SAR TEST REPORT

Product Name: 4G PHONE

Model Name: Q1

FCC ID : 2A8MA-Q1

Prepared For	:	QUALITY TECNOLOGY SAS
	:	STREET 13 # 15 61 OF 501, CENTRO DE NEGOCIOS AV COLON, BOGOTA - COLOMBIA
Prepared By	:	Shenzhen LGT Test Service Co., Ltd.
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Report Number	:	LGT22I016HA01
Date of Tests	:	September 26, 2022 –October 13, 2022
Date of Issue	:	October 14, 2022
Max. SAR (1g):	:	Head: 0.507 W/kg
	:	Body: 0.850 W/kg

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Revision History

Rev.	Issue Date	Contents
00	October 14, 2022	Initial Issue

TEST REPORT CERTIFICATION

Applicant	QUALITY TECNOLOGY SAS
Address	STREET 13 # 15 61 OF 501,CENTRO DE NEGOCIOS AV COLON,BOGOTA - COLOMBIA
Manufacture	shenzhen 7 step technology co.,limited
Address	Rm2205-2210, Baotong Building, 13th District, Bao'an Shenzhen,China
Product Name	4G PHONE
Trade Mark	7 STEP
Model Name	Q1
Sample Status:	Normal

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC KDB 447498 D04 v01；FCC KDB 865664 D01 v01r04；FCC KDB 865664 D02 v01r02；FCC KDB 941225 D01 v03r01；FCC KDB 941225 D05 v02r05； FCC KDB 648474 D04 v01r03	PASS

Prepared by:

Zane Shan

Zane Shan
Engineer

Approved by:

Vita Li
Manager

(1) The test report is effective only with both signature and specialized stamp.

(2) This report shall not be reproduced except in full without the written approval of the Laboratory.

(3) The results in this report apply to the test sample(s) mentioned above at the time of the testing period only and are not to be used to indicate applicability to other similar products.

1. General Information

1.1 EUT Description

Product Name	4G PHONE		
Brand Name	7 STEP		
Model Name	Q1		
Series Model	N/A		
Model Difference	N/A		
Hardware Version	N/A		
Software Version	N/A		
Frequency Range	GSM 850: 824 ~ 849 MHz GSM1900: 1850 ~ 1910 MHz WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2:1850 ~1910MHz LTE Band 4:1710 ~1755MHz LTE Band 5:824 ~ 849MHz LTE Band 7:2500 ~ 2570MHz LTE Band 17:704 ~ 716MHz Bluetooth: 2402 ~ 2480 MHz FM: 87.5 ~ 108 MHz		
Max. Reported SAR(1g)	Mode	Head(W/ kg)	Body(W/ kg)
	GSM 850	0.094	0.157
	GSM 1900	0.391	0.712
	WCDMA Band II	0.391	0.437
	WCDMA Band V	0.201	0.850
	LTE Band 2	0.507	0.602
	LTE Band 4	0.059	0.335
	LTE Band 5	0.159	0.582
	LTE Band 7	0.164	0.818
	LTE Band 17	0.220	0.191
	Bluetooth	0.039	0.051
	Limit	1.6 W/kg	
Battery	Rated Voltage:3.7V Charge Limit Voltage:4.2V Capacity: 1000mAh		
Description test modes	SIM 1 and SIM 2 is a chipset unit and tested as single chipset, SIM 1 is used to tested		
Modulation Mode	GSM	GMSK for GSM/GPRS	
	WCDMA	RMC, HSDPA, HSUPA Release 6	
	LTE	QPSK, 16QAM	
	Bluetooth	BT(1Mbps): GFSK BT EDR(2Mbps): π/4-DQPSK BT EDR(3Mbps): 8DPSK	
	FM	FM	
Power control level	GSM900: 5, DCS1800: 0		
Power class	GSM900: 4, GSM1800: 1		
Antenna Specification	GSM/WCDMA/LTE: PIFA Antenna Bluetooth: PIFA Antenna FM: Internal Antenna		
Operating Mode	Maximum continuous output		

1.2 Test Environment

Ambient conditions in the SAR laboratory:

Items	Required
Temperature (℃)	18-25
Humidity (%RH)	30-70

1.3 Test Factory

Company Name:	Shenzhen LGT Test Service Co., Ltd.
Address:	Room 205, Building 13, Zone B, Chen Hsong Industrial Park, No.177 Renmin West Road, Jinsha Community, Kengzi Street, Pingshan New District, Shenzhen, China

2. Test Standards and Limits

No.	Identity	Document Title
1	47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	ANSI/IEEE Std. C95.1-1992	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
3	IEEE Std. 1528-2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
4	FCC KDB 447498 D04 v01	RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices
5	FCC KDB 865664 D01 v01r04	SAR Measurement 100 MHz to 6 GHz
6	FCC KDB 865664 D02 v01r02	RF Exposure Reporting
7	FCC KDB 941225 D01 v03r01	SAR Measurement Procedures for 3G Devices
8	FCC KDB 941225 D05 v02r05	SAR for LTE Devices
9	FCC KDB 648474 D04 v01r03	SAR Evaluation Considerations for Wireless Handsets

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

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

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

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

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

Population/Uncontrolled Environments:

Are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

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).

NOTE GENERAL POPULATION/UNCONTROLLED EXPOSURE PARTIAL BODY LIMIT 1.6 W/kg

3. SAR Measurement System

3.1 Definition of Specific Absorption Rate (SAR)

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

$$\mathbf{SAR} = \frac{d}{dt}\left(\frac{dW}{dm}\right) = \frac{d}{dt}\left(\frac{dW}{\rho dv}\right)$$

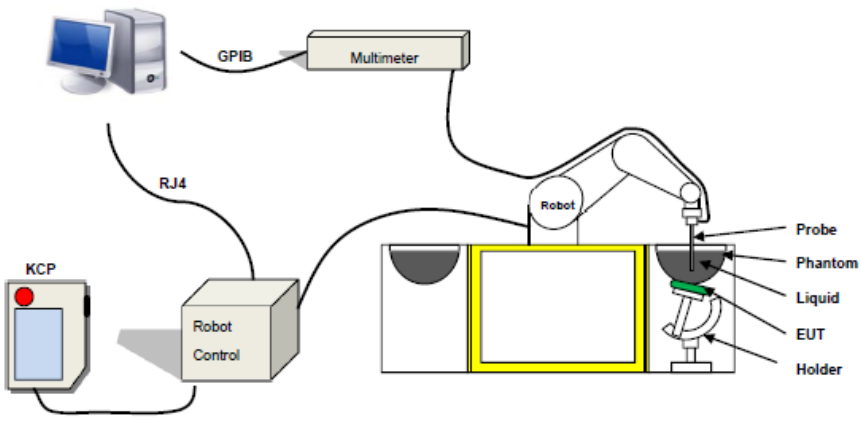
SAR is expressed in units of Watts per kilogram (W/kg) SAR measurement can be related to the electrical field in the tissue by

$$\mathbf{SAR} = \frac{\sigma E^2}{\rho}$$

Where: σ is the conductivity of the tissue;
ρ is the mass density of the tissue and E is the RMS electrical field strength.

3.2 SAR System

MVG SAR System Diagram:



COMOSAR is a system that is able to determine the SAR distribution inside a phantom of human being according to different standards. The COMOSAR system consists of the following items:
- Main computer to control all the system
- 6 axis robot
- Data acquisition system
- Miniature E-field probe
- Phone holder
- Head simulating tissue

The following figure shows the system.

The EUT under test operating at the maximum power level is placed in the phone holder, under the phantom, which is filled with head simulating liquid. The E-Field probe measures the electric field inside the phantom. The OpenSAR software computes the results to give a SAR value in a 1g or 1g mass.

3.2.1 Probe

For the measurements the Specific Dosimetric E-Field Probe SN 04/22 EPGO364 with following specifications is used
- Probe Length: 330 mm
- Length of Individual Dipoles: 2mm
- Maximum external diameter: 8 mm
- Probe Tip External Diameter: 2.5 mm
- Distance between dipole/probe extremity: 1 mm
- Dynamic range: 0.01-100 W/kg
- Probe linearity: 3%
- Axial Isotropy: < 0.10 dB
- Spherical Isotropy: < 0.10 dB
- Calibration range: 150 MHz to 6 GHz for head & body simulating liquid.
-Angle between probe axis (evaluation axis) and surface normal line: less than 30°

Figure 1-MVG COMOSAR Dosimetric E field Probe

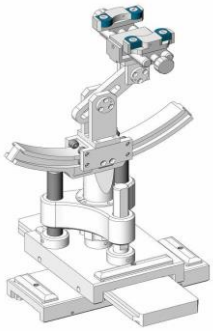
3.2.2 Phantom

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

Figure-SN 06/22 SAM 148

Figure-SN 06/22 ELLI 51

3.2.3 Device Holder



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

4. Tissue Simulating Liquids

4.1 Simulating Liquids Parameter Check

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine of the dielectric parameters are within the tolerances of the specified target values

The uncertainty due to the liquid conductivity and permittivity arises from two different sources. The first source of error is the deviation of the liquid conductivity from its target value (max _ 5 %) and the second source of error arises from the measurement procedures used to assess conductivity. The uncertainty shall be assessed using a rectangular probability For 1 g averaging, the maximum weighting coefficient for SAR is 0,5.

IEEE SCC-34/SC-2 RECOMMENDED TISSUE DIELECTRIC PARAMETERS
The head and body tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 have been incorporated in the following table.

Frequency	εr		σ 1g S/m	
	Head	Body	Head	Body
300	45.3	45.3	0.87	0.87
450	43.5	43.5	0.87	0.87
900	41.5	41.5	0.97	0.97
1450	40.5	40.5	1.20	1.20
1800	40.0	40.0	1.40	1.40
2450	39.2	39.2	1.80	1.80
3000	38.5	38.5	2.40	2.40
5200	36.0	36.0	4.70	4.70

LIQUID MEASUREMENT RESULTS

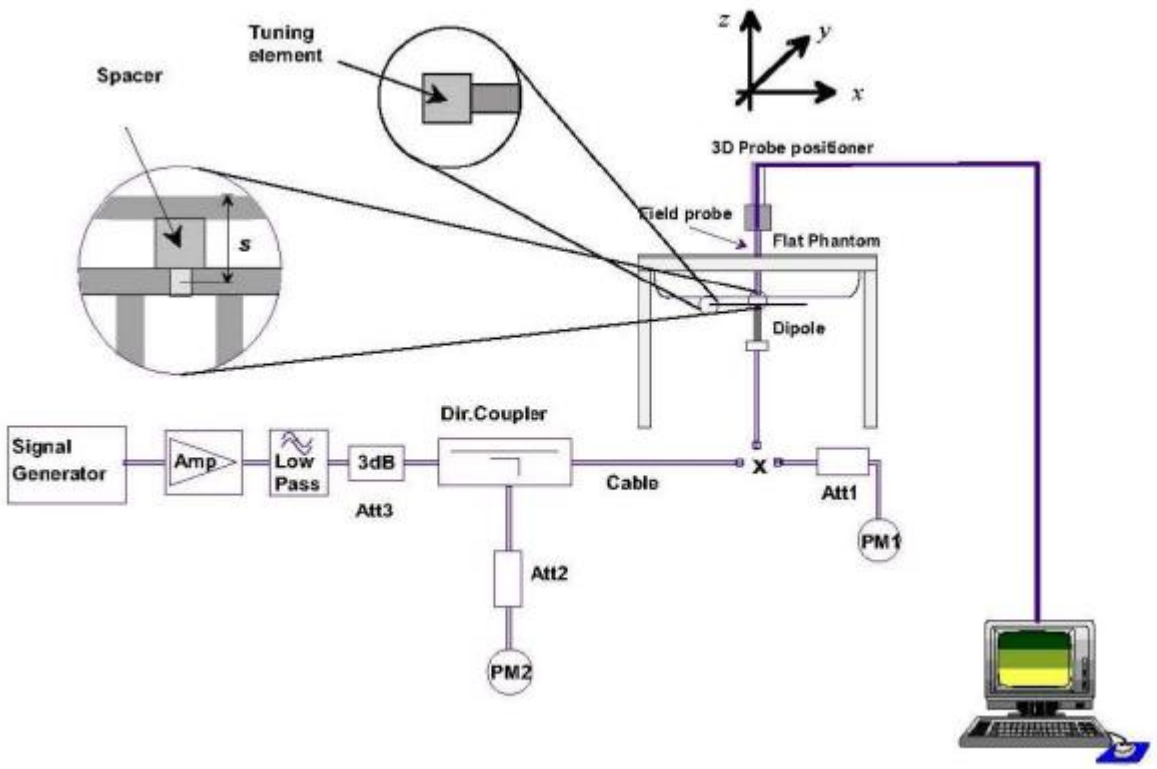
Date	Ambient		Simulating Liquid		Parameters	Target	Measured	Deviation %	Limited %
	Temp. [°C]	Humidity %	Frequency(MHz)	Temp. [°C]					
2022.10.11	23.6	59	750 MHz	23.8	Permittivity	41.9	42.45	1.30	±5
					Conductivity	0.89	0.89	-0.49	±5
2022.09.27	23.1	61	835 MHz	23.2	Permittivity	41.50	41.58	0.18	±5
					Conductivity	0.92	0.92	0.03	±5
2022.09.30	23.3	57	1800 MHz	23.7	Permittivity	40.00	40.61	1.52	±5
					Conductivity	1.40	1.42	1.50	±5
2022.10.11	23.9	59	1900 MHz	23.2	Permittivity	40	40.11	0.26	±5
					Conductivity	1.4	1.43	1.86	±5
2022.10.12	22.8	54	2450MHz	22.0	Permittivity	39.2	40.13	2.38	±5
					Conductivity	1.8	1.73	-3.86	±5
2022.10.08	24.1	53	2600 MHz	23.4	Permittivity	39	39.43	1.11	±5
					Conductivity	1.96	2.01	2.69	±5

5. SAR System Validation

5.1 Validation System

Each MVG system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the MVG software, enable the user to conduct the system performance check and system validation. System kit includes a dipole, and dipole device holder.

The system check verifies that the system operates within its specifications. It's performed daily or before every SAR measurement. The system check uses normal SAR measurement in the flat section of the phantom with a matched dipole at a specified distance. The system validation setup is shown as below.



5.2 Validation Result

Comparing to the original SAR value provided by MVG, the validation data should be within its specification of ±10 %.

Date	Freq.	Power	Power drift	Tested Value	Normalized SAR	Target SAR	Tolerance
	(MHz)	(mW)	(%)	(W/Kg)	(W/kg)	1g(W/kg)	(%)
2022.10.11	750	100	-1.49	0.924	9.24	8.49	8.83
2022.09.27	835	100	-3.23	0.978	9.78	9.56	0.00
2022.09.30	1800	100	0.78	3.958	39.58	38.4	3.07
2022.10.11	1900	100	-1.64	4.149	41.49	39.7	4.51
2022.10.12	2450	100	-3.24	4.759	47.59	52.4	-9.18
2022.10.08	2600	100	-2.20	5.276	52.76	55.3	-4.59

6. SAR Evaluation Procedures

The procedure for assessing the average SAR value consists of the following steps:

The following steps are used for each test position

- Establish a call with the maximum output power with a base station simulator. The connection between the mobile and the base station simulator is established via air interface

- Measurement of the local E-field value at a fixed location. This value serves as a reference value for calculating a possible power drift.

- Measurement of the SAR distribution with a grid of 8 to 16mm * 8 to16 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.

➢ Area Scan& Zoom Scan

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g. Area scan and zoom scan resolution setting follows KDB 865664 D01 quoted below.

When the 1-g SAR of the highest peak is within 2 dB of the SAR limit, additional zoom scans are required for other peaks within 2 dB of the highest peak that have not been included in any zoom scan to ensure there is no increase in SAR.

7. EUT Test Position

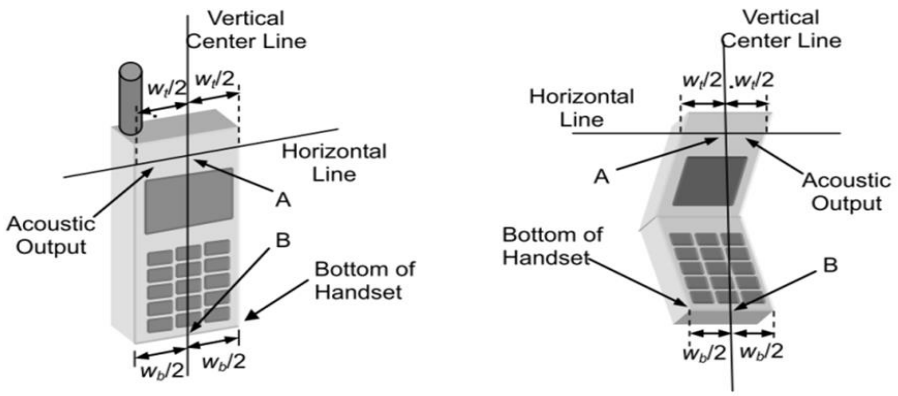
This EUT was tested in Right Cheek, Right Titled, Left Cheek, Left Titled, Front Face and Rear Face.

Define Two Imaginary Lines On The Handset:

1)The vertical centerline passes through two points on the front side of the handset the midpoint of the width wt of the handset at the level of the acoustic output, and the midpoint of the width wb of the handset.

2)The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output. The horizontal line is also tangential to the face of the handset at point A.

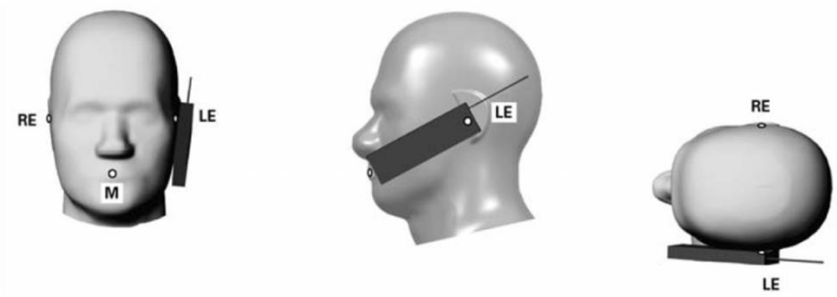
3)The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily to the front face of the handset, especially for clamshell handsets, handsets with flip covers, and other irregularly shaped handsets.



7.1 Cheek Position

1) To position the device with the vertical center line of the body of the device and the horizontal line crossing the center piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical center line with the reference plane containing the ear and mouth reference point (M: Mouth, RE: Right Ear, and LE: Left Ear) and align the center of the ear piece with the line RE-LE.

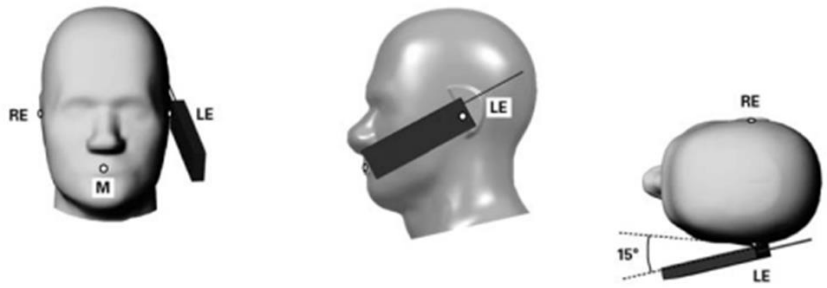
2) To move the device towards the phantom with the ear piece aligned with the line LE-RE until the phone touched the ear. While maintaining the device in the reference plane and maintaining the phone contact with ear, move the bottom of the phone until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost



7.2 Tilt Position

(1)To position the device in the “cheek” position described above.

(2) While maintaining the device in the reference plane described above and pivoting against the ear, moves it outward away from the mouth by an angle of 15 degrees or until with the ear is lost.

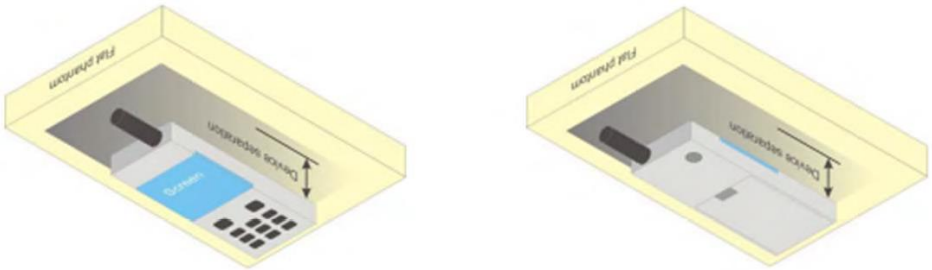


7.3 Body-worn Position Conditions

1) To position the EUT parallel to the phantom surface.

2) To adjust the EUT parallel to the flat phantom.

3) To adjust the distance between the EUT surface and the flat phantom to 10mm.



8. Measurement Uncertainty

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 (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	vi
Measurement System								
Probe calibration	5.86	N	1	1	1	5.86	5.86	∞
Axial Isotropy	0.16	R	$\sqrt{3}$	√0.5	√0.5	0.07	0.07	∞
Hemispherical Isotropy	1.06	R	$\sqrt{3}$	√0.5	√0.5	0.43	0.43	∞
Boundary effect	1	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	1.27	R	$\sqrt{3}$	1	1	0.73	0.73	∞
System detection limits	1.23	R	$\sqrt{3}$	1	1	0.71	0.71	∞
Modulation response	3.6	R	$\sqrt{3}$	1	1	3.60	3.60	∞
Readout Electronics	0.28	N	1	1	1	0.28	0.28	∞
Response Time	0.19	R	$\sqrt{3}$	1	1	0.11	0.11	∞
Integration Time	1.47	R	$\sqrt{3}$	1	1	0.85	0.85	∞
RF ambient conditions-Noise	3.5	R	$\sqrt{3}$	1	1	2.02	2.02	∞
RF ambient conditions-reflections	3.2	R	$\sqrt{3}$	1	1	1.85	1.85	∞
Probe positioner mechanical tolerance	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to phantom shell	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Post-processing	2.3	R	$\sqrt{3}$	1	1	1.33	1.33	∞
Test sample Related								
Test sample positioning	3.1	N	1	1	1	3.10	3.10	∞
Device holder uncertainty	3.8	N	1	1	1	3.80	3.80	∞
SAR drift measurement	4.8	R	$\sqrt{3}$	1	1	2.77	2.77	∞
SAR scaling	2	R	$\sqrt{3}$	1	1	1.15	1.15	∞
Phantom and tissue parameters								
Phantom uncertainty (shape and thickness uncertainty)	4	R	$\sqrt{3}$	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviations in permittivity and conductivity	2	N	1	1	0.84	2.00	1.68	∞
Liquid conductivity (temperature uncertainty)	2.5	R	$\sqrt{3}$	0.78	0.71	1.95	1.78	∞
Liquid conductivity (measured)	4	N	1	0.78	0.71	0.92	1.04	M
Liquid permittivity (temperature uncertainty)	2.5	R	$\sqrt{3}$	0.23	0.26	1.95	1.78	∞
Liquid permittivity (measured)	5	N	1	0.23	0.26	1.15	1.30	M
Combined Standard Uncertainty		RSS				10.60	10.51	
Expanded Uncertainty (95% Confidence interval)		K=2				21.21	21.03	

9. Conducted Power Measurement

Test Result:

Burst Average Power (dBm)						
Band	GSM 850			PCS 1900		
Channel	128	190	251	512	661	810
Frequency (MHz)	824.2	836.6	848.8	1850.2	1880.0	1909.8
GSM (GMSK, 1-Slot)	33.06	32.92	32.99	28.27	28.70	29.15
GPRS (GMSK, 1-Slot)	33.01	32.96	33.97	28.51	28.78	29.22
GPRS (GMSK, 2-Slot)	31.02	31.21	31.24	25.48	26.11	26.71
GPRS (GMSK, 3-Slot)	29.29	29.39	29.47	23.87	24.38	25.06
GPRS (GMSK, 4-Slot)	27.39	27.47	27.68	21.88	22.33	23.04
Remark: GPRS, CS4 coding scheme. EGPRS, MCS5 coding scheme. Multi-Slot Class 8, Support Max 4 downlink, 1 uplink, 5 working link Multi-Slot Class 10, Support Max 4 downlink, 2 uplink, 5 working link Multi-Slot Class 12, Support Max 4 downlink, 4 uplink, 5 working link						

Frame- Average Power(dBm)						
Band	GSM 850			PCS 1900		
Channel	128	190	251	512	661	810
Frequency (MHz)	824.2	836.6	848.8	1850.2	1880.0	1909.8
GSM (GMSK, 1-Slot)	24.03	23.89	23.96	19.24	19.67	20.12
GPRS (GMSK, 1-Slot)	23.98	23.93	24.94	19.48	19.75	20.19
GPRS (GMSK, 2-Slot)	25.00	25.19	25.22	19.46	20.09	20.69
GPRS (GMSK, 3-Slot)	25.03	25.13	25.21	19.61	20.12	20.80
GPRS (GMSK, 4-Slot)	24.38	24.46	24.67	18.87	19.32	20.03
Remark: 1. SAR testing was performed on the maximum frame-averaged power mode. 2. The frame-averaged power is linearly proportion to the slot number configured and it is linearly scaled the maximum Burst - averaged power based on time slots. The calculated method is shown as below: Frame-averaged power = Burst averaged power (1 TX Slot) – 9.03 dB Frame-averaged power = Burst averaged power (2 TX Slots) – 6.02 dB Frame-averaged power = Burst averaged power (3 TX Slots) - 4.26 dB Frame-averaged power = Burst averaged power (4 TX Slots) – 3.01 dB						

WCDMA

Band	WCDMA Band 2			WCDMA Band 5		
Channel	9262	9400	9538	4132	4183	4233
Frequency (MHz)	1852.4	1880	1907.6	826.4	836.6	846.6
RMC 12.2Kbps	22.18	22.14	22.28	22.60	22.29	22.29
HSDPA Subtest-1	22.62	22.23	22.11	23.42	22.66	23.73
HSDPA Subtest-2	22.37	22.02	21.79	23.05	22.48	23.51
HSDPA Subtest-3	21.98	21.71	21.59	22.84	22.22	23.21
HSDPA Subtest-4	21.92	21.68	21.51	22.68	21.98	22.90
HSUPA Subtest-1	22.35	22.21	22.00	23.35	22.65	23.31
HSUPA Subtest-2	22.45	22.20	22.10	23.28	22.61	23.70
HSUPA Subtest-3	22.3	21.44	21.56	23.01	22.6	23.36
HSUPA Subtest-4	22.47	22.25	22.10	23.33	22.69	23.69
HSUPA Subtest-5	22.40	21.98	22.02	23.27	22.50	23.41

According to 3GPP 25.101 sub-clause 6.2.2, the maximum output power is allowed to be reduced by following the table.

Table 6.1A: UE maximum output power with HS-DPCCH and E-DCH

UE Transmit Channel Configuration	CM(db)	MPR(db)
For all combinations of ,DPDCH,DPCCH HS-DPDCH,E-DPDCH and E-DPCCH	0≤ CM≤3.5	MAX(CM-1,0)
Note: CM=1 for βc/βd=12/15, βhs/ βc=24/15.For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.		

The device supports MPR to solve linearity issues (ACLR or SEM) due to the higher peak-to average ratios (PAR) of the HSUPA signal. This prevents saturating the full range of the TX DAC inside of device and provides a reduced power output to the RF transceiver chip according to the Cubic Metric (a function of the combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH).

When E-DPDCH channels are present the beta gains on those channels are reduced firsts to try to get the power under the allowed limit. If the beta gains are lowered as far as possible, then a hard limiting is applied at the maximum allowed level.

The SW currently recalculates the cubic metric every time the beta gains on the E-DPDCH are reduced. The cubic metric will likely get lower each time this is done .However, there is no reported reduction of maximum output power in the HSUPA mode since the device also provides a compensation for the power back-off by increasing the gain of TX_AGC in the transceiver (PA) device.

The end effect is that the DUT output power is identical to the case where there is no MPR in the device.

Bluetooth

BT				
Mode	Channel Number	Frequency (MHz)	Average Power (dBm)	Output Power (mW)
GFSK(1Mbps)	0	2402	8.88	7.73
	39	2441	7.70	5.89
	78	2480	6.91	4.91
π/4-QPSK(2Mbps)	0	2402	9.32	8.55
	39	2441	8.74	7.48
	78	2480	8.06	6.40
8DPSK(3Mbps)	0	2402	9.35	8.61
	39	2441	9.01	7.96
	78	2480	8.28	6.73

Tune Up Power:

Mode	GSM900(AVG)	GSM1800(AVG)
GSM/DCS	32.5±1dBm	28.5±1dBm
GPRS (1 Slot)	33±1dBm	28.5±1dBm
GPRS (2 Slot)	30.5±1dBm	26±1dBm
GPRS (3 Slot)	28.5±1dBm	24.5±1dBm
GPRS (4 Slot)	27±1dBm	22.5±1dBm

Mode	BT(AVG)
GFSK	7.9±1dBm
π/4-DQPSK	8.5±1dBm
8DPSK	8.5±1dBm

LTE Conducted Power

General Note:

1. Anritsu CMW500 base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ⩽ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ⩽ 1.45 W/kg; Per KDB 941225 D05, 16QAM SAR testing is not required.
7. Per KDB 941225 D05, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ⩽ 1.45 W/kg; Per KDB 941225 D05, smaller bandwidth SAR testing is not required.

LTE

Bandwidth (MHz)	Channel (MHz)	Result (dBm)				
		LTE Band 2	LTE Band 4	LTE Band 5	LTE Band 7	LTE Band 17
1.4	Low	22.68	22.64	23.19	N/A	N/A
	Middle	22.87	22.76	22.97	N/A	N/A
	High	23.01	22.86	23.00	N/A	N/A
3	Low	22.81	22.54	23.43	N/A	N/A
	Middle	22.79	22.67	22.76	N/A	N/A
	High	23.00	22.85	23.03	N/A	N/A
5	Low	22.64	22.21	22.96	22.40	22.77
	Middle	22.78	22.76	22.74	22.28	22.53
	High	22.81	22.59	22.91	22.65	22.98
10	Low	22.98	22.68	23.31	22.64	23.10
	Middle	22.75	22.84	23.14	22.34	22.76
	High	23.02	22.94	22.96	22.77	23.00
15	Low	23.02	22.75	N/A	22.74	N/A
	Middle	22.80	22.84	N/A	22.43	N/A
	High	22.86	22.88	N/A	22.65	N/A
20	Low	22.97	22.64	N/A	22.00	N/A
	Middle	22.94	23.52	N/A	22.59	N/A
	High	23.10	23.31	N/A	22.78	N/A

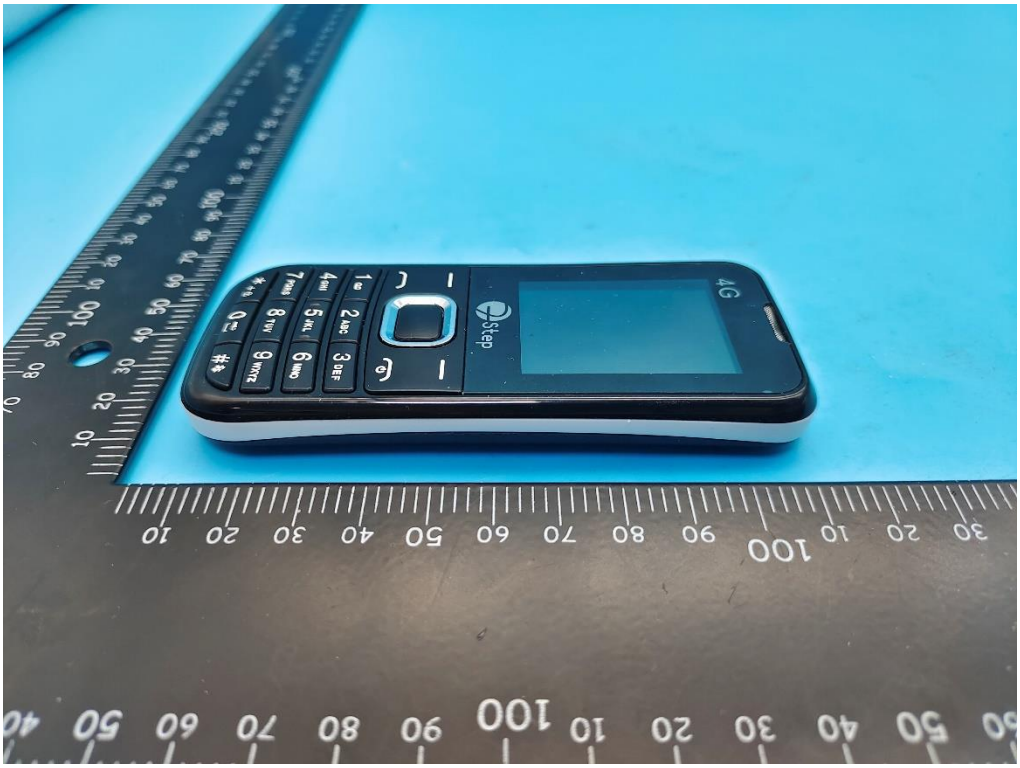
10. Test Photos and Results

10.1 EUT Photos

Front side

Back side

Right Edge



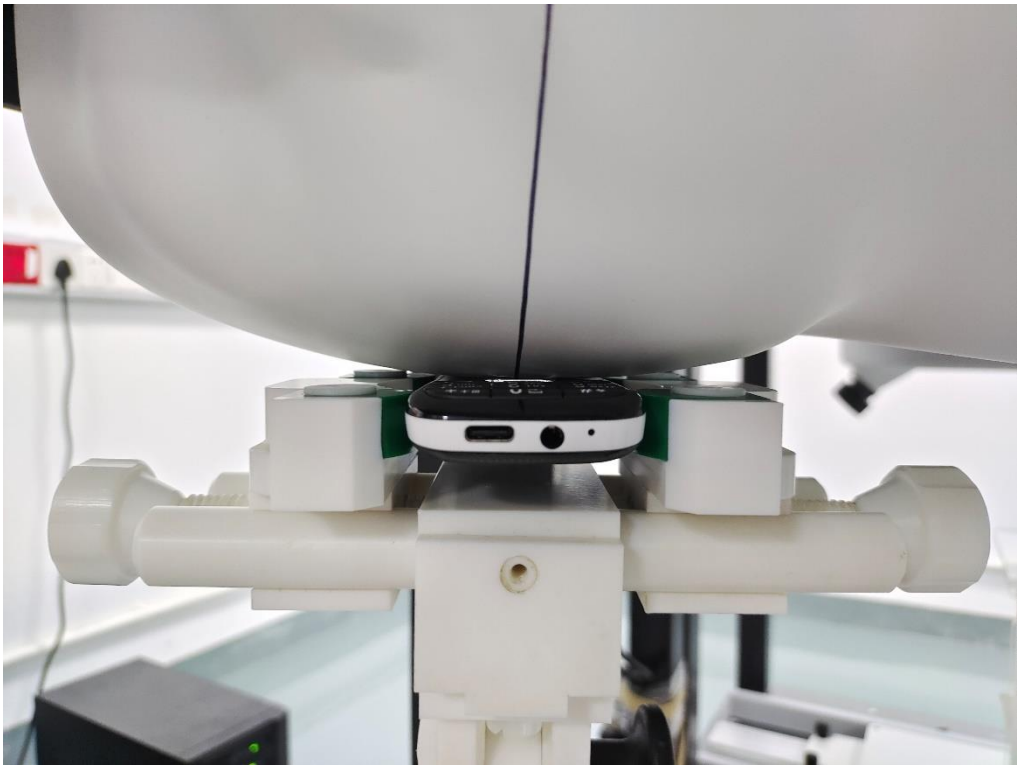
Left Edge

Top Edge

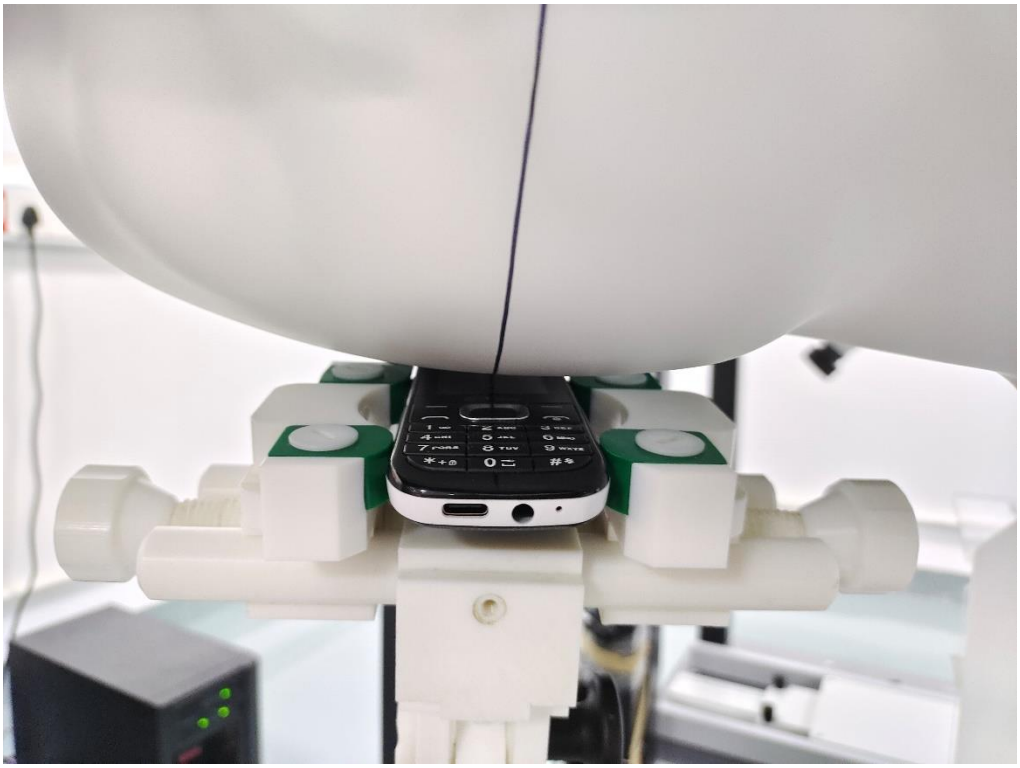
Bottom Edge

10.2 Setup Photos

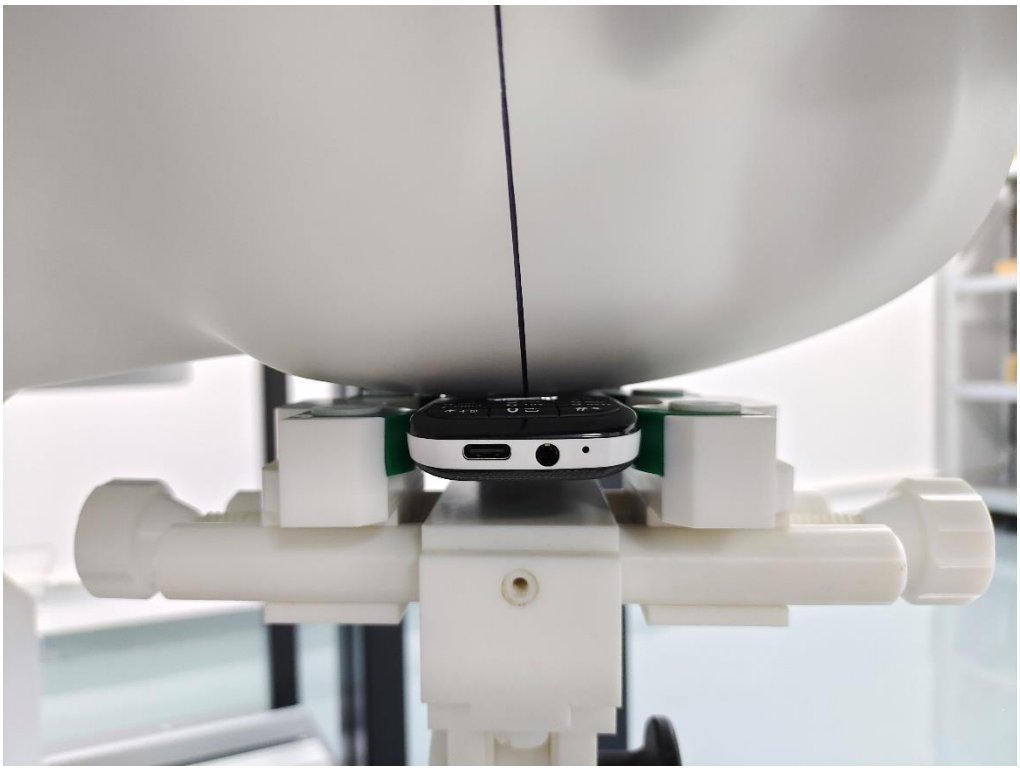
Right Touch



Right Tilt

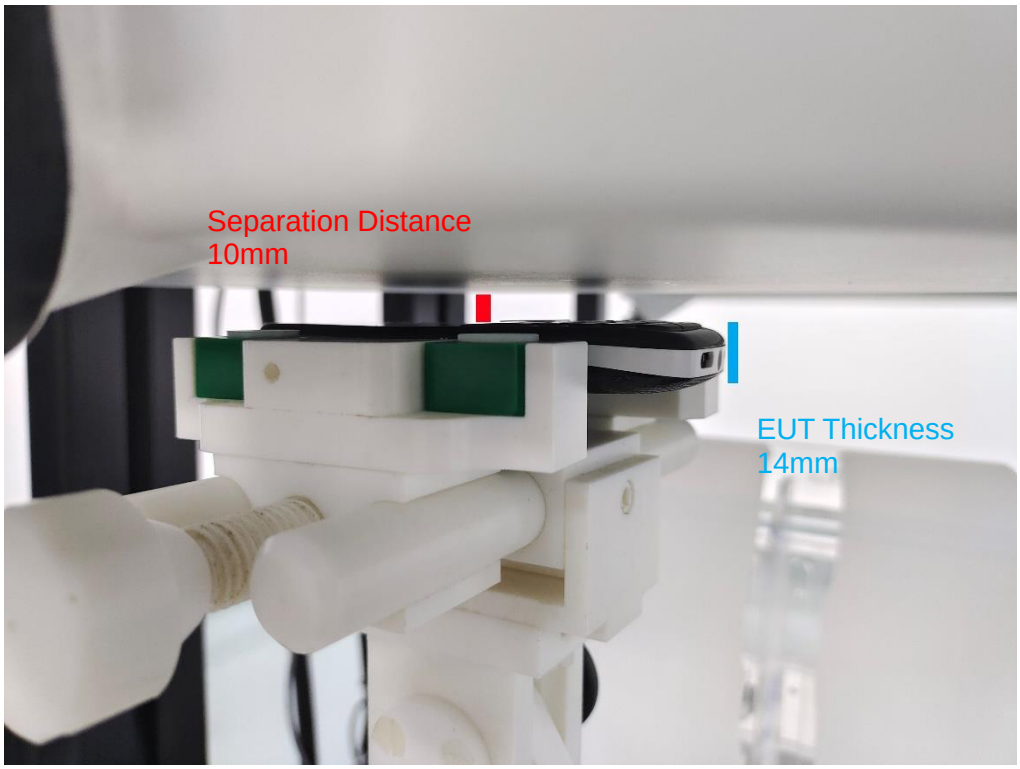


Left Touch

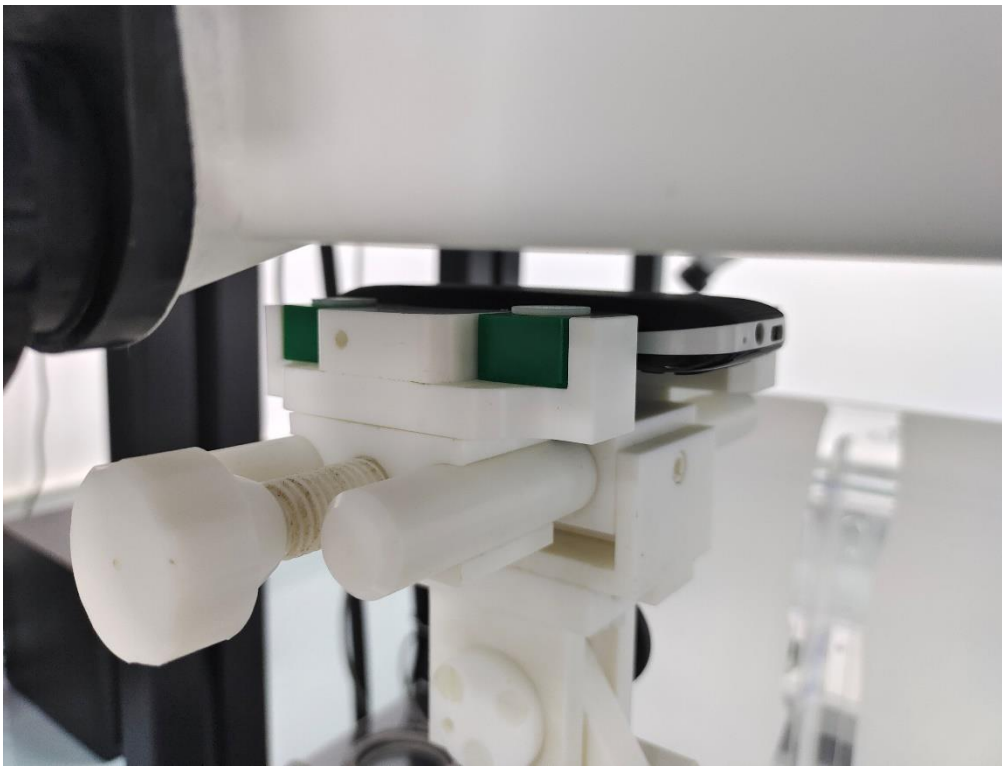


Left Tilt

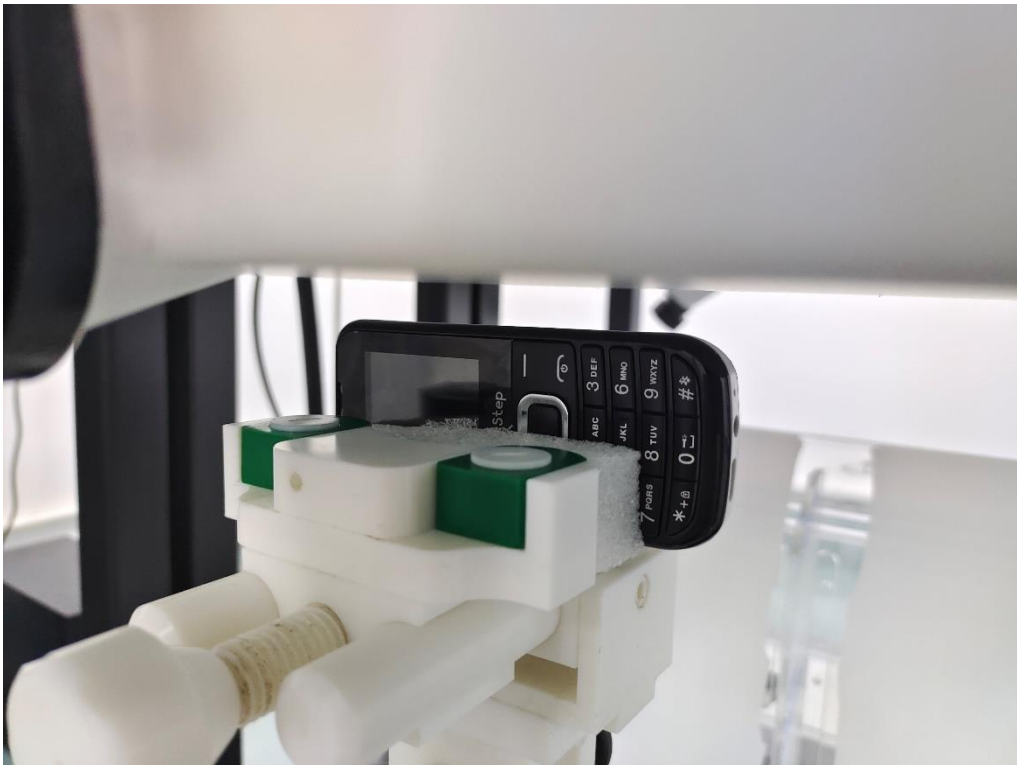
Body Front side



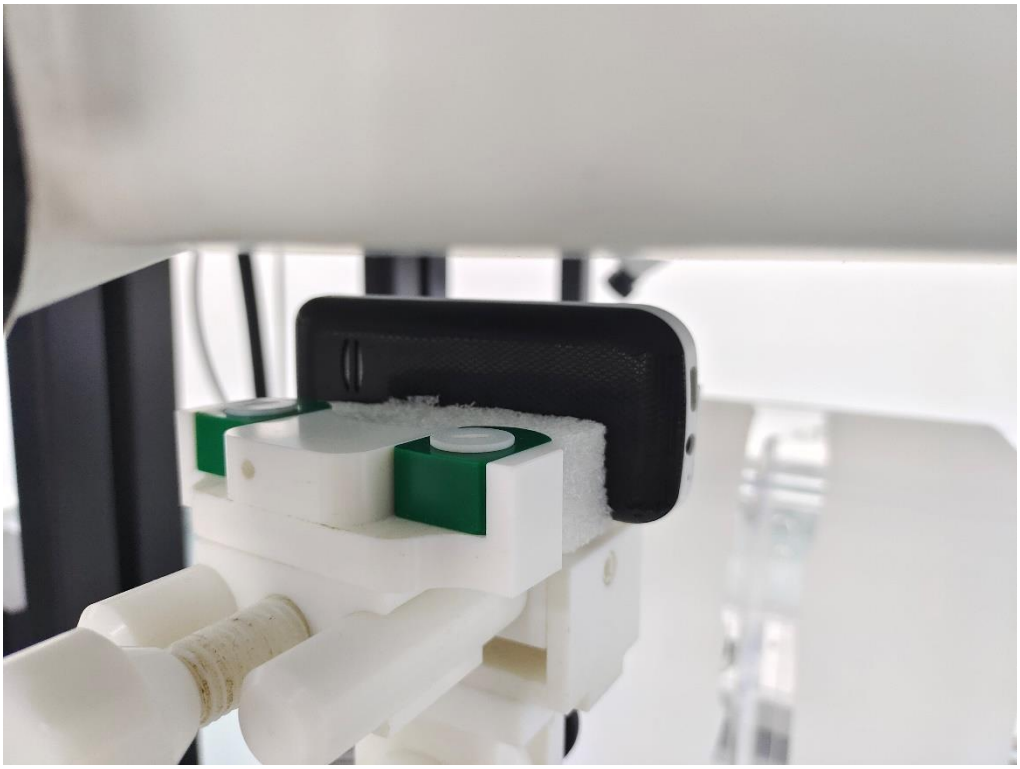
Body Back side



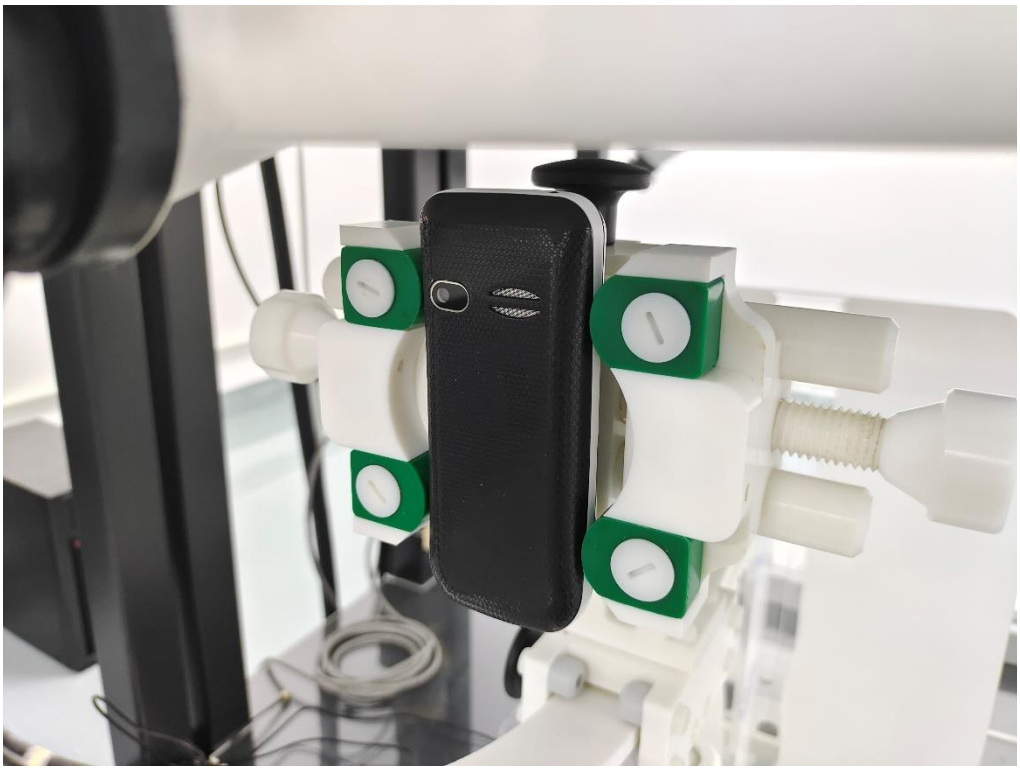
Body Right side



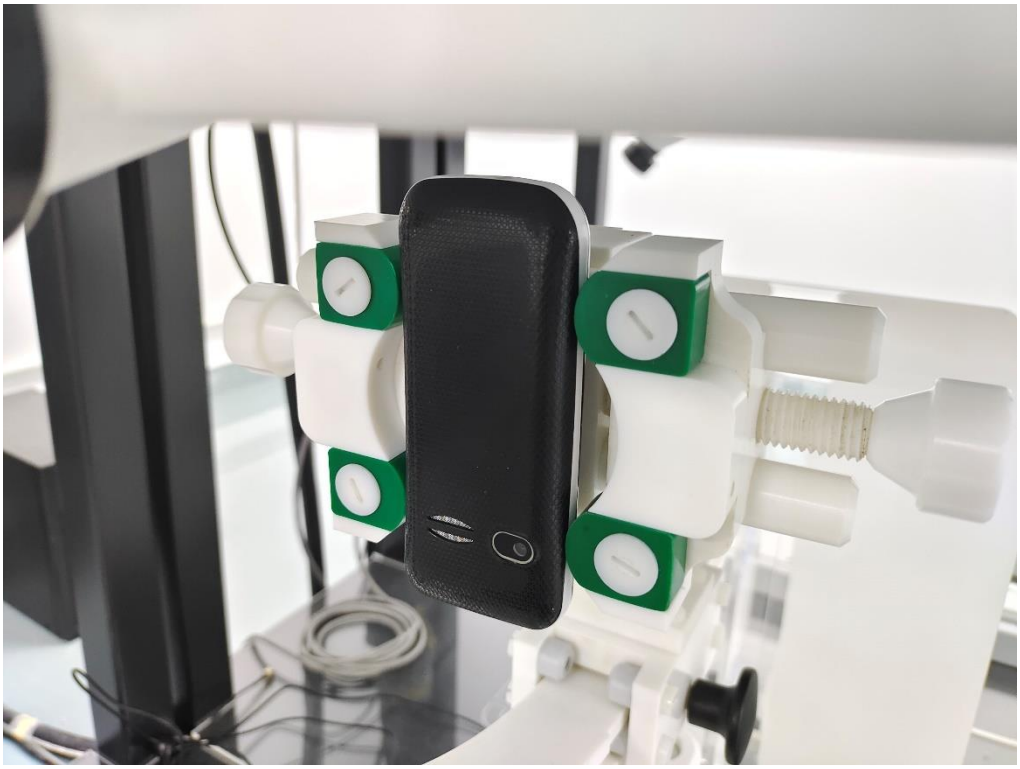
Body Left side



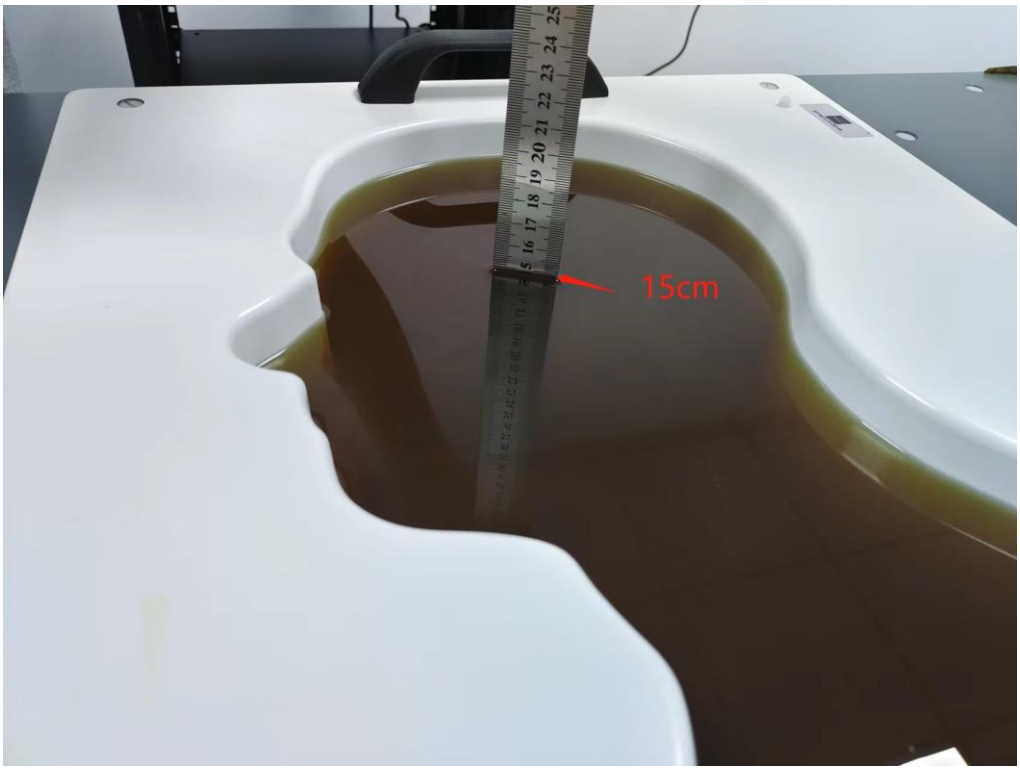
Top Edge



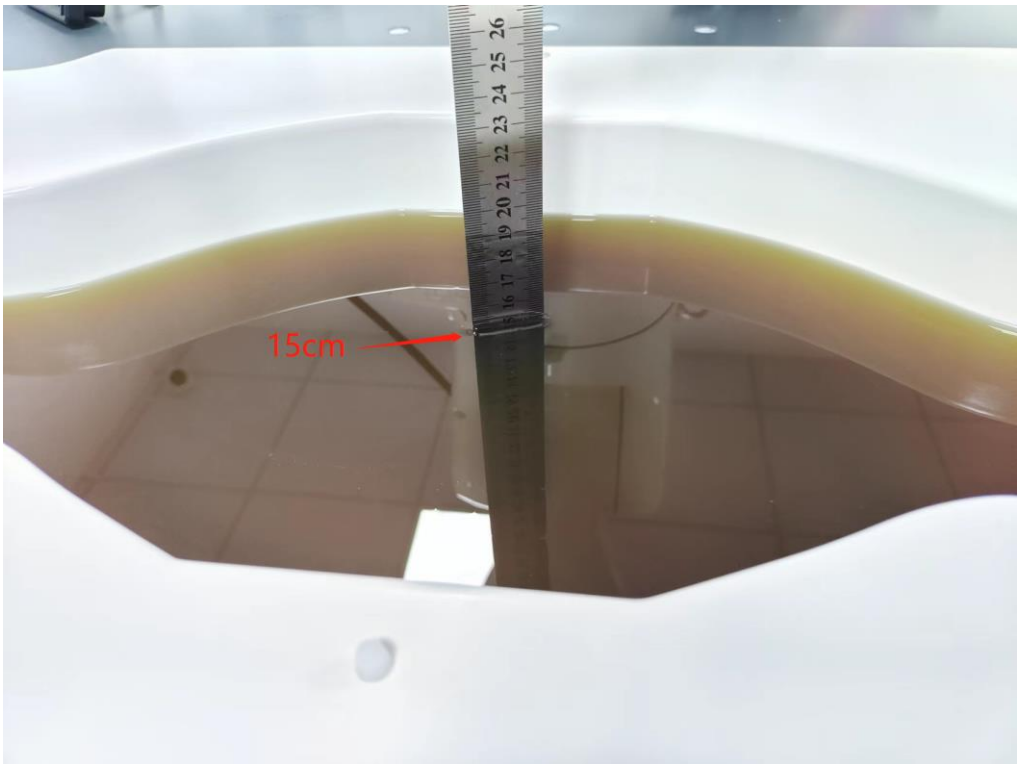
Bottom Edge



Liquid depth (15 cm)



Liquid depth (15 cm)



11. SAR Result Summary

HEAD SAR

Band	Model	Test Position	Freq.	SAR (1g) (W/kg)	Power Drift(%)	Meas.Output Power(dBm)	Max.Turn-up Power(dBm)	Scaled SAR (W/Kg)	Meas.No.
GSM850	Voice	Right Cheek	836.6	0.067	-3.60	32.92	33.5	0.077	/
		Right Tilt	836.6	0.082	-3.46	32.92	33.5	0.094	1
		Left Cheek	836.6	0.079	1.83	32.92	33.5	0.090	/
		Left Tilt	836.6	0.079	-2.98	32.92	33.5	0.090	/
GSM1900	Voice	Right Cheek	1850.2	0.127	-4.59	28.27	29.5	0.169	/
		Right Cheek	1880.0	0.325	-3.35	28.70	29.5	0.391	3
		Right Cheek	1909.8	0.262	-2.55	29.15	29.5	0.284	/
		Right Tilt	1880.0	0.131	-1.30	28.70	29.5	0.157	/
		Left Cheek	1880.0	0.129	-2.08	28.70	29.5	0.155	/
		Left Tilt	1880.0	0.041	-2.33	28.70	29.5	0.049	/
WCDMA Band 2	RMC	Right Cheek	1852.4	0.363	-1.36	22.18	22.5	0.391	5
		Right Cheek	1880	0.219	4.23	22.14	22.5	0.238	/
		Right Cheek	1907.6	0.356	-0.87	22.28	22.5	0.374	/
		Right Tilt	1880	0.070	2.19	22.14	22.5	0.076	/
		Left Cheek	1880	0.208	2.71	22.14	22.5	0.226	/
		Left Tilt	1880	0.057	-3.16	22.14	22.5	0.062	/
WCDMA Band 5	RMC	Right Cheek	836.6	0.164	2.09	22.29	23	0.193	/
		Right Tilt	836.6	0.130	-1.17	22.29	23	0.153	/
		Left Cheek	836.6	0.171	-1.44	22.29	23	0.201	7
		Left Tilt	836.6	0.140	-2.64	22.29	23	0.165	/
LTE Band 2	20MHz QPSK	Right Cheek	1853.7	0.191	2.43	22.97	23.5	0.216	/
		Right Cheek	1873.7	0.269	1.79	22.94	23.5	0.306	/
		Right Cheek	1893.7	0.462	-1.86	23.1	23.5	0.507	9
		Right Tilt	1873.7	0.099	-1.33	22.94	23.5	0.113	/
		Left Cheek	1873.7	0.200	-4.62	22.94	23.5	0.228	/
		Left Tilt	1873.7	0.105	-3.49	22.94	23.5	0.119	/
LTE Band 4	20MHz QPSK	Right Cheek	1726.2	0.046	-1.20	23.52	24	0.051	/
		Right Tilt	1726.2	0.053	-2.05	23.52	24	0.059	11
		Left Cheek	1726.2	0.042	-4.59	23.52	24	0.047	/
		Left Tilt	1726.2	0.037	-4.46	23.52	24	0.041	/
LTE Band 5	10MHz QPSK	Right Cheek	834.7	0.143	3.87	23.14	23.5	0.155	/
		Right Tilt	834.7	0.103	-2.11	23.14	23.5	0.112	/
		Left Cheek	834.7	0.146	-1.52	23.14	23.5	0.159	13
		Left Tilt	834.7	0.111	-3.31	23.14	23.5	0.121	/
LTE Band 7	20MHz QPSK	Right Cheek	2528.7	0.149	3.56	22.59	23	0.164	15
		Right Tilt	2528.7	0.128	-1.31	22.59	23	0.141	/
		Left Cheek	2528.7	0.134	-2.43	22.59	23	0.147	/
		Left Tilt	2528.7	0.106	1.23	22.59	23	0.116	/
LTE Band 17	10MHz QPSK	Right Cheek	708.2	0.185	-2.44	22.75	23.5	0.220	17
		Right Tilt	708.2	0.040	-4.83	22.75	23.5	0.048	/
		Left Cheek	708.2	0.035	1.39	22.75	23.5	0.042	/
		Left Tilt	708.2	0.030	0.06	22.75	23.5	0.036	/
Bluetooth	8DPSK	Right Cheek	2402	0.031	0.24	9.35	9.5	0.032	/
		Right Tilt	2402	0.025	2.43	9.35	9.5	0.026	/
		Left Cheek	2402	0.034	-1.66	9.35	9.5	0.035	/
		Left Tilt	2402	0.038	3.40	9.35	9.5	0.039	19

BODY SAR

Band	Model	Test Position	Freq.	SAR (1g) (W/kg)	Power Drift(%)	Meas.Output Power(dBm)	Max.Turn-up Power(dBm)	Scaled SAR (W/Kg)	Meas.No.
GSM850	GPRS (GMSK, 2-Slot)	Front Side	836.6	0.066	4.84	31.21	31.5	0.071	/
		Back Side	836.6	0.147	-3.04	31.21	31.5	0.157	2
		Right Edge	836.6	0.041	-2.57	31.21	31.5	0.044	/
		Left Edge	836.6	0.032	-3.15	31.21	31.5	0.034	/
		Bottom Edge	836.6	0.067	4.56	31.21	31.5	0.072	/
GSM1900	GPRS (GMSK, 3-Slot)	Front Side	1880	0.282	-3.63	24.38	25.5	0.365	/
		Back Side	1850.2	0.312	-4.07	23.87	25.5	0.454	/
		Back Side	1880	0.385	-2.78	24.38	25.5	0.498	/
		Back Side	1909.8	0.643	-3.46	25.06	25.5	0.712	4
		Right Edge	1880	0.089	2.20	24.38	25.5	0.115	/
		Left Edge	1880	0.114	-2.06	24.38	25.5	0.148	/
		Bottom Edge	1880	0.124	-4.19	24.38	25.5	0.160	/
WCDMA Band 2	HSDPA Subtest-1	Front Side	1880	0.145	-3.13	22.23	23	0.173	/
		Back Side	1880	0.366	1.17	22.23	23	0.437	6
		Right Edge	1880	0.038	1.78	22.23	23	0.045	/
		Left Edge	1880	0.020	4.43	22.23	23	0.024	/
		Bottom Edge	1880	0.138	-5.04	22.23	23	0.165	/
WCDMA Band 5	HSDPA Subtest-1	Front Side	836.6	0.143	-4.85	22.66	24	0.195	/
		Back Side	826.4	0.547	2.64	23.42	24	0.625	/
		Back Side	836.6	0.624	-2.52	22.66	24	0.850	8
		Back Side	846.6	0.339	1.03	23.73	24	0.361	/
		Right Edge	836.6	0.104	-3.88	22.66	24	0.142	/
		Left Edge	836.6	0.131	-4.11	22.66	24	0.178	/
		Bottom Edge	836.6	0.077	-4.69	22.66	24	0.105	/
LTE Band 2	20MHz QPSK	Front Side	1893.7	0.203	1.06	22.94	23.5	0.231	/
		Back Side	1893.7	0.529	-4.72	22.94	23.5	0.602	10
		Right Edge	1893.7	0.011	-3.76	22.94	23.5	0.013	/
		Left Edge	1893.7	0.031	-4.08	22.94	23.5	0.035	/
		Bottom Edge	1893.7	0.177	-3.48	22.94	23.5	0.201	/
LTE Band 4	20MHz QPSK	Front Side	1726.2	0.042	-3.59	23.52	24	0.047	/
		Back Side	1726.2	0.318	-1.09	23.52	24	0.355	12
		Right Edge	1726.2	0.031	-3.18	23.52	24	0.035	/
		Left Edge	1726.2	0.067	-2.74	23.52	24	0.075	/
		Bottom Edge	1726.2	0.049	-1.31	23.52	24	0.055	/
LTE Band 5	10MHz QPSK	Front Side	834.7	0.123	-2.85	23.14	23.5	0.134	/
		Back Side	834.7	0.536	4.05	23.14	23.5	0.582	14
		Right Edge	834.7	0.102	-1.61	23.14	23.5	0.111	/
		Left Edge	834.7	0.111	-1.69	23.14	23.5	0.121	/
		Bottom Edge	834.7	0.078	-1.01	23.14	23.5	0.085	/
LTE Band 7	20MHz QPSK	Front Side	2528.7	0.121	-2.75	22.59	23	0.133	/
		Back Side	2503.7	0.438	4.90	22.60	23	0.480	/
		Back Side	2528.7	0.554	-2.44	22.59	23	0.609	/

		Back Side	2553.7	0.778	-2.39	22.78	23	0.818	16
		Right Edge	2528.7	0.086	-2.77	22.59	23	0.095	/
		Left Edge	2528.7	0.074	3.96	22.59	23	0.081	/
		Bottom Edge	2528.7	0.162	-2.51	22.59	23	0.178	/
LTE Band 17	10MHz QPSK	Front Side	708.2	0.046	-1.70	22.76	23.5	0.055	/
		Back Side	708.2	0.161	-1.95	22.76	23.5	0.191	18
		Right Edge	708.2	0.032	-3.33	22.76	23.5	0.038	/
		Left Edge	708.2	0.040	-4.46	22.76	23.5	0.047	/
		Bottom Edge	708.2	0.013	-4.19	22.76	23.5	0.015	/
Bluetooth	8DPSK	Front Side	2402	0.049	-3.08	9.35	9.5	0.051	20
		Back Side	2402	0.026	-4.58	9.35	9.5	0.027	/
		Right Edge	2402	0.025	-4.37	9.35	9.5	0.026	/
		Left Edge	2402	0.022	-1.93	9.35	9.5	0.023	/
		Bottom Edge	2402	0.038	3.36	9.35	9.5	0.039	/

Note:

1. Per KDB 447498 D04, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.

a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.

b. Scaled SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor

2. Per KDB 865664 D01, Repeated measurement is not required when the original highest measured SAR is <0.80 W/kg

Simultaneous Multi-band Transmission Evaluation:
Application Simultaneous Transmission information:

Position	Simultaneous State
Head	1. GSM + Bluetooth
	2. WCDMA + Bluetooth
	3. LTE + Bluetooth
Body	1. GSM + Bluetooth
	2. WCDMA + Bluetooth
	3. LTE + Bluetooth

NOTE：

1.Bluetooth and WLAN can't simultaneous transmission at the same time.

2.For simultaneous transmission at head and body exposure position, 2 transmitters simultaneous transmission was the worst state.

3.If the test separation distance is <5mm, 5mm is used for excluded SAR calculation.

4. KDB 447498 Appendix E, when standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

$$SAR_{est} = 1.6 \cdot Pant / Pth \text{ [W/kg]}.$$

P_{ant} is maximum time-averaged power or effective radiated power (ERP), whichever is greater, and P_{th} is defined in Formula KDB 447498 (B.2).

Simultaneous Mode	Position	Mode	Max. 1-g SAR (W/kg)	1-g Sum SAR (W/kg)
GSM + Bluetooth	Head	GSM	0.391	0.430
		Bluetooth	0.039	
	Body	GSM	0.712	0.763
		Bluetooth	0.051	
WCDMA + Bluetooth	Head	WCDMA	0.391	0.430
		Bluetooth	0.039	
	Body	WCDMA	0.850	0.901
		Bluetooth	0.051	
LTE + Bluetooth	Head	LTE	0.507	0.546
		Bluetooth	0.039	
	Body	LTE	0.818	0.869
		Bluetooth	0.051	

Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneous transmitting antenna.

When the sum of SAR 1g of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit (SAR-1g 1.6 W/kg), the simultaneous transmission SAR is not required. When the sum of SAR 1g is greater than the SAR limit (SAR-1g 1.6 W/kg), SAR test exclusion is determined by the SPLSR.

12. Equipment List

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
750MHz Dipole	MVG	DIP0G750	SN 06/22 DIP0G750-638	2022.02.11	2023.02.10
835MHz Dipole	MVG	DIP0G835	SN 06/22 DIP0G835-639	2022.02.11	2023.02.10
1800MHz Dipole	MVG	DIP1G800	SN 06/22 DIP1G800-640	2022.02.11	2023.02.10
1900MHz Dipole	MVG	DIP1G900	SN 06/22 DIP1G900-641	2022.02.11	2023.02.10
2450MHz Dipole	MVG	GIP2G450	SN 06/22 DIP2G450-645	2022.02.11	2023.02.10
2600MHz Dipole	MVG	DIP2G600	SN 06/22 DIP2G600-646	2022.02.11	2023.02.10
E-Field Probe	MVG	EPGO364	SN 04/22 EPGO364	2022.02.11	2023.02.10
Dielectric Probe Kit	MVG	OCPG 87	SN 06/22 OCPG87	2022.02.11	2023.02.10
Antenna	MVG	ANTA 73	SN 06/22 ANTA 73	N/A	N/A
Ellipsoid Phantom	MVG	ELLI 51	SN 06/22 ELLI 51	N/A	N/A
Phantom	MVG	SAM 148	SN 06/22 SAM148	N/A	N/A
Phone holder	MVG	MSH 117	SN 06/22 MSH 117	N/A	N/A
Laptop holder	MVG	LSH 36	SN 06/22 LSH 38	N/A	N/A
Directional coupler	SHW	SHWDCP	202203280013	N/A	N/A
Network Analyzer	Agilent	E5071C	MY46418070	2022.03.28	2023.03.27
Multi Meter	Keithley	DMM6500	DMM6500	2022.05.05	2023.05.04
Signal Generator	Keithley	N5182B	MY59100717	2022.04.29	2023.04.28
Wireless Communication Test Set	R&S	CMW500	137737	2022.04.29	2023.04.28
Power Sensor	R&S	Z11	116184	2022.03.28	2023.03.27
Temperature hygrometer	N/A	ST-W2318	N/A	2022.05.05	2023.05.04
Thermograph	N/A	TP101	N/A	2022.05.05	2023.05.04

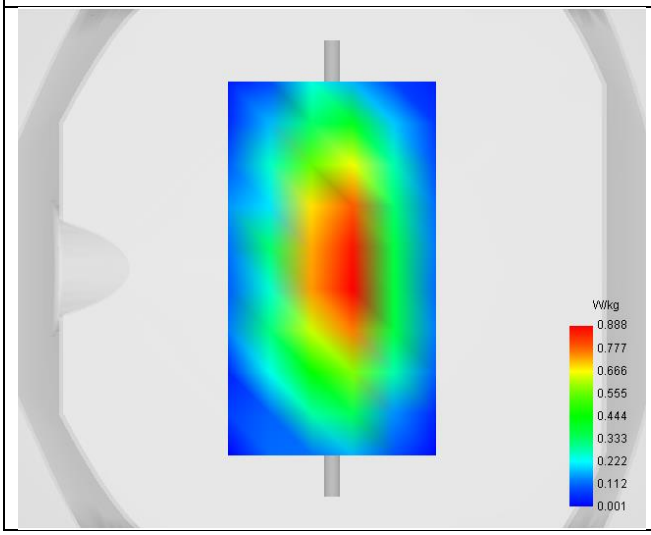
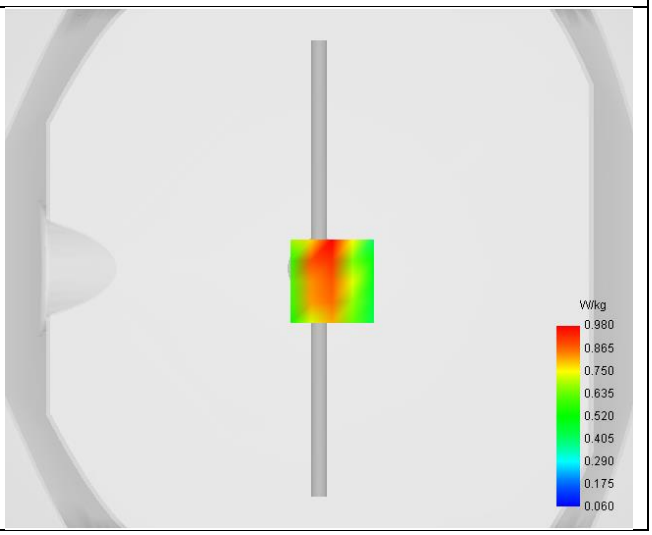
Appendix A. System Validation Plots

System Performance Check Data (750MHz)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2022.10.11

Experimental conditions.

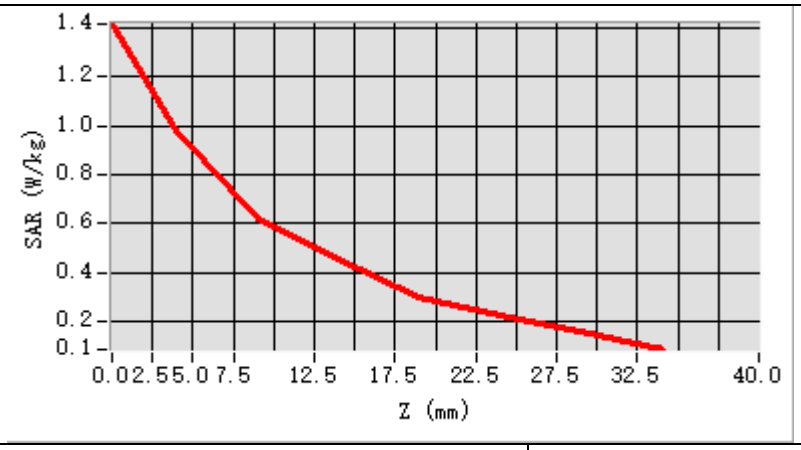
Phantom	Validation plane
Device Position	Dipole
Band	CW750
Channels	Middle
Signal	CW
Frequency (MHz)	750.000
Relative permittivity	41.900
Conductivity (S/m)	0.890
Probe	SN 04/22 EPGO364
ConvF	1.69
Crest factor:	1:1

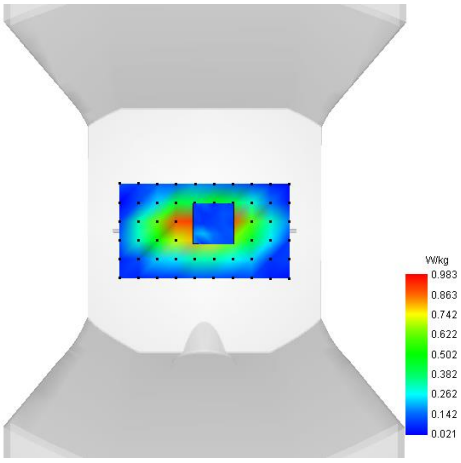
SURFACE SAR	VOLUME SAR
	

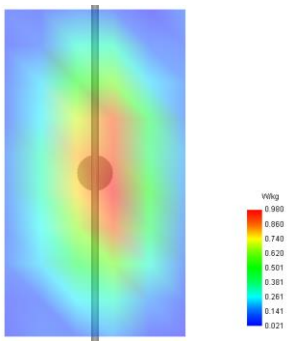
Maximum location: X=5.00, Y=-5.00 ; SAR Peak: 1.52 W/kg

SAR 10g (W/Kg)	0.557
SAR 1g (W/Kg)	0.924

Z Axis Scan


1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.1
SAR (W/kg)
0.0 2.5 5.0 7.5 12.5 17.5 22.5 27.5 32.5 40.0
Z (mm)


W/kg
0.983
0.863
0.742
0.622
0.502
0.382
0.262
0.142
0.021

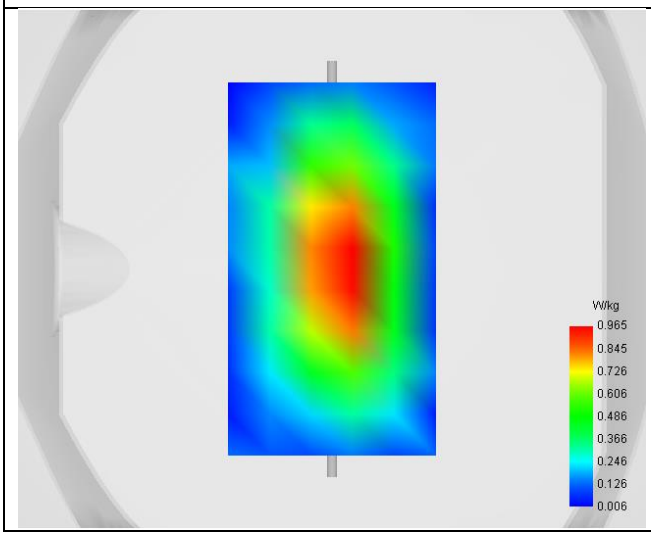
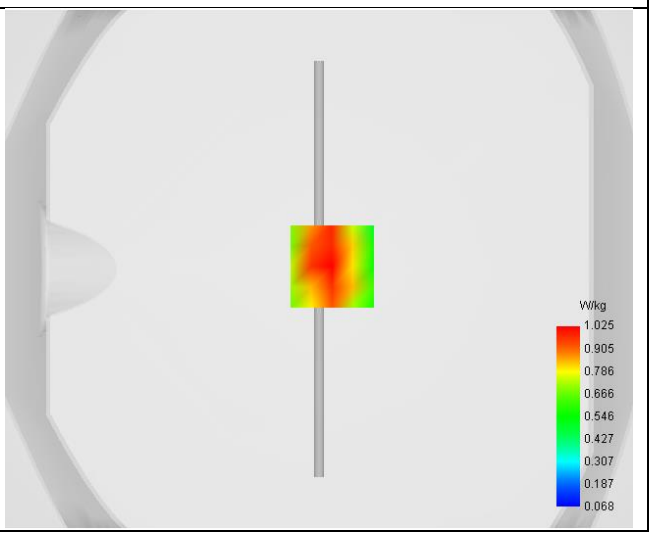


System Performance Check Data (835MHz)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement: 2022.09.27

Experimental conditions.

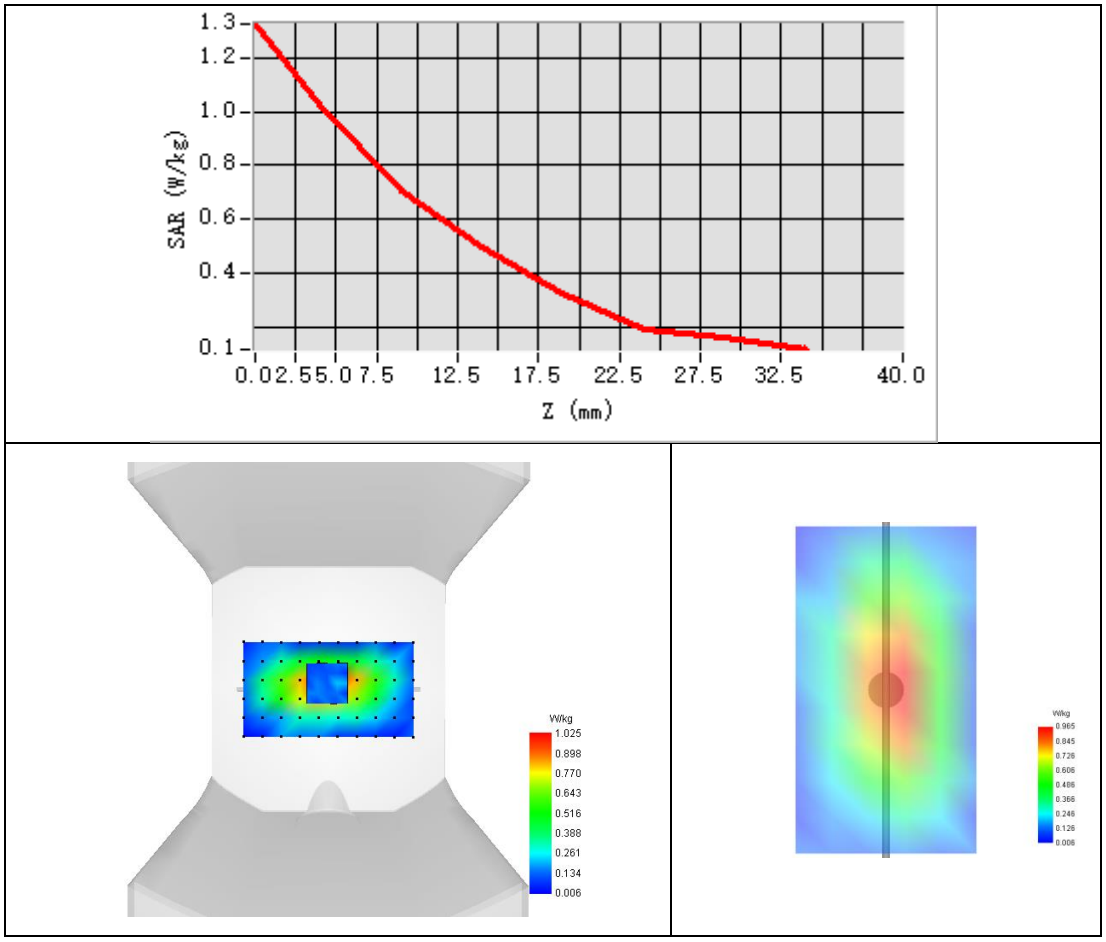
Phantom	Validation plane
Device Position	Dipole
Band	CW835
Channels	Middle
Signal	CW
Frequency (MHz)	835.000
Relative permittivity	41.500
Conductivity (S/m)	0.900
Probe	SN 04/22 EPGO364
ConvF	1.72
Crest factor:	1:1

SURFACE SAR	VOLUME SAR
	

Maximum location: X=5.00, Y=1.00 ; SAR Peak: 1.42 W/kg

SAR 10g (W/Kg)	0.620
SAR 1g (W/Kg)	0.978

Z Axis Scan

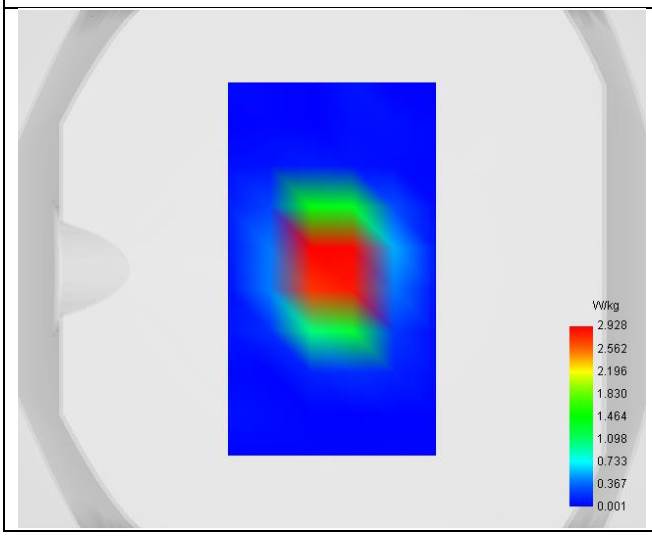
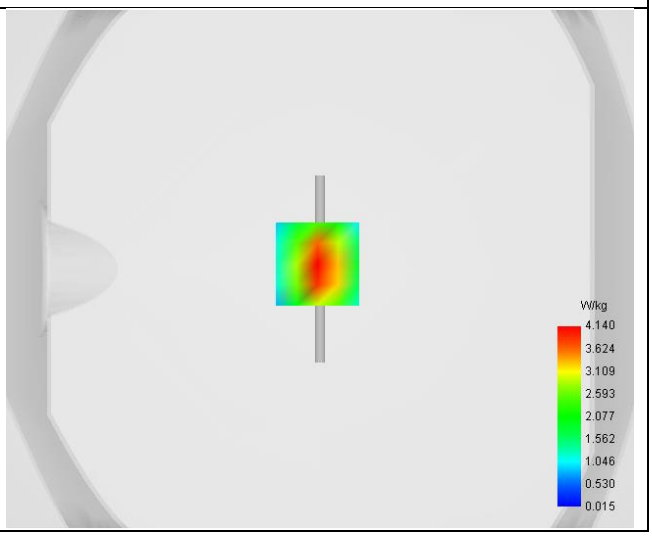

1.3
1.2
1.0
0.8
0.6
0.4
0.1
SAR (W/kg)
0.0 2.5 5.0 7.5 12.5 17.5 22.5 27.5 32.5 40.0
Z (mm)
W/kg
1.025
0.898
0.770
0.643
0.516
0.388
0.261
0.134
0.006
W/kg
0.965
0.845
0.726
0.606
0.486
0.366
0.246
0.126
0.006

System Performance Check Data (1800MHz)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm, dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement:2022.09.30

Experimental conditions.

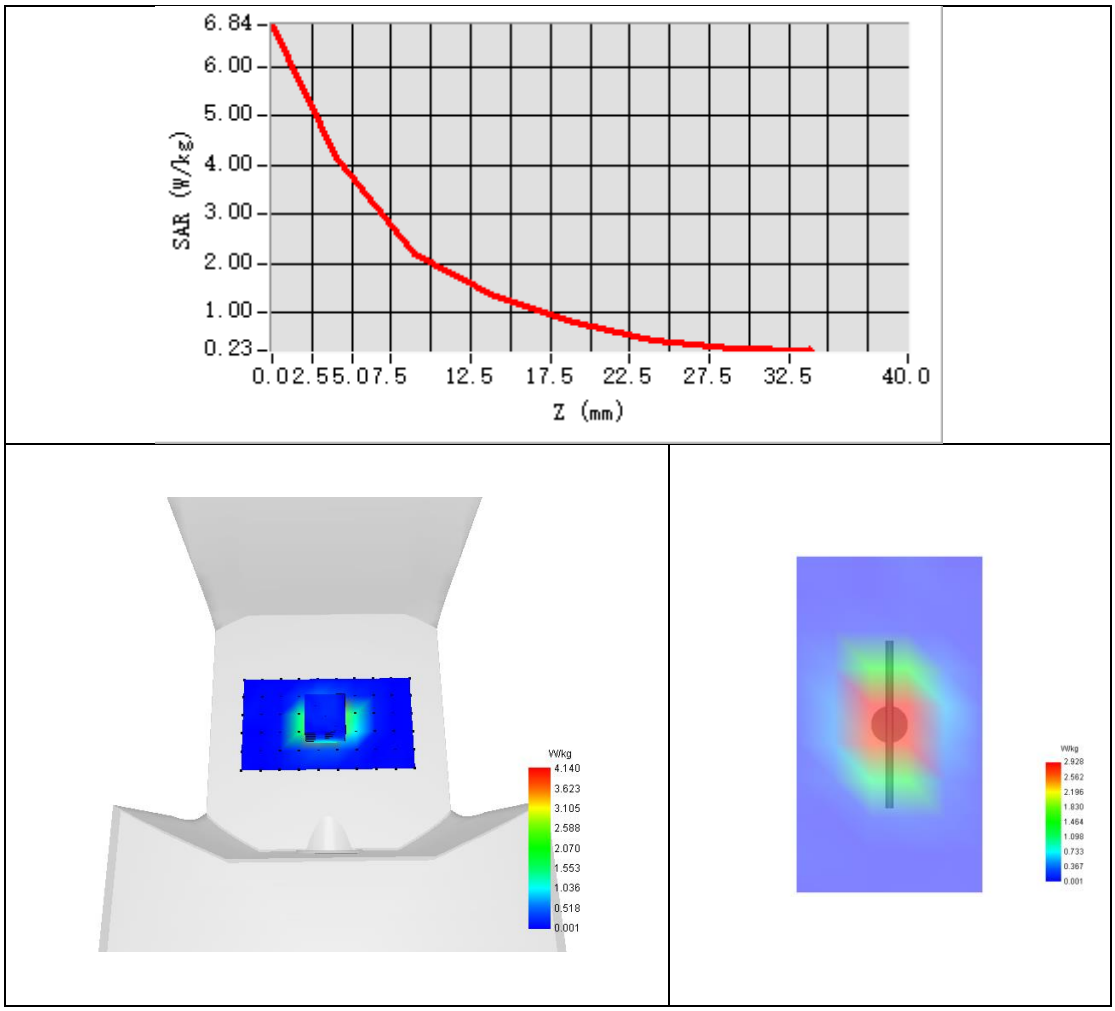
Phantom	Validation plane
Device Position	Dipole
Band	CW1800
Channels	Middle
Signal	CW
Frequency (MHz)	1800.000
Relative permittivity	40.000
Conductivity (S/m)	1.400
Probe	SN 04/22 EPGO364
ConvF	1.95
Crest factor:	1:1

SURFACE	VOLUME SAR
	

Maximum location: X=-1.00, Y=2.00 ; SAR Peak: 6.75 W/kg

SAR 10g (W/Kg)	2.015
SAR 1g (W/Kg)	3.958

Z Axis Scan

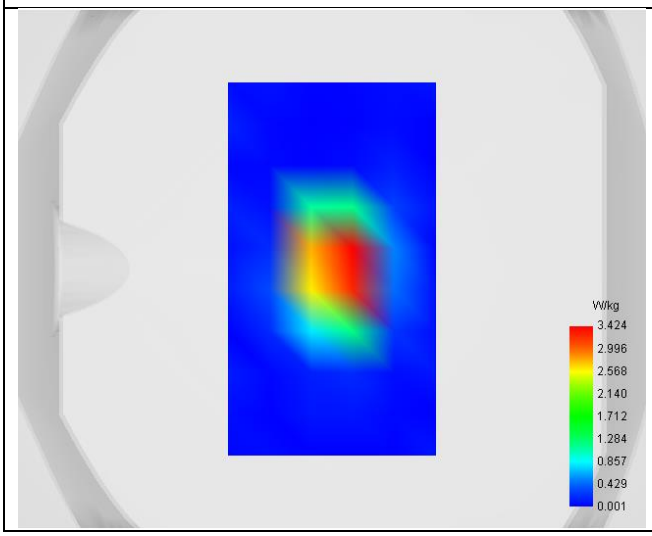
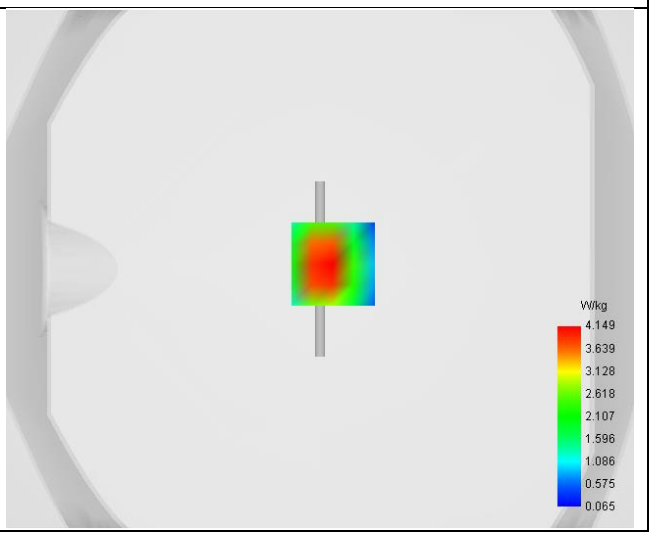

6.84
6.00
5.00
4.00
3.00
2.00
1.00
0.23
SAR (W/kg)
0.0 2.5 5.0 7.5 12.5 17.5 22.5 27.5 32.5 40.0
Z (mm)
W/kg
4.140
3.623
3.105
2.588
2.070
1.553
1.036
0.518
0.001
W/kg
2.928
2.562
2.196
1.830
1.464
1.098
0.733
0.367
0.001

System Performance Check Data (1900MHz)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm, dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement:2022.10.11

Experimental conditions.

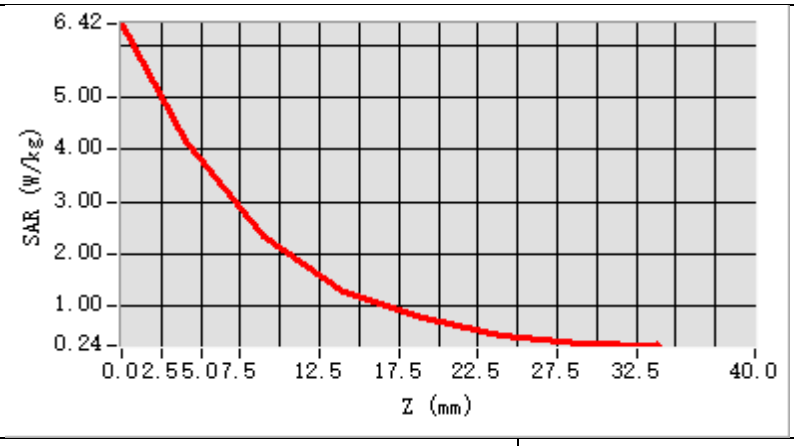
Phantom	Validation plane
Device Position	Dipole
Band	CW1900
Channels	Middle
Signal	CW
Frequency (MHz)	1900.000
Relative permittivity	40.000
Conductivity (S/m)	1.400
Probe	SN 04/22 EPGO364
ConvF	2.25
Crest factor:	1:1

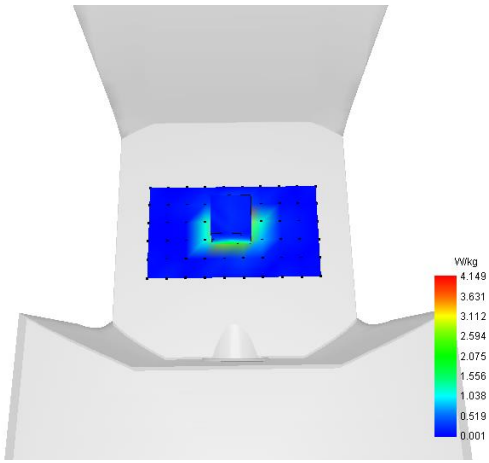
SURFACE	VOLUME SAR
	

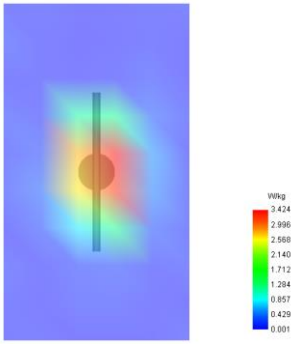
Maximum location: X=-1.00, Y=2.00 ; SAR Peak: 6.53 W/kg

SAR 10g (W/Kg)	2.060
SAR 1g (W/Kg)	4.149

Z Axis Scan


6.42
5.00
4.00
3.00
2.00
1.00
0.24
SAR (W/kg)
0.0 2.5 5.0 7.5 12.5 17.5 22.5 27.5 32.5 40.0
Z (mm)


W/kg
4.149
3.631
3.112
2.594
2.075
1.556
1.038
0.519
0.001

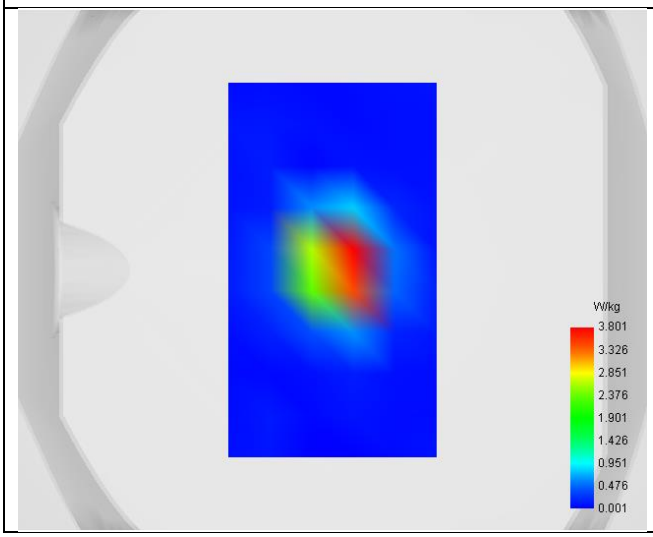
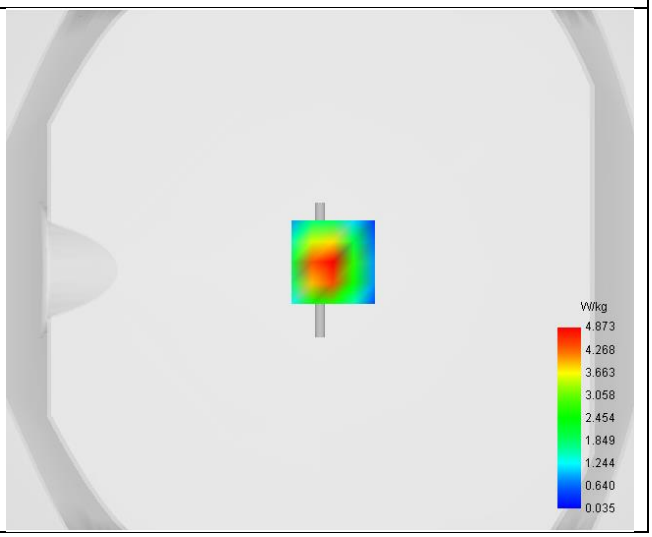

W/kg
3.424
2.996
2.568
2.140
1.712
1.284
0.857
0.429
0.001

System Performance Check Data (2450MHz)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm, dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement:2022.10.12

Experimental conditions.

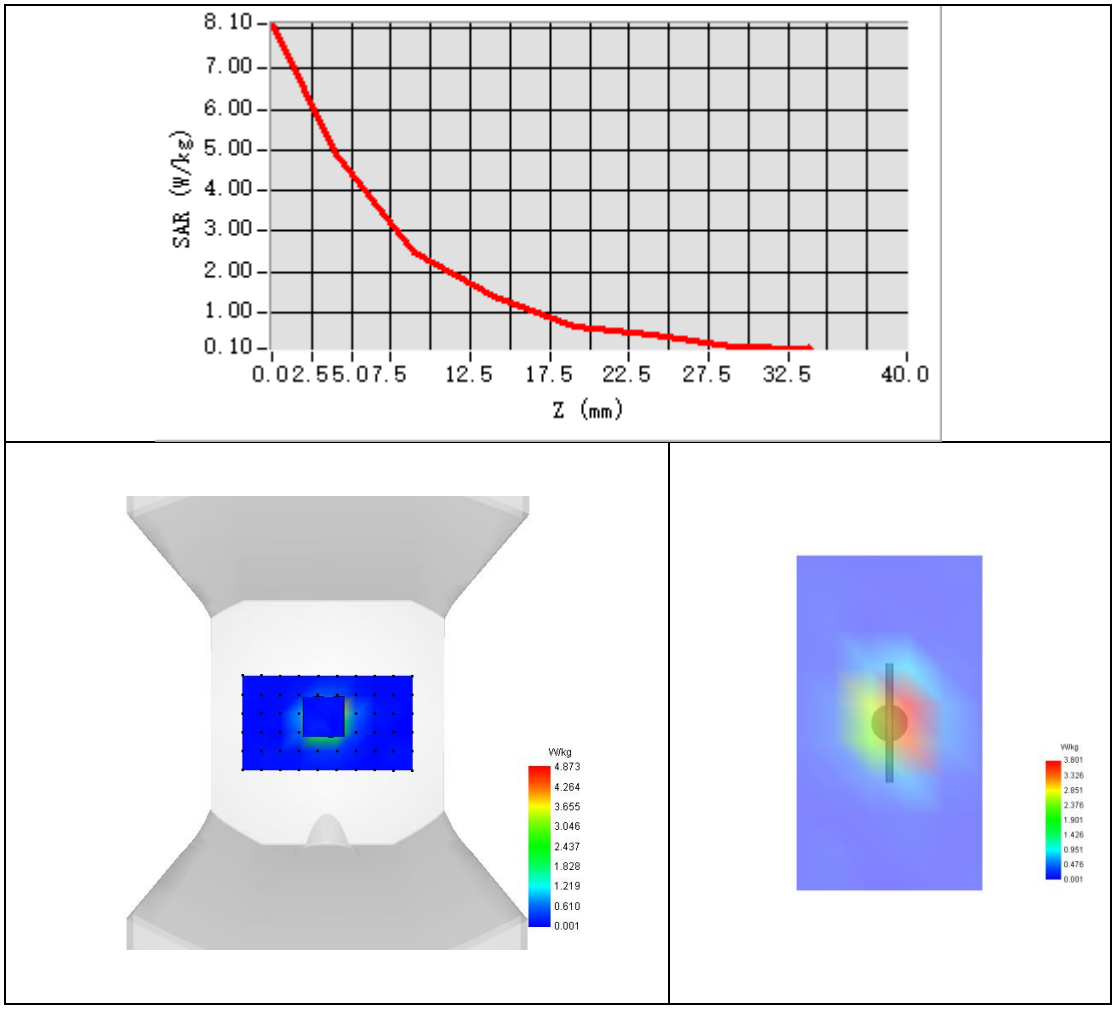
Phantom	Validation plane
Device Position	Dipole
Band	CW2450
Channels	Middle
Signal	CW
Frequency (MHz)	2450.000
Relative permittivity	39.200
Conductivity (S/m)	1.799
Probe	SN 04/22 EPGO364
ConvF	2.33
Crest factor:	1:1

SURFACE	VOLUME SAR
	

Maximum location: X=5.00, Y=3.00 ; SAR Peak: 8.43 W/kg

SAR 10g (W/Kg)	2.183
SAR 1g (W/Kg)	4.759

Z Axis Scan

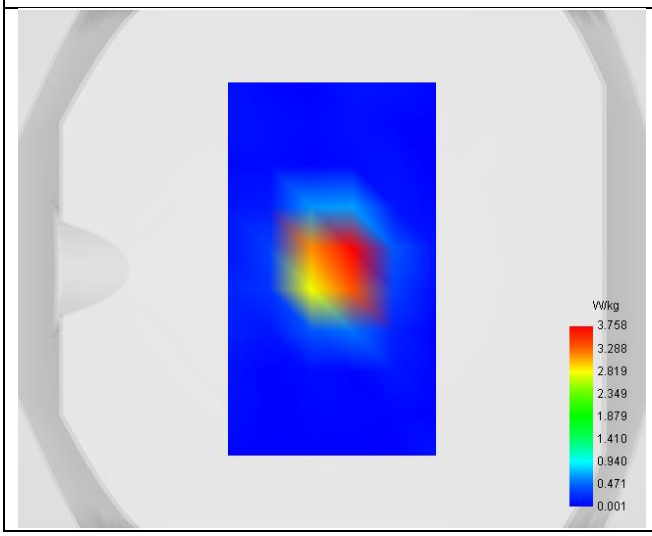
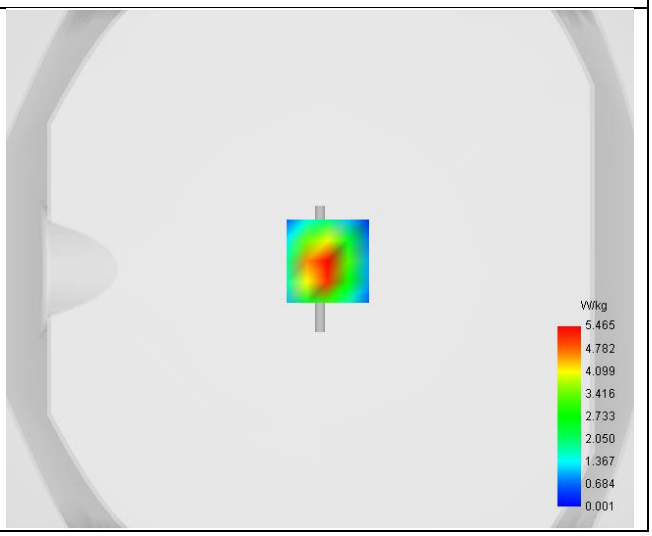

8.10
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.10
SAR (W/kg)
0.0 2.5 5.0 7.5 12.5 17.5 22.5 27.5 32.5 40.0
Z (mm)
W/kg
4.873
4.264
3.655
3.046
2.437
1.828
1.219
0.610
0.001
W/kg
3.801
3.326
2.851
2.376
1.901
1.426
0.951
0.476
0.001

System Performance Check Data (2600MHz)

Type: Phone measurement (Complete)
Area scan resolution: dx=8mm, dy=8mm
Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm
Date of measurement:2022.10.08

Experimental conditions.

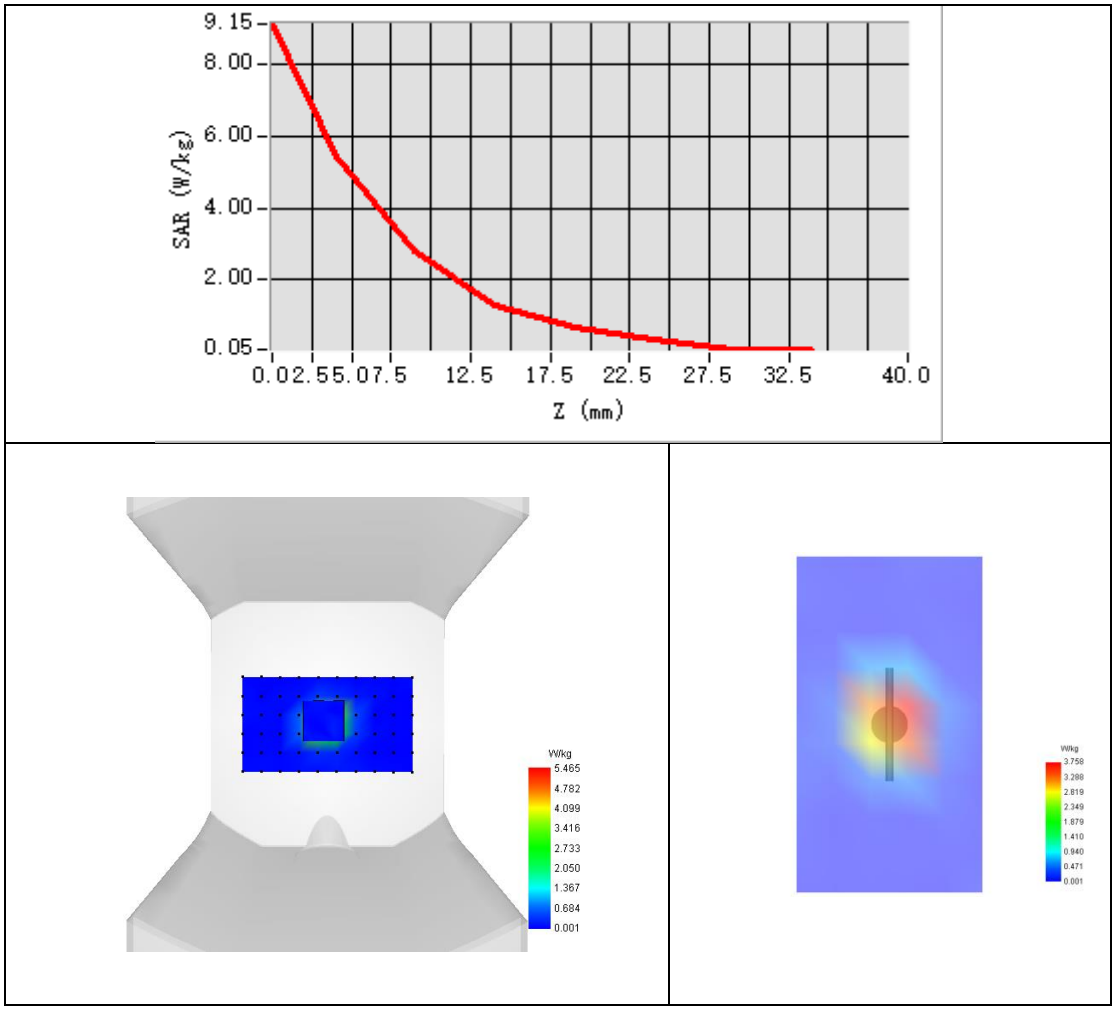
Phantom	Validation plane
Device Position	Dipole
Band	CW2600
Channels	Middle
Signal	CW
Frequency (MHz)	2600.000
Relative permittivity	39.000
Conductivity (S/m)	1.960
Probe	SN 04/22 EPGO364
ConvF	2.36
Crest factor:	1:1

SURFACE	VOLUME SAR
	

Maximum location: X=3.00, Y=3.00 ; SAR Peak: 9.58 W/kg

SAR 10g (W/Kg)	2.323
SAR 1g (W/Kg)	5.276

Z Axis Scan

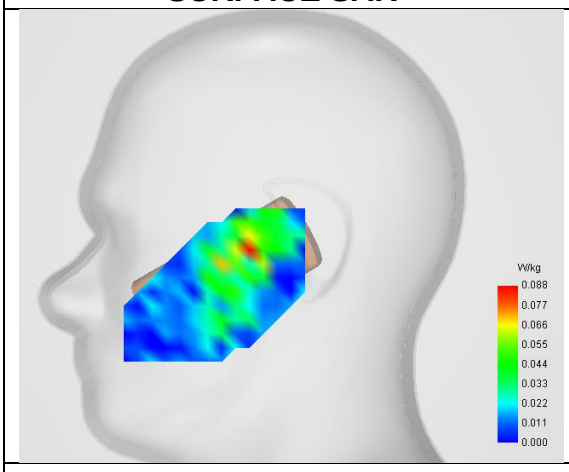
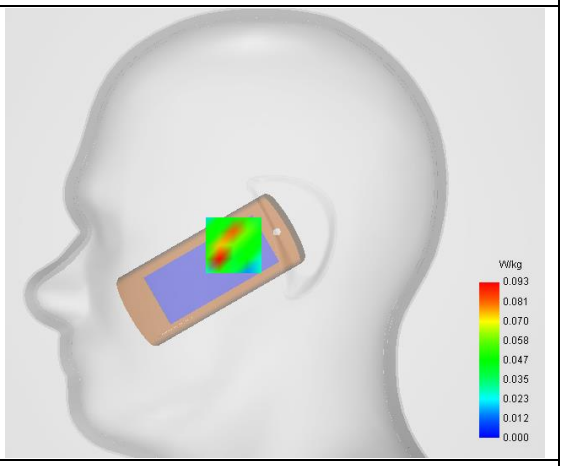
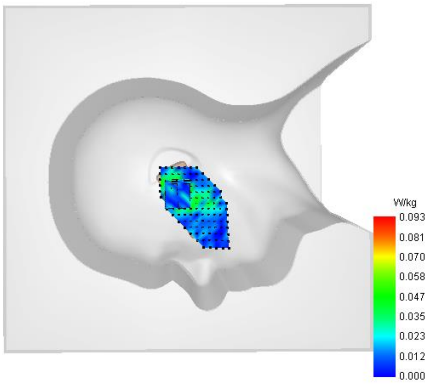
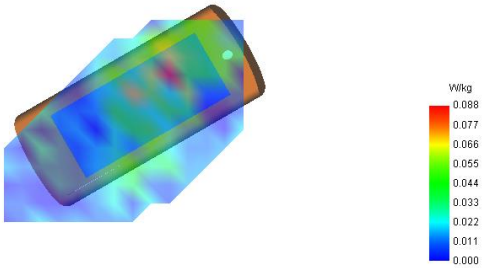

9.15
8.00
6.00
4.00
2.00
0.05
SAR (W/kg)
0.0 2.5 5.0 7.5 12.5 17.5 22.5 27.5 32.5 40.0
Z (mm)
W/kg
5.465
4.782
4.099
3.416
2.733
2.050
1.367
0.684
0.001
W/kg
3.758
3.288
2.819
2.349
1.879
1.410
0.940
0.471
0.001

Appendix B. SAR Test Plots

Plot 1: DUT: Mobile phone; EUT Model: Q1

Test Date	2022.09.27
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Right head
Device Position	Tilt
Band	GSM850
Signal	TDMA (GSM)
Frequency	836.600
SAR 10g (W/Kg)	0.039
SAR 1g (W/Kg)	0.082

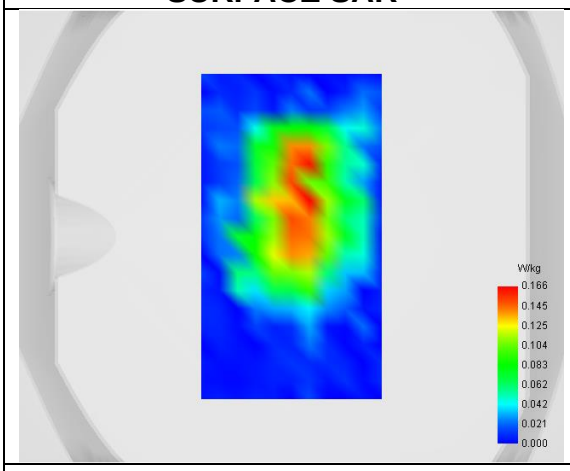
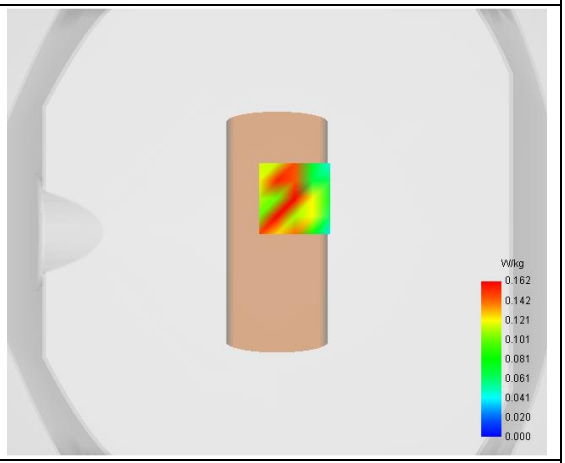
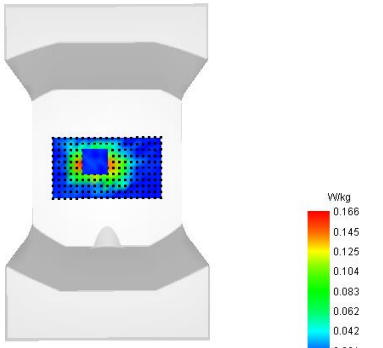
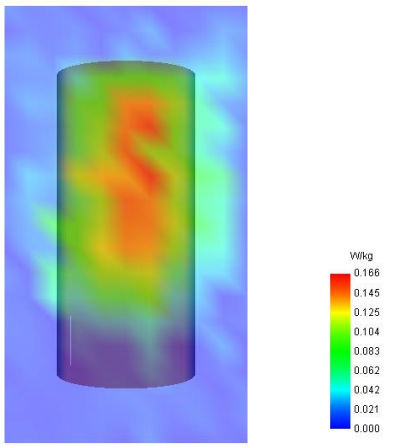
Maximum location: X=-24.00, Y=-7.00 ; SAR Peak: 0.19 W/kg

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Hot spot position**
	

Plot 2: DUT: Mobile phone; EUT Model: Q1

Test Date	2022.09.27
Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	GPRS850
Signal	TDMA (GPRS)
Frequency	836.600
SAR 10g (W/Kg)	0.079
SAR 1g (W/Kg)	0.147

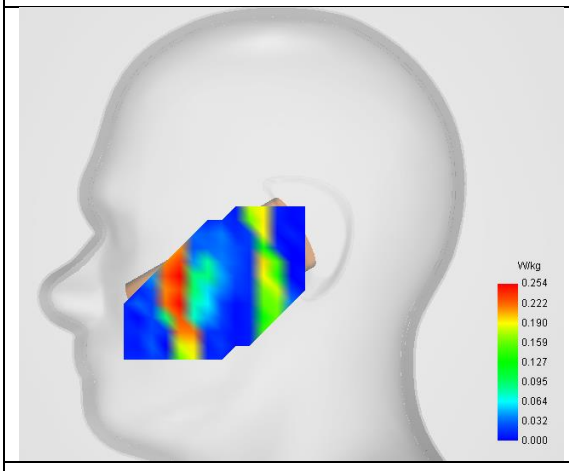
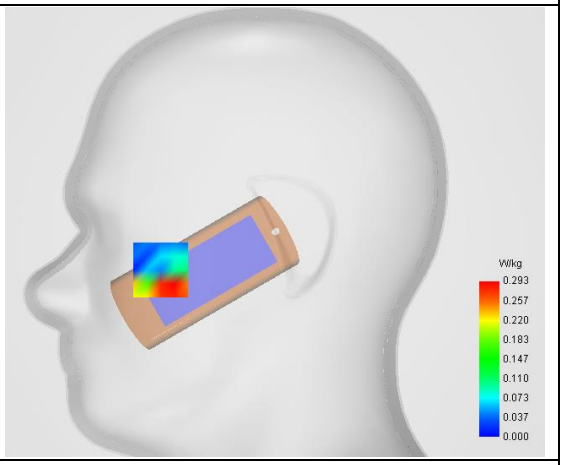
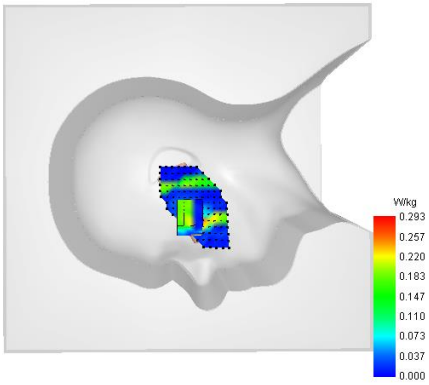
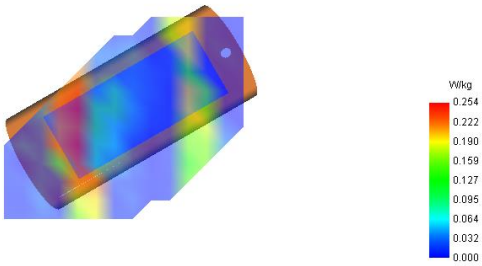
Maximum location: X=8.00, Y=15.00 ; SAR Peak: 0.28 W/kg

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Hot spot position**
	

Plot 3: DUT: Mobile phone; EUT Model: Q1

Test Date	2022.10.11
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Right head
Device Position	Cheek
Band	GSM1800 GSM1900
Signal	TDMA (GSM)
Frequency	1880.000
SAR 10g (W/Kg)	0.147
SAR 1g (W/Kg)	0.325

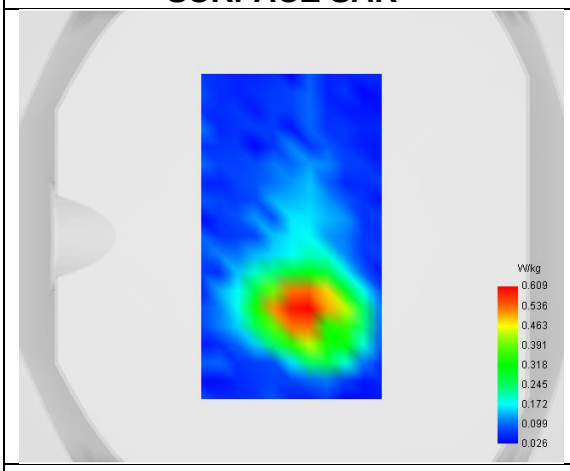
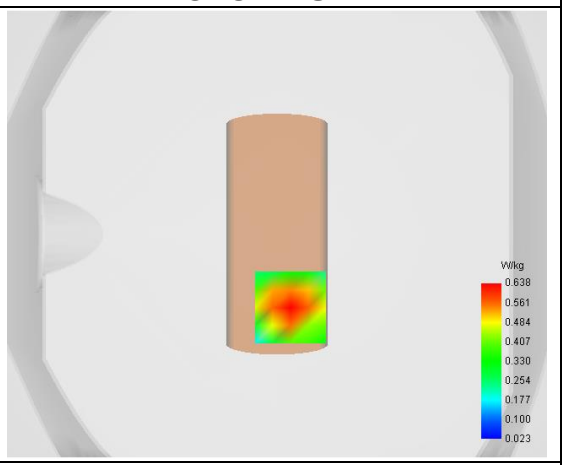
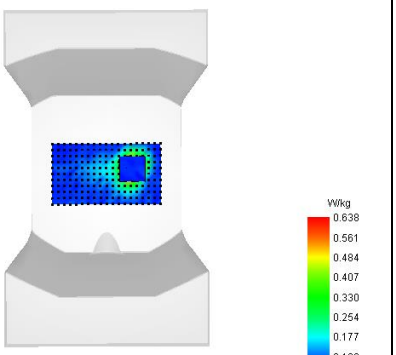
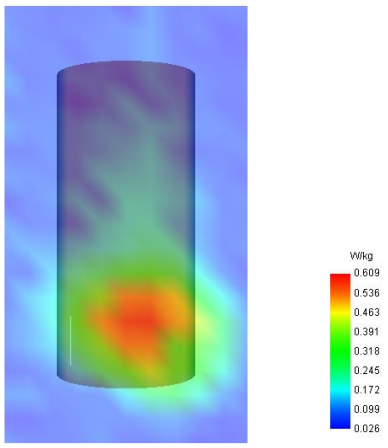
Maximum location: X=-66.00, Y=-22.00 ; SAR Peak: 0.78 W/kg

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Hot spot position**
	

Plot 4: DUT: Mobile phone; EUT Model: Q1

Test Date	2022.10.11
Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	GPRS1900
Signal	TDMA (GPRS)
Frequency	1909.800
SAR 10g (W/Kg)	0.347
SAR 1g (W/Kg)	0.643

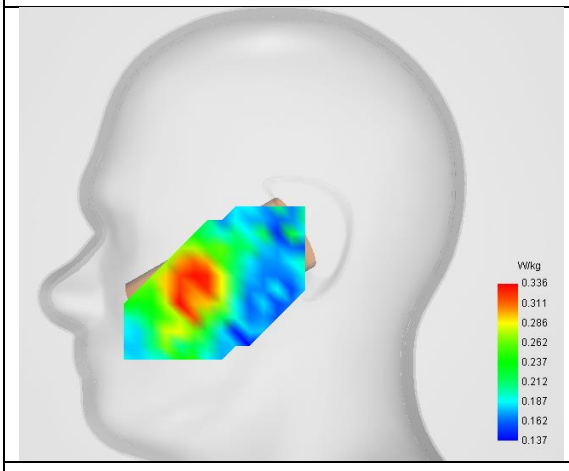
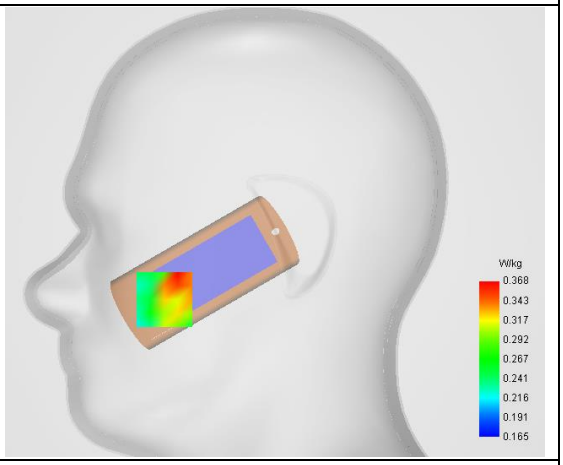
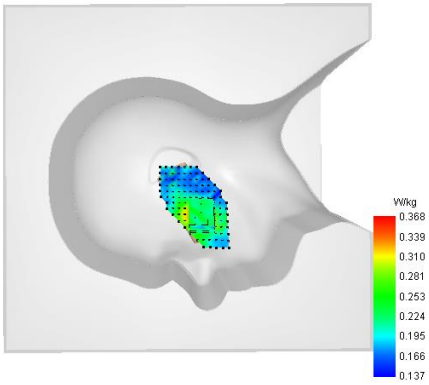
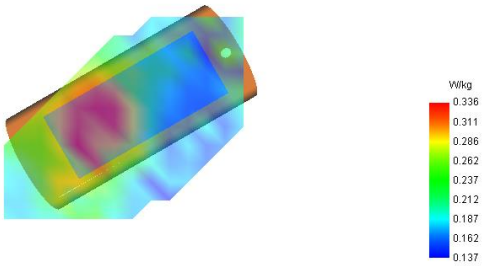
Maximum location: X=6.00, Y=-33.00 ; SAR Peak: 1.19 W/kg

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Hot spot position**
	

Plot 5: DUT: Mobile phone; EUT Model: Q1

Test Date	2022.10.11
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Right head
Device Position	Cheek
Band	Band 2 (1900)
Signal	WCDMA
Frequency	1852.400
SAR 10g (W/Kg)	0.287
SAR 1g (W/Kg)	0.363

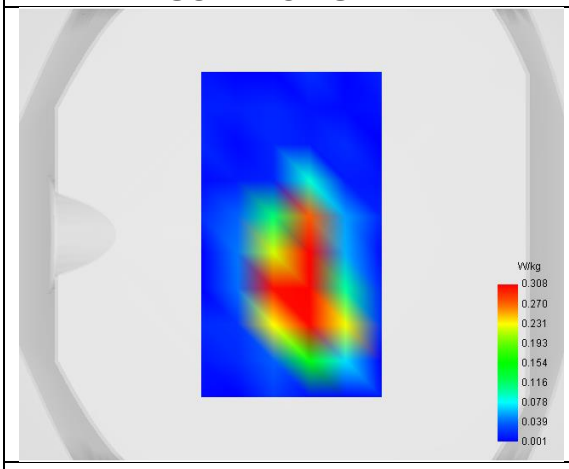
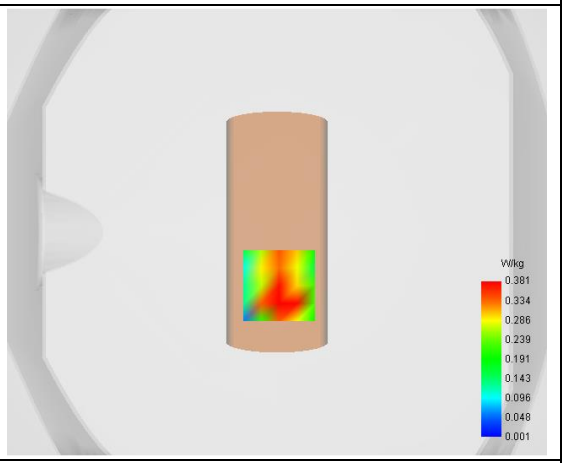
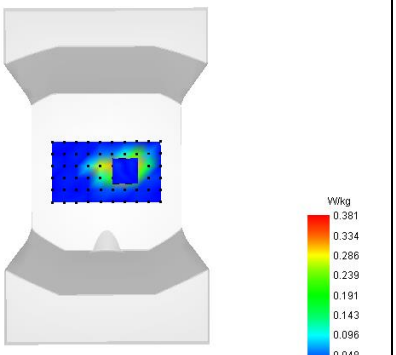
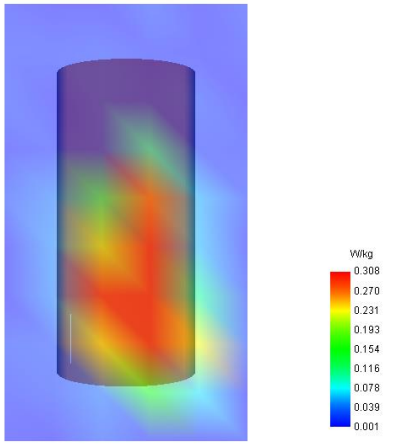
Maximum location: X=-64.00, Y=-39.00 ; SAR Peak: 0.54 W/kg

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Hot spot position**
	

Plot 6: DUT: Mobile phone; EUT Model: Q1

Test Date	2022.10.11
Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	Band 2 (1900)
Signal	WCDMA
Frequency	1880.000
SAR 10g (W/Kg)	0.195
SAR 1g (W/Kg)	0.366

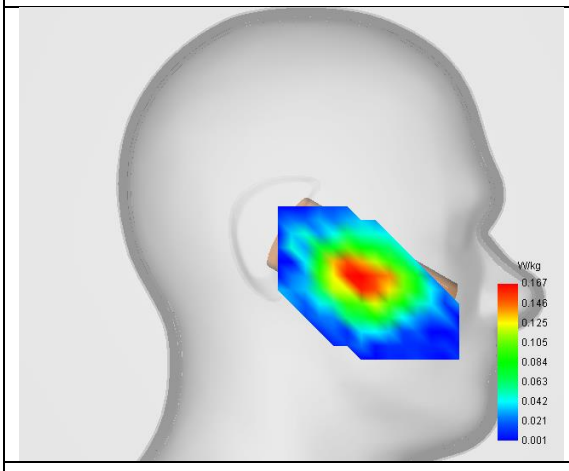
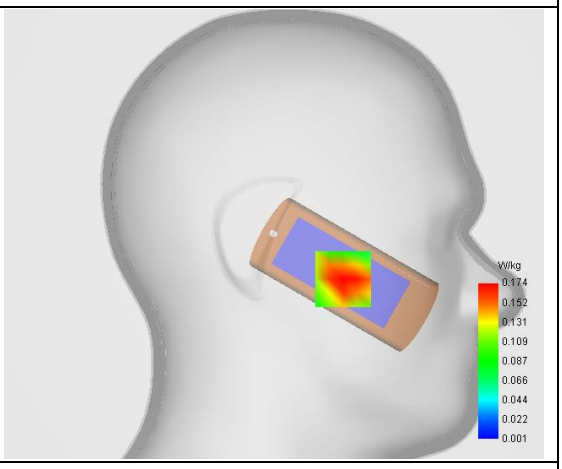
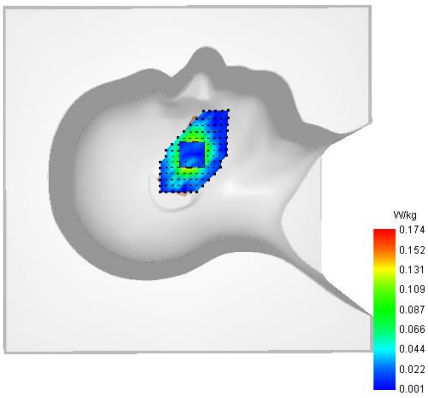
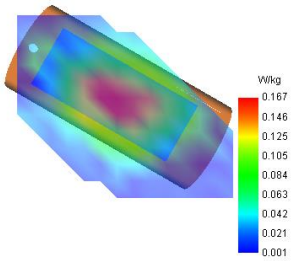
Maximum location: X=1.00, Y=-24.00 ; SAR Peak: 0.65 W/kg

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Hot spot position**
	

Plot 7: DUT: Mobile phone; EUT Model: Q1

Test Date	2022.09.29
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Left head
Device Position	Cheek
Band	Band 5 (850)
Signal	WCDMA
Frequency	836.600
SAR 10g (W/Kg)	0.102
SAR 1g (W/Kg)	0.171

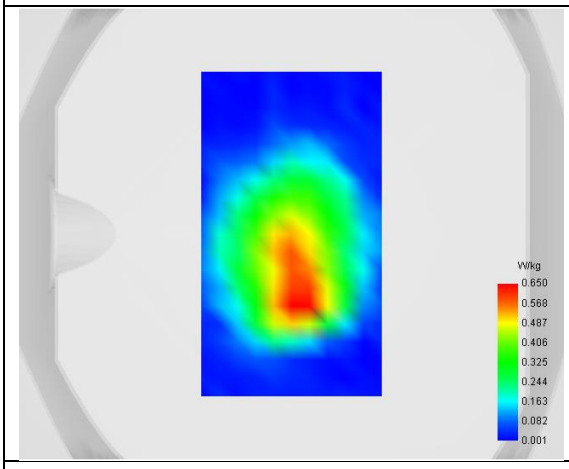
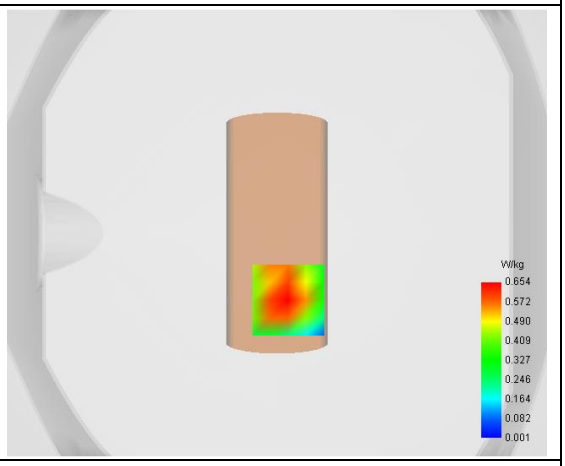
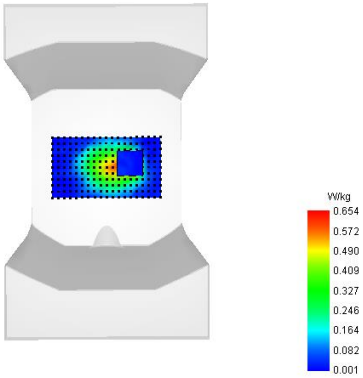
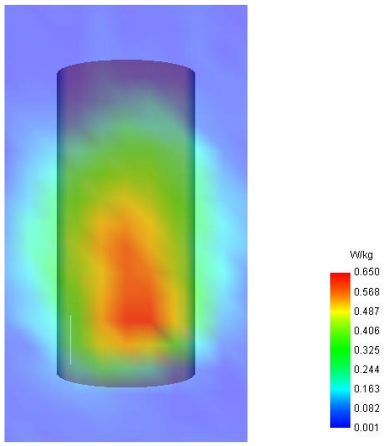
Maximum location: X=-40.00, Y=-26.00 ; SAR Peak: 0.29 W/kg

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Hot spot position**
	

Plot 8: DUT: Mobile phone; EUT Model: Q1

Test Date	2022.09.29
Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	Band 5 (850)
Signal	WCDMA
Frequency	836.600
SAR 10g (W/Kg)	0.346
SAR 1g (W/Kg)	0.624

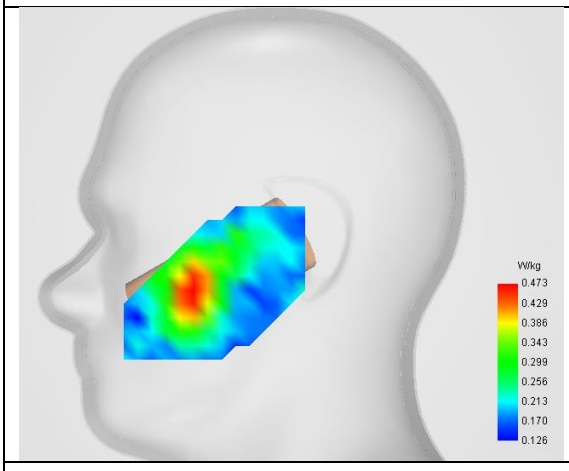
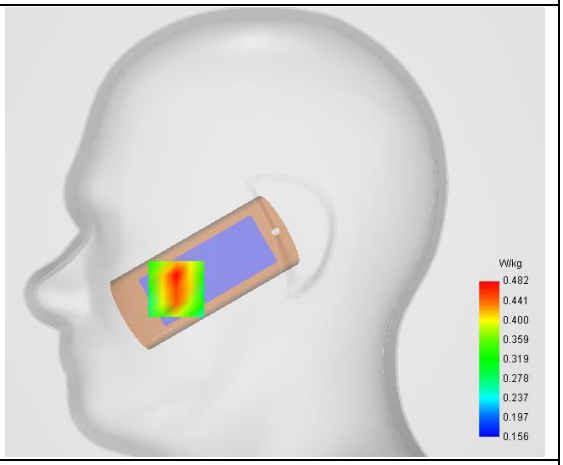
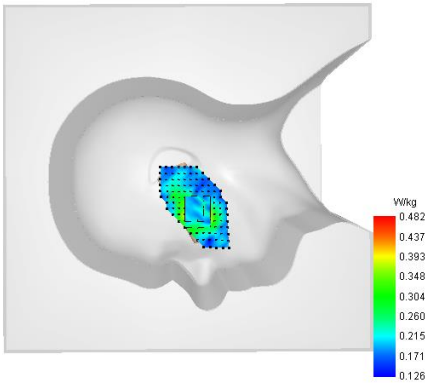
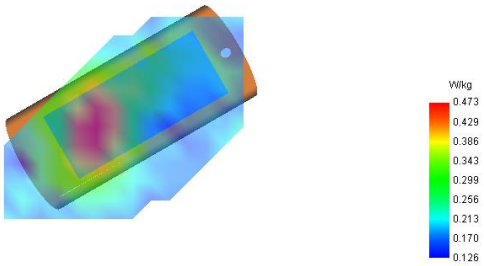
Maximum location: X=5.00, Y=-30.00 ; SAR Peak: 1.01 W/kg

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Hot spot position**
	

Plot 9: DUT: Mobile phone; EUT Model: Q1

Test Date	2022.09.30
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Right head
Device Position	Cheek
Band	LTE band 2
Signal	LTE FDD
Frequency	1893.700
SAR 10g (W/Kg)	0.338
SAR 1g (W/Kg)	0.462

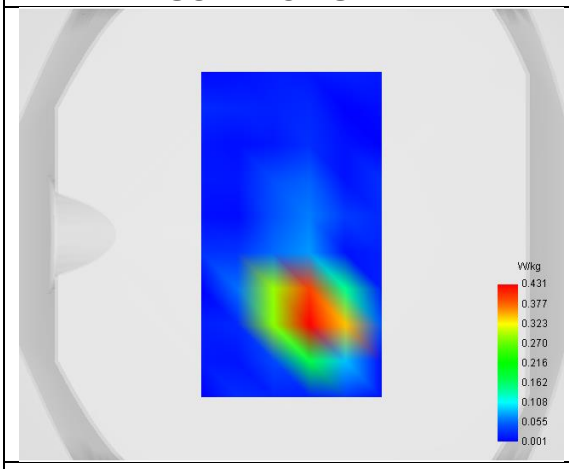
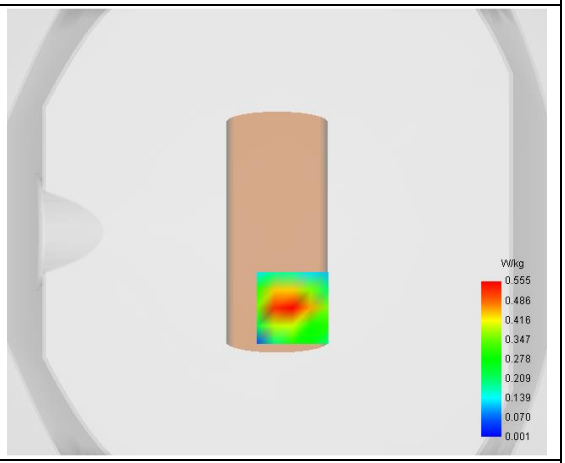
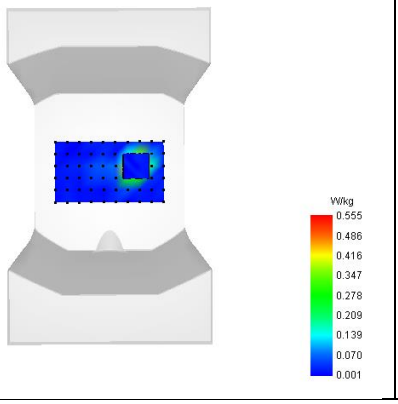
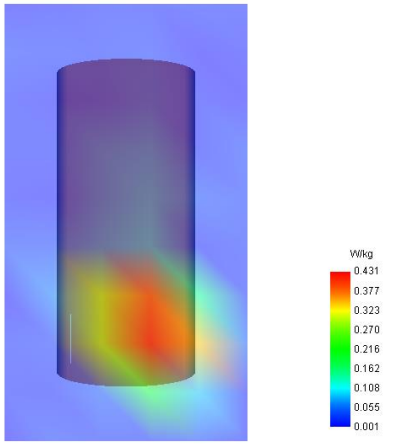
Maximum location: X=-57.00, Y=-33.00 ; SAR Peak: 0.64 W/kg

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Hot spot position**
	

Plot 10: DUT: Mobile phone; EUT Model: Q1

Test Date	2022.09.30
Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 2
Signal	LTE FDD
Frequency	1873.700
SAR 10g (W/Kg)	0.257
SAR 1g (W/Kg)	0.529

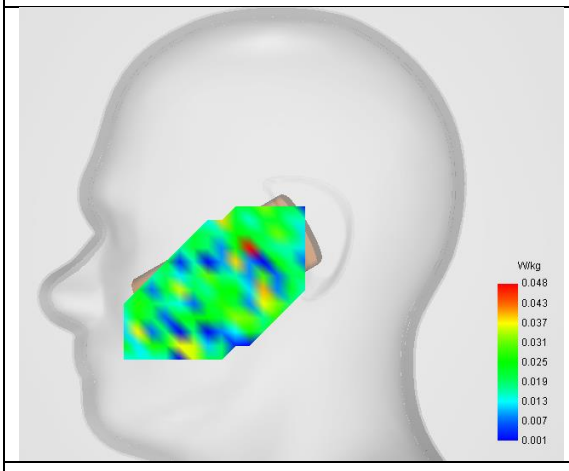
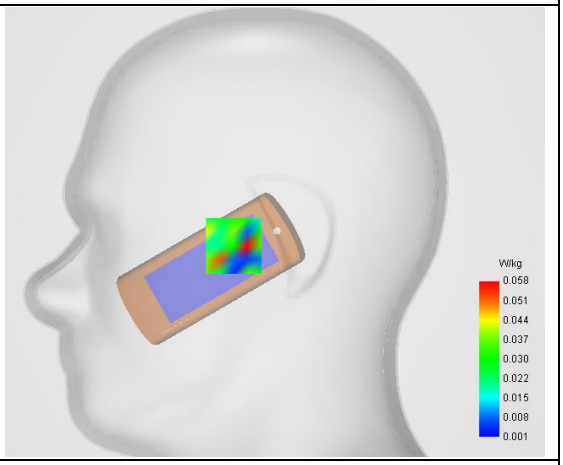
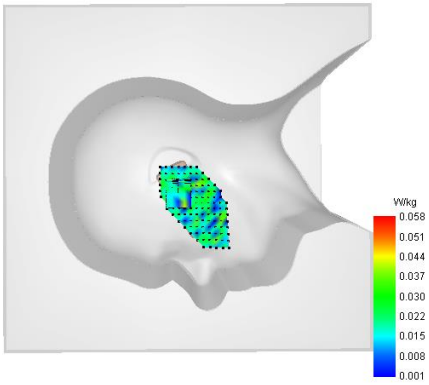
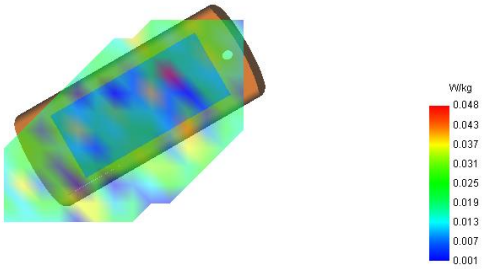
Maximum location: X=7.00, Y=-34.00 ; SAR Peak: 0.97 W/kg

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Hot spot position**
	

Plot 11: DUT: Mobile phone; EUT Model: Q1

Test Date	2022.09.30
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Right head
Device Position	Cheek
Band	LTE band 4
Signal	LTE FDD
Frequency	1726.200
SAR 10g (W/Kg)	0.024
SAR 1g (W/Kg)	0.053

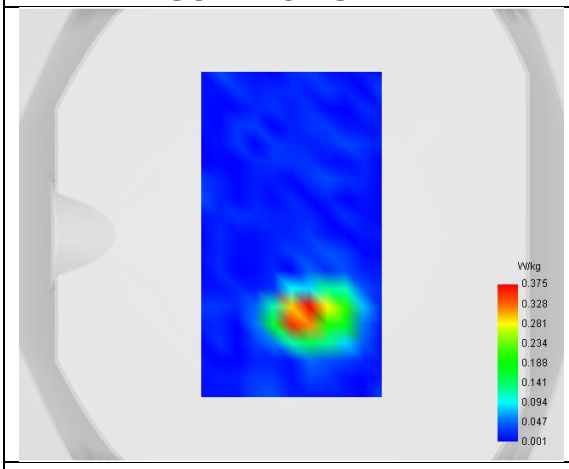
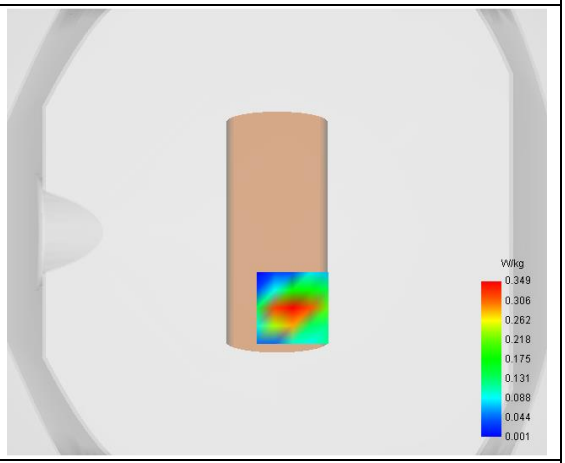
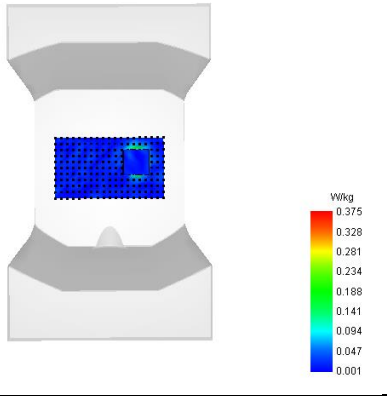
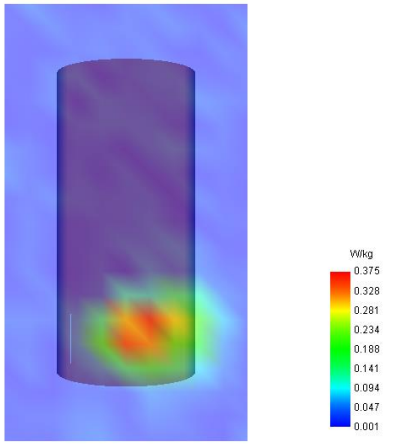
Maximum location: X=-24.00, Y=-8.00 ; SAR Peak: 0.15 W/kg

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Hot spot position**
	

Plot 12: DUT: Mobile phone; EUT Model: Q1

Test Date	2022.09.30
Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 4
Signal	LTE FDD
Frequency	1726.200
SAR 10g (W/Kg)	0.141
SAR 1g (W/Kg)	0.318

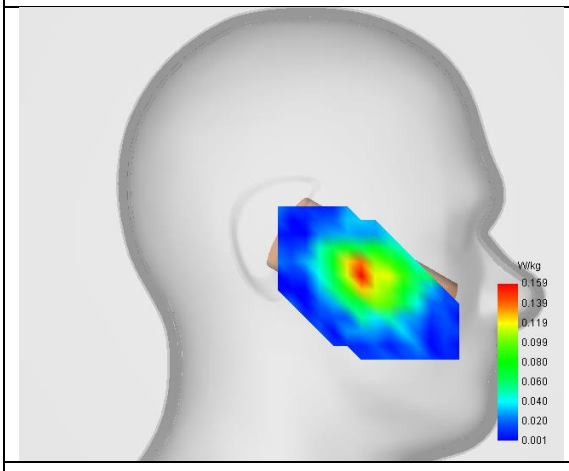
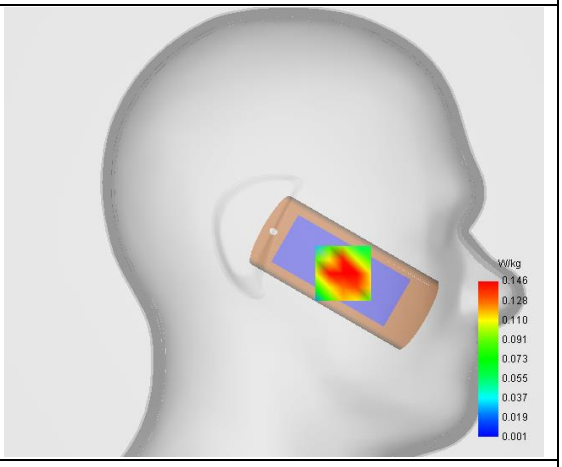
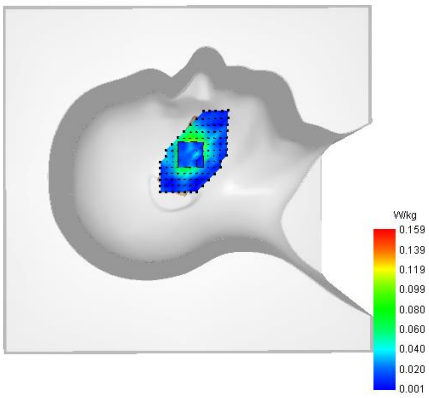
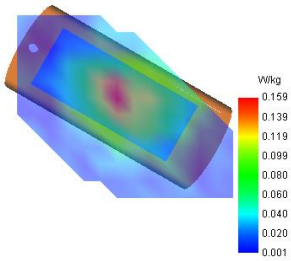
Maximum location: X=7.00, Y=-34.00 ; SAR Peak: 0.59 W/kg

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Hot spot position**
	

Plot 13: DUT: Mobile phone; EUT Model: Q1

Test Date	2022.10.08
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Left head
Device Position	Cheek
Band	LTE band 5
Signal	LTE FDD
Frequency	834.700
SAR 10g (W/Kg)	0.086
SAR 1g (W/Kg)	0.146

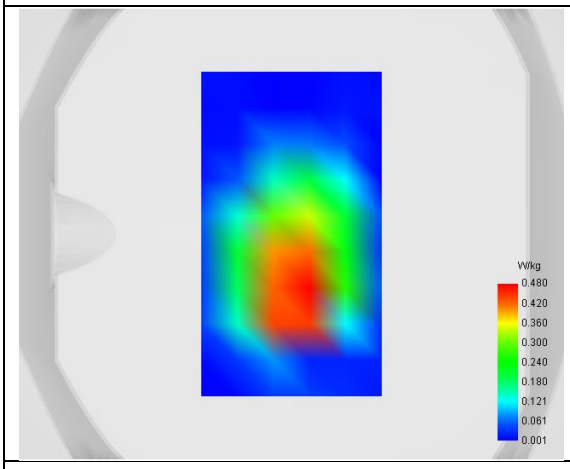
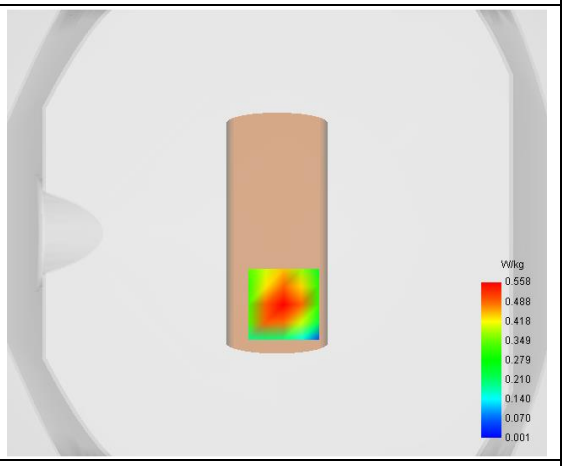
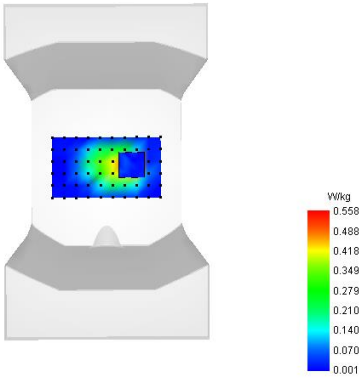
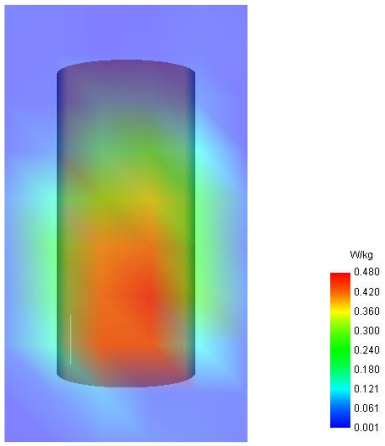
Maximum location: X=-40.00, Y=-24.00 ; SAR Peak: 0.26 W/kg

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Hot spot position**
	

Plot 14: DUT: Mobile phone; EUT Model: Q1

Test Date	2022.10.08
Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 5
Signal	LTE FDD
Frequency	834.700
SAR 10g (W/Kg)	0.303
SAR 1g (W/Kg)	0.536

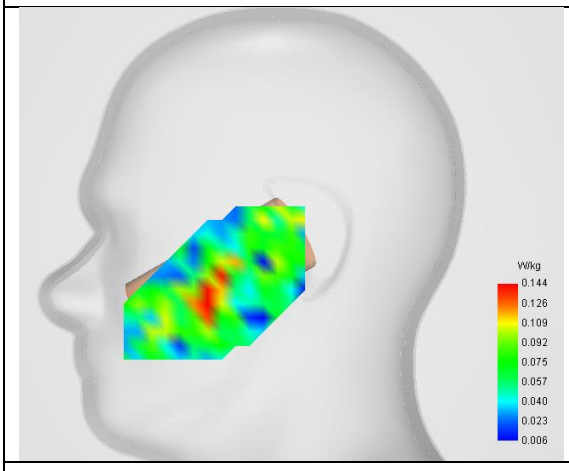
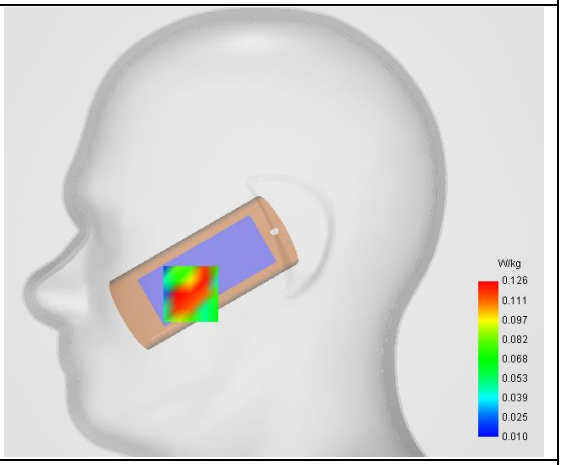
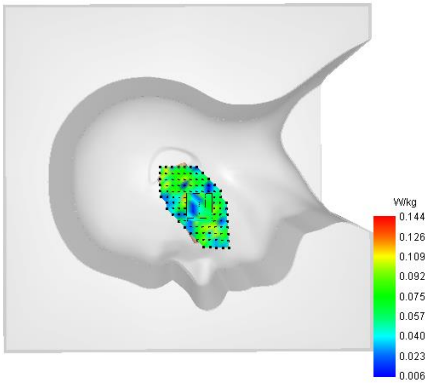
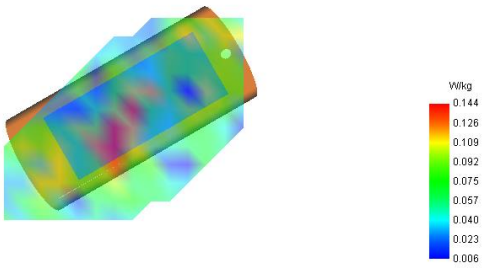
Maximum location: X=3.00, Y=-32.00 ; SAR Peak: 0.86 W/kg

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Hot spot position**
	

Plot 15: DUT: Mobile phone; EUT Model: Q1

Test Date	2022.10.08
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Right head
Device Position	Cheek
Band	LTE band 7
Signal	LTE FDD
Frequency	2528.700
SAR 10g (W/Kg)	0.086
SAR 1g (W/Kg)	0.149

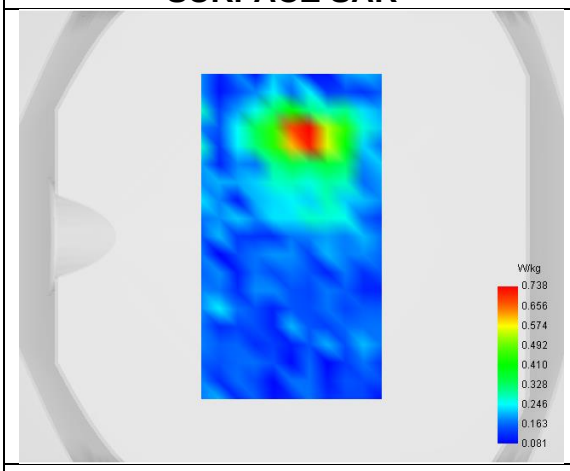
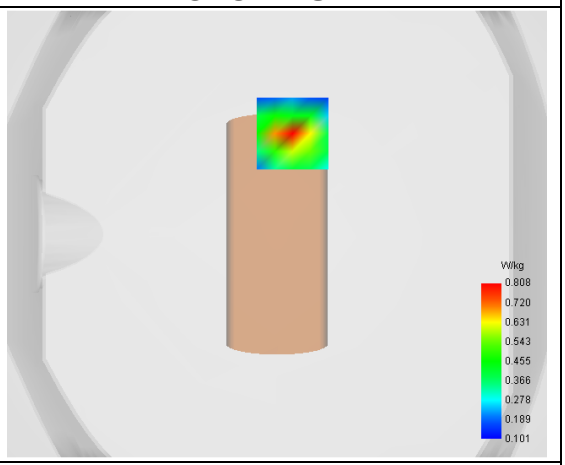
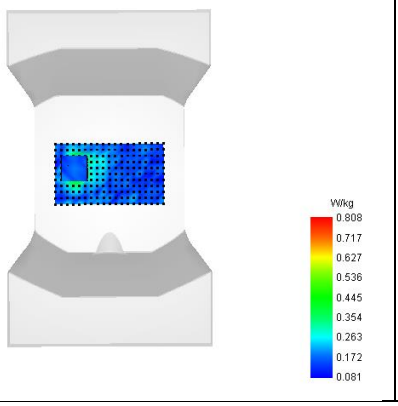
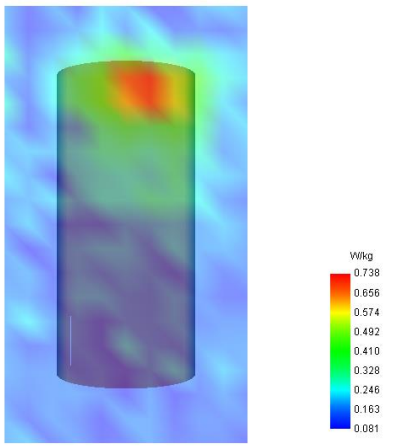
Maximum location: X=-48.00, Y=-36.00 ; SAR Peak: 0.28 W/kg

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Hot spot position**
	

Plot 16: DUT: Mobile phone; EUT Model: Q1

Test Date	2022.10.08
Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 7
Signal	LTE FDD
Frequency	2553.700
SAR 10g (W/Kg)	0.437
SAR 1g (W/Kg)	0.778

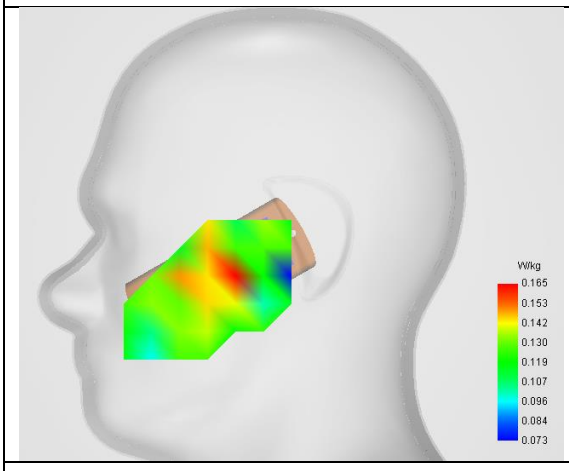
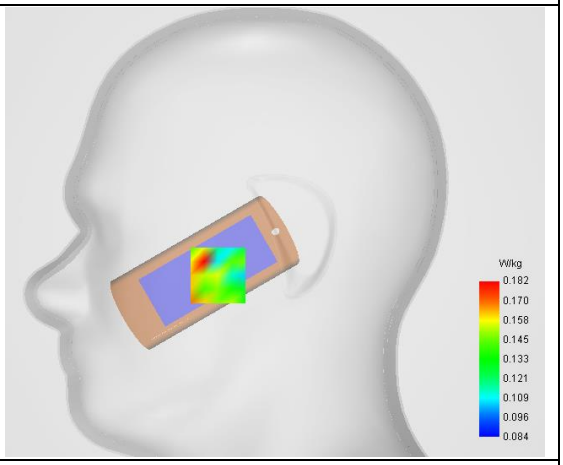
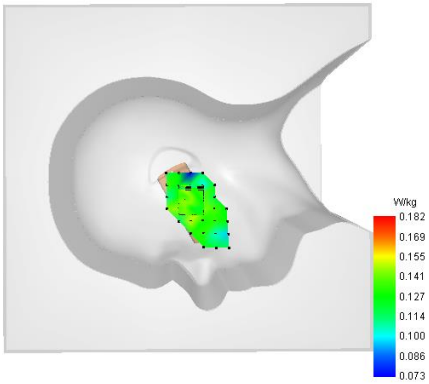
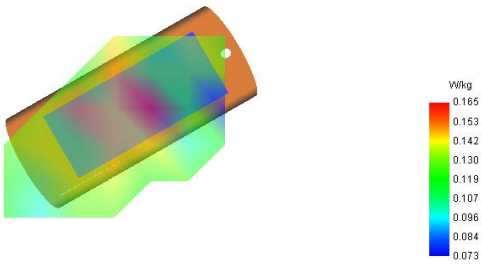
Maximum location: X=7.00, Y=45.00 ; SAR Peak: 1.42 W/kg

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Hot spot position**
	

Plot 17: DUT: Mobile phone; EUT Model: Q1

Test Date	2022.10.11
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Right head
Device Position	Cheek
Band	LTE band 17
Signal	LTE FDD
Frequency	708.200
SAR 10g (W/Kg)	0.141
SAR 1g (W/Kg)	0.185

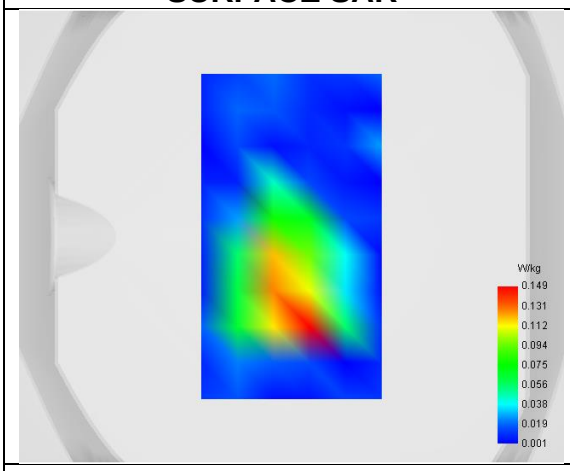
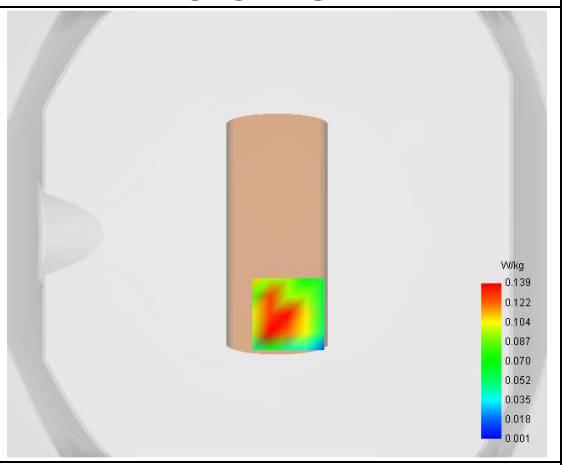
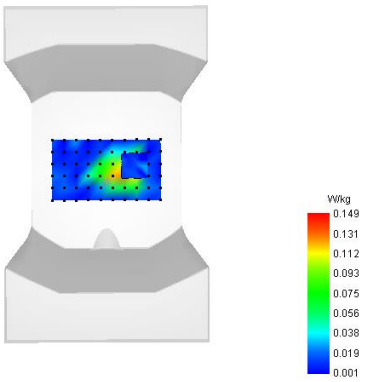
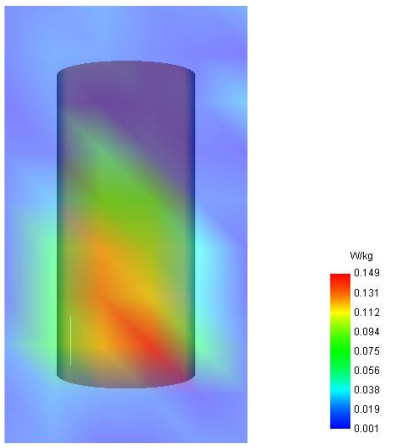
Maximum location: X=-33.00, Y=-25.00 ; SAR Peak: 0.29 W/kg

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Hot spot position**
	

Plot 18: DUT: Mobile phone; EUT Model: Q1

Test Date	2022.10.11
Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 17
Signal	LTE FDD
Frequency	708.200
SAR 10g (W/Kg)	0.079
SAR 1g (W/Kg)	0.161

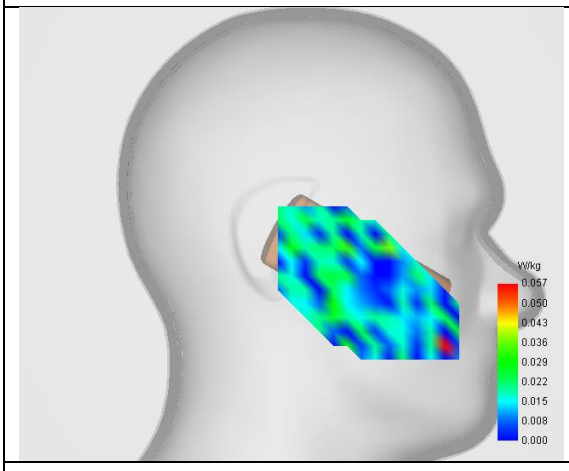
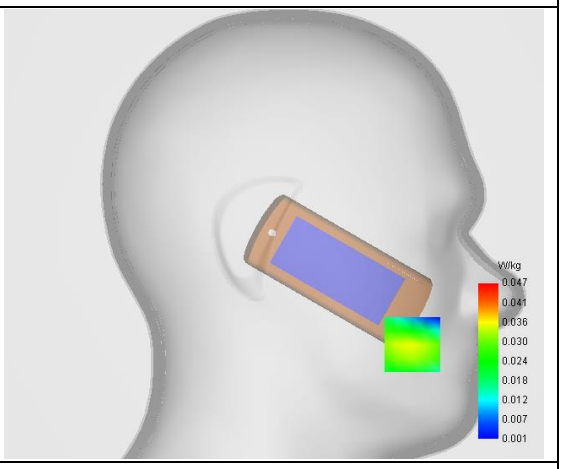
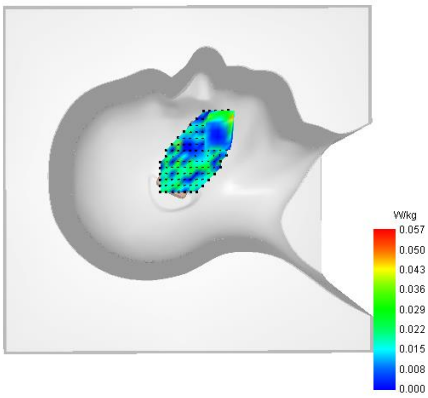
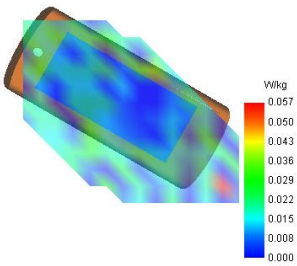
Maximum location: X=5.00, Y=-36.00 ; SAR Peak: 0.33 W/kg

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Hot spot position**
	

Plot 19: DUT: Mobile phone; EUT Model: Q1

Test Date	2022.10.12
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Left head
Device Position	Tilt
Band	Bluetooth
Signal	Bluetooth
Frequency	2402.000
SAR 10g (W/Kg)	0.023
SAR 1g (W/Kg)	0.038

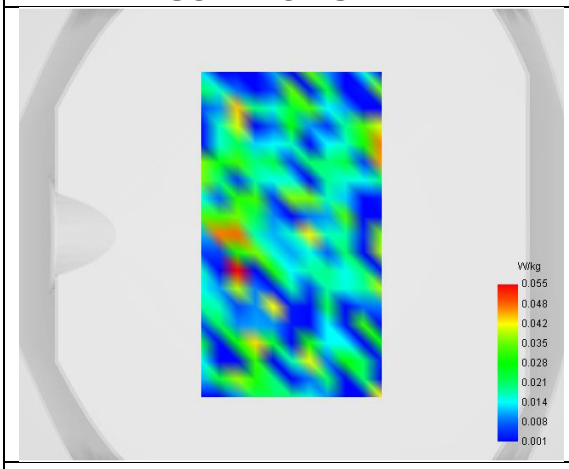
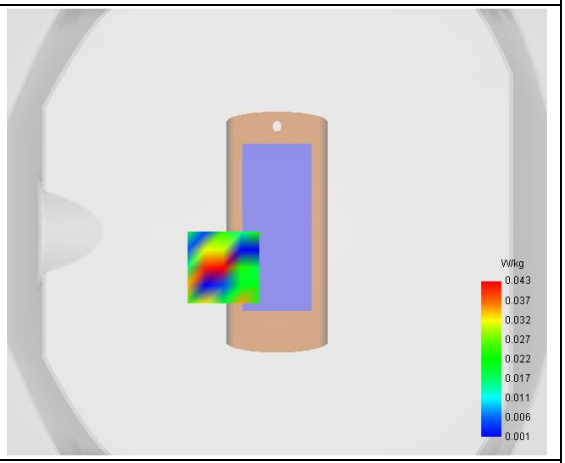
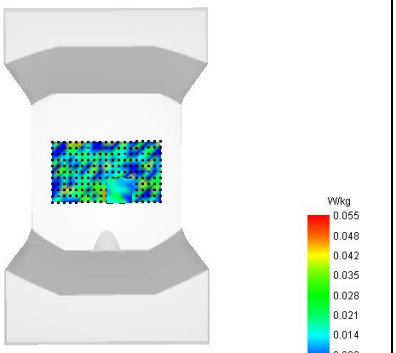
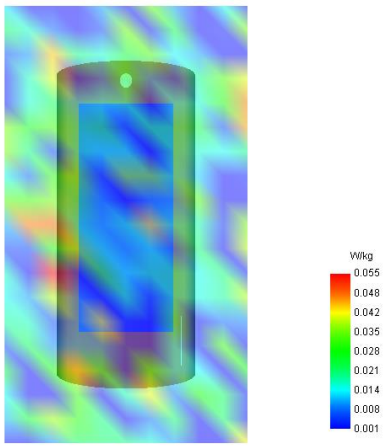
Maximum location: X=-80.00, Y=-64.00 ; SAR Peak: 0.07 W/kg

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Hot spot position**
	

Plot 20: DUT: Mobile phone; EUT Model: Q1

Test Date	2022.10.12
Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	Bluetooth
Signal	Bluetooth
Frequency	2402.000
SAR 10g (W/Kg)	0.022
SAR 1g (W/Kg)	0.049

Maximum location: X=-24.00, Y=-16.00 ; SAR Peak: 0.11 W/kg

SURFACE SAR	VOLUME SAR
	
3D screen shot	**Hot spot position**
	

Appendix C. Probe Calibration and Dipole Calibration Report

Refer the appendix Calibration Report.

※※※※※END OF THE REPORT※※※※※