



**MOTOROLA**

**Portable Cellular Phone SAR Test Report**

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**Accreditation:**



TESTING CERT #2518-02

- |   |  |
|---|--|
| <u>Tests:</u><br>Electromagnetic Specific Absorption Rate | <u>Procedures:</u><br>IEC 62209-1<br>RSS-102<br>IEEE 1528 - 2003<br>FCC OET Bulletin 65 (including Supplement C)<br>Australian Communications Authority Radio<br>Communications (Electromagnetic Radiation – Human<br>Exposure) Standard 2003<br>CENELEC EN 50360 (2001)<br>CENELEC EN 50361 (2001)<br>ARIB Std. T-56 (2002) |
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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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The results and statements contained herein relate only to the items tested. The names of individuals involved may be mentioned only in connection with the statements or results from this report.

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

## Table of Contents

<b>1. Introduction</b>	<b>2</b>
<b>2. Description of the Device Under Test</b>	<b>3</b>
2.1 Antenna description	3
2.2 Device description	3
<b>3. Test Equipment Used</b>	<b>4</b>
3.1 Dosimetric System	4
3.2 Additional Equipment	4
<b>4. Electrical parameters of the tissue simulating liquid</b>	<b>5</b>
<b>5. System Accuracy Verification</b>	<b>6</b>
<b>6. Test Results</b>	<b>7</b>
6.1 Head Adjacent Test Results	8
6.2 Body Worn Test Results	13
<b>References</b>	<b>16</b>
<b>Appendix 1: SAR distribution comparison for system accuracy verification</b>	<b>17</b>
<b>Appendix 2: SAR distribution plots for Phantom Head Adjacent Use</b>	<b>18</b>
<b>Appendix 3: SAR distribution plots for Body Worn Configuration</b>	<b>19</b>
<b>Appendix 4: Probe Calibration Certificate</b>	<b>20</b>
<b>Appendix 5: Measurement Uncertainty Budget</b>	<b>21</b>
<b>Appendix 6: Dipole Characterization Certificate</b>	<b>23</b>

## **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 ICNIRP (10 g), the final SAR reading for this phone is 0.83 W/kg for head adjacent use and 0.81 W/kg for body-worn use. For ANSI / IEEE C95.1 (1 g), the final SAR reading for this phone is 1.40 W/kg for head adjacent use and 1.14 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>	CDMA 800/1700 Band - Internal	
<b>Location</b>	Bottom Rear of Transceiver	
<b>Dimensions</b>	Length	56 mm
	Width	18 mm
<b>Configuration</b>	FICA	

<b>Type</b>	CDMA 1900 Band - Internal	
<b>Location</b>	Top Rear of Transceiver	
<b>Dimensions</b>	Length	39 mm
	Width	10 mm
<b>Configuration</b>	IFA	

### 2.2 Device description

<b>Serial number</b>	<b>80747706, 80A39E4E</b>						
<b>Mode(s) of Operation</b>	800 CDMA	1700 CDMA	1900 CDMA	800 EV-DO Rel. O	1700 EV-DO Rel. O	1900 EV-DO Rel. O	Bluetooth
<b>Modulation Mode(s)</b>	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	GMSK
<b>Maximum Output Power Setting</b>	25.00 dBm	25.00 dBm	25.00 dBm	25.00 dBm	25.00 dBm	25.00 dBm	8.00 dBm
<b>Duty Cycle</b>	1:1	1:1	1:1	1:1	1:1	1:1	1:1
<b>Transmitting Frequency Range(s)</b>	824.70 – 848.31 MHz	1711.2 - 1753.75 MHz	1851.25 – 1908.75 MHz	824.70 – 848.31 MHz	1711.2 - 1753.75 MHz	1851.25 – 1908.75 MHz	2400.0 - 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						

### 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	Jan-28-2009
E-Field Probe ES3DV3	3115	May-12-2008
DASY4™ DAE V1	661	Jan-28-2009
E-Field Probe ES3DV3	3124	Mar-17-2009
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-22-2009
Dipole Validation Kit, DV1800V2	272TR	Apr-22-2009
Dipole Validation Kit, DV2450V2	740	Apr-22-2009

#### 3.2 Additional Equipment

Description	Serial Number	Cal Due Date
Signal Generator HP8648C	3847A04844	Jan-29-2010
Power Meter E4419B	US39250622	Jun-07-2009
Power Sensor #1 - E9301A	US39211008	Jun-02-2009
Power Sensor #2 - E9301A	US39211009	Jun-02-2009
Network Analyzer HP8753ES	US39171846	Jul-05-2009
Dielectric Probe Kit HP85070B	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-24-2008	41.3	0.91	20.7
		Recommended Limits	41.5 $\pm$ 5%	0.90 $\pm$ 5%	18-25
	Body	Measured, Aug-24-2008	54.1	1.00	21.0
		Recommended Limits	55.2 $\pm$ 5%	0.97 $\pm$ 5%	18-25
1750	Head	Measured, Sep-03-2008	40.5	1.30	19.6
		Recommended Limits	40.1 $\pm$ 5%	1.37 $\pm$ 5%	18-25
	Body	Measured, Aug-23-2008	51.5	1.43	19.8
		Recommended Limits	53.4 $\pm$ 5%	1.49 $\pm$ 5%	18-25
1880	Head	Measured, Aug-23-2008	40.1	1.46	20.1
		Recommended Limits	40.0 $\pm$ 5%	1.40 $\pm$ 5%	18-25
	Body	Measured, Aug-23-2008	50.7	1.57	19.9
		Recommended Limits	53.3 $\pm$ 5%	1.52 $\pm$ 5%	18-25
2450	Body	Measured, Sep-04-2008	47.7	2.00	19.6
		Recommended Limits	52.7 $\pm$ 10%	1.95 $\pm$ 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 ±10% from the target SAR indicated Appendix 7. These frequencies are within ±10% of the compliance test mid-band frequency as required in [1] and [5]. The test was conducted on the same days as the measurement of the DUT. Recommended limits for permittivity and conductivity, specified in [5], are shown in the table below. The obtained results from the system accuracy verification are also displayed in the table below. SAR values are normalized to 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 ± 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)
			ε <sub>r</sub>	σ (S/m)		
900	Measured, Aug-24-2008	11.475	40.5	0.97	20.5	20.7
	Recommended Limits	11.29	41.5 ±5%	0.97 ±5%	18-25	18-25
1800	Measured, Aug-23-2008	39.125	40.5	1.38	20.3	20.3
	Measured, Sep-03-2008	38.925	39.7	1.37	20.7	20.3
	Recommended Limits	37.7	40.0 ±5%	1.40 ±5%	18-25	18-25
2450	Measured, Sep-03-2008	58.75	35.5	1.86	20.5	19.5
	Recommended Limits	56.5	39.2 ±10%	1.80 ±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	3115	900	5.63	8 of 9
		1810	4.93	8 of 9
	3124	2450	4.51	8 of 9

## 6. Test Results

The test sample was operated using an actual transmission through a base station simulator. The base station simulator was setup to the proper channel, transmitter power level and transmit mode of operation. The phone was tested in the configurations stipulated in [1], [4] and [5]. The phone was positioned into these configurations using the device holder supplied with the DASY4™ SAR measurement system. The measured dielectric constant of the material used for the device holder is less than 2.9 and the loss tangent is less than 0.02 (± 30%) at 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 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 SNN5833A - 930 mAH Battery

The battery with the highest capacity is the SNN5833A. This battery was used to do 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, RC1, RC3 and RC3 (FCH + SCH) CDMA modes, EVDO Rev O, EVDO Rev A were considered. The conducted power measurements (per steps 3, 4 & 10 of section 4.4.5.2 of 3GPP2 C.5.011 / TIA -98-E) for each mode are shown in the table below.

Conducted power (dBm) for CDMA modes						
	Channel	RC1		RC3		RC3 (FCH + SCH)
		SO2	SO55	SO2	SO55	
CDMA 800	1013	24.95	24.91	24.93	24.88	Per Motorola designs, the maximum power, when in a mode that allows supplemental channels, will always be less than the RC3/RC1 maximum conducted power limit.
	384	24.91	24.91	24.91	24.85	
	777	24.80	24.83	24.87	24.84	
CDMA 1700	25	24.92	24.97	25.01	24.95	
	450	24.86	24.80	24.74	24.88	
	875	24.78	24.77	24.71	24.92	
CDMA 1900	25	25.04	25.03	24.96	24.93	
	600	24.84	24.83	24.89	24.88	
	1175	24.90	24.92	24.93	24.93	

## 6.1 Head Adjacent Test Results

The SAR results shown in tables 1 through 8 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 for the CDMA RC3/SO55 mode, 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. Note that 800 MHz digital mode SAR measurements were performed in accordance with [4].

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

The SAR measurements were performed using the SAM phantoms listed in section 3.1. Since the same phantoms and simulated tissue were used for the system accuracy verification and the device SAR measurements, the Z-axis scans included in Appendix 1 are applicable for verification of simulated tissue depth to be 15.0 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	3115	900	5.63	8 of 9
		1810	4.93	8 of 9

Left Head Cheek Position, Slider Extended								
<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)
CDMA 800	Channel 1013	24.88	20.7	-0.056	0.598	0.61	0.832	0.84
	Channel 384	24.85	<b>20.7</b>	<b>-0.216</b>	<b>0.773</b>	<b>0.81</b>	<b>1.08</b>	<b>1.14</b>
	Channel 777	24.84	20.7	0.048	0.642	0.64	0.897	0.90
CDMA 1700	Channel 25	24.95						
	Channel 450	24.88	<b>19.6</b>	<b>-0.198</b>	<b>0.306</b>	<b>0.32</b>	<b>0.495</b>	<b>0.52</b>
	Channel 875	24.92						
CDMA 1900	Channel 25	24.93						
	Channel 600	24.88	19.9	0.080	0.042	0.04	0.068	0.07
	Channel 1175	24.93						

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

Left Head Cheek Position, Slider Retracted								
<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)
CDMA 800	Channel 1013	24.88						
	Channel 384	24.85	20.8	0.220	0.456	0.46	0.620	0.62
	Channel 777	24.84						
CDMA 1700	Channel 25	24.95						
	Channel 450	24.88	<b>19.6</b>	<b>-0.493</b>	<b>0.122</b>	<b>0.14</b>	<b>0.204</b>	<b>0.23</b>
	Channel 875	24.92						
CDMA 1900	Channel 25	24.93						
	Channel 600	24.88	20.0	-0.158	0.241	0.25	0.416	0.43
	Channel 1175	24.93						

**Table 2: 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, Slider Extended								
$f$ (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)
CDMA 800	Channel 1013	24.88	20.8	-0.090	0.572	0.58	0.754	0.77
	Channel 384	24.85	20.7	-0.127	0.726	0.75	0.990	1.02
	Channel 777	24.84	20.8	-0.072	0.663	0.67	0.897	0.91
CDMA 1700	Channel 25	24.95						
	Channel 450	24.88	19.6	-0.258	0.206	0.22	0.302	0.32
	Channel 875	24.92						
CDMA 1900	Channel 25	24.93						
	Channel 600	24.88	20.0	0.320	0.046	0.05	0.075	0.07
	Channel 1175	24.93						

Table 3: 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, Slider Retracted								
$f$ (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)
CDMA 800	Channel 1013	24.88						
	Channel 384	24.85	20.8	0.246	0.453	0.45	0.651	0.65
	Channel 777	24.84						
CDMA 1700	Channel 25	24.95						
	Channel 450	24.88	19.8	-0.260	0.116	0.12	0.189	0.20
	Channel 875	24.92						
CDMA 1900	Channel 25	24.93						
	Channel 600	24.88	20.0	-0.215	0.326	0.34	0.590	0.62
	Channel 1175	24.93						

Table 4: 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, Slider Extended								
<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)
CDMA 800	Channel 1013	24.88						
	Channel 384	24.85	20.7	-0.063	0.451	0.46	0.588	0.60
	Channel 777	24.84						
CDMA 1700	Channel 25	24.95						
	Channel 450	24.88	19.8	-0.216	0.199	0.21	0.334	0.35
	Channel 875	24.92						
CDMA 1900	Channel 25	24.93						
	Channel 600	24.88	19.9	0.212	0.048	0.05	0.085	0.09
	Channel 1175	24.93						

Table 5: SAR measurement results at the highest possible output power, measured in a head 15° Tilt position against the ICNIRP and ANSI SAR Limit.

Left Head 15° Tilt Position, Slider Retracted								
<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)
CDMA 800	Channel 1013	24.88						
	Channel 384	24.85	20.8	0.275	0.295	0.30	0.43	0.43
	Channel 777	24.84						
CDMA 1700	Channel 25	24.95						
	Channel 450	24.88	19.6	-0.274	0.249	0.27	0.440	0.47
	Channel 875	24.92						
CDMA 1900	Channel 25	24.93						
	Channel 600	24.88	20.0	-0.025	0.330	0.33	0.592	0.60
	Channel 1175	24.93						

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

Right Head 15° Tilt Position, Slider Extended								
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)
CDMA 800	Channel 1013	24.88						
	Channel 384	24.85	20.8	0.020	0.467	0.47	0.611	0.61
	Channel 777	24.84						
CDMA 1700	Channel 25	24.95						
	Channel 450	24.88	19.8	-0.320	0.197	0.21	0.308	0.33
	Channel 875	24.92						
CDMA 1900	Channel 25	24.93						
	Channel 600	24.88	20.0	0.119	0.058	0.06	0.105	0.11
	Channel 1175	24.93						

Table 7: 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, Slider Retracted								
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)
CDMA 800	Channel 1013	24.88						
	Channel 384	24.85	20.8	0.086	0.333	0.33	0.441	0.44
	Channel 777	24.84						
CDMA 1700	Channel 25	24.95						
	Channel 450	24.88	19.8	0.050	0.245	0.25	0.429	0.43
	Channel 875	24.92						
CDMA 1900	Channel 25	24.93						
	Channel 600	24.88	20.0	-0.207	0.386	0.40	0.739	0.78
	Channel 1175	24.93						

Table 8: 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 9 through 11 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 for the CDMA RC3/SO55 mode, 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. Note that 800 MHz digital mode SAR measurements were performed in accordance with [4].

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

A “flat” phantom was for the body-worn tests. This “flat” phantom is made out of 1” thick natural High Density Polyethylene with a thickness at the bottom equal to 2.0mm. It measures 52.7 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 all the way 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. In addition to accessory testing, the cellular phone was tested with the front and back of the phone facing the phantom. For voice mode operation, the phone was placed as a distance of 25 mm from the phantom. For data mode operation, the phone was placed as a distance of 25 mm from the phantom. The cellular phone was tested with a headset connected to the device for all body-worn SAR measurements.

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

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

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ES3DV3	3115	900	5.67	8 of 9
		1810	4.75	8 of 9
	3124	2450	4.19	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)
CDMA 800	Channel 1013	24.88						
	Channel 384	24.85	21.0	-0.067	0.041	0.04	0.059	0.06
	Channel 777	24.84						
CDMA 1700	Channel 25	24.95						
	Channel 450	24.88	19.8	-0.548	0.018	0.02	0.027	0.03
	Channel 875	24.92						
CDMA 1900	Channel 25	24.93						
	Channel 600	24.88	20.0	-0.355	0.045	0.05	0.068	0.07
	Channel 1175	24.93						

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

Body-Worn; 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)
CDMA 800	Channel 1013	24.88						
	Channel 384	24.85	21.0	-0.129	0.253	0.26	0.365	0.38
	Channel 777	24.84						
CDMA 1700	Channel 25	24.95	19.9	-0.344	0.746	0.81	1.26	1.36
	Channel 450	24.88	19.8	-0.141	0.798	0.82	1.35	1.39
	Channel 875	24.92	20.0	0.014	0.826	0.83	1.40	1.40
CDMA 1900	Channel 25	24.93						
	Channel 600	24.88	20.0	-0.045	0.118	0.12	0.189	0.19
	Channel 1175	24.93						
Bluetooth 2450 MHz	Channel 39	7.681	19.7	-0.375	0.00136	0.00	0.00276	0.00

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

<b>Highest of Extrapolated SAR Values, including Bluetooth summation</b>							
<i>f</i> (MHz)	Description	<i>10 g SAR value</i>			<i>1 g SAR value</i>		
		Original Measurement (W/kg)	Bluetooth Measurement (W/kg)	Summation (W/kg)	Original Measurement (W/kg)	Bluetooth Measurement (W/kg)	Summation (W/kg)
<b>CDMA 800</b>	Body Worn, Back of Phone 25 mm from Phantom	0.26	0.00	0.26	0.38	0.00	0.38
<b>CDMA 1700</b>	Body Worn, Back of Phone 25 mm from Phantom	0.83	0.00	0.83	1.40	0.00	1.40
<b>CDMA 1900</b>	Body Worn, Back of Phone 25 mm from Phantom	0.12	0.00	0.12	0.19	0.00	0.19

**Table 11: 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**

Date/Time: 8/24/2008 7:37:47 AM

## Test Laboratory: Motorola - 082408 900MHz Good at +1.6%

**DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN: 91; FCC ID: IHDP56JX2**

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

Sim.Temp@meas = 20.7 C; Sim.Temp@SPC = 20.7 C; Room Temp @ SPC = 20.5 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 - SN3115; ConvF(5.63, 5.63, 5.63); Calibrated: 5/12/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 1/28/2008
- 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 71; Postprocessing SW: SEMCAD, V1.8 Build 184

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

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 2.22 mW/g

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

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

Reference Value = 51.6 V/m; Power Drift = -0.019 dB; Peak SAR (extrapolated) = 3.53 W/kg

**SAR(1 g) = 2.32 mW/g; SAR(10 g) = 1.49 mW/g;** Maximum value of SAR (measured) = 2.51 mW/g

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

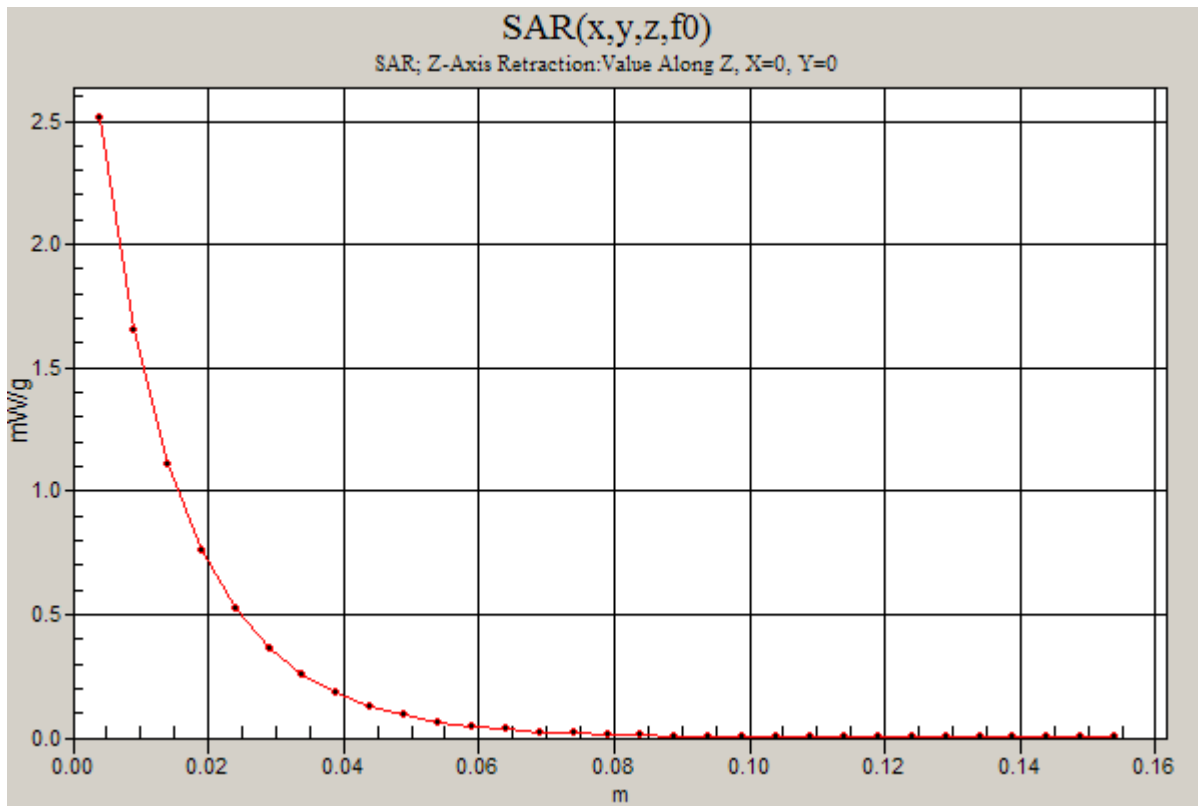
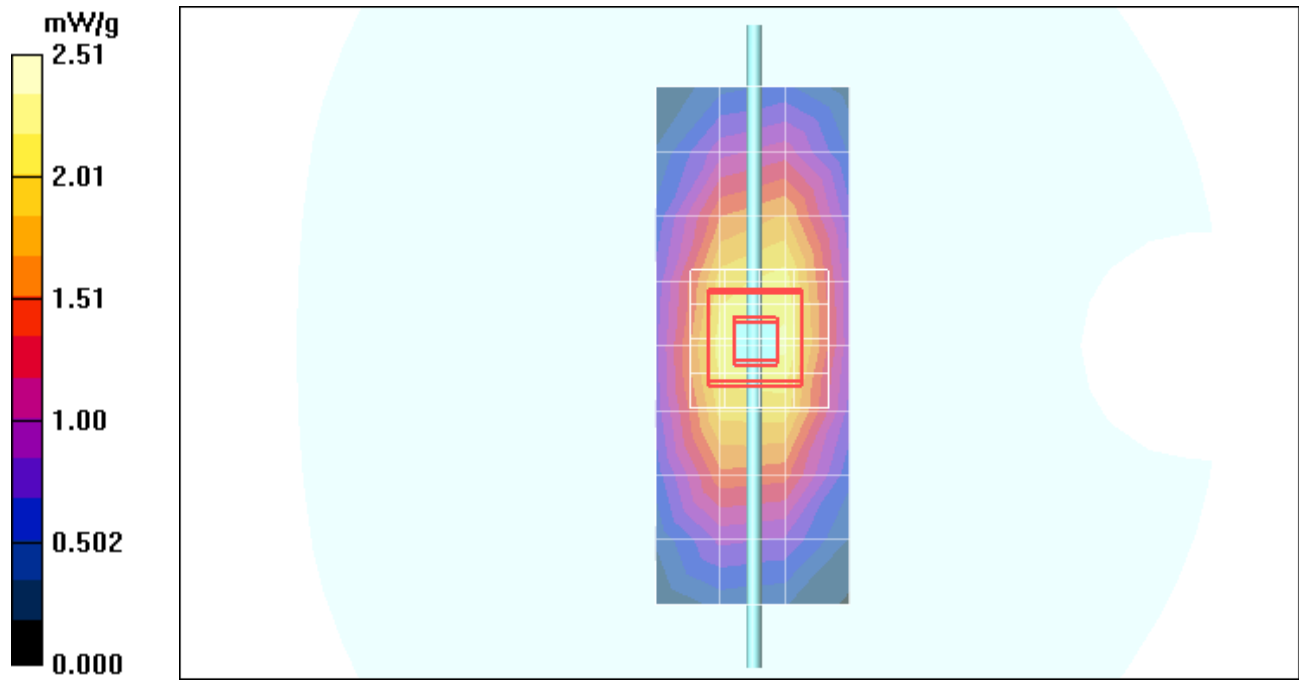
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 51.6 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;** Maximum value of SAR (measured) = 2.45 mW/g

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

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



Date/Time: 8/23/2008 5:00:19 AM

## Test Laboratory: Motorola - 082308 1800MHz Good at +3.8%

**DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 272TR; FCC ID: IHDP56JX2**

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

Sim.Temp@meas = 20.1 C; Sim.Temp@SPC = 20.3 C; Room Temp @ SPC = 20.3 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;  $\epsilon_r = 40.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3115; ConvF(4.93, 4.93, 4.93); Calibrated: 5/12/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 1/28/2008
- 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 71; Postprocessing SW: SEMCAD, V1.8 Build 184

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

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 6.80 mW/g

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

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

Reference Value = 81.1 V/m; Power Drift = 0.000 dB; Peak SAR (extrapolated) = 14.2 W/kg

**SAR(1 g) = 7.91 mW/g; SAR(10 g) = 4.18 mW/g; Maximum value of SAR (measured) = 8.88 mW/g**

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

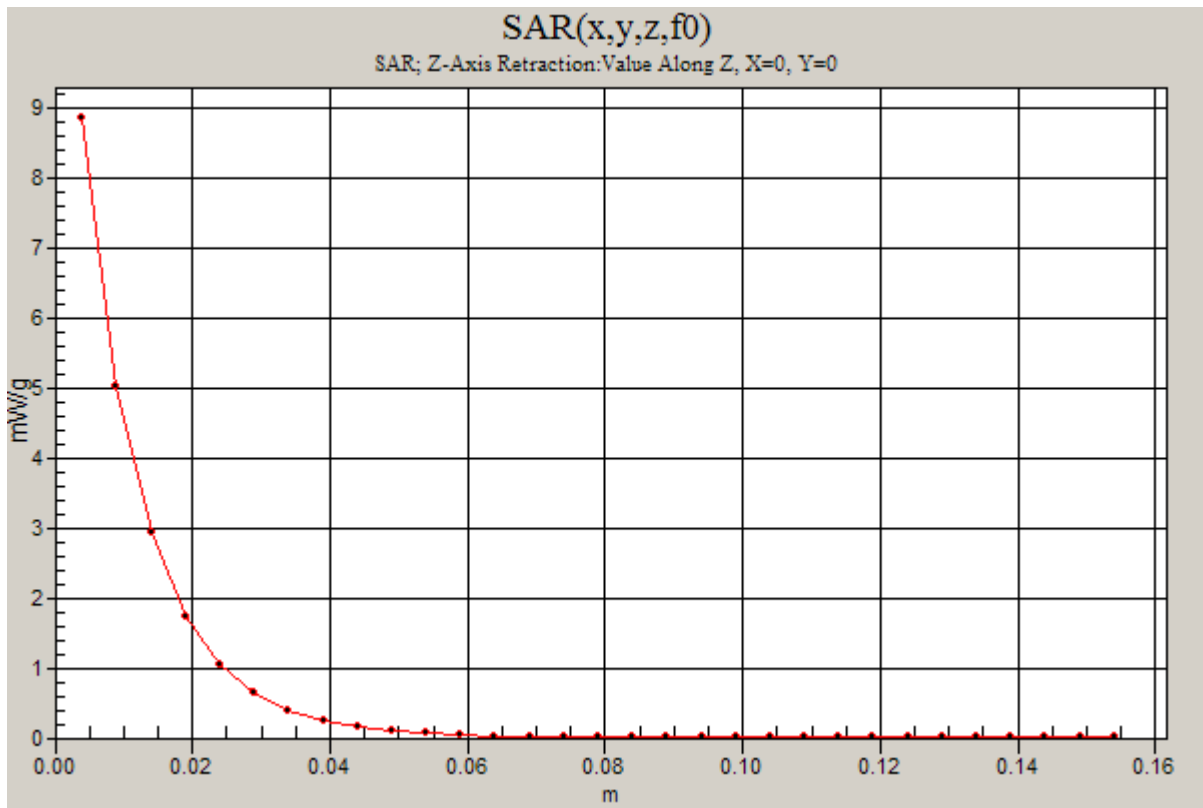
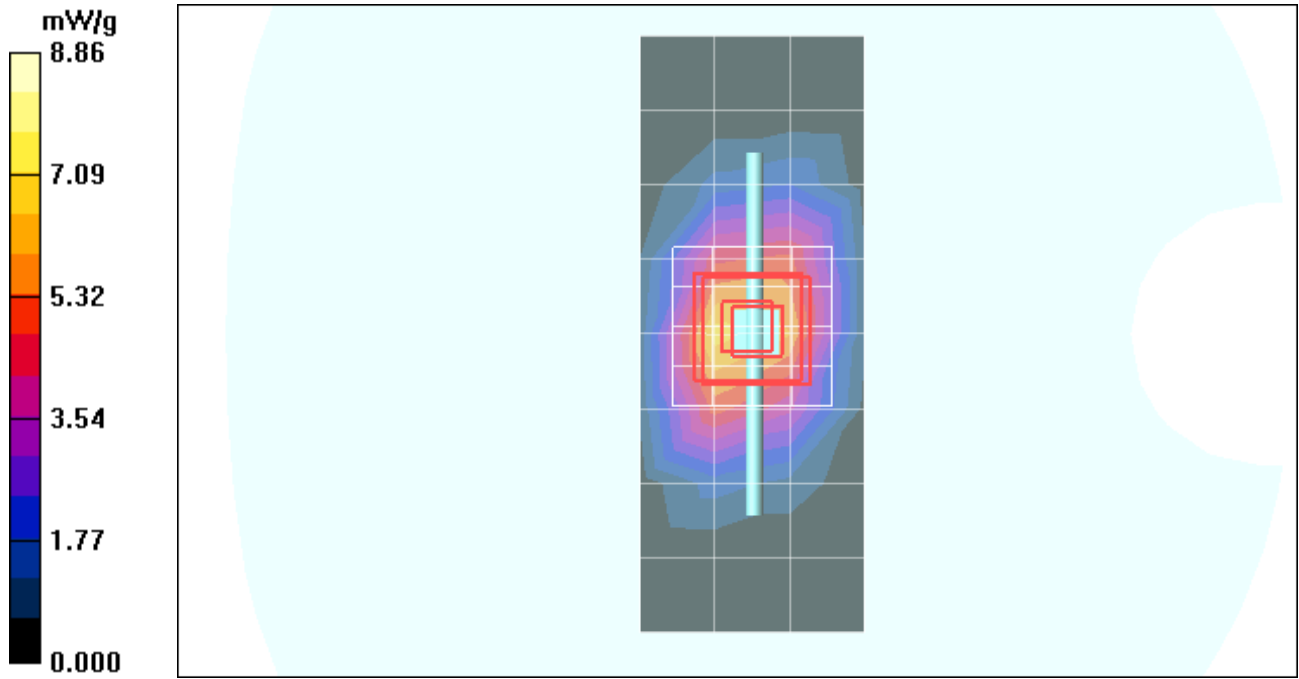
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 81.1 V/m; Power Drift = 0.000 dB; Peak SAR (extrapolated) = 13.8 W/kg

**SAR(1 g) = 7.74 mW/g; SAR(10 g) = 4.12 mW/g; Maximum value of SAR (measured) = 8.65 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



Date/Time: 9/3/2008 8:43:01 AM

## Test Laboratory: Motorola - 090308 1800MHz Good at +3.2%

**DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 272TR; FCC ID: IHDP56JX2**

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

Sim.Temp@meas = 19.7 C; Sim.Temp@SPC = 20.3 C; Room Temp @ SPC = 20.7 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;  $\epsilon_r = 39.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3115; ConvF(4.93, 4.93, 4.93); Calibrated: 5/12/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 1/28/2008
- 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 71; Postprocessing SW: SEMCAD, V1.8 Build 184

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

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 6.62 mW/g

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

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

Reference Value = 80.5 V/m; Power Drift = 0.098 dB; Peak SAR (extrapolated) = 13.8 W/kg

**SAR(1 g) = 7.74 mW/g; SAR(10 g) = 4.11 mW/g;** Maximum value of SAR (measured) = 8.66 mW/g

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

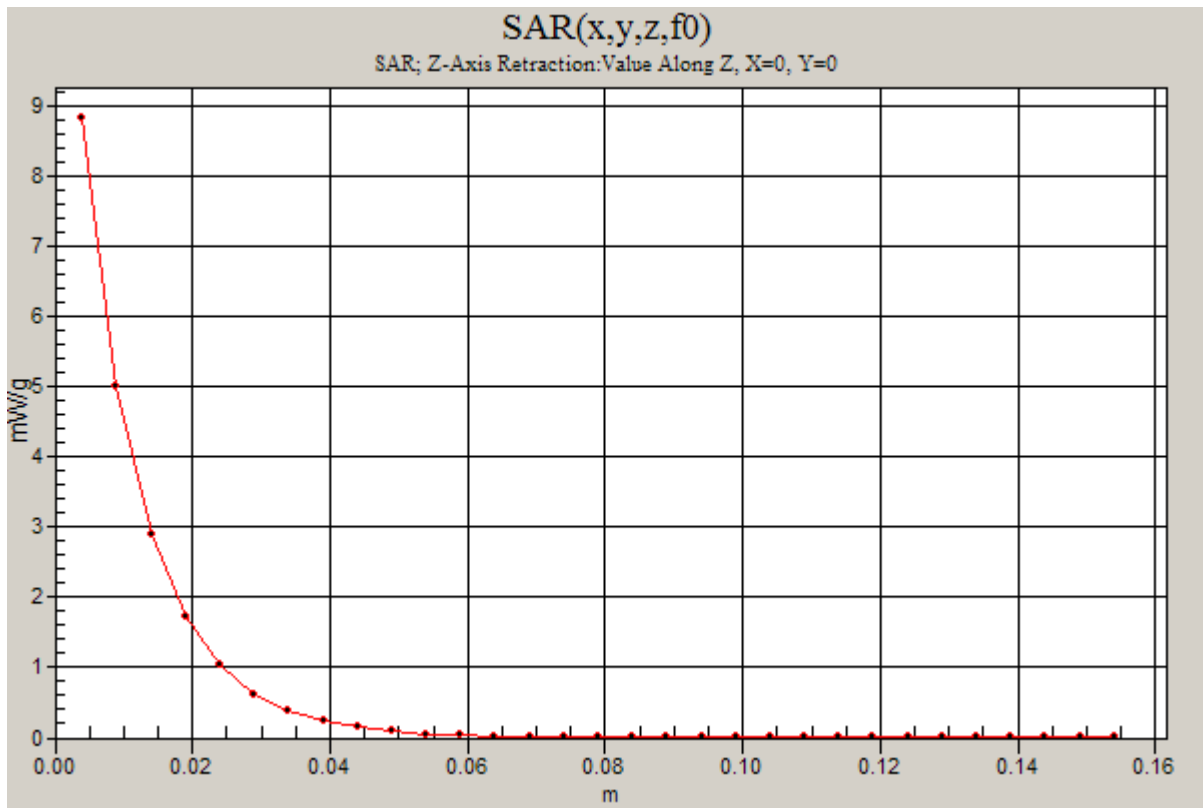
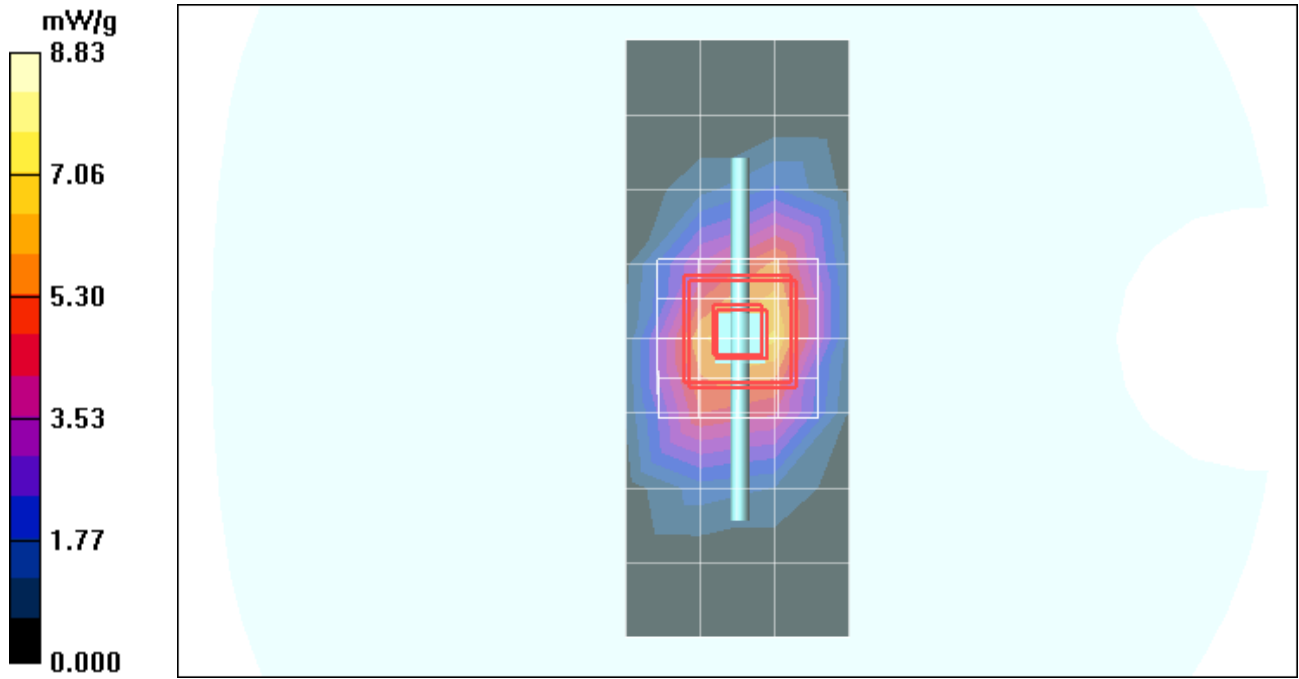
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 80.5 V/m; Power Drift = 0.098 dB; Peak SAR (extrapolated) = 14.2 W/kg

**SAR(1 g) = 7.83 mW/g; SAR(10 g) = 4.13 mW/g;** Maximum value of SAR (measured) = 8.77 mW/g

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

Measurement grid: dx=20mm, dy=20mm, dz=5mm; Maximum value of SAR (measured) = 8.83 mW/g



Date/Time: 9/3/2008 10:27:45 AM

## Test Laboratory: Motorola - 090308 2450 MHz Good 4.0%

**DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 740; FCC ID: IHDP56JX2**

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

Sim.Temp@meas = 19.5 C; Sim.Temp@SPC = 19.5 C; Room Temp @ SPC = 20.5 C

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

Medium: VALIDATION Only

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.86$  mho/m;  $\epsilon_r = 35.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.51, 4.51, 4.51); Calibrated: 3/17/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn661; Calibrated: 1/28/2008
- Phantom: R2 Section 1, Amy Twin, Rev2 (23-June-04); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

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

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 10.0 mW/g

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

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

Reference Value = 81.1 V/m; Power Drift = -0.013 dB; Peak SAR (extrapolated) = 25.3 W/kg

**SAR(1 g) = 11.8 mW/g; SAR(10 g) = 5.41 mW/g; Maximum value of SAR (measured) = 13.3 mW/g**

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

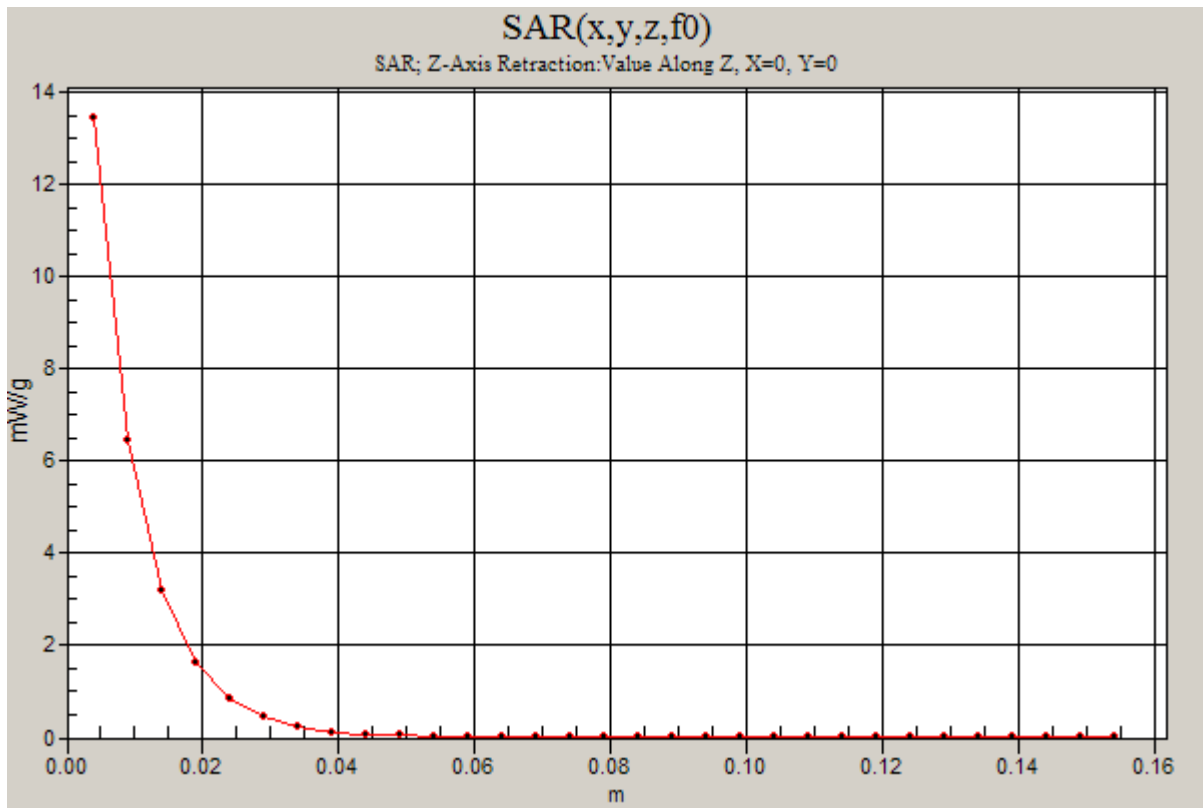
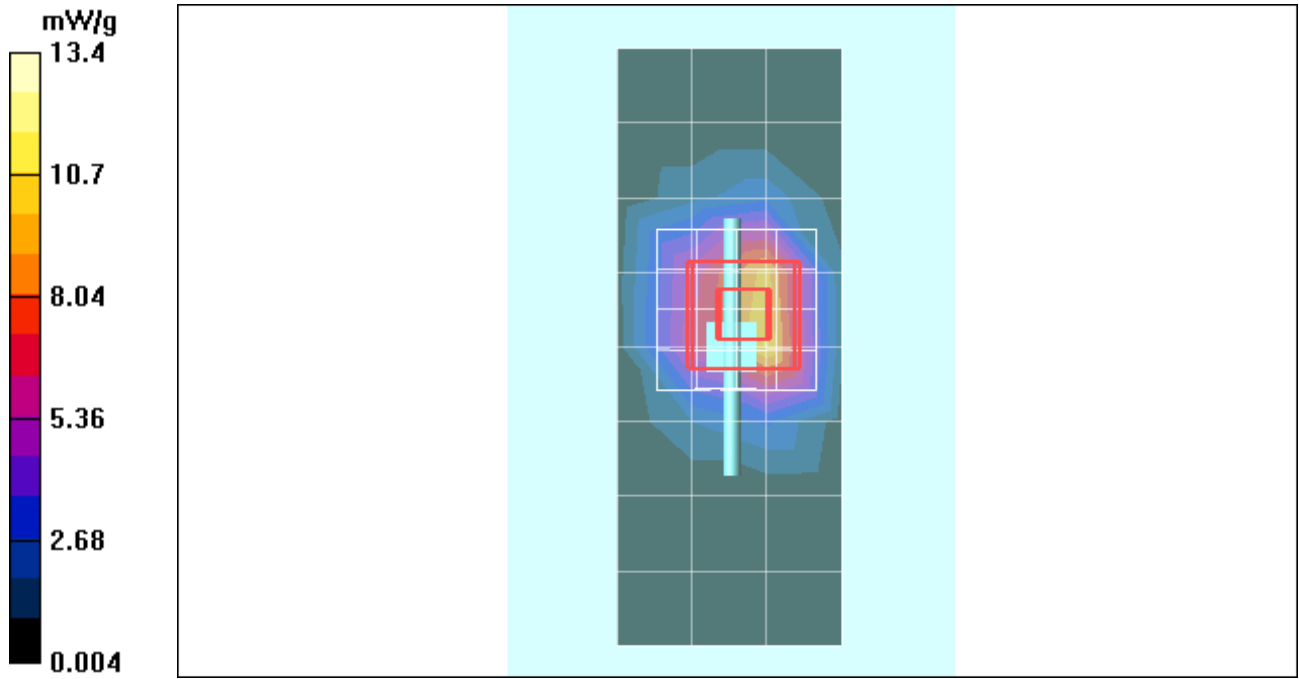
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 81.1 V/m; Power Drift = -0.013 dB; Peak SAR (extrapolated) = 25.1 W/kg

**SAR(1 g) = 11.7 mW/g; SAR(10 g) = 5.39 mW/g; Maximum value of SAR (measured) = 12.9 mW/g**

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

Measurement grid: dx=20mm, dy=20mm, dz=5mm; Maximum value of SAR (measured) = 13.4 mW/g



## Appendix 2

### SAR distribution plots for Phantom Head Adjacent Use

Date/Time: 8/24/2008 8:02:31 AM

## Test Laboratory: Motorola - CDMA 800 Cheek, Slider Extended

Serial: 80747706; FCC ID: IHDP56JX2

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

Battery Model #: SNN5833A; DEVICE POSITION: CHEEK

Communication System: CDMA 835; Frequency: 836.52 MHz; Channel Number: 384; Duty Cycle: 1:1

Medium: Low Freq Head

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.91$  mho/m;  $\epsilon_r = 41.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3115; ConvF(5.63, 5.63, 5.63); Calibrated: 5/12/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 1/28/2008
- 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 71; Postprocessing SW: SEMCAD, V1.8 Build 184

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

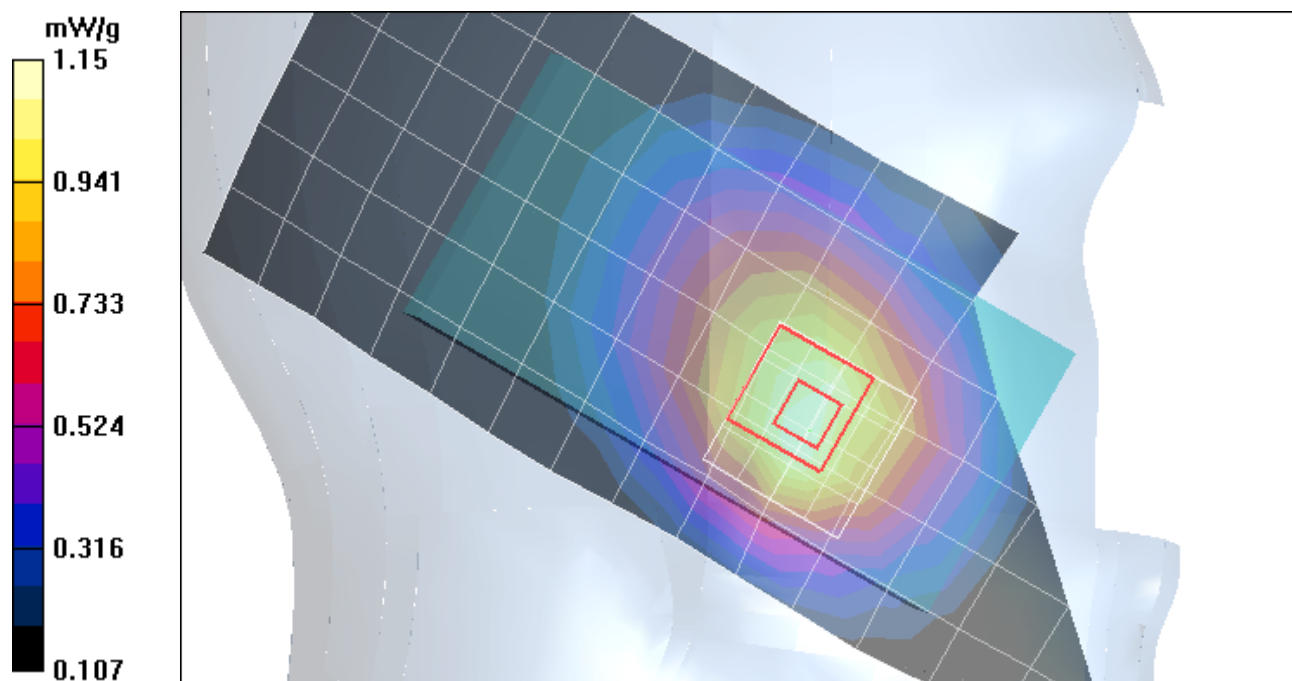
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 1.16 mW/g

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

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

Reference Value = 34.7 V/m; Power Drift = -0.216 dB; Peak SAR (extrapolated) = 1.43 W/kg

**SAR(1 g) = 1.08 mW/g; SAR(10 g) = 0.773 mW/g; Maximum value of SAR (measured) = 1.15 mW/g**



Date/Time: 8/24/2008 1:19:12 PM

## Test Laboratory: Motorola - 800 Cheek, Slider Retracted

Serial: 80747706; FCC ID: IHDP56JX2

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

Battery Model #: SNN5833A; DEVICE POSITION: CHEEK

Communication System: CDMA 835; Frequency: 836.52 MHz; Channel Number: 384; Duty Cycle: 1:1

Medium: Low Freq Head

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.91$  mho/m;  $\epsilon_r = 41.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3115; ConvF(5.63, 5.63, 5.63); Calibrated: 5/12/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 1/28/2008
- 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 71; Postprocessing SW: SEMCAD, V1.8 Build 184

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

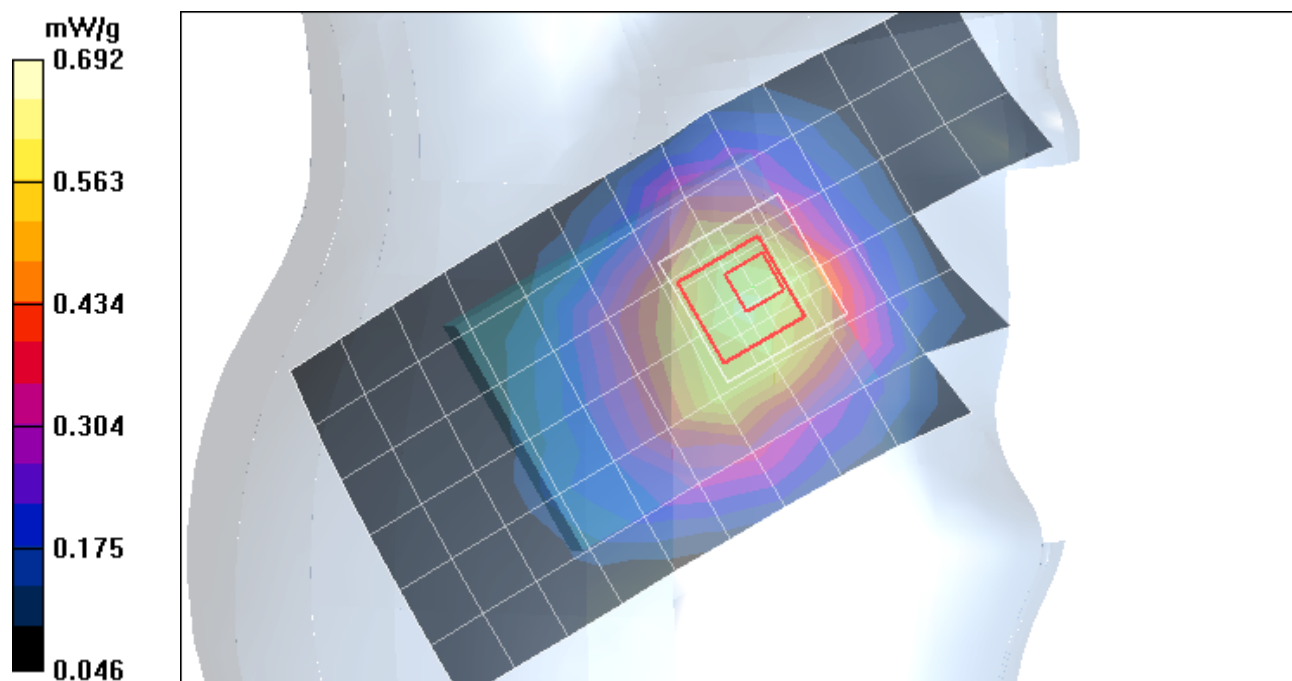
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.629 mW/g

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

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

Reference Value = 25.8 V/m; Power Drift = 0.246 dB; Peak SAR (extrapolated) = 0.926 W/kg

**SAR(1 g) = 0.651 mW/g; SAR(10 g) = 0.453 mW/g; Maximum value of SAR (measured) = 0.692 mW/g**



Date/Time: 9/3/2008 12:41:03 PM

## Test Laboratory: Motorola - CDMA 1700 Cheek, Slider Extended

Serial: 80747706; FCC ID: IHDP56JX2

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

Battery Model #: SNN5833A; DEVICE POSITION: CHEEK

Communication System: CDMA 1700; Frequency: 1732.5 MHz; Channel Number: 450; Duty Cycle: 1:1

Medium: Backup Glycol Head 1750/1880

Medium parameters used:  $f = 1730$  MHz;  $\sigma = 1.3$  mho/m;  $\epsilon_r = 40.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3115; ConvF(4.93, 4.93, 4.93); Calibrated: 5/12/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 1/28/2008
- 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 71; Postprocessing SW: SEMCAD, V1.8 Build 184

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

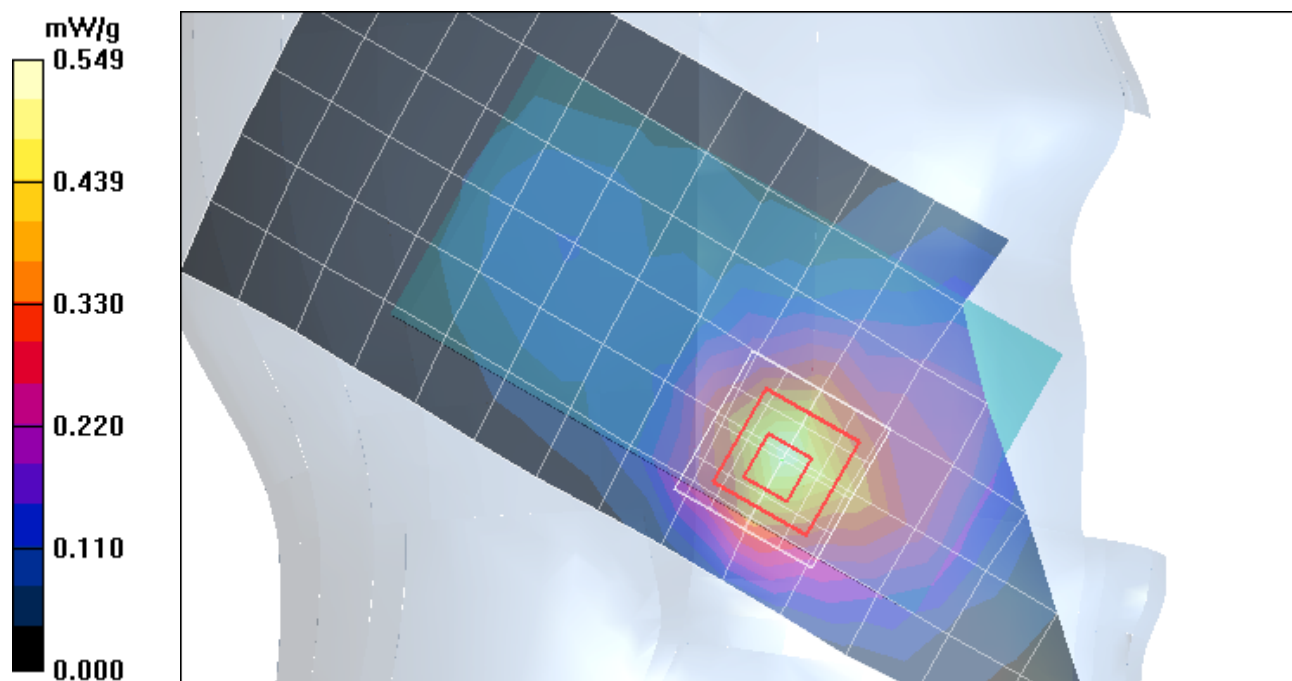
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.549 mW/g

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

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

Reference Value = 18.3 V/m; Power Drift = -0.198 dB; Peak SAR (extrapolated) = 0.734 W/kg

**SAR(1 g) = 0.495 mW/g; SAR(10 g) = 0.306 mW/g; Maximum value of SAR (measured) = 0.547 mW/g**



Date/Time: 9/3/2008 1:17:17 PM

## Test Laboratory: Motorola - CDMA 1700 Cheek, Slider Retracted

Serial: 80747706; FCC ID: IHDP56JX2

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

Battery Model #: SNN5833A; DEVICE POSITION: CHEEK

Communication System: CDMA 1700; Frequency: 1732.5 MHz; Channel Number: 450; Duty Cycle: 1:1

Medium: Backup Glycol Head 1750/1880

Medium parameters used:  $f = 1730$  MHz;  $\sigma = 1.3$  mho/m;  $\epsilon_r = 40.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3115; ConvF(4.93, 4.93, 4.93); Calibrated: 5/12/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 1/28/2008
- 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 71; Postprocessing SW: SEMCAD, V1.8 Build 184

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

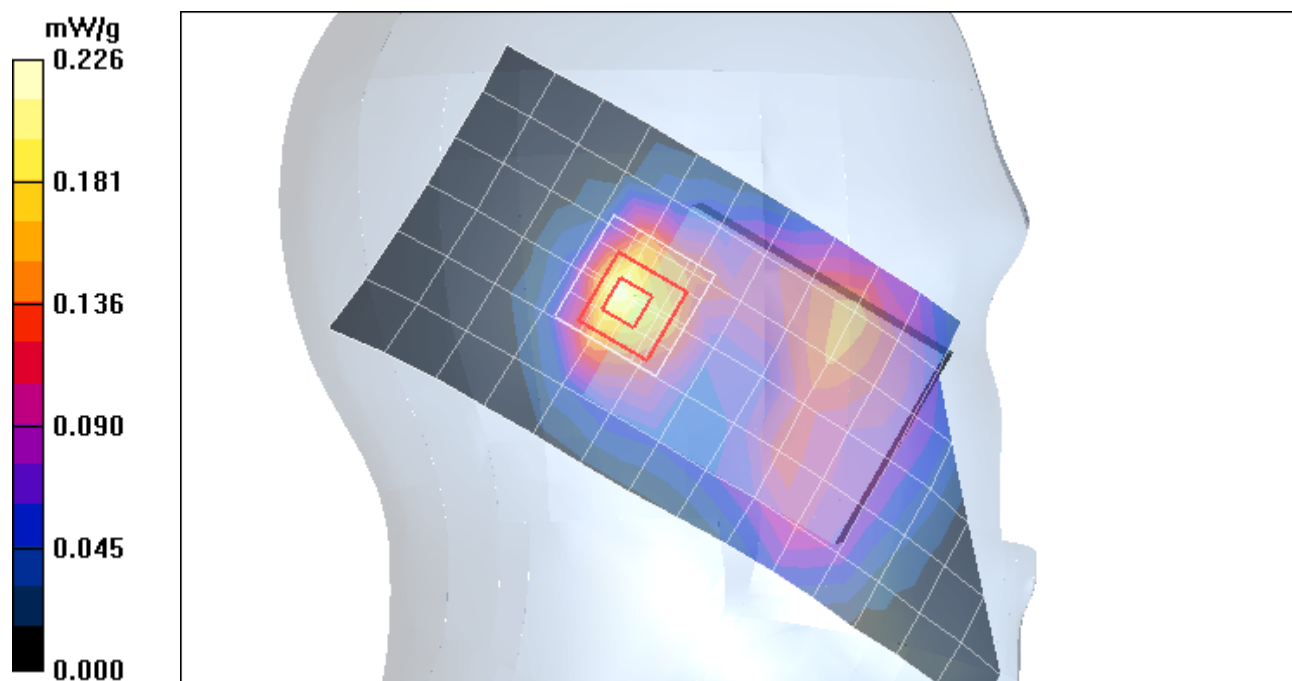
Measurement grid:  $dx=15$ mm,  $dy=15$ mm; Maximum value of SAR (measured) = 0.226 mW/g

### 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 = 13.4 V/m; Power Drift = -0.493 dB; Peak SAR (extrapolated) = 0.312 W/kg

SAR(1 g) = 0.204 mW/g; SAR(10 g) = 0.122 mW/g; Maximum value of SAR (measured) = 0.222 mW/g



Date/Time: 8/23/2008 9:09:01 AM

## Test Laboratory: Motorola - CDMA 1900 Cheek, Slider Extended

Serial: 80747706; FCC ID: IHDP56JX2

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

Battery Model #: SNN5833A; DEVICE POSITION: CHEEK

Communication System: CDMA 1900; Frequency: 1880 MHz; Channel Number: 600; Duty Cycle: 1:1

Medium: Regular Glycol Head 1750/1880

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.46$  mho/m;  $\epsilon_r = 40.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3115; ConvF(4.93, 4.93, 4.93); Calibrated: 5/12/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 1/28/2008
- 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 71; Postprocessing SW: SEMCAD, V1.8 Build 184

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

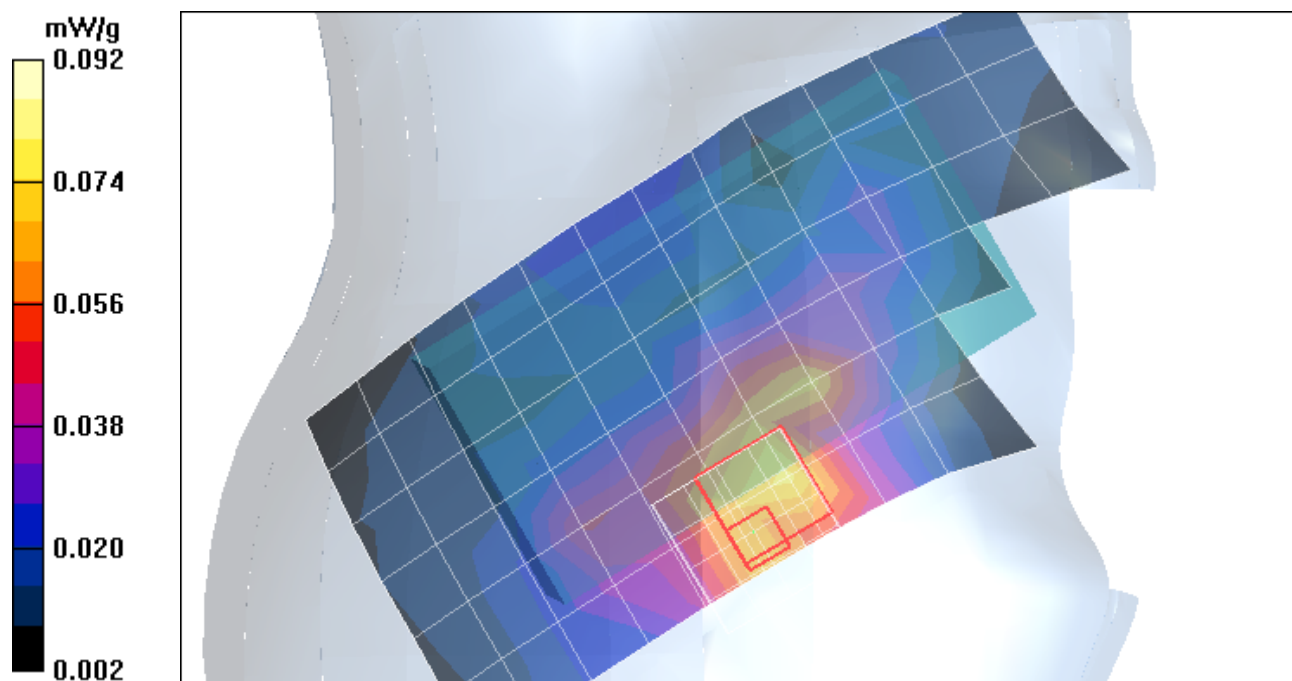
Measurement grid:  $dx=15$ mm,  $dy=15$ mm; Maximum value of SAR (measured) = 0.077 mW/g

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

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

Reference Value = 7.02 V/m; Power Drift = 0.320 dB; Peak SAR (extrapolated) = 0.116 W/kg

**SAR(1 g) = 0.075 mW/g; SAR(10 g) = 0.046 mW/g; Maximum value of SAR (measured) = 0.092 mW/g**



Date/Time: 8/23/2008 10:15:19 AM

## Test Laboratory: Motorola - CDMA 1900 Cheek, Slider Retracted

Serial: 80747706; FCC ID: IHDP56JX2

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

Battery Model #: SNN5833A; DEVICE POSITION: CHEEK

Communication System: CDMA 1900; Frequency: 1880 MHz; Channel Number: 600; Duty Cycle: 1:1

Medium: Regular Glycol Head 1750/1880

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.46$  mho/m;  $\epsilon_r = 40.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3115; ConvF(4.93, 4.93, 4.93); Calibrated: 5/12/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 1/28/2008
- 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 71; Postprocessing SW: SEMCAD, V1.8 Build 184

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

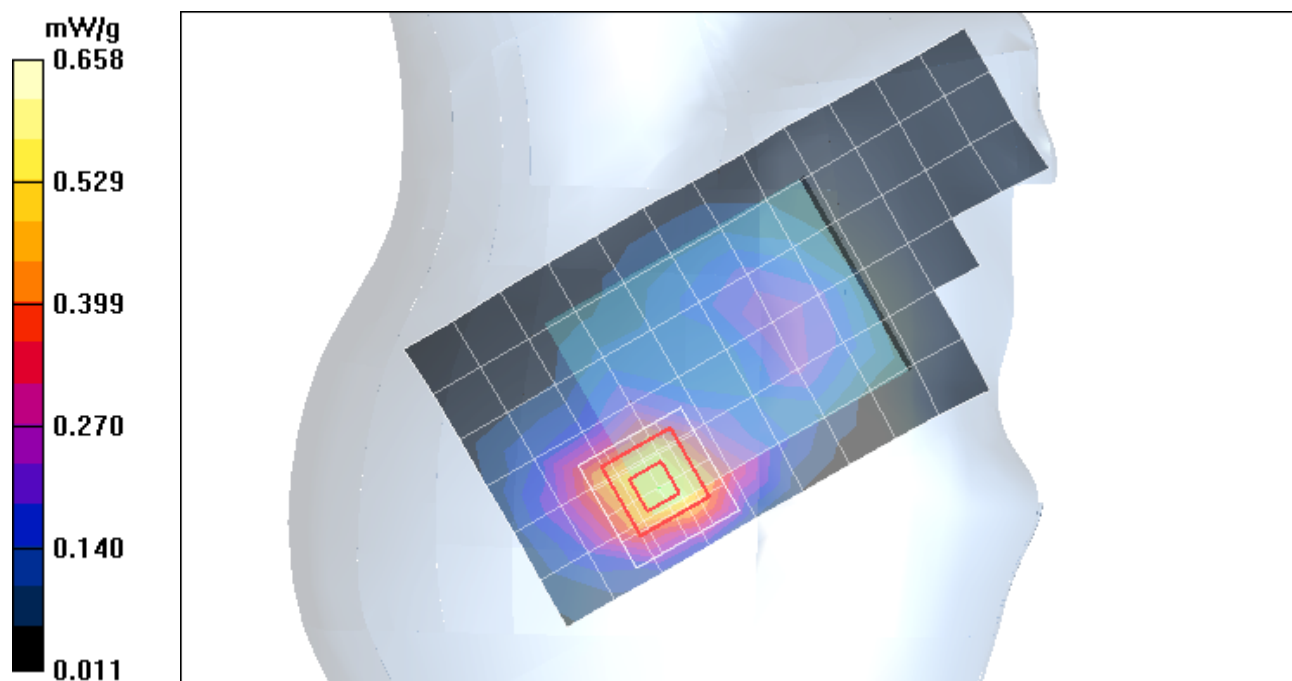
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.558 mW/g

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

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

Reference Value = 16.5 V/m; Power Drift = -0.215 dB; Peak SAR (extrapolated) = 0.996 W/kg

**SAR(1 g) = 0.590 mW/g; SAR(10 g) = 0.326 mW/g; Maximum value of SAR (measured) = 0.658 mW/g**



Date/Time: 8/24/2008 10:55:56 AM

## Test Laboratory: Motorola - CDMA 800 Tilt, Slider Extended

Serial: 80747706; FCC ID: IHDP56JX2

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

Battery Model #: SNN5833A; DEVICE POSITION: TILT

Communication System: CDMA 835; Frequency: 836.52 MHz; Channel Number: 384; Duty Cycle: 1:1

Medium: Low Freq Head

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.91$  mho/m;  $\epsilon_r = 41.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3115; ConvF(5.63, 5.63, 5.63); Calibrated: 5/12/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 1/28/2008
- 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 71; Postprocessing SW: SEMCAD, V1.8 Build 184

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

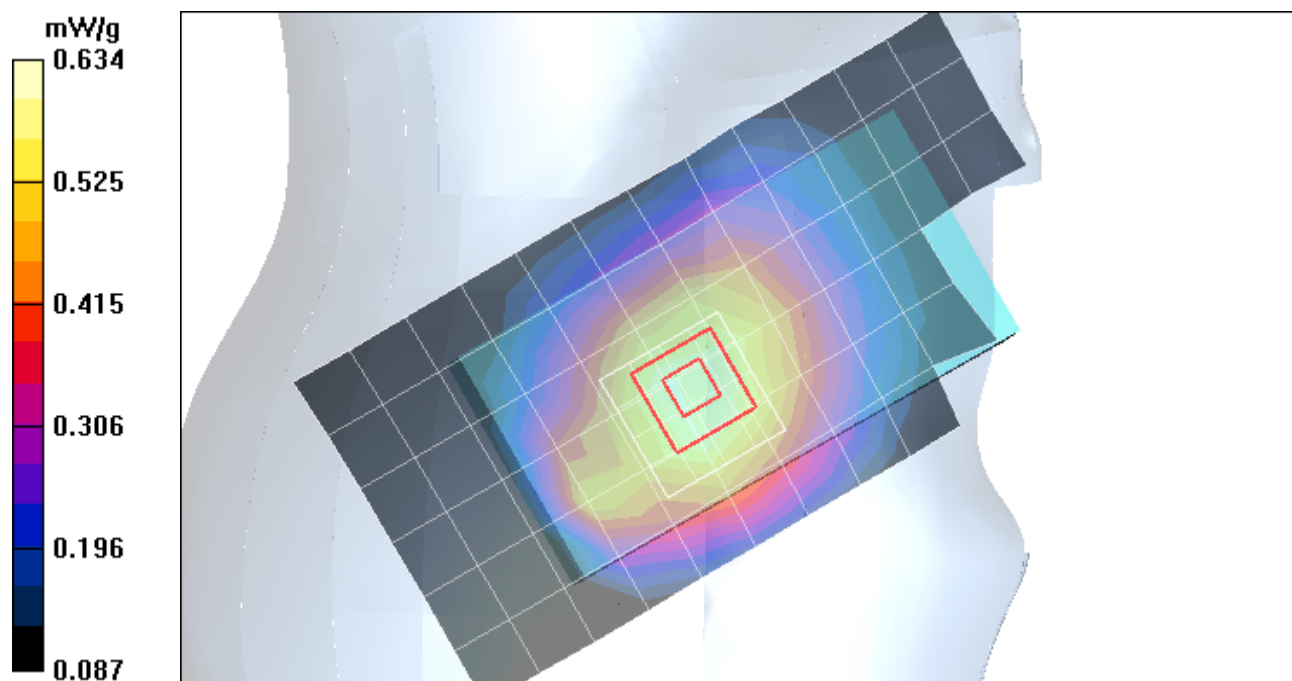
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.605 mW/g

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

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

Reference Value = 26.6 V/m; Power Drift = 0.020 dB; Peak SAR (extrapolated) = 0.743 W/kg

**SAR(1 g) = 0.611 mW/g; SAR(10 g) = 0.467 mW/g; Maximum value of SAR (measured) = 0.634 mW/g**



Date/Time: 8/24/2008 1:43:38 PM

## Test Laboratory: Motorola - CDMA 800 Tilt, Slider Retracted

Serial: 80747706; FCC ID: IHDP56JX2

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

Battery Model #: SNN5833A; DEVICE POSITION: TILT

Communication System: CDMA 835; Frequency: 836.52 MHz; Channel Number: 384; Duty Cycle: 1:1

Medium: Low Freq Head

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.91$  mho/m;  $\epsilon_r = 41.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3115; ConvF(5.63, 5.63, 5.63); Calibrated: 5/12/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 1/28/2008
- 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 71; Postprocessing SW: SEMCAD, V1.8 Build 184

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

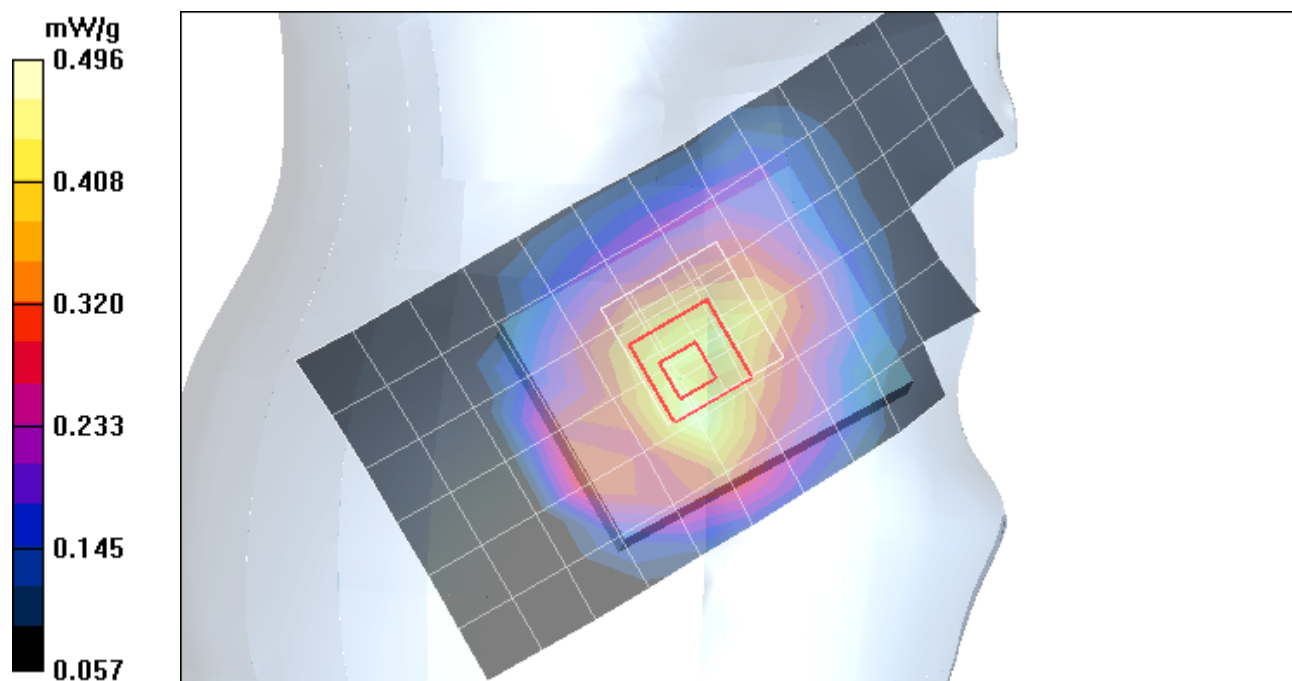
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.471 mW/g

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

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

Reference Value = 22.8 V/m; Power Drift = 0.086 dB; Peak SAR (extrapolated) = 0.575 W/kg

SAR(1 g) = 0.441 mW/g; SAR(10 g) = 0.333 mW/g; Maximum value of SAR (measured) = 0.496 mW/g



Date/Time: 9/3/2008 12:17:40 PM

## Test Laboratory: Motorola - CDMA 1700 Tilt, Slider Extended

Serial: 80747706; FCC ID: IHDP56JX2

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

Battery Model #: SNN5833A; DEVICE POSITION: TILT

Communication System: CDMA 1700; Frequency: 1732.5 MHz; Channel Number: 450; Duty Cycle: 1:1

Medium: Backup Glycol Head 1750/1880

Medium parameters used:  $f = 1730$  MHz;  $\sigma = 1.3$  mho/m;  $\epsilon_r = 40.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3115; ConvF(4.93, 4.93, 4.93); Calibrated: 5/12/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 1/28/2008
- 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 71; Postprocessing SW: SEMCAD, V1.8 Build 184

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

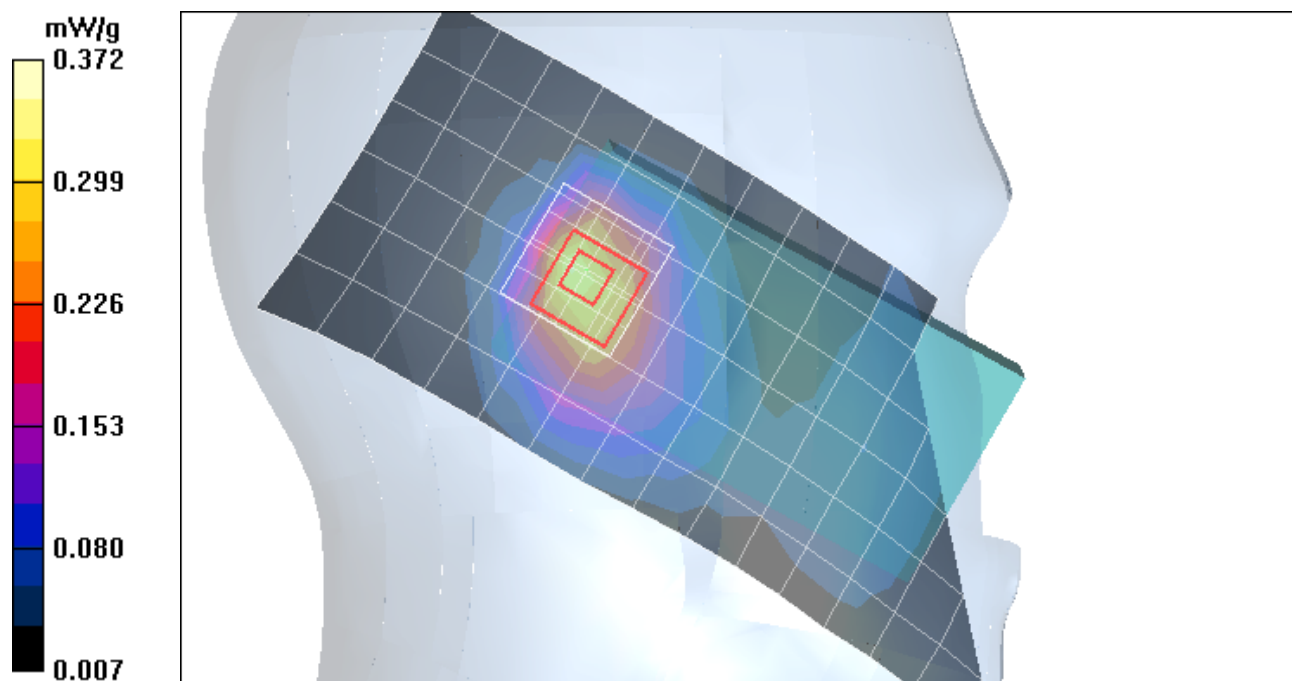
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.331 mW/g

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

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

Reference Value = 16.1 V/m; Power Drift = -0.216 dB; Peak SAR (extrapolated) = 0.519 W/kg

**SAR(1 g) = 0.334 mW/g; SAR(10 g) = 0.199 mW/g; Maximum value of SAR (measured) = 0.372 mW/g**



Date/Time: 9/3/2008 1:42:45 PM

## Test Laboratory: Motorola - CDMA 1700 Tilt, Slider Retracted

Serial: 80747706; FCC ID: IHDP56JX2

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

Battery Model #: SNN5833A; DEVICE POSITION: TILT

Communication System: CDMA 1700; Frequency: 1732.5 MHz; Channel Number: 450; Duty Cycle: 1:1

Medium: Backup Glycol Head 1750/1880

Medium parameters used:  $f = 1730$  MHz;  $\sigma = 1.3$  mho/m;  $\epsilon_r = 40.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3115; ConvF(4.93, 4.93, 4.93); Calibrated: 5/12/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 1/28/2008
- 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 71; Postprocessing SW: SEMCAD, V1.8 Build 184

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

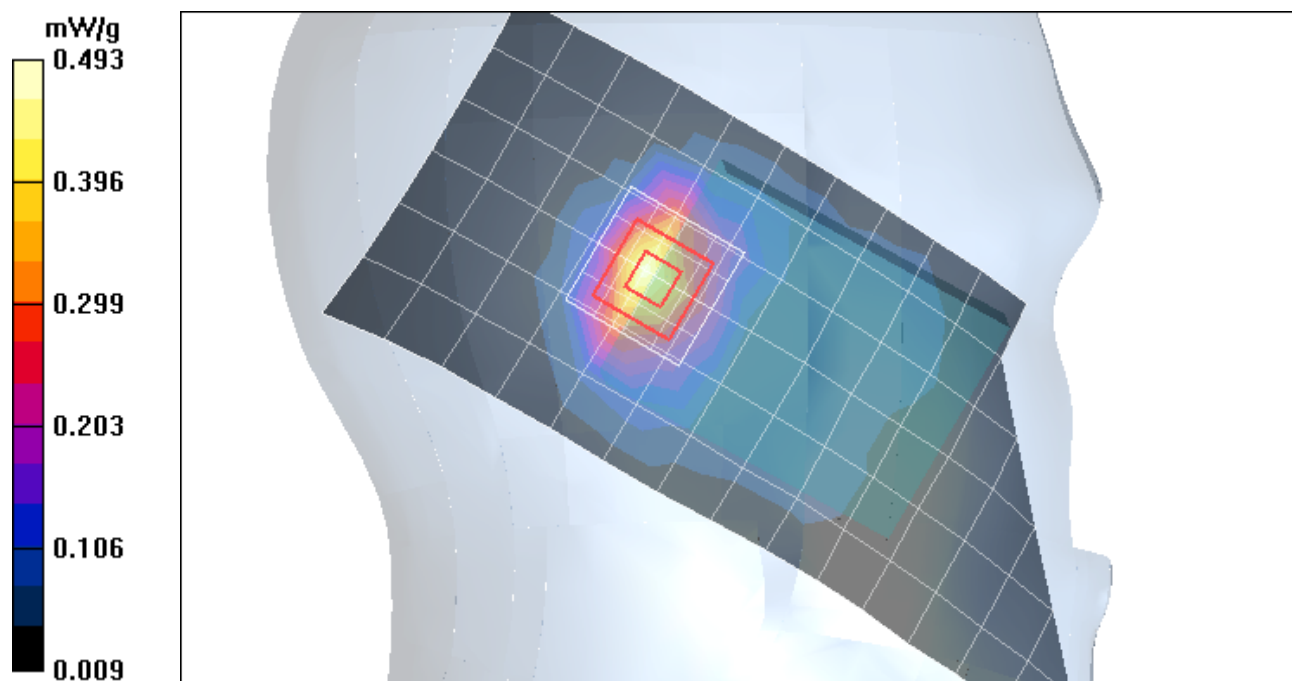
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.485 mW/g

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

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

Reference Value = 18.8 V/m; Power Drift = -0.274 dB; Peak SAR (extrapolated) = 0.702 W/kg

**SAR(1 g) = 0.440 mW/g; SAR(10 g) = 0.249 mW/g; Maximum value of SAR (measured) = 0.493 mW/g**



Date/Time: 8/23/2008 9:33:28 AM

## Test Laboratory: Motorola - CDMA 1900 Tilt, Slider Extended

Serial: 80747706; FCC ID: IHDP56JX2

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

Battery Model #: SNN5833A; DEVICE POSITION: TILT

Communication System: CDMA 1900; Frequency: 1880 MHz; Channel Number: 600; Duty Cycle: 1:1

Medium: Regular Glycol Head 1750/1880

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.46$  mho/m;  $\epsilon_r = 40.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3115; ConvF(4.93, 4.93, 4.93); Calibrated: 5/12/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 1/28/2008
- 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 71; Postprocessing SW: SEMCAD, V1.8 Build 184

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

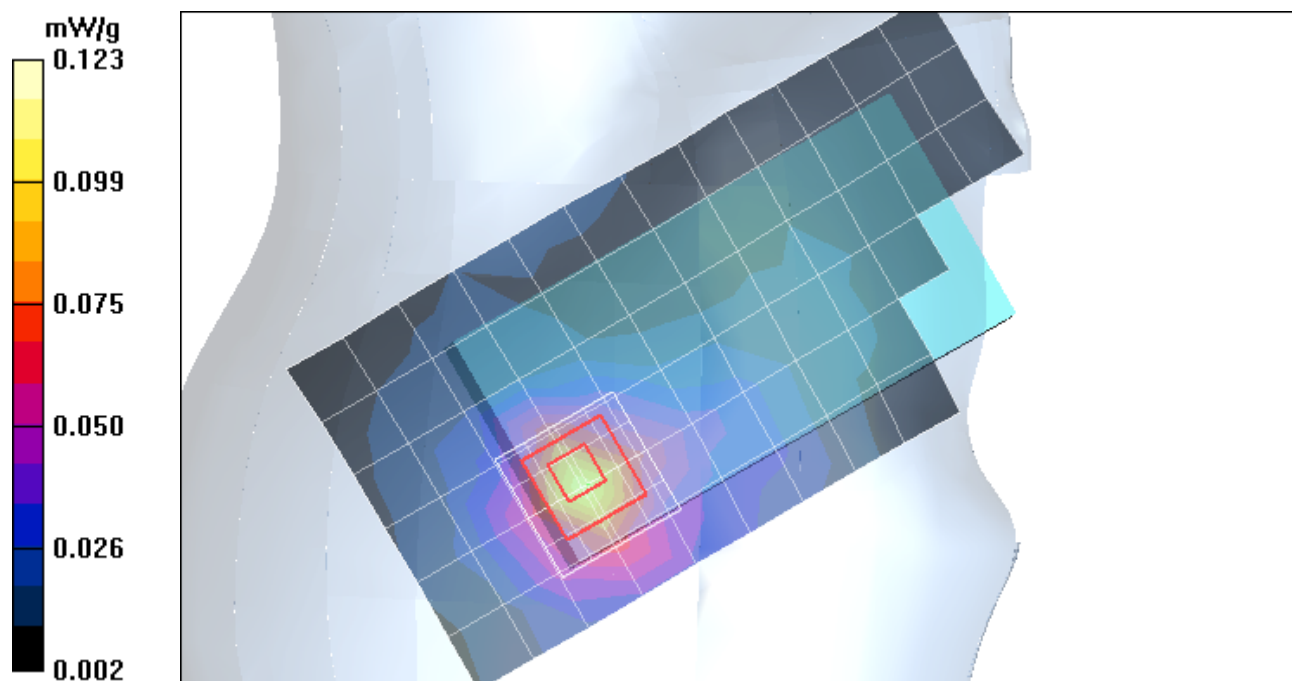
Measurement grid:  $dx=15$ mm,  $dy=15$ mm; Maximum value of SAR (measured) = 0.109 mW/g

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

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

Reference Value = 8.16 V/m; Power Drift = 0.119 dB; Peak SAR (extrapolated) = 0.166 W/kg

**SAR(1 g) = 0.105 mW/g; SAR(10 g) = 0.058 mW/g; Maximum value of SAR (measured) = 0.123 mW/g**



Date/Time: 8/23/2008 10:33:57 AM

## Test Laboratory: Motorola - CDMA 1900 Tilt, Slider Retracted

Serial: 80747706; FCC ID: IHDP56JX2

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

Battery Model #: SNN5833A; DEVICE POSITION: TILT

Communication System: CDMA 1900; Frequency: 1880 MHz; Channel Number: 600; Duty Cycle: 1:1

Medium: Regular Glycol Head 1750/1880

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.46$  mho/m;  $\epsilon_r = 40.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3115; ConvF(4.93, 4.93, 4.93); Calibrated: 5/12/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 1/28/2008
- 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 71; Postprocessing SW: SEMCAD, V1.8 Build 184

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

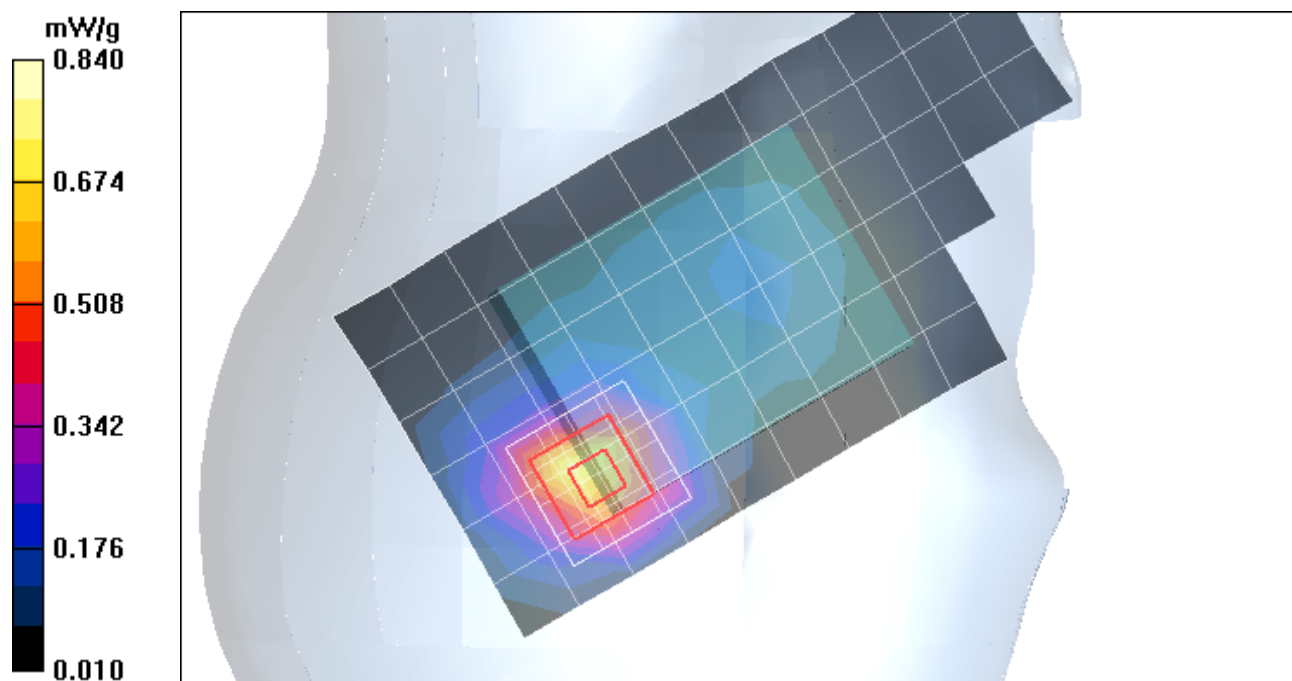
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.763 mW/g

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

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

Reference Value = 19.5 V/m; Power Drift = -0.207 dB; Peak SAR (extrapolated) = 1.33 W/kg

SAR(1 g) = 0.739 mW/g; SAR(10 g) = 0.386 mW/g; Maximum value of SAR (measured) = 0.840 mW/g



## **Appendix 3**

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

Date/Time: 8/24/2008 2:58:28 PM

## Test Laboratory: Motorola - CDMA 800 Body Worn

Serial: 80747706; FCC ID: IHDP56JX2

Procedure Notes: Pwr Step: All up Bits; Antenna Position: Internal; Battery Model #: SNN5833A

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

Communication System: CDMA 835; Frequency: 836.52 MHz; Channel Number: 384; Duty Cycle: 1:1

Medium: Low Freq Body

Medium parameters used:  $f = 835$  MHz;  $\sigma = 1$  mho/m;  $\epsilon_r = 54.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3115; ConvF(5.67, 5.67, 5.67); Calibrated: 5/12/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 1/28/2008
- Phantom: R4 : Sect.2, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

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

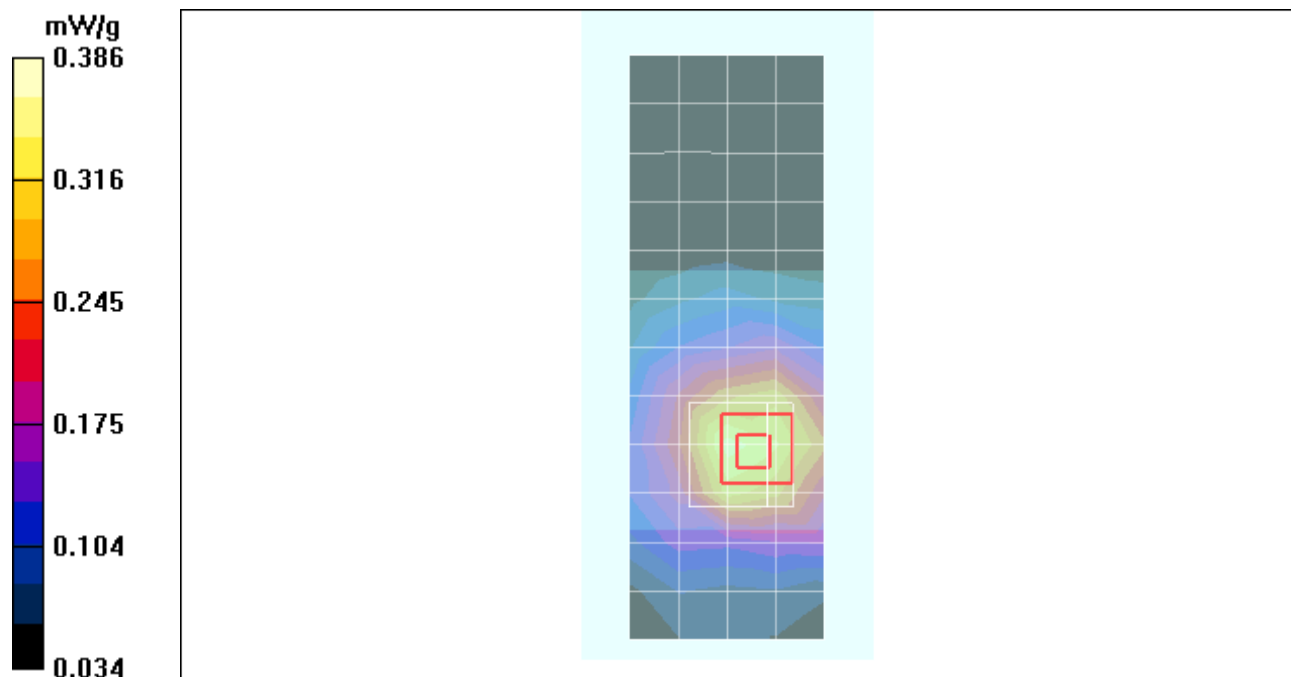
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.353 mW/g

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

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

Reference Value = 18.8 V/m; Power Drift = -0.129 dB; Peak SAR (extrapolated) = 0.515 W/kg

**SAR(1 g) = 0.365 mW/g; SAR(10 g) = 0.253 mW/g; Maximum value of SAR (measured) = 0.386 mW/g**



Date/Time: 8/23/2008 7:09:13 AM

## Test Laboratory: Motorola - CDMA 1700 Body Worn

Serial: 80747706; FCC ID: IHDP56JX2

Procedure Notes: Pwr Step: All up Bits; Antenna Position: Internal; Battery Model #: SNN5833A

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

Communication System: CDMA 1700; Frequency: 1753.75 MHz; Channel Number: 875; Duty Cycle: 1:1

Medium: Regular Glycol Body 1730

Medium parameters used:  $f = 1730$  MHz;  $\sigma = 1.43$  mho/m;  $\epsilon_r = 51.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3115; ConvF(4.75, 4.75, 4.75); Calibrated: 5/12/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 1/28/2008
- Phantom: R4 : Sect.1, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

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

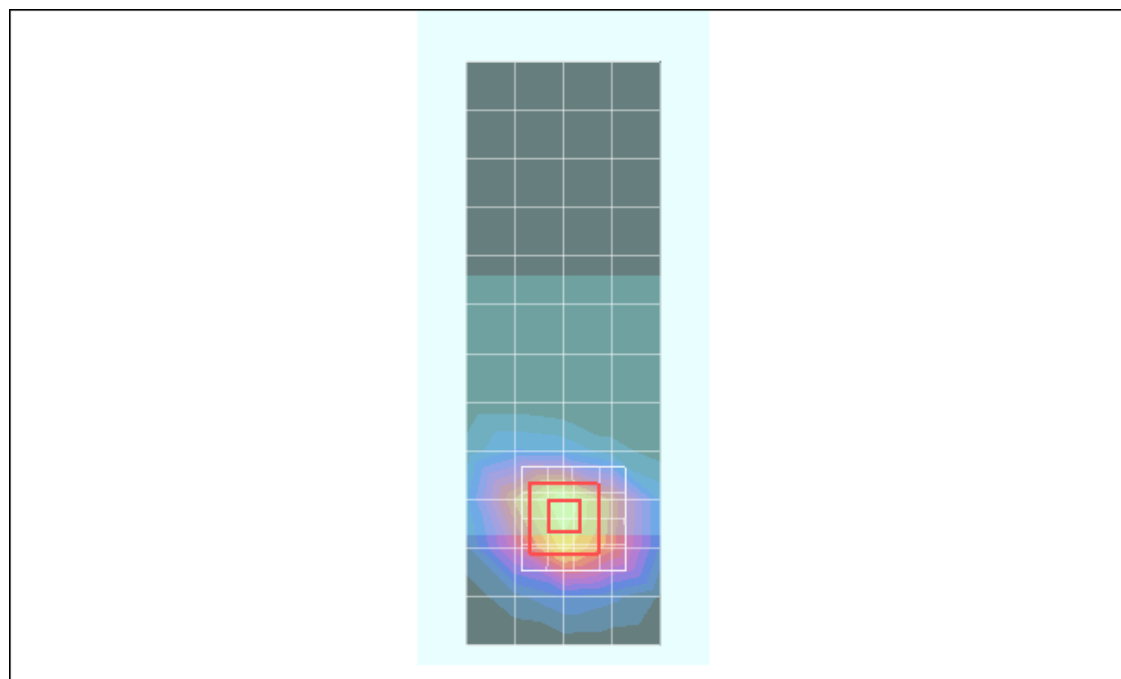
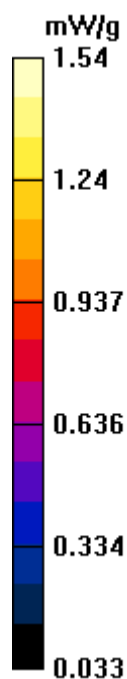
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 1.37 mW/g

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

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

Reference Value = 31.8 V/m; Power Drift = 0.014 dB; Peak SAR (extrapolated) = 2.22 W/kg

**SAR(1 g) = 1.4 mW/g; SAR(10 g) = 0.826 mW/g; Maximum value of SAR (measured) = 1.54 mW/g**



Date/Time: 8/23/2008 11:18:55 AM

## Test Laboratory: Motorola - CDMA 1900 Body Worn

Serial: 80747706; FCC ID: IHDP56JX2

Procedure Notes: Pwr Step: All up Bits; Antenna Position: Internal; Battery Model #: SNN5833A

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

Communication System: CDMA 1900; Frequency: 1880 MHz; Channel Number: 600; Duty Cycle: 1:1

Medium: Regular Glycol Body 1750/1880

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.57$  mho/m;  $\epsilon_r = 50.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3115; ConvF(4.75, 4.75, 4.75); Calibrated: 5/12/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn434; Calibrated: 1/28/2008
- Phantom: R4 : Sect.1, Amy Twin; Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

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

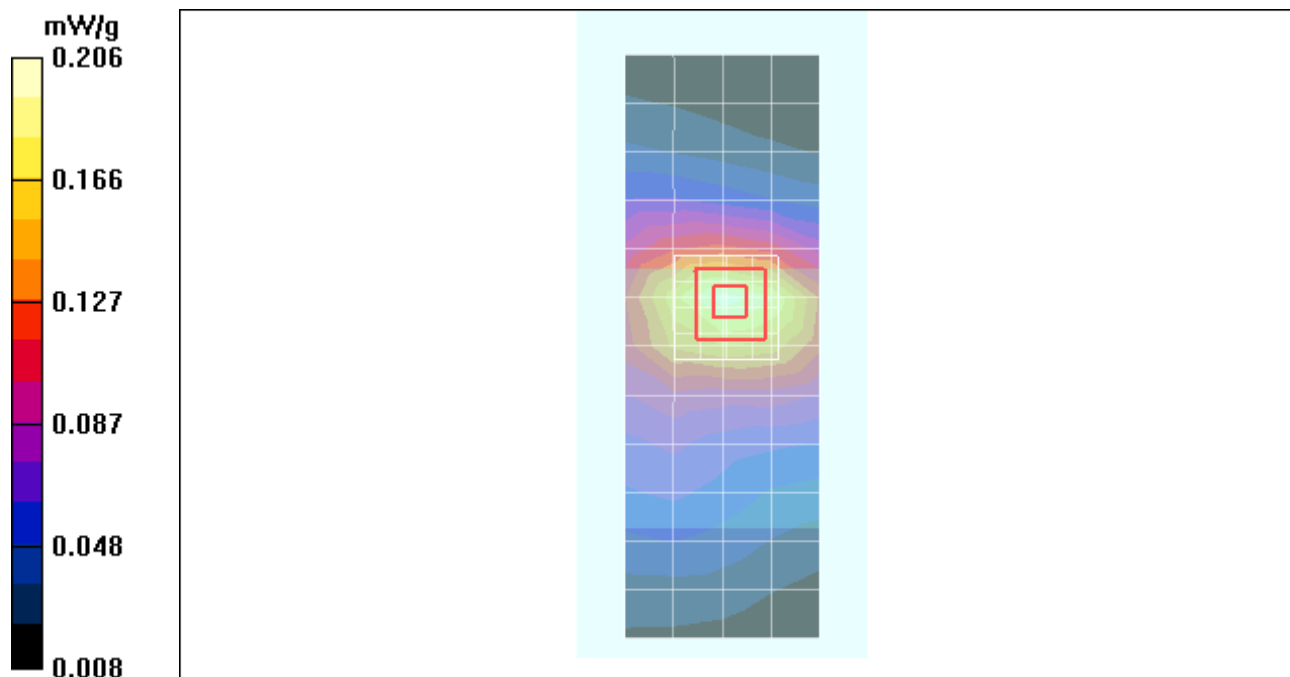
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.202 mW/g

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

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

Reference Value = 10.7 V/m; Power Drift = -0.045 dB; Peak SAR (extrapolated) = 0.292 W/kg

**SAR(1 g) = 0.189 mW/g; SAR(10 g) = 0.118 mW/g; Maximum value of SAR (measured) = 0.206 mW/g**



Date/Time: 9/4/2008 9:33:06 AM

## Test Laboratory: Motorola - Bluetooth Body Worn

Serial: 80747706; FCC ID: IHDP56JX2

Procedure Notes: Pwr Step: N/A; Antenna Position: Internal; Battery Model #: SNN5833A

Device Position: Body Worn, Back of Phone 25mm 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;  $\sigma = 2$  mho/m;  $\epsilon_r = 47.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.19, 4.19, 4.19); Calibrated: 3/17/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn661; Calibrated: 1/28/2008
- Phantom: R2 Section 1, Amy Twin, Rev2 (23-June-04); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

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

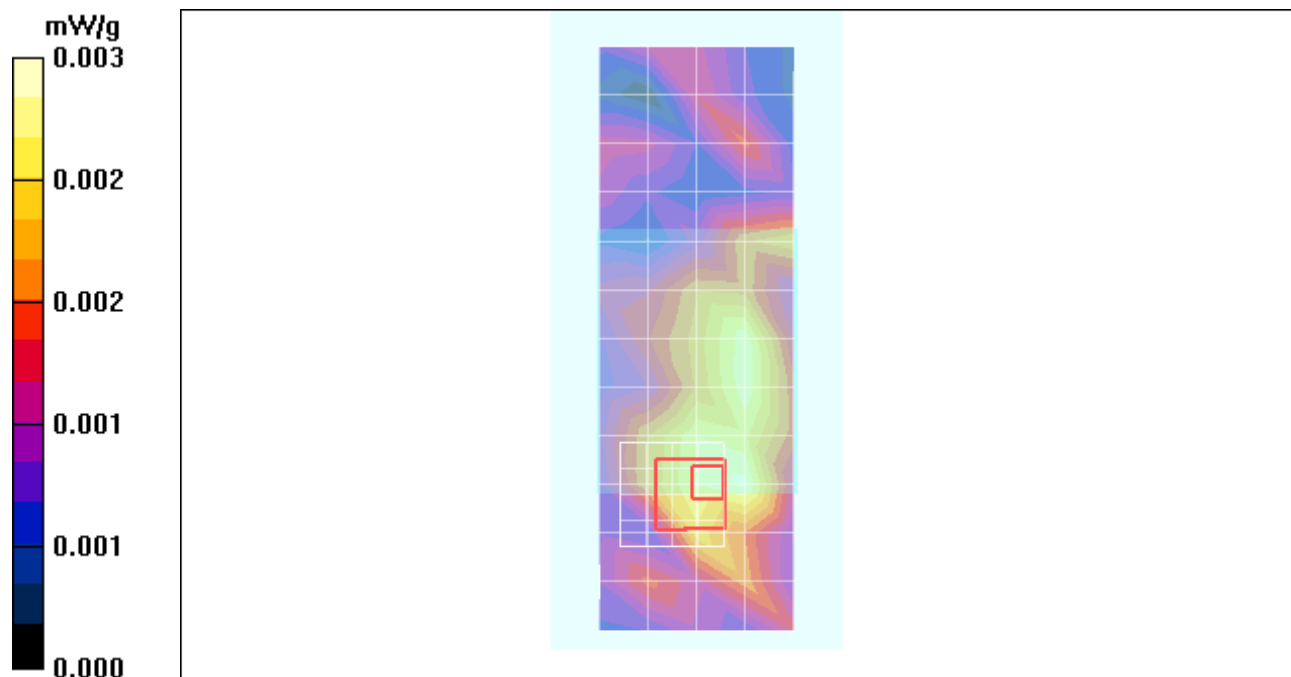
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.003 mW/g

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

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

Reference Value = 1.04 V/m; Power Drift = -0.375 dB; Peak SAR (extrapolated) = 0.011 W/kg

**SAR(1 g) = 0.00276 mW/g; SAR(10 g) = 0.00136 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: **ES3-3115\_May08**

## CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3115**

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

Calibration date: **May 12, 2008**

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-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41495277	1-Apr-08 (No. 217-00788)	Apr-09
Power sensor E4412A	MY41498087	1-Apr-08 (No. 217-00788)	Apr-09
Reference 3 dB Attenuator	SN: S5054 (3c)	8-Aug-07 (No. 217-00719)	Aug-08
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-08 (No. 217-00787)	Apr-09
Reference 30 dB Attenuator	SN: S5129 (30b)	8-Aug-07 (No. 217-00720)	Aug-08
Reference Probe ES3DV2	SN: 3013	2-Jan-08 (No. ES3-3013_Jan08)	Jan-09
DAE4	SN: 660	3-Sep-07 (No. DAE4-660_Sep07)	Sep-08
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-07)	In house check: Oct-08

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

Issued: May 13, 2008

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



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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

### 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:3115

Manufactured:	March 6, 2006
Last calibrated:	July 16, 2007
Repaired:	April 28, 2008
Recalibrated:	May 12, 2008

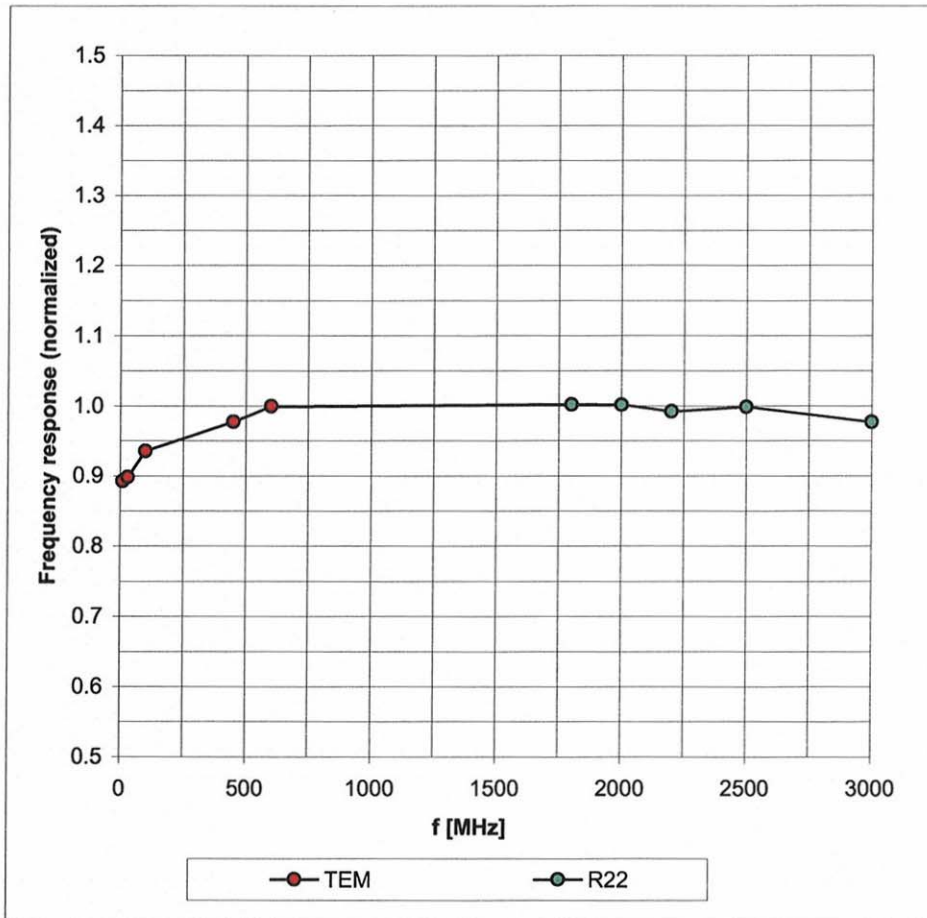
Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)



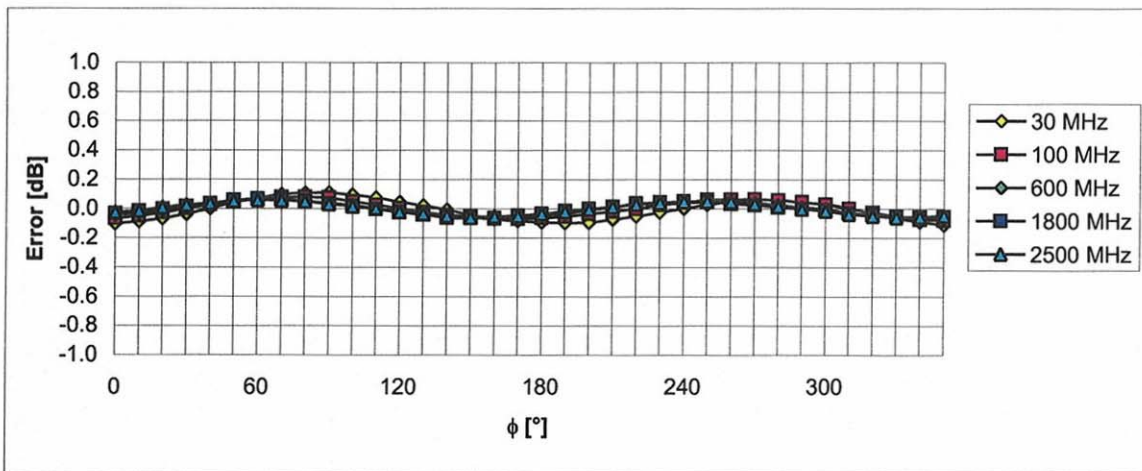
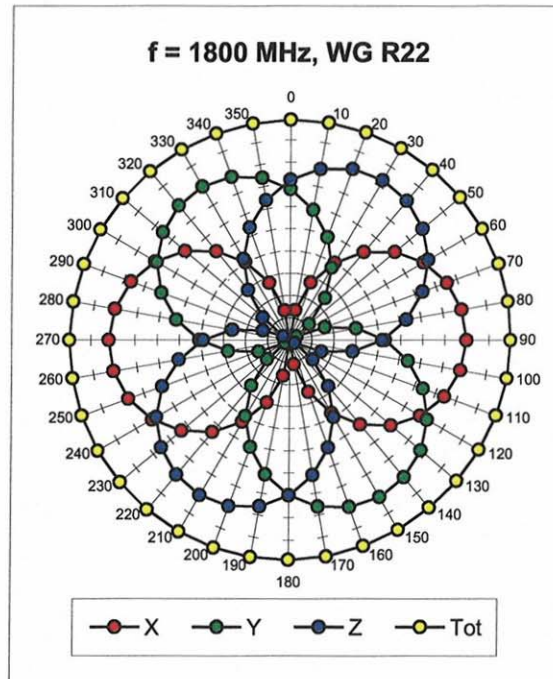
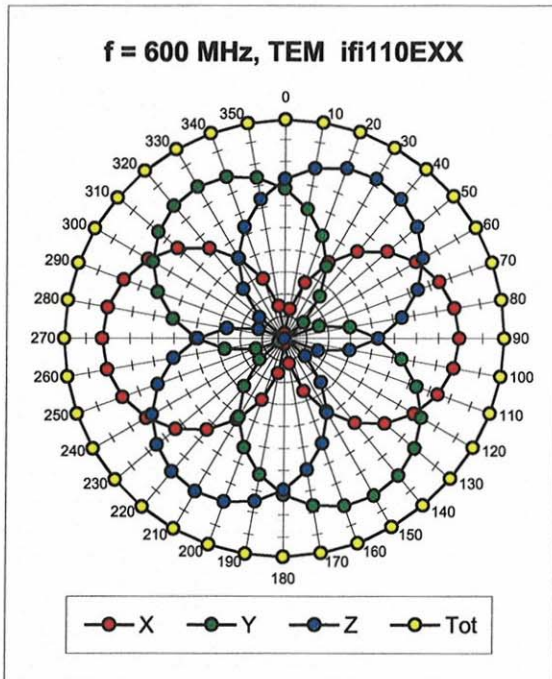
# Frequency Response of E-Field

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



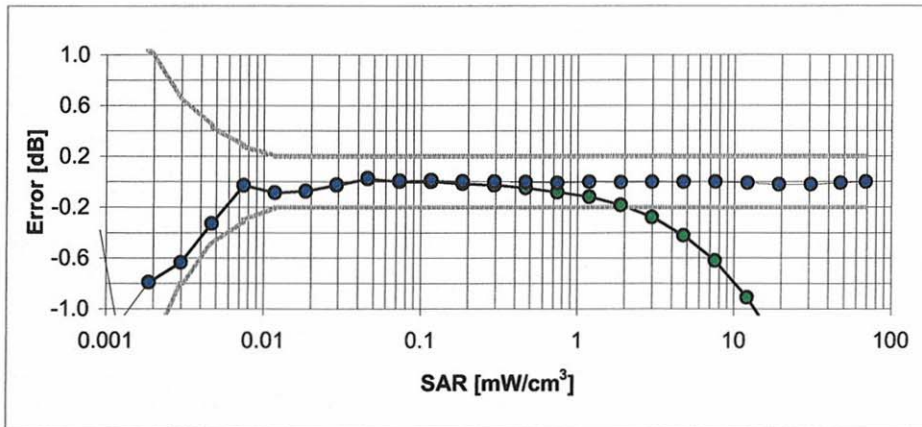
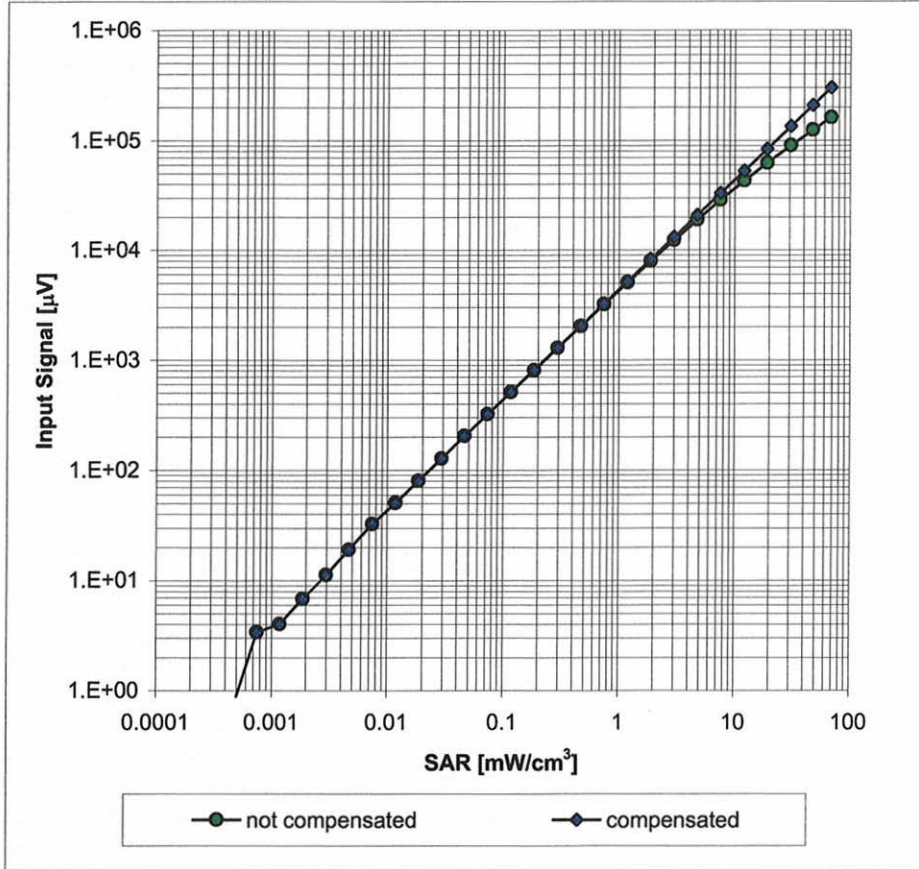
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

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



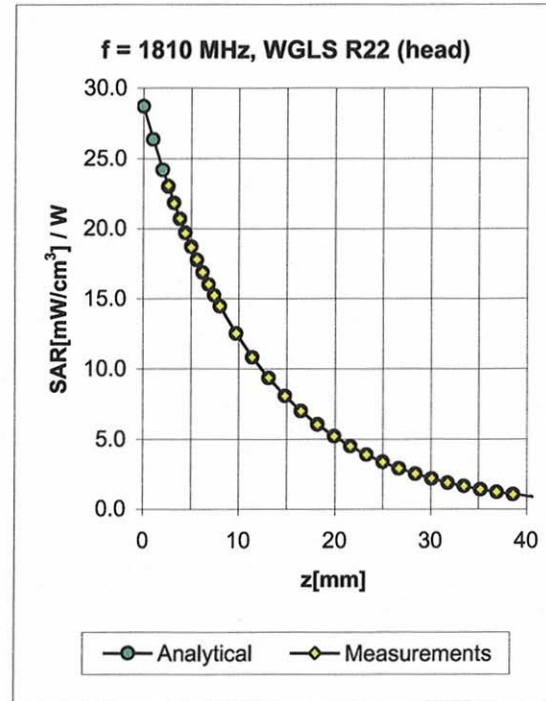
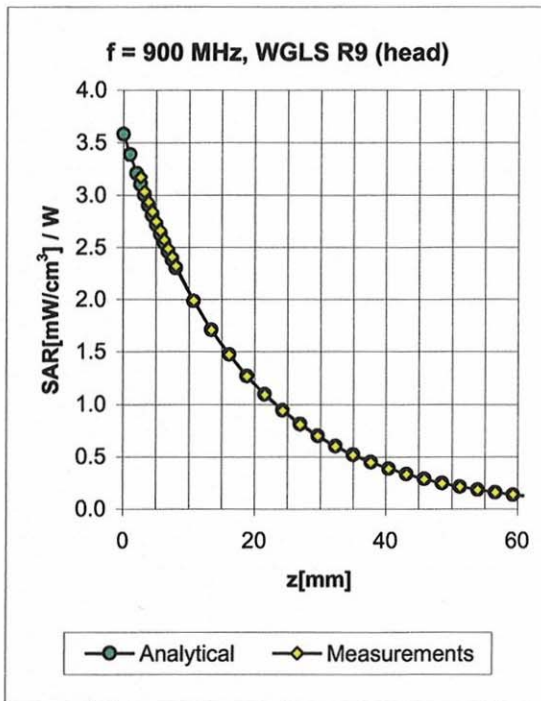
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

### 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

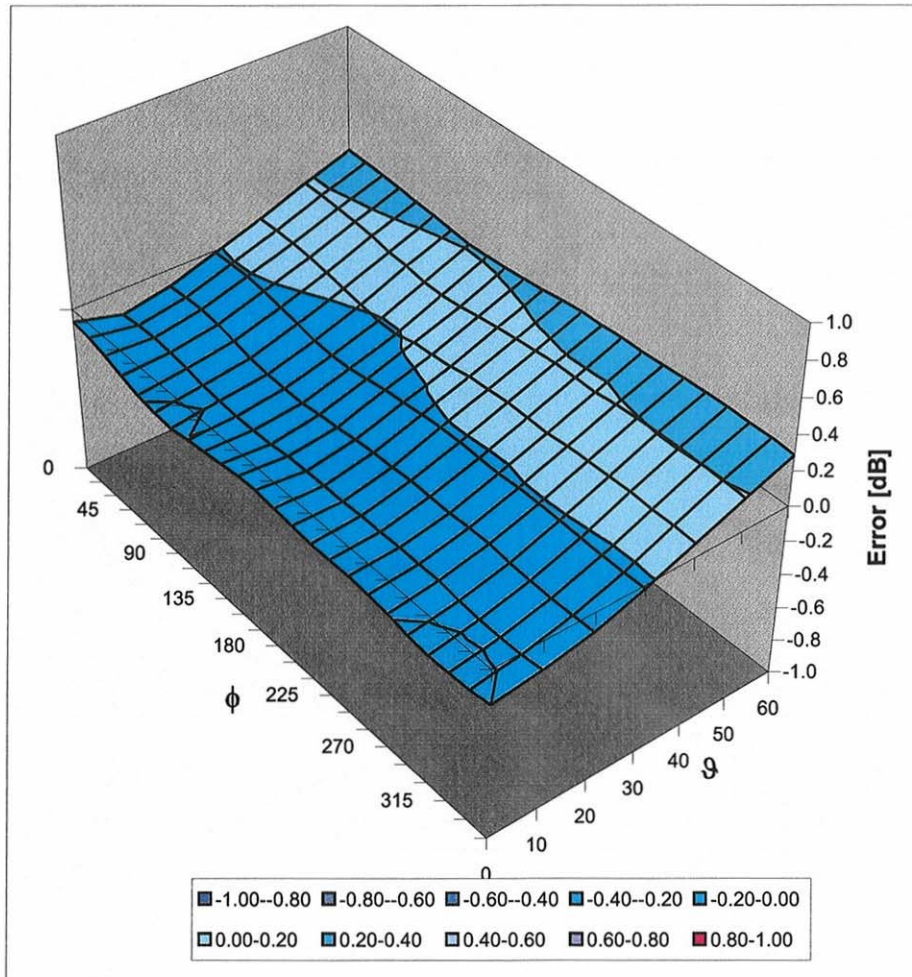


f [MHz]	Validity [MHz] <sup>c</sup>	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.45	1.40	5.63 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.48	1.54	4.93 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.53	1.46	4.71 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.88	1.17	4.41 ± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.61	1.35	5.67 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.71	1.30	4.75 ± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.60	1.45	4.66 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.80	1.25	4.10 ± 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:  $\pm 2.6\%$  ( $k=2$ )



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\_Mar08**

## CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3124**

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

Calibration date: **March 17, 2008**

Condition of the calibrated item **In Tolerance**

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

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

### Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41495277	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41498087	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Reference 3 dB Attenuator	SN: S5054 (3c)	8-Aug-07 (METAS, No. 217-00719)	Aug-08
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-07 (METAS, No. 217-00671)	Mar-08
Reference 30 dB Attenuator	SN: S5129 (30b)	8-Aug-07 (METAS, No. 217-00720)	Aug-08
Reference Probe ES3DV2	SN: 3013	2-Jan-08 (SPEAG, No. ES3-3013_Jan08)	Jan-09
DAE4	SN: 654	20-Apr-07 (SPEAG, No. DAE4-654_Apr07)	Apr-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-07)	In house check: Oct-08

Calibrated by: **Katja Pokovic**      **Technical Manager**

Approved by: **Niels Kuster**      **Quality Manager**

Signature

Issued: March 17, 2008

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



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**

### 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  $E^2$ -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 20, 2007
Recalibrated:	March 17, 2008

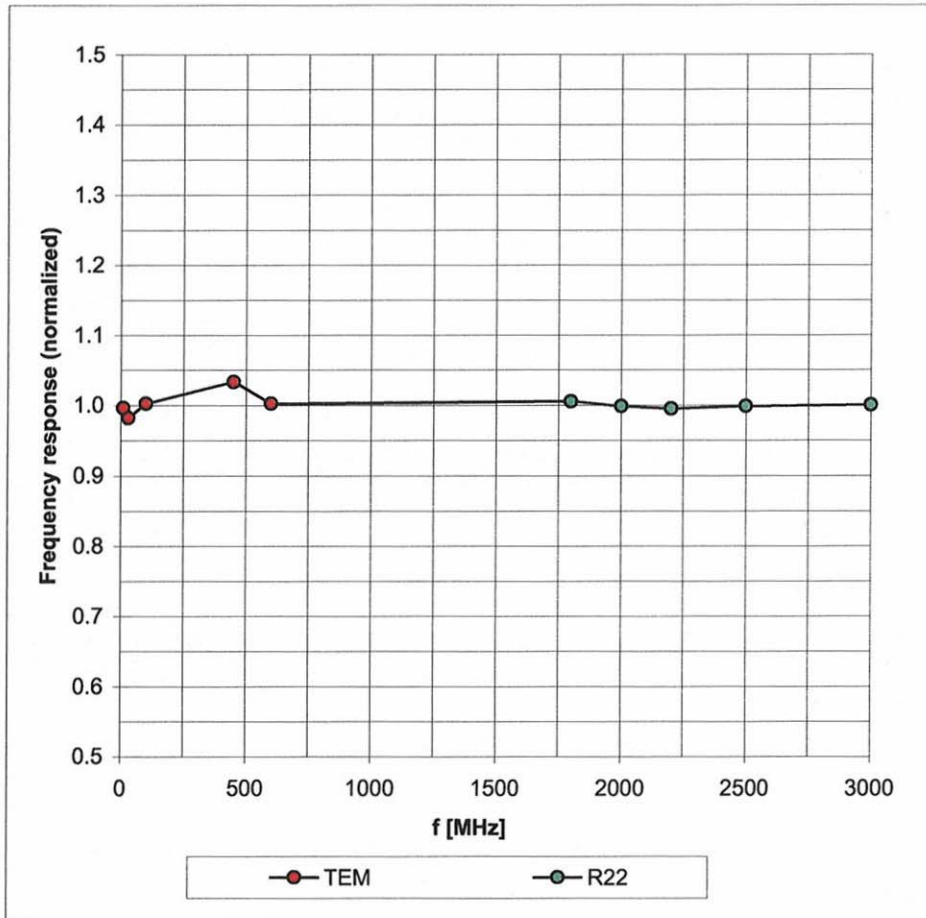
Calibrated for DASYS Systems

(Note: non-compatible with DASYS2 system!)



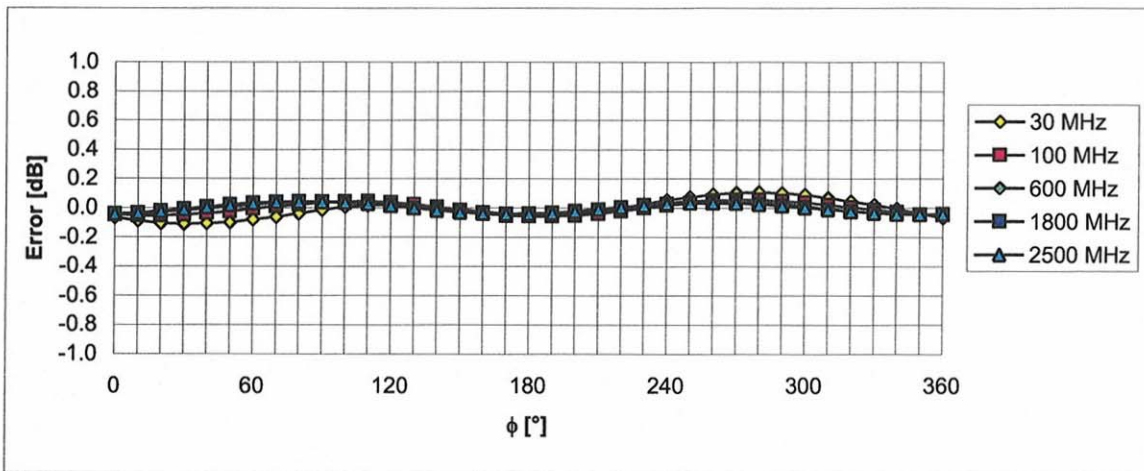
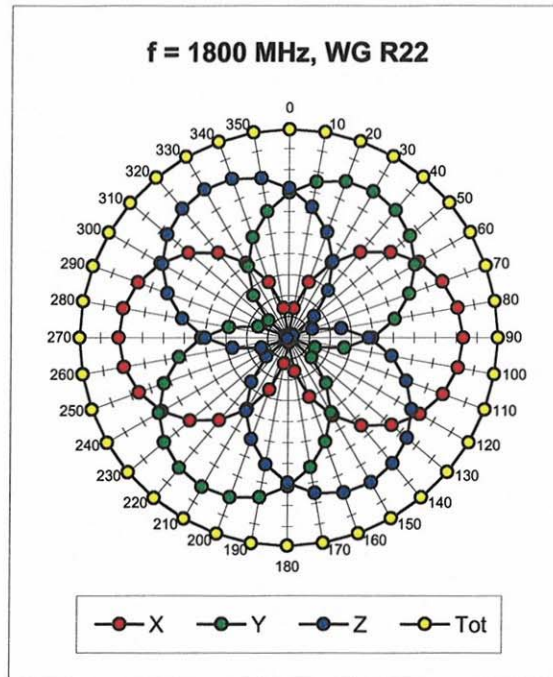
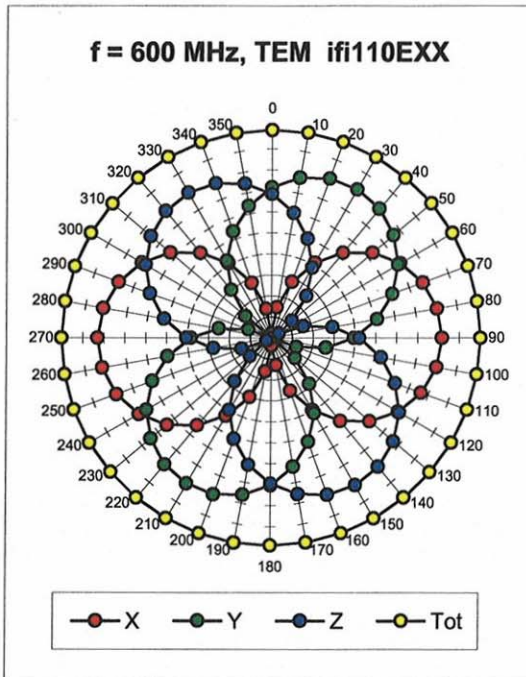
# Frequency Response of E-Field

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



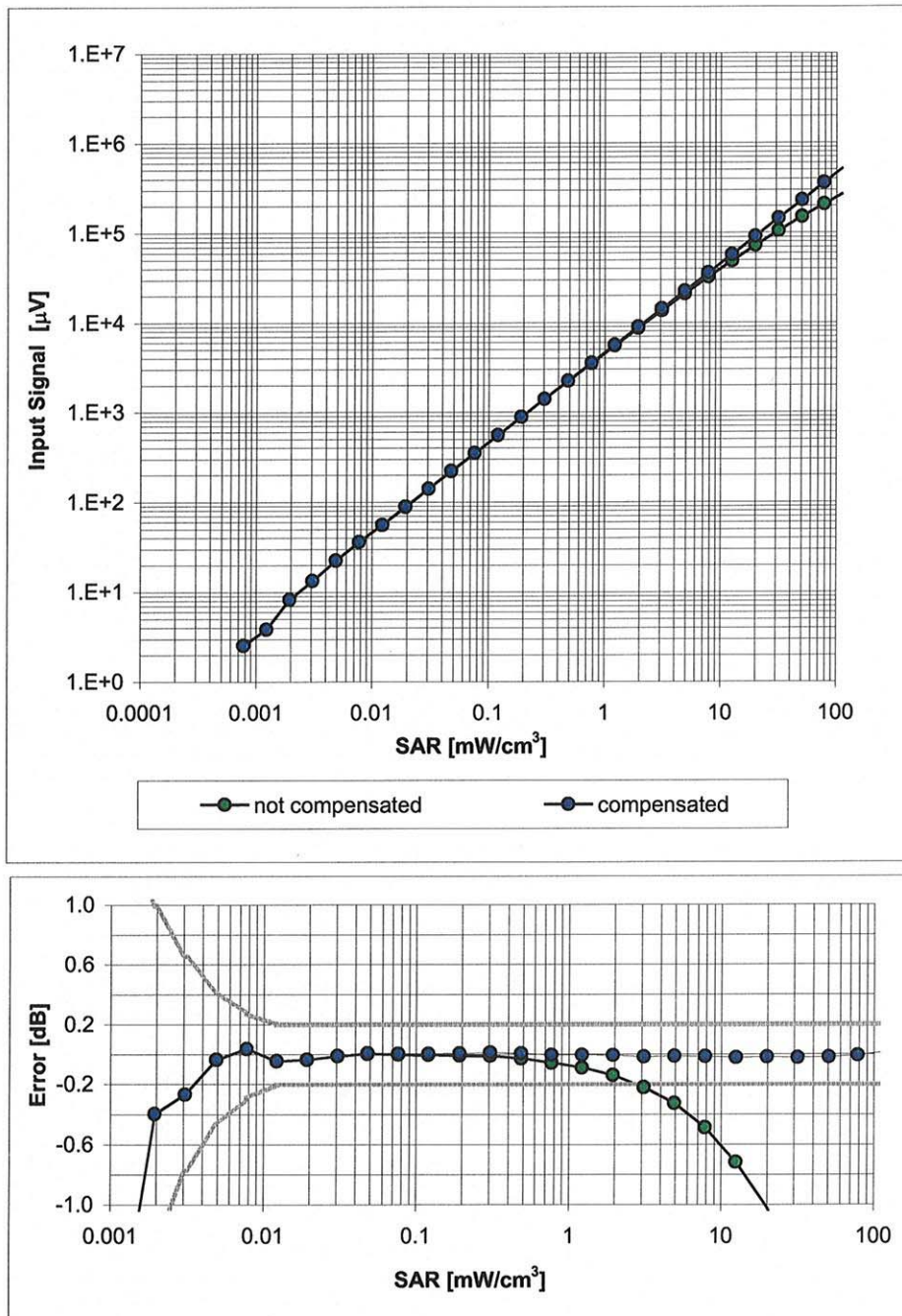
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

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



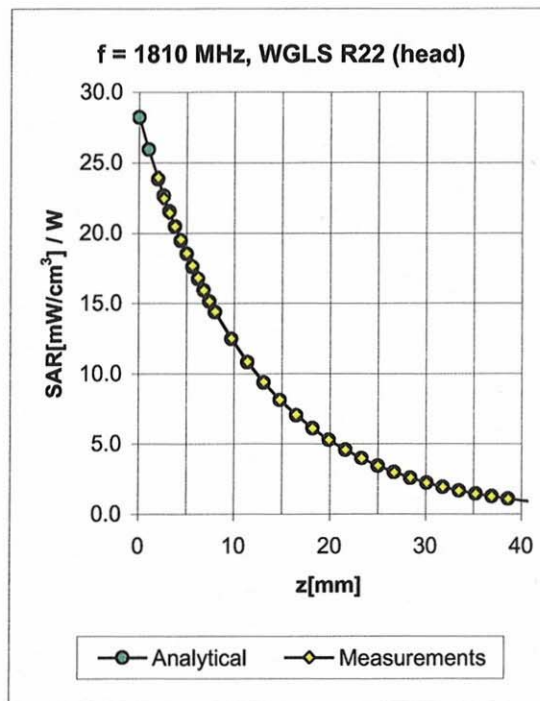
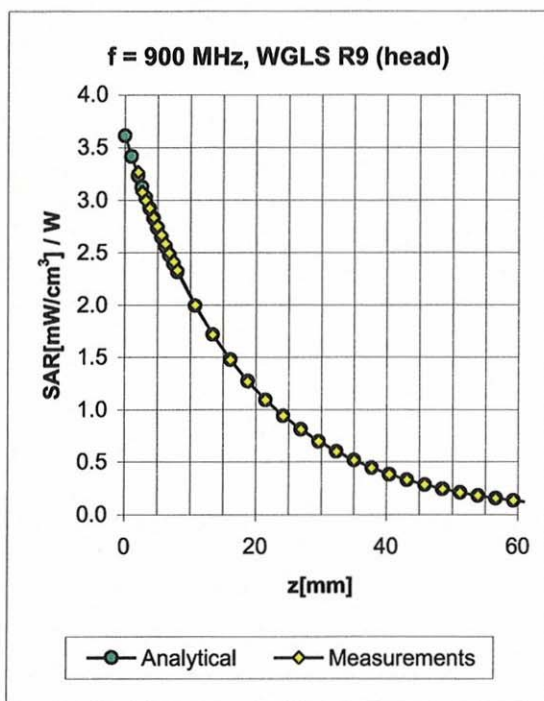
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

## 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

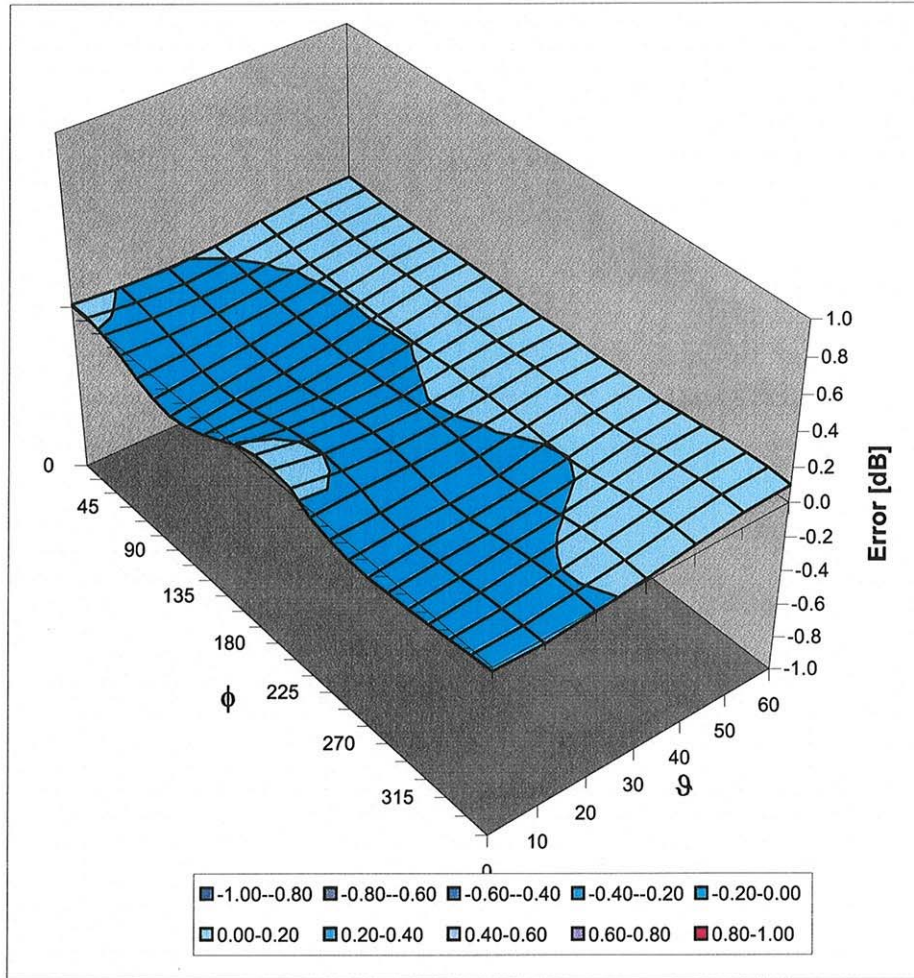


f [MHz]	Validity [MHz] <sup>c</sup>	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.95	1.18	6.03 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.84	1.31	4.98 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.81	1.33	4.80 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.95	1.18	4.51 ± 11.8% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.95	1.20	5.64 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.69	1.44	5.08 ± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.92	1.22	4.88 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.85	1.26	4.19 ± 11.8% (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 ( $\phi, \theta$ ),  $f = 900$  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>	$\frac{h = c \times f}{e}$	$\frac{i = c \times g}{e}$	<i>k</i>
<b>Uncertainty Component</b>	IEEE 1528 section	Tol. ( $\pm$ %)	Prob Dist	Div.	$c_i$ (1 g)	$c_i$ (10 g)	1 g $u_i$ ( $\pm$ %)	10 g $u_i$ ( $\pm$ %)	$v_i$
<b>Measurement System</b>									
Probe Calibration	E.2.1	5.9	N	1.00	1	1	5.9	5.9	$\infty$
Axial Isotropy	E.2.2	4.7	R	1.73	0.707	0.707	1.9	1.9	$\infty$
Hemispherical Isotropy	E.2.2	9.6	R	1.73	0.707	0.707	3.9	3.9	$\infty$
Boundary Effect	E.2.3	1.0	R	1.73	1	1	0.6	0.6	$\infty$
Linearity	E.2.4	4.7	R	1.73	1	1	2.7	2.7	$\infty$
System Detection Limits	E.2.5	1.0	R	1.73	1	1	0.6	0.6	$\infty$
Readout Electronics	E.2.6	0.3	N	1.00	1	1	0.3	0.3	$\infty$
Response Time	E.2.7	1.1	R	1.73	1	1	0.6	0.6	$\infty$
Integration Time	E.2.8	1.1	R	1.73	1	1	0.6	0.6	$\infty$
RF Ambient Conditions - Noise	E.6.1	3.0	R	1.73	1	1	1.7	1.7	$\infty$
RF Ambient Conditions - Reflections	E.6.1	0.0	R	1.73	1	1	0.0	0.0	$\infty$
Probe Positioner Mech. Tolerance	E.6.2	0.4	R	1.73	1	1	0.2	0.2	$\infty$
Probe Positioning w.r.t Phantom	E.6.3	1.4	R	1.73	1	1	0.8	0.8	$\infty$
Max. SAR Evaluation (ext., int., avg.)	E.5	3.4	R	1.73	1	1	2.0	2.0	$\infty$
<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	$\infty$
<b>Phantom and Tissue Parameters</b>									
Phantom Uncertainty	E.3.1	4.0	R	1.73	1	1	2.3	2.3	$\infty$
Liquid Conductivity (target)	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	$\infty$
Liquid Conductivity (measurement)	E.3.3	3.3	N	1.00	0.64	0.43	2.1	1.4	$\infty$
Liquid Permittivity (target)	E.3.2	5.0	R	1.73	0.6	0.49	1.7	1.4	$\infty$
Liquid Permittivity (measurement)	E.3.3	1.9	N	1.00	0.6	0.49	1.1	0.9	$\infty$
<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

Based on WI-0396

-Historical Data-

900MHz	
Reference Target:	10.9 (W/kg)
Measurement Uncertainty (k=1):	9.0%
Measurement Period:	18-April-07 to 14-April-08
# of tests performed:	1,125
Grand Average:	11.29 (W/kg)
% Delta (Average - Reference Target)	3.6%
Is % Delta <= Expanded Measurement Uncertainty (k=2)?	Yes
Accept/Reject Average as new system performance check target?	ACCEPT
Applies to Dipole SN's: 55, 69, 77, 78, 79, 80, 91, 92, 93, 94, 95, 96, 97, 1d034, 1d035	

-New System Performance Check Targets- per WI-0396

(based on analysis of historical data)

Frequency	SAR Target (W/kg)	Permittivity	Conductivity (S/m)
900MHz	11.29	41.5 ± 5%	0.97 ± 5%

-Approvals-

Submitted by:  Date:

Signed: 

Comments:

Approved by:  Date:

Signed: 

Comments:

# Certification of System Performance Check Targets

Based on WI-0396

-Historical Data-

1800MHz	
Reference Target:	38.4 (W/kg)
Measurement Uncertainty (k=1):	9.0%
Measurement Period:	18-April-07 to 14-April-08
# of tests performed:	1,028
Grand Average:	37.7 (W/kg)
% Delta (Average - Reference Target)	-1.7%
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> 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	Conductivity (S/m)
1800MHz	37.7	40.0 ± 5%	1.40 ± 5%

-Approvals-

Submitted by:  Date:

Signed: 

Comments:

Approved by:  Date:

Signed: 

Comments:

# Certification of System Performance Check Targets

Based on WI-0396

-Historical Data-

2450MHz	
Reference Target:	52.4 (W/kg)
Measurement Uncertainty (k=1):	9.0%
Measurement Period:	18-April-07 to 14-April-08
# of tests performed:	77
Grand Average:	56.5 (W/kg)
% Delta (Average - IEEE1528 Target)	7.8%
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> 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	Conductivity (S/m)
2450MHz	56.5	39.2 ± 5%	1.80 ± 5%

-Approvals-

Submitted by:  Date:

Signed: 

Comments:

Approved by:  Date:

Signed: 

Comments: