Portable Cellular Phone SAR Test Report

Test Report #:	18656-2F
Date of Report:	Jul-14-2006
Date of Test:	Jun-27-2006 to Jul-11-2006
FCC ID #:	**IHDT56GJ1**
Generic Name:	**N/A**
Laboratory:	Motorola Mobile Devices Business Product Safety & Compliance Laboratory 600 N. US Highway 45 Libertyville, Illinois 60048
Report Author:	Thomas Nipple RF Engineer

Accreditation:

This laboratory is accredited to ISO/IEC 17025-1999 to perform the following tests:

Tests:	Procedures:
Electromagnetic Specific Absorption Rate (SAR)	ANSI / IEEE C95.1-1992, 1999 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 portable cellular telephone 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)

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.

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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 portable cellular phone covered by this test report. The Specific Absorption Rate (SAR) of this product was measured. The portable cellular phone was tested in accordance with [1], [4] and [5]. The SAR values measured for the portable cellular phone 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 ICNIRP (10g), the final SAR reading for this phone is 0.79 W/kg for head adjacent use and 0.80 W/kg for body worn use. For ANSI / IEEE C95.1 (1g), the final SAR reading for this phone is 1.31 W/kg for head adjacent use and 1.20 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

Type	Internal	
Location	Bottom of Handset	
Dimensions	Length	38.5 mm
	Width	8.4 mm
Configuration	FJA	

2.2 Device description

Serial number	**806A1B93**		
Mode(s) of Operation	800 CDMA	1900 CDMA	Bluetooth
Modulation Mode(s)	QPSK	QPSK	GMSK
Maximum Output Power Setting	25.00 dBm	25.00 dBm	4.00 dBm
Duty Cycle	1:1	1:1	1:1
Transmitting Frequency Rang(s)	824.70 – 848.31 MHz	1851.25 – 1908.75 MHz	2400.0 - 2483.5 MHz
Production Unit or Identical Prototype (47 CFR §2..908)	Identical Prototype		
Device Category	Portable		
RF Exposure Limits	General Population / Uncontrolled		

Per the "Preliminary Guidance for Reviewing Applications for Certifications of 3G Devices" released on May 9, 2006, RC1, RC3 and RC3 (FCH + SCH) CDMA modes were considered. The conducted power measurements (per steps 3, 4 & 10 of section 4.4.5.2 of 3GPP2 C.5.011 / TIA -98-E) show that the portable cellular phone FCC ID IHDT56GJ1 has the same output conducted power for both CDMA modes.

		Conducted power (dBm) for CDMA modes		
		RC1	RC3	RC3 (FCH + SCH)
CDMA 800	Ch 1013	25.15	25.12	Per Motorola designs; the maximum power, when in a mode that allows supplemental channels, will always be less that the RC3 / RC1 maximum conducted power limit.
	Ch 384	25.15	25.12	
	Ch 777	24.91	24.90	
CDMA 1900	Ch 25	25.18	25.05	
	Ch 600	25.06	24.98	
	Ch 1175	25.00	25.05	

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™ DAE V1	SN376	Sep-05-2006
E-Field Probe ES3DV3	SN3037	Nov-17-2006
Dipole Validation Kit, DV900V2	SN96	May-22-2007
S.A.M. Phantom used for 800/900 MHz	TP-1131	
Dipole Validation Kit, DV1800V2	SN272	
S.A.M. Phantom used for 1800/1900 MHz	TP-1250	

3.2 Additional Equipment

Description	Serial Number	Cal Due Date
Signal Generator HP8648C	3847A04632	Sep-20-2006
Power Meter E4419B	GB39511084	Aug-19-2006
Power Sensor #1 - 8481A	US39210918	Sep-21-2006
Power Sensor #2 - 8481A	US39210934	Sep-21-2006
Network Analyzer HP8753ES	US39171846	Aug-22-2006
Dielectric Probe Kit HP85070B	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	**Head**	**Measured,** Jun-27-2006	41.0	0.90	20.0
		Recommended Limits	41.5 ±5%	0.90 ±5%	18-25
	Body	**Measured,** Jul-11-2006	54.3	0.96	20.0
		Recommended Limits	55.2 ±5%	0.97 ±5%	18-25
1880	**Head**	**Measured,** Jun-29-2006	41.3	1.43	20.0
		Recommended Limits	40.0 ±5%	1.40 ±5%	18-25
	Body	**Measured,** Jul-03-2006	50.9	1.59	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 7 for the 900 Mhz target reference SAR value. These tests were done at 900 MHz and 1800 MHz. 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,** Jun-27-2006	11.33	40.2	0.95	20.8	20.0
	Measured, Jul-11-2006	11.93	42.0	0.99	20.1	20.0
	Recommended Limits	11.3	41.5 ±5%	0.97 ±5%	18-25	18-25
1800	**Measured,** Jun-29-2006	39.68	41.6	1.34	20.9	21.9
	Measured, Jul-3-2006	40.13	41.7	1.40	20.7	20.4
	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 ES3DV3	3037	900	6.07	8 of 9
		1810	5.01	8 of 9

6. Test Results

The test sample was operated using an actual transmission through a base station simulator. The base station simulator was setup to the proper channel, transmitter power level and transmit mode of operation. The phone was tested in the configurations stipulated in [1], [4] and [5]. The phone was positioned into these configurations using the device holder supplied with the DASY4™ SAR measurement system The measured dielectric constant of the material used for the device holder 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 used 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 model covered by this report has the following battery options:
Model SNN5758A – 1500 mAH Battery
Model SNN5756A – 850 mAH Battery

The battery with the highest capacity is the Model SNN5758A. 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 configurations that resulted in the highest SAR values were tested using the other battery listed above.

6.1 Head Adjacent Test Results

The SAR results shown in tables 1 through 6 are maximum SAR values averaged over 1 gram of phantom tissue, to demonstrate compliance to [3] and also over 10 grams of phantom tissue, to demonstrate compliance to the [6]. Also shown are the measured conducted output powers, the temperature of the simulated tissue 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 DASY4™ 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 simulated tissue were used for the system accuracy verification and the device SAR measurements, the Z-axis scans included in Appendix 1 are applicable for verification of simulated tissue 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 ES3DV3	3037	900	6.07	8 of 9
		1810	5.01	8 of 9

Left Head Cheek Position								
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)
800MHz	Chan. 1013	25.07						
	Channel 384	24.89	**20.0**	**-0.125**	**0.371**	**0.38**	**0.564**	**0.58**
	Channel 777	24.80						
1900MHz	Channel 25	24.99	19.8	0.0117	0.616	0.62	1.04	1.04
	Channel 600	24.95	**21.9**	**0.156**	**0.787**	**0.79**	**1.31**	**1.31**
	Chan. 1175	25.00	19.8	-0.0514	0.593	0.60	1.04	1.05

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

Right Head Cheek Position								
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)
800MHz	Chan. 1013	25.07						
	Channel 384	24.89	20.0	-0.36	0.342	0.37	0.504	0.55
	Channel 777	24.80						
1900MHz	Channel 25	24.99	19.8	-0.133	0.586	0.60	0.943	0.97
	Channel 600	24.95	19.8	0.292	0.57	0.57	0.95	0.95
	Chan. 1175	25.00	19.9	-0.662	0.506	0.59	0.841	0.98

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

Left Head 15° Tilt Position								
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)
800MHz	Chan. 1013	25.07						
	Channel 384	24.89	20.0	-0.0989	0.273	0.28	0.355	0.36
	Channel 777	24.80						
1900MHz	Channel 25	24.99						
	Channel 600	24.95	19.8	0.0178	0.246	0.25	0.405	0.41
	Chan. 1175	25.00						

Table 3: SAR measurement results at the highest possible output power, measured in a head 15° Tilt position against the ICNIRP and ANSI SAR Limit.

Right Head 15° Tilt Position								
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)
800MHz	Chan. 1013	25.07						
	Channel 384	24.89	20.0	-0.0724	0.215	0.22	0.295	0.30
	Channel 777	24.80						
1900MHz	Channel 25	24.99						
	Channel 600	24.95	19.9	0.133	0.348	0.35	0.59	0.59
	Chan. 1175	25.00						

Table 4: SAR measurement results at the highest possible output power, measured in a head 15° Tilt position against the ICNIRP and ANSI SAR Limit.

Left Head Cheek Position with SNN5756A								
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)
800MHz	Chan. 1013	25.07						
	Channel 384	24.89	20.0	0.142	0.361	0.36	0.535	0.54
	Channel 777	24.80						
1900MHz	Channel 25	24.99						
	Channel 600	24.95	19.9	-0.0309	0.718	0.72	1.24	1.25
	Chan. 1175	25.00						

Table 5: SAR measurement results at the highest possible output power, measured in a head cheek position against the ICNIRP and ANSI SAR Limit.

Right Head 15° Tilt Position with SNN5756A								
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)
800MHz	Chan. 1013	25.07						
	Channel 384	24.89	20.4	-0.14	0.289	0.30	0.392	0.40
	Channel 777	24.80						
1900MHz	Channel 25	24.99						
	Channel 600	24.95	19.9	-0.082	0.356	0.36	0.601	0.61
	Chan. 1175	25.00						

Table 6: SAR measurement results at the highest possible output power, measured in a head 15° Tilt position against the ICNIRP and ANSI SAR Limit.

6.2 Body Worn Test Results

The SAR results shown in tables 7 through 12 are maximum SAR values averaged over 1 gram of phantom tissue, to demonstrate compliance to [3] and also over 10 grams of phantom tissue, to demonstrate compliance to the [6]. 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 DASY4™ 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. The functional accessories were divided into two categories, the ones with metal components and the ones with non-metal components. For non-metallic component accessories', testing was performed on the accessory that displayed the closest proximity to the flat phantom. Each metallic component accessory, if any, was checked for uniqueness of metal component so that each is tested with the device. If multiple accessories shared an identical metal component, only the accessory that dictates the closest spacing to the body was tested. In addition to accessory testing, the cellular phone was tested with the front and back of the phone facing the phantom. For voice mode operation, the phone was placed as a distance of 15mm from the phantom. For data mode operation, the phone was placed as a distance of 25mm from the phantom. The cellular phone was tested with a headset connected to the device for all body-worn SAR measurements.

There are no Body-Worn Accessories available for this phone:

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	3037	900	5.93	8 of 9
		1810	4.65	8 of 9

Body-Worn; Front of Phone 15mm from 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)
800MHz	Chan. 1013	25.07						
	Channel 384	24.89	20.8	0.128	0.511	0.51	0.709	0.71
	Channel 777	24.80						
1900MHz	Channel 25	24.99	20.1	0.105	0.605	0.61	0.987	0.99
	Channel 600	24.95	20.9	0.0422	0.639	0.64	1.05	1.05
	Chan. 1175	25.00	20.1	-0.149	0.537	0.56	0.886	0.92

Table 7: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

Body-Worn; Back of Phone 15mm from 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)
800MHz	Chan. 1013	25.07	20.8	-0.0673	0.724	0.74	1.05	1.07
	Channel 384	24.89	20.8	0.13	0.735	0.74	1.08	1.08
	Channel 777	24.80	20.3	-0.437	0.7	0.77	1.07	1.18
1900MHz	Channel 25	24.99	20.1	0.0245	0.391	0.39	0.642	0.64
	Channel 600	24.95	20.1	0.0279	0.456	0.46	0.751	0.75
	Chan. 1175	25.00	20.1	-0.0129	0.342	0.34	0.568	0.57

Table 8: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

Body-Worn with Bluetooth Mode; *Noted Facing* 15mm From 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)
800MHz *Back of Phone*	Chan. 1013	25.07	20.8	-0.0695	0.712	0.72	1.03	1.05
	Channel 384	24.89	20.0	0.0785	0.651	0.65	0.914	0.91
	Channel 777	24.80	20.3	-0.0876	0.716	0.73	1.07	1.09
1900MHz *Front of Phone*	Channel 25	24.99	20.1	-0.0472	0.597	0.60	0.973	0.98
	Channel 600	24.95	**20.1**	**-0.0581**	**0.689**	**0.70**	**1.11**	**1.12**
	Chan. 1175	25.00	20.6	-0.19	0.549	0.57	0.9	0.94

Table 9: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

Body-Worn with EV-DO Mode; *Noted Facing* 25mm From 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)
800MHz *Back of Phone*	Chan. 1013	25.07						
	Channel 384	24.89	20.0	-0.222	0.29	0.31	0.417	0.44
	Channel 777	24.80						
1900MHz *Front of Phone*	Channel 25	24.99	20.6	0.0479	0.288	0.29	0.448	0.45
	Channel 600	24.95	20.6	0.0851	0.359	0.36	0.564	0.56
	Chan. 1175	25.00	20.6	-0.0816	0.303	0.31	0.477	0.49

Table 10: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

Body-Worn with SNN5756A; Back of Phone 15mm From 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)
800MHz	Chan. 1013	25.07						
	Channel 384	24.89						
	Channel 777	24.80	**20.0**	**0.2**	**0.801**	**0.80**	**1.20**	**1.20**

Table 11: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

Body-Worn with Bluetooth Mode and SNN5756A; Front of Phone 15mm From 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 25	24.99						
	Channel 600	24.95	20.6	0.0577	0.563	0.65	1.07	1.07
	Chan. 1175	25.00						

Table 12: 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: 6/27/2006 8:40:18 AM

Test Laboratory: Motorola - 062706 900MHz Good at +0.2%

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 096
Procedure Notes: 900 MHz System Performance Check; Dipole Sn#: 096; PM1 Power = 200 mW
Sim.Temp@meas = 20*C; Sim.Temp@SPC = 20*C; Room Temp @ SPC = 20.8*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 = 0.95 mho/m; ε_r = 40.2; ρ = 1000 kg/m^3

DASY4 Configuration:

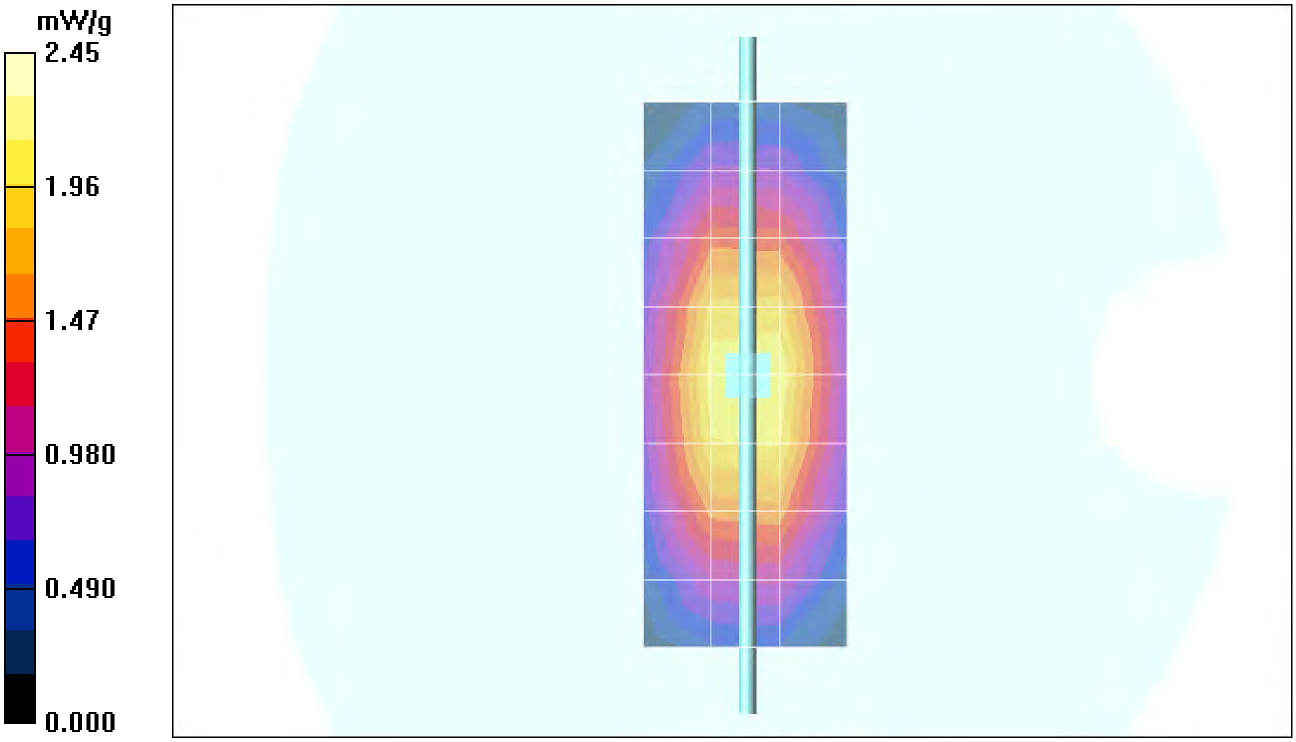
- Probe: ES3DV3 - SN3037; ConvF(6.07, 6.07, 6.07); Calibrated: 11/17/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 9/5/2005
- Phantom: R4: Sugar Water SAM; Type: SAM; Serial: TP-1131;
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 171

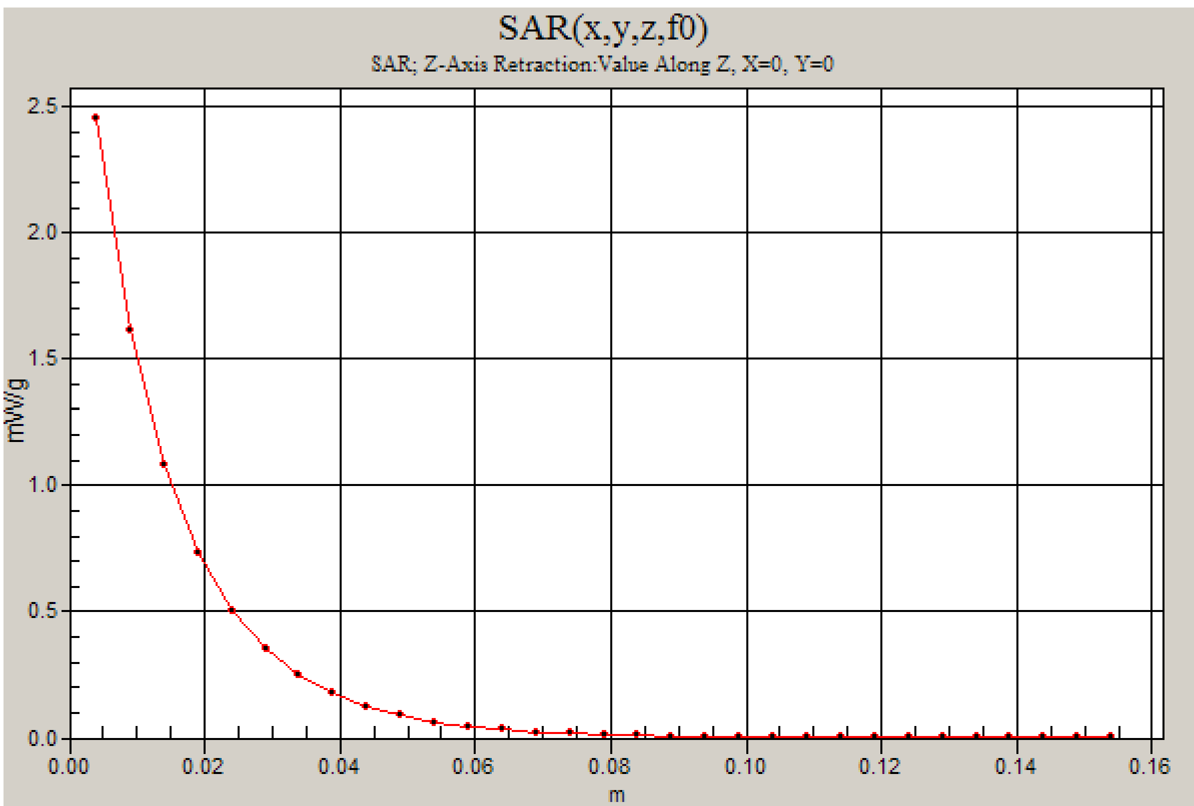
Daily SPC Check/Dipole Area Scan (4x9x1):
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 2.12 mW/g

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 = -0.027 dB; Peak SAR (extrapolated) = 3.44 W/kg
SAR(1 g) = 2.26 mW/g; SAR(10 g) = 1.44 mW/g; Maximum value of SAR (measured) = 2.46 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 = -0.027 dB; Peak SAR (extrapolated) = 3.44 W/kg
SAR(1 g) = 2.27 mW/g; SAR(10 g) = 1.45 mW/g; Maximum value of SAR (measured) = 2.45 mW/g

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


mW/g
2.45
1.96
1.47
0.980
0.490
0.000


SAR(x,y,z,f0)
SAR; Z-Axis Retraction:Value Along Z, X=0, Y=0
mW/g
m
2.5
2.0
1.5
1.0
0.5
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16

Date/Time: 6/29/2006 9:09:11 AM

Test Laboratory: Motorola - 062906 1800MHz Good at +4.1%

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 272
Procedure Notes: 1800 MHz System Performance Check; Dipole Sn# 272(TR); PM1 Power = 200mW
Sim.Temp@meas = 21.9*C; Sim.Temp@SPC = 20*C; Room Temp @ SPC = 20.9*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 = 1.34 mho/m; ε_r = 41.6; 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 171

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

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 7.98 mW/g

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

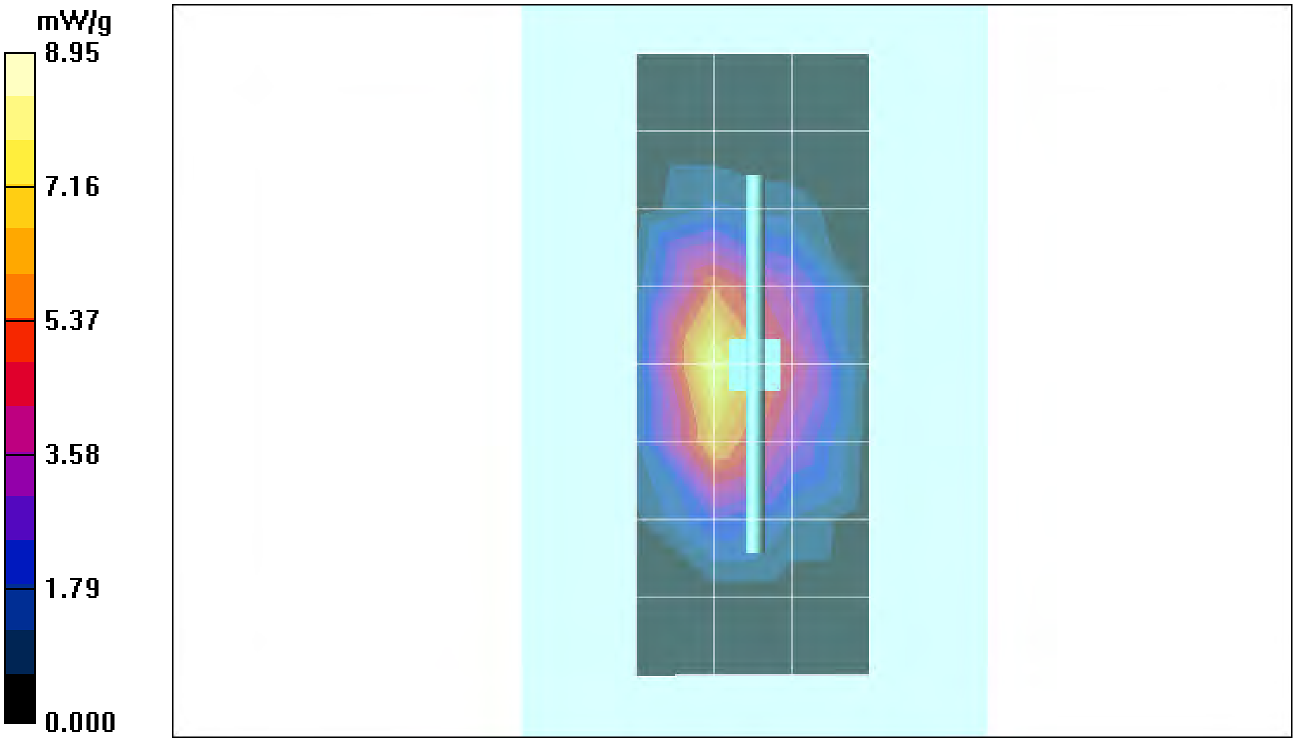
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 79.5 V/m; Power Drift = 0.033 dB; Peak SAR (extrapolated) = 13.8 W/kg
SAR(1 g) = 7.89 mW/g; SAR(10 g) = 4.23 mW/g; Maximum value of SAR (measured) = 8.82 mW/g

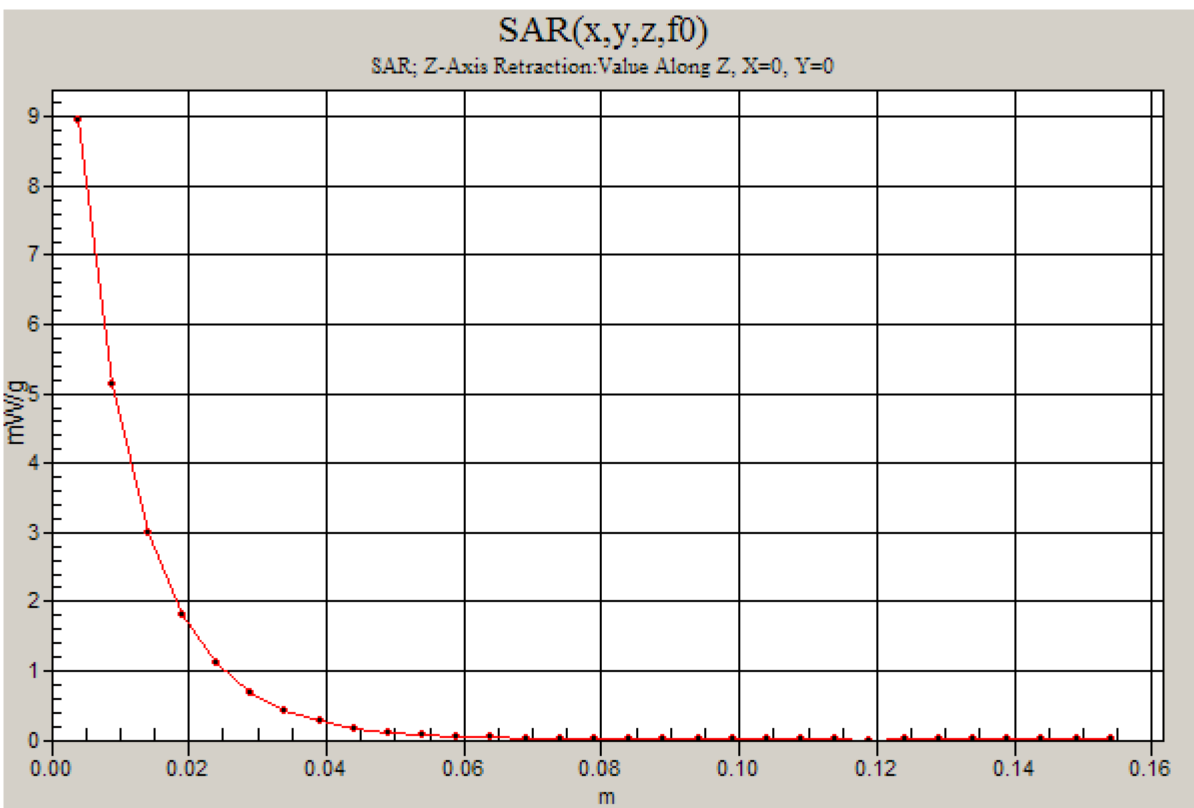
Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 79.5 V/m; Power Drift = 0.033 dB; Peak SAR (extrapolated) = 13.9 W/kg
SAR(1 g) = 7.98 mW/g; SAR(10 g) = 4.27 mW/g; Maximum value of SAR (measured) = 9.00 mW/g

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

Measurement grid: dx=20mm, dy=20mm, dz=5mm; Maximum value of SAR (measured) = 8.95 mW/g


mW/g
8.95
7.16
5.37
3.58
1.79
0.000


SAR(x,y,z,f0)
SAR; Z-Axis Retraction:Value Along Z, X=0, Y=0
mW/g
m
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
0
1
2
3
4
5
6
7
8
9

Date/Time: 7/3/2006 3:59:02 PM

Test Laboratory: Motorola - 070306 1800MHz Good at +5.3%

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 272
Procedure Notes: 1800 MHz System Performance Check; Dipole Sn# 272tr; PM1 Power = 198 mW
Sim.Temp@meas = 20.4*C; Sim.Temp@SPC = 19.7*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 = 1.4 mho/m; ε_r = 41.7; 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 171

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

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 6.81 mW/g

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

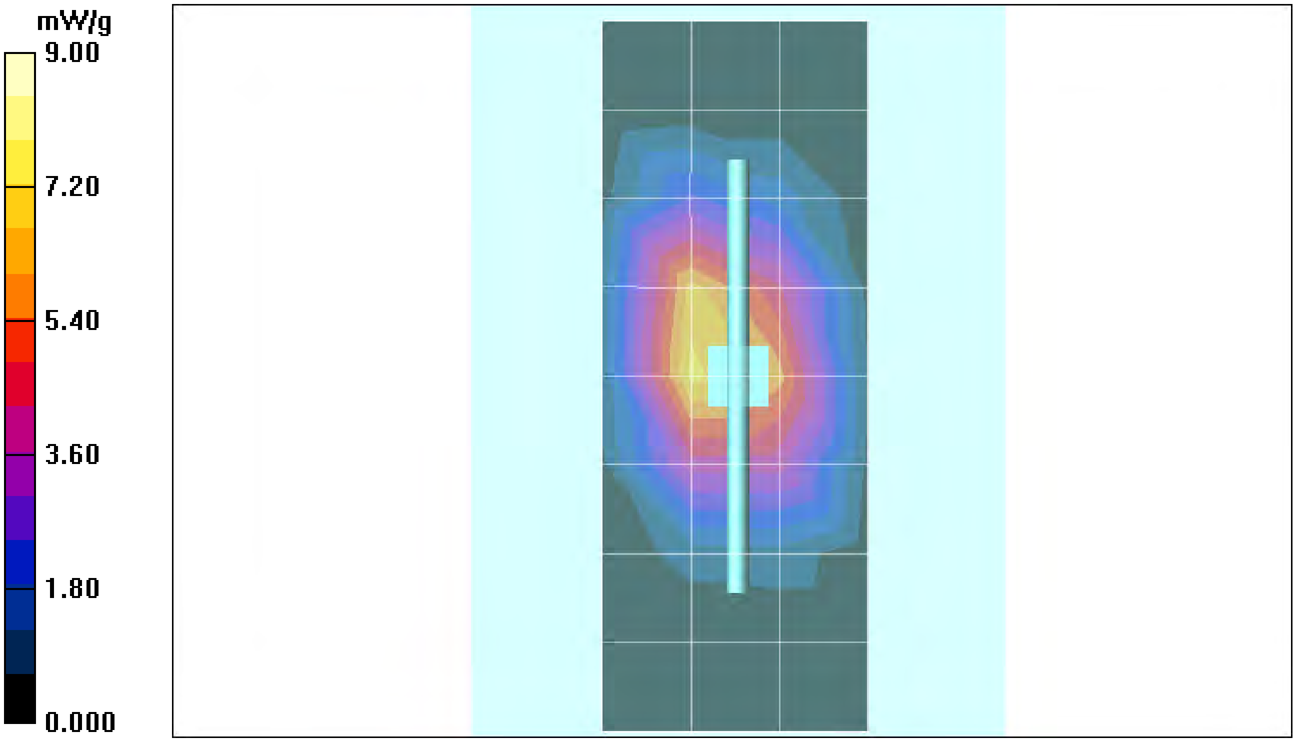
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 80.9 V/m; Power Drift = -0.020 dB; Peak SAR (extrapolated) = 13.9 W/kg
SAR(1 g) = 7.92 mW/g; SAR(10 g) = 4.21 mW/g; Maximum value of SAR (measured) = 8.91 mW/g

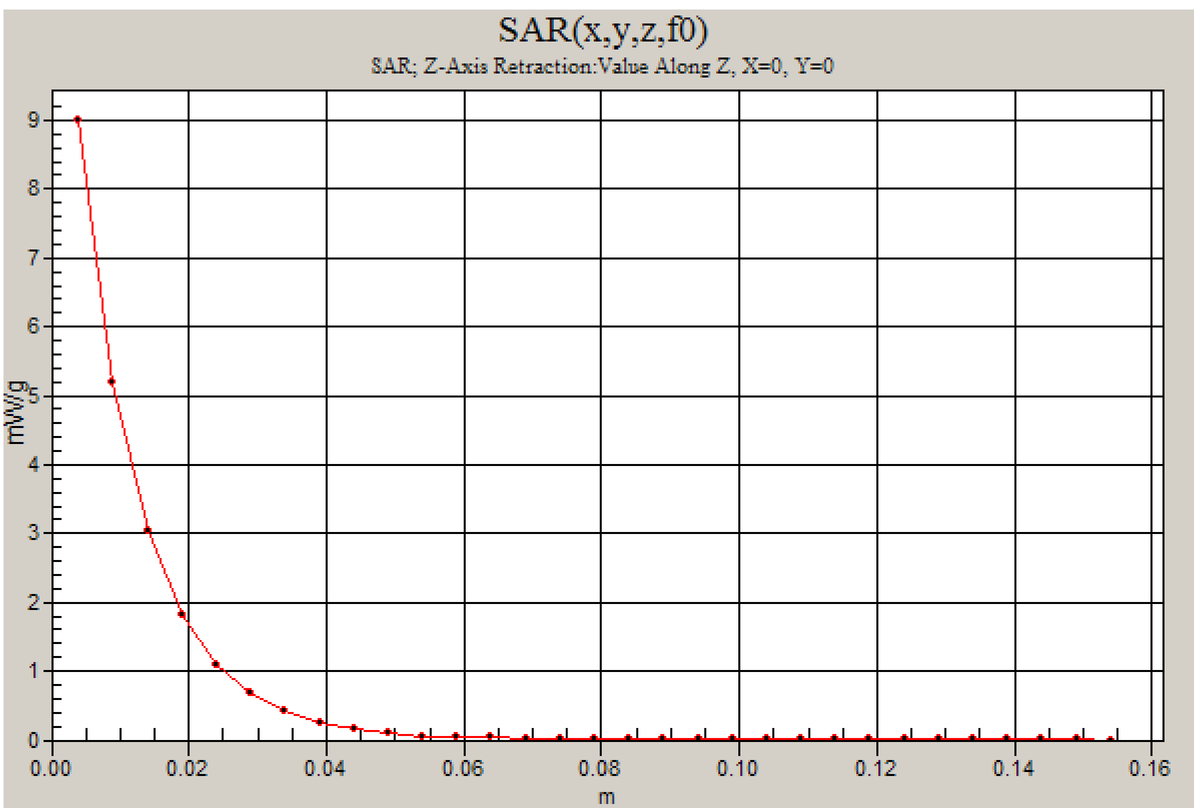
Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 80.9 V/m; Power Drift = -0.020 dB; Peak SAR (extrapolated) = 14.0 W/kg
SAR(1 g) = 7.97 mW/g; SAR(10 g) = 4.24 mW/g; Maximum value of SAR (measured) = 8.88 mW/g

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

Measurement grid: dx=20mm, dy=20mm, dz=5mm; Maximum value of SAR (measured) = 9.00 mW/g


mW/g
9.00
7.20
5.40
3.60
1.80
0.000


SAR(x,y,z,f0)
SAR; Z-Axis Retraction:Value Along Z, X=0, Y=0
mW/g
m
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
0
1
2
3
4
5
6
7
8
9

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 171

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:

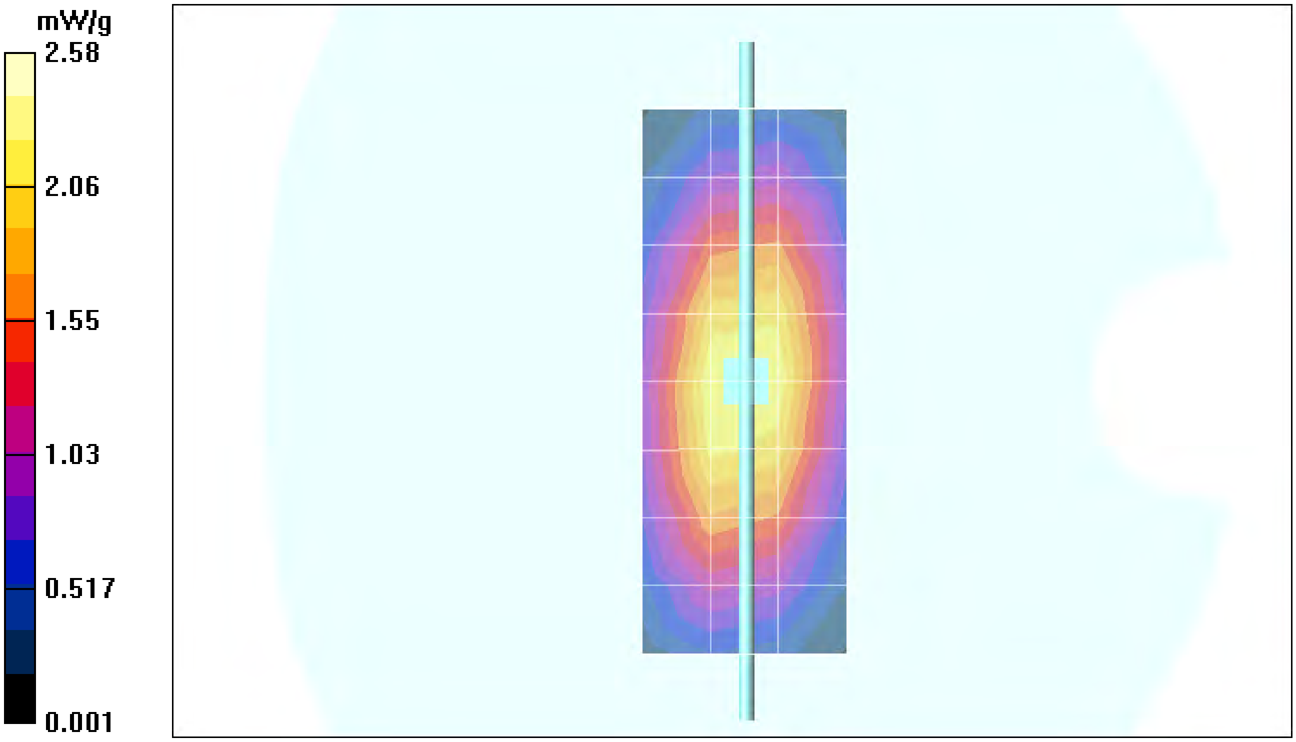
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 51.7 V/m; Power Drift = -0.028 dB; Peak SAR (extrapolated) = 3.62 W/kg
SAR(1 g) = 2.38 mW/g; SAR(10 g) = 1.52 mW/g; Maximum value of SAR (measured) = 2.58 mW/g

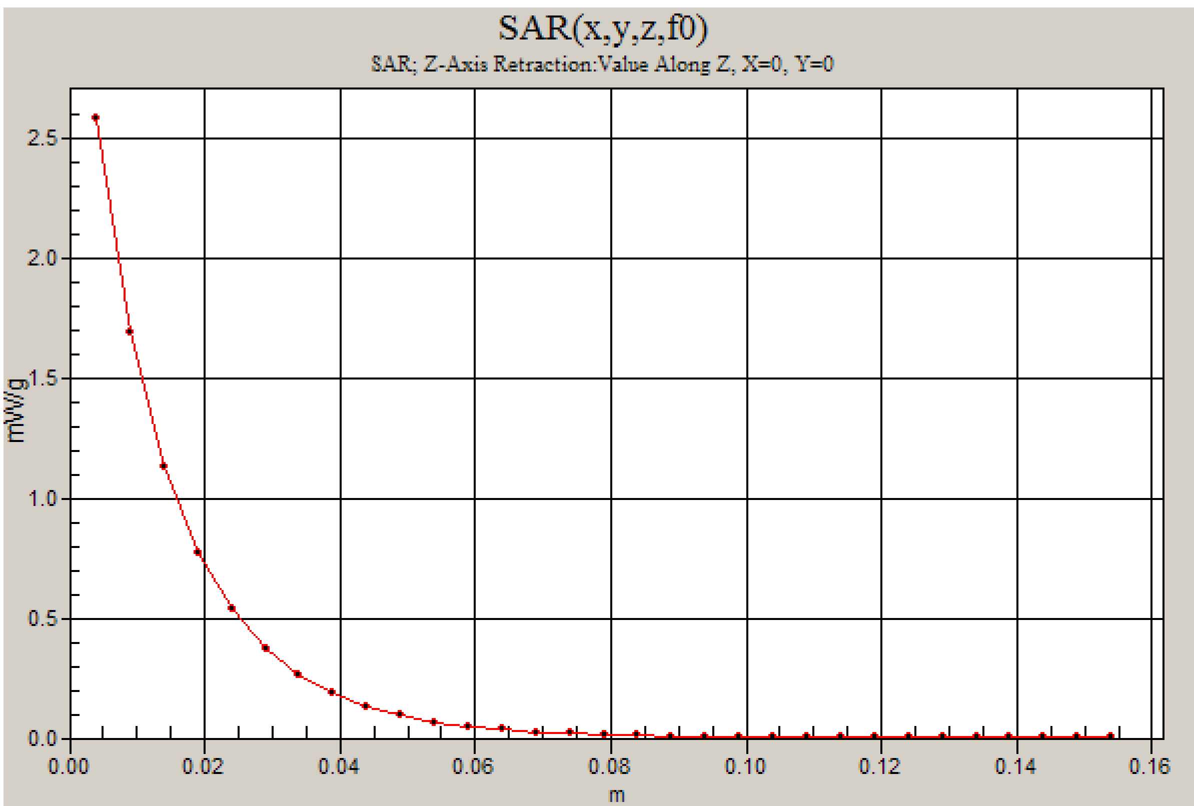
Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0:

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


mW/g
2.58
2.06
1.55
1.03
0.517
0.001


SAR(x,y,z,f0)
SAR; Z-Axis Retraction:Value Along Z, X=0, Y=0
mW/g
2.5
2.0
1.5
1.0
0.5
0.0
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: 6/27/2006 5:46:27 PM

Test Laboratory: Motorola - CDMA 800 Cheek

Serial: 806A1B93

Procedure Notes: Pwr Step: Always Up; Antenna Position: Internal; Accesory Model #: N/A
Battery Model #: SNN5758A; DEVICE POSITION (cheek or rotated): Cheek
Communication System: CDMA 835; Frequency: 836.52 MHz; Channel Number: 384; Duty Cycle: 1:1

Medium: Low Freq Head
Medium parameters used: f = 835 MHz; σ = 0.9 mho/m; ε_r = 41; ρ = 1000 kg/m^3

DASY4 Configuration:

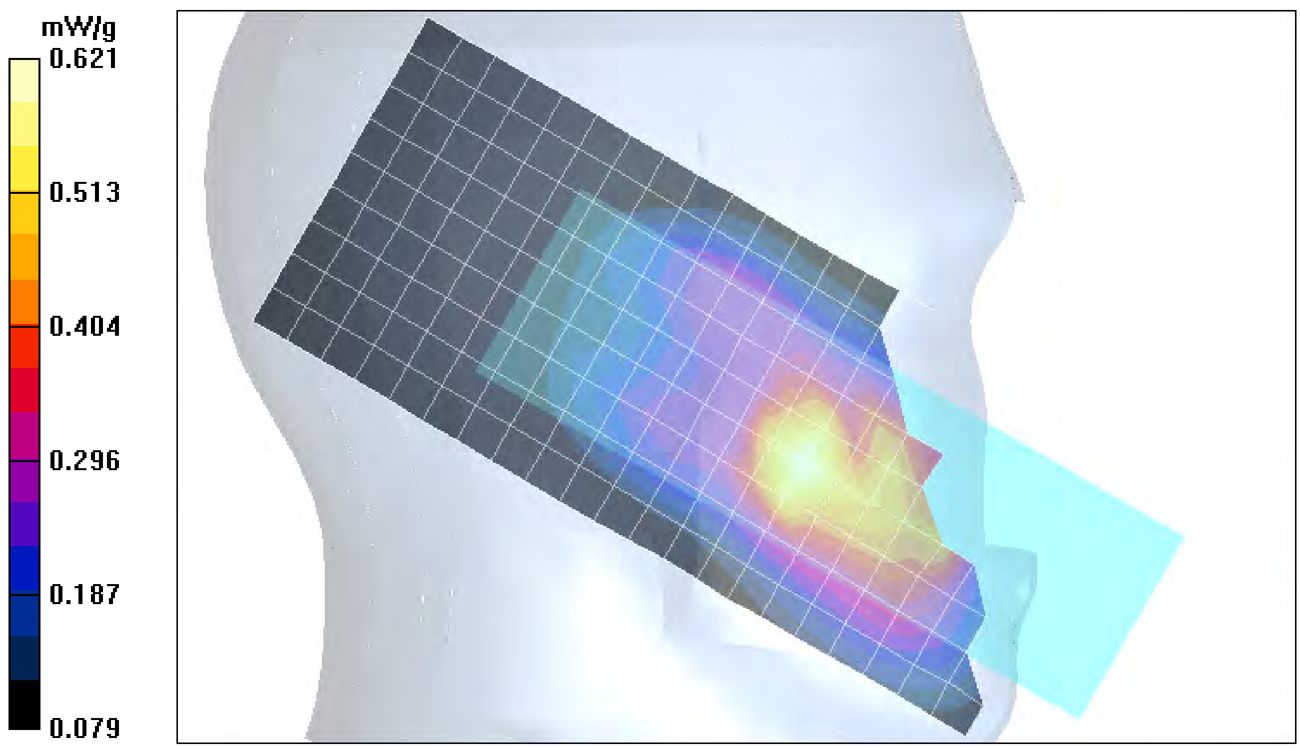
- Probe: ES3DV3 - SN3037; ConvF(6.07, 6.07, 6.07); Calibrated: 11/17/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 9/5/2005
- Phantom: R4: Sugar Water SAM; Type: SAM; Serial: TP-1131;
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 171

Left Head Template/Area Scan - Normal (10mm) (10x25x1):

Measurement grid: dx=10mm, dy=10mm; Maximum value of SAR (measured) = 0.630 mW/g

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 23.9 V/m; Power Drift = -0.125 dB; Peak SAR (extrapolated) = 1.08 W/kg
SAR(1 g) = 0.564 mW/g; SAR(10 g) = 0.371 mW/g; Maximum value of SAR (measured) = 0.621 mW/g



Date/Time: 6/29/2006 2:46:24 PM

Test Laboratory: Motorola - CDMA 1900 Cheek

Serial: 806A1B93

Procedure Notes: Pwr Step: All Up; Antenna Position: Internal; Accessory Model #: N/A
Battery Model #: SNN5758A; DEVICE POSITION: Cheek
Communication System: CDMA 1900; Frequency: 1880 MHz; Channel Number: 600; Duty Cycle: 1:1

Medium: Regular Glycol Head
Medium parameters used: f = 1880 MHz; σ = 1.43 mho/m; ε_r = 41.3; ρ = 1000 kg/m^3

DASY4 Configuration:

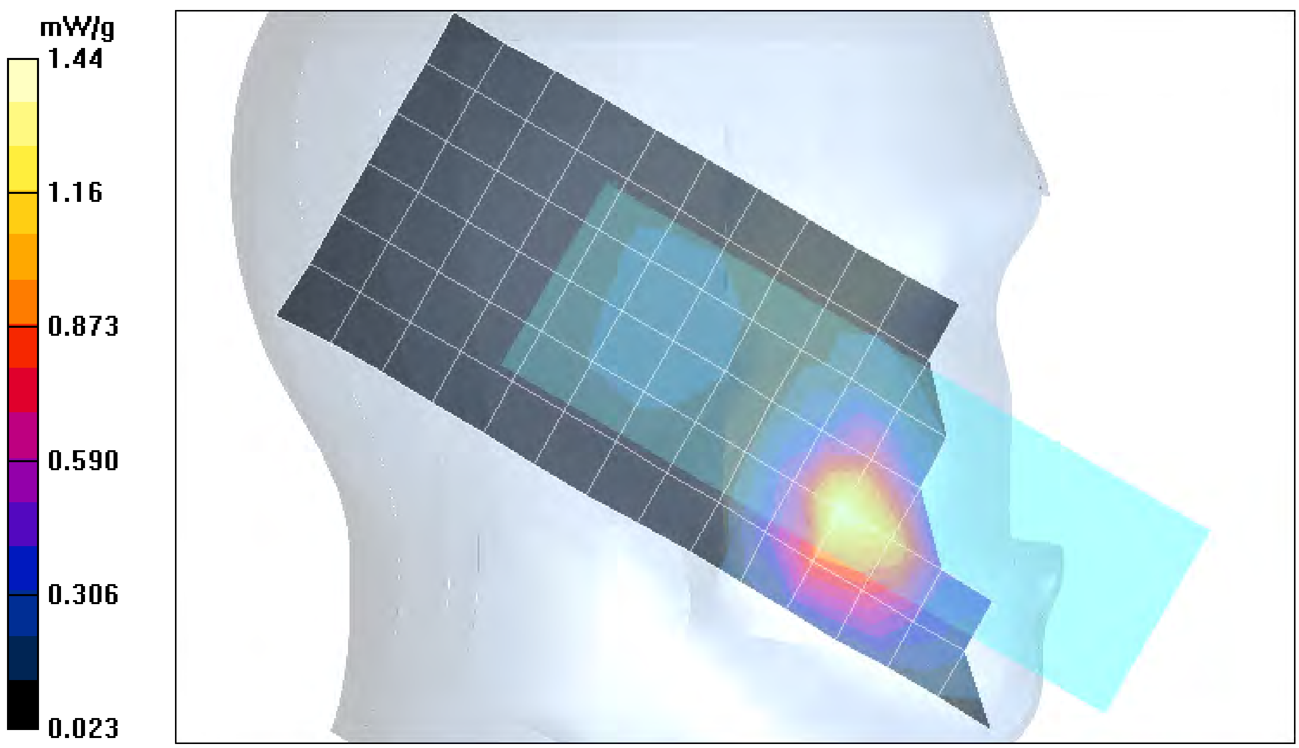
- Probe: ES3DV3 - SN3037; ConvF(5.01, 5.01, 5.01); Calibrated: 11/17/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 9/5/2005
- Phantom: R4: Glycol SAM; Type: SAM; Serial: TP-1250;
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 171

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

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 1.38 mW/g

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 28.7 V/m; Power Drift = 0.156 dB; Peak SAR (extrapolated) = 1.94 W/kg
SAR(1 g) = 1.31 mW/g; SAR(10 g) = 0.787 mW/g; Maximum value of SAR (measured) = 1.44 mW/g



Appendix 3

SAR distribution plots for Body Worn Configuration

Date/Time: 7/11/2006 2:14:20 PM

Test Laboratory: Motorola - CDMA 800 Body with SNN5756A

Serial: 806A1B93
Procedure Notes: Pwr Step: All Up; Antenna Position: Internal; Battery Model #: SNN5756A
Device Position: Back of Phone 15mm From Phantom
Communication System: CDMA 835; Frequency: 848.31 MHz; Channel Number: 777; Duty Cycle: 1:1

Medium: Low Freq Body
Medium parameters used: f = 835 MHz; $\sigma = 0.96$ mho/m; $\varepsilon_r = 54.3$; $\rho = 1000$ kg/m^3

DASY4 Configuration:

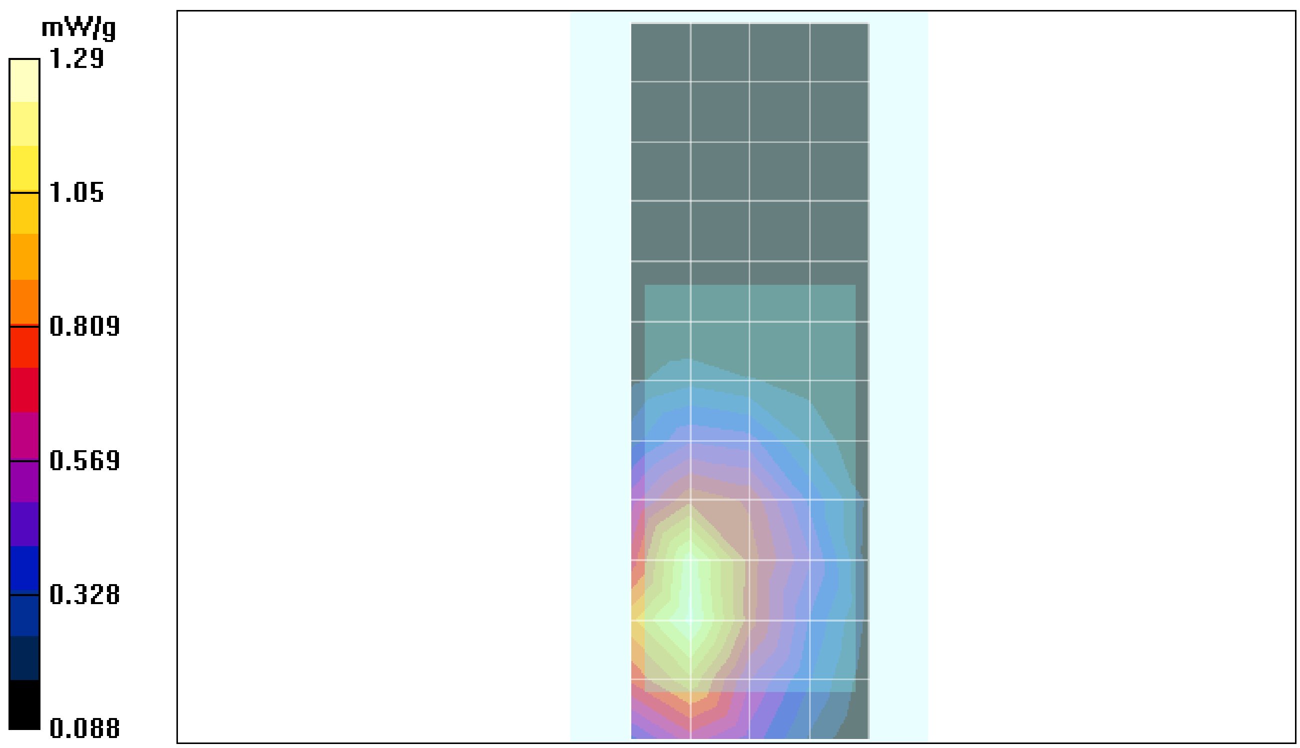
- Probe: ES3DV3 - SN3037; ConvF(5.93, 5.93, 5.93); Calibrated: 11/17/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 9/5/2005
- Phantom: R4 : Sect.1, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Amy Twin Phone Template/Area Scan - Normal Body (15mm) (13x7x1):

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 1.24 mW/g

Amy Twin Phone Template/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 31.0 V/m; Power Drift = 0.200 dB; Peak SAR (extrapolated) = 1.98 W/kg
SAR(1 g) = 1.2 mW/g; SAR(10 g) = 0.801 mW/g; Maximum value of SAR (measured) = 1.29 mW/g



Date/Time: 7/3/2006 11:27:27 PM

Test Laboratory: Motorola - CDMA 1900 Body

Serial: 806A1B93

Procedure Notes: Pwr Step: Always Up; Antenna Position: Internal; Battery Model #: SNN5758A
Device Position: Front of Phone 15mm from Flat Phantom with Bluetooth Mode
Communication System: CDMA 1900; Frequency: 1880 MHz; Channel Number: 600; Duty Cycle: 1:1

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:

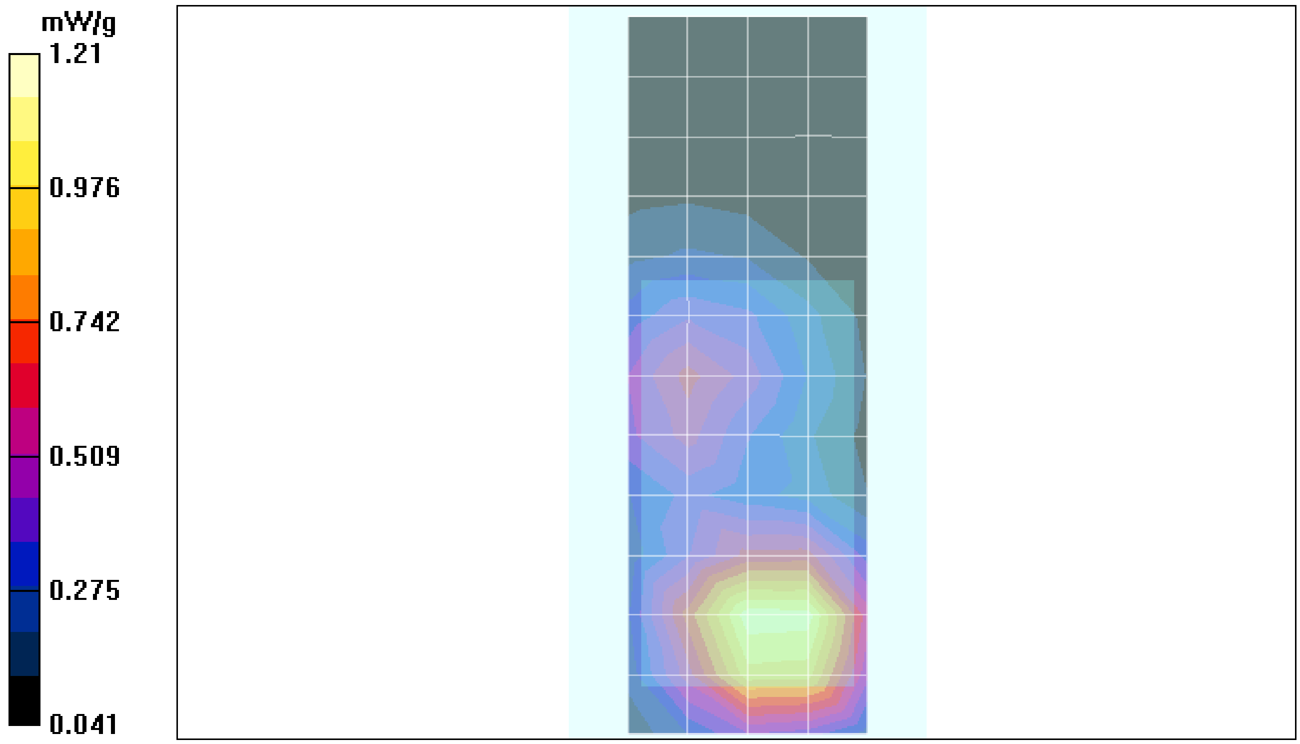
- Probe: ES3DV3 - SN3037; ConvF(4.65, 4.65, 4.65); Calibrated: 11/17/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 9/5/2005
- Phantom: R4 : Sect.2, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.6 Build 23; Postprocessing SW: SEMCAD, V1.8 Build 171

Amy Twin Phone Template/Area Scan - Normal Body (15mm) (13x7x1):

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 1.11 mW/g

Amy Twin Phone Template/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 25.9 V/m; Power Drift = -0.058 dB; Peak SAR (extrapolated) = 1.71 W/kg
SAR(1 g) = 1.11 mW/g; SAR(10 g) = 0.689 mW/g; Maximum value of SAR (measured) = 1.21 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**
C **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	D. Vetterli
Approved by:	Katja Pokovic	Technical Manager	Katja

Issued: November 17, 2005

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

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

Accredited by the Swiss 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

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

Probe 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]

NormX	**1.15** ± 10.1%	$\mu V/(V/m)^2$
NormY	**0.84** ± 10.1%	$\mu V/(V/m)^2$
NormZ	**0.95** ± 10.1%	$\mu V/(V/m)^2$

Diode Compression[B]

DCP X	**97** mV
DCP Y	**97** mV
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

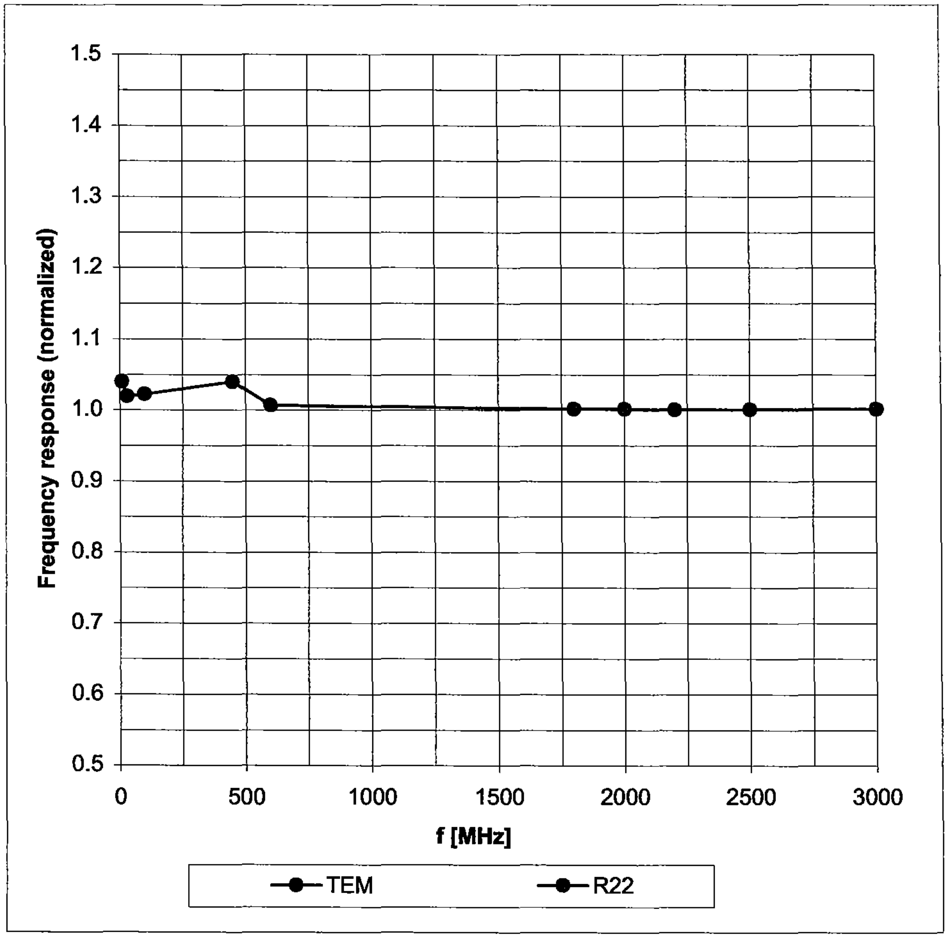
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[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.

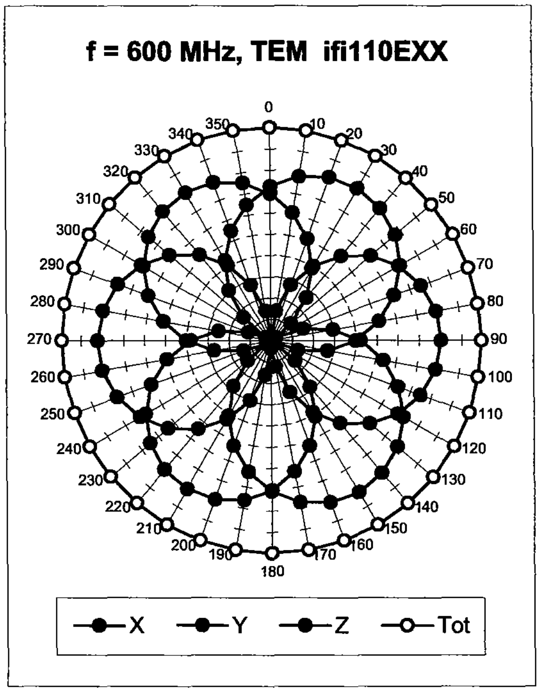
Frequency Response of E-Field

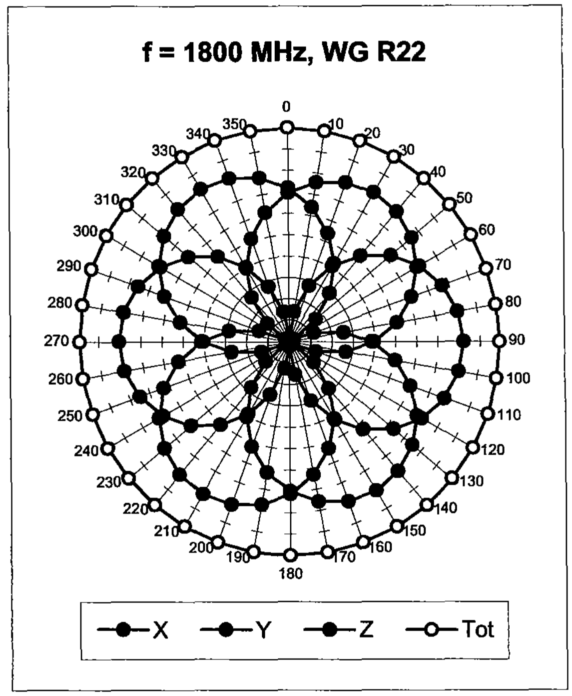
(TEM-Cell:ifi110 EXX, Waveguide: R22)

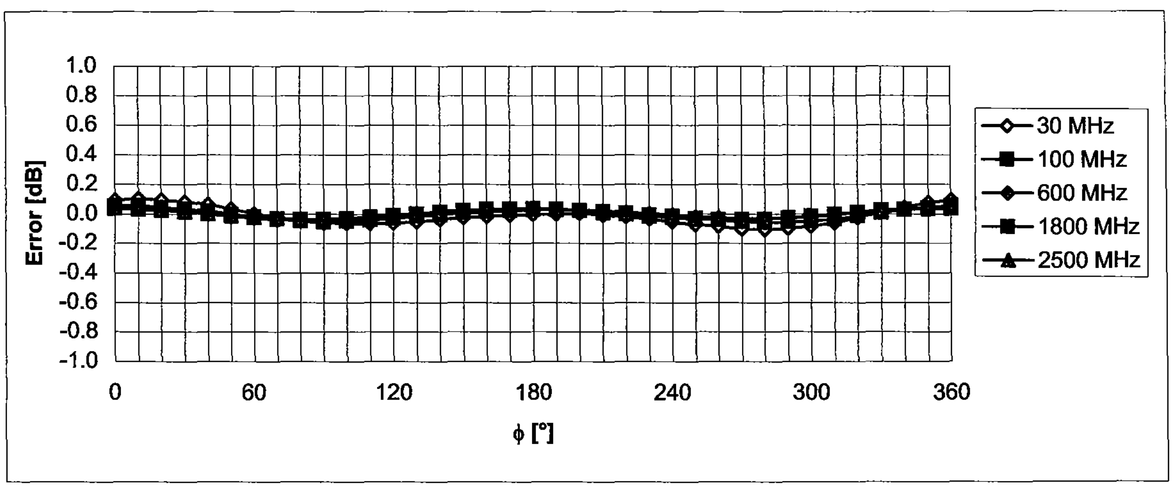


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), $\vartheta = 0°$



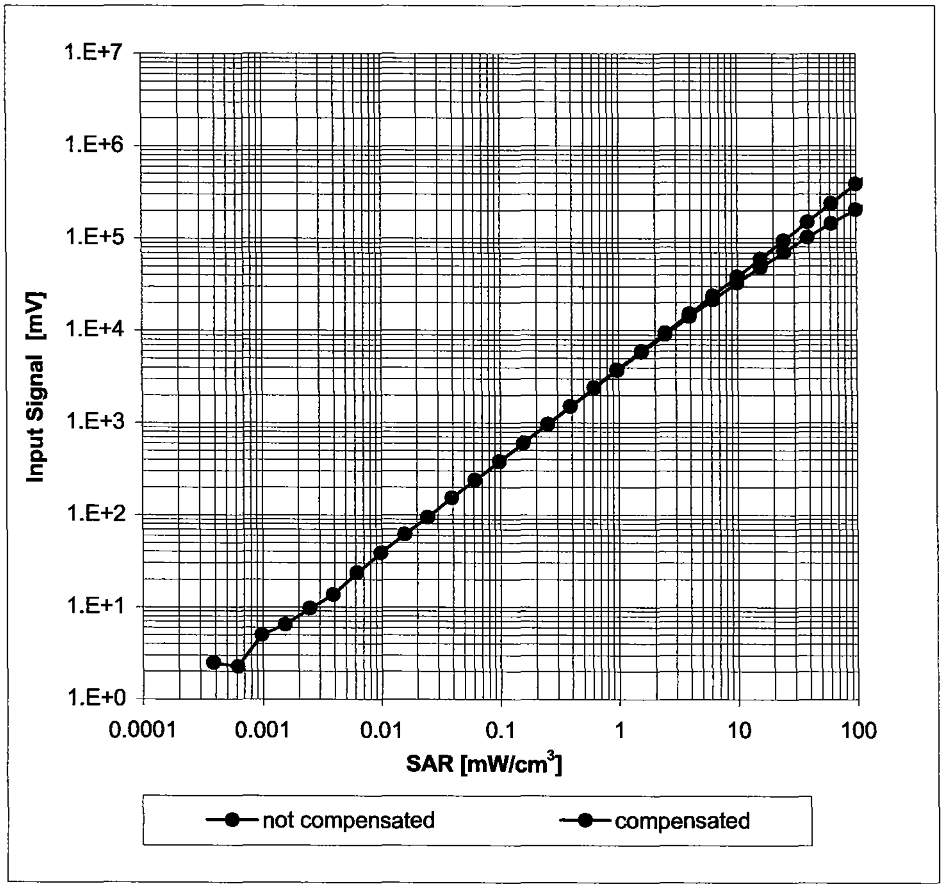


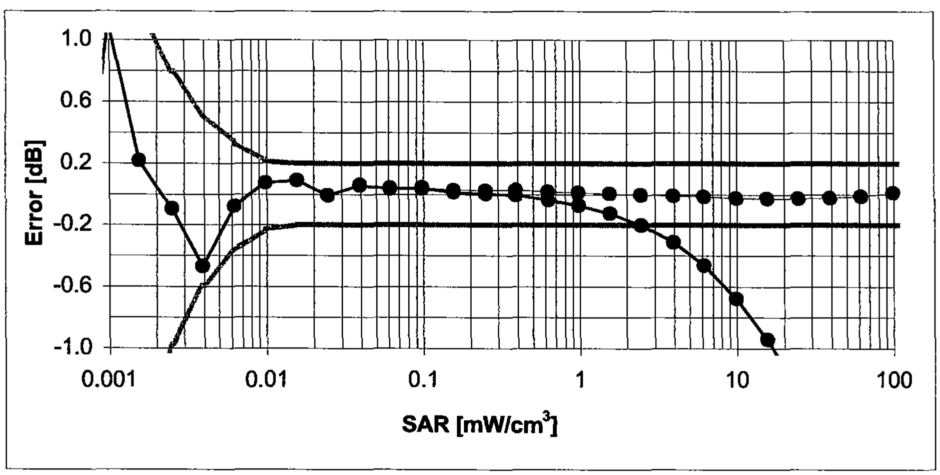


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

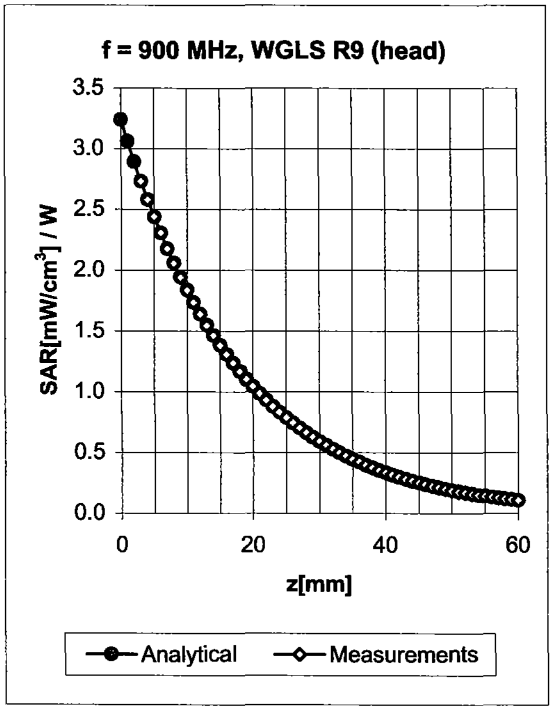
(Waveguide R22, f = 1800 MHz)

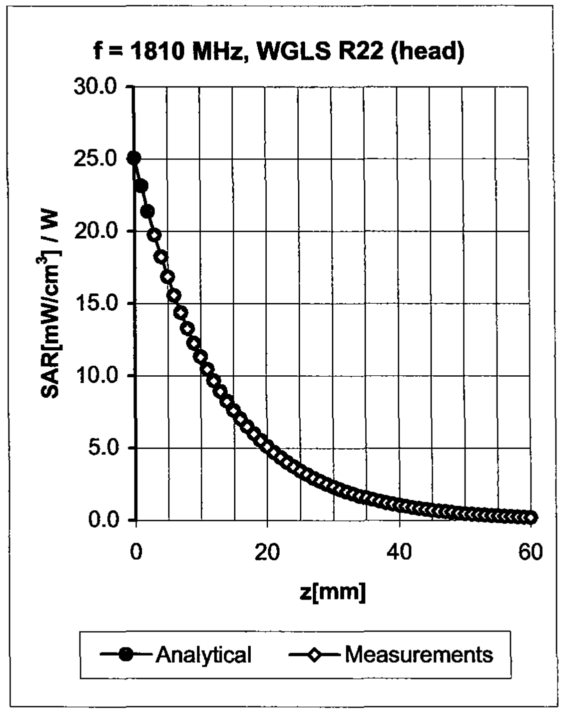




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



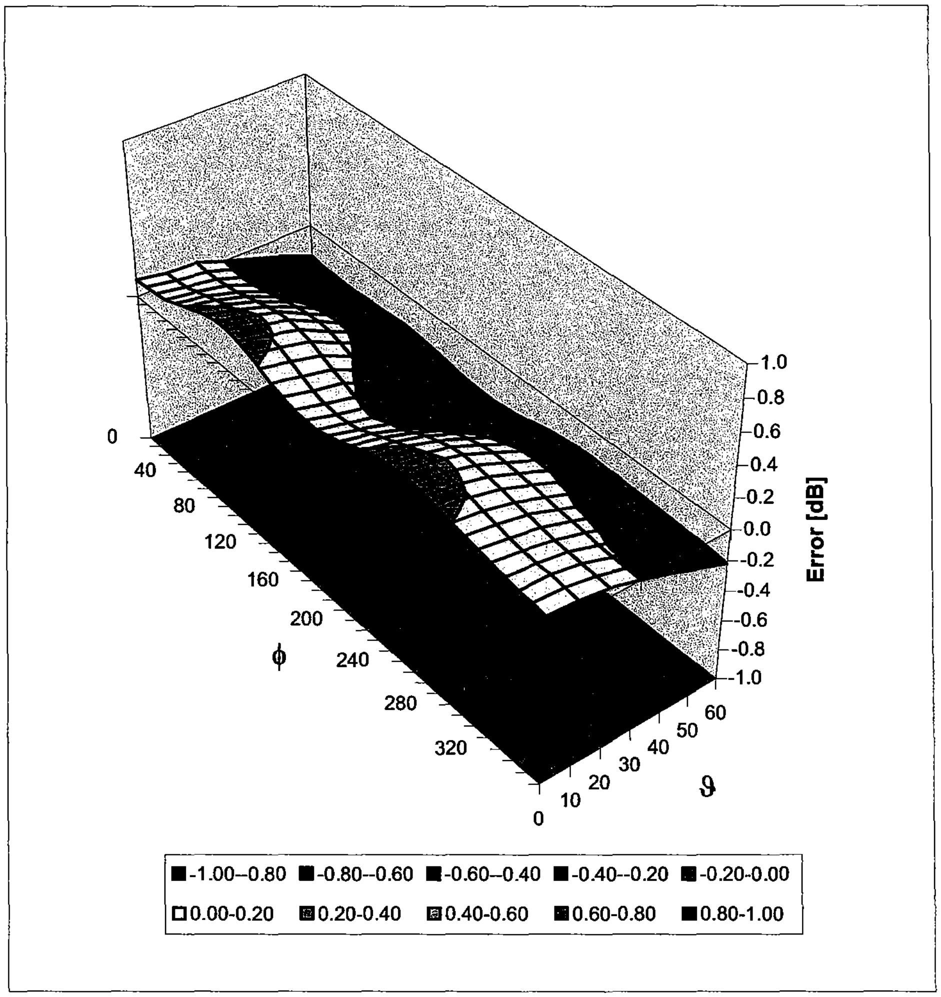


f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.44	1.35	6.07	± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.27	2.38	5.01	± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.28	2.21	4.66	± 11.0% (k=2)
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 5

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 6

Photographs of the device under test
(SEE FCC EXHIBIT 7A)

Appendix 7

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:			