MOTOROLA

Data Card SAR Test Report

Test Report #:	18697-1F
Date of Report:	8/30/2006
Date of Test:	7/7/2006-7/13/2006
FCC ID #:	**IHDT6FL1**
Generic Name:	**MJT6-33411A11**
Laboratory:	Motorola Mobile Devices Business Product Safety & Compliance Laboratory 600 N. US Highway 45 Libertyville, Illinois 60048
Report Author:	Paul Ma RF 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 2003 CENELEC EN 50361 (2001)
Simulated Tissue Preparation	WI-0247
RF Power Measurement	WI-1847

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 the data card model 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) as well as with CENELEC en50360:2001 and ANSI / IEEE C95.1. It also declares that the product was tested in accordance with CENELEC en50361:2001, IEEE 1528, as well as other appropriate measurement standards, guidelines and recommended practices. Any deviations from these standards, guidelines and recommended practices are noted below:

(none)

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1. Introduction

The Motorola Mobile Devices Business Product Safety Laboratory has performed measurements of the maximum potential exposure to the user of the data card covered by this test report. The Specific Absorption Rate (SAR) of this product was measured. The data card was tested in accordance with [1], [4] and [5]. The SAR values measured for the data card are below the maximum recommended levels of 1.6 W/kg in a 1g average set in [3] and 2.0W/kg in a 10g average set in [2].

For ANSI / IEEE C95.1 (1g), the final SAR reading for this phone is 0.55 W/kg for body worn use. These measurements were performed using a Dasy4™ v4.6 system manufactured by Schmid & Partner Engineering AG (SPEAG), of Zurich Switzerland.

2. Description of the Device Under Test

2.1 Antenna description

Antenna #1

Type	Internal	
Location	End of Unit, Top	
Dimensions	Length	44 mm
	Width	24 mm
Configuration	Planar	

Antenna #2

Type	Internal	
Location	End of Unit, Bottom	
Dimensions	Length	14.5 mm
	Width	32.5 mm
Configuration	Inverted F	

2.2 Device description

FCC ID Number	IHDT6FL1				
Serial number	LEL03Q0015, Y6012222WS				
Mode(s) of Operation	EGSM900	GSM 1800	GSM 1900	WCDMA 800	WCDMA 2100
Modulation Mode(s)	GMSK	GMSK	GMSK	QPSK	QPSK
Maximum Output Power Setting	33.00dBm	30.00dBm	29.00dBm	24.00dBm	24.00dBm
Duty Cycle	1:8	1:8	1:8	1:1	1:1
Transmitting Frequency Rang(s)	880.2-914.8MHz	1710.2-1784.8MHz	1850.2-1909.8MHz	830.5-839.7MHz	1920.3-1979.7MHz
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™ v4.6) manufactured by Schmid & Partner Engineering AG (SPEAG™), of Zurich Switzerland. All the SAR measurements are taken within a shielded enclosure. The overall 10g RSS uncertainty of the measurement system is ±10.8% (K=1) with an expanded uncertainty of ±21.6% (K=2). The overall 1g 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 0.4W/kg to 10W/kg.

The list of calibrated equipment used for the measurements is shown in the following table.

Description	Serial Number	Cal Due Date
DASY4™ DAE4	376	9/5/2006
DASY4™ DAE3	437	7/18/2007
E-Field Probe ES3DV3	3037	11/17/2006
Dipole Validation Kit, DV900V2	096	
S.A.M. Phantom used for 800/900MHz	TP-1131	
Dipole Validation Kit, DV1800V2	272TR	
S.A.M. Phantom used for 1800/1900/2450MHz	TP-1250	
Dipole Validation Kit, DV1900V2	533TR	

3.2 Additional Equipment

Description	Serial Number	Cal Due Date
Signal Generator HP8648C	3847A04632	9/20/2006
Power Meter E4419B	GB39511084	8/19/2006
Power Sensor #1 – E9301A	US39210918	9/21/2006
Power Sensor #2 - E9301A	US39210934	9/21/2006
Network Analyzer HP8753ES	US39171846	8/22/2006
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 a HP85070 Dielectric Probe Kit These values, along with the temperature of the simulated tissue are shown in the table below. The recommended limits for permittivity and conductivity are also shown. A mass density of ρ=1g/cm3 was entered into the system in all the cases. It can be seen that the measured parameters are within tolerance of the recommended limits specified in [1] and [5].

f (MHz)	Tissue type	Limits / Measured	Dielectric Parameters		
			ε_r	σ (S/m)	Temp (°C)
835	**Body**	**Measured,** 7/11/2005	55.4	0.98	20.0
		Measured, 7/12/2005	55.4	0.98	19.8
		Recommended Limits	55.2 ±5%	0.97 ±5%	18-25
900	**Body**	**Measured,** 7/10/2006	55.1	1.04	20.0
		Measured, 7/11/2006	54.8	1.05	20.5
		Measured, 7/13/2006	54.4	1.03	19.8
		Recommended Limits	55.0 ±5%	1.05 ±5%	18-25
1750	**Body**	**Measured,** 7/8/2006	51.2	1.44	20.0
		Recommended Limits	53.4 ±5%	1.49 ±5%	18-25
1880	**Body**	**Measured,** 7/8/2006	50.7	1.59	20.0
		Recommended Limits	53.3 ±5%	1.52 ±5%	18-25
2100	**Body**	**Measured,** 7/13/2006	52.8	1.56	19.5
		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	835MHz / 900 MHz Head	835MHz / 900 MHz Body	1800MHz / 1900 MHz Head	1800 MHz / 1900 MHz Body	2450MHz Head	2450 MHz Body
Sugar	57	44.9	--	--	--	--
DGBE	--	--	47	30.8	--	30
Diacetin	--	--	--	--	51	
Water	40.45	53.06	52.62	68.8	48.75	70
Salt	1.45	0.94	0.38	0.4	0.15	--
HEC	1	1	--	--	--	--
Bact.	0.1	0.1	--	--	0.1	--

5. System Accuracy Verification

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

A SAR measurement was performed to verify the measured SAR was within ±10% from the target SAR indicated in Section 8.3.7 Reference SAR Values in [5] or Appendix 6 for the 900Mhz and/or 1900Mhz target reference SAR value. These tests were done at 900MHz and/or 1800MHz. These frequencies are within ±10% of the compliance test mid-band frequency as required in [1] and [5]. The test was conducted on the same days as the measurement of the DUT. Recommended limits for permittivity and conductivity, specified in [5], are shown in the table below. The obtained results from the system accuracy verification are also displayed in the table below. SAR values are normalized to 1W forward power delivered to the dipole. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values. 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.

f (MHz)	Description	SAR (W/kg), 1gram	Dielectric Parameters		Ambient Temp (°C)	Tissue Temp (°C)
			ε_r	σ (S/m)		
900	**Measured,** 7/10/2006	11.9	41.9	0.98	20.3	20.0
	Measured, 7/11/2006	11.9	42.0	0.99	20.1	20.0
	Measured, 7/12/2006	11.3	41.2	0.96	20.5	19.6
	Recommended Limits	11.3	41.5 ±5%	0.97 ±5%	18-25	18-25
1800	**Measured,** 7/8/2006	41.05	39.4	1.37	20.7	20.0
	Recommended Limits	38.1	40.0 ±5%	1.4 ±5%	18-25	18-25
1900	**Measured,** 7/13/2006	41.4	38.8	1.47	20.5	19.8
	Recommended Limits	40.9	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 ES3DV3	SN3037	900	6.07	8 of 9
		1800	5.01	8 of 9

6. Test Results

The test samples were configured in three different laptop PCs. In each laptop PC tests were performed with the bottom of PC parallel to, and touching the phantom (lap position). The EUT was tested in both the upper and the lower PCMCIA slots (were applicable) of the PC. The distance from the bottom of the EUT to the phantom was measured and entered into the tables below.

The DASY v4.6 SAR measurement system specified in section 3.1 was utilized within the intended operations as set by the SPEAG™ setup. The test samples were positioned into the measurement configurations using the positioner supplied with the DASY 4.6 SAR measurement system along with the Styrofoam for additional laptop support.. 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. Please refer to the DASY manual for additional information on SAR scanning procedures and algorithms used.

6.1 Body Worn Test Results

The SAR results shown in tables 1 - 4 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 indicated as bold numbers in the following table are included in Appendix 2. All other test conditions measured lower SAR values than those included in Appendix 2.

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 ES3DV3	SN3037	900	5.93	8 of 9
		1800	4.65	8 of 9

Computer Model Used: Dell D620 Laptop (14mm from Bottom of Card to Phantom)								
f (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	*10g SAR value*		*1g SAR value*	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
1900MHz	Channel 512	29.01						
	Channel 661	28.98	20.0	0.01	0.16	0.16	0.24	0.24
	Channel 810	29.01						

Table 1: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

Computer Model Used: IBM T41 Laptop (6mm from Bottom of Card to Phantom)								
f (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	*10g SAR value*		*1g SAR value*	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
1900MHz	Channel 512	29.01						
	Channel 661	28.98	20.0	-0.1	0.27	0.27	0.47	0.49
	Channel 810	29.01						

Table 2: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

Computer Model Used: Fujitsu S7010 Laptop (7mm from Bottom of Card to Phantom)								
f (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	*10g SAR value*		*1g SAR value*	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
1900MHz	Channel 512	29.01						
	Channel 661	28.98	20.0	-0.18	0.28	0.29	0.5	0.52
	Channel 810	29.01						

Table 3: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

Computer Model Used: Fujitsu S7010 Laptop GPRS Class 10 (7mm from Bottom of Card to Phantom)								
f (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	*10g SAR value*		*1g SAR value*	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
1900MHz	Channel 512	28.81						
	Channel 661	28.83	19.7	-0.05	0.32	0.33	0.55	0.55
	Channel 810	29.16						

Table 4: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

References

[1] CENELEC, en50361:2001 “Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300MHz – 3GHz)”

[2] CENELEC, en50360:2001 “Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300MHz – 3GHz)”.

[3] ANSI / IEEE, C95.1 1999 Edition “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300GHz”

[4] FCC OET Bulletin 65 Supplement C 01-01

[5] IEEE 1528 2003 Edition “IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”

[6] ICNIRP Guidelines “Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz)”

Appendix 1

SAR distribution comparison for the system accuracy verification

Date/Time: 7/8/2006 7:33:07 AM

Test Laboratory: Motorola

070806 1800MHz Good at +7.7%

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:272tr
Procedure Notes: 1800 MHz System Performance Check / Dipole Sn# 272tr PM1 Power = 200mW

Sim.Temp@meas = 20*C Sim.Temp@SPC = 20*C Room Temp @ SPC = 20.7*C

Communication System: CW - Dipole; Frequency: 1800 MHz; Channel Number: 8; Duty Cycle: 1:1
Medium: VALIDATION Only; Medium parameters used: f = 1800 MHz; σ = 1.37 mho/m; ε_r = 39.4; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3037; ConvF(5.01, 5.01, 5.01); Calibrated: 11/17/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 9/5/2005
- Phantom: R4 : Sect.2, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

Daily SPC Check/Dipole Area Scan (9x4x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 6.57 mW/g

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

Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 83.8 V/m; Power Drift = -0.019 dB
Peak SAR (extrapolated) = 14.4 W/kg
SAR(1 g) = 8.19 mW/g; SAR(10 g) = 4.36 mW/g
Maximum value of SAR (measured) = 9.20 mW/g

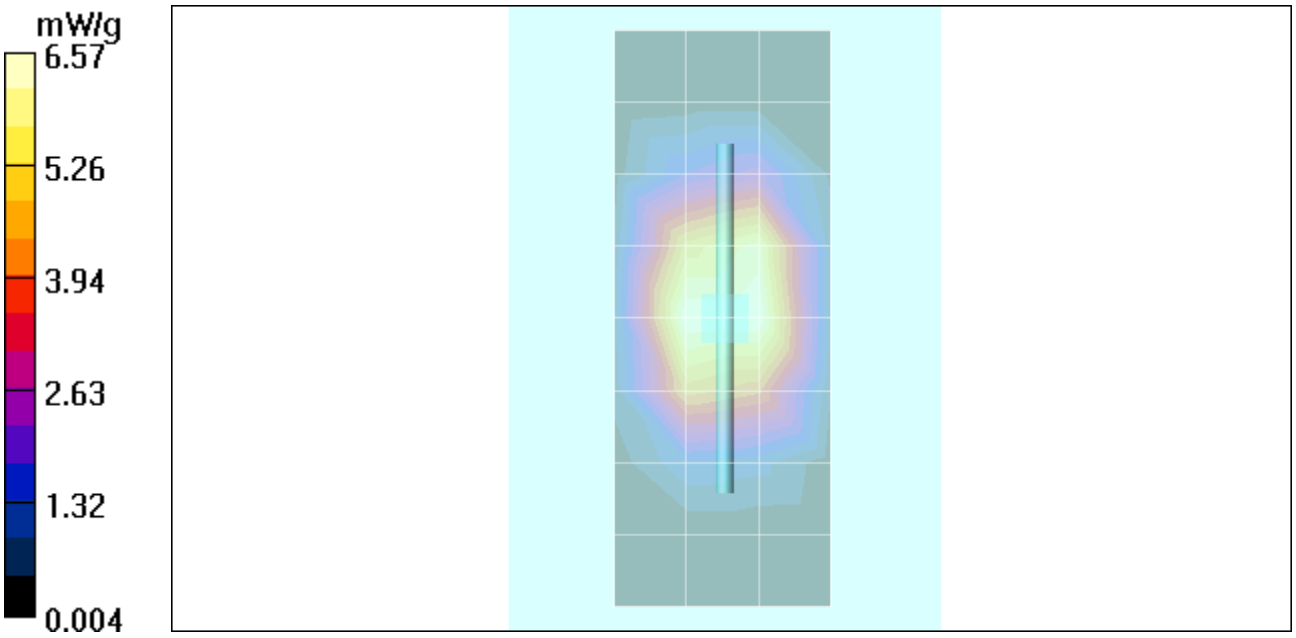
Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0:

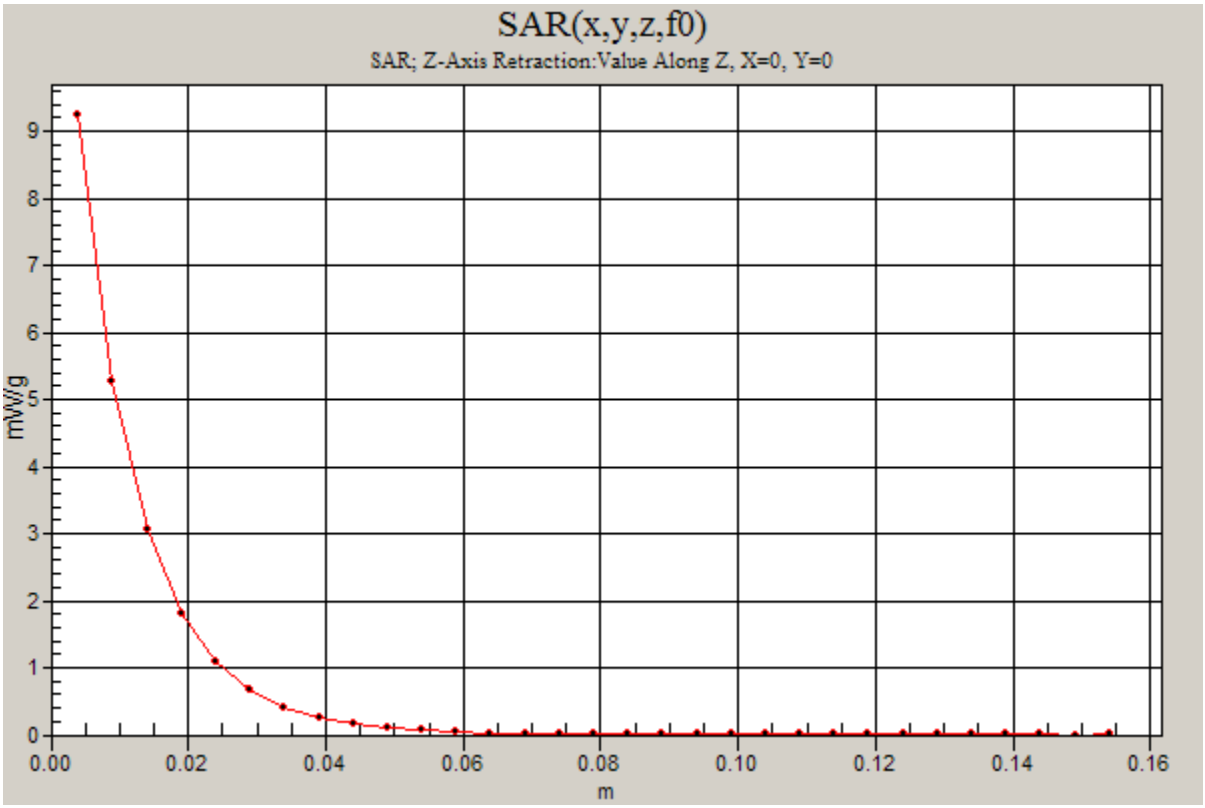
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 83.8 V/m; Power Drift = -0.019 dB
Peak SAR (extrapolated) = 14.4 W/kg
SAR(1 g) = 8.23 mW/g; SAR(10 g) = 4.39 mW/g
Maximum value of SAR (measured) = 9.17 mW/g

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

Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 9.25 mW/g

070806 1800MHz Good at +7.7%





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Date/Time: 7/10/2006 8:29:04 AM

Test Laboratory: Motorola

071006 900MHz Good at +5.5%

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:096
Procedure Notes: 900MHz System Performance Check / Dipole Sn#096 PM1 Power =200mW

Sim.Temp@meas = 20*C Sim.Temp@SPC = 20*C Room Temp @ SPC = 20.3*C

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 = 41.9; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3037; ConvF(6.07, 6.07, 6.07); Calibrated: 11/17/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 9/5/2005
- Phantom: R4: Sugar Water SAM; Type: SAM; Serial: TP-1131;
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

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

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.20 mW/g

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

Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 51.5 V/m; Power Drift = -0.006 dB
Peak SAR (extrapolated) = 3.62 W/kg
SAR(1 g) = 2.38 mW/g; SAR(10 g) = 1.52 mW/g
Maximum value of SAR (measured) = 2.58 mW/g

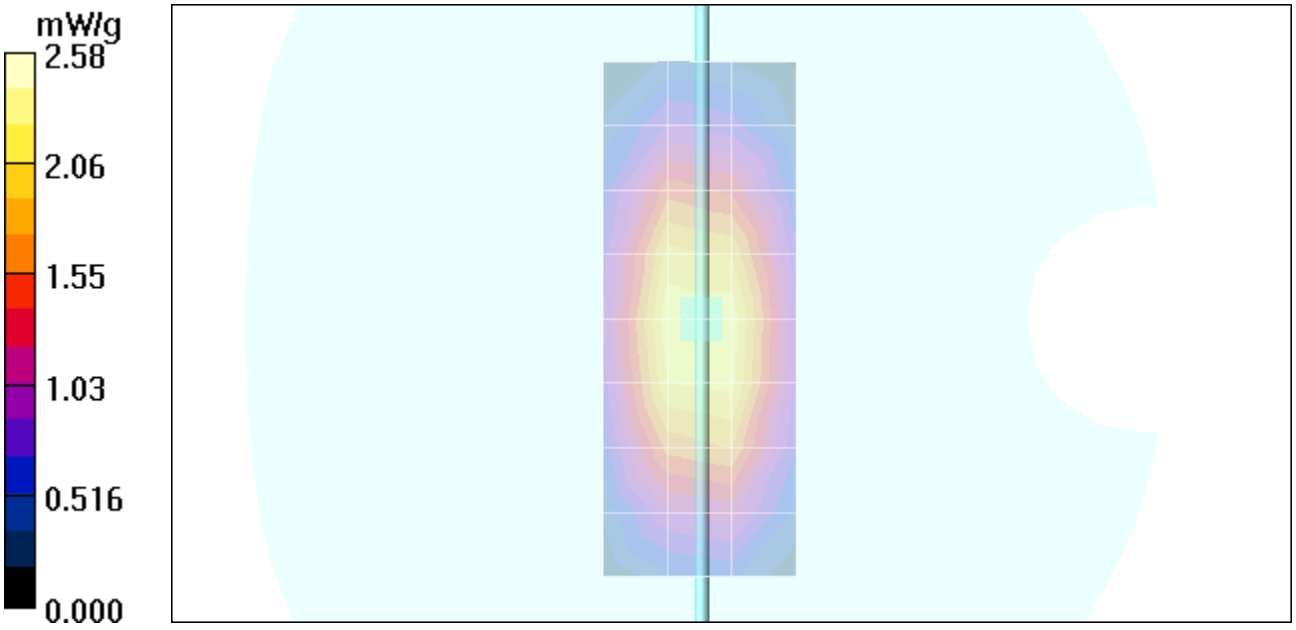
Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0:

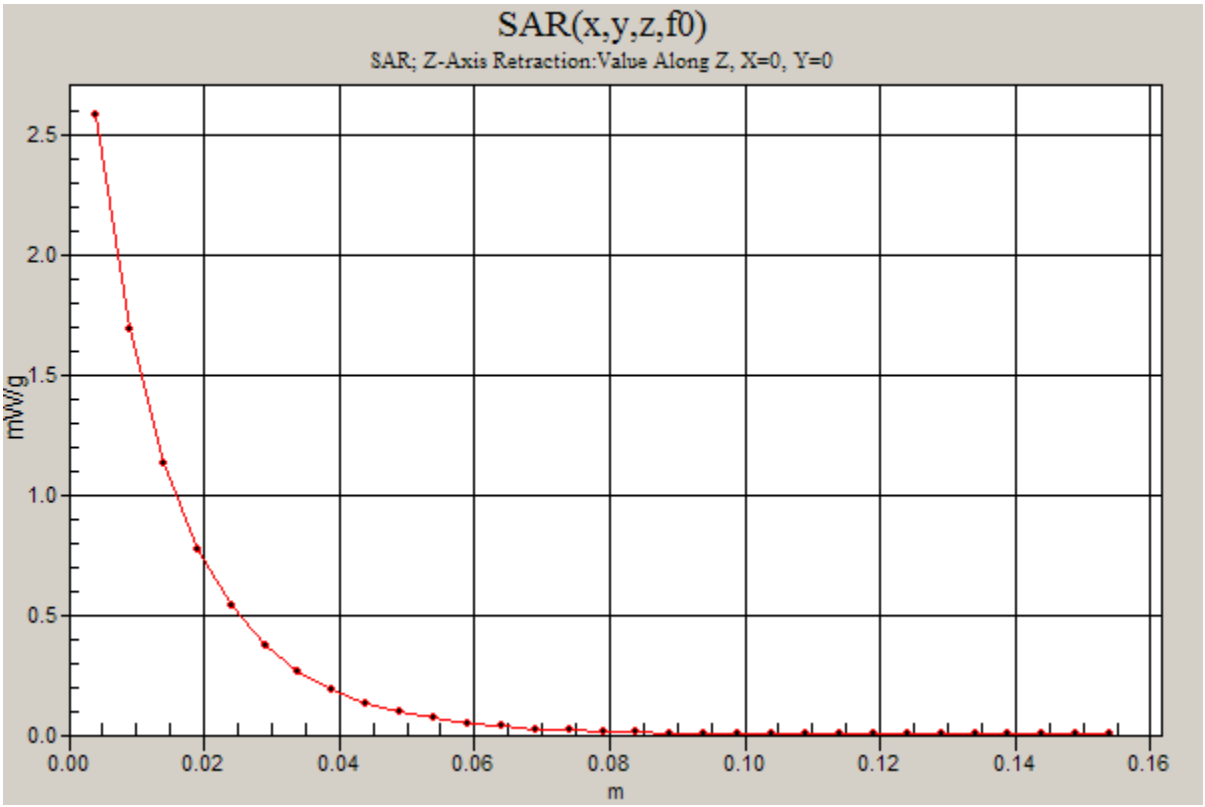
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 51.5 V/m; Power Drift = -0.006 dB
Peak SAR (extrapolated) = 3.65 W/kg
SAR(1 g) = 2.39 mW/g; SAR(10 g) = 1.53 mW/g
Maximum value of SAR (measured) = 2.60 mW/g

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

Measurement grid: dx=20mm, dy=20mm, dz=5mm

071006 900MHz Good at +5.5%





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Date/Time: 7/11/2006 9:19:52 AM

Test Laboratory: Motorola

071106 900MHz Good at +5.5%

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:096
Procedure Notes: 900MHz System Performance Check / Dipole Sn#096 PM1 Power =200mW

Sim.Temp@meas = 20*C Sim.Temp@SPC = 20*C Room Temp @ SPC = 20.1*C

Communication System: CW - Dipole; Frequency: 900 MHz; Channel Number: 4; Duty Cycle: 1:1
Medium: VALIDATION Only; Medium parameters used: f = 900 MHz; σ = 0.99 mho/m; ε_r = 42; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3037; ConvF(6.07, 6.07, 6.07); Calibrated: 11/17/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 9/5/2005
- Phantom: R4: Sugar Water SAM; Type: SAM; Serial: TP-1131;
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 160

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

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.24 mW/g

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

Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 51.7 V/m; Power Drift = -0.028 dB
Peak SAR (extrapolated) = 3.62 W/kg
SAR(1 g) = 2.38 mW/g; SAR(10 g) = 1.52 mW/g
Maximum value of SAR (measured) = 2.58 mW/g

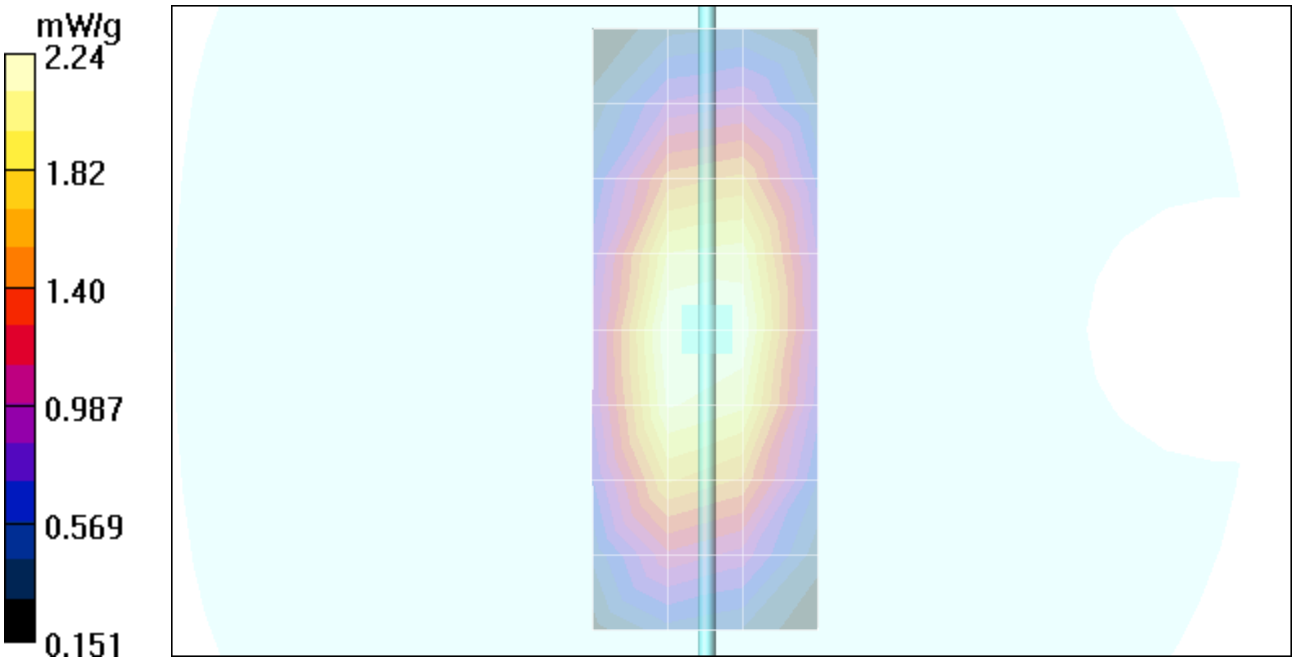
Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0:

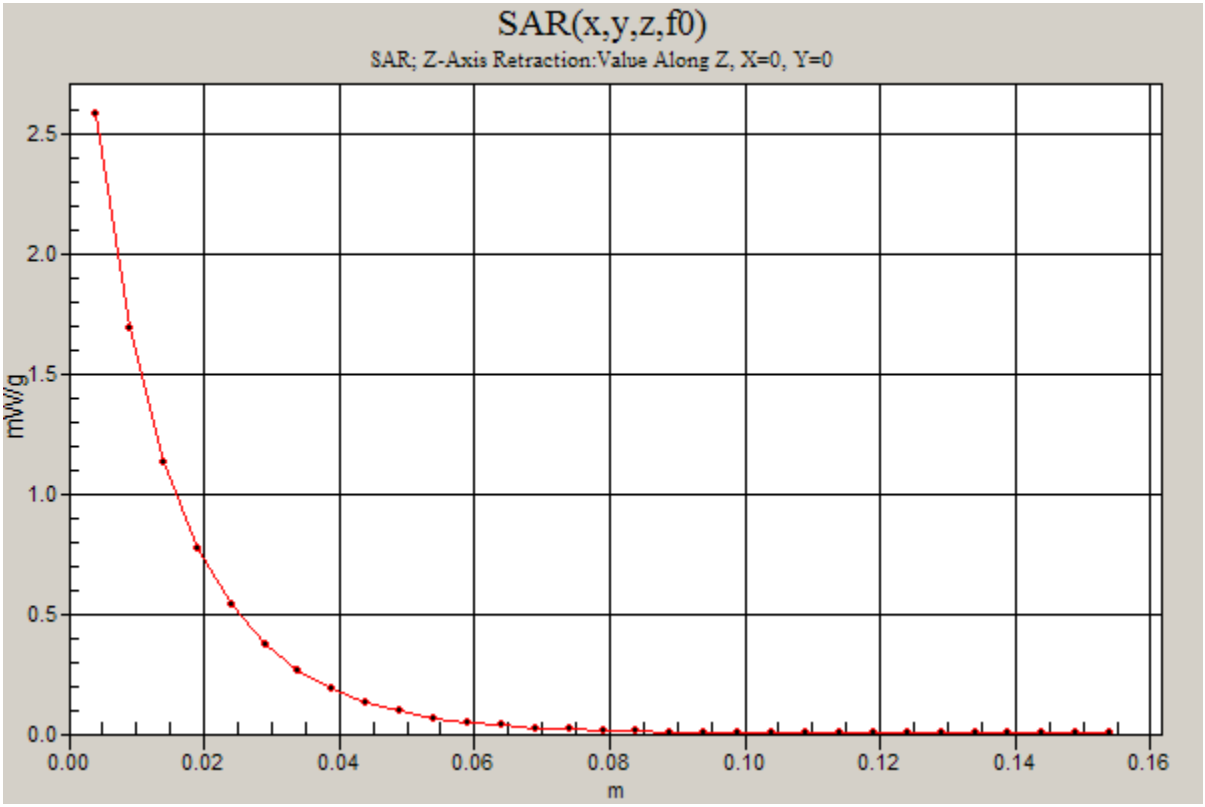
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 51.7 V/m; Power Drift = -0.028 dB
Peak SAR (extrapolated) = 3.62 W/kg
SAR(1 g) = 2.39 mW/g; SAR(10 g) = 1.53 mW/g

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

Measurement grid: dx=20mm, dy=20mm, dz=5mm

071106 900MHz Good at +5.5%





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Date/Time: 7/12/2006 12:42:04 PM

Test Laboratory: Motorola

071206 900MHz Good at +0.0%

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:096
Procedure Notes: 900MHz System Performance Check / Dipole Sn#096 PM1 Power =200mW

Sim.Temp@meas = 19.5*C Sim.Temp@SPC = 19.6*C Room Temp @ SPC = 20.5*C

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 = 41.2; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3037; ConvF(6.07, 6.07, 6.07); Calibrated: 11/17/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 9/5/2005
- Phantom: R4: Sugar Water SAM; Type: SAM; Serial: TP-1131;
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 160

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

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.11 mW/g

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

Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 50.9 V/m; Power Drift = 0.017 dB
Peak SAR (extrapolated) = 3.41 W/kg
SAR(1 g) = 2.25 mW/g; SAR(10 g) = 1.44 mW/g
Maximum value of SAR (measured) = 2.45 mW/g

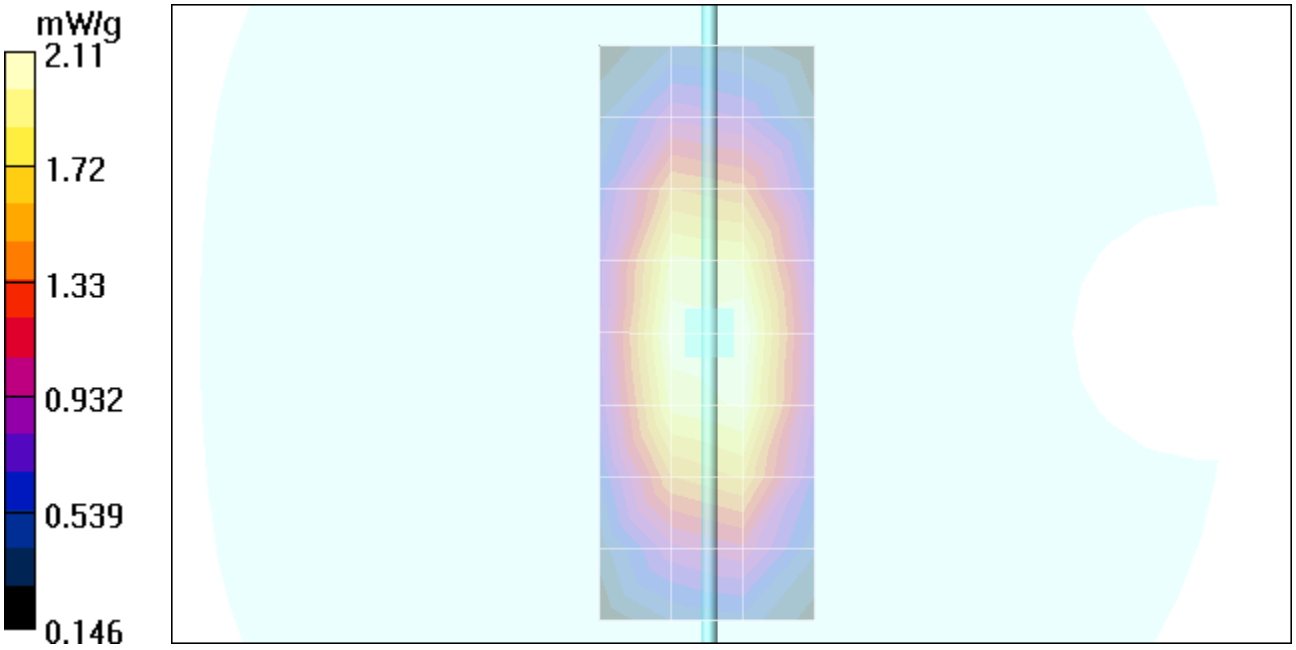
Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0:

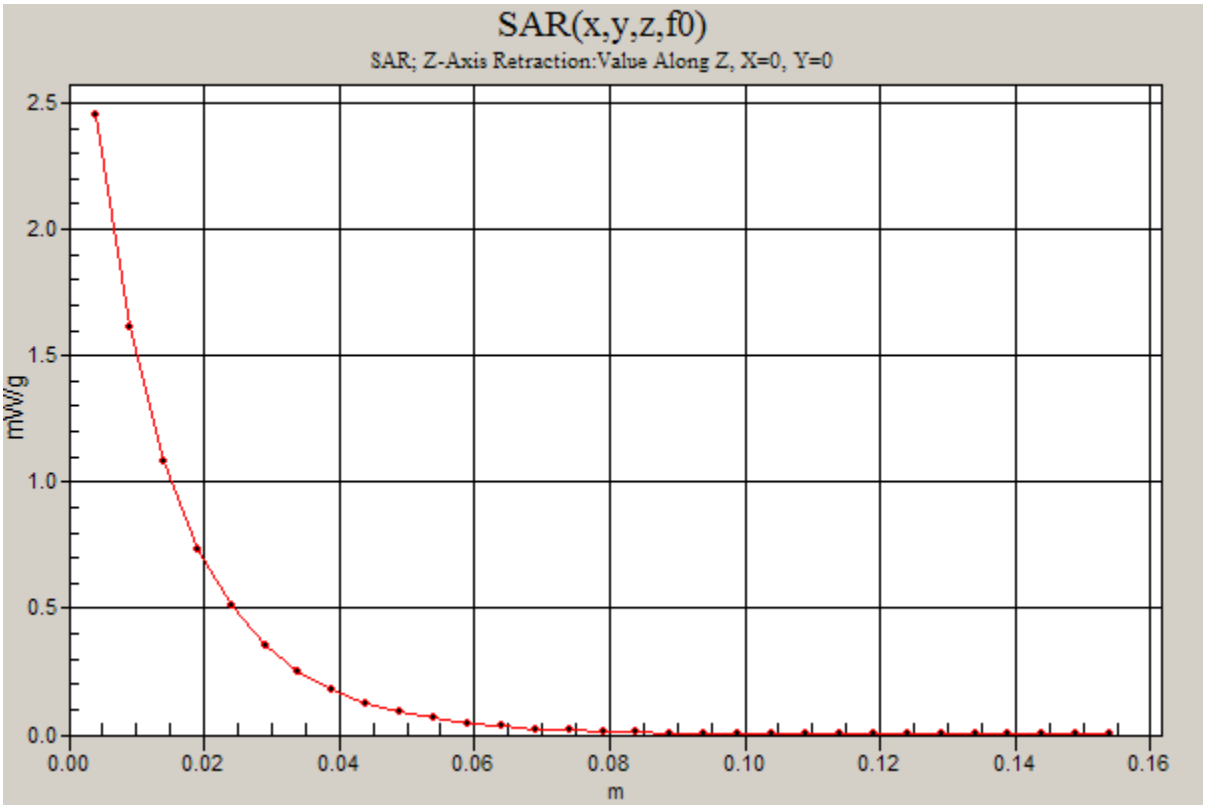
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 50.9 V/m; Power Drift = 0.017 dB
Peak SAR (extrapolated) = 3.43 W/kg
SAR(1 g) = 2.27 mW/g; SAR(10 g) = 1.46 mW/g
Maximum value of SAR (measured) = 2.46 mW/g

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

Measurement grid: dx=20mm, dy=20mm, dz=5mm

071206 900MHz Good at +0.0%





Date/Time: 7/13/2006 8:41:05 AM

Test Laboratory: Motorola

071306 1900MHz Good at +1.2%open

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:533TR
Procedure Notes: 1900 MHz System Performance Check / Dipole Sn# 533tr PM1 Power = 200mW

Sim.Temp@meas = 19.8*C Sim.Temp@SPC = 19.8*C Room Temp @ SPC = 20.5*C

Communication System: CW - Dipole; Frequency: 1900 MHz; Channel Number: 10; Duty Cycle: 1:1
Medium: VALIDATION Only; Medium parameters used: f = 1900 MHz; σ = 1.47 mho/m; ε_r = 38.8; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3037; ConvF(5.01, 5.01, 5.01); Calibrated: 11/17/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 9/5/2005
- Phantom: R4 : Sect.2, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 160

Daily SPC Check/Dipole Area Scan (9x4x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 7.38 mW/g

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

Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 79.8 V/m; Power Drift = 0.037 dB
Peak SAR (extrapolated) = 15.0 W/kg
SAR(1 g) = 8.23 mW/g; SAR(10 g) = 4.25 mW/g
Maximum value of SAR (measured) = 9.26 mW/g

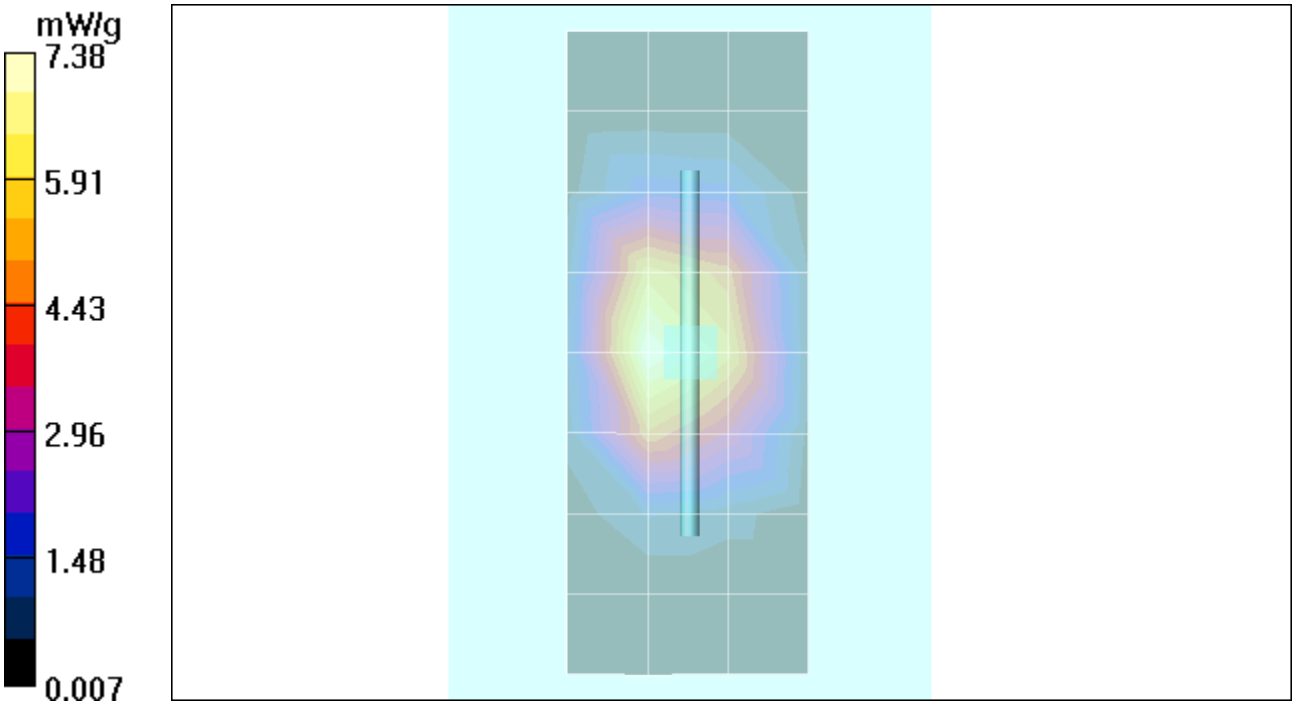
Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0:

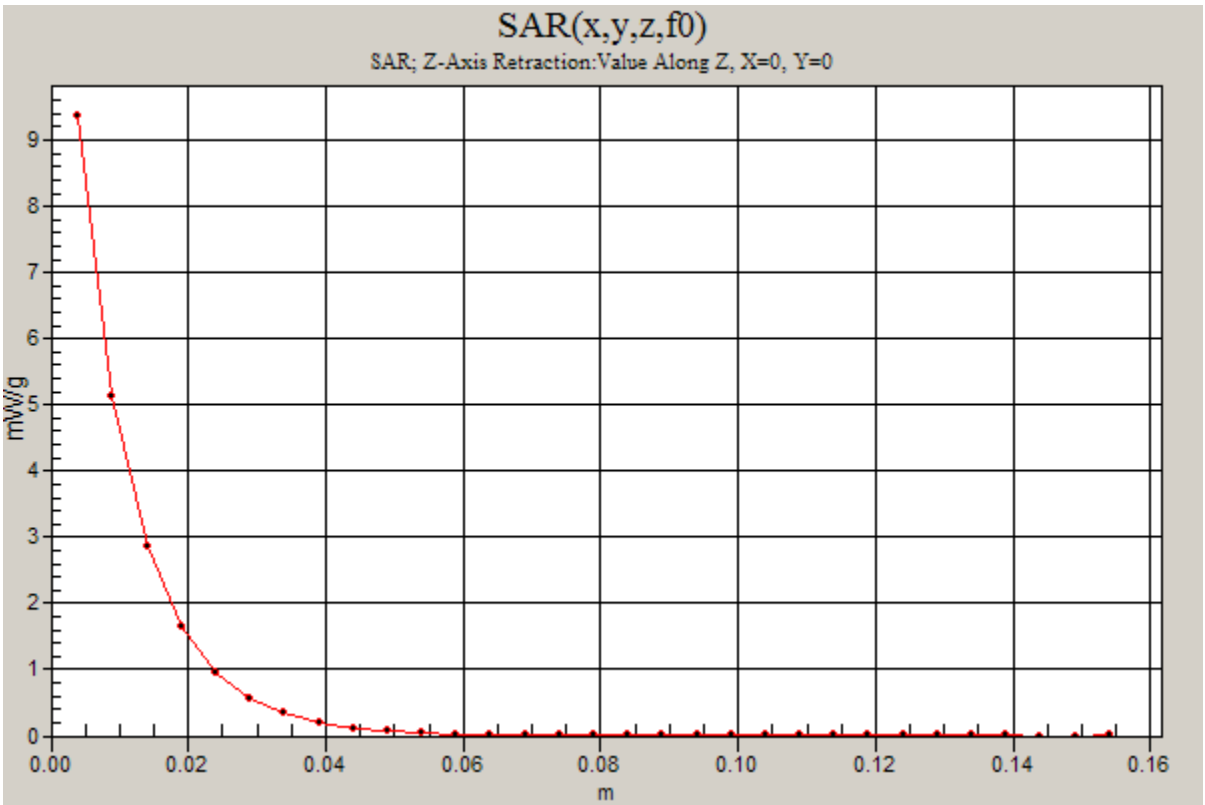
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 79.8 V/m; Power Drift = 0.037 dB
Peak SAR (extrapolated) = 15.2 W/kg
SAR(1 g) = 8.33 mW/g; SAR(10 g) = 4.3 mW/g
Maximum value of SAR (measured) = 9.21 mW/g

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

Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 9.37 mW/g

071306 1900MHz Good at +1.2%open





created 7/20/2006

Appendix 2

SAR distribution plots for Body Worn Configuration

Date/Time: 7/8/2006 9:07:56 AM

Test Laboratory: Motorola

1900 Dell

Serial: DELL Laptop

Procedure Notes: Pwr Step: 0 (radio com) Antenna Position: INTERNAL

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 = 50.7; ρ = 1000 kg/m^3

DASY4 Configuration:

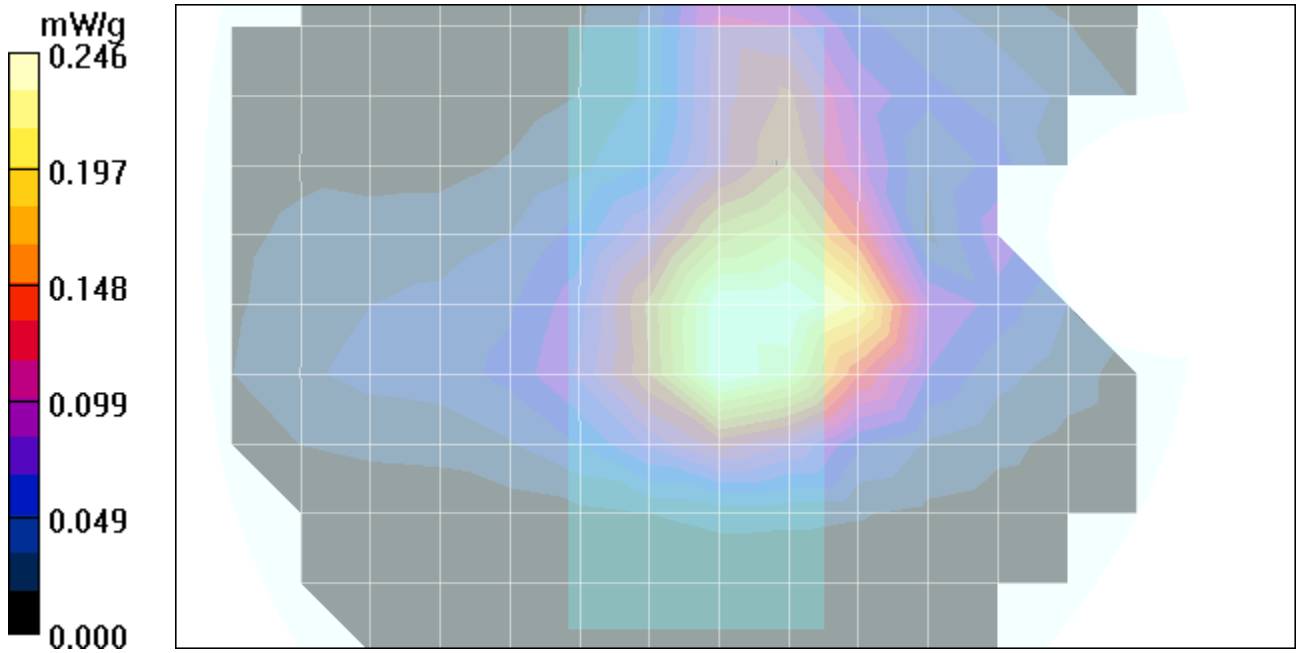
- Probe: ES3DV3 - SN3037; ConvF(4.65, 4.65, 4.65); Calibrated: 11/17/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 9/5/2005
- Phantom: R4: Glycol SAM; Type: SAM; Serial: TP-1250;
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

SAM Phone Against Flat Section/Area Scan - Full Body (15mm) (21x14x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.246 mW/g

SAM Phone Against Flat Section/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.6 V/m; Power Drift = 0.007 dB
Peak SAR (extrapolated) = 0.363 W/kg
SAR(1 g) = 0.244 mW/g; SAR(10 g) = 0.158 mW/g
Maximum value of SAR (measured) = 0.263 mW/g



Date/Time: 7/8/2006 10:26:43 AM

Test Laboratory: Motorola

1900 Fujitsu

Serial: Fujitsu Laptop

Procedure Notes: Pwr Step: 0 (radio com) **Antenna Position: INTERNAL**

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 = 50.7; ρ = 1000 kg/m^3

DASY4 Configuration:

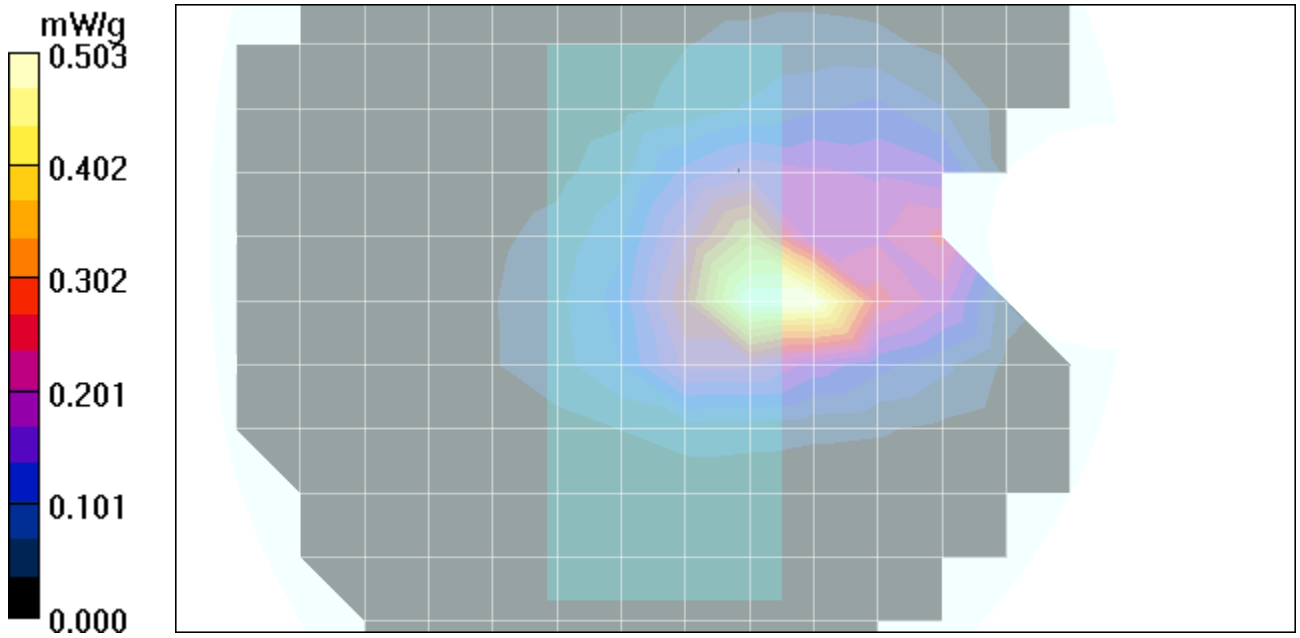
- Probe: ES3DV3 - SN3037; ConvF(4.65, 4.65, 4.65); Calibrated: 11/17/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 9/5/2005
- Phantom: R4: Glycol SAM; Type: SAM; Serial: TP-1250;
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

SAM Phone Against Flat Section/Area Scan - Full Body (15mm) (21x14x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.503 mW/g

SAM Phone Against Flat Section/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 19.4 V/m; Power Drift = -0.176 dB
Peak SAR (extrapolated) = 0.800 W/kg
SAR(1 g) = 0.497 mW/g; SAR(10 g) = 0.280 mW/g
Maximum value of SAR (measured) = 0.559 mW/g



Date/Time: 8/30/2006 11:17:48 AM

Test Laboratory: Motorola

1900 Fujitsu GPRS

Serial: Fujitsu Laptop
Procedure Notes: Pwr Step: burst1and2=0 Antenna Position: INTERNAL

Accessory Model # = Fujitsu Laptop

Communication System: GPRS 1900 - Class 10; Frequency: 1880 MHz; Channel Number: 661; Duty Cycle: 1:4
Medium: Regular Glycol Body; Medium parameters used: f = 1880 MHz; σ = 1.59 mho/m; ε_r = 50.9; ρ = 1000 kg/m^3

DASY4 Configuration:

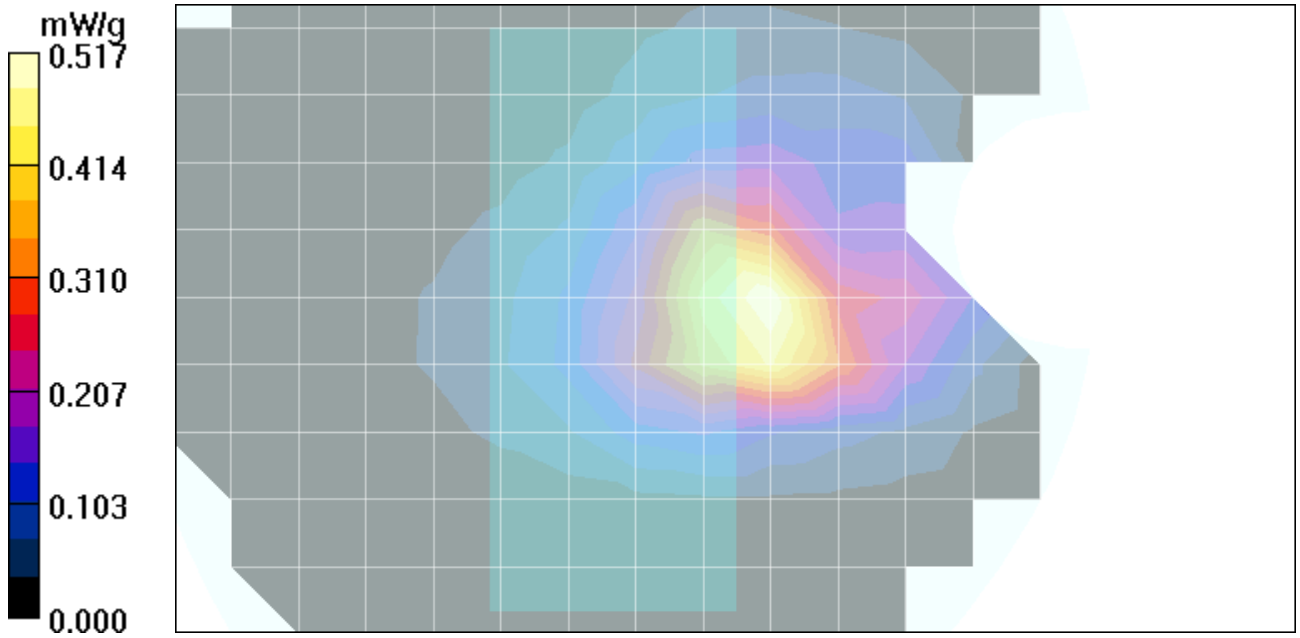
- Probe: ES3DV3 - SN3037; ConvF(4.65, 4.65, 4.65); Calibrated: 11/17/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn437; Calibrated: 7/18/2006
- Phantom: R4: Glycol SAM; Type: SAM; Serial: TP-1250;
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 160

SAM Phone Against Flat Section/Area Scan - Full Body (15mm) (21x14x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.517 mW/g

SAM Phone Against Flat Section/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.9 V/m; Power Drift = -0.050 dB
Peak SAR (extrapolated) = 0.822 W/kg
SAR(1 g) = 0.546 mW/g; SAR(10 g) = 0.322 mW/g
Maximum value of SAR (measured) = 0.603 mW/g



Date/Time: 7/8/2006 9:45:40 AM

Test Laboratory: Motorola

1900 IBM

Serial: IBM Laptop

Procedure Notes: Pwr Step: 0 (radio com) **Antenna Position: INTERNAL**

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 = 50.7; ρ = 1000 kg/m^3

DASY4 Configuration:

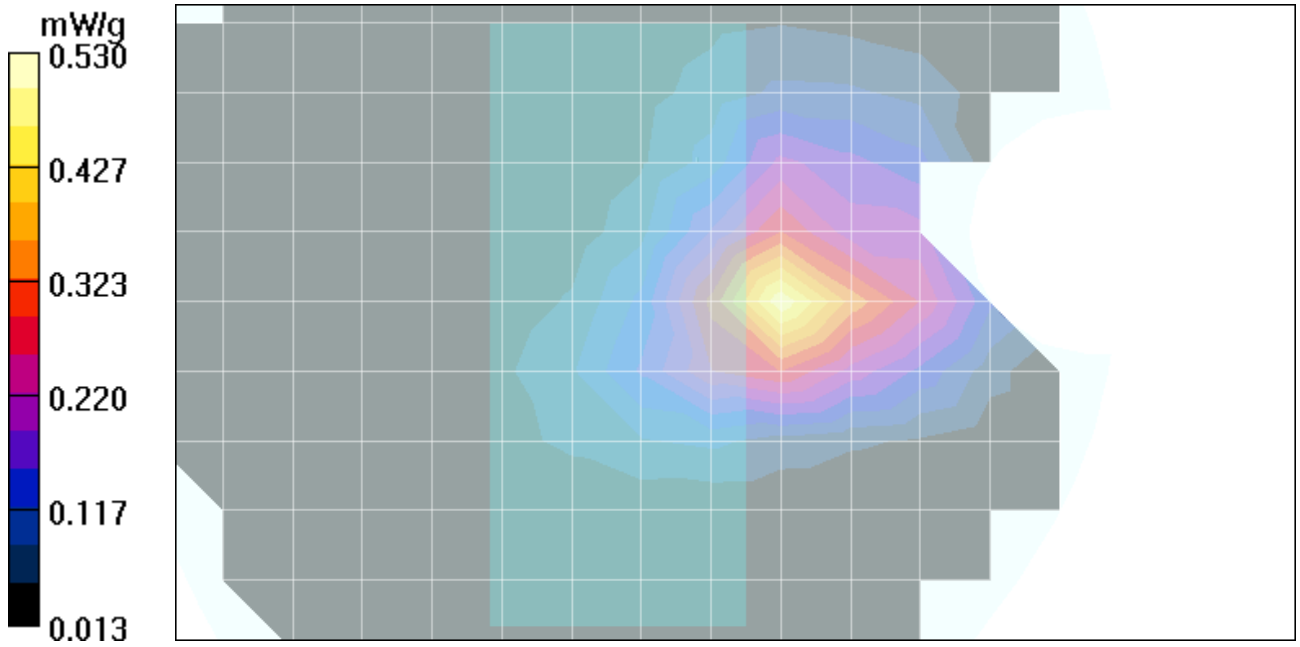
- Probe: ES3DV3 - SN3037; ConvF(4.65, 4.65, 4.65); Calibrated: 11/17/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 9/5/2005
- Phantom: R4: Glycol SAM; Type: SAM; Serial: TP-1250;
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 160

SAM Phone Against Flat Section/Area Scan - Full Body (15mm) (21x14x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.491 mW/g

SAM Phone Against Flat Section/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.3 V/m; Power Drift = -0.123 dB
Peak SAR (extrapolated) = 0.750 W/kg
SAR(1 g) = 0.474 mW/g; SAR(10 g) = 0.267 mW/g
Maximum value of SAR (measured) = 0.530 mW/g



Appendix 3

Probe Calibration Certificate

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
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: ES3-3037_Nov05

CALIBRATION CERTIFICATE

Object	ES3DV3 - SN:3037
Calibration procedure(s)	QA CAL-01.v5 Calibration procedure for dosimetric E-field probes
Calibration date:	November 17, 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	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41495277	3-May-05 (METAS, No. 251-00466)	May-06
Power sensor E4412A	MY41498087	3-May-05 (METAS, No. 251-00466)	May-06
Reference 3 dB Attenuator	SN: S5054 (3c)	11-Aug-05 (METAS, No. 251-00499)	Aug-06
Reference 20 dB Attenuator	SN: S5086 (20b)	3-May-05 (METAS, No. 251-00467)	May-06
Reference 30 dB Attenuator	SN: S5129 (30b)	11-Aug-05 (METAS, No. 251-00500)	Aug-06
Reference Probe ES3DV2	SN: 3013	7-Jan-05 (SPEAG, No. ES3-3013_Jan05)	Jan-06
DAE4	SN: 654	27-Oct-05 (SPEAG, No. DAE4-654_Oct05)	Oct-06

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
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: November 17, 2005

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 ES3DV3

SN:3037

Manufactured:	August 21, 2003
Last calibrated:	November 25, 2005
Recalibrated:	November 17, 2005

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ES3DV3 SN:3037

Sensitivity in Free Space[A] Diode Compression[B]

NormX	**1.15** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**97** mV
NormY	**0.84** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**97** mV
NormZ	**0.95** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**97** mV

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		**3.0 mm**	**4.0 mm**
SAR_{be} [%]	Without Correction Algorithm	5.1	2.3
SAR_{be} [%]	With Correction Algorithm	0.0	0.1

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

Sensor Center to Phantom Surface Distance		**3.0 mm**	**4.0 mm**
SAR_{be} [%]	Without Correction Algorithm	8.4	5.2
SAR_{be} [%]	With Correction Algorithm	0.0	0.1

Sensor Offset

Probe Tip to Sensor Center	**2.0** mm

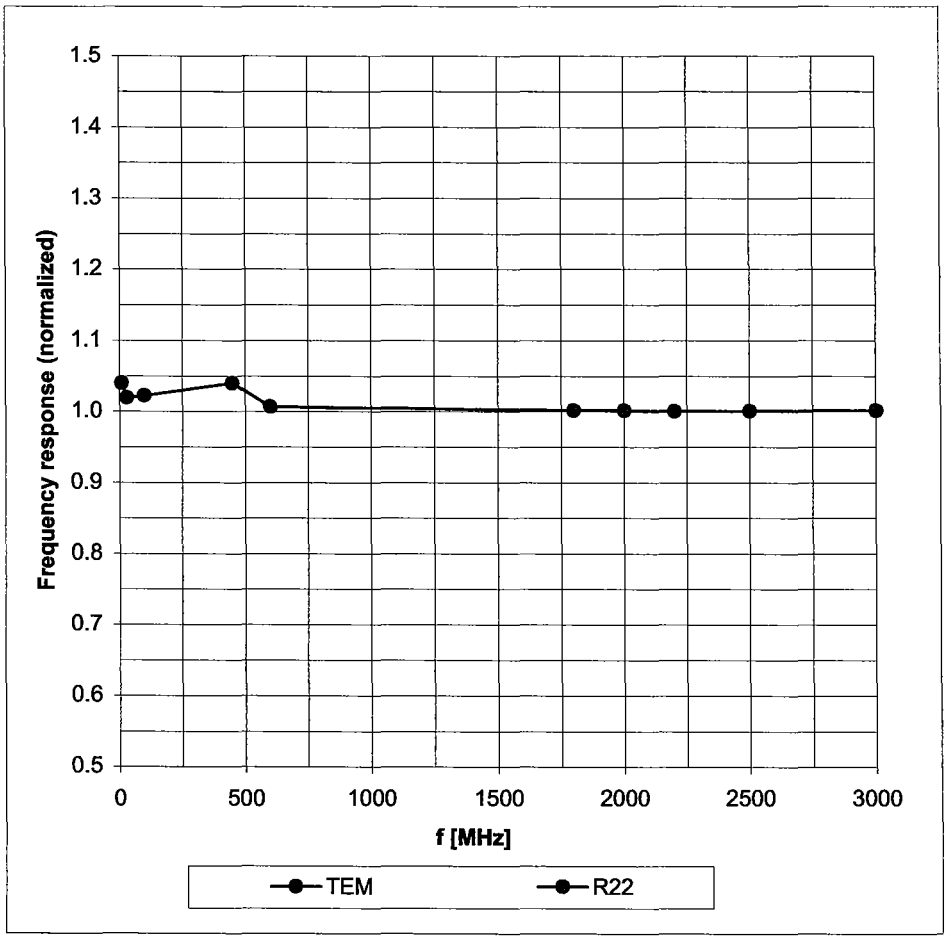
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

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

[B] Numerical linearization parameter: uncertainty not required.

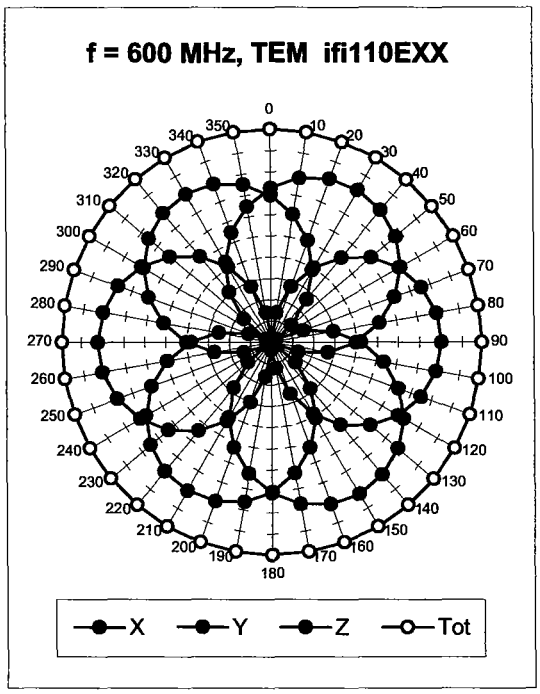
Frequency Response of E-Field

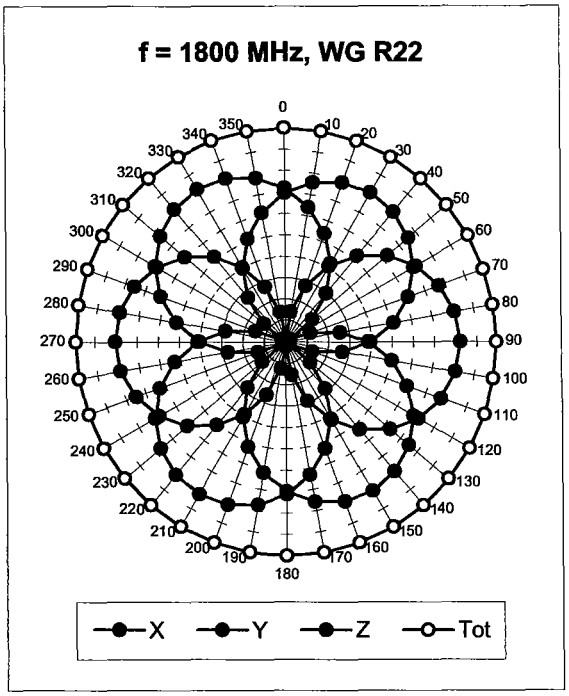
(TEM-Cell:ifi110 EXX, Waveguide: R22)

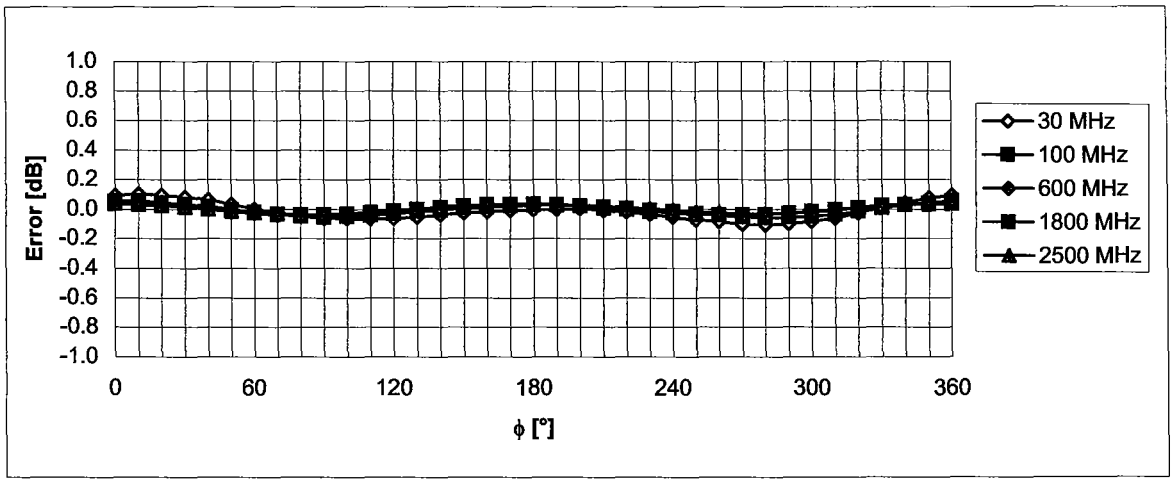


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°



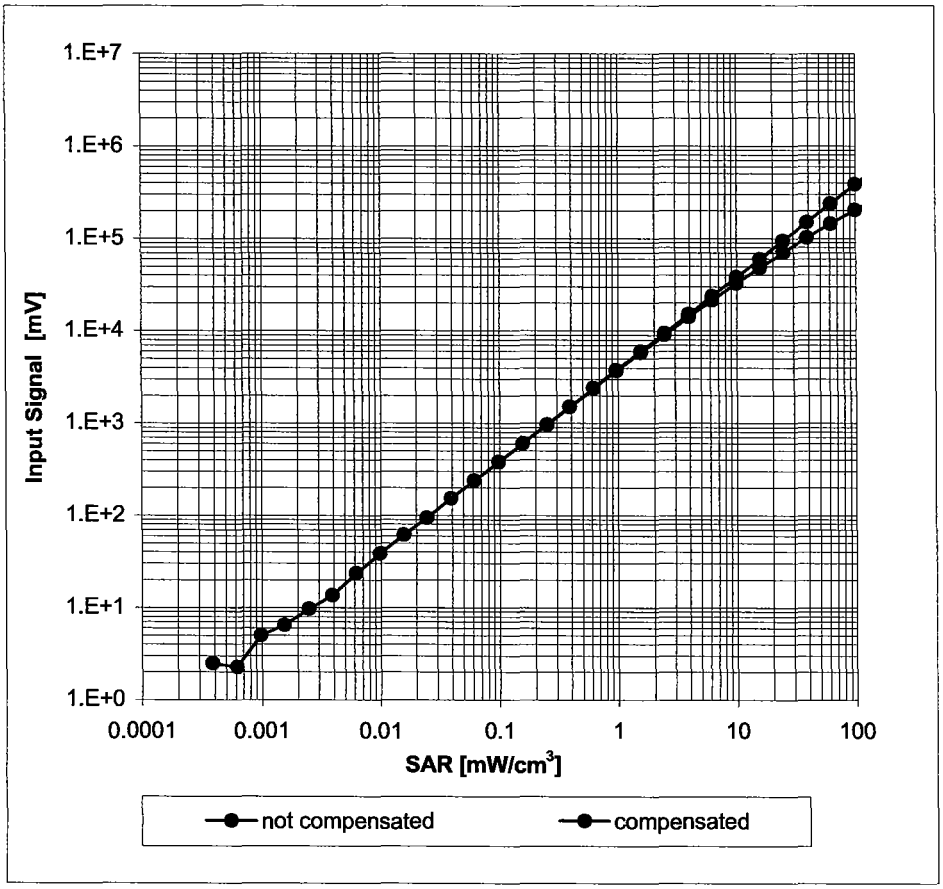


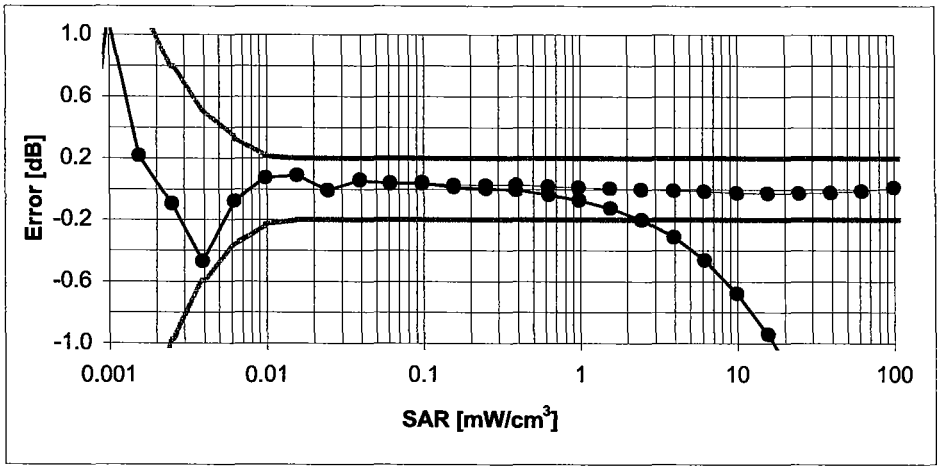


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

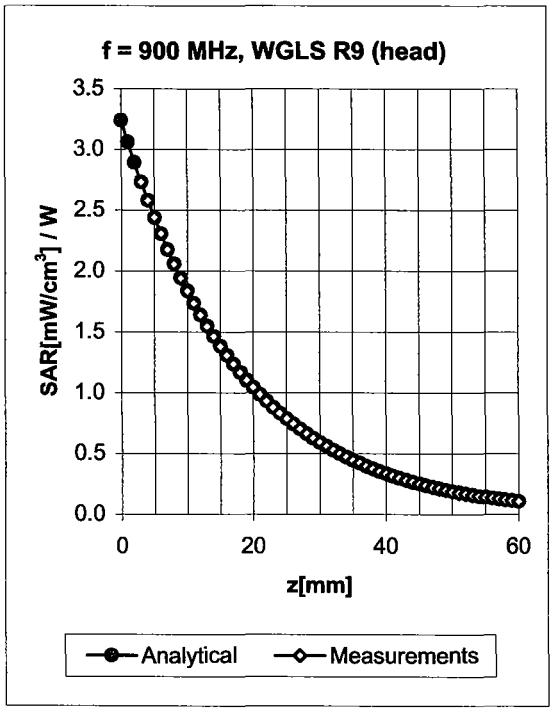
(Waveguide R22, f = 1800 MHz)

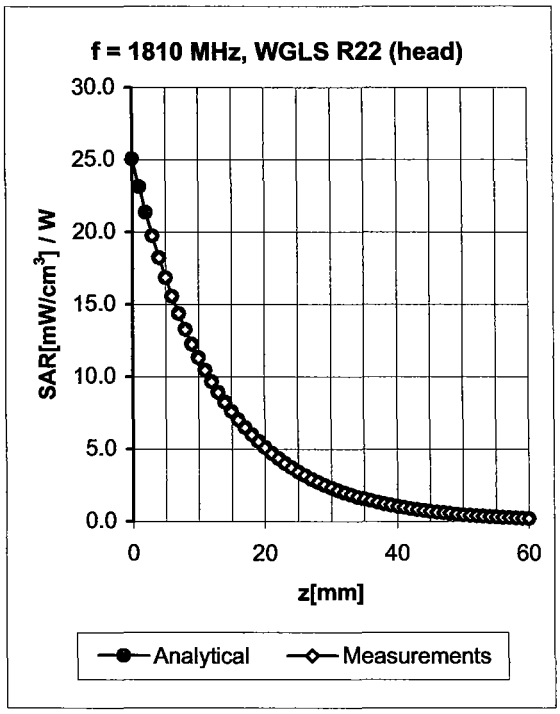




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



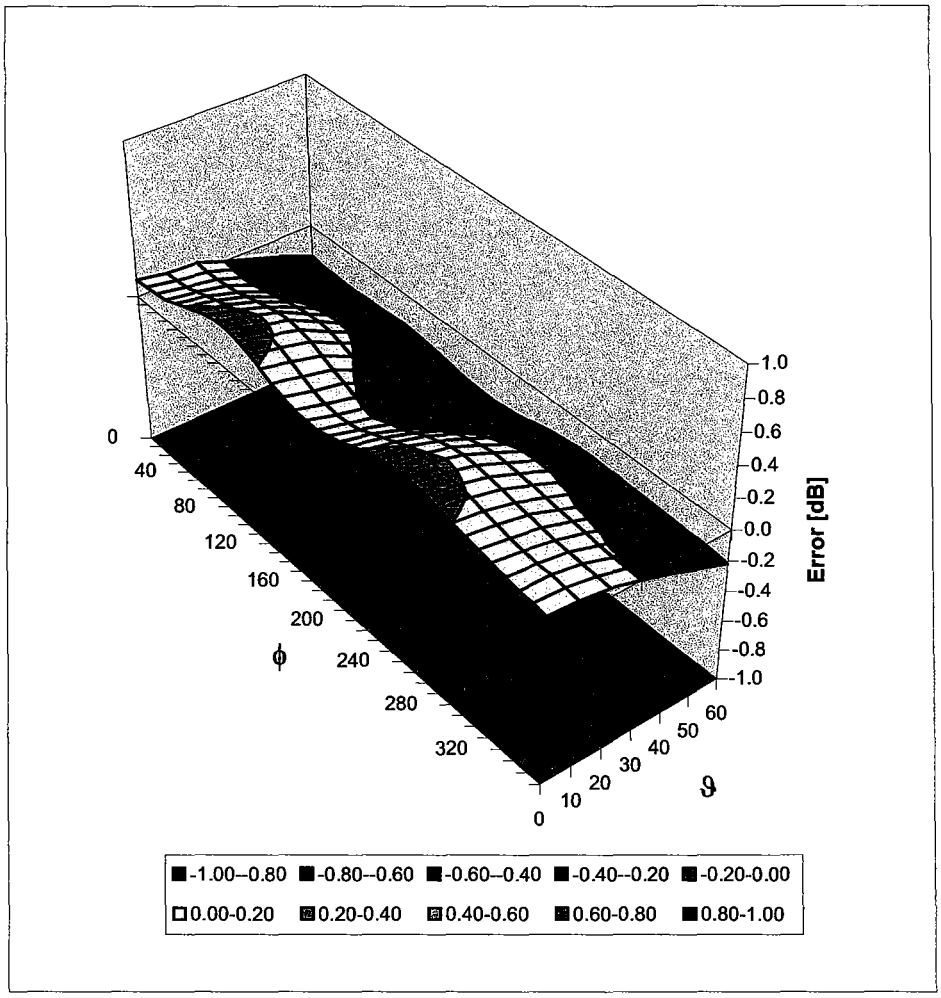


f [MHz]	Validity [MHz][c]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.44	1.35	6.07 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.27	2.38	5.01 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.28	2.21	4.66 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.48	1.52	4.31 ± 11.8% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.52	1.27	5.93 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.27	2.51	4.65 ± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.33	2.04	4.44 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.49	1.53	4.30 ± 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.**

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Appendix 4

Measurement Uncertainty Budget

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	

Appendix 5

Photographs of the device under test

Figure 1. Data Card

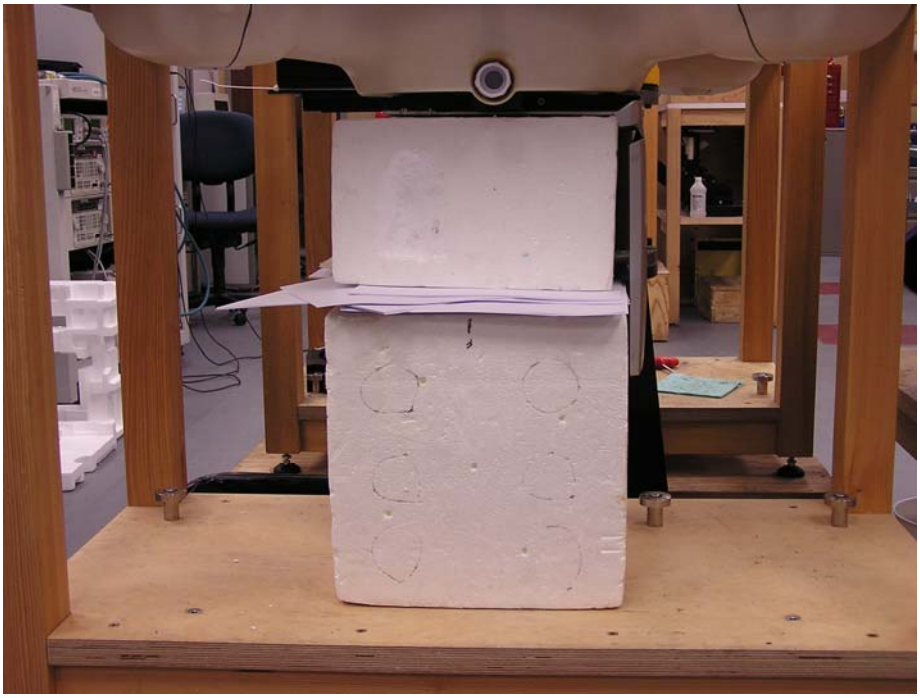


Figure 2. Laptop Setup (Front View)

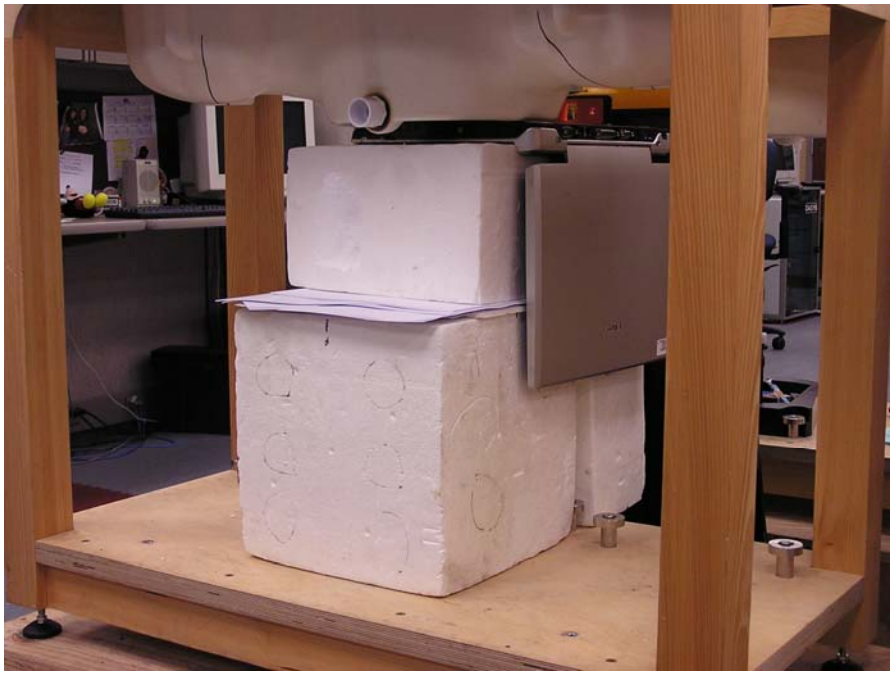


Figure 3. Laptop Setup (Quarter Right View)

Figure 4. Right Side of Laptop/Data Card

Figure 5. Right Side of Data Card

Appendix 6

Dipole Characterization Certificate

Certification of System Performance Check Targets
Based on WI-0396

-Historical Data-

	900MHz	
IEEE1528 Target:	10.8	**(W/kg)**
Measurement Uncertainty (k=1):	9.0%	
Measurement Period:	*3-June-05 to 10-May-06*	
# of tests performed:	1571	
Grand Average:	11.3	**(W/kg)**
% Delta (Average - IEEE1528 Target)	4.3%	
Is % Delta <= Expanded Measurement Uncertainty (k=2)?	**Yes**	
Accept/Reject Average as new system performance check target?	**ACCEPT**	
	Applies to Dipole SN's: 55, 69, 77, 78, 79, 80, 91, 92, 93, 94, 95, 96, 97	

-New System Performance Check Targets- per WI-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: 12-May-06

Signed: Marge Kaunas

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

Approved by: Mark Douglas **Date:** 22-May-06

Signed: Mark Douglas

Comments: