Portable Cellular Phone SAR Test Report

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Test Laboratory:	Motorola Mobile Devices Business Product Safety & Compliance Laboratory 11th Floor, Hibrand Living Hall, 215, Yanjae-Dong, Seocho-Gu, Seoul, 137-130, South Korea
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Accreditation:

This laboratory is accredited to ISO/IEC 17025-2005 to perform the following tests:

Tests:	Procedures:
Electromagnetic Specific Absorption Rate	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)

TESTING CERT #2518-02

Statement of Compliance:

On the following products or types of products:

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

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 1g average set in [3] and 2.0W/kg in a 10g average set in [2].

For ICNIRP (10g), the final SAR reading for this phone is 0.74 W/kg for head adjacent use and 1.11 W/kg for body worn use. For ANSI / IEEE C95.1 (1g), the final SAR reading for this phone is 1.12 W/kg for head adjacent use and 1.59 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

Type	Internal	
Location	Bottom of the transceiver	
Dimensions	Length	34.18 mm
	Width	7.8 mm
Configuration	FJA	

2.2 Device description

Serial number	**80C9004E**						
Mode(s) of Operation	800 CDMA	1700 CDMA	1900 CDMA	800 1xEVDO Rel. O	1700 1xEVDO Rel. O	1900 1xEVDO Rel. O	Bluetooth
Modulation Mode(s)	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	GMSK
Maximum Output Power Setting	25.00 dBm	25.00 dBm	25.00 dBm	25.00 dBm	25.00 dBm	25.00 dBm	10.00 dBm
Duty Cycle	1:1	1:1	1:1	1:1	1:1	1:1	1:1
Transmitting Frequency Range(s)	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
Production Unit or Identical Prototype (47 CFR §2..908)	Identical Prototype						
Device Category	Portable						
RF Exposure Limits	General Population / Uncontrolled						

3. Test Equipment Used

3.1 Dosimetric System

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

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

Description	Serial Number	Cal Due Date
DASY4™ DAE V3	385	Mar-12-2010
E-Field Probe ES3DV3	3178	July-14-2009
S.A.M. Phantom used for 800/900MHz	TP-1129	
S.A.M. Phantom used for 1800/1900/2450MHz	TP-1134	
Dipole Validation Kit, DV900V2	97	Apr-01-2010
Dipole Validation Kit, DV1800V2	277tr	Apr-01-2010
Dipole Validation Kit, DV2450V2	767	Apr-01-2010

3.2 Additional Equipment

Description	Serial Number	Cal Due Date
Signal Generator HP8648C	3847A04840	21-Jan-2010
Power Meter E4419B	GB39511085	21-Jan-2010
Power Sensor #1 - 8481A	MY41095450	21-Jan-2010
Power Sensor #2 - 8481A	2702A82671	21-Jan-2010
Network Analyzer HP8753ES	US39172714	22-Jan-2010
Dielectric Probe Kit HP85070C	US99360207	

4. Electrical parameters of the tissue simulating liquid

Prior to conducting SAR measurements, the relative permittivity, ε_r, and the conductivity, σ, of the tissue simulating liquids were measured with a HP85070 Dielectric Probe Kit These values, along with the temperature of the simulated tissue are shown in the table below. The recommended limits for permittivity and conductivity are also shown. A mass density of ρ=1g/cm3 was entered into the system in all the cases. It can be seen that the measured parameters are within tolerance of the recommended limits specified in [1] and [5].

f (MHz)	Tissue type	Limits / Measured	Dielectric Parameters		
			ε_r	σ (S/m)	Temp (°C)
835	Head	**Measured,** Jun-15-2009	42.0	0.91	20.9
		Measured, Jun-16-2009	41.9	0.91	20.8
		Recommended Limits	41.5 ±5%	0.90 ±5%	18-25
	Body	**Measured,** Jun-16-2009	55.5	1.01	20.9
		Recommended Limits	55.2 ±5%	0.97 ±5%	18-25
1730	Head	**Measured,** Jun-18-2009	38.3	1.40	20.7
		Recommended Limits	40.1 ±5%	1.36 ±5%	18-25
	Body	**Measured,** Jun-18-2009	51.3	1.53	21.8
		Recommended Limits	53.5 ±5%	1.48 ±5%	18-25
1880	Head	**Measured,** Jun-18-2009	38.0	1.43	21.3
		Recommended Limits	40.0 ±5%	1.40 ±5%	18-25
	Body	**Measured,** Jun-18-2009	51.7	1.58	21.3
		Recommended Limits	53.3 ±5%	1.52 ±5%	18-25
2450	Body	**Measured,** Jun-19-2009	49.6	2.03	22.2
		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	835MHz / 900 MHz Head	835MHz / 900 MHz Body	1800MHz / 1900 MHz Head	1800 MHz / 1900 MHz Body	2450MHz Head	2450 MHz Body
Sugar	57	44.9	--	--	--	--
DGBE	--	--	47	30.8	--	30
Diacetin	--	--	--	--	51	
Water	40.45	53.06	52.62	68.8	48.75	70
Salt	1.45	0.94	0.38	0.4	0.15	--
HEC	1	1	--	--	--	--
Bact.	0.1	0.1	--	--	0.1	--

5. System Accuracy Verification

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

A SAR measurement was performed to verify the measured SAR was within ±10% from the target SAR indicated in Appendix 6. These frequencies are within ±10% of the compliance test mid-band frequency as required in [1] and [5]. The test was conducted on the same days as the measurement of the DUT. Recommended limits for permittivity and conductivity, specified in [5], are shown in the table below. The obtained results from the system accuracy verification are also displayed in the table below. SAR values are normalized to 1W forward power delivered to the dipole. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values. The distributions of SAR compare well with those of the reference measurements (see Appendix 1). The tissue stimulant depth was verified to be 15.0± ±0.5cm. Z-axis scans showing the SAR penetration are also included in Appendix 1.

f (MHz)	Description	SAR (W/kg), 1gram	Dielectric Parameters ε_r	Dielectric Parameters σ (S/m)	Ambient Temp (°C)	Tissue Temp (°C)
900	**Measured,** Jun-15-2009	12.08	41.3	0.98	21.5	21.4
	Measured, Jun-16-2009	11.78	41.2	0.97	19.9	21.1
	Recommended Limits	11.19	41.5 ±5%	0.97 ±5%	18-25	18-25
1800	**Measured,** Jun-18-2009	39.7	38.4	1.35	21.5	21.5
	Recommended Limits	37.91	40.0 ±5%	1.4 ±5%	18-25	18-25
2450	**Measured,** Jun-19-2009	53.00	36.3	1.87	21.6	22.3
	Recommended Limits	56.68	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	SN3178	900	5.63	8 of 9
		1810	4.82	8 of 9
		2450	4.29	8 of 9

6. Test Results

The test sample was operated using an actual transmission through a base station simulator. The base station simulator was setup to the proper channel, transmitter power level and transmit mode of operation. The phone was tested in the configurations stipulated in [1], [4] and [5]. The phone was positioned into these configurations using the device holder supplied with the DASY4™ SAR measurement system The measured dielectric constant of the material used for the device holder is less than 2.9 and the loss tangent is less than 0.02 (± 30%) at 850MHz. The default settings for the "coarse" and "cube" scans were chosen and used for measurements. The grid spacing of the course scan was set to 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:
SNN5837A - 1140 mAH Battery
SNN5833A - 930 mAH Battery
SNN5838A - 1600 mAH Battery
SNN5851A - 1380 mAH Battery

The SNN5837A inbox battery was used to do most of the SAR testing. The phone was placed in the SAR measurement system with a fully charged battery. The configuration that resulted in the highest SAR values were tested using the other batteries listed above.

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	25.14	25.16	24.89	25.07	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	25.03	25.03	24.99	24.93	
	777	24.93	24.96	24.97	24.87	
CDMA 1700	25	25.32	25.28	25.16	25.10	
	450	25.25	25.22	25.18	25.15	
	875	25.09	25.09	25.12	25.11	
CDMA 1900	25	25.07	24.99	25.00	25.14	
	600	25.03	24.96	24.96	25.04	
	1175	25.04	24.99	25.01	25.06	

Conducted power (dBm) for EVDO modes				
	Channel	Rev 0		Rev A
		FTAP 307.2k	RTAP 153.6k	Subtype 2
CDMA 800	1013	25.18	25.13	N/A
	384	25.01	25.09	N/A
	777	24.92	24.97	N/A
CDMA 1700	25	25.49	25.84	N/A
	450	25.27	25.41	N/A
	875	25.30	25.43	N/A
CDMA 1900	25	24.88	25.01	N/A
	600	24.84	24.92	N/A
	1175	24.92	25.10	N/A

6.1 Head Adjacent Test Results

The SAR results shown in tables 1 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 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 New SAR = Old SAR * 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4™ measurement system can be scaled up by the measured drift to determine the SAR at the beginning of the measurement process. This is the most conservative SAR because it corresponds to the average output power at the beginning of the SAR test. This extrapolation has been done because when the DUT is operating properly it may exhibit a slump in radiated power and SAR over time. This is verified by measuring the SAR drift after the test. Note that 800MHz 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 15.0cm ±0.5cm.

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

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ES3DV3	SN3178	900	5.63	8 of 9
		1810	4.82	8 of 9

Left Head Cheek Position								
f (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	*10g SAR value*		*1g SAR value*	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
CDMA 800 MHz	**Channel 1013**	25.07	21.0	-0.209	0.603	0.603	0.901	0.95
	Channel 384	24.93	21.2	-0.00685	0.596	0.60	0.898	0.90
	Channel 777	24.87	**20.9**	**-0.069**	**0.726**	**0.74**	**1.09**	**1.11**
CDMA 1700MHz	**Channel 25**	25.10						
	Channel 450	25.15	21.0	-0.0633	0.347	0.35	0.507	0.51
	Channel 875	25.11						
CDMA 1900MHz	**Channel 25**	25.14	20.8	0.0376	0.45	0.45	0.698	0.70
	Channel 600	25.04	20.9	-0.111	0.503	0.52	0.791	0.81
	Channel 1175	25.06	20.8	-0.122	0.482	0.50	0.786	0.81

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

Right Head Cheek Position								
f (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	*10g SAR value*		*1g SAR value*	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
CDMA 800 MHz	Channel 1013	25.07	20.7	0.11	0..581	0.58	0.892	0.89
	Channel 384	24.93	21.0	-0.0121	0.583	0.58	0.884	0.89
	Channel 777	24.87	20.8	0.00294	0.705	0.71	1.1	1.10
CDMA 1700MHz	Channel 25	25.10						
	Channel 450	25.15	20.8	0.074	0.358	0.36	0.587	0.59
	Channel 875	25.11						
CDMA 1900MHz	Channel 25	25.14	21.2	0.0016	0.523	0.52	0.867	0.87
	Channel 600	25.04	21.4	0.00737	0.597	0.60	1.01	1.01
	Channel 1175	25.06	21.1	-0.0459	0.517	0.52	0.878	0.89

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

The noted Highest Head Cheek Position with SNN5733A Battery								
f (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	*10g SAR value*		*1g SAR value*	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
CDMA 800 MHz *Left*	Channel 1013	25.07						
	Channel 384	24.93						
	Channel 777	24.87	20.9	0.0138	0.744	0.74	1.1	1.10
CDMA 1700MHz *Right*	Channel 25	25.10						
	Channel 450	25.15	**20.7**	**0.0521**	**0.367**	**0.37**	**0.605**	**0.61**
	Channel 875	25.11						
CDMA 1900MHz *Right*	Channel 25	25.14						
	Channel 600	25.04	**21.3**	**0.049**	**0.609**	**0.61**	**1.03**	**1.03**
	Channel 1175	25.06						

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

The noted Highest Head Cheek Position with SNN5838A Battery								
					10g SAR value		*1g SAR value*	
f **(MHz)**	**Description**	**Conducted Output Power (dBm)**	**Temp (°C)**	**Drift (dB)**	**Measured (W/kg)**	**Extrapolated (W/kg)**	**Measured (W/kg)**	**Extrapolated (W/kg)**
CDMA 800 MHz *Left*	**Channel 1013**	25.07						
	Channel 384	24.93						
	Channel 777	24.87	21.3	-0.0758	0.693	0.71	1.00	1.02
CDMA 1700MHz *Right*	**Channel 25**	25.10						
	Channel 450	25.15	21.4	0.0356	0.333	0.33	0.552	0.55
	Channel 875	25.11						
CDMA 1900MHz *Right*	**Channel 25**	25.14						
	Channel 600	25.04	21.3	-0.0446	0.507	0.51	0.857	0.87
	Channel 1175	25.06						

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

The noted Highest Head Cheek Position with SNN5851A Battery								
					10g SAR value		*1g SAR value*	
f **(MHz)**	**Description**	**Conducted Output Power (dBm)**	**Temp (°C)**	**Drift (dB)**	**Measured (W/kg)**	**Extrapolated (W/kg)**	**Measured (W/kg)**	**Extrapolated (W/kg)**
CDMA 800 MHz *Left*	**Channel 1013**	25.07						
	Channel 384	24.93						
	Channel 777	24.87	21.3	0.0152	0.709	0.71	1.05	1.05
CDMA 1700MHz *Right*	**Channel 25**	25.10						
	Channel 450	25.15	21.4	0.0122	0.345	0.35	0.57	0.57
	Channel 875	25.11						
CDMA 1900MHz *Right*	**Channel 25**	25.14						
	Channel 600	25.04	21.3	-0.00506	0.536	0.54	0.897	0.90
	Channel 1175	25.06						

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

Left Head 15° Tilt Position								
f (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	*10g SAR value*		*1g SAR value*	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
CDMA 800 MHz	Channel 1013	25.07						
	Channel 384	24.93	20.9	-0.0293	0.136	0.14	0.175	0.18
	Channel 777	24.87						
CDMA 1700MHz	Channel 25	25.10						
	Channel 450	25.15	20.9	-0.0674	0.141	0.14	0.23	0.23
	Channel 875	25.11						
CDMA 1900MHz	Channel 25	25.14						
	Channel 600	25.04	20.8	0.0198	0.195	0.20	0.327	0.33
	Channel 1175	25.06						

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								
f (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	*10g SAR value*		*1g SAR value*	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
CDMA 800 MHz	Channel 1013	25.07						
	Channel 384	24.93	20.9	-0.0261	0.132	0.13	0.171	0.17
	Channel 777	24.87						
CDMA 1700MHz	Channel 25	25.10						
	Channel 450	25.15	20.7	-0.039	0.11	0.11	0.177	0.18
	Channel 875	25.11						
CDMA 1900MHz	Channel 25	25.14						
	Channel 600	25.04	21.1	-0.116	0.15	0.15	0.253	0.26
	Channel 1175	25.06						

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.

The Noted Highest Head 15° Tilt Position with SNN5833A Battery								
					10g SAR value		*1g SAR value*	
f **(MHz)**	**Description**	**Conducted Output Power (dBm)**	**Temp (°C)**	**Drift (dB)**	**Measured (W/kg)**	**Extrapolated (W/kg)**	**Measured (W/kg)**	**Extrapolated (W/kg)**
CDMA 800 MHz *Left*	**Channel 1013**	25.07						
	Channel 384	24.93	**20.8**	**0.0488**	**0.147**	**0.15**	**0.187**	**0.19**
	Channel 777	24.87						
CDMA 1700MHz *Left*	**Channel 25**	25.10						
	Channel 450	25.15	**20.6**	**-0.0367**	**0.138**	**0.14**	**0.224**	**0.23**
	Channel 875	25.11						
CDMA 1900MHz *Left*	**Channel 25**	25.14						
	Channel 600	25.04	**21.2**	**0.0777**	**0.197**	**0.20**	**0.328**	**0.33**
	Channel 1175	25.06						

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.

The Noted Highest Head 15° Tilt Position with SNN5838A Battery								
					10g SAR value		*1g SAR value*	
f **(MHz)**	**Description**	**Conducted Output Power (dBm)**	**Temp (°C)**	**Drift (dB)**	**Measured (W/kg)**	**Extrapolated (W/kg)**	**Measured (W/kg)**	**Extrapolated (W/kg)**
CDMA 800 MHz *Left*	**Channel 1013**	25.07						
	Channel 384	24.93	21.2	-0.0672	0.145	0.15	0.188	0.19
	Channel 777	24.87						
CDMA 1700MHz *Left*	**Channel 25**	25.10						
	Channel 450	25.15	21.5	0.052	0.122	0.12	0.198	0.20
	Channel 875	25.11						
CDMA 1900MHz *Left*	**Channel 25**	25.14						
	Channel 600	25.04	21.4	-0.211	0.186	0.20	0.304	0.32
	Channel 1175	25.06						

Table 9: SAR measurement results at the highest possible output power, measured in a head 15° Tilt position against the ICNIRP and ANSI SAR Limit.

The Noted Highest Head 15° Tilt Position with SNN5851A Battery								
f **(MHz)**	**Description**	**Conducted Output Power (dBm)**	**Temp (°C)**	**Drift (dB)**	***10g SAR value***		***1g SAR value***	
					Measured (W/kg)	**Extrapolated (W/kg)**	**Measured (W/kg)**	**Extrapolated (W/kg)**
CDMA 800 MHz *Left*	**Channel 1013**	25.07						
	Channel 384	24.93	21.1	-0.108	0.146	0.15	0.188	0.19
	Channel 777	24.87						
CDMA 1700MHz *Left*	**Channel 25**	25.10						
	Channel 450	25.15	21.5	-0.0122	0.123	0.12	0.198	0.20
	Channel 875	25.11						
CDMA 1900MHz *Left*	**Channel 25**	25.14						
	Channel 600	25.04	21.2	0.00456	0.185	0.19	0.304	0.30
	Channel 1175	25.06						

Table 10: SAR measurement results at the highest possible output power, measured in a head 15° Tilt position against the ICNIRP and ANSI SAR Limit.

The below SAR results were corrected for the tissue permittivity that was measured above the nominal target. Corrections were performed using the data provided in FCC KDB 450824. No correction was made for conductivity, since the measured tissue value already represents a conservative result in the measured SAR.

The noted Head position, scaled SAR							
f **(MHz)**	**Description**	**Conducted Output Power (dBm)**	**Measured ε_r**	***10g SAR value***		***1g SAR value***	
				Measured (W/kg)	**Extrapolated (W/kg)**	**Measured (W/kg)**	**Extrapolated (W/kg)**
CDMA 800 MHz ***Left***	**Channel 1013**	25.07					
	Channel 384	24.93					
	Channel 777	24.87	42.0	0.74	(0.7440) **0.74**	1.1075	(1.1138) **1.11**

6.2 Body Worn Test Results

The SAR results shown in tables 11 through 18 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 and 1x EVDO Release O R-TAP modes, the temperature of the test facility during the test, the temperature of the tissue simulate after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is New SAR = Old SAR * 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4™ measurement system can be scaled up by the measured drift to determine the SAR at the beginning of the measurement process. This is the most conservative SAR because it corresponds to the average output power at the beginning of the SAR test. This extrapolation has been done because when the DUT is operating properly it may exhibit a slump in radiated power and SAR over time. This is verified by measuring the SAR drift after the test. Note that 800MHz 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 52.7cm(long) x 26.7cm(wide) x 21.2cm(tall). The measured dielectric constant of the material used is less than 2.3 and the loss tangent is less than 0.0046 all the way up to 2.184GHz.

The tissue stimulant depth was verified to be 15.0cm ±0.5cm. The same device holder described in section 6 was used for positioning the phone. The functional accessories were divided into two categories, the ones with metal components and the ones with non-metal components. For non-metallic component accessories', testing was performed on the accessory that displayed the closest proximity to the flat phantom. Each metallic component accessory, if any, was checked for uniqueness of metal component so that each is tested with the device. If multiple accessories shared an identical metal component, only the accessory that dictates the closest spacing to the body was tested. 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 hence the device was tested per the supplement C testing guidelines for devices that do not have body worn accessories. A separation distance of 15mm 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 25mm between the device and the flat phantom was used. The device was tested with the front and back of the device facing the phantom.

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	SN3178	900	5.64	8 of 9
		1810	4.50	8 of 9
		2450	3.90	8 of 9

Body-Worn; Front of Phone 15mm from Phantom								
f (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	*10g SAR value*		*1g SAR value*	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
CDMA 800 MHz	Channel 1013	25.07						
	Channel 384	24.93	21.0	0.00733	0.544	0.54	0.737	0.74
	Channel 777	24.87						
CDMA 1700MHz	Channel 25	25.10						
	Channel 450	25.15	22.0	-0.109	0.215	0.22	0.324	0.33
	Channel 875	25.11						
CDMA 1900MHz	Channel 25	25.14						
	Channel 600	25.04	21.5	0.108	0.255	0.26	0.397	0.40
	Channel 1175	25.06						

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

Body-Worn; Back of Phone 15mm from Phantom								
f (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	*10g SAR value*		*1g SAR value*	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
CDMA 800 MHz	Channel 1013	25.07	20.8	0.154	0.771	0.77	1.08	1.08
	Channel 384	24.93	**20.9**	**0.0212**	**1.11**	**1.11**	**1.58**	**1.58**
	Channel 777	24.87	20.9	0.0441	0.782	0.78	1.11	1.11
CDMA 1700MHz	Channel 25	25.10						
	Channel 450	25.15	**21.8**	**0.0179**	**0.446**	**0.45**	**0.683**	**0.68**
	Channel 875	25.11						
CDMA 1900MHz	Channel 25	25.14						
	Channel 600	25.04	**21.3**	**-0.0998**	**0.37**	**0.38**	**0.575**	**0.59**
	Channel 1175	25.06						

Table 12: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

Body-Worn; *The noted phone facing* 25mm from Phantom (1X EVDO Rel. O R-TAP Mode)								
f (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	*10g SAR value*		*1g SAR value*	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
CDMA 800 MHz *Back of phone*	Channel 1013	25.13						
	Channel 384	25.09	20.8	0.0712	0.419	0.42	0.575	0.58
	Channel 777	24.97						
CDMA 1700MHz *Back of phone*	Channel 25	25.84						
	Channel 450	25.41	21.5	0.02	0.181	0.18	0.277	0.28
	Channel 875	25.43						
CDMA 1900MHz *Back of phone*	Channel 25	25.01						
	Channel 600	24.92	21.2	-0.143	0.138	0.14	0.212	0.22
	Channel 1175	25.10						

Table 13: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

The noted Highest Body-Worn Position with SNN5833A Battery								
f (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	*10g SAR value*		*1g SAR value*	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
CDMA 800 MHz *Back, 15mm*	Channel 1013	25.07						
	Channel 384	24.93	21.1	-0.0954	1.08	1.10	1.55	1.58
	Channel 777	24.87						
CDMA 1700MHz *Back, 15mm*	Channel 25	25.10						
	Channel 450	25.15	21.6	0.0238	0.44	0.44	0.673	0.67
	Channel 875	25.11						
CDMA 1900MHz *Back, 15mm*	Channel 25	25.14						
	Channel 600	25.04	21.2	-0.0253	0.337	0.34	0.526	0.53
	Channel 1175	25.06						

Table 14: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

The noted Highest Body-Worn Position with SNN5838A Battery								
					10g SAR value		*1g SAR value*	
f **(MHz)**	**Description**	**Conducted Output Power (dBm)**	**Temp (°C)**	**Drift (dB)**	**Measured (W/kg)**	**Extrapolated (W/kg)**	**Measured (W/kg)**	**Extrapolated (W/kg)**
CDMA 800 MHz *Back, 15mm*	**Channel 1013**	25.07						
	Channel 384	24.93	21.5	-0.135	0.826	0.85	1.17	1.21
	Channel 777	24.87						
CDMA 1700MHz *Back, 15mm*	**Channel 25**	25.10						
	Channel 450	25.15	21.5	-0.00873	0.337	0.34	0.517	0.52
	Channel 875	25.11						
CDMA 1900MHz *Back, 15mm*	**Channel 25**	25.14						
	Channel 600	25.04	21.4	-0.0928	0.317	0.32	0.488	0.50
	Channel 1175	25.06						

Table 15: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

The noted Highest Body-Worn Position with SNN5851A Battery								
					10g SAR value		*1g SAR value*	
f **(MHz)**	**Description**	**Conducted Output Power (dBm)**	**Temp (°C)**	**Drift (dB)**	**Measured (W/kg)**	**Extrapolated (W/kg)**	**Measured (W/kg)**	**Extrapolated (W/kg)**
CDMA 800 MHz *Back, 15mm*	**Channel 1013**	25.07						
	Channel 384	24.93	21.4	-0.113	0.814	0.84	1.14	1.17
	Channel 777	24.87						
CDMA 1700MHz *Back, 15mm*	**Channel 25**	25.10						
	Channel 450	25.15	21.5	-0.0331	0.287	0.29	0.44	0.44
	Channel 875	25.11						
CDMA 1900MHz *Back, 15mm*	**Channel 25**	25.14						
	Channel 600	25.04	21.5	0.0454	0.287	0.29	0.439	0.44
	Channel 1175	25.06						

Table 16: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

Bluetooth; ***Noted highest Body-Worn position and battery***								
f **(MHz)**	**Description**	**Conducted Output Power (dBm)**	**Temp (°C)**	**Drift (dB)**	***10g SAR value***		***1g SAR value***	
					Measured (W/kg)	**Extrapolated (W/kg)**	**Measured (W/kg)**	**Extrapolated (W/kg)**
Bluetooth 2450MHz *Back 15mm SNN5837A Battery*	**Channel 0**							
	Channel 39		22.2	-0.454	0.00118	**0.00131**	0.00517	**0.00574**
	Channel 78							

Table 17: SAR measurement results at the highest possible output power, measured in a body-worn position against the ICNIRP and ANSI SAR Limit.

The below SAR results were corrected for the tissue permittivity that was measured above the nominal target. Corrections were performed using the data provided in FCC KDB 450824. No correction was made for conductivity, since the measured tissue value already represents a conservative result in the measured SAR.

The noted Body position, **scaled SAR**						
f **(MHz)**	**Description**	**Measured ε_r**	***10g SAR value***		***1g SAR value***	
			Measured (W/kg)	**Extrapolated (W/kg)**	**Measured (W/kg)**	**Extrapolated (W/kg)**
CDMA 800 MHz *Back,15mm, SNN5837A*	**Channel 1013**					
	Channel 384	55.5	1.11	**1.1127**	1.58	**1.5890**
	Channel 777					

Table 18. Corrected SAR measurement results at the highest possible output power, measured in a head position against the ICNIRP and ANSI SAR Limit.

Highest Extrapolated SAR Values (including Bluetooth summation)							
f **(MHz)**	**Description**	***10 g SAR value***			***1 g SAR value***		
		Original Measurement (W/kg)	**Bluetooth Measurement (W/kg)**	**Summation (W/kg)**	**Original Measurement (W/kg)**	**Bluetooth Measurement (W/kg)**	**Summation (W/kg)**
CDMA 800 MHz	Back of phone 15mm from phantom with SNN5837A Battery	1.1127	0.00131	(1.1140) **1.11**	1.5890	0.00574	(1.5947) **1.59**
CDMA 1700 MHz	Back of phone 15mm from phantom with SNN5837A Battery	0.4460	0.00131	(0.4473) **0.45**	0.6830	0.00574	(0.6887) **0.69**
CDMA 1900 MHz	Back of phone 15mm from phantom with SNN5837A Battery	0.3786	0.00131	(0.3799) **0.38**	0.5884	0.00574	(0.5941) **0.59**

Table 19: SAR measurement results at the highest possible output power, calculated for the 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 (300MHz – 3GHz)".

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

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

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

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

Appendix 1

SAR distribution comparison for the system accuracy verification

Date/Time: 06/15/2009 AM 10:43:08

Test Laboratory: Motorola 0615'2009_900MHz_+7.9%

Procedure Notes: 900 MHz System Performance Check / Dipole Sn# 097 PM1 Power = 200 mW
Sim.Temp@meas = 21.9 ▪ C Sim.Temp@SPC = 21.4 ▪ C Room Temp @ SPC = 21.5 ▪ C
Communication System: CW - Dipole; Frequency: 900 MHz; Channel Number: 4; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used: f = 900 MHz; σ = 0.98 mho/m; ε_r = 41.3; ρ = 1000 kg/m^3

DASY4 Configuration:

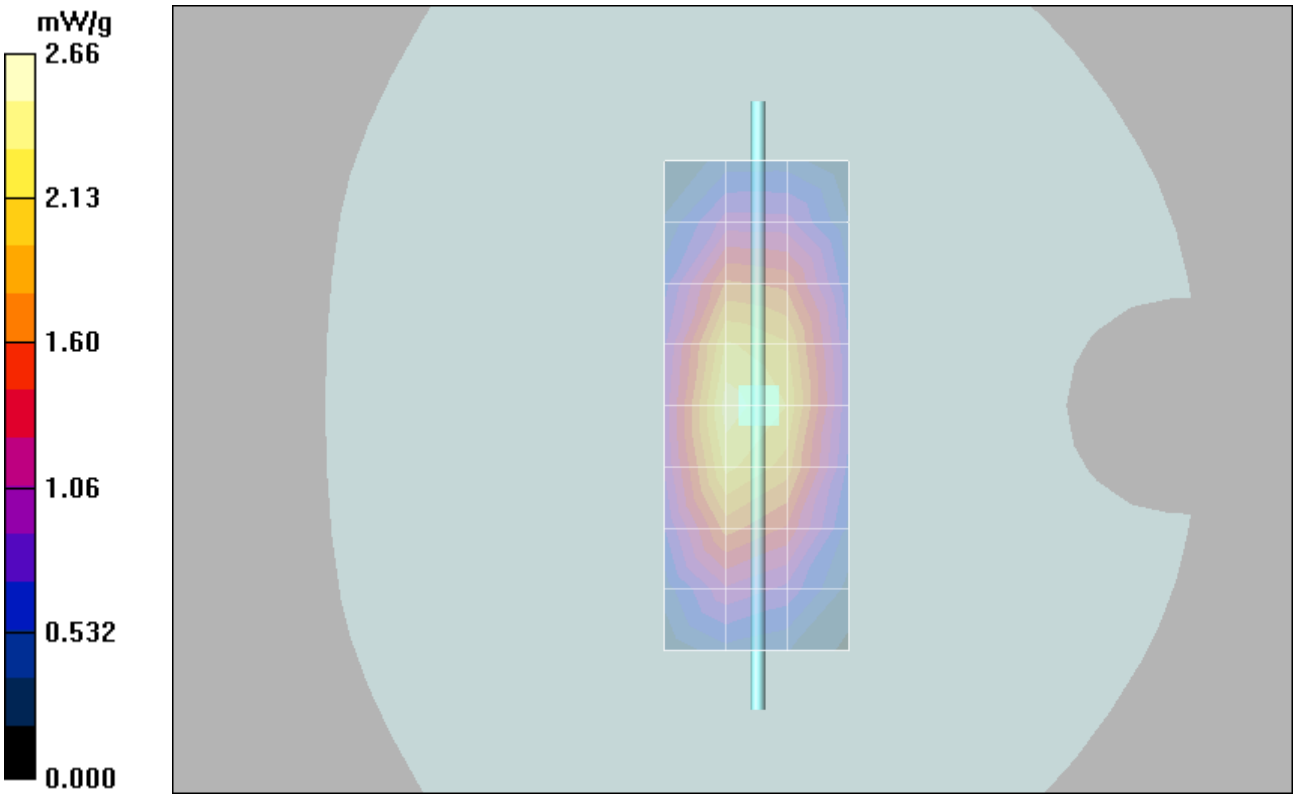
- Probe: ES3DV3 - SN3178; ConvF(5.63, 5.63, 5.63); Calibrated: 07/14/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn385; Calibrated: 03/12/2009
- Phantom: PCS-9_Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP- 1129;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

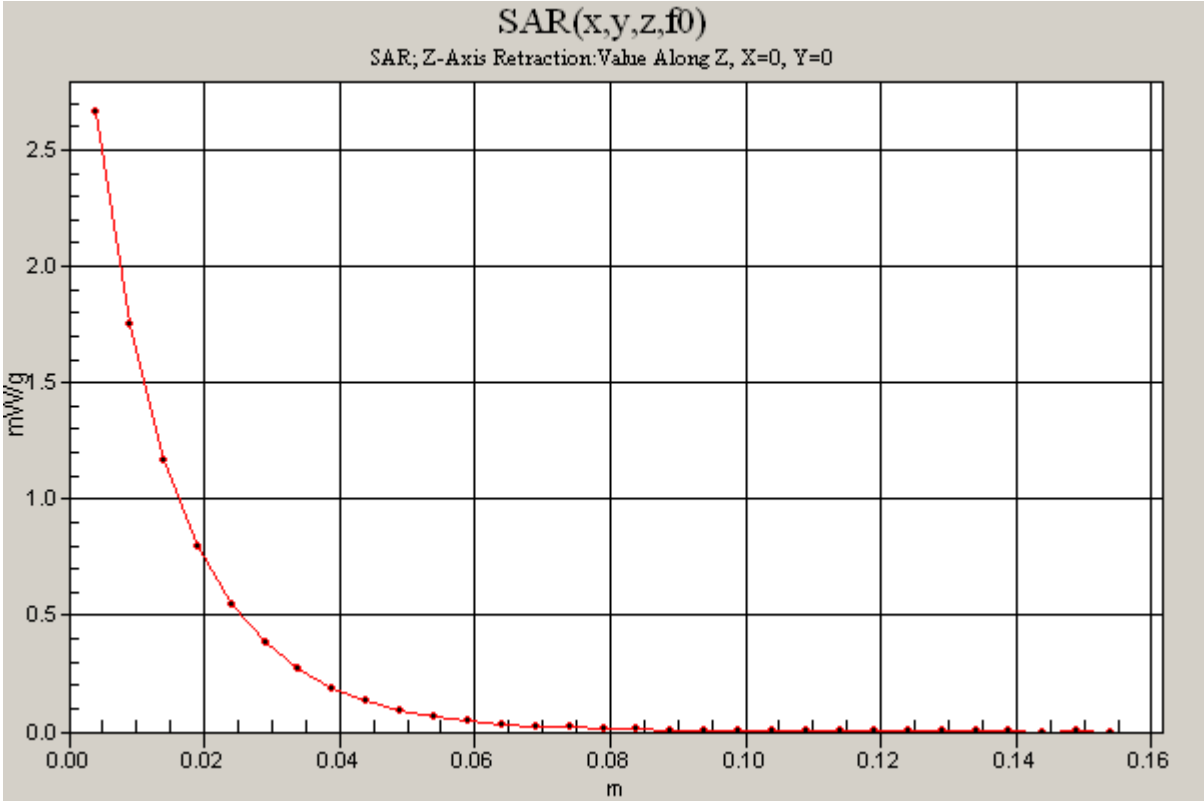
Daily SPC Check/Dipole Area Scan (4x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.40 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 52.9 V/m; Power Drift = -0.003 dB
Peak SAR (extrapolated) = 3.64 W/kg
SAR(1 g) = 2.43 mW/g; SAR(10 g) = 1.55 mW/g
Maximum value of SAR (measured) = 2.64 mW/g

Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 52.9 V/m; Power Drift = -0.003 dB
Peak SAR (extrapolated) = 3.60 W/kg
SAR(1 g) = 2.4 mW/g; SAR(10 g) = 1.54 mW/g
Maximum value of SAR (measured) = 2.60 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 2.66 mW/g




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

Date/Time: 06/16/2009 AM 09:16:39

Test Laboratory: Motorola 0616'2009_900MHz_+5.2%

Procedure Notes: 900 MHz System Performance Check / Dipole Sn# 097 PM1 Power = 200 mW
Sim.Temp@meas = 21.4 ▪ C Sim.Temp@SPC = 21.1 ▪ C Room Temp @ SPC = 19.9 ▪ C
Communication System: CW - Dipole; Frequency: 900 MHz; Channel Number: 4; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used: f = 900 MHz; σ = 0.97 mho/m; ε_r = 41.2; ρ = 1000 kg/m^3

DASY4 Configuration:

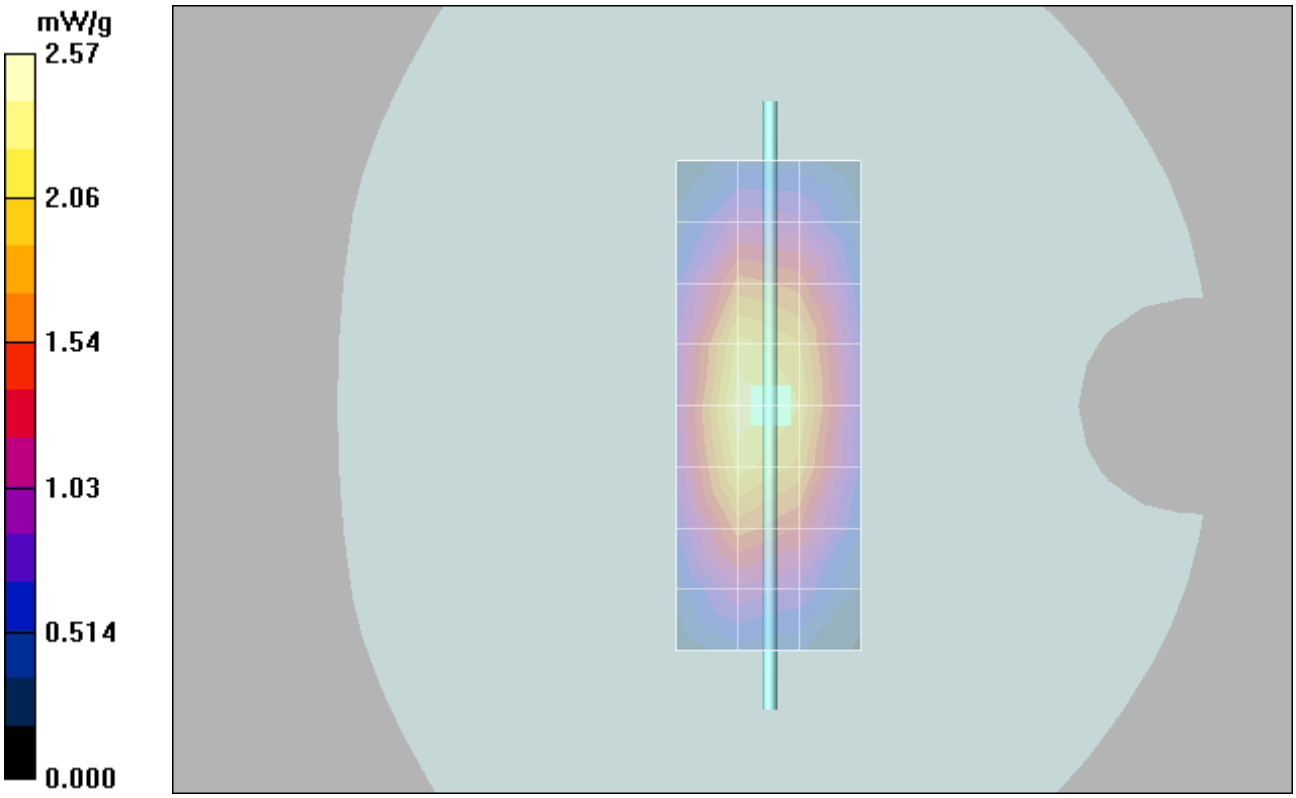
- Probe: ES3DV3 - SN3178; ConvF(5.63, 5.63, 5.63); Calibrated: 07/14/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn385; Calibrated: 03/12/2009
- Phantom: PCS-9_Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP- 1129;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

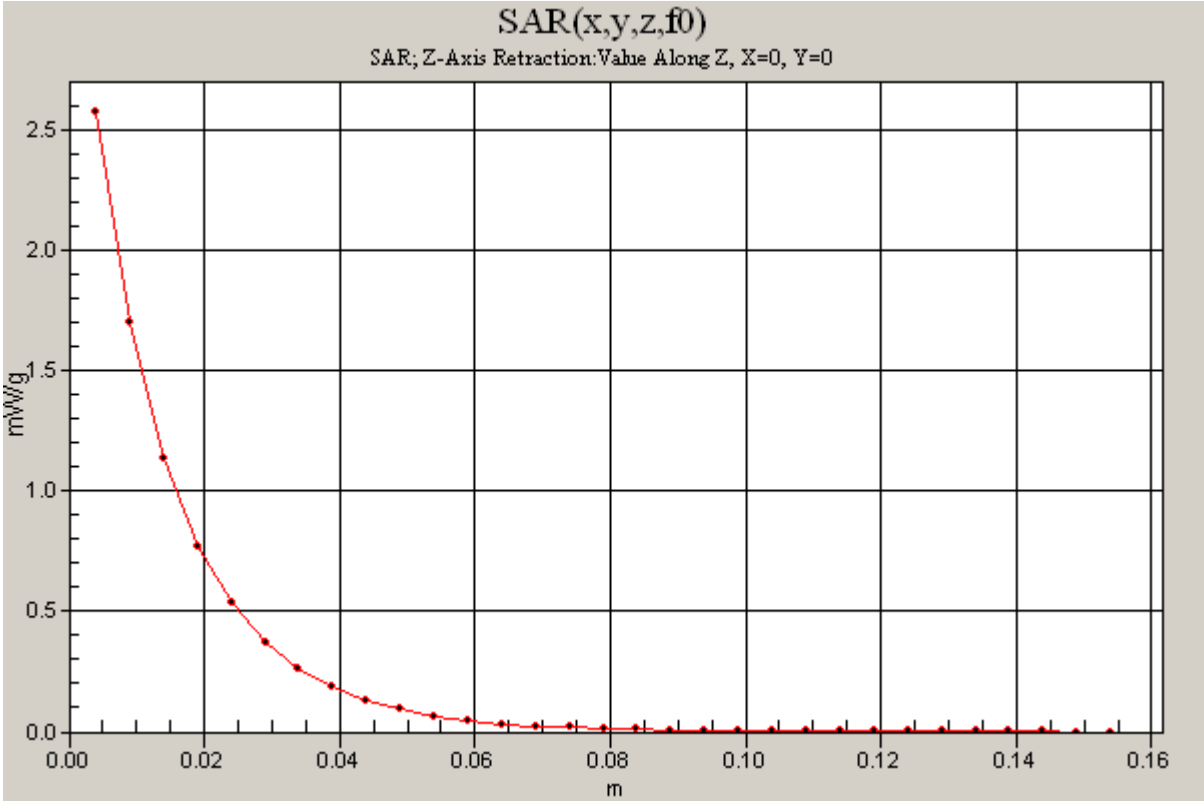
Daily SPC Check/Dipole Area Scan (4x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.35 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 52.4 V/m; Power Drift = -0.010 dB
Peak SAR (extrapolated) = 3.54 W/kg
SAR(1 g) = 2.37 mW/g; SAR(10 g) = 1.52 mW/g
Maximum value of SAR (measured) = 2.58 mW/g

Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 52.4 V/m; Power Drift = -0.010 dB
Peak SAR (extrapolated) = 3.48 W/kg
SAR(1 g) = 2.34 mW/g; SAR(10 g) = 1.49 mW/g
Maximum value of SAR (measured) = 2.52 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 2.57 mW/g

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mW/g
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2.0
1.5
1.0
0.5
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Date/Time: 06/18/2009 AM 10:23:46

Test Laboratory: Motorola 0618'2009_1800MHz_+4.7%

Procedure Notes: 1800 MHz System Performance Check / Dipole Sn# 277tr PM1 Power = 200 mW
Sim.Temp@meas = 22.5 ▪ C Sim.Temp@SPC = 21.5C Room Temp @ SPC = 21.5 ▪ C
Communication System: CW - Dipole; Frequency: 1800 MHz; Channel Number: 8; Duty Cycle: 1:1
Medium: VALIDATION Only; Medium parameters used: f = 1800 MHz; σ = 1.35 mho/m; ε_r = 38.4; ρ = 1000 kg/m^3

DASY4 Configuration:

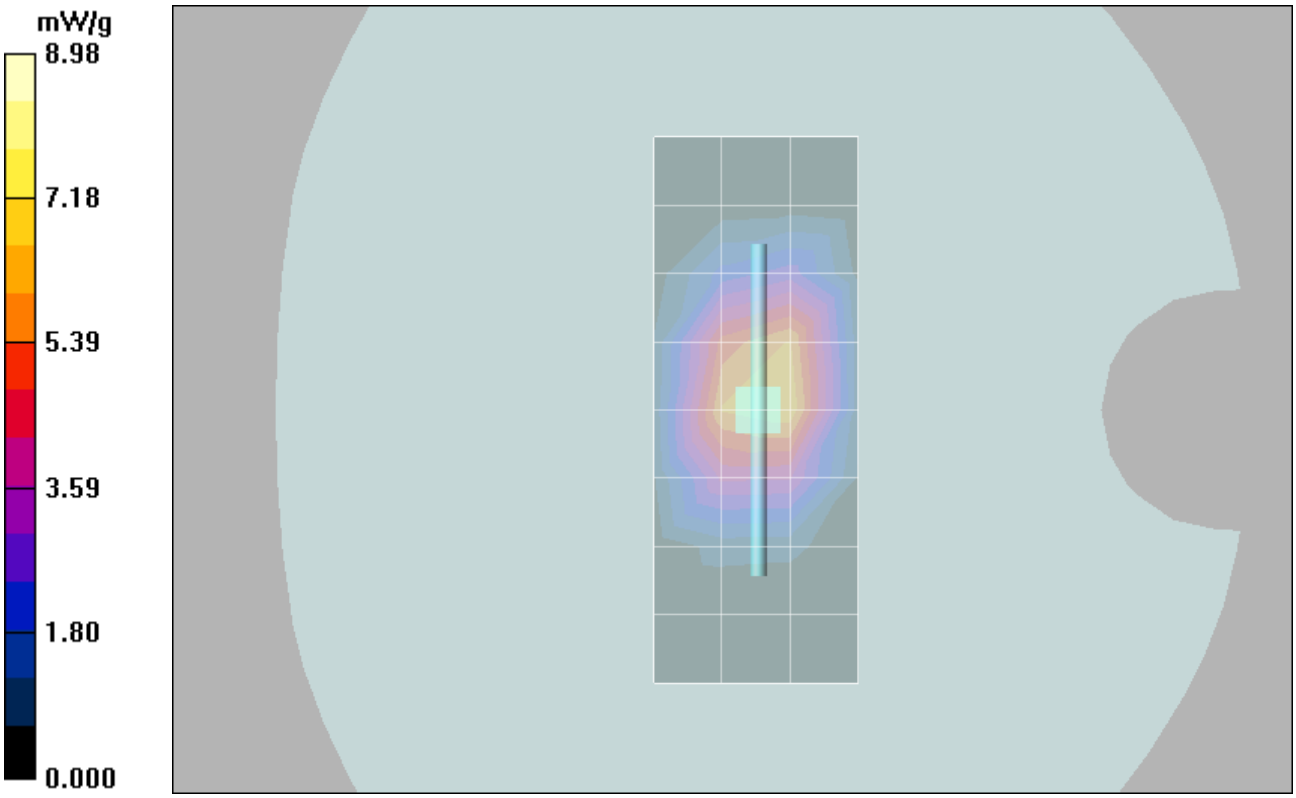
- Probe: ES3DV3 - SN3178; ConvF(4.82, 4.82, 4.82); Calibrated: 07/14/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn385; Calibrated: 03/12/2009
- Phantom: PCS-9_ Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1134;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

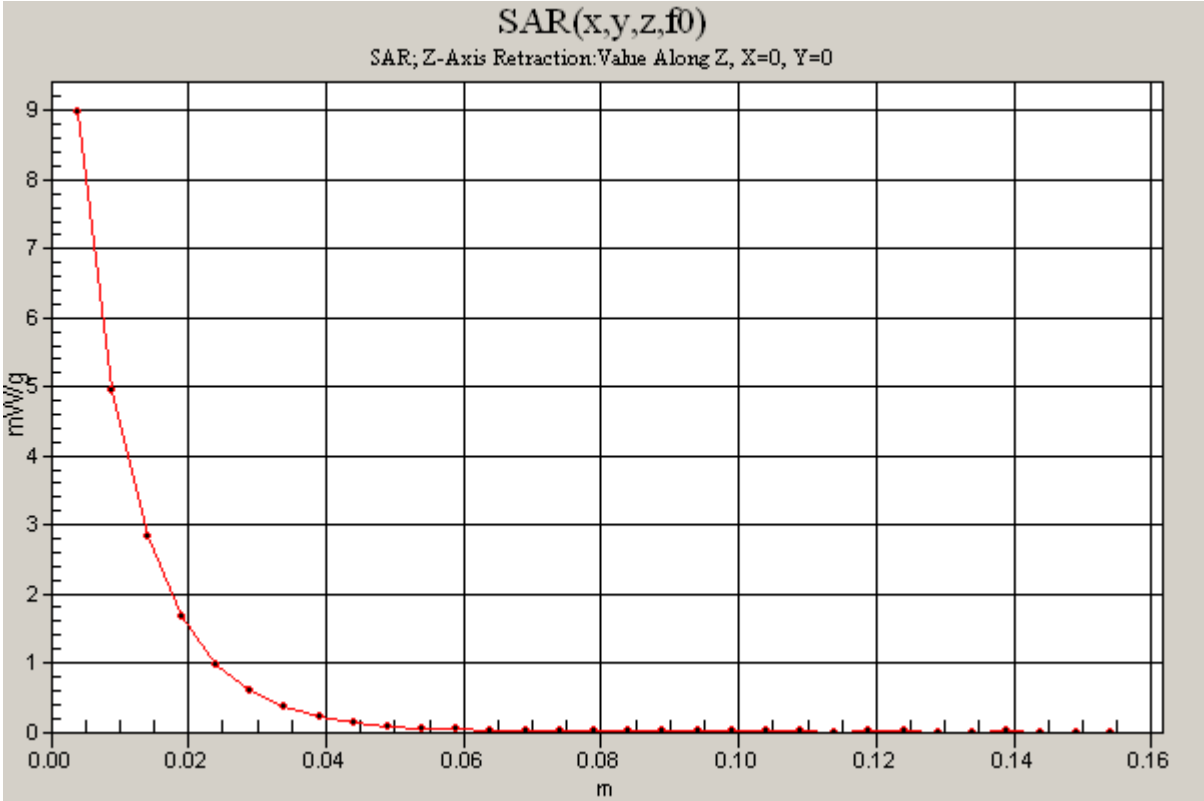
Daily SPC Check/Dipole Area Scan (4x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 6.55 mW/g

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 = 0.029 dB
Peak SAR (extrapolated) = 14.6 W/kg
SAR(1 g) = 7.96 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 = 81.0 V/m; Power Drift = 0.029 dB
Peak SAR (extrapolated) = 14.6 W/kg
SAR(1 g) = 7.92 mW/g; SAR(10 g) = 4.15 mW/g
Maximum value of SAR (measured) = 8.74 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 8.98 mW/g

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2
3
4
5
6
7
8
9
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Date/Time: 06/19/2009 PM 02:20:50

Test Laboratory: Motorola 0619'2009_2450MHz_-6.5%

Procedure Notes: 2450 MHz System Performance Check / Dipole Sn# 767 PM1 Power = 200 mW
Sim.Temp@meas = 24 ▪ C Sim.Temp@SPC = 22.3 ▪ C Room Temp @ SPC = 21.6 ▪ C
Communication System: CW - Dipole; Frequency: 2450 MHz; Channel Number: 11; Duty Cycle: 1:1
Medium: VALIDATION Only; Medium parameters used: f = 2450 MHz; σ = 1.87 mho/m; ε_r = 36.3; ρ = 1000 kg/m^3

DASY4 Configuration:

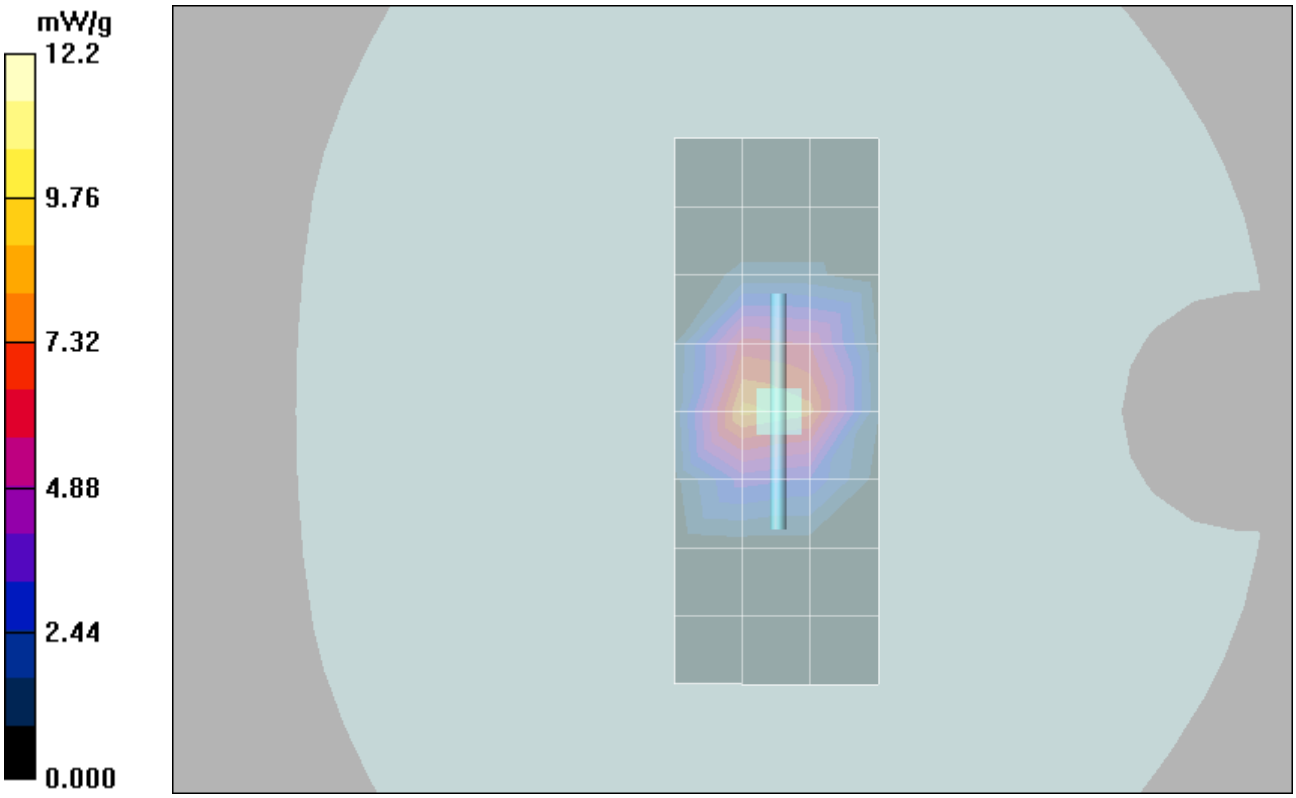
- Probe: ES3DV3 - SN3178; ConvF(4.29, 4.29, 4.29); Calibrated: 07/14/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn385; Calibrated: 03/12/2009
- Phantom: PCS-9_ Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1134;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

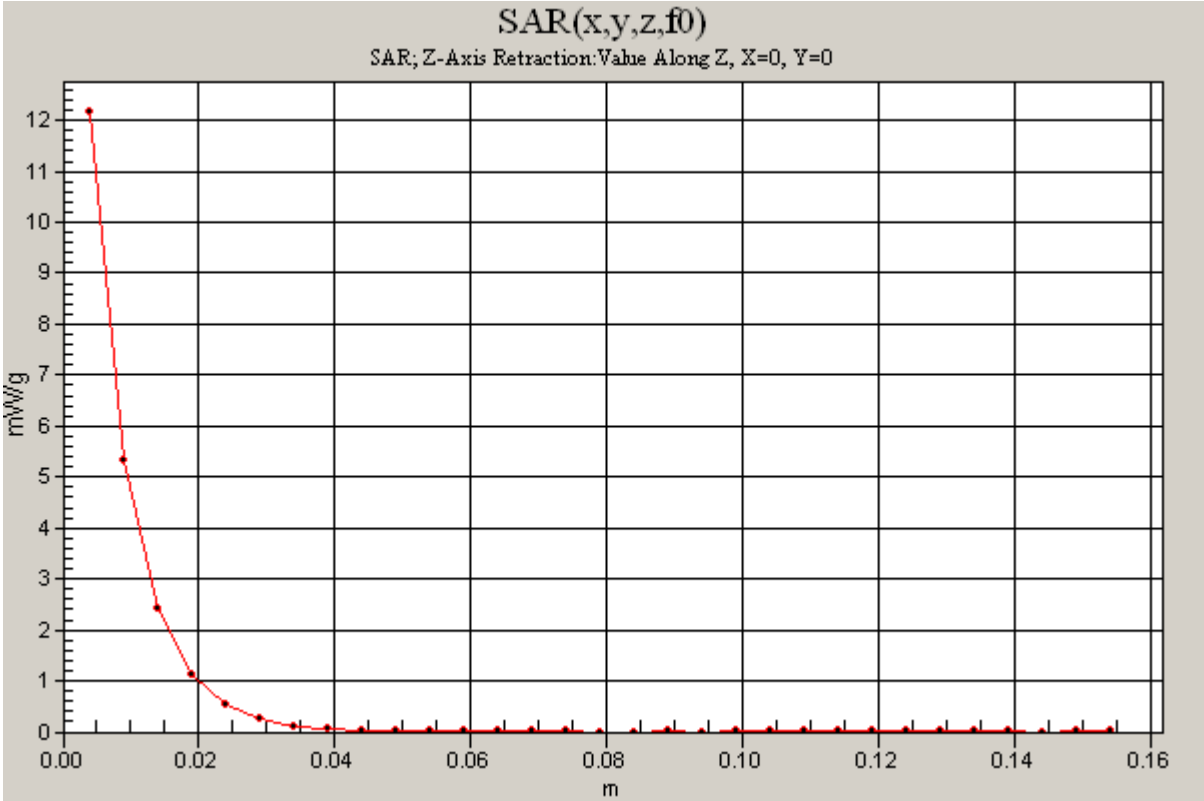
Daily SPC Check/Dipole Area Scan (4x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 8.47 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 80.2 V/m; Power Drift = 0.007 dB
Peak SAR (extrapolated) = 25.0 W/kg
SAR(1 g) = 10.7 mW/g; SAR(10 g) = 4.74 mW/g
Maximum value of SAR (measured) = 11.9 mW/g

Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 80.2 V/m; Power Drift = 0.007 dB
Peak SAR (extrapolated) = 24.6 W/kg
SAR(1 g) = 10.5 mW/g; SAR(10 g) = 4.64 mW/g
Maximum value of SAR (measured) = 11.6 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




SAR(x,y,z,f0)
SAR; Z-Axis Retraction:Value Along Z, X=0, Y=0
mW/g
0
1
2
3
4
5
6
7
8
9
10
11
12
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Appendix 2

SAR distribution plots for Phantom Head Adjacent Use

Date/Time: 06/15/2009 PM 01:59:12

Test Laboratory: Motorola CDMA800 Cheek

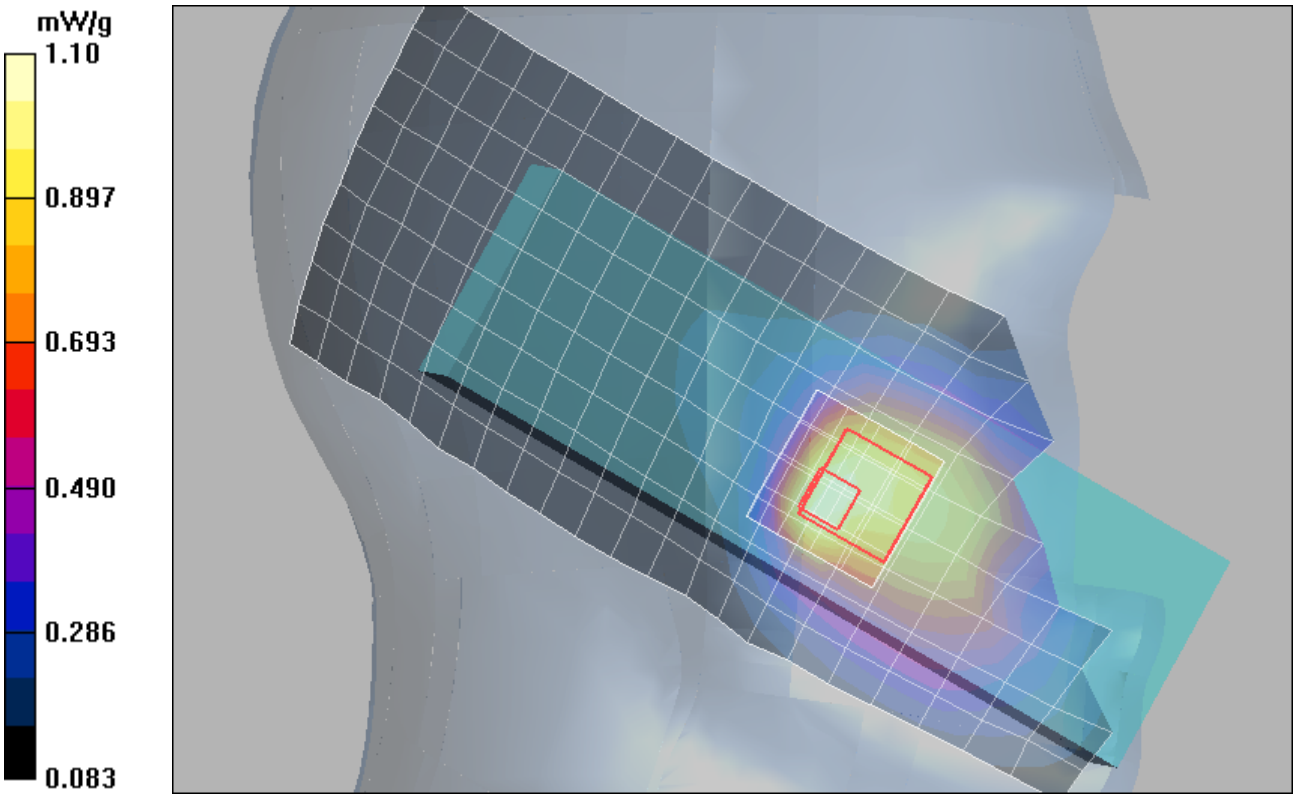
80C9004E;
Procedure Notes: Pwr Step: All up(OTA) Antenna Position: Internal
Battery Model #: SNN5837A DEVICE POSITION (cheek or rotated): Cheek
Communication System: CDMA 835; Frequency: 848.31 MHz; Channel Number: 777; Duty Cycle: 1:1
Medium: Low Freq Head; Medium parameters used: f = 835 MHz; σ = 0.91 mho/m; ε_r = 42; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3178; ConvF(5.63, 5.63, 5.63); Calibrated: 07/14/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn385; Calibrated: 03/12/2009
- Phantom: PCS-9_Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP- 1129;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Left Head Template/Area Scan - Normal (10mm) (10x25x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.19 mW/g

Left Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 35.0 V/m; Power Drift = -0.069 dB
Peak SAR (extrapolated) = 2.04 W/kg
SAR(1 g) = 1.09 mW/g; SAR(10 g) = 0.726 mW/g
Maximum value of SAR (measured) = 1.10 mW/g



Date/Time: 06/18/2009 PM 07:07:03

Test Laboratory: Motorola CDMA1700 Cheek

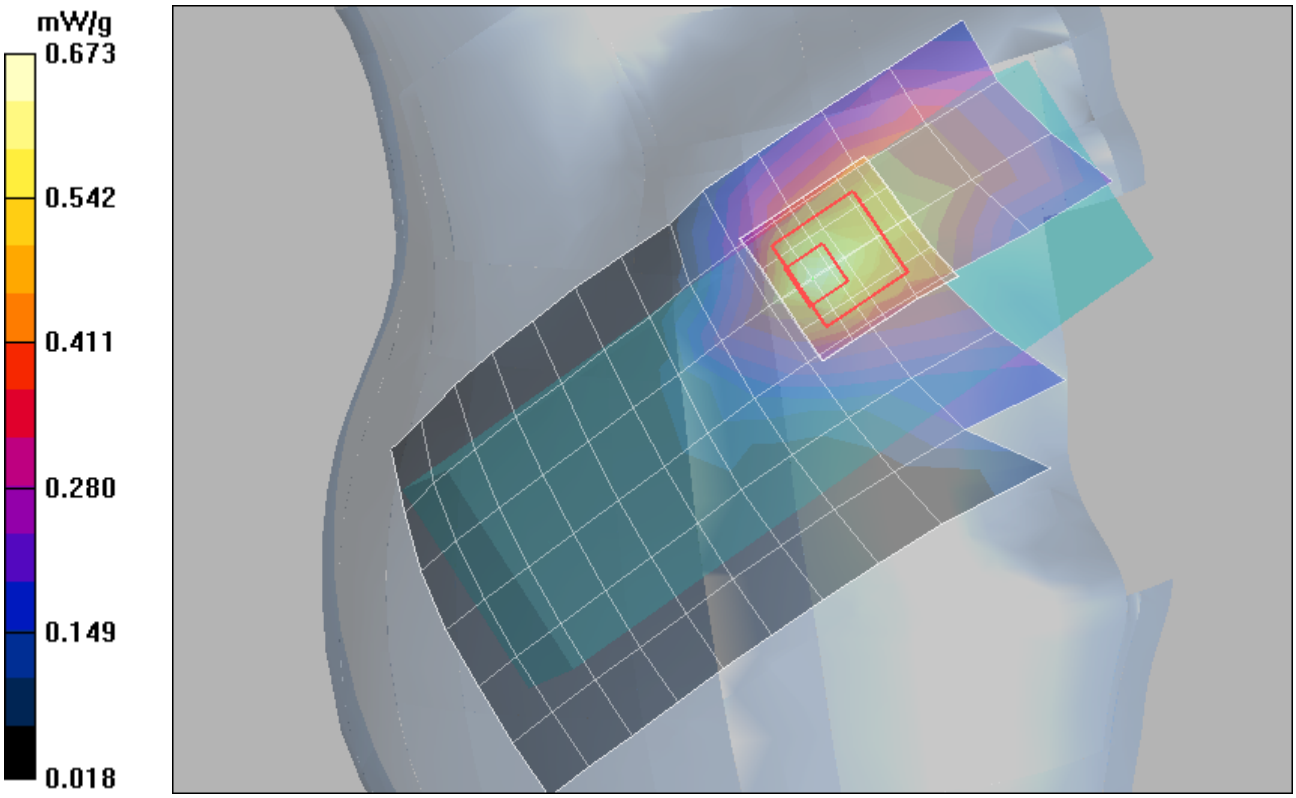
80C9004E;
Procedure Notes: Pwr Step: All Up(OTA) Antenna Position: internal
Battery Model #: SNN5833A DEVICE POSITION (cheek or rotated): cheek
Communication System: CDMA 1700; Frequency: 1732.5 MHz; Channel Number: 450; Duty Cycle: 1:1
Medium: 1730 Glycol Head; Medium parameters used: f = 1730 MHz; σ = 1.4 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3178; ConvF(4.82, 4.82, 4.82); Calibrated: 07/14/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn385; Calibrated: 03/12/2009
- Phantom: PCS-9_ Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1134;
- 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) = 0.638 mW/g

Right Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.6 V/m; Power Drift = 0.052 dB
Peak SAR (extrapolated) = 1.09 W/kg
SAR(1 g) = 0.605 mW/g; SAR(10 g) = 0.367 mW/g
Maximum value of SAR (measured) = 0.673 mW/g



Date/Time: 06/18/2009 PM 01:22:34

Test Laboratory: Motorola CDMA1900 Cheek

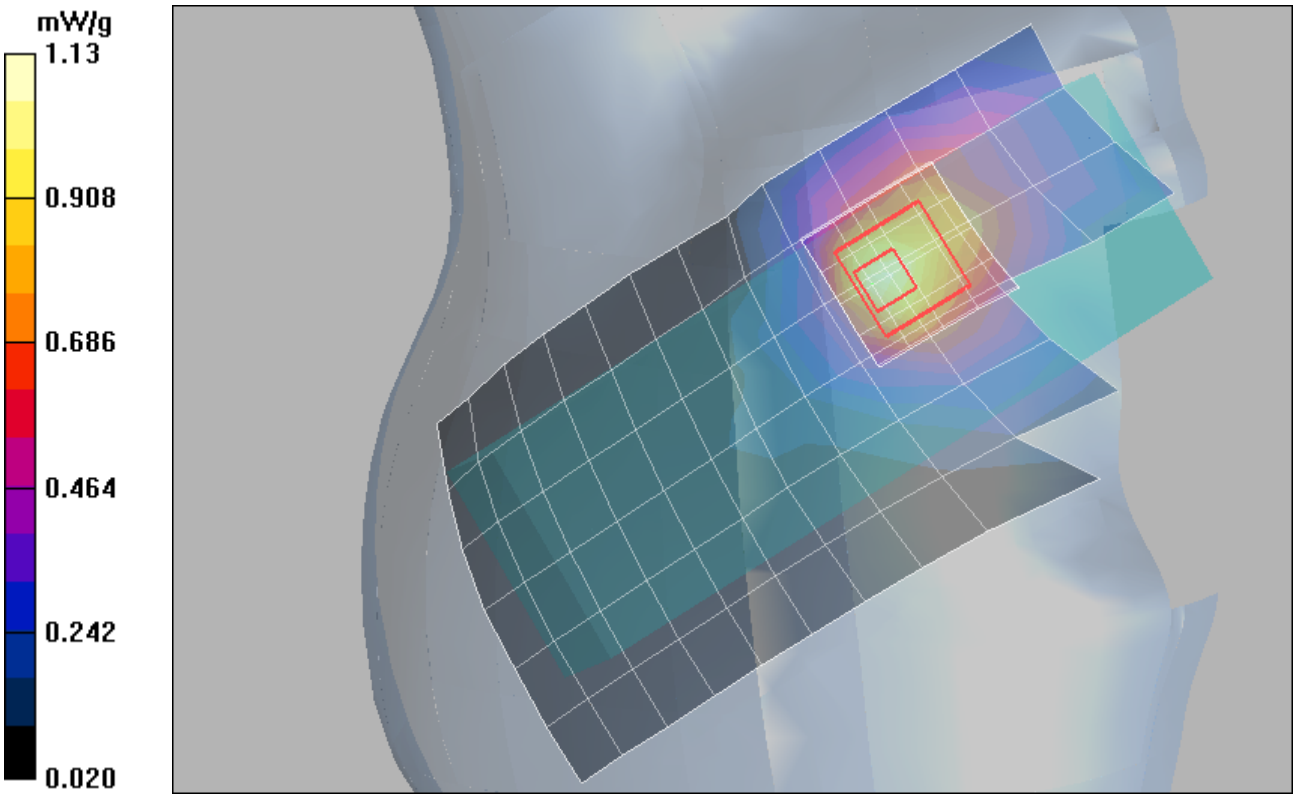
80C9004E;
Procedure Notes: Pwr Step: All up(OTA) Antenna Position: Internal
Battery Model #: SNN5833A DEVICE POSITION (cheek or rotated): Cheek
Communication System: CDMA 1900; Frequency: 1880 MHz; Channel Number: 600; Duty Cycle: 1:1
Medium: Regular Glycol Head 1750/1880; Medium parameters used: f = 1880 MHz; σ = 1.43 mho/m; ε_r = 38; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3178; ConvF(4.82, 4.82, 4.82); Calibrated: 07/14/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn385; Calibrated: 03/12/2009
- Phantom: PCS-9_ Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1134;
- 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) = 1.13 mW/g

Right Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.6 V/m; Power Drift = 0.049 dB
Peak SAR (extrapolated) = 1.84 W/kg
SAR(1 g) = 1.03 mW/g; SAR(10 g) = 0.609 mW/g



Date/Time: 06/16/2009 PM 01:06:59

Test Laboratory: Motorola CDMA800 Tilt

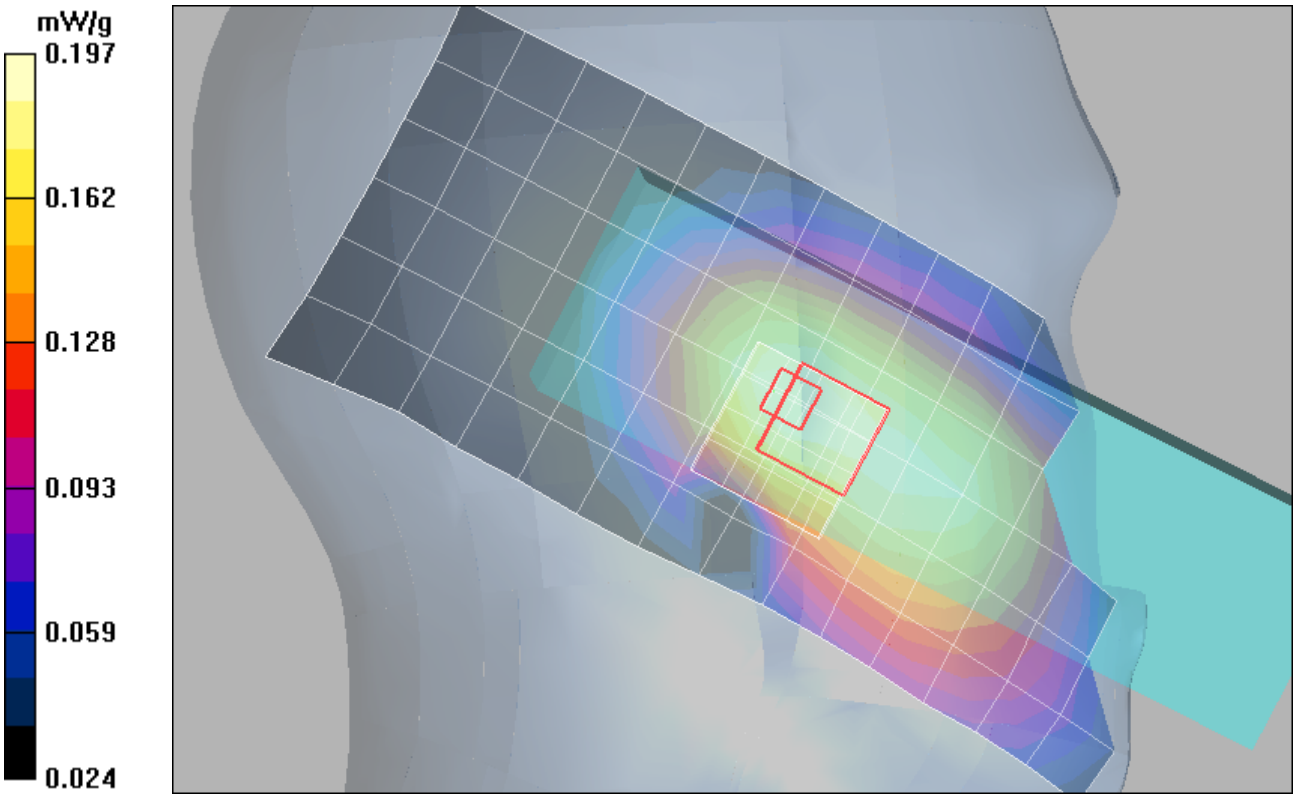
80C9004E; Procedure Notes: Pwr Step: All up(OTA) Antenna Position: Internal
Battery Model #: SNN5833A DEVICE POSITION (cheek or rotated): Rotated
Communication System: CDMA 835; Frequency: 836.52 MHz; Channel Number: 384; Duty Cycle: 1:1
Medium: Low Freq Head; Medium parameters used: f = 835 MHz; σ = 0.91 mho/m; ε_r = 41.9; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3178; ConvF(5.63, 5.63, 5.63); Calibrated: 07/14/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn385; Calibrated: 03/12/2009
- Phantom: PCS-9_Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP- 1129;
- 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) = 0.202 mW/g

Left Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.5 V/m; Power Drift = 0.049 dB
Peak SAR (extrapolated) = 0.228 W/kg
SAR(1 g) = 0.187 mW/g; SAR(10 g) = 0.147 mW/g
Maximum value of SAR (measured) = 0.197 mW/g



Date/Time: 06/18/2009 PM 07:41:28

Test Laboratory: Motorola CDMA1700 Tilt

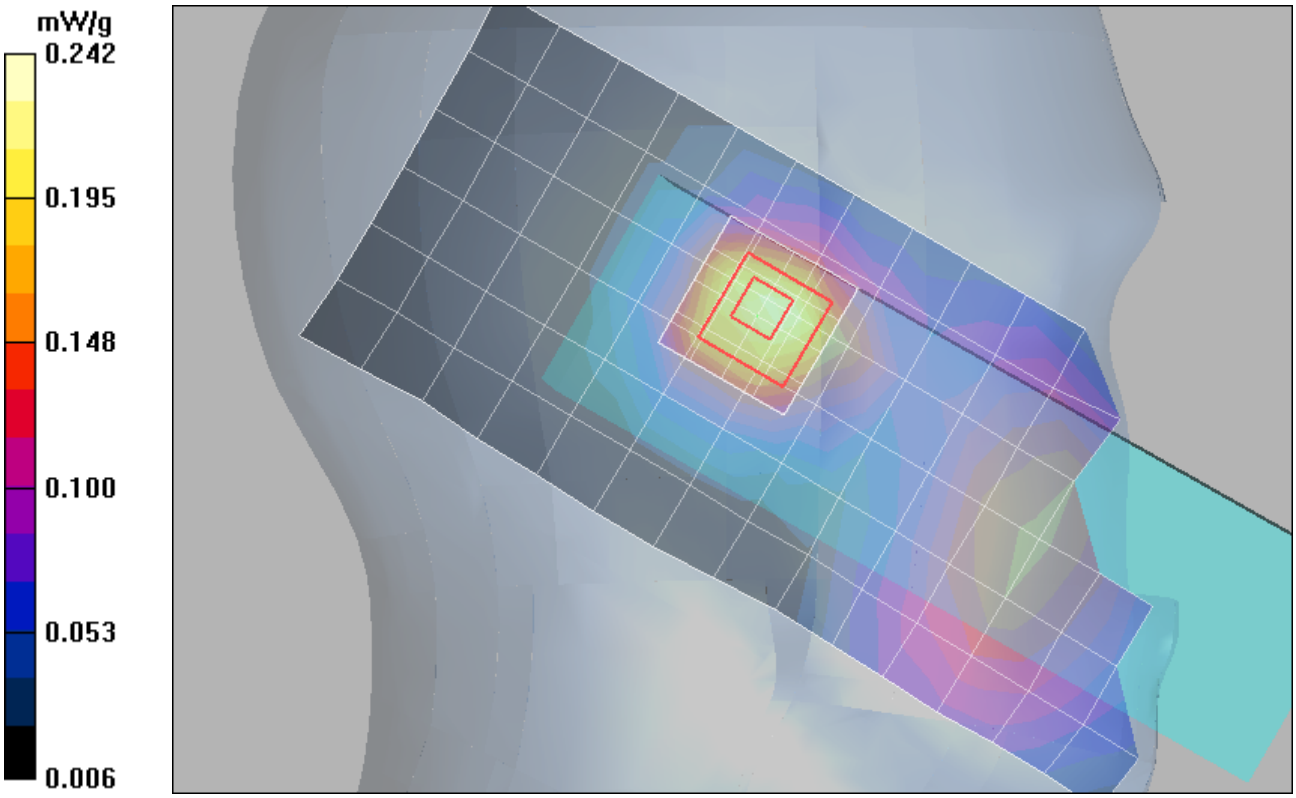
80C9004E;
Procedure Notes: Pwr Step: All Up(OTA) Antenna Position: internal
Battery Model #: SNN5833A DEVICE POSITION (cheek or rotated): rotated
Communication System: CDMA 1700; Frequency: 1732.5 MHz; Channel Number: 450; Duty Cycle: 1:1
Medium: 1730 Glycol Head; Medium parameters used: f = 1730 MHz; σ = 1.4 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3178; ConvF(4.82, 4.82, 4.82); Calibrated: 07/14/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn385; Calibrated: 03/12/2009
- Phantom: PCS-9_ Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1134;
- 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) = 0.229 mW/g

Left Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.4 V/m; Power Drift = -0.037 dB
Peak SAR (extrapolated) = 0.338 W/kg
SAR(1 g) = 0.224 mW/g; SAR(10 g) = 0.138 mW/g
Maximum value of SAR (measured) = 0.242 mW/g



Date/Time: 06/18/2009 PM 02:19:27

Test Laboratory: Motorola CDMA1900 Tilt

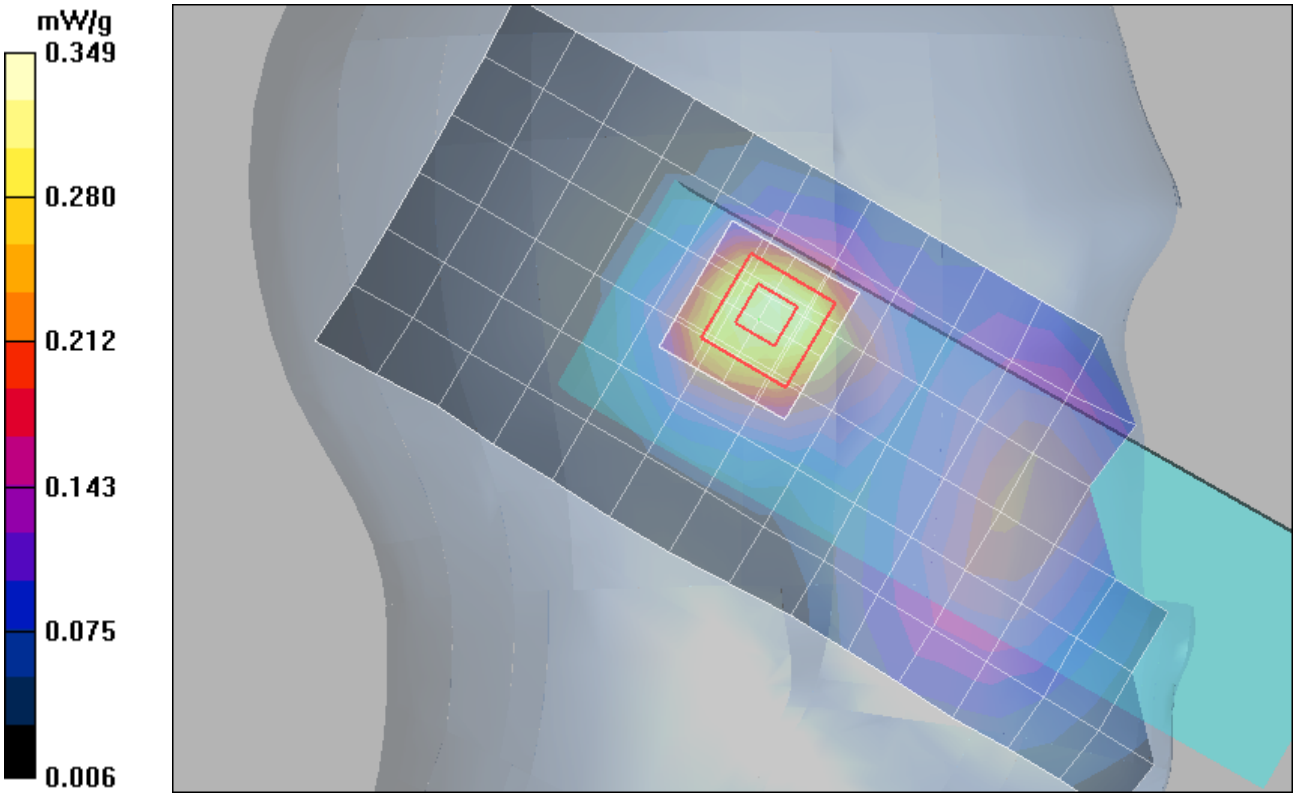
80C9004E;
Procedure Notes: Pwr Step: All up(OTA) Antenna Position: Internal
Battery Model #: SNN5833A DEVICE POSITION (cheek or rotated): Rotated
Communication System: CDMA 1900; Frequency: 1880 MHz; Channel Number: 600; Duty Cycle: 1:1
Medium: Regular Glycol Head 1750/1880; Medium parameters used: f = 1880 MHz; σ = 1.43 mho/m; ε_r = 38; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3178; ConvF(4.82, 4.82, 4.82); Calibrated: 07/14/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn385; Calibrated: 03/12/2009
- Phantom: PCS-9_ Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1134;
- 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) = 0.324 mW/g

Left Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.9 V/m; Power Drift = 0.078 dB
Peak SAR (extrapolated) = 0.520 W/kg
SAR(1 g) = 0.328 mW/g; SAR(10 g) = 0.197 mW/g
Maximum value of SAR (measured) = 0.349 mW/g



Appendix 3

SAR distribution plots for Body Worn Configuration

Date/Time: 06/16/2009 PM 03:41:36

Test Laboratory: Motorola CDMA800 BodyWorn

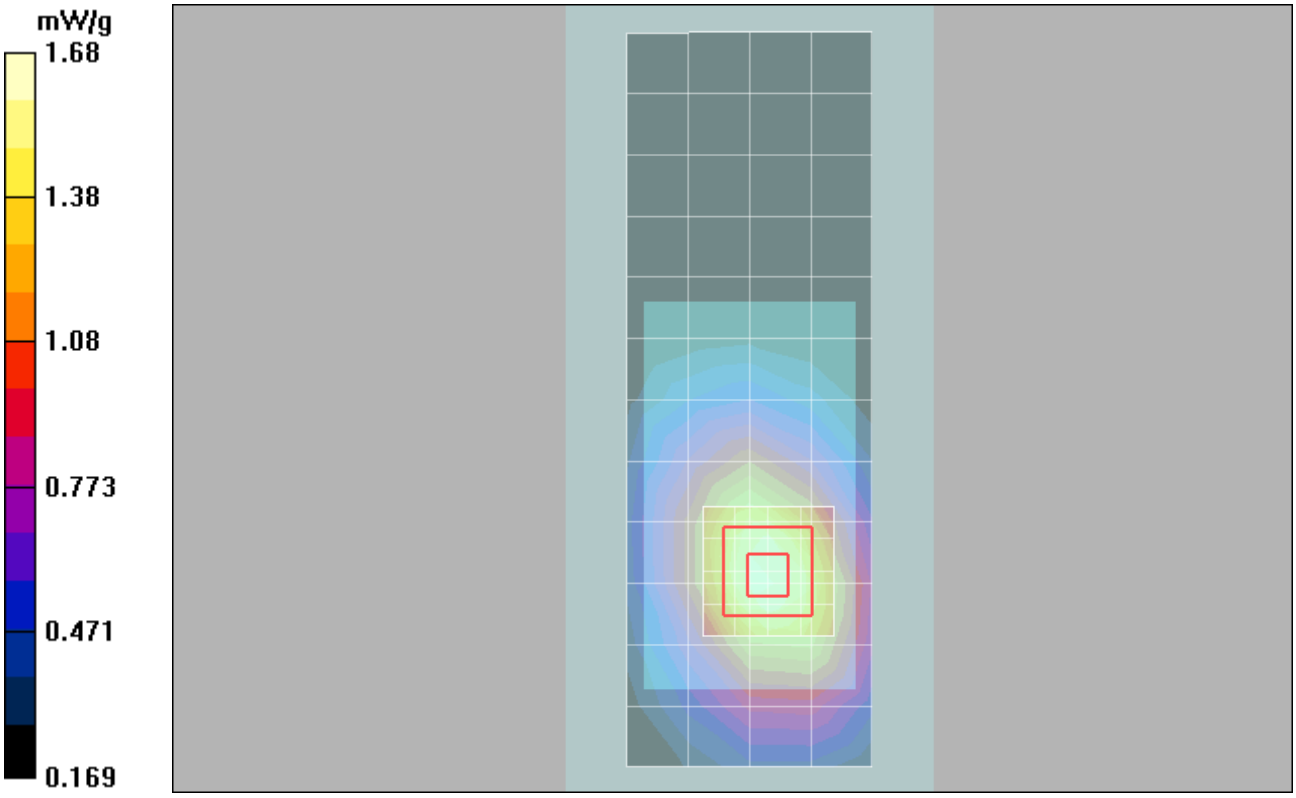
80C9004E;
Procedure Notes: Pwr Step: All up(OTA) Antenna Position: Internal
Battery Model #: SNN5837A Device Position: Back of phone 15mm away from phantom
Communication System: CDMA 835; Frequency: 836.52 MHz; Channel Number: 384; Duty Cycle: 1:1
Medium: Low Freq Body; Medium parameters used: f = 835 MHz; σ = 1.01 mho/m; ε_r = 55.5; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3178; ConvF(5.64, 5.64, 5.64); Calibrated: 07/14/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn385; Calibrated: 03/12/2009
- Phantom: R#9_ Section 1, Amy Twin, Rev2 (23-June-04); 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) = 1.63 mW/g

Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 37.9 V/m; Power Drift = 0.021 dB
Peak SAR (extrapolated) = 2.08 W/kg
SAR(1 g) = 1.58 mW/g; SAR(10 g) = 1.11 mW/g
Maximum value of SAR (measured) = 1.68 mW/g



Date/Time: 06/18/2009 PM 08:34:38

Test Laboratory: Motorola CDMA1700 BodyWorn

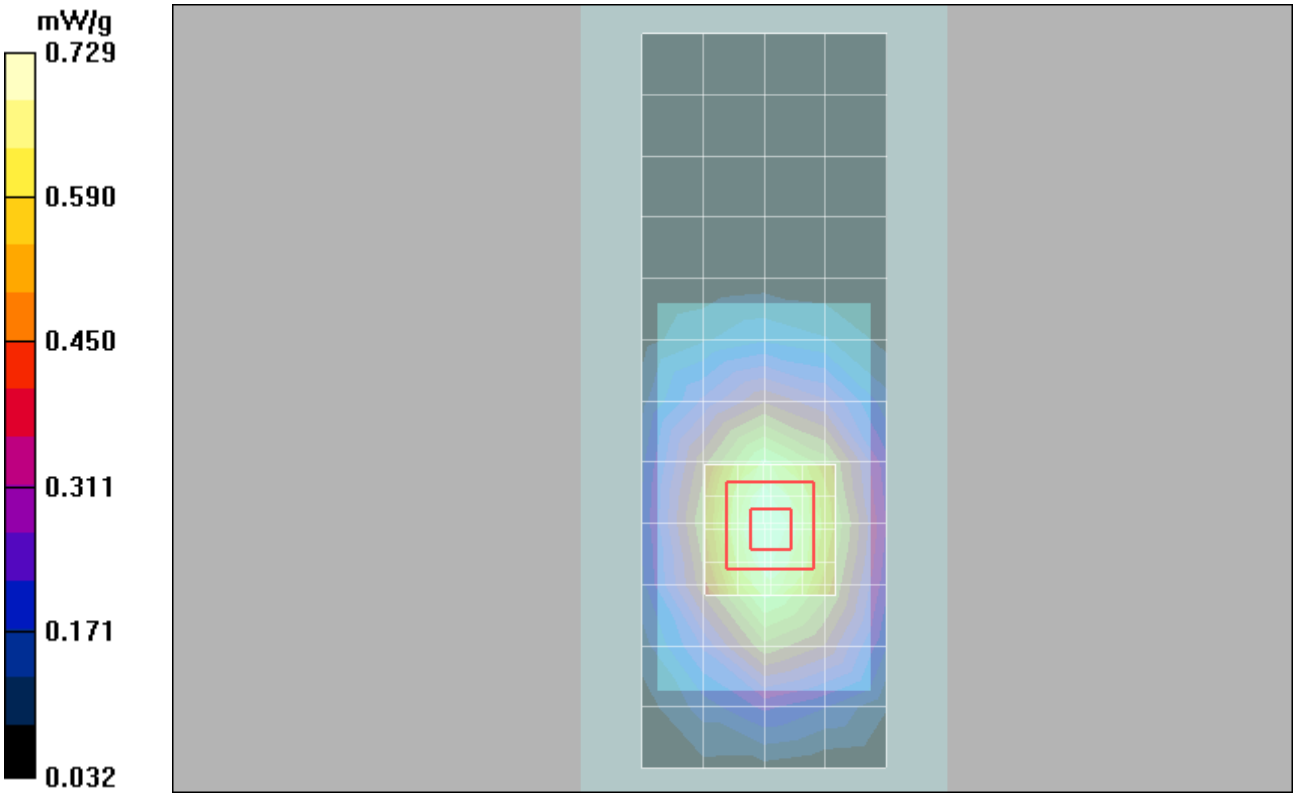
80C9004E;
Procedure Notes: Pwr Step: All Up(OTA) Antenna Position: internal
Battery Model #: SNN5837A Device Position: Back of phone 15mm away from phantom
Communication System: CDMA 1700; Frequency: 1732.5 MHz; Channel Number: 450; Duty Cycle: 1:1
Medium: 1730 Glycol Body; Medium parameters used: f = 1730 MHz; σ = 1.53 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3178; ConvF(4.5, 4.5, 4.5); Calibrated: 07/14/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn385; Calibrated: 03/12/2009
- Phantom: R#9_ Section 2, Amy Twin, Rev2 (23-June-04); 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) = 0.743 mW/g

Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.2 V/m; Power Drift = 0.018 dB
Peak SAR (extrapolated) = 1.02 W/kg
SAR(1 g) = 0.683 mW/g; SAR(10 g) = 0.446 mW/g
Maximum value of SAR (measured) = 0.729 mW/g



Date/Time: 06/18/2009 PM 03:15:39

Test Laboratory: Motorola CDMA1900 BodyWorn

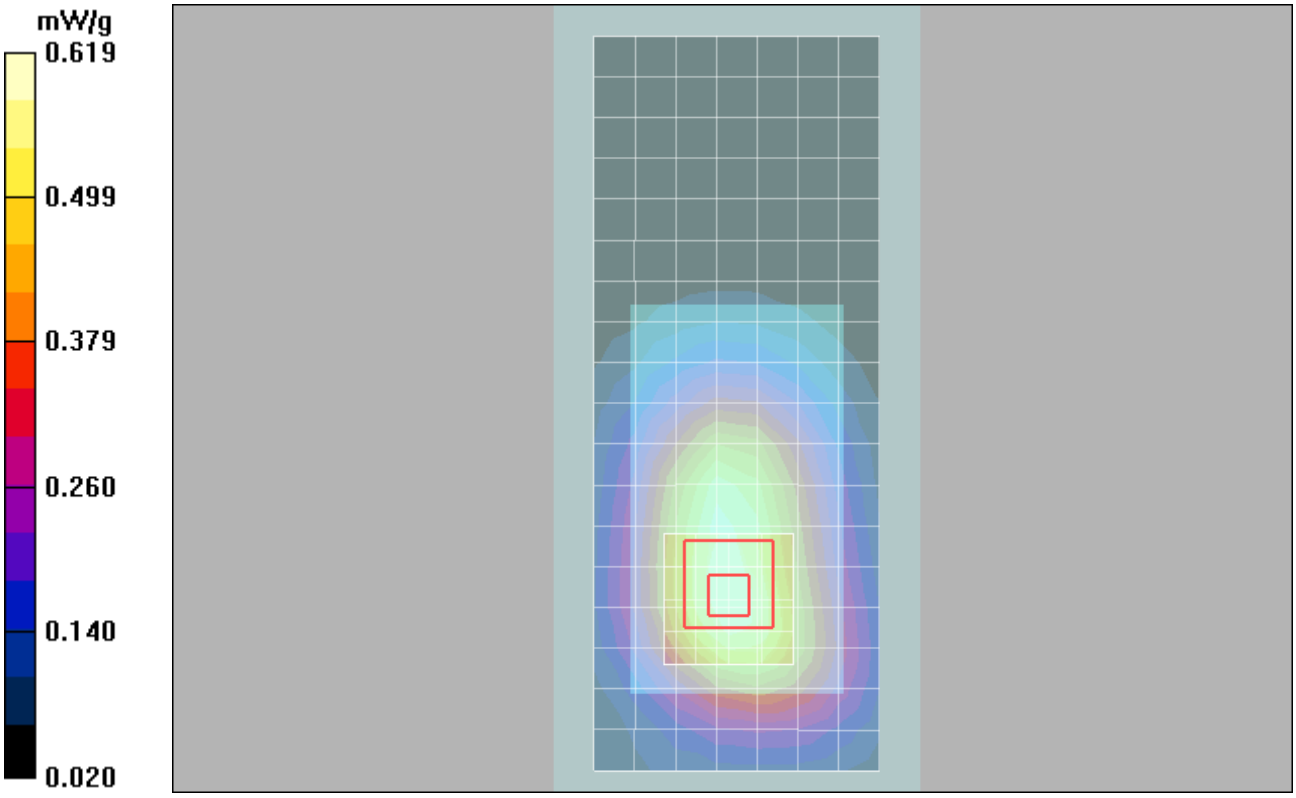
80C9004E;
Procedure Notes: Pwr Step: All up(OTA) Antenna Position: Internal
Battery Model #: SNN5837A Device Position: Back of phone 15mm away from phantom
Communication System: CDMA 1900; Frequency: 1880 MHz; Channel Number: 600; Duty Cycle: 1:1
Medium: Regular Glycol Body 1750/1880; Medium parameters used: f = 1880 MHz; σ = 1.58 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3178; ConvF(4.5, 4.5, 4.5); Calibrated: 07/14/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn385; Calibrated: 03/12/2009
- Phantom: R#9_ Section 2, Amy Twin, Rev2 (23-June-04); 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 (10mm) (19x10x1):
Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.618 mW/g

Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.0 V/m; Power Drift = -0.100 dB
Peak SAR (extrapolated) = 0.880 W/kg
SAR(1 g) = 0.575 mW/g; SAR(10 g) = 0.370 mW/g
Maximum value of SAR (measured) = 0.619 mW/g



Date/Time: 06/19/2009 PM 04:53:56

Test Laboratory: Motorola

2450 Bluetooth BodyWorn

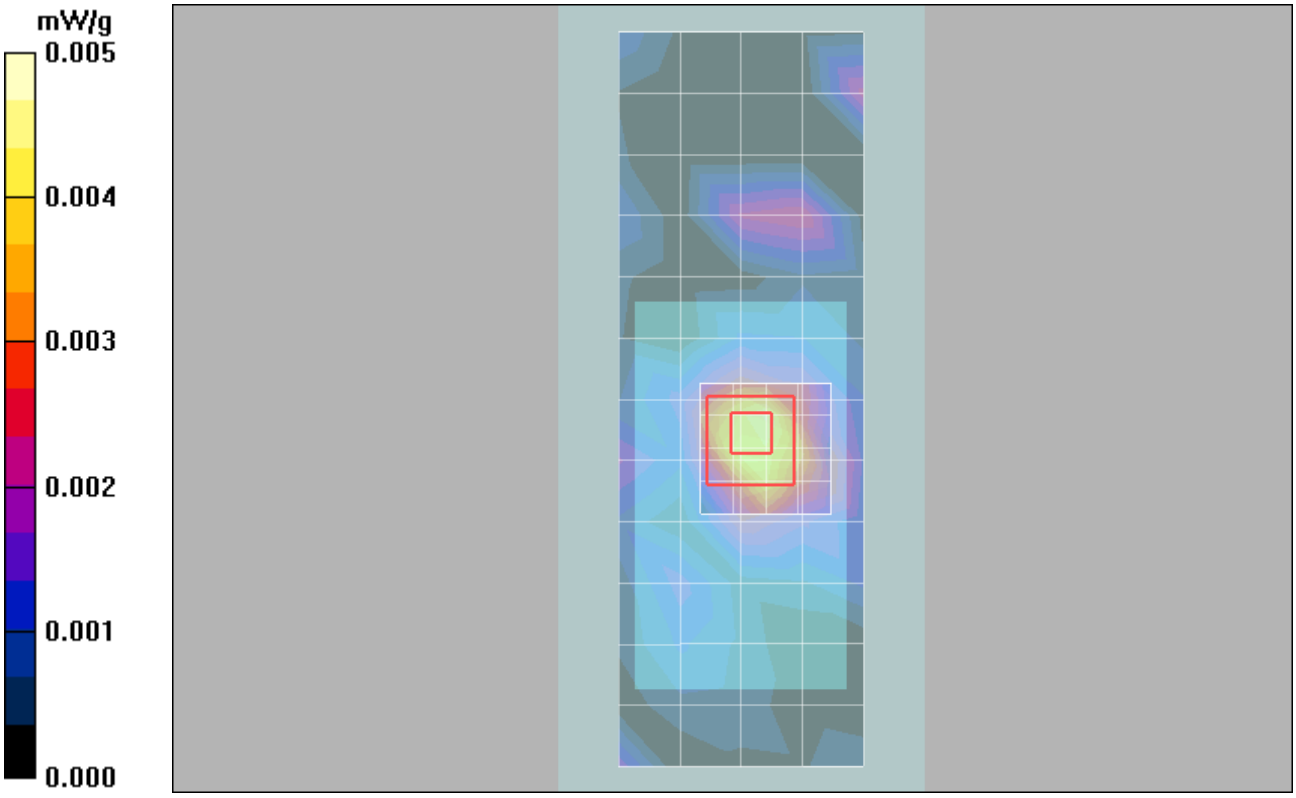
80C9004E;
Procedure Notes: Pwr Step: BT(CMU200) Antenna Position: Intenal
Battery Model #: SNN5837A Device Position: Back of phone 15mm away from phantom
Communication System: Bluetooth; Frequency: 2441MHz; Channel Number: 39; Duty Cycle: 1:1
Medium: 2450 Glycol Body; Medium parameters used: f = 2450 MHz; σ = 2.03 mho/m; ε_r = 49.6; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3178; ConvF(3.9, 3.9, 3.9); Calibrated: 07/14/2008
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn385; Calibrated: 03/12/2009
- Phantom: R#9_ Section 2, Amy Twin, Rev2 (23-June-04); 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) = 0.004 mW/g

Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.595 V/m; Power Drift = -0.454 dB
Peak SAR (extrapolated) = 0.024 W/kg
SAR(1 g) = 0.00517 mW/g; SAR(10 g) = 0.00118 mW/g
Maximum value of SAR (measured) = 0.005 mW/g



Appendix 4

Probe Calibration Certificate

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

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

Accredited by the Swiss 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 Korea

Certificate No: ES3-3178_Jul08

CALIBRATION CERTIFICATE

Object	ES3DV3 - SN:3178
Calibration procedure(s)	QA CAL-01.v6 and QA CAL-23.v3 Calibration procedure for dosimetric E-field probes
Calibration date:	July 14, 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)	1-Jul-08 (No. 217-00865)	Jul-09
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-08 (No. 217-00787)	Apr-09
Reference 30 dB Attenuator	SN: S5129 (30b)	1-Jul-08 (No. 217-00866)	Jul-09
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:	Niels Kuster	Quality Manager	

Issued: July 14, 2008

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

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) 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:

- *NORMx,y,z:* Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ES3DV3

SN:3178

Manufactured: January 23, 2008
Calibrated: July 14, 2008

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ES3DV3 SN:3178

Sensitivity in Free Space[A]

NormX	**1.30** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**91** mV
NormY	**1.21** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**87** mV
NormZ	**1.33** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**94** mV

Diode Compression[B]

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL **900 MHz** **Typical SAR gradient: 5 % per mm**

Sensor Center to Phantom Surface Distance		**3.0 mm**	**4.0 mm**
SAR_{be} [%]	Without Correction Algorithm	9.7	5.9
SAR_{be} [%]	With Correction Algorithm	0.6	0.5

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

Sensor Center to Phantom Surface Distance		**3.0 mm**	**4.0 mm**
SAR_{be} [%]	Without Correction Algorithm	8.1	4.6
SAR_{be} [%]	With Correction Algorithm	0.4	0.3

Sensor Offset

Probe Tip to Sensor Center **2.0** mm

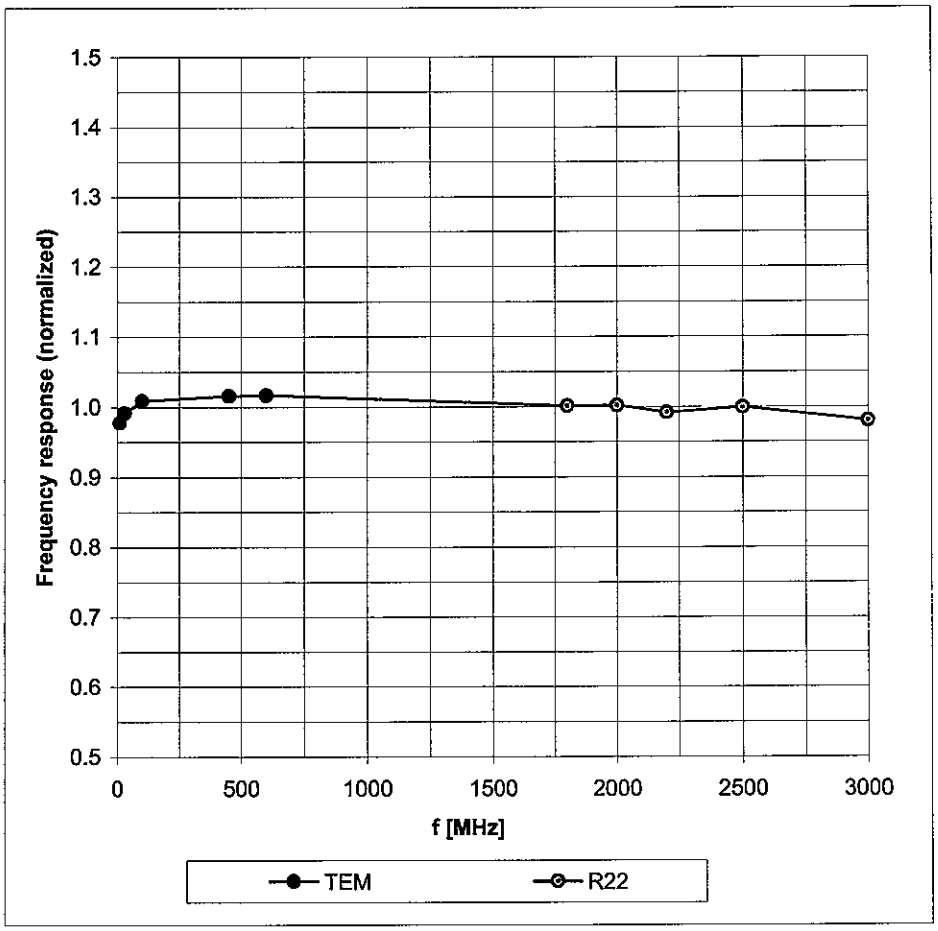
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

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

[B] Numerical linearization parameter: uncertainty not required.

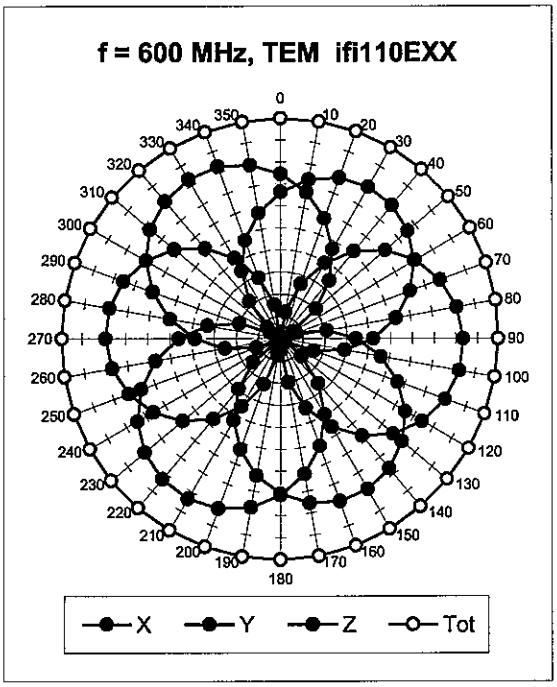
Frequency Response of E-Field

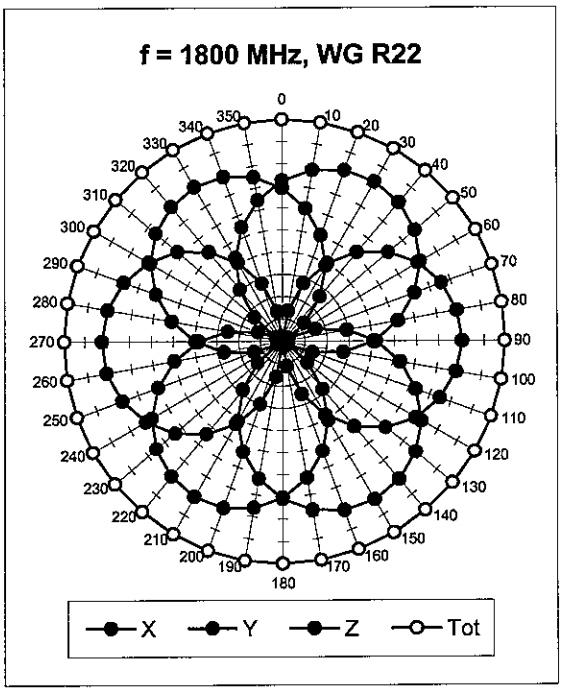
(TEM-Cell:ifi110 EXX, Waveguide: R22)

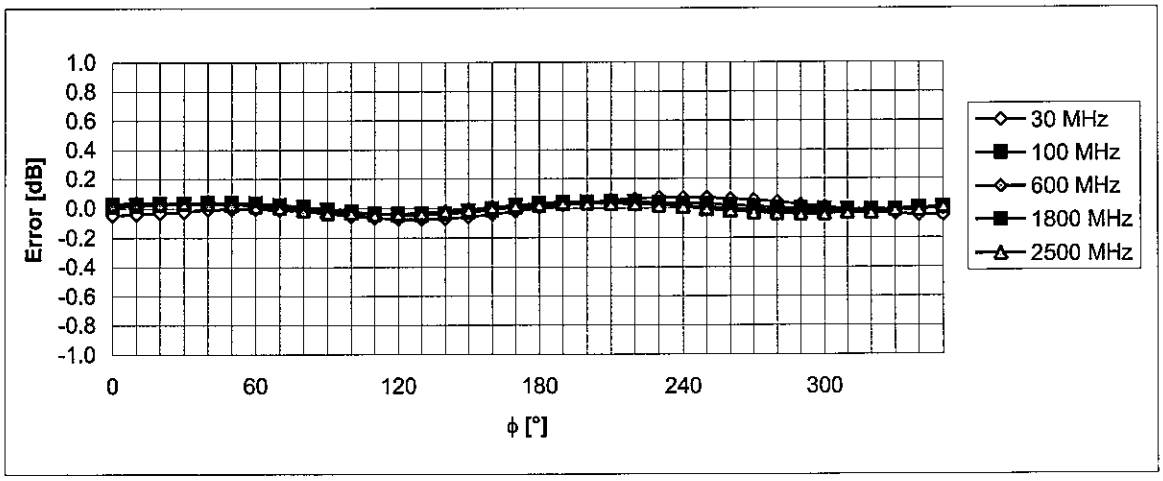


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°



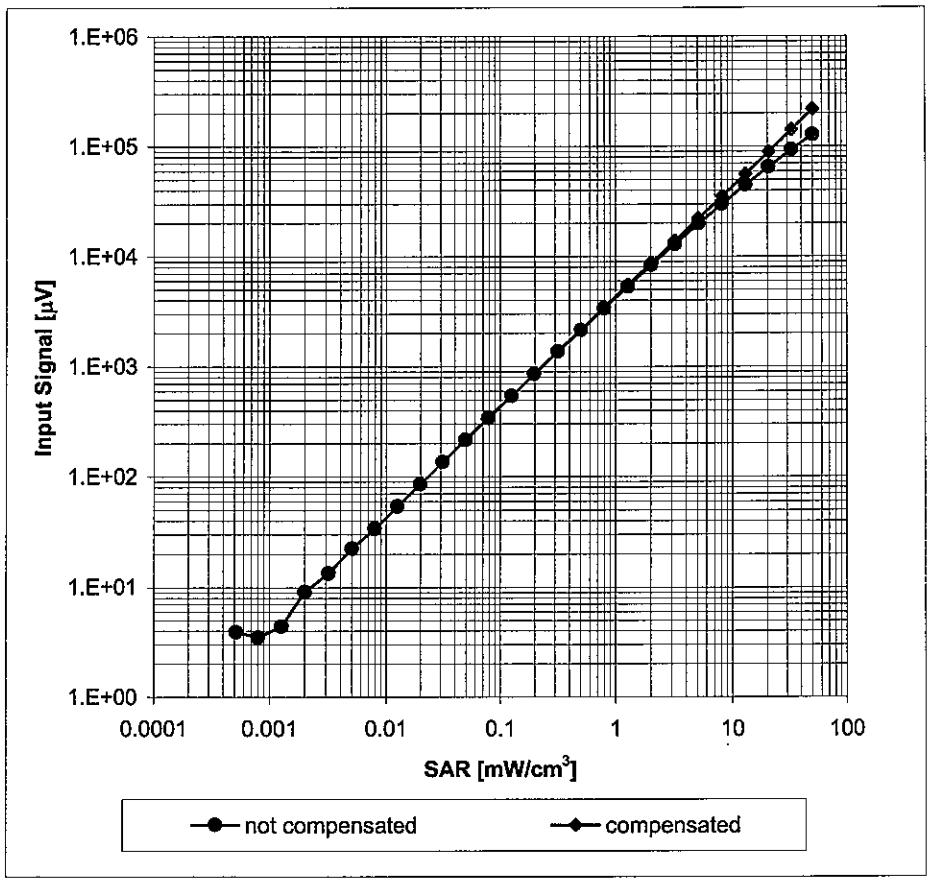


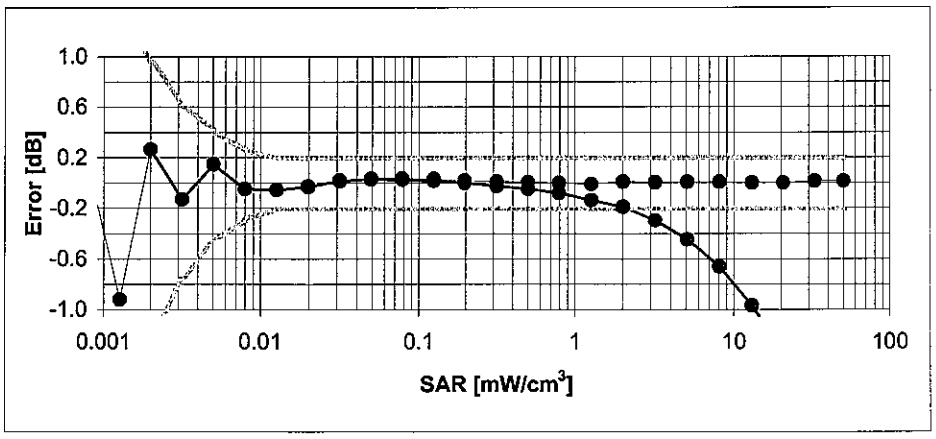


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

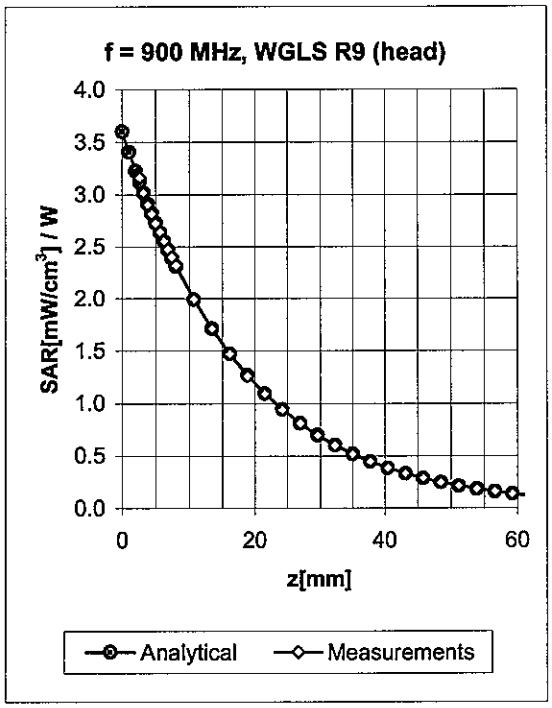
(Waveguide R22, f = 1800 MHz)

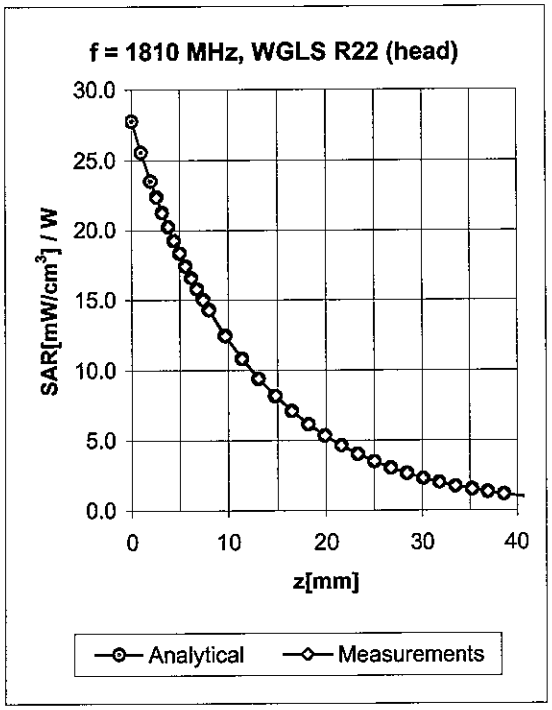




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



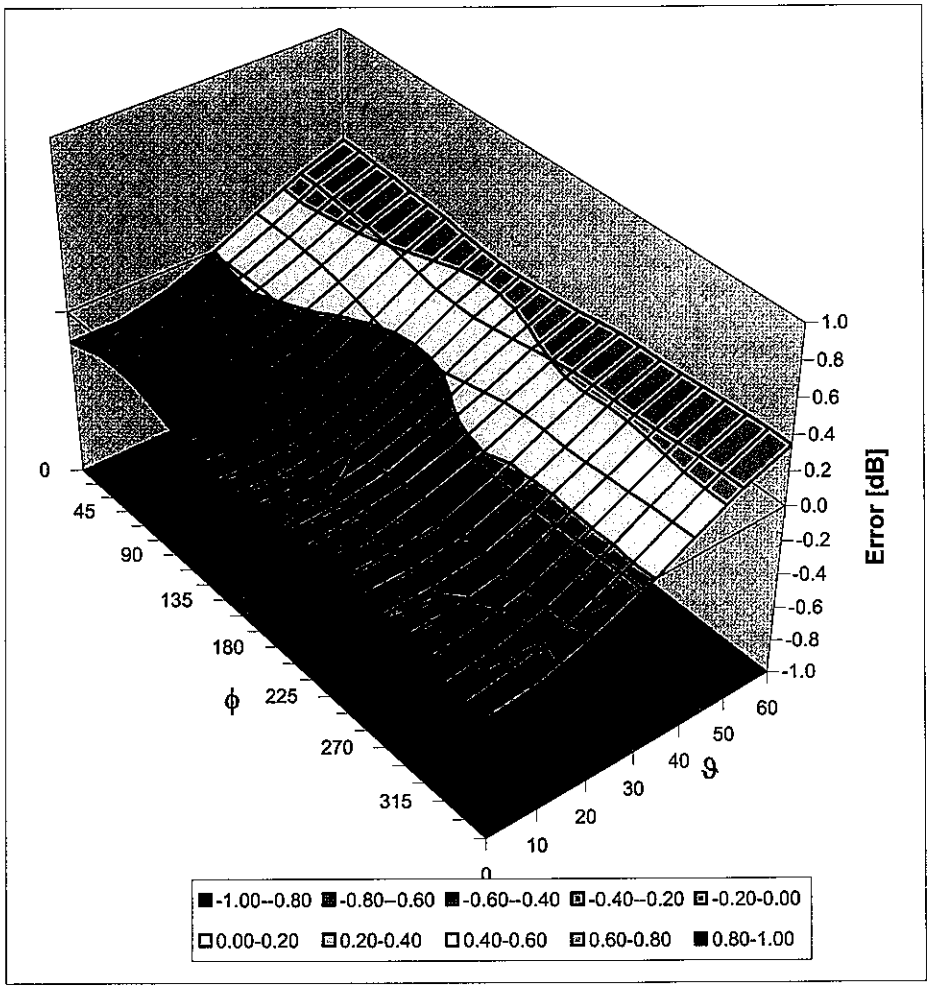


f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.30	1.91	5.63	± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.58	1.33	4.82	± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.45	1.50	4.63	± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.70	1.25	4.29	± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.52	1.41	5.64	± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.36	1.82	4.50	± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.51	1.48	4.47	± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.70	1.25	3.90	± 11.0% (k=2)

[C] The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Appendix 5

Measurement Uncertainty Budget

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

Appendix 6

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 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 Target +/- %	Conductivity (S/m) Target +/- %
900 MHz	**11.19**	41.5 +/- 5%	0.97 +/- 5%

-Approvals-

Submitted by: Marge Kaunas Date: 1-Apr-09

Signed: Marge Kaunas

Comments: Data file available upon request.

Approved by: Steve Hauswirth **Date:** 1-Apr-09

Signed: Steven Hauswirth

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 Average as new system performance check target?	**ACCEPT**	
	Applies to Dipole SN's: **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: Marge Kaunas Date: 1-Apr-09

Signed: Marge Kaunas

Comments: Data file available upon request.

Approved by: Steve Hauswirth **Date:** 1-Apr-09

Signed: Steven Hauswirth

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 Average 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: Marge Kaunas Date: 1-Apr-09

Signed: Marge Kaunas

Comments: Data file available upon request.

Approved by: Steve Hauswirth **Date:** 1-Apr-09

Signed: Steven Hauswirth

Comments:

END OF REPORT