

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 : Handheld Device

Trademark : AMobile

Model Name : GT500V

Serial Model : N/A

Report No. : S18101604501E

FCC ID : 2AQ5W-GT500V

Prepared for

Hong Kong AMobile Intelligent Corp. Limited Taiwan Branch
8F.-1, No.700, Zhongzheng Rd., Zhonghe Dist., New Taipei City 235, Taiwan

Prepared by

Shenzhen NTEK Testing Technology Co., Ltd.
1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street,
Bao'an District, Shenzhen 518126 P.R.China.
Tel.: +86-755-6115 6588 Fax.: +86-755-6115 6599
Website: <http://www.ntek.org.cn>

TEST RESULT CERTIFICATION

Applicant's name: Hong Kong AMobile Intelligent Corp. Limited Taiwan Branch
 Address.....: 8F.-1, No.700, Zhongzheng Rd., Zhonghe Dist.,
 New Taipei City 235, Taiwan

Manufacturer's Name.....: Hong Kong AMobile Intelligent Corp. Limited Taiwan Branch
 Address.....: 8F.-1, No.700, Zhongzheng Rd., Zhonghe Dist.,
 New Taipei City 235, Taiwan

Product description

Product name.....: Handheld Device
 Trademark: AMobile
 Model and/or type reference .: GT500V
 Serial Model.....: N/A
 FCC 47 CFR Part 2(2.1093)

Standards: 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.

This report shall not be reproduced except in full, without the written approval of Shenzhen NTEK, this document may be altered or revised by Shenzhen NTEK, personal only, and shall be noted in the revision of the document.

Date of Test

Date (s) of performance of tests: Aug. 07, 2018 ~ Oct. 18, 2018
 Date of Issue: Oct. 19, 2018
 Test Result.....: **Pass**

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

Approved By : Sam. Chen
 (Lab Manager) :
 (Sam Chen)

※ ※ Revision History ※ ※

REV.	DESCRIPTION	ISSUED DATE	REMARK
Rev.1.0	Initial Test Report Release	Oct. 19, 2018	Cheng Jiawen

TABLE OF CONTENTS

1. General Information	6
1.1. RF exposure limits	6
1.2. Statement of Compliance.....	7
1.3. EUT Description	7
1.4. Test specification(s)	8
1.5. Ambient Condition	9
2. SAR Measurement System	9
2.1. SATIMO SAR Measurement Set-up Diagram	9
2.2. Robot	10
2.3. E-Field Probe	11
2.3.1. E-Field Probe Calibration.....	11
2.4. SAM phantoms	12
2.4.1. Technical Data	12
2.5. Device Holder	14
2.6. Test Equipment List	15
3. SAR Measurement Procedures	17
3.1. Power Reference.....	17
3.2. Area scan & Zoom scan	17
3.3. Description of interpolation/extrapolation scheme	19
3.4. Volumetric Scan	19
3.5. Power Drift	19
4. System Verification Procedure.....	20
4.1. Tissue Verification.....	20
4.1.1. Tissue Dielectric Parameter Check Results	21
4.2. System Verification Procedure	22
4.2.1. System Verification Results	23
5. SAR Measurement variability and uncertainty	24
5.1. SAR measurement variability	24
5.2. SAR measurement uncertainty.....	24
6. RF Exposure Positions	25
6.1. Ear and handset reference point.....	25
6.2. Definition of the cheek position	25
6.3. Definition of the tilt position.....	27
6.4. Body Worn Accessory	27
6.5. Wireless Router Devices.....	28
7. RF Output Power	29
7.1. Maximum Tune-up Limit	29
7.2. LTE Conducted Power.....	30
7.3. WLAN & Bluetooth Output Power.....	37

7.3.1. Output Power Results Of WLAN	37
7.3.2. Output Power Results Of Bluetooth	38
8. Antenna Location.....	39
9. Stand-alone SAR test exclusion	40
10. SAR Results	41
10.1. SAR measurement results	41
10.1.1. SAR measurement Result of LTE Band XIII	41
10.1.2. SAR measurement Result of LTE Band IV	43
10.1.3. SAR measurement Result of LTE Band II	45
10.1.4. SAR measurement Result of WLAN 2.4G	47
10.1.5. SAR measurement Result of WLAN 5.2G	47
10.1.6. SAR measurement Result of WLAN 5.8G	48
10.2. Simultaneous Transmission Possibilities	49
10.3. SAR Summation Scenario	50
11. Appendix A. Photo documentation	55
12. Appendix B. System Check Plots	56
13. Appendix C. Plots of High SAR Measurement	81
14. Appendix D. Calibration Certificate	106

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 GT500V are as follows.

Band	Max Reported SAR Value(W/kg)			
	1-g Head	1-g Body-Worn (Separation distance of 10mm)	1-g Hotspot (Separation distance of 10mm)	Max Simultaneous Tx
LTE Band XIII	0.081	0.170	0.170	1.575
LTE Band IV	0.067	0.247	0.247	
LTE Band II	0.101	1.138	1.138	
WLAN 2.4G	0.030	0.395	0.395	
WLAN 5.2G	0.213	0.155	N/A	
WLAN 5.8G	0.464	0.437	N/A	

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	Handheld Device		
Trade Name	AMobile		
Model Name	GT500V		
Serial Model	N/A		
FCC ID	2AQ5W-GT500V		
Device Phase	Identical Prototype		
Exposure Category	General population / Uncontrolled environment		
Antenna	FPCB Antenna		
Battery Information	DC 3.8V, 4800mAh		
Device Operating Configurations			
Supporting Mode(s)	LTE Band XIII/IV/II, WLAN 2.4G/5.2G/5.8G, Bluetooth		
Test Modulation	LTE(QPSK/16QAM), WLAN(DSSS/OFDM), Bluetooth(GFSK, $\pi/4$ -DQPSK, 8DPSK)		
Device Class	B		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	LTE Band XIII	777-787	746-756
	LTE Band IV	1710-1755	2110-2155

	LTE Band II	1850-1910	1930-1990
	WLAN 2.4G	2412-2462	
	WLAN 5.2G	5180-5240	
	WLAN 5.8G	5745-5825	
	Bluetooth	2402-2480	
Power Class	3, tested with power control all Max.(LTE Band XIII)		
	3, tested with power control all Max.(LTE Band IV)		
	3, tested with power control all Max.(LTE Band II)		
Test Channels (low-mid-high)	23205-23230-23255 (LTE Band XIII BW=5MHz)		
	23230(LTE Band XIII BW=10MHz)		
	19957-20175-20393(LTE Band IV BW=1.4MHz)		
	19965-20175-20385(LTE Band IV BW=3MHz)		
	19975-20175-20375(LTE Band IV BW=5MHz)		
	20000-20175-20350(LTE Band IV BW=10MHz)		
	20025-20175-20325(LTE Band IV BW=15MHz)		
	20050-20175-20300(LTE Band IV BW=20MHz)		
	18607-18900-19193(LTE Band II BW=1.4MHz)		
	18615-18900-19185(LTE Band II BW=3MHz)		
	18625-18900-19175(LTE Band II BW=5MHz)		
	18650-18900-19150(LTE Band II BW=10MHz)		
	18675-18900-19125(LTE Band II BW=15MHz)		
	18700-18900-19100(LTE Band II BW=20MHz)		
	1-3-6-9-11(WLAN 2.4G)		
36-38-40-46-48(WLAN 5.2G)			
149-151-157-159-165(WLAN 5.8G)			

1.4. Test specification(s)

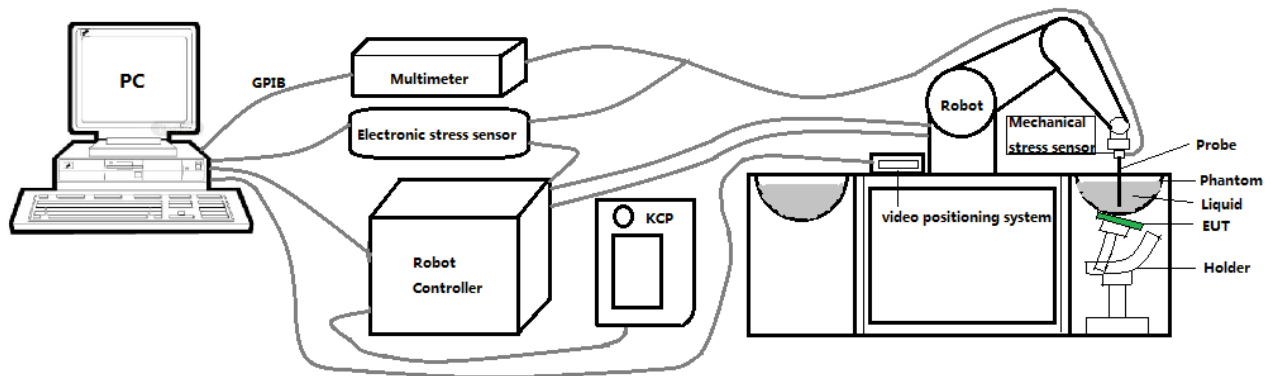
FCC 47 CFR Part 2(2.1093)
ANSI/IEEE C95.1-1992
IEEE Std 1528-2013
KDB 865664 D01 SAR measurement 100 MHz to 6 GHz
KDB 865664 D02 RF Exposure Reporting
KDB 447498 D01 General RF Exposure Guidance
KDB 248227 D01 802.11 Wi-Fi SAR
KDB 941225 D05 SAR for LTE Devices
KDB 941225 D06 Hotspot SAR
KDB 648474 D04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

1.5. Ambient Condition

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

2. SAR Measurement System

2.1. SATIMO SAR Measurement Set-up Diagram



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

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

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

2.2. Robot

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



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

2.3. E-Field Probe

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

For the measurements the Specific Dosimetric E-Field Probe SN 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 $\pm 10\%$. The spherical isotropy shall be evaluated and within ± 0.25 dB. The sensitivity parameters (Norm X, Norm Y, and Norm Z), the diode compression parameter (DCP) and the conversion factor (Conv F) of the probe are tested. The calibration data can be referred to appendix D of this report.

2.4. SAM phantoms

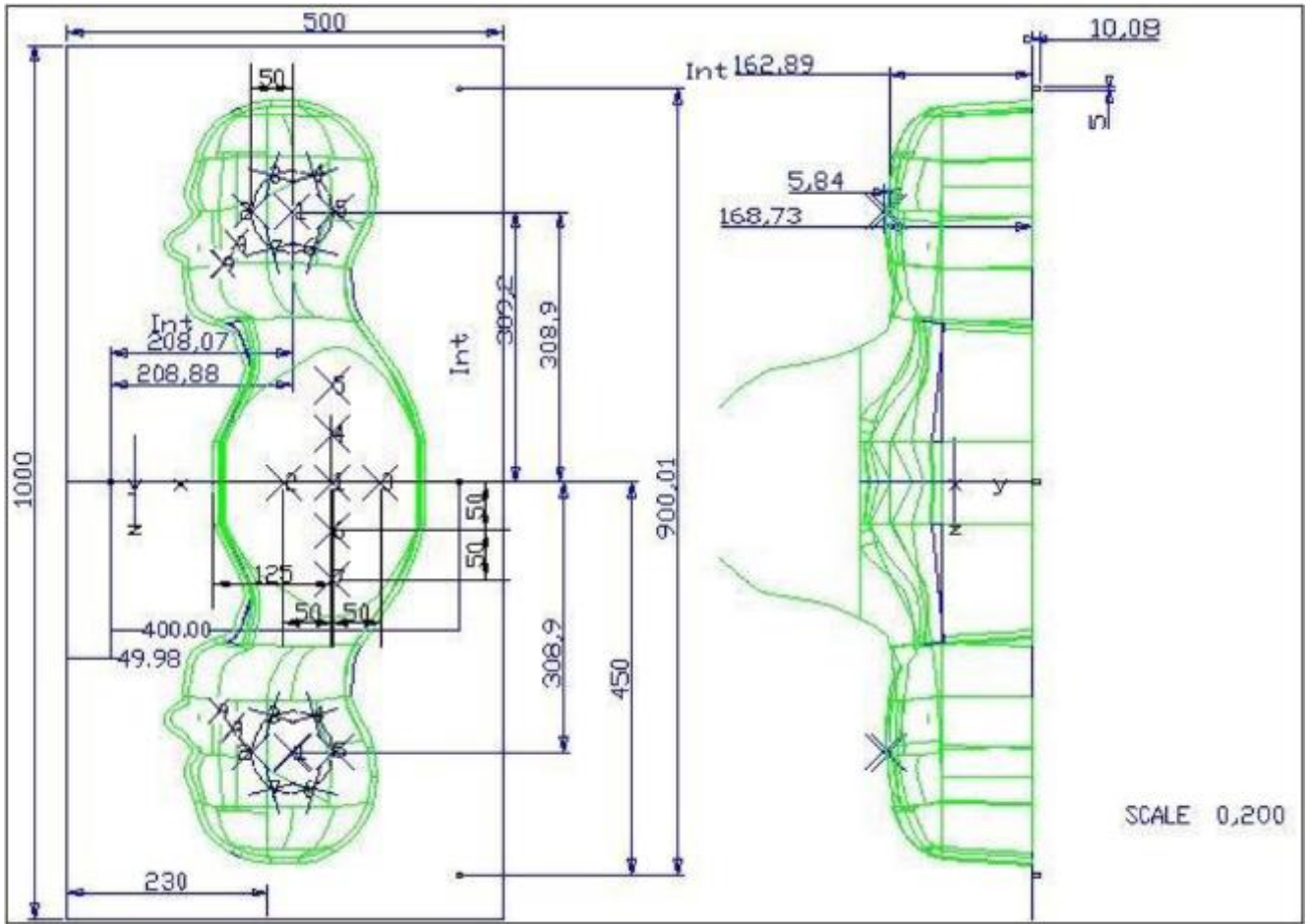
Photo of SAM phantom SN 16/15 SAM119



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

2.4.1. Technical Data

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

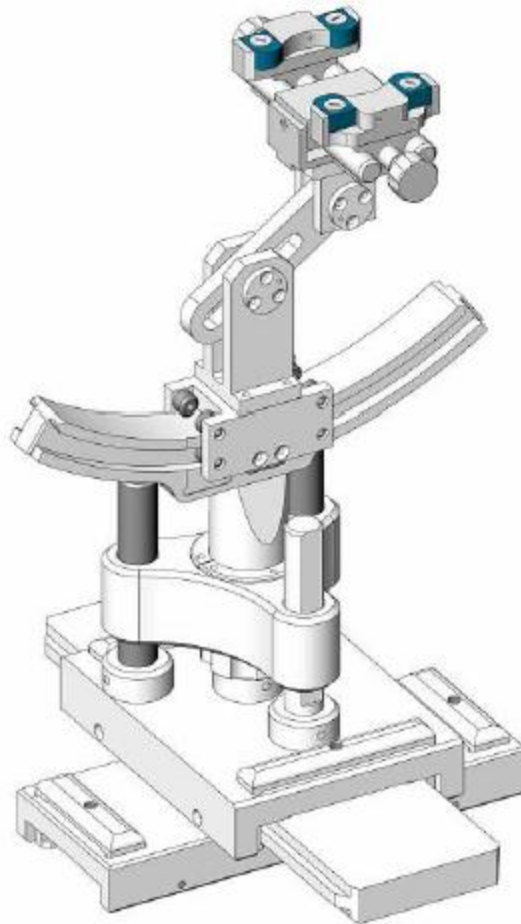


Serial Number	Left Head		Right Head		Flat Part	
SN 16/15 SAM119	2	2.02	2	2.08	1	2.09
	3	2.05	3	2.06	2	2.06
	4	2.07	4	2.07	3	2.08
	5	2.08	5	2.08	4	2.10
	6	2.05	6	2.07	5	2.10
	7	2.05	7	2.05	6	2.07
	8	2.07	8	2.06	7	2.07
	9	2.08	9	2.06	-	-

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

2.5. Device Holder

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



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

2.6. Test Equipment List

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

Devices used during the test described are marked

	Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
					Last Cal.	Due Date
<input checked="" type="checkbox"/>	MVG	E FIELD PROBE	SSE2	SN 08/16 EPGO287	Sep. 18, 2017	Sep. 17, 2018
					Sep. 17, 2018	Sep. 16, 2019
<input checked="" type="checkbox"/>	MVG	750 MHz Dipole	SID750	SN 03/15 DIP 0G750-355	Apr. 19, 2018	Apr. 18, 2021
<input type="checkbox"/>	MVG	835 MHz Dipole	SID835	SN 03/15 DIP 0G835-347	Apr. 19, 2018	Apr. 18, 2021
<input type="checkbox"/>	MVG	900 MHz Dipole	SID900	SN 03/15 DIP 0G900-348	Apr. 19, 2018	Apr. 18, 2021
<input checked="" type="checkbox"/>	MVG	1800 MHz Dipole	SID1800	SN 03/15 DIP 1G800-349	Apr. 19, 2018	Apr. 18, 2021
<input checked="" type="checkbox"/>	MVG	1900 MHz Dipole	SID1900	SN 03/15 DIP 1G900-350	Apr. 19, 2018	Apr. 18, 2021
<input type="checkbox"/>	MVG	2000 MHz Dipole	SID2000	SN 03/15 DIP 2G000-351	Apr. 19, 2018	Apr. 18, 2021
<input checked="" type="checkbox"/>	MVG	2450 MHz Dipole	SID2450	SN 03/15 DIP 2G450-352	Apr. 19, 2018	Apr. 18, 2021
<input type="checkbox"/>	MVG	2600 MHz Dipole	SID2600	SN 03/15 DIP 2G600-356	Apr. 19, 2018	Apr. 18, 2021
<input checked="" type="checkbox"/>	MVG	5000 MHz Dipole	SWG5500	SN 13/14 WGA 33	Apr. 19, 2018	Apr. 18, 2021
<input checked="" type="checkbox"/>	MVG	Liquid measurement Kit	SCLMP	SN 21/15 OCPG 72	NCR	NCR
<input checked="" type="checkbox"/>	MVG	Power Amplifier	N.A	AMPLISAR_28/14_003	NCR	NCR
<input checked="" type="checkbox"/>	KEITHLEY	Millivoltmeter	2000	4072790	NCR	NCR
<input type="checkbox"/>	R&S	Universal radio communication tester	CMU200	117858	Aug. 05, 2018	Aug. 04, 2019
<input checked="" type="checkbox"/>	R&S	Wideband radio communication tester	CMW500	103917	Oct. 26, 2017	Oct. 25, 2018
<input checked="" type="checkbox"/>	HP	Network Analyzer	8753D	3410J01136	Aug. 05, 2018	Aug. 04, 2019

<input checked="" type="checkbox"/>	Agilent	PSG Analog Signal Generator	E8257D	MY51110112	Aug. 05, 2018	Aug. 04, 2019
<input checked="" type="checkbox"/>	Agilent	Power meter	E4419B	MY45102538	Aug. 05, 2018	Aug. 04, 2019
<input checked="" type="checkbox"/>	Agilent	Power sensor	E9301A	MY41495644	Aug. 05, 2018	Aug. 04, 2019
<input checked="" type="checkbox"/>	Agilent	Power sensor	E9301A	US39212148	Aug. 05, 2018	Aug. 04, 2019
<input checked="" type="checkbox"/>	MCLI/USA	Directional Coupler	CB11-20	0D2L51502	Aug. 05, 2018	Aug. 04, 2019

3. SAR Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

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

<SAR measurement>

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

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

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

3.1. Power Reference

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

3.2. Area scan & Zoom scan

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

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

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

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

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

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

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

3.3. Description of interpolation/extrapolation scheme

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

An extrapolation is used to determine these 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 of a full 3D scan over a specific area. This 3D scan is useful for multi Tx SAR measurement. Indeed, it is possible with OpenSAR to add, point by point, several volumetric scans to calculate the SAR value of the combined measurement as it is defined in the standard IEEE1528 and IEC62209.

3.5. Power Drift

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

4. System Verification Procedure

4.1. Tissue Verification

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

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

4.1.1. Tissue Dielectric Parameter Check Results

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

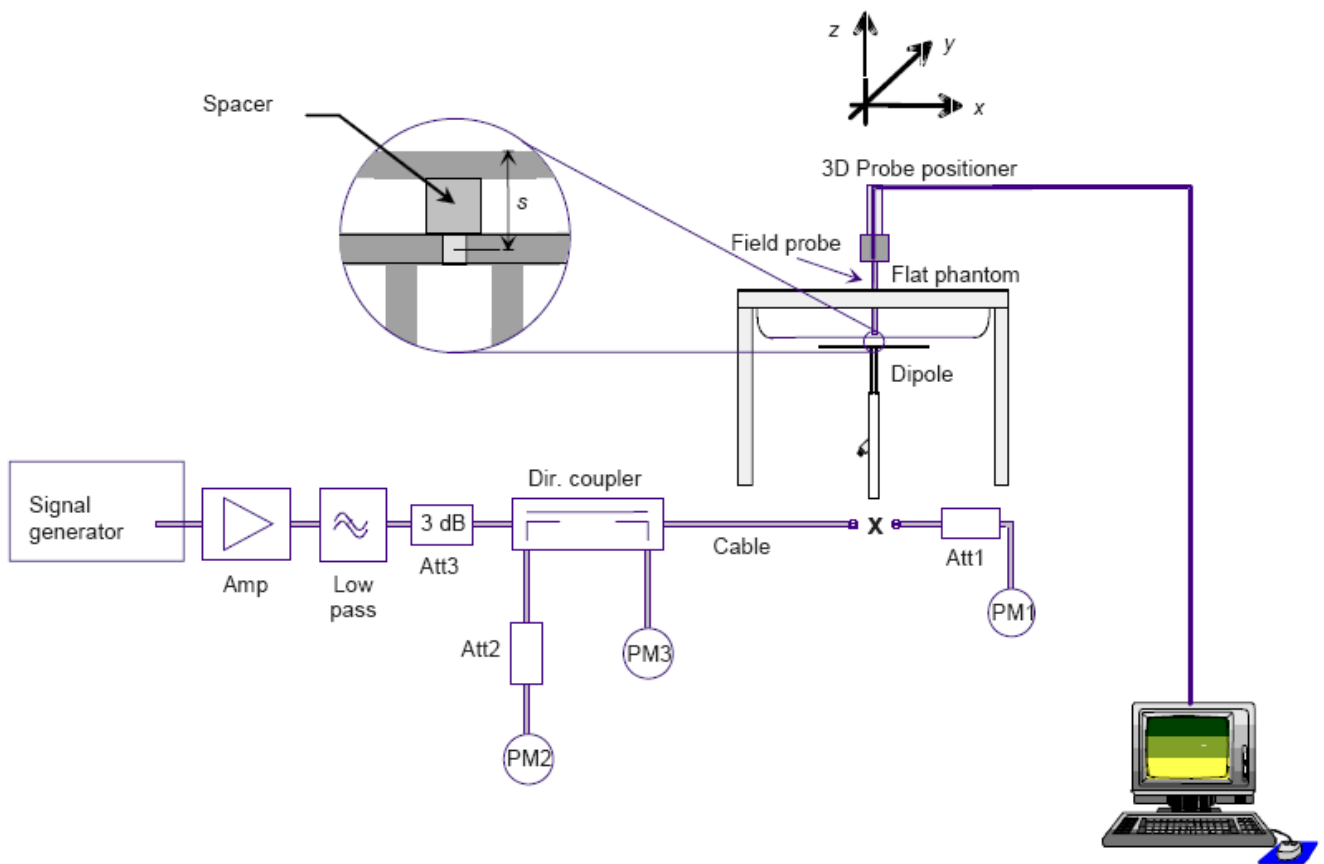
Tissue Type	Measured Frequency (MHz)	Target Tissue		Measured Tissue		Liquid Temp.	Test Date
		ϵ_r ($\pm 5\%$)	σ (S/m) ($\pm 5\%$)	ϵ_r	σ (S/m)		
Head 750	750	41.90 (39.81~43.99)	0.89 (0.85~0.93)	41.59	0.91	21.8 °C	Aug. 13, 2018
Body 750	750	55.50 (52.73~58.27)	0.96 (0.91~1.01)	55.58	0.97	21.5 °C	Aug. 13, 2018
Head 1800	1800	40.00 (38.00~42.00)	1.40 (1.33~1.47)	39.91	1.40	22.0 °C	Aug. 07, 2018
Body 1800	1800	53.30 (50.64~55.96)	1.52 (1.44~1.59)	53.98	1.51	21.9 °C	Aug. 07, 2018
Head 1900	1900	40.00 (38.00~42.00)	1.40 (1.33~1.47)	39.49	1.43	21.5 °C	Aug. 14, 2018
Body 1900	1900	53.30 (50.64~55.96)	1.52 (1.44~1.59)	53.50	1.54	21.4 °C	Aug. 14, 2018
Head 2450	2450	39.20 (37.24~41.16)	1.80 (1.71~1.89)	38.92	1.84	21.7 °C	Aug. 09, 2018
Body 2450	2450	52.70 (50.07~55.33)	1.95 (1.85~2.04)	52.54	1.97	21.4 °C	Aug. 09, 2018
Head 5000	5200	36.00 (34.20~37.80)	4.66 (4.43~4.89)	36.21	4.69	21.7 °C	Oct. 17, 2018
Body 5000	5200	49.00 (46.55~51.45)	5.30 (5.04~5.57)	49.98	5.25	21.8 °C	Oct. 13, 2018
Head 5000	5800	35.30 (33.54~37.07)	5.27 (5.01~5.53)	34.63	5.11	21.6 °C	Oct. 18, 2018
Body 5000	5800	48.20 (43.38~53.02)	6.00 (5.40~6.60)	48.66	6.04	21.8 °C	Oct. 12, 2018

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

4.2. System Verification Procedure

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

The system verification is shown as below picture:



4.2.1. System Verification Results

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

System Verification	Target SAR (1W) ($\pm 10\%$)		Measured SAR (Normalized to 1W)		Liquid Temp.	Test Date
	1-g (W/Kg)	10-g (W/Kg)	1-g (W/Kg)	10-g (W/Kg)		
750MHz Head	8.49 (7.64~9.34)	5.55 (4.99~6.11)	8.55	5.69	21.8 °C	Aug. 13, 2018
750MHz Body	8.55 (7.69~9.41)	5.75 (5.17~6.33)	8.39	5.59	21.5 °C	Aug. 13, 2018
1800MHz Head	38.40 (34.56~42.24)	20.10 (18.09~22.11)	38.48	20.11	22.0 °C	Aug. 07, 2018
1800MHz Body	37.04 (33.34~40.74)	20.26 (18.23~22.29)	38.38	20.03	21.9 °C	Aug. 07, 2018
1900MHz Head	39.70 (35.73~43.67)	20.50 (18.45~22.55)	41.89	21.73	21.5 °C	Aug. 14, 2018
1900MHz Body	38.43 (34.59~42.27)	20.34 (18.31~22.37)	41.94	21.68	21.4 °C	Aug. 14, 2018
2450MHz Head	52.40 (47.16~57.64)	24.00 (21.60~26.40)	53.40	24.62	21.7 °C	Aug. 09, 2018
2450MHz Body	49.32 (44.39~54.25)	22.89 (20.60~25.17)	51.79	22.93	21.4 °C	Aug. 09, 2018
5200MHz Head	159.00 (143.10~174.90)	56.90 (51.21~62.59)	152.44	54.46	21.7 °C	Oct. 17, 2018
5200MHz Body	150.06 (135.05~165.07)	53.20 (47.88~58.52)	152.00	56.38	21.8 °C	Oct. 13, 2018
5800MHz Head	181.20 (163.08~199.32)	61.50 (55.35~67.65)	179.58	61.44	21.6 °C	Oct. 18, 2018
5800MHz Body	173.64 (156.28~191.00)	59.29 (53.36~65.22)	176.48	62.39	21.8 °C	Oct. 12, 2018

5. SAR Measurement variability and uncertainty

5.1. SAR measurement variability

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

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

5.2. SAR measurement uncertainty

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

6. RF Exposure Positions

6.1. Ear and handset reference point

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

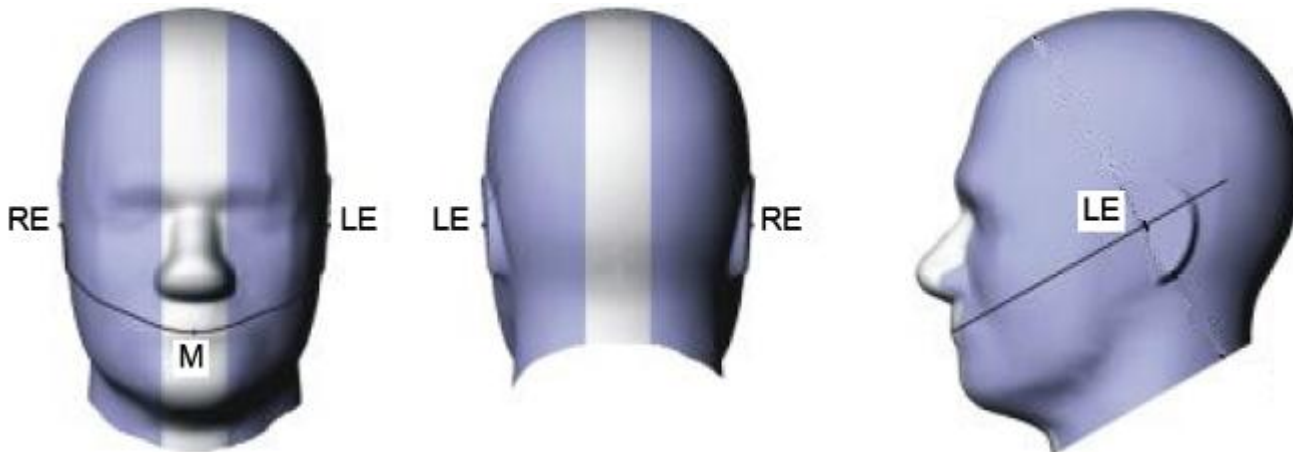


Fig 6.1.1 Front, back, and side views of SAM phantom

6.2. Definition of the cheek position

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

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

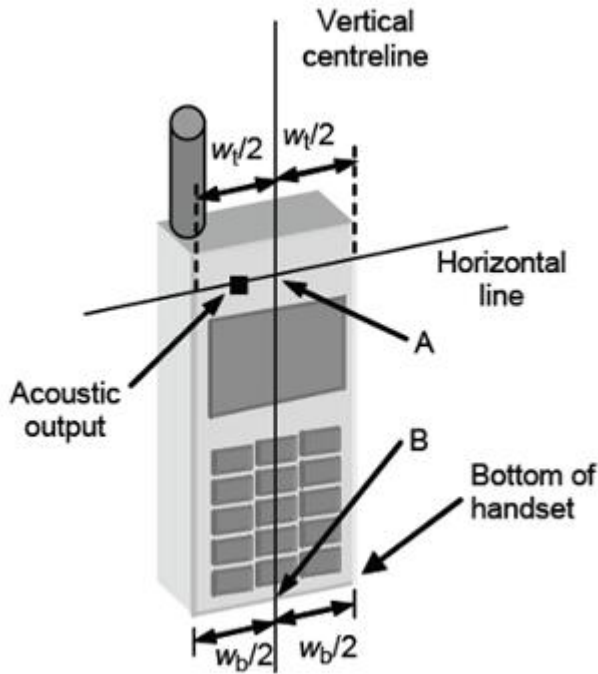


Fig 6.2.1 Handset vertical and horizontal reference lines—“fixed case”

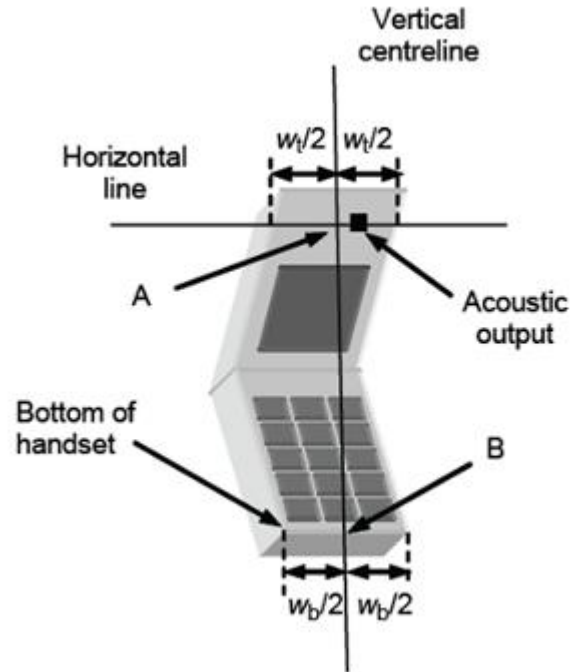


Fig 6.2.2 Handset vertical and horizontal reference lines—“clam-shell case”

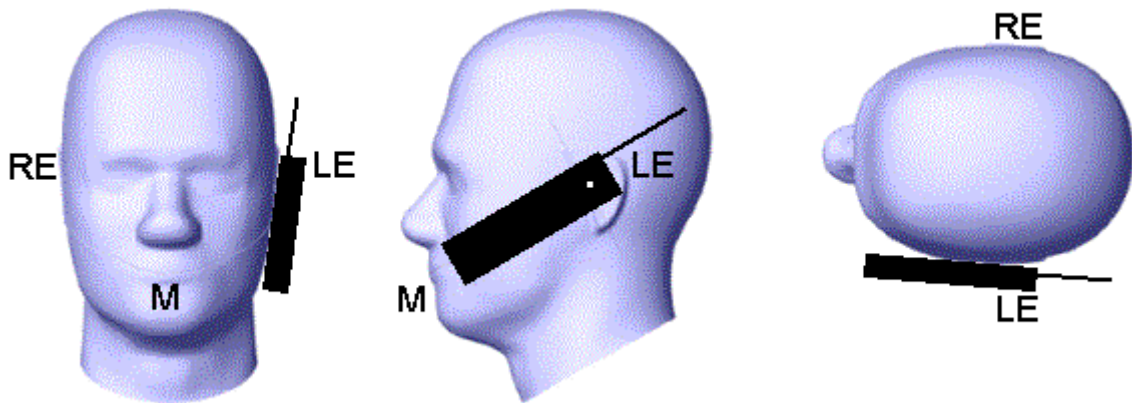


Fig 6.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

6.3. Definition of the tilt position

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

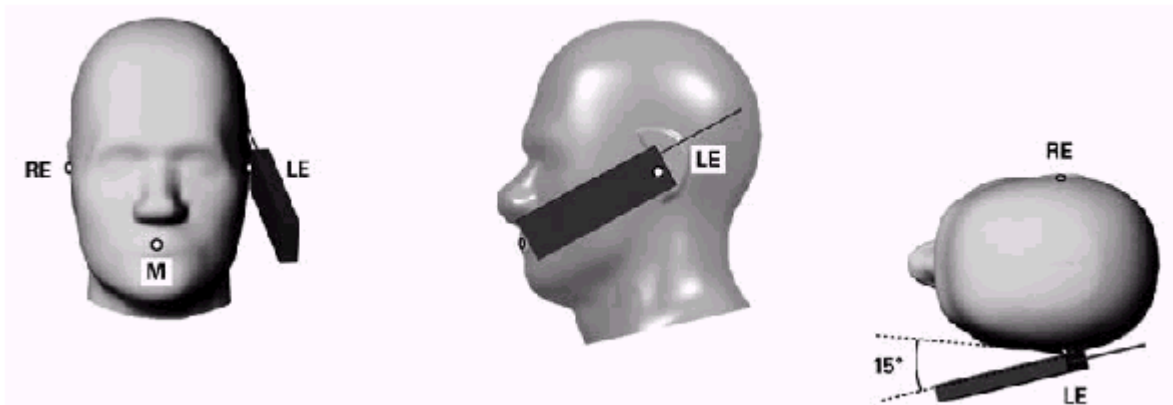


Figure 6.3.1 – Tilt position of the wireless device on the left side of SAM

6.4. Body Worn Accessory

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

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

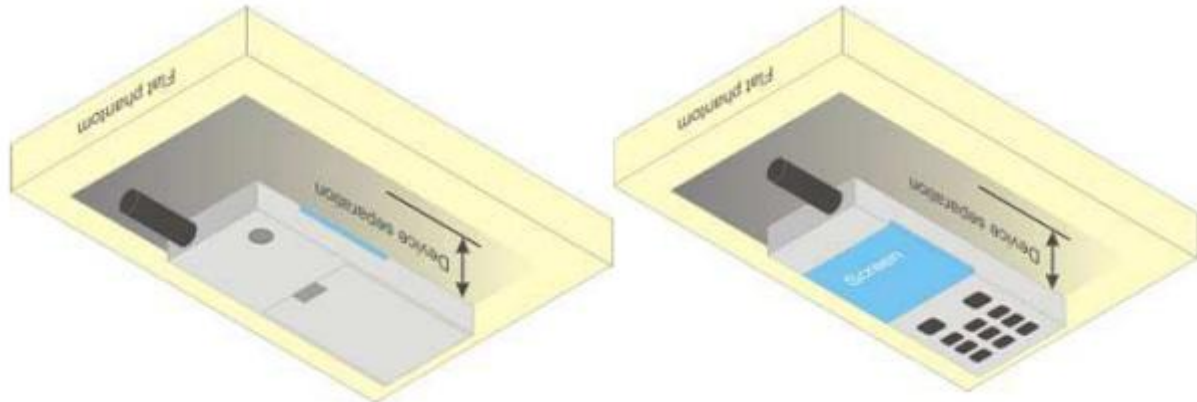


Figure 6.4.1 – Test positions for body-worn devices

6.5. Wireless Router Devices

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

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

7. RF Output Power

7.1. Maximum Tune-up Limit

Band	Mode	The Tune-up Maximum Power (Customer Declared)(dBm)	Range	Measured Maximum Output Power(dBm)
LTE Band XIII	QPSK	23±1	22~24	24.00
	16QAM	23±1	22~24	23.60
LTE Band IV	QPSK	23±1	22~24	24.00
	16QAM	23±1	22~24	23.84
LTE Band II	QPSK	23±1	22~24	24.00
	16QAM	23±1	22~24	23.99
WLAN 2.4G	802.11b	16±1	15~17	16.8
	802.11g	16±1	15~17	16.3
	802.11n20	16±1	15~17	16.3
	802.11n40	15±1	14~16	15.8
WLAN 5.2G	802.11a	10±1	9~11	10.9
	802.11n20	10±1	9~11	10.9
	802.11n40	10±1	9~11	10.2
	802.11ac20	10±1	9~11	10.9
	802.11ac40	10±1	9~11	10.2
WLAN 5.8G	802.11a	10±1	9~11	10.8
	802.11n20	10±1	9~11	10.6
	802.11n40	10±1	9~11	10.5
	802.11ac20	10±1	9~11	10.3
	802.11ac40	10±1	9~11	10.0
Bluetooth	BR+EDR	4.5±1	3.5~5.5	5.41
	BLE	4.5±1	3.5~5.5	5.32

7.2. LTE Conducted Power

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		23205/779.5	23230/782	23255/784.5
LTE Band XIII	5MHz	QPSK	1	0	24.00	23.85	23.94	24.00
			1	12	24.00	23.99	23.98	23.94
			1	24	24.00	23.98	23.81	23.79
			12	0	24.00	23.28	23.27	23.40
			12	6	24.00	23.09	23.18	23.25
			12	11	24.00	23.30	23.22	23.23
			25	0	24.00	23.39	23.26	23.25
		16QAM	1	0	24.00	23.10	23.07	23.36
			1	12	24.00	23.12	23.07	23.30
			1	24	24.00	23.08	22.92	23.19
			12	0	23.00	22.27	22.47	22.28
			12	6	23.00	22.39	22.38	22.26
			12	11	23.00	22.48	22.32	22.27
			25	0	23.00	22.40	22.41	22.25
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		23230/782		
LTE Band XIII	10MHz	QPSK	1	0	24.00	23.79		
			1	24	24.00	23.86		
			1	49	24.00	23.44		
			25	0	24.00	23.37		
			25	12	24.00	23.34		
			25	24	24.00	23.34		
			50	0	24.00	23.44		
		16QAM	1	0	24.00	23.59		
			1	24	24.00	23.60		
			1	49	24.00	23.15		
			25	0	23.00	22.41		
			25	12	23.00	22.41		
			25	24	23.00	22.39		
			50	0	23.00	22.41		

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		19957/1710.7	20175/1732.5	20393/1754.3
LTE Band IV	1.4MHz	QPSK	1	0	24.00	23.27	23.36	23.69
			1	2	24.00	23.21	23.37	23.76
			1	5	24.00	23.26	23.39	23.68
			3	0	24.00	23.43	23.41	23.75
			3	1	24.00	23.33	23.41	23.72
			3	2	24.00	23.39	23.45	23.72
		16QAM	6	0	23.00	22.73	22.68	22.85
			1	0	23.00	22.89	22.83	22.95
			1	2	23.00	22.90	22.74	22.95
			1	5	23.00	22.84	22.87	22.91
			3	0	23.00	22.88	22.75	22.94
			3	1	23.00	22.81	22.73	22.92
			3	2	23.00	22.89	22.72	22.93
			6	0	22.00	21.79	21.76	21.98
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		19965/1711.5	20175/1732.5	20385/1753.5
LTE Band IV	3MHz	QPSK	1	0	24.00	23.51	23.49	23.72
			1	7	24.00	23.48	23.39	23.65
			1	14	24.00	23.45	23.35	23.63
			8	0	23.00	22.69	22.80	22.95
			8	4	23.00	22.65	22.75	22.80
			8	7	23.00	22.74	22.74	22.89
			15	0	23.00	22.74	22.63	22.94
		16QAM	1	0	24.00	23.28	22.80	23.18
			1	7	24.00	23.23	22.69	23.10
			1	14	24.00	23.06	22.75	23.12
			8	0	23.00	22.05	21.93	22.00
			8	4	23.00	22.06	21.95	22.11
			8	7	23.00	21.98	21.92	22.05
			15	0	22.00	21.85	21.85	21.92

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		19975/1712.5	20175/1732.5	20375/1752.5
			LTE Band IV	5MHz		QPSK	1	0
			1	12	24.00	23.53	23.43	23.70
			1	24	24.00	23.54	23.38	23.68
			12	0	23.00	22.75	22.79	22.91
			12	6	23.00	22.69	22.70	22.95
			12	11	23.00	22.68	22.68	22.88
			25	0	23.00	22.75	22.74	22.87
		16QAM	1	0	24.00	22.75	22.86	23.13
			1	12	24.00	22.55	22.72	23.07
			1	24	24.00	22.53	22.72	22.99
			12	0	23.00	21.89	21.80	22.16
			12	6	23.00	21.85	22.79	22.15
			12	11	23.00	21.82	21.79	22.11
			25	0	23.00	21.80	21.81	22.03
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20000/1715	20175/1732.5	20350/1750
			LTE Band IV	10MHz		QPSK	1	0
			1	24	24.00	23.31	23.40	23.60
			1	49	24.00	23.42	23.50	23.71
			25	0	23.00	22.87	22.85	22.98
			25	12	23.00	22.68	22.75	22.89
			25	24	23.00	22.66	22.76	22.89
			50	0	23.00	22.78	22.78	22.97
		16QAM	1	0	24.00	23.58	23.13	23.39
			1	24	24.00	23.14	22.69	23.05
			1	49	24.00	23.18	22.87	23.15
			25	0	23.00	22.03	21.97	22.12
			25	12	23.00	21.95	21.89	22.05
			25	24	23.00	21.80	21.87	21.99
			50	0	23.00	21.81	21.87	22.00

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20025/1717.5	20175/1732.5	20325/1747.5
			LTE Band IV			QPSK	1	0
		1	37	24.00	23.37		23.42	23.61
		1	74	24.00	23.49		23.60	23.71
		36	0	24.00	23.05		22.91	23.11
		36	18	24.00	22.77		22.89	22.98
		36	37	24.00	22.75		22.78	22.95
		75	0	23.00	22.88		22.84	22.96
		16QAM	1	0	24.00	23.84	23.61	23.59
			1	37	24.00	23.10	23.02	23.09
			1	74	24.00	23.22	23.13	23.17
			36	0	23.00	22.02	22.02	22.17
			36	18	23.00	21.92	21.89	22.05
			36	37	23.00	21.79	21.82	21.91
			75	0	23.00	21.89	21.88	22.03
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20050/1720	20175/1732.5	20300/1745
			LTE Band IV			QPSK	1	0
		1	49	24.00	23.28		23.30	23.49
		1	99	24.00	23.24		23.43	23.71
		50	0	24.00	22.93		22.98	22.97
		50	24	24.00	22.90		22.89	22.95
		50	49	24.00	22.59		22.70	22.84
		100	0	24.00	22.77		22.78	22.97
		16QAM	1	0	24.00	23.44	23.72	23.53
			1	49	24.00	22.74	23.02	22.88
			1	99	24.00	22.68	23.17	23.07
			50	0	23.00	22.04	22.03	22.13
			50	24	23.00	22.01	21.92	22.12
			50	49	23.00	21.62	21.76	21.88
			100	0	22.00	21.86	21.91	21.98

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		18607/1850.7	18900/1880	19193/1909.3
LTE Band II	1.4MHz	QPSK	1	0	24.00	23.11	23.73	23.87
			1	2	24.00	23.98	23.75	23.78
			1	5	24.00	23.95	23.71	23.68
			3	0	24.00	23.88	23.70	23.82
			3	1	24.00	23.89	23.71	23.75
			3	2	24.00	23.84	23.71	23.74
		16QAM	6	0	23.00	22.90	22.99	22.95
			1	0	24.00	23.29	23.22	23.29
			1	2	24.00	23.18	22.98	23.23
			1	5	24.00	23.18	23.20	23.22
			3	0	24.00	23.19	23.11	23.19
			3	1	24.00	23.20	23.11	23.15
			3	2	24.00	23.27	23.05	23.11
			6	0	23.00	22.21	22.13	22.22
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		18615/1851.5	18900/1880	19185/1908.5
LTE Band II	3MHz	QPSK	1	0	24.00	23.80	23.57	23.99
			1	7	24.00	23.69	23.45	23.79
			1	14	24.00	23.40	23.51	23.68
			8	0	24.00	23.09	23.02	23.23
			8	4	24.00	23.56	23.05	23.21
			8	7	24.00	22.99	23.05	23.09
			15	0	24.00	22.94	23.00	22.90
		16QAM	1	0	24.00	23.54	23.25	23.71
			1	7	24.00	23.40	23.20	23.62
			1	14	24.00	23.33	23.18	23.43
			8	0	23.00	22.38	22.23	22.55
			8	4	23.00	22.31	22.25	22.45
			8	7	23.00	22.30	22.22	22.40
			15	0	23.00	22.12	22.15	22.28

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		18625/1852.5	18900/1880	19175/1907.5
			LTE Band II	5MHz		QPSK	1	0
			1	12	24.00	23.53	23.40	23.73
			1	24	24.00	23.43	23.44	23.48
			12	0	24.00	23.11	23.10	23.38
			12	6	24.00	23.15	23.10	23.25
			12	11	24.00	22.99	23.05	23.13
			25	0	24.00	23.09	23.03	23.23
		16QAM	1	0	24.00	23.00	23.18	23.66
			1	12	24.00	22.79	23.11	23.43
			1	24	24.00	22.74	23.17	23.25
			12	0	23.00	22.22	22.20	22.57
			12	6	23.00	22.15	22.21	22.35
			12	11	23.00	22.10	22.15	22.39
			25	0	23.00	22.15	22.15	22.38
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		18650/1855	18900/1880	19150/1905
			LTE Band II	10MHz		QPSK	1	0
			1	24	24.00	23.38	23.53	23.74
			1	49	24.00	23.24	23.64	23.61
			25	0	24.00	23.16	23.18	23.59
			25	12	24.00	22.12	23.11	23.45
			25	24	24.00	22.91	23.11	23.25
			50	0	24.00	23.06	23.16	23.41
		16QAM	1	0	24.00	23.78	23.39	23.99
			1	24	24.00	23.37	22.97	23.49
			1	49	24.00	23.27	23.29	23.38
			25	0	23.00	22.27	22.28	22.68
			25	12	23.00	22.15	22.25	22.41
			25	24	23.00	22.10	22.23	22.35
			50	0	23.00	22.11	22.30	22.49

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		18675/1857.5	18900/1880	19125/1902.5
			LTE Band II	15MHz		QPSK	1	0
			1	37	24.00	23.37	23.51	23.73
			1	74	24.00	23.45	23.73	23.62
			36	0	24.00	23.47	23.32	23.73
			36	18	24.00	23.15	23.22	23.31
			36	37	24.00	23.12	23.17	23.34
			75	0	24.00	23.23	23.22	23.61
		16QAM	1	0	24.00	23.86	23.95	23.94
			1	37	24.00	23.44	23.35	23.49
			1	74	24.00	23.54	23.66	23.37
			36	0	23.00	22.44	22.34	22.84
			36	18	23.00	22.35	22.31	22.40
			36	37	23.00	22.19	22.22	22.40
			75	0	23.00	22.12	22.27	22.65
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		18700/1860	18900/1880	19100/1900
			LTE Band II	20MHz		QPSK	1	0
			1	49	24.00	23.31	23.36	23.66
			1	99	24.00	23.30	23.50	23.27
			50	0	24.00	23.55	23.69	23.67
			50	24	24.00	23.45	23.25	23.41
			50	49	24.00	22.95	23.15	23.20
			100	0	24.00	23.13	23.34	23.50
		16QAM	1	0	24.00	23.89	23.98	23.98
			1	49	24.00	23.05	23.52	23.55
			1	99	24.00	23.03	23.63	23.05
			50	0	23.00	22.51	22.47	22.70
			50	24	23.00	22.37	22.41	22.40
			50	49	23.00	22.06	22.25	22.24
			100	0	23.00	22.24	22.36	22.48

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	17.0	16.5
	6	2437	17.0	16.8
	11	2462	17.0	16.2
802.11g	1	2412	17.0	15.4
	6	2437	17.0	16.3
	11	2462	17.0	15.9
802.11n 20M	1	2412	17.0	15.4
	6	2437	17.0	16.3
	11	2462	17.0	16.1
802.11n 40M	3	2422	16.0	15.3
	6	2437	16.0	15.8
	9	2452	16.0	15.6

NOTE: Power measurement results of WLAN 2.4G.

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)
802.11a	36	5180	11.0	10.9
	40	5200	11.0	10.9
	48	5240	11.0	10.5
802.11n (HT20)	36	5180	11.0	10.9
	40	5200	11.0	10.9
	48	5240	11.0	10.5
802.11n (HT40)	38	5190	11.0	10.2
	46	5230	11.0	9.5
802.11ac (VHT20)	36	5180	11.0	10.8
	40	5200	11.0	10.9
	48	5240	11.0	10.7
802.11ac (VHT40)	38	5190	11.0	10.2
	46	5230	11.0	9.6

NOTE: Power measurement results of WLAN 5.2G.

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)
802.11a	149	5745	11.0	10.8
	157	5785	11.0	10.4
	165	5825	11.0	10.6
802.11n (HT20)	149	5745	11.0	10.6
	157	5785	11.0	10.0
	165	5825	11.0	9.5
802.11n (HT40)	151	5755	11.0	10.5
	159	5795	11.0	9.9
802.11ac (VHT20)	149	5745	11.0	10.3
	157	5785	11.0	9.5
	165	5825	11.0	9.4
802.11ac (VHT40)	151	5755	11.0	10.0
	159	5795	11.0	9.4

NOTE: Power measurement results of WLAN 5.8G.

7.3.2. Output Power Results Of Bluetooth

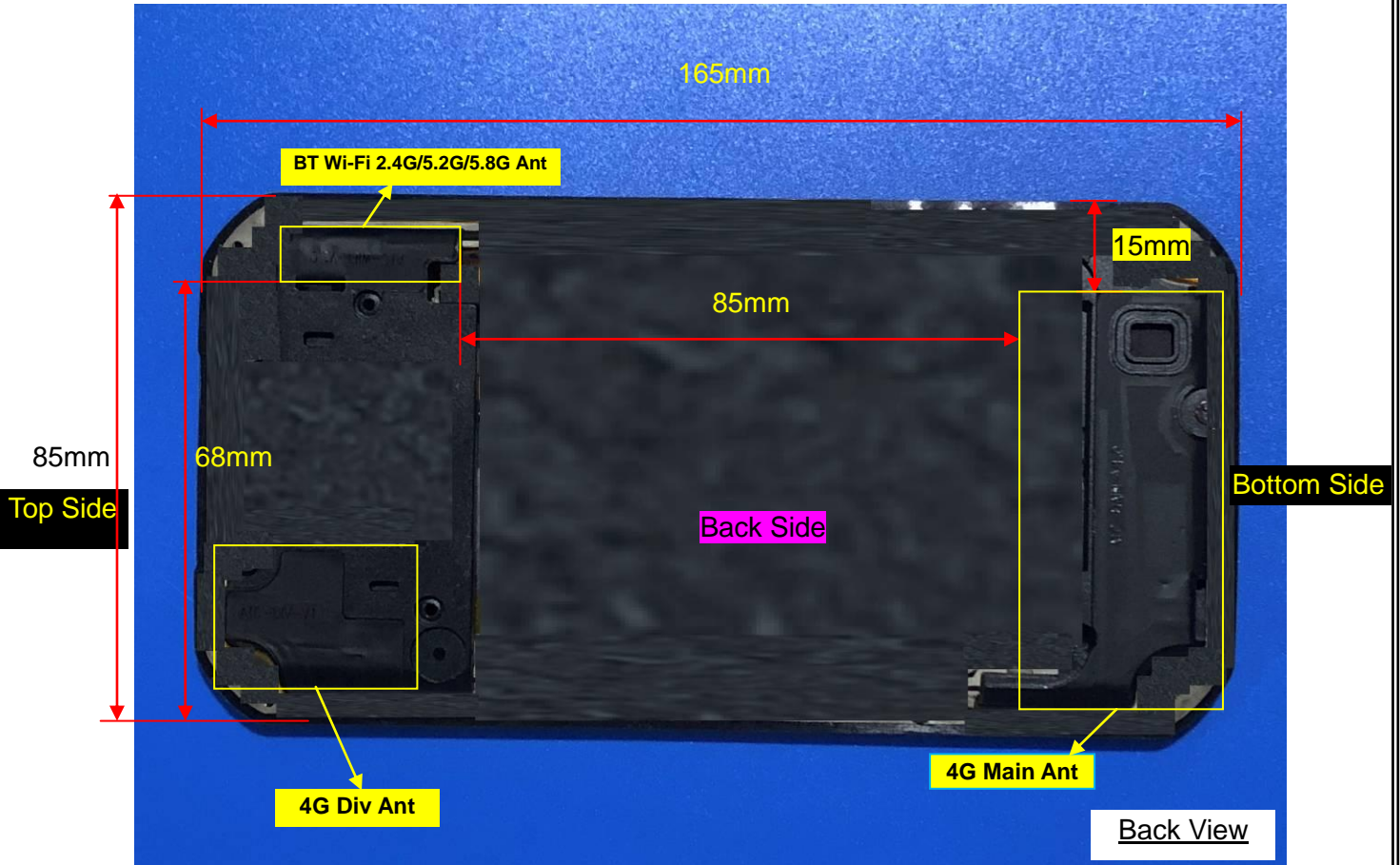
The output power of Bluetooth is as following:

BR+EDR	Output Power (dBm)				
	Channel	Tune-up	Data Rates		
			0CH	39CH	78CH
	1M	5.50	4.15	5.41	4.17
	2M	5.00	3.22	4.49	3.34
	3M	5.00	3.64	4.89	3.72

BLE	Channel	Tune-up	Output Power (dBm)
	0CH	5.50	3.68
	19CH	5.50	5.32
	39CH	5.50	4.03

8. Antenna Location

Left Side



Right Side

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

9. Stand-alone SAR test exclusion

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

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

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

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

Mode	P_{max} (dBm)	P_{max} (mW)	Distance (mm)	f (GHz)	Calculation Result	SAR Exclusion threshold	SAR test exclusion
Bluetooth	5.5	3.55	5	2.480	1.12	3.0	Yes

NOTE: Standalone SAR test exclusion for Bluetooth

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

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

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

Mode	Position	P_{max} (dBm)	P_{max} (mW)	Distance (mm)	f (GHz)	x	Estimated SAR (W/Kg)
Bluetooth	Head	5.5	3.55	5	2.480	7.5	0.149
Bluetooth	Body	5.5	3.55	10	2.480	7.5	0.075
Bluetooth	Hotspot	5.5	3.55	10	2.480	7.5	0.075

NOTE: Estimated SAR calculation for Bluetooth

10. SAR Results

10.1. SAR measurement results

10.1.1. SAR measurement Result of LTE Band XIII

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	23230/782	10M QPSK(1,24)	0.078	0.062	3.09	23.86	24.00	0.081
Left Tilt 15 Degree	23230/782	10M QPSK(1,24)	0.037	0.020	-1.16	23.86	24.00	0.038
Right Cheek	23230/782	10M QPSK(1,24)	0.065	0.030	0.87	23.86	24.00	0.067
Right Tilt 15 Degree	23230/782	10M QPSK(1,24)	0.028	0.016	2.31	23.86	24.00	0.029
50%RB								
Left Cheek	23230/782	10M QPSK(25,0)	0.065	0.051	3.05	23.37	24.00	0.075
Left Tilt 15 Degree	23230/782	10M QPSK(25,0)	0.031	0.018	-1.13	23.37	24.00	0.036
Right Cheek	23230/782	10M QPSK(25,0)	0.049	0.025	3.25	23.37	24.00	0.057
Right Tilt 15 Degree	23230/782	10M QPSK(25,0)	0.024	0.015	-2.21	23.37	24.00	0.028

NOTE: Head SAR test results of LTE Band XIII

Test Position of Body-Worn with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Front Side	23230/782	10M QPSK(1,24)	0.061	0.040	-1.13	23.86	24.00	0.063
Back Side	23230/782	10M	0.165	0.103	3.45	23.86	24.00	0.170

		QPSK(1,24)						
50%RB								
Front Side	23230/782	10M QPSK(25,0)	0.050	0.031	-1.28	23.37	24.00	0.058
Back Side	23230/782	10M QPSK(25,0)	0.131	0.061	-1.13	23.37	24.00	0.151

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

Test Position of Hotspot with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Front Side	23230/782	10M QPSK(1,24)	0.061	0.040	-1.13	23.86	24.00	0.063
Back Side	23230/782	10M QPSK(1,24)	0.165	0.103	3.45	23.86	24.00	0.170
Left Side	23230/782	10M QPSK(1,24)	0.030	0.018	0.58	23.86	24.00	0.031
Right Side	23230/782	10M QPSK(1,24)	0.032	0.022	0.21	23.86	24.00	0.033
Bottom Side	23230/782	10M QPSK(1,24)	0.059	0.031	-1.13	23.86	24.00	0.061
50%RB								
Front Side	23230/782	10M QPSK(25,0)	0.050	0.031	-1.28	23.37	24.00	0.058
Back Side	23230/782	10M QPSK(25,0)	0.131	0.061	-1.13	23.37	24.00	0.151
Left Side	23230/782	10M QPSK(25,0)	0.028	0.018	-2.31	23.37	24.00	0.032
Right Side	23230/782	10M QPSK(25,0)	0.030	0.018	2.24	23.37	24.00	0.035
Bottom Side	23230/782	10M QPSK(25,0)	0.050	0.030	0.76	23.37	24.00	0.058

NOTE: Hotspot SAR test results of LTE Band XIII

10.1.2. SAR measurement Result of LTE Band IV

Test Position of Head	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Left Cheek	20175/1732.5	20M QPSK(1,0)	0.059	0.041	2.83	24.00	24.00	0.059
Left Tilt 15 Degree	20175/1732.5	20M QPSK(1,0)	0.028	0.020	-1.15	24.00	24.00	0.028
Right Cheek	20175/1732.5	20M QPSK(1,0)	0.040	0.027	0.59	24.00	24.00	0.040
Right Tilt 15 Degree	20175/1732.5	20M QPSK(1,0)	0.020	0.011	0.02	24.00	24.00	0.020
50%RB								
Left Cheek	20175/1732.5	20M QPSK(50,0)	0.053	0.036	4.52	22.98	24.00	0.067
Left Tilt 15 Degree	20175/1732.5	20M QPSK(50,0)	0.025	0.018	-1.64	22.98	24.00	0.032
Right Cheek	20175/1732.5	20M QPSK(50,0)	0.035	0.022	-2.21	22.98	24.00	0.044
Right Tilt 15 Degree	20175/1732.5	20M QPSK(50,0)	0.021	0.015	0.86	22.98	24.00	0.027

NOTE: Head SAR test results of LTE Band IV

Test Position of Body-Worn with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Front Side	20175/1732.5	20M QPSK(1,0)	0.104	0.059	-1.13	24.00	24.00	0.104
Back Side	20175/1732.5	20M QPSK(1,0)	0.241	0.145	-1.87	24.00	24.00	0.241
50%RB								
Front Side	20175/1732.5	20M QPSK(50,0)	0.089	0.055	-2.23	22.98	24.00	0.113

	5							
Back Side	20175/1732. 5	20M QPSK(50,0)	0.195	0.112	2.38	22.98	24.00	0.247

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

Test Position of Hotspot with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Front Side	20175/1732. 5	20M QPSK(1,0)	0.104	0.059	-1.13	24.00	24.00	0.104
Back Side	20175/1732. 5	20M QPSK(1,0)	0.241	0.145	-1.87	24.00	24.00	0.241
Left Side	20175/1732. 5	20M QPSK(1,0)	0.038	0.025	0.25	24.00	24.00	0.038
Right Side	20175/1732. 5	20M QPSK(1,0)	0.049	0.029	2.21	24.00	24.00	0.049
Bottom Side	20175/1732. 5	20M QPSK(1,0)	0.067	0.042	-1.13	24.00	24.00	0.067
50%RB								
Front Side	20175/1732. 5	20M QPSK(50,0)	0.089	0.055	-2.23	22.98	24.00	0.113
Back Side	20175/1732. 5	20M QPSK(50,0)	0.195	0.112	2.38	22.98	24.00	0.247
Left Side	20175/1732. 5	20M QPSK(50,0)	0.030	0.021	0.65	22.98	24.00	0.038
Right Side	20175/1732. 5	20M QPSK(50,0)	0.042	0.025	-2.06	22.98	24.00	0.053
Bottom Side	20175/1732. 5	20M QPSK(50,0)	0.051	0.037	0.08	22.98	24.00	0.065

NOTE: Hotspot SAR test results of LTE Band IV

10.1.3. SAR measurement Result of LTE Band II

Test Position of Head	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Left Cheek	18900/1880	20M QPSK(1,0)	0.100	0.064	0.96	23.94	24.00	0.101
Left Tilt 15 Degree	18900/1880	20M QPSK(1,0)	0.039	0.020	-2.13	23.94	24.00	0.040
Right Cheek	18900/1880	20M QPSK(1,0)	0.070	0.043	0.08	23.94	24.00	0.071
Right Tilt 15 Degree	18900/1880	20M QPSK(1,0)	0.032	0.021	0.14	23.94	24.00	0.032
50%RB								
Left Cheek	18900/1880	20M QPSK(50,0)	0.089	0.051	-2.21	23.69	24.00	0.096
Left Tilt 15 Degree	18900/1880	20M QPSK(50,0)	0.034	0.022	0.17	23.69	24.00	0.037
Right Cheek	18900/1880	20M QPSK(50,0)	0.061	0.038	-1.16	23.69	24.00	0.066
Right Tilt 15 Degree	18900/1880	20M QPSK(50,0)	0.030	0.017	0.58	23.69	24.00	0.032

NOTE: Head SAR test results of LTE Band II

Test Position of Body-Worn with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Front Side	18900/1880	20M QPSK(1,0)	0.120	0.073	-0.58	23.94	24.00	0.122
Back Side	18900/1880	20M QPSK(1,0)	1.122	0.636	1.01	23.94	24.00	1.138
Back Side - Repeated	18900/1880	20M QPSK(1,0)	1.107	0.622	-1.20	23.94	24.00	1.122
Back Side	18700/1860	20M QPSK(1,0)	0.730	0.378	-2.18	23.99	24.00	0.732
Back Side	19100/1900	20M QPSK(1,0)	1.105	0.573	-0.87	23.98	24.00	1.110

50%RB								
Front Side	18900/1880	20M QPSK(50,0)	0.091	0.050	-1.12	23.69	24.00	0.098
Back Side	18900/1880	20M QPSK(50,0)	0.735	0.407	-1.10	23.69	24.00	0.789
100%RB								
Back Side	18900/1880	20M QPSK(100,0)	0.614	0.377	-1.15	23.34	24.00	0.715

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

Test Position of Hotspot with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
1RB								
Front Side	18900/1880	20M QPSK(1,0)	0.120	0.073	-0.58	23.94	24.00	0.122
Back Side	18900/1880	20M QPSK(1,0)	1.122	0.636	1.01	23.94	24.00	1.138
Back Side - Repeated	18900/1880	20M QPSK(1,0)	1.107	0.622	-1.20	23.94	24.00	1.122
Left Side	18900/1880	20M QPSK(1,0)	0.138	0.079	-2.11	23.94	24.00	0.140
Right Side	18900/1880	20M QPSK(1,0)	0.267	0.157	2.69	23.94	24.00	0.271
Bottom Side	18900/1880	20M QPSK(1,0)	0.531	0.317	0.07	23.94	24.00	0.538
Back Side	18700/1860	20M QPSK(1,0)	0.730	0.378	-2.18	23.99	24.00	0.732
Back Side	19100/1900	20M QPSK(1,0)	1.105	0.573	-0.87	23.98	24.00	1.110
50%RB								
Front Side	18900/1880	20M QPSK(50,0)	0.091	0.050	-1.12	23.69	24.00	0.098
Back Side	18900/1880	20M QPSK(50,0)	0.735	0.407	-1.10	23.69	24.00	0.789
Left Side	18900/1880	20M QPSK(50,0)	0.095	0.045	0.01	23.69	24.00	0.102
Right Side	18900/1880	20M QPSK(50,0)	0.201	0.114	0.84	23.69	24.00	0.216
Bottom Side	18900/1880	20M QPSK(50,0)	0.337	0.208	-1.68	23.69	24.00	0.362
100%RB								
Back Side	18900/1880	20M QPSK(100,0)	0.614	0.377	-1.15	23.34	24.00	0.715

NOTE: Hotspot SAR test results of LTE Band II

10.1.4. 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	0.029	0.019	4.23	16.80	17.00	0.030
Left Tilt 15 Degree	6/2437	802.11 b	0.021	0.014	-1.10	16.80	17.00	0.022
Right Cheek	6/2437	802.11 b	0.024	0.017	2.84	16.80	17.00	0.025
Right Tilt 15 Degree	6/2437	802.11 b	0.017	0.010	-2.31	16.80	17.00	0.018

NOTE: Head SAR test results of WLAN 2.4G

Test Position of Body-Worn with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Front Side	6/2437	802.11 b	0.064	0.038	3.32	16.80	17.00	0.067
Back Side	6/2437	802.11 b	0.377	0.204	-2.05	16.80	17.00	0.395

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

Test Position of Hotspot with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Front Side	6/2437	802.11 b	0.064	0.038	3.32	16.80	17.00	0.067
Back Side	6/2437	802.11 b	0.377	0.204	-2.05	16.80	17.00	0.395
Left Side	6/2437	802.11 b	0.041	0.025	-1.10	16.80	17.00	0.043
Top Side	6/2437	802.11 b	0.057	0.032	0.58	16.80	17.00	0.060

NOTE: Hotspot SAR test results of WLAN 2.4G

10.1.5. 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	0.208	0.105	-3.38	10.90	11.00	0.213
Left Tilt 15 Degree	40/5200	802.11 a	0.095	0.041	-1.02	10.90	11.00	0.097

Right Cheek	40/5200	802.11 a	0.153	0.078	0.24	10.90	11.00	0.157
Right Tilt 15 Degree	40/5200	802.11 a	0.072	0.034	-0.30	10.90	11.00	0.074

NOTE: Head SAR test results of WLAN 5.2G

Test Position of Body-Worn with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Front Side	40/5200	802.11 a	0.075	0.031	-1.00	10.90	11.00	0.077
Back Side	40/5200	802.11 a	0.151	0.102	-1.07	10.90	11.00	0.155

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

10.1.6. 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	0.404	0.189	-4.01	10.40	11.00	0.464
Left Tilt 15 Degree	157/5785	802.11 a	0.281	0.100	-2.13	10.40	11.00	0.323
Right Cheek	157/5785	802.11 a	0.312	0.130	0.51	10.40	11.00	0.358
Right Tilt 15 Degree	157/5785	802.11 a	0.188	0.072	-1.00	10.40	11.00	0.216

NOTE: Head SAR test results of WLAN 5.8G

Test Position of Body-Worn with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)
			1g	10g				
Front Side	157/5785	802.11 a	0.279	0.075	-1.23	10.40	11.00	0.320
Back Side	157/5785	802.11 a	0.381	0.282	0.83	10.40	11.00	0.437

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

10.2. Simultaneous Transmission Possibilities

The Simultaneous Transmission Possibilities of this device are as below:

No.	Configuration	Head	Body	Hotspot	Note
1	LTE(data) + WLAN 2.4GHz(data)	Yes	Yes	Yes	2.4GHz Hotspot
2	LTE(data) + Bluetooth(data)	Yes	Yes	Yes	Bluetooth Tethering

NOTE:

- 1) This device supported VoIP in LTE (e.g. 3rd party VoIP).
- 2) This device WLAN 2.4GHz supports Hotspot operation.
- 3) WLAN 2.4GHz and Bluetooth share the same antenna, and cannot transmit simultaneously.
- 4) EUT will choose each LTE according to the network signal condition; therefore, they will not operate simultaneously at any moment.
- 5) This device WLAN 5.2GHz/5.8GHz cannot supports Hotspot operation.
- 6) The Scaled SAR Simultaneous Tx is calculated based on the same configuration and test position.

10.3. SAR Summation Scenario

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

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

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band XIII	WLAN 2.4G			
Head	Left Cheek	0.081	0.030	0.111	N/A	N/A
	Left Tilt 15 Degree	0.038	0.022	0.060	N/A	N/A
	Right Cheek	0.067	0.025	0.092	N/A	N/A
	Right Tilt 15 Degree	0.029	0.018	0.047	N/A	N/A
Body-Worn	Front Side	0.063	0.067	0.130	N/A	N/A
	Back Side	0.170	0.395	0.565	N/A	N/A
Hotspot	Front Side	0.063	0.067	0.130	N/A	N/A
	Back Side	0.170	0.395	0.565	N/A	N/A
	Left Side	0.032	0.043	0.075	N/A	N/A
	Right Side	0.035	N/A	0.035	N/A	N/A
	Top Side	N/A	0.060	0.060	N/A	N/A
	Bottom Side	0.061	N/A	0.061	N/A	N/A

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

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band IV	WLAN 2.4G			
Head	Left Cheek	0.067	0.030	0.097	N/A	N/A
	Left Tilt 15 Degree	0.032	0.022	0.054	N/A	N/A
	Right Cheek	0.044	0.025	0.069	N/A	N/A
	Right Tilt 15 Degree	0.027	0.018	0.044	N/A	N/A
Body-Worn	Front Side	0.113	0.067	0.180	N/A	N/A
	Back Side	0.247	0.395	0.641	N/A	N/A
Hotspot	Front Side	0.113	0.067	0.180	N/A	N/A
	Back Side	0.247	0.395	0.641	N/A	N/A
	Left Side	0.038	0.043	0.081	N/A	N/A
	Right Side	0.053	N/A	0.053	N/A	N/A
	Top Side	N/A	0.060	0.060	N/A	N/A

	Bottom Side	0.067	N/A	0.067	N/A	N/A
--	-------------	-------	-----	-------	-----	-----

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

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band II	WLAN 2.4G			
Head	Left Cheek	0.101	0.030	0.132	N/A	N/A
	Left Tilt 15 Degree	0.040	0.022	0.062	N/A	N/A
	Right Cheek	0.071	0.025	0.096	N/A	N/A
	Right Tilt 15 Degree	0.032	0.018	0.050	N/A	N/A
Body-Worn	Front Side	0.122	0.067	0.189	N/A	N/A
	Back Side	1.138	0.395	1.532	N/A	N/A
Hotspot	Front Side	0.122	0.067	0.189	N/A	N/A
	Back Side	1.138	0.395	1.532	N/A	N/A
	Left Side	0.140	0.043	0.183	N/A	N/A
	Right Side	0.271	N/A	0.271	N/A	N/A
	Top Side	N/A	0.060	0.060	N/A	N/A
	Bottom Side	0.538	N/A	0.538	N/A	N/A

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

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band XIII	Bluetooth			
Head	Left Cheek	0.081	0.149	0.230	N/A	N/A
	Left Tilt 15 Degree	0.038	0.149	0.187	N/A	N/A
	Right Cheek	0.067	0.149	0.216	N/A	N/A
	Right Tilt 15 Degree	0.029	0.149	0.178	N/A	N/A
Body-Worn	Front Side	0.063	0.075	0.137	N/A	N/A
	Back Side	0.170	0.075	0.245	N/A	N/A
Hotspot	Front Side	0.063	0.075	0.137	N/A	N/A
	Back Side	0.170	0.075	0.245	N/A	N/A
	Left Side	0.032	0.075	0.107	N/A	N/A
	Right Side	0.035	N/A	0.035	N/A	N/A
	Top Side	N/A	0.075	0.075	N/A	N/A
	Bottom Side	0.061	N/A	0.061	N/A	N/A

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

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band IV	Bluetooth			
Head	Left Cheek	0.067	0.149	0.216	N/A	N/A
	Left Tilt 15 Degree	0.032	0.149	0.181	N/A	N/A
	Right Cheek	0.044	0.149	0.193	N/A	N/A
	Right Tilt 15 Degree	0.027	0.149	0.176	N/A	N/A
Body-Worn	Front Side	0.113	0.075	0.187	N/A	N/A
	Back Side	0.247	0.075	0.321	N/A	N/A
Hotspot	Front Side	0.113	0.075	0.187	N/A	N/A
	Back Side	0.247	0.075	0.321	N/A	N/A
	Left Side	0.038	0.075	0.112	N/A	N/A
	Right Side	0.053	N/A	0.053	N/A	N/A
	Top Side	N/A	0.075	0.075	N/A	N/A
	Bottom Side	0.067	N/A	0.067	N/A	N/A

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

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band II	Bluetooth			
Head	Left Cheek	0.101	0.149	0.250	N/A	N/A
	Left Tilt 15 Degree	0.040	0.149	0.189	N/A	N/A
	Right Cheek	0.071	0.149	0.220	N/A	N/A
	Right Tilt 15 Degree	0.032	0.149	0.181	N/A	N/A
Body-Worn	Front Side	0.122	0.075	0.197	N/A	N/A
	Back Side	1.138	0.075	1.212	N/A	N/A
Hotspot	Front Side	0.122	0.075	0.197	N/A	N/A
	Back Side	1.138	0.075	1.212	N/A	N/A
	Left Side	0.140	0.075	0.214	N/A	N/A
	Right Side	0.271	N/A	0.271	N/A	N/A
	Top Side	N/A	0.075	0.075	N/A	N/A
	Bottom Side	0.538	N/A	0.538	N/A	N/A

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

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band XIII	WLAN 5.2G			
Head	Left Cheek	0.081	0.213	0.293	N/A	N/A
	Left Tilt 15 Degree	0.038	0.097	0.135	N/A	N/A

	Right Cheek	0.067	0.157	0.224	N/A	N/A
	Right Tilt 15 Degree	0.029	0.074	0.103	N/A	N/A
Body-Worn	Front Side	0.063	0.077	0.140	N/A	N/A
	Back Side	0.170	0.155	0.325	N/A	N/A

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

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band IV	WLAN 5.2G			
Head	Left Cheek	0.067	0.213	0.280	N/A	N/A
	Left Tilt 15 Degree	0.032	0.097	0.129	N/A	N/A
	Right Cheek	0.044	0.157	0.201	N/A	N/A
	Right Tilt 15 Degree	0.027	0.074	0.100	N/A	N/A
Body-Worn	Front Side	0.113	0.077	0.189	N/A	N/A
	Back Side	0.247	0.155	0.401	N/A	N/A

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

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band II	WLAN 5.2G			
Head	Left Cheek	0.101	0.213	0.314	N/A	N/A
	Left Tilt 15 Degree	0.040	0.097	0.137	N/A	N/A
	Right Cheek	0.071	0.157	0.228	N/A	N/A
	Right Tilt 15 Degree	0.032	0.074	0.106	N/A	N/A
Body-Worn	Front Side	0.122	0.077	0.199	N/A	N/A
	Back Side	1.138	0.155	1.292	N/A	N/A

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

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band XIII	WLAN 5.8G			
Head	Left Cheek	0.081	0.464	0.544	N/A	N/A
	Left Tilt 15 Degree	0.038	0.323	0.361	N/A	N/A
	Right Cheek	0.067	0.358	0.425	N/A	N/A
	Right Tilt 15 Degree	0.029	0.216	0.245	N/A	N/A
Body-Worn	Front Side	0.063	0.320	0.383	N/A	N/A
	Back Side	0.170	0.437	0.608	N/A	N/A

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

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band IV	WLAN 5.8G			
Head	Left Cheek	0.067	0.464	0.531	N/A	N/A
	Left Tilt 15 Degree	0.032	0.323	0.354	N/A	N/A
	Right Cheek	0.044	0.358	0.402	N/A	N/A
	Right Tilt 15 Degree	0.027	0.216	0.242	N/A	N/A
Body-Worn	Front Side	0.113	0.320	0.433	N/A	N/A
	Back Side	0.247	0.437	0.684	N/A	N/A

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

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		LTE Band II	WLAN 5.8G			
Head	Left Cheek	0.101	0.464	0.565	N/A	N/A
	Left Tilt 15 Degree	0.040	0.323	0.362	N/A	N/A
	Right Cheek	0.071	0.358	0.429	N/A	N/A
	Right Tilt 15 Degree	0.032	0.216	0.248	N/A	N/A
Body-Worn	Front Side	0.122	0.320	0.442	N/A	N/A
	Back Side	1.138	0.437	1.575	N/A	N/A

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

11. Appendix A. Photo documentation

Refer to appendix Test Setup photo---SAR

12. Appendix B. System Check Plots

Table of contents
MEASUREMENT 1 System Performance Check - SID750 - Head
MEASUREMENT 2 System Performance Check - SID750 - Body
MEASUREMENT 3 System Performance Check - SID1800 - Head
MEASUREMENT 4 System Performance Check - SID1800 - Body
MEASUREMENT 5 System Performance Check - SID1900 - Head
MEASUREMENT 6 System Performance Check - SID1900 - Body
MEASUREMENT 7 System Performance Check - SID2450 - Head
MEASUREMENT 8 System Performance Check - SID2450 - Body
MEASUREMENT 9 System Performance Check - SID5200 - Head
MEASUREMENT 10 System Performance Check - SID5200 - Body
MEASUREMENT 11 System Performance Check - SID5800 - Head
MEASUREMENT 12 System Performance Check - SID5800 - Body

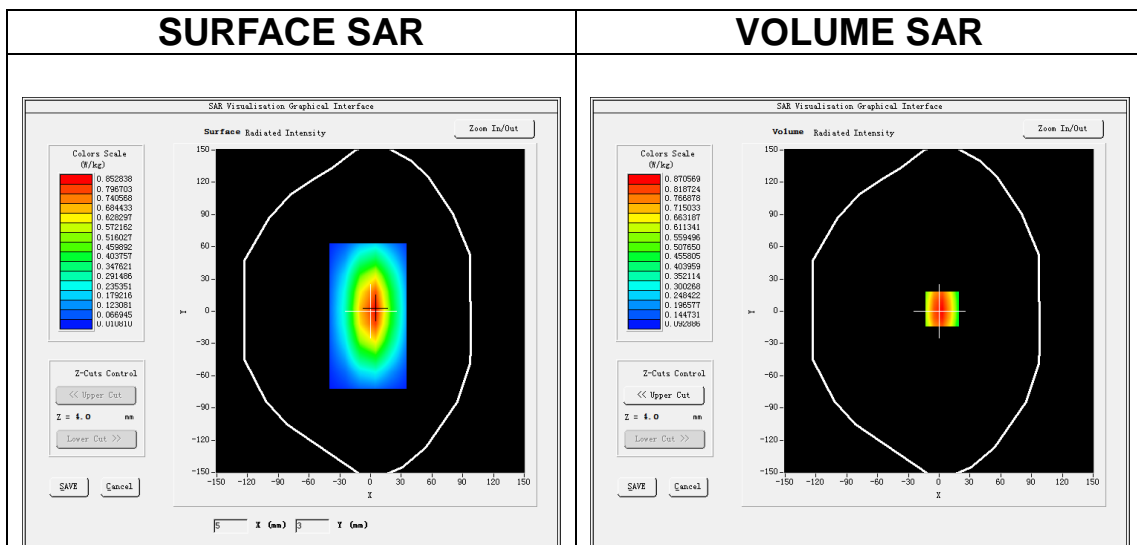
MEASUREMENT 1

A. Experimental conditions.

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

B. SAR Measurement Results

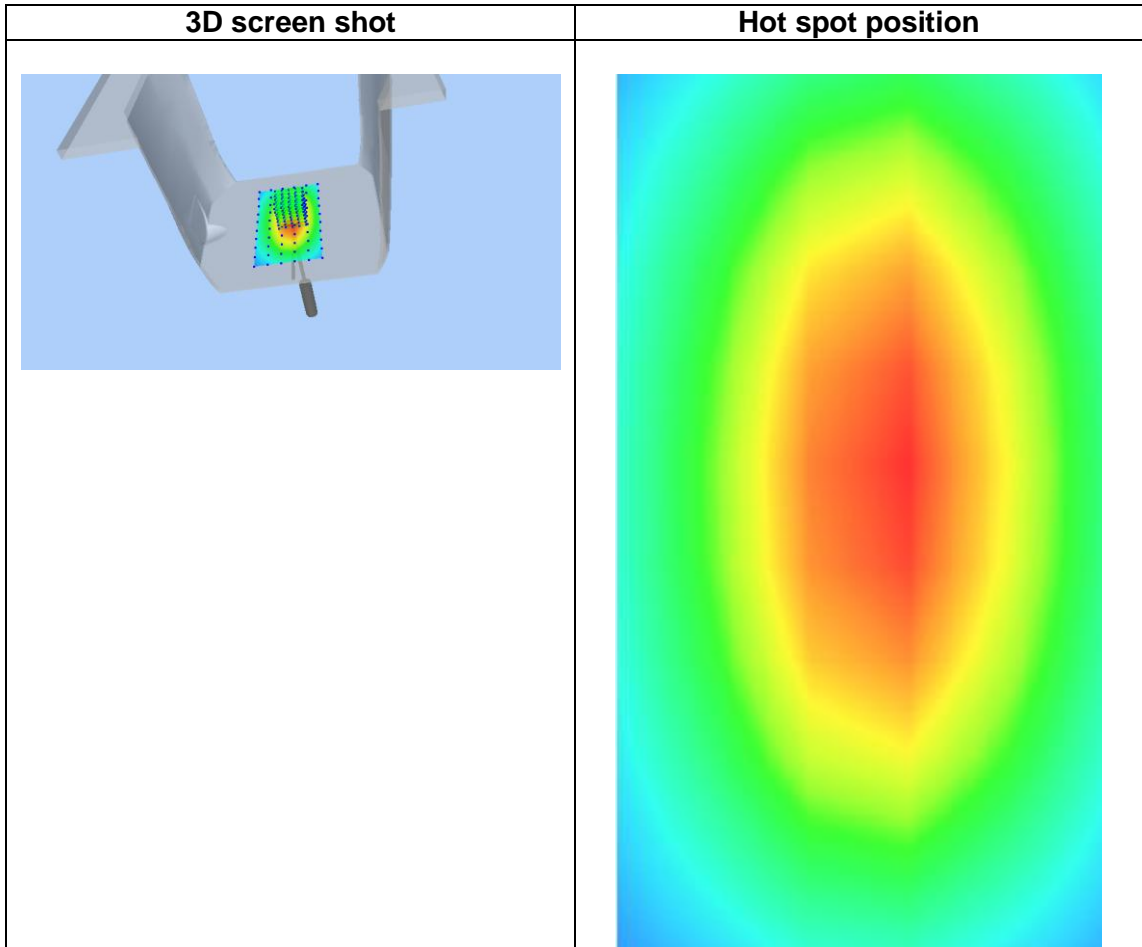
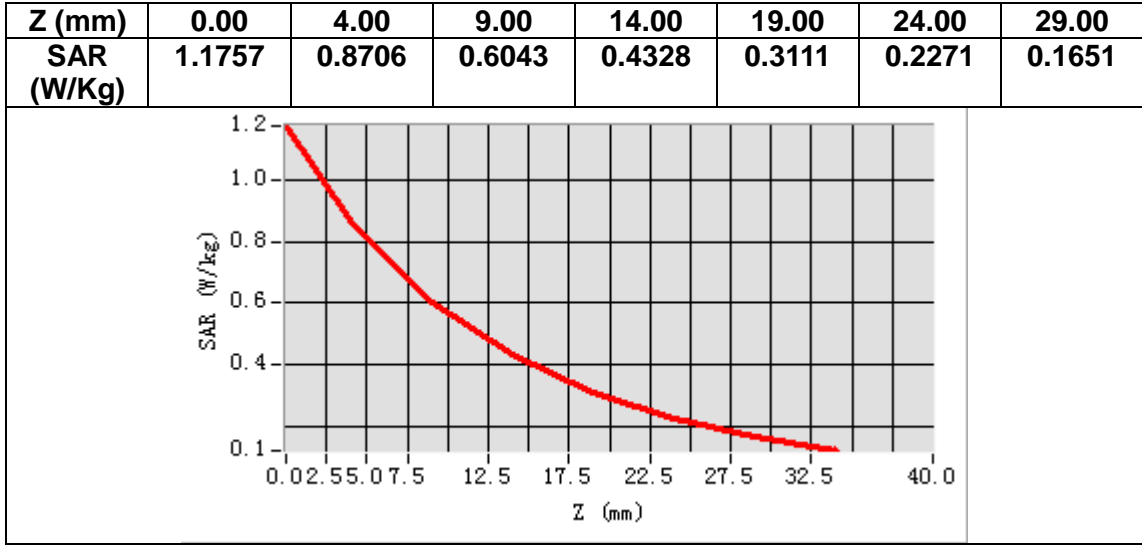
Frequency (MHz)	750.000000
Relative permittivity (real part)	41.589426
Relative permittivity (imaginary part)	21.939779
Conductivity (S/m)	0.906594
Variation (%)	-0.710000



Maximum location: X=3.00, Y=2.00

SAR Peak: 1.18 W/kg

SAR 10g (W/Kg)	0.569036
SAR 1g (W/Kg)	0.855279



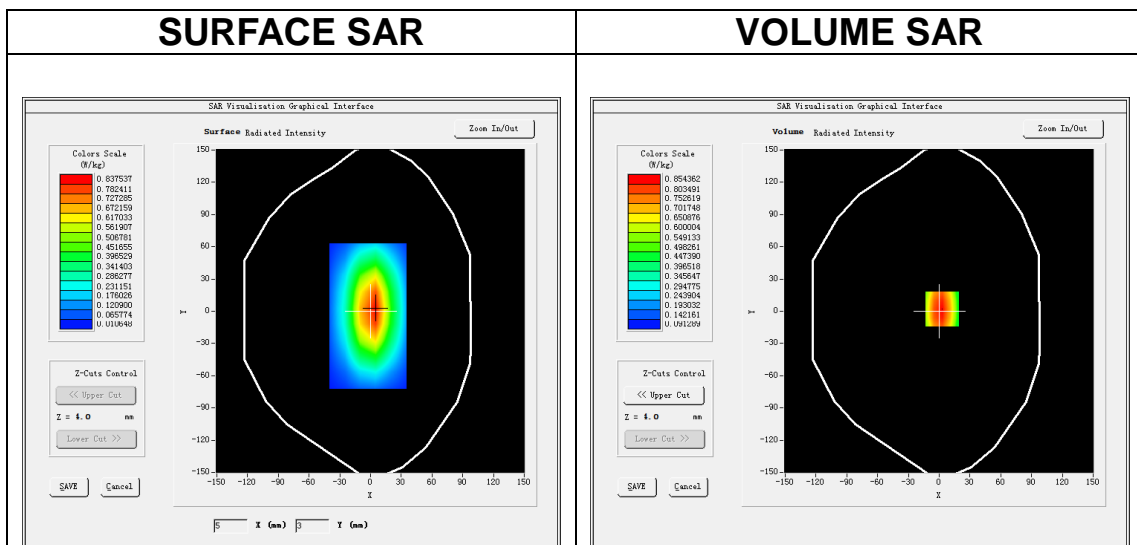
MEASUREMENT 2

A. Experimental conditions.

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

B. SAR Measurement Results

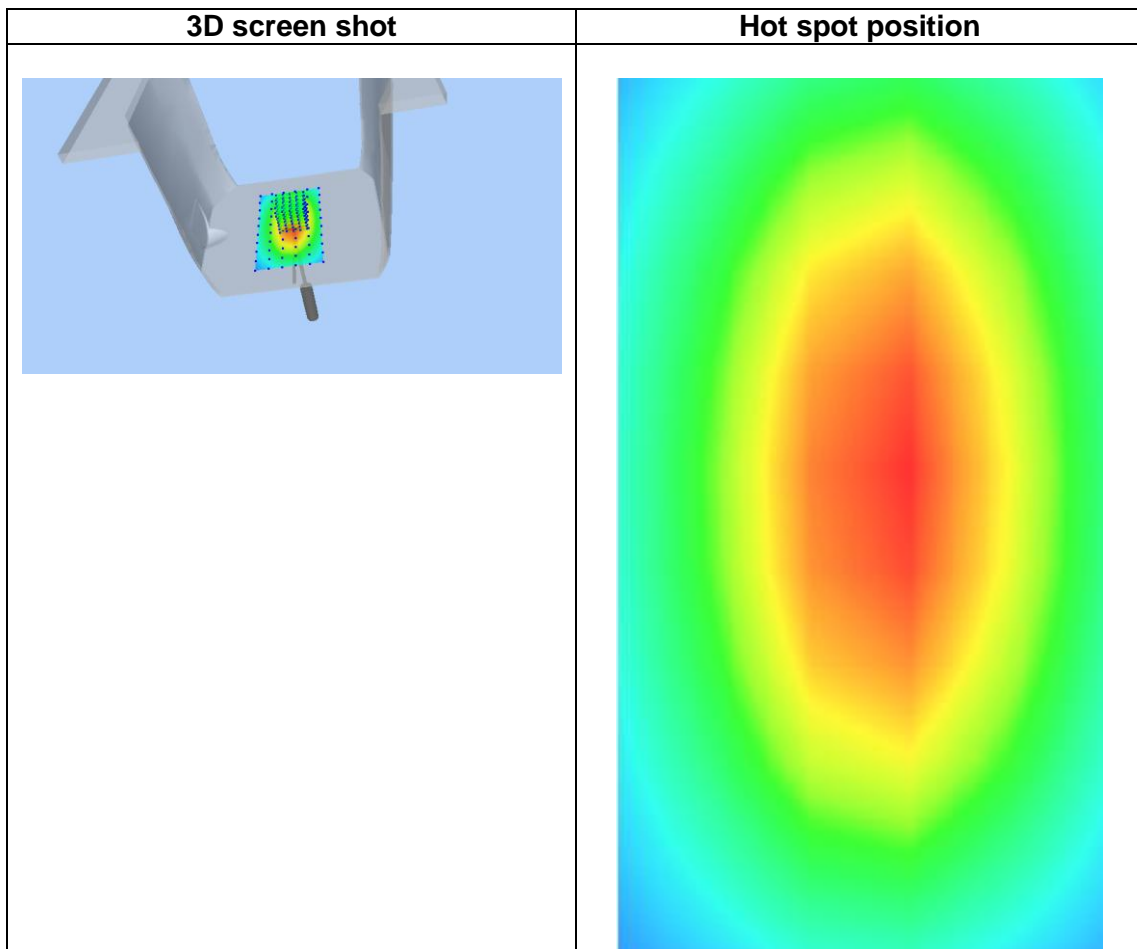
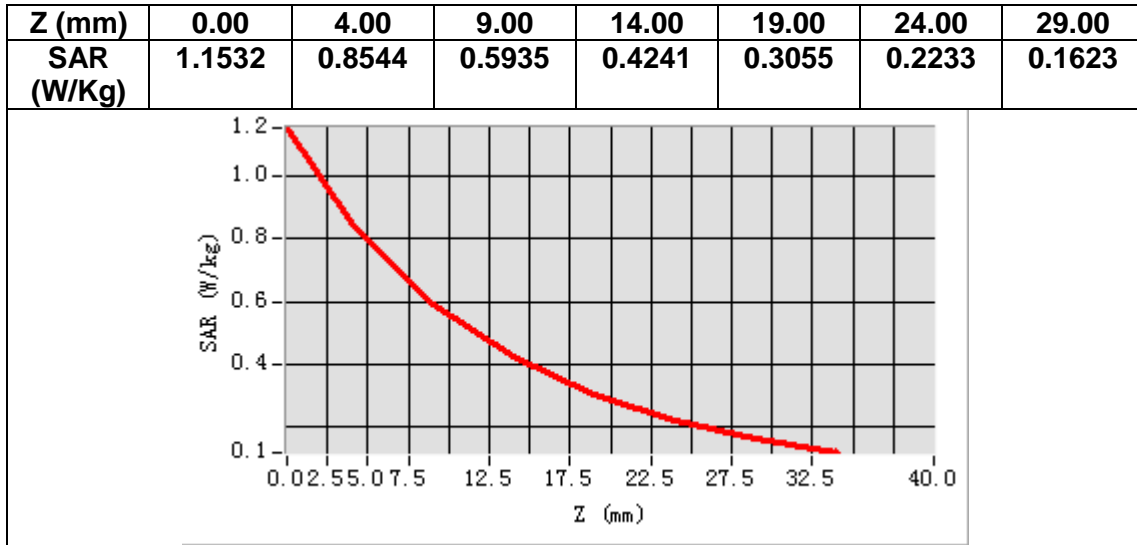
Frequency (MHz)	750.000000
Relative permittivity (real part)	55.579426
Relative permittivity (imaginary part)	23.375000
Conductivity (S/m)	0.966594
Variation (%)	-0.610000



Maximum location: X=3.00, Y=2.00

SAR Peak: 1.16 W/kg

SAR 10g (W/Kg)	0.558532
SAR 1g (W/Kg)	0.839217



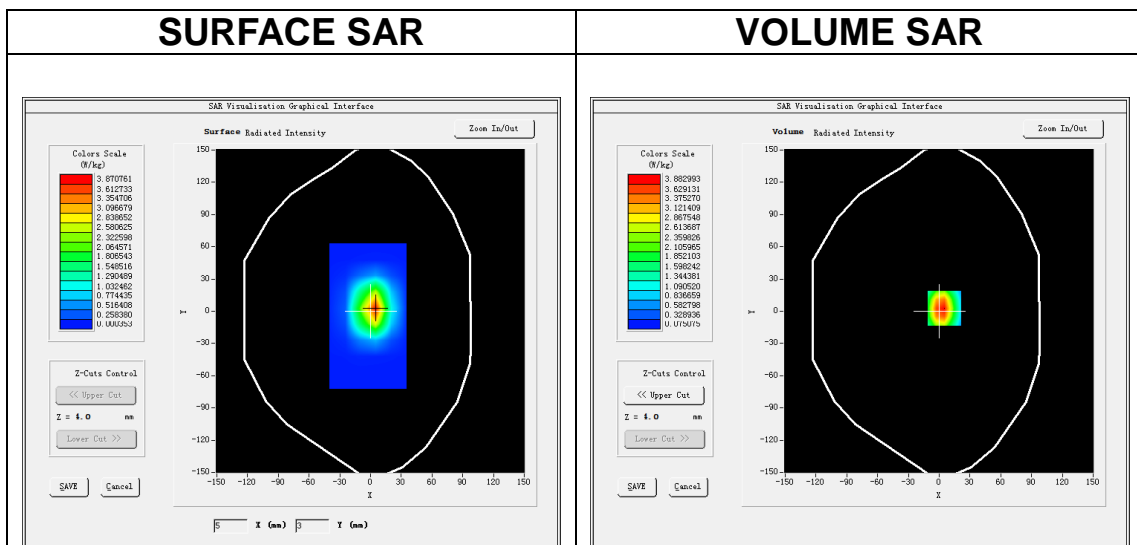
MEASUREMENT 3

A. Experimental conditions.

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

B. SAR Measurement Results

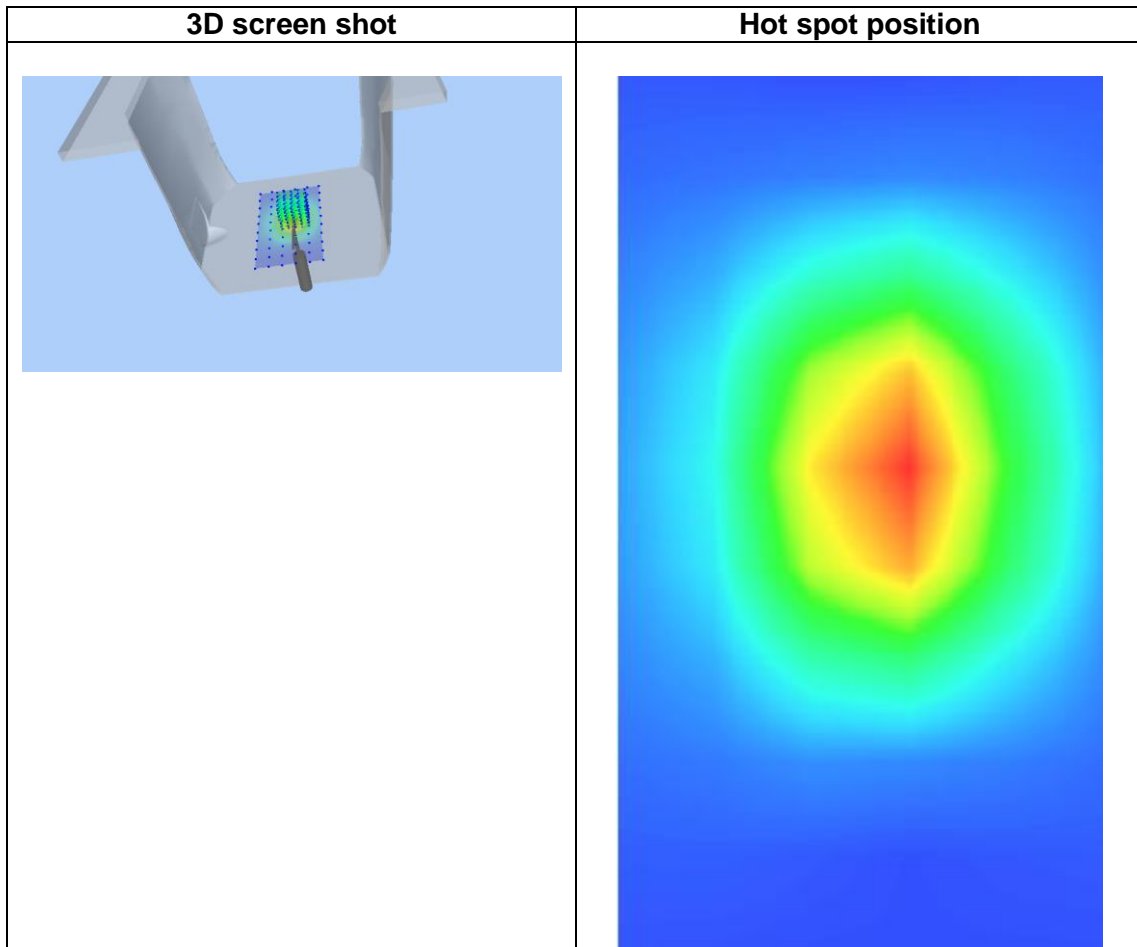
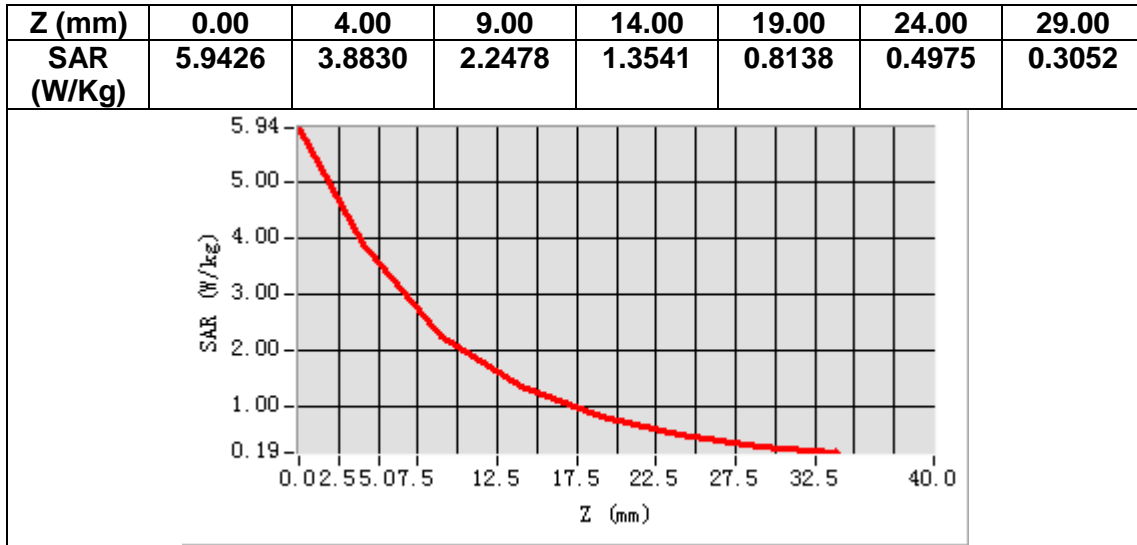
Frequency (MHz)	1800.000000
Relative permittivity (real part)	39.905899
Relative permittivity (imaginary part)	14.002042
Conductivity (S/m)	1.401587
Variation (%)	-0.380000



Maximum location: X=5.00, Y=3.00

SAR Peak: 6.17 W/kg

SAR 10g (W/Kg)	2.010726
SAR 1g (W/Kg)	3.848393



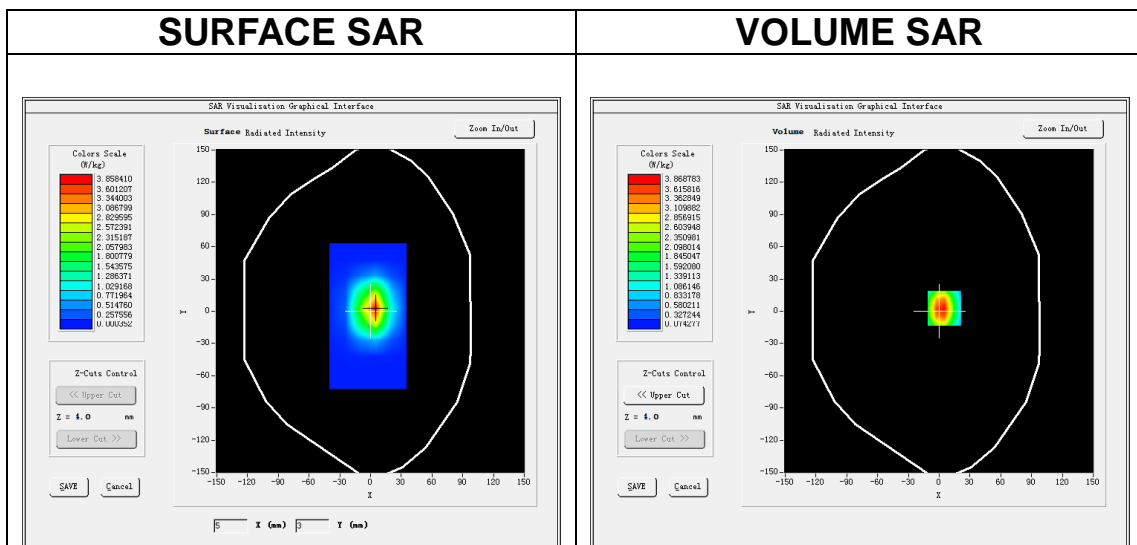
MEASUREMENT 4

A. Experimental conditions.

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

B. SAR Measurement Results

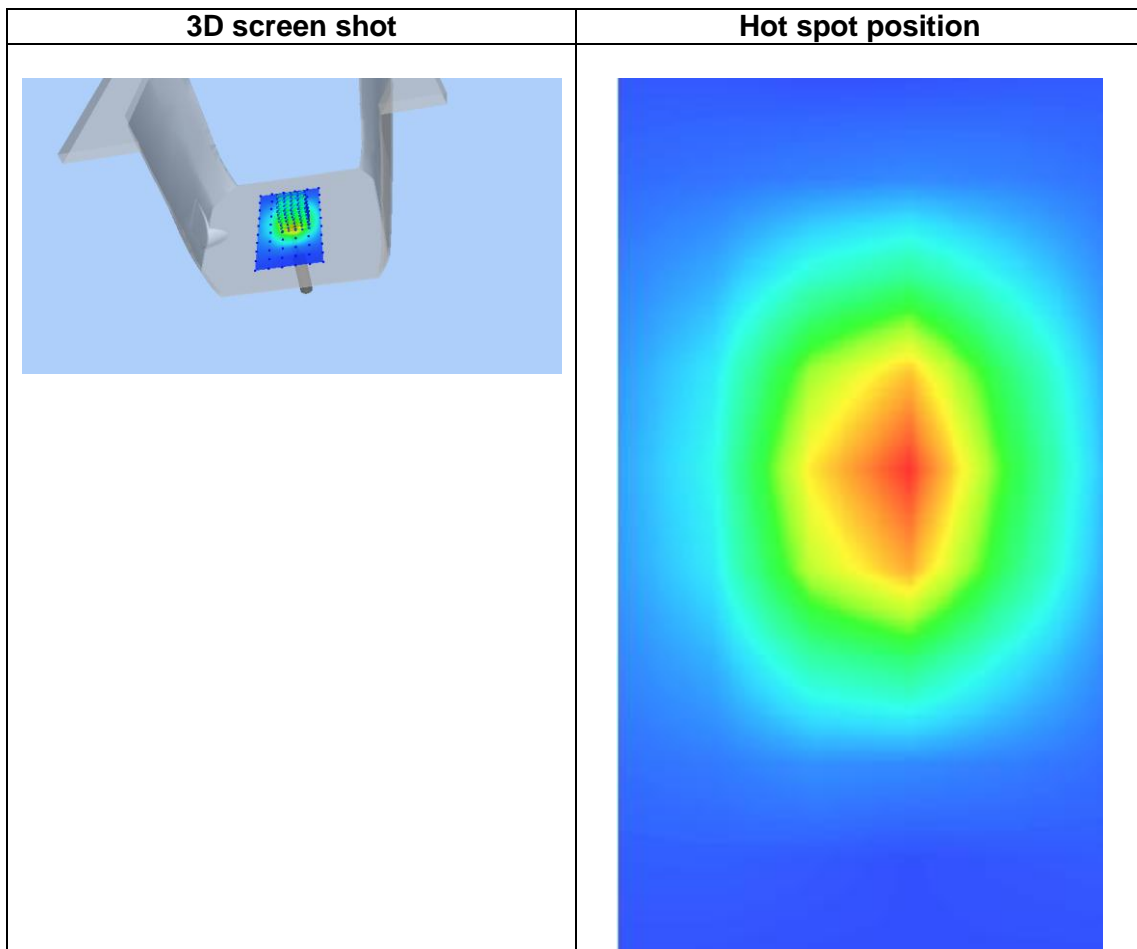
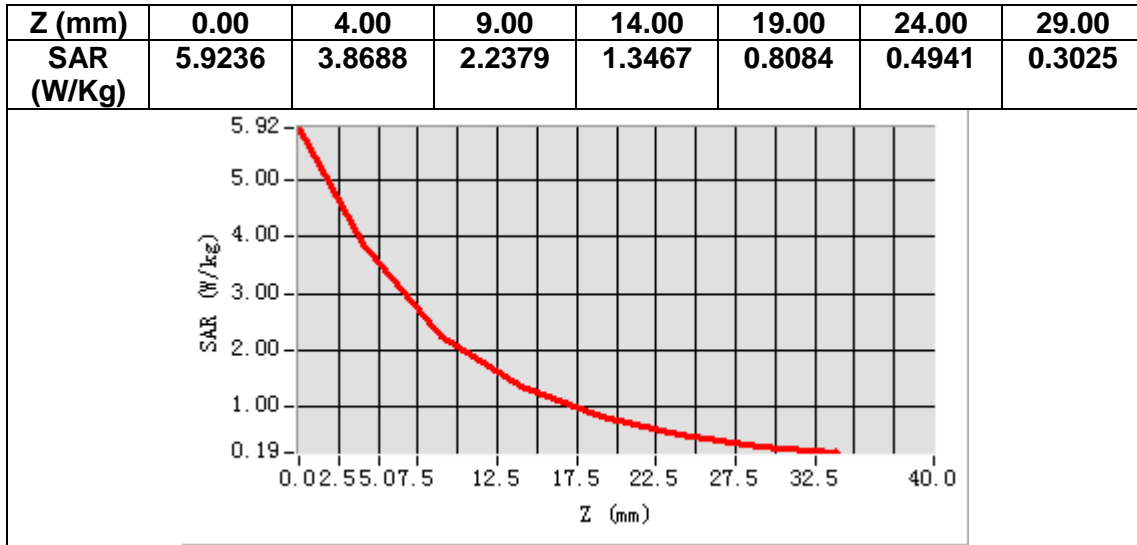
Frequency (MHz)	1800.000000
Relative permittivity (real part)	53.975899
Relative permittivity (imaginary part)	15.147470
Conductivity (S/m)	1.505587
Variation (%)	-0.190000



Maximum location: X=5.00, Y=3.00

SAR Peak: 6.16 W/kg

SAR 10g (W/Kg)	2.003281
SAR 1g (W/Kg)	3.838010



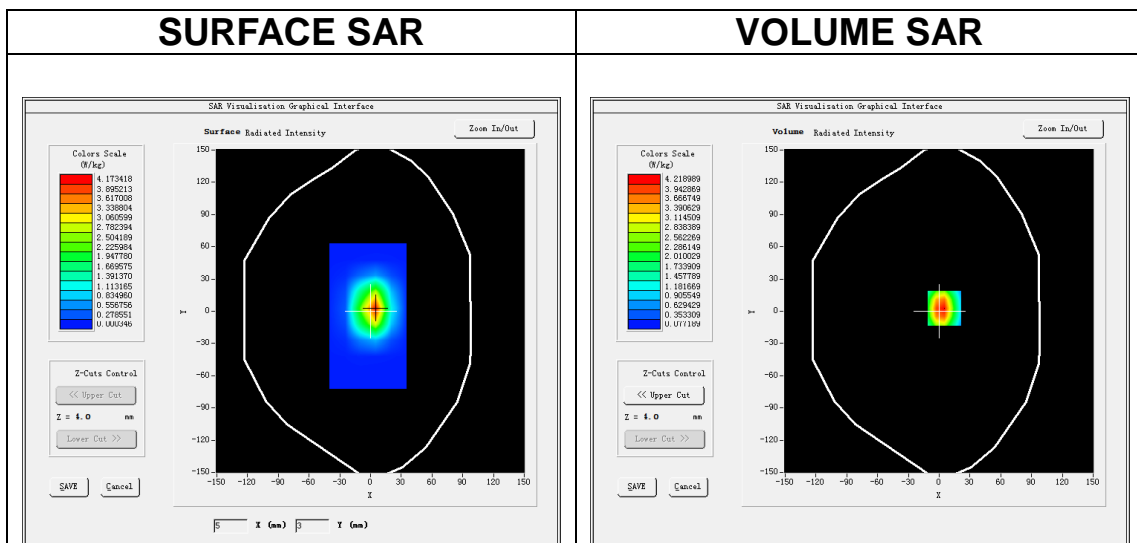
MEASUREMENT 5

A. Experimental conditions.

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

B. SAR Measurement Results

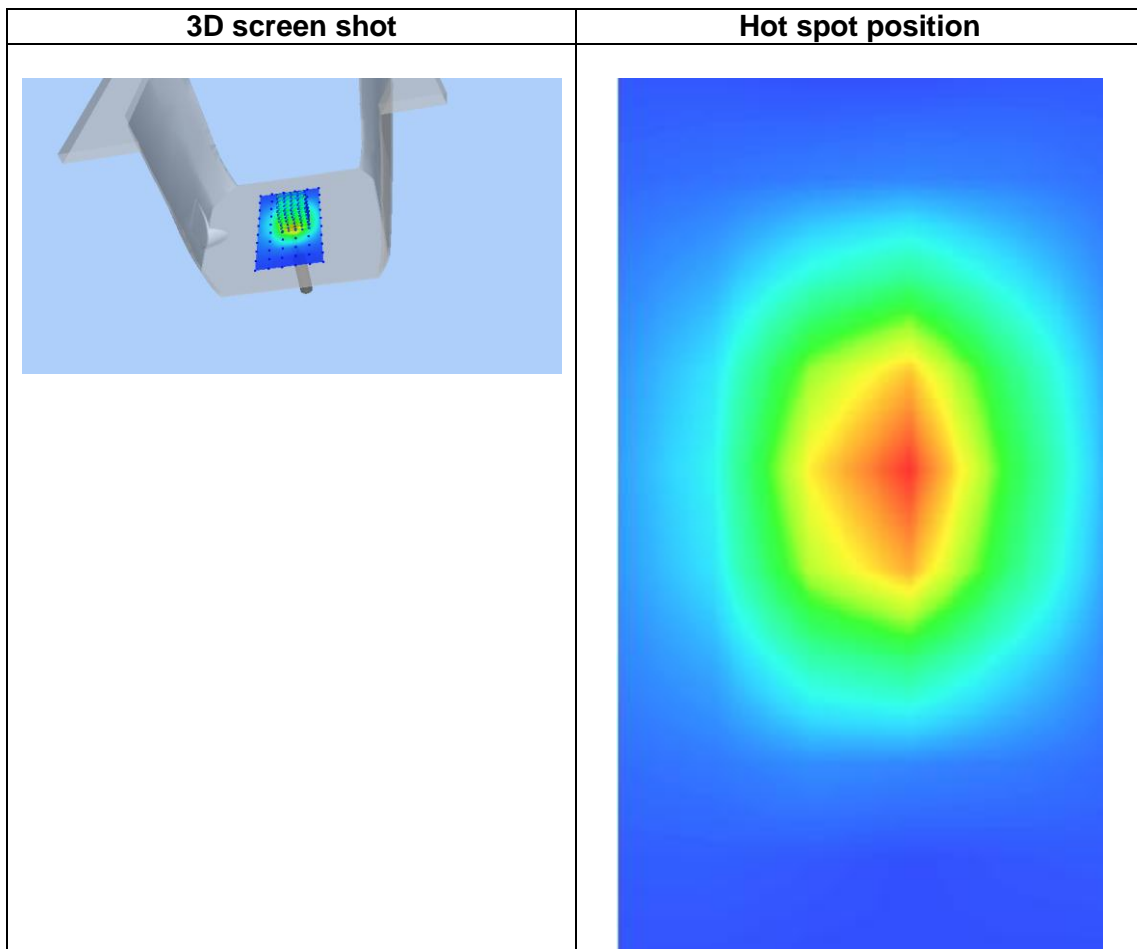
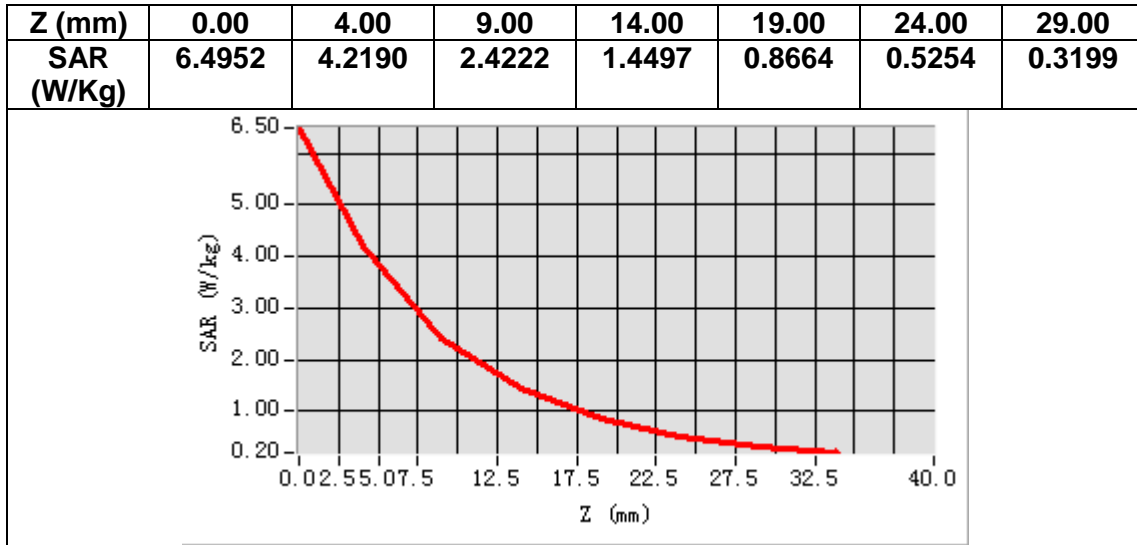
Frequency (MHz)	1900.000000
Relative permittivity (real part)	39.485899
Relative permittivity (imaginary part)	13.590900
Conductivity (S/m)	1.425587
Variation (%)	1.410000



Maximum location: X=5.00, Y=3.00

SAR Peak: 6.76 W/kg

SAR 10g (W/Kg)	2.173139
SAR 1g (W/Kg)	4.188765



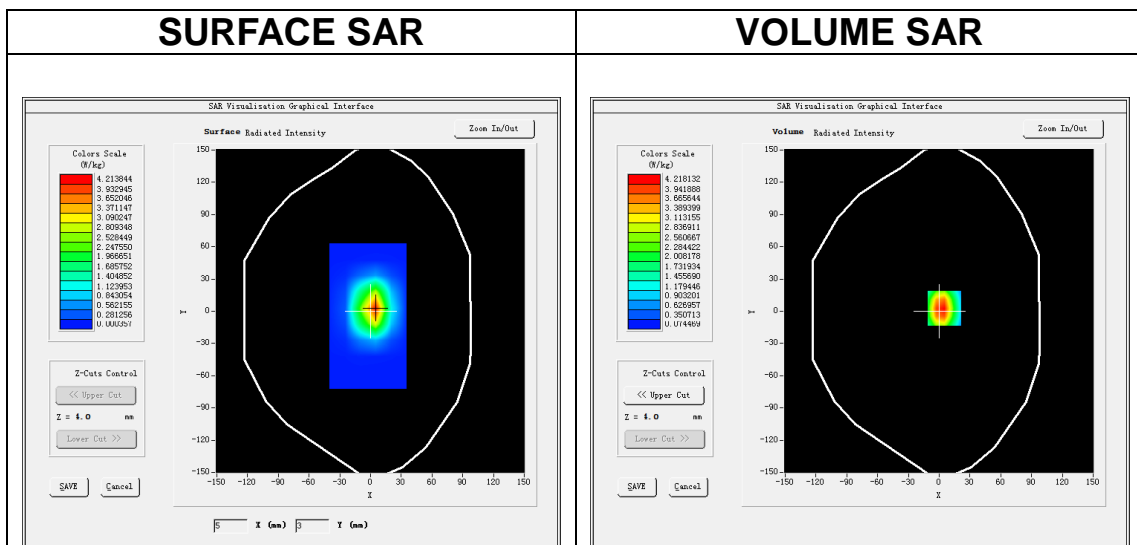
MEASUREMENT 6

A. Experimental conditions.

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

B. SAR Measurement Results

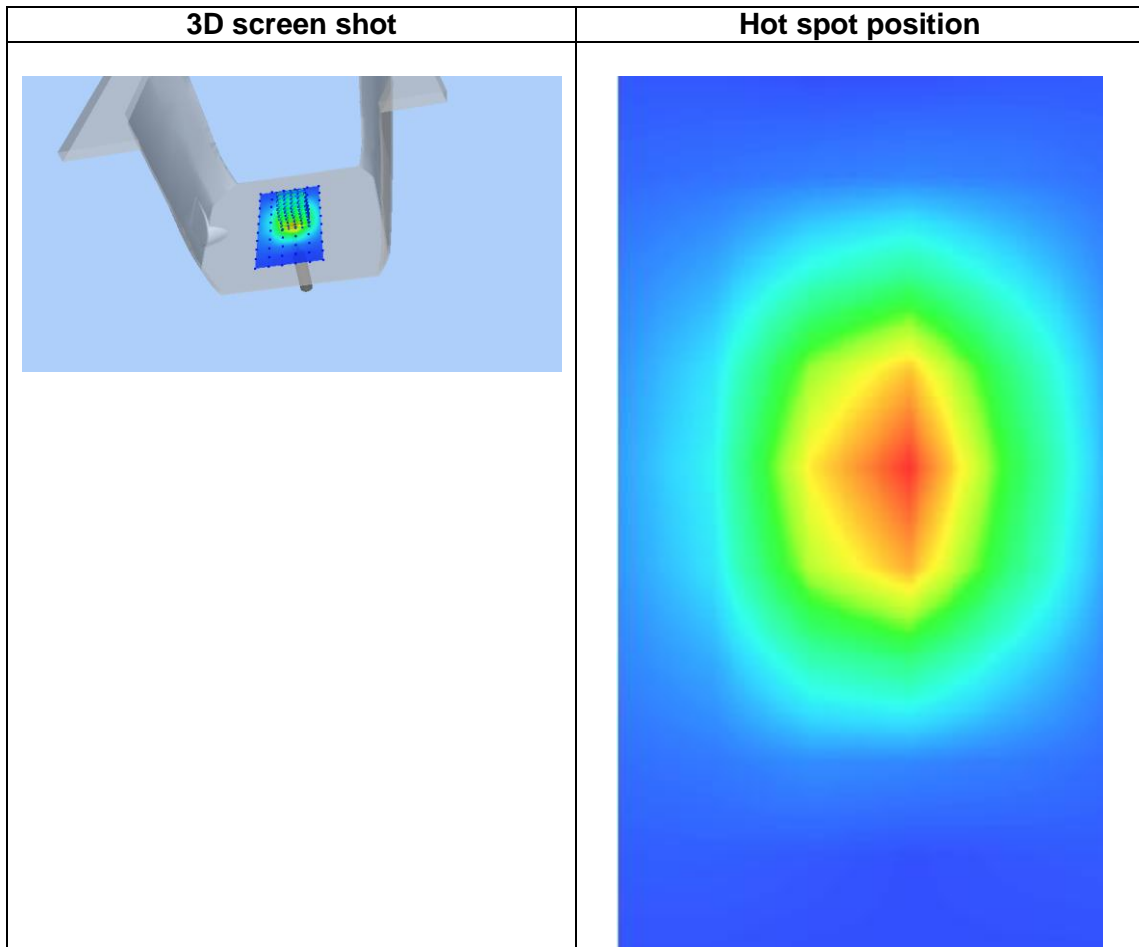
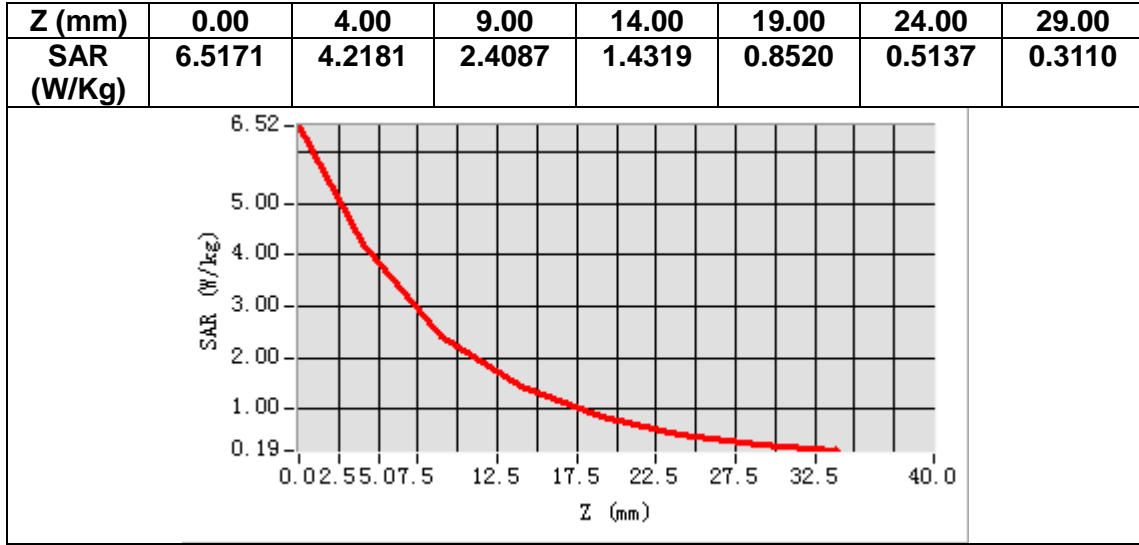
Frequency (MHz)	1900.000000
Relative permittivity (real part)	53.495899
Relative permittivity (imaginary part)	14.563560
Conductivity (S/m)	1.535587
Variation (%)	-0.410000



Maximum location: X=5.00, Y=3.00

SAR Peak: 6.79 W/kg

SAR 10g (W/Kg)	2.167814
SAR 1g (W/Kg)	4.194172



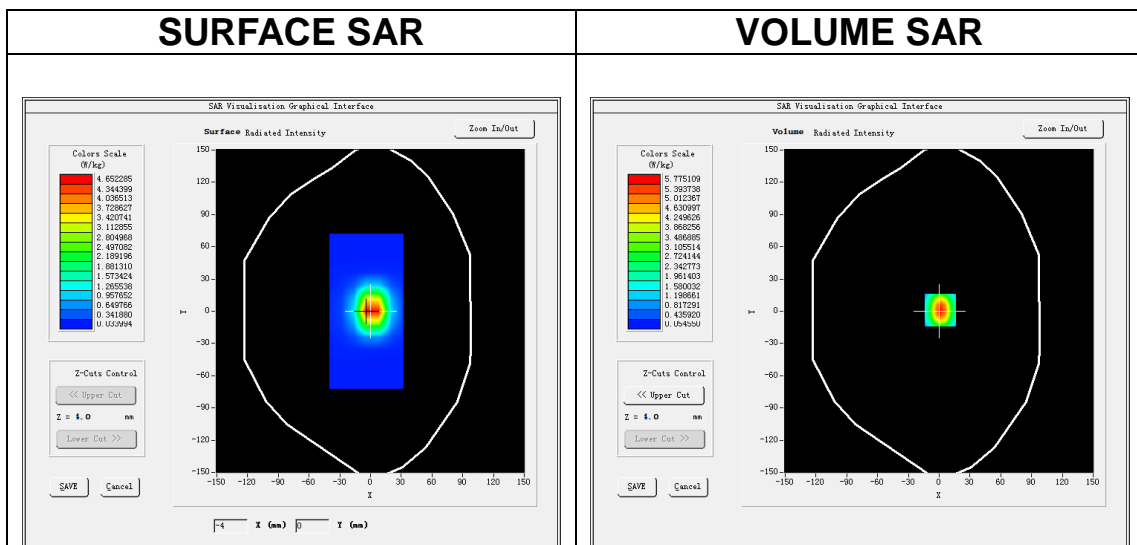
MEASUREMENT 7

A. Experimental conditions.

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

B. SAR Measurement Results

Frequency (MHz)	2450.000000
Relative permittivity (real part)	38.924097
Relative permittivity (imaginary part)	13.529100
Conductivity (S/m)	1.836738
Variation (%)	-0.050000

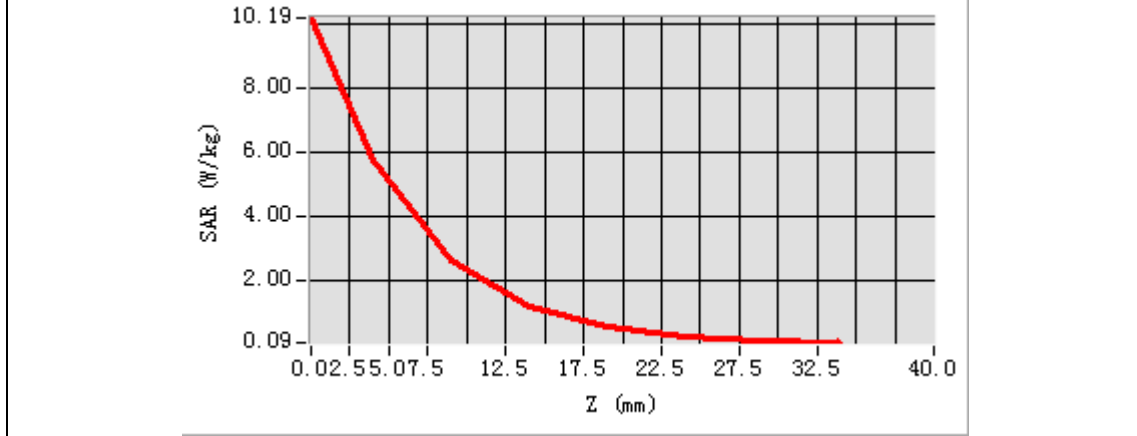


Maximum location: X=1.00, Y=1.00

SAR Peak: 10.08 W/kg

SAR 10g (W/Kg)	2.462453
SAR 1g (W/Kg)	5.339995

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	10.1922	5.7751	2.6280	1.2137	0.5848	0.2917	0.1545



3D screen shot	Hot spot position
