



# MOTOROLA

## Portable Cellular Phone SAR Test Report

**Tests Requested By:** Motorola Mobile Devices  
600 N. US Highway 45  
Libertyville, IL 60048

**Test Report #:** 23265-1F  
**Date of Report:** Sep-10-2009  
**Date of Test:** Aug-27-2009 to Sep-03-2009  
**FCC ID #:** IHDT56KV2  
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**Test Laboratory:** Motorola Mobile Devices Business Product Safety & Compliance Laboratory  
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This laboratory is accredited to ISO/IEC 17025-2005 to perform the following tests:

**Accreditation:**



TESTING CERT #2518-02

Tests:  
Electromagnetic Specific Absorption Rate

Procedures:  
IEC 62209-1  
RSS-102  
IEEE 1528 - 2003  
FCC OET Bulletin 65 (including Supplement C)  
Australian Communications Authority Radio  
Communications (Electromagnetic Radiation – Human  
Exposure) Standard 2003  
CENELEC EN 50360  
ARIB Std. T-56 (2002)

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

**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 IEEE 1528 / CENELEC EN62209-1 (2006), 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 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 1 g average set in [3] and 2.0 W/kg in a 10 g average set in [2].

For ANSI / IEEE C95.1 (1 g), the final SAR reading for this phone is 1.37 W/kg for head-adjacent use and 0.43 W/kg for body-worn use. These measurements were performed using a Dasy4™ v4.7 system manufactured by Schmid & Partner Engineering AG (SPEAG), of Zurich Switzerland.

## 2. Description of the Device Under Test

### 2.1 Antenna description

<b>Type</b>	Internal	
<b>Location</b>	Bottom of Transceiver	
<b>Dimensions</b>	Length	55.02 mm
	Width	15.46 mm
	Height	4.38 mm
<b>Configuration</b>	FICA	

### 2.2 Device description

<b>Serial Number(s)</b>	<b>35668903000079, 35668903000012</b>								
<b>Mode(s) of Operation</b>	GSM 850	GSM 900	GSM 1800	GSM 1900	WCDMA 850	WCDMA 1900	WCDMA 2100	Wi-Fi 802.11b/g	Bluetooth
<b>Modulation Mode(s)</b>	GSMK	GSMK	GSMK	GSMK	QPSK	QPSK	QPSK	BPSK	GFSK
<b>Maximum Output Power Setting</b>	32.5 dBm	33.0 dBm	30.5 dBm	31.5 dBm	24.0 dBm	24.0 dBm	24.0 dBm	18 dBm	10 dBm
<b>Duty Cycle</b>	1:8	1:8	1:8	1:8	1:1	1:1	1:1	1:1	1:1
<b>Transmitting Frequency Range(s)</b>	824.2 - 848.8 MHz	880.2 - 914.8 MHz	1710.2 - 1784.8 MHz	1850.2 - 1909.8 MHz	826.4 - 846.6 MHz	1852.4 - 1907.6 MHz	1922.4 - 1977.6 MHz	2412.0 - 2462.5 MHz	2402.0 - 2483.5 MHz
<b>Production Unit or Identical Prototype (47 CFR §2.908)</b>	Identical Prototype								
<b>Device Category</b>	Portable								
<b>RF Exposure Limits</b>	General Population / Uncontrolled								

<b>Mode(s) of Operation</b>	GPRS 850				GPRS 900				GPRS 1800				GPRS 1900			
<b>Modulation</b>	GMSK				GMSK				GMSK				GMSK			
<b>Maximum Output Power Setting</b>	32.5	<b>30.5</b>	28.5	26.5	33.0	<b>31.0</b>	29.0	27.0	30.5	<b>28.5</b>	26.5	24.5	31.5	<b>29.5</b>	27.5	25.5
<b>Duty Cycle</b>	1:8	<b>2:8</b>	3:8	4:8	1:8	<b>2:8</b>	3:8	4:8	1:8	<b>2:8</b>	3:8	4:8	1:8	<b>2:8</b>	3:8	4:8
<b>Transmitting Frequency Range(s)</b>	824.2 - 848.8 MHz				880.2 - 914.8 MHz				1710.2 - 1784.8 MHz				1850.2 - 1909.8 MHz			

<b>Mode(s) of Operation</b>	EDGE 850				EDGE 900				EDGE 1800				EDGE 1900			
<b>Modulation</b>	8PSK				8PSK				8PSK				8PSK			
<b>Maximum Output Power Setting</b>	27.5	<b>25.5</b>	23.5	21.5	28.0	<b>26.0</b>	24.0	22.0	27.0	<b>25.0</b>	23.0	21.0	28.0	<b>26.0</b>	24.0	22.0
<b>Duty Cycle</b>	1:8	<b>2:8</b>	3:8	4:8	1:8	<b>2:8</b>	3:8	4:8	1:8	<b>2:8</b>	3:8	4:8	1:8	<b>2:8</b>	3:8	4:8
<b>Transmitting Frequency Range(s)</b>	824.2 - 848.8 MHz				880.2 - 914.8 MHz				1710.2 - 1784.8 MHz				1850.2 - 1909.8 MHz			

Note: Bolded entries indicate data mode configurations of highest time-average power output per band and data mode type.

### 3. Test Equipment Used

#### 3.1 Dosimetric System

The Motorola Mobile Devices Business Product Safety & Compliance Laboratory utilizes a Dosimetric Assessment System (Dasy4™ v4.7) manufactured by Schmid & Partner Engineering AG (SPEAG™), of Zurich Switzerland. All the SAR measurements are taken within a shielded enclosure. The overall 10 g RSS uncertainty of the measurement system is  $\pm 10.8\%$  (K=1) with an expanded uncertainty of  $\pm 21.6\%$  (K=2). The overall 1 g RSS uncertainty of the measurement system is  $\pm 11.1\%$  (K=1) with an expanded uncertainty of  $\pm 22.2\%$  (K=2). The measurement uncertainty budget is given in Appendix 5. Per IEEE 1528, this uncertainty budget is applicable to the SAR range of 0.4 W/kg to 10 W/kg.

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

Description	Serial Number	Cal Due Date
DASY4™ DAE V1	434	Feb-09-2010
E-Field Probe ES3DV3	3124	Apr-21-2010
S.A.M. Phantom used for 800/900 MHz	TP-1131	
S.A.M. Phantom used for 1800/1900/2450 MHz	TP-1250	
Dipole Validation Kit, DV900V2	91	Apr-01-2010
Dipole Validation Kit, DV1800V2	272TR	Apr-01-2010
Dipole Validation Kit, DV2450V2	740	Apr-01-2010

#### 3.2 Additional Equipment

Description	Serial Number	Cal Due Date
Signal Generator HP8648C	3847A04843	Apr-22-2010
Power Meter E4419B	GB39511084	Jun-17-2010
Power Sensor #1 - E9301A	US39210931	Jun-23-2010
Power Sensor #2 - E9301A	US39210932	Jun-23-2010
Signal Generator HP8648C	3847A04844	Jan-29-2010
Power Meter E4419B	GB39511086	Jun-12-2010
Power Sensor #1 - E9301A	US39210934	Apr-23-2010
Power Sensor #2 - E9301A	US39211006	Apr-22-2010
Signal Generator HP8648C	3847A04822	Apr-22-2010
Power Meter E4419B	GB39510961	Jan-24-2010
Power Sensor #1 - E9301A	US39210917	Jun-04-2010
Power Sensor #2 - E9301A	US39210918	Jun-04-2010
Network Analyzer HP8753ES	US39172529	Jun-11-2010
Dielectric Probe Kit HP85070C	US99360070	

#### 4. Electrical parameters of the tissue simulating liquid

Prior to conducting SAR measurements, the relative permittivity,  $\epsilon_r$ , and the conductivity,  $\sigma$ , 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  $\rho = 1 \text{ g/cm}^3$  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		
			$\epsilon_r$	$\sigma$ (S/m)	Temp (°C)
835	Head	Measured, Aug-27-2009	40.5	0.90	19.1
		Measured, Aug-28-2009	41.3	0.91	19.8
		Measured, Aug-29-2009	40.4	0.90	19.8
	Recommended Limits	41.5 ±5%	0.90 ±5%	18-25	
	Body	Measured, Aug-31-2009	54.1	0.98	20.0
		Measured, Sep-03-2009	53.7	0.98	20.0
Recommended Limits		55.2 ±5%	0.97 ±5%	18-25	
1880	Head	Measured, Aug-28-2009	38.0	1.47	19.5
		Recommended Limits	40.0 ±5%	1.40 ±5%	18-25
	Body	Measured, Aug-31-2009	51.6	1.58	19.1
		Recommended Limits	53.3 ±5%	1.52 ±5%	18-25
2450	Head	Measured, Sep-02-2009	37.3	1.78	19.8
		Recommended Limits	39.2 ±10%	1.80 ±5%	18-25
	Body	Measured, Sep-02-2009	51.8	1.89	20.0
		Recommended Limits	52.7 ±10%	1.95 ±5%	18-25

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

Ingredient	835 MHz / 900 MHz Head	835 MHz / 900 MHz Body	1800 MHz / 1900 MHz Head	1800 MHz / 1900 MHz Body	2450 MHz 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  $\pm 10\%$  from the target SAR indicated in Appendix 6. These frequencies are within  $\pm 10\%$  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 1 W 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 15.0 cm  $\pm$  0.5 cm. Z-axis scans showing the SAR penetration are also included in Appendix 1.

f (MHz)	Description	SAR (W/kg), 1 gram	Dielectric Parameters		Ambient Temp (°C)	Tissue Temp (°C)
			$\epsilon_r$	$\sigma$ (S/m)		
900	Measured, Aug-27-2009	11.25	39.7	0.96	19.8	20.5
	Measured, Aug-28-2009	11.425	40.5	0.97	19.7	20.2
	Measured, Aug-29-2009	11.375	39.7	0.96	20.1	20.0
	Measured, Aug-30-2009	11.675	41.7	0.99	20.0	19.4
	Measured, Aug-31-2009	11.325	41.5	0.98	19.6	19.8
	Measured, Sep-03-2009	11.30	41.1	0.98	19.9	19.8
	<b>Recommended Limits</b>	11.19	41.5 $\pm 5\%$	0.97 $\pm 5\%$	18-25	18-25
1800	Measured, Aug-28-2009	38.325	38.4	1.38	19.7	19.5
	Measured, Aug-30-2009	40.75	39.3	1.39	20.0	19.7
	Measured, Aug-31-2009	40.00	39.4	1.37	19.6	19.1
	Measured, Sep-03-2009	39.65	39.1	1.38	19.6	19.5
	<b>Recommended Limits</b>	37.91	40.0 $\pm 5\%$	1.4 $\pm 5\%$	18-25	18-25
2450	Measured, Sep-02-2009	53.75	37.3	1.78	19.9	19.8
	<b>Recommended Limits</b>	56.68	39.2 $\pm 10\%$	1.80 $\pm 5\%$	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	3124	900	5.73	8 of 9
		1810	4.95	8 of 9
		2450	4.42	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 set up 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 ( $\pm 30\%$ ) at 850 MHz. 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 15 mm or less as shown in the SAR plots included in Appendix 2 and 3. Please refer to the DASY4™ 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 SNN5843A - 1390 mAH Battery

This battery was used to complete all of the SAR testing. The phone was placed in the SAR measurement system with a fully charged battery.

Per the “SAR Measurement Procedures for 3G Devices” released in October, 2007, 12.2 kbps RMC, 12.2 kbps AMR, HS-DPCCH Sub-test 1-4, and E-DCH Sub-test 1-5 modes were considered. The conducted power measurements (per section 5.2 of 3GPP TS 34.121) for each mode are shown in the table below.

Band	Channel	Conducted power (dBm) for WCDMA modes		Conducted Power (dBm) for WCDMA – HSDPA (Rel 5) Modes				Conducted Power (dBm) for WCDMA – HSPA (HSUPA/HSDPA-Rel 6) Modes				
		RMC	AMR	Subtest 1	Subtest 2	Subtest 3	Subtest 4	Subtest 1	Subtest 2	Subtest 3	Subtest 4	Subtest 5
WCDMA 850	4132	23.90	23.87	23.92	21.90	21.07	20.84	23.99	23.97	23.98	24.01	24.05
	4180	23.81	23.86	23.74	21.92	20.90	20.90	23.85	23.98	23.95	24.02	24.00
	4233	23.82	23.80	23.80	21.81	20.98	20.82	23.91	23.85	23.91	23.81	23.91
WCDMA 1900	9262	23.93	24.04	23.51	22.23	21.30	21.31	24.17	24.05	24.16	24.03	24.20
	9400	23.93	23.93	23.85	22.00	21.25	20.93	24.74	23.98	24.07	23.98	24.10
	9538	23.88	23.55	23.04	21.73	20.82	20.64	23.73	23.72	23.75	23.56	23.58

### **This product utilizes the following mechanism for Maximum Power Reduction (MPR)**

The device supports MPR to solve linearity issues (ACLR or SEM) due to the higher peak-to-average ratios (PAR) of the HSUPA signal. This prevents saturating the full range of the TX DAC inside of the device and provides a reduced power output to the RF transceiver chip according to the Cubic Metric (a function of the combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH).

When E-DPDCH channels are present, the beta gains on those channels are reduced first to try to get the power under the allowed limit. If the beta gains are lowered as far as possible, then a hard limiting is applied at the maximum allowed level.

The SW currently recalculates the cubic metric every time the beta gains on the E-DPDCH are reduced. The cubic metric will likely get lower each time this is done. However, there is no reported reduction of maximum output power in the HSUPA mode since the device also provides a mechanism to compensate for the power back-off by increasing the gain of TX\_AGC in the transceiver (PA) device.

The end effect is that the DUT output power is identical to the case where there is no MPR in the device.

## 6.1 Head Adjacent Test Results

The SAR results shown in tables 1 through 4 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 power levels, the temperature of the simulated tissue after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is  $\text{New SAR} = \text{Old SAR} * 10^{(-\text{drift}/10)}$ . 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 tables below also include the highest SAR value summations for primary and secondary co-located transmitters, with the results indicated in italics.

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 15.0 cm ± 0.5 cm.

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

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ES3DV3	3124	900	5.73	8 of 9
		1810	4.95	8 of 9
		1950	4.78	8 of 9
		2450	4.42	8 of 9

Left Head Cheek Position								
<i>f</i> (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	<i>10 g SAR value</i>		<i>1 g SAR value</i>	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
<b>GSM 850</b>	Channel 128	32.34						
	Channel 190	32.35	19.8	0.110	0.202	0.20	0.262	0.26
	Channel 251	32.37						
<b>GSM 1900</b>	Channel 512	31.88						
	Channel 661	31.40	<b>19.4</b>	<b>-0.023</b>	<b>0.390</b>	<b>0.39</b>	<b>0.657</b>	<b>0.66</b>
	Channel 810	31.41						
<b>WCDMA 850</b>	Channel 4132	23.90						
	Channel 4180	23.81	19.7	-0.134	0.346	0.36	0.446	0.46
	Channel 4233	23.82						
<b>WCDMA 1900</b>	Channel 9262	23.93	<b>19.6</b>	<b>0.136</b>	<b>0.735</b>	<b>0.74</b>	<b>1.22</b>	<b>1.22</b>
	Channel 9400	23.94	19.6	-0.157	0.661	0.69	1.11	1.15
	Channel 9538	23.88	19.7	0.354	0.670	0.67	1.12	1.12
<b>WI-FI 2450</b>	Channel 1							
	Channel 6	17.72	19.8	0.269	0.0686	0.07	0.150	0.15
	Channel 11							
<i>GSM 850 + WI-FI</i>						0.27		0.41
<i>GSM 1900 + WI-FI</i>						0.46		0.81
<i>WCDMA 850 + WI-FI</i>						0.43		0.61
<i>WCDMA 1900 + WI-FI</i>						0.81		1.37

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								
<i>f</i> (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	<i>10 g SAR value</i>		<i>1 g SAR value</i>	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
<b>GSM 850</b>	Channel 128	32.34						
	Channel 190	32.35	<b>19.6</b>	<b>0.349</b>	<b>0.228</b>	<b>0.23</b>	<b>0.301</b>	<b>0.30</b>
	Channel 251	32.37						
<b>GSM 1900</b>	Channel 512	31.88						
	Channel 661	31.40	19.4	-0.012	0.313	0.31	0.477	0.48
	Channel 810	31.41						
<b>WCDMA 850</b>	Channel 4132	23.90						
	Channel 4180	23.81	<b>19.8</b>	<b>-0.073</b>	<b>0.386</b>	<b>0.39</b>	<b>0.504</b>	<b>0.51</b>
	Channel 4233	23.82						
<b>WCDMA 1900</b>	Channel 9262	23.93						
	Channel 9400	23.94	19.3	0.439	0.479	0.48	0.729	0.73
	Channel 9538	23.88						
<b>WI-FI 2450</b>	Channel 1							
	Channel 6	17.72	<b>19.8</b>	<b>-0.047</b>	<b>0.070</b>	<b>0.07</b>	<b>0.154</b>	<b>0.16</b>
	Channel 11							
<i>GSM 850 + WI-FI</i>						<i>0.30</i>		<i>0.46</i>
<i>GSM 1900 + WI-FI</i>						<i>0.38</i>		<i>0.64</i>
<i>WCDMA 850 + WI-FI</i>						<i>0.46</i>		<i>0.67</i>
<i>WCDMA 1900 + WI-FI</i>						<i>0.55</i>		<i>0.89</i>

**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								
<i>f</i> (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	<i>10 g SAR value</i>		<i>1 g SAR value</i>	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
<b>GSM 850</b>	Channel 128	32.34						
	Channel 190	32.35	<b>19.1</b>	<b>0.065</b>	<b>0.179</b>	<b>0.18</b>	<b>0.238</b>	<b>0.24</b>
	Channel 251	32.37						
<b>GSM 1900</b>	Channel 512	31.88						
	Channel 661	31.40	<b>19.4</b>	<b>0.021</b>	<b>0.223</b>	<b>0.22</b>	<b>0.359</b>	<b>0.36</b>
	Channel 810	31.41						
<b>WCDMA 850</b>	Channel 4132	23.90						
	Channel 4180	23.81	19.3	-0.384	0.320	0.35	0.424	0.46
	Channel 4233	23.82						
<b>WCDMA 1900</b>	Channel 9262	23.93						
	Channel 9400	23.94	<b>19.6</b>	<b>-0.104</b>	<b>0.403</b>	<b>0.41</b>	<b>0.650</b>	<b>0.67</b>
	Channel 9538	23.88						
<b>WI-FI 2450</b>	Channel 1							
	Channel 6	17.72	<b>19.8</b>	<b>0.019</b>	<b>0.026</b>	<b>0.03</b>	<b>0.050</b>	<b>0.05</b>
	Channel 11							
<i>GSM 850 + WI-FI</i>						0.21		0.29
<i>GSM 1900 + WI-FI</i>						0.25		0.41
<i>WCDMA 850 + WI-FI</i>						0.38		0.51
<i>WCDMA 1900 + WI-FI</i>						0.44		0.72

**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)	10 g SAR value		1 g SAR value	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
GSM 850	Channel 128	32.34						
	Channel 190	32.35	18.7	0.061	0.164	0.16	0.217	0.22
	Channel 251	32.37						
GSM 1900	Channel 512	31.88						
	Channel 661	31.40	19.0	-0.092	0.216	0.22	0.348	0.36
	Channel 810	31.41						
WCDMA 850	Channel 4132	23.90						
	Channel 4180	23.81	19.8	-0.123	0.353	0.36	0.465	0.48
	Channel 4233	23.82						
WCDMA 1900	Channel 9262	23.93						
	Channel 9400	23.94	19.6	-0.095	0.381	0.39	0.611	0.62
	Channel 9538	23.88						
WI-FI 2450	Channel 1							
	Channel 6	17.72	19.8	0.184	0.0173	0.02	0.0315	0.03
	Channel 11							
GSM 850 + WI-FI						0.18		0.25
GSM 1900 + WI-FI						0.24		0.39
WCDMA 850 + WI-FI						0.38		0.51
WCDMA 1900 + WI-FI						0.41		0.65

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.

## 6.2 Body Worn Test Results

The SAR results shown in tables 5 through 10 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 power levels, 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  $\text{New SAR} = \text{Old SAR} * 10^{(-\text{drift}/10)}$ . 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. The tables below also include the highest SAR value summations for primary and secondary co-located transmitters, with the results indicated in italics.

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 2.0 mm. It measures 52.7 cm(long) x 26.7 cm(wide) x 21.2 cm(tall). The measured dielectric constant of the material used is less than 2.3 and the loss tangent is less than 0.0046 at frequencies up to 2.184 GHz.

The tissue stimulant depth was verified to be 15.0 cm ± 0.5 cm. 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. 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 at the time of testing thus the device was tested per the Supplement C testing guidelines for devices that do not have body-worn accessories. A separation distance of 25 mm between the device and the flat phantom was used for testing body-worn SAR. The device was tested with the front and back of the device facing the phantom.

In addition to accessory testing, the cellular phone was tested in data mode operations with the front and back of the phone facing the phantom. For these tests, a separation distance of 25 mm between the device and the flat phantom was used.

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	3124	900	5.73	8 of 9
		1810	4.75	8 of 9
		1950	4.69	8 of 9
		2450	4.05	8 of 9

Body-Worn; Front of Phone 25 mm from Phantom								
<i>f</i> (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
<b>GSM 850</b>	Channel 128	32.34						
	Channel 190	32.35	19.9	0.005	0.060	0.06	0.082	0.08
	Channel 251	32.37						
<b>GSM 1900</b>	Channel 512	31.88						
	Channel 661	31.40	19.9	-0.027	0.065	0.07	0.0998	0.10
	Channel 810	31.41						
<b>WCDMA 850</b>	Channel 4132	23.90						
	Channel 4180	23.81	20.0	-0.036	0.129	0.13	0.172	0.17
	Channel 4233	23.82						
<b>WCDMA 1900</b>	Channel 9262	23.93						
	Channel 9400	23.94	19.2	-0.063	0.115	0.12	0.176	0.18
	Channel 9538	23.88						
<b>WI-FI 2450</b>	Channel 1							
	Channel 6	17.72	19.8	-0.062	0.005	0.01	0.009	0.01
	Channel 11							
<i>GSM 850 + WI-FI</i>						0.07		0.09
<i>GSM 1900 + WI-FI</i>						0.08		0.11
<i>WCDMA 850 + WI-FI</i>						0.14		0.18
<i>WCDMA 1900 + WI-FI</i>						0.13		0.19

**Table 5: 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 25 mm from Phantom								
<i>f</i> (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	<i>10 g SAR value</i>		<i>1 g SAR value</i>	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
<b>GSM 850</b>	Channel 128	32.34						
	Channel 190	32.35	20.0	-0.062	0.093	0.09	0.128	0.13
	Channel 251	32.37						
<b>GSM 1900</b>	Channel 512	31.88						
	Channel 661	31.40	19.9	-0.005	0.108	0.11	0.174	0.17
	Channel 810	31.41						
<b>WCDMA 850</b>	Channel 4132	23.90						
	Channel 4180	23.81	<b>20.0</b>	<b>-0.025</b>	<b>0.235</b>	<b>0.34</b>	<b>0.318</b>	<b>0.32</b>
	Channel 4233	23.82						
<b>WCDMA 1900</b>	Channel 9262	23.93						
	Channel 9400	23.94	19.2	-0.004	0.191	0.19	0.305	0.31
	Channel 9538	23.88						
<b>WI-FI 2450</b>	Channel 1							
	Channel 6	17.72	<b>20.0</b>	<b>0.024</b>	<b>0.029</b>	<b>0.03</b>	<b>0.053</b>	<b>0.05</b>
	Channel 11							
<b>Bluetooth 2450</b>	Channel 0							
	Channel 39	9.096	<b>20.0</b>	<b>0.867</b>	<b>0.000355</b>	<b>0.00</b>	<b>0.00071</b>	<b>0.00</b>
	Channel 78							
<i>GSM 850 + WI-FI</i>						<i>0.12</i>		<i>0.18</i>
<i>GSM 1900 + WI-FI</i>						<i>0.14</i>		<i>0.22</i>
<i>WCDMA 850 + WI-FI</i>						<i>0.37</i>		<i>0.37</i>
<i>WCDMA 1900 + WI-FI</i>						<i>0.22</i>		<i>0.36</i>

**Table 6: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.**

GPRS Class 10 (2 Uplink Timeslots) Body-Worn; Back of Phone 25 mm from Phantom								
<i>f</i> (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
GSM 850	Channel 128	30.61						
	Channel 190	30.52	20.0	0.017	0.146	0.15	0.197	0.20
	Channel 251	30.37						
GSM 1900	Channel 512	29.48						
	Channel 661	29.53	19.2	-0.044	0.168	0.17	0.269	0.27
	Channel 810	29.33						
GSM 850 + WI-FI						0.18		0.25
GSM 1900 + WI-FI						0.20		0.32

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

EDGE Class 10 (2 Uplink Timeslots) Body-Worn; Back of Phone 25 mm from Phantom								
<i>f</i> (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
GSM 850	Channel 128	25.57						
	Channel 190	25.54	20.0	-0.003	0.094	0.09	0.127	0.13
	Channel 251	25.37						
GSM 1900	Channel 512	26.06						
	Channel 661	26.09	19.1	-0.007	0.082	0.08	0.131	0.13
	Channel 810	25.91						
GSM 850 + WI-FI						0.12		0.18
GSM 1900 + WI-FI						0.11		0.18

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

HSPA (HSUPA/HSDPA Rel. 6) Subtest 1 Body-Worn; Back of Phone 25 mm from Phantom								
<i>f</i> (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
WCDMA 1900	Channel 9262	24.17						
	Channel 9400	24.74	19.1	-0.057	0.230	0.23	0.371	0.38
	Channel 9538	23.73						
WCDMA 1900 + WI-FI						0.26		0.43

Table 9: 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, en62209-1:2006 “Human Exposure to Radio Frequency Fields From Hand - Held and Body - Mounted Wireless Communication Devices – Human Models, Instrumentation, and Procedures”
- [2] CENELEC, en50360:2001 “Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300 MHz – 3 GHz)”.
- [3] ANSI / IEEE, C95.1 1999 Edition “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”
- [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**

## Test Laboratory: Motorola - 082709 900 MHz

**DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 91; FCC ID: IHDT56KV2**

Procedure Notes: 900 MHz System Performance Check; Dipole Sn# 91; Input Power = 200 mW

Sim.Temp@meas = 20.5 °C; Sim.Temp@SPC = 20.5 °C; Room Temp @ SPC = 19.8 °C

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

Medium: VALIDATION Only

Medium parameters used:  $f = 900$  MHz;  $\sigma = 0.96$  mho/m;  $\epsilon_r = 39.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(5.73, 5.73, 5.73); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R#4 Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 2.21 mW/g

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

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 50.3 V/m; Power Drift = -0.027 dB; Peak SAR (extrapolated) = 3.44 W/kg

**SAR(1 g) = 2.25 mW/g; SAR(10 g) = 1.44 mW/g; Maximum value of SAR (measured) = 2.43 mW/g**

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

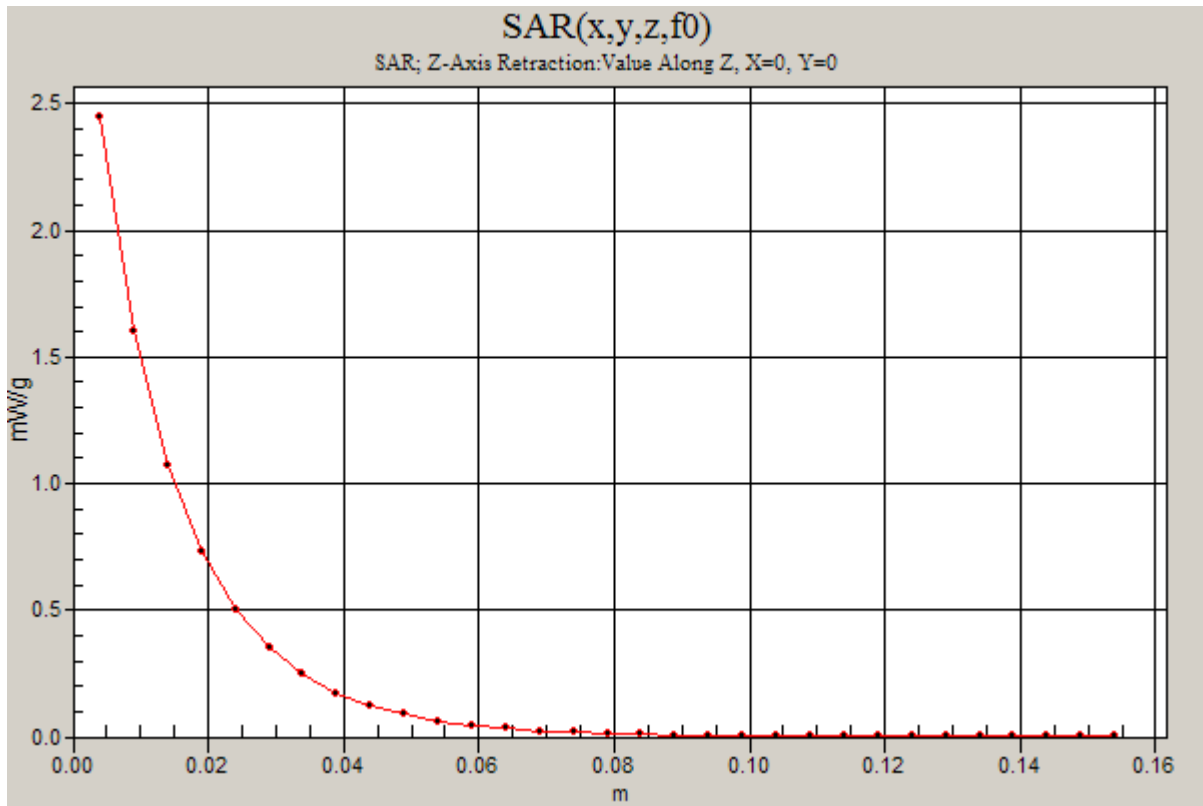
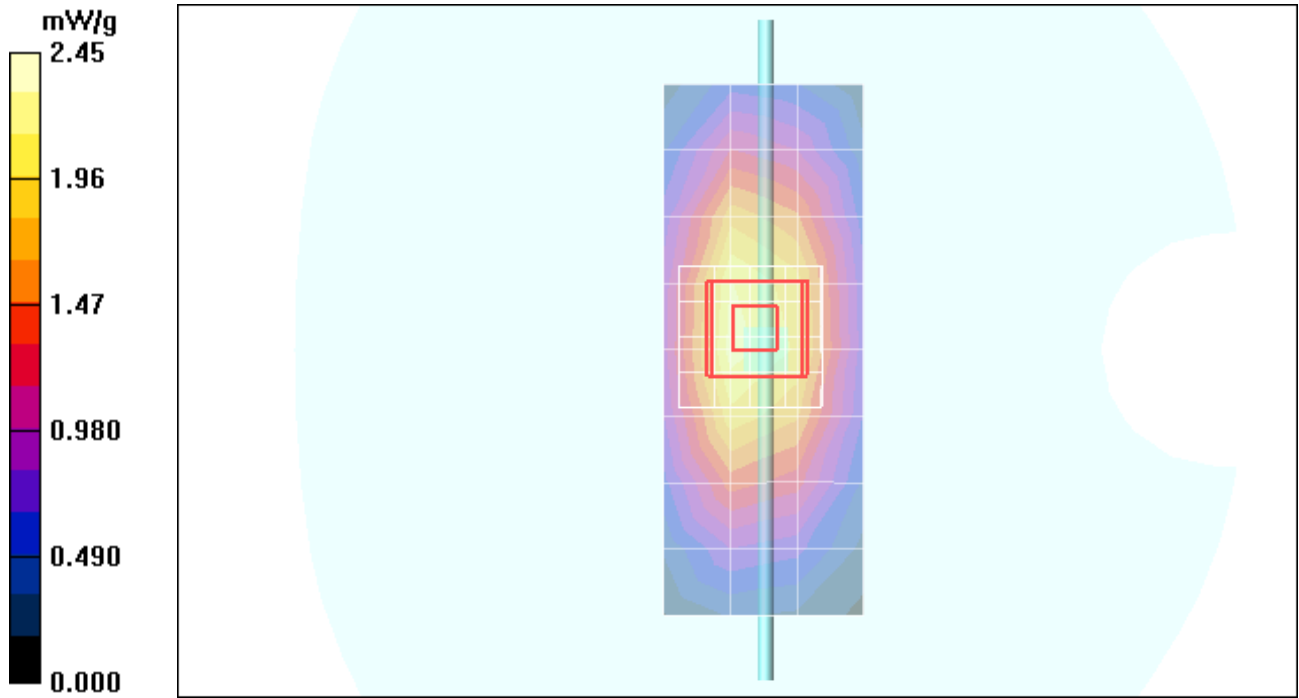
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 50.3 V/m; Power Drift = -0.027 dB; Peak SAR (extrapolated) = 3.45 W/kg

**SAR(1 g) = 2.25 mW/g; SAR(10 g) = 1.44 mW/g**

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

Measurement grid: dx=20mm, dy=20mm, dz=5mm; Maximum value of SAR (measured) = 2.45 mW/g



## Test Laboratory: Motorola - 082809 900 MHz

**DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 91; FCC ID: IHDT56KV2**

Procedure Notes: 900 MHz System Performance Check; Dipole Sn# 91; Input Power = 200 mW

Sim.Temp@meas = 20.2°C; Sim.Temp@SPC = 20.2°C; Room Temp @ SPC = 19.7°C

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

Medium: VALIDATION Only

Medium parameters used:  $f = 900$  MHz;  $\sigma = 0.97$  mho/m;  $\epsilon_r = 40.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(5.73, 5.73, 5.73); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R#4 Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 2.13 mW/g

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

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 51.0 V/m; Power Drift = -0.017 dB; Peak SAR (extrapolated) = 3.50 W/kg

**SAR(1 g) = 2.28 mW/g; SAR(10 g) = 1.46 mW/g; Maximum value of SAR (measured) = 2.48 mW/g**

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

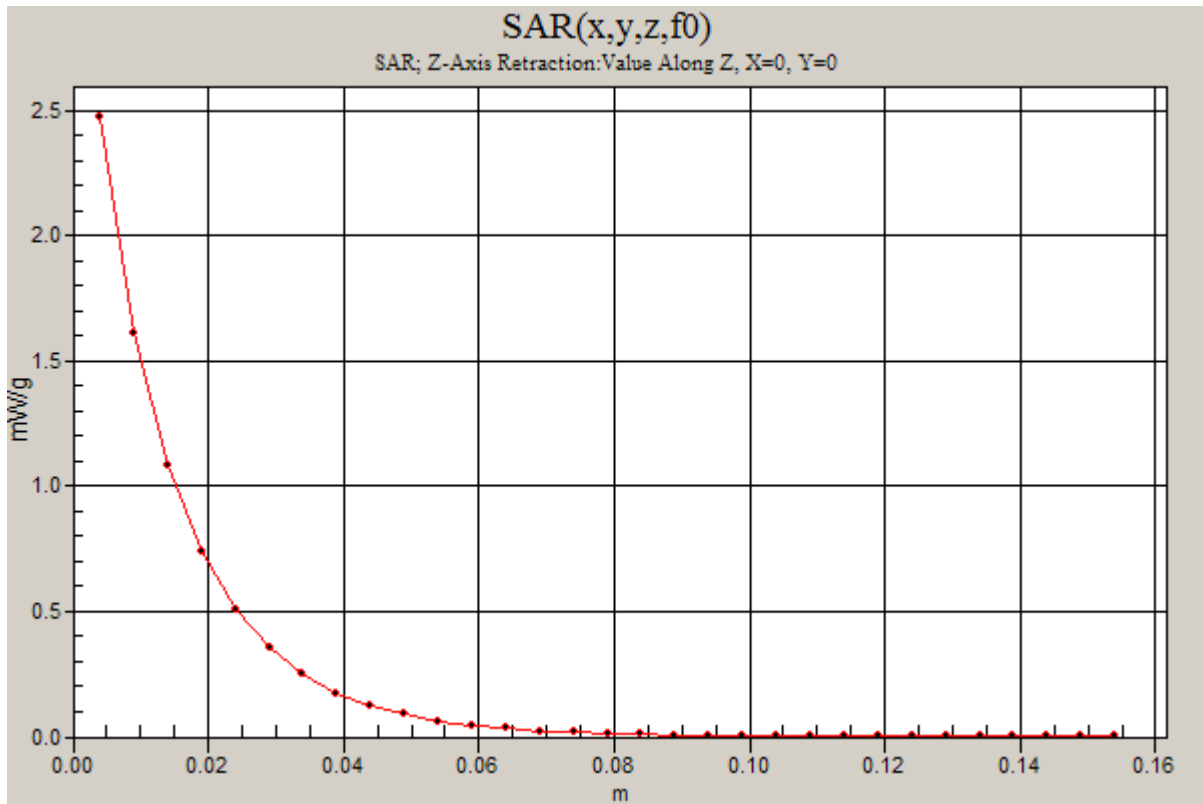
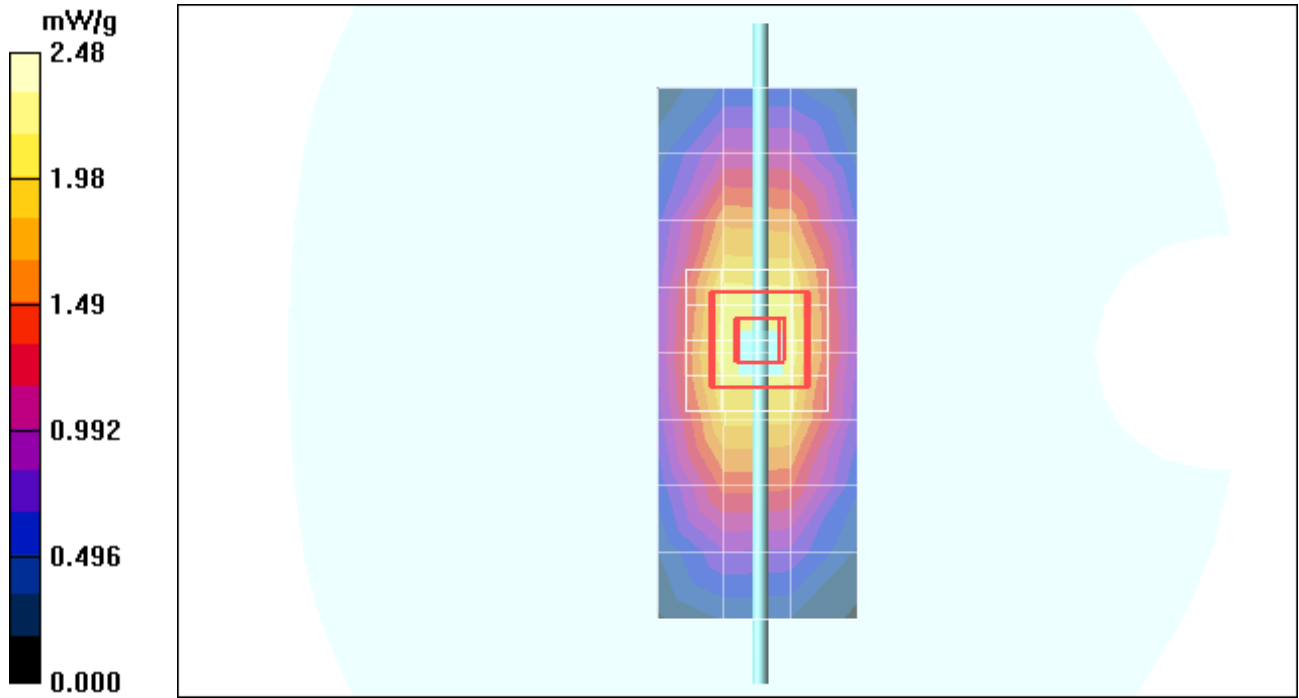
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 51.0 V/m; Power Drift = -0.017 dB; Peak SAR (extrapolated) = 3.51 W/kg

**SAR(1 g) = 2.29 mW/g; SAR(10 g) = 1.46 mW/g**

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

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



## Test Laboratory: Motorola - 082909 900 MHz

**DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 91; FCC ID: IHDT56KV2**

Procedure Notes: 900 MHz System Performance Check; Dipole Sn# 91; Input Power = 200 mW

Sim.Temp@meas = 20.0°C; Sim.Temp@SPC = 20.0°C; Room Temp @ SPC = 20.1°C

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

Medium: VALIDATION Only

Medium parameters used:  $f = 900$  MHz;  $\sigma = 0.96$  mho/m;  $\epsilon_r = 39.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(5.73, 5.73, 5.73); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R#4 Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 2.34 mW/g

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

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 50.2 V/m; Power Drift = 0.002 dB; Peak SAR (extrapolated) = 3.46 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/90-Degree 5x5x7 Cube (5x5x7)/Cube 0:

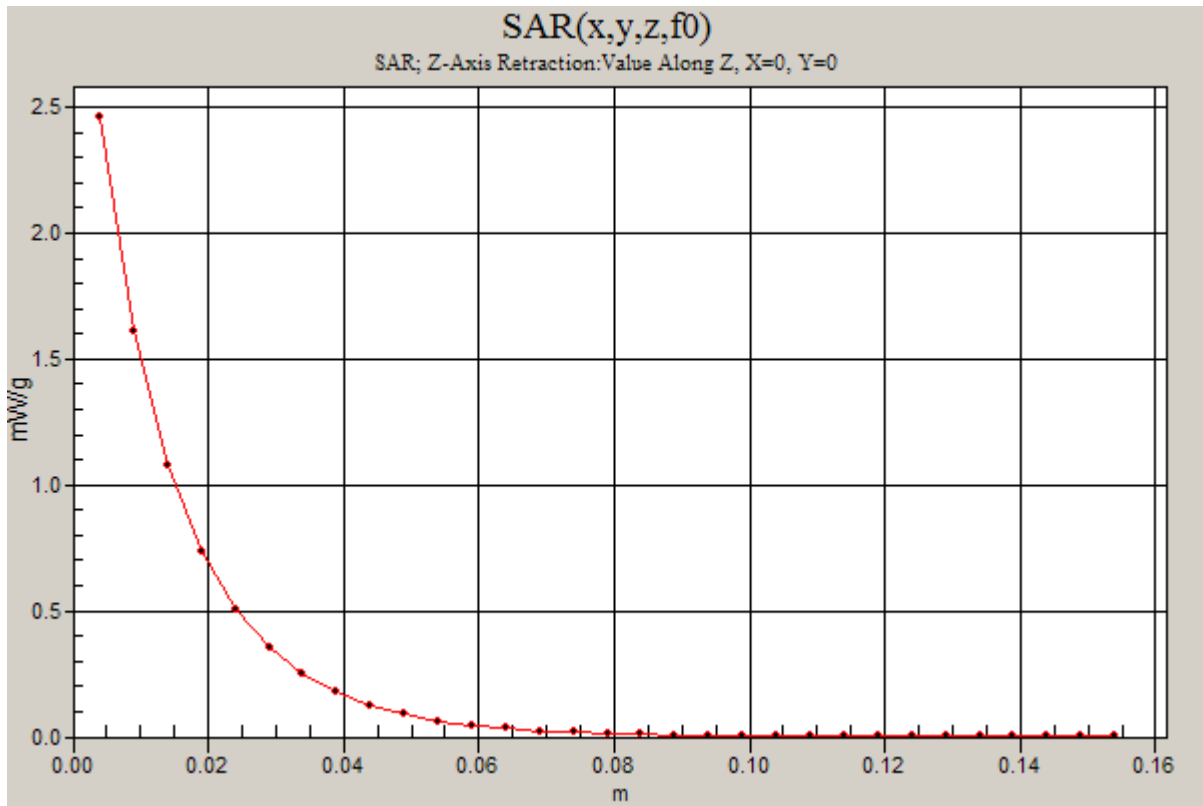
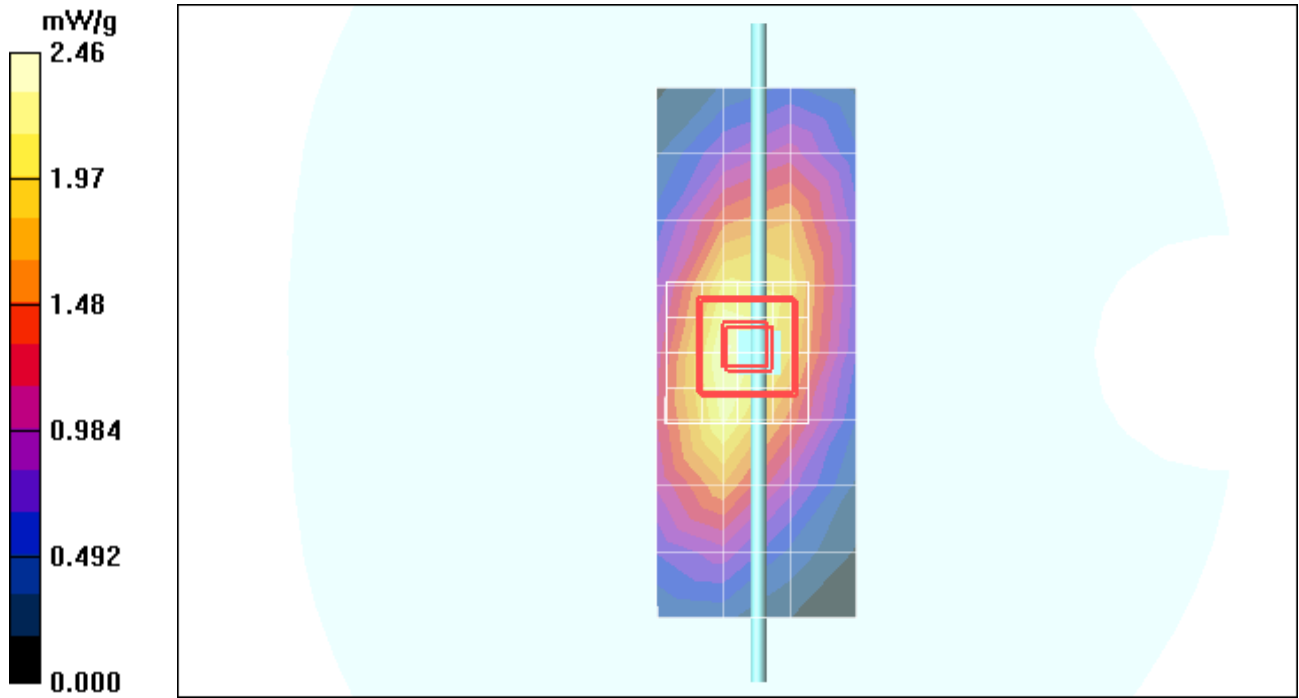
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 50.2 V/m; Power Drift = 0.002 dB; Peak SAR (extrapolated) = 3.50 W/kg

**SAR(1 g) = 2.28 mW/g; SAR(10 g) = 1.46 mW/g; Maximum value of SAR (measured) = 2.41 mW/g**

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

Measurement grid: dx=20mm, dy=20mm, dz=5mm; Maximum value of SAR (measured) = 2.46 mW/g



## Test Laboratory: Motorola - 083009 900 MHz

**DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 91; FCC ID: IHDT56KV2**

Procedure Notes: 900 MHz System Performance Check; Dipole Sn# 91; Input Power = 200 mW

Sim.Temp@meas = 19.4°C; Sim.Temp@SPC = 19.4°C; Room Temp @ SPC = 20.0°C

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

Medium: Low Freq Head

Medium parameters used:  $f = 900$  MHz;  $\sigma = 0.99$  mho/m;  $\epsilon_r = 41.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(5.73, 5.73, 5.73); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R#4 Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 2.21 mW/g

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

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 50.8 V/m; Power Drift = -0.027 dB; Peak SAR (extrapolated) = 3.55 W/kg

**SAR(1 g) = 2.33 mW/g; SAR(10 g) = 1.49 mW/g; Maximum value of SAR (measured) = 2.53 mW/g**

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

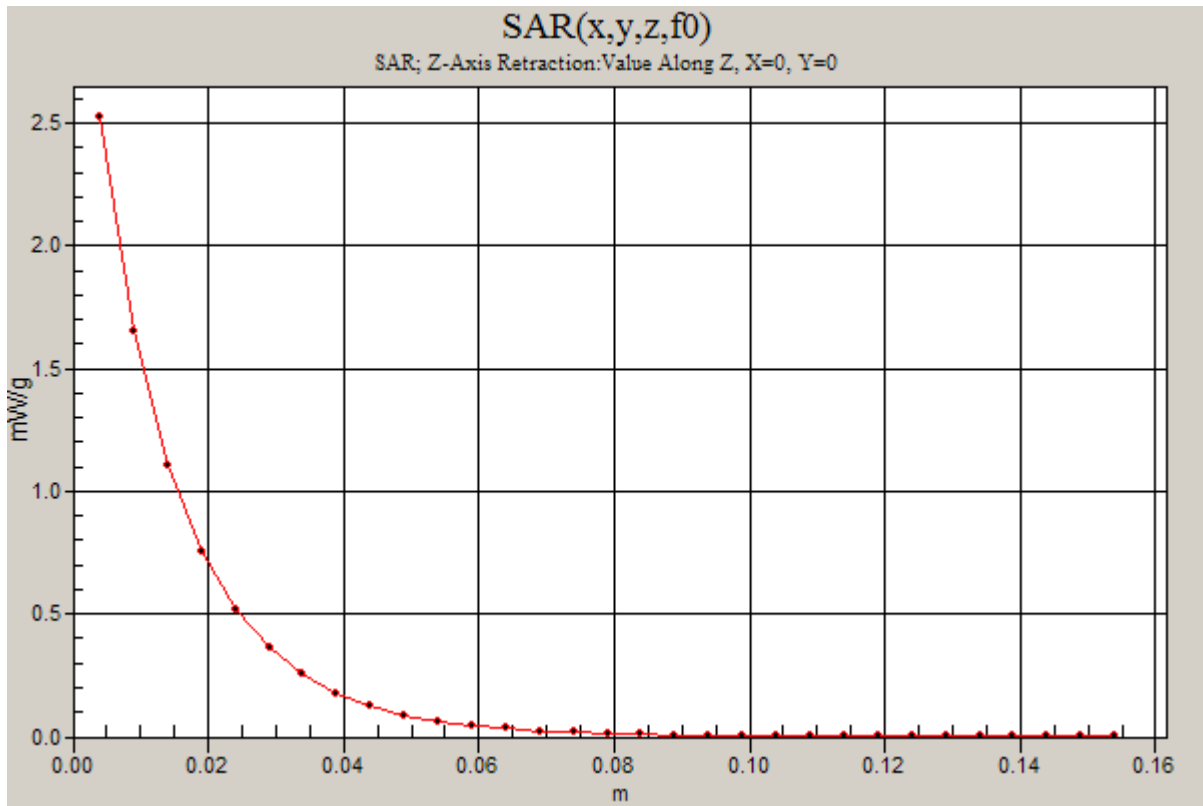
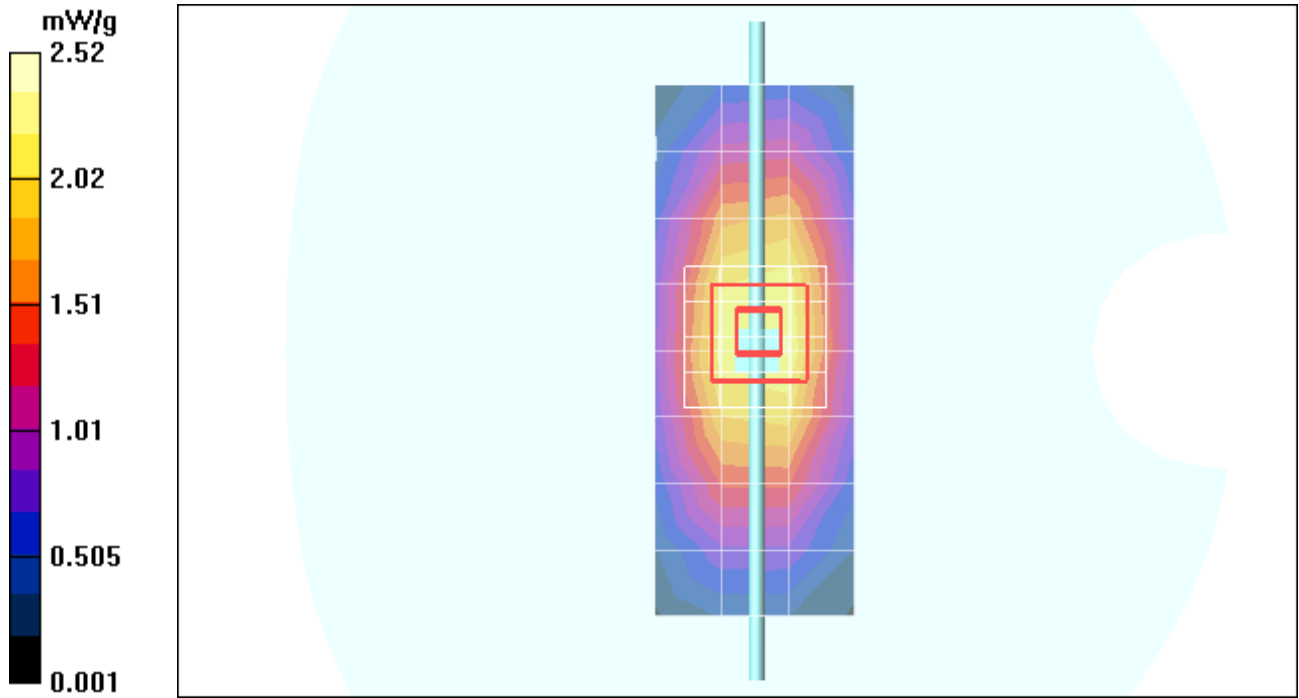
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 50.8 V/m; Power Drift = -0.027 dB; Peak SAR (extrapolated) = 3.57 W/kg

**SAR(1 g) = 2.34 mW/g; SAR(10 g) = 1.5 mW/g**

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

Measurement grid: dx=20mm, dy=20mm, dz=5mm; Maximum value of SAR (measured) = 2.52 mW/g



## Test Laboratory: Motorola - 083109 900 MHz

**DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 91; FCC ID: IHDT56KV2**

Procedure Notes: 900 MHz System Performance Check; Dipole Sn# 091; Input Power = 200 mW

Sim.Temp@meas = 19.8°C; Sim.Temp@SPC = 19.8°C; Room Temp @ SPC = 19.6°C

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

Medium: VALIDATION Only

Medium parameters used:  $f = 900$  MHz;  $\sigma = 0.98$  mho/m;  $\epsilon_r = 41.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(5.73, 5.73, 5.73); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R#4 Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 2.14 mW/g

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

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 50.1 V/m; Power Drift = -0.019 dB; Peak SAR (extrapolated) = 3.42 W/kg

**SAR(1 g) = 2.26 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:

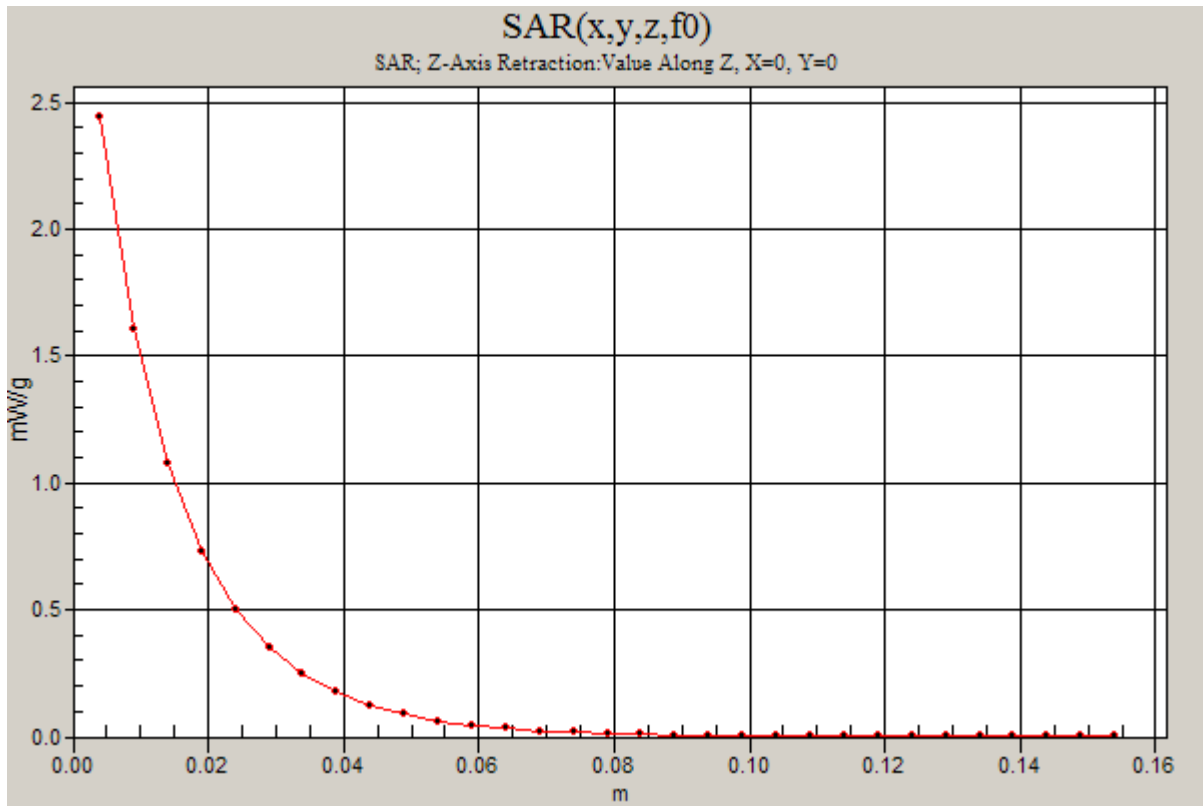
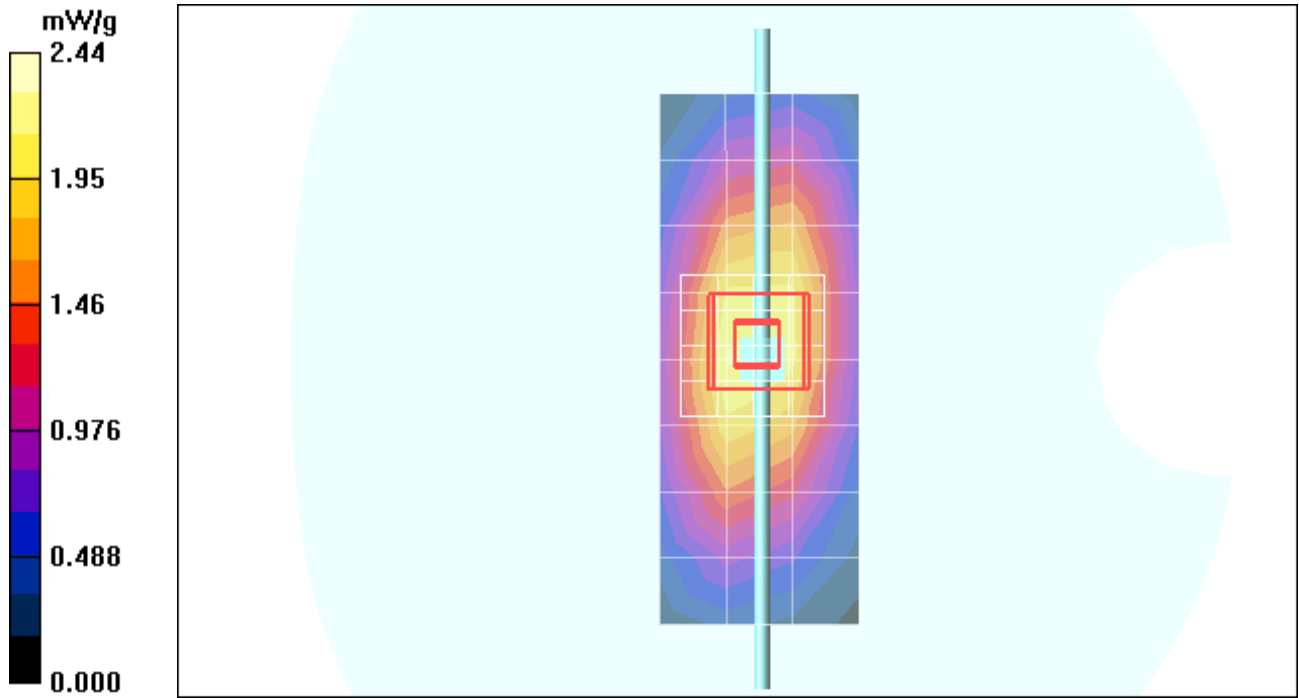
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 50.1 V/m; Power Drift = -0.019 dB; Peak SAR (extrapolated) = 3.46 W/kg

**SAR(1 g) = 2.27 mW/g; SAR(10 g) = 1.45 mW/g**

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

Measurement grid: dx=20mm, dy=20mm, dz=5mm; Maximum value of SAR (measured) = 2.44 mW/g



## Test Laboratory: Motorola - 090309 900 MHz

**DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 91; FCC ID: IHDT56KV2**

Procedure Notes: 900 MHz System Performance Check; Dipole Sn# 091; Input Power = 200 mW

Sim.Temp@meas = 19.8°C; Sim.Temp@SPC = 19.8°C; Room Temp @ SPC = 19.9°C

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

Medium: VALIDATION Only

Medium parameters used:  $f = 900$  MHz;  $\sigma = 0.98$  mho/m;  $\epsilon_r = 41.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(5.73, 5.73, 5.73); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R#4 Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 2.14 mW/g

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

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 50.6 V/m; Power Drift = 0.007 dB; Peak SAR (extrapolated) = 3.46 W/kg

**SAR(1 g) = 2.26 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:

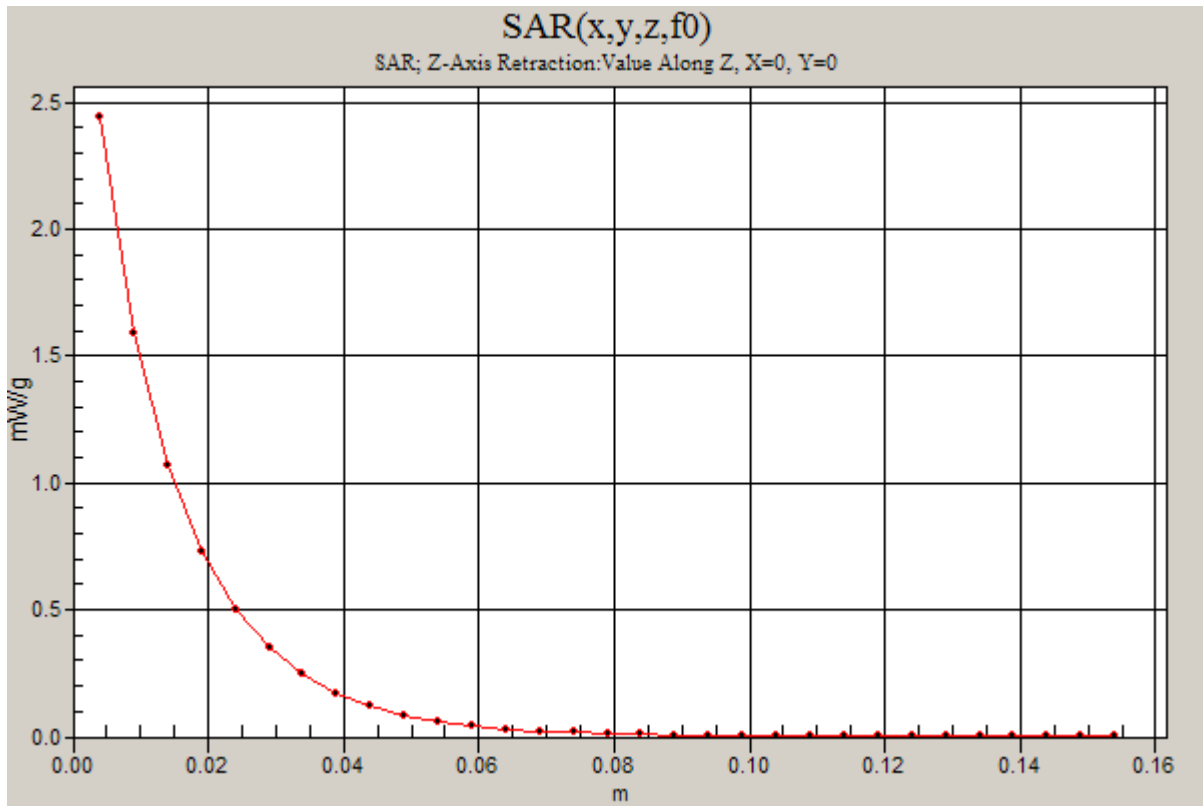
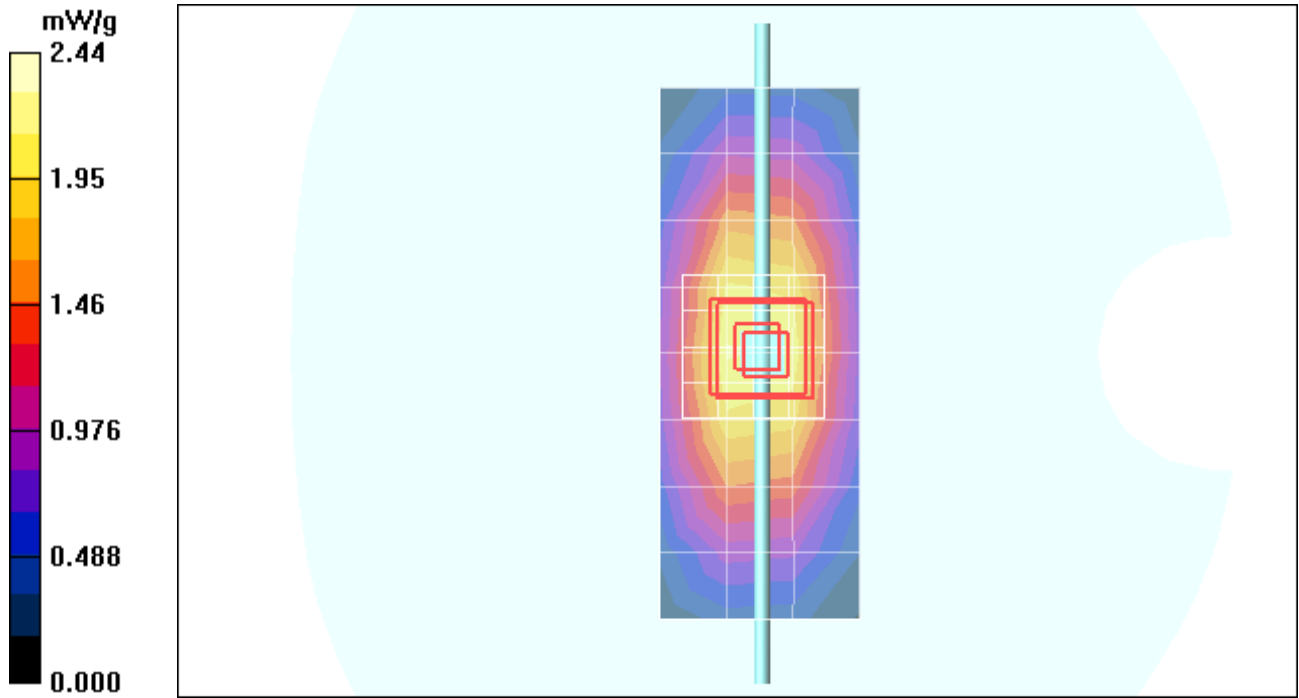
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 50.6 V/m; Power Drift = 0.007 dB; Peak SAR (extrapolated) = 3.45 W/kg

**SAR(1 g) = 2.26 mW/g; SAR(10 g) = 1.45 mW/g;** Maximum value of SAR (measured) = 2.39 mW/g

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

Measurement grid: dx=20mm, dy=20mm, dz=5mm; Maximum value of SAR (measured) = 2.44 mW/g



## Test Laboratory: Motorola - 082809 1800 MHz

**DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 272TR; FCC ID: IHDT56KV2**

Procedure Notes: 1800 MHz System Performance Check; Dipole Sn# 272tr; Input Power = 200 mW

Sim.Temp@meas = 19.5°C; Sim.Temp@SPC = 19.5°C; Room Temp @ SPC = 19.7°C

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

Medium: VALIDATION Only

Medium parameters used:  $f = 1800$  MHz;  $\sigma = 1.38$  mho/m;  $\epsilon_r = 38.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.95, 4.95, 4.95); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R#4 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1250;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 7.62 mW/g

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

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 73.1 V/m; Power Drift = 0.050 dB; Peak SAR (extrapolated) = 14.0 W/kg

**SAR(1 g) = 7.67 mW/g; SAR(10 g) = 4.02 mW/g; Maximum value of SAR (measured) = 8.66 mW/g**

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

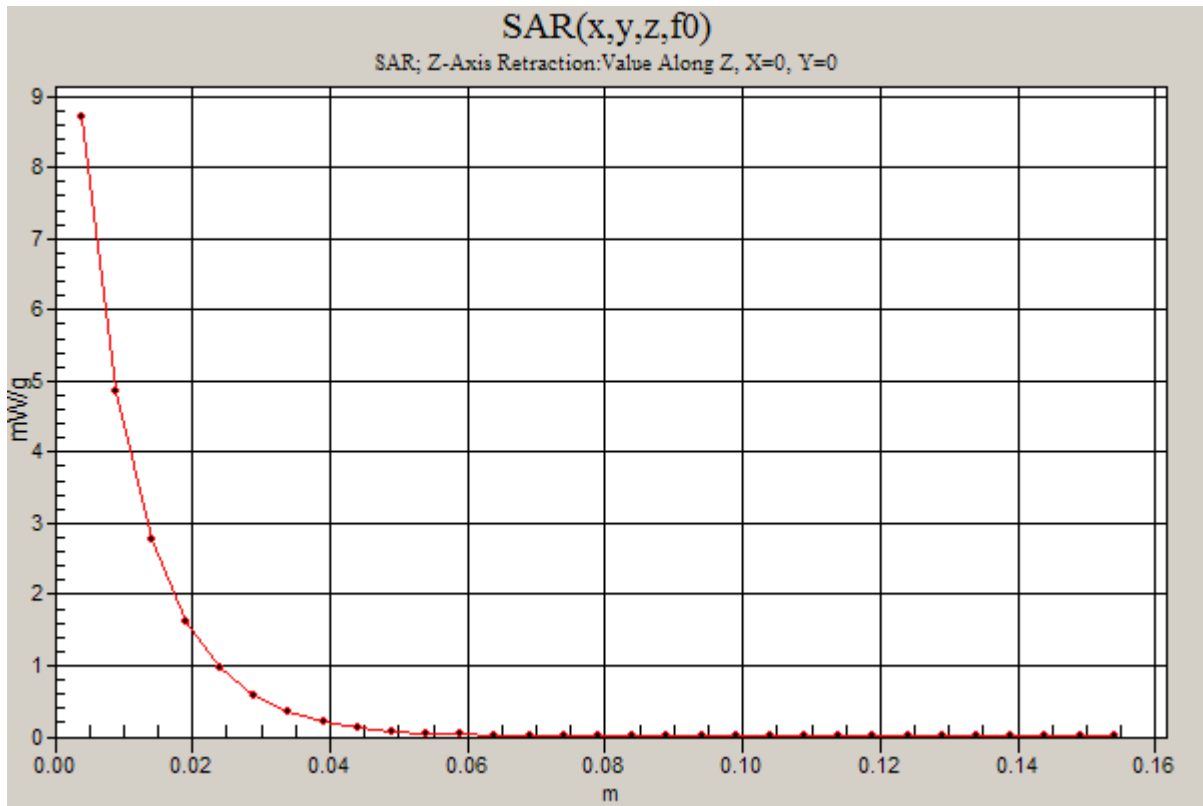
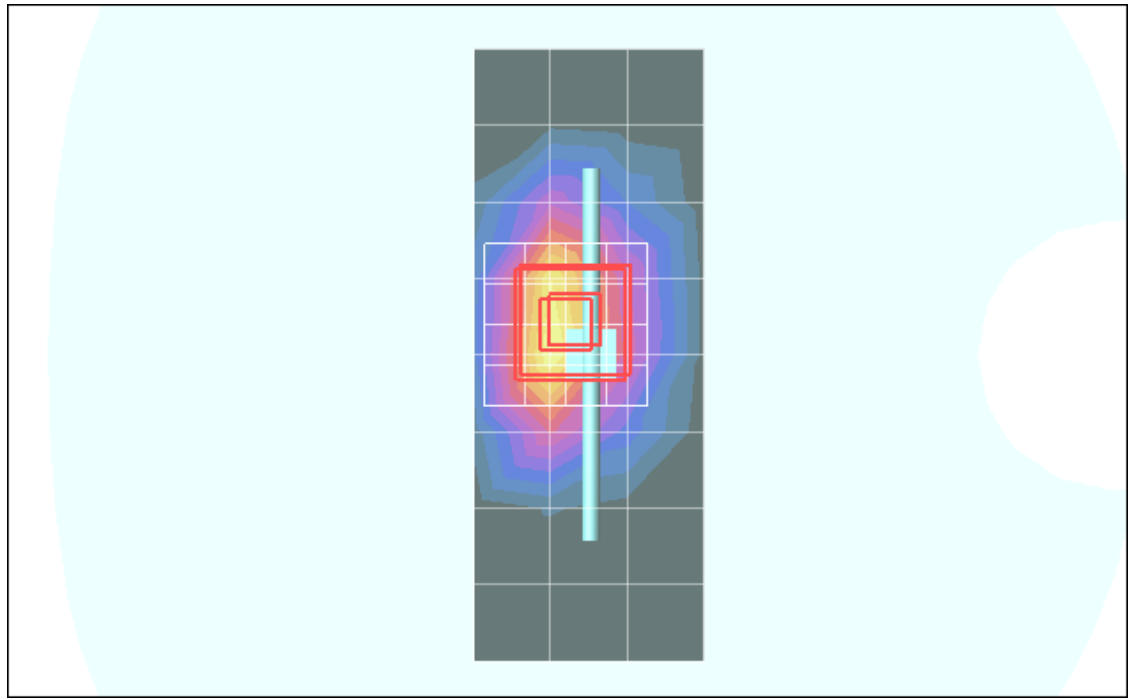
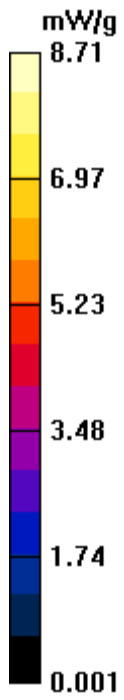
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 73.1 V/m; Power Drift = 0.050 dB; Peak SAR (extrapolated) = 14.0 W/kg

**SAR(1 g) = 7.66 mW/g; SAR(10 g) = 4.04 mW/g; Maximum value of SAR (measured) = 8.53 mW/g**

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

Measurement grid: dx=20mm, dy=20mm, dz=5mm; Maximum value of SAR (measured) = 8.71 mW/g



## Test Laboratory: Motorola - 083009 1800 MHz

**DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 272TR; FCC ID: IHDT56KV2**

Procedure Notes: 1800 MHz System Performance Check; Dipole Sn# 272tr; Input Power = 200 mW

Sim.Temp@meas = 19.7°C; Sim.Temp@SPC = 19.7°C; Room Temp @ SPC = 20.0°C

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

Medium: VALIDATION Only

Medium parameters used:  $f = 1800$  MHz;  $\sigma = 1.39$  mho/m;  $\epsilon_r = 39.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.95, 4.95, 4.95); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R4 : Sect.1, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 7.14 mW/g

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

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 81.0 V/m; Power Drift = 0.004 dB; Peak SAR (extrapolated) = 14.8 W/kg

**SAR(1 g) = 8.16 mW/g; SAR(10 g) = 4.32 mW/g; Maximum value of SAR (measured) = 9.16 mW/g**

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

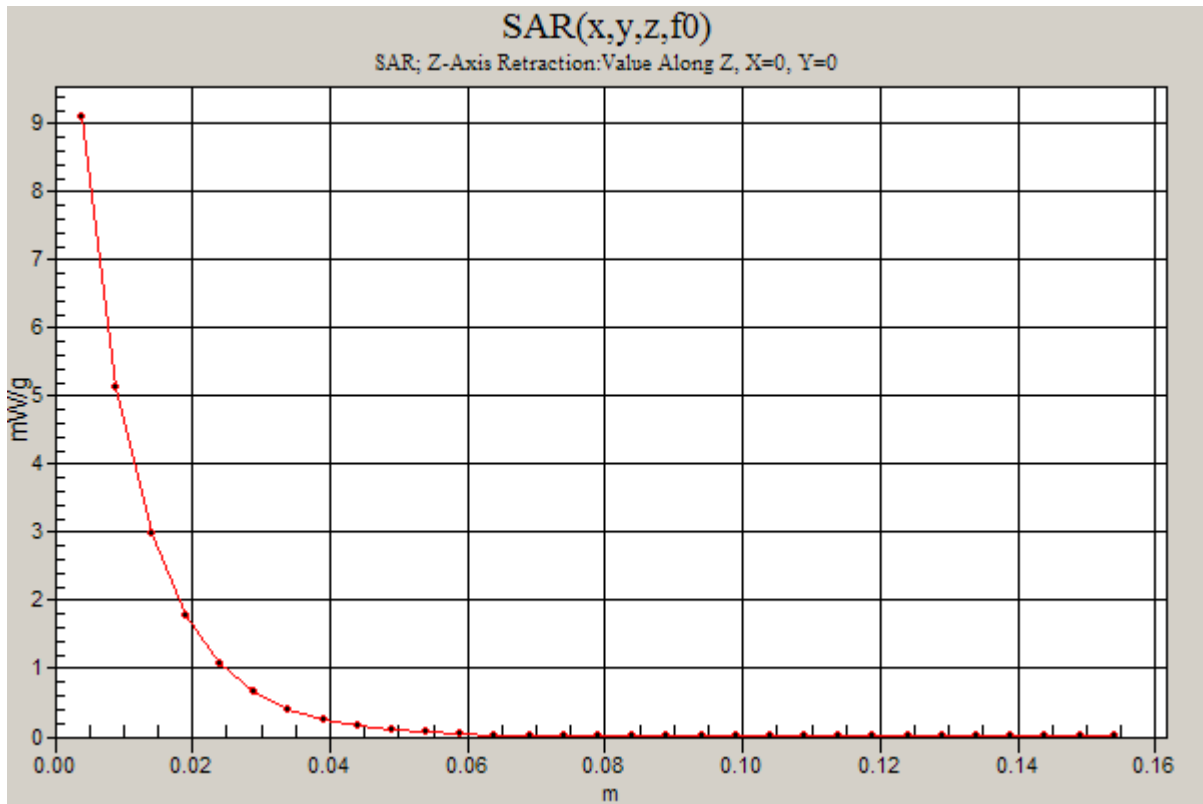
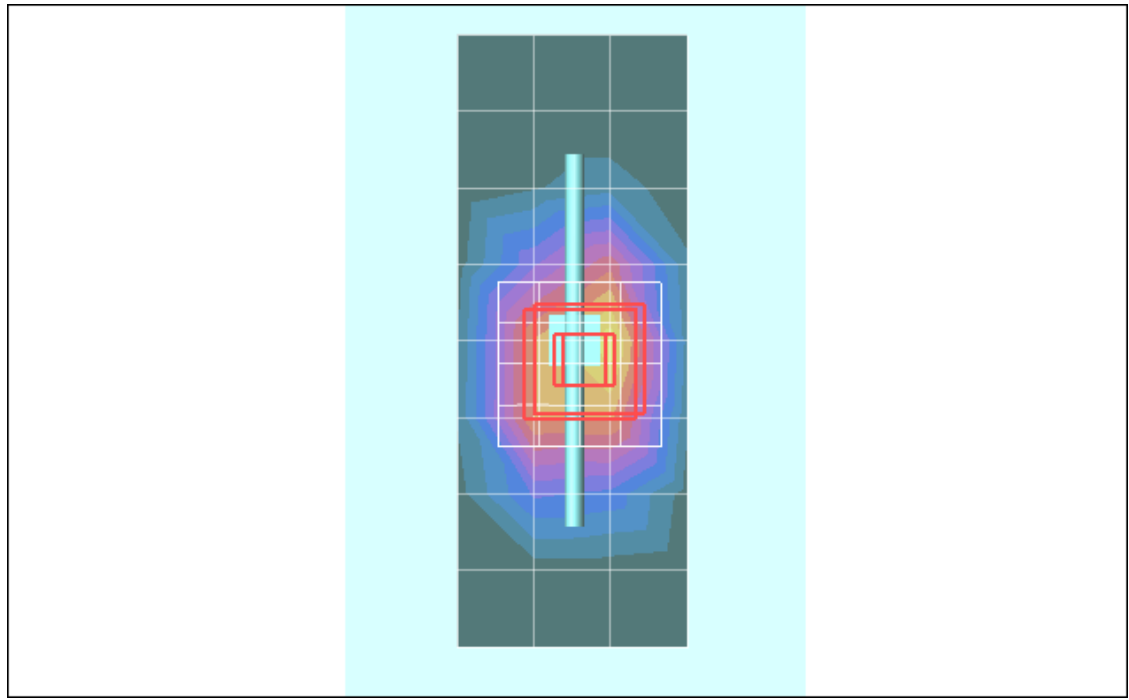
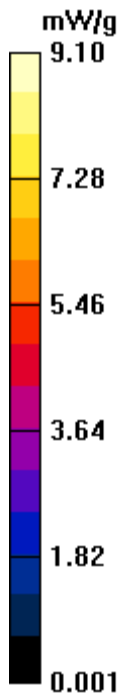
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 81.0 V/m; Power Drift = 0.004 dB; Peak SAR (extrapolated) = 14.7 W/kg

**SAR(1 g) = 8.14 mW/g; SAR(10 g) = 4.32 mW/g; Maximum value of SAR (measured) = 8.95 mW/g**

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

Measurement grid: dx=20mm, dy=20mm, dz=5mm; Maximum value of SAR (measured) = 9.10 mW/g



## Test Laboratory: Motorola - 083109 1800 MHz

**DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 272TR; FCC ID: IHDT56KV2**

Procedure Notes: 1800? MHz System Performance Check; Dipole Sn# 272tr; Input Power = 200 mW

Sim.Temp@meas = 19.1 °C; Sim.Temp@SPC = 19.1 °C; Room Temp @ SPC = 19.6 °C

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

Medium: VALIDATION Only

Medium parameters used:  $f = 1800$  MHz;  $\sigma = 1.37$  mho/m;  $\epsilon_r = 39.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.95, 4.95, 4.95); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R4 : Sect.1, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 7.32 mW/g

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

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 81.0 V/m; Power Drift = 0.042 dB; Peak SAR (extrapolated) = 14.7 W/kg

**SAR(1 g) = 8 mW/g; SAR(10 g) = 4.21 mW/g;** Maximum value of SAR (measured) = 8.94 mW/g

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

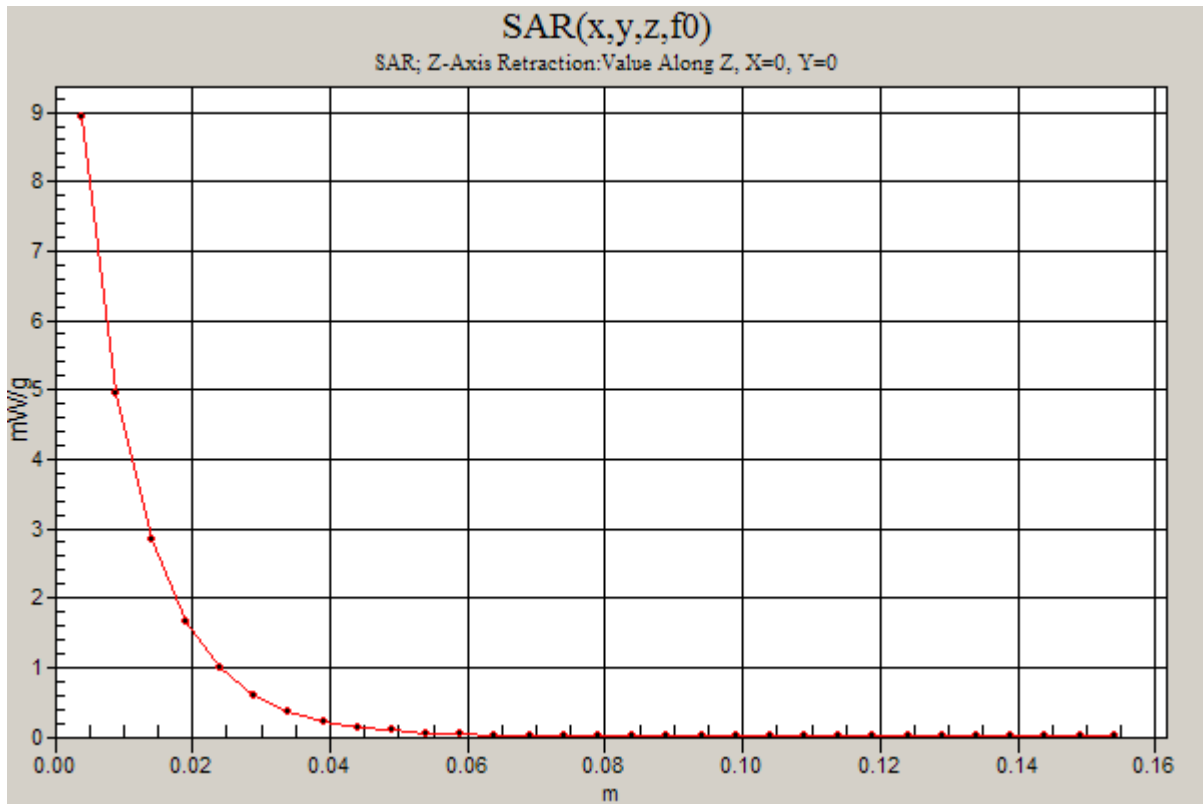
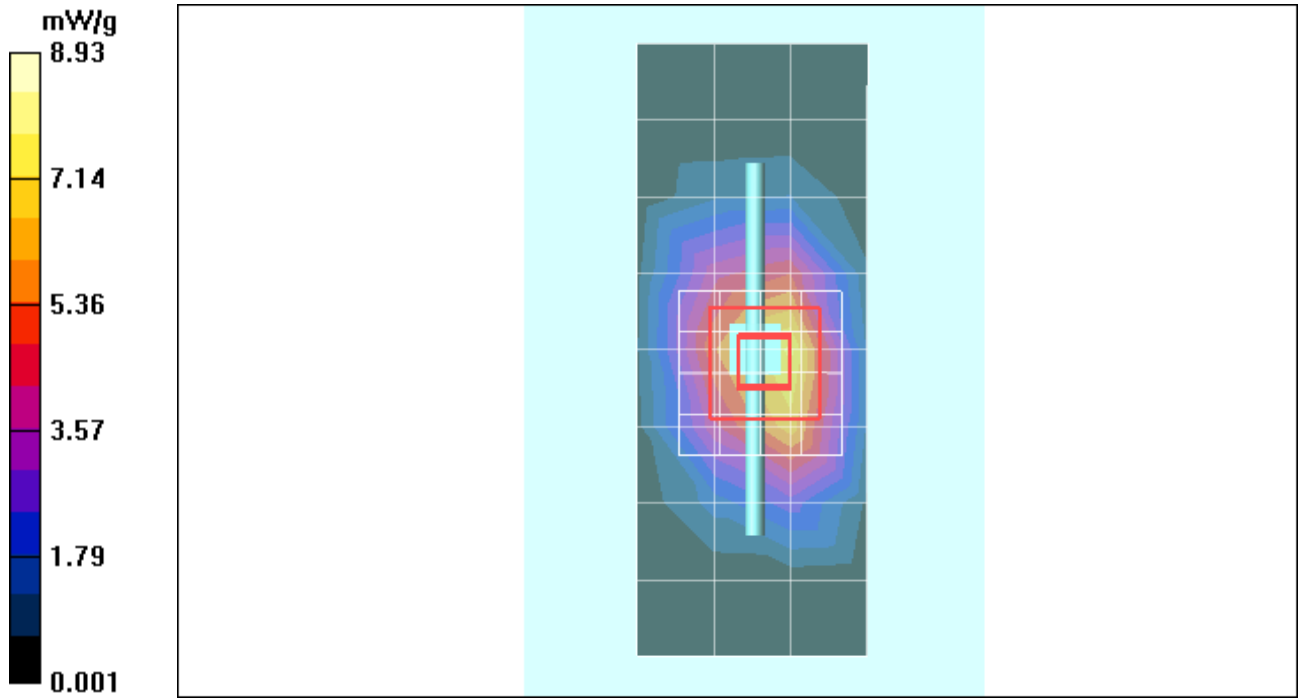
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 81.0 V/m; Power Drift = 0.042 dB; Peak SAR (extrapolated) = 14.7 W/kg

**SAR(1 g) = 8 mW/g; SAR(10 g) = 4.22 mW/g;** Maximum value of SAR (measured) = 8.83 mW/g

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

Measurement grid: dx=20mm, dy=20mm, dz=5mm; Maximum value of SAR (measured) = 8.93 mW/g



## Test Laboratory: Motorola - 090309 1800 MHz

**DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 272TR; FCC ID: IHDT56KV2**

Procedure Notes: 1800 MHz System Performance Check; Dipole Sn# 272tr; Input Power = 200 mW

Sim.Temp@meas = 19.5 °C; Sim.Temp@SPC = 19.5 °C; Room Temp @ SPC = 19.6 °C

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

Medium: VALIDATION Only

Medium parameters used:  $f = 1800$  MHz;  $\sigma = 1.38$  mho/m;  $\epsilon_r = 39.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.95, 4.95, 4.95); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R4 : Sect.1, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 8.01 mW/g

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

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 79.6 V/m; Power Drift = 0.008 dB; Peak SAR (extrapolated) = 14.5 W/kg

**SAR(1 g) = 7.91 mW/g; SAR(10 g) = 4.18 mW/g; Maximum value of SAR (measured) = 8.78 mW/g**

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

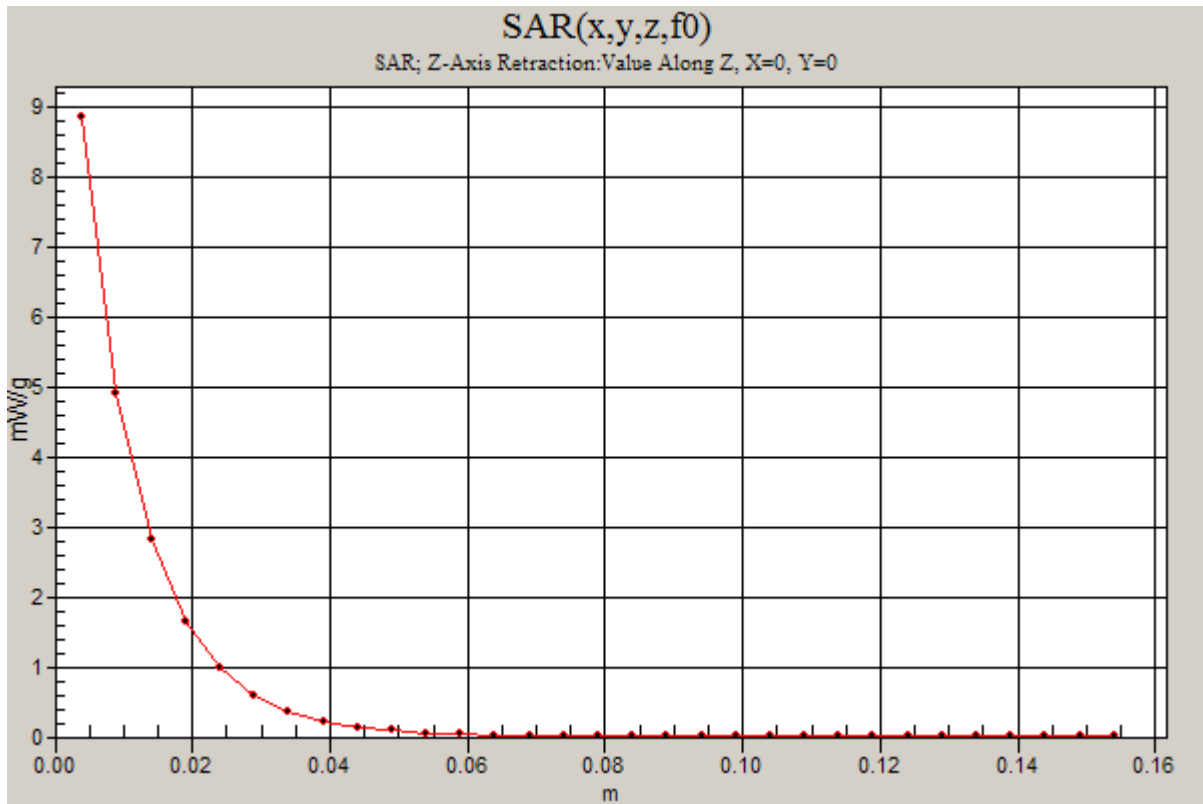
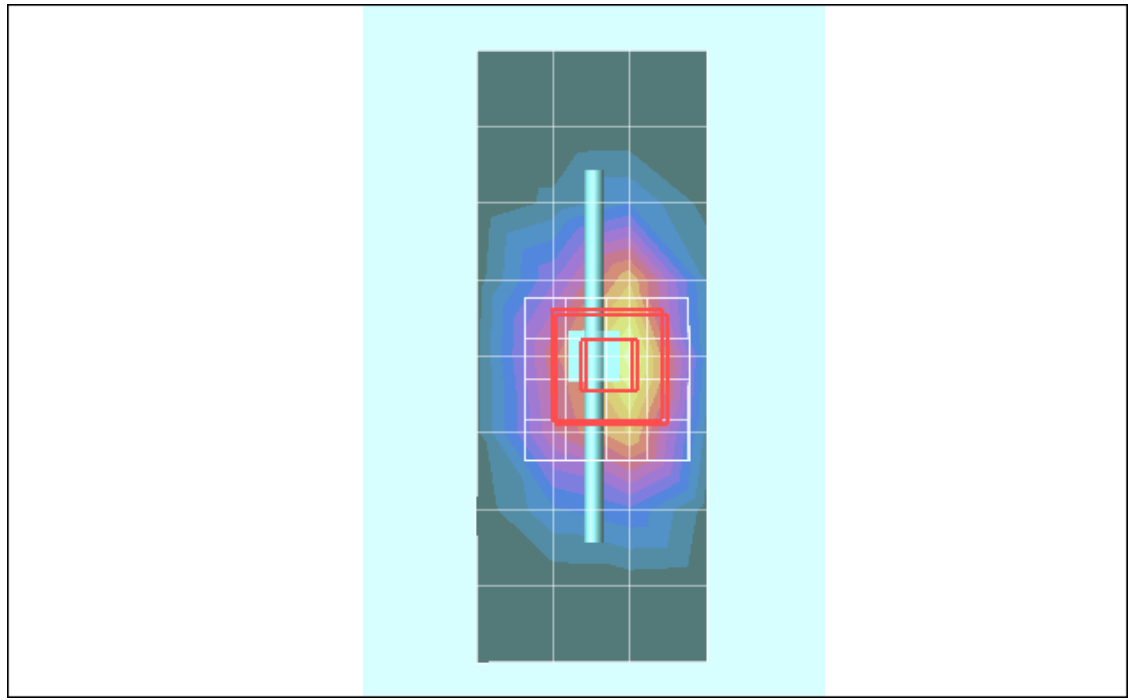
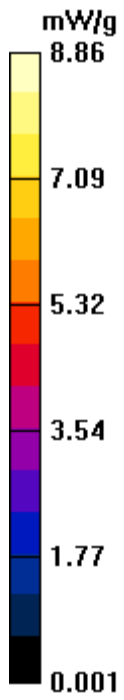
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 79.6 V/m; Power Drift = 0.008 dB; Peak SAR (extrapolated) = 14.5 W/kg

**SAR(1 g) = 7.95 mW/g; SAR(10 g) = 4.2 mW/g; Maximum value of SAR (measured) = 8.87 mW/g**

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

Measurement grid: dx=20mm, dy=20mm, dz=5mm; Maximum value of SAR (measured) = 8.86 mW/g



## Test Laboratory: Motorola - 090209 2450 MHz

**DUT: HAC Dipole 2450 MHz; Type: CD2450V3; Serial: 740; FCC ID: IHDT56KV2**

Procedure Notes: 2450 MHz System Performance Check; Dipole Sn# 740; Input Power = 200 mW

Sim.Temp@meas = 19.8°C; Sim.Temp@SPC = 19.8°C; Room Temp @ SPC = 19.9°C

Communication System: CW - Dipole; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: VALIDATION Only

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.78$  mho/m;  $\epsilon_r = 37.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.42, 4.42, 4.42); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R#4 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1250;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 9.09 mW/g

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

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 83.1 V/m; Power Drift = 0.051 dB; Peak SAR (extrapolated) = 23.0 W/kg

**SAR(1 g) = 10.7 mW/g; SAR(10 g) = 4.9 mW/g; Maximum value of SAR (measured) = 12.1 mW/g**

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

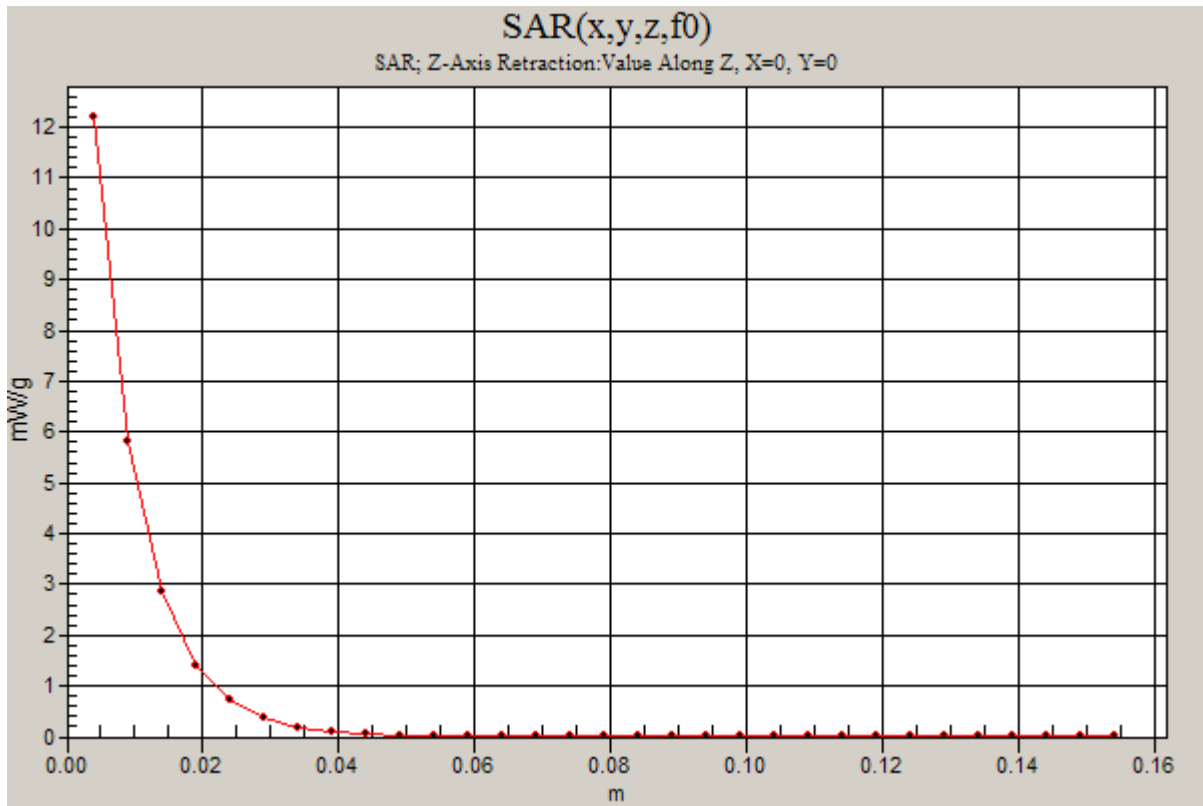
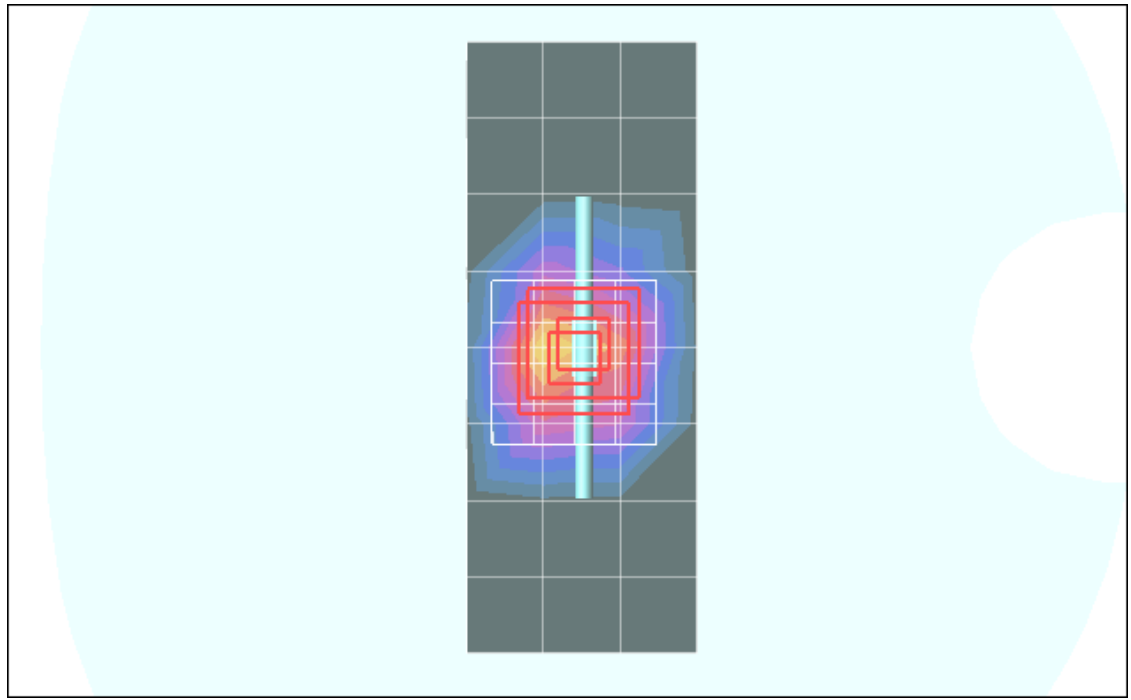
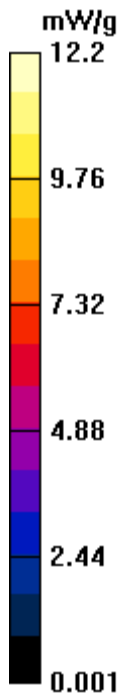
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 83.1 V/m; Power Drift = 0.051 dB; Peak SAR (extrapolated) = 23.2 W/kg

**SAR(1 g) = 10.8 mW/g; SAR(10 g) = 4.92 mW/g; Maximum value of SAR (measured) = 11.5 mW/g**

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

Measurement grid: dx=20mm, dy=20mm, dz=5mm; Maximum value of SAR (measured) = 12.2 mW/g



## **Appendix 2**

### **SAR distribution plots for Phantom Head Adjacent Use**

# Test Laboratory: Motorola - GSM 850 Cheek

Serial: 356689030000079; FCC ID: IHDT56KV2

Procedure Notes: Pwr Step: 5; Antenna Position: Internal; Accessory Model #: N/A

Battery Model #: SNN5843A; DEVICE POSITION (cheek or rotated): Cheek

Communication System: GSM 850; Frequency: 836.6 MHz; Channel Number: 190; Duty Cycle: 1:8

Medium: Low Freq Head

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.9 \text{ mho/m}$ ;  $\epsilon_r = 40.5$ ;  $\rho = 1000 \text{ kg/m}^3$

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(5.73, 5.73, 5.73); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R#4 Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

## Right Head Template/Area Scan - Normal Extended (10mm) (10x25x1):

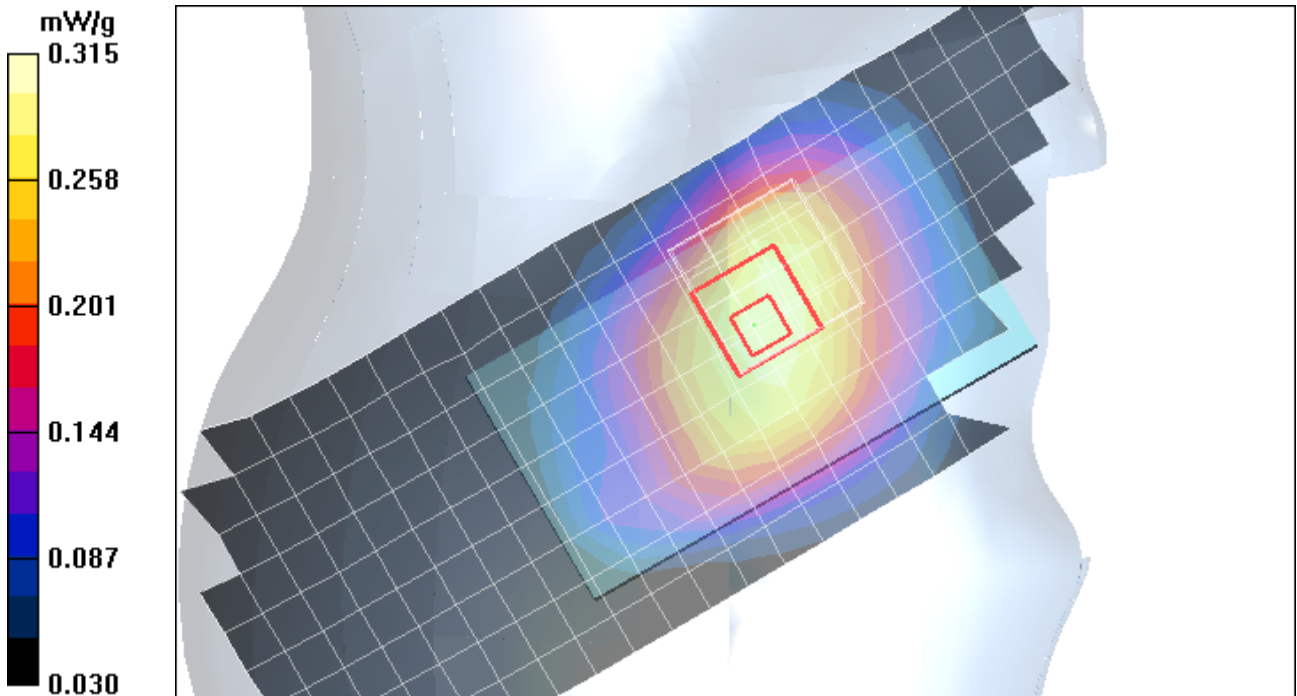
Measurement grid:  $dx=10\text{mm}$ ,  $dy=10\text{mm}$ ; Maximum value of SAR (measured) = 0.297 mW/g

## Right Head Template/5x5x7 Zoom Scan ( $\leq 3\text{GHz}$ ) (5x5x7)/Cube 0:

Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 17.8 V/m; Power Drift = 0.349 dB; Peak SAR (extrapolated) = 0.375 W/kg

**SAR(1 g) = 0.301 mW/g; SAR(10 g) = 0.228 mW/g; Maximum value of SAR (measured) = 0.315 mW/g**



## Test Laboratory: Motorola - GSM 1900 Cheek

Serial: 356689030000079; FCC ID: IHDT56KV2

Procedure Notes: Pwr Step: 0; Antenna Position: Internal; Accessory Model #: N/A

Battery Model #: SNN5843A; DEVICE POSITION (cheek or rotated): Cheek

Communication System: GSM 1900; Frequency: 1880 MHz; Channel Number: 661; Duty Cycle: 1:8

Medium: Regular Glycol Head 1750/1880

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 38$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.95, 4.95, 4.95); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R#4 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1250;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

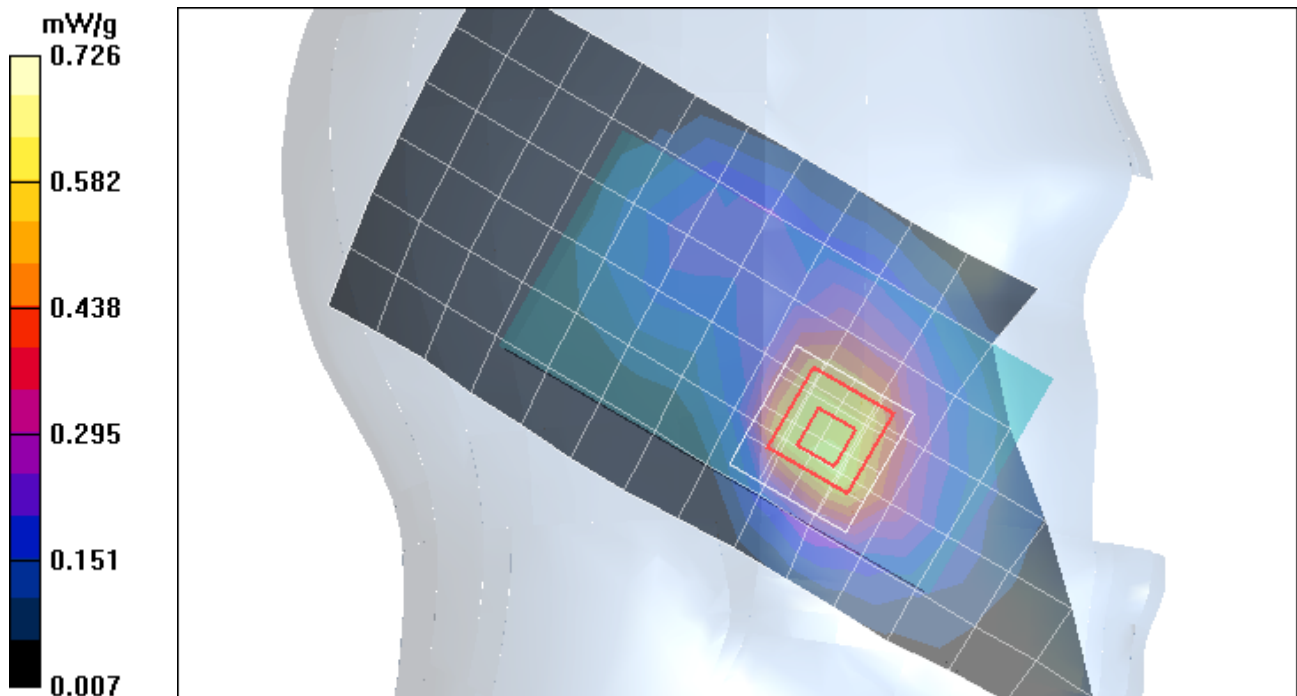
Measurement grid:  $dx=15$ mm,  $dy=15$ mm; Maximum value of SAR (measured) = 0.616 mW/g

### Left Head Template/5x5x7 Zoom Scan ( $\leq 3$ GHz) (5x5x7)/Cube 0:

Measurement grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=5$ mm

Reference Value = 22.2 V/m; Power Drift = -0.023 dB; Peak SAR (extrapolated) = 1.02 W/kg

**SAR(1 g) = 0.657 mW/g; SAR(10 g) = 0.390 mW/g; Maximum value of SAR (measured) = 0.726 mW/g**



# Test Laboratory: Motorola - WCDMA 850 Cheek

Serial: 356689030000079; FCC ID: IHDT56KV2

Procedure Notes: Pwr Step: All up Bits; Antenna Position: Internal; Accessory Model #: N/A

Battery Model #: SNN5843A; DEVICE POSITION (cheek or rotated): Cheek

Communication System: WCDMA 850; Frequency: 836 MHz; Channel Number: 4180; Duty Cycle: 1:1

Medium: Low Freq Head

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.91 \text{ mho/m}$ ;  $\epsilon_r = 41.3$ ;  $\rho = 1000 \text{ kg/m}^3$

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(5.73, 5.73, 5.73); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R#4 Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

## Right Head Template/Area Scan - Normal Extended (10mm) (10x25x1):

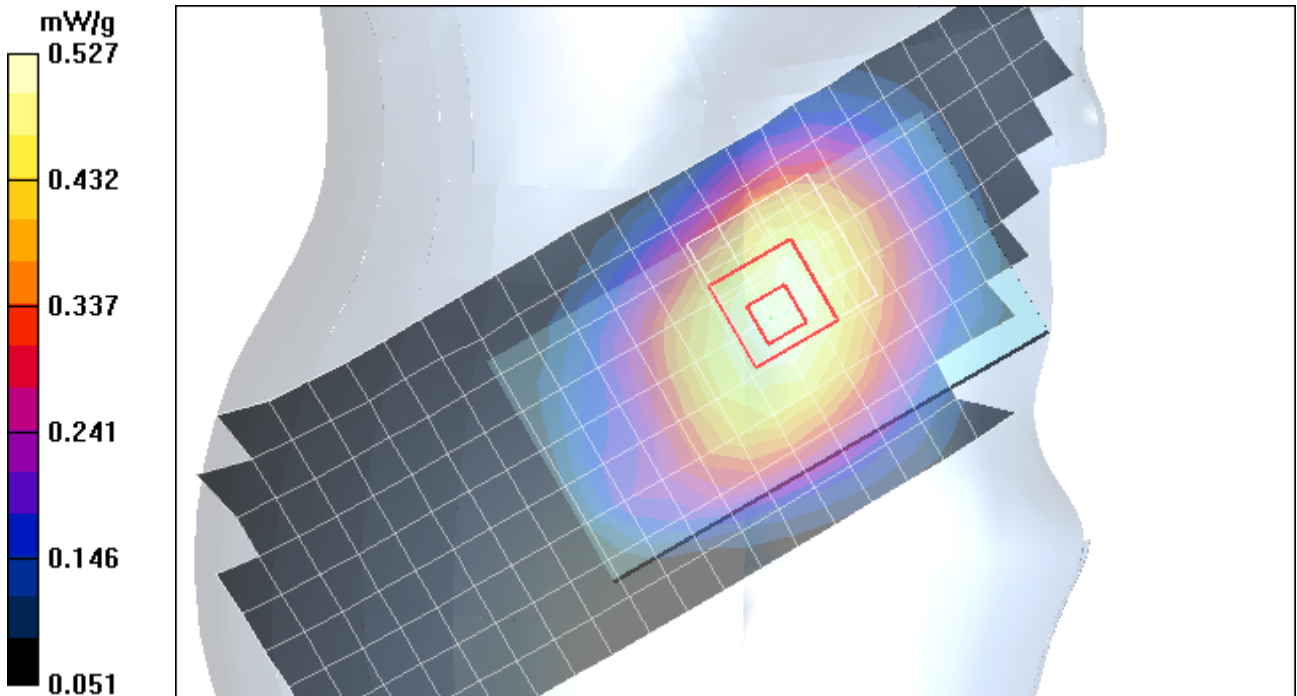
Measurement grid:  $dx=10\text{mm}$ ,  $dy=10\text{mm}$ ; Maximum value of SAR (measured) = 0.524 mW/g

## Right Head Template/5x5x7 Zoom Scan ( $\leq 3\text{GHz}$ ) (5x5x7)/Cube 0:

Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 24.1 V/m; Power Drift = -0.073 dB; Peak SAR (extrapolated) = 0.610 W/kg

**SAR(1 g) = 0.504 mW/g; SAR(10 g) = 0.386 mW/g; Maximum value of SAR (measured) = 0.527 mW/g**



## Test Laboratory: Motorola - WCDMA 1900 Cheek

Serial: 356689030000079; FCC ID: IHDT56KV2

Procedure Notes: Pwr Step: All up Bits; Antenna Position: Internal; Accessory Model #: N/A

Battery Model #: SNN5843A; DEVICE POSITION (cheek or rotated): Cheek

Communication System: WCDMA 1900; Frequency: 1852.5 MHz; Channel Number: 9262; Duty Cycle: 1:1

Medium: Regular Glycol Head 1750/1880

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 38$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.95, 4.95, 4.95); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R#4 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1250;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

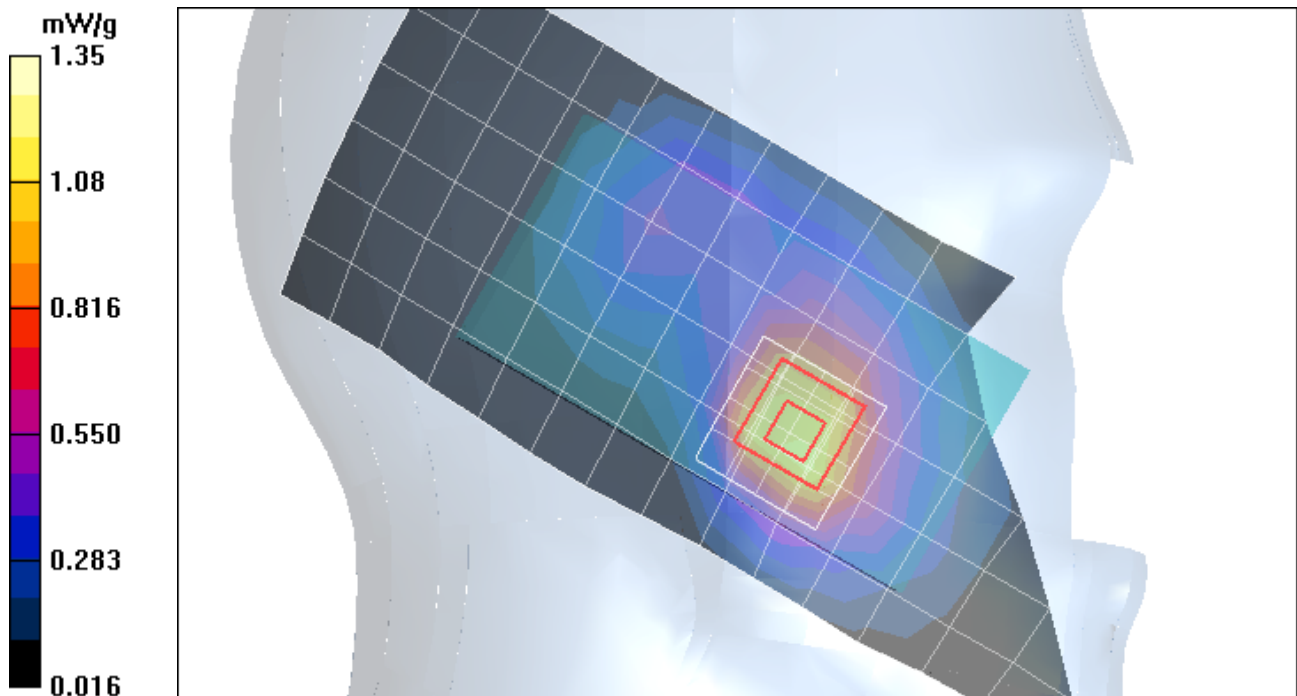
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 1.14 mW/g

### Left Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 29.7 V/m; Power Drift = 0.136 dB; Peak SAR (extrapolated) = 1.87 W/kg

**SAR(1 g) = 1.22 mW/g; SAR(10 g) = 0.735 mW/g; Maximum value of SAR (measured) = 1.35 mW/g**



## Test Laboratory: Motorola - Wi-Fi 2450 MHz Cheek

Serial: 356689030000012; FCC ID: IHDT56KV2

Procedure Notes: Pwr Step: N/A; Antenna Position: Internal; Accessory Model #: N/A

Battery Model #: SNN5843A; DEVICE POSITION: CHEEK

Communication System: Wi-Fi 2450; Frequency: 2437 MHz; Channel Number: 6; Duty Cycle: 1:1

Medium: 2450 Glycol Head

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.78$  mho/m;  $\epsilon_r = 37.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.42, 4.42, 4.42); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R#4 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1250;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

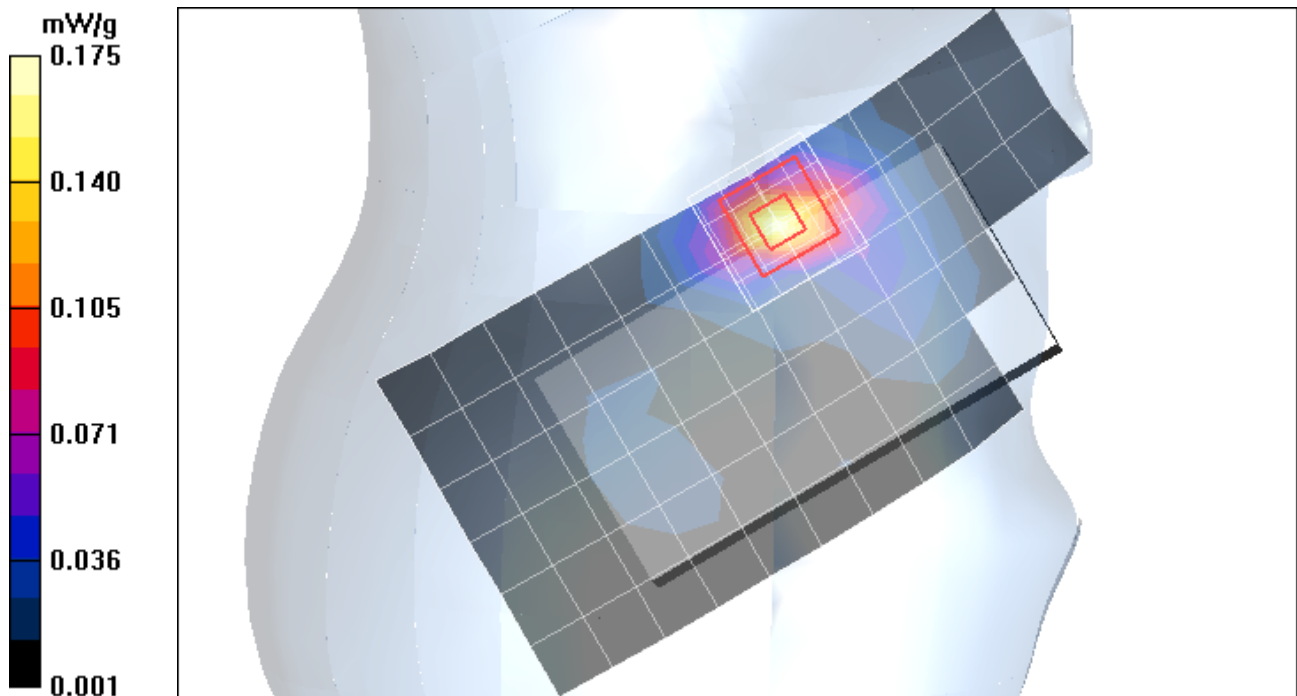
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.178 mW/g

### Right Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.15 V/m; Power Drift = -0.047 dB; Peak SAR (extrapolated) = 0.341 W/kg

SAR(1 g) = 0.154 mW/g; SAR(10 g) = 0.070 mW/g; Maximum value of SAR (measured) = 0.175 mW/g



## Test Laboratory: Motorola - GSM 850 Tilt

Serial: 356689030000079; FCC ID: IHDT56KV2

Procedure Notes: Pwr Step: 5; Antenna Position: Internal; Accessory Model #: N/A

Battery Model #: SNN5843A; DEVICE POSITION (cheek or rotated): Rotated

Communication System: GSM 850; Frequency: 836.6 MHz; Channel Number: 190; Duty Cycle: 1:8

Medium: Low Freq Head

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.9$  mho/m;  $\epsilon_r = 40.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(5.73, 5.73, 5.73); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R#4 Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

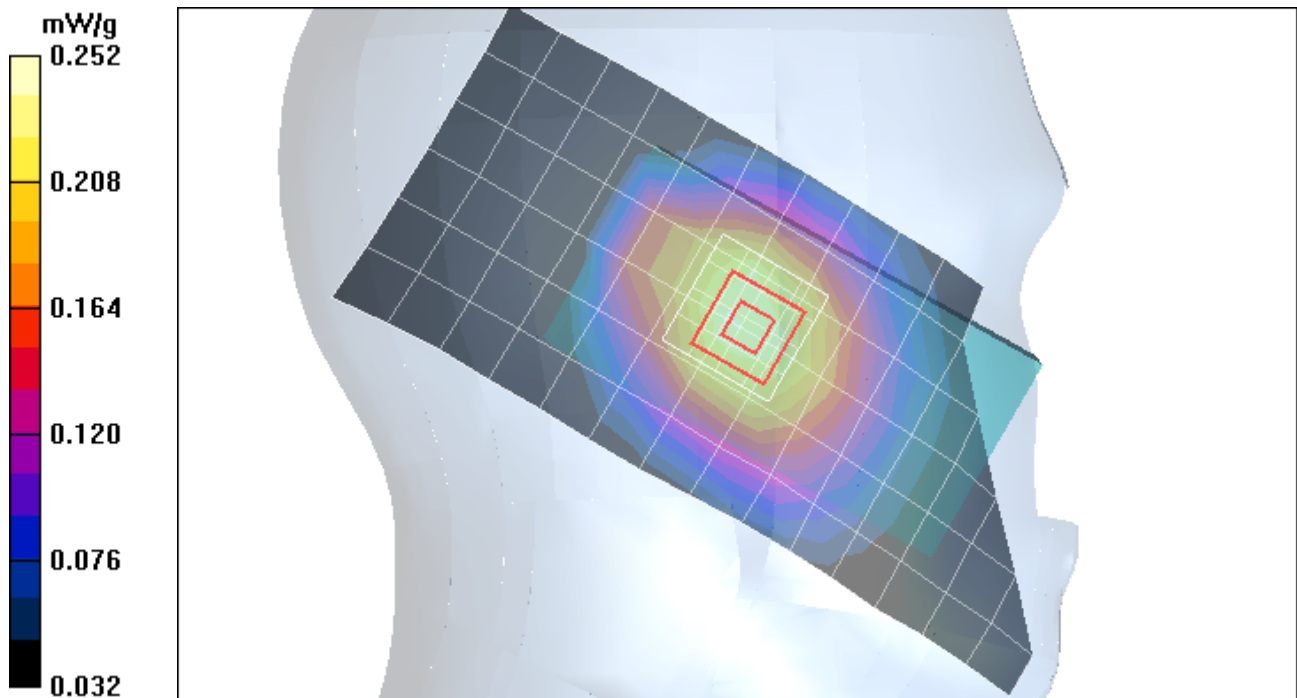
Measurement grid:  $dx=15$ mm,  $dy=15$ mm; Maximum value of SAR (measured) = 0.241 mW/g

### Left Head Template/5x5x7 Zoom Scan ( $\leq 3$ GHz) (5x5x7)/Cube 0:

Measurement grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=5$ mm

Reference Value = 16.0 V/m; Power Drift = 0.065 dB; Peak SAR (extrapolated) = 0.300 W/kg

**SAR(1 g) = 0.238 mW/g; SAR(10 g) = 0.179 mW/g; Maximum value of SAR (measured) = 0.252 mW/g**



## Test Laboratory: Motorola - GSM 1900 Tilt

Serial: 356689030000079; FCC ID: IHDT56KV2

Procedure Notes: Pwr Step: 0; Antenna Position: Internal; Accessory Model #: N/A

Battery Model #: SNN5843A; DEVICE POSITION (check or rotated): Tilt

Communication System: GSM 1900; Frequency: 1880 MHz; Channel Number: 661; Duty Cycle: 1:8

Medium: Regular Glycol Head 1750/1880

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 38$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.95, 4.95, 4.95); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R#4 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1250;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

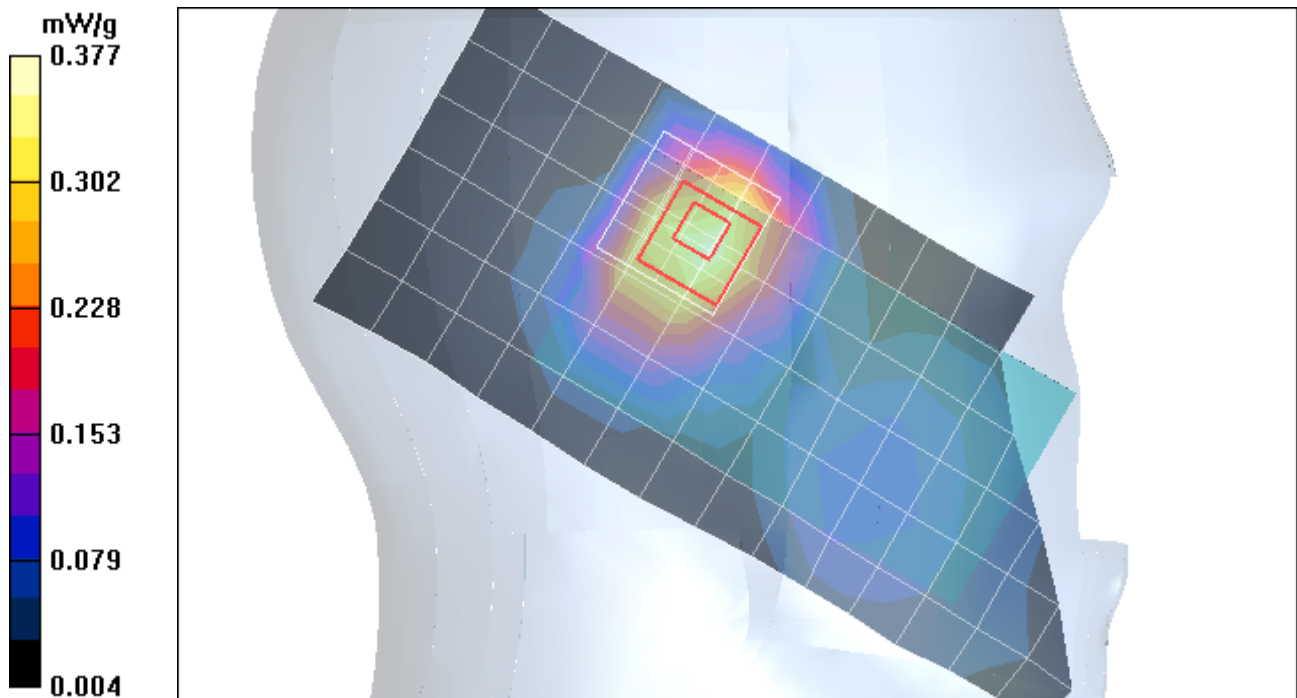
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.366 mW/g

### Left Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.5 V/m; Power Drift = 0.021 dB; Peak SAR (extrapolated) = 0.542 W/kg

**SAR(1 g) = 0.359 mW/g; SAR(10 g) = 0.223 mW/g; Maximum value of SAR (measured) = 0.377 mW/g**



## Test Laboratory: Motorola - WCDMA 850 Tilt

Serial: 356689030000079; FCC ID: IHDT56KV2

Procedure Notes: Pwr Step: All up Bits; Antenna Position: Internal; Accessory Model #: N/A

Battery Model #: SNN5843A; DEVICE POSITION (cheek or rotated): Tilt

Communication System: WCDMA 850; Frequency: 836 MHz; Channel Number: 4180; Duty Cycle: 1:1

Medium: Low Freq Head

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.9 \text{ mho/m}$ ;  $\epsilon_r = 40.4$ ;  $\rho = 1000 \text{ kg/m}^3$

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(5.73, 5.73, 5.73); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R#4 Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

### Right Head Template/Area Scan - Normal Extended (10mm) (10x25x1):

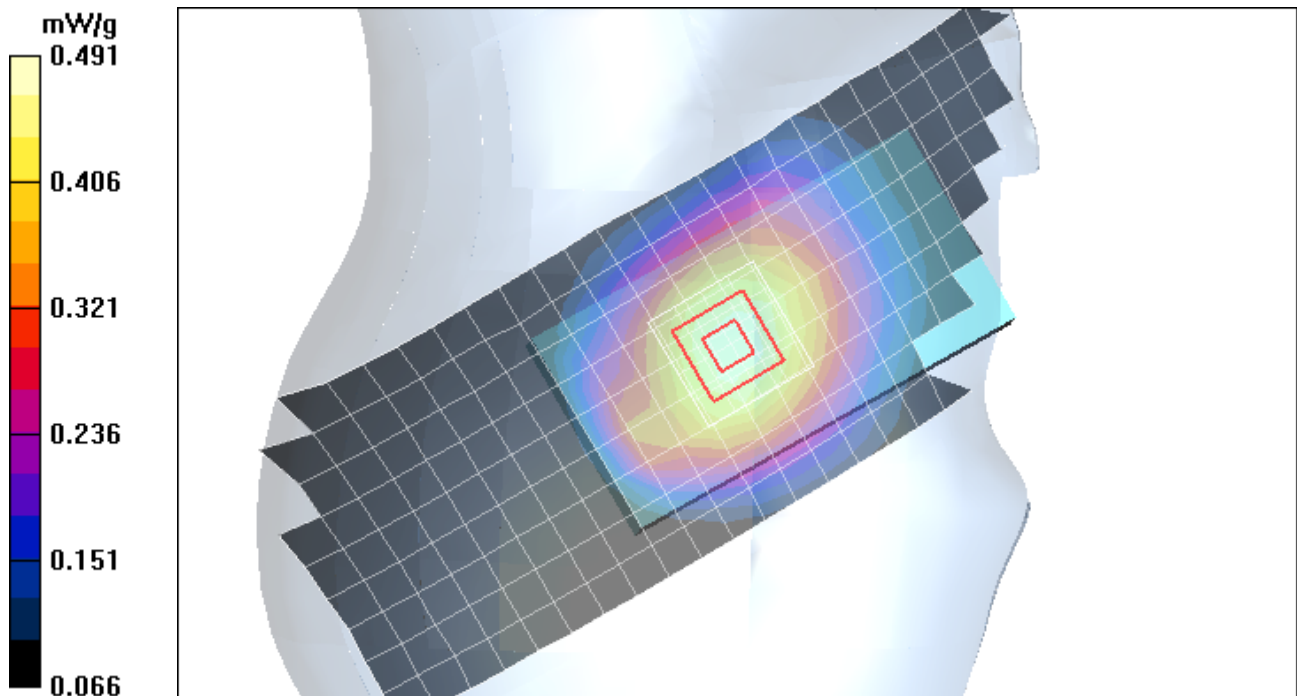
Measurement grid:  $dx=10\text{mm}$ ,  $dy=10\text{mm}$ ; Maximum value of SAR (measured) = 0.484 mW/g

### Right Head Template/5x5x7 Zoom Scan ( $\leq 3\text{GHz}$ ) (5x5x7)/Cube 0:

Measurement grid:  $dx=8\text{mm}$ ,  $dy=8\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 23.2 V/m; Power Drift = -0.123 dB; Peak SAR (extrapolated) = 0.579 W/kg

**SAR(1 g) = 0.465 mW/g; SAR(10 g) = 0.353 mW/g; Maximum value of SAR (measured) = 0.491 mW/g**



## Test Laboratory: Motorola - WCDMA 1900 Tilt

Serial: 356689030000079; FCC ID: IHDT56KV2

Procedure Notes: Pwr Step: All up Bits; Antenna Position: Internal; Accessory Model #: N/A

Battery Model #: SNN5843A; DEVICE POSITION (cheek or rotated): Rotated

Communication System: WCDMA 1900; Frequency: 1880 MHz; Channel Number: 9400; Duty Cycle: 1:1

Medium: Regular Glycol Head 1750/1880

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.47$  mho/m;  $\epsilon_r = 38$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.95, 4.95, 4.95); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R#4 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1250;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

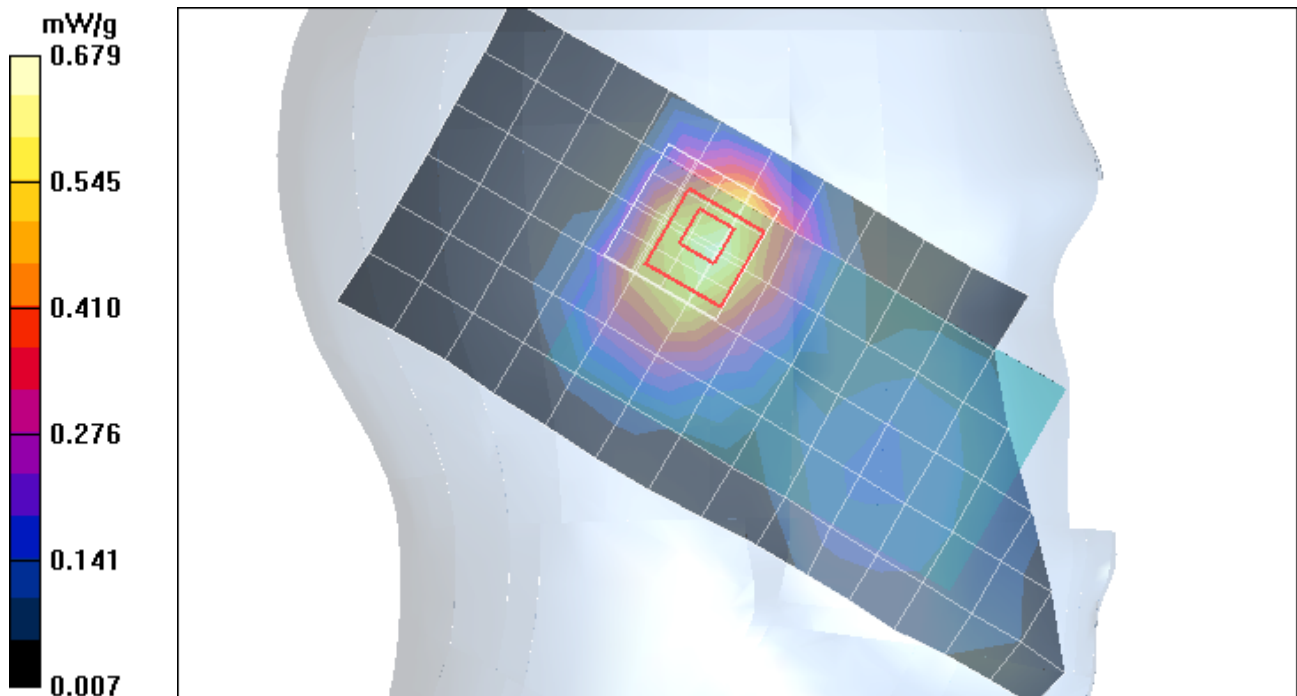
Measurement grid:  $dx=15$ mm,  $dy=15$ mm; Maximum value of SAR (measured) = 0.671 mW/g

### Left Head Template/5x5x7 Zoom Scan ( $\leq 3$ GHz) (5x5x7)/Cube 0:

Measurement grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=5$ mm

Reference Value = 20.9 V/m; Power Drift = -0.104 dB; Peak SAR (extrapolated) = 0.984 W/kg

**SAR(1 g) = 0.650 mW/g; SAR(10 g) = 0.403 mW/g; Maximum value of SAR (measured) = 0.679 mW/g**



## Test Laboratory: Motorola - Wi-Fi 2450 MHz Tilt

Serial: 356689030000012; FCC ID: IHDT56KV2

Procedure Notes: Pwr Step: N/A; Antenna Position: Internal; Accessory Model #: N/A

Battery Model #: SNN5843A; DEVICE POSITION: TILT

Communication System: Wi-Fi 2450; Frequency: 2437 MHz; Channel Number: 6; Duty Cycle: 1:1

Medium: 2450 Glycol Head

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.78$  mho/m;  $\epsilon_r = 37.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.42, 4.42, 4.42); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R#4 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1250;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

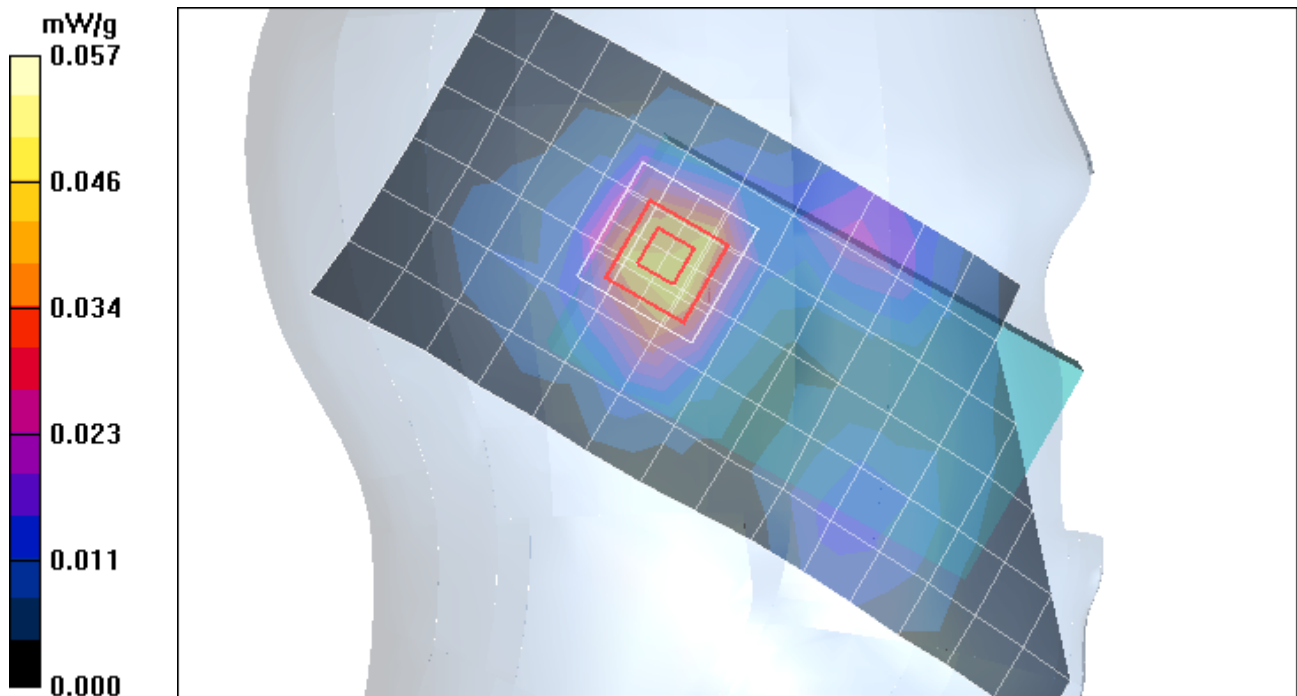
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.042 mW/g

### Left Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 5.51 V/m; Power Drift = 0.019 dB; Peak SAR (extrapolated) = 0.093 W/kg

**SAR(1 g) = 0.050 mW/g; SAR(10 g) = 0.026 mW/g; Maximum value of SAR (measured) = 0.057 mW/g**



## **Appendix 3**

### **SAR distribution plots for Body Worn Configuration**

## Test Laboratory: Motorola - GSM 850 Body Worn

Serial: 356689030000079; FCC ID: IHDT56KV2

Procedure Notes: Pwr Step: 5; Antenna Position: Internal; Battery Model #: SNN5843A

Device Position: Body Worn, Back of Phone 25 mm from Phantom

Communication System: GPRS 850 Cl. 10; Frequency: 836.6 MHz; Channel Number: 190; Duty Cycle: 1:4

Medium: Low Freq Body

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.98$  mho/m;  $\epsilon_r = 54.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(5.73, 5.73, 5.73); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R4 : Sect.2, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

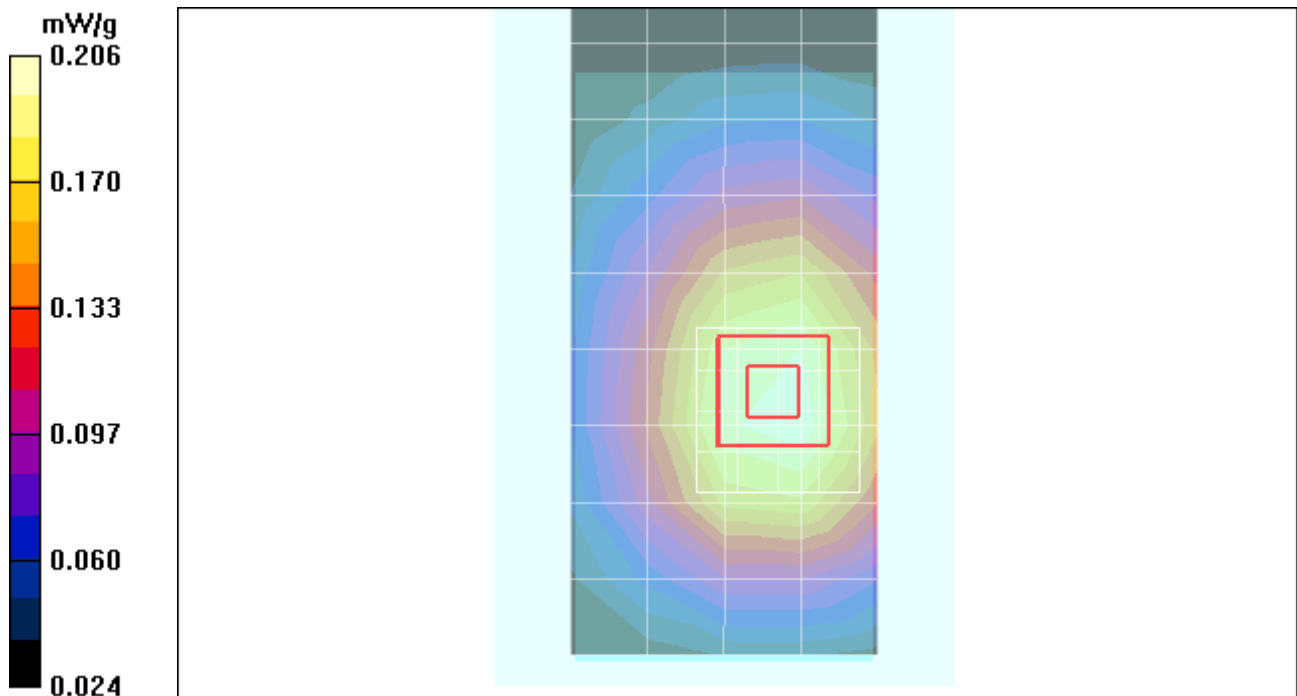
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.204 mW/g

### Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.6 V/m; Power Drift = 0.017 dB; Peak SAR (extrapolated) = 0.253 W/kg

**SAR(1 g) = 0.197 mW/g; SAR(10 g) = 0.146 mW/g; Maximum value of SAR (measured) = 0.206 mW/g**



# Test Laboratory: Motorola - GSM 1900 Body Worn

Serial: 356689030000079; FCC ID: IHDT56KV2

Procedure Notes: Pwr Step: 0; Antenna Position: Internal; Battery Model #: SNN5843A

Device Position: Body Worn, Back of Phone 25 mm from Phantom

Communication System: GPRS 1900 Cl. 10; Frequency: 1880 MHz; Channel Number: 661; Duty Cycle: 1:4

Medium: Regular Glycol Body 1750/1880

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.58$  mho/m;  $\epsilon_r = 51.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.75, 4.75, 4.75); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R4 : Sect.1, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

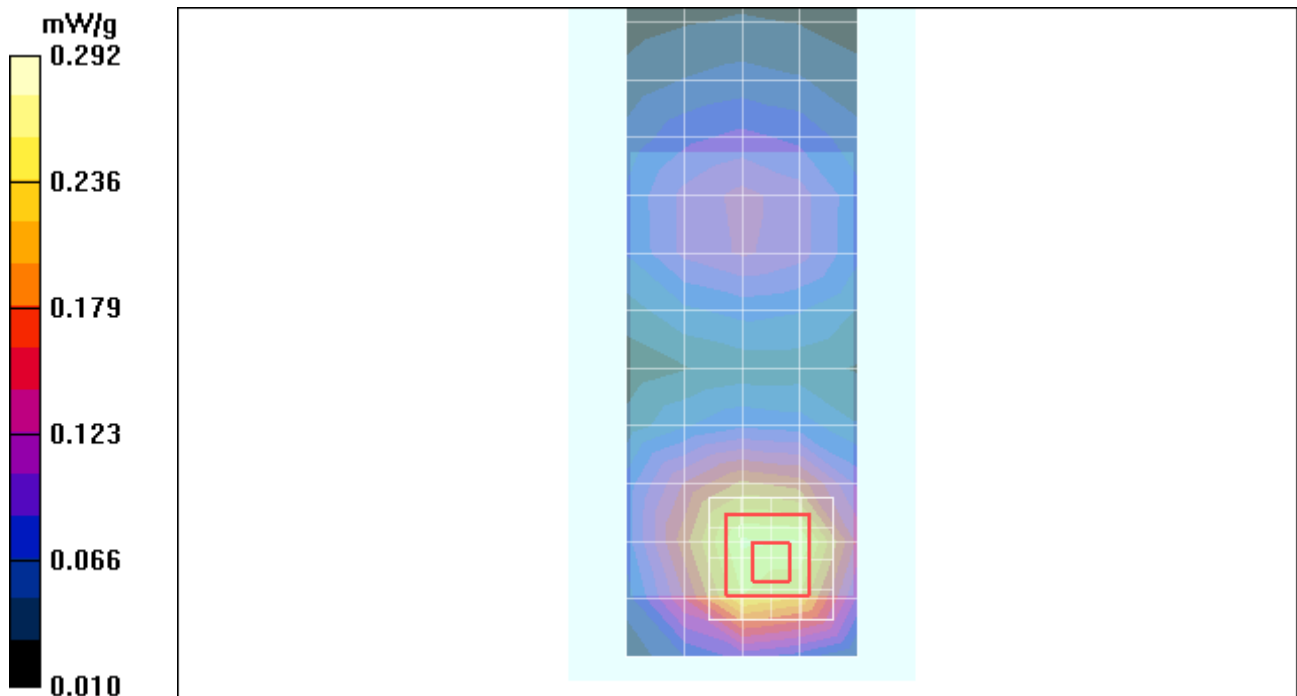
Measurement grid:  $dx=15$ mm,  $dy=15$ mm; Maximum value of SAR (measured) = 0.259 mW/g

## Amy Twin Phone Template/5x5x7 Zoom Scan ( $\leq 3$ GHz) (5x5x7)/Cube 0:

Measurement grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=5$ mm

Reference Value = 12.7 V/m; Power Drift = -0.044 dB; Peak SAR (extrapolated) = 0.412 W/kg

**SAR(1 g) = 0.269 mW/g; SAR(10 g) = 0.168 mW/g; Maximum value of SAR (measured) = 0.292 mW/g\**



# Test Laboratory: Motorola - WCDMA 850 Body Worn

Serial: 356689030000079; FCC ID: IHDT56KV2

Procedure Notes: Pwr Step: All up Bits; Antenna Position: Internal; Battery Model #: SNN5843A

Device Position: Body Worn, Back of Phone 25 mm from Phantom

Communication System: WCDMA 850; Frequency: 836 MHz; Channel Number: 4180; Duty Cycle: 1:1

Medium: Low Freq Body

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.98$  mho/m;  $\epsilon_r = 53.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(5.73, 5.73, 5.73); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R4 : Sect.2, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

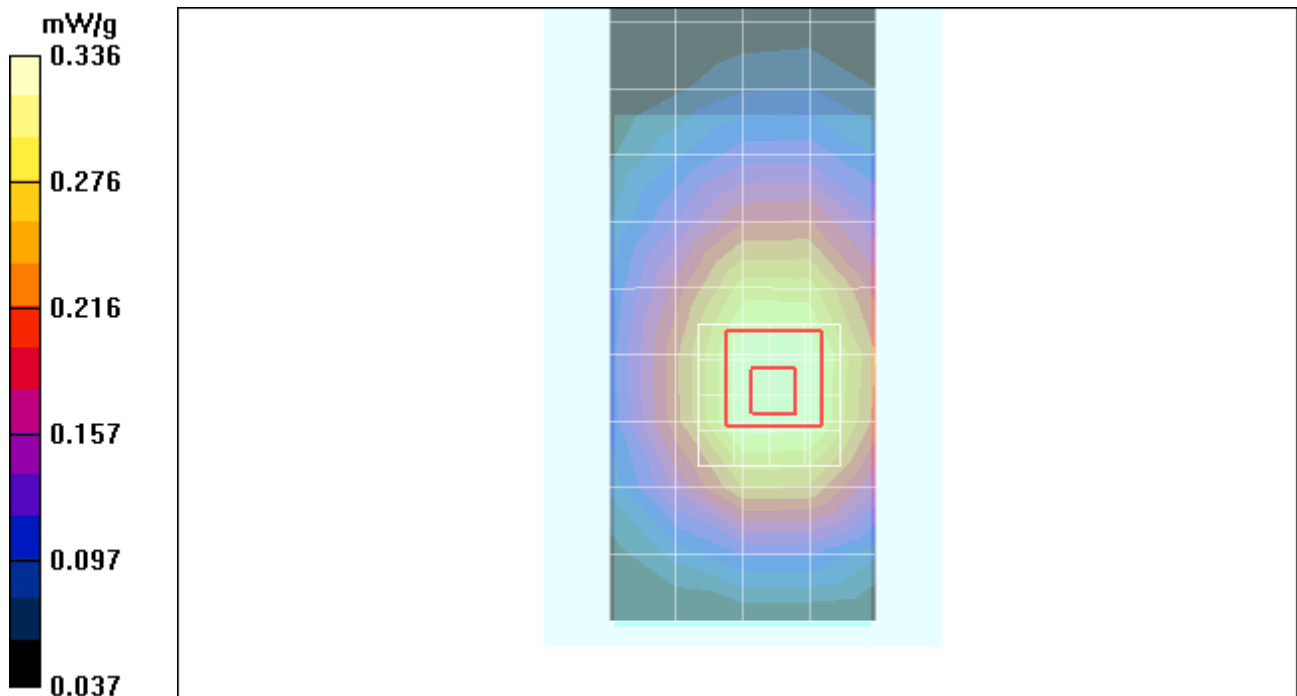
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.313 mW/g

## Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 17.9 V/m; Power Drift = -0.025 dB; Peak SAR (extrapolated) = 0.413 W/kg

**SAR(1 g) = 0.318 mW/g; SAR(10 g) = 0.235 mW/g; Maximum value of SAR (measured) = 0.336 mW/g**



# Test Laboratory: Motorola- WCDMA 1900 Body Worn

Serial: 356689030000079; FCC ID: IHDT56KV2

Procedure Notes: Pwr Step: All up Bits; Antenna Position: Internal; Battery Model #: SNN5843A

Device Mode: WCDMA - HSPA (HSUPA/HSDPA) Rel. 6, Subtest 1

Device Position: Body Worn, Back of Phone 25 mm from Phantom

Communication System: WCDMA 1900; Frequency: 1880 MHz; Channel Number: 9400; Duty Cycle: 1:1

Medium: Regular Glycol Body 1750/1880

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.58$  mho/m;  $\epsilon_r = 51.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.75, 4.75, 4.75); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R4 : Sect.1, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

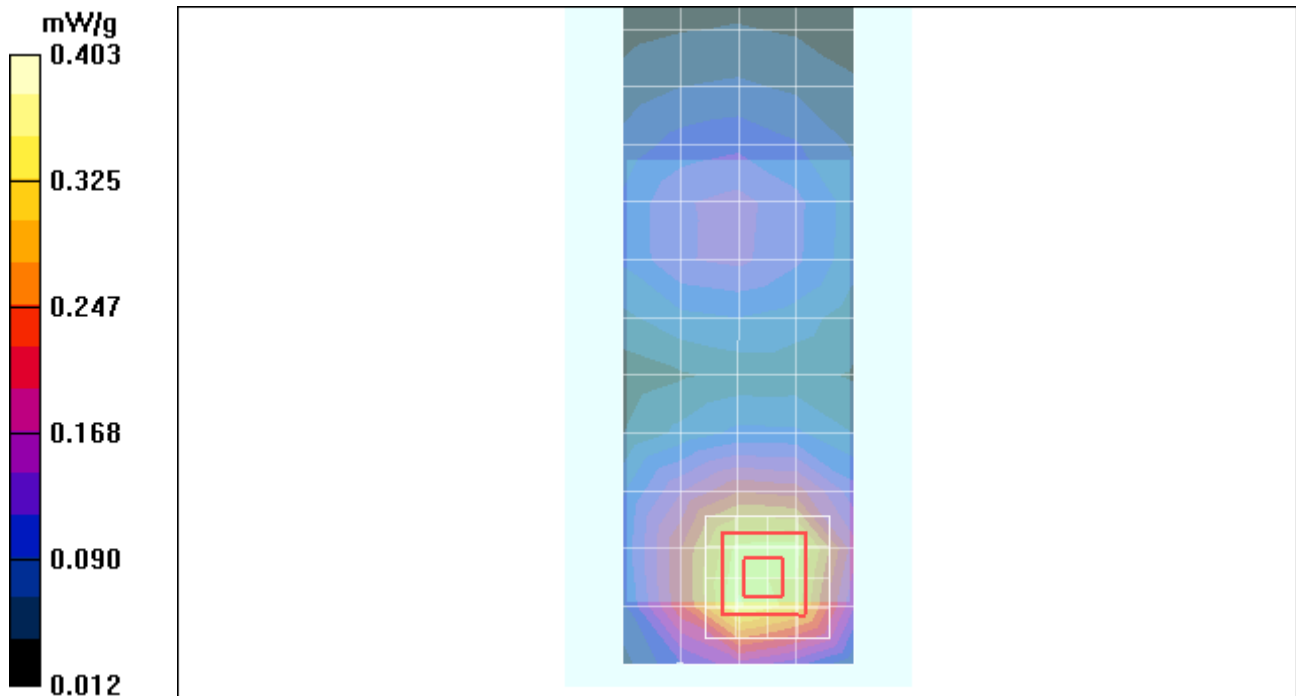
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.356 mW/g

## Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 14.4 V/m; Power Drift = -0.057 dB; Peak SAR (extrapolated) = 0.566 W/kg

**SAR(1 g) = 0.371 mW/g; SAR(10 g) = 0.230 mW/g; Maximum value of SAR (measured) = 0.403 mW/g**



## Test Laboratory: Motorola - Wi-Fi 2450 MHz Body Worn

Serial: 356689030000012; FCC ID: IHDT56KV2

Procedure Notes: Pwr Step: N/A; Antenna Position: Internal; Battery Model #: SNN5843A

Device Position: Body Worn, Back of Phone 25 mm from Phantom

Communication System: Wi-Fi 2450; Frequency: 2437 MHz; Channel Number: 6; Duty Cycle: 1:1

Medium: 2450 Glycol Body

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.89$  mho/m;  $\epsilon_r = 51.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.05, 4.05, 4.05); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R4 : Sect.1, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

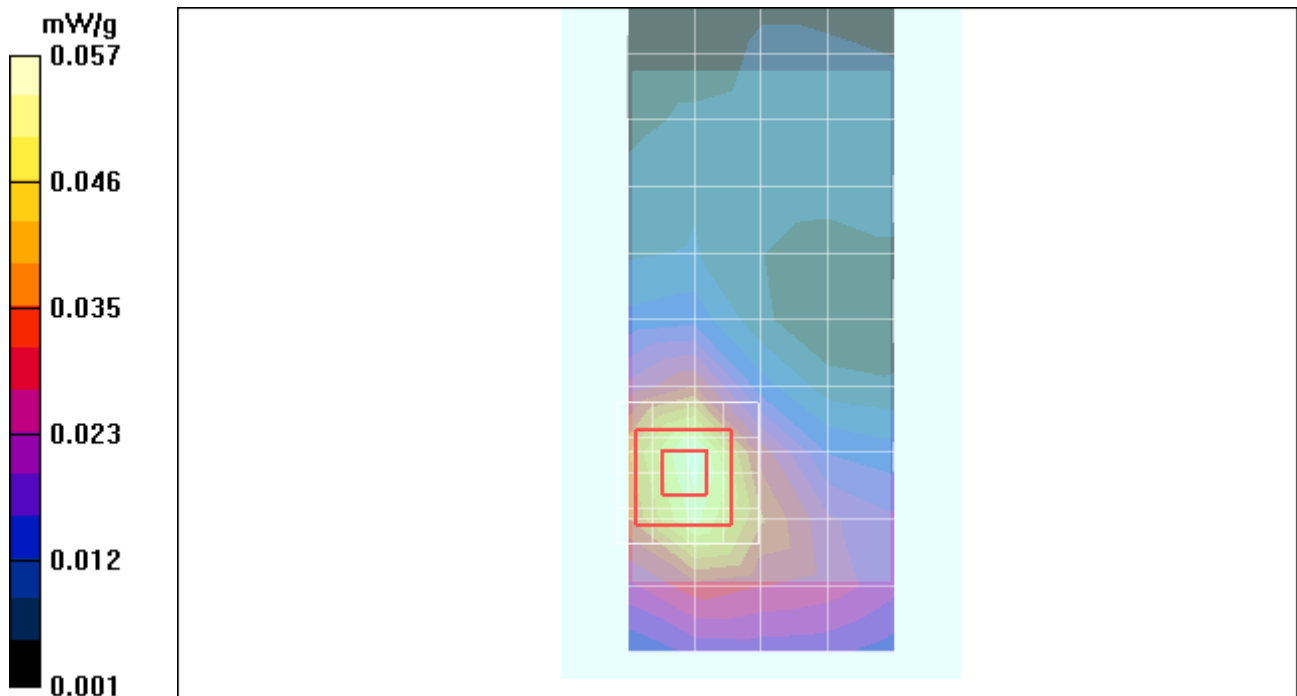
Measurement grid:  $dx=15$ mm,  $dy=15$ mm; Maximum value of SAR (measured) = 0.056 mW/g

### Amy Twin Phone Template/5x5x7 Zoom Scan ( $\leq 3$ GHz) (5x5x7)/Cube 0:

Measurement grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=5$ mm

Reference Value = 4.47 V/m; Power Drift = 0.024 dB; Peak SAR (extrapolated) = 0.095 W/kg

**SAR(1 g) = 0.053 mW/g; SAR(10 g) = 0.029 mW/g; Maximum value of SAR (measured) = 0.057 mW/g**



# Test Laboratory: Motorola - Bluetooth Body Worn

Serial: 356689030000012; FCC ID: IHDT56KV2

Procedure Notes: Pwr Step: N/A; Antenna Position: Internal; Battery Model #: SNN5843A

Device Position: Body Worn, Back of Phone 25 mm from Phantom

Communication System: Bluetooth; Frequency: 2441 MHz; Channel Number: 39; Duty Cycle: 1:1

Medium: 2450 Glycol Body

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.89$  mho/m;  $\epsilon_r = 51.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.05, 4.05, 4.05); Calibrated: 4/21/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 2/9/2009
- Phantom: R4 : Sect.1, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

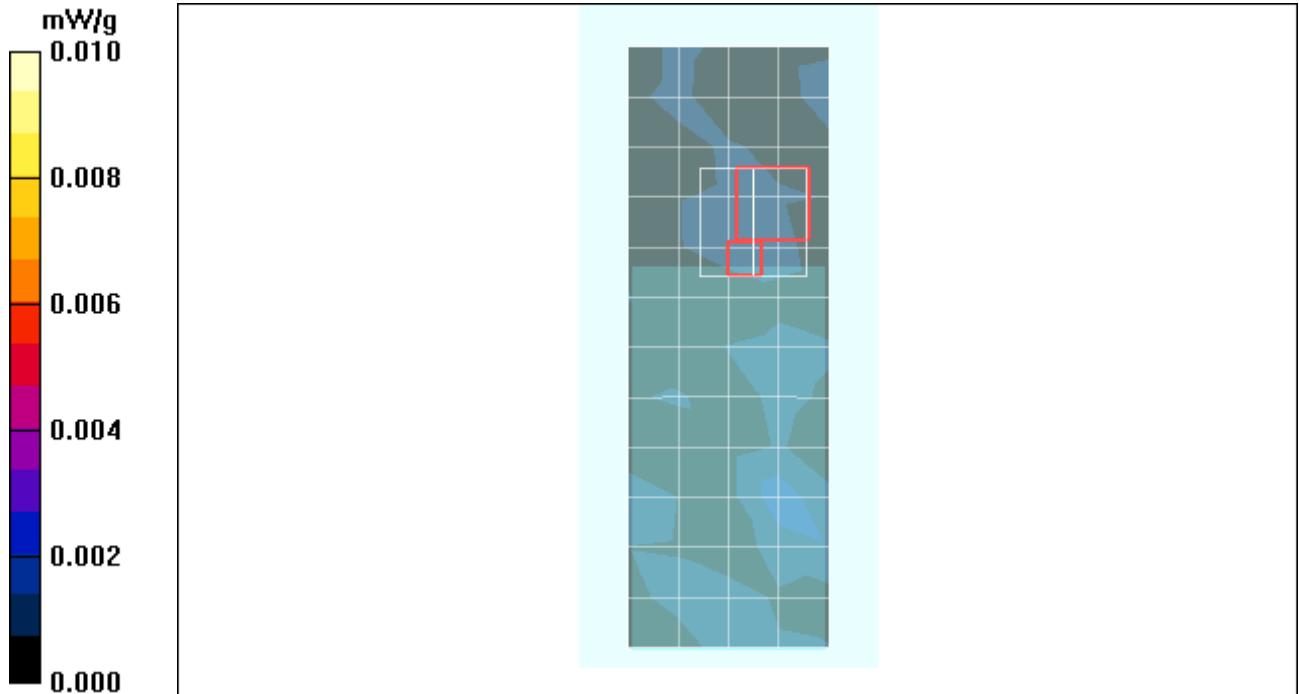
Measurement grid:  $dx=15$ mm,  $dy=15$ mm; Maximum value of SAR (measured) = 0.002 mW/g

## Amy Twin Phone Template/5x5x7 Zoom Scan ( $\leq 3$ GHz) (5x5x7)/Cube 0:

Measurement grid:  $dx=8$ mm,  $dy=8$ mm,  $dz=5$ mm

Reference Value = 0.597 V/m; Power Drift = 0.867 dB; Peak SAR (extrapolated) = 0.003 W/kg

**SAR(1 g) = 0.00071 mW/g; SAR(10 g) = 0.000355 mW/g**



## **Appendix 4**

### **Probe Calibration Certificate**



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

Accreditation No.: **SCS 108**

Client **Motorola MDb**

Certificate No: **ES3-3124\_Apr09**

**CALIBRATION CERTIFICATE**

Object **ES3DV3 - SN:3124**

Calibration procedure(s) **QA CAL-01.v6 and QA CAL-23.v3  
 Calibration procedure for dosimetric E-field probes**

Calibration date: **April 21, 2009**

Condition of the calibrated item **In Tolerance**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41495277	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41498087	1-Apr-09 (No. 217-01030)	Apr-10
Reference 3 dB Attenuator	SN: S5054 (3c)	31-Mar-09 (No. 217-01026)	Mar-10
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-09 (No. 217-01028)	Mar-10
Reference 30 dB Attenuator	SN: S5129 (30b)	31-Mar-09 (No. 217-01027)	Mar-10
Reference Probe ES3DV2	SN: 3013	2-Jan-09 (No. ES3-3013_Jan09)	Jan-10
DAE4	SN: 660	9-Sep-08 (No. DAE4-660_Sep08)	Sep-09
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-08)	In house check: Oct-09

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

Issued: April 22, 2009

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



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The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

### Glossary:

TSL	tissue simulating liquid
NORM <sub>x,y,z</sub>	sensitivity in free space
ConvF	sensitivity in TSL / NORM <sub>x,y,z</sub>
DCP	diode compression point
Polarization $\varphi$	$\varphi$ rotation around probe axis
Polarization $\vartheta$	$\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

### Calibration is Performed According to the Following Standards:

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

### Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not effect the E<sup>2</sup>-field uncertainty inside TSL (see below *ConvF*).
- NORM(f)<sub>x,y,z</sub> = NORM<sub>x,y,z</sub> \* frequency\_response** (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- DCP<sub>x,y,z</sub>**: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM<sub>x,y,z</sub> \* 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  $\pm 50$  MHz to  $\pm 100$  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:3124

Manufactured:	July 11, 2006
Last calibrated:	March 17, 2008
Recalibrated:	April 21, 2009

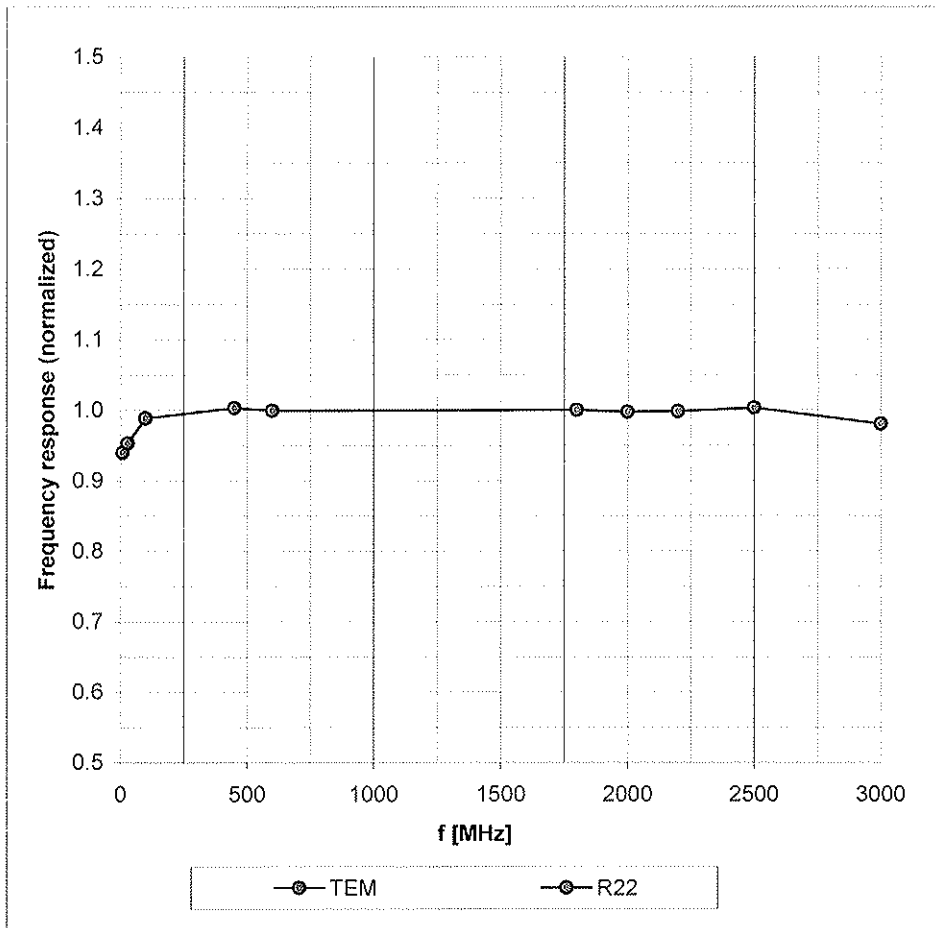
Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)



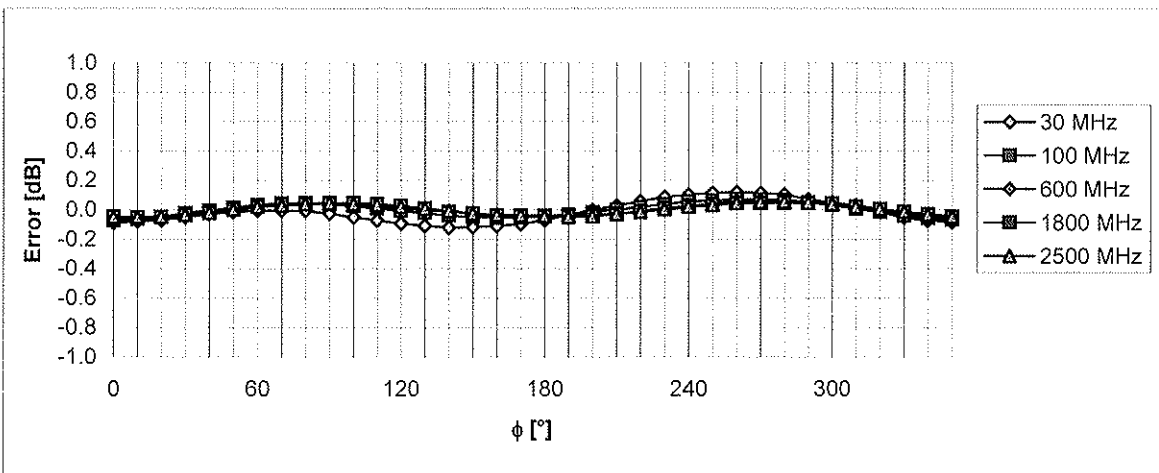
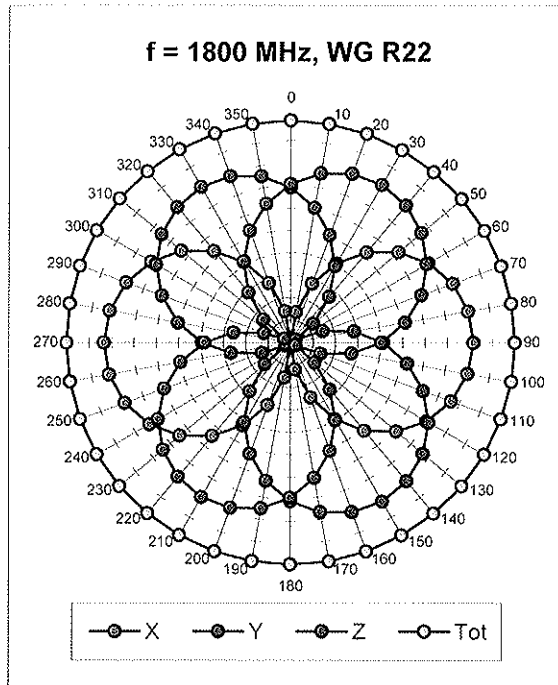
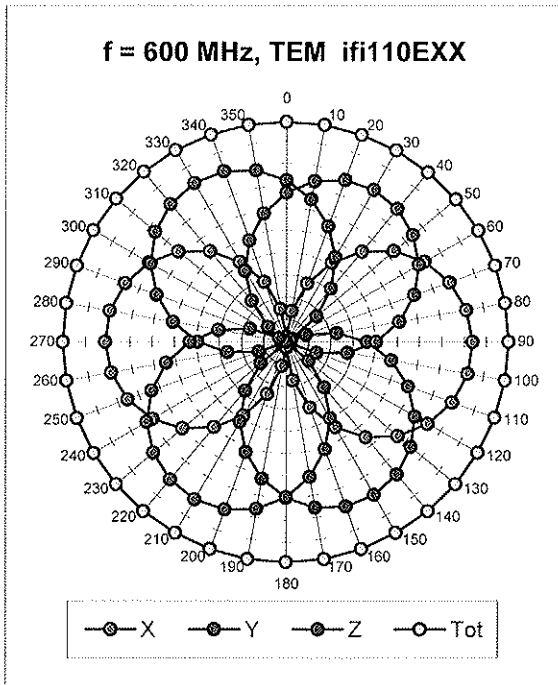
# Frequency Response of E-Field

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



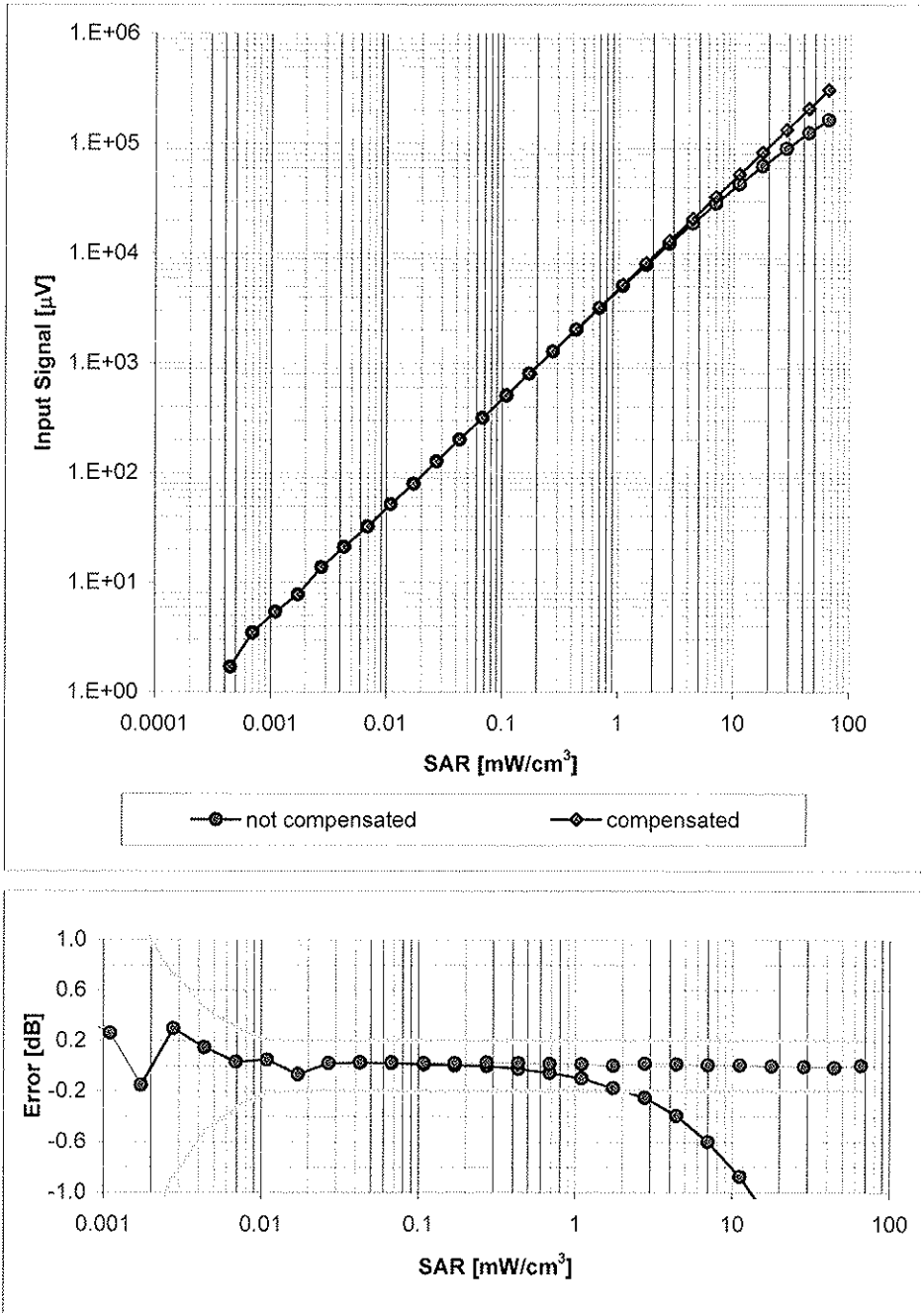
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

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



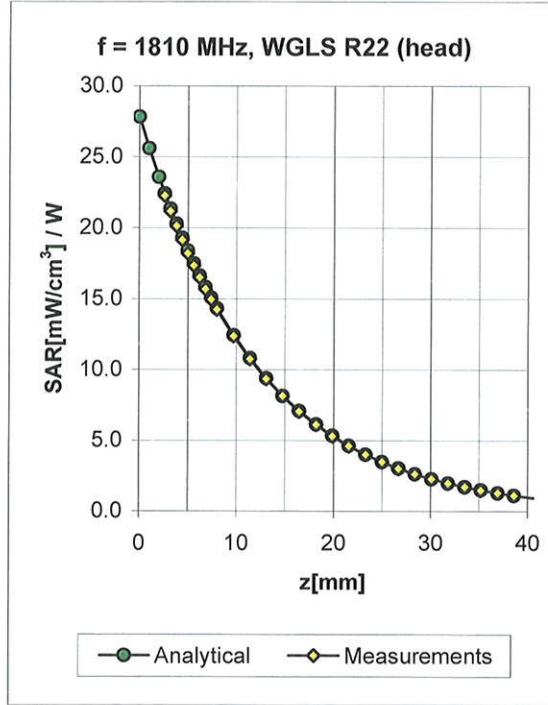
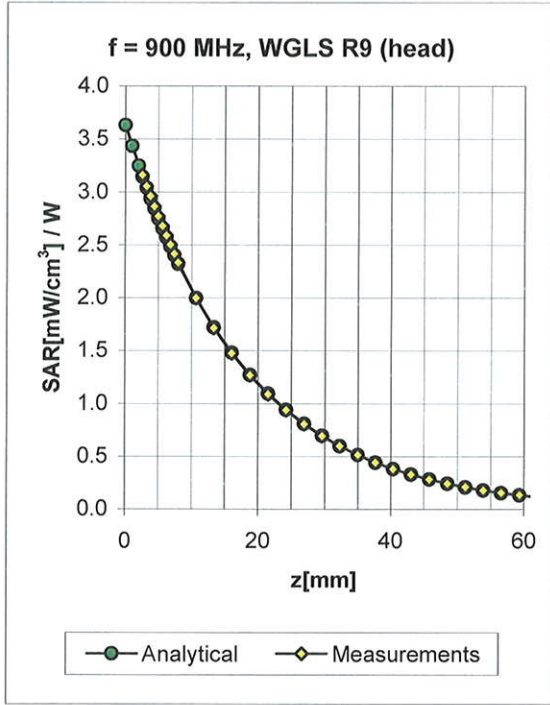
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

### Dynamic Range $f(\text{SAR}_{\text{head}})$ (Waveguide R22, $f = 1800 \text{ MHz}$ )



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

## Conversion Factor Assessment

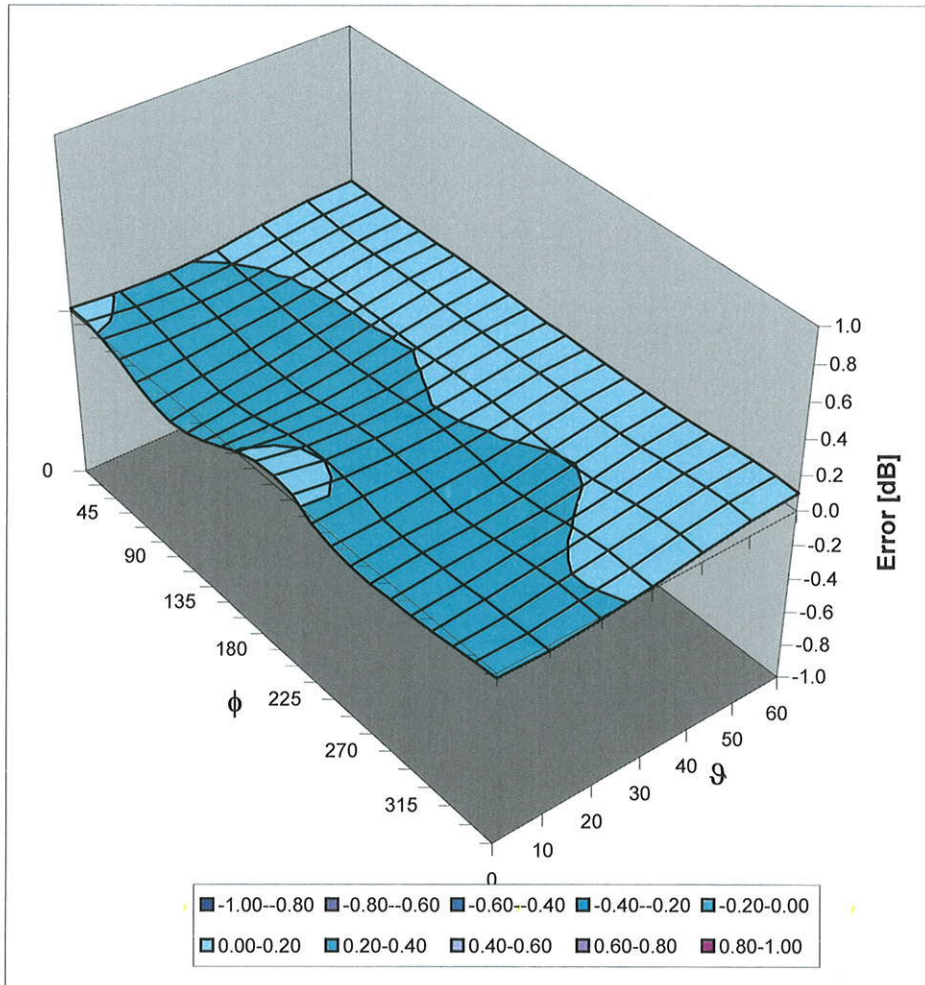


f [MHz]	Validity [MHz] <sup>c</sup>	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.91	1.07	5.73 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.53	1.44	4.95 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.49	1.51	4.78 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.59	1.47	4.42 ± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.92	1.12	5.73 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.49	1.70	4.75 ± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.53	1.73	4.69 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.99	1.09	4.05 ± 11.0% (k=2)

<sup>c</sup> 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 ( $\phi$ ,  $\vartheta$ ),  $f = 900$  MHz



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

## **Appendix 5**

### **Measurement Uncertainty Budget**

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	$e = f(d,k)$	<i>f</i>	<i>g</i>	$h = c \times f / e$	$i = c \times g / e$	<i>k</i>
<b>Uncertainty Component</b>	IEEE 1528 section	Tol. (± %)	Prob Dist	Div.	$c_i$ (1 g)	$c_i$ (10 g)	1 g $u_i$ (±%)	10 g $u_i$ (±%)	$v_i$
<b>Measurement System</b>									
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	∞
<b>Test sample Related</b>									
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	∞
<b>Phantom and Tissue Parameters</b>									
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	∞
<b>Combined Standard Uncertainty</b>			RSS				11.1	10.8	411
<b>Expanded Uncertainty (95% CONFIDENCE LEVEL)</b>			$k=2$				22.2	21.6	

## **Appendix 6**

### **Dipole Characterization Certificate**

# Certification of System Performance Check Targets

FCD-1806, rev-1

-Historical Data-

900 MHz	
Reference Target:	10.9 (W/kg)
Measurement Uncertainty (k=1):	9.0%
Measurement Period:	15April08 - 26March09
# of tests performed:	1,099
Grand Average:	11.19 (W/kg)
% Delta (Average - Reference Target)	2.7%
Is % Delta <= Expanded Measurement Uncertainty (k=2)?	Yes
Accept/Reject <u>Average</u> as new system performance check target?	ACCEPT
<u>Applies to Dipole SN's:</u> 55, 69, 77, 78, 79, 80, 91, 92, 93, 94, 95, 96, 97, 1d034, 1d035	

-New System Performance Check Targets- per WI-0396

(based on analysis of historical data)

Frequency	SAR Target (W/kg)	Permittivity Target +/- %	Conductivity (S/m) Target +/- %
900 MHz	11.19	41.5 +/- 5%	0.97 +/- 5%


-Approvals-

Submitted by:  Date:

Signed: 

Comments:

Approved by:  Date:

Signed: 

Comments:

# Certification of System Performance Check Targets

FCD-1806, rev-1

-Historical Data-

1800 MHz	
Reference Target:	38.4 (W/kg)
Measurement Uncertainty (k=1):	9.0%
Measurement Period:	15April08 - 26March09
# of tests performed:	929
Grand Average:	37.91 (W/kg)
% Delta (Average - Reference Target)	-1.3%
Is % Delta <= Expanded Measurement Uncertainty (k=2)?	Yes
Accept/Reject <u>Average</u> as new system performance check target?	ACCEPT
<u>Applies to Dipole SN's:</u> 246tr, 250tr, 251tr, 259tr, 263tr, 271tr, 272tr, 276tr, 277tr, 279tr, 280tr, 281tr, 283tr, 284tr, 2d128, 2d129	

-New System Performance Check Targets- per WI-0396

(based on analysis of historical data)

Frequency	SAR Target (W/kg)	Permittivity Target +/- %	Conductivity (S/m) Target +/- %
1800 MHz	37.91	40.0 +/- 5%	1.40 +/- 5%


-Approvals-

Submitted by:  Date:

Signed: 

Comments:

Approved by:  Date:

Signed: 

Comments:

# Certification of System Performance Check Targets

FCD-1806, rev-1

-Historical Data-

2450 MHz	
Reference Target:	52.4 (W/kg)
Measurement Uncertainty (k=1):	9.0%
Measurement Period:	15April08 - 26March09
# of tests performed:	150
Grand Average:	56.68 (W/kg)
% Delta (Average - Reference Target)	8.2%
Is % Delta <= Expanded Measurement Uncertainty (k=2)?	Yes
Accept/Reject <u>Average</u> as new system performance check target?	ACCEPT
Applies to Dipole SN's:	
740, 766, 767, 788, 789	

-New System Performance Check Targets- per WI-0396

(based on analysis of historical data)

Frequency	SAR Target (W/kg)	Permittivity Target +/- %	Conductivity (S/m) Target +/- %
2450 MHz	56.68	39.2 +/- 10%	1.80 +/- 5%

-Approvals-

Submitted by:  Date:

Signed: 

Comments:

Approved by:  Date:

Signed: 

Comments:

**END OF REPORT**