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： Tablet

Trademark： Acer

Model Name： Acer one 8 T2

Family Model： N/A

Report No.： S20072802603001

FCC ID： HLZ-ACERONE8T2

Prepared for

Acer Incorporated

8F, 88, Sec. 1, Hsin Tai Wu Rd, Hsichih,Taipei Hsien,Taiwan

Prepared by

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TEST RESULT CERTIFICATION

Applicant's name..... : Acer Incorporated

Address..... : 8F, 88, Sec. 1, Hsin Tai Wu Rd, Hsichih,Taipei Hsien,Taiwan

Manufacturer's Name..... : Acer Incorporated

Address..... : 8F, 88, Sec. 1, Hsin Tai Wu Rd, Hsichih,Taipei Hsien,Taiwan

Product description

Product name..... : Tablet

Trademark ..... : Acer

Model Name ..... : Acer one 8 T2

Family Model..... : N/A

Standards..... : FCC 47 CFR Part 2(2.1093)
ANSI/IEEE C95.1-1992
IEEE Std 1528-2013
Published RF exposure KDB procedures

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

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Date of Test

Date (s) of performance of tests..... : Jul. 30, 2020 ~ Aug. 21, 2020

Date of Issue ..... : Aug. 25, 2020

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

Prepared By
(Test Engineer) : Cheng Jiawen
(Cheng Jiawen)

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

※ ※ Revision History ※ ※

REV.	DESCRIPTION	ISSUED DATE	REMARK
Rev.1.0	Initial Test Report Release	Aug. 25, 2020	Cheng Jiawen

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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 Acer one 8 T2 are as follows.

RF Exposure Conditions		Equipment Class -Highest Reported SAR (W/kg)			
		PCE	DTS	NII	DSS
1-g Head		0.124	0.196	0.563	N/A
1-g Body (Separation distance of 0mm)		1.097	0.225	0.453	N/A
Max Simultaneous Tx	Head	0.687	0.320	0.687	0.208
	Body	1.550	1.322	1.550	1.181

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	Tablet		
Trade Name	Acer		
Model Name	Acer one 8 T2		
Family Model	N/A		
FCC ID	HLZ-ACERONE8T2		
Device Phase	Identical Prototype		
Exposure Category	General population / Uncontrolled environment		
Antenna	FPCB Antenna		
Battery Information	DC 3.7V, 4000mAh, 14.8Wh		
Device Operating Configurations			
Supporting Mode(s)	GSM 850/1900, LTE Band 5/41, WLAN 2.4G/5.2G/5.8G, Bluetooth		
Test Modulation	GSM(GMSK), LTE(QPSK/16QAM), WLAN(DSSS/OFDM), Bluetooth(GFSK, π/4-DQPSK, 8DPSK)		
Device Class	B		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	GSM 850	824-849	869-894
	GSM 1900	1850-1910	1930-1990
	LTE Band 5	824-849	869-894
	LTE Band 41	2555-2655	

	WLAN 2.4G	2412-2462
	WLAN 5.2G	5180-5240
	WLAN 5.8G	5745-5825
	Bluetooth	2402-2480
GPRS Multislot Class(12)	Max Number of Timeslots in Uplink	4
	Max Number of Timeslots in Downlink	4
	Max Total Timeslot	5
Power Class	4, tested with power level 5(GSM 850)	
	1, tested with power level 0(GSM 1900)	
	3, tested with power control all Max.(LTE Band 5)	
	3, tested with power control all Max.(LTE Band 41)	
Test Channels (low-mid-high)	128-189-251(GSM 850)	
	512-661-810(GSM 1900)	
	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)	
	40265-40740-41215(LTE Band 41 BW=5MHz)	
	40290-40740-41190 (LTE Band 41 BW=10MHz)	
	40315-40740-41165 (LTE Band 41 BW=15MHz)	
	40340-40740-41140(LTE Band 41 BW=20MHz)	
	1-6-11(WLAN 2.4G) 36-38-40-46-48(WLAN 5.2G) 149-151-157-159-165(WLAN 5.8G)	

1.4. Test specification(s)

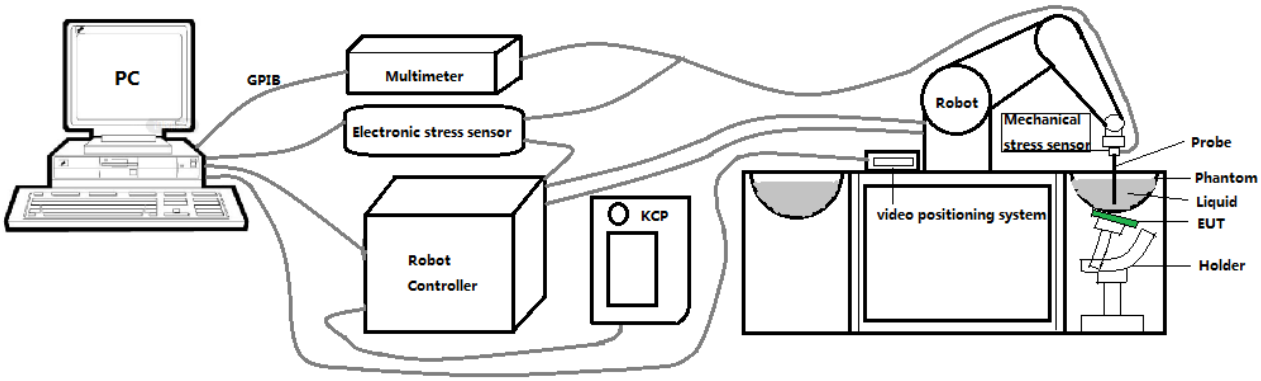
FCC 47 CFR Part 2(2.1093)
ANSI/IEEE C95.1-1992
IEEE Std 1528-2013
KDB 865664 D01 SAR measurement 100 MHz to 6 GHz
KDB 865664 D02 RF Exposure Reporting
KDB 447498 D01 General RF Exposure Guidance
KDB 248227 D01 802.11 Wi-Fi SAR
KDB 941225 D01 3G SAR Procedures
KDB 941225 D05 SAR for LTE Devices
KDB 616217 D04 SAR for laptop and tablets

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 08/16 EPGO287 with following specifications is used

- Dynamic range: 0.01-100 W/kg
- Tip Diameter: 2.5 mm
- Distance between probe tip and sensor center: 1 mm
- Distance between sensor center and the inner phantom surface: 2 mm (repeatability better than ±1 mm).
- Probe linearity: ±0.08 dB
- Axial isotropy: 0.06 dB
- Hemispherical Isotropy: 0.08 dB
- Calibration range: 650MHz to 5900MHz for head & body simulating liquid.
- Lower detection limit: 7mW/kg

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

2.3.1. E-Field Probe Calibration

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

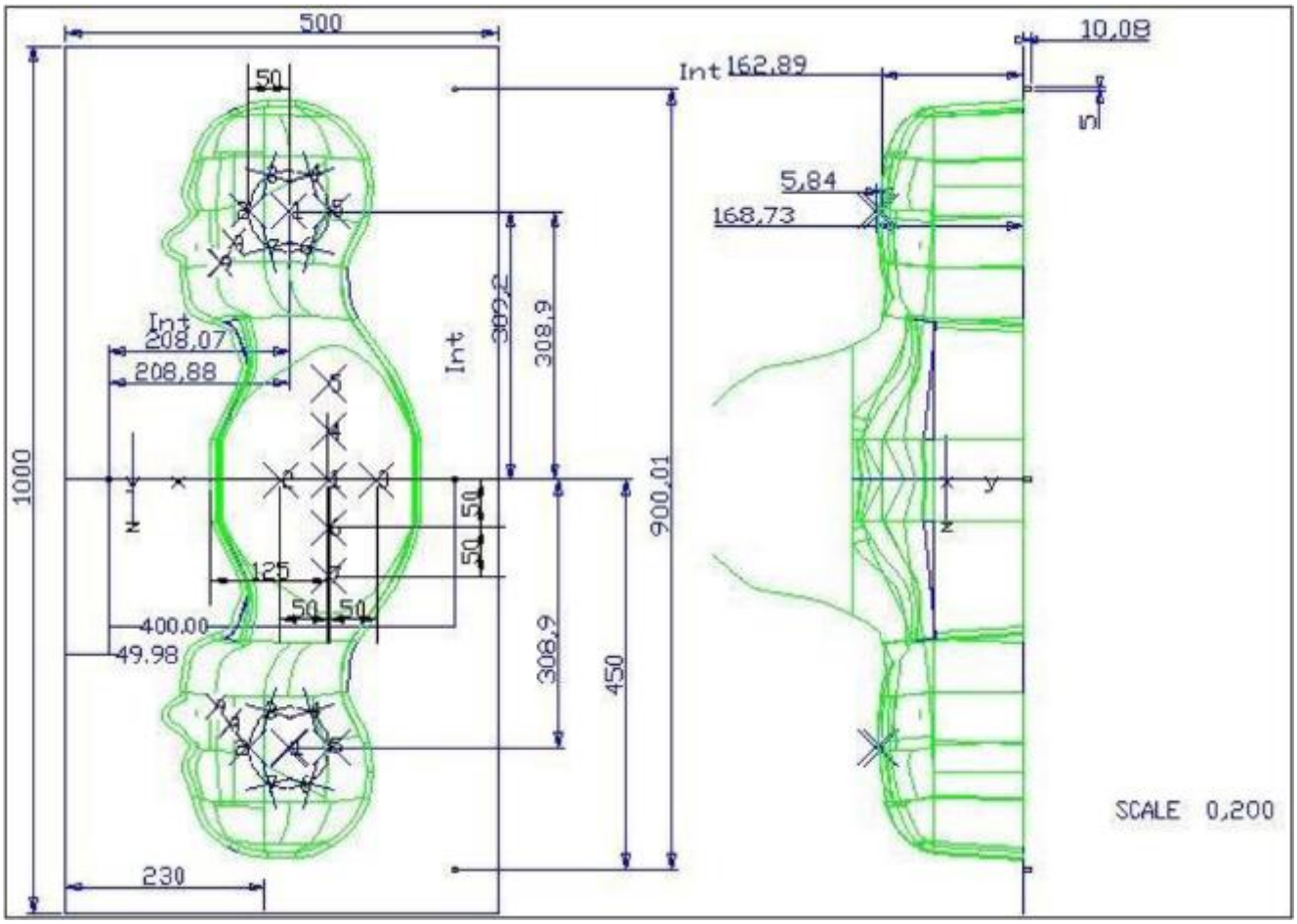
2.4. SAM phantoms

Photo of SAM phantom SN 16/15 SAM119

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

2.4.1. Technical Data

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

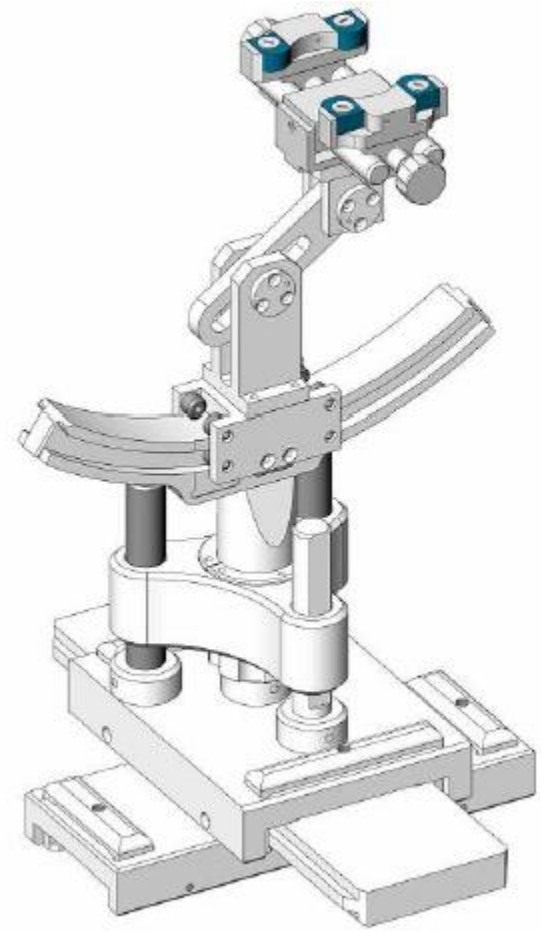


Serial Number	Left Head(mm)		Right Head(mm)		Flat Part(mm)	
SN 16/15 SAM119	2	2.02	2	2.08	1	2.09
	3	2.05	3	2.06	2	2.06
	4	2.07	4	2.07	3	2.08
	5	2.08	5	2.08	4	2.10
	6	2.05	6	2.07	5	2.10
	7	2.05	7	2.05	6	2.07
	8	2.07	8	2.06	7	2.07
	9	2.08	9	2.06	-	-

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

2.5. Device Holder

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



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

2.6. Test Equipment List

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

Devices used during the test described are marked ☒

	Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
					Last Cal.	Due Date
☒	MVG	E FIELD PROBE	SSE2	SN 08/16 EPGO287	Dec. 27, 2019	Dec. 26, 2020
☐	MVG	750 MHz Dipole	SID750	SN 03/15 DIP 0G750-355	Apr. 19, 2018	Apr. 18, 2021
☒	MVG	835 MHz Dipole	SID835	SN 03/15 DIP 0G835-347	Apr. 19, 2018	Apr. 18, 2021
☐	MVG	900 MHz Dipole	SID900	SN 03/15 DIP 0G900-348	Apr. 19, 2018	Apr. 18, 2021
☐	MVG	1800 MHz Dipole	SID1800	SN 03/15 DIP 1G800-349	Apr. 19, 2018	Apr. 18, 2021
☒	MVG	1900 MHz Dipole	SID1900	SN 03/15 DIP 1G900-350	Apr. 19, 2018	Apr. 18, 2021
☐	MVG	2000 MHz Dipole	SID2000	SN 03/15 DIP 2G000-351	Apr. 19, 2018	Apr. 18, 2021
☒	MVG	2450 MHz Dipole	SID2450	SN 03/15 DIP 2G450-352	Apr. 19, 2018	Apr. 18, 2021
☒	MVG	2600 MHz Dipole	SID2600	SN 03/15 DIP 2G600-356	Apr. 19, 2018	Apr. 18, 2021
☒	MVG	5000 MHz Dipole	SWG5500	SN 13/14 WGA 33	Apr. 19, 2018	Apr. 18, 2021
☒	MVG	Liquid measurement Kit	SCLMP	SN 21/15 OCPG 72	NCR	NCR
☒	MVG	Power Amplifier	N.A	AMPLISAR_28/14_003	NCR	NCR
☒	KEITHLEY	Millivoltmeter	2000	4072790	NCR	NCR
☒	R&S	Universal radio communication tester	CMU200	117858	Jul. 13, 2020	Jul. 12, 2021
☒	R&S	Wideband radio communication tester	CMW500	103917	Jul. 13, 2020	Jul. 12, 2021
☒	HP	Network Analyzer	8753D	3410J01136	Jul. 13, 2020	Jul. 12, 2021
☒	Agilent	PSG Analog Signal Generator	E8257D	MY51110112	Jul. 13, 2020	Jul. 12, 2021

☒	Agilent	Power meter	E4419B	MY45102538	Jul. 13, 2020	Jul. 12, 2021
☒	Agilent	Power sensor	E9301A	MY41495644	Jul. 13, 2020	Jul. 12, 2021
☒	Agilent	Power sensor	E9301A	US39212148	Jul. 13, 2020	Jul. 12, 2021
☒	MCLI/USA	Directional Coupler	CB11-20	0D2L51502	Jul. 17, 2020	Jul. 16, 2023

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.

<table>
<tr><td colspan="3"></td><td>≤ 3 GHz</td><td>> 3 GHz</td></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 ± 1 mm</td><td>½·δ·ln(2) ± 0.5 mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>≤ 2 GHz: ≤ 15 mm
2 – 3 GHz: ≤ 12 mm</td><td>3 – 4 GHz: ≤ 12 mm
4 – 6 GHz: ≤ 10 mm</td></tr>
<tr><td colspan="2">When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>≤ 2 GHz: ≤ 8 mm
2 – 3 GHz: ≤ 5 mm*</td><td>3 – 4 GHz: ≤ 5 mm*
4 – 6 GHz: ≤ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>≤ 5 mm</td><td>3 – 4 GHz: ≤ 4 mm
4 – 5 GHz: ≤ 3 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>≤ 4 mm</td><td>3 – 4 GHz: ≤ 3 mm
4 – 5 GHz: ≤ 2.5 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">≤ 1.5·$\Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3 – 4 GHz: ≥ 28 mm
4 – 5 GHz: ≥ 25 mm
5 – 6 GHz: ≥ 22 mm</td></tr>
<tr><td colspan="5">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.</td></tr>
</table>

3.3. Description of interpolation/extrapolation scheme

The local SAR inside the phantom is measured using small dipole sensing elements inside a probe body. The probe tip must not be in contact with the phantom surface in order to minimise measurements errors, but the highest local SAR will occur at the surface of the phantom.
An extrapolation is using to determinate this highest local SAR values. The extrapolation is based on a fourth-order least-square polynomial fit of measured data. The local SAR value is then extrapolated from the liquid surface with a 1 mm step.
The measurements have to be performed over a limited time (due to the duration of the battery) so the step of measurement is high. It could vary between 5 and 8 mm. To obtain an accurate assessment of the maximum SAR averaged over 10 grams and 1 gram requires a very fine resolution in the three dimensional scanned data array.

3.4. Volumetric Scan

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

3.5. Power Drift

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

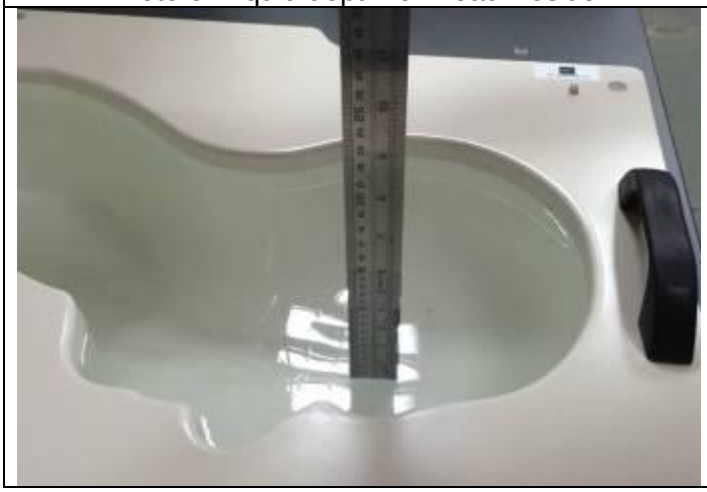
4. System Verification Procedure

4.1. Tissue Verification

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

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

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

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

4.1.1. Tissue Dielectric Parameter Check Results

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

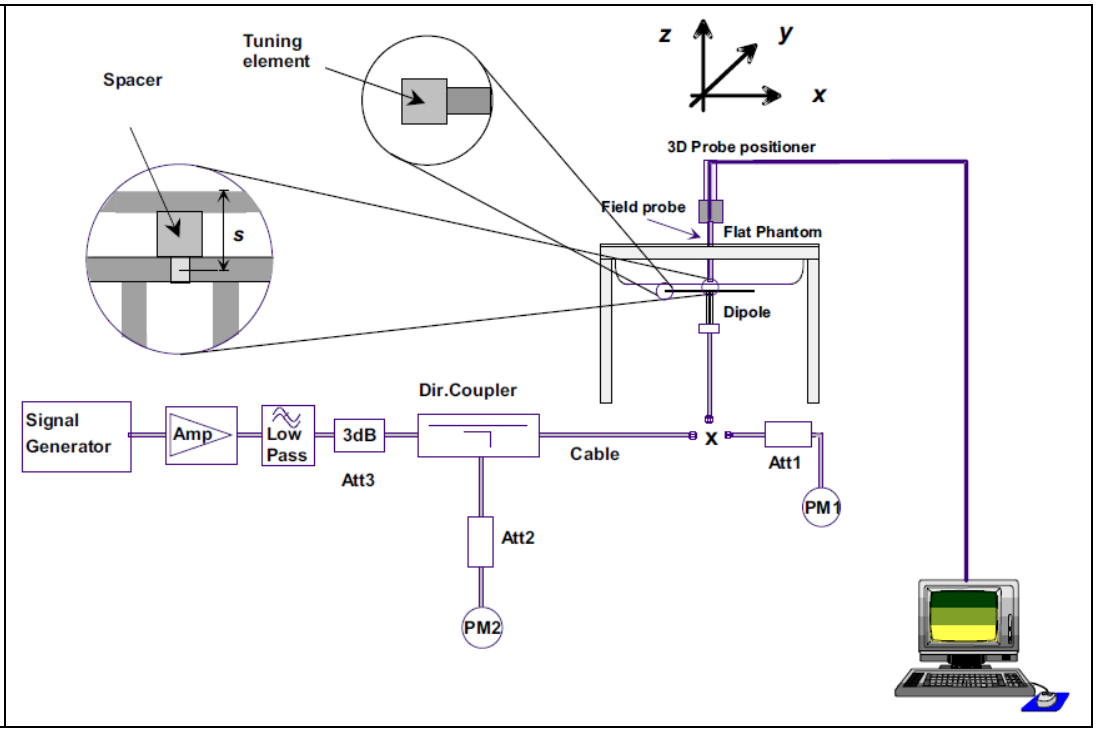
Tissue Type	Measured Frequency (MHz)	Target Tissue		Measured Tissue		Liquid Temp.	Test Date
		εr (±5%)	σ (S/m) (±5%)	εr	σ (S/m)		
Head 850	835	41.50 (39.43~43.58)	0.90 (0.86~0.95)	40.80	0.92	21.5 °C	Aug. 20, 2020
Body 850	835	55.20 (52.44~57.96)	0.97 (0.92~1.02)	54.53	0.98	21.3 °C	Aug. 21, 2020
Head 1900	1900	40.00 (38.00~42.00)	1.40 (1.33~1.47)	38.66	1.44	21.4 °C	Aug. 20, 2020
Body 1900	1900	53.30 (50.64~55.97)	1.52 (1.44~1.60)	54.27	1.53	21.4 °C	Aug. 21, 2020
Head 2450	2450	39.20 (37.24~41.16)	1.80 (1.71~1.89)	38.55	1.84	21.5 °C	Aug. 10, 2020
Body 2450	2450	52.70 (50.07~55.34)	1.95 (1.85~2.05)	51.53	1.88	21.2 °C	Aug. 12, 2020
Head 2600	2600	39.01 (37.06~40.96)	1.96 (1.86~2.06)	38.12	2.02	21.4 °C	Jul. 30, 2020
Body 2600	2600	52.51 (49.88~55.14)	2.16 (2.05~2.27)	52.84	2.22	21.6 °C	Aug. 09, 2020
Head 5200	5200	36.00 (34.20~37.80)	4.66 (4.43~4.89)	35.66	4.64	21.5 °C	Aug. 04, 2020
Body 5200	5200	49.00 (46.55~51.45)	5.30 (5.04~5.57)	49.68	5.25	21.5 °C	Aug. 04, 2020
Head 5800	5800	35.30 (33.54~37.07)	5.27 (5.01~5.53)	34.57	5.22	21.9 °C	Aug. 05, 2020
Body 5800	5800	48.20 (45.79~50.61)	6.00 (5.70~6.30)	48.34	6.06	21.2 °C	Aug. 05, 2020

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

4.2. System Verification Procedure

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

The system verification is shown as below picture:



4.2.1. System Verification Results

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

System Verification	Target SAR (1W) (±10%)		Measured SAR (Normalized to 1W)		Liquid Temp.	Test Date
	1-g (W/Kg)	10-g (W/Kg)	1-g (W/Kg)	10-g (W/Kg)		
835MHz Head	9.55 (8.60~10.51)	6.10 (5.49~6.71)	9.71	5.90	21.5 °C	Aug. 20, 2020
835MHz Body	9.83 (8.85~10.81)	6.45 (5.81~7.10)	9.97	6.86	21.3 °C	Aug. 21, 2020
1900MHz Head	38.92 (35.03~42.81)	20.09 (18.08~22.10)	38.22	20.63	21.4 °C	Aug. 20, 2020
1900MHz Body	39.02 (35.12~42.92)	20.57 (18.51~22.63)	38.94	21.04	21.4 °C	Aug. 21, 2020
2450MHz Head	53.76 (48.38~59.14)	24.12 (21.71~26.53)	51.22	23.53	21.5 °C	Aug. 10, 2020
2450MHz Body	52.90 (47.61~58.19)	24.09 (21.68~26.50)	50.80	23.74	21.2 °C	Aug. 12, 2020
2600MHz Head	55.60 (50.04~61.16)	24.60 (22.14~27.06)	58.90	23.37	21.4 °C	Jul. 30, 2020
2600MHz Body	52.49 (47.24~57.74)	23.74 (21.37~26.11)	50.57	22.80	21.6 °C	Aug. 09, 2020
5200MHz Head	160.94 (144.85~177.03)	55.97 (50.37~61.57)	157.41	54.46	21.5 °C	Aug. 04, 2020
5200MHz Body	156.85 (141.17~172.54)	55.20 (49.68~60.72)	159.33	55.85	21.5 °C	Aug. 04, 2020
5800MHz Head	184.13 (165.72~202.54)	62.74 (56.47~69.01)	183.87	60.04	21.9 °C	Aug. 05, 2020
5800MHz Body	169.30 (152.37~186.23)	58.49 (52.64~64.34)	170.65	57.66	21.2 °C	Aug. 05, 2020

5. SAR Measurement variability and uncertainty

5.1. SAR measurement variability

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

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

5.2. SAR measurement uncertainty

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

6. RF Exposure Positions

6.1. Ear and handset reference point

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

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

6.2. Definition of the cheek position

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

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

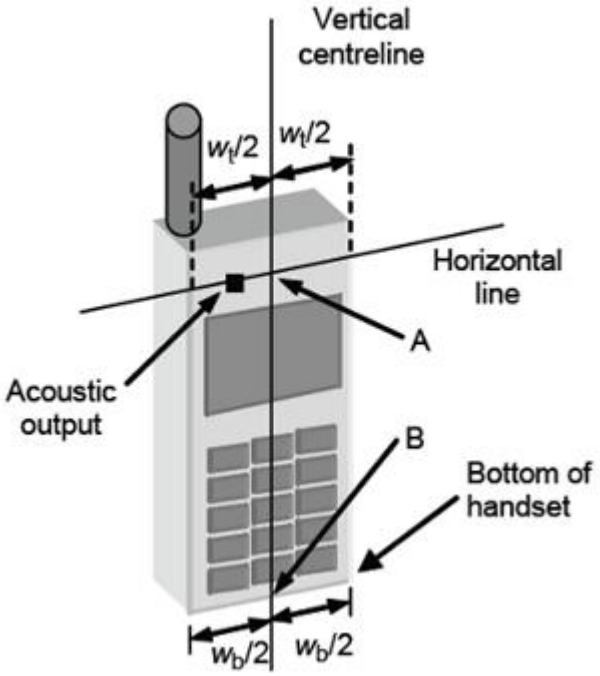


Fig 6.2.1 Handset vertical and horizontal reference lines—"fixed case

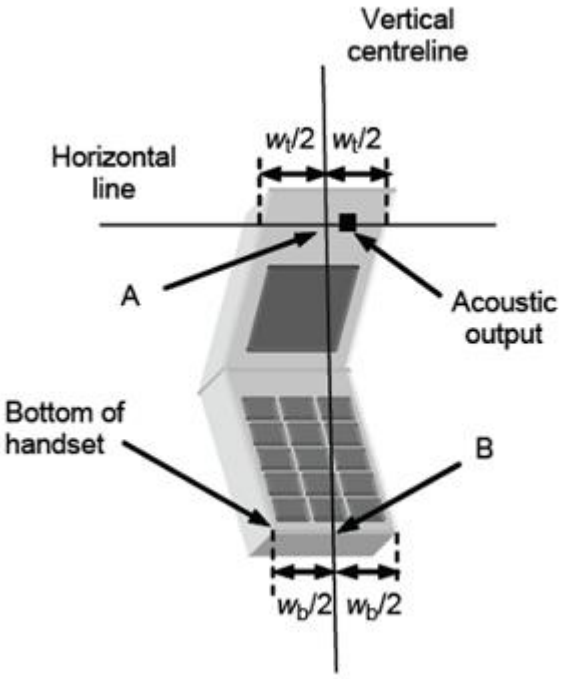


Fig 6.2.2 Handset vertical and horizontal reference lines— "clam-shell case"

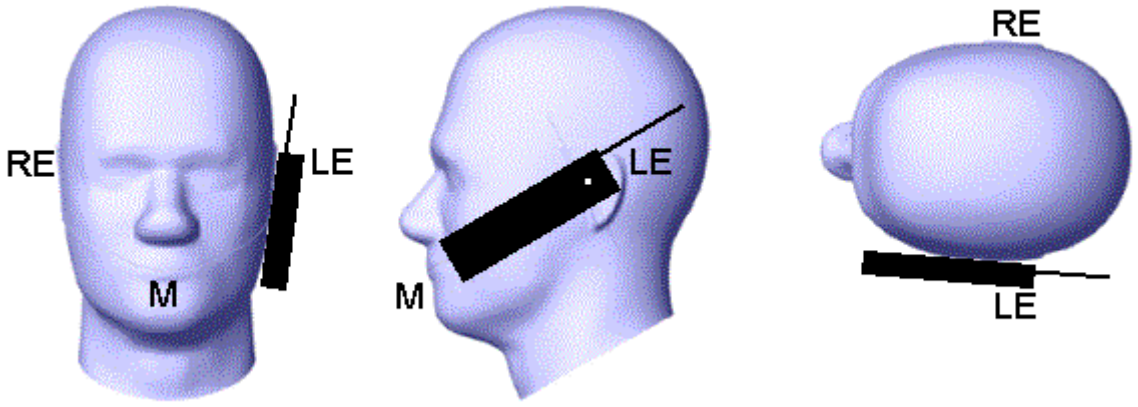


Fig 6.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

6.3. Definition of the tilt position

1. While maintaining the orientation of the handset, retract the handset parallel to the reference plane far enough away from the phantom to enable a rotation of the device by 15 degree.
2. Rotate the Handset around the horizontal line by 15 degree (see Figure 6.3.1).

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

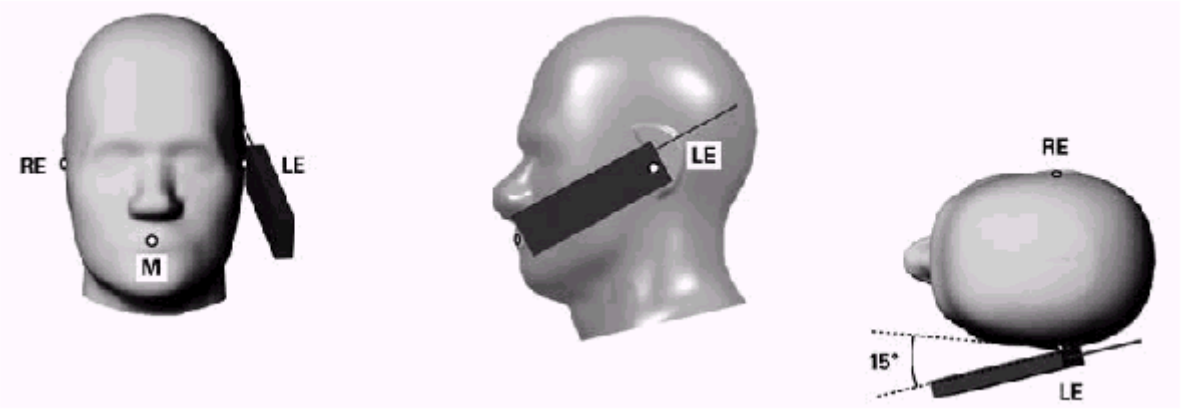


Figure 6.3.1 – Tilt position of the wireless device on the left side of SAM

6.4. Tablet host platform exposure conditions

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

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

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

7. RF Output Power

7.1. GSM Conducted Power

Band GSM850	Burst-Averaged output Power (dBm)				Frame-Averaged output Power (dBm)			
Tx Channel	Tune-up	128	189	251	Tune-up	128	189	251
Frequency (MHz)	(dBm)	824.2	836.4	848.8	(dBm)	824.2	836.4	848.8
GSM (GMSK)	32.00	31.13	31.89	31.61	22.97	22.10	22.86	22.58
GPRS(GMSK, 1 TS)	32.00	31.78	31.93	31.68	22.97	22.75	22.90	22.65
GPRS(GMSK, 2 TS)	32.00	30.92	31.10	30.79	25.98	24.90	25.08	24.77
GPRS(GMSK, 3 TS)	30.00	28.99	29.16	28.91	25.74	24.73	24.90	24.65
GPRS(GMSK, 4 TS)	28.00	27.80	27.99	27.72	24.99	24.79	24.98	24.71
Band GSM1900	Burst-Averaged output Power (dBm)				Frame-Averaged output Power (dBm)			
Tx Channel	Tune-up	512	661	810	Tune-up	512	661	810
Frequency (MHz)	(dBm)	1850.2	1880.0	1909.8	(dBm)	1850.2	1880.0	1909.8
GSM (GMSK)	29.00	27.00	28.03	28.72	19.97	17.97	19.00	19.69
GPRS(GMSK, 1 TS)	29.00	27.07	28.10	28.78	19.97	18.04	19.07	19.75
GPRS(GMSK, 2 TS)	28.00	27.17	27.28	27.07	21.98	21.15	21.26	21.05
GPRS(GMSK, 3 TS)	26.00	24.17	25.42	25.33	21.74	19.91	21.16	21.07
GPRS(GMSK, 4 TS)	25.00	23.15	24.21	24.16	21.99	20.14	21.20	21.15

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

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

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

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

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

7.2. LTE Conducted Power

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20407/824.7	20525/836.5	20643/848.3
LTE Band 5	1.4MHz	QPSK	1	0	23.00	21.15	21.86	22.00
			1	2	23.00	21.20	22.04	22.13
			1	5	23.00	21.34	21.87	21.97
			3	0	23.00	22.12	22.08	22.14
			3	1	23.00	22.13	22.08	22.12
			3	2	23.00	22.12	22.10	22.09
			6	0	22.00	21.10	21.04	21.11

		16QAM	1	0	22.00	21.35	21.28	20.92
			1	2	22.00	21.42	21.38	21.14
			1	5	22.00	21.37	21.25	20.96
			3	0	22.00	21.44	21.36	21.34
			3	1	22.00	21.48	21.38	21.35
			3	2	22.00	21.45	21.39	21.36
			6	0	21.00	20.34	20.22	20.34
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	23.00	22.10	21.97	22.03
			1	7	23.00	22.43	22.28	22.36
			1	14	23.00	22.06	21.94	21.99
			8	0	22.00	21.05	21.01	21.13
			8	4	22.00	21.13	21.02	21.18
			8	7	22.00	21.08	21.05	21.12
			15	0	22.00	21.12	21.05	21.16
		16QAM	1	0	22.00	21.13	21.46	21.34
			1	7	22.00	21.44	21.82	21.66
			1	14	22.00	21.01	21.52	21.40
			8	0	21.00	20.12	20.10	20.17
			8	4	21.00	20.13	20.15	20.21
			8	7	21.00	20.08	20.09	20.12
			15	0	21.00	20.23	20.15	20.11
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	23.00	21.92	21.83	22.01
			1	12	23.00	22.31	22.25	22.30
			1	24	23.00	21.88	21.95	21.98
			12	0	22.00	21.10	21.14	21.21
			12	6	22.00	21.11	21.14	21.21
			12	11	22.00	21.17	21.03	21.10
			25	0	22.00	21.12	21.13	21.15
		16QAM	1	0	23.00	21.73	21.30	21.49
			1	12	23.00	22.05	21.70	21.80
			1	24	23.00	21.52	21.38	21.38
			12	0	21.00	20.15	20.10	20.29

			12	6	21.00	20.17	20.11	20.30
			12	11	21.00	20.19	20.07	20.18
			25	0	21.00	20.11	20.19	20.20
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	23.00	22.05	21.83	22.05
			1	24	23.00	22.02	22.06	22.22
			1	49	23.00	21.94	22.00	22.04
			25	0	22.00	20.93	21.22	21.15
			25	12	22.00	21.02	21.05	21.21
			25	24	22.00	21.00	21.15	21.12
			50	0	22.00	20.97	21.24	21.12
		16QAM	1	0	22.00	21.61	21.14	21.01
			1	24	22.00	21.60	21.37	21.21
			1	49	22.00	21.41	21.35	21.01
			25	0	21.00	20.00	20.27	20.21
			25	12	21.00	20.13	20.18	20.27
			25	24	21.00	20.06	20.18	20.14
			50	0	21.00	20.02	20.33	20.14

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		40265/2557.5	40740/2605	41215/2652.5
LTE Band 41	5MHz	QPSK	1	0	25.00	24.75	24.28	24.06
			1	12	25.00	24.06	24.67	24.28
			1	24	25.00	24.70	24.19	24.90
			12	0	24.00	23.66	23.23	23.15
			12	6	24.00	23.71	23.23	23.14
			12	11	24.00	23.70	23.17	23.07
			25	0	24.00	23.71	23.17	23.09
		16QAM	1	0	25.00	24.05	23.31	23.34
			1	12	25.00	24.35	23.56	23.52
			1	24	25.00	24.11	23.18	23.16
			12	0	23.00	22.66	22.11	21.17
			12	6	23.00	22.78	22.15	21.19
			12	11	23.00	22.71	22.09	21.05
			25	0	23.00	22.75	22.15	21.08

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		40290/2560	40740/2605	41190/2650
LTE Band 41	10MHz	QPSK	1	0	25.00	24.80	24.51	24.30
			1	24	25.00	24.97	24.55	24.31
			1	49	25.00	24.75	24.24	23.98
			25	0	24.00	23.74	23.30	22.33
			25	12	24.00	23.69	23.22	22.31
			25	24	24.00	23.76	23.20	22.10
			50	0	24.00	23.75	23.24	22.25
		16QAM	1	0	25.00	24.08	23.36	23.28
			1	24	25.00	24.28	23.39	23.26
			1	49	25.00	24.11	23.10	23.91
			25	0	23.00	22.76	22.24	21.36
			25	12	23.00	22.78	22.16	21.23
			25	24	23.00	22.77	22.16	21.14
			50	0	23.00	22.80	22.22	21.28

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		40315/2562.5	40740/2605	41165/2648.5
LTE Band 41	15MHz	QPSK	1	0	25.00	24.78	24.41	23.49
			1	37	25.00	24.05	24.54	23.47
			1	74	25.00	24.70	23.92	23.87
			36	0	24.00	23.84	23.50	22.47
			36	18	24.00	23.91	23.44	22.38
			36	37	24.00	23.87	23.30	22.22
			75	0	24.00	23.87	23.37	22.32
		16QAM	1	0	24.00	23.81	23.53	22.86
			1	37	24.00	24.00	23.56	22.85
			1	74	24.00	23.76	22.98	22.25
			36	0	23.00	22.82	22.29	21.43
			36	18	23.00	22.90	22.24	21.34
			36	37	23.00	22.85	22.10	21.15
			75	0	23.00	22.77	22.29	21.35

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		40340/2565	40740/2605	41140/2645

LTE Band 41	20MHz	QPSK	1	0	25.00	24.57	24.29	24.43
			1	49	25.00	24.90	24.41	24.47
			1	99	25.00	24.52	23.69	24.72
			50	0	24.00	23.64	23.20	23.53
			50	24	24.00	23.73	23.13	23.38
			50	49	24.00	23.68	23.02	23.09
			100	0	24.00	23.68	23.13	23.32
		16QAM	1	0	24.00	23.59	23.34	22.68
			1	49	24.00	24.00	23.38	22.62
			1	99	24.00	23.59	22.71	22.88
			50	0	23.00	22.68	22.23	21.55
			50	24	23.00	22.73	22.13	21.38
			50	49	23.00	22.70	22.00	21.08
			100	0	23.00	22.67	22.12	21.36

7.3. WLAN & Bluetooth Output Power

7.3.1. Output Power Results Of WLAN

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)
802.11b	1	2412	15.00	13.89
	6	2437	15.00	13.95
	11	2462	15.00	14.14
802.11g	1	2412	13.00	11.88
	6	2437	13.00	11.66
	11	2462	13.00	12.53
802.11n HT20	1	2412	12.00	11.80
	6	2437	12.00	11.65
	11	2462	12.00	11.90

NOTE: Power measurement results of WLAN 2.4G.

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)
802.11a	36	5180	10.00	9.59
	40	5200	10.00	9.01
	48	5240	10.00	9.64
802.11n HT20	36	5180	10.00	9.39
	40	5200	10.00	9.45
	48	5240	10.00	9.47
802.11n HT40	38	5190	10.00	9.00
	46	5230	10.00	9.51

NOTE: Power measurement results of WLAN 5.2G.

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)
802.11a	149	5745	10.00	9.47
	157	5785	10.00	9.30
	165	5825	10.00	9.07
802.11n HT20	149	5745	10.00	9.83
	157	5785	10.00	9.23
	165	5825	10.00	9.92
802.11n HT40	151	5755	10.00	9.88
	159	5795	10.00	8.57

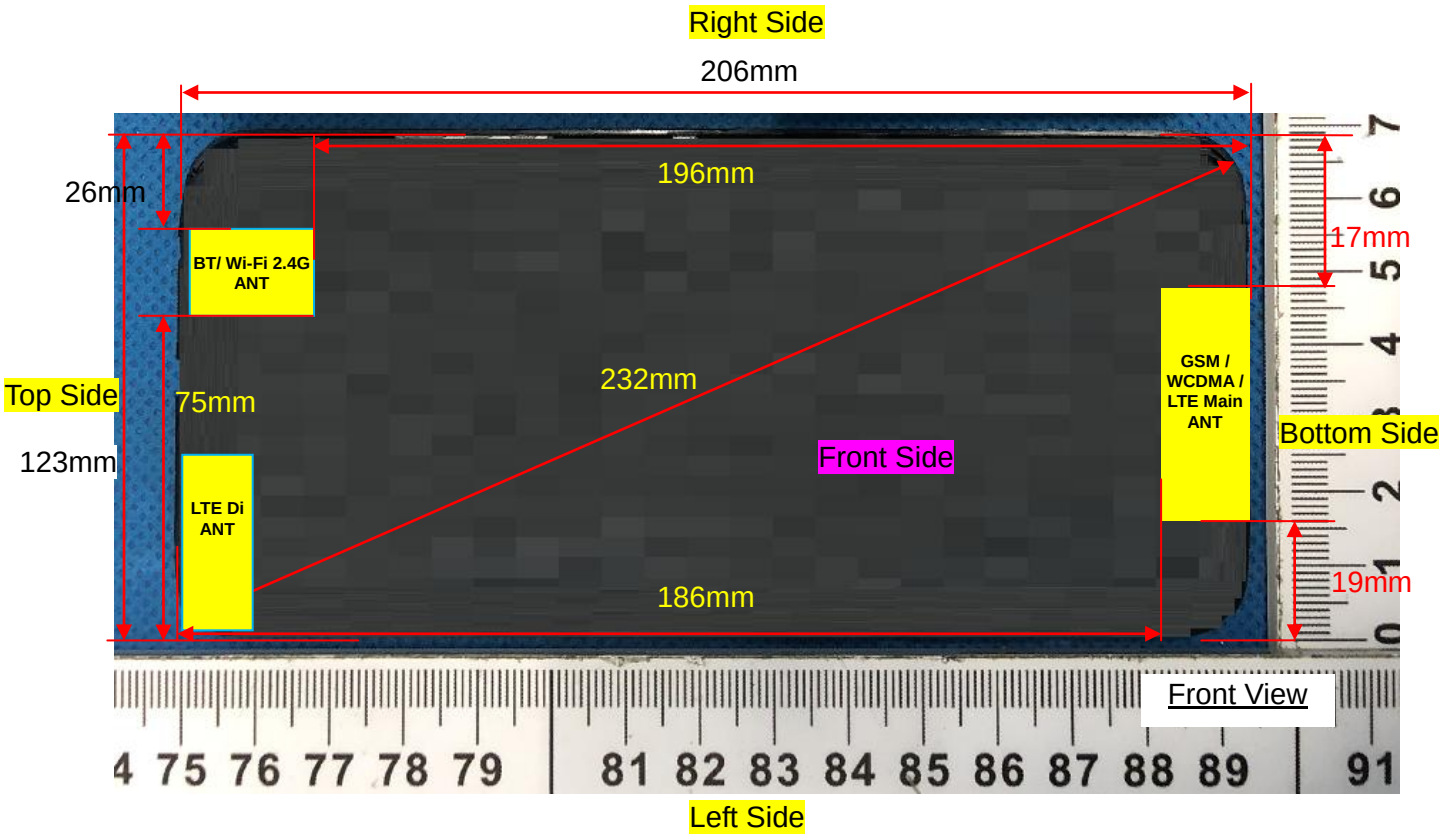
NOTE: Power measurement results of WLAN 5.8G.

7.3.2. Output Power Results Of Bluetooth

	Output Power (dBm)				
BR+EDR	Channel	Tune-up	Data Rates		
			1M	2M	3M
	0CH	3.000	2.957	2.635	2.766
	39CH	3.000	2.874	2.603	2.823
	78CH	3.000	2.960	2.711	2.850

	Channel	Tune-up	Output Power (dBm)
BLE	0CH	-7.000	-7.708
	19CH	-7.000	-7.758
	39CH	-7.000	-7.904

8. Antenna Location



Note: Since the confidentiality request of EUT，the antenna location example diagram see as above.

Distance of the Antenna to the EUT surface/edge						
Antennas	Front Side	Back Side	Left Side	Right Side	Top Side	Bottom Side
WWAN Main	5	5	19	17	186	5
WLAN & Bluetooth	5	5	75	26	5	196

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

Positions for SAR tests		
Test separation distances ≤ 50 mm		
Exposure Positions	Tune-up Maximum power of WLAN 2.4G	
	15dBm	
Front Side	Antenna to user(mm)	5
	SAR exclusion threshold	9.9
	SAR testing required?	**YES**
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold	9.9
	SAR testing required?	**YES**
Right Side	Antenna to user(mm)	26
	SAR exclusion threshold	1.9
	SAR testing required?	**NO**
Top Side	Antenna to user(mm)	5
	SAR exclusion threshold	9.9
	SAR testing required?	**YES**
Exposure Positions	Tune-up Maximum power of WLAN 5.2G	
	10dBm	
Front Side	Antenna to user(mm)	5
	SAR exclusion threshold	**4.6**
	SAR testing required?	**YES**
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold	**4.6**
	SAR testing required?	**YES**
Right Side	Antenna to user(mm)	26
	SAR exclusion threshold	**0.9**
	SAR testing required?	**NO**
Top Side	Antenna to user(mm)	5
	SAR exclusion threshold	**4.6**
	SAR testing required?	**YES**
Exposure Positions	Tune-up Maximum power of WLAN 5.8G	
	10dBm	
Front Side	Antenna to user(mm)	5
	SAR exclusion threshold	**4.8**
	SAR testing required?	**YES**
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold	**4.8**
	SAR testing required?	**YES**
Right Side	Antenna to user(mm)	26

	SAR exclusion threshold	**0.9**
	SAR testing required?	**NO**
Top Side	Antenna to user(mm)	5
	SAR exclusion threshold	**4.8**
	SAR testing required?	**YES**
Exposure Positions	Tune-up Maximum power of GSM850	
	32dBm	
Front Side	Antenna to user(mm)	5
	SAR exclusion threshold	292.0
	SAR testing required?	**YES**
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold	292.0
	SAR testing required?	**YES**
Left Side	Antenna to user(mm)	19
	SAR exclusion threshold	76.9
	SAR testing required?	**YES**
Right Side	Antenna to user(mm)	**17**
	SAR exclusion threshold	**85.9**
	SAR testing required?	**YES**
Bottom Side	Antenna to user(mm)	5
	SAR exclusion threshold	292.0
	SAR testing required?	**YES**
Exposure Positions	Tune-up Maximum power of GSM1900	
	29dBm	
Front Side	Antenna to user(mm)	5
	SAR exclusion threshold	219.5
	SAR testing required?	**YES**
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold	219.5
	SAR testing required?	**YES**
Left Side	Antenna to user(mm)	19
	SAR exclusion threshold	57.8
	SAR testing required?	**YES**
Right Side	Antenna to user(mm)	**17**
	SAR exclusion threshold	**64.6**
	SAR testing required?	**YES**
Bottom Side	Antenna to user(mm)	5
	SAR exclusion threshold	219.5
	SAR testing required?	**YES**
Exposure Positions	Tune-up Maximum power of LTE Band 5	

	23dBm	
Front Side	Antenna to user(mm)	5
	SAR exclusion threshold	36.8
	SAR testing required?	**YES**
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold	36.8
	SAR testing required?	**YES**
Left Side	Antenna to user(mm)	19
	SAR exclusion threshold	9.7
	SAR testing required?	**YES**
Right Side	Antenna to user(mm)	**17**
	SAR exclusion threshold	**10.8**
	SAR testing required?	**YES**
Bottom Side	Antenna to user(mm)	5
	SAR exclusion threshold	36.8
	SAR testing required?	**YES**
Exposure Positions	Tune-up Maximum power of LTE Band 41	
	25dBm	
Front Side	Antenna to user(mm)	5
	SAR exclusion threshold	103.0
	SAR testing required?	**YES**
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold	103.0
	SAR testing required?	**YES**
Left Side	Antenna to user(mm)	19
	SAR exclusion threshold	27.1
	SAR testing required?	**YES**
Right Side	Antenna to user(mm)	17
	SAR exclusion threshold	30.3
	SAR testing required?	**YES**
Bottom Side	Antenna to user(mm)	5
	SAR exclusion threshold	103.0
	SAR testing required?	**YES**

NOTE: Refer to section 4.3.1 of KDB 447498 D01.

Positions for SAR tests		
Test separation distances > 50 mm		
Exposure Positions	Tune-up Maximum power of WLAN 2.4G	
	15dBm	31.62mW
Left Side	Antenna to user(mm)	75

	SAR exclusion threshold(mW)	346
	SAR testing required?	**NO**
Bottom Side	Antenna to user(mm)	196
	SAR exclusion threshold(mW)	1556
	SAR testing required?	**NO**
Exposure Positions	Tune-up Maximum power of WLAN 5.2G	
	10dBm	10.00mW
Left Side	Antenna to user(mm)	75
	SAR exclusion threshold(mW)	316
	SAR testing required?	**NO**
Bottom Side	Antenna to user(mm)	196
	SAR exclusion threshold(mW)	1526
	SAR testing required?	**NO**
Exposure Positions	Tune-up Maximum power of WLAN 5.8G	
	10dBm	10.00mW
Left Side	Antenna to user(mm)	75
	SAR exclusion threshold(mW)	312
	SAR testing required?	**NO**
Bottom Side	Antenna to user(mm)	196
	SAR exclusion threshold(mW)	1522
	SAR testing required?	**NO**
Exposure Positions	Tune-up Maximum power of GSM 850	
	32dBm	1584.89mW
Top Side	Antenna to user(mm)	186
	SAR exclusion threshold(mW)	921
	SAR testing required?	**Yes**
Exposure Positions	Tune-up Maximum power of GSM 1900	
	29dBm	794.33mW
Top Side	Antenna to user(mm)	186
	SAR exclusion threshold(mW)	1469
	SAR testing required?	**NO**
Exposure Positions	Tune-up Maximum power of LTE Band 5	
	23dBm	199.53mW
Top Side	Antenna to user(mm)	186
	SAR exclusion threshold(mW)	921
	SAR testing required?	**NO**
Exposure Positions	Tune-up Maximum power of LTE Band 41	
	25dBm	316.23mW
Top Side	Antenna to user(mm)	186
	SAR exclusion threshold(mW)	1456

	SAR testing required?	**NO**

NOTE: Refer to section 4.3.1 of KDB 447498 D01.

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:

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

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

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

Mode	P_{max} (dBm)	P_{max} (mW)	Distance (mm)	f (GHz)	Calculation Result	SAR Exclusion threshold	SAR test exclusion
Bluetooth	3.00	2.00	5	2.480	0.63	3.0	Yes

NOTE: Standalone SAR test exclusion for Bluetooth

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

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

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

Mode	Position	P_{max} (dBm)	P_{max} (mW)	Distance (mm)	f (GHz)	x	Estimated SAR (W/Kg)
Bluetooth	Head	3.00	2.00	5	2.480	7.5	0.084
Bluetooth	Body	3.00	2.00	5	2.480	7.5	0.084

NOTE: Estimated SAR calculation for Bluetooth.

10. SAR Results

10.1. SAR measurement results

10.1.1. SAR measurement Result of GSM850

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	189/836.4	GPRS(GMSK 2TS)	0.090	0.072	-0.53	31.10	32.00	0.111
Left Tilt 15 Degree	189/836.4	GPRS(GMSK 2TS)	0.041	0.019	-1.26	31.10	32.00	0.050
Right Cheek	189/836.4	GPRS(GMSK 2TS)	0.071	0.038	4.47	31.10	32.00	0.087
Right Tilt 15 Degree	189/836.4	GPRS(GMSK 2TS)	0.030	0.012	4.27	31.10	32.00	0.037

NOTE: Head SAR test results of GSM850

Test Position of Body with 0mm	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	189/836.4	GPRS(GMSK 2TS)	0.537	0.285	-3.70	31.10	32.00	0.661
Back Side	189/836.4	GPRS(GMSK 2TS)	0.659	0.355	2.69	31.10	32.00	0.811
Left Side	189/836.4	GPRS(GMSK 2TS)	0.508	0.269	-0.16	31.10	32.00	0.625
Right Side	189/836.4	GPRS(GMSK 2TS)	0.311	0.171	1.77	31.10	32.00	0.383
Top side	189/836.4	GPRS(GMSK 2TS)	0.189	0.098	1.22	31.10	32.00	0.233
Bottom Side	189/836.4	GPRS(GMSK 2TS)	0.250	0.138	-2.03	31.10	32.00	0.308
Back Side	128/824.2	GPRS(GMSK 2TS)	0.597	0.330	1.24	30.92	32.00	0.766
Back Side	251/848.8	GPRS(GMSK 2TS)	0.585	0.328	0.55	30.79	32.00	0.773

NOTE: Body SAR test results of GSM850

10.1.2. SAR measurement Result of GSM1900

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	661/1880	GPRS(GMSK 2TS)	0.086	0.056	0.81	27.28	28.00	0.102
Left Tilt 15 Degree	661/1880	GPRS(GMSK 2TS)	0.067	0.036	0.50	27.28	28.00	0.079
Right Cheek	661/1880	GPRS(GMSK 2TS)	0.081	0.053	0.70	27.28	28.00	0.096
Right Tilt 15 Degree	661/1880	GPRS(GMSK 2TS)	0.054	0.033	0.31	27.28	28.00	0.064

NOTE: Head SAR test results of GSM1900

Test Position of Body with 0mm	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	661/1880	GPRS(GMSK 2TS)	0.651	0.290	1.40	27.28	28.00	0.768
Back Side	661/1880	GPRS(GMSK 2TS)	0.929	0.402	3.80	27.28	28.00	1.097
Back Side Repeated	661/1880	GPRS(GMSK 2TS)	0.920	0.398	1.24	27.28	28.00	1.086
Left Side	661/1880	GPRS(GMSK 2TS)	0.436	0.186	3.69	27.28	28.00	0.515
Right Side	661/1880	GPRS(GMSK 2TS)	0.342	0.145	4.69	27.28	28.00	0.404
Bottom Side	661/1880	GPRS(GMSK 2TS)	0.329	0.146	-3.64	27.28	28.00	0.388
Back Side	512/1850.2	GPRS(GMSK 2TS)	0.789	0.376	0.23	27.17	28.00	0.955
Back Side	810/1909.8	GPRS(GMSK 2TS)	0.782	0.373	1.23	27.07	28.00	0.969

NOTE: Body SAR test results of GSM1900

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(1,24)	0.100	0.080	3.19	22.06	23.00	0.124

Left Tilt 15 Degree	20525/836.5	10M QPSK(1,24)	0.060	0.049	0.84	22.06	23.00	0.074
Right Cheek	20525/836.5	10M QPSK(1,24)	0.091	0.070	1.59	22.06	23.00	0.113
Right Tilt 15 Degree	20525/836.5	10M QPSK(1,24)	0.043	0.034	-2.90	22.06	23.00	0.053
50%RB								
Left Cheek	20525/836.5	1.4M QPSK(3,0)	0.093	0.070	-1.71	22.08	23.00	0.115
Left Tilt 15 Degree	20525/836.5	1.4M QPSK(3,0)	0.056	0.042	-3.44	22.08	23.00	0.069
Right Cheek	20525/836.5	1.4M QPSK(3,0)	0.079	0.060	4.62	22.08	23.00	0.098
Right Tilt 15 Degree	20525/836.5	1.4M QPSK(3,0)	0.037	0.031	-4.68	22.08	23.00	0.046

NOTE: Head SAR test results of LTE Band 5

Test Position of Body with 0mm	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(1,24)	0.430	0.232	-3.22	22.06	23.00	0.534
Back Side	20525/836.5	10M QPSK(1,24)	0.546	0.290	-1.14	22.06	23.00	0.678
Left Side	20525/836.5	10M QPSK(1,24)	0.414	0.224	0.18	22.06	23.00	0.514
Right Side	20525/836.5	10M QPSK(1,24)	0.252	0.135	4.44	22.06	23.00	0.313
Bottom Side	20525/836.5	10M QPSK(1,24)	0.189	0.101	-4.67	22.06	23.00	0.235
50%								
Front Side	20525/836.5	1.4M QPSK(3,0)	0.372	0.217	-1.22	22.08	23.00	0.460
Back Side	20525/836.5	1.4M QPSK(3,0)	0.508	0.270	4.43	22.08	23.00	0.628
Left Side	20525/836.5	1.4M QPSK(3,0)	0.376	0.199	2.06	22.08	23.00	0.465
Right Side	20525/836.5	1.4M QPSK(3,0)	0.231	0.124	2.82	22.08	23.00	0.286
Bottom Side	20525/836.5	1.4M	0.166	0.088	2.46	22.08	23.00	0.205

		QPSK(3,0)						

NOTE: Body SAR test results of LTE Band 5

10.1.4. SAR measurement Result of WCDMA Band 41

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	40740/2605	20M QPSK(1,49)	0.084	0.052	-0.44	24.41	25.00	0.096
Left Tilt 15 Degree	40740/2605	20M QPSK(1,49)	0.046	0.032	1.67	24.41	25.00	0.053
Right Cheek	40740/2605	20M QPSK(1,49)	0.076	0.048	-4.08	24.41	25.00	0.087
Right Tilt 15 Degree	40740/2605	20M QPSK(1,49)	0.039	0.027	3.39	24.41	25.00	0.045
50%RB								
Left Cheek	40740/2605	20M QPSK(50,24)	0.048	0.030	3.01	23.13	24.00	0.059
Left Tilt 15 Degree	40740/2605	20M QPSK(50,24)	0.027	0.019	0.24	23.13	24.00	0.033
Right Cheek	40740/2605	20M QPSK(50,24)	0.044	0.028	1.68	23.13	24.00	0.054
Right Tilt 15 Degree	40740/2605	20M QPSK(50,24)	0.023	0.016	1.46	23.13	24.00	0.028

NOTE: Head SAR test results of LTE Band 41

Test Position of Body with 0mm	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	40740/2605	20M QPSK(1,49)	0.627	0.261	3.73	24.41	25.00	0.718
Back Side	40740/2605	20M QPSK(1,49)	0.830	0.340	-1.33	24.41	25.00	0.951
Back Side Repeated	40740/2605	20M QPSK(1,49)	0.825	0.335	0.25	24.41	25.00	0.945
Left Side	40740/2605	20M QPSK(1,49)	0.615	0.250	-2.44	24.41	25.00	0.704
Right Side	40740/2605	20M	0.361	0.151	0.91	24.41	25.00	0.414

		QPSK(1,49)						
Bottom Side	40740/2605	20M QPSK(1,49)	0.290	0.115	-3.70	24.41	25.00	0.332
Back Side	40340/2565	20M QPSK(1,49)	0.765	0.301	2.36	24.90	25.00	0.783
Back Side	41140/2645	20M QPSK(1,49)	0.743	0.297	1.45	24.47	25.00	0.839
50%RB								
Front Side	40740/2605	20M QPSK(50,24)	0.329	0.144	4.04	23.13	24.00	0.402
Back Side	40740/2605	20M QPSK(50,24)	0.453	0.193	3.71	23.13	24.00	0.553
Left Side	40740/2605	20M QPSK(50,24)	0.326	0.135	3.04	23.13	24.00	0.398
Right Side	40740/2605	20M QPSK(50,24)	0.194	0.076	0.57	23.13	24.00	0.237
Bottom Side	40740/2605	20M QPSK(50,24)	0.155	0.065	3.08	23.13	24.00	0.189
100%RB								
Back Side	40740/2605	20M QPSK(100,0)	0.258	0.101	-2.92	23.13	24.00	0.315

NOTE: Body SAR test results of LTE Band 41

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	802.11 b	0.154	0.072	4.88	13.95	15.00	0.196
Left Tilt 15 Degree	6/2437	802.11 b	0.079	0.031	-2.16	13.95	15.00	0.101
Right Cheek	6/2437	802.11 b	0.134	0.063	-4.60	13.95	15.00	0.171
Right Tilt 15 Degree	6/2437	802.11 b	0.066	0.029	3.78	13.95	15.00	0.084

NOTE: Head SAR test results of WLAN 2.4G

Test Position of Body with 0mm	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	802.11 b	0.157	0.063	-1.12	13.95	15.00	0.200
Back Side	6/2437	802.11 b	0.177	0.077	-0.18	13.95	15.00	0.225

Top Side	6/2437	802.11 b	0.131	0.055	-3.34	13.95	15.00	0.167

NOTE: Body 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	802.11 a	0.448	0.165	-4.81	9.01	10.00	0.563
Left Tilt 15 Degree	40/5200	802.11 a	0.255	0.091	0.22	9.01	10.00	0.320
Right Cheek	40/5200	802.11 a	0.400	0.143	-4.60	9.01	10.00	0.502
Right Tilt 15 Degree	40/5200	802.11 a	0.208	0.073	2.97	9.01	10.00	0.261

NOTE: Head SAR test results of WLAN 5.2G

Test Position of Body with 0mm	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	802.11 a	0.234	0.107	-2.22	9.01	10.00	0.294
Back Side	40/5200	802.11 a	0.361	0.168	0.67	9.01	10.00	0.453
Top Side	40/5200	802.11 a	0.111	0.053	-1.79	9.01	10.00	0.139

NOTE: Body 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	802.11 a	0.285	0.123	2.26	9.30	10.00	0.335
Left Tilt 15 Degree	157/5785	802.11 a	0.160	0.072	-4.44	9.30	10.00	0.188
Right Cheek	157/5785	802.11 a	0.250	0.110	-3.09	9.30	10.00	0.294
Right Tilt 15 Degree	157/5785	802.11 a	0.123	0.055	1.61	9.30	10.00	0.145

NOTE: Head SAR test results of WLAN 5.8G

Test Position of Body with 0mm	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	802.11 a	0.280	0.124	4.06	9.30	10.00	0.329

Back Side	157/5785	802.11 a	0.365	0.201	-1.90	9.30	10.00	0.429
Top Side	157/5785	802.11 a	0.148	0.068	-1.78	9.30	10.00	0.174

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

Test Position		Scaled SAR_{MAX}		∑1-g SAR (W/Kg)	SPLSR	Remark
		GSM 850	WLAN 2.4G			
Head	Left Cheek	0.111	0.196	0.307	N/A	N/A
	Left Tilt 15 Degree	0.050	0.101	0.151	N/A	N/A
	Right Cheek	0.087	0.171	0.258	N/A	N/A
	Right Tilt 15 Degree	0.037	0.084	0.121	N/A	N/A
Body	Front Side	0.661	0.200	0.861	N/A	N/A
	Back Side	0.811	0.225	1.036	N/A	N/A
	Left Side	0.625	N/A	0.625	N/A	N/A
	Right Side	0.383	N/A	0.383	N/A	N/A
	Top Side	0.233	0.167	0.400	N/A	N/A
	Bottom Side	0.308	N/A	0.308	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of GSM850 and WLAN 2.4G.

Test Position		Scaled SAR_{MAX}		∑1-g SAR (W/Kg)	SPLSR	Remark
		GSM 1900	WLAN 2.4G			
Head	Left Cheek	0.102	0.196	0.298	N/A	N/A
	Left Tilt 15 Degree	0.079	0.101	0.180	N/A	N/A
	Right Cheek	0.096	0.171	0.267	N/A	N/A
	Right Tilt 15 Degree	0.064	0.084	0.148	N/A	N/A
Body	Front Side	0.768	0.200	0.968	N/A	N/A
	Back Side	1.097	0.225	1.322	N/A	N/A
	Left Side	0.515	N/A	0.515	N/A	N/A
	Right Side	0.404	N/A	0.404	N/A	N/A
	Top Side	N/A	0.167	0.167	N/A	N/A

	Bottom Side	0.388	N/A	0.388	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of GSM1900 and WLAN 2.4G.

Test Position		Scaled SAR_{MAX}		∑1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band 5	WLAN 2.4G			
Head	Left Cheek	0.124	0.196	0.320	N/A	N/A
	Left Tilt 15 Degree	0.074	0.101	0.175	N/A	N/A
	Right Cheek	0.113	0.171	0.284	N/A	N/A
	Right Tilt 15 Degree	0.053	0.084	0.137	N/A	N/A
Body	Front Side	0.534	0.200	0.734	N/A	N/A
	Back Side	0.678	0.225	0.903	N/A	N/A
	Left Side	0.514	N/A	0.514	N/A	N/A
	Right Side	0.313	N/A	0.313	N/A	N/A
	Top Side	N/A	0.167	0.167	N/A	N/A
	Bottom Side	0.235	N/A	0.235	N/A	N/A

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

Test Position		Scaled SAR_{MAX}		∑1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band 41	WLAN 2.4G			
Head	Left Cheek	0.096	0.196	0.292	N/A	N/A
	Left Tilt 15 Degree	0.053	0.101	0.154	N/A	N/A
	Right Cheek	0.087	0.171	0.258	N/A	N/A
	Right Tilt 15 Degree	0.045	0.084	0.129	N/A	N/A
Body	Front Side	0.718	0.200	0.918	N/A	N/A
	Back Side	0.951	0.225	1.176	N/A	N/A
	Left Side	0.704	N/A	0.704	N/A	N/A
	Right Side	0.414	N/A	0.414	N/A	N/A
	Top Side	N/A	0.167	0.167	N/A	N/A
	Bottom Side	0.332	N/A	0.332	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band 41 and WLAN 2.4G.

Test Position		Scaled SAR_{MAX}		∑1-g SAR (W/Kg)	SPLSR	Remark
		GSM 850	WLAN 5.2G			
Head	Left Cheek	0.111	0.563	0.674	N/A	N/A
	Left Tilt 15 Degree	0.050	0.320	0.370	N/A	N/A

	Right Cheek	0.087	0.502	0.589	N/A	N/A
	Right Tilt 15 Degree	0.037	0.261	0.298	N/A	N/A
Body	Front Side	0.661	0.294	0.955	N/A	N/A
	Back Side	0.811	0.453	1.264	N/A	N/A
	Left Side	0.625	N/A	0.625	N/A	N/A
	Right Side	0.383	N/A	0.383	N/A	N/A
	Top Side	0.233	0.139	0.372	N/A	N/A
	Bottom Side	0.308	N/A	0.308	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of GSM850 and WLAN 5.2G.

Test Position		Scaled SAR_{MAX}		∑1-g SAR (W/Kg)	SPLSR	Remark
		GSM 1900	WLAN 5.2G			
Head	Left Cheek	0.102	0.563	0.665	N/A	N/A
	Left Tilt 15 Degree	0.079	0.320	0.399	N/A	N/A
	Right Cheek	0.096	0.502	0.598	N/A	N/A
	Right Tilt 15 Degree	0.064	0.261	0.325	N/A	N/A
Body	Front Side	0.768	0.294	1.062	N/A	N/A
	Back Side	1.097	0.453	1.550	N/A	N/A
	Left Side	0.515	N/A	0.515	N/A	N/A
	Right Side	0.404	N/A	0.404	N/A	N/A
	Top Side	N/A	0.139	0.139	N/A	N/A
	Bottom Side	0.388	N/A	0.388	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of GSM1900 and WLAN 5.2G.

Test Position		Scaled SAR_{MAX}		∑1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band 5	WLAN 5.2G			
Head	Left Cheek	0.124	0.563	0.687	N/A	N/A
	Left Tilt 15 Degree	0.074	0.320	0.394	N/A	N/A
	Right Cheek	0.113	0.502	0.615	N/A	N/A
	Right Tilt 15 Degree	0.053	0.261	0.314	N/A	N/A
Body	Front Side	0.534	0.294	0.828	N/A	N/A
	Back Side	0.678	0.453	1.131	N/A	N/A
	Left Side	0.514	N/A	0.514	N/A	N/A
	Right Side	0.313	N/A	0.313	N/A	N/A
	Top Side	N/A	0.139	0.139	N/A	N/A

	Bottom Side	0.235	N/A	0.235	N/A	N/A

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

Test Position		Scaled SAR_{MAX}		∑1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band 41	WLAN 5.2G			
Head	Left Cheek	0.096	0.563	0.659	N/A	N/A
	Left Tilt 15 Degree	0.053	0.320	0.373	N/A	N/A
	Right Cheek	0.087	0.502	0.589	N/A	N/A
	Right Tilt 15 Degree	0.045	0.261	0.306	N/A	N/A
Body	Front Side	0.718	0.294	1.012	N/A	N/A
	Back Side	0.951	0.453	1.404	N/A	N/A
	Left Side	0.704	N/A	0.704	N/A	N/A
	Right Side	0.414	N/A	0.414	N/A	N/A
	Top Side	N/A	0.139	0.139	N/A	N/A
	Bottom Side	0.332	N/A	0.332	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band 41 and WLAN 5.2G.

Test Position		Scaled SAR_{MAX}		∑1-g SAR (W/Kg)	SPLSR	Remark
		GSM 850	WLAN 5.8G			
Head	Left Cheek	0.111	0.335	0.446	N/A	N/A
	Left Tilt 15 Degree	0.050	0.188	0.238	N/A	N/A
	Right Cheek	0.087	0.294	0.381	N/A	N/A
	Right Tilt 15 Degree	0.037	0.145	0.182	N/A	N/A
Body	Front Side	0.661	0.329	0.990	N/A	N/A
	Back Side	0.811	0.429	1.240	N/A	N/A
	Left Side	0.625	N/A	0.625	N/A	N/A
	Right Side	0.383	N/A	0.383	N/A	N/A
	Top Side	0.233	0.174	0.407	N/A	N/A
	Bottom Side	0.308	N/A	0.308	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of GSM850 and WLAN 5.8G.

Test Position		Scaled SAR_{MAX}		∑1-g SAR (W/Kg)	SPLSR	Remark
		GSM 1900	WLAN 5.8G			
Head	Left Cheek	0.102	0.335	0.437	N/A	N/A
	Left Tilt 15	0.079	0.188	0.267	N/A	N/A

	Degree					
	Right Cheek	0.096	0.294	0.390	N/A	N/A
	Right Tilt 15 Degree	0.064	0.145	0.209	N/A	N/A
Body	Front Side	0.768	0.329	1.097	N/A	N/A
	Back Side	1.097	0.429	1.526	N/A	N/A
	Left Side	0.515	N/A	0.515	N/A	N/A
	Right Side	0.404	N/A	0.404	N/A	N/A
	Top Side	N/A	0.174	0.174	N/A	N/A
	Bottom Side	0.388	N/A	0.388	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of GSM1900 and WLAN 5.8G.

Test Position		Scaled SAR_{MAX}		∑1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band 5	WLAN 5.8G			
Head	Left Cheek	0.124	0.335	0.459	N/A	N/A
	Left Tilt 15 Degree	0.074	0.188	0.262	N/A	N/A
	Right Cheek	0.113	0.294	0.407	N/A	N/A
	Right Tilt 15 Degree	0.053	0.145	0.198	N/A	N/A
Body	Front Side	0.534	0.329	0.863	N/A	N/A
	Back Side	0.678	0.429	1.107	N/A	N/A
	Left Side	0.514	N/A	0.514	N/A	N/A
	Right Side	0.313	N/A	0.313	N/A	N/A
	Top Side	N/A	0.174	0.174	N/A	N/A
	Bottom Side	0.235	N/A	0.235	N/A	N/A

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

Test Position		Scaled SAR_{MAX}		∑1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band 41	WLAN 5.8G			
Head	Left Cheek	0.096	0.335	0.431	N/A	N/A
	Left Tilt 15 Degree	0.053	0.188	0.241	N/A	N/A
	Right Cheek	0.087	0.294	0.381	N/A	N/A
	Right Tilt 15 Degree	0.045	0.145	0.190	N/A	N/A
Body	Front Side	0.718	0.329	1.047	N/A	N/A
	Back Side	0.951	0.429	1.380	N/A	N/A
	Left Side	0.704	N/A	0.704	N/A	N/A
	Right Side	0.414	N/A	0.414	N/A	N/A

	Top Side	N/A	0.174	0.174	N/A	N/A
	Bottom Side	0.332	N/A	0.332	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band 41 and WLAN 5.8G.

Test Position		Scaled SAR_{MAX}		∑1-g SAR (W/Kg)	SPLSR	Remark
		GSM 850	Bluetooth			
Head	Left Cheek	0.111	0.084	0.195	N/A	N/A
	Left Tilt 15 Degree	0.050	0.084	0.134	N/A	N/A
	Right Cheek	0.087	0.084	0.171	N/A	N/A
	Right Tilt 15 Degree	0.037	0.084	0.121	N/A	N/A
Body	Front Side	0.661	0.084	0.745	N/A	N/A
	Back Side	0.811	0.084	0.895	N/A	N/A
	Left Side	0.625	N/A	0.625	N/A	N/A
	Right Side	0.383	N/A	0.383	N/A	N/A
	Top Side	0.233	0.084	0.317	N/A	N/A
	Bottom Side	0.308	N/A	0.308	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of GSM850 and Bluetooth.

Test Position		Scaled SAR_{MAX}		∑1-g SAR (W/Kg)	SPLSR	Remark
		GSM 1900	Bluetooth			
Head	Left Cheek	0.102	0.084	0.186	N/A	N/A
	Left Tilt 15 Degree	0.079	0.084	0.163	N/A	N/A
	Right Cheek	0.096	0.084	0.180	N/A	N/A
	Right Tilt 15 Degree	0.064	0.084	0.148	N/A	N/A
Body	Front Side	0.768	0.084	0.852	N/A	N/A
	Back Side	1.097	0.084	1.181	N/A	N/A
	Left Side	0.515	N/A	0.515	N/A	N/A
	Right Side	0.404	N/A	0.404	N/A	N/A
	Top Side	N/A	0.084	0.084	N/A	N/A
	Bottom Side	0.388	N/A	0.388	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of GSM1900 and Bluetooth.

Test Position		Scaled SAR_{MAX}		∑1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band 5	Bluetooth			
Head	Left Cheek	0.124	0.084	0.208	N/A	N/A
	Left Tilt 15 Degree	0.074	0.084	0.158	N/A	N/A

	Right Cheek	0.113	0.084	0.197	N/A	N/A
	Right Tilt 15 Degree	0.053	0.084	0.137	N/A	N/A
Body	Front Side	0.534	0.084	0.618	N/A	N/A
	Back Side	0.678	0.084	0.762	N/A	N/A
	Left Side	0.514	N/A	0.514	N/A	N/A
	Right Side	0.313	N/A	0.313	N/A	N/A
	Top Side	N/A	0.084	0.084	N/A	N/A
	Bottom Side	0.235	N/A	0.235	N/A	N/A

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

Test Position		Scaled SAR_{MAX}		∑1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band 41	Bluetooth			
Head	Left Cheek	0.096	0.084	0.180	N/A	N/A
	Left Tilt 15 Degree	0.053	0.084	0.137	N/A	N/A
	Right Cheek	0.087	0.084	0.171	N/A	N/A
	Right Tilt 15 Degree	0.045	0.084	0.129	N/A	N/A
Body	Front Side	0.718	0.084	0.802	N/A	N/A
	Back Side	0.951	0.084	1.035	N/A	N/A
	Left Side	0.704	N/A	0.704	N/A	N/A
	Right Side	0.414	N/A	0.414	N/A	N/A
	Top Side	N/A	0.084	0.084	N/A	N/A
	Bottom Side	0.332	N/A	0.332	N/A	N/A

NOTE: 1-g SAR Simultaneous Tx Combination of LTE Band 41 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 System Performance Check- SID835 -Head
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MEASUREMENT 5 System Performance Check- SID2450-Head
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MEASUREMENT 8 System Performance Check- SID2600 - Body
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MEASUREMENT 10 System Performance Check- SID5200 - Body
MEASUREMENT 11 System Performance Check- SID5800 -Head
MEASUREMENT 12 System Performance Check- SID5800 - Body

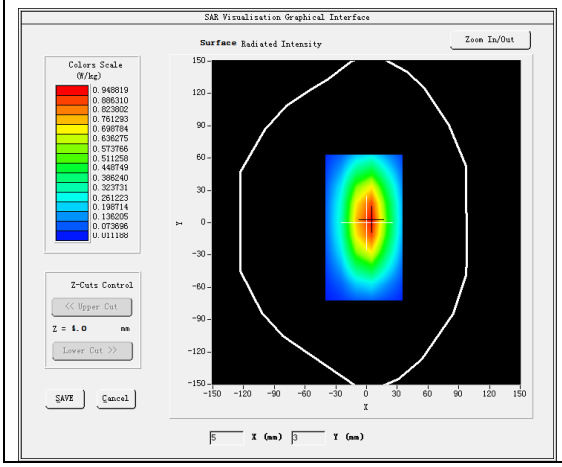
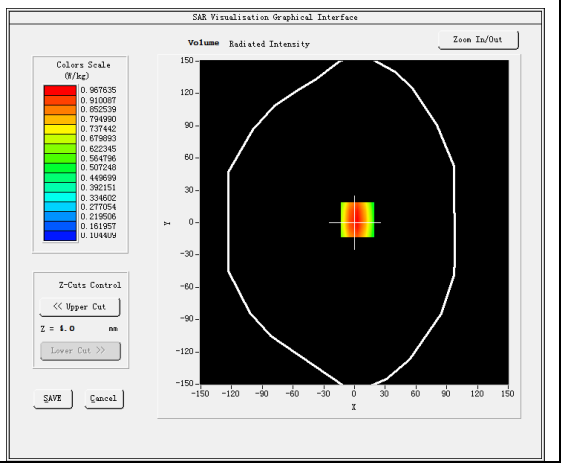
MEASUREMENT 1

A. Experimental conditions.

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

B. SAR Measurement Results

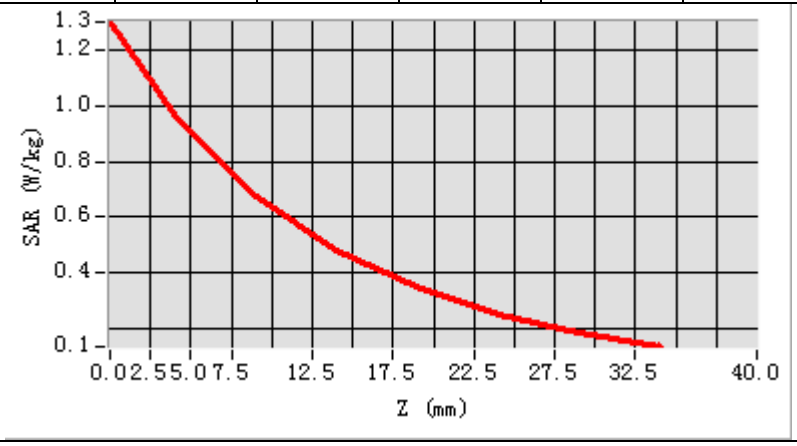
Frequency (MHz)	835.000000
Relative permittivity (real part)	40.803541
Relative permittivity (imaginary part)	19.941613
Conductivity (S/m)	0.920542
Variation (%)	1.870000

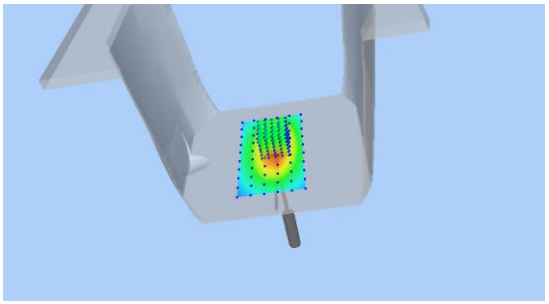
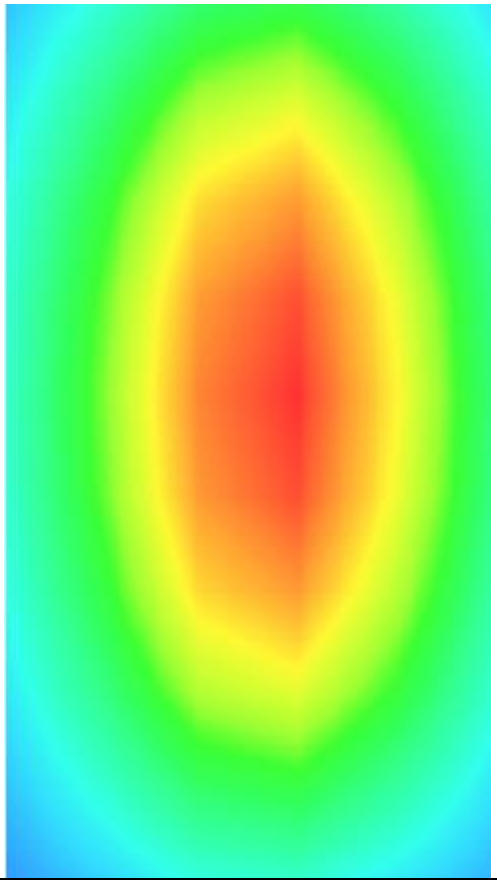
SURFACE SAR	**VOLUME SAR**
	

Maximum location: X=3.00, Y=3.00
SAR Peak: 1.30 W/kg

SAR 10g (W/Kg)	0.590466
SAR 1g (W/Kg)	0.971035

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.3026	0.9678	0.6705	0.4851	0.3491	0.2507	0.1863



3D screen shot	Hot spot position
	

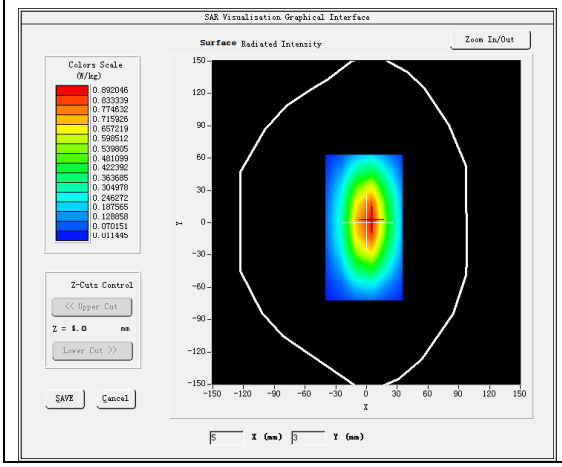
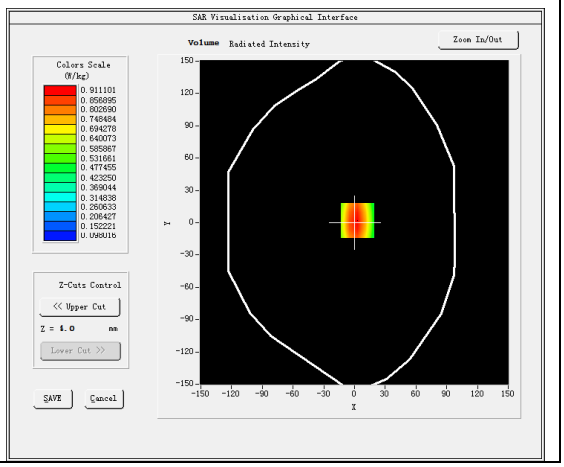
MEASUREMENT 2

A. Experimental conditions.

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

B. SAR Measurement Results

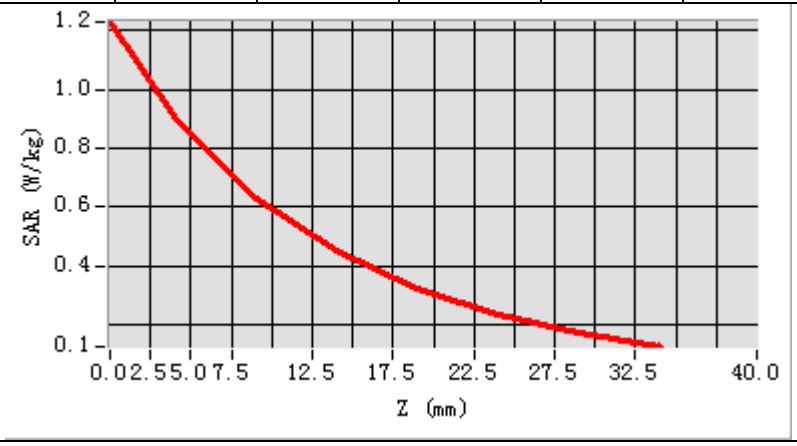
Frequency (MHz)	835.000000
Relative permittivity (real part)	54.531101
Relative permittivity (imaginary part)	21.183359
Conductivity (S/m)	0.981236
Variation (%)	-1.210000

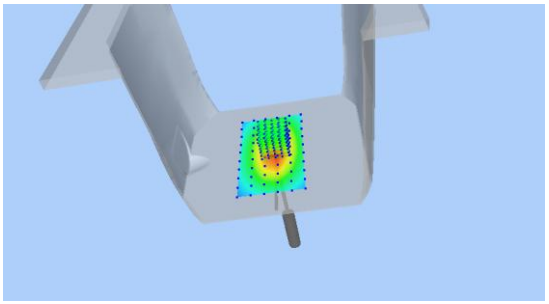
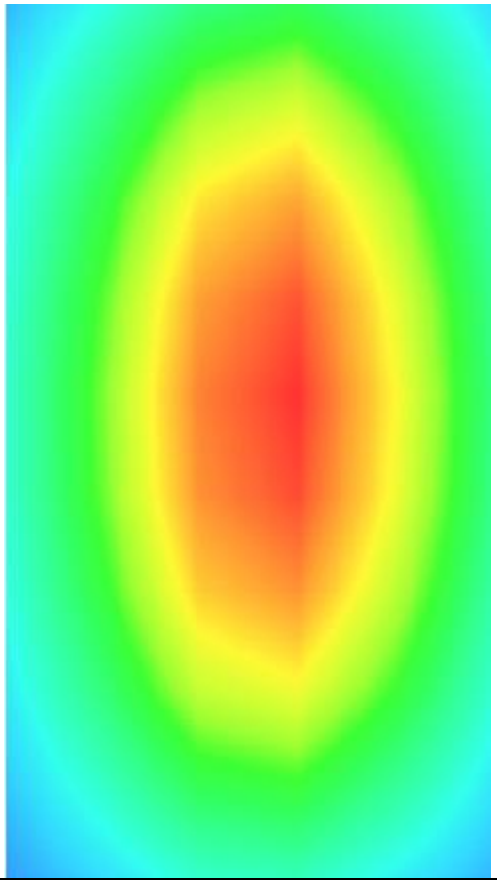
SURFACE SAR	VOLUME SAR
	

Maximum location: X=3.00, Y=2.00
SAR Peak: 1.23 W/kg

SAR 10g (W/Kg)	0.686123
SAR 1g (W/Kg)	0.997356

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.2214	0.9178	0.6330	0.4575	0.3252	0.2301	0.1735



3D screen shot	Hot spot position
	

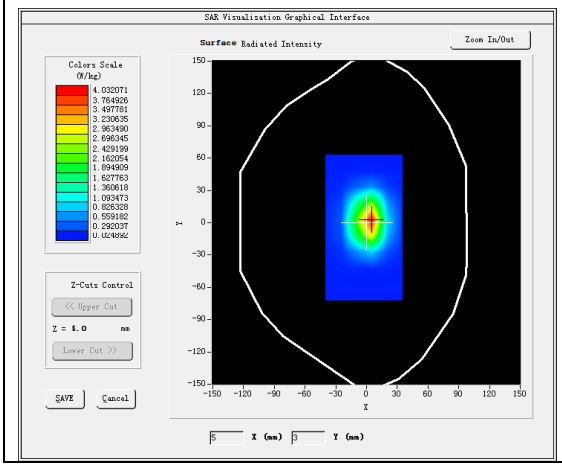
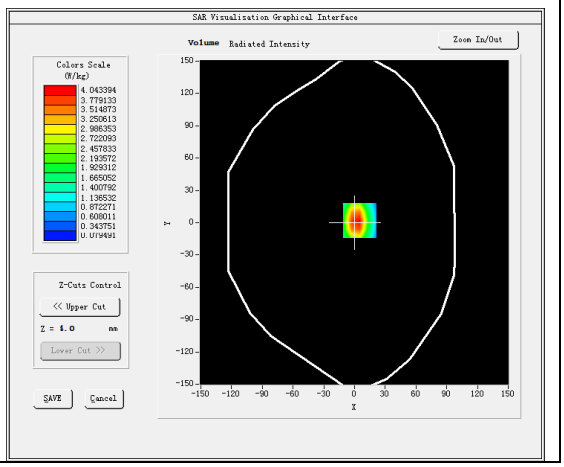
MEASUREMENT 3

A. Experimental conditions.

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

B. SAR Measurement Results

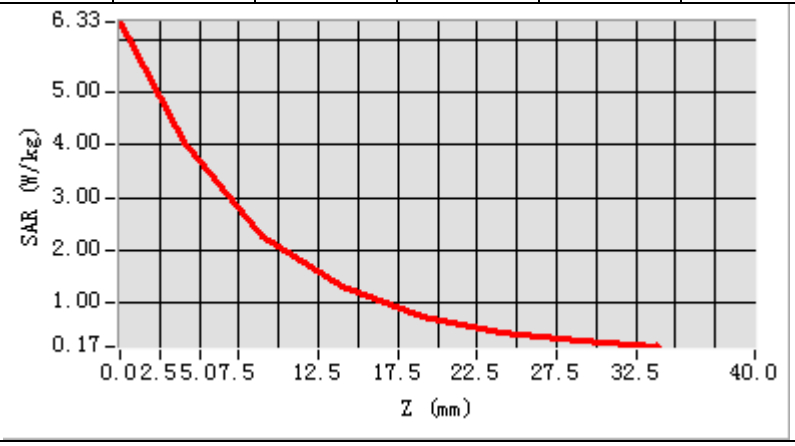
Frequency (MHz)	1900.000000
Relative permittivity (real part)	38.661287
Relative permittivity (imaginary part)	13.603008
Conductivity (S/m)	1.440336
Variation (%)	-1.430000

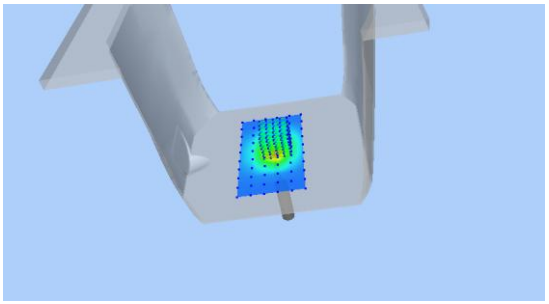
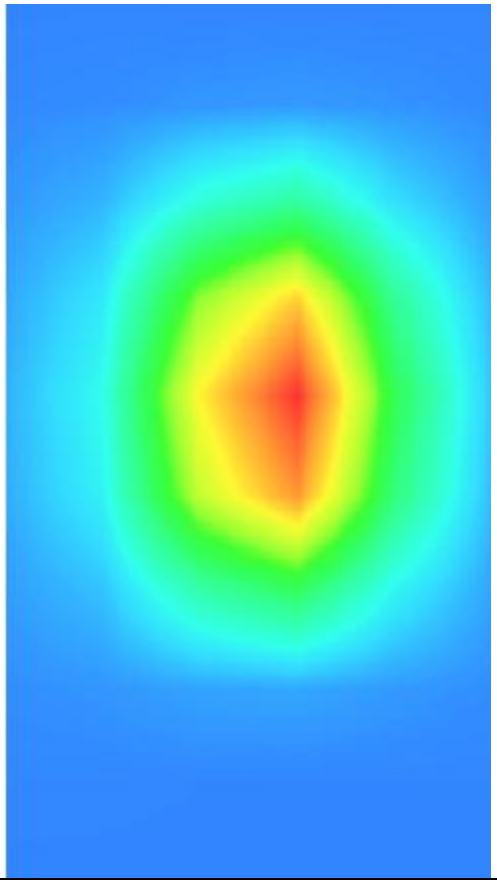
SURFACE SAR	**VOLUME SAR**
	

Maximum location: X=5.00, Y=2.00
SAR Peak: 6.70 W/kg

SAR 10g (W/Kg)	2.063456
SAR 1g (W/Kg)	3.822365

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	6.3211	4.0432	2.2653	1.3077	0.7635	0.4533	0.2735



3D screen shot	Hot spot position
	

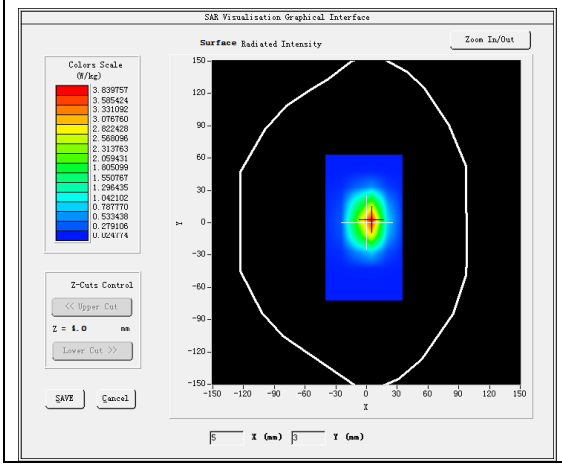
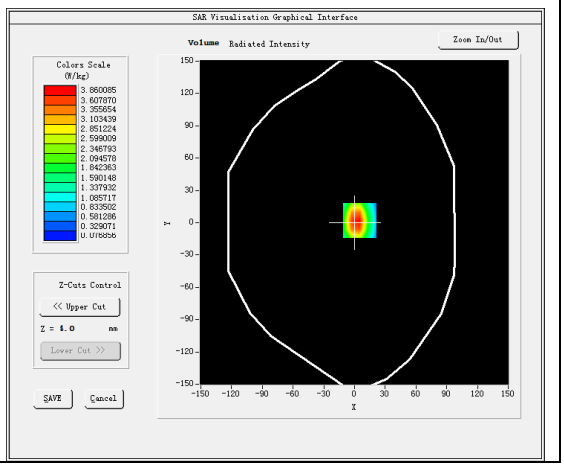
MEASUREMENT 4

A. Experimental conditions.

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

B. SAR Measurement Results

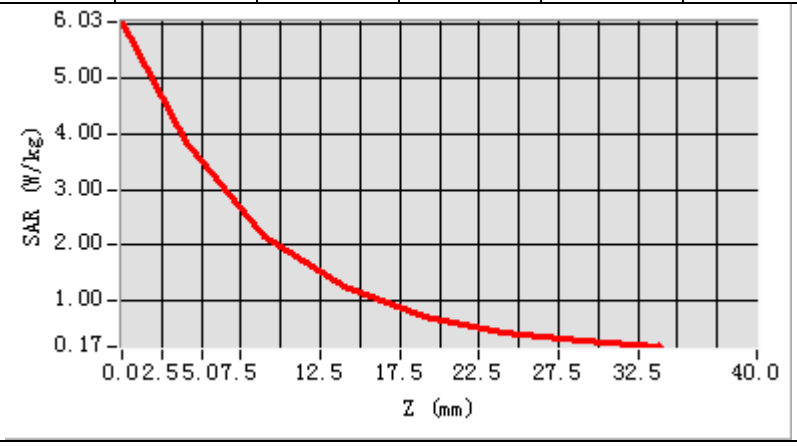
Frequency (MHz)	1900.000000
Relative permittivity (real part)	54.273335
Relative permittivity (imaginary part)	14.483503
Conductivity (S/m)	1.533566
Variation (%)	0.120000

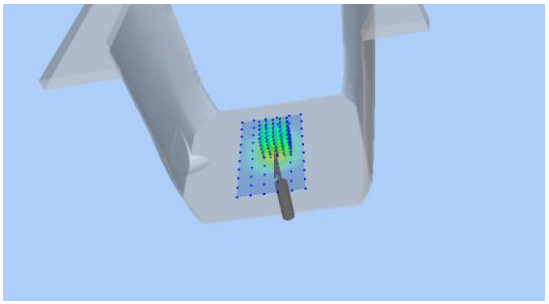
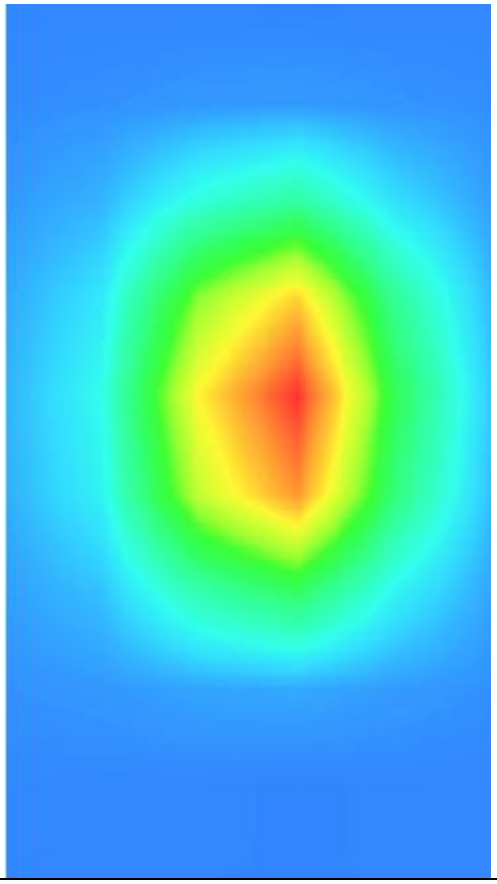
SURFACE SAR	VOLUME SAR
	

Maximum location: X=5.00, Y=2.00
SAR Peak: 6.39 W/kg

SAR 10g (W/Kg)	2.104329
SAR 1g (W/Kg)	3.894402

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
	

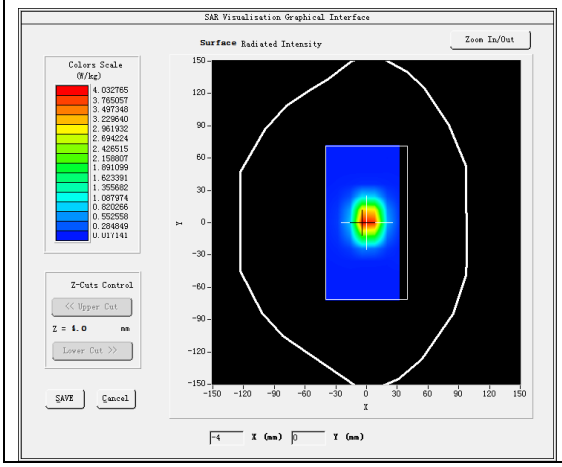
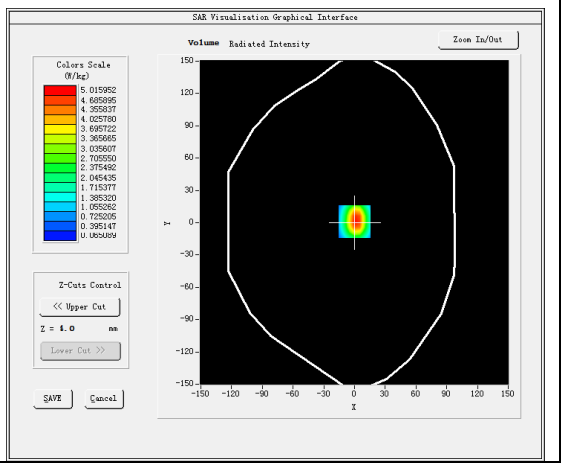
MEASUREMENT 5

A. Experimental conditions.

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

B. SAR Measurement Results

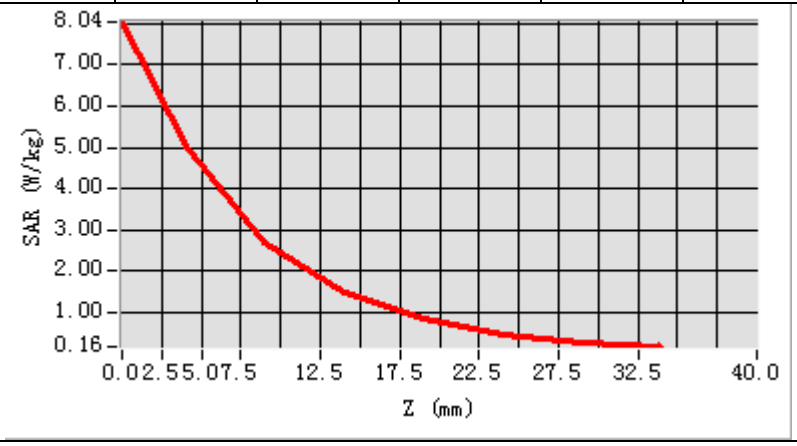
Frequency (MHz)	2450.000000
Relative permittivity (real part)	38.551421
Relative permittivity (imaginary part)	13.552631
Conductivity (S/m)	1.840663
Variation (%)	-3.350000

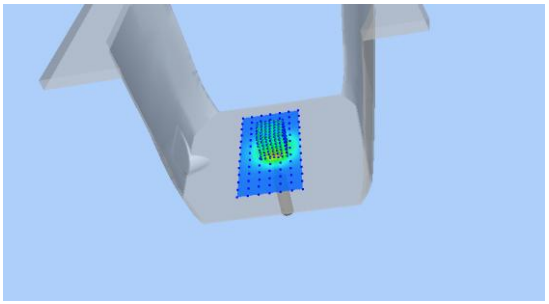
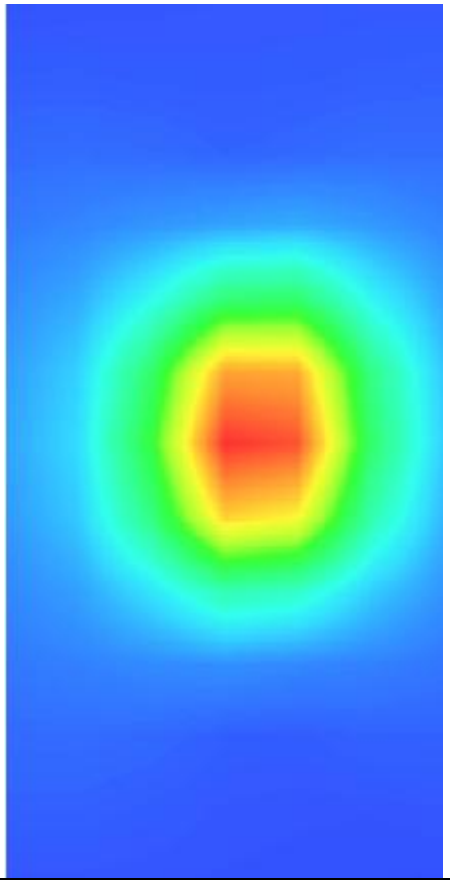
SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=1.00
SAR Peak: 8.14 W/kg

SAR 10g (W/Kg)	2.353375
SAR 1g (W/Kg)	5.122435

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	8.0302	5.0113	2.6947	1.4868	0.8390	0.4693	0.2643



3D screen shot	Hot spot position
	

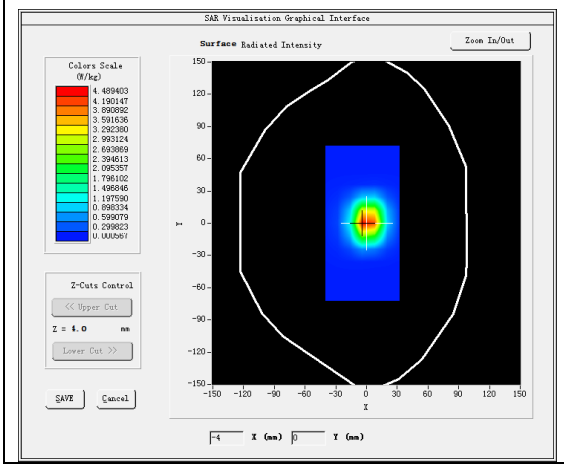
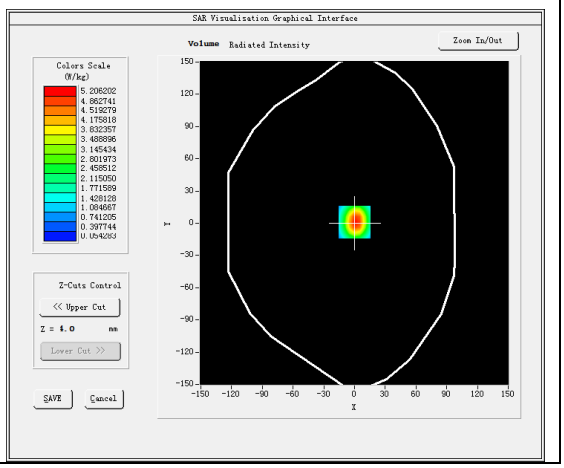
MEASUREMENT 6

A. Experimental conditions.

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

B. SAR Measurement Results

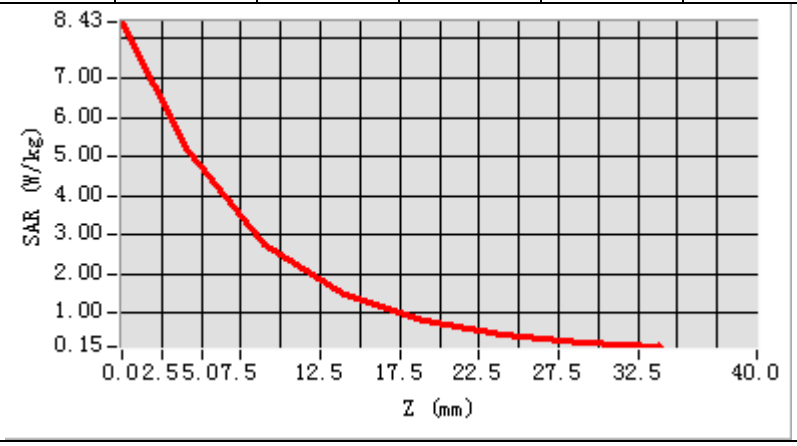
Frequency (MHz)	2450.000000
Relative permittivity (real part)	51.531497
Relative permittivity (imaginary part)	13.833566
Conductivity (S/m)	1.882816
Variation (%)	0.420000

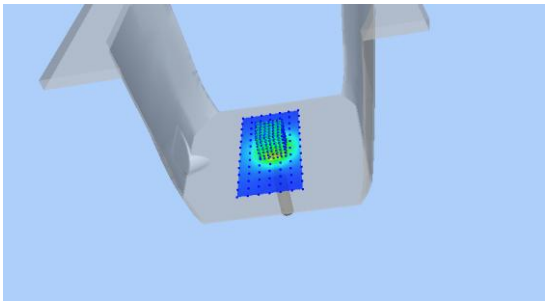
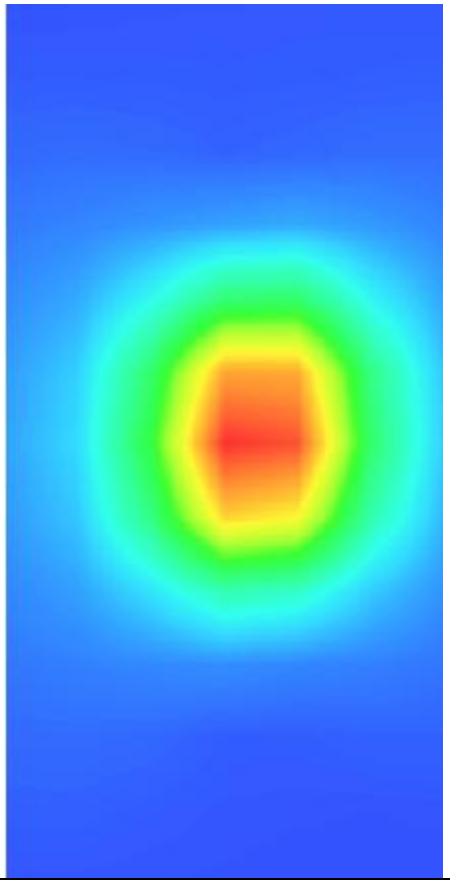
SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=1.00
SAR Peak: 8.46 W/kg

SAR 10g (W/Kg)	2.374285
SAR 1g (W/Kg)	5.080270

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	8.4312	5.2217	2.7528	1.4235	0.8268	0.4398	0.2567



3D screen shot	Hot spot position
	

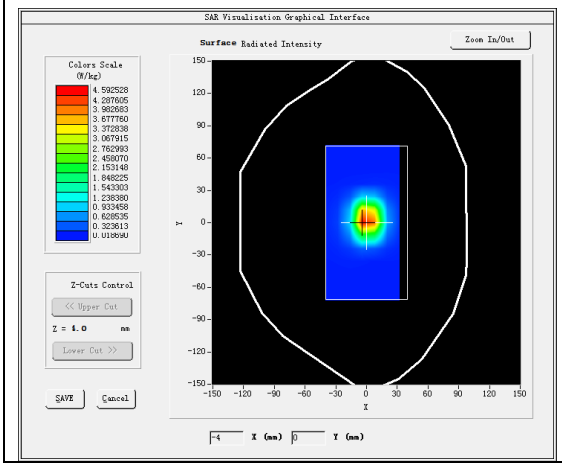
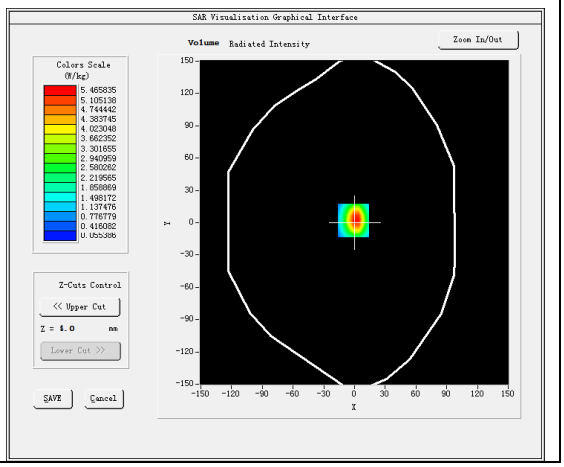
MEASUREMENT 7

A. Experimental conditions.

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

B. SAR Measurement Results

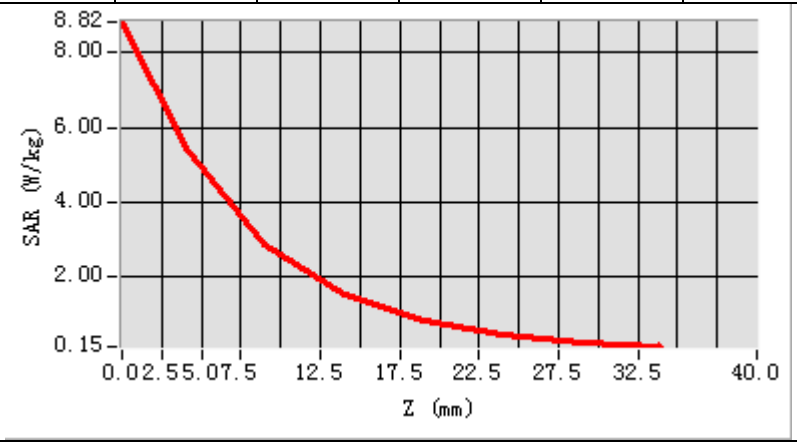
Frequency (MHz)	2600.000000
Relative permittivity (real part)	38.122638
Relative permittivity (imaginary part)	14.003997
Conductivity (S/m)	2.023631
Variation (%)	-0.040000

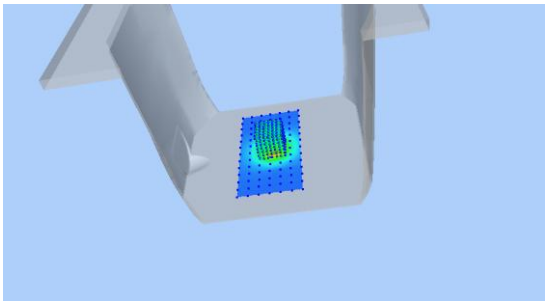
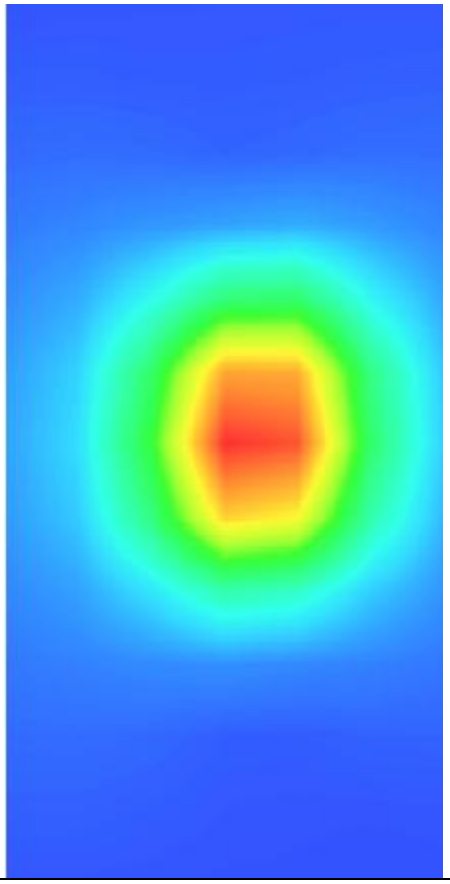
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-1.00, Y=2.00
SAR Peak: 9.07 W/kg

SAR 10g (W/Kg)	2.337205
SAR 1g (W/Kg)	5.890267

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	8.8122	5.4610	2.8915	1.5687	0.8509	0.4754	0.2617



3D screen shot	Hot spot position
	

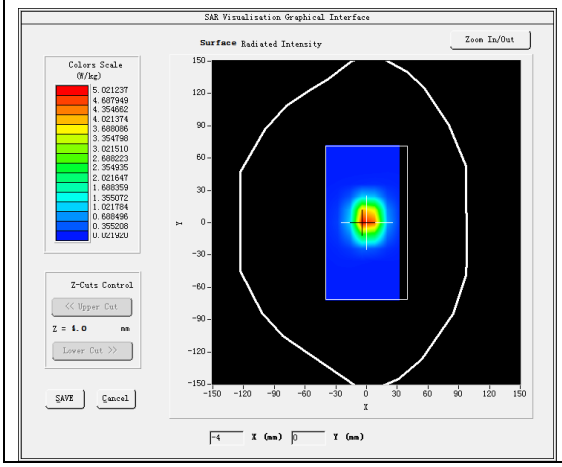
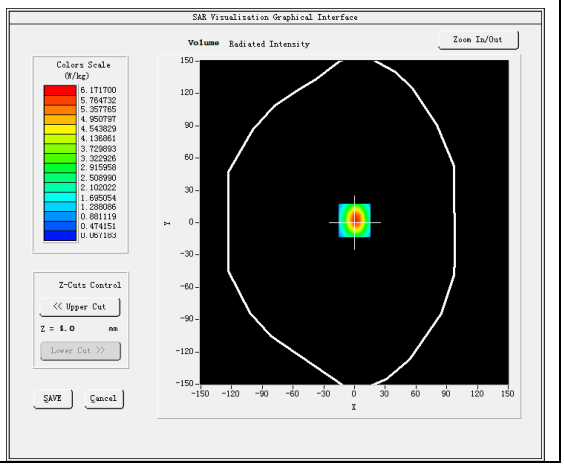
MEASUREMENT 8

A. Experimental conditions.

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

B. SAR Measurement Results

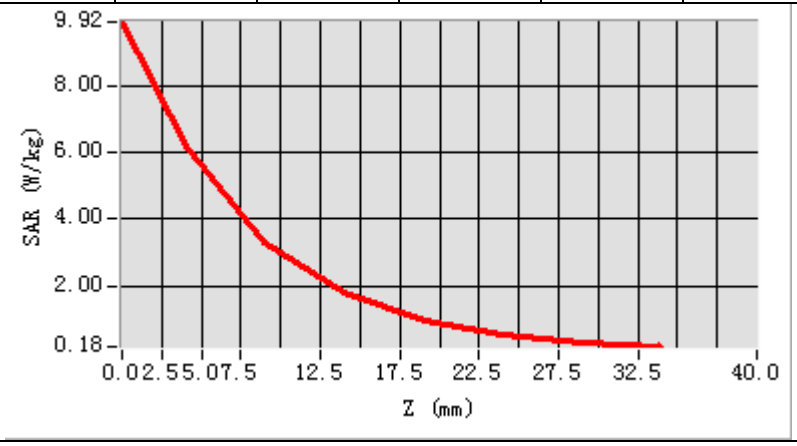
Frequency (MHz)	2600.000000
Relative permittivity (real part)	52.842866
Relative permittivity (imaginary part)	15.340101
Conductivity (S/m)	2.223465
Variation (%)	-1.220000

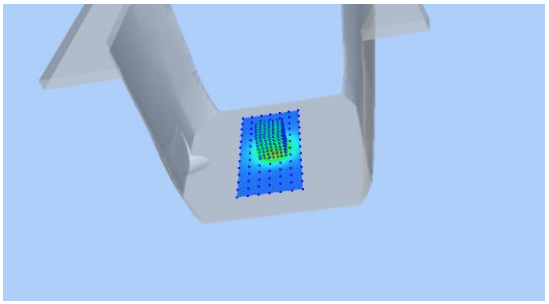
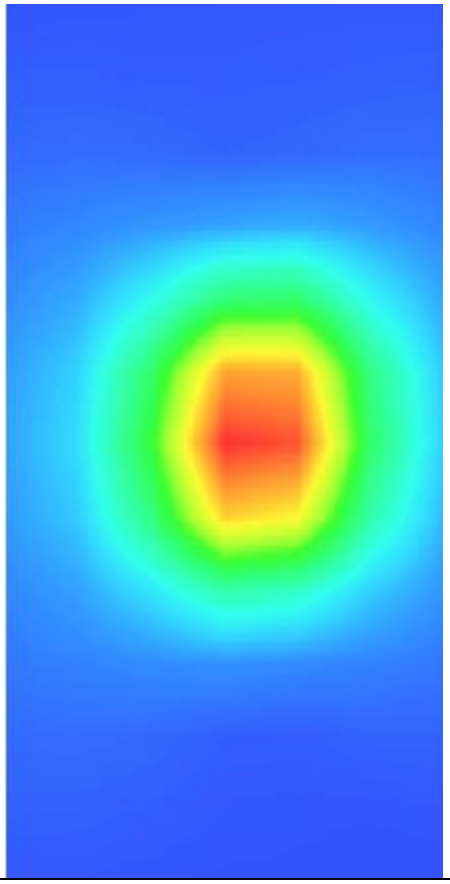
SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=2.00
SAR Peak: 9.99 W/kg

SAR 10g (W/Kg)	2.280324
SAR 1g (W/Kg)	5.057188

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	9.9118	6.1777	3.2952	1.7819	0.9818	0.5452	0.3128



3D screen shot	Hot spot position
	

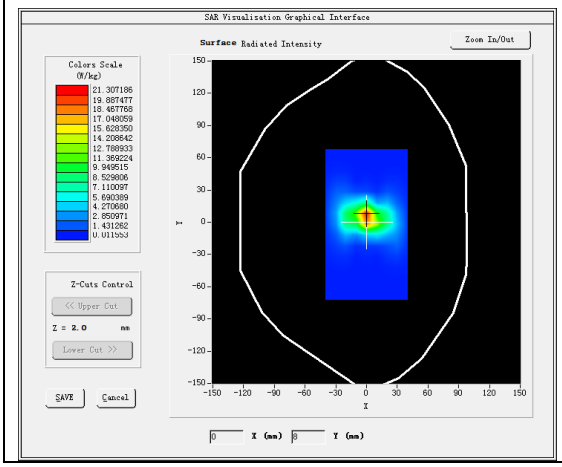
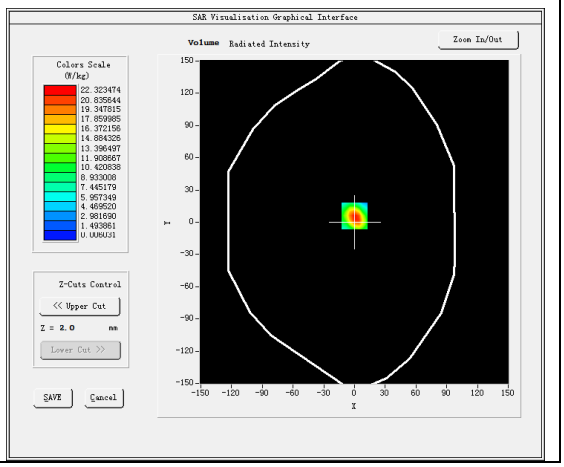
MEASUREMENT 9

A. Experimental conditions.

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

B. SAR Measurement Results

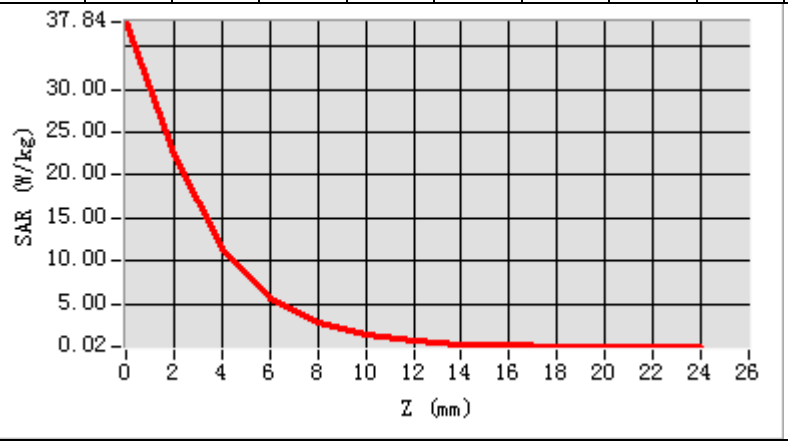
Frequency (MHz)	5200.000000
Relative permittivity (real part)	35.661980
Relative permittivity (imaginary part)	16.071619
Conductivity (S/m)	4.643246
Variation (%)	1.660000

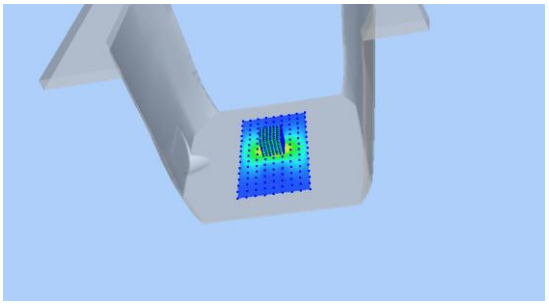
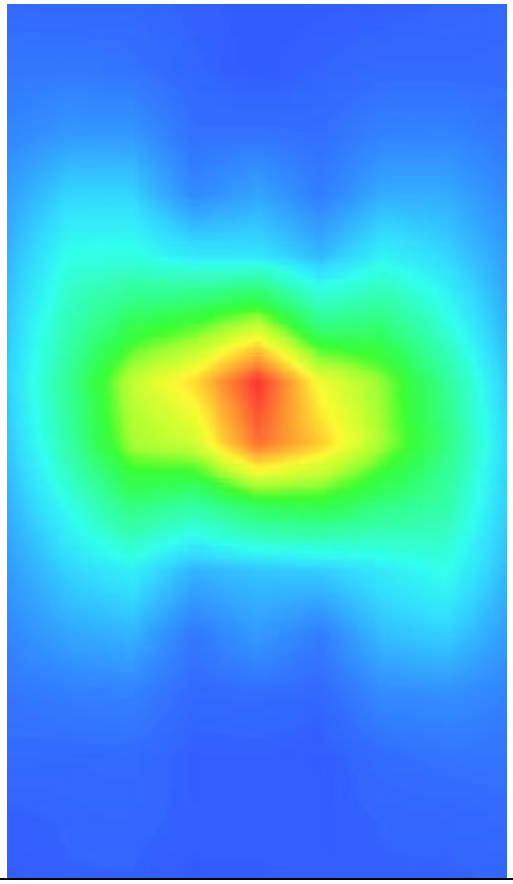
SURFACE SAR	**VOLUME SAR**
	

Maximum location: X=0.00, Y=6.00
SAR Peak: 40.06 W/kg

SAR 10g (W/Kg)	5.446495
SAR 1g (W/Kg)	15.741221

Z (mm)	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)	37.8356	22.3278	11.3730	5.6618	2.8255	1.4093	0.7124	0.3660	0.1808	0.1012	0.0513	0.0323



3D screen shot	Hot spot position
	

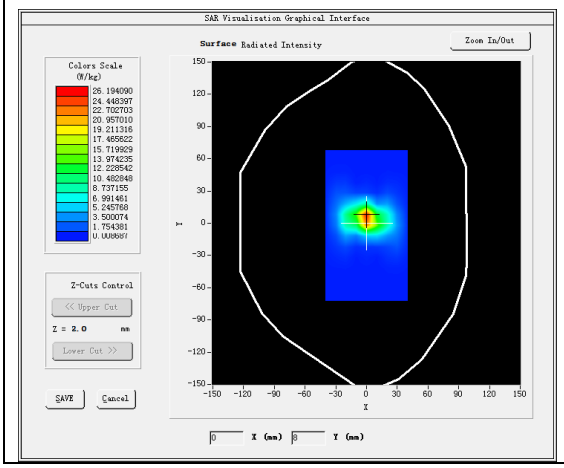
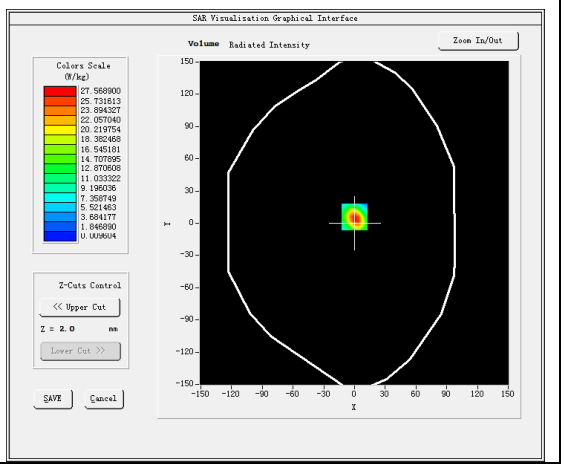
MEASUREMENT 10

A. Experimental conditions.

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

B. SAR Measurement Results

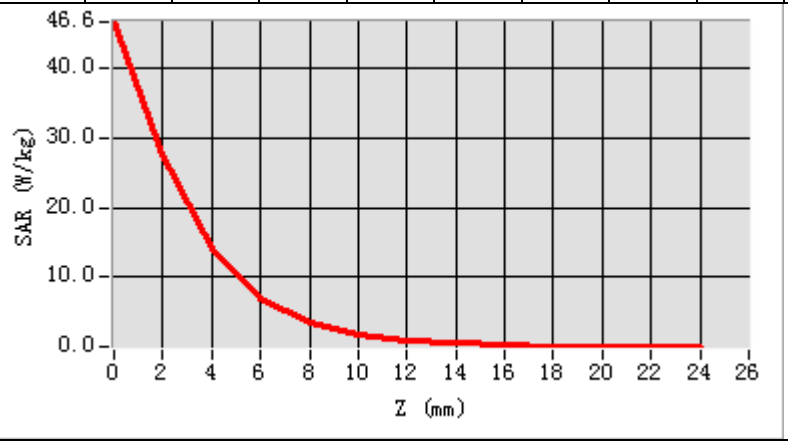
Frequency (MHz)	5200.000000
Relative permittivity (real part)	49.679539
Relative permittivity (imaginary part)	18.190510
Conductivity (S/m)	5.254258
Variation (%)	4.490000

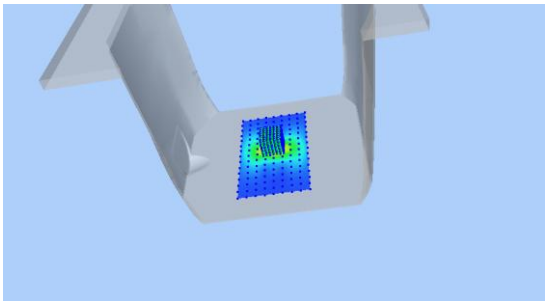
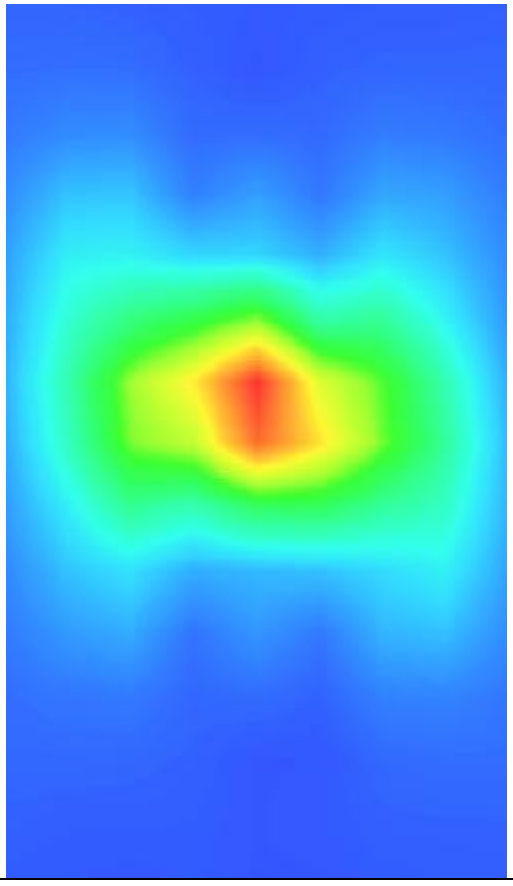
SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=6.00
SAR Peak: 49.61 W/kg

SAR 10g (W/Kg)	5.585184
SAR 1g (W/Kg)	15.933246

Z (mm)	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	7.05 91	3.59 28	1.78 02	0.89 38	0.46 70	0.24 75	0.13 53	0.06 50	0.04 000



3D screen shot	Hot spot position
	

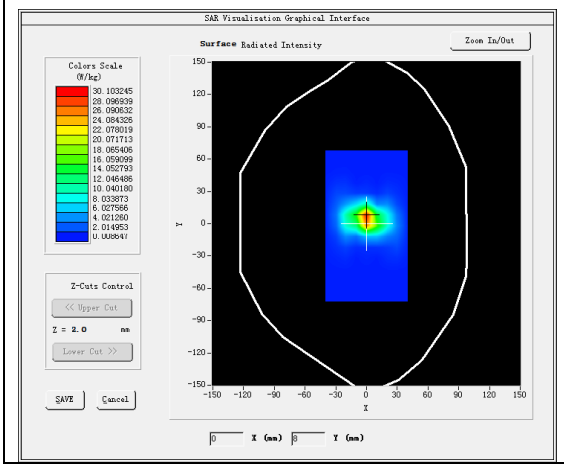
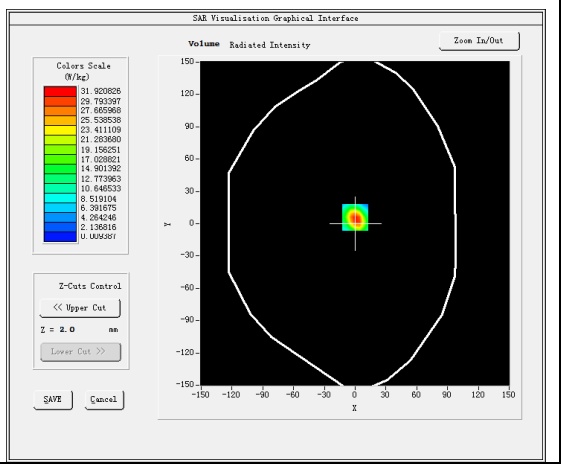
MEASUREMENT 11

A. Experimental conditions.

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

B. SAR Measurement Results

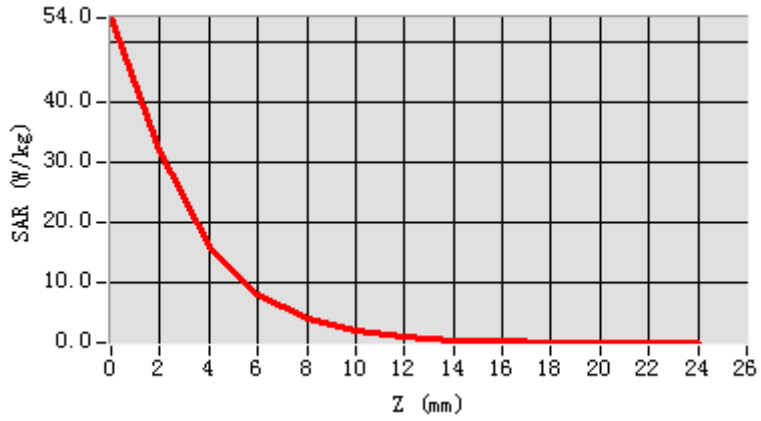
Frequency (MHz)	5800.000000
Relative permittivity (real part)	34.571512
Relative permittivity (imaginary part)	16.213082
Conductivity (S/m)	5.224981
Variation (%)	-1.880000

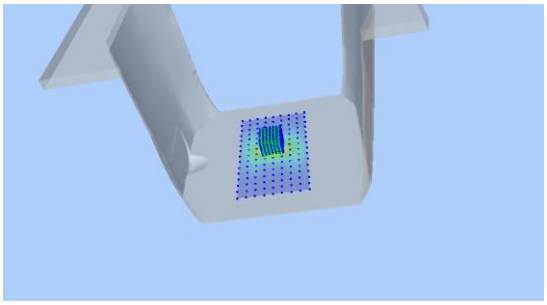
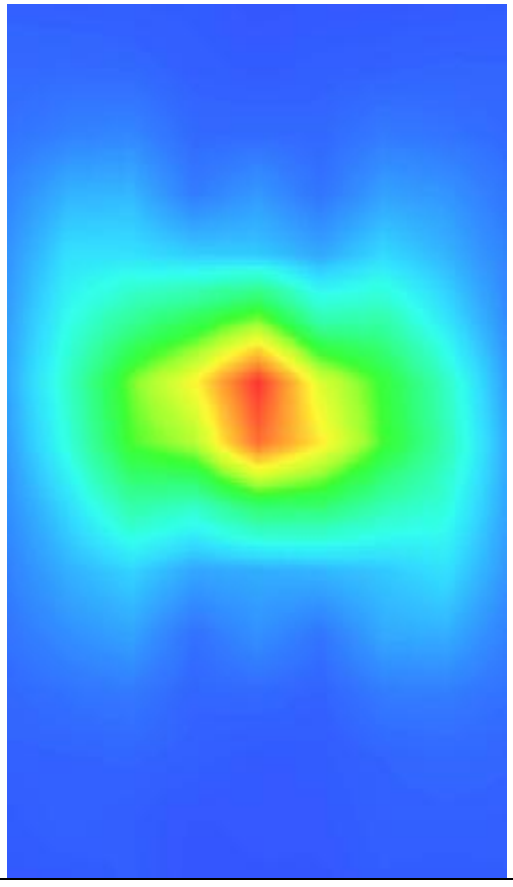
SURFACE SAR	**VOLUME SAR**
	

Maximum location: X=0.00, Y=6.00
SAR Peak: 57.37 W/kg

SAR 10g (W/Kg)	6.004095
SAR 1g (W/Kg)	18.387093

Z (mm)	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)	54.0311	31.9215	16.1720	8.1701	4.0884	2.0512	1.0308	0.5181	0.2750	0.1553	0.0740	0.0439



3D screen shot	Hot spot position
	

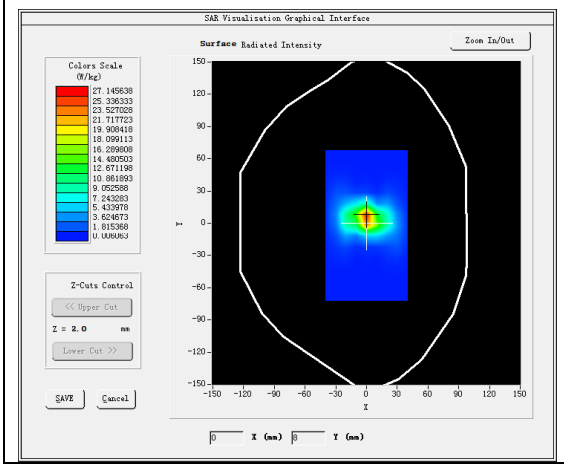
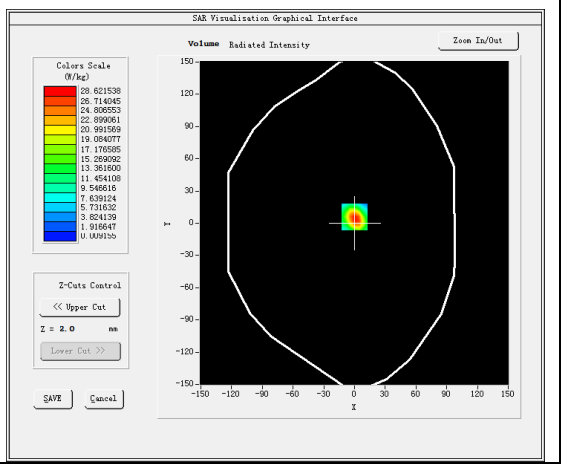
MEASUREMENT 12

A. Experimental conditions.

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

B. SAR Measurement Results

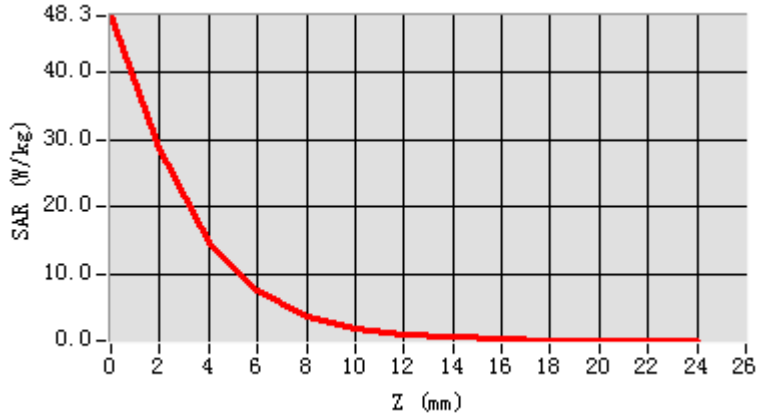
Frequency (MHz)	5800.000000
Relative permittivity (real part)	48.340523
Relative permittivity (imaginary part)	18.810043
Conductivity (S/m)	6.061524
Variation (%)	1.340000

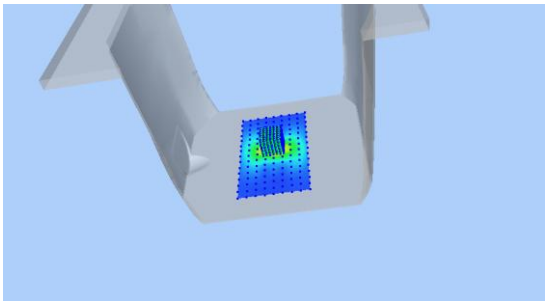
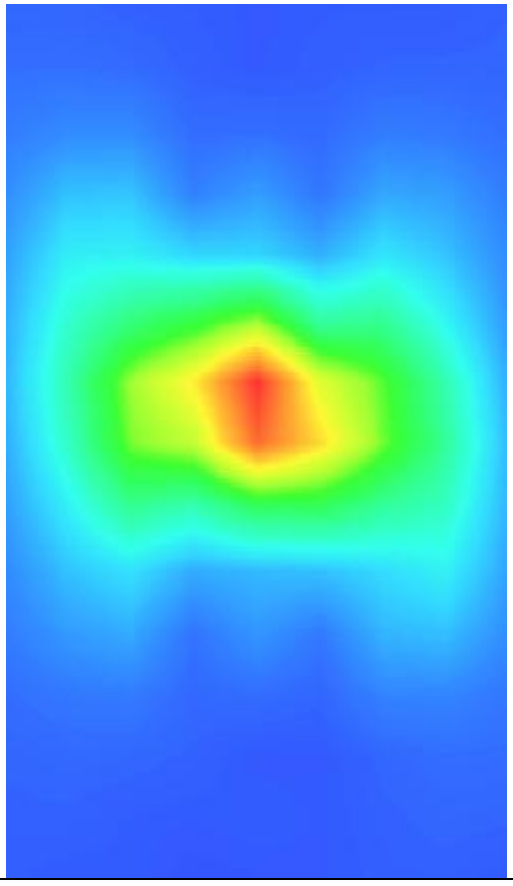
SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=6.00
SAR Peak: 51.30 W/kg

SAR 10g (W/Kg)	5.766184
SAR 1g (W/Kg)	17.065052

Z (mm)	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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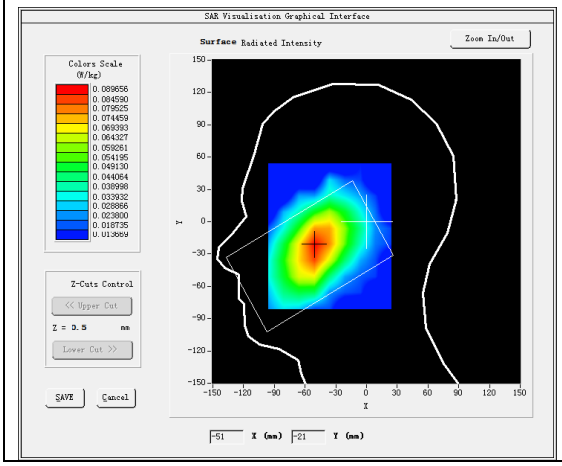
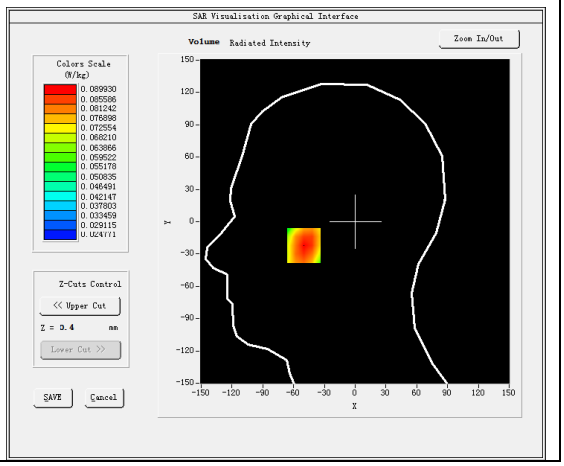
MEASUREMENT 1

A. Experimental conditions.

Area Scan	dx=15mm dy=15mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Left head
Device Position	Cheek
Band	GSM850
Channels	Middle
Signal	TDMA (Crest factor: 4.0)

B. SAR Measurement Results

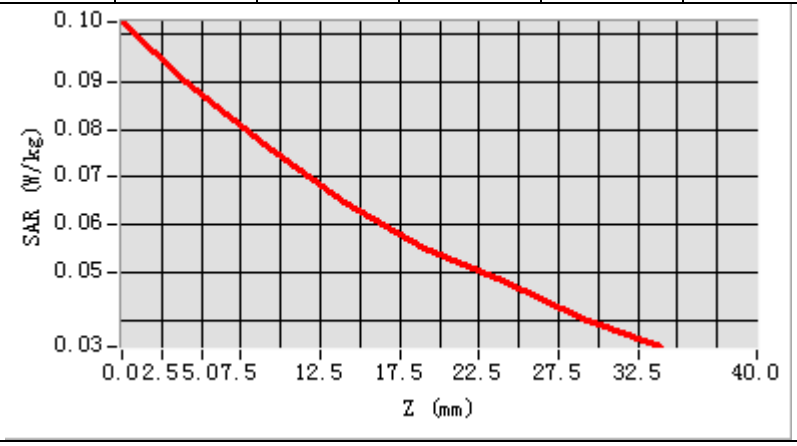
Frequency (MHz)	836.400000
Relative permittivity (real part)	40.710960
Relative permittivity (imaginary part)	19.961540
Conductivity (S/m)	0.927546
Variation (%)	-0.530000

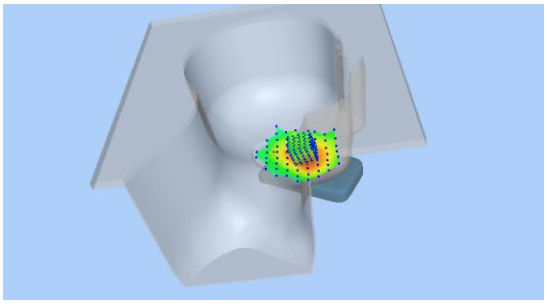
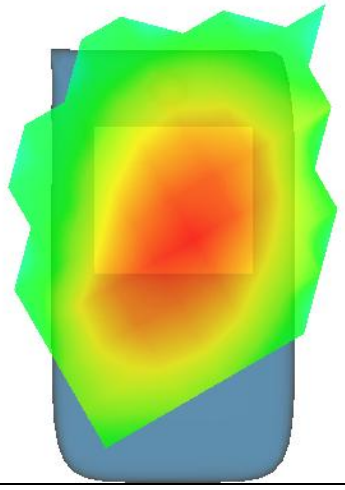
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-50.00, Y=-22.00
SAR Peak: 0.10 W/kg

SAR 10g (W/Kg)	0.071505
SAR 1g (W/Kg)	0.089765

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.1023	0.0899	0.0767	0.0646	0.0553	0.0484	0.0407



3D screen shot	Hot spot position
	

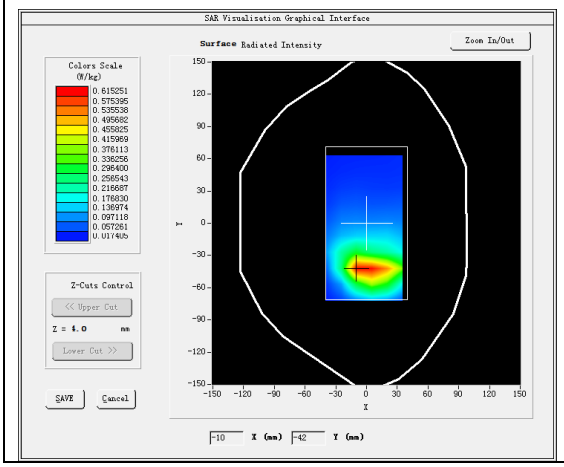
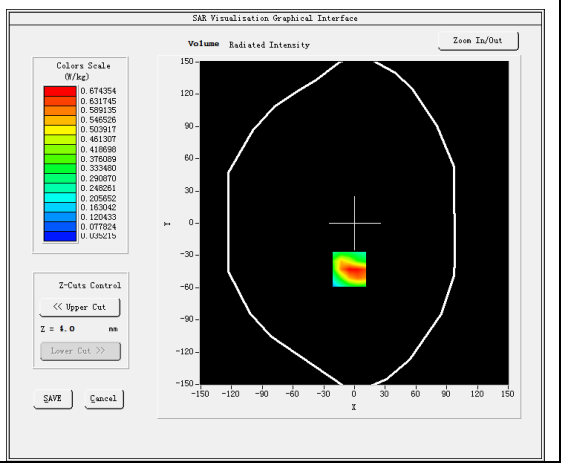
MEASUREMENT 2

A. Experimental conditions.

Area Scan	dx=15mm dy=15mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	GSM850
Channels	Middle
Signal	TDMA (Crest factor: 4.0)

B. SAR Measurement Results

Frequency (MHz)	836.400000
Relative permittivity (real part)	54.539581
Relative permittivity (imaginary part)	21.162741
Conductivity (S/m)	0.983362
Variation (%)	2.690000

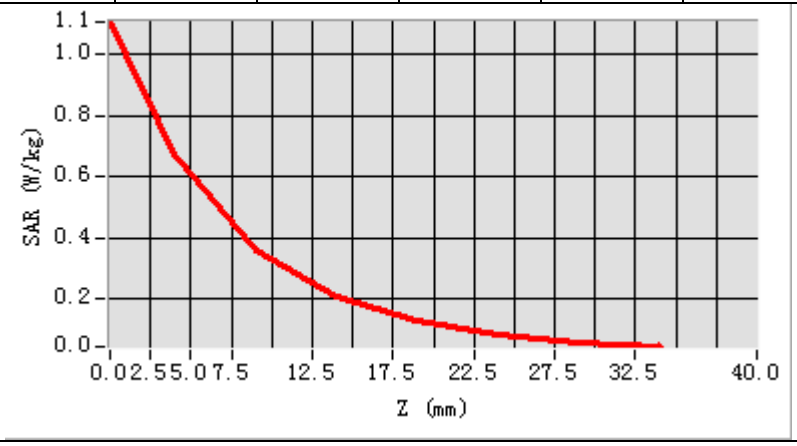
SURFACE SAR	**VOLUME SAR**
	

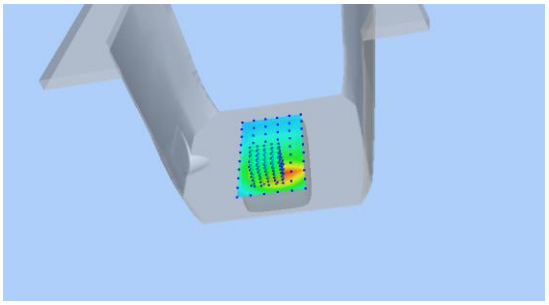
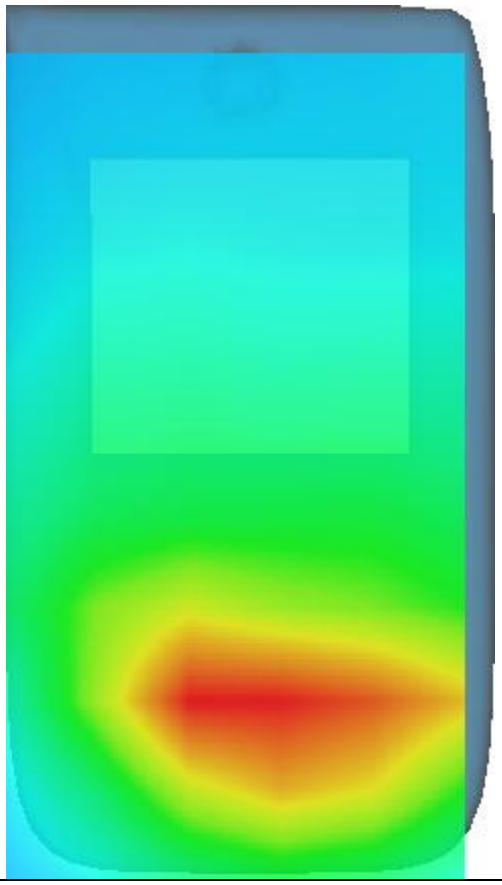
Maximum location: X=-5.00, Y=-43.00

SAR Peak: 1.12 W/kg

SAR 10g (W/Kg)	0.355118
SAR 1g (W/Kg)	0.659027

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.1043	0.6744	0.3588	0.2087	0.1299	0.0867	0.0609



3D screen shot	Hot spot position
	

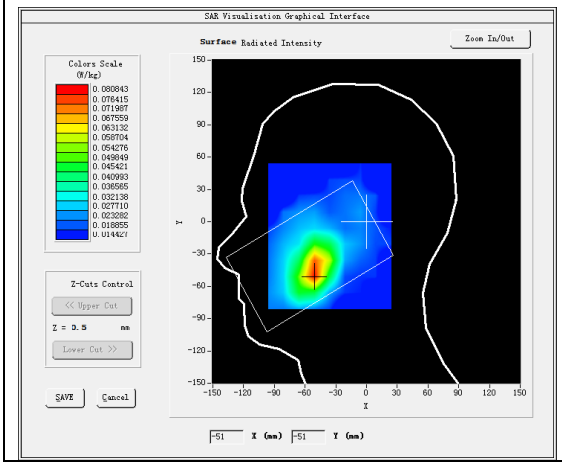
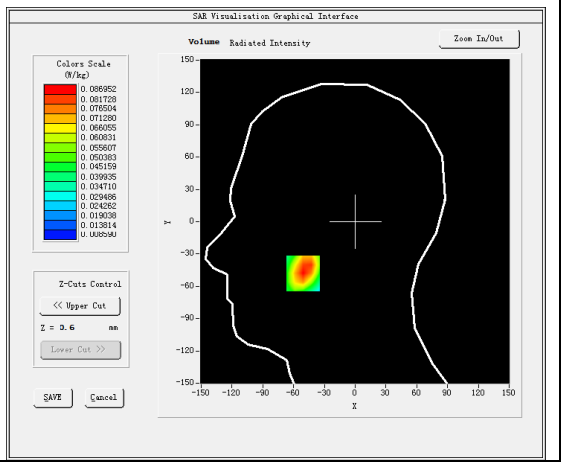
MEASUREMENT 3

A. Experimental conditions.

Area Scan	dx=15mm dy=15mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Left head
Device Position	Cheek
Band	GSM1900
Channels	Middle
Signal	TDMA (Crest factor: 4.0)

B. SAR Measurement Results

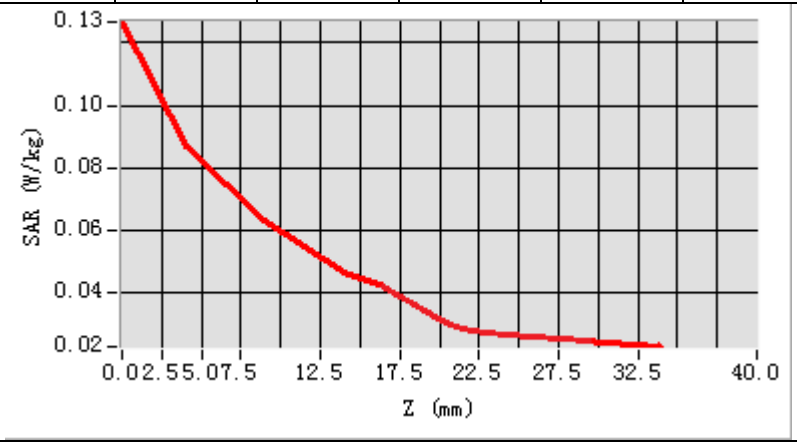
Frequency (MHz)	1880.000000
Relative permittivity (real part)	39.036999
Relative permittivity (imaginary part)	13.250200
Conductivity (S/m)	1.383910
Variation (%)	0.810000

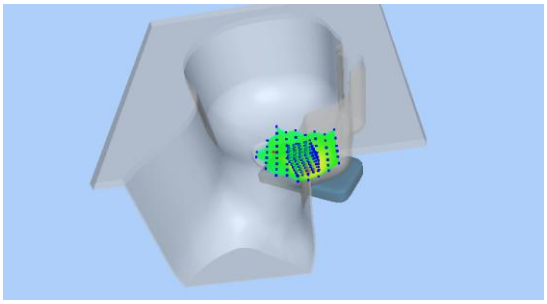
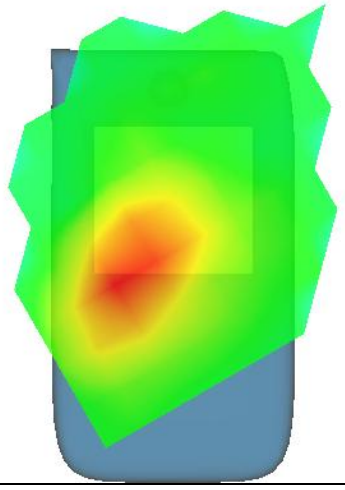
SURFACE SAR	VOLUME SAR
	

Maximum location: X=-51.00, Y=-48.00
SAR Peak: 0.13 W/kg

SAR 10g (W/Kg)	0.056104
SAR 1g (W/Kg)	0.086018

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.1267	0.0870	0.0636	0.0469	0.0317	0.0259	0.0249



3D screen shot	Hot spot position
	

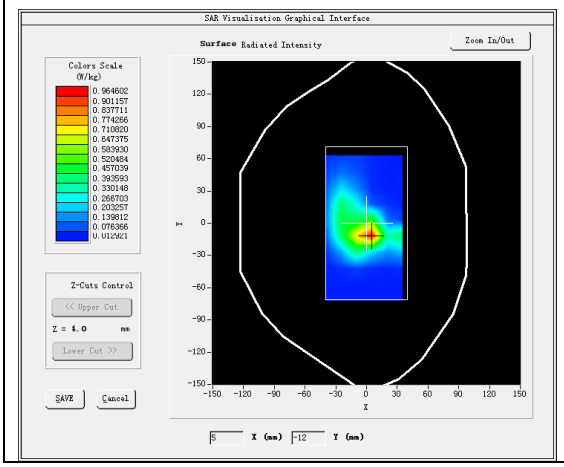
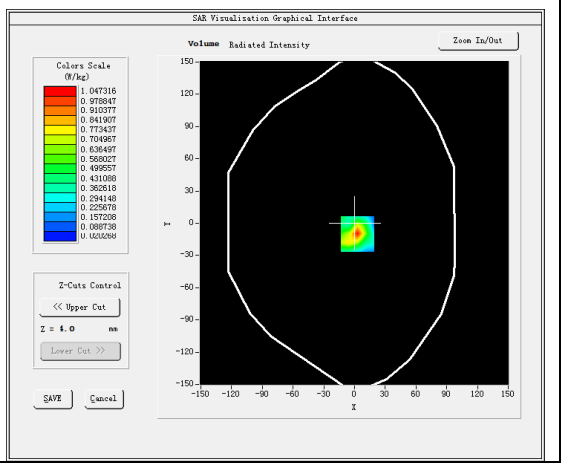
MEASUREMENT 4

A. Experimental conditions.

Area Scan	dx=15mm dy=15mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	GSM1900
Channels	Middle
Signal	TDMA (Crest factor: 4.0)

B. SAR Measurement Results

Frequency (MHz)	1880.000000
Relative permittivity (real part)	54.343899
Relative permittivity (imaginary part)	14.567700
Conductivity (S/m)	1.521515
Variation (%)	3.800000

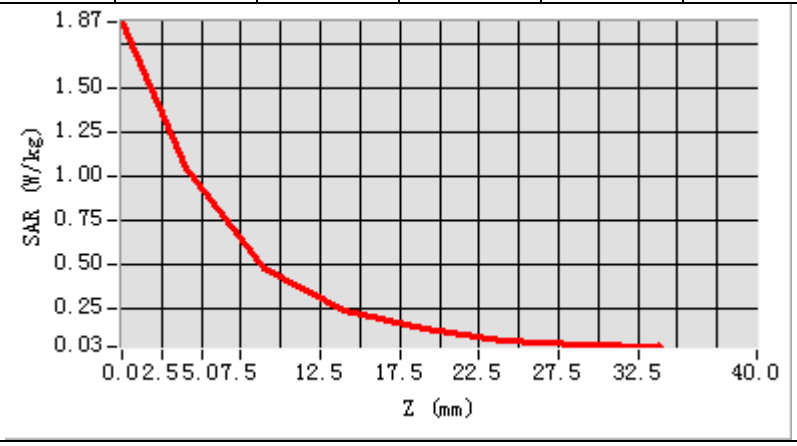
SURFACE SAR	VOLUME SAR
	

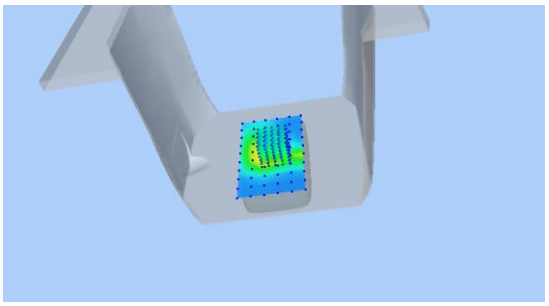
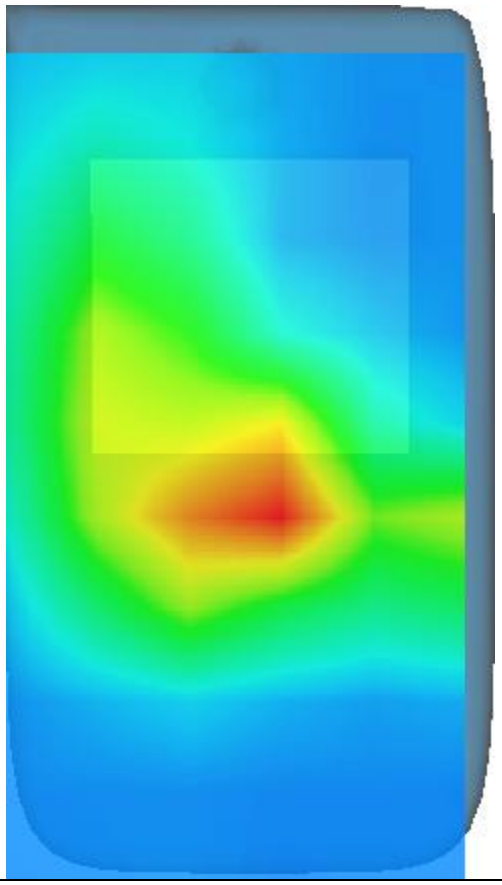
Maximum location: X=3.00, Y=-10.00

SAR Peak: 1.85 W/kg

SAR 10g (W/Kg)	0.402152
SAR 1g (W/Kg)	0.929185

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.8706	1.0473	0.4758	0.2359	0.1293	0.0698	0.0451



3D screen shot	Hot spot position
	

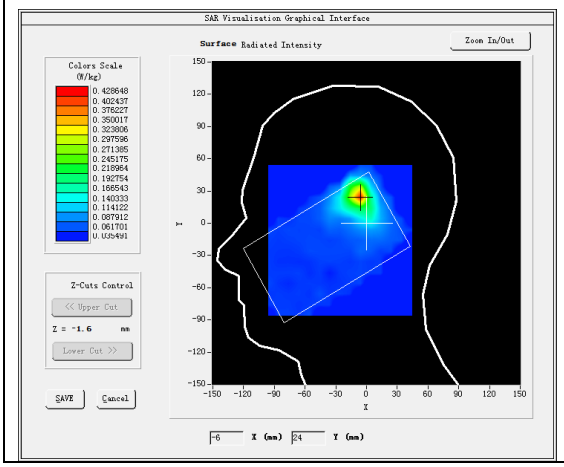
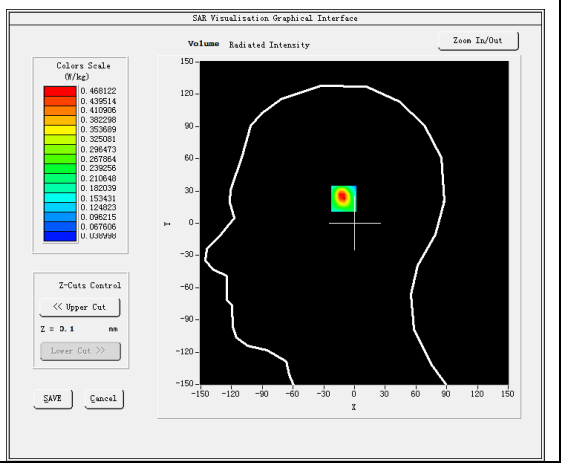
MEASUREMENT 5

A. Experimental conditions.

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

B. SAR Measurement Results

Frequency (MHz)	5200.000000
Relative permittivity (real part)	35.661980
Relative permittivity (imaginary part)	16.071619
Conductivity (S/m)	4.643246
Variation (%)	-4.810000

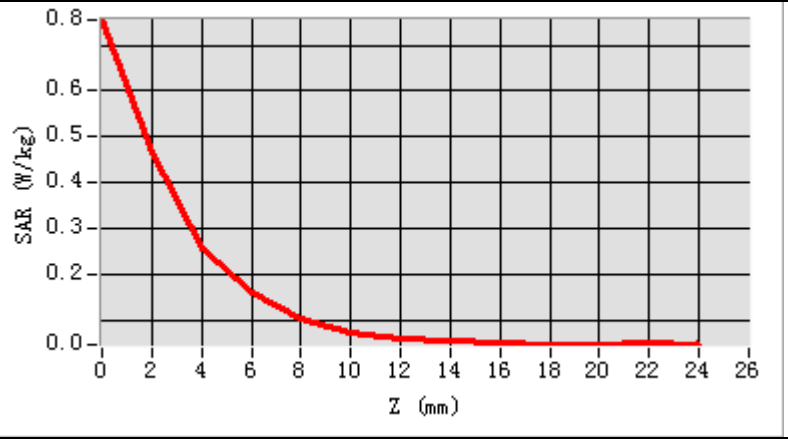
SURFACE SAR	VOLUME SAR
	

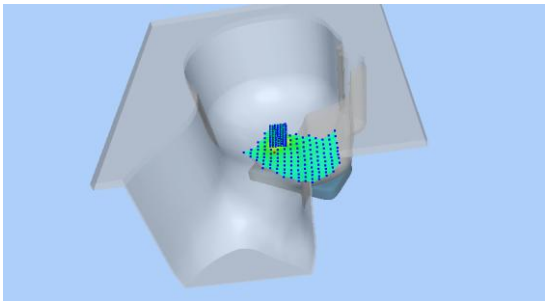
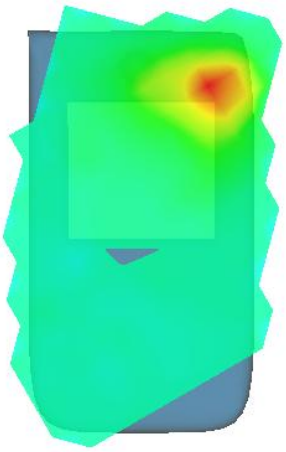
Maximum location: X=-7.00, Y=25.00

SAR Peak: 1.22 W/kg

SAR 10g (W/Kg)	0.164911
SAR 1g (W/Kg)	0.448248

Z (mm)	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)	0.7546	0.4681	0.2563	0.1618	0.1035	0.0767	0.0607	0.0566	0.0535	0.0485	0.0490	0.0508



3D screen shot	Hot spot position
	

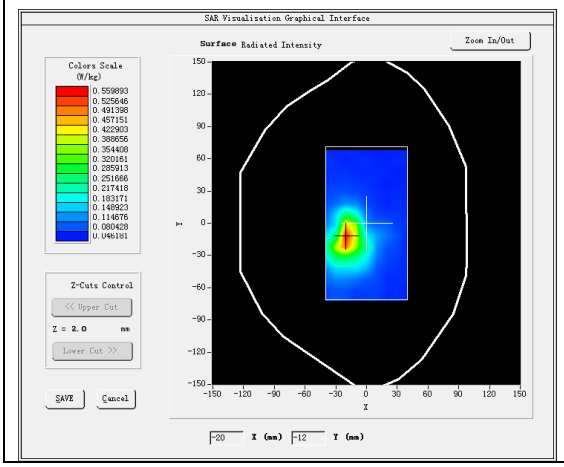
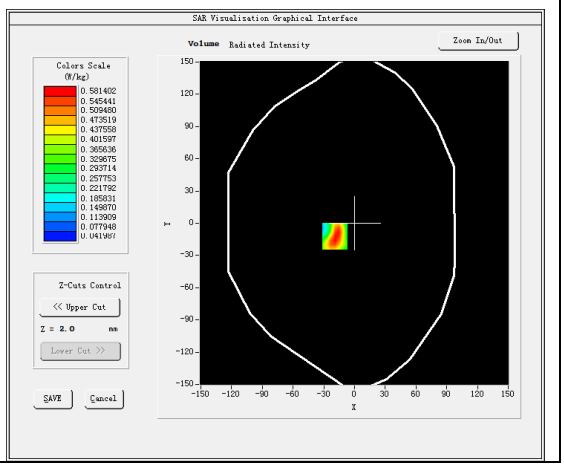
MEASUREMENT 6

A. Experimental conditions.

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

B. SAR Measurement Results

Frequency (MHz)	5200.000000
Relative permittivity (real part)	49.679539
Relative permittivity (imaginary part)	18.190510
Conductivity (S/m)	5.254258
Variation (%)	0.670000

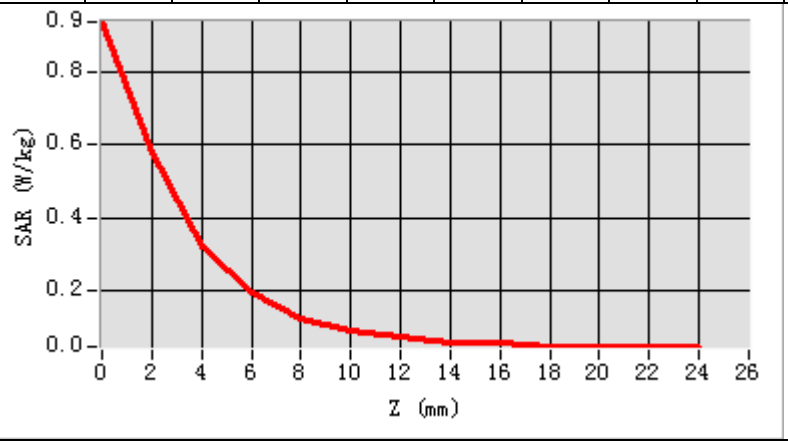
SURFACE SAR	VOLUME SAR
	

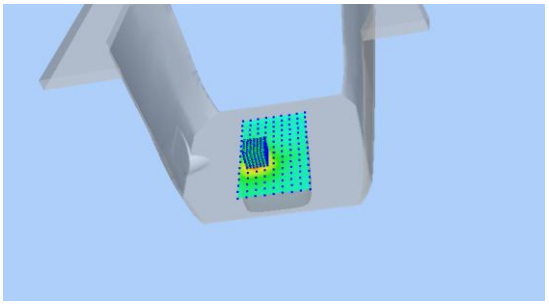
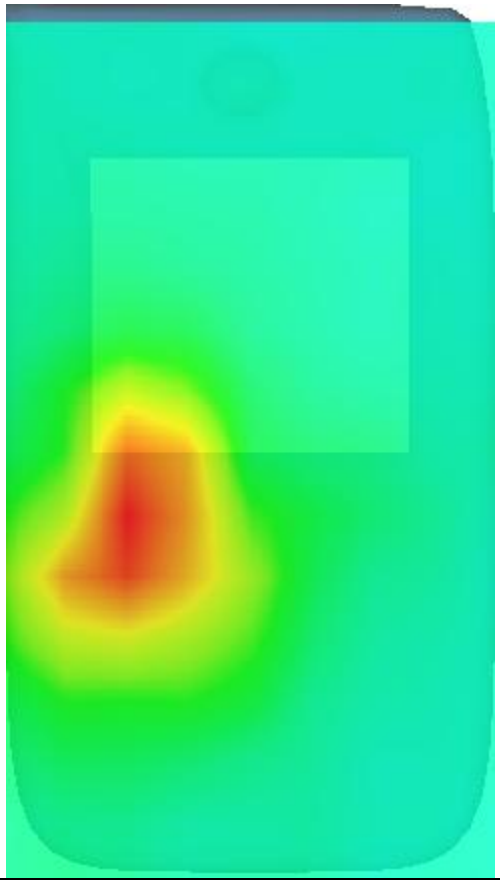
Maximum location: X=-19.00, Y=-12.00

SAR Peak: 0.98 W/kg

SAR 10g (W/Kg)	0.167766
SAR 1g (W/Kg)	0.360610

Z (mm)	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)	0.9364	0.5814	0.3256	0.1985	0.1254	0.0910	0.0742	0.0604	0.0588	0.0507	0.0516	0.0502



3D screen shot	Hot spot position
	

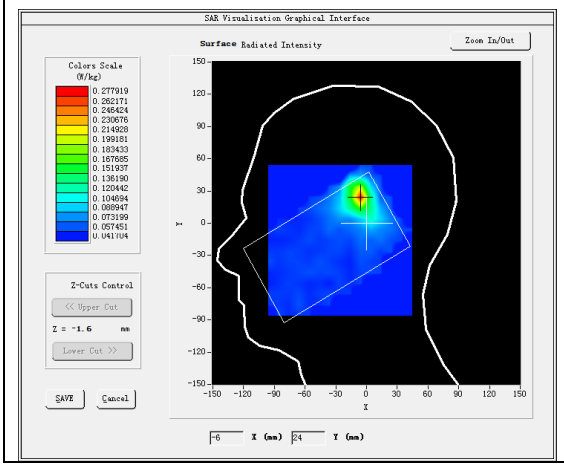
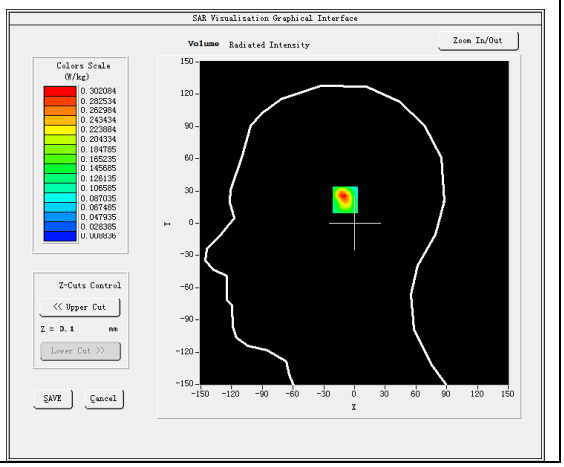
MEASUREMENT 7

A. Experimental conditions.

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

B. SAR Measurement Results

Frequency (MHz)	5785.000000
Relative permittivity (real part)	34.641788
Relative permittivity (imaginary part)	16.085266
Conductivity (S/m)	5.169626
Variation (%)	2.260000

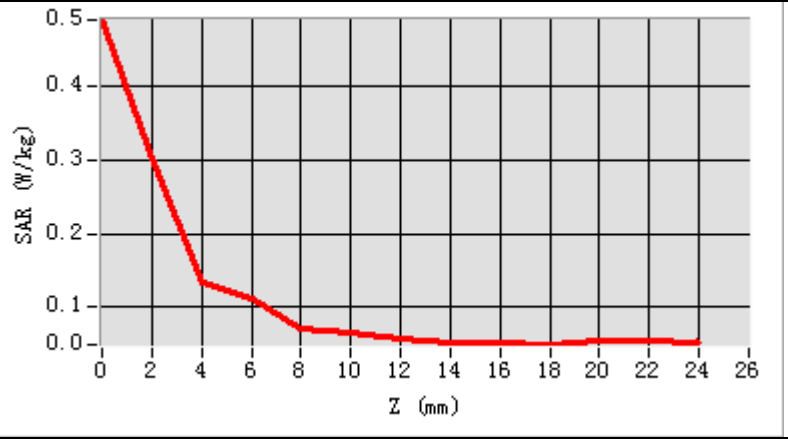
SURFACE SAR	**VOLUME SAR**
	

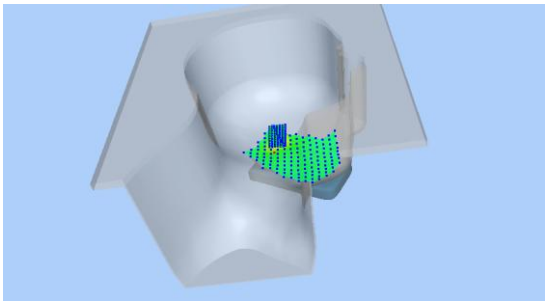
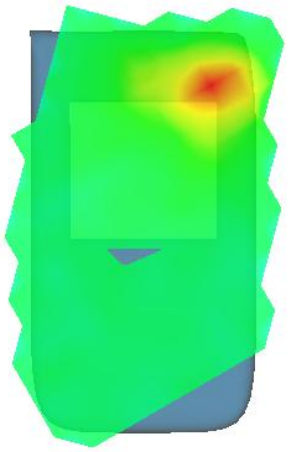
Maximum location: X=-6.00, Y=24.00

SAR Peak: 0.73 W/kg

SAR 10g (W/Kg)	0.122818
SAR 1g (W/Kg)	0.284853

Z (mm)	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)	0.4912	0.3021	0.1335	0.1117	0.0708	0.0638	0.0575	0.0502	0.0525	0.0485	0.0532	0.0537



3D screen shot	Hot spot position
	

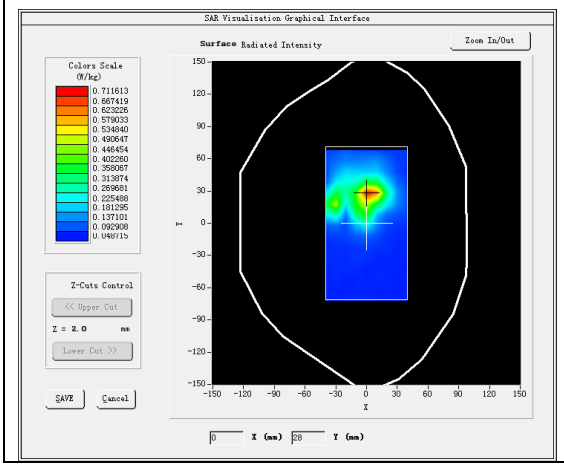
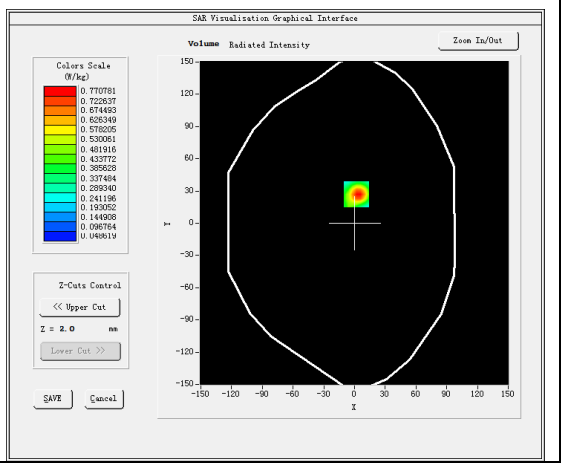
MEASUREMENT 8

A. Experimental conditions.

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

B. SAR Measurement Results

Frequency (MHz)	5785.000000
Relative permittivity (real part)	48.418702
Relative permittivity (imaginary part)	18.686766
Conductivity (S/m)	6.005719
Variation (%)	-1.900000

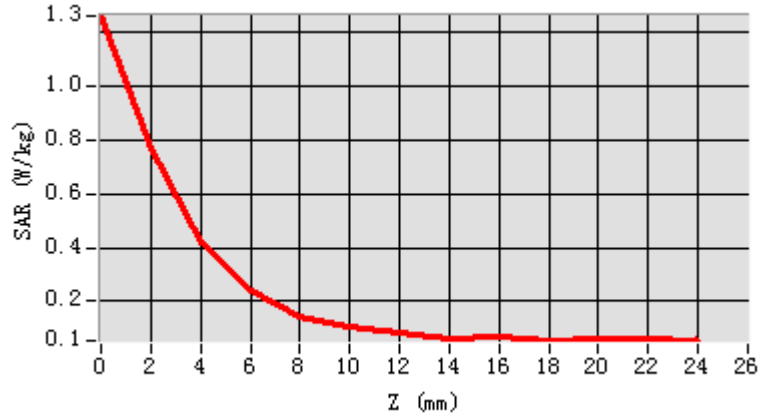
SURFACE SAR	VOLUME SAR
	

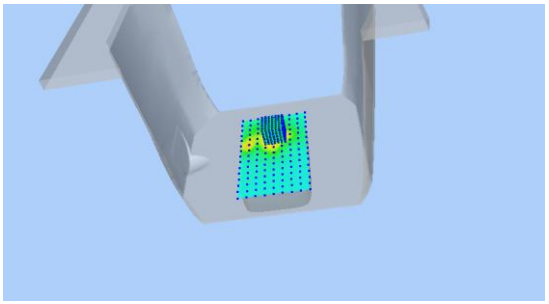
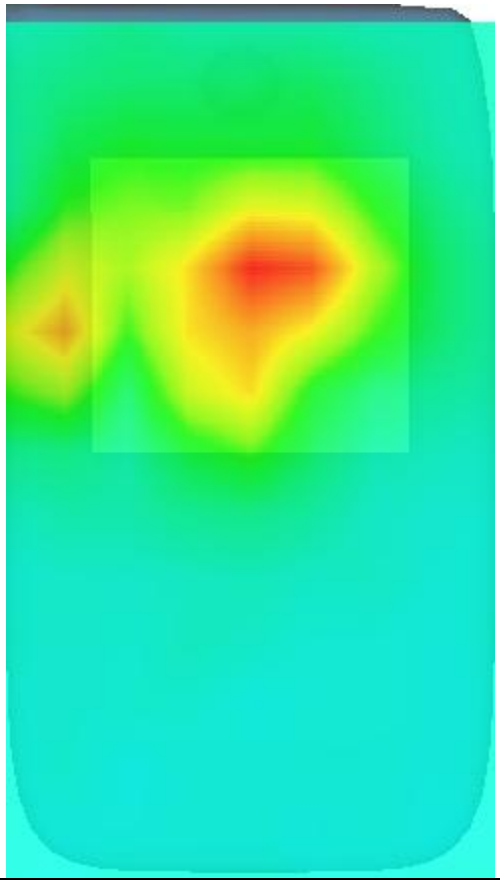
Maximum location: X=2.00, Y=27.00

SAR Peak: 1.34 W/kg

SAR 10g (W/Kg)	0.200586
SAR 1g (W/Kg)	0.364951

Z (mm)	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)	1.2630	0.7708	0.4210	0.2390	0.1451	0.1062	0.0822	0.0630	0.0654	0.0555	0.0594	0.0589



3D screen shot	Hot spot position
	

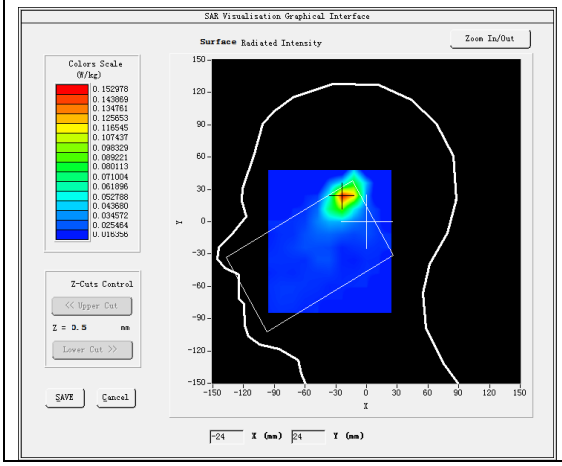
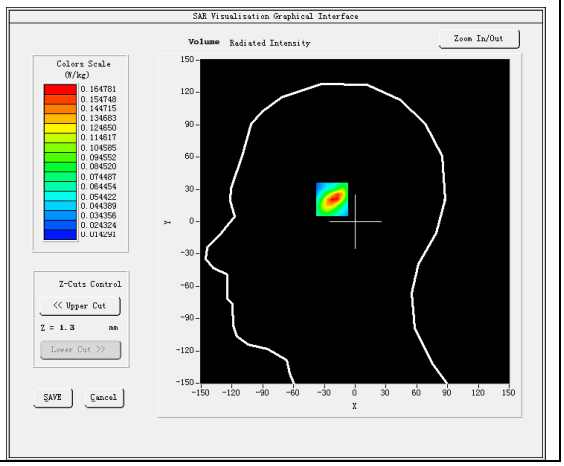
MEASUREMENT 9

A. Experimental conditions.

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

B. SAR Measurement Results

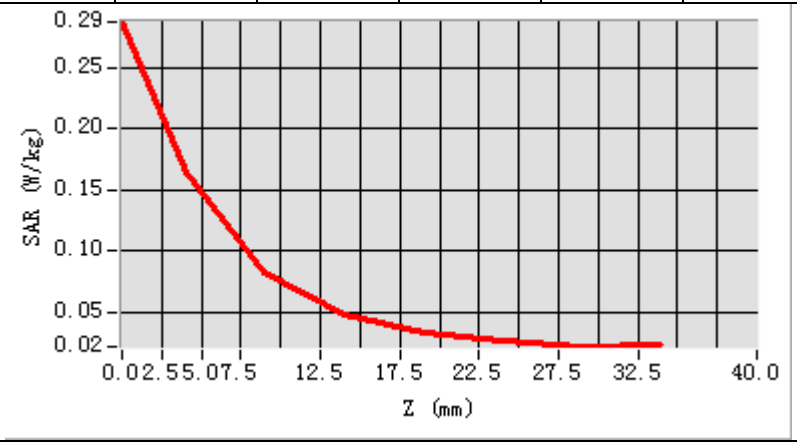
Frequency (MHz)	2437.000000
Relative permittivity (real part)	38.598000
Relative permittivity (imaginary part)	13.470300
Conductivity (S/m)	1.823729
Variation (%)	4.880001

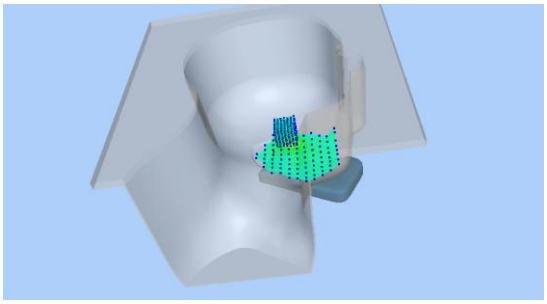
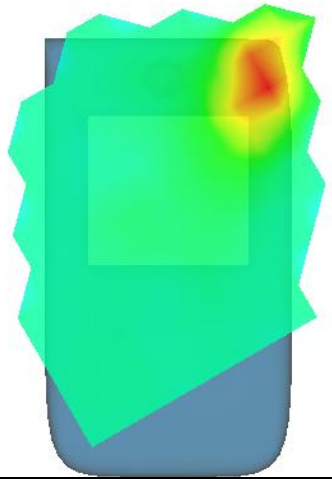
SURFACE SAR	**VOLUME SAR**
	

Maximum location: X=-22.00, Y=23.00
SAR Peak: 0.31 W/kg

SAR 10g (W/Kg)	0.071673
SAR 1g (W/Kg)	0.153582

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.2872	0.1648	0.0822	0.0475	0.0332	0.0264	0.0217



3D screen shot	Hot spot position
	

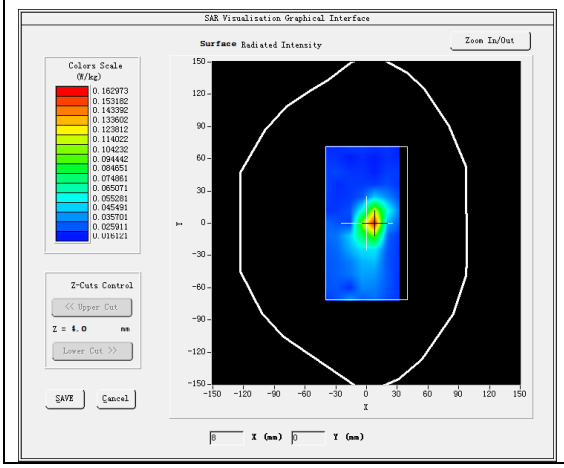
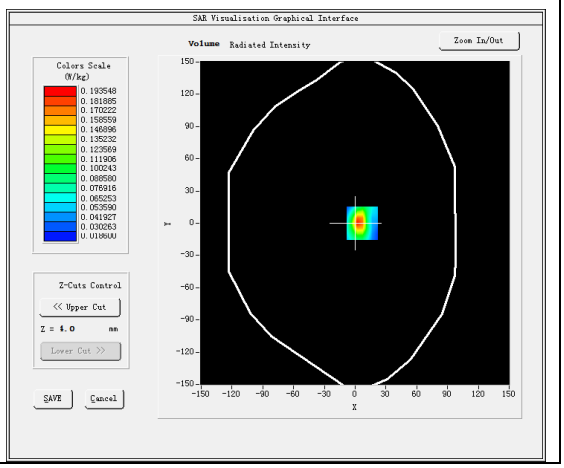
MEASUREMENT 10

A. Experimental conditions.

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

B. SAR Measurement Results

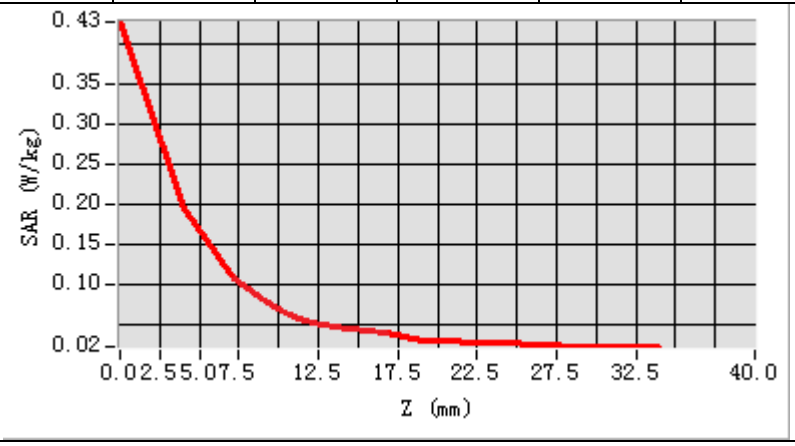
Frequency (MHz)	2437.000000
Relative permittivity (real part)	51.663700
Relative permittivity (imaginary part)	13.904400
Conductivity (S/m)	1.882501
Variation (%)	-0.180000

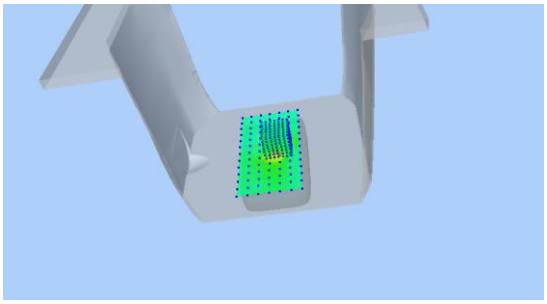
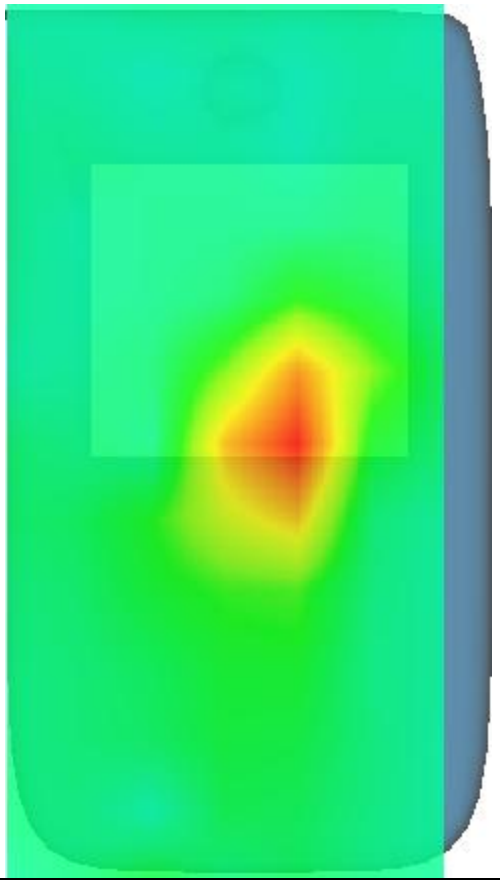
SURFACE SAR	VOLUME SAR
	

Maximum location: X=7.00, Y=0.00
SAR Peak: 0.35 W/kg

SAR 10g (W/Kg)	0.077349
SAR 1g (W/Kg)	0.176916

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.4264	0.1935	0.0621	0.0507	0.0404	0.0265	0.0218



3D screen shot	Hot spot position
	

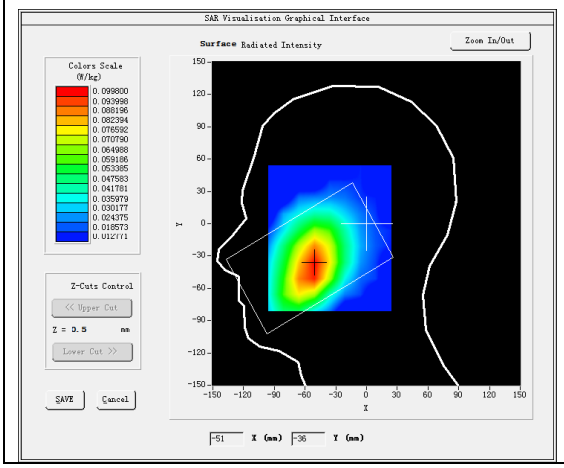
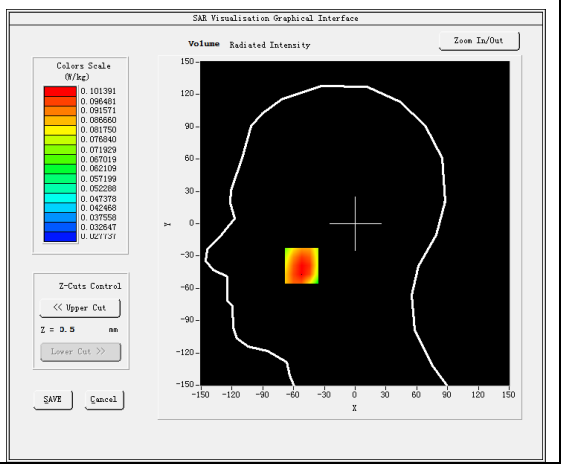
MEASUREMENT 11

A. Experimental conditions.

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

B. SAR Measurement Results

Frequency (MHz)	836.500000
Relative permittivity (real part)	40.710600
Relative permittivity (imaginary part)	19.958300
Conductivity (S/m)	0.927507
Variation (%)	3.190000

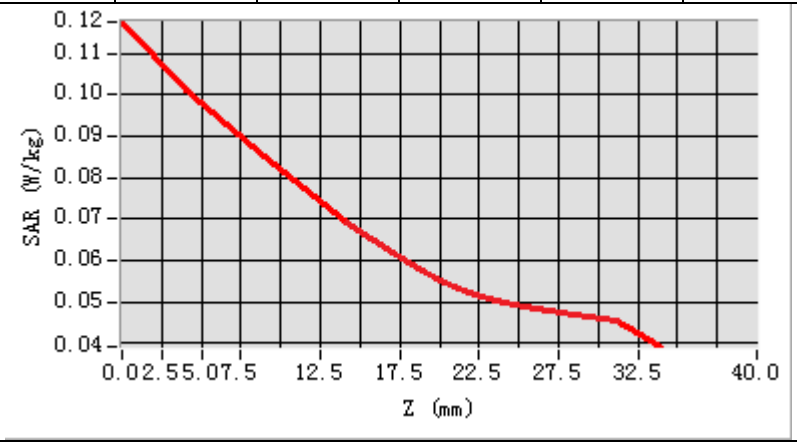
SURFACE SAR	VOLUME SAR
	

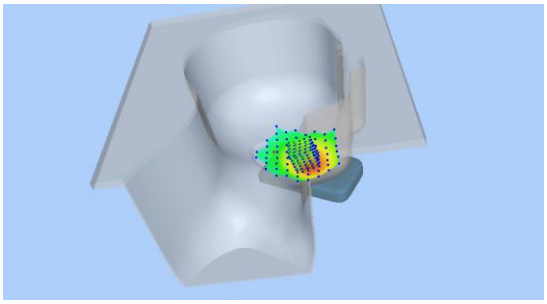
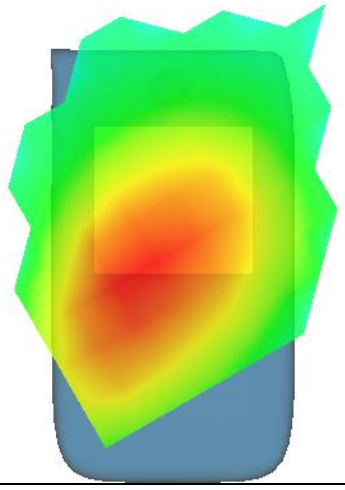
Maximum location: X=-52.00, Y=-39.00

SAR Peak: 0.12 W/kg

SAR 10g (W/Kg)	0.080470
SAR 1g (W/Kg)	0.100364

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.1176	0.1014	0.0852	0.0676	0.0554	0.0501	0.0302



3D screen shot	Hot spot position
	

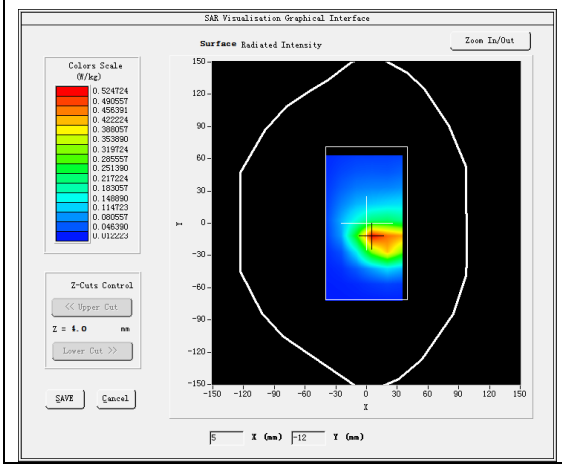
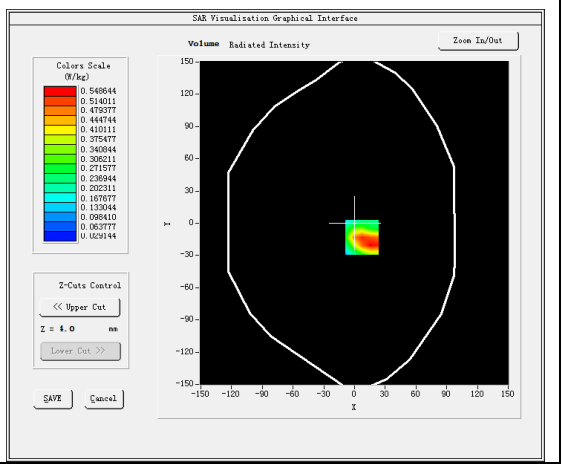
MEASUREMENT 12

A. Experimental conditions.

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

B. SAR Measurement Results

Frequency (MHz)	836.500000
Relative permittivity (real part)	54.543499
Relative permittivity (imaginary part)	21.157000
Conductivity (S/m)	0.983213
Variation (%)	-1.140000

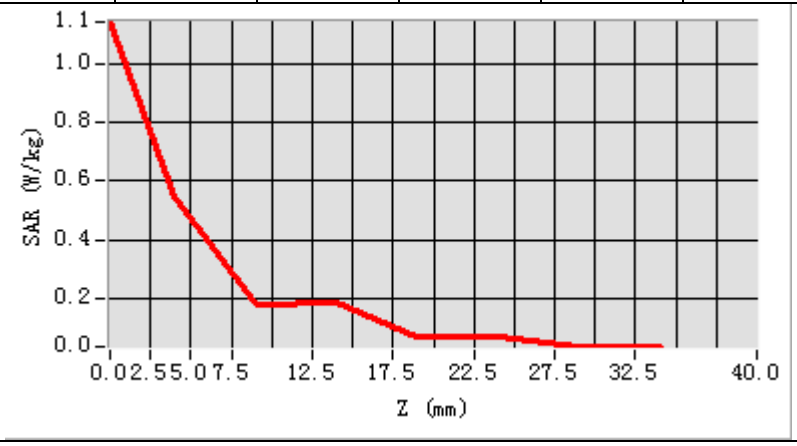
SURFACE SAR	VOLUME SAR
	

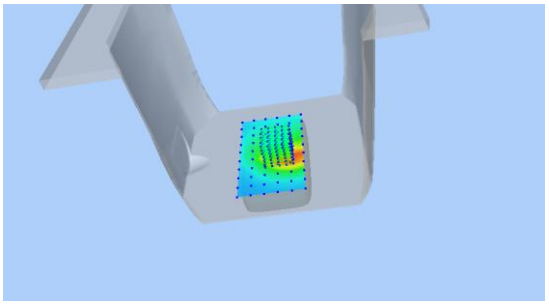
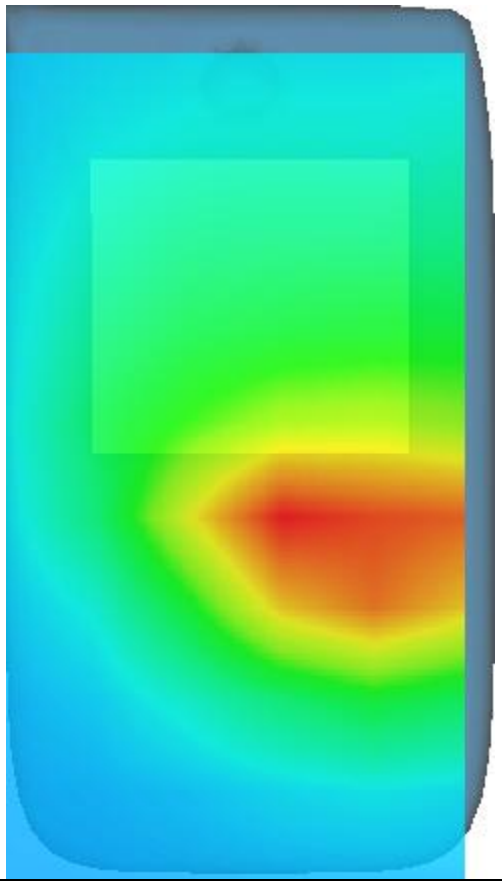
Maximum location: X=7.00, Y=-13.00

SAR Peak: 0.92 W/kg

SAR 10g (W/Kg)	0.289604
SAR 1g (W/Kg)	0.545479

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.1394	0.5486	0.1815	0.1859	0.0743	0.0766	0.0401



3D screen shot	Hot spot position
	

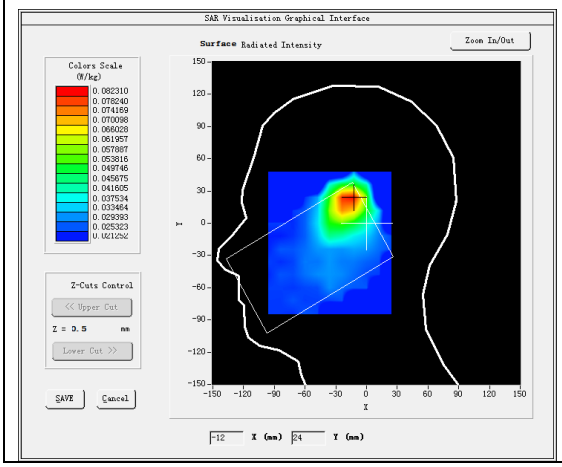
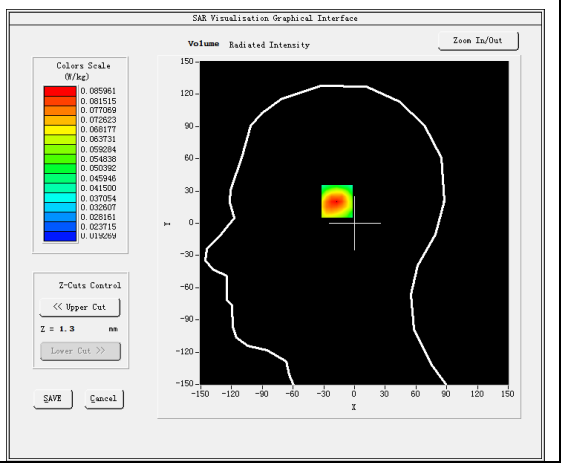
MEASUREMENT 13

A. Experimental conditions.

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

C. SAR Measurement Results

Frequency (MHz)	2605.000000
Relative permittivity (real part)	38.072086
Relative permittivity (imaginary part)	14.053560
Conductivity (S/m)	2.033862
Variation (%)	-0.440000

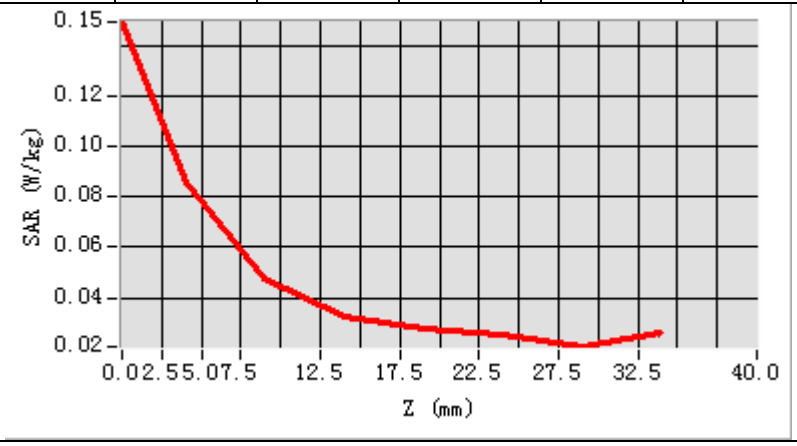
SURFACE SAR	VOLUME SAR
	

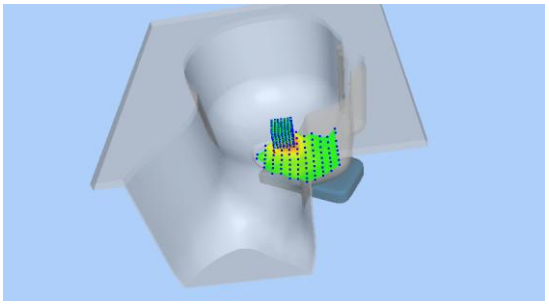
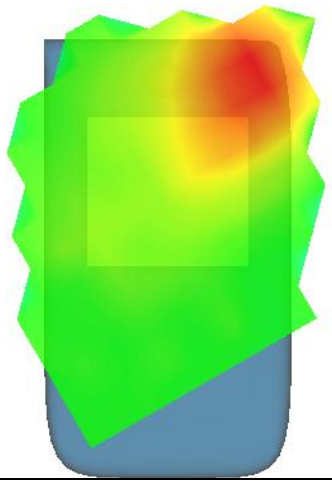
Maximum location: X=-16.00, Y=22.00

SAR Peak: 0.15 W/kg

SAR 10g (W/Kg)	0.051776
SAR 1g (W/Kg)	0.084109

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.1492	0.0860	0.0481	0.0325	0.0279	0.0252	0.0207



3D screen shot	Hot spot position
	

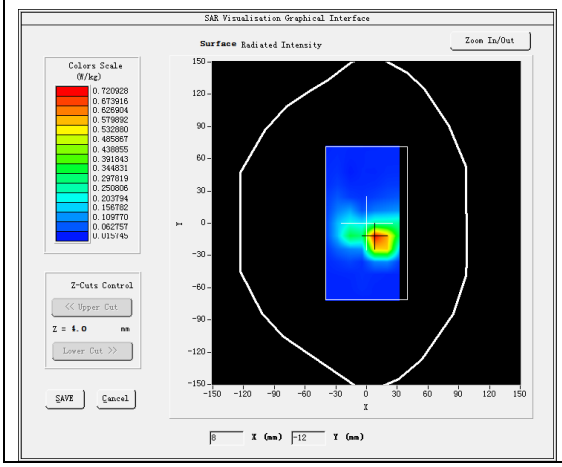
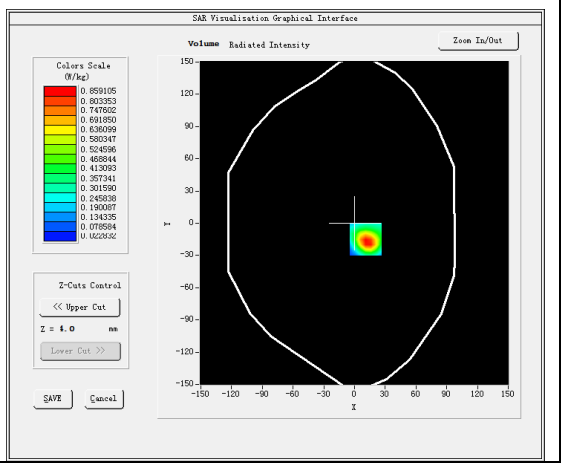
MEASUREMENT 14

A. Experimental conditions.

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

B. SAR Measurement Results

Frequency (MHz)	2605.000000
Relative permittivity (real part)	52.796546
Relative permittivity (imaginary part)	15.390240
Conductivity (S/m)	2.277309
Variation (%)	-1.330000

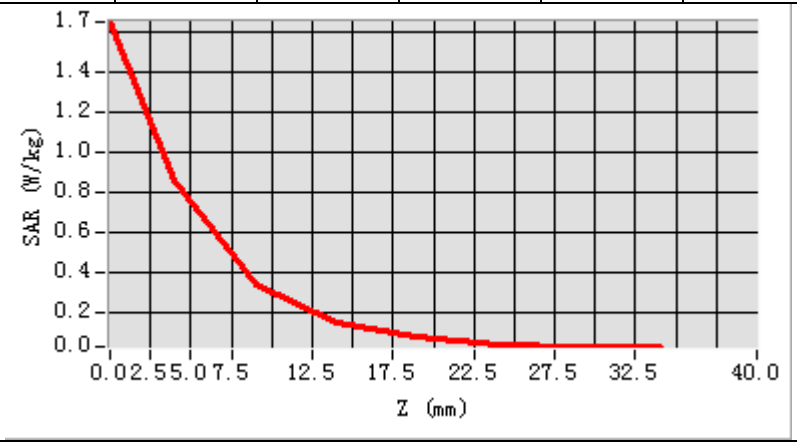
SURFACE SAR	VOLUME SAR
	

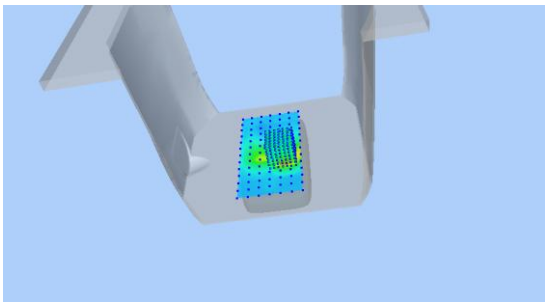
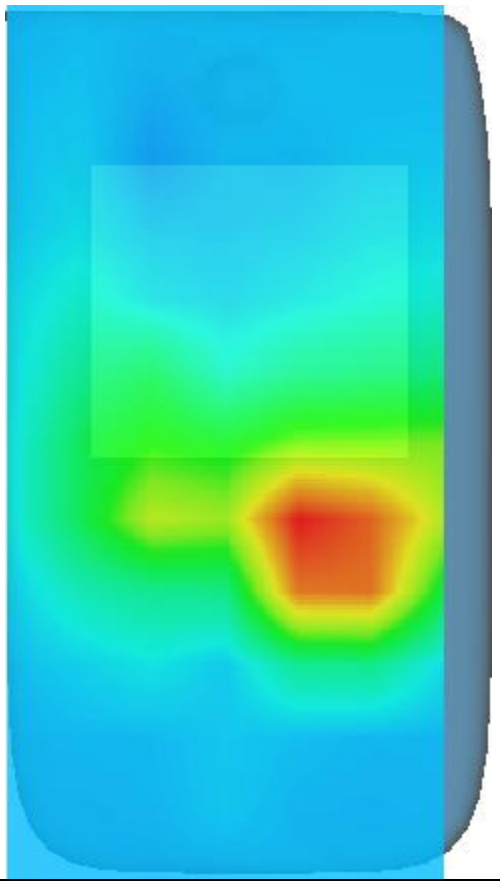
Maximum location: X=11.00, Y=-15.00

SAR Peak: 1.66 W/kg

SAR 10g (W/Kg)	0.340352
SAR 1g (W/Kg)	0.829917

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.6522	0.8591	0.3358	0.1520	0.0794	0.0428	0.0329



3D screen shot	Hot spot position
	

14. Appendix D. Calibration Certificate

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E Field Probe - SN 08/16 EPGO287
835 MHz Dipole - SN 03/15 DIP 0G835-347
1900 MHz Dipole - SN 03/15 DIP 1G900-350
2450 MHz Dipole - SN 03/15 DIP 2G450-352
2600 MHz Dipole - SN 03/15 DIP 2G600-356
5000-6000 MHz Dipole - SN 13/14 WGA 33
Extended Calibration Certificate

COMOSAR E-Field Probe Calibration Report

Ref : ACR.260.1.18.SATU.A

SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

BUILDING E, FENDA SCIENCE PARK, SANWEI COMMUNITY, XIXIANG STREET,

BAO'AN DISTRICT, SHENZHEN GUANGDONG, CHINA

MVG COMOSAR DOSIMETRIC E-FIELD PROBE

SERIAL NO.: SN 08/16 EPGO287

Calibrated at MVG US

2105 Barrett Park Dr. - Kennesaw, GA 30144

Calibration Date: 12/27/2019

Summary:

This document presents the method and results from an accredited COMOSAR Dosimetric E-Field Probe calibration performed in MVG USA using the CALISAR / CALIBAIR test bench, for use with a COMOSAR system only. All calibration results are traceable to national metrology institutions.

COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.260.1.18.SATU.A

	Name	*Function*	*Date*	*Signature*
Prepared by :	Jérôme LUC	Product Manager	12/27/2019	
Checked by :	Jérôme LUC	Product Manager	12/27/2019	
Approved by :	Kim RUTKOWSKI	Quality Manager	12/27/2019	

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

Issue	*Date*	*Modifications*
A	12/27/2019	Initial release

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1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	MVG
Model	SSE2
Serial Number	SN 08/16 EPGO287
Product Condition (new / used)	Used
Frequency Range of Probe	0.15 GHz-6GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.209 MΩ Dipole 2: R2=0.196 MΩ Dipole 3: R3=0.197 MΩ

A yearly calibration interval is recommended.

2 PRODUCT DESCRIPTION

2.1 GENERAL INFORMATION

MVG's COMOSAR E field Probes are built in accordance to the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards.

Figure 1 – *MVG COMOSAR Dosimetric E field Dipole*

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

3 MEASUREMENT METHOD

The IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards provide recommended practices for the probe calibrations, including the performance characteristics of interest and methods by which to assess their affect. All calibrations / measurements performed meet the fore mentioned standards.

3.1 LINEARITY

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

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3.2 SENSITIVITY

The sensitivity factors of the three dipoles were determined using a two step calibration method (air and tissue simulating liquid) using waveguides as outlined in the standards.

3.3 LOWER DETECTION LIMIT

The lower detection limit was assessed using the same measurement set up as used for the linearity measurement. The required lower detection limit is 10 mW/kg.

3.4 ISOTROPY

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

3.5 BOUNDARY EFFECT

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

4 MEASUREMENT UNCERTAINTY

The guidelines outlined in the IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty associated with an E-field probe calibration using the waveguide technique. All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

Uncertainty analysis of the probe calibration in waveguide					
ERROR SOURCES	Uncertainty value (%)	Probability Distribution	Divisor	ci	Standard Uncertainty (%)
Incident or forward power	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Reflected power	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Liquid conductivity	5.00%	Rectangular	$\sqrt{3}$	1	2.887%
Liquid permittivity	4.00%	Rectangular	$\sqrt{3}$	1	2.309%
Field homogeneity	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Field probe positioning	5.00%	Rectangular	$\sqrt{3}$	1	2.887%
Field probe linearity	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Combined standard uncertainty					5.831%
Expanded uncertainty 95 % confidence level k = 2					12.0%

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5 CALIBRATION MEASUREMENT RESULTS

Calibration Parameters	
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

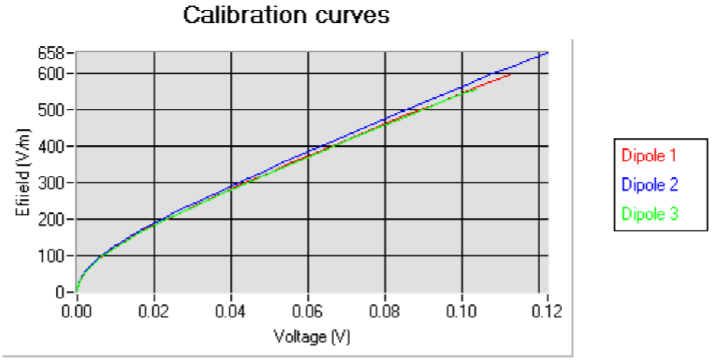
5.1 SENSITIVITY IN AIR

Normx dipole 1 (μV/(V/m)²)	Normy dipole 2 (μV/(V/m)²)	Normz dipole 3 (μV/(V/m)²)
0.66	0.75	0.58

DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
93	93	98

Calibration curves ei=f(V) (i=1,2,3) allow to obtain H-field value using the formula:

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



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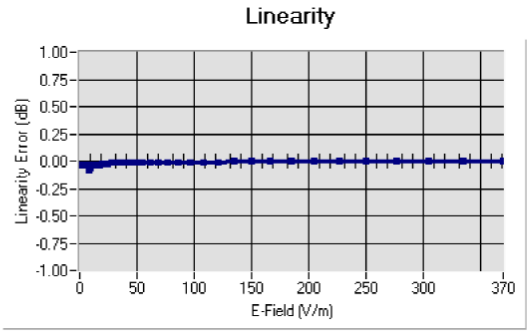
5.2 LINEARITY



Linearity: +/-1.89% (+/-0.08dB)

5.3 SENSITIVITY IN LIQUID

Liquid	Frequency (MHz +/- 100MHz)	Permittivity	Epsilon (S/m)	ConvF
HL750	750	40.03	0.93	1.45
BL750	750	56.83	1.00	1.49
HL850	835	42.19	0.90	1.50
BL850	835	54.67	1.01	1.56
HL900	900	42.08	1.01	1.51
HL1800	1800	41.68	1.46	1.71
BL1800	1800	53.86	1.46	1.77
HL1900	1900	38.45	1.45	2.03
BL1900	1900	53.32	1.56	2.07
HL2000	2000	38.26	1.38	1.76
HL2450	2450	37.50	1.80	2.00
BL2450	2450	53.22	1.89	2.08
HL2600	2600	39.80	1.99	2.12
BL2600	2600	52.52	2.23	2.19
HL5200	5200	35.64	4.67	2.55
BL5200	5200	48.64	5.51	2.62
HL5400	5400	36.44	4.87	2.53
BL5400	5400	46.52	5.77	2.59
HL5600	5600	36.66	5.17	2.64
BL5600	5600	46.79	5.77	2.73
HL5800	5800	35.31	5.31	2.72
BL5800	5800	47.04	6.10	2.81

LOWER DETECTION LIMIT: 7mW/kg

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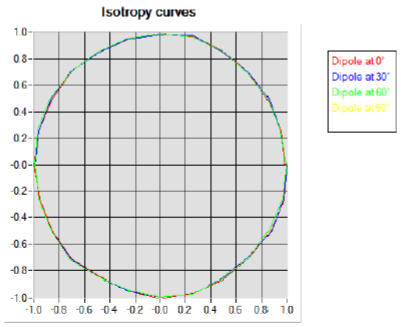
5.4 ISOTROPY

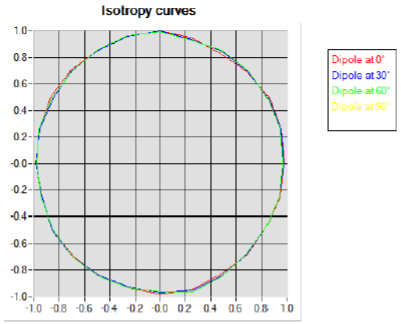
HL900 MHz

- Axial isotropy: 0.04 dB
- Hemispherical isotropy: 0.07 dB



HL1800 MHz

- Axial isotropy: 0.06 dB
- Hemispherical isotropy: 0.08 dB



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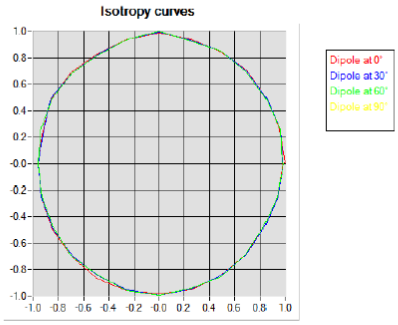
HL5600 MHz

- Axial isotropy: 0.06 dB
- Hemispherical isotropy: 0.08 dB



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6 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
Flat Phantom	MVG	SN-20/09-SAM71	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rhode & Schwarz ZVA	SN100132	02/2019	02/2022
Reference Probe	MVG	EP 94 SN 37/08	10/2019	10/2020
Multimeter	Keithley 2000	1188656	01/2017	01/2020
Signal Generator	Agilent E4438C	MY49070581	01/2017	01/2020
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	HP E4418A	US38261498	01/2017	01/2020
Power Sensor	HP ECP-E26A	US37181460	01/2017	01/2020
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Waveguide	Mega Industries	069Y7-158-13-712	Validated. No cal required.	Validated. No cal required.
Waveguide Transition	Mega Industries	069Y7-158-13-701	Validated. No cal required.	Validated. No cal required.
Waveguide Termination	Mega Industries	069Y7-158-13-701	Validated. No cal required.	Validated. No cal required.
Temperature / Humidity Sensor	Control Company	150798832	11/2017	11/2020

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SAR Reference Dipole Calibration Report

Ref : ACR.109.2.18.SATU.A

SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

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

MVG COMOSAR REFERENCE DIPOLE

FREQUENCY: 835 MHZ
SERIAL NO.: SN 03/15 DIP 0G835-347

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

Calibration Date: 04/19/2018

Summary:

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

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.109.2.18.SATU.A

	Name	*Function*	*Date*	*Signature*
Prepared by :	Jérôme LUC	Product Manager	4/19/2018	
Checked by :	Jérôme LUC	Product Manager	4/19/2018	
Approved by :	Kim RUTKOWSKI	Quality Manager	4/19/2018	

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

Issue	*Date*	*Modifications*
A	4/19/2018	Initial release

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