Exhibit 11: SAR Test Report IDHT56FW1

Date of test:	07-Oct-2005 through 21-Oct-2005
Date of Report:	07-Nov-2005
Laboratory:	Motorola Mobile Devices Business Product Safety & Compliance Laboratory 600 N. US Highway 45 Room: MW113 Libertyville, Illinois 60048
Test Responsible:	Albert Patapack Senior Staff Engineer
Accreditation:	This laboratory is accredited to ISO/IEC 17025-1999 to perform the following tests:

Tests:	Procedures:
Electromagnetic Specific Absorption Rate	ANSI/IEEE C95.1-1992, 1999 (SAR) IEEE C95.3-1991 IEEE 1528, IEC 62209-1 FCC OET Bulletin 65 (*including Supplements A, B, C*) Australian Communications Authority Radio Communications (Electromagnetic Radiation – Human Exposure) Standard 1999 CENELEC EN 50361 (2001)
Simulated Tissue Preparation	APP-0247
RF Power Measurement	DOI-0876, 0900, 0902, 0904, 0915

On the following products or types of products:
Wireless Communications Devices (Examples): Two Way Radios; Portable Phones (including Cellular, Licensed Non-Broadcast and PCS); Low Frequency Readers; and Pagers

A2LA certificate #1651-01

Statement of Compliance:

Motorola declares under its sole responsibility that portable cellular telephone FCC ID IHDT56FW1 to which this declaration relates, is in conformity with the appropriate General Population/Uncontrolled RF exposure standards, recommendations and guidelines (FCC 47 CFR §2.1093). It also declares that the product was tested in accordance with the appropriate measurement standards, guidelines and recommended practices. Any deviations from these standards, guidelines and recommended practices are noted below:

(none)

©Motorola, Inc. 2005
This test report shall not be reproduced except in full, without written approval of the laboratory.

The results and statements contained herein relate only to the items tested. The names of individuals involved may be mentioned only in connection with the statements or results from this report.

Motorola encourages all feedback, both positive and negative, on this test report.

Table of Contents

1. INTRODUCTION 3

2. DESCRIPTION OF THE DEVICE UNDER TEST 3

2.2 Device description 3

3. TEST EQUIPMENT USED 4

3.1 Dosimetric System 4

3.2 Additional Equipment 4

4. ELECTRICAL PARAMETERS OF THE TISSUE SIMULATING LIQUID 5

5. SYSTEM ACCURACY VERIFICATION 6

6. TEST RESULTS 7

6.1 Head Adjacent Test Results 7

6.2 Body Worn Test Results 10

APPENDIX 1: SAR DISTRIBUTION COMPARISON FOR SYSTEM ACCURACY VERIFICATION 12

APPENDIX 2: SAR DISTRIBUTION PLOTS FOR PHANTOM HEAD ADJACENT USE 13

APPENDIX 3: SAR DISTRIBUTION PLOTS FOR BODY WORN CONFIGURATION 14

APPENDIX 4: PROBE CALIBRATION CERTIFICATE 15

APPENDIX 5: MEASUREMENT UNCERTAINTY BUDGET 16

APPENDIX 6: PHOTOGRAPHS OF DEVICE UNDER TEST 19

APPENDIX 7: DIPOLE CHARACTERIZATION CERTIFICATE 23

1 Introduction

The Motorola Mobile Devices Business Product Safety Laboratory has performed measurements of the maximum potential exposure to the user of portable cellular phone (FCC ID IHDT56FW1). The Specific Absorption Rate (SAR) of this product was measured. The portable cellular phone was tested in accordance with FCC OET Bulletin 65 Supplement C 01-01.

2 Description of the Device Under Test

2.1 Antenna description

Type	Internal Antenna	
Location	Bottom of the transceiver	
Dimensions	Length	88 mm
	Width	1 mm
Configuration	FJA	

2.2 Device description

FCC ID Number	IHDT56FW1								
Serial number	G0LT020035								
Mode(s) of Operation	GSM 850	GSM 900	GSM 1800	GSM 1900	GPRS 850	GPRS 900	GPRS 1800	GPRS 1900	Blue Tooth
Modulation Mode(s)	GMSK	GMSK	GMSK	GMSK	GMSK	GMSK	GMSK	GMSK	GFSK
Maximum Output Power Setting	32.20 dBm	32.30 dBm	30.00 dBm	30.00 dBm	32.20 dBm	32.30 dBm	30.00 dBm	30.00 dBm	4.00 dBm
Duty Cycle	1:8	1:8	1:8	1:8	2:8	2:8	2:8	2:8	1:1
Transmitting Frequency Rang(s)	824.2-848.8 MHz	880.2-914.8 MHz	1710.2-1784.8 MHz	1850.20 – 1909.80 MHz	824.2-848.8 MHz	880.2-914.8 MHz	1710.2-1784.8 MHz	1850.20 – 1909.80 MHz	2400 - 2483.5 MHz
Production Unit or Identical Prototype (47 CFR §2..908)	Identical Prototype								
Device Category	Portable								
RF Exposure Limits	General Population / Uncontrolled								

3 Test Equipment Used

3.1 Dosimetric System

The Motorola Mobile Devices Business Product Safety & Compliance Laboratory utilizes a Dosimetric Assessment System (Dasy4™ v4.5) manufactured by Schmid & Partner Engineering AG (SPEAG™), of Zurich Switzerland. All the SAR measurements are taken within a shielded enclosure. The overall RSS uncertainty of the measurement system is ±11.1% (K=1) with an expanded uncertainty of ±22.2% (K=2). The measurement uncertainty budget is given in Appendix 6. Per IEEE 1528, this uncertainty budget is applicable to the SAR range of 0.4 W/kg to 10 W/kg. The list of calibrated equipment used for the measurements is shown below.

Description	Serial Number	Cal Due Date
DASY4 DAE3	437	24-Mar-2006
E-Field Probe ET3DV6	1397	22-Apr-2006
Dipole Validation Kit, D900V2	80	02-Jun-2006
S.A.M. Phantom used for 800MHz	TP-1153	
Dipole Validation Kit, D1800V2	251tr	
S.A.M. Phantom used for 1900MHz	TP-1159	

3.2 Additional Equipment

Description	Serial Number	Cal Due Date
Signal Generator HP8648C	3847A04845	22-Aug-2006
Power Meter E4419B	GB39511087	28-Dec-2005
Power Sensor #1 - E9301A	MY41495336	28-Dec-2005
Power Sensor #2 - E9301A	US39211007	29-Aug-2006
Network Analyzer HP8753ES	US39172529	21-Feb-2006
Dielectric Probe Kit HP85070C	US99360070	

4 Electrical parameters of the tissue simulating liquid

Prior to conducting SAR measurements, the relative permittivity, ε_r, and the conductivity, σ, of the tissue simulating liquids were measured with the HP85070 Dielectric Probe Kit These values, along with the temperature of the tissue simulate are shown in the table below. The recommended limits for maximum permittivity and minimum conductivity are also shown. These come from the Federal Communication Commission, OET Bulletin 65 Supplement C 01-01. It is seen that the measured parameters are satisfactory for compliance testing.

f (MHz)	Tissue type	Limits / Measured	Dielectric Parameters		
			ε_r	σ (S/m)	Temp (°C)
835	**Head**	**Measured,** 11-Oct-2005	43.3	0.93	20.4
		Measured, 12-Oct-2005	42.6	0.92	20.4
		Recommended Limits	41.5 ±5%	0.90 ±5%	18-25
	Body	**Measured,** 13-Oct-2005	55.5	0.99	20.7
		Recommended Limits	55.2 ±5%	0.97 ±5%	18-25
1880	**Head**	**Measured,** 07-Oct-2005	38.4	1.44	20.2
		Measured, 21-Oct-2005	40.0	1.45	20.0
		Recommended Limits	40.0 ±5%	1.40 ±5%	18-25
	Body	**Measured,** 17-Oct-2005	51.1	1.59	20.1
		Recommended Limits	53.3 ±5%	1.52 ±5%	18-25

The list of ingredients and the percent composition used for the tissue simulates are indicated in the table below.

Ingredient	800MHz Head	800MHz Body	1900MHz Head	1900MHz Body
Sugar	57.0	44.9	--	--
DGBE	--	--	47.0	30.80
Water	40.45	53.06	52.8	68.91
Salt	1.45	0.94	0.2	0.29
HEC	1.0	1.0	--	--
Bact.	0.1	0.1	--	--

5 System Accuracy Verification

A system accuracy verification of the DASY4 v4.5 was performed using the measurement equipment listed in Section 3.1. The daily system accuracy verification occurs within center section of the SAM phantom.

A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR indicated in Section 8.3.7 Reference SAR Values in IEEE 1528, or Appendix 7 for the 900Mhz target reference SAR value. These tests were done at 900MHz, 1800MHz. These frequencies are within 100MHz of the mid-band frequency of the test device. This is within the allowable window given in Supplement C 01-01 *Appendix D System Verification* section item #5. The test was conducted on the same days as the measurement of the DUT. Recommended limits for maximum permittivity, minimum conductivity are shown in the table below. These come from the Federal Communication Commission, OET Bulletin 65 Supplement C 01-01. The obtained results from the system accuracy verification are displayed in the table below. The distributions of SAR compare well with those of the reference measurements (see Appendix 1). The tissue stimulant depth was verified to be 15.0cm ±0.5cm. Z-axis scans showing the SAR penetration are also included in Appendix 1. SAR values are normalized to 1W forward power delivered to the dipole.

f (MHz)	Description	SAR (W/kg), 1gram	Dielectric Parameters		Ambient Temp (°C)	Tissue Temp (°C)
			ε_r	σ (S/m)		
900	**Measured,** 11-Oct-2005	10.98	40.1	0.96	23.0	20.6
	Measured, 12-Oct-2005	11.13	41.8	0.98	23.0	21.0
	Measured, 13-Oct-2005	10.90	41.1	0.98	23.0	21.1
	Recommended Limits	11.3	41.5 ±5%	0.97 ±5%	18-25	18-25
1800	**Measured,** 07-Oct-2005	36.43	38.8	1.35	22.0	19.7
	Measured, 17-Oct-2005	37.38	39.0	1.38	22.0	20.5
	Measured, 21-Oct-2005	36.53	40.4	1.36	22.0	20.1
	Recommended Limits	38.1	40.0 ±5%	1.4 ±5%	18-25	18-25

The following probe conversion factors were used on the E-Field probe(s) used for the system accuracy verification measurements:

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ET3DV6	1397	900	6.38	8 of 9
		1810	5.17	8 of 9

6 Test Results

The test sample was operated in a test mode that allows control of the transmitter without the need to place actual phone calls. For the purposes of this test the unit is commanded to test mode and manually set to the proper channel, transmitter power level and transmit mode of operation. The phone was tested in the configurations stipulated in OET Bulletin 65 Supplement C 01-01. Motorola also followed the requirements in Supplement. C / Appendix D: SAR Measurement Procedures, section titled "*Devices Operating Next To A Person's Ear* ". These directions state "The device should be tested on the left and right side of the head phantom in the "Cheek/Touch" and "Ear/Tilt" positions. When applicable, each configuration should be tested with the antenna in its fully extended and fully retracted positions. These test configurations should be tested at the high, middle and low frequency channels of each operating mode; for example, AMPS, CDMA, and TDMA. If the SAR measured at the middle channel for each test configuration (left, right, Cheek/Touch, Tile/Ear, extended and retracted) is at least 2.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s)."

The DASY4 v4.5 SAR measurement system specified in section 3.1 was utilized within the intended operations as set by the SPEAG™ setup. The phone was positioned into the measurement configurations using the positioner supplied with the DASY4 v4.5 SAR measurement system. The measured dielectric constant of the material used for the positioner is less than 2.9 and the loss tangent is less than 0.02 (± 30%) at 850MHz. The default settings for the "coarse" and "cube" scans were chosen and use for measurements. The grid spacing of the course scan was set to 15cm as shown in the SAR plots included in appendix 2 and 3. Please refer to the DASY manual for additional information on SAR scanning procedures and algorithms used.

The Cellular Phone (FCC ID IHDT56FW1) has the following battery options:

Model #1 – SNN5768A - 820 mAH Battery
Model #2 – SNN5779A - 700 mAH Battery

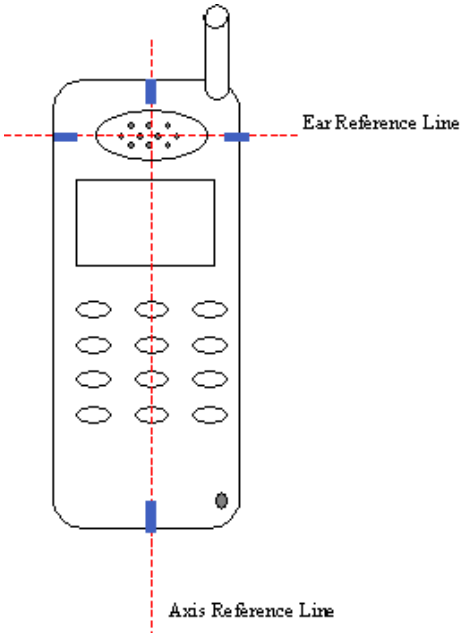
The battery with the highest capacity is the SNN5768A. This battery was used to do most of the SAR testing. The phone was placed in the SAR measurement system with a fully charged battery. The configuration that resulted in the highest SAR values were tested using the other batteries listed above.

6.1 Head Adjacent Test Results

To aid in positioning repeatability, the ear reference line of the device and the axis reference line of the device have been physically added using a non-metallic marker.

- Per Figure 1, the "Ear Reference Line" is centered vertically through the center of the listening area (as defined by the speaker holes in the housing).
- The "Axis Reference Line" bisects the front surface of the device at its top and bottom edges.
- The intersection of these two lines defines the location of the "Ear Reference Point".

The lines drawn on the device extended to the outside edges, as shown in blue in the figure below, & wrap around the sides of the device.



The SAR results shown in tables 1 through 3 are maximum SAR values averaged over 1 gram of phantom tissue. Also shown are the measured conducted output powers, the temperature of the test facility during the test, the temperature of the tissue simulate after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is New SAR = Old SAR * 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY™ measurement system can be scaled up by the measured drift to determine the SAR at the beginning of the measurement process. This is the most conservative SAR because it corresponds to the average output power at the beginning of the SAR test. This extrapolation has been done because when the DUT is operating properly it may exhibit a slump in radiated power and SAR over time. This is verified by measuring the SAR drift after the test.

The left head and right head SAR contour distributions are similar. Because of this similarity, the cheek/touch and 15° tilt test conditions with the highest SAR values in each band are indicated as bold numbers in the following tables and are included in Appendix 2. All other test conditions measured lower SAR values than those included in Appendix 2.

The SAR measurements were performed using the SAM phantoms listed in section 3.1. Since the same phantoms and tissue simulate are used for the system accuracy verification as the device SAR measurements, the Z-axis scans included in within Appendix 1 are applicable for verification of tissue simulate depth to be 15.0cm ±0.5cm.

The following probe conversion factors were used on the E-Field probe(s) used for the head adjacent measurements:

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ET3DV6	1397	900	6.38	8 of 9
		1810	5.17	8 of 9

f (MHz)	Description	Conducted Output Power (dBm)	Cheek / Touch Position							
			Left Head				Right Head			
			Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)	Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)
GSM 850MHz	Channel 128	32.18	1.09	-0.02	1.10	20.4	1.14	-0.02	1.15	20.4
	Channel 190	32.19	1.30	-0.17	1.35	20.4	1.30	-0.007	1.30	20.5
	Channel 251	32.20	1.46	-0.01	1.46	20.4	**1.58**	**-0.01**	**1.58**	**20.4**
GSM 1900MHz	Channel 512	30.00	1.14	-0.03	1.15	20.2	0.934	-0.05	0.94	20.0
	Channel 661	29.96	1.22	-0.01	1.22	20.2	0.991	-0.05	1.00	20.1
	Channel 810	29.98	1.32	-0.02	1.33	20.2	1.06	0.07	1.06	20.0

Table 1: SAR measurement results for the portable cellular telephone FCC ID IHDT56FW1 at highest possible output power. Measured against the head in the Cheek/Touch Position.

f (MHz)	Description	Conducted Output Power (dBm)	15° Tilt Position							
			Left Head				Right Head			
			Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)	Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)
GSM 850MHz	Channel 128	32.18								
	Channel 190	32.19	0.544	-0.002	0.54	20.4	0.548	-0.02	0.55	20.4
	Channel 251	32.20								
GSM 1900MHz	Channel 512	30.00								
	Channel 661	29.96	**0.401**	**0.01**	**0.40**	**20.1**	0.356	-0.02	0.36	20.0
	Channel 810	29.98								

Table 2: SAR measurement results for the portable cellular telephone FCC ID IHDT56FW1 at highest possible output power. Measured against the head in the 15° Tilt Position.

f (MHz)	Description	Conducted Output Power (dBm)	Highest head with SNN5779A							
			Cheek				Tilt			
			Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)	Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)
GSM 850MHz	Channel 128	32.18								
	Channel 190	32.19					**0.573**	**0.01**	**0.57**	**20.4**
	Channel 251	32.20	1.53	-0.02	1.54	20.4				
GSM 1900MHz	Channel 512	30.00	1.25	-0.09	1.28	19.6				
	Channel 661	29.96	1.25	-0.08	1.27	20.0	0.388	-0.04	0.39	19.6
	Channel 810	29.98	**1.42**	**-0.03**	**1.43**	**20.0**				

Table 3: SAR measurement results for the portable cellular telephone FCC ID IHDT56FW1at highest possible output power. Measured against the head.

6.2 Body Worn Test Results

The SAR results shown in table 4 through 7 are the maximum SAR values averaged over 1 gram of phantom tissue. Also shown are the measured conducted output powers, the temperature of the test facility during the test, the temperature of the tissue simulate after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is New SAR = Old SAR * 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY™ measurement system can be scaled up by the measured drift to determine the SAR at the beginning of the measurement process. This is the most conservative SAR because it corresponds to the average output power at the beginning of the SAR test. This extrapolation has been done because when the DUT is operating properly it may exhibit a slump in radiated power and SAR over time. This is verified by measuring the SAR drift after the test.

The test conditions that produced the highest SAR values in each band are indicated as bold numbers in the following tables and are included in Appendix 3. All other test conditions measured lower SAR values than those included in Appendix 3.

A "flat" phantom was for the body-worn tests. This "flat" phantom is made out of 1" thick natural High Density Polyethylene with a thickness at the bottom equal to 2.0mm. It measures 52.7cm(long) x 26.7cm(wide) x 21.2cm(tall). The measured dielectric constant of the material used is less than 2.3 and the loss tangent is less than 0.0046 all the way up to 2.184GHz.

The tissue stimulant depth was verified to be 15.0cm ±0.5cm. The same device holder described in section 6 was used for positioning the phone. There are no Body-Worn Accessories available for this phone at the time of testing hence the device was tested per the supplement C testing guidelines for devices that do not have body worn accessories. The phone was placed a maximum of 25mm away from a flat phantom per the supplement C standard guidelines to perform SAR measurement. The cellular phone was tested with a headset connected to the device for all body-worn SAR measurements.

The following probe conversion factors were used on the E-Field probe(s) used for the body worn measurements:

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ET3DV6	1397	900	6.22	8 of 9
		1810	4.77	8 of 9

f (MHz)	Description	Conducted Output Power (dBm)	GSM Body Worn							
			Front of Phone 15mm from Phantom				Back of Phone 15mm from Phantom			
			Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)	Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)
GSM 850MHz	Channel 128	32.18								
	Channel 190	32.19	0.552	-0.009	0.55	20.6	0.568	-0.09	0.58	20.6
	Channel 251	32.20								
GSM 1900MHz	Channel 512	30.00								
	Channel 661	29.96	0.509	-0.05	0.51	20.1	0.417	-0.003	0.42	20.1
	Channel 810	29.98								

Table 4: SAR measurement results for the portable cellular telephone FCC ID IHDT56FW1at highest possible output power. Measured against the body.

f (MHz)	Description	Conducted Output Power (dBm)	Body Worn							
			Highest GSM (front or back) with Bluetooth enabled				Highest GSM (front or back) with GPRS enabled & 25mm from phantom			
			Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)	Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)
GSM 850MHz	Channel 128	32.18	0.702	-0.08	0.72	20.7				
	Channel 190	32.19	0.845	-0.07	0.86	20.7	0.61	-0.06	0.62	20.7
	Channel 251	32.20	**0.878**	**-0.08**	**0.89**	**20.7**				
GSM 1900MHz	Channel 512	30.00								
	Channel 661	29.96	0.476	-0.04	0.48	20.1	0.26	-0.009	0.26	20.1
	Channel 810	29.98								

Table 5: SAR measurement results for the portable cellular telephone FCC ID IHDT56FW1 at highest possible output power. Measured against the body.

f (MHz)	Description	Conducted Output Power (dBm)	Body Worn			
			Previous highest with SNN5779A			
			Measured (W/kg)	Drift (dB)	Extrapolated (W/kg)	Simulate Temp (°C)
GSM 850MHz	Channel 128	32.18				
	Channel 190	32.19	0.805	-0.007	0.81	20.7
	Channel 251	32.20				
GSM 1900MHz	Channel 512	30.00				
	Channel 661	29.96	**0.659**	**-0.03**	**0.66**	**20.1**
	Channel 810	29.98				

Table 6: SAR measurement results for the portable cellular telephone FCC ID IHDT56FW1 at highest possible output power. Measured against the body.

Appendix 1

SAR distribution comparison for the system accuracy verification

Date/Time: 10/7/2005 6:38:31 AM

Test Laboratory: Motorola 100705 1800Mhz GOOD-4.4%

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:251tr;

Procedure Notes: 1800 MHz System Performance Check / Dipole Sn# 251tr PM1 Power = 200 mW

Sim.Temp@meas = 20.2C Sim.Temp@SPC = 19.7C Room Temp @ SPC = 22C

Communication System: CW - Dipole; Frequency: 1800 MHz; Channel Number: 8; Duty Cycle: 1:1

Medium: VALIDATION Only;

Medium parameters used: f = 1800 MHz; σ = 1.35 mho/m; ε_r = 38.8; ρ = 1000kg/m^3

DASY4 Configuration:

- Probe: ET3DV6R - SN1397; ConvF(5.17, 5.17, 5.17); Calibrated: 4/22/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn437; Calibrated: 3/24/2005
- Phantom: R3: Glycol SAM; Type: SAM; Serial: TP-1159;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Daily SPC Check/Dipole Area Scan (4x9x1):

Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 6.03 mW/g

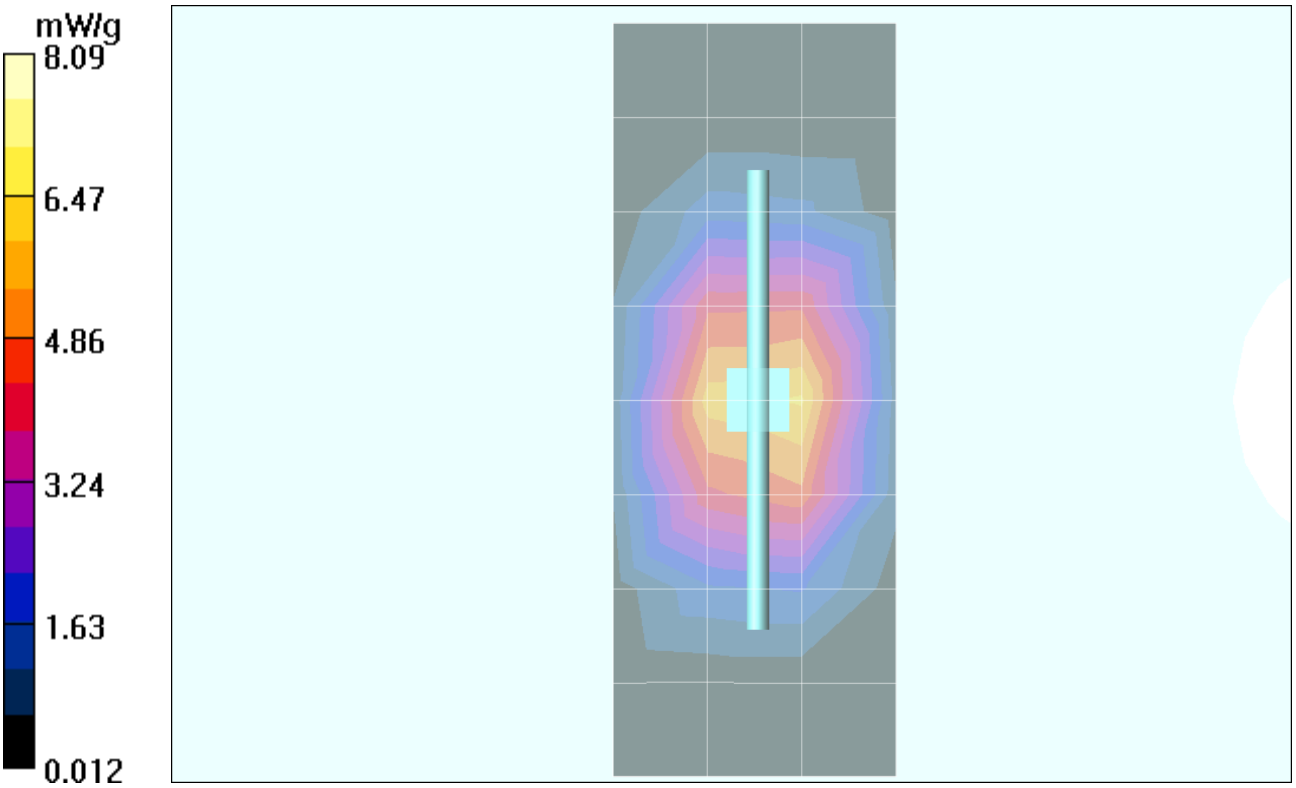
Daily SPC Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0:

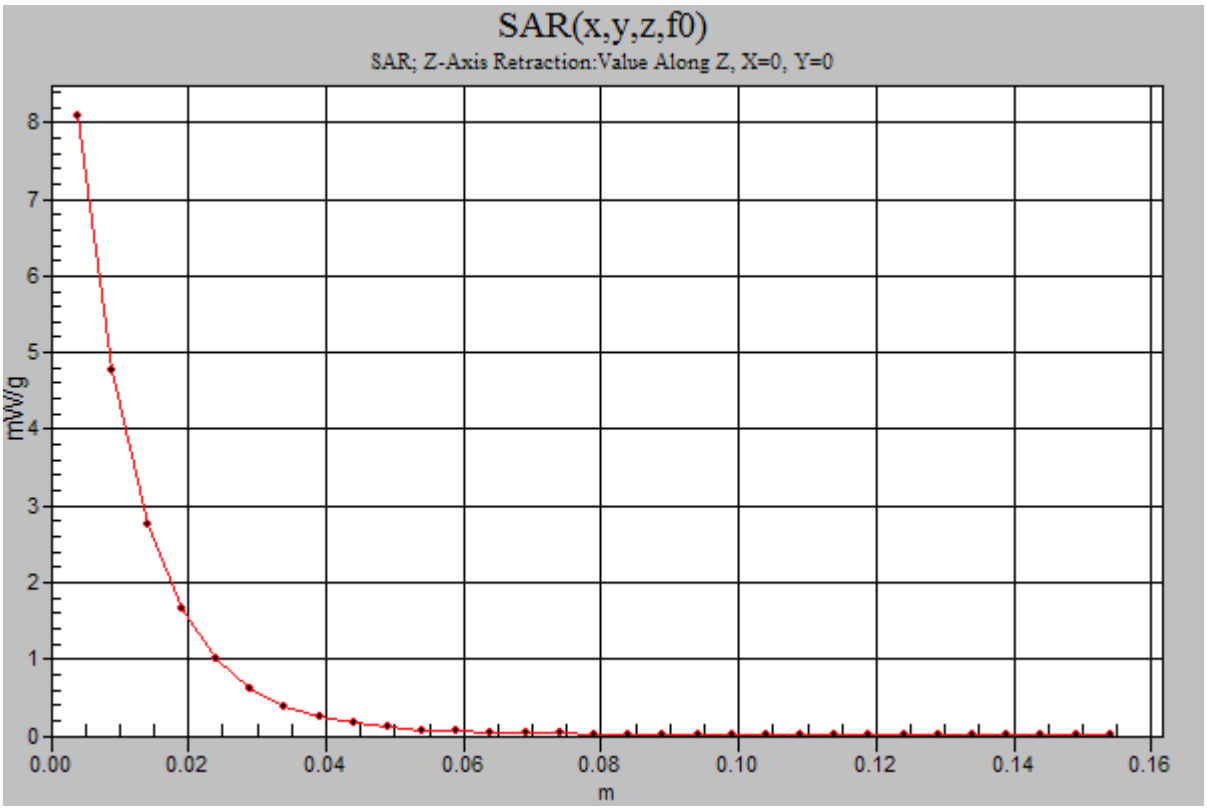
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 82.0 V/m; Power Drift = -0.018 dB Peak SAR (extrapolated) = 11.7 W/kg
SAR(1 g) = 7.13 mW/g; SAR(10 g) = 3.87 mW/g Maximum value of SAR (measured) = 8.09 mW/g

Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 82.0 V/m; Power Drift = -0.018 dB Peak SAR (extrapolated) = 12.3 W/kg
SAR(1 g) = 7.44 mW/g; SAR(10 g) = 4.02 mW/g Maximum value of SAR (measured) = 8.37 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm


mW/g
8.09
6.47
4.86
3.24
1.63
0.012


SAR(x,y,z,f0)
SAR; Z-Axis Retraction:Value Along Z, X=0, Y=0
mW/g
0
1
2
3
4
5
6
7
8
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Date/Time: 10/11/2005 8:46:49 AM

Test Laboratory: Motorola 101105 900Mhz GOOD-2.9%

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:080;

Procedure Notes: 900 MHz System Performance Check / Dipole Sn# 80 PM1 Power = 200 mW

Sim.Temp@meas = 20.6C Sim.Temp@SPC = 20.6C Room Temp @ SPC = 23C

Communication System: CW - Dipole; Frequency: 900 MHz; Channel Number: 4; Duty Cycle: 1:1

Medium: VALIDATION Only;

Medium parameters used: f = 900 MHz; σ = 0.96 mho/m; ε_r = 40.1; ρ = 1000kg/m^3

DASY4 Configuration:

- Probe: ET3DV6R - SN1397; ConvF(6.38, 6.38, 6.38); Calibrated: 4/22/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn437; Calibrated: 3/24/2005
- Phantom: R3: Sugar Water SAM; Type: SAM; Serial: TP-1153;
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Daily SPC Check/Dipole Area Scan (4x9x1):

Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 2.08 mW/g

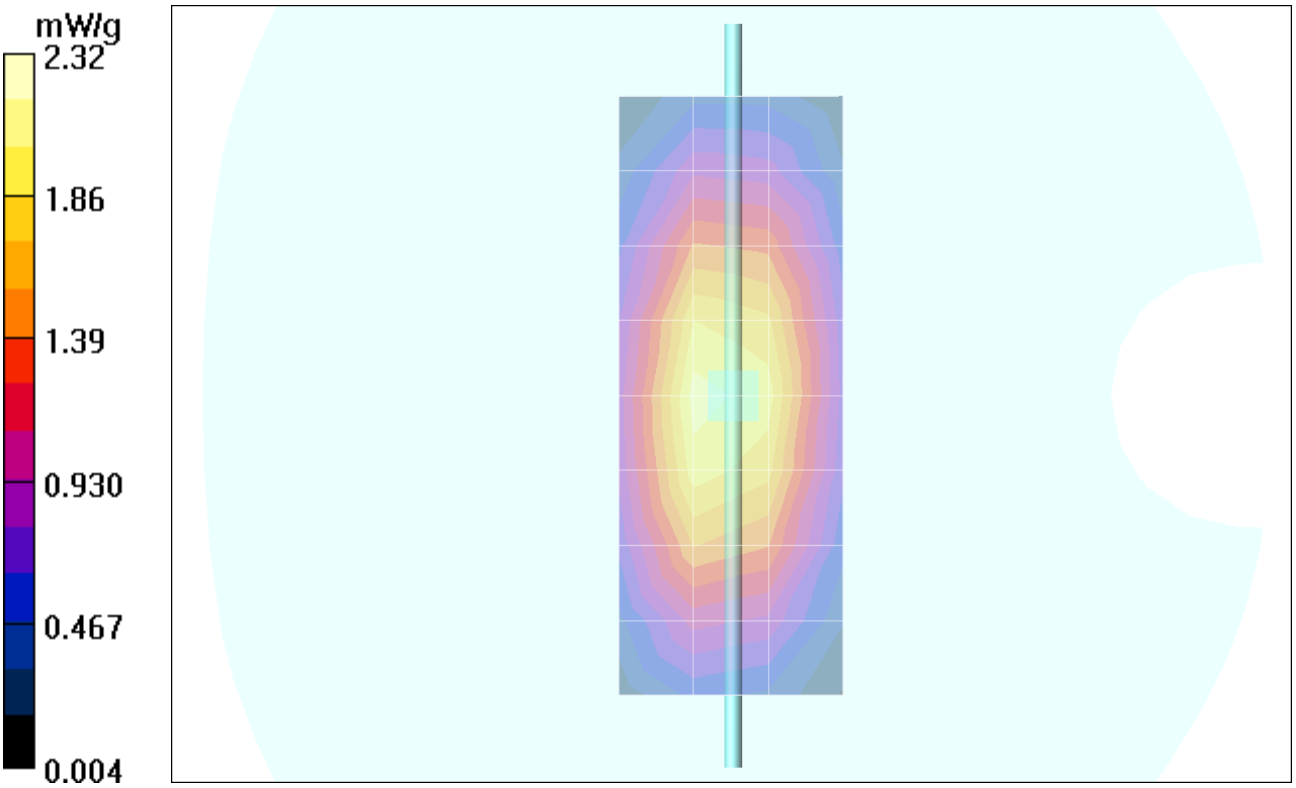
Daily SPC Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0:

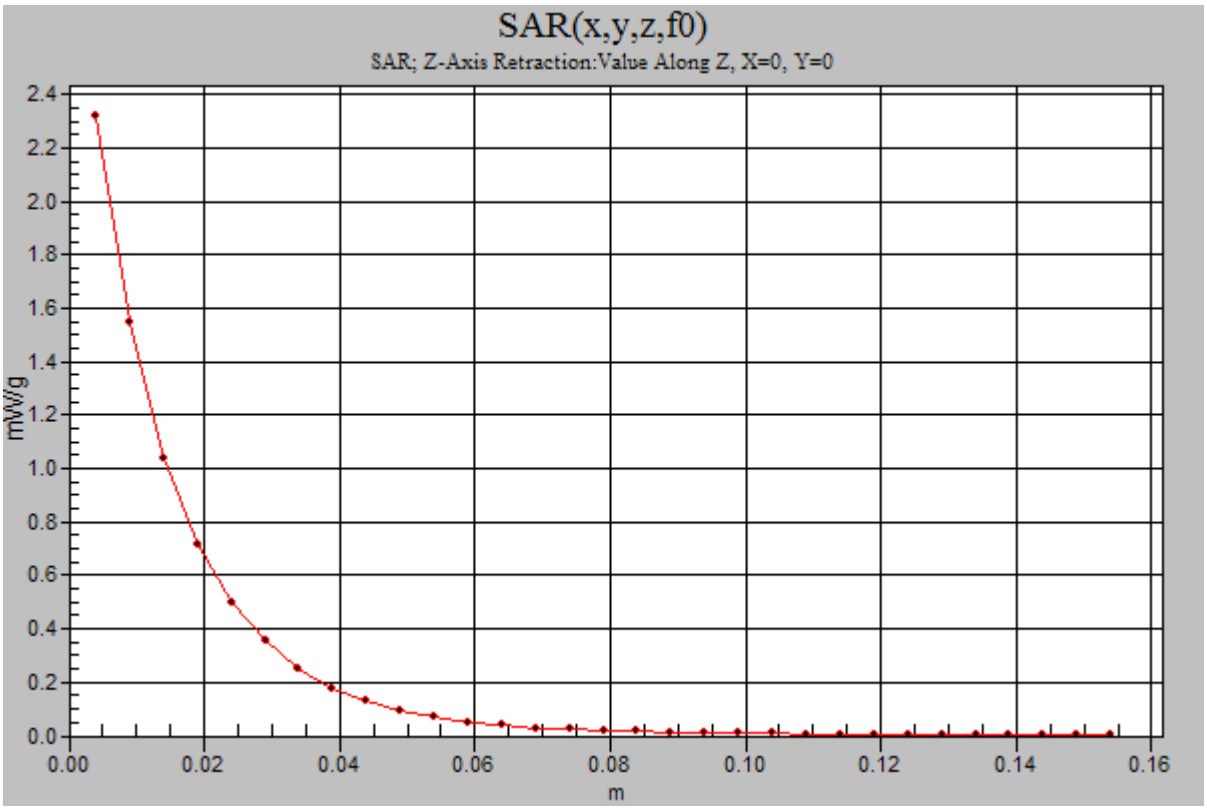
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 50.8 V/m; Power Drift = -0.021 dB Peak SAR (extrapolated) = 3.14 W/kg
SAR(1 g) = 2.14 mW/g; SAR(10 g) = 1.38 mW/g Maximum value of SAR (measured) = 2.32 mW/g

Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 50.8 V/m; Power Drift = -0.021 dB Peak SAR (extrapolated) = 3.34 W/kg
SAR(1 g) = 2.25 mW/g; SAR(10 g) = 1.45 mW/g Maximum value of SAR (measured) = 2.44 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm


mW/g
2.32
1.86
1.39
0.930
0.467
0.004


SAR(x,y,z,f0)
SAR; Z-Axis Retraction:Value Along Z, X=0, Y=0
mW/g
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Date/Time: 10/12/2005 7:46:08 AM

Test Laboratory: Motorola 101205 900Mhz GOOD-1.5%

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:080;

Procedure Notes: 900 MHz System Performance Check / Dipole Sn# 80 PM1 Power = 200 mW

Sim.Temp@meas = 21.0C Sim.Temp@SPC = 21.0C Room Temp @ SPC = 23C

Communication System: CW - Dipole; Frequency: 900 MHz; Channel Number: 4; Duty Cycle: 1:1

Medium: VALIDATION Only;

Medium parameters used: f = 900 MHz; σ = 0.98 mho/m; ε_r = 41.8; ρ = 1000kg/m^3

DASY4 Configuration:

- Probe: ET3DV6R - SN1397; ConvF(6.38, 6.38, 6.38); Calibrated: 4/22/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn437; Calibrated: 3/24/2005
- Phantom: R3: Sugar Water SAM; Type: SAM; Serial: TP-1153;
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Daily SPC Check/Dipole Area Scan (4x9x1):

Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 2.15 mW/g

Daily SPC Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0:

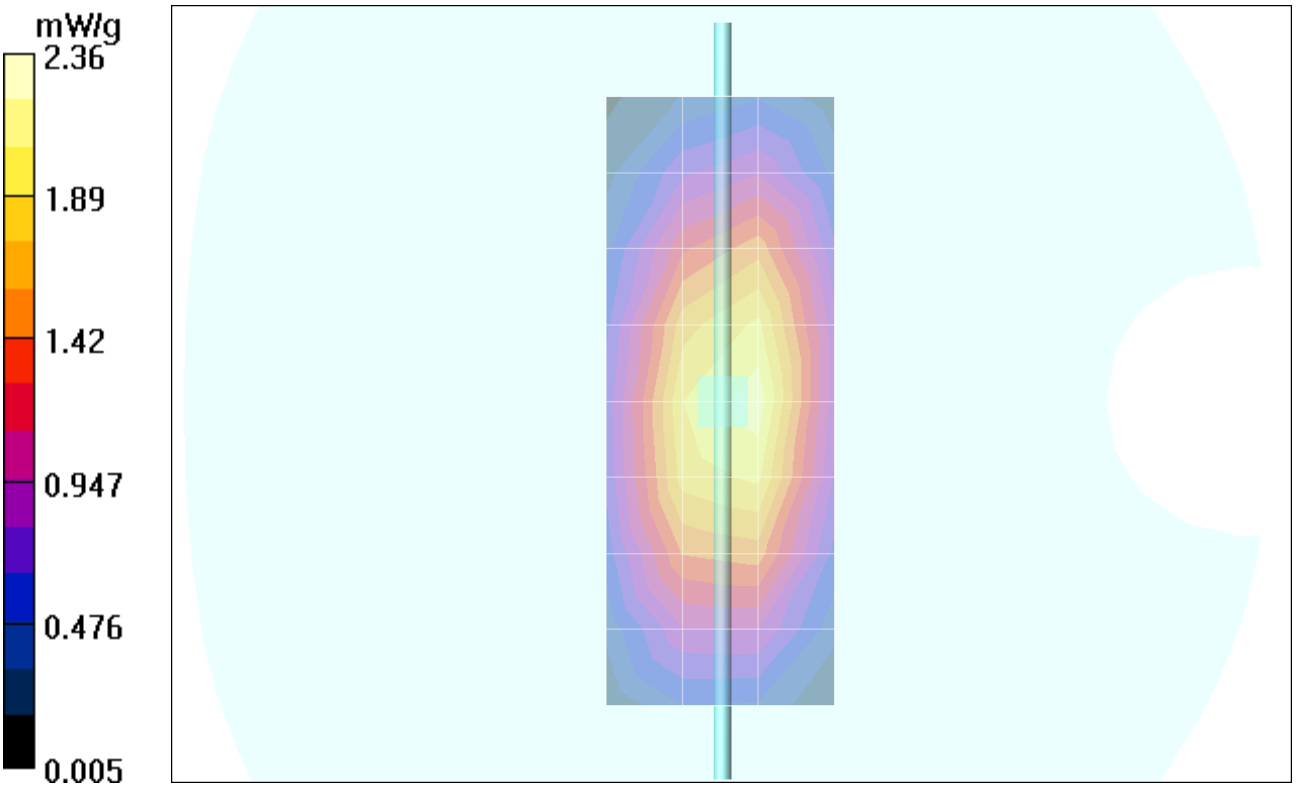
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 50.8 V/m; Power Drift = -0.035 dB Peak SAR (extrapolated) = 3.17 W/kg
SAR(1 g) = 2.16 mW/g; SAR(10 g) = 1.39 mW/g Maximum value of SAR (measured) = 2.34 mW/g

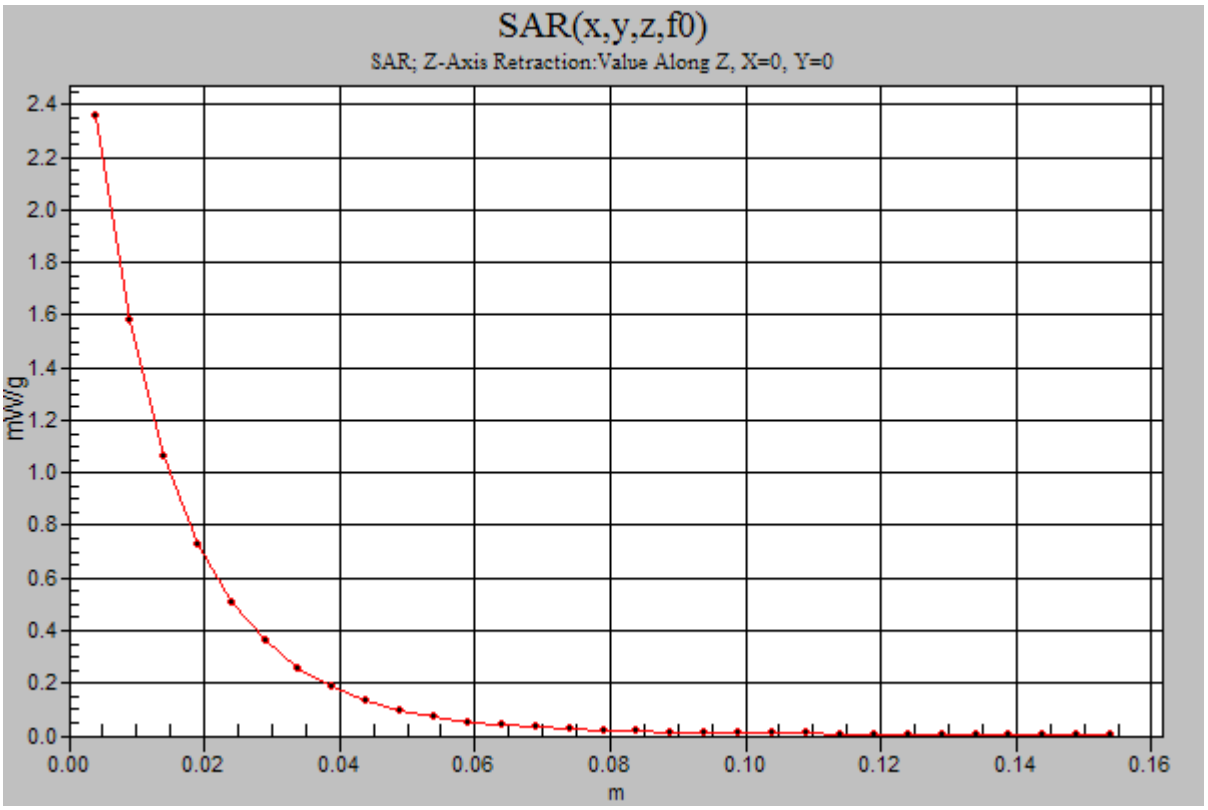
Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 50.8 V/m; Power Drift = -0.035 dB Peak SAR (extrapolated) = 3.39 W/kg
SAR(1 g) = 2.29 mW/g; SAR(10 g) = 1.47 mW/g Maximum value of SAR (measured) = 2.47 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31):

Measurement grid: dx=20mm, dy=20mm, dz=5mm Maximum value of SAR (measured) = 2.36 mW/g


mW/g
2.36
1.89
1.42
0.947
0.476
0.005


SAR(x,y,z,f0)
SAR; Z-Axis Retraction:Value Along Z, X=0, Y=0
mW/g
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Date/Time: 10/13/2005 7:55:54 AM

Test Laboratory: Motorola

101305 900Mhz GOOD-3.5%

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:080;

Procedure Notes: 900 MHz System Performance Check / Dipole Sn# 80 PM1 Power = 200 mW

Sim.Temp@meas = 21.1C Sim.Temp@SPC = 21.1C Room Temp @ SPC = 23C

Communication System: CW - Dipole; Frequency: 900 MHz; Channel Number: 4; Duty Cycle: 1:1

Medium: VALIDATION Only;

Medium parameters used: f = 900 MHz; σ = 0.98 mho/m; ε_r = 41.1; ρ = 1000kg/m^3

DASY4 Configuration:

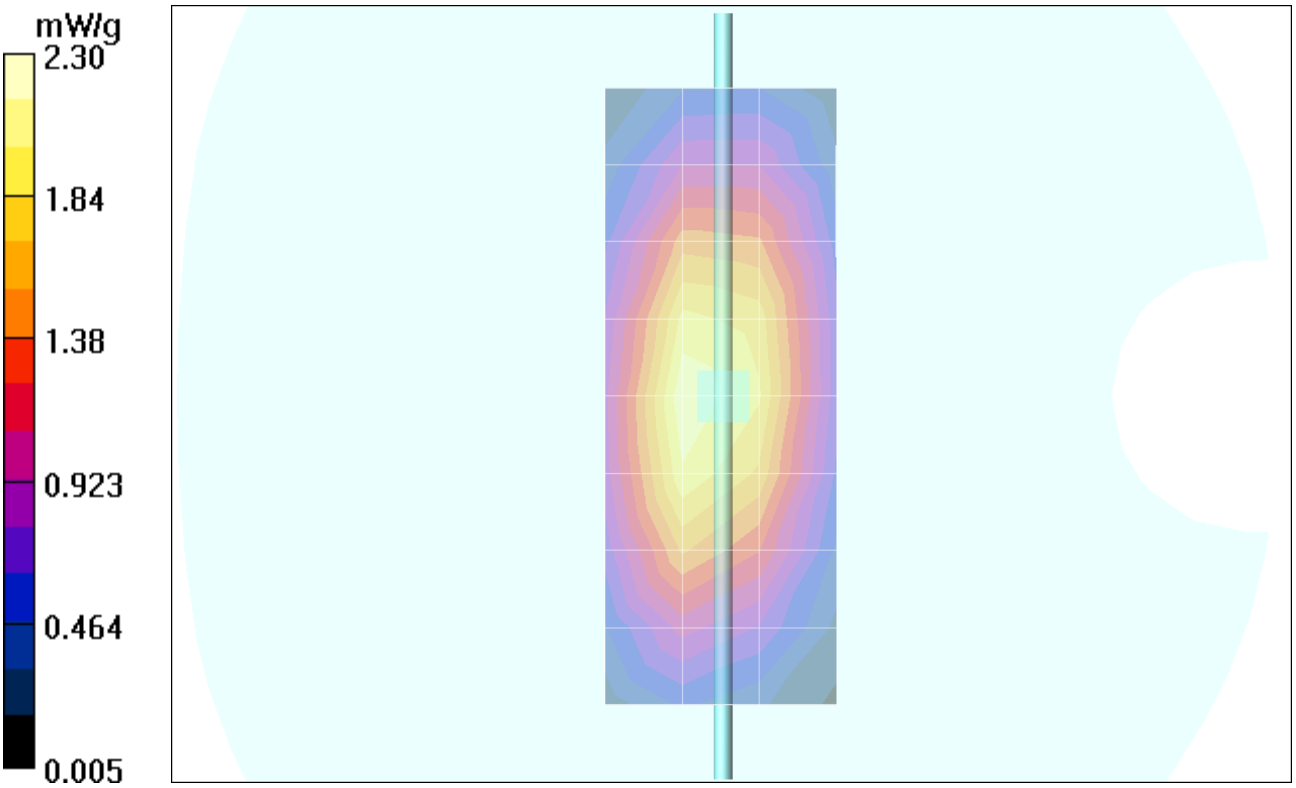
- Probe: ET3DV6R - SN1397; ConvF(6.38, 6.38, 6.38); Calibrated: 4/22/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn437; Calibrated: 3/24/2005
- Phantom: R3: Sugar Water SAM; Type: SAM; Serial: TP-1153;
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

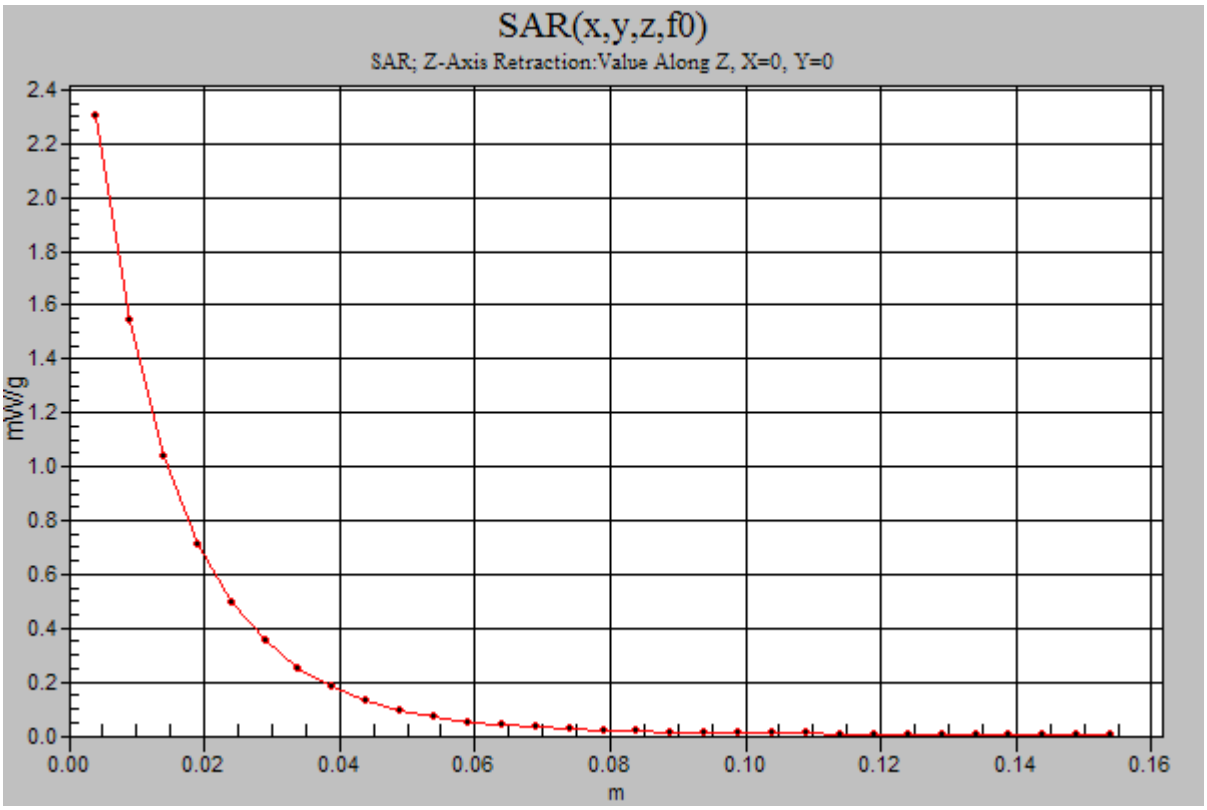
Daily SPC Check/Dipole Area Scan (4x9x1):
Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 2.13 mW/g

Daily SPC Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 50.3 V/m; Power Drift = -0.012 dB Peak SAR (extrapolated) = 3.14 W/kg
SAR(1 g) = 2.13 mW/g; SAR(10 g) = 1.38 mW/g Maximum value of SAR (measured) = 2.31 mW/g

Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 50.3 V/m; Power Drift = -0.012 dB Peak SAR (extrapolated) = 3.28 W/kg
SAR(1 g) = 2.23 mW/g; SAR(10 g) = 1.44 mW/g Maximum value of SAR (measured) = 2.41 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31):
Measurement grid: dx=20mm, dy=20mm, dz=5mm Maximum value of SAR (measured) = 2.30 mW/g


mW/g
2.30
1.84
1.38
0.923
0.464
0.005


SAR(x,y,z,f0)
SAR; Z-Axis Retraction:Value Along Z, X=0, Y=0
mW/g
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Date/Time: 10/17/2005 7:02:47 AM

Test Laboratory: Motorola

101705 1800Mhz GOOD-1.9%

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:251tr;

Procedure Notes: 1800 MHz System Performance Check / Dipole Sn# 251tr PM1 Power = 200 mW

Sim.Temp@meas = 20.5C Sim.Temp@SPC = 20.0C Room Temp @ SPC = 22C

Communication System: CW - Dipole; Frequency: 1800 MHz; Channel Number: 8; Duty Cycle: 1:1

Medium: VALIDATION Only;

Medium parameters used: f = 1800 MHz; σ = 1.38 mho/m; ε_r = 39; ρ = 1000kg/m^3

DASY4 Configuration:

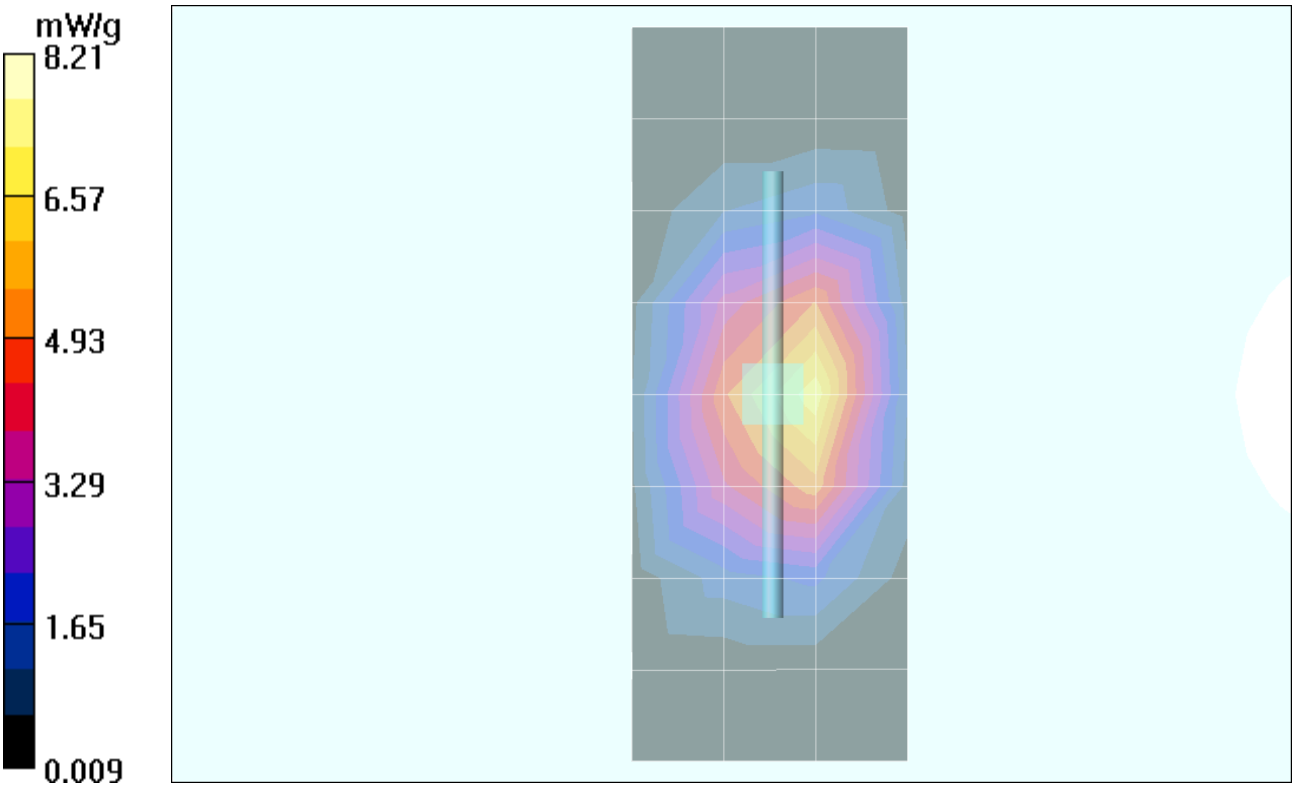
- Probe: ET3DV6R - SN1397; ConvF(5.17, 5.17, 5.17); Calibrated: 4/22/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn437; Calibrated: 3/24/2005
- Phantom: R3: Glycol SAM; Type: SAM; Serial: TP-1159;
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

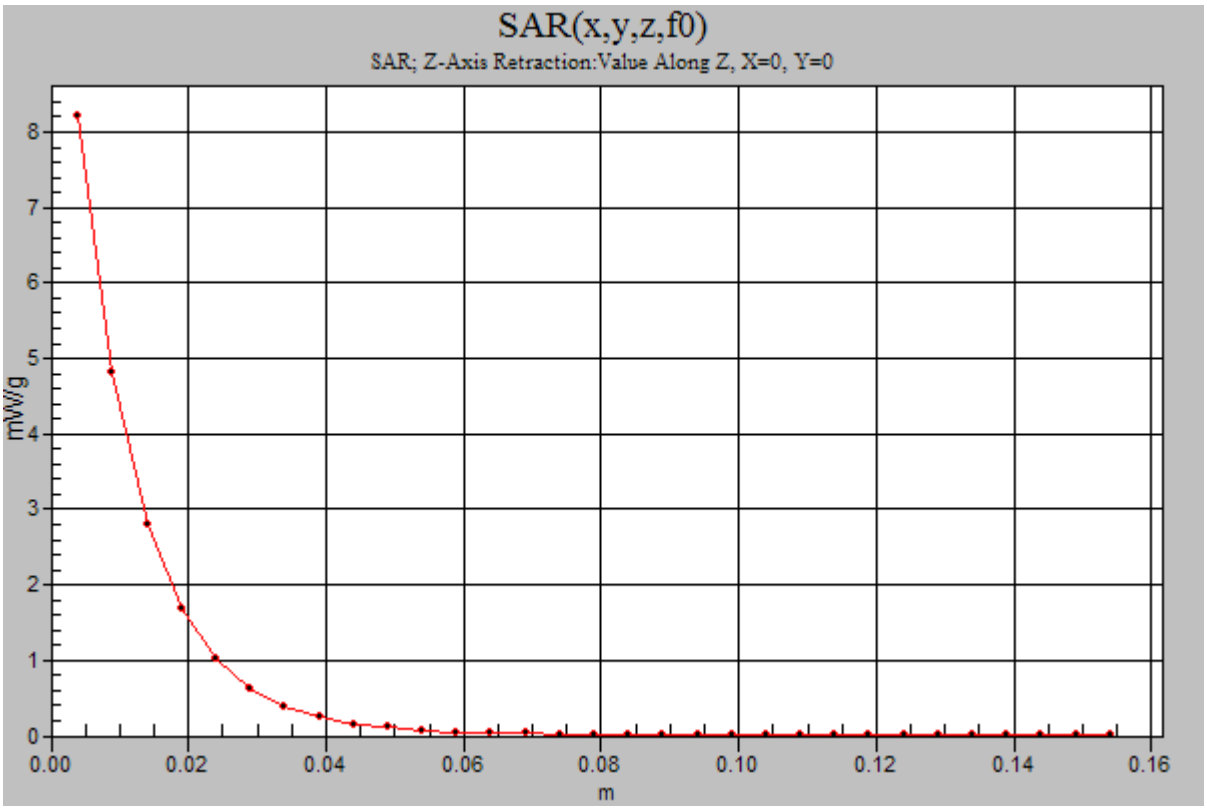
Daily SPC Check/Dipole Area Scan (4x9x1):
Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 6.97 mW/g

Daily SPC Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 81.2 V/m; Power Drift = -0.066 dB Peak SAR (extrapolated) = 12.1 W/kg
SAR(1 g) = 7.27 mW/g; SAR(10 g) = 3.94 mW/g Maximum value of SAR (measured) = 8.19 mW/g

Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 81.2 V/m; Power Drift = -0.066 dB Peak SAR (extrapolated) = 12.9 W/kg
SAR(1 g) = 7.68 mW/g; SAR(10 g) = 4.14 mW/g Maximum value of SAR (measured) = 8.63 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31):
Measurement grid: dx=20mm, dy=20mm, dz=5mm Maximum value of SAR (measured) = 8.21 mW/g


mW/g
8.21
6.57
4.93
3.29
1.65
0.009


SAR(x,y,z,f0)
SAR; Z-Axis Retraction:Value Along Z, X=0, Y=0
mW/g
0
1
2
3
4
5
6
7
8
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Date/Time: 10/21/2005 6:37:49 AM

Test Laboratory: Motorola

102105 1800Mhz GOOD-4.1%

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:251tr;

Procedure Notes: 1800 MHz System Performance Check / Dipole Sn# 251tr PM1 Power = 200 mW

Sim.Temp@meas = 20.5C Sim.Temp@SPC = 20.1C Room Temp @ SPC = 22C

Communication System: CW - Dipole; Frequency: 1800 MHz; Channel Number: 8; Duty Cycle: 1:1

Medium: VALIDATION Only;

Medium parameters used: f = 1800 MHz; σ = 1.36 mho/m; ε_r = 40.4; ρ = 1000kg/m^3

DASY4 Configuration:

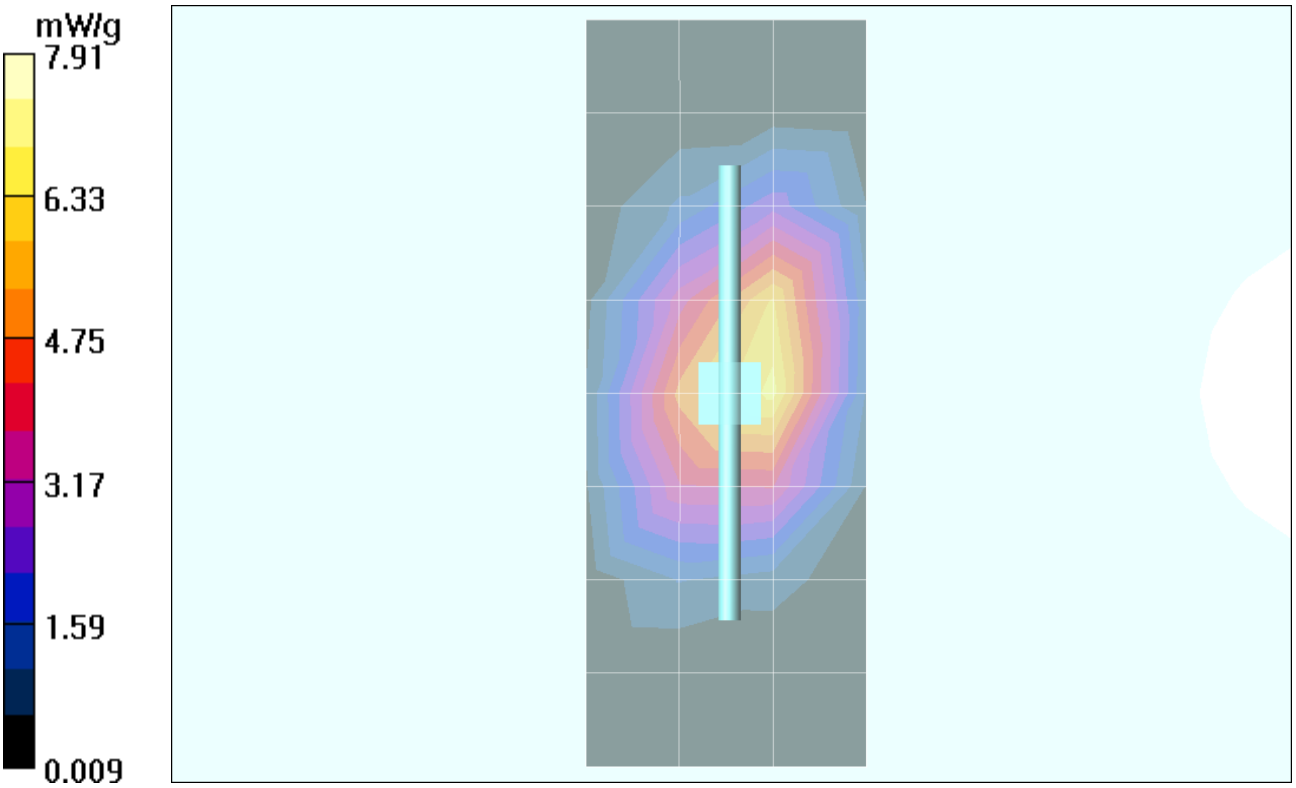
- Probe: ET3DV6R - SN1397; ConvF(5.17, 5.17, 5.17); Calibrated: 4/22/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn437; Calibrated: 3/24/2005
- Phantom: R3: Glycol SAM; Type: SAM; Serial: TP-1159;
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

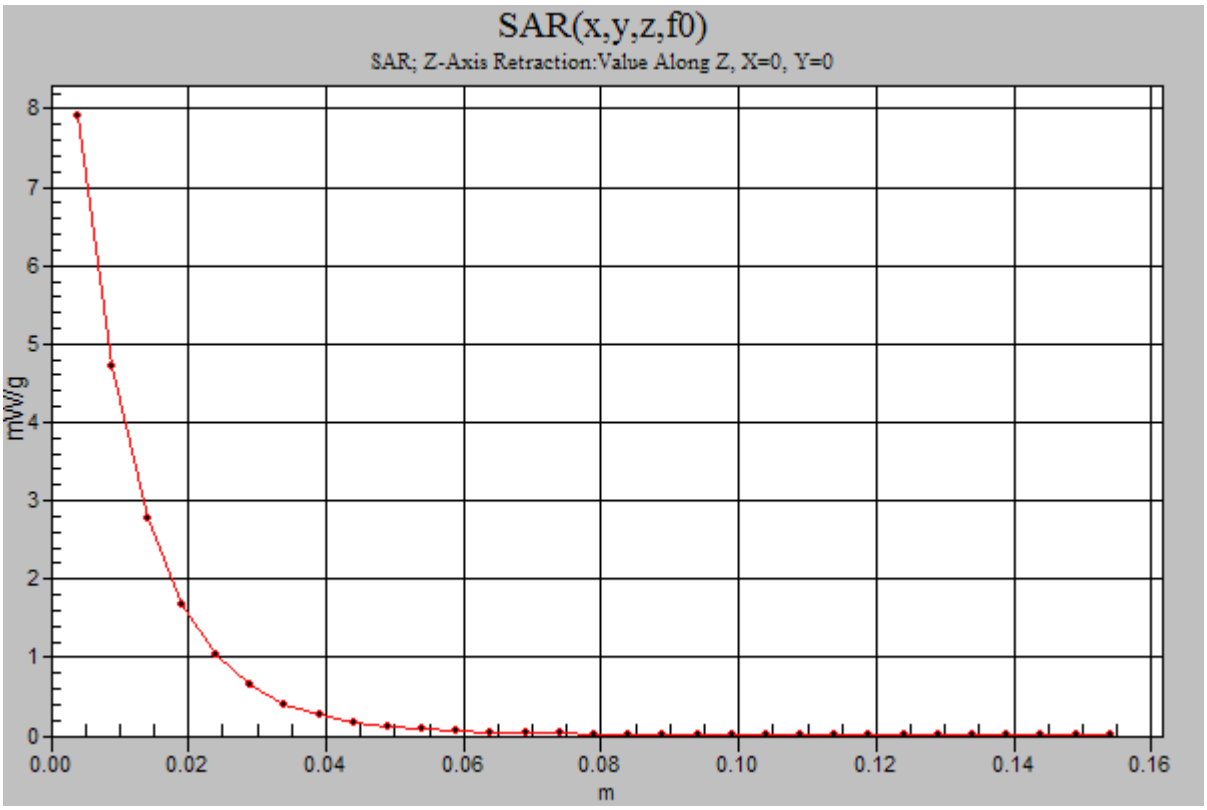
Daily SPC Check/Dipole Area Scan (4x9x1):
Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 6.54 mW/g

Daily SPC Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 81.1 V/m; Power Drift = -0.016 dB Peak SAR (extrapolated) = 11.8 W/kg
SAR(1 g) = 7.09 mW/g; SAR(10 g) = 3.84 mW/g Maximum value of SAR (measured) = 7.96 mW/g

Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 81.1 V/m; Power Drift = -0.016 dB Peak SAR (extrapolated) = 12.6 W/kg
SAR(1 g) = 7.52 mW/g; SAR(10 g) = 4.05 mW/g Maximum value of SAR (measured) = 8.47 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31):
Measurement grid: dx=20mm, dy=20mm, dz=5mm Maximum value of SAR (measured) = 7.91 mW/g


mW/g
7.91
6.33
4.75
3.17
1.59
0.009


SAR(x,y,z,f0)
SAR; Z-Axis Retraction:Value Along Z, X=0, Y=0
mW/g
0
1
2
3
4
5
6
7
8
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Appendix 2

SAR distribution plots for Phantom Head Adjacent Use

Date/Time: 10/11/2005 3:33:27 PM

Test Laboratory: Motorola 850 cheek

Serial: GOLT020035

Procedure Notes: Pwr Step: 5 Antenna Position: Internal Accessory Model #: ???
Battery Model #: SNN5768A DEVICE POSITION (cheek or rotated): Cheek
Communication System: GSM 850; Frequency: 848.8 MHz; Channel Number: 251; Duty Cycle: 1:8
Medium: Low Freq Head; Medium parameters used: f = 835 MHz; σ = 0.93 mho/m; ε_r = 43.3; ρ = 1000 kg/m^3

DASY4 Configuration:

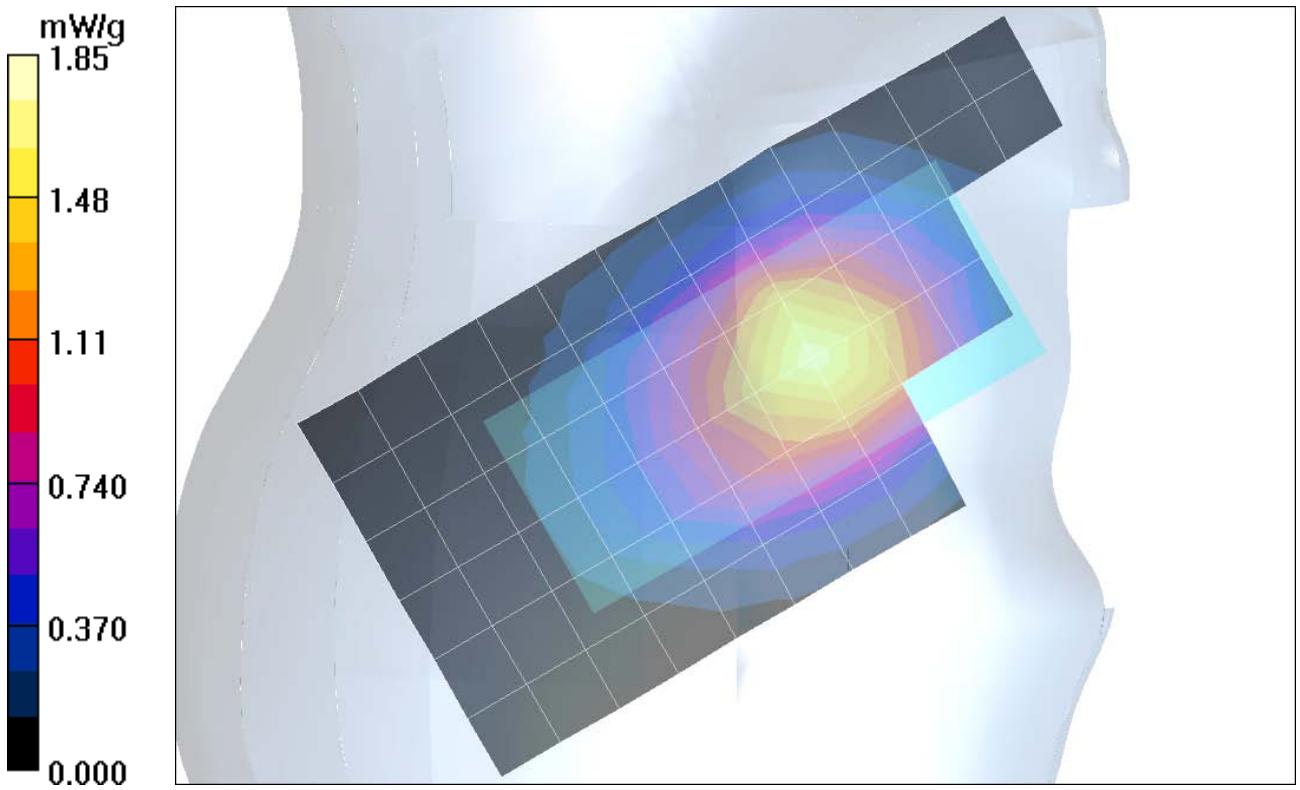
- Probe: ET3DV6R - SN1397; ConvF(6.38, 6.38, 6.38); Calibrated: 4/22/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn437; Calibrated: 3/24/2005
- Phantom: R3: Sugar Water SAM; Type: SAM; Serial: TP-1153;
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Right Head Template/Area Scan - Normal (15mm) (7x17x1):

Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 1.71 mW/g

Right Head Template/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 41.2 V/m; **Power Drift = -0.011 dB** Peak SAR (extrapolated) = 2.13 W/kg
SAR(1 g) = 1.58 mW/g; SAR(10 g) = 1.1 mW/g Maximum value of SAR (measured) = 1.70 mW/g



Date/Time: 10/12/2005 1:36:12 PM

Test Laboratory: Motorola 850 tilt

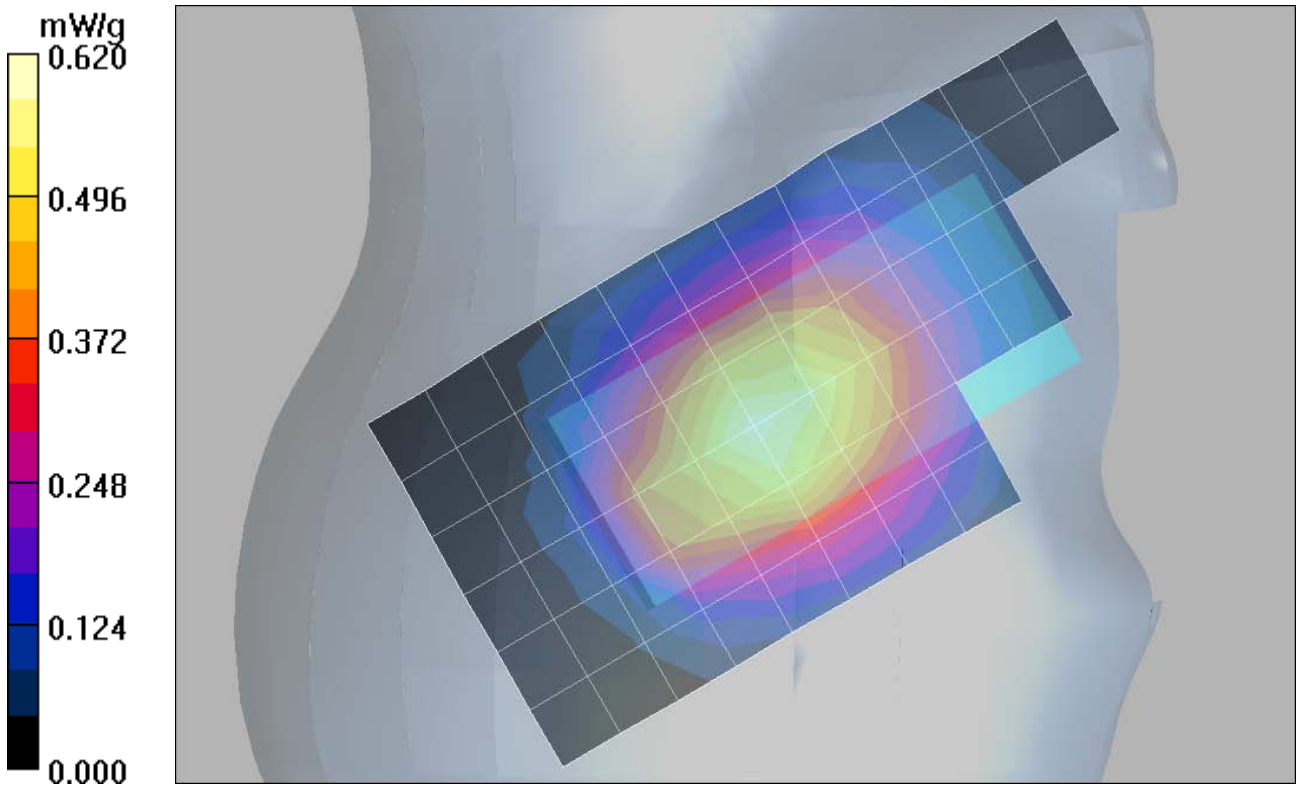
Serial: GOLT020035;
Procedure Notes: Pwr Step: 5 Antenna Position: Internal Accessory Model #: ???
Battery Model #: SNN5779A DEVICE POSITION (cheek or rotated): Rotated
Communication System: GSM 850; Frequency: 836.6 MHz; Channel Number: 190; Duty Cycle: 1:8
Medium: Low Freq Head; Medium parameters used: f = 835 MHz; σ = 0.92 mho/m; ε_r = 42.6; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ET3DV6R - SN1397; ConvF(6.38, 6.38, 6.38); Calibrated: 4/22/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn437; Calibrated: 3/24/2005
- Phantom: R3: Sugar Water SAM; Type: SAM; Serial: TP-1153;
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Right Head Template/Area Scan - Normal (15mm) (7x17x1):
Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.604 mW/g

Right Head Template/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 25.9 V/m; **Power Drift = 0.011 dB** Peak SAR (extrapolated) = 0.724 W/kg
SAR(1 g) = 0.573 mW/g; SAR(10 g) = 0.422 mW/g Maximum value of SAR (measured) = 0.603 mW/g



Date/Time: 10/7/2005 6:09:11 PM

Test Laboratory: Motorola 1900 cheek

Serial: GOLT020035;
Procedure Notes: Pwr Step: 00 Antenna Position: INTERNAL Accessory Model #: ???
Battery Model #: SNN5768A DEVICE POSITION (cheek or rotated): CHEEK
Communication System: GSM 1900; Frequency: 1850.2 MHz; Channel Number: 512; Duty Cycle: 1:8

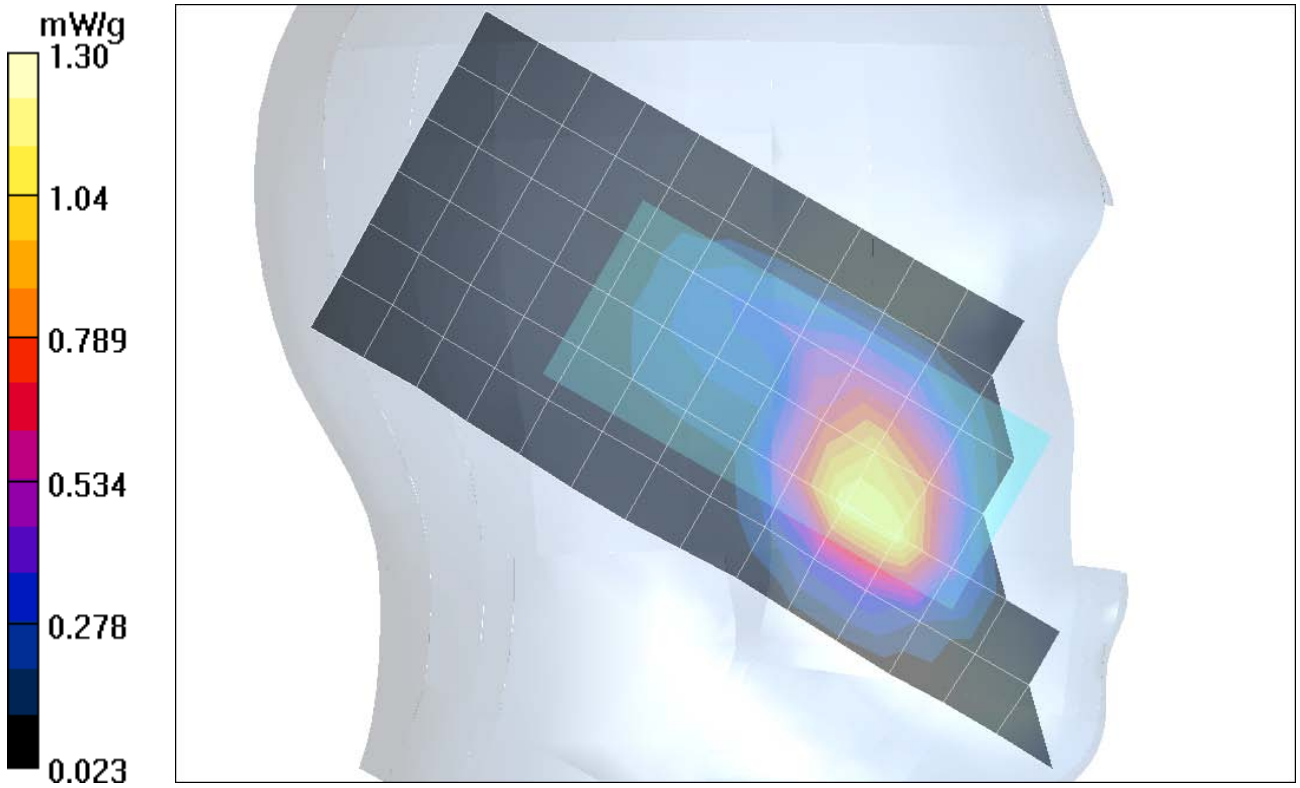
Medium: Back-Up Glycol Head; Medium parameters used: f=1880 MHz; σ=1.44 mho/m; ε_r=38.4; ρ=1000 kg/m^3

DASY4 Configuration:

- Probe: ET3DV6R - SN1397; ConvF(5.17, 5.17, 5.17); Calibrated: 4/22/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn437; Calibrated: 3/24/2005
- Phantom: R3: Glycol SAM; Type: SAM; Serial: TP-1159;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Left Head Template/Area Scan - Normal (15mm) (7x17x1):
Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 1.14 mW/g

Left Head Template/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 30.6 V/m; **Power Drift = -0.034 dB** Peak SAR (extrapolated) = 1.92 W/kg
SAR(1 g) = 1.13 mW/g; SAR(10 g) = 0.663 mW/g Maximum value of SAR (measured) = 1.21 mW/g



Date/Time: 10/7/2005 9:19:39 PM

Test Laboratory: Motorola 1900 tilt

Serial: GOLT020035;
Procedure Notes: Pwr Step: 00 Antenna Position: INTERNAL Accessory Model #: ???
Battery Model #: SNN5768A DEVICE POSITION (cheek or rotated): ROTATED
Communication System: GSM 1900; Frequency: 1880 MHz; Channel Number: 661; Duty Cycle: 1:8

Medium: Back-Up Glycol Head;

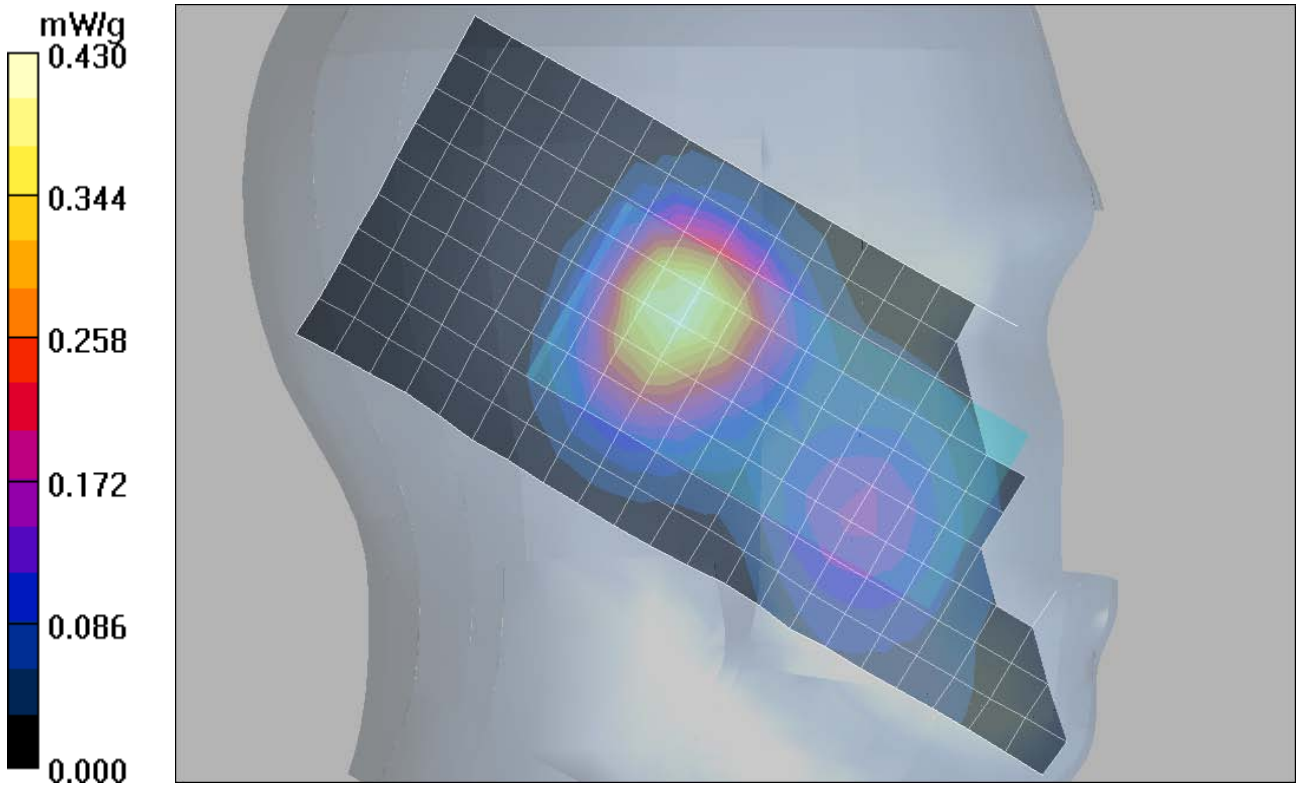
Medium parameters used: f = 1880 MHz; σ = 1.44 mho/m; ε_r = 38.4; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ET3DV6R - SN1397; ConvF(5.17, 5.17, 5.17); Calibrated: 4/22/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn437; Calibrated: 3/24/2005
- Phantom: R3: Glycol SAM; Type: SAM; Serial: TP-1159;
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Left Head Template/Area Scan - Normal (10mm) (10x25x1):
Measurement grid: dx=10mm, dy=10mm Maximum value of SAR (measured) = 0.416 mW/g

Left Head Template/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.4 V/m; **Power Drift = 0.007 dB** Peak SAR (extrapolated) = 0.563 W/kg
SAR(1 g) = 0.399 mW/g; SAR(10 g) = 0.247 mW/g Maximum value of SAR (measured) = 0.432 mW/g



Appendix 3

SAR distribution plots for Body Worn Configuration

Date/Time: 10/13/2005 1:44:18 PM

Test Laboratory: Motorola 850 body worn

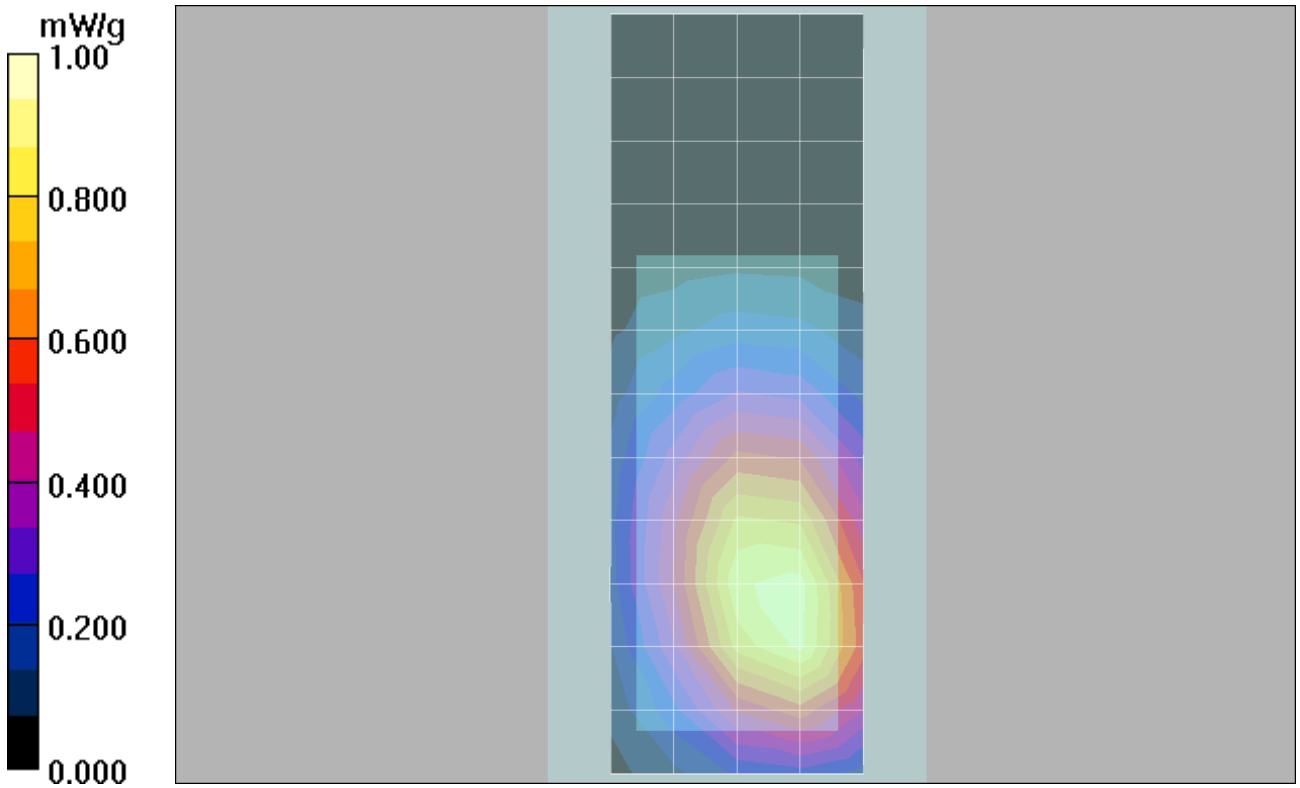
Serial: GOLT020035;
Procedure Notes: Pwr Step: 5 Antenna Position: Internal Battery Model #: SNN5768A
Accessory Model # = Back of Phone 15mm from Phantom with Bluetooth Headset
Communication System: GSM 850; Frequency: 848.8 MHz; Channel Number: 251; Duty Cycle: 1:8
Medium: Low Freq Body; Medium parameters used: f = 835 MHz; σ = 0.99 mho/m; ε_r = 55.5; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ET3DV6R - SN1397; ConvF(6.22, 6.22, 6.22); Calibrated: 4/22/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn437; Calibrated: 3/24/2005
- Phantom: R3: Sect.2, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Amy Twin Phone Template/Area Scan - Normal Body (15mm) (13x7x1):
Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.893 mW/g

Amy Twin Phone Template/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 29.8 V/m; **Power Drift = -0.077 dB** Peak SAR (extrapolated) = 1.11 W/kg
SAR(1 g) = 0.878 mW/g; SAR(10 g) = 0.638 mW/g Maximum value of SAR (measured) = 0.929 mW/g



Date/Time: 10/17/2005 11:42:06 AM

Test Laboratory: Motorola 1900 body worn

Serial: GOLT020035;
Procedure Notes: Pwr Step: 0 Antenna Position: Internal Battery Model #: SNN5779A
Accessory Model # = Front of Phone 15mm from Phantom
Communication System: GSM 1900; Frequency: 1880 MHz; Channel Number: 661; Duty Cycle: 1:8

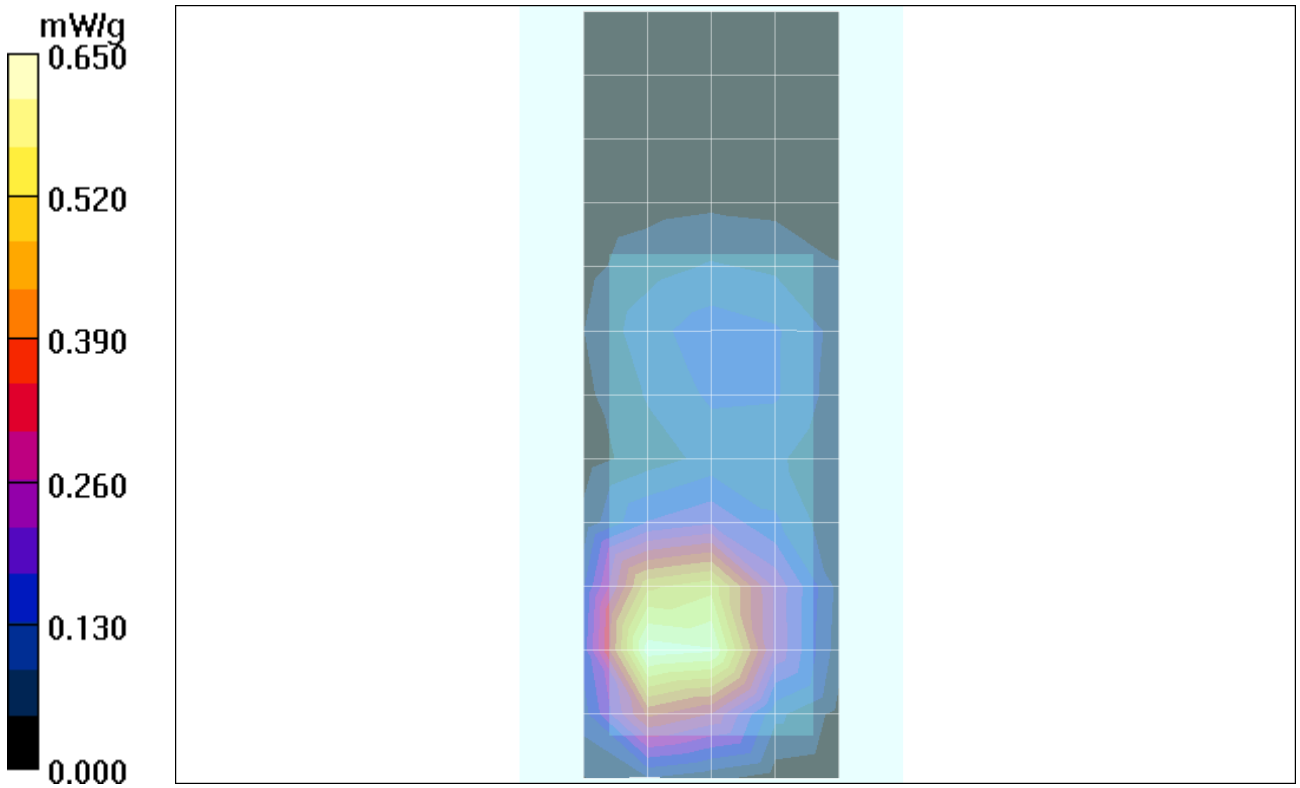
Medium: Regular Glycol Body; Medium parameters used: f = 1880 MHz; σ = 1.59 mho/m; ε_r = 51.1; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ET3DV6R - SN1397; ConvF(4.77, 4.77, 4.77); Calibrated: 4/22/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn437; Calibrated: 3/24/2005
- Phantom: R3: Sect.1, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.6 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 159

Amy Twin Phone Template/Area Scan - Normal Body (15mm) (13x7x1):
Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.634 mW/g

Amy Twin Phone Template/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 21.2 V/m; **Power Drift = -0.034 dB** Peak SAR (extrapolated) = 1.05 W/kg
SAR(1 g) = 0.659 mW/g; SAR(10 g) = 0.392 mW/g Maximum value of SAR (measured) = 0.722 mW/g



Appendix 4

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 Federal Office of Metrology and Accreditation
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 Motorola MDb

Certificate No: ET3-1397_Apr05

CALIBRATION CERTIFICATE

Object	ET3DV6R - SN:1397
Calibration procedure(s)	QA CAL-01 v5 Calibration procedure for dosimetric E-field probes
Calibration date:	April 22, 2005
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-May-04 (METAS, No. 251-00388)	May-05
Power sensor E4412A	MY41495277	5-May-04 (METAS, No. 251-00388)	May-05
Reference 3 dB Attenuator	SN: S5054 (3c)	10-Aug-04 (METAS, No. 251-00403)	Aug-05
Reference 20 dB Attenuator	SN: S5086 (20b)	3-May-04 (METAS, No. 251-00389)	May-05
Reference 30 dB Attenuator	SN: S5129 (30b)	10-Aug-04 (METAS, No. 251-00404)	Aug-05
Reference Probe ES3DV2	SN: 3013	7-Jan-05 (SPEAG, No. ES3-3013_Jan05)	Jan-06
DAE4	SN: 617	19-Jan-05 (SPEAG, No. DAE4-617_Jan05)	Jan-06

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092180	18-Sep-02 (SPEAG, in house check Oct-03)	In house check: Oct 05
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Dec-03)	In house check: Dec-05
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-04)	In house check: Nov 05

	Name	Function	Signature
Calibrated by:	Nico Vetterli	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 25, 2005

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

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConF	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., $\vartheta = 0$ 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) 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:

- *NORMx,y,z:* Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ 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 $f \leq 800$ 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 *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 ET3DV6R

SN:1397

Manufactured:	October 24, 1999
Last calibrated:	May 21, 2004
Recalibrated:	April 22, 2005

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6R SN:1397

Sensitivity in Free Space[A]

NormX	**1.81** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**95** mV
NormY	**1.69** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**95** mV
NormZ	**1.95** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**95** 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		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	9.2	4.7
SAR_{be} [%]	With Correction Algorithm	0.1	0.2

TSL **1810 MHz** **Typical SAR gradient: 10 % per mm**

Sensor Center to Phantom Surface Distance		**3.7 mm**	**4.7 mm**
SAR_{be} [%]	Without Correction Algorithm	13.5	9.1
SAR_{be} [%]	With Correction Algorithm	0.8	0.1

Sensor Offset

Probe Tip to Sensor Center **2.7** mm

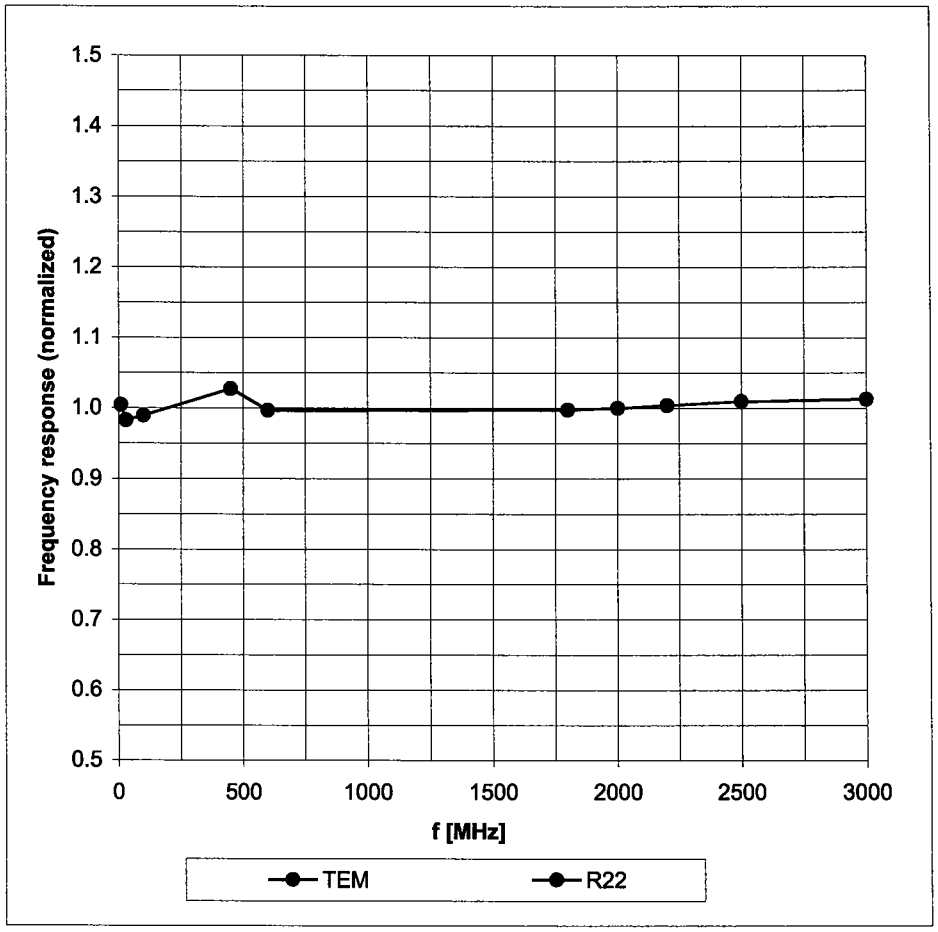
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[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.

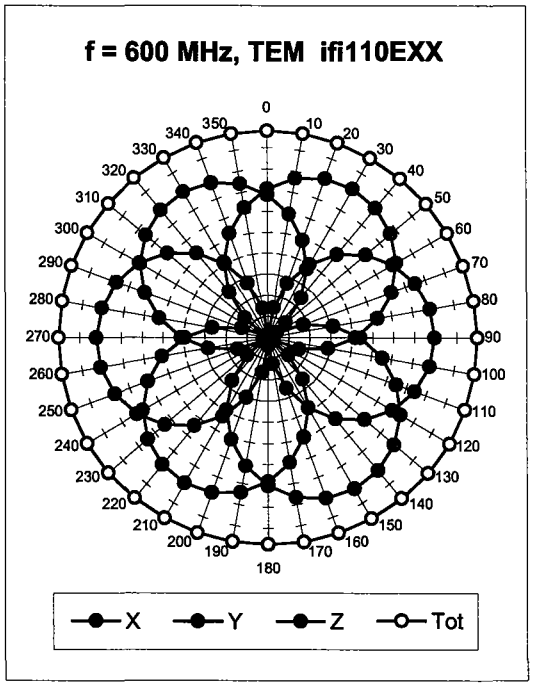
Frequency Response of E-Field

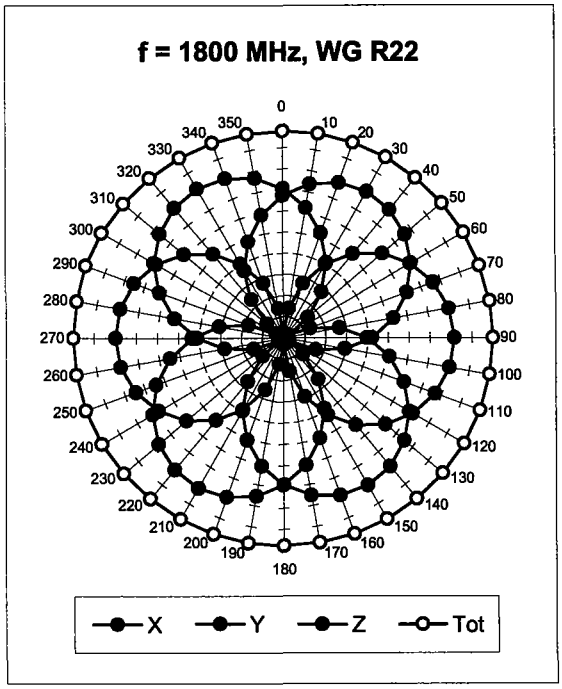
(TEM-Cell:ifi110 EXX, Waveguide: R22)

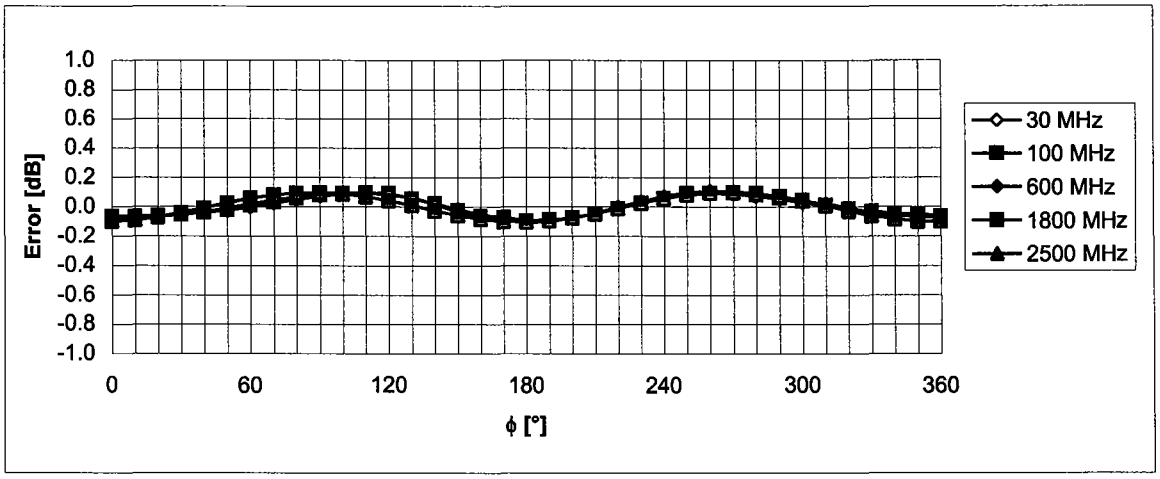


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°



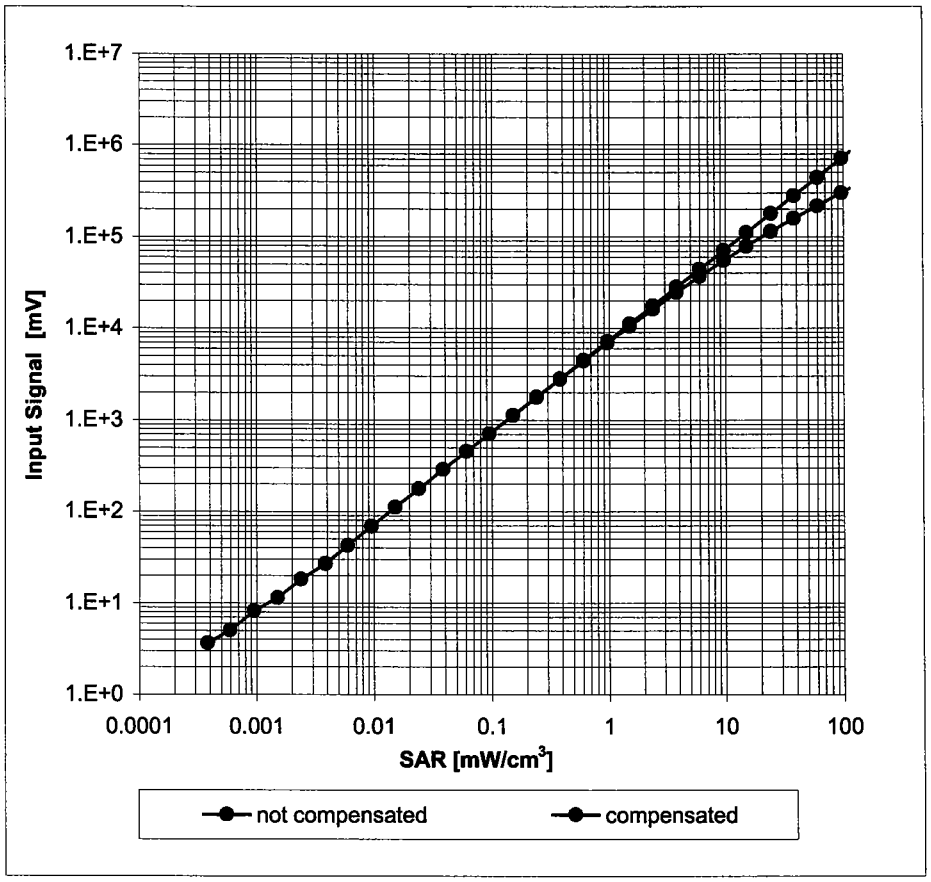


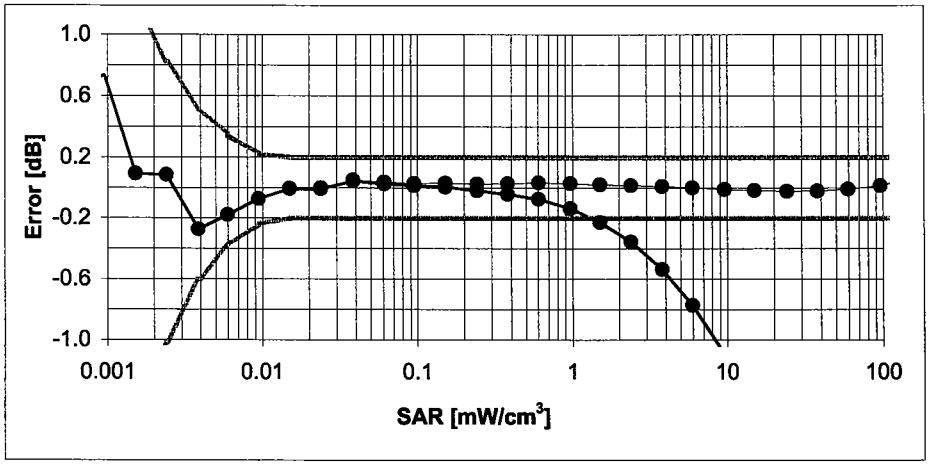


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

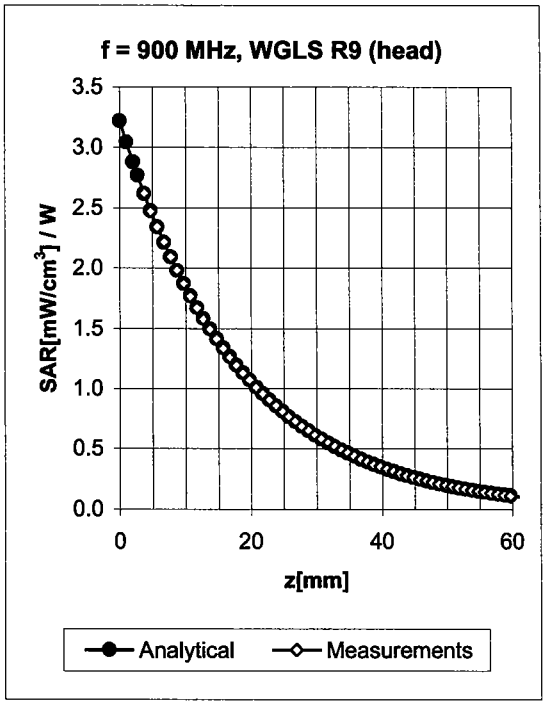
(Waveguide R22, f = 1800 MHz)

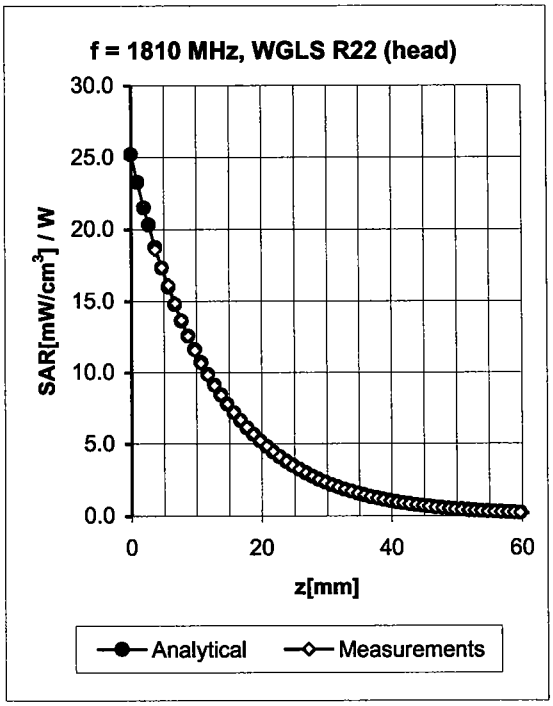




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



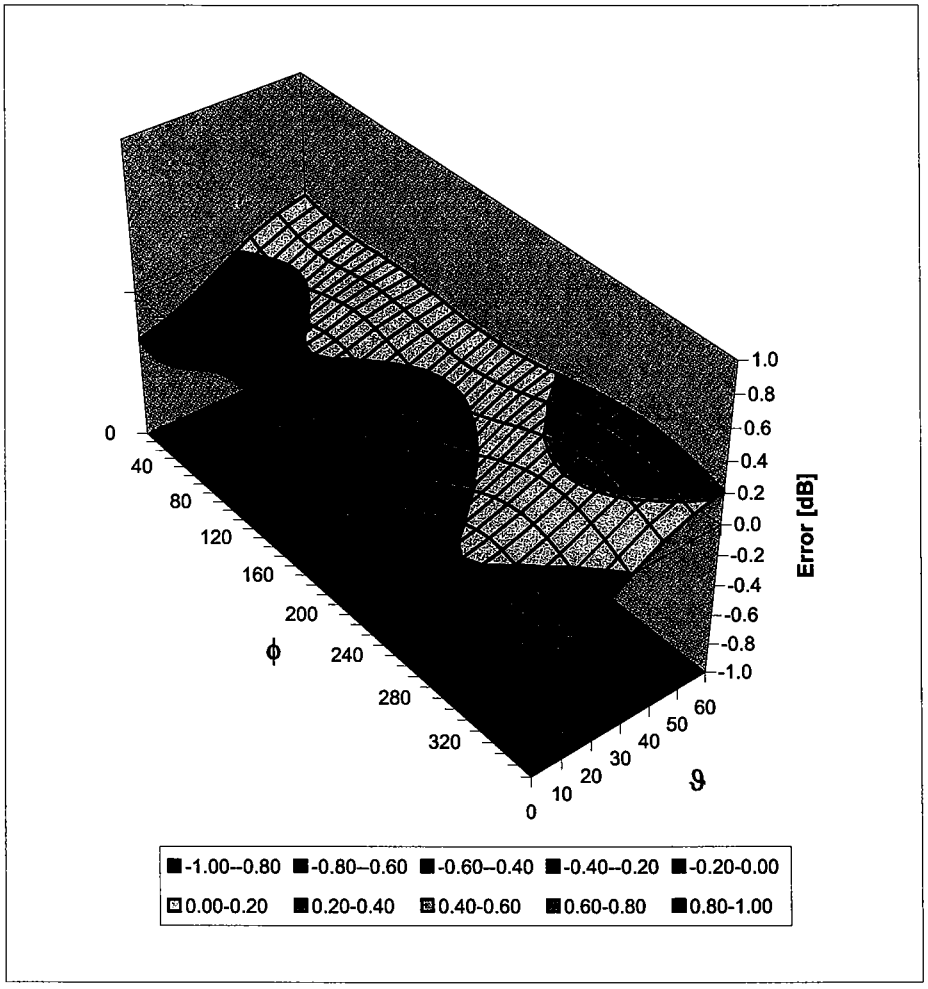


f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.71	1.73	6.38 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.60	2.37	5.17 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.59	2.49	4.90 ± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.58	2.00	6.22 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.57	2.75	4.77 ± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.60	2.53	4.44 ± 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.

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Appendix 5

Measurement Uncertainty Budget

Uncertainty Budget for Device Under Test: 30 – 3000 MHz

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h = c x f / e*	*i = c x g / e*	*k*
Uncertainty Component	**IEEE 1528 section**	**Tol. (± %)**	**Prob Dist**	**Div.**	**c_i (1 g)**	**c_i (10 g)**	**1 g u_i (±%)**	**10 g u_i (±%)**	**v_i**
Measurement System									
Probe Calibration	E.2.1	5.9	N	1.00	1	1	5.9	5.9	∞
Axial Isotropy	E.2.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	E.2.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	E.2.3	1.0	R	1.73	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	0.3	N	1.00	1	1	0.3	0.3	∞
Response Time	E.2.7	1.1	R	1.73	1	1	0.6	0.6	∞
Integration Time	E.2.8	1.1	R	1.73	1	1	0.6	0.6	∞
RF Ambient Conditions - Noise	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1	0.0	R	1.73	1	1	0.0	0.0	∞
Probe Positioner Mech. Tolerance	E.6.2	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning w.r.t Phantom	E.6.3	1.4	R	1.73	1	1	0.8	0.8	∞
Max. SAR Evaluation (ext., int., avg.)	E.5	3.4	R	1.73	1	1	2.0	2.0	∞
Test sample Related									
Test Sample Positioning	E.4.2	3.2	N	1.00	1	1	3.2	3.2	29
Device Holder Uncertainty	E.4.1	4.0	N	1.00	1	1	4.0	4.0	8
SAR drift	6.6.2	5.0	R	1.73	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measurement)	E.3.3	3.3	N	1.00	0.64	0.43	2.1	1.4	∞
Liquid Permittivity (target)	E.3.2	5.0	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measurement)	E.3.3	1.9	N	1.00	0.6	0.49	1.1	0.9	∞
Combined Standard Uncertainty			RSS				11.1	10.8	411
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k*=2				22.2	21.6	

Uncertainty Budget for System Check: 30 – 3000 MHz

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h = c x f / e*	*i = c x g / e*	*k*
Uncertainty Component	**IEEE 1528 section**	**Tol. (± %)**	**Prob. Dist.**	**Div.**	**c_i (1 g)**	**c_i (10 g)**	**1 g u_i (±%)**	**10 g u_i (±%)**	**v_i**
Measurement System									
Probe Calibration	E.2.1	5.9	N	1.00	1	1	5.9	5.9	∞
Axial Isotropy	E.2.2	4.7	R	1.73	1	1	2.7	2.7	∞
Spherical Isotropy	E.2.2	9.6	R	1.73	0	0	0.0	0.0	∞
Boundary Effect	E.2.3	1.0	R	1.73	1	1	0.6	0.6	∞
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6	0.3	N	1.00	1	1	0.3	0.3	∞
Response Time	E.2.7	1.1	R	1.73	1	1	0.6	0.6	∞
Integration Time	E.2.8	0.0	R	1.73	1	1	0.0	0.0	∞
RF Ambient Conditions - Noise	E.6.1	3.0	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1	0.0	R	1.73	1	1	0.0	0.0	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning w.r.t. Phantom	E.6.3	1.4	R	1.73	1	1	0.8	0.8	∞
Max. SAR Evaluation (ext., int., avg.)	E.5	3.4	R	1.73	1	1	2.0	2.0	∞
Dipole									
Dipole Axis to Liquid Distance	8, E.4.2	2.0	R	1.73	1	1	1.2	1.2	∞
Input Power and SAR Drift Measurement	8, 6.6.2	5.0	R	1.73	1	1	2.9	2.9	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measurement)	E.3.3	3.3	R	1.73	0.64	0.43	1.2	0.8	∞
Liquid Permittivity (target)	E.3.2	5.0	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measurement)	E.3.3	1.9	R	1.73	0.6	0.49	0.6	0.5	∞
Combined Standard Uncertainty			RSS				9.0	8.8	99999
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k*=2				17.7	17.3	

Appendix 6

Photographs of the device under test

Figure 1: Front of phone

Figure 2: Back of phone

Figure 3. Phone Against the Head Phantom (Cheek Touch)

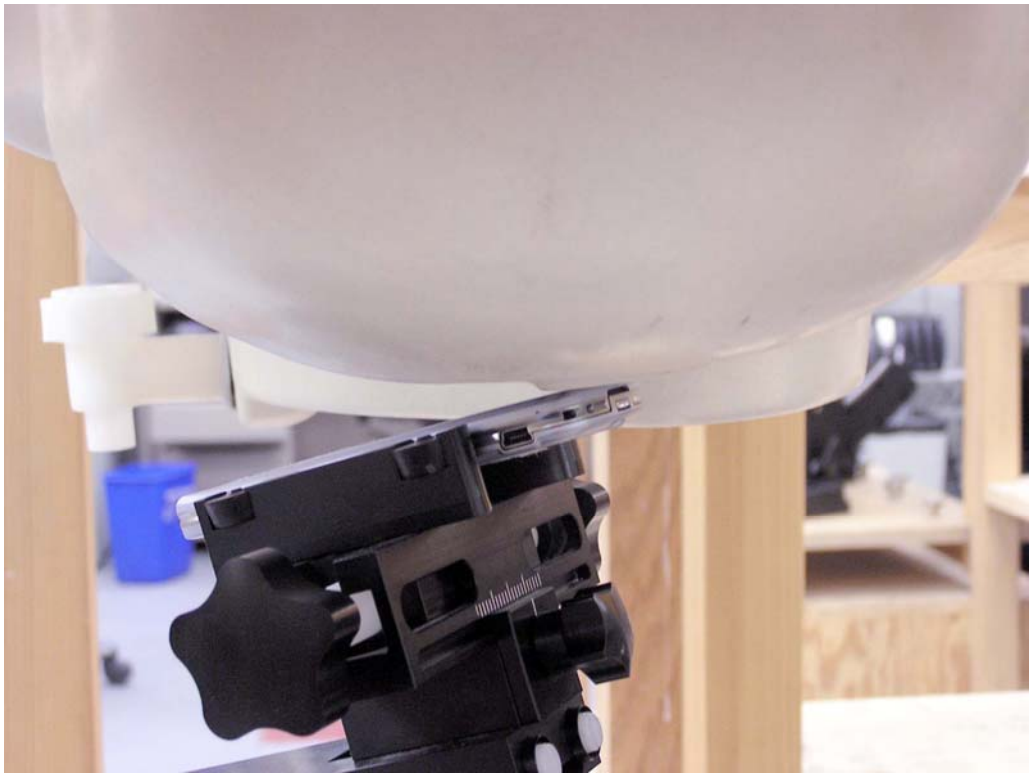


Figure 4. Phone Against the Head Phantom (15°Tilt)

Figure 5: Phone Against the Flat Phantom

Appendix 7

Dipole Characterization Certificate

Certification of System Performance Check Targets
Based on APP-0396

-Historical Data-

	900MHz	
IEEE1528 Target:	10.8	**(W/kg)**
Measurement Uncertainty (k=1):	9.0%	
Measurement Period:	*9-Nov-04 to 2-June-05*	
# of tests performed:	813	
Grand Average:	11.3	**(W/kg)**
% Delta (Average - IEEE1528 Target)	4.4%	
Is % Delta <= Expanded Measurement Uncertainty (k=2)?	**Yes**	
Accept/Reject <u>Average</u> as new system performance check target?	**ACCEPT**	
	Historic data included the following 900MHz Dipoles:	
	69, 77	
	79, 80	
	91, 94	
	96, 97	

-New System Performance Check Targets- per APP-0396
(based on analysis of historical data)

Frequency	SAR Target (W/kg)	Permittivity	Conductivity (S/m)
900MHz	**11.3**	41.5 ± 5%	0.97 ± 5%

-Approvals-

Submitted by: Marge Kaunas — Date: 2-Jun-05

Signed:

Comments: Spreadsheet detailing referenced historical measurements is available upon request.

Approved by: Mark Douglas — **Date:** 2-Jun-05

Signed:

Comments: