 <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 :
	SZ081104B04

I. INFORMATIONS ON THE TESTING

I. INFORMATIONS ON THE TESTING

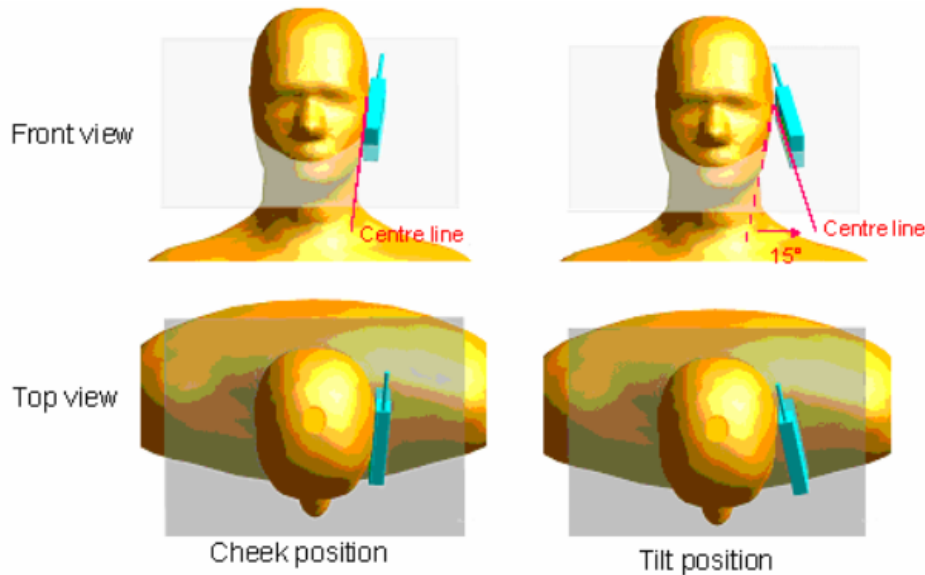
I.1. Normative reference

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>	<u>20N Mode Configuration 1 Low</u> : Validation Plane with Body device position (band wireless) <u>20N Mode Configuration 2 Low</u> : Validation Plane with Body device position (band wireless) <u>20N Mode Configuration 3 Low</u> : Validation Plane with Body device position (band wireless) <u>20N Mode Configuration 4 Low</u> : Validation Plane with Body device position (band wireless) <u>20N Mode Configuration 1Middle</u> : Validation Plane with Body device position (band wireless) <u>20N Mode Configuration 2Middle</u> : Validation Plane with Body device position (band wireless) <u>20N Mode Configuration 3Middle</u> : Validation Plane with Body device position (band wireless) <u>20N Mode Configuration 4Middle</u> : Validation Plane with Body device position (band wireless) <u>20N Mode Configuration 1High</u> : Validation Plane with Body device position (band wireless) <u>20N Mode Configuration 2High</u> : Validation Plane with Body device position (band wireless) <u>20N Mode Configuration 3High</u> : Validation Plane with Body device position (band wireless) <u>20N Mode Configuration 4High</u> : Validation Plane with Body device position (band wireless)

20N Mode Configuration 1

Type: Phone measurement (Complete)

Date of measurement: 12/12/2008

Measurement duration: 6 minutes 6 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

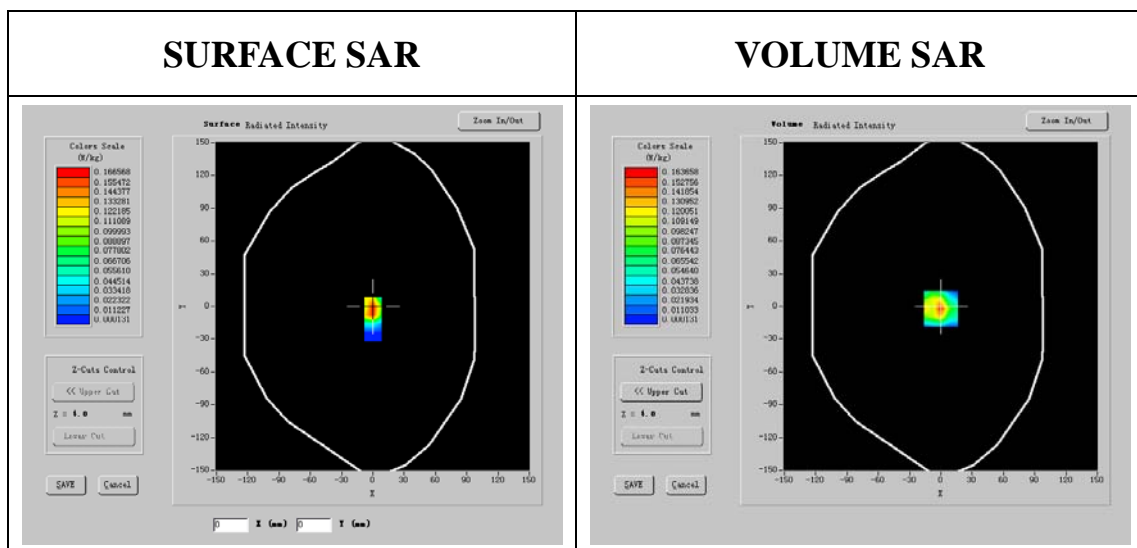
B. Instrumentations.



PC	HP (Pentium(R) V3.06GHz, SN:375052-AA1)
Network Emulator	R&S (CMU200, SN:B23-03291)
Voltmeter	Keithley (2000, SN:1015843)
Synthesizer	Agilent (E8257C, SN:MY43321570)
Amplifier	Mini-Circuits (ZHL-42, SN:110405)
Power Meter	Agilent (E4416A, SN:QB41292714)
Probe	Antennessa (SN:SN_0807_EP_74)
Phantom	Antennessa (SN:SN41_05_SAM29)
Liquid	Antennessa

C. SAR Measurement Results

Frequency (MHz)	2412.000000
Relative permittivity (real part)	52.514999
Relative permittivity (imaginary part)	13.366500
Conductivity (S/m)	1.951111
Variation (%)	-0.490000

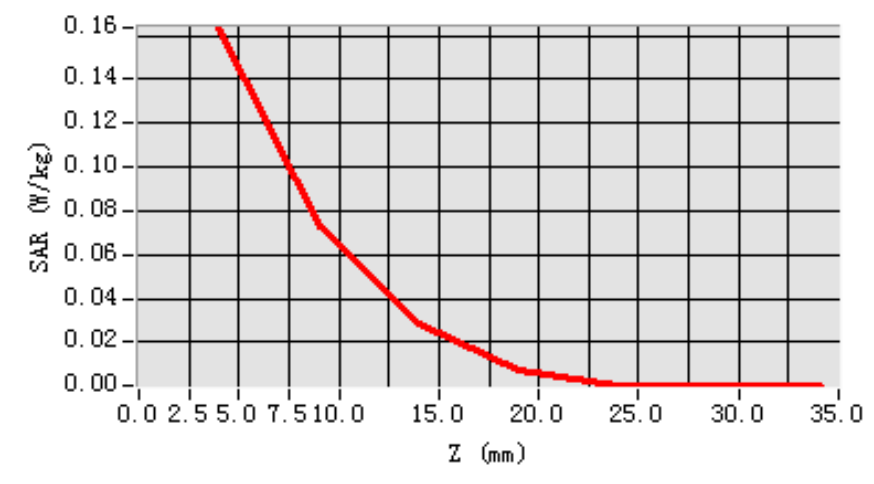


Maximum location: X=0.00, Y=-2.00

SAR 10g (W/Kg)	0.059829
SAR 1g (W/Kg)	0.142547

Z Axis Scan

SAR, Z Axis Scan (X = 0, Y = -2)



20N Mode Configuration 2

Type: Phone measurement (Complete)

Date of measurement: 12/12/2008

Measurement duration: 6 minutes 52 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

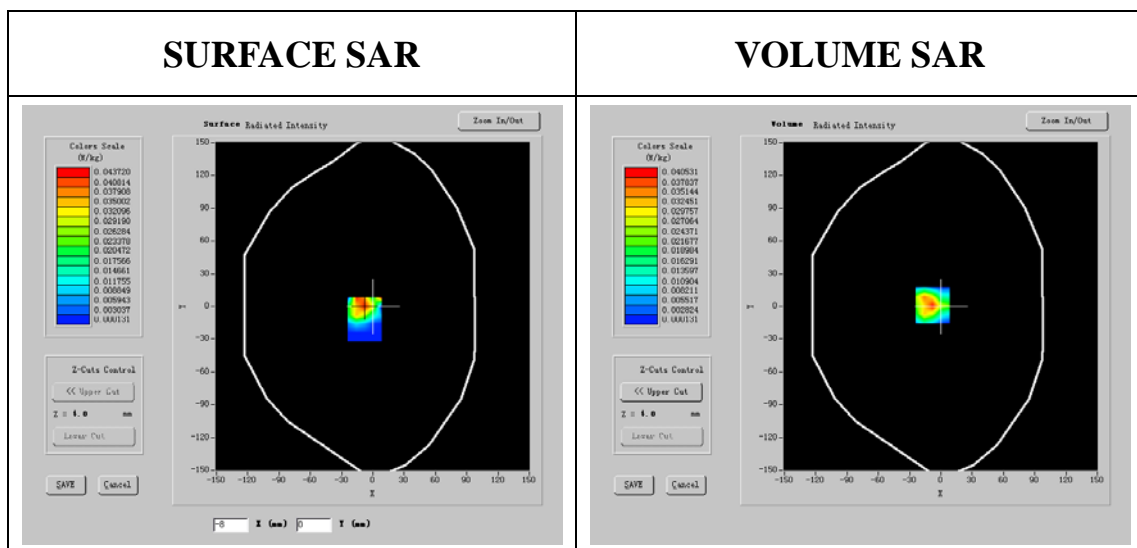
B. Instrumentations.



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_0807_EP_74)
Phantom	Antennessa (SN:SN41_05_SAM29)
Liquid	Antennessa

C. SAR Measurement Results

Frequency (MHz)	2412.000000
Relative permittivity (real part)	52.514999
Relative permittivity (imaginary part)	13.366500
Conductivity (S/m)	1.949121
Variation (%)	-1.980000

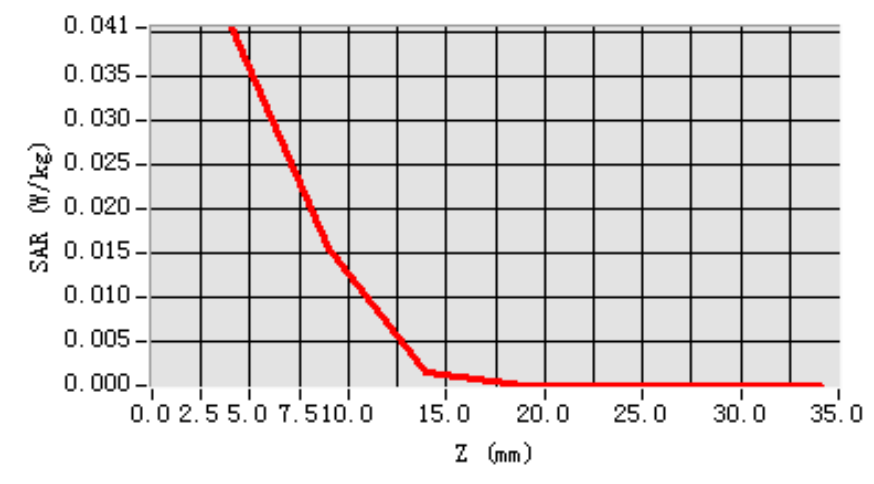


Maximum location: X=-8.00, Y=1.00

SAR 10g (W/Kg)	0.014676
SAR 1g (W/Kg)	0.037000

Z Axis Scan

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



20N Mode Configuration 3

Type: Phone measurement (Complete)

Date of measurement: 12/12/2008

Measurement duration: 6 minutes 56 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

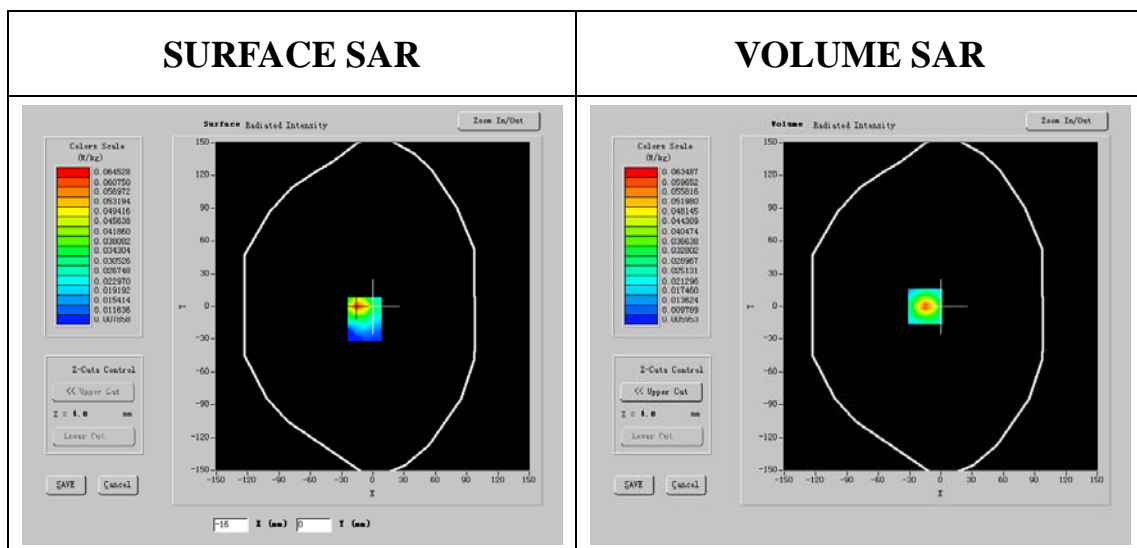
B. Instrumentations.



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_0807_EP_74)
Phantom	Antennessa (SN:SN41_05_SAM29)
Liquid	Antennessa

C. SAR Measurement Results

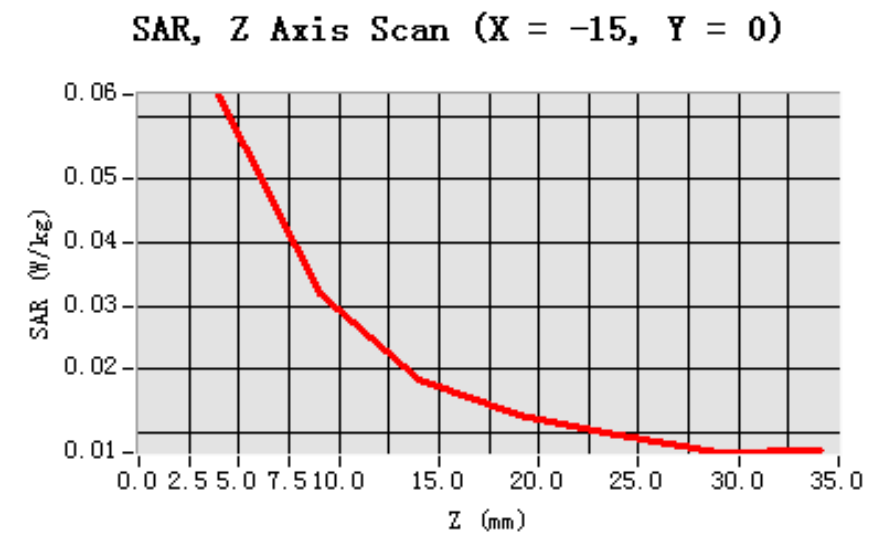
Frequency (MHz)	2412.000000
Relative permittivity (real part)	52.514999
Relative permittivity (imaginary part)	13.366500
Conductivity (S/m)	1.951156
Variation (%)	-1.860000



Maximum location: X=-15.00, Y=0.00

SAR 10g (W/Kg)	0.028564
SAR 1g (W/Kg)	0.057509

Z Axis Scan



20N Mode Configuration 4

Type: Phone measurement (Complete)

Date of measurement: 12/12/2008

Measurement duration: 6 minutes 56 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

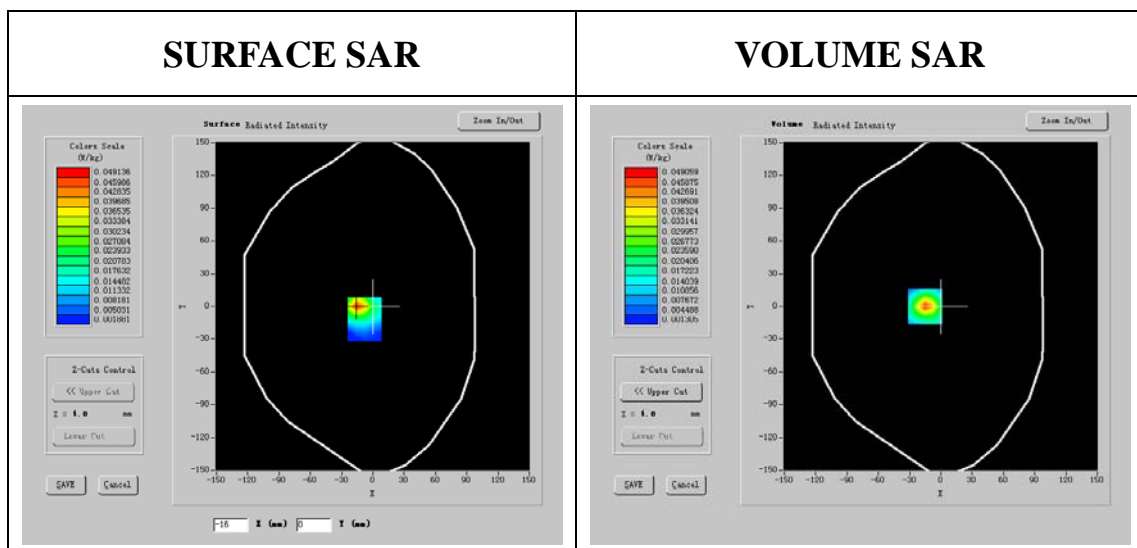
B. Instrumentations.



PC	HP (Pentium(R) V3.06GHz, SN:375052-AA1)
Network Emulator	R&S (CMU200, SN:B23-03291)
Voltmeter	Keithley (2000, SN:1015843)
Synthesizer	Agilent (E8257C, SN:MY43321570)
Amplifier	Mini-Circuits (ZHL-42, SN:110405)
Power Meter	Agilent (E4416A, SN:QB41292714)
Probe	Antennessa (SN:SN_0807_EP_74)
Phantom	Antennessa (SN:SN41_05_SAM29)
Liquid	Antennessa

C. SAR Measurement Results

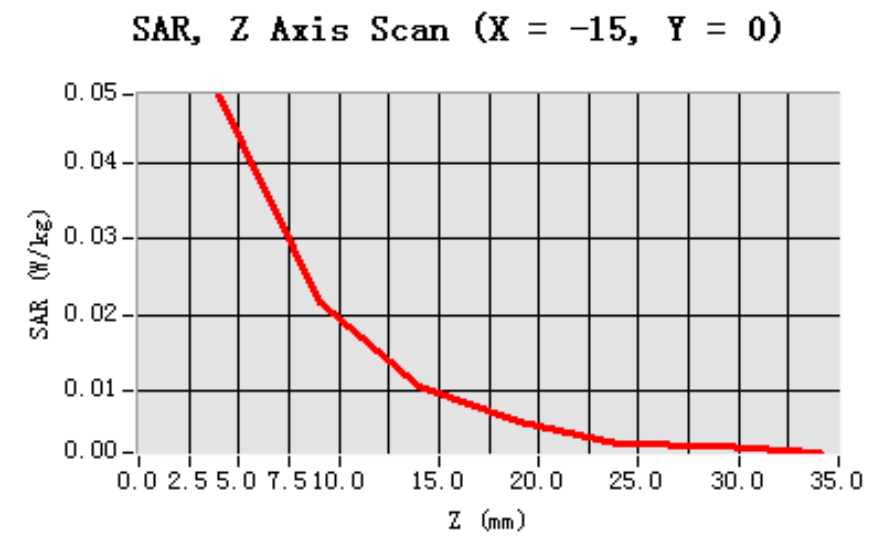
Frequency (MHz)	2412.000000
Relative permittivity (real part)	52.514999
Relative permittivity (imaginary part)	13.366500
Conductivity (S/m)	1.956341
Variation (%)	-0.140000



Maximum location: X=-15.00, Y=0.00

SAR 10g (W/Kg)	0.018864
SAR 1g (W/Kg)	0.043581

Z Axis Scan



20N Mode Configuration 1

Type: Phone measurement (Complete)

Date of measurement: 12/12/2008

Measurement duration: 5 minutes 59 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	Middle
Signal	Duty Cycle: 1

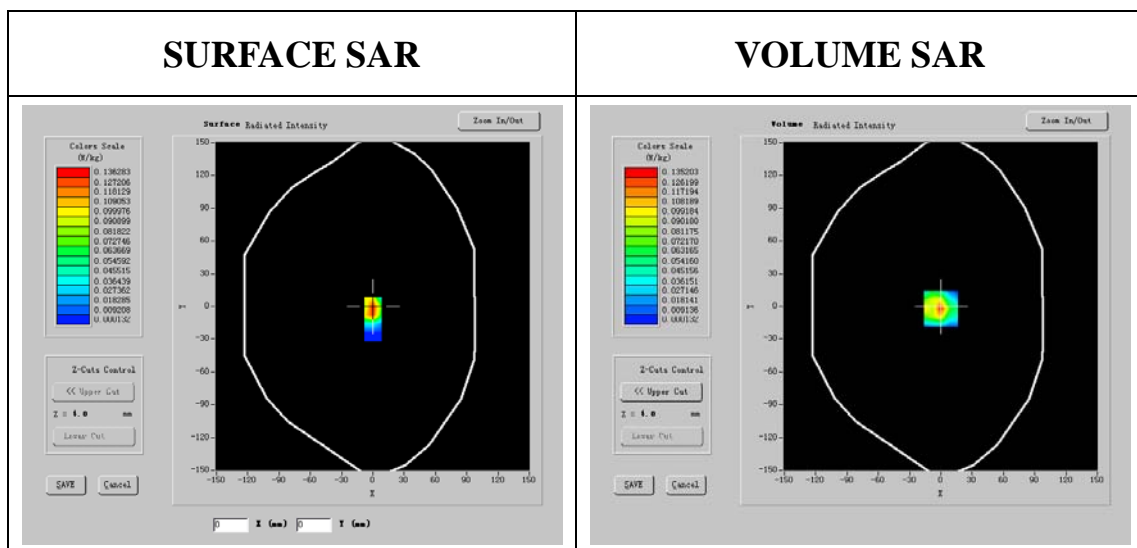
B. Instrumentations.



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_0807_EP_74)
Phantom	Antennessa (SN:SN41_05_SAM29)
Liquid	Antennessa

C. SAR Measurement Results

Frequency (MHz)	2437.000000
Relative permittivity (real part)	52.641998
Relative permittivity (imaginary part)	13.318200
Conductivity (S/m)	1.953410
Variation (%)	-0.060000

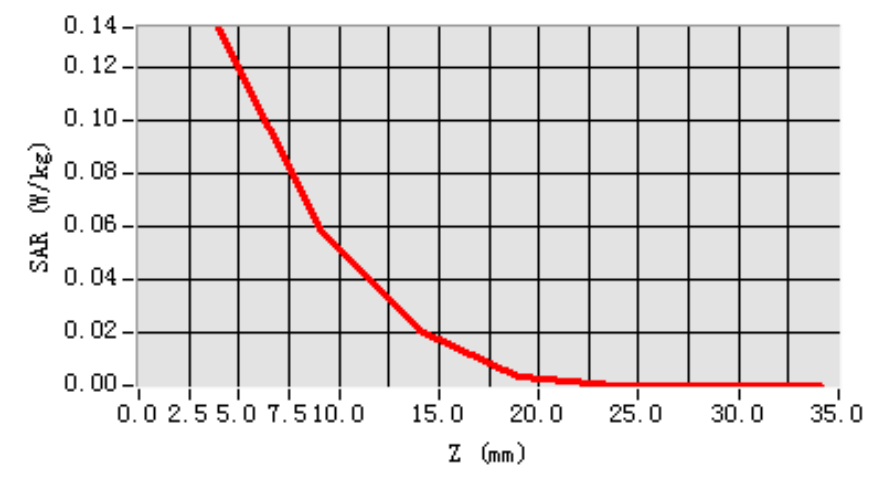


Maximum location: X=0.00, Y=-2.00

SAR 10g (W/Kg)	0.047680
SAR 1g (W/Kg)	0.116805

Z Axis Scan

SAR, Z Axis Scan (X = 0, Y = -2)



20N Mode Configuration 2

Type: Phone measurement (Complete)

Date of measurement: 12/12/2008

Measurement duration: 6 minutes 53 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

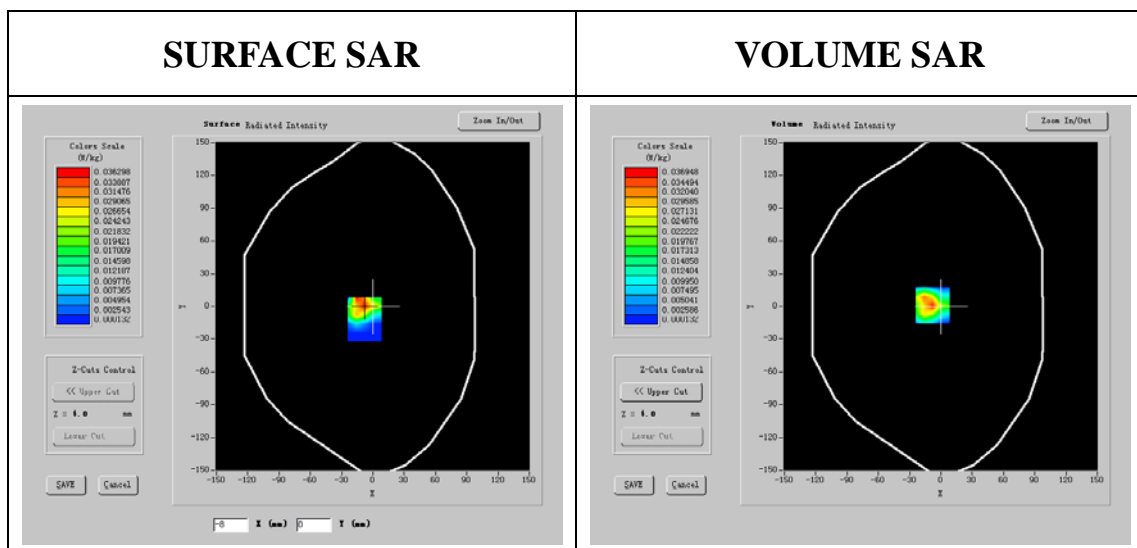
B. Instrumentations.



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_0807_EP_74)
Phantom	Antennessa (SN:SN41_05_SAM29)
Liquid	Antennessa

C. SAR Measurement Results

Frequency (MHz)	2437.000000
Relative permittivity (real part)	52.641998
Relative permittivity (imaginary part)	13.318200
Conductivity (S/m)	1.954641
Variation (%)	-1.630000

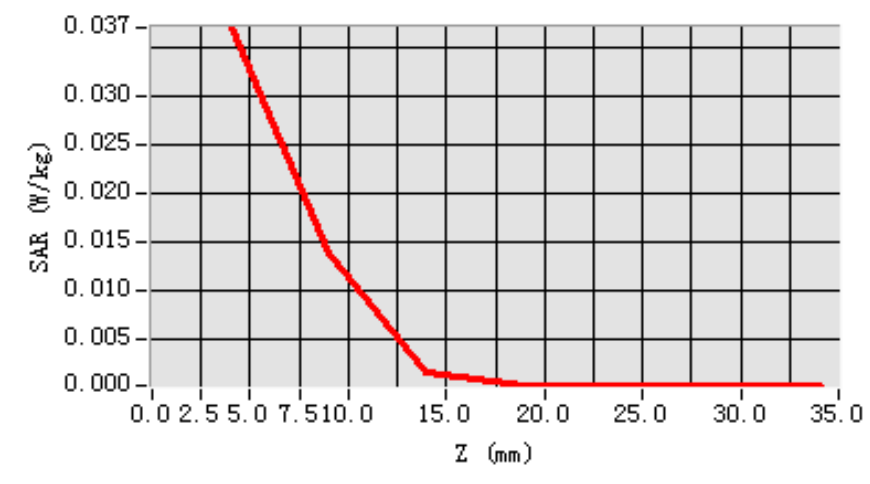


Maximum location: X=-8.00, Y=1.00

SAR 10g (W/Kg)	0.013357
SAR 1g (W/Kg)	0.033808

Z Axis Scan

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



20N Mode Configuration 3

Type: Phone measurement (Complete)

Date of measurement: 12/12/2008

Measurement duration: 6 minutes 55 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

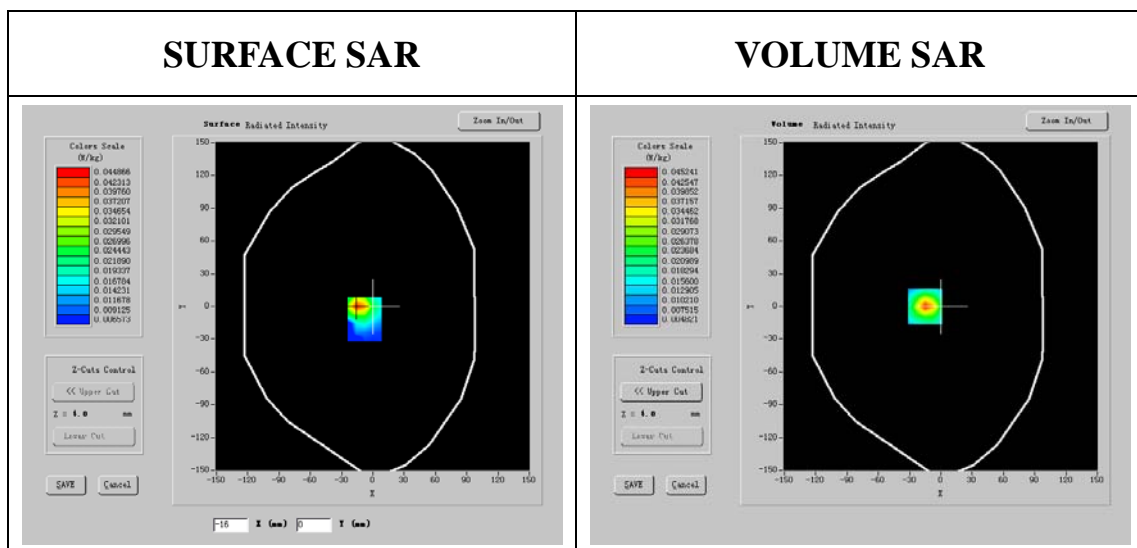
B. Instrumentations.



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_0807_EP_74)
Phantom	Antennessa (SN:SN41_05_SAM29)
Liquid	Antennessa

C. SAR Measurement Results

Frequency (MHz)	2437.000000
Relative permittivity (real part)	52.641998
Relative permittivity (imaginary part)	13.318200
Conductivity (S/m)	1.953525
Variation (%)	-2.560000

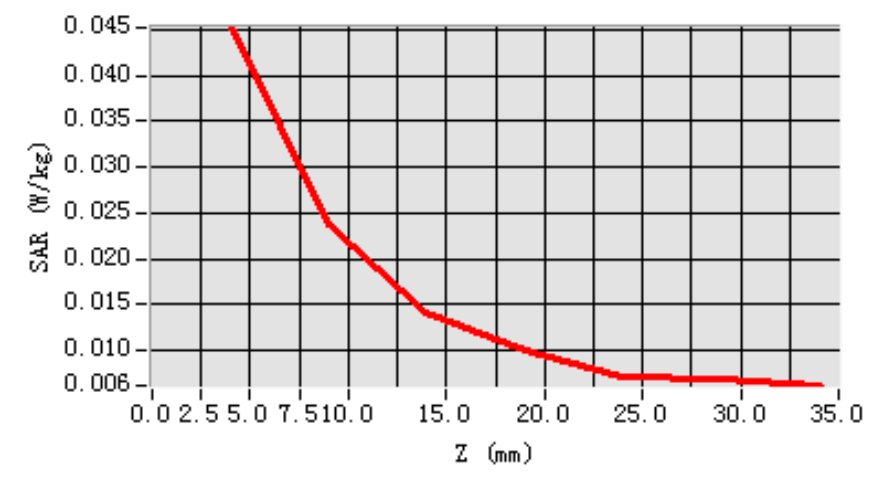


Maximum location: X=-15.00, Y=0.00

SAR 10g (W/Kg)	0.020818
SAR 1g (W/Kg)	0.040900

Z Axis Scan

SAR, Z Axis Scan (X = -15, Y = 0)



20N Mode Configuration 4

Type: Phone measurement (Complete)

Date of measurement: 12/12/2008

Measurement duration: 6 minutes 56 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	Middle
Signal	Duty Cycle: 1

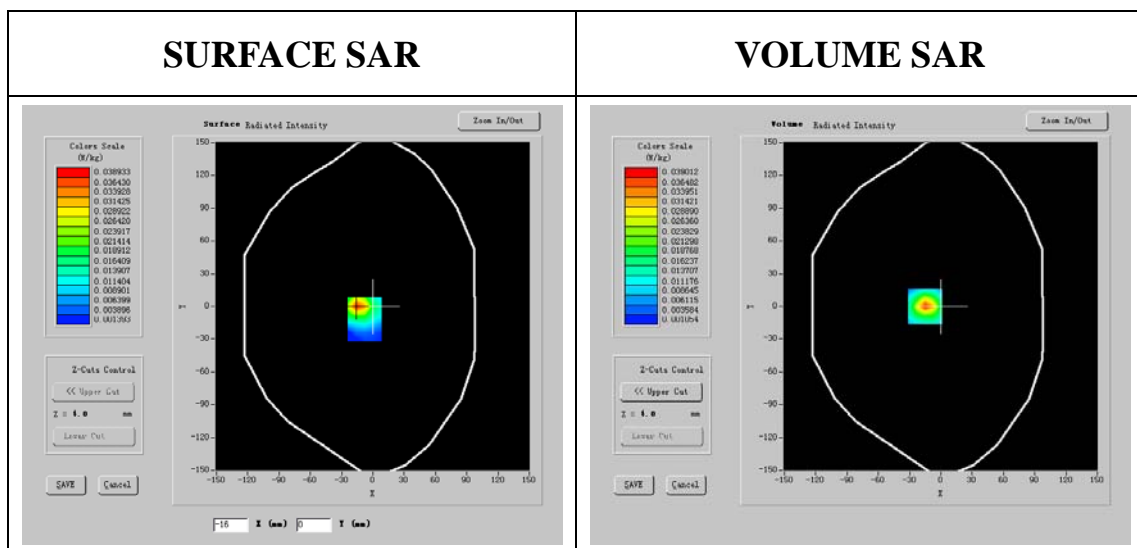
B. Instrumentations.



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_0807_EP_74)
Phantom	Antennessa (SN:SN41_05_SAM29)
Liquid	Antennessa

C. SAR Measurement Results

Frequency (MHz)	2437.000000
Relative permittivity (real part)	52.641998
Relative permittivity (imaginary part)	13.318200
Conductivity (S/m)	1.952581
Variation (%)	-0.460000

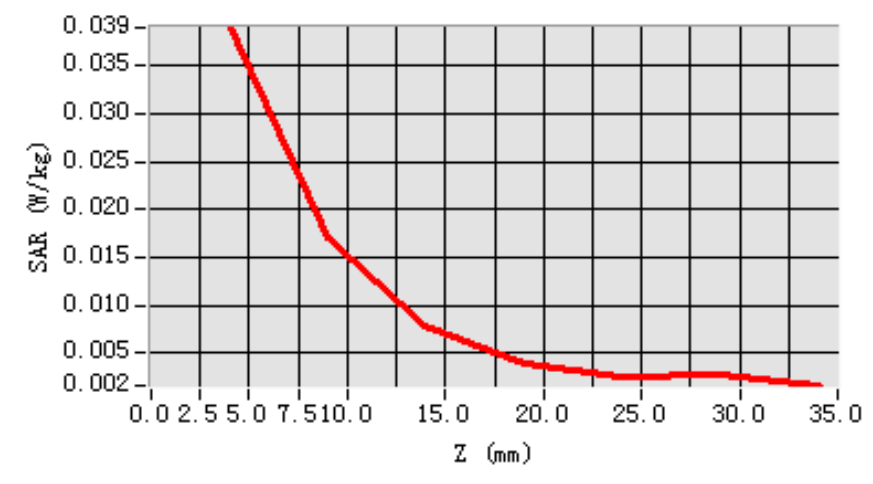


Maximum location: X=-15.00, Y=0.00

SAR 10g (W/Kg)	0.015009
SAR 1g (W/Kg)	0.034925

Z Axis Scan

SAR, Z Axis Scan (X = -15, Y = 0)



20N Mode Configuration 1

Type: Phone measurement (Complete)

Date of measurement: 12/12/2008

Measurement duration: 5 minutes 56 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

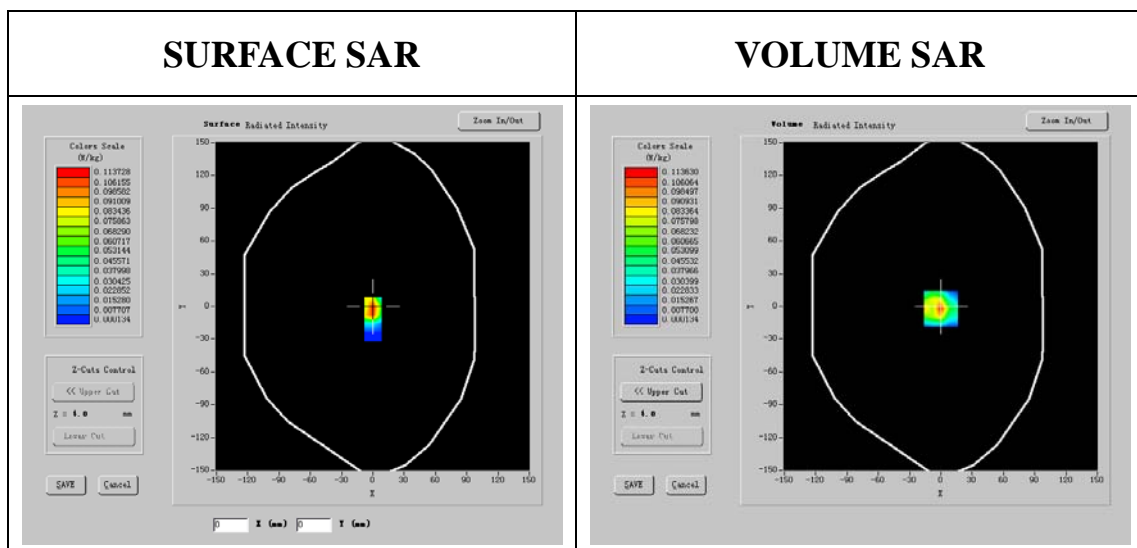
B. Instrumentations.



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_0807_EP_74)
Phantom	Antennessa (SN:SN41_05_SAM29)
Liquid	Antennessa

C. SAR Measurement Results

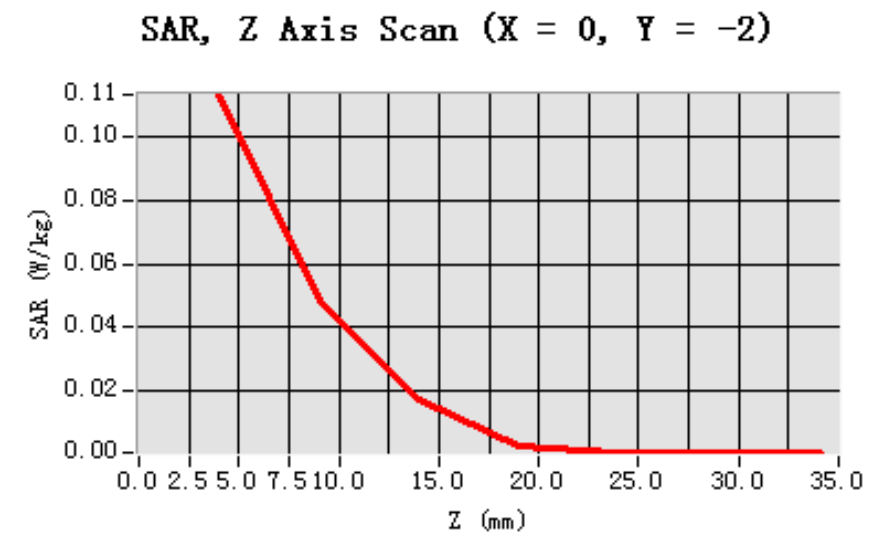
Frequency (MHz)	2462.000000
Relative permittivity (real part)	52.469002
Relative permittivity (imaginary part)	13.381200
Conductivity (S/m)	1.953461
Variation (%)	-2.800000



Maximum location: X=0.00, Y=-2.00

SAR 10g (W/Kg)	0.039130
SAR 1g (W/Kg)	0.098173

Z Axis Scan



20N Mode Configuration 2

Type: Phone measurement (Complete)

Date of measurement: 12/12/2008

Measurement duration: 6 minutes 42 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	High
Signal	Duty Cycle: 1

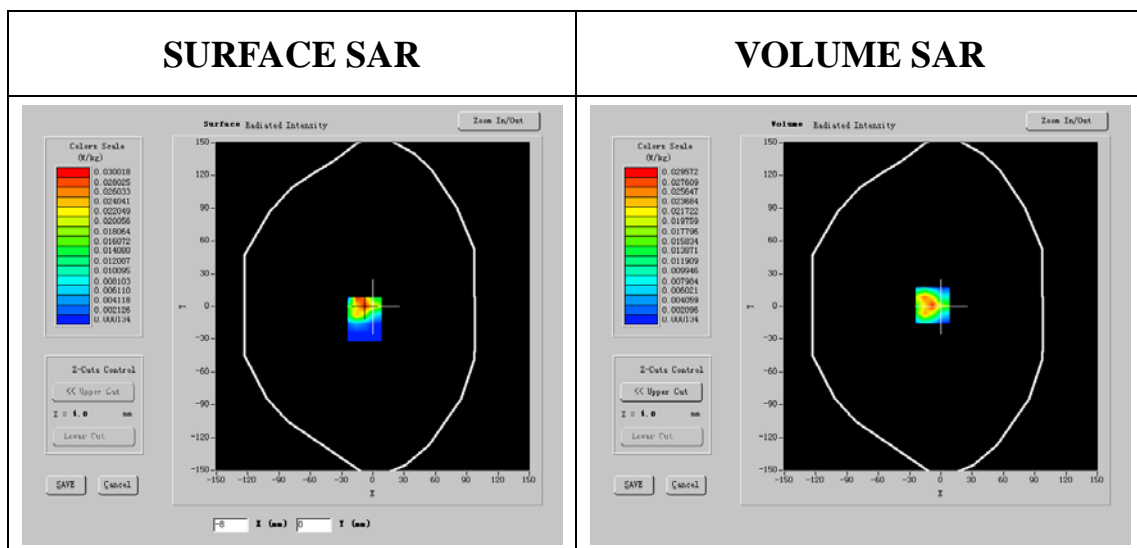
B. Instrumentations.



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_0807_EP_74)
Phantom	Antennessa (SN:SN41_05_SAM29)
Liquid	Antennessa

C. SAR Measurement Results

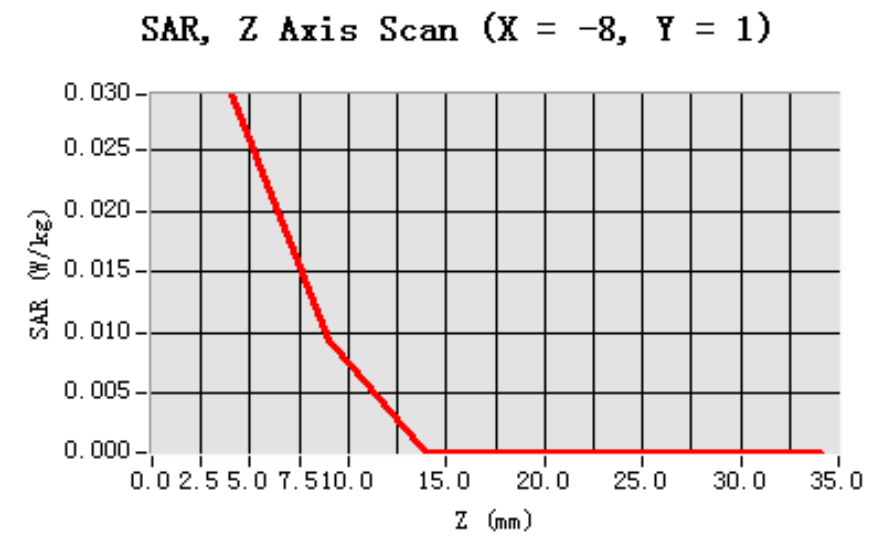
Frequency (MHz)	2462.000000
Relative permittivity (real part)	52.469002
Relative permittivity (imaginary part)	13.381200
Conductivity (S/m)	1.951661
Variation (%)	-3.930000



Maximum location: X=-8.00, Y=1.00

SAR 10g (W/Kg)	0.010334
SAR 1g (W/Kg)	0.027069

Z Axis Scan



20N Mode Configuration 3

Type: Phone measurement (Complete)

Date of measurement: 12/12/2008

Measurement duration: 6 minutes 55 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

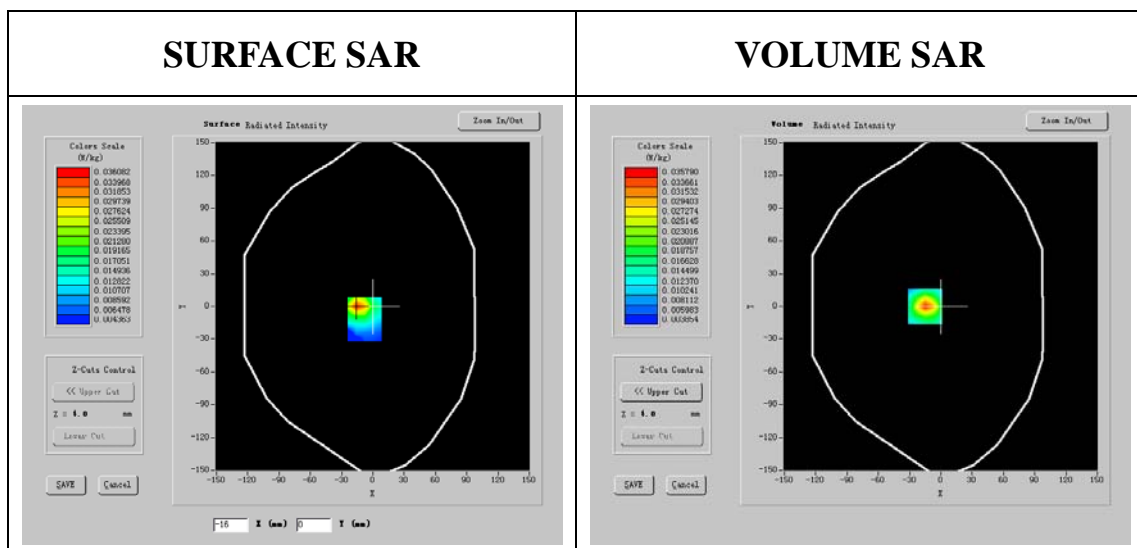
B. Instrumentations.



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_0807_EP_74)
Phantom	Antennessa (SN:SN41_05_SAM29)
Liquid	Antennessa

C. SAR Measurement Results

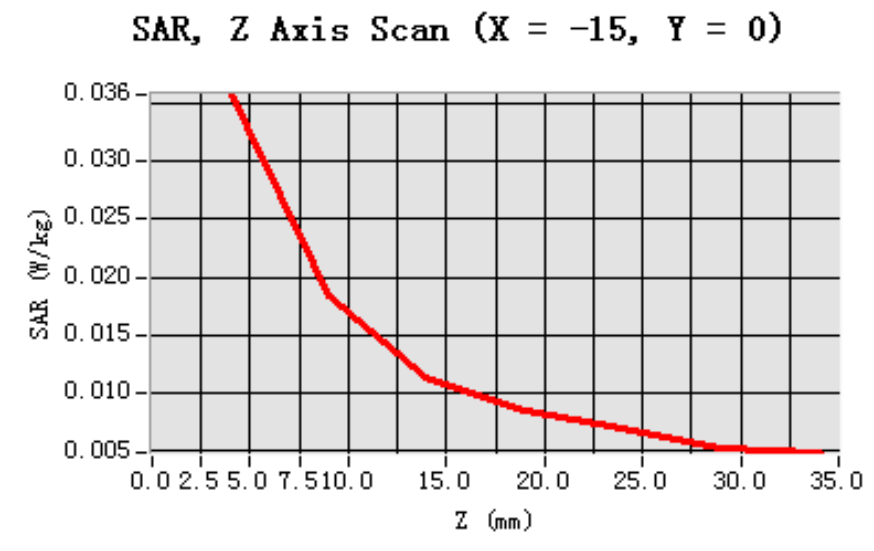
Frequency (MHz)	2462.000000
Relative permittivity (real part)	52.469002
Relative permittivity (imaginary part)	13.381200
Conductivity (S/m)	1.951245
Variation (%)	0.680000



Maximum location: X=-15.00, Y=0.00

SAR 10g (W/Kg)	0.017003
SAR 1g (W/Kg)	0.032978

Z Axis Scan



20N Mode Configuration 4

Type: Phone measurement (Complete)

Date of measurement: 12/12/2008

Measurement duration: 6 minutes 55 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	High
Signal	Duty Cycle: 1

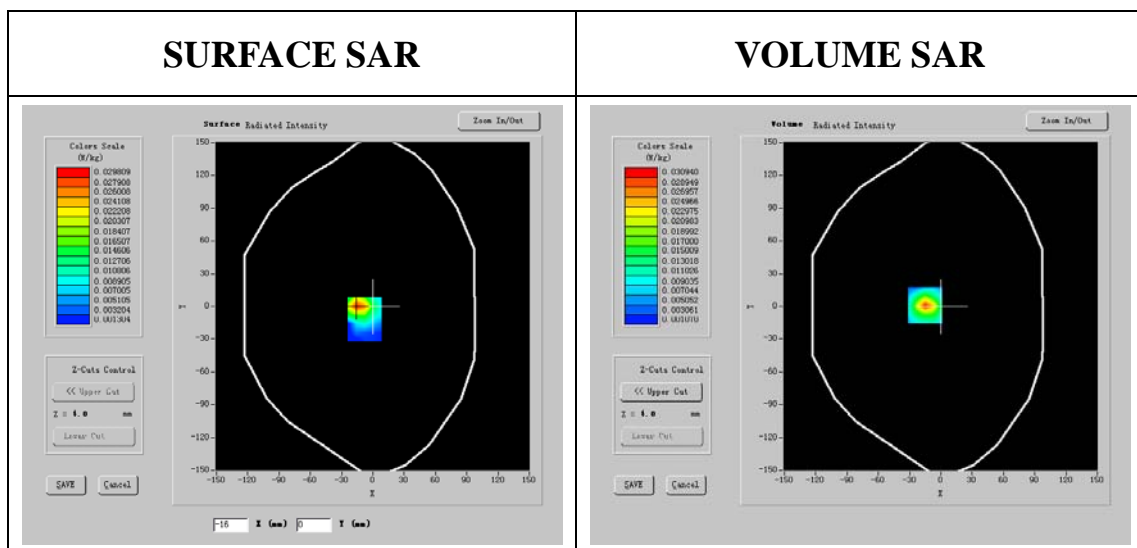
B. Instrumentations.



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_0807_EP_74)
Phantom	Antennessa (SN:SN41_05_SAM29)
Liquid	Antennessa

C. SAR Measurement Results

Frequency (MHz)	2462.000000
Relative permittivity (real part)	52.469002
Relative permittivity (imaginary part)	13.381200
Conductivity (S/m)	1.953511
Variation (%)	1.250000



Maximum location: X=-15.00, Y=1.00

SAR 10g (W/Kg)	0.011670
SAR 1g (W/Kg)	0.027160

Z Axis Scan

SAR, Z Axis Scan (X = -15, Y = 1)

