



SAR TEST REPORT For FCC

No. 2010EEE02797

For

Motorola Inc. (Mobile Devices Business)

WCDMA mobile phone

Model Name: A1680

Type Name: IUQ6-34411A11

With

Hardware Version: P3

Software Version: E28.0006_A.1.6_01.21I

FCCID: IHDP56LR1

Issued Date: 2010-06-28



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

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检测 CNAS L0442

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1 Test Laboratory

1.1 Testing Location

Company Name: TMC Beijing, Telecommunication Metrology Center of MIIT
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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

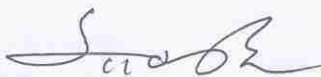
Project Leader: Qi Dianyuan
Test Engineer: Lin Xiaojun
Testing Start Date: May 18, 2010
Testing End Date: May 21, 2010

1.4 Signature



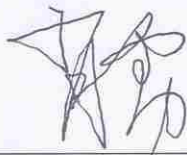
Lin Xiaojun

(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

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Postal Code:	/
Country:	P.R. China
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3 Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1 About EUT

EUT Description:	WCDMA mobile phone
Model Name:	A1680
Type Name:	IUQ6-34411A11
GSM Frequency Band:	GSM 850 / PCS 1900 / WiFi

3.2 Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT1	351563040000913	P3	E28.0006_A.1.6_01.21I

*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	BT60	/	Motorola (China) Electronics Ltd.
AE2	Travel Charger	DC4050US0301	/	Motorola (China) Electronics Ltd.
AE3	Stereo headset	SJYN0182A	/	MERRY ELECTRONICS CO., LTD.

*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 Xmitter and Ant, v01r05: SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas.

KDB248227: SAR measurement procedures for 802.112abg transmitters.

They specify the measurement method for demonstration of compliance with the SAR limits for such equipments.

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.

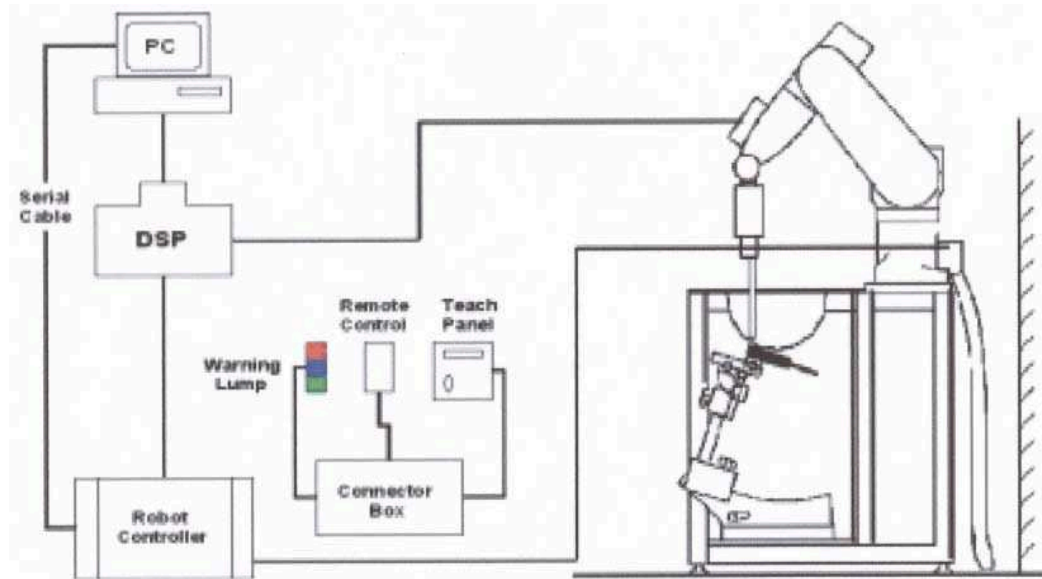
The EUT shall use its internal transmitter. The antenna(s), battery and accessories shall be those specified by the manufacturer. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output. If a wireless link is used, the antenna connected to the 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 $\pm 0.02\text{mm}$. 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 $\pm 10\%$. The spherical isotropy was evaluated and found to be better than $\pm 0.25\text{dB}$.

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 μ W/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 $\pm 10\%$. The spherical isotropy was evaluated and found to be better than ± 0.25 dB. 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 below 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 repeatably 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±0.1 mm
Filling Volume	Approx. 20 liters
Dimensions	810 x 1000 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 800-2000 MHz consisted of water, sugar, salt and Cellulose, the range of 2000-3000 MHz consisted of water, Glycol monobutyl and salt. The liquid has been previously proven to be suited for worst-case. The Table 1 to 4 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 $\epsilon=41.5$ $\sigma=0.90$
MIXTURE %	FREQUENCY 1900MHz
Water	55.242
Glycol monobutyl	44.452
Salt	0.306
Dielectric Parameters Target Value	f=1900MHz $\epsilon=40.0$ $\sigma=1.40$

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 $\epsilon=55.2$ $\sigma=0.97$
MIXTURE %	FREQUENCY 1900MHz
Water	69.91
Glycol monobutyl	29.96
Salt	0.13
Dielectric Parameters Target Value	f=1900MHz $\epsilon=53.3$ $\sigma=1.52$

Table 3: Composition of the Head Tissue Equivalent Matter

MIXTURE %	FREQUENCY 2450MHz
Water	58.79
Glycol monobutyl	41.15
Salt	0.06
Dielectric Parameters Target Value	f=2450MHz $\epsilon=39.2$ $\sigma=1.80$

Table 4: Composition of the Body Tissue Equivalent Matter

MIXTURE %	FREQUENCY 2450MHz
Water	72.60
Glycol monobutyl	27.22
Salt	0.18
Dielectric Parameters Target Value	f=2450MHz $\epsilon=52.7$ $\sigma=1.95$

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 LABORATORY ENVIRONMENT

Table 5: The Ambient Conditions during EMF Test

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surround objects is minimized and in compliance with requirement of standards.	

7 CONDUCTED OUTPUT POWER MEASUREMENT

7.1 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 peak output power should be greater and within 5% than EMI measurement.

7.2 Conducted Power

7.2.1 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.

7.2.2 Measurement result

The conducted power for GSM 850/1900 is as following:

GSM 850MHZ	Conducted Power (dBm)		
	Channel 128(824.2MHz)	Channel 190(836.6MHz)	Channel 251(848.8MHz)
	31.5	31.9	32.2

GSM 1900MHZ	Conducted Power (dBm)		
	Channel 512(1850.2MHz)	Channel 661(1880MHz)	Channel 810(1909.8MHz)
	28.8	28.8	28.9

The conducted power for GPRS/EGPRS 850/1900 is as following:

GSM 850 GPRS	Measured Power (dBm)			calculation	Averaged Power (dBm)		
	128	190	251		128	190	251
1 Txslot	31.7	32.0	32.3	-9.03dB	22.67	22.97	23.27
2 Txslots	29.8	30.1	30.4	-6.02dB	23.78	24.08	24.38
3Txslots	27.9	28.2	28.5	-4.26dB	23.64	23.94	24.24
4 Txslots	25.8	26.1	26.4	-3.01dB	22.79	23.09	23.39
GSM 850 EGPRS	Measured Power (dBm)				Averaged Power (dBm)		
	128	190	251		128	190	251
1 Txslot	27.13	26.79	26.52	-9.03dB	18.10	17.76	17.49
2 Txslots	25.08	24.77	24.47	-6.02dB	19.06	18.75	18.45
3Txslots	23.17	22.86	22.55	-4.26dB	18.91	18.60	18.29
4 Txslots	21.12	20.78	20.50	-3.01dB	18.11	17.77	17.49
DCS1900 GPRS	Measured Power (dBm)				Averaged Power (dBm)		
	512	661	810		512	661	810
1 Txslot	29.5	29.3	29.4	-9.03dB	20.47	20.27	20.37
2 Txslots	27.5	27.3	27.4	-6.02dB	21.48	21.28	21.38
3Txslots	25.5	25.4	25.4	-4.26dB	21.24	21.14	21.14
4 Txslots	23.6	23.5	23.5	-3.01dB	20.59	20.49	20.49
DCS1900 EGPRS	Measured Power (dBm)				Averaged Power (dBm)		
	512	661	810		512	661	810
1 Txslot	26.22	26.16	26.10	-9.03dB	17.19	17.13	17.07
2 Txslots	24.03	23.98	23.96	-6.02dB	18.01	17.96	17.94
3Txslots	21.90	21.83	21.82	-4.26dB	17.64	17.57	17.56
4 Txslots	19.97	19.88	19.91	-3.01dB	16.96	16.87	16.90

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 GPRS and EGPRS.

7.2.3 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 10 to Table 15 labeled as: (Power Drift [dB]). This ensures that the power drift during one measurement is within 5%.

8 TEST RESULTS

8.1 Dielectric Performance

Table 6: Dielectric Performance of Head Tissue Simulating Liquid

Measurement is made at temperature 23.0 °C and relative humidity 38%.			
Liquid temperature during the test: 22.5°C			
Measurement Date : 850 MHz <u>May 18, 2010</u> 1900 MHz <u>May 19, 2010</u> 2450 MHz <u>May 21, 2010</u>			
/	Frequency	Permittivity ϵ	Conductivity σ (S/m)
Target value	850 MHz	41.5	0.90
	1900 MHz	40.0	1.40
	2450 MHz	39.2	1.80
Measurement value (Average of 10 tests)	850 MHz	40.2	0.89
	1900 MHz	39.1	1.41
	2450 MHz	39.4	1.82

Table 7: Dielectric Performance of Body Tissue Simulating Liquid

Measurement is made at temperature 23.0 °C and relative humidity 38%.			
Liquid temperature during the test: 22.5°C			
Measurement Date : 850 MHz <u>May 18, 2010</u> 1900 MHz <u>May 19, 2010</u> 2450 MHz <u>May 21, 2010</u>			
/	Frequency	Permittivity ϵ	Conductivity σ (S/m)
Target value	850 MHz	55.2	0.97
	1900 MHz	53.3	1.52
	2450 MHz	52.7	1.95
Measurement value (Average of 10 tests)	850 MHz	53.9	0.95
	1900 MHz	52.3	1.55
	2450 MHz	51.0	1.94

8.2 System Validation

Table 8: System Validation of Head

Measurement is made at temperature 23.0 °C and relative humidity 38%.				
Liquid temperature during the test: 22.5°C				
Measurement Date : 850 MHz <u>May 18, 2010</u> 1900 MHz <u>May 19, 2010</u> 2450 MHz <u>May 21, 2010</u>				
Liquid parameters	Dipole calibration Target value	Frequency	Permittivity ϵ	Conductivity σ (S/m)
		835 MHz	41.6	0.92
		1900 MHz	39.6	1.40
		2450 MHz	40.5	1.85
	Actual Measurement value	835 MHz	40.3	0.87
		1900 MHz	39.1	1.41
		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	1.54	2.38	1.58	2.32	2.60%	-2.52%
	1900 MHz	5.05	9.91	4.91	9.80	-2.77%	-1.11%
	2450 MHz	5.91	13.07	5.78	12.8	-2.20%	-2.07%

Table 9: System Validation of Body

Measurement is made at temperature 23.0 °C and relative humidity 38%.

Liquid temperature during the test: 22.5°C

Measurement Date : 850 MHz May 18, 2010 1900 MHz May 19, 2010 2450 MHz May 21, 2010

Liquid parameters	Dipole calibration Target value	Frequency		Permittivity ϵ		Conductivity σ (S/m)	
		835 MHz		54.5		0.97	
		1900 MHz		52.5		1.51	
		2450 MHz		51.8		1.93	
	Actual Measurement value	835 MHz		54.0		0.93	
		1900 MHz		52.3		1.55	
		2450 MHz		51.0		1.94	
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	1.57	2.41	1.51	2.42	-3.82%	0.41%
	1900 MHz	5.24	10.4	5.35	10.3	2.10%	-0.96%
	2450 MHz	5.82	12.78	5.95	13.2	2.23%	3.29%

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

8.3 Summary of Measurement Results

Table 10: SAR Values (850MHz-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, Mid frequency (See Fig.1)	0.200	0.271	0.149
Left hand, Tilt 15 Degree, Mid frequency (See Fig.2)	0.060	0.075	-0.100

Right hand, Touch cheek, Top frequency (See Fig.3)	0.210	0.292	0.154
Right hand, Touch cheek, Mid frequency (See Fig.4)	0.200	0.279	0.193
Right hand, Touch cheek, Bottom frequency (See Fig.5)	0.186	0.258	0.162
Right hand, Tilt 15 Degree, Mid frequency (See Fig.6)	0.063	0.082	-0.092

Table 11: SAR Values (1900MHz-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, Mid frequency (See Fig.7)	0.052	0.078	0.199
Left hand, Tilt 15 Degree, Mid frequency (See Fig.8)	0.019	0.028	0.179
Right hand, Touch cheek, Top frequency (See Fig.9)	0.075	0.126	0.134
Right hand, Touch cheek, Mid frequency (See Fig.10)	0.083	0.137	-0.192
Right hand, Touch cheek, Bottom frequency (See Fig.11)	0.095	0.155	-0.188
Right hand, Tilt 15 Degree, Mid frequency (See Fig.12)	0.024	0.036	-0.073

Table 12: SAR Values (850MHz-Body)

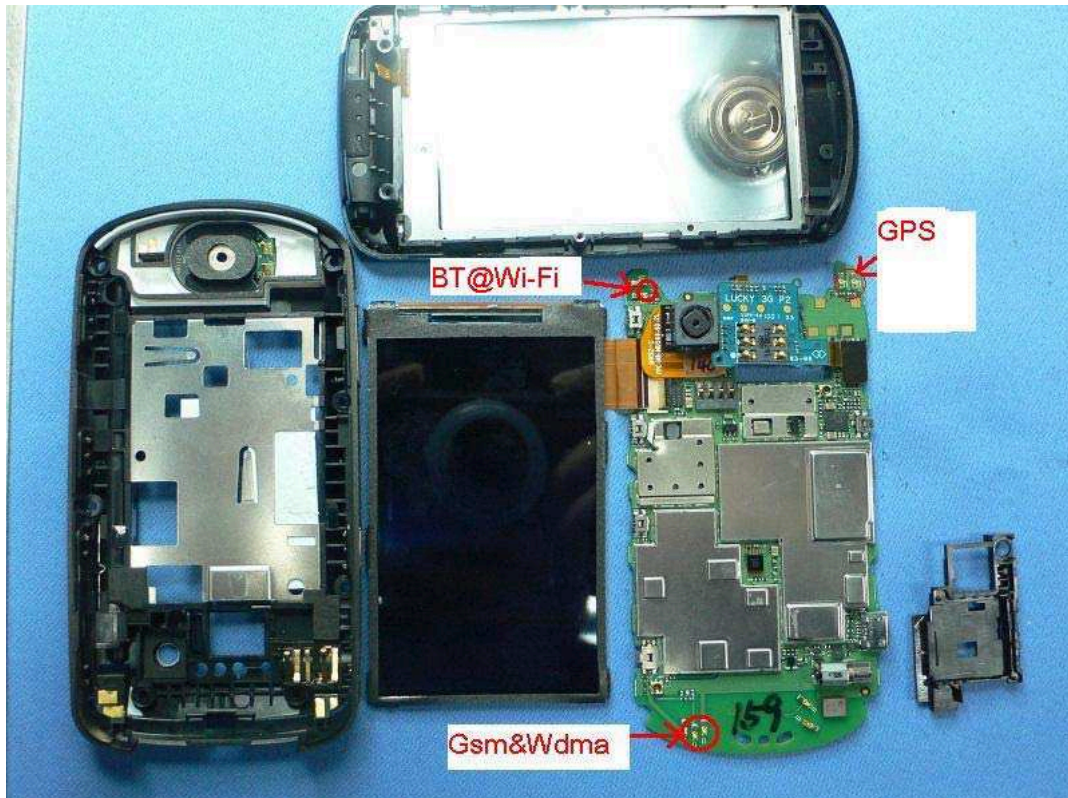
Limit of SAR (W/kg)	10 g Average	1g Average	Power Drift (dB)
	2.0	1.6	
Test Case	Measurement Result (W/kg)		
	10 g Average	1 g Average	
Body, Towards Ground, Top frequency with GPRS (See Fig.13)	0.594	0.837	-0.053
Body, Towards Ground, Mid frequency with GPRS (See Fig.14)	0.623	0.874	-0.014
Body, Towards Ground, Bottom frequency with GPRS (See Fig.15)	0.667	0.933	0.035
Body, Towards Ground, Bottom frequency with EGPRS (See Fig.16)	0.202	0.282	0.043
Body, Towards Ground, Bottom frequency with Headset (See Fig.17)	0.430	0.601	-0.048
Body, Handset closed, Towards Ground, Bottom frequency with Headset (See Fig.18)	0.457	0.638	-0.075
Body, Handset closed, Towards Phantom, Bottom frequency with Headset (See Fig.19)	0.352	0.492	-0.024

Table 13: SAR Values (1900MHz-Body)

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.20)	0.155	0.250	0.195
Body, Towards Ground, Mid frequency with GPRS (See Fig.21)	0.163	0.263	-0.037
Body, Towards Ground, Bottom frequency with GPRS (See Fig.22)	0.202	0.332	0.009
Body, Towards Ground, Bottom frequency with EGPRS (See Fig.23)	0.076	0.124	0.120
Body, Towards Ground, Bottom frequency with Headset (See Fig.24)	0.142	0.234	0.109
Body, Handset closed, Towards Ground, Bottom frequency with Headset (See Fig.25)	0.148	0.246	0.035
Body, Handset closed, Towards Phantom, Bottom frequency with Headset (See Fig.26)	0.087	0.144	-0.031

8.4 Summary of Measurement Results (WiFi and Bluetooth function)

The distance between BT-WiFi antenna and GSM antenna is $>5\text{cm}$. The location of the antennas inside mobile phone is shown below:



The conducted power for BT antenna is -3.2dBm.

The conducted power for WiFi is as following:

802.11b (dBm)

Channel\data rate	1Mbps	2Mbps	5.5Mbps	11Mbps
1	16.32	16.31	16.34	16.33
6	16.17	16.21	16.22	16.22
11	16.15	16.18	16.20	16.21

802.11g (dBm)

Channel\data rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
1	16.27	16.29	16.30	16.31	16.29	16.28	16.31	16.28
6	16.21	16.31	16.27	16.28	16.28	16.27	16.23	16.26
11	16.26	16.32	16.24	16.27	16.28	16.26	16.27	16.29

According to the conducted power measurement result and the distance between the two antennas, we can draw the conclusion that: stand-alone SAR and simultaneous transmission SAR are not required for BT transmitter, because the conducted power for BT transmitter is $\leq 2P_{Ref}$ and its antenna is $> 5\text{cm}$ from other antenna. Because the conducted power for WiFi transmitter is $> 2P_{Ref}$ and its antenna is $> 5\text{cm}$ from other antenna, stand-alone SAR for WiFi should be performed. Then, simultaneous transmission SAR for WiFi is considered with measurement results of GSM and WiFi.

Because SAR is not required for 802.11g channels since 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 1". If SAR for highest output channel is $> 50\%$ of SAR limit, test all channels.

Table 14: SAR Values (WiFi 802.11b -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 1 (See Fig.27)	0.087	0.182	0.144
Left hand, Tilt 15 Degree, 1Mbps, channel 1 (See Fig.28)	0.00612	0.013	-0.155
Right hand, Touch cheek, 1Mbps, channel 1 (See Fig.29)	0.081	0.150	-0.101
Right hand, Tilt 15 Degree, 1Mbps, channel 1(See Fig.30)	0.010	0.023	-0.089

Table 15: SAR Values (WiFi 802.11b -Body)

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, 1Mbps, channel 1 (See Fig.31)	0.036	0.062	-0.181

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

8.5 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 Body, Towards Ground, Bottom frequency with GPRS (Table 12)**, and the value are: **0.667(10g), 0.933(1g)**.

9 Measurement Uncertainty

No.	Error Description	Type	Tolerance ($\pm\%$)	Probability Distribution	Divisor	c_i	Standard Uncertainty (%) u_i (%)	Degree of freedom V_{eff} or v_i
1	System repeatability	A	0.5	N	1	1	0.5	9
Measurement system								
2	— probe calibration	B	3.5	N	1	1	3.5	∞
3	— axial isotropy of the probe	B	4.7	R	$\sqrt{3}$	0.5	4.3	∞
4	— hemisphere isotropy of the probe	B	9.4	R	$\sqrt{3}$			
5	— space resolution	B	0	R	$\sqrt{3}$	1	0	∞
6	— boundary effect	B	11.0	R	$\sqrt{3}$	1	6.4	∞
7	— probe linearity	B	4.7	R	$\sqrt{3}$	1	2.7	∞

8	— detection limit	B	1.0	R	$\sqrt{3}$	1	0.6	∞
9	— readout electronics	B	1.0	N	1	1	1.0	∞
10	— RF Ambient Conditions	B	3.0	R	$\sqrt{3}$	1	1.73	∞
11	— Probe Positioner Mechanical Tolerance	B	0.4	R	$\sqrt{3}$	1	0.2	∞
12	— Probe Positioning with respect to Phantom Shell	B	2.9	R	$\sqrt{3}$	1	1.7	∞
13	— Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	B	3.9	R	$\sqrt{3}$	1	2.3	∞
Test sample Related								
14	— Test Sample Positioning	A	4.9	N	1	1	4.9	5
15	— Device Holder	A	6.1	N	1	1	6.1	5
16	— Output Power Variation - SAR drift measurement	B	5.0	R	$\sqrt{3}$	1	2.9	∞
Phantom and Tissue Parameters								
17	— Phantom Uncertainty (shape and thickness tolerances)	B	1.0	R	$\sqrt{3}$	1	0.6	∞
18	— liquid conductivity (deviation from target)	B	5.0	R	$\sqrt{3}$	0.6	1.7	∞
19	— liquid conductivity (measurement error)	A	0.23	N	1	1	0.23	9
20	-liquid permittivity (deviation from target)	B	5.0	R	$\sqrt{3}$	0.6	1.7	∞
21	— liquid permittivity (measurement error)	A	0.46	N	1	1	0.46	9
Combined standard uncertainty		$u'_c = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$		/			12.2	88.7
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$		N	k=2		24.4	/

10 MAIN TEST INSTRUMENTS

Table 16: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	HP 8753E	US38433212	August 29, 2009	One year
02	Power meter	NRVD	101253	September 4, 2009	One year
03	Power sensor	NRV-Z5	100333		
04	Signal Generator	E4433B	US37230472	September 3, 2009	One Year
05	Amplifier	VTL5400	0505	No Calibration Requested	
06	BTS	CMU 200	113312	August 10, 2009	One year
07	E-field Probe	SPEAG ES3DV3	3149	September 25, 2009	One year
08	E-field Probe	SPEAG EX3DV4	3617	July 9, 2009	One year
09	DAE	SPEAG DAE4	771	November 19, 2009	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	IndexSAR IXD-245	40102	October, 2008	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.

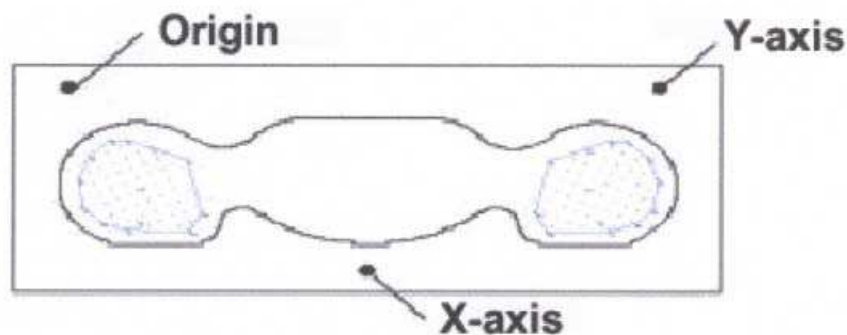
Step 3: Around this point, a volume of 30 mm x 30 mm x 30 mm was assessed by measuring 7 x 7x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

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.

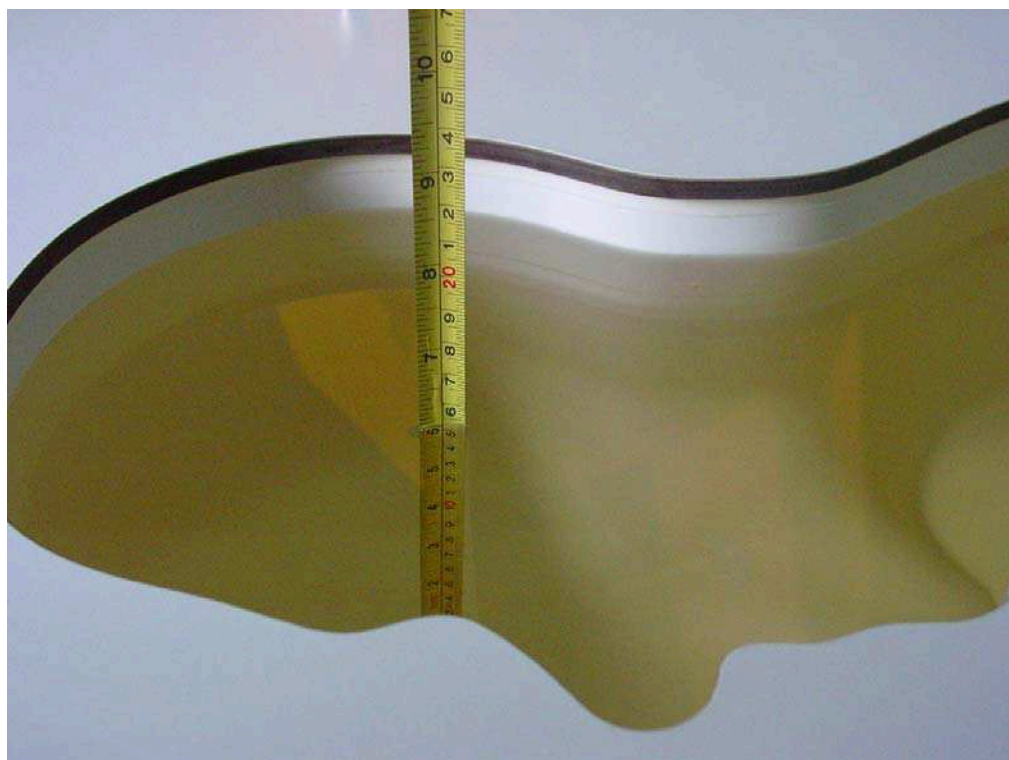


Picture A: SAR Measurement Points in Area Scan

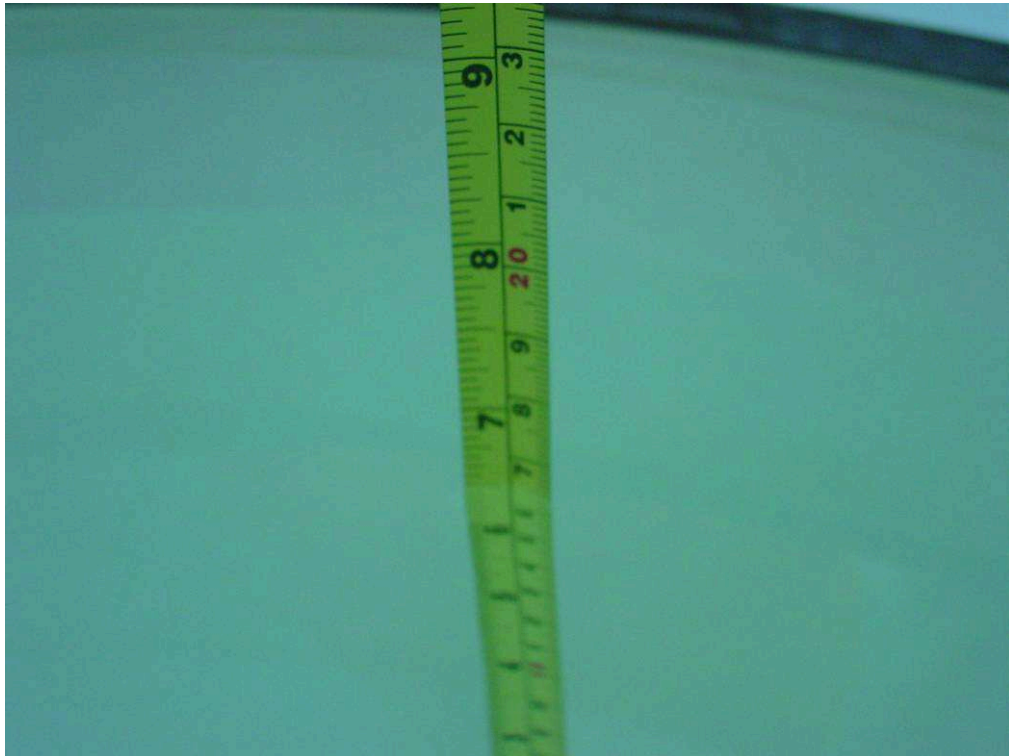
ANNEX B TEST LAYOUT



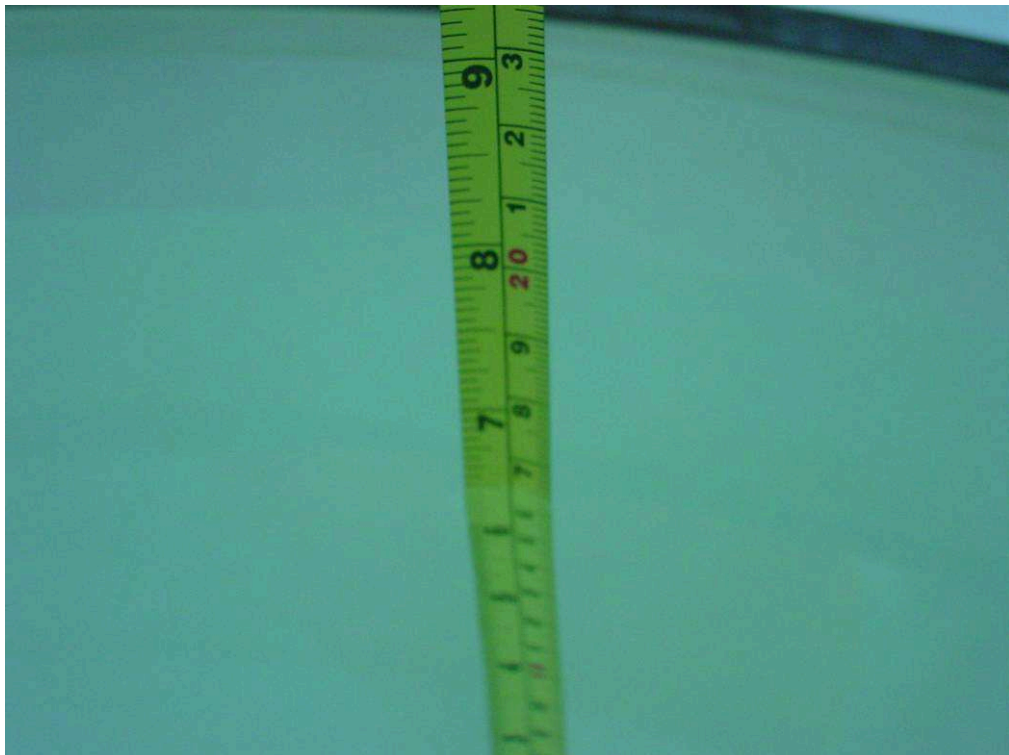
Picture B1: Specific Absorption Rate Test Layout



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)



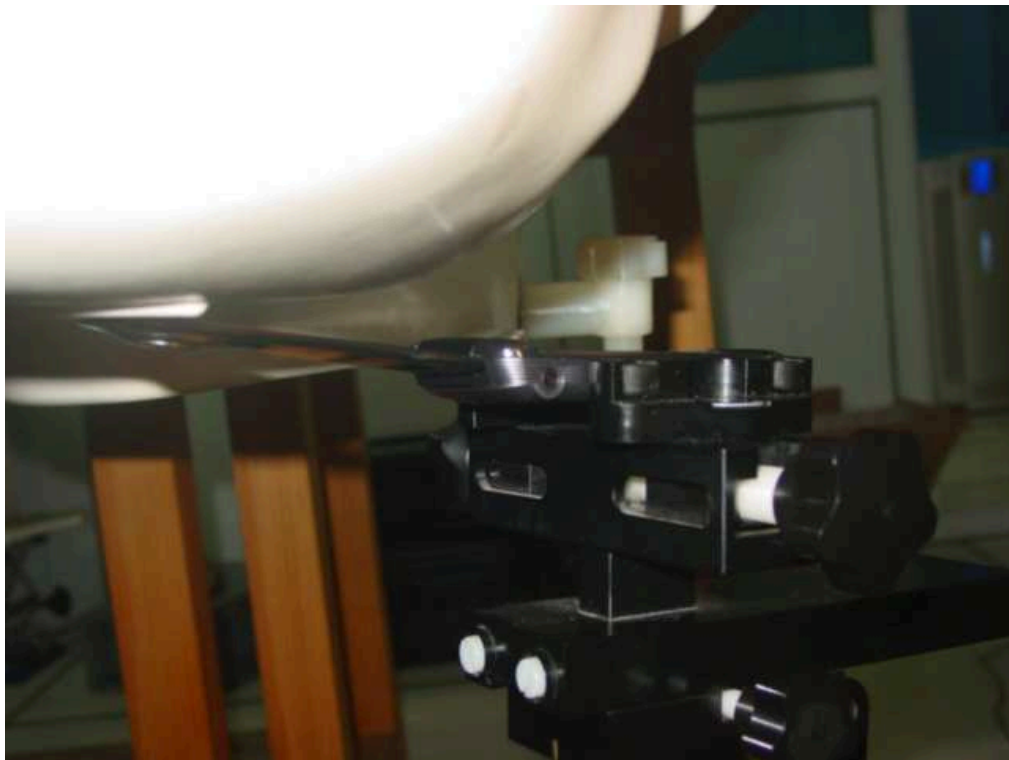
Picture B5: Left Hand Touch Cheek Position



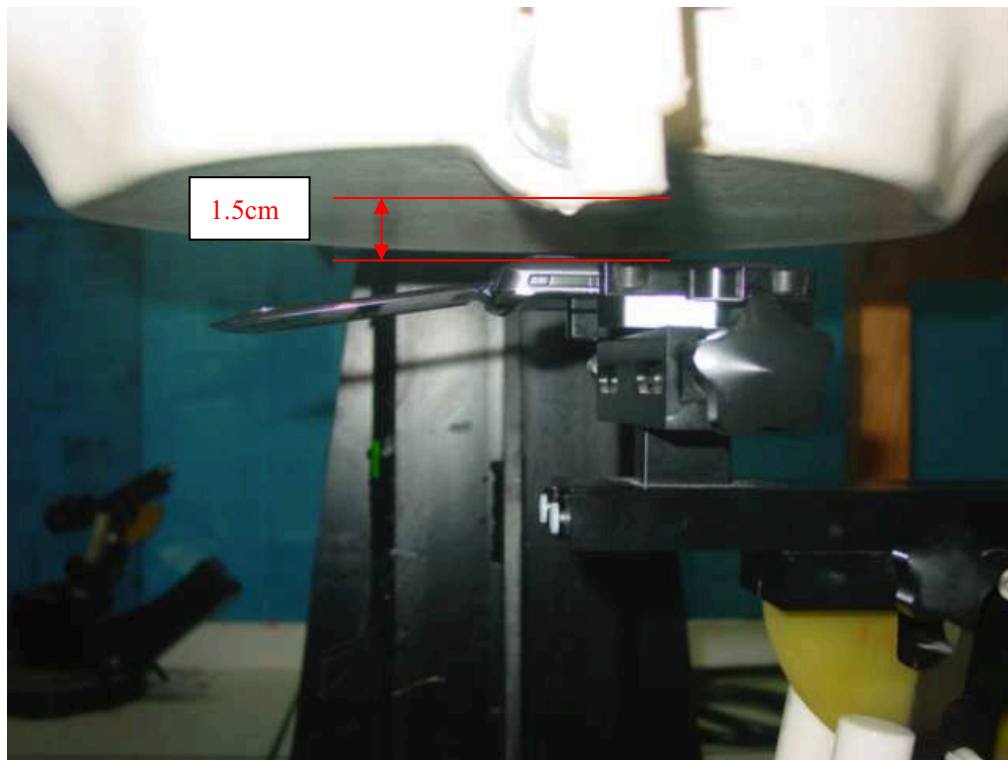
Picture B6: Left Hand Tilt 15° Position



Picture B7: Right Hand Touch Cheek Position



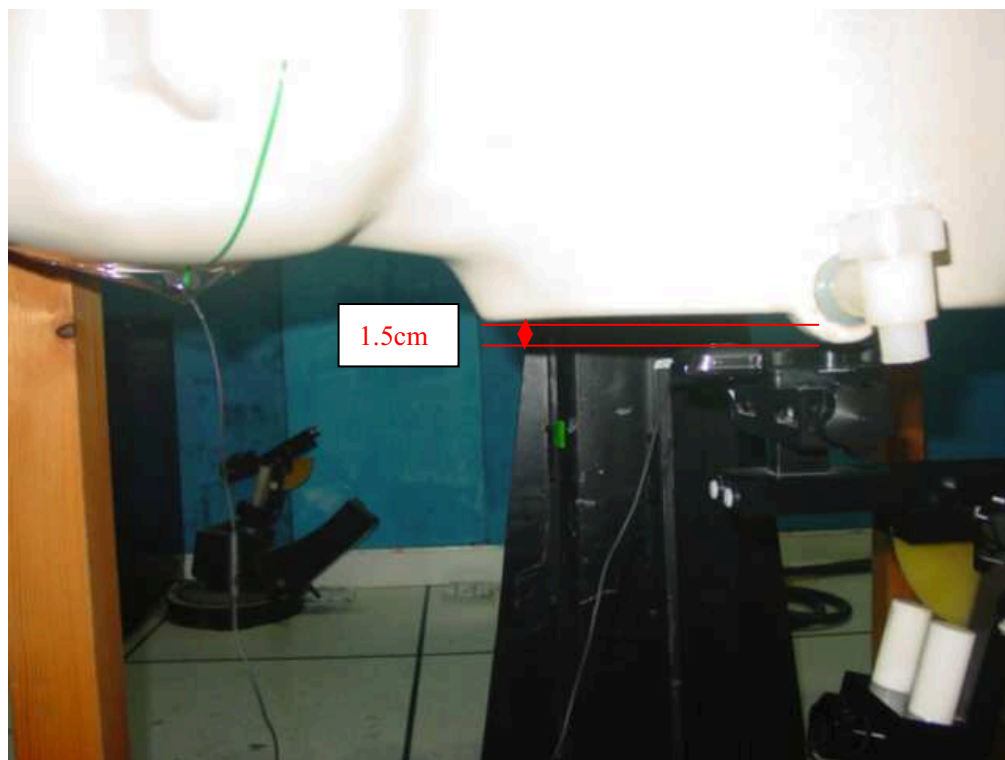
Picture B8: Right Hand Tilt 15° Position



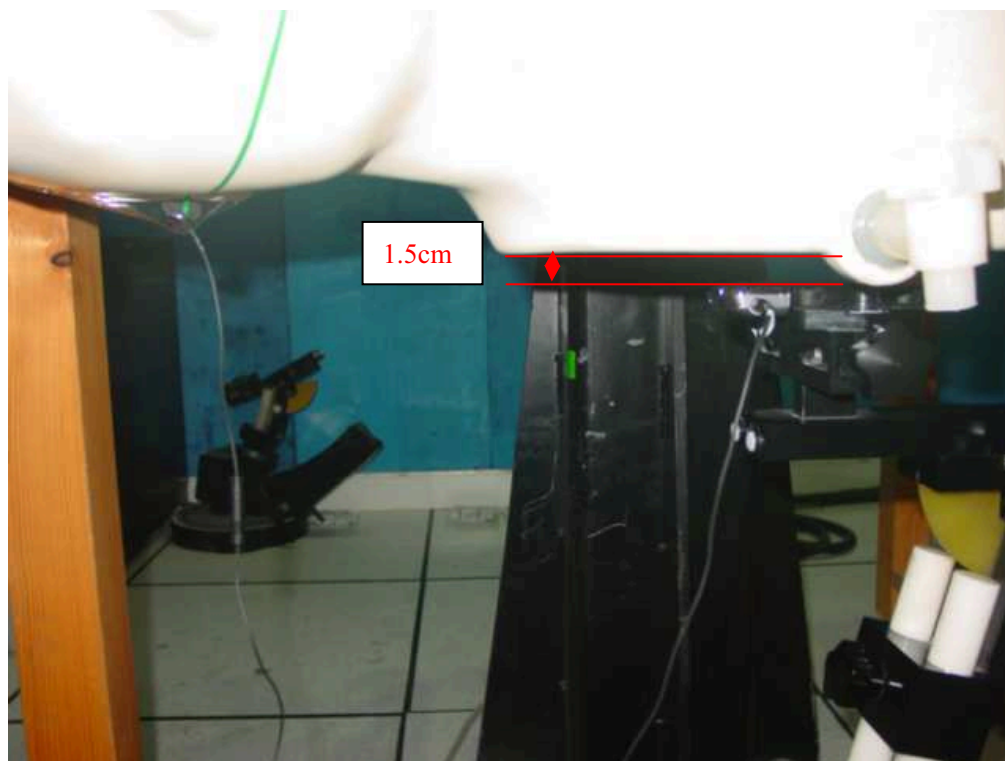
Picture B9: Body-worn Position (towards ground, the distance from handset to the bottom of the Phantom is 1.5cm)



Picture B10: Body-worn Position with Headset (towards ground, 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) – Handset Closed



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

ANNEX C GRAPH RESULTS

850 Left Cheek Middle

Date/Time: 2010-5-18 8:13:26

Electronics: DAE4 Sn771

Medium: Head 850

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.878$ mho/m; $\epsilon_r = 40.3$; $\rho = 1000$ kg/m³

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

Communication System: GSM 850 Frequency: 836.6 MHz Duty Cycle: 1:8.3

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

Cheek Middle/Area Scan (51x151x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.286 mW/g

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

Reference Value = 2.97 V/m; Power Drift = 0.149 dB

Peak SAR (extrapolated) = 0.358 W/kg

SAR(1 g) = 0.271 mW/g; SAR(10 g) = 0.200 mW/g

Maximum value of SAR (measured) = 0.285 mW/g

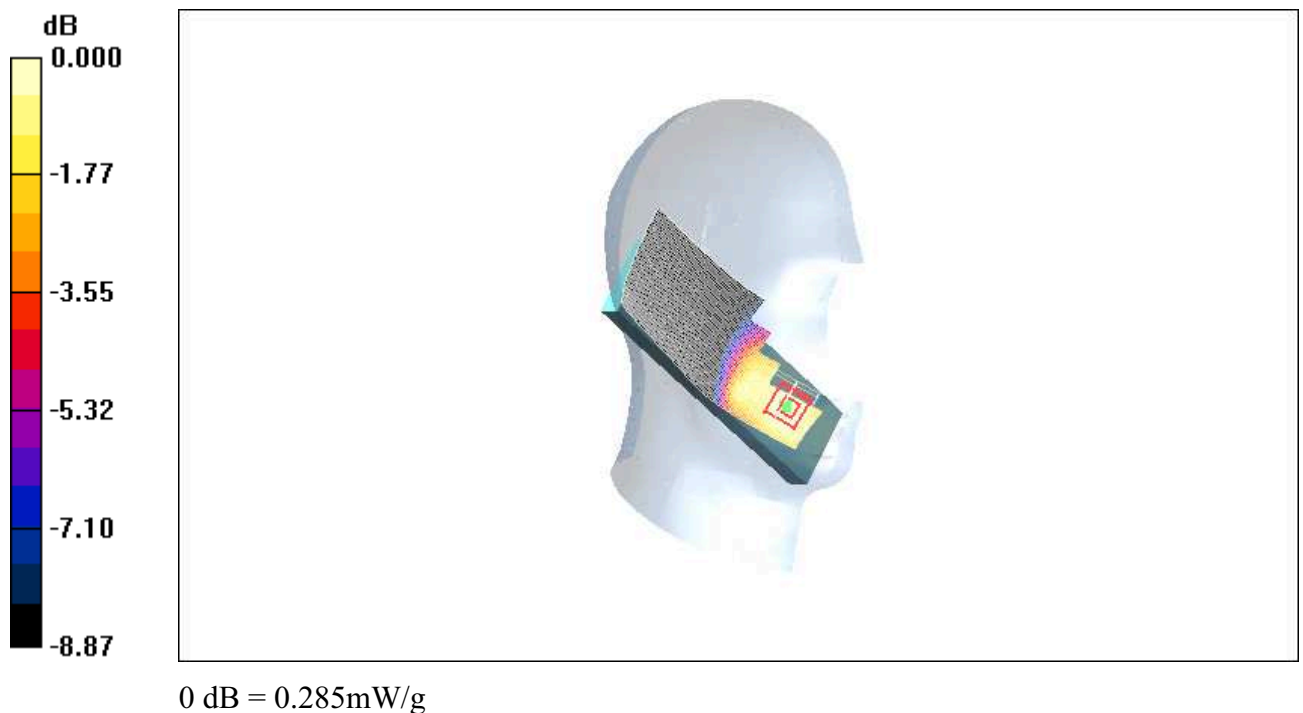


Fig. 1 850 MHz CH190

850 Left Tilt Middle

Date/Time: 2010-5-18 8:27:51

Electronics: DAE4 Sn771

Medium: Head 850

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.878$ mho/m; $\epsilon_r = 40.3$; $\rho = 1000$ kg/m³

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

Communication System: GSM 850 Frequency: 836.6 MHz Duty Cycle: 1:8.3

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

Tilt Middle/Area Scan (51x151x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.078 mW/g

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

Reference Value = 6.37 V/m; Power Drift = -0.100 dB

Peak SAR (extrapolated) = 0.092 W/kg

SAR(1 g) = 0.075 mW/g; SAR(10 g) = 0.060 mW/g

Maximum value of SAR (measured) = 0.078 mW/g

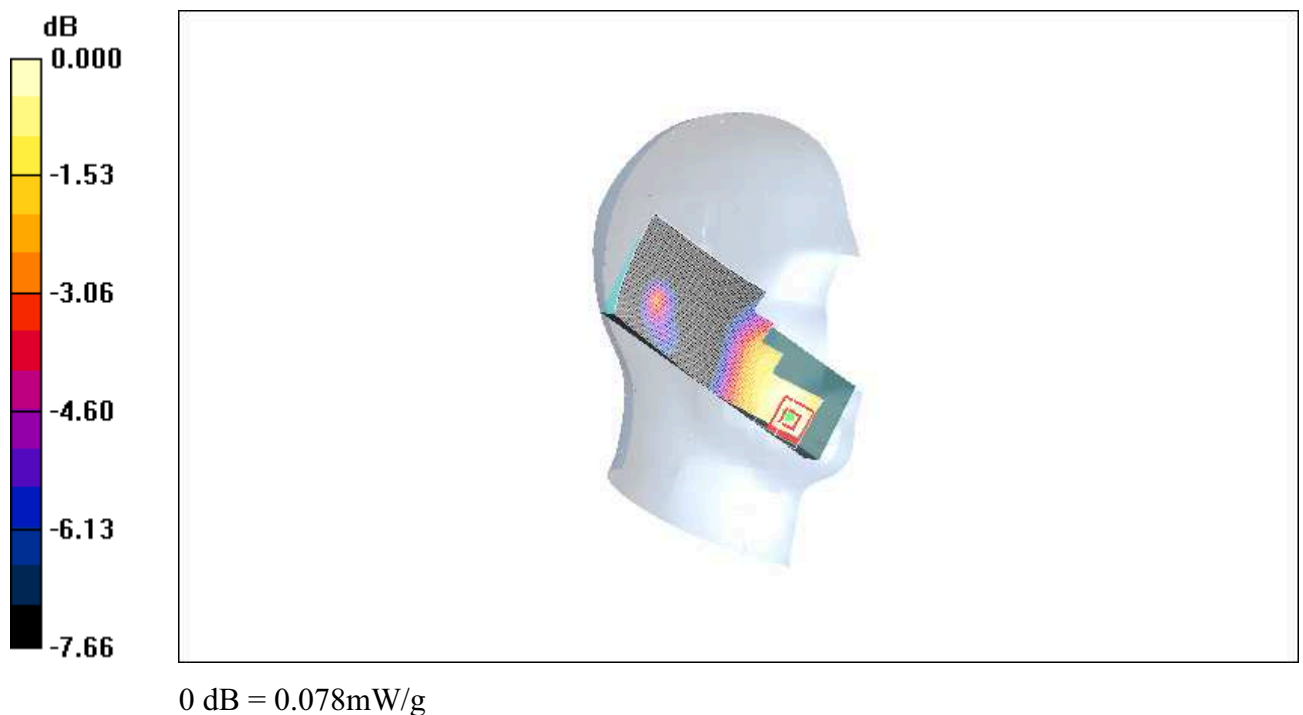


Fig.2 850 MHz CH190

850 Right Cheek High

Date/Time: 2010-5-18 8:57:33

Electronics: DAE4 Sn771

Medium: Head 850

Medium parameters used (interpolated): $f = 848.8$ MHz; $\sigma = 0.89$ mho/m; $\epsilon_r = 40.2$; $\rho = 1000$ kg/m³

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 (51x151x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.311 mW/g

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

Reference Value = 1.86 V/m; Power Drift = 0.154 dB

Peak SAR (extrapolated) = 0.396 W/kg

SAR(1 g) = 0.292 mW/g; SAR(10 g) = 0.210 mW/g

Maximum value of SAR (measured) = 0.308 mW/g

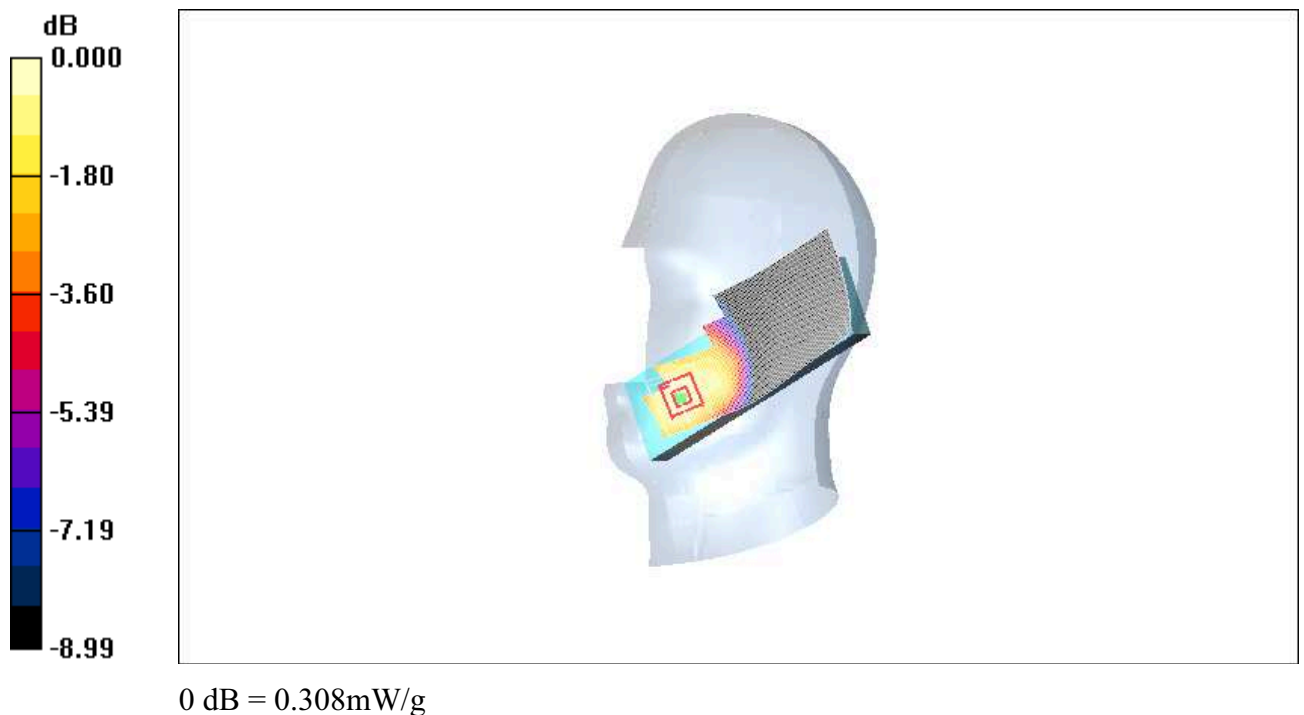


Fig. 3 850 MHz CH251

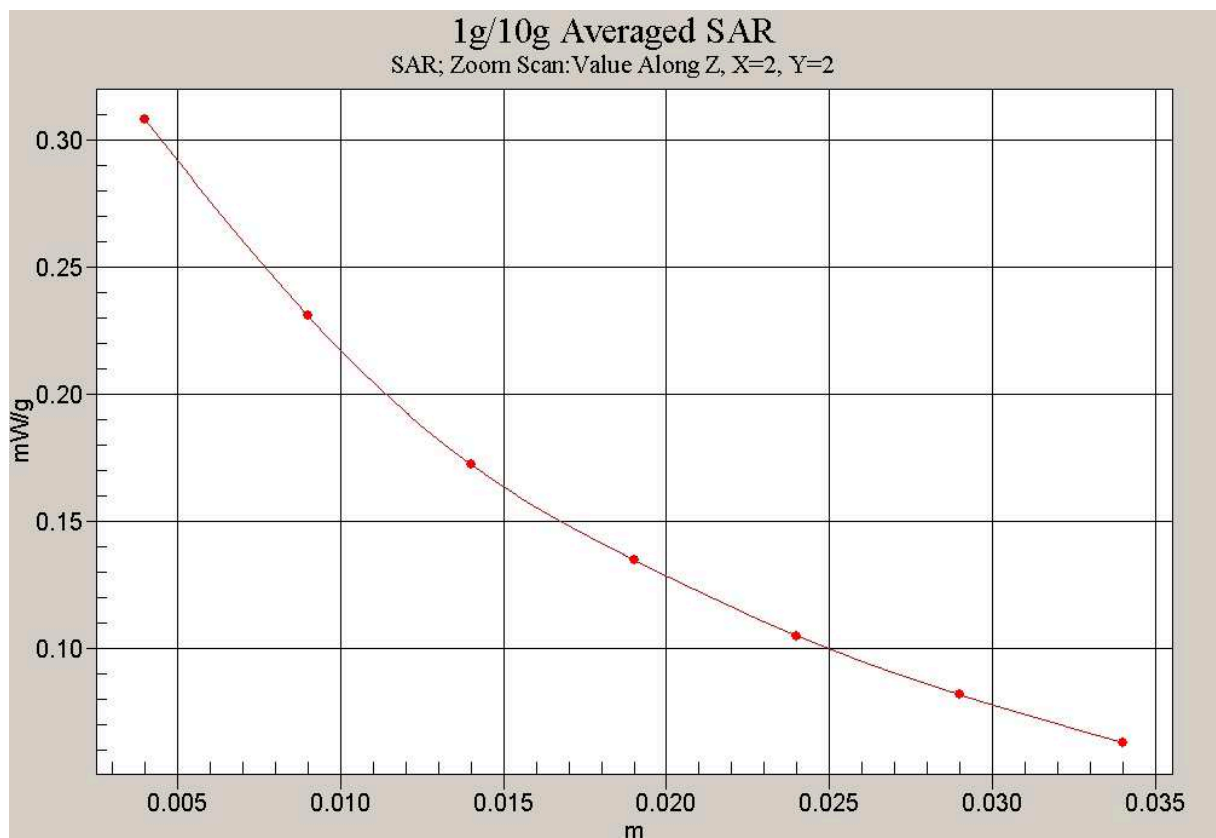


Fig. 3-1 Z-Scan at power reference point (850 MHz CH251)

850 Right Cheek Middle

Date/Time: 2010-5-18 8:43:14

Electronics: DAE4 Sn771

Medium: Head 850

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.878$ mho/m; $\epsilon_r = 40.3$; $\rho = 1000$ kg/m³

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

Communication System: GSM 850 Frequency: 836.6 MHz Duty Cycle: 1:8.3

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

Cheek Middle/Area Scan (51x151x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.298 mW/g

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

Reference Value = 2.51 V/m; Power Drift = 0.193 dB

Peak SAR (extrapolated) = 0.372 W/kg

SAR(1 g) = 0.279 mW/g; SAR(10 g) = 0.200 mW/g

Maximum value of SAR (measured) = 0.297 mW/g

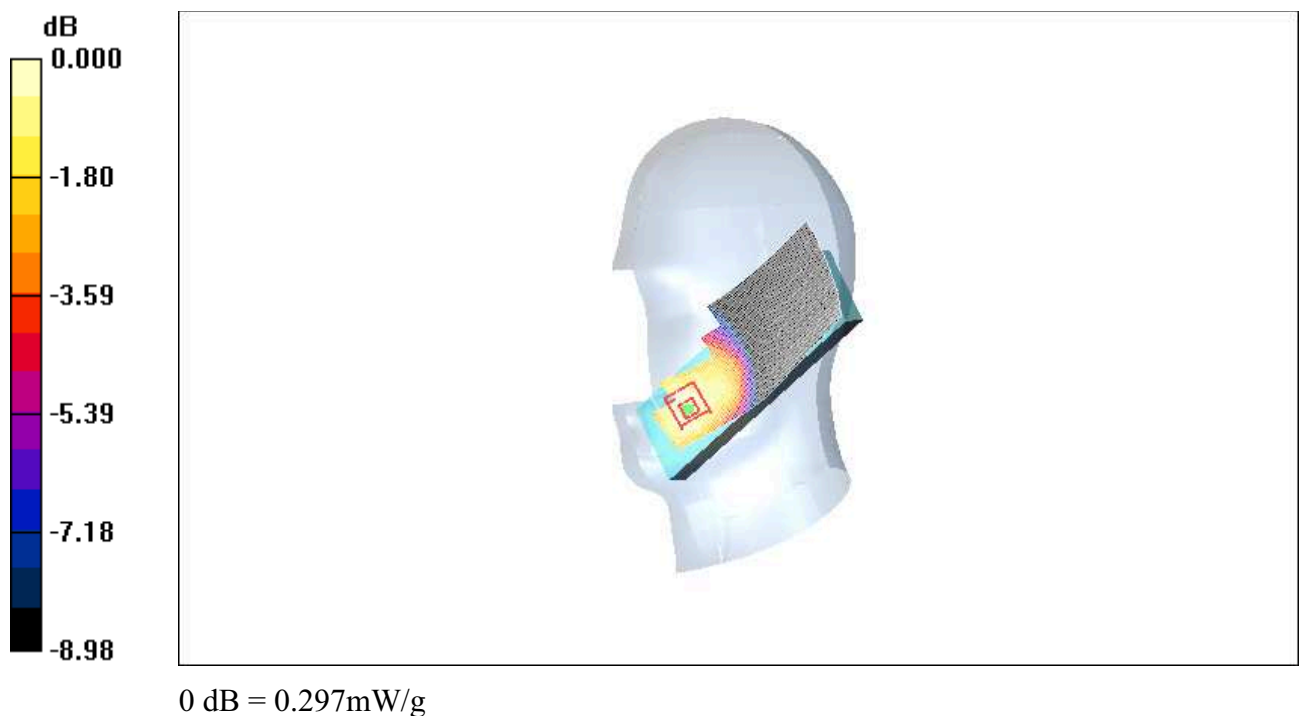


Fig. 4 850 MHz CH190

850 Right Cheek Low

Date/Time: 2010-5-18 9:11:54

Electronics: DAE4 Sn771

Medium: Head 850

Medium parameters used: $f = 825$ MHz; $\sigma = 0.866$ mho/m; $\epsilon_r = 40.3$; $\rho = 1000$ kg/m³

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 (51x151x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.274 mW/g

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

Reference Value = 3.67 V/m; Power Drift = 0.162 dB

Peak SAR (extrapolated) = 0.345 W/kg

SAR(1 g) = 0.258 mW/g; SAR(10 g) = 0.186 mW/g

Maximum value of SAR (measured) = 0.271 mW/g



Fig. 5 850 MHz CH128

850 Right Tilt Middle

Date/Time: 2010-5-18 9:26:20

Electronics: DAE4 Sn771

Medium: Head 850

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.878$ mho/m; $\epsilon_r = 40.3$; $\rho = 1000$ kg/m³

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

Communication System: GSM 850 Frequency: 836.6 MHz Duty Cycle: 1:8.3

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

Tilt Middle/Area Scan (51x151x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.086 mW/g

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

Reference Value = 6.47 V/m; Power Drift = -0.092 dB

Peak SAR (extrapolated) = 0.101 W/kg

SAR(1 g) = 0.082 mW/g; SAR(10 g) = 0.063 mW/g

Maximum value of SAR (measured) = 0.085 mW/g

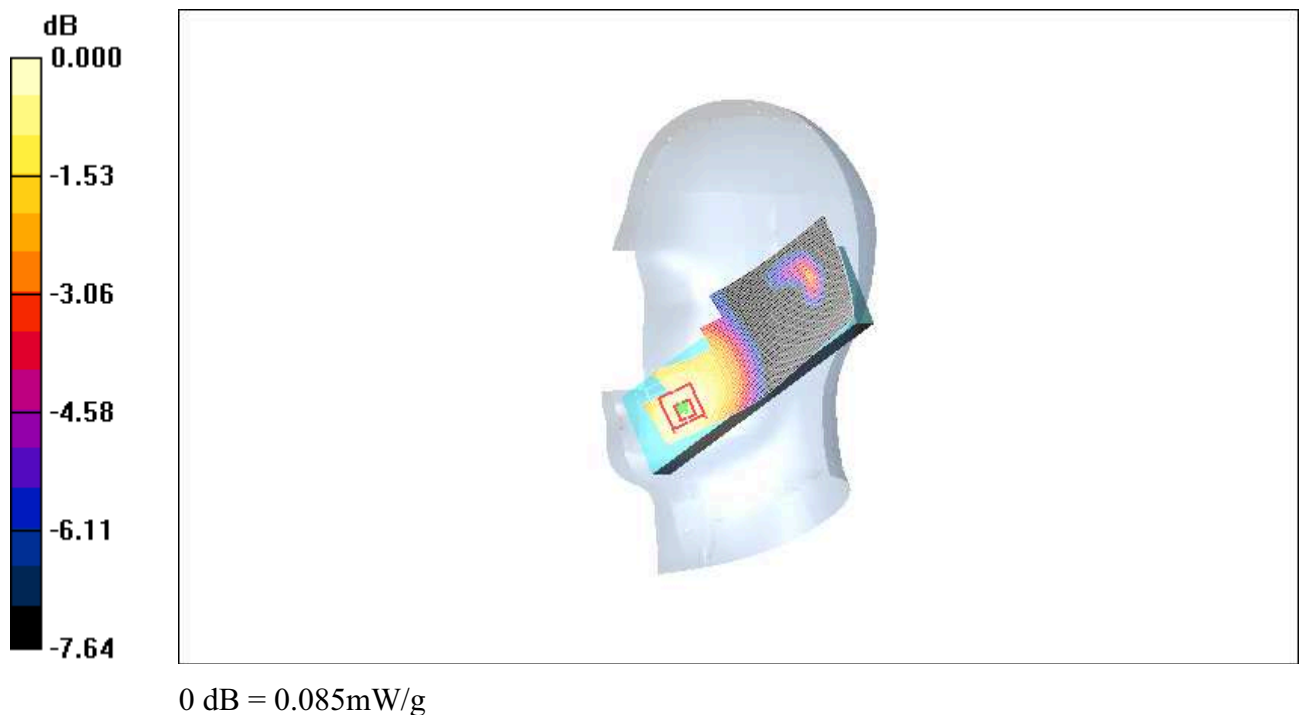


Fig.6 850 MHz CH190

1900 Left Cheek Middle

Date/Time: 2010-5-19 8:20:03

Electronics: DAE4 Sn771

Medium: Head 1900 MHz

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.40$ mho/m; $\epsilon_r = 39.1$; $\rho = 1000$ kg/m³

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

Communication System: GSM 1900MHz Frequency: 1880 MHz Duty Cycle: 1:8.3

Probe: ES3DV3 - SN3149 ConvF(5.03, 5.03, 5.03)

Cheek Middle/Area Scan (51x151x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.079 mW/g

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

Reference Value = 0.875 V/m; Power Drift = 0.199 dB

Peak SAR (extrapolated) = 0.113 W/kg

SAR(1 g) = 0.078 mW/g; SAR(10 g) = 0.052 mW/g

Maximum value of SAR (measured) = 0.085 mW/g

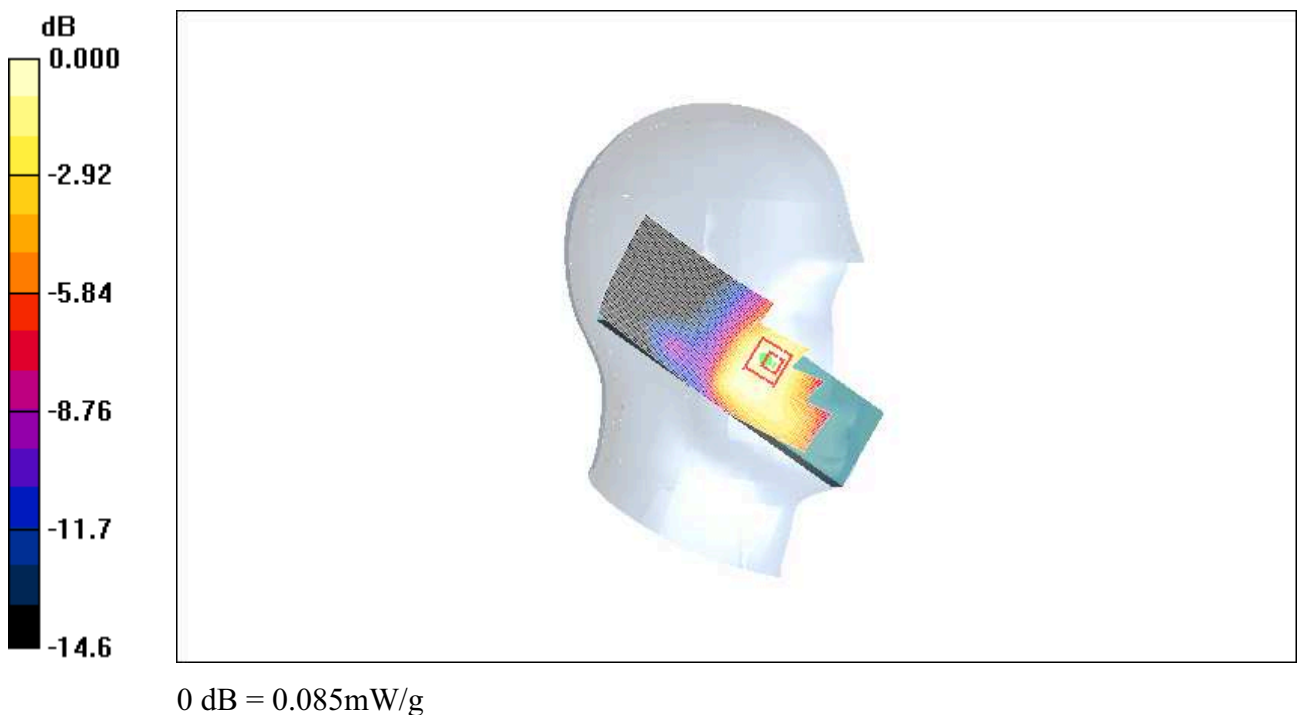


Fig. 7 1900 MHz CH661

1900 Left Tilt Middle

Date/Time: 2010-5-19 8:34:21

Electronics: DAE4 Sn771

Medium: 1900 Head

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.40$ mho/m; $\epsilon_r = 39.1$; $\rho = 1000$ kg/m³

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

Communication System: GSM 1900MHz Frequency: 1880 MHz Duty Cycle: 1:8.3

Probe: ES3DV3 - SN3149 ConvF(5.03, 5.03, 5.03)

Tilt Middle/Area Scan (51x151x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.029 mW/g

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

Reference Value = 1.45 V/m; Power Drift = 0.179 dB

Peak SAR (extrapolated) = 0.038 W/kg

SAR(1 g) = 0.028 mW/g; SAR(10 g) = 0.019 mW/g

Maximum value of SAR (measured) = 0.029 mW/g

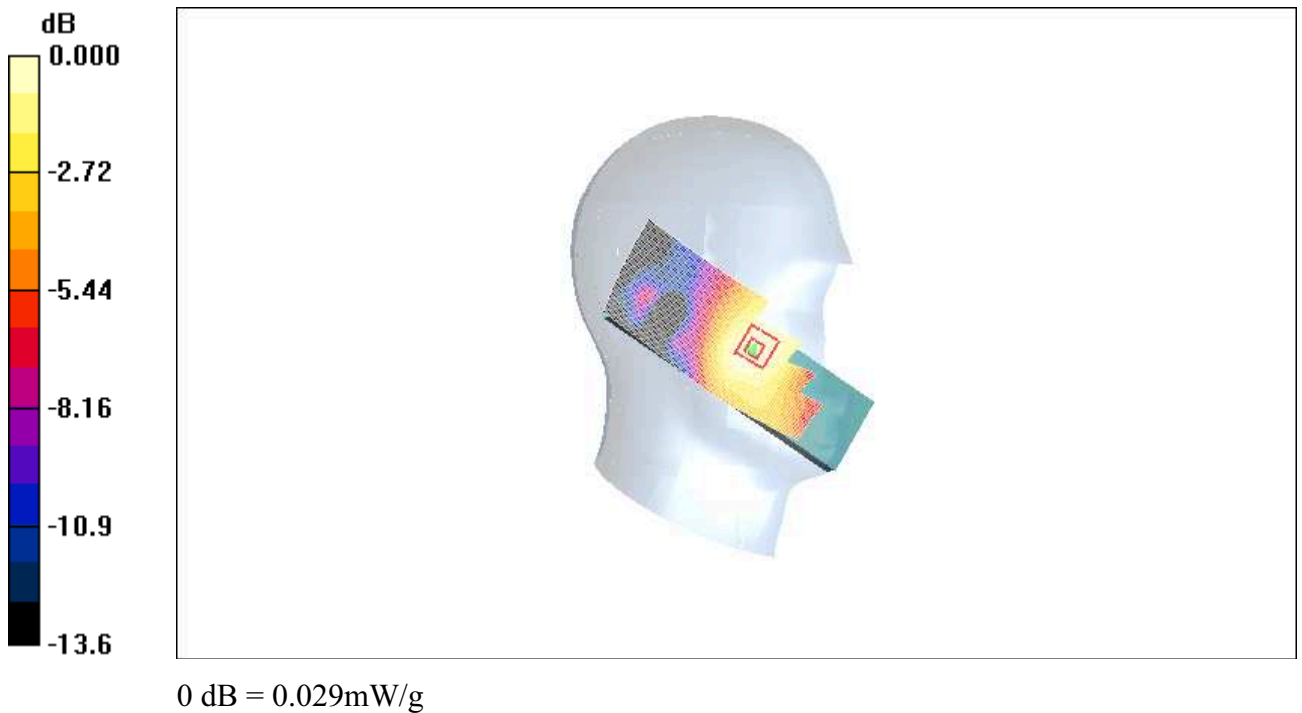


Fig. 8 1900 MHz CH661

1900 Right Cheek High

Date/Time: 2010-5-19 9:03:26

Electronics: DAE4 Sn771

Medium: 1900 Head

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.42$ mho/m; $\epsilon_r = 39.0$; $\rho = 1000$ kg/m³

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

Communication System: GSM 1900MHz Frequency: 1909.8 MHz Duty Cycle: 1:8.3

Probe: ES3DV3 - SN3149 ConvF(5.03, 5.03, 5.03)

Cheek High/Area Scan (51x151x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.135 mW/g

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

Reference Value = 0.849 V/m; Power Drift = 0.134 dB

Peak SAR (extrapolated) = 0.197 W/kg

SAR(1 g) = 0.126 mW/g; SAR(10 g) = 0.075 mW/g

Maximum value of SAR (measured) = 0.139 mW/g

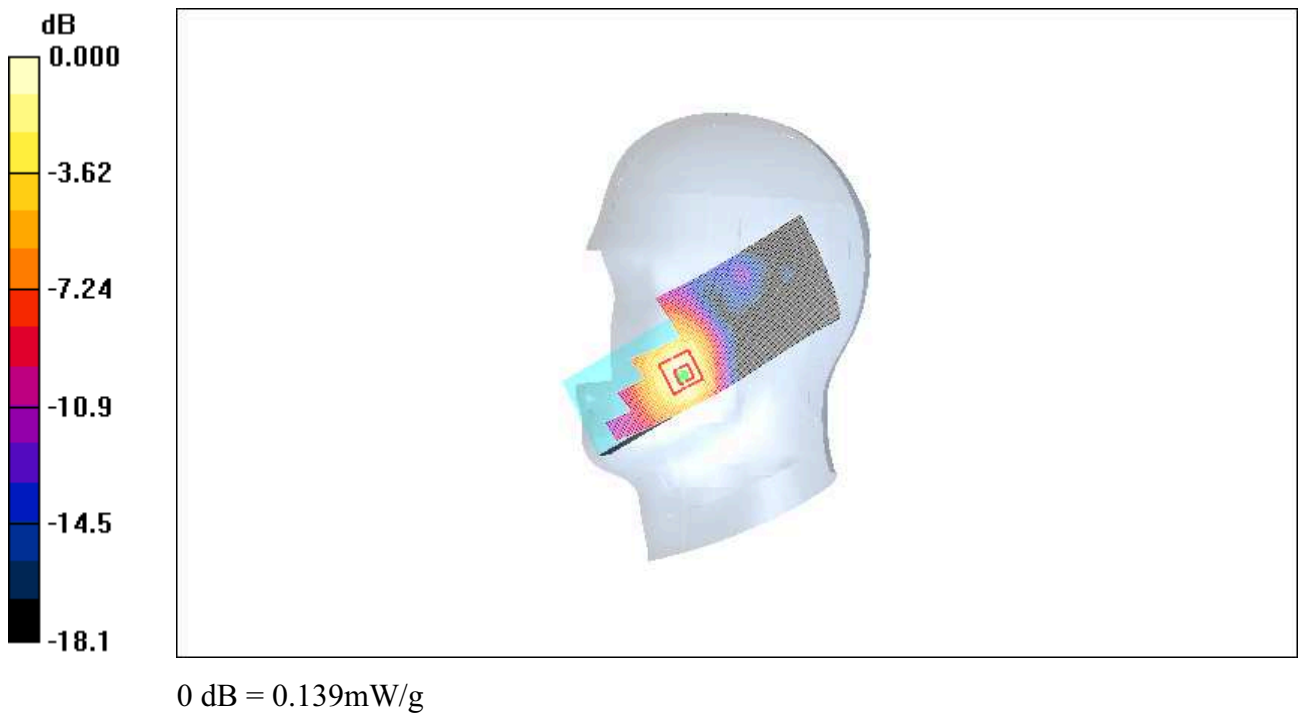


Fig. 9 1900 MHz CH810

1900 Right Cheek Middle

Date/Time: 2010-5-19 8:49:07

Electronics: DAE4 Sn771

Medium: 1900 Head

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.40$ mho/m; $\epsilon_r = 39.1$; $\rho = 1000$ kg/m³

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

Communication System: GSM 1900MHz Frequency: 1880 MHz Duty Cycle: 1:8.3

Probe: ES3DV3 - SN3149 ConvF(5.03, 5.03, 5.03)

Cheek Middle/Area Scan (51x151x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.147 mW/g

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

Reference Value = 0.475 V/m; Power Drift = -0.192 dB

Peak SAR (extrapolated) = 0.209 W/kg

SAR(1 g) = 0.137 mW/g; SAR(10 g) = 0.083 mW/g

Maximum value of SAR (measured) = 0.149 mW/g

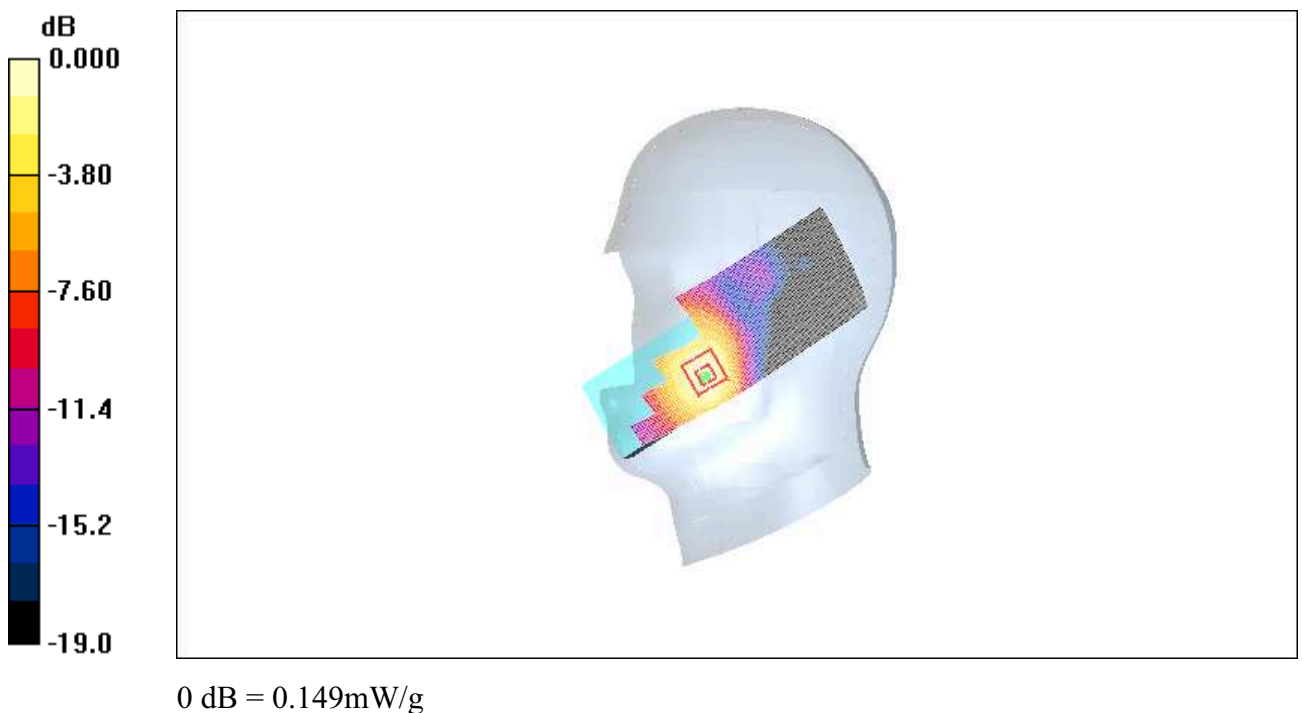


Fig. 10 1900 MHz CH661

1900 Right Cheek Low

Date/Time: 2010-5-19 9:17:44

Electronics: DAE4 Sn771

Medium: 1900 Head

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.37$ mho/m; $\epsilon_r = 39.2$; $\rho = 1000$ kg/m³

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

Communication System: GSM 1900MHz Frequency: 1850.2 MHz Duty Cycle: 1:8.3

Probe: ES3DV3 - SN3149 ConvF(5.03, 5.03, 5.03)

Cheek Low/Area Scan (51x151x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.168 mW/g

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

Reference Value = 0.775 V/m; Power Drift = -0.188 dB

Peak SAR (extrapolated) = 0.238 W/kg

SAR(1 g) = 0.155 mW/g; SAR(10 g) = 0.095 mW/g

Maximum value of SAR (measured) = 0.163 mW/g

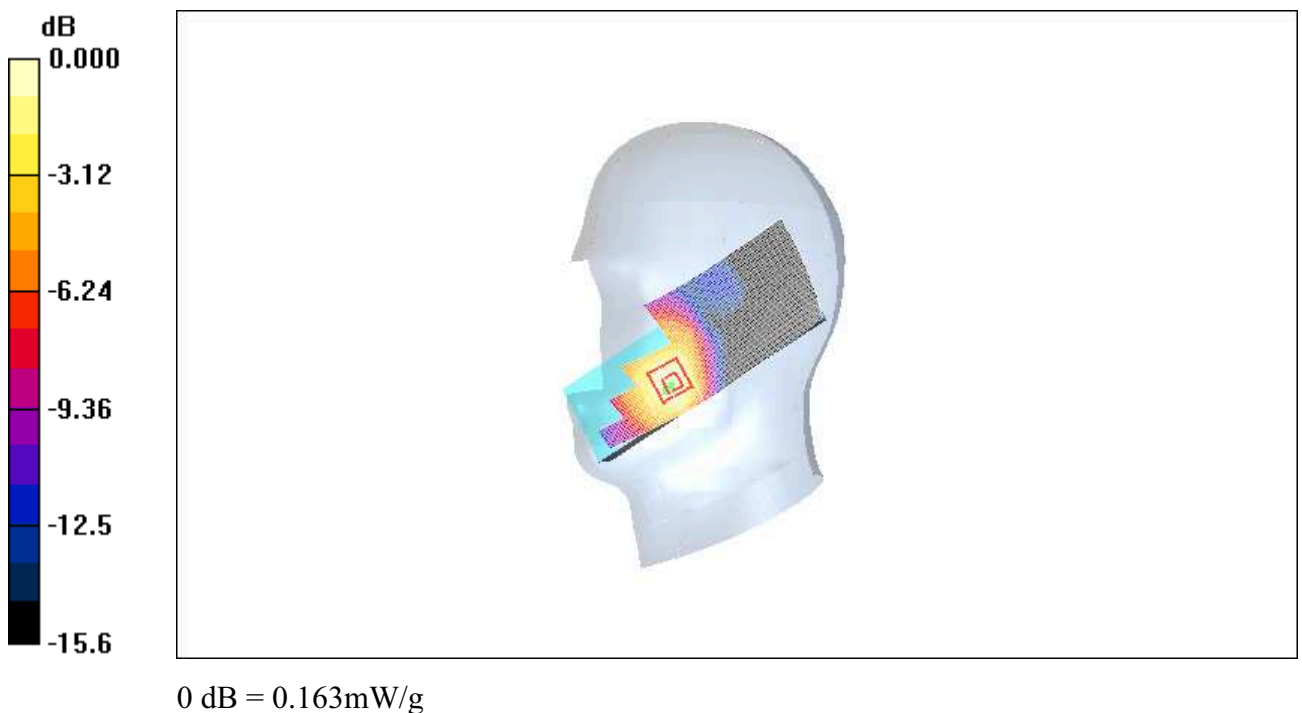


Fig. 11 1900 MHz CH512

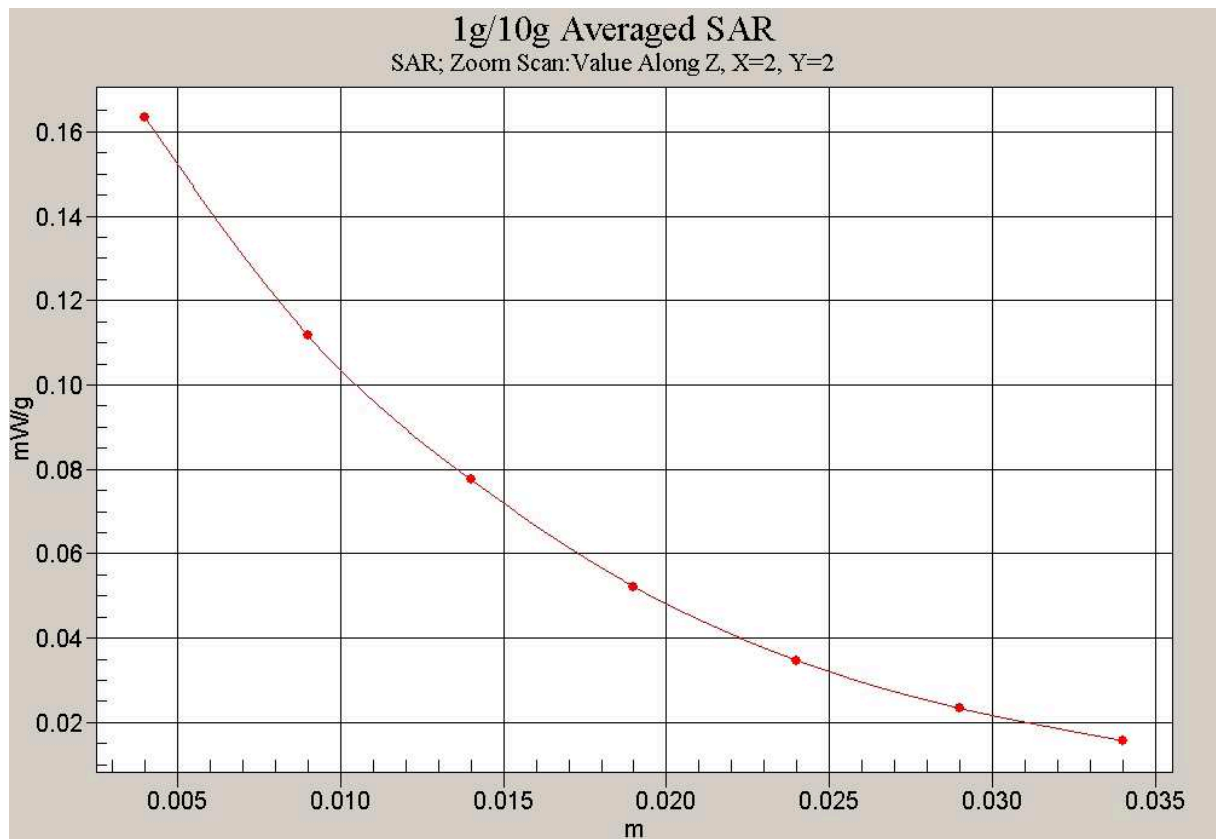


Fig. 11-1 Z-Scan at power reference point (1900 MHz CH512)

1900 Right Tilt Middle

Date/Time: 2010-5-19 9:32:17

Electronics: DAE4 Sn771

Medium: 1900 Head

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.40$ mho/m; $\epsilon_r = 39.1$; $\rho = 1000$ kg/m³

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

Communication System: GSM 1900MHz Frequency: 1880 MHz Duty Cycle: 1:8.3

Probe: ES3DV3 - SN3149 ConvF(5.03, 5.03, 5.03)

Tilt Middle/Area Scan (51x151x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.038 mW/g

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

Reference Value = 1.46 V/m; Power Drift = -0.073 dB

Peak SAR (extrapolated) = 0.053 W/kg

SAR(1 g) = 0.036 mW/g; SAR(10 g) = 0.024 mW/g

Maximum value of SAR (measured) = 0.039 mW/g

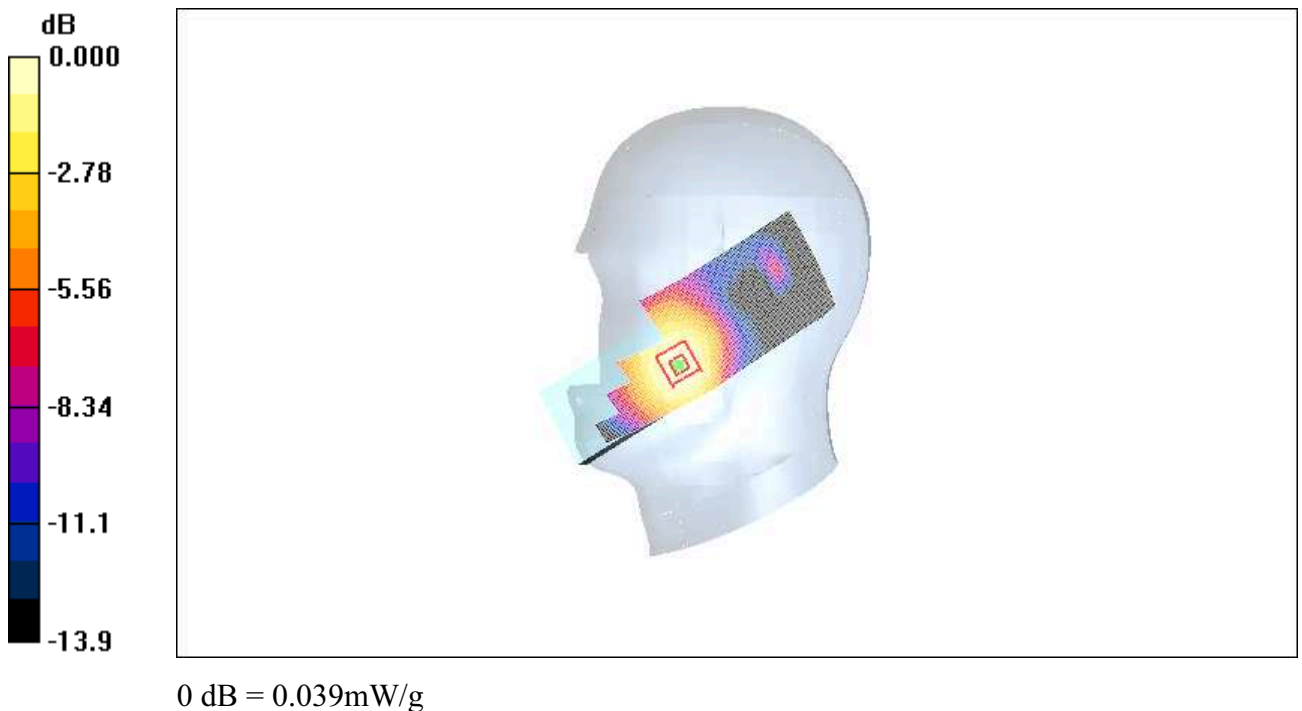


Fig.12 1900 MHz CH661

850 Body Towards Ground High with GPRS

Date/Time: 2010-5-18 13:49:18

Electronics: DAE4 Sn771

Medium: 850 Body

Medium parameters used (interpolated): $f = 848.8$ MHz; $\sigma = 0.95$ mho/m; $\epsilon_r = 53.9$; $\rho = 1000$ kg/m³

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

Communication System: GSM 850 GPRS Frequency: 848.8 MHz Duty Cycle: 1:4

Probe: ES3DV3 - SN3149 ConvF(6.22, 6.22, 6.22)

Toward Ground High/Area Scan (51x141x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.893 mW/g

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

Reference Value = 22.2 V/m; Power Drift = -0.053 dB

Peak SAR (extrapolated) = 1.10 W/kg

SAR(1 g) = 0.837 mW/g; SAR(10 g) = 0.594 mW/g

Maximum value of SAR (measured) = 0.861 mW/g

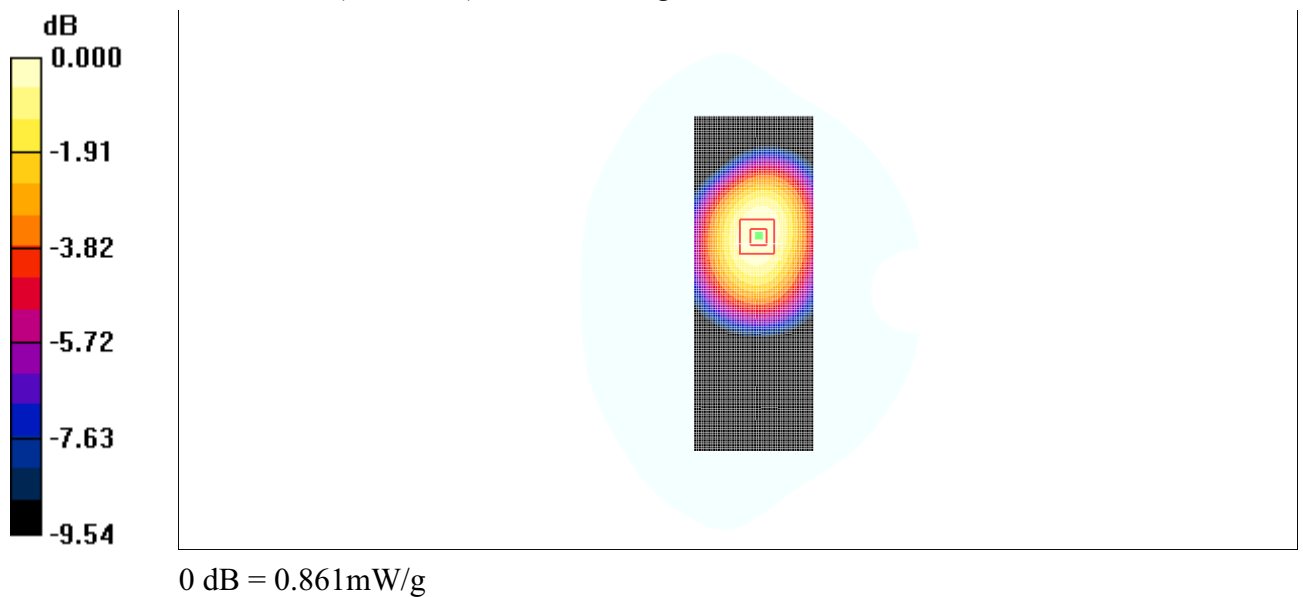


Fig. 13 850 MHz CH251

850 Body Towards Ground Middle with GPRS

Date/Time: 2010-5-18 14:04:35

Electronics: DAE4 Sn771

Medium: 850 Body

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.94$ mho/m; $\epsilon_r = 54.0$; $\rho = 1000$ kg/m³

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

Communication System: GSM 850 GPRS Frequency: 836.6 MHz Duty Cycle: 1:4

Probe: ES3DV3 - SN3149 ConvF(6.22, 6.22, 6.22)

Toward Ground Middle/Area Scan (51x141x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.930 mW/g

Toward Ground Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 22.6 V/m; Power Drift = -0.014 dB

Peak SAR (extrapolated) = 1.15 W/kg

SAR(1 g) = 0.874 mW/g; SAR(10 g) = 0.623 mW/g

Maximum value of SAR (measured) = 0.904 mW/g

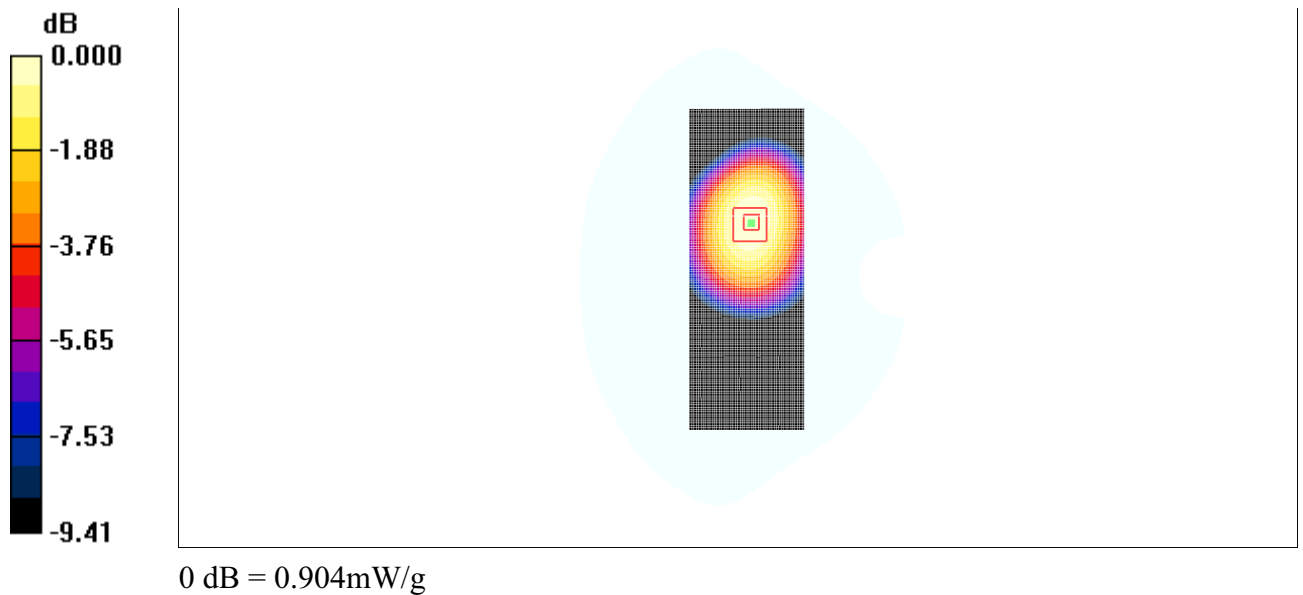


Fig. 14 850 MHz CH190

850 Body Towards Ground Low with GPRS

Date/Time: 2010-5-18 14:19:56

Electronics: DAE4 Sn771

Medium: 850 Body

Medium parameters used: $f = 825$ MHz; $\sigma = 0.923$ mho/m; $\epsilon_r = 54.1$; $\rho = 1000$ kg/m³

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

Communication System: GSM 850 GPRS Frequency: 824.2 MHz Duty Cycle: 1:4

Probe: ES3DV3 - SN3149 ConvF(6.22, 6.22, 6.22)

Toward Ground Low/Area Scan (51x141x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.989 mW/g

Toward Ground Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 23.1 V/m; Power Drift = 0.035 dB

Peak SAR (extrapolated) = 1.23 W/kg

SAR(1 g) = 0.933 mW/g; SAR(10 g) = 0.667 mW/g

Maximum value of SAR (measured) = 0.967 mW/g

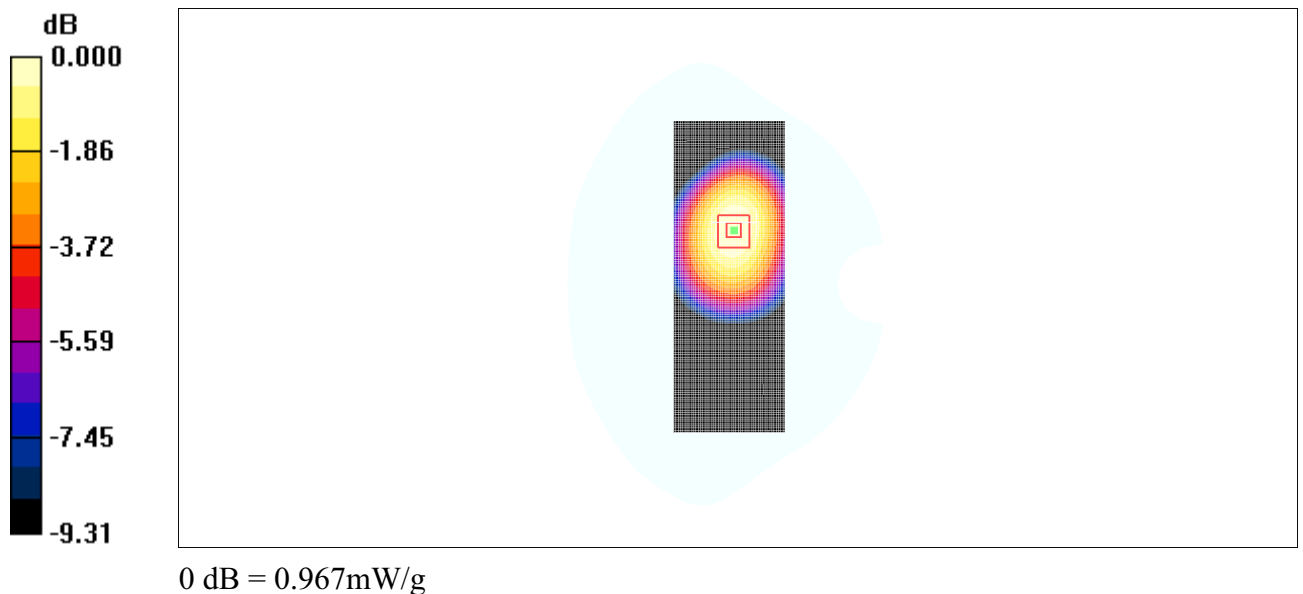


Fig. 15 850 MHz CH128

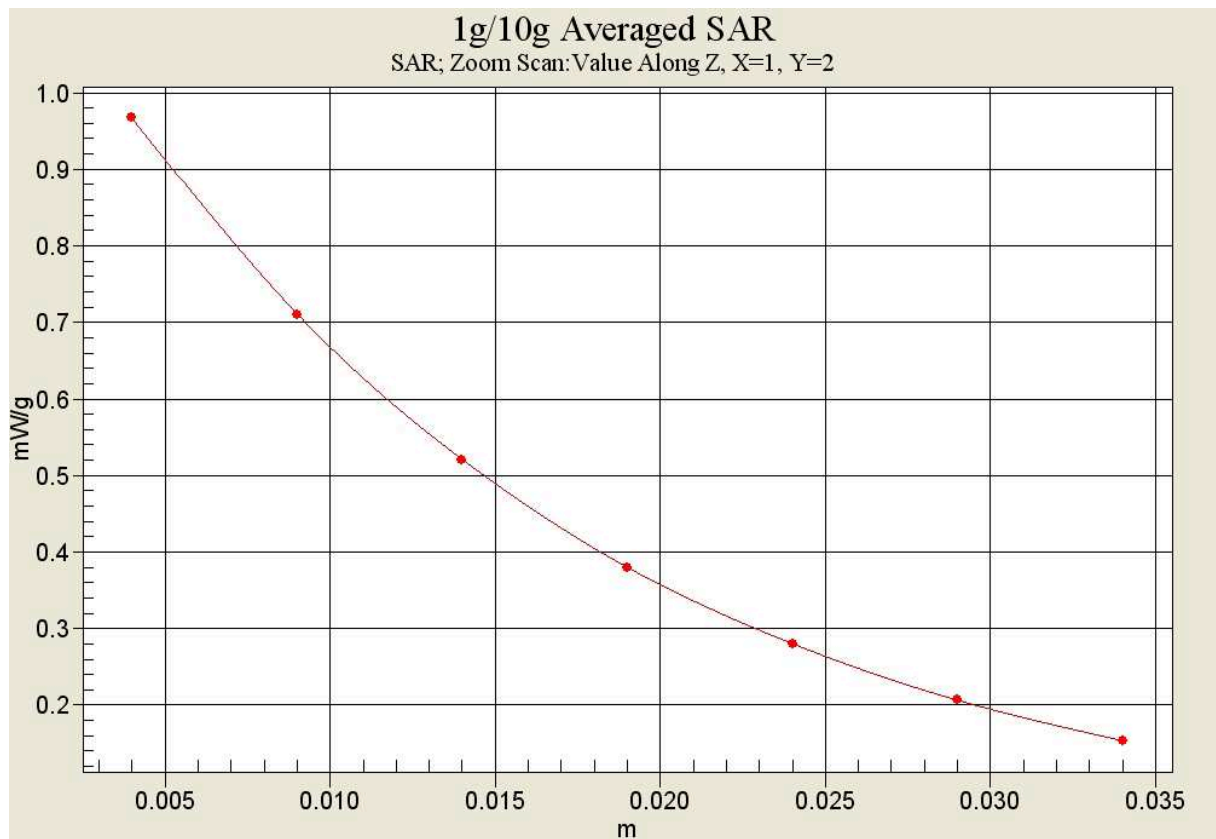


Fig. 15-1 Z-Scan at power reference point (850 MHz CH128)

850 Body Towards Ground Low with EGPRS

Date/Time: 2010-5-18 14:37:30

Electronics: DAE4 Sn771

Medium: 850 Body

Medium parameters used: $f = 825$ MHz; $\sigma = 0.923$ mho/m; $\epsilon_r = 54.1$; $\rho = 1000$ kg/m³

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

Communication System: GSM 850 GPRS Frequency: 824.2 MHz Duty Cycle: 1:4

Probe: ES3DV3 - SN3149 ConvF(6.22, 6.22, 6.22)

Toward Ground Low/Area Scan (51x141x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.307 mW/g

Toward Ground Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.7 V/m; Power Drift = 0.043 dB

Peak SAR (extrapolated) = 0.369 W/kg

SAR(1 g) = 0.282 mW/g; SAR(10 g) = 0.202 mW/g

Maximum value of SAR (measured) = 0.290 mW/g

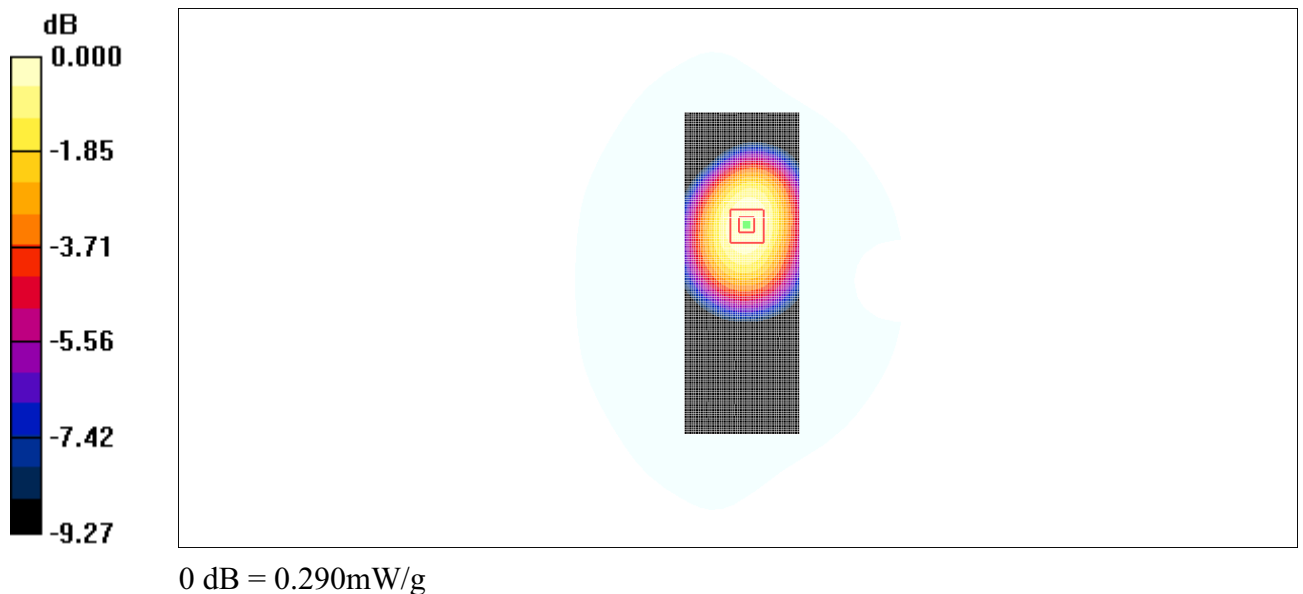


Fig. 16 850 MHz CH128

850 Body Towards Ground Low with Headset

Date/Time: 2010-5-18 14:59:31

Electronics: DAE4 Sn771

Medium: 850 Body

Medium parameters used: $f = 825$ MHz; $\sigma = 0.923$ mho/m; $\epsilon_r = 54.1$; $\rho = 1000$ kg/m³

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(6.22, 6.22, 6.22)

Toward Ground Low/Area Scan (51x141x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.646 mW/g

Toward Ground Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 22.3 V/m; Power Drift = -0.048 dB

Peak SAR (extrapolated) = 0.792 W/kg

SAR(1 g) = 0.601 mW/g; SAR(10 g) = 0.430 mW/g

Maximum value of SAR (measured) = 0.623 mW/g

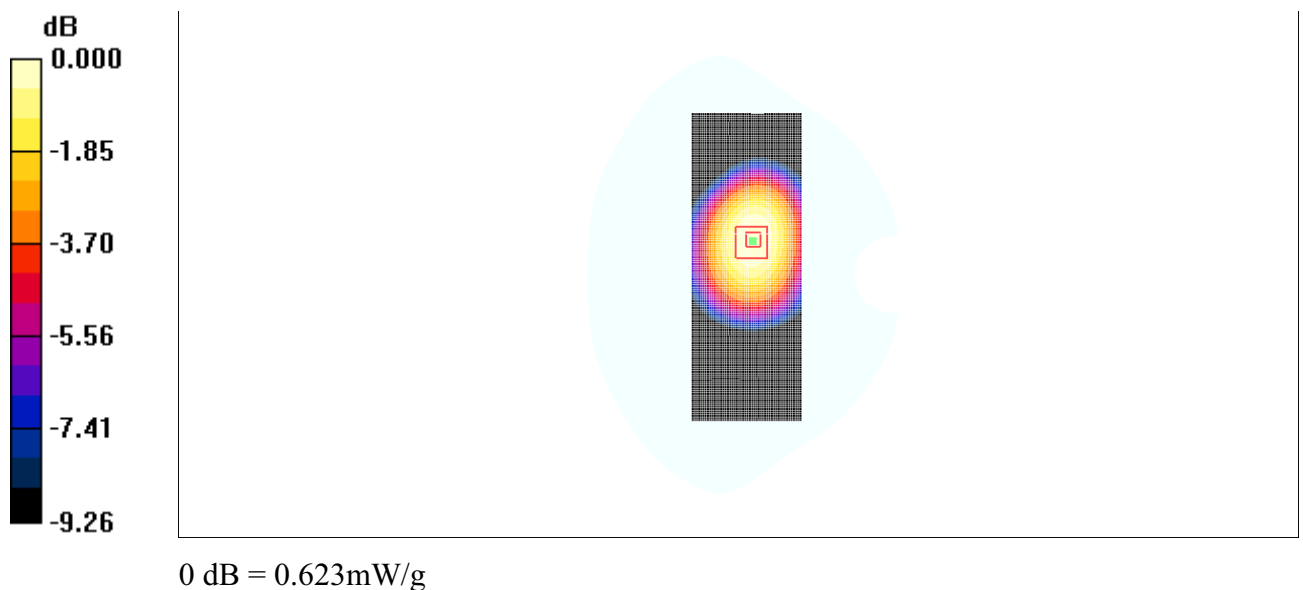


Fig. 17 850 MHz CH128

850 Body Closed Towards Ground Low with Headset

Date/Time: 2010-5-18 15:20:08

Electronics: DAE4 Sn771

Medium: 850 Body

Medium parameters used: $f = 825$ MHz; $\sigma = 0.923$ mho/m; $\epsilon_r = 54.1$; $\rho = 1000$ kg/m³

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(6.22, 6.22, 6.22)

Toward Ground Low/Area Scan (51x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.684 mW/g

Toward Ground Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 23.8 V/m; Power Drift = -0.075 dB

Peak SAR (extrapolated) = 0.839 W/kg

SAR(1 g) = 0.638 mW/g; SAR(10 g) = 0.457 mW/g

Maximum value of SAR (measured) = 0.660 mW/g

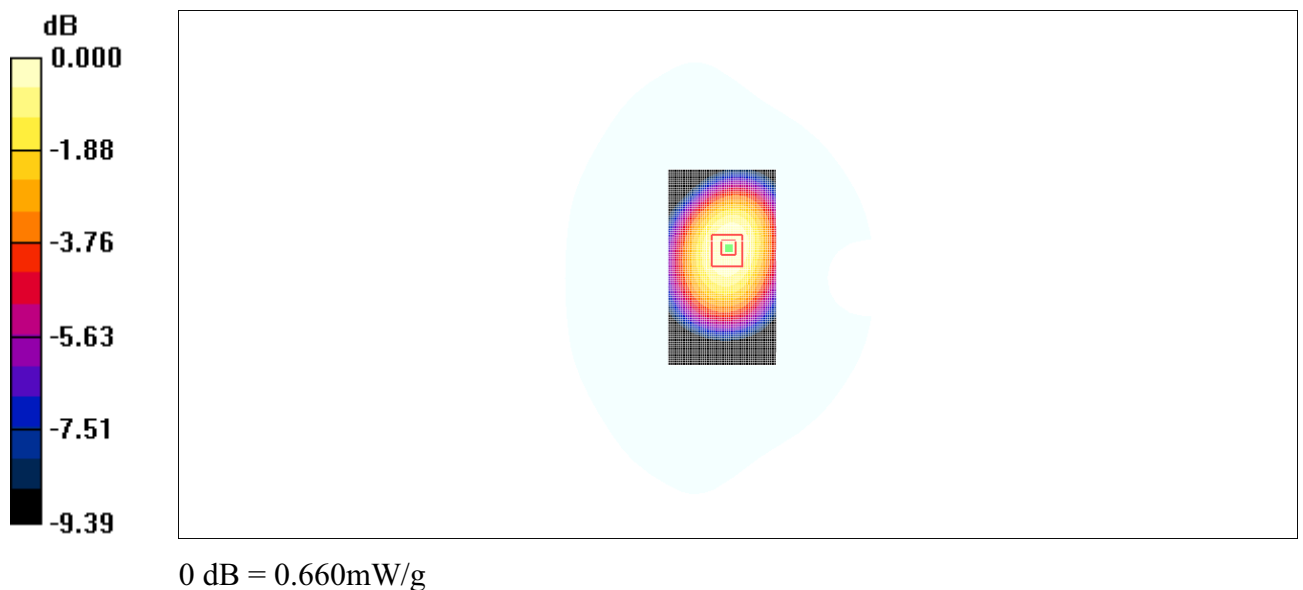


Fig. 18 850 MHz CH128

850 Body Closed Towards Phantom Low with Headset

Date/Time: 2010-5-18 15:41:22

Electronics: DAE4 Sn771

Medium: 850 Body

Medium parameters used: $f = 825$ MHz; $\sigma = 0.923$ mho/m; $\epsilon_r = 54.1$; $\rho = 1000$ kg/m³

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(6.22, 6.22, 6.22)

Toward Phantom Low/Area Scan (51x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.518 mW/g

Toward Phantom Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 20.4 V/m; Power Drift = -0.024 dB

Peak SAR (extrapolated) = 0.643 W/kg

SAR(1 g) = 0.492 mW/g; SAR(10 g) = 0.352 mW/g

Maximum value of SAR (measured) = 0.514 mW/g

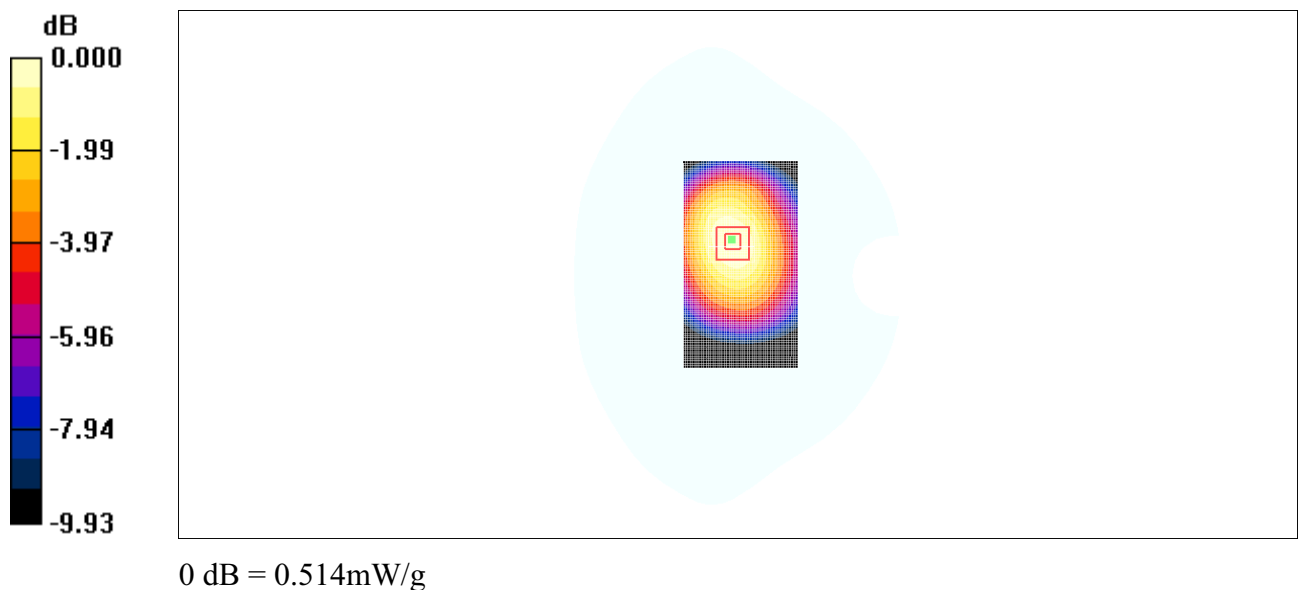


Fig. 19 850 MHz CH128

1900 Body Towards Ground High with GPRS

Date/Time: 2010-5-19 13:51:10

Electronics: DAE4 Sn771

Medium: Body 1900 MHz

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.56$ mho/m; $\epsilon_r = 52.3$; $\rho = 1000$ kg/m³

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

Communication System: GSM 1900MHz GPRS Frequency: 1909.8 MHz Duty Cycle: 1:4

Probe: ES3DV3 - SN3149 ConvF(4.68, 4.68, 4.68)

Toward Ground High/Area Scan (51x141x1): Measurement grid: $dx=10$ mm, $dy=10$ mm

Maximum value of SAR (interpolated) = 0.278 mW/g

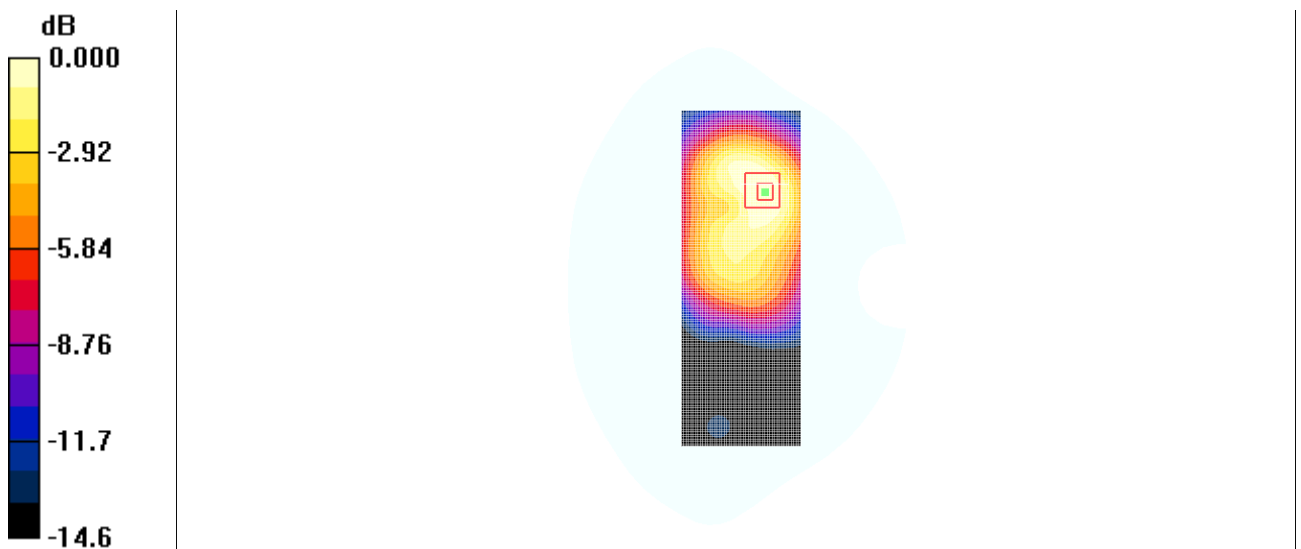
Toward Ground High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 8.58 V/m; Power Drift = 0.195 dB

Peak SAR (extrapolated) = 0.404 W/kg

SAR(1 g) = 0.250 mW/g; SAR(10 g) = 0.155 mW/g

Maximum value of SAR (measured) = 0.263 mW/g



0 dB = 0.263mW/g

Fig. 20 1900 MHz CH810

1900 Body Towards Ground Middle with GPRS

Date/Time: 2010-5-19 14:06:29

Electronics: DAE4 Sn771

Medium: Body 1900 MHz

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 52.4$; $\rho = 1000$ kg/m³

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

Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:4

Probe: ES3DV3 - SN3149 ConvF(4.68, 4.68, 4.68)

Toward Ground Middle/Area Scan (51x141x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.290 mW/g

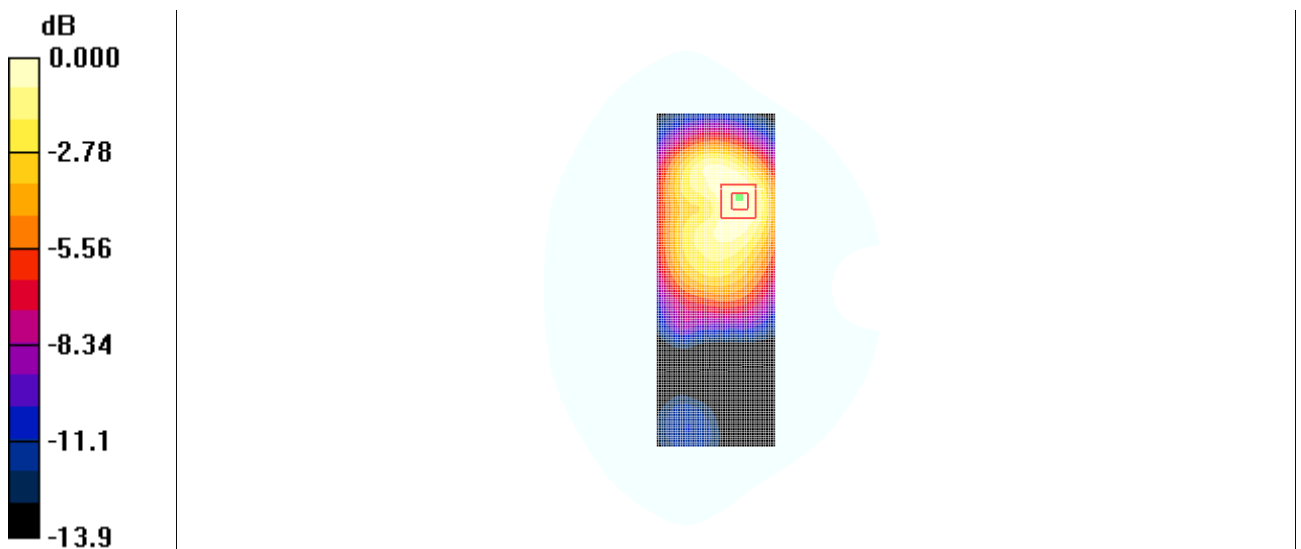
Toward Ground Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.53 V/m; Power Drift = -0.037 dB

Peak SAR (extrapolated) = 0.429 W/kg

SAR(1 g) = 0.263 mW/g; SAR(10 g) = 0.163 mW/g

Maximum value of SAR (measured) = 0.273 mW/g



0 dB = 0.273mW/g

Fig. 21 1900 MHz CH661

1900 Body Towards Ground Low with GPRS

Date/Time: 2010-5-19 14:21:45

Electronics: DAE4 Sn771

Medium: Body 1900 MHz

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.51$ mho/m; $\epsilon_r = 52.4$; $\rho = 1000$ kg/m³

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

Communication System: GSM 1900MHz GPRS Frequency: 1850.2 MHz Duty Cycle: 1:4

Probe: ES3DV3 - SN3149 ConvF(4.68, 4.68, 4.68)

Toward Ground Low/Area Scan (51x141x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.352 mW/g

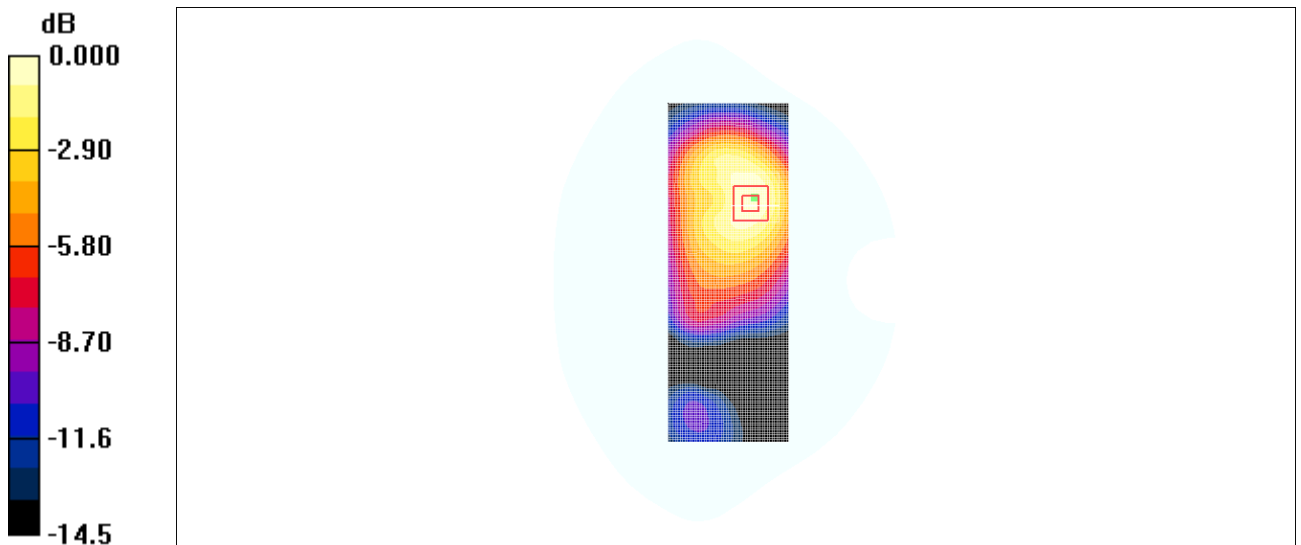
Toward Ground Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.51 V/m; Power Drift = 0.009 dB

Peak SAR (extrapolated) = 0.548 W/kg

SAR(1 g) = 0.332 mW/g; SAR(10 g) = 0.202 mW/g

Maximum value of SAR (measured) = 0.355 mW/g



0 dB = 0.355mW/g

Fig. 22 1900 MHz CH512

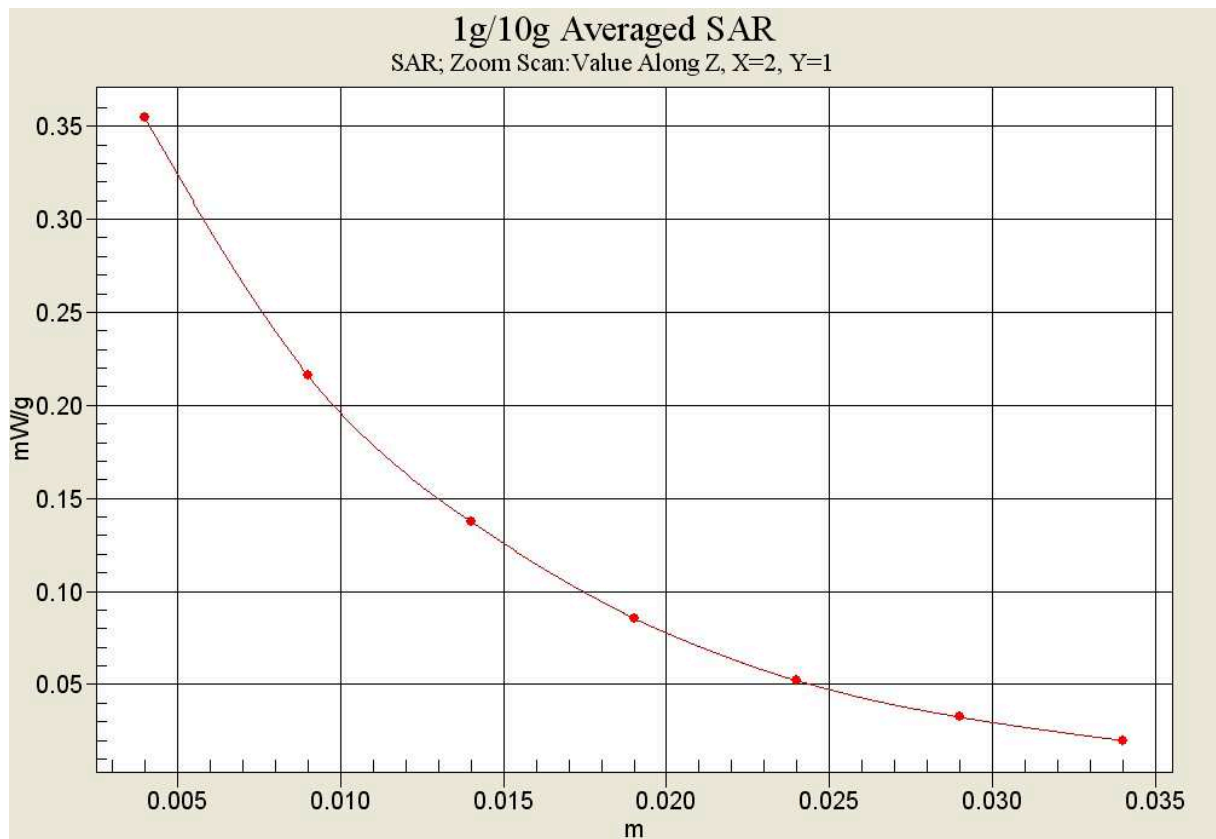


Fig. 22-1 Z-Scan at power reference point (1900 MHz CH512)

1900 Body Towards Ground Low with EGPRS

Date/Time: 2010-5-19 14:38:28

Electronics: DAE4 Sn771

Medium: Body 1900 MHz

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.51$ mho/m; $\epsilon_r = 52.4$; $\rho = 1000$ kg/m³

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

Communication System: GSM 1900MHz GPRS Frequency: 1850.2 MHz Duty Cycle: 1:4

Probe: ES3DV3 - SN3149 ConvF(4.68, 4.68, 4.68)

Toward Ground Low/Area Scan (51x141x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.133 mW/g

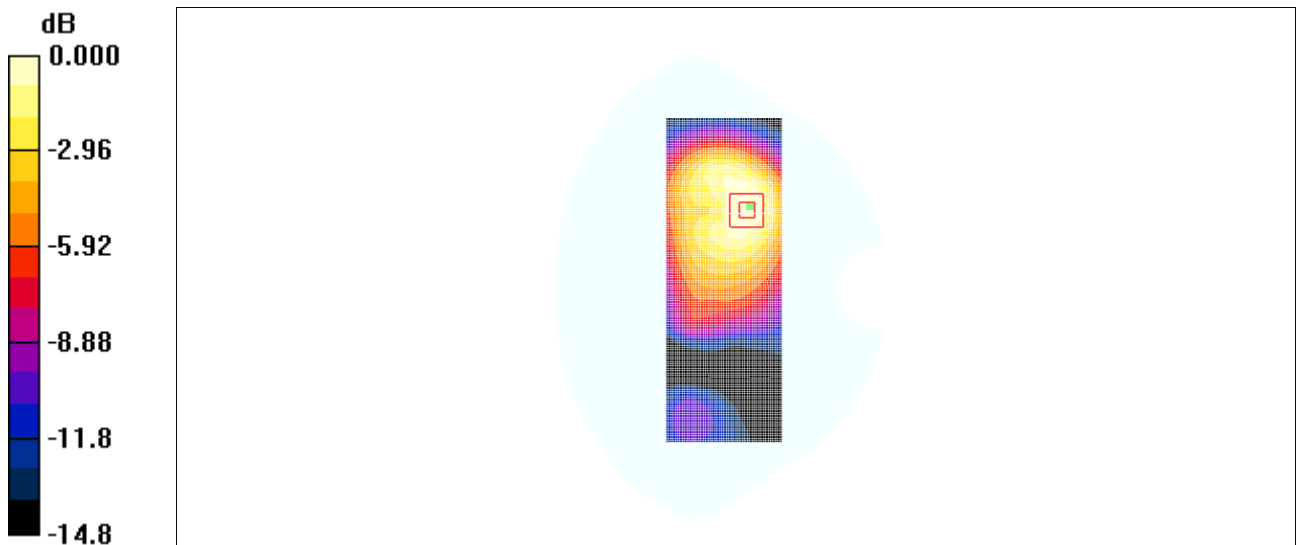
Toward Ground Low/Zoom Scan (4x4x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.31 V/m; Power Drift = 0.120 dB

Peak SAR (extrapolated) = 0.202 W/kg

SAR(1 g) = 0.124 mW/g; SAR(10 g) = 0.076 mW/g

Maximum value of SAR (measured) = 0.132 mW/g



0 dB = 0.132mW/g

Fig. 23 1900 MHz CH512

1900 Body Towards Ground Low with Headset

Date/Time: 2010-5-19 15:01:34

Electronics: DAE4 Sn771

Medium: Body 1900 MHz

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.51$ mho/m; $\epsilon_r = 52.4$; $\rho = 1000$ kg/m³

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

Communication System: GSM 1900MHz Frequency: 1850.2 MHz Duty Cycle: 1:8.3

Probe: ES3DV3 - SN3149 ConvF(4.68, 4.68, 4.68)

Toward Ground Low/Area Scan (51x141x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.250 mW/g

Toward Ground Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.10 V/m; Power Drift = 0.109 dB

Peak SAR (extrapolated) = 0.385 W/kg

SAR(1 g) = 0.234 mW/g; SAR(10 g) = 0.142 mW/g

Maximum value of SAR (measured) = 0.241 mW/g

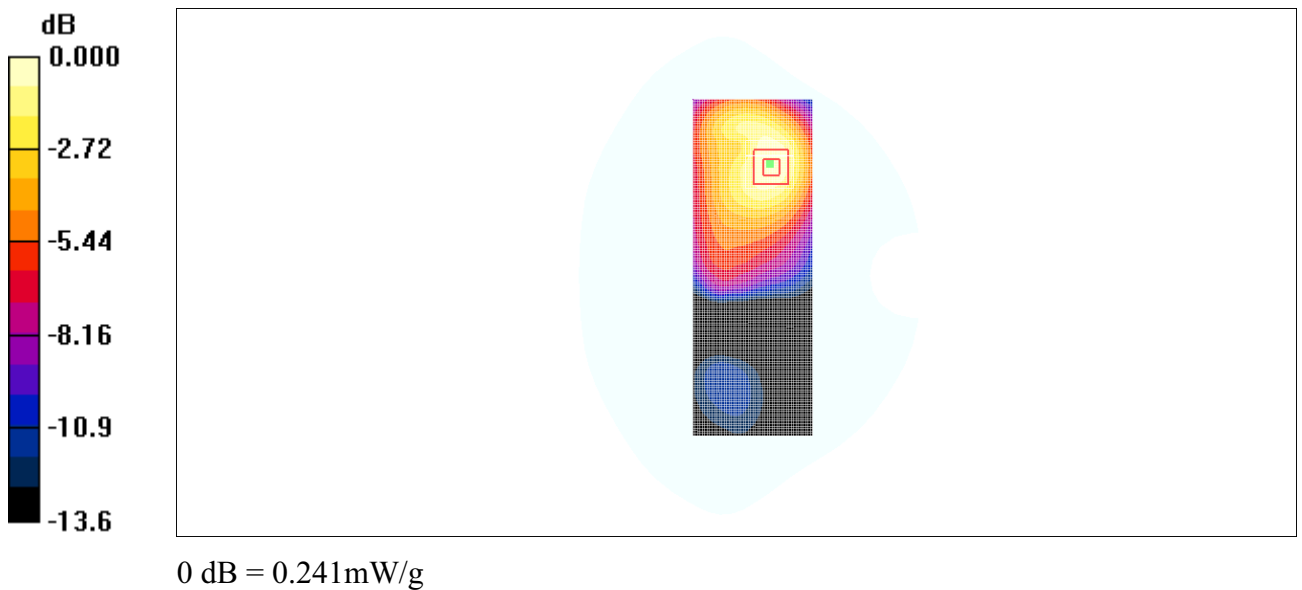


Fig. 24 1900 MHz CH512