



NO.: RZA2008-0052FCC

OET 65

TEST REPORT

Test name	Electromagnetic Field (Specific Absorption Rate)
Product	CDMA 1X USB Stick
Model	HUAWEI EC121
FCC ID	QISEC121
Client	HUAWEI Technologies Co., Ltd.

TA Technology (Shanghai) Co., Ltd.



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GENERAL SUMMARY

Product	CDMA 1X USB Stick	Model	HUAWEI EC121
Client	HUAWEI Technologies Co., Ltd.	Type of test	Entrusted
Manufacturer	HUAWEI Technologies Co., Ltd.	Arrival Date of sample	Jan.9 th , 2008
Place of sampling	(Blank)	Carrier of the samples	Ting Zhang
Quantity of the samples	One	Date of product	(Blank)
Base of the samples	(Blank)	Items of test	SAR
Series number	109C8FDE		
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 62209-2 (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.</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) Date of issue: Jan. 29th, 2008</p>		
Comment	TX Freq. Band:	CDMA Cellular	
	Max. Power:	0.25Watt	

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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

3.2. Constituents of EUT

Table 3: Constituents of Samples

Description	Model	Serial Number	Manufacturer
CDMA 1X USB Stick	EC121	109C8FDE	HUAWEI Technologies Co., Ltd.

Note:

The EUT appearances see ANNEX G.

3.3. General Description

Equipment Under Test (EUT) is a CDMA 1X USB Stick. SAR is tested for the EUT respectively for CDMA Cellular.

Since the EUT only has the data transfer function, but does not have the speech transfer function, the tests in the band of CDMA Cellular are only performed in the mode of data transfer function.

The measurements were performed in combination with three different host products [DELL LATITUDE D830, Acer ZH1 and BenQ Joybook R55V (118)]. DELL LATITUDE D830 and Acer ZH1 laptop have horizontal USB slots, BenQ Joybook R55V (118) laptop has vertical USB slots.

The sample under 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 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.

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. 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.

4.3. Position of module in Portable devices

For each channel, the EUT is tested at the following 7 test positions:

- Test Position 1: The EUT is connected to the portable computer with horizontal USB slot. The back side of the EUT is towards the bottom of the flat phantom. (ANNEX G Picture 5-a)
- Test Position 2: The EUT is connected to the portable computer with horizontal USB slot. The front side of the EUT is towards the bottom of the flat phantom. (ANNEX G Picture 5-b)
- Test Position 3: The EUT is connected to the portable computer with horizontal USB slot. The top side of the EUT is towards the bottom of the flat phantom. (ANNEX G Picture 5-c)
- Test Position 4: The EUT is connected to the portable computer with vertical USB slot. The front side of the EUT is towards the bottom of the flat phantom. (ANNEX G Picture 5-d)
- Test Position 5: The EUT is connected to the portable computer with vertical USB slot. The left side of the EUT is towards the bottom of the flat phantom. (ANNEX G Picture 5-e)
- Test Position 6: The EUT is connected to the portable computer with vertical USB slot. The right side of the EUT is towards the bottom of the flat phantom. (ANNEX G Picture 5-f)
- Test Position 7: The EUT is connected to the portable computer with vertical USB slot. The top side of the EUT is towards the bottom of the flat phantom. (ANNEX G Picture 5-g)

Show the distance that the back side of the EUT with different computer is towards the bottom of the Phantom. Please see ANNEX G Picture 5.

4.4. Picture of host product

During the test, The DELL LATITUDE D830 laptop, Acer ZH1 laptop and BenQ Joybook R55V (118) laptop are used as an assistant to help to setup communication. (See Picture 1)

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Picture 1-a: DELL LATITUDE D830 Close



Picture 1-b: DELL LATITUDE D830 Open



Picture 1-c: Acer ZH1 Close



Picture 1-d: Acer ZH1 Open



Picture 1-e: BenQ Joybook R55V Close



Picture 1-f: BenQ Joybook R55V Open



Picture 1-g: DELL LATITUDE D830 with horizontal USB slot



Picture 1-h: Acer ZH1 with horizontal USB slot



Picture 1-i: BenQ Joybook R55V(118) with Vertical USB slot

Picture 1: Computer as a test assistant

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

A cell controller system contains the power supply, robot controller, teaches pendant (Joystick) and remote control, is used to drive the robot motors. The PC consists of the Micron Pentium III 800 MHz computer with Windows 2000 system and SAR Measurement Software DASY4, A/D interface card, monitor, mouse, and keyboard. The Stäubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.

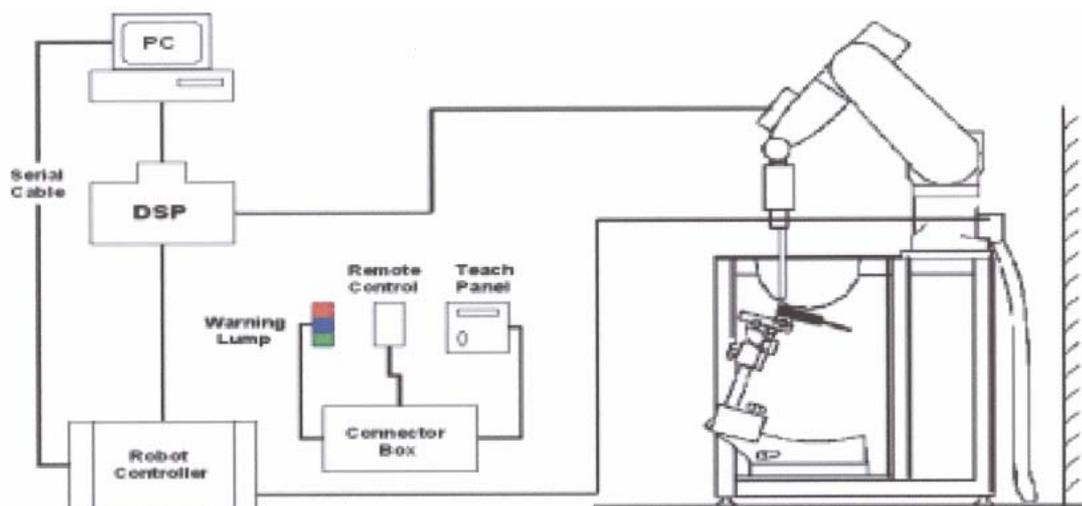


Figure1. SAR Lab Test Measurement Set-up

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, 1.8GHz, 2.0GHz and 2.4GHz (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 around probe axis)
Dynamic Range	5 μ W/g to > 100mW/g; Linearity: ± 0.2 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

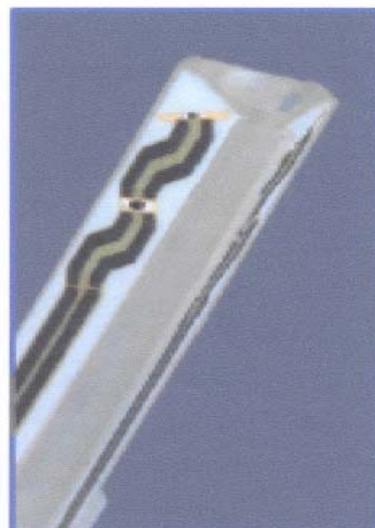


Figure 2. ET3DV6 E-field Probe

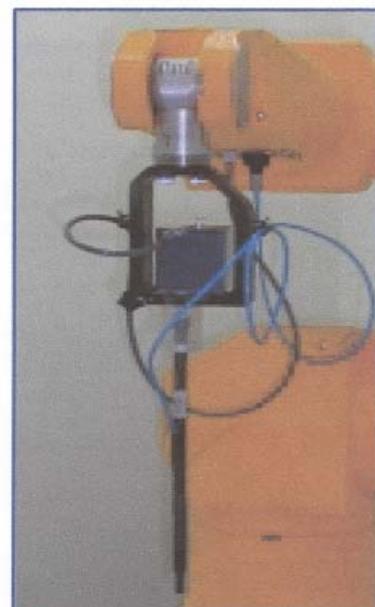


Figure 3. ET3DV6 E-field probe

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.

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

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

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

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).



Figure 4. 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



Figure 5. Generic Twin Phantom

5.5. Equivalent Tissues

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

Table 4: Composition of the Body Tissue Equivalent Matter

MIXTURE%	FREQUENCY 835MHz		
Water	52.5		
Sugar	45		
Salt	1.4		
Preventol	0.1		
Cellulose	1.0		
Dielectric Parameters Target Value	f=835MHz	$\epsilon=55.2$	$\sigma=0.97$

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 5: 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.	

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 9 to Table 11 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. The measurements were done at 3 channels both before and after SAR tests for each test band.

8.3.2. Measurement result

Table 6: Conducted Power Measurement Results

CDMA Cellular(TM1)	Conducted Power(dBm)		
	Channel 1013	Channel 384	Channel 777
Before Test	24.47	24.65	24.42
After Test	24.44	24.57	24.45
CDMA Cellular(TM3)	Conducted Power(dBm)		
	Channel 1013	Channel 384	Channel 777
Before Test	24.63	24.42	24.43
After Test	24.57	24.49	24.41

9. TEST RESULTS

9.1. Dielectric Performance

Table 7: 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	55.42	0.39	%
	Conductivity σ	0.97	0.99	2.06	%

9.2. System Validation

Table 8: 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	42.8		0.89			
Verification results	Frequency	Target value (W/kg)		Measurement value (W/kg)		Difference percentage	
		10 g Average	1 g Average	10 g Average	10 g Average	1 g Average	10 g Average
	835MHz	1.6	2.48	1.53	2.34	4.38%	5.65%

Note:

- a. Target Values used derive from the SPEAG calibration certificate and 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 9: SAR Values (CDMA Cellular at Test Position 1)

Liquid Temperature: 22.4°C					
Limit of SAR (W/kg)		10g Average	1g Average	Power Drift (dB)	Graph Results
		2.0	1.6	± 0.2	
Test Case Of Body		Measurement Result (W/kg)		Power Drift (dB)	
Different Model Computer	Channel	10g Average	1g Average		
Acer ZH1	Middle	0.814	1.220	-0.137	Figure 7
DELL LATITUDE D830	Middle	0.413	0.689	0.194	Figure 9

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

Table 10: SAR Values (CDMA Cellular with Acer ZH1)

Liquid Temperature: 22.4°C					
Limit of SAR (W/kg)		10 g Average	1g Average	Power Drift (dB)	Graph Results
		2.0	1.6	± 0.2	
Test Case Of Body		Measurement Result (W/kg)		Power Drift (dB)	
Different Test Position	Channel	10 g Average	1 g Average		
Test Position 1	High	0.552	0.834	-0.097	Figure 11
	Middle	0.814	1.220	-0.137	Figure 7
	Low	0.683	1.020	-0.069	Figure 13
Test Position 2	High	0.491	0.745	0.105	Figure 15
	Middle	0.710	1.080	0.067	Figure 17
	Low	0.565	0.850	0.076	Figure 19
Test Position 3	Middle	0.218	0.726	-0.187	Figure 21

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Table 11: SAR Values (CDMA Cellular with BenQ R55V)

Liquid Temperature: 22.4°C					
Limit of SAR (W/kg)		10 g Average	1g Average	Power Drift (dB)	Graph Results
		2.0	1.6	± 0.2	
Test Case Of Body		Measurement Result (W/kg)		Power Drift (dB)	
Different Test Position	Channel	10 g Average	1 g Average		
Test Position 4	Middle	0.398	0.582	-0.066	Figure 23
Test Position 5	Middle	0.332	0.478	0.005	Figure 25
Test Position 6	Middle	0.571	0.823	-0.038	Figure 27
Test Position 7	Middle	0.277	0.926	0.106	Figure 29

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

No.	a	Type	c	d	e=f(d, k)	f	h=cxf / 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							11.25	
Expanded Uncertainty (95 % CONFIDENCE INTERVAL)							22.5	

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11. MAIN TEST INSTRUMENTS

Table 12: 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	March 16, 2007	One year
04	Power sensor	Agilent 8481H	MY41091316	March 16, 2007	One year
05	Signal Generator	HP 8341B	2730A00804	September 15, 2007	One year
06	Amplifier	IXA-020	0401	No Calibration Requested	
07	Validation Kit 835MHz	SPEAG D835V2	443	February 19, 2007	One years
08	BTS	E5515C	GB46490218	September 15, 2007	One year
10	E-field Probe	ET3DV6	1737	February 20, 2007	One year
11	DAE	DAE3	452	September 6, 2007	One year

12. TEST PERIOD

The test is performed from Jan.17th, 2008 to Jan.21st, 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 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.

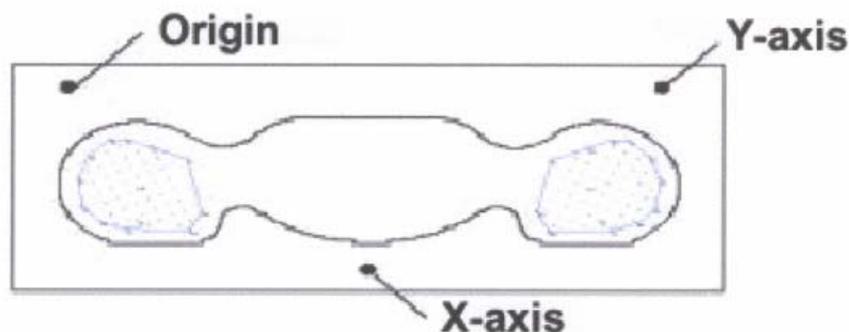
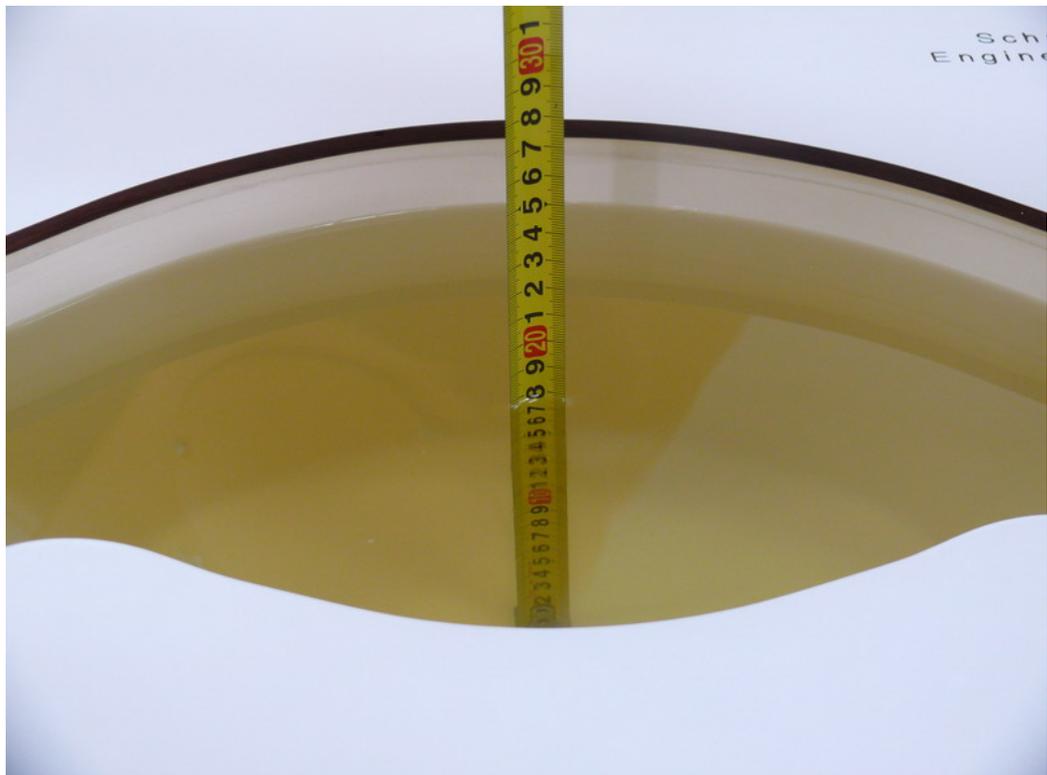


Figure 6 SAR Measurement Points in Area Scan

ANNEX B: TEST LAYOUT



Picture 2 Specific Absorption Rate Test Layout



Picture 3 Liquid depth in the Flat Phantom (835MHz)

ANNEX C: GRAPH RESULTS

CDMA Cellular with Acer ZH1 Test Position 1 Mid frequency

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

Medium parameters used: $f = 837$ MHz; $\sigma = 0.996$ mho/m; $\epsilon_r = 55.4$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(6.52, 6.52, 6.52);

Electronics: DAE3 Sn452;

Test Position 1 Middle/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.30 mW/g

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

Reference Value = 33.5 V/m; Power Drift = -0.137 dB

Peak SAR (extrapolated) = 1.68 W/kg

SAR(1 g) = 1.22 mW/g; SAR(10 g) = 0.814 mW/g

Maximum value of SAR (measured) = 1.32 mW/g

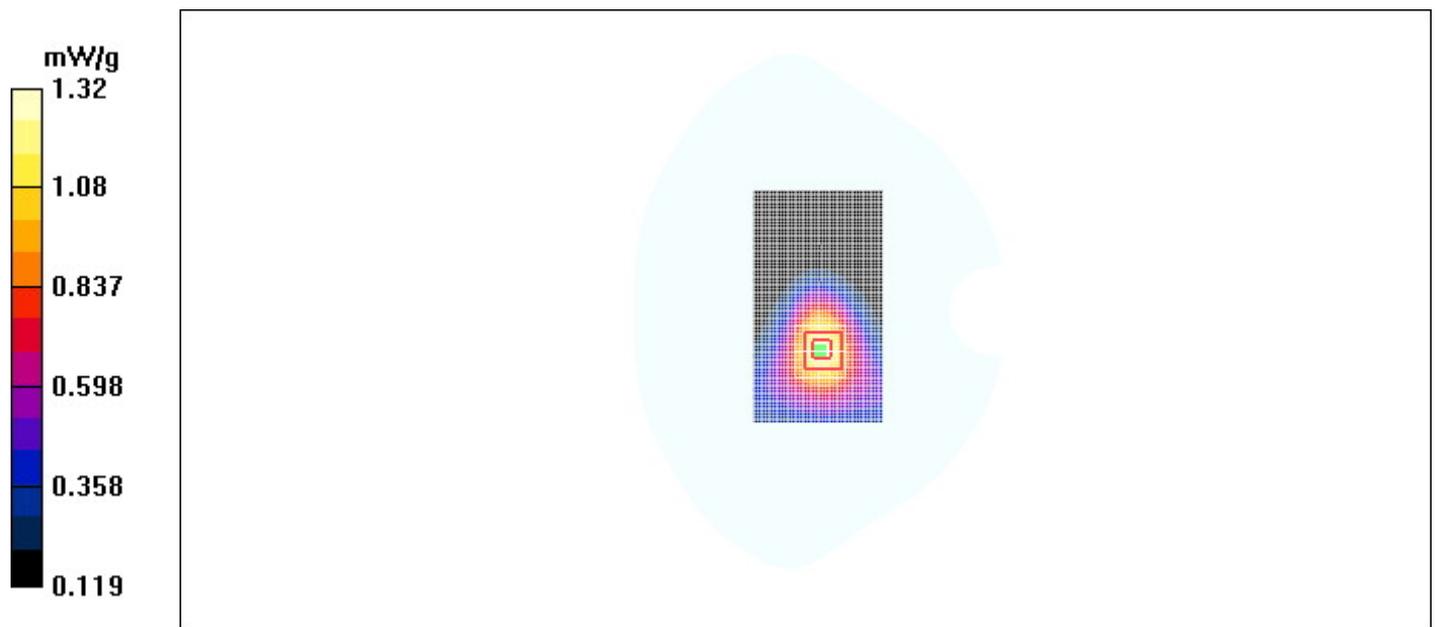


Figure.7 CDMA Cellular Test Position 1 Channel 384

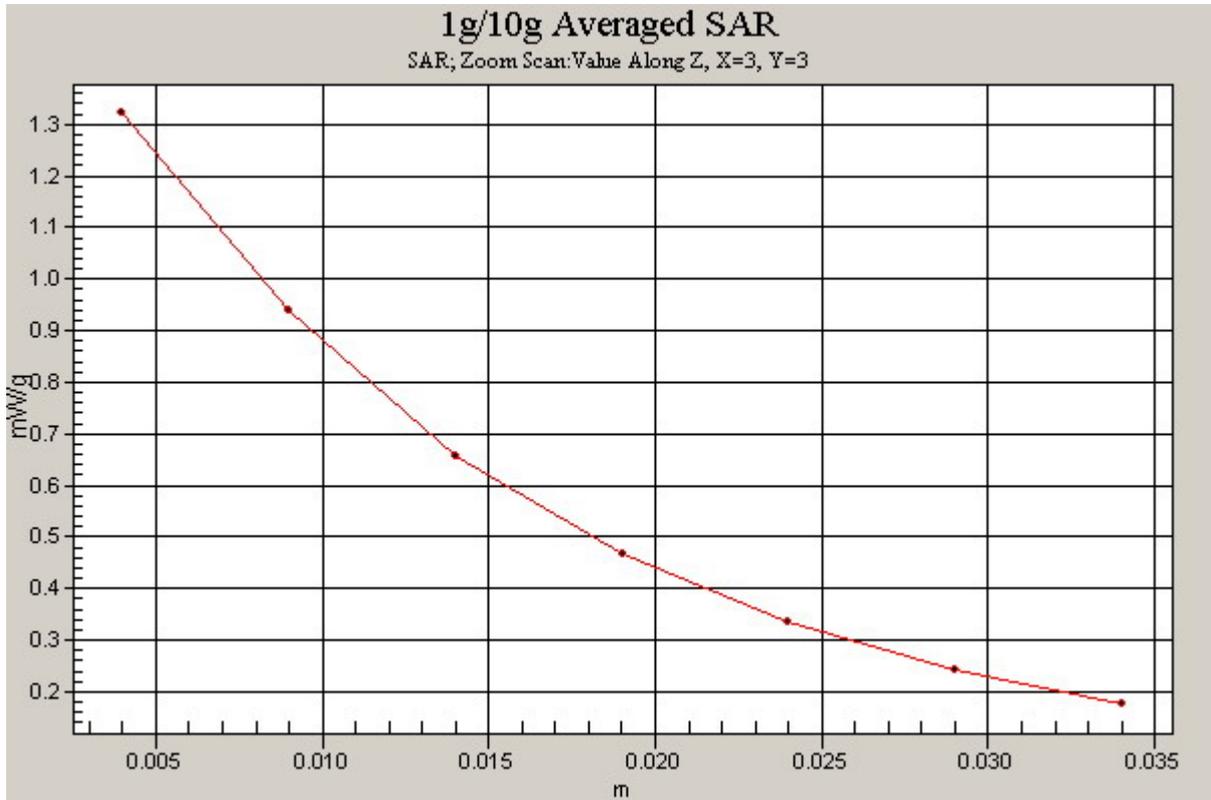


Figure.8 Z-Scan at power reference point (CDMA Cellular Test Position 1 Channel 384)

CDMA Cellular with DELL LATITUDE D830 Test Position 1 Mid frequency

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

Medium parameters used: $f = 837$ MHz; $\sigma = 0.996$ mho/m; $\epsilon_r = 55.4$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(6.52, 6.52, 6.52);

Electronics: DAE3 Sn452;

Test Position 1 Middle/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.848 mW/g

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

Reference Value = 27.2 V/m; Power Drift = 0.194 dB

Peak SAR (extrapolated) = 1.17 W/kg

SAR(1 g) = 0.689 mW/g; SAR(10 g) = 0.413 mW/g

Maximum value of SAR (measured) = 0.756 mW/g

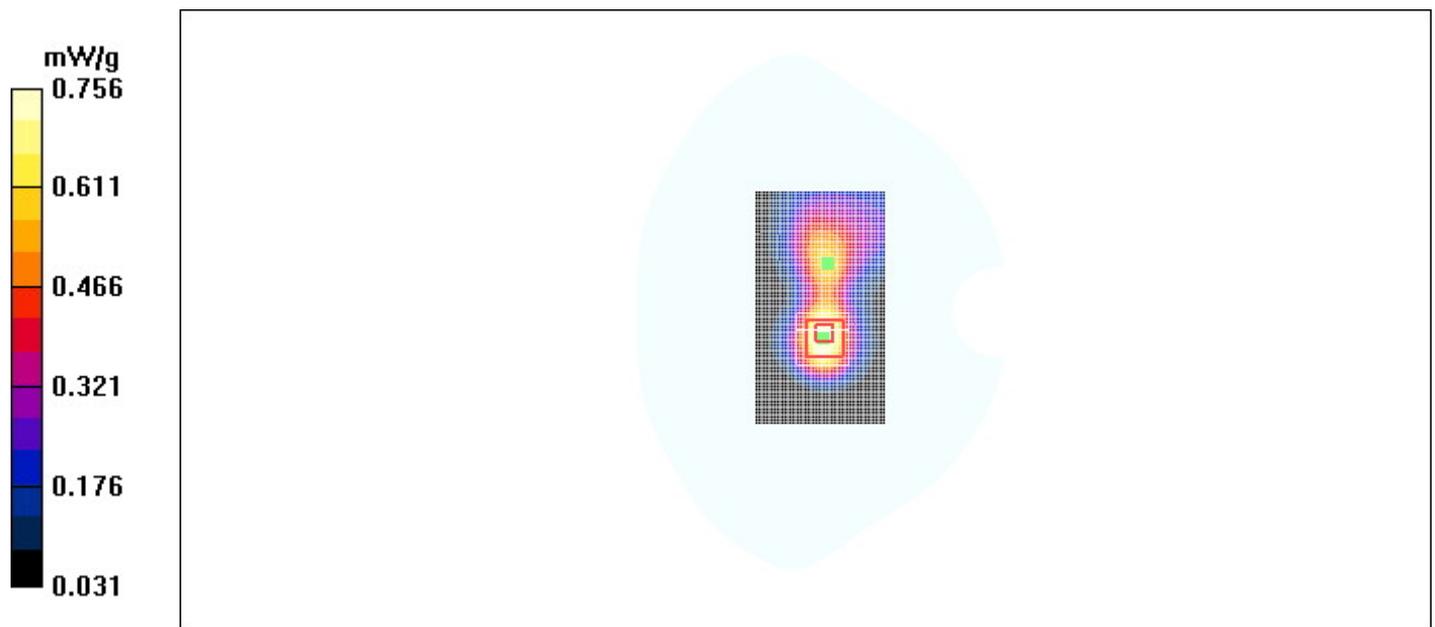


Figure.9 CDMA Cellular Test Position 1 Channel 384

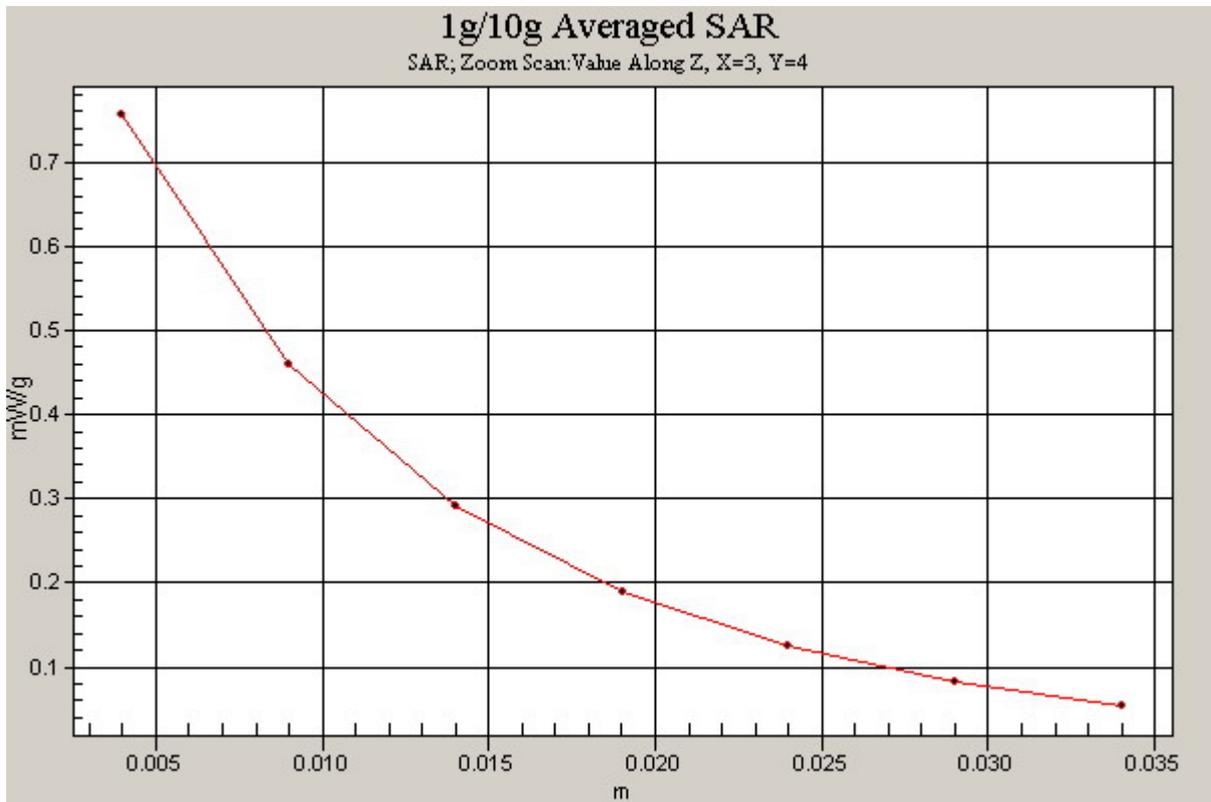


Figure.10 Z-Scan at power reference point (CDMA Cellular Test Position 1 Channel 384)

CDMA Cellular with Acer ZH1 Test Position 1 High frequency

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

Medium parameters used (interpolated): $f = 848.31$ MHz; $\sigma = 1.01$ mho/m; $\epsilon_r = 55.3$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(6.52, 6.52, 6.52);

Electronics: DAE3 Sn452;

Test Position 1 High/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.997 mW/g

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

Reference Value = 27.5 V/m; Power Drift = -0.097 dB

Peak SAR (extrapolated) = 1.16 W/kg

SAR(1 g) = 0.834 mW/g; SAR(10 g) = 0.552 mW/g

Maximum value of SAR (measured) = 0.898 mW/g

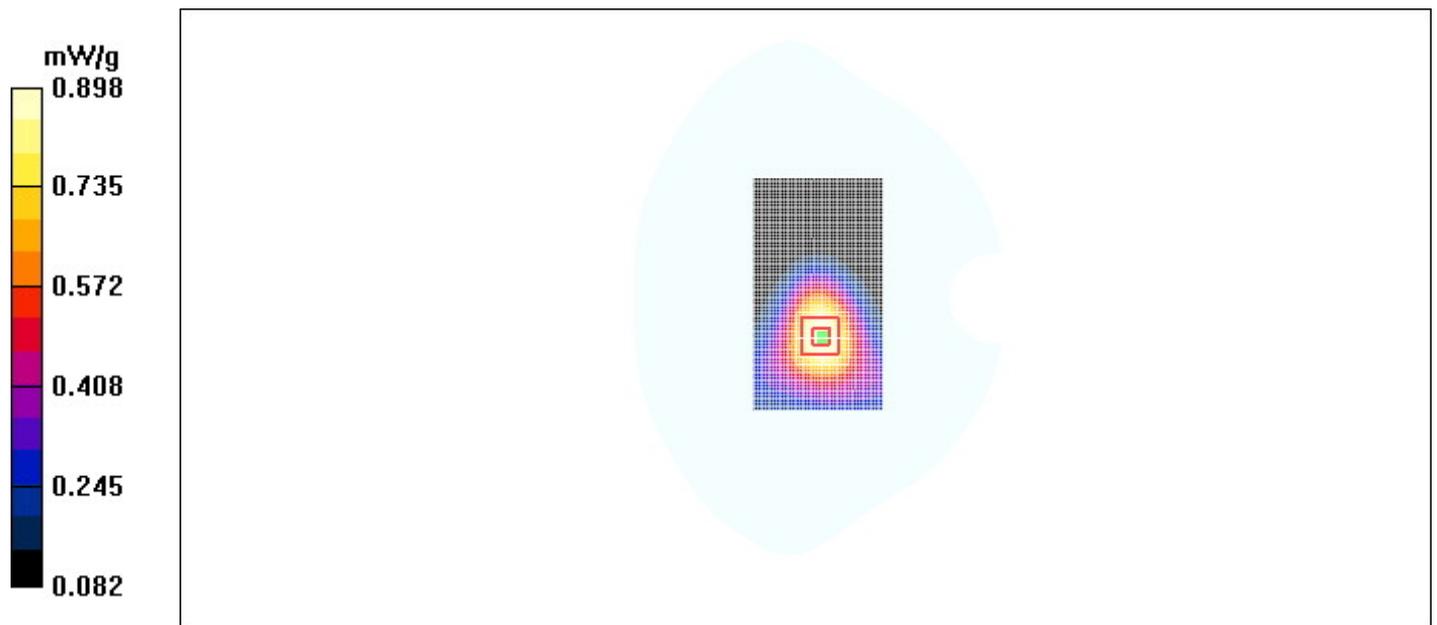


Figure.11 CDMA Cellular Test Position 1 Channel 777

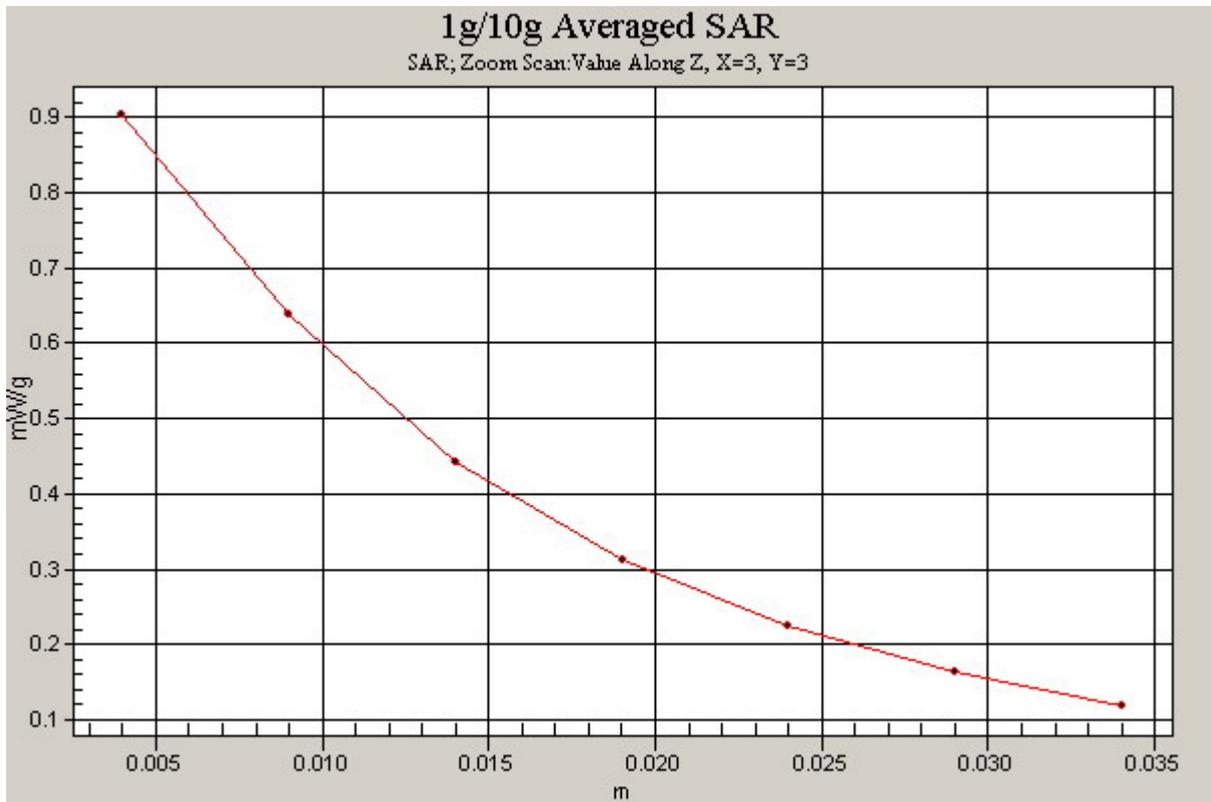


Figure.12 Z-Scan at power reference point (CDMA Cellular Test Position 1 Channel 777)

CDMA Cellular with Acer ZH1 Test Position 1 Low frequency

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

Medium parameters used: $f = 825$ MHz; $\sigma = 0.973$ mho/m; $\epsilon_r = 55.5$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(6.52, 6.52, 6.52);

Electronics: DAE3 Sn452;

Test Position 1 Low/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

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

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

Reference Value = 29.2 V/m; Power Drift = -0.069 dB

Peak SAR (extrapolated) = 1.41 W/kg

SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.683 mW/g

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

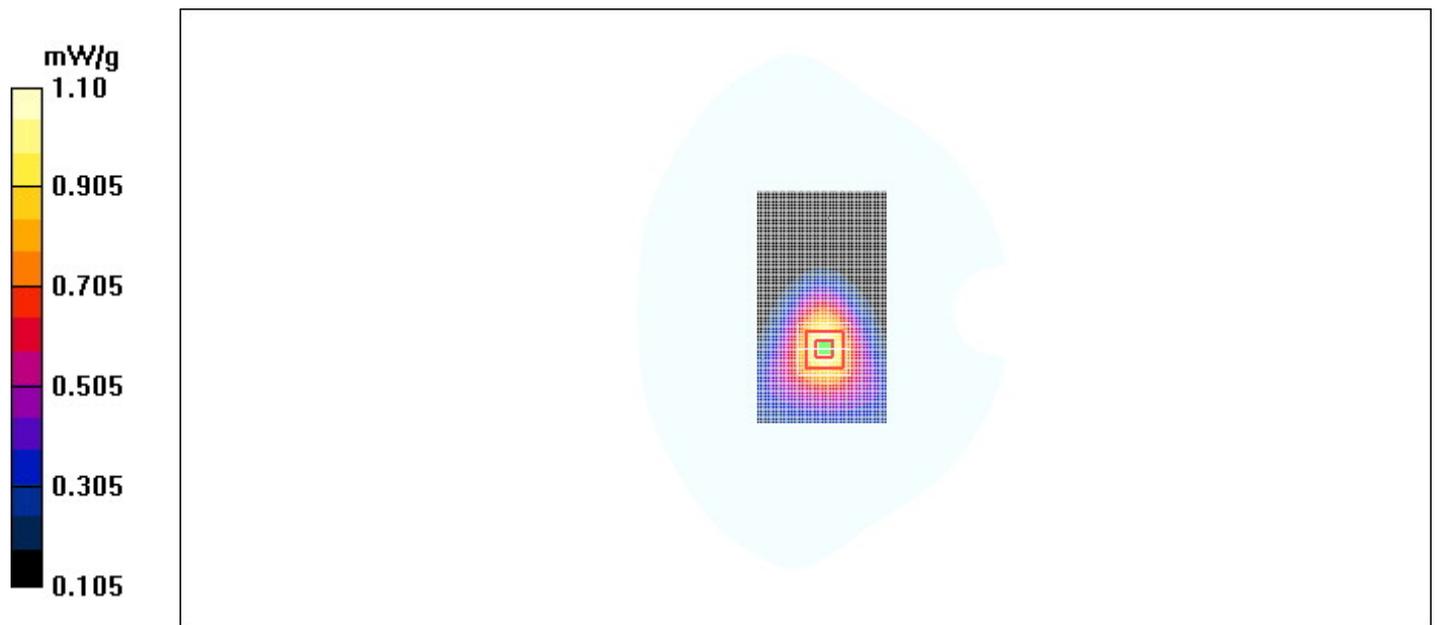


Figure.13 CDMA Cellular Test Position 1 Channel 1013

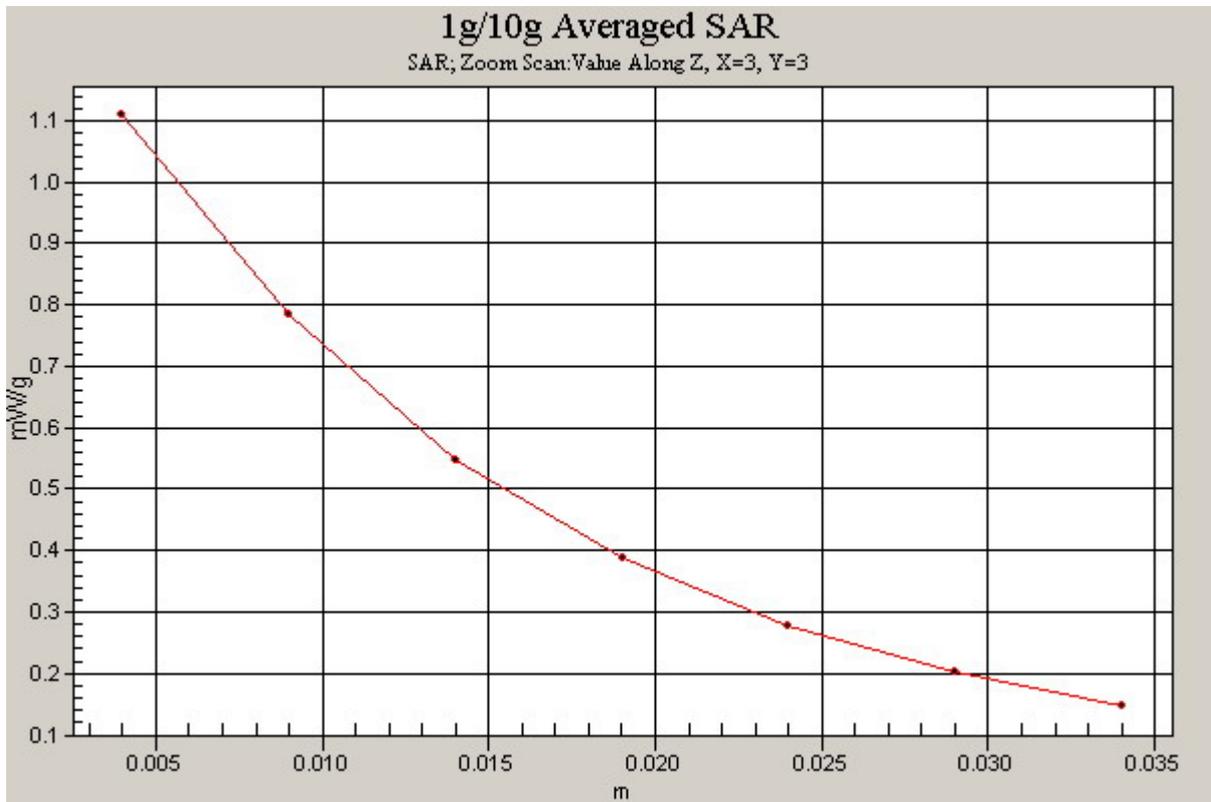


Figure.14 Z-Scan at power reference point (CDMA Cellular Test Position 1 Channel 1013)

CDMA Cellular with Acer ZH1 Test Position 2 High frequency

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

Medium parameters used (interpolated): $f = 848.31$ MHz; $\sigma = 1.01$ mho/m; $\epsilon_r = 55.3$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(6.52, 6.52, 6.52);

Electronics: DAE3 Sn452;

Test Position 2 High/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.832 mW/g

Test Position 2 High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 25.9 V/m; Power Drift = 0.105 dB

Peak SAR (extrapolated) = 1.04 W/kg

SAR(1 g) = 0.745 mW/g; SAR(10 g) = 0.491 mW/g

Maximum value of SAR (measured) = 0.810 mW/g

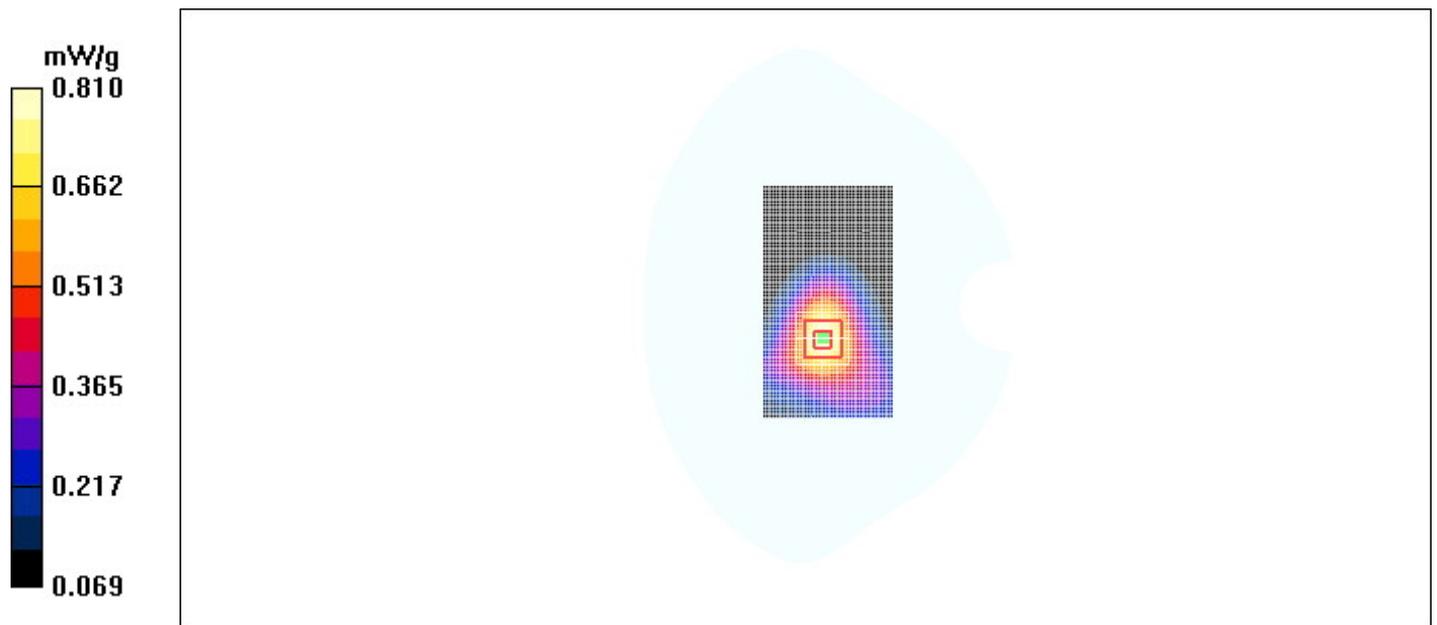


Figure.15 CDMA Cellular Test Position 2 Channel 777

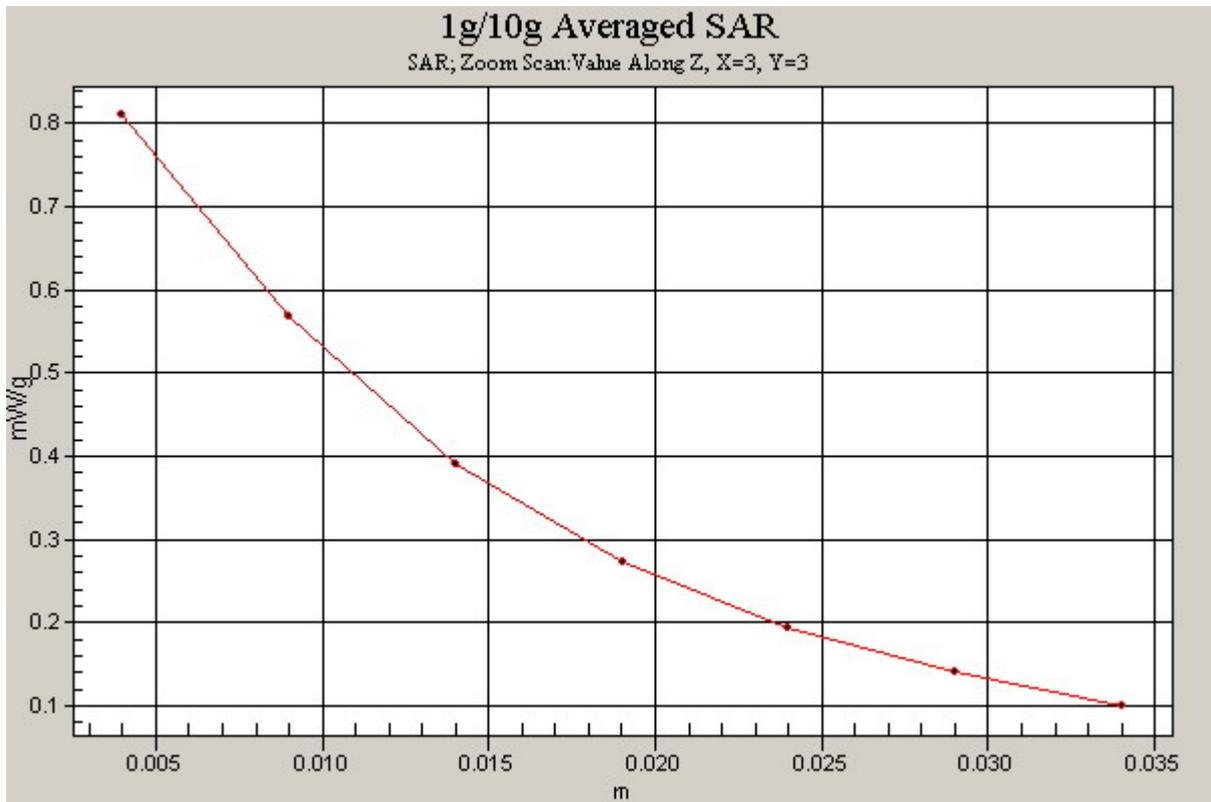


Figure.16 Z-Scan at power reference point (CDMA Cellular Test Position 2 Channel 777)

CDMA Cellular with Acer ZH1 Test Position 2 Mid frequency

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

Medium parameters used: $f = 837$ MHz; $\sigma = 0.996$ mho/m; $\epsilon_r = 55.4$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(6.52, 6.52, 6.52);

Electronics: DAE3 Sn452;

Test Position 2 Middle/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

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

Test Position 2 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 30.6 V/m; Power Drift = 0.067 dB

Peak SAR (extrapolated) = 1.50 W/kg

SAR(1 g) = 1.08 mW/g; SAR(10 g) = 0.710 mW/g

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

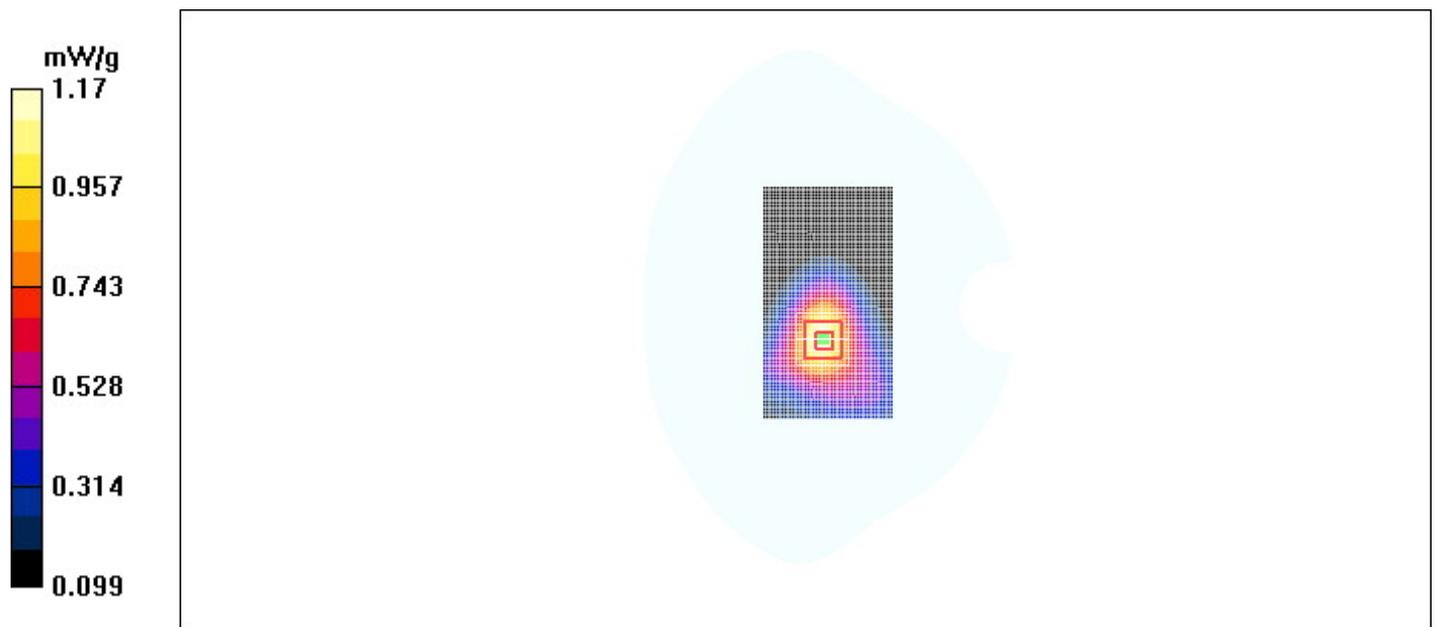


Figure.17 CDMA Cellular Test Position 2 Channel 384

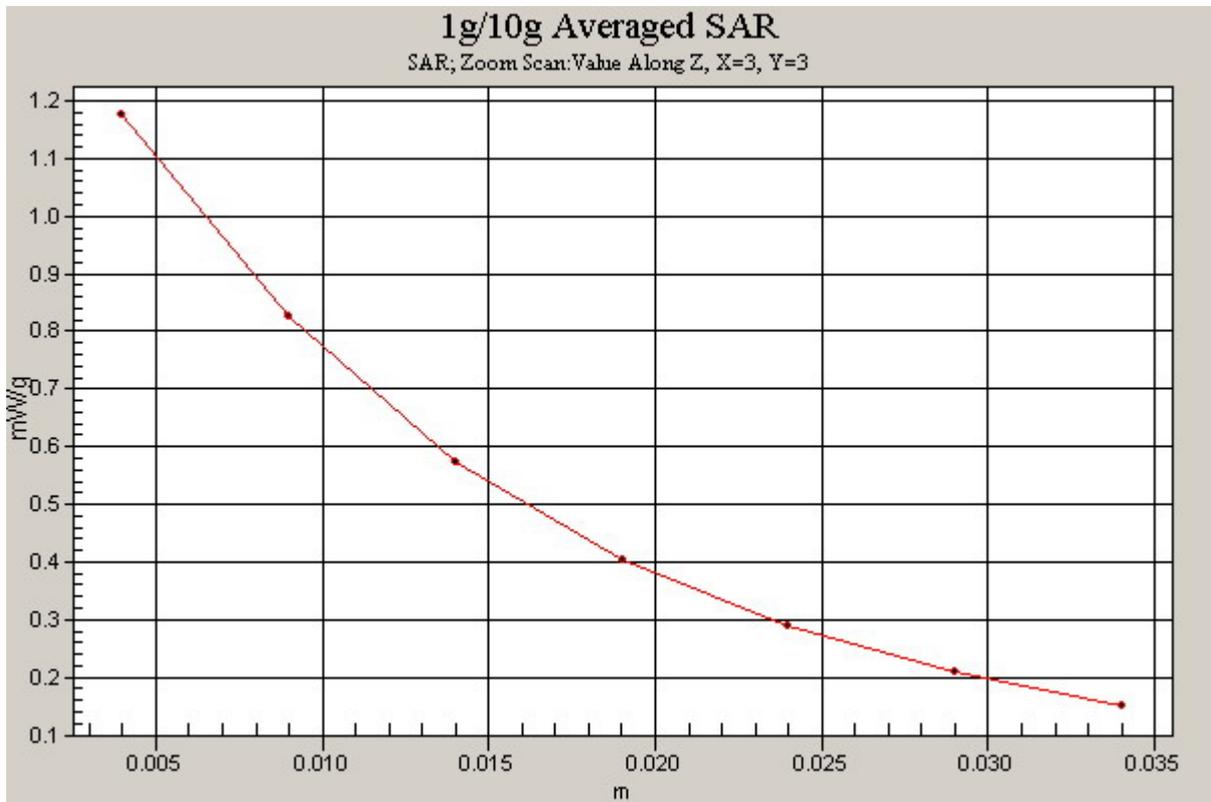


Figure.18 Z-Scan at power reference point (CDMA Cellular Test Position 2 Channel 384)

CDMA Cellular with Acer ZH1 Test Position 2 Low frequency

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

Medium parameters used: $f = 825$ MHz; $\sigma = 0.973$ mho/m; $\epsilon_r = 55.5$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(6.52, 6.52, 6.52);

Electronics: DAE3 Sn452;

Test Position 2 Low/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.911 mW/g

Test Position 2 Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 26.5 V/m; Power Drift = 0.076 dB

Peak SAR (extrapolated) = 1.17 W/kg

SAR(1 g) = 0.850 mW/g; SAR(10 g) = 0.565 mW/g

Maximum value of SAR (measured) = 0.916 mW/g

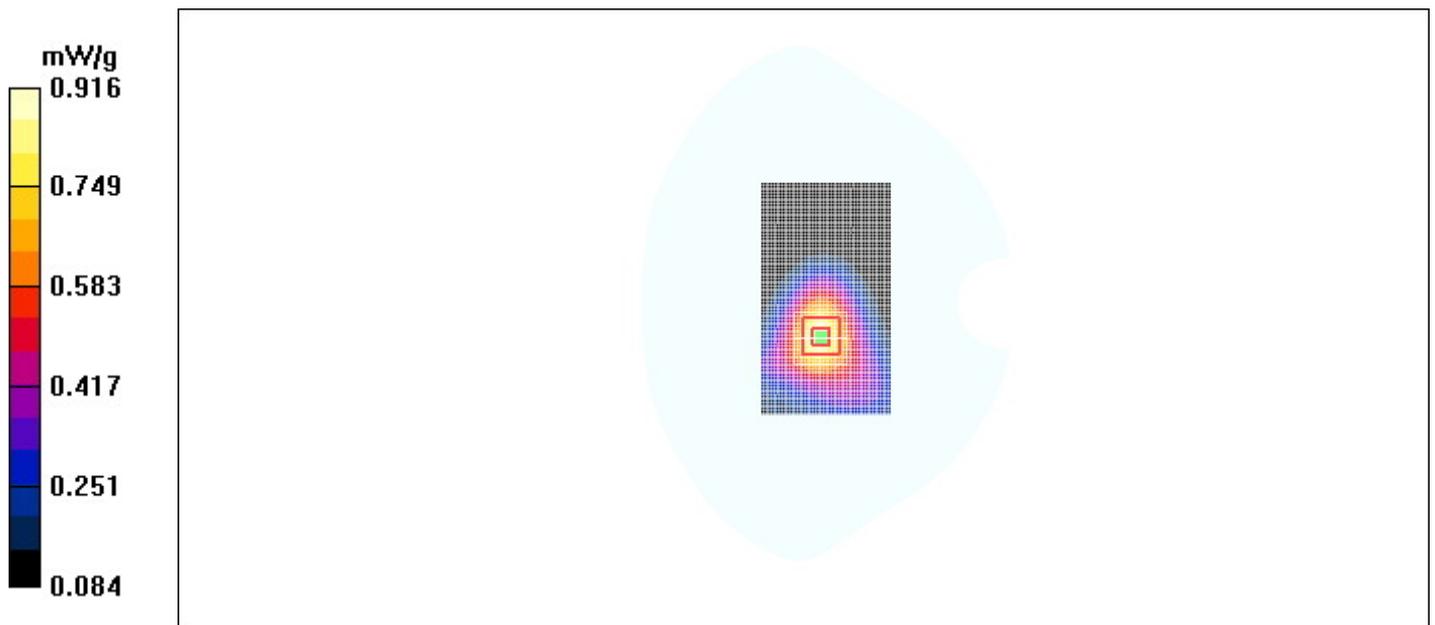


Figure.19 CDMA Cellular Test Position 2 Channel 1013

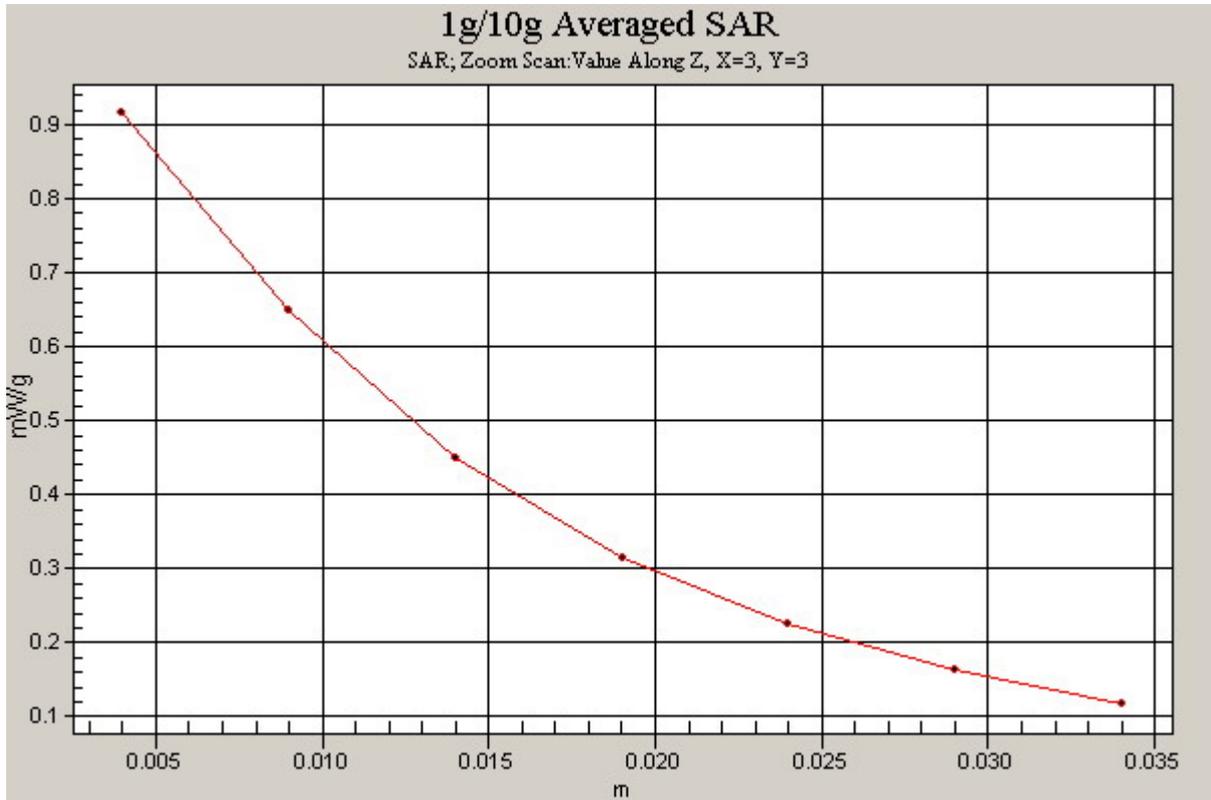


Figure.20 Z-Scan at power reference point (CDMA Cellular Test Position 2 Channel 1013)

CDMA Cellular with Acer ZH1 Test Position 3 Mid frequency

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

Medium parameters used: $f = 837$ MHz; $\sigma = 0.996$ mho/m; $\epsilon_r = 55.4$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(6.52, 6.52, 6.52);

Electronics: DAE3 Sn452;

Test Position 3 Middle/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.01 mW/g

Test Position 3 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 33.4 V/m; Power Drift = -0.187 dB

Peak SAR (extrapolated) = 2.32 W/kg

SAR(1 g) = 0.726 mW/g; SAR(10 g) = 0.218 mW/g

Maximum value of SAR (measured) = 1.03 mW/g

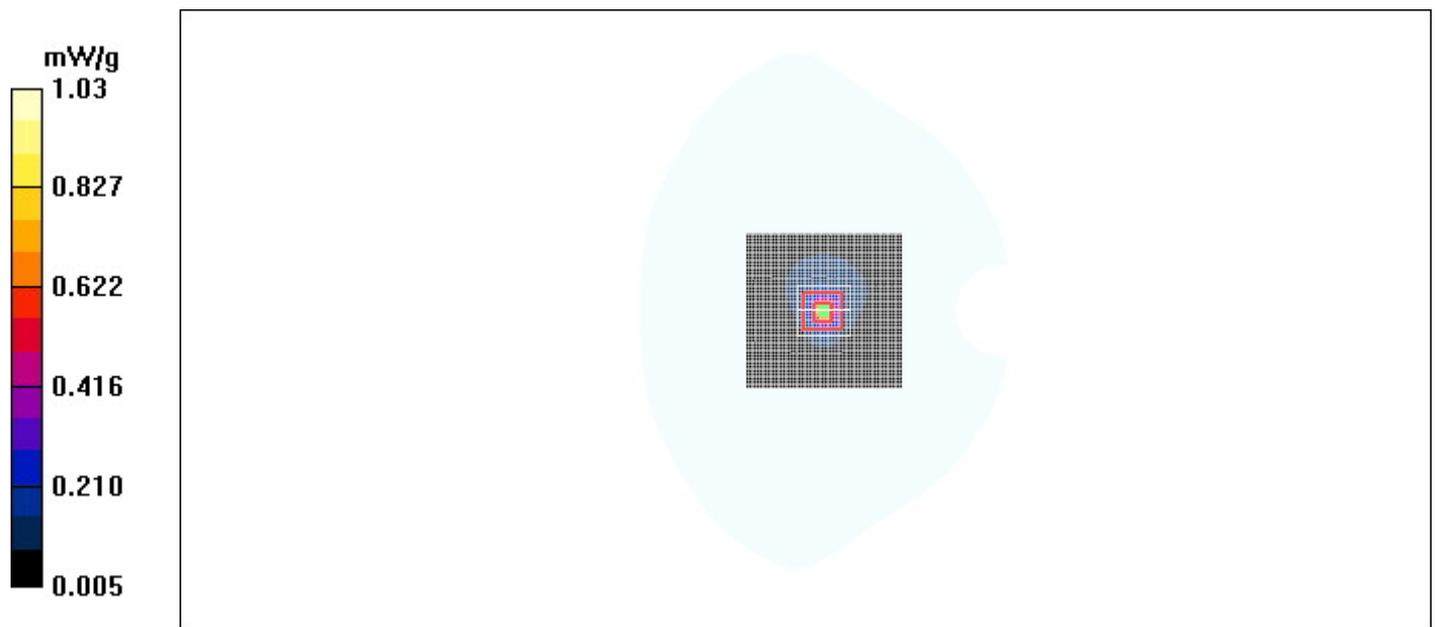


Figure.21 CDMA Cellular Test Position 3 Channel 384

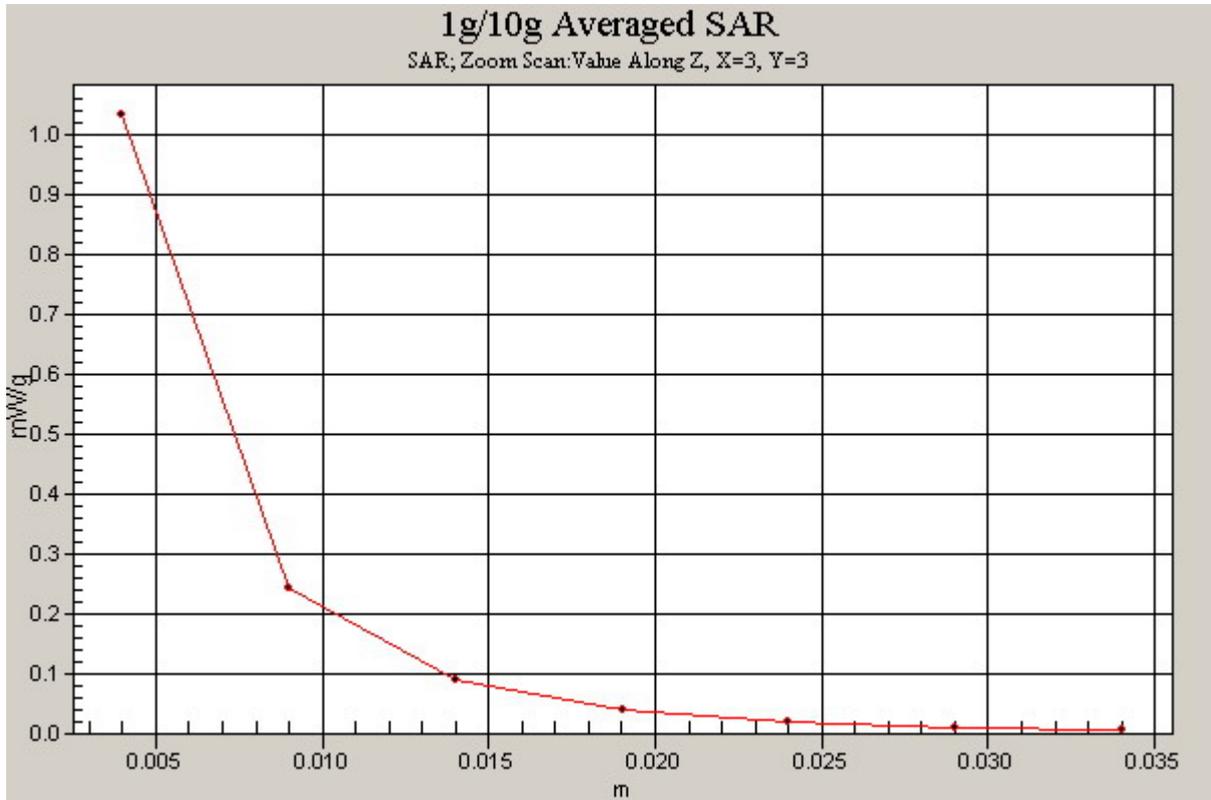


Figure.22 Z-Scan at power reference point (CDMA Cellular Test Position 3 Channel 384)

CDMA Cellular with BenQ R55V Test Position 4 Mid frequency

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

Medium parameters used: $f = 837$ MHz; $\sigma = 0.996$ mho/m; $\epsilon_r = 55.4$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(6.52, 6.52, 6.52);

Electronics: DAE3 Sn452;

Test Position 4 Middle/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.659 mW/g

Test Position 4 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 18.0 V/m; Power Drift = -0.066 dB

Peak SAR (extrapolated) = 1.04 W/kg

SAR(1 g) = 0.582 mW/g; SAR(10 g) = 0.398 mW/g

Maximum value of SAR (measured) = 0.727 mW/g

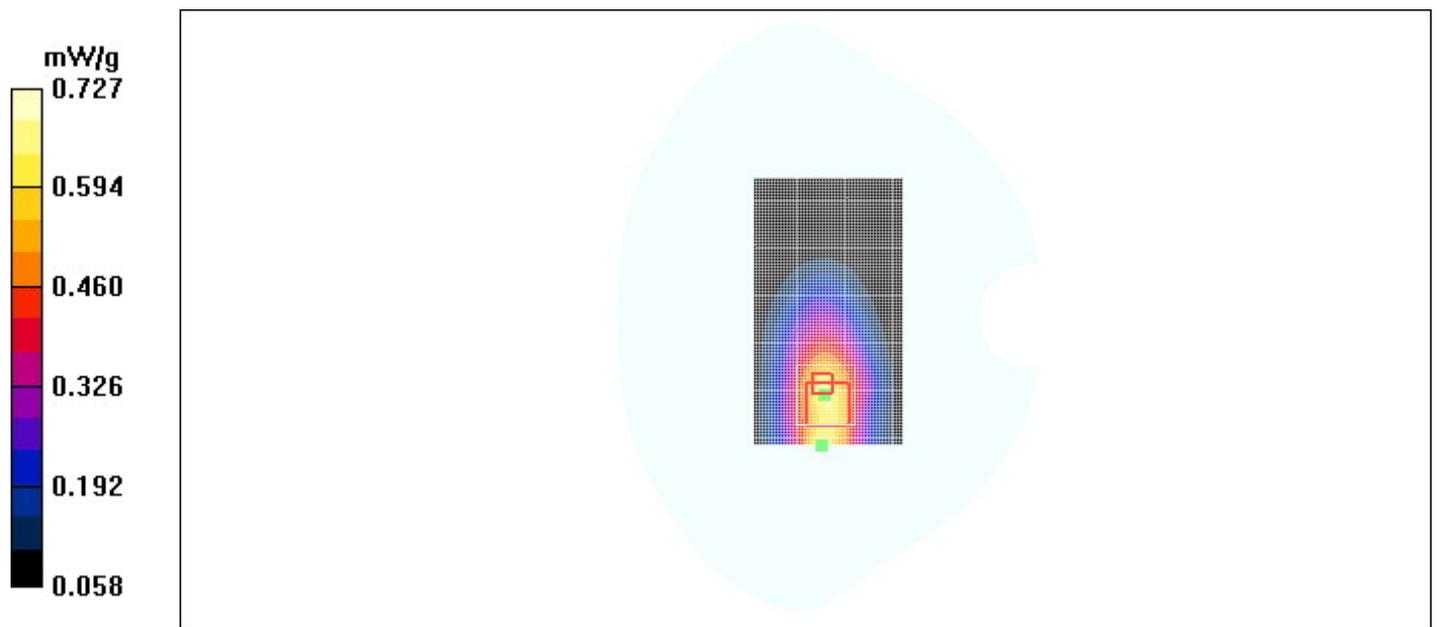


Figure.23 CDMA Cellular Test Position 4 Channel 384

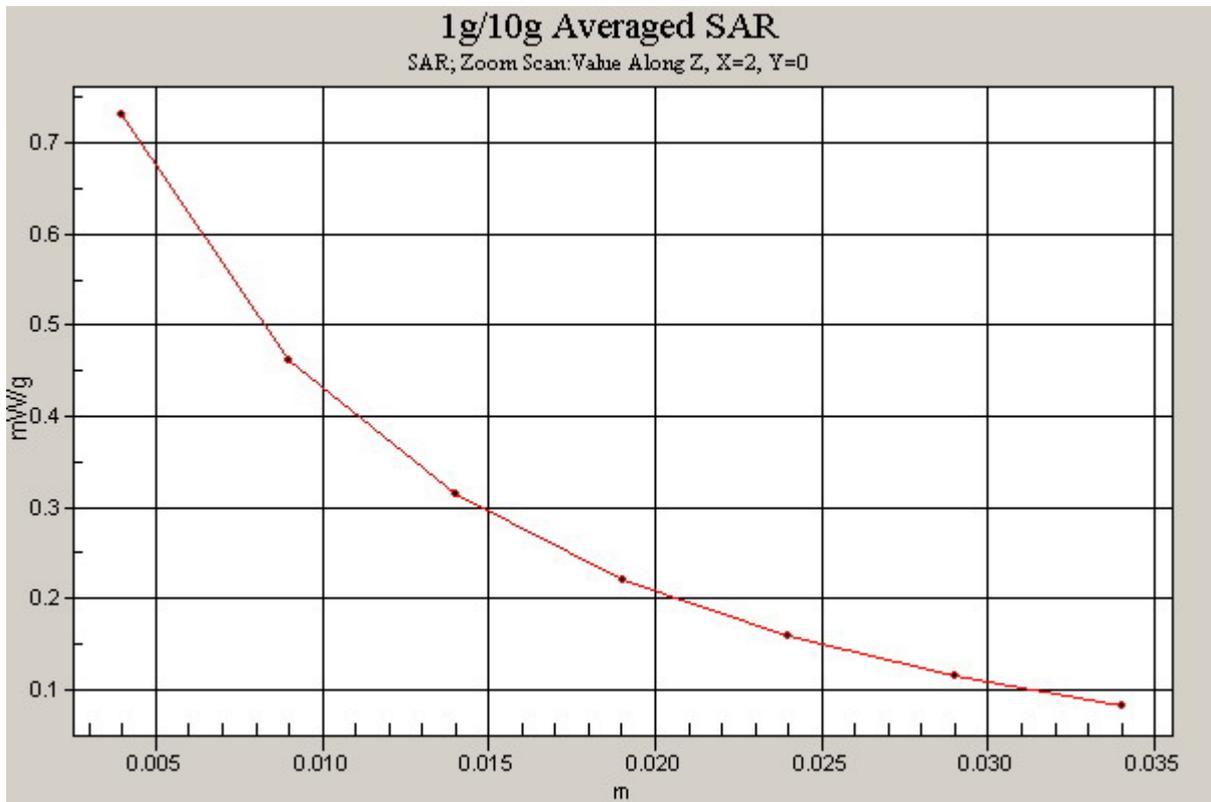


Figure.24 Z-Scan at power reference point (CDMA Cellular Test Position 4 Channel 384)

CDMA Cellular with BenQ R55V Test Position 5 Mid frequency

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

Medium parameters used: $f = 837$ MHz; $\sigma = 0.996$ mho/m; $\epsilon_r = 55.4$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(6.52, 6.52, 6.52);

Electronics: DAE3 Sn452;

Test Position 5 Middle/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.540 mW/g

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

Reference Value = 19.9 V/m; Power Drift = 0.005 dB

Peak SAR (extrapolated) = 0.664 W/kg

SAR(1 g) = 0.478 mW/g; SAR(10 g) = 0.332 mW/g

Maximum value of SAR (measured) = 0.520 mW/g

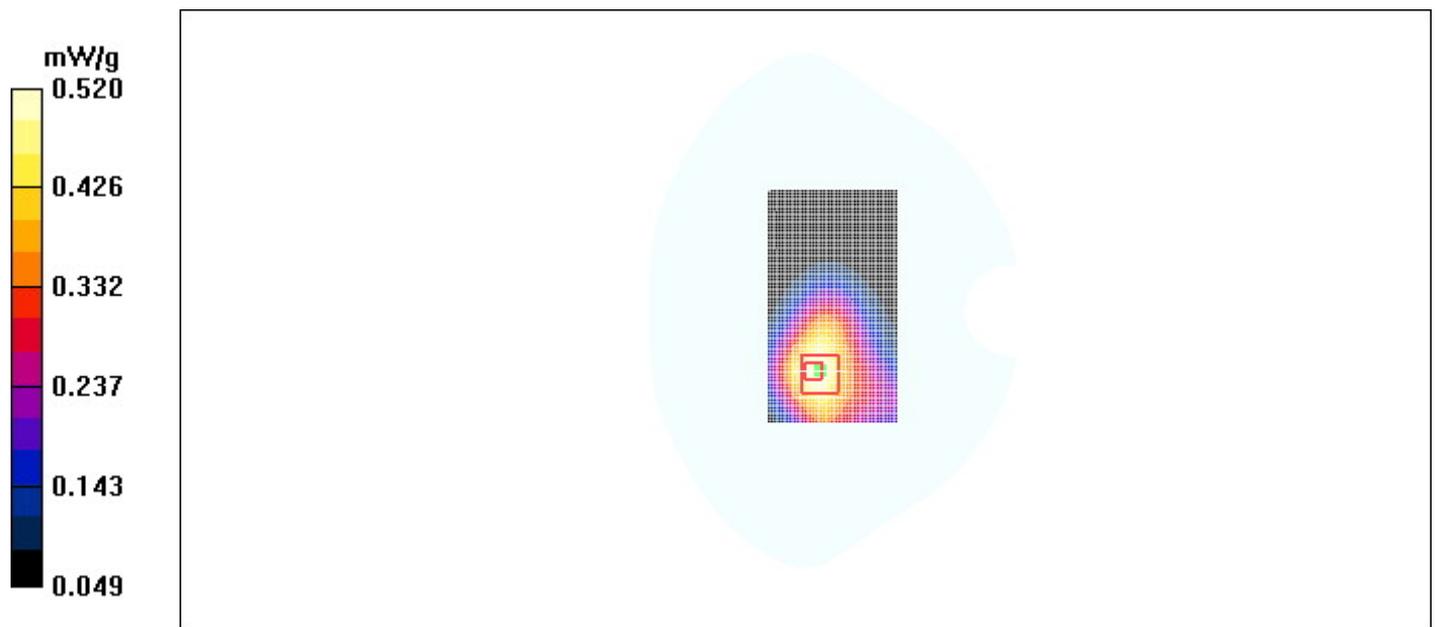


Figure.25 CDMA Cellular Test Position 5 Channel 384



Figure.26 Z-Scan at power reference point (CDMA Cellular Test Position 5 Channel 384)

CDMA Cellular with BenQ R55V Test Position 6 Mid frequency

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

Medium parameters used: $f = 837$ MHz; $\sigma = 0.996$ mho/m; $\epsilon_r = 55.4$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(6.52, 6.52, 6.52);

Electronics: DAE3 Sn452;

Test Position 6 Middle/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.881 mW/g

Test Position 6 Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 29.6 V/m; Power Drift = -0.038 dB

Peak SAR (extrapolated) = 1.15 W/kg

SAR(1 g) = 0.823 mW/g; SAR(10 g) = 0.571 mW/g

Maximum value of SAR (measured) = 0.889 mW/g

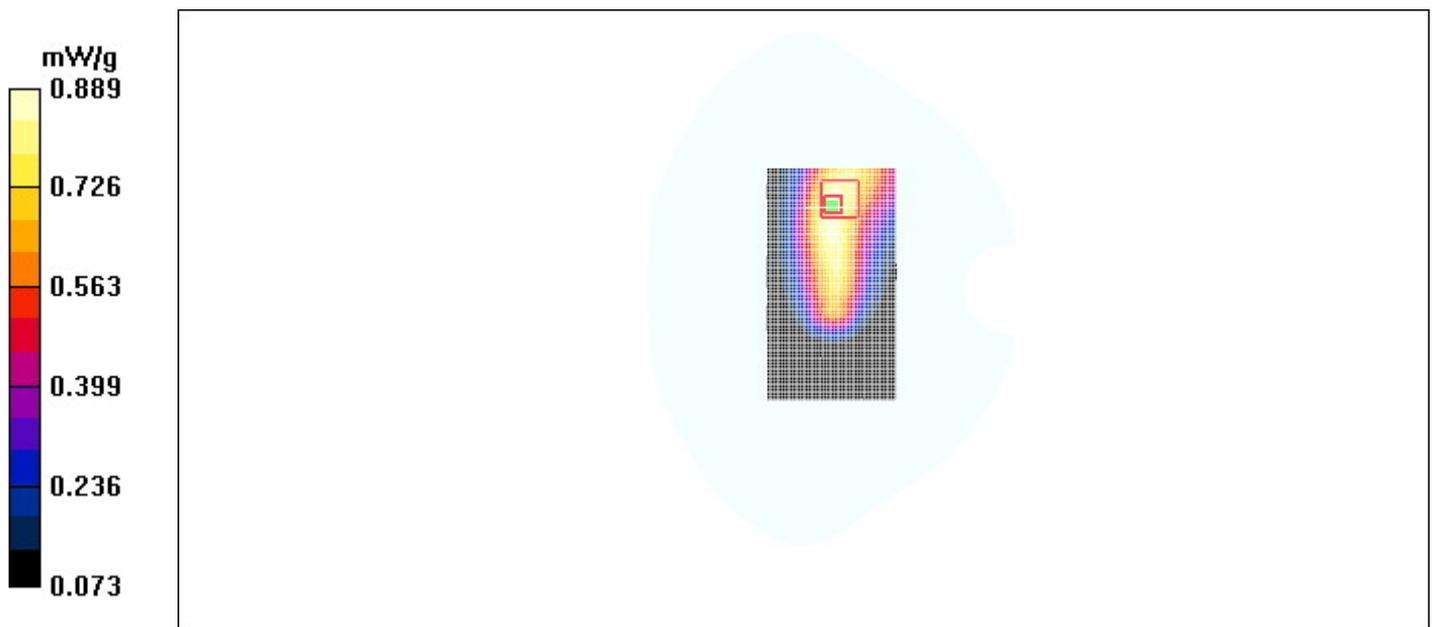


Figure.27 CDMA Cellular Test Position 6 Channel 384

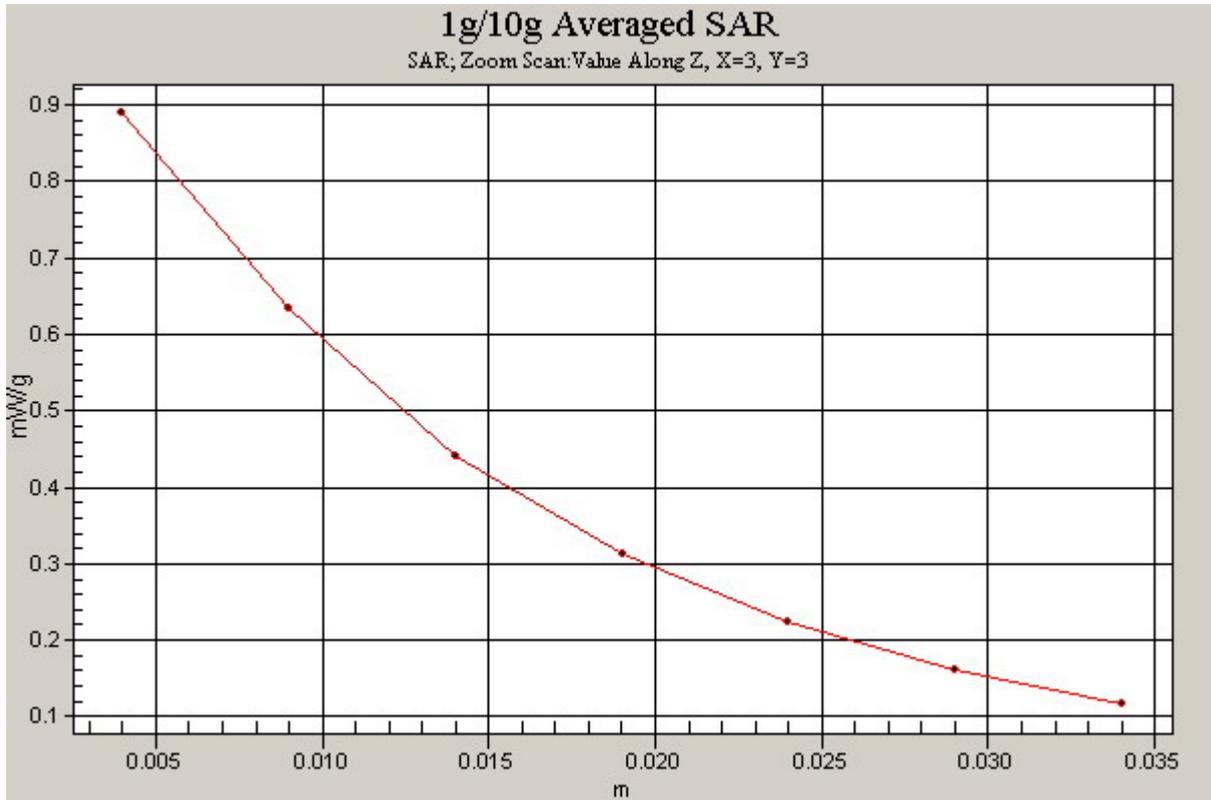


Figure.28 Z-Scan at power reference point (CDMA Cellular Test Position 6 Channel 384)

CDMA Cellular with BenQ R55V Test Position 7 Mid frequency

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

Medium parameters used: $f = 837$ MHz; $\sigma = 0.996$ mho/m; $\epsilon_r = 55.4$; $\rho = 1000$ kg/m³

Probe: ET3DV6 - SN1737; ConvF(6.52, 6.52, 6.52);

Electronics: DAE3 Sn452;

Test Position 7 Middle/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.24 mW/g

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

Reference Value = 38.2 V/m; Power Drift = 0.106 dB

Peak SAR (extrapolated) = 2.90 W/kg

SAR(1 g) = 0.926 mW/g; SAR(10 g) = 0.277 mW/g

Maximum value of SAR (measured) = 1.24 mW/g

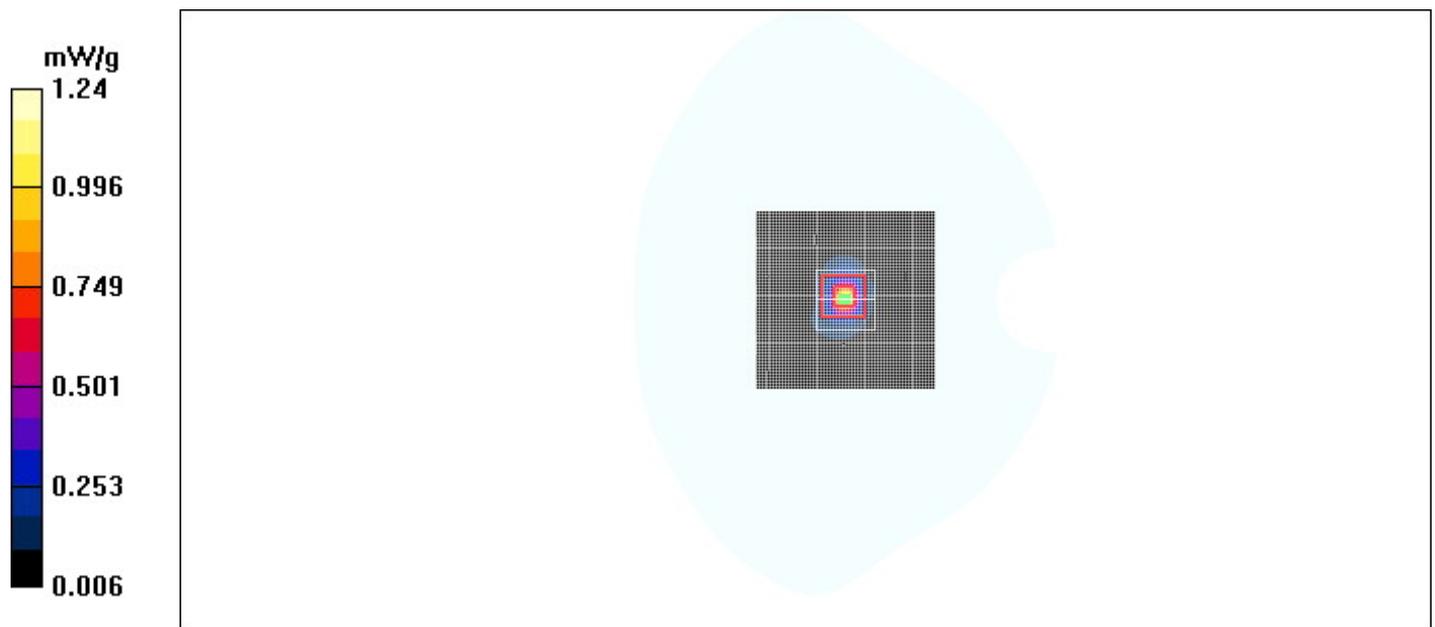


Figure.29 CDMA Cellular Test Position 7 Channel 384

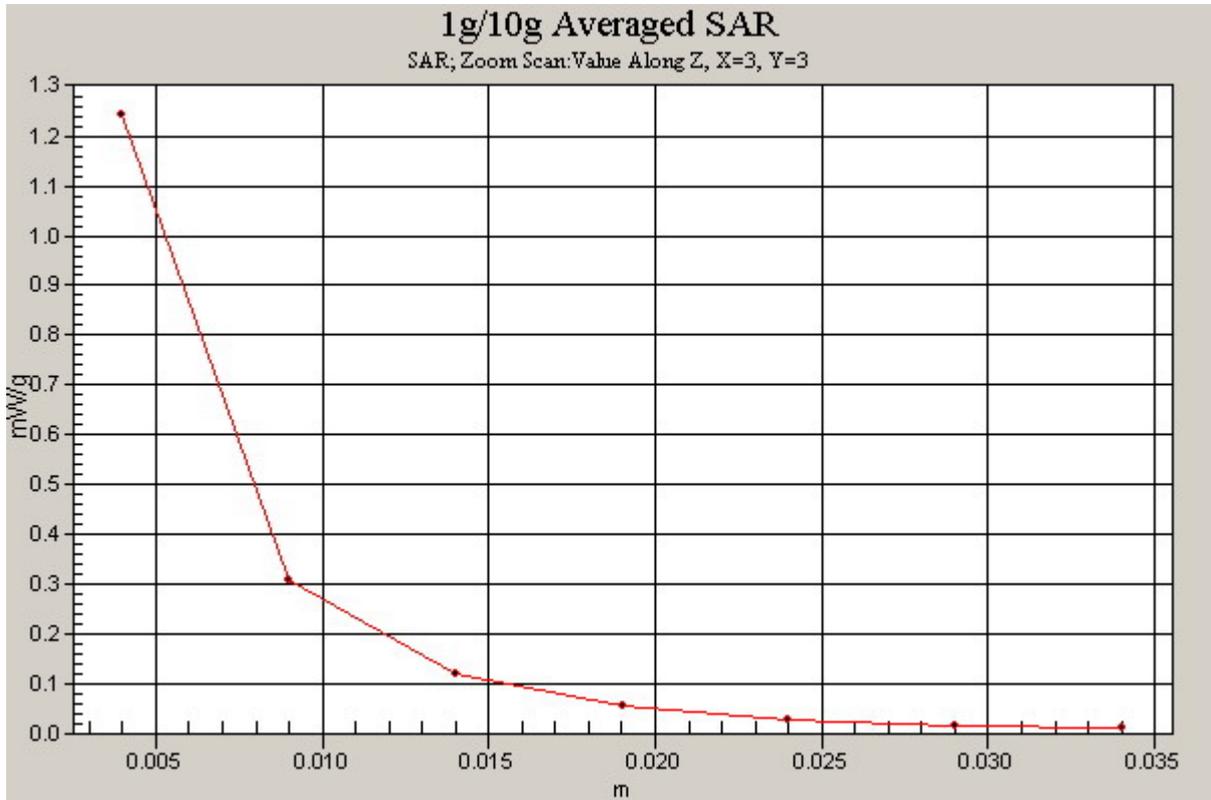


Figure.30 Z-Scan at power reference point (CDMA Cellular Test Position 7 Channel 384)

ANNEX D: SYSTEM VALIDATION RESULTS

System Performance Check at 835 MHz

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:443

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

Medium: Head 835MHz

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.899 \text{ mho/m}$; $\epsilon_r = 42.8$; $\rho = 1000 \text{ kg/m}^3$

- Probe: ET3DV6 - SN1737; ConvF(6.52, 6.52, 6.52);

- Electronics: DAE3 Sn452;

d=15mm, Pin=250mW/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 2.54 mW/g

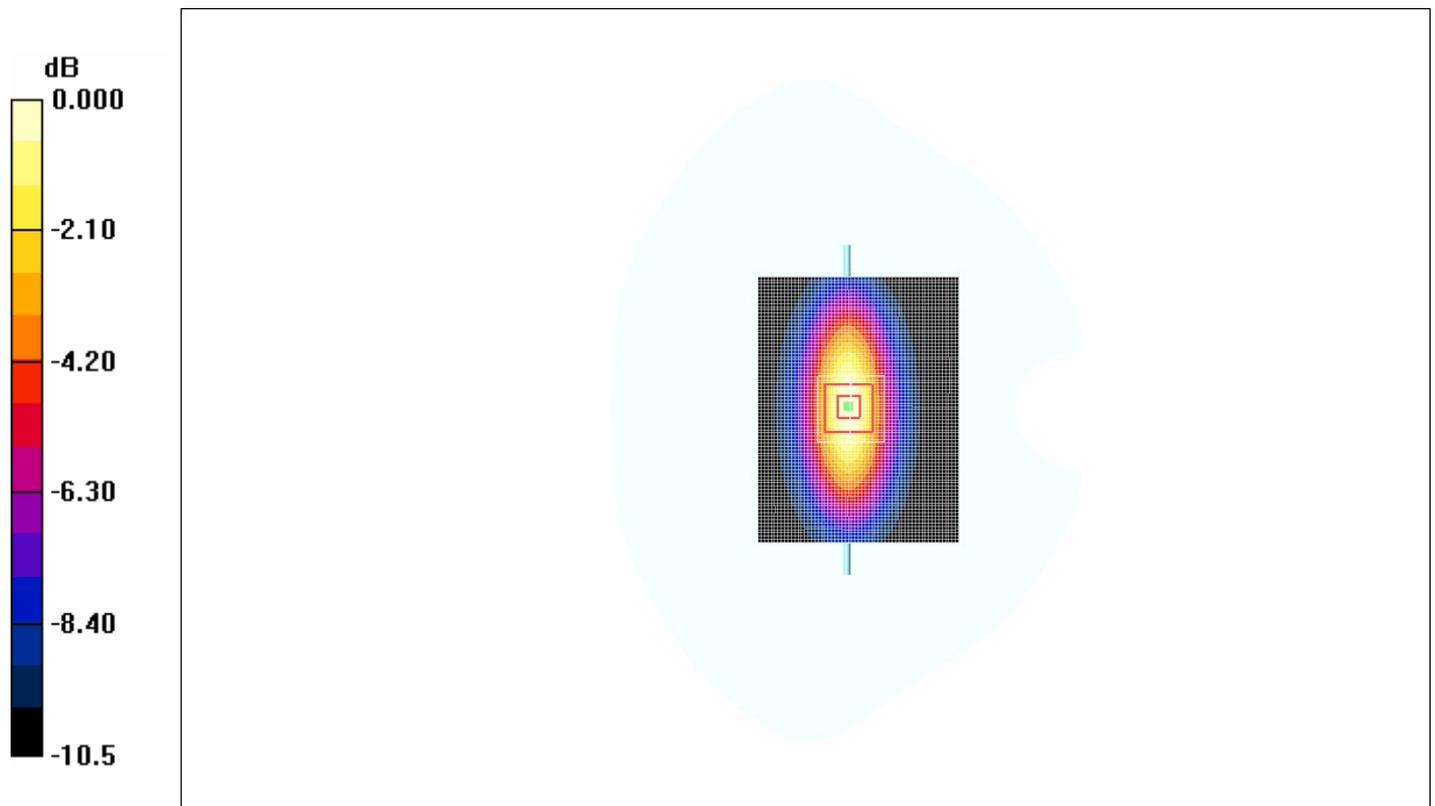
d=15mm, Pin=250mW/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.0 V/m; Power Drift = -0.061 dB

Peak SAR (extrapolated) = 3.44 W/kg

SAR(1 g) = 2.34 mW/g; SAR(10 g) = 1.53 mW/g

Maximum value of SAR (measured) = 2.52 mW/g



0 dB = 2.52mW/g

Figure.31 System Performance Check 835MHz 250mW

TA Technology (Shanghai) Co., Ltd. Test Report

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ANNEX E: PROBE CALIBRATION CERTIFICATE

**Calibration Laboratory of
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Engineering AG**
Zeughausstrasse 43, 8004 Zurich, Switzerland



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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 **TMC-Auden**

Certificate No: **ET3-1737_Feb07**

CALIBRATION CERTIFICATE

Object	ET3DV6 - SN:1737
Calibration procedure(s)	QA CAL-01.v5 Calibration procedure for dosimetric E-field probes
Calibration date:	February 19, 2007
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 (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41495277	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41498087	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Reference 3 dB Attenuator	SN: S5054 (3c)	10-Aug-06 (METAS, No. 217-00592)	Aug-07
Reference 20 dB Attenuator	SN: S5086 (20b)	4-Apr-06 (METAS, No. 251-00558)	Apr-07
Reference 30 dB Attenuator	SN: S5129 (30b)	10-Aug-06 (METAS, No. 217-00593)	Aug-07
Reference Probe ES3DV2	SN: 3013	4-Jan-07 (SPEAG, No. ES3-3013_Jan07)	Jan-08
DAE4	SN: 654	21-Jun-06 (SPEAG, No. DAE4-654_Jun06)	Jun-07
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct-07

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: February 19, 2007

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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConF	sensitivity in TSL / NORM _{x,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., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- 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
- CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}:** Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E²-field uncertainty inside TSL (see below *ConvF*).
- NORM(*f*)_{x,y,z} = NORM_{x,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*.
- DCP_{x,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 $f \leq 800$ 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 NORM_{x,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.

ET3DV6 SN:1737

February 19, 2007

Probe ET3DV6

SN:1737

Manufactured:	September 27, 2002
Last calibrated:	February 23, 2005
Recalibrated:	February 19, 2007

Calibrated for DASY Systems

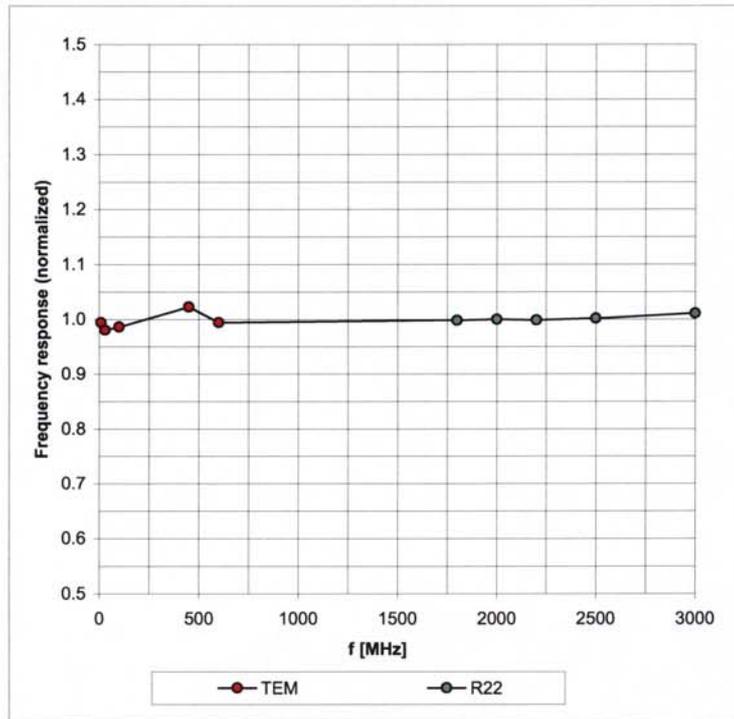
(Note: non-compatible with DASY2 system!)

ET3DV6 SN:1737

February 19, 2007

Frequency Response of E-Field

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

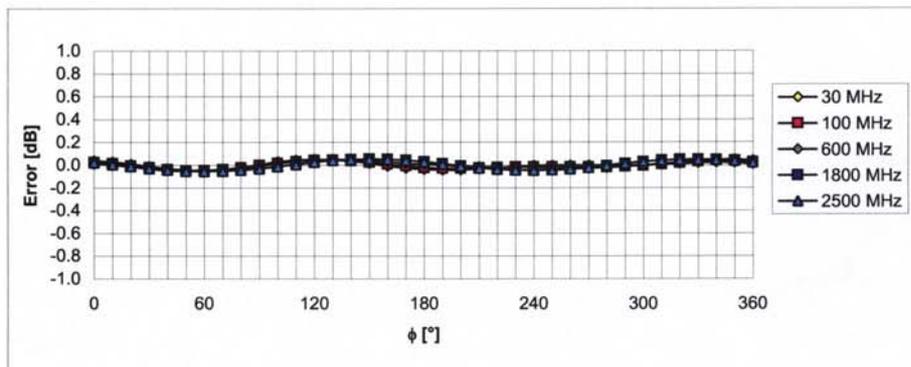
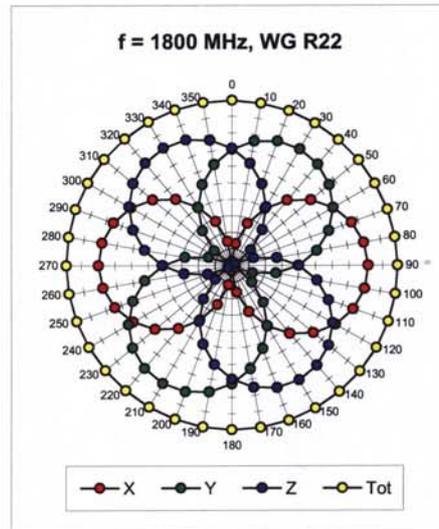
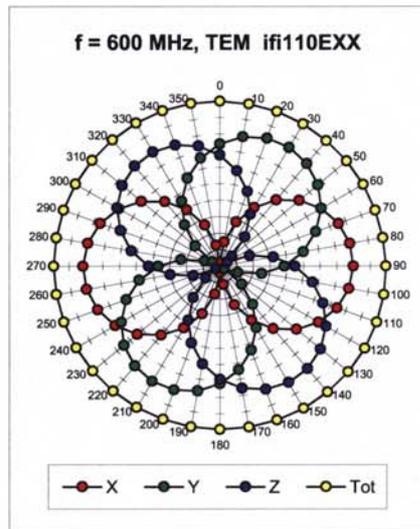


Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

ET3DV6 SN:1737

February 19, 2007

Receiving Pattern (ϕ), $\vartheta = 0^\circ$

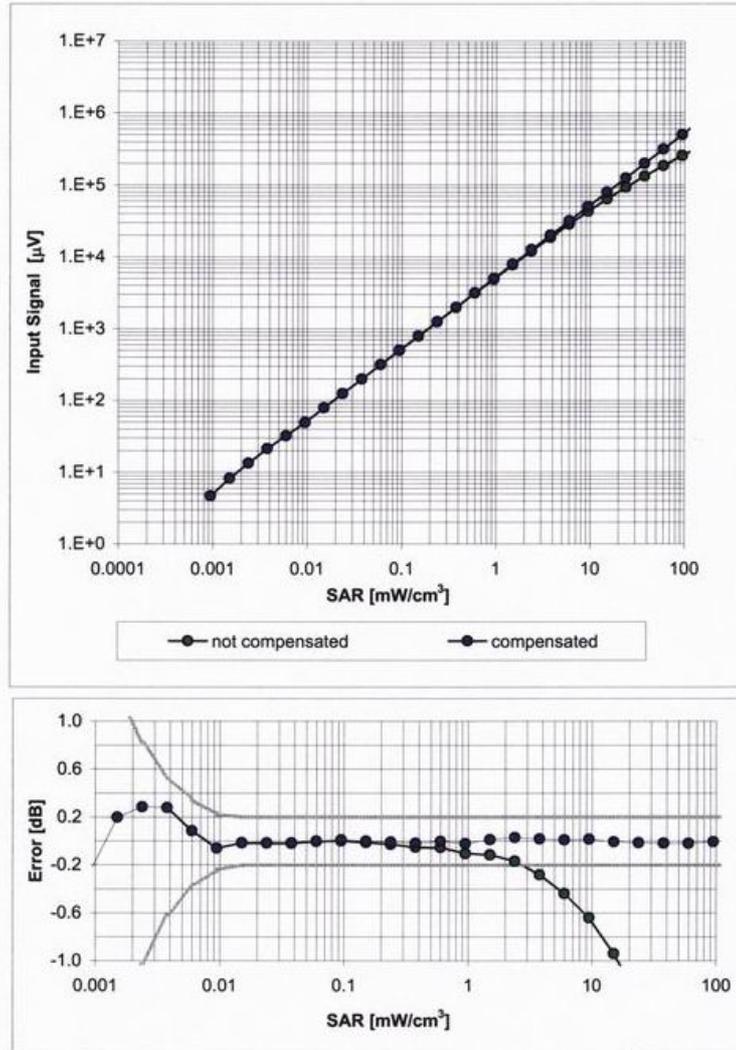


Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

ET3DV6 SN:1737

February 19, 2007

Dynamic Range $f(SAR_{head})$
(Waveguide R22, $f = 1800$ MHz)

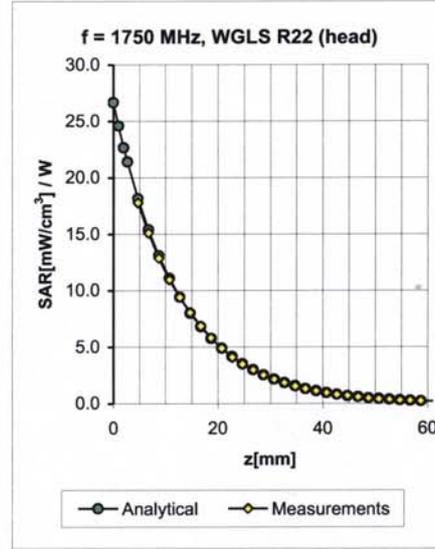
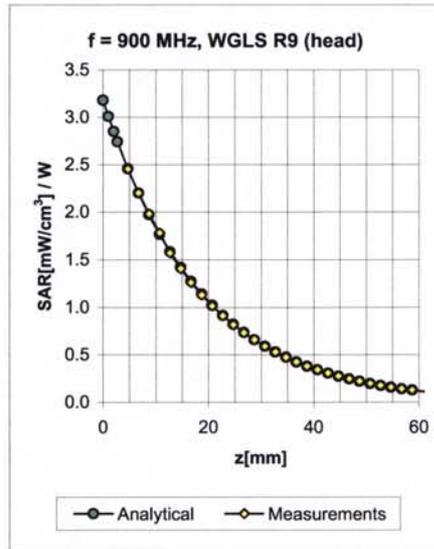


Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

ET3DV6 SN:1737

February 19, 2007

Conversion Factor Assessment



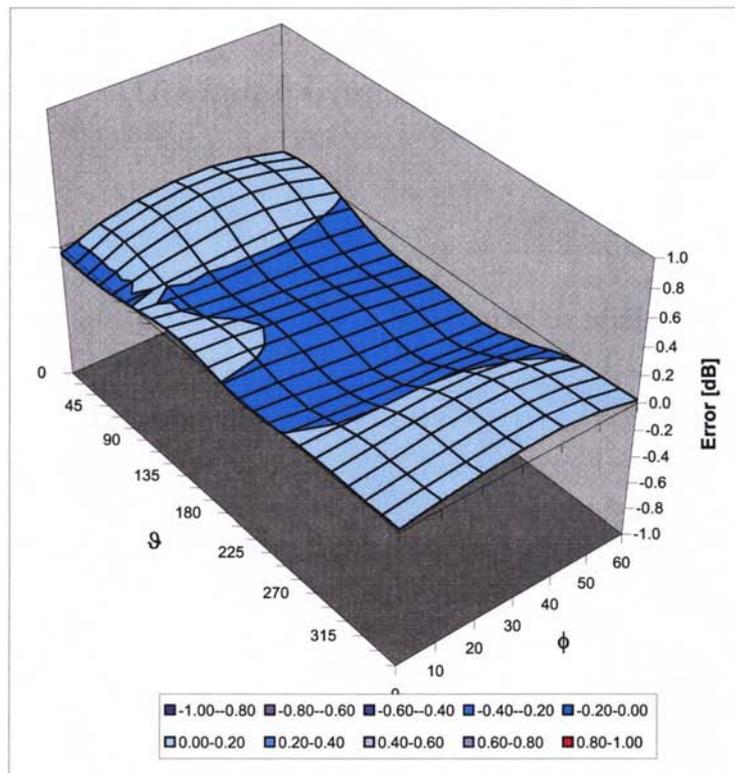
f [MHz]	Validity [MHz] ^c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.27	2.89	6.85 ± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.52	2.56	5.42 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.49	2.89	5.15 ± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.35	2.82	6.52 ± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.56	2.68	4.97 ± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.88	2.07	4.64 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.66	2.16	4.10 ± 11.8% (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.

ET3DV6 SN:1737

February 19, 2007

Deviation from Isotropy in HSL
Error (ϕ , ϑ), $f = 900$ MHz



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ ($k=2$)

TA Technology (Shanghai) Co., Ltd. Test Report

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ANNEX F: DIPOLE CALIBRATION CERTIFICATE

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Client TMC China

Accreditation No.: SCS 108

Certificate No: D835V2-443_Feb07

CALIBRATION CERTIFICATE

Object	D835V2-SN: 443
Calibration procedure(s)	QA CAL-05.v6 Calibration procedure for dipole validation kits
Calibration date:	February 19, 2007
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 at an environment temperature $(22\pm 3)^{\circ}\text{C}$ and humidity < 70%

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID#	Cal Data (Calibrated by, Certification NO.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	03-Oct-06 (METAS, NO. 217-00608)	Oct-07
Power sensor 8481A	US37292783	03-Oct-06 (METAS, NO. 217-00608)	Oct-07
Reference 20 dB Attenuator	SN:5086 (20g)	10-Aug-06 (METAS, NO. 217-00591)	Aug-07
Reference 10 dB Attenuator	SN:5047_2 (10r)	10-Aug-06 (METAS, NO. 217-00591)	Aug-07
DAE4	SN:601	30-Jan-07 (SPEAG, NO.DAE4-601_Jan07)	Jan-08
Reference Probe ET3DV6 (HF)	SN: 1507	19-Oct-06 (SPEAG, NO. ET3-1507_Oct06)	Oct-07
Secondary Standards	ID#	Check Data (in house)	Scheduled Calibration
Power sensor HP 8481A	MY41092317	18-Oct-02(SPEAG, in house check Oct-05)	in house check: Oct-07
RF generator Agilent E4421B	MY41000675	11-May-05(SPEAG, in house check Nov-05)	in house check: Nov -07
Network Analyzer HP 8753E	US37390585S4206	18-Oct-01(SPEAG, in house check Oct-06)	in house check: Oct -07

	Name	Function	Signature
Calibrated by:	Marcel Fehr	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Director	

Issued: February 21, 2007

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

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No. RZA2008-0052FCC

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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- 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
- CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY4	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz \pm 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 \pm 0.2) °C	39.9 \pm 6 %	0.88 mho/m \pm 6 %
Head TSL temperature during test	(21.2 \pm 0.2) °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.48 mW / g
SAR normalized	normalized to 1W	9.90 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	9.70 mW / g \pm 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.60 mW / g
SAR normalized	normalized to 1W	6.40 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	6.31 mW / g \pm 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.5Ω - 6.8 jΩ
Return Loss	- 25.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.402 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	September 3, 2001

DASY4 Validation Report for Head TSL

Date/Time: 19.02.2007 10:04:15

Test laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; serial: D835V2-SN: 443

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

Medium: HSL 835 MHz;

Medium parameters used: $f=835$ MHz; $\sigma=0.88$ mho/m; $\epsilon_r=39.9$; $\rho=1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6-SN1507(HF); ConvF(6.01,6.01,6.01); Calibrated: 19.10.2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.1_2007
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA;
- Measurement SW: DASY, V4.7 Build 53; Post processing SW: SEMCAD, V1.8 Build 172

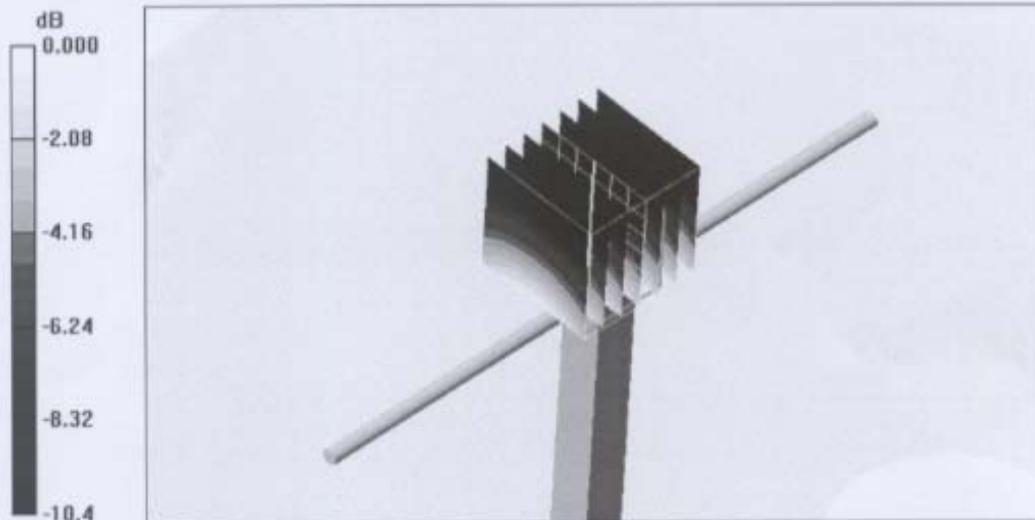
Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.6 V/m; Power Drift = 0.010 dB

Peak SAR (extrapolated) = 3.72 W/kg

SAR(1 g) = 2.48 mW/g; SAR(10 g) = 1.60 mW/g

Maximum value of SAR (measured) = 2.70 mW/g



Impedance measurement Plot for Head TSL

