SAR TEST REPORT

No. 2011SAR00048

For

TCT Mobile Limited

Quadband GSM/GPRS/EDGE mobile phone

Soul

one touch 891

With

Hardware Version: PIO

Software Version: V12D

FCCID: RAD180

Issued Date: 2011-05-25

Deutscher Akkreditierungs Rat

***No.* DGA-PL-114/01-02**

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of TMC Beijing.

Test Laboratory:

TMC Beijing, Telecommunication Metrology Center of MIIT
No. 52, Huayuan Bei Road, Haidian District, Beijing, P. R. China 100191.
Tel:+86(0)10-62304633-2079, Fax:+86(0)10-62304793 Email:welcome@emcite.com. www.emcite.com

TABLE OF CONTENT

1 Test Laboratory

1.1 Testing Location

Company Name:	TMC Beijing, Telecommunication Metrology Center of MIIT
Address:	No 52, Huayuan beilu, Haidian District, Beijing,P.R.China
Postal Code:	100191
Telephone:	+86-10-62304633
Fax:	+86-10-62304793

1.2 Testing Environment

Temperature:	18°C~25 °C,
Relative humidity:	30%~ 70%
Ground system resistance:	< 0.5 Ω

Ambient noise is checked and found very low and in compliance with requirement of standards.
Reflection of surrounding objects is minimized and in compliance with requirement of standards.

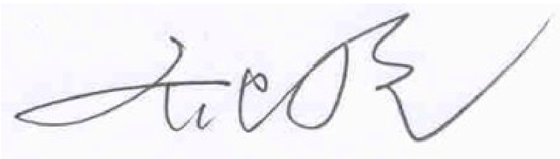
1.3 Project Data

Project Leader:	Qi Dianyuan
Test Engineer:	Lin Xiaojun
Testing Start Date:	May 2, 2011
Testing End Date:	May 6, 2011

1.4 Signature

Lin Xiaojun

(Prepared this test report)



Qi Dianyuan

(Reviewed this test report)

Xiao Li

Deputy Director of the laboratory

(Approved this test report)

2 Client Information

2.1 Applicant Information

Company Name:	TCT Mobile Limited
Address /Post:	4/F, South Building,No.2966, Jinke Road, Zhangjiang High-Tech Park, Pudong, Shanghai, 201203, P.R.China
City:	Shanghai
Postal Code:	201203
Country:	P. R. China
Contact Person:	Gong Zhizhou
Contact Email	zhizhou.gong@jrdcom.com
Telephone:	0086-21-61460890
Fax:	0086-21-61460602

2.2 Manufacturer Information

Company Name:	TCT Mobile Limited
Address /Post:	4/F, South Building,No.2966, Jinke Road, Zhangjiang High-Tech Park, Pudong, Shanghai, 201203, P.R.China
City:	Shanghai
Postal Code:	201203
Country:	P. R. China
Contact Person:	Gong Zhizhou
Contact Email	zhizhou.gong@jrdcom.com
Telephone:	0086-21-61460890
Fax:	0086-21-61460602

3 Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1 About EUT

EUT Description:	Quadband GSM/GPRS/EDGE mobile phone
Model Name:	Soul
Marketing Name:	one touch 891
GSM Frequency Band:	GSM 850 / PCS 1900 / WiFi
GPRS Multislot Class:	12
EGPRS Multislot Class:	12
GPRS capability Class:	B
Hotspot mode:	Be not supported

3.2 Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT1	357089040011589	PIO	V12D

*EUT ID: is used to identify the test sample in the lab internally.

3.3 Internal Identification of AE used during the test

AE ID*	Description	Model	SN	Manufacturer
AE1	Battery	CAB31L0000C1	\	BYD
AE2	Battery	CAB31L0000C2	\	BAK
AE3	Headset	CCB3160A10C2	\	Shunda
AE4	Headset	CCB3160B10C1	\	Juwei

*AE ID: is used to identify the test sample in the lab internally.

4 CHARACTERISTICS OF THE TEST

4.1 Applicable Limit Regulations

EN 50360–2001: Product standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones.
It specifies the maximum exposure limit of **2.0 W/kg** as averaged over any 10 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

ANSI C95.1–1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.
It specifies the maximum exposure limit of **1.6 W/kg** as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

4.2 Applicable Measurement Standards

EN 62209-1–2006: Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 1:

Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz).

IEEE 1528–2003: Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques.

OET Bulletin 65 (Edition 97-01) and Supplement C(Edition 01-01): Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits.

IEC 62209-1: Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 1:Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)

KDB648474 D01 SAR Handsets Multi Xmiter and Ant, v01r05: SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas.

KDB248227: SAR measurement procedures for 802.112abg transmitters.

5 OPERATIONAL CONDITIONS DURING TEST

5.1 Schematic Test Configuration

During SAR test, EUT is in Traffic Mode (Channel Allocated) at Normal Voltage Condition. A communication link is set up with a System Simulator (SS) by air link, and a call is established. The Absolute Radio Frequency Channel Number (ARFCN) is allocated to 128, 190 and 251 respectively in the case of GSM 850 MHz, or to 512, 661 and 810 respectively in the case of PCS 1900 MHz. The EUT is commanded to operate at maximum transmitting power.

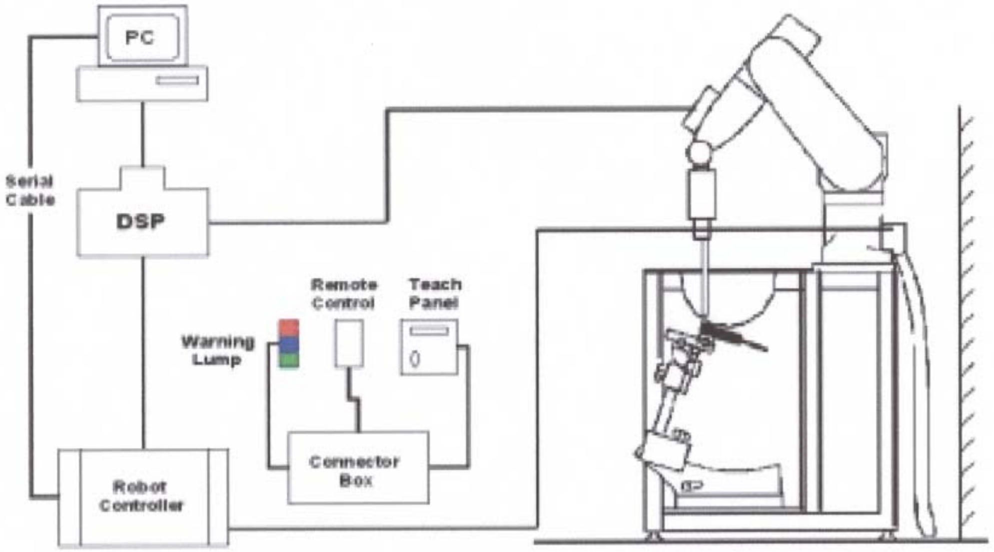
The EUT shall use its internal transmitter. The antenna(s), battery and accessories shall be those specified by the manufacturer. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output. If a wireless link is used, the antenna connected to the output of the base station simulator shall be placed at least 50 cm away from the handset. The signal transmitted by the simulator to the antenna feeding point shall be lower than the output power level of the handset by at least 30 dB.

5.2 SAR Measurement Set-up

These measurements were performed with the automated near-field scanning system DASY4 Professional from Schmid & Partner Engineering AG (SPEAG). The system is based on a high precision robot (working range greater than 0.9m), which positions the probes with a positional repeatability of better than ± 0.02mm. Special E- and H-field probes have been developed for measurements close to material discontinuity, the sensors of which are directly loaded with a

Schottky diode and connected via highly resistive lines (length =300mm) to the data acquisition unit.

A cell controller system contains the power supply, robot controller, teaches pendant (Joystick), and remote control, is used to drive the robot motors. The PC consists of the Micron Pentium III 800 MHz computer with Windows 2000 system and SAR Measurement Software DASY4 Professional, A/D interface card, monitor, mouse, and keyboard. The Stäubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.



Picture 2: SAR Lab Test Measurement Set-up

The DAE consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

5.3 Dasy4 E-field Probe System

The SAR measurements were conducted with the dosimetric probe ES3DV3 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe has been calibrated according to the standard procedure with an accuracy of better than ± 10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB.

ES3DV3 Probe Specification

Construction	Symmetrical design with triangular core
	Interleaved sensors

	Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	Basic Broad Band Calibration in air Conversion Factors (CF) for HSL 900 and HSL 1810 Additional CF for other liquids and frequencies upon request

Picture 3: ES3DV3 E-field

Frequency	10 MHz to 4 GHz; Linearity: ± 0.2 dB (30 MHz to 4 GHz)
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.3 dB in tissue material (rotation normal to probe axis)
Dynamic Range	5 μW/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 3.9 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm
Application	General dosimetry up to 4 GHz Dosimetry in strong gradient fields Compliance tests of mobile phones

Picture4:ES3DV3 E-field probe

5.4 E-field Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than ± 10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies bellow 1 GHz, and in a wave guide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

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

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

Where: Δt = Exposure time (30 seconds),
C = Heat capacity of tissue (brain or muscle),
ΔT = Temperature increase due to RF exposure.

Or

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

Where:
σ = Simulated tissue conductivity,
ρ = Tissue density (kg/m^3).

Picture 5: Device Holder

5.5 Other Test Equipment

5.5.1 Device Holder for Transmitters

In combination with the Generic Twin Phantom V3.0, the Mounting Device (POM) enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation points is the ear opening. The devices can be easily, accurately, and repeatable positioned according to the FCC and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

5.5.2 Phantom

The Generic Twin Phantom is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90% of all users. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents the evaporation of the liquid. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot.

Shell Thickness	2±0. l mm
Filling Volume	Approx. 20 liters
Dimensions	810 x l000 x 500 mm (H x L x W)
Available	Special

Picture 6: Generic Twin Phantom

5.6 Equivalent Tissues

The liquid used for the frequency range of 800-3000 MHz consisted of water, sugar, salt, Glycol monobutyl, Preventol and Cellulose. The liquid has been previously proven to be suited for worst-case. The Table 1 and 2 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the IEEE 1528.

Table 1. Composition of the Head Tissue Equivalent Matter

MIXTURE %	FREQUENCY 850MHz
Water	41.45
Sugar	56.0
Salt	1.45
Preventol	0.1
Cellulose	1.0
Dielectric Parameters Target Value	f=850MHz ε=41.5 σ=0.90
MIXTURE %	FREQUENCY 1900MHz
Water	55.242
Glycol monobutyl	44.452
Salt	0.306
Dielectric Parameters Target Value	f=1900MHz ε=40.0 σ=1.40
MIXTURE %	FREQUENCY 2450MHz
Water	58.79
Glycol monobutyl	41.15
Salt	0.06
Dielectric Parameters Target Value	f=2450MHz ε=39.2 σ=1.80

Table 2. Composition of the Body Tissue Equivalent Matter

MIXTURE %	FREQUENCY 850MHz
Water	52.5
Sugar	45.0
Salt	1.4
Preventol	0.1
Cellulose	1.0
Dielectric Parameters Target Value	f=850MHz ε=55.2 σ=0.97
MIXTURE %	FREQUENCY 1900MHz
Water	69.91
Glycol monobutyl	29.96
Salt	0.13
Dielectric Parameters Target Value	f=1900MHz ε=53.3 σ=1.52
MIXTURE %	FREQUENCY 2450MHz
Water	72.60
Glycol monobutyl	27.22
Salt	0.18
Dielectric Parameters Target Value	f=2450MHz ε=52.7 σ=1.95

5.7 System Specifications

Specifications

Positioner: Stäubli Unimation Corp. Robot Model: RX90L

Repeatability: ±0.02 mm

No. of Axis: 6

Data Acquisition Electronic (DAE) System

Cell Controller

Processor: Pentium III

Clock Speed: 800 MHz

Operating System: Windows 2000

Data Converter

Features: Signal Amplifier, multiplexer, A/D converter, and control logic

Software: DASY4 software

Connecting Lines: Optical downlink for data and status info.
Optical uplink for commands and clock

6 CONDUCTED OUTPUT POWER MEASUREMENT

6.1 Summary

During the process of testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication tester (CMU-200) to ensure the maximum power transmission and proper modulation. This result contains conducted output power for the EUT. In all cases, the measured output power should be greater and within 5% than EMI measurement.

6.2 Conducted Power

6.2.1 Measurement Methods

The EUT was set up for the maximum output power. The channel power was measured with Agilent Spectrum Analyzer E4440A. These measurements were done at low, middle and high channels.

6.2.2 Measurement result

Table 3: The conducted power for GSM 850/1900

GSM 850MHZ	Conducted Power (dBm)		
	Channel 251(848.8MHz)	Channel 190(836.6MHz)	Channel 128(824.2MHz)
	32.41	32.41	32.69
GSM 1900MHZ	Conducted Power (dBm)		
	Channel 810(1909.8MHz)	Channel 661(1880MHz)	Channel 512(1850.2MHz)
	29.29	29.29	29.26

Table 4: The conducted power for GPRS 850/1900 and EGPRS 850/1900

GSM 850 GPRS	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	251	**190**	**128**		**251**	**190**	**128**
1 Txslot	31.70	31.90	32.13	-9.03dB	22.67	22.87	23.10
2 Txslots	30.95	31.15	31.49	-6.02dB	**24.93**	**25.13**	**25.47**
3Txslots	28.14	28.38	28.92	-4.26dB	23.88	24.12	24.66
4 Txslots	27.30	27.46	28.02	-3.01dB	24.29	24.45	25.01
GSM 850 EGPRS	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	251	**190**	**128**		**251**	**190**	**128**
1 Txslot	31.79	31.99	32.23	-9.03dB	22.76	22.96	23.20
2 Txslots	31.01	31.23	31.57	-6.02dB	**24.99**	**25.21**	**25.55**
3Txslots	28.19	28.41	28.94	-4.26dB	23.93	24.15	24.68
4 Txslots	27.15	27.40	28.02	-3.01dB	24.14	24.39	25.01
PCS1900 GPRS	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	810	**661**	**512**		**810**	**661**	**512**
1 Txslot	29.32	29.33	29.29	-9.03dB	20.29	20.30	20.26
2 Txslots	28.40	28.39	28.38	-6.02dB	22.38	22.37	22.36
3Txslots	26.58	26.54	26.59	-4.26dB	22.32	22.28	22.33
4 Txslots	25.67	25.64	25.74	-3.01dB	**22.66**	**22.63**	**22.73**
PCS1900 EGPRS	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	810	**661**	**512**		**810**	**661**	**512**
1 Txslot	29.27	29.29	29.26	-9.03dB	20.24	20.26	20.23
2 Txslots	28.36	28.34	28.32	-6.02dB	22.34	22.32	22.30
3Txslots	26.58	26.53	26.59	-4.26dB	22.32	22.27	22.33
4 Txslots	25.69	25.66	25.76	-3.01dB	**22.68**	**22.65**	**22.75**

NOTES:

1) Division Factors

To average the power, the division factor is as follows:

1TX-slot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB

2TX-slots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB

3TX-slots = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB

4TX-slots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB

According to the conducted power as above, the body measurements are performed with 2 Txslots for GSM850 and 4 Txslots for GSM1900.

6.2.3 Power Drift

To control the output power stability during the SAR test, DASY4 system calculates the power drift by measuring the E-field at the same location at the beginning and at the end of the measurement for each test position. These drift values can be found in Table 11 to Table 18 labeled as: (Power Drift [dB]). This ensures that the power drift during one measurement is within 5%.

7 TEST RESULTS

7.1 Dielectric Performance

Table 5: Dielectric Performance of Head Tissue Simulating Liquid

Measurement is made at temperature 23.0 °C and relative humidity 37%.
Liquid temperature during the test: 22.5°C
Measurement Date : 850 MHz **May 5, 2011** 1900 MHz **May 6, 2011** 2450 MHz **May 2, 2011**

/	Frequency	Permittivity ε	Conductivity σ (S/m)
Target value	835 MHz	41.5	0.90
	1900 MHz	40.0	1.40
	2450 MHz	39.2	1.80
Measurement value (Average of 10 tests)	835 MHz	40.3	0.89
	1900 MHz	39.1	1.40
	2450 MHz	39.4	1.82

Table 6: Dielectric Performance of Body Tissue Simulating Liquid

Measurement is made at temperature 23.0 °C and relative humidity 37%.
Liquid temperature during the test: 22.5°C
Measurement Date : 850 MHz **May 5, 2011** 1900 MHz **May 6, 2011** 2450 MHz **May 2, 2011**

/	Frequency	Permittivity ε	Conductivity σ (S/m)
Target value	835 MHz	55.2	0.97
	1900 MHz	53.3	1.52
	2450 MHz	52.7	1.95
Measurement value (Average of 10 tests)	835 MHz	56.3	0.96
	1900 MHz	52.0	1.50
	2450 MHz	53.2	1.96

7.2 System Validation

Table 7: System Validation of Head

Measurement is made at temperature 23.0 °C and relative humidity 37%.
Liquid temperature during the test: 22.5°C
Measurement Date : 850 MHz **May 5, 2011** 1900 MHz **May 6, 2011** 2450 MHz **May 2, 2011**

		Frequency	Permittivity ε	Conductivity σ (S/m)
Liquid parameters	Dipole calibration Target value	835 MHz	41.6	0.92
		1900 MHz	39.6	1.40
		2450 MHz	39.0	1.74
	Actural Measurement value	835 MHz	40.3	0.89
		1900 MHz	39.1	1.40
		2450 MHz	39.4	1.82

Verification results	Frequency	Target value (W/kg)		Measured value (W/kg)		Deviation	
		10 g Average	1 g Average	10 g Average	1 g Average	10 g Average	1 g Average
	835 MHz	6.12	9.41	5.96	9.68	-2.61%	2.87%
	1900 MHz	20.1	39.4	19.8	39.6	-1.49%	0.51%
	2450 MHz	24.6	52.4	23.88	51.2	-2.93%	-2.29%

Note：Target values are the data of the dipole validation results, please check Annex F for the Dipole Calibration Certificate.

Table 8: System Validation of Body

Measurement is made at temperature 23.0 °C and relative humidity 37%.
Liquid temperature during the test: 22.5°C
Measurement Date : 850 MHz **May 5, 2011** 1900 MHz **May 6, 2011** 2450 MHz **May 2, 2011**

Liquid parameters		Frequency	Permittivity ε	Conductivity σ (S/m)
	Dipole calibration Target value	835 MHz	54.5	0.97
		1900 MHz	52.5	1.51
		2450 MHz	52.5	1.95
	Actural Measurement value	835 MHz	56.3	0.96
		1900 MHz	52.0	1.50
		2450 MHz	53.2	1.96

Verification results	Frequency	Target value (W/kg)		Measured value (W/kg)		Deviation	
		10 g Average	1 g Average	10 g Average	1 g Average	10 g Average	1 g Average
	835 MHz	6.24	9.57	6.24	9.84	0.00%	2.82%
	1900 MHz	20.9	41.4	21.12	41.6	1.05%	0.48%
	2450 MHz	23.9	51.6	23.6	52.0	-1.26%	0.78%

Note：Target values are the data of the dipole validation results, please check Annex F for the Dipole Calibration Certificate.

7.3 Evaluation of Multi-Batteries

Table 9: Pretest SAR Values (GSM 850 MHz Band)

Limit of SAR (W/kg)	10 g Average	1 g Average
	2.0	1.6
Test Case	**Measurement Result (W/kg)**	
	10 g Average	**1 g Average**
Left hand, Touch cheek, Top frequency (CAB31L0000C1)	0.766	1.04
Left hand, Touch cheek, Top frequency (CAB31L0000C2)	0.762	1.03

Note: According to the values in the above table, the battery, CAB31L0000C1, is the normal battery. We'll perform the head measurement with this battery and retest on highest value point with others.

Table 10: Pretest SAR Values (GSM 850 MHz Band-Body)

Limit of SAR (W/kg)	10 g Average	1 g Average
	2.0	1.6
Test Case	**Measurement Result (W/kg)**	
	10 g Average	**1 g Average**
Body, Towards Phantom, Mid frequency (CAB31L0000C1)	0.434	0.593
Body, Towards Phantom, Mid frequency (CAB31L0000C2)	0.430	0.591

Note: According to the values in the above table, the battery, CAB31L0000C1, is the normal battery. We'll perform the body measurement with this battery and retest on highest value point with others.

7.4 Summary of Measurement Results

Table 11: SAR Values (850MHz-Head) - with battery CAB31L0000C1

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	2.0	1.6	
Test Case	**Measurement Result (W/kg)**		
	10 g Average	**1 g Average**	
Left hand, Touch cheek, Top frequency (See Fig.1)	0.766	1.04	-0.078
Left hand, Touch cheek, Mid frequency (See Fig.2)	0.681	0.923	-0.132
Left hand, Touch cheek, Bottom frequency (See Fig.3)	0.609	0.825	-0.066
Left hand, Tilt 15 Degree, Top frequency (See Fig.4)	0.348	0.459	-0.108
Left hand, Tilt 15 Degree, Mid frequency (See Fig.5)	0.329	0.431	-0.102
Left hand, Tilt 15 Degree, Bottom frequency (See Fig.6)	0.303	0.396	0.044
Right hand, Touch cheek, Top frequency (See Fig.7)	0.666	0.923	-0.034
Right hand, Touch cheek, Mid frequency (See Fig.8)	0.618	0.856	-0.160
Right hand, Touch cheek, Bottom frequency (See Fig.9)	0.557	0.765	-0.048
Right hand, Tilt 15 Degree, Top frequency (See Fig.10)	0.366	0.488	-0.051
Right hand, Tilt 15 Degree, Mid frequency (See Fig.11)	0.345	0.457	-0.033
Right hand, Tilt 15 Degree, Bottom frequency (See Fig.12)	0.319	0.421	-0.049

Table 12: SAR Values (1900MHz-Head) - with battery CAB31L0000C1

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	2.0	1.6	
Test Case	**Measurement Result (W/kg)**		
	10 g Average	**1 g Average**	

Left hand, Touch cheek, Top frequency (See Fig.13)	0.443	0.757	-0.147
Left hand, Touch cheek, Mid frequency (See Fig.14)	0.444	0.754	0.072
Left hand, Touch cheek, Bottom frequency (See Fig.15)	0.448	0.752	-0.006
Left hand, Tilt 15 Degree, Top frequency (See Fig.16)	0.185	0.295	-0.173
Left hand, Tilt 15 Degree, Mid frequency (See Fig.17)	0.199	0.316	-0.015
Left hand, Tilt 15 Degree, Bottom frequency (See Fig.18)	0.198	0.309	0.004
Right hand, Touch cheek, Top frequency (See Fig.19)	0.431	0.762	-0.086
Right hand, Touch cheek, Mid frequency (See Fig.20)	0.464	0.823	0.015
Right hand, Touch cheek, Bottom frequency (See Fig.21)	0.465	0.823	0.075
Right hand, Tilt 15 Degree, Top frequency (See Fig.22)	0.196	0.311	0.014
Right hand, Tilt 15 Degree, Mid frequency (See Fig.23)	0.203	0.319	-0.049
Right hand, Tilt 15 Degree, Bottom frequency(See Fig.24)	0.204	0.316	-0.014

Table 13: SAR Values (850MHz-Head) - with battery CAB31L0000C2

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	2.0	1.6	
Test Case	Measurement Result (W/kg)		
	10 g Average	1 g Average	
Left hand, Touch cheek, Top frequency (See Fig.25)	0.762	1.03	0.099

Table 14: SAR Values (850MHz-Body) - with battery CAB31L0000C1

Limit of SAR (W/kg)	10 g Average	1g Average	Power Drift (dB)
	2.0	1.6	
Test Case	Measurement Result (W/kg)		
	10 g Average	1 g Average	
Body, Towards Ground, Top frequency with GPRS (See Fig.26)	0.969	1.35	-0.110
Body, Towards Ground, Mid frequency with GPRS (See Fig.27)	0.962	1.34	-0.077
Body, Towards Ground, Bottom frequency with GPRS (See Fig.28)	0.884	1.23	-0.071
Body, Towards Phantom, Top frequency with GPRS (See Fig.29)	0.933	1.27	0.0051
Body, Towards Phantom, Mid frequency with GPRS (See Fig.30)	0.924	1.26	-0.034
Body, Towards Phantom, Bottom frequency with GPRS (See Fig.31)	0.849	1.16	-0.060
Body, Towards Ground, Top frequency with EGPRS (See Fig.32)	0.951	1.33	-0.151
Body, Towards Ground, Top frequency with Headset_ CCB3160A10C2 (See Fig.33)	0.585	0.820	-0.062

Body, Towards Ground, Top frequency with Headset_ CCB3160B10C1 (See Fig.34)	0.576	0.810	-0.041

Table 15: SAR Values (1900MHz-Body) - with battery CAB31L0000C1

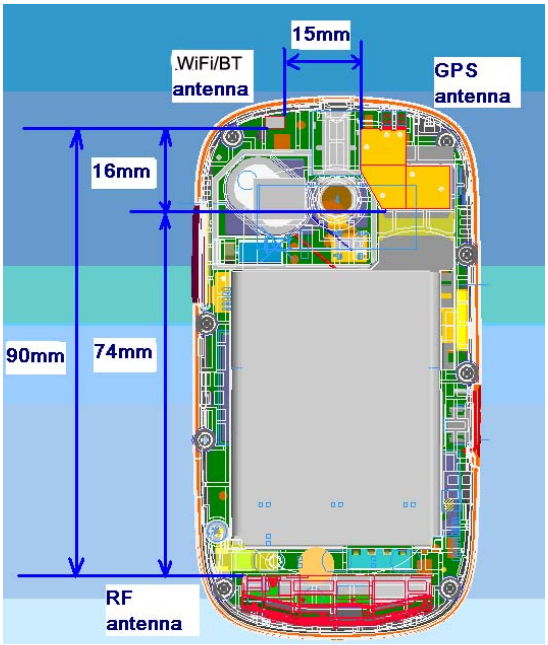
Limit of SAR (W/kg)	10 g Average	1g Average	Power Drift (dB)
	2.0	1.6	
Test Case	Measurement Result (W/kg)		
	10 g Average	1 g Average	
Body, Towards Ground, Top frequency with GPRS (See Fig.35)	0.245	0.425	0.062
Body, Towards Ground, Mid frequency with GPRS (See Fig.36)	0.256	0.443	0.159
Body, Towards Ground, Bottom frequency with GPRS (See Fig.37)	0.297	0.512	0.070
Body, Towards Phantom, Top frequency with GPRS (See Fig.38)	0.219	0.378	0.00232
Body, Towards Phantom, Mid frequency with GPRS (See Fig.39)	0.227	0.392	0.147
Body, Towards Phantom, Bottom frequency with GPRS (See Fig.40)	0.258	0.441	0.011
Body, Towards Ground, Bottom frequency with EGPRS (See Fig.41)	0.294	0.508	0.149
Body, Towards Ground, Bottom frequency with Headset_ CCB3160A10C2 (See Fig.42)	0.187	0.319	-0.089
Body, Towards Ground, Bottom frequency with Headset_ CCB3160B10C1 (See Fig.43)	0.173	0.299	0.021

Table 16: SAR Values (850MHz-Body) - with battery CAB31L0000C2

Limit of SAR (W/kg)	10 g Average	1g Average	Power Drift (dB)
	2.0	1.6	
Test Case	Measurement Result (W/kg)		
	10 g Average	1 g Average	
Body, Towards Ground, Top frequency with GPRS (See Fig.44)	0.958	1.34	0.126

7.5 Summary of Measurement Results (Bluetooth and WiFi function)

The distance between BT/WiFi antenna and RF antenna is ＞5cm. The location of the antennas inside mobile phone is shown below:



The output power of BT antenna is as following:

Channel	**Ch 0 2402 MHz**	**Ch 39 2441 Mhz**	**Ch 78 2480 MHz**
Peak Conducted Output Power(dBm)	-4.59	-4.36	-4.02

The output power of BT transmitter is ≤$2P_{Ref}$ and its antenna is ＞5cm from the RF antenna. So we can draw the conclusion that: stand-alone SAR and simultaneous transmission SAR are not required for BT transmitter.

Note: Power thresholds (P_{Ref}) is derived from multiples of 0.5×60/$f_{(GHz)}$, that is 12mW (10.79dBm) for BT/WiFi frequency.

The average conducted power for WiFi is as following:

802.11b（dBm）

Channel\data rate	1Mbps	2Mbps	5.5Mbps	11Mbps
1	13.52	13.16	13.18	13.10
6	13.57	13.55	13.56	13.55
11	14.32	14.29	14.26	14.23

802.11g（dBm）

Channel\data rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
1	10.50	10.51	10.50	10.44	10.46	10.40	10.38	10.38
6	11.28	11.20	11.35	11.37	11.39	11.37	11.40	11.49
11	11.99	11.95	11.95	11.95	11.99	11.98	12.02	11.90

The peak conducted power for WiFi is as following:

802.11b（dBm）

Channel\data rate	1Mbps	2Mbps	5.5Mbps	11Mbps
1	16.36	16.35	17.66	19.01
6				19.79
11				20.11

802.11g（dBm）

Channel\data rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
1	19.35	19.33	19.20	19.19	19.57	19.51	19.52	19.55
6					20.11			
11					20.53			

According to the conducted power measurement result, we can draw the conclusion that: stand-alone SAR for WiFi should be performed. Then, simultaneous transmission SAR for WiFi is considered with measurement results of GSM and WiFi.

SAR is not required for 802.11g channels if the output power is less than 0.25dB higher than that measured on the corresponding 802.11b channels, and for each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than 0.25dB higher than those measured at the lowest data rate. According to the above conducted power, the EUT should be tested for “802.11b, 1Mbps, channel 11”.

Table 17: SAR Values (WIFI 802.b - Head)

Limit of SAR (W/kg)	**10 g Average**	**1 g Average**	**Power Drift (dB)**
	2.0	1.6	
Test Case	**Measurement Result (W/kg)**		
	10 g Average	**1 g Average**	
Left hand, Touch cheek, 1Mbps,channel 11 (See Fig.45)	0.037	0.078	0.178
Left hand, Tilt 15 Degree, 1Mbps,channel 11 (See Fig.46)	0.017	0.040	-0.183
Right hand, Touch cheek, 1Mbps,channel 11 (See Fig.47)	0.020	0.040	-0.024
Right hand, Tilt 15 Degree, 1Mbps,channel 11 (See Fig.48)	0.013	0.027	0.111

Table 18: SAR Values (WIFI 802.b - Body)

Limit of SAR (W/kg)	**10 g Average**	**1 g Average**	**Power Drift (dB)**
	2.0	1.6	
Test Case	**Measurement Result (W/kg)**		
	10 g Average	**1 g Average**	
Toward Ground, 1Mbps,channel 11 (See Fig.49)	0.015	0.027	0.139
Toward Phantom, 1Mbps,channel 11(See Fig.50)	0.020	0.035	-0.124

Table 19: The sum of SAR values for GSM and WiFi

	Maximum SAR value for Head	Maximum SAR value for Body
GSM	1.04	1.35
WiFi	0.078	0.035
Sum	**1.118**	**1.385**

According to the above tables, the sum of SAR values for GSM and WiFi ＜1.6W/kg. So simultaneous transmission SAR are not required for WiFi transmitter.

7.6 Conclusion

Localized Specific Absorption Rate (SAR) of this portable wireless device has been measured in all cases requested by the relevant standards cited in Clause 4.2 of this report. Maximum localized SAR is below exposure limits specified in the relevant standards cited in Clause 4.1 of this test report.

The maximum SAR values are obtained at the case of **GSM 850 MHz Band, Body, Towards Ground, Top frequency with GPRS (Table 14)**, and the value are: **1.35(1g).**

8 Measurement Uncertainty

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	5.5	N	1	1	1	5.5	5.5	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	N	1	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	∞
10	RF ambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	Probe positioned mech. restrictions	B	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	∞
12	Probe positioning with respect to phantom shell	B	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Test sample related										

14	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
15	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
16	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
17	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
18	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
19	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
20	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
21	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521
Combined standard uncertainty		$u_c' = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$						9.25	9.12	257
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						18.5	18.2	

9 MAIN TEST INSTRUMENTS

Table 20: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	HP 8753E	US38433212	August 4,2010	One year
02	Power meter	NRVD	102083	September 11, 2010	One year
03	Power sensor	NRV-Z5	100542		
04	Signal Generator	E4433C	MY49070393	November 13, 2010	One Year
05	Amplifier	VTL5400	0505	No Calibration Requested	
06	BTS	8960	MY48365192	November 18, 2010	One year
07	E-field Probe	SPEAG ES3DV3	3149	September 25, 2010	One year
08	E-field Probe	SPEAG EX3DV4	3617	July 9, 2010	One year
09	DAE	SPEAG DAE4	771	November 21, 2010	One year
10	Dipole Validation Kit	SPEAG D835V2	443	February 26, 2010	Two years
11	Dipole Validation Kit	SPEAG D1900V2	541	February 26, 2010	Two years
12	Dipole Validation Kit	SPEAG D2450V2	853	September 27, 2010	Two years

END OF REPORT BODY

ANNEX A MEASUREMENT PROCESS

The evaluation was performed with the following procedure:

Step 1: Measurement of the SAR value at a fixed location above the reference point was measured and was used as a reference value for assessing the power drop.

Step 2: The SAR distribution at the exposed side of the phantom was measured at a distance of 3.9 mm from the inner surface of the shell. The area covered the entire dimension of the flat phantom and the horizontal grid spacing was 10 mm x 10 mm. Based on this data, the area of the maximum absorption was determined by spline interpolation.

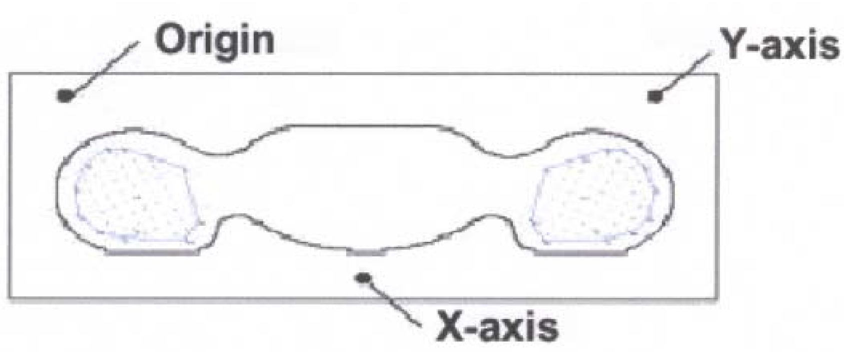
Step 3: Around this point, a volume of 30 mm x 30 mm x 30 mm was assessed by measuring 7 x 7x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

a. The data at the surface were extrapolated, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

b. The maximum interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot"-condition (in x ~ y and z-directions). The volume was integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.

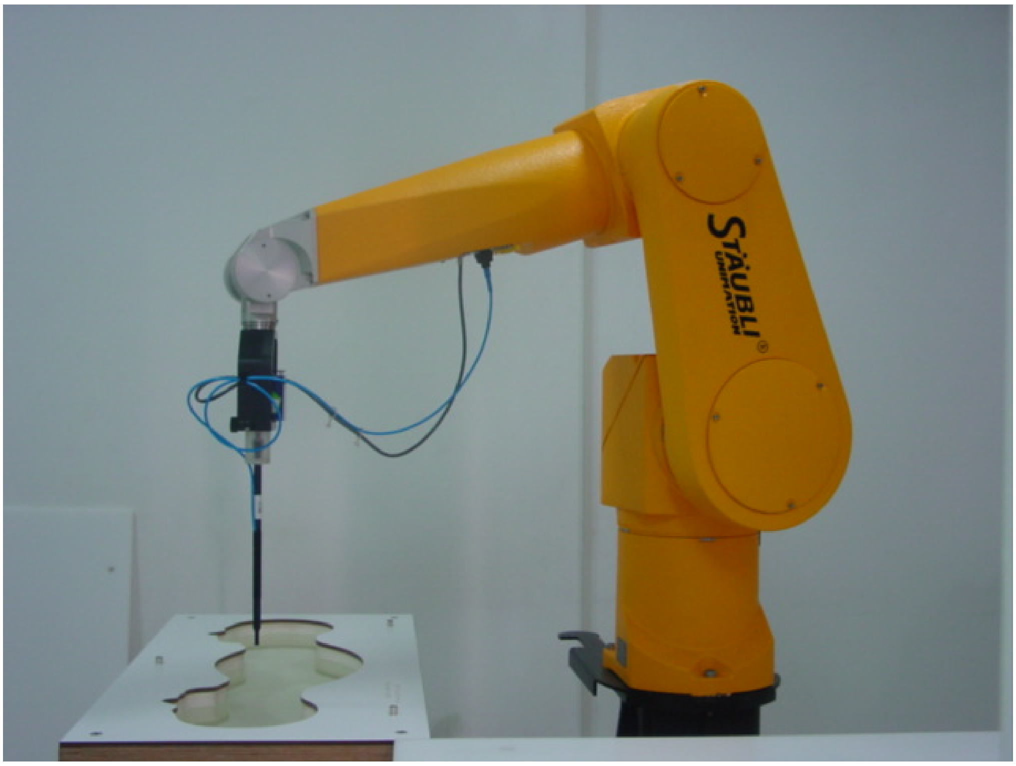
c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

Step 4: Re-measurement the SAR value at the same location as in Step 1. If the value changed by more than 5%, the evaluation is repeated.

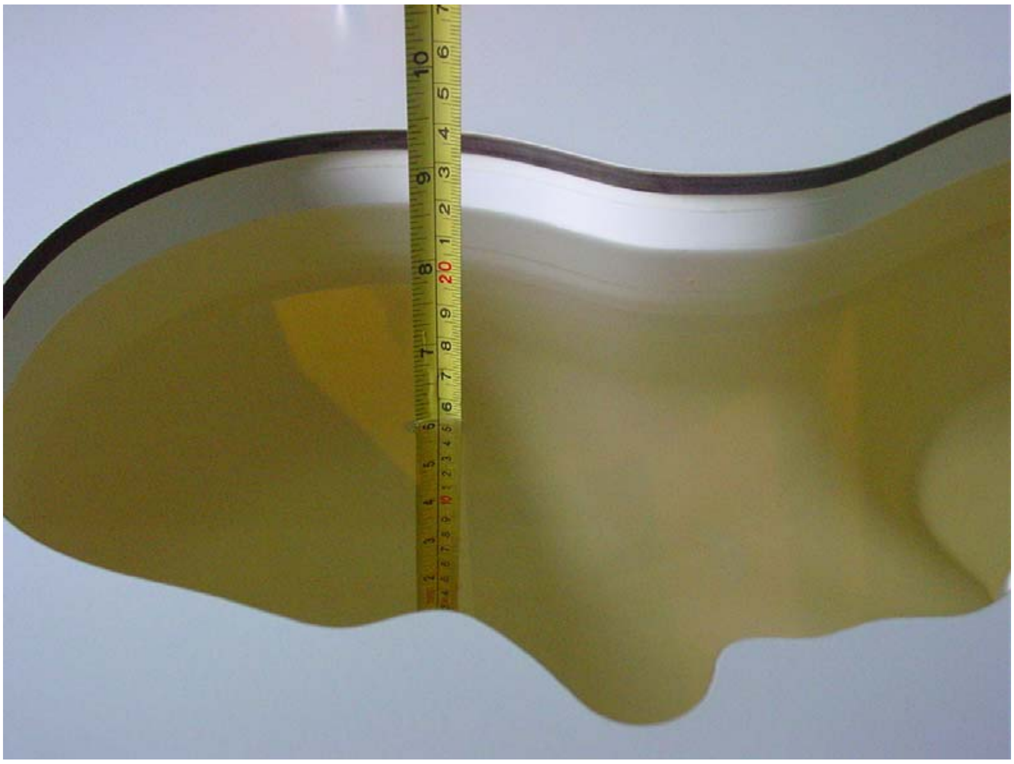


Picture A: SAR Measurement Points in Area Scan

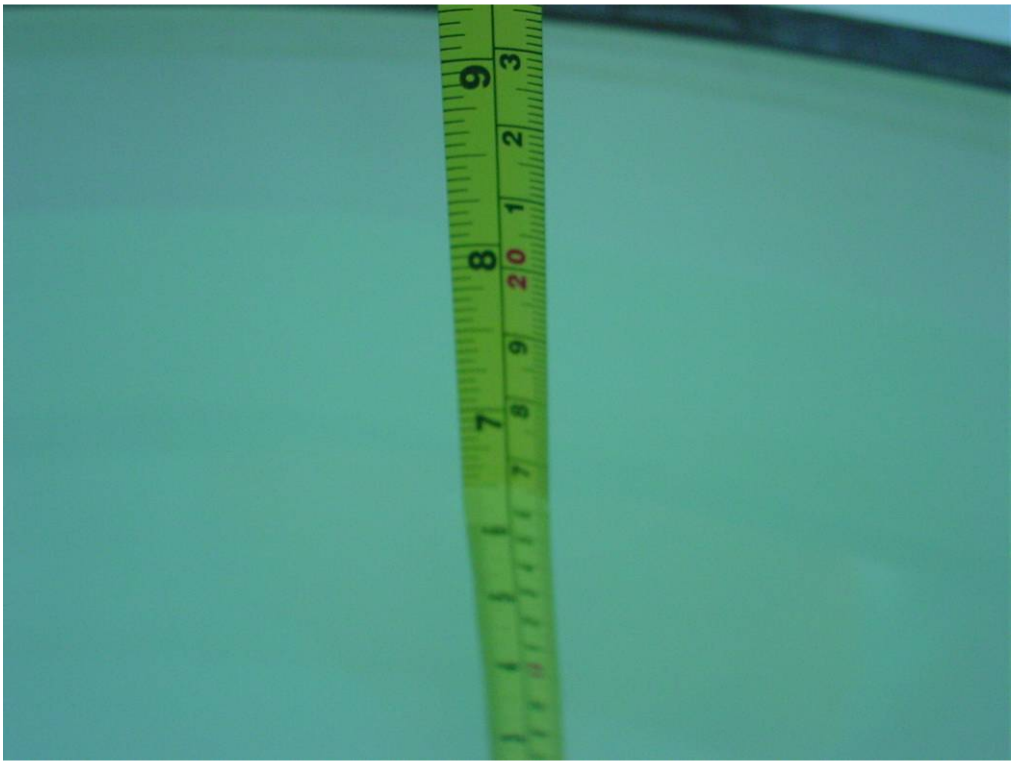
ANNEX B TEST LAYOUT



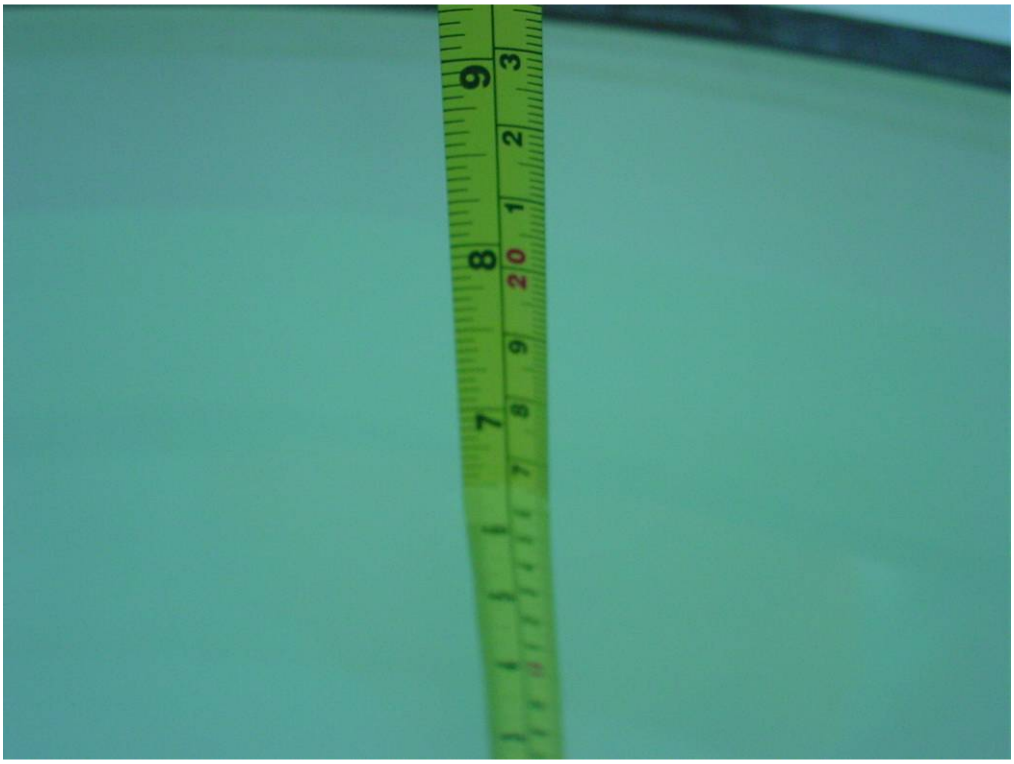
Picture B1: Specific Absorption Rate Test Layout



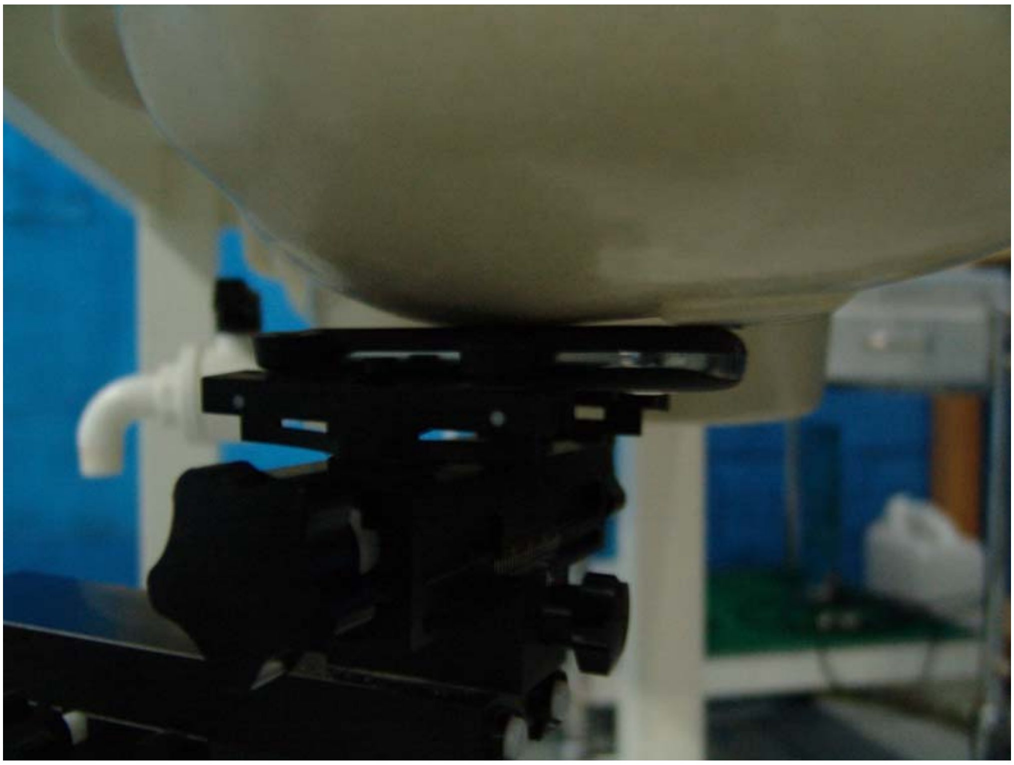
Picture B2: Liquid depth in the Flat Phantom (850 MHz)



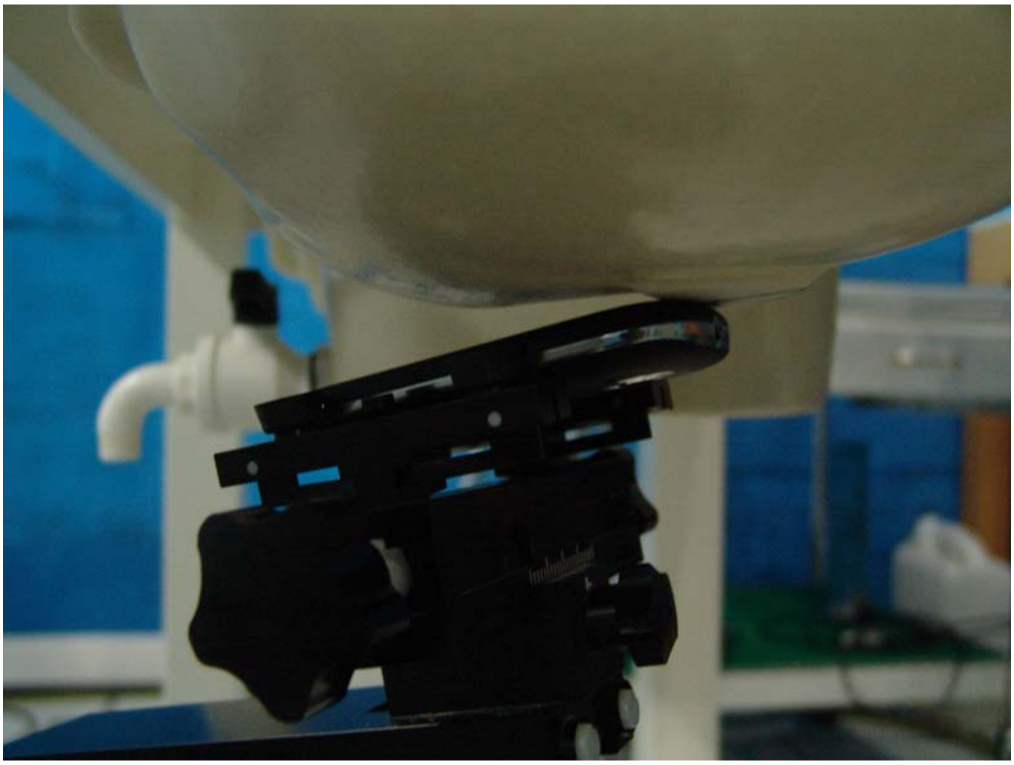
Picture B3 Liquid depth in the Flat Phantom (1900MHz)



Picture B4 Liquid depth in the Flat Phantom (2450MHz)



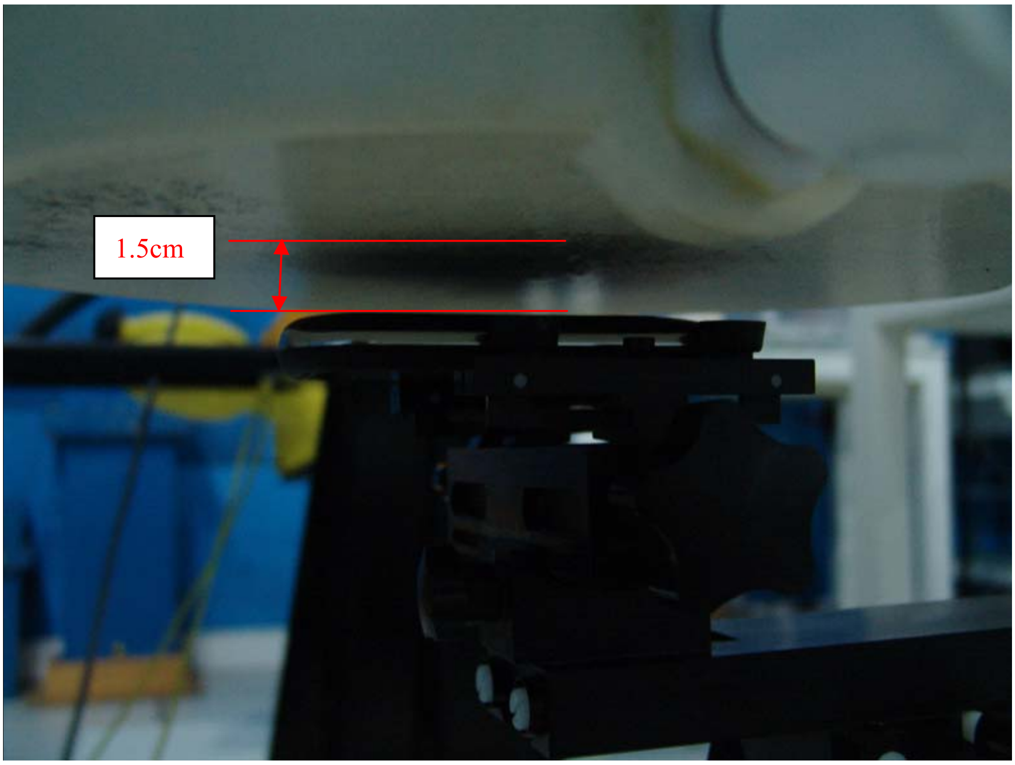
Picture B5: Left Hand Touch Cheek Position



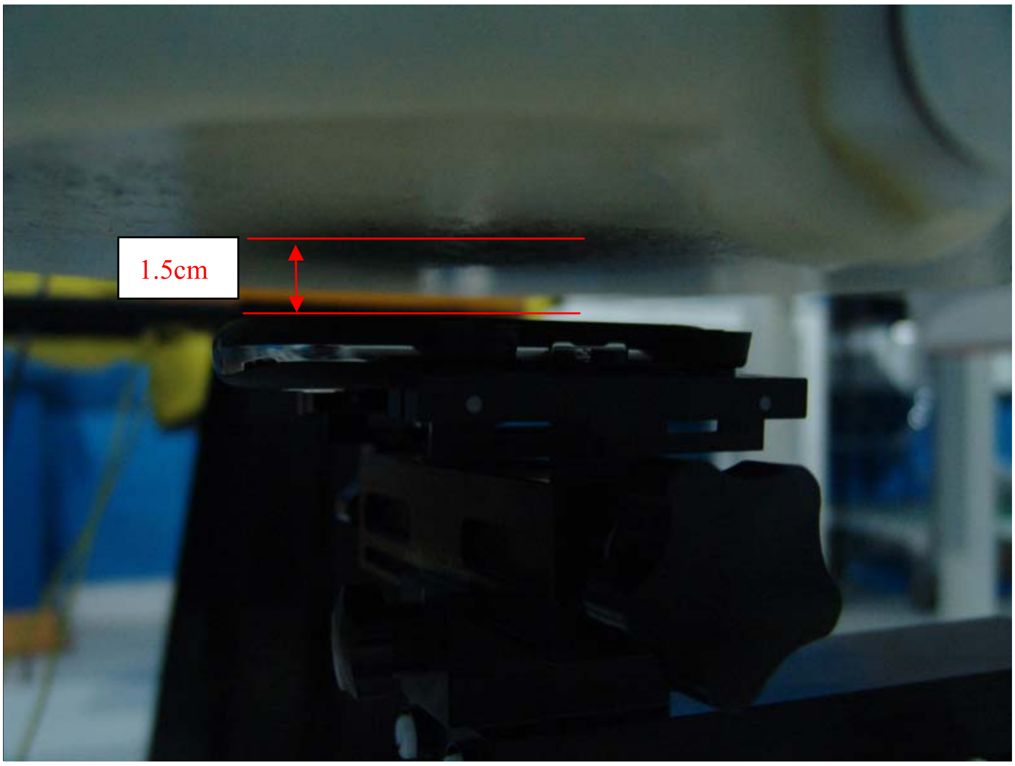
Picture B6: Left Hand Tilt 15° Position

Picture B7: Right Hand Touch Cheek Position

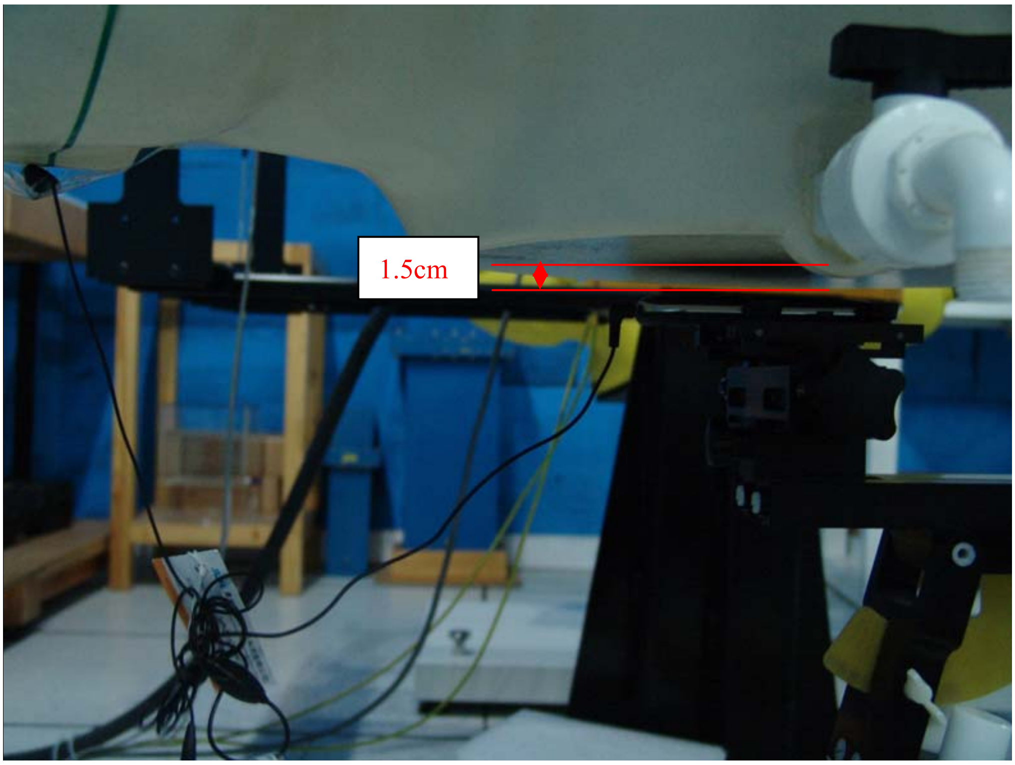
Picture B8: Right Hand Tilt 15° Position



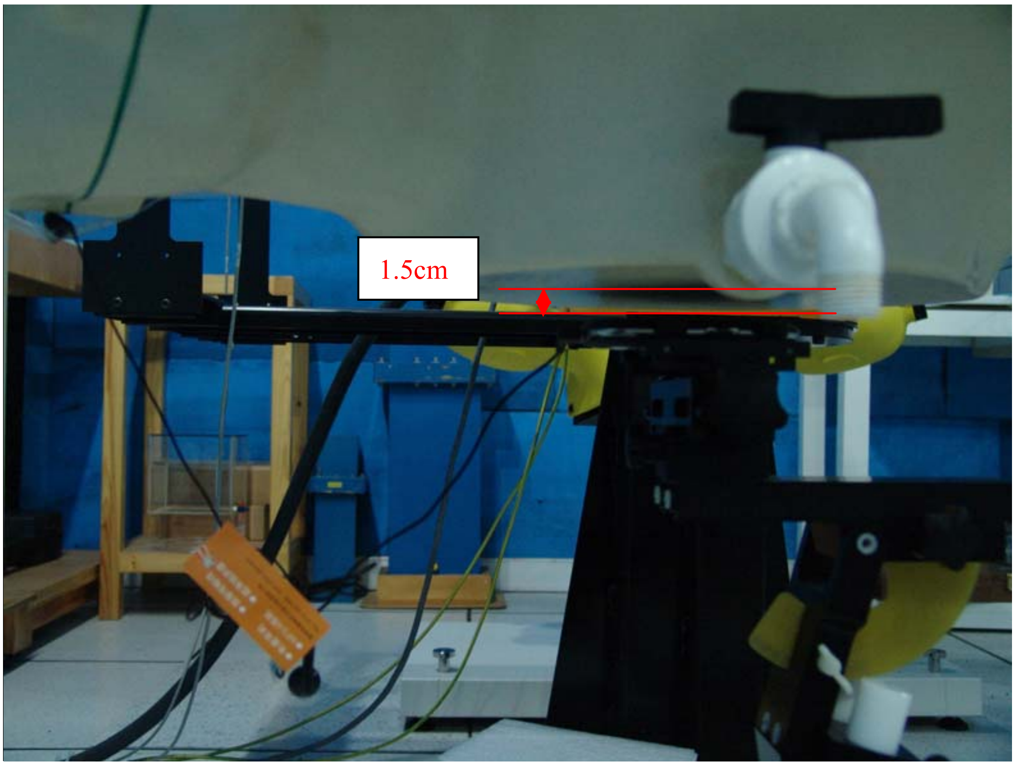
Picture B9: Body-worn Position (towards ground, the distance from handset to the bottom of the Phantom is 1.5cm)



Picture B10: Body-worn Position (towards phantom, the distance from handset to the bottom of the Phantom is 1.5cm)



Picture B11: Body-worn Position with Headset (towards ground, the distance from handset to the bottom of the Phantom is 1.5cm)



Picture B12: Body-worn Position with Headset (towards phantom, the distance from handset to the bottom of the Phantom is 1.5cm)

ANNEX C GRAPH RESULTS

850 Left Cheek High

Date/Time: 2011-5-5 8:10:14
Electronics: DAE4 Sn771
Medium: Head 850 MHz
Medium parameters used (interpolated): f = 848.8 MHz; σ = 0.91 mho/m; εr = 40.2; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: GSM 850 Frequency: 848.8 MHz Duty Cycle: 1:8.3
Probe: ES3DV3 - SN3149 ConvF(6.56, 6.56, 6.56)

Cheek High/Area Scan (61x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.1 mW/g

Cheek High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.6 V/m; Power Drift = -0.078 dB
Peak SAR (extrapolated) = 1.29 W/kg
SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.766 mW/g
Maximum value of SAR (measured) = 1.09 mW/g

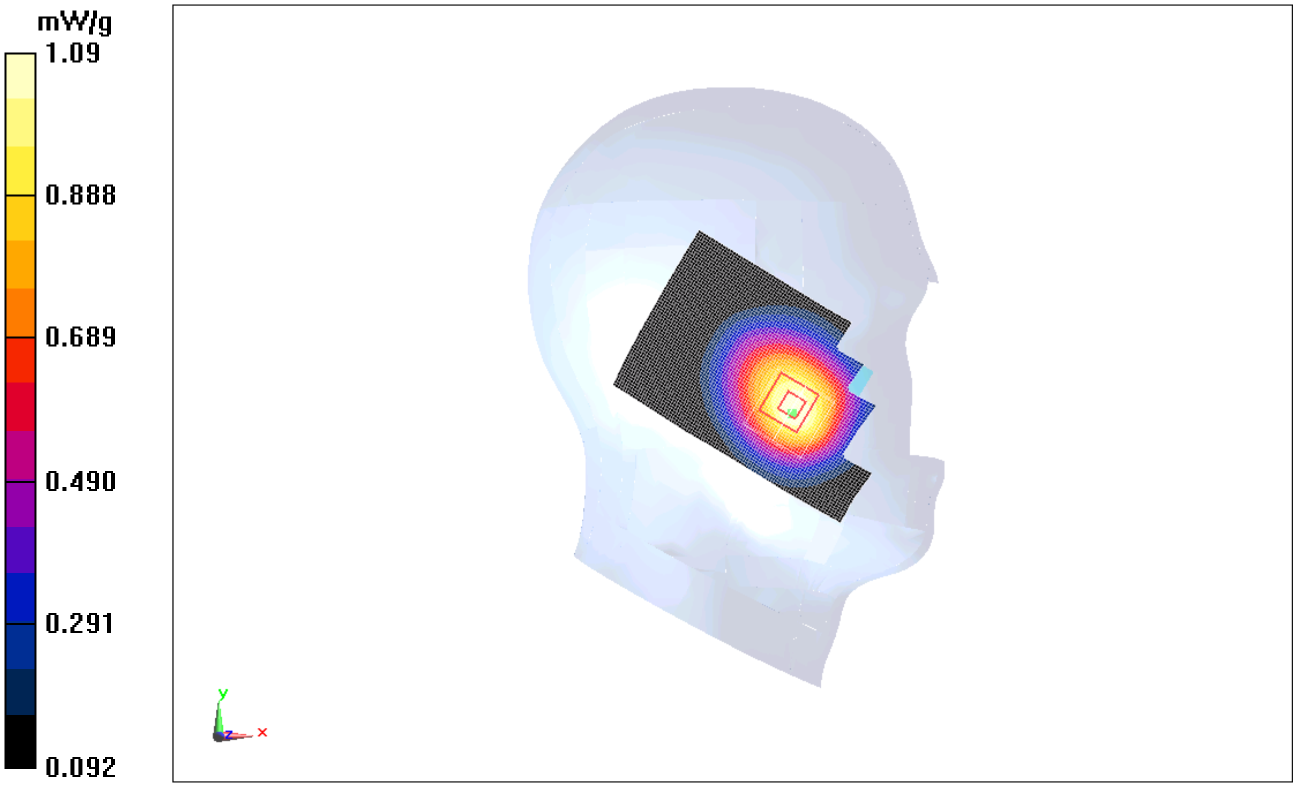


Fig. 1 850MHz CH251

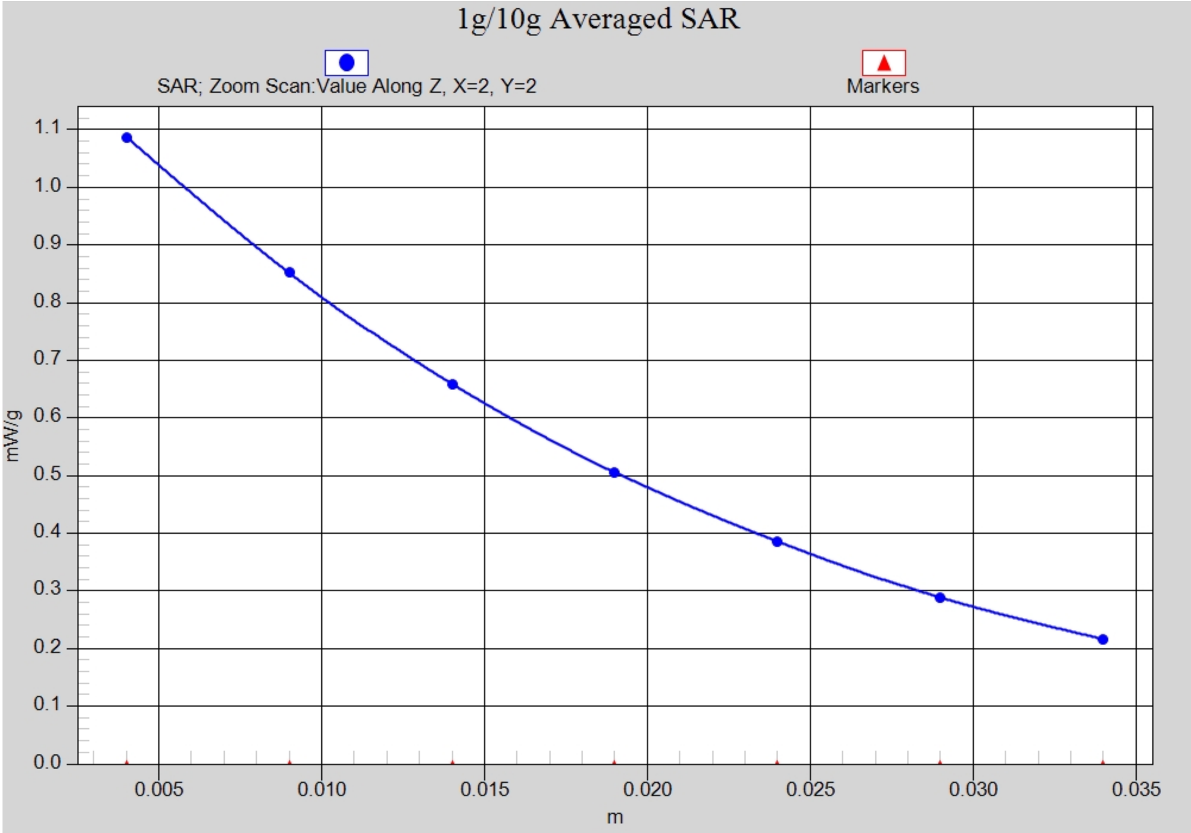


Fig. 1-1 Z-Scan at power reference point (850 MHz CH251)

850 Left Cheek Middle

Date/Time: 2011-5-5 8:24:33
Electronics: DAE4 Sn771
Medium: Head 850 MHz
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.898 mho/m; εr = 40.3; ρ = 1000 kg/m^3
Ambient Temperature:23.0^{o}C Liquid Temperature: 22.5^{o}C
Communication System: GSM 850 Frequency: 836.6 MHz Duty Cycle: 1:8.3
Probe: ES3DV3 - SN3149 ConvF(6.56, 6.56, 6.56)

850 Left/Cheek Middle/Area Scan (61x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.974 mW/g

850 Left/Cheek Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.25 V/m; Power Drift = -0.132 dB
Peak SAR (extrapolated) = 1.15 W/kg
SAR(1 g) = 0.923 mW/g; SAR(10 g) = 0.681 mW/g
Maximum value of SAR (measured) = 0.961 mW/g

Fig. 2 850 MHz CH190

850 Left Cheek Low
Date/Time: 2011-5-5 8:38:56
Electronics: DAE4 Sn771
Medium: Head 850 MHz
Medium parameters used: f = 825 MHz; σ = 0.886 mho/m; εr = 40.3; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: GSM 850 Frequency: 824.2 MHz Duty Cycle: 1:8.3
Probe: ES3DV3 - SN3149 ConvF(6.56, 6.56, 6.56)

Cheek Low/Area Scan (61x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.872 mW/g

Cheek Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.15 V/m; Power Drift = -0.066 dB
Peak SAR (extrapolated) = 1.03 W/kg
SAR(1 g) = 0.825 mW/g; SAR(10 g) = 0.609 mW/g
Maximum value of SAR (measured) = 0.857 mW/g

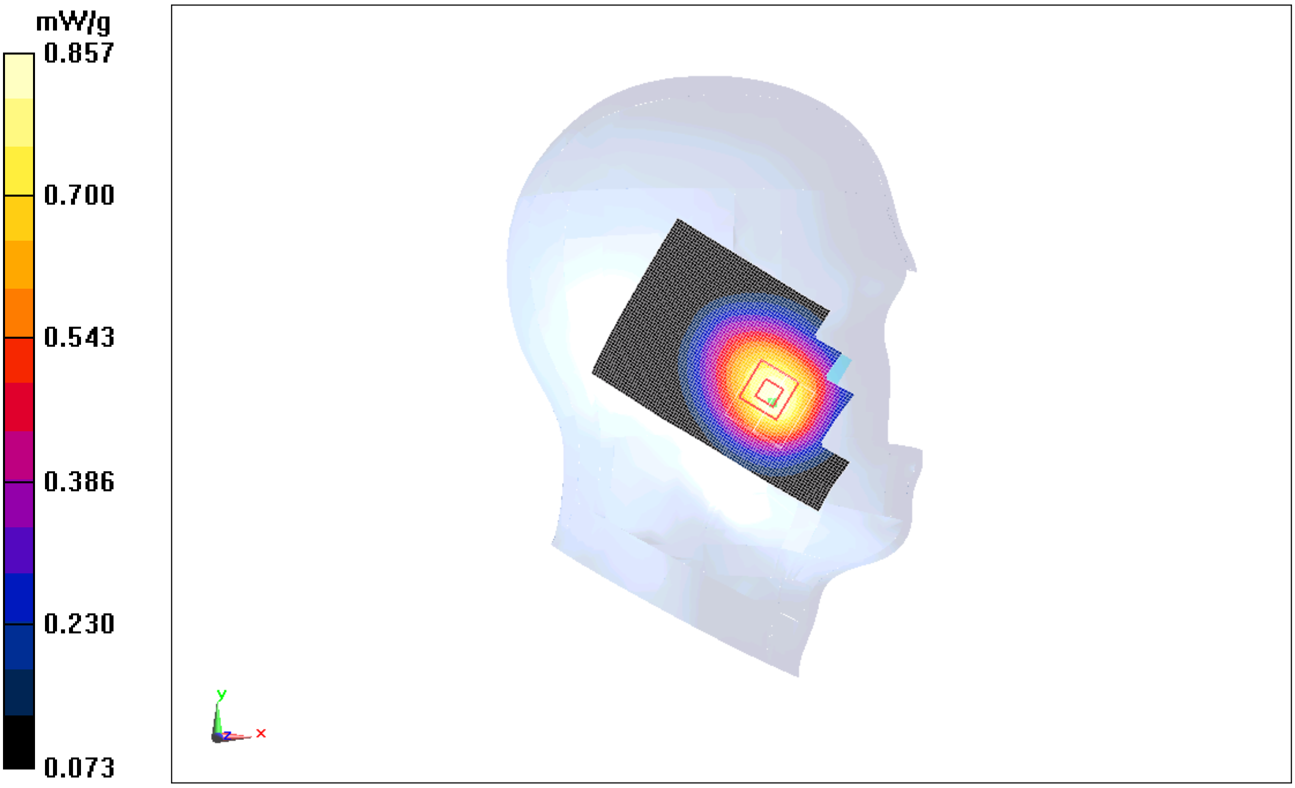


Fig. 3 850 MHz CH128

850 Left Tilt High

Date/Time: 2011-5-5 8:53:39

Electronics: DAE4 Sn771

Medium: Head 850 MHz

Medium parameters used (interpolated): f = 848.8 MHz; σ = 0.91 mho/m; εr = 40.2; ρ = 1000 kg/m^3

Ambient Temperature:23.0°C Liquid Temperature: 22.5°C

Communication System: GSM 850 Frequency: 848.8 MHz Duty Cycle: 1:8.3

Probe: ES3DV3 - SN3149 ConvF(6.56, 6.56, 6.56)

Tilt High/Area Scan (61x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.482 mW/g

Tilt High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.9 V/m; Power Drift = -0.108 dB

Peak SAR (extrapolated) = 0.562 W/kg

SAR(1 g) = 0.459 mW/g; SAR(10 g) = 0.348 mW/g

Maximum value of SAR (measured) = 0.482 mW/g

Fig.4 850 MHz CH251