NO.: RZA2008-1382

OET 65

TEST REPORT

Test name	Electromagnetic Field (Specific Absorption Rate)
Product	CDMA 1X Digital Mobile Telephone
FCC ID	QISC2807
Model	C2807
Client	Huawei Technologies Co., Ltd.

TA Technology (Shanghai) Co., Ltd.

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GENERAL SUMMARY

Product	CDMA 1X Digital Mobile Telephone	**Model**	HUAWEI C2807
Client	Huawei Technologies Co., Ltd.	**Type of test**	Entrusted
Manufacturer	Huawei Technologies Co., Ltd.	**Arrival Date of sample**	October 29th, 2008
Place of sampling	(Blank)	**Carrier of the samples**	Yaohui Gu
Quantity of the samples	One	**Date of product**	(Blank)
Base of the samples	(Blank)	**Items of test**	SAR
Series number	A0000013300721		
Standard(s)	**ANSI C95.1–2005:** IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz. **IEEE 1528–2003:** Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head Due to Wireless Communications Devices: Experimental Techniques. **OET Bulletin 65 supplement C, published June 2001 including DA 02-1438, published June 2002:** Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits. Transition Period for the Phantom Requirements of Supplement C to OET Bulletin 65. **IEC 62209-1:** Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 1: Procedure to determine the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz). **IEC 62209-2 （draft）:** Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 2: Procedure to determine the Specific Absorption Rate (SAR)in the head and body for 30MHz to 6GHz Handheld and Body-Mounted Devices used in close proximity to the body.		
Conclusion	Localized Specific Absorption Rate (SAR) of this portable wireless equipment has been measured in all cases requested by the relevant standards cited in Clause 7.2 of this test report. Maximum localized SAR is below exposure limits specified in the relevant standards cited in Clause 7.1 of this test report. General Judgment: **Pass** (Stamp) **Date of issue: November 3rd, 2008**		
Comment	The test result only responds to the measured sample.		

Approved by 杨伟中 Weizhong Yang

Revised by 凌敏宝 Minbao Ling

Performed by 石峰 feng Shi

TABLE OF CONTENT

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

3.2. Constituents of EUT

Table 3: Constituents of Samples

Description	Model	Serial Number	Manufacturer
Handset	HUAWEI C2807	A0000013300721	HUAWEI Techonologies CO.,Ltd
Lithium Battery	HBL3A	HGY751919403	Shenzhen BYD Co., Ltd.
AC/DC Adapter	HS-050040C1	XQH872404960	TECH-POWER Electronics （Shenzhen） Co., Ltd.

Note:

The EUT appearances see ANNEX H.

3.3. General Description

Equipment Under Test (EUT) is a model of CDMA 1X Digital Mobile Telephone with internal antenna. The detail about Mobile phone, Lithium Battery and AC/DC Adapter is in Table 3. SAR is tested for CDMA Cellular only.

The sample under test was selected by the Client.

Components list please refer to documents of the manufacturer.

3.4. Test item

Table 4: Test item of EUT

Device type :	portable device	
Exposure category:	uncontrolled environment / general population	
Device operating configurations :		
Operating mode(s):	CDMA Cellular	
Standard output power	(24dBm,0.25W) CDMA Cellular;	
Operating frequency range(s)	transmitter frequency range	receiver frequency range
CDMA Cellular	824.7 MHz ~ 848.31 MHz	869.7 MHz ~ 893.31MHz
Test channel (Low –Middle –High)	1013 -384 – 777 (CDMA Cellular)	
Hardware version:	Ver.A	
Antenna type:	integrated antenna	

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 1013, 384 and 777 respectively in the case of CDMA Cellular. The EUT is commanded to operate at maximum transmitting power.

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.

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 50cm 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.

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.

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	SO32 （test data service 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 ± 0.02mm. Special E- and H-field probes have been developed for measurements close to material discontinuity, the sensors of which are directly loaded with a Schottky diode and connected via highly resistive lines (length =300mm) to the data acquisition unit.

A cell controller system contains the power supply, robot controller, teaches pendant (Joystick) and remote control, is used to drive the robot motors. The PC consists of the Micron Pentium III 800 MHz computer with Windows 2003 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.

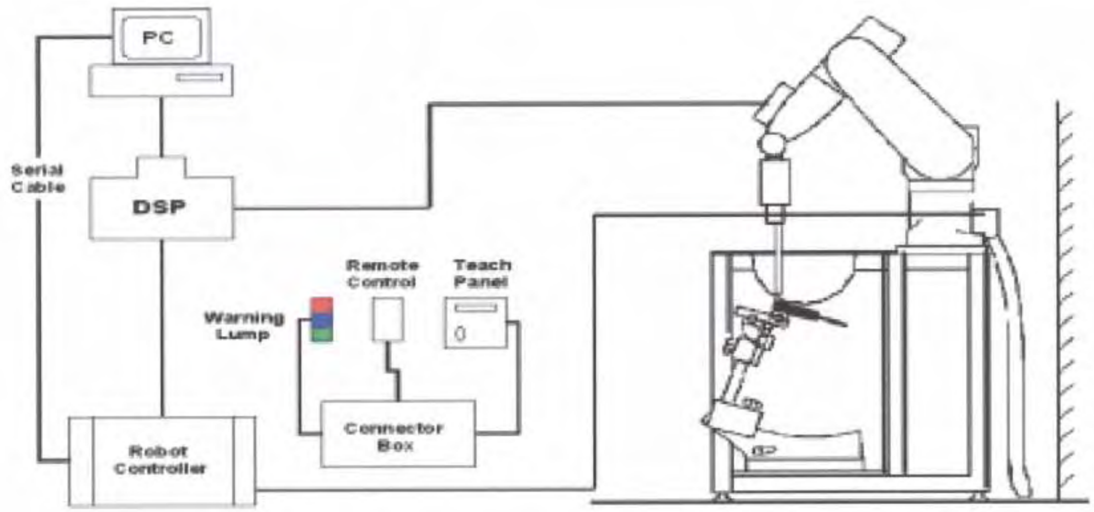


Figure 1. SAR Lab Test Measurement Set-up

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 EX3DV4 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.

5.2.1. EX3DV4 Probe Specification

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	Basic Broad Band Calibration in air Conversion Factors (CF) for HSL 900 and HSL 1800 Additional CF for other liquids and frequencies upon request
Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	10 µW/g to > 100 mW/g Linearity: ± 0.2dB (noise: typically < 1 µW/g)
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.

Figure 2.EX3DV4 E-field Probe

Figure 3. EX3DV4 E-field probe

5.2.2. E-field Probe Calibration

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

The free space E-field from amplified probe outputs is determined in a test Chamber. This is performed in a TEM cell for frequencies bellow 1 GHz, and in a wave guide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.
E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

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

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

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

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

5.3. Other Test Equipment

5.3.1. 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).

Figure 4. Device Holder

5.3.2. 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 l000 x 500 mm (H x L x W)
Available	Special

Figure 5. Generic Twin Phantom

5.4. Scanning procedure

The DASY4 installation includes predefined files with recommended procedures for measurements and validation. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.

- The ”reference“ and ”drift“ measurements are located at the beginning and end of the batch process.
  They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT’s output power and should vary max. ± 5 %.

- The ”surface check“ measurement tests the optical surface detection system of the DASY4 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ± 0.1mm). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within ± 30°.)

- The “area scan“ measures the SAR above the DUT or verification dipole on a parallel plane to the surface. It is used to locate the approximate location of the peak SAR with 2D spline interpolation. The robot performs a stepped movement along one grid axis while the local electrical field strength is measured by the probe. The probe is touching the surface of the SAM during acquisition of measurement values. The standard scan uses large grid spacing for faster measurement. Standard grid
  spacing for head measurements is 15 mm in x- and y- dimension. If a finer resolution is needed, the grid spacing can be reduced. Grid spacing and orientation have no influence on the SAR result. For special applications where the standard scan method does not find the peak SAR within the grid, e.g. mobile phones with flip cover, the grid can be adapted in orientation.

- A” 7x7x7 zoom scan” measures the field in a volume around the 2D peak SAR value acquired in the previous”coarse“scan. This is a fine 7x7 grid where the robot additionally moves the probe in 7 steps along the z-axis away from the bottom of the Phantom. Grid spacing for the cube measurement is 5mm in x and y-direction and 5 mm in z-direction. DASY4 is also able to perform repeated zoom scans if more than 1 peak is found during area scan.

- A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube 7x7x7 scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 2mm steps.

5.5. Data Storage and Evaluation

5.5.1. Data Storage

The DASY4 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension ".DA4". The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [mW/g], [mW/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

5.5.2. Data Evaluation by SEMCAD

The SEMCAD software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters:	- Sensitivity	Normi, ai_0, a_{i1}, a_{i2}
	- Conversion factor	$ConvF_i$
	- Diode compression point	Dcp_i
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	σ
	- Density	ρ

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY4 components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot cf / dcp_i$$

With V_i = compensated signal of channel i (i = x, y, z)

U_i = input signal of channel i (i = x, y, z)

cf = crest factor of exciting field (DASY parameter)

dcp_i = diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes: $$E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$$

H-field probes: $$H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1} f + a_{i2} f^2) / f$$

With V_i = compensated signal of channel i (i = x, y, z)

$Norm_i$ = sensor sensitivity of channel i (i = x, y, z)

[mV/(V/m)^2] for E-field Probes

$ConvF$ = sensitivity enhancement in solution

a_{ij} = sensor sensitivity factors for H-field probes

f = carrier frequency [GHz]

E_i = electric field strength of channel i in V/m

H_i = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = (E_x^2 + E_Y^2 + E_z^2)^{1/2}$$

The primary field data are used to calculate the derived field units.

$$SAR = (E_{tot}^2 \cdot \sigma) / (\rho \cdot 1000)$$

with SAR = local specific absorption rate in mW/g

E_{tot} = total field strength in V/m

σ = conductivity in [mho/m] or [Siemens/m]

ρ = equivalent tissue density in g/cm^3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = E_{tot}^2 / 3770 \quad \text{or} \quad P_{pwe} = H_{tot}^2 \cdot 37.7$$

with P_{pwe} = equivalent power density of a plane wave in mW/cm^2

E_{tot} = total electric field strength in V/m

H_{tot} = total magnetic field strength in A/m

5.6. System Specifications

5.6.1. Robotic System Specifications

<u>**Specifications**</u>

Positioner: Stäubli Unimation Corp. Robot Model: RX90L
Repeatability: ±0.02 mm
No. of Axis: 6

<u>**Data Acquisition Electronic (DAE) System**</u>

<u>**Cell Controller**</u>

Processor: Pentium III
Clock Speed: 800 MHz
Operating System: Windows 2003

<u>**Data Converter**</u>

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.

5.7. System validation

System validation is performed by using a validation dipole which is positioned parallel to the planar part of the SAM phantom at the reference point. The distance of the dipole to the SAM phantom is determined by a plexiglass spacer. The dipole is connected to the signal source consisting of signal generator and amplifier via a directional coupler, N-connector cable and adaption to SMA. It is fed with a power of 1000 mW. To adjust this power a power meter is used. The power sensor is connected to the cable before the validation to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the validation to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test.

Validation results have to be equal or near the values determined during dipole calibration with the relevant liquids and test system (± 10 %).

System validation is performed regularly on all frequency bands where tests are performed with the DASY 4 system.

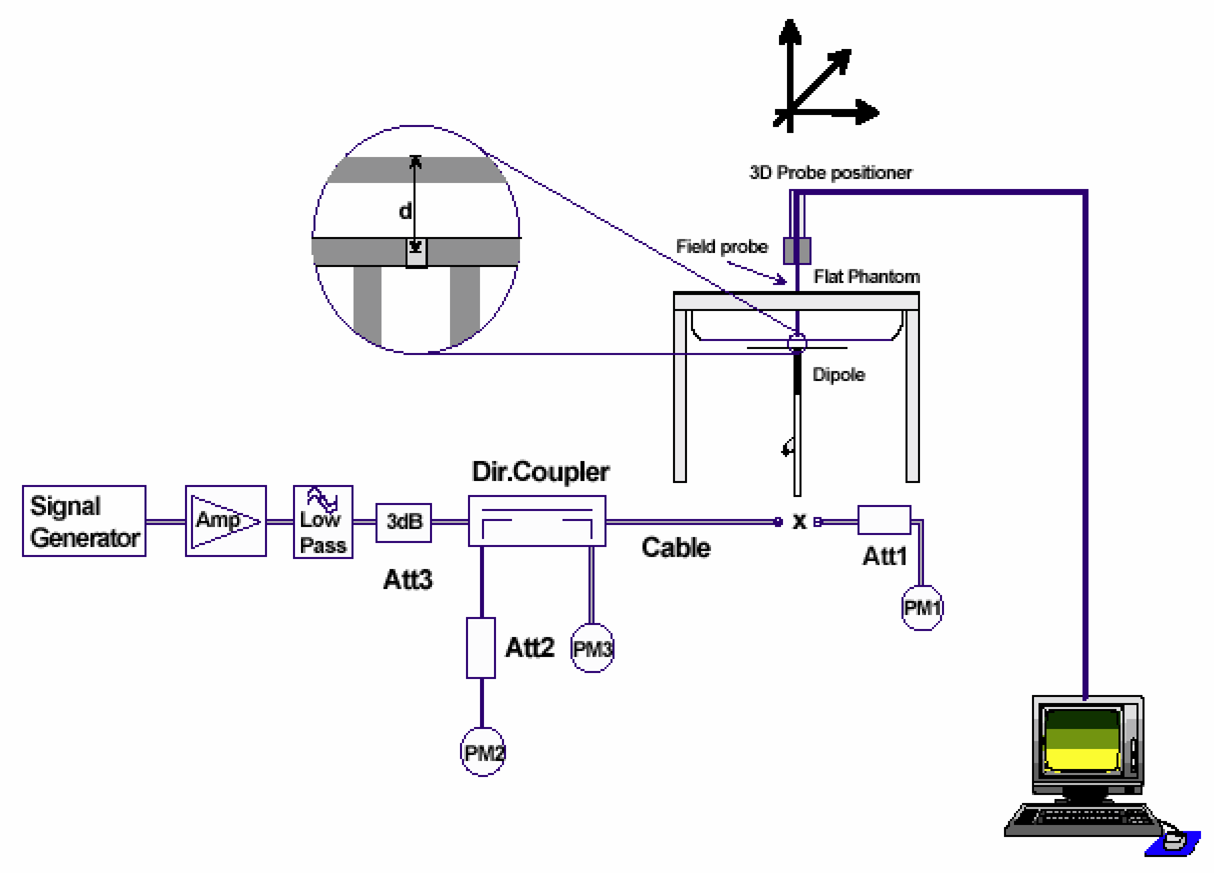


Figure 6. System validation Set-up

5.8. Equivalent Tissues

The liquid is consisted of water, sugar, salt, Preventol,Glycol and Cellulose. The liquid has previously been proven to be suited for worst-case. The Table 5 and Table 6 show the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the OET 65.

Table 5: Composition of the Head Tissue Equivalent Matter

MIXTURE%	FREQUENCY(Brain) 835MHz
Water	41.45
Sugar	56
Salt	1.45
Preventol	0.1
Cellulose	1.0
Dielectric Parameters Target Value	f=835MHz ε=41.5 σ=0.9

Table 6: Composition of the Body Tissue Equivalent Matter

MIXTURE%	FREQUENCY(Body)835MHz
Water	52.5
Sugar	45
Salt	1.4
Preventol	0.1
Cellulose	1.0
Dielectric Parameters Target Value	f=835MHz ε=55.2 σ=0.97

6. LABORATORY ENVIRONMENT

Table 7: 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.	

7. CHARACTERISTICS OF THE TEST

7.1. Applicable Limit Regulations

ANSI C95.1–2005: 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.

7.2. Applicable Measurement Standards

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

OET Bulletin 65 supplement C, published June 2001 including DA 02-1438, published June 2002: Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits. Transition Period for the Phantom Requirements of Supplement C to OET Bulletin 65.

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

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

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 with in 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 12 labeled as: (Power Drift [dB]). This ensures that the power drift during one measurement is within 0.21dB.

8.3. Conducted Power

8.3.1. Measurement Methods

The EUT was set up for the maximum output power. The channel power was measured .The measurements were done both before and after SAR tests for each test band.

8.3.2. Measurement result

Table 8: Conducted Power Measurement Results

CDMA Cellular (RC3)	**Conducted Power**		
	Channel 777 (848.31MHz)	**Channel 384 (836.52MHz)**	**Channel 1013 (824.7MHz)**
Results (dBm)	24.2	24.2	24.1
CDMA Cellular (RC1)	**Conducted Power**		
	Channel 777 (848.31MHz)	**Channel 384 (836.52MHz)**	**Channel 1013 (824.7MHz)**
Results (dBm)	24.3	24.2	24.2

9. TEST RESULTS

9.1. Dielectric Performance

Table 9: 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**
835 (Brain)	Permittivity ε_r	41.50	41.75	0.60 %
	Conductivity σ	0.90	0.916	1.78 %

Table 10: 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**
835 (Body)	Permittivity ε_r	55.20	54.70	-0.91 %
	Conductivity σ	0.97	0.985	1.55 %

9.2. System Validation Results

Table 11: 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)**		
	835MHz	41.75			0.916		
Verification results	**Frequency**	**Target value (W/kg)**		**Measurement value (W/kg)**		**Difference percentage**	
		10 g Average	**1 g Average**	**10 g Average**	**1 g Average**	**10 g Average**	**1g Average**
	835MHz	1.52	2.30	1.50	2.30	-1.32%	0.00%

Note：

1. Target Values used derive from the SPEAG calibration certificate and 250 mW is used as feeding power to the validation dipole (SPEAG using).
2. The graph results see ANNEX D.

9.3. Summary of Measurement Results

Table 12: SAR Values (CDMA Cellular)

Liquid Temperature: 22.5℃					
Limit of SAR (W/kg)		**10 g Average**	**1 g Average**	**Power Drift (dB)**	**Graph Results**
		2.0	**1.6**	**± 0.21**	
Different Test Position	**Channel**	**Measurement Result(W/kg)**		**Power Drift(dB)**	
		10 g Average	**1 g Average**		
Test position of Head					
Left hand, Touch cheek	High	0.795	1.180	-0.195	Figure 8
	Middle	0.706	1.050	-0.091	Figure 10
	Low	0.680	1.010	-0.182	Figure 12
Left hand, Tilt 15 Degree	High	0.370	0.523	0.026	Figure 14
	Middle	0.321	0.453	0.145	Figure 16
	Low	0.320	0.449	-0.179	Figure 18
Right hand, Touch cheek	High	0.774	1.150	0.010	Figure 20
	Middle	0.714	1.050	-0.054	Figure 22
	Low	0.712	1.040	-0.097	Figure 24
Right hand, Tilt 15 Degree	High	0.388	0.549	-0.037	Figure 26
	Middle	0.357	0.503	-0.188	Figure 28
	Low	0.343	0.481	-0.020	Figure 30
Test position of Body (Distance 15mm)					
Towards Ground	High	0.713	1.010	0.034	Figure 32
	Middle	0.767	1.090	-0.176	Figure 34
	Low	0.736	1.040	0.121	Figure 36
Towards Phantom	High	0.396	0.563	0.170	Figure 38
	Middle	0.364	0.518	-0.003	Figure 40
	Low	0.363	0.514	0.035	Figure 42

Note: 1.The value with blue color is the maximum SAR Value of each test band.

2. Tests in body position were performed with 15 mm air gap between DUT and Phantom to simulate the use of a non-metallic belt-clip or holster.

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 7.2 of this report. Maximum localized SAR is 1.180 W/kg is below exposure limits specified in the relevant standards cited in Clause 7.1 of this test report. Minimum localized SAR is 0.449 W/kg.

10. MEASUREMENT UNCERTAINTY

No.	a	Type	c	d	e=f(d、k)	f	h=c×f／e	k
	Uncertainty Component		Tol. (±%)	Prob. Dist	Div.	c_1(1g)	1g u (± %)	v_1
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	$\sqrt{3}$	$(1-cp)^{1/2}$	4.3	∞
4	Hemisphere 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	

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 14, 2008	One year
02	Dielectric Probe Kit	Agilent 85070E	US44020115	No Calibration Requested	
03	Power meter	Agilent E4417A	GB41291714	March 14, 2008	One year
04	Power sensor	Agilent 8481H	MY41091316	March 14, 2008	One year
05	Signal Generator	HP 8341B	2730A00804	September 14, 2008	One year
06	Amplifier	IXA-020	0401	No Calibration Requested	
07	BTS	E5515C	GB46490218	September 14, 2008	One year
08	E-field Probe	EX3DV4	3660	September 3, 2008	One year
09	DAE	DAE3	536	August 28, 2008	One year
10	Validation Kit 835MHz	D835V2	4d020	July 21, 2008	One year

12. TEST PERIOD

The test is performed from October 30, 2008 to November 2, 2008

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 15 mm x 15 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 7x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

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

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

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

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

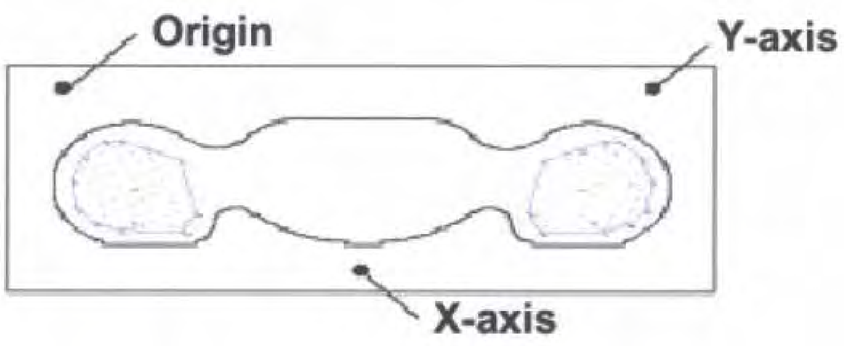
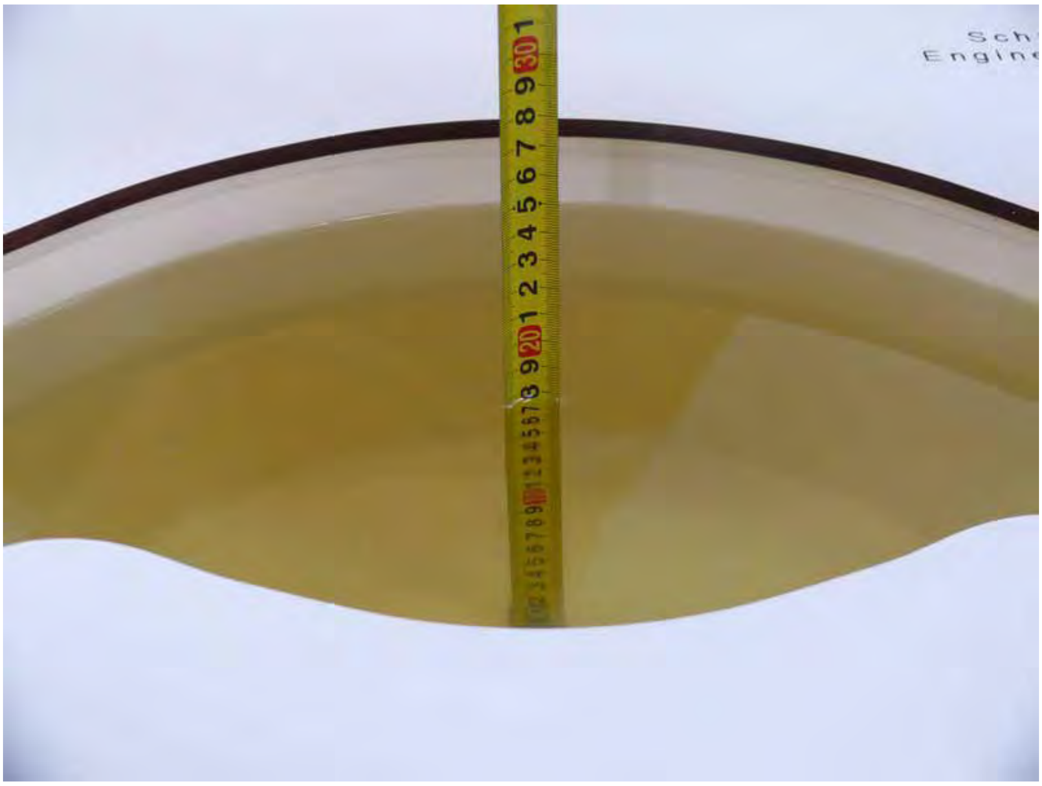


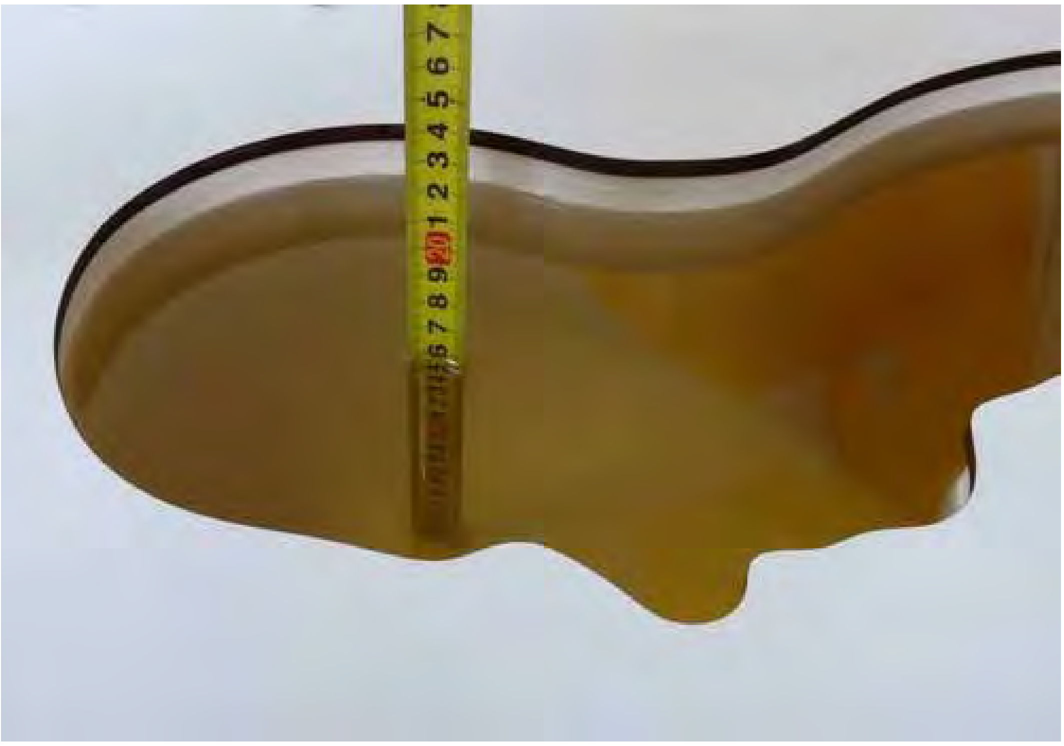
Figure 7 SAR Measurement Points in Area Scan

ANNEX B： TEST LAYOUT

Picture 1: Specific Absorption Rate Test Layout



Picture 2: Liquid depth in the Flat Phantom (835 MHz)



Picture 3: Liquid depth in the head Phantom (835 MHz)

ANNEX C： GRAPH RESULTS

CDMA Cellular Left Cheek High

Communication System: CDMA Cellular; Frequency: 848.31 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 848.31 MHz; $\sigma = 0.927$ mho/m; $\varepsilon_r = 41.6$; $\rho = 1000$ kg/m^3
Probe: EX3DV4 - SN3660; ConvF(9.19, 9.19, 9.19);
Electronics: DAE3 Sn536;
Cheek High/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.43 mW/g

Cheek High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.4 V/m; Power Drift = -0.195 dB
Peak SAR (extrapolated) = 1.67 W/kg
SAR(1 g) = 1.18 mW/g; SAR(10 g) = 0.795 mW/g
Maximum value of SAR (measured) = 1.29 mW/g

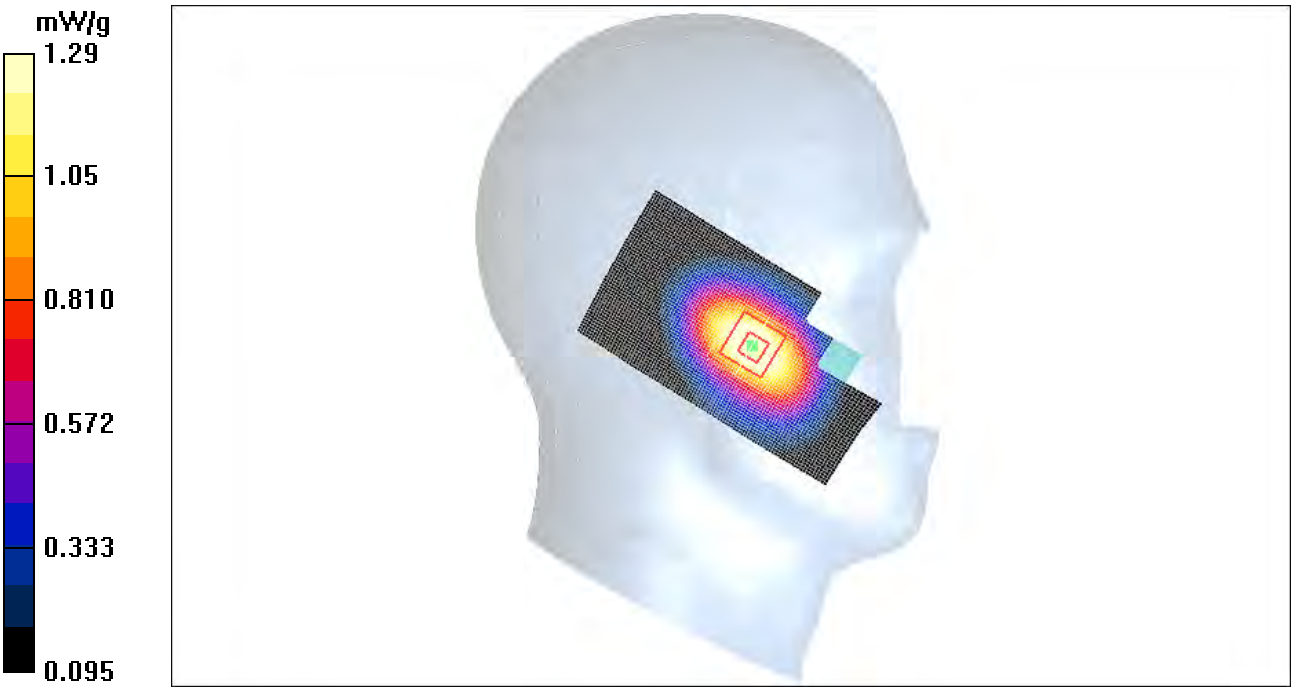


Figure 8 Left Hand Touch Cheek CDMA Cellular Channel 777

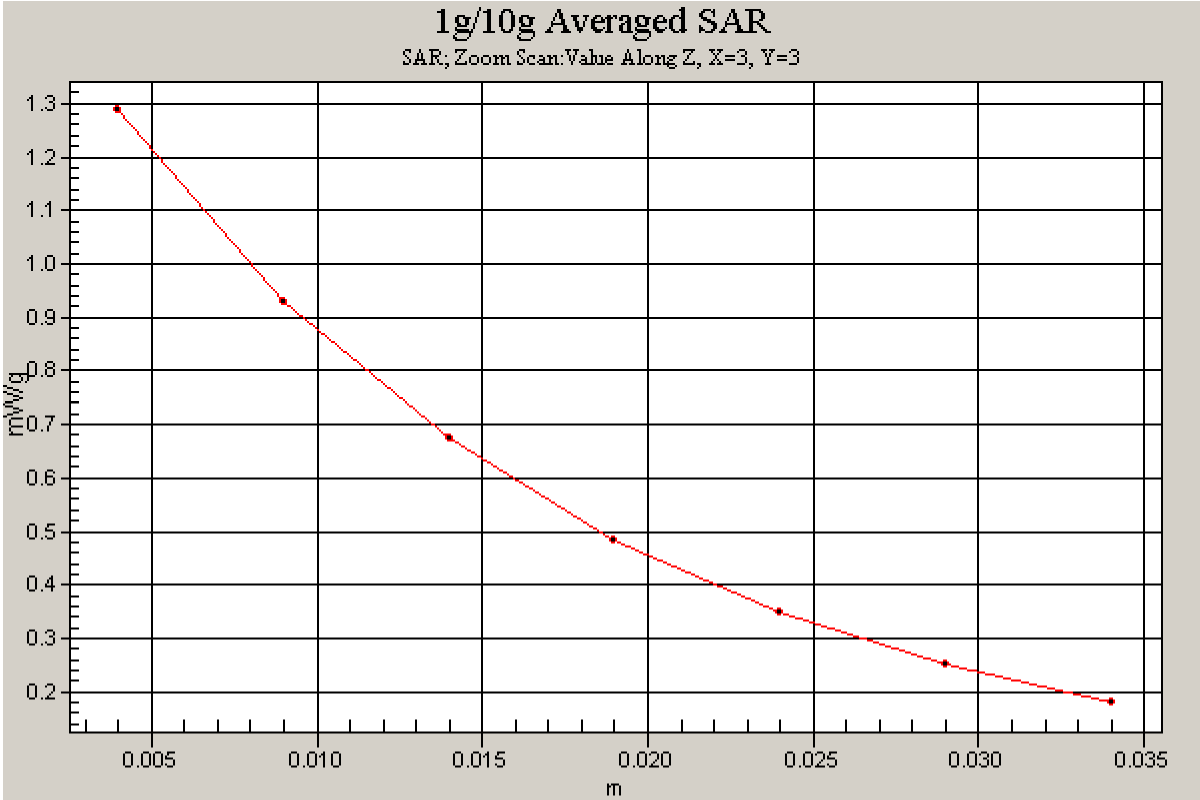


Figure 9 Z-Scan at power reference point (Left Hand Touch Cheek CDMA Cellular Channel 777)

CDMA Cellular Left Cheek Middle

Communication System: CDMA Cellular; Frequency: 836.52 MHz;Duty Cycle: 1:1

Medium parameters used: f = 837 MHz; σ = 0.918 mho/m; ε_r = 41.7; ρ = 1000 kg/m^3

Probe: EX3DV4 - SN3660; ConvF(9.19, 9.19, 9.19);

Electronics: DAE3 Sn536;

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

Maximum value of SAR (interpolated) = 1.11 mW/g

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

Reference Value = 9.42 V/m; Power Drift = -0.091 dB

Peak SAR (extrapolated) = 1.48 W/kg

SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.706 mW/g

Maximum value of SAR (measured) = 1.15 mW/g

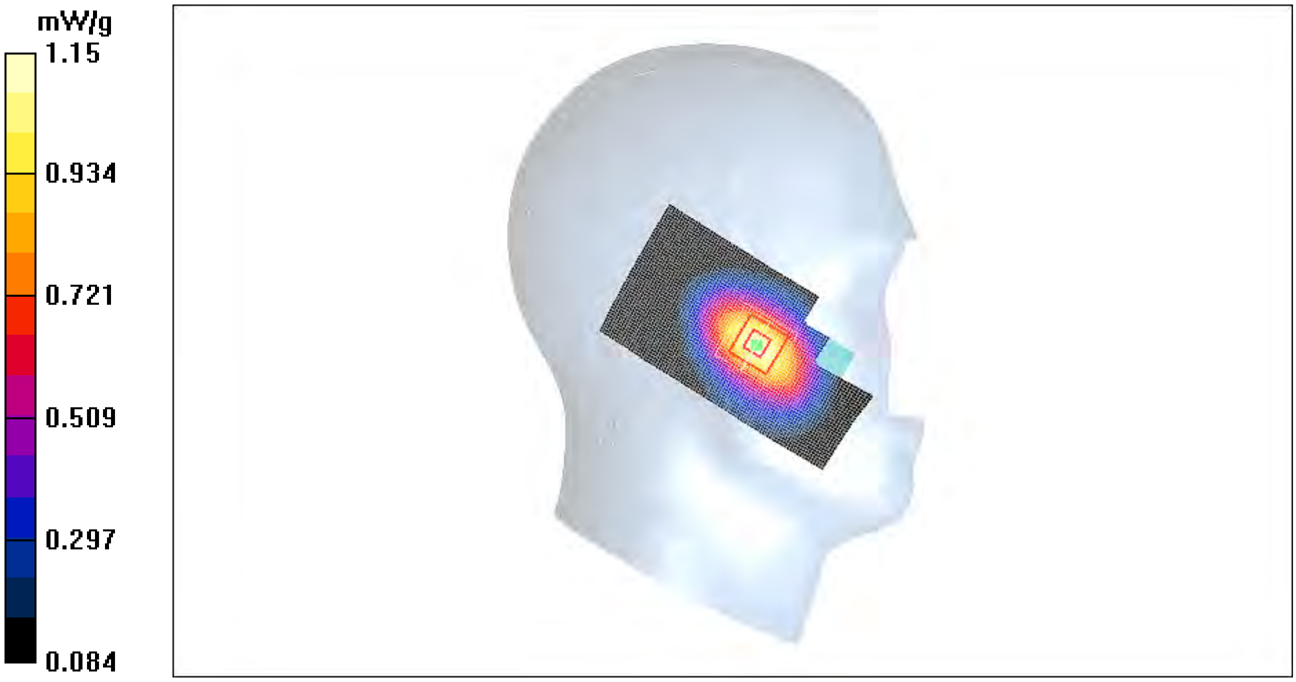


Figure 10 Left Hand Touch Cheek CDMA Cellular Channel 384

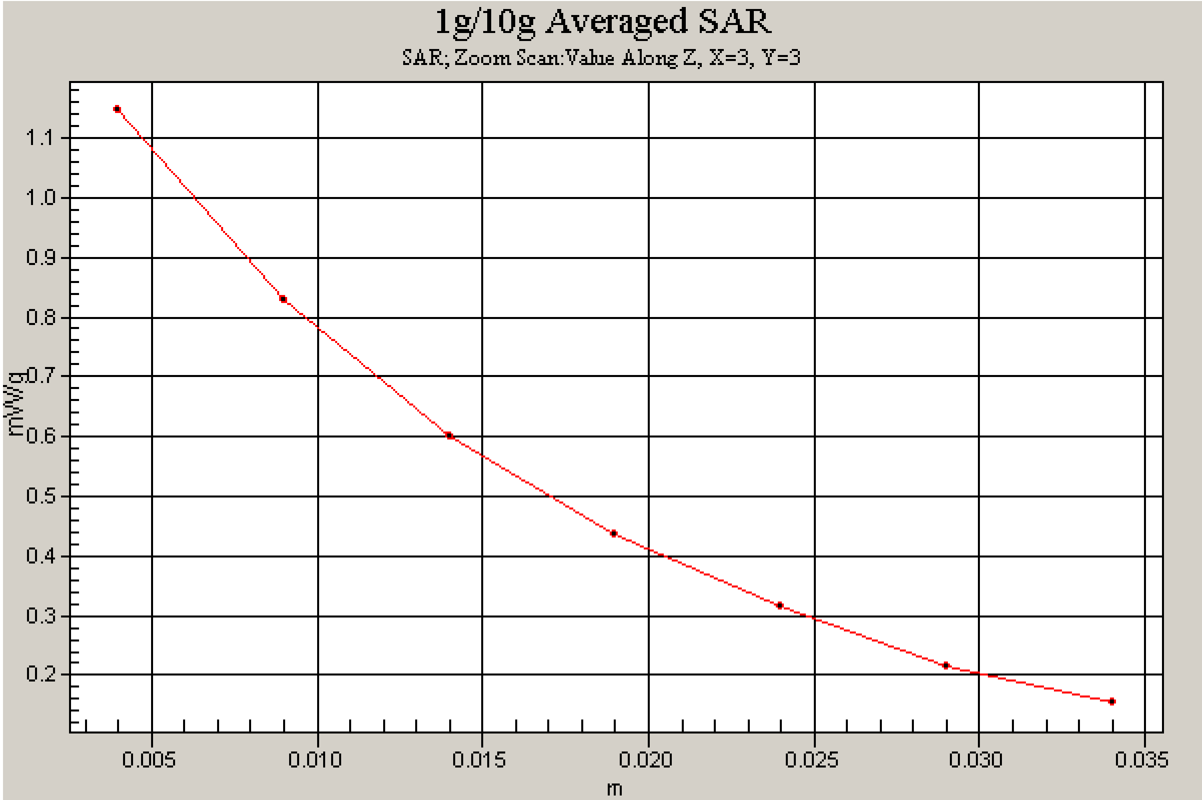


Figure 11 Z-Scan at power reference point (Left Hand Touch Cheek CDMA Cellular Channel 384)

CDMA Cellular Left Cheek Low

Communication System: CDMA Cellular; Frequency: 824.7 MHz;Duty Cycle: 1:1

Medium parameters used: f = 825 MHz; σ = 0.909 mho/m; ε_r = 41.9; ρ = 1000 kg/m^3

Probe: EX3DV4 - SN3660; ConvF(9.19, 9.19, 9.19);

Electronics: DAE3 Sn536;

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

Maximum value of SAR (interpolated) = 1.12 mW/g

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

Reference Value = 9.28 V/m; Power Drift = -0.182 dB

Peak SAR (extrapolated) = 1.38 W/kg

SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.680 mW/g

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

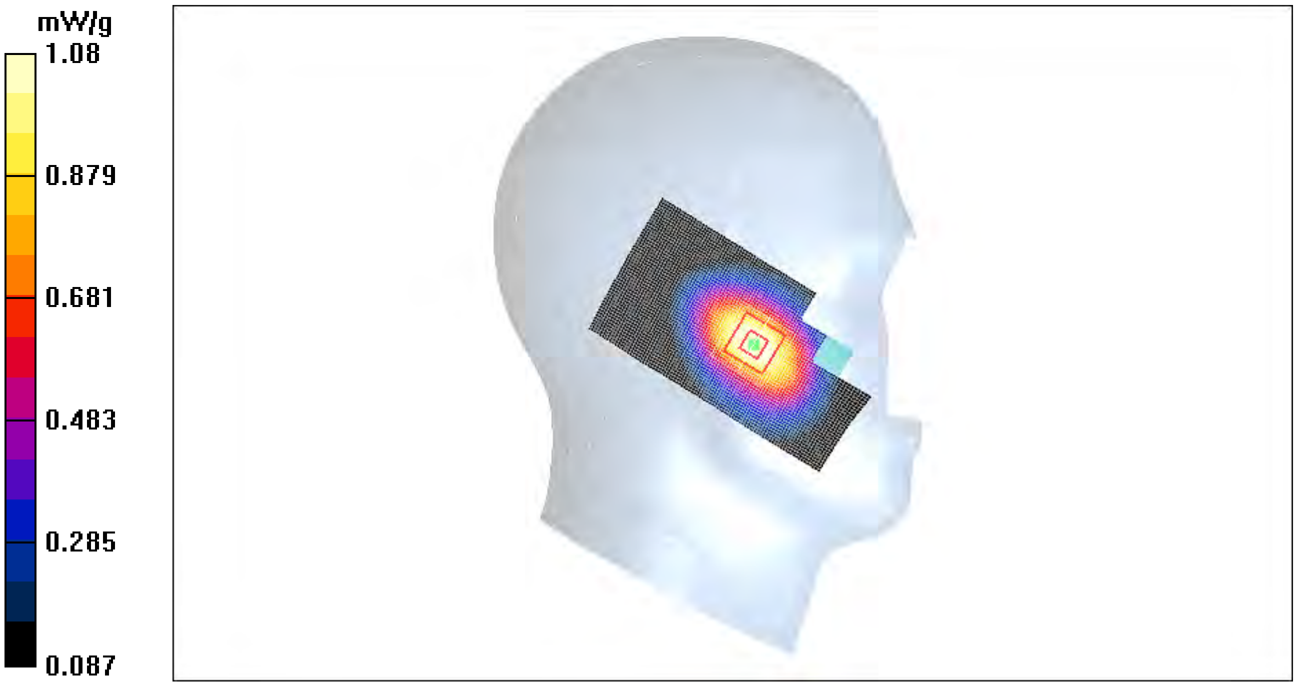


Figure 12 Left Hand Touch Cheek CDMA Cellular Channel 1013

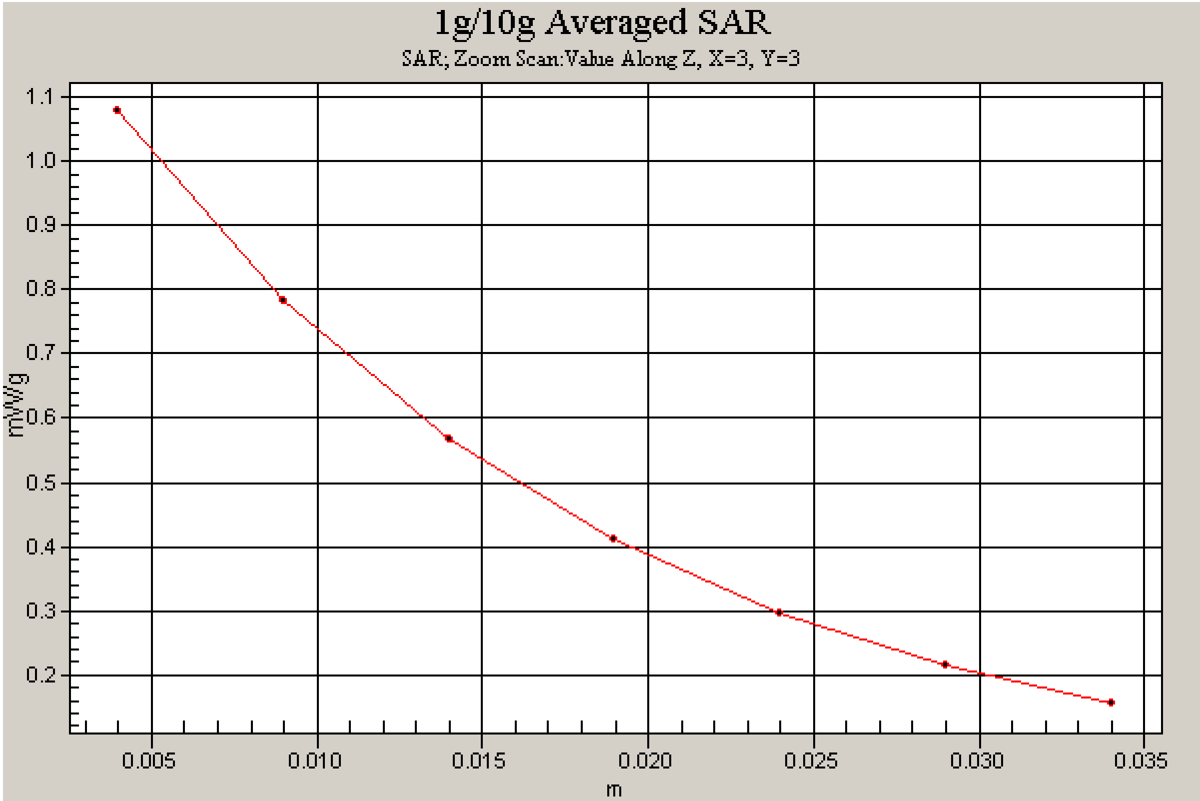


Figure 13 Z-Scan at power reference point (Left Hand Touch Cheek CDMA Cellular Channel 1013)

CDMA Cellular Left Tilt High

Communication System: CDMA Cellular; Frequency: 848.31 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 848.31 MHz; σ = 0.927 mho/m; ε_r = 41.6; ρ = 1000 kg/m^3

Probe: EX3DV4 - SN3660; ConvF(9.19, 9.19, 9.19);

Electronics: DAE3 Sn536;

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

Maximum value of SAR (interpolated) = 0.566 mW/g

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

Reference Value = 11.9 V/m; Power Drift = 0.026 dB

Peak SAR (extrapolated) = 0.710 W/kg

SAR(1 g) = 0.523 mW/g; SAR(10 g) = 0.370 mW/g

Maximum value of SAR (measured) = 0.556 mW/g

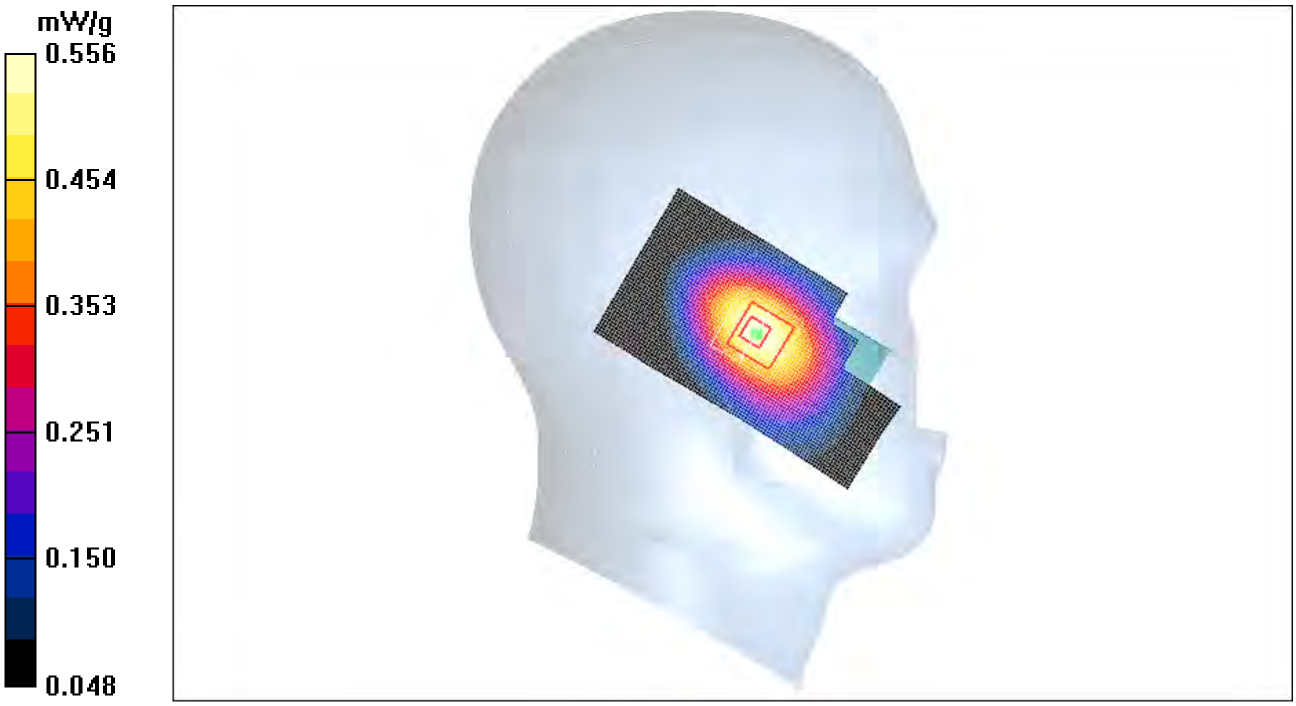


Figure 14 Left Hand Tilt 15° CDMA Cellular Channel 777

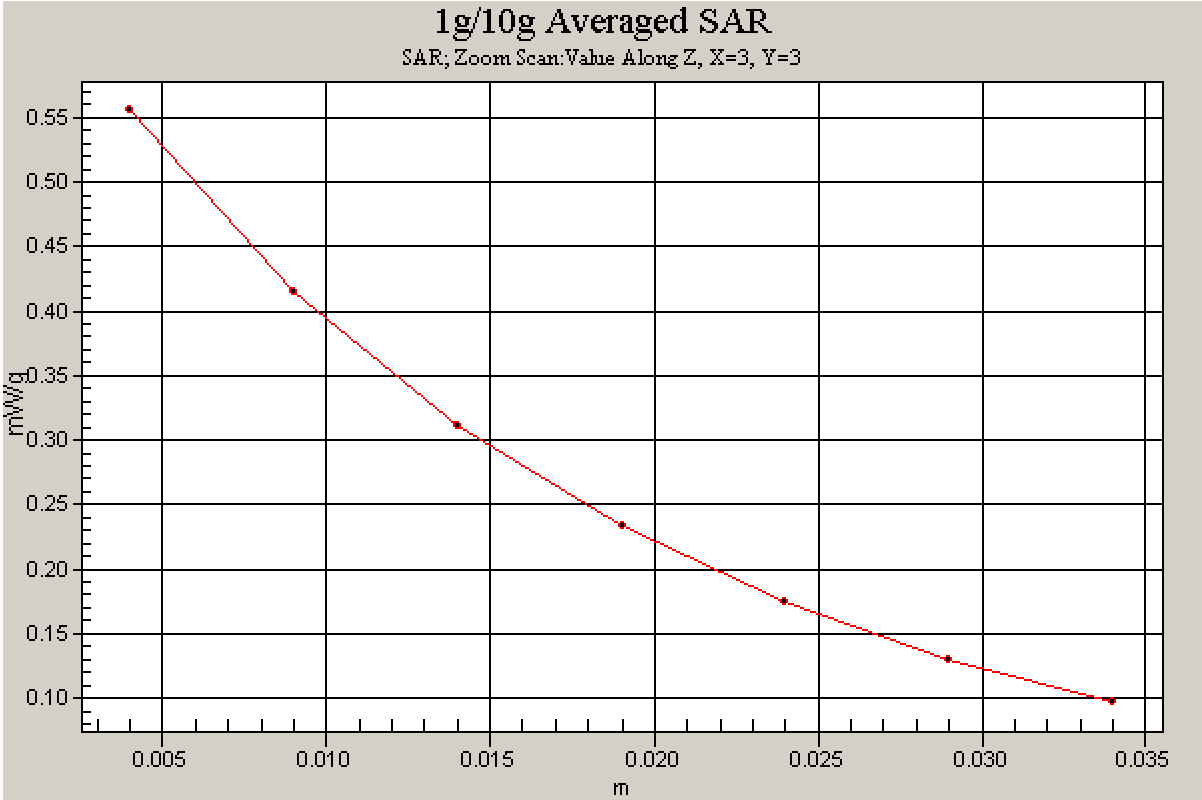


Figure 15 Z-Scan at power reference point (Left Hand Tilt 15° CDMA Cellular Channel 777)

CDMA Cellular Left Tilt Middle

Communication System: CDMA Cellular; Frequency: 836.52 MHz;Duty Cycle: 1:1

Medium parameters used: f = 837 MHz; σ = 0.918 mho/m; ε_r = 41.7; ρ = 1000 kg/m^3

Probe: EX3DV4 - SN3660; ConvF(9.19, 9.19, 9.19);

Electronics: DAE3 Sn536;

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

Maximum value of SAR (interpolated) = 0.480 mW/g

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

Reference Value = 11.1 V/m; Power Drift = 0.145 dB

Peak SAR (extrapolated) = 0.612 W/kg

SAR(1 g) = 0.453 mW/g; SAR(10 g) = 0.321 mW/g

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

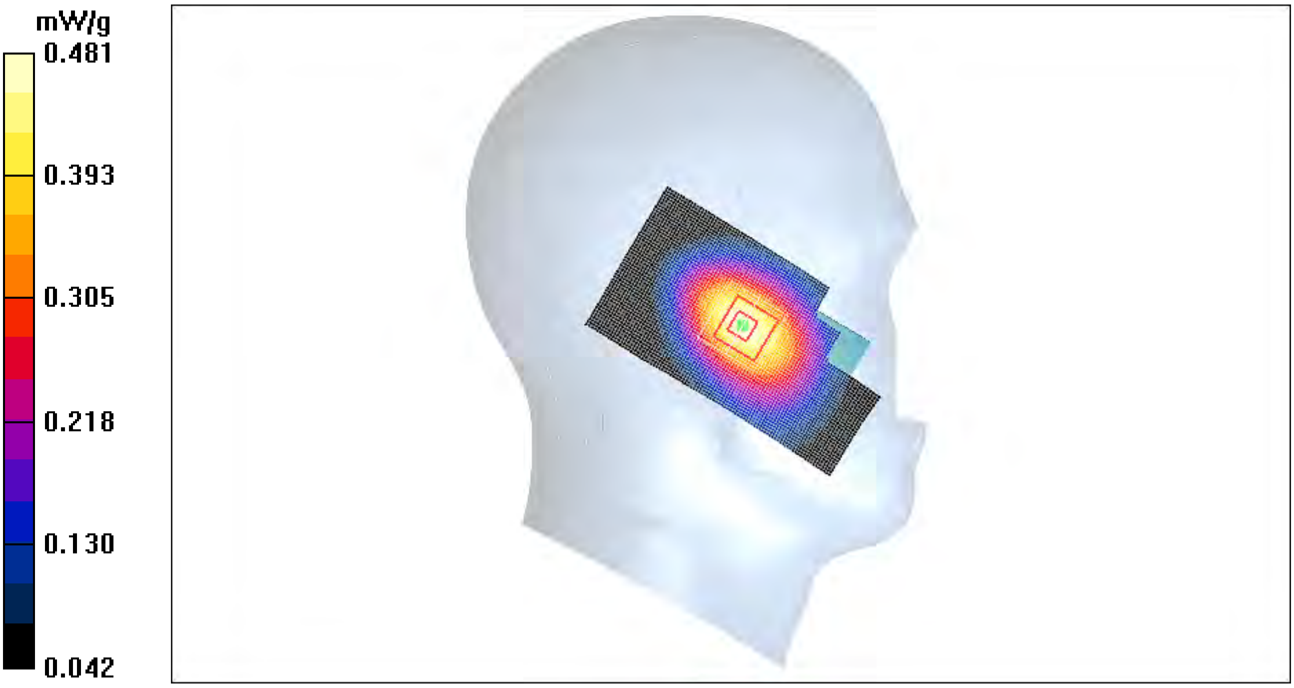


Figure 16 Left Hand Tilt 15° CDMA Cellular Channel 384

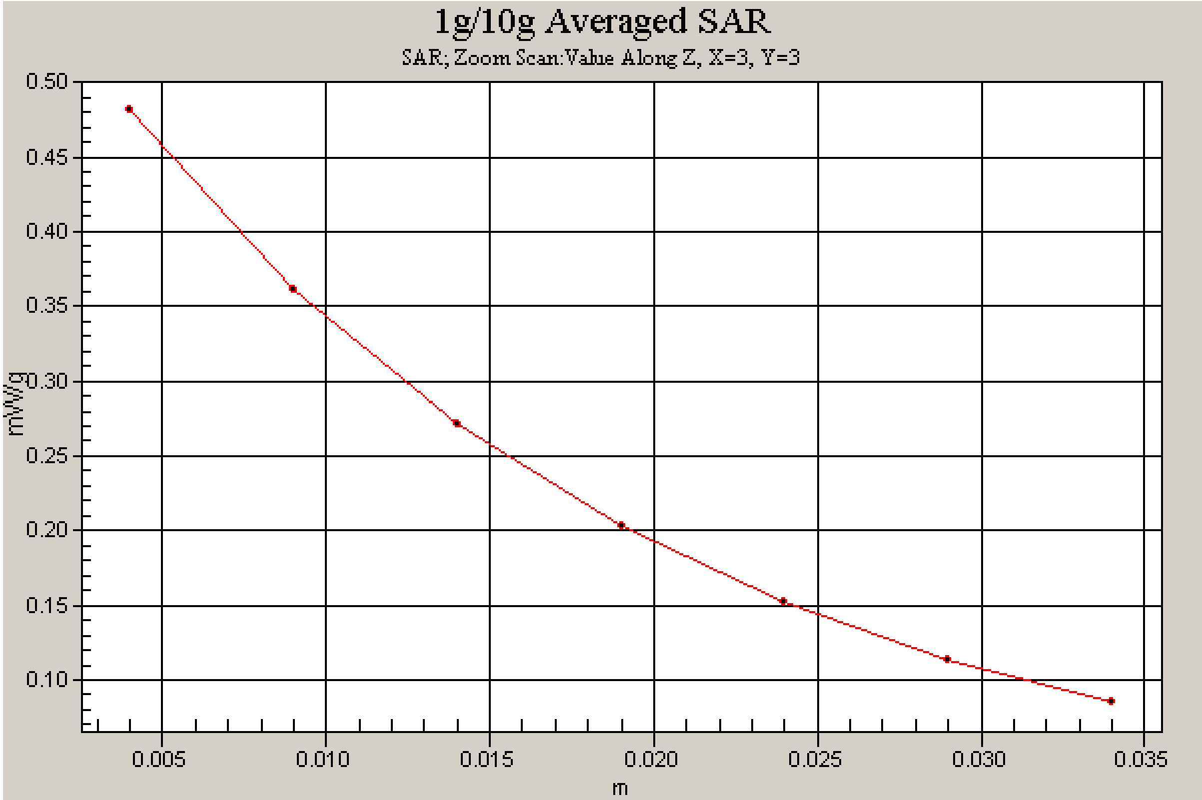


Figure 17 Z-Scan at power reference point (Left Hand Tilt 15° CDMA Cellular Channel 384)

CDMA Cellular Left Tilt Low

Communication System: CDMA Cellular; Frequency: 824.7 MHz;Duty Cycle: 1:1

Medium parameters used: f = 825 MHz; σ = 0.909 mho/m; ε_r = 41.9; ρ = 1000 kg/m^3

Probe: EX3DV4 - SN3660; ConvF(9.19, 9.19, 9.19);

Electronics: DAE3 Sn536;

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

Maximum value of SAR (interpolated) = 0.499 mW/g

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

Reference Value = 11.5 V/m; Power Drift = -0.179 dB

Peak SAR (extrapolated) = 0.604 W/kg

SAR(1 g) = 0.449 mW/g; SAR(10 g) = 0.320 mW/g

Maximum value of SAR (measured) = 0.475 mW/g

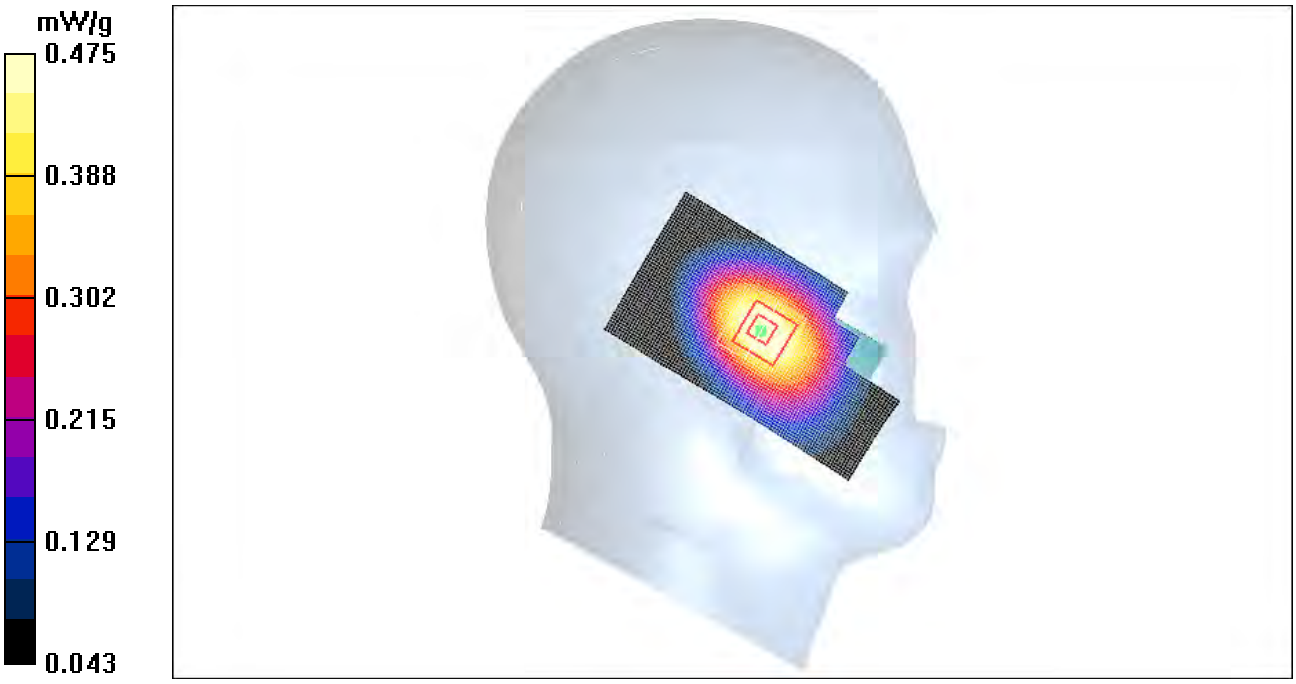


Figure 18 Left Hand Tilt 15° CDMA Cellular Channel 1013

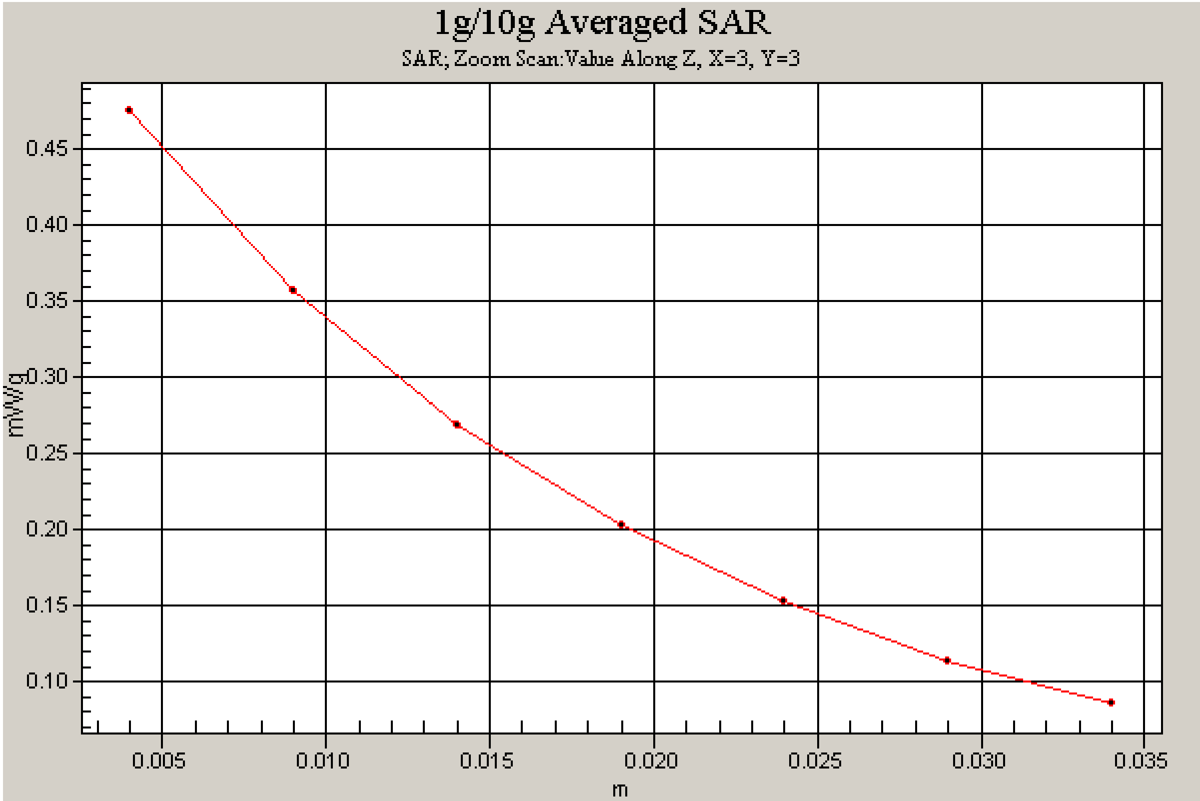


Figure 19 Z-Scan at power reference point (Left Hand Tilt 15° CDMA Cellular Channel 1013)

CDMA Cellular Right Cheek High

Communication System: CDMA Cellular; Frequency: 848.31 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 848.31 MHz; σ = 0.927 mho/m; ε_r = 41.3; ρ = 1000 kg/m^3

Probe: EX3DV4 - SN3660; ConvF(9.19, 9.19, 9.19);

Electronics: DAE3 Sn536;

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

Maximum value of SAR (interpolated) = 1.26 mW/g

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

Reference Value = 10.1 V/m; Power Drift = 0.010 dB

Peak SAR (extrapolated) = 1.61 W/kg

SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.774 mW/g

Maximum value of SAR (measured) = 1.26 mW/g

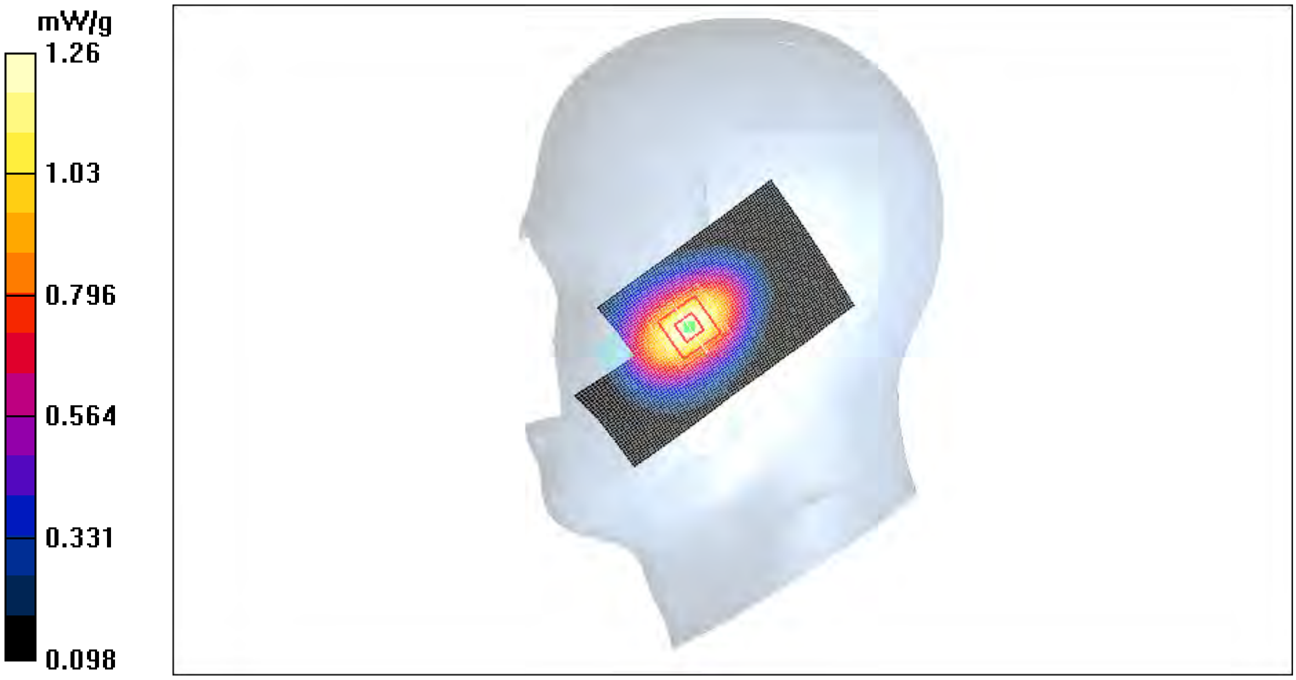


Figure 20 Right Hand Touch Cheek CDMA Cellular Channel 777

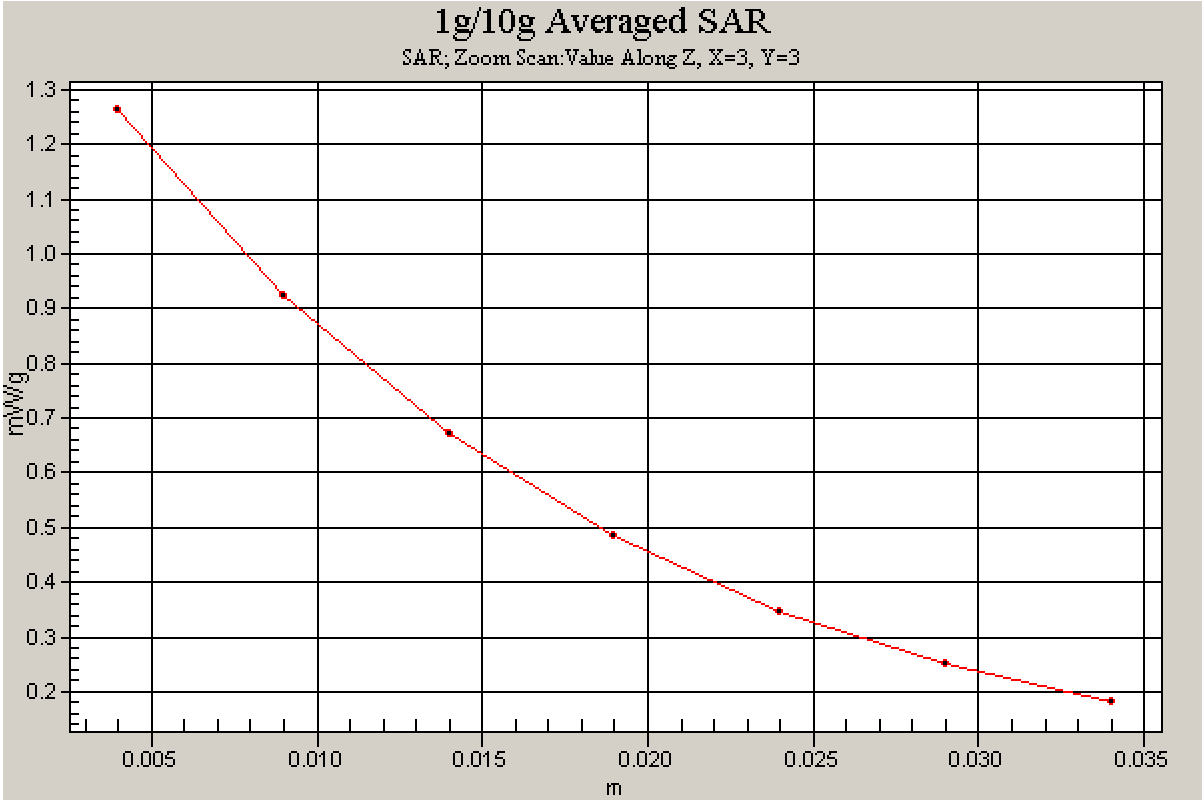


Figure 21 Z-Scan at power reference point (Right Hand Touch Cheek CDMA Cellular Channel 777)

CDMA Cellular Right Cheek Middle

Communication System: CDMA Cellular; Frequency: 836.52 MHz;Duty Cycle: 1:1

Medium parameters used: f = 837 MHz; σ = 0.915 mho/m; ε_r = 41.4; ρ = 1000 kg/m^3

Probe: EX3DV4 - SN3660; ConvF(9.19, 9.19, 9.19);

Electronics: DAE3 Sn536;

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

Maximum value of SAR (interpolated) = 1.14 mW/g

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

Reference Value = 9.76 V/m; Power Drift = -0.054 dB

Peak SAR (extrapolated) = 1.45 W/kg

SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.714 mW/g

Maximum value of SAR (measured) = 1.14 mW/g

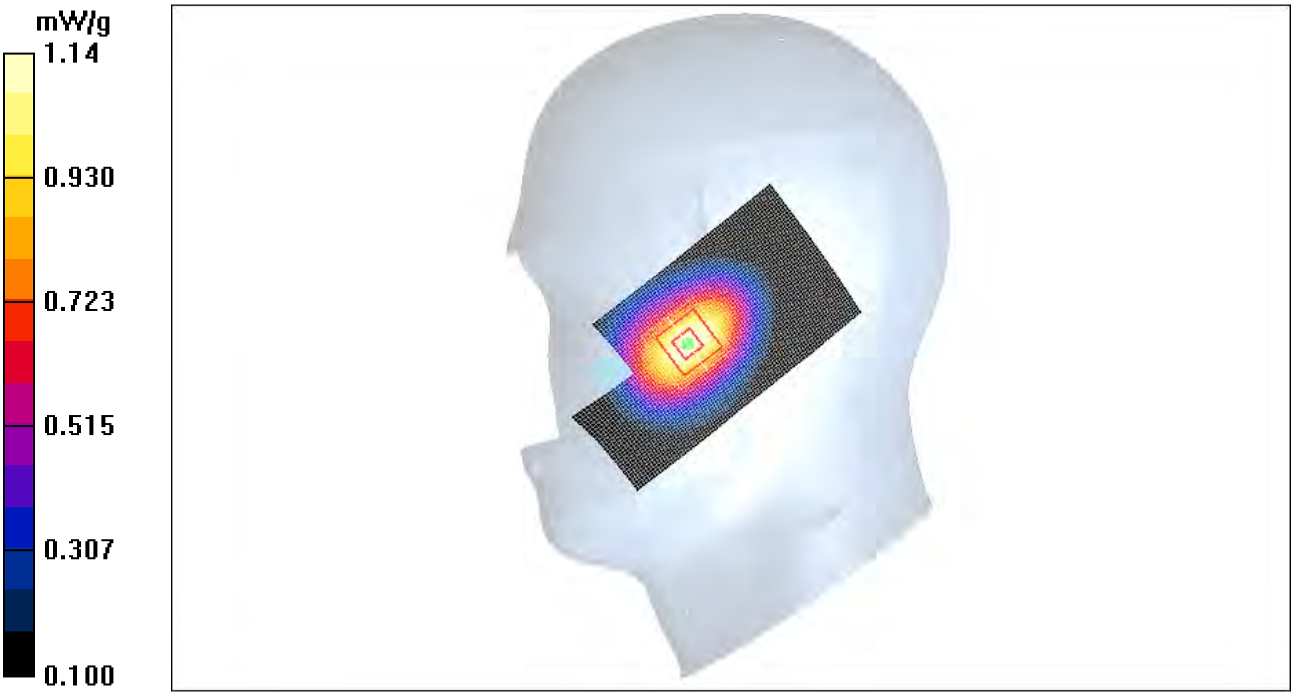


Figure 22 Right Hand Touch Cheek CDMA Cellular Channel 384

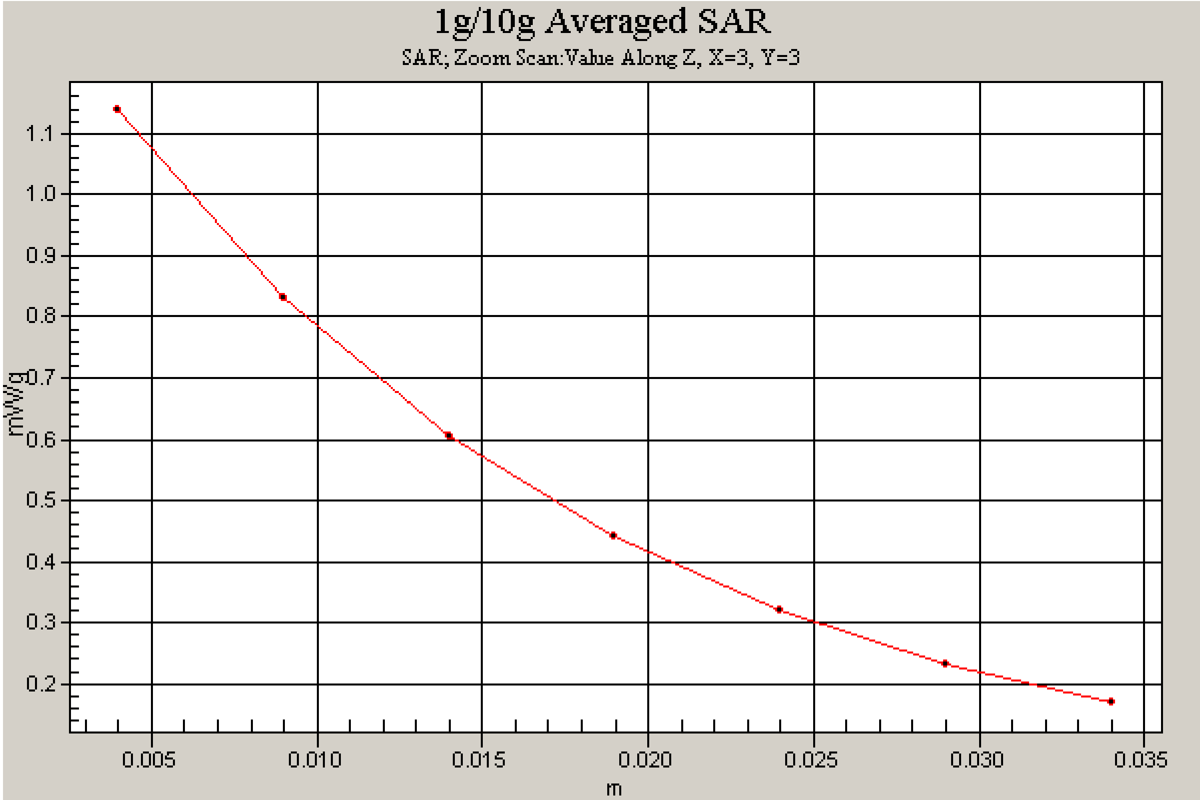


Figure 23 Z-Scan at power reference point (Right Hand Touch Cheek CDMA Cellular Channel 384)

CDMA Cellular Right Cheek Low

Communication System: CDMA Cellular; Frequency: 824.7 MHz;Duty Cycle: 1:1

Medium parameters used: f = 825 MHz; σ = 0.901 mho/m; ε_r = 41.6; ρ = 1000 kg/m^3

Probe: EX3DV4 - SN3660; ConvF(9.19, 9.19, 9.19);

Electronics: DAE3 Sn536;

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

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

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

Reference Value = 9.83 V/m; Power Drift = -0.097 dB

Peak SAR (extrapolated) = 1.41 W/kg

SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.712 mW/g

Maximum value of SAR (measured) = 1.10 mW/g

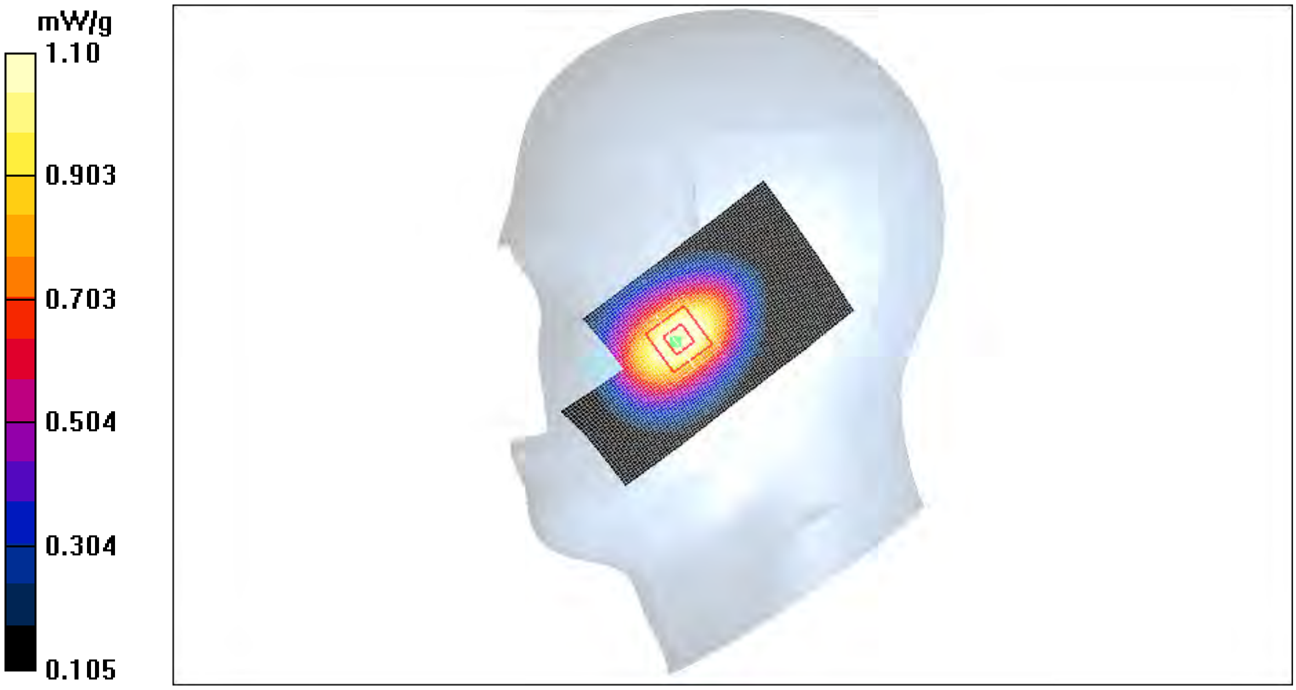


Figure 24 Right Hand Touch Cheek CDMA Cellular Channel 1013

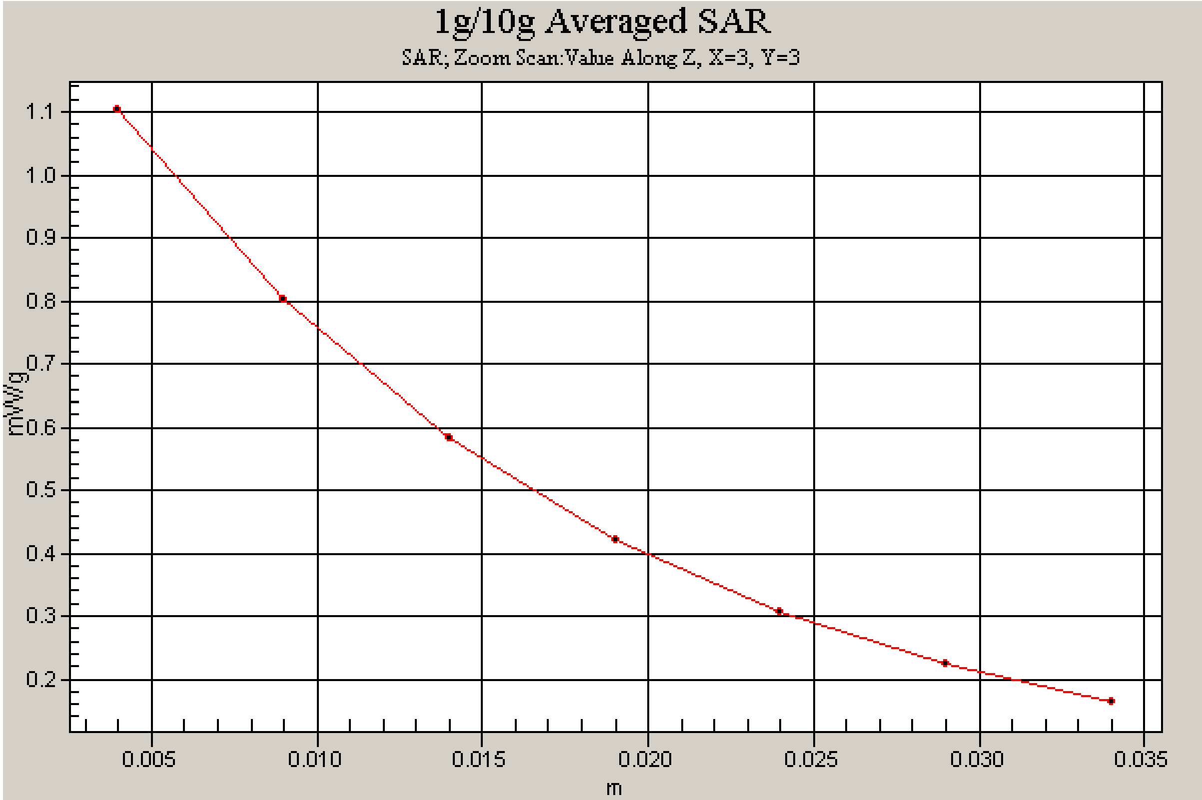


Figure 25 Z-Scan at power reference point (Right Hand Touch Cheek CDMA Cellular Channel 1013)

CDMA Cellular Right Tilt High

Communication System: CDMA Cellular; Frequency: 848.31 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 848.31 MHz; σ = 0.927 mho/m; ε_r = 41.3; ρ = 1000 kg/m^3

Probe: EX3DV4 - SN3660; ConvF(9.19, 9.19, 9.19);

Electronics: DAE3 Sn536;

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

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

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

Reference Value = 13.3 V/m; Power Drift = -0.037 dB

Peak SAR (extrapolated) = 0.746 W/kg

SAR(1 g) = 0.549 mW/g; SAR(10 g) = 0.388 mW/g

Maximum value of SAR (measured) = 0.585 mW/g

Figure 26 Right Hand Tilt 15° CDMA Cellular Channel 777

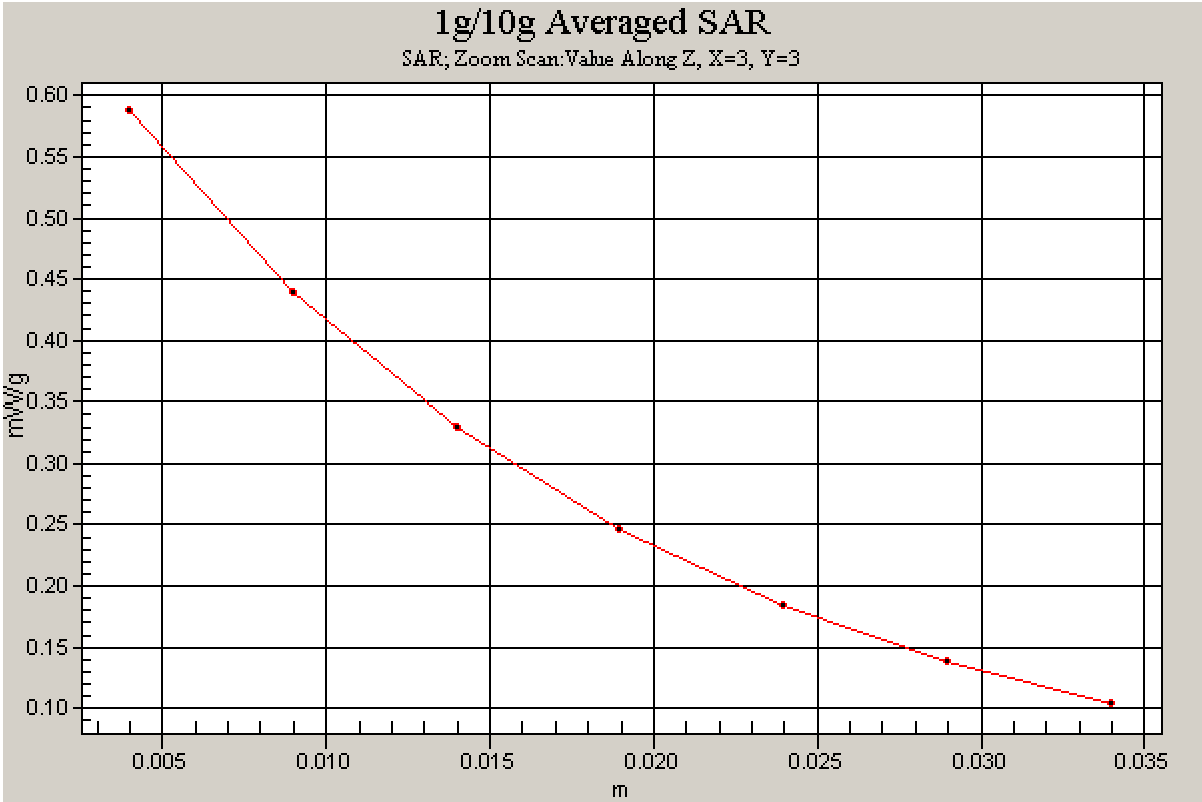


Figure 27 Z-Scan at power reference point (Right Hand Tilt 15° CDMA Cellular Channel 777)

CDMA Cellular Right Tilt Middle

Communication System: CDMA Cellular; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium parameters used: f = 837 MHz; σ = 0.915 mho/m; ε_r = 41.4; ρ = 1000 kg/m^3
Probe: EX3DV4 - SN3660; ConvF(9.19, 9.19, 9.19);
Electronics: DAE3 Sn536;
Tilt Middle/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.527 mW/g

Tilt Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.4 V/m; Power Drift = -0.188 dB
Peak SAR (extrapolated) = 0.678 W/kg
SAR(1 g) = 0.503 mW/g; SAR(10 g) = 0.357 mW/g
Maximum value of SAR (measured) = 0.533 mW/g

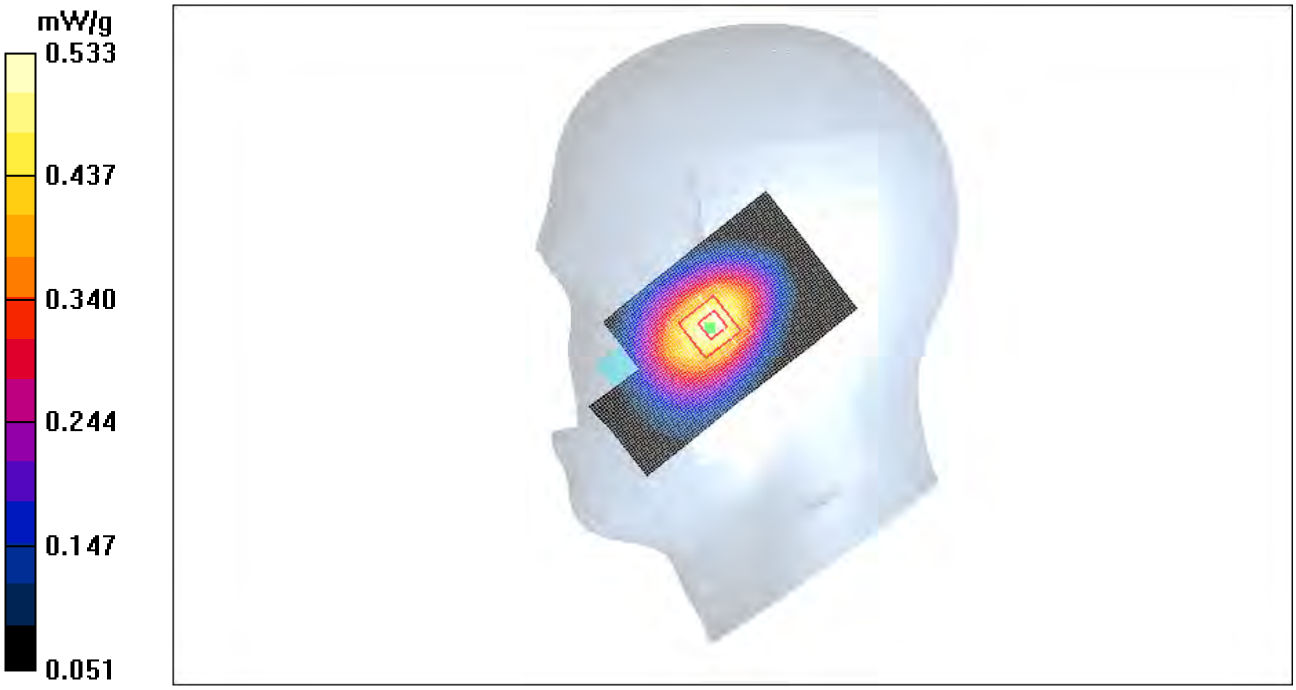


Figure 28 Right Hand Tilt 15° CDMA Cellular Channel 384

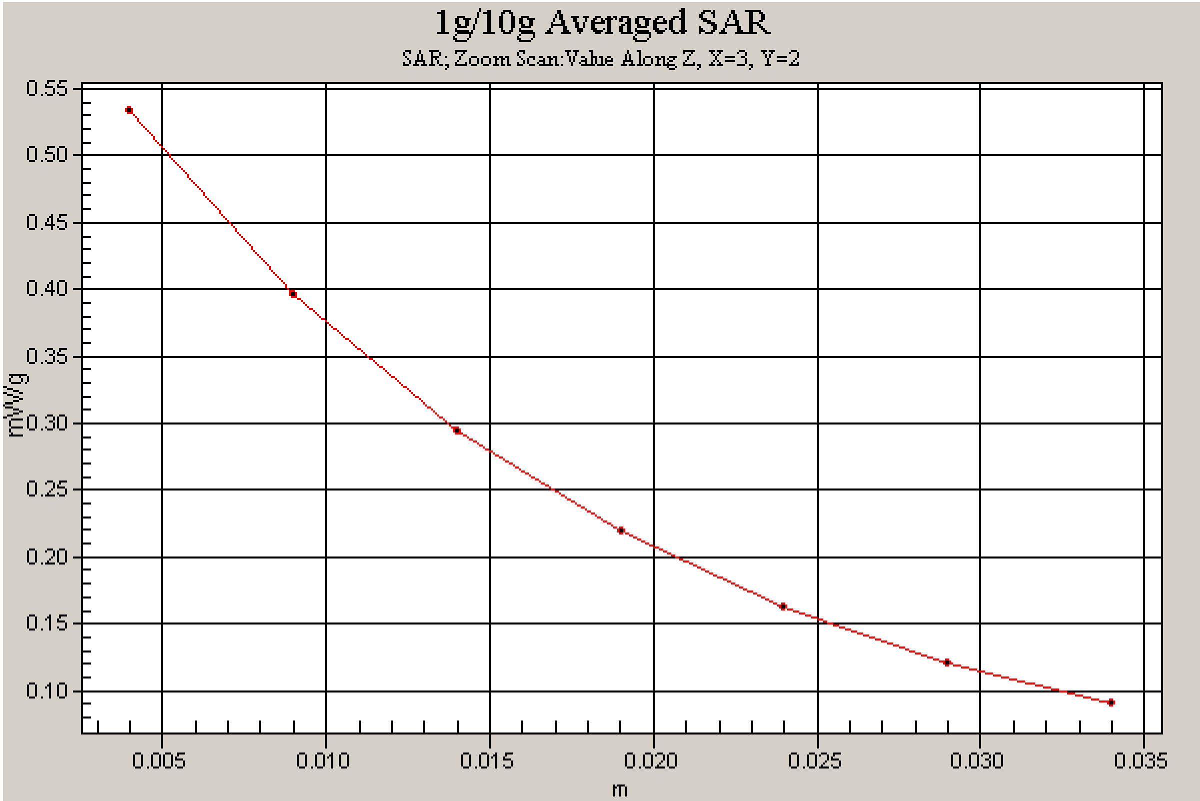


Figure 29 Z-Scan at power reference point (Right Hand Tilt 15° CDMA Cellular Channel 384)

CDMA Cellular Right Tilt Low

Communication System: CDMA Cellular; Frequency: 824.7 MHz;Duty Cycle: 1:1

Medium parameters used: f = 825 MHz; σ = 0.901 mho/m; ε_r = 41.6; ρ = 1000 kg/m^3

Probe: EX3DV4 - SN3660; ConvF(9.19, 9.19, 9.19);

Electronics: DAE3 Sn536;

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

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

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

Reference Value = 12.6 V/m; Power Drift = -0.020 dB

Peak SAR (extrapolated) = 0.641 W/kg

SAR(1 g) = 0.481 mW/g; SAR(10 g) = 0.343 mW/g

Maximum value of SAR (measured) = 0.510 mW/g

Figure 30 Right Hand Tilt 15° CDMA Cellular Channel 1013

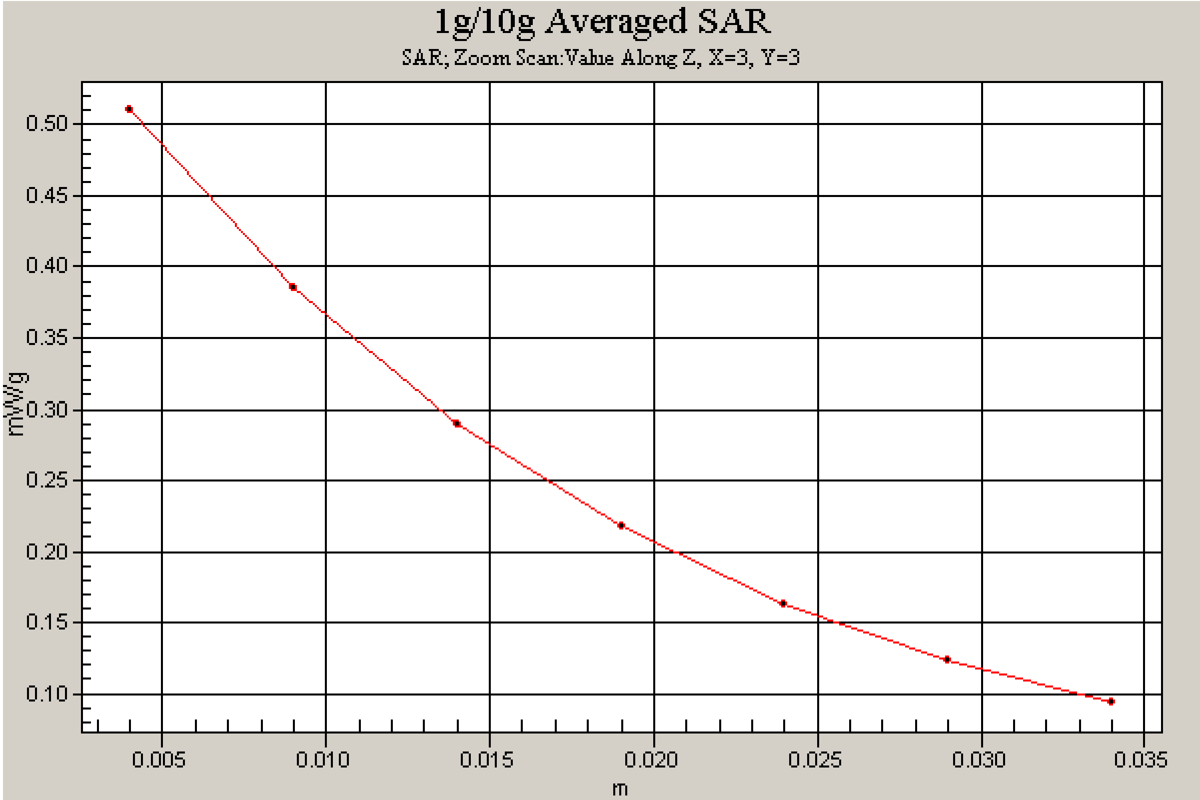


Figure 31 Z-Scan at power reference point (Right Hand Tilt 15° CDMA Cellular Channel 1013)

CDMA Cellular Towards Ground High

Communication System: CDMA Cellular; Frequency: 848.31 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 848.31 MHz; σ = 0.997 mho/m; ε_r = 54.5; ρ = 1000 kg/m^3

Probe: EX3DV4 - SN3660; ConvF(9.1, 9.1, 9.1);

Electronics: DAE3 Sn536;

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

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

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

Reference Value = 13.3 V/m; Power Drift = 0.034 dB

Peak SAR (extrapolated) = 1.38 W/kg

SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.713 mW/g

Maximum value of SAR (measured) = 1.07 mW/g

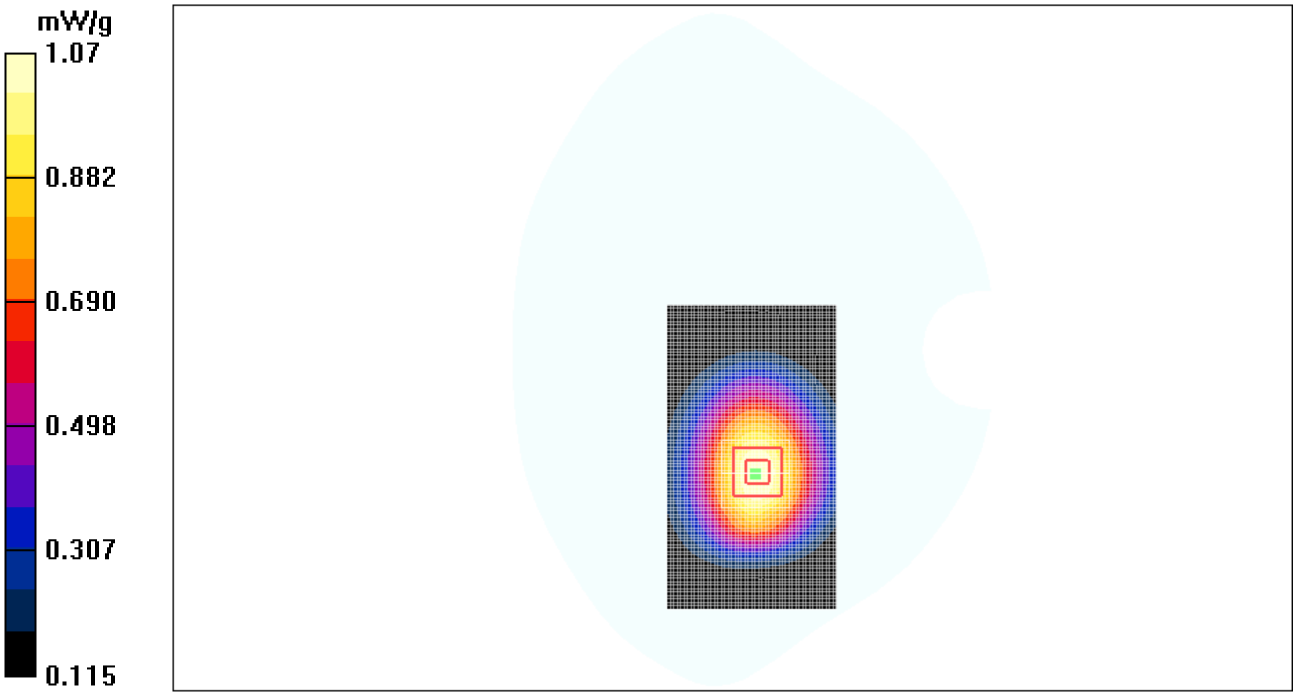


Figure 32 Body, Towards Ground, CDMA Cellular Channel 777

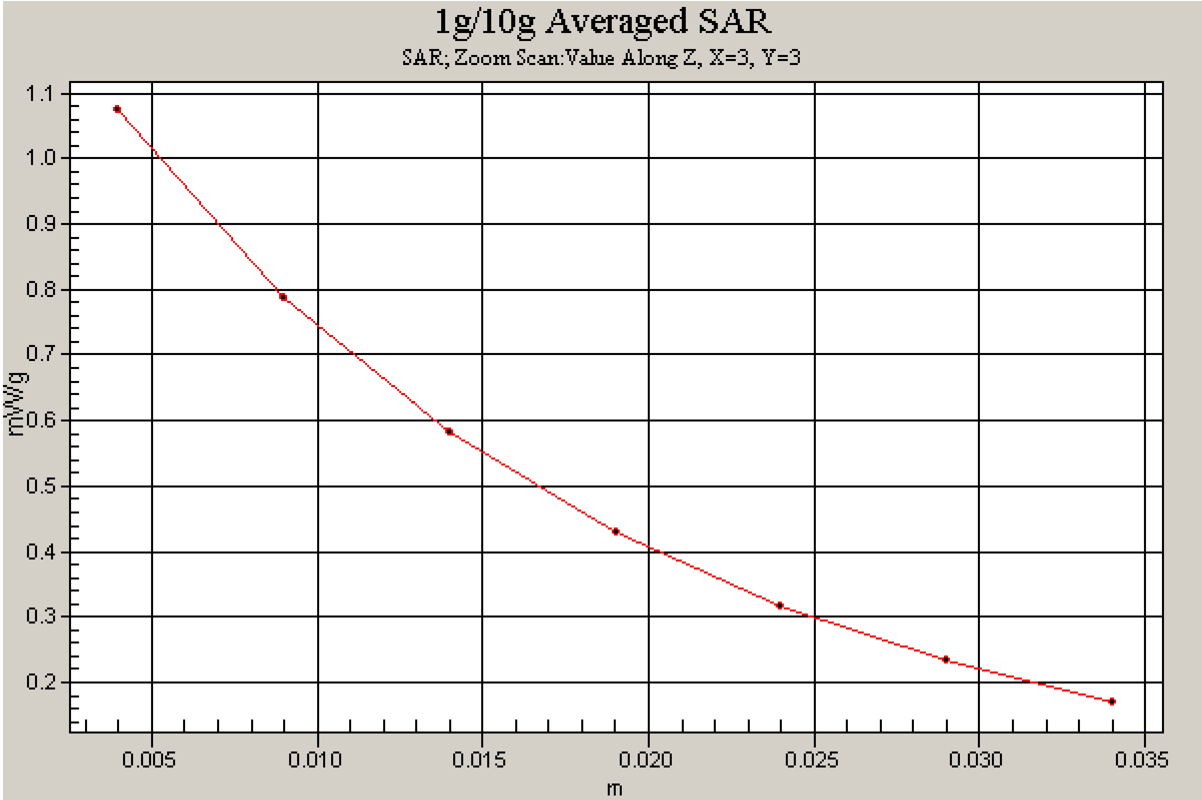


Figure 33 Z-Scan at power reference point (Body, Towards Ground, CDMA Cellular Channel 777)

CDMA Cellular Towards Ground Middle

Communication System: CDMA Cellular; Frequency: 836.52 MHz;Duty Cycle: 1:1

Medium parameters used: f = 837 MHz; σ = 0.986 mho/m; ε_r = 54.7; ρ = 1000 kg/m^3

Probe: EX3DV4 - SN3660; ConvF(9.1, 9.1, 9.1);

Electronics: DAE3 Sn536;

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

Maximum value of SAR (interpolated) = 1.27 mW/g

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

Reference Value = 13.9 V/m; Power Drift = -0.176 dB

Peak SAR (extrapolated) = 1.50 W/kg

SAR(1 g) = 1.09 mW/g; SAR(10 g) = 0.767 mW/g

Maximum value of SAR (measured) = 1.18 mW/g

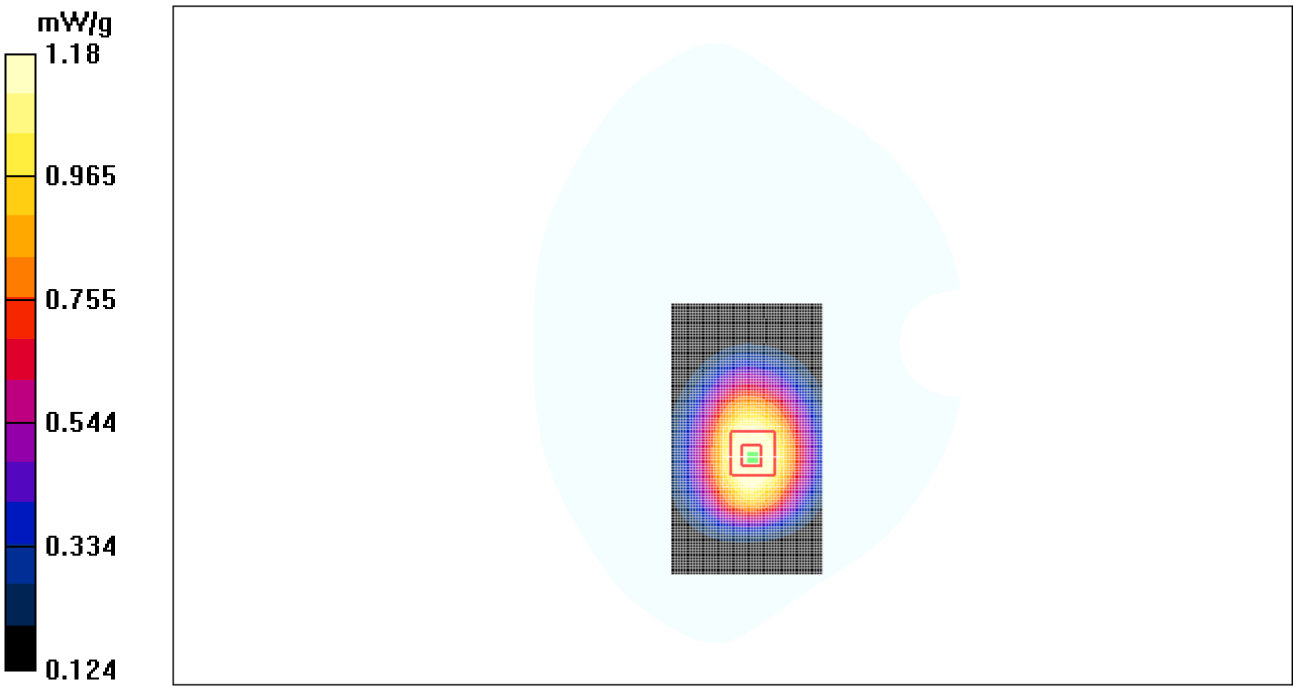


Figure 34 Body, Towards Ground, CDMA Cellular Channel 384

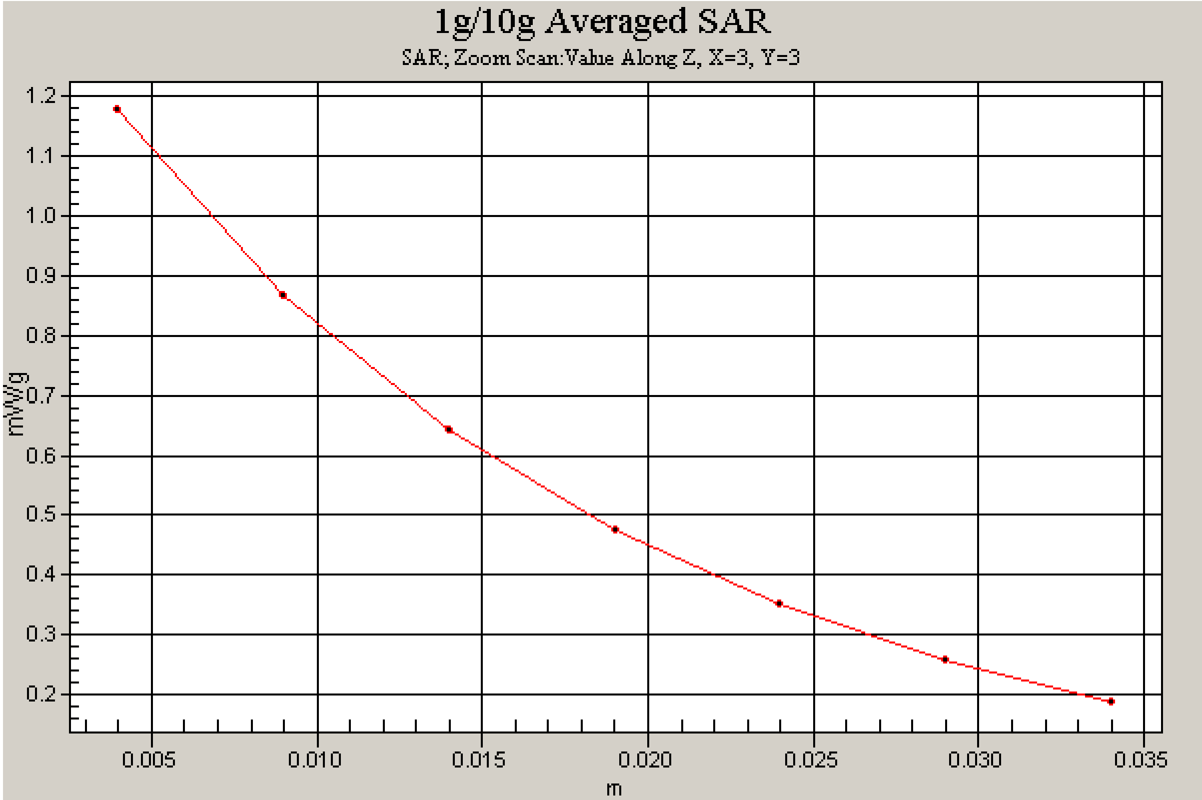


Figure 35 Z-Scan at power reference point (Body, Towards Ground, CDMA Cellular Channel 384)

CDMA Cellular Towards Ground Low

Communication System: CDMA Cellular; Frequency: 824.7 MHz;Duty Cycle: 1:1

Medium parameters used: f = 825 MHz; σ = 0.978 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3

Probe: EX3DV4 - SN3660; ConvF(9.1, 9.1, 9.1);

Electronics: DAE3 Sn536;

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

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

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

Reference Value = 13.3 V/m; Power Drift = 0.121 dB

Peak SAR (extrapolated) = 1.40 W/kg

SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.736 mW/g

Maximum value of SAR (measured) = 1.10 mW/g

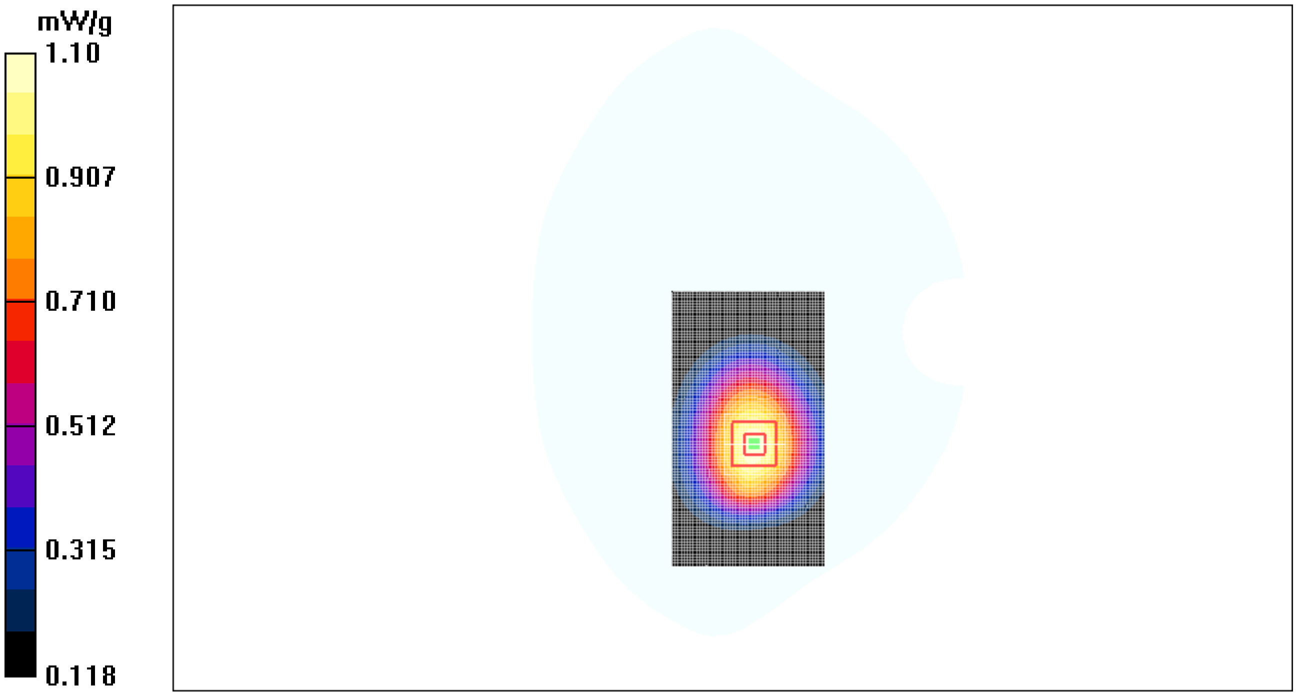


Figure 36 Body, Towards Ground, CDMA Cellular Channel 1013

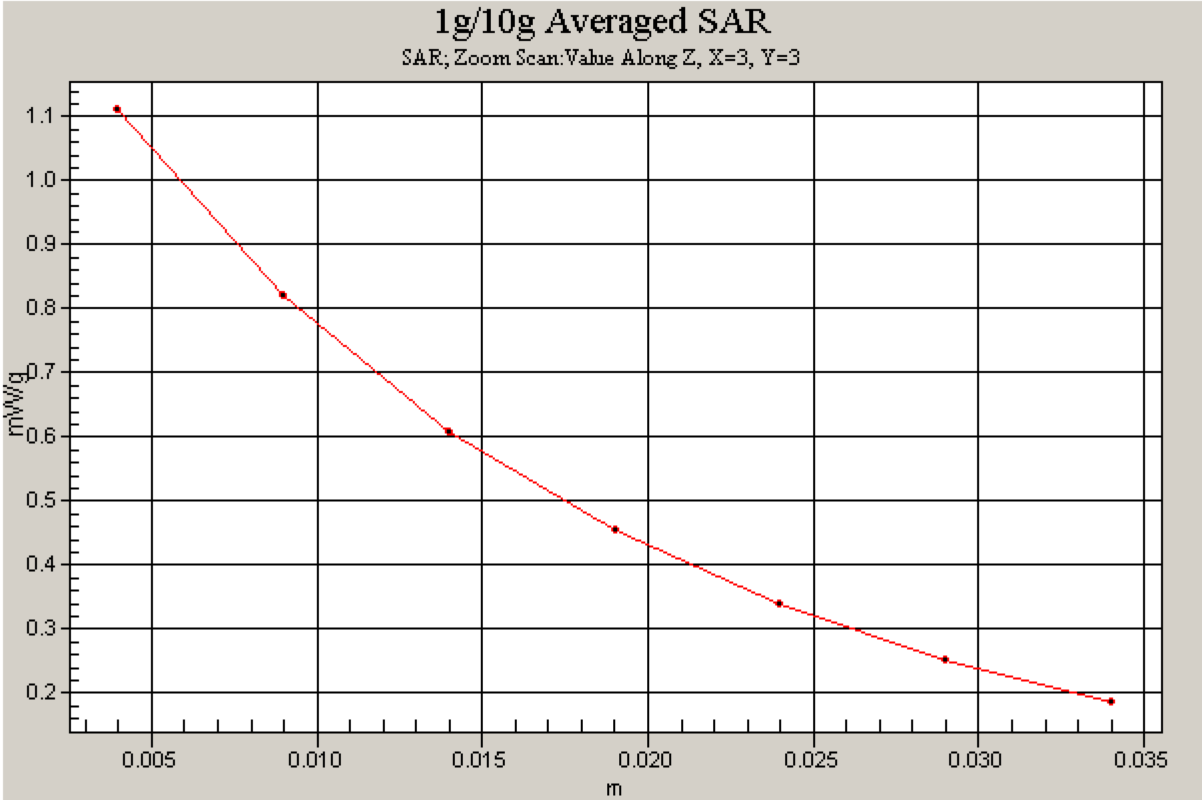


Figure 37 Z-Scan at power reference point (Body, Towards Ground, CDMA Cellular Channel 1013)

CDMA Cellular Towards Phantom High

Communication System: CDMA Cellular; Frequency: 848.31 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 848.31 MHz; σ = 0.997 mho/m; ε_r = 54.5; ρ = 1000 kg/m^3

Probe: EX3DV4 - SN3660; ConvF(9.1, 9.1, 9.1);

Electronics: DAE3 Sn536;

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

Maximum value of SAR (interpolated) = 0.611 mW/g

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

Reference Value = 9.05 V/m; Power Drift = 0.170 dB

Peak SAR (extrapolated) = 0.768 W/kg

SAR(1 g) = 0.563 mW/g; SAR(10 g) = 0.396 mW/g

Maximum value of SAR (measured) = 0.600 mW/g

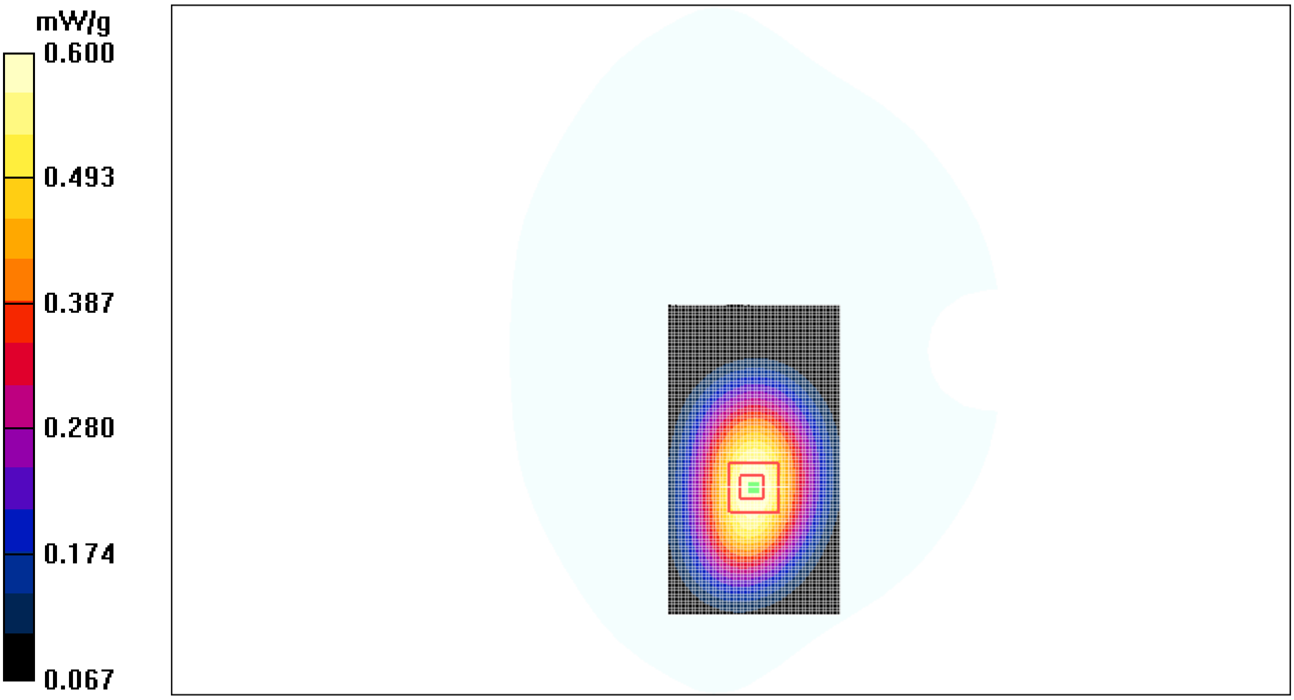


Figure 38 Body, Towards Phantom, CDMA Cellular Channel 777

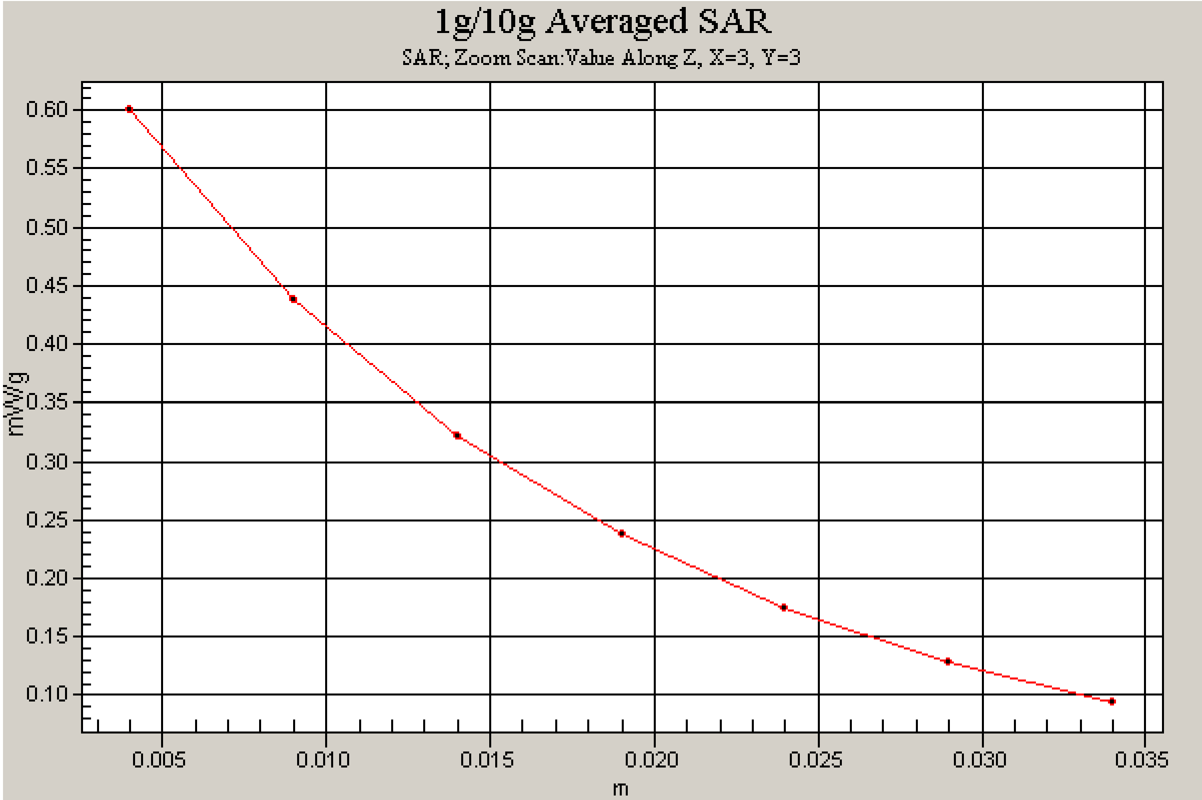


Figure 39 Z-Scan at power reference point (Body, Towards Phantom, CDMA Cellular Channel 777)

CDMA Cellular Towards Phantom Middle

Communication System: CDMA Cellular; Frequency: 836.52 MHz;Duty Cycle: 1:1

Medium parameters used: f = 837 MHz; σ = 0.986 mho/m; ε_r = 54.7; ρ = 1000 kg/m^3

Probe: EX3DV4 - SN3660; ConvF(9.1, 9.1, 9.1);

Electronics: DAE3 Sn536;

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

Maximum value of SAR (interpolated) = 0.553 mW/g

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

Reference Value = 8.80 V/m; Power Drift = -0.003 dB

Peak SAR (extrapolated) = 0.701 W/kg

SAR(1 g) = 0.518 mW/g; SAR(10 g) = 0.364 mW/g

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

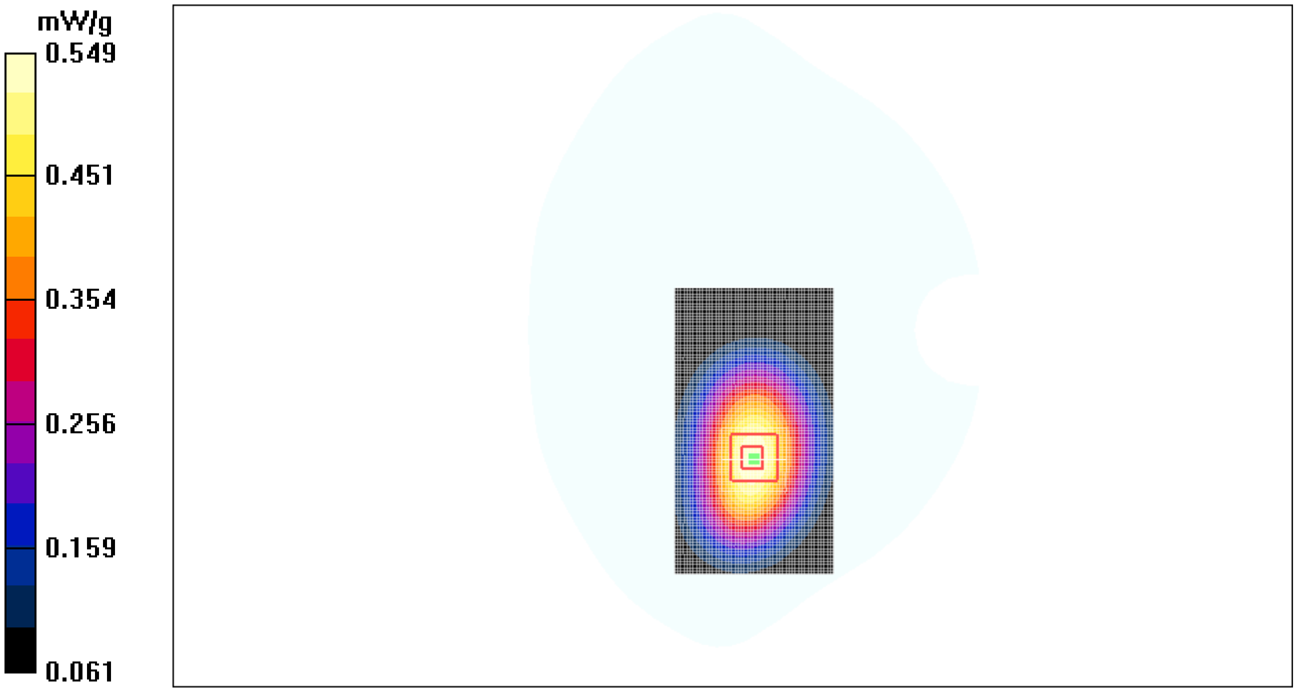


Figure 40 Body, Towards Phantom, CDMA Cellular Channel 384

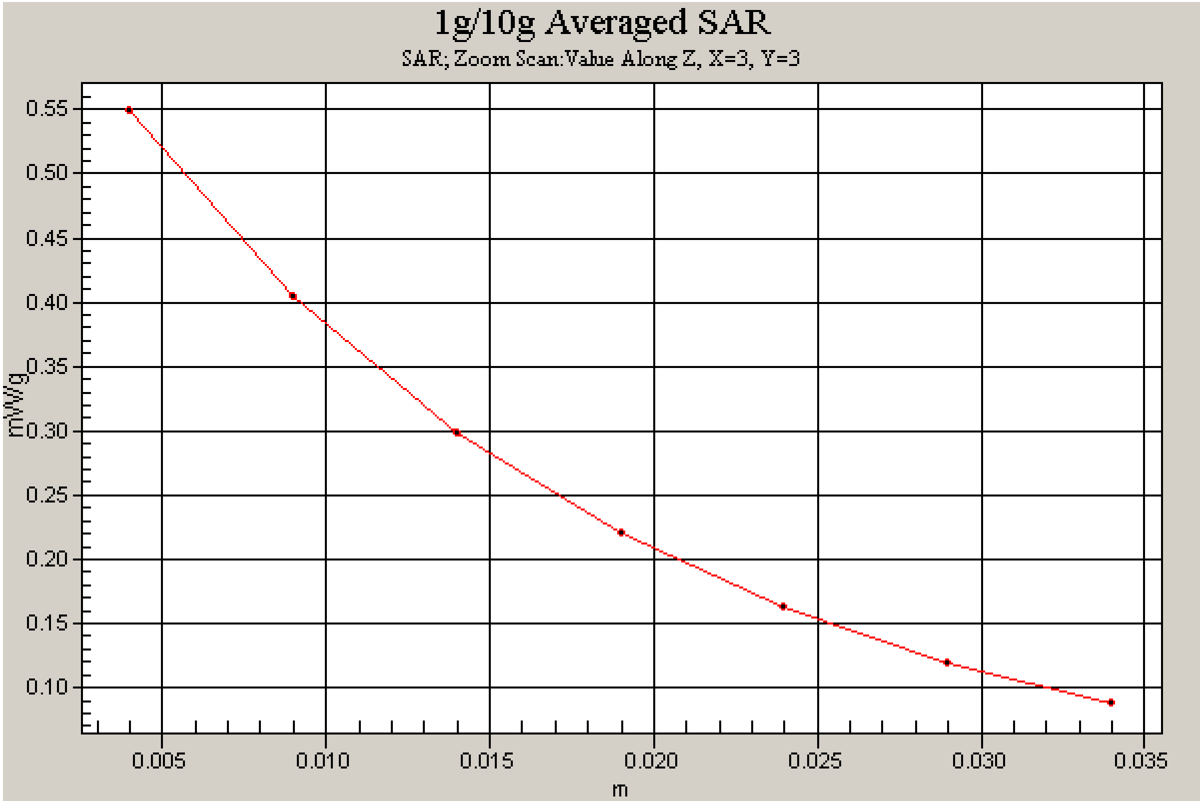


Figure 41 Z-Scan at power reference point (Body, Towards Phantom, CDMA Cellular Channel 384)

CDMA Cellular Towards Phantom Low

Communication System: CDMA Cellular; Frequency: 824.7 MHz;Duty Cycle: 1:1

Medium parameters used: f = 825 MHz; σ = 0.978 mho/m; ε_r = 54.8; ρ = 1000 kg/m^3

Probe: EX3DV4 - SN3660; ConvF(9.1, 9.1, 9.1);

Electronics: DAE3 Sn536;

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

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

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

Reference Value = 8.93 V/m; Power Drift = 0.035 dB

Peak SAR (extrapolated) = 0.695 W/kg

SAR(1 g) = 0.514 mW/g; SAR(10 g) = 0.363 mW/g

Maximum value of SAR (measured) = 0.545 mW/g

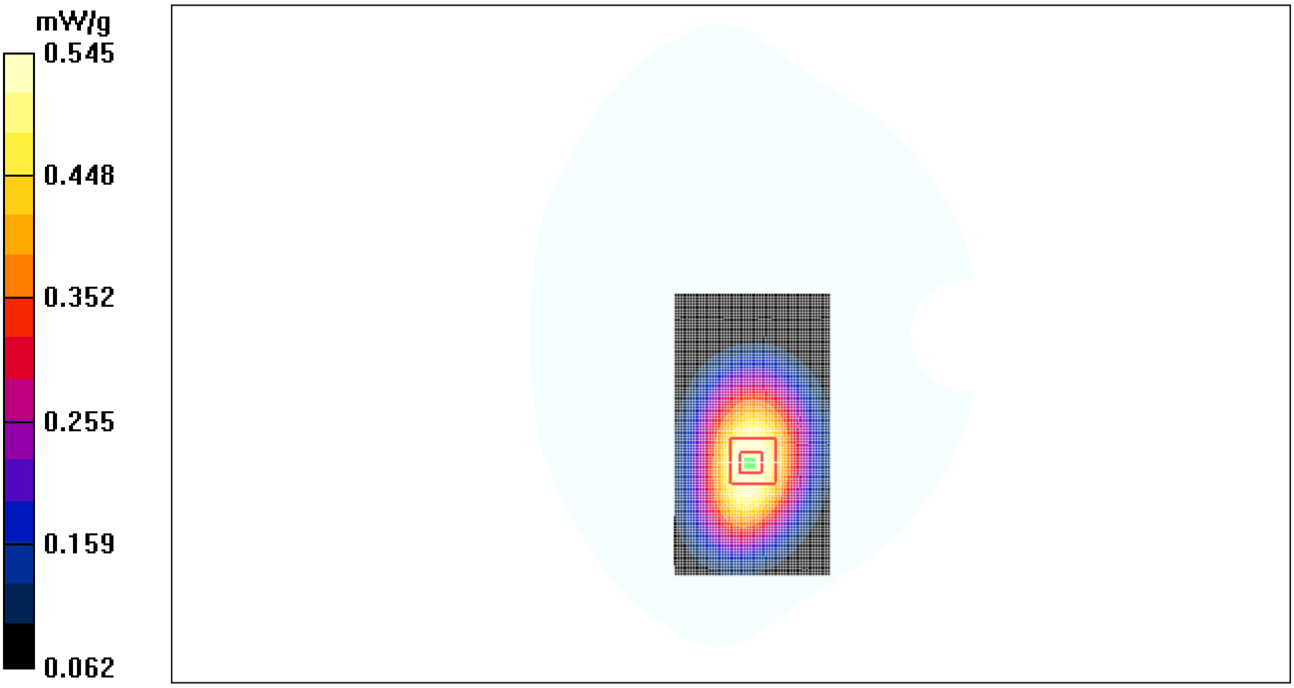


Figure 42 Body, Towards Phantom, CDMA Cellular Channel 1013

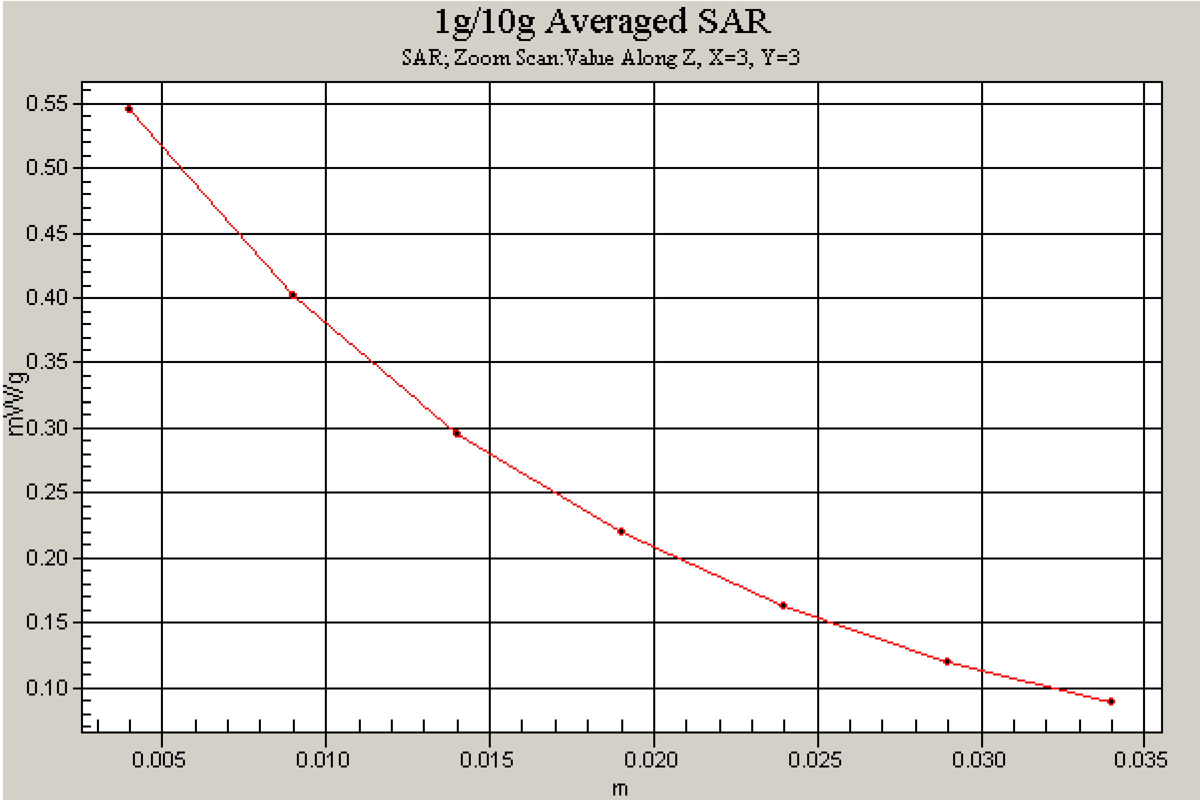


Figure 43 Z-Scan at power reference point (Body, Towards Phantom, CDMA Cellular Channel 1013)

ANNEX D： SYSTEM VALIDATION RESULTS

System Performance Check at 835 MHz

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d020

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1

Medium parameters used: f = 835 MHz; σ = 0.916 mho/m; ε_r = 41.75; ρ = 1000 kg/m^3

Probe: EX3DV4 - SN3660; ConvF(9.19, 9.19, 9.19);

Electronics: DAE3 Sn536;

d=15mm, Pin=250mW/Area Scan (101x121x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 2.81 mW/g

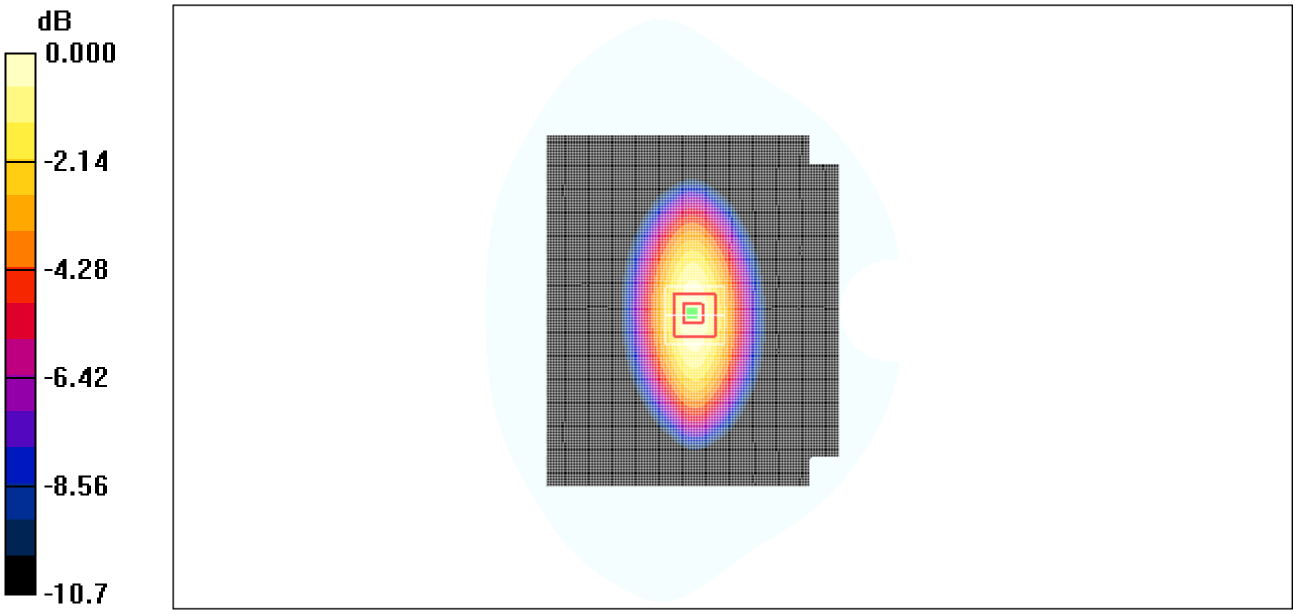
d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.8 V/m; Power Drift = -0.060 dB

Peak SAR (extrapolated) = 3.50 W/kg

SAR(1 g) = 2.3 mW/g; SAR(10 g) = 1.5 mW/g

Maximum value of SAR (measured) = 2.83 mW/g



0 dB = 2.83mW/g

Figure 44 System Performance Check 835MHz 250mW

ANNEX E： PROBE CALIBRATION CERTIFICATE

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **TA (Auden)**

Certificate No: **EX3-3660_Sep08**

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3660
Calibration procedure(s)	QA CAL-01.v6 and QA CAL-23.v3 Calibration procedure for dosimetric E-field probes
Calibration date:	September 3, 2008
Condition of the calibrated item	In Tolerance

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41495277	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41498087	1-Apr-08 (No. 217-00788)	Apr-09
Reference 3 dB Attenuator	SN: S5054 (3c)	1-Jul-08 (No. 217-00865)	Jul-09
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-08 (No. 217-00787)	Apr-09
Reference 30 dB Attenuator	SN: S5129 (30b)	1-Jul-08 (No. 217-00866)	Jul-09
Reference Probe ES3DV2	SN: 3013	2-Jan-08 (No. ES3-3013_Jan08)	Jan-09
DAE4	SN: 660	3-Sep-07 (No. DAE4-660_Sep07)	Sep-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-07)	In house check: Oct-08

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Fin Bomholt	R&D Director	

Issued: September 3, 2008

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: EX3-3660_Sep08 Page 1 of 9

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe EX3DV4

SN:3660

Manufactured: April 29, 2008
Calibrated: September 3, 2008

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: EX3DV4 SN:3660

Sensitivity in Free Space[A]

NormX	**0.44** ± 10.1%	μV/(V/m)^2	DCP X	**88** mV
NormY	**0.42** ± 10.1%	μV/(V/m)^2	DCP Y	**85** mV
NormZ	**0.45** ± 10.1%	μV/(V/m)^2	DCP Z	**89** mV

Diode Compression[B]

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL 900 MHz Typical SAR gradient: 5 % per mm

Sensor Center to Phantom Surface Distance		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	9.5	5.2
SAR_{be} [%]	With Correction Algorithm	0.4	0.1

TSL 1750 MHz Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		**2.0 mm**	**3.0 mm**
SAR_{be} [%]	Without Correction Algorithm	7.6	3.8
SAR_{be} [%]	With Correction Algorithm	0.2	0.1

Sensor Offset

Probe Tip to Sensor Center **1.0** mm

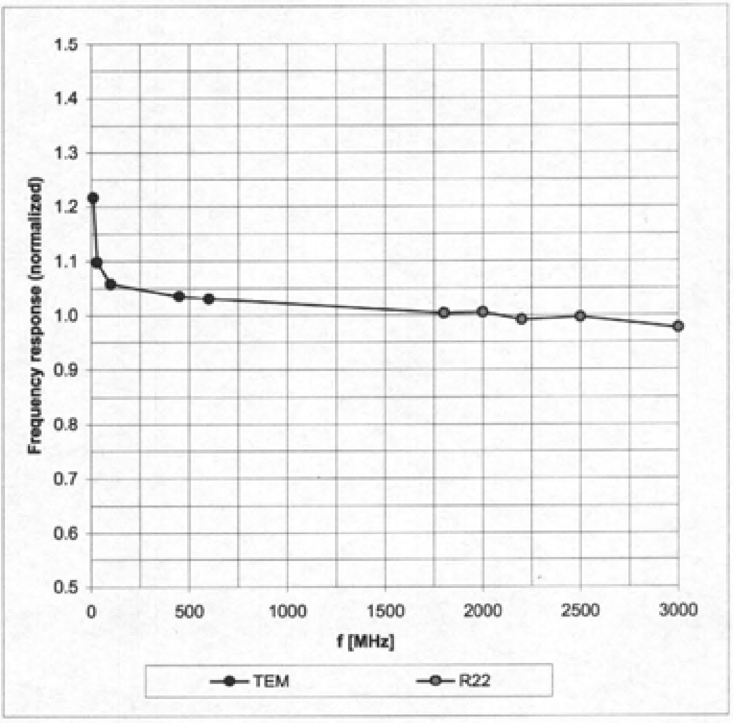
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 8).
[B] Numerical linearization parameter: uncertainty not required.

EX3DV4 SN:3660 September 3, 2008

Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

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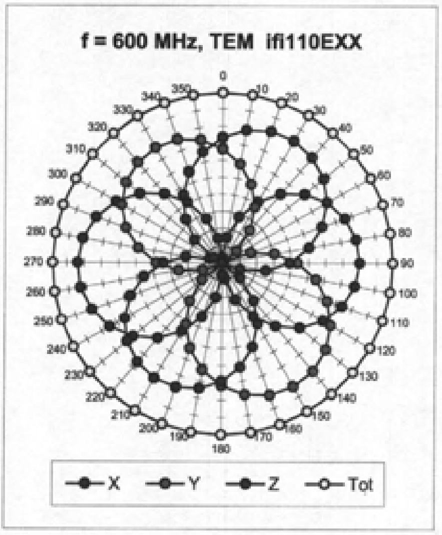
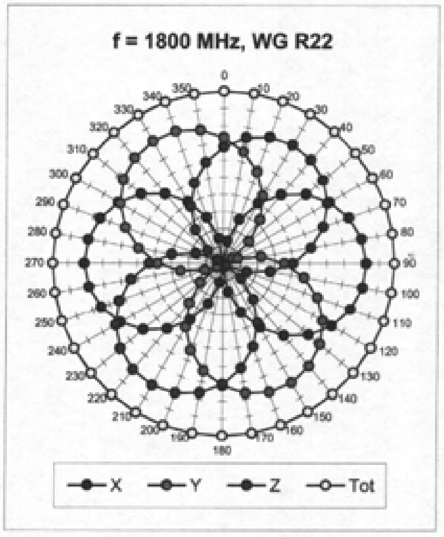
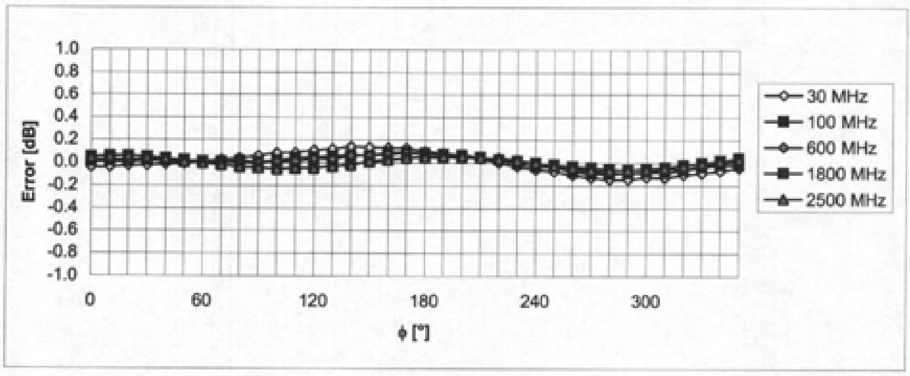
Receiving Pattern (ϕ), ϑ = 0°







Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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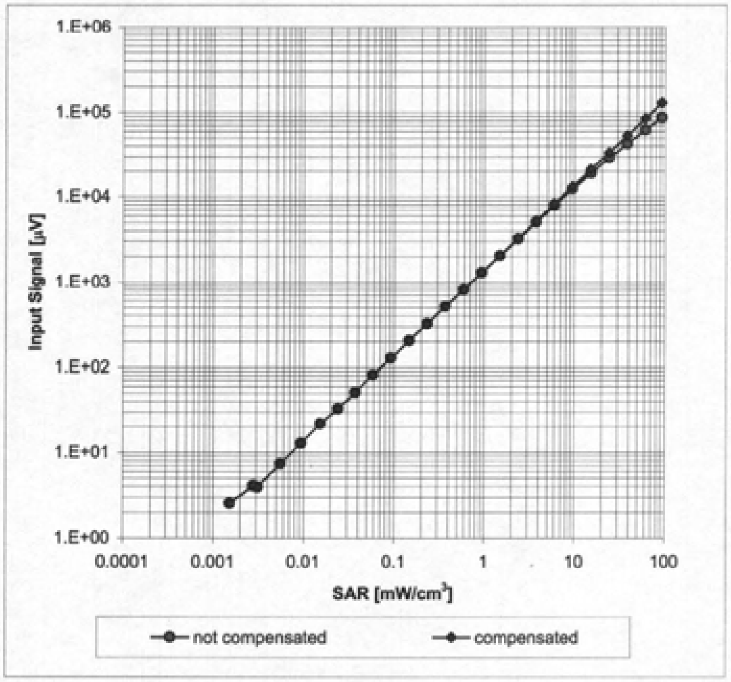
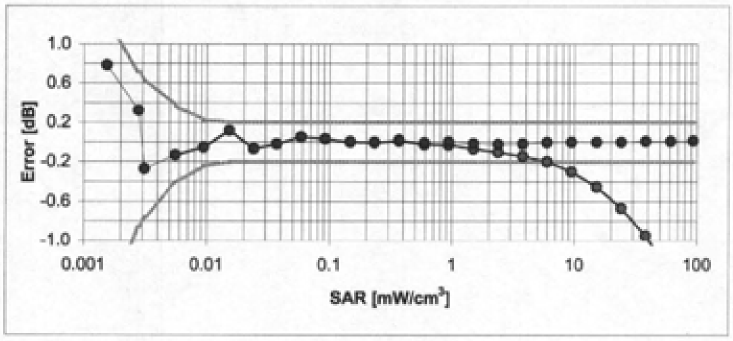
Dynamic Range f(SAR_{head})

(Waveguide R22, f = 1800 MHz)





Uncertainty of Linearity Assessment: ± 0.6% (k=2)

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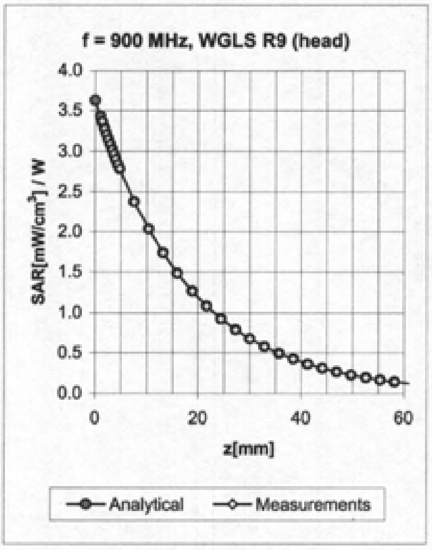
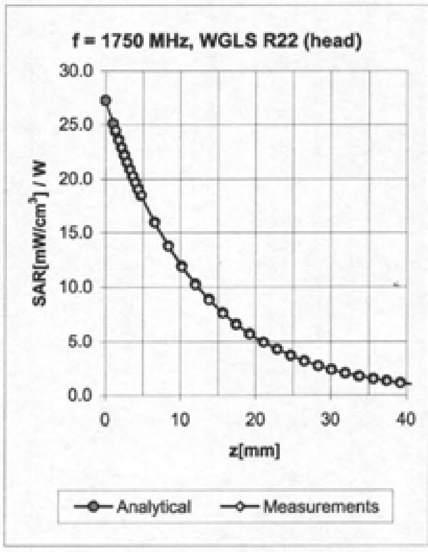
Conversion Factor Assessment





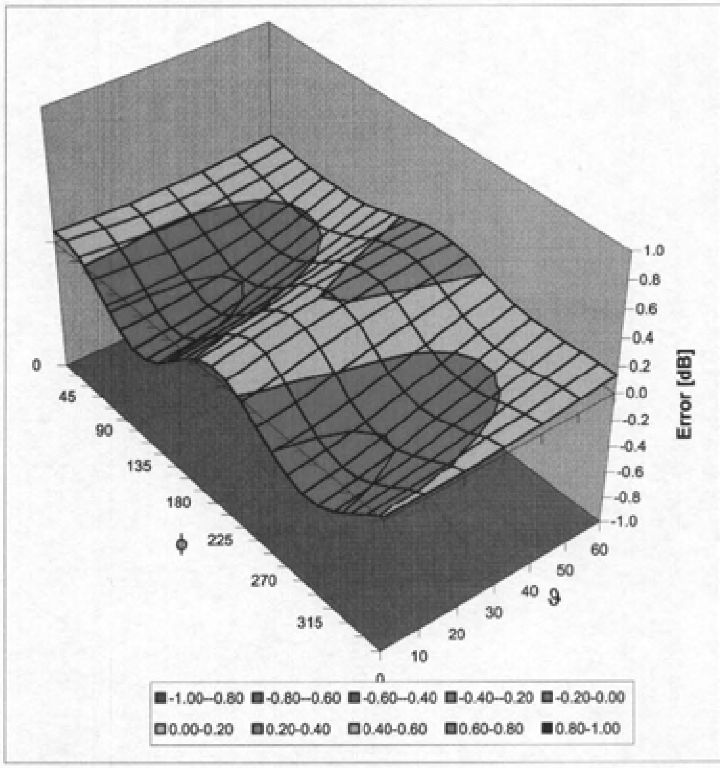
f [MHz]	Validity [MHz][c]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.49	0.76	9.19	± 11.0% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.43	0.83	8.84	± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.68	0.63	7.79	± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.31	0.80	7.35	± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.32	0.85	6.94	± 11.0% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.63	0.71	9.10	± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.30	1.08	8.76	± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.34	0.86	7.55	± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.60	0.67	7.45	± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.30	1.15	6.75	± 11.0% (k=2)

[c] The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

EX3DV4 SN:3660 September 3, 2008

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

ANNEX F： D835V2 DIPOLE CALIBRATION CERTIFICATE

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Auden**

Certificate No: **D835V2-4d020_Jul08**

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d020
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	July 21, 2008
Condition of the calibrated item	In Tolerance

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-07 (No. 217-00736)	Oct-08
Power sensor HP 8481A	US37292783	04-Oct-07 (No. 217-00736)	Oct-08
Reference 20 dB Attenuator	SN: 5086 (20g)	01-Jul-08 (No. 217-00864)	Jul-09
Type-N mismatch combination	SN: 5047.2 / 06327	01-Jul-08 (No. 217-00867)	Jul-09
Reference Probe ES3DV2	SN: 3025	28-Apr-08 (No. ES3-3025_Apr08)	Apr-09
DAE4	SN: 601	14-Mar-08 (No. DAE4-601_Mar08)	Mar-09

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-07)	In house check: Oct-09
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-07)	In house check: Oct-08

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 21, 2008

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.