

SAR Test Report

Report No.: AGC00594170601FH01

FCC ID : 2AI3K-CS22SA

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION : Rugged Mobile Phone

BRAND NAME : Cyrus

MODEL NAME : CS22SA

CLIENT : Cyrus Technology GmbH

DATE OF ISSUE : July 12,2017

STANDARD(S) : IEEE Std. 1528:2013
FCC 47CFR § 2.1093
IEEE/ANSI C95.1:2005

REPORT VERSION : V1.0

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Report Revise Record

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V1.0	/	July 12,2017	Valid	Original Report

Test Report Certification	
Applicant Name	Cyrus Technology GmbH
Applicant Address	Hergelsbendenstraße 49 D-52080 Aachen Germany
Manufacturer Name	Shenzhen Xin Kingbrand Enterprises Co., Ltd.
Manufacturer Address	KingBrand Industrial Zone, Nanpu Road, Shang Liao Lin Pikeng, Shajing Town, Baoan District, Shenzhen City, Guangdong Province, China
Product Designation	Rugged Mobile Phone
Brand Name	Cyrus
Model Name	CS22SA
Different Description	N/A
EUT Voltage	DC3.8V by battery
Applicable Standard	IEEE Std. 1528:2013 FCC 47CFR § 2.1093 IEEE/ANSI C95.1:2005
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1. SUMMARY OF MAXIMUM SAR VALUE

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

Frequency Band	Highest Reported 1g-SAR(W/Kg)		SAR Test Limit (W/Kg)	
	Head	Body-worn		
GSM 850	0.215	0.490	1.6	
PCS 1900	0.563	1.118		
UMTS Band II	0.465	1.193		
UMTS Band IV	0.054	0.705		
UMTS Band V	0.321	0.594		
LTE Band 2	0.673	1.145		
LTE Band 4	0.051	0.677		
LTE Band 5	0.610	1.189		
LTE Band 7	0.194	1.093		
LTE Band 17	0.074	0.264		
WIFI 2.4G	0.507	0.348		
Simultaneous Reported SAR	1.541			
SAR Test Result	PASS			

This device is compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6W/Kg) specified in IEEE Std. 1528:2013; FCC 47CFR § 2.1093; IEEE/ANSI C95.1:2005 and the following specific FCC Test Procedures:

- KDB 447498 D01 General RF Exposure Guidance v06
- KDB 648474 D04 Handset SAR v01r03
- KDB 865664 D01 SAR Measurement 100MHz to 6GHz v01r04
- KDB 941225 D01 3G SAR Procedures v03r01
- KDB 941225 D06 Hotspot Mode v02r01
- KDB 248227 D01 802.11 Wi-Fi SAR v02r02
- KDB 941225 D05 SAR for LTE Devices v02r05

2. GENERAL INFORMATION

2.1. EUT Description

General Information	
Product Designation	Rugged Mobile Phone
Test Model	CS22SA
Hardware Version	FQ5_02
Software Version	smartphone_A7N_20170607_V0.01
Device Category	Portable
RF Exposure Environment	Uncontrolled
Antenna Type	Internal
GSM and GPRS& EGPRS	
Support Band	<input checked="" type="checkbox"/> GSM 850 <input checked="" type="checkbox"/> PCS 1900 <input checked="" type="checkbox"/> GSM 900 <input checked="" type="checkbox"/> DCS 1800
GPRS & EGPRS Type	Class B
GPRS & EGPRS Class	Class 12(1Tx+4Rx, 2Tx+3Rx, 3Tx+2Rx, 4Tx+1Rx)
TX Frequency Range	GSM 850 : 820-850MHz; PCS 1900: 1850-1910MHz;
RX Frequency Range	GSM 850 : 869~894MHz; PCS 1900: 1930~1990MHz
Release Version	R99
Type of modulation	GMSK for GSM/GPRS; GMSK & 8-PSK for EGPRS
Antenna Gain	GSM850: -0.8dBi; PCS1900: -1.0dBi;
Max. Average Power	GSM850: 31.52dBm; PCS1900: 27.53dBm
WCDMA	
Support Band	<input checked="" type="checkbox"/> UMTS FDD Band II <input checked="" type="checkbox"/> UMTS FDD Band V <input checked="" type="checkbox"/> UMTS FDD Band IV <input type="checkbox"/> UMTS FDD Band I <input type="checkbox"/> UMTS FDD Band III <input type="checkbox"/> UMTS FDD Band VIII
HS Type	HSPA(HSUPA/HSDPA)
TX Frequency Range	FDD Band II: 1850-1910MHz; FDD Band V: 820-850MHz Band IV: 1712.4-1752.6MHz
RX Frequency Range	FDD Band II: 1930-1990MHz; FDD Band V: 869-894MHz Band IV: 2112.4-2152.6MHz
Release Version	Rel-6
Type of modulation	HSDPA:QPSK/16QAM; HSUPA:BPSK; WCDMA:QPSK
Antenna Gain	Band II: -0.9dBii; Band IV:-0.7 dBi Band V: -0.6dBi
Max. Average Power	Band II: 21.66dBm; Band IV: 20.77dBm; Band V: 21.08dBm

EUT Description(Continue)

LTE	
Support Band	<input checked="" type="checkbox"/> FDD Band 2 <input type="checkbox"/> FDD Band 4 <input checked="" type="checkbox"/> FDD Band 5 <input checked="" type="checkbox"/> FDD Band 7 <input type="checkbox"/> FDD Band 12 <input checked="" type="checkbox"/> FDD Band 17 <input type="checkbox"/> FDD Band 25 <input type="checkbox"/> FDD Band 26 <input checked="" type="checkbox"/> TDD Band 40 <input type="checkbox"/> TDD Band 41
TX Frequency Range	Band 2: 1850-1909.9MHz; Band 4: 1710 -1754.9MHz; Band 5 :824-849MHz; Band 7:2500-2570MHz; Band 17: 704-716 MHz;
RX Frequency Range	Band 2: 1930-1989.9 MHz; Band 4: 2110 -2154.9MHz; Band 5 :869-894MHz; Band 7:2620-2690MHz Band 17 734-746 MHz;
Release Version	Rel-8
Type of modulation	QPSK, 16QAM
Antenna gain:	-0.5dBi(LTE band 2),-0.7dBi(LTE band 4), -1.0dBi(LTE band 5), -0.3dBi(LTE band 7), -1.0dBi(LTE band 17)
Diversity Antenna Gain	-0.7dBi(LTE band 2),-0.9dBi(LTE band 4), -1.3dBi(LTE band 5), -0.5dBi(LTE band 7), -1.3dBi(LTE band 17)
Max. Average Power	Band 2: 22.96dBm; Band 4: 22.93dBm; Band 5: 22.89dBm Band 7: 22.73dBm; Band 17: 22.82dBm
Bluetooth	
Bluetooth Version	<input type="checkbox"/> V2.0 <input type="checkbox"/> V2.1 <input type="checkbox"/> V2.1+EDR <input checked="" type="checkbox"/> V3.0 <input type="checkbox"/> V3.0+HS <input checked="" type="checkbox"/> V4.0 <input type="checkbox"/> V4.1
Operation Frequency	2402~2480MHz
Type of modulation	<input checked="" type="checkbox"/> GFSK <input checked="" type="checkbox"/> Π/4-DQPSK <input checked="" type="checkbox"/> 8-DPSK
Peak Power	0.759dBm
Antenna Gain	0.5dBi
WIFI	
WIFI Specification	<input type="checkbox"/> 802.11a <input checked="" type="checkbox"/> 802.11b <input checked="" type="checkbox"/> 802.11g <input checked="" type="checkbox"/> 802.11n(20) <input checked="" type="checkbox">802.11n(40)</input>
Operation Frequency	2412~2462MHz
Avg. Burst Power	11b: 13.91dBm,11g: 11.56dBm,11n(20): 11.74dBm,11n(40): 11.47dBm
Antenna Gain	0.5dBi
Accessories	
Battery	Brand name: N/A Model No. : V28S Voltage and Capacitance: 3.8 V & 3000mAh
Adapter	Brand name: N/A Model No. : TPA—10120125UU-MTK Input AC 100-240V 50/60Hz, Output DC 5V 2A
Earphone	Brand name: N/A Model No. : N/A

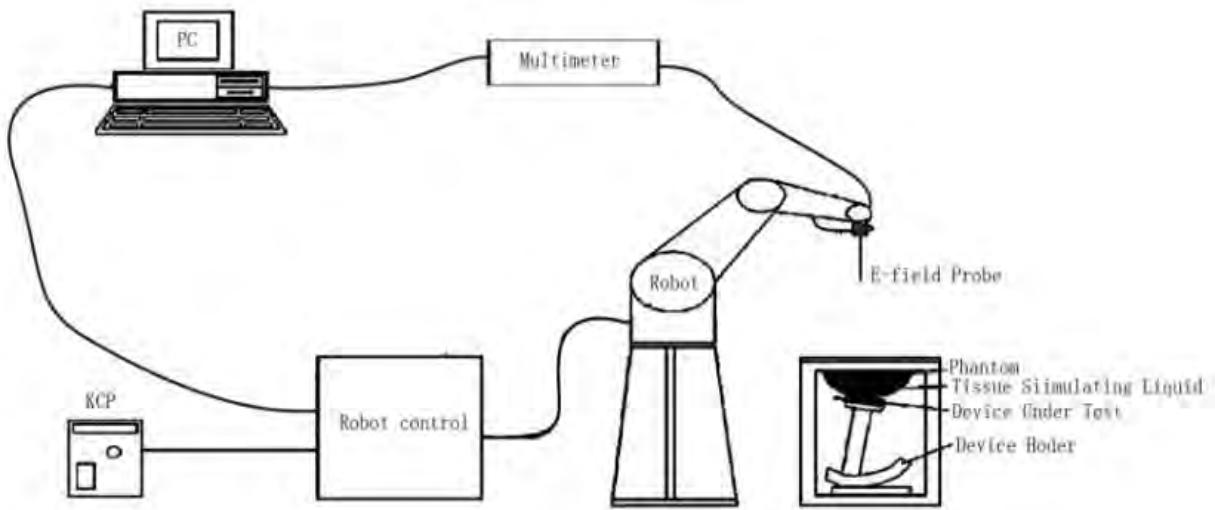
Note:1.CMU200 can measure the average power and Peak power at the same time

2.The sample used for testing is end product.

Product	Type
	<input checked="" type="checkbox"/> Production unit <input type="checkbox"/> Identical Prototype

3. SAR MEASUREMENT SYSTEM

3.1. The SATIMO system used for performing compliance tests consists of following items



The COMOSAR system for performing compliance tests consists of the following items:

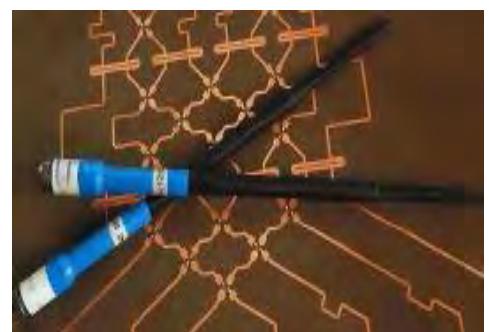
- The PC. It controls most of the bench devices and stores measurement data. A computer running WinXP and the Opensar software.
- The E-Field probe. The probe is a 3-axis system made of 3 distinct dipoles. Each dipole returns a voltage in function of the ambient electric field.
- The Keithley multimeter measures each probe dipole voltages.
- The SAM phantom simulates a human head. The measurement of the electric field is made inside the phantom.
- The liquids simulate the dielectric properties of the human head tissues.
- The network emulator controls the mobile phone under test.
- The validation dipoles are used to measure a reference SAR. They are used to periodically check the bench to make sure that there is no drift of the system characteristics over time.
- The phantom, the device holder and other accessories according to the targeted measurement.

3.2. COMOSAR E-Field Probe

The SAR measurement is conducted with the dosimetric probe manufactured by SATIMO. The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. SATIMO conducts the probe calibration in compliance with international and national standards (e.g. IEEE 1528 and relevant KDB files.) The calibration data are in Appendix D.

Isotropic E-Field Probe Specification

Model	SSE5
Manufacture	MVG
Identification No.	SN 14/16 EP308
Frequency	0.3GHz-3.7GHz Linearity: ± 0.08 dB(300MHz -3.7GHz)
Dynamic Range	0.01W/Kg-100W/Kg Linearity: ± 0.08 dB
Dimensions	Overall length:330mm Length of individual dipoles:4.5mm Maximum external diameter:8mm Probe Tip external diameter:5mm Distance between dipoles/ probe extremity:2.7mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 3 GHz with precision of better 30%.



Model	SSE5
Manufacture	MVG
Identification No.	SN 14/16 EP307
Frequency	0.7GHz-3GHz Linearity: ± 0.05 dB(700MHz-3GHz)
Dynamic Range	0.01W/Kg-100W/Kg Linearity: ± 0.05 dB
Dimensions	Overall length:330mm Length of individual dipoles:4.5mm Maximum external diameter:8mm Probe Tip external diameter:5mm Distance between dipoles/ probe extremity:2.7mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 3 GHz with precision of better 30%.



3.3. Robot

The COMOSAR system uses the KUKA robot from SATIMO SA (France). For the 6-axis controller COMOSAR system, the KUKA robot controller version from SATIMO is used.

The XL robot series have many features that are important for our application:

- High precision (repeatability 0.02 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)
- 6-axis controller

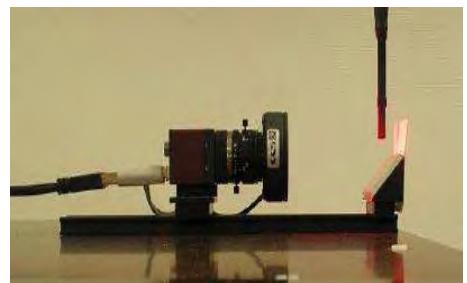


3.4. Video Positioning System

The video positioning system is used in OpenSAR to check the probe. Which is composed of a camera, LED, mirror and mechanical parts. The camera is piloted by the main computer with firewire link.

During the process, the actual position of the probe tip with respect to the robot arm is measured, as well as the probe length and the horizontal probe offset. The software then corrects all movements, such that the robot coordinates are valid for the probe tip.

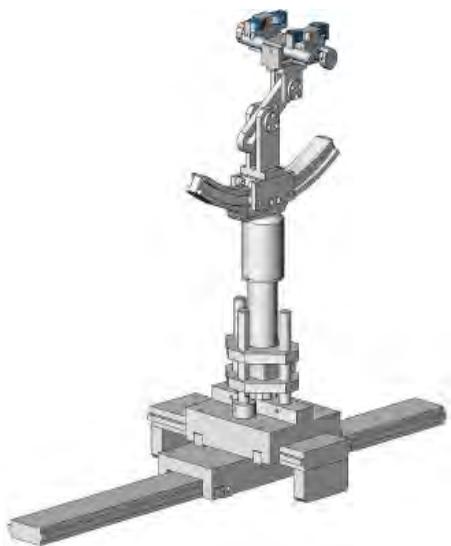
The repeatability of this process is better than 0.1 mm. If a position has been taught with an aligned probe, the same position will be reached with another aligned probe within 0.1 mm, even if the other probe has different dimensions. During probe rotations, the probe tip will keep its actual position.



3.5. Device Holder

The COMOSAR device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (EPR).

Thus the device needs no repositioning when changing the angles. The COMOSAR device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity $\epsilon_r = 3$ and loss tangent $\delta = 0.02$. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.



3.6. SAM Twin Phantom

The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region where shell thickness increases to 6mm). It has three measurement areas:

- Left head
- Right head
- Flat phantom



The bottom plate contains three pairs of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

4. SAR MEASUREMENT PROCEDURE

4.1. Specific Absorption Rate (SAR)

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

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

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

SAR is expressed in units of Watts per kilogram (W/Kg)

SAR can be obtained using either of the following equations:

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

$$\text{SAR} = c_h \left. \frac{dT}{dt} \right|_{t=0}$$

Where

SAR	is the specific absorption rate in watts per kilogram;
E	is the r.m.s. value of the electric field strength in the tissue in volts per meter;
ζ	is the conductivity of the tissue in siemens per metre;
ρ	is the density of the tissue in kilograms per cubic metre;
c_h	is the heat capacity of the tissue in joules per kilogram and Kelvin;

$\left. \frac{dT}{dt} \right|_{t=0}$ is the initial time derivative of temperature in the tissue in kelvins per second

4.2. SAR Measurement Procedure

Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurement are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface is 2.7mm This distance cannot be smaller than the distance os sensor calibration points to probe tip as `defined in the probe properties,

Step 2: Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in SATIMO software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in db) is specified in the standards for compliance testing. For example, a 2db range is required in IEEE Standard 1528 and IEC62209 standards, whereby 3db is a requirement when compliance is assessed in accordance with the ARIB standard (Japan) If one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximum are detected, the number of Zoom Scan has to be increased accordingly.

Area Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100MHz to 6GHz

	$\leq 3 \text{ GHz}$	$> 3 \text{ GHz}$
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	$5 \pm 1 \text{ mm}$	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5 \text{ mm}$
Maximum probe angle from probe axis to phantom surface normal at the measurement location	$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
	$\leq 2 \text{ GHz}: \leq 15 \text{ mm}$ $2 - 3 \text{ GHz}: \leq 12 \text{ mm}$	$3 - 4 \text{ GHz}: \leq 12 \text{ mm}$ $4 - 6 \text{ GHz}: \leq 10 \text{ mm}$
Maximum area scan spatial resolution: $\Delta x_{\text{Area}}, \Delta y_{\text{Area}}$	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.	

Step 3: Zoom Scan

Zoom Scan are used to assess the peak spatial SAR value within a cubic average volume containing 1g abd 10g of simulated tissue. The Zoom Scan measures points(refer to table below) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1g and 10g and displays these values next to the job's label.

Zoom Scan Parameters extracted from KDB865664 d01 SAR Measurement 100MHz to 6GHz

Maximum zoom scan spatial resolution: Δx_{Zoom} , Δy_{Zoom}		$\leq 2 \text{ GHz: } \leq 8 \text{ mm}$ $2 - 3 \text{ GHz: } \leq 5 \text{ mm}^*$	$3 - 4 \text{ GHz: } \leq 5 \text{ mm}^*$ $4 - 6 \text{ GHz: } \leq 4 \text{ mm}^*$
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$ graded grid	$\leq 5 \text{ mm}$	$3 - 4 \text{ GHz: } \leq 4 \text{ mm}$ $4 - 5 \text{ GHz: } \leq 3 \text{ mm}$ $5 - 6 \text{ GHz: } \leq 2 \text{ mm}$
		$\Delta z_{Zoom}(1): \text{ between } 1^{\text{st}} \text{ two points closest to phantom surface}$ $\Delta z_{Zoom}(n>1): \text{ between subsequent points}$	$\leq 4 \text{ mm}$ $\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$
Minimum zoom scan volume	x, y, z	$\geq 30 \text{ mm}$	$3 - 4 \text{ GHz: } \geq 28 \text{ mm}$ $4 - 5 \text{ GHz: } \geq 25 \text{ mm}$ $5 - 6 \text{ GHz: } \geq 22 \text{ mm}$
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 <u>reported</u> SAR from the <i>area scan based 1-g SAR estimation</i> procedures of KDB 447498 is $\leq 1.4 \text{ W/kg}$, $\leq 8 \text{ mm}$, $\leq 7 \text{ mm}$ and $\leq 5 \text{ mm}$ zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.			

Step 4: Power Drift Measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the same settings. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

4.3. RF Exposure Conditions

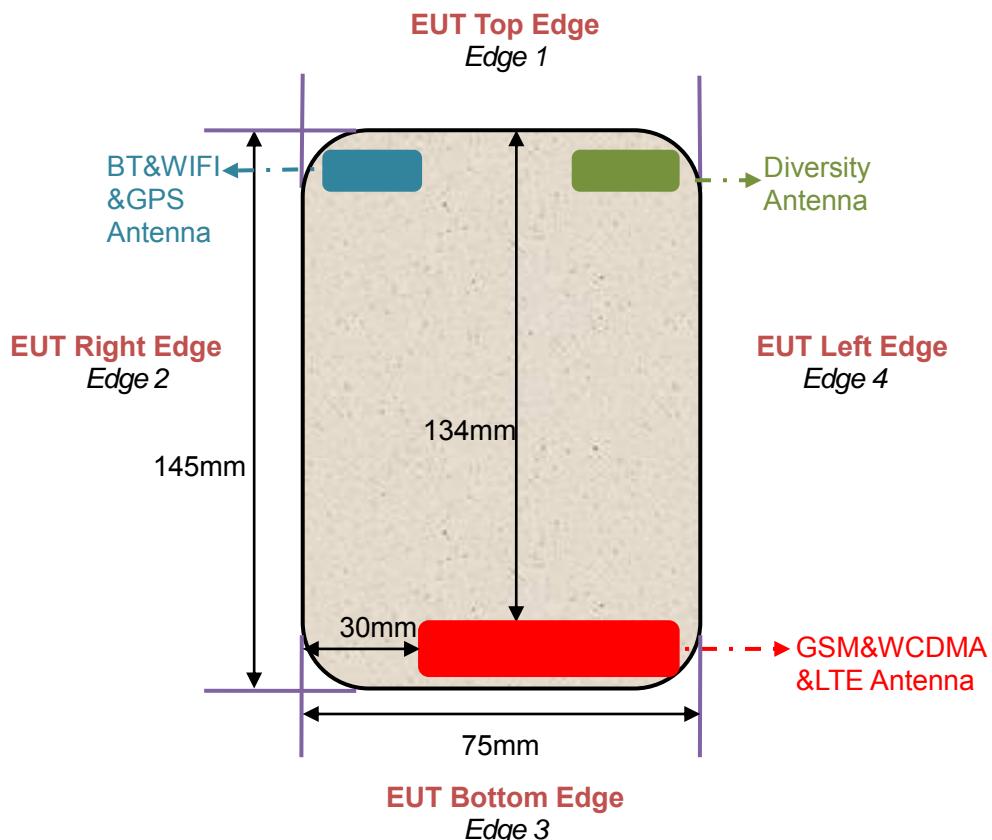
Test Configuration and setting:

The EUT is a model of GSM Portable Mobile Station (MS). It supports GSM/GPRS/EGPRS, WCDMA/HSPA, LTE, BT, WIFI, and support hot spot mode.

For WWAN SAR testing, the device was controlled by using a base station emulator. Communication between the device and the emulator were established by air link. The distance between the EUT and the antenna is larger than 50cm, and the output power radiated from the emulator antenna is at least 30db smaller than the output power of EUT.

For WLAN testing, the EUT is configured with the WLAN continuous TX tool through engineering command.

Antenna Location: (the back view)



For WWAN mode:

Test Configurations		Antenna to edges/surface	SAR required	Note
Head				
Left Touch		Yes		--
Left Tilt		Yes		--
Right Touch		Yes		--
Right Tilt		Yes		--
Body				
Back	<25mm	Yes		--
Front	<25mm	Yes		--
Hotspot				
Back	<25mm	Yes		--
Front	<25mm	Yes		--
Edge 1 (Top)	134mm	No	SAR is not required for the distance between the antenna and the edge is >25mm as per KDB 941225 D06 Hotspot SAR	
Edge 2 (Right)	30mm	No	SAR is not required for the distance between the antenna and the edge is >25mm as per KDB 941225 D06 Hotspot SAR	
Edge 3 (Bottom)	1mm	Yes		--
Edge 4 (Left)	2mm	Yes		--

For WLAN mode:

Test Configurations		Antenna to edges/surface	SAR required	Note
Head				
Left Touch		Yes		--
Left Tilt		Yes		--
Right Touch		Yes		--
Right Tilt		Yes		--
Body				
Back	<25mm	Yes		--
Front	<25mm	Yes		--
Hotspot				
Back	<25mm	Yes		--
Front	<25mm	Yes		--
Edge 1 (Top)	5mm	Yes		--
Edge 2 (Right)	5mm	Yes		--
Edge 3 (Bottom)	130mm	No	SAR is not required for the distance between the antenna and the edge is >25mm as per KDB 941225 D06 Hotspot SAR	
Edge 4 (Left)	41mm	No	SAR is not required for the distance between the antenna and the edge is >25mm as per KDB 941225 D06 Hotspot SAR	

5. TISSUE SIMULATING LIQUID

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 15cm. For head SAR testing the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15cm. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15cm. The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 5% are listed in 5.2

5.1. The composition of the tissue simulating liquid

Frequency (MHz)	Ingredient (% Weight)	Water	NaCl	Polysorbate 20	DGBE	1,2 Propanediol	Triton X-100
750 Head		35	2	0.0	0.0	63	0.0
750 Body		55	1	0.0	0.0	44	0.0
835 Head		50.36	1.25	48.39	0.0	0.0	0.0
835 Body		54.00	1	0.0	15	0.0	30
1750 Head		52.64	0.36	0.0	47	0.0	0.0
1750 Body		70	1	0.0	9	0.0	20
1900 Head		54.9	0.18	0.0	44.92	0.0	0.0
1900 Body		70	1	0.0	9	0.0	20
2450 Head		71.88	0.16	0.0	7.99	0.0	19.97
2450 Body		70	1	0.0	9	0.0	20
2600 Head		55.242	0.306	0.0	44.452	0.0	0.0
2600 Body		70	1	0.0	9	0.0	20

5.2. Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEEE 1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in IEEE 1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in IEEE 1528.

Target Frequency (MHz)	head		body	
	ϵ_r	σ (S/m)	ϵ_r	σ (S/m)
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
750	41.9	0.89	55.5	0.96
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	1.01	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1750	40.1	1.37	53.4	1.49
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
2600	39.00	1.96	52.51	2.16
3000	38.5	2.40	52.0	2.73

(ϵ_r = relative permittivity, ζ = conductivity and ρ = 1000 kg/m³)

5.3. Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using SATIMO Dielectric Probe Kit and R&S Network Analyzer ZVL6.

Tissue Stimulant Measurement for 750MHz					
Head	Fr. (MHz)	Dielectric Parameters ($\pm 5\%$)		Tissue Temp [°C]	Test time
		ϵ_r 41.9 (39.805-43.995)	$\delta [s/m]$ 0.89(0.8455-0.9345)		
	709	42.75	0.88	21.6	July 04,2017
	710	42.33	0.89		
	711	41.87	0.90		
	750	41.25	0.91		
Body	Fr. (MHz)	Dielectric Parameters ($\pm 5\%$)		Tissue Temp [°C]	Test time
		ϵ_r 55.5(52.725-58.275)	$\delta [s/m]$ 0.96(0.912-1.008)		
	709	56.42	0.94	21.9	July 04,2017
	710	55.89	0.95		
	711	55.23	0.96		
	750	54.63	0.99		

Tissue Stimulant Measurement for 1750MHz					
Head	Fr. (MHz)	Dielectric Parameters ($\pm 5\%$)		Tissue Temp [°C]	Test time
		ϵ_r 40.1 (38.095-42.105)	$\delta [s/m]$ 1.37(1.3015-1.439)		
	1712.5	41.89	1.32	21.3	July 02,2017
	1720	41.59	1.33		
	1732.5	41.03	1.35		
	1745	40.67	1.36		
	1750	40.11	1.38		
Body	Fr. (MHz)	Dielectric Parameters ($\pm 5\%$)		Tissue Temp [°C]	Test time
		ϵ_r 53.4(50.73-56.07)	$\delta [s/m]$ 1.49(1.4155-1.5645)		
	1712.5	55.06	1.43	21.5	July 02,2017
	1720	54.59	1.44		
	1732.5	53.87	1.46		
	1745	53.16	1.47		
	1750	52.66	1.49		
	1752.5	51.09	1.51		

Tissue Stimulant Measurement for 835MHz					
	Fr. (MHz)	Dielectric Parameters ($\pm 5\%$)		Tissue Temp [°C]	Test time
		ϵ_r 41.5 (39.425-43.575)	δ [s/m] 0.90(0.855-0.945)		
Head	824.2	42.86	0.88	21.3	July 02,2017
	826.4	42.31	0.90		
	829	42.01	0.90		
	835	41.79	0.90		
	836.6	41.23	0.91		
	844	40.95	0.92		
	846.6	40.67	0.92		
	848.8	40.11	0.93		
Body	Fr. (MHz)	Dielectric Parameters ($\pm 5\%$)		Tissue Temp [°C]	Test time
		ϵ_r 55.20(52.44-57-96)	δ [s/m]0.97(0.9215-1.0185)		
	824.2	56.55	0.94	21.5	July 02,2017
	826.4	56.03	0.95		
	829	55.74	0.96		
	835	55.67	0.96		
	836.6	55.21	0.97		
	844	54.98	0.97		
	846.6	54.53	0.98		
	848.8	53.89	0.99		

Tissue Stimulant Measurement for 1900MHz					
	Fr. (MHz)	Dielectric Parameters ($\pm 5\%$)		Tissue Temp [°C]	Test time
		ϵ_r 40.00(38.00-42.00)	δ [s/m]1.40(1.33-1.47)		
Head	1850.2	41.10	1.34	21.3	June 28, 2017
	1852.4	40.59	1.36		
	1860	40.22	1.36		
	1880	40.03	1.37		
	1900	39.51	1.38		
	1907.6	39.00	1.40		
	1909.8	38.48	1.42		
Body	Fr. (MHz)	Dielectric Parameters ($\pm 5\%$)		Tissue Temp [°C]	Test time
		ϵ_r 53.30(50.635-55.965)	δ [s/m]1.52(1.444-1.596)		
	1850.2	55.15	1.45	21.5	June 28, 2017
	1852.4	54.67	1.47		
	1860	54.26	1.48		
	1880	54.02	1.49		
	1900	53.58	1.51		
	1907.6	52.97	1.52		
	1909.8	52.37	1.54		

Tissue Stimulant Measurement for 2450MHz					
	Fr. (MHz)	Dielectric Parameters ($\pm 5\%$)		Tissue Temp [°C]	Test time
		ϵ_r 39.2(37.24-41.16)	δ [s/m]1.80(1.71-1.89)		
Head	2412	40.29	1.75	21.6	July 12,2017
	2437	39.75	1.80		
	2450	38.59	1.84		
	2462	38.03	1.85		
Body	Fr. (MHz)	Dielectric Parameters ($\pm 5\%$)		Tissue Temp [°C]	Test time
		ϵ_r 52.7(50.065-55.335)	δ [s/m]1.95(1.8525-2.0475)		
	2412	54.63	1.87	21.7	July 12,2017
	2437	53.95	1.90		
	2450	53.12	1.93		
	2462	52.11	1.95		

Tissue Stimulant Measurement for 2600MHz					
	Fr. (MHz)	Dielectric Parameters ($\pm 5\%$)		Tissue Temp [°C]	Test time
		ϵ_r 39.0 (37.05-40.95)	δ [s/m]1.96 (1.86-2.06)		
Head	2510	39.51	1.88	21.1	July 03,2017
	2535	38.95	1.90		
	2560	38.37	1.91		
	2600	37.68	1.92		
Body	Fr. (MHz)	Dielectric Parameters ($\pm 5\%$)		Tissue Temp [°C]	Test time
		ϵ_r 52.51 (49.88-55.14)	δ [s/m] 2.16 (2.05-2.27)		
	2510	54.23	2.10	21.3	July 03,2017
	2535	53.57	2.12		
	2560	52.79	2.14		
	2600	52.00	2.16		

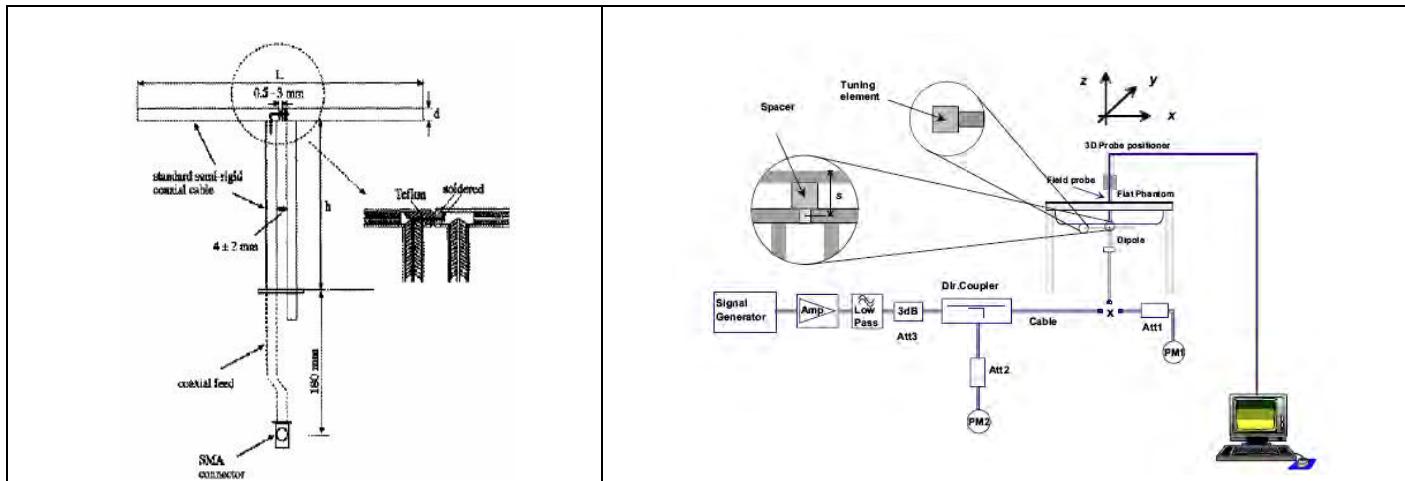
6. SAR SYSTEM CHECK PROCEDURE

6.1. SAR System Check Procedures

SAR system check is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device. The same SAR probe(s) and tissue-equivalent media combinations used with each specific SAR system for system verification must be used for device testing. When multiple probe calibration points are required to cover substantially large transmission bands, independent system verifications are required for each probe calibration point. A system verification must be performed before each series of SAR measurements using the same probe calibration point and tissue-equivalent medium. Additional system verification should be considered according to the conditions of the tissue-equivalent medium and measured tissue dielectric parameters, typically every three to four days when the liquid parameters are remeasured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

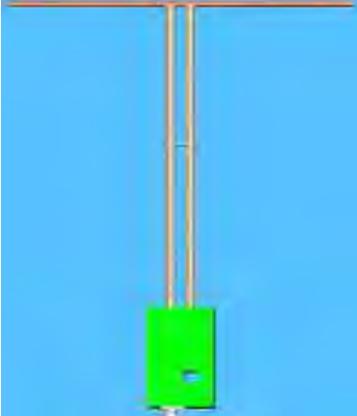
Each SATIMO system is equipped with one or more system check kits. These units, together with the predefined measurement procedures within the SATIMO software, enable the user to conduct the system check and system validation. System kit includes a dipole, and dipole device holder.

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



6.2. SAR System Check

6.2.1. Dipoles

	<p>The dipoles used are based on the IEEE-1528 standard, and is complied with mechanical and electrical specifications in line with the requirements of IEEE. the table below provides details for the mechanical and electrical Specifications for the dipoles.</p>
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Frequency	L (mm)	h (mm)	d (mm)
750MHz	176	100	6.35
835MHz	161.0	89.8	3.6
1800MHz	71.6	41.7	3.6
1900MHz	68	39.5	3.6
2450MHz	51.5	30.4	3.6
2600MHz	48.5	28.8	3.6

6.2.2. System Check Result

System Performance Check at 750MHz&835MHz &1800MHz &1900MHz &2450MHz & 2600MHz for Head								
Validation Kit: SN47/14 DIP 0G750-340& SN29/15 DIP 0G835-383& SN29/15 DIP 1G800-387&SN 29/15 DIP 1G900-389& SN 29/15DIP 2G450-393 & SN 47/14 DIP 2G600-342								
Frequency [MHz]	Target Value(W/Kg)		Reference Result ($\pm 10\%$)		Tested Value(W/Kg)		Tissue Temp. [°C]	Test time
	1g	10g	1g	10g	1g	10g		
750	8.55	5.62	7.695-9.405	5.058-6.182	9.13	6.05	21.6	July 04,2017
835	10.04	6.43	9.036-11.044	5.787 -7.073	10.12	6.19	21.3	July 02,2017
1800	37.43	19.88	33.687-41.173	17.892-21.868	37.56	20.10	21.3	July 02,2017
1900	41.44	21.33	37.296-45.584	19.197-23.463	40.27	21.16	21.3	June 28, 2017
2450	54.53	24.30	49.077-59.983	21.87-26.730	55.05	24.82	21.6	July 12,2017
2600	55.48	24.49	49.932-61.028	22.041-26.939	55.60	24.98	21.1	July 03,2017

System Performance Check at 750MHz & 835MHz &1800MHz &1900MHz &2450MHz& 2600MHz for Body								
Frequency [MHz]	Target Value(W/Kg)		Reference Result ($\pm 10\%$)		Tested Value(W/Kg)		Tissue Temp. [°C]	Test time
	1g	10g	1g	10g	1g	10g		
750	8.78	5.86	7.902-9.658	5.274-6.446	9.48	5.79	21.9	July 04,2017
835	9.85	6.45	8.865-10.835	5.805-7.095	9.66	5.93	21.5	July 02,2017
1800	36.53	19.80	32.877-40.183	17.82-21.780	35.85	19.18	21.5	July 02,2017
1900	39.38	20.86	35.442-43.318	18.774-22.946	38.30	20.12	21.5	June 28, 2017
2450	49.92	23.16	44.928-54.912	20.844-25.476	51.40	23.14	21.7	July 12,2017
2600	52.19	23.58	46.971-57.409	21.222-25.938	53.72	24.09	21.3	July 03,2017

Note:

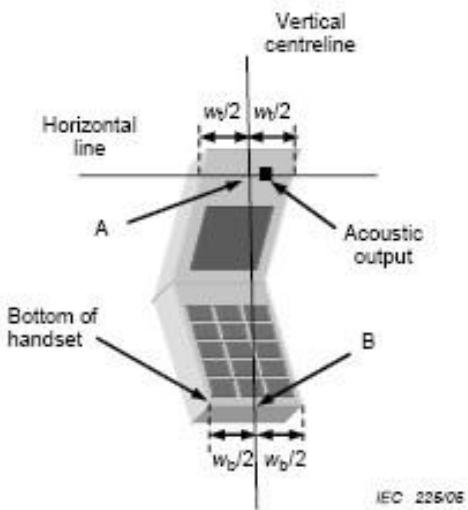
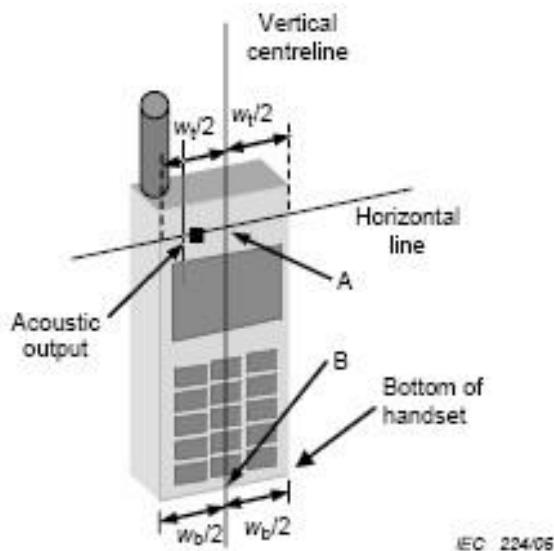
- (1) We use a CW signal of 18dBm for system check, and then all SAR values are normalized to 1W forward power. The result must be within $\pm 10\%$ of target value.

7. EUT TEST POSITION

This EUT was tested in **Right Cheek, Right Tilted, Left Cheek, Left Tilted, Body back, Body front and 4 edges.**

7.1. Define Two Imaginary Lines on the Handset

- (1) The vertical centerline passes through two points on the front side of the handset the midpoint of the width w_t of the handset at the level of the acoustic output, and the midpoint of the width w_b of the handset.
- (2) The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output. The horizontal line is also tangential to the face of the handset at point A.
- (3) The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily to the front face of the handset, especially for clamshell handsets, handsets with flip covers, and other irregularly shaped handsets.



7.2. Cheek Position

- (1) To position the device with the vertical center line of the body of the device and the horizontal line crossing the center piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical center line with the reference plane containing the ear and mouth reference point (M: Mouth, RE: Right Ear, and LE: Left Ear) and align the center of the ear piece with the line RE-LE.
- (2) To move the device towards the phantom with the ear piece aligned with the line LE-RE until the phone touched the ear. While maintaining the device in the reference plane and maintaining the phone contact with ear, move the bottom of the phone until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost



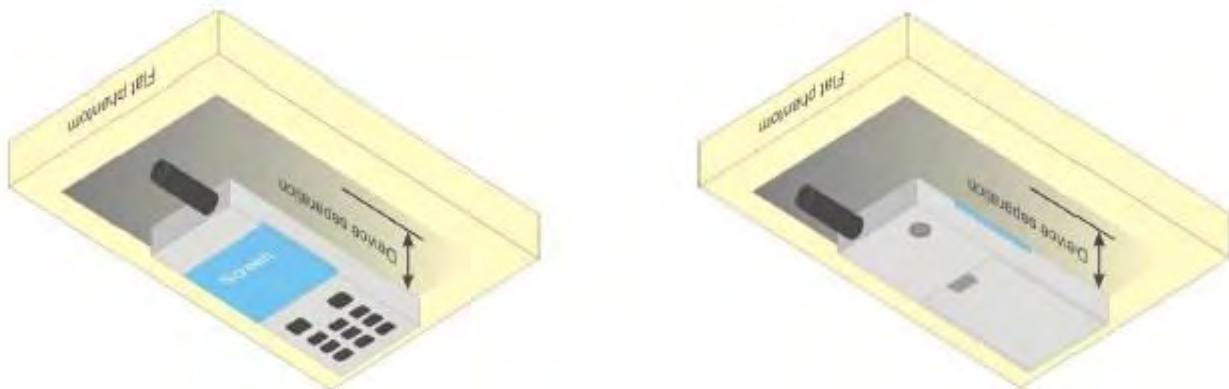
7.3. Tilt Position

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



7.4. Body Worn Position

- (1) To position the EUT parallel to the phantom surface.
- (2) To adjust the EUT parallel to the flat phantom.
- (3) To adjust the distance between the EUT surface and the flat phantom to **5mm**.



8. SAR EXPOSURE LIMITS

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

Type Exposure	Uncontrolled Environment Limit (W/kg)
Spatial Peak SAR (1g cube tissue for brain or body)	1.60
Spatial Average SAR (Whole body)	0.08
Spatial Peak SAR (Limbs)	4.0

9. TEST EQUIPMENT LIST

Equipment description	Manufacturer/ Model	Identification No.	Current calibration date	Next calibration date
SAR Probe	MVG	SN 14/16 EP308	12/05/2016	12/04/2017
SAR Probe	MVG	SN 14/16 EP307	07/05/2016	07/04/2017
Phantom	SATIMO	SN_4511_SAM90	Validated. No cal required.	Validated. No cal required.
Liquid	SATIMO	-	Validated. No cal required.	Validated. No cal required.
Comm Tester	Agilent-8960	GB46310822	03/02/2017	03/01/2018
Comm Tester	R&S- CMW500	S/N121209	07/18/2016	07/17/2017
Multimeter	Keithley 2000	1188656	03/02/2017	03/01/2018
Dipole	SATIMO SID750	SN47/14 DIP 0G750-340	12/03/2014	12/02/2017
Dipole	SATIMO SID835	SN29/15 DIP 0G835-383	07/05/2016	07/04/2019
Dipole	SATIMO SID1800	SN29/15 DIP 1G800-387	07/05/2016	07/04/2019
Dipole	SATIMO SID1900	SN 29/15 DIP 1G900-389	07/05/2016	07/04/2019
Dipole	SATIMO SID2450	SN29/15 DIP 2G450-393	07/05/2016	07/04/2019
Dipole	SATIMO SID2600	SN47/14 DIP 2G600-342	12/03/2014	12/02/2017
Signal Generator	Agilent-E4438C	US41461365	03/02/2017	03/01/2018
Vector Analyzer	Agilent / E4440A	US41421290	03/02/2017	03/01/2018
Network Analyzer	Rhode & Schwarz ZVL6	SN100132	03/02/2017	03/01/2018
Attenuator	Warison /WATT-6SR1211	N/A	N/A	N/A
Attenuator	Mini-circuits / VAT-10+	N/A	N/A	N/A
Amplifier	EM30180	SN060552	03/02/2017	03/01/2018
Directional Couple	Werlatone/ C5571-10	SN99463	06/20/2017	06/19/2018
Directional Couple	Werlatone/ C6026-10	SN99482	06/20/2017	06/19/2018
Power Sensor	NRP-Z21	1137.6000.02	10/10/2016	10/09/2017
Power Sensor	NRP-Z23	US38261498	03/02/2017	03/01/2018
Power Viewer	R&S	V2.3.1.0	N/A	N/A

Note: Per KDB 865664 Dipole SAR Validation, AGC Lab has adopted 3 years calibration intervals. On annual basis, every measurement dipole has been evaluated and is in compliance with the following criteria:

1. There is no physical damage on the dipole;
2. System validation with specific dipole is within 10% of calibrated value;
3. Return-loss is within 20% of calibrated measurement;
4. Impedance is within 5Ω of calibrated measurement.

10. MEASUREMENT UNCERTAINTY

Per KDB 865664 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 1528-2013 is not required in SAR reports submitted for equipment approval.

11. CONDUCTED POWER MEASUREMENT

GSM BAND

Mode	Frequency(MHz)	Avg. Burst Power(dBm)	Duty cycle Factor(dBm)	Frame Power(dBm)
Maximum Power <1>				
GSM 850	824.2	31.49	-9	22.49
	836.6	31.52	-9	22.52
	848.8	31.37	-9	22.37
GPRS 850 (1 Slot)	824.2	31.40	-9	22.40
	836.6	31.40	-9	22.40
	848.8	31.15	-9	22.15
GPRS 850 (2 Slot)	824.2	28.71	-6	22.71
	836.6	28.59	-6	22.59
	848.8	28.50	-6	22.50
GPRS 850 (3 Slot)	824.2	26.77	-4.26	22.51
	836.6	26.42	-4.26	22.16
	848.8	26.29	-4.26	22.03
GPRS 850 (4 Slot)	824.2	25.71	-3	22.71
	836.6	25.76	-3	22.76
	848.8	25.40	-3	22.40
EGPRS 850 (1 Slot)	824.2	24.59	-9	15.59
	836.6	24.31	-9	15.31
	848.8	24.14	-9	15.14
EGPRS 850 (2 Slot)	824.2	21.71	-6	15.71
	836.6	21.12	-6	15.12
	848.8	21.72	-6	15.72
EGPRS 850 (3 Slot)	824.2	20.28	-4.26	16.02
	836.6	20.20	-4.26	15.94
	848.8	20.13	-4.26	15.87
EGPRS 850 (4 Slot)	824.2	18.64	-3	15.64
	836.6	18.78	-3	15.78
	848.8	18.64	-3	15.64

Mode	Frequency(MHz)	Avg. Burst Power(dBm)	Duty cycle Factor(dBm)	Frame Power(dBm)
Maximum Power <2>				
GSM 850	824.2	31.22	-9	22.22
	836.6	31.46	-9	22.46
	848.8	31.15	-9	22.15
GPRS 850 (1 Slot)	824.2	31.25	-9	22.25
	836.6	31.33	-9	22.33
	848.8	31.02	-9	22.02
GPRS 850 (2 Slot)	824.2	28.25	-6	22.25
	836.6	28.12	-6	22.12
	848.8	28.33	-6	22.33
GPRS 850 (3 Slot)	824.2	26.62	-4.26	22.36
	836.6	26.32	-4.26	22.06
	848.8	26.12	-4.26	21.86
GPRS 850 (4 Slot)	824.2	25.62	-3	22.62
	836.6	25.75	-3	22.75
	848.8	25.33	-3	22.33

GSM BAND CONTINUE

Mode	Frequency(MHz)	Avg. Burst Power(dBm)	Duty cycle Factor(dBm)	Frame Power(dBm)
Maximum Power <1>				
PCS1900	1850.2	27.07	-9	18.07
	1880	27.53	-9	18.53
	1909.8	27.42	-9	18.42
GPRS1900 (1 Slot)	1850.2	27.19	-9	18.19
	1880	27.34	-9	18.34
	1909.8	27.02	-9	18.02
GPRS1900 (2 Slot)	1850.2	24.66	-6	18.66
	1880	24.37	-6	18.37
	1909.8	24.26	-6	18.26
GPRS1900 (3 Slot)	1850.2	22.29	-4.26	18.03
	1880	22.44	-4.26	18.18
	1909.8	22.48	-4.26	18.22
GPRS1900 (4 Slot)	1850.2	21.49	-3	18.49
	1880	21.55	-3	18.55
	1909.8	21.34	-3	18.34
EGPRS1900 (1 Slot)	1850.2	24.51	-9	15.51
	1880	24.87	-9	15.87
	1909.8	24.67	-9	15.67
EGPRS1900 (2 Slot)	1850.2	21.49	-6	15.49
	1880	21.76	-6	15.76
	1909.8	21.55	-6	15.55
EGPRS1900 (3 Slot)	1850.2	21.45	-4.26	17.19
	1880	21.59	-4.26	17.33
	1909.8	21.52	-4.26	17.26
EGPRS1900 (4 Slot)	1850.2	20.37	-3	17.37
	1880	20.55	-3	17.55
	1909.8	20.15	-3	17.15

Mode	Frequency(MHz)	Avg. Burst Power(dBm)	Duty cycle Factor(dBm)	Frame Power(dBm)
Maximum Power <2>				
PCS1900	1850.2	27.02	-9	18.02
	1880	27.48	-9	18.48
	1909.8	27.11	-9	18.11
GPRS1900 (1 Slot)	1850.2	27.02	-9	18.02
	1880	27.12	-9	18.12
	1909.8	27.01	-9	18.01
GPRS1900 (2 Slot)	1850.2	24.62	-6	18.62
	1880	24.35	-6	18.35
	1909.8	24.22	-6	18.22
GPRS1900 (3 Slot)	1850.2	22.02	-4.26	17.76
	1880	22.33	-4.26	18.07
	1909.8	22.25	-4.26	17.99
GPRS1900 (4 Slot)	1850.2	21.12	-3	18.12
	1880	21.25	-3	18.25
	1909.8	21.29	-3	18.29

Note 1:

The Frame Power (Source-based time-averaged Power) is scaled the maximum burst average power based on time slots. The calculated methods are show as following:

$$\text{Frame Power} = \text{Max burst power (1 Up Slot)} - 9 \text{ dB}$$

$$\text{Frame Power} = \text{Max burst power (2 Up Slot)} - 6 \text{ dB}$$

$$\text{Frame Power} = \text{Max burst power (3 Up Slot)} - 4.26 \text{ dB}$$

$$\text{Frame Power} = \text{Max burst power (4 Up Slot)} - 3 \text{ dB}$$

Note 2:

SAR is not required for GPRS (1 Slot) Mode because its output power is less than of Voice Mode

UMTS BAND

HSDPA Setup Configuration:

- The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
- The RF path losses were compensated into the measurements.
- A call was established between EUT and Based Station with following setting:
 - (1) Set Gain Factors(β_c and β_d) parameters set according to each
 - (2) Set RMC 12.2Kbps+HSDPA mode.
 - (3) Set Cell Power=-86dBm
 - (4) Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)
 - (5) Select HSDPA Uplink Parameters
 - (6) Set Delta ACK, Delta NACK and Delta CQI=8
 - (7) Set Ack - Nack Repetition Factor to 3
 - (8) Set CQI Feedback Cycle (k) to 4ms
 - (9) Set CQI Repetition Factor to 2
 - (10) Power Ctrl Mode=All Up bits
- The transmitted maximum output power was recorded.

Table C.10.2.4: β values for transmitter characteristics tests with HS-DPCCH

Sub-test	β_c (Note5)	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15(Note 4)	15/15(Note 4)	64	12/15(Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: ΔACK , ΔNACK and $\Delta\text{CQI} = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$.

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause

5.13.1AA, ΔACK and $\Delta\text{NACK} = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$, and $\Delta\text{CQI} = 24/15$ with $\beta_{hs} = 24/15 * \beta_c$.

Note 3: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 11/15$ and $\beta_d = 15/15$.

HSUPA Setup Configuration:

- The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
- The RF path losses were compensated into the measurements.
- A call was established between EUT and Base Station with following setting * :

 - (1) Call Configs = 5.2B, 5.9B, 5.10B, and 5.13.2B with QPSK
 - (2) Set the Gain Factors (β_c and β_d) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.3, quoted from the TS 34.121
 - (3) Set Cell Power = -86 dBm
 - (4) Set Channel Type = 12.2k + HSPA
 - (5) Set UE Target Power
 - (6) Power Ctrl Mode= Alternating bits
 - (7) Set and observe the E-TFCI
 - (8) Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1, and other subtest's E-TFCI

- The transmitted maximum output power was recorded.

Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note 1)	β_{EC}	β_{ED} (Note 4) (Note 5)	β_{ED} (SF)	β_{ED} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2) (Note 6)	AG Index (Note 5)	E-TF CI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ED1}:$ 47/15 $\beta_{ED2}:$ 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	0	-	-	5/15	5/15	47/15	4	1	1.0	0.0	12	67

Note 1: For sub-test 1 to 4, ΔACK , $\Delta NACK$ and $\Delta CQI = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$. For sub-test 5, ΔACK , $\Delta NACK$ and $\Delta CQI = 5/15$ with $\beta_{hs} = 5/15 * \beta_c$.

Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH, HS DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$.

Note 4: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.

Note 5: β_{ED} cannot be set directly; it is set by Absolute Grant Value.

Note 6: For subtests 2, 3 and 4, UE may perform E-DPDCH power scaling at max power which could results in slightly smaller MPR values.

UMTS BAND II

Mode	Frequency (MHz)	Avg. Burst Power (dBm)
WCDMA 1900 RMC	1852.4	21.35
	1880	21.66
	1907.6	21.45
WCDMA 1900 AMR	1852.4	21.31
	1880	21.42
	1907.6	21.58
HSDPA Subtest 1	1852.4	20.50
	1880	20.38
	1907.6	20.24
HSDPA Subtest 2	1852.4	20.20
	1880	20.69
	1907.6	20.63
HSDPA Subtest 3	1852.4	20.26
	1880	20.22
	1907.6	20.67
HSDPA Subtest 4	1852.4	20.25
	1880	20.37
	1907.6	20.37
HSUPA Subtest 1	1852.4	20.31
	1880	20.51
	1907.6	20.39
HSUPA Subtest 2	1852.4	20.52
	1880	20.66
	1907.6	20.59
HSUPA Subtest 3	1852.4	20.90
	1880	20.36
	1907.6	20.48
HSUPA Subtest 4	1852.4	20.53
	1880	20.68
	1907.6	20.68
HSUPA Subtest 5	1852.4	20.57
	1880	20.62
	1907.6	20.85

UMTS BAND IV

Mode	Frequency (MHz)	Avg. Burst Power (dBm)
WCDMA 1700 RMC	1712.5	20.46
	1732.5	20.60
	1752.5	20.77
WCDMA 1700 AMR	1712.5	20.06
	1732.5	20.33
	1752.5	20.25
HSDPA Subtest 1	1712.5	20.64
	1732.5	20.34
	1752.5	20.25
HSDPA Subtest 2	1712.5	20.43
	1732.5	20.59
	1752.5	20.56
HSDPA Subtest 3	1712.5	20.20
	1732.5	20.26
	1752.5	20.33
HSDPA Subtest 4	1712.5	20.41
	1732.5	20.49
	1752.5	20.39
HSUPA Subtest 1	1712.5	20.32
	1732.5	20.32
	1752.5	20.32
HSUPA Subtest 2	1712.5	20.67
	1732.5	20.32
	1752.5	20.47
HSUPA Subtest 3	1712.5	20.50
	1732.5	20.30
	1752.5	20.35
HSUPA Subtest 4	1712.5	20.66
	1732.5	20.43
	1752.5	20.38
HSUPA Subtest 5	1712.5	20.48
	1732.5	20.47
	1752.5	20.56

UMTS BAND V

Mode	Frequency (MHz)	Avg. Burst Power (dBm)
WCDMA 850 RMC	826.4	20.92
	836.6	21.08
	846.6	21.04
WCDMA 850 AMR	826.4	20.87
	836.6	20.77
	846.6	20.62
HSDPA Subtest 1	826.4	20.30
	836.6	20.33
	846.6	20.89
HSDPA Subtest 2	826.4	20.72
	836.6	20.78
	846.6	20.93
HSDPA Subtest 3	826.4	20.36
	836.6	20.23
	846.6	20.84
HSDPA Subtest 4	826.4	20.43
	836.6	20.27
	846.6	20.30
HSUPA Subtest 1	826.4	20.92
	836.6	20.91
	846.6	20.58
HSUPA Subtest 2	826.4	20.64
	836.6	20.34
	846.6	20.68
HSUPA Subtest 3	826.4	20.44
	836.6	20.45
	846.6	20.31
HSUPA Subtest 4	826.4	20.66
	836.6	20.42
	846.6	20.51
HSUPA Subtest 5	826.4	20.32
	836.6	20.52
	846.6	20.39

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

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

UE Transmit Channel Configuration	CM(db)	MPR(db)
For all combinations of ,DPDCH,DPCCH HS-DPDCH,E-DPDCH and E-DPCCH	0≤ CM≤3.5	MAX(CM-1,0)

Note: CM=1 for $\beta_c/\beta_d=12/15$, $\beta_{hs}/\beta_c=24/15$.For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

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

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

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

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

LTE Band

Conducted Power of LTE Band II(dBm)							
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					18607	18900	19193
1.4MHz	QPSK	1	0	0	22.02	21.63	21.45
			3	0	22.16	21.34	21.57
			5	0	22.10	21.75	21.52
		3	0	0	21.45	22.04	22.44
			2	0	21.23	22.02	21.41
			3	0	21.60	21.81	22.48
	16QAM	6	0	1	21.72	21.83	22.04
		1	0	1	21.94	22.52	22.19
			3	1	22.30	21.44	21.43
			5	1	22.57	21.51	21.20
3MHz	QPSK	3	0	1	22.09	22.56	21.59
			2	1	21.94	21.47	21.76
			3	1	22.16	21.20	22.04
		6	0	2	22.32	22.07	22.02
	16QAM	1	0	0	22.04	23.05	22.32
			7	0	22.12	22.51	22.91
			14	0	22.48	21.13	21.20
		8	0	1	21.09	21.81	21.25
			4	1	20.80	22.01	21.80
			7	1	20.91	21.03	22.04
		15	0	1	22.33	21.68	22.12
	16QAM	1	0	1	22.24	21.84	22.48
			7	1	22.38	22.30	21.09
			14	1	22.18	22.04	20.80
		8	0	2	21.63	21.23	20.91
			4	2	22.85	22.38	22.33
			7	2	22.15	21.71	22.24
		15	0	2	22.66	21.53	22.38

Conducted Power of LTE Band II(dBm)							
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					18625	18900	19175
5MHz	QPSK	1	0	0	21.58	21.43	20.92
			13	0	22.02	20.96	22.30
			24	0	20.97	21.22	22.05
		12	0	1	21.56	21.99	21.09
			6	1	21.38	21.62	22.16
			13	1	21.42	20.94	21.54
	16QAM	25	0	1	21.09	22.42	22.24
		1	0	1	21.09	21.87	21.18
			13	1	21.23	21.47	21.49
			24	1	22.46	21.01	21.43
10MHz	QPSK	1	0	2	21.66	21.72	21.67
			6	2	21.79	21.44	21.06
			13	2	22.13	21.30	21.05
		25	0	2	21.46	22.43	21.27
	16QAM	1	0	0	22.14	22.73	22.23
			25	0	20.72	21.26	21.20
			49	0	21.73	22.74	22.38
		25	0	1	21.38	21.82	21.31
			13	1	21.66	22.80	21.17
			25	1	22.09	20.99	22.34
		50	0	1	21.41	22.22	20.86

Conducted Power of LTE Band II(dBm)								
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel	
					18675	18900	19125	
15MHz	QPSK	1	0	0	21.25	21.45	21.27	
			38	0	21.40	21.69	20.95	
			74	0	22.48	22.14	21.19	
		36	0	1	21.42	22.05	21.52	
			18	1	22.25	21.70	21.21	
			39	1	22.45	21.91	21.60	
	16QAM	75	0	1	21.41	21.89	20.92	
		1	0	1	20.80	21.10	22.64	
			38	1	21.89	22.34	21.68	
			74	1	22.10	21.87	22.11	
		36	0	2	21.30	21.45	22.26	
			18	2	22.08	22.32	21.57	
			39	2	20.91	21.11	21.03	
		75	0	2	22.87	21.30	21.63	
Bandwidth		RB size		RB offset		Channel	Channel	
Modulation		Target MPR		18700		18900	19100	
20MHz	QPSK	1	0	0	21.84	21.61	22.38	
			50	0	22.89	22.40	22.01	
			99	0	21.09	20.88	21.77	
		50	0	1	22.44	21.50	21.57	
			25	1	21.58	22.34	21.62	
			50	1	22.14	21.95	21.90	
	16QAM	100	0	1	22.20	21.91	22.96	
		1	0	1	21.41	21.48	20.81	
			50	1	22.80	22.18	22.14	
			99	1	21.43	22.26	21.64	
		50	0	2	20.99	21.58	22.37	
			25	2	21.79	21.65	22.07	
			50	2	20.85	22.54	21.41	
		100	0	2	21.83	22.19	21.90	

Conducted Power of LTE Band IV(dBm)							
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					19957	20175	20393
1.4MHz	QPSK	1	0	0	21.89	21.57	21.51
			3	0	21.75	22.68	22.17
			5	0	22.12	21.06	21.58
		3	0	0	21.45	22.23	21.56
			2	0	21.63	23.01	21.49
			3	0	22.14	21.77	21.84
	16QAM	6	0	1	22.59	21.61	22.02
		1	0	1	22.61	22.07	22.06
			3	1	21.51	21.78	21.23
			5	1	21.70	22.22	21.82
		3	0	1	22.05	22.00	22.39
			2	1	21.32	21.30	22.29
			3	1	20.91	21.46	22.87
		6	0	2	21.97	21.44	21.84
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					19965	20175	20385
3MHz	QPSK	1	0	0	21.98	22.34	21.52
			7	0	22.22	21.25	21.41
			14	0	22.23	22.14	21.76
		8	0	1	20.87	21.02	20.74
			4	1	22.22	22.57	22.55
			7	1	21.26	22.53	21.28
	16QAM	15	0	1	20.88	21.78	20.81
		1	0	1	22.50	22.08	21.51
			7	1	22.03	21.30	21.24
			14	1	22.04	21.22	22.01
		8	0	2	21.01	21.59	21.87
			4	2	21.77	21.48	21.69
			7	2	21.31	22.13	21.63
		15	0	2	21.20	21.19	22.15

Conducted Power of LTE Band IV(dBm)								
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel	
					19975	20175	20375	
5MHz	QPSK	1	0	0	21.64	22.50	21.88	
			13	0	21.42	22.09	21.17	
			24	0	22.22	21.54	20.86	
		12	0	1	20.90	21.59	21.90	
			6	1	21.40	21.64	21.30	
			13	1	22.08	21.07	21.86	
	16QAM	25	0	1	20.98	21.09	21.63	
		1	0	1	20.97	21.40	22.16	
			13	1	21.74	21.70	21.66	
			24	1	22.13	21.95	21.38	
		12	0	2	22.75	21.05	22.30	
			6	2	21.98	22.39	20.93	
			13	2	21.69	21.48	21.02	
		25	0	2	21.51	21.40	21.86	
Bandwidth		RB size		RB offset		Channel	Channel	
Modulation		Target MPR		20000		20175	20350	
10MHz	QPSK	1	0	0	21.67	22.93	22.05	
			25	0	22.42	22.14	21.41	
			49	0	22.73	22.02	22.15	
		25	0	1	22.31	21.04	21.44	
			13	1	21.38	21.13	21.62	
			25	1	22.27	21.73	21.21	
		50	0	1	21.98	21.43	22.54	
	16QAM	1	0	1	21.65	21.25	22.01	
			25	1	20.90	21.60	22.11	
			49	1	21.97	22.67	21.39	
		25	0	2	21.13	21.82	22.22	
			13	2	21.87	21.30	22.02	
			25	2	21.54	21.88	21.48	
		50	0	2	22.13	21.98	21.07	

Conducted Power of LTE Band IV(dBm)								
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel	
					20025	20175	20325	
15MHz	QPSK	1	0	0	22.10	22.74	22.16	
			38	0	21.42	22.77	20.80	
			74	0	21.55	20.85	21.63	
		36	0	1	21.21	22.93	22.02	
			18	1	21.55	22.30	21.34	
			39	1	21.35	21.46	22.01	
	16QAM	75	0	1	22.03	21.52	21.44	
		1	0	1	22.34	21.76	21.81	
			38	1	21.86	22.18	21.15	
			74	1	22.86	22.68	21.42	
		36	0	2	21.31	21.90	21.42	
			18	2	21.57	21.34	22.15	
			39	2	21.59	22.27	22.33	
		75	0	2	22.14	21.88	22.04	
Bandwidth		RB size		RB offset		Channel	Channel	
Modulation		Target MPR		20050		20175	20300	
20MHz	QPSK	1	0	0	20.92	22.86	21.16	
			50	0	21.27	21.35	21.28	
			99	0	21.98	21.85	21.47	
		50	0	1	20.99	22.23	21.12	
			25	1	21.73	21.97	21.14	
			50	1	22.06	22.53	21.03	
	16QAM	100	0	1	22.06	21.60	21.41	
		1	0	1	21.06	21.61	21.97	
			50	1	22.38	22.04	20.99	
			99	1	22.13	22.23	21.88	
		50	0	2	21.29	21.27	22.12	
			25	2	22.35	22.13	22.01	
			50	2	22.26	21.61	21.13	
		100	0	2	22.01	21.59	21.03	

Conducted Power of LTE Band V(dBm)								
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel	
					20407	20525	20643	
1.4MHz	QPSK	1	0	0	21.76	21.48	22.34	
			3	0	21.62	22.23	21.48	
			5	0	21.47	20.94	22.49	
		3	0	0	21.05	21.79	22.19	
			2	0	22.32	22.21	21.62	
			3	0	21.70	21.55	21.27	
	16QAM	6	0	1	22.18	21.96	21.77	
		1	0	1	21.95	22.46	21.67	
			3	1	22.27	21.83	20.85	
			5	1	22.72	22.51	22.17	
		3	0	1	22.89	21.49	21.89	
			2	1	21.46	21.72	22.19	
			3	1	21.47	22.03	21.92	
		6	0	2	22.02	22.05	22.39	
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel	
					20415	20525	20635	
3MHz	QPSK	1	0	0	22.86	21.18	21.57	
			7	0	21.77	21.75	21.79	
			14	0	21.40	21.80	21.66	
		8	0	1	21.10	22.13	22.64	
			4	1	21.94	21.51	21.78	
			7	1	21.76	22.08	22.77	
		15	0	1	21.29	21.26	22.01	
		1	0	1	22.10	21.71	21.55	
	16QAM		7	1	21.41	21.61	20.87	
			14	1	21.76	21.88	21.80	
	8	0	2	21.58	21.15	22.02		
		4	2	22.44	22.33	21.43		
		7	2	21.27	20.83	22.07		
	15	0	2	22.57	21.21	21.39		

Conducted Power of LTE Band V(dBm)							
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					20425	20525	20625
5MHz	QPSK	1	0	0	21.82	21.75	21.44
			13	0	22.60	21.85	21.71
			24	0	21.75	21.42	21.43
		12	0	1	22.20	22.24	21.49
			6	1	20.95	22.11	22.37
			13	1	22.82	20.97	22.00
	16QAM	25	0	1	22.69	21.41	22.75
		1	0	1	22.69	22.41	21.71
			13	1	21.52	21.63	21.96
			24	1	21.91	21.74	21.05
10MHz	QPSK	1	0	2	22.57	22.02	22.05
			6	2	22.42	21.83	22.55
			13	2	20.89	22.47	22.66
		25	0	2	21.36	20.96	22.00
	16QAM	1	0	0	22.34	22.52	22.04
			25	0	21.31	21.25	21.02
			49	0	22.16	21.13	22.32
		25	0	1	21.45	22.70	20.91
			13	1	21.99	21.52	22.61
			25	1	22.76	21.85	21.54
			50	0	1	21.54	21.39
		1	0	1	21.12	22.47	22.20
			25	1	21.28	22.01	21.39
			49	1	20.86	22.34	22.25
			0	2	21.74	21.51	22.00
		25	13	2	22.72	22.17	21.36
			25	2	20.80	21.21	21.14
			50	0	2	21.95	21.31

Conducted Power of LTE Band VII (dBm)							
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel
					20775	21100	21425
5MHz	QPSK	1	0	0	21.75	21.81	21.73
			12	0	21.88	21.99	21.92
			24	0	22.22	21.48	22.11
		12	0	1	21.87	21.67	22.19
			6	1	21.39	22.39	22.30
			13	1	21.32	22.30	21.75
	16QAM	25	0	1	22.34	22.28	21.88
		1	0	1	22.11	21.61	22.22
			12	1	22.02	22.48	21.87
			24	1	22.24	21.71	21.39
10MHz	QPSK	1	0	2	21.88	22.07	21.32
			6	2	21.42	21.24	22.34
			13	2	22.31	21.55	22.11
		25	0	2	22.08	21.84	22.02
	16QAM	1	0	0	22.40	22.70	21.62
			24	0	22.15	22.00	21.84
			49	0	22.31	21.74	21.87
		25	0	1	21.84	22.08	22.20
			12	1	22.42	22.00	21.64
			25	1	21.52	22.31	22.40
		50	0	1	22.31	22.24	22.15

Conducted Power of LTE Band VII (dBm)								
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel	
					20825	21100	21375	
15MHz	QPSK	1	0	0	21.88	22.51	21.72	
			37	0	22.45	21.73	22.31	
			74	0	21.58	22.13	22.09	
		37	0	1	22.41	22.62	21.65	
			19	1	21.89	22.00	22.25	
			38	1	22.08	22.13	21.88	
	16QAM	75	0	1	22.21	22.06	22.45	
		1	0	1	22.32	21.97	21.58	
			37	1	22.02	21.67	22.41	
			74	1	21.49	22.06	21.89	
20MHz	QPSK	1	0	2	21.52	21.86	22.08	
			19	2	21.92	22.32	22.21	
			38	2	22.28	22.48	22.32	
		37	75	0	22.37	21.61	22.02	
	16QAM		0	2	21.37	21.61	22.02	
			49	0	21.82	22.21	22.45	
			99	0	21.88	22.25	22.23	
	50	0	1	21.93	21.66	22.29		
		25	1	21.73	22.73	21.64		
		50	1	22.61	22.25	21.74		
	100	0	1	22.06	21.44	21.82		
	16QAM	1	0	1	22.27	22.22	21.88	
			49	1	21.99	22.61	21.93	
			99	1	21.65	21.97	21.73	
		50	0	2	22.30	22.02	22.61	
			25	2	21.65	22.31	22.06	
			50	2	22.44	21.55	22.27	
		100	0	2	21.33	21.96	21.99	

Conducted Power of LTE Band XVII(dBm)								
Bandwidth	Modulation	RB size	RB offset	Target MPR	Channel	Channel	Channel	
					23755	23790	23825	
5MHz	QPSK	1	0	0	21.66	21.12	22.18	
			13	0	21.61	21.39	22.25	
			24	0	21.18	22.50	22.26	
		12	0	1	22.57	22.56	21.45	
			6	1	21.49	22.39	21.91	
			13	1	22.82	21.24	21.40	
	16QAM	25	0	1	22.29	21.63	21.60	
		1	0	1	22.32	22.42	21.15	
			13	1	22.64	22.02	22.57	
			24	1	22.08	22.62	21.44	
	16QAM	12	0	2	21.88	21.23	21.96	
			6	2	21.76	21.23	22.57	
			13	2	21.26	22.28	22.15	
		25	0	2	22.03	21.64	22.61	
Bandwidth		Modulation		RB size	RB offset	Target MPR	Channel	
							23780	
10MHz	QPSK	1	0	0	21.87	22.76	22.22	
			25	0	21.84	22.26	21.23	
			49	0	21.99	21.71	22.04	
		25	0	1	21.54	21.39	21.73	
			13	1	21.72	22.42	20.85	
			25	1	22.11	22.28	21.87	
	16QAM	50	0	1	22.89	21.91	21.84	
		1	0	1	21.69	21.99	21.25	
			25	1	22.61	21.60	21.54	
			49	1	21.52	22.18	21.34	
	16QAM	25	0	2	22.03	21.75	22.11	
			13	2	21.14	22.44	21.24	
			25	2	21.60	21.54	21.65	
		50	0	2	22.72	21.77	22.74	

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3.3-1 of the 3GPP TS36.101.

Table 6.2.3.3-1 Maximum Power Reduction (MPR) for Power class3

Modulation	Maximum Power Reduction (MPR) for Power[RB]						MPR(dB)
	1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz	
QPSK	>5	>4	>8	>12	>16	>18	≤1
16QAM	≤5	≤4	≤8	≤12	≤16	≤18	≤1
16QAM	>5	>4	>8	>12	>16	>18	≤2

The allowed A-MPR values specified below in Table 6.2.4.3-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01".3

Table 6.2.4.3-1: Additional Maximum Power Reduction (A-MPR) / Spectrum Emission requirements

Network Signaling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.2-1	1.4,3,5,10,15,20	Table 5.4.2-1	N/A
NS_03	6.6.2.2.3.1	2,4,10, 23, 25,35,36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.3.2	41	5	>6	≤ 1
			10, 15, 20	Table 6.2.4.3-4	
NS_05	6.6.3.3.3.1	1	10,15,20	≥ 50	≤ 1
NS_06	6.6.2.2.3.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.4.2-1	N/A
NS_07	6.6.2.2.3.3	13	10	Table 6.2.4.3-2	Table 6.2.4.3-2
	6.6.3.3.3.2				
NS_08	6.6.3.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
				Table 6.2.4.3-3	
NS_10		20	15, 20	Table 6.2.4.3-3	
NS_11	6.6.2.2.1	231	1.4, 3, 5, 10,15,20	Table 6.2.4.3-5	Table 6.2.4.3-5
	6.6.3.3.13				
NS_12	6.6.3.3.5	26	1.4, 3, 5	Table 6.2.4.3-6	Table 6.2.4.3-6
NS_13	6.6.3.3.6	26	5	Table 6.2.4.3-7	Table 6.2.4.3-7
NS_14	6.6.3.3.7	26	10, 15	Table 6.2.4.3-8	Table 6.2.4.3-8
NS_15	6.6.3.3.8	26	1.4, 3, 5, 10, 15	Table 6.2.4.3-9 Table 6.2.4.3-10	Table 6.2.4.3-9, Table 6.2.4.3-10
NS_16	6.6.3.3.9	27	3, 5, 10	Table 6.2.4.3-11, Table 6.2.4.3-12, Table 6.2.4.3-13	
NS_17	6.6.3.3.10	28	5, 10	Table 5.4.2-1	N/A
			5	≥ 2	≤ 1
NS_18			10, 15, 20	≥ 1	≤ 4
NS_19			10, 15, 20	Table 6.2.4.3-15	Table 6.2.4.3-15
NS_20			5, 10, 15, 20	Table 6.2.4.3-14	Table 6.2.4.3-14
...					
NS_20	-	-	-	-	-

WIFI

Mode	Data Rate (Mbps)	Channel	Frequency(MHz)	Avg. Burst Power(dBm)
802.11b	1	01	2412	10.88
		06	2437	13.18
		11	2462	13.91
802.11g	6	01	2412	7.16
		06	2437	11.52
		11	2462	11.56
802.11n(20)	6.5	01	2412	7.26
		06	2437	11.74
		11	2462	11.72
802.11n(40)	13.5	03	2422	11.34
		06	2437	11.47
		09	2452	11.12

Bluetooth_V3.0

Modulation	Channel	Frequency(MHz)	Peak Power (dBm)
GFSK	0	2402	-1.849
	39	2441	-0.411
	78	2480	0.759
$\pi/4$ -DQPSK	0	2402	-2.848
	39	2441	-1.106
	78	2480	-0.021
8-DPSK	0	2402	-2.930
	39	2441	-1.229
	78	2480	-0.081

Bluetooth_V4.0

Modulation	Channel	Frequency(MHz)	Peak Power (dBm)
GFSK	0	2402	-2.113
	19	2440	0.246
	39	2480	0.834

12. TEST RESULTS

12.1. SAR Test Results Summary

12.1.1. Test position and configuration

Head SAR was performed with the device configured in the positions according to IEEE 1528-2013, Body-worn SAR was performed with the device 5mm from the phantom, and 4 Edges SAR was performed with the device 10mm from the phantom.

12.1.2. Operation Mode

1. Per KDB 447498 D01 v06 ,for each exposure position, if the highest 1-g SAR is $\leq 0.8 \text{ W/kg}$, testing for low and high channel is optional.
2. Per KDB 865664 D01 v01r04,for each frequency band, if the measured SAR is $\geq 0.8\text{W/Kg}$, testing for repeated SAR measurement is required , that the highest measured SAR is only to be tested. When the SAR results are near the limit, the following procedures are required for each device to verify these types of SAR measurement related variation concerns by repeating the highest measured SAR configuration in each frequency band.
 - (1) When the original highest measured SAR is $\geq 0.8\text{W/Kg}$, repeat that measurement once.
 - (2) 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 $\geq 1.45 \text{ W/Kg}$.
 - (3) Perform a third repeated measurement only if the original, first and second repeated measurement is $\geq 1.5 \text{ W/Kg}$ and ratio of largest to smallest SAR for the original, first and second measurement is ≥ 1.20 .
3. Body-worn exposure conditions are intended to voice call operations, therefore GSM voice call mode is selected to be test.
4. Per KDB 648474 D04 v01r03,when the reported SAR for a body-worn accessory measured without a headset connected to the handset is $\leq 1.2\text{W/Kg}$, SAR testing with a headset connected is not required.
5. Per KDB 248227 D01v02r02,for 2.4GHz 802.11g/n SAR testing is not required when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is $\leq 1.2\text{W/kg}$.
6. Per KDB 941225 D06 V02r01, When the same wireless mode transmission configurations for voice and data are required for SAR measurements, the more conservative configuration with a smaller separation distance should be tested for the overlapping SAR configurations.
7. Maximum Scaling SAR in order to calculate the Maximum SAR values to test under the standard Peak Power, Calculation method is as follows:
Maximum Scaling SAR =tested SAR (Max.) \times [maximum turn-up power (mw)/ maximum measurement output power(mw)]
8. Proximity sensor, just for avoiding the wrong operation in the phone screen when call, and has no influence on output power or SAR result
9. Per KDB 941225 D05v02r03, start with the largest channel bandwidth and measure SAR for QPSK with 1RB allocation using the RB offset and required test channel combination with highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
10. Per KDB 941125 D05v02r03, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
11. Per KDB 941125 D05v02r03. For QPSK with 100% RB allocation. SAR is not required when the highest maximum output power for 100% RB allocation is less than the highest maximum output power in 50% and

1RB allocation and the highest reported SAR is >1.45 W/Kg, the remaining required test channels must also be tested.

12. Per KDB 941125 D05v02r03. 16QAM output power for each RB allocation configuration is not 1/2 dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/Kg, Per KDB 941225 D05v02r02, 16QAM SAR testing is not required.
13. Per KDB 941125 D05v02r03. Smaller bandwidth output power for each RB allocation configuration is $>$ not 1/2 dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/Kg. Per KDB 941125 D05v02r03, smaller bandwidth SAR testing is not required.

12.1.3. Test Result

SAR MEASUREMENT																
Depth of Liquid (cm):>15			Relative Humidity (%): 50.8													
Product: Rugged Mobile Phone																
Test Mode: GSM850 with GMSK modulation																
Position	Mode	Ch.	Fr. (MHz)	Power Drift ($\pm 5\%$)	SAR (1g) (W/kg)	Max. Tune-up Power (dBm)	Meas. output Power (dBm)	Scaled SAR (W/Kg)	Limit (W/kg)							
SIM 1 Card																
Left Cheek	voice	190	836.6	-0.23	0.123	31.52	31.52	0.123	1.6							
Left Tilt	voice	190	836.6	1.33	0.091	31.52	31.52	0.091	1.6							
Right Cheek	voice	190	836.6	0.23	0.158	31.52	31.52	0.158	1.6							
Right Tilt	voice	190	836.6	-1.33	0.085	31.52	31.52	0.085	1.6							
Body back	voice	190	836.6	0.25	0.317	31.52	31.52	0.317	1.6							
Body front	voice	190	836.6	-0.23	0.189	31.52	31.52	0.189	1.6							
Left Cheek	GPRS-4 slot	190	836.6	0.23	0.181	25.76	25.76	0.181	1.6							
Left Tilt	GPRS-4 slot	190	836.6	1.35	0.127	25.76	25.76	0.127	1.6							
Right Cheek	GPRS-4 slot	190	836.6	-0.23	0.215	25.76	25.76	0.215	1.6							
Right Tilt	GPRS-4 slot	190	836.6	1.33	0.146	25.76	25.76	0.146	1.6							
Body back	GPRS-4 slot	190	836.6	0.26	0.490	25.76	25.76	0.490	1.6							
Body front	GPRS-4 slot	190	836.6	-0.23	0.299	25.76	25.76	0.299	1.6							
Edge 1 (Top)	GPRS-4 slot	190	836.6	-1.33	0.017	25.76	25.76	0.017	1.6							
Edge 2(Right)	GPRS-4 slot	190	836.6	-0.26	0.119	25.76	25.76	0.119	1.6							
Edge 3(Bottom)	GPRS-4 slot	190	836.6	0.23	0.091	25.76	25.76	0.091	1.6							
Edge 4(Left)	GPRS-4 slot	190	836.6	-1.33	0.064	25.76	25.76	0.064	1.6							
SIM 2Card																
Right Cheek	GPRS-4 slot	190	836.6	0.02	0.213	25.76	25.75	0.213	1.6							
Body back	GPRS-4 slot	190	836.6	-0.03	0.483	25.76	25.75	0.484	1.6							

Note:

- When the 1-g Reported SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 447498.
- The test separation for body back and body front is 5mm of all above table.
- The test separation for 4 Edges is 10mm of all above table.

SAR MEASUREMENT																
Depth of Liquid (cm):>15			Relative Humidity (%): 55.4													
Product: Rugged Mobile Phone																
Test Mode: PCS1900 with GMSK modulation																
Position	Mode	Ch.	Fr. (MHz)	Power Drift ($\pm 5\%$)	SAR (1g) (W/kg)	Max. Tune-up Power (dBm)	Meas. output Power (dBm)	Scaled SAR (W/Kg)	Limit (W/kg)							
SIM 1 Card																
Left Cheek	voice	661	1880.0	-0.32	0.307	27.53	27.53	0.307	1.6							
Left Tilt	voice	661	1880.0	1.22	0.092	27.53	27.53	0.092	1.6							
Right Cheek	voice	661	1880.0	-0.23	0.167	27.53	27.53	0.167	1.6							
Right Tilt	voice	661	1880.0	-0.23	0.091	27.53	27.53	0.091	1.6							
Body back	voice	661	1880.0	-1.33	0.643	27.53	27.53	0.643	1.6							
Body front	voice	661	1880.0	0.27	0.458	27.53	27.53	0.458	1.6							
Left Cheek	GPRS-2 slot	661	1880.0	-0.23	0.527	24.66	24.37	0.563	1.6							
Left Tilt	GPRS-2 slot	661	1880.0	1.30	0.138	24.66	24.37	0.148	1.6							
Right Cheek	GPRS-2 slot	661	1880.0	-0.82	0.313	24.66	24.37	0.335	1.6							
Right Tilt	GPRS-2 slot	661	1880.0	0.93	0.134	24.66	24.37	0.143	1.6							
Body back	GPRS-2 slot	512	1850.2	0.23	0.633	24.66	24.66	0.633	1.6							
Body back	GPRS-2 slot	661	1880.0	-1.33	0.851	24.66	24.37	0.910	1.6							
Body back	GPRS-2 slot	810	1909.8	0.02	1.020	24.66	24.26	1.118	1.6							
Body front	GPRS-2 slot	512	1850.2	0.23	0.576	24.66	24.66	0.576	1.6							
Body front	GPRS-2 slot	661	1880.0	-1.33	0.843	24.66	24.37	0.901	1.6							
Body front	GPRS-2 slot	810	1909.8	0.02	0.965	24.66	24.26	1.058	1.6							
Edge 1 (Top)	GPRS-2 slot	661	1880.0	0.23	0.091	24.66	24.37	0.097	1.6							
Edge 2(Right)	GPRS-2 slot	661	1880.0	-0.23	0.118	24.66	24.37	0.126	1.6							
Edge 3(Bottom)	GPRS-2 slot	661	1880.0	-1.33	0.399	24.66	24.37	0.427	1.6							
Edge 4(Left)	GPRS-2 slot	661	1880.0	0.02	0.324	24.66	24.37	0.346	1.6							
SIM 2 Card																
Left Cheek	GPRS-2 slot	661	1880.0	-0.32	0.464	24.66	24.35	0.498	1.6							
Body back	GPRS-2 slot	810	1909.8	-1.33	0.992	24.66	24.22	1.098	1.6							

Note:

- When the 1-g Reported SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 447498.
- The test separation for body back and body front is 5mm of all above table.
- The test separation for 4 Edges is 10mm of all above table.

SAR MEASUREMENT																
Depth of Liquid (cm):>15			Relative Humidity (%): 55.4													
Product: Rugged Mobile Phone																
Test Mode: WCDMA Band II with QPSK modulation																
Position	Mode	Ch.	Fr. (MHz)	Power Drift ($\pm 5\%$)	SAR (1g) (W/kg)	Max. Tune-up Power (dBm)	Meas. output Power (dBm)	Scaled SAR (W/Kg)	Limit (W/kg)							
Left Cheek	RMC 12.2kbps	9400	1880	-0.63	0.465	21.66	21.66	0.465	1.6							
Left Tilt	RMC 12.2kbps	9400	1880	1.23	0.115	21.66	21.66	0.115	1.6							
Right Cheek	RMC 12.2kbps	9400	1880	-0.62	0.258	21.66	21.66	0.258	1.6							
Right Tilt	RMC 12.2kbps	9400	1880	-1.26	0.123	21.66	21.66	0.123	1.6							
Body back	RMC 12.2kbps	9262	1852.4	0.03	1.007	21.66	21.35	1.082	1.6							
Body back	RMC 12.2kbps	9400	1880	-0.16	1.193	21.66	21.66	1.193	1.6							
Body back	RMC 12.2kbps	9538	1907.6	0.32	1.016	21.66	21.45	1.066	1.6							
Body front	RMC 12.2kbps	9400	1880	-1.63	0.702	21.66	21.66	0.702	1.6							
Edge 1 (Top)	RMC 12.2kbps	9400	1880	-0.02	0.094	21.66	21.66	0.094	1.6							
Edge 2(Right)	RMC 12.2kbps	9400	1880	-0.23	0.094	21.66	21.66	0.094	1.6							
Edge 3(Bottom)	RMC 12.2kbps	9400	1880	1.33	0.287	21.66	21.66	0.287	1.6							
Edge 4(Left)	RMC 12.2kbps	9400	1880	0.55	0.370	21.66	21.66	0.370	1.6							

Note:

- When the 1-g Reported SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 447498.
- The test separation for body back and body front is 5mm of all above table.
- The test separation for 4 Edges is 10mm of all above table.

SAR MEASUREMENT																
Depth of Liquid (cm):>15			Relative Humidity (%):													
Product: Rugged Mobile Phone																
Test Mode: WCDMA Band IV with QPSK modulation																
Position	Mode	Ch.	Fr. (MHz)	Power Drift ($\pm 5\%$)	SAR (1g) (W/kg)	Max. Tune-up Power (dBm)	Meas. output Power (dBm)	Scaled SAR (W/Kg)	Limit (W/kg)							
Left Cheek	RMC 12.2kbps	8662	1732.5	-0.93	0.052	20.77	20.60	0.054	1.6							
Left Tilt	RMC 12.2kbps	8662	1732.5	1.63	0.014	20.77	20.60	0.015	1.6							
Right Cheek	RMC 12.2kbps	8662	1732.5	-0.32	0.025	20.77	20.60	0.026	1.6							
Right Tilt	RMC 12.2kbps	8662	1732.5	0.63	0.019	20.77	20.60	0.020	1.6							
Body back	RMC 12.2kbps	8662	1732.5	-1.33	0.678	20.77	20.60	0.705	1.6							
Body front	RMC 12.2kbps	8662	1732.5	0.52	0.117	20.77	20.60	0.122	1.6							
Edge 1 (Top)	RMC 12.2kbps	8662	1732.5	0.23	0.021	20.77	20.60	0.022	1.6							
Edge 2(Right)	RMC 12.2kbps	8662	1732.5	-1.43	0.007	20.77	20.60	0.007	1.6							
Edge 3(Bottom)	RMC 12.2kbps	8662	1732.5	0.52	0.110	20.77	20.60	0.114	1.6							
Edge 4(Left)	RMC 12.2kbps	8662	1732.5	0.23	0.042	20.77	20.60	0.044	1.6							

Note:

- When the 1-g Reported SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 447498.
- The test separation for body back and body front is 5mm of all above table.
- The test separation for 4 Edges is 10mm of all above table.

SAR MEASUREMENT																
Depth of Liquid (cm):>15			Relative Humidity (%): 50.8													
Product: Rugged Mobile Phone																
Test Mode: WCDMA Band V with QPSK modulation																
Position	Mode	Ch.	Fr. (MHz)	Power Drift ($\pm 5\%$)	SAR (1g) (W/kg)	Max. Tune-up Power (dBm)	Meas. output Power (dBm)	Scaled SAR (W/Kg)	Limit (W/kg)							
Left Cheek	RMC 12.2kbps	4183	836.6	-0.02	0.321	21.08	21.08	0.321	1.6							
Left Tilt	RMC 12.2kbps	4183	836.6	1.33	0.181	21.08	21.08	0.181	1.6							
Right Cheek	RMC 12.2kbps	4183	836.6	-0.65	0.230	21.08	21.08	0.230	1.6							
Right Tilt	RMC 12.2kbps	4183	836.6	0.78	0.088	21.08	21.08	0.088	1.6							
Body back	RMC 12.2kbps	4183	836.6	0.55	0.299	21.08	21.08	0.299	1.6							
Body front	RMC 12.2kbps	4183	836.6	-0.36	0.594	21.08	21.08	0.594	1.6							
Edge 1 (Top)	RMC 12.2kbps	4183	836.6	0.10	0.003	21.08	21.08	0.003	1.6							
Edge 2(Right)	RMC 12.2kbps	4183	836.6	0.20	0.018	21.08	21.08	0.018	1.6							
Edge 3(Bottom)	RMC 12.2kbps	4183	836.6	-0.36	0.005	21.08	21.08	0.005	1.6							
Edge 4(Left)	RMC 12.2kbps	4183	836.6	0.44	0.031	21.08	21.08	0.031	1.6							

Note:

- When the 1-g Reported SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 447498.
- The test separation for body back and body front is 5mm of all above table.
- The test separation for 4 Edges is 10mm of all above table.

SAR MEASUREMENT																			
Depth of Liquid (cm):>15				Relative Humidity (%): 55.4															
Product: Rugged Mobile Phone																			
Test Mode: LTE Band II																			
BM MHz	MOD	Position	Test Mode		Ch.	Freq. (MHz)	Power Drift ($\pm 5\%$)	SAR (1g) (W/kg)	Max. Tune up Power (dBm)	Meas. output Power (dBm)	Scaled SAR (W/Kg)	Limit (W/kg)							
20	QPSK	Left Cheek	1	50	18900	1880	-0.23	0.592	22.96	22.40	0.673	1.6							
		Left Tilt	1	50	18900	1880	1.30	0.109	22.96	22.40	0.124	1.6							
		Right Cheek	1	50	18900	1880	-0.22	0.270	22.96	22.40	0.307	1.6							
		Right Tilt	1	50	18900	1880	1.33	0.121	22.96	22.40	0.138	1.6							
		Body back	1	50	18700	1860	0.23	0.930	22.96	22.89	0.945	1.6							
		Body back	1	50	18900	1880	0.23	0.942	22.96	22.40	1.072	1.6							
		Body back	1	50	19100	1900	-1.33	0.920	22.96	22.01	1.145	1.6							
		Body front	1	50	18700	1860	0.02	0.865	22.96	22.89	0.879	1.6							
		Body front	1	50	18900	1880	0.23	0.873	22.96	22.40	0.993	1.6							
		Body front	1	50	19100	1900	-1.33	0.877	22.96	22.01	1.091	1.6							
		Edge 1 (Top)	1	50	18900	1880	0.25	0.115	22.96	22.40	0.131	1.6							
		Edge 2(Right)	1	50	18900	1880	0.52	0.079	22.96	22.40	0.090	1.6							
		Edge 3(Bottom)	1	50	18900	1880	-0.23	0.384	22.96	22.40	0.437	1.6							
		Edge 4(Left)	1	50	18900	1880	-1.33	0.297	22.96	22.40	0.338	1.6							

Note:

- When the 1-g Reported SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 447498.
- The test separation for body back and body front is 5mm of all above table.
- The test separation for 4 Edges is 10mm of all above table.

SAR MEASUREMENT																			
Depth of Liquid (cm):>15				Relative Humidity (%): 52.9															
Product: Rugged Mobile Phone																			
Test Mode: LTE Band IV																			
BM MHz	MOD	Position	Test Mode		Ch.	Freq. (MHz)	Power Drift ($\leq \pm 5\%$)	SAR (1g) (W/kg)	Max. Tuneu p Power (dBm)	Meas. output Power (dBm)	Scaled SAR (W/Kg)	Limit (W/kg)							
			UL RB Allocation	UL RB START															
20	QPSK	Left Cheek	1	0	20175	1732.5	-0.23	0.049	23.00	22.86	0.051	1.6							
		Left Tilt	1	0	20175	1732.5	1.36	0.014	23.00	22.86	0.014	1.6							
		Right Cheek	1	0	20175	1732.5	0.23	0.023	23.00	22.86	0.024	1.6							
		Right Tilt	1	0	20175	1732.5	-1.55	0.016	23.00	22.86	0.017	1.6							
		Body back	1	0	20175	1732.5	0.20	0.656	23.00	22.86	0.677	1.6							
		Body front	1	0	20175	1732.5	0.23	0.118	23.00	22.86	0.122	1.6							
		Edge 1 (Top)	1	0	20175	1732.5	-1.66	0.040	23.00	22.86	0.041	1.6							
		Edge 2(Right)	1	0	20175	1732.5	0.53	0.007	23.00	22.86	0.007	1.6							
		Edge 3(Bottom)	1	0	20175	1732.5	0.26	0.205	23.00	22.86	0.212	1.6							
		Edge 4(Left)	1	0	20175	1732.5	-0.14	0.092	23.00	22.86	0.095	1.6							

Note:

- When the 1-g Reported SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 447498.
- The test separation for body back and body front is 5mm of all above table.
- The test separation for 4 Edges is 10mm of all above table.

SAR MEASUREMENT																			
Depth of Liquid (cm):>15				Relative Humidity (%):50.8															
Product: Rugged Mobile Phone																			
Test Mode: LTE Band V																			
BM MHz	MOD	Position	Test Mode		Ch.	Freq. (MHz)	Power Drift (<±5%)	SAR (1g) (W/kg)	Max. Tuneup Power (dBm)	Meas. output Power (dBm)	Scaled SAR (W/Kg)	Limit (W/kg)							
10	QPSK	Left Cheek	1	0	20525	836.5	-0.93	0.492	22.89	22.52	0.536	1.6							
		Left Tilt	1	0	20525	836.5	1.66	0.313	22.89	22.52	0.341	1.6							
		Right Cheek	1	0	20525	836.5	0.20	0.560	22.89	22.52	0.610	1.6							
		Right Tilt	1	0	20525	836.5	-1.63	0.290	22.89	22.52	0.316	1.6							
		Body back	1	0	20450	829	0.12	1.030	22.89	22.34	1.169	1.6							
		Body back	1	0	20525	836.5	0.53	0.964	22.89	22.52	1.050	1.6							
		Body back	1	0	20600	844	-1.23	0.978	22.89	22.04	1.189	1.6							
		Body front	1	0	20450	829	0.62	0.750	22.89	22.34	0.851	1.6							
		Body front	1	0	20525	836.5	-0.22	0.813	22.89	22.52	0.885	1.6							
		Body front	1	0	20600	844	0.62	0.736	22.89	22.04	0.895	1.6							
		Edge 1 (Top)	1	0	20525	836.5	1.33	0.033	22.89	22.52	0.036	1.6							
		Edge 2(Right)	1	0	20525	836.5	-0.63	0.365	22.89	22.52	0.397	1.6							
		Edge 3(Bottom)	1	0	20525	836.5	-1.36	0.102	22.89	22.52	0.111	1.6							
		Edge 4(Left)	1	0	20525	836.5	0.13	0.249	22.89	22.52	0.271	1.6							

Note:

- When the 1-g Reported SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 447498.
- The test separation for body back and body front is 5mm of all above table.
- The test separation for 4 Edges is 10mm of all above table.

SAR MEASUREMENT																			
Depth of Liquid (cm):>15				Relative Humidity (%): 51.3															
Product: Rugged Mobile Phone																			
Test Mode: LTE Band VII																			
BM MHz	MOD	Position	Test Mode		Ch.	Freq. (MHz)	Power Drift (<±5%)	SAR (1g) (W/kg)	Max. Tuneup Power (dBm)	Meas. output Power (dBm)	Scaled SAR (W/Kg)	Limit (W/kg)							
20	QPSK	Left Cheek	1	49	21100	2535	-0.22	0.169	22.80	22.21	0.194	1.6							
		Left Tilt	1	49	21100	2535	0.02	0.037	22.80	22.21	0.042	1.6							
		Right Cheek	1	49	21100	2535	-1.33	0.076	22.80	22.21	0.087	1.6							
		Right Tilt	1	49	21100	2535	0.02	0.041	22.80	22.21	0.047	1.6							
		Body back	1	49	20850	2510	0.23	0.872	22.80	21.82	1.093	1.6							
		Body back	1	49	21100	2535	1.33	0.854	22.80	22.21	0.978	1.6							
		Body back	1	49	21350	2560	0.02	0.890	22.80	22.45	0.965	1.6							
		Body front	1	49	21100	2535	-0.23	0.655	22.80	22.21	0.750	1.6							
		Edge 1 (Top)	1	49	21100	2535	0.02	0.014	22.80	22.21	0.016	1.6							
		Edge 2(Right)	1	49	21100	2535	0.23	0.035	22.80	22.21	0.040	1.6							
		Edge 3(Bottom)	1	49	21100	2535	-1.33	0.511	22.80	22.21	0.585	1.6							
		Edge 4(Left)	1	49	21100	2535	-0.02	0.053	22.80	22.21	0.061	1.6							

Note:

- When the 1-g Reported SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 447498.
- The test separation for body back and body front is 5mm of all above table.
- The test separation for 4 Edges is 10mm of all above table.

SAR MEASUREMENT																			
Depth of Liquid (cm):>15				Relative Humidity (%): 54.6															
Product: Rugged Mobile Phone																			
Test Mode: LTE Band XVII																			
BM MHz	MOD	Position	Test Mode		Ch.	Freq. (MHz)	Power Drift (<±5%)	SAR (1g) (W/kg)	Max. Tuneup Power (dBm)	Meas. output Power (dBm)	Scaled SAR (W/Kg)	Limit (W/kg)							
10	QPSK	Left Cheek	UL RB Allocation	UL RB START	23790	710	-0.63	0.070	23.00	22.76	0.074	1.6							
		Left Tilt	1	0	23790	710	1.23	0.046	23.00	22.76	0.049	1.6							
		Right Cheek	1	0	23790	710	0.02	0.070	23.00	22.76	0.074	1.6							
		Right Tilt	1	0	23790	710	-0.15	0.056	23.00	22.76	0.059	1.6							
		Body back	1	0	23790	710	0.32	0.250	23.00	22.76	0.264	1.6							
		Body front	1	0	23790	710	1.03	0.125	23.00	22.76	0.132	1.6							
		Edge 1 (Top)	1	0	23790	710	-0.22	0.005	23.00	22.76	0.005	1.6							
		Edge 2(Right)	1	0	23790	710	0.63	0.060	23.00	22.76	0.063	1.6							
		Edge 3(Bottom)	1	0	23790	710	1.36	0.024	23.00	22.76	0.025	1.6							
		Edge 4(Left)	1	0	23790	710	-0.63	0.071	23.00	22.76	0.075	1.6							

Note:

- When the 1-g Reported SAR is ≤ 0.8 W/kg, testing for low and high channel is optional. Refer to KDB 447498.
- The test separation for body back and body front is 5mm of all above table.
- The test separation for 4 Edges is 10mm of all above table.

SAR MEASUREMENT																
Depth of Liquid (cm):>15			Relative Humidity (%): 53.6													
Product: Rugged Mobile Phone																
Test Mode:802.11b																
Position	Mode	Ch.	Fr. (MHz)	Power Drift (<±5%)	SAR (1g) (W/kg)	Max. Tune-up Power (dBm)	Meas. output Power (dBm)	Scaled SAR (W/Kg)	Limit (W/kg)							
Left Cheek	DTS	11	2462	-0.66	0.507	13.91	13.91	0.507	1.6							
Left Tilt	DTS	11	2462	0.51	0.285	13.91	13.91	0.285	1.6							
Right Cheek	DTS	11	2462	-0.23	0.180	13.91	13.91	0.180	1.6							
Right Tilt	DTS	11	2462	1.33	0.155	13.91	13.91	0.155	1.6							
Body back	DTS	11	2462	0.26	0.348	13.91	13.91	0.348	1.6							
Body front	DTS	11	2462	-0.35	0.248	13.91	13.91	0.248	1.6							
Edge 1 (Top)	DTS	11	2462	0.41	0.061	13.91	13.91	0.061	1.6							
Edge 2(Right)	DTS	11	2462	0.23	0.061	13.91	13.91	0.061	1.6							
Edge 3(Bottom)	DTS	11	2462	0.02	0.014	13.91	13.91	0.014	1.6							
Edge 4(Left)	DTS	11	2462	-1.66	0.012	13.91	13.91	0.012	1.6							

Note:

- According to KDB248227, SAR is not required for 802.11n HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11a/b channels.
- All of above "DTS" means data transmitters.
- The test separation for body back and body front is 5mm of all above table.
- The test separation for 4 Edges is 10mm of all above table.

Repeated SAR										
Product: Rugged Mobile Phone										
Test Mode: PCS1900& WCDMA Band II & LTE Band II & LTE Band V										
Position	Mode	Ch.	Fr. (MHz)	Power Drift (<±5%)	Once SAR (1g) (W/kg)	Power Drift (<±5%)	Twice SAR (1g) (W/kg)	Power Drift (<±5%)	Third SAR (1g) (W/kg)	Limit W/kg
Body back	GPRS-2 slot	810	1909.8	-0.32	1.017	--	--	--	--	1.6
Body back	RMC 12.2kbps	9400	1880	1.33	1.007	--	--	--	--	1.6
Body back	QPSK	18900	1880	-0.02	0.912	--	--	--	--	1.6
Body back	QPSK	20450	829	0.56	1.007	--	--	--	--	1.6
Body back	QPSK	21350	2560	-0.32	0.874	--	--	--	--	1.6

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

NO	Simultaneous state	Portable Handset		
		Head	Body-worn	Hotspot
1	GSM(voice)+WLAN 2.4GHz (data)	Yes	Yes	-
2	WCDMA(voice)+WLAN 2.4GHz (data)	Yes	Yes	-
3	GSM(voice)+Bluetooth(data)	-	Yes	-
4	WCDMA(voice)+Bluetooth(data)	-	Yes	-
5	GSM (Data) + Bluetooth(data)	-	Yes	
6	GSM (Data) + WLAN 2.4GHz (data)	Yes	Yes	Yes
7	WCDMA (Data) + Bluetooth(data)	--	Yes	
8	WCDMA (Data) + WLAN 2.4GHz (data)	Yes	Yes	Yes
9	LTE + Bluetooth(data)	--	Yes	
10	LTE + WLAN 2.4GHz (data)	Yes	Yes	Yes

NOTE:

1. WIFI and BT share the same antenna, and cannot transmit simultaneously.
2. Simultaneous with every transmitter must be the same test position.
3. KDB 447498 D01, BT SAR is excluded as below table.
4. KDB 447498 D01, for handsets the test separation distance is determined by the smallest distance between the outer surface of the device and the user; which is 0mm for head SAR and 5mm for body-worn SAR.
5. According to KDB 447498 D01 4.3.1, Standalone SAR test exclusion is as follow:

For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR³⁰, where

- $f(\text{GHz})$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation³¹
- The result is rounded to one decimal place for comparison
- The values 3.0 and 7.5 are referred to as numeric thresholds in step b) below

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm, and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 4.1 f) is applied to determine SAR test exclusion.

6. If the test separation distance is < 5 mm, 5mm is used for excluded SAR calculation.
7. According to KDB 447498 D01 4.3.2, simultaneous transmission SAR test exclusion is as follow:
 - (1) Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneous transmitting antenna.
 - (2) Any transmitters and antennas should be considered when calculating simultaneous mode.
 - (3) For mobile phone and PC, it's the sum of all transmitters and antennas at the same mode with same position in each applicable exposure condition
 - (4) When the standalone SAR test exclusion of section 4.3.2 is applied to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to the following to det

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

8. When the sum of SAR is larger than the limit, SAR test exclusion is determined by the SAR to peak location separation ratio. The simultaneous transmitting antennas in each operating mode and exposure condition combination must be considered one pair at a time to determine the SAR to peak location separation ratio to qualify for test exclusion. The ratio is determined by $(\text{SAR1} + \text{SAR2})1.5/\text{R}_i$, rounded to two decimal digits, and must be ≤ 0.04 for all antenna pairs in the configuration to qualify for 1-g SAR test exclusion.

Estimated SAR		Max Power including Tune-up Tolerance		Separation Distance (mm)	Estimated SAR (W/kg)
		dBm	mW		
BT	Head	1	1.259	0	0.053
	Body	1	1.259	5	0.053
				10	0.026

Sum of the SAR for GSM 850 &Wi-Fi & BT:

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario			$\Sigma 1\text{-g SAR}$ (W/Kg)	SPLSR (Yes/No)
		GSM 850	Wi-Fi DTS Band	Bluetooth		
Head (voice)	Left Touch	0.123	0.507		0.630	No
	Left Tilt	0.091	0.285		0.376	No
	Right Touch	0.158	0.180		0.338	No
	Right Tilt	0.085	0.155		0.240	No
Body-worn (voice)	Rear	0.317	0.348		0.665	No
		0.317		0.053	0.370	No
	Front	0.189	0.248		0.437	No
		0.189		0.053	0.242	No
Head (Data)	Left Touch	0.181	0.507		0.688	No
	Left Tilt	0.127	0.285		0.412	No
	Right Touch	0.215	0.180		0.395	No
	Right Tilt	0.146	0.155		0.301	No
Body-worn (Data)	Rear	0.490		0.053	0.543	No
		0.490	0.348		0.838	No
	Front	0.299		0.053	0.352	No
		0.299	0.248		0.547	No
Body-worn (Hotspot)	Edge 1	0.017	0.061		0.078	No
	Edge 2	0.119	0.061		0.180	No
	Edge 3	0.091	0.014		0.105	No
	Edge 4	0.064	0.012		0.076	No
	Edge 1	0.017		0.026	0.043	No
	Edge 2	0.119		0.026	0.145	No
	Edge 3	0.091		0.026	0.117	No
	Edge 4	0.064		0.026	0.090	No

Note:

- According to KDB 447498 D01 General RF Exposure Guidance, when the simultaneous transmission SAR is less than 1.6 W/Kg, SPLSR assessment is not required.
- SPLSR mean is "The SAR to Peak Location Separation Ratio "

Sum of the SAR for GSM 1900 &Wi-Fi & BT:

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario			$\Sigma 1\text{-g SAR}$ (W/Kg)	SPLSR (Yes/No)
		PCS 1900	Wi-Fi DTS Band	Bluetooth		
Head (voice)	Left Touch	0.307	0.507		0.814	No
	Left Tilt	0.092	0.285		0.377	No
	Right Touch	0.167	0.180		0.347	No
	Right Tilt	0.091	0.155		0.246	No
Body-worn (voice)	Rear	0.643	0.348		0.991	No
		0.643		0.053	0.696	No
	Front	0.458	0.248		0.706	No
		0.458		0.053	0.511	No
Head (Data)	Left Touch	0.563	0.507		1.070	No
	Left Tilt	0.148	0.285		0.433	No
	Right Touch	0.335	0.180		0.515	No
	Right Tilt	0.143	0.155		0.298	No
Body-worn (Data)	Rear	1.118		0.053	1.171	No
		1.118	0.348		1.466	No
	Front	1.058		0.053	1.111	No
		1.058	0.248		1.306	No
Body-worn (Hotspot)	Edge 1	0.097	0.061		0.158	No
	Edge 2	0.126	0.061		0.187	No
	Edge 3	0.427	0.014		0.441	No
	Edge 4	0.346	0.012		0.358	No
	Edge 1	0.097		0.026	0.123	No
	Edge 2	0.126		0.026	0.152	No
	Edge 3	0.427		0.026	0.453	No
	Edge 4	0.346		0.026	0.372	No

Note:

- According to KDB 447498 D01 General RF Exposure Guidance, when the simultaneous transmission SAR is less than 1.6 W/Kg, SPLSR assessment is not required.
- SPLSR mean is "The SAR to Peak Location Separation Ratio "

Sum of the SAR for WCDMA Band II &Wi-Fi & BT:

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario			$\Sigma 1\text{-g SAR (W/Kg)}$	SPLSR (Yes/No)
		WCDMA Band II	Wi-Fi DTS Band	Bluetooth		
Head	Left Touch	0.465	0.507		0.972	No
	Left Tilt	0.115	0.285		0.400	No
	Right Touch	0.258	0.180		0.438	No
	Right Tilt	0.123	0.155		0.278	No
Body-worn	Rear	1.193	0.348		1.541	No
	Front	0.702	0.248		0.950	No
	Edge 1	0.094	0.061		0.155	No
	Edge 2	0.094	0.061		0.155	No
	Edge 3	0.287	0.014		0.301	No
	Edge 4	0.370	0.012		0.382	No
	Rear	1.193		0.053	1.246	No
	Front	0.702		0.053	0.755	No
	Edge 1	0.094		0.026	0.120	No
	Edge 2	0.094		0.026	0.120	No
	Edge 3	0.287		0.026	0.313	No
	Edge 4	0.370		0.026	0.396	No

Note:

- According to KDB 447498 D01 General RF Exposure Guidance, when the simultaneous transmission SAR is less than 1.6 W/Kg, SPLSR assessment is not required.
- SPLSR mean is "The SAR to Peak Location Separation Ratio "

Sum of the SAR for WCDMA Band IV &Wi-Fi & BT:

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario			$\Sigma 1\text{-g SAR (W/Kg)}$	SPLSR (Yes/No)
		WCDMA Band IV	Wi-Fi DTS Band	Bluetooth		
Head	Left Touch	0.054	0.507		0.561	No
	Left Tilt	0.015	0.285		0.300	No
	Right Touch	0.026	0.180		0.206	No
	Right Tilt	0.020	0.155		0.175	No
Body-worn	Rear	0.705	0.348		1.053	No
	Front	0.122	0.248		0.370	No
	Edge 1	0.022	0.061		0.083	No
	Edge 2	0.007	0.061		0.068	No
	Edge 3	0.114	0.014		0.128	No
	Edge 4	0.044	0.012		0.056	No
	Rear	0.705		0.053	0.758	No
	Front	0.122		0.053	0.175	No
	Edge 1	0.022		0.026	0.048	No
	Edge 2	0.007		0.026	0.033	No
	Edge 3	0.114		0.026	0.140	No
	Edge 4	0.044		0.026	0.070	No

Note:

- According to KDB 447498 D01 General RF Exposure Guidance, when the simultaneous transmission SAR is less than 1.6 W/Kg, SPLSR assessment is not required.
- SPLSR mean is "The SAR to Peak Location Separation Ratio "

Sum of the SAR for WCDMA Band V &Wi-Fi & BT:

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario			$\Sigma 1\text{-g SAR (W/Kg)}$	SPLSR (Yes/No)
		WCDMA Band V	Wi-Fi DTS Band	Bluetooth		
Head	Left Touch	0.321	0.507		0.828	No
	Left Tilt	0.181	0.285		0.466	No
	Right Touch	0.230	0.180		0.410	No
	Right Tilt	0.088	0.155		0.243	No
Body-worn	Rear	0.299	0.348		0.647	No
	Front	0.594	0.248		0.842	No
	Edge 1	0.003	0.061		0.064	No
	Edge 2	0.018	0.061		0.079	No
	Edge 3	0.005	0.014		0.019	No
	Edge 4	0.031	0.012		0.043	No
	Rear	0.299		0.053	0.352	No
	Front	0.594		0.053	0.647	No
	Edge 1	0.003		0.026	0.029	No
	Edge 2	0.018		0.026	0.044	No
	Edge 3	0.005		0.026	0.031	No
	Edge 4	0.031		0.026	0.057	No

Note:

- According to KDB 447498 D01 General RF Exposure Guidance, when the simultaneous transmission SAR is less than 1.6 W/Kg, SPLSR assessment is not required.
- SPLSR mean is "The SAR to Peak Location Separation Ratio "

Sum of the SAR for LTE Band II &Wi-Fi & BT:

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario			$\Sigma 1\text{-g SAR}$ (W/Kg)	SPLSR (Yes/No)
		LTE Band II	Wi-Fi DTS Band	Bluetooth		
Head	Left Touch	0.673	0.507		1.180	No
	Left Tilt	0.124	0.285		0.409	No
	Right Touch	0.307	0.180		0.487	No
	Right Tilt	0.138	0.155		0.293	No
Body-worn	Rear	1.145	0.348		1.493	No
	Front	1.091	0.248		1.339	No
	Edge 1	0.131	0.061		0.192	No
	Edge 2	0.090	0.061		0.151	No
	Edge 3	0.437	0.014		0.451	No
	Edge 4	0.338	0.012		0.350	No
	Rear	1.145		0.053	1.198	No
	Front	1.091		0.053	1.144	No
	Edge 1	0.131		0.026	0.157	No
	Edge 2	0.090		0.026	0.116	No
	Edge 3	0.437		0.026	0.463	No
	Edge 4	0.338		0.026	0.364	No

Sum of the SAR for LTE Band IV &Wi-Fi & BT:

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario			$\Sigma 1\text{-g SAR}$ (W/Kg)	SPLSR (Yes/No)
		LTE Band IV	Wi-Fi DTS Band	Bluetooth		
Head	Left Touch	0.051	0.507		0.558	No
	Left Tilt	0.014	0.285		0.299	No
	Right Touch	0.024	0.180		0.204	No
	Right Tilt	0.017	0.155		0.172	No
Body-worn	Rear	0.677	0.348		1.025	No
	Front	0.122	0.248		0.370	No
	Edge 1	0.041	0.061		0.102	No
	Edge 2	0.007	0.061		0.068	No
	Edge 3	0.212	0.014		0.226	No
	Edge 4	0.095	0.012		0.107	No
	Rear	0.677		0.053	0.730	No
	Front	0.122		0.053	0.175	No
	Edge 1	0.041		0.026	0.067	No
	Edge 2	0.007		0.026	0.033	No
	Edge 3	0.212		0.026	0.238	No
	Edge 4	0.095		0.026	0.121	No

Note:

- According to KDB 447498 D01 General RF Exposure Guidance, when the simultaneous transmission SAR is less than 1.6 W/Kg, SPLSR assessment is not required.
- SPLSR mean is "The SAR to Peak Location Separation Ratio "

Sum of the SAR for LTE Band V &Wi-Fi & BT:

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario			$\Sigma 1\text{-g SAR}$ (W/Kg)	SPLSR (Yes/No)
		LTE Band V	Wi-Fi DTS Band	Bluetooth		
Head	Left Touch	0.536	0.507		1.043	No
	Left Tilt	0.341	0.285		0.626	No
	Right Touch	0.610	0.180		0.790	No
	Right Tilt	0.316	0.155		0.471	No
Body-worn	Rear	1.189	0.348		1.537	No
	Front	0.895	0.248		1.143	No
	Edge 1	0.036	0.061		0.097	No
	Edge 2	0.397	0.061		0.458	No
	Edge 3	0.111	0.014		0.125	No
	Edge 4	0.271	0.012		0.283	No
	Rear	1.189		0.053	1.242	No
	Front	0.895		0.053	0.948	No
	Edge 1	0.036		0.026	0.062	No
	Edge 2	0.397		0.026	0.423	No
	Edge 3	0.111		0.026	0.137	No
	Edge 4	0.271		0.026	0.297	No

Sum of the SAR for LTE Band VII &Wi-Fi & BT:

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario			$\Sigma 1\text{-g SAR}$ (W/Kg)	SPLSR (Yes/No)
		LTE Band VII	Wi-Fi DTS Band	Bluetooth		
Head	Left Touch	0.194	0.507		0.701	No
	Left Tilt	0.042	0.285		0.327	No
	Right Touch	0.087	0.180		0.267	No
	Right Tilt	0.047	0.155		0.202	No
Body-worn	Rear	1.093	0.348		1.441	No
	Front	0.750	0.248		0.998	No
	Edge 1	0.016	0.061		0.077	No
	Edge 2	0.040	0.061		0.101	No
	Edge 3	0.585	0.014		0.599	No
	Edge 4	0.061	0.012		0.073	No
	Rear	1.093		0.053	1.146	No
	Front	0.750		0.053	0.803	No
	Edge 1	0.016		0.026	0.042	No
	Edge 2	0.040		0.026	0.066	No
	Edge 3	0.585		0.026	0.611	No
	Edge 4	0.061		0.026	0.087	No

Note:

- According to KDB 447498 D01 General RF Exposure Guidance, when the simultaneous transmission SAR is less than 1.6 W/Kg, SPLSR assessment is not required.
- SPLSR mean is "The SAR to Peak Location Separation Ratio "

Sum of the SAR for LTE Band XVII &Wi-Fi & BT:

RF Exposure Conditions	Test Position	Simultaneous Transmission Scenario			$\Sigma 1\text{-g SAR}$ (W/Kg)	SPLSR (Yes/No)
		LTE Band XVII	Wi-Fi DTS Band	Bluetooth		
Head	Left Touch	0.074	0.507		0.581	No
	Left Tilt	0.049	0.285		0.334	No
	Right Touch	0.074	0.180		0.254	No
	Right Tilt	0.059	0.155		0.214	No
Body-worn	Rear	0.264	0.348		0.612	No
	Front	0.132	0.248		0.380	No
	Edge 1	0.005	0.061		0.066	No
	Edge 2	0.063	0.061		0.124	No
	Edge 3	0.025	0.014		0.039	No
	Edge 4	0.075	0.012		0.087	No
	Rear	0.264		0.053	0.317	No
	Front	0.132		0.053	0.185	No
	Edge 1	0.005		0.026	0.031	No
	Edge 2	0.063		0.026	0.089	No
	Edge 3	0.025		0.026	0.051	No
	Edge 4	0.075		0.026	0.101	No

Note:

- According to KDB 447498 D01 General RF Exposure Guidance, when the simultaneous transmission SAR is less than 1.6 W/Kg, SPLSR assessment is not required.
- SPLSR mean is "The SAR to Peak Location Separation Ratio "

APPENDIX A. SAR SYSTEM CHECK DATA

Test Laboratory: AGC Lab

System Check Head 750 MHz

DUT: Dipole 750 MHz Type: SID 750

Communication System CW; Communication System Band: D750 (750.0 MHz); Duty Cycle: 1:1; Conv.F=5.11

Frequency: 750 MHz; Medium parameters used: $f = 750$ MHz; $\zeta = 0.91$ mho/m; $\epsilon_r = 41.25$; $\rho = 1000$ kg/m³ ; Phantom section: Flat Section; Input Power=18dBm

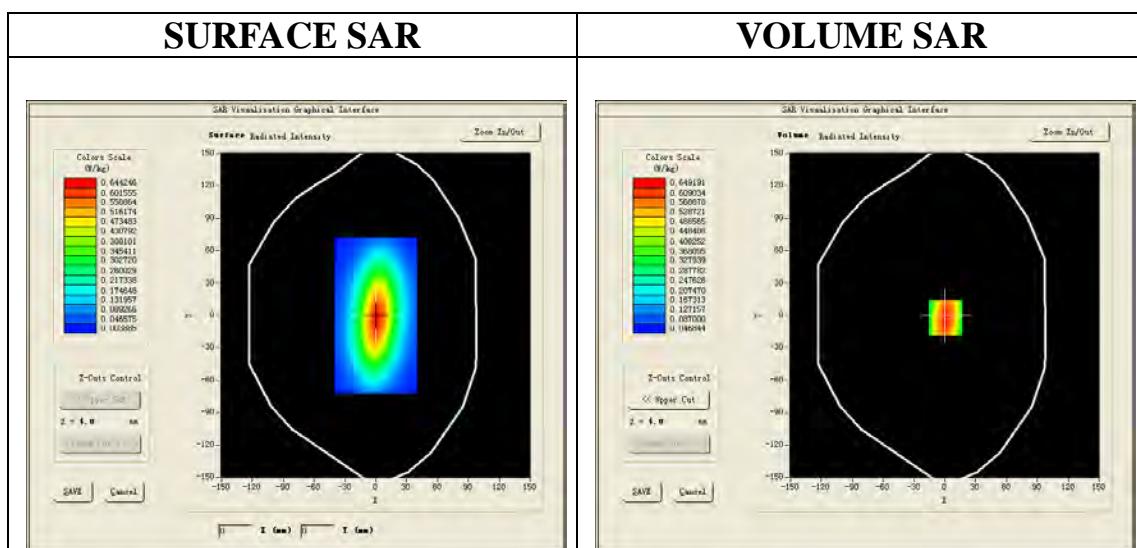
Ambient temperature (°C): 22.3, Liquid temperature (°C): 21.6

SATIMO Configuration:

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/System Check 750MHz Head/Area Scan: Measurement grid: dx=8mm, dy=8mm

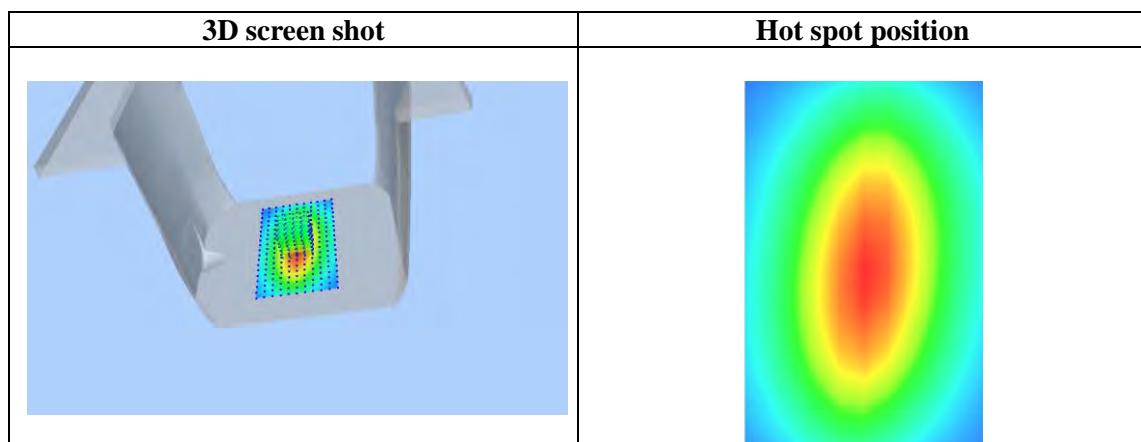
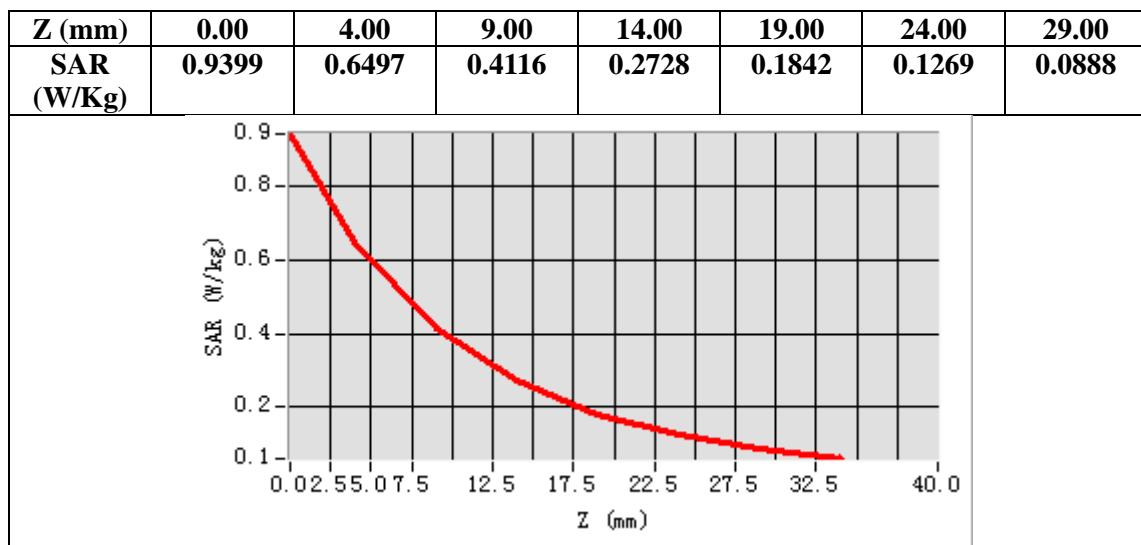
Configuration/System Check 750MHz Head/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm



Maximum location: X=1.00, Y=-2.00

SAR Peak: 0.94 W/kg

SAR 10g (W/Kg)	0.381529
SAR 1g (W/Kg)	0.575762



Test Laboratory: AGC Lab
System Check Body 750 MHz
DUT: Dipole 750 MHz Type: SID 750

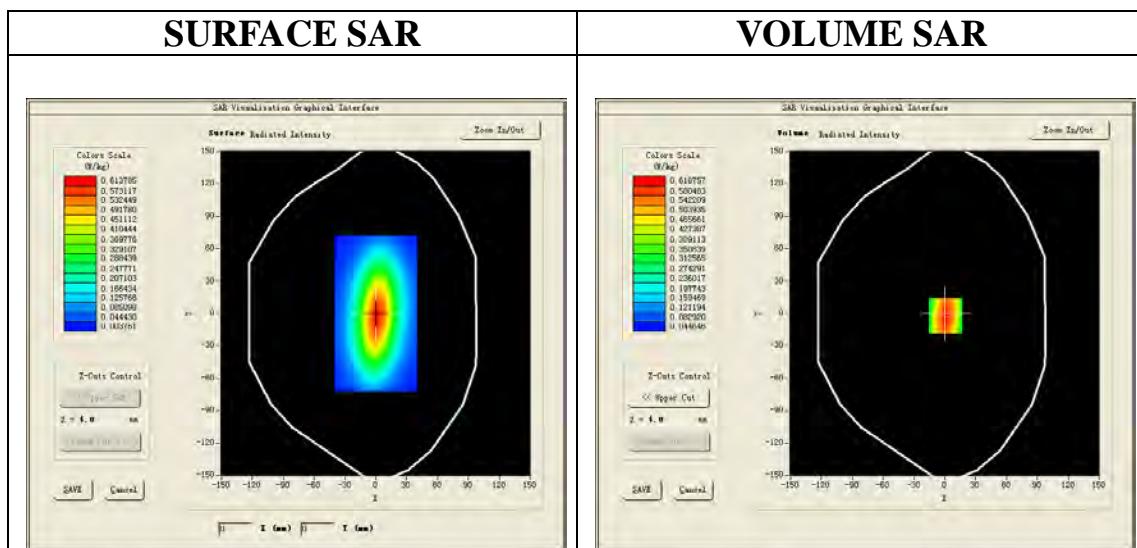
Date: July 04,2017

Communication System CW; Communication System Band: D750 (750.0 MHz); Duty Cycle: 1:1; Conv.F=5.30
Frequency: 750 MHz; Medium parameters used: $f = 750$ MHz; $\zeta = 0.99$ mho/m; $\epsilon_r = 54.63$; $\rho = 1000$ kg/m³ ;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature (°C):22.3, Liquid temperature (°C): 21.9

SATIMO Configuration:

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

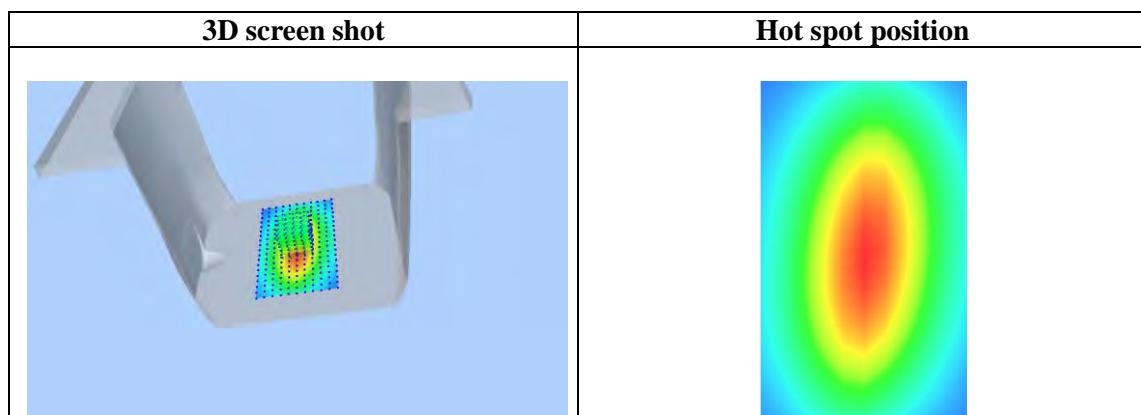
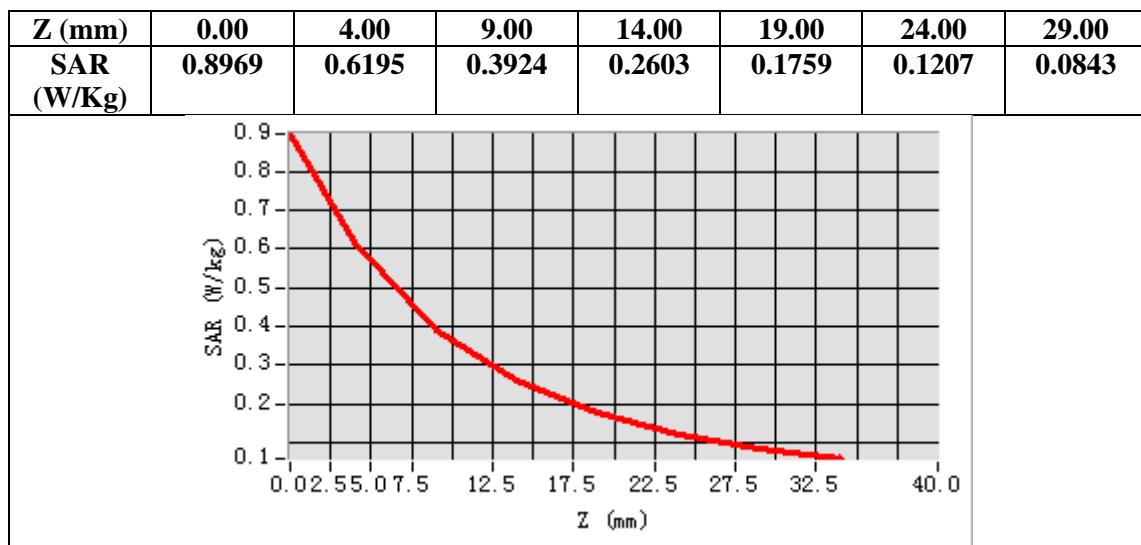
Configuration/System Check 750MHz Body/Area Scan: Measurement grid: dx=8mm, dy=8mm
Configuration/System Check 750MHz Body/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm



Maximum location: X=1.00, Y=-2.00

SAR Peak: 0.90 W/kg

SAR 10g (W/Kg)	0.365132
SAR 1g (W/Kg)	0.597896



Test Laboratory: AGC Lab
System Check Head 835 MHz
DUT: Dipole 835 MHz Type: SID 835

Date: July 02,2017

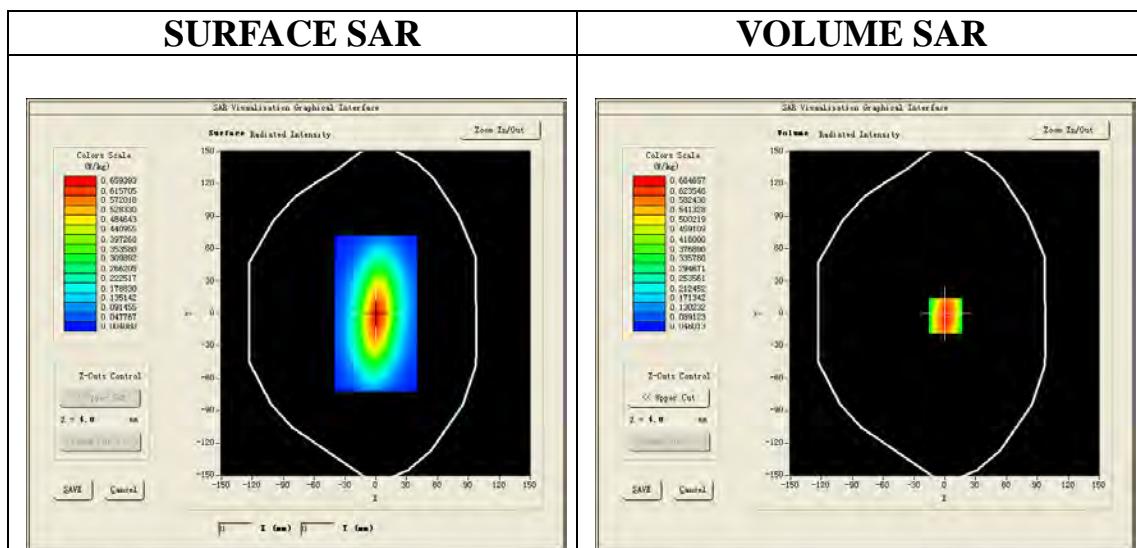
Communication System CW; Communication System Band: D835 (835.0 MHz); Duty Cycle: 1:1; Conv.F=5.72
Frequency: 835 MHz; Medium parameters used: $f = 835 \text{ MHz}$; $\zeta = 0.90 \text{ mho/m}$; $\epsilon_r = 41.79$; $\rho = 1000 \text{ kg/m}^3$;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature ($^{\circ}\text{C}$): 21.9, Liquid temperature ($^{\circ}\text{C}$): 21.3

SATIMO Configuration:

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/System Check 835MHz Head/Area Scan: Measurement grid: dx=8mm, dy=8mm

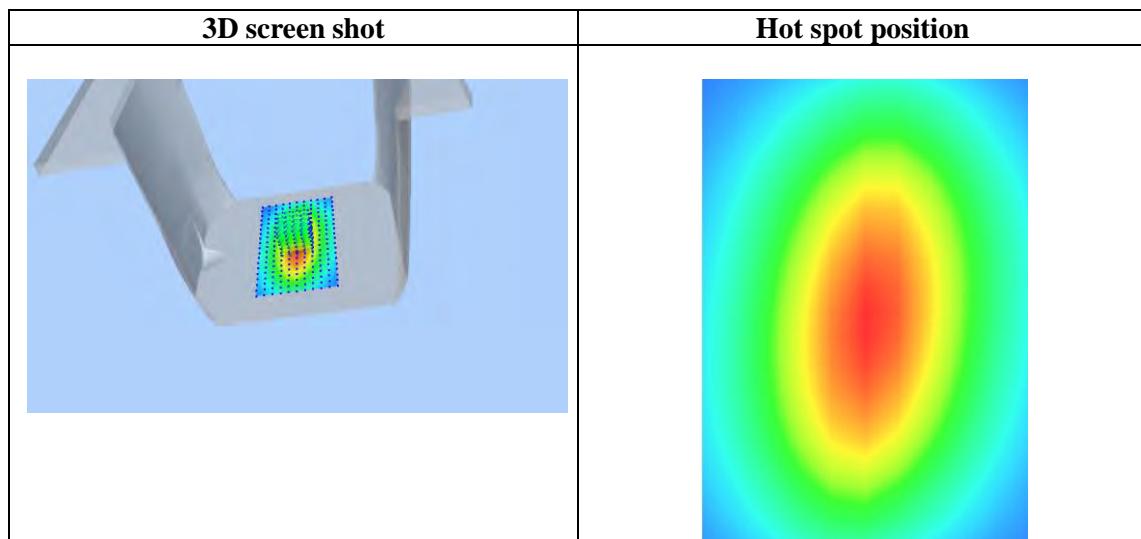
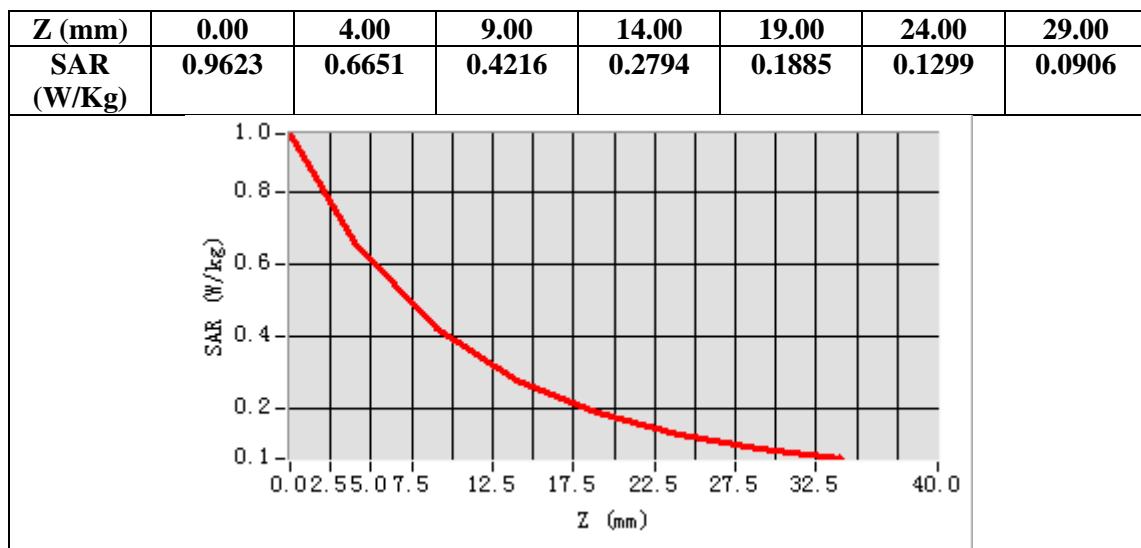
Configuration/System Check 835MHz Head/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm



Maximum location: X=1.00, Y=-2.00

SAR Peak: 0.97 W/kg

SAR 10g (W/Kg)	0.390532
SAR 1g (W/Kg)	0.638571



Test Laboratory: AGC Lab
System Check Body 835 MHz
DUT: Dipole 835 MHz Type: SID 835

Date: July 02,2017

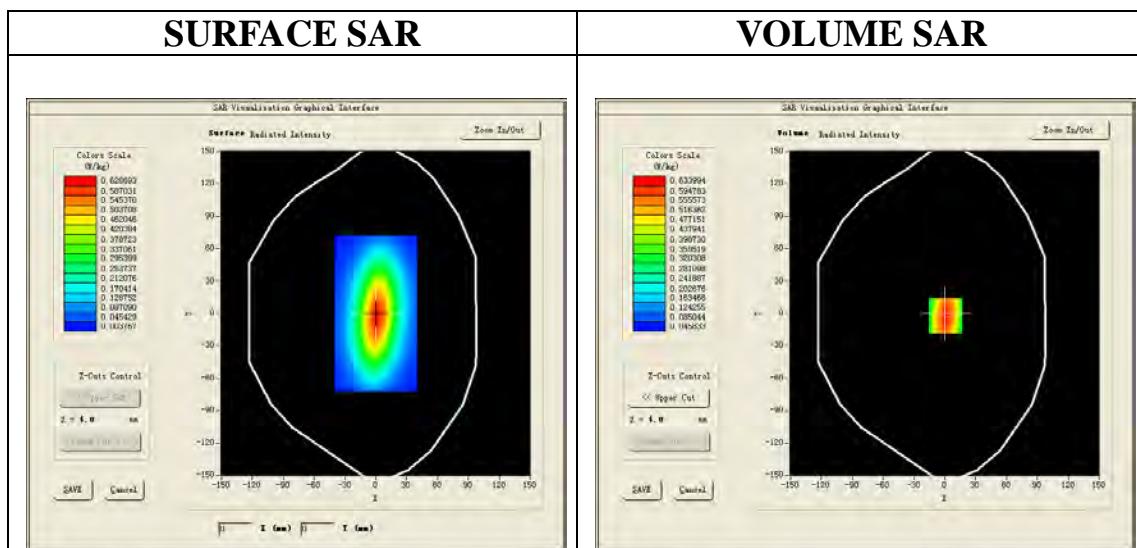
Communication System CW; Communication System Band: D835 (835.0 MHz); Duty Cycle: 1:1; Conv.F=5.94
Frequency: 835 MHz; Medium parameters used: $f = 835 \text{ MHz}$; $\zeta = 0.96 \text{ mho/m}$; $\epsilon_r = 55.67$; $\rho = 1000 \text{ kg/m}^3$;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature ($^{\circ}\text{C}$): 21.9, Liquid temperature ($^{\circ}\text{C}$): 21.5

SATIMO Configuration:

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/System Check 835MHz Body/Area Scan: Measurement grid: dx=8mm, dy=8mm

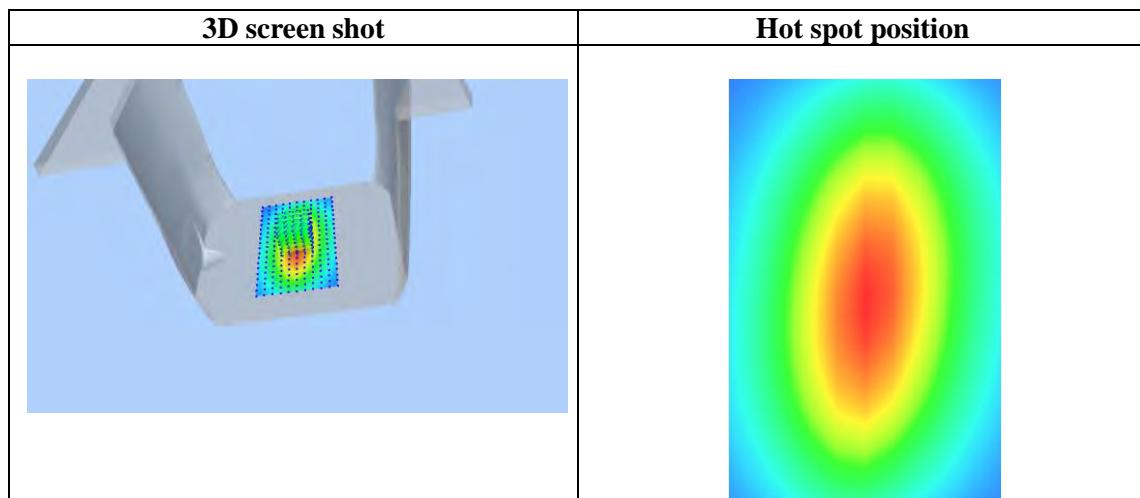
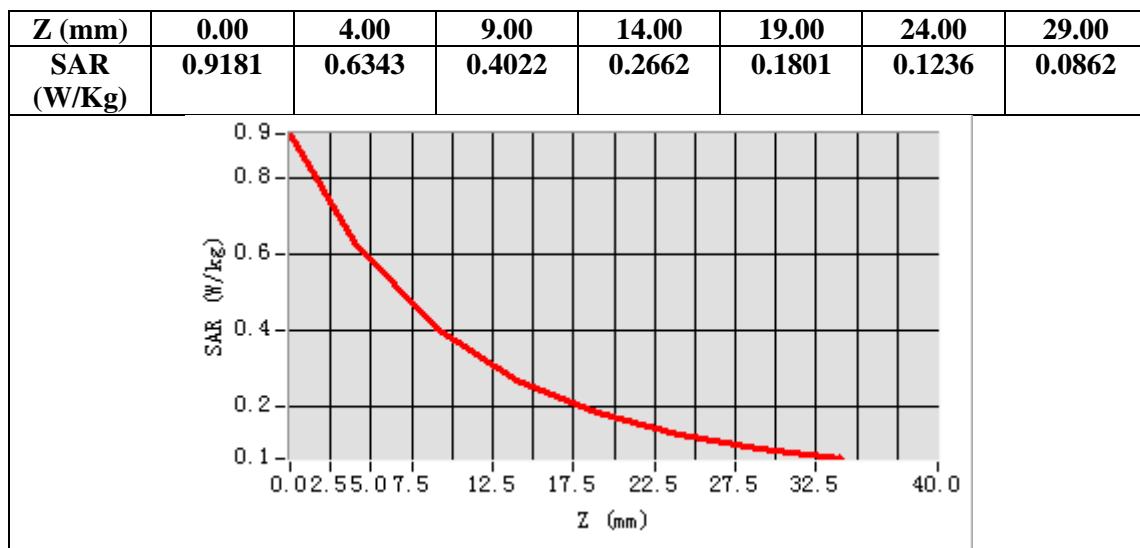
Configuration/System Check 835MHz Body/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm



Maximum location: X=1.00, Y=-2.00

SAR Peak: 0.92 W/kg

SAR 10g (W/Kg)	0.374120
SAR 1g (W/Kg)	0.609572



Test Laboratory: AGC Lab
System Check Head 1750MHz
DUT: Dipole 1800 MHz; Type: SID 1800

Date: July 02,2017

Communication System: CW; Communication System Band: D1700 (1750.0 MHz); Duty Cycle:1:1; Conv.F=4.92
Frequency: 1750 MHz; Medium parameters used: $f = 1750\text{MHz}$; $\zeta = 1.38\text{mho/m}$; $\epsilon_r = 40.11$; $\rho = 1000 \text{ kg/m}^3$;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature ($^{\circ}\text{C}$): 22.1, Liquid temperature ($^{\circ}\text{C}$): 21.3

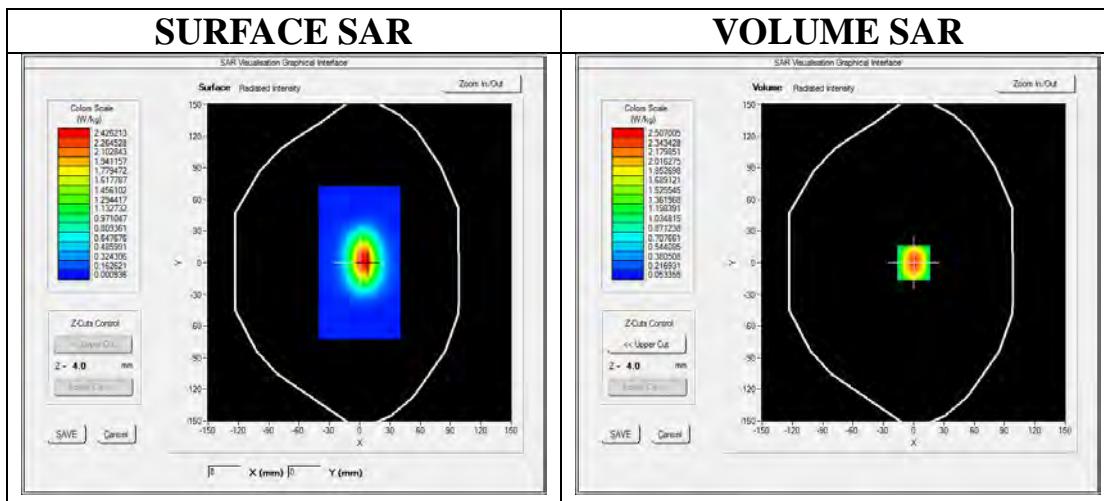
SATIMO Configuration:

Probe: SSE5; Calibrated: 07/05/2016; Serial No.: SN 14/16 EP307

- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

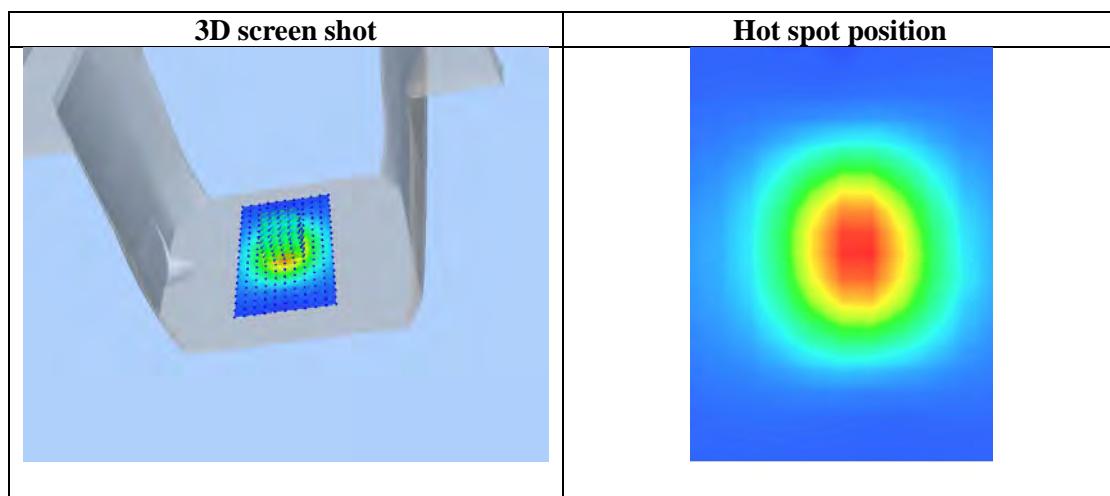
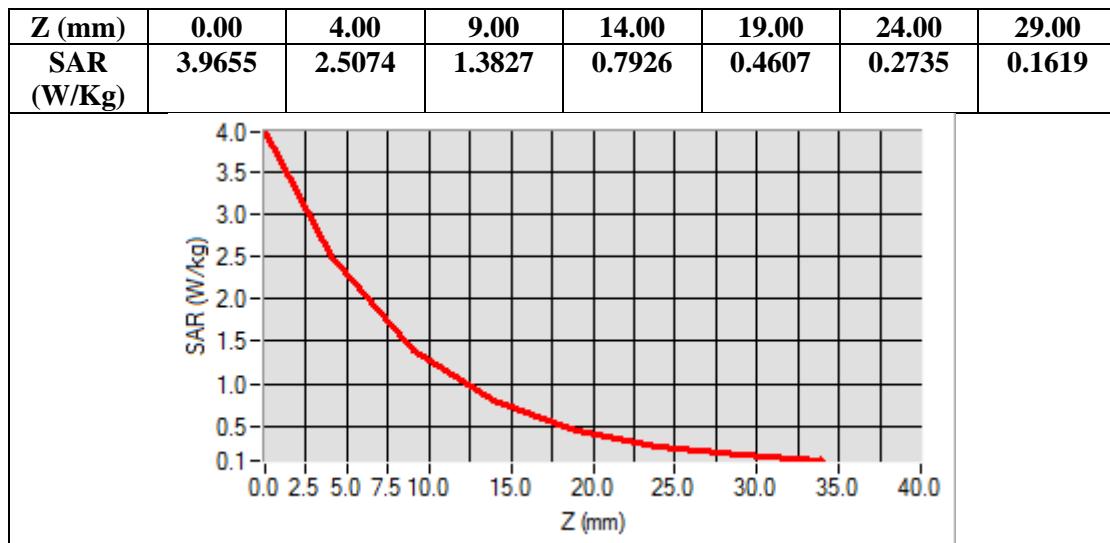
Configuration/System Check 1750MHz Head/Area Scan: Measurement grid: dx=8mm,dy=8mm

Configuration/System Check 1750MHz Head/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm



Maximum location: X=0.00, Y=0.00
SAR Peak: 3.95 W/kg

SAR 10g (W/Kg)	1.268513
SAR 1g (W/Kg)	2.370125



Test Laboratory: AGC Lab
System Check Body 1750MHz
DUT: Dipole 1800 MHz; Type: SID 1800

Date: July 02,2017

Communication System: CW; Communication System Band: D1700 (1750.0 MHz); Duty Cycle:1:1; Conv.F=5.06
Frequency: 1750MHz; Medium parameters used: $f = 1750\text{MHz}$; $\zeta = 1.49 \text{ mho/m}$; $\epsilon_r = 52.66$; $\rho = 1000 \text{ kg/m}^3$;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature ($^\circ\text{C}$): 22.1, Liquid temperature ($^\circ\text{C}$): 21.5

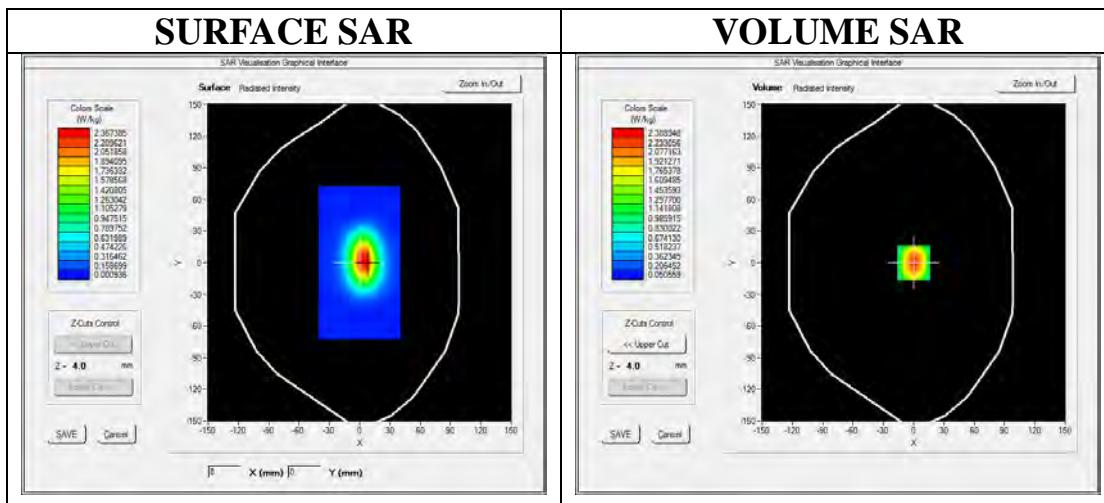
SATIMO Configuration:

Probe: SSE5; Calibrated: 07/05/2016; Serial No.: SN 14/16 EP307

- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

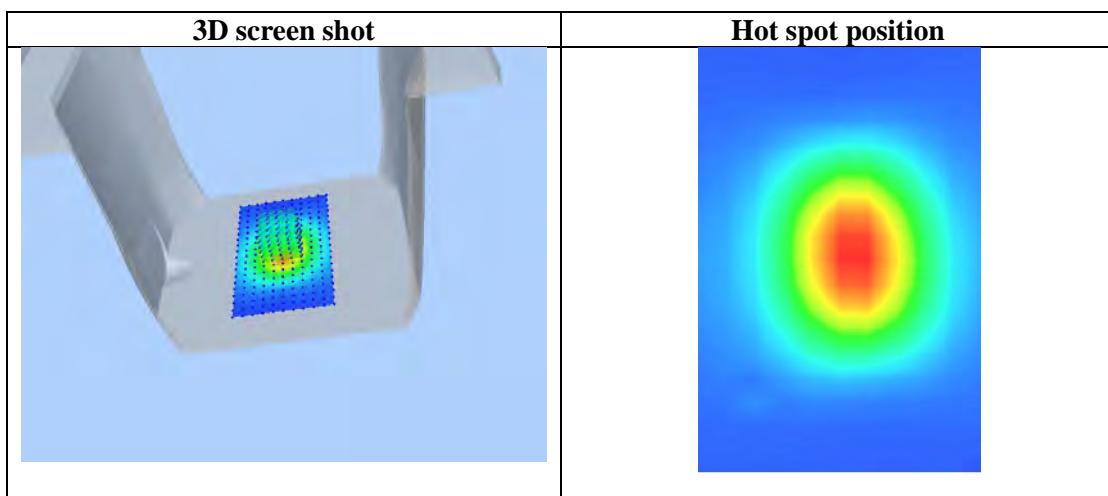
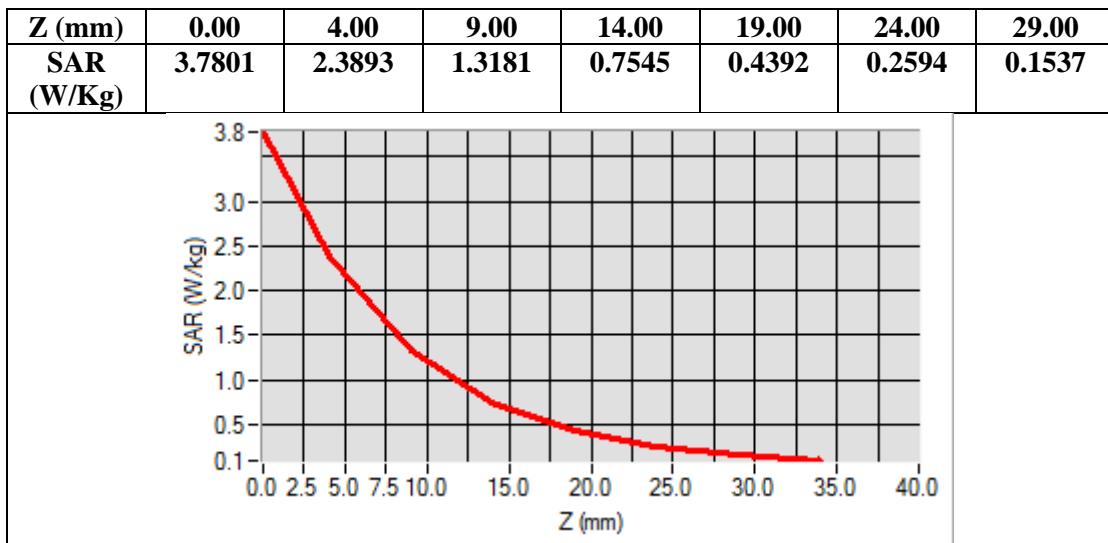
Configuration/System Check 1750MHz Body/Area Scan: Measurement grid: dx=8mm,dy=8mm

Configuration/System Check 1750MHz Body/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm



Maximum location: X=0.00, Y=0.00
SAR Peak: 3.78 W/kg

SAR 10g (W/Kg)	1.210254
SAR 1g (W/Kg)	2.261745



Test Laboratory: AGC Lab
System Check Head 1900MHz
DUT: Dipole 1900 MHz; Type: SID 1900

Date: June 28, 2017

Communication System: CW; Communication System Band: D1900 (1900.0 MHz); Duty Cycle:1:1; Conv.F=5.14
Frequency: 1900 MHz; Medium parameters used: $f = 1900$ MHz; $\zeta = 1.38$ mho/m; $\epsilon_r = 39.51$; $\rho = 1000$ kg/m³ ;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature (°C):22.1, Liquid temperature (°C): 21.3

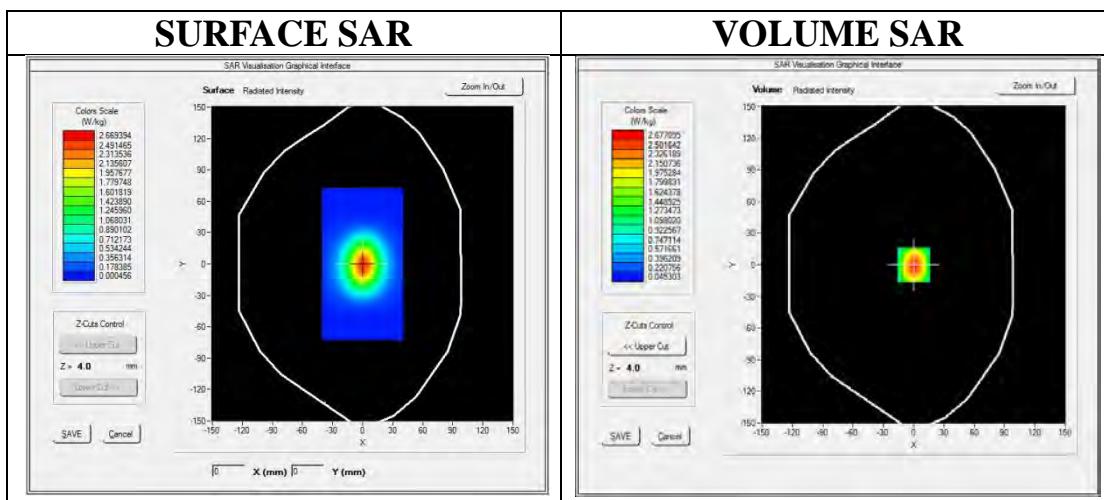
SATIMO Configuration:

Probe: SSE5; Calibrated: 07/05/2016; Serial No.: SN 14/16 EP307

- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

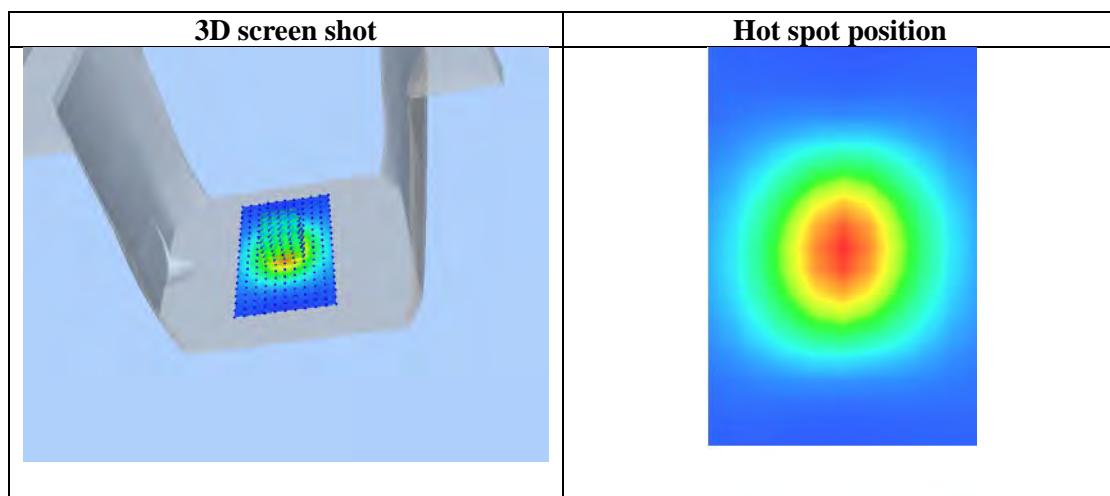
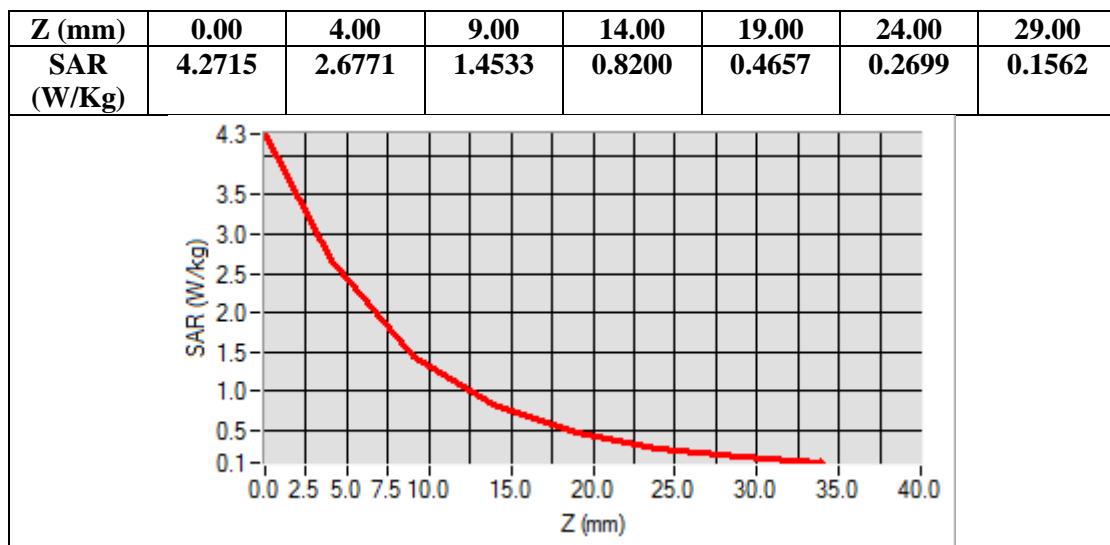
Configuration/System Check 1900MHz Head/Area Scan: Measurement grid: dx=8mm, dy=8mm

Configuration/System Check 1900MHz Head/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm



Maximum location: X=0.00, Y=0.00
SAR Peak: 4.24 W/kg

SAR 10g (W/Kg)	1.335305
SAR 1g (W/Kg)	2.540856



Test Laboratory: AGC Lab
System Check Body 1900MHz
DUT: Dipole 1900 MHz; Type: SID 1900

Date: June 28, 2017

Communication System: CW; Communication System Band: D1900 (1900.0 MHz); Duty Cycle:1:1; Conv.F=5.34
Frequency: 1900 MHz; Medium parameters used: $f = 1900$ MHz; $\zeta = 1.51$ mho/m; $\epsilon_r = 53.58$; $\rho = 1000$ kg/m³ ;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature (°C):22.1, Liquid temperature (°C): 21.5

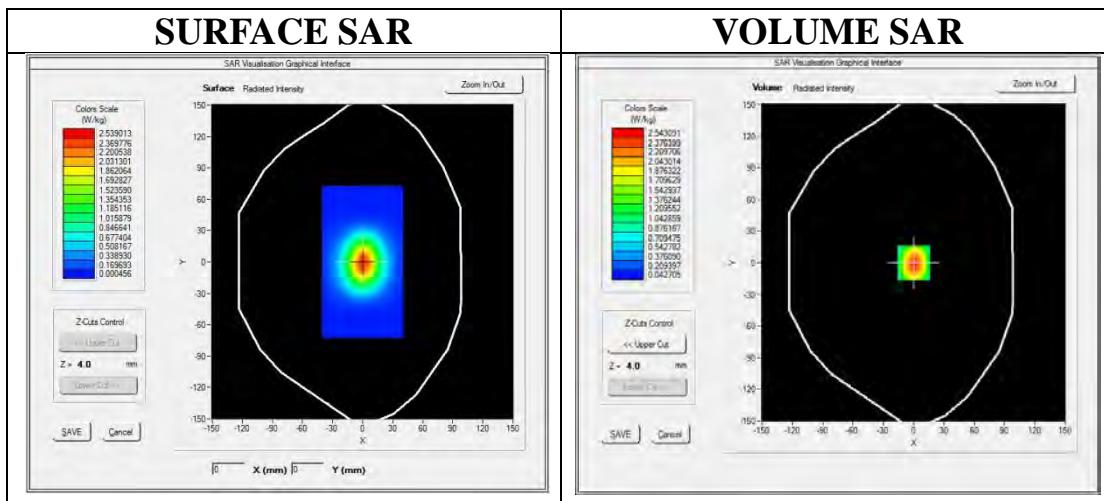
SATIMO Configuration:

Probe: SSE5; Calibrated: 07/05/2016; Serial No.: SN 14/16 EP307

- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

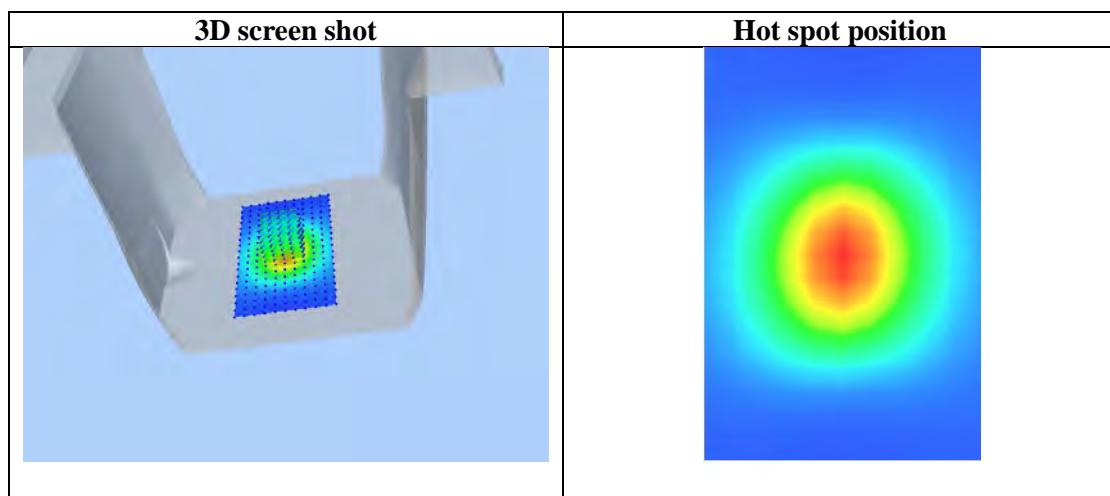
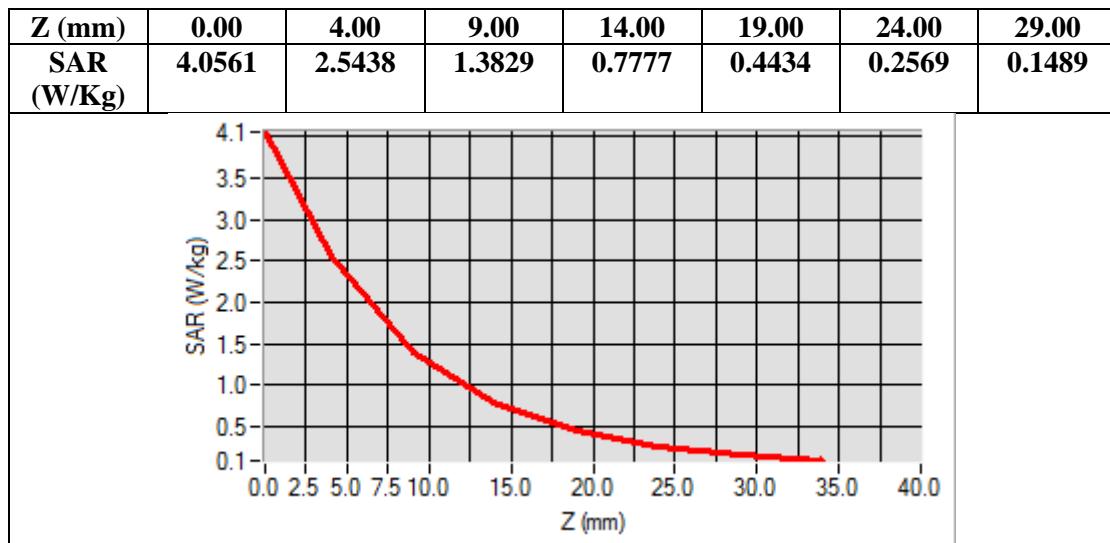
Configuration/System Check 1900MHz Body/Area Scan: Measurement grid: dx=8mm, dy=8mm

Configuration/System Check 1900MHz Body/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm



Maximum location: X=0.00, Y=0.00
SAR Peak: 4.05 W/kg

SAR 10g (W/Kg)	1.269532
SAR 1g (W/Kg)	2.416594



Test Laboratory: AGC Lab

System Check Head 2450 MHz

DUT: Dipole 2450 MHz Type: SID 2450

Communication System CW; Communication System Band: D2450 (2450.0 MHz); Duty Cycle: 1:1; Conv.F=5.19

Frequency: 2450 MHz; Medium parameters used: $f = 2450$ MHz; $\zeta = 1.84$ mho/m; $\epsilon_r = 38.59$; $\rho = 1000$ kg/m³ ;

Phantom section: Flat Section; Input Power=18dBm

Ambient temperature (°C): 22.1, Liquid temperature (°C): 21.6

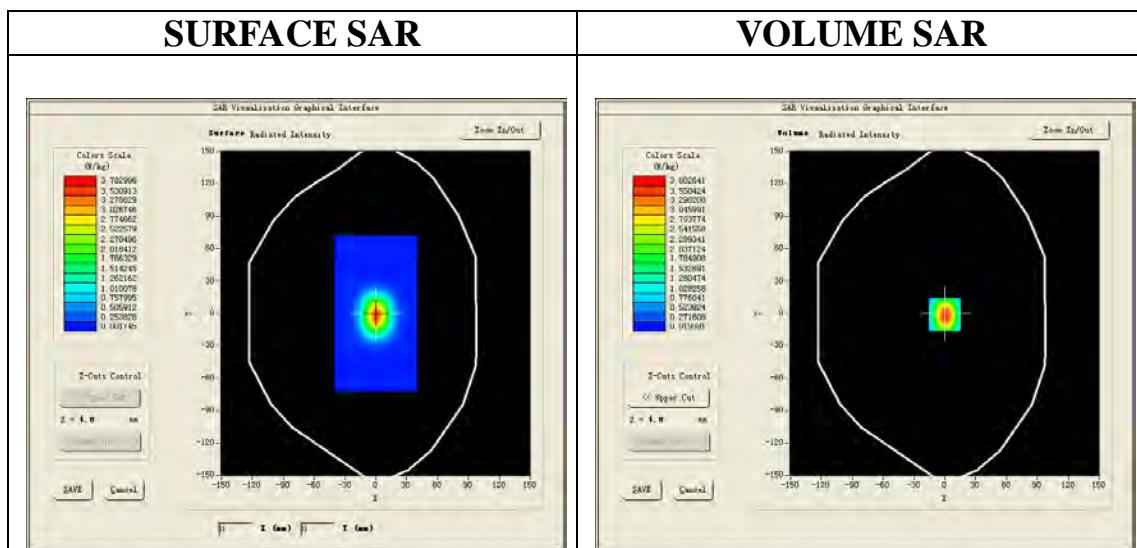
Date: July 12,2017

SATIMO Configuration

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/System Check 2450MHz Head/Area Scan: Measurement grid: dx=8mm, dy=8mm

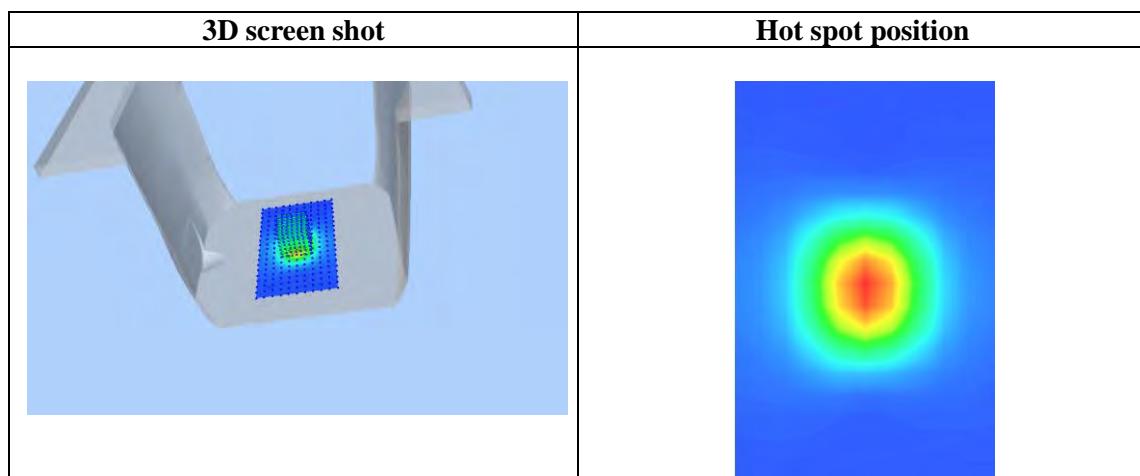
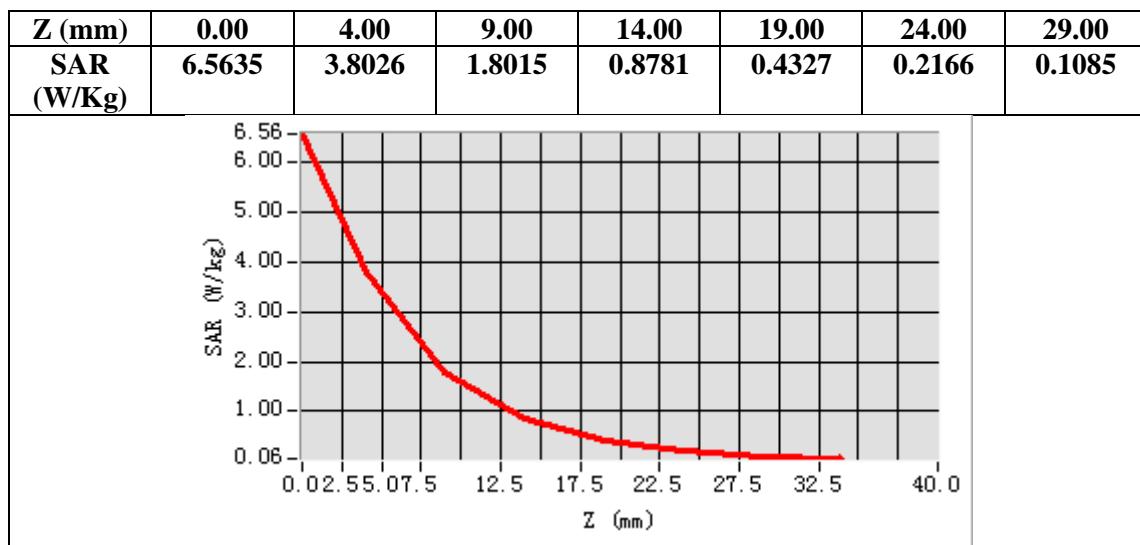
Configuration/System Check 2450MHz Head/Zoom Scan: Measurement grid: dx=5mm,dy=5mm, dz=5mm



Maximum location: X=0.00, Y=-1.00

SAR Peak: 6.50 W/kg

SAR 10g (W/Kg)	1.566009
SAR 1g (W/Kg)	3.473732



Test Laboratory: AGC Lab

System Check Body 2450 MHz

DUT: Dipole 2450 MHz Type: SID 2450

Communication System CW; Communication System Band: D2450 (2450.0 MHz); Duty Cycle: 1:1; Conv.F=5.33

Frequency: 2450 MHz; Medium parameters used: $f = 2450$ MHz; $\zeta = 1.93\text{mho/m}$; $\epsilon_r = 53.12$; $\rho = 1000 \text{ kg/m}^3$;

Phantom section: Flat Section; Input Power=18dBm

Ambient temperature ($^{\circ}\text{C}$):22.1, Liquid temperature ($^{\circ}\text{C}$): 21.7

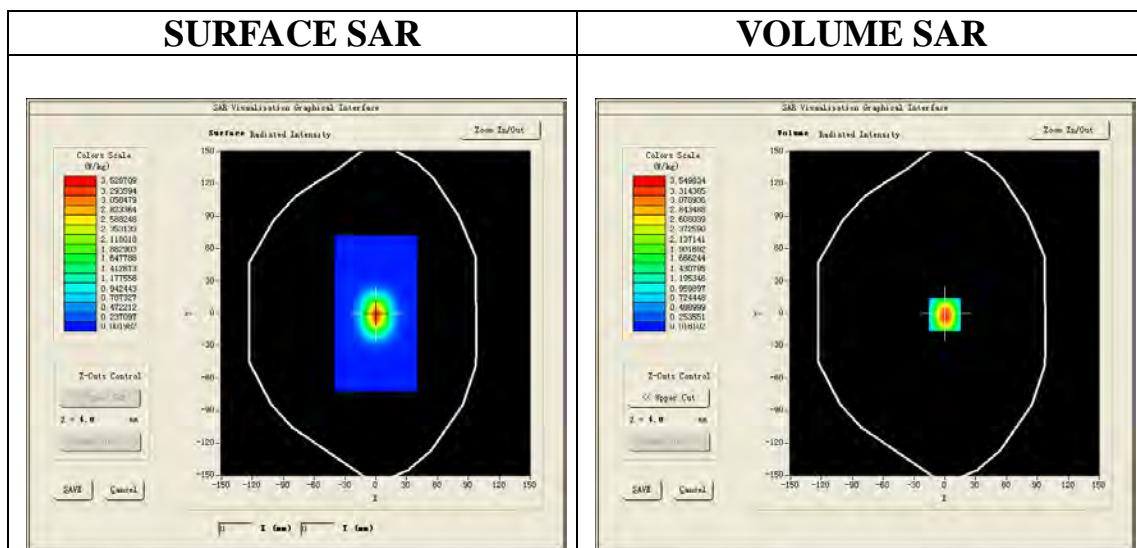
Date: July 12,2017

SATIMO Configuration

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/System Check 2450MHz Body/Area Scan: Measurement grid: dx=8mm, dy=8mm

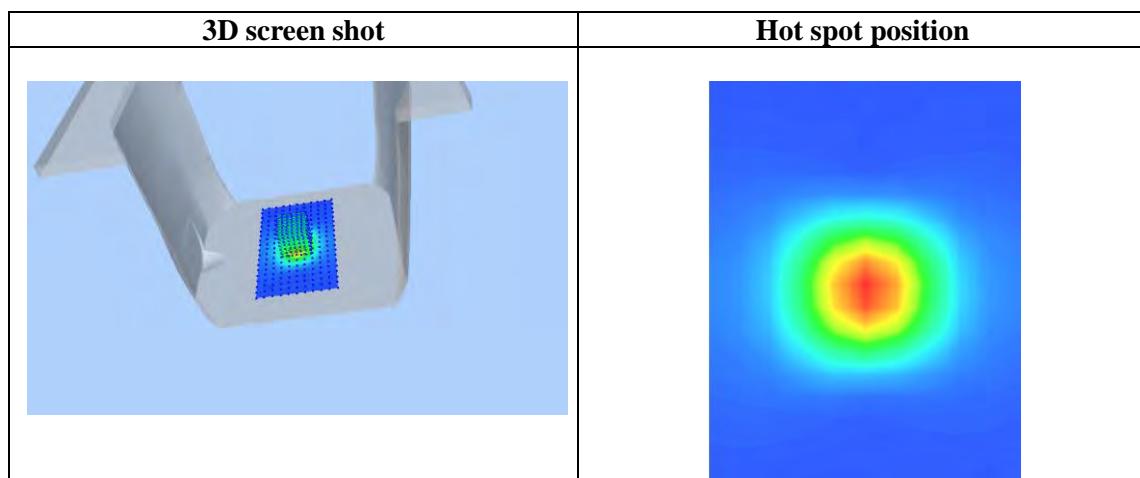
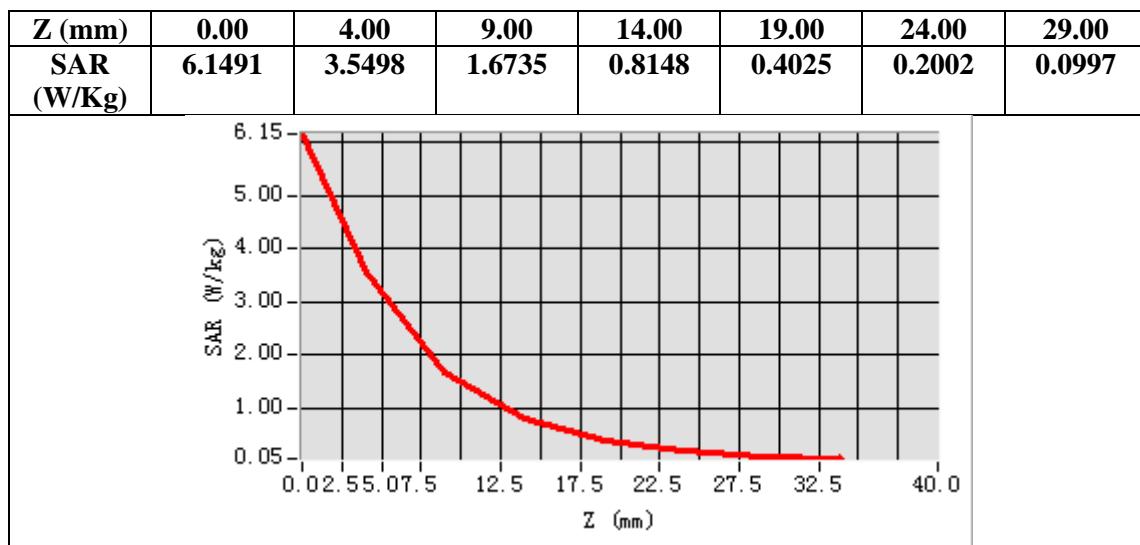
Configuration/System Check 2450MHz Body/Zoom Scan: Measurement grid: dx=5mm,dy=5mm, dz=5mm



Maximum location: X=0.00, Y=-1.00

SAR Peak: 6.09 W/kg

SAR 10g (W/Kg)	1.460182
SAR 1g (W/Kg)	3.243430



Test Laboratory: AGC Lab
System Check Head 2600MHz
DUT: Dipole 2600 MHz; Type: SID 2600

Date: July 03,2017

Communication System: CW; Communication System Band: D2600 (2600.0 MHz); Duty Cycle: 1:1; Conv.F=5.07
Frequency:2600 MHz; Medium parameters used: $f = 2600$ MHz; $\zeta = 1.92\text{mho/m}$; $\epsilon_r = 37.68$; $\rho = 1000 \text{ kg/m}^3$;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature ($^{\circ}\text{C}$): 21.7, Liquid temperature ($^{\circ}\text{C}$): 21.1

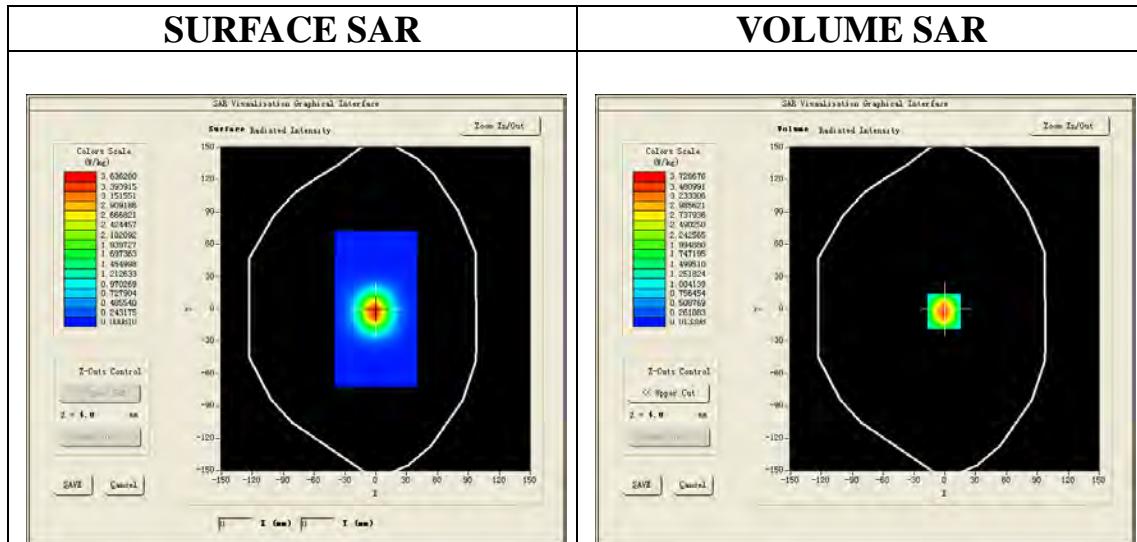
SATIMO Configuration:

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/System Check 2600 Head/Area Scan: Measurement grid: dx=8mm,dy=8mm

Configuration/System Check 2600 Head/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm

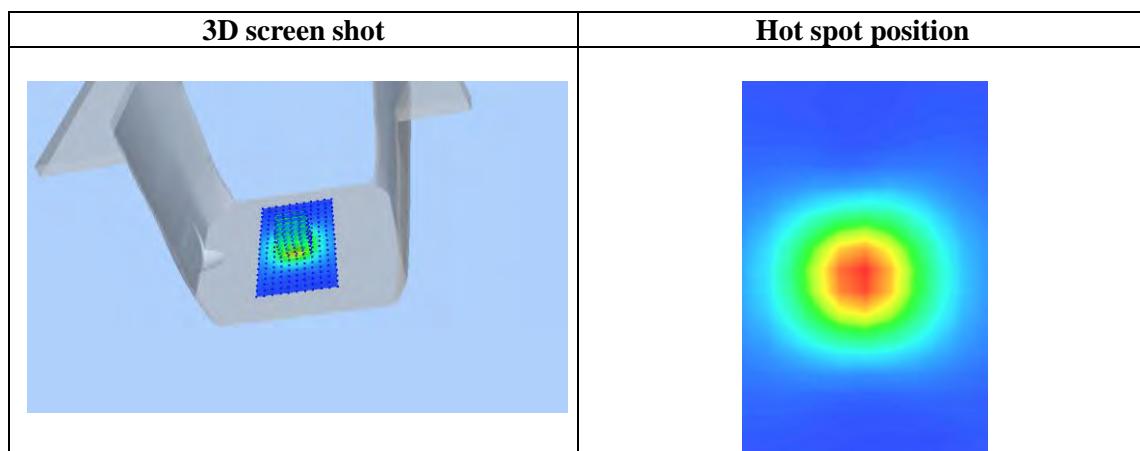
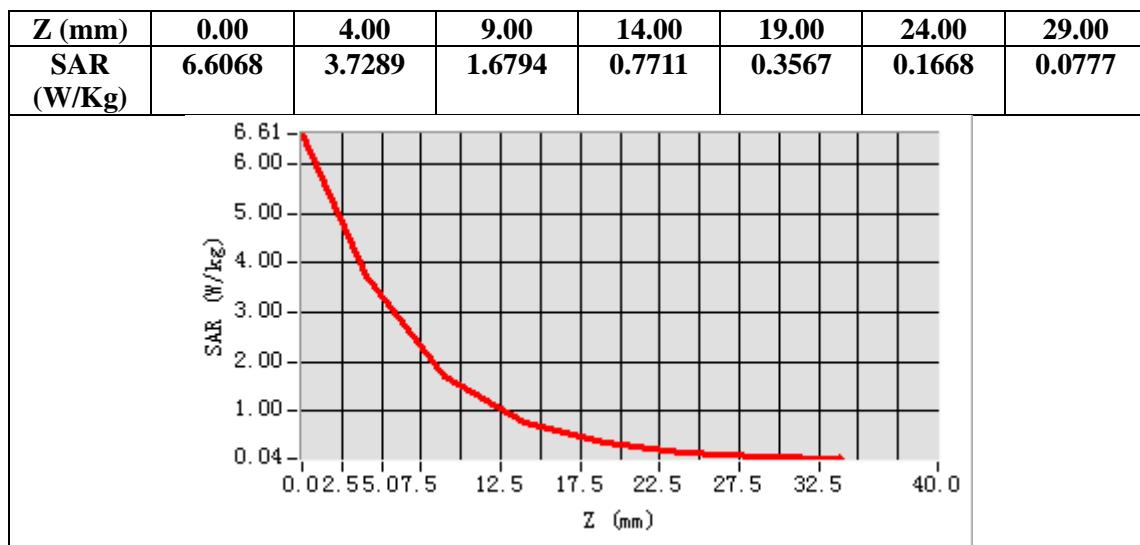
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	SAM twin phantom
Device Position	Flat
Band	CW 2600
Channels	Middle
Signal	Crest factor: 1.0



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

SAR Peak: 6.53 W/kg

SAR 10g (W/Kg)	1.575963
SAR 1g (W/Kg)	3.508412



Test Laboratory: AGC Lab
System Check Body 2600MHz
DUT: Dipole 2600 MHz; Type: SID 2600

Date: July 03,2017

Communication System: CW; Communication System Band: D2600 (2600.0 MHz); Duty Cycle: 1:1; Conv.F=5.19
Frequency:2600 MHz; Medium parameters used: $f = 2600$ MHz; $\zeta = 2.16\text{mho/m}$; $\epsilon_r = 52.00$; $\rho = 1000 \text{ kg/m}^3$;
Phantom section: Flat Section; Input Power=18dBm
Ambient temperature ($^{\circ}\text{C}$): 21.7, Liquid temperature ($^{\circ}\text{C}$): 21.3

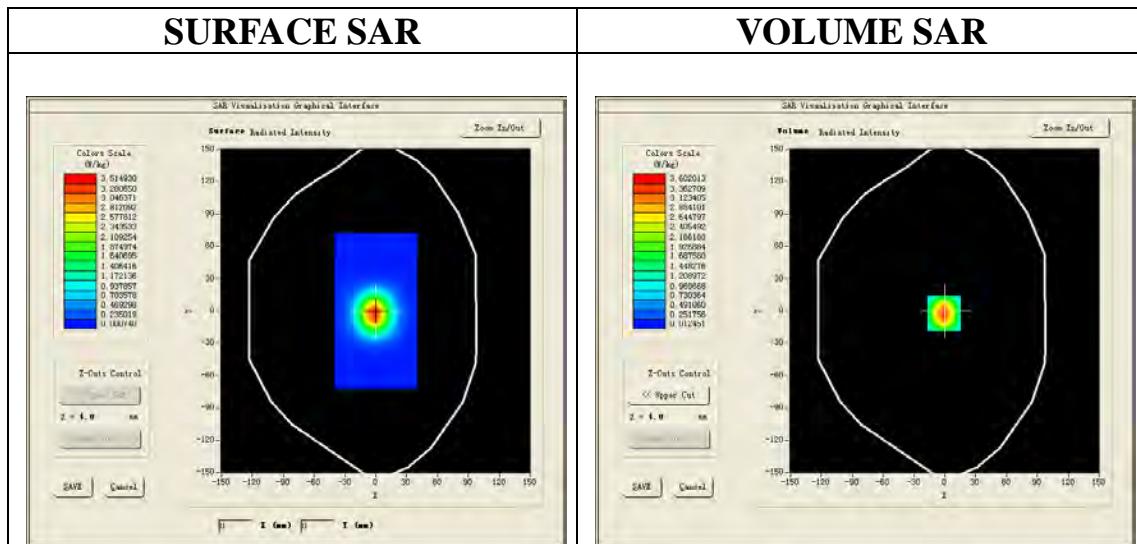
SATIMO Configuration:

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/System Check 2600 Body/Area Scan: Measurement grid: dx=8mm,dy=8mm

Configuration/System Check 2600 Body /Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm

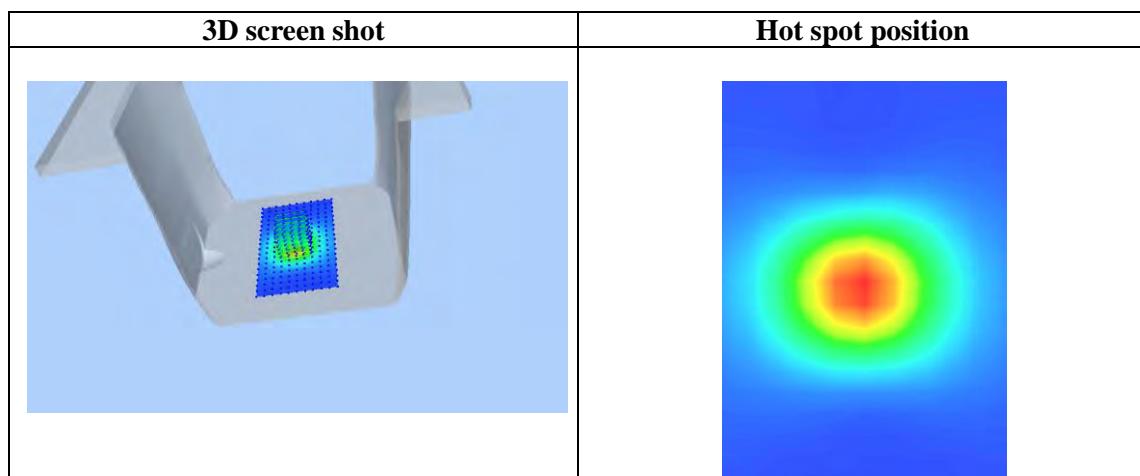
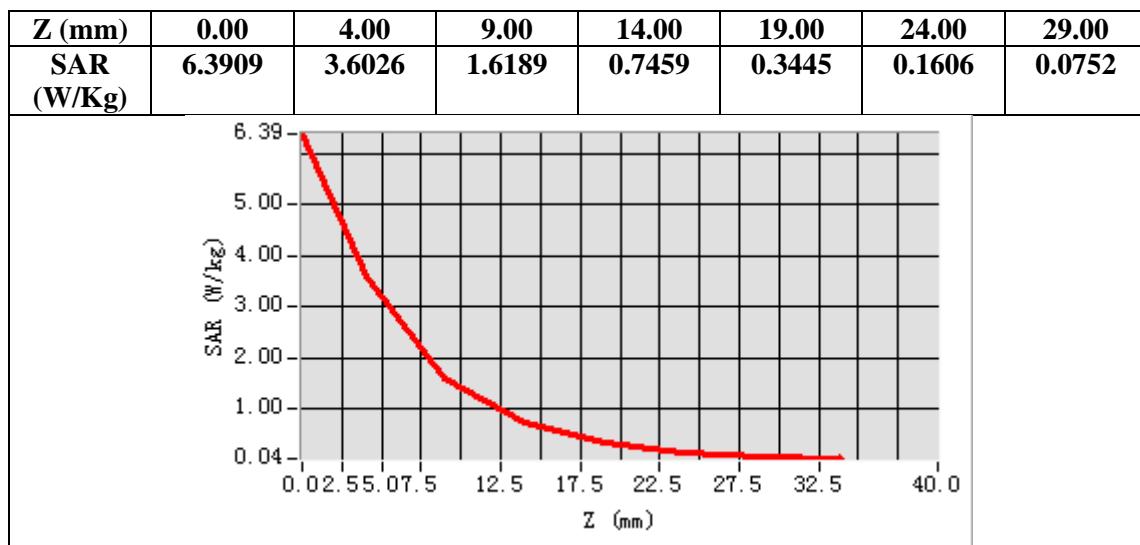
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	SAM twin phantom
Device Position	Flat
Band	CW 2600
Channels	Middle
Signal	Crest factor: 1.0



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

SAR Peak: 6.32 W/kg

SAR 10g (W/Kg)	1.520153
SAR 1g (W/Kg)	3.389567



APPENDIX B. SAR MEASUREMENT DATA

Test Laboratory: AGC Lab

GSM 850 Mid-Touch-Right <SIM 1>

DUT: Rugged Mobile Phone; Type: CS22SA

Date: July 02,2017

Communication System: Generic GSM; Communication System Band: GSM 850; Duty Cycle: 1:8.3; Conv.F=5.72; Frequency: 836.6 MHz; Medium parameters used: $f = 835 \text{ MHz}$; $\zeta = 0.91 \text{ mho/m}$; $\epsilon_r = 41.23$; $\rho = 1000 \text{ kg/m}^3$; Phantom section: Right Section

Ambient temperature (°C): 21.9, Liquid temperature (°C): 21.3

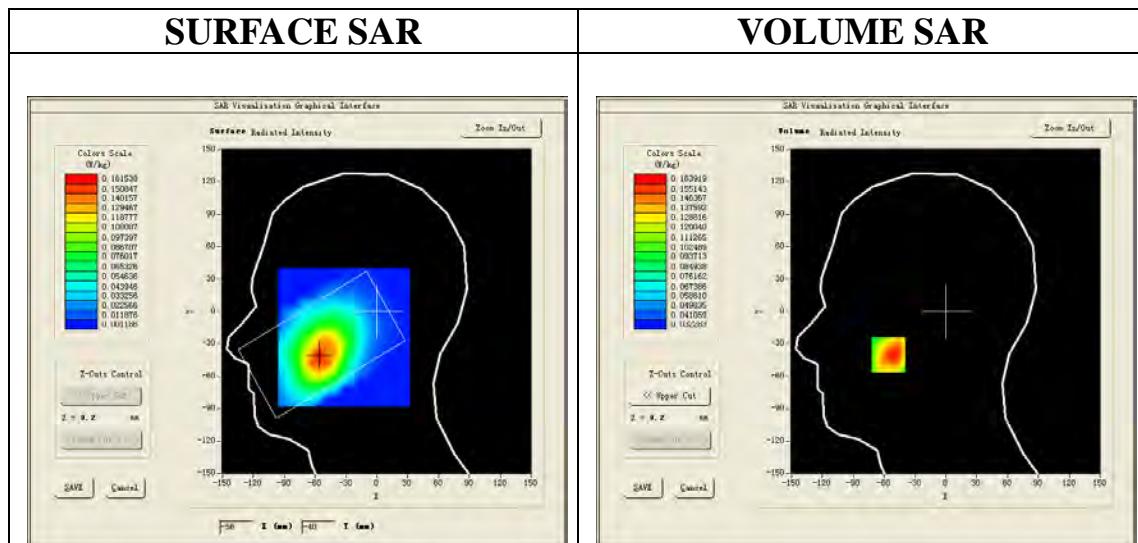
SATIMO Configuration:

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/GSM 850 Mid-Touch-Right/Area Scan: Measurement grid: dx=8mm, dy=8mm

Configuration/GSM 850 Mid-Touch-Right/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

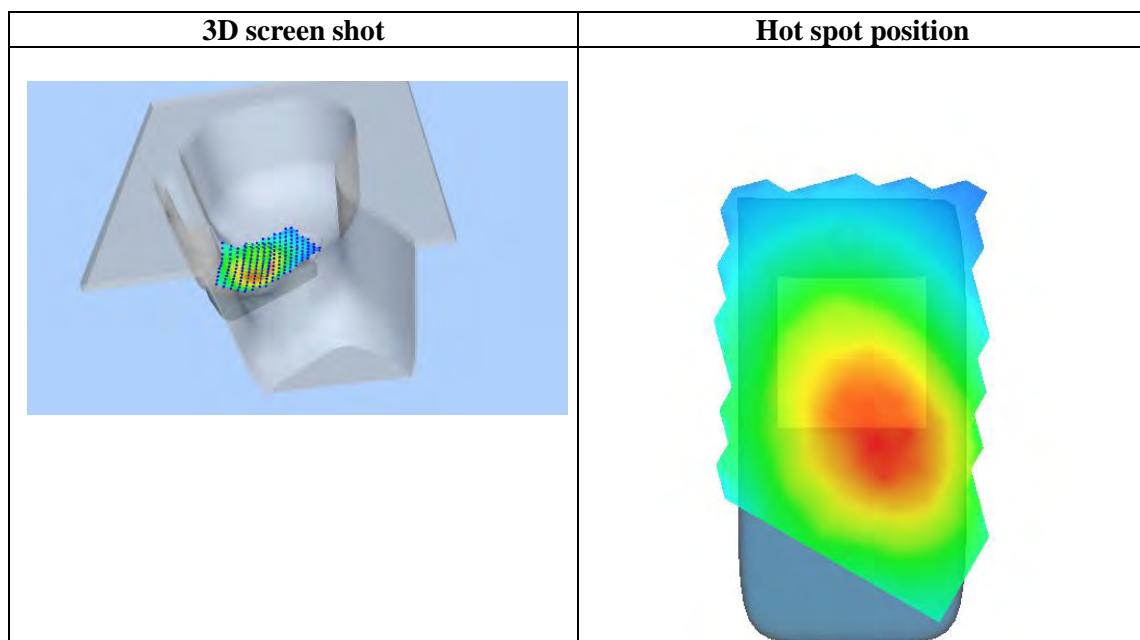
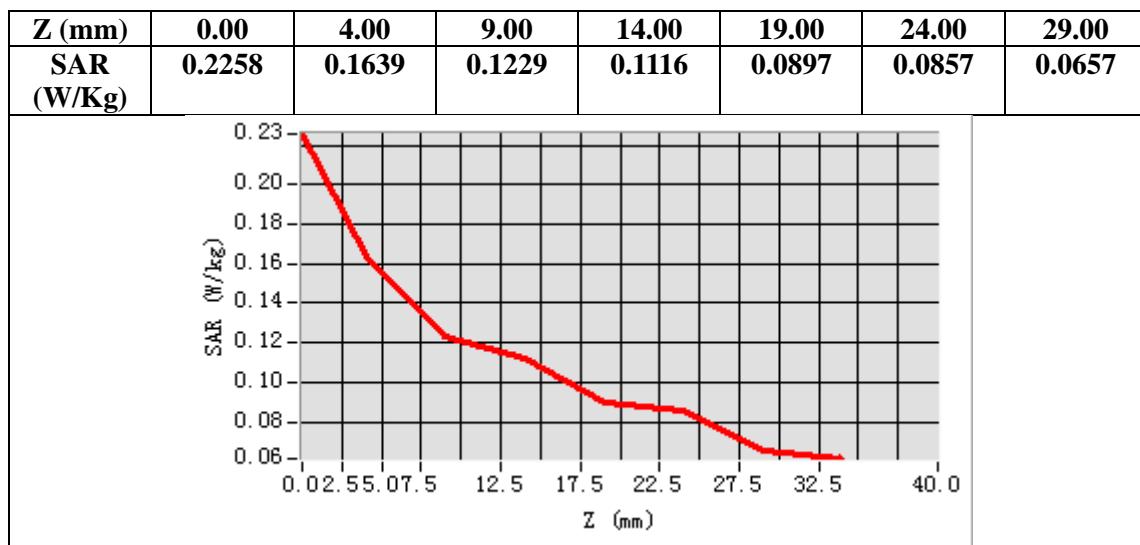
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Right head
Device Position	Cheek
Band	GSM 850
Channels	Middle
Signal	TDMA (Crest factor: 8.0)



Maximum location: X=-56.00, Y=-40.00

SAR Peak: 0.19 W/kg

SAR 10g (W/Kg)	0.123507
SAR 1g (W/Kg)	0.158170



Test Laboratory: AGC Lab
GSM 850 Mid- Body- Back (MS)<SIM 1>
DUT: Rugged Mobile Phone; Type: CS22SA

Date: July 02,2017

Communication System: Generic GSM; Communication System Band: GSM 850; Duty Cycle: 1:8.3; Conv.F=5.94;
Frequency: 836.6 MHz; Medium parameters used: $f = 835$ MHz; $\zeta = 0.97$ mho/m; $\epsilon_r = 55.21$; $\rho = 1000$ kg/m³ ;
Phantom section: Flat Section
Ambient temperature (°C): 21.9, Liquid temperature (°C): 21.5

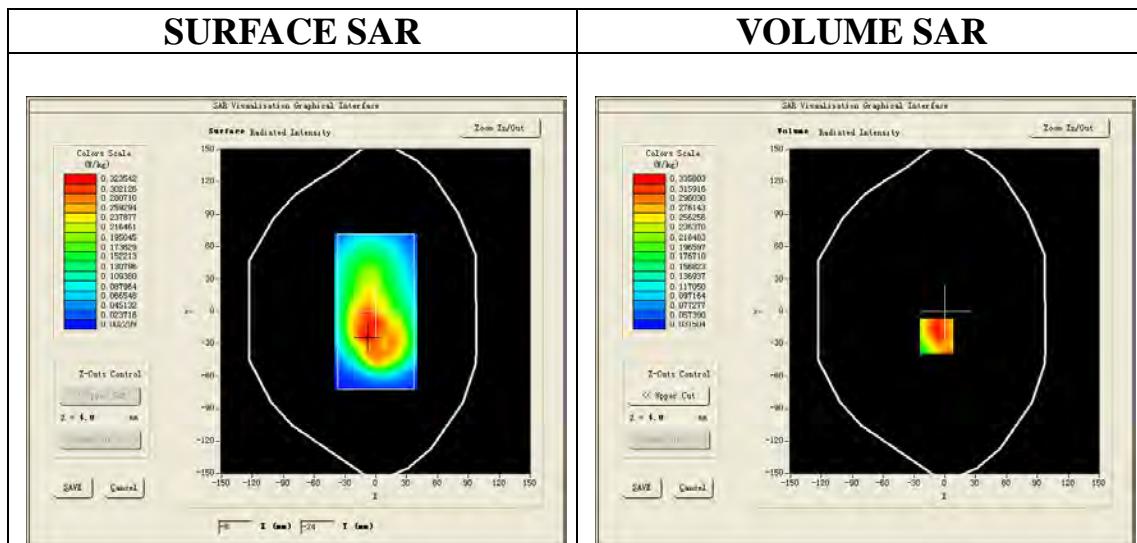
SATIMO Configuration:

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/GSM 850 Mid-Body-Back/Area Scan: Measurement grid: dx=8mm, dy=8mm

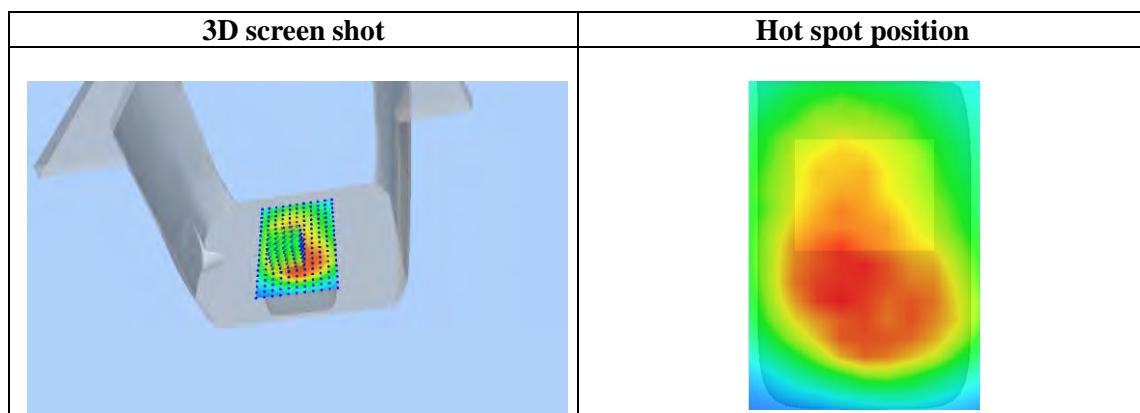
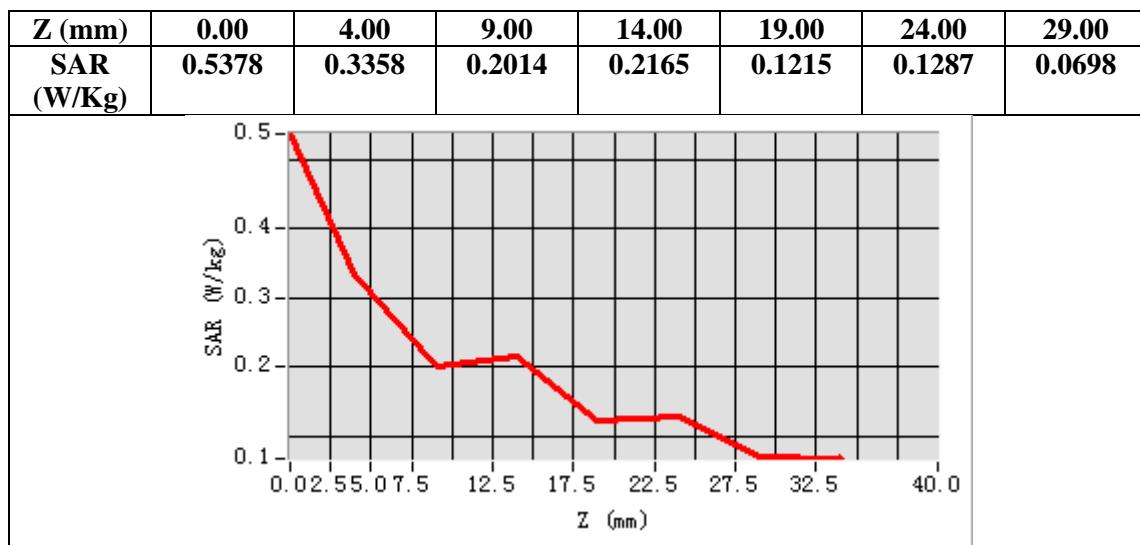
Configuration/GSM 850 Mid-Body-Back/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body Back
Band	GSM 850
Channels	Middle
Signal	TDMA (Crest factor: 8.0)



Maximum location: X=-8.00, Y=-23.00
SAR Peak: 0.43 W/kg

SAR 10g (W/Kg)	0.235118
SAR 1g (W/Kg)	0.317094



Test Laboratory: AGC Lab
GPRS 850 Mid-Touch-Right (4up) <SIM 1>
DUT: Rugged Mobile Phone; Type: CS22SA

Date: July 02,2017

Communication System: GPRS-4 Slot; Communication System Band: GSM 850; Duty Cycle: 1:2.1; Conv.F=5.72
Frequency: 836.6 MHz; Medium parameters used: $f = 835$ MHz; $\zeta = 0.91$ mho/m; $\epsilon_r = 41.23$; $\rho = 1000$ kg/m³;
Phantom section: Right Section
Ambient temperature (°C): 21.9, Liquid temperature (°C): 21.3

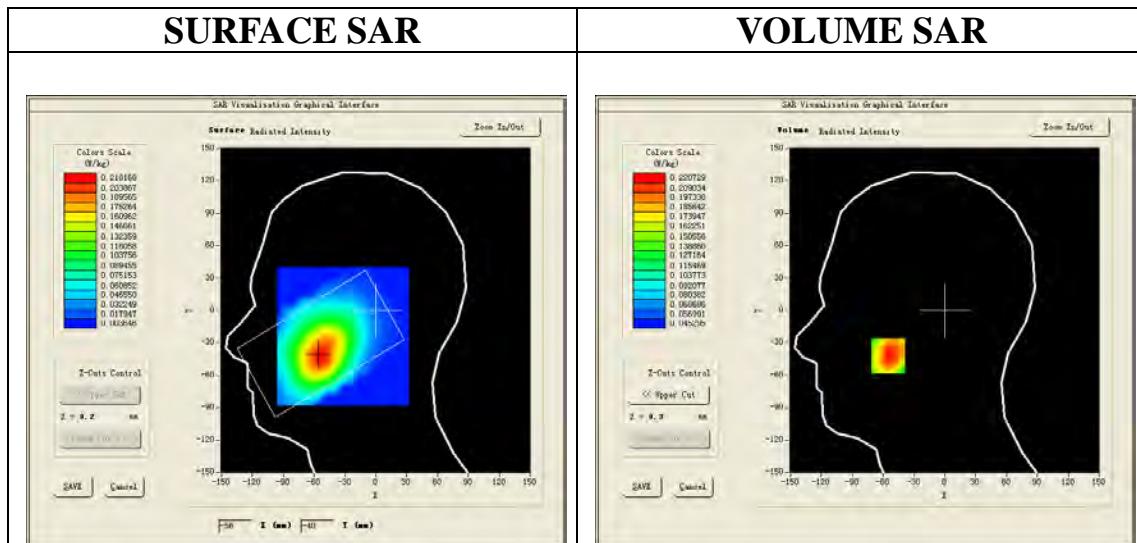
SATIMO Configuration:

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/GPRS 850 Mid-Touch-Right/Area Scan: Measurement grid: dx=8mm, dy=8mm

Configuration/GPRS 850 Mid-Touch-Right/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm

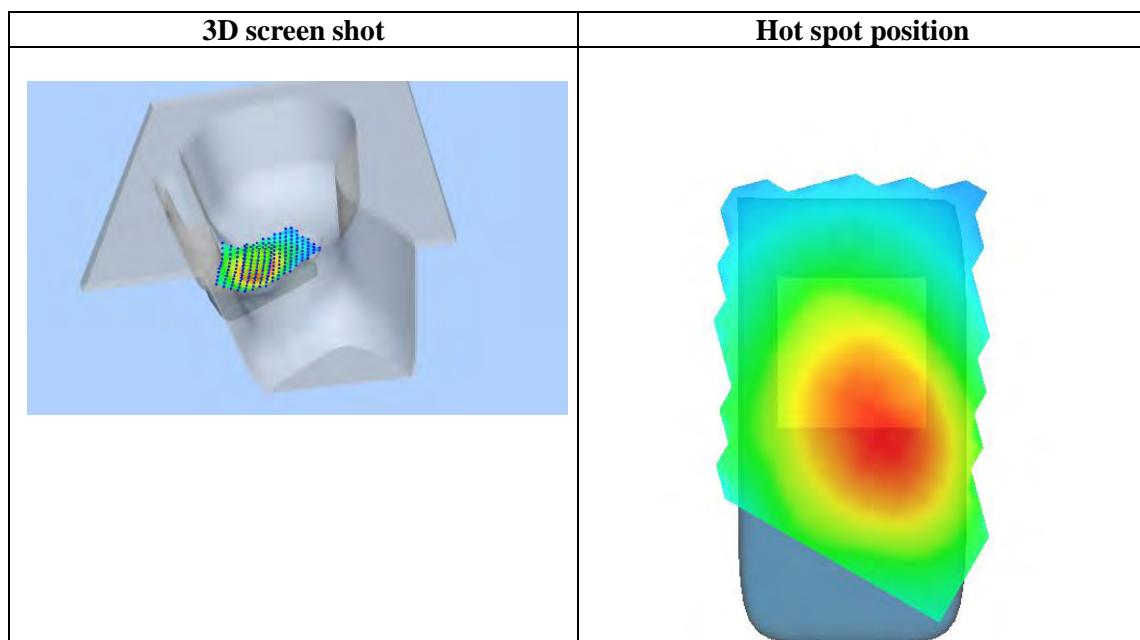
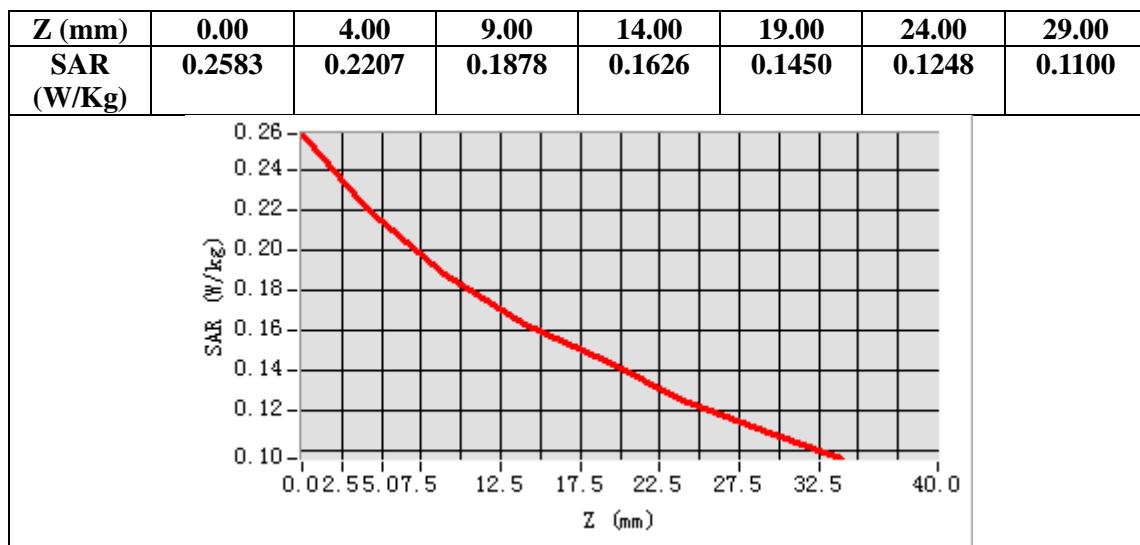
Area Scan	sam_direct_droit2_surf8mm.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Right head
Device Position	Cheek
Band	GSM 850
Channels	Middle
Signal	TDMA (Crest factor: 2.0)



Maximum location: X=-55.00, Y=-42.00

SAR Peak: 0.26 W/kg

SAR 10g (W/Kg)	0.171244
SAR 1g (W/Kg)	0.215394



Test Laboratory: AGC Lab
GPRS 850 Mid - Body- Back (4up) <SIM 1>
DUT: Rugged Mobile Phone; Type: CS22SA

Date: July 02,2017

Communication System: GPRS-4 Slot; Communication System Band: GSM 850; Duty Cycle: 1:2.1; Conv.F=5.94;
 Frequency: 836.6 MHz; Medium parameters used: $f = 835$ MHz; $\zeta = 0.97$ mho/m; $\epsilon_r = 55.21$; $\rho = 1000$ kg/m³ ;
 Phantom section: Flat Section
 Ambient temperature (°C): 21.9, Liquid temperature (°C): 21.5

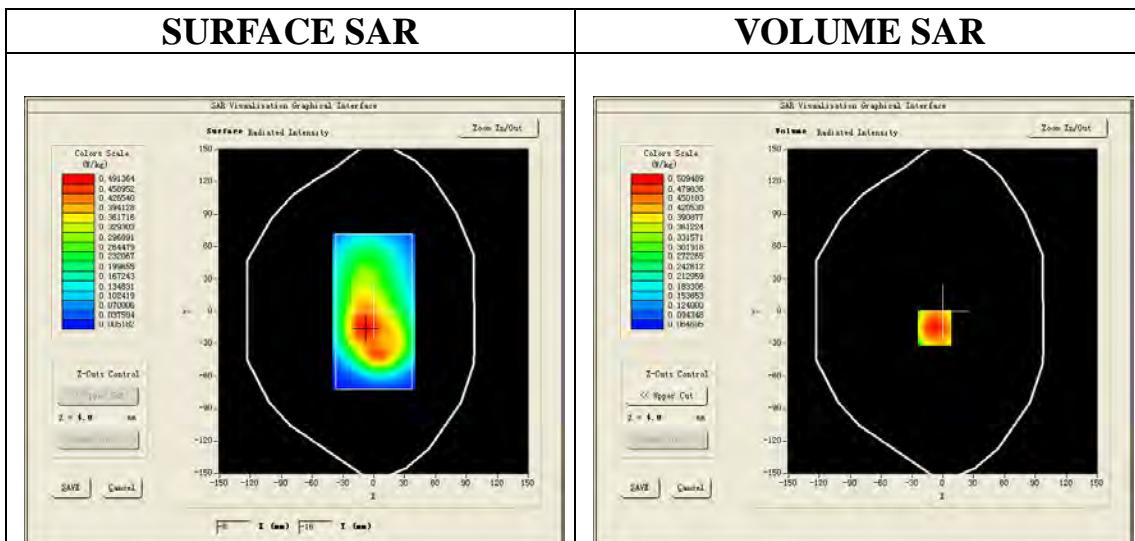
SATIMO Configuration:

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/GPRS 850 Mid -Body-Back/Area Scan: Measurement grid: dx=8mm, dy=8mm

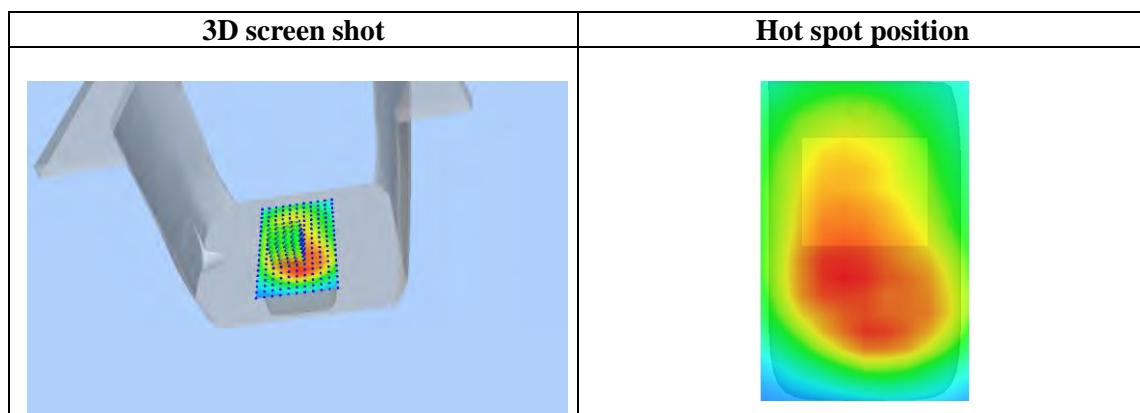
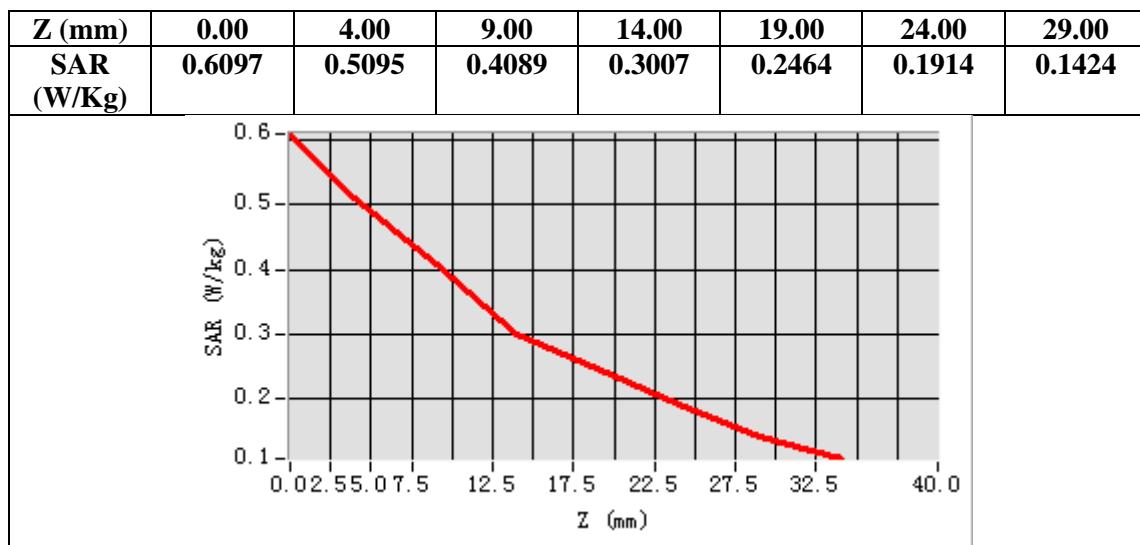
Configuration/GPRS 850 Mid -Body-Back/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

Area Scan	sam_direct_droit2_surf8mm.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body Back
Band	GSM 850
Channels	Middle
Signal	TDMA (Crest factor: 2.0)



Maximum location: X=-8.00, Y=-15.00
SAR Peak: 0.63 W/kg

SAR 10g (W/Kg)	0.365427
SAR 1g (W/Kg)	0.489659



Test Laboratory: AGC Lab
GPRS 850 Mid-Touch-Right (4up) <SIM 2>
DUT: Rugged Mobile Phone; Type: CS22SA

Date: July 02,2017

Communication System: GPRS-4 Slot; Communication System Band: GSM 850; Duty Cycle: 1:2.1; Conv.F=5.72
Frequency: 836.6 MHz; Medium parameters used: $f = 835$ MHz; $\zeta = 0.91$ mho/m; $\epsilon_r = 41.23$; $\rho = 1000$ kg/m³;
Phantom section: Right Section
Ambient temperature (°C): 21.9, Liquid temperature (°C): 21.3

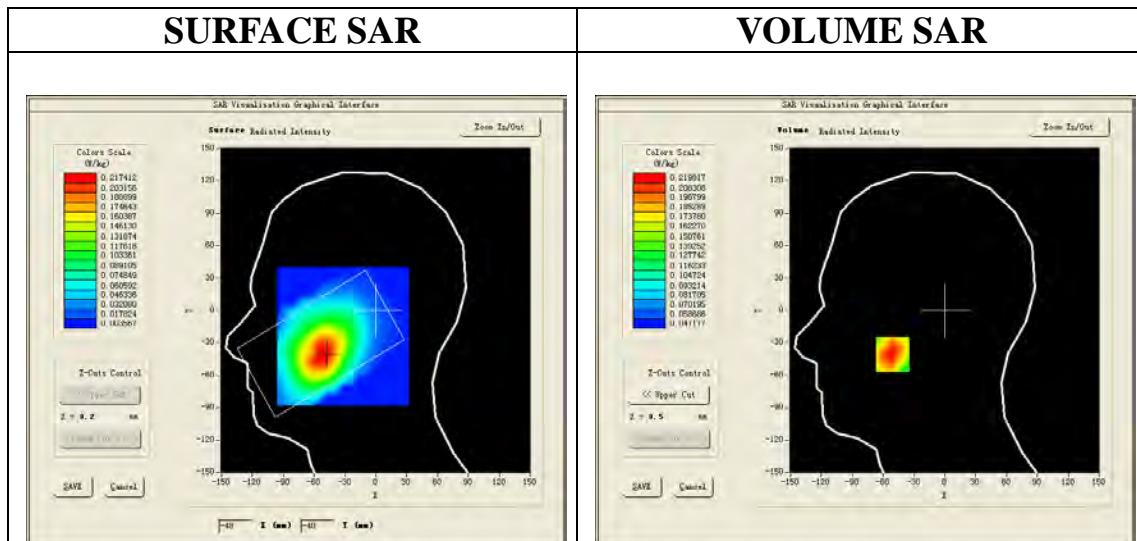
SATIMO Configuration:

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/GPRS 850 Mid-Touch-Right/Area Scan: Measurement grid: dx=8mm, dy=8mm

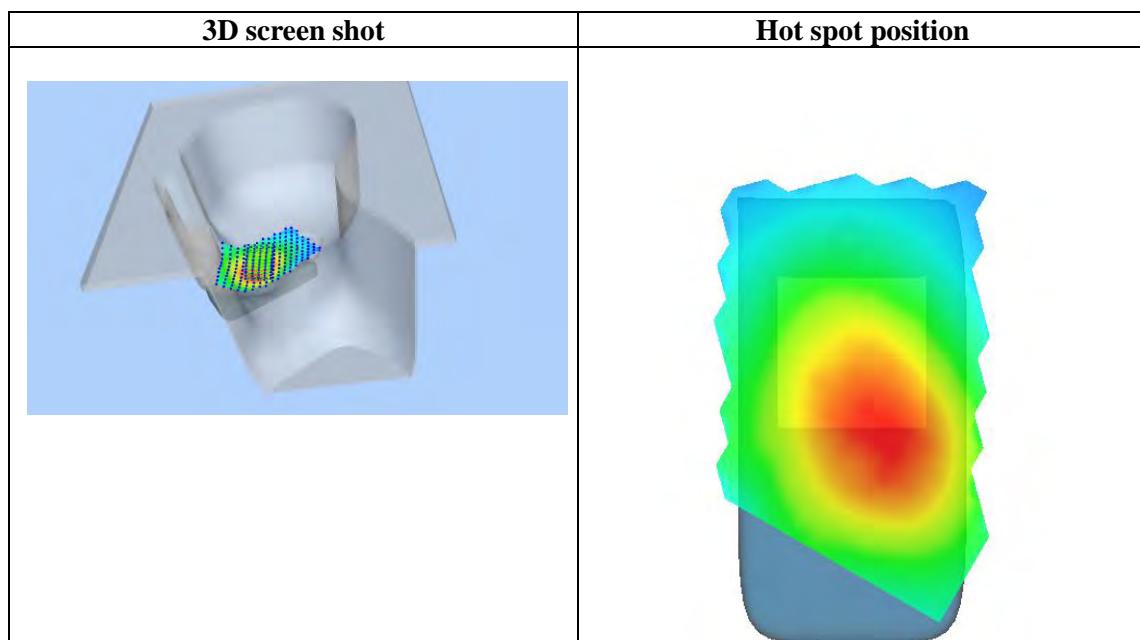
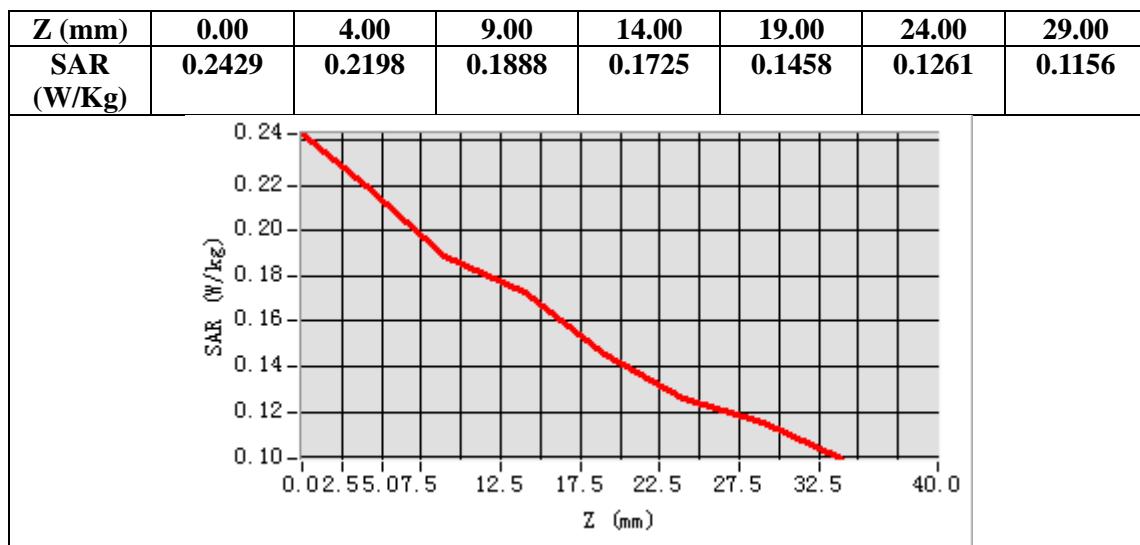
Configuration/GPRS 850 Mid-Touch-Right/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm

Area Scan	sam_direct_droit2_surf8mm.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Right head
Device Position	Cheek
Band	GSM 850
Channels	Middle
Signal	TDMA (Crest factor: 2.0)



Maximum location: X=-51.00, Y=-41.00
SAR Peak: 0.25 W/kg

SAR 10g (W/Kg)	0.172203
SAR 1g (W/Kg)	0.212960



Test Laboratory: AGC Lab
GPRS 850 Mid - Body- Back (4up) <SIM 2>
DUT: Rugged Mobile Phone; Type: CS22SA

Date: July 02,2017

Communication System: GPRS-4 Slot; Communication System Band: GSM 850; Duty Cycle: 1:2.1; Conv.F=5.94;
 Frequency: 836.6 MHz; Medium parameters used: $f = 835$ MHz; $\zeta = 0.97$ mho/m; $\epsilon_r = 55.21$; $\rho = 1000$ kg/m³ ;
 Phantom section: Flat Section
 Ambient temperature (°C): 21.9, Liquid temperature (°C): 21.5

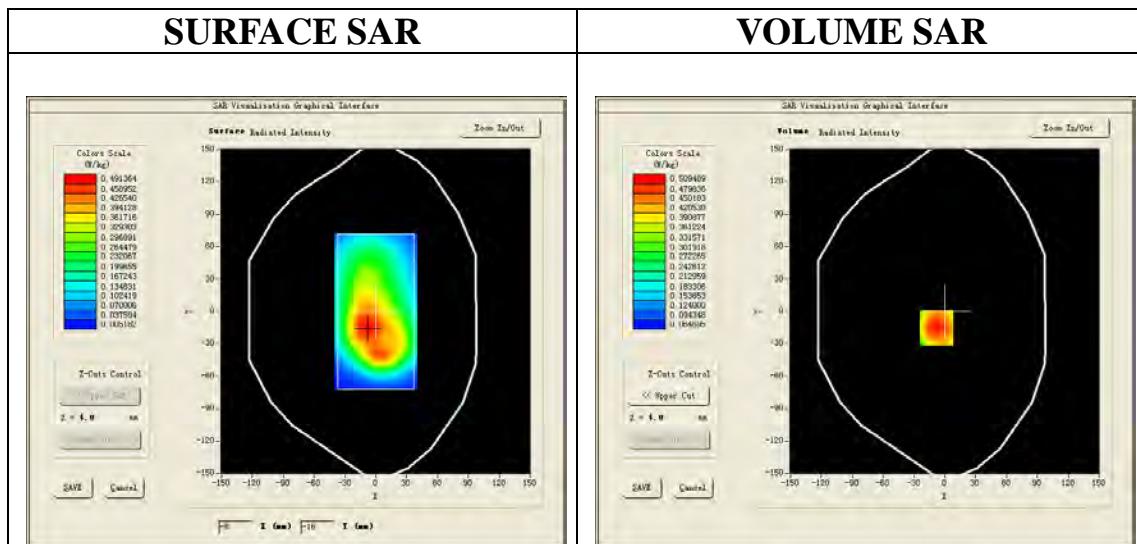
SATIMO Configuration:

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/GPRS 850 Mid -Body-Back/Area Scan: Measurement grid: dx=8mm, dy=8mm

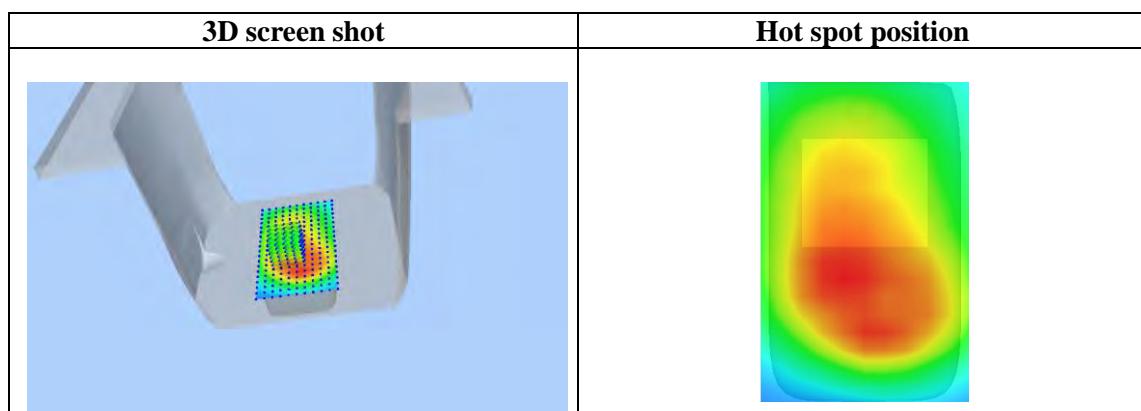
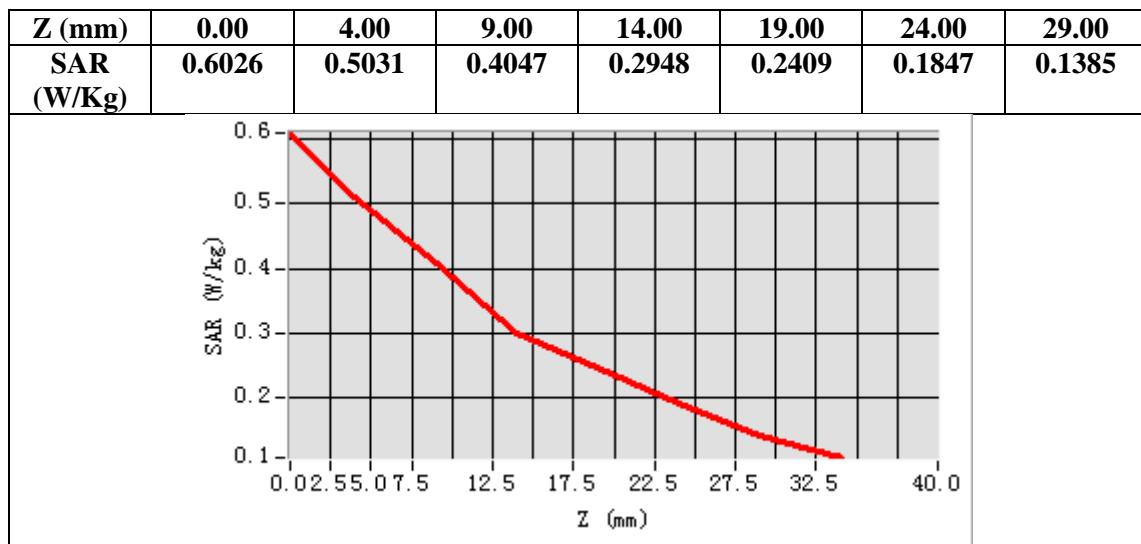
Configuration/GPRS 850 Mid -Body-Back/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

Area Scan	sam_direct_droit2_surf8mm.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body Back
Band	GSM 850
Channels	Middle
Signal	TDMA (Crest factor: 2.0)



Maximum location: X=-8.00, Y=-15.00
SAR Peak: 0.63 W/kg

SAR 10g (W/Kg)	0.360835
SAR 1g (W/Kg)	0.482739



Test Laboratory: AGC Lab
PCS 1900 Mid-Touch- Left <SIM 1>
DUT: Rugged Mobile Phone; Type: CS22SA

Date: June 28, 2017

Communication System: Generic GSM; Communication System Band: PCS 1900; Duty Cycle: 1:8.3; Conv.F=5.14;
Frequency: 1880 MHz; Medium parameters used: $f = 1900$ MHz; $\zeta = 1.37$ mho/m; $\epsilon_r = 40.03$; $\rho = 1000$ kg/m³ ;
Phantom section: Left Section
Ambient temperature (°C): 22.1, Liquid temperature (°C): 21.3

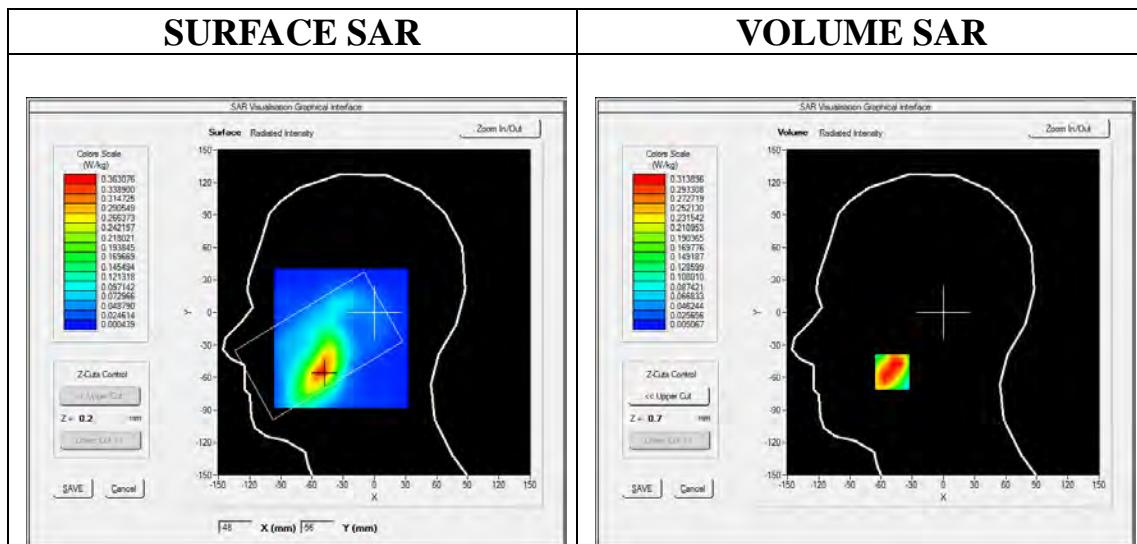
SATIMO Configuration:

- Probe: SSE5; Calibrated: 07/05/2016; Serial No.: SN 14/16 EP307
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/PCS1900 Mid-Touch-Left/Area Scan: Measurement grid: dx=8mm, dy=8mm

Configuration/PCS1900 Mid-Touch-Left/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

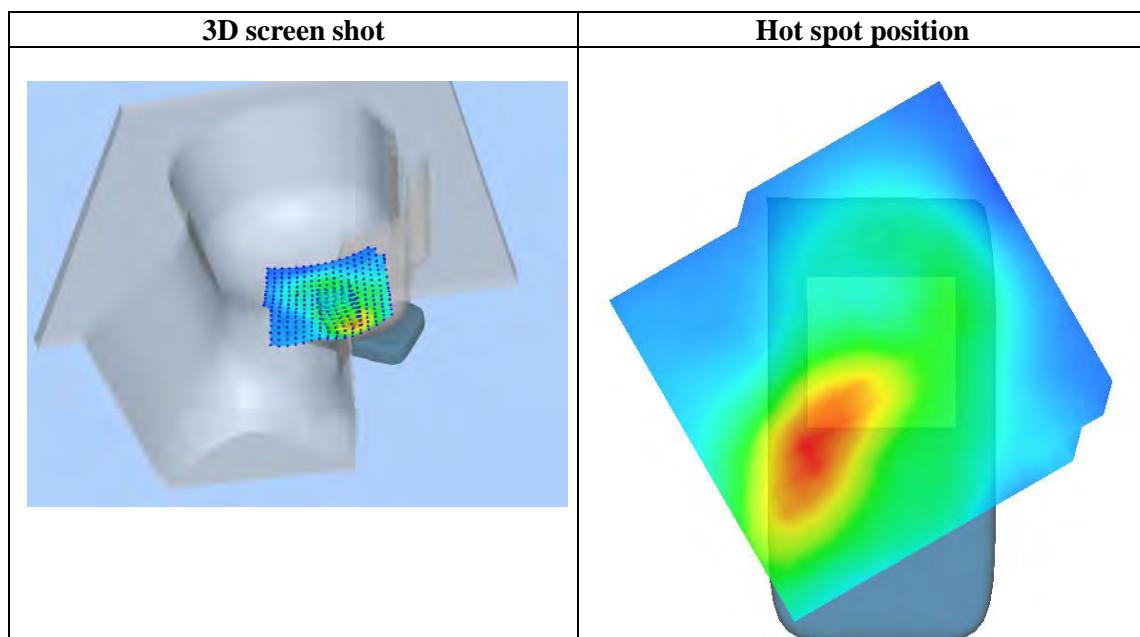
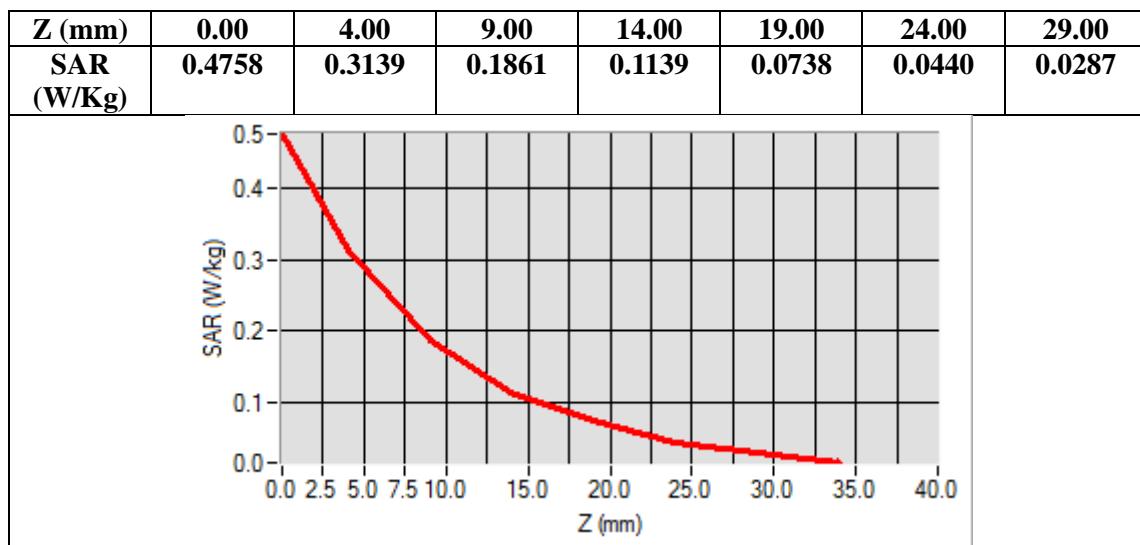
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Left head
Device Position	Cheek
Band	PCS 1900
Channels	Middle
Signal	TDMA (Crest factor: 8.0)



Maximum location: X=-49.00, Y=-55.00

SAR Peak: 0.53 W/kg

SAR 10g (W/Kg)	0.177267
SAR 1g (W/Kg)	0.306996



Test Laboratory: AGC Lab
PCS 1900 Mid-Body-Back (MS)<SIM 1>
DUT: Rugged Mobile Phone; Type: CS22SA

Date: June 28, 2017

Communication System: Generic GSM; Communication System Band: PCS 1900; Duty Cycle: 1:8.3; Conv.F=5.34;
Frequency: 1880 MHz; Medium parameters used: $f = 1900$ MHz; $\zeta = 1.49$ mho/m; $\epsilon_r = 54.02$; $\rho = 1000$ kg/m³ ;
Phantom section: Flat Section
Ambient temperature (°C): 22.1, Liquid temperature (°C): 21.5

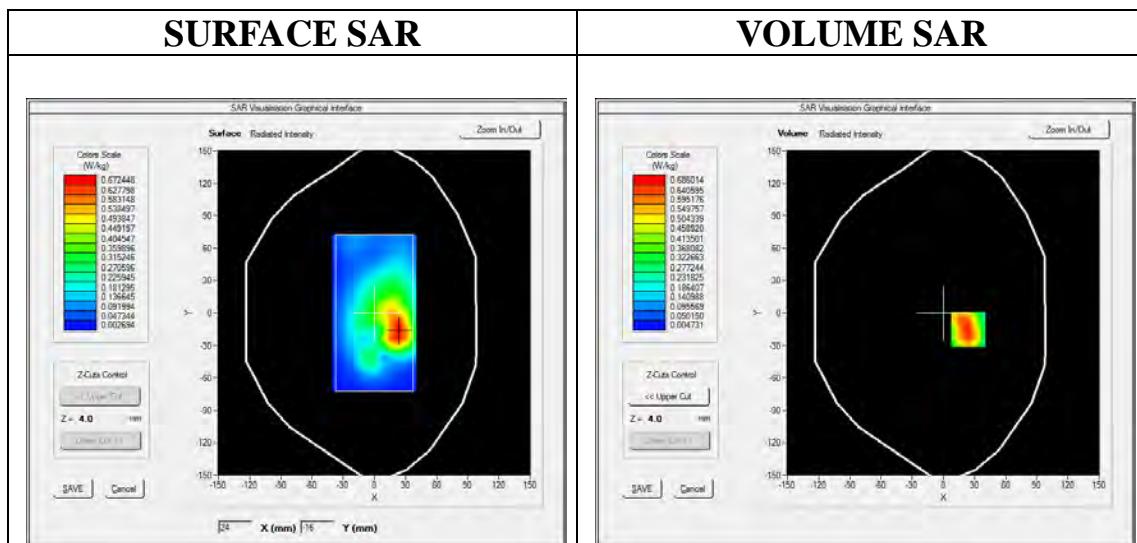
SATIMO Configuration:

- Probe: SSE5; Calibrated: 07/05/2016; Serial No.: SN 14/16 EP307
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/PCS1900 Mid-Body-Back/Area Scan: Measurement grid: dx=8mm, dy=8mm

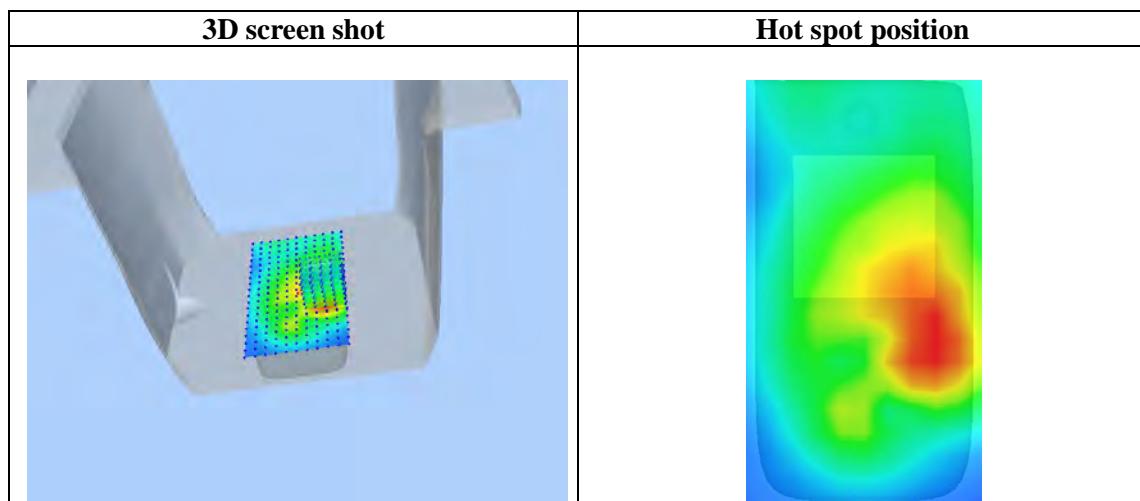
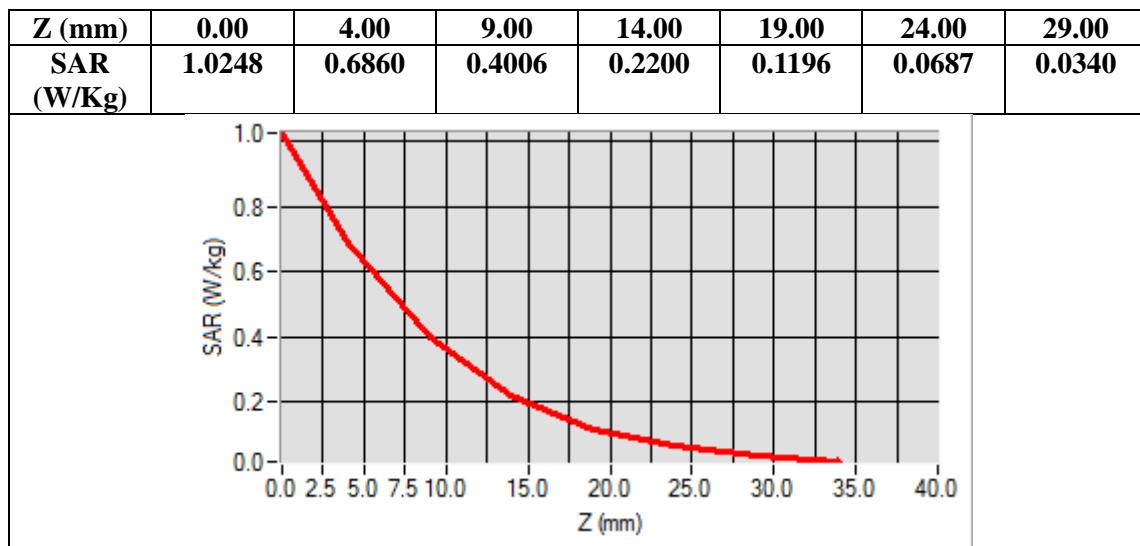
Configuration/PCS1900 Mid-Body-Back/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body Back
Band	PCS 1900
Channels	Middle
Signal	TDMA (Crest factor: 8.0)



Maximum location: X=24.00, Y=-15.00
SAR Peak: 1.06 W/kg

SAR 10g (W/Kg)	0.353244
SAR 1g (W/Kg)	0.643296



Test Laboratory: AGC Lab
GPRS 1900 Mid-Touch- Left (2up) <SIM 1>
DUT: Rugged Mobile Phone; Type: CS22SA

Date: June 28, 2017

Communication System: GPRS-2Slot; Communication System Band: PCS 1900; Duty Cycle: 1:4.2; Conv.F=5.14;
 Frequency: 1880 MHz; Medium parameters used: $f = 1900$ MHz; $\zeta = 1.37$ mho/m; $\epsilon_r = 40.03$; $\rho = 1000$ kg/m³ ;
 Phantom section: Left Section
 Ambient temperature (°C): 22.1, Liquid temperature (°C): 21.3

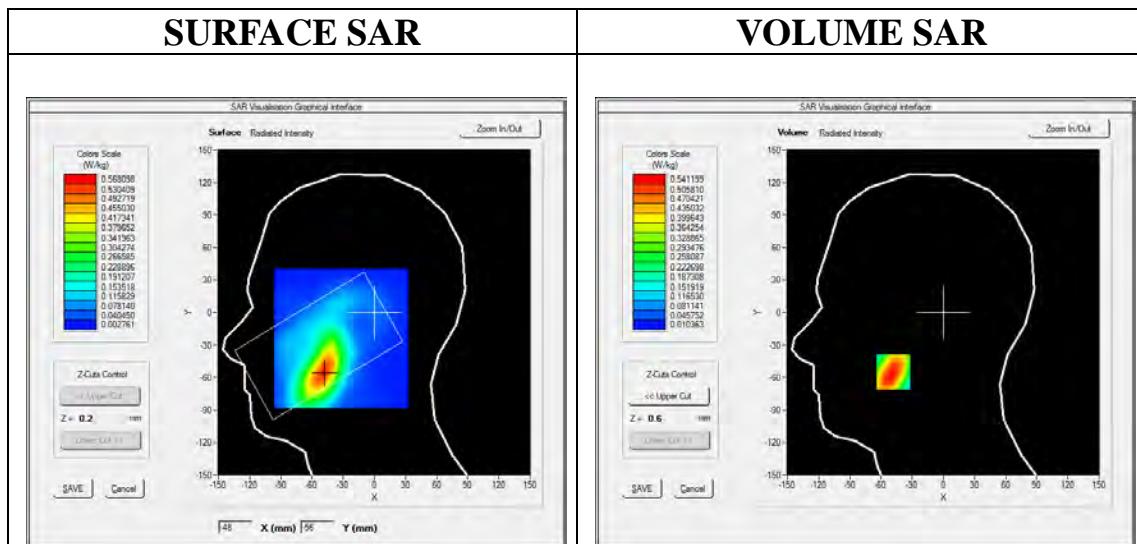
SATIMO Configuration:

- Probe: SSE5; Calibrated: 07/05/2016; Serial No.: SN 14/16 EP307
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/GPRS1900 Mid-Touch-Left/Area Scan: Measurement grid: dx=8mm, dy=8mm

Configuration/GPRS1900 Mid-Touch-Left/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

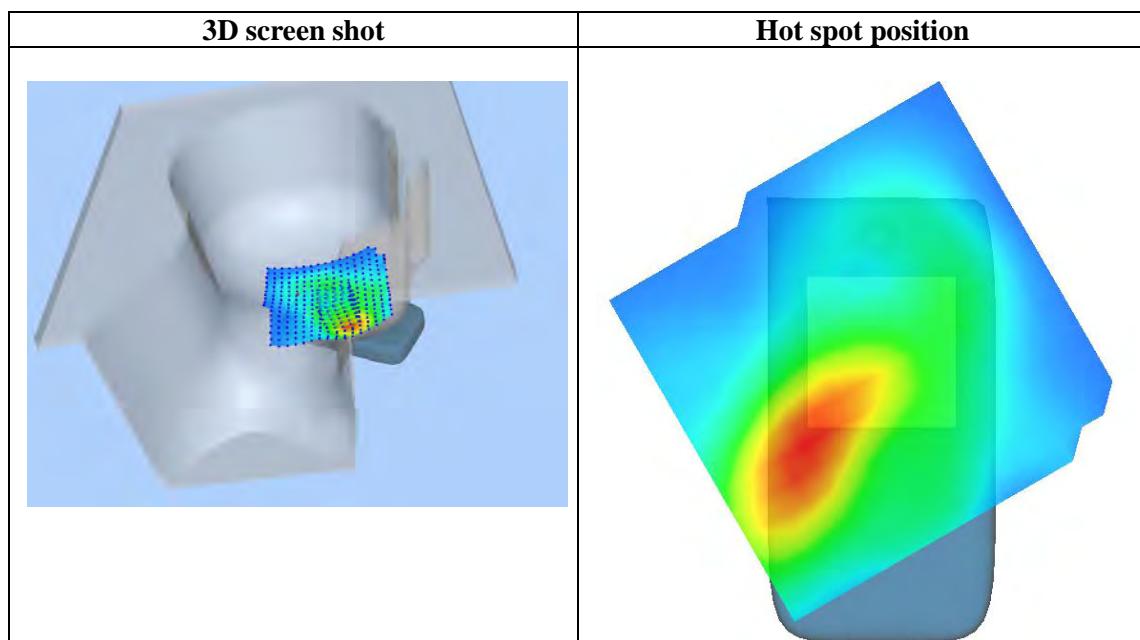
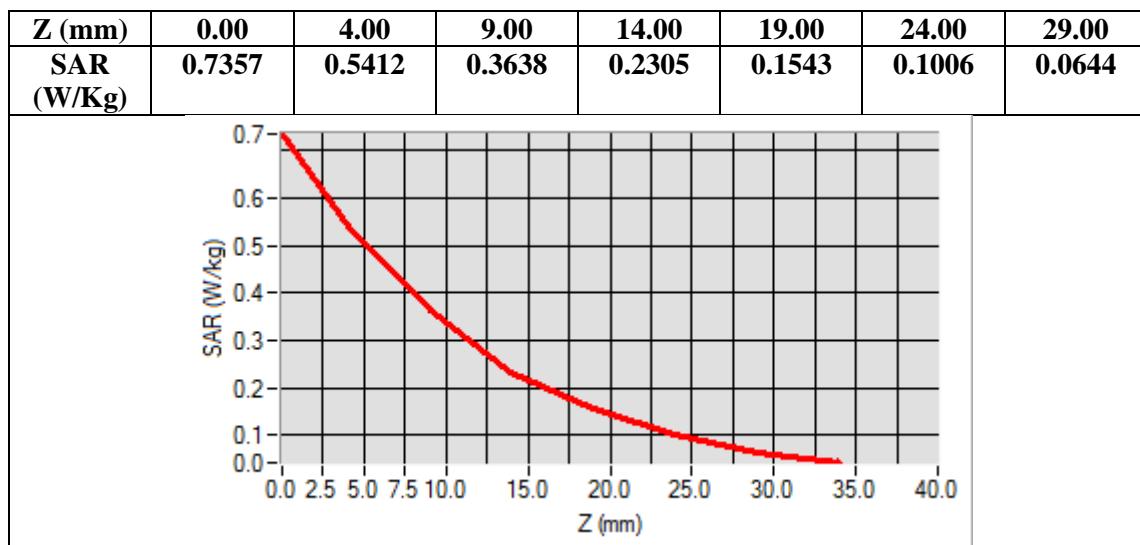
Area Scan	sam_direct_droit2_surf8mm.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Left head
Device Position	Cheek
Band	PCS 1900
Channels	Middle
Signal	TDMA (Crest factor: 4.0)



Maximum location: X=-48.00, Y=-55.00

SAR Peak: 0.81 W/kg

SAR 10g (W/Kg)	0.310320
SAR 1g (W/Kg)	0.526812



Test Laboratory: AGC Lab
GPRS 1900 High-Body-Back (2up) <SIM 1>
DUT: Rugged Mobile Phone; Type: CS22SA

Date: June 28, 2017

Communication System: GPRS-2Slot; Communication System Band: PCS 1900; Duty Cycle: 1:4.2; Conv.F=5.34;
Frequency: 1909.8MHz; Medium parameters used: $f = 1900 \text{ MHz}$; $\zeta = 1.54 \text{ mho/m}$; $\epsilon_r = 52.37$; $\rho = 1000 \text{ kg/m}^3$;
Phantom section: Flat Section
Ambient temperature ($^{\circ}\text{C}$): 22.1, Liquid temperature ($^{\circ}\text{C}$): 21.5

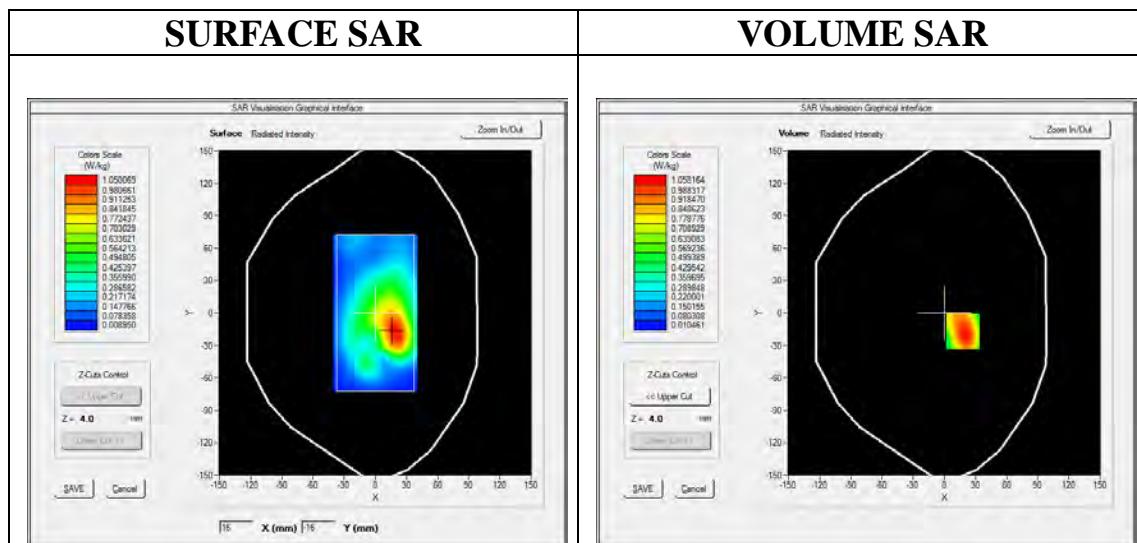
SATIMO Configuration:

- Probe: SSE5; Calibrated: 07/05/2016; Serial No.: SN 14/16 EP307
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/GPRS1900 High -Body- back /Area Scan: Measurement grid: dx=8mm, dy=8mm

Configuration/GPRS1900 High -Body- back /Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

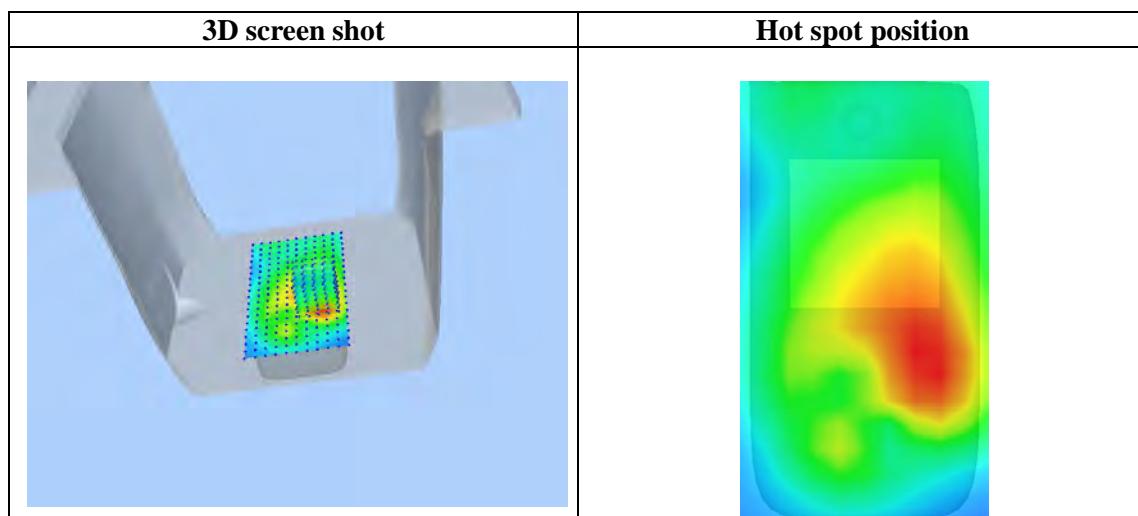
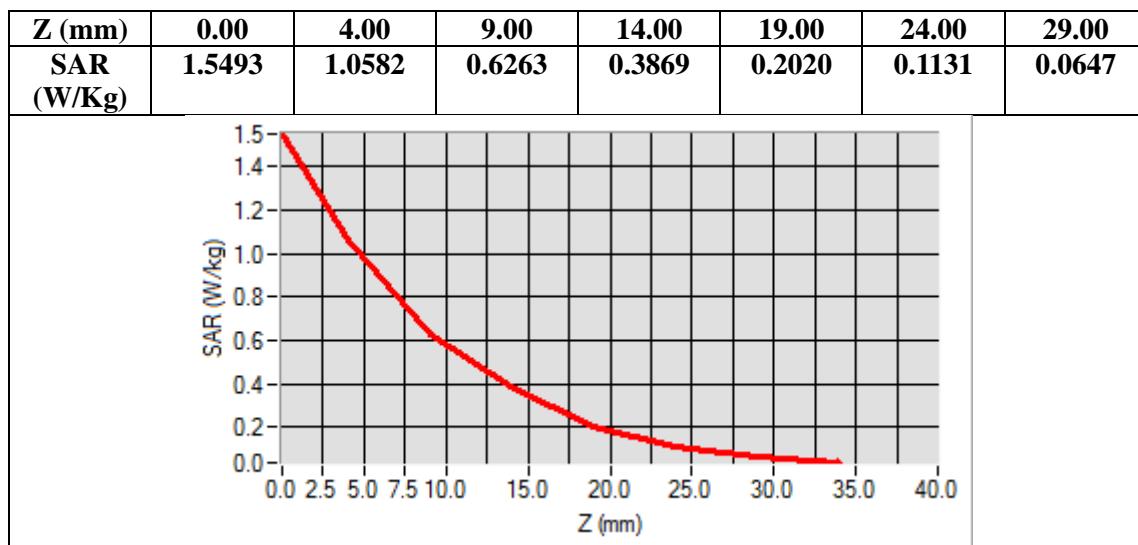
Area Scan	sam_direct_droit2_surf8mm.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body back
Band	PCS 1900
Channels	High
Signal	TDMA (Crest factor: 4.0)



Maximum location: X=18.00, Y=-17.00

SAR Peak: 1.60 W/kg

SAR 10g (W/Kg)	0.587948
SAR 1g (W/Kg)	1.020393



Test Laboratory: AGC Lab
GPRS 1900 Mid-Touch- Left (2up) <SIM 2>
DUT: Rugged Mobile Phone; Type: CS22SA

Date: June 28, 2017

Communication System: GPRS-2Slot; Communication System Band: PCS 1900; Duty Cycle: 1:4.2; Conv.F=5.14;
 Frequency: 1880 MHz; Medium parameters used: $f = 1900 \text{ MHz}$; $\zeta = 1.37 \text{ mho/m}$; $\epsilon_r = 40.03$; $\rho = 1000 \text{ kg/m}^3$;
 Phantom section: Left Section
 Ambient temperature ($^{\circ}\text{C}$): 22.1, Liquid temperature ($^{\circ}\text{C}$): 21.3

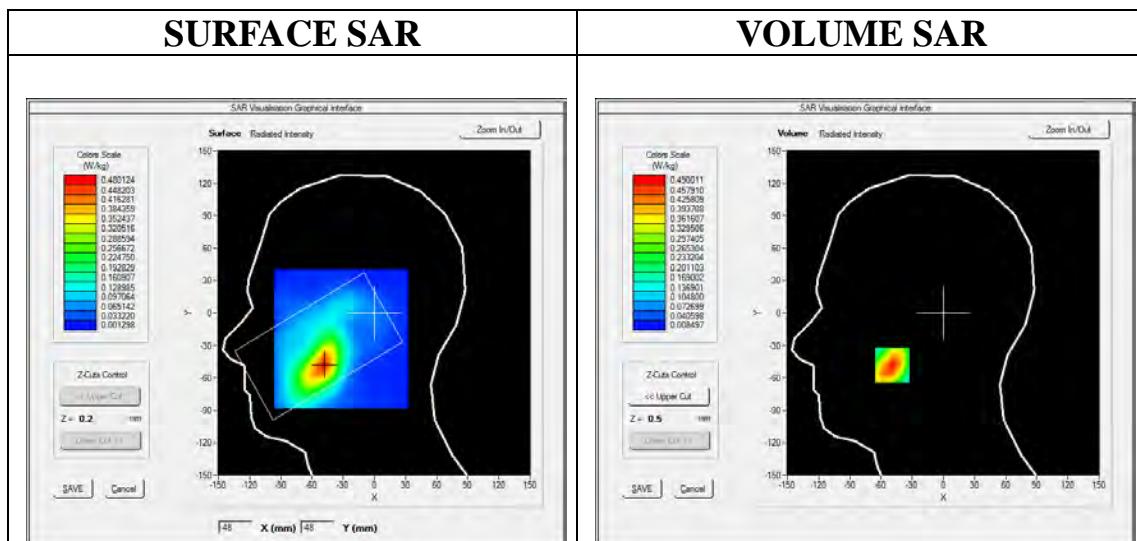
SATIMO Configuration:

- Probe: SSE5; Calibrated: 07/05/2016; Serial No.: SN 14/16 EP307
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/GPRS1900 Mid-Touch-Left/Area Scan: Measurement grid: dx=8mm, dy=8mm

Configuration/GPRS1900 Mid-Touch-Left/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

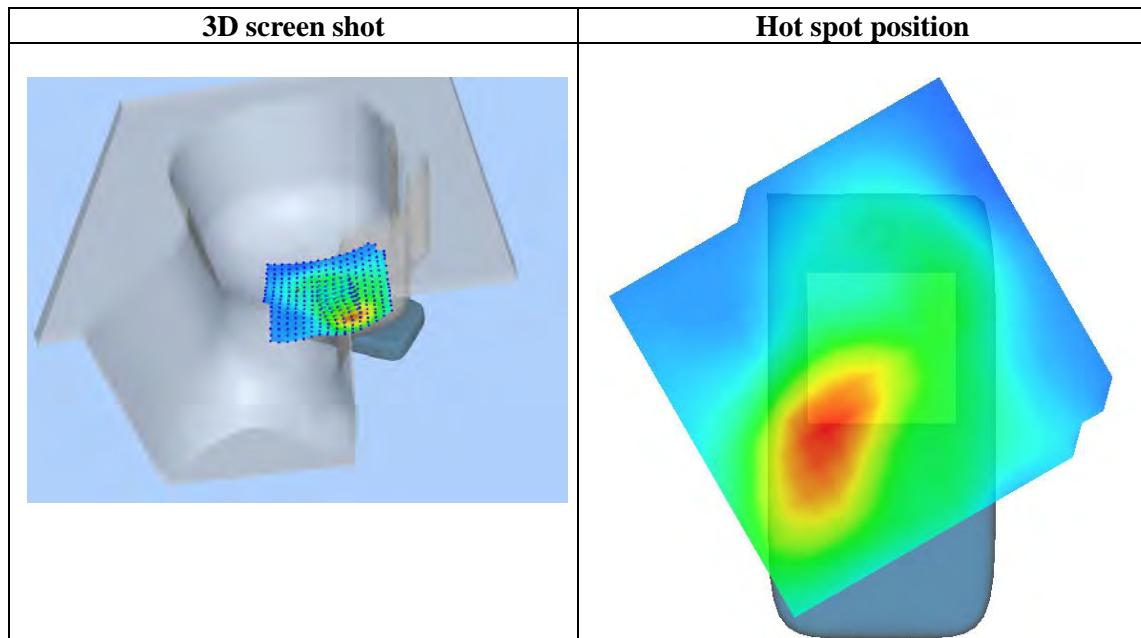
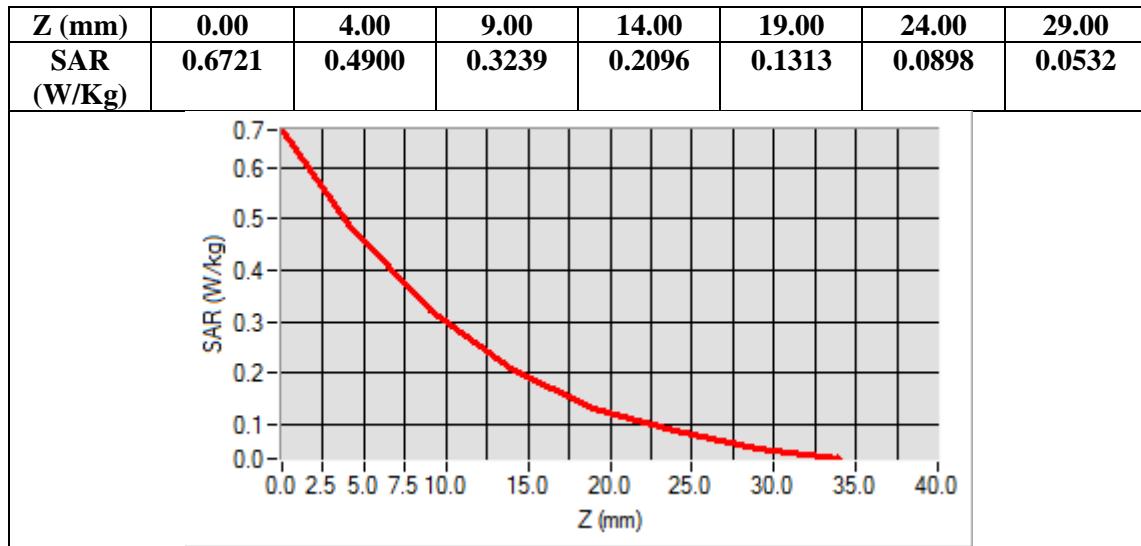
Area Scan	sam_direct_droit2_surf8mm.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Left head
Device Position	Cheek
Band	PCS 1900
Channels	Middle
Signal	TDMA (Crest factor: 4.0)



Maximum location: X=-49.00, Y=-48.00

SAR Peak: 0.71 W/kg

SAR 10g (W/Kg)	0.268931
SAR 1g (W/Kg)	0.464244



Test Laboratory: AGC Lab
GPRS 1900 High-Body-Back (2up) <SIM 2>
DUT: Rugged Mobile Phone; Type: CS22SA

Date: June 28, 2017

Communication System: GPRS-2Slot; Communication System Band: PCS 1900; Duty Cycle: 1:4.2; Conv.F=5.34;
Frequency: 1909.8MHz; Medium parameters used: $f = 1900 \text{ MHz}$; $\zeta = 1.54 \text{ mho/m}$; $\epsilon_r = 52.37$; $\rho = 1000 \text{ kg/m}^3$;
Phantom section: Flat Section
Ambient temperature ($^{\circ}\text{C}$): 22.1, Liquid temperature ($^{\circ}\text{C}$): 21.5

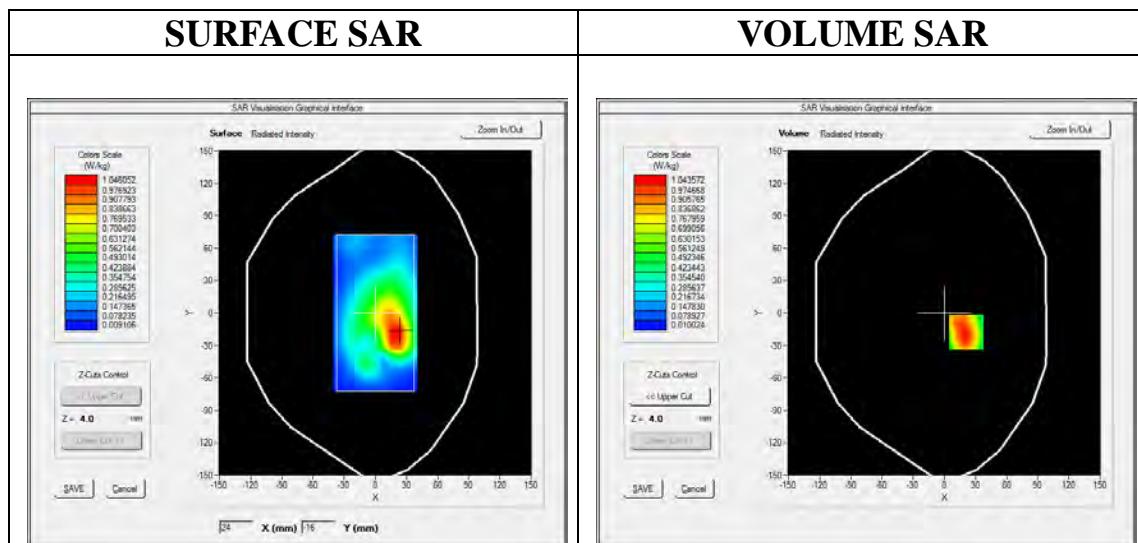
SATIMO Configuration:

- Probe: SSE5; Calibrated: 07/05/2016; Serial No.: SN 14/16 EP307
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/GPRS1900 High -Body- back /Area Scan: Measurement grid: dx=8mm, dy=8mm

Configuration/GPRS1900 High -Body- back /Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

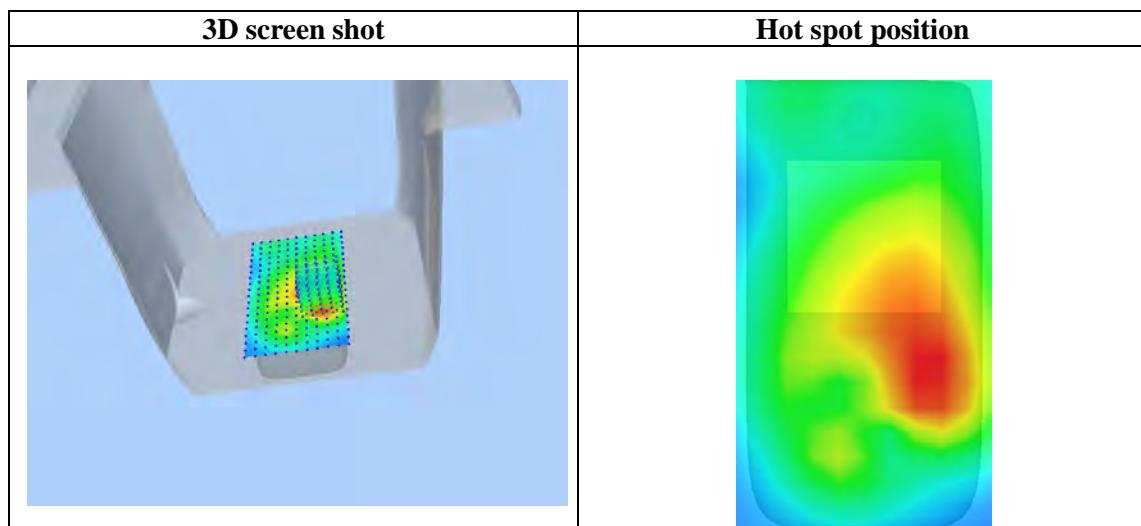
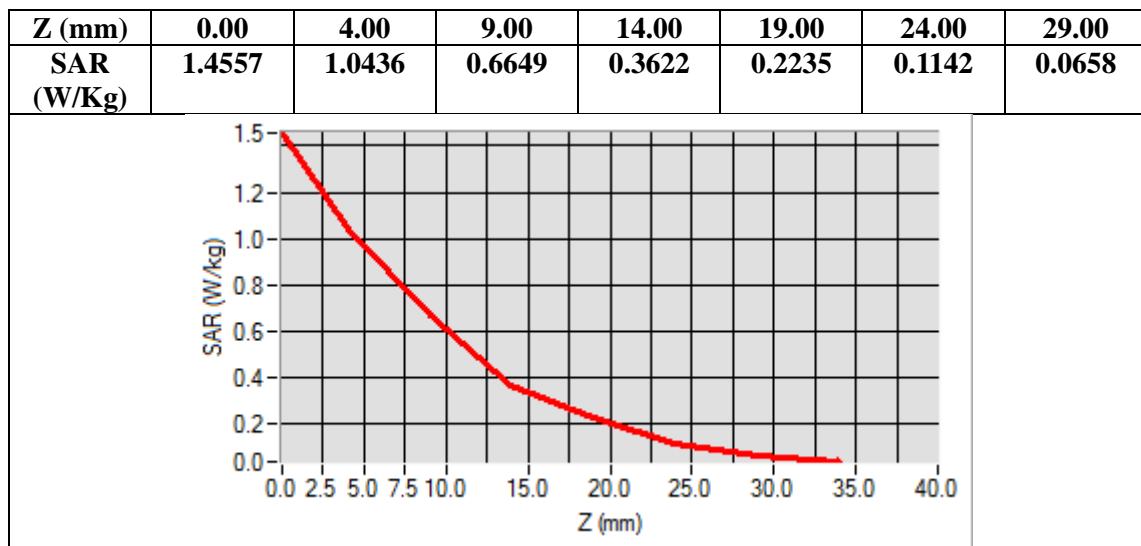
Area Scan	sam_direct_droit2_surf8mm.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body back
Band	PCS 1900
Channels	High
Signal	TDMA (Crest factor: 4.0)



Maximum location: X=21.00, Y=-18.00

SAR Peak: 1.51 W/kg

SAR 10g (W/Kg)	0.578620
SAR 1g (W/Kg)	0.991962



Test Laboratory: AGC Lab
WCDMA Band II Mid-Touch-Left (RMC)
DUT: Rugged Mobile Phone; Type: CS22SA

Date: June 28, 2017

Communication System: UMTS; Communication System Band: Band II UTRA/FDD ;Duty Cycle:1:1; Conv.F=5.14;
Frequency: 1880 MHz; Medium parameters used: $f = 1900$ MHz; $\zeta = 1.37$ mho/m; $\epsilon_r = 40.03$; $\rho = 1000$ kg/m³ ;
Phantom section: Left Section
Ambient temperature (°C): 22.1, Liquid temperature (°C): 21.3

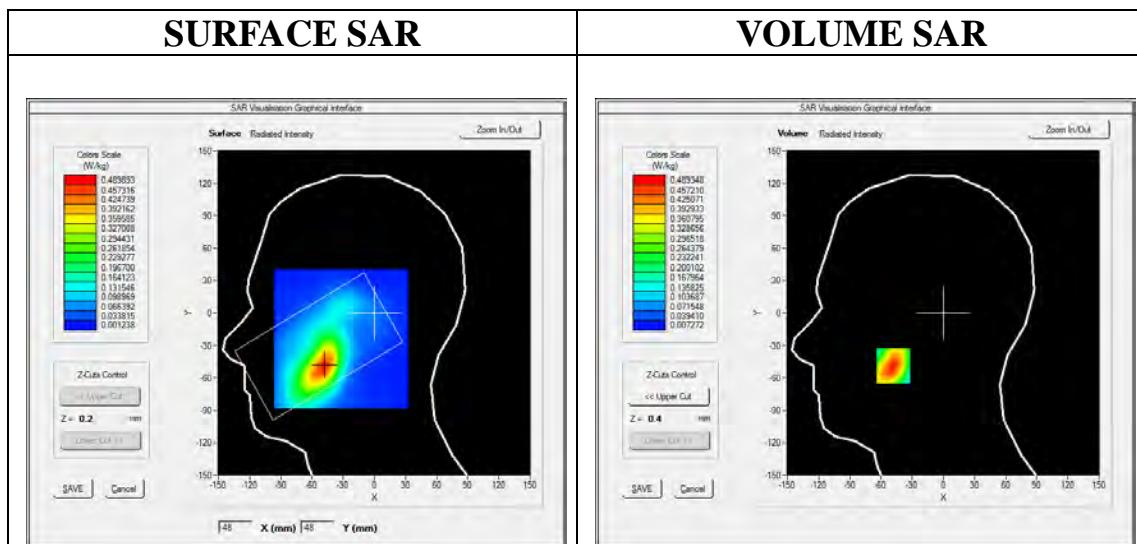
SATIMO Configuration:

- Probe: SSE5; Calibrated: 07/05/2016; Serial No.: SN 14/16 EP307
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/WCDMA band II Mid-Touch-Left/Area Scan: Measurement grid: dx=8mm, dy=8mm

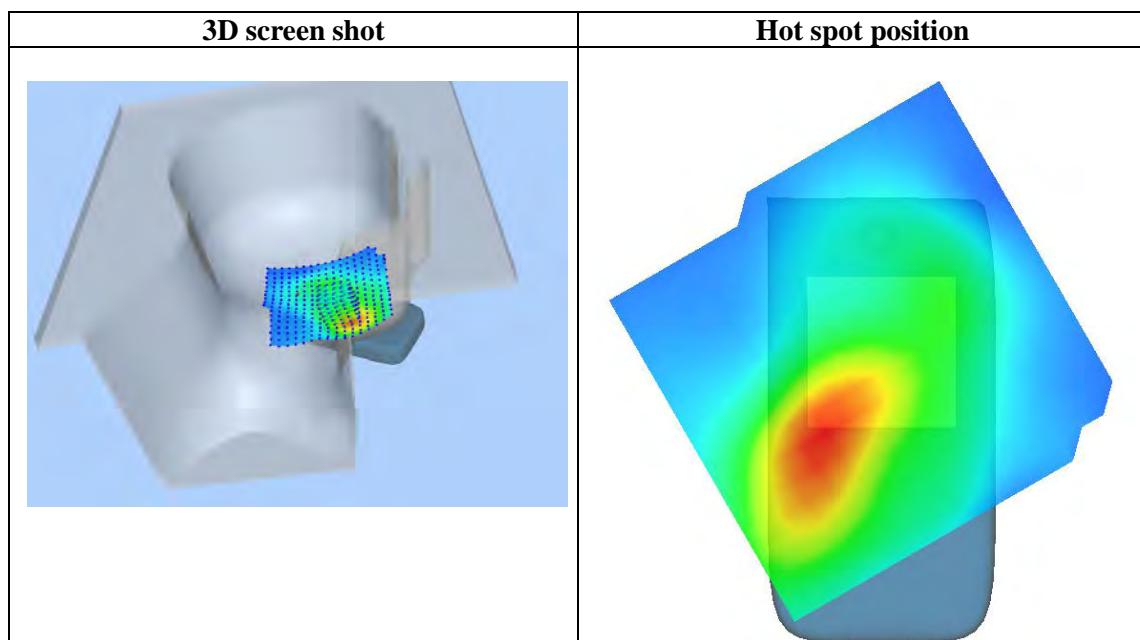
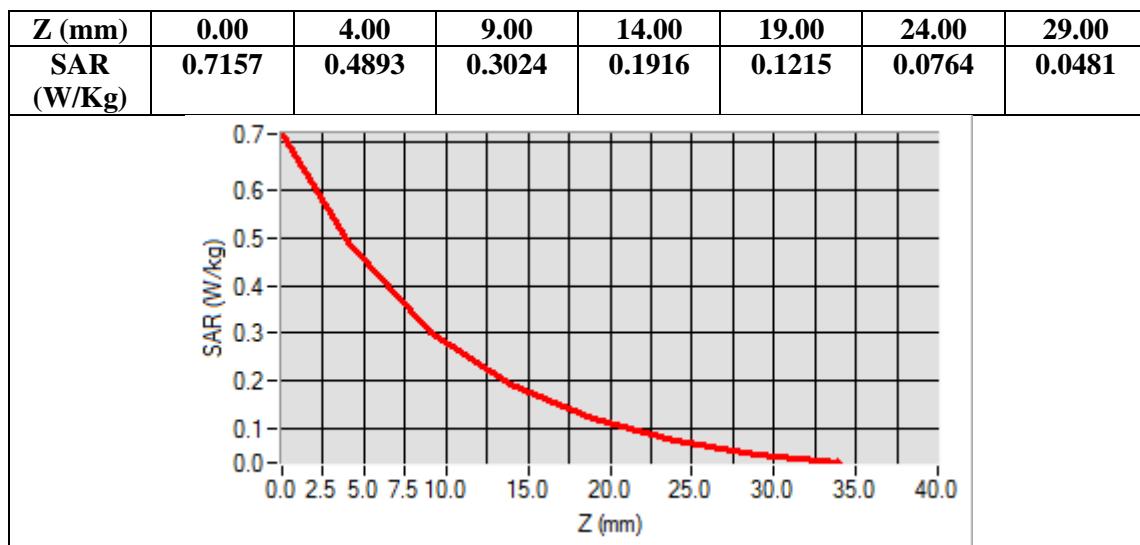
Configuration/WCDMA band II Mid-Touch-Left/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Left head
Device Position	Cheek
Band	WCDMA band II
Channels	Middle
Signal	CDMA (Crest factor: 1.0)



Maximum location: X=-48.00, Y=-49.00
SAR Peak: 0.72 W/kg

SAR 10g (W/Kg)	0.266574
SAR 1g (W/Kg)	0.464918



Test Laboratory: AGC Lab
WCDMA Band II Mid -Body-Towards Grounds (RMC 12.2kbps)
DUT: Rugged Mobile Phone; Type: CS22SA

Date: June 28, 2017

Communication System: UMTS; Communication System Band: Band II UTRA/FDD ;Duty Cycle:1:1; Conv.F=5.34;
Frequency: 1880 MHz; Medium parameters used: $f = 1900$ MHz; $\zeta = 1.49$ mho/m; $\epsilon_r = 54.02$; $\rho = 1000$ kg/m³ ;
Phantom section: Flat Section
Ambient temperature (°C): 22.1, Liquid temperature (°C): 21.5

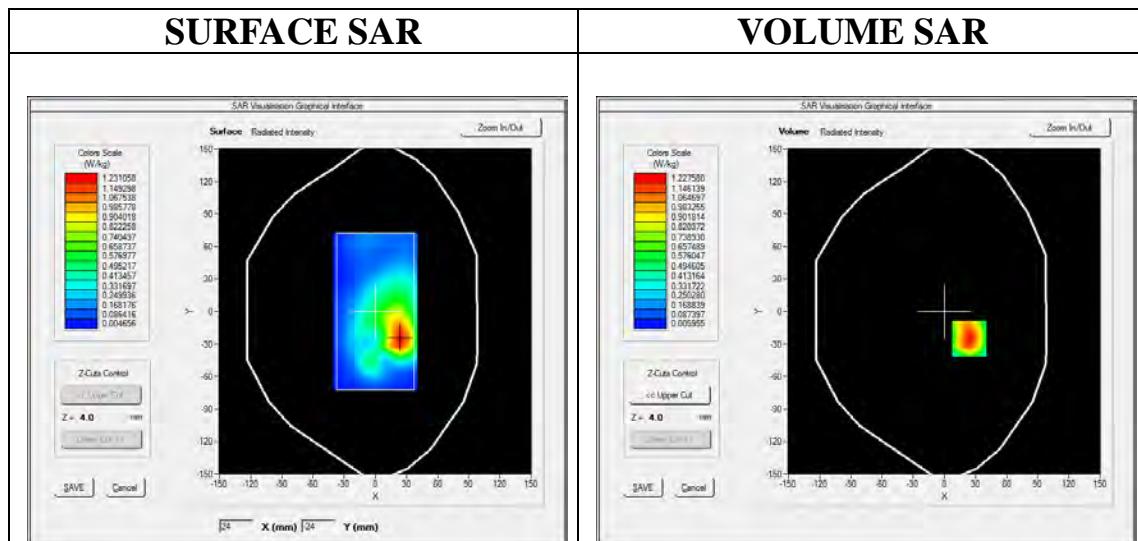
SATIMO Configuration:

- Probe: SSE5; Calibrated: 07/05/2016; Serial No.: SN 14/16 EP307
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/ WCDMA band II Mid -Body- Back t /Area Scan: Measurement grid: dx=8mm, dy=8mm

Configuration/ WCDMA band II Mid -Body- Back /Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5m;

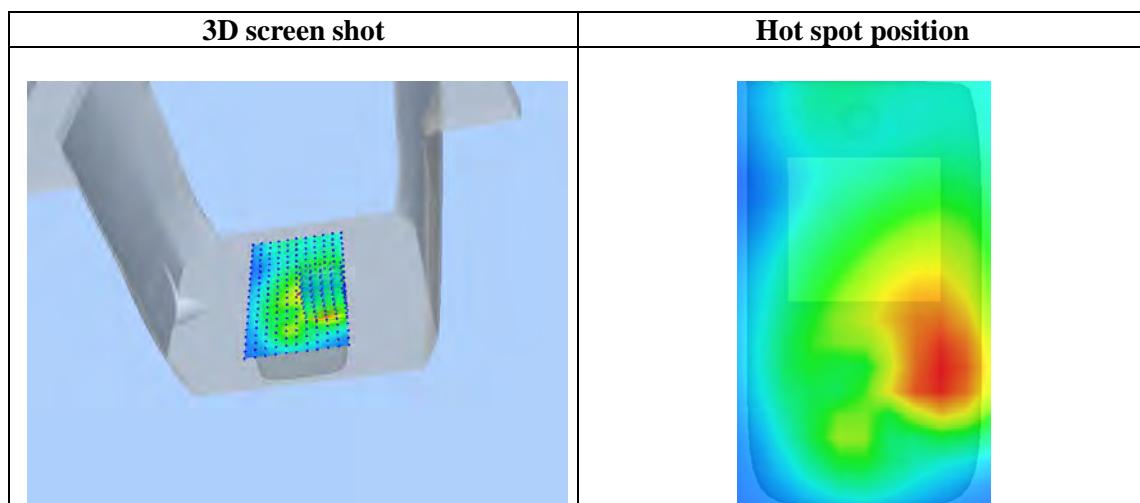
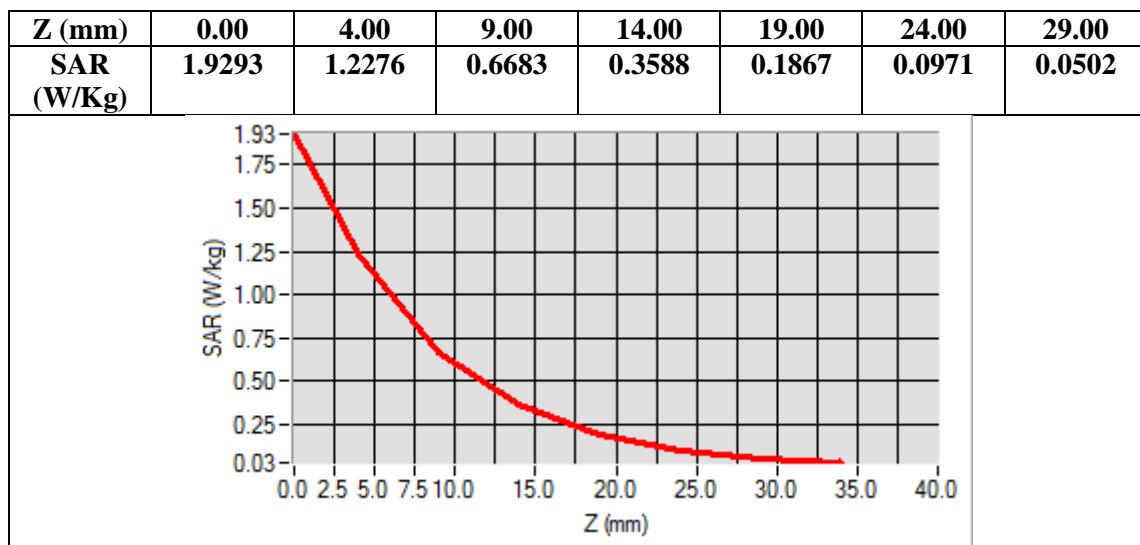
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body Back
Band	WCDMA band II
Channels	Middle
Signal	CDMA (Crest factor: 1.0)



Maximum location: X=24.00, Y=-25.00

SAR Peak: 2.10 W/kg

SAR 10g (W/Kg)	0.618204
SAR 1g (W/Kg)	1.193088



Test Laboratory: AGC Lab
WCDMA Band IV Mid-Touch-Left (RMC)
DUT: Rugged Mobile Phone; Type: CS22SA

Date: July 02,2017

Communication System: UMTS; Communication System Band: BAND IV UTRA/FDD; Duty Cycle:1: 1; Conv.F=4.92;
Frequency:1732.5 MHz; Medium parameters used: $f = 1750 \text{ MHz}$; $\zeta = 1.35 \text{ mho/m}$; $\epsilon_r = 41.03$; $\rho = 1000 \text{ kg/m}^3$;
Phantom section: Left Section
Ambient temperature ($^{\circ}\text{C}$): 22.1, Liquid temperature ($^{\circ}\text{C}$): 21.3

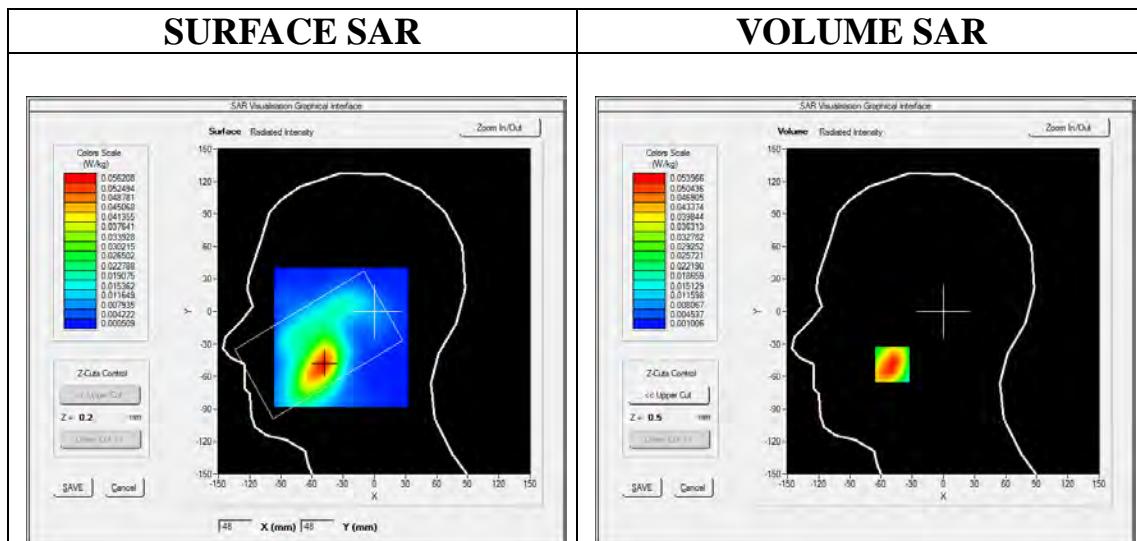
SATIMO Configuration:

- Probe: SSE5; Calibrated: 07/05/2016; Serial No.: SN 14/16 EP307
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/ WCDMA Band IV Mid-Touch-Left/Area Scan: Measurement grid: dx=8mm, dy=8mm

Configuration/ WCDMA Band IV Mid-Touch-Left/Zoom Scan: Measurement grid: dx=8mm, dy=8mm, dz=5mm

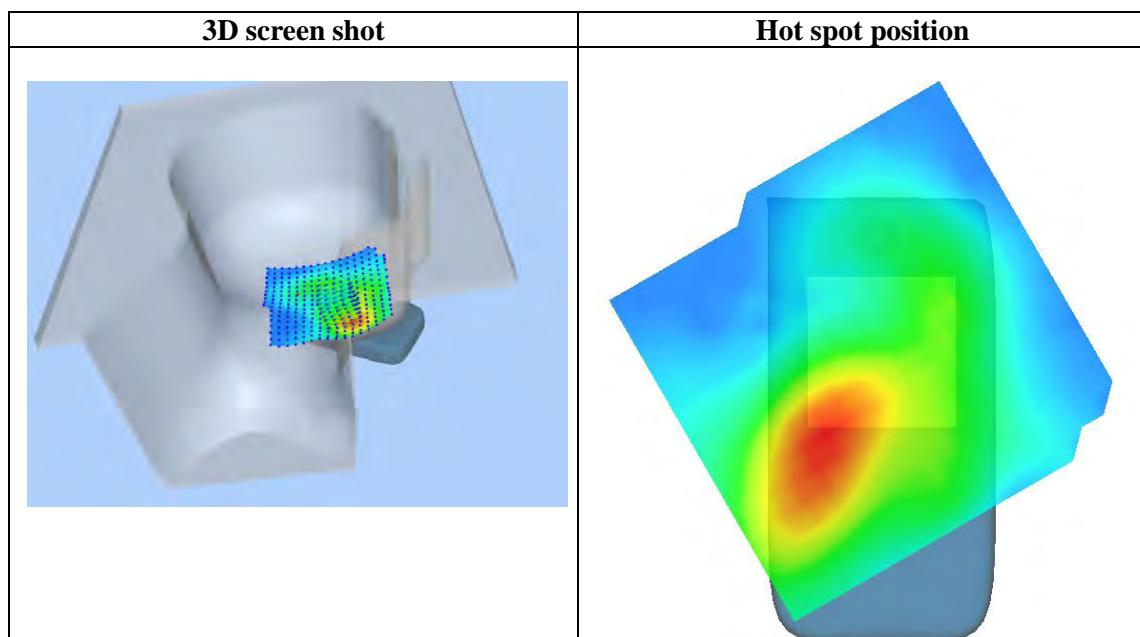
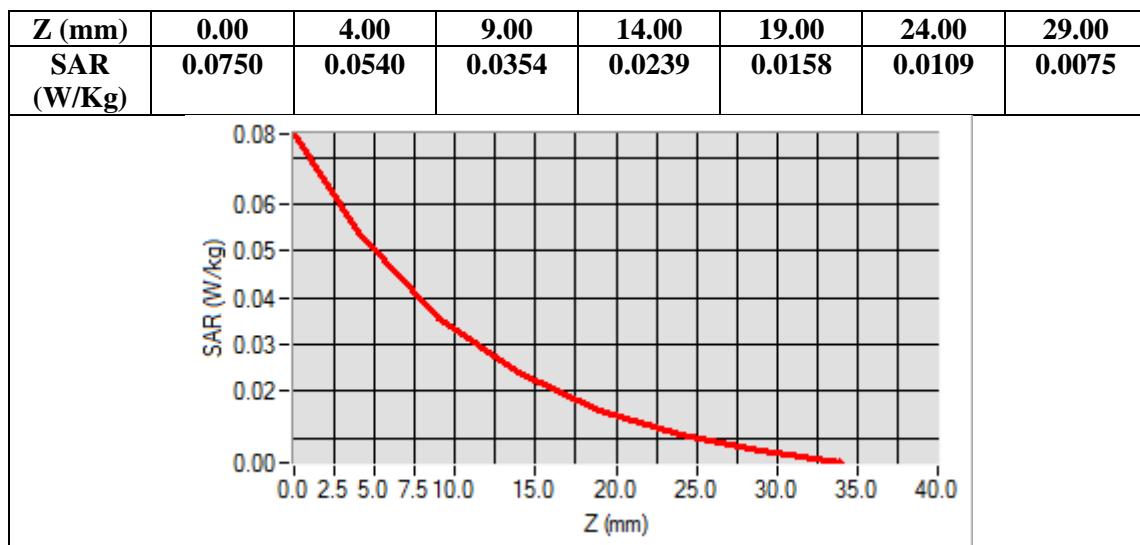
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Left head
Device Position	Cheek
Band	WCDMA Band IV
Channels	Middle
Signal	CDMA (Crest factor: 1.0)



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

SAR Peak: 0.08 W/kg

SAR 10g (W/Kg)	0.031272
SAR 1g (W/Kg)	0.051539



Test Laboratory: AGC Lab
WCDMA Band IV Mid-Body-Towards Grounds (RMC)
DUT: Rugged Mobile Phone; Type: CS22SA

Date: July 02,2017

Communication System: UMTS; Communication System Band: BAND IV UTRA/FDD; Duty Cycle:1: 1; Conv.F=5.06;
Frequency:1732.5 MHz; Medium parameters used: $f = 1750$ MHz; $\zeta = 1.46$ mho/m; $\epsilon_r = 53.87$; $\rho = 1000$ kg/m³;
Phantom section: Flat Section
Ambient temperature (°C): 22.1, Liquid temperature (°C): 21.5

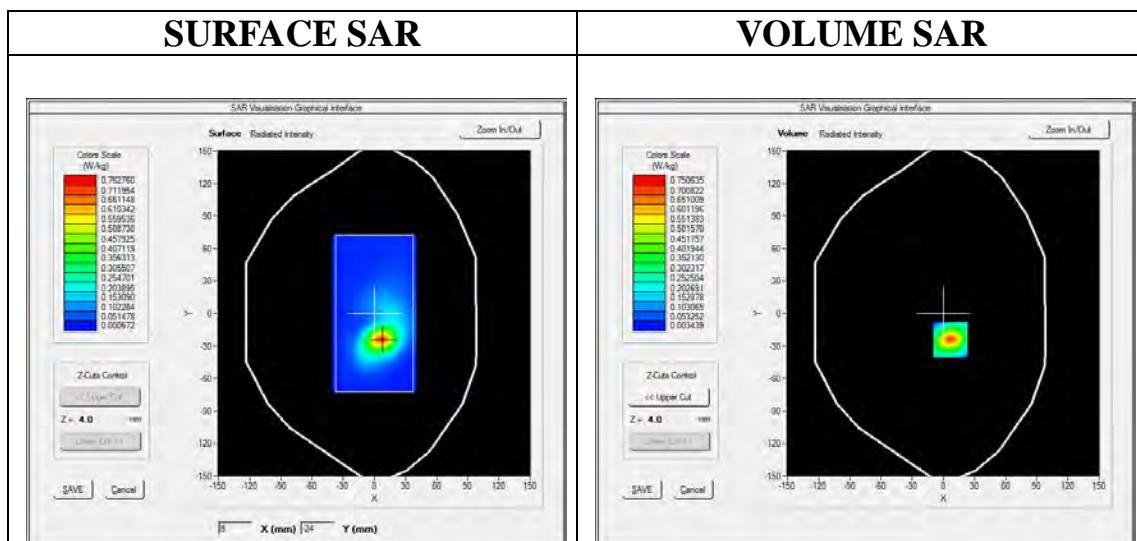
SATIMO Configuration:

- Probe: SSE5; Calibrated: 07/05/2016; Serial No.: SN 14/16 EP307
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/ WCDMA Band IV Mid-Body-Back/Area Scan: Measurement grid: dx=8mm, dy=8mm

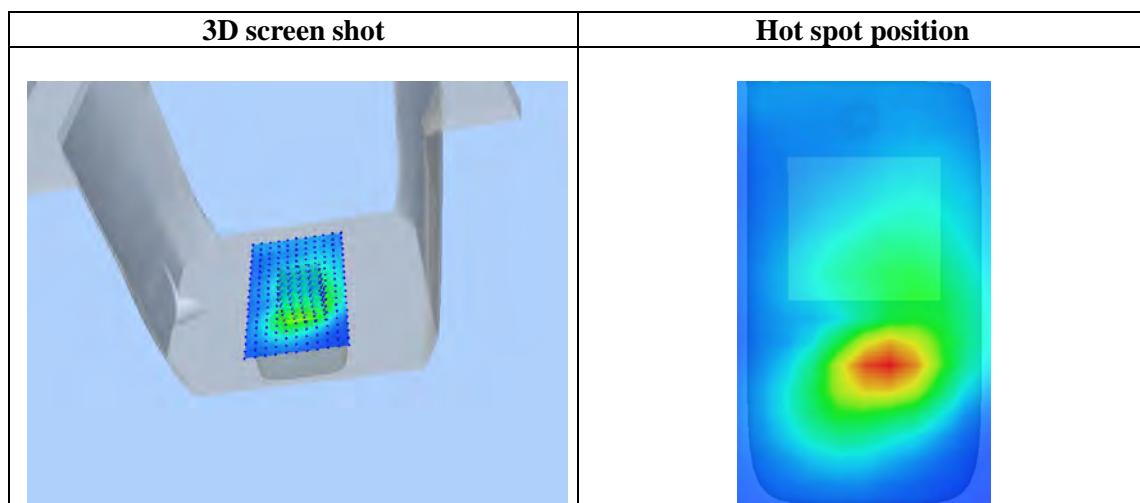
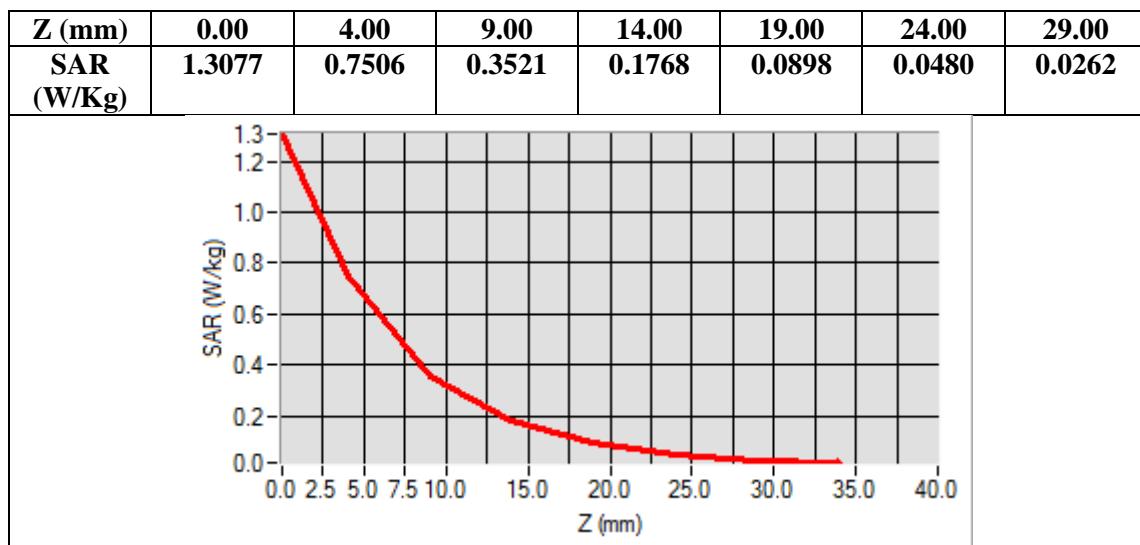
Configuration/ WCDMA Band IV Mid-Body-Back/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body Back
Band	WCDMA Band IV
Channels	Middle
Signal	CDMA (Crest factor: 1.0)



Maximum location: X=7.00, Y=-24.00
SAR Peak: 1.29 W/kg

SAR 10g (W/Kg)	0.291904
SAR 1g (W/Kg)	0.677527



Test Laboratory: AGC Lab

Date: July 02,2017

WCDMA Band V Mid-Touch-Left (RMC)

DUT: Rugged Mobile Phone; Type: CS22SA

Communication System: UMTS; Communication System Band: BAND V UTRA/FDD ; Duty Cycle:1: 1; Conv.F=5.72;
Frequency: 836.6 MHz; Medium parameters used: $f = 835\text{MHz}$; $\zeta = 0.91 \text{ mho/m}$; $\epsilon_r = 41.23$; $\rho = 1000 \text{ kg/m}^3$;
Phantom section: Left Section

Ambient temperature ($^{\circ}\text{C}$): 21.9, Liquid temperature ($^{\circ}\text{C}$): 21.3

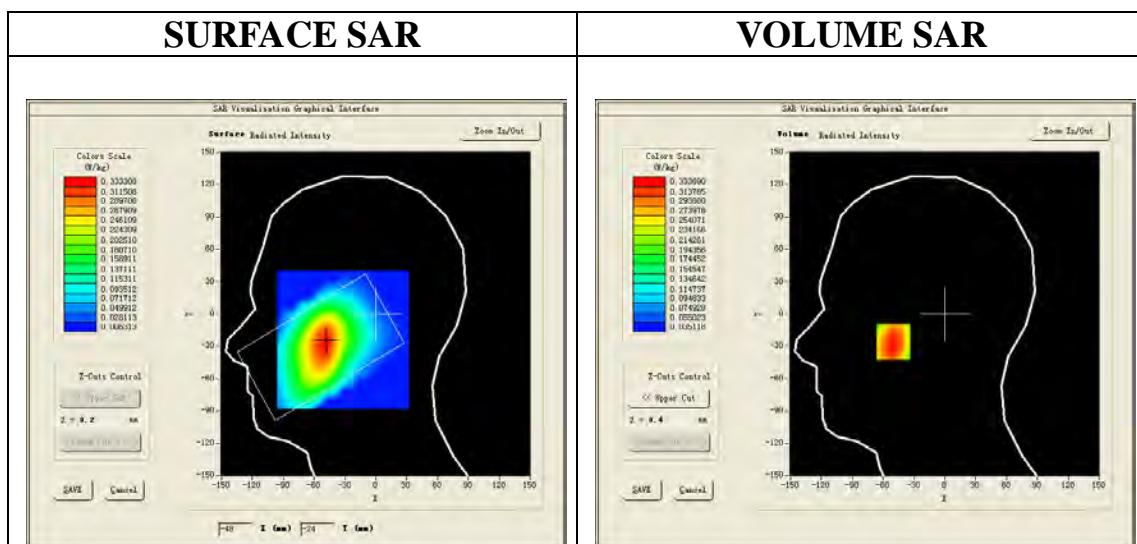
SATIMO Configuration:

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/ WCDMA Band V Mid-Touch-Left/Area Scan: Measurement grid: dx=8mm, dy=8mm

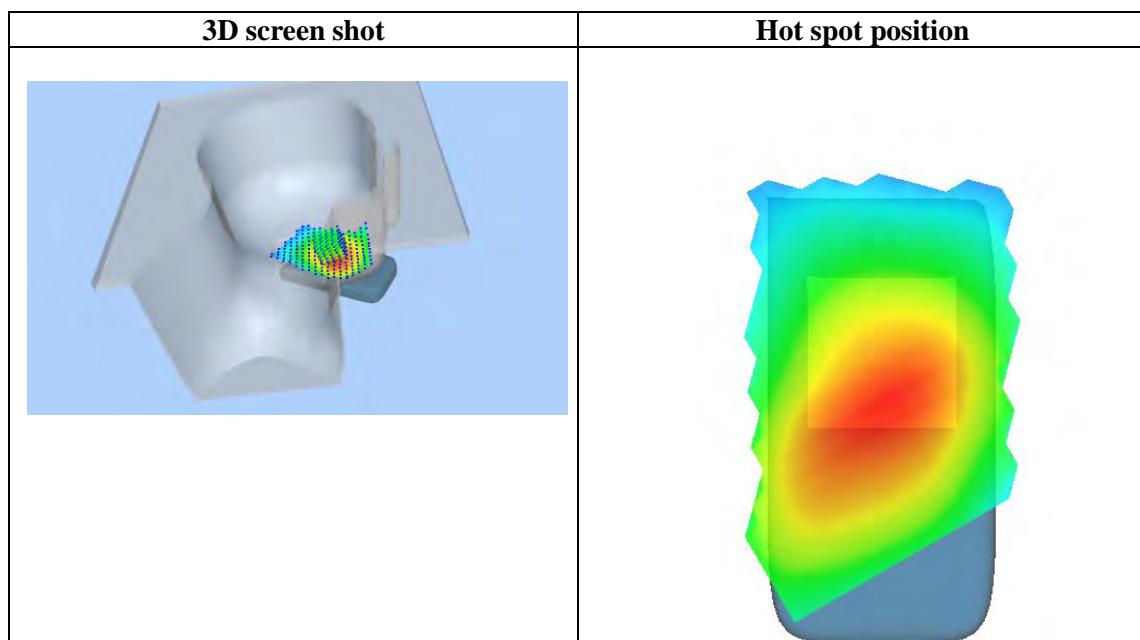
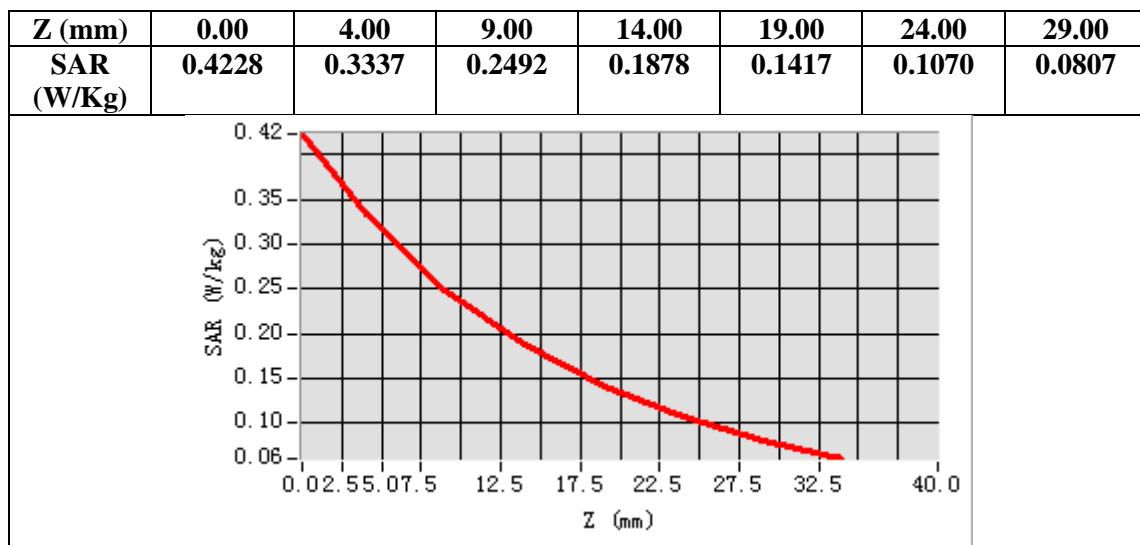
Configuration/ WCDMA Band V Mid-Touch-Left/Zoom Scan: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Left head
Device Position	Cheek
Band	WCDMA Band V
Channels	Middle
Signal	CDMA (Crest factor: 1.0)



Maximum location: X=-50.00, Y=-26.00
SAR Peak: 0.43 W/kg

SAR 10g (W/Kg)	0.226222
SAR 1g (W/Kg)	0.321359



Test Laboratory: AGC Lab

Date: July 02,2017

WCDMA Band V Mid-Body-Towards Phantom (RMC)

DUT: Rugged Mobile Phone; Type: CS22SA

Communication System: UMTS; Communication System Band: BAND V UTRA/FDD; Duty Cycle:1: 1; Conv.F=5.94; Frequency: 836.6 MHz; Medium parameters used: $f = 835 \text{ MHz}$; $\zeta = 0.97 \text{ mho/m}$; $\epsilon_r = 55.21$; $\rho = 1000 \text{ kg/m}^3$; Phantom section: Flat Section

Ambient temperature ($^{\circ}\text{C}$): 21.9, Liquid temperature ($^{\circ}\text{C}$): 21.5

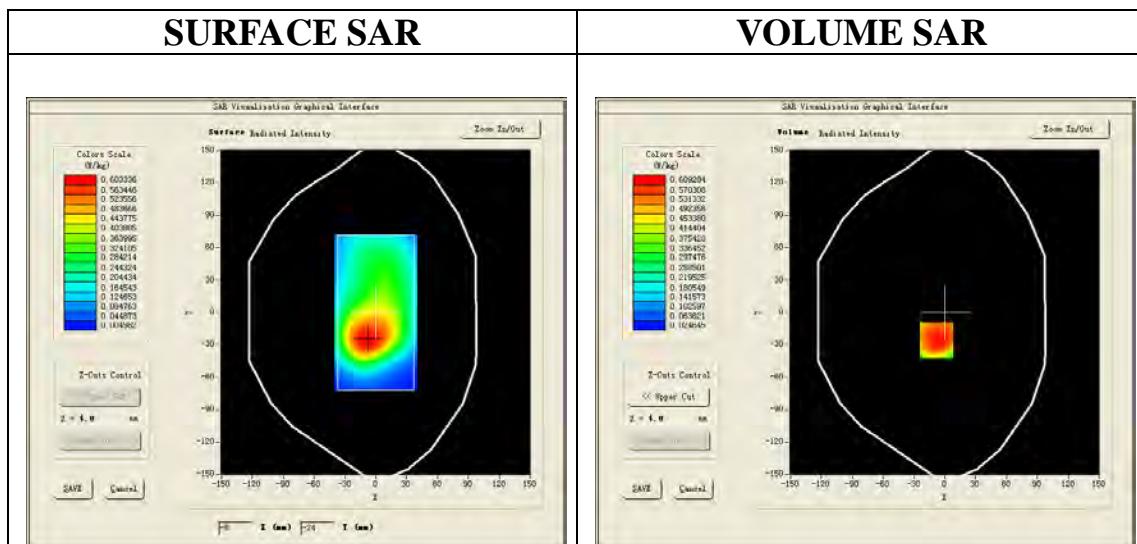
SATIMO Configuration:

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/ WCDMA Band V Mid -Body-Front/Area Scan: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$

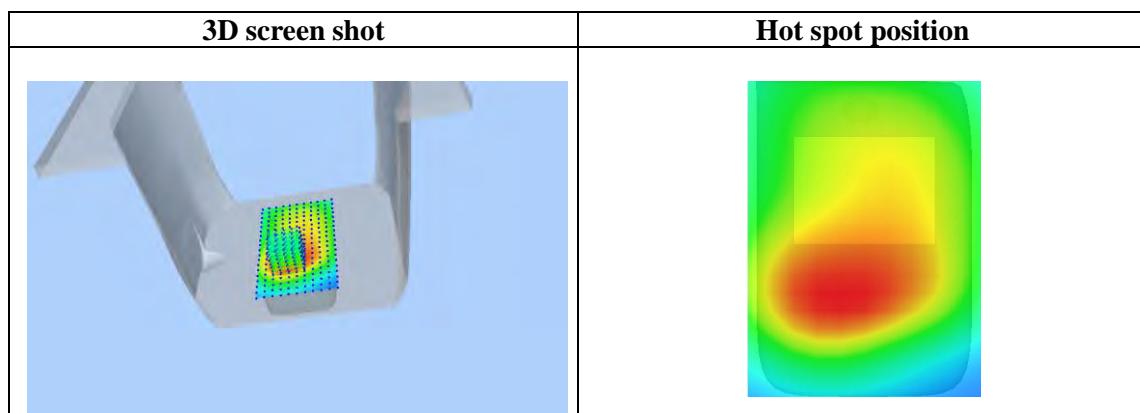
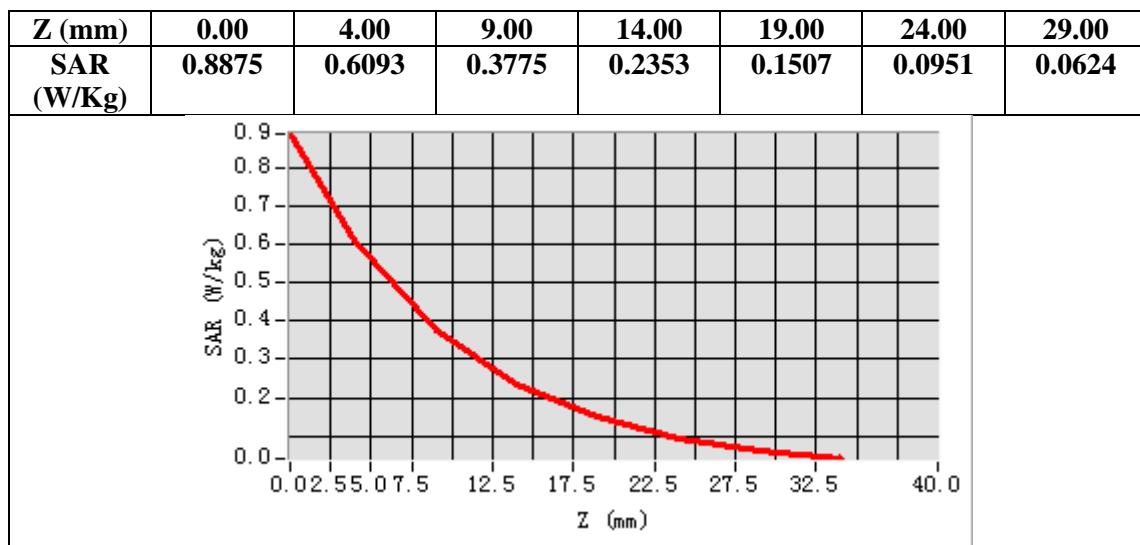
Configuration/ WCDMA Band V Mid -Body-Front /Zoom Scan: Measurement grid: $dx=8\text{mm}, dy=8\text{mm}$, $dz=5\text{mm}$;

Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body Front
Band	WCDMA Band V
Channels	Middle
Signal	CDMA (Crest factor: 1.0)



Maximum location: X=-8.00, Y=-26.00
SAR Peak: 0.92 W/kg

SAR 10g (W/Kg)	0.369960
SAR 1g (W/Kg)	0.594288



Test Laboratory: AGC Lab
LTE Band II Mid-Touch-Left (1 RB#50)
DUT: Rugged Mobile Phone; Type: CS22SA

Date: June 28, 2017

Communication System: LTE; Communication System Band: LTE Band II; Duty Cycle:1:1; Conv.F=5.14;
 Frequency:1880MHz; Medium parameters used: $f = 1900$ MHz; $\zeta = 1.37$ mho/m; $\epsilon_r = 40.03$; $\rho = 1000$ kg/m³ ;
 Phantom section: Left Section
 Ambient temperature (°C): 22.1, Liquid temperature (°C): 21.3

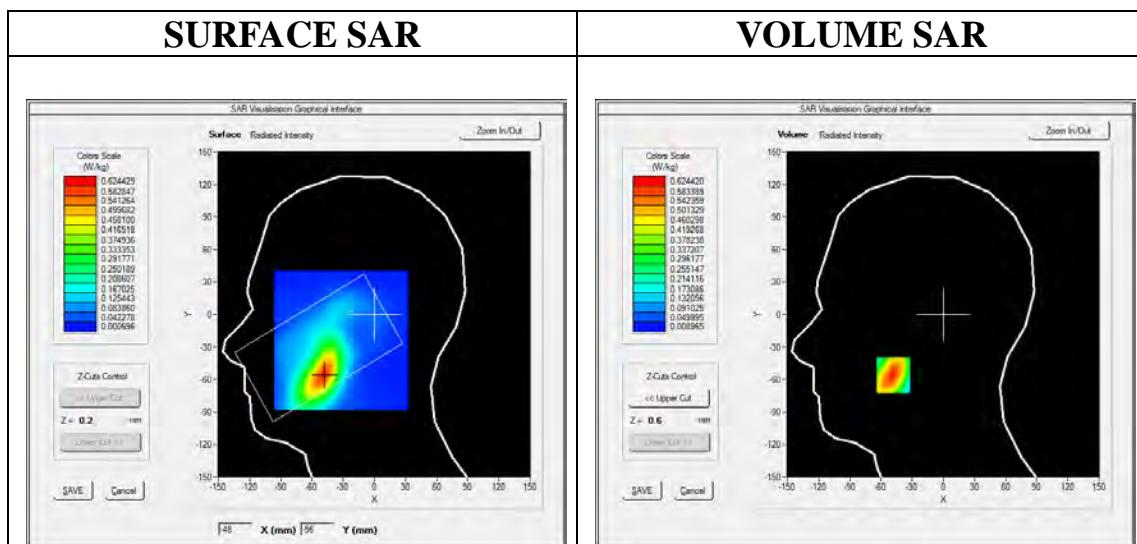
SATIMO Configuration:

- Probe: SSE5; Calibrated: 07/05/2016; Serial No.: SN 14/16 EP307
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/ LTE Band II Mid- Touch-Left /Area Scan: Measurement grid: dx=8mm, dy=8mm

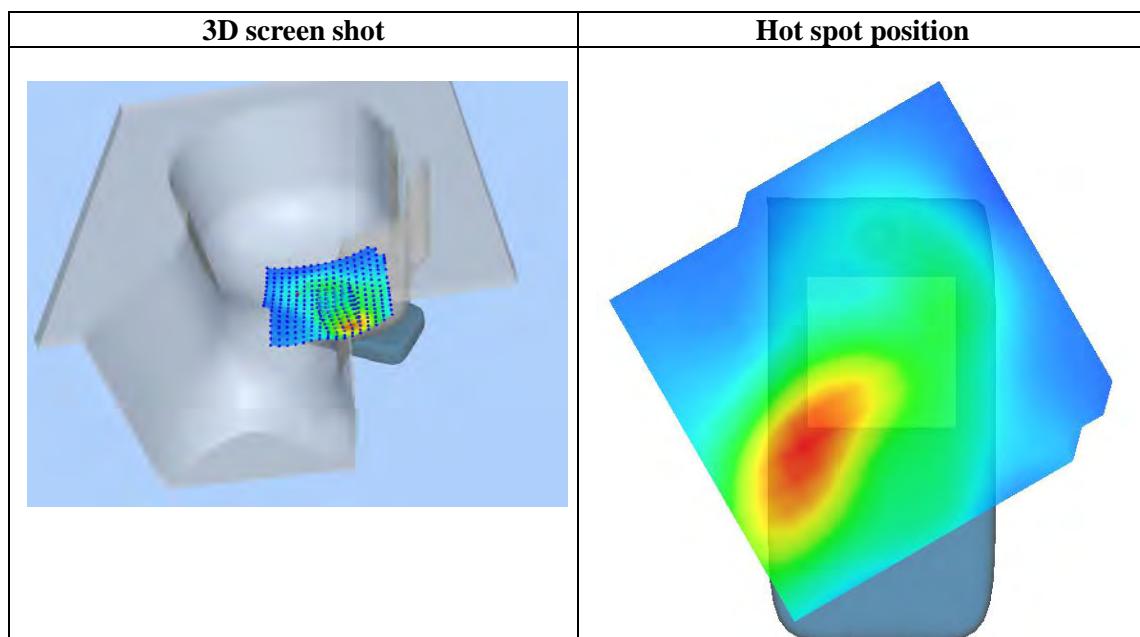
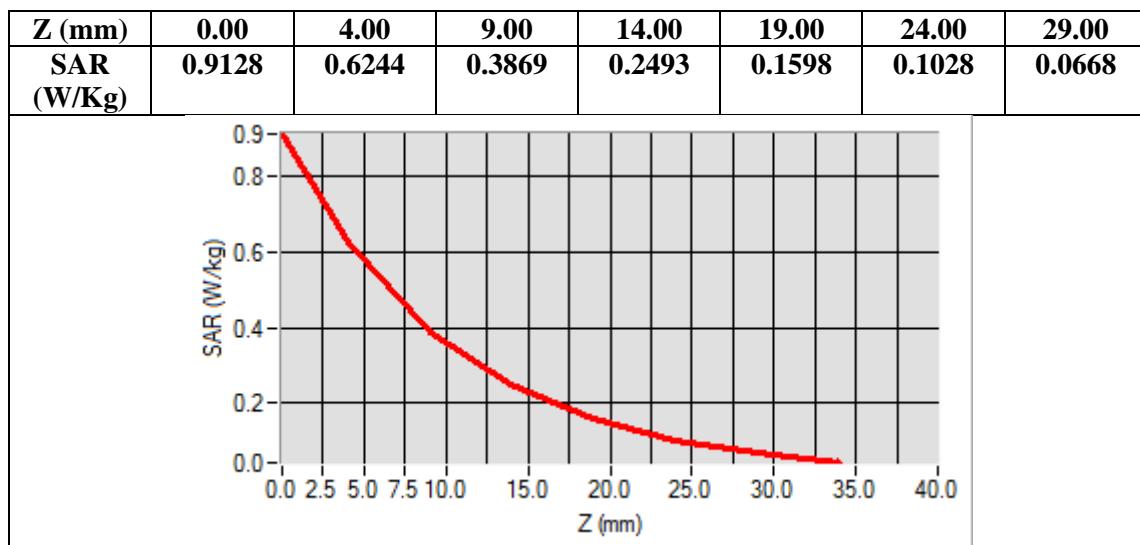
Configuration/ LTE Band II Mid- Touch-Left /Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

Area Scan	sam_direct_droit2_surf8mm.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Left head
Device Position	Cheek
Band	LTE Band II
Channels	Middle
Signal	OFDM (Crest factor: 1.0)



Maximum location: X=-48.00, Y=-56.00
SAR Peak: 0.91 W/kg

SAR 10g (W/Kg)	0.340410
SAR 1g (W/Kg)	0.592089



Test Laboratory: AGC Lab
LTE Band II Mid- Body-Back (1 RB#50)
DUT: Rugged Mobile Phone; Type: CS22SA

Date: June 28, 2017

Communication System: LTE; Communication System Band: LTE Band II; Duty Cycle:1:1; Conv.F=5.34;
 Frequency:1880MHz; Medium parameters used: $f = 1900$ MHz; $\zeta = 1.49$ mho/m; $\epsilon_r = 54.02$; $\rho = 1000$ kg/m³ ;
 Phantom section: Flat Section
 Ambient temperature (°C): 22.1, Liquid temperature (°C): 21.5

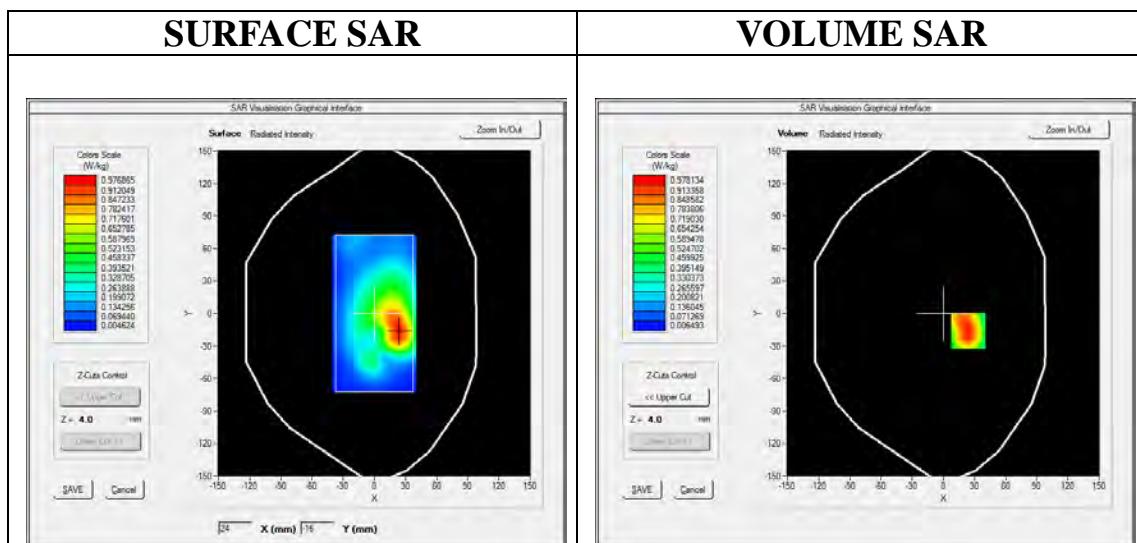
SATIMO Configuration:

- Probe: SSE5; Calibrated: 07/05/2016; Serial No.: SN 14/16 EP307
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/ LTE Band II Mid- Body-Back /Area Scan: Measurement grid: dx=8mm, dy=8mm

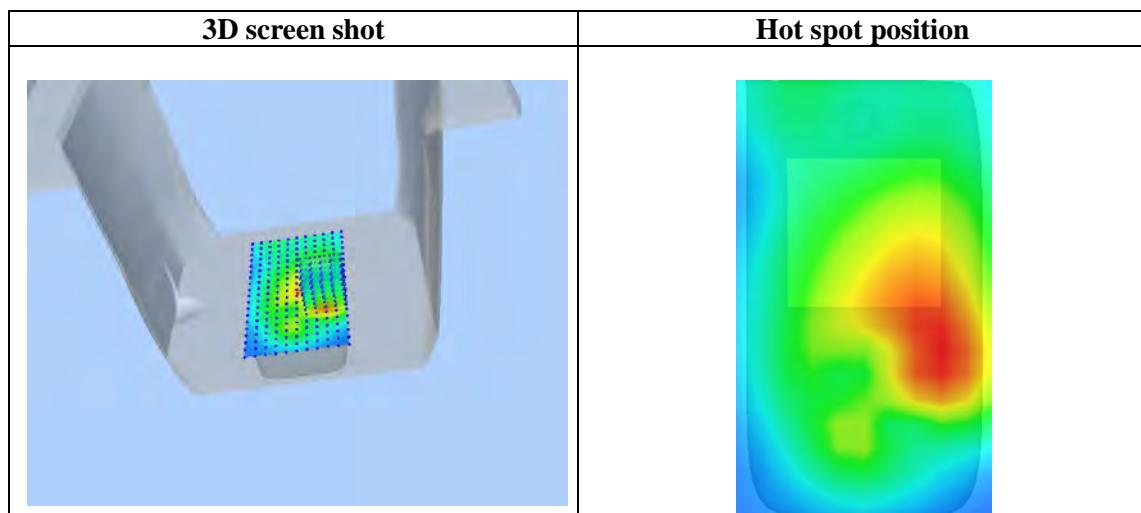
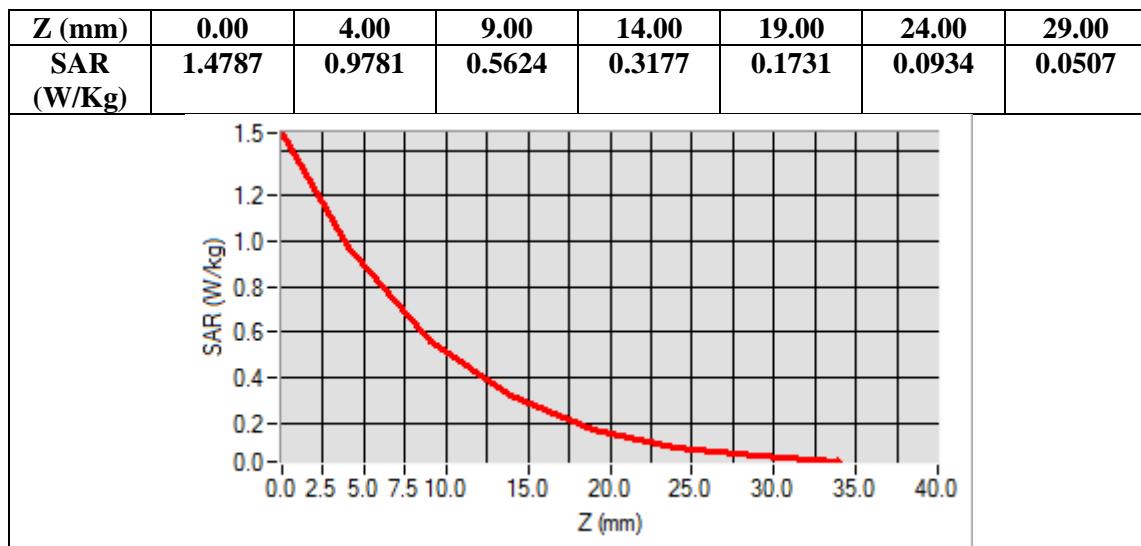
Configuration/ LTE Band II Mid- E Body-Back /Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5m;

Area Scan	sam_direct_droit2_surf8mm.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body-Back
Band	LTE Band II
Channels	Middle
Signal	OFDM (Crest factor: 1.0)



Maximum location: X=24.00, Y=-16.00
SAR Peak: 1.56 W/kg

SAR 10g (W/Kg)	0.519410
SAR 1g (W/Kg)	0.942043



Test Laboratory: AGC Lab

Date: July 02,2017

LTE Band IV Mid-Touch-Left (1 RB#0)

DUT: Rugged Mobile Phone; Type: CS22SA

Communication System: LTE; Communication System Band: LTE Band IV; Duty Cycle:1:1; Conv.F=4.92;
Frequency:1732.5 MHz; Medium parameters used: $f = 1750 \text{ MHz}$; $\zeta = 1.35 \text{ mho/m}$; $\epsilon_r = 41.03$; $\rho = 1000 \text{ kg/m}^3$;
Phantom section: Left Section
Ambient temperature ($^{\circ}\text{C}$): 22.1, Liquid temperature ($^{\circ}\text{C}$): 21.3

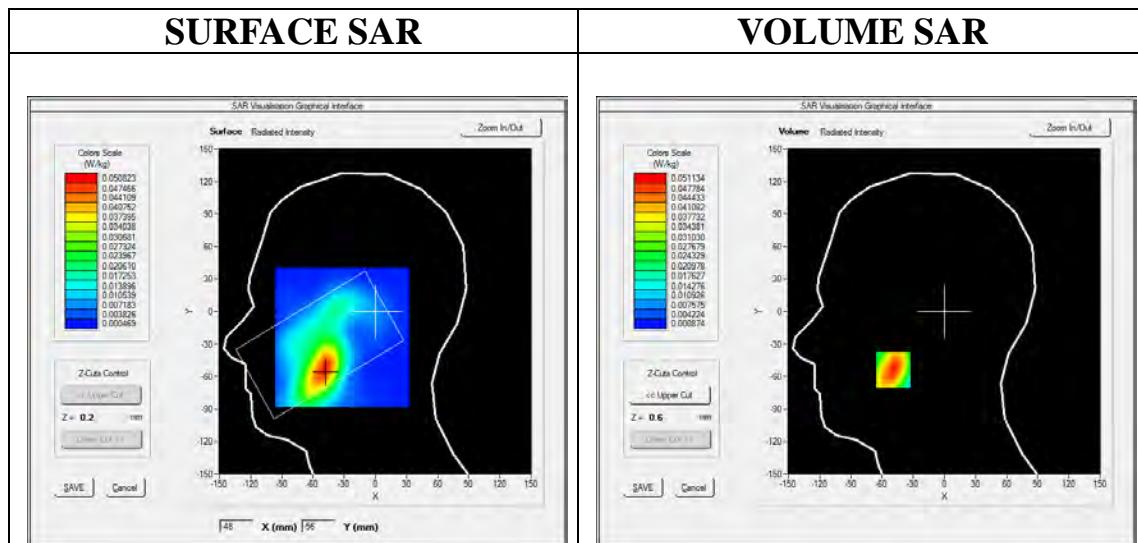
SATIMO Configuration:

- Probe: SSE5; Calibrated: 07/05/2016; Serial No.: SN 14/16 EP307
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/ LTE Band IV Mid- Touch-Left /Area Scan: Measurement grid: dx=8mm, dy=8mm

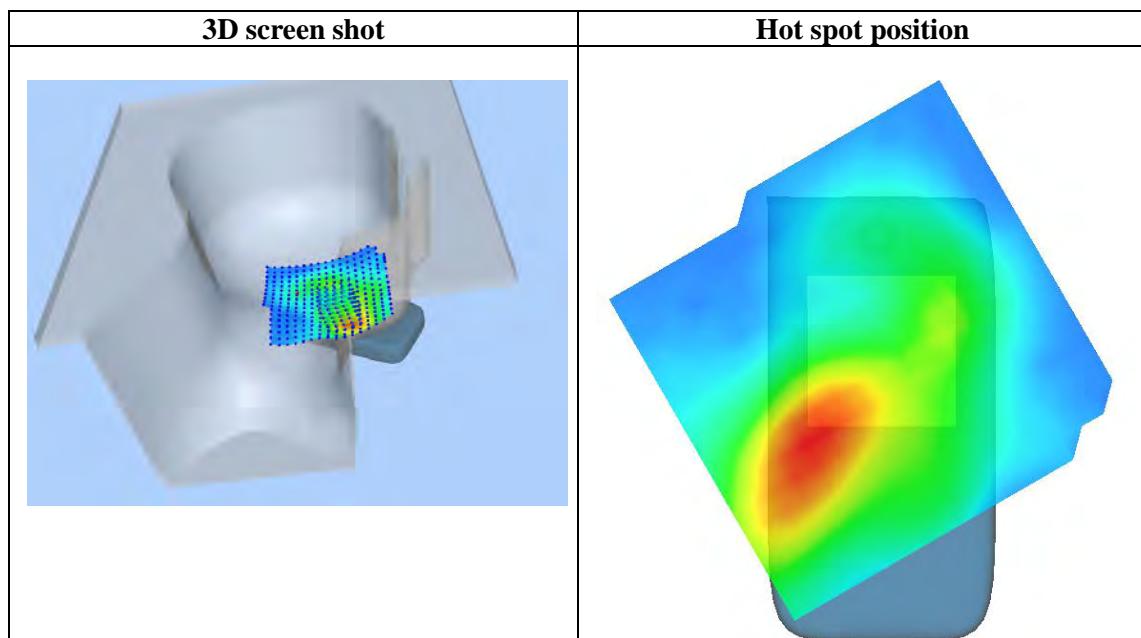
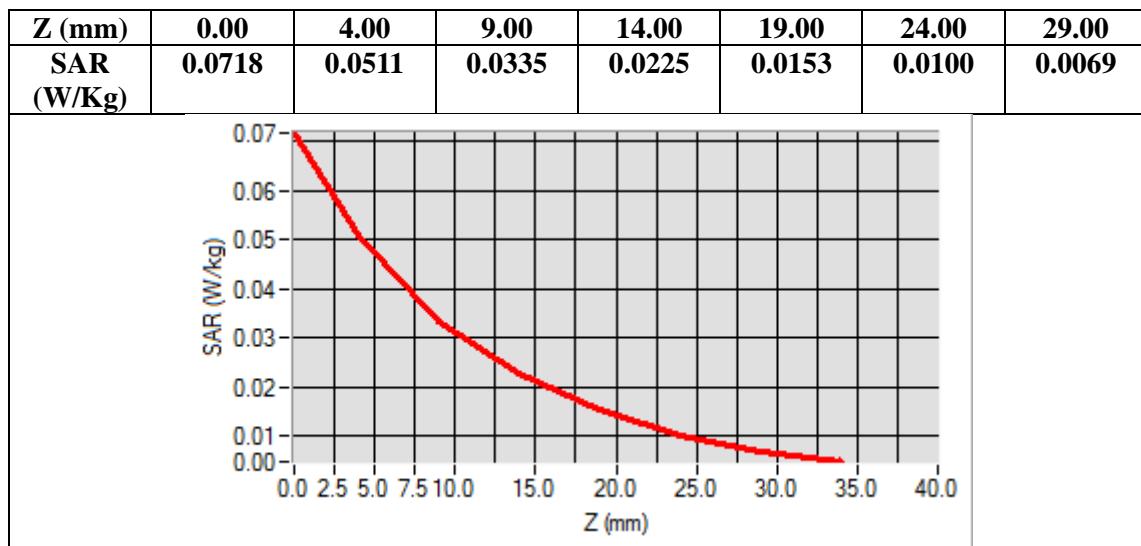
Configuration/ LTE Band IV Mid- Touch-Left /Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

Area Scan	sam_direct_droit2_surf8mm.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Left head
Device Position	Cheek
Band	LTE Band IV
Channels	Middle
Signal	OFDM (Crest factor: 1.0)



Maximum location: X=-49.00, Y=-54.00
SAR Peak: 0.07 W/kg

SAR 10g (W/Kg)	0.029285
SAR 1g (W/Kg)	0.048565



Test Laboratory: AGC Lab

Date: July 02,2017

LTE Band IV Mid-Body-Back (1 RB#0)

DUT: Rugged Mobile Phone; Type: CS22SA

Communication System: LTE; Communication System Band: LTE Band IV; Duty Cycle:1:1; Conv.F=5.06;
Frequency:1732.5 MHz; Medium parameters used: $f = 1750$ MHz; $\zeta = 1.46$ mho/m; $\epsilon_r = 53.87$; $\rho = 1000$ kg/m³ ;
Phantom section: Flat Section
Ambient temperature (°C): 22.1, Liquid temperature (°C): 21.5

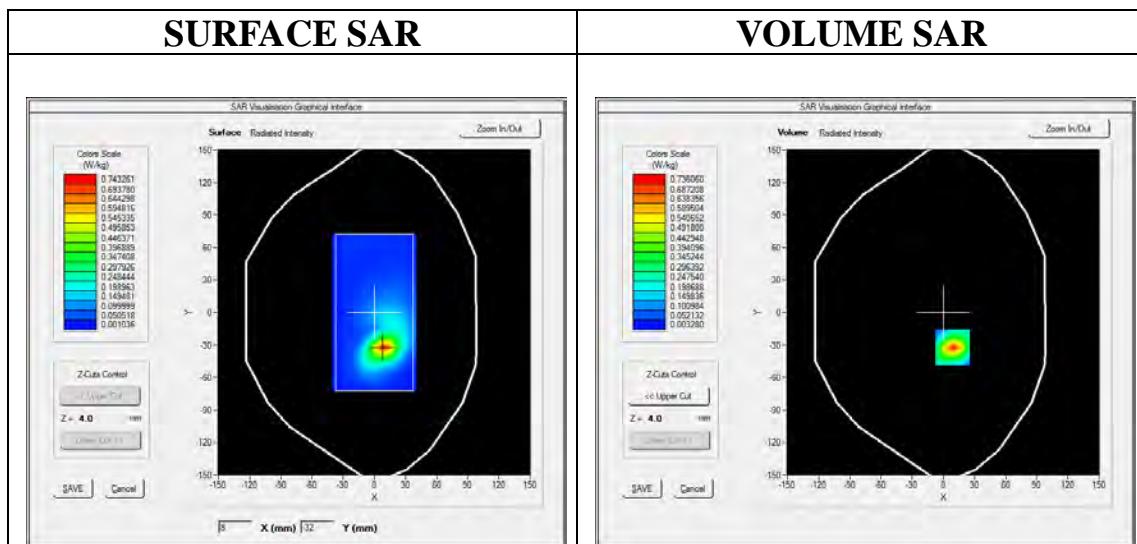
SATIMO Configuration:

- Probe: SSE5; Calibrated: 07/05/2016; Serial No.: SN 14/16 EP307
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/ LTE Band IV Mid-Body-back/Area Scan: Measurement grid: dx=8mm, dy=8mm

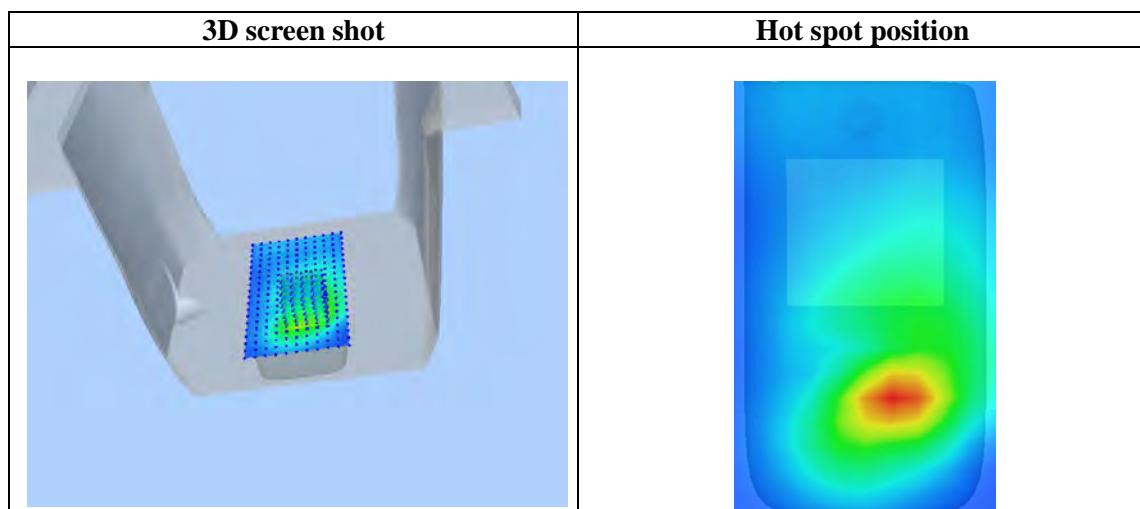
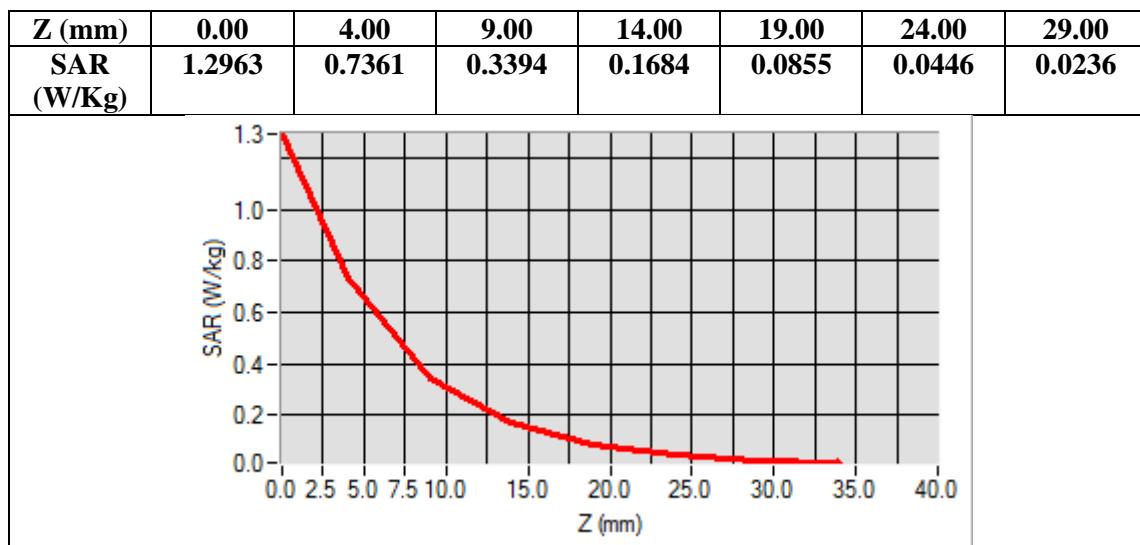
Configuration/ LTE Band IV Mid-Body-back/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5m;

Area Scan	sam_direct_droit2_surf8mm.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body Back
Band	LTE Band IV
Channels	Middle
Signal	OFDM (Crest factor: 1.0)



Maximum location: X=9.00, Y=-32.00
SAR Peak: 1.28 W/kg

SAR 10g (W/Kg)	0.279828
SAR 1g (W/Kg)	0.656294



Test Laboratory: AGC Lab
LTE Band V Mid -Touch-Right (1 RB#0)
DUT: Rugged Mobile Phone; Type: CS22SA

Date: July 02,2017

Communication System: LTE; Communication System Band: LTE Band V; Duty Cycle:1:1; Conv.F=5.72
Frequency: 836.5 MHz; Medium parameters used: $f = 835$ MHz; $\zeta = 0.91$ mho/m; $\epsilon_r = 41.23$; $\rho = 1000$ kg/m³ ;
Phantom section: Right Section
Ambient temperature (°C): 21.9, Liquid temperature (°C): 21.3

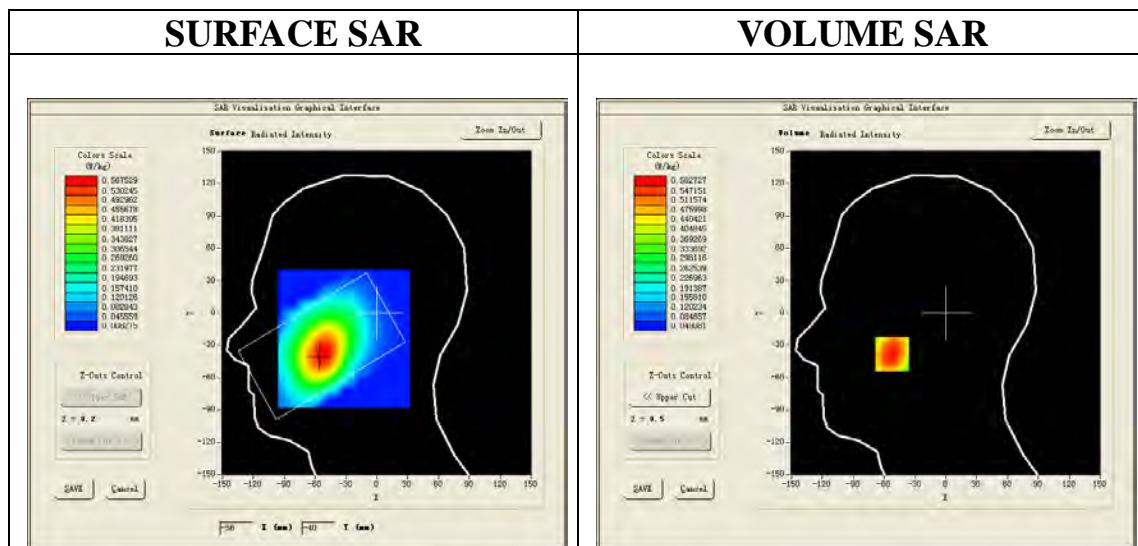
SATIMO Configuration:

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/ LTE Band V Mid - Touch-Right /Area Scan: Measurement grid: dx=8mm, dy=8mm

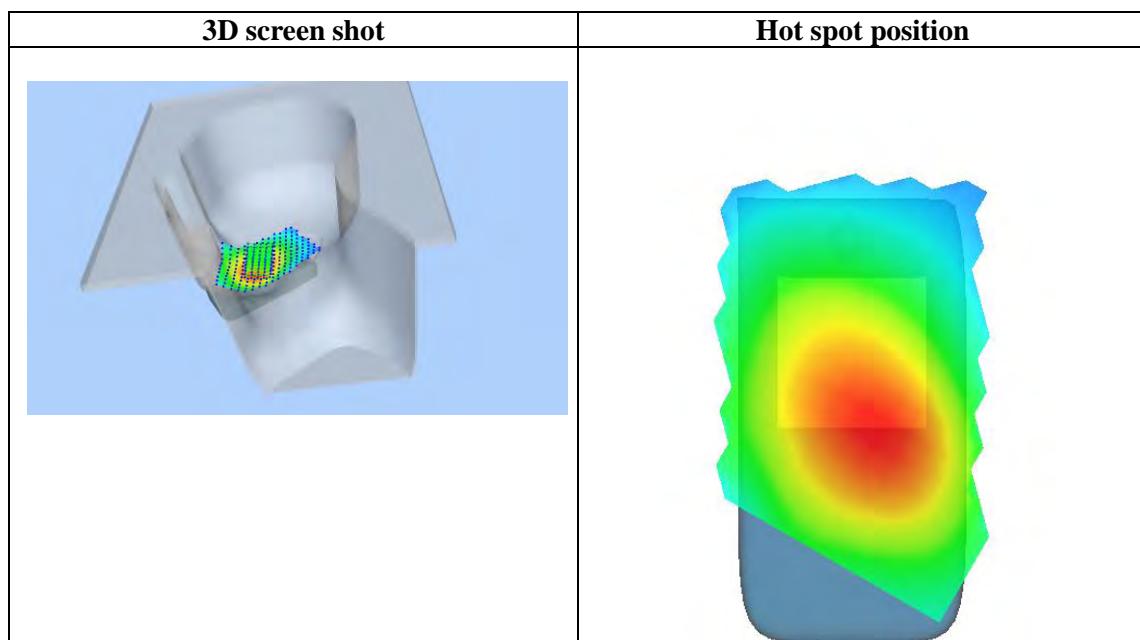
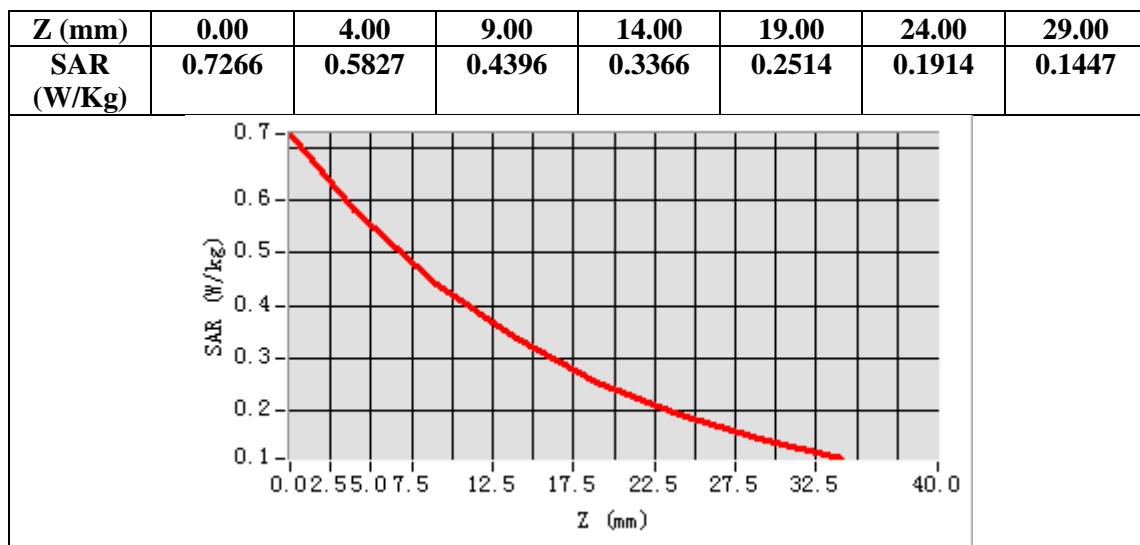
Configuration/ LTE Band V Mid - Touch-Right /Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

Area Scan	sam_direct_droit2_surf8mm.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Right head
Device Position	Cheek
Band	LTE Band V
Channels	Middle
Signal	OFDM (Crest factor: 1.0)



Maximum location: X=-52.00, Y=-38.00
SAR Peak: 0.73 W/kg

SAR 10g (W/Kg)	0.396975
SAR 1g (W/Kg)	0.559634



Test Laboratory: AGC Lab
LTE Band V Low -Body- Back (1 RB#0)
DUT: Rugged Mobile Phone; Type: CS22SA

Date: July 02,2017

Communication System: LTE; Communication System Band: LTE Band V; Duty Cycle:1:1; Conv.F=5.94
Frequency: 829MHz; Medium parameters used: $f = 835 \text{ MHz}$; $\zeta = 0.96 \text{ mho/m}$; $\epsilon_r = 55.74$; $\rho = 1000 \text{ kg/m}^3$;
Phantom section: Flat Section
Ambient temperature ($^{\circ}\text{C}$): 21.9, Liquid temperature ($^{\circ}\text{C}$): 21.5

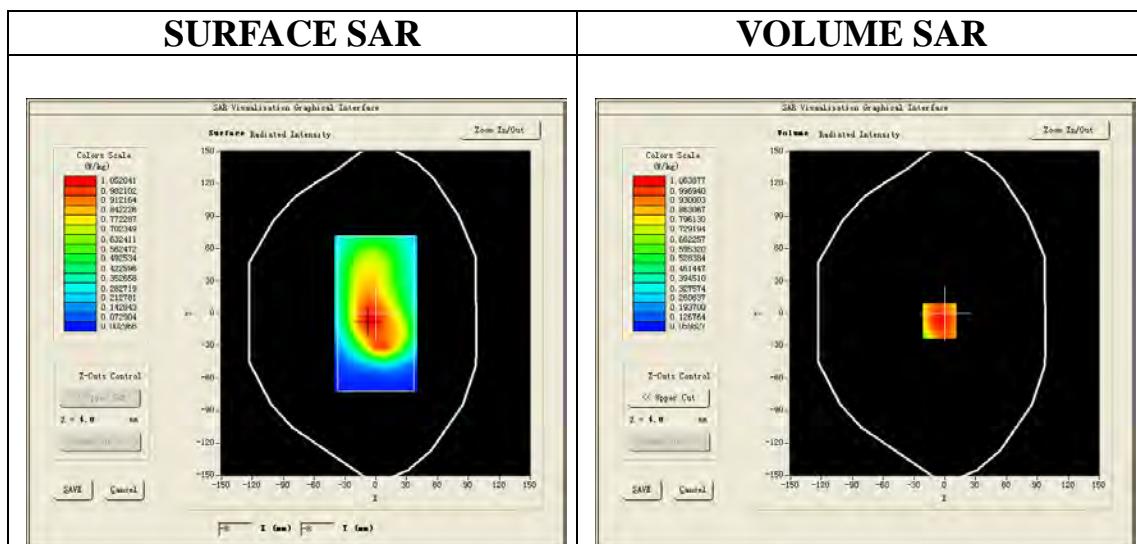
SATIMO Configuration:

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/ LTE Band V Low -Body- Back /Area Scan: Measurement grid: dx=8mm, dy=8mm

Configuration/ LTE Band V Low -Body- Back /Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

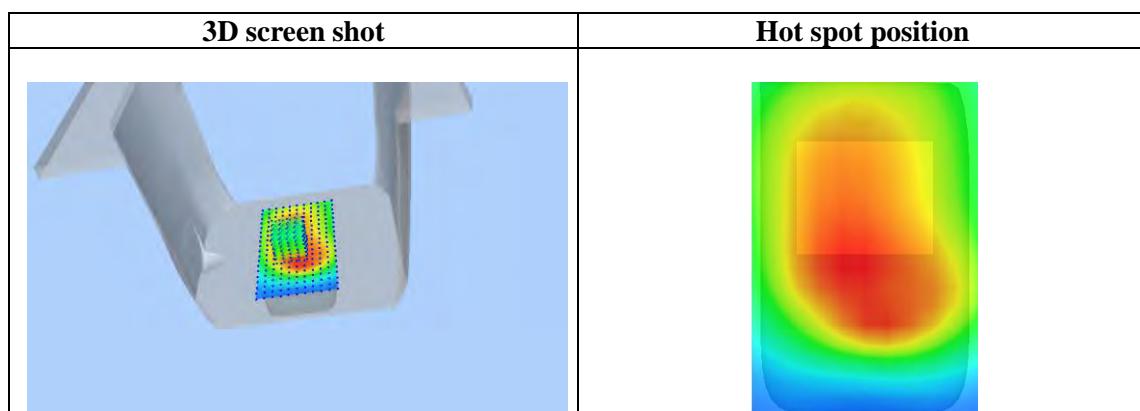
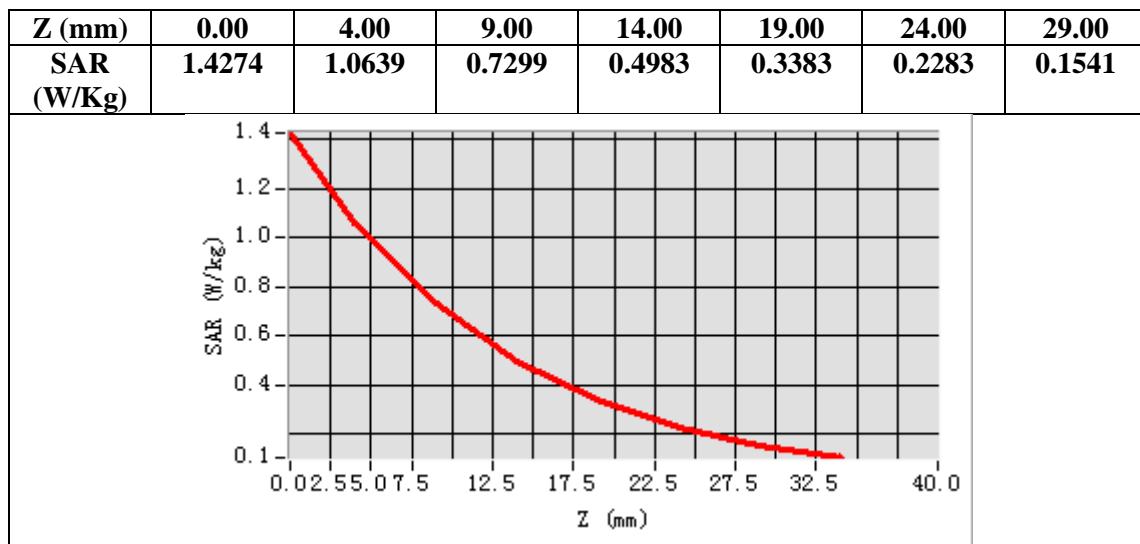
Area Scan	sam_direct_droit2_surf8mm.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body Back
Band	LTE Band V
Channels	Low
Signal	OFDM (Crest factor: 1.0)



Maximum location: X=-5.00, Y=-7.00

SAR Peak: 1.44 W/kg

SAR 10g (W/Kg)	0.693438
SAR 1g (W/Kg)	1.030253



Test Laboratory: AGC Lab
LTE Band 7 Mid-Touch-Left (1RB#49)
DUT: Rugged Mobile Phone; Type: CS22SA

Date: July 03,2017

Communication System: LTE; Communication System Band: LTE Band 7; Duty Cycle:1:1; Conv.F=5.07
Frequency: 2535MHz; Medium parameters used: $f = 2600$ MHz; $\zeta = 1.90$ mho/m; $\epsilon_r = 38.95$; $\rho = 1000$ kg/m³ ;
Phantom section: Left Section
Ambient temperature (°C): 21.7, Liquid temperature (°C): 21.1

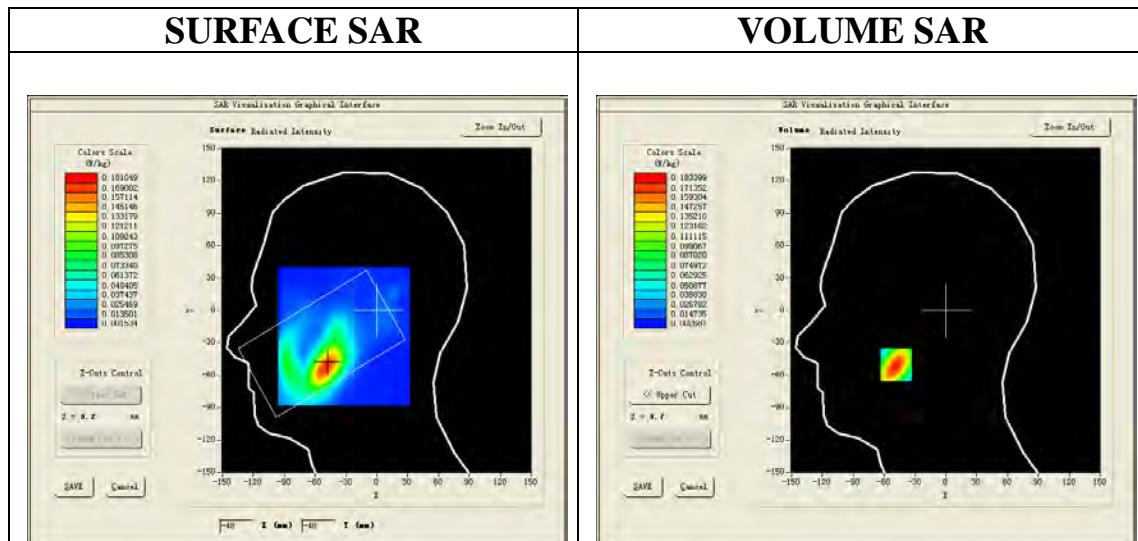
SATIMO Configuration:

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/ LTE BAND 7 Mid-Touch-Left/Area Scan: Measurement grid: dx=8mm, y=8mm

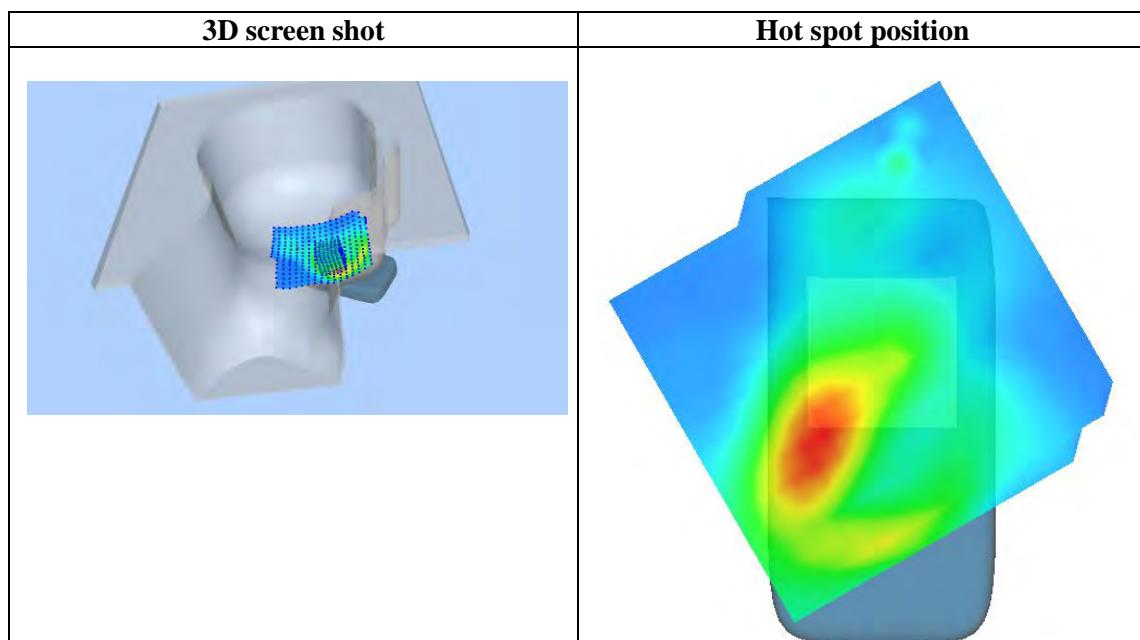
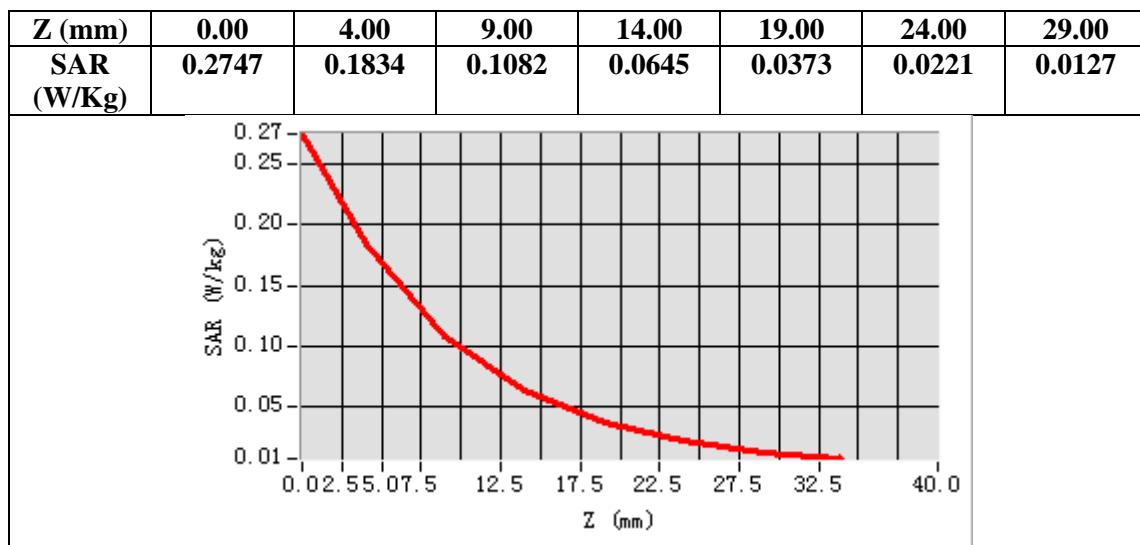
Configuration/ LTE BAND 7 Mid-Touch-Left/Zoom Scan: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Left head
Device Position	Cheek
Band	LTE BAND 7
Channels	Middle
Signal	OFDM (Crest factor: 1.0)



Maximum location: X=-48.00, Y=-50.00
SAR Peak: 0.27 W/kg

SAR 10g (W/Kg)	0.090854
SAR 1g (W/Kg)	0.168693



Test Laboratory: AGC Lab
LTE Band 7 High-Body-Back (1RB#49)
DUT: Rugged Mobile Phone; Type: CS22SA

Date: July 03,2017

Communication System: LTE; Communication System Band: LTE Band 7; Duty Cycle:1:1; Conv.F=5.19
Frequency: 2560MHz; Medium parameters used: $f = 2600 \text{ MHz}$; $\zeta = 2.14 \text{ mho/m}$; $\epsilon_r = 52.79$; $\rho = 1000 \text{ kg/m}^3$;
Phantom section: Flat Section
Ambient temperature ($^{\circ}\text{C}$): 21.7, Liquid temperature ($^{\circ}\text{C}$): 21.3

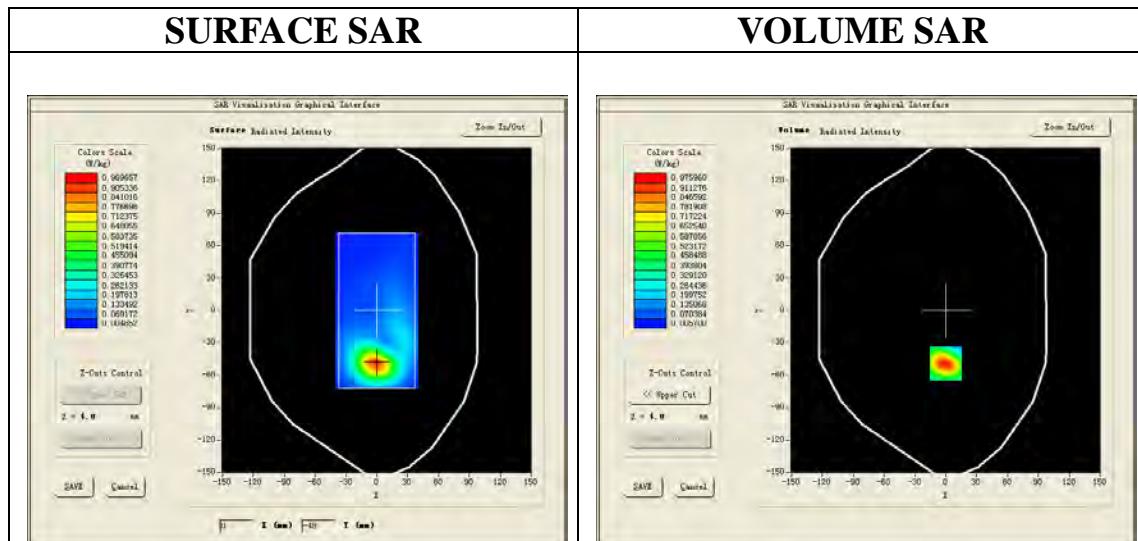
SATIMO Configuration:

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/ LTE BAND 7 High -Body-Back /Area Scan: Measurement grid: $dx=10\text{mm}$, $y=10\text{mm}$

Configuration/ LTE BAND 7 High -Body-Back /Zoom Scan: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

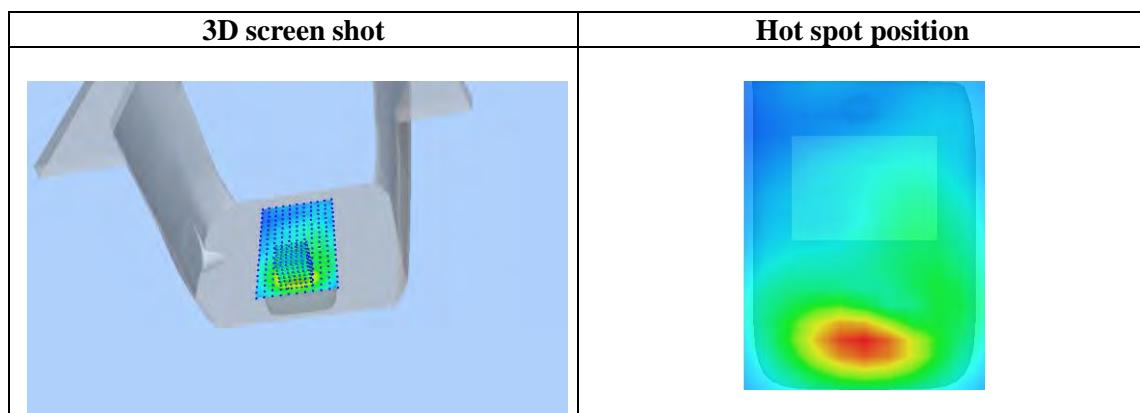
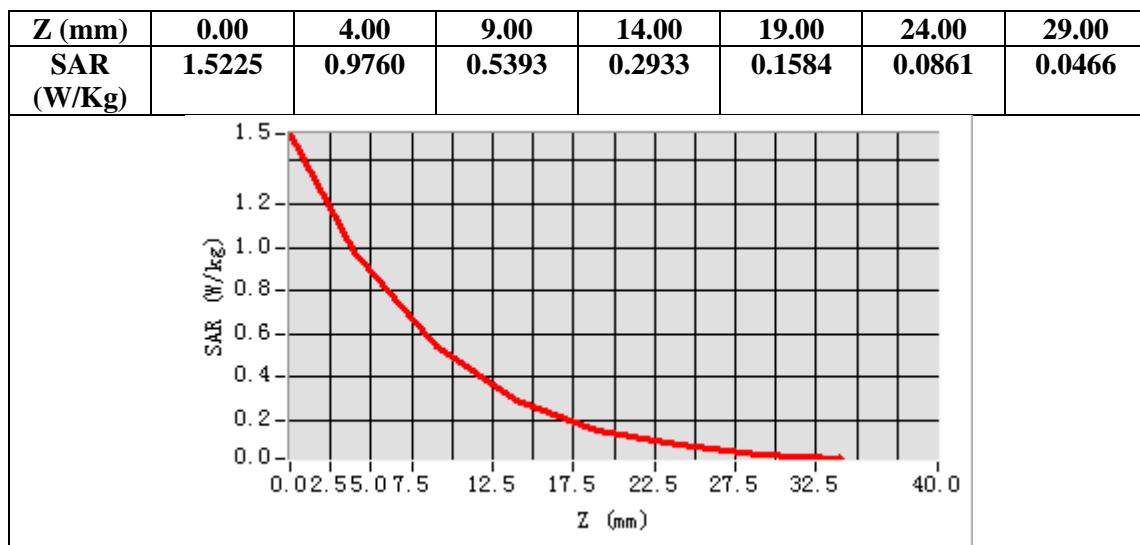
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body Back
Band	LTE BAND 7
Channels	High
Signal	OFDM (Crest factor: 1.0)



Maximum location: X=0.00, Y=-49.00

SAR Peak: 1.51 W/kg

SAR 10g (W/Kg)	0.450104
SAR 1g (W/Kg)	0.890437



Test Laboratory: AGC Lab
LTE Band XVII Mid-Touch-Right (1 RB#0)
DUT: Rugged Mobile Phone; Type: CS22SA

Date: July 04,2017

Communication System: LTE; Communication System Band: LTE Band XVII; Duty Cycle:1:1; Conv.F=5.11
Frequency: 710 MHz; Medium parameters used: $f = 750 \text{ MHz}$; $\zeta = 0.89 \text{ mho/m}$; $\epsilon_r = 42.33$; $\rho = 1000 \text{ kg/m}^3$;
Phantom section: Right Section
Ambient temperature ($^{\circ}\text{C}$): 22.3, Liquid temperature ($^{\circ}\text{C}$): 21.6

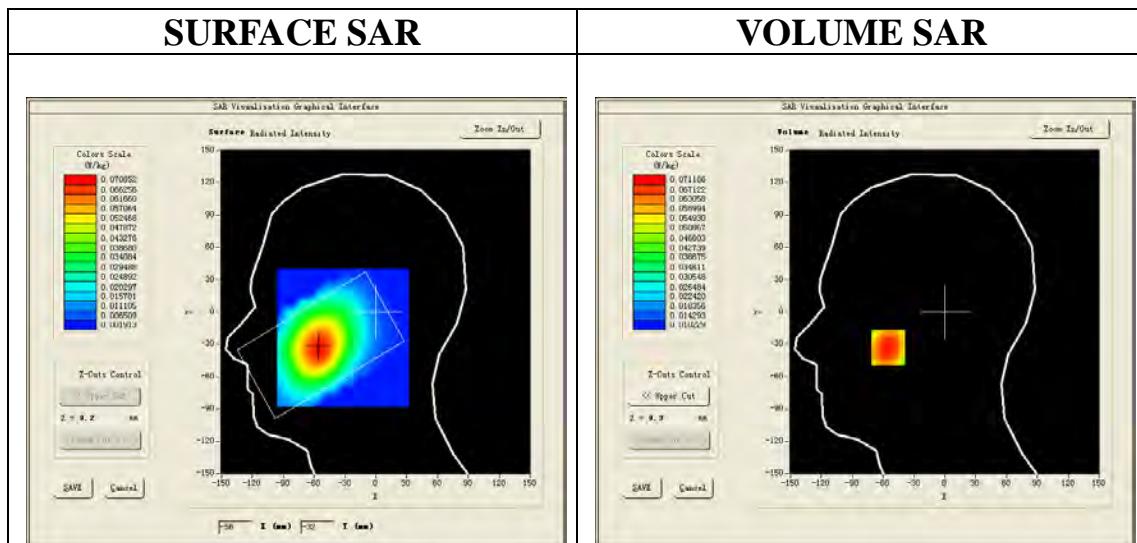
SATIMO Configuration:

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/ LTE Band XVII Mid- Touch-Right /Area Scan: Measurement grid: dx=8mm, dy=8mm

Configuration/ LTE Band XVII Mid- Touch-Right /Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

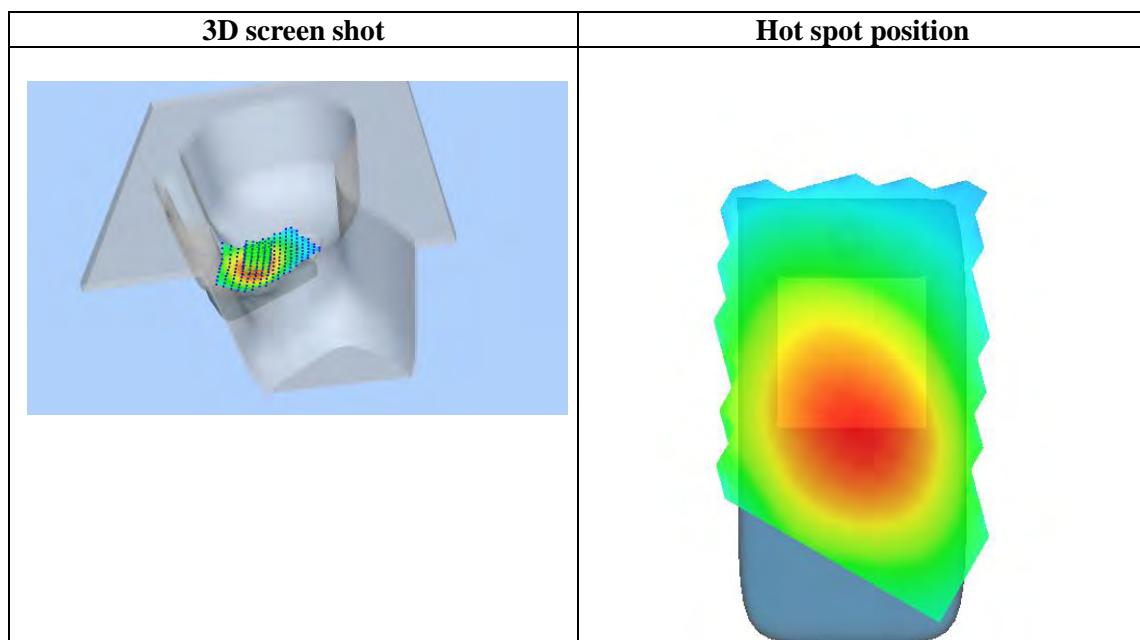
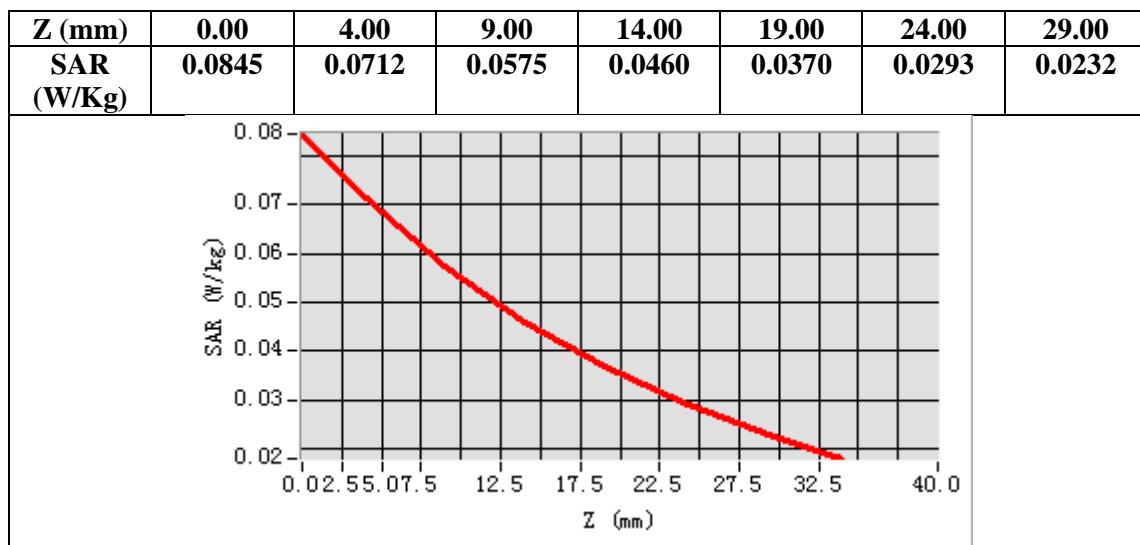
Area Scan	sam_direct_droit2_surf8mm.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Right head
Device Position	Cheek
Band	LTE Band XVII
Channels	Middle
Signal	OFDM (Crest factor: 1.0)



Maximum location: X=-55.00, Y=-33.00

SAR Peak: 0.09 W/kg

SAR 10g (W/Kg)	0.052863
SAR 1g (W/Kg)	0.070274



Test Laboratory: AGC Lab
LTE Band XVII Mid-Body-Back (1 RB#0)
DUT: Rugged Mobile Phone; Type: CS22SA

Date: July 04,2017

Communication System: LTE; Communication System Band: LTE Band XVII; Duty Cycle:1:1; Conv.F=5.30;
Frequency: 710 MHz; Medium parameters used: $f = 750 \text{ MHz}$; $\zeta = 0.95 \text{ mho/m}$; $\epsilon_r = 55.89$; $\rho = 1000 \text{ kg/m}^3$;
Phantom section: Flat Section
Ambient temperature ($^{\circ}\text{C}$): 22.3, Liquid temperature ($^{\circ}\text{C}$): 21.9

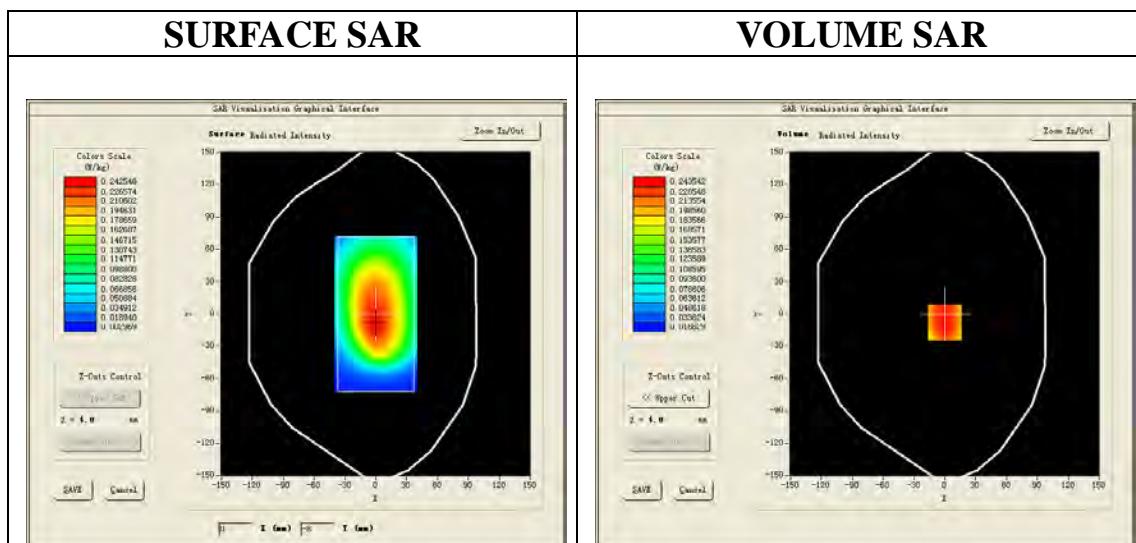
SATIMO Configuration:

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/ LTE Band XVII Mid-Body-back/Area Scan: Measurement grid: dx=8mm, dy=8mm

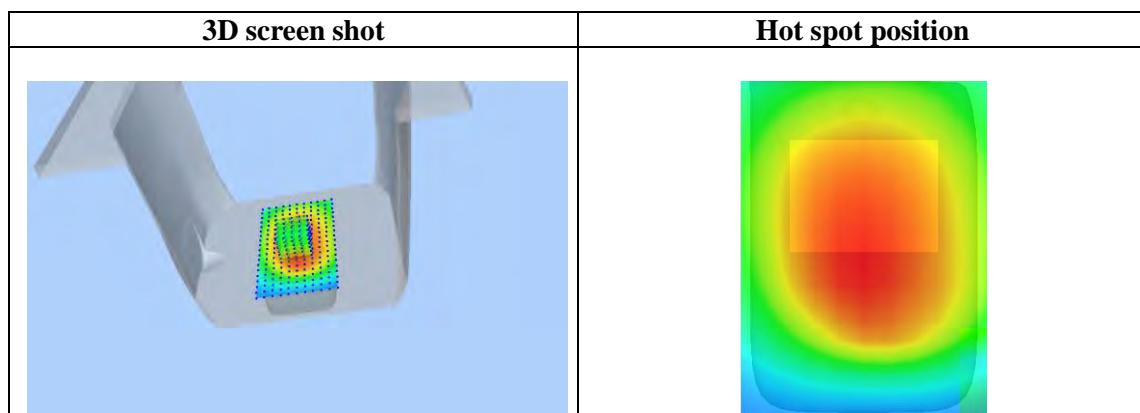
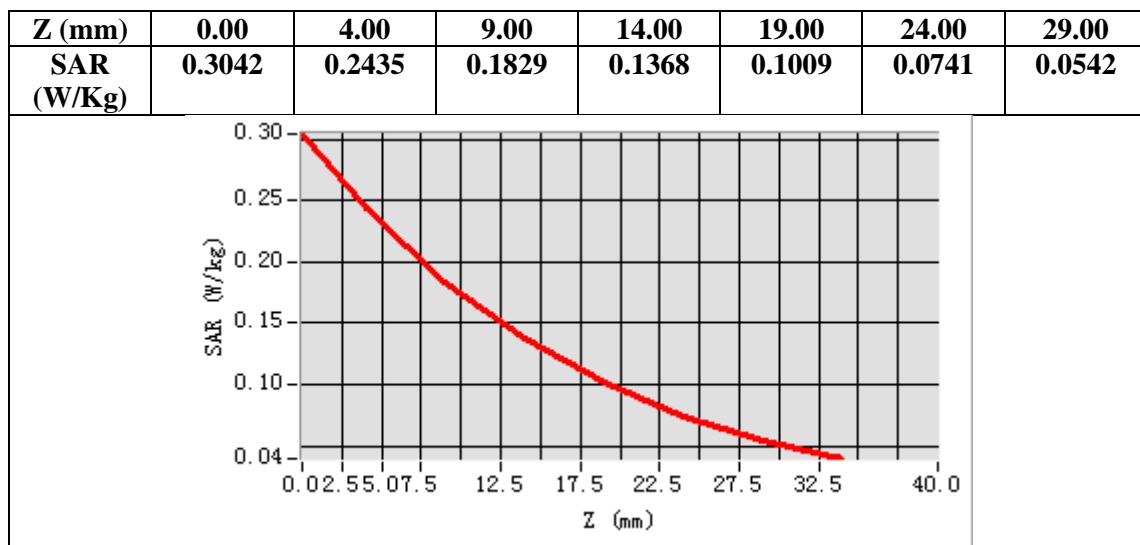
Configuration/ LTE Band XVII Mid-Body-back/Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5m;

Area Scan	sam_direct_droit2_surf8mm.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body back
Band	LTE Band XVII
Channels	Middle
Signal	OFDM (Crest factor: 1.0)



Maximum location: X=0.00, Y=-8.00
SAR Peak: 0.31 W/kg

SAR 10g (W/Kg)	0.180404
SAR 1g (W/Kg)	0.250450



WIFI MODE

Test Laboratory: AGC Lab

802.11bHigh-Touch-Left

DUT: Rugged Mobile Phone; Type: CS22SA

Date: July 12,2017

Communication System: Wi-Fi; Communication System Band: 802.11b; Duty Cycle: 1:1; Conv.F=5.19;
Frequency: 2462 MHz; Medium parameters used: $f = 2450$ MHz; $\zeta = 1.85$ mho/m; $\epsilon_r = 38.03$, $\rho = 1000$ kg/m³ ;
Phantom section: Left Section
Ambient temperature (°C): 22.1, Liquid temperature (°C): 21.6

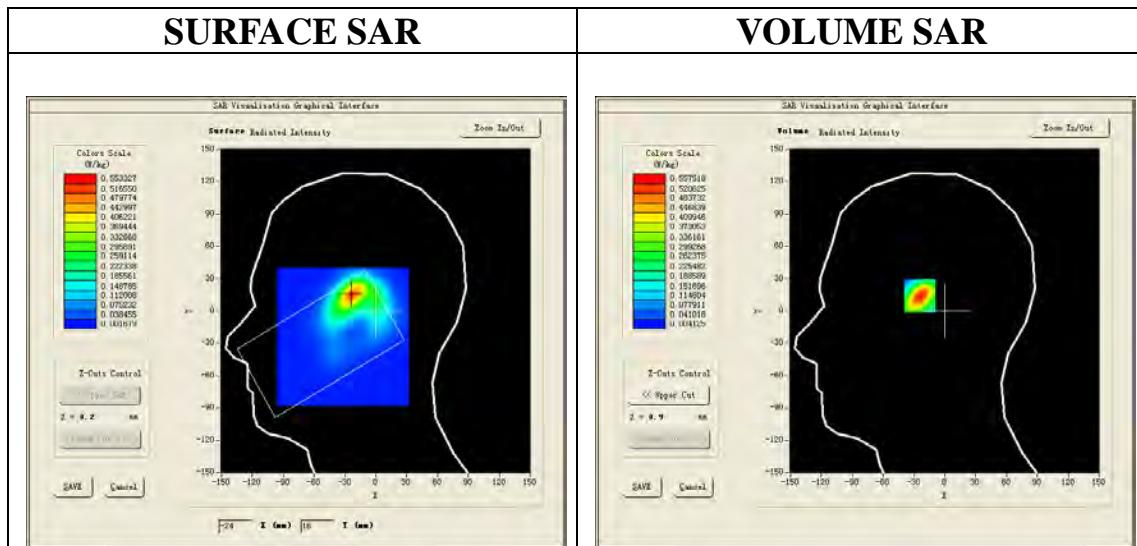
SATIMO Configuration:

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/802.11b High- Touch-Left/Area Scan: Measurement grid: dx=8mm, dy=8mm

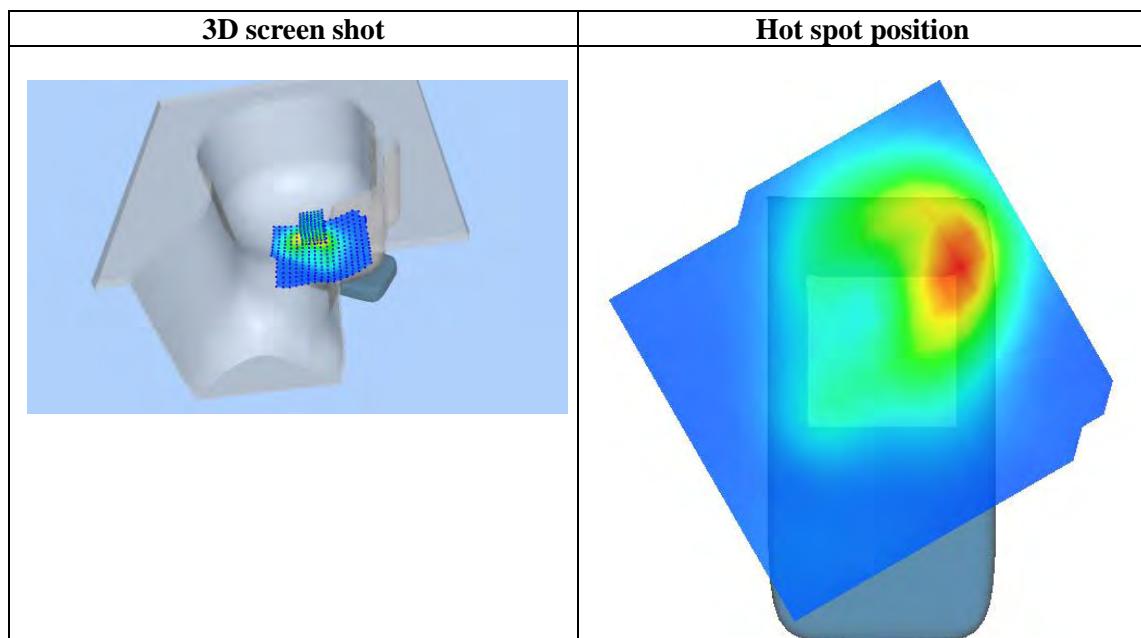
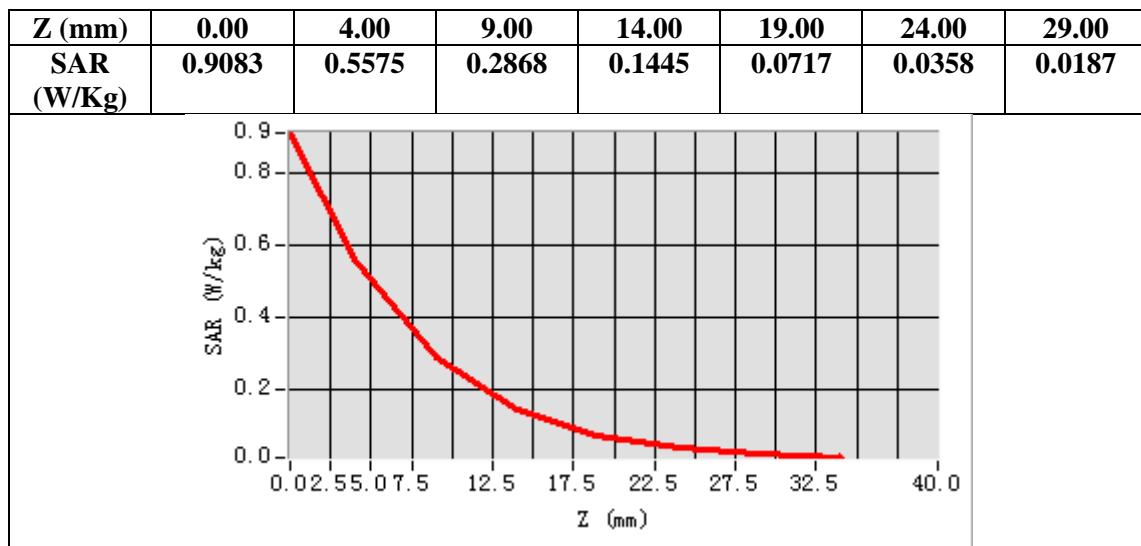
Configuration/802.11b High- Touch-Left/Zoom Scan: Measurement grid: dx=5mm,dy=5mm, dz=5mm

Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	7x7x7,dx=5mm dy=5mm dz=5mm
Phantom	Left head
Device Position	Cheek
Band	2450MHz
Channels	High
Signal	Crest factor: 1.0



Maximum location: X=-23.00, Y=16.00
SAR Peak: 0.91 W/kg

SAR 10g (W/Kg)	0.240053
SAR 1g (W/Kg)	0.506901



Test Laboratory: AGC Lab
802.11b High-Body-Worn- Back
DUT: Rugged Mobile Phone; Type: CS22SA

Date: July 12,2017

Communication System: Wi-Fi; Communication System Band: 802.11b; Duty Cycle: 1:1; Conv.F=5.33;
Frequency: 2462 MHz; Medium parameters used: $f = 2450$ MHz; $\zeta = 1.95$ mho/m; $\epsilon_r = 52.11$; $\rho = 1000$ kg/m³ ;
Phantom section: Flat Section
Ambient temperature (°C): 22.1, Liquid temperature (°C): 21.7

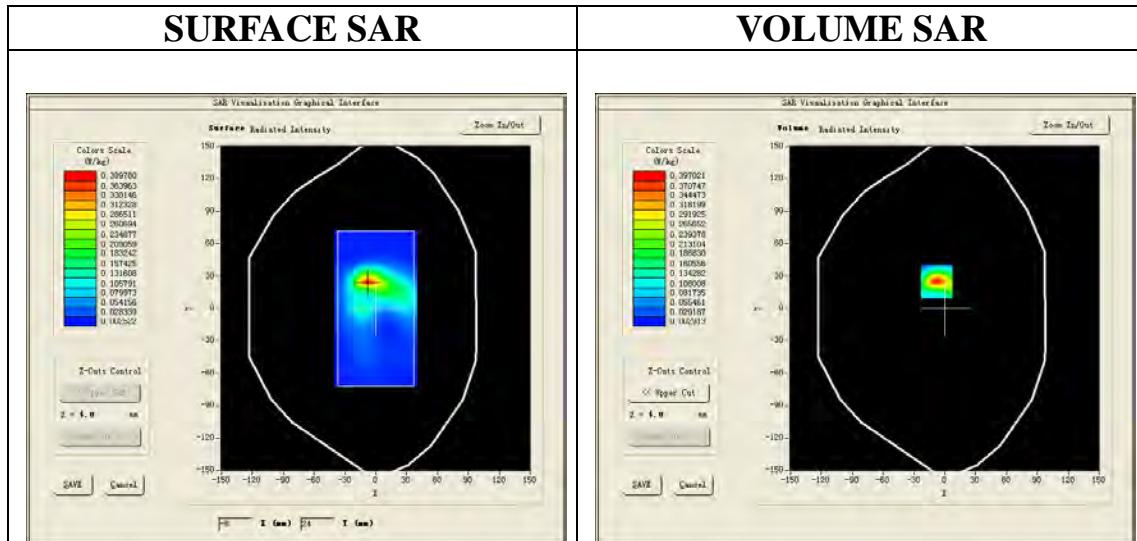
SATIMO Configuration:

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/802.11b High - Body- Back /Area Scan: Measurement grid: dx=8mm, dy=8mm

Configuration/802.11b High - Body- Back /Zoom Scan: Measurement grid: dx=5mm,dy=5mm, dz=5mm;

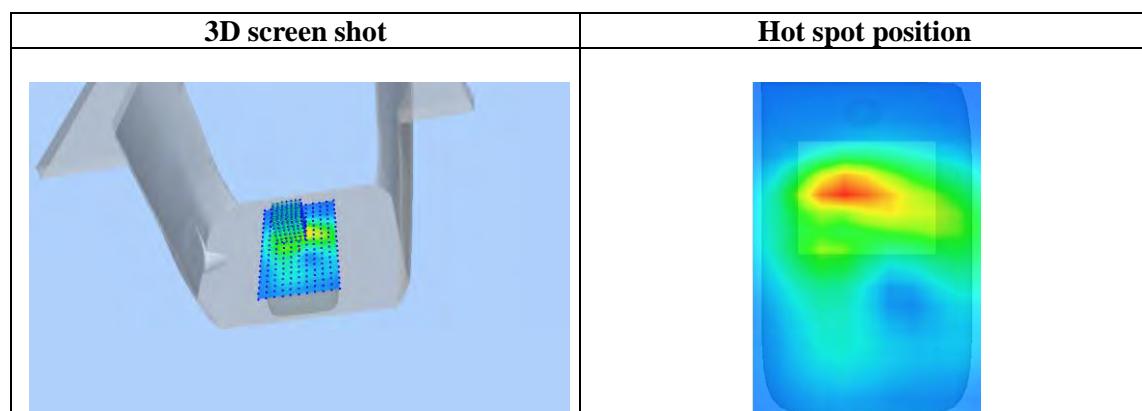
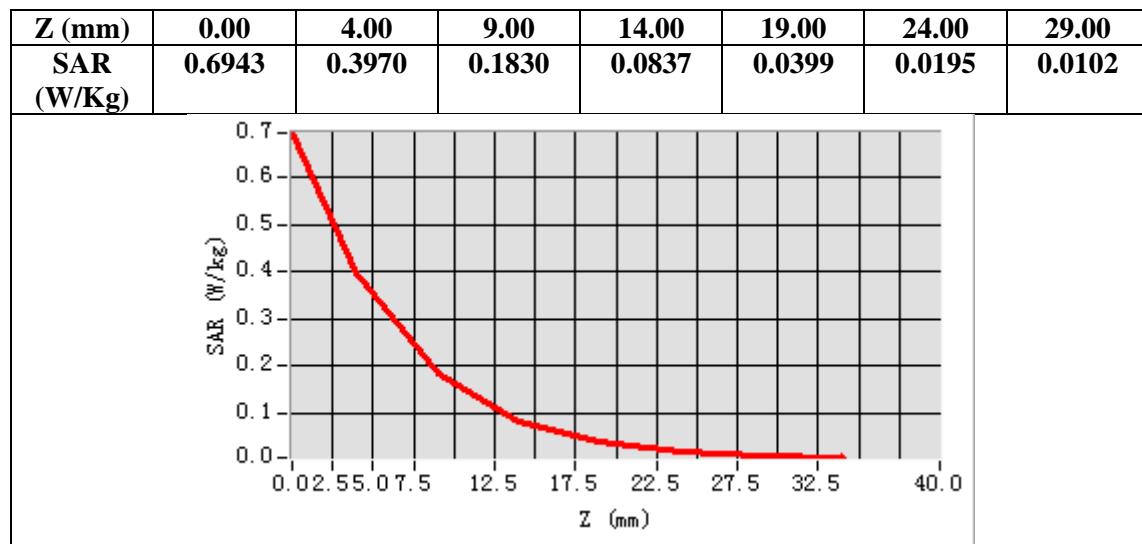
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	7x7x7,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Body Back
Band	2450MHz
Channels	High
Signal	Crest factor: 1.0



Maximum location: X=-8.00, Y=25.00

SAR Peak: 0.69 W/kg

SAR 10g (W/Kg)	0.144605
SAR 1g (W/Kg)	0.347631



Repeated SAR

Test Laboratory: AGC Lab

Date: June 28, 2017

GPRS 1900 High-Body-Back (2up) <SIM 1>

DUT: Rugged Mobile Phone; **Type:** CS22SA

Communication System: GPRS-2Slot; Communication System Band: PCS 1900; Duty Cycle: 1:4.2; Conv.F=5.34; Frequency: 1909.8MHz; Medium parameters used: $f = 1900 \text{ MHz}$; $\zeta = 1.54 \text{ mho/m}$; $\epsilon_r = 52.37$; $\rho = 1000 \text{ kg/m}^3$; Phantom section: Flat Section

Ambient temperature ($^{\circ}\text{C}$): 22.1, Liquid temperature ($^{\circ}\text{C}$): 21.5

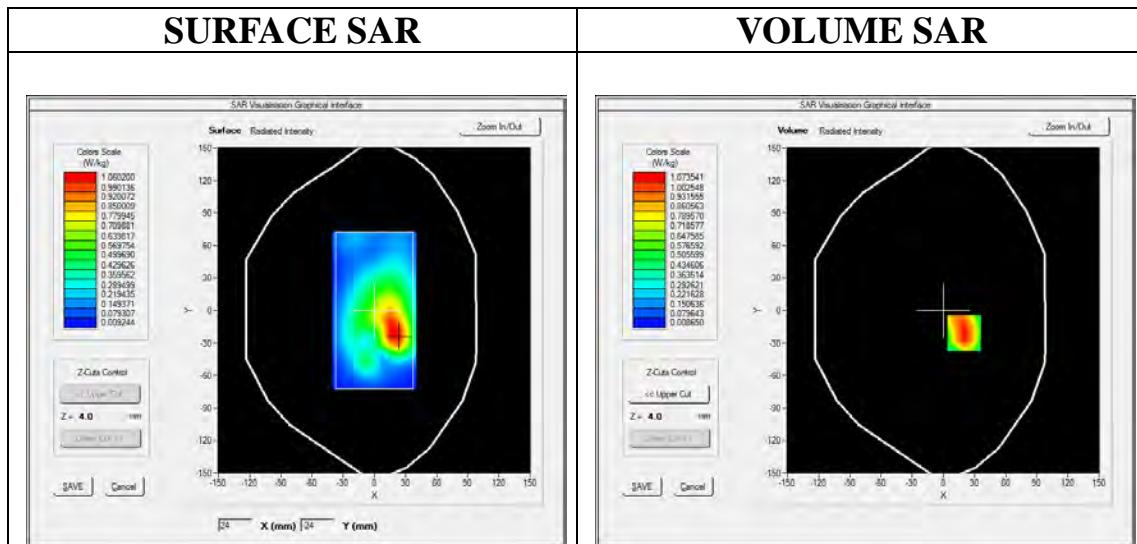
SATIMO Configuration:

- Probe: SSE5; Calibrated: 07/05/2016; Serial No.: SN 14/16 EP307
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/GPRS1900 High -Body- back /Area Scan: Measurement grid: dx=8mm, dy=8mm

Configuration/GPRS1900 High -Body- back /Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

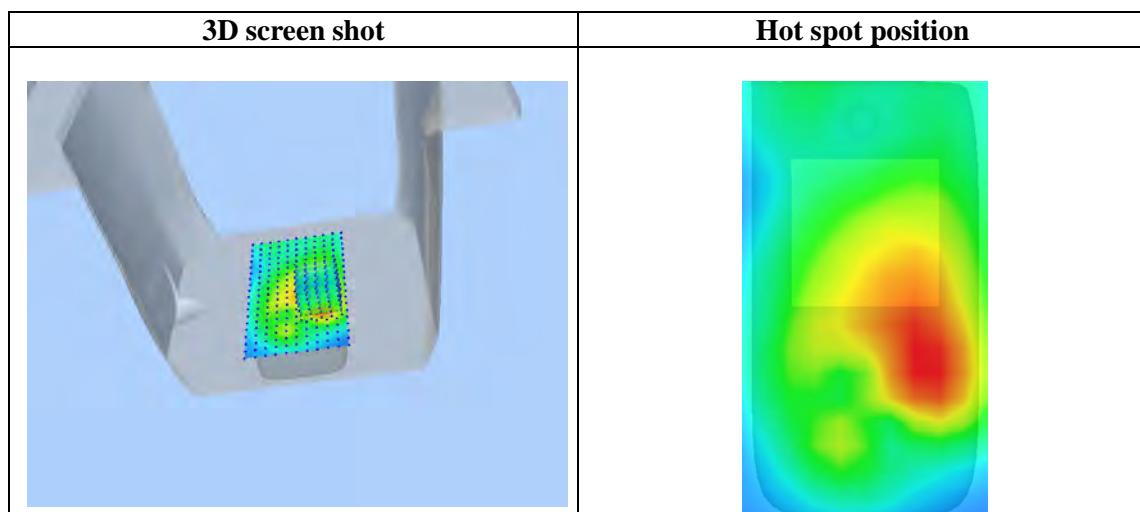
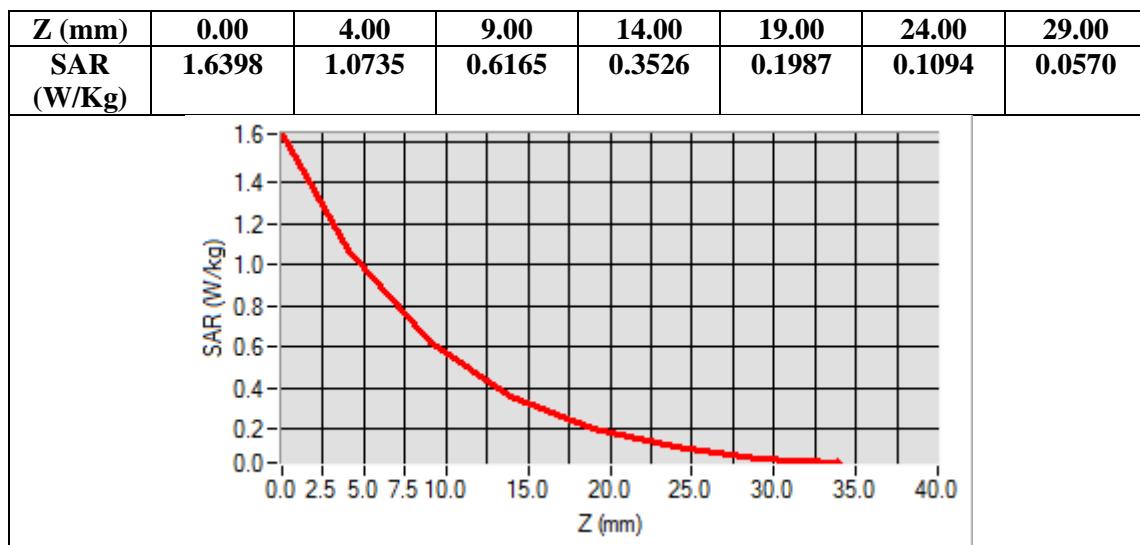
Area Scan	sam_direct_droit2_surf8mm.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body back
Band	PCS 1900
Channels	High
Signal	TDMA (Crest factor: 4.0)



Maximum location: X=20.00, Y=-21.00

SAR Peak: 1.72 W/kg

SAR 10g (W/Kg)	0.577669
SAR 1g (W/Kg)	1.016751



Test Laboratory: AGC Lab
WCDMA Band II Mid -Body-Towards Grounds (RMC 12.2kbps)
DUT: Rugged Mobile Phone; Type: CS22SA

Date: June 28, 2017

Communication System: UMTS; Communication System Band: Band II UTRA/FDD ;Duty Cycle:1:1; Conv.F=5.34;
Frequency: 1880 MHz; Medium parameters used: $f = 1900$ MHz; $\zeta = 1.49$ mho/m; $\epsilon_r = 54.02$; $\rho = 1000$ kg/m³ ;
Phantom section: Flat Section
Ambient temperature (°C): 22.1, Liquid temperature (°C): 21.5

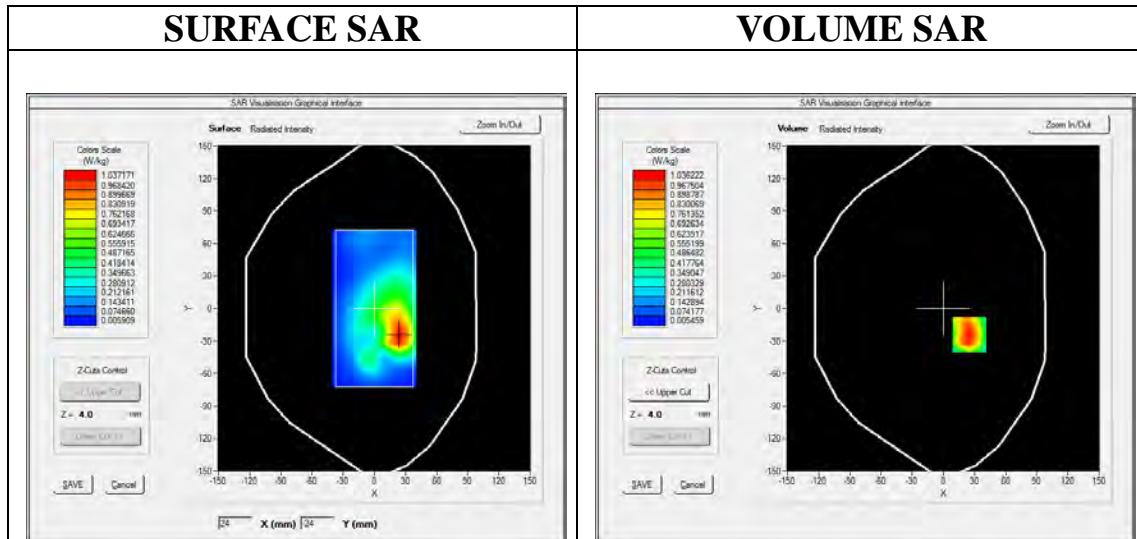
SATIMO Configuration:

- Probe: SSE5; Calibrated: 07/05/2016; Serial No.: SN 14/16 EP307
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/ WCDMA band II Mid -Body- Back t /Area Scan: Measurement grid: dx=8mm, dy=8mm

Configuration/ WCDMA band II Mid -Body- Back /Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5m;

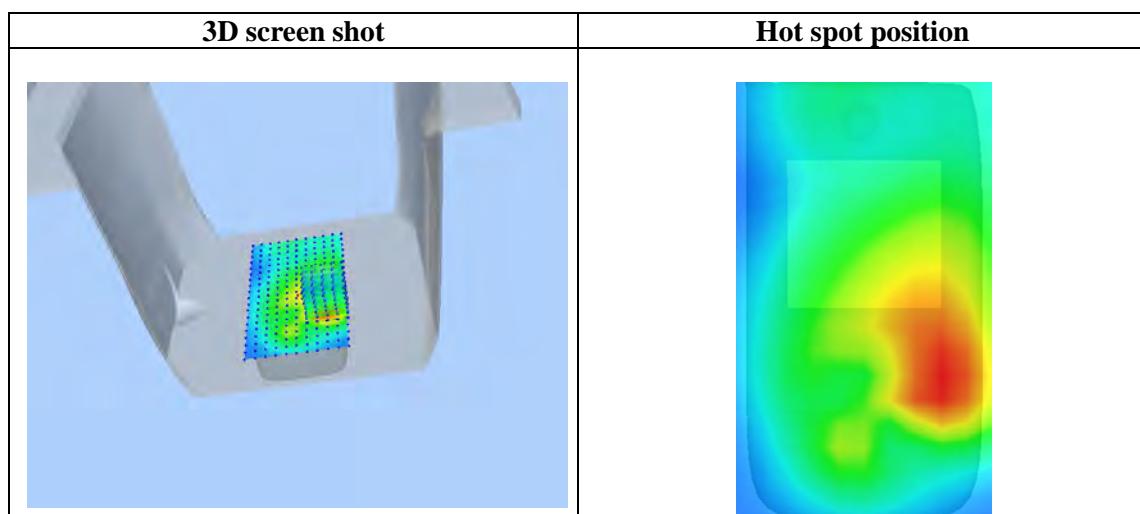
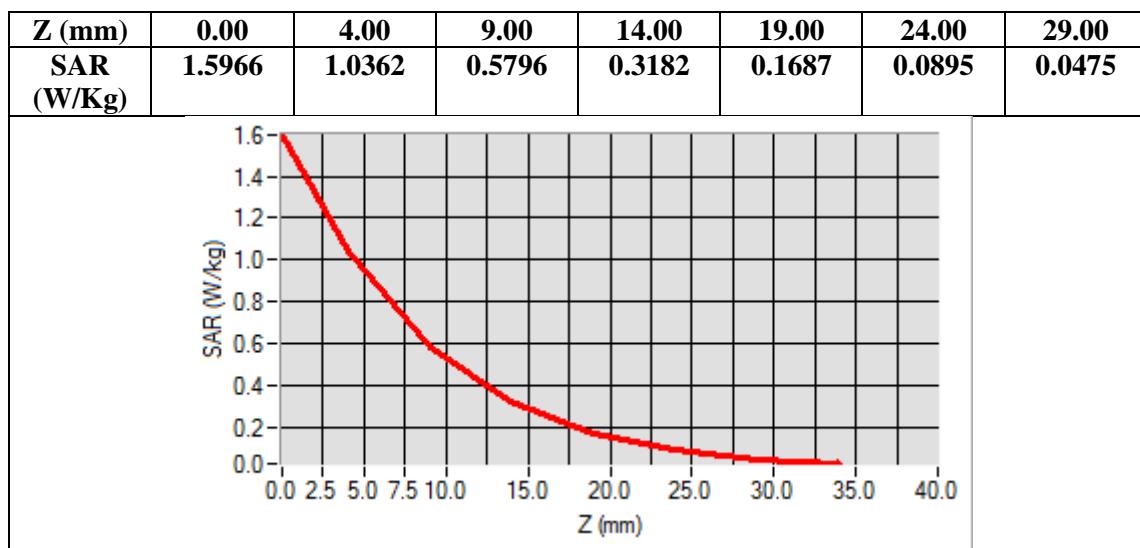
Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body Back
Band	WCDMA band II
Channels	Middle
Signal	CDMA (Crest factor: 1.0)



Maximum location: X=25.00, Y=-24.00

SAR Peak: 1.76 W/kg

SAR 10g (W/Kg)	0.527605
SAR 1g (W/Kg)	1.007393



Test Laboratory: AGC Lab
LTE Band II Mid- Body-Back (1 RB#50)
DUT: Rugged Mobile Phone; Type: CS22SA

Date: June 28, 2017

Communication System: LTE; Communication System Band: LTE Band II; Duty Cycle:1:1; Conv.F=5.34;
 Frequency:1880MHz; Medium parameters used: $f = 1900$ MHz; $\zeta = 1.49$ mho/m; $\epsilon_r = 54.02$; $\rho = 1000$ kg/m³ ;
 Phantom section: Flat Section
 Ambient temperature (°C): 22.1, Liquid temperature (°C): 21.5

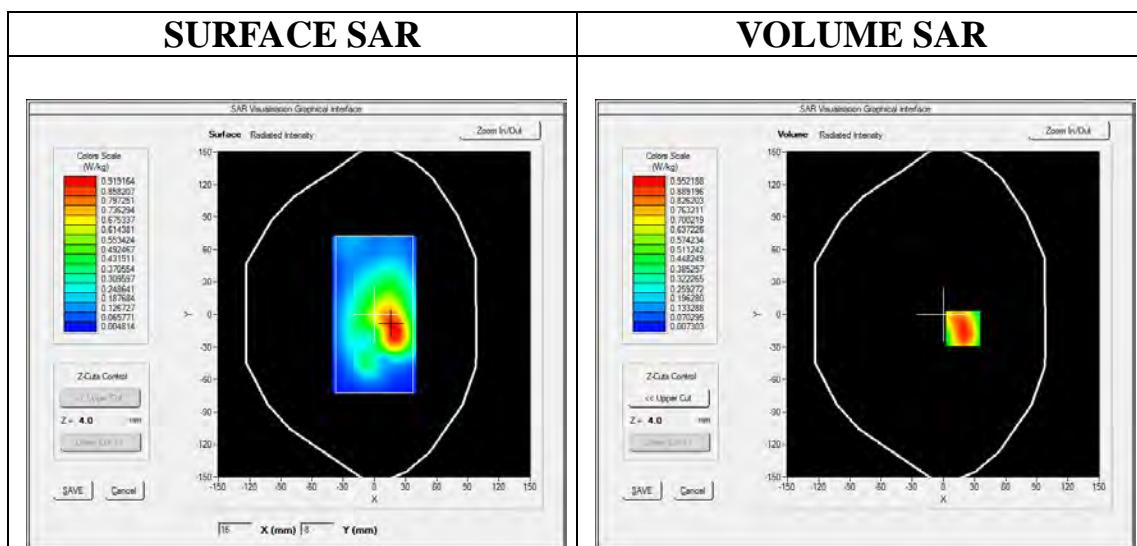
SATIMO Configuration:

- Probe: SSE5; Calibrated: 07/05/2016; Serial No.: SN 14/16 EP307
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_35

Configuration/ LTE Band II Mid- Body-Back /Area Scan: Measurement grid: dx=8mm, dy=8mm

Configuration/ LTE Band II Mid- E Body-Back /Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5m;

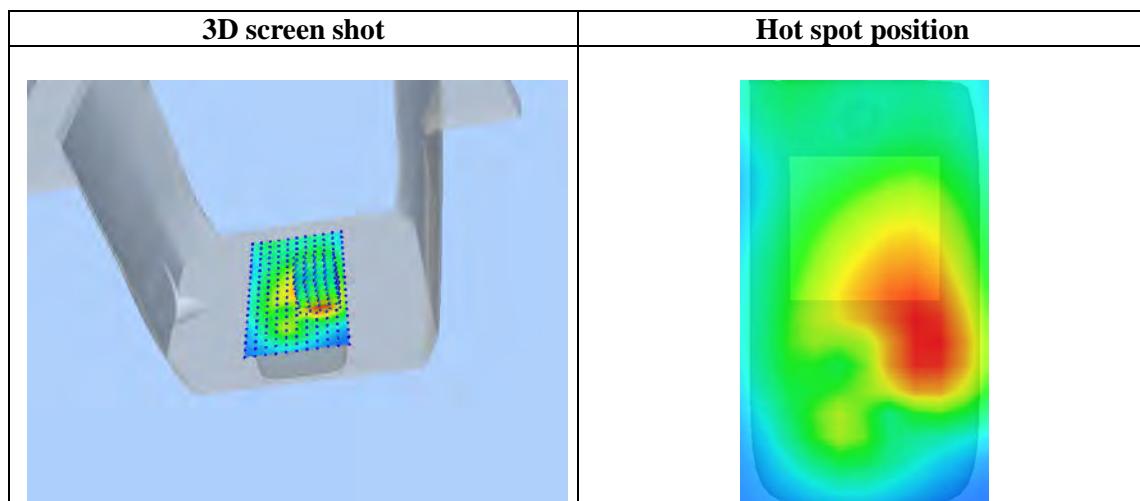
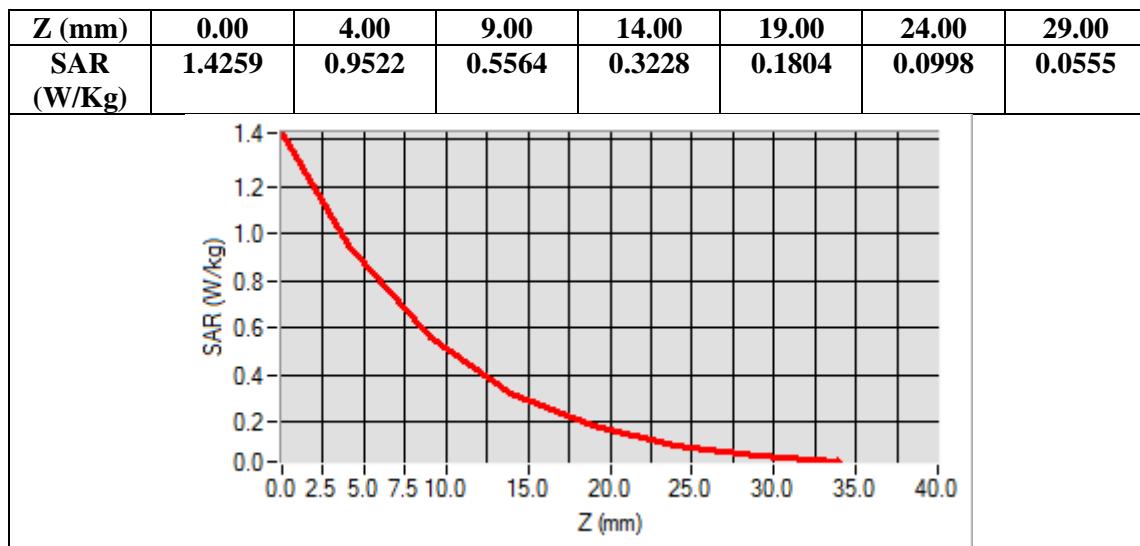
Area Scan	sam_direct_droit2_surf8mm.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body-Back
Band	LTE Band II
Channels	Middle
Signal	OFDM (Crest factor: 1.0)



Maximum location: X=19.00, Y=-13.00

SAR Peak: 1.47 W/kg

SAR 10g (W/Kg)	0.515858
SAR 1g (W/Kg)	0.912430



Test Laboratory: AGC Lab
LTE Band V Low -Body- Back (1 RB#0)
DUT: Rugged Mobile Phone; Type: CS22SA

Date: July 02,2017

Communication System: LTE; Communication System Band: LTE Band V; Duty Cycle:1:1; Conv.F=5.94
Frequency: 829MHz; Medium parameters used: $f = 835 \text{ MHz}$; $\zeta = 0.96 \text{ mho/m}$; $\epsilon_r = 55.74$; $\rho = 1000 \text{ kg/m}^3$;
Phantom section: Flat Section
Ambient temperature ($^{\circ}\text{C}$): 21.9, Liquid temperature ($^{\circ}\text{C}$): 21.5

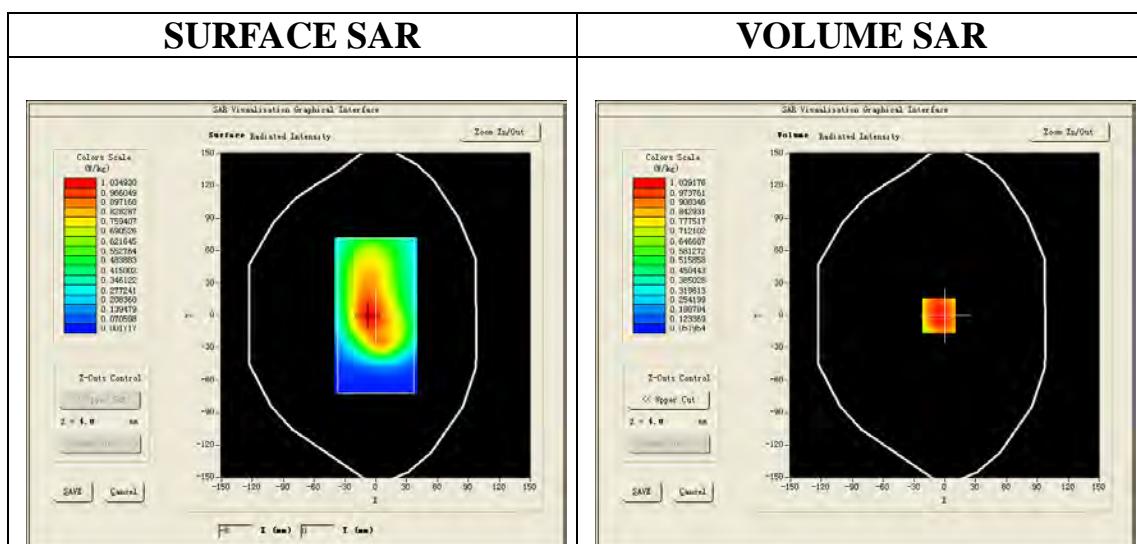
SATIMO Configuration:

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/ LTE Band V Low -Body- Back /Area Scan: Measurement grid: dx=8mm, dy=8mm

Configuration/ LTE Band V Low -Body- Back /Zoom Scan: Measurement grid: dx=8mm,dy=8mm, dz=5mm;

Area Scan	sam_direct_droit2_surf8mm.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body Back
Band	LTE Band V
Channels	Low
Signal	OFDM (Crest factor: 1.0)

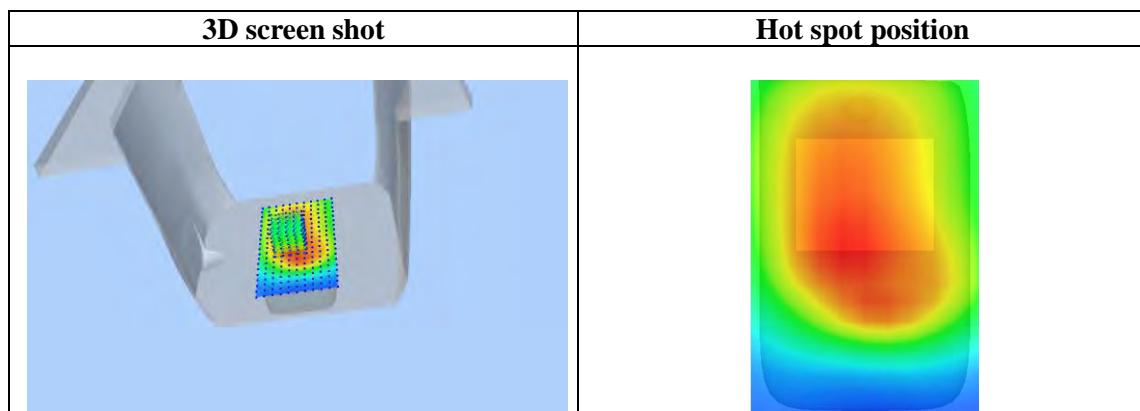
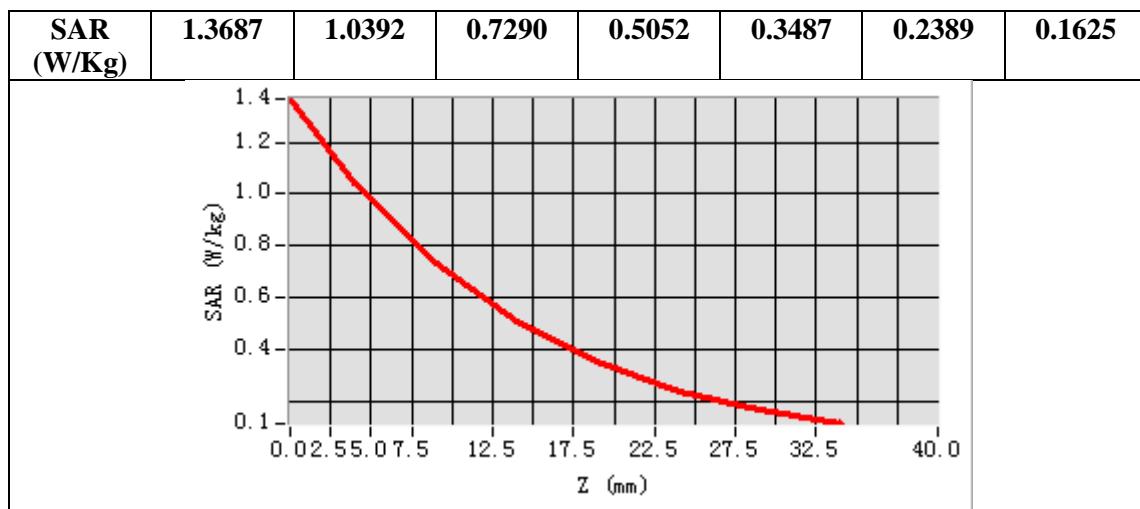


Maximum location: X=-6.00, Y=0.00

SAR Peak: 1.39 W/kg

SAR 10g (W/Kg)	0.685404
SAR 1g (W/Kg)	1.006941

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
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Test Laboratory: AGC Lab
LTE Band 7 High-Body-Back (1RB#49)
DUT: Rugged Mobile Phone; Type: CS22SA

Date: July 03,2017

Communication System: LTE; Communication System Band: LTE Band 7; Duty Cycle:1:1; Conv.F=5.19
Frequency: 2560MHz; Medium parameters used: $f = 2600 \text{ MHz}$; $\zeta = 2.14 \text{ mho/m}$; $\epsilon_r = 52.79$; $\rho = 1000 \text{ kg/m}^3$;
Phantom section: Flat Section
Ambient temperature ($^{\circ}\text{C}$): 21.7, Liquid temperature ($^{\circ}\text{C}$): 21.3

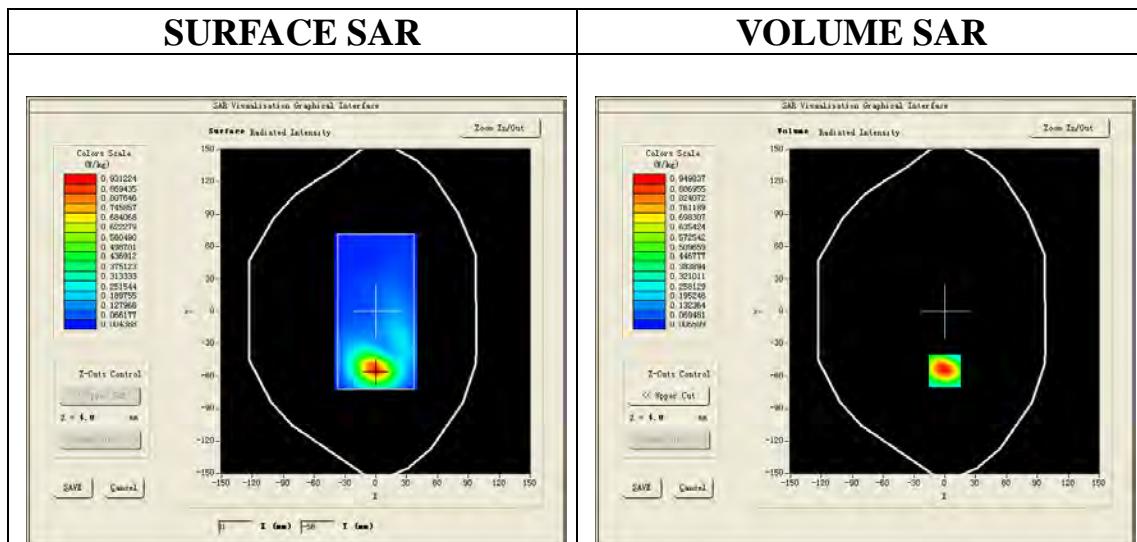
SATIMO Configuration:

- Probe: SSE5; Calibrated: 12/05/2016; Serial No.: SN 14/16 EP308
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Phantom: SAM twin phantom
- Measurement SW: OpenSAR V4_02_32

Configuration/ LTE BAND 7 High -Body-Back /Area Scan: Measurement grid: dx=10mm, y=10mm

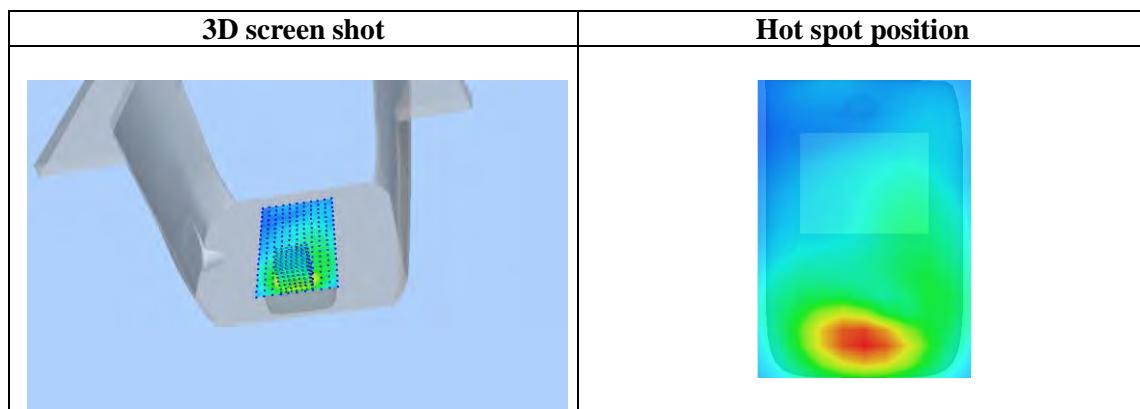
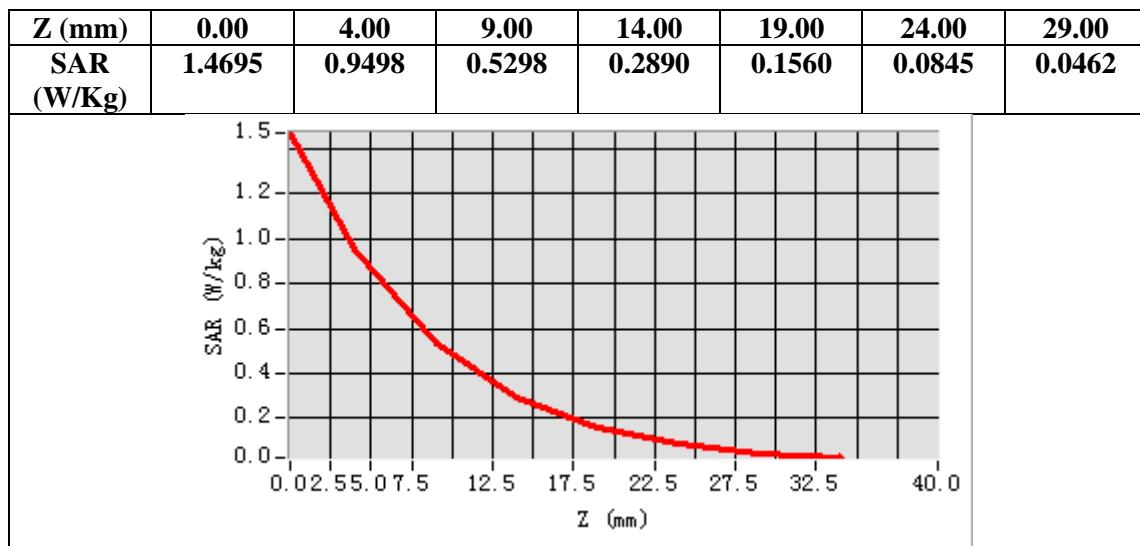
Configuration/ LTE BAND 7 High -Body-Back /Zoom Scan: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body Back
Band	LTE BAND 7
Channels	High
Signal	OFDM (Crest factor: 1.0)



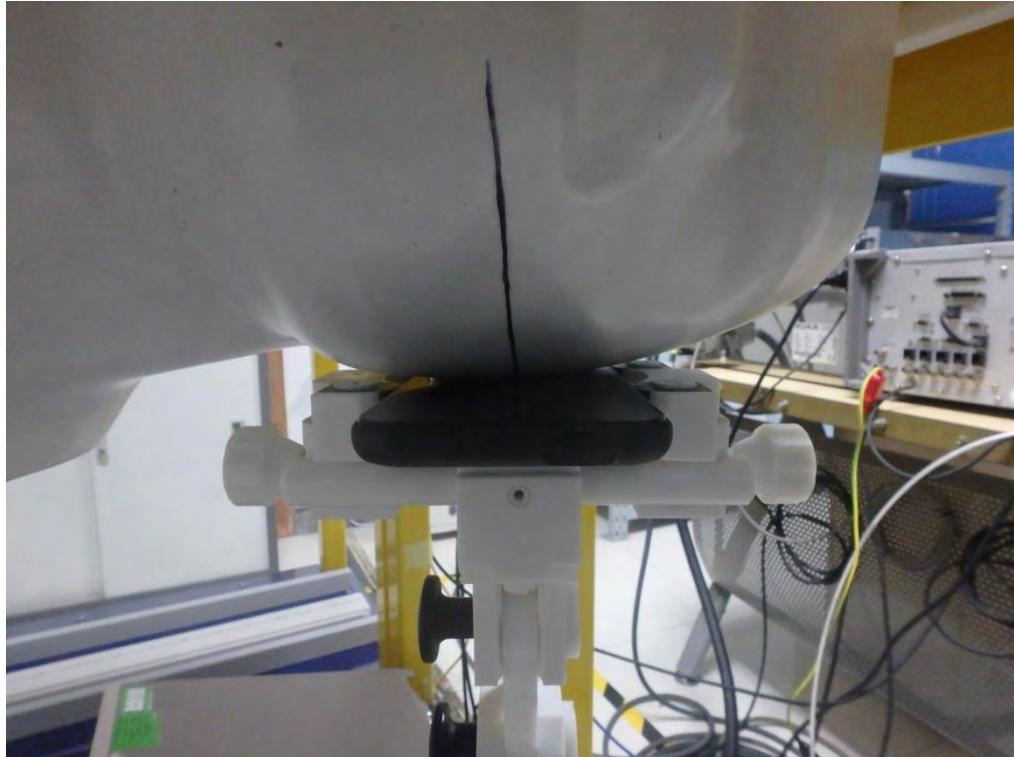
Maximum location: X=0.00, Y=-55.00
SAR Peak: 1.48 W/kg

SAR 10g (W/Kg)	0.441752
SAR 1g (W/Kg)	0.874065

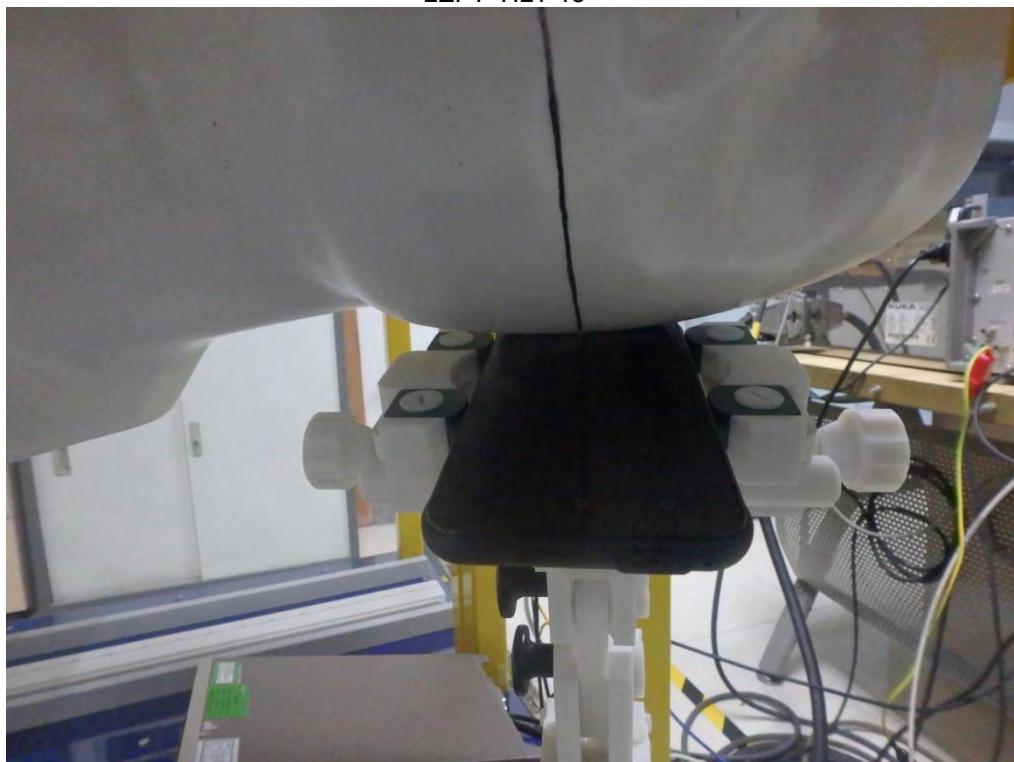


APPENDIX C. TEST SETUP PHOTOGRAPHS

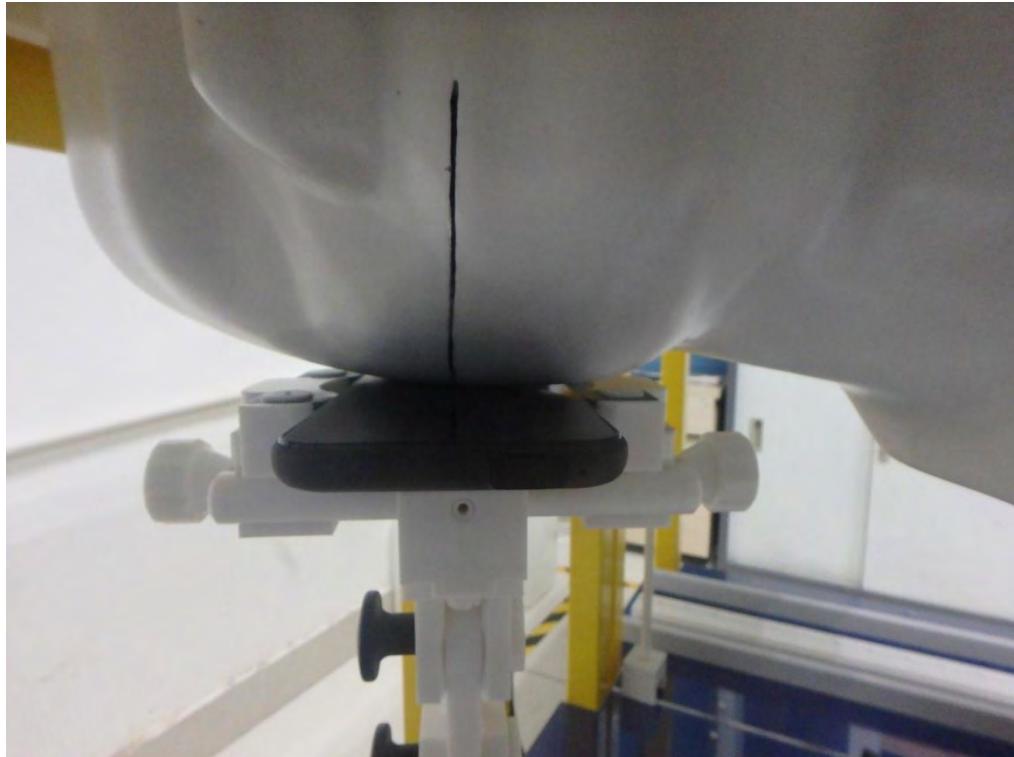
Test Setup Photographs LEFT-CHEEK TOUCH



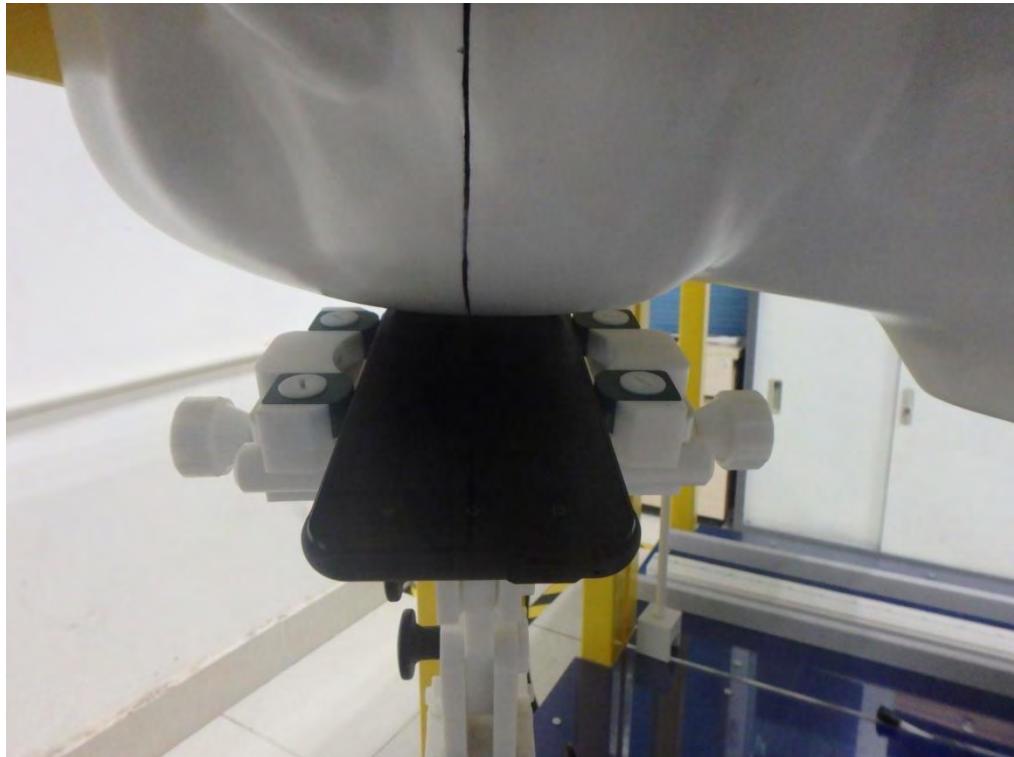
LEFT-TILT 15°



RIGHT- CHEEK TOUCH



RIGHT-TILT 15⁰



Body Back 5mm



Body Front 5mm



Edge 1(Top) 10mm-Hotspot Mode



Edge 2(Right) 10mm-Hotspot Mode



Edge 3(Bottom) 10mm-Hotspot Mode



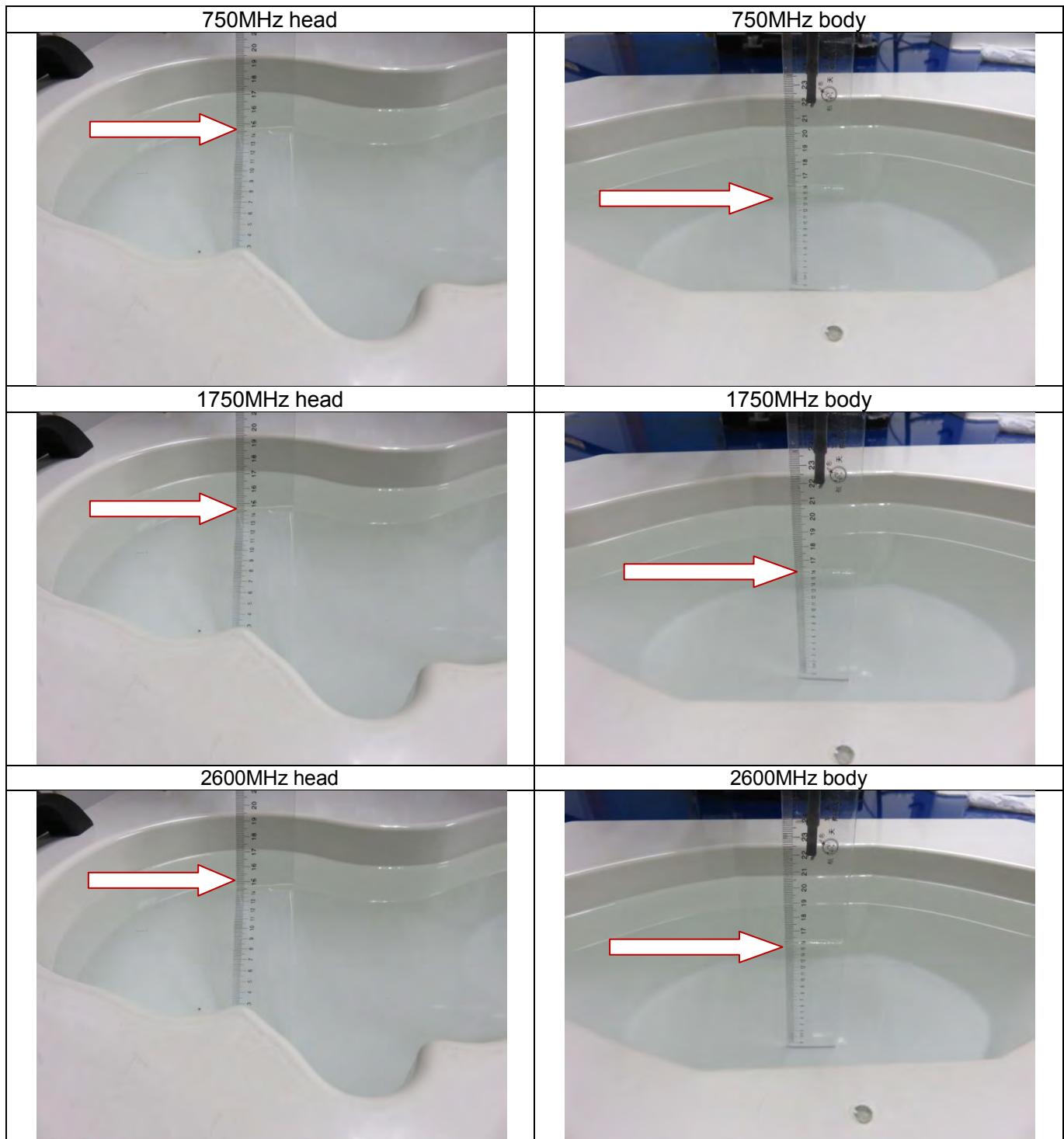
Edge 4(Left) 10mm-Hotspot Mode



DEPTH OF THE LIQUID IN THE PHANTOM—ZOOM IN

Note : The position used in the measurement were according to IEEE 1528-2013

835MHz head	835MHz body
 A photograph of a white, anatomically shaped phantom containing a clear liquid. A vertical ruler is positioned next to the phantom's neck. A red arrow points to the liquid level, which is approximately at the 18 cm mark on the ruler.	 A photograph of a white, anatomically shaped phantom containing a clear liquid. A vertical ruler is positioned next to the phantom's neck. A red arrow points to the liquid level, which is approximately at the 18 cm mark on the ruler.
1900MHz head	1900MHz body
 A photograph of a white, anatomically shaped phantom containing a clear liquid. A vertical ruler is positioned next to the phantom's neck. A red arrow points to the liquid level, which is approximately at the 18 cm mark on the ruler.	 A photograph of a white, anatomically shaped phantom containing a clear liquid. A vertical ruler is positioned next to the phantom's neck. A red arrow points to the liquid level, which is approximately at the 18 cm mark on the ruler.
2450MHz head	2450MHz body
 A photograph of a white, anatomically shaped phantom containing a clear liquid. A vertical ruler is positioned next to the phantom's neck. A red arrow points to the liquid level, which is approximately at the 18 cm mark on the ruler.	 A photograph of a white, anatomically shaped phantom containing a clear liquid. A vertical ruler is positioned next to the phantom's neck. A red arrow points to the liquid level, which is approximately at the 18 cm mark on the ruler.



APPENDIX D. CALIBRATION DATA

Refer to Attached files.