

# GSM1900, Right Cheek, Low

Type: Phone measurement (11 points in the volume)

Date of measurement: 21/11/2014

Measurement duration: 5 minutes 37 seconds

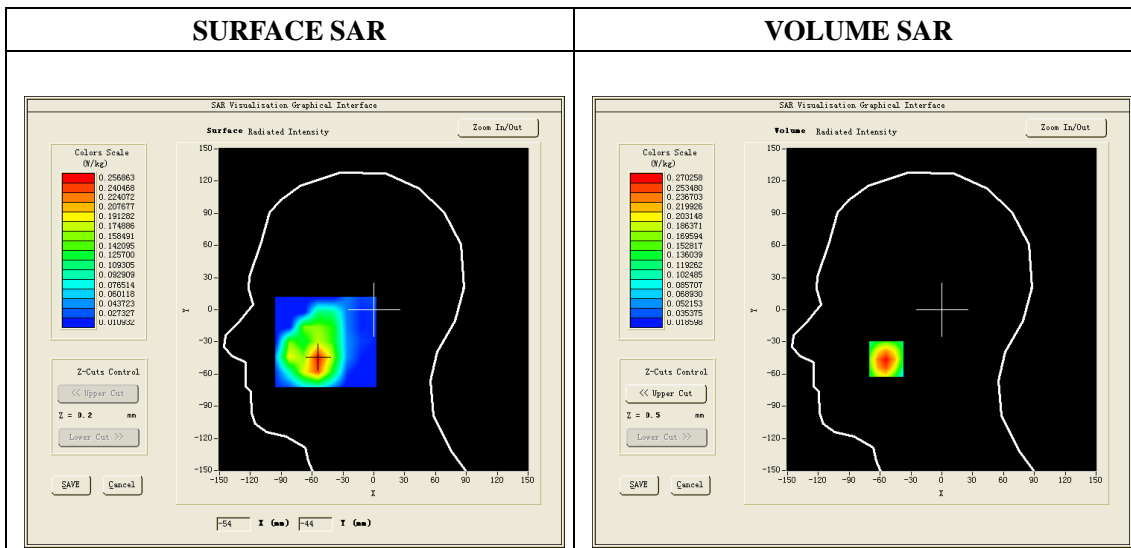
Mobile Phone IMEI number: --

### A. Experimental conditions.

Area Scan	sam_direct_droit2_surf8mm.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Right head
Device Position	Cheek
Band	GSM1900
Channels	512
Signal	GSM (Duty cycle: 1:8)

### B.SAR Measurement Results

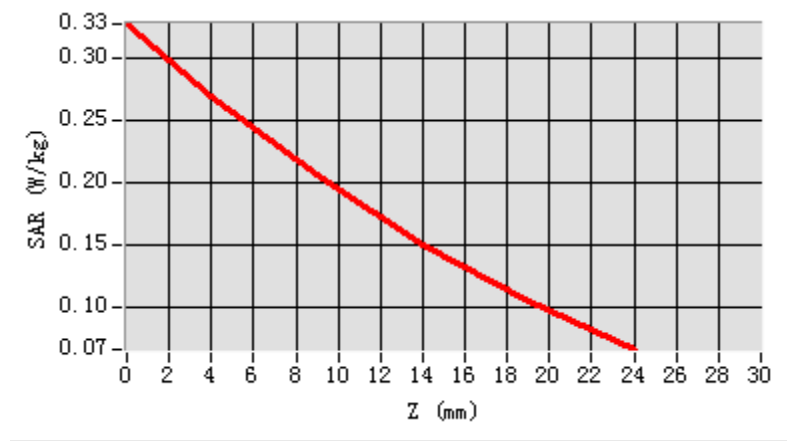
Frequency (MHz)	1850.2
Relative permittivity (real part)	39.98
Relative permittivity (imaginary part)	15.07
Conductivity (S/m)	1.41
Variation (%)	-1.400000
ConvF:	5.49

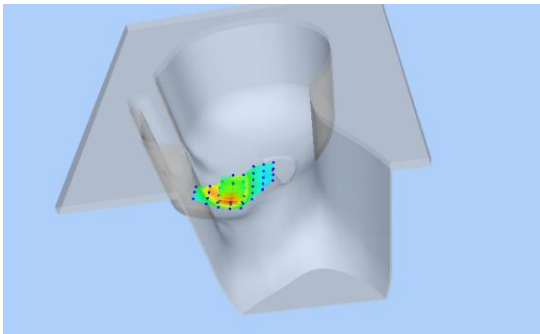
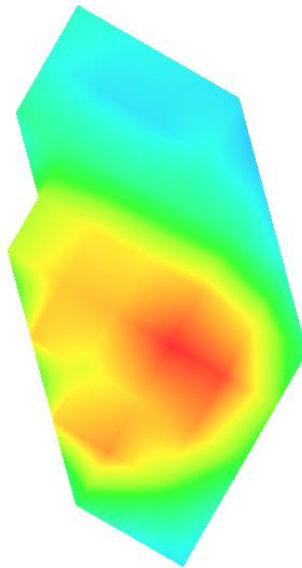


**Maximum location: X=-54.00, Y=-46.00**

<b>SAR 10g (W/Kg)</b>	0.165250
<b>SAR 1g (W/Kg)</b>	0.254945

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.3279	0.2703	0.2062	0.1510	0.1045



3D screen shot	Hot spot position
	

# GSM1900, Back, Middle

Type: Phone measurement (11 points in the volume)

Date of measurement: 21/11/2014

Measurement duration: 6 minutes 52 seconds

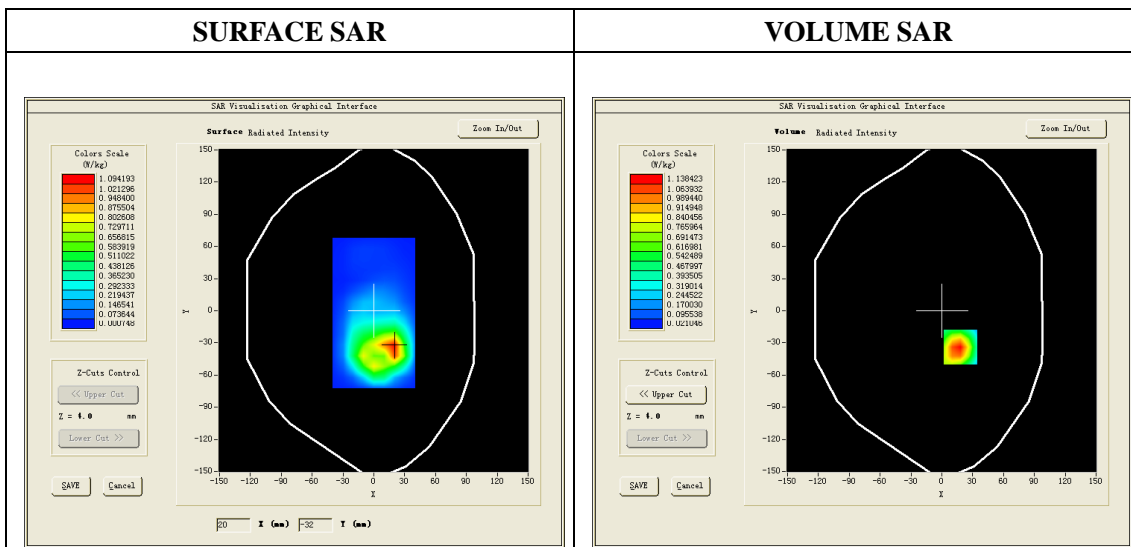
Mobile Phone IMEI number: --

## A. Experimental conditions.

<b>Area Scan</b>	dx=8mm dy=8mm
<b>ZoomScan</b>	5x5x7,dx=8mm dy=8mm dz=5mm
<b>Phantom</b>	Validation plane
<b>Device Position</b>	Back
<b>Band</b>	GSM1900
<b>Channels</b>	661
<b>Signal</b>	GSM (Duty cycle: 1:8)

## B. SAR Measurement Results

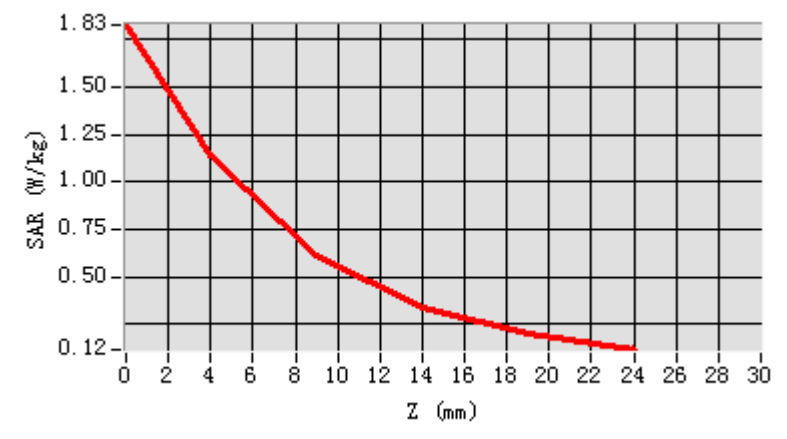
<b>Frequency (MHz)</b>	1880.0
<b>Relative permittivity (real part)</b>	53.28
<b>Relative permittivity (imaginary part)</b>	12.99
<b>Conductivity (S/m)</b>	1.53
<b>Variation (%)</b>	-3.010000
<b>ConvF:</b>	5.65

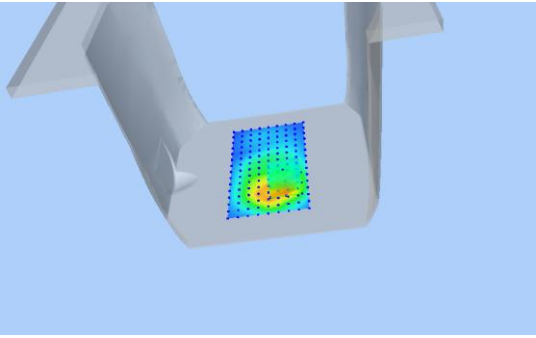
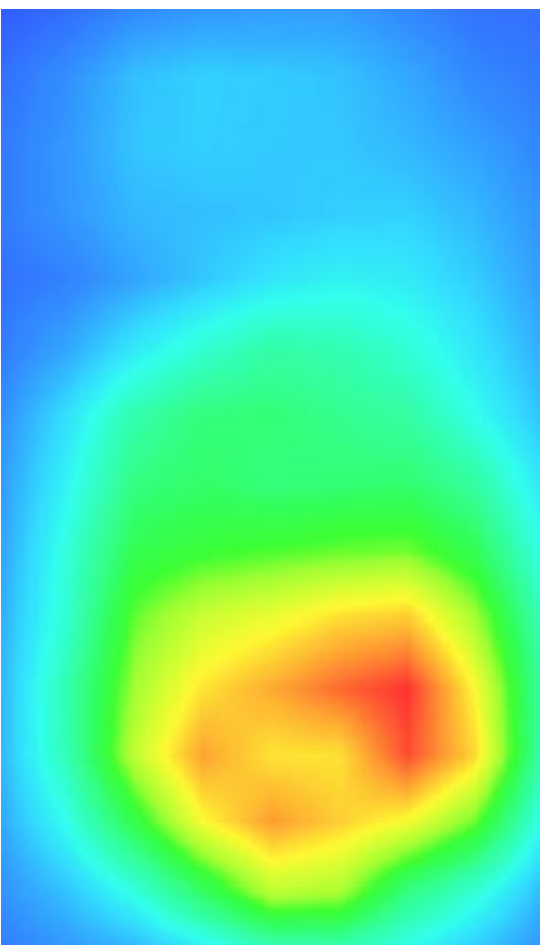


**Maximum location: X=18.00, Y=-34.00**

<b>SAR 10g (W/Kg)</b>	0.673158
<b>SAR 1g (W/Kg)</b>	1.295928

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.8262	1.1384	0.6134	0.3352	0.1963



3D screen shot	Hot spot position
	

# GSM1900, Back, Middle, Repeated testing

Type: Phone measurement (11 points in the volume)

Date of measurement: 21/11/2014

Measurement duration: 6 minutes 52 seconds

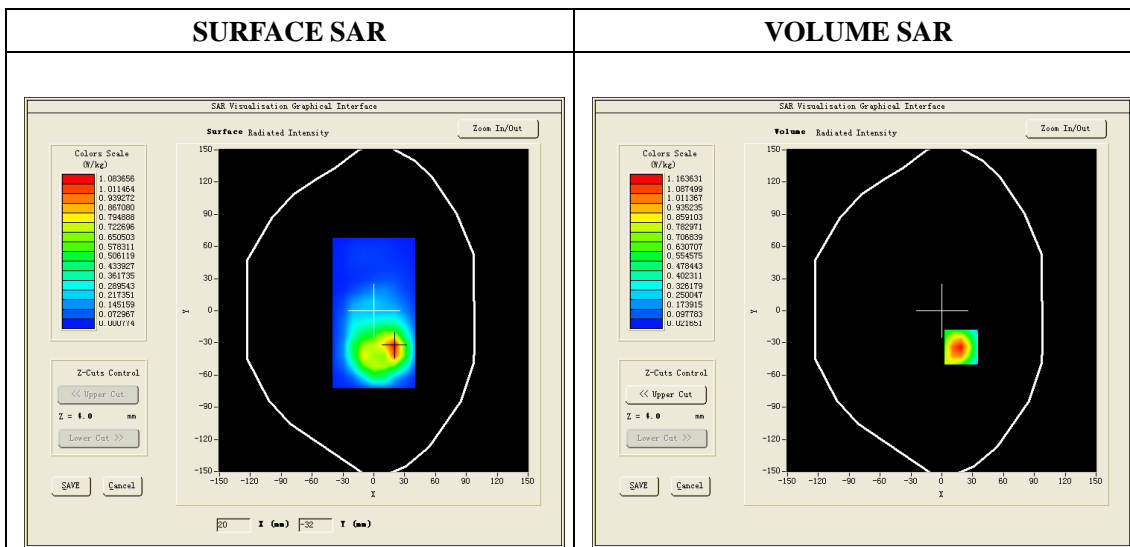
Mobile Phone IMEI number: --

## A. Experimental conditions.

<b>Area Scan</b>	dx=8mm dy=8mm
<b>ZoomScan</b>	5x5x7,dx=8mm dy=8mm dz=5mm
<b>Phantom</b>	Validation plane
<b>Device Position</b>	Back
<b>Band</b>	GSM1900
<b>Channels</b>	661
<b>Signal</b>	GSM (Duty cycle: 1:8)

## B. SAR Measurement Results

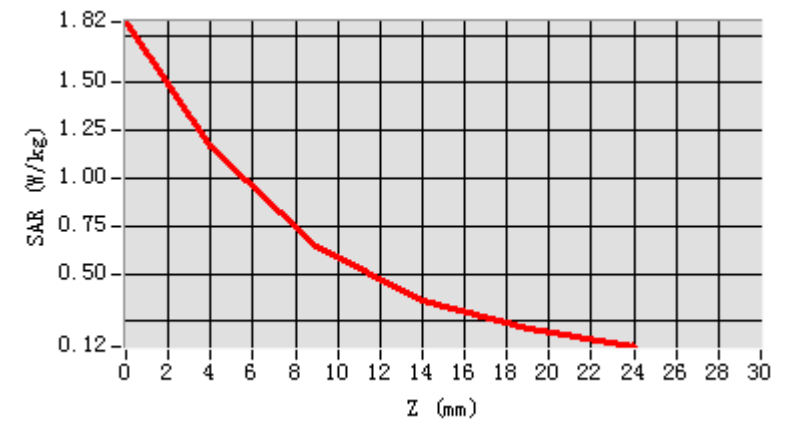
<b>Frequency (MHz)</b>	1880.0
<b>Relative permittivity (real part)</b>	53.28
<b>Relative permittivity (imaginary part)</b>	12.99
<b>Conductivity (S/m)</b>	1.53
<b>Variation (%)</b>	-1.820000
<b>ConvF:</b>	5.65

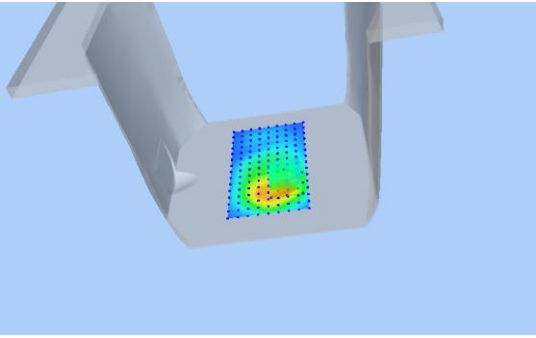
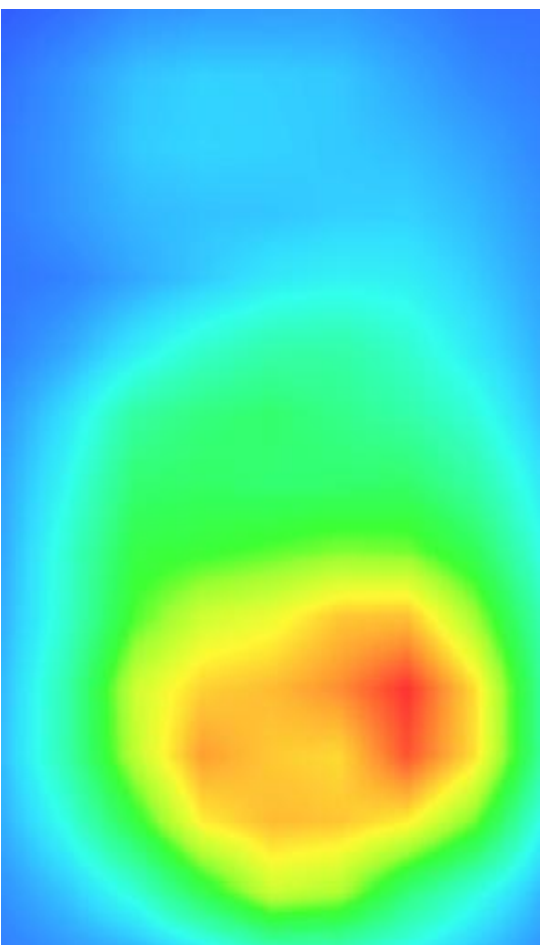


**Maximum location: X=19.00, Y=-34.00**

<b>SAR 10g (W/Kg)</b>	0.665618
<b>SAR 1g (W/Kg)</b>	1.282632

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.8200	1.1636	0.6470	0.3600	0.2076



3D screen shot	Hot spot position
 <p>A 3D perspective view of a grey, L-shaped device. A small rectangular area on the horizontal part of the device is highlighted with a color-coded heatmap, showing a central red/yellow hot spot transitioning to blue at the edges.</p>	 <p>A 2D heatmap visualization of the hot spot. It shows a circular gradient where the center is red (highest intensity) and the intensity decreases through yellow and green to blue (lowest intensity) at the periphery.</p>

# GSM1900, Back, Middle, Repeated testing

Type: Phone measurement (11 points in the volume)

Date of measurement: 21/11/2014

Measurement duration: 6 minutes 52 seconds

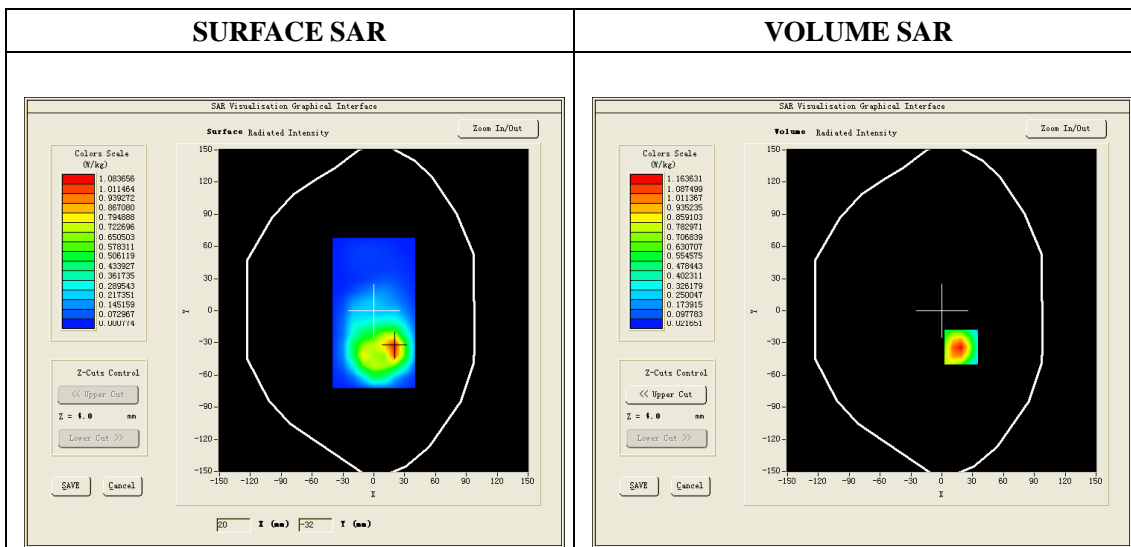
Mobile Phone IMEI number: --

## A. Experimental conditions.

<b>Area Scan</b>	dx=8mm dy=8mm
<b>ZoomScan</b>	5x5x7,dx=8mm dy=8mm dz=5mm
<b>Phantom</b>	Validation plane
<b>Device Position</b>	Back
<b>Band</b>	GSM1900
<b>Channels</b>	661
<b>Signal</b>	GSM (Duty cycle: 1:8)

## B. SAR Measurement Results

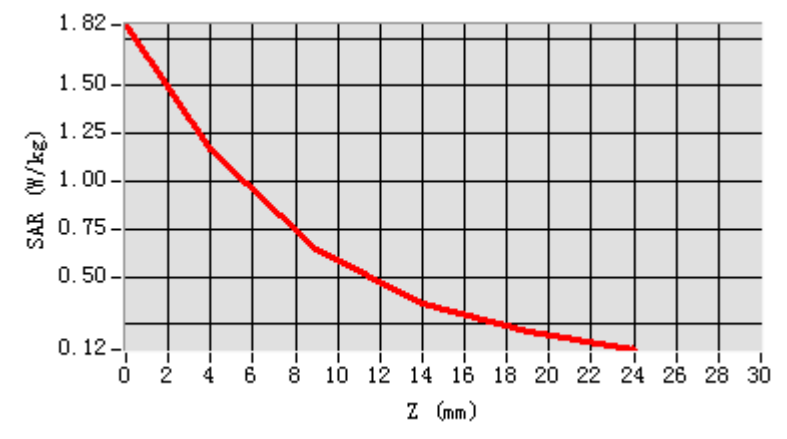
<b>Frequency (MHz)</b>	1880.0
<b>Relative permittivity (real part)</b>	53.28
<b>Relative permittivity (imaginary part)</b>	12.99
<b>Conductivity (S/m)</b>	1.53
<b>Variation (%)</b>	-1.240000
<b>ConvF:</b>	5.65

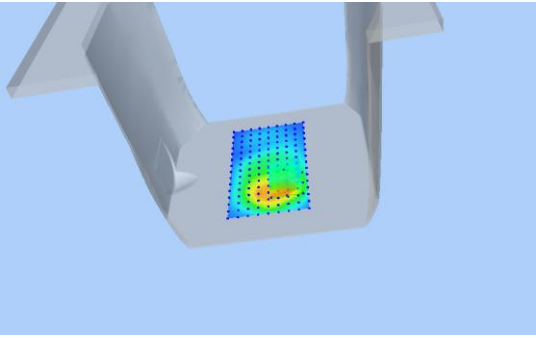
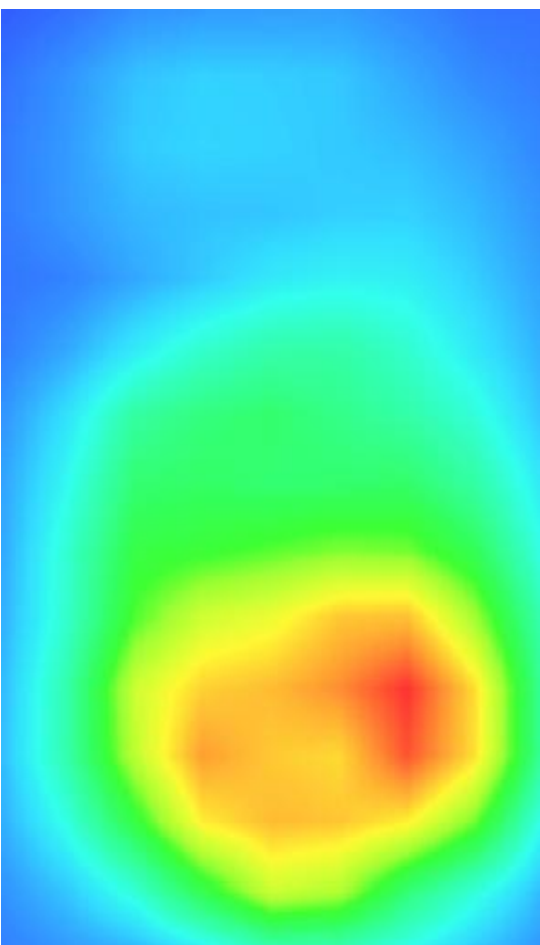


**Maximum location: X=19.00, Y=-34.00**

<b>SAR 10g (W/Kg)</b>	0.671057
<b>SAR 1g (W/Kg)</b>	1.287425

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.8200	1.1638	0.6474	0.3602	0.2068



3D screen shot	Hot spot position
	



# GPRS1900, BACK, Middle

Type: Phone measurement ( 11 points in the volume)

Date of measurement: 21/11/2014

Measurement duration: 7 minutes 31 seconds

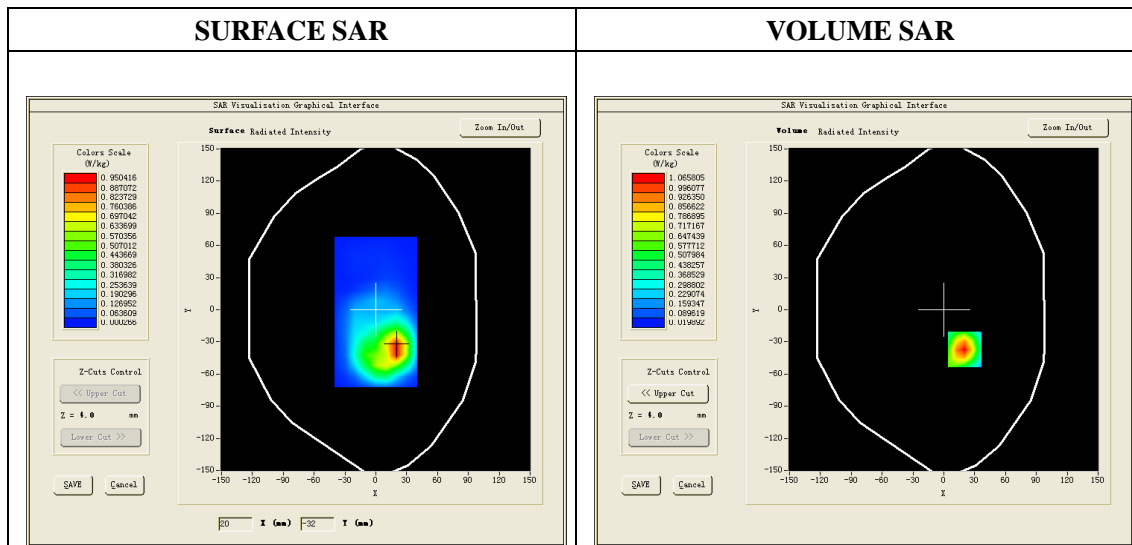
Mobile Phone IMEI number: --

## A. Experimental conditions.

Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	CUSTOM (GPRS1900_1Tx)
Channels	661
Signal	GPRS (Duty cycle: 1:8)

## B. SAR Measurement Results

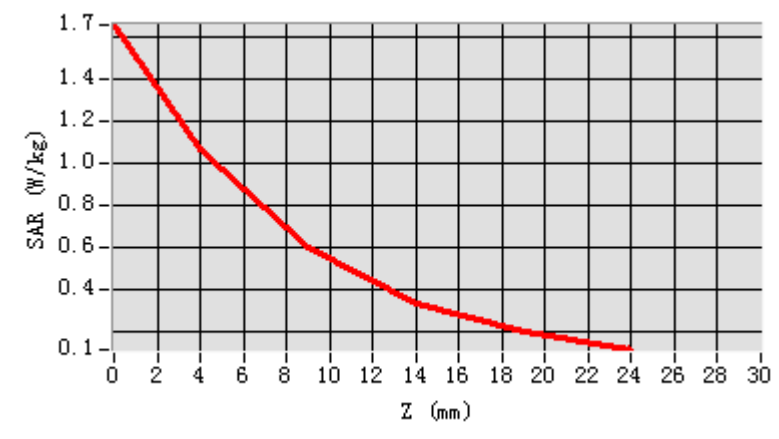
Frequency (MHz)	1880.0
Relative permittivity (real part)	53.28
Relative permittivity (imaginary part)	12.99
Conductivity (S/m)	1.53
Variation (%)	-3.720000
ConvF:	5.65

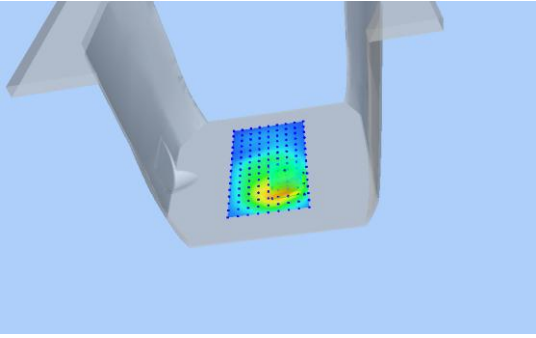
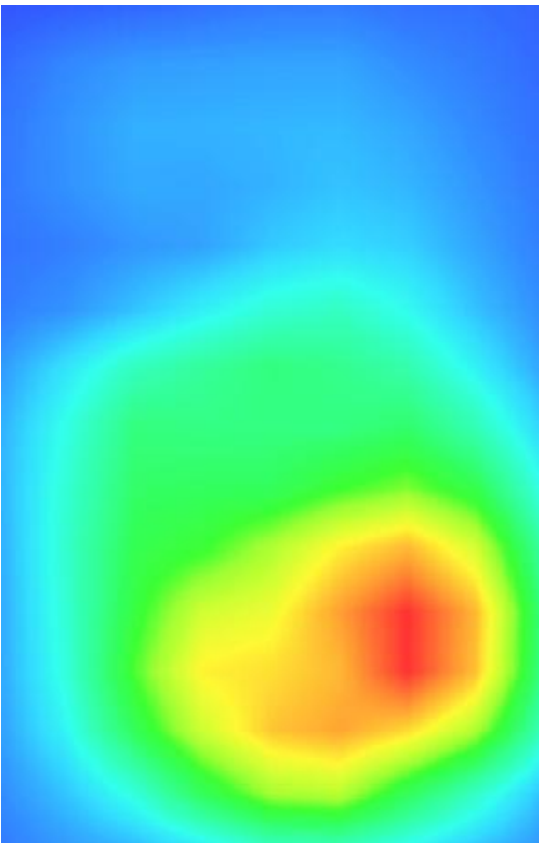


**Maximum location: X=20.00, Y=-37.00**

<b>SAR 10g (W/Kg)</b>	0.522610
<b>SAR 1g (W/Kg)</b>	1.014037

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.6573	1.0658	0.5996	0.3404	0.2025



3D screen shot	Hot spot position
	

# GPRS1900, BACK, Middle, Repeated testing

Type: Phone measurement ( 11 points in the volume)

Date of measurement:21/11/2014

Measurement duration: 7 minutes 31 seconds

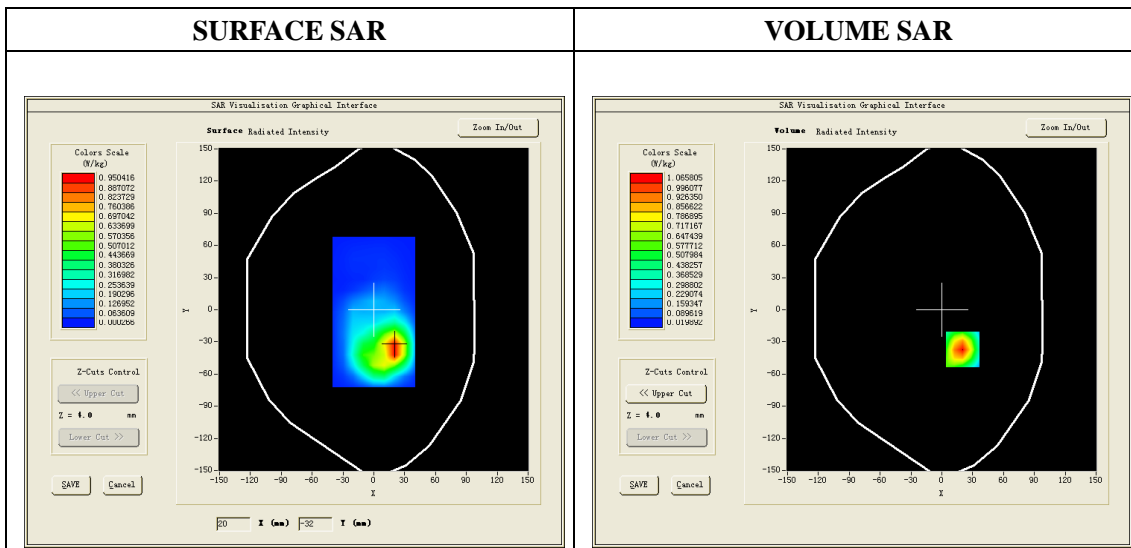
Mobile Phone IMEI number: --

### A. Experimental conditions.

<b>Area Scan</b>	surf_sam_plan.txt
<b>ZoomScan</b>	5x5x7,dx=8mm dy=8mm dz=5mm
<b>Phantom</b>	Validation plane
<b>Device Position</b>	Body
<b>Band</b>	CUSTOM (GPRS1900_1Tx)
<b>Channels</b>	661
<b>Signal</b>	GPRS (Duty cycle: 1:8)

### B. SAR Measurement Results

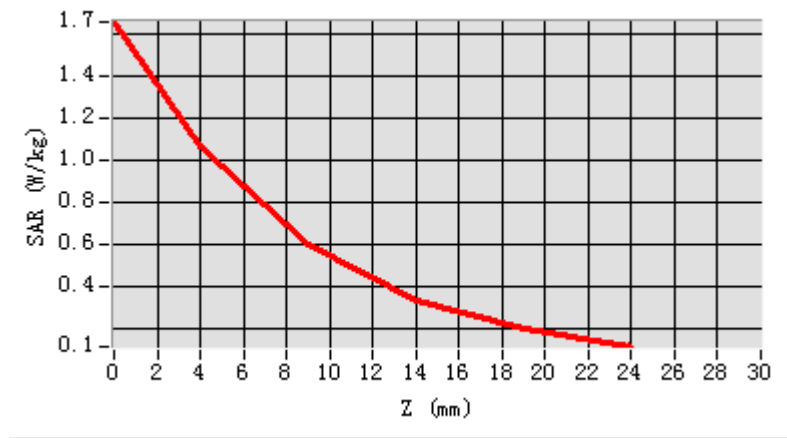
<b>Frequency (MHz)</b>	1880.0
<b>Relative permittivity (real part)</b>	53.28
<b>Relative permittivity (imaginary part)</b>	12.99
<b>Conductivity (S/m)</b>	1.53
<b>Variation (%)</b>	-1.020000
<b>ConvF:</b>	5.65

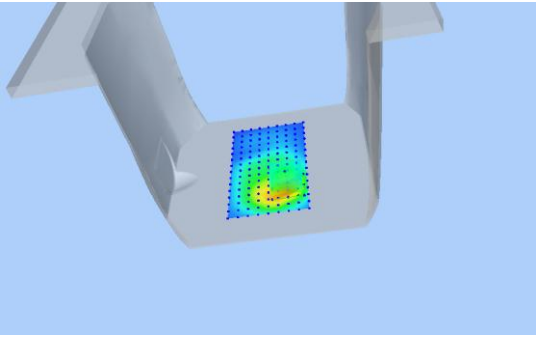
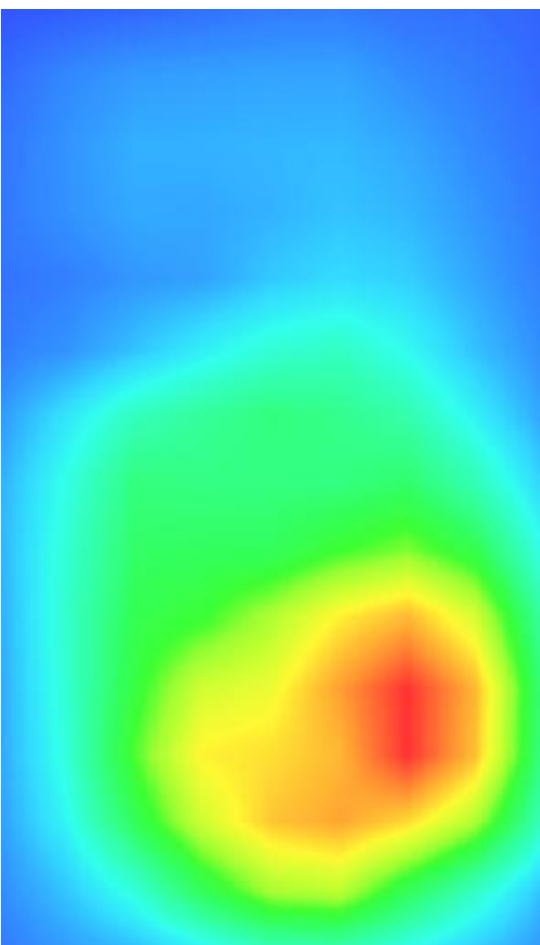


**Maximum location: X=20.00, Y=-37.00**

<b>SAR 10g (W/Kg)</b>	0.512573
<b>SAR 1g (W/Kg)</b>	1.003247

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.6425	1.0534	0.5948	0.3235	0.2012



3D screen shot	Hot spot position
	

# WCDMA850, Left Cheek, Middle

Type: Phone measurement ( 11 points in the volume)

Date of measurement: 19/11/2014

Measurement duration: 5 minutes 19 seconds

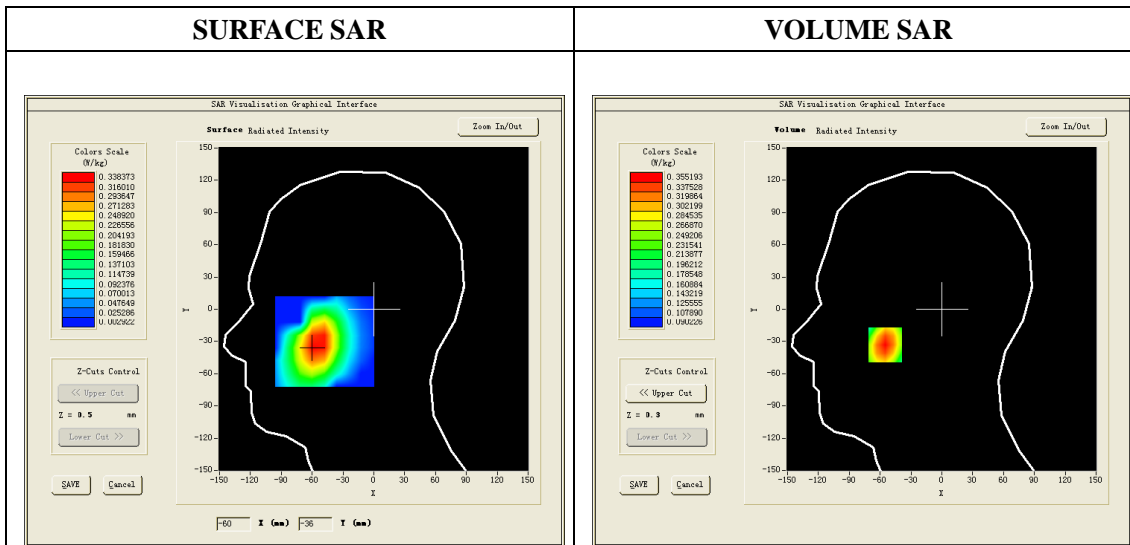
Mobile Phone IMEI number: --

### A. Experimental conditions.

<b>Area Scan</b>	sam_direct_droit2_surf8mm.txt
<b>ZoomScan</b>	5x5x7,dx=8mm dy=8mm dz=5mm
<b>Phantom</b>	Left head
<b>Device Position</b>	Cheek
<b>Band</b>	Band5_WCDMA850
<b>Channels</b>	4183
<b>Signal</b>	WCDMA (Duty cycle: 1:1)

### B. SAR Measurement Results

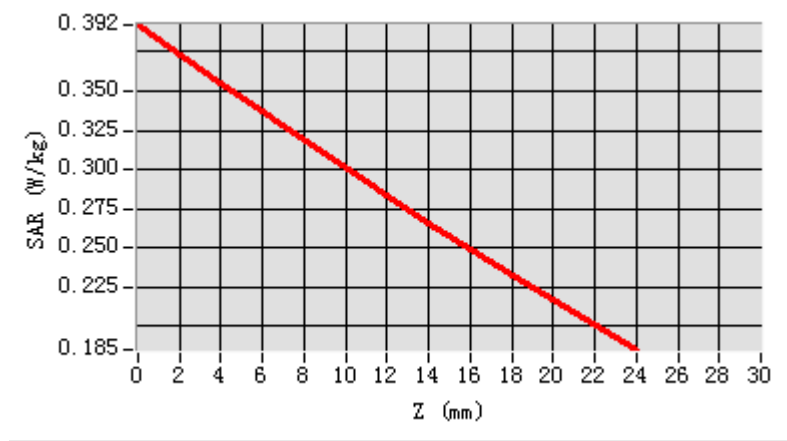
<b>Frequency (MHz)</b>	836.6
<b>Relative permittivity (real part)</b>	41.45
<b>Relative permittivity (imaginary part)</b>	15.07
<b>Conductivity (S/m)</b>	0.91
<b>Variation (%)</b>	-0.970000
<b>ConvF:</b>	5.51

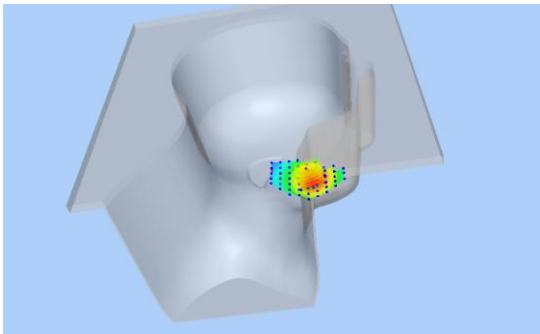
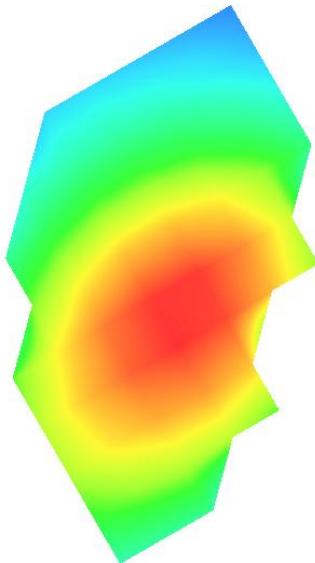


**Maximum location: X=-55.00, Y=-33.00**

<b>SAR 10g (W/Kg)</b>	0.270419
<b>SAR 1g (W/Kg)</b>	0.342508

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.3920	0.3552	0.3101	0.2662	0.2243



3D screen shot	Hot spot position
	

# WCDMA850, Edge D, Middle

Type: Phone measurement ( 11 points in the volume)

Date of measurement: 19/11/2014

Measurement duration: 7 minutes 26 seconds

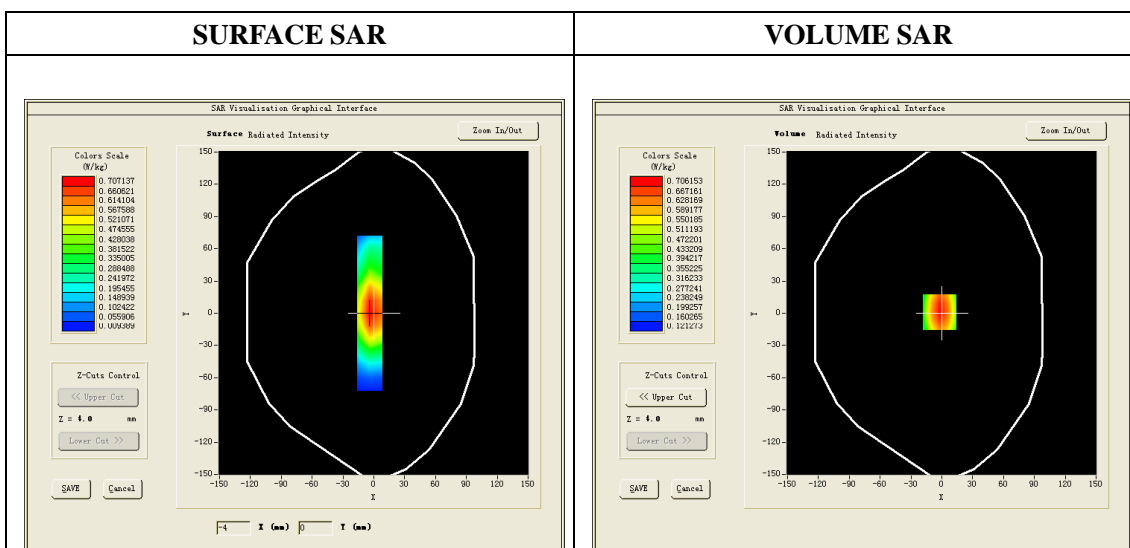
Mobile Phone IMEI number: --

## A. Experimental conditions.

Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Edge D
Band	Band5_WCDMA850
Channels	4183
Signal	WCDMA (Crest factor: 1:1)

## B. SAR Measurement Results

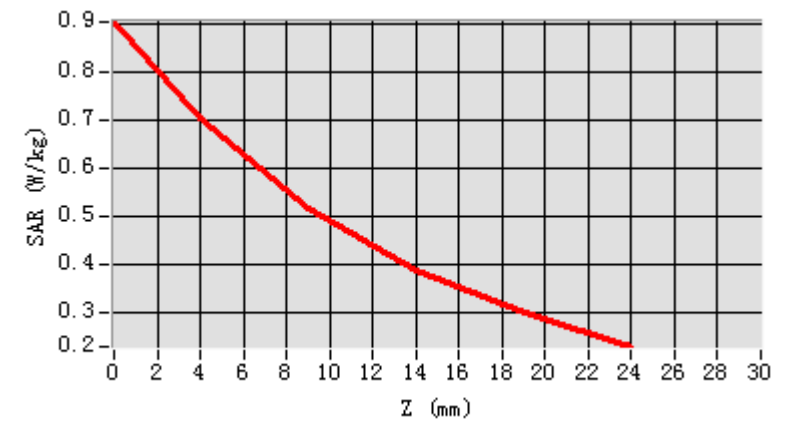
Frequency (MHz)	836.6
Relative permittivity (real part)	55.26
Relative permittivity (imaginary part)	21.71
Conductivity (S/m)	0.98
Variation (%)	-1.680000
ConvF:	5.68

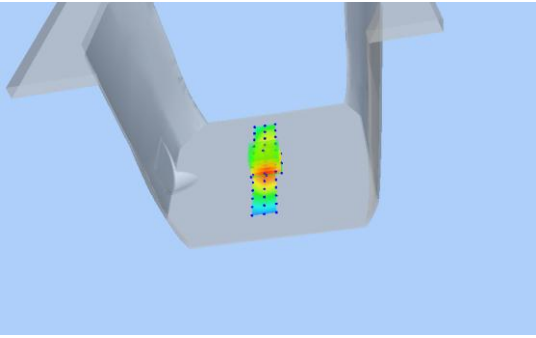



**Maximum location: X=-2.00, Y=1.00**

SAR 10g (W/Kg)	0.515136
SAR 1g (W/Kg)	0.742315

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.9056	0.7062	0.5201	0.3902	0.2998



3D screen shot	Hot spot position
	



# WCDMA1900, Left Cheek, Middle

Type: Phone measurement ( 11 points in the volume)

Date of measurement: 21/11/2014

Measurement duration: 6 minutes 6 seconds

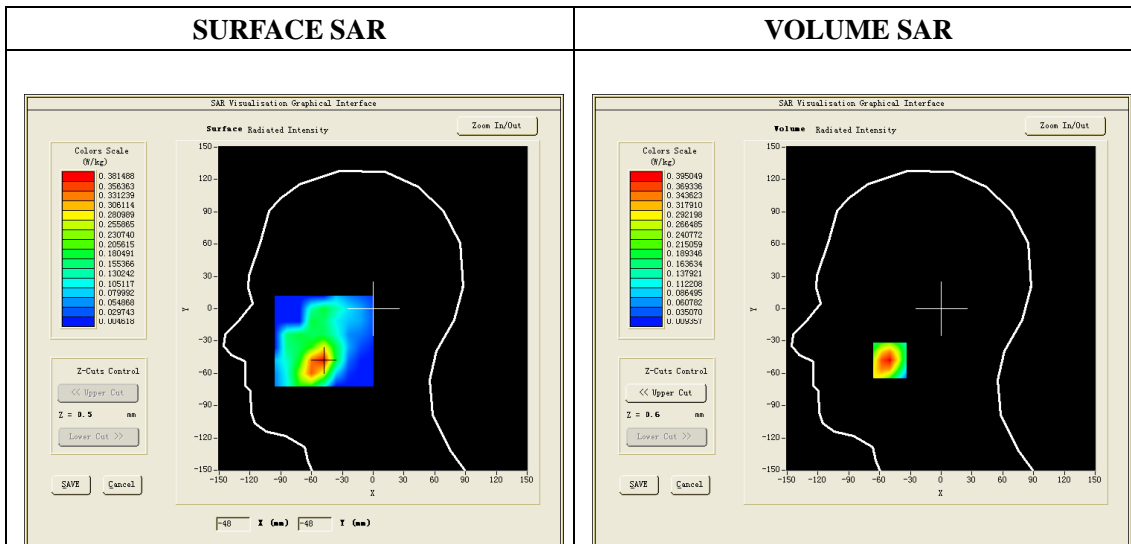
Mobile Phone IMEI number: --

**A. Experimental conditions.**

<b>Area Scan</b>	sam_direct_droit2_surf8mm.txt
<b>ZoomScan</b>	5x5x7,dx=8mm dy=8mm dz=5mm
<b>Phantom</b>	Left head
<b>Device Position</b>	Cheek
<b>Band</b>	Band2_WCDMA1900
<b>Channels</b>	9400
<b>Signal</b>	WCDMA (Duty cycle: 1:1)

**B. SAR Measurement Results**

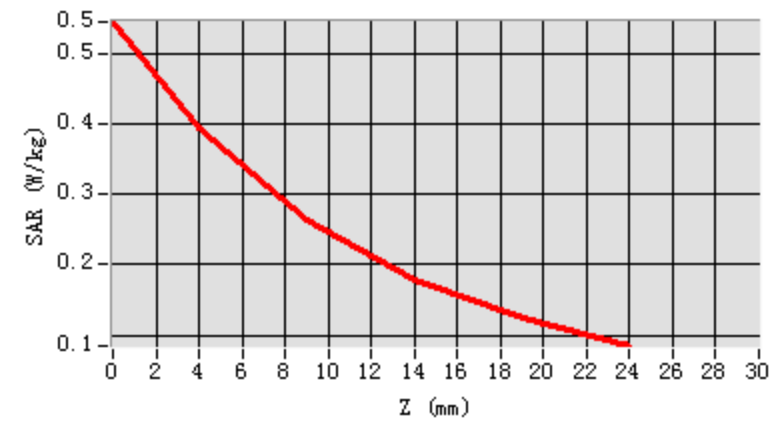
<b>Frequency (MHz)</b>	1880.0
<b>Relative permittivity (real part)</b>	39.98
<b>Relative permittivity (imaginary)</b>	15.07
<b>Conductivity (S/m)</b>	1.41
<b>Variation (%)</b>	0.190000
<b>ConvF:</b>	5.49

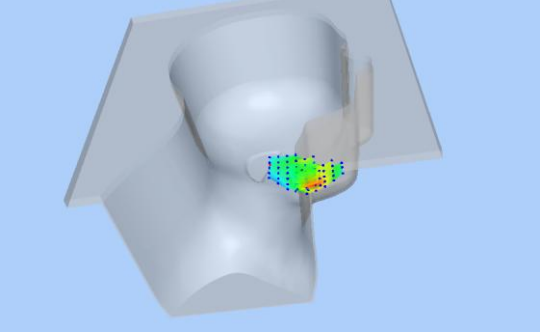
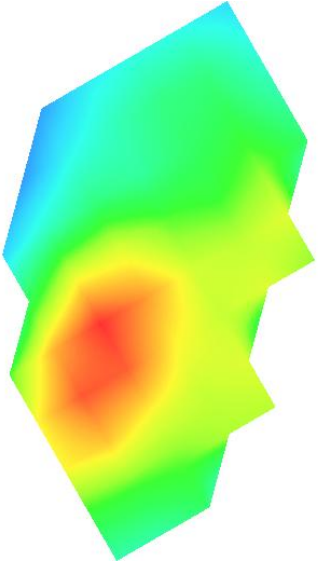


**Maximum location: X=-50.00, Y=-48.00**

<b>SAR 10g (W/Kg)</b>	0.223731
<b>SAR 1g (W/Kg)</b>	0.372996

<b>Z (mm)</b>	<b>0.00</b>	<b>4.00</b>	<b>9.00</b>	<b>14.00</b>	<b>19.00</b>
<b>SAR (W/Kg)</b>	<b>0.5458</b>	<b>0.3950</b>	<b>0.2628</b>	<b>0.1774</b>	<b>0.1229</b>



3D screen shot	Hot spot position
	

# WCDMA1900, FACE, Middle

Type: Phone measurement ( 11 points in the volume)

Date of measurement: 21/11/2014

Measurement duration: 7 minutes 37 seconds

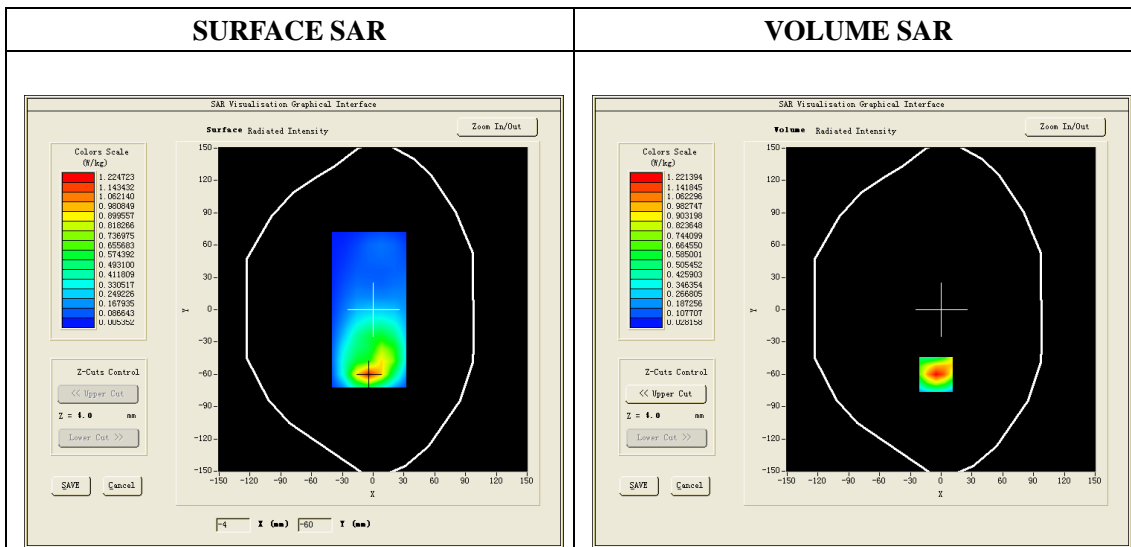
Mobile Phone IMEI number: --

### A. Experimental conditions.

Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Back
Band	Band2_WCDMA1900
Channels	9400
Signal	WCDMA (Duty cycle: 1:1)

### B. SAR Measurement Results

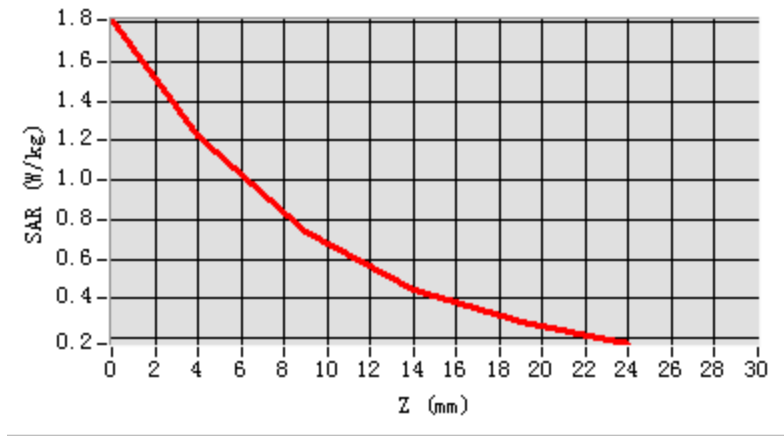
Frequency (MHz)	1880.0
Relative permittivity (real part)	53.28
Relative permittivity (imaginary)	12.99
Conductivity (S/m)	1.53
Variation (%)	-0.710000
ConvF:	5.65

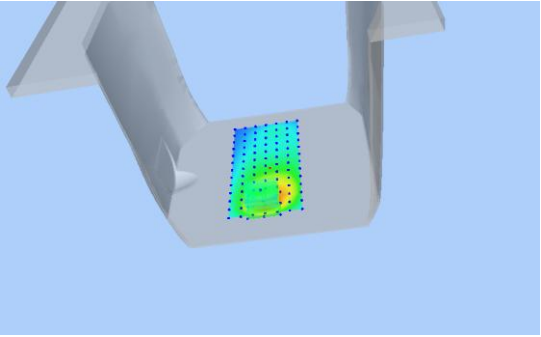
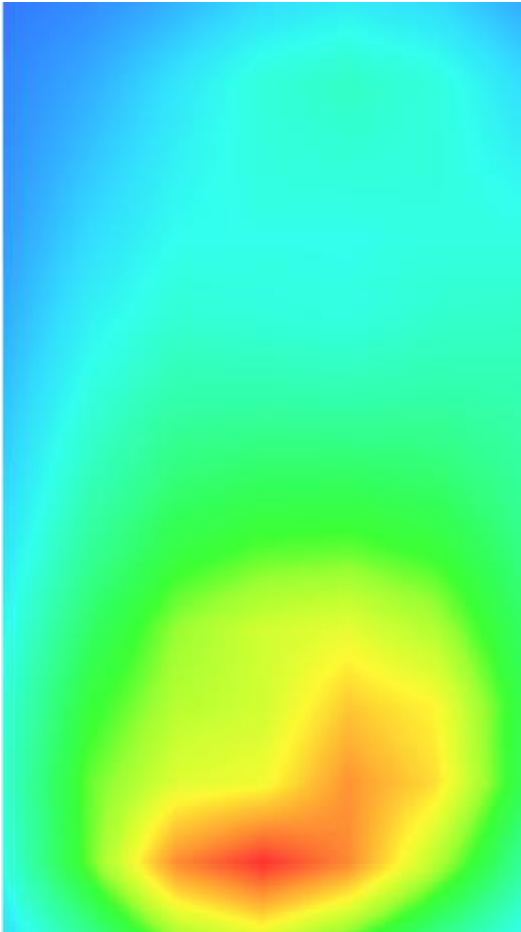


**Maximum location: X=-5.00, Y=-60.00**

SAR 10g (W/Kg)	0.614640
SAR 1g (W/Kg)	1.130835

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.8100	1.2214	0.7356	0.4468	0.2801



3D screen shot	Hot spot position
	

# WCDMA1900, Face, Middle, Repeated testing

Type: Phone measurement ( 11 points in the volume)

Date of measurement: 21/11/2014

Measurement duration: 7 minutes 37 seconds

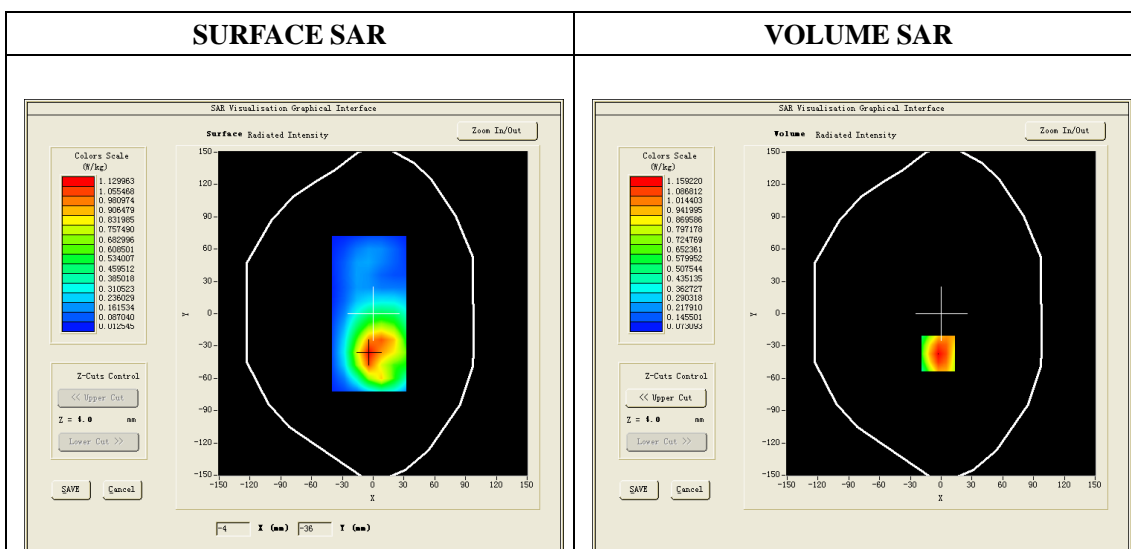
Mobile Phone IMEI number: --

### A. Experimental conditions.

<b>Area Scan</b>	surf_sam_plan.txt
<b>ZoomScan</b>	5x5x7,dx=8mm dy=8mm dz=5mm
<b>Phantom</b>	Validation plane
<b>Device Position</b>	Back
<b>Band</b>	Band2_WCDMA1900
<b>Channels</b>	9400
<b>Signal</b>	WCDMA (Duty cycle: 1:1)

### B. SAR Measurement Results

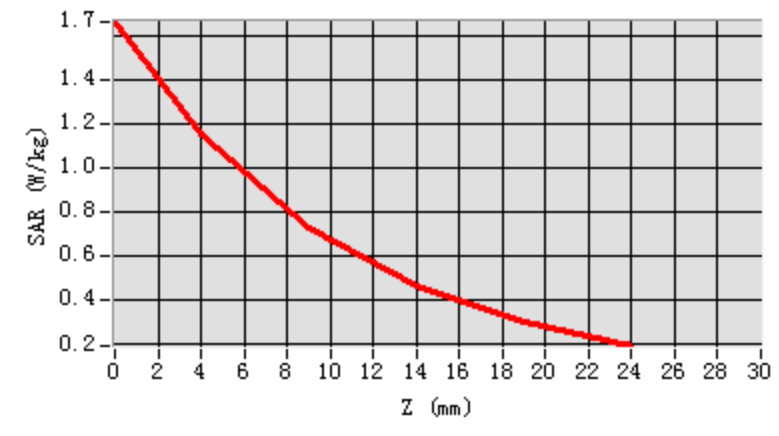
<b>Frequency (MHz)</b>	1880.0
<b>Relative permittivity (real part)</b>	53.28
<b>Relative permittivity (imaginary)</b>	12.99
<b>Conductivity (S/m)</b>	1.53
<b>Variation (%)</b>	1.050000
<b>ConvF:</b>	5.65

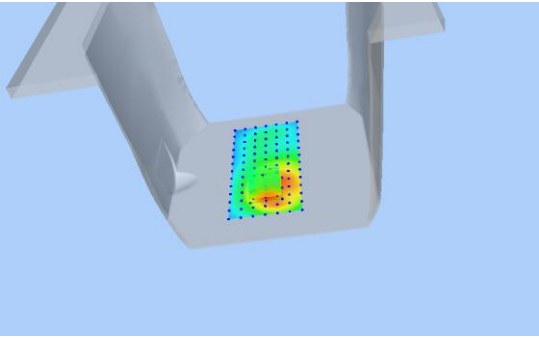
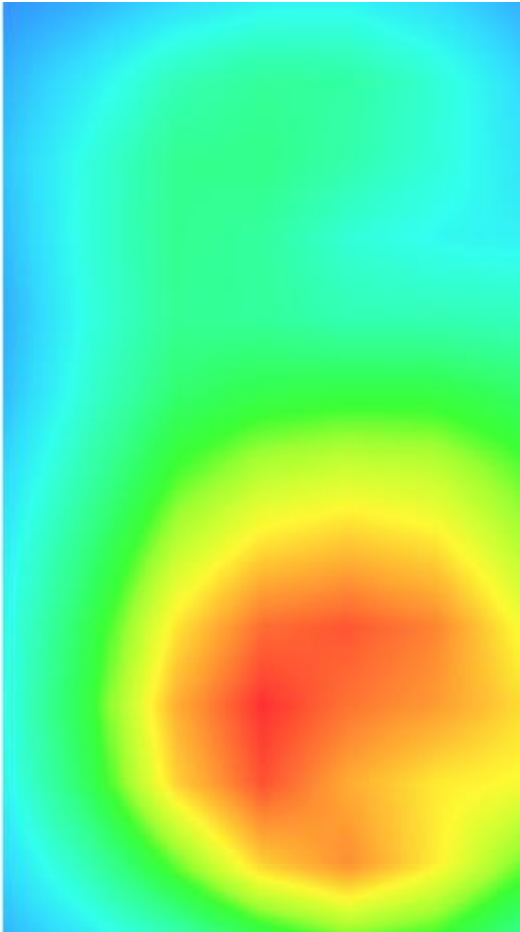


**Maximum location: X=-3.00, Y=-37.00**

<b>SAR 10g (W/Kg)</b>	0.675846
<b>SAR 1g (W/Kg)</b>	1.124327

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.6671	1.1595	0.7284	0.4613	0.2992



3D screen shot	Hot spot position
	

# Wi-Fi 802.11b ,Right Cheek, Middle

Type: Phone measurement ( 11 points in the volume)

Date of measurement: 24/11/2014

Measurement duration: 7 minutes 21 seconds

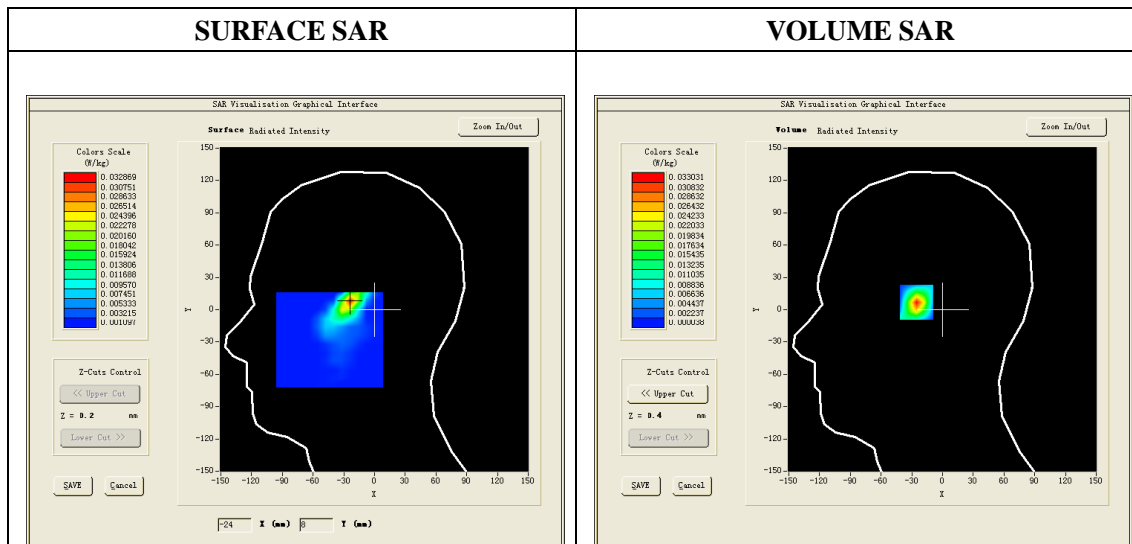
Mobile Phone IMEI number: --

## A. Experimental conditions.

Area Scan	dx=8mm dy=8mm
ZoomScan	5x5x7,dx=5mm dy=5mm dz=5mm
Phantom	Right head
Device Position	Cheek
Band	IEEE 802.11b ISM
Channels	6
Signal	DSSS (Crest factor: 1:1)

## B. SAR Measurement Results

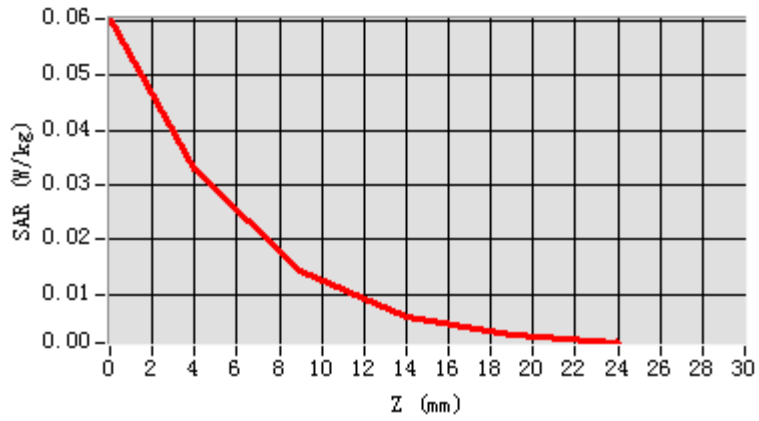
Frequency (MHz)	2437
Relative permittivity (real part)	38.99
Relative permittivity (imaginary part)	13.19
Conductivity (S/m)	1.81
Variation (%)	3.210000
ConvF:	4.81



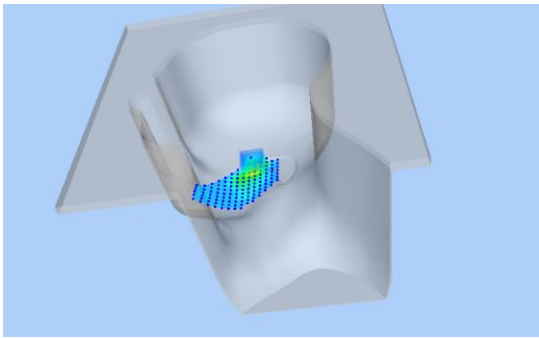
**Maximum location: X=-24.00, Y=8.00**

SAR 10g (W/Kg)	0.011458
SAR 1g (W/Kg)	0.029436

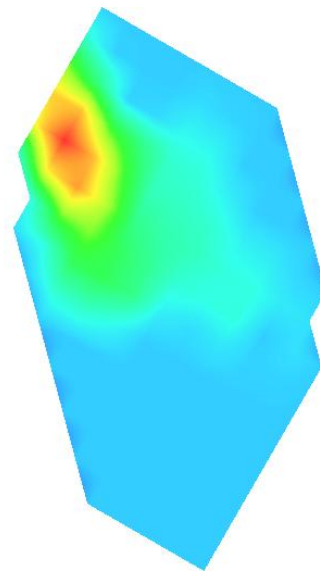
**Z axis scan**



**3D screen shot**



**Hot spot position**





# Wi-Fi 802.11b , Back, Middle

Type: Phone measurement ( 11 points in the volume)

Date of measurement: 24/11/2014

Measurement duration: 7 minutes 11 seconds

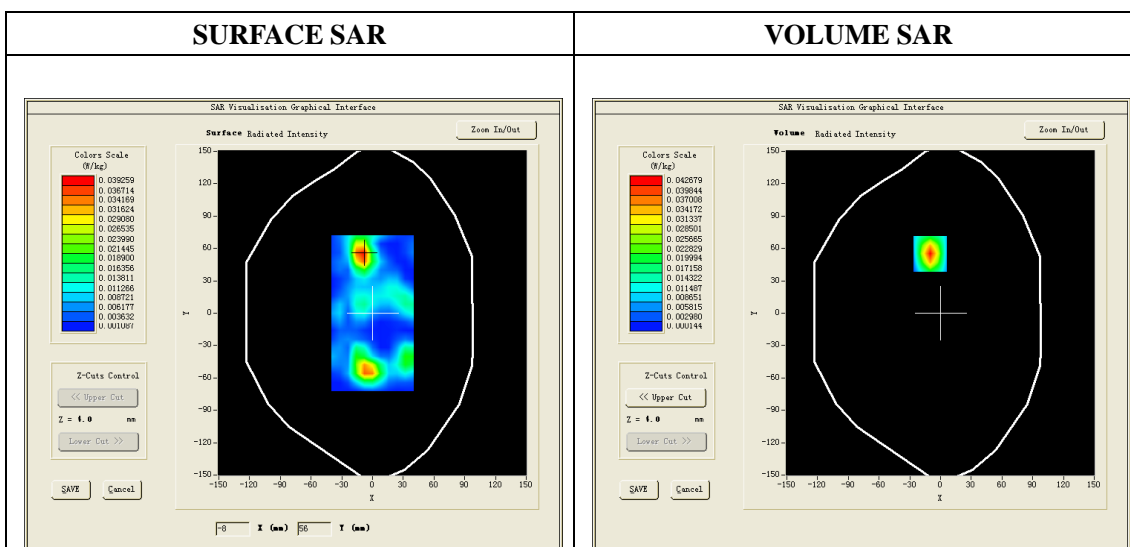
Mobile Phone IMEI number: --

## A. Experimental conditions.

Area Scan	dx=8mm dy=8mm
ZoomScan	5x5x7,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Back
Band	IEEE 802.11b ISM
Channels	6
Signal	DSSS (Crest factor: 1:1)

## B. SAR Measurement Results

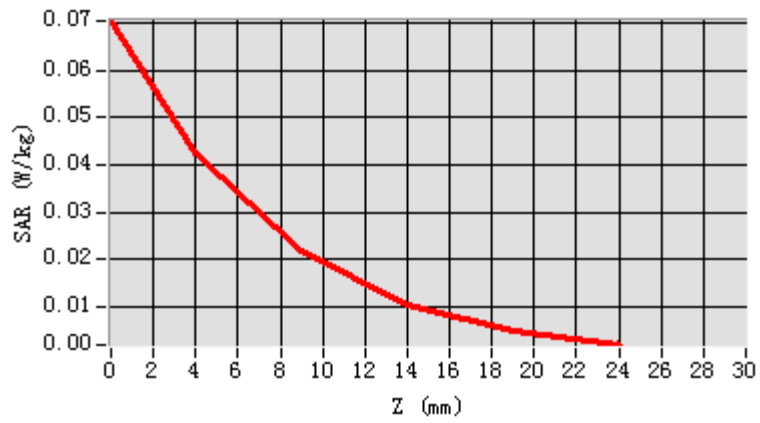
Frequency (MHz)	2437
Relative permittivity (real part)	52.65
Relative permittivity (imaginary part)	13.02
Conductivity (S/m)	1.96
Variation (%)	0.230000
ConvF:	4.91



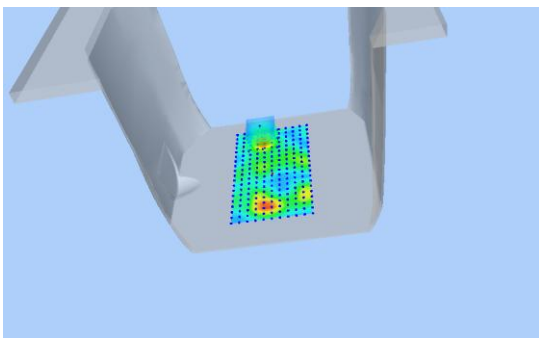
**Maximum location: X=-10.00, Y=55.00**

SAR 10g (W/Kg)	0.024563
SAR 1g (W/Kg)	0.044837

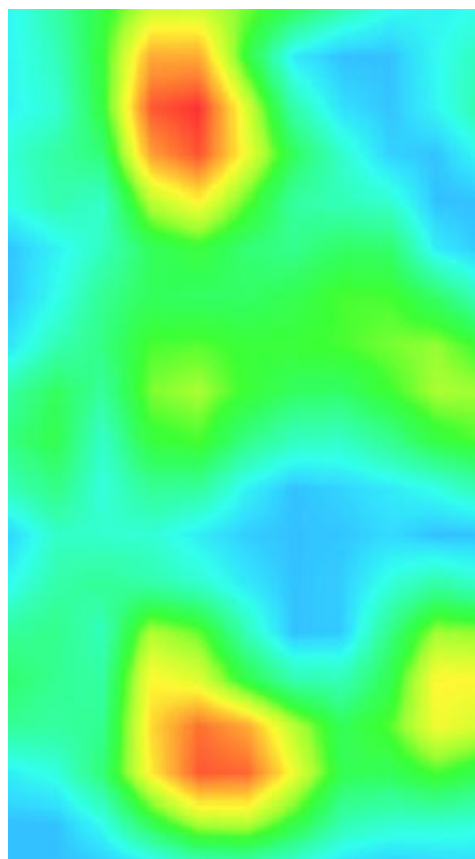
**Z axis scan**



**3D screen shot**



**Hot spot position**



# LTE Band 2 , Left Cheek, Middle

Type: Phone measurement ( 11 points in the volume)

Date of measurement: 27/01/2015

Measurement duration: 7 minutes 37 seconds

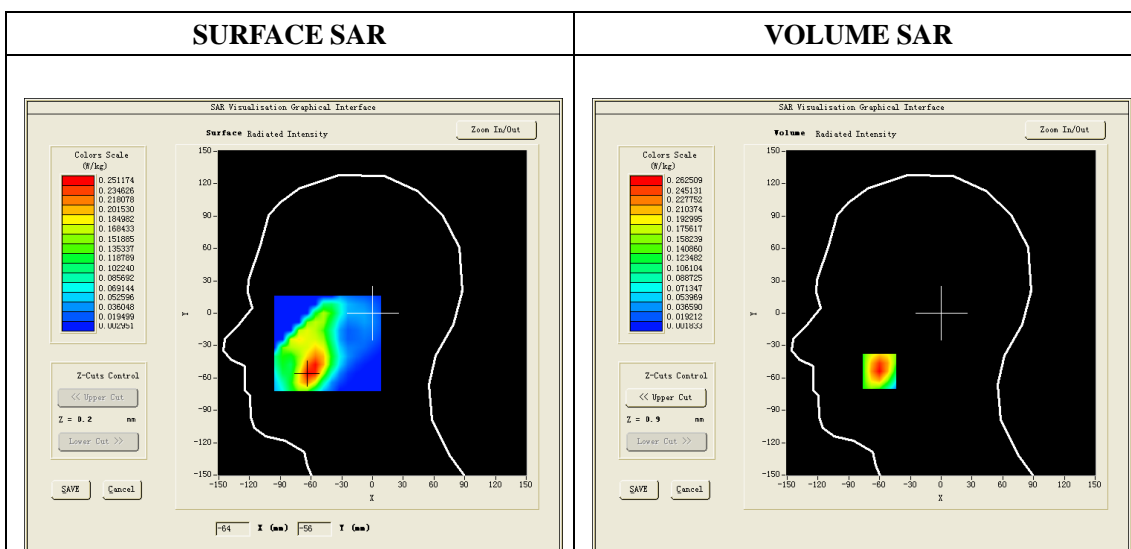
Mobile Phone IMEI number: --

**A. Experimental conditions.**

<b>Area Scan</b>	surf_sam_plan.txt
<b>ZoomScan</b>	5x5x7,dx=8mm dy=8mm dz=5mm
<b>Phantom</b>	Left head
<b>Device Position</b>	Cheek
<b>Band</b>	LTE Band2
<b>Channels</b>	Middle
<b>Signal</b>	Duty cycle: 1:1

**B. SAR Measurement Results**

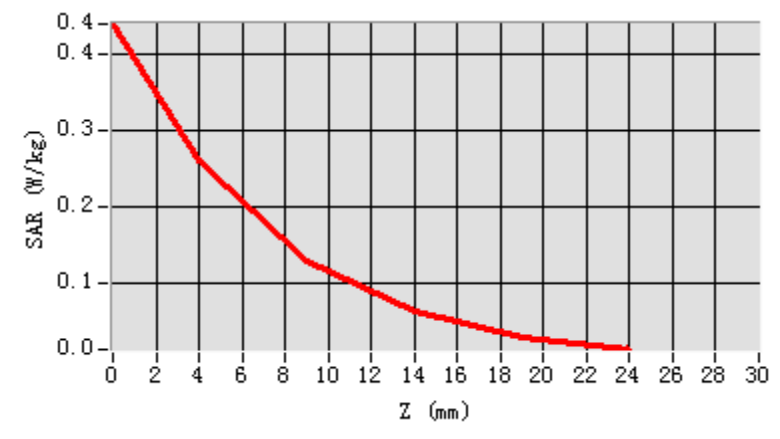
<b>Frequency (MHz)</b>	1879.500000
<b>Relative permittivity (real part)</b>	39.98
<b>Relative permittivity (imaginary)</b>	15.07
<b>Conductivity (S/m)</b>	1.40
<b>Variation (%)</b>	2.870000
<b>ConvF:</b>	5.49

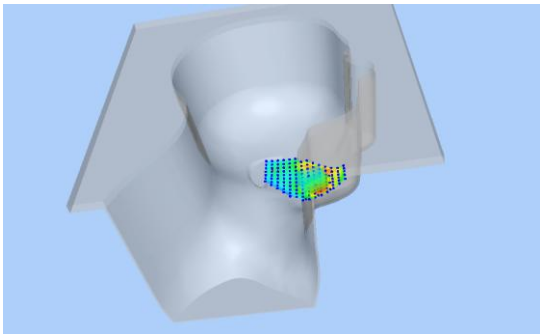
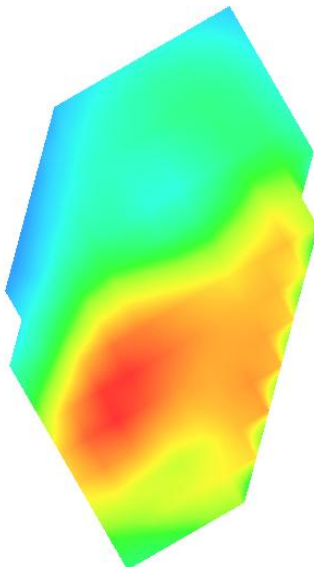


**Maximum location: X=-60.00, Y=-54.00**

<b>SAR 10g (W/Kg)</b>	0.125850
<b>SAR 1g (W/Kg)</b>	0.247490

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.4401	0.2625	0.1304	0.0629	0.0309



3D screen shot	Hot spot position
	

# LTE Band 2 , Edge C, Middle

Type: Phone measurement ( 11 points in the volume)

Date of measurement: 27/01/2015

Measurement duration: 7 minutes 37 seconds

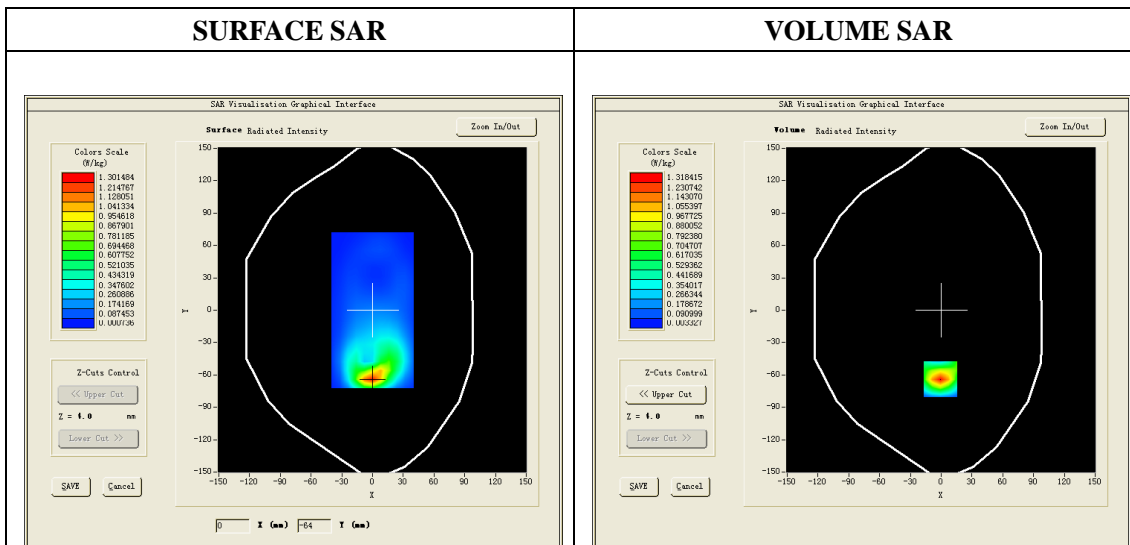
Mobile Phone IMEI number: --

### A. Experimental conditions.

<b>Area Scan</b>	surf_sam_plan.txt
<b>ZoomScan</b>	5x5x7,dx=8mm dy=8mm dz=5mm
<b>Phantom</b>	Validation plane
<b>Device Position</b>	Edge C
<b>Band</b>	LTE Band2
<b>Channels</b>	Middle
<b>Signal</b>	Duty cycle: 1:1

### B. SAR Measurement Results

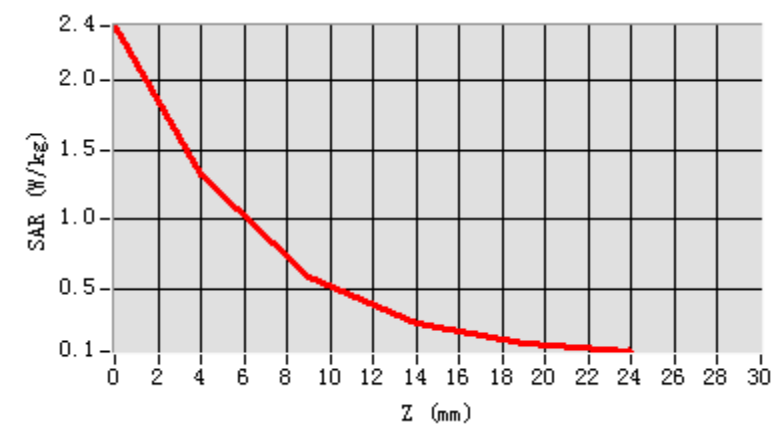
<b>Frequency (MHz)</b>	1879.500000
<b>Relative permittivity (real part)</b>	53.28
<b>Relative permittivity (imaginary)</b>	12.99
<b>Conductivity (S/m)</b>	1.53
<b>Variation (%)</b>	0.210000
<b>ConvF:</b>	5.65

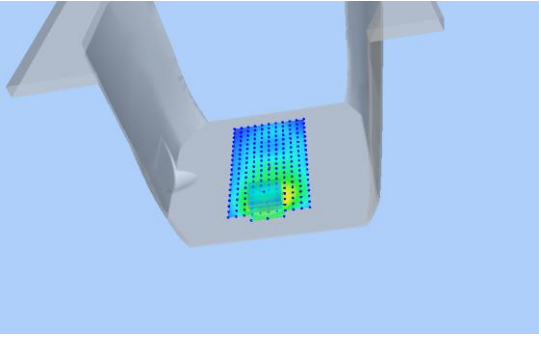
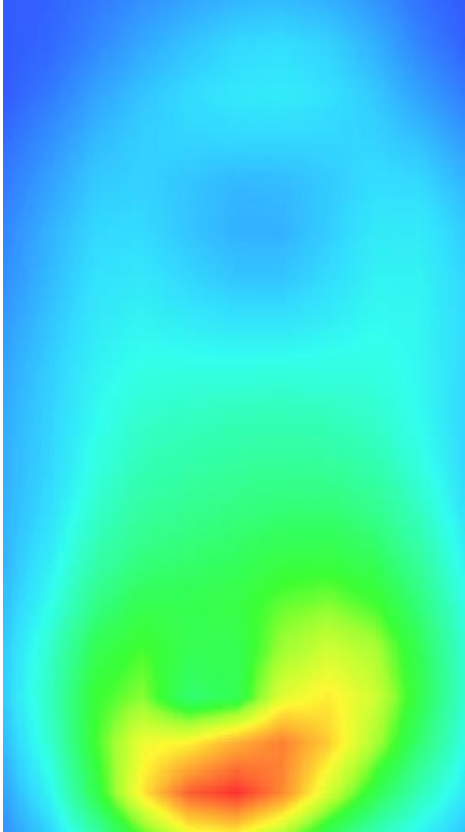


**Maximum location: X=-1.00, Y=-64.00**

<b>SAR 10g (W/Kg)</b>	0.568510
<b>SAR 1g (W/Kg)</b>	1.317598

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	2.3890	1.3184	0.5799	0.2464	0.1126



3D screen shot	Hot spot position
	

# LTE Band 2 , Edge C, Middle, Repeat 1

Type: Phone measurement ( 11 points in the volume)

Date of measurement: 27/01/2015

Measurement duration: 7 minutes 37 seconds

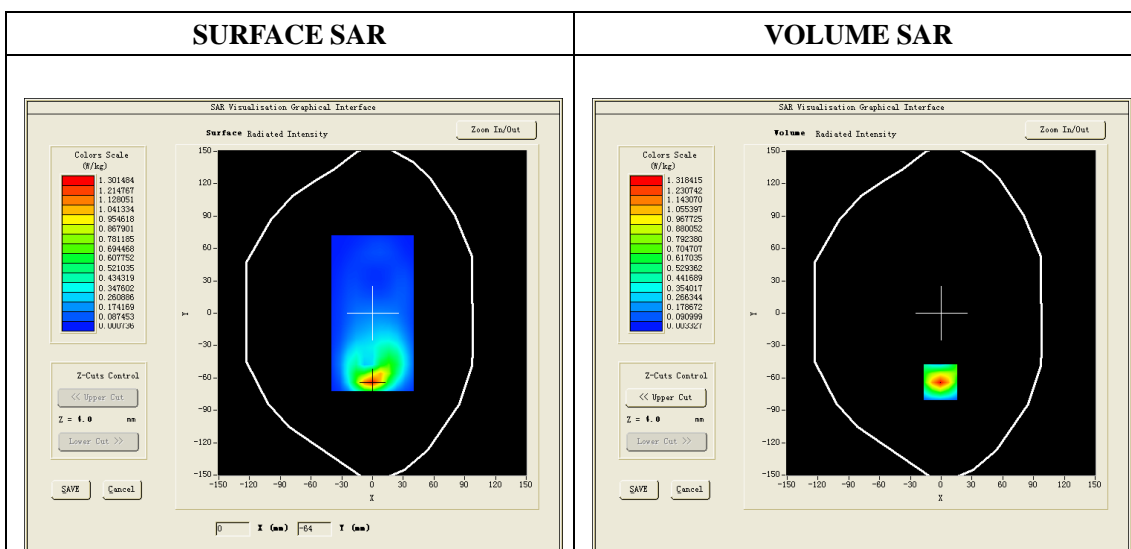
Mobile Phone IMEI number: --

**A. Experimental conditions.**

<b>Area Scan</b>	surf_sam_plan.txt
<b>ZoomScan</b>	5x5x7,dx=8mm dy=8mm dz=5mm
<b>Phantom</b>	Validation plane
<b>Device Position</b>	Edge C
<b>Band</b>	LTE Band2
<b>Channels</b>	Middle
<b>Signal</b>	Duty cycle: 1:1

**B. SAR Measurement Results**

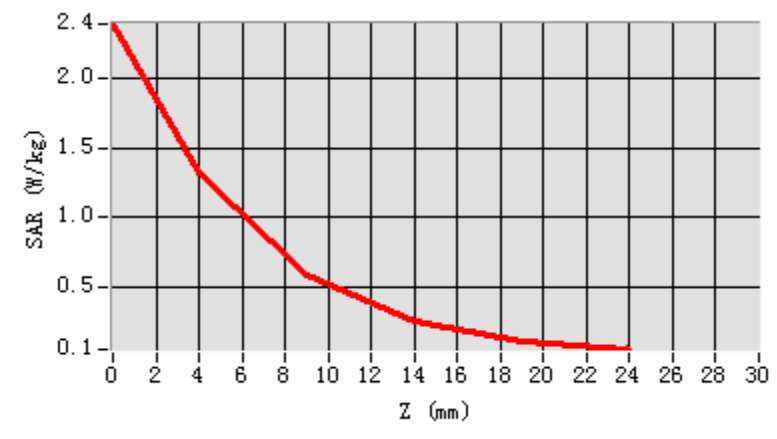
<b>Frequency (MHz)</b>	1879.500000
<b>Relative permittivity (real part)</b>	53.28
<b>Relative permittivity (imaginary)</b>	12.99
<b>Conductivity (S/m)</b>	1.53
<b>Variation (%)</b>	0.130000
<b>ConvF:</b>	5.65

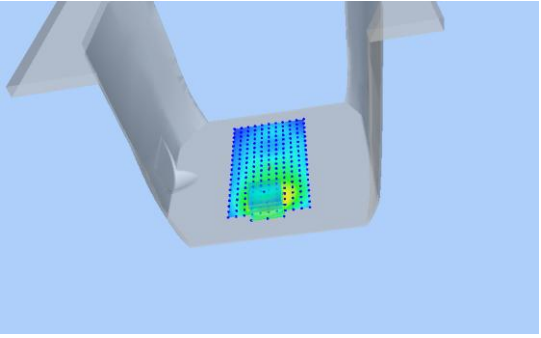
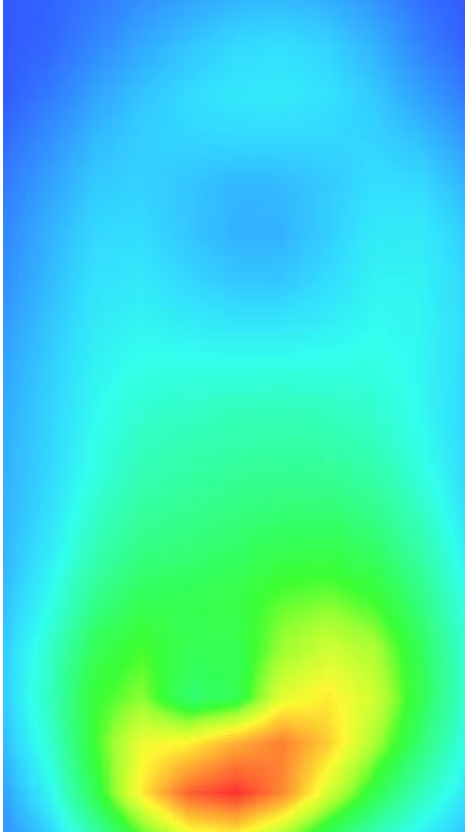


**Maximum location: X=-1.00, Y=-64.00**

<b>SAR 10g (W/Kg)</b>	0.569647
<b>SAR 1g (W/Kg)</b>	1.254463

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	2.3746	1.3145	0.5784	0.2452	0.1124



3D screen shot	Hot spot position
 <p>A 3D perspective view of a grey, L-shaped device. A grid of colored dots is overlaid on the device's surface, representing the SAR distribution. The colors range from blue (low SAR) to red (high SAR), with the highest concentration (red) located in the lower part of the device's horizontal section.</p>	 <p>A 2D heatmap showing the spatial distribution of SAR. The color scale transitions from blue at the top to red at the bottom, with a distinct red and yellow region at the bottom center, indicating the location of the maximum SAR (hot spot).</p>



# LTE Band 2 , Edge C, Repeat 2

Type: Phone measurement ( 11 points in the volume)

Date of measurement: 27/01/2015

Measurement duration: 7 minutes 37 seconds

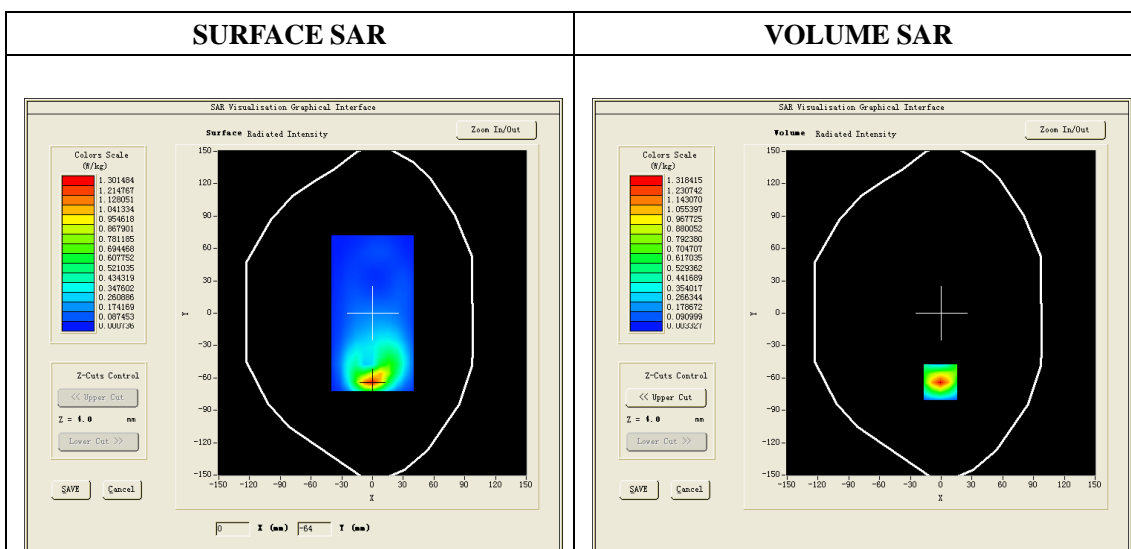
Mobile Phone IMEI number: --

### A. Experimental conditions.

<b>Area Scan</b>	surf_sam_plan.txt
<b>ZoomScan</b>	5x5x7,dx=8mm dy=8mm dz=5mm
<b>Phantom</b>	Validation plane
<b>Device Position</b>	Edge C
<b>Band</b>	LTE Band2
<b>Channels</b>	Middle
<b>Signal</b>	Duty cycle: 1:1

### B. SAR Measurement Results

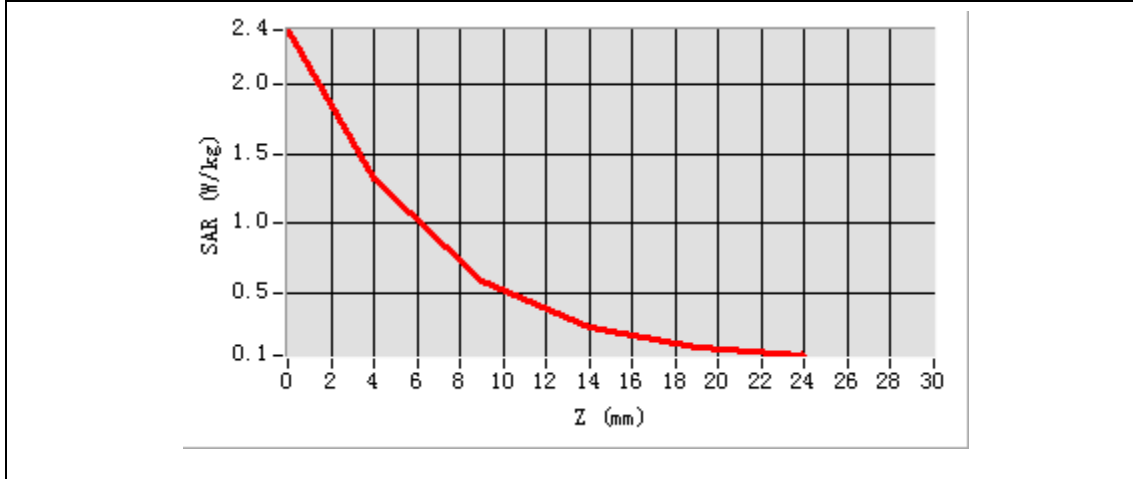
<b>Frequency (MHz)</b>	1879.500000
<b>Relative permittivity (real part)</b>	53.28
<b>Relative permittivity (imaginary)</b>	12.99
<b>Conductivity (S/m)</b>	1.53
<b>Variation (%)</b>	-0.010000
<b>ConvF:</b>	5.65

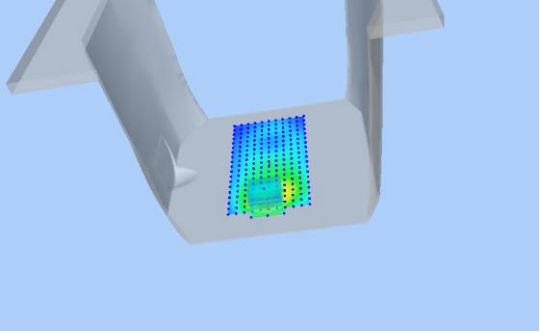
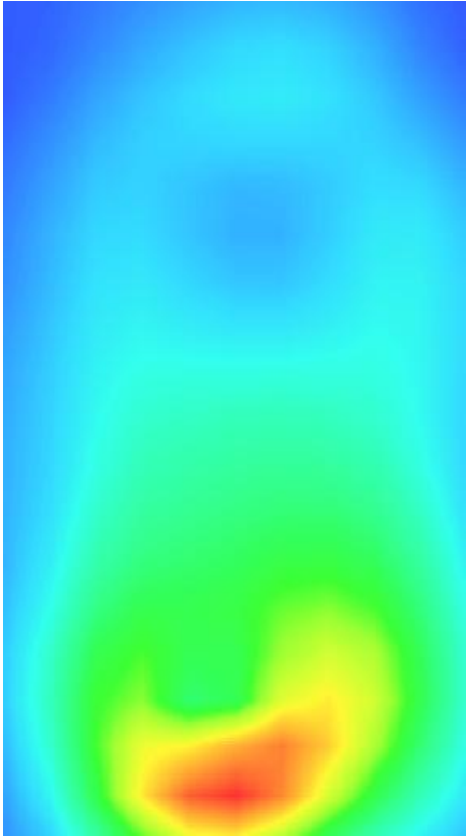


**Maximum location: X=-1.00, Y=-64.00**

<b>SAR 10g (W/Kg)</b>	0.564723
<b>SAR 1g (W/Kg)</b>	1.252346

<b>Z (mm)</b>	<b>0.00</b>	<b>4.00</b>	<b>9.00</b>	<b>14.00</b>	<b>19.00</b>
<b>SAR (W/Kg)</b>	<b>2.3876</b>	<b>1.3175</b>	<b>0.5787</b>	<b>0.2457</b>	<b>0.1117</b>



3D screen shot	Hot spot position
	

# LTE Band 4 , Right Cheek, Middle

Type: Phone measurement ( 11 points in the volume)

Date of measurement: 20/11/2014

Measurement duration: 7 minutes 37 seconds

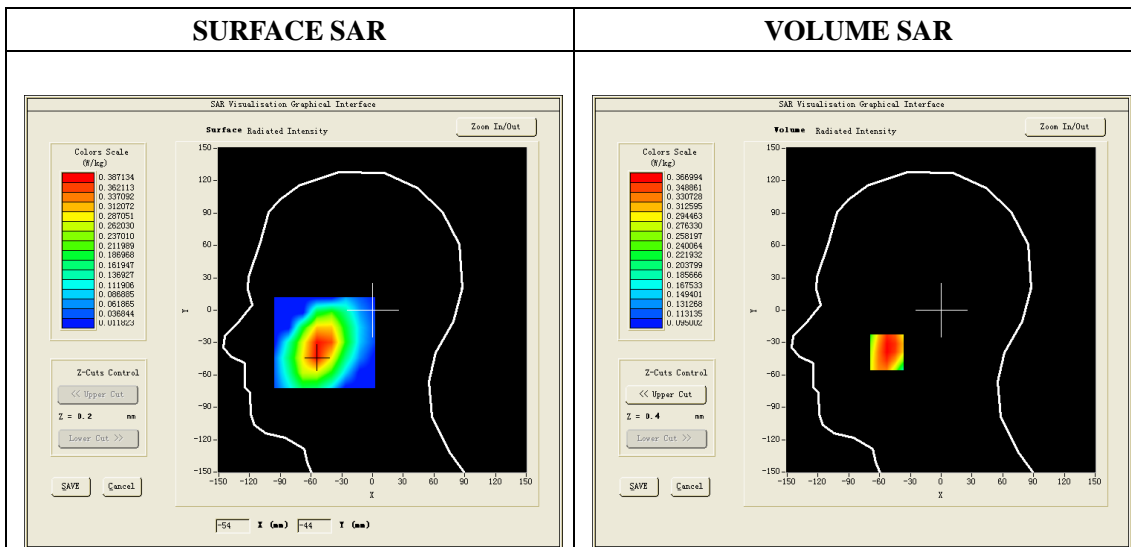
Mobile Phone IMEI number: --

### A. Experimental conditions.

<b>Area Scan</b>	surf_sam_plan.txt
<b>ZoomScan</b>	5x5x7,dx=8mm dy=8mm dz=5mm
<b>Phantom</b>	Right head
<b>Device Position</b>	Cheek
<b>Band</b>	LTE Band4
<b>Channels</b>	Middle
<b>Signal</b>	Duty cycle: 1:1

### B. SAR Measurement Results

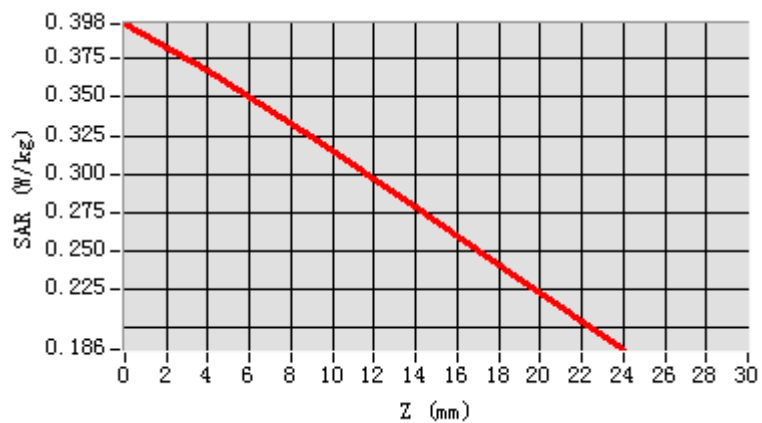
<b>Frequency (MHz)</b>	1732.5
<b>Relative permittivity (real part)</b>	39.979347
<b>Relative permittivity (imaginary)</b>	15.067700
<b>Conductivity (S/m)</b>	1.413587
<b>Variation (%)</b>	-0.800000
<b>ConvF:</b>	4.80

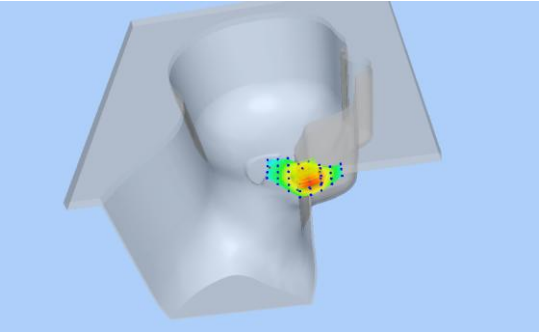
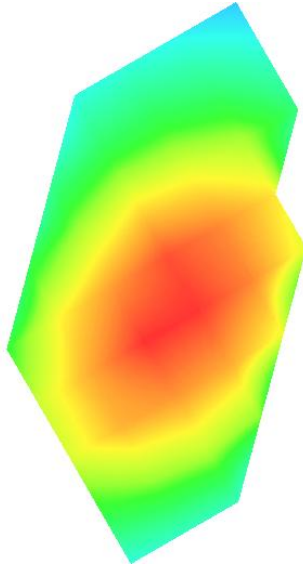


**Maximum location: X=-53.00, Y=-39.00**

<b>SAR 10g (W/Kg)</b>	0.285463
<b>SAR 1g (W/Kg)</b>	0.347346

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.3942	0.3650	0.3214	0.2721	0.2301



3D screen shot	Hot spot position
	

# LTE Band 4 , Back, Middle

Type: Phone measurement ( 11 points in the volume)

Date of measurement: 20/11/2014

Measurement duration: 7 minutes 37 seconds

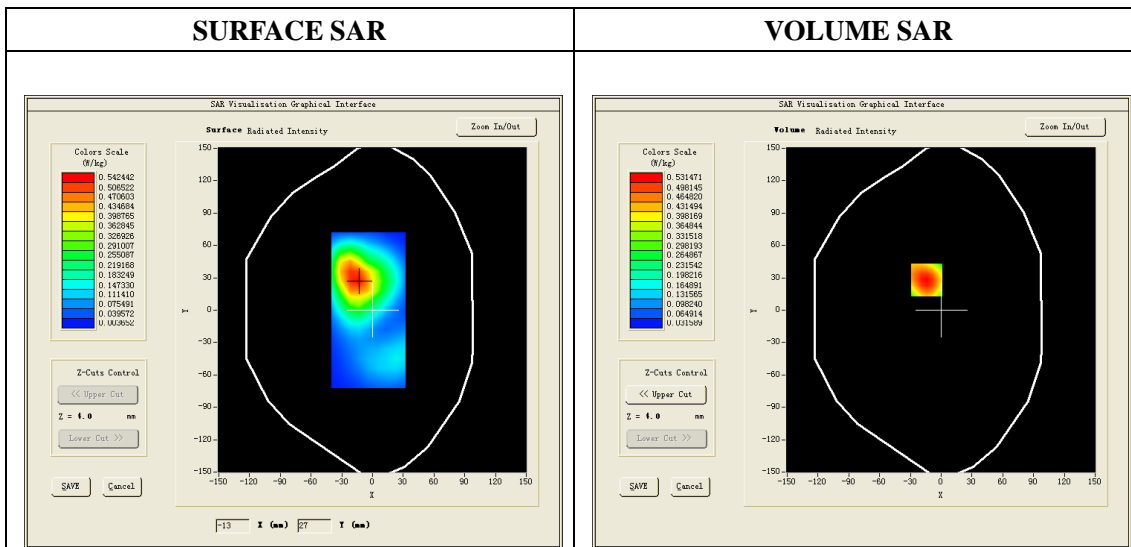
Mobile Phone IMEI number: --

### A. Experimental conditions.

<b>Area Scan</b>	surf_sam_plan.txt
<b>ZoomScan</b>	5x5x7,dx=8mm dy=8mm dz=5mm
<b>Phantom</b>	Validation plane
<b>Device Position</b>	Back
<b>Band</b>	LTE Band4
<b>Channels</b>	Middle
<b>Signal</b>	Duty cycle: 1:1

### B. SAR Measurement Results

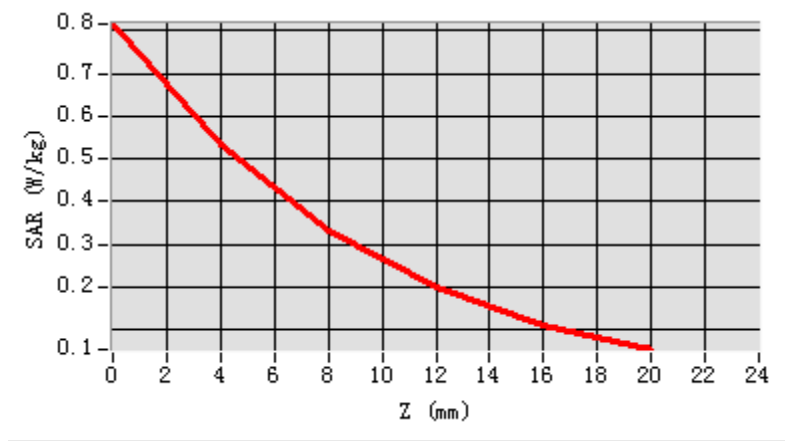
<b>Frequency (MHz)</b>	1732.5
<b>Relative permittivity (real part)</b>	53.890442
<b>Relative permittivity (imaginary)</b>	14.070000
<b>Conductivity (S/m)</b>	1.529512
<b>Variation (%)</b>	0.250000
<b>ConvF:</b>	4.94

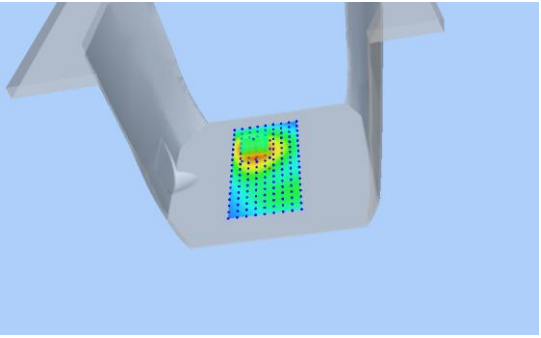
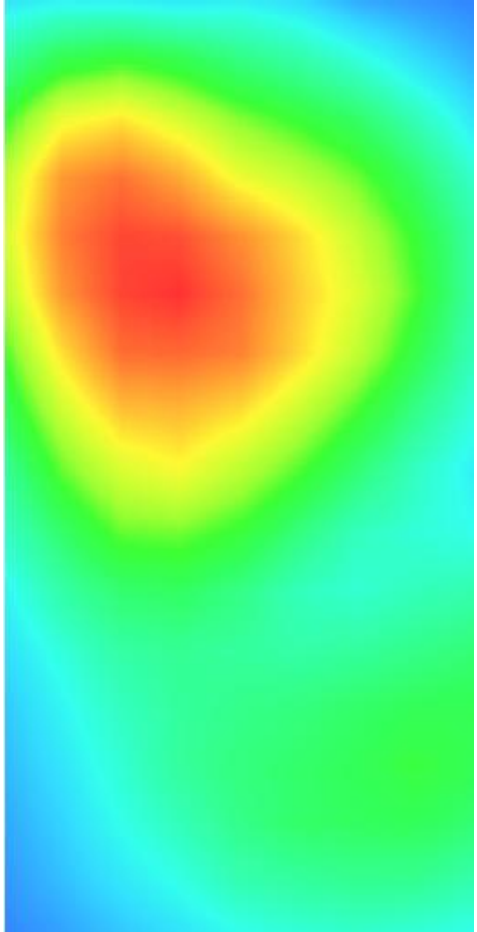


**Maximum location: X=-5.00, Y=-56.00**

<b>SAR 10g (W/Kg)</b>	0.398824
<b>SAR 1g (W/Kg)</b>	0.684481

Z (mm)	0.00	4.00	8.00	12.00	16.00
SAR (W/Kg)	0.8151	0.5315	0.3334	0.2000	0.1125



3D screen shot	Hot spot position
	

# LTE Band17, Right Cheek, Middle

Type: Phone measurement ( 11 points in the volume)

Date of measurement: 25/11/2014

Measurement duration: 6 minutes 35 seconds

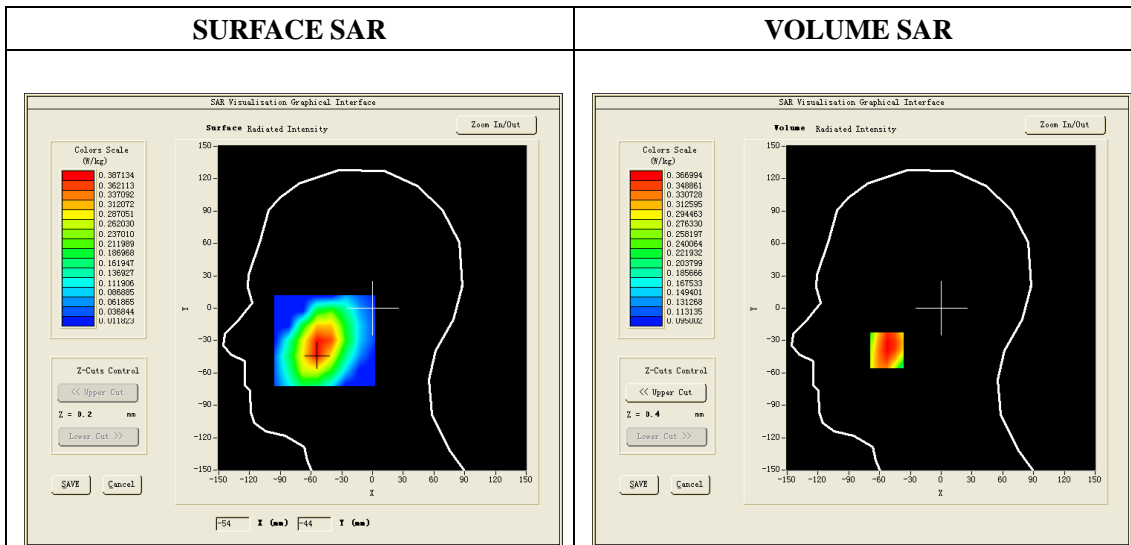
Mobile Phone IMEI number: --

### A. Experimental conditions.

<b>Area Scan</b>	sam_direct_droit2_surf8mm.txt
<b>ZoomScan</b>	5x5x7,dx=8mm dy=8mm dz=5mm
<b>Phantom</b>	Right head
<b>Device Position</b>	Cheek
<b>Band</b>	LTE Band17
<b>Channels</b>	Middle
<b>Signal</b>	Duty cycle: 1:1

### B. SAR Measurement Results

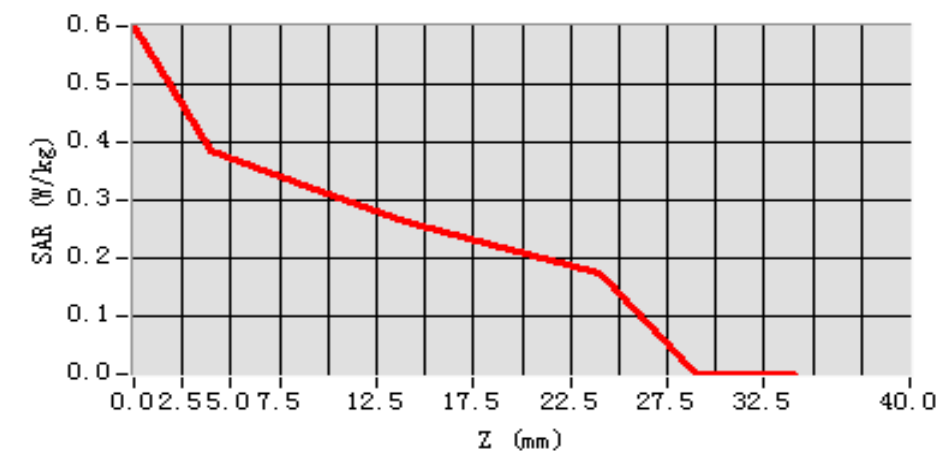
<b>Frequency (MHz)</b>	710
<b>Relative permittivity (real part)</b>	41.46
<b>Relative permittivity (imaginary part)</b>	15.07
<b>Conductivity (S/m)</b>	0.91
<b>Variation (%)</b>	-3.900000
<b>ConvF:</b>	22.51



**Maximum location: X=-53.00, Y=-39.00**

<b>SAR 10g (W/Kg)</b>	0.304649
<b>SAR 1g (W/Kg)</b>	0.429603

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.3976	0.3670	0.3246	0.2785	0.2311



3D screen shot	Hot spot position
<p>A 3D rendering of a human head model. A small, localized area on the side of the head is highlighted with a multi-colored (yellow, orange, red) hot spot, indicating the position of maximum SAR exposure.</p>	<p>A 2D color map visualization of the hot spot. The color gradient ranges from green (low SAR) to red (high SAR), showing a central red region surrounded by yellow and green areas.</p>



# LTE Band17, Back, Middle

Type: Phone measurement ( 11 points in the volume)

Date of measurement: 25/11/2014

Measurement duration: 7 minutes 32 seconds

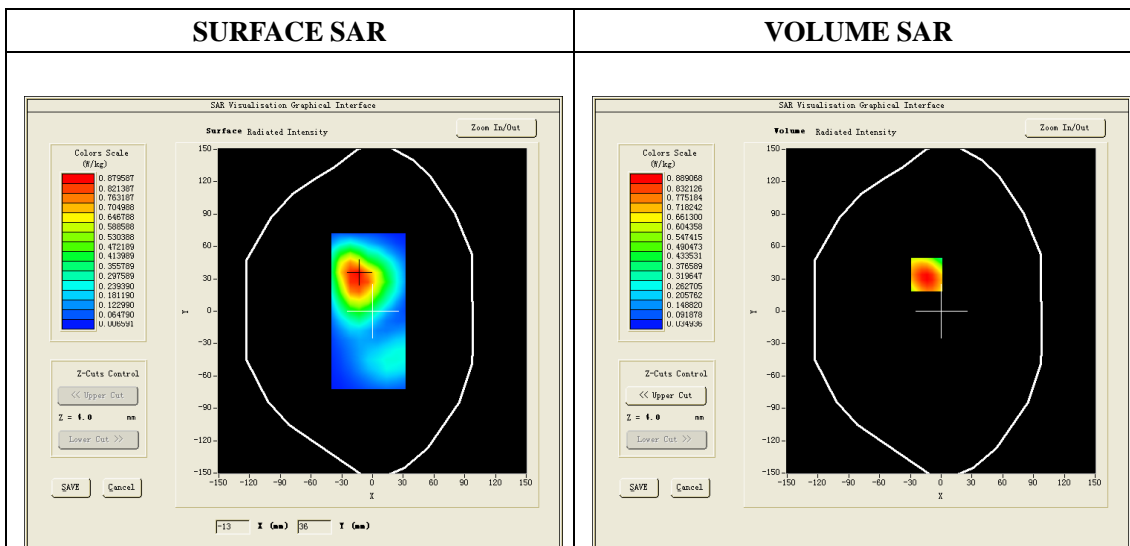
Mobile Phone IMEI number: --

### A. Experimental conditions.

Area Scan	surf_sam_plan.txt
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Back
Band	LTE Band17
Channels	Middle
Signal	Duty cycle: 1:1

### B. SAR Measurement Results

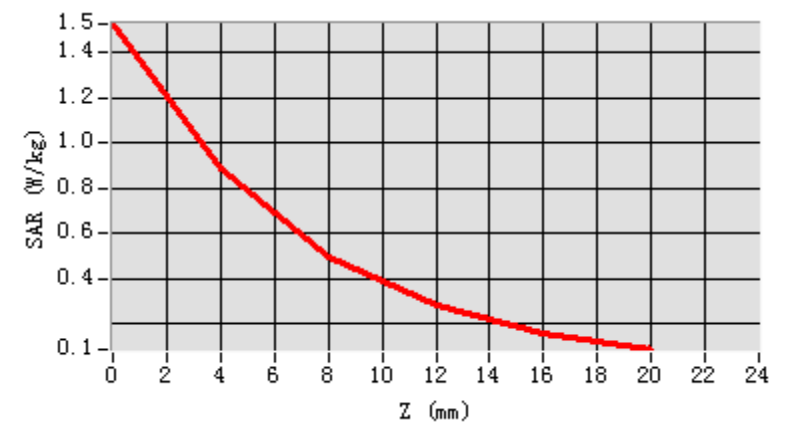
Frequency (MHz)	710
Relative permittivity (real part)	55.531170
Relative permittivity (imaginary part)	24.594805
Conductivity (S/m)	1.024784
Variation (%)	-0.800000
ConvF:	23.36

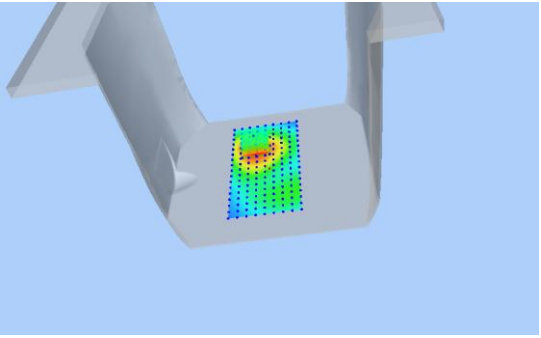
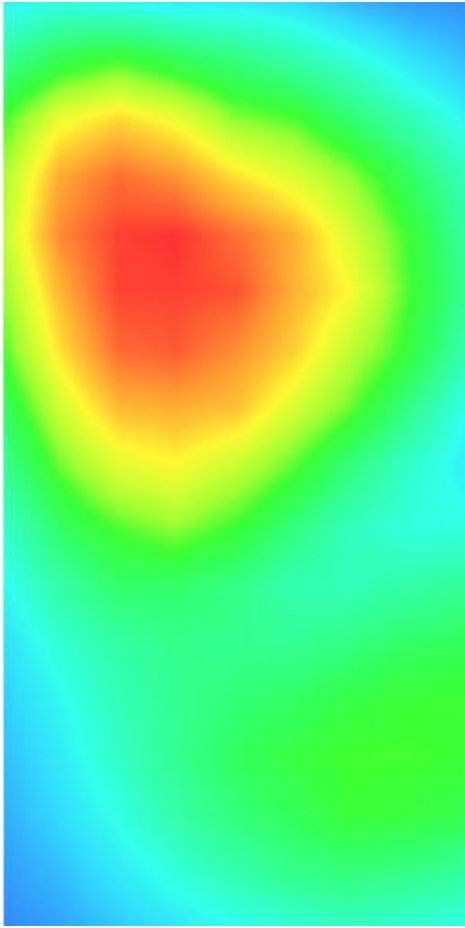


**Maximum location: X=-14.00, Y=34.00**

SAR 10g (W/Kg)	0.464579
SAR 1g (W/Kg)	0.720385

Z (mm)	0.00	4.00	8.00	12.00	16.00
SAR (W/Kg)	1.5281	0.8864	0.4968	0.2763	0.1565



3D screen shot	Hot spot position
	



**ANNEX E**  
**of**  
**CCIC-SET**

**CONFORMANCE TEST REPORT FOR**  
**HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS**

**SET2015-01431**

**LTE Mobile Phone**

**Type Name: M4 SS4445T**

**Hardware Version: A-V1.0**

**Software Version: M4\_SS4445\_S10\_VER200**

**Calibration Certificate of Probe and Dipoles**

**This Annex consists of 45 pages**

**Date of Report: 2015-01-30**

**Probe Calibration Certificate****COMOSAR E-Field Probe Calibration Report**

Ref : ACR.96.2.14.SATU.A

**CCIC SOUTHERN ELECTRONIC PRODUCT  
TESTING (SHENZHEN) Co., Ltd**  
ELECTRONIC TESTING BUILDING, SHAHE ROAD, XILI  
TOWN, SHENZHEN, P.R. CHINA (POST CODE:518055)  
**SATIMO COMOSAR DOSIMETRIC E-FIELD PROBE**  
SERIAL NO.: SN 09/13 EP169

Calibrated at SATIMO US  
2105 Barrett Park Dr. - Kennesaw, GA 30144



04/05/14

**Summary:**

This document presents the method and results from an accredited COMOSAR Dosimetric E-Field Probe calibration performed in SATIMO USA using the CALISAR / CALIBAIR test bench, for use with a SATIMO COMOSAR system only. All calibration results are traceable to national metrology institutions.



## COMOSARE-FIELD PROBE CALIBRATION REPORT

Ref: ACR.96.2.14.SATU.A

	<i>Name</i>	<i>Function</i>	<i>Date</i>	<i>Signature</i>
<i>Prepared by :</i>	Jérôme LUC	Product Manager	04/05/2014	<i>JL</i>
<i>Checked by :</i>	Jérôme LUC	Product Manager	04/05/2014	<i>JL</i>
<i>Approved by :</i>	Kim RUTKOWSKI	Quality Manager	04/08/2014	<i>Kim Rutkowski</i>

	<i>Customer Name</i>
<i>Distribution :</i>	CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd

<i>Issue</i>	<i>Date</i>	<i>Modifications</i>
A	04/08/2014	Initial release

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**1 DEVICE UNDER TEST**

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	Satimo
Model	SSE5
Serial Number	SN 09/13 EP169
Product Condition (new / used)	new
Frequency Range of Probe	0.7 GHz-3GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.223 MΩ Dipole 2: R2=0.233 MΩ Dipole 3: R3=0.222 MΩ

A yearly calibration interval is recommended.

**2 PRODUCT DESCRIPTION**

**2.1 GENERAL INFORMATION**

Satimo's COMOSAR E field Probes are built in accordance to the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards.



Figure 1 – Satimo COMOSAR Dosimetric E field Dipole

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	2.7 mm

**3 MEASUREMENT METHOD**

The IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards provide recommended practices for the probe calibrations, including the performance characteristics of interest and methods by which to assess their affect. All calibrations / measurements performed meet the fore mentioned standards.

**3.1 LINEARITY**

The evaluation of the linearity was done in free space using the waveguide, performing a power sweep to cover the SAR range 0.01W/kg to 100W/kg.

### 3.2 SENSITIVITY

The sensitivity factors of the three dipoles were determined using a two step calibration method (air and tissue simulating liquid) using waveguides as outlined in the standards.

### 3.3 LOWER DETECTION LIMIT

The lower detection limit was assessed using the same measurement set up as used for the linearity measurement. The required lower detection limit is 10 mW/kg.

### 3.4 ISOTROPY

The axial isotropy was evaluated by exposing the probe to a reference wave from a standard dipole with the dipole mounted under the flat phantom in the test configuration suggested for system validations and checks. The probe was rotated along its main axis from 0 - 360 degrees in 15 degree steps. The hemispherical isotropy is determined by inserting the probe in a thin plastic box filled with tissue-equivalent liquid, with the plastic box illuminated with the fields from a half wave dipole. The dipole is rotated about its axis (0°–180°) in 15° increments. At each step the probe is rotated about its axis (0°–360°).

### 3.5 BOUNDARY EFFECT

The boundary effect is defined as the deviation between the SAR measured data and the expected exponential decay in the liquid when the probe is oriented normal to the interface. To evaluate this effect, the liquid filled flat phantom is exposed to fields from either a reference dipole or waveguide. With the probe normal to the phantom surface, the peak spatial average SAR is measured and compared to the analytical value at the surface.

## 4 MEASUREMENT UNCERTAINTY

The guidelines outlined in the IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty associated with an E-field probe calibration using the waveguide technique. All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ , traceable to the Internationally Accepted Guides to Measurement Uncertainty.

Uncertainty analysis of the probe calibration in waveguide					
ERROR SOURCES	Uncertainty value (%)	Probability Distribution	Divisor	ci	Standard Uncertainty (%)
Incident or forward power	3.00%	Rectangular	$\sqrt{3}$	1	1.733%
Reflected power	3.00%	Rectangular	$\sqrt{3}$	1	1.733%
Liquid conductivity	5.00%	Rectangular	$\sqrt{3}$	1	2.886%
Liquid permittivity	4.00%	Rectangular	$\sqrt{3}$	1	2.310%
Field homogeneity	3.00%	Rectangular	$\sqrt{3}$	1	1.733%
Field probe positioning	5.00%	Rectangular	$\sqrt{3}$	1	2.886%
Field probe linearity	3.00%	Rectangular	$\sqrt{3}$	1	1.733%

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Combined standard uncertainty					5.832%
Expanded uncertainty 95 % confidence level k = 2					12.1%

## 5 CALIBRATION MEASUREMENT RESULTS

Calibration Parameters	
Liquid Temperature	23 °C
Lab Temperature	23 °C
Lab Humidity	58 %

### 5.1 SENSITIVITY IN AIR

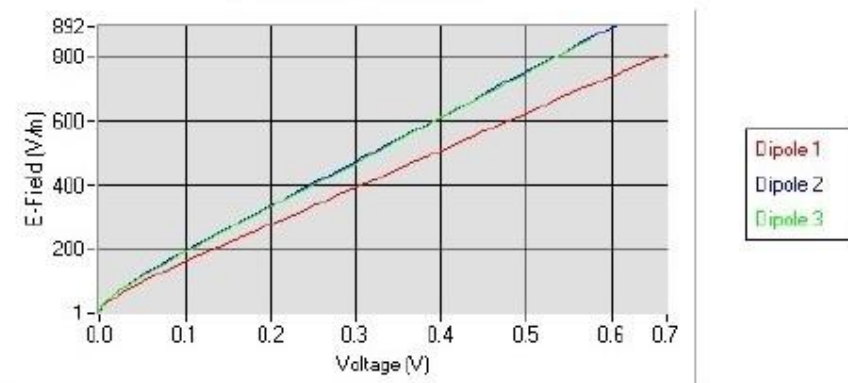
Normx dipole 1 ( $\mu\text{V}/(\text{V}/\text{m})^2$ )	Normy dipole 2 ( $\mu\text{V}/(\text{V}/\text{m})^2$ )	Normz dipole 3 ( $\mu\text{V}/(\text{V}/\text{m})^2$ )
7.23	6.10	5.74

DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
93.2	93.1	90.2

Calibration curves  $e_i=f(V)$  ( $i=1,2,3$ ) allow to obtain H-field value using the formula:

$$E = \sqrt{E_1^2 + E_2^2 + E_3^2}$$

Calibration curves



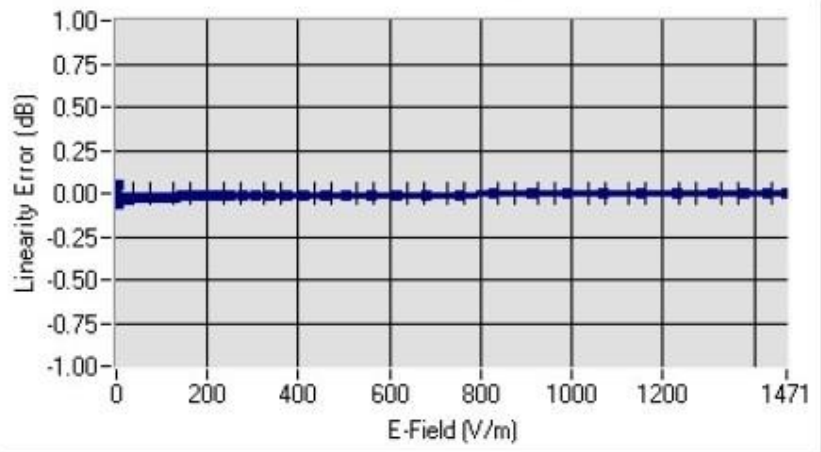
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## 5.2 LINEARITY

### Linearity



Linearity:  $\pm 1.42\%$  ( $\pm 0.06\text{dB}$ )

## 5.3 SENSITIVITY IN LIQUID

Liquid	Frequency (MHz +/- 100MHz)	Permittivity	Epsilon (S/m)	ConvF
HL850	835	42.56	0.87	5.51
BL850	835	55.26	0.97	5.68
HL900	900	41.79	0.97	5.20
BL900	900	55.98	1.05	5.33
HL1800	1750	40.17	1.39	4.80
BL1800	1750	52.05	1.49	4.94
HL1900	1880	39.80	1.45	5.49
BL1900	1880	52.55	1.52	5.65
HL2000	1950	38.93	1.42	4.80
BL2000	1950	53.12	1.50	5.02
HL2450	2450	38.64	1.83	4.81
BL2450	2450	52.02	1.95	4.91

LOWER DETECTION LIMIT: 9mW/kg

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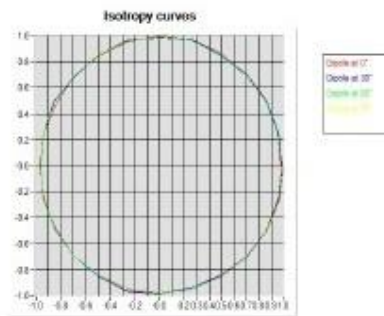
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#### 5.4 ISOTROPY

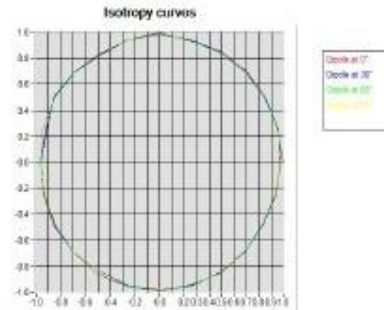
##### HL900 MHz

- Axial isotropy: 0.04 dB
- Hemispherical isotropy: 0.04 dB



##### HL1800 MHz

- Axial isotropy: 0.05 dB
- Hemispherical isotropy: 0.06 dB

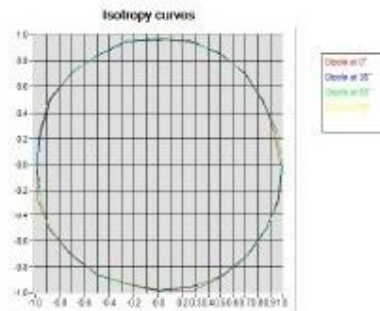


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**HL2450 MHz**

- Axial isotropy: 0.07 dB
- Hemispherical isotropy: 0.08 dB



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## 6 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
Flat Phantom	Satimo	SN-20/09-SAM71	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rhode & Schwarz ZVA	SN100132	02/2013	02/2016
Reference Probe	Satimo	EP 94 SN 37/08	Characterized prior to test. No cal required	Characterized prior to test. No cal required.
Multimeter	Keithley 2000	1188656	11/2013	11/2016
Signal Generator	Agilent E4438C	MY49070581	12/2013	12/2016
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required	Characterized prior to test. No cal required.
Power Meter	HP E4418A	US38261498	11/2013	11/2016
Power Sensor	HP ECP-E26A	US37181460	11/2013	11/2016
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required	Characterized prior to test. No cal required.
Waveguide	Mega Industries	069Y7-158-13-712	Validated. No cal required.	Validated. No cal required.
Waveguide Transition	Mega Industries	069Y7-158-13-701	Validated. No cal required.	Validated. No cal required.
Waveguide Termination	Mega Industries	069Y7-158-13-701	Validated. No cal required.	Validated. No cal required.
Temperature / Humidity Sensor	Control Company	11-661-9	3/2014	3/2016

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**Probe Calibration Ceri****COMOSAR E-Field Probe Calibration Report**

Ref : ACR.155.1.14.SATU.A

**SHENZHEN BALUN TECHNOLOGY Co.,Ltd.  
BLOCK B, FL 1, BAISHA SCIENCE AND TECHNOLOGY  
PARK, SHAHE XI ROAD,  
NANSHAN DISTRICT, SHENZHEN, GUANGDONG  
PROVINCE, P.R. CHINA 518055  
SATIMO COMOSAR DOSIMETRIC E-FIELD PROBE  
SERIAL NO.: SN 27/14 EPG210**

**Calibrated at SATIMO US  
2105 Barrett Park Dr. - Kennesaw, GA 30144**

**05/16/2014***Summary:*

This document presents the method and results from an accredited COMOSAR Dosimetric E-Field Probe calibration performed in SATIMO USA using the CALISAR / CALIBAIR test bench, for use with a SATIMO COMOSAR system only. All calibration results are traceable to national metrology institutions.



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.155.1.14.SATU.A

	<i>Name</i>	<i>Function</i>	<i>Date</i>	<i>Signature</i>
<i>Prepared by :</i>	Jérôme LUC	Product Manager	6/4/2014	<i>JL</i>
<i>Checked by :</i>	Jérôme LUC	Product Manager	6/4/2014	<i>JL</i>
<i>Approved by :</i>	Kim RUTKOWSKI	Quality Manager	6/4/2014	<i>Kim Rutkowski</i>

	<i>Customer Name</i>
<i>Distribution :</i>	ChangNing (Shenzhen) Electronics Co., Ltd.

<i>Issue</i>	<i>Date</i>	<i>Modifications</i>
A	6/4/2014	Initial release

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## 1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	Satimo
Model	SSE2
Serial Number	SN 27/14 EPG210
Product Condition (new / used)	New
Frequency Range of Probe	0.3 GHz-6GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.197 MΩ Dipole 2: R2=0.220 MΩ Dipole 3: R3=0.241 MΩ

A yearly calibration interval is recommended.

## 2 PRODUCT DESCRIPTION

### 2.1 GENERAL INFORMATION

Satimo's COMOSAR E field Probes are built in accordance to the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards.



Figure 1 – Satimo COMOSAR Dosimetric E field Dipole

Probe Length	330 mm
Length of Individual Dipoles	2 mm
Maximum external diameter	8 mm
Probe Tip External Diameter	2.5 mm
Distance between dipoles / probe extremity	1 mm

## 3 MEASUREMENT METHOD

The IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards provide recommended practices for the probe calibrations, including the performance characteristics of interest and methods by which to assess their affect. All calibrations / measurements performed meet the fore mentioned standards.

### 3.1 LINEARITY

The evaluation of the linearity was done in free space using the waveguide, performing a power sweep to cover the SAR range 0.01 W/kg to 100W/kg.

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### 3.2 SENSITIVITY

The sensitivity factors of the three dipoles were determined using a two step calibration method (air and tissue simulating liquid) using waveguides as outlined in the standards.

### 3.3 LOWER DETECTION LIMIT

The lower detection limit was assessed using the same measurement set up as used for the linearity measurement. The required lower detection limit is 10 mW/kg.

### 3.4 ISOTROPY

The axial isotropy was evaluated by exposing the probe to a reference wave from a standard dipole with the dipole mounted under the flat phantom in the test configuration suggested for system validations and checks. The probe was rotated along its main axis from 0 - 360 degrees in 15 degree steps. The hemispherical isotropy is determined by inserting the probe in a thin plastic box filled with tissue-equivalent liquid, with the plastic box illuminated with the fields from a half wave dipole. The dipole is rotated about its axis (0°–180°) in 15° increments. At each step the probe is rotated about its axis (0°–360°).

### 3.5 BOUNDARY EFFECT

The boundary effect is defined as the deviation between the SAR measured data and the expected exponential decay in the liquid when the probe is oriented normal to the interface. To evaluate this effect, the liquid filled flat phantom is exposed to fields from either a reference dipole or waveguide. With the probe normal to the phantom surface, the peak spatial average SAR is measured and compared to the analytical value at the surface.

## 4 MEASUREMENT UNCERTAINTY

The guidelines outlined in the IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty associated with an E-field probe calibration using the waveguide technique. All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

Uncertainty analysis of the probe calibration in waveguide					
ERROR SOURCES	Uncertainty value (%)	Probability Distribution	Divisor	ci	Standard Uncertainty (%)
Incident or forward power	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Reflected power	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Liquid conductivity	5.00%	Rectangular	$\sqrt{3}$	1	2.887%
Liquid permittivity	4.00%	Rectangular	$\sqrt{3}$	1	2.309%
Field homogeneity	3.00%	Rectangular	$\sqrt{3}$	1	1.732%
Field probe positioning	5.00%	Rectangular	$\sqrt{3}$	1	2.887%
Field probe linearity	3.00%	Rectangular	$\sqrt{3}$	1	1.732%

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Combined standard uncertainty					5.831%
Expanded uncertainty 95 % confidence level k = 2					12.0%

## 5 CALIBRATION MEASUREMENT RESULTS

Calibration Parameters	
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

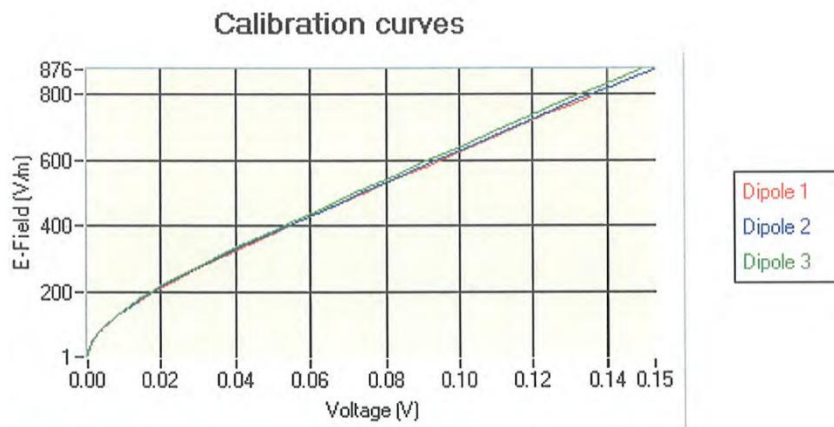
### 5.1 SENSITIVITY IN AIR

Normx dipole 1 ( $\mu\text{V}/(\text{V}/\text{m})^2$ )	Normy dipole 2 ( $\mu\text{V}/(\text{V}/\text{m})^2$ )	Normz dipole 3 ( $\mu\text{V}/(\text{V}/\text{m})^2$ )
0.44	0.54	0.52

DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
90	90	90

Calibration curves  $e_i=f(V)$  ( $i=1,2,3$ ) allow to obtain H-field value using the formula:

$$E = \sqrt{E_1^2 + E_2^2 + E_3^2}$$

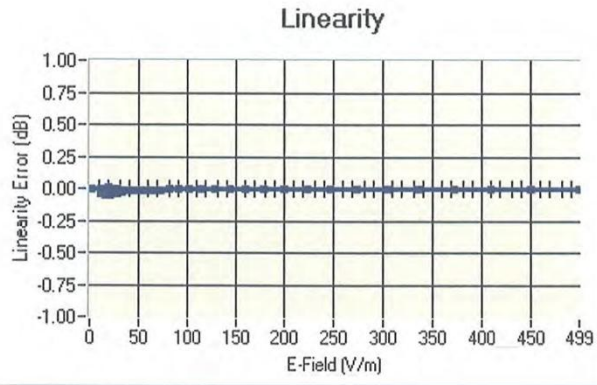


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5.2 LINEARITY



Linearity:  $\pm 1.25\%$  ( $\pm 0.05\text{dB}$ )

5.3 SENSITIVITY IN LIQUID

Liquid	Frequency (MHz +/- 100MHz)	Permittivity	Epsilon (S/m)	ConvF
HL450	450	43.02	0.85	30.15
BL450	450	57.52	0.96	31.02
HL750	750	42.10	0.88	22.51
BL750	750	54.79	0.96	23.36
HL850	835	43.03	0.87	23.67
BL850	835	53.35	0.96	24.58
HL900	900	42.29	0.96	23.35
BL900	900	56.82	1.06	24.10
HL1800	1800	40.93	1.36	23.21
BL1800	1800	52.57	1.47	23.69
HL1900	1900	40.92	1.45	26.70
BL1900	1900	53.60	1.52	27.47
HL2000	2000	39.36	1.44	25.28
BL2000	2000	52.17	1.53	26.28
HL2450	2450	39.12	1.78	25.25
BL2450	2450	52.17	1.90	26.09
HL2600	2600	38.46	1.92	25.94
BL2600	2600	51.76	2.19	26.66
HL5200	5200	36.47	4.91	22.36
BL5200	5200	51.18	4.84	22.88
HL5400	5400	36.83	5.02	25.63
BL5400	5400	48.35	5.81	26.47
HL5600	5600	35.39	5.49	24.82
BL5600	5600	49.03	6.17	25.66
HL5800	5800	34.91	5.76	22.60
BL5800	5800	47.18	6.32	23.20

LOWER DETECTION LIMIT: 7mW/kg

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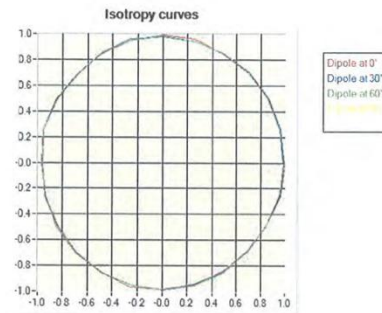
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#### 5.4 ISOTROPY

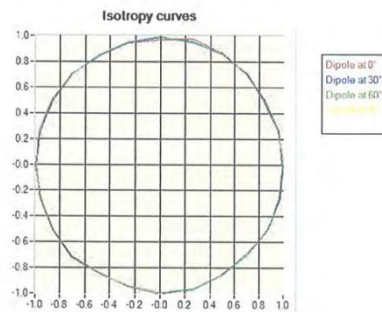
##### HL900 MHz

- Axial isotropy: 0.04 dB
- Hemispherical isotropy: 0.07 dB



##### HL1800 MHz

- Axial isotropy: 0.04 dB
- Hemispherical isotropy: 0.08 dB

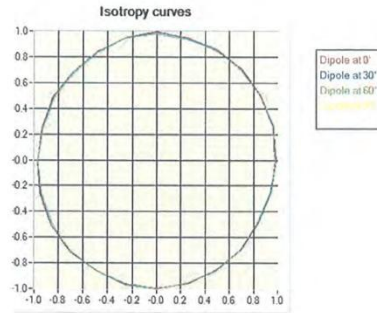


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**HL5400 MHz**

- Axial isotropy: 0.05 dB
- Hemispherical isotropy: 0.10 dB



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**SID835 Dipole Calibration Certificate**



## 6 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
Flat Phantom	Satimo	SN-20/09-SAM71	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rhode & Schwarz ZVA	SN100132	02/2013	02/2016
Reference Probe	Satimo	EP 94 SN 37/08	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Multimeter	Keithley 2000	1188656	12/2013	12/2016
Signal Generator	Agilent E4438C	MY49070581	12/2013	12/2016
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	HP E4418A	US38261498	12/2013	12/2016
Power Sensor	HP ECP-E26A	US37181460	12/2013	12/2016
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Waveguide	Mega Industries	069Y7-158-13-712	Validated. No cal required.	Validated. No cal required.
Waveguide Transition	Mega Industries	069Y7-158-13-701	Validated. No cal required.	Validated. No cal required.
Waveguide Termination	Mega Industries	069Y7-158-13-701	Validated. No cal required.	Validated. No cal required.
Temperature / Humidity Sensor	Control Company	11-661-9	8/2012	8/2015

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## SAR Reference Dipole Calibration Report

Ref : ACR.240.1.14.SATU.A

**CCIC SOUTHERN ELECTRONIC PRODUCT  
TESTING (SHENZHEN) CO., LTD**  
ELECTRONIC TESTING BUILDING, SHAHE ROAD, XILI  
TOWN  
SHENZHEN, P.R. CHINA (POST CODE:518055)  
**SATIMO COMOSAR REFERENCE DIPOLE**  
FREQUENCY: 835 MHZ  
SERIAL NO.: SN 09/13 DIP0G835-217

Calibrated at SATIMO US  
2105 Barrett Park Dr. - Kennesaw, GA 30144



08/28/14

*Summary:*

This document presents the method and results from an accredited SAR reference dipole calibration performed in SATIMO USA using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.





SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.240.1.14.SATU.A

	<i>Name</i>	<i>Function</i>	<i>Date</i>	<i>Signature</i>
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**1 INTRODUCTION**

This document contains a summary of the requirements set forth by the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

**2 DEVICE UNDER TEST**

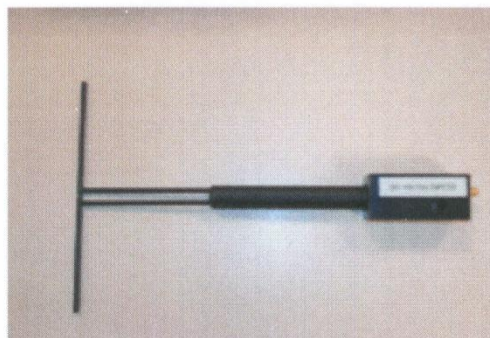
Device Under Test	
Device Type	COMOSAR 835 MHz REFERENCE DIPOLE
Manufacturer	Satimo
Model	SID835
Serial Number	SN 09/13 DIP0G835-217
Product Condition (new / used)	used

A yearly calibration interval is recommended.

**3 PRODUCT DESCRIPTION**

**3.1 GENERAL INFORMATION**

Satimo’s COMOSAR Validation Dipoles are built in accordance to the IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards. The product is designed for use with the COMOSAR test bench only.



**Figure 1 – Satimo COMOSAR Validation Dipole**

#### 4 MEASUREMENT METHOD

The IEEE 1528, OET 65 Bulletin C and CEI/IEC 62209 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

##### 4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards.

##### 4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimensions frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness.

#### 5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ , traceable to the Internationally Accepted Guides to Measurement Uncertainty.

##### 5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.1 dB

##### 5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
3 - 300	0.05 mm

##### 5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEEE 1528, OET 65 Bulletin C, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

Scan Volume	Expanded Uncertainty
1 g	20.3 %
10 g	20.1 %

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