



No. DAT-P-114/01-01



No. L0442

TEST REPORT

No. 2005E00355-1

FCC ID	QISEC321
Test name	Electromagnetic Field (Specific Absorption Rate)
Product	HUAWEI EC321 Datacard
Model	EC321
Client	HUAWEI Technologies Co., Ltd.
Type of test	Non Type Approval

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3 DESCRIPTION OF EUT

3.1 Addressing Information Related to EUT

Table 1: Applicant (The Client)

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

Table 2: Manufacturer

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

3.2 Constituents of EUT

Table 3: Constituents of Samples

Description	Model	Serial Number	Manufacturer
HUAWEI EC321 Datacard	EC321	H21AA10512100091	HUAWEI Technologies Co., Ltd.



Picture 1-a: Front side of the EUT with Antenna In Picture 1-b: Front Side of the EUT with Antenna Out

Picture 1: Constituents of the sample

3.3 General Description

Equipment Under Test (EUT) is a CDMA Datacard with non-integrated antenna. SAR is tested in the band of CDMA 835MHz.

The sample undergoing test was selected by the Client.

Components list please refer to documents of the manufacturer.

4 OPERATIONAL CONDITIONS DURING TEST

4.1 Schematic Test Configuration

During SAR test, EUT is in its Traffic Mode (Channel Allocated) at Normal Voltage Condition. The Absolute Radio Frequency Channel Number (ARFCN) is allocated to 1013, 384 and 777 respectively in the case of CDMA 835MHz. 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. If a wireless link is used, the antenna connected to the output of the

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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.

Test communication setup meet as followings:

Communication standard between mobile station and base station simulator	3GPP2 C.S0011-B
Radio configuration	RC3 (Supporting CDMA 1X)
Spreading Rate	SR1
Data Rate	9600bps
Service Options	SO55 (loop back mode)
Service Options	SO3 (voice mode)
Multiplex Options	The mobile station does not support this service.

Base station Simulator: CMU200

Test Parameter setup for maximum RF output power according to section 4.4.5 of 3GPP2

C.S0011-B:

Parameter	Units	Value
I_{or}	dBm/1.23MHz	-104
$\frac{PilotE_c}{I_{or}}$	dB	-7
$\frac{TrafficE_c}{I_{or}}$	dB	-7.4

For SAR test, the maximum power output is very important and essential; it does not matter with radio configurations. In this report, we use typical RC3 to estimate.

Under the loop back mode between mobile station and CMU200, the transmitter continuously emits with maximum power more strong than voice mode, so the SAR test was done with loop back mode.

To make the EUT emits maximum power; the output power of CMU200 would be adjusted to minimum power with the sensitivity of the mobile station to build steady connection with mobile station. The power level control parameter in the CMU200 is "0", it means "all up" and requires mobile station to emit with maximum power.

During the test, three different brands of laptop will be used as a testing assistant to help setting communication separately. For each laptop, the EUT should first be tested at the following eight positions at middle channel with the antenna spread out totally, and then find the test position with the maximum result, after that test again at the same position with the antenna spread half. Then compare the two results and choose the condition with a greater value to continue the test at the

high and low channels.

Note: Laptop 1 is Dell LATITUDE D6100 (See Picture 2-a).

Laptop 2 is HP Compaq nx 6130 (See Picture 2-b).

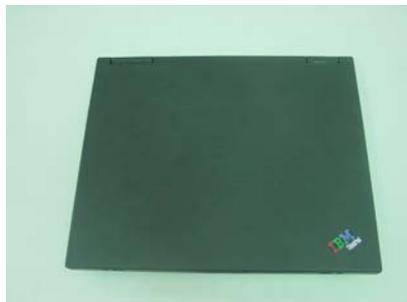
Laptop 3 is IBM T23 (See Picture 2-c).



Picture 2-a: Laptop 1



Picture 2-b: Laptop 2



Picture 2-c: Laptop 3

Picture 2: Test Assistants

The EUT is tested at the following eight positions:

- Position 1: The EUT is plugged in the PCMCIA slot of the portable computer, the top of the EUT is located at the bottom of the flat phantom with a distance of 1.5cm to the bottom of the flat phantom. And the antenna spreads out horizontally to the bottom of the phantom and vertically to the keyboard plane of the laptop (See Picture 3-a).
- Position 2: The EUT is plugged in the PCMCIA slot of the portable computer, the top of the EUT is located at the bottom of the flat phantom with a distance of 1.5cm to the bottom of the flat phantom. And the antenna spreads out horizontally to the bottom of the phantom and points to the right (See Picture 3-b).
- Position 3: The EUT is plugged in the PCMCIA slot of the portable computer, the top of the EUT is located at the bottom of the flat phantom with a distance of 1.5cm to the bottom of the flat phantom. And the antenna spreads out horizontally to the bottom of the phantom and

points to the left (See Picture 3-c).

- Position 4: The EUT is plugged in the PCMCIA slot of the portable computer with the antenna spread out vertically. And the antenna should upright touch the bottom of the phantom tightly (See Picture 3-d).
- Position 5: The EUT is plugged in the PCMCIA slot of the portable computer, the bottom of the portable computer contact the bottom of the flat phantom tightly. The antenna of the EUT spreads horizontally to the left side of the laptop pointing to the right (See Picture 3-e).
- Position 6: The EUT is plugged in the PCMCIA slot of the portable computer, the bottom of the portable computer contact the bottom of the flat phantom tightly. The antenna of the EUT spreads horizontally to the left side of the laptop pointing to the left (See Picture 3-f).
- Position 7: The EUT is plugged in the PCMCIA slot of the portable computer, the bottom of the portable computer contact the bottom of the flat phantom tightly. The antenna of the EUT spreads out vertically to the left side of the laptop (See Picture 3-g).
- Position 8: The EUT is plugged in the PCMCIA slot of the portable computer, the bottom of the portable computer contact the bottom of the flat phantom tightly. The antenna of the EUT spreads down vertically to the left side of the laptop (See Picture 3-h).



Picture 3-a: Test position 1 of the EUT



Picture 3-b: Test position 2 of the EUT



Picture 3-c: Test position 3 of the EUT



Picture 3-d: Test position 4 of the EUT



Picture 3-e: Test position 5 of the EUT



Picture 3-f: Test position 6 of the EUT



Picture 3-g: Test position 7 of the EUT



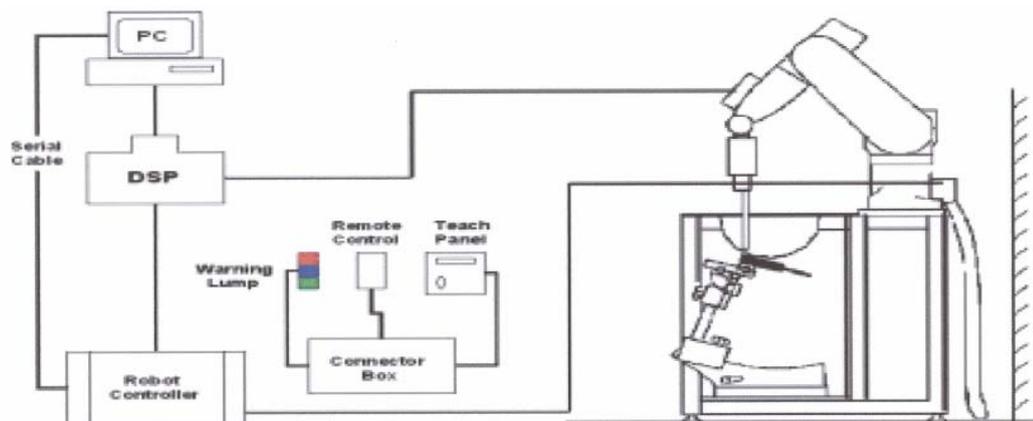
Picture 3-h: Test position 8 of the EUT

Picture 3: Test positions of the EUT

4.2 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, 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 4. 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

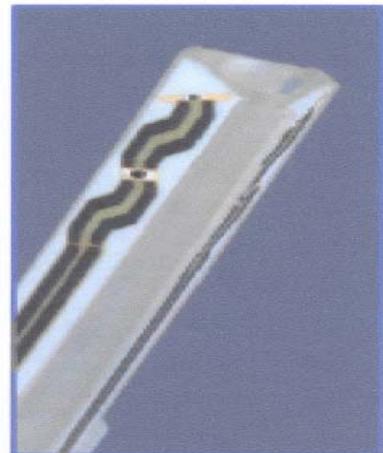
data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

4.3 Dasy4 E-field Probe System

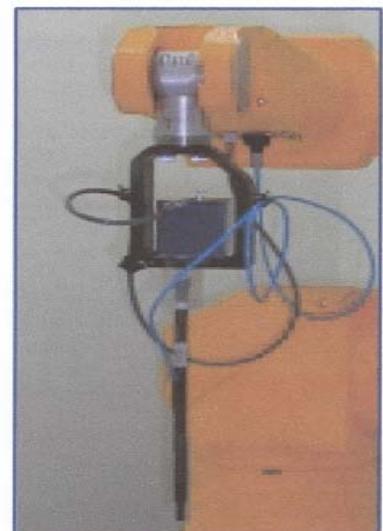
The SAR measurements were conducted with the dosimetric probe ET3DV6 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe has been calibrated according to the standard procedure with an accuracy of better than $\pm 10\%$. The spherical isotropy was evaluated and found to be better than $\pm 0.25\text{dB}$.

ET3DV6 Probe Specification

Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection System(ET3DV6 only) Built-in shielding against static charges PEEK enclosure material(resistant to organic solvents, e.q., glycol)
Calibration	In air from 10 MHz to 2.5 GHz In brain and muscle simulating tissue at frequencies of 450MHz, 900MHz and 1.8GHz (accuracy $\pm 8\%$) Calibration for other liquids and frequencies upon request
Frequency	10 MHz to > 6 GHz; Linearity: ± 0.2 dB (30 MHz to 3 GHz)
Directivity	± 0.2 dB in brain tissue (rotation around probe axis) ± 0.4 dB in brain tissue (rotation normal probe axis)
Dynamic Range	5u W/g to > 100mW/g; Linearity: $\pm 0.2\text{dB}$
Surface Detection	± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surface(ET3DV6 only)
Dimensions	Overall length: 330mm Tip length: 16mm Body diameter: 12mm Tip diameter: 6.8mm Distance from probe tip to dipole centers: 2.7mm
Application	General dosimetry up to 3GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms



Picture 5. ET3DV6 E-field Probe



Picture 6. ET3DV6 E-field

4.4 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 $\pm 0.25\text{dB}$. 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/m³).

Note: please see Annex E to check the probe calibration certificate.



Picture 7. Device Holder

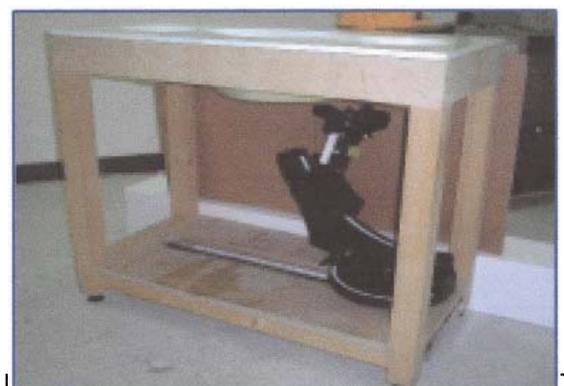
4.5 Other Test Equipment

4.5.1 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 repeat ably positioned according to the FCC and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

4.5.2 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



Picture 8. Generic Twin Phantom

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

4.6 Equivalent Tissues

The liquid used for the frequency range of 800-2000 MHz consisted of water, sugar, salt and Cellulose. The liquid has previously been 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 4. Composition of the Body Tissue Equivalent Matter

MIXTURE %	FREQUENCY 835MHz
Water	52.5
Sugar	45.0
Salt	1.4
Preventol	0.1
Cellulose	1.0
Dielectric Parameters Target Value	f=835MHz $\epsilon=55.2$ $\sigma=0.97$

4.7 System Specifications

4.7.1 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

5 CHARACTERISTICS OF THE TEST

5.1 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 mm 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 mm of the user in the uncontrolled environment.

5.2 Applicable Measurement Standards

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.

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.

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

5.3 Character of the Test

Since the EUT may be used for body-worn situation, it is test with the flat phantom to simulate this case.

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 surrounding objects is minimized and in compliance with requirement of standards.	

7 TEST RESULTS

7.1 Dielectric Performance

Table 6: Dielectric Performance of Body Tissue Simulating Liquid

Measurement is made at temperature 22.5 °C and relative humidity 49%. Liquid temperature during the test: 21.4°C			
/	Frequency	Permittivity ε	Conductivity σ (S/m)
Target value	835 MHz	55.2	0.97
Measurement value (Average of 10 tests)	835 MHz	54.6	0.95

7.2 System Validation

Table 7: System Validation

Measurement is made at temperature 22.3 °C, relative humidity 49%, input power 250 mW. Liquid temperature during the test: 22.6°C							
Liquid parameters		Frequency		Permittivity ϵ		Conductivity σ (S/m)	
		835 MHz		41.7		0.88	
Verification results	Frequency	Target value (W/kg)		Measurement value (W/kg)			
		10 g Average	1 g Average	10 g Average	1 g Average		
	835 MHz	1.55	2.375	1.62	2.48		

Note1: The liquid used in system validation is head tissue liquid.

Note2: Target Values used are one fourth of those in IEEE Std 1528-2003 (feeding power is normalized to 1 Watt), i.e. 250 mW is used as feeding power to the validation dipole (SPEAG using).

7.3 Summary of Measurement Results

Table 8: SAR Values with Laptop 1

Temperature: 22 °C, humidity: 50%. Liquid temperature during the test: 22.2°C			
Limit of SAR (W/kg)	10 g Average	1 g Average	Conducted Power before/after each test (dBm)
	2.0	1.6	
Test Case	Measurement Result (W/kg)		
	10 g Average	1 g Average	
Position 1, Whole Antenna, Top frequency(See Fig.1)	0.562	0.841	24.29/24.26
Position 1 , Whole Antenna, Mid frequency(See Fig.3)	0.614	0.929	24.25/24.23
Position 1, Whole Antenna, Bottom frequency(See Fig.5)	0.607	0.910	24.31/24.32
Position 1, Half Antenna, Mid frequency(See Fig.7)	0.540	0.843	24.26/24.25
Position 2, Whole Antenna, Mid frequency (See Fig.9)	0.337	0.530	24.26/24.25
Position 3, Whole Antenna, Mid frequency (See Fig.11)	0.042	0.071	24.24/24.25
Position 4, Whole Antenna, Mid frequency (See Fig.13)	0.049	0.069	24.25/24.25
Position 5, Whole Antenna, Mid frequency (See Fig.15)	0.084	0.138	24.27/24.25
Position 6 , Whole Antenna, Mid frequency (See Fig.17)	0.336	0.517	24.26/24.25
Position 7, Whole Antenna, Mid frequency (See Fig.19)	0.608	0.909	24.26/24.25
Position 8, Whole Antenna, Mid frequency (See Fig.21)	0.122	0.182	24.25/24.27

Table 9: SAR Values with Laptop 2

Temperature: 22 °C, humidity: 50%. Liquid temperature during the test: 22.2°C			
Limit of SAR (W/kg)	10 g Average	1 g Average	Conducted Power before/after each test (dBm)
	2.0	1.6	
Test Case	Measurement Result (W/kg)		
	10 g Average	1 g Average	
Position 1, Whole Antenna, Mid frequency(See Fig.23)	0.255	0.390	24.25/24.26
Position 2, Whole Antenna, Mid frequency (See Fig.25)	0.097	0.153	24.25/24.24
Position 3, Whole Antenna, Mid frequency (See Fig.27)	0.043	0.073	24.26/24.25
Position 4, Whole Antenna, Mid frequency (See Fig.29)	0.014	0.019	24.25/24.25
Position 5, Whole Antenna, Mid frequency (See Fig.31)	0.063	0.086	24.26/24.25
Position 6 , Whole Antenna, Mid frequency (See Fig.33)	0.079	0.126	24.26/24.25
Position 7, Whole Antenna, Top frequency (See Fig.35)	0.207	0.304	24.30/24.32
Position 7 , Whole Antenna, Mid frequency(See Fig.37)	0.285	0.415	24.27/24.25
Position 7, Whole Antenna, Bottom frequency(See Fig.39)	0.247	0.362	24.32/24.33
Position 7, Half Antenna, Mid Frequency (See Fig.41)	0.252	0.376	24.25/24.25
Position 8, Whole Antenna, Mid frequency (See Fig.43)	0.063	0.094	24.25/24.27

Table 10: SAR Values with Laptop 3

Temperature: 22 °C, humidity: 50%.			
Liquid temperature during the test: 22.2°C			
Limit of SAR (W/kg)	10 g Average	1 g Average	Conducted Power before/after each test (dBm)
	2.0	1.6	
Test Case	Measurement Result (W/kg)		
	10 g Average	1 g Average	
Position 1, Whole Antenna, Mid frequency(See Fig.45)	0.047	0.069	24.24/24.26
Position 2, Whole Antenna, Mid frequency (See Fig.47)	0.024	0.046	24.25/24.23
Position 3, Whole Antenna, Mid frequency (See Fig.49)	0.018	0.030	24.25/24.26
Position 4, Whole Antenna, Mid frequency (See Fig.51)	0.013	0.048	24.27/24.25
Position 5, Whole Antenna, Mid frequency (See Fig.53)	0.215	0.341	24.26/24.25
Position 6 , Whole Antenna, Mid frequency (See Fig.55)	0.211	0.332	24.24/24.26
Position 7, Whole Antenna, Top frequency (See Fig.57)	0.494	0.749	24.32/24.31
Position 7 , Whole Antenna, Mid frequency(See Fig.59)	0.582	0.883	24.26/24.24
Position 7, Whole Antenna, Bottom frequency(See Fig.61)	0.255	0.868	24.33/24.31
Position 7, Half Antenna, Mid Frequency (See Fig.63)	0.454	0.681	24.25/24.24
Position 8, Whole Antenna, Mid frequency (See Fig.65)	0.159	0.232	24.25/24.26

7.4 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 5.2 of this report. Maximum localized SAR is below exposure limits specified in the relevant standards cited in Clause 5.1 of this test report.

8 Measurement Uncertainty

SN	a	Type	c	d	e = f(d,k)	f	h = c x f / e	k
	Uncertainty Component		Tol.	Prob	Div.	c _i	1 g	v _i

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			(± %)	. Dist.		(1 g)	u_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 11: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	HP 8753E	US38433212	August 29,2005	One year
02	Dielectric Probe Kit	Agilent 85070C	US99360113	No Calibration Requested	
03	Power meter	NRVD	101253	No Calibration Requested	
04	Power sensor	NRV-Z5	100331		
05	Power sensor	NRV-Z6	100011		
06	Signal Generator	MG 3633A	M73386	No Calibration Requested	
07	Amplifier	AT 50S1G4A	26549	No Calibration Requested	
08	BTS	CMU 200	105948	August 15,2005	One year
09	E-field Probe	SPEAG ET3DV6	1736	July 14, 2005	One year
10	DAE	SPEAG DAE3	536	July 11, 2005	One year

10 TEST PERIOD

The test is performed from January 19, 2006 to January 22, 2006.

11 TEST LOCATION

The test is performed at Radio Communication & Electromagnetic Compatibility Laboratory of Telecommunication Metrology Center of Ministry of Information Industry of The People's Republic of China

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-axis. 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.

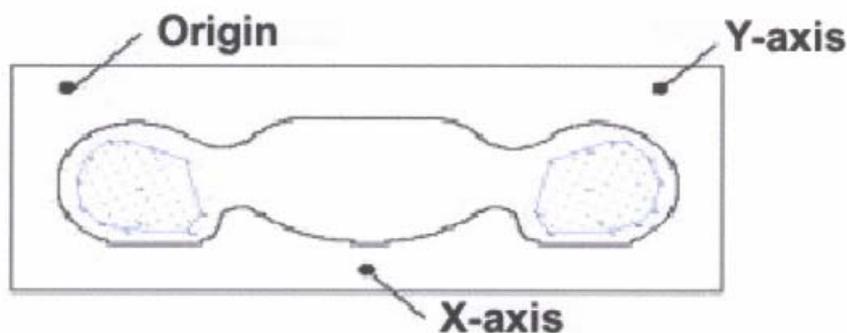
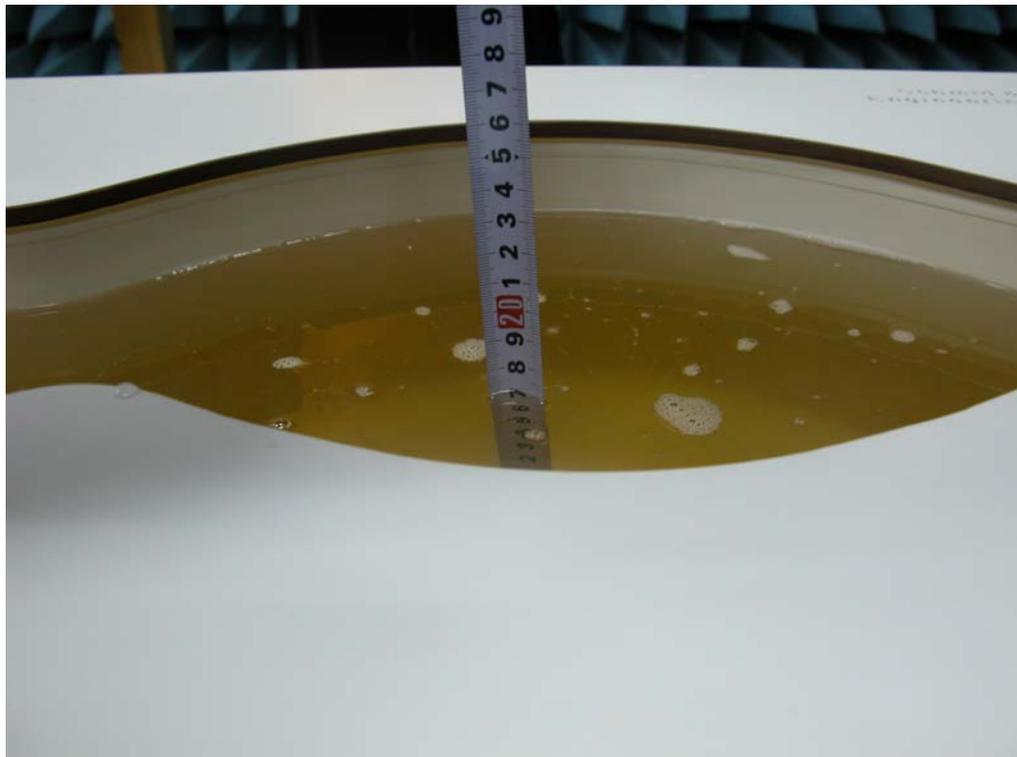


Figure A: SAR Measurement Points in Area Scan

ANNEX B: TEST LAYOUT



Picture B1: Specific Absorption Rate Test Layout



Picture B2: Liquid depth in the Flat Phantom (CDMA 835)

ANNEX C: GRAPH RESULTS

Position 1, Whole Antenna, High of Laptop 1

Electronics: DAE3 Sn536

Communication System: CDMA 1X-new Frequency: 848.31 MHz Duty Cycle: 1:1

Probe: ET3DV6 - SN1736 ConvF(6.45, 6.45, 6.45)

Position 1, Whole Antenna, High/Area Scan (61x61x1): Measurement grid:
dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.906 mW/g

Position 1, Whole Antenna, High /Zoom Scan (7x7x7)/Cube 0: Measurement grid:
dx=5mm, dy=5mm, dz=5mm

Reference Value = 19.2 V/m; Power Drift = -0.001 dB

Peak SAR (extrapolated) = 1.17 W/kg

SAR(1 g) = 0.841 mW/g; SAR(10 g) = 0.562 mW/g

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

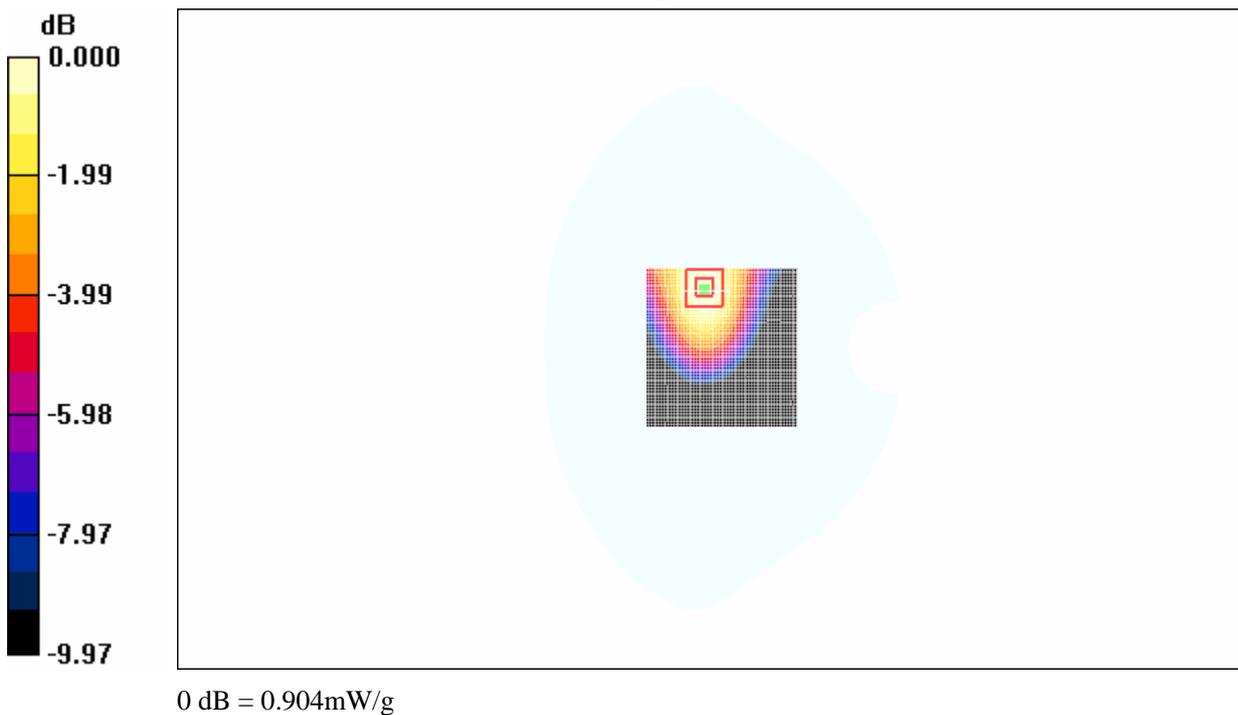


Fig. 1 Laptop 1, Test Position 1, Whole Antenna, CDMA CH777

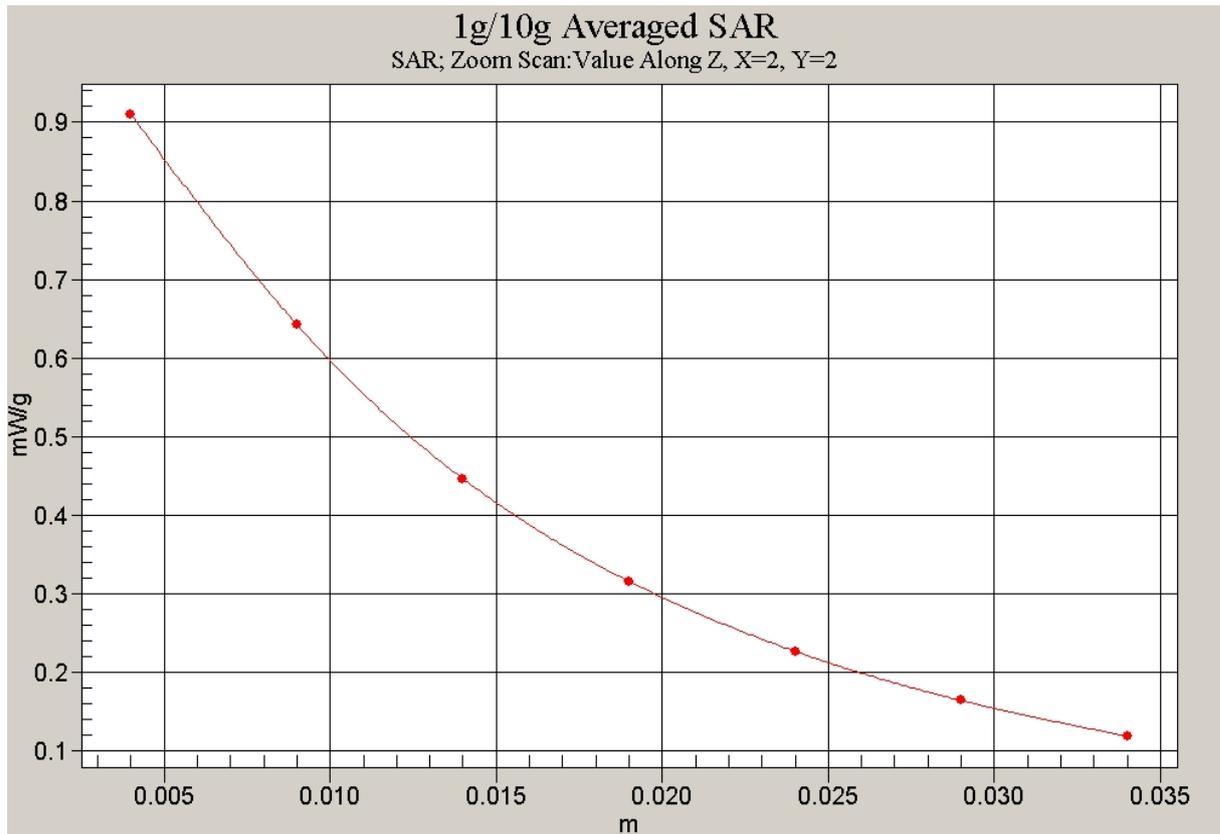


Fig. 2 Z-Scan at power reference point
(Laptop 1, Test Position 1, Whole Antenna, CDMA CH777)

Position 1, Whole Antenna, Middle of Laptop 1

Electronics: DAE3 Sn536

Communication System: CDMA 1X-new Frequency: 836.52 MHz Duty Cycle: 1:1

Probe: ET3DV6 - SN1736 ConvF(6.45, 6.45, 6.45)

Position 1, Whole Antenna, Middle/Area Scan (61x71x1): Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.988 mW/g

Position 1, Whole Antenna, Middle/Zoom Scan (7x7x7)/Cube 0: Measurement

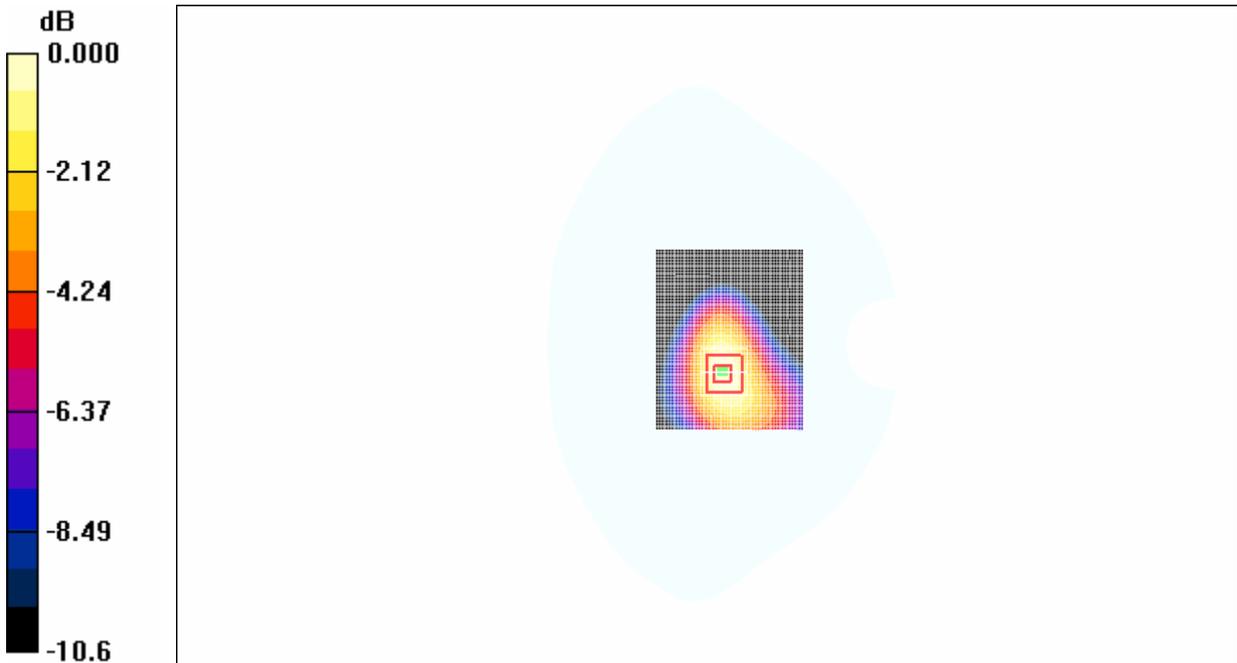
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 29.2 V/m; Power Drift = 0.200 dB

Peak SAR (extrapolated) = 1.33 W/kg

SAR(1 g) = 0.929 mW/g; SAR(10 g) = 0.614 mW/g

Maximum value of SAR (measured) = 0.995 mW/g



0 dB = 0.995mW/g

Fig. 3 Laptop 1, Test Position 1, Whole Antenna, CDMA CH384

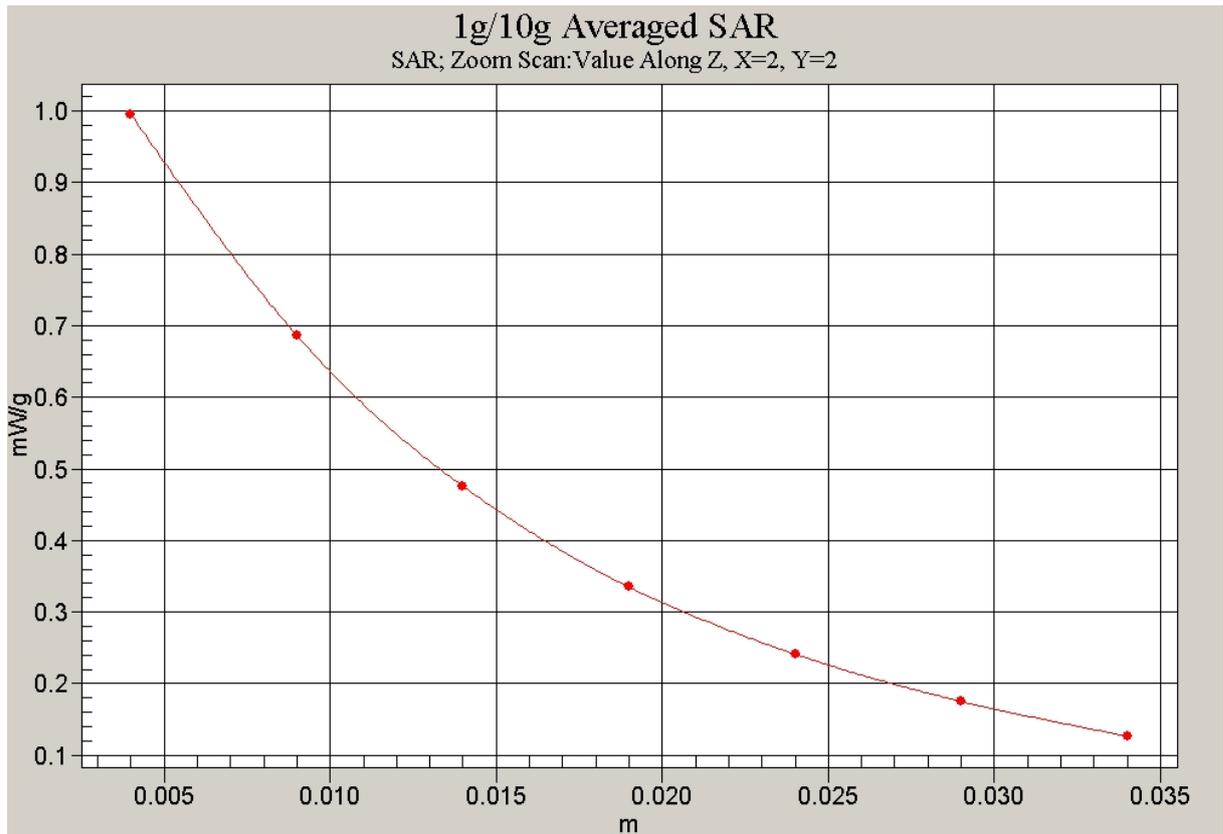


Fig. 4 Z-Scan at power reference point
(Laptop 1, Test Position 1, Whole Antenna, CDMA CH384)

Position 1, Whole Antenna, Low of Laptop 1

Electronics: DAE3 Sn536

Communication System: CDMA 1X-new Frequency: 824.7 MHz Duty Cycle: 1:1

Probe: ET3DV6 - SN1736 ConvF(6.45, 6.45, 6.45)

Position 1, Whole Antenna, Low/Area Scan (61x61x1): Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.972 mW/g

Position 1, Whole Antenna, Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

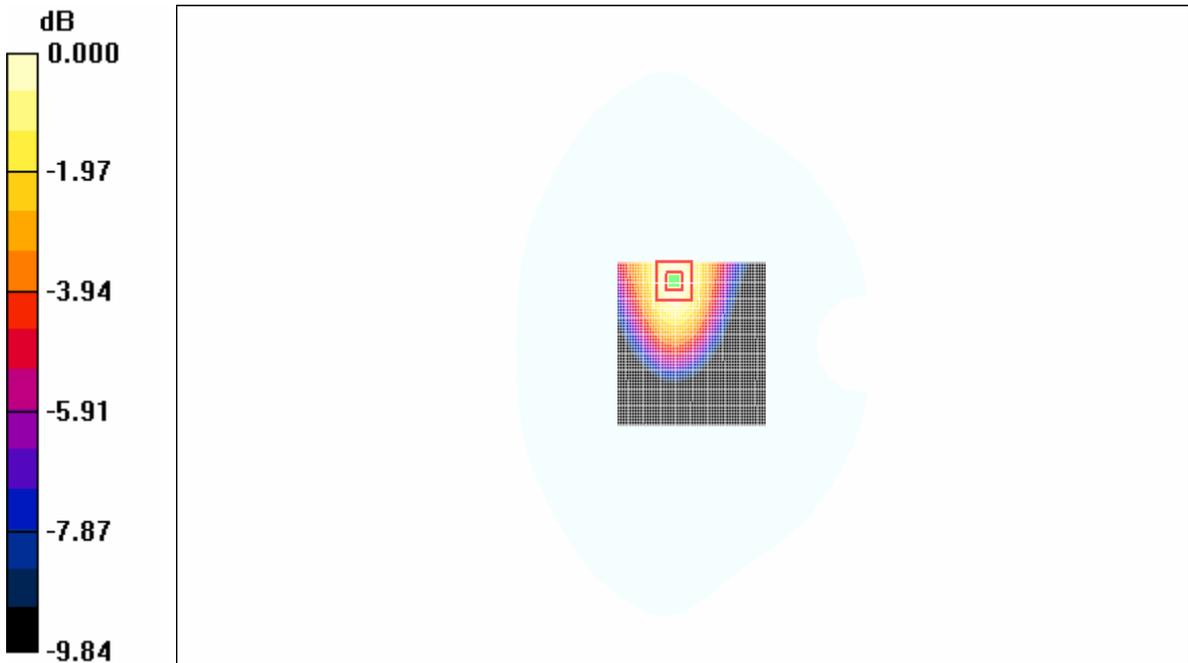
dx=5mm, dy=5mm, dz=5mm

Reference Value = 20.1 V/m; Power Drift = -0.019 dB

Peak SAR (extrapolated) = 1.27 W/kg

SAR(1 g) = 0.910 mW/g; SAR(10 g) = 0.607 mW/g

Maximum value of SAR (measured) = 0.987 mW/g



0 dB = 0.987mW/g

Fig. 5 Laptop 1, Test Position 1, Whole Antenna, CH1013

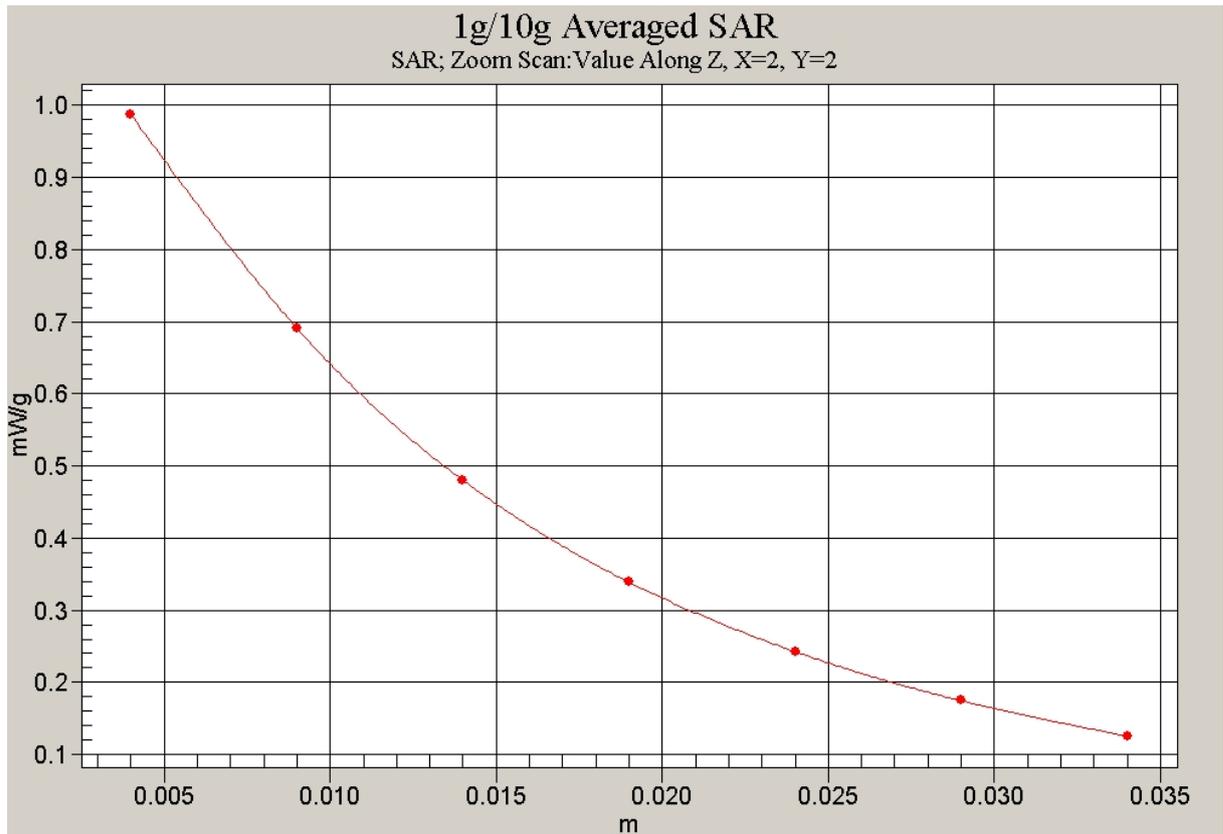


Fig. 6 Z-Scan at power reference point
(Laptop 1, Test Position 1, Whole Antenna, CH1013)

Position 1, Half Antenna, Middle of Laptop 1

Electronics: DAE3 Sn536

Communication System: CDMA 1X-new Frequency: 836.52 MHz Duty Cycle: 1:1

Probe: ET3DV6 - SN1736 ConvF(6.45, 6.45, 6.45)

Position 1, Half Antenna, Middle/Area Scan (61x61x1): Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.872 mW/g

Position 1, Half Antenna, Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

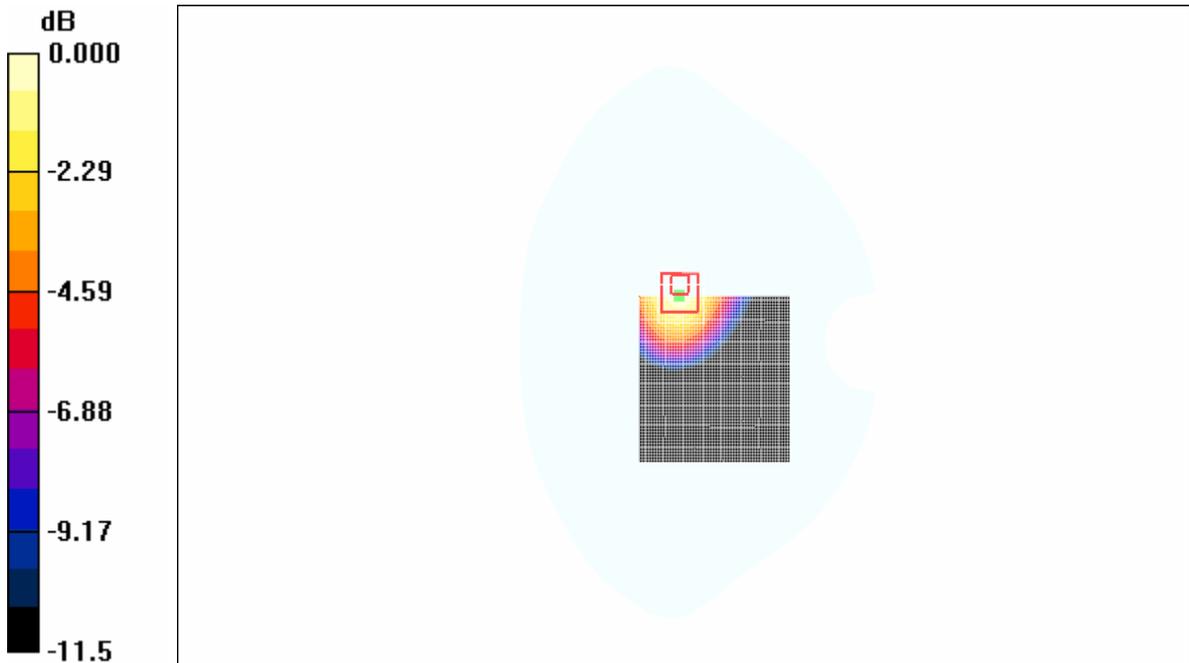
dx=5mm, dy=5mm, dz=5mm

Reference Value = 16.3 V/m; Power Drift = -0.036 dB

Peak SAR (extrapolated) = 1.22 W/kg

SAR(1 g) = 0.843 mW/g; SAR(10 g) = 0.540 mW/g

Maximum value of SAR (measured) = 0.912 mW/g



0 dB = 0.912mW/g

Fig. 7 Laptop 1, Test Position 1, Half Antenna, CH384

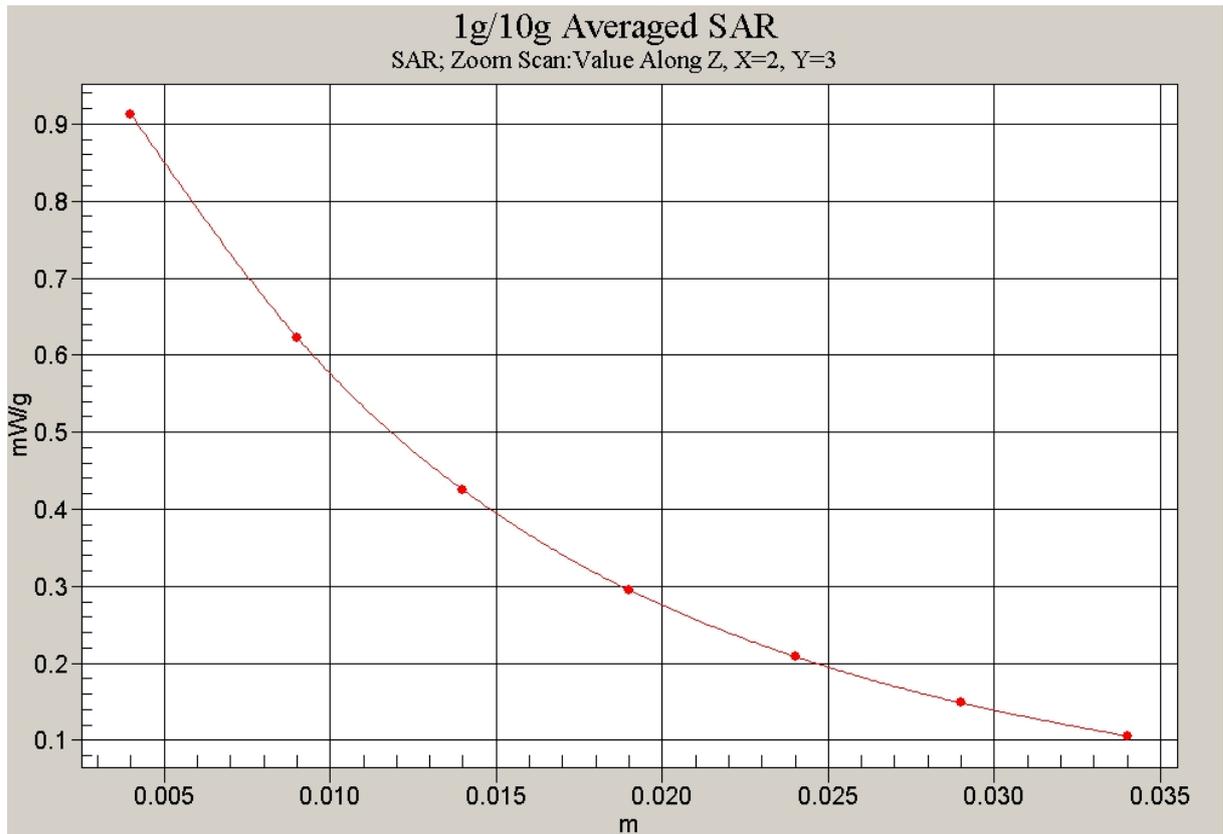


Fig. 8 Z-Scan at power reference point
(Laptop 1, Test Position 1, Half Antenna, CH384)

Position 2, Whole Antenna, Middle of Laptop 1

Electronics: DAE3 Sn536

Communication System: CDMA 1X-new Frequency: 836.52 MHz Duty Cycle: 1:1

Probe: ET3DV6 - SN1736 ConvF(6.45, 6.45, 6.45)

Position 2, Whole Antenna, Middle/Area Scan (61x71x1): Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.580 mW/g

Position 2, Whole Antenna, Middle/Zoom Scan (7x7x7)/Cube 0: Measurement

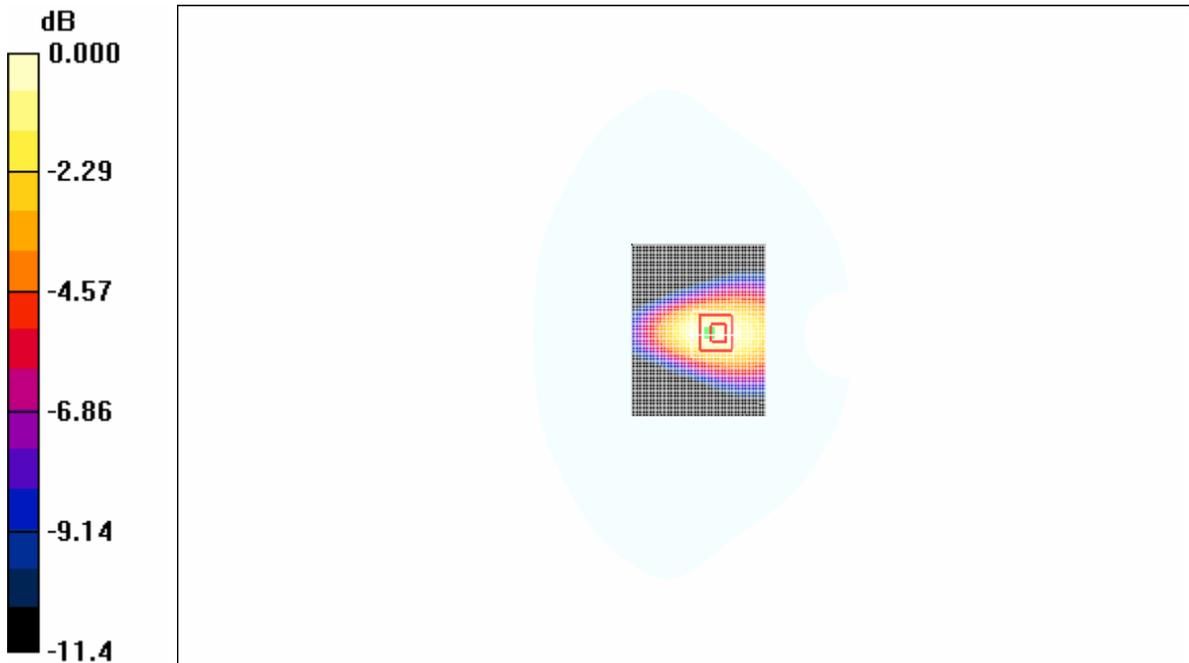
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 23.2 V/m; Power Drift = 0.043 dB

Peak SAR (extrapolated) = 0.783 W/kg

SAR(1 g) = 0.530 mW/g; SAR(10 g) = 0.337 mW/g

Maximum value of SAR (measured) = 0.576 mW/g



0 dB = 0.576mW/g

Fig. 9 Laptop 1, Test Position 2, whole Antenna, CH384

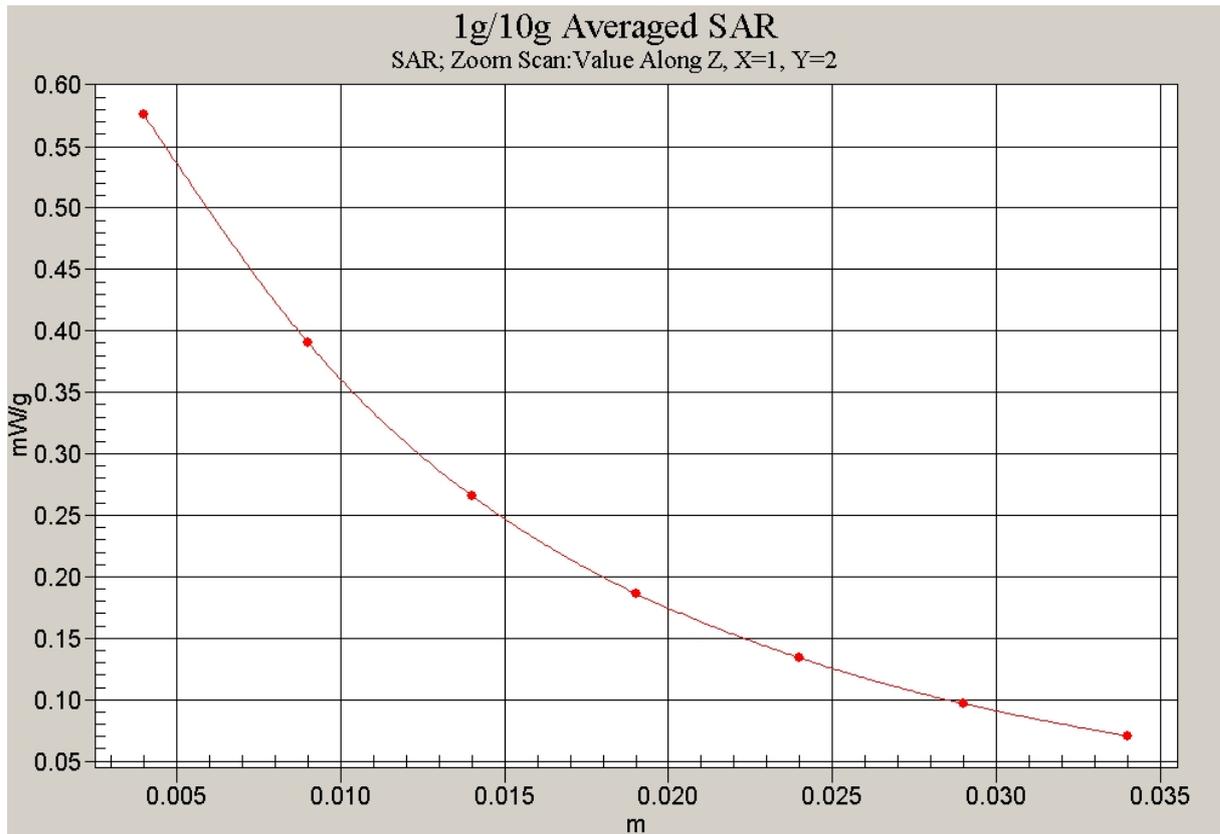


Fig. 10 Z-Scan at power reference point
(Laptop 1, Test Position 2, whole Antenna, CH384)

Position 3, Whole Antenna, Middle of Laptop 1

Electronics: DAE3 Sn536

Communication System: CDMA 1X-new Frequency: 836.52 MHz Duty Cycle: 1:1

Probe: ET3DV6 - SN1736 ConvF(6.45, 6.45, 6.45)

Position 3, Whole Antenna, Middle/Area Scan (61x61x1): Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.074 mW/g

Position 3, Whole Antenna, Middle /Zoom Scan (7x7x7)/Cube 0: Measurement

grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.28 V/m; Power Drift = -0.037 dB

Peak SAR (extrapolated) = 0.119 W/kg

SAR(1 g) = 0.071 mW/g; SAR(10 g) = 0.042 mW/g

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

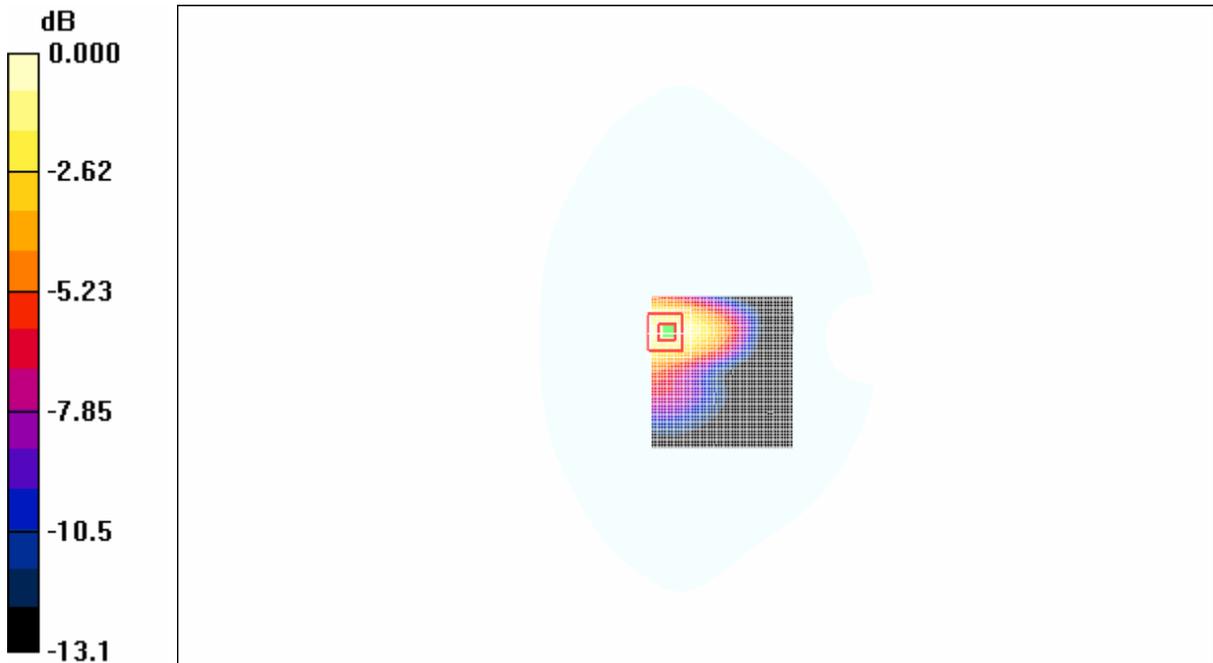


Fig. 11 Laptop 1, Test Position 3, whole Antenna, CH384

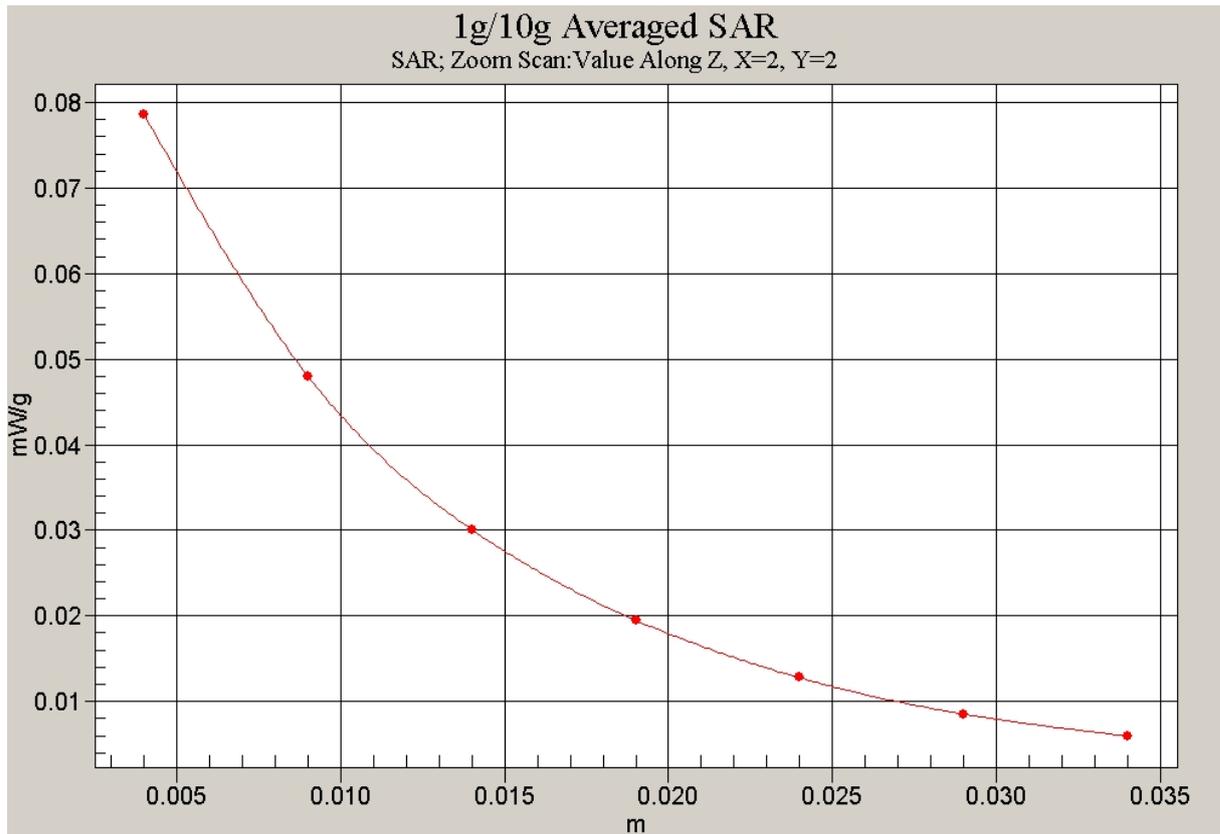


Fig. 12 Z-Scan at power reference point
(Laptop 1, Test Position 3, whole Antenna, CH384)

Position 4, Whole Antenna, Middle of Laptop 1

Electronics: DAE3 Sn536

Communication System: CDMA 1X-new Frequency: 836.52 MHz Duty Cycle: 1:1

Probe: ET3DV6 - SN1736 ConvF(6.45, 6.45, 6.45)

Position 4, Whole Antenna, Middle/Area Scan (41x41x1): Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.014 mW/g

Position 4, Whole Antenna, Middle/Zoom Scan (7x7x7)/Cube 0: Measurement

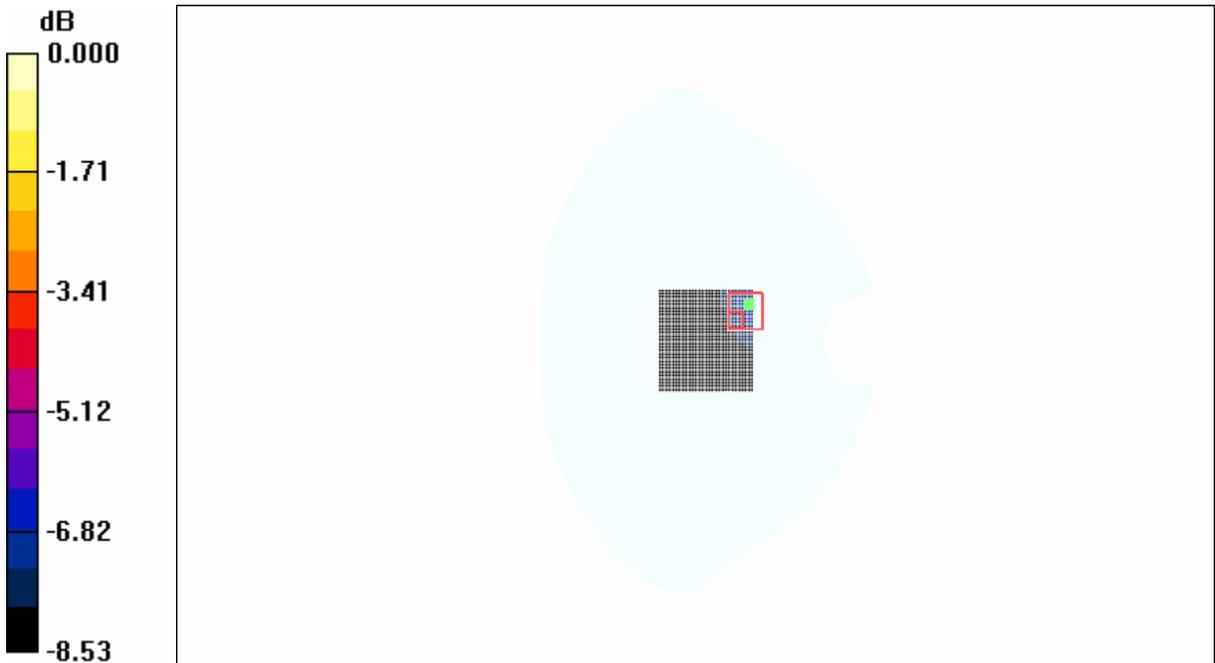
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.84 V/m; Power Drift = 0.200 dB

Peak SAR (extrapolated) = 0.085 W/kg

SAR(1 g) = 0.069 mW/g; SAR(10 g) = 0.049 mW/g

Maximum value of SAR (measured) = 0.076 mW/g



0 dB = 0.076mW/g

Fig. 13 Laptop 1, Test Position 4, whole Antenna, CH384

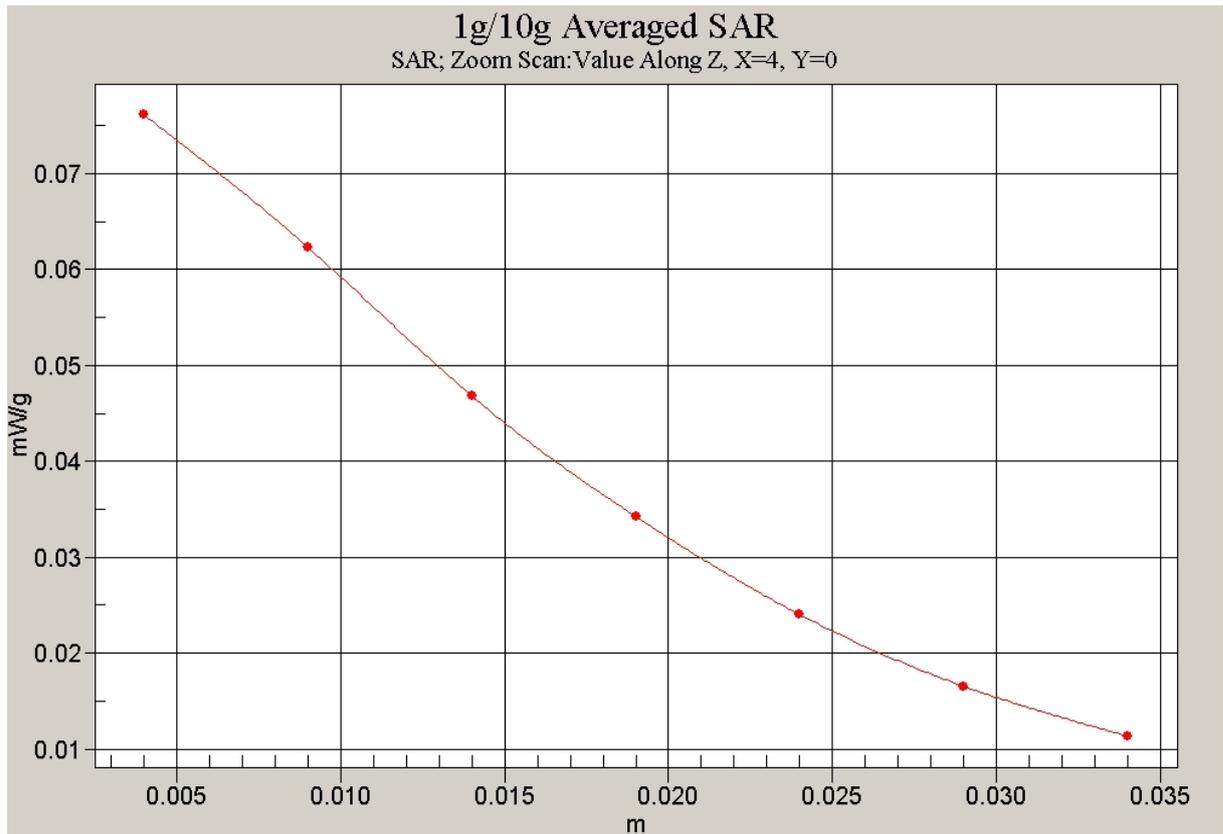


Fig. 14 Z-Scan at power reference point
(Laptop 1, Test Position 4, whole Antenna, CH384)

Position 5, Whole Antenna, Middle of Laptop 1

Electronics: DAE3 Sn536

Communication System: CDMA 1X-new Frequency: 836.52 MHz Duty Cycle: 1:1

Probe: ET3DV6 - SN1736 ConvF(6.45, 6.45, 6.45)

Position 5, Whole Antenna, Middle/Area Scan (61x71x1): Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.154 mW/g

Position 5, Whole Antenna, Middle/Zoom Scan (7x7x7)/Cube 0: Measurement

grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.4 V/m; Power Drift = -0.200 dB

Peak SAR (extrapolated) = 0.221 W/kg

SAR(1 g) = 0.138 mW/g; SAR(10 g) = 0.084 mW/g

Maximum value of SAR (measured) = 0.154 mW/g

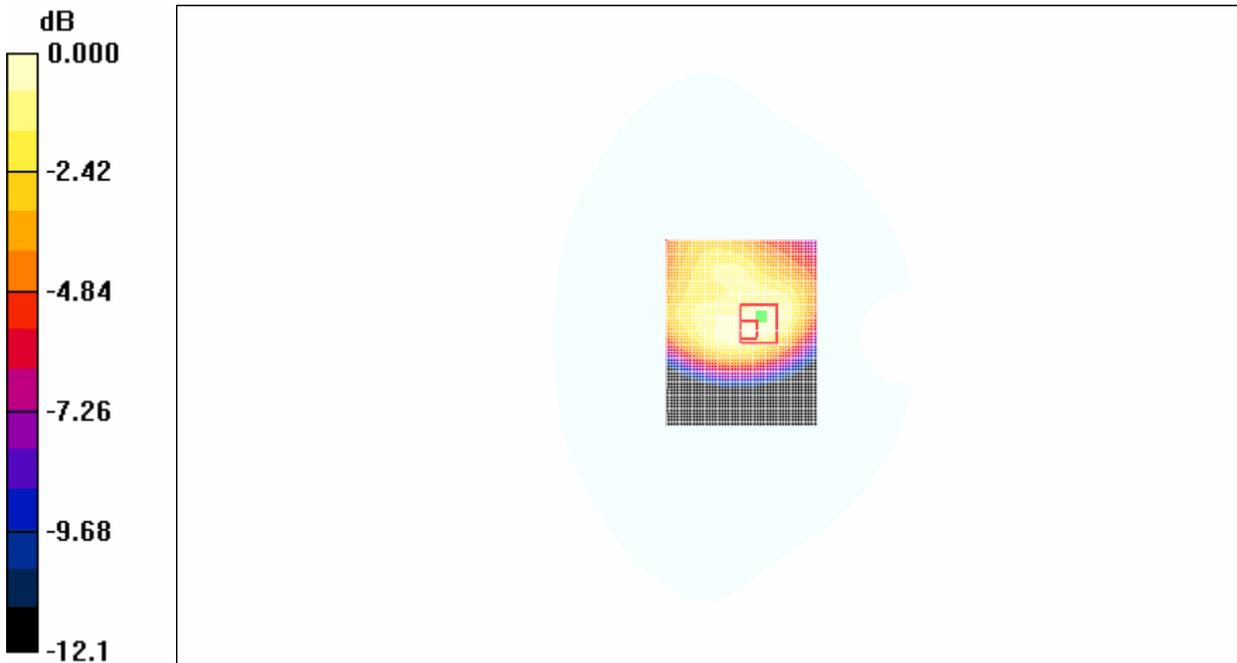


Fig. 15 Laptop 1, Test Position 5, whole Antenna, CH384

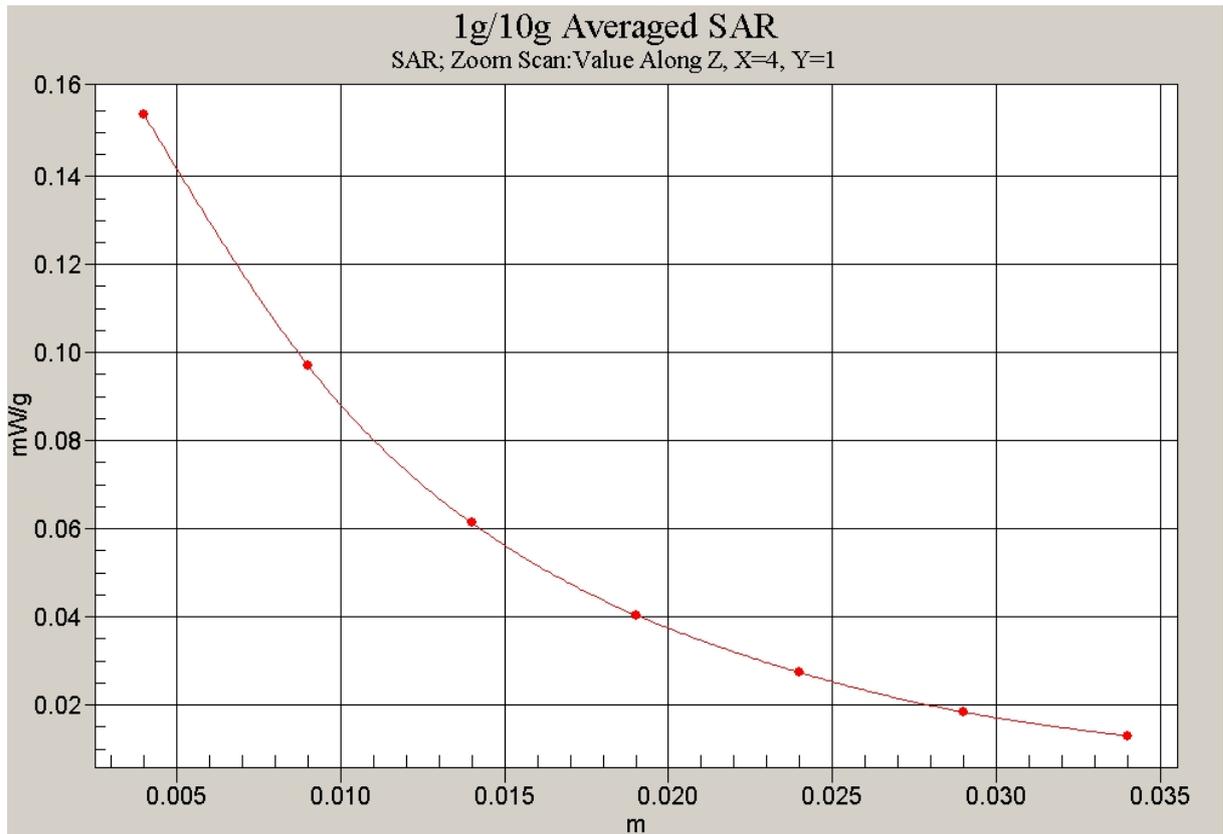


Fig. 16 Z-Scan at power reference point
(Laptop 1, Test Position 5, whole Antenna, CH384)

Position 6, Whole Antenna, Middle of Laptop 1

Electronics: DAE3 Sn536

Communication System: CDMA 1X-new Frequency: 836.52 MHz Duty Cycle: 1:1

Probe: ET3DV6 - SN1736 ConvF(6.45, 6.45, 6.45)

Position 6, Whole Antenna, Middle/Area Scan (61x61x1): Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.543 mW/g

Position 6, Whole Antenna, Middle/Zoom Scan (7x7x7)/Cube 0: Measurement

grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 17.5 V/m; Power Drift = 0.200 dB

Peak SAR (extrapolated) = 0.758 W/kg

SAR(1 g) = 0.517 mW/g; SAR(10 g) = 0.336 mW/g

Maximum value of SAR (measured) = 0.551 mW/g

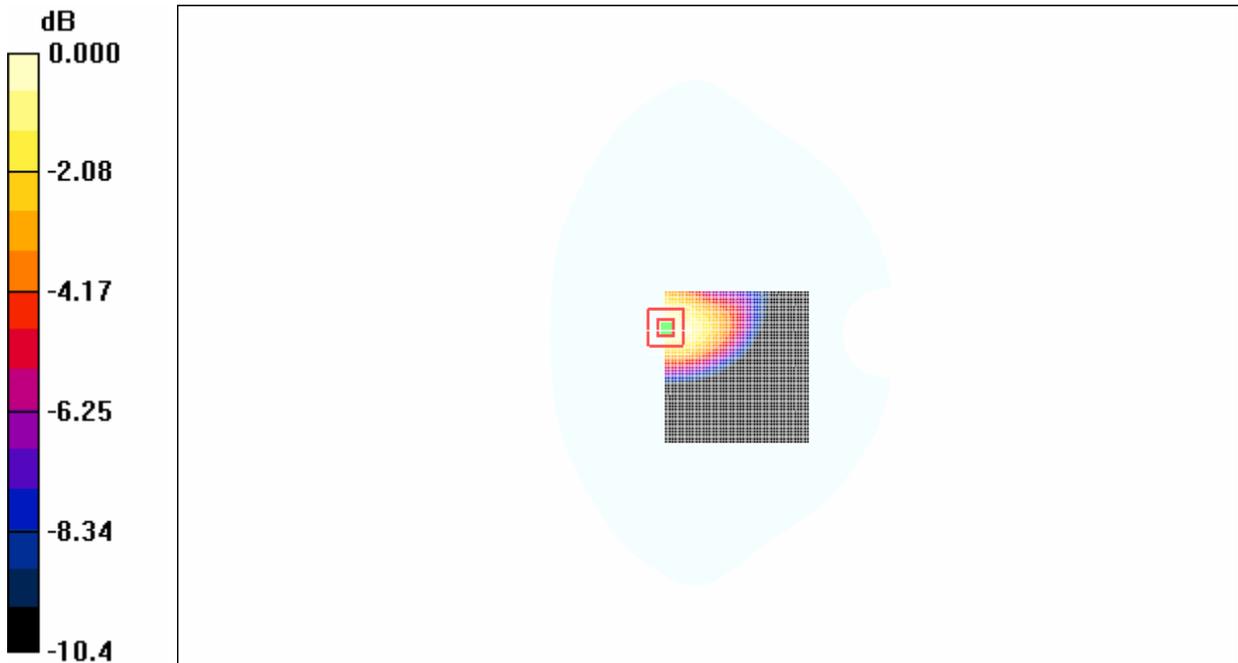


Fig. 17 Laptop 1, Test Position 6, whole Antenna, CH384

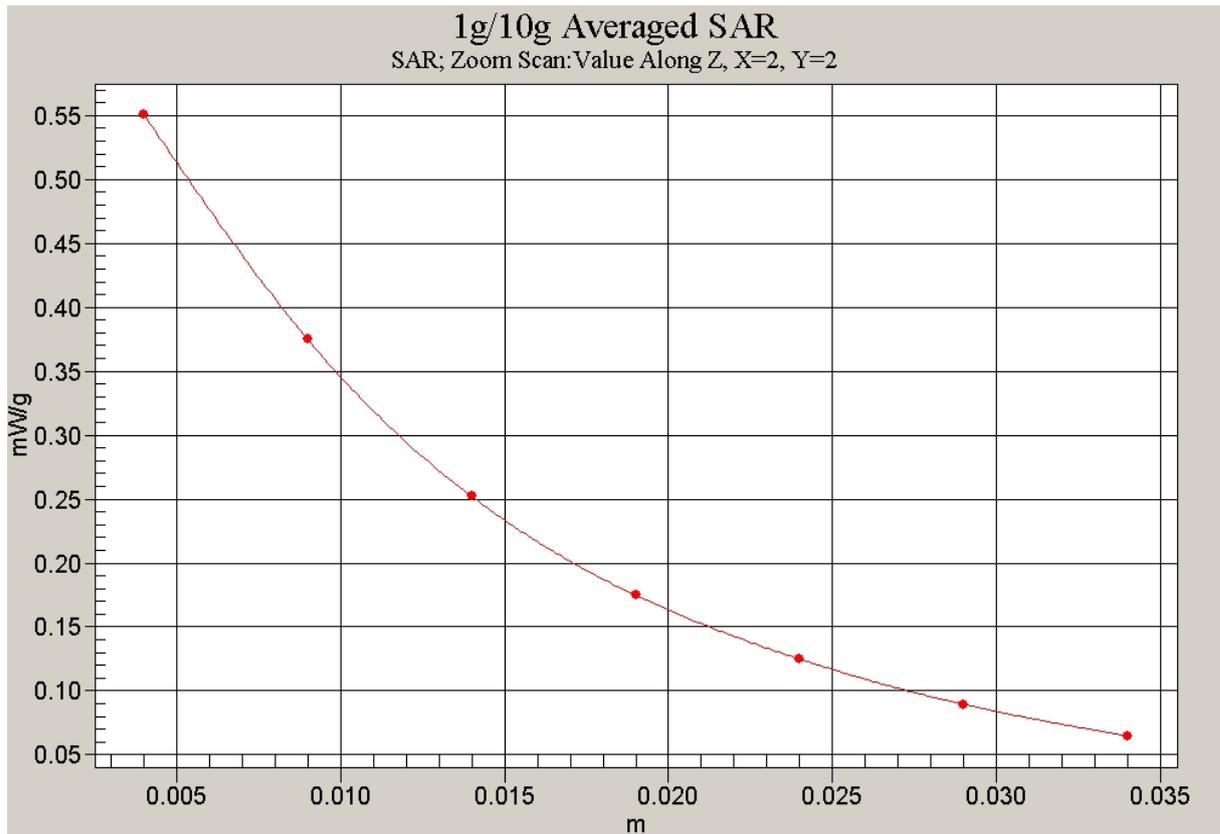


Fig. 18 Z-Scan at power reference point
(Laptop 1, Test Position 6, whole Antenna, CH384)

Position 7, Whole Antenna, Middle of Laptop 1

Electronics: DAE3 Sn536

Communication System: CDMA 1X-new Frequency: 836.52 MHz Duty Cycle: 1:1

Probe: ET3DV6 - SN1736 ConvF(6.45, 6.45, 6.45)

Position 7, Whole Antenna, Middle/Area Scan (61x61x1): Measurement grid:

dx=10mm, dy=10mm

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

Position 7, Whole Antenna, Middle /Zoom Scan (7x7x7)/Cube 0: Measurement

grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 23.4 V/m; Power Drift = -0.083 dB

Peak SAR (extrapolated) = 1.27 W/kg

SAR(1 g) = 0.909 mW/g; SAR(10 g) = 0.608 mW/g

Maximum value of SAR (measured) = 0.971 mW/g

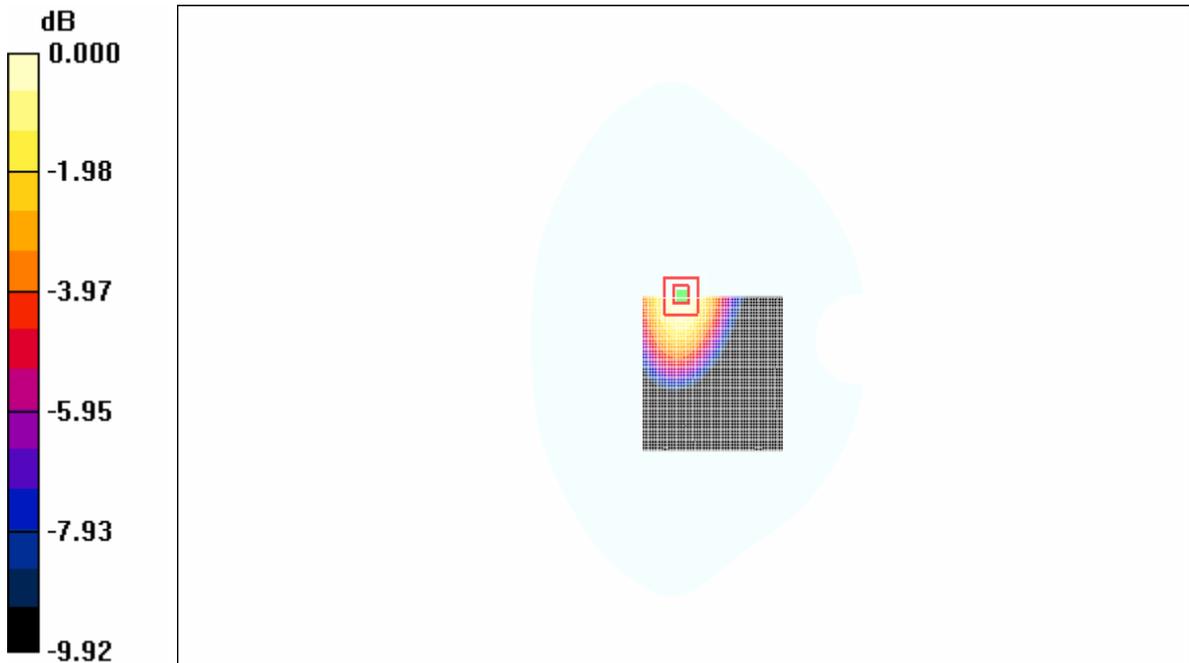


Fig. 19 Laptop 1, Test Position 7, whole Antenna, CH384

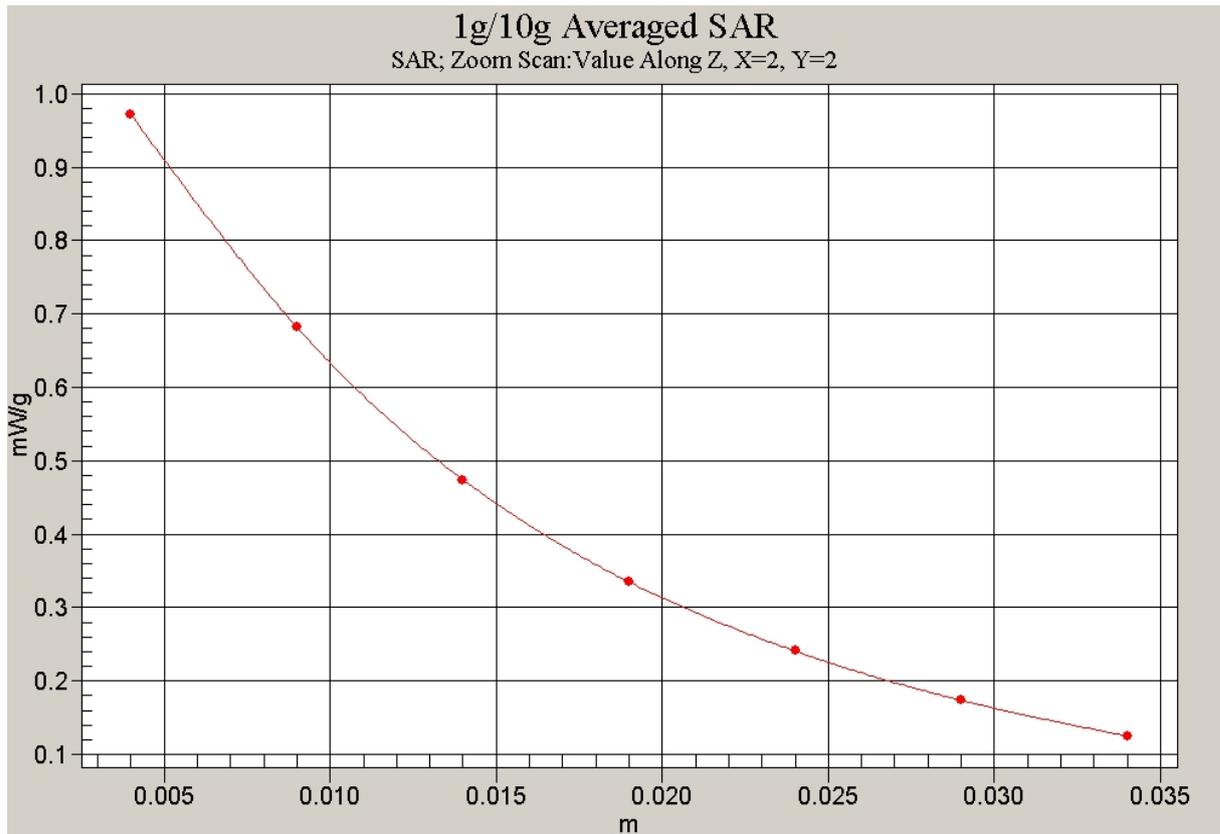


Fig. 20 Z-Scan at power reference point
(Laptop 1, Test Position 7, whole Antenna, CH384)

Position 8, Whole Antenna, Middle of Laptop 1

Electronics: DAE3 Sn536

Communication System: CDMA 1X-new Frequency: 836.52 MHz Duty Cycle: 1:1

Probe: ET3DV6 - SN1736 ConvF(6.45, 6.45, 6.45)

Position 8, Whole Antenna, Middle/Area Scan (51x51x1): Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.202 mW/g

Position 8, Whole Antenna, Middle/Zoom Scan (7x7x7)/Cube 0: Measurement

grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.3 V/m; Power Drift = -0.200 dB

Peak SAR (extrapolated) = 0.262 W/kg

SAR(1 g) = 0.182 mW/g; SAR(10 g) = 0.122 mW/g

Maximum value of SAR (measured) = 0.196 mW/g



Fig. 21 Laptop 1, Test Position 8, whole Antenna, CH384

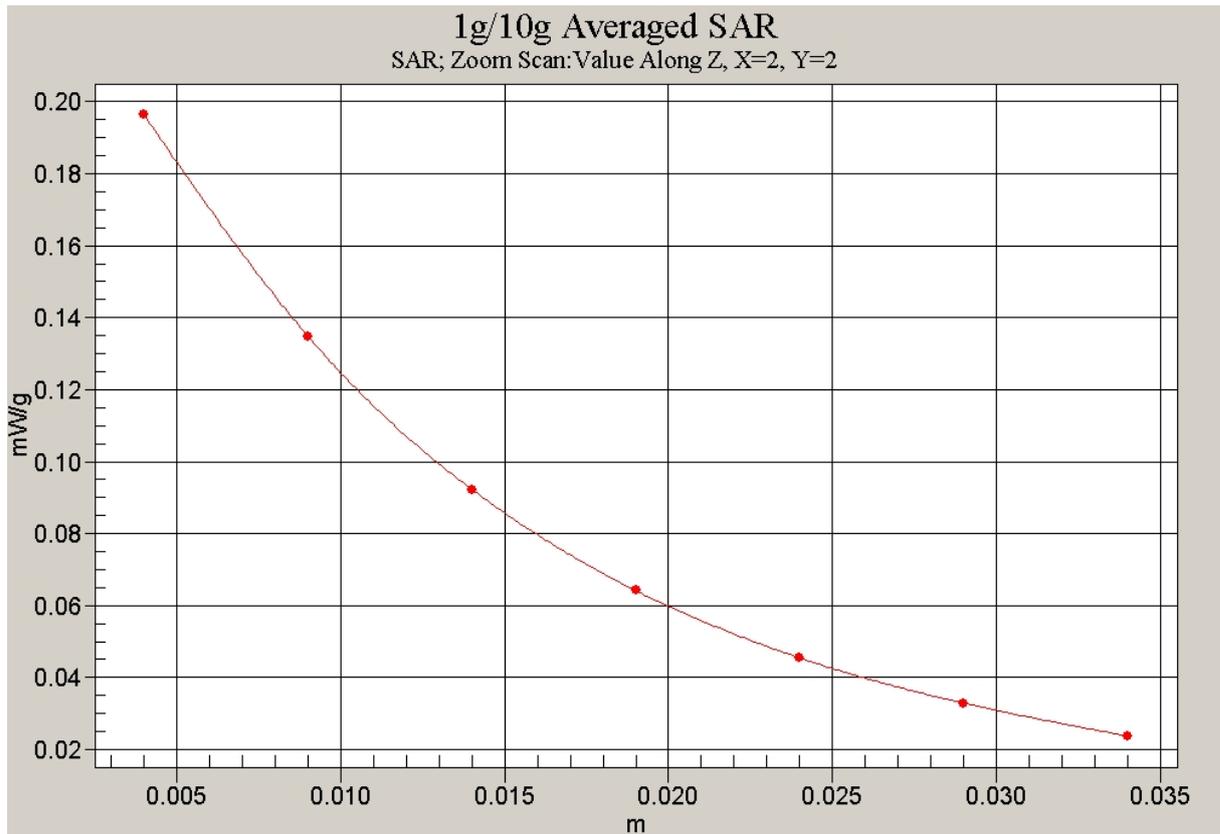


Fig. 22 Z-Scan at power reference point
(Laptop 1, Test Position 8, whole Antenna, CH384)

Position 1, Whole Antenna, Middle of Laptop 2

Electronics: DAE3 Sn536

Communication System: CDMA 1X-new Frequency: 836.52 MHz Duty Cycle: 1:1

Probe: ET3DV6 - SN1736 ConvF(6.45, 6.45, 6.45)

Position 1, Whole Antenna, Middle/Area Scan (61x71x1): Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.411 mW/g

Position 1, Whole Antenna, Middle/Zoom Scan (7x7x7)/Cube 0: Measurement

grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 15.0 V/m; Power Drift = 0.200 dB

Peak SAR (extrapolated) = 0.567 W/kg

SAR(1 g) = 0.390 mW/g; SAR(10 g) = 0.255 mW/g

Maximum value of SAR (measured) = 0.420 mW/g

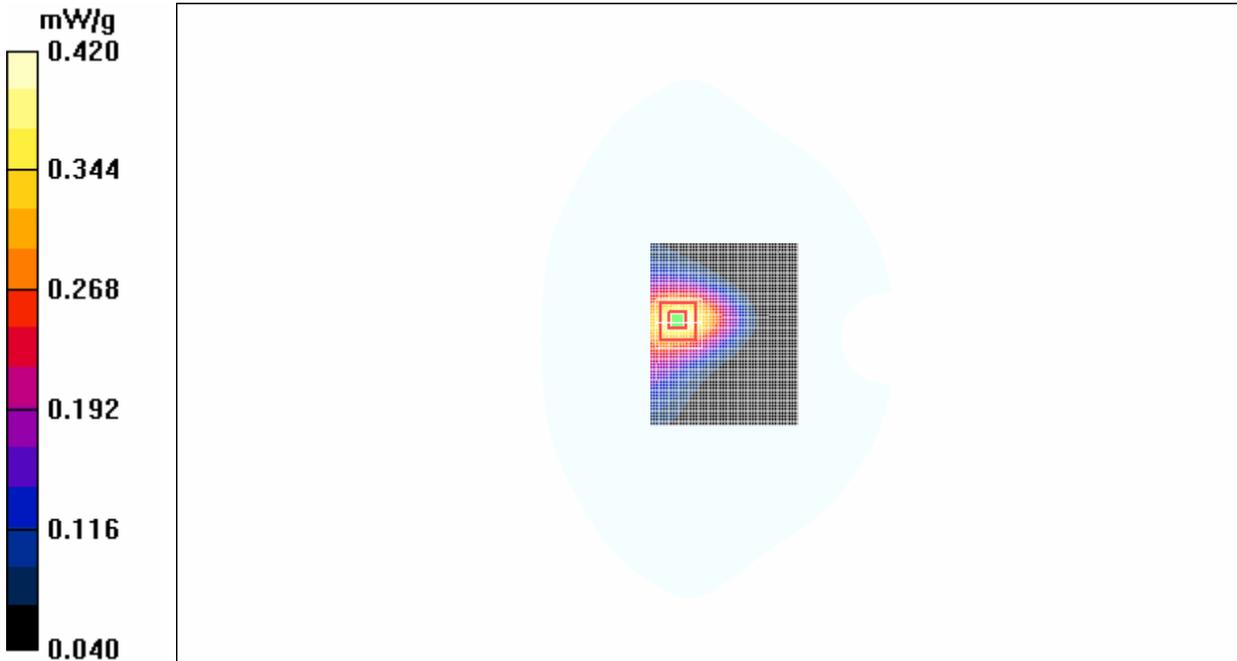


Fig. 23 Laptop 2, Test Position 1, whole Antenna, CH384

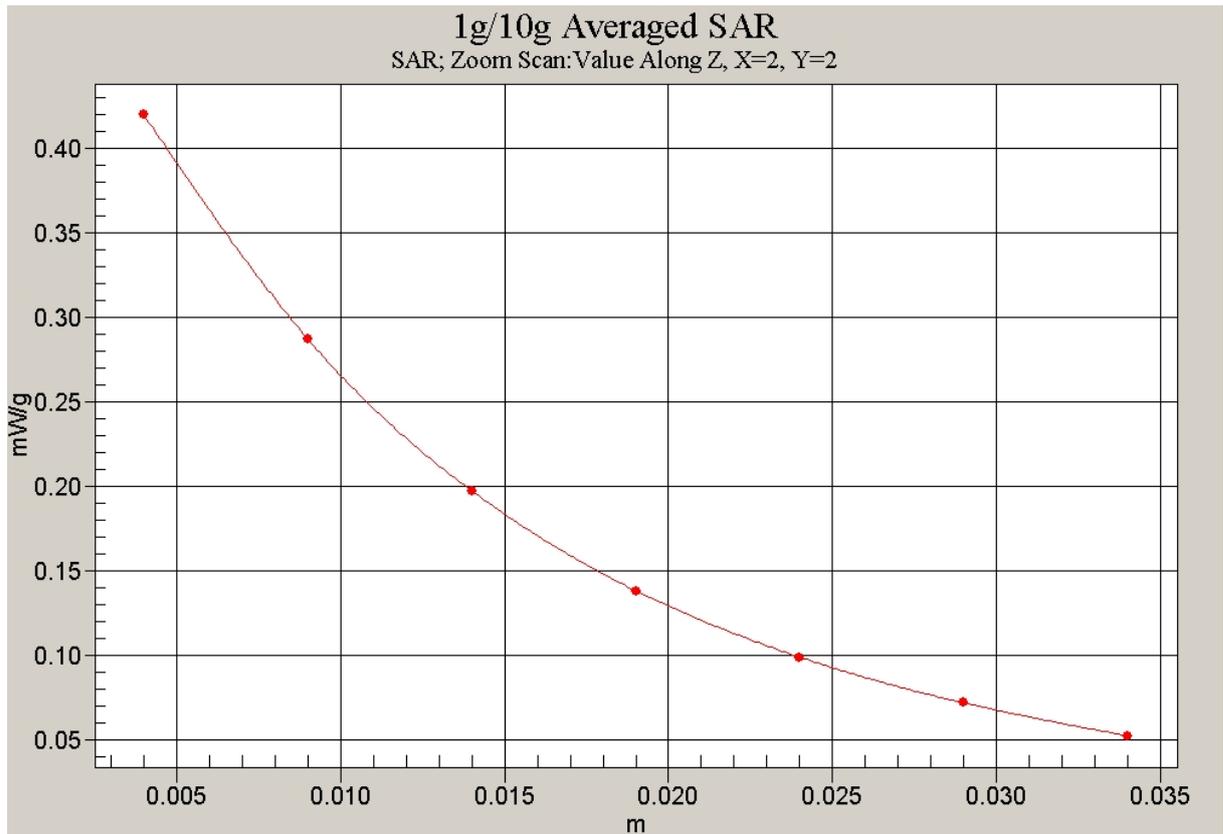


Fig.24 Z-Scan at power reference point
(Laptop 2, Test Position 1, whole Antenna, CH384)

Position 2, Whole Antenna, Middle of Laptop 2

Electronics: DAE3 Sn536

Communication System: CDMA 1X-new Frequency: 836.52 MHz Duty Cycle: 1:1

Probe: ET3DV6 - SN1736 ConvF(6.45, 6.45, 6.45)

Position 2, Whole Antenna, Middle/Area Scan (61x71x1): Measurement grid:

dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.171 mW/g

Position 2, Whole Antenna, Middle/Zoom Scan (7x7x7)/Cube 0: Measurement

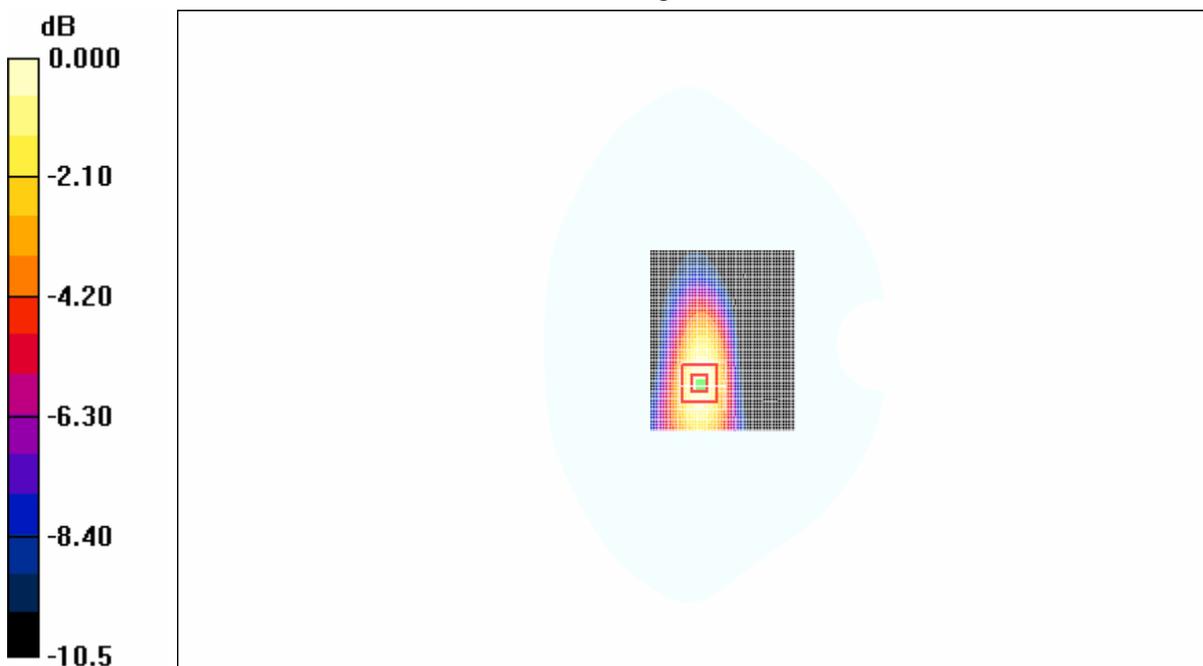
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.95 V/m; Power Drift = 0.200 dB

Peak SAR (extrapolated) = 0.222 W/kg

SAR(1 g) = 0.153 mW/g; SAR(10 g) = 0.097 mW/g

Maximum value of SAR (measured) = 0.167 mW/g



0 dB = 0.167mW/g

Fig.25 Laptop 2, Test Position 2, whole Antenna, CH384

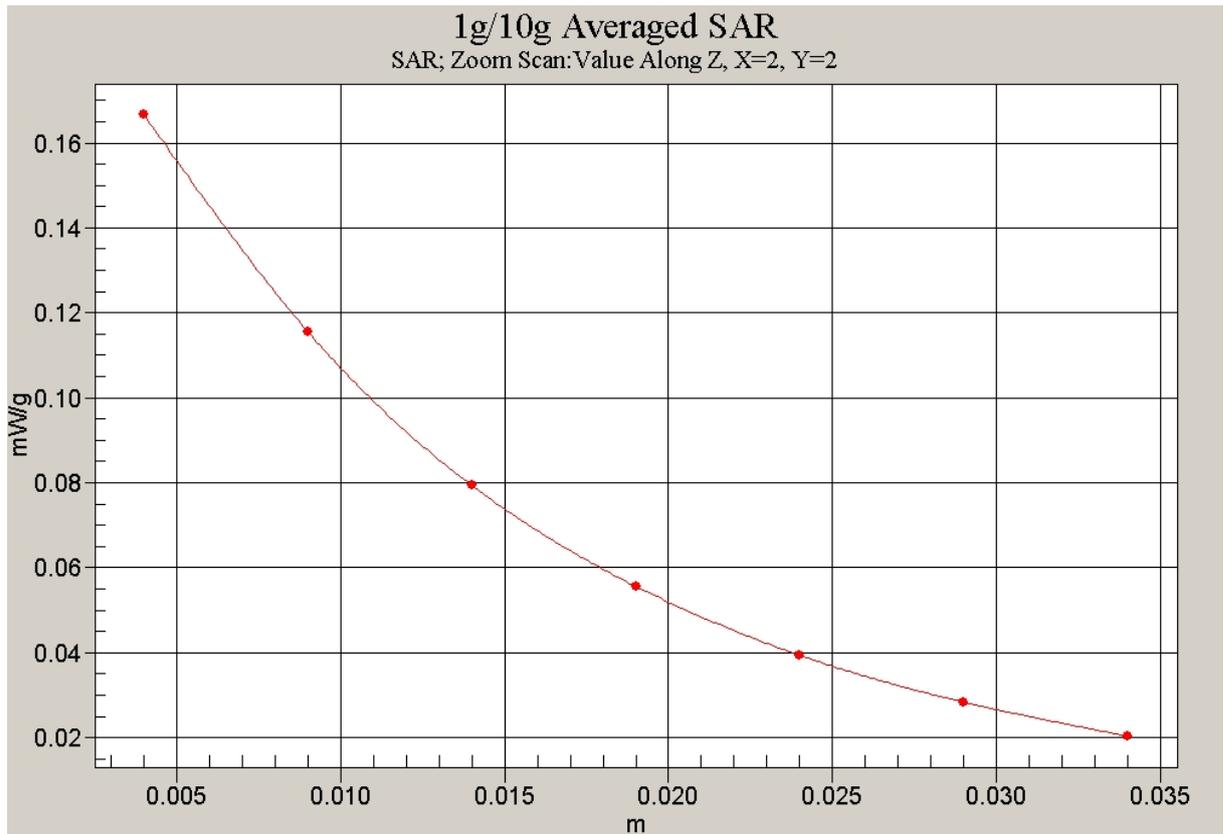


Fig. 26 Z-Scan at power reference point
(Laptop 2, Test Position 2, whole Antenna, CH384)

Position 3, Whole Antenna, Middle of Laptop 2

Electronics: DAE3 Sn536

Communication System: CDMA 1X-new Frequency: 836.52 MHz Duty Cycle: 1:1

Probe: ET3DV6 - SN1736 ConvF(6.45, 6.45, 6.45)

Position 3, Whole Antenna, Middle/Area Scan (61x61x1): Measurement grid:

dx=10mm, dy=10mm

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

Position 3, Whole Antenna, Middle/Zoom Scan (7x7x7)/Cube 0: Measurement

grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.36 V/m; Power Drift = 0.200 dB

Peak SAR (extrapolated) = 0.124 W/kg

SAR(1 g) = 0.073 mW/g; SAR(10 g) = 0.043 mW/g

Maximum value of SAR (measured) = 0.080 mW/g

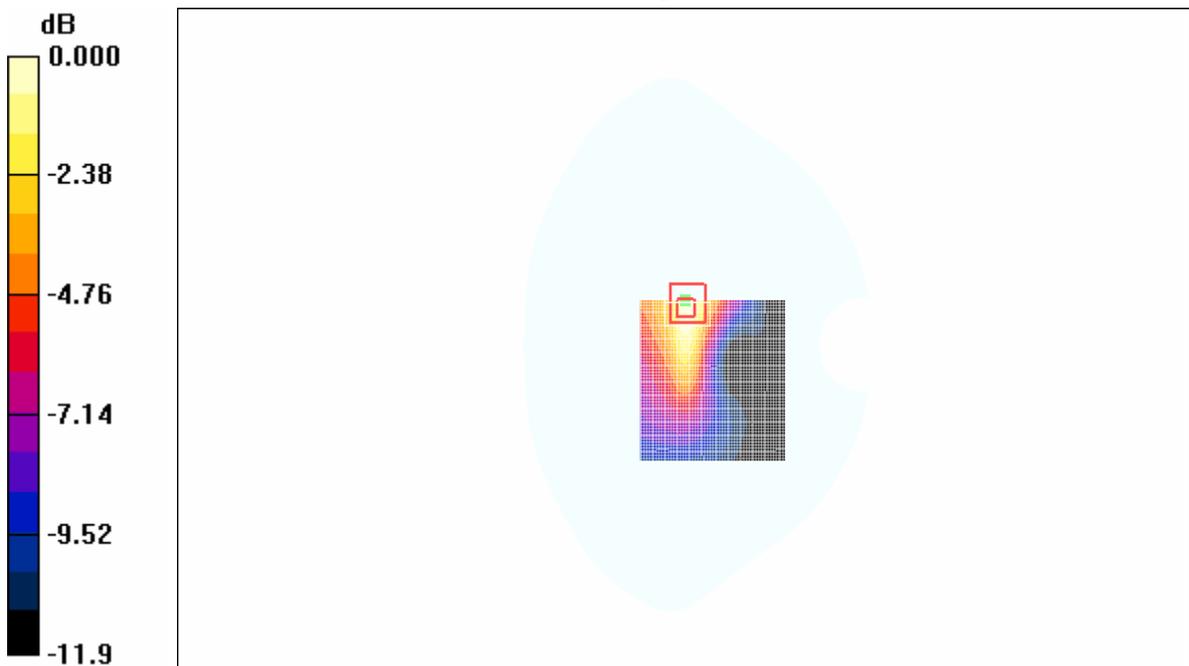


Fig. 27 Laptop 2, Test Position 3, whole Antenna, CH384

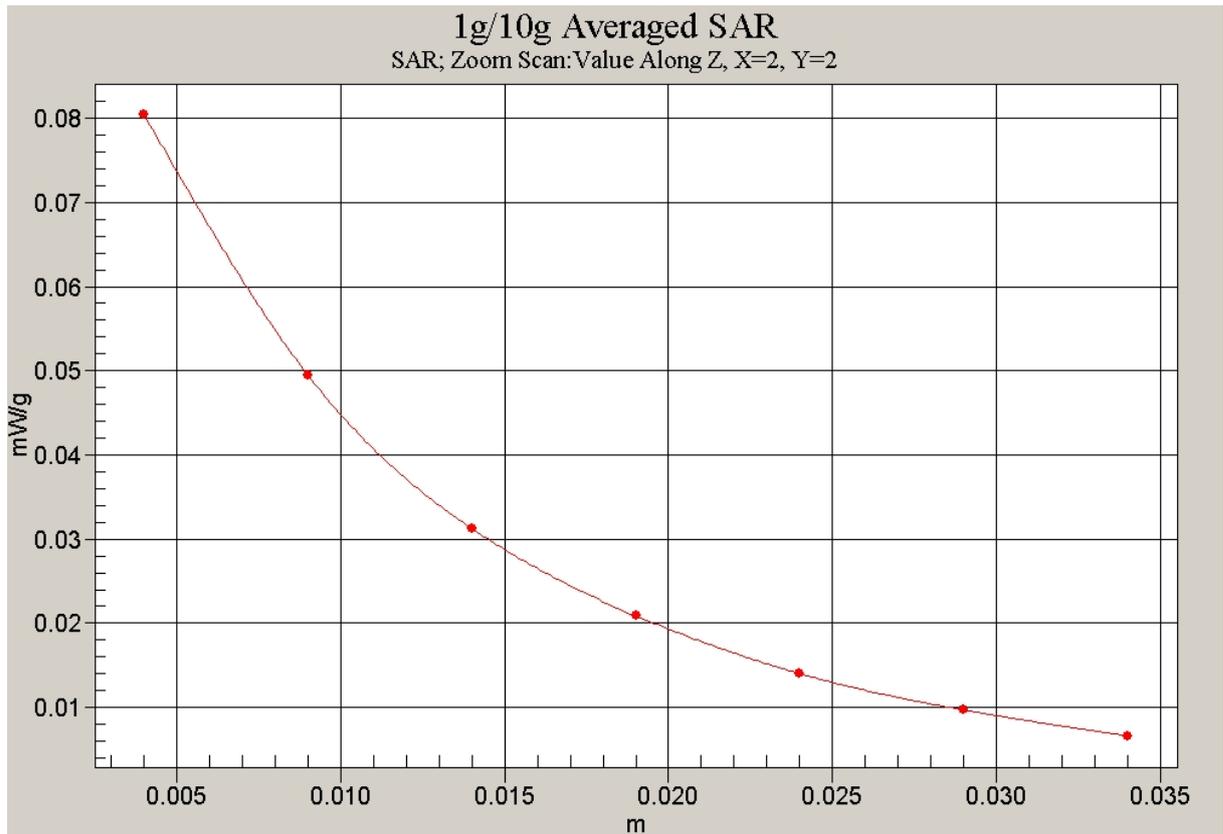


Fig. 28 Z-Scan at power reference point
(Laptop 2, Test Position 3, whole Antenna, CH384)