



NO.: RZA2007-1404FCC

OET 65

TEST REPORT

Test name Electromagnetic Field (Specific Absorption Rate)

Product CDMA 1X Digital Mobile Phone

Model HUAWEI C223s

FCC ID QISC223S

Client HUAWEI Technologies Co., Ltd.

TA Technology (Shanghai) Co., Ltd.



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GENERAL SUMMARY

Product	CDMA 1X Digital Mobile Phone	Model	HUAWEI C223s
Client	HUAWEI Technologies Co., Ltd.	Type of test	Entrusted
Manufacturer	HUAWEI Technologies Co., Ltd.	Arrival Date of sample	Dec.25 th , 2007
Place of sampling	(Blank)	Carrier of the samples	Yi Fang
Quantity of the samples	One	Date of product	(Blank)
Base of the samples	(Blank)	Items of test	SAR
Series number	01610414084		
Standard(s)	<p>EN 50360-2001: Product standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones.</p> <p>EN 50361-2001: Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones.</p> <p>ANSI C95.1-1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.</p> <p>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.</p> <p>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.</p> <p>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).</p>		
Conclusion	<p>Localized Specific Absorption Rate (SAR) of this portable wireless equipment has been measured in all cases requested by the relevant standards cited in Clause 6.2 of this test report. Maximum localized SAR is below exposure limits specified in the relevant standards cited in Clause 6.1 of this test report.</p> <p>General Judgment: Pass</p> <p style="text-align: right;">(Stamp)</p> <p style="text-align: right;">Date of issue: Jan. 8th, 2008</p>		
Comment	<p>TX Freq. Band: 1851-1909MHz (CDMA) Max. Power: 0.25W(CDMA)</p> <p>The test result only responds to the measured sample.</p>		

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1 COMPETENCE AND WARRANTIES

TA Technology (Shanghai) Co., Ltd. is a test laboratory competent to carry out the tests described in this test report.

TA Technology (Shanghai) Co., Ltd. guarantees the reliability of the data presented in this test report, which is the results of measurements and tests performed for the items under test on the date and under the conditions stated in this test report and is based on the knowledge and technical facilities available at TA Technology (Shanghai) Co., Ltd. at the time of execution of the test.

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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
City	Shenzhen
Postal Code	518129
Country	P.R. China
Telephone	0755-28780808
Fax	0755-28780808

Table 2: Manufacturer

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

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3.2 Constituents of EUT

Table 3: Constituents of Samples

Description	Model	Serial Number	Manufacturer
Handset	HUAWEI C223s	01610414084	HUAWEI Technologies Co.,Ltd.
Lithium Battery	HBC80S	HGY7B1433693	Harbin Coslight Power Co., Ltd.
AC/DC Adapter	CHG5365-3C	HKY7B0500033	SHENZHEN CHI YUAN INDUSTRIAL CO.,LTD.
	XQLCHW07	AKD792525695	SHENZHEN OCT XINQIAO TECHNOLOGY CO.,LTD.
	TPCA-053065E	TPI762110093	TECH-POWER ELECTRONICS(SHENZHEN) CO.,LTD.

Note:

The EUT appearances see ANNEX G

3.3 General Description

Equipment Under Test (EUT) is a model of CDMA 1X portable Mobile Station (MS) with internal antenna. It consists of Handset, Lithium Battery and AC/DC Adapter .The detail about Mobile phone, Lithium Battery and AC/DC Adapter is in Table 3. SAR is tested for CDMA PCS only.

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 Test to be performed

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 25, 600 and 1175 respectively in the case of CDMA PCS. 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.

4.2 Information for the measurement of CDMA 1x devices

4.2.1 Output Power Verification

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

Parameter	Units	Value
I or	dBm/1.23MHz	-104
PilotE c /I or	dB	-7
TrafficE c /I or	dB	-7.4

For SAR test, the maximum power output is very important and essential; it is identical under the measurement uncertainty. It is proper to use typical Test Mode 3 (FW RC3, RVS RC3, SO55) as the worst case for SAR test.

Under the loop back mode between mobile station and E5515C, 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 mobile emits maximum power; the output power of E5515C 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 “all up” and it means that requires mobile station to emit with maximum power.

4.2.2 Head SAR measurement

SAR is measured in RC3 with the DUT configured to transmit at full rate using Loopback Service Option SO55. SAR for RC1 is not required because the maximum average output of each channel is less than 0.25 dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel in RC1 using the exposure configuration that results in the highest SAR for that channel in RC3.

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4.2.3 Body SAR measurement

SAR is measured in RC3 with the EUT configured to transmit at full rate using TDSO/SO32, transmit at full rate on FCH with all other code channels disabled. SAR for multiple code channels (FCH+SCHn) is not required when the maximum average output of each RF channel is less than 0.25dB higher than measured with FCH only.

Body SAR in RC1 is not required because the maximum average output of each channel is less than 0.25 dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel in RC1; with Loopback Service Option SO55, at full rate using the body exposure configuration that results in the highest SAR for that channel in RC3.

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.

5 SAR MEASUREMENTS SYSTEM CONFIGURATION

5.1 SAR Measurement Set-up

These measurements were performed with the automated near-field scanning system DASY4 from Schmid & Partner Engineering AG (SPEAG). The system is based on a high precision robot (working range greater than 0.9m) which positions the probes with a positional repeatability of better than ± 0.02 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.

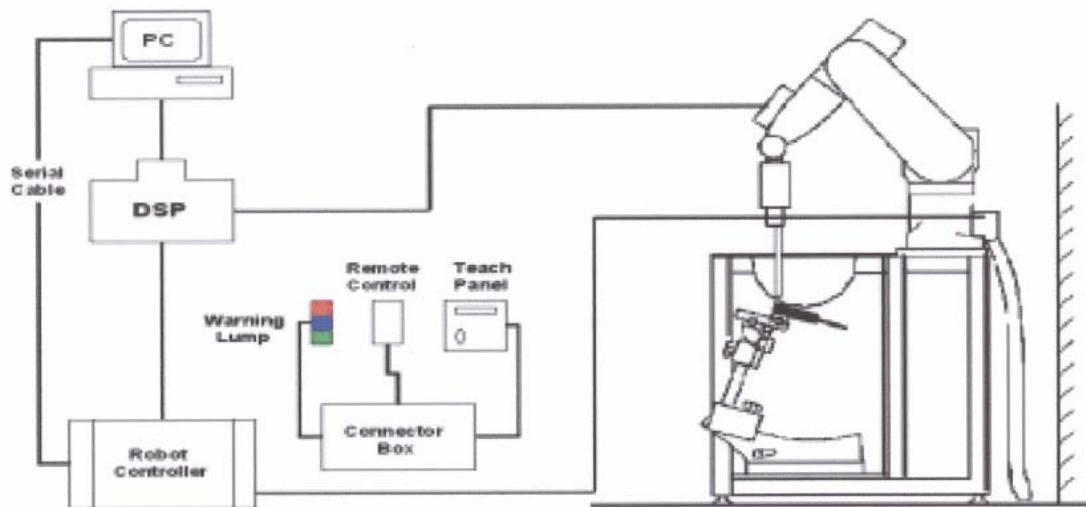


Figure1. SAR Lab Test Measurement Set-up

The DAE3 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.

5.2 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	5uW/g to $> 100\text{mW/g}$; 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

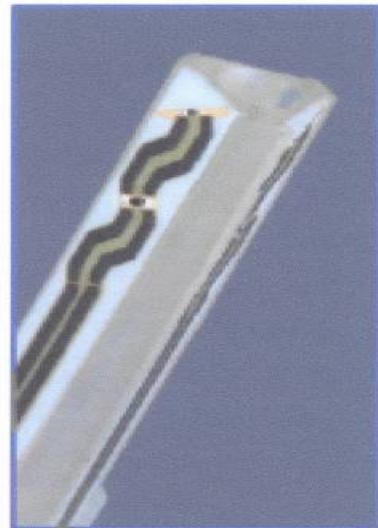


Figure2. ET3DV6 E-field Probe

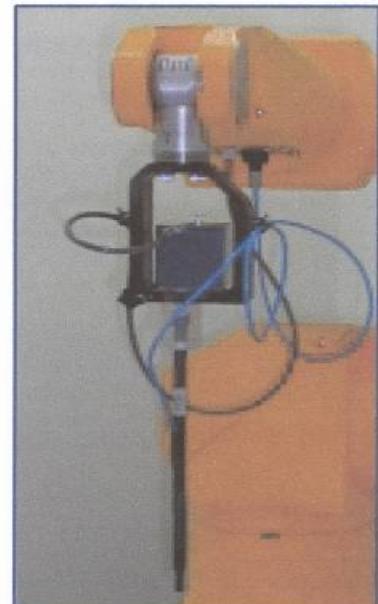


Figure3. ET3DV6 E-field probe

5.3 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.

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

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

Or

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

Where:

σ = Simulated tissue conductivity,
 ρ = Tissue density (kg/m³).

5.4 Other Test Equipment

5.4.1 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).



Figure4. Device Holder

5.4.2 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



Figure5. Generic Twin Phantom

5.5 Equivalent Tissues

The liquid used for the frequency range of 800-2000 MHz consisted of water, salt and Glycol. The liquid has previously been proven to be suited for worst-case. The Table 4 and Table 5 show the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the IEEE 1528.

Table 4: Composition of the Head Tissue Equivalent Matter

MIXTURE%	FREQUENCY(Brain) 1900MHz
Water	55.242
Glycol	44.452
Salt	0.306
Dielectric Parameters Target Value	f=1900MHz $\epsilon=40.0$ $\sigma=1.40$

Table 5: Composition of the Body Tissue Equivalent Matter

MIXTURE%	FREQUENCY(Body) 1900MHz
Water	69.91
Glycol	29.96
Salt	0.13
Dielectric Parameters Target Value	f=1900MHz $\epsilon=53.3$ $\sigma=1.52$

5.6 System Specifications

5.6.1 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 CHARACTERISTICS OF THE TEST

6.1 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.

6.2 Applicable Measurement Standards

EN 50361–2001: Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones.

It specifies the measurement method for demonstration of compliance with the SAR limits for such equipments.

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)

7 LABORATORY ENVIRONMENT

Table 6: The Ambient Conditions during Test

Temperature	Min. = 20 °C, Max. = 25 °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.	

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8 CONDUCTED OUTPUT POWER MEASUREMENT

8.1 Summary

During the process of testing, the EUT was controlled via Digital Radio Communication tester 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.

8.2 Power Drift

To control the output power stability during the SAR test, DASY4 system calculates the power drift by measuring the E-field at the same location at the beginning and at the end of the measurement for each test position. These drift values can be found in Table 11 to Table 12 labeled as: (Power Drift [dB]). This ensures that the power drift during one measurement is within 5%.

8.3 Conducted Power

8.3.1 Measurement Methods

The EUT was set up for the maximum output power. The channel power was measured. These measurements were done at 3 channels 25, 600 and 1175 before SAR test and after SAR test.

8.3.2 Measurement result

Table 7: Conducted Power Measurement Results

CDMA2000 1× (RC3)	Conducted Power		
	Channel 25	Channel 600	Channel 1175
Before Test (dBm)	22.2	22	22.1
After Test (dBm)	22.1	22	22
CDMA2000 1× (RC1)	Conducted Power		
	Channel 25	Channel 600	Channel 1175
Before Test (dBm)	22.2	22.1	22.1
After Test (dBm)	22.1	22.1	22

9 TEST RESULTS

9.1 Dielectric Performance

Table 8: Dielectric Performance of Head Tissue Simulating Liquid

Measurement is made at temperature 22.5 °C and relative humidity 51%. Liquid temperature during the test: 22.3°C					
Frequency (MHz)		Target value	Measurement value	Difference percentage	
1900 (Head)	Permittivity ϵ_r	40.0	39.71	0.73	%
	Conductivity σ	1.40	1.418	1.28	%

Table 9: Dielectric Performance of Body Tissue Simulating Liquid

Measurement is made at temperature 22.5 °C and relative humidity 51%. Liquid temperature during the test: 22.3°C					
Frequency (MHz)		Target value	Measurement value	Difference percentage	
1900 (Body)	Permittivity ϵ_r	53.3	53.42	0.23	%
	Conductivity σ	1.52	1.522	0.13	%

9.2 System Validation

Table 10: System Validation

Measurement is made at temperature 23.2 °C, relative humidity 50%, and input power 250 mW. Liquid temperature during the test: 22.3°C						
Liquid parameters		Frequency	Permittivity ϵ	Conductivity σ (S/m)		
		1900MHz	39.4	1.42		
Verification results	Frequency	Target value (W/kg)		Measurement value (W/kg)		
		10 g Average	1 g Average	10 g Average	1 g Average	
		5.09	9.73	5.12	9.69	
		10 g Average	1 g Average	10 g Average	1 g Average	
		0.59%	-0.41%			

Note:

- a. 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).
- b. The graph results see ANNEX D.

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9.3 Summary of Measurement Results

Table 11: SAR Values (CDMA PCS, Head)

Liquid Temperature: 22.5°C				Power Drift (dB)
Limit of SAR (W/kg)	10 g Average	1 g Average		
	2.0	1.6		
Test Case Of Head		Measurement Result (W/kg)		
	10 g Average	1 g Average		
Left hand, Touch Cheek, High frequency (See Figure 7)	0.376	0.622	0.059	
Left hand, Touch Cheek, Mid frequency (See Figure 9)	0.511	0.843	-0.096	
Left hand, Touch Cheek, Low frequency (See Figure 11)	0.373	0.611	-0.190	
Left hand, Tilt 15 Degree, High frequency (See Figure 13)	0.288	0.525	0.067	
Left hand, Tilt 15 Degree, Mid frequency (See Figure 15)	0.341	0.628	-0.149	
Left hand, Tilt 15 Degree, Low frequency (See Figure 17)	0.264	0.487	-0.176	
Right hand, Touch Cheek, High frequency (See Figure 19)	0.328	0.534	-0.079	
Right hand, Touch Cheek, Mid frequency (See Figure 21)	0.431	0.701	0.084	
Right hand, Touch Cheek, Low frequency (See Figure 23)	0.333	0.543	0.081	
Right hand, Tilt 15 Degree, High frequency (See Figure 25)	0.238	0.423	-0.100	
Right hand, Tilt 15 Degree, Mid frequency (See Figure 27)	0.326	0.583	0.076	
Right hand, Tilt 15 Degree, Low frequency (See Figure 29)	0.232	0.413	0.019	

Remark: The value with blue color is the maximum SAR Value of each test band.

Table 12: SAR Values (CDMA PCS, Body, Distance 15mm)

Liquid Temperature: 22.4°C				Power Drift (dB)
Limit of SAR (W/kg)	10 g Average	1 g Average		
	2.0	1.6		
Test Case Of Body		Measurement Result (W/kg)		
	10 g Average	1 g Average		
Body, Towards Phantom, High frequency (See Figure 31)	0.162	0.262	0.149	
Body, Towards Phantom, Mid frequency (See Figure 33)	0.201	0.322	0.159	
Body, Towards Phantom, Low frequency (See Figure 35)	0.145	0.228	0.007	
Body, Towards Ground, High frequency (See Figure 37)	0.278	0.439	-0.199	
Body, Towards Ground, Mid frequency (See Figure 39)	0.321	0.515	-0.073	
Body, Towards Ground, Low frequency (See Figure 41)	0.290	0.471	-0.158	

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9.4 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 6.2 of this report. Maximum localized SAR is below exposure limits specified in the relevant standards cited in Clause 6.1 of this test report.

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10 MEASUREMENT UNCERTAINTY

SN	a	Type	c	d	$e = f(d,k)$	f	$h = c \times f / e$	k
	Uncertainty Component		Tol. ($\pm \%$)	Prob - Dist.	Div.	c_l (1 g)	$1 g$ u_l ($\pm \%$)	v_l
1	System repetitivty	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	$\sqrt{3}$	$(1-c_p)^{1/2}$	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	

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11 MAIN TEST INSTRUMENTS

Table 13: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	Agilent 8753E	US37390326	September 15, 2007	One year
02	Dielectric Probe Kit	Agilent 85070E	US44020115	No Calibration Requested	
03	Power meter	Agilent E4417A	GB41291714	January 25, 2007	One year
04	Power sensor	Agilent 8481H	MY41091316	January 25, 2007	
05	Signal Generator	HP 8341B	2730A00804	September 15, 2007	One year
06	Amplifier	IXA-020	0401	No Calibration Requested	
07	Validation Kit 1900MHz	SPEAG D1900V2	541	February 20, 2007	Two years
08	BTS	E5515C	GB46490218	September 15, 2007	One year
09	E-field Probe	ET3DV6	1737	February 20, 2007	One year
10	DAE	DAE3	452	September 06, 2007	One year

12 TEST PERIOD

The test is performed on Dec. 29th, 2007.

13 TEST LOCATION

The test is performed at TA Technology (Shanghai) Co., Ltd.

*****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 ear 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 head was measured at a distance of 3.9 mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 20 mm x 20 mm. Based on this data, the area of the maximum absorption was determined by spline interpolation.

Step 3: Around this point, a volume of 32 mm x 32 mm x 34 mm was assessed by measuring 7 x 7 x 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.

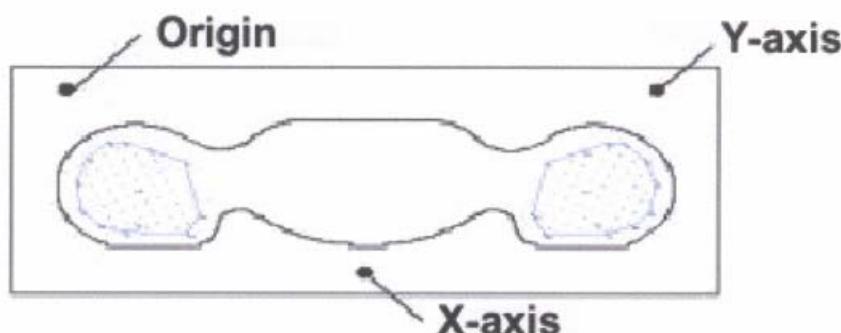


Figure 6 SAR Measurement Points in Area Scan

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ANNEX B: TEST LAYOUT



Picture 1: Specific Absorption Rate Test Layout



Picture 2: Liquid depth in the Flat Phantom (1900 MHz)

ANNEX C: GRAPH RESULTS

CDMA PCS Left Cheek High

Communication System: CDMA PCS; Frequency: 1908.75 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1908.75$ MHz; $\sigma = 1.43$ mho/m; $\epsilon_r = 39.6$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(5.15, 5.15, 5.15);

Electronics: DAE3 Sn452;

Cheek High/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.711 mW/g

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

Reference Value = 18.9 V/m; Power Drift = 0.059 dB

Peak SAR (extrapolated) = 0.792 W/kg

SAR(1 g) = 0.622 mW/g; SAR(10 g) = 0.376 mW/g

Maximum value of SAR (measured) = 0.688 mW/g

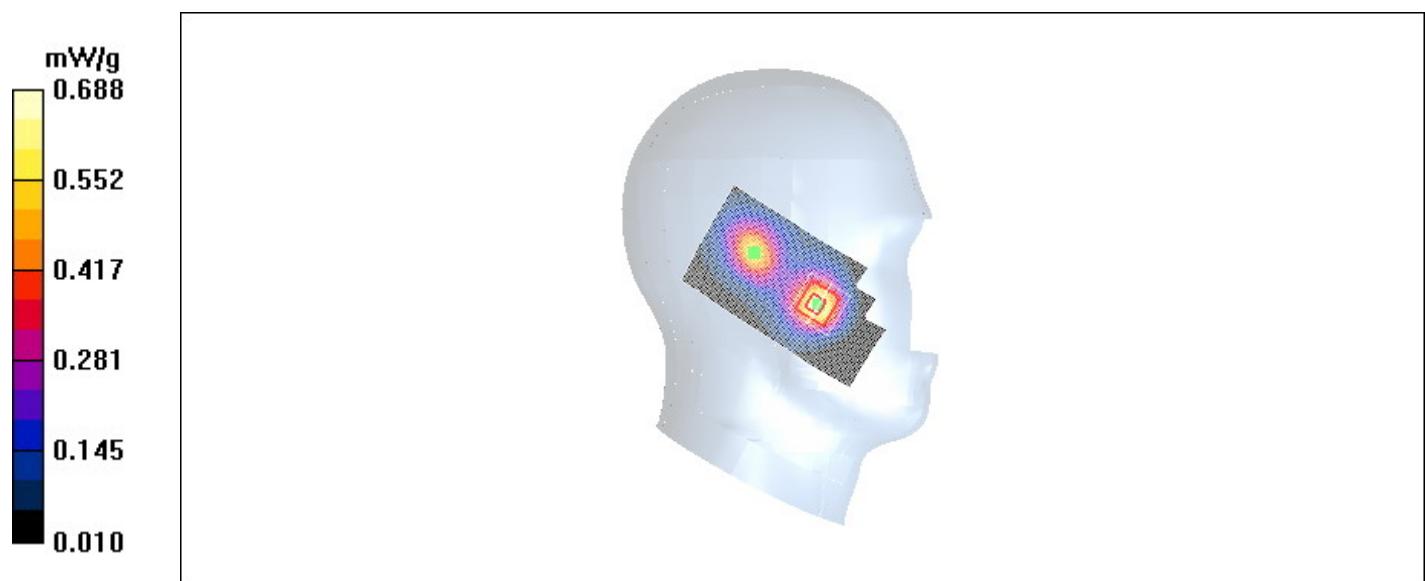


Figure. 7 Left Hand Touch Cheek CDMA PCS Channel 1175

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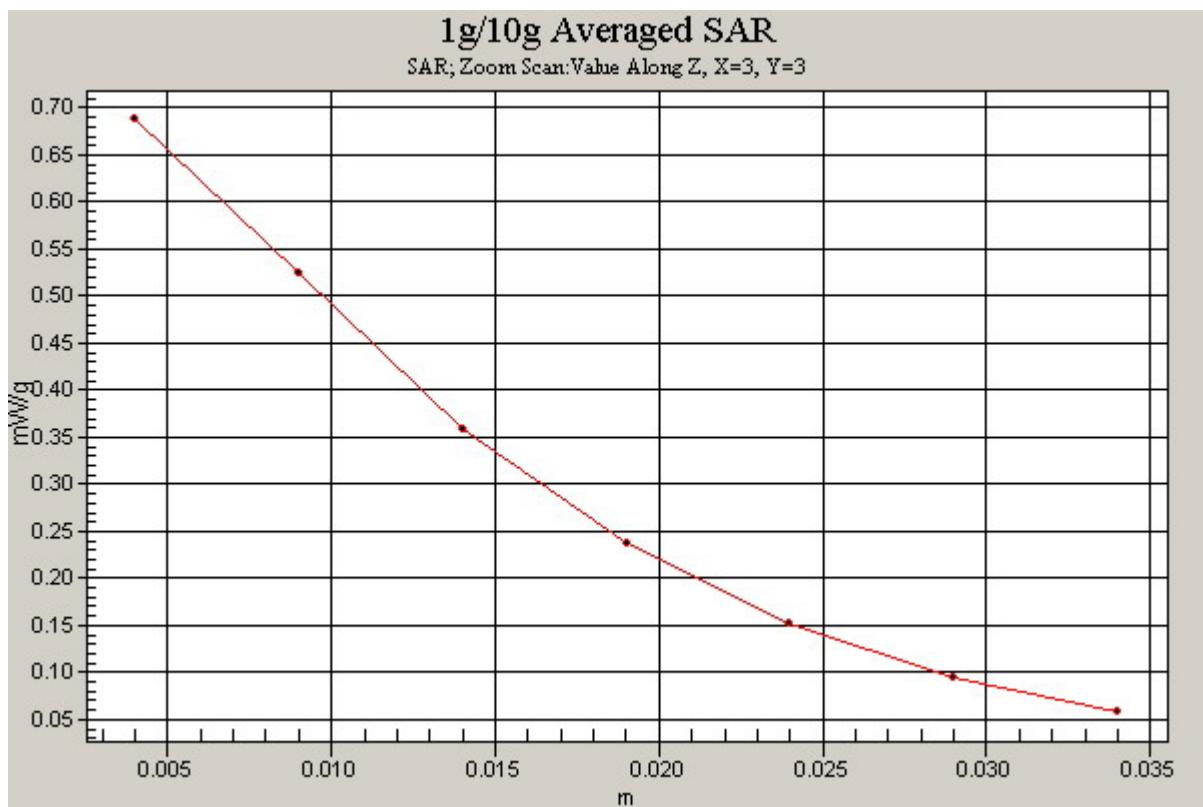


Figure. 8 Z-Scan at power reference point (Left Hand Touch Cheek CDMA PCS Channel 1175)

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CDMA PCS Left Cheek Middle

Communication System: CDMA PCS; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.39$ mho/m; $\epsilon_r = 39.8$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(5.15, 5.15, 5.15);

Electronics: DAE3 Sn452;

Cheek Middle/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.02 mW/g

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

Reference Value = 21.6 V/m; Power Drift = -0.096 dB

Peak SAR (extrapolated) = 1.06 W/kg

SAR (1 g) = 0.843 mW/g; SAR (10 g) = 0.511 mW/g

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

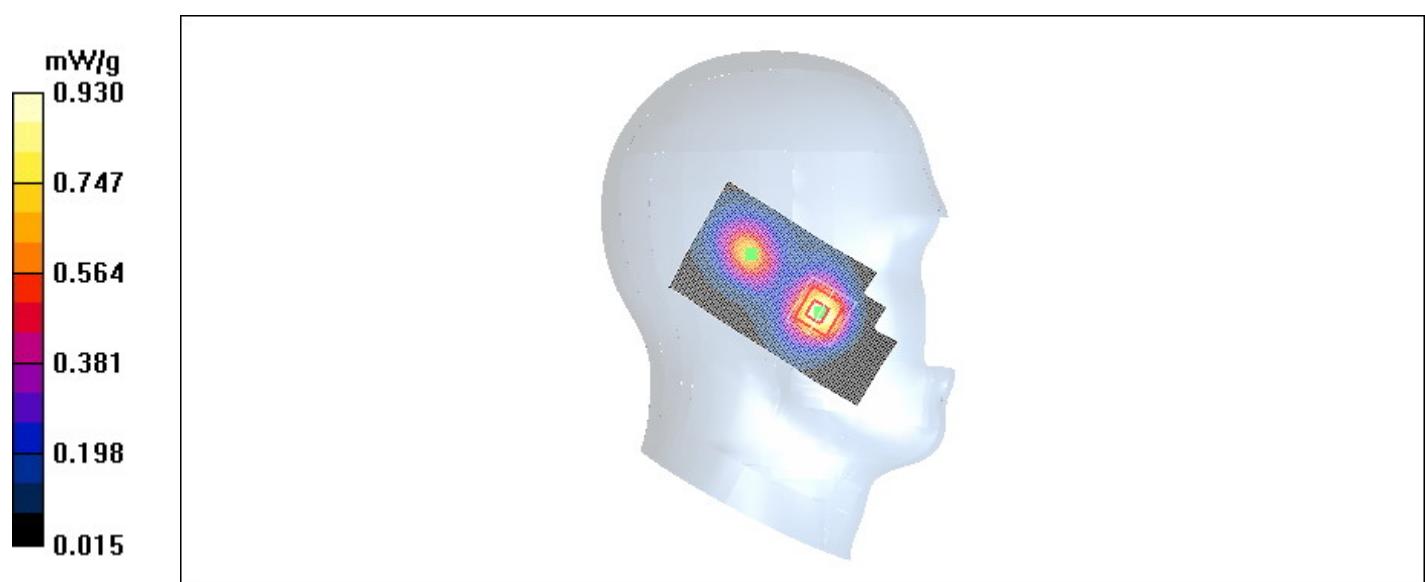


Figure. 9 Left Hand Touch Cheek CDMA PCS Channel 600

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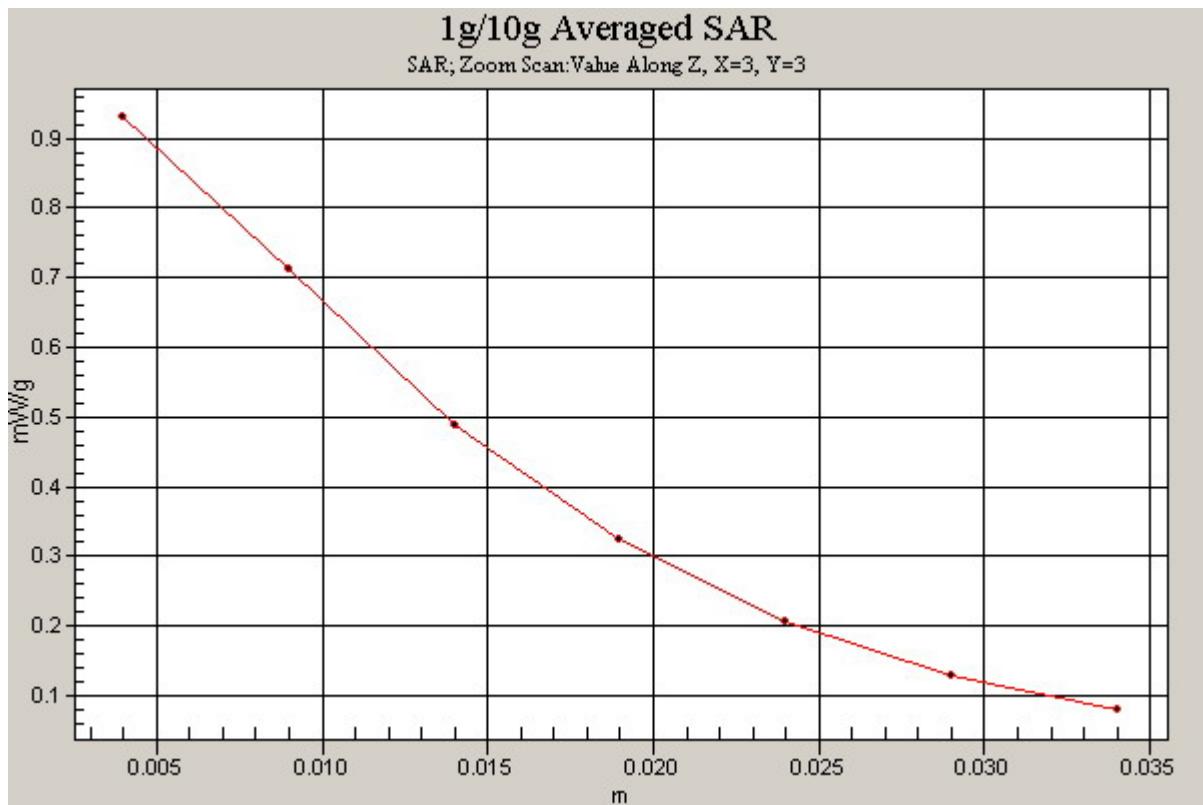


Figure. 10 Z-Scan at power reference point (Left Hand Touch Cheek CDMA PCS Channel 600)

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CDMA PCS Left Cheek Low

Communication System: CDMA PCS; Frequency: 1851.25 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1852$ MHz; $\sigma = 1.36$ mho/m; $\epsilon_r = 39.9$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(5.15, 5.15, 5.15);

Electronics: DAE3 Sn452;

Cheek Low/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.722 mW/g

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

Reference Value = 18.9 V/m; Power Drift = -0.190 dB

Peak SAR (extrapolated) = 0.800 W/kg

SAR(1 g) = 0.611 mW/g; SAR(10 g) = 0.373 mW/g

Maximum value of SAR (measured) = 0.661 mW/g

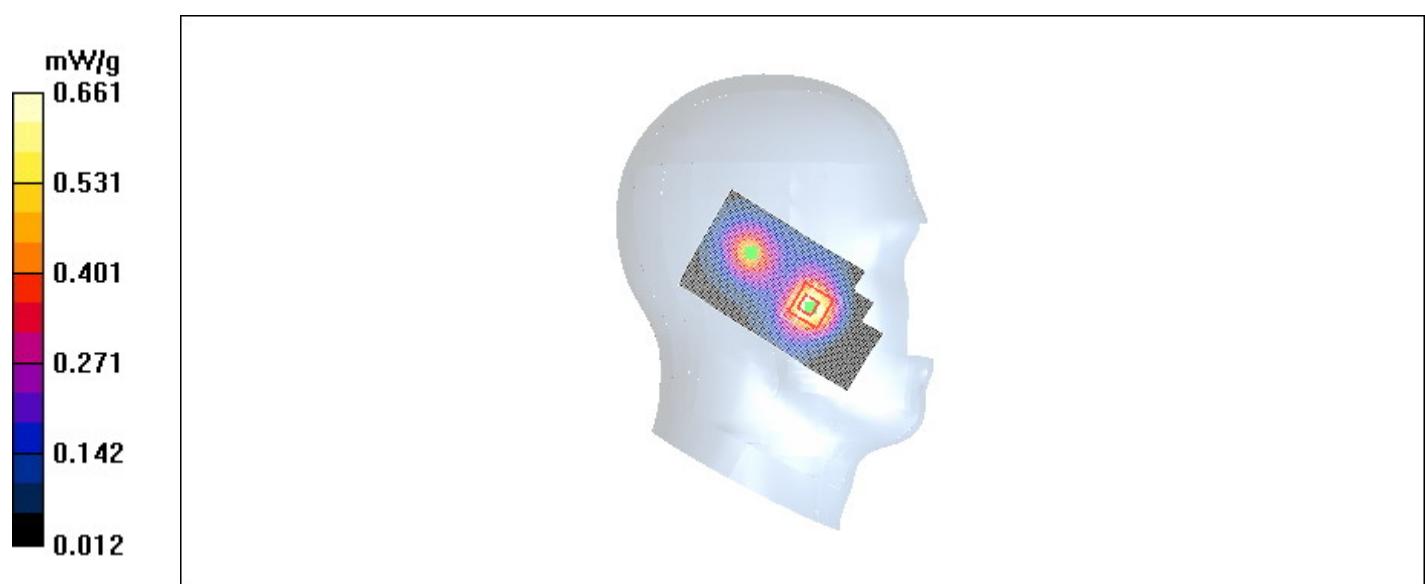


Figure. 11 Left Hand Touch Cheek CDMA PCS Channel 25

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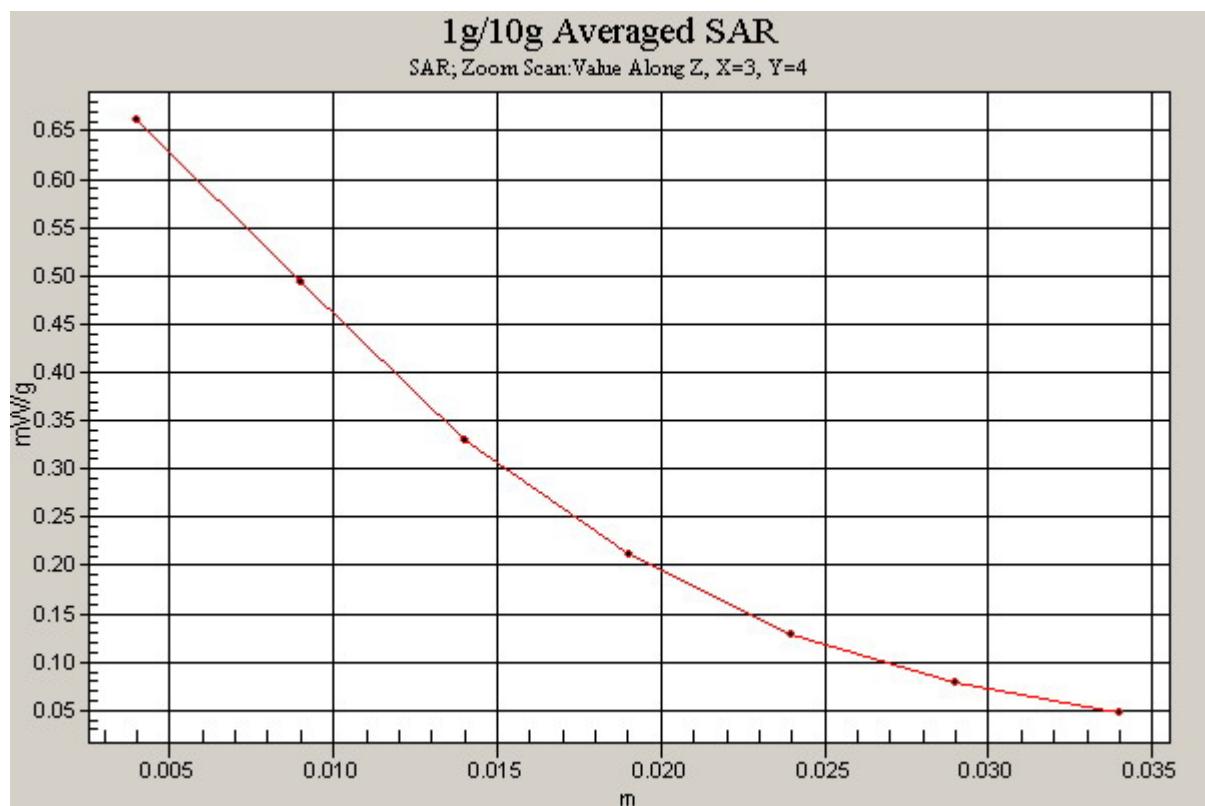


Figure. 12 Z-Scan at power reference point (Left Hand Touch Cheek CDMA PCS Channel 25)

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CDMA PCS Left Tilt High

Communication System: CDMA PCS; Frequency: 1908.75 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1908.75$ MHz; $\sigma = 1.43$ mho/m; $\epsilon_r = 39.6$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(5.15, 5.15, 5.15);

Electronics: DAE3 Sn452;

Tilt High/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.626 mW/g

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

Reference Value = 19.9 V/m; Power Drift = 0.067 dB

Peak SAR (extrapolated) = 0.869 W/kg

SAR(1 g) = 0.525 mW/g; SAR(10 g) = 0.288 mW/g

Maximum value of SAR (measured) = 0.584 mW/g

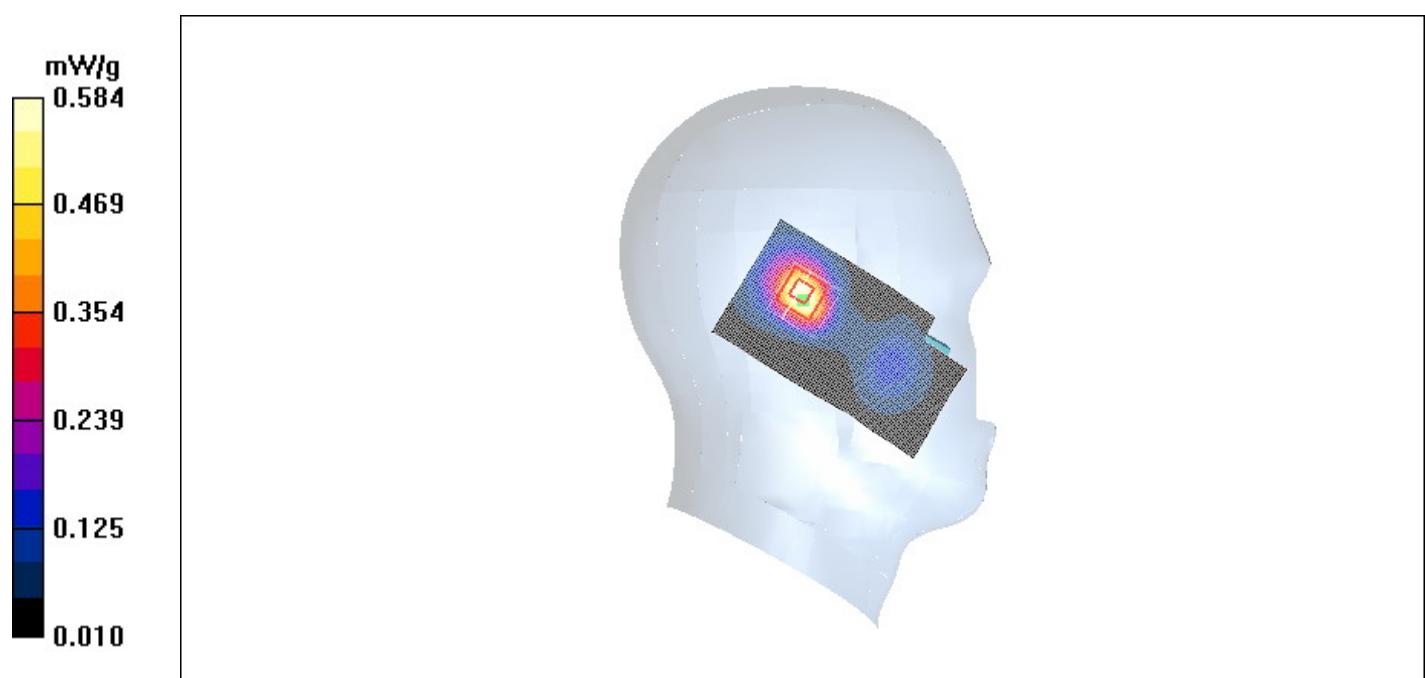


Figure. 13 Left Hand Tilt 15° CDMA PCS Channel 1175

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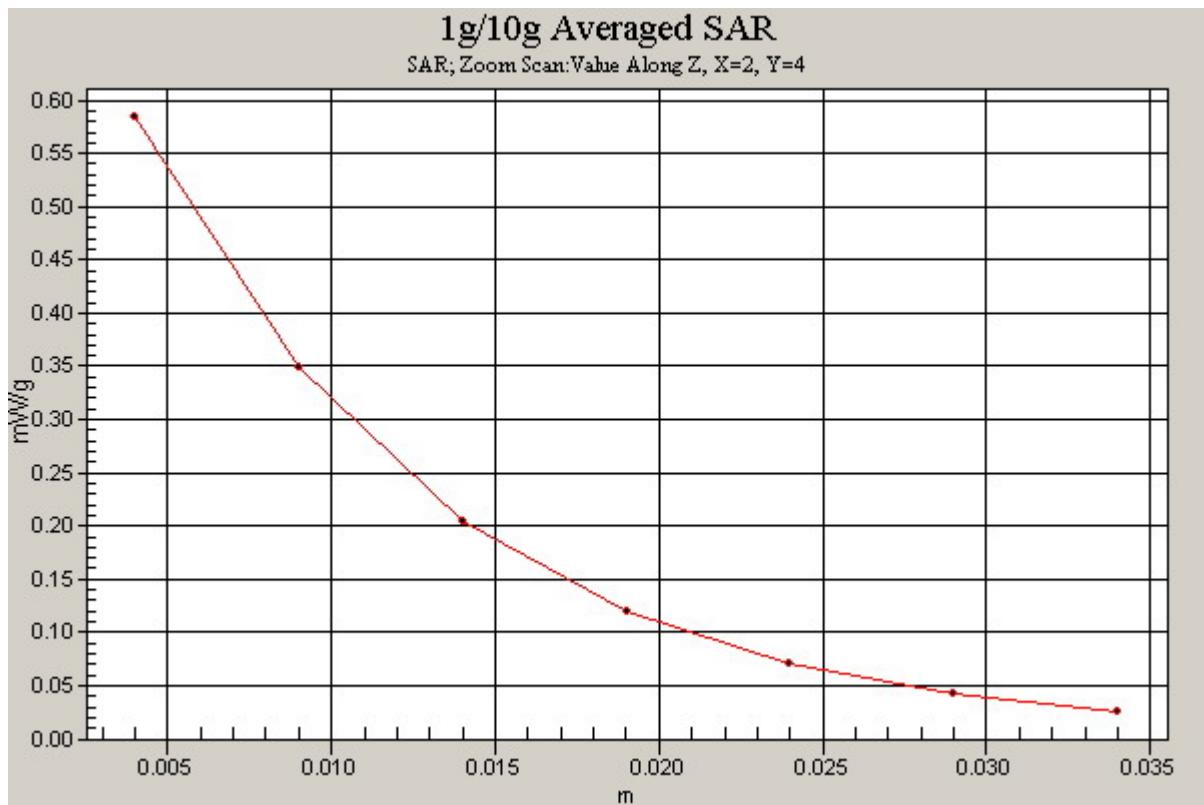


Figure. 14 Z-Scan at power reference point (Left Hand Tilt 15° CDMA PCS Channel 1175)

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CDMA PCS Left Tilt Middle

Communication System: CDMA PCS; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.39$ mho/m; $\epsilon_r = 39.8$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(5.15, 5.15, 5.15);

Electronics: DAE3 Sn452;

Tilt Middle/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.721 mW/g

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

Reference Value = 21.8 V/m; Power Drift = -0.149 dB

Peak SAR (extrapolated) = 1.03 W/kg

SAR(1 g) = 0.628 mW/g; SAR(10 g) = 0.341 mW/g

Maximum value of SAR (measured) = 0.707 mW/g

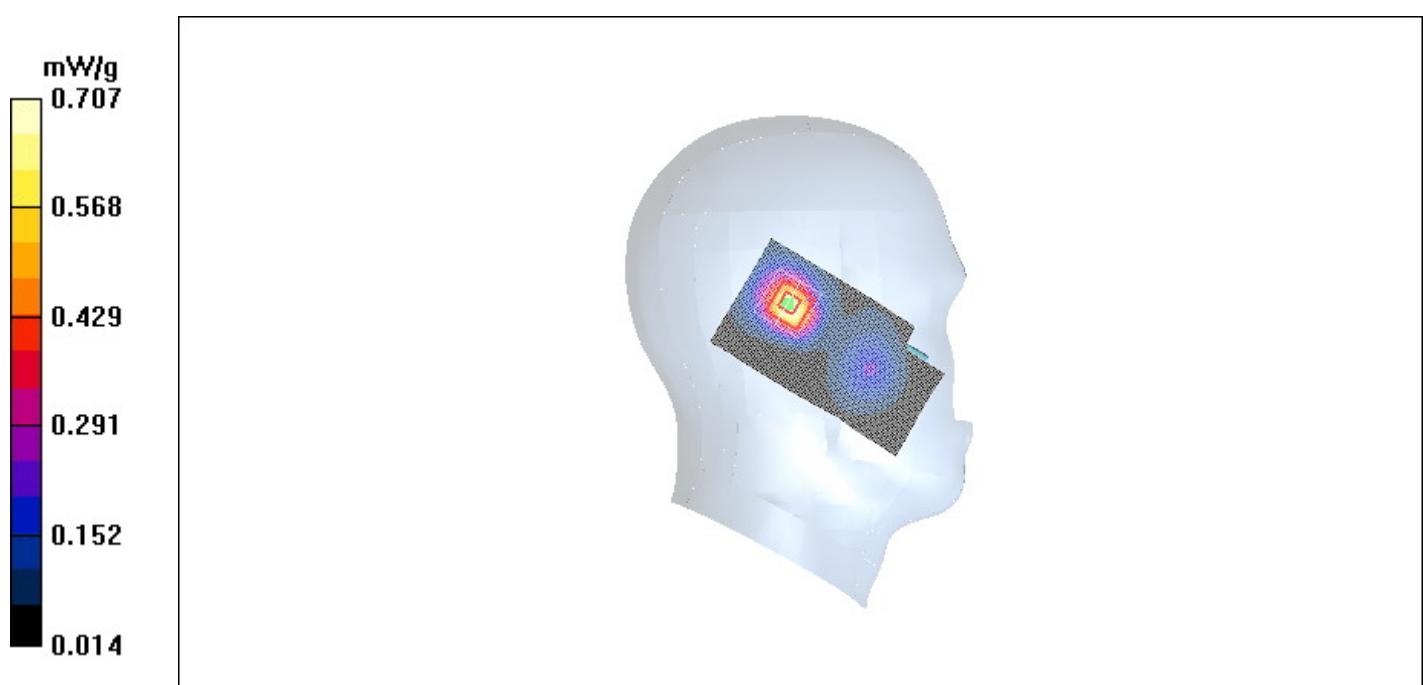


Figure. 15 Left Hand Tilt 15° CDMA PCS Channel 600

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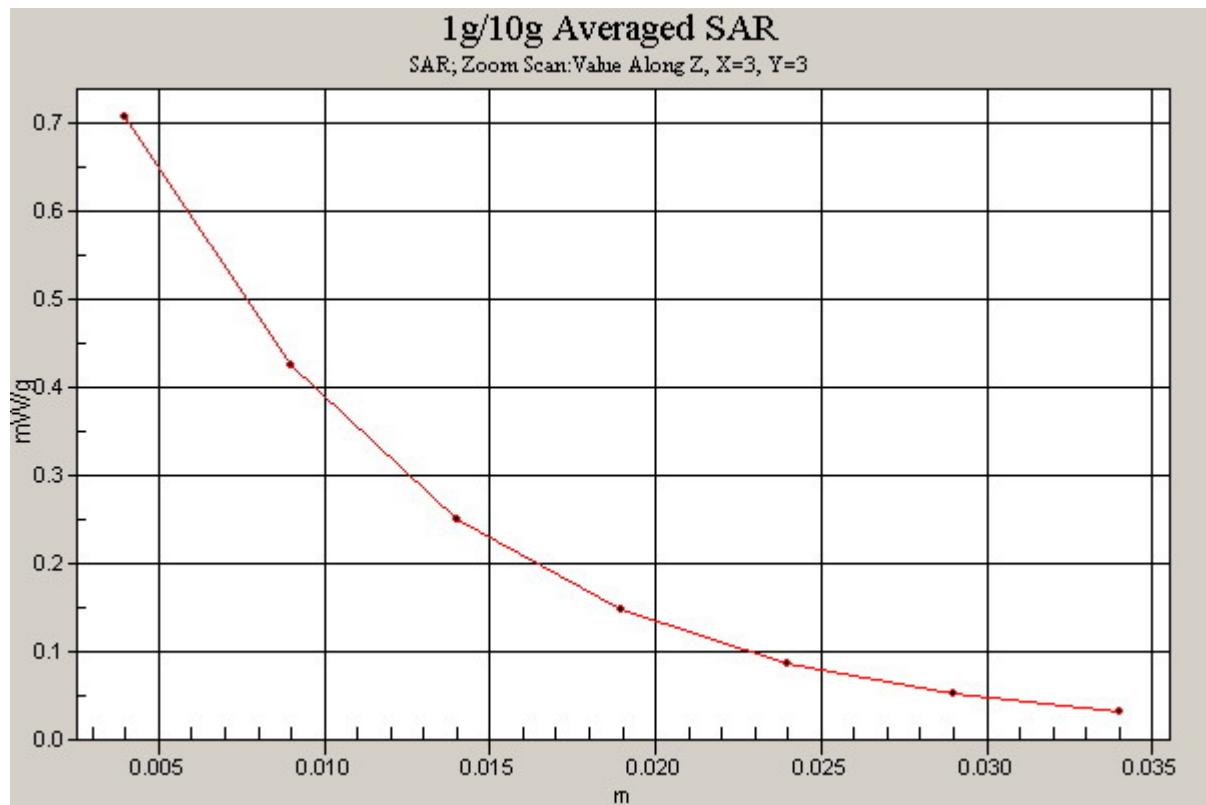


Figure. 16 Z-Scan at power reference point (Left Hand Tilt 15° CDMA PCS Channel 600)

CDMA PCS Left Tilt Low

Communication System: CDMA PCS; Frequency: 1851.25 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1852$ MHz; $\sigma = 1.36$ mho/m; $\epsilon_r = 39.9$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(5.15, 5.15, 5.15);

Electronics: DAE3 Sn452;

Tilt Low/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.572 mW/g

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

Reference Value = 19.5 V/m; Power Drift = -0.176 dB

Peak SAR (extrapolated) = 0.798 W/kg

SAR(1 g) = 0.487 mW/g; SAR(10 g) = 0.264 mW/g

Maximum value of SAR (measured) = 0.549 mW/g

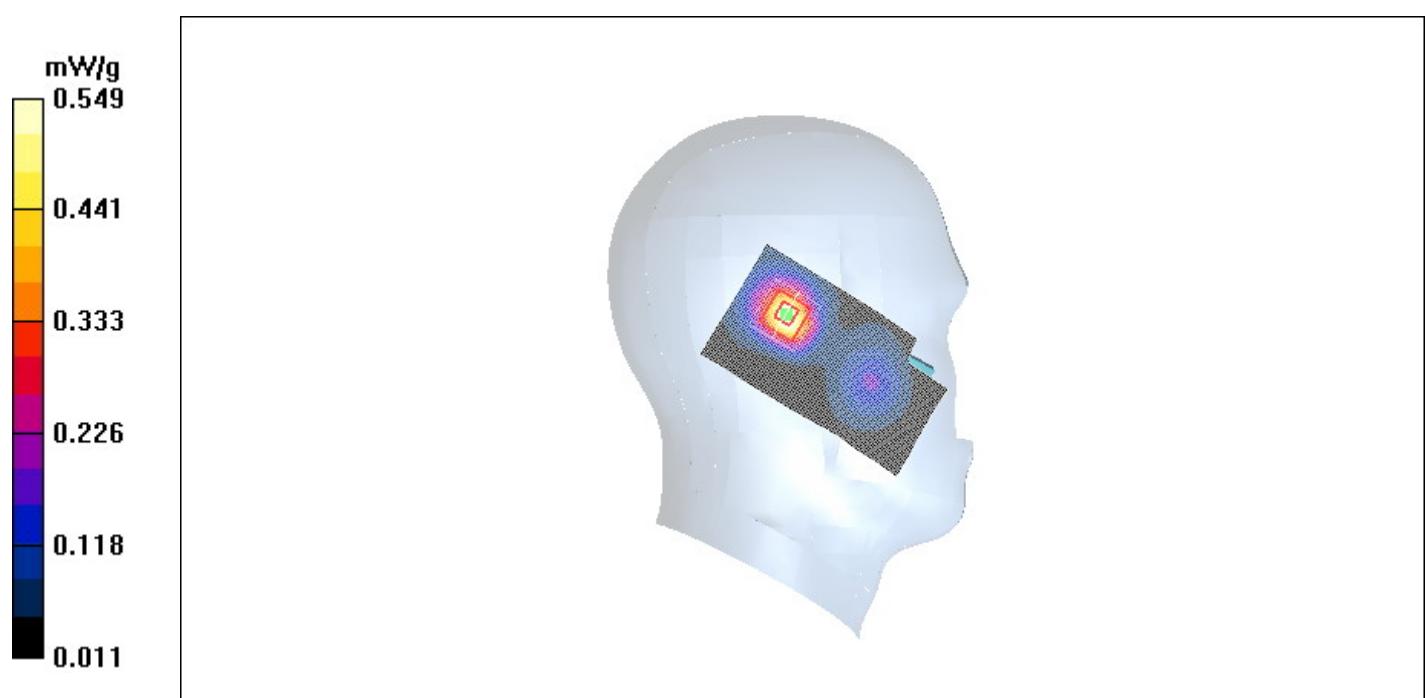


Figure. 17 Left Hand Tilt 15° CDMA PCS Channel 25

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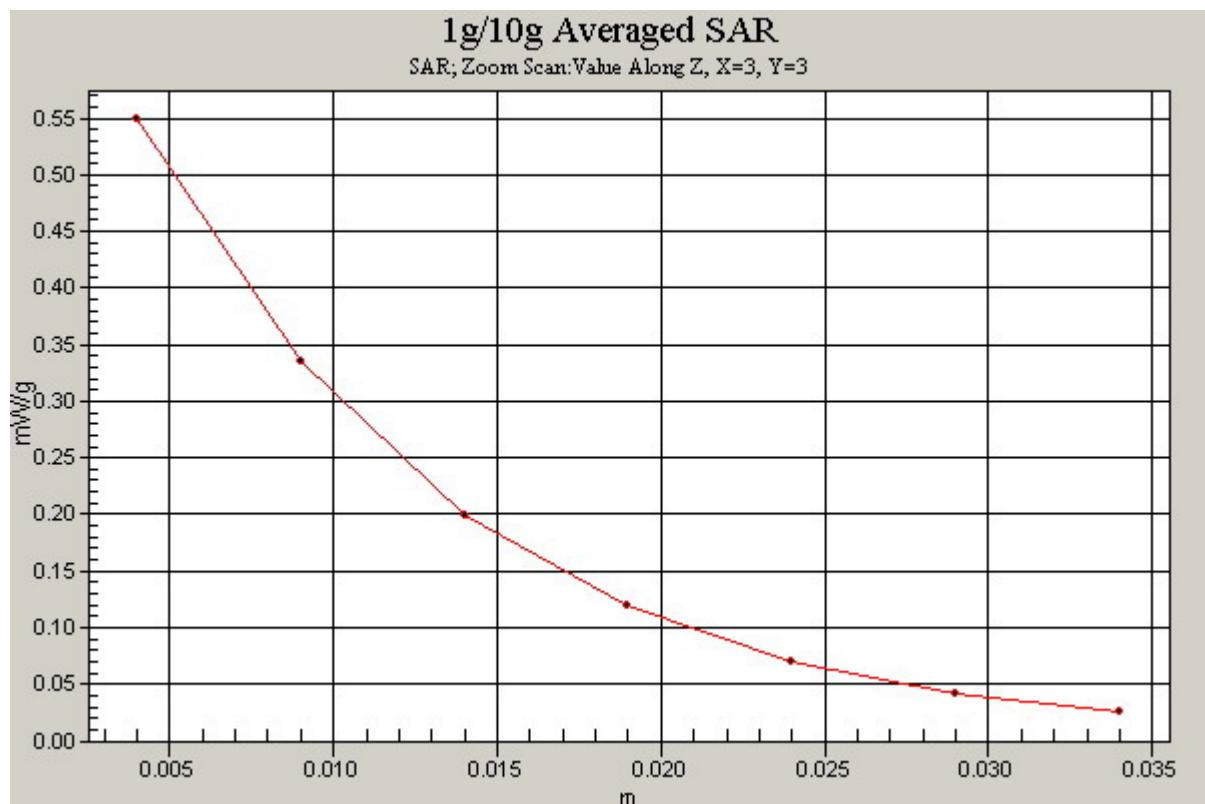


Figure.18 Z-Scan at power reference point (Left Hand Tilt 15° CDMA PCS Channel 25)

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CDMA PCS Right Cheek High

Communication System: CDMA PCS; Frequency: 1908.75 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1908.75$ MHz; $\sigma = 1.43$ mho/m; $\epsilon_r = 39.6$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(5.15, 5.15, 5.15);

Electronics: DAE3 Sn452;

Cheek High/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.617 mW/g

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

Reference Value = 17.9 V/m; Power Drift = -0.079 dB

Peak SAR (extrapolated) = 0.697 W/kg

SAR(1 g) = 0.534 mW/g; SAR(10 g) = 0.328 mW/g

Maximum value of SAR (measured) = 0.579 mW/g

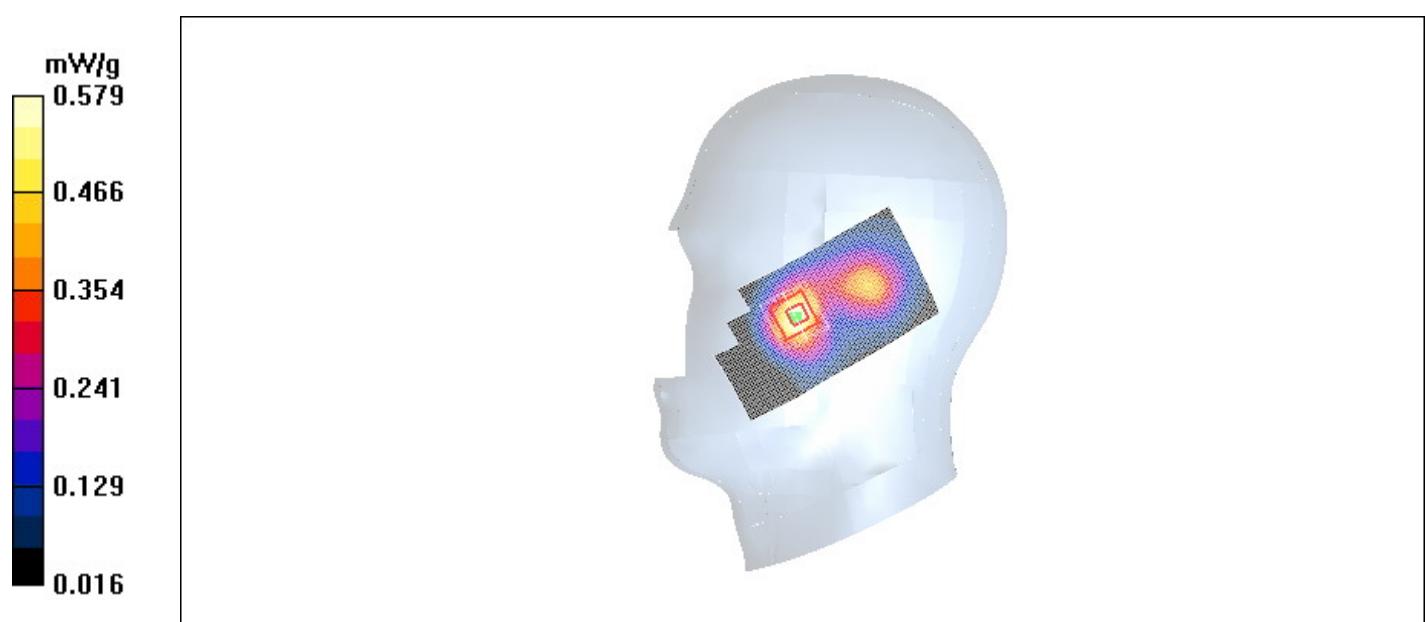


Figure. 19 Right Hand Touch Cheek CDMA PCS Channel 1175

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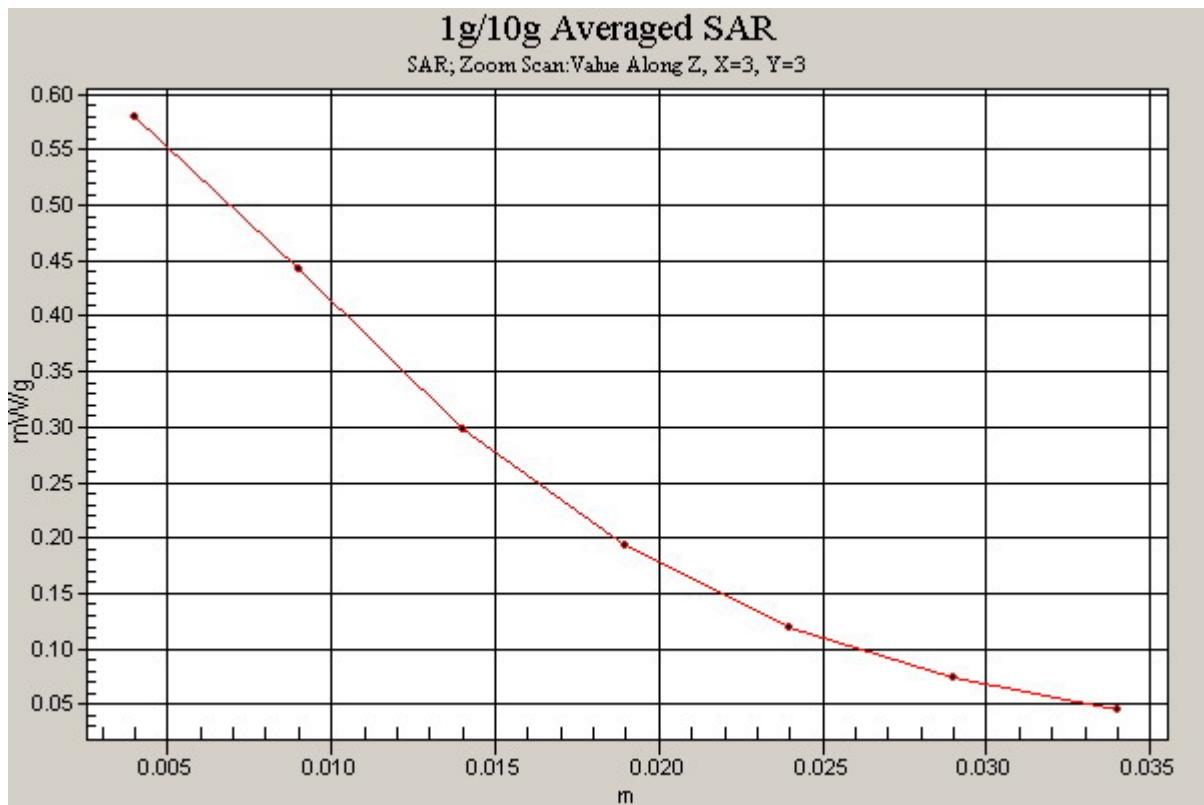


Figure. 20 Z-Scan at power reference point (Right Hand Touch Cheek CDMA PCS Channel 1175)

CDMA PCS Right Cheek Middle

Communication System: CDMA PCS; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.39$ mho/m; $\epsilon_r = 39.8$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(5.15, 5.15, 5.15);

Electronics: DAE3 Sn452;

Cheek Middle/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.780 mW/g

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

Reference Value = 19.8 V/m; Power Drift = 0.084 dB

Peak SAR (extrapolated) = 0.913 W/kg

SAR(1 g) = 0.701 mW/g; SAR(10 g) = 0.431 mW/g

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

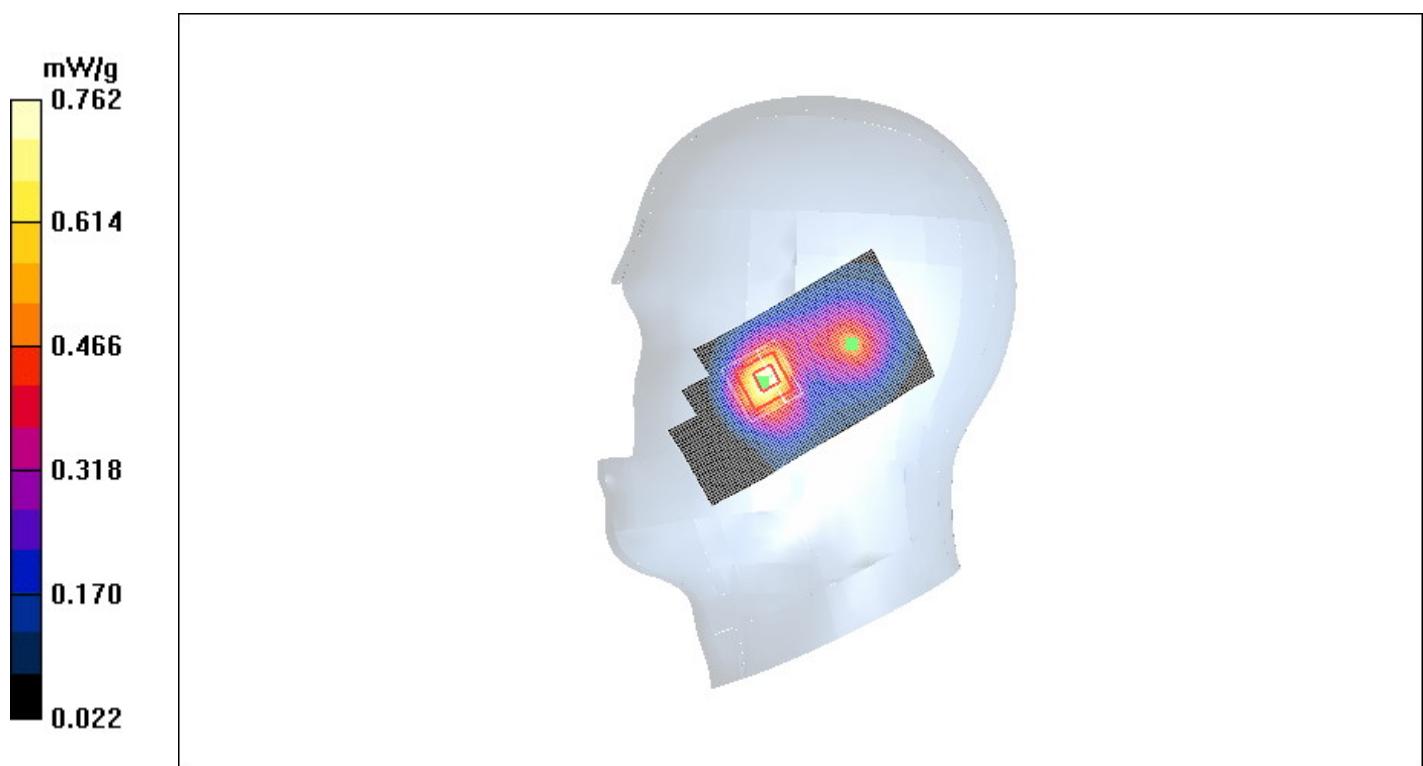


Figure. 21 Right Hand Touch Cheek CDMA PCS Channel 600

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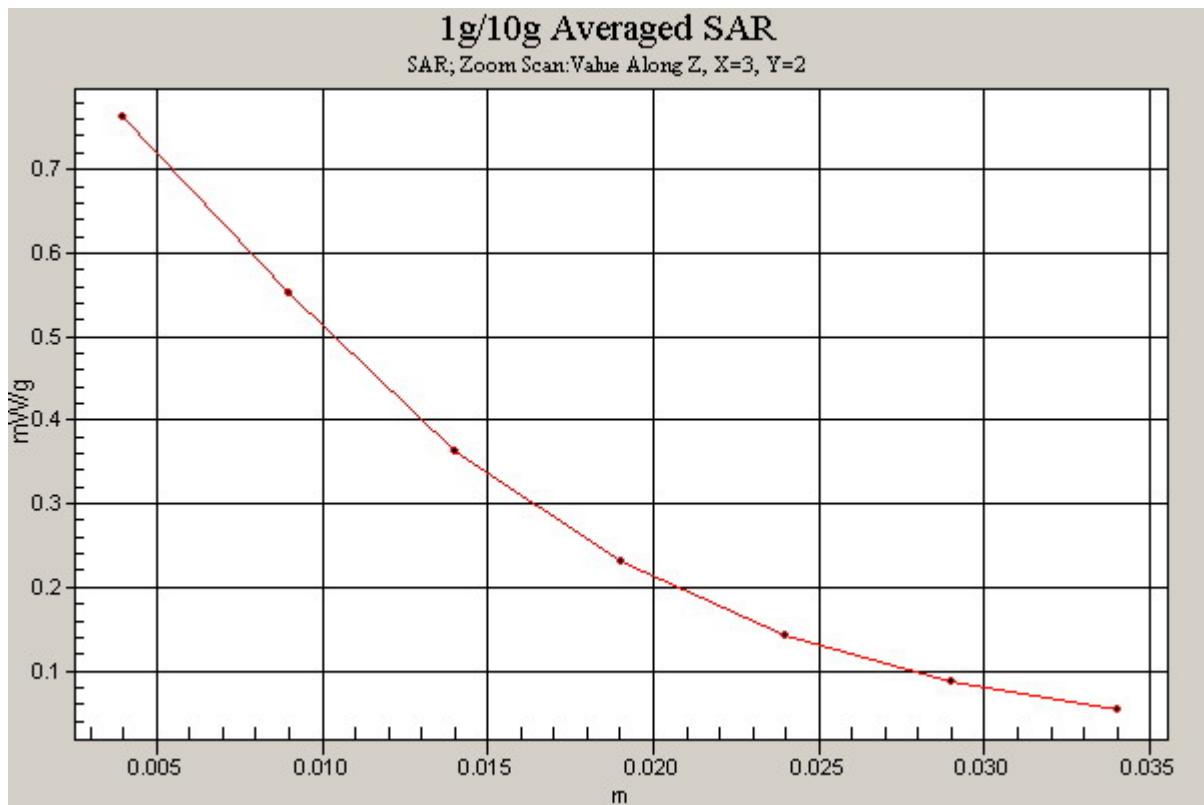


Figure. 22 Z-Scan at power reference point (Right Hand Touch Cheek CDMA PCS Channel 600)

CDMA PCS Right Cheek Low

Communication System: CDMA PCS; Frequency: 1851.25 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1852$ MHz; $\sigma = 1.36$ mho/m; $\epsilon_r = 39.9$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(5.15, 5.15, 5.15);

Electronics: DAE3 Sn452;

Cheek Low/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.606 mW/g

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

Reference Value = 17.2 V/m; Power Drift = 0.081 dB

Peak SAR (extrapolated) = 0.707 W/kg

SAR(1 g) = 0.543 mW/g; SAR(10 g) = 0.333 mW/g

Maximum value of SAR (measured) = 0.601 mW/g

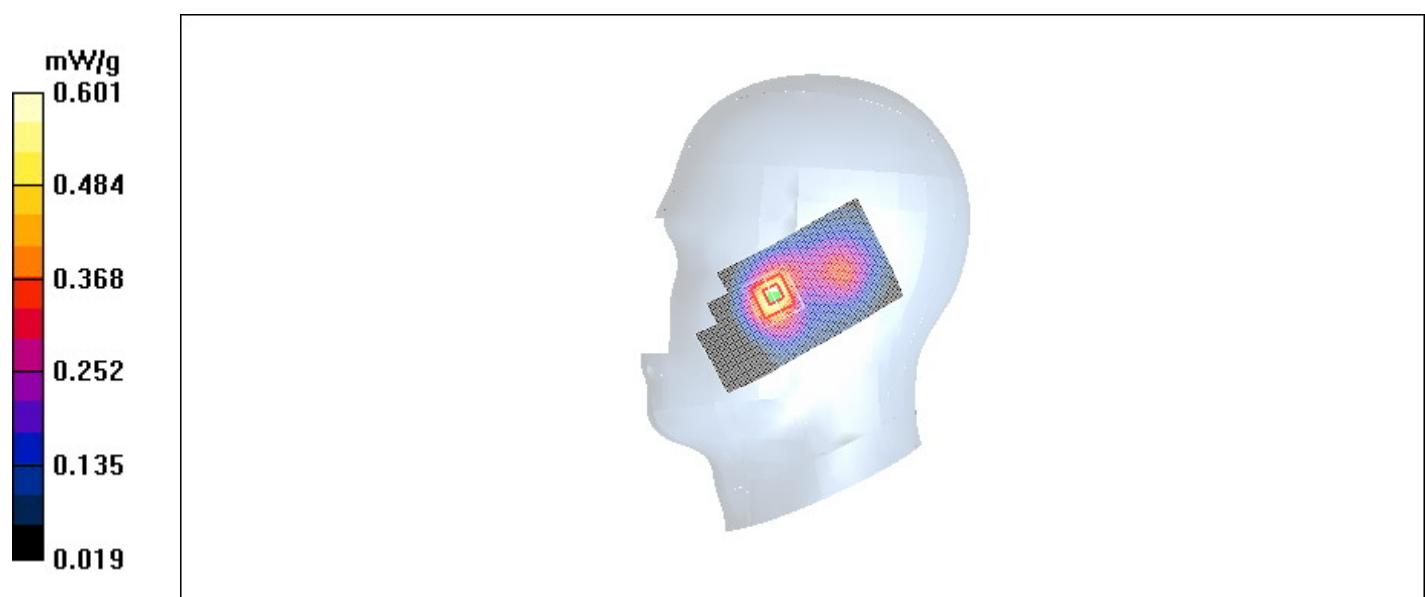


Figure. 23 Right Hand Touch Cheek CDMA PCS Channel 25

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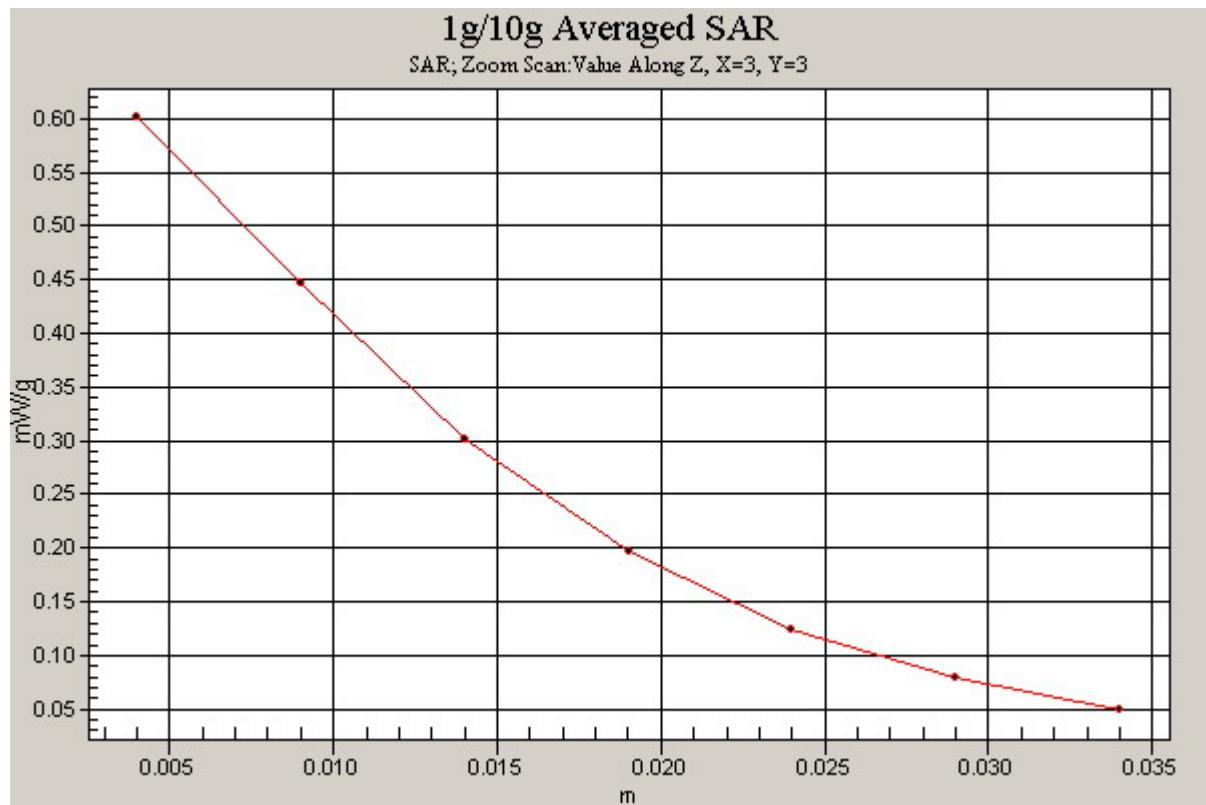


Figure. 24 Z-Scan at power reference point (Right Hand Touch Cheek CDMA PCS Channel 25)

CDMA PCS Right Tilt High

Communication System: CDMA PCS; Frequency: 1908.75 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1908.75$ MHz; $\sigma = 1.43$ mho/m; $\epsilon_r = 39.6$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(5.15, 5.15, 5.15);

Electronics: DAE3 Sn452;

Tilt High/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

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 = 19.7 V/m; Power Drift = -0.100 dB

Peak SAR (extrapolated) = 0.685 W/kg

SAR(1 g) = 0.423 mW/g; SAR(10 g) = 0.238 mW/g

Maximum value of SAR (measured) = 0.471 mW/g

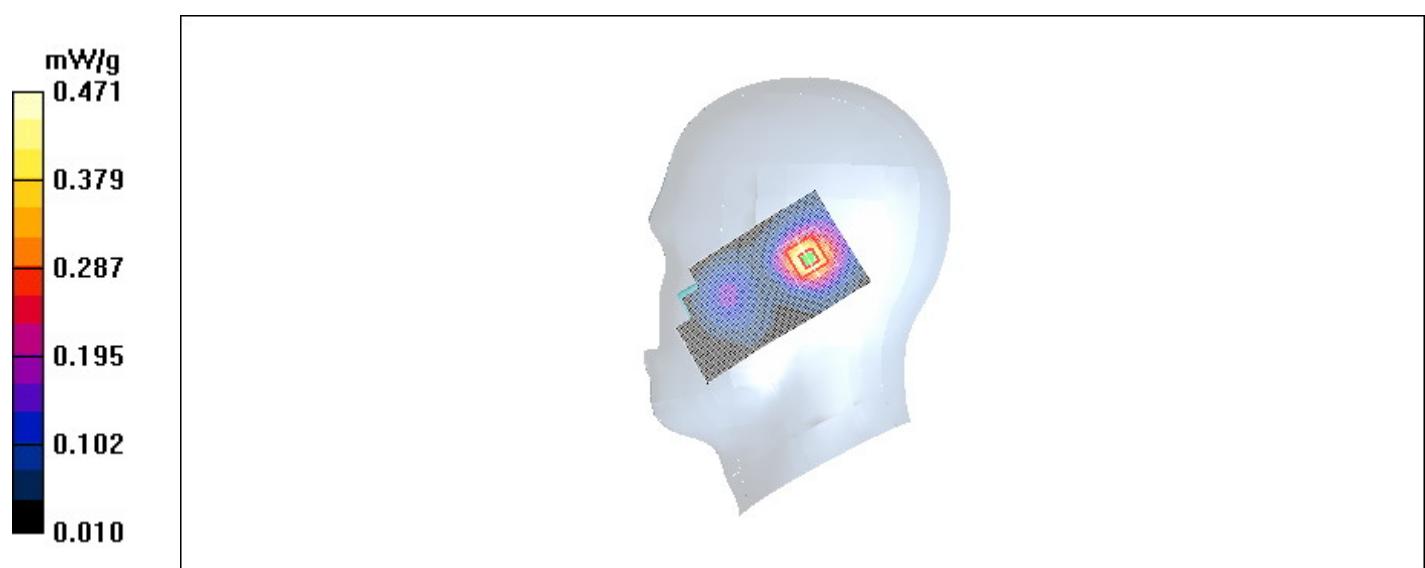


Figure. 25 Right Hand Tilt 15° CDMA PCS Channel 1175

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Figure. 26 Z-Scan at power reference point (Right Hand Tilt 15° CDMA PCS Channel 1175)

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CDMA PCS Right Tilt Middle

Communication System: CDMA PCS; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.39$ mho/m; $\epsilon_r = 39.8$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(5.15, 5.15, 5.15);

Electronics: DAE3 Sn452;

Tilt Middle/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.668 mW/g

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

Reference Value = 22.9 V/m; Power Drift = 0.076 dB

Peak SAR (extrapolated) = 0.943 W/kg

SAR(1 g) = 0.583 mW/g; SAR(10 g) = 0.326 mW/g

Maximum value of SAR (measured) = 0.656 mW/g

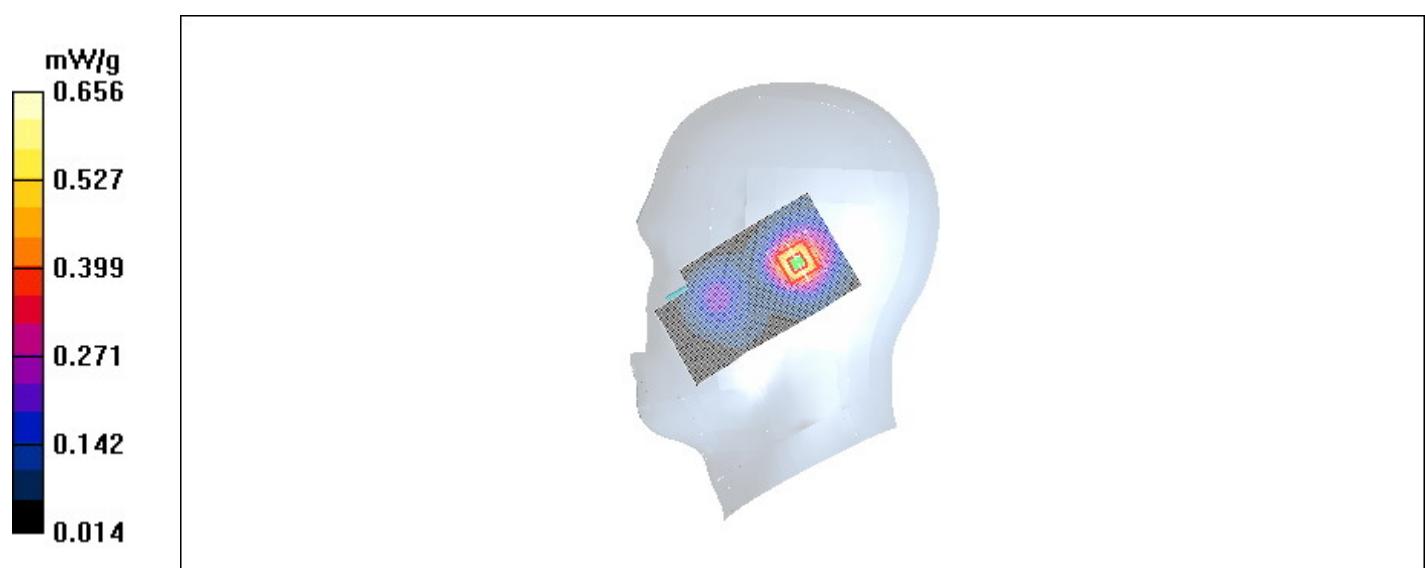


Figure. 27 Right Hand Tilt 15° CDMA PCS Channel 600

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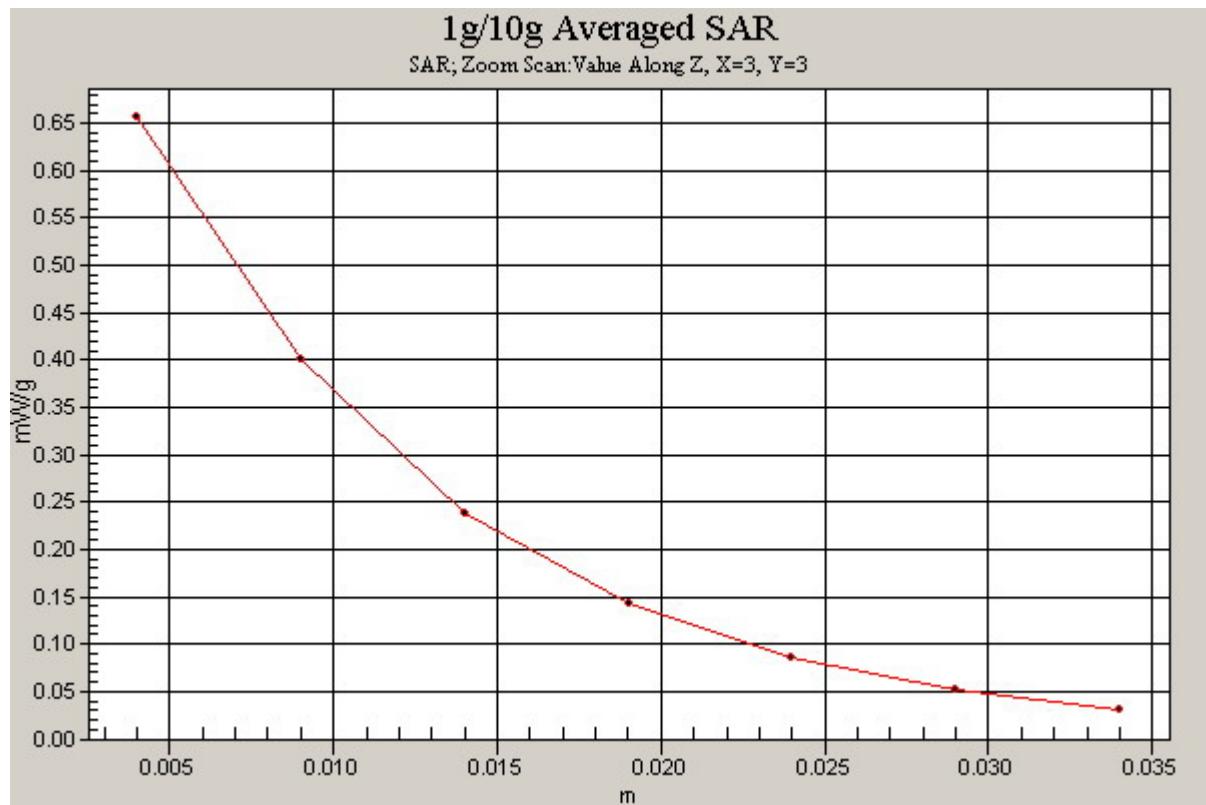


Figure.28 Z-Scan at power reference point (Right Hand Tilt 15° CDMA PCS Channel 600)

CDMA PCS Right Tilt Low

Communication System: CDMA PCS; Frequency: 1851.25 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1852$ MHz; $\sigma = 1.36$ mho/m; $\epsilon_r = 39.9$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(5.15, 5.15, 5.15);

Electronics: DAE3 Sn452;

Tilt Low/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.483 mW/g

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

Reference Value = 19.5 V/m; Power Drift = 0.019 dB

Peak SAR (extrapolated) = 0.675 W/kg

SAR(1 g) = 0.413 mW/g; SAR(10 g) = 0.232 mW/g

Maximum value of SAR (measured) = 0.466 mW/g

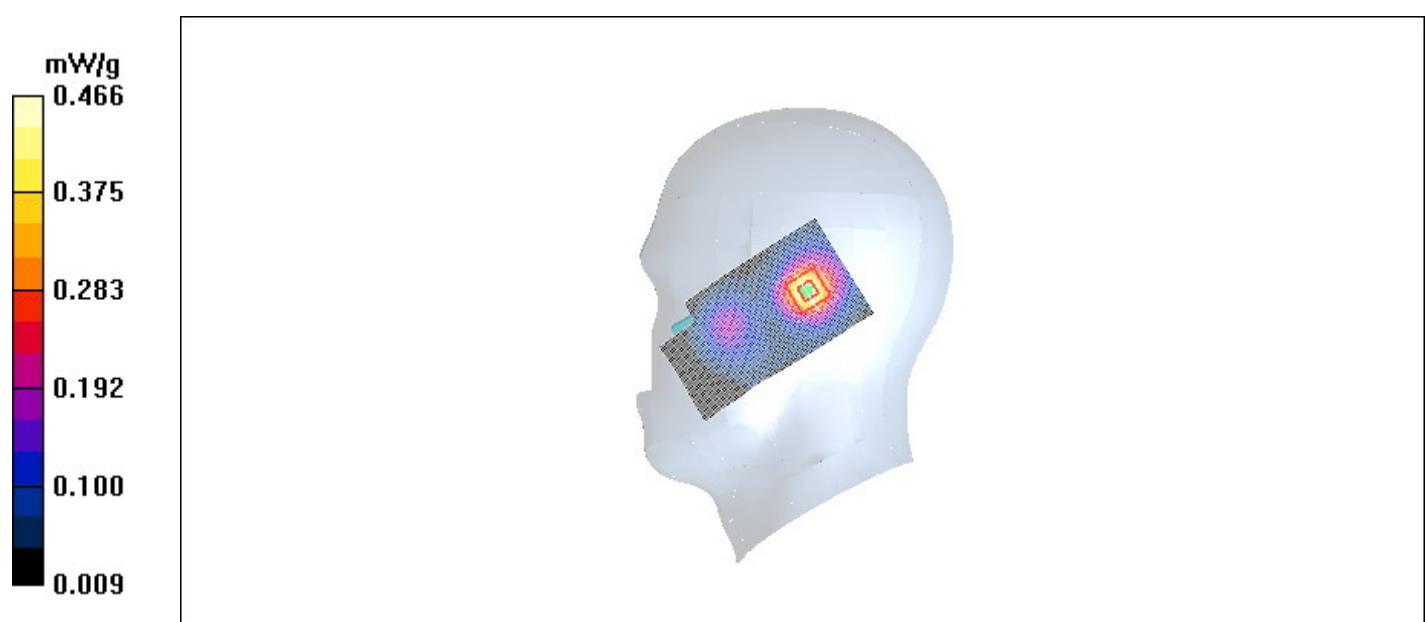


Figure. 29 Right Hand Tilt 15° CDMA PCS Channel 25

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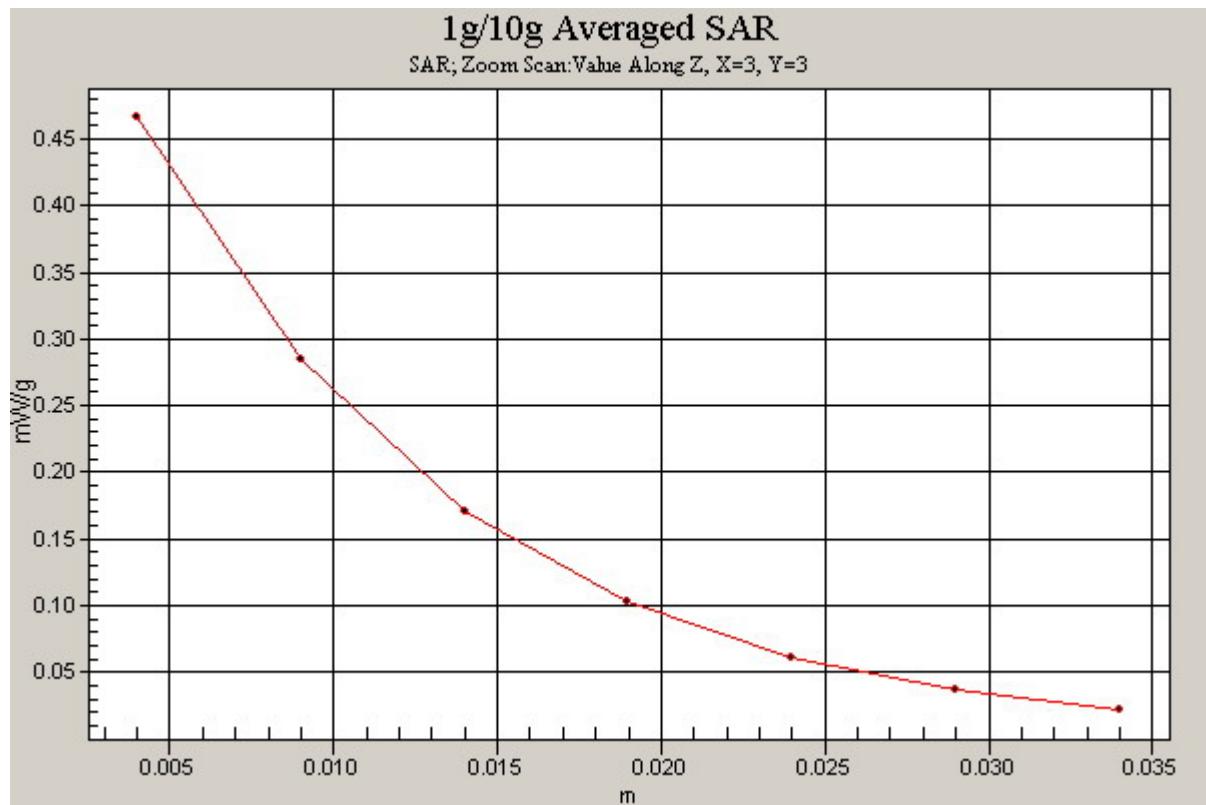


Figure. 30 Z-Scan at power reference point (Right Hand Tilt 15° CDMA PCS Channel 25)

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CDMA PCS Towards Phantom High

Communication System: CDMA PCS; Frequency: 1908.75 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1908.75$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 53.4$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(4.64, 4.64, 4.64);

Electronics: DAE3 Sn452;

Toward Phantom High/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

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

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

Reference Value = 10.4 V/m; Power Drift = 0.149 dB

Peak SAR (extrapolated) = 0.398 W/kg

SAR(1 g) = 0.262 mW/g; SAR(10 g) = 0.162 mW/g

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

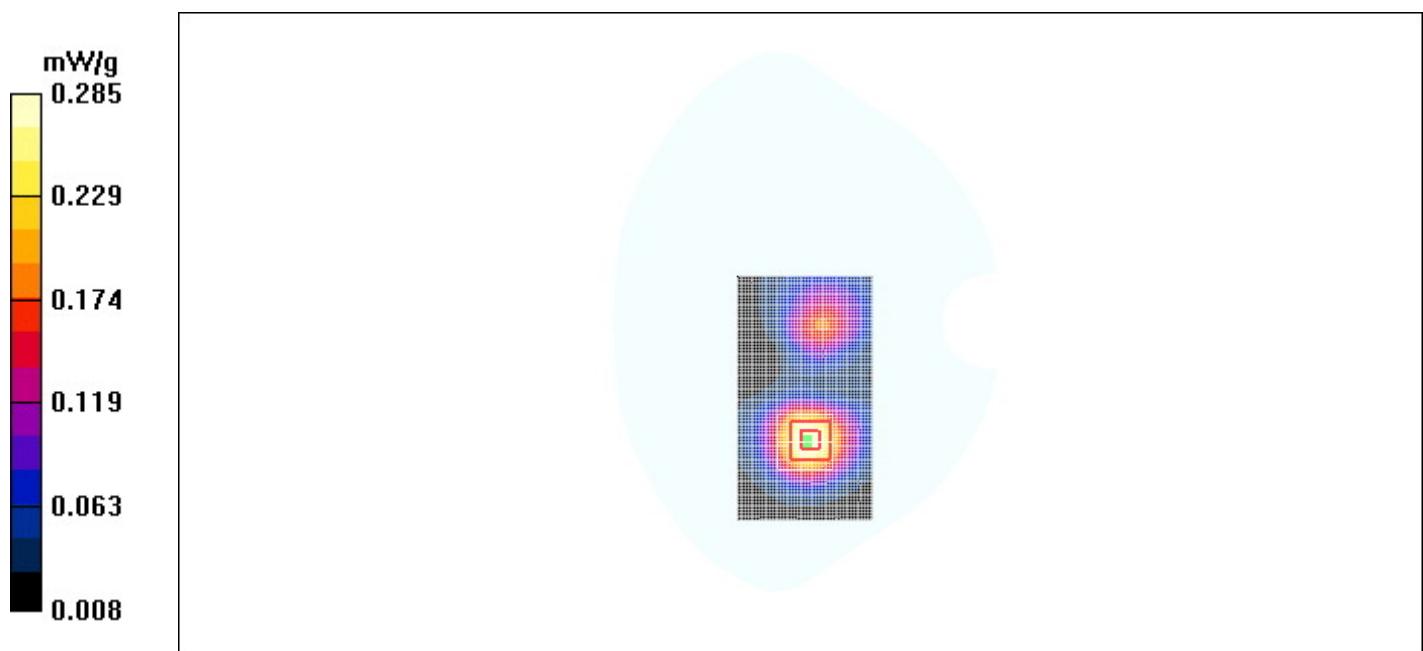


Figure. 31 Body, Towards Phantom, CDMA PCS Channel 1175

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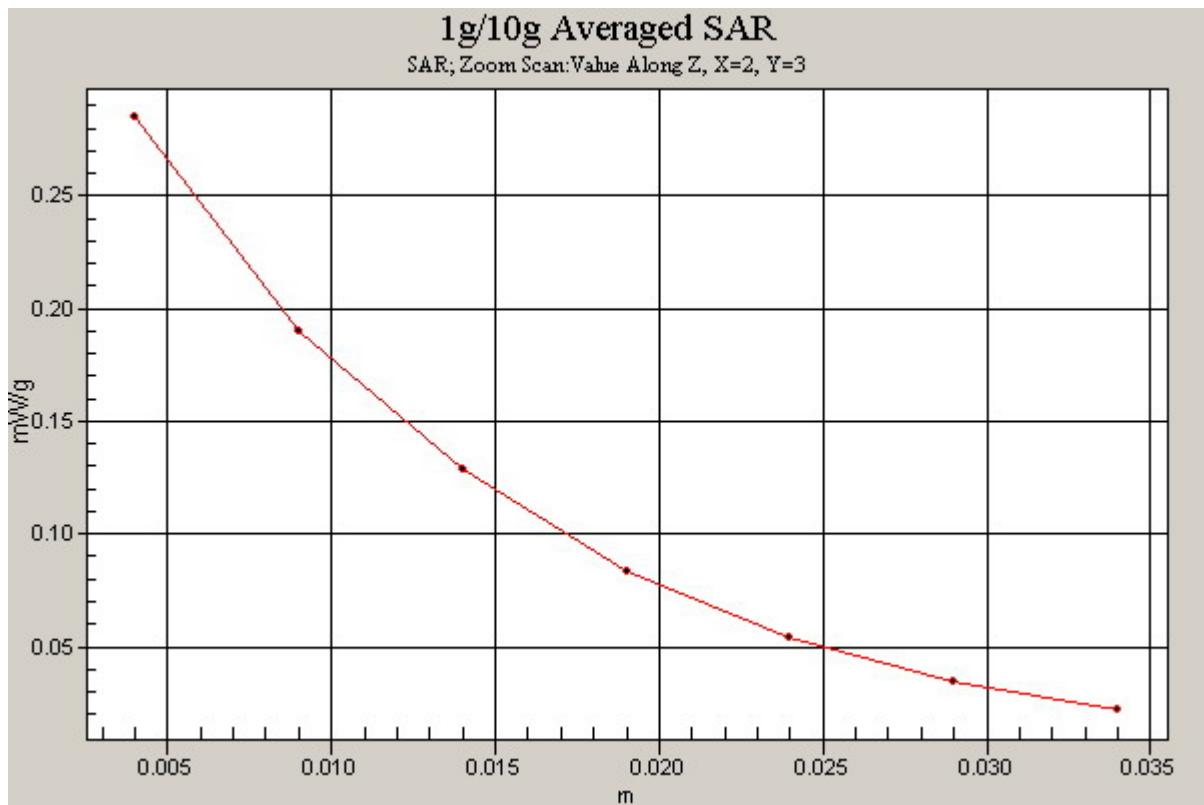


Figure. 32 Z-Scan at power reference point (Body, Towards Phantom, CDMA PCS Channel 1175)

CDMA PCS Towards Phantom Middle

Communication System: CDMA PCS; Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.5$ mho/m; $\epsilon_r = 53.4$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(4.64, 4.64, 4.64);

Electronics: DAE3 Sn452;

Toward Phantom Middle/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

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

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

Reference Value = 11.4 V/m; Power Drift = 0.159 dB

Peak SAR (extrapolated) = 0.483 W/kg

SAR(1 g) = 0.322 mW/g; SAR(10 g) = 0.201 mW/g

Maximum value of SAR (measured) = 0.351 mW/g

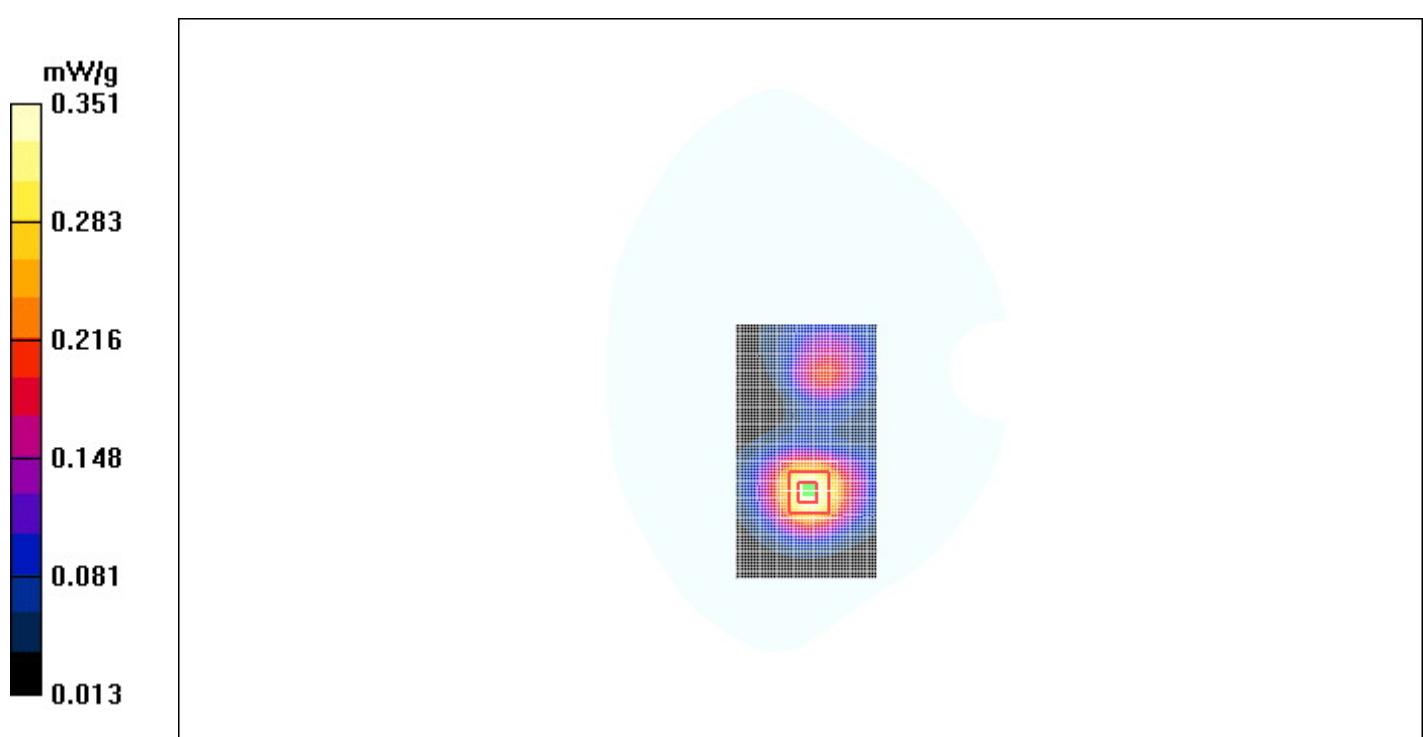


Figure. 33 Body, Towards Phantom, CDMA PCS Channel 600

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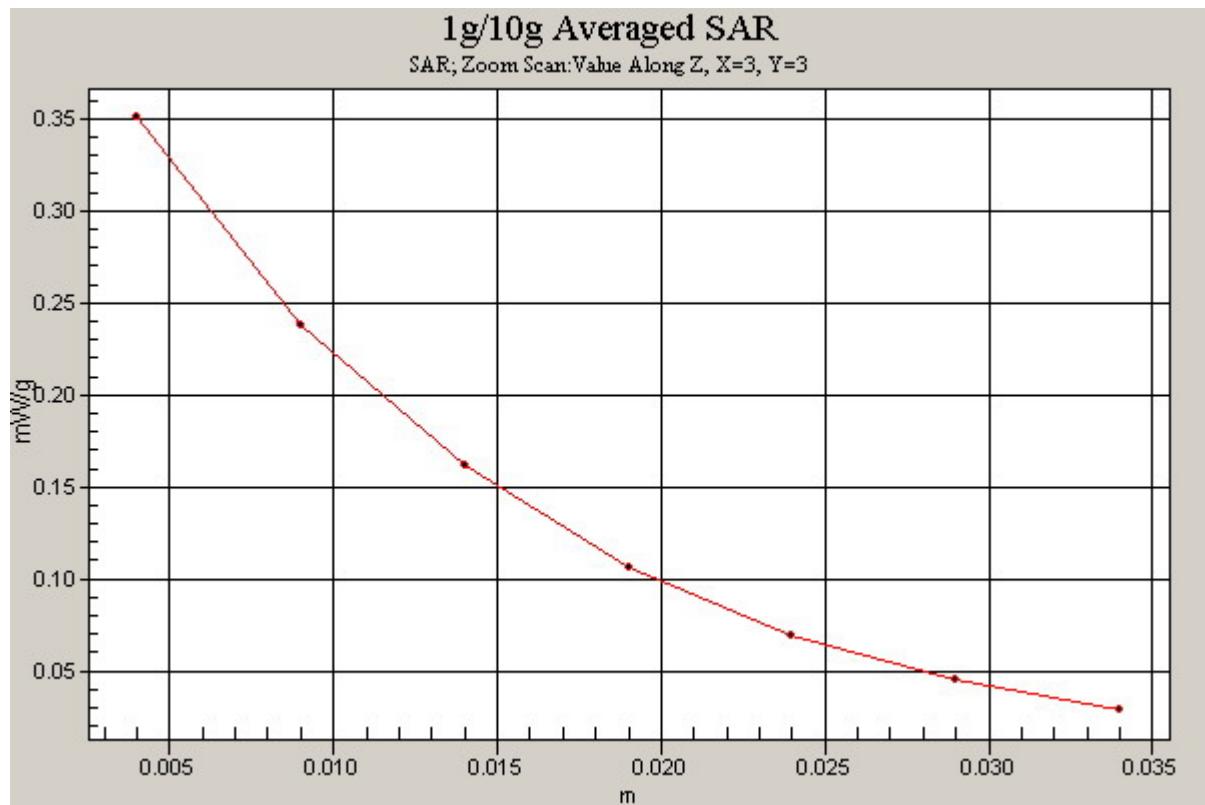


Figure. 34 Z-Scan at power reference point (Body, Towards Phantom, CDMA PCS Channel 600)

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CDMA PCS Towards Phantom Low

Communication System: CDMA PCS; Frequency: 1851.25 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1852$ MHz; $\sigma = 1.46$ mho/m; $\epsilon_r = 53.5$; $\rho = 1000$ kg/m³ Probe: ET3DV6 - SN1737; ConvF(4.64, 4.64, 4.64);

Electronics: DAE3 Sn452;

Toward Phantom Low/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.253 mW/g

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

Reference Value = 9.01 V/m; Power Drift = 0.007 dB

Peak SAR (extrapolated) = 0.336 W/kg

SAR(1 g) = 0.228 mW/g; SAR(10 g) = 0.145 mW/g

Maximum value of SAR (measured) = 0.246 mW/g

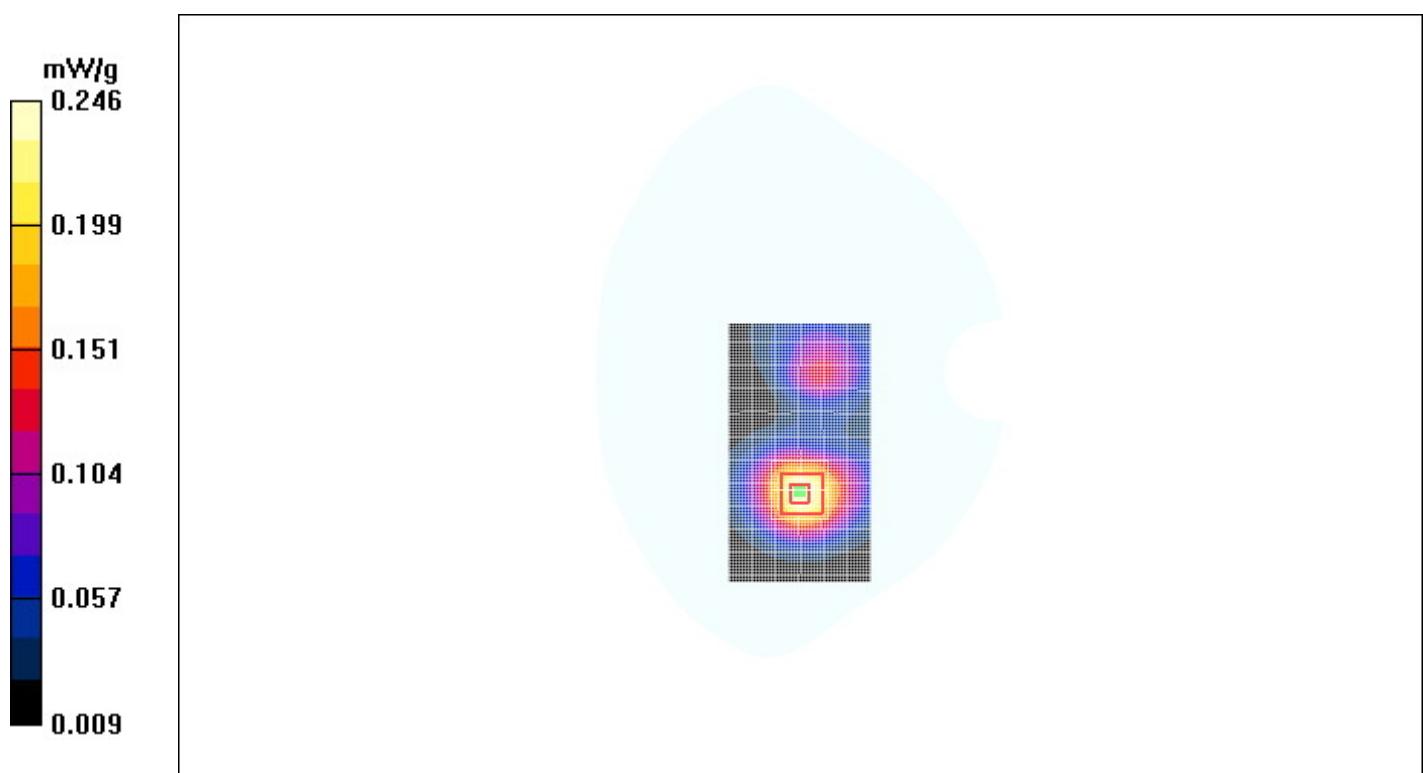


Figure. 35 Body, Towards Phantom, CDMA PCS Channel 25

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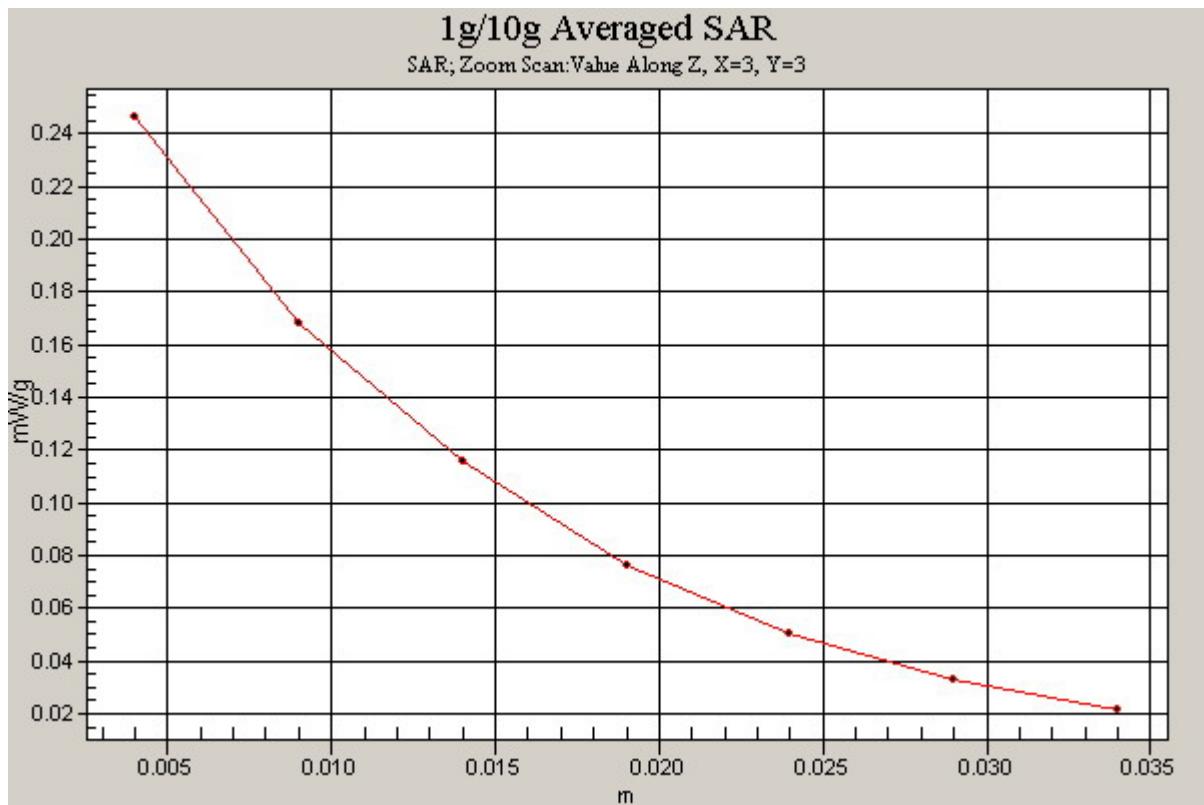


Figure. 36 Z-Scan at power reference point (Body, Towards Phantom, CDMA PCS Channel 25)

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CDMA PCS Towards Ground High

Communication System: CDMA PCS; Frequency: 1908.75 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1908.75$ MHz; $\sigma = 1.53$ mho/m; $\epsilon_r = 53.4$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(4.64, 4.64, 4.64);

Electronics: DAE3 Sn452;

Toward Ground High/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.495 mW/g

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

Reference Value = 15.0 V/m; Power Drift = -0.199 dB

Peak SAR (extrapolated) = 0.653 W/kg

SAR(1 g) = 0.439 mW/g; SAR(10 g) = 0.278 mW/g

Maximum value of SAR (measured) = 0.474 mW/g

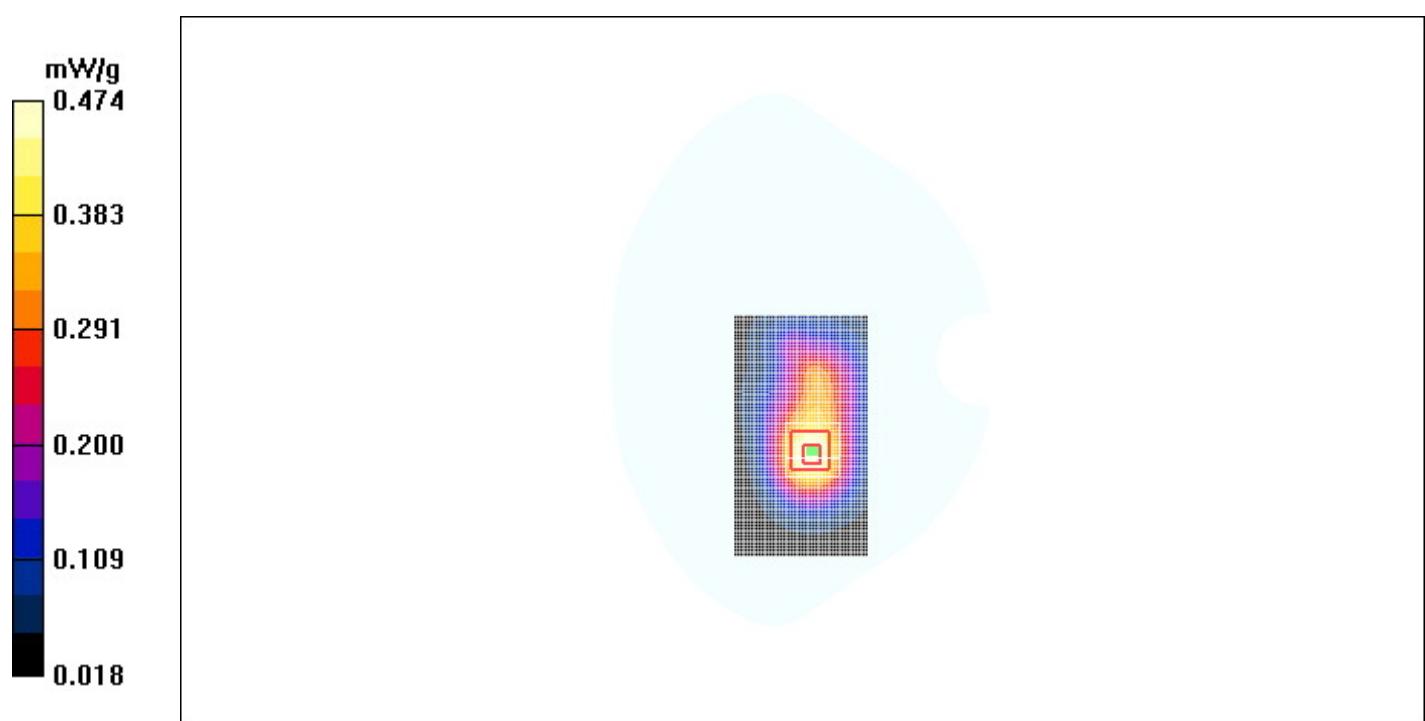


Figure. 37 Body, Towards Ground, CDMA PCS Channel 1175

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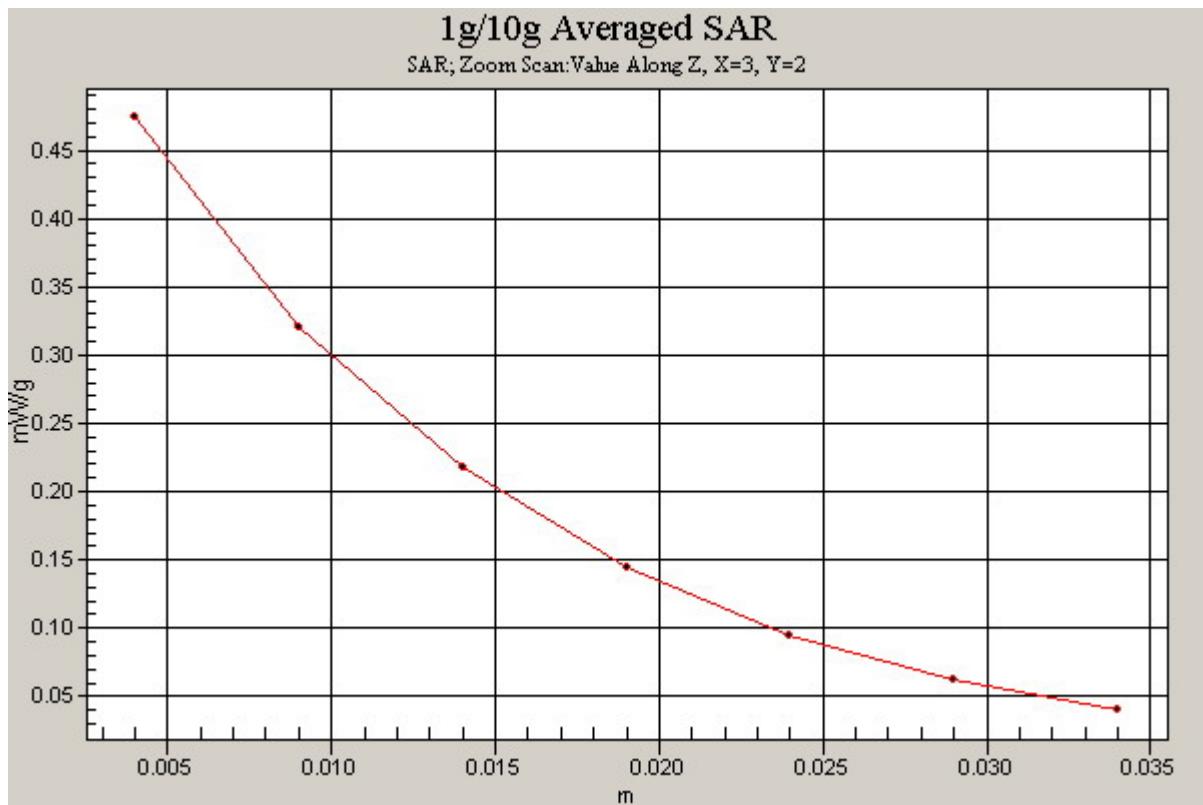


Figure. 38 Z-Scan at power reference point (Body, Towards Ground, CDMA PCS Channel 1175)