



SAR TEST REPORT

No. 2008EEE02885

For

HUAWEI Technologies Co., Ltd.

WCDMA/GPRS/GSM Mobile Phone With Bluetooth

U1301/V725i/Vodafone 725i

With

Hardware Version: HD2U130M VER.C

Software Version: U1301V100R001C01B123

FCCID: QISU1301

Issued Date: 2008-09-19



No. DAT-P-114/01-01

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 Ministry of Information Industry

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1 Test Laboratory

1.1 Testing Location

Company Name: TMC Beijing, Telecommunication Metrology Center of MII
Address: No 52, Huayuan beilu, Haidian District, Beijing, P.R.China
Postal Code: 100083
Telephone: +86-10-62303288
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

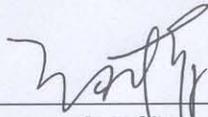
Project Leader: Sun Qian
Test Engineer: Lin Hao
Testing Start Date: September 16, 2008
Testing End Date: September 17, 2008

1.4 Signature



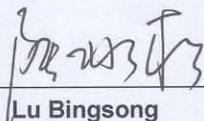
Lin Hao

(Prepared this test report)



Sun Qian

(Reviewed this test report)



Lu Bingsong

Deputy Director of the laboratory
(Approved this test report)

2 Client Information

2.1 Applicant Information

Company Name: HUAWEI Technologies Co., Ltd.
Address /Post: Bantian, Longgang District, Shenzhen, Guangdong
City: Shenzhen
Postal Code: 518129
Country: China
Telephone: 0755-28780808
Fax: 0755-28780808

2.2 Manufacturer Information

Company Name: HUAWEI Technologies Co., Ltd.
Address /Post: Bantian, Longgang District, Shenzhen, Guangdong
City: Shenzhen
Postal Code: 518129
Country: China
Telephone: 0755-28780808
Fax: 0755-28780808

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

3.1 About EUT

Description: WCDMA/GPRS/GSM Mobile Phone With Bluetooth
Model: U1301/V725i/Vodafone 725i
Test Frequency Band: GSM 850/GSM 1900
GPRS Class: 10

3.2 Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT1	357797020000568	HD2U130M VER.C	U1301V100R001C01B123

*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	Travel Adapter	TPCA-053065VY	HKY7C1100 195	Tech-Power TECH-POWER Electronics(Shenzhen)Co., Ltd./
AE2	Battery	HBU570	FMT731901 833Y	Shenzhen FMT 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 50360–2006: 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)

IEC 62209-2 (Draft): Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures – Part 2: Procedure to determine the Specific Absorption Rate (SAR) in the head and body for 30MHz to 6GHz Handheld and Body-Mounted Devices used in close proximity to the Body.

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

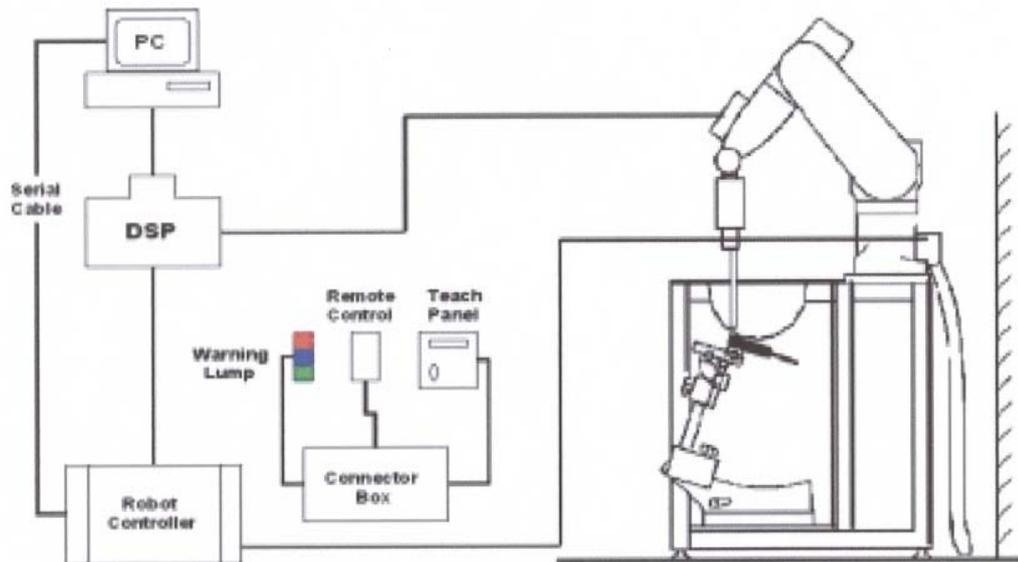
During SAR test, EUT is in Traffic Mode (Channel Allocated) at Normal Voltage Condition. A communication link is set up with a System Simulator (SS) by air link, and a call is established. The Absolute Radio Frequency Channel Number (ARFCN) is allocated to 128, 190 and 251 respectively in the case of 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 1: 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
Frequency	10 MHz to 4 GHz; Linearity: $\pm 0.2 \text{ dB}$ (30 MHz to 4 GHz)
Directivity	$\pm 0.2 \text{ dB}$ in HSL (rotation around probe axis) $\pm 0.3 \text{ dB}$ in tissue material (rotation normal to probe axis)



Picture 2: ES3DV3 E-field Probe

Dynamic Range	5 μ W/g to > 100 mW/g; Linearity: \pm 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



Picture3: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 \pm 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 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 4: 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



5.6 Equivalent Tissues

Picture 5: Generic Twin Phantom

The liquid used for the frequency range of 800-2000

MHz consisted of water, sugar, salt and Cellulose. The liquid has been previously proven to be suited for worst-case. The Table 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	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

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 $\epsilon=53.3$ $\sigma=1.52$

5.7 System Specifications

5.7.1 Robotic 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 and ERP for the EUT. In all cases, the measured peak 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: Conducted Power Measurement Results

850MHZ	Conducted Power (dBm)		
	Channel 128(824.2MHz)	Channel 190(836.6MHz)	Channel 251(848.8MHz)
Speech	32.40	32.60	32.49
GPRS	32.42	32.59	32.50
1900MHZ	Conducted Power (dBm)		
	Channel 512(1850.2MHz)	Channel 661(1880MHz)	Channel 810(1909.8MHz)
Speech	29.51	29.52	29.70
GPRS	29.53	29.53	29.70

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 8 to Table 12 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 4: Dielectric Performance of Head Tissue Simulating Liquid

Measurement is made at temperature 23.3 °C and relative humidity 49%.			
Liquid temperature during the test: 22.5°C			
/	Frequency	Permittivity ϵ	Conductivity σ (S/m)
Target value	850 MHz	41.5	0.90
	1900 MHz	40.0	1.40
Measurement value (Average of 10 tests)	850 MHz	41.6	0.98
	1900 MHz	40.9	1.38

Table 5: Dielectric Performance of Body Tissue Simulating Liquid

Measurement is made at temperature 23.3 °C and relative humidity 49%.			
Liquid temperature during the test: 22.5°C			
/	Frequency	Permittivity ϵ	Conductivity σ (S/m)
Target value	850 MHz	55.2	0.97
	1900 MHz	53.3	1.52
Measurement value (Average of 10 tests)	850 MHz	53.7	1.02
	1900 MHz	52.1	1.49

7.2 System Validation

Table 6: System Validation

Measurement is made at temperature 23.3 °C, relative humidity 49%, input power 250 mW. Liquid temperature during the test: 22.5°C							
Liquid parameters		Frequency		Permittivity ϵ		Conductivity σ (S/m)	
		835 MHz		43.5		0.91	
		1900 MHz		40.9		1.38	
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	1.60	2.48	1.62	2.50	1.25%	0.81%
	1900 MHz	5.09	9.73	5.27	9.91	3.3%	1.9%

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

7.3 Summary of Measurement Results (850MHz)

Table 7: 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, Top frequency(See Fig.1)	0.452	0.681	0.200
Left hand, Touch cheek, Mid frequency(See Fig.3)	0.315	0.474	0.027
Left hand, Touch cheek, Bottom frequency(See Fig.5)	0.208	0.313	0.050
Left hand, Tilt 15 Degree, Top frequency(See Fig.7)	0.307	0.465	-0.034
Left hand, Tilt 15 Degree, Mid frequency(See Fig.9)	0.227	0.342	-0.200
Left hand, Tilt 15 Degree, Bottom frequency(See Fig.11)	0.159	0.241	-0.080
Right hand, Touch cheek, Top frequency(See Fig.13)	0.471	0.696	-0.200
Right hand, Touch cheek, Mid frequency(See Fig.15)	0.330	0.489	-0.045
Right hand, Touch cheek, Bottom frequency(See Fig.17)	0.221	0.328	-0.030
Right hand, Tilt 15 Degree, Top frequency(See Fig.19)	0.307	0.454	-0.026
Right hand, Tilt 15 Degree, Mid frequency(See Fig.21)	0.222	0.329	-0.032
Right hand, Tilt 15 Degree, Bottom frequency(See Fig.23)	0.153	0.227	-0.089

Table 8: SAR Values (850MHz-Body)

Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	2.0	1.6	
Test Case	Measurement Result		Power Drift (dB)
	10 g Average	1 g Average	
Body, Towards Ground, Top frequency with GPRS(See Fig.25)	0.786	1.11	-0.054
Body, Towards Ground, Mid frequency with GPRS (See Fig.27)	0.730	1.02	0.034
Body, Towards Ground, Bottom frequency with GPRS (See Fig.29)	0.565	0.791	0.005
Body, Towards Phantom, Top frequency with GPRS(See Fig.31)	0.379	0.529	0.198
Body, Towards Phantom, Mid frequency with GPRS (See Fig.33)	0.289	0.406	0.200
Body, Towards Phantom, Bottom frequency with GPRS (See Fig.35)	0.188	0.262	0.017
Body, Towards Ground, Top frequency with Headset (See Fig.37)	0.440	0.615	-0.010

Note: During the test of “GSM 850 Body with GPRS”, the power reduction was applied; the maximum output power was reduced 2dB with 2 timeslots in uplink.

7.4 Summary of Measurement Results (1900MHz)

Table 9: SAR Values (1900MHz-Head)

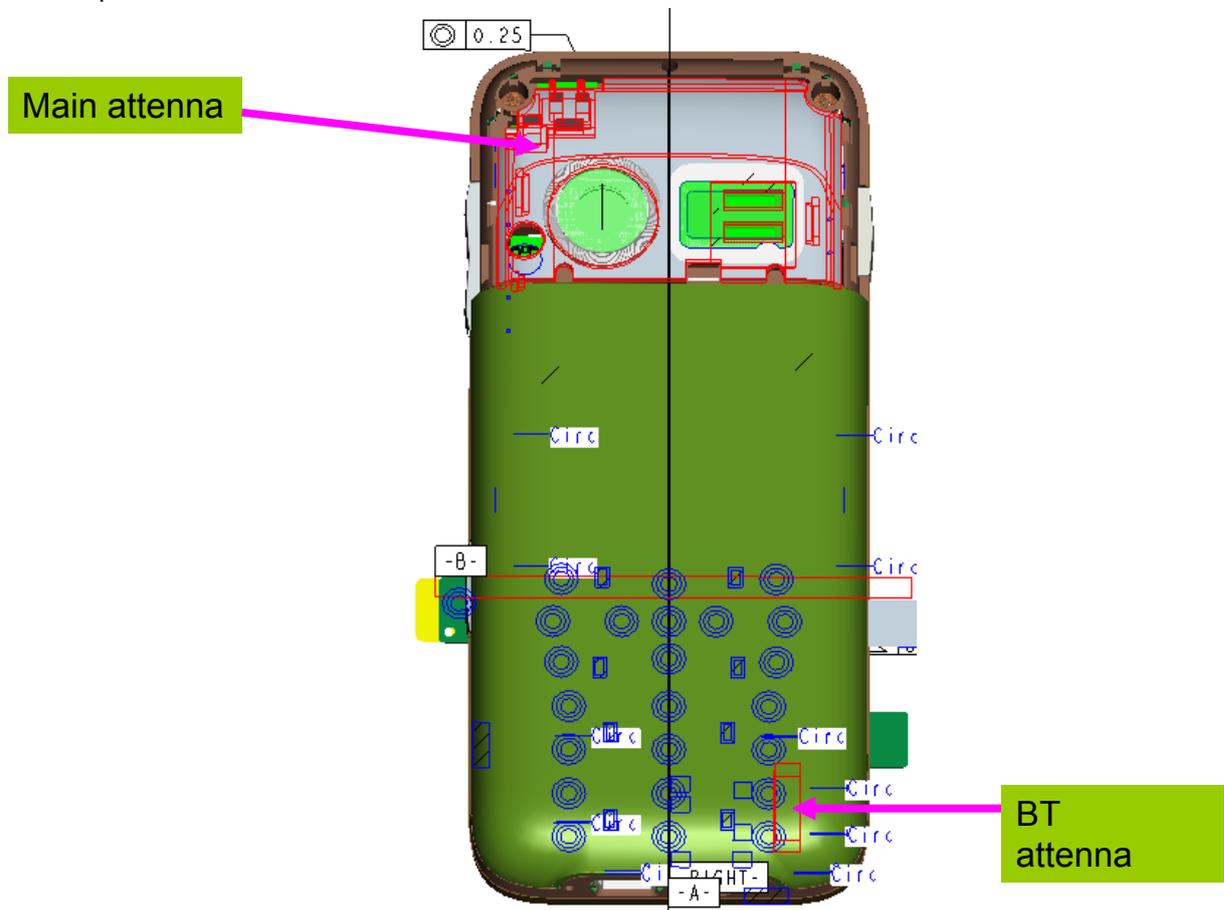
Limit of SAR (W/kg)	10 g Average	1 g Average	Power Drift (dB)
	2.0	1.6	
Test Case	Measurement Result (W/kg)		Power Drift (dB)
	10 g Average	1 g Average	
Left hand, Touch cheek, Top frequency(See Fig.41)	0.244	0.469	-0.200
Left hand, Touch cheek, Mid frequency(See Fig.43)	0.256	0.491	-0.103
Left hand, Touch cheek, Bottom frequency(See Fig.45)	0.284	0.544	-0.049
Left hand, Tilt 15 Degree, Top frequency(See Fig.47)	0.262	0.484	-0.012
Left hand, Tilt 15 Degree, Mid frequency(See Fig.49)	0.284	0.523	-0.003
Left hand, Tilt 15 Degree, Bottom frequency(See Fig.51)	0.324	0.599	0.039
Right hand, Touch cheek, Top frequency(See Fig.53)	0.208	0.347	0.005
Right hand, Touch cheek, Mid frequency(See Fig.55)	0.229	0.382	-0.015
Right hand, Touch cheek, Bottom frequency(See Fig.57)	0.268	0.447	-0.025
Right hand, Tilt 15 Degree, Top frequency(See Fig.59)	0.227	0.413	-0.017
Right hand, Tilt 15 Degree, Mid frequency(See Fig.61)	0.256	0.464	0.008
Right hand, Tilt 15 Degree, Bottom frequency(See Fig.63)	0.304	0.545	0.064

Table 10: SAR Values (1900MHz-Body)

Limit of SAR (W/kg)	10 g Average	1g Average	Power Drift (dB)
	2.0	1.6	
Test Case	Measurement		Power Drift (dB)
	10 g Average	1 g Average	
Body, Towards Ground, Top frequency with GPRS(See Fig.65)	0.150	0.251	-0.031
Body, Towards Ground, Mid frequency with GPRS (See Fig.67)	0.151	0.253	0.079
Body, Towards Ground, Bottom frequency with GPRS (See Fig.69)	0.158	0.263	-0.003
Body, Towards Phantom, Top frequency with GPRS(See Fig.71)	0.422	0.686	0.015
Body, Towards Phantom, Mid frequency with GPRS (See Fig.73)	0.385	0.620	-0.004
Body, Towards Phantom, Bottom frequency with GPRS (See Fig.75)	0.354	0.551	0.009
Body, Towards Ground, Top frequency with Headset (See Fig.77)	0.221	0.371	0.007

7.5 Summary of Measurement Results (Bluetooth function)

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



	Uncertainty Component		Tol. (± %)	Prob Dist.	Div.	c_i (1 g)	1 g u_i (±%)	v_i
1	System repetivity	A	0.5	N	1	1	0.5	9
Measurement System								
2	Probe Calibration	B	5	N	2	1	2.5	∞
3	Axial Isotropy	B	4.7	R	$\sqrt{3}$	$\frac{(1-c_p)^{1/2}}{2}$	4.3	∞
4	Hemispherical Isotropy	B	9.4	R	$\sqrt{3}$	$\sqrt{c_p}$		∞
5	Boundary Effect	B	0.4	R	$\sqrt{3}$	1	0.23	∞
6	Linearity	B	4.7	R	$\sqrt{3}$	1	2.7	∞
7	System Detection Limits	B	1.0	R	$\sqrt{3}$	1	0.6	∞
8	Readout Electronics	B	1.0	N	1	1	1.0	∞
9	RF Ambient Conditions	B	3.0	R	$\sqrt{3}$	1	1.73	∞
10	Probe Positioner Mechanical Tolerance	B	0.4	R	$\sqrt{3}$	1	0.2	∞
11	Probe Positioning with respect to Phantom Shell	B	2.9	R	$\sqrt{3}$	1	1.7	∞
12	Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	B	3.9	R	$\sqrt{3}$	1	2.3	∞
Test sample Related								
13	Test Sample Positioning	A	4.9	N	1	1	4.9	N-1
14	Device Holder Uncertainty	A	6.1	N	1	1	6.1	N-1
15	Output Power Variation - SAR drift measurement	B	5.0	R	$\sqrt{3}$	1	2.9	∞
Phantom and Tissue Parameters								
16	Phantom Uncertainty (shape and thickness tolerances)	B	1.0	R	$\sqrt{3}$	1	0.6	∞
17	Liquid Conductivity - deviation from target values	B	5.0	R	$\sqrt{3}$	0.64	1.7	∞
18	Liquid Conductivity - measurement uncertainty	B	5.0	N	1	0.64	1.7	M
19	Liquid Permittivity - deviation from target values	B	5.0	R	$\sqrt{3}$	0.6	1.7	∞
20	Liquid Permittivity - measurement uncertainty	B	5.0	N	1	0.6	1.7	M
Combined Standard Uncertainty					RSS		11.25	
Expanded Uncertainty (95% CONFIDENCE INTERVAL)					K=2		22.5	

9 MAIN TEST INSTRUMENTS

Table 13: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	HP 8753E	US38433212	August 30,2008	One year
02	Power meter	NRVD	101253	June 20, 2008	One year
03	Power sensor	NRV-Z5	100333		
04	Power sensor	NRV-Z6	100011	September 2, 2008	One year
05	Signal Generator	E4433B	US37230472	September 4, 2008	One Year
06	Amplifier	VTL5400	0505	No Calibration Requested	
07	BTS	CMU 200	105948	August 15, 2008	One year
08	E-field Probe	SPEAG ES3DV3	3149	December 14, 2007	One year
09	DAE	SPEAG DAE4	771	November 22, 2007	One year
10	Dipole Validation Kit	SPEAG D835V2	443	February 19, 2007	Two years
11	Dipole Validation Kit	SPEAG D1900V2	541	February 20, 2007	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.

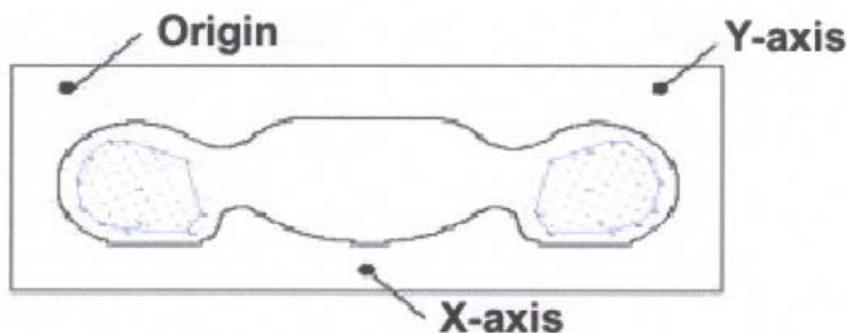
Step 3: Around this point, a volume of 30 mm x 30 mm x 30 mm was assessed by measuring 7 x 7x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

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.

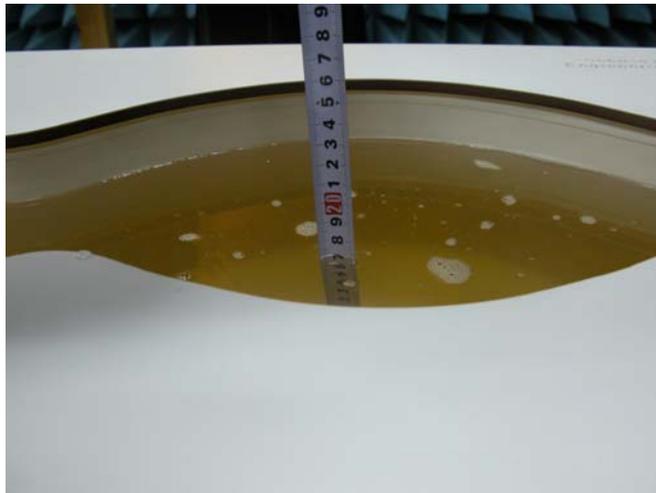


Picture A: SAR Measurement Points in Area Scan

ANNEX B TEST LAYOUT



Picture B1: Specific Absorption Rate Test Layout



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



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



Picture B4: Liquid depth in the Flat Phantom (GSM 850 MHz Body)



Picture B5: Liquid depth in the Flat Phantom (GSM 1900MHz Body)

ANNEX C GRAPH RESULTS

850 Left Cheek High

Date/Time: 2008-9-17 9:37:37

Electronics: DAE4 Sn771

Medium: Head GSM850

Medium parameters used (interpolated): $f = 848.8$ MHz; $\sigma = 0.937$ mho/m; $\epsilon_r = 41.6$; $\rho = 1000$ kg/m³

Ambient Temperature: 23.3°C Liquid Temperature: 22.5°C

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

Probe: ES3DV3 - SN3149 ConvF(6.28, 6.28, 6.28)

Cheek High/Area Scan (51x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.762 mW/g

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

Reference Value = 18.8 V/m; Power Drift = 0.200 dB

Peak SAR (extrapolated) = 0.950 W/kg

SAR(1 g) = 0.681 mW/g; SAR(10 g) = 0.452 mW/g

Maximum value of SAR (measured) = 0.732 mW/g

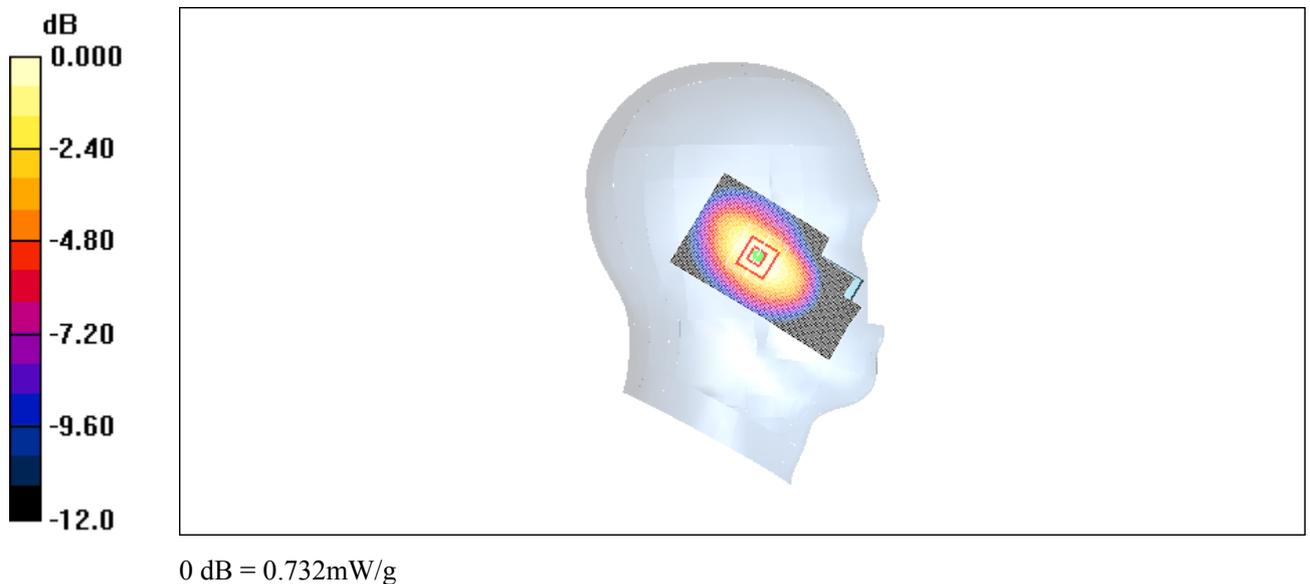


Fig. 1 850MHz CH251

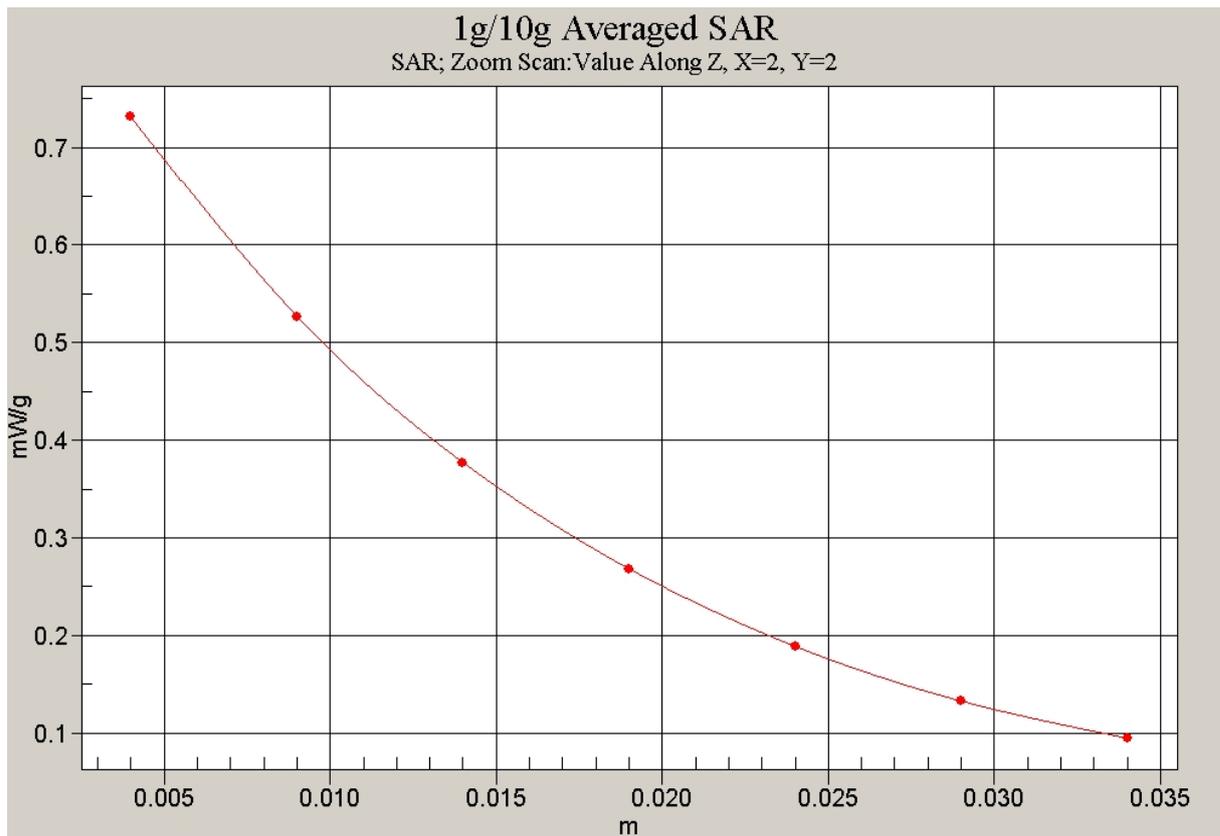


Fig. 2 Z-Scan at power reference point (850 MHz CH251)

850 Left Cheek Middle

Date/Time: 2008-9-17 9:50:24

Electronics: DAE4 Sn771

Medium: Head GSM850

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.925$ mho/m; $\epsilon_r = 41.7$; $\rho = 1000$ kg/m³

Ambient Temperature: 23.3°C Liquid Temperature: 22.5°C

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

Probe: ES3DV3 - SN3149 ConvF(6.28, 6.28, 6.28)

Cheek Middle/Area Scan (51x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.522 mW/g

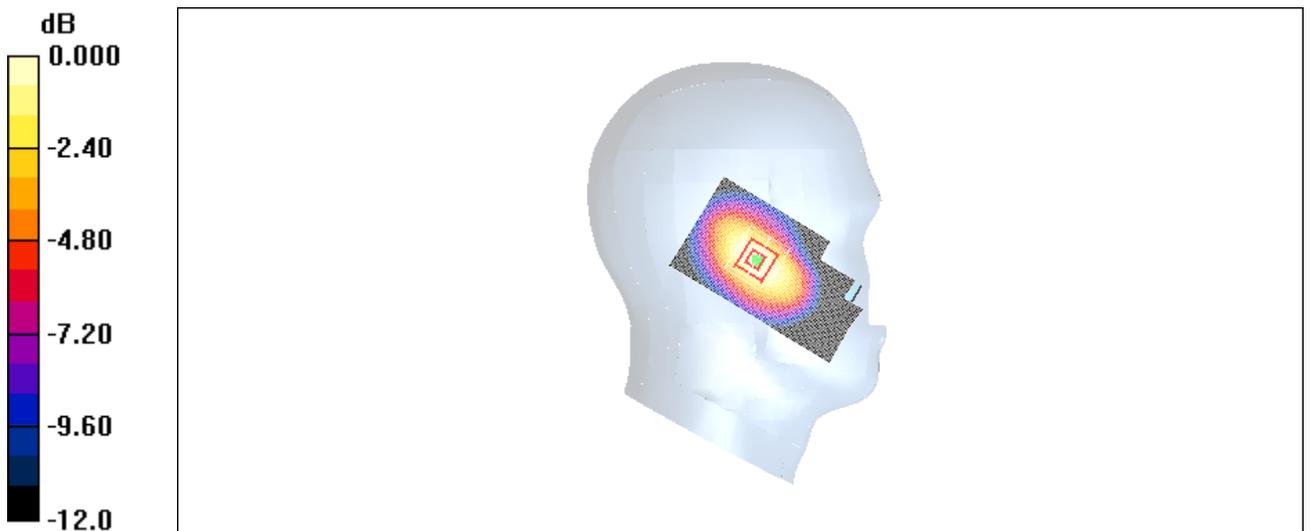
Cheek Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 16.3 V/m; Power Drift = 0.027 dB

Peak SAR (extrapolated) = 0.660 W/kg

SAR(1 g) = 0.474 mW/g; SAR(10 g) = 0.315 mW/g

Maximum value of SAR (measured) = 0.507 mW/g



0 dB = 0.507mW/g

Fig. 3 850 MHz CH190

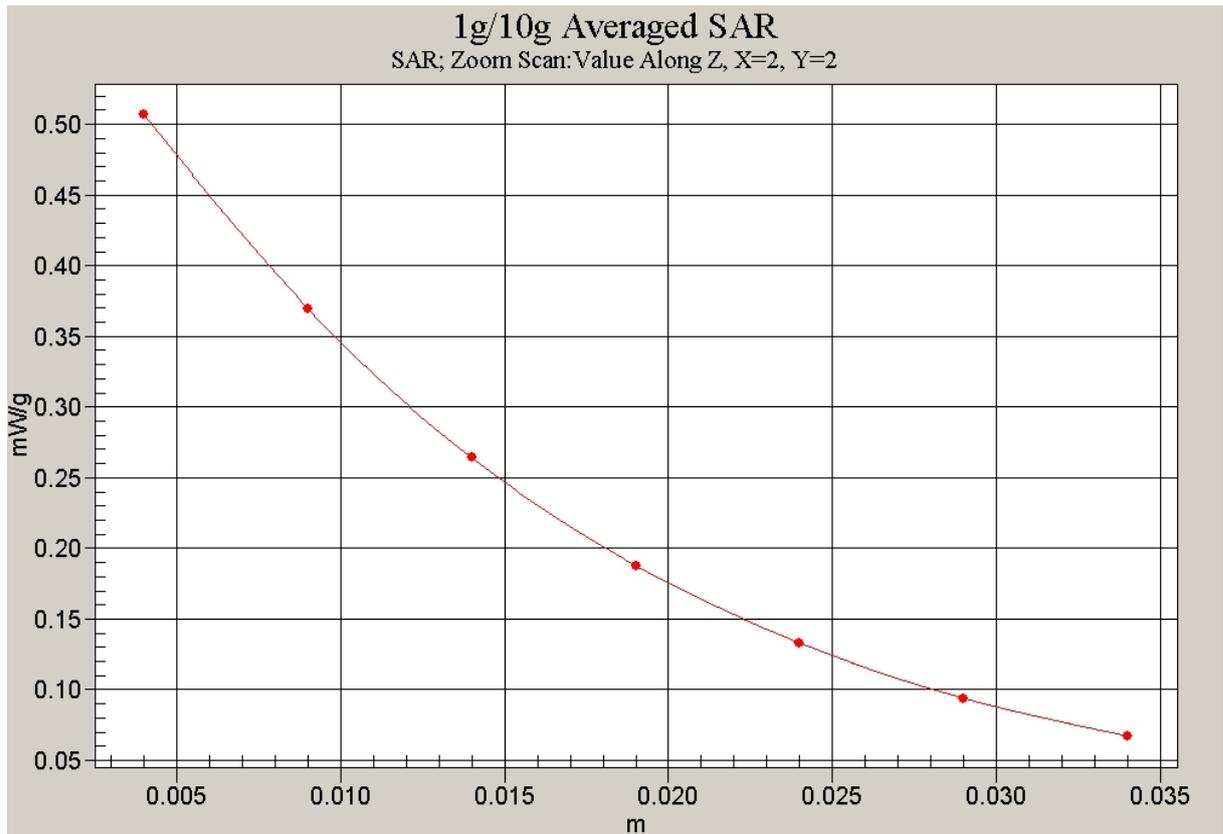


Fig. 4 Z-Scan at power reference point (850 MHz CH190)

850 Left Cheek Low

Date/Time: 2008-9-17 10:05:06

Electronics: DAE4 Sn771

Medium: Head GSM850

Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.913$ mho/m; $\epsilon_r = 41.9$; $\rho = 1000$ kg/m³

Ambient Temperature: 23.3°C Liquid Temperature: 22.5°C

Communication System: GSM 850 Frequency: 824.2 MHz Duty Cycle: 1:8.3

Probe: ES3DV3 - SN3149 ConvF(6.28, 6.28, 6.28)

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

Maximum value of SAR (interpolated) = 0.345 mW/g

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

Reference Value = 13.4 V/m; Power Drift = 0.050 dB

Peak SAR (extrapolated) = 0.440 W/kg

SAR(1 g) = 0.313 mW/g; SAR(10 g) = 0.208 mW/g

Maximum value of SAR (measured) = 0.335 mW/g

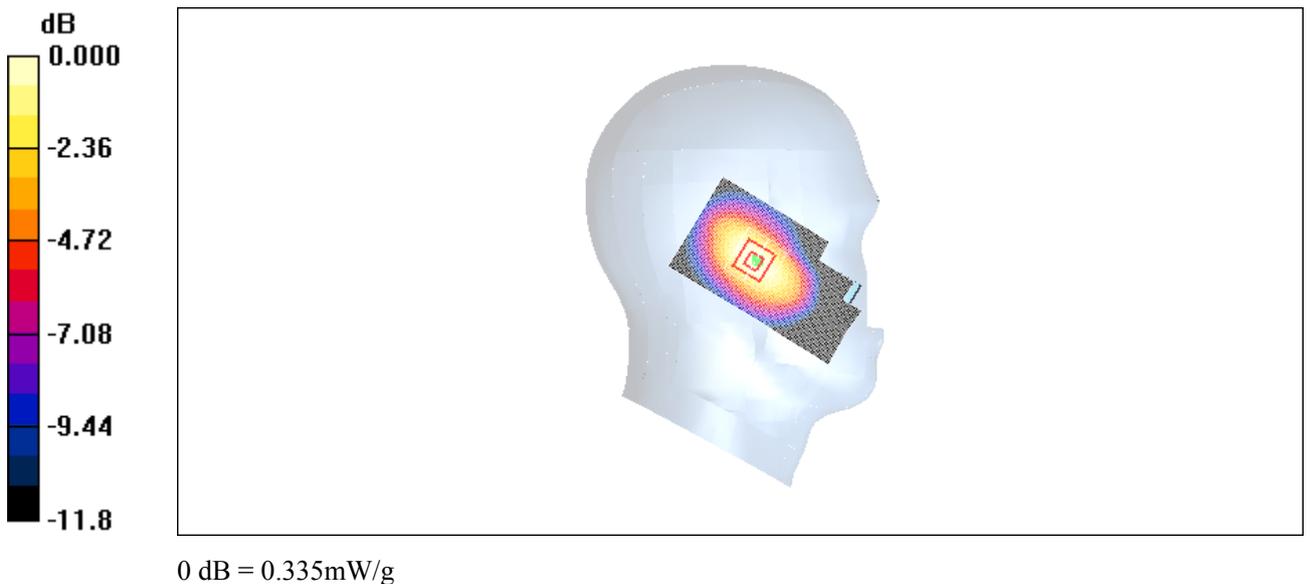


Fig. 5 850 MHz CH128

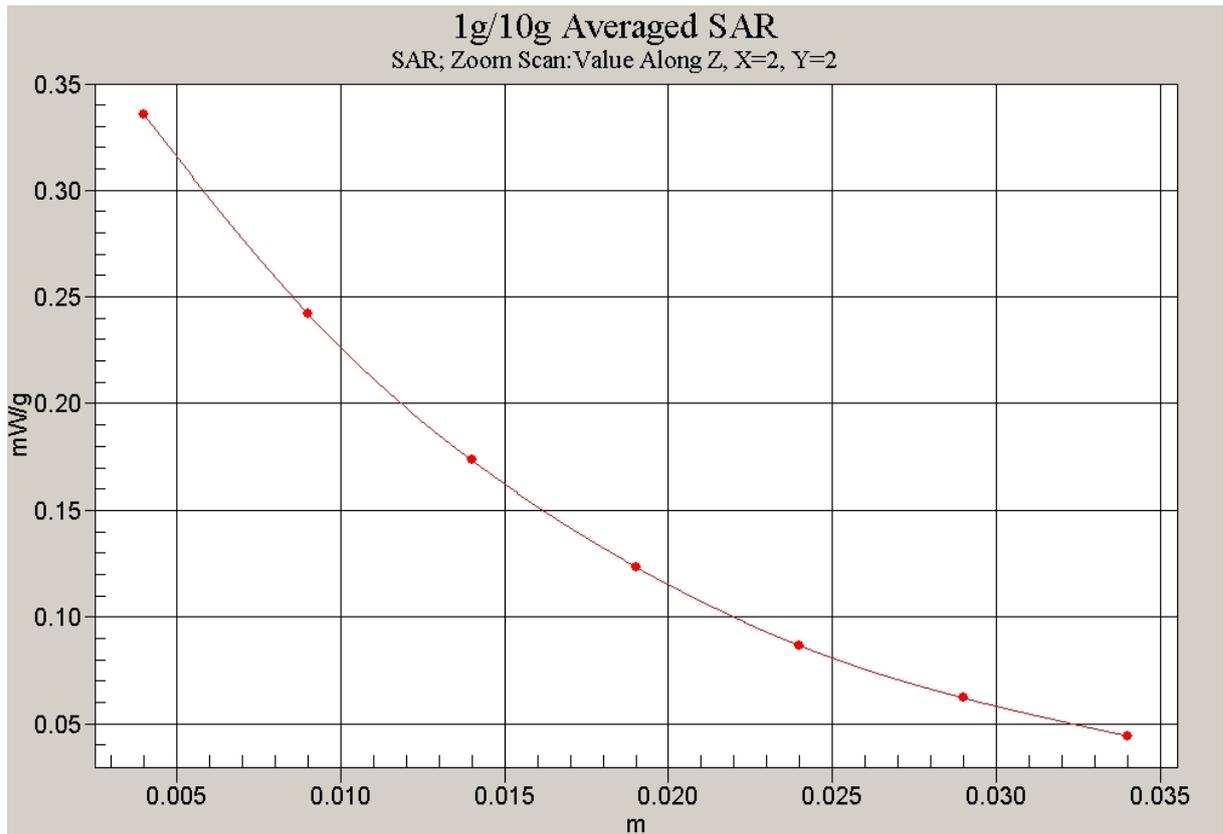


Fig. 6 Z-Scan at power reference point (850 MHz CH190)

850 Left Tilt High

Date/Time: 2008-9-17 11:28:08

Electronics: DAE4 Sn771

Medium: Head GSM850

Medium parameters used (interpolated): $f = 848.8$ MHz; $\sigma = 0.937$ mho/m; $\epsilon_r = 41.6$; $\rho = 1000$ kg/m³

Ambient Temperature: 23.3°C Liquid Temperature: 22.5°C

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

Probe: ES3DV3 - SN3149 ConvF(6.28, 6.28, 6.28)

Tilt High/Area Scan (51x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.515 mW/g

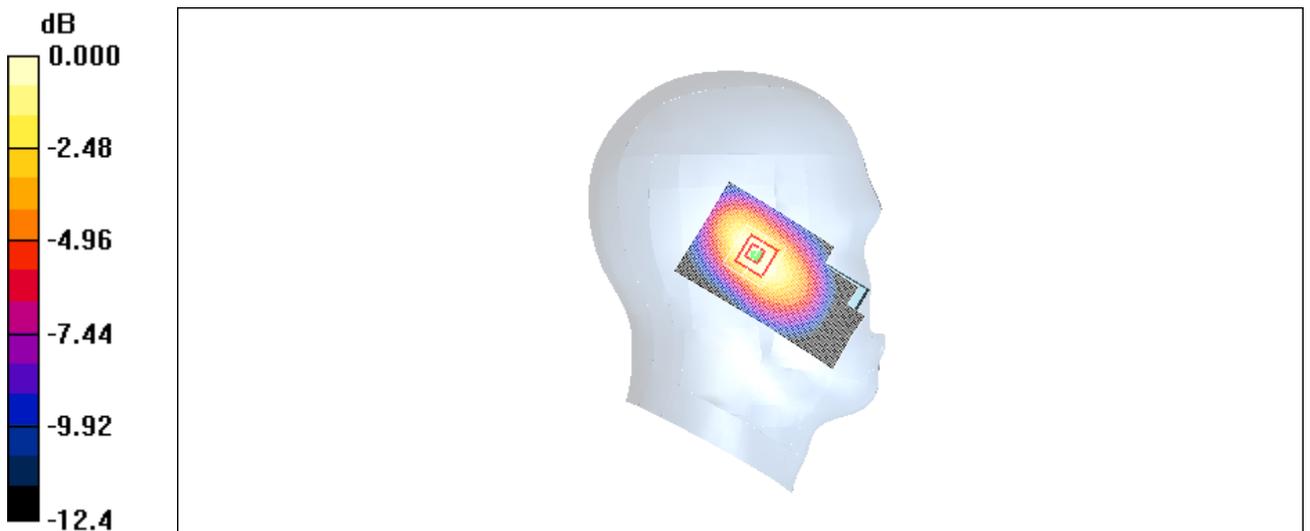
Tilt High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 16.6 V/m; Power Drift = -0.034 dB

Peak SAR (extrapolated) = 0.657 W/kg

SAR(1 g) = 0.465 mW/g; SAR(10 g) = 0.307 mW/g

Maximum value of SAR (measured) = 0.497 mW/g



0 dB = 0.497mW/g

Fig.7 850 MHz CH251

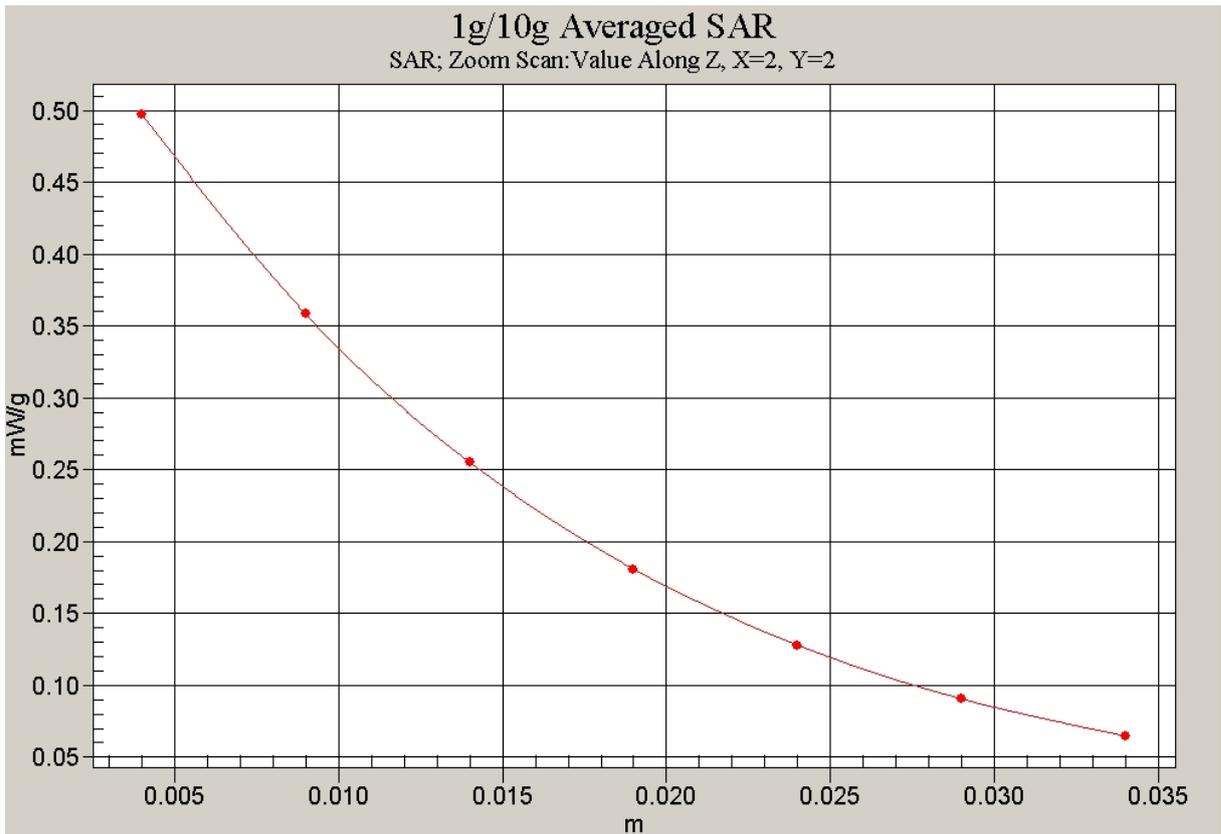


Fig. 8 Z-Scan at power reference point (850 MHz CH251)

850 Left Tilt Middle

Date/Time: 2008-9-17 11:14:29

Electronics: DAE4 Sn771

Medium: Head GSM850

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.925$ mho/m; $\epsilon_r = 41.7$; $\rho = 1000$ kg/m³

Ambient Temperature: 23.3°C Liquid Temperature: 22.5°C

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

Probe: ES3DV3 - SN3149 ConvF(6.28, 6.28, 6.28)

Tilt Middle/Area Scan (51x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.376 mW/g

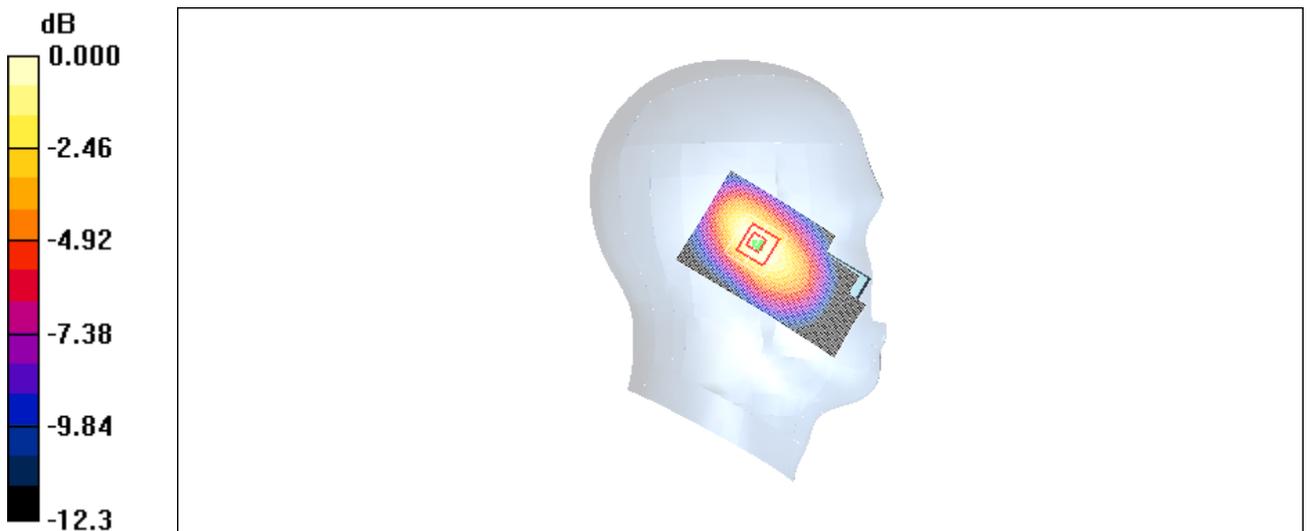
Tilt Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.8 V/m; Power Drift = -0.200 dB

Peak SAR (extrapolated) = 0.480 W/kg

SAR(1 g) = 0.342 mW/g; SAR(10 g) = 0.227 mW/g

Maximum value of SAR (measured) = 0.365 mW/g



0 dB = 0.365mW/g

Fig.9 850 MHz CH190

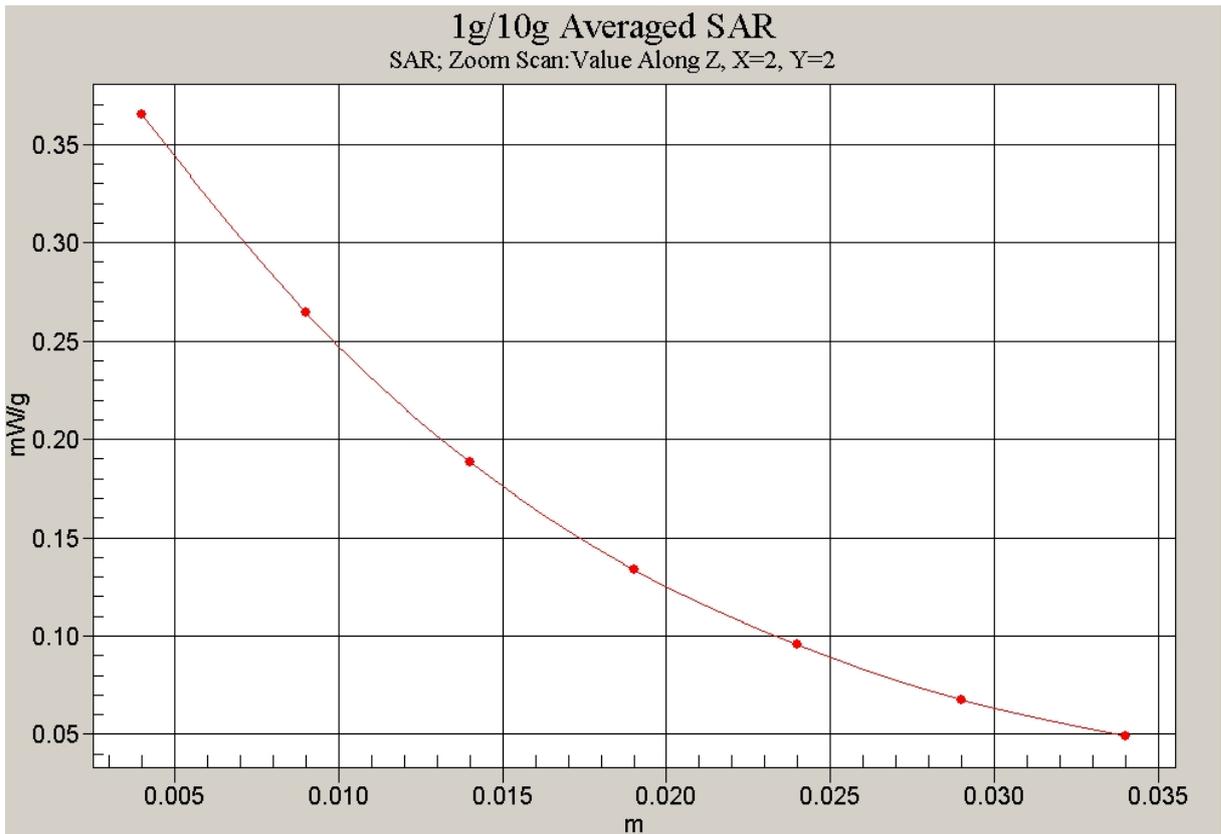


Fig. 10 Z-Scan at power reference point (850 MHz CH190)

850 Left Tilt Low

Date/Time: 2008-9-17 10:58:17

Electronics: DAE4 Sn771

Medium: Head GSM850

Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.913$ mho/m; $\epsilon_r = 41.9$; $\rho = 1000$ kg/m³

Ambient Temperature: 23.3°C Liquid Temperature: 22.5°C

Communication System: GSM 850 Frequency: 824.2 MHz Duty Cycle: 1:8.3

Probe: ES3DV3 - SN3149 ConvF(6.28, 6.28, 6.28)

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

Maximum value of SAR (interpolated) = 0.269 mW/g

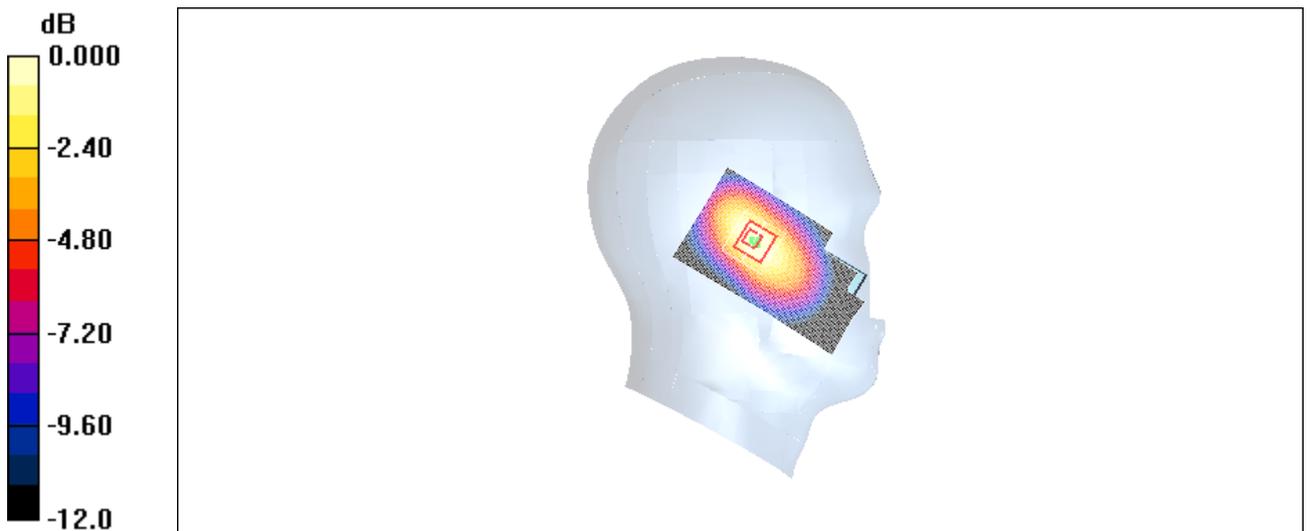
Tilt Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.4 V/m; Power Drift = -0.080 dB

Peak SAR (extrapolated) = 0.342 W/kg

SAR(1 g) = 0.241 mW/g; SAR(10 g) = 0.159 mW/g

Maximum value of SAR (measured) = 0.258 mW/g



0 dB = 0.258mW/g

Fig. 11 850 MHz CH128

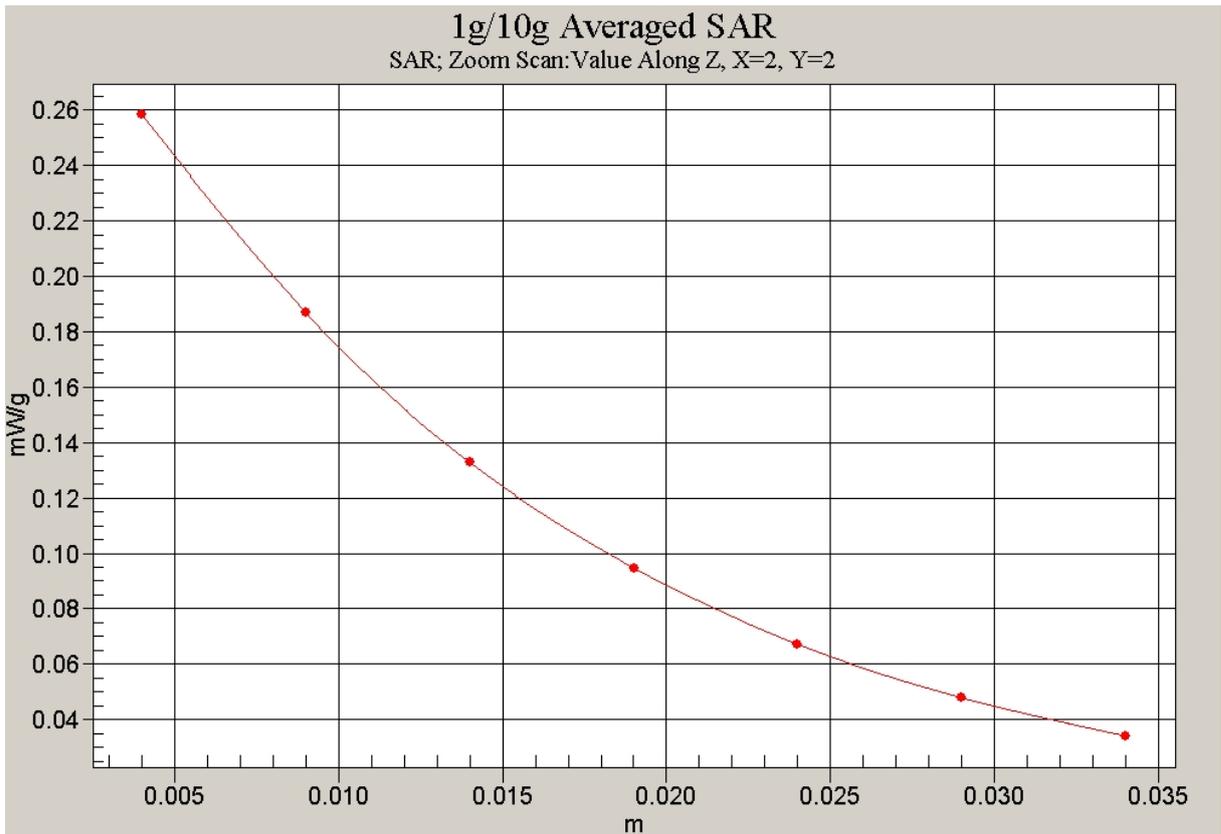


Fig. 12 Z-Scan at power reference point (850 MHz CH128)

850 Right Cheek High

Date/Time: 2008-9-17 8:15:32

Electronics: DAE4 Sn771

Medium: Head GSM850

Medium parameters used (interpolated): $f = 848.8$ MHz; $\sigma = 0.937$ mho/m; $\epsilon_r = 41.6$; $\rho = 1000$ kg/m³

Ambient Temperature: 23.3°C Liquid Temperature: 22.5°C

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

Probe: ES3DV3 - SN3149 ConvF(6.28, 6.28, 6.28)

Cheek High/Area Scan (51x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.799 mW/g

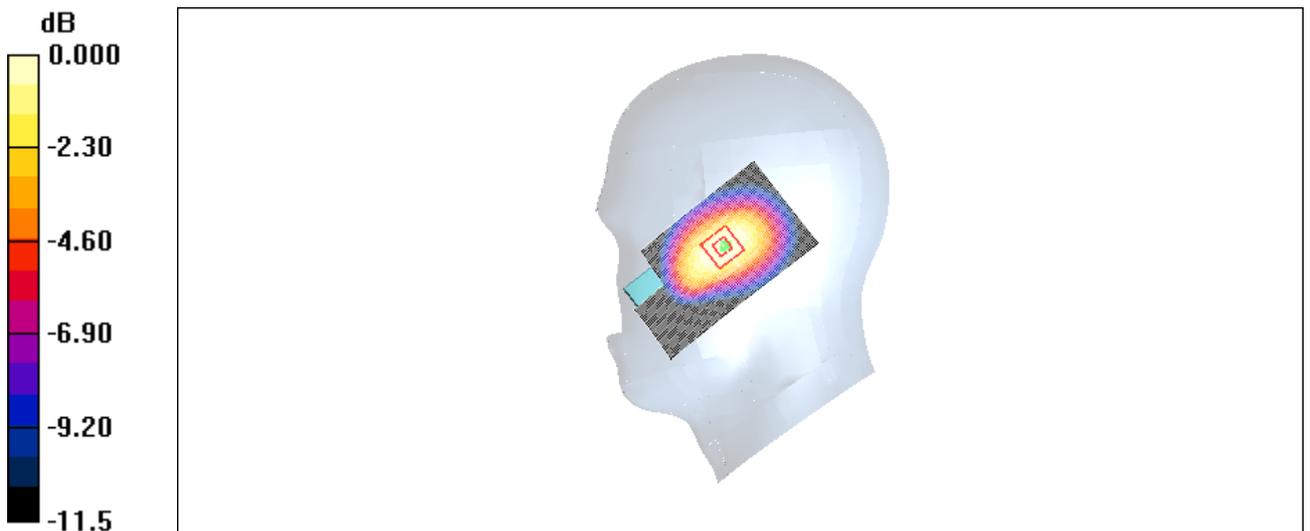
Cheek High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 20.5 V/m; Power Drift = -0.200 dB

Peak SAR (extrapolated) = 0.946 W/kg

SAR(1 g) = 0.696 mW/g; SAR(10 g) = 0.471 mW/g

Maximum value of SAR (measured) = 0.736 mW/g



0 dB = 0.736mW/g

Fig. 13 850 MHz CH251

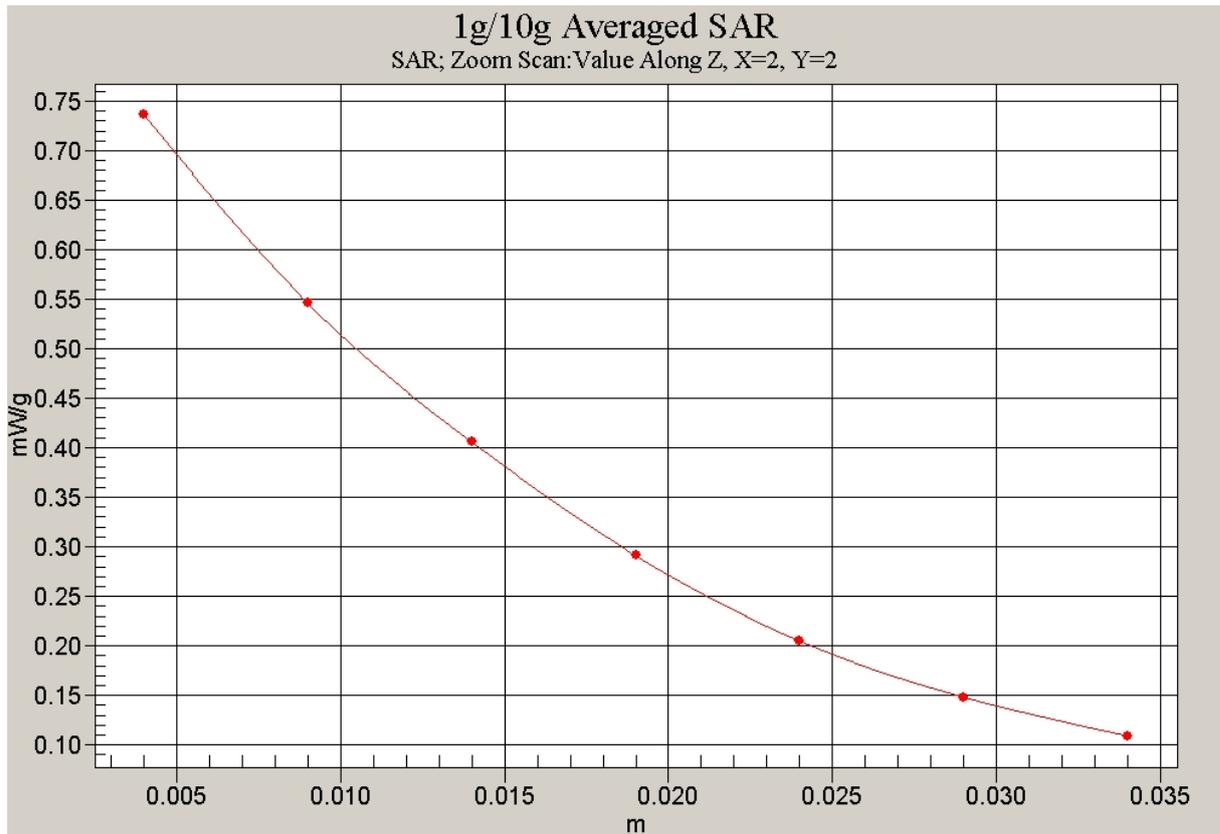


Fig. 14 Z-Scan at power reference point (850 MHz CH251)

850 Right Cheek Middle

Date/Time: 2008-9-17 8:28:07

Electronics: DAE4 Sn771

Medium: Head GSM850

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.925$ mho/m; $\epsilon_r = 41.7$; $\rho = 1000$ kg/m³

Ambient Temperature: 23.3°C Liquid Temperature: 22.5°C

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

Probe: ES3DV3 - SN3149 ConvF(6.28, 6.28, 6.28)

Cheek Middle/Area Scan (51x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.548 mW/g

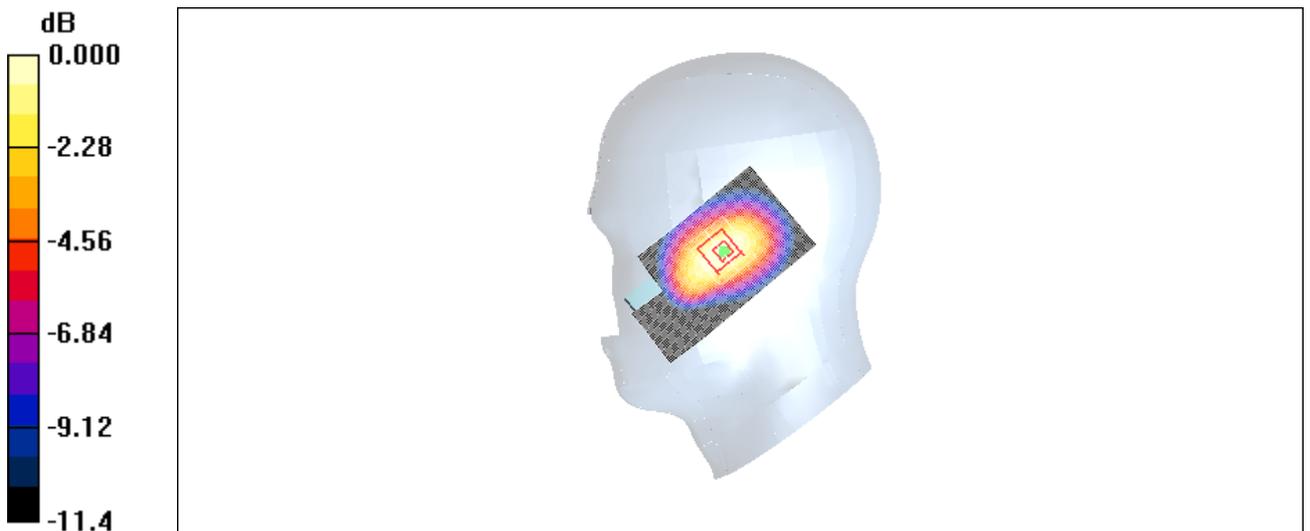
Cheek Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 16.8 V/m; Power Drift = -0.045 dB

Peak SAR (extrapolated) = 0.663 W/kg

SAR(1 g) = 0.489 mW/g; SAR(10 g) = 0.330 mW/g

Maximum value of SAR (measured) = 0.522 mW/g



0 dB = 0.522mW/g

Fig. 15 850 MHz CH190

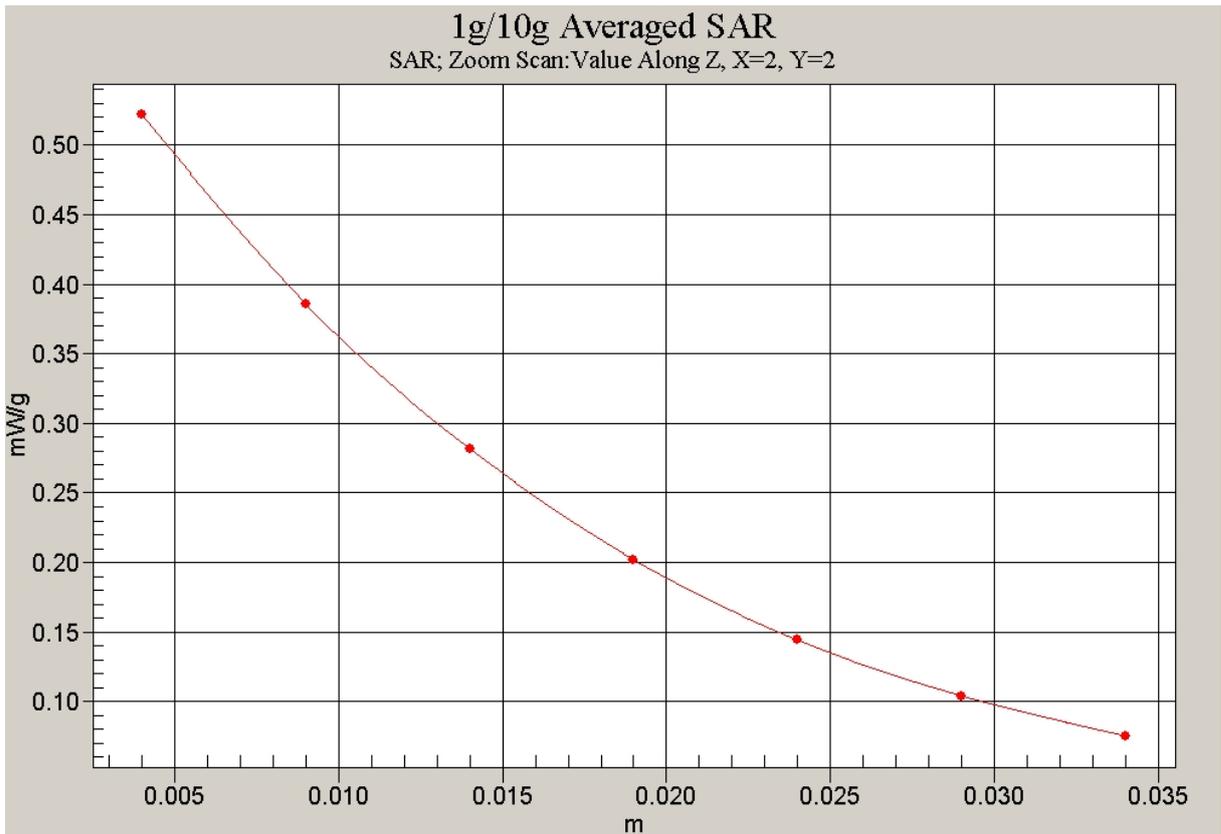


Fig. 16 Z-Scan at power reference point (850 MHz CH190)

850 Right Cheek Low

Date/Time: 2008-9-17 8:40:37

Electronics: DAE4 Sn771

Medium: Head GSM850

Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.913$ mho/m; $\epsilon_r = 41.9$; $\rho = 1000$ kg/m³

Ambient Temperature: 23.3°C Liquid Temperature: 22.5°C

Communication System: GSM 850 Frequency: 824.2 MHz Duty Cycle: 1:8.3

Probe: ES3DV3 - SN3149 ConvF(6.28, 6.28, 6.28)

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

Maximum value of SAR (interpolated) = 0.367 mW/g

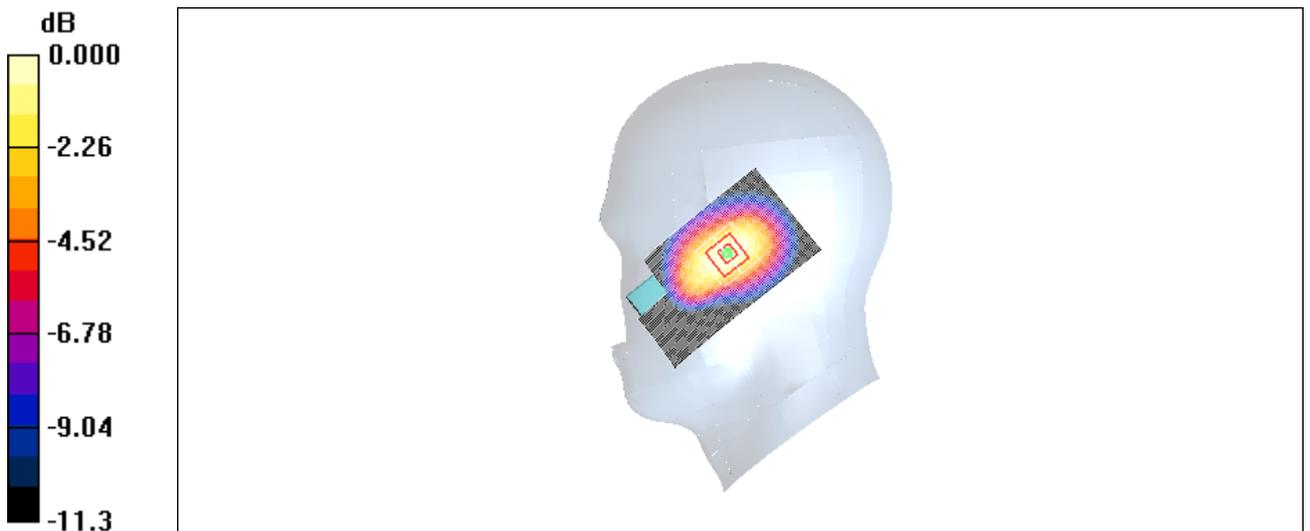
Cheek Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.9 V/m; Power Drift = -0.030 dB

Peak SAR (extrapolated) = 0.451 W/kg

SAR(1 g) = 0.328 mW/g; SAR(10 g) = 0.221 mW/g

Maximum value of SAR (measured) = 0.349 mW/g



0 dB = 0.349mW/g

Fig. 17 850 MHz CH128

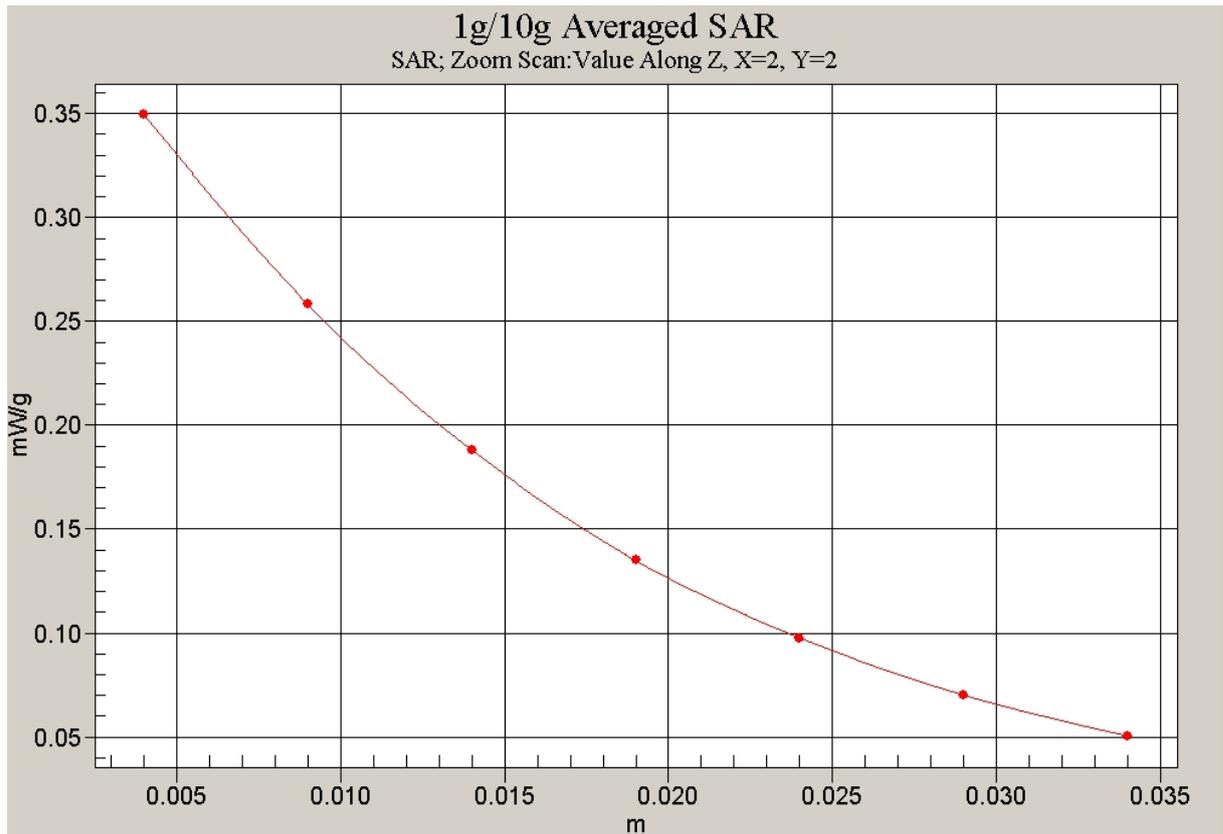


Fig. 18 Z-Scan at power reference point (850 MHz CH128)

850 Right Tilt High

Date/Time: 2008-9-17 9:20:47

Electronics: DAE4 Sn771

Medium: Head GSM850

Medium parameters used (interpolated): $f = 848.8$ MHz; $\sigma = 0.937$ mho/m; $\epsilon_r = 41.6$; $\rho = 1000$ kg/m³

Ambient Temperature: 23.3°C Liquid Temperature: 22.5°C

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

Probe: ES3DV3 - SN3149 ConvF(6.28, 6.28, 6.28)

Tilt High/Area Scan (51x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.504 mW/g

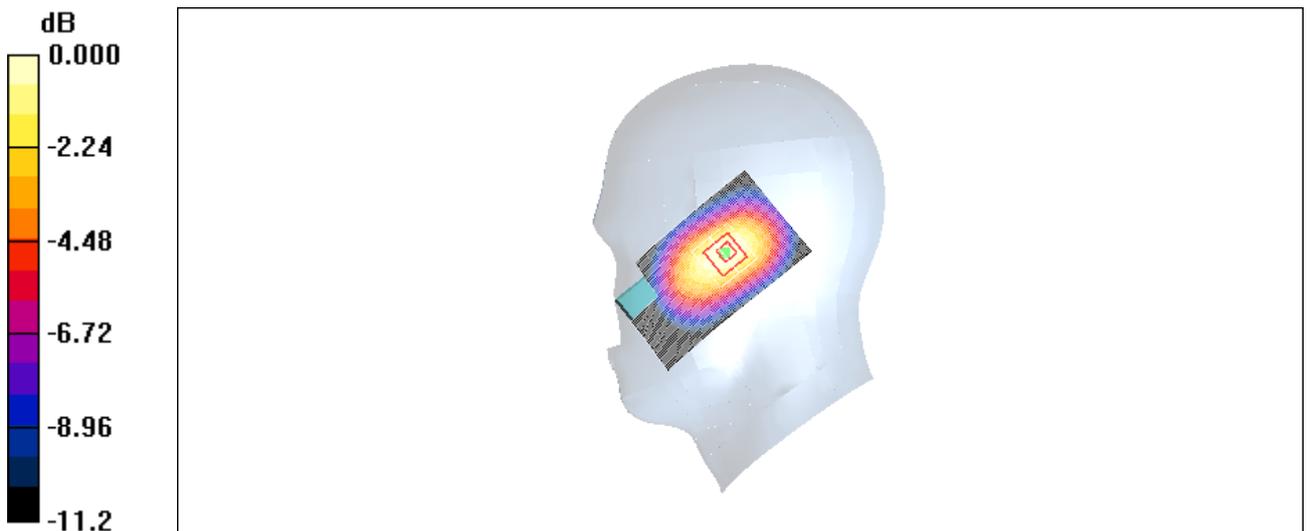
Tilt High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 18.4 V/m; Power Drift = -0.026 dB

Peak SAR (extrapolated) = 0.620 W/kg

SAR(1 g) = 0.454 mW/g; SAR(10 g) = 0.307 mW/g

Maximum value of SAR (measured) = 0.481 mW/g



0 dB = 0.481mW/g

Fig.19 850 MHz CH251

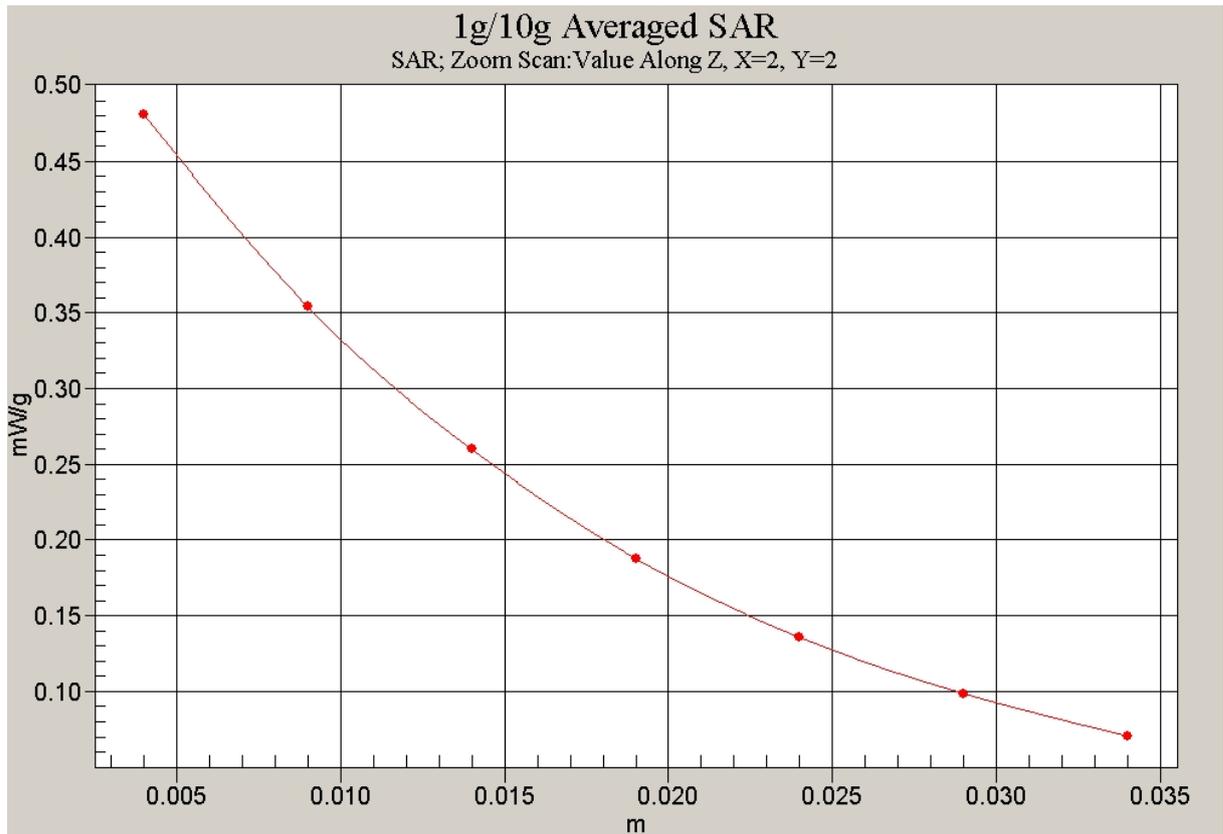


Fig. 20 Z-Scan at power reference point (850 MHz CH251)

850 Right Tilt Middle

Date/Time: 2008-9-17 9:05:59

Electronics: DAE4 Sn771

Medium: Head GSM850

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.925$ mho/m; $\epsilon_r = 41.7$; $\rho = 1000$ kg/m³

Ambient Temperature: 23.3°C Liquid Temperature: 22.5°C

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

Probe: ES3DV3 - SN3149 ConvF(6.28, 6.28, 6.28)

Tilt Middle/Area Scan (51x91x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.366 mW/g

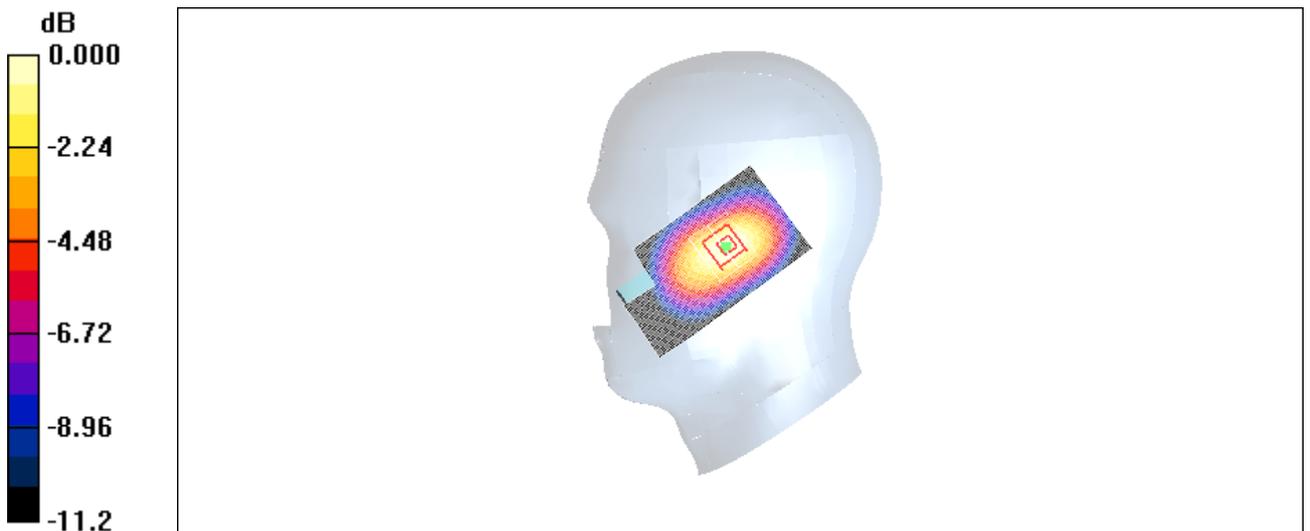
Tilt Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 15.8 V/m; Power Drift = -0.032 dB

Peak SAR (extrapolated) = 0.449 W/kg

SAR(1 g) = 0.329 mW/g; SAR(10 g) = 0.222 mW/g

Maximum value of SAR (measured) = 0.350 mW/g



0 dB = 0.350mW/g

Fig.21 850 MHz CH190

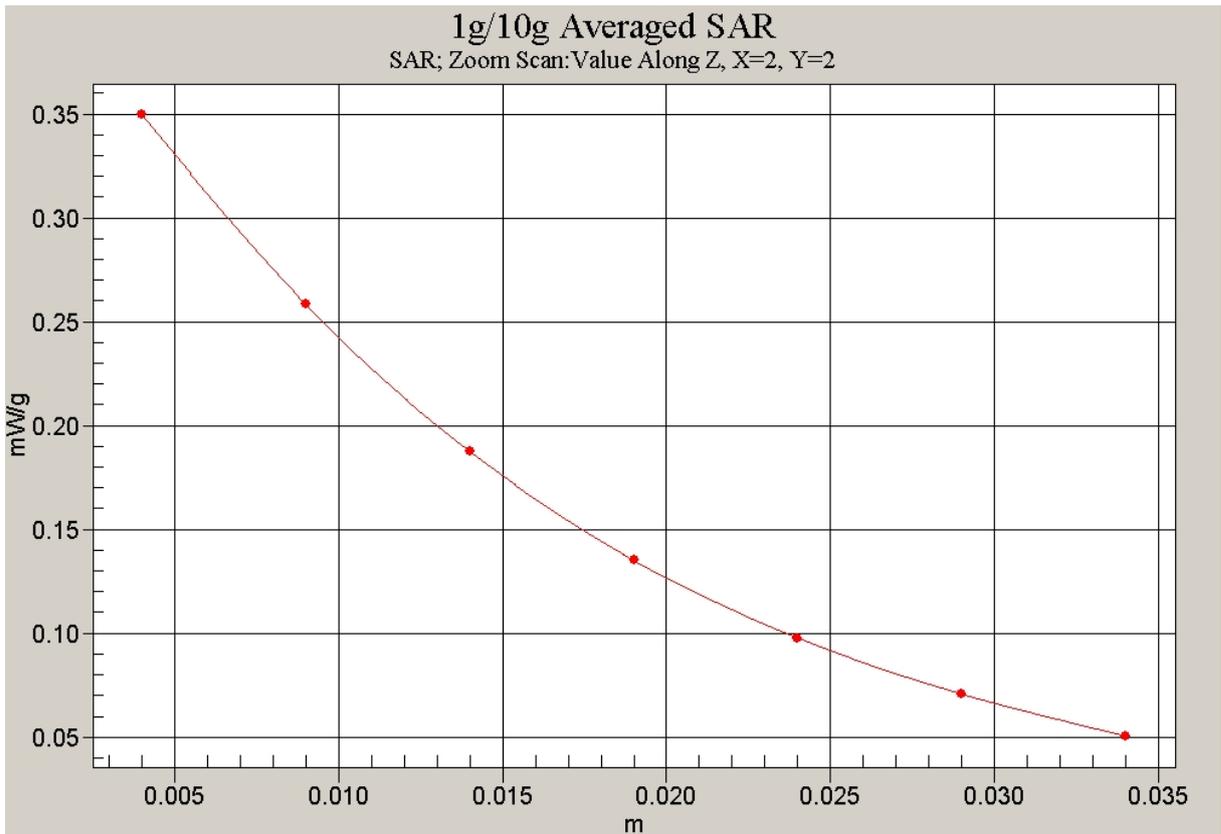


Fig. 22 Z-Scan at power reference point (850 MHz CH190)

850 Right Tilt Low

Date/Time: 2008-9-17 8:53:27

Electronics: DAE4 Sn771

Medium: Head GSM850

Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.913$ mho/m; $\epsilon_r = 41.9$; $\rho = 1000$ kg/m³

Ambient Temperature: 23.3°C Liquid Temperature: 22.5°C

Communication System: GSM 850 Frequency: 824.2 MHz Duty Cycle: 1:8.3

Probe: ES3DV3 - SN3149 ConvF(6.28, 6.28, 6.28)

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

Maximum value of SAR (interpolated) = 0.254 mW/g

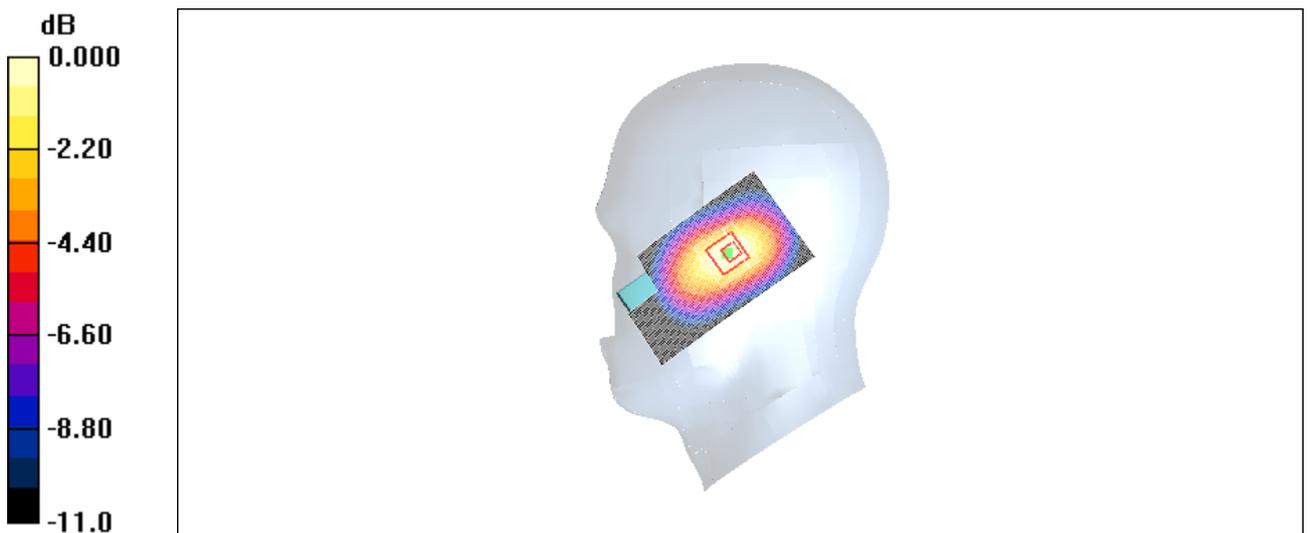
Tilt Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.2 V/m; Power Drift = -0.089 dB

Peak SAR (extrapolated) = 0.310 W/kg

SAR(1 g) = 0.227 mW/g; SAR(10 g) = 0.153 mW/g

Maximum value of SAR (measured) = 0.242 mW/g



0 dB = 0.242mW/g

Fig. 23 850 MHz CH128

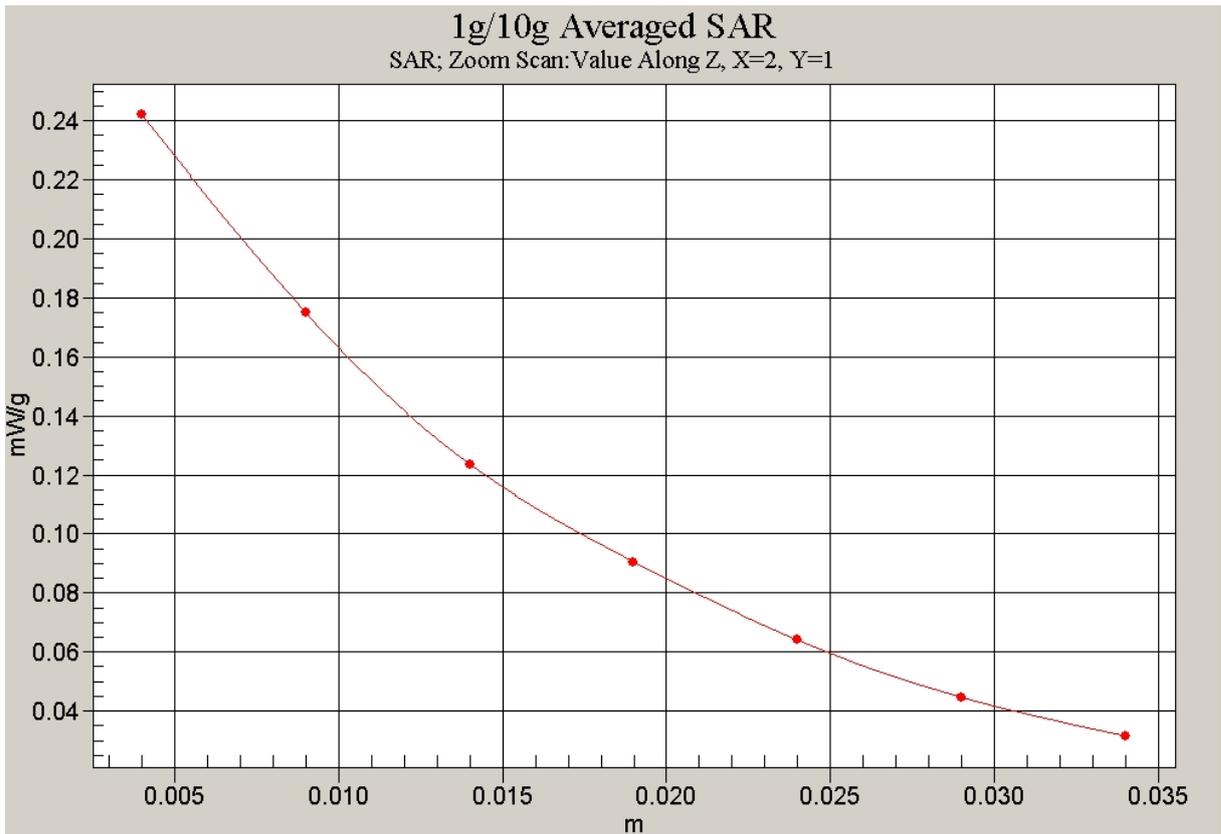


Fig. 24 Z-Scan at power reference point (850 MHz CH128)

850 Body Towards Ground High with GPRS

Date/Time: 2008-9-17 16:37:32

Electronics: DAE4 Sn771

Medium: 850 Body

Medium parameters used (interpolated): $f = 848.8$ MHz; $\sigma = 1.02$ mho/m; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³

Ambient Temperature: 23.3°C Liquid Temperature: 22.5°C

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

Probe: ES3DV3 - SN3149 ConvF(5.97, 5.97, 5.97)

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

Maximum value of SAR (interpolated) = 1.16 mW/g

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

Reference Value = 34.5 V/m; Power Drift = -0.054 dB

Peak SAR (extrapolated) = 1.46 W/kg

SAR(1 g) = 1.11 mW/g; SAR(10 g) = 0.786 mW/g

Maximum value of SAR (measured) = 1.17 mW/g

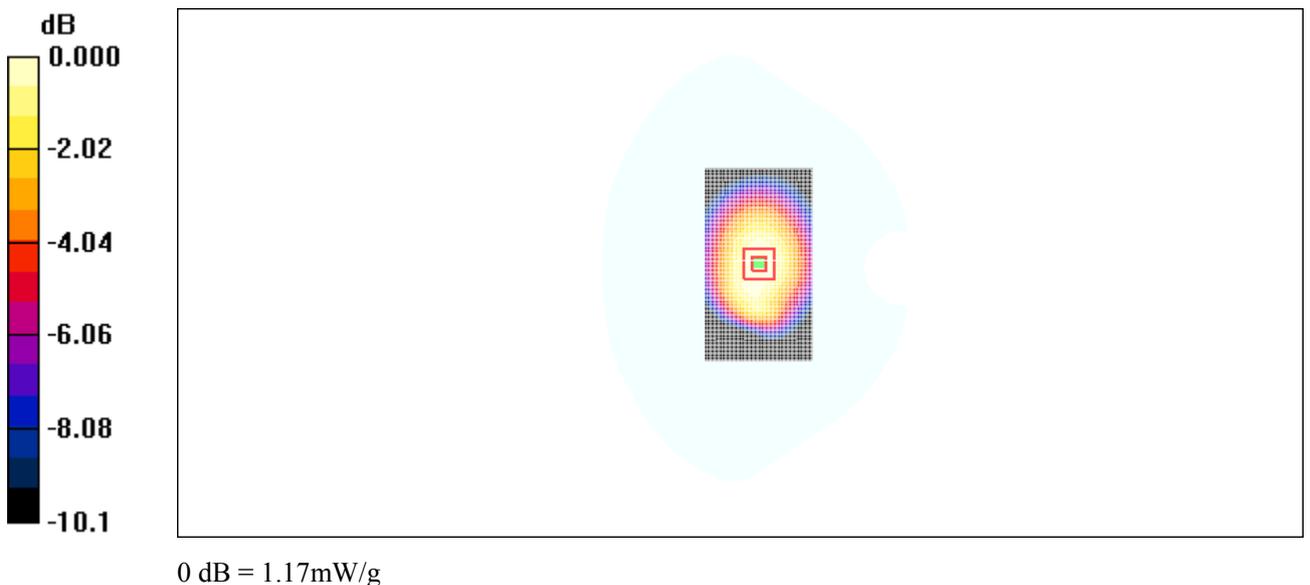


Fig. 25 850 MHz CH251

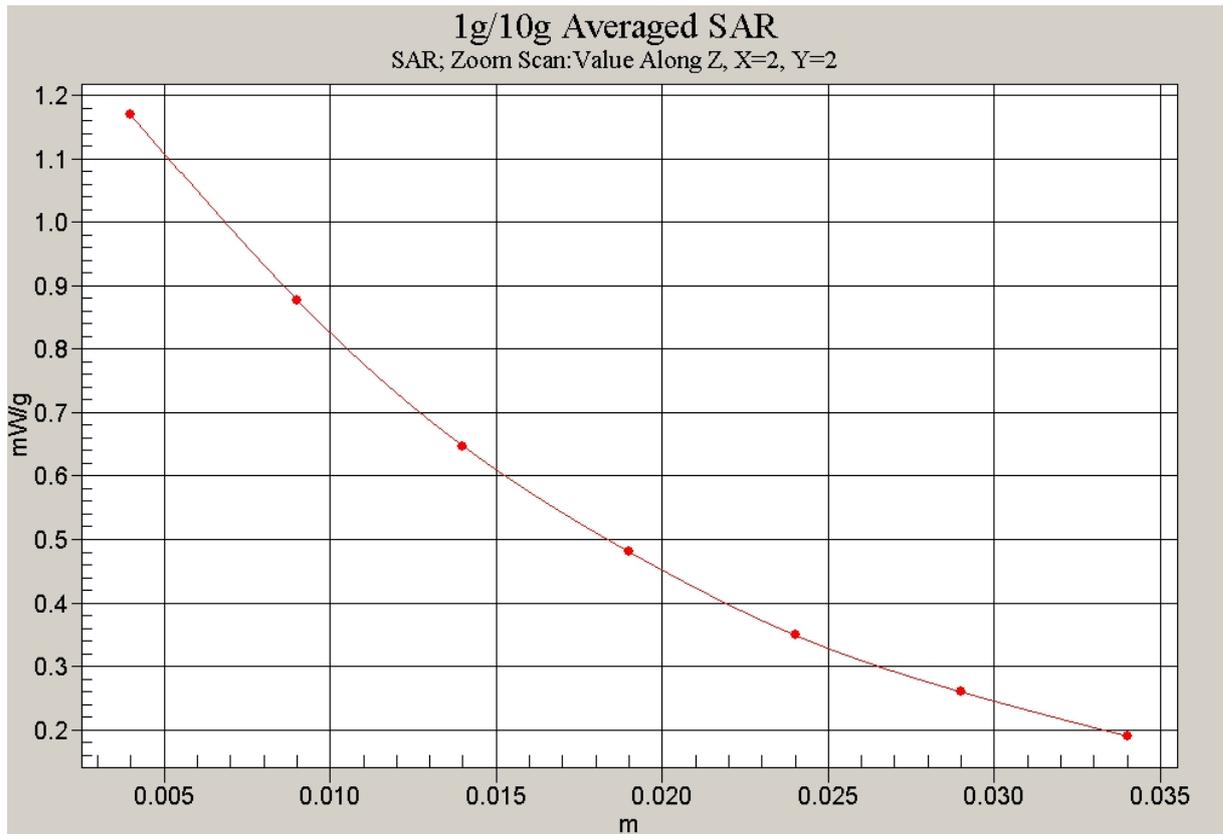


Fig. 26 Z-Scan at power reference point (850 MHz CH251)

850 Body Towards Ground Middle with GPRS

Date/Time: 2008-9-17 16:52:02

Electronics: DAE4 Sn771

Medium: 850 Body

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 1.01$ mho/m; $\epsilon_r = 53.8$; $\rho = 1000$ kg/m³

Ambient Temperature: 23.3°C Liquid Temperature: 22.5°C

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

Probe: ES3DV3 - SN3149 ConvF(5.97, 5.97, 5.97)

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

Maximum value of SAR (interpolated) = 1.08 mW/g

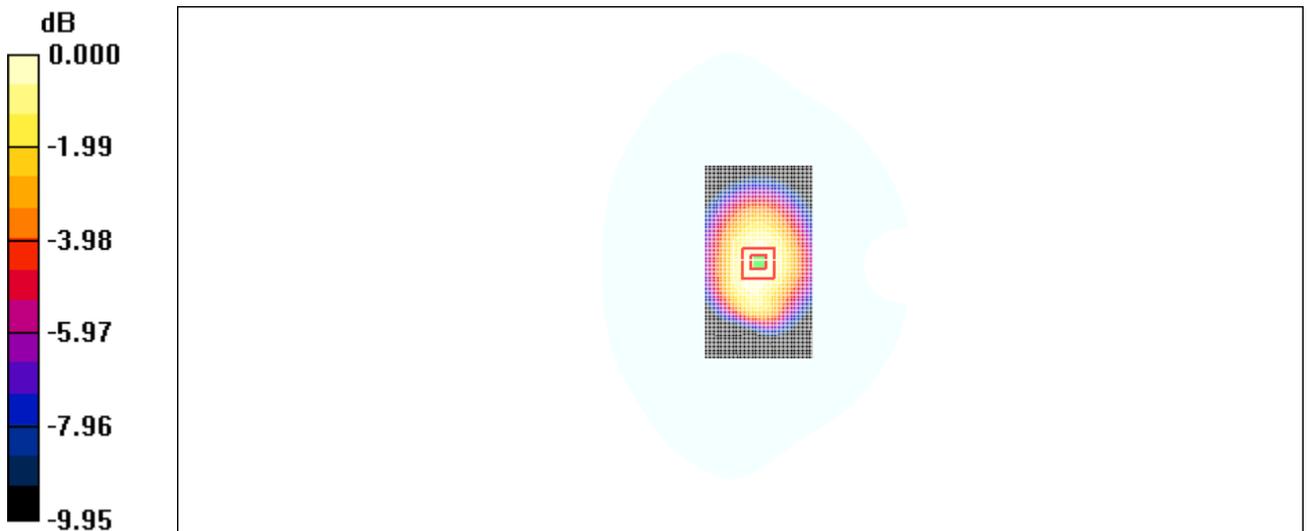
Toward Ground Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 33.3 V/m; Power Drift = 0.034 dB

Peak SAR (extrapolated) = 1.33 W/kg

SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.730 mW/g

Maximum value of SAR (measured) = 1.09 mW/g



0 dB = 1.09mW/g

Fig. 27 850 MHz CH190

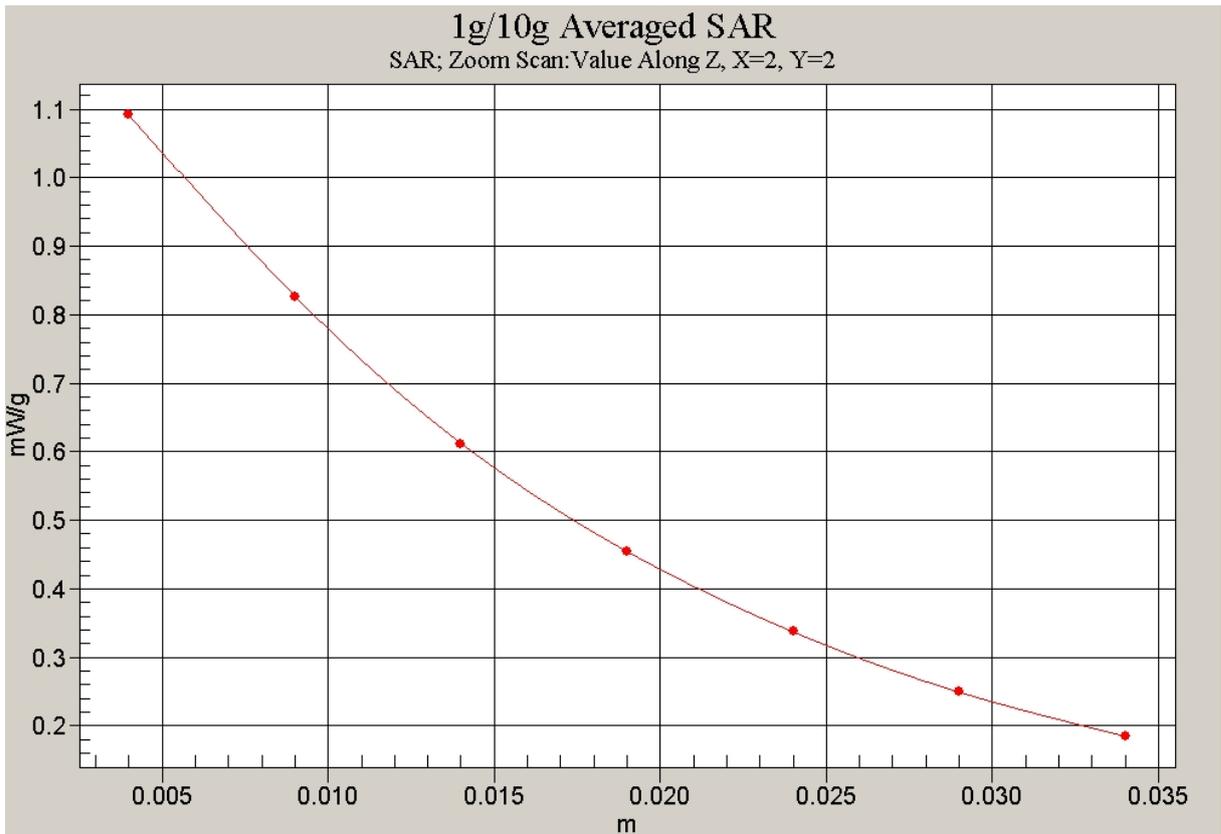


Fig. 28 Z-Scan at power reference point (850 MHz CH190)