FCC SAR
Measurement and Test Report

For

Poindus Systems Corp.

5F, No.59, Ln. 77, xing-Ai Rd., Neihu District, Taipei City 114, Taiwan

FCC ID: 2ACH5-PD001

FCC Rules:	FCC 47 CFR Part 2 (2.1093) ANSI/IEEE C95.1-1992 IEEE 1528-2003 KDB 865664 D01 v01r03 KDB 865664 D02 v01r01
Product Description:	Varipad
Tested Model:	PD001
Report No.:	STR14058278H
Max. SAR Values:	Body: **1.0913 W/kg(1g)**
Tested Date:	2014-06-04 to 2014-06-07
Issued Date:	2014-06-09
Tested By:	Silin Chen / Engineer
Reviewed By:	Lahm Peng / EMC Manager
Approved & Authorized By:	Jandy so / PSQ Manager
Prepared By:	

Shenzhen SEM.Test Technology Co., Ltd.
1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road,
Bao'an District, Shenzhen, P.R.C.（518101）
Tel.: +86-755-33663308 Fax.: +86-755-33663309 Website: www.semtest.com.cn

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM. Test Technology Co., Ltd.

SEM.Test

TABLE OF CONTENTS

1. General Information **3**
1.1 Product Description for Equipment Under Test (EUT) 3
1.2 Test Standards 5
1.3 Test Methodology 5
1.4 Test Facility 5
2. Summary of Test Results **6**
3. Specific Absorption Rate (SAR) **7**
3.1 Introduction 7
3.2 SAR Definition 7
4. SAR Measurement System **8**
4.1 The Measurement System 8
4.2 Probe 8
4.3 Probe Calibration Process 10
4.4 Phantom 11
4.5 Device Holder 11
4.6 Test Equipment List 12
5. Tissue Simulating Liquids **13**
5.1 Composition of Tissue Simulating Liquid 13
5.2 Tissue Dielectric Parameters for Head and Body Phantoms 14
5.3 Tissue Calibration Result 15
6. SAR Measurement Evaluation **16**
6.1 Purpose of System Performance Check 16
6.2 System Setup 16
6.3 Validation Results 17
7. EUT Testing Position **18**
7.1 Body Worn Position 18
7.2 EUT Antenna Position 18
7.4 EUT Testing Position 19
8. SAR Measurement Procedures **20**
8.1 Measurement Procedures 20
8.2 Spatial Peak SAR Evaluation 20
8.3 Area & Zoom Scan Procedures 21
8.4 Volume Scan Procedures 21
8.5 SAR Averaged Methods 21
8.6 Power Drift Monitoring 21
9. SAR Test Result **22**
9.1 Conducted RF Output Power 22
9.2 Test Results for Standalone SAR Test 25
9.3 Simultaneous Multi-band Transmission SAR Analysis 26
10. Measurement Uncertainty **28**
10.1 Uncertainty for EUT SAR Test 28
10.2 Uncertainty for System Performance Check 29
Annex A. Plots of System Performance Check **31**
Annex B. Plots of SAR Measurement **35**
Annex C. EUT Photos **64**
Annex D. Test Setup Photos **66**
Annex E. Calibration Certificate **69**

STM. Test

1. General Information

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	Poindus Systems Corp.
Address of applicant:	5F, No.59, Ln. 77, xing-Ai Rd., Neihu District, Taipei City 114, Taiwan
Manufacturer:	Shenzhen kente science & technology co., Ltd.
Address of manufacturer:	Rm ABC, 15F, BTower, XuesongBuilding, Tairan6th Rd, Tairan Industry & Trading Park, Futian, Shenzhen, China

General Description of EUT	
Product Name:	Varipad
Brand Name:	/
Model No.:	PD001
Adding Mode:	/
Software Version:	PD001_20140416_V1.0.2
Hardware Version:	V01
Rated Voltage:	DC 3.7V
Battery:	8000mAh
Device Category:	Portable Device
The test data is gathered from a production sample, provided by the manufacturer.	

SEM-Test

Technical Characteristics of EUT	
2G	
Support Networks:	GSM, GPRS, EDGE
Support Band:	GSM850/PCS1900
Uplink Frequency:	GSM/GPRS/EDGE 850: 824~849MHz GSM/GPRS/EDGE 1900: 1850~1910MHz
Downlink Frequency:	GSM/GPRS/EDGE 850: 869~894MHz GSM/GPRS/EDGE 1900: 1930~1990MHz
RF Output Power:	GSM850: 32.64dBm, GSM1900: 30.43dBm
Type of Modulation:	GMSK, 8PSK
Antenna Type:	Internal Antenna
Antenna Gain:	0dBi
GPRS/EDGE Class:	Class 12
Bluetooth	
Bluetooth Version:	V4.0
Frequency Range:	2402-2480MHz
RF Output Power:	2.09dBm (Conducted)
Modulation Type:	1Mbps, 2Mbps, 3Mbps
Data Rate:	GFSK, Pi/4 QDPSK, 8DPSK
Quantity of Channels	79/39
Channel Separation:	1MHz/2MHz
Antenna Type:	Integral
Antenna Gain:	0dBi
Wi-Fi	
Support Standards:	802.11b, 802.11g, 802.11n
Frequency Range:	2412-2472MHz
RF Output Power:	9.80dBm (Conducted)
Type of Modulation:	CCK, OFDM, QPSK, BPSK, 16QAM, 64QAM
Data Rate:	1-11Mbps, 6-54Mbps, up to 150Mbps
Quantity of Channels	13
Channel Separation:	5MHz
Type of Antenna:	Integral
Antenna Gain:	0dBi

STM Test

1.2 Test Standards

The following report is prepared on behalf of the Poindus Systems Corp. in accordance with FCC 47 CFR Part 2.1093, ANSI/IEEE C95.1-1992, IEEE 1528-2003 and KDB 865664 D01 v01r03 and KDB 865664 D02 v01r01

The objective is to determine compliance with FCC Part 2.1093 of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with KDB 865664 D01 v01r03 and KDB 865664 D02 v01r01. The public notice KDB 447498 D01 V05 for Mobile and Portable Devices RF Exposure Procedure also.

1.4 Test Facility

- **FCC – Registration No.: 934118**
  Shenzhen SEM.Test Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 934118.

- **Industry Canada (IC) Registration No.: 11464A**
  The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

- **CNAS Registration No.: L4062**
  Shenzhen SEM.Test Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C (518101)

SEM.Test

2. Summary of Test Results

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

Frequency Band	Position	SAR_{1g} (W/kg)	Scaled SAR_{1g} (W/kg)
GSM850	Body (0mm Gap)	**1.0863**	**1.0913**
GSM1900	Body (0mm Gap)	0.5347	0.5651

The device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR Part 2.1093 and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedure specified in IEEE 1528-2003 and KDB 865664 D01 v01r03 and KDB 865664 D02 v01r01

SEM. Test

3. Specific Absorption Rate (SAR)

3.1 Introduction

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

3.2 SAR Definition

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

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

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

$$\mathbf{SAR} = \mathbf{C}\left(\frac{\boldsymbol{\delta}\mathbf{T}}{\boldsymbol{\delta}\mathbf{t}}\right)$$

Where: C is the specific heat capacity, δ T is the temperature rise and δ t is the exposure duration, or related to the
electrical field in the tissue by

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

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

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

SEM.Test

4. SAR Measurement System

4.1 The Measurement System

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

The following figure shows the system.

The EUT under test operating at the maximum power level is placed in the phone holder, under the phantom, which is filled with head simulating liquid. The E-Field probe measures the electric field inside the phantom. The OpenSAR software computes the results to give a SAR value in a 1g or 10g mass.

4.2 Probe

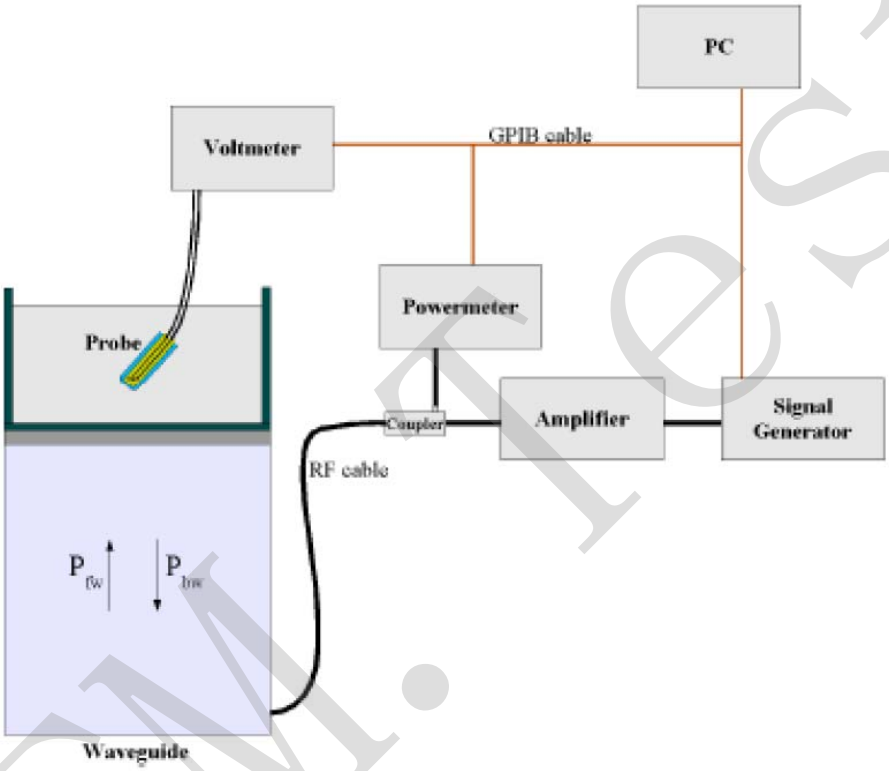
For the measurements the Specific Dosimetric E-Field Probe SSE5 SN 09/13 EP168 with following specifications is used
- Dynamic range: 0.01-100 W/kg
- Probe Length: 330 mm
- Length of Individual Dipoles: 4.5 mm
- Maximum external diameter: 8 mm
- Probe Tip External Diameter : 5 mm
- Distance between dipoles / probe extremity: 2.7mm

SEMTest

- Probe linearity: ＜0.25 dB
- Axial Isotropy: ＜0.25 dB
- Spherical Isotropy: ＜0.50 dB
- Calibration range: 700 to 3000MHz for head & body simulating liquid.

Angle between probe axis (evaluation axis) and suface normal line:1ess than 30°

Probe calibration is realized, in compliance with EN 62209-1 and IEEE 1528 STD, with CALISAR, Antennessa proprietary calibration system. The calibration is performed with the EN 62209-1 annexe technique using reference guide at the five frequencies.



$$SAR = \frac{4\left(P_{fw} - P_{bw}\right)}{ab\delta} \cos^2\left(\pi \frac{y}{a}\right) e^{-(2z/\delta)}$$

Where :

Pfw = Forward Power

Pbw = Backward Power

a and b =Waveguide dimensions

I = Skin depth

Keithley configuration:

Rate = Medium; Filter = ON; RDGS = 10; Filter type = Moving Average; Range auto after each calibration, a SAR measurement is performed on a validation dipole and compared with a NPL calibrated probe, to verify it.

SEM. Test

The calibration factors, CF(N), for the 3 sensors corresponding to dipole 1, dipole 2 and dipole 3 are:

$$CF(N)=SAR(N)/Vlin(N)\ (N=1,2,3)$$

The linearised output voltage Vlin(N) is obtained from the displayed output voltage V(N) using

$$Vlin(N)=V(N)*(1+V(N)/DCP(N))\ (N=1,2,3)$$

where DCP is the diode compression point in mV.

4.3 Probe Calibration Process

Dosimetric Assessment Procedure

Each E-Probe/Probe Amplifier combination has unique calibration parameters. SATIMO Probe calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm2) using an with CALISAR, Antenna proprietary calibration system.

Free Space Assessment Procedure

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and in a waveguide or other methodologies above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1mW/cm2.

Temperature Assessment Procedure

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated head tissue. The E-field in the medium correlates with the temperature rise in the dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$SAR = C\frac{\Delta T}{\Delta t}$$

Where:

Δt = exposure time (30 seconds),

C = heat capacity of tissue (brain or muscle),

ΔT = temperature increase due to RF exposure.

SAR is proportional to $\Delta T/\Delta t$, the initial rate of tissue heating, before thermal diffusion takes place. The electric field in the simulated tissue can be used to estimate SAR by equating the thermally derived SAR to that with the E- field component.

SEM.Test

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

Where:
σ = simulated tissue conductivity,
ρ = Tissue density (1.25 g/cm3 for brain tissue)

4.4 Phantom

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

4.5 Device Holder

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

System Material	Permittivity	Loss Tangent
Delrin	3.7	0.005

SEMTest

4.6 Test Equipment List

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
E-Field Probe	SATIMO	SSE5	SN 09/13 EP168	2014-03-21	2015-03-20
835MHz Dipole	SATIMO	SID835	SN 47/12 DIP 0G835-204	2014-11-26	2015-11-25
1900MHz Dipole	SATIMO	SID1900	SN 47/12 DIP 1G900-207	2014-11-26	2015-11-25
2450MHz Dipole	SATIMO	SID2450	SN 47/12 DIP 2G450-209	2014-11-26	2015-11-25
Dielectric Probe	SATIMO	SCLMP	SN 47/12 OCPG49	2014-11-26	2015-11-25
SAM Phantom	SATIMO	SAM	SN/ 47/12 SAM95	N/A	N/A
Multi Meter	Keithley	Keithley 2000	4006367	2014-05-07	2015-05-06
Signal Generator	Rohde & Schwarz	SMR20	100047	2014-05-07	2015-05-06
Universal Tester	Rohde & Schwarz	CMU200	112012	2014-05-07	2015-05-06
Network Analyzer	HP	8753C	2901A00831	2014-05-07	2015-05-06

SEM. Test

5. Tissue Simulating Liquids

5.1 Composition of Tissue Simulating Liquid

For the measurement of the field distribution inside the SAM phantom with SMTIMO, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm. Please see the following photos for the liquid height.

Liquid Height for Body SAR

The Composition of Tissue Simulating Liquid

Frequency (MHz)	Water (%)	Salt (%)	Triton (%)	HEC (%)	Preventol (%)	DGBE (%)
Body						
835	52.87	1.07	0.00	0.00	46.10	0.00
1900	69.99	0.41	20.66	0.00	0.00	8.93

SEM. Test

5.2 Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 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 P1528 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 P1528.

Target Frequency (MHz)	**Head**		**Body**	
	Conductivity (σ)	**Permittivity** (ε_r)	**Conductivity** (σ)	**Permittivity** (ε_r)
150	0.76	52.3	0.80	61.9
300	0.87	45.3	0.92	58.2
450	0.87	43.5	0.94	56.7
835	0.90	41.5	**0.97**	**55.2**
900	0.97	41.5	1.05	55.0
915	0.98	41.5	1.06	55.0
1450	1.20	40.5	1.30	54.0
1610	1.29	40.3	1.40	53.8
1800-2000	1.40	40.0	**1.52**	**53.3**
2450	1.80	39.2	1.95	52.7
3000	2.40	38.5	2.73	52.0
5800	5.27	35.3	6.00	48.2

SEM. Test

5.3 Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using COMOSAR Dielectric Probe Kit and an Agilent Network Analyzer.

Calibration Result for Dielectric Parameters of Tissue Simulating Liquid

Body Tissue Simulating Liquid									
Freq. MHz.	Temp. (℃)	Conductivity			Permittivity			Limit (%)	Date
		Reading (σ)	Target (σ)	Delta (%)	Reading (ε r)	Target (ε r)	Delta (%)		
835	21.2	0.96	0.97	-1.03	54.49	55.2	-1.29	±5	2014-06-04
1900	21.3	1.49	1.52	-1.97	52.39	53.3	-1.71	±5	2014-06-04

SEM. Test

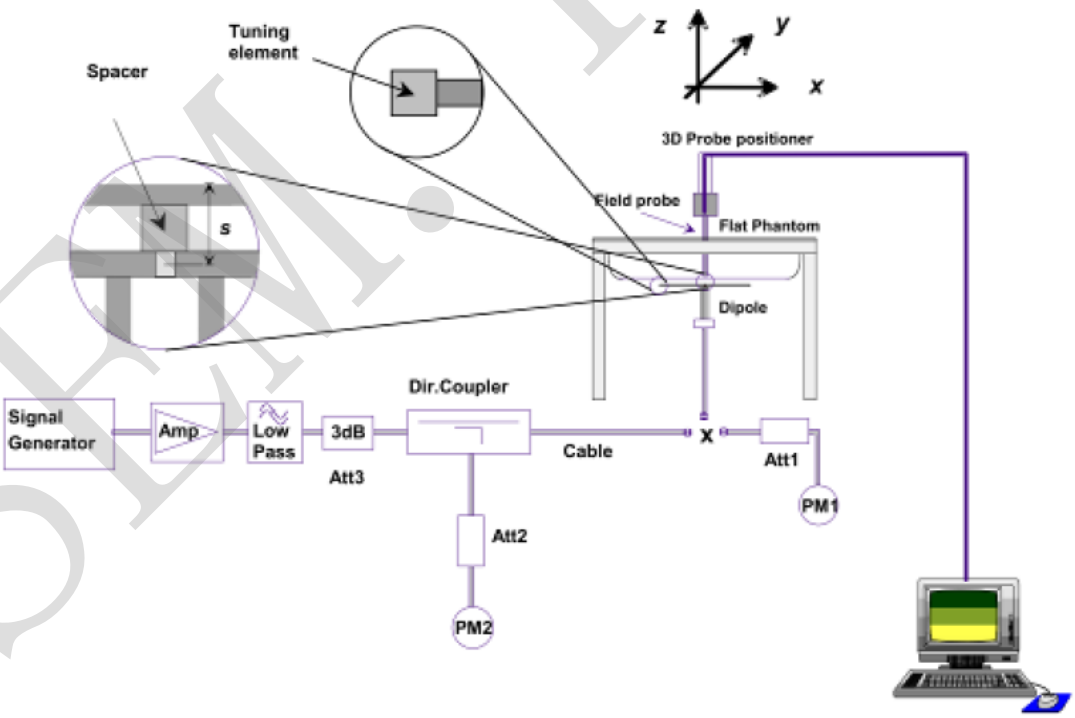
6. SAR Measurement Evaluation

6.1 Purpose of System Performance Check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

6.2 System Setup

In the simplified setup for system evaluation, the EUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave which comes from a signal generator at frequency 835 MHz and 1900 MHz. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom.



System Verification Setup Block Diagram

SEM.Test

Setup Photo of Dipole Antenna

The output power on dipole port must be calibrated to 24 dBm (250 mW) before dipole is connected.

6.3 Validation Results

Comparing to the original SAR value provided by SATIMO, the validation data should be within its specification of 10 %. Table 6.1 shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion.

Frequency	Targeted SAR_{1g}	Measured SAR_{1g}	Normalized SAR_{1g}	Tolerance
MHz	(W/kg)	(W/kg)	(W/kg)	(%)
Body				
835	10.19	2.52	10.09	-0.98
1900	40.41	10.09	40.34	-0.17

Targeted and Measurement SAR

Please refer to Annex A for the plots of system performance check.

SEM. Test

7. EUT Testing Position

7.1 Body Worn Position

(a) To position the device parallel to the phantom surface with either keypad up or down.
(b) To adjust the device parallel to the flat phantom.
(c) To adjust the distance between the device surface and the flat phantom to 0mm.

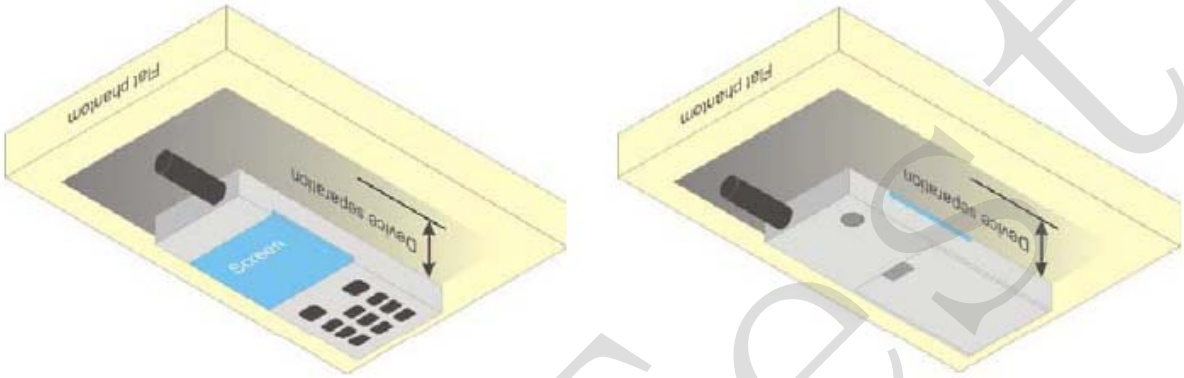


Illustration for Body Worn Position

7.2 EUT Antenna Position

Block Diagram for EUT Antenna Position

SEM Test

7.4 EUT Testing Position

Exclusion Distance Calculation				
Frequency Bands	Service	Maximum Tune-up Power	Average Power	Exclusion Distance
GSM850	GSM	33.0dBm	24.0dBm	70mm
GPRS850	GPRS(4slots)	29.0dBm	26.0dBm	100mm
GSM1900	GSM	30.5dBm	21.5dBm	60mm
GPRS1900	GPRS(4slots)	28.0dBm	25.0dBm	80mm
Note: Refer to Chapter 9.1 Conducted RF Output Power				

Remark:

1. Referring to KDB 447498 D01v05 and KDB616217 D04 v01r01, the distance of the antennas to all adjacent edges SAR test exclusion for adjacent edges.

Head/Body-worn/Hotspot mode SAR assessments are required for this device. This EUT was tested in different positions for different SAR test modes, more information as below:

Body SAR tests, Test distance: 0mm							
Antennas	**Front**	**Back**	**Right Side**	**Left Side**	**Top Side**	**Bottom Side**	**Body with headset**
WWAN	No	Yes	Yes	Yes	Yes	No	Yes
WLAN	No	Yes	Yes	Yes	Yes	No	No

Remark:

1. Referring to KDB 616217 D04 v01r01, KDB 248227 D04 and KDB 447498 D01 v05r02, this device is a overall diagonal dimension(>20cm) tablet, tested in direct contact (no gap) with flat phantom.

Please refer to Annex D for the EUT test setup photos.

SEM.Test

8. SAR Measurement Procedures

8.1 Measurement Procedures

The measurement procedures are as follows:
(a) Use base station simulator (if applicable) or engineering software to transmit RF power continuously (continuous Tx) in the highest power channel.
(b) Keep EUT to radiate maximum output power or 100% factor (if applicable)
(c) Measure output power through RF cable and power meter.
(d) Place the EUT in the positions as Annex E demonstrates.
(e) Set scan area, grid size and other setting on the SATIMO software.
(f) Measure SAR results for the highest power channel on each testing position.
(g) Find out the largest SAR result on these testing positions of each band
(h) Measure SAR results for other channels in worst SAR testing position if the SAR of highest power channel is larger than 0.8 W/kg

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:
(a) Power reference measurement
(b) Area scan
(c) Zoom scan
(d) Power drift measurement

8.2 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The SATIMO software includes all numerical procedures necessary to evaluate the spatial peak SAR value.
The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.
The entire evaluation of the spatial peak values is performed within the post-processing engine. The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:
(a) Extraction of the measured data (grid and values) from the Zoom Scan
(b) Calculation of the SAR value at every measurement point based on all stored data
(c) Generation of a high-resolution mesh within the measured volume
(d) Interpolation of all measured values form the measurement grid to the high-resolution grid
(e) Extrapolation of the entire 3D field distribution to the phantom surface over the distance from sensor to surface
(f) Calculation of the averaged SAR within masses of 1g and 10g

SEM. Test

8.3 Area & Zoom Scan Procedures

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan measures 5x5x7 points with step size 8, 8 and 5 mm for 300 MHz to 3 GHz, and 8x8x8 points with step size 4, 4 and 2.5 mm for 3 GHz to 6 GHz. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g.

8.4 Volume Scan Procedures

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing (step-size is 4, 4 and 2.5 mm). When all volume scan were completed, the software can combine and subsequently superpose these measurement data to calculating the multiband SAR.

8.5 SAR Averaged Methods

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

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

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

8.6 Power Drift Monitoring

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

SEM Test

9. SAR Test Result

9.1 Conducted RF Output Power

GSM - Burst Average Power (dBm)						
Band	**GSM850**			**PCS1900**		
Channel	**128**	**190**	**251**	**512**	**661**	**810**
Frequency (MHz)	**824.2**	**836.4**	**848.8**	**1850.2**	**1880**	**1909.8**
GSM	32.64	32.54	32.51	30.20	30.43	30.37
GPRS (1 slot)	32.63	32.52	32.49	30.20	30.41	30.33
GPRS (2 slots)	31.69	31.60	31.59	29.20	29.44	29.38
GPRS (3 slots)	29.88	29.80	29.82	27.38	27.64	27.56
GPRS (4 slots)	28.98	28.90	28.93	26.52	26.76	26.74
EDGE (1 slots)	27.21	27.08	26.99	26.66	26.36	26.06
EDGE (2 slots)	25.94	25.85	25.70	25.34	24.96	24.66
EDGE (3 slots)	23.74	23.62	23.44	22.78	22.41	22.10
EDGE (4 slots)	22.33	22.21	22.05	21.44	21.07	20.71

GSM - Source-Based Time-Average Power (dBm)						
Band	**GSM850**			**PCS1900**		
Channel	**128**	**190**	**251**	**512**	**661**	**810**
Frequency (MHz)	**824.2**	**836.4**	**848.8**	**1850.2**	**1880**	**1909.8**
GSM	23.64	23.54	23.51	21.20	21.43	21.37
GPRS (1 slot)	23.63	23.52	23.49	21.20	21.41	21.33
GPRS (2 slots)	25.69	25.60	25.59	23.20	23.44	23.38
GPRS (3 slots)	25.63	25.55	25.57	23.13	23.39	23.31
GPRS (4 slots)	25.98	25.90	25.93	23.52	23.76	23.74
EDGE (1 slots)	18.21	18.08	17.99	17.66	17.36	17.06
EDGE (2 slots)	19.94	19.85	19.70	19.34	18.96	18.66
EDGE (3 slots)	19.49	19.37	19.19	18.53	18.16	17.85
EDGE (4 slots)	19.33	19.21	19.05	18.44	18.07	17.71
Note: The source-based time-averaged power is linearly scaled the maximum burst averaged power based on time slots. The calculated method are shown as below: Source based time-average power = Burst averaged power - Duty cycle factor in dB Duty cycle factor = 9 dB for 1 Tx slot, 6 dB for 2 Tx slots, 4.25 dB for 3 Tx slots, 3 dB for 4 Tx slots						

Remark:

1. For Head SAR testing, GSM should be evaluated, therefore the EUT was set in GSM for GSM850 and GSM1900 due to its highest source-based time-average power.
2. For Body SAR testing, GPRS should be evaluated, therefore the EUT was set in GPRS (4 Tx slots) for GSM850 and GSM1900 due to its highest source-based time-average power.
3. Per KDB 447498, the maximum output power channel is used for SAR testing and for further SAR test reduction.
4. The DUT do not support DTM function.

STMTest

WLAN - Maximum Average Power				
Test Mode	**Data Rate**	**Channel**	**Frequency (MHz)**	**Average Power (dBm)**
802.11b	1Mbps	CH 01	2412	9.80
		CH 07	2442	9.47
		CH 13	2472	9.15
802.11g	54Mbps	CH 01	2412	9.34
		CH 07	2442	9.39
		CH 13	2472	9.17
802.11n (20MHz)	MCS7	CH 01	2412	9.38
		CH 07	2442	9.43
		CH 13	2472	9.45
802.11n (40MHz)	MCS7	CH 03	2422	9.58
		CH 07	2442	9.43
		CH 11	2462	9.36

Remark:

WIFI maximum output power (including tune-up tolerance) is 6.0dBm. Per KDB 648474 D01, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR,16 where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation17
- The result is rounded to one decimal place for comparison

Max. Power (dBm)	Max. Power (mW)	Distance (mm)	Frequency (GHz)	Result	Limit
9.80	9.55	5	2.412	2.97	3

The exclusion thresoholds is 2.97 < 3, therefore, the RF exposure evaluation is not required.

SEM. Test

Bluetooth - Maximum Average Power				
Test Mode	**Data Rate**	**Channel**	**Frequency (MHz)**	**Average Power (dBm)**
GFSK	1Mbps	CH 00	2402	-0.31
		CH 39	2441	0.69
		CH 78	2480	2.09
BLE	1Mbps	CH 00	2402	-8.13
		CH 18	2440	-6.92
		CH 39	2480	-5.39

Remark:

Bluetooth maximum output power (including tune-up tolerance) is 6.0dBm. Per KDB 648474 D01, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR,16 where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation17
- The result is rounded to one decimal place for comparison

Max. Power (dBm)	Max. Power (mW)	Distance (mm)	Frequency (GHz)	Result	Limit
2.09	1.62	5	2.480	0.51	3

The exclusion thresoholds is 0.51 < 3, therefore, the RF exposure evaluation is not required.

SEM. rest

9.2 Test Results for Standalone SAR Test

Body SAR

GSM850 – Body SAR Test (Gap: 0mm)									
Plot No.	Mode	Test Postion Body	Frequency		Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
			CH.	MHz					
1	GSM	(Back)Body with headset	128	824.2	32.64	33.0	1.09	0.7630	0.8289
2	GSM	(Front)Body with headset	128	824.2	32.64	33.0	1.09	0.5317	0.5777
3	GPRS_4TX	Back	128	824.2	28.98	29.0	1.00	1.0863	1.0913
4	GPRS_4TX	Back	190	836.4	28.90	29.0	1.02	0.9019	0.9229
5	GPRS_4TX	Back	251	848.8	28.93	29.0	1.02	0.7569	0.7692
6	GPRS_4TX	Top side	128	824.2	28.98	29.0	1.00	0.3749	0.3766
7	GPRS_4TX	Right side	128	824.2	28.98	29.0	1.00	0.3379	0.3395
8	GPRS_4TX	Left side	128	824.2	28.98	29.0	1.00	0.2296	0.2307

GSM1900 – Body SAR Test (Gap: 0mm)									
Plot No.	Mode	Test Postion Body	Frequency		Output Power (dBm)	Rated Limit (dBm)	Scaling Factor	SAR1g (W/kg)	Scaled SAR1g (W/kg)
			CH.	MHz					
9	GSM	(Back)Body with headset	661	1880.0	30.43	30.5	1.02	0.5317	0.5403
10	GSM	(Front)Body with headset	661	1880.0	30.43	30.5	1.02	0.3379	0.3434
11	GPRS_4TX	Back	661	1880.0	26.76	27.0	1.06	0.5347	0.5651
12	GPRS_4TX	Top side	661	1880.0	26.76	27.0	1.06	0.1550	0.1638
13	GPRS_4TX	Right side	661	1880.0	26.76	27.0	1.06	0.1258	0.1329
14	GPRS_4TX	Left side	661	1880.0	26.76	27.0	1.06	0.1135	0.1199

Remark:

1. Per KDB 447498, if the highest output channel SAR for each exposure position ≤ 0.8 W/kg other channels SAR tests are not necessary.

STM.Test

9.3 Simultaneous Multi-band Transmission SAR Analysis

List of Mode for Simultanous Multi-band Transmission

No.	Configurations	Head SAR	Body-worn SAR	Hotspot SAR
1	GSM + WIFI	-	Yes	-
2	GPRS + WIFI	-	-	Yes
3	GSM + Bluetooth	-	Yes	-
4	GPRS + Bluetooth	-	-	Yes

Remark:

1. GSM and WCDMA share the same antenna, and cannot transmit simultaneously.
2. WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.
3. According to the KDB 447498 D01v05r01, when standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]·[√f(GHz)/x] W/kg for test separation distances ≤ 50 mm;

where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR.

For simultaneous transmission analysis, WIFI/Bluetooth SAR is estimated per KDB 447498 D01v05r01 as below:

WIFI:

Max. Power (dBm)	Max. Power (mW)	Distance (mm)	Frequency (GHz)	x	SAR(W/kg)
9.80	9.55	5	2.412	7.5	0.3960

Bluetooth:

Max. Power (dBm)	Max. Power (mW)	Distance (mm)	Frequency (GHz)	x	SAR(W/kg)
2.09	1.62	5	2.480	7.5	0.0680

SEM. Test

GSM and WIFI

	WWAN		WIFI	Summed SAR (W/kg)
Position	**Band**	**Scaled SAR (W/kg)**	**Scaled SAR (W/kg)**	
Back	GSM850	1.0913	0.3960	**1.4873**
Front	GSM850	-	0.3960	0.3960
Top side	GSM850	0.3766	0.3960	0.7726
Bottom side	GSM850	-	0.3960	0.3960
Right side	GSM850	0.3395	0.3960	0.7355
Left side	GSM850	0.2307	0.3960	0.6267
Back	GSM1900	0.5651	0.3960	0.9611
Front	GSM1900	-	0.3960	0.3960
Top side	GSM1900	0.1638	0.3960	0.5598
Bottom side	GSM1900	-	0.3960	0.3960
Right side	GSM1900	0.1638	0.3960	0.5598
Left side	GSM1900	0.1199	0.3960	0.5159

GSM and Bluetooth

	WWAN		Bluetooth	Summed SAR (W/kg)
Position	**Band**	**Scaled SAR (W/kg)**	**Scaled SAR (W/kg)**	
Back	GSM850	1.0913	0.0680	**1.1593**
Front	GSM850	-	0.0680	0.1467
Top side	GSM850	0.3766	0.0680	0.4446
Bottom side	GSM850	-	0.0680	0.3298
Right side	GSM850	0.3395	0.0680	0.4075
Left side	GSM850	0.2307	0.0680	0.2987
Back	GSM1900	0.5651	0.0680	0.6331
Front	GSM1900	-	0.0680	0.1467
Top side	GSM1900	0.1638	0.0680	0.2318
Bottom side	GSM1900	-	0.0680	0.2485
Right side	GSM1900	0.1638	0.0680	0.2318
Left side	GSM1900	0.1199	0.0680	0.1879

SEMTest

10. Measurement Uncertainty

10.1 Uncertainty for EUT SAR Test

a	b	c	d	e= f(d,k)	f	g	h= c*f/e	i= c*g/e	k
Uncertainty Component	**Sec.**	**Tol (+- %)**	**Prob. Dist.**	**Div.**	**Ci (1g)**	**Ci (10g)**	**1g Ui (+-%)**	**10g Ui (+-%)**	**Vi**
Measurement System									
Probe calibration	E.2.1	7.0	N	1	1	1	7.00	7.00	∝
Axial Isotropy	E.2.2	2.5	R	√3	(1_Cp)^1/2	(1_Cp)^1/2	1.02	1.02	∝
Hemispherical Isotropy	E.2.2	4.0	R	√3	(Cp)^1/2	(Cp)^1/2	1.63	1.63	∝
Boundary effect	E.2.3	1.0	R	√3	1	1	0.58	0.58	∝
Linearity	E.2.4	5.0	R	√3	1	1	2.89	2.89	∝
System detection limits	E.2.5	1.0	R	√3	1	1	0.58	0.58	∝
Readout Electronics	E.2.6	0.02	N	1	1	1	0.02	0.02	∝
Reponse Time	E.2.7	3.0	R	√3	1	1	1.73	1.73	∝
Integration Time	E.2.8	2.0	R	√3	1	1	1.15	1.15	∝
RF ambient Conditions	E.6.1	3.0	R	√3	1	1	1.73	1.73	∝
Probe positioner Mechanical Tolerance	E.6.2	2.0	R	√3	1	1	1.15	1.15	∝
Probe positioning with respect to Phantom Shell	E.6.3	0.05	R	√3	1	1	0.03	0.03	∝
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	E.5.2	5.0	R	√3	1	1	2.89	2.89	∝
Test Sample Related									
Test sample positioning	E.4.2.1	0.03	N	1	1	1	0.03	0.03	N−1
Device Holder Uncertainty	E.4.1.1	5.00	N	1	1	1	5.00	5.00	
Output power Variation - SAR drift measurement	6.6.2	12.02	R	√3	1	1	6.94	6.94	∝
Phantom and Tissue Parameters									
Phantom Uncertainty (Shape and thickness tolerances)	E.3.1	0.05	R	√3	1	1	0.03	0.03	∝
Liquid conductivity - deviation from target value	E.3.2	5.00	R	√3	0.64	0.43	1.85	1.24	
Liquid conductivity - measurement uncertainty	E.3.3	5.00	N	1	0.64	0.43	3.20	2.15	
Liquid permittivity - deviation from target value	E.3.2	0.37	R	√3	0.6	0.49	0.13	0.10	
Liquid permittivity -	E.3.3	10.00	N	1	0.6	0.49	6.00	4.90	M

STM. Test

measurement uncertainty									
Combined Standard Uncertainty			RSS				12.98	12.53	
Expanded Uncertainty (95% Confidence interval)			K=2				25.32	24.43	

10.2 Uncertainty for System Performance Check

a	b	c	d	e= f(d,k)	f	g	h= c*f/e	i= c*g/e	k
Uncertainty Component	**Sec.**	**Tol (+- %)**	**Prob. Dist.**	**Div.**	**Ci (1g)**	**Ci (10g)**	**1g Ui (+-%)**	**10g Ui (+-%)**	**Vi**
Measurement System									
Probe calibration	E.2.1	7.0	N	1	1	1	7.00	7.00	∝
Axial Isotropy	E.2.2	2.5	R	√3	(1_Cp)^1/2	(1_Cp)^1/2	1.02	1.02	∝
Hemispherical Isotropy	E.2.2	4.0	R	√3	(Cp)^1/2	(Cp)^1/2	1.63	1.63	∝
Boundary effect	E.2.3	1.0	R	√3	1	1	0.58	0.58	∝
Linearity	E.2.4	5.0	R	√3	1	1	2.89	2.89	∝
System detection limits	E.2.5	1.0	R	√3	1	1	0.58	0.58	∝
Readout Electronics	E.2.6	0.02	N	1	1	1	0.02	0.02	∝
Reponse Time	E.2.7	3.0	R	√3	1	1	1.73	1.73	∝
Integration Time	E.2.8	2.0	R	√3	1	1	1.15	1.15	∝
RF ambient Conditions	E.6.1	3.0	R	√3	1	1	1.73	1.73	∝
Probe positioner Mechanical Tolerance	E.6.2	2.0	R	√3	1	1	1.15	1.15	∝
Probe positioning with respect to Phantom Shell	E.6.3	0.05	R	√3	1	1	0.03	0.03	∝
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	E.5.2	5.0	R	√3	1	1	2.89	2.89	∝
Dipole									
Dipole axis to liquid Distance	8,E.4.2	1.00	N	√3	1	1	0.58	0.58	N−1
Input power and SAR drift measurement	8,6.6.2	12.02	R	√3	1	1	6.94	6.94	∝
Phantom and Tissue Parameters									
Phantom Uncertainty (Shape and thickness tolerances)	E.3.1	0.05	R	√3	1	1	0.03	0.03	∝
Liquid conductivity - deviation from target value	E.3.2	5.00	R	√3	0.64	0.43	1.85	1.24	

SEM.Test

Liquid conductivity - measurement uncertainty	E.3.3	5.00	N	1	0.64	0.43	3.20	2.15	
Liquid permittivity - deviation from target value	E.3.2	0.37	R	√3	0.6	0.49	0.13	0.10	
Liquid permittivity - measurement uncertainty	E.3.3	10.00	N	1	0.6	0.49	6.00	4.90	M
Combined Standard Uncertainty			RSS				12.00	11.50	
Expanded Uncertainty (95% Confidence interval)			K=2				23.39	22.43	

SEM. Test

Annex A. Plots of System Performance Check

MEASUREMENT 1

For Body Liquid

Type: Validation measurement (Fast, 75.00 %)

Date of measurement: 06/04/2014

Measurement duration: 12 minutes 21 seconds

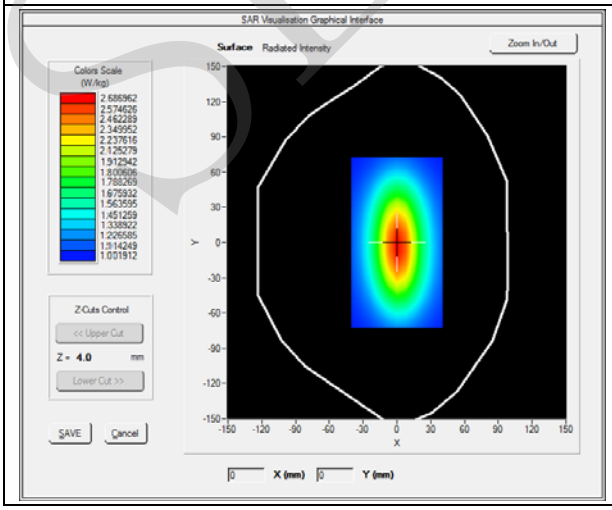
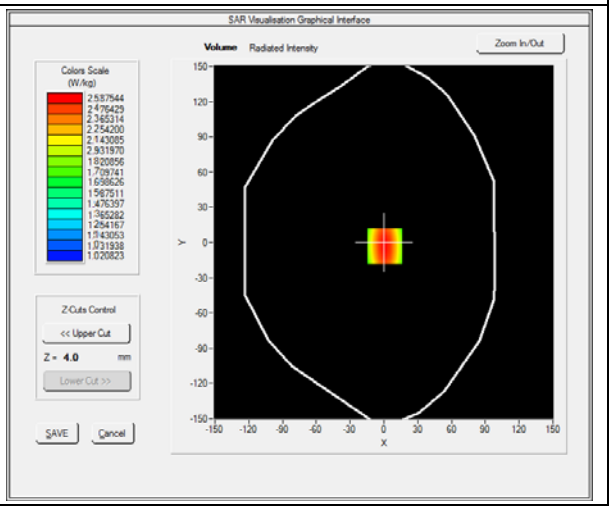
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.50; Calibrated: 03/21/2014

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Phantom	Validation plane
Device Position	Dipole
Band	CW835
Channels	Middle
Signal	CW (Crest factor: 1.0)

B. SAR Measurement Results

Frequency (MHz)	835.000000
Relative Permittivity (real part)	54.492364
Conductivity (S/m)	0.963236
Power Variation (%)	0.926400
Ambient Temperature	21.1
Liquid Temperature	21.3

SURFACE SAR	VOLUME SAR
	

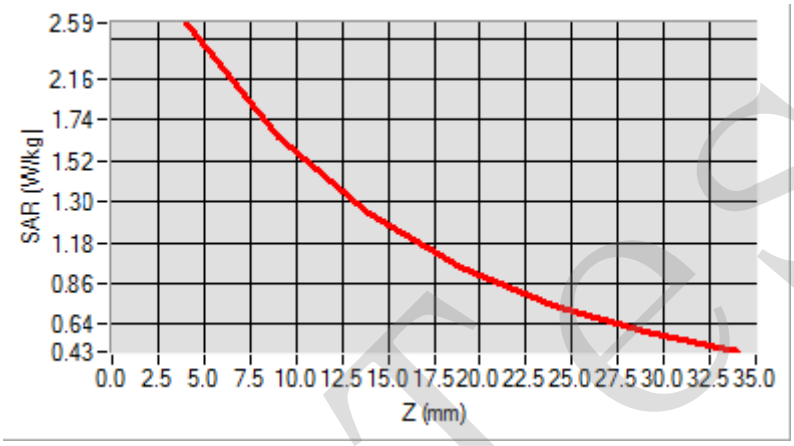
SEM. Test

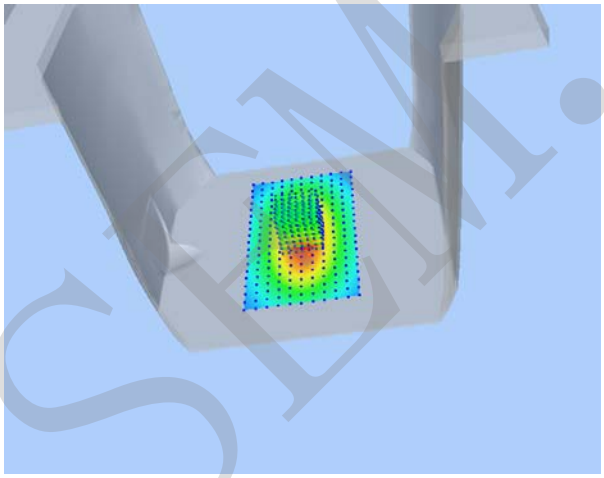
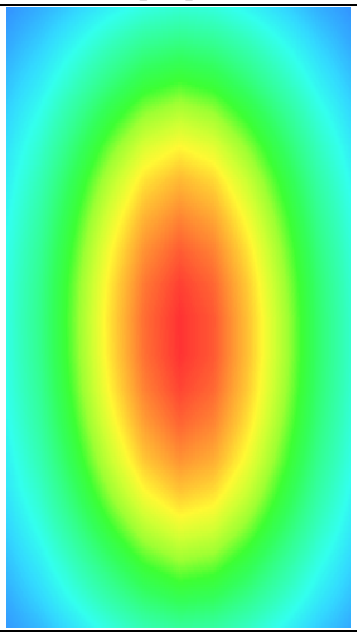
Maximum location: X=0.00, Y=0.00

SAR 10g (W/Kg)	1.502100
SAR 1g (W/Kg)	2.521346

Z Axis Scan

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**	**24.00**	**29.00**
SAR (W/Kg)	**0.0000**	**2.5989**	**1.6985**	**1.1642**	**0.8322**	**0.5521**	**0.4025**



3D screen shot	**Hot spot position**
	

SEM. Test

MEASUREMENT 2

For Body Liquid

Type: Validation measurement (Fast, 75.00 %)

Date of measurement: 06/04/2014

Measurement duration: 12 minutes 21 seconds

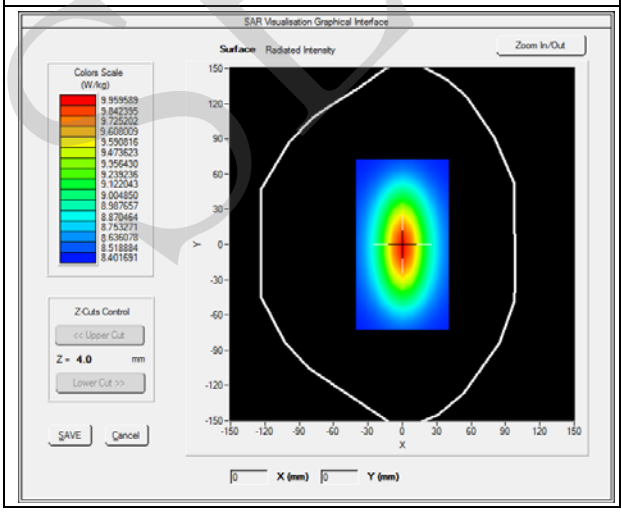
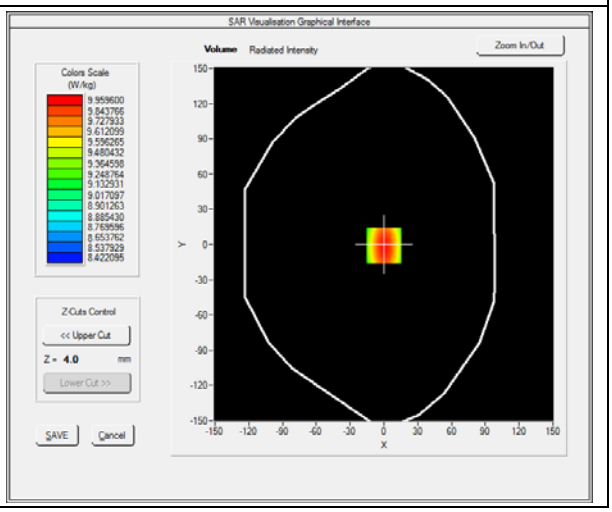
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.30; Calibrated: 03/21/2014

A. Experimental conditions

Area Scan	dx=8mm dy=8mm
Phantom	Validation plane
Device Position	Dipole
Band	CW1900
Channels	Middle
Signal	CW (Crest factor: 1.0)

B. SAR Measurement Results

Frequency (MHz)	1900.000000
Relative Permittivity (real part)	52.394440
Conductivity (S/m)	1.491240
Power Variation (%)	0.768521
Ambient Temperature	21.1
Liquid Temperature	21.3

SURFACE SAR	VOLUME SAR
	

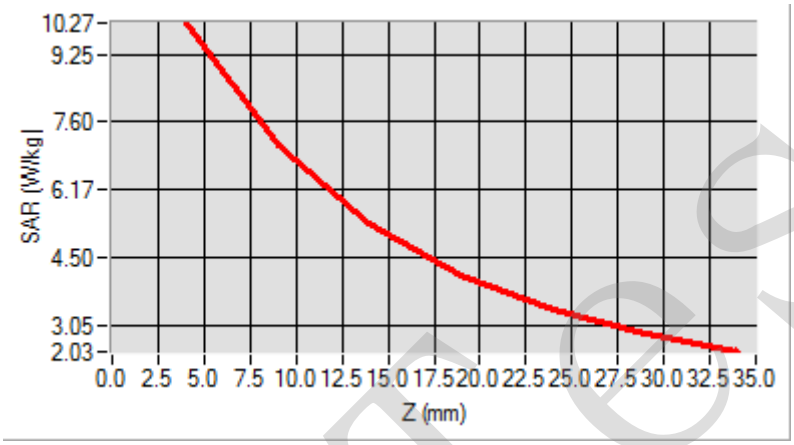
SEM. Test

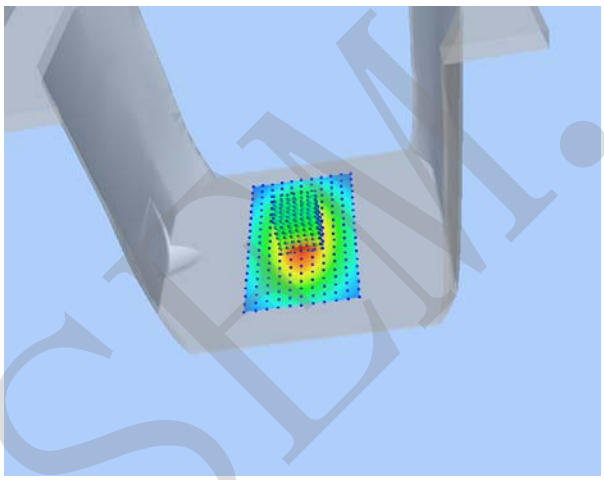
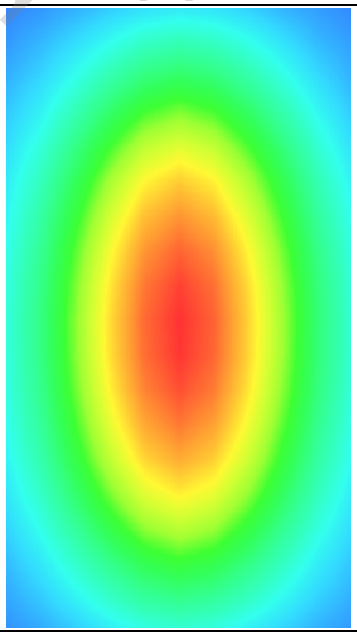
Maximum location: X=0.00, Y=0.00

SAR 10g (W/Kg)	5.102232
SAR 1g (W/Kg)	10.092420

Z Axis Scan

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**	**24.00**	**29.00**
SAR (W/Kg)	**0.0000**	**10.1564**	**6.4363**	**5.1336**	**3.9541**	**3.1262**	**2.7601**



3D screen shot	**Hot spot position**
	

SBM Test

Annex B. Plots of SAR Measurement

TYPE	BAND	PARAMETERS
Tablet	**GSM850**	Measurement 1: Flat Plane with Back device position Body with headset on Low Channel in GSM mode
Tablet	**GSM850**	Measurement 2: Flat Plane with Front device position Body with headset on Low Channel in GSM mode
Tablet	**GPRS850_4TX**	Measurement 3: Flat Plane with Back device position on Low Channel in GPRS mode
Tablet	**GPRS850_4TX**	Measurement 4: Flat Plane with Back device position on Middle Channel in GPRS mode
Tablet	**GPRS850_4TX**	Measurement 5: Flat Plane with Back device position on High Channel in GPRS mode
Tablet	**GPRS850_4TX**	Measurement 6: Flat Plane with Top side device position on Low Channel in GPRS mode
Tablet	**GPRS850_4TX**	Measurement 7: Flat Plane with Right side device position on Low Channel in GPRS mode
Tablet	**GPRS850_4TX**	Measurement 8: Flat Plane with Left side device position on Low Channel in GPRS mode
Tablet	**GSM1900**	Measurement 9: Flat Plane with Back device position Body with headset on Low Channel in GSM mode
Tablet	**GSM1900**	Measurement 10: Flat Plane with Front device position Body with headset on Low Channel in GSM mode
Tablet	**GPRS1900_4TX**	Measurement 11: Flat Plane with Back device position on Middle Channel in GPRS mode
Tablet	**GPRS1900_4TX**	Measurement 12: Flat Plane with Top side device position on Middle Channel in GPRS mode
Tablet	**GPRS1900_4TX**	Measurement 13: Flat Plane with Right side device position on Middle Channel in GPRS mode
Tablet	**GPRS1900_4TX**	Measurement 14: Flat Plane with Left side device position on Middle Channel in GPRS mode

`

SEM Test

MEASUREMENT 1

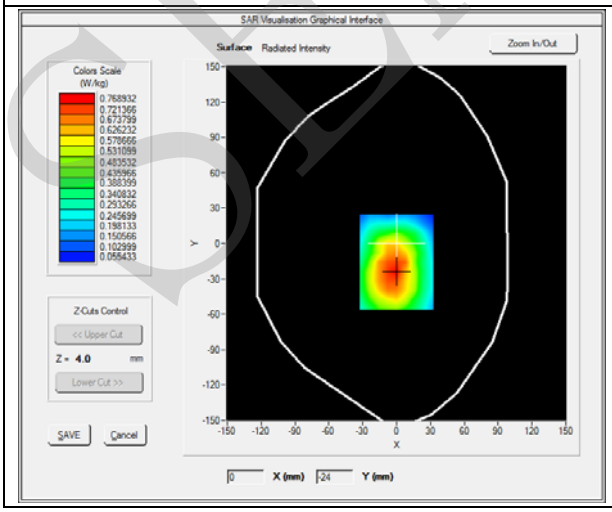
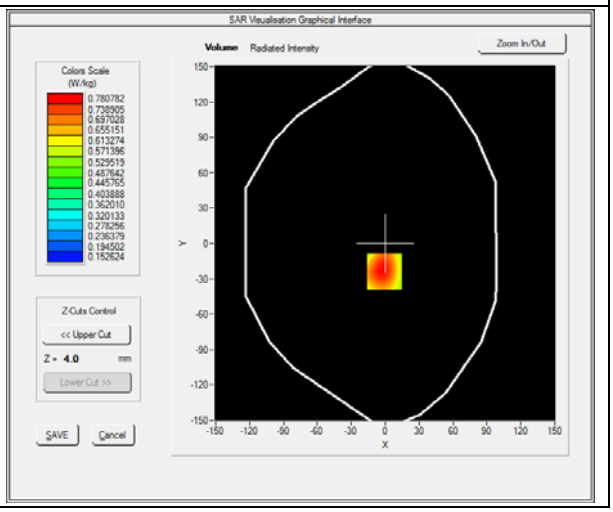
Type: Phone measurement (Complete)
Date of measurement: 06/04/2014
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.5; Calibrated: 2012/11/26

A. Experimental conditions

Area Scan	sam_direct_droit2_surf8mm.txt
Phantom	Flat Plane
Device Position	Back(Body with headset)
Band	GSM850
Channels	Low
Signal	TDMA (Crest factor: 8.0)

B. SAR Measurement Results

Frequency (MHz)	824.200000
Relative Permittivity (real part)	52.124510
Conductivity (S/m)	0.96000
Power Variation (%)	0.80000
Ambient Temperature	21.1
Liquid Temperature	21.3

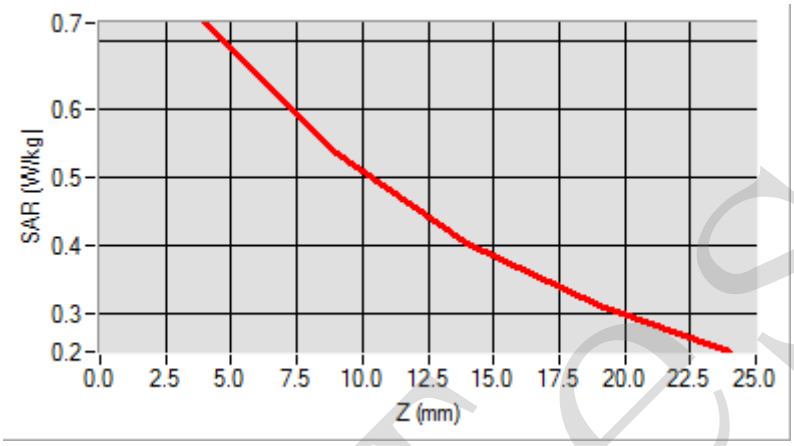
SURFACE SAR	VOLUME SAR
	

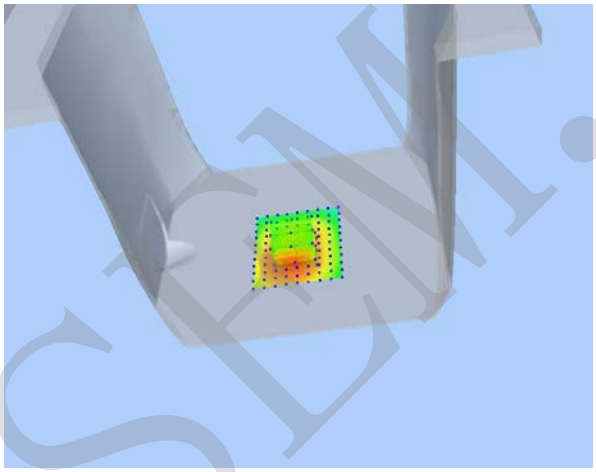
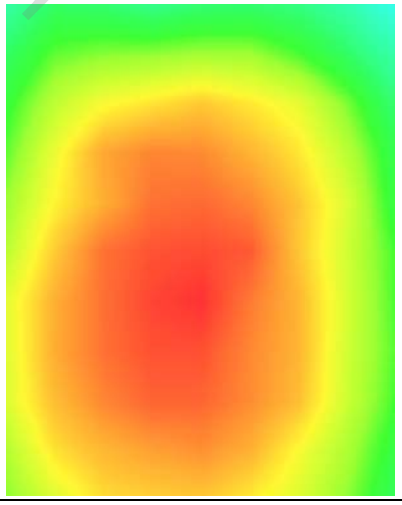
SEM.Test

Maximum location: X=0.00, Y=-19.00

SAR 10g (W/Kg)	**0.544146**
SAR 1g (W/Kg)	**0.762996**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**0.0000**	**0.7254**	**0.5349**	**0.4035**	**0.3134**



3D screen shot	**Hot spot position**
	

SEM. Test

MEASUREMENT 2

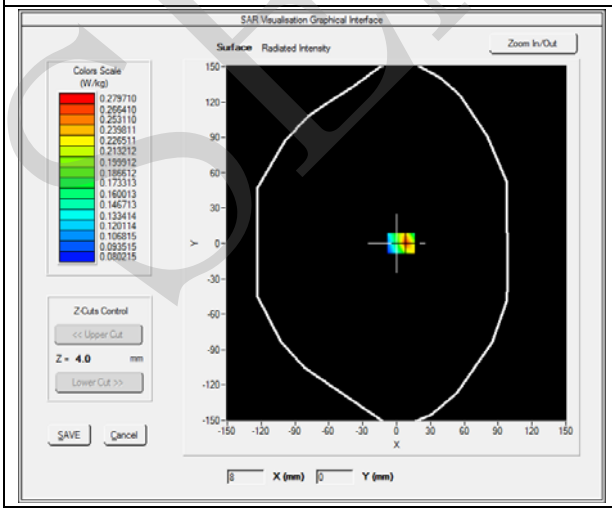
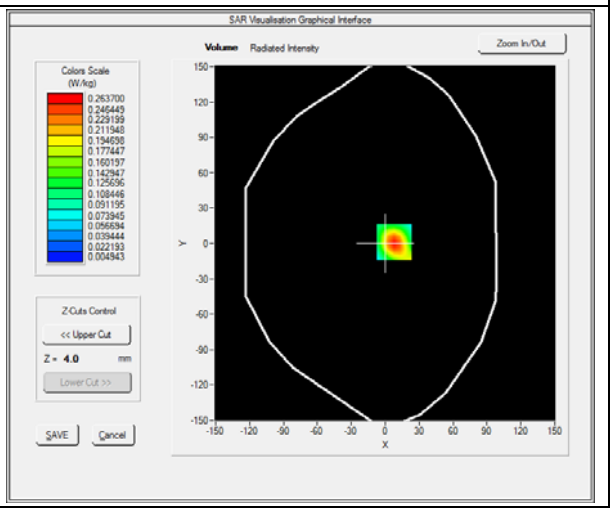
Type: Phone measurement (Complete)
Date of measurement: 06/04/2014
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.5; Calibrated: 2012/11/26

A. Experimental conditions

Area Scan	sam_direct_droit2_surf8mm.txt
Phantom	Flat Plane
Device Position	Front(Body with headset)
Band	GSM850
Channels	Low
Signal	TDMA (Crest factor: 8.0)

B. SAR Measurement Results

Frequency (MHz)	824.200000
Relative Permittivity (real part)	52.124510
Conductivity (S/m)	0.96000
Power Variation (%)	0.80000
Ambient Temperature	21.1
Liquid Temperature	21.3

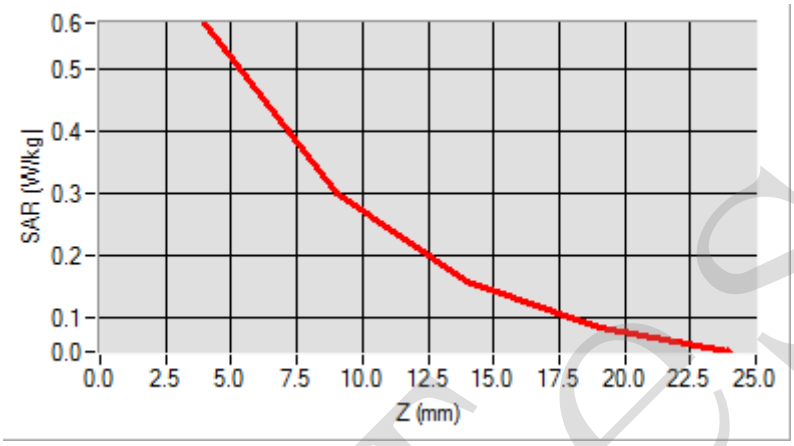
SURFACE SAR	VOLUME SAR
	

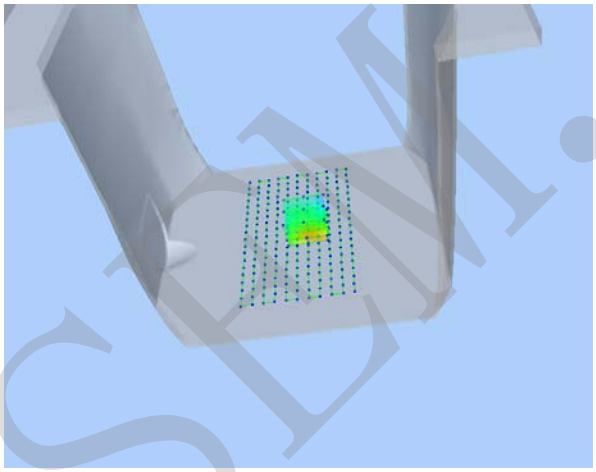
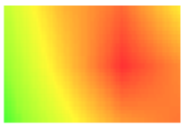
SEM.Test

Maximum location: X=8.00, Y=1.00

SAR 10g (W/Kg)	**0.277633**
SAR 1g (W/Kg)	**0.531724**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**0.0000**	**0.5746**	**0.3015**	**0.1577**	**0.0864**



3D screen shot	**Hot spot position**
	

SBM Test

MEASUREMENT 3

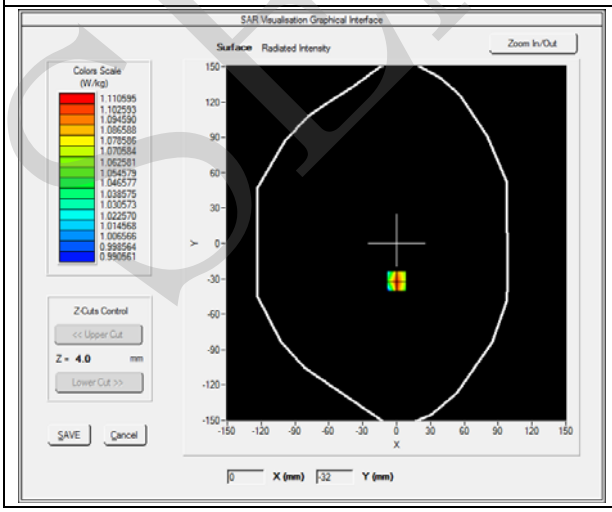
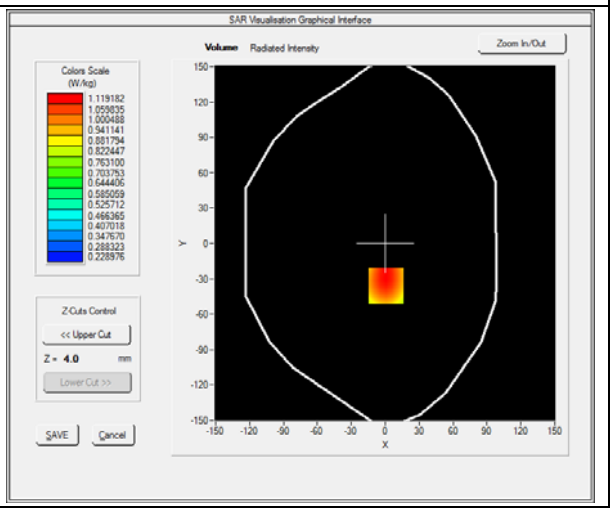
Type: Phone measurement (Complete)
Date of measurement: 06/04/2014
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.5; Calibrated: 03/21/2014

A. Experimental conditions

Area Scan	sam_direct_droit2_surf8mm.txt
Phantom	Flat plane
Device Position	Back
Band	GPRS850_4TX
Channels	Low
Signal	Duty Cycle: 3.00 (Crest factor: 3.00)

B. SAR Measurement Results

Frequency (MHz)	836.400000
Relative Permittivity (real part)	52.124510
Conductivity (S/m)	0.96000
Power Variation (%)	0.80000
Ambient Temperature	21.1
Liquid Temperature	21.3

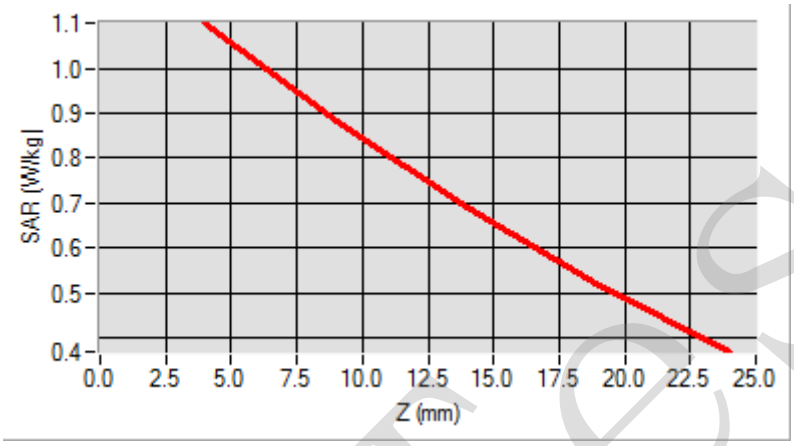
SURFACE SAR	VOLUME SAR
	

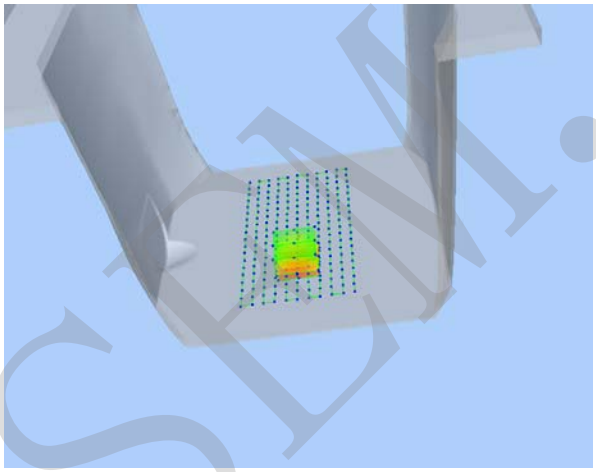
SEM. Test

Maximum location: X=1.00, Y=-36.00

SAR 10g (W/Kg)	**0.789688**
SAR 1g (W/Kg)	**1.086270**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**0.0000**	**1.1007**	**0.8844**	**0.6897**	**0.5178**



3D screen shot	**Hot spot position**
	

SBM Test

MEASUREMENT 4

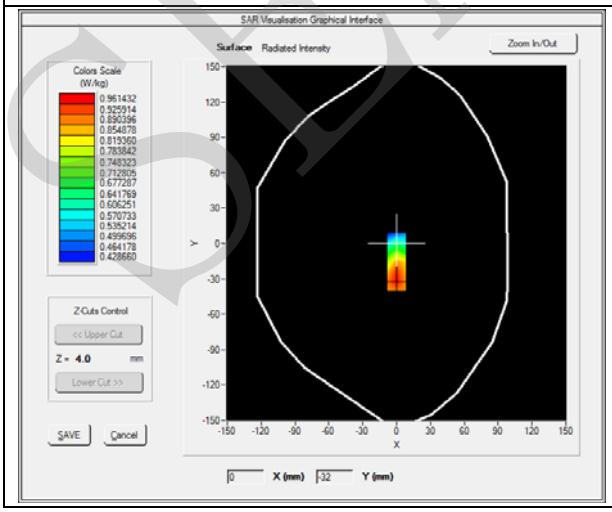
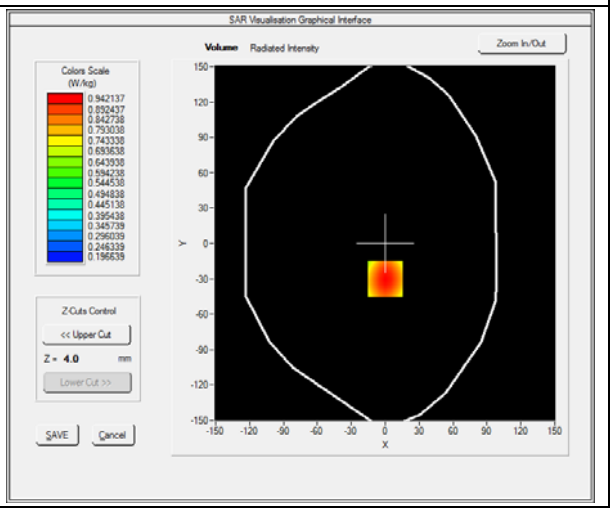
Type: Phone measurement (Complete)
Date of measurement: 06/04/2014
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.5; Calibrated: 03/21/2014

A. Experimental conditions

Area Scan	sam_direct_droit2_surf8mm.txt
Phantom	Flat plane
Device Position	Back
Band	GPRS850_4TX
Channels	Middle
Signal	Duty Cycle: 3.00 (Crest factor: 3.00)

B. SAR Measurement Results

Frequency (MHz)	824.200000
Relative Permittivity (real part)	52.124510
Conductivity (S/m)	0.96000
Power Variation (%)	0.80000
Ambient Temperature	21.1
Liquid Temperature	21.3

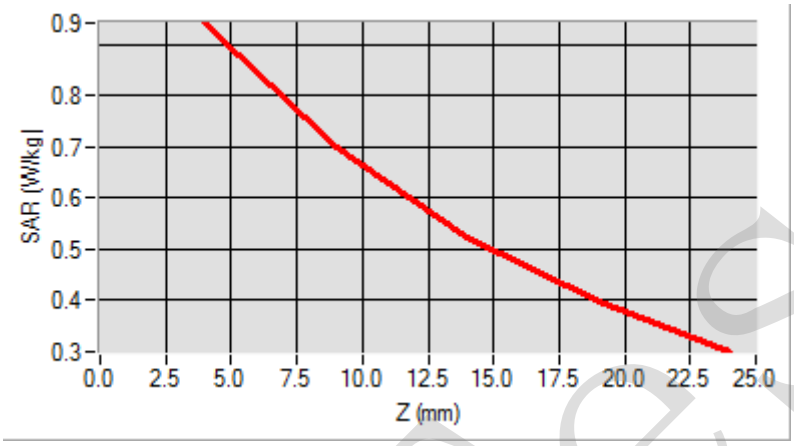
SURFACE SAR	VOLUME SAR
	

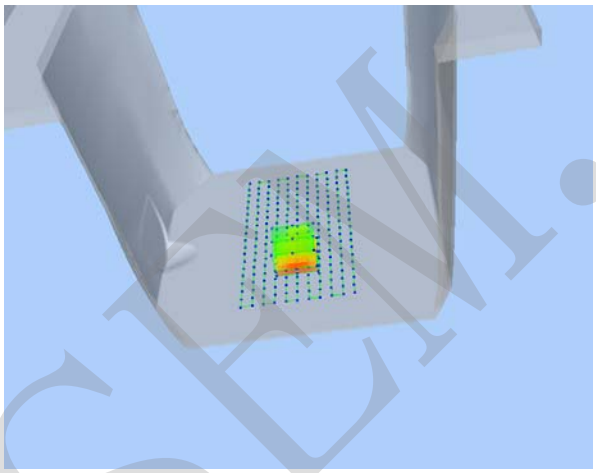
SEM-Test

Maximum location: X=0.00, Y=-30.00

SAR 10g (W/Kg)	**0.646040**
SAR 1g (W/Kg)	**0.901881**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**0.0000**	**0.9421**	**0.6992**	**0.5243**	**0.3982**



3D screen shot	**Hot spot position**
	

SEM. Test

MEASUREMENT 5

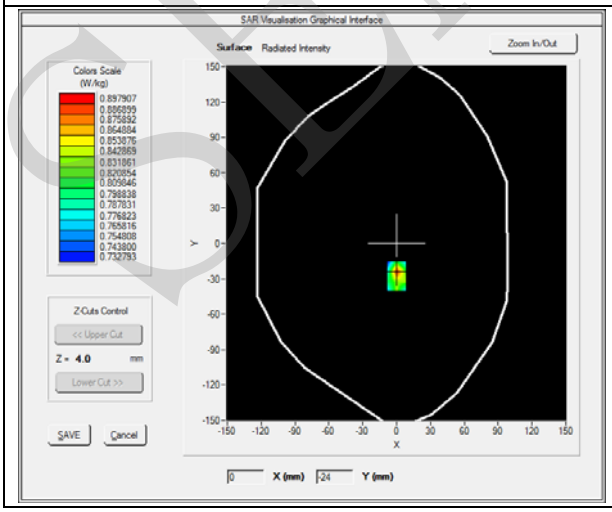
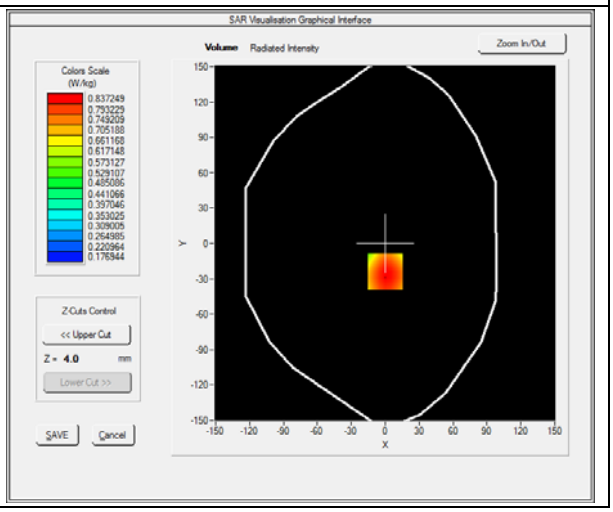
Type: Phone measurement (Complete)
Date of measurement: 06/04/2014
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.5; Calibrated: 03/21/2014

A. Experimental conditions

Area Scan	sam_direct_droit2_surf8mm.txt
Phantom	Flat plane
Device Position	Back
Band	GPRS850_4TX
Channels	High
Signal	Duty Cycle: 3.00 (Crest factor: 3.00)

B. SAR Measurement Results

Frequency (MHz)	848.800000
Relative Permittivity (real part)	52.124510
Conductivity (S/m)	0.96000
Power Variation (%)	0.80000
Ambient Temperature	21.1
Liquid Temperature	21.3

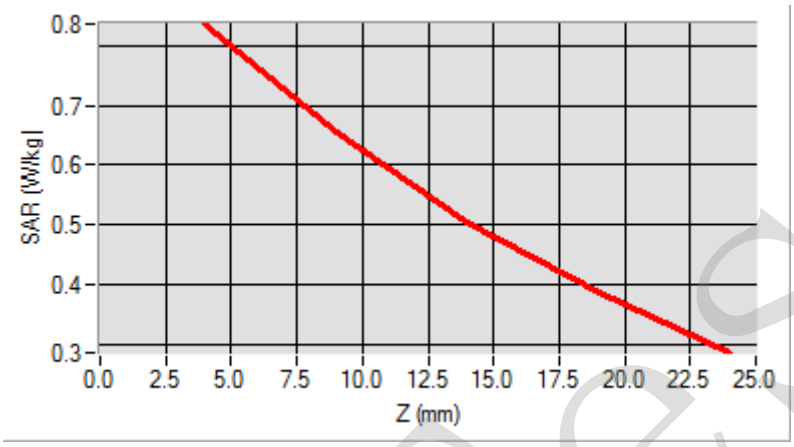
SURFACE SAR	VOLUME SAR
	

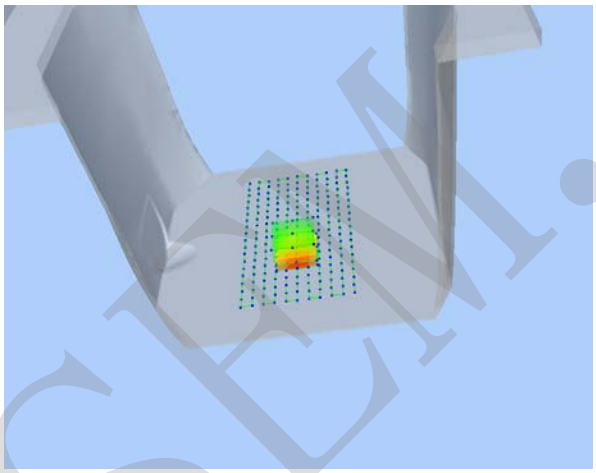
SEM-Test

Maximum location: X=0.00, Y=-24.00

SAR 10g (W/Kg)	**0.545621**
SAR 1g (W/Kg)	**0.756920**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**0.0000**	**0.8122**	**0.6125**	**0.4569**	**0.3426**



3D screen shot	**Hot spot position**
	

SEM. Test

MEASUREMENT 6

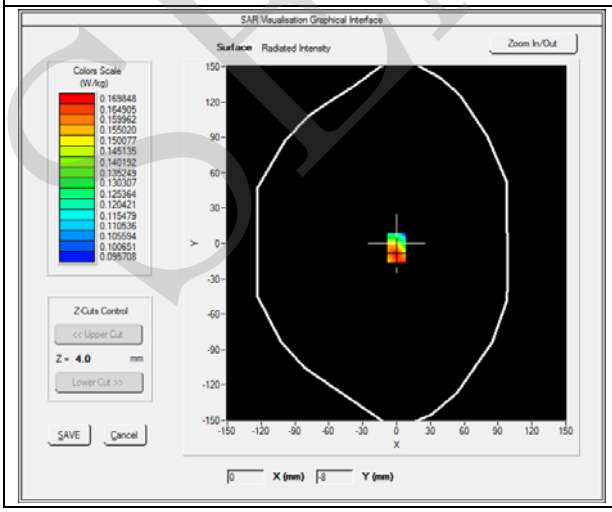
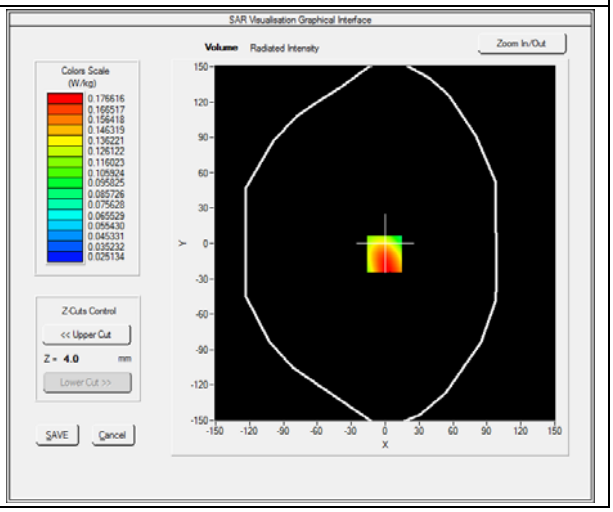
Type: Phone measurement (Complete)
Date of measurement: 06/04/2014
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.50; Calibrated: 03/21/2014

A. Experimental conditions

Area Scan	sam_direct_droit2_surf8mm.txt
Phantom	Flat plane
Device Position	Bottom
Band	GPRS850_4TX
Channels	Low
Signal	Duty Cycle: 3.00 (Crest factor: 3.00)

B. SAR Measurement Results

Frequency (MHz)	836.600000
Relative Permittivity (real part)	52.124510
Conductivity (S/m)	0.96000
Power Variation (%)	0.80000
Ambient Temperature	21.1
Liquid Temperature	21.3

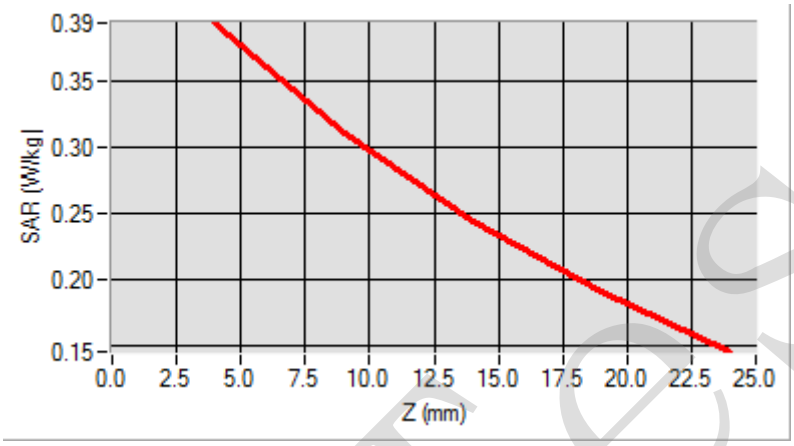
SURFACE SAR	VOLUME SAR
	

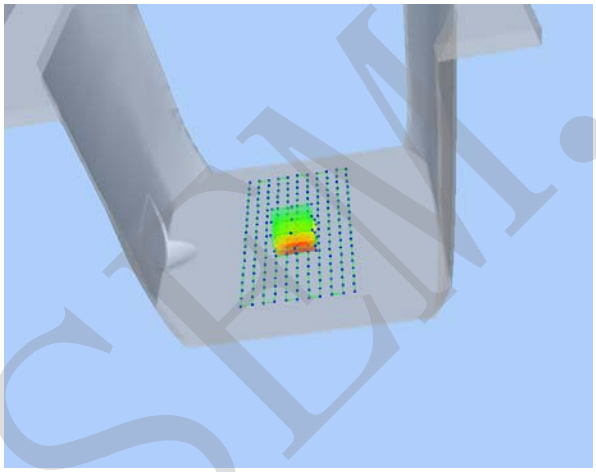
SEM. Test

Maximum location: X=-1.00, Y=-9.00

SAR 10g (W/Kg)	**0.273231**
SAR 1g (W/Kg)	**0.374864**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**0.0000**	**0.3930**	**0.3108**	**0.2444**	**0.1907**



3D screen shot	**Hot spot position**
	

SBM Test

MEASUREMENT 7

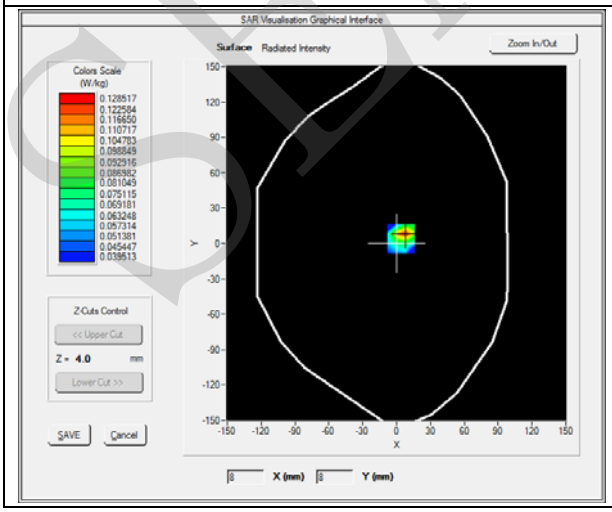
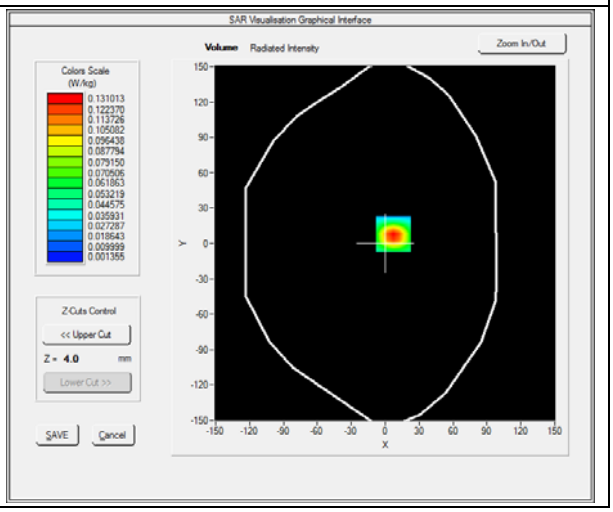
Type: Phone measurement (Complete)
Date of measurement: 06/04/2014
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.50; Calibrated: 03/21/2014

A. Experimental conditions

Area Scan	sam_direct_droit2_surf8mm.txt
Phantom	Flat plane
Device Position	Right side
Band	GPRS850_4TX
Channels	Low
Signal	Duty Cycle: 3.00 (Crest factor: 3.00)

B. SAR Measurement Results

Frequency (MHz)	836.600000
Relative Permittivity (real part)	52.124510
Conductivity (S/m)	0.96000
Power Variation (%)	0.80000
Ambient Temperature	21.1
Liquid Temperature	21.3

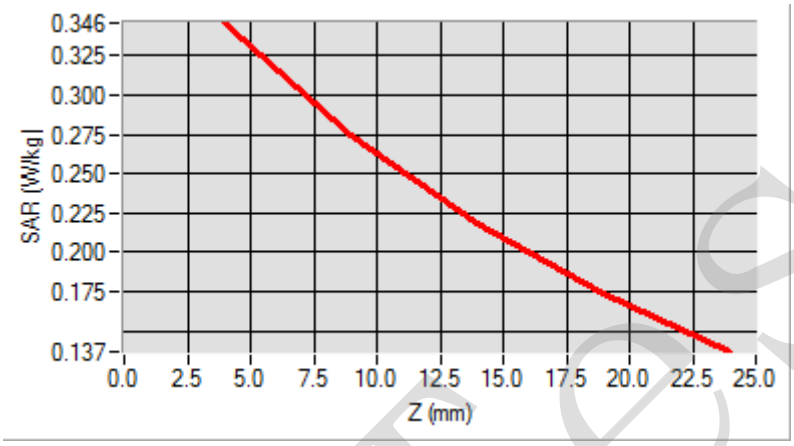
SURFACE SAR	VOLUME SAR
	

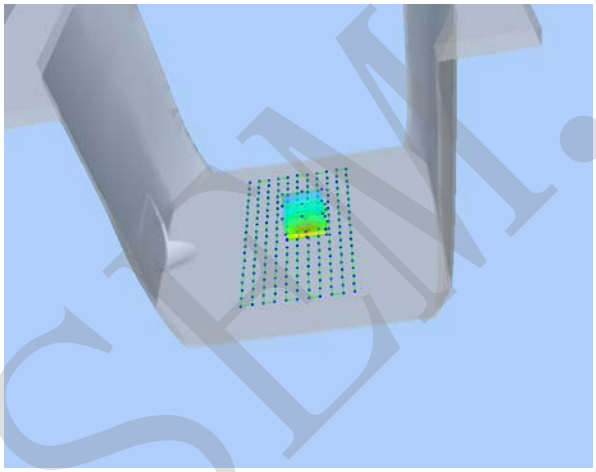
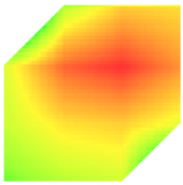
SEM.Test

Maximum location: X=7.00, Y=8.00

SAR 10g (W/Kg)	**0.252357**
SAR 1g (W/Kg)	**0.337912**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**0.0000**	**0.3459**	**0.2748**	**0.2186**	**0.1740**



3D screen shot	**Hot spot position**
	

SBM Test

MEASUREMENT 8

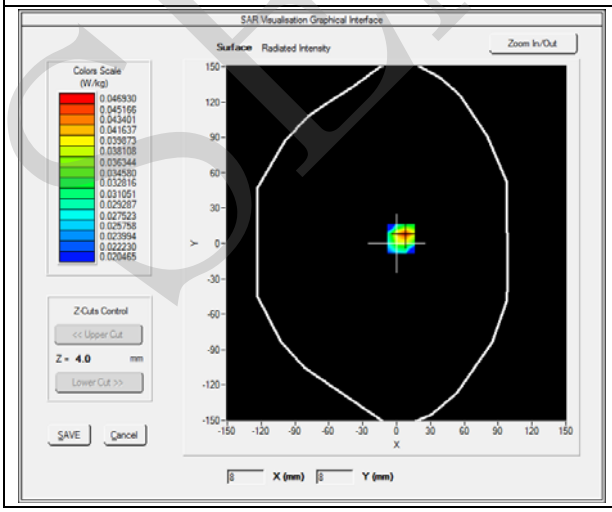
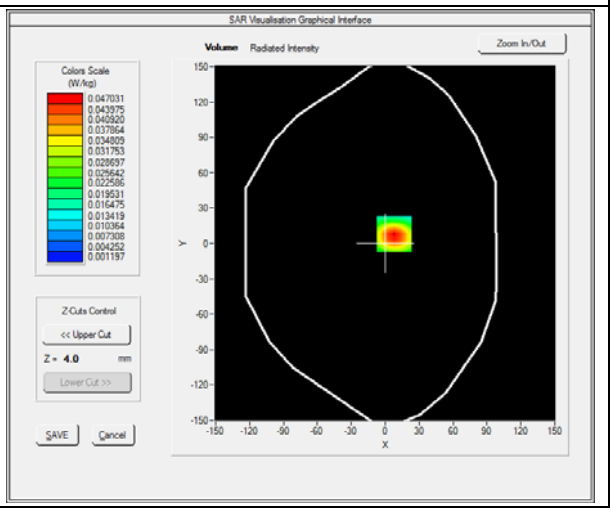
Type: Phone measurement (Complete)
Date of measurement: 06/04/2014
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.50; Calibrated: 03/21/2014

A. Experimental conditions

Area Scan	sam_direct_droit2_surf8mm.txt
Phantom	Flat plane
Device Position	Left side
Band	GPRS850_4TX
Channels	Low
Signal	Duty Cycle: 3.00 (Crest factor: 3.00)

B. SAR Measurement Results

Frequency (MHz)	836.600000
Relative Permittivity (real part)	52.124510
Conductivity (S/m)	0.96000
Power Variation (%)	0.80000
Ambient Temperature	21.1
Liquid Temperature	21.3

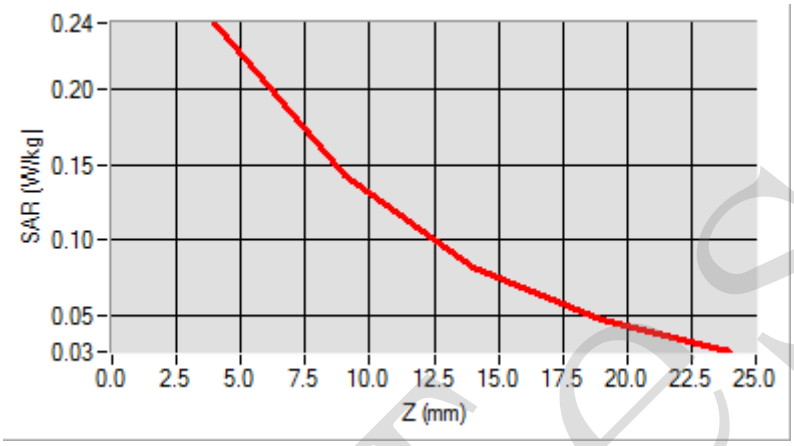
SURFACE SAR	VOLUME SAR
	

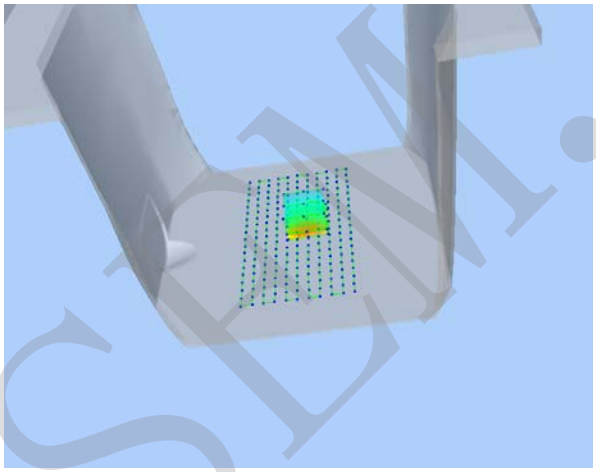
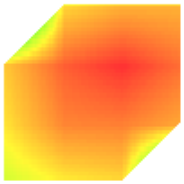
SEM-Test

Maximum location: X=8.00, Y=8.00

SAR 10g (W/Kg)	**0.129477**
SAR 1g (W/Kg)	**0.229647**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**0.0000**	**0.2441**	**0.1423**	**0.0819**	**0.0472**



3D screen shot	**Hot spot position**
	

SBM. Test

MEASUREMENT 9

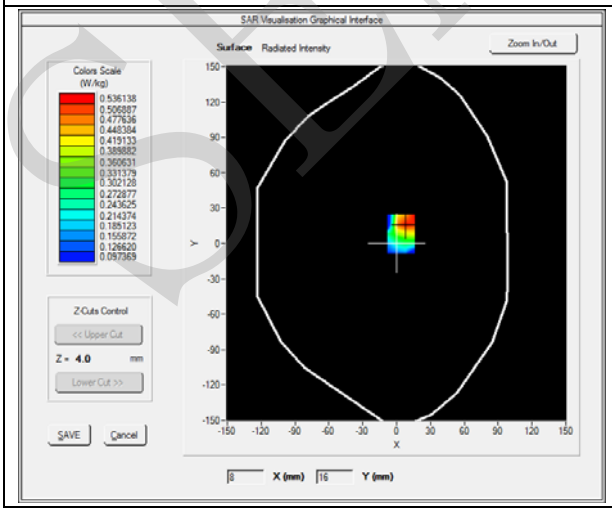
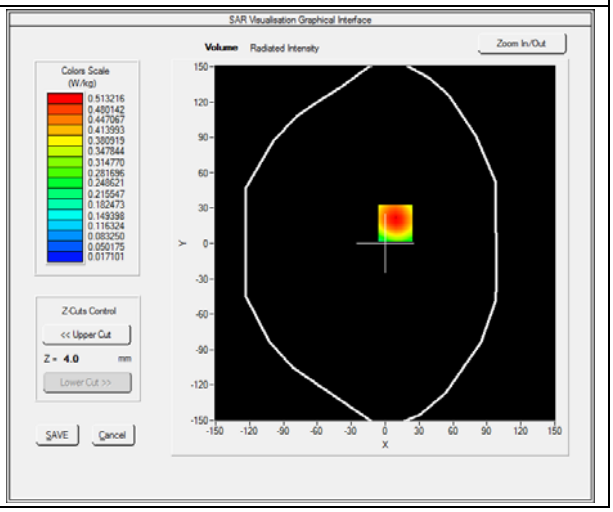
Type: Phone measurement (Complete)
Date of measurement: 06/04/2014
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.30; Calibrated: 03/21/2014

A. Experimental conditions

Area Scan	sam_direct_droit2_surf8mm.txt
Phantom	Flat Plane
Device Position	Back(Body with headset)
Band	GSM1900
Channels	Low
Signal	TDMA (Crest factor: 8.0)

B. SAR Measurement Results

Frequency (MHz)	1850.200000
Relative Permittivity (real part)	51.361240
Conductivity (S/m)	1.510000
Power Variation (%)	0.752100
Ambient Temperature	21.1
Liquid Temperature	21.3

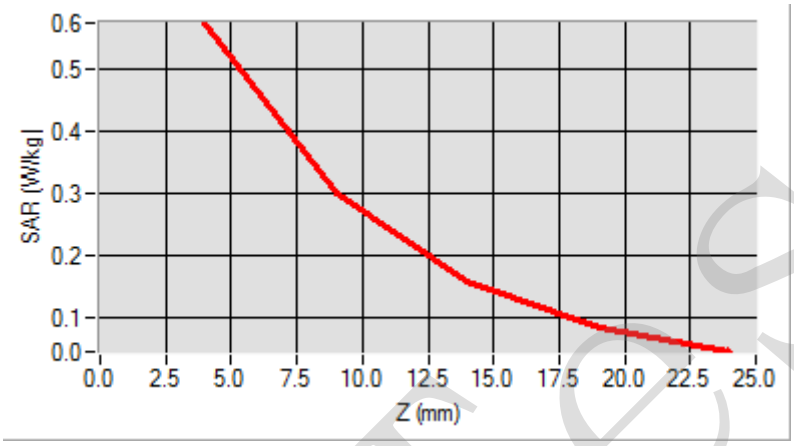
SURFACE SAR	VOLUME SAR
	

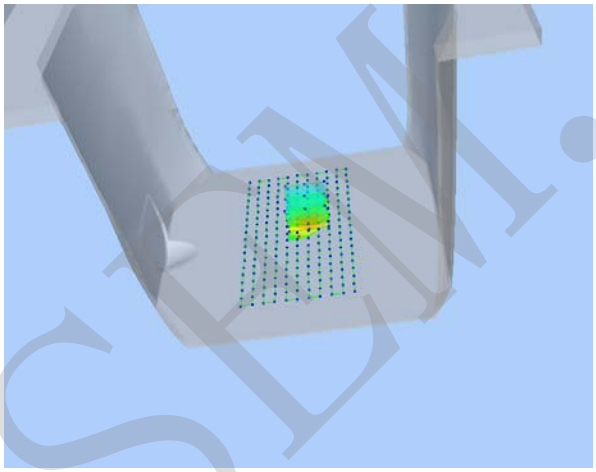
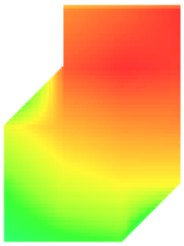
SEM-Test

Maximum location: X=9.00, Y=17.00

SAR 10g (W/Kg)	**0.277633**
SAR 1g (W/Kg)	**0.531724**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**0.0000**	**0.5746**	**0.3015**	**0.1577**	**0.0864**



3D screen shot	**Hot spot position**
	

SBM. Test

MEASUREMENT 10

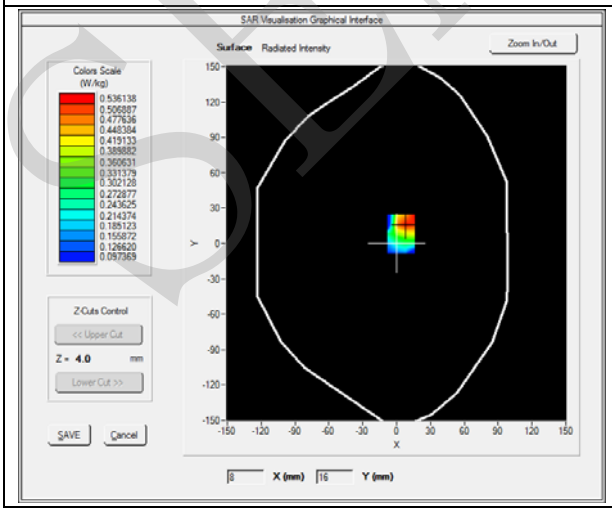
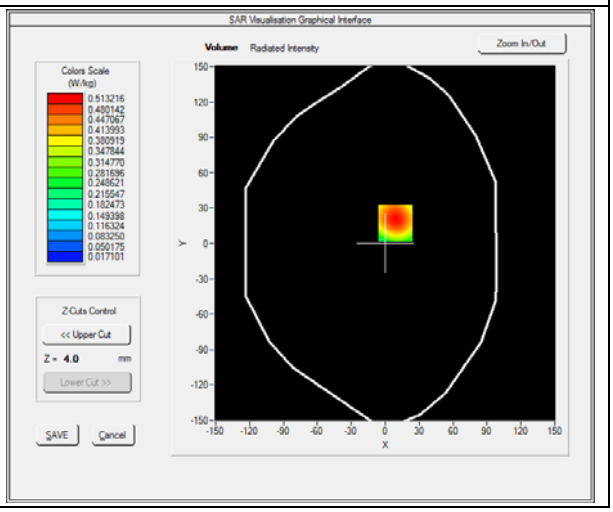
Type: Phone measurement (Complete)
Date of measurement: 06/04/2014
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.30; Calibrated: 03/21/2014

A. Experimental conditions

Area Scan	sam_direct_droit2_surf8mm.txt
Phantom	Flat Plane
Device Position	Front(Body with headset)
Band	GSM1900
Channels	Low
Signal	TDMA (Crest factor: 8.0)

B. SAR Measurement Results

Frequency (MHz)	1850.200000
Relative Permittivity (real part)	51.361240
Conductivity (S/m)	1.510000
Power Variation (%)	0.752100
Ambient Temperature	21.1
Liquid Temperature	21.3

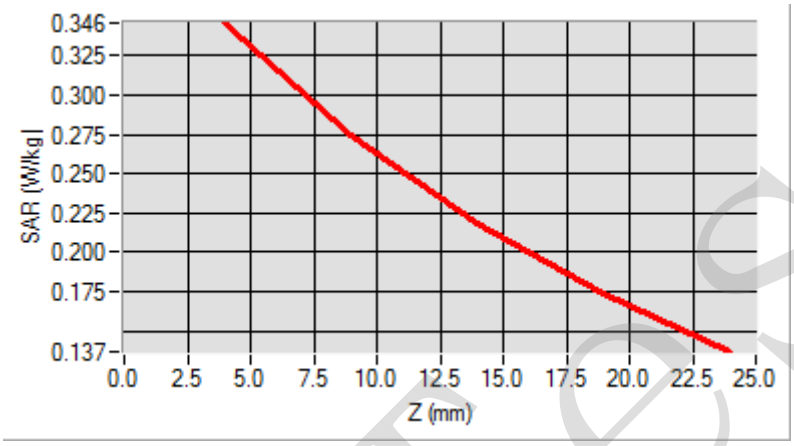
SURFACE SAR	VOLUME SAR
	

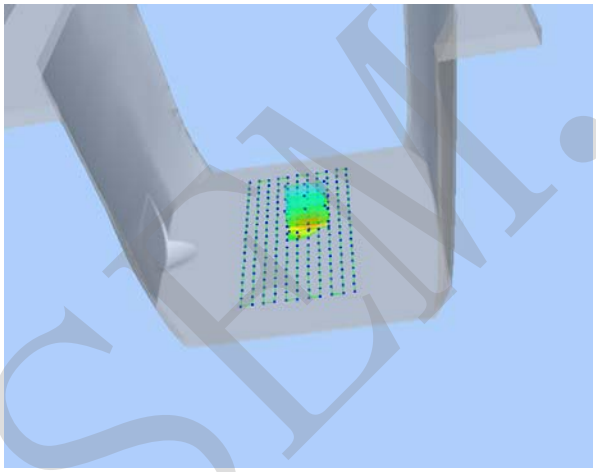
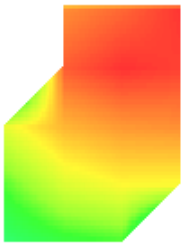
SEM-Test

Maximum location: X=9.00, Y=17.00

SAR 10g (W/Kg)	**0.252357**
SAR 1g (W/Kg)	**0.337912**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**0.0000**	**0.3459**	**0.2748**	**0.2186**	**0.1740**



3D screen shot	**Hot spot position**
	

SBM. Test

MEASUREMENT 11

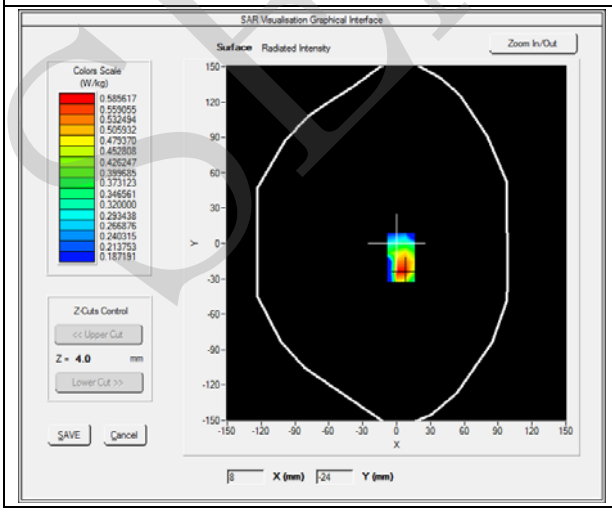
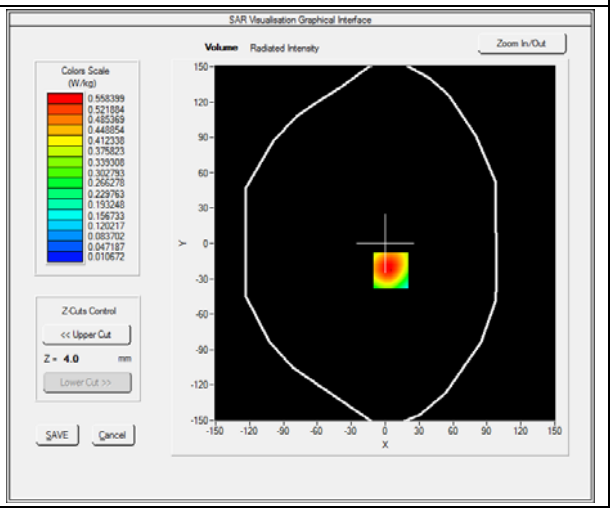
Type: Phone measurement (Complete)
Date of measurement: 06/04/2014
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.30; Calibrated: 03/21/2014

A. Experimental conditions

Area Scan	sam_direct_droit2_surf8mm.txt
Phantom	Flat plane
Device Position	Back
Band	GPRS1900_4TX
Channels	Middle
Signal	Duty Cycle: 3.00 (Crest factor: 3.00)

B. SAR Measurement Results

Frequency (MHz)	1909.800000
Relative Permittivity (real part)	51.361240
Conductivity (S/m)	1.510000
Power Variation (%)	0.752100
Ambient Temperature	21.1
Liquid Temperature	21.3

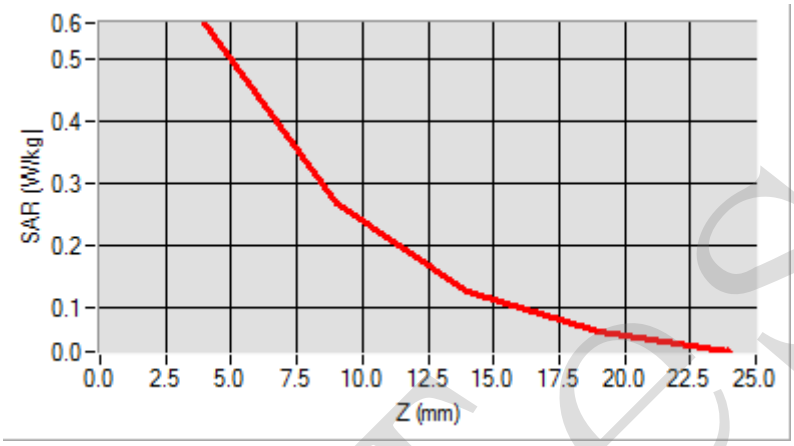
SURFACE SAR	VOLUME SAR
	

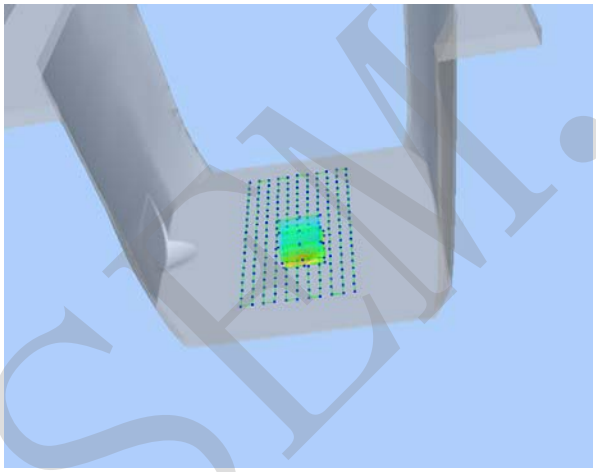
SEM. Test

Maximum location: X=5.00, Y=-23.00

SAR 10g (W/Kg)	**0.279891**
SAR 1g (W/Kg)	**0.534719**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**0.0000**	**0.5584**	**0.2670**	**0.1252**	**0.0619**



3D screen shot	**Hot spot position**
	

SBM Test

MEASUREMENT 12

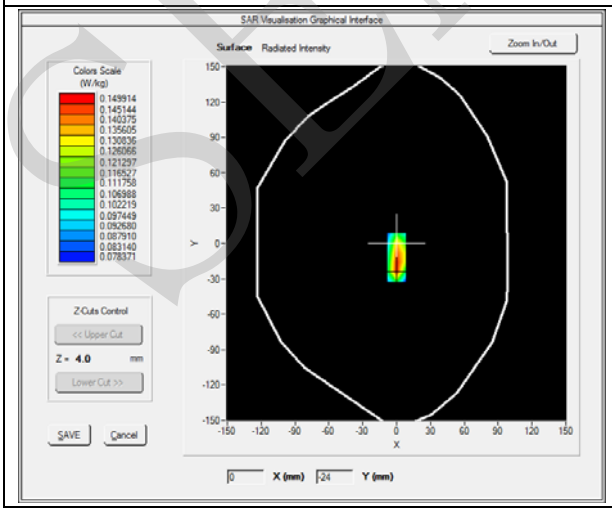
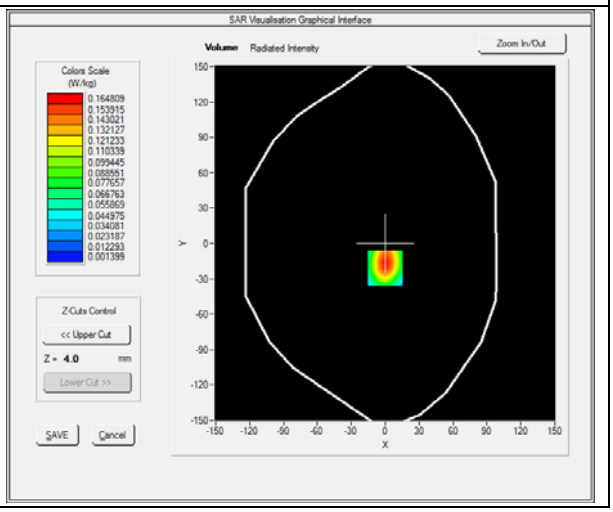
Type: Phone measurement (Complete)
Date of measurement: 06/04/2014
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.30; Calibrated: 03/21/2014

A. Experimental conditions

Area Scan	sam_direct_droit2_surf8mm.txt
Phantom	Flat plane
Device Position	Bottom
Band	GPRS1900_4TX
Channels	Middle
Signal	Duty Cycle: 3.00 (Crest factor: 3.00)

B. SAR Measurement Results

Frequency (MHz)	1909.800000
Relative Permittivity (real part)	51.361240
Conductivity (S/m)	1.510000
Power Variation (%)	0.752100
Ambient Temperature	21.1
Liquid Temperature	21.3

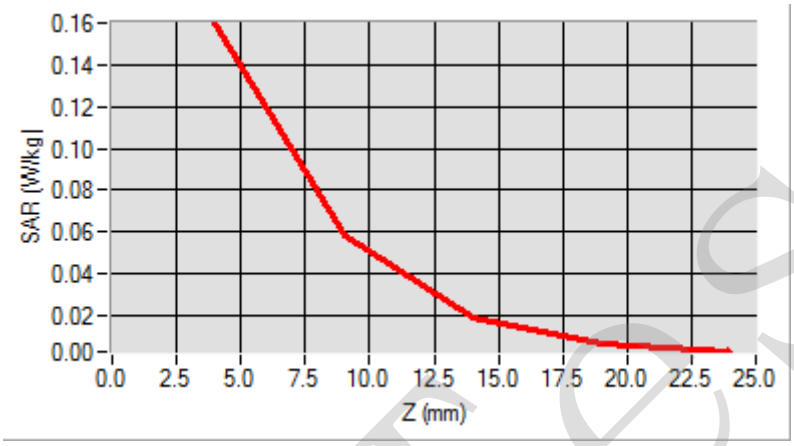
SURFACE SAR	VOLUME SAR
	

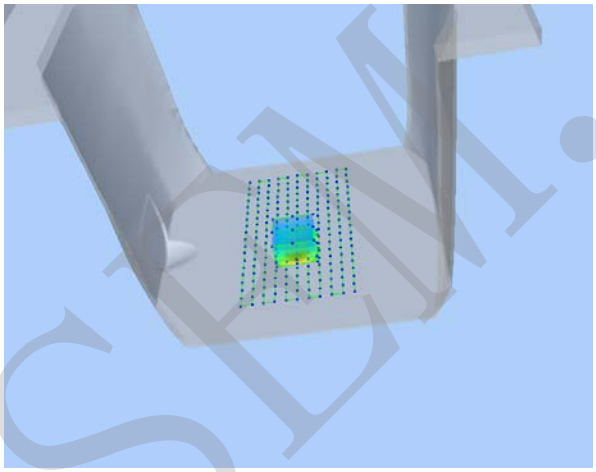
SEM. Test

Maximum location: X=0.00, Y=-21.00

SAR 10g (W/Kg)	**0.069348**
SAR 1g (W/Kg)	**0.155011**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**0.0000**	**0.1602**	**0.0580**	**0.0188**	**0.0066**



3D screen shot	**Hot spot position**
	

SBM Test

MEASUREMENT 13

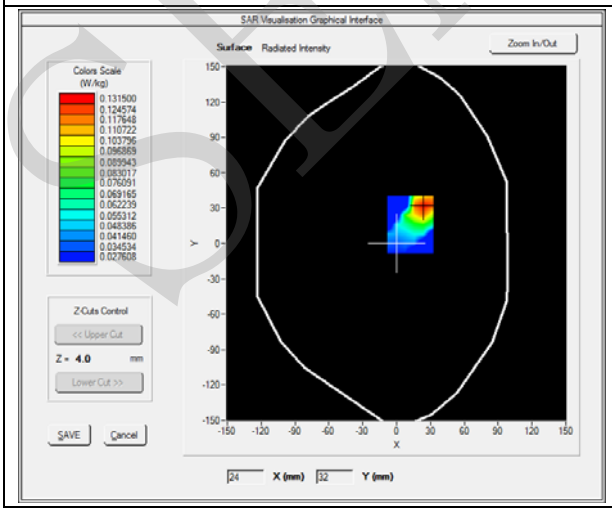
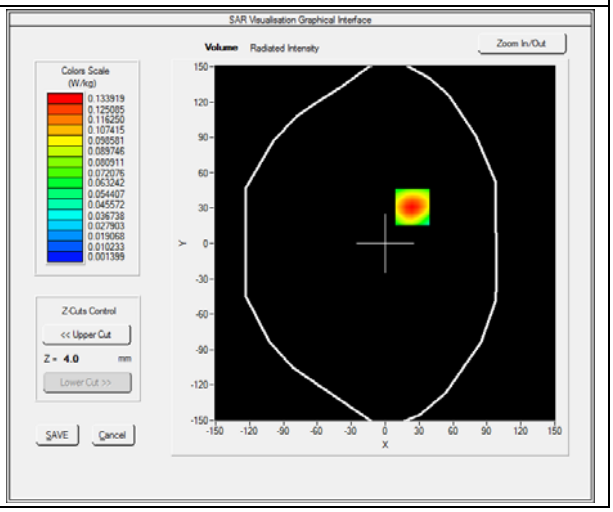
Type: Phone measurement (Complete)
Date of measurement: 06/04/2014
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.30; Calibrated: 03/21/2014

A. Experimental conditions

Area Scan	sam_direct_droit2_surf8mm.txt
Phantom	Flat plane
Device Position	Right side
Band	GPRS850_4TX
Channels	High
Signal	Duty Cycle: 3.00 (Crest factor: 3.00)

B. SAR Measurement Results

Frequency (MHz)	1909.800000
Relative Permittivity (real part)	51.361240
Conductivity (S/m)	1.510000
Power Variation (%)	0.752100
Ambient Temperature	21.1
Liquid Temperature	21.3

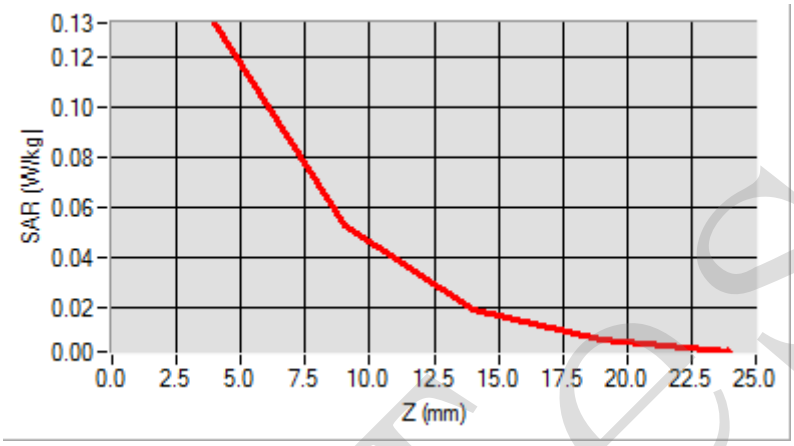
SURFACE SAR	VOLUME SAR
	

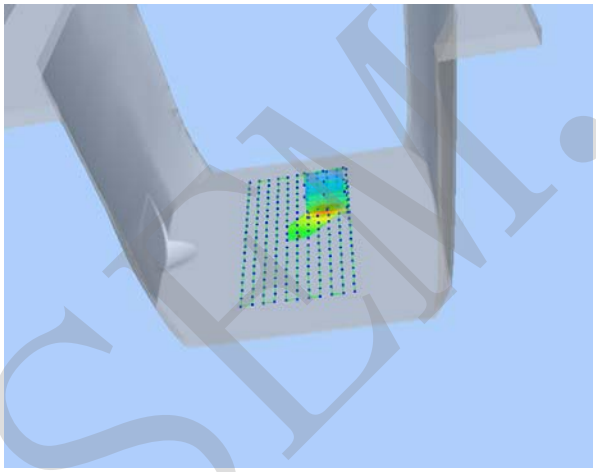
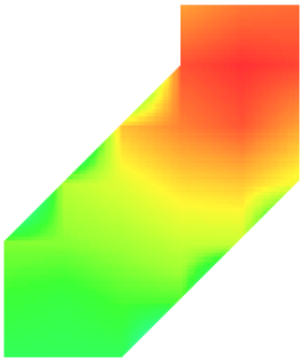
SEM. Test

Maximum location: X=24.00, Y=31.00

SAR 10g (W/Kg)	**0.059456**
SAR 1g (W/Kg)	**0.125804**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**0.0000**	**0.1339**	**0.0528**	**0.0189**	**0.0068**



3D screen shot	**Hot spot position**
	

SBM. Test

MEASUREMENT 14

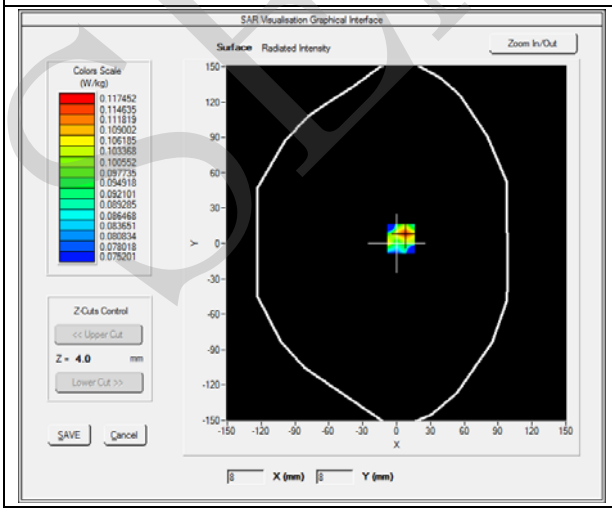
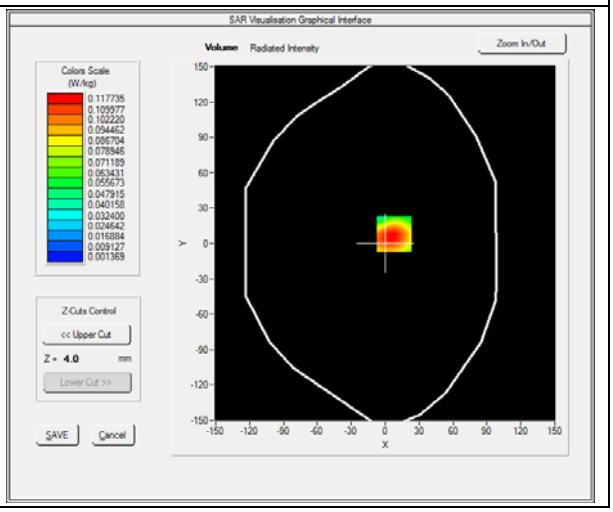
Type: Phone measurement (Complete)
Date of measurement: 06/04/2014
Measurement duration: 12 minutes 3 seconds
E-field Probe: SSE5 - SN 09/13 EP168; ConvF: 6.30; Calibrated: 03/21/2014

A. Experimental conditions

Area Scan	sam_direct_droit2_surf8mm.txt
Phantom	Flat plane
Device Position	Left side
Band	GPRS850_4TX
Channels	High
Signal	Duty Cycle: 3.00 (Crest factor: 3.00)

B. SAR Measurement Results

Frequency (MHz)	1909.80000
Relative Permittivity (real part)	51.361240
Conductivity (S/m)	1.510000
Power Variation (%)	0.752100
Ambient Temperature	21.1
Liquid Temperature	21.3

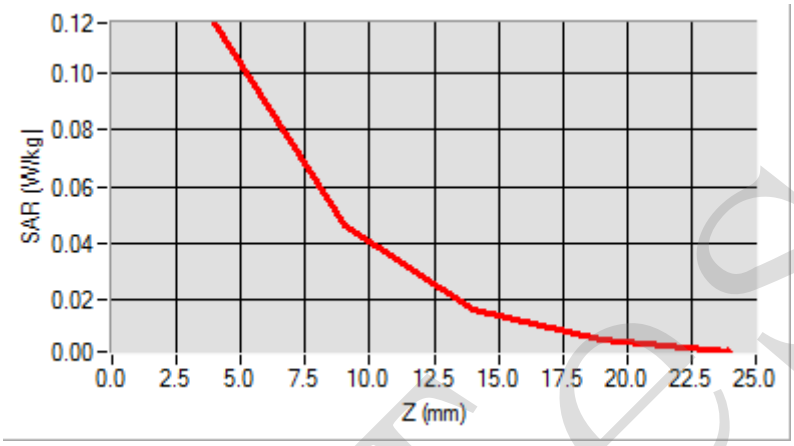
SURFACE SAR	VOLUME SAR
	

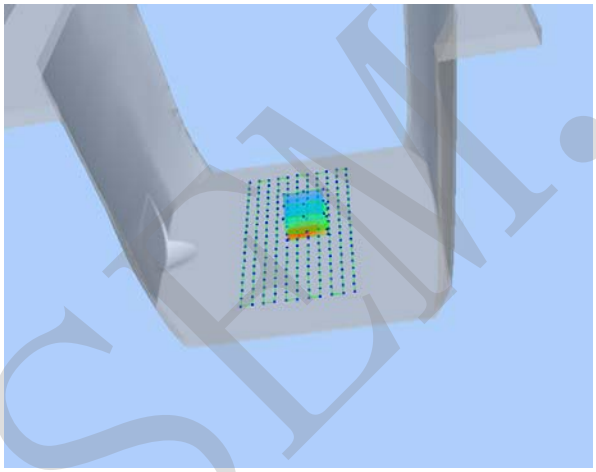
SEM. Test

Maximum location: X=8.00, Y=8.00

SAR 10g (W/Kg)	**0.054433**
SAR 1g (W/Kg)	**0.113513**

Z (mm)	**0.00**	**4.00**	**9.00**	**14.00**	**19.00**
SAR (W/Kg)	**0.0000**	**0.1177**	**0.0464**	**0.0166**	**0.0060**



3D screen shot	**Hot spot position**
	

SBM. Test

Annex C. EUT Photos

EUT View_Front

EUT View_Back

SEM. Test

Antenna View

GSM/WCDMA Antenna

WIFI/BT Antenna

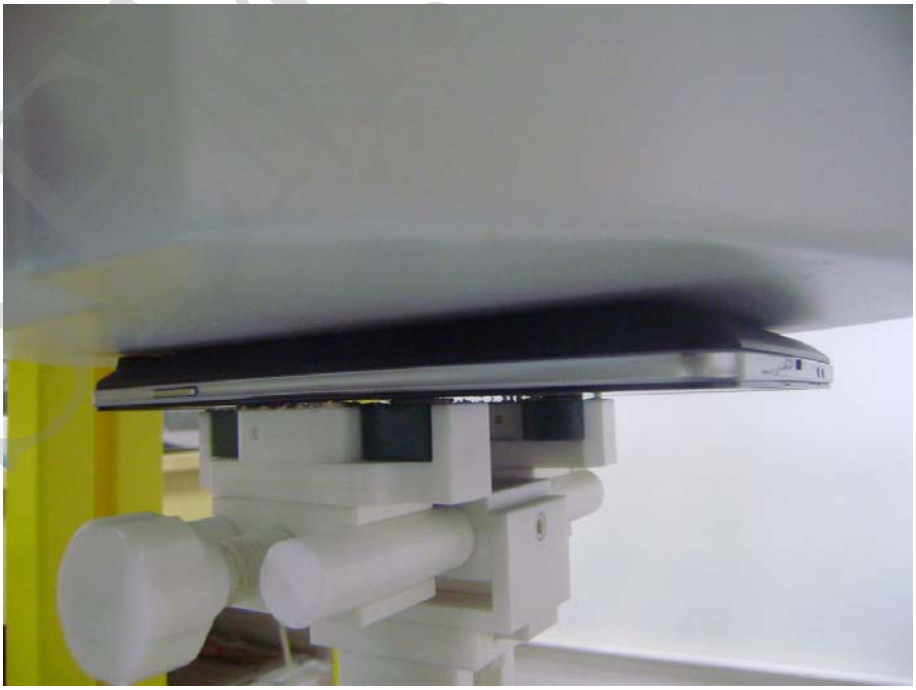
SEM Test

Annex D. Test Setup Photos

Test View 1

Body Front

Body Back



SEM Test

Top Side

Right Side

SEM. Test

Left Side

SEM. Test

Annex E. Calibration Certificate

Please refer to the exhibit for the calibration certificate

******* END OF REPORT *******

SEM. Test