

FCC SAR EVALUATION REPORT

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

Product Name : Boha Handheld Scanner

Trademark : BOHA!™

Model Name : RD52

Family Model : BOHA!™ Handheld 2

Report No. : S19111503203001

FCC ID : RBP-RD52

Prepared for

TransAct Technologies Inc

2319 Whitney Avenue, Suite 3B Hamden, CT 06518-3509

Prepared by

Shenzhen NTEK Testing Technology Co., Ltd.

1/F, Building E, Fenda Science Park Sanwei, Xixiang, Bao'an District,

Shenzhen, Guangdong, China

Tel.: +86-755-6115 6588 Fax.: +86-755-6115 6599

Website: <http://www.ntek.org.cn>

※ ※ Revision History ※ ※

REV.	DESCRIPTION	ISSUED DATE	REMARK
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1. General Information

1.1. RF exposure limits

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

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

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

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

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

Occupational/Controlled Environments:

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

General Population/Uncontrolled Environments:

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

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

1.2. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for RD52 are as follows.

Band	Max Reported SAR Value(W/kg)			
	1-g Head	1-g Body-Worn (Separation distance of 10mm)	1-g Hotspot (Separation distance of 10mm)	Max Simultaneous Tx
LTE Band 2	0.079	0.128	0.128	0.805
LTE Band 4	0.067	0.119	0.119	
LTE Band 5	0.106	0.182	0.182	
LTE Band 17	0.037	0.072	0.072	
WLAN 2.4G	0.028	0.049	0.049	
WLAN 5.2G	0.097	0.453	0.453	
WLAN 5.8G	0.215	0.623	0.623	

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

1.3. EUT Description

Device Information			
Product Name	Boha Handheld Scanner		
Trade Name	BOHA!™		
Model Name	RD52		
Family Model	BOHA!™ Handheld 2		
FCC ID	RBP-RD52		
Device Phase	Identical Prototype		
Exposure Category	General population / Uncontrolled environment		
Antenna	FPCB Antenna		
Battery Information	DC 3.8V, 4000mAh, 15.2Wh		
Device Operating Configurations			
Supporting Mode(s)	LTE Band 2/4/5/17, WLAN 2.4G/5.2G/5.8G, Bluetooth, NFC		
Test Modulation	LTE(QPSK/16QAM), WLAN(DSSS/OFDM), Bluetooth(GFSK, π/4-DQPSK, 8DPSK), NFC(ASK)		
Device Class	B		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	LTE Band 2	1850-1910	1930-1990
	LTE Band 4	1710-1755	2110-2155

	LTE Band 5	824-849	869-894
	LTE Band 17	704-716	734-746
	WLAN 2.4G	2412-2462	
	WLAN 5.2G	5180-5240	
	WLAN 5.8G	5745-5825	
	Bluetooth	2402-2480	
	NFC	13.56	
Power Class	3, tested with power control all Max.(LTE Band 2)		
	3, tested with power control all Max.(LTE Band 4)		
	3, tested with power control all Max.(LTE Band 5)		
	3, tested with power control all Max.(LTE Band 17)		
Test Channels (low-mid-high)	18607-18900-19193(LTE Band 2 BW=1.4MHz)		
	18615-18900-19185(LTE Band 2 BW=3MHz)		
	18625-18900-19175(LTE Band 2 BW=5MHz)		
	18650-18900-19150(LTE Band 2 BW=10MHz)		
	18675-18900-19125(LTE Band 2 BW=15MHz)		
	18700-18900-19100(LTE Band 2 BW=20MHz)		
	19957-20175-20393(LTE Band 4 BW=1.4MHz)		
	19965-20175-20385(LTE Band 4 BW=3MHz)		
	19975-20175-20375(LTE Band 4 BW=5MHz)		
	20000-20175-20350(LTE Band 4 BW=10MHz)		
	20025-20175-20325(LTE Band 4 BW=15MHz)		
	20050-20175-20300(LTE Band 4 BW=20MHz)		
	20407-20525-20643(LTE Band 5 BW=1.4MHz)		
	20415-20525-20635(LTE Band 5 BW=3MHz)		
	20425-20525-20625(LTE Band 5 BW=5MHz)		
	20450-20525-20600(LTE Band 5 BW=10MHz)		
	23755-23790-23825(LTE Band 17 BW=5MHz)		
	23780-23790-23800(LTE Band 17 BW=10MHz)		
	1-3-6-9-11(WLAN 2.4G)		
36-38-40-46-48(WLAN 5.2G)			
149-151-157-159-165(WLAN 5.8G)			

1.4. Test specification(s)

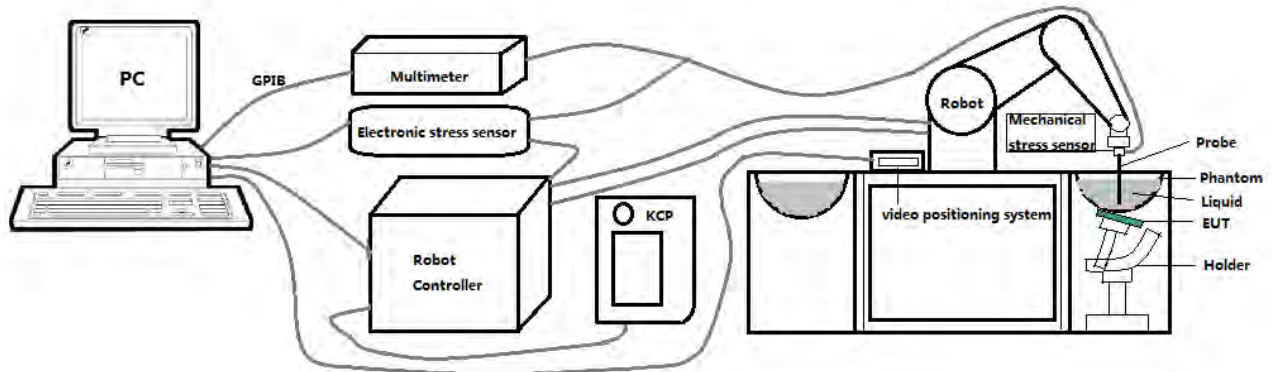
FCC 47 CFR Part 2(2.1093)
ANSI/IEEE C95.1-1992
IEEE Std 1528-2013
KDB 865664 D01 SAR measurement 100 MHz to 6 GHz
KDB 865664 D02 RF Exposure Reporting
KDB 447498 D01 General RF Exposure Guidance
KDB 248227 D01 802.11 Wi-Fi SAR
KDB 941225 D05 SAR for LTE Devices
KDB 941225 D06 Hotspot SAR
KDB 648474 D04 Handset SAR

1.5. Ambient Condition

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

2. SAR Measurement System

2.1. SATIMO SAR Measurement Set-up Diagram



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

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

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

2.2. Robot

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



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

2.3. E-Field Probe

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

For the measurements the Specific Dosimetric E-Field Probe SN 41/18 EPGO330 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: ± 0.10 dB
 - Axial isotropy: 0.06 dB
 - Hemispherical Isotropy: 0.09 dB
 - Calibration range: 650MHz to 5900MHz for head & body simulating liquid.
 - Lower detection limit: 9mW/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

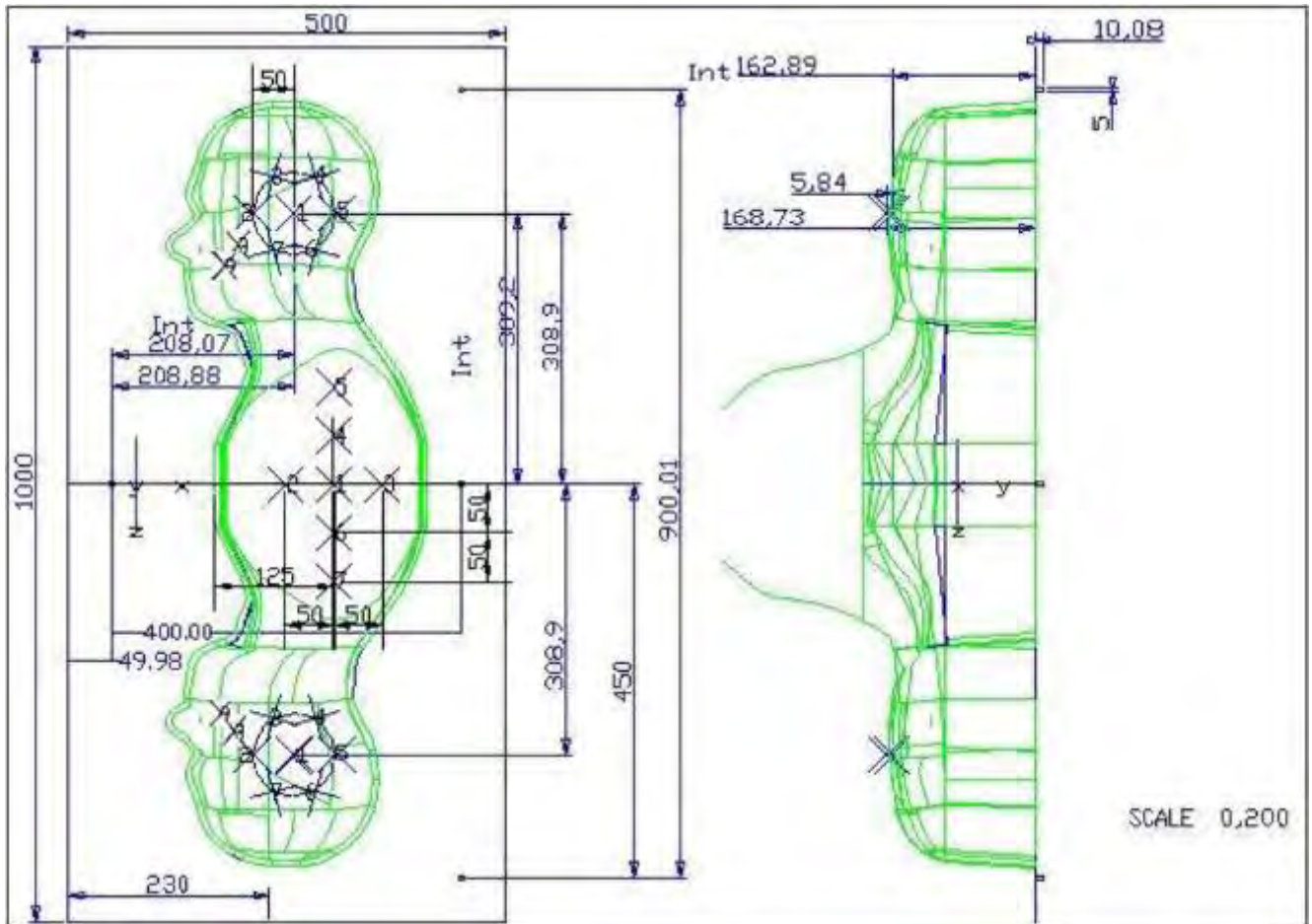
Photo of SAM phantom SN 16/15 SAM119



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

2.4.1. Technical Data

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

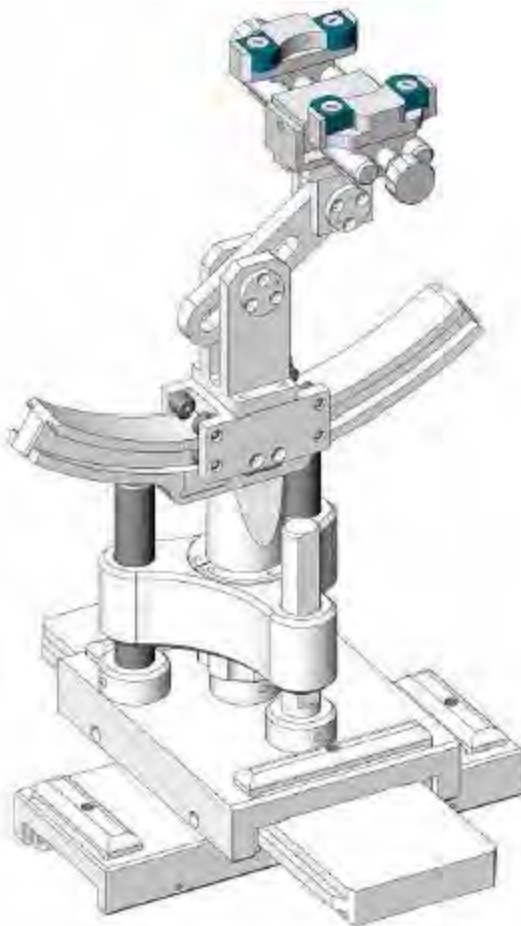


Serial Number	Left Head(mm)		Right Head(mm)		Flat Part(mm)	
	1	2	1	2	1	2
SN 16/15 SAM119	2	2.02	2	2.08	1	2.09
	3	2.05	3	2.06	2	2.06
	4	2.07	4	2.07	3	2.08
	5	2.08	5	2.08	4	2.10
	6	2.05	6	2.07	5	2.10
	7	2.05	7	2.05	6	2.07
	8	2.07	8	2.06	7	2.07
	9	2.08	9	2.06	-	-

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
<input checked="" type="checkbox"/>	MVG	E FIELD PROBE	SSE2	SN 41/18 EPGO330	May 21, 2019	May 20, 2020
<input checked="" type="checkbox"/>	MVG	750 MHz Dipole	SID750	SN 03/15 DIP 0G750-355	Apr. 19, 2018	Apr. 18, 2021
<input checked="" type="checkbox"/>	MVG	835 MHz Dipole	SID835	SN 03/15 DIP 0G835-347	Apr. 19, 2018	Apr. 18, 2021
<input type="checkbox"/>	MVG	900 MHz Dipole	SID900	SN 03/15 DIP 0G900-348	Apr. 19, 2018	Apr. 18, 2021
<input checked="" type="checkbox"/>	MVG	1800 MHz Dipole	SID1800	SN 03/15 DIP 1G800-349	Apr. 19, 2018	Apr. 18, 2021
<input checked="" type="checkbox"/>	MVG	1900 MHz Dipole	SID1900	SN 03/15 DIP 1G900-350	Apr. 19, 2018	Apr. 18, 2021
<input type="checkbox"/>	MVG	2000 MHz Dipole	SID2000	SN 03/15 DIP 2G000-351	Apr. 19, 2018	Apr. 18, 2021
<input checked="" type="checkbox"/>	MVG	2450 MHz Dipole	SID2450	SN 03/15 DIP 2G450-352	Apr. 19, 2018	Apr. 18, 2021
<input type="checkbox"/>	MVG	2600 MHz Dipole	SID2600	SN 03/15 DIP 2G600-356	Apr. 19, 2018	Apr. 18, 2021
<input checked="" type="checkbox"/>	MVG	5000 MHz Dipole	SWG5500	SN 13/14 WGA 33	Apr. 19, 2018	Apr. 18, 2021
<input checked="" type="checkbox"/>	MVG	Liquid measurement Kit	SCLMP	SN 21/15 OCPG 72	NCR	NCR
<input checked="" type="checkbox"/>	MVG	Power Amplifier	N.A	AMPLISAR_28/14_003	NCR	NCR
<input checked="" type="checkbox"/>	KEITHLEY	Millivoltmeter	2000	4072790	NCR	NCR
<input type="checkbox"/>	R&S	Universal radio communication tester	CMU200	117858	Aug. 06, 2019	Aug. 05, 2020
<input checked="" type="checkbox"/>	R&S	Wideband radio communication tester	CMW500	103917	Aug. 28, 2019	Aug. 27, 2020
<input checked="" type="checkbox"/>	HP	Network Analyzer	8753D	3410J01136	Aug. 06, 2019	Aug. 05, 2020
<input checked="" type="checkbox"/>	Agilent	PSG Analog Signal Generator	E8257D	MY51110112	Aug. 06, 2019	Aug. 05, 2020

<input checked="" type="checkbox"/>	Agilent	Power meter	E4419B	MY45102538	Aug. 06, 2019	Aug. 05, 2020
<input checked="" type="checkbox"/>	Agilent	Power sensor	E9301A	MY41495644	Aug. 06, 2019	Aug. 05, 2020
<input checked="" type="checkbox"/>	Agilent	Power sensor	E9301A	US39212148	Aug. 06, 2019	Aug. 05, 2020
<input checked="" type="checkbox"/>	MCLI/USA	Directional Coupler	CB11-20	0D2L51502	Aug. 06, 2019	Aug. 05, 2020

3. SAR Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

- (a) For WWAN power measurement, use base station simulator to configure EUT WWAN transmission in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.
- (b) Read the WWAN RF power level from the base station simulator.
- (c) For WLAN/Bluetooth power measurement, use engineering software to configure EUT WLAN/Bluetooth continuously transmission, at maximum RF power in each supported wireless interface and frequency band.
- (d) Connect EUT RF port through RF cable to the power meter, and measure WLAN/Bluetooth output power.

<SAR measurement>

- (a) Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/Bluetooth continuously transmission, at maximum RF power, in the highest power channel.
- (b) Place the EUT in the positions as Appendix A demonstrates.
- (c) Set scan area, grid size and other setting on the OPENSAR software.
- (d) Measure SAR results for the highest power channel on each testing position.
- (e) Find out the largest SAR result on these testing positions of each band.
- (f) Measure SAR results for other channels in worst SAR testing position if the reported SAR of highest power channel is larger than 0.8 W/kg.

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

- (a) Power reference measurement
- (b) Area scan
- (c) Zoom scan
- (d) Power drift measurement

3.1. Power Reference

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

3.2. Area scan & Zoom scan

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

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

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

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

		≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface		5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location		$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: $\Delta x_{Area}, \Delta y_{Area}$		≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
		When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be \leq the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: $\Delta x_{Zoom}, \Delta y_{Zoom}$		≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$	≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1 st two points closest to phantom surface	≤ 4 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$
Minimum zoom scan volume	x, y, z	≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

* When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

3.3. Description of interpolation/extrapolation scheme

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

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

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

3.4. Volumetric Scan

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

3.5. Power Drift

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

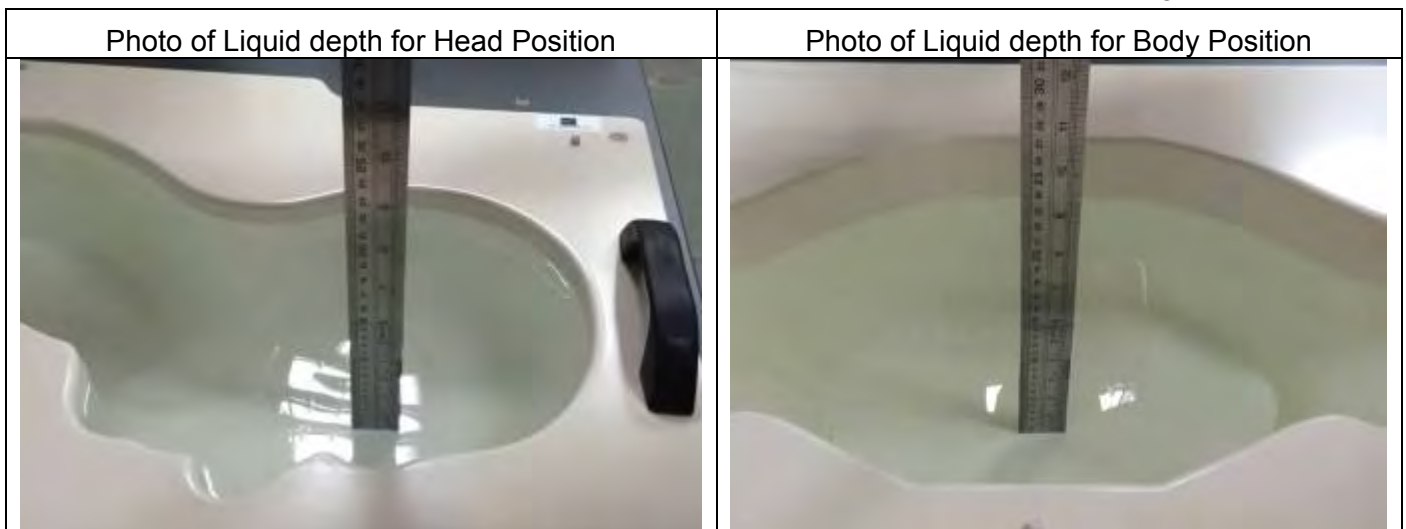
4. System Verification Procedure

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									
	750	835	900	1800	1900	2000	2450	2600	5200	5800
Frequency Band (MHz)										
Water	34.40	34.40	34.40	55.36	55.36	57.87	57.87	57.87	65.53	65.53
NaCl	0.79	0.79	0.79	0.35	0.35	0.16	0.16	0.16	0.00	0.00
1,2-Propanediol	64.81	64.81	64.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triton X-100	0.00	0.00	0.00	30.45	30.45	19.97	19.97	19.97	24.24	24.24
DGBE	0.00	0.00	0.00	13.84	13.84	22.00	22.00	22.00	10.23	10.23
Ingredients (% of weight)	Body Tissue									
	750	835	900	1800	1900	2000	2450	2600	5200	5800
Frequency Band (MHz)										
Water	50.30	50.30	50.30	69.91	69.91	71.88	71.88	71.88	79.54	79.54
NaCl	0.60	0.60	0.60	0.13	0.13	0.16	0.16	0.16	0.00	0.00
1,2-Propanediol	49.10	49.10	49.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triton X-100	0.00	0.00	0.00	9.99	9.99	19.97	19.97	19.97	11.24	11.24
DGBE	0.00	0.00	0.00	19.97	19.97	7.99	7.99	7.99	9.22	9.22

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



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.

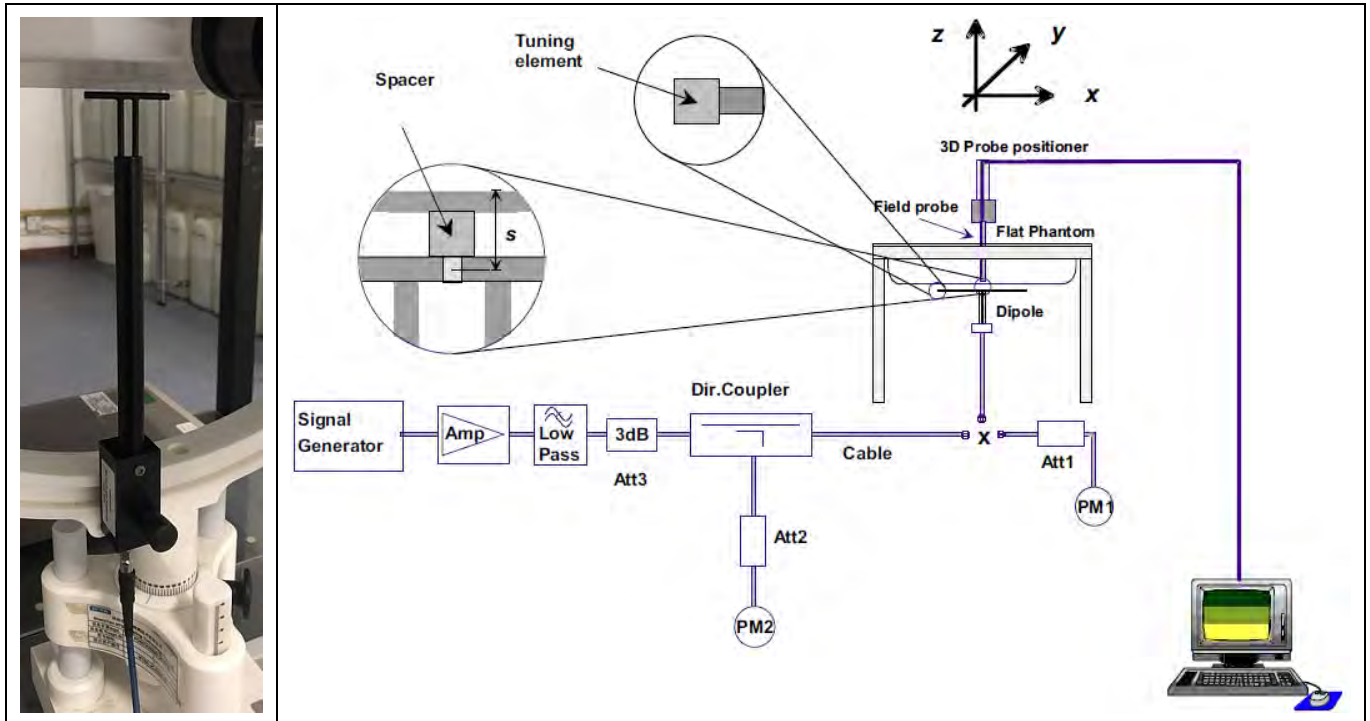
Tissue Type	Measured Frequency (MHz)	Target Tissue		Measured Tissue		Liquid Temp.	Test Date
		ϵ_r ($\pm 5\%$)	σ (S/m) ($\pm 5\%$)	ϵ_r	σ (S/m)		
Head 750	750	41.96 (39.86~44.06)	0.89 (0.85~0.93)	41.23	0.91	21.5 °C	Dec. 04, 2019
Body 750	750	55.55 (52.77~58.33)	0.96 (0.91~1.01)	55.30	0.97	21.4 °C	Dec. 04, 2019
Head 850	835	41.50 (39.43~43.58)	0.90 (0.86~0.95)	40.53	0.94	21.5 °C	Dec. 15, 2019
Body 850	835	55.20 (52.44~57.96)	0.97 (0.92~1.02)	54.37	1.01	21.0 °C	Dec. 15, 2019
Head 1800	1800	40.00 (38.00~42.00)	1.40 (1.33~1.47)	38.48	1.41	21.5 °C	Dec. 10, 2019
Body 1800	1800	53.30 (50.64~55.97)	1.52 (1.44~1.60)	53.24	1.56	21.2 °C	Nov. 30, 2019
Head 1900	1900	40.00 (38.00~42.00)	1.40 (1.33~1.47)	40.96	1.46	21.5 °C	Dec. 04, 2019
Body 1900	1900	53.30 (50.64~55.97)	1.52 (1.44~1.60)	52.57	1.57	21.5 °C	Dec. 04, 2019
Head 2450	2450	39.20 (37.24~41.16)	1.80 (1.71~1.89)	38.72	1.88	21.5 °C	Dec. 10, 2019
Body 2450	2450	52.70 (50.07~55.34)	1.95 (1.85~2.05)	52.09	2.03	21.8 °C	Nov. 30, 2019
Head 5200	5200	36.00 (34.20~37.80)	4.66 (4.43~4.89)	35.83	4.63	21.5 °C	Dec. 06, 2019
Body 5200	5200	49.00 (46.55~51.45)	5.30 (5.04~5.57)	49.66	5.29	21.5 °C	Dec. 06, 2019
Head 5800	5800	35.30 (33.54~37.07)	5.27 (5.01~5.53)	34.74	5.18	21.9 °C	Dec. 06, 2019
Body 5800	5800	48.20 (45.79~50.61)	6.00 (5.70~6.30)	48.35	6.06	21.2 °C	Dec. 06, 2019

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 Head	8.56 (7.70~9.42)	5.55 (5.00~6.11)	8.53	5.51	21.5 °C	Dec. 04, 2019
750MHz Body	8.85 (7.97~9.74)	5.91 (5.32~6.50)	8.86	5.89	21.4 °C	Dec. 04, 2019
835MHz Head	9.55 (8.60~10.51)	6.10 (5.49~6.71)	9.45	6.02	21.5 °C	Dec. 15, 2019
835MHz Body	9.83 (8.85~10.81)	6.45 (5.81~7.10)	9.70	6.60	21.0 °C	Dec. 15, 2019
1800MHz Head	38.11 (34.30~41.92)	20.05 (18.05~22.06)	38.06	20.10	21.5 °C	Dec. 10, 2019
1800MHz Body	38.13 (34.32~41.94)	20.65 (18.59~22.72)	38.12	20.63	21.2 °C	Nov. 30, 2019
1900MHz Head	38.92 (35.03~42.81)	20.09 (18.08~22.10)	38.90	20.07	21.5 °C	Dec. 04, 2019
1900MHz Body	39.02 (35.12~42.92)	20.57 (18.51~22.63)	39.10	20.59	21.5 °C	Dec. 04, 2019
2450MHz Head	53.76 (48.38~59.14)	24.12 (21.71~26.53)	53.69	24.16	21.5 °C	Dec. 10, 2019
2450MHz Body	52.90 (47.61~58.19)	24.09 (21.68~26.50)	52.88	24.01	21.8 °C	Nov. 30, 2019
5200MHz Head	160.94 (144.85~177.03)	55.97 (50.37~61.57)	160.77	55.84	21.5 °C	Dec. 06, 2019
5200MHz Body	156.85 (141.17~172.54)	55.20 (49.68~60.72)	156.77	55.10	21.5 °C	Dec. 06, 2019
5800MHz Head	184.13 (165.72~202.54)	62.74 (56.47~69.01)	184.10	62.56	21.9 °C	Dec. 06, 2019
5800MHz Body	169.30 (152.37~186.23)	58.49 (52.64~64.34)	169.11	58.40	21.2 °C	Dec. 06, 2019

5. SAR Measurement variability and uncertainty

5.1. SAR measurement variability

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

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

5.2. SAR measurement uncertainty

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

6. RF Exposure Positions

6.1. Ear and handset reference point

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



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

6.2. Definition of the cheek position

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

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

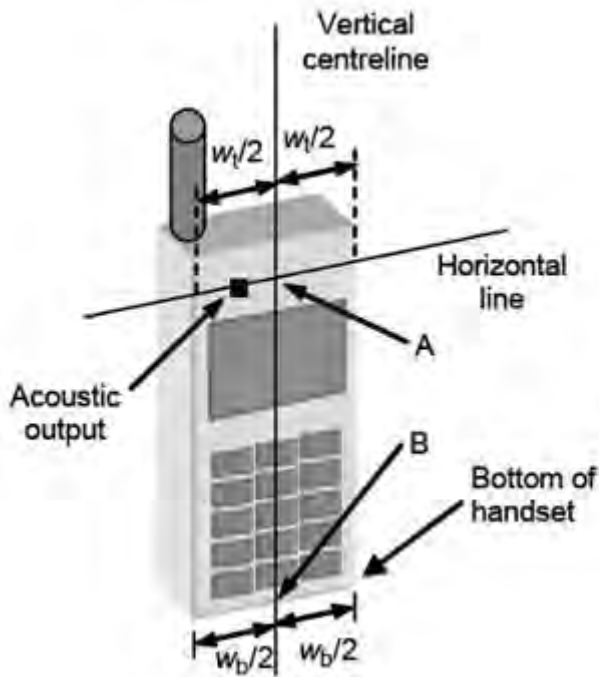


Fig 6.2.1 Handset vertical and horizontal reference lines—fixed case

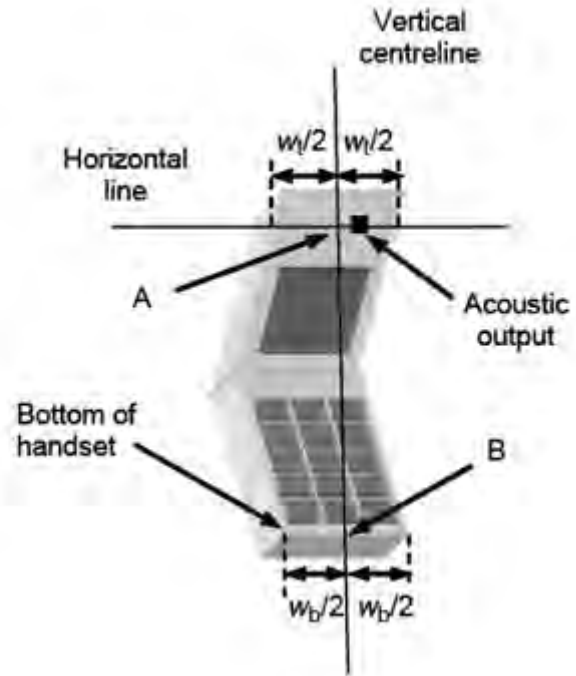


Fig 6.2.2 Handset vertical and horizontal reference lines—“clam-shell case”

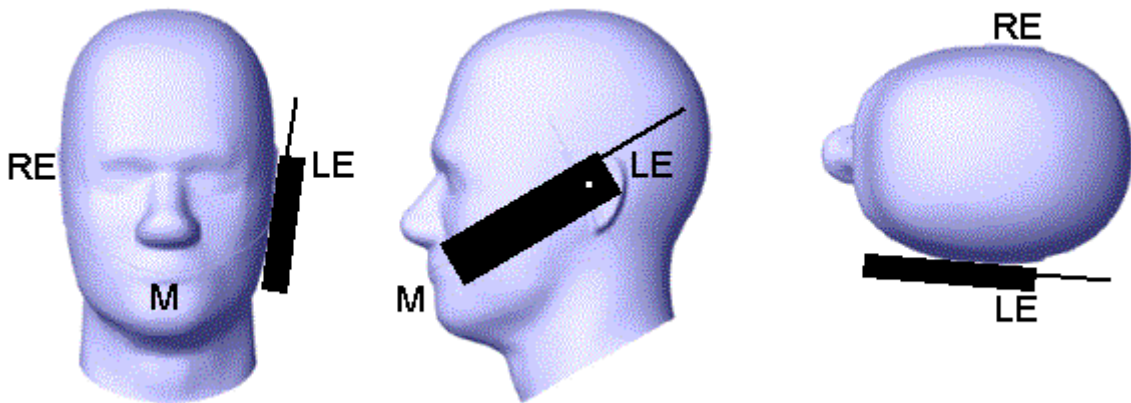


Fig 6.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

6.3. Definition of the tilt position

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

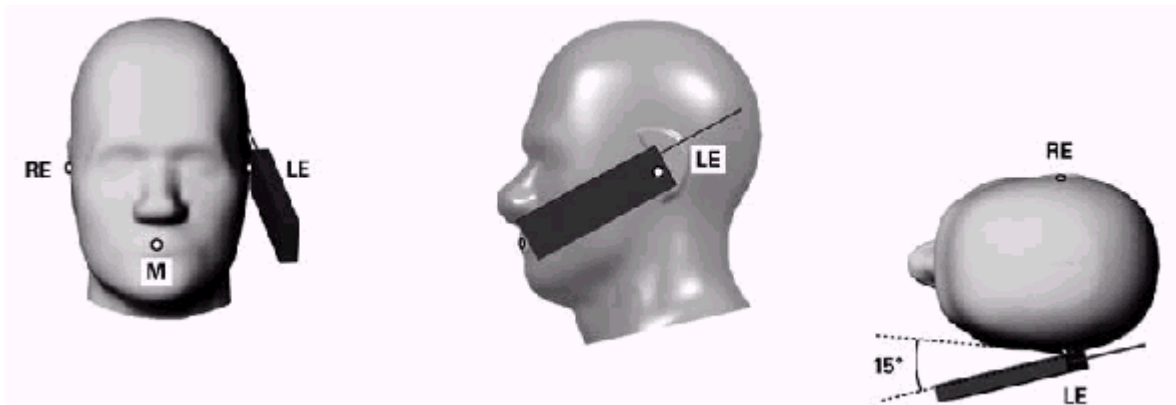


Figure 6.3.1 – Tilt position of the wireless device on the left side of SAM

6.4. Body Worn Accessory

1. Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 6.4.1). Per KDB 648474 D04, body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB 447498 D01 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for body-worn accessory, measured without a headset connected to the handset is $< 1.2 \text{ W/kg}$, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a handset attached to the handset.
2. Accessories for body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest

spacing to the body. Then multiple accessories that contain metallic components are test with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

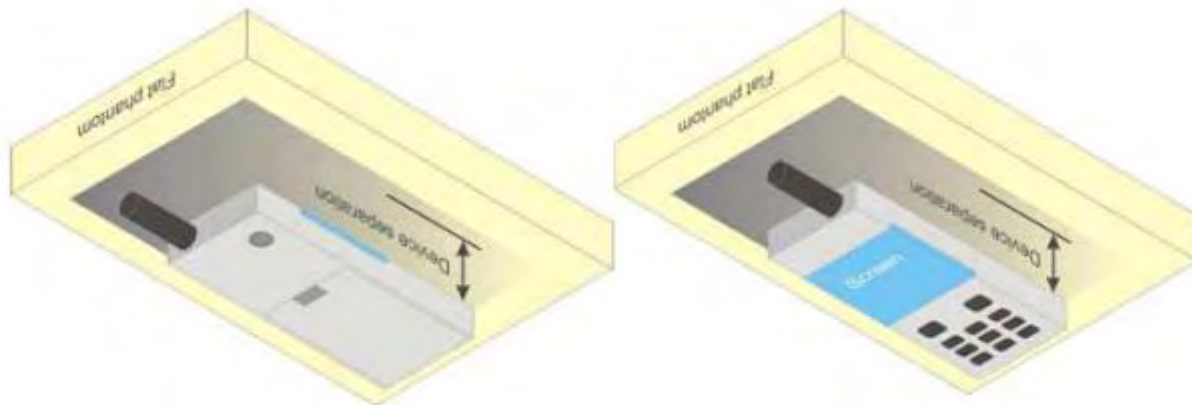


Figure 6.4.1 – Test positions for body-worn devices

6.5. Wireless Router Devices

Some battery-operated handsets have the capability to transmit and receive user through simultaneous transmission of WLAN simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06 where SAR test considerations for handsets ($L \times W \geq 9 \text{ cm} \times 5 \text{ cm}$) are based on a composite test separation distance of 10mm from the front, back and edges of the device containing transmitting antennas within 2.5cm of their edges, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WLAN transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each frequency transmission and mode separately and spatially summed with the WLAN transmitter according to FCC KDB Publication 447498 D01 publication procedures. The “Portable Hotspot” feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.

7. RF Output Power

7.1. LTE Conducted Power

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		18607/1850.7	18900/1880	19193/1909.3
LTE Band 2	1.4MHz	QPSK	1	0	19.00	18.38	18.42	17.95
			1	2	19.00	18.43	18.47	17.99
			1	5	19.00	18.37	18.40	17.91
			3	0	19.00	18.40	18.44	17.96
			3	1	19.00	18.31	18.35	17.86
			3	2	19.00	18.33	18.41	17.88
		16QAM	6	0	18.00	17.33	17.41	16.86
			1	0	18.00	17.54	17.58	16.82
			1	2	18.00	17.60	17.64	16.90
			1	5	18.00	17.54	17.58	16.80
			3	0	18.00	17.57	17.65	17.10
			3	1	18.00	17.49	17.55	17.02
			3	2	18.00	17.48	17.60	17.07
6	0	17.00	16.49	16.52	16.03			
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		18615/1851.5	18900/1880	19185/1908.5
LTE Band 2	3MHz	QPSK	1	0	19.00	18.35	18.38	18.00
			1	7	19.00	18.29	18.36	17.93
			1	14	19.00	18.29	18.36	17.86
			8	0	18.00	17.41	17.43	17.01
			8	4	18.00	17.39	17.44	16.98
			8	7	18.00	17.38	17.45	16.93
			15	0	18.00	17.35	17.39	16.91
		16QAM	1	0	18.00	17.73	17.56	16.87
			1	7	18.00	17.67	17.53	16.81
			1	14	18.00	17.68	17.51	16.72
			8	0	17.00	16.38	16.41	15.99
			8	4	17.00	16.36	16.43	15.95
			8	7	17.00	16.35	16.44	15.91
15	0	17.00	16.32	16.29	15.94			

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		18625/1852.5	18900/1880	19175/1907.5
LTE Band 2	5MHz	QPSK	1	0	19.00	18.42	18.46	18.13
			1	12	19.00	18.36	18.41	17.95
			1	24	19.00	18.36	18.42	17.84
			12	0	18.00	17.43	17.46	17.07
			12	6	18.00	17.43	17.45	17.02
			12	11	18.00	17.40	17.45	16.97
			25	0	18.00	17.35	17.38	16.97
		16QAM	1	0	18.00	17.95	17.75	17.46
			1	12	18.00	17.86	17.66	17.29
			1	24	18.00	17.90	17.69	17.20
			12	0	17.00	16.40	16.39	16.11
			12	6	17.00	16.37	16.36	16.04
			12	11	17.00	16.38	16.35	15.96
			25	0	17.00	16.27	16.37	15.94
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		18650/1855	18900/1880	19150/1905
LTE Band 2	10MHz	QPSK	1	0	19.00	18.40	18.46	18.39
			1	24	19.00	18.40	18.47	18.22
			1	49	19.00	18.38	18.47	17.94
			25	0	18.00	17.37	17.41	17.23
			25	12	18.00	17.34	17.41	17.14
			25	24	18.00	17.36	17.43	16.97
			50	0	18.00	17.33	17.41	17.10
		16QAM	1	0	18.00	17.80	17.61	17.27
			1	24	18.00	17.80	17.62	17.05
			1	49	18.00	17.82	17.62	16.81
			25	0	17.00	16.34	16.38	16.19
			25	12	17.00	16.32	16.35	16.10
			25	24	17.00	16.32	16.37	15.96
			50	0	17.00	16.30	16.41	16.07
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		18675/1857.5	18900/1880	19125/1902.5

LTE Band 2	15MHz	QPSK	1	0	19.00	18.37	18.52	18.51
			1	37	19.00	18.32	18.42	18.17
			1	74	19.00	18.40	18.47	17.88
			36	0	18.00	17.42	17.53	17.42
			36	18	18.00	17.44	17.48	17.28
			36	37	18.00	17.46	17.47	17.08
			75	0	18.00	17.44	17.49	17.25
		16QAM	1	0	18.00	17.85	17.70	17.67
			1	37	18.00	17.79	17.57	17.36
			1	74	18.00	17.88	17.64	17.06
			36	0	17.00	16.44	16.53	16.35
			36	18	17.00	16.44	16.51	16.24
			36	37	17.00	16.49	16.50	16.06
			75	0	17.00	16.41	16.44	16.27
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		18700/1860	18900/1880	19100/1900
LTE Band 2	20MHz	QPSK	1	0	19.00	18.43	18.55	18.62
			1	49	19.00	18.46	18.51	18.41
			1	99	19.00	18.43	18.56	17.98
			50	0	18.00	17.40	17.48	17.51
			50	24	18.00	17.43	17.45	17.35
			50	49	18.00	17.45	17.47	17.17
			100	0	18.00	17.40	17.45	17.31
		16QAM	1	0	18.00	17.77	17.82	17.86
			1	49	18.00	17.77	17.74	17.64
			1	99	18.00	17.78	17.81	17.27
			50	0	17.00	16.41	16.42	16.51
			50	24	17.00	16.43	16.40	16.36
			50	49	17.00	16.45	16.40	16.16
			100	0	17.00	16.37	16.40	16.30

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		19957/1710.7	20175/1732.5	20393/1754.3
LTE Band 4	1.4MHz	QPSK	1	0	19.00	18.20	17.89	17.69
			1	2	19.00	18.27	17.94	17.71
			1	5	19.00	18.12	17.86	17.63

			3	0	19.00	18.25	17.96	17.67
			3	1	19.00	18.16	17.85	17.59
			3	2	19.00	18.17	17.91	17.60
			6	0	18.00	17.12	16.88	16.58
		16QAM	1	0	18.00	17.38	17.09	16.54
			1	2	18.00	17.44	17.13	16.61
			1	5	18.00	17.35	17.08	16.50
			3	0	18.00	17.42	17.20	16.81
			3	1	18.00	17.34	17.09	16.73
			3	2	18.00	17.33	17.14	16.75
6	0	17.00	16.32	16.01	15.75			
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		19965/1711.5	20175/1732.5	20385/1753.5
LTE Band 4	3MHz	QPSK	1	0	19.00	18.15	17.86	17.73
			1	7	19.00	18.10	17.84	17.65
			1	14	19.00	18.04	17.84	17.60
			8	0	18.00	17.20	16.95	16.74
			8	4	18.00	17.18	16.93	16.69
			8	7	18.00	17.16	16.92	16.65
			15	0	18.00	17.12	16.88	16.64
		16QAM	1	0	18.00	17.57	17.06	16.61
			1	7	18.00	17.50	17.04	16.52
			1	14	18.00	17.47	17.04	16.43
			8	0	17.00	16.22	15.91	15.73
			8	4	17.00	16.19	15.92	15.66
			8	7	17.00	16.17	15.90	15.61
			15	0	17.00	16.15	15.80	15.68
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		19975/1712.5	20175/1732.5	20375/1752.5
LTE Band 4	5MHz	QPSK	1	0	19.00	18.25	17.95	17.88
			1	12	19.00	18.16	17.89	17.69
			1	24	19.00	18.08	17.87	17.58
			12	0	18.00	17.20	16.98	16.84
			12	6	18.00	17.18	16.94	16.76
			12	11	18.00	17.11	16.93	16.71
			25	0	18.00	17.11	16.89	16.71

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20000/1715	20175/1732.5	20350/1750
16QAM			1	0	18.00	17.79	17.29	17.21
			1	12	18.00	17.64	17.16	17.04
			1	24	18.00	17.60	17.18	16.91
			12	0	17.00	16.20	15.92	15.84
			12	6	17.00	16.16	15.88	15.75
			12	11	17.00	16.10	15.88	15.69
			25	0	17.00	16.04	15.87	15.67
LTE Band 4	10MHz	QPSK	1	0	19.00	18.23	18.01	17.98
			1	24	19.00	18.10	17.94	17.91
			1	49	19.00	18.08	17.89	17.66
			25	0	18.00	17.11	16.94	16.87
			25	12	18.00	17.05	16.90	16.82
			25	24	18.00	17.04	16.90	16.74
			50	0	18.00	17.07	16.92	16.79
		16QAM	1	0	18.00	17.65	17.19	16.84
			1	24	18.00	17.50	17.13	16.78
			1	49	18.00	17.47	17.08	16.54
			25	0	17.00	16.12	15.92	15.85
			25	12	17.00	16.06	15.89	15.78
			25	24	17.00	16.05	15.88	15.72
			50	0	17.00	16.07	15.93	15.75
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20025/1717.5	20175/1732.5	20325/1747.5
LTE Band 4	15MHz	QPSK	1	0	19.00	18.22	18.05	17.91
			1	37	19.00	18.04	17.90	17.77
			1	74	19.00	18.05	17.89	17.61
			36	0	18.00	17.13	17.03	16.90
			36	18	18.00	17.10	16.96	16.91
			36	37	18.00	17.09	16.93	16.79
			75	0	18.00	17.12	16.97	16.86
		16QAM	1	0	18.00	17.64	17.25	17.07
			1	37	18.00	17.43	17.09	16.98
			1	74	18.00	17.44	17.09	16.79
36	0		17.00	16.14	16.08	15.86		

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20050/1720	20175/1732.5	20300/1745
			36	18		17.00	16.11	16.00
36	37	17.00	16.11	15.97	15.77			
75	0	17.00	16.10	15.94	15.87			
LTE Band 4	20MHz	QPSK	1	0	19.00	18.22	18.08	17.97
			1	49	19.00	18.08	17.98	17.96
			1	99	19.00	18.01	17.97	17.74
			50	0	18.00	17.12	17.03	16.91
			50	24	18.00	17.05	16.95	16.88
			50	49	18.00	17.06	16.94	16.87
			100	0	18.00	17.05	16.96	16.88
		16QAM	1	0	18.00	17.58	17.39	17.25
			1	49	18.00	17.39	17.25	17.21
			1	99	18.00	17.35	17.26	16.99
			50	0	17.00	16.14	16.01	15.92
			50	24	17.00	16.08	15.92	15.92
			50	49	17.00	16.07	15.92	15.88
			100	0	17.00	16.05	15.92	15.86

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20407/824.7	20525/836.5	20643/848.3
			1	0		21.00	20.42	20.13
1	2	21.00	20.50	20.19	20.53			
1	5	21.00	20.38	20.10	20.48			
3	0	21.00	20.43	20.19	20.49			
3	1	21.00	20.37	20.13	20.43			
3	2	21.00	20.40	20.17	20.49			
6	0	20.00	19.40	19.11	19.41			
LTE Band 5	1.4MHz	QPSK	1	0	20.00	19.56	19.35	19.37
			1	2	20.00	19.64	19.40	19.47
			1	5	20.00	19.54	19.35	19.41
			3	0	20.00	19.60	19.48	19.70
			3	1	20.00	19.54	19.41	19.63
			3	2	20.00	19.57	19.45	19.71
			6	0	19.00	18.55	18.26	18.64

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20415/825.5	20525/836.5	20635/847.5
LTE Band 5	3MHz	QPSK	1	0	21.00	20.39	20.08	20.40
			1	7	21.00	20.36	20.13	20.48
			1	14	21.00	20.25	20.10	20.47
			8	0	20.00	19.41	19.20	19.46
			8	4	20.00	19.42	19.19	19.48
			8	7	20.00	19.38	19.17	19.50
			15	0	20.00	19.35	19.15	19.44
		16QAM	1	0	20.00	19.78	19.32	19.32
			1	7	20.00	19.76	19.39	19.40
			1	14	20.00	19.68	19.29	19.38
			8	0	19.00	18.41	18.20	18.46
			8	4	19.00	18.40	18.19	18.49
			8	7	19.00	18.39	18.17	18.49
			15	0	19.00	18.37	18.10	18.50
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20425/826.5	20525/836.5	20625/846.5
LTE Band 5	5MHz	QPSK	1	0	21.00	20.46	20.17	20.34
			1	12	21.00	20.39	20.19	20.43
			1	24	21.00	20.30	20.13	20.42
			12	0	20.00	19.41	19.18	19.41
			12	6	20.00	19.38	19.19	19.46
			12	11	20.00	19.33	19.19	19.52
			25	0	20.00	19.32	19.15	19.42
		16QAM	1	0	20.00	19.94	19.53	19.65
			1	12	20.00	19.90	19.54	19.80
			1	24	20.00	19.86	19.45	19.82
			12	0	19.00	18.40	18.16	18.40
			12	6	19.00	18.37	18.13	18.48
			12	11	19.00	18.34	18.15	18.51
			25	0	19.00	18.27	18.15	18.40
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20450/829	20525/836.5	20600/844

LTE Band 5	10MHz	QPSK	1	0	21.00	20.44	20.19	20.20
			1	24	21.00	20.34	20.18	20.35
			1	49	21.00	20.21	20.18	20.52
			25	0	20.00	19.35	19.15	19.19
			25	12	20.00	19.29	19.15	19.28
			25	24	20.00	19.24	19.14	19.39
			50	0	20.00	19.27	19.17	19.29
		16QAM	1	0	20.00	19.83	19.39	19.06
			1	24	20.00	19.76	19.39	19.21
			1	49	20.00	19.64	19.36	19.45
			25	0	19.00	18.33	18.15	18.15
			25	12	19.00	18.28	18.15	18.24
			25	24	19.00	18.23	18.12	18.36
			50	0	19.00	18.27	18.19	18.24

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		23755/706.5	23790/710	23825/713.5
LTE Band 17	5MHz	QPSK	1	0	22.00	21.05	21.00	20.95
			1	12	22.00	21.02	20.96	20.96
			1	24	22.00	20.98	20.84	20.90
			12	0	21.00	20.09	20.06	19.96
			12	6	21.00	20.11	20.04	20.01
			12	11	21.00	20.09	20.01	19.98
			25	0	21.00	20.05	20.00	19.93
		16QAM	1	0	21.00	20.43	20.43	20.57
			1	12	21.00	20.42	20.43	20.55
			1	24	21.00	20.39	20.28	20.44
			12	0	20.00	19.02	19.13	19.00
			12	6	20.00	19.07	19.11	19.02
			12	11	20.00	19.05	19.05	19.01
			25	0	20.00	19.10	18.98	18.90
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		23780/709	23790/710	23800/711
LTE Band 17	10MHz	QPSK	1	0	22.00	21.07	21.00	21.03
			1	24	22.00	21.01	20.95	20.98
			1	49	22.00	20.96	20.92	20.93

	16QAM	25	0	21.00	20.05	20.01	20.02
		25	12	21.00	20.05	20.00	19.97
		25	24	21.00	19.99	19.96	19.98
		50	0	21.00	20.05	20.03	20.01
		1	0	21.00	20.52	20.24	19.97
		1	24	21.00	20.51	20.23	19.95
		1	49	21.00	20.44	20.18	19.84
		25	0	20.00	19.05	19.03	19.03
		25	12	20.00	19.06	19.01	18.98
		25	24	20.00	19.03	18.98	18.97
		50	0	20.00	19.06	19.06	19.02

7.2. WLAN & Bluetooth Output Power

7.2.1. Output Power Results Of WLAN

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)
802.11b	1	2412	14.00	13.48
	6	2437	14.00	13.52
	11	2462	14.00	13.32
802.11g	1	2412	13.00	12.64
	6	2437	13.00	12.54
	11	2462	13.00	12.89
802.11n HT20	1	2412	13.00	12.68
	6	2437	13.00	12.90
	11	2462	13.00	12.97
802.11n HT40	3	2422	13.00	12.85
	6	2437	13.00	12.98
	9	2452	13.00	12.91

NOTE: Power measurement results of WLAN 2.4G.

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)
802.11a	36	5180	12.00	11.33
	40	5200	12.00	11.76
	48	5240	12.00	11.66
802.11n HT20	36	5180	12.00	11.48
	40	5200	12.00	11.87
	48	5240	12.00	11.20
802.11n HT40	38	5190	9.00	8.44
	46	5230	9.00	8.54
802.11ac	36	5180	13.00	11.76

VHT20	40	5200	13.00	11.54
	48	5240	13.00	12.16
802.11ac	38	5190	12.00	11.74
VHT40	46	5230	12.00	11.90

NOTE: Power measurement results of WLAN 5.2G.

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)
802.11a	149	5745	12.00	11.08
	157	5785	12.00	10.95
	165	5825	12.00	11.32
802.11n HT20	149	5745	12.00	10.73
	157	5785	12.00	11.60
	165	5825	12.00	11.66
802.11n HT40	151	5755	12.00	11.36
	159	5795	12.00	11.39
802.11ac VHT20	149	5745	12.00	10.89
	157	5785	12.00	11.41
	165	5825	12.00	11.46
802.11ac VHT40	151	5755	12.00	11.61
	159	5795	12.00	11.41

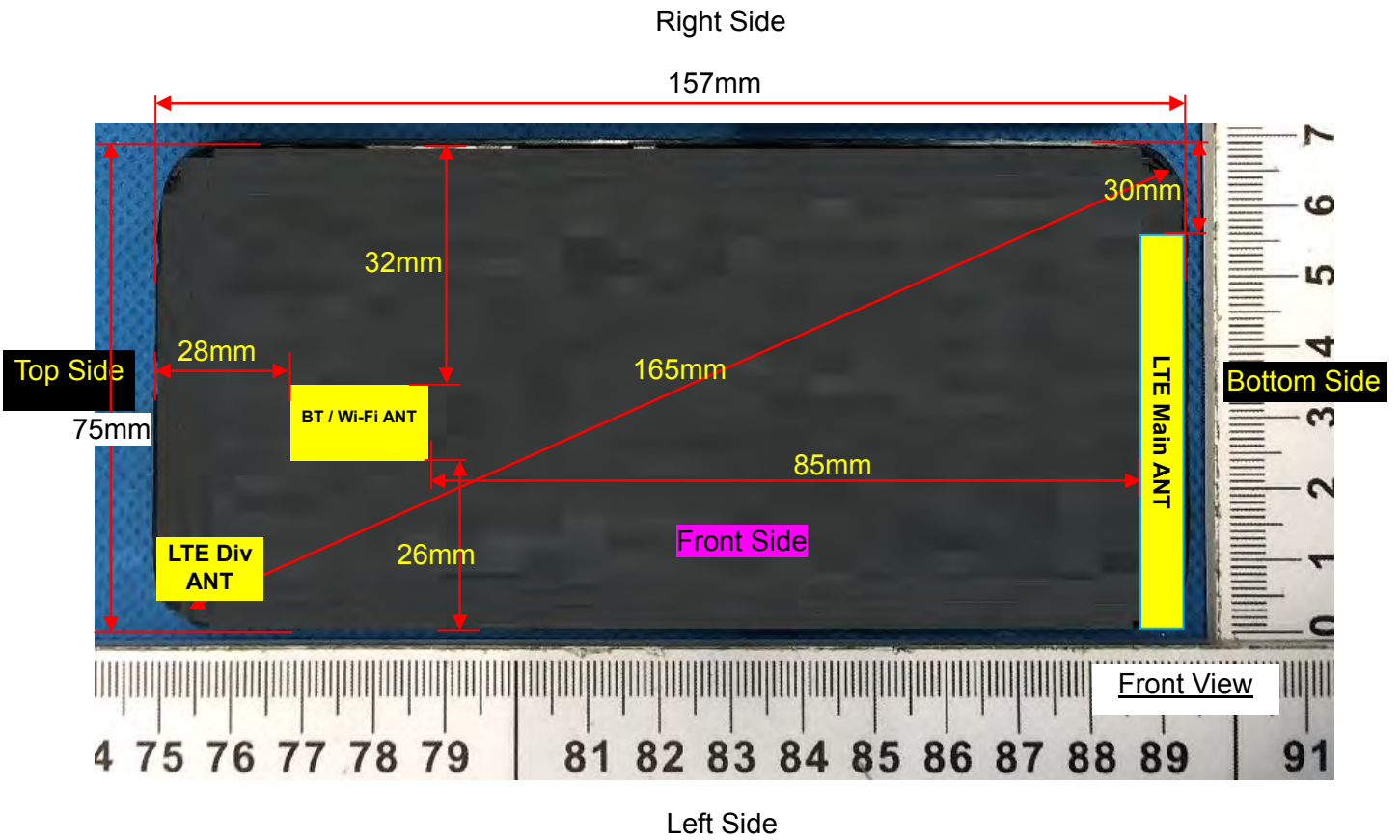
NOTE: Power measurement results of WLAN 5.8G.

7.2.2. Output Power Results Of Bluetooth

BR+EDR	Output Power (dBm)				
	Data Rates	Tune-up	Channel		
			0	39	78
	1DH5	7.000	6.852	6.972	6.813
	2DH5	7.000	6.149	6.238	5.964
	3DH5	7.000	6.332	6.407	6.144

BLE	Channel	Tune-up	Output Power (dBm)
	0	7.500	6.926
	19	7.500	7.042
	39	7.500	6.853

8. Antenna Location



Distance of the Antenna to the EUT surface/edge						
Antennas	Front Side	Back Side	Left Side	Right Side	Top Side	Bottom Side
WWAN Main	≤ 25mm	≤ 25mm	≤ 25mm	>25mm	>25mm	≤ 25mm
WLAN & Bluetooth	≤ 25mm	≤ 25mm	>25mm	>25mm	>25mm	>25mm
Positions for SAR tests						
Antennas	Front Side	Back Side	Left Side	Right Side	Top Side	Bottom Side
WWAN Main	Yes	Yes	Yes	NO	NO	Yes
WLAN & Bluetooth	Yes	Yes	NO	NO	NO	NO

9. Stand-alone SAR test exclusion

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

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

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

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

Mode	P_{max} (dBm)	P_{max} (mW)	Distance (mm)	f (GHz)	Calculation Result	SAR Exclusion threshold	SAR test exclusion
Bluetooth	7.500	5.623	5	2.48	1.8	3.0	Yes

NOTE: Standalone SAR test exclusion for Bluetooth

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

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

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

Mode	Position	P_{max} (dBm)	P_{max} (mW)	Distance (mm)	f (GHz)	x	Estimated SAR (W/Kg)
Bluetooth	Head	7.500	5.623	5	2.48	7.5	0.236
Bluetooth	Body	7.500	5.623	10	2.48	7.5	0.118
Bluetooth	Hotspot	7.500	5.623	10	2.48	7.5	0.118

NOTE: Estimated SAR calculation for Bluetooth

10. SAR Results

10.1. SAR measurement results

10.1.1. SAR measurement Result of LTE Band 2

Test Position of Head	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Left Cheek	18900/1880	20M QPSK(1,0)	0.071	0.042	-0.61	18.55	19.00	0.079
Left Tilt 15 Degree	18900/1880	20M QPSK(1,0)	0.041	0.024	-0.44	18.55	19.00	0.045
Right Cheek	18900/1880	20M QPSK(1,0)	0.063	0.035	4.76	18.55	19.00	0.070
Right Tilt 15 Degree	18900/1880	20M QPSK(1,0)	0.033	0.018	2.52	18.55	19.00	0.037
50%RB								
Left Cheek	18900/1880	1.4M QPSK(3,0)	0.065	0.039	1.75	18.44	19.00	0.074
Left Tilt 15 Degree	18900/1880	1.4M QPSK(3,0)	0.039	0.020	1.49	18.44	19.00	0.044
Right Cheek	18900/1880	1.4M QPSK(3,0)	0.058	0.031	-3.39	18.44	19.00	0.066
Right Tilt 15 Degree	18900/1880	1.4M QPSK(3,0)	0.029	0.017	-1.17	18.44	19.00	0.033

NOTE: Head SAR test results of LTE Band 2

Test Position of Body-Worn with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Front Side	18900/1880	20M QPSK(1,0)	0.089	0.052	-3.61	18.55	19.00	0.099
Back Side	18900/1880	20M QPSK(1,0)	0.115	0.062	0.35	18.55	19.00	0.128
50%RB								
Front Side	18900/1880	1.4M QPSK(3,0)	0.083	0.048	3.05	18.44	19.00	0.094
Back Side	18900/1880	1.4M QPSK(3,0)	0.099	0.053	0.74	18.44	19.00	0.113

NOTE: Body-Worn SAR test results of LTE Band 2

Test Position of Hotspot with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Front Side	18900/1880	20M QPSK(1,0)	0.089	0.052	-3.61	18.55	19.00	0.099
Back Side	18900/1880	20M QPSK(1,0)	0.115	0.062	0.35	18.55	19.00	0.128
Left Side	18900/1880	20M QPSK(1,0)	0.084	0.045	1.05	18.55	19.00	0.093
Bottom Side	18900/1880	20M QPSK(1,0)	0.040	0.022	4.22	18.55	19.00	0.044
50%RB								
Front Side	18900/1880	1.4M QPSK(3,0)	0.083	0.048	3.05	18.44	19.00	0.094
Back Side	18900/1880	1.4M QPSK(3,0)	0.099	0.053	0.74	18.44	19.00	0.113
Left Side	18900/1880	1.4M QPSK(3,0)	0.076	0.039	3.89	18.44	19.00	0.086
Bottom Side	18900/1880	1.4M QPSK(3,0)	0.037	0.019	-1.56	18.44	19.00	0.042

NOTE: Hotspot SAR test results of LTE Band 2

10.1.2. SAR measurement Result of LTE Band 4

Test Position of Head	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Left Cheek	20175/1732.5	20M QPSK(1,0)	0.054	0.036	0.21	18.08	19.00	0.067
Left Tilt 15 Degree	20175/1732.5	20M QPSK(1,0)	0.029	0.020	4.30	18.08	19.00	0.036
Right Cheek	20175/1732.5	20M QPSK(1,0)	0.046	0.028	-3.35	18.08	19.00	0.057
Right Tilt 15 Degree	20175/1732.5	20M QPSK(1,0)	0.022	0.016	-1.25	18.08	19.00	0.027
50%RB								
Left Cheek	20175/1732.5	1.4M QPSK(3,0)	0.050	0.033	-4.22	17.96	19.00	0.064
Left Tilt 15	20175/1732.5	1.4M QPSK(3,0)	0.026	0.019	4.93	17.96	19.00	0.033

Degree								
Right Cheek	20175/1732.5	1.4M QPSK(3,0)	0.042	0.025	-1.11	17.96	19.00	0.053
Right Tilt 15 Degree	20175/1732.5	1.4M QPSK(3,0)	0.021	0.015	2.71	17.96	19.00	0.027

NOTE: Head SAR test results of LTE Band 4

Test Position of Body-Worn with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Front Side	20175/1732.5	20M QPSK(1,0)	0.073	0.043	3.69	18.08	19.00	0.090
Back Side	20175/1732.5	20M QPSK(1,0)	0.096	0.055	0.84	18.08	19.00	0.119
50%RB								
Front Side	20175/1732.5	1.4M QPSK(3,0)	0.066	0.040	-4.15	17.96	19.00	0.084
Back Side	20175/1732.5	1.4M QPSK(3,0)	0.086	0.052	-0.06	17.96	19.00	0.109

NOTE: Body-Worn SAR test results of LTE Band 4

Test Position of Hotspot with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Front Side	20175/1732.5	20M QPSK(1,0)	0.073	0.043	3.69	18.08	19.00	0.090
Back Side	20175/1732.5	20M QPSK(1,0)	0.096	0.055	0.84	18.08	19.00	0.119
Left Side	20175/1732.5	20M QPSK(1,0)	0.071	0.044	-4.96	18.08	19.00	0.088
Bottom Side	20175/1732.5	20M QPSK(1,0)	0.033	0.024	-3.91	18.08	19.00	0.041
50%RB								
Front Side	20175/1732.5	1.4M QPSK(3,0)	0.066	0.040	-4.15	17.96	19.00	0.084
Back Side	20175/1732.5	1.4M QPSK(3,0)	0.086	0.052	-0.06	17.96	19.00	0.109

	5							
Left Side	20175/1732.5	1.4M QPSK(3,0)	0.061	0.038	-0.61	17.96	19.00	0.078
Bottom Side	20175/1732.5	1.4M QPSK(3,0)	0.031	0.020	3.22	17.96	19.00	0.039

NOTE: Hotspot SAR test results of LTE Band 4

10.1.3. SAR measurement Result of LTE Band 5

Test Position of Head	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Left Cheek	20525/836.5	10M QPSK(1,49)	0.088	0.070	3.93	20.18	21.00	0.106
Left Tilt 15 Degree	20525/836.5	10M QPSK(1,49)	0.049	0.043	-0.70	20.18	21.00	0.059
Right Cheek	20525/836.5	10M QPSK(1,49)	0.082	0.066	4.82	20.18	21.00	0.099
Right Tilt 15 Degree	20525/836.5	10M QPSK(1,49)	0.038	0.027	0.08	20.18	21.00	0.046
50%RB								
Left Cheek	20525/836.5	1.4M QPSK(3,0)	0.077	0.066	2.68	20.19	21.00	0.093
Left Tilt 15 Degree	20525/836.5	1.4M QPSK(3,0)	0.045	0.040	-4.22	20.19	21.00	0.054
Right Cheek	20525/836.5	1.4M QPSK(3,0)	0.074	0.058	-4.86	20.19	21.00	0.089
Right Tilt 15 Degree	20525/836.5	1.4M QPSK(3,0)	0.034	0.023	1.02	20.19	21.00	0.041

NOTE: Head SAR test results of LTE Band 5

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

10mm								
1RB								
Front Side	20525/836.5	10M QPSK(1,49)	0.127	0.096	-3.53	20.18	21.00	0.153
Back Side	20525/836.5	10M QPSK(1,49)	0.151	0.116	-0.05	20.18	21.00	0.182
50%RB								
Front Side	20525/836.5	1.4M QPSK(3,0)	0.108	0.084	-2.09	20.19	21.00	0.130
Back Side	20525/836.5	1.4M QPSK(3,0)	0.133	0.108	1.35	20.19	21.00	0.160

NOTE: Body-Worn SAR test results of LTE Band 5

Test Position of Hotspot with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Front Side	20525/836.5	10M QPSK(1,49)	0.127	0.096	-3.53	20.18	21.00	0.153
Back Side	20525/836.5	10M QPSK(1,49)	0.151	0.116	-0.05	20.18	21.00	0.182
Left Side	20525/836.5	10M QPSK(1,49)	0.115	0.088	-1.65	20.18	21.00	0.139
Bottom Side	20525/836.5	10M QPSK(1,49)	0.056	0.043	1.15	20.18	21.00	0.068
50%RB								
Front Side	20525/836.5	1.4M QPSK(3,0)	0.108	0.084	-2.09	20.19	21.00	0.130
Back Side	20525/836.5	1.4M QPSK(3,0)	0.133	0.108	1.35	20.19	21.00	0.160
Left Side	20525/836.5	1.4M QPSK(3,0)	0.102	0.079	-1.39	20.19	21.00	0.123
Bottom Side	20525/836.5	1.4M QPSK(3,0)	0.050	0.040	-2.22	20.19	21.00	0.060

NOTE: Hotspot SAR test results of LTE Band 5

10.1.4. SAR measurement Result of LTE Band 17

Test Position of Head	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Left Cheek	23790/710	10M QPSK(1,0)	0.029	0.025	-2.56	21.00	22.00	0.037
Left Tilt 15	23790/710	10M QPSK(1,0)	0.017	0.015	1.63	21.00	22.00	0.021

Degree								
Right Cheek	23790/710	10M QPSK(1,0)	0.026	0.017	-3.17	21.00	22.00	0.033
Right Tilt 15 Degree	23790/710	10M QPSK(1,0)	0.013	0.006	4.12	21.00	22.00	0.016
50%RB								
Left Cheek	23790/710	10M QPSK(25,0)	0.015	0.013	-1.67	20.01	21.00	0.019
Left Tilt 15 Degree	23790/710	10M QPSK(25,0)	0.009	0.007	-1.49	20.01	21.00	0.011
Right Cheek	23790/710	10M QPSK(25,0)	0.014	0.010	2.86	20.01	21.00	0.018
Right Tilt 15 Degree	23790/710	10M QPSK(25,0)	0.007	0.003	1.35	20.01	21.00	0.009

NOTE: Head SAR test results of LTE Band 17

Test Position of Body-Worn with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Front Side	23790/710	10M QPSK(1,0)	0.048	0.044	1.86	21.00	22.00	0.060
Back Side	23790/710	10M QPSK(1,0)	0.057	0.047	-0.26	21.00	22.00	0.072
50%RB								
Front Side	23790/710	10M QPSK(25,0)	0.029	0.023	-3.46	20.01	21.00	0.036
Back Side	23790/710	10M QPSK(25,0)	0.030	0.024	-1.87	20.01	21.00	0.038

NOTE: Body-Worn SAR test results of LTE Band 17

Test Position of Hotspot with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Front Side	23790/710	10M QPSK(1,0)	0.048	0.044	1.86	21.00	22.00	0.060
Back	23790/710	10M QPSK(1,0)	0.057	0.047	-0.26	21.00	22.00	0.072

Side								
Left Side	23790/710	10M QPSK(1,0)	0.042	0.034	4.63	21.00	22.00	0.053
Bottom Side	23790/710	10M QPSK(1,0)	0.020	0.010	-3.94	21.00	22.00	0.025
50%RB								
Front Side	23790/710	10M QPSK(25,0)	0.029	0.023	-3.46	20.01	21.00	0.036
Back Side	23790/710	10M QPSK(25,0)	0.030	0.024	-1.87	20.01	21.00	0.038
Left Side	23790/710	10M QPSK(25,0)	0.023	0.018	-0.75	20.01	21.00	0.029
Bottom Side	23790/710	10M QPSK(25,0)	0.011	0.010	2.87	20.01	21.00	0.014

NOTE: Hotspot SAR test results of LTE Band 17

10.1.5. SAR measurement Result of WLAN 2.4G

Test Position of Head	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Left Cheek	6/2437	802.11b	0.025	0.021	0.25	13.52	14.00	0.028
Left Tilt 15 Degree	6/2437	802.11b	0.014	0.012	-3.80	13.52	14.00	0.016
Right Cheek	6/2437	802.11b	0.021	0.020	2.53	13.52	14.00	0.023
Right Tilt 15 Degree	6/2437	802.11b	0.012	0.016	1.26	13.52	14.00	0.013

NOTE: Head SAR test results of WLAN 2.4G

Test Position of Body-Worn with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Front Side	6/2437	802.11b	0.035	0.029	-0.76	13.52	14.00	0.039
Back Side	6/2437	802.11b	0.044	0.032	-1.39	13.52	14.00	0.049

NOTE: Body-Worn SAR test results of WLAN 2.4G

Test Position of Hotspot with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Front Side	6/2437	802.11b	0.035	0.029	-0.76	13.52	14.00	0.039

Back Side	6/2437	802.11b	0.044	0.032	-1.39	13.52	14.00	0.049
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NOTE: Hotspot SAR test results of WLAN 2.4G

10.1.6. SAR measurement Result of WLAN 5.2G

Test Position of Head	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Left Cheek	40/5200	802.11ac (VHT20)	0.061	0.042	-2.64	11.54	13.00	0.097
Left Tilt 15 Degree	40/5200	802.11ac (VHT20)	0.035	0.016	-1.37	11.54	13.00	0.049
Right Cheek	40/5200	802.11ac (VHT20)	0.069	0.056	-0.27	11.54	13.00	0.097
Right Tilt 15 Degree	40/5200	802.11ac (VHT20)	0.036	0.013	3.63	11.54	13.00	0.050

NOTE: Head SAR test results of WLAN 5.2G

Test Position of Body-Worn with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Front Side	40/5200	802.11ac (VHT20)	0.271	0.133	-2.93	11.54	13.00	0.379
Back Side	40/5200	802.11ac (VHT20)	0.324	0.155	0.17	11.54	13.00	0.453

NOTE: Body-Worn SAR test results of WLAN 5.2G

Test Position of Hotspot with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Front Side	40/5200	802.11ac (VHT20)	0.271	0.133	-2.93	11.54	13.00	0.379
Back Side	40/5200	802.11ac (VHT20)	0.324	0.155	0.17	11.54	13.00	0.453

NOTE: Hotspot SAR test results of WLAN 5.2G

10.1.7. SAR measurement Result of WLAN 5.8G

Test Position of Head	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Left Cheek	157/5785	802.11a	0.157	0.081	-1.95	10.95	12.00	0.200
Left Tilt 15 Degree	157/5785	802.11a	0.082	0.041	-1.43	10.95	12.00	0.104
Right Cheek	157/5785	802.11a	0.169	0.096	2.11	10.95	12.00	0.215
Right Tilt 15 Degree	157/5785	802.11a	0.087	0.052	2.33	10.95	12.00	0.111

NOTE: Head SAR test results of WLAN 5.8G

Test Position of Body-Worn with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Front Side	157/5785	802.11a	0.373	0.140	-0.19	10.95	12.00	0.475
Back Side	157/5785	802.11a	0.489	0.186	-4.28	10.95	12.00	0.623

NOTE: Body-Worn SAR test results of WLAN 5.8G

Test Position of Hotspot with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Front Side	157/5785	802.11a	0.373	0.140	-0.19	10.95	12.00	0.475
Back Side	157/5785	802.11a	0.489	0.186	-4.28	10.95	12.00	0.623

NOTE: Hotspot SAR test results of WLAN 5.8G

10.2. SAR Summation Scenario

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

- 1) Scalar SAR summation < 1.6W/kg.
- 2) $SPLSR = (SAR_1 + SAR_2)^{1.5} / (\text{min. separation distance, mm})$, and the peak separation distance is determined from the square root of $[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$, where (x_1, y_1, z_1) and (x_2, y_2, z_2) are the coordinates of the extrapolated peak SAR locations in the zoom scan. If $SPLSR \leq 0.04$, simultaneously transmission SAR measurement is not necessary.

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band 2	WLAN 2.4G			
Head	Left Cheek	0.079	0.028	0.107	N/A	N/A

	Left Tilt 15 Degree	0.045	0.016	0.061	N/A	N/A
	Right Cheek	0.070	0.023	0.093	N/A	N/A
	Right Tilt 15 Degree	0.037	0.013	0.050	N/A	N/A
Body-Worn	Front Side	0.099	0.039	0.138	N/A	N/A
	Back Side	0.128	0.049	0.177	N/A	N/A
Hotspot	Front Side	0.099	0.039	0.138	N/A	N/A
	Back Side	0.128	0.049	0.177	N/A	N/A
	Left Side	0.093	N/A	0.093	N/A	N/A
	Bottom Side	0.044	N/A	0.044	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band 2 and WLAN 2.4G.

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band 4	WLAN 2.4G			
Head	Left Cheek	0.067	0.028	0.095	N/A	N/A
	Left Tilt 15 Degree	0.036	0.016	0.051	N/A	N/A
	Right Cheek	0.057	0.023	0.080	N/A	N/A
	Right Tilt 15 Degree	0.027	0.013	0.041	N/A	N/A
Body-Worn	Front Side	0.090	0.039	0.129	N/A	N/A
	Back Side	0.119	0.049	0.168	N/A	N/A
Hotspot	Front Side	0.090	0.039	0.129	N/A	N/A
	Back Side	0.119	0.049	0.168	N/A	N/A
	Left Side	0.088	N/A	0.088	N/A	N/A
	Bottom Side	0.041	N/A	0.041	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band 4 and WLAN 2.4G.

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band 5	WLAN 2.4G			
Head	Left Cheek	0.106	0.028	0.134	N/A	N/A
	Left Tilt 15 Degree	0.059	0.016	0.075	N/A	N/A
	Right Cheek	0.099	0.023	0.122	N/A	N/A
	Right Tilt 15 Degree	0.046	0.013	0.059	N/A	N/A
Body-Worn	Front Side	0.153	0.039	0.192	N/A	N/A
	Back Side	0.182	0.049	0.232	N/A	N/A
Hotspot	Front Side	0.153	0.039	0.192	N/A	N/A
	Back Side	0.182	0.049	0.232	N/A	N/A
	Left Side	0.139	N/A	0.139	N/A	N/A
	Bottom Side	0.068	N/A	0.068	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band 5 and WLAN 2.4G.

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band 17	WLAN 2.4G			
Head	Left Cheek	0.037	0.028	0.064	N/A	N/A
	Left Tilt 15 Degree	0.021	0.016	0.037	N/A	N/A
	Right Cheek	0.033	0.023	0.056	N/A	N/A
	Right Tilt 15 Degree	0.016	0.013	0.030	N/A	N/A
Body-Worn	Front Side	0.060	0.039	0.100	N/A	N/A
	Back Side	0.072	0.049	0.121	N/A	N/A
Hotspot	Front Side	0.060	0.039	0.100	N/A	N/A
	Back Side	0.072	0.049	0.121	N/A	N/A
	Left Side	0.053	N/A	0.053	N/A	N/A
	Bottom Side	0.025	N/A	0.025	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band 17 and WLAN 2.4G.

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band 2	WLAN 5.2G			
Head	Left Cheek	0.079	0.097	0.175	N/A	N/A
	Left Tilt 15 Degree	0.045	0.049	0.094	N/A	N/A
	Right Cheek	0.070	0.097	0.166	N/A	N/A
	Right Tilt 15 Degree	0.037	0.050	0.087	N/A	N/A
Body-Worn	Front Side	0.099	0.379	0.478	N/A	N/A
	Back Side	0.128	0.453	0.581	N/A	N/A
Hotspot	Front Side	0.099	0.379	0.478	N/A	N/A
	Back Side	0.128	0.453	0.581	N/A	N/A
	Left Side	0.093	N/A	0.093	N/A	N/A
	Bottom Side	0.044	N/A	0.044	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band 2 and WLAN 5.2G.

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band 4	WLAN 5.2G			
Head	Left Cheek	0.067	0.097	0.163	N/A	N/A
	Left Tilt 15 Degree	0.036	0.049	0.085	N/A	N/A
	Right Cheek	0.057	0.097	0.153	N/A	N/A
	Right Tilt 15 Degree	0.027	0.050	0.078	N/A	N/A

Body-Worn	Front Side	0.090	0.379	0.470	N/A	N/A
	Back Side	0.119	0.453	0.572	N/A	N/A
Hotspot	Front Side	0.090	0.379	0.470	N/A	N/A
	Back Side	0.119	0.453	0.572	N/A	N/A
	Left Side	0.088	N/A	0.088	N/A	N/A
	Bottom Side	0.041	N/A	0.041	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band 4 and WLAN 5.2G.

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band 5	WLAN 5.2G			
Head	Left Cheek	0.106	0.097	0.203	N/A	N/A
	Left Tilt 15 Degree	0.059	0.049	0.108	N/A	N/A
	Right Cheek	0.099	0.097	0.196	N/A	N/A
	Right Tilt 15 Degree	0.046	0.050	0.096	N/A	N/A
Body-Worn	Front Side	0.153	0.379	0.533	N/A	N/A
	Back Side	0.182	0.453	0.636	N/A	N/A
Hotspot	Front Side	0.153	0.379	0.533	N/A	N/A
	Back Side	0.182	0.453	0.636	N/A	N/A
	Left Side	0.139	N/A	0.139	N/A	N/A
	Bottom Side	0.068	N/A	0.068	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band 5 and WLAN 5.2G.

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band 17	WLAN 5.2G			
Head	Left Cheek	0.037	0.097	0.133	N/A	N/A
	Left Tilt 15 Degree	0.021	0.049	0.070	N/A	N/A
	Right Cheek	0.033	0.097	0.129	N/A	N/A
	Right Tilt 15 Degree	0.016	0.050	0.067	N/A	N/A
Body-Worn	Front Side	0.060	0.379	0.440	N/A	N/A
	Back Side	0.072	0.453	0.525	N/A	N/A
Hotspot	Front Side	0.060	0.379	0.440	N/A	N/A
	Back Side	0.072	0.453	0.525	N/A	N/A
	Left Side	0.053	N/A	0.053	N/A	N/A
	Bottom Side	0.025	N/A	0.025	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band 17 and WLAN 5.2G.

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band 2	WLAN 5.8G			
Head	Left Cheek	0.079	0.200	0.279	N/A	N/A

	Left Tilt 15 Degree	0.045	0.104	0.150	N/A	N/A
	Right Cheek	0.070	0.215	0.285	N/A	N/A
	Right Tilt 15 Degree	0.037	0.111	0.147	N/A	N/A
Body-Worn	Front Side	0.099	0.475	0.574	N/A	N/A
	Back Side	0.128	0.623	0.750	N/A	N/A
Hotspot	Front Side	0.099	0.475	0.574	N/A	N/A
	Back Side	0.128	0.623	0.750	N/A	N/A
	Left Side	0.093	N/A	0.093	N/A	N/A
	Bottom Side	0.044	N/A	0.044	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band 2 and WLAN 5.8G.

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band 4	WLAN 5.8G			
Head	Left Cheek	0.067	0.200	0.267	N/A	N/A
	Left Tilt 15 Degree	0.036	0.104	0.140	N/A	N/A
	Right Cheek	0.057	0.215	0.272	N/A	N/A
	Right Tilt 15 Degree	0.027	0.111	0.138	N/A	N/A
Body-Worn	Front Side	0.090	0.475	0.565	N/A	N/A
	Back Side	0.119	0.623	0.741	N/A	N/A
Hotspot	Front Side	0.090	0.475	0.565	N/A	N/A
	Back Side	0.119	0.623	0.741	N/A	N/A
	Left Side	0.088	N/A	0.088	N/A	N/A
	Bottom Side	0.041	N/A	0.041	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band 4 and WLAN 5.8G.

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band 5	WLAN 5.8G			
Head	Left Cheek	0.106	0.200	0.306	N/A	N/A
	Left Tilt 15 Degree	0.059	0.104	0.164	N/A	N/A
	Right Cheek	0.099	0.215	0.314	N/A	N/A
	Right Tilt 15 Degree	0.046	0.111	0.157	N/A	N/A
Body-Worn	Front Side	0.153	0.475	0.628	N/A	N/A
	Back Side	0.182	0.623	0.805	N/A	N/A
Hotspot	Front Side	0.153	0.475	0.628	N/A	N/A
	Back Side	0.182	0.623	0.805	N/A	N/A
	Left Side	0.139	N/A	0.139	N/A	N/A
	Bottom Side	0.068	N/A	0.068	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band 5 and WLAN 5.8G.

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band 17	WLAN 5.8G			
Head	Left Cheek	0.037	0.200	0.236	N/A	N/A
	Left Tilt 15 Degree	0.021	0.104	0.126	N/A	N/A
	Right Cheek	0.033	0.215	0.248	N/A	N/A
	Right Tilt 15 Degree	0.016	0.111	0.127	N/A	N/A
Body-Worn	Front Side	0.060	0.475	0.535	N/A	N/A
	Back Side	0.072	0.623	0.695	N/A	N/A
Hotspot	Front Side	0.060	0.475	0.535	N/A	N/A
	Back Side	0.072	0.623	0.695	N/A	N/A
	Left Side	0.053	N/A	0.053	N/A	N/A
	Bottom Side	0.025	N/A	0.025	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band 17 and WLAN 5.8G.

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band 2	Bluetooth			
Head	Left Cheek	0.079	0.236	0.315	N/A	N/A
	Left Tilt 15 Degree	0.045	0.236	0.282	N/A	N/A
	Right Cheek	0.070	0.236	0.306	N/A	N/A
	Right Tilt 15 Degree	0.037	0.236	0.273	N/A	N/A
Body-Worn	Front Side	0.099	0.118	0.217	N/A	N/A
	Back Side	0.128	0.118	0.246	N/A	N/A
Hotspot	Front Side	0.099	0.118	0.217	N/A	N/A
	Back Side	0.128	0.118	0.246	N/A	N/A
	Left Side	0.093	N/A	0.093	N/A	N/A
	Bottom Side	0.044	N/A	0.044	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band 2 and Bluetooth.

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band 4	Bluetooth			
Head	Left Cheek	0.067	0.236	0.303	N/A	N/A
	Left Tilt 15 Degree	0.036	0.236	0.272	N/A	N/A
	Right Cheek	0.057	0.236	0.293	N/A	N/A
	Right Tilt 15 Degree	0.027	0.236	0.263	N/A	N/A
Body-Worn	Front Side	0.090	0.118	0.208	N/A	N/A
	Back Side	0.119	0.118	0.237	N/A	N/A

Hotspot	Front Side	0.090	0.118	0.208	N/A	N/A
	Back Side	0.119	0.118	0.237	N/A	N/A
	Left Side	0.088	N/A	0.088	N/A	N/A
	Bottom Side	0.041	N/A	0.041	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band 4 and Bluetooth.

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band 5	Bluetooth			
Head	Left Cheek	0.106	0.236	0.342	N/A	N/A
	Left Tilt 15 Degree	0.059	0.236	0.295	N/A	N/A
	Right Cheek	0.099	0.236	0.335	N/A	N/A
	Right Tilt 15 Degree	0.046	0.236	0.282	N/A	N/A
Body-Worn	Front Side	0.153	0.118	0.271	N/A	N/A
	Back Side	0.182	0.118	0.300	N/A	N/A
Hotspot	Front Side	0.153	0.118	0.271	N/A	N/A
	Back Side	0.182	0.118	0.300	N/A	N/A
	Left Side	0.139	N/A	0.139	N/A	N/A
	Bottom Side	0.068	N/A	0.068	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band 5 and Bluetooth.

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band 17	Bluetooth			
Head	Left Cheek	0.037	0.236	0.273	N/A	N/A
	Left Tilt 15 Degree	0.021	0.236	0.258	N/A	N/A
	Right Cheek	0.033	0.236	0.269	N/A	N/A
	Right Tilt 15 Degree	0.016	0.236	0.253	N/A	N/A
Body-Worn	Front Side	0.060	0.118	0.179	N/A	N/A
	Back Side	0.072	0.118	0.190	N/A	N/A
Hotspot	Front Side	0.060	0.118	0.179	N/A	N/A
	Back Side	0.072	0.118	0.190	N/A	N/A
	Left Side	0.053	N/A	0.053	N/A	N/A
	Bottom Side	0.025	N/A	0.025	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band 17 and Bluetooth.

11. Appendix A. Photo documentation

Refer to appendix Test Setup photo---SAR

12. Appendix B. System Check Plots

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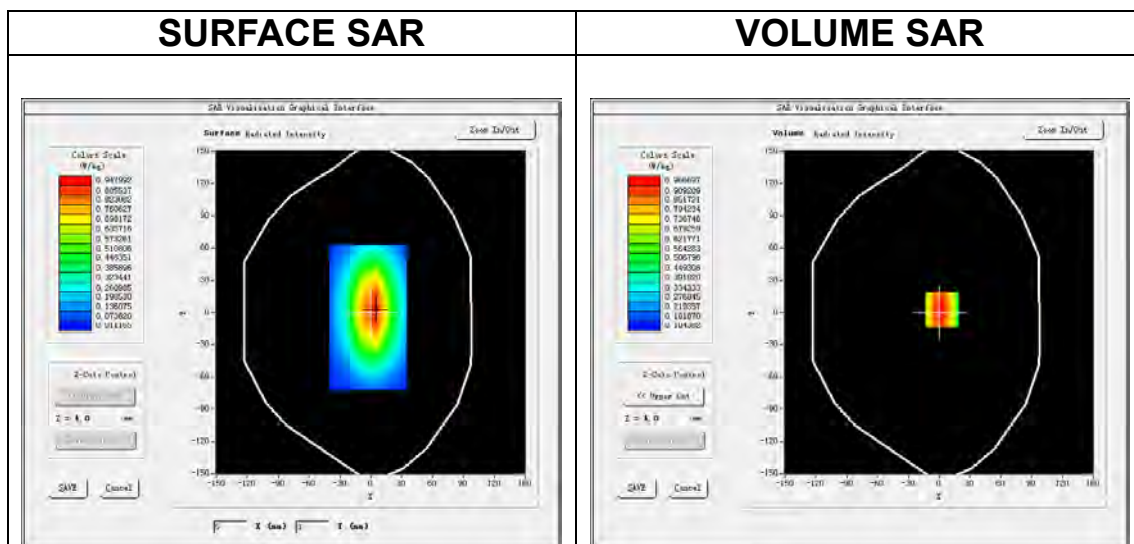
MEASUREMENT 1

A. Experimental conditions.

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

B. SAR Measurement Results

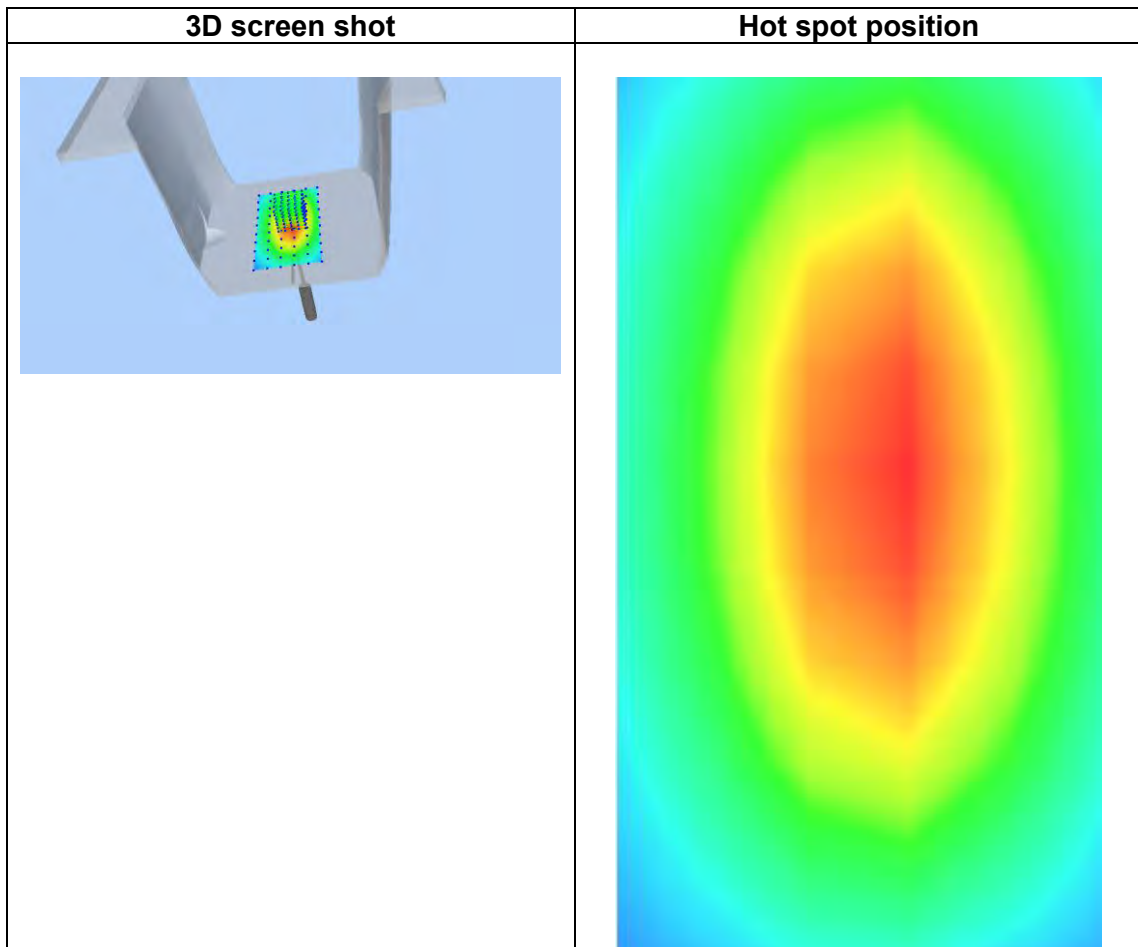
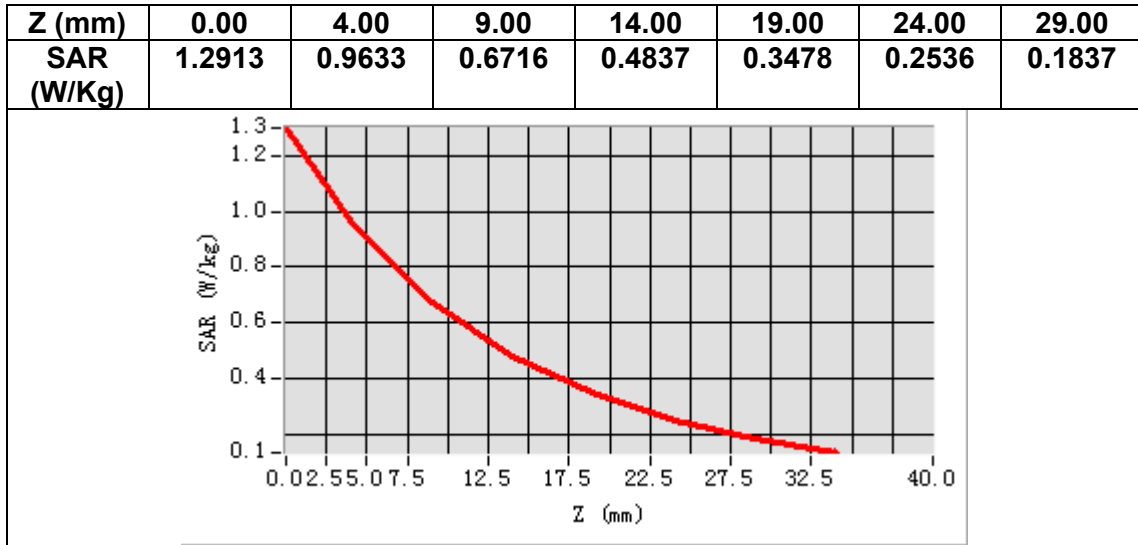
Frequency (MHz)	750.000000
Relative permittivity (real part)	41.233162
Relative permittivity (imaginary part)	21.911263
Conductivity (S/m)	0.912262
Variation (%)	-3.810000



Maximum location: X=3.00, Y=3.00

SAR Peak: 1.30 W/kg

SAR 10g (W/Kg)	0.551218
SAR 1g (W/Kg)	0.853362



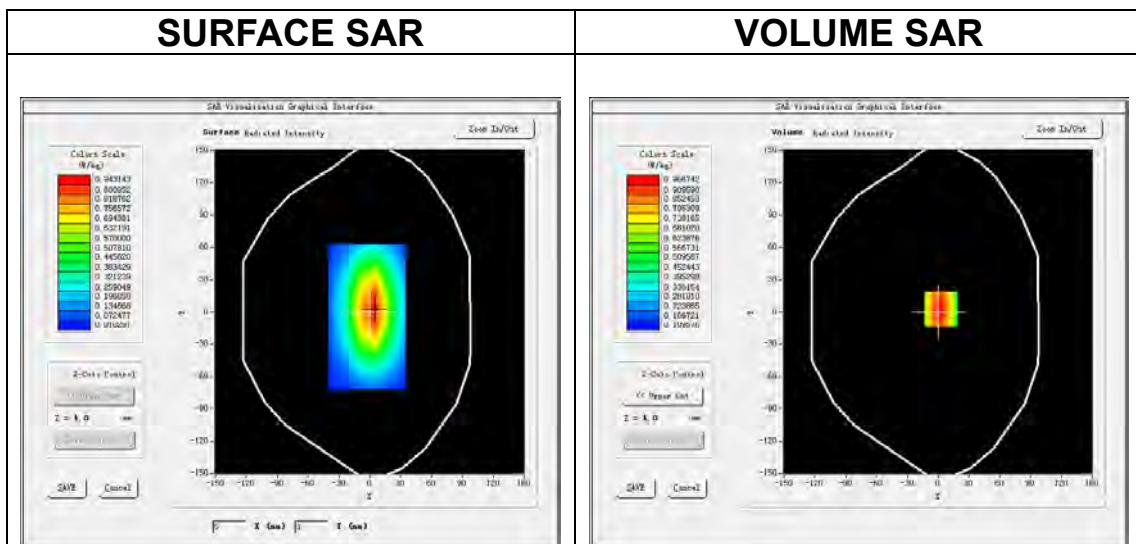
MEASUREMENT 2

A. Experimental conditions.

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

B. SAR Measurement Results

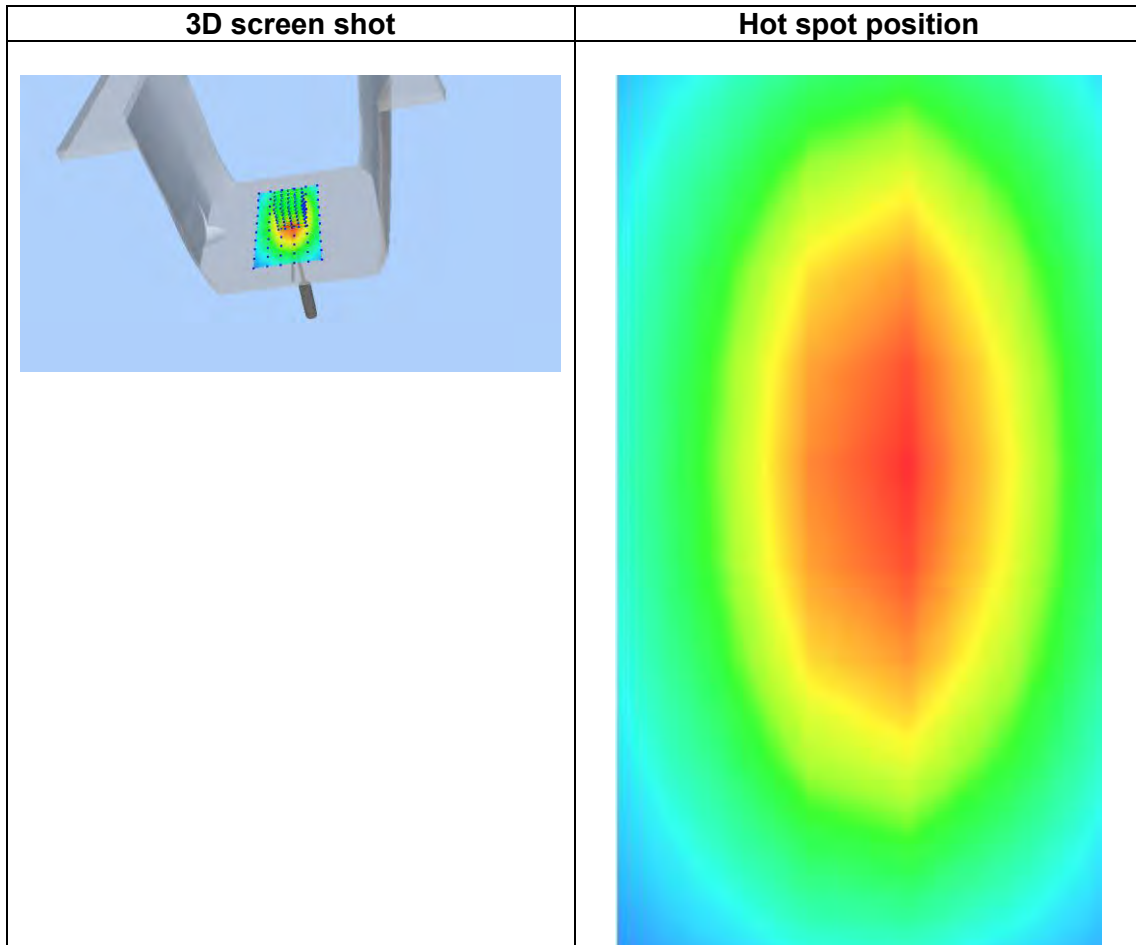
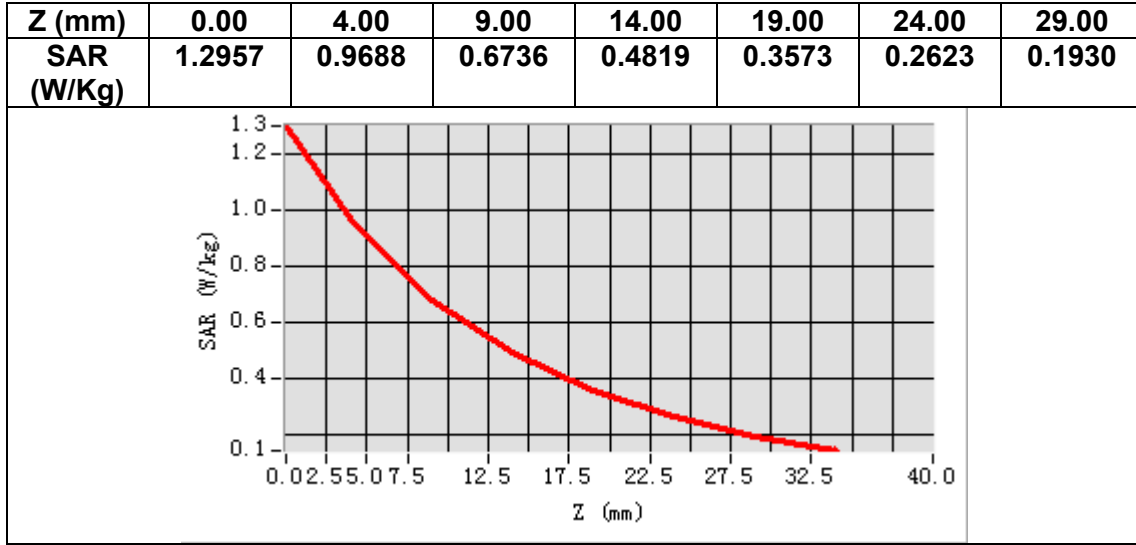
Frequency (MHz)	750.000000
Relative permittivity (real part)	55.300248
Relative permittivity (imaginary part)	23.313842
Conductivity (S/m)	0.970318
Variation (%)	-1.490000



Maximum location: X=3.00, Y=3.00

SAR Peak: 1.30 W/kg

SAR 10g (W/Kg)	0.589281
SAR 1g (W/Kg)	0.886263



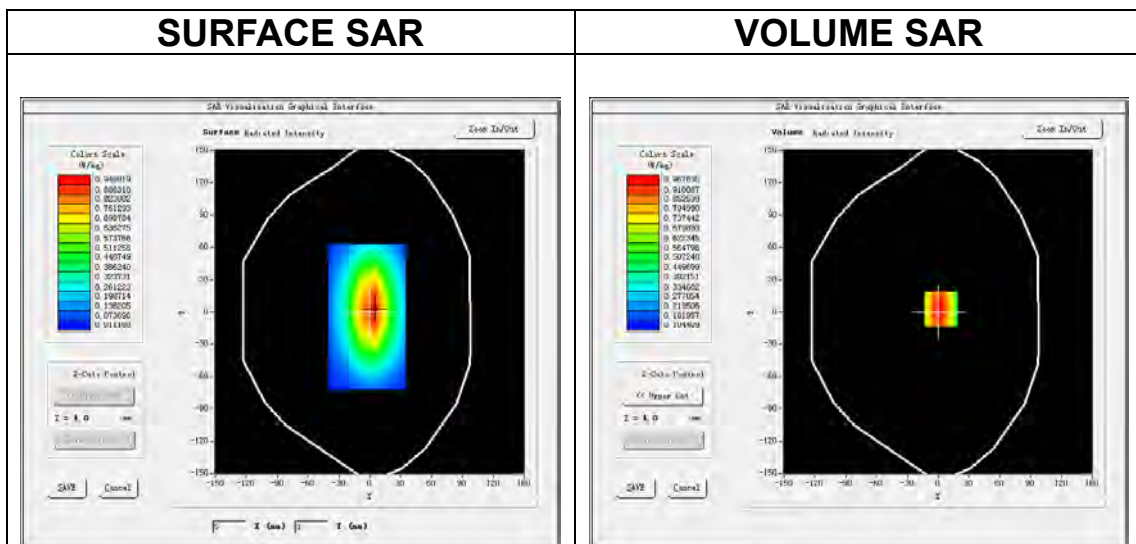
MEASUREMENT 3

A. Experimental conditions.

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

B. SAR Measurement Results

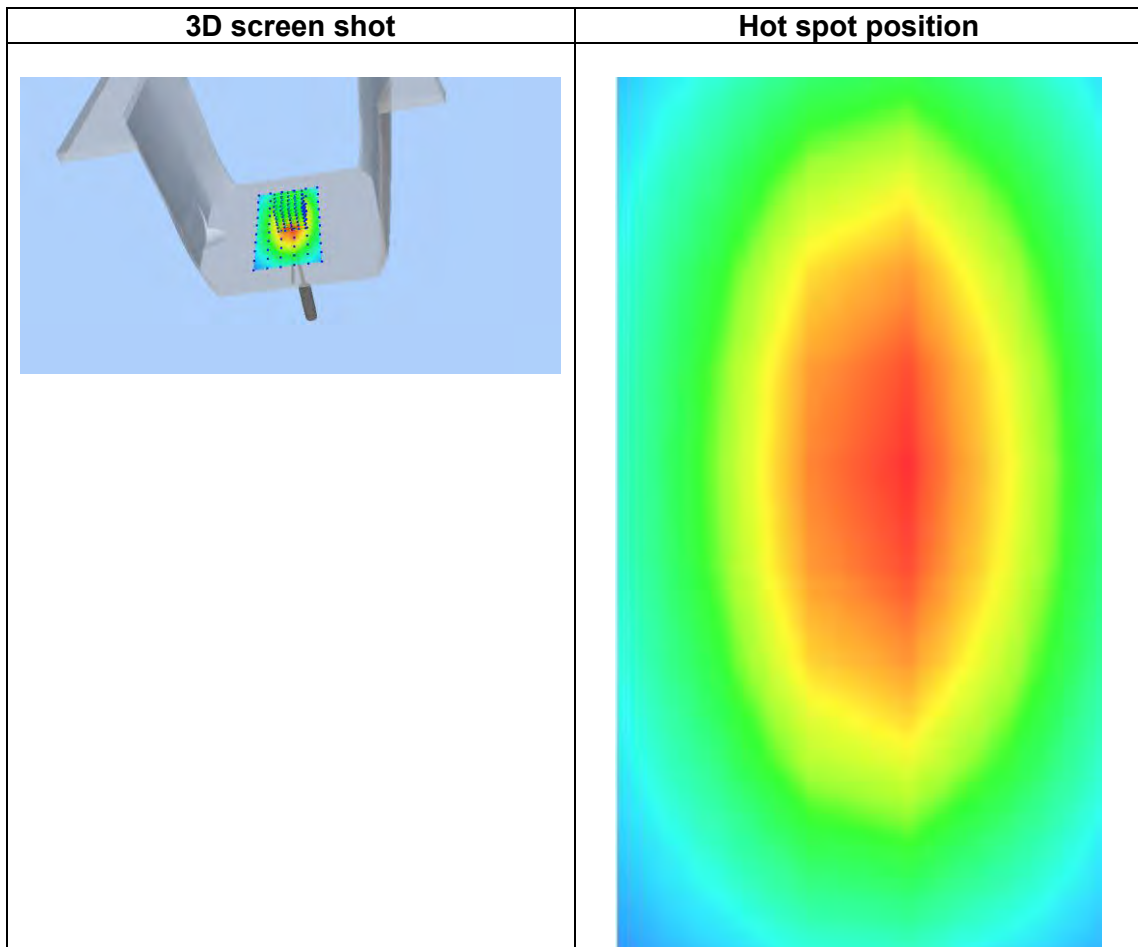
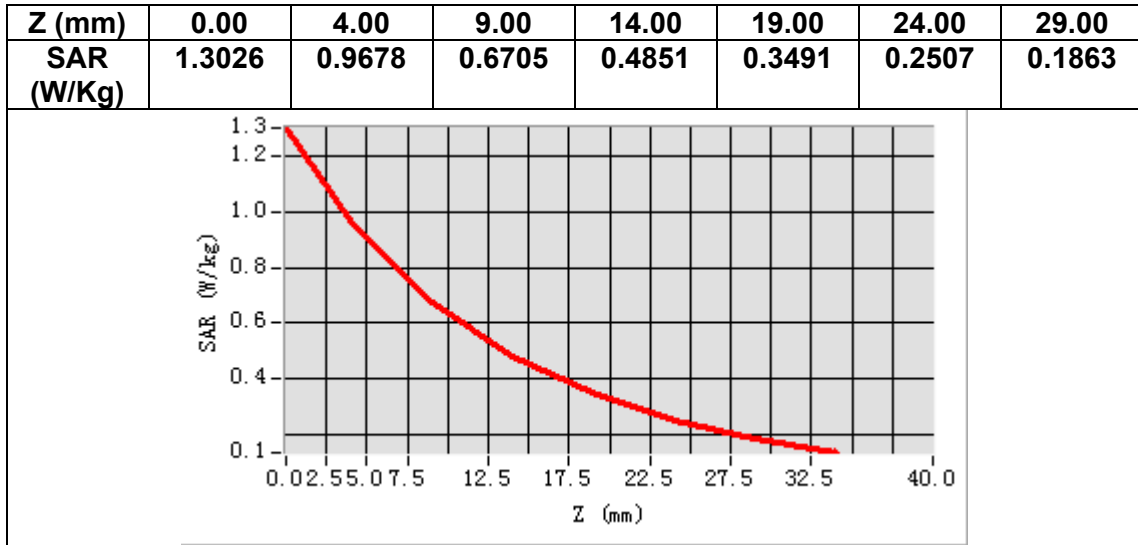
Frequency (MHz)	835.000000
Relative permittivity (real part)	40.533541
Relative permittivity (imaginary part)	20.159613
Conductivity (S/m)	0.940542
Variation (%)	1.870000



Maximum location: X=3.00, Y=3.00

SAR Peak: 1.30 W/kg

SAR 10g (W/Kg)	0.601966
SAR 1g (W/Kg)	0.945035



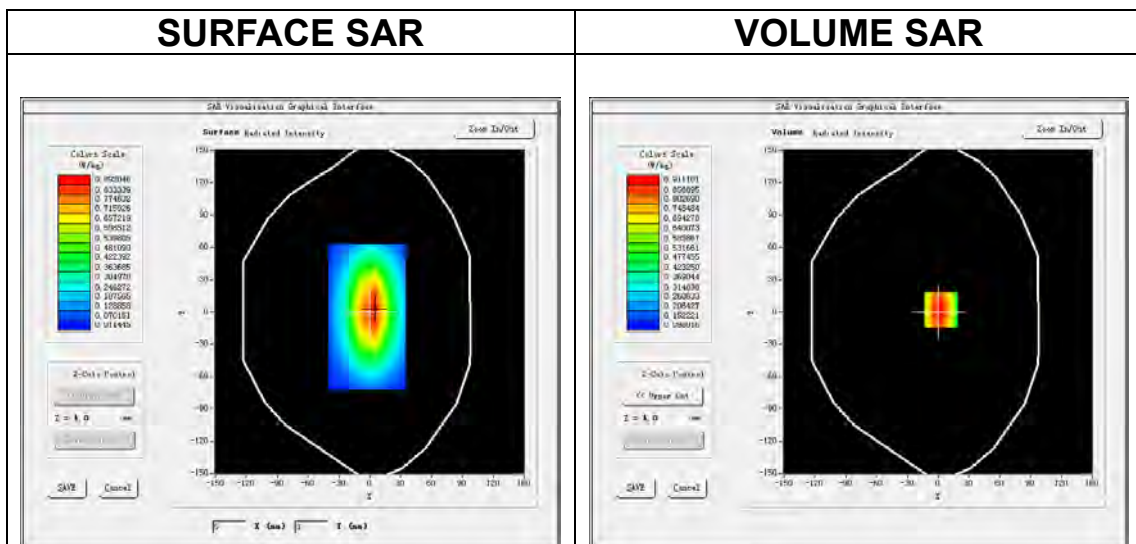
MEASUREMENT 4

A. Experimental conditions.

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

B. SAR Measurement Results

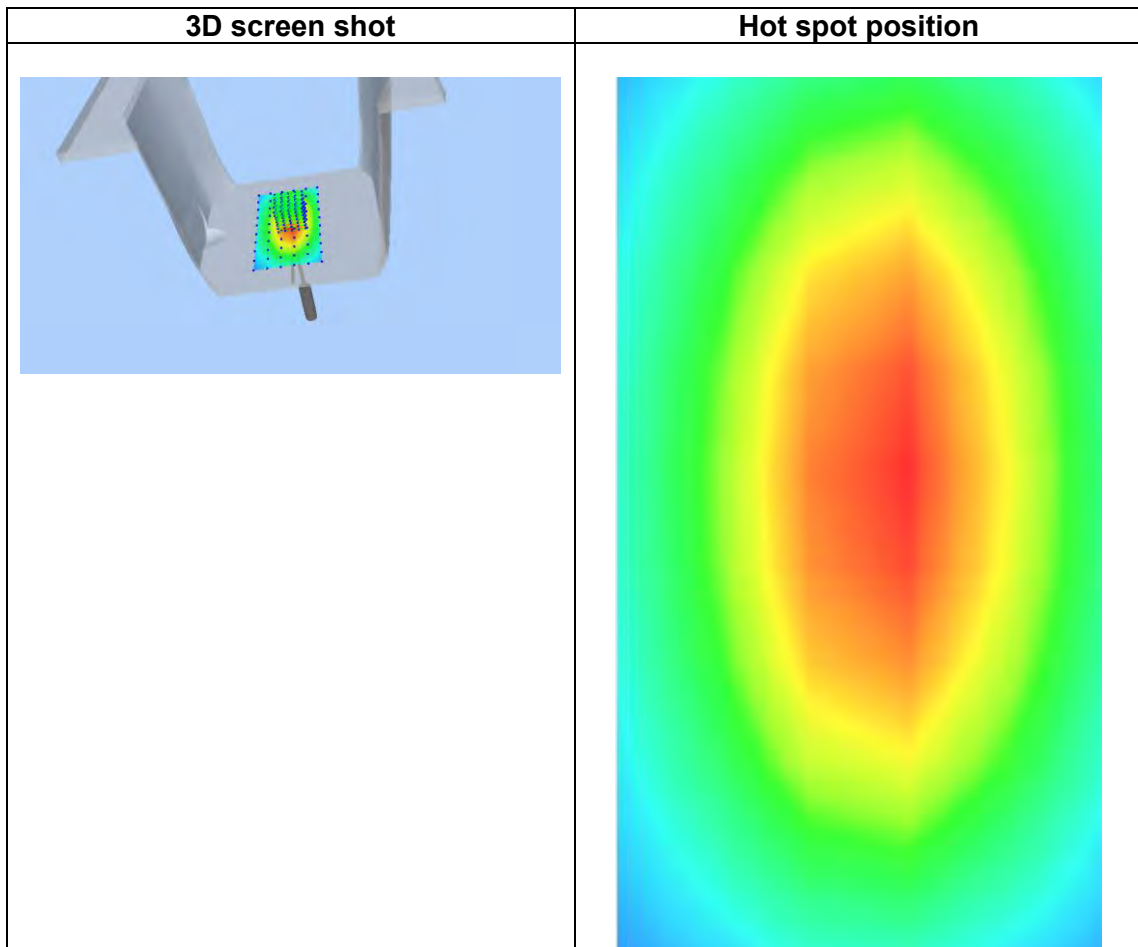
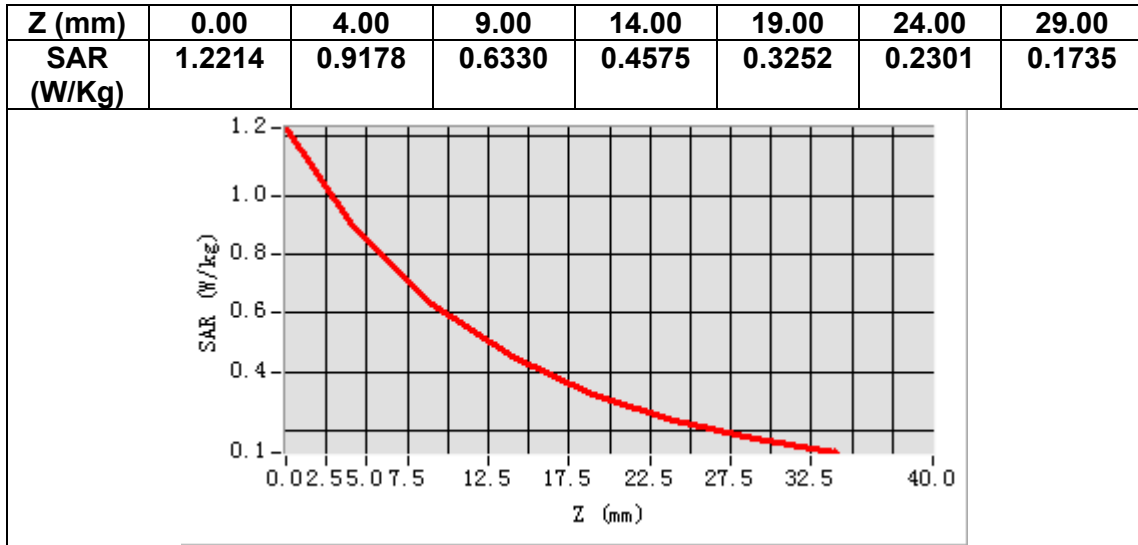
Frequency (MHz)	835.000000
Relative permittivity (real part)	54.371111
Relative permittivity (imaginary part)	21.743359
Conductivity (S/m)	1.011236
Variation (%)	-1.200000



Maximum location: X=3.00, Y=2.00

SAR Peak: 1.23 W/kg

SAR 10g (W/Kg)	0.660123
SAR 1g (W/Kg)	0.970356



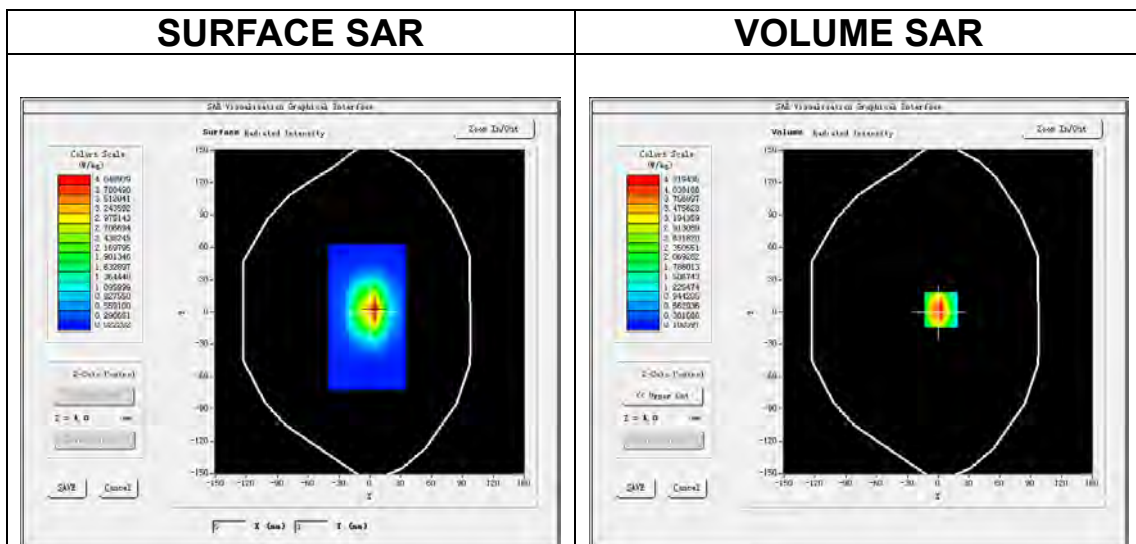
MEASUREMENT 5

A. Experimental conditions.

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

B. SAR Measurement Results

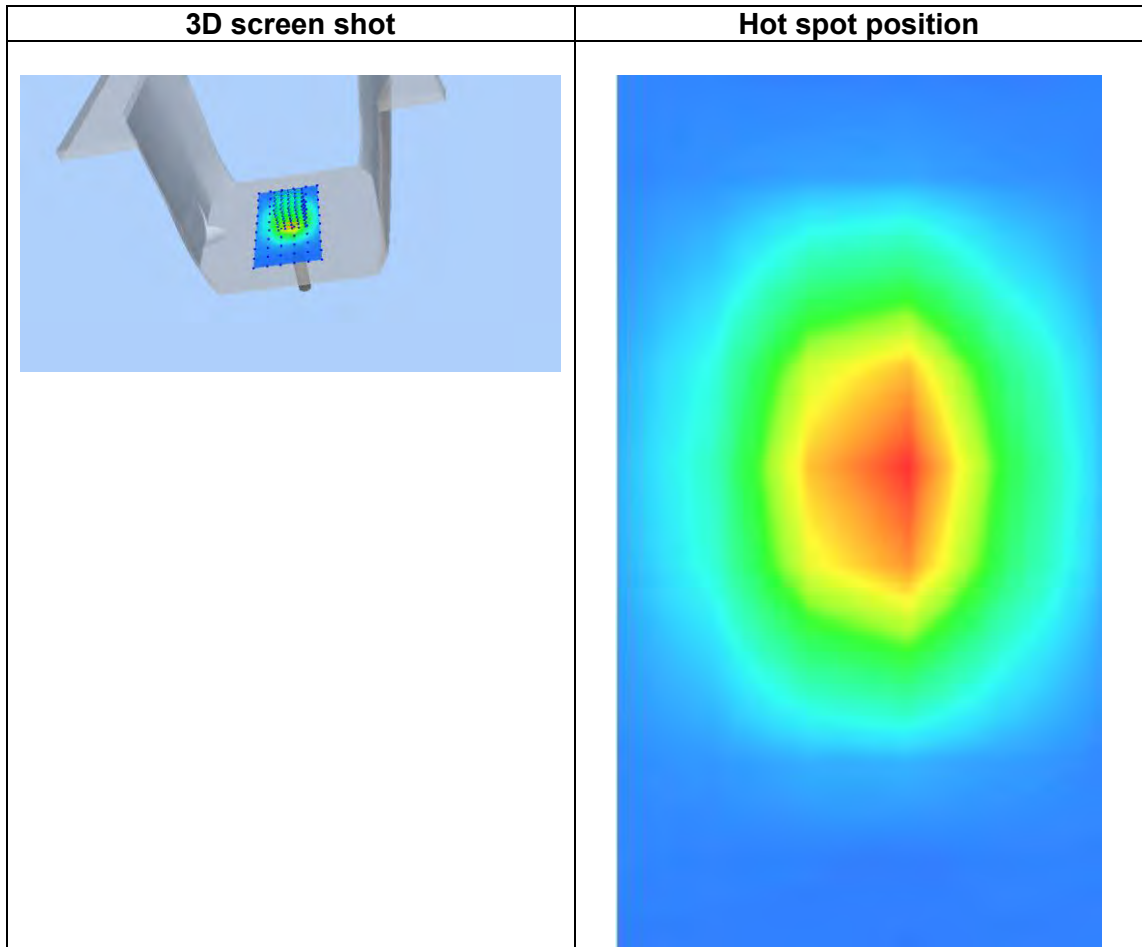
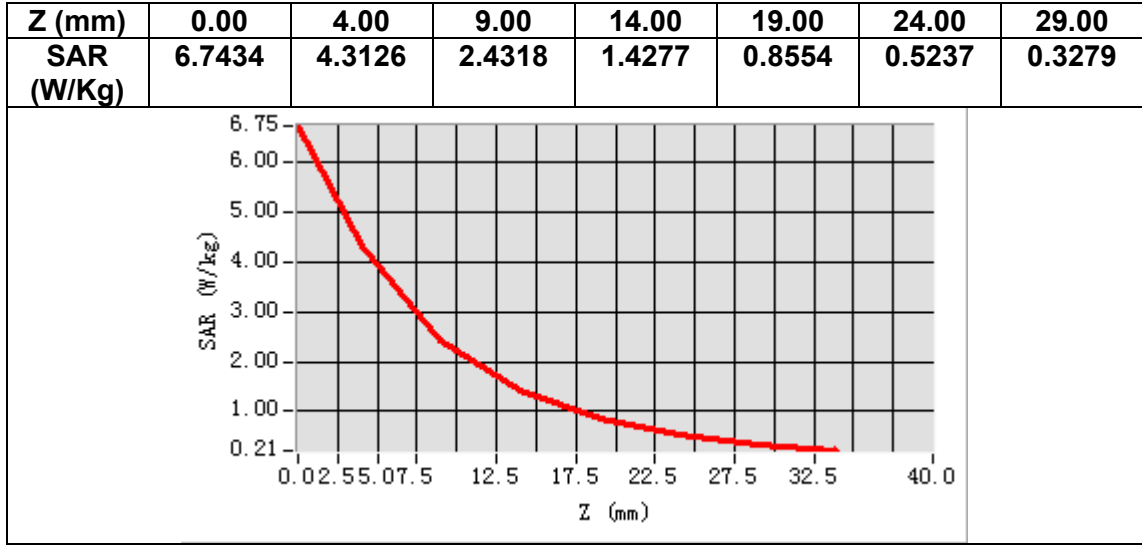
Frequency (MHz)	1800.000000
Relative permittivity (real part)	38.481237
Relative permittivity (imaginary part)	14.143229
Conductivity (S/m)	1.409367
Variation (%)	-2.110000



Maximum location: X=3.00, Y=2.00

SAR Peak: 6.82 W/kg

SAR 10g (W/Kg)	2.010397
SAR 1g (W/Kg)	3.806451



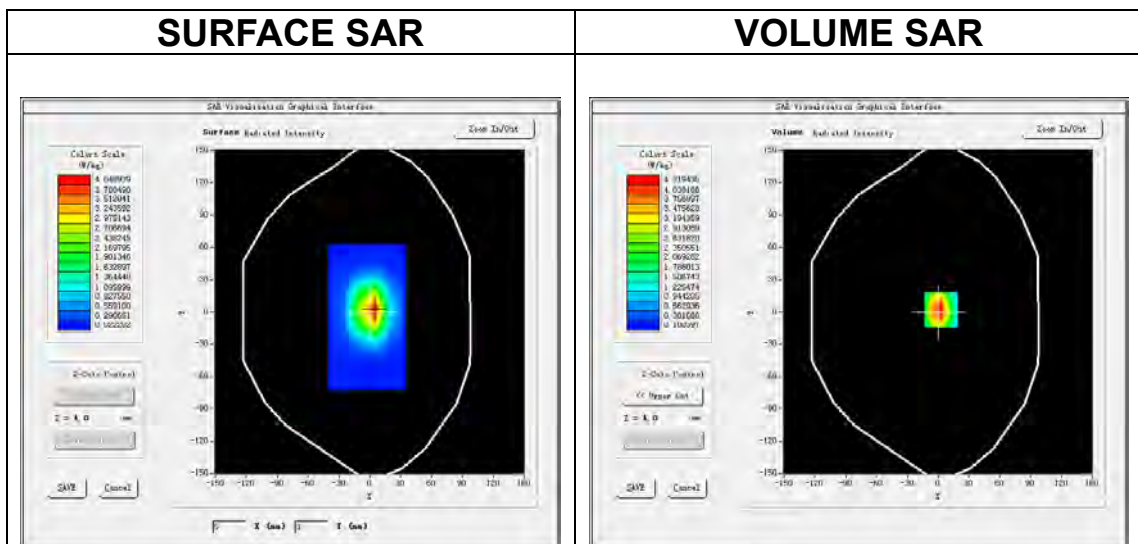
MEASUREMENT 6

A. Experimental conditions.

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

B. SAR Measurement Results

Frequency (MHz)	1800.000000
Relative permittivity (real part)	53.243510
Relative permittivity (imaginary part)	15.634016
Conductivity (S/m)	1.563096
Variation (%)	2.020000

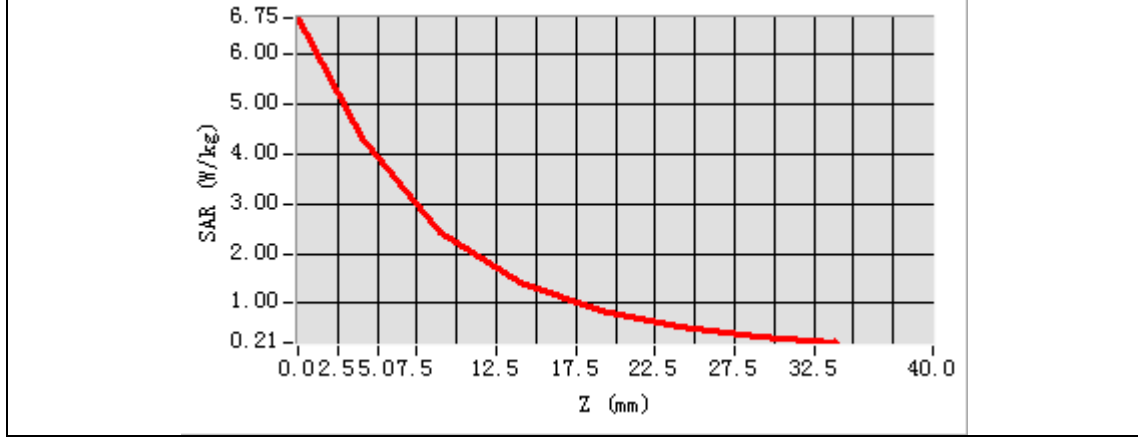


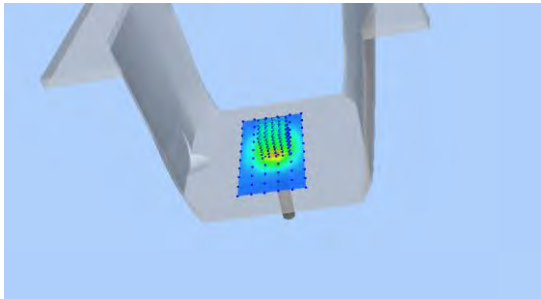
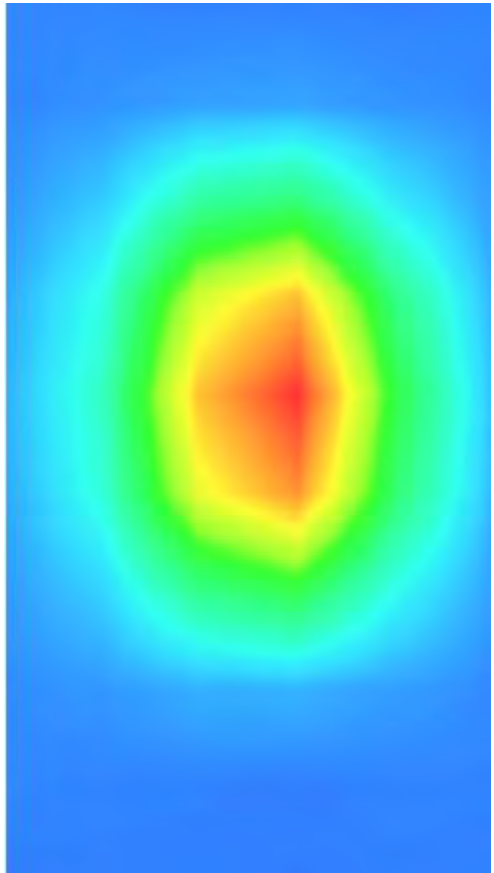
Maximum location: X=3.00, Y=2.00

SAR Peak: 6.82 W/kg

SAR 10g (W/Kg)	2.063379
SAR 1g (W/Kg)	3.812268

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	6.7434	4.3133	2.4332	1.4247	0.8577	0.5244	0.3266



3D screen shot	Hot spot position
	

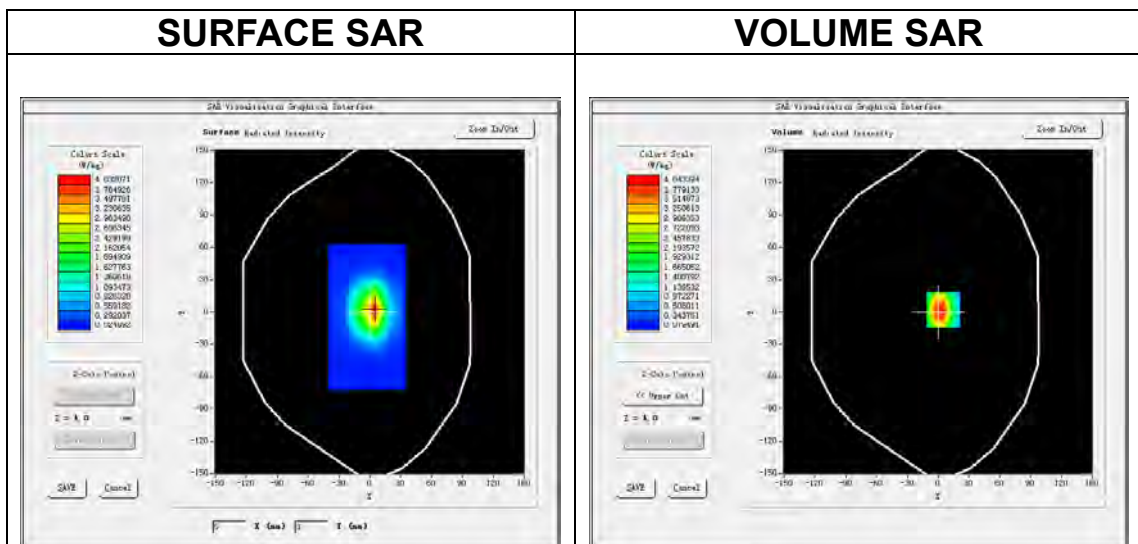
MEASUREMENT 7

A. Experimental conditions.

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

B. SAR Measurement Results

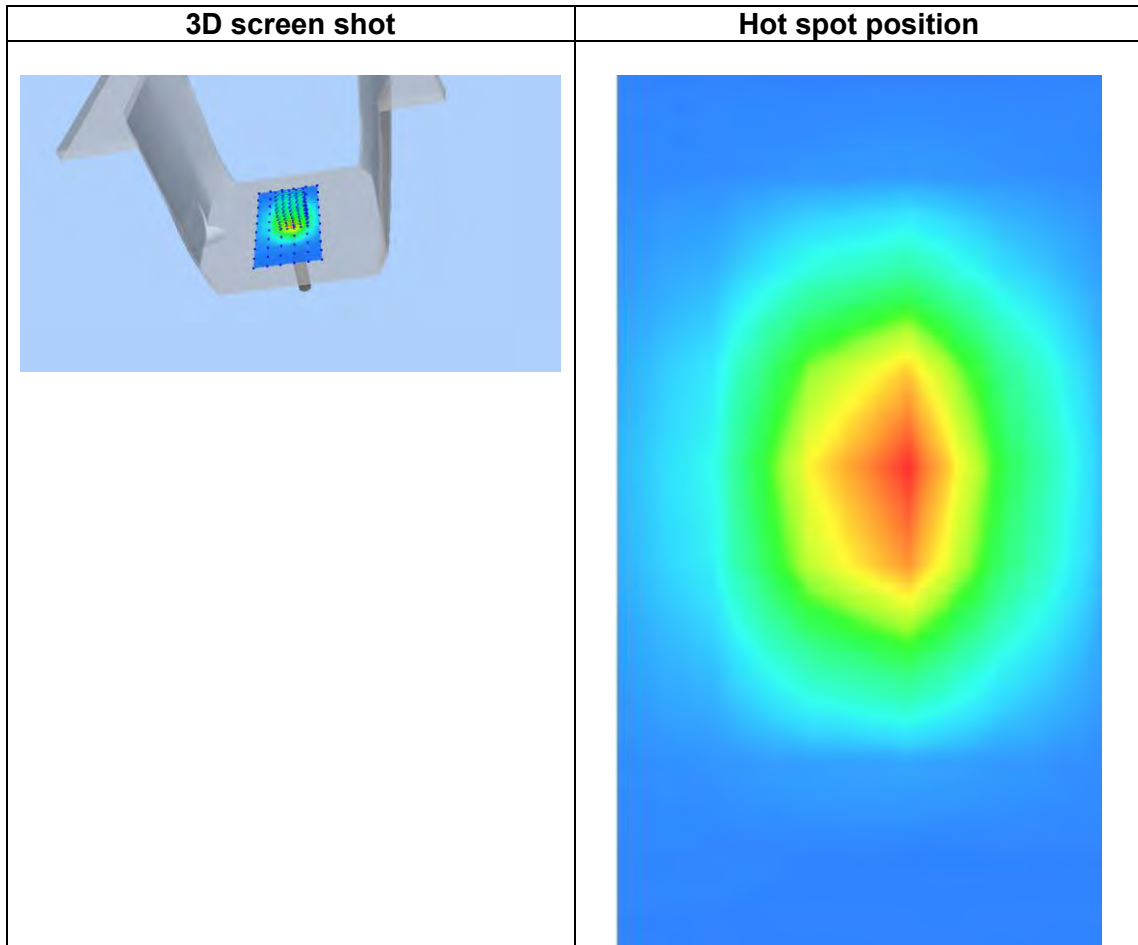
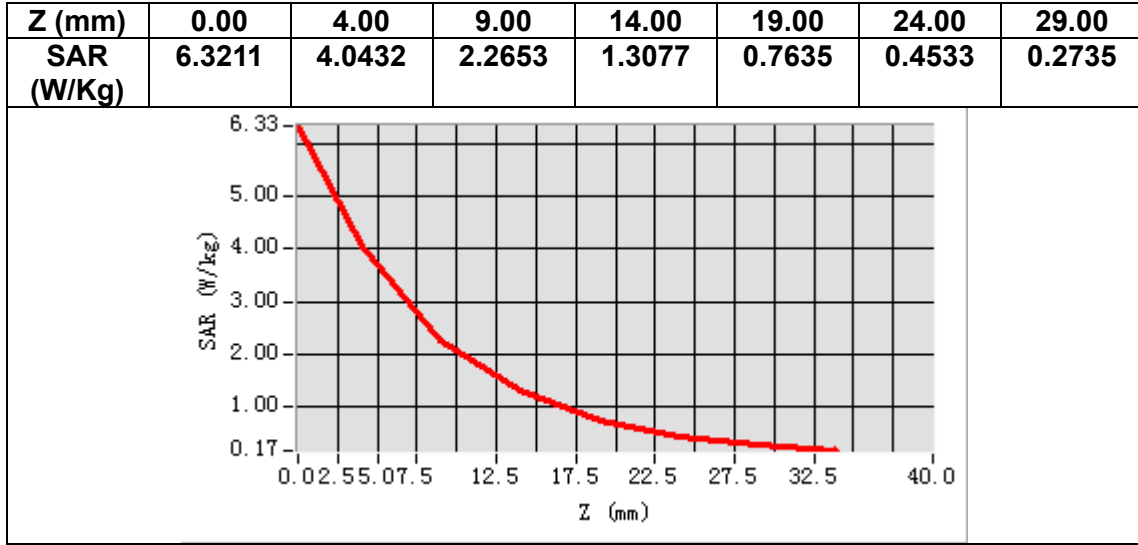
Frequency (MHz)	1900.000000
Relative permittivity (real part)	40.961287
Relative permittivity (imaginary part)	13.843008
Conductivity (S/m)	1.460336
Variation (%)	-1.430000



Maximum location: X=5.00, Y=2.00

SAR Peak: 6.70 W/kg

SAR 10g (W/Kg)	2.007456
SAR 1g (W/Kg)	3.890365



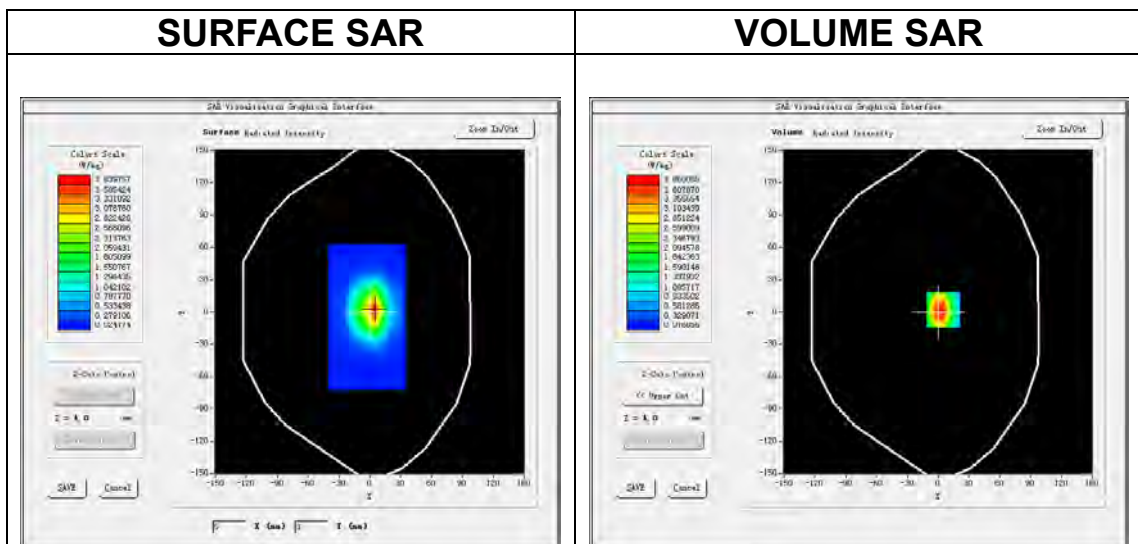
MEASUREMENT 8

A. Experimental conditions.

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

B. SAR Measurement Results

Frequency (MHz)	1900.000000
Relative permittivity (real part)	52.573335
Relative permittivity (imaginary part)	14.903503
Conductivity (S/m)	1.569566
Variation (%)	3.460000

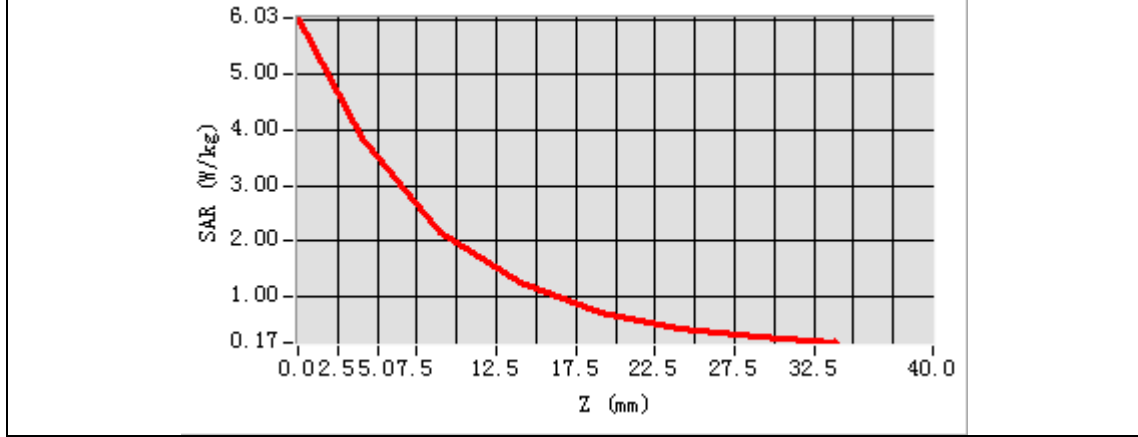


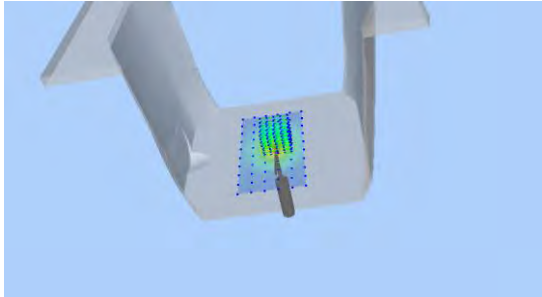
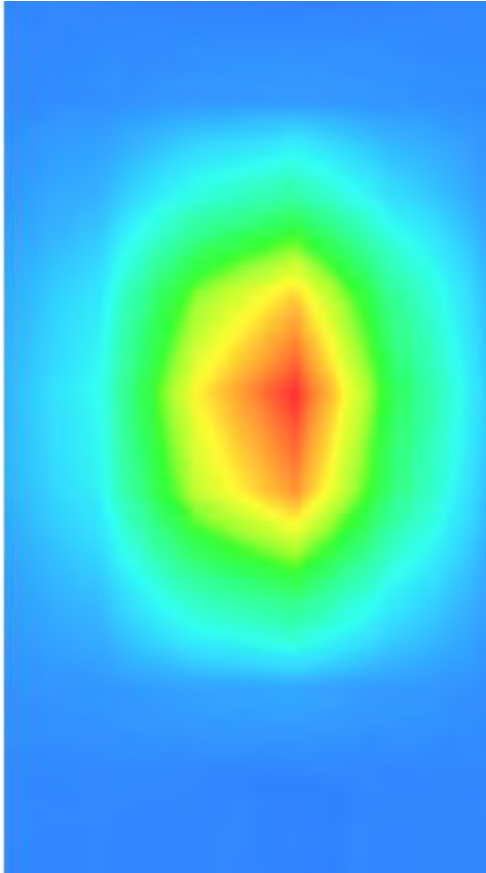
Maximum location: X=5.00, Y=2.00

SAR Peak: 6.39 W/kg

SAR 10g (W/Kg)	2.059329
SAR 1g (W/Kg)	3.910402

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	6.0345	3.8665	2.1619	1.2445	0.7255	0.4326	0.2634



3D screen shot	Hot spot position
	

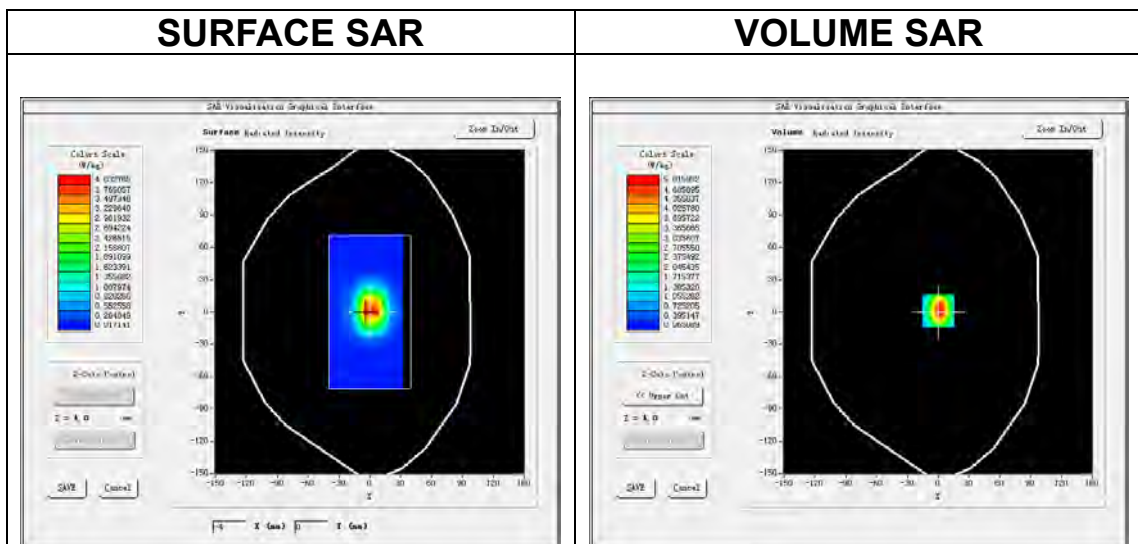
MEASUREMENT 9

A. Experimental conditions.

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

B. SAR Measurement Results

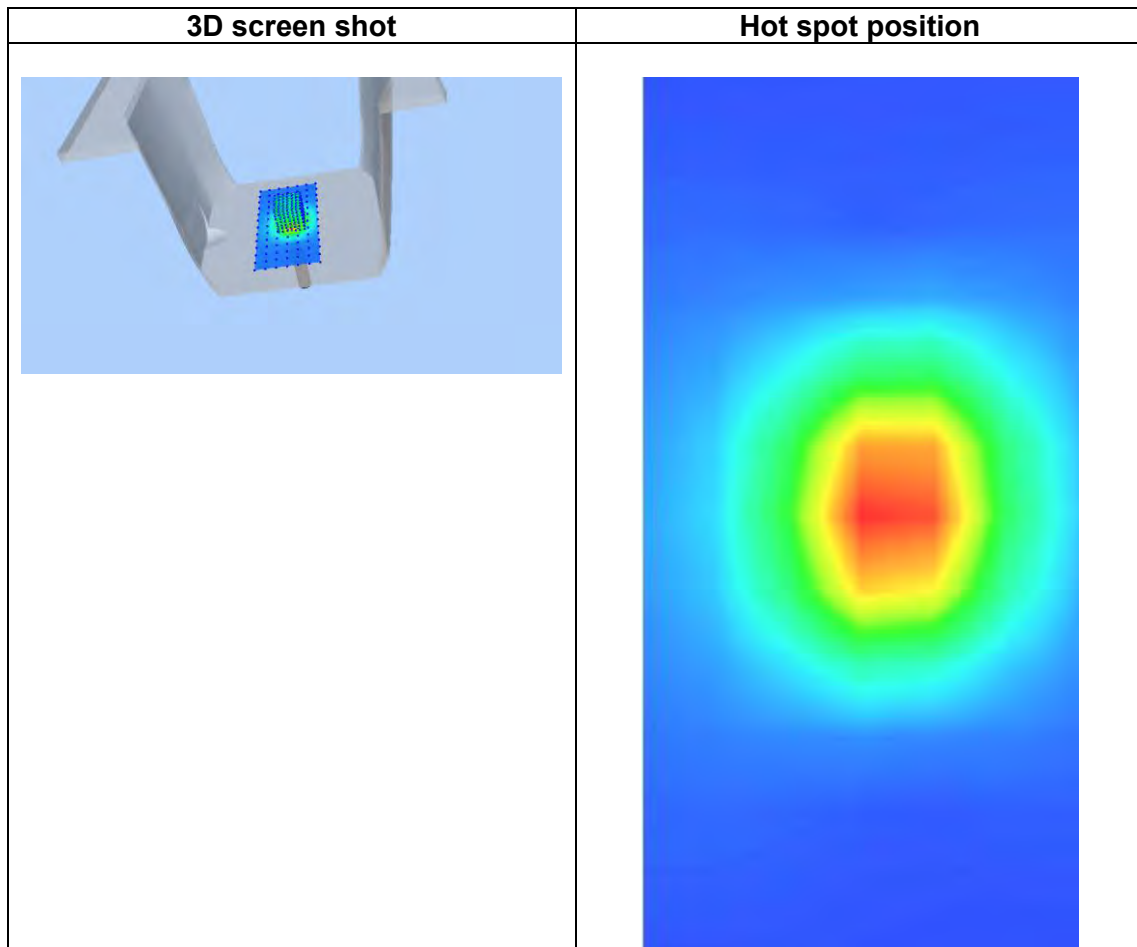
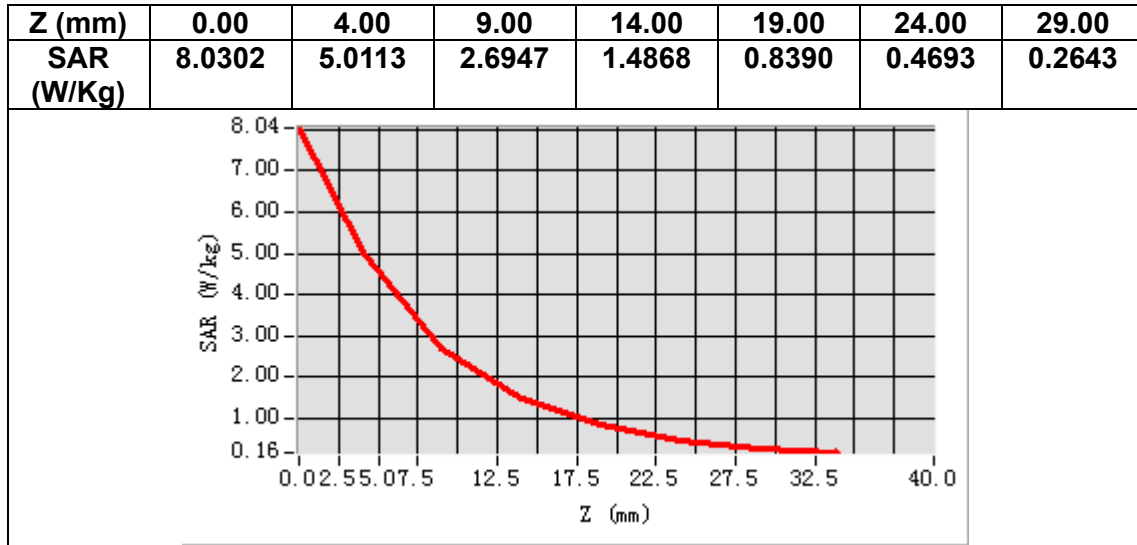
Frequency (MHz)	2450.000000
Relative permittivity (real part)	38.721421
Relative permittivity (imaginary part)	13.792631
Conductivity (S/m)	1.879663
Variation (%)	-3.350000



Maximum location: X=0.00, Y=1.00

SAR Peak: 8.14 W/kg

SAR 10g (W/Kg)	2.416375
SAR 1g (W/Kg)	5.369435



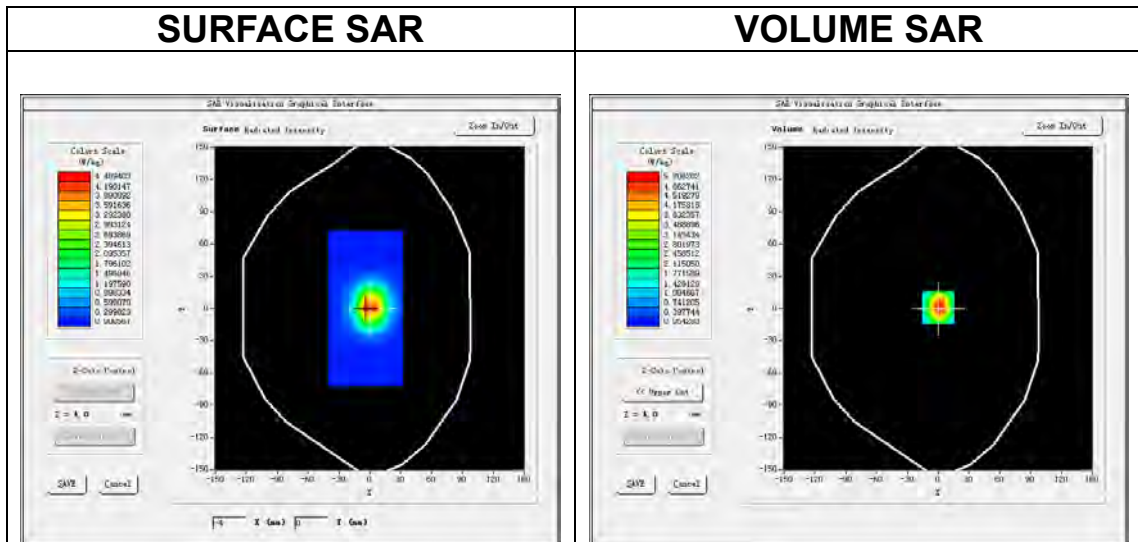
MEASUREMENT 10

A. Experimental conditions.

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

B. SAR Measurement Results

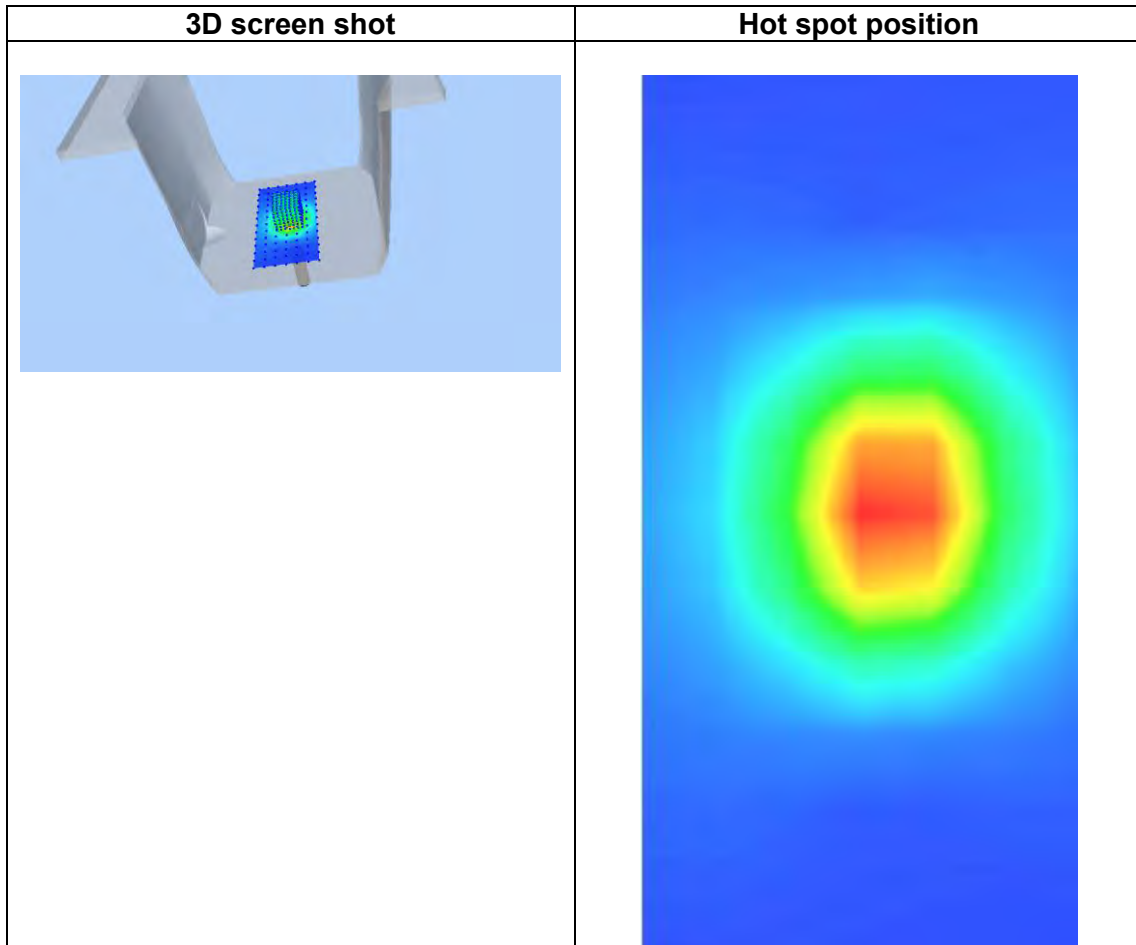
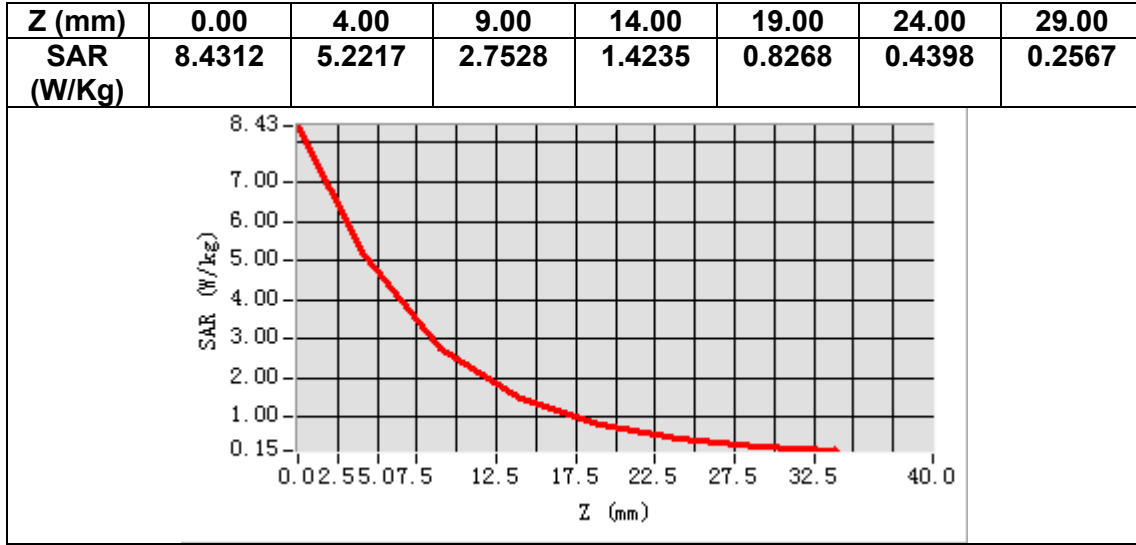
Frequency (MHz)	2450.000000
Relative permittivity (real part)	52.091497
Relative permittivity (imaginary part)	14.883566
Conductivity (S/m)	2.032816
Variation (%)	1.420000



Maximum location: X=0.00, Y=1.00

SAR Peak: 8.46 W/kg

SAR 10g (W/Kg)	2.401285
SAR 1g (W/Kg)	5.288270



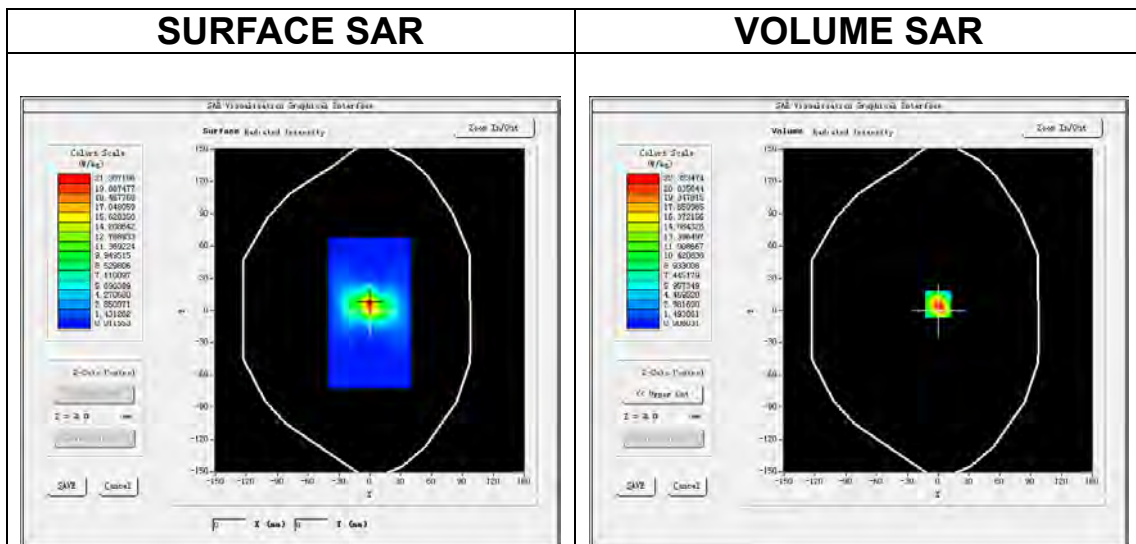
MEASUREMENT 11

A. Experimental conditions.

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

B. SAR Measurement Results

Frequency (MHz)	5200.000000
Relative permittivity (real part)	35.832204
Relative permittivity (imaginary part)	16.043542
Conductivity (S/m)	4.632321
Variation (%)	1.660000

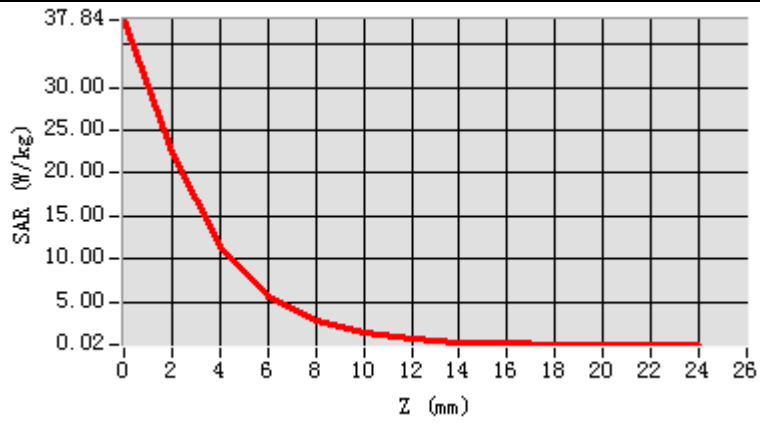


Maximum location: X=0.00, Y=6.00

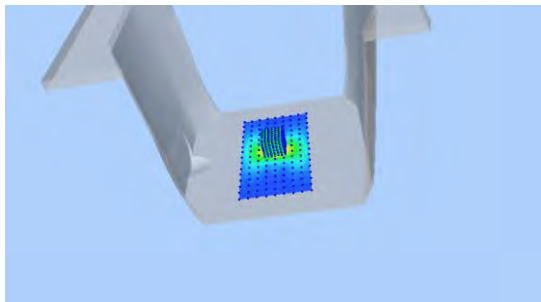
SAR Peak: 40.06 W/kg

SAR 10g (W/Kg)	5.584495
SAR 1g (W/Kg)	16.077221

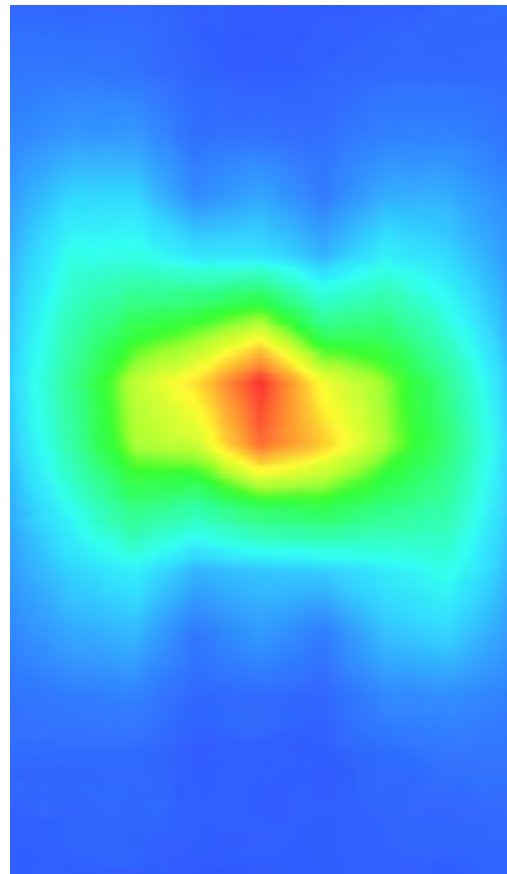
Z (m m)	0.00	2.00	4.00	6.00	8.00	10.0	12.0	14.0	16.0	18.0	20.0	22.0
SAR R (W/ Kg)	37.8 356	22.3 278	11.3 730	5.66 18	2.82 55	1.40 93	0.71 24	0.36 60	0.18 08	0.10 12	0.05 13	0.03 23



3D screen shot



Hot spot position



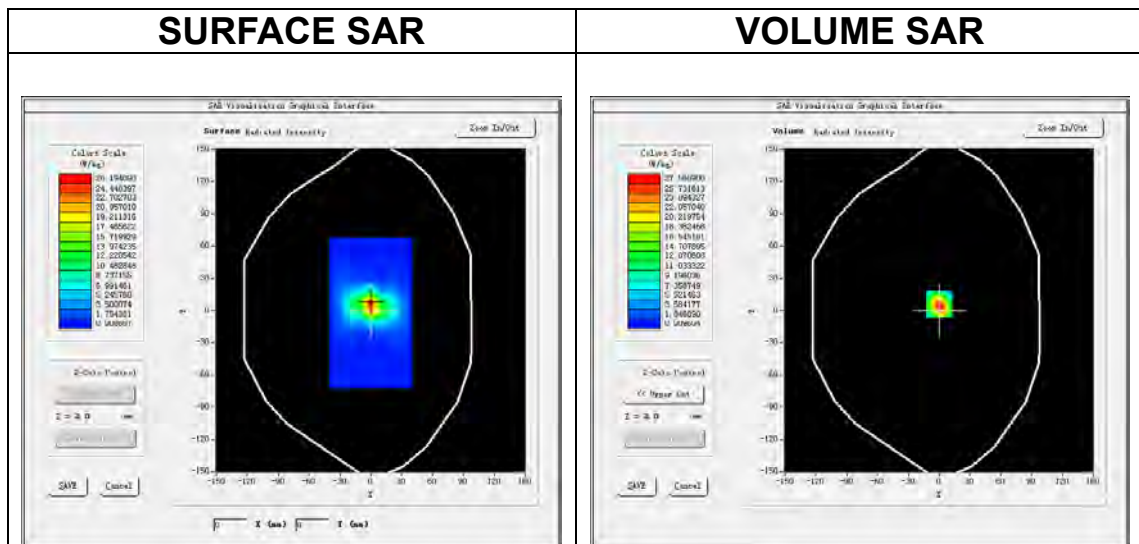
MEASUREMENT 12

A. Experimental conditions.

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

B. SAR Measurement Results

Frequency (MHz)	5200.000000
Relative permittivity (real part)	49.662845
Relative permittivity (imaginary part)	18.301441
Conductivity (S/m)	5.293842
Variation (%)	4.490000

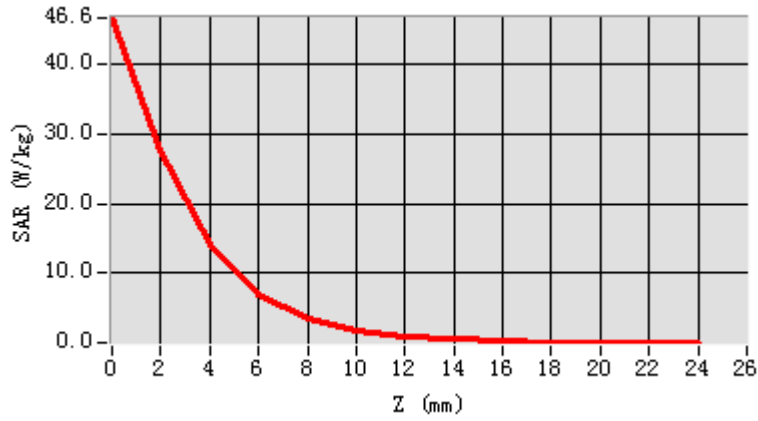


Maximum location: X=0.00, Y=6.00

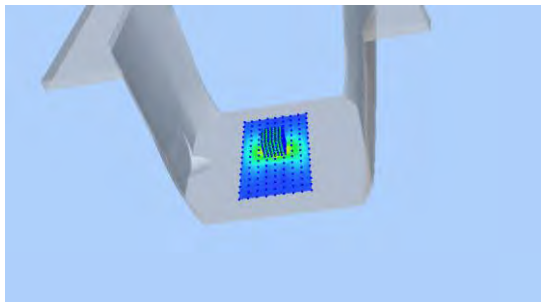
SAR Peak: 49.61 W/kg

SAR 10g (W/Kg)	5.510184
SAR 1g (W/Kg)	15.677246

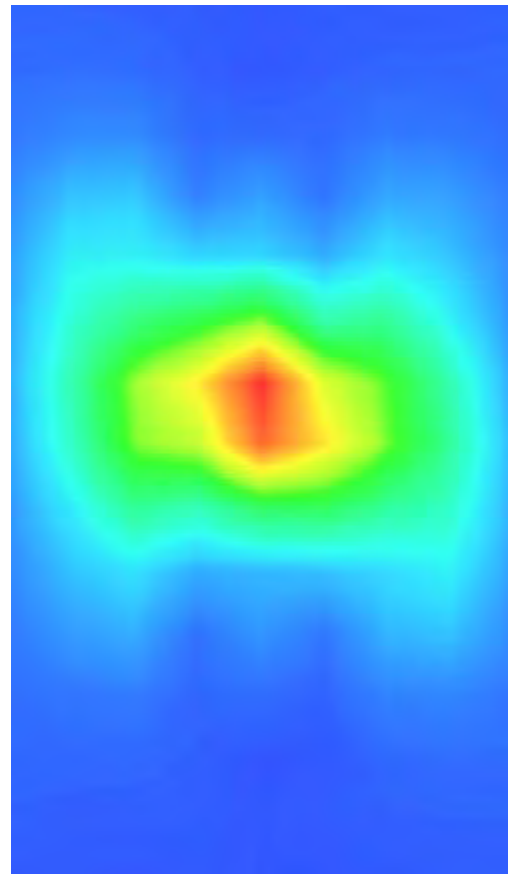
Z (m m)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00
SAR (W/Kg)	46.6150	27.5644	14.0668	7.0591	3.5928	1.7802	0.8938	0.4670	0.2475	0.1353	0.0650	0.04000



3D screen shot



Hot spot position



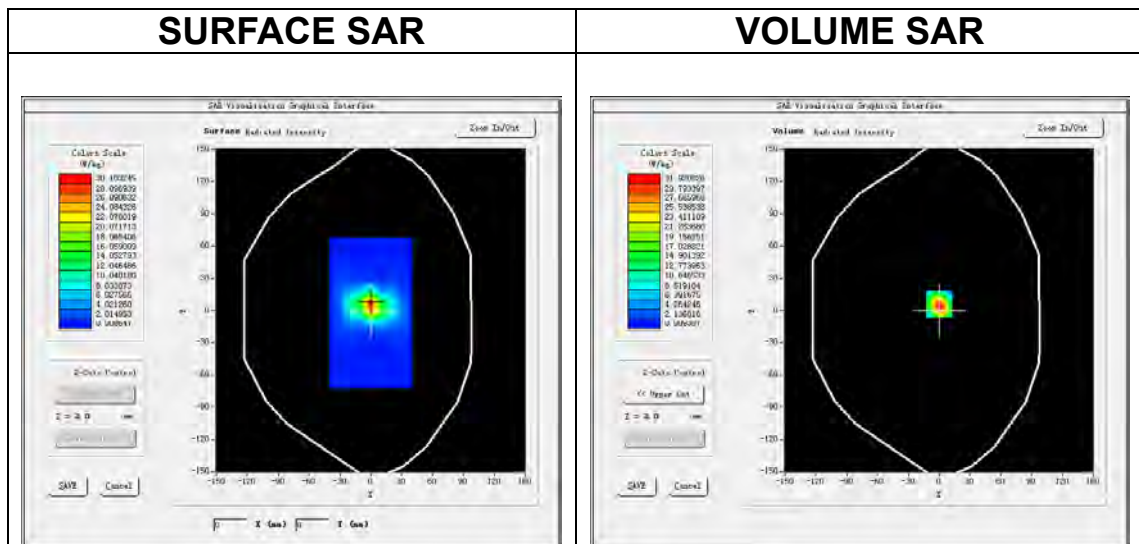
MEASUREMENT 13

A. Experimental conditions.

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

B. SAR Measurement Results

Frequency (MHz)	5800.000000
Relative permittivity (real part)	34.741512
Relative permittivity (imaginary part)	16.083082
Conductivity (S/m)	5.180981
Variation (%)	1.880000

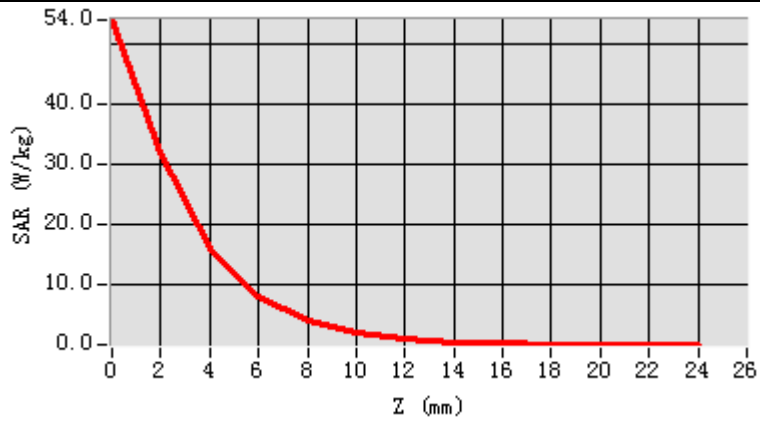


Maximum location: X=0.00, Y=6.00

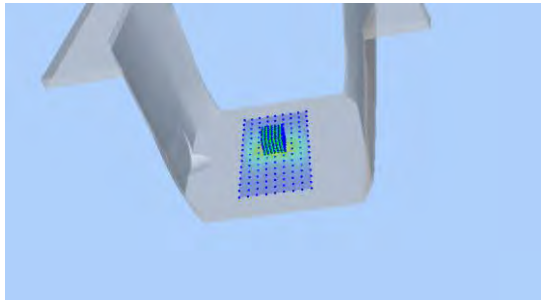
SAR Peak: 57.37 W/kg

SAR 10g (W/Kg)	6.256095
SAR 1g (W/Kg)	18.410093

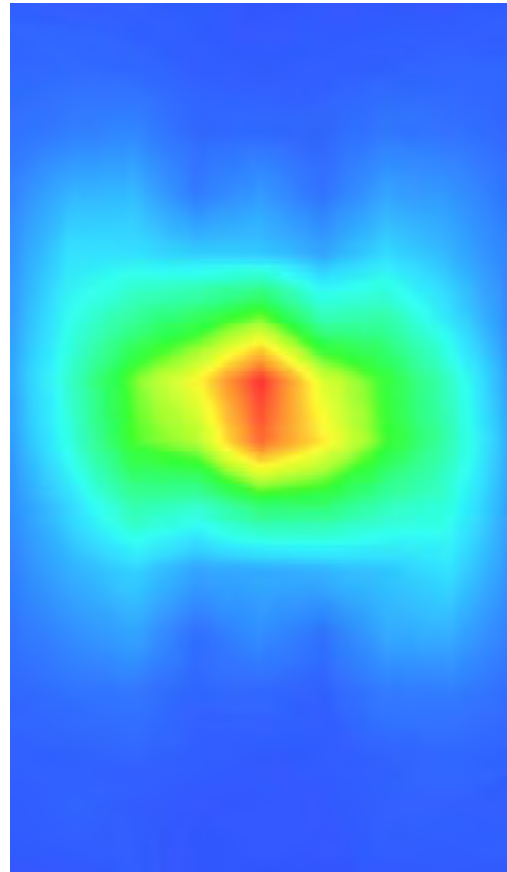
Z (m m)	0.00	2.00	4.00	6.00	8.00	10.0	12.0	14.0	16.0	18.0	20.0	22.0
SAR R (W/ Kg)	54.0 337	31.9 251	16.1 709	8.17 95	4.08 15	2.05 72	1.03 29	0.51 77	0.27 63	0.15 42	0.07 82	0.04 46



3D screen shot



Hot spot position



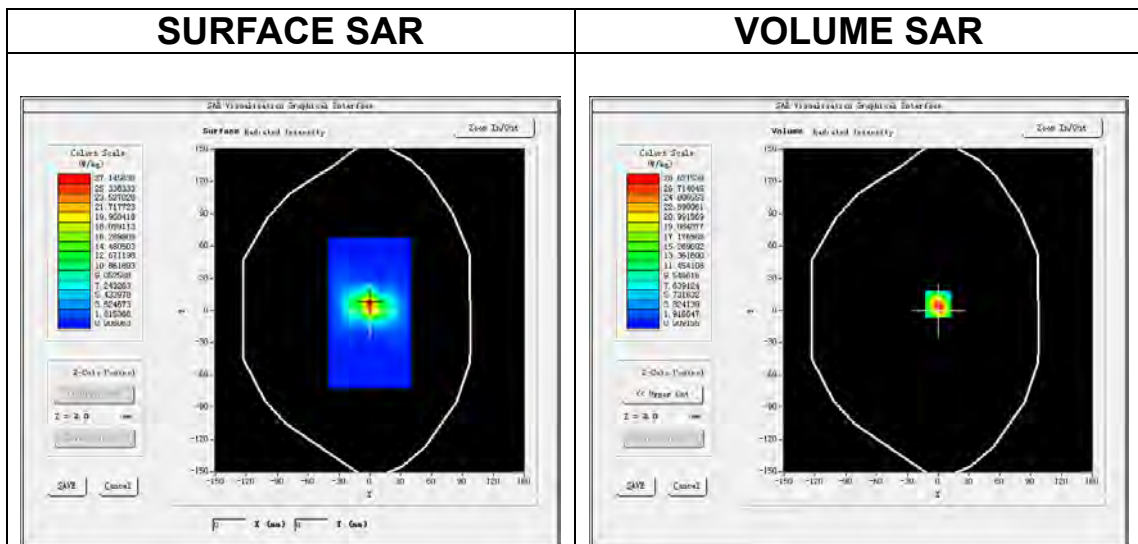
MEASUREMENT 14

A. Experimental conditions.

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

B. SAR Measurement Results

Frequency (MHz)	5800.000000
Relative permittivity (real part)	48.350523
Relative permittivity (imaginary part)	18.820043
Conductivity (S/m)	6.061524
Variation (%)	1.340000

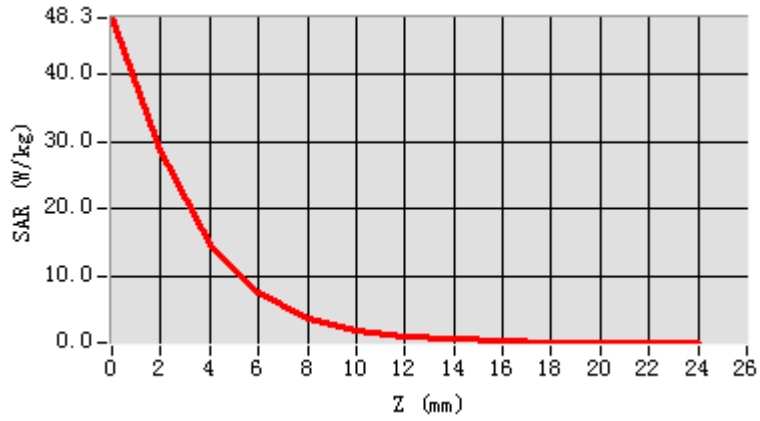


Maximum location: X=0.00, Y=6.00

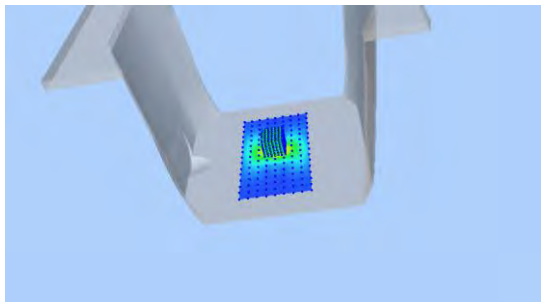
SAR Peak: 51.30 W/kg

SAR 10g (W/Kg)	5.840184
SAR 1g (W/Kg)	16.911052

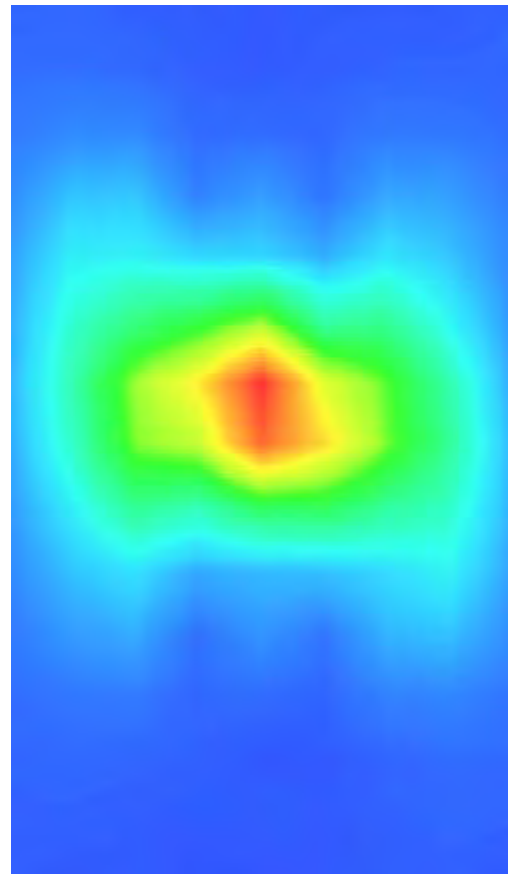
Z (m)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00
SAR (W/Kg)	48.3472	28.6209	14.6589	7.4039	3.6857	1.8335	0.9318	0.4760	0.2513	0.1308	0.0783	0.0522



3D screen shot



Hot spot position



13. Appendix C. Plots of High SAR Measurement

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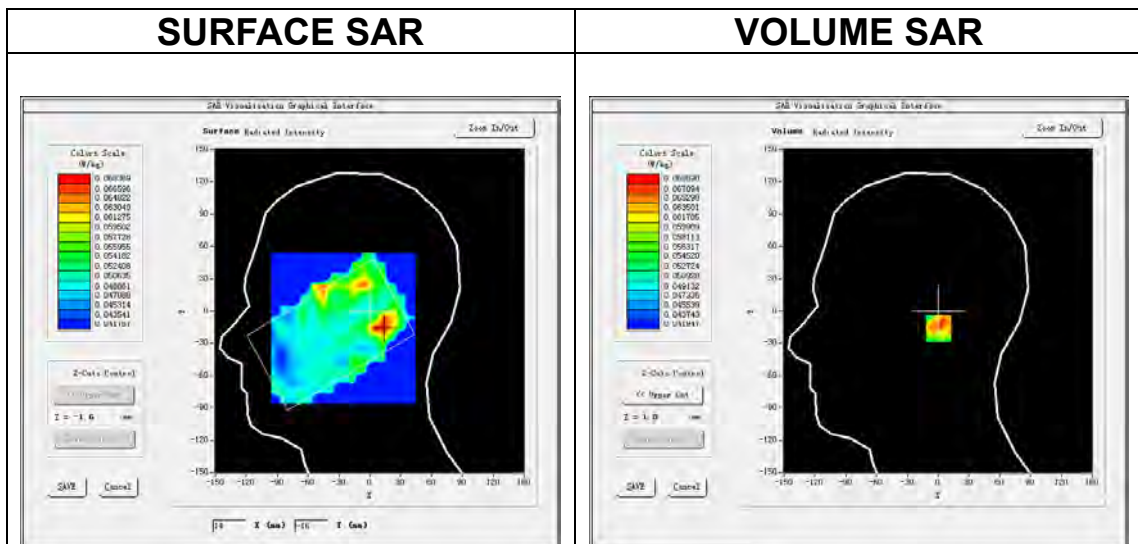
MEASUREMENT 1

A. Experimental conditions.

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

B. SAR Measurement Results

Frequency (MHz)	5200.000000
Relative permittivity (real part)	35.832981
Relative permittivity (imaginary part)	16.041618
Conductivity (S/m)	4.634246
Variation (%)	-0.270000

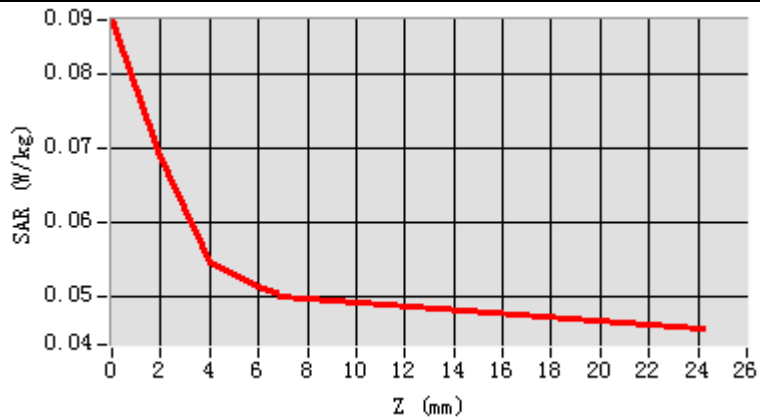


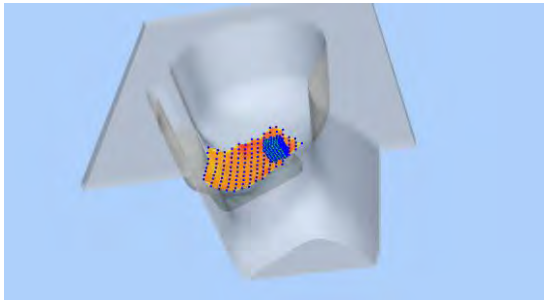
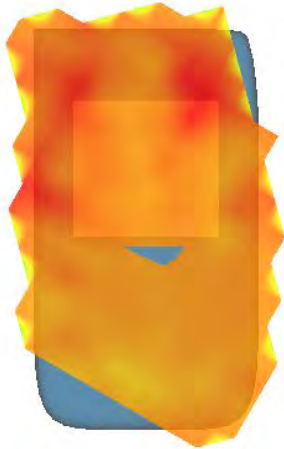
Maximum location: X=9.00, Y=-16.00

SAR Peak: 0.12 W/kg

SAR 10g (W/Kg)	0.055755
SAR 1g (W/Kg)	0.068635

Z (m m)	0.00	2.00	4.00	6.00	8.00	10.0	12.0	14.0	16.0	18.0	20.0	22.0
SAR (W/ Kg)	0.0873	0.0689	0.0547	0.0514	0.0501	0.0495	0.0484	0.0480	0.0475	0.0463	0.0455	0.0450



3D screen shot	Hot spot position
	

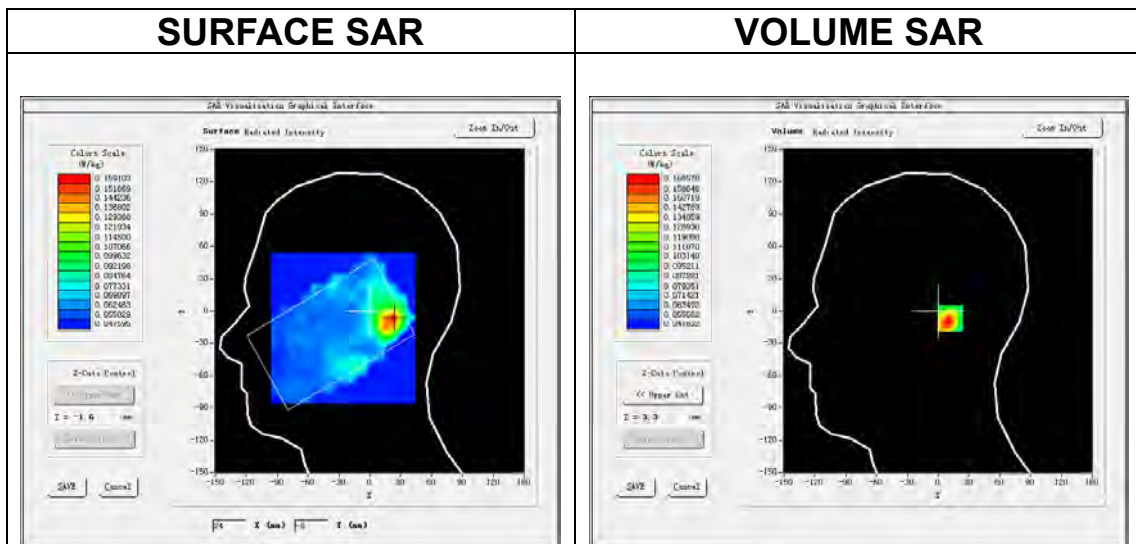
MEASUREMENT 2

A. Experimental conditions.

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

B. SAR Measurement Results

Frequency (MHz)	5785.000000
Relative permittivity (real part)	34.814789
Relative permittivity (imaginary part)	15.955266
Conductivity (S/m)	5.127845
Variation (%)	2.110000

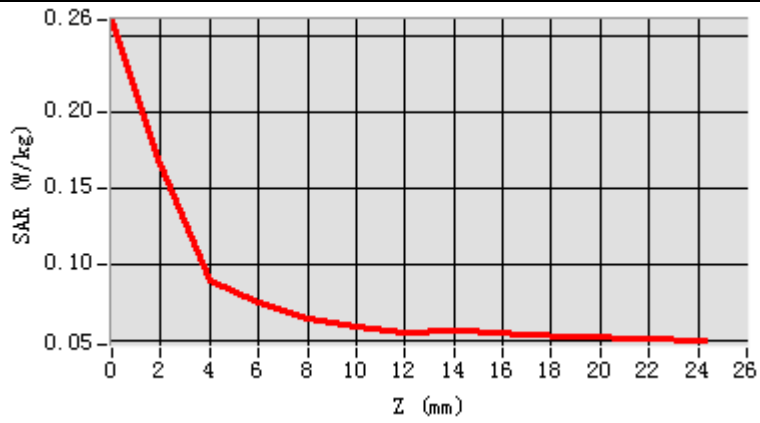


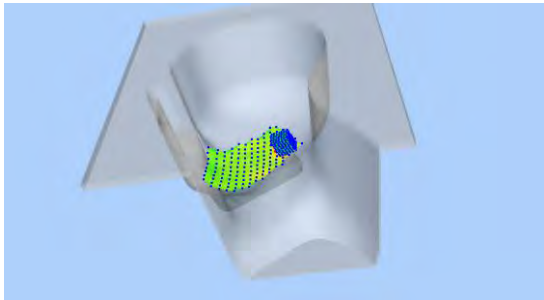
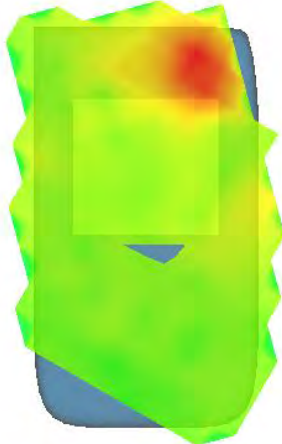
Maximum location: X=22.00, Y=-7.00

SAR Peak: 0.38 W/kg

SAR 10g (W/Kg)	0.095640
SAR 1g (W/Kg)	0.169403

Z (m m)	0.00	2.00	4.00	6.00	8.00	10.0	12.0	14.0	16.0	18.0	20.0	22.0
SAR (W/ Kg)	0.26 10	0.16 66	0.08 94	0.07 51	0.06 53	0.06 01	0.05 51	0.05 64	0.05 52	0.05 10	0.05 03	0.05 00



3D screen shot	Hot spot position
	

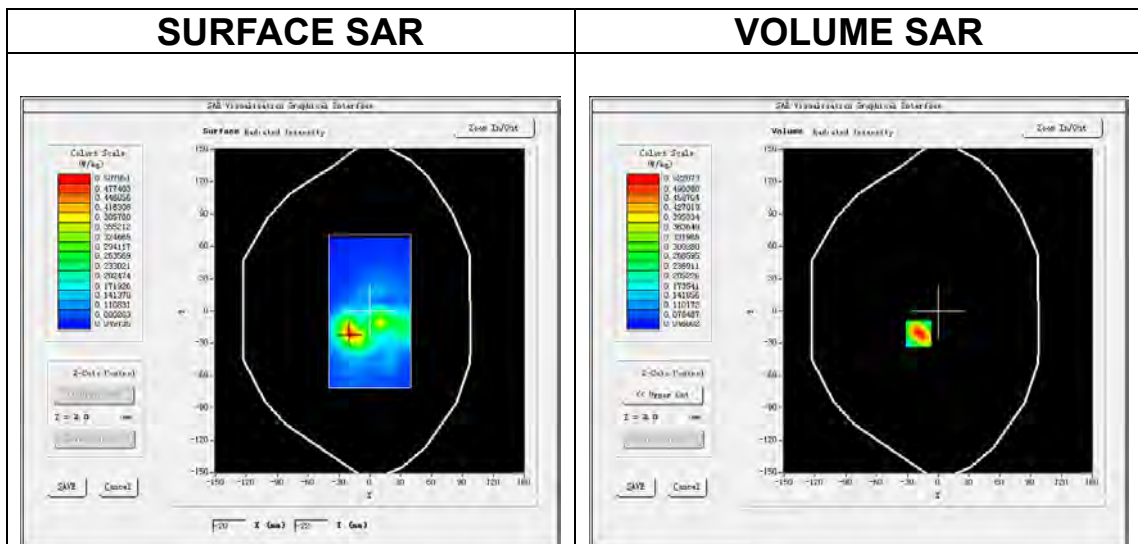
MEASUREMENT 3

A. Experimental conditions.

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

B. SAR Measurement Results

Frequency (MHz)	5200.000000
Relative permittivity (real part)	49.659538
Relative permittivity (imaginary part)	18.295509
Conductivity (S/m)	5.285369
Variation (%)	0.170000

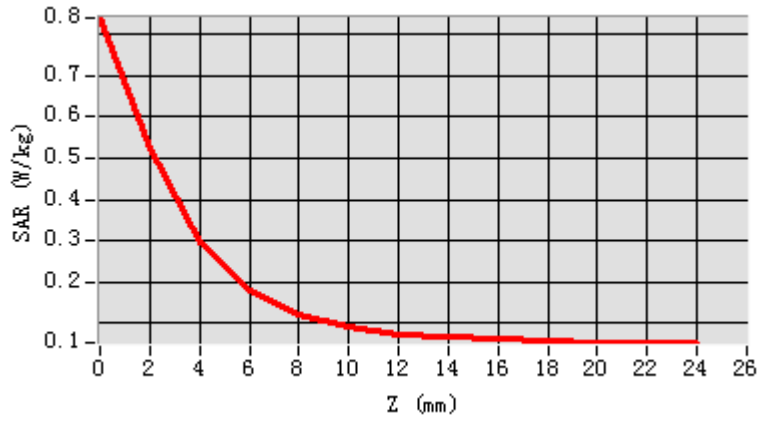


Maximum location: X=-19.00, Y=-21.00

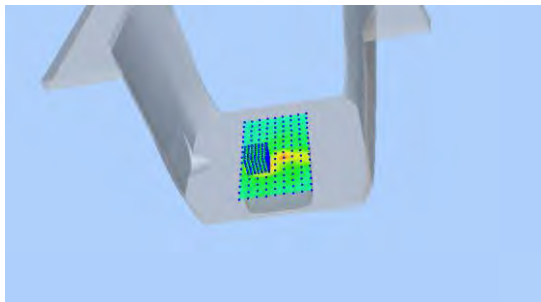
SAR Peak: 0.88 W/kg

SAR 10g (W/Kg)	0.155293
SAR 1g (W/Kg)	0.323884

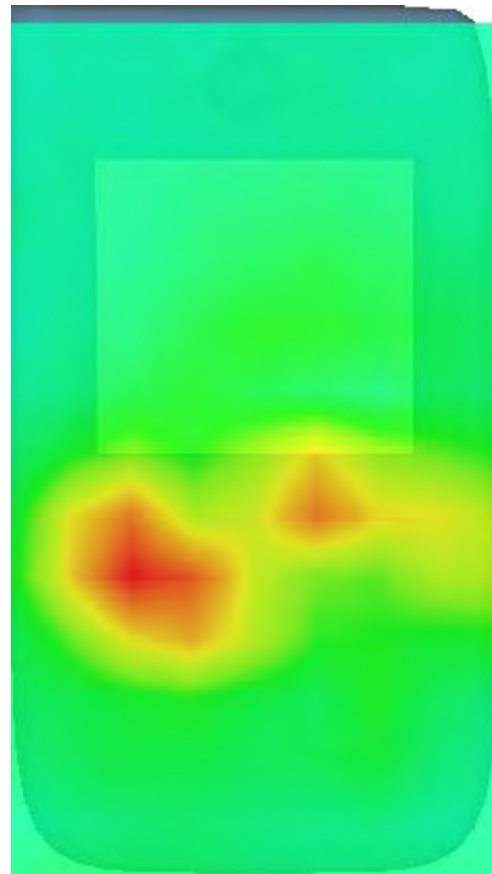
Z (m m)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00
SAR (W/Kg)	0.8409	0.5221	0.2977	0.1808	0.1196	0.0918	0.0727	0.0668	0.0605	0.0589	0.0539	0.0519



3D screen shot



Hot spot position



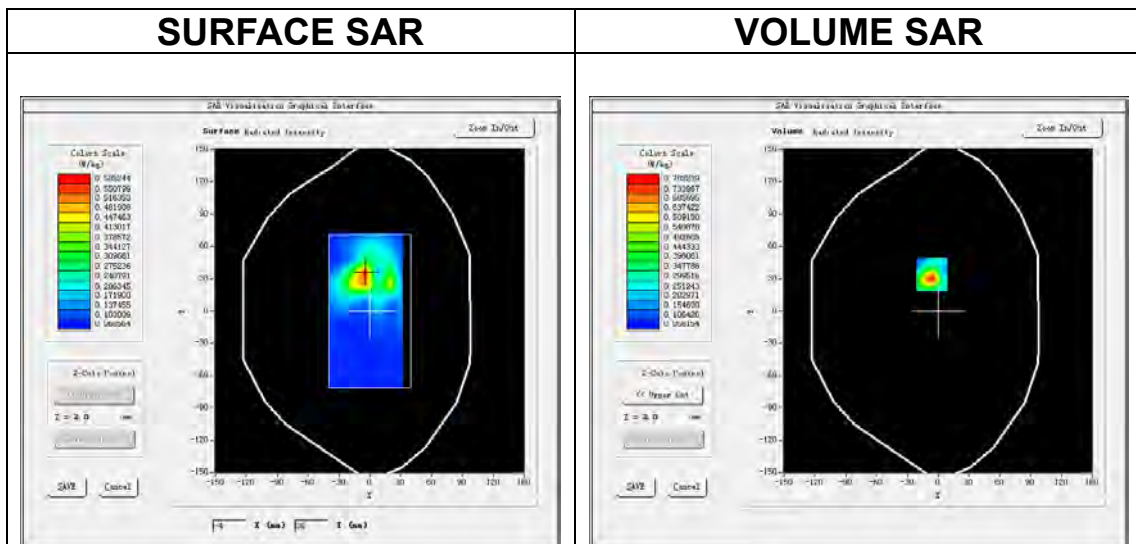
MEASUREMENT 4

A. Experimental conditions.

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

B. SAR Measurement Results

Frequency (MHz)	5785.000000
Relative permittivity (real part)	48.428703
Relative permittivity (imaginary part)	18.696766
Conductivity (S/m)	6.008933
Variation (%)	-4.280000



Maximum location: X=-6.00, Y=34.00

SAR Peak: 1.29 W/kg

SAR 10g (W/Kg)	0.186058
SAR 1g (W/Kg)	0.488682

