 <p>Bâtiment le Ponant Avenue de la PEROUSE 29280 PLOUZANÉ France Tél. : 02.98.05.13.34 Fax : 02.98.05.53.87</p>	SAR MEASUREMENT REPORT
	Project name :
	SZ090401B04

I. INFORMATIONS ON THE TESTING

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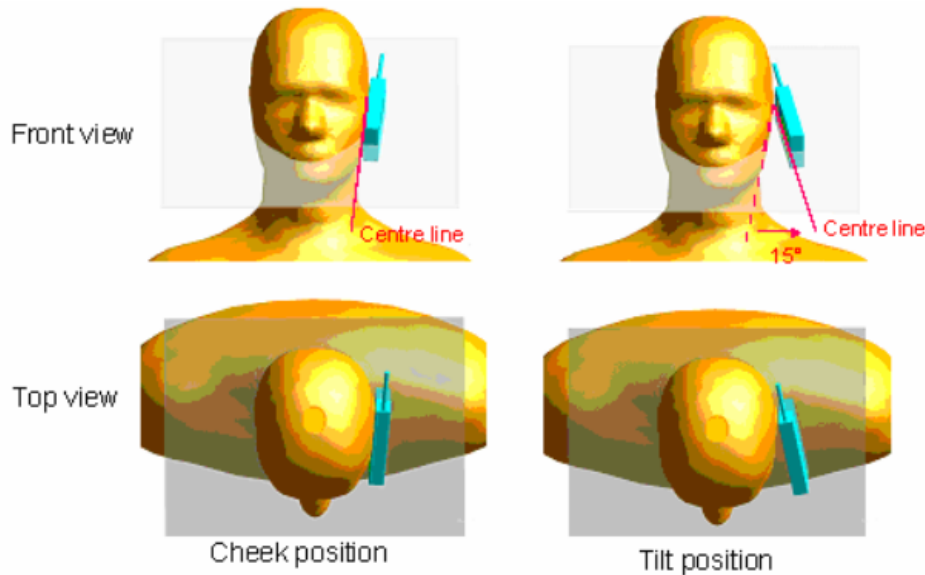
I.1. Normative reference

IEEE 1528: Recommended Practice for determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques. Institute of Electrical and Electronics Engineers, INC., 2003.

I.3. Positions and test conditions of the mobile phone under test

The mobile phone antenna and battery are those specified by the manufacturer. The battery is fully charged before each measurement. The output power and frequency are controlled using a base station simulator. The mobile phone is set to transmit at its highest output peak power level.

The mobile phone is test in the “cheek” and “tilted” positions on the left and right sides of the phantom. The mobile phone is placed with the vertical centre line of the body of the mobile phone and the horizontal line crossing the centre of the earpiece in a plane parallel to the sagittal plane of the phantom.





Description of the « cheek » position:

The mobile phone is well placed in the reference plane and the earpiece is in contact with the ear. Then the mobile phone is moved until any point on the front side get in contact with the cheek of the phantom or until contact with the ear is lost.

Description of the « tilted » position:

The mobile phone is well place in the “cheek” position as described above. Then the mobile phone is moved outward away from the mouth by an angle of 15 degrees or until contact with the ear lost.

II. 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.



COMOSAR bench

The mobile phone 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 10 g mass.

II.1. 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 2 mm +/- 0,2 mm. It enables the dosimetric evaluation of left and right hand 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.

II.2. Probe

For the measurements the Specific Dosimetric E-Field Probe SSE5 with following specifications is used.

- Dynamic range: 0.01-100 W/kg
- Tip Diameter : 5 mm

- Distance between probe tip and sensor center : 2.5 mm
- Distance between sensor center and the inner phantom surface: 4 mm (repeatability better than +/- 1mm).
- Probe linearity : <0.25 dB
- Axial Isotropy : <0.25 dB
- Spherical Isotropy : <0.50 dB
- Calibration range : 835 to 2500 MHz for head & body simulating liquid
- Angle between probe axis (evaluation axis) and surface normal line : less than 30°

II.3. Measurement procedure

The following steps are used for each test position

- Establish a call with the maximum output power with a base station simulator. The connection between the mobile and the base station simulator is established via air interface
- Measurement of the local E-field value at a fixed location. This value serves as a reference value for calculating a possible power drift.
- Measurement of the SAR distribution with a grid of 8 to 16 mm * 8 to 16 mm and a constant distance to the inner surface of the phantom. Since the sensors can not directly measure at the inner phantom surface, the values between the sensors and the inner phantom surface are extrapolated. With these values the area of the maximum SAR is calculated by an interpolation scheme.
- Around this point, a cube of 30 * 30 * 30 mm or 32 * 32 * 32 mm is assessed by measuring 5 or 8 * 5 or 8 * 4 or 5 mm. With these data, the peak spatial-average SAR value can be calculated.

II.4 Description of interpolation/extrapolation scheme

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

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

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

III. RESULTS

<u>TYPE</u>	<u>BAND</u>	<u>PARAMETERS</u>
<u>Noise</u>	--	--
<u>Validation</u>	--	--
<u>Phone</u>	<u>CUSTOM</u>	<p><u>G Mode Configuration 1 Low:</u> Validation Plane with Body device position (band wireless)</p> <p><u>G Mode Configuration 2 Low:</u> Validation Plane with Body device position (band wireless)</p> <p><u>G Mode Configuration 3 Low:</u> Validation Plane with Body device position (band wireless)</p> <p><u>G Mode Configuration 1 Middle:</u> Validation Plane with Body device position (band wireless)</p> <p><u>G Mode Configuration 2 Middle:</u> Validation Plane with Body device position (band wireless)</p> <p><u>G Mode Configuration 3 Middle:</u> Validation Plane with Body device position (band wireless)</p> <p><u>G Mode Configuration 1 High:</u> Validation Plane with Body device position (band wireless)</p> <p><u>G Mode Configuration 2 High:</u> Validation Plane with Body device position (band wireless)</p> <p><u>G Mode Configuration 3 High:</u> Validation Plane with Body device position (band wireless)</p>

G Mode Configuration 1

Type: Phone measurement (Complete)

Date of measurement: 24/07/2009

Measurement duration: 6 minutes 22 seconds

Mobile Phone IMEI number: --

A. Experimental conditions.

Phantom File	surf_sam_plan.txt, Adaptive 2 max
Phantom	Validation plane
Device Position	Body
Band	CUSTOM (wireless)
Channels	Low
Signal	Duty Cycle: 1

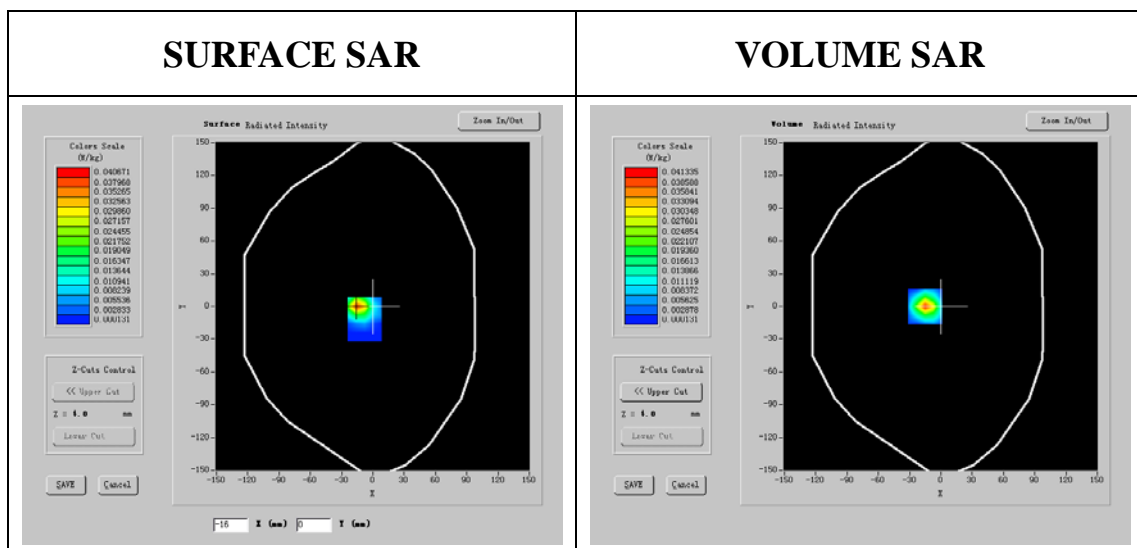
B. Instrumentations.



PC	HP (Pentium(R) V3.06GHz, SN:375052-AA1)
Network Emulator	R&S (CMU200, SN:B23-03291)
Voltmeter	Keithley (2000, SN:1015843)
Synthetizer	Agilent (E8257C, SN:MY43321570)
Amplifier	Mini-Circuits (ZHL-42, SN:110405)
Power Meter	Agilent (E4416A, SN:QB41292714)
Probe	Antennessa (SN:SN_1109_EP_100)
Phantom	Antennessa (SN:SN41_05_SAM29)
Liquid	Antennessa

C. SAR Measurement Results

Frequency (MHz)	2412.000000
Relative permittivity (real part)	52.459250
Relative permittivity (imaginary part)	13.359000
Conductivity (S/m)	1.951472
Variation (%)	-0.670000

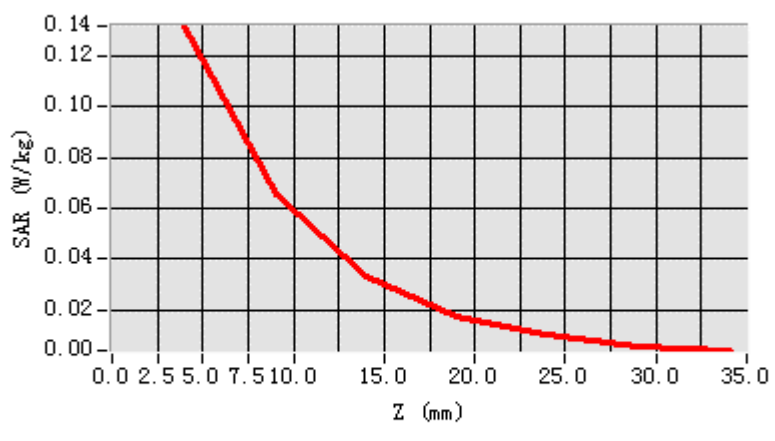


Maximum location: X=-15.00, Y=0.00

SAR 10g (W/Kg)	0.106017
SAR 1g (W/Kg)	0.141310

Z Axis Scan

SAR, Z Axis Scan (X = -23, Y = -7)



G Mode Configuration 2

Type: Phone measurement (Complete)

Date of measurement: 24/07/2009

Measurement duration: 6 minutes 35 seconds

Mobile Phone IMEI number: --

A. Experimental conditions.

Phantom File	surf_sam_plan.txt, Adaptative 2 max
Phantom	Validation plane
Device Position	Body
Band	CUSTOM (wireless)
Channels	Low
Signal	Duty Cycle: 1

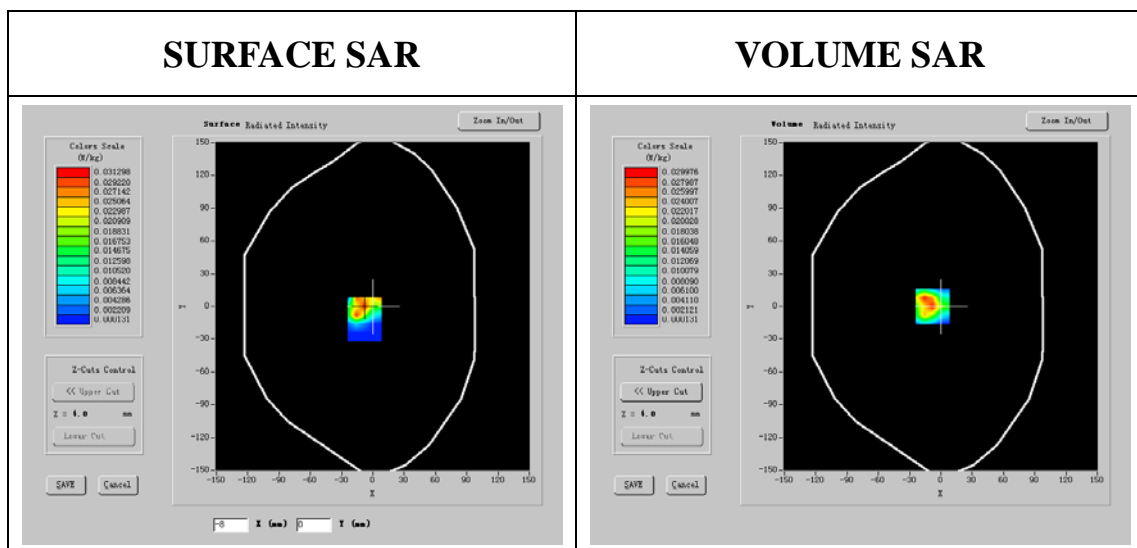
B. Instrumentations.



PC	HP (Pentium(R) V3.06GHz, SN:375052-AA1)
Network Emulator	R&S (CMU200, SN:B23-03291)
Voltmeter	Keithley (2000, SN:1015843)
Synthesizer	Agilent (E8257C, SN:MY43321570)
Amplifier	Mini-Circuits (ZHL-42, SN:110405)
Power Meter	Agilent (E4416A, SN:QB41292714)
Probe	Antennessa (SN:SN_1109_EP_100)
Phantom	Antennessa (SN:SN41_05_SAM29)
Liquid	Antennessa

C. SAR Measurement Results

Frequency (MHz)	2412.000000
Relative permittivity (real part)	52.495541
Relative permittivity (imaginary part)	13.355600
Conductivity (S/m)	1.946832
Variation (%)	-0.010000

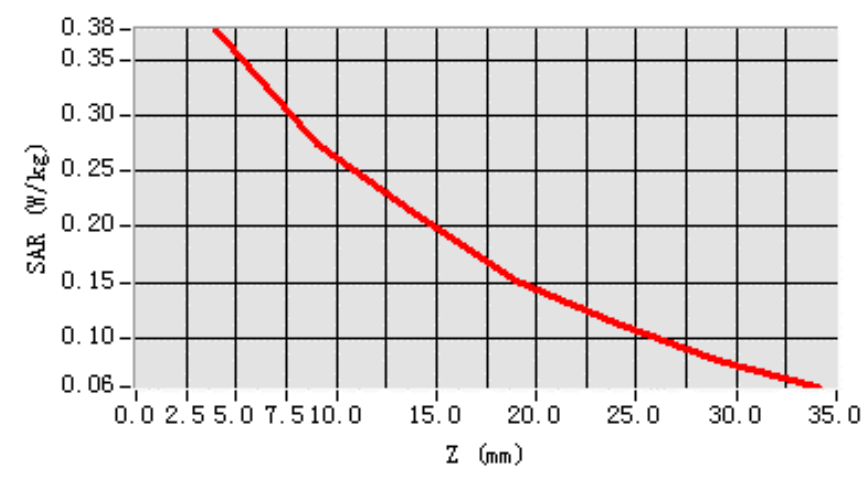


Maximum location: X=-8.00, Y=0.00

SAR 10g (W/Kg)	0.203061
SAR 1g (W/Kg)	0.357220

Z Axis Scan

SAR, Z Axis Scan (X = -24, Y = -15)



G Mode Configuration 3

Type: Phone measurement (Complete)

Date of measurement: 24/07/2009

Measurement duration: 6 minutes 51 seconds

Mobile Phone IMEI number: --

A. Experimental conditions.

Phantom File	surf_sam_plan.txt, Adaptative 2 max
Phantom	Validation plane
Device Position	Body
Band	CUSTOM (wireless)
Channels	Low
Signal	Duty Cycle: 1

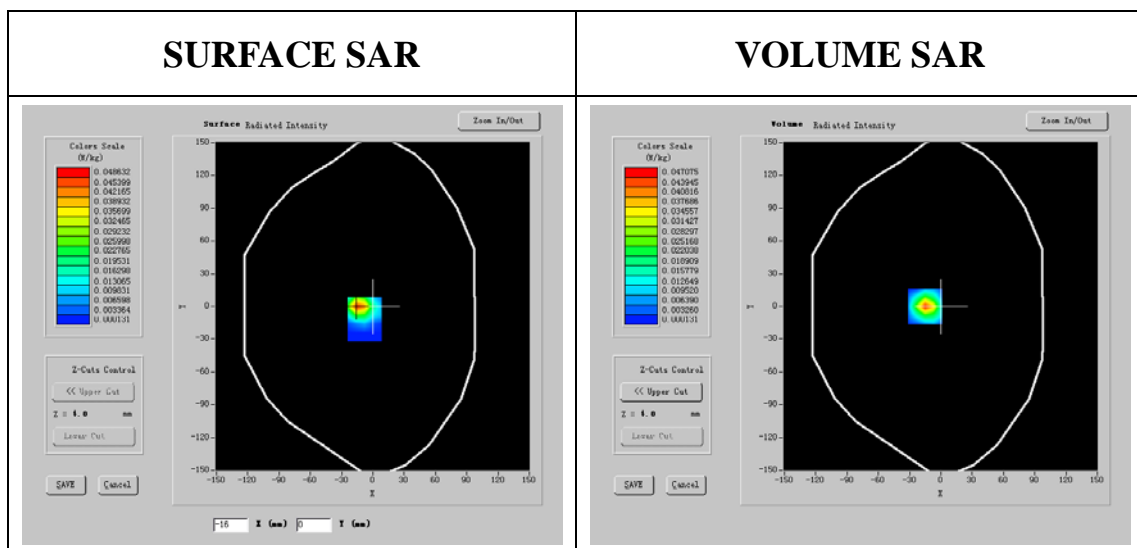
B. Instrumentations.



PC	HP (Pentium(R) V3.06GHz, SN:375052-AA1)
Network Emulator	R&S (CMU200, SN:B23-03291)
Voltmeter	Keithley (2000, SN:1015843)
Synthesizer	Agilent (E8257C, SN:MY43321570)
Amplifier	Mini-Circuits (ZHL-42, SN:110405)
Power Meter	Agilent (E4416A, SN:QB41292714)
Probe	Antennessa (SN:SN_1109_EP_100)
Phantom	Antennessa (SN:SN41_05_SAM29)
Liquid	Antennessa

C. SAR Measurement Results

Frequency (MHz)	2412.000000
Relative permittivity (real part)	52.230050
Relative permittivity (imaginary part)	13.353600
Conductivity (S/m)	1.944333
Variation (%)	-1.150000

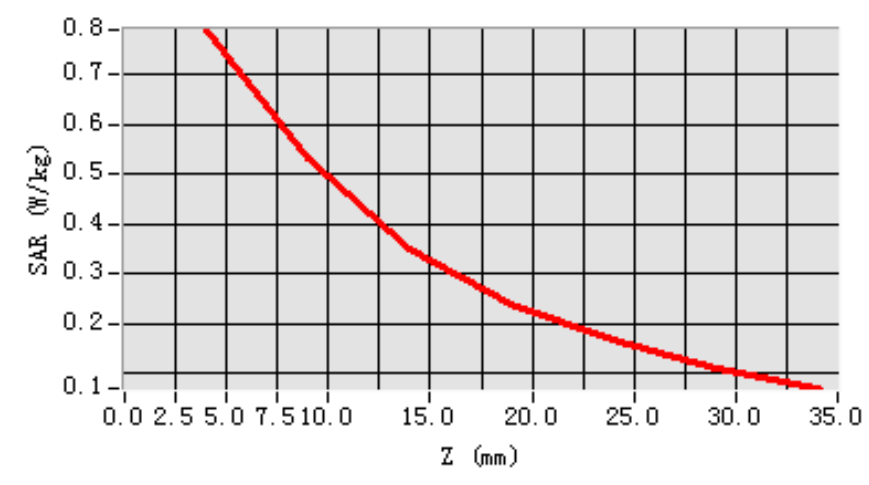


Maximum location: X=-15.00, Y=0.00

SAR 10g (W/Kg)	0.428320
SAR 1g (W/Kg)	0.663550

Z Axis Scan

SAR, Z Axis Scan (X = -1, Y = 8)



G Mode Configuration 1

Type: Phone measurement (Complete)

Date of measurement: 24/07/2009

Measurement duration: 6 minutes 27 seconds

Mobile Phone IMEI number: --

A. Experimental conditions.

Phantom File	surf_sam_plan.txt, Adaptative 2 max
Phantom	Validation plane
Device Position	Body
Band	CUSTOM (wireless)
Channels	Middle
Signal	Duty Cycle: 1

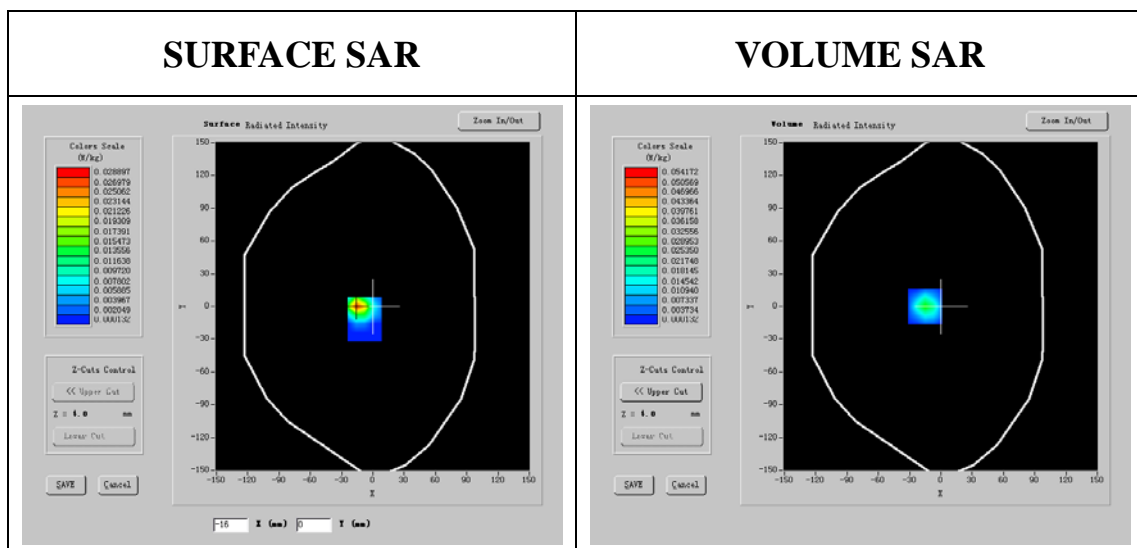
B. Instrumentations.



PC	HP (Pentium(R) V3.06GHz, SN:375052-AA1)
Network Emulator	R&S (CMU200, SN:B23-03291)
Voltmeter	Keithley (2000, SN:1015843)
Synthesizer	Agilent (E8257C, SN:MY43321570)
Amplifier	Mini-Circuits (ZHL-42, SN:110405)
Power Meter	Agilent (E4416A, SN:QB41292714)
Probe	Antennessa (SN:SN_1109_EP_100)
Phantom	Antennessa (SN:SN41_05_SAM29)
Liquid	Antennessa

C. SAR Measurement Results

Frequency (MHz)	2437.000000
Relative permittivity (real part)	52.603508
Relative permittivity (imaginary part)	13.35600
Conductivity (S/m)	1.947124
Variation (%)	-0.040000

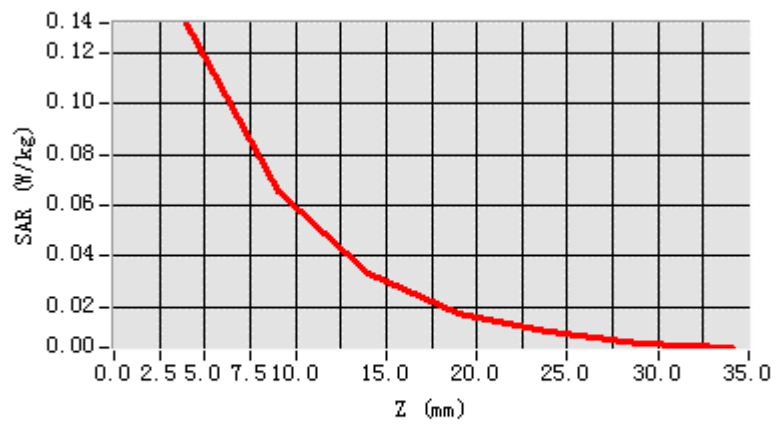


Maximum location: X=-15.00, Y=0.00

SAR 10g (W/Kg)	0.103671
SAR 1g (W/Kg)	0.132144

Z Axis Scan

SAR, Z Axis Scan (X = -23, Y = -7)



G Mode Configuration 2

Type: Phone measurement (Complete)

Date of measurement: 24/07/2009

Measurement duration: 6 minutes 28 seconds

Mobile Phone IMEI number: --

A. Experimental conditions.

Phantom File	surf_sam_plan.txt, Adaptative 2 max
Phantom	Validation plane
Device Position	Body
Band	CUSTOM (wireless)
Channels	Middle
Signal	Duty Cycle: 1

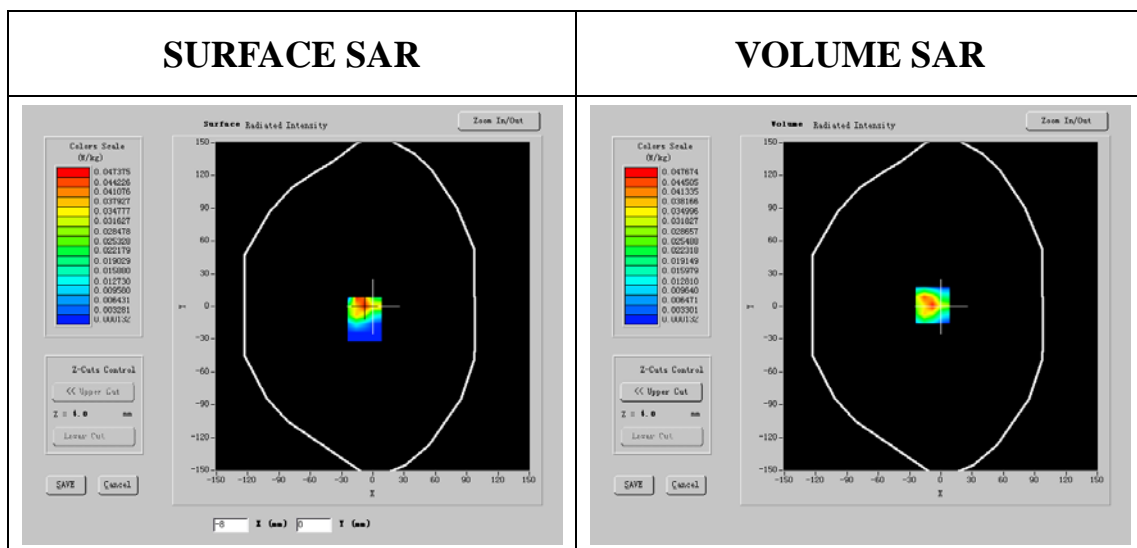
B. Instrumentations.



PC	HP (Pentium(R) V3.06GHz, SN:375052-AA1)
Network Emulator	R&S (CMU200, SN:B23-03291)
Voltmeter	Keithley (2000, SN:1015843)
Synthesizer	Agilent (E8257C, SN:MY43321570)
Amplifier	Mini-Circuits (ZHL-42, SN:110405)
Power Meter	Agilent (E4416A, SN:QB41292714)
Probe	Antennessa (SN:SN_1109_EP_100)
Phantom	Antennessa (SN:SN41_05_SAM29)
Liquid	Antennessa

C. SAR Measurement Results

Frequency (MHz)	2437.000000
Relative permittivity (real part)	52.621291
Relative permittivity (imaginary part)	13.318200
Conductivity (S/m)	1.951200
Variation (%)	-1.390000

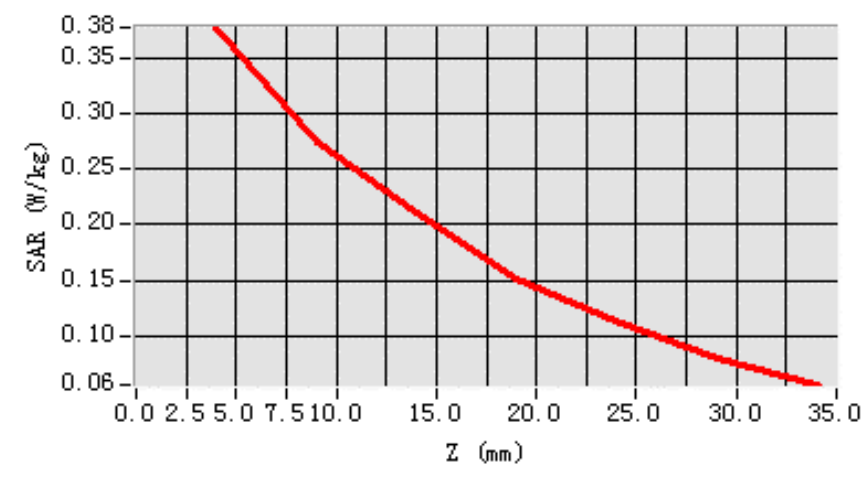


Maximum location: X=-8.00, Y=1.00

SAR 10g (W/Kg)	0.208360
SAR 1g (W/Kg)	0.354760

Z Axis Scan

SAR, Z Axis Scan (X = -24, Y = -15)



G Mode Configuration 3

Type: Phone measurement (Complete)

Date of measurement: 24/07/2009

Measurement duration: 6 minutes 51 seconds

Mobile Phone IMEI number: --

A. Experimental conditions.

Phantom File	surf_sam_plan.txt, Adaptative 2 max
Phantom	Validation plane
Device Position	Body
Band	CUSTOM (wireless)
Channels	Middle
Signal	Duty Cycle: 1

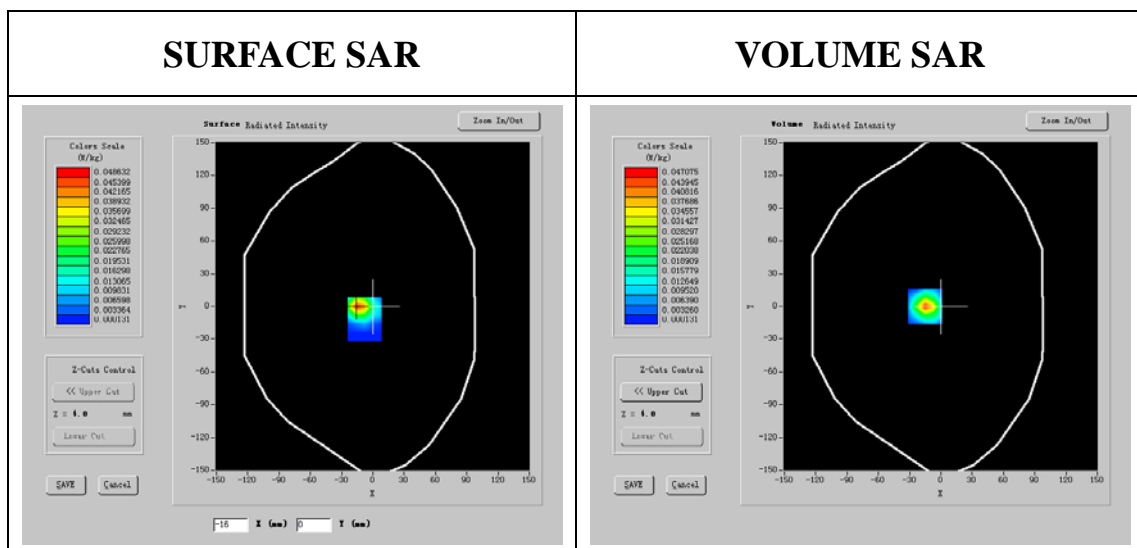
B. Instrumentations.



PC	HP (Pentium(R) V3.06GHz, SN:375052-AA1)
Network Emulator	R&S (CMU200, SN:B23-03291)
Voltmeter	Keithley (2000, SN:1015843)
Synthetizer	Agilent (E8257C, SN:MY43321570)
Amplifier	Mini-Circuits (ZHL-42, SN:110405)
Power Meter	Agilent (E4416A, SN:QB41292714)
Probe	Antennessa (SN:SN_1109_EP_100)
Phantom	Antennessa (SN:SN41_05_SAM29)
Liquid	Antennessa

C. SAR Measurement Results

Frequency (MHz)	2437.000000
Relative permittivity (real part)	52.135200
Relative permittivity (imaginary part)	13.334222
Conductivity (S/m)	1.901233
Variation (%)	-0.050000

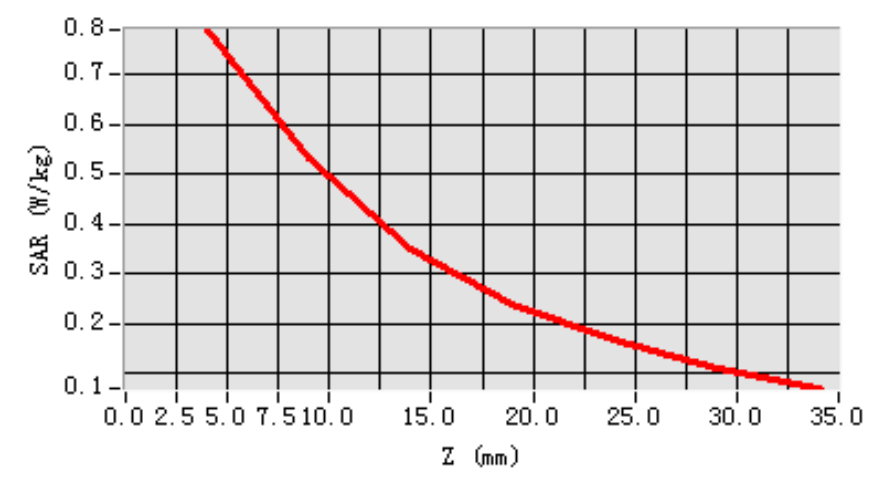


Maximum location: X=-15.00, Y=0.00

SAR 10g (W/Kg)	0.411256
SAR 1g (W/Kg)	0.655111

Z Axis Scan

SAR, Z Axis Scan (X = -1, Y = 8)



G Mode Configuration 1

Type: Phone measurement (Complete)

Date of measurement: 24/07/2009

Measurement duration: 6 minutes 51 seconds

Mobile Phone IMEI number: --

A. Experimental conditions.

Phantom File	surf_sam_plan.txt, Adaptative 2 max
Phantom	Validation plane
Device Position	Body
Band	CUSTOM (wireless)
Channels	High
Signal	Duty Cycle: 1

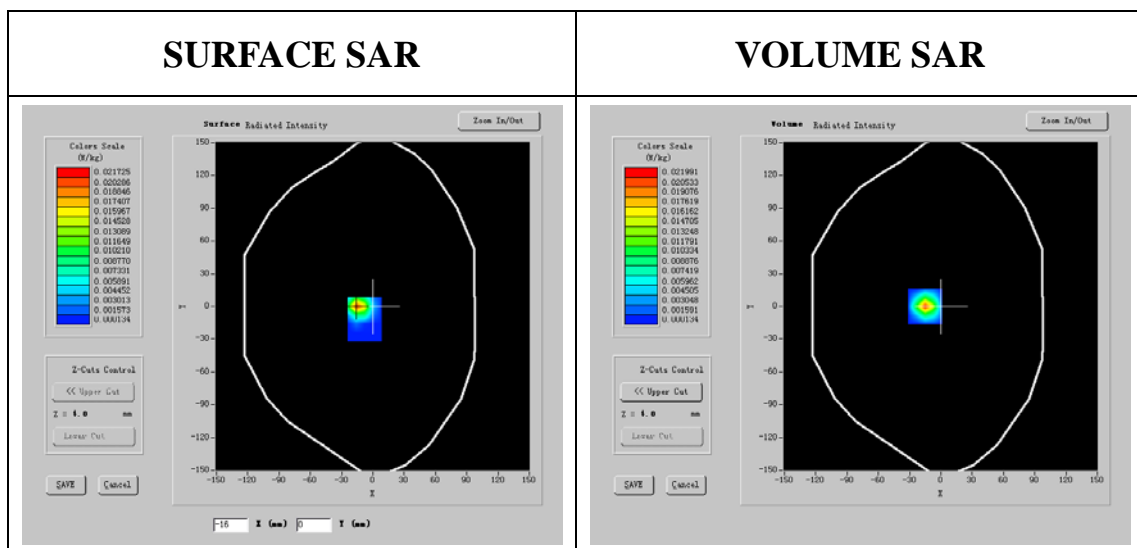
B. Instrumentations.



PC	HP (Pentium(R) V3.06GHz, SN:375052-AA1)
Network Emulator	R&S (CMU200, SN:B23-03291)
Voltmeter	Keithley (2000, SN:1015843)
Synthetizer	Agilent (E8257C, SN:MY43321570)
Amplifier	Mini-Circuits (ZHL-42, SN:110405)
Power Meter	Agilent (E4416A, SN:QB41292714)
Probe	Antennessa (SN:SN_1109_EP_100)
Phantom	Antennessa (SN:SN41_05_SAM29)
Liquid	Antennessa

C. SAR Measurement Results

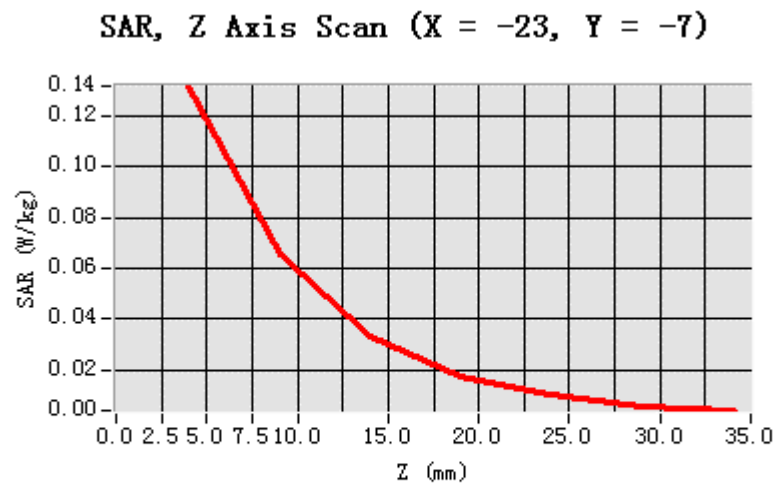
Frequency (MHz)	2462.000000
Relative permittivity (real part)	52.514700
Relative permittivity (imaginary part)	13.381200
Conductivity (S/m)	1.950231
Variation (%)	-1.000000



Maximum location: X=-15.00, Y=0.00

SAR 10g (W/Kg)	0.103455
SAR 1g (W/Kg)	0.121086

Z Axis Scan



G Mode Configuration 2

Type: Phone measurement (Complete)

Date of measurement: 24/07/2009

Measurement duration: 6 minutes 52 seconds

Mobile Phone IMEI number: --

A. Experimental conditions.

Phantom File	surf_sam_plan.txt, Adaptative 2 max
Phantom	Validation plane
Device Position	Body
Band	CUSTOM (wireless)
Channels	High
Signal	Duty Cycle: 1

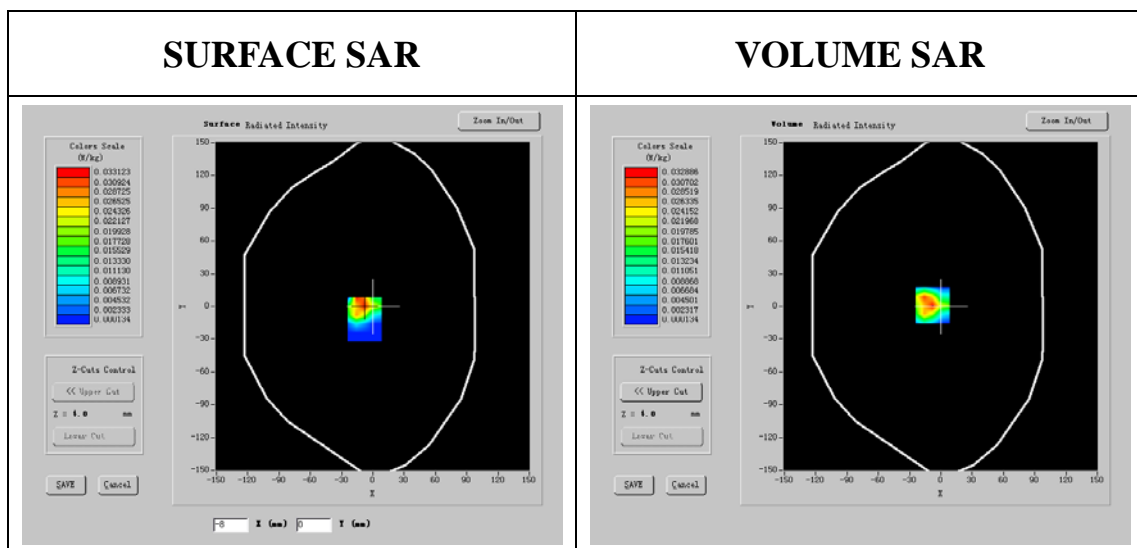
B. Instrumentations.



PC	HP (Pentium(R) V3.06GHz, SN:375052-AA1)
Network Emulator	R&S (CMU200, SN:B23-03291)
Voltmeter	Keithley (2000, SN:1015843)
Synthesizer	Agilent (E8257C, SN:MY43321570)
Amplifier	Mini-Circuits (ZHL-42, SN:110405)
Power Meter	Agilent (E4416A, SN:QB41292714)
Probe	Antennessa (SN:SN_1109_EP_100)
Phantom	Antennessa (SN:SN41_05_SAM29)
Liquid	Antennessa

C. SAR Measurement Results

Frequency (MHz)	2462.000000
Relative permittivity (real part)	52.459001
Relative permittivity (imaginary part)	13.411200
Conductivity (S/m)	1.953740
Variation (%)	-0.440000

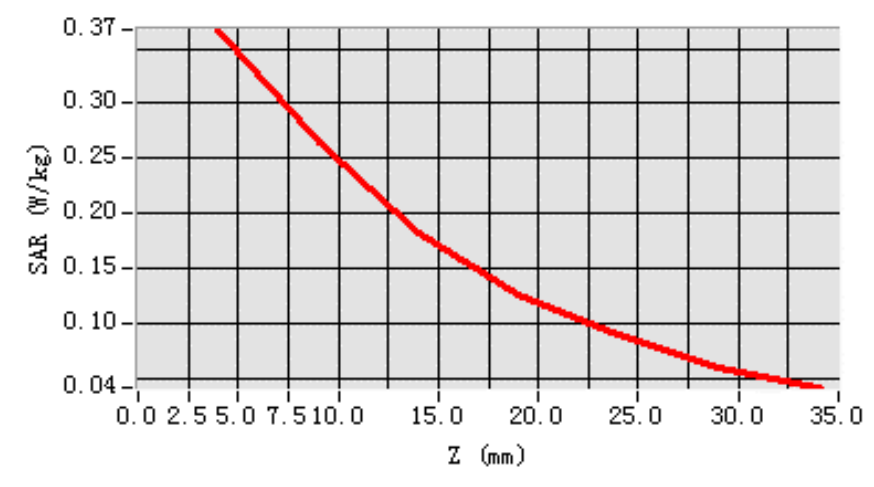


Maximum location: X=-8.00, Y=1.00

SAR 10g (W/Kg)	0.205147
SAR 1g (W/Kg)	0.350881

Z Axis Scan

SAR, Z Axis Scan (X = -1, Y = 0)



G Mode Configuration 3

Type: Phone measurement (Complete)

Date of measurement: 24/07/2009

Measurement duration: 6 minutes 51 seconds

Mobile Phone IMEI number: --

A. Experimental conditions.

Phantom File	surf_sam_plan.txt, Adaptative 2 max
Phantom	Validation plane
Device Position	Body
Band	CUSTOM (wireless)
Channels	High
Signal	Duty Cycle: 1

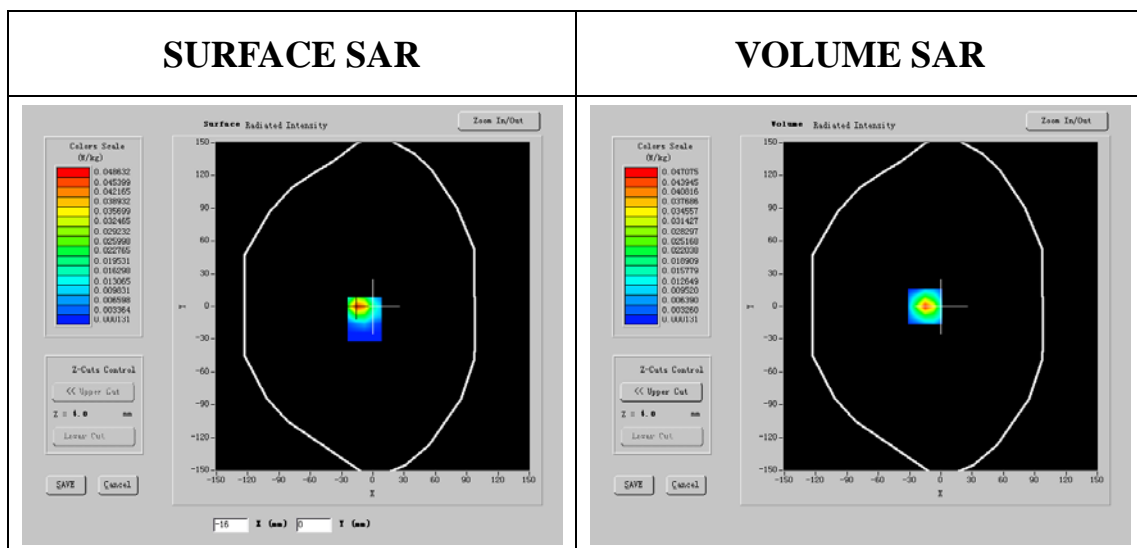
B. Instrumentations.



PC	HP (Pentium(R) V3.06GHz, SN:375052-AA1)
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Synthesizer	Agilent (E8257C, SN:MY43321570)
Amplifier	Mini-Circuits (ZHL-42, SN:110405)
Power Meter	Agilent (E4416A, SN:QB41292714)
Probe	Antennessa (SN:SN_1109_EP_100)
Phantom	Antennessa (SN:SN41_05_SAM29)
Liquid	Antennessa

C. SAR Measurement Results

Frequency (MHz)	2437.000000
Relative permittivity (real part)	52.111000
Relative permittivity (imaginary part)	13.425500
Conductivity (S/m)	1.910000
Variation (%)	-0.750000



Maximum location: X=-15.00, Y=0.00

SAR 10g (W/Kg)	0.421690
SAR 1g (W/Kg)	0.644412

Z Axis Scan

SAR, Z Axis Scan (X = -24, Y = -15)

