



MOTOROLA

Portable Cellular Phone SAR Test Report

Tests Requested By: Motorola Mobility, Inc.
600 N. US Highway 45
Libertyville, IL 60048

Test Report #: 24425-1F Rev C
Date of Report: Apr 21 2011, revised on May 2, 2011
Date of Test: Aug 25 & 26, 2010 and Mar 31, 2011 to Apr 11, 2011
FCC ID #: IHDP56MW2
Generic Name: MZVQ7-3334411A11

Test Laboratory: Motorola Mobility, Inc. - Product Safety & Compliance Laboratory
600 N. US Highway 45
Libertyville, IL 60048

Report Author: Steven Hauswirth
Distinguished Member of the Technical Staff

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

Accreditation:



2404

<p><u>Tests:</u> Electromagnetic Specific Absorption Rate</p>	<p><u>Procedures:</u> 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)</p>
---	--

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)

©Motorola, Inc. 2011

This test report shall not be reproduced except in full, without written approval of the laboratory. 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

1. Introduction	3
2. Description of the Device Under Test	3
2.1 Antenna description	3
2.2 Device description	4
2.3 Evaluation of WCDMA modes	6
2.4 Evaluation of Wi-Fi 802.11 modes	7
2.5 Evaluation of Bluetooth	8
3. Test Equipment Used	9
3.1 Dosimetric System	9
3.2 Additional Equipment	9
4. Electrical parameters of the tissue simulating liquid	10
5. System Accuracy Verification	11
6. Test Results	12
6.1 Head Adjacent Test Results	12
6.2 Body Worn Test Results	15
6.3 Mobile Hotspot Test Results	18
References	21
Appendix 1: SAR distribution comparison for the system accuracy verification	
Appendix 2: SAR distribution plots for Phantom Head Adjacent Use	
Appendix 3: SAR distribution plots for Body Worn Configuration	
Appendix 4: SAR distribution plots for Mobile Hotspot Configuration	
Appendix 5: Measurement Uncertainty Budget	
Appendix 6: Probe Calibration Certificate	
Appendix 7: Dipole Characterization Certificate	

1. Introduction

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

For ANSI / IEEE C95.1 (1 g), the final SAR reading for this phone is 1.08 W/kg for head-adjacent use, 0.80 W/kg for body-worn use and 1.02 W/kg for mobile-hotspot 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

Main Antenna

Type	Internal	
Location	Bottom of Transceiver	
Dimensions	Width	10.55 mm
	Length	52.50 mm

Bluetooth/Wi-Fi Antenna

Type	Internal	
Location	Left-Side Rear of Transceiver	
Dimensions	Width	3.56 mm
	Length	21.85 mm

2.2 Device description

Serial Number(s)	355499040005626 (GSM/WCDMA Head, Body and 10mm, WiFi 10mm) KVT00L0154 (WiFi Head and Body SAR measurements)
Production Unit or Identical Prototype (47 CFR §2.908)	Identical Prototype
Device Category	Portable
RF Exposure Limits	General Population / Uncontrolled

Mode(s) of Operation	GSM 850	GSM 900	GSM 1800	GSM 1900	WCDMA 900	WCDMA 1900	WCDMA 2100	Wi-Fi 802.11b/g/n	Bluetooth
Modulation Mode(s)	GMSK	GMSK	GMSK	GMSK	QPSK	QPSK	QPSK	BPSK	GFSK
Maximum Output Power Setting	33.5 dBm	33.5 dBm	30.5 dBm	30.5 dBm	24.0 dBm	24.0 dBm	24.0 dBm ¹	20.0 dBm ¹	10 dBm ¹
Duty Cycle	1:8	1:8	1:8	1:8	1:1	1:1	1:1	1:1	1:1
Transmitting Frequency Range(s)	824.2 - 848.8 MHz	880.2 - 914.8 MHz	1710.2 - 1784.8 MHz	1850.2 - 1909.8 MHz	882.4 - 912.6 MHz	1852.4 - 1907.6 MHz	1922.4 - 1977.6 MHz	2412.0 - 2462.5 MHz	2402.0 - 2483.5 MHz

GSM Data Functionality	GPRS/EDGE Class 12 (4 uplink timeslots; 4 downlink timeslots; 5 total timeslots per frame)
	Class B (DTM not supported)

Mode(s) of Operation	GPRS 850				GPRS 900				GPRS 1800				GPRS 1900			
Modulation	GMSK				GMSK				GMSK				GMSK			
Maximum Output Power Setting (dBm)	33.5	31.5	29.5	27.5	33.5	31.5	29.5	27.5	30.5	28.5	26.5	24.5	30.5	28.5	26.5	24.5
Duty Cycle	1:8	2:8	3:8	4:8	1:8	2:8	3:8	4:8	1:8	2:8	3:8	4:8	1:8	2:8	3:8	4:8
Transmitting Frequency Range(s)	824.2 - 848.8 MHz				880.2 - 914.8 MHz				1710.2 - 1784.8 MHz				1850.2 - 1909.8 MHz			

Mode(s) of Operation	EDGE 850				EDGE 900				EDGE 1800				EDGE 1900			
Modulation	8PSK				8PSK				8PSK				8PSK			
Maximum Output Power Setting (dBm)	27.5	26.5	24.5	22.5	27.5	26.5	24.5	22.5	26.5	25.5	23.5	21.5	26.5	25.5	23.5	21.5
Duty Cycle	1:8	2:8	3:8	4:8	1:8	2:8	3:8	4:8	1:8	2:8	3:8	4:8	1:8	2:8	3:8	4:8
Transmitting Frequency Range(s)	824.2 - 848.8 MHz				880.2 - 914.8 MHz				1710.2 - 1784.8 MHz				1850.2 - 1909.8 MHz			

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

¹ Output power from WiFi/BT Chipset is theoretical maximum and does not account for any path loss or insertion loss to measurement port. Measured conducted power may be lower than these limits.

2.3 Device Conducted Power Measurements

2.3.1 GSM Modes

Band	Channel	Conducted power (dBm) for GSM modes ²						
		GSM CS Voice (1 Slot)	GPRS PS Data (2 Slots)	GPRS PS Data (3 Slots)	GPRS PS Data (4 Slots)	EDGE PS Data (2 Slots)	EDGE PS Data (3 Slots)	EDGE PS Data (4 Slots)
GSM 850	128	33.34	31.48	29.58	27.59	26.65	24.15	22.11
	190	33.35	31.30	29.49	27.63	26.52	24.30	22.09
	251	33.52	31.60	29.63	27.48	26.67	24.45	22.39
GSM 1900	512	30.57	28.63	26.12	24.15	25.69	23.23	21.17
	661	30.35	28.56	26.25	24.23	25.51	23.17	21.35
	810	30.67	28.70	26.44	24.39	25.64	23.11	21.49

Mode(s) of Operation	GPRS/EDGE 850				GPRS/EDGE 1900			
Modulation	GMSK				GMSK			
Duty Cycle	1:8	2:8	3:8	4:8	1:8	2:8	3:8	4:8
Maximum Output Power Setting (dBm)	33.5	31.5	29.5	27.5	30.5	28.5	26.5	24.5
Time Average Output Power Setting (dBm)	24.5	25.5	25.2	24.5	21.5	22.5	22.2	21.5

Mode(s) of Operation	EDGE 850				EDGE 1900			
Modulation	8PSK				8PSK			
Duty Cycle	1:8	2:8	3:8	4:8	1:8	2:8	3:8	4:8
Maximum Output Power Setting (dBm)	27.5	26.5	24.5	22.5	26.5	25.5	23.5	21.5
Time Average Output Power Setting (dBm)	18.5	20.5	20.2	19.5	17.5	19.5	19.2	18.5

The DUT utilizes a reduced limit for the maximum transmit power when the mobile hotspot functionality is enabled. A table of the reduced limits used for testing is given below. A complete description of this functionality is provided in the “Operational Description” contained within Exhibit 12, and is discussed within PBA inquiry 384782. The implementation to trigger the reduction in power requires the device to be radiating, which prevents conducted power measurements of this functionality without modification to the unit.

Mode(s) of Operation	WCDMA 1900		
Test Channel	9262	9400	9538
Channel Ranges	9262-9367	9368-9455	9456-9538
Reduced Maximum Output Power Setting (dBm)	21.0	21.0	21.0
Duty Cycle	1:1	1:1	1:1

² CS Voice denotes circuit-switched transmission for voice calling, and PS Data denotes packet-switched transmission for data sessions.

2.3.2 Evaluation of WCDMA modes

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

Band	Channel	Conducted power (dBm) for WCDMA modes		Conducted Power (dBm) for WCDMA – HSDPA (Rel 5) Modes				Conducted Power (dBm) for WCDMA – HSPA (HSUPA/HSDPA-Rel 6) Modes				
		RMC	AMR	Subtest 1	Subtest 2	Subtest 3	Subtest 4	Subtest 1	Subtest 2	Subtest 3	Subtest 4	Subtest 5
WCDMA 1900	9262	23.72	23.83	23.82	23.85	23.82	23.88	23.86	23.91	23.91	23.85	24.00
	9400	23.95	23.85	23.90	23.91	23.92	23.94	24.05	23.93	23.99	24.01	24.07
	9538	24.18	24.12	24.18	24.19	24.08	24.08	23.93	23.82	23.69	23.65	24.01

Maximum Power Reduction (MPR)

According to 3GPP 25.101 sub-clause 6.2.2, the maximum output power is allowed to be reduced by following the table.

Table 6.1A: UE maximum output power with HS-DPCCH and E-DCH

UE transmit channel configuration	CM (dB)	MPR (dB)
For all combinations of; DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH	$0 \leq CM \leq 3.5$	MAX (CM-1, 0)
Note 1: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.		

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

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

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

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

2.3.3 Evaluation of Wi-Fi 802.11 modes

Per “SAR Measurement Procedures for 802.11 a/b/g Transmitters” (FCC KDB 248227), power measurements were performed for 802.11 operational modes. The conducted power measurements for each mode are shown in the tables below. SAR testing for 802.11 was performed within each transmit band (2.5 GHz, 5.2 GHz, 5.8 GHz) with the transmitter set to the lowest data rate on the default test channels **highlighted in bold** in the tables below..

Band	Channel	Conducted Power (dBm) for 802.11b Mode Data Rates			
		1 Mbps	2 Mbps	5.5 Mbps	11 Mbps
Wi-Fi 2450 MHz	1	17.55	17.60	17.55	17.75
	6	18.19	18.11	18.30	18.26
	11	18.59	18.51	18.50	18.59

Band	Channel	Conducted Power (dBm) for 802.11g Mode Data Rates							
		6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps
Wi-Fi 2450 MHz	1	16.68	16.67	15.93	15.73	13.94	13.98	12.55	12.43
	6	17.32	17.26	16.41	16.34	14.56	14.45	13.07	12.99
	11	17.84	17.82	16.96	16.86	14.98	14.88	13.36	13.62

Band	Channel	Conducted Power (dBm) for 802.11n Mode Data Rates (20 MHz Channel, 800 ns Guard Interval)							
		6.5 Mbps	13 Mbps	19.5 Mbps	26 Mbps	39 Mbps	52 Mbps	58.5 Mbps	65 Mbps
Wi-Fi 2450 MHz	1	16.92	15.96	15.52	13.86	13.76	12.37	12.41	11.51
	6	17.08	16.10	15.75	14.16	13.95	12.66	12.61	11.64
	11	17.79	16.82	16.44	14.73	14.76	13.36	13.27	12.28

Note: The DUT does not support 802.11n mode utilizing 400 ns Guard Interval.

2.4 Evaluation of Simultaneous Transmitters

Per "SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas" (FCC KDB 648474), the necessity of stand-alone and simultaneous SAR testing was evaluated for the licensed and unlicensed transmitters of the device under test.

By device design the GSM/WCDMA transmitter may operate simultaneously with either the Wi-Fi 802.11 transmitter or the Bluetooth transmitter. The separation distance between the Wi-Fi 802.11/Bluetooth antennas and the GSM/WCDMA antenna is 4.13 cm. Pictorial representation of the antenna locations and separation distances are given in Exhibit 7d.

The Bluetooth transmitter of the device under test can be excluded from stand-alone and simultaneous SAR evaluation, per the **highlighted** requirements from FCC KDB 648474, as follows:

1. The highest output conducted power measured for Bluetooth on the device under test is 10.8 mW [$\leq 12 \text{ mW}$]
2. The separation distance between the Bluetooth antenna and the main antenna is 3.6 cm [$\geq 2.5 \text{ cm}$]

For the transmitters requiring stand-alone SAR testing (GSM/WCDMA and Wi-Fi 802.11), the KDB guidelines direct that if the sum of the 1 g SAR measured for the simultaneously transmitting antennas is less than the SAR limit, SAR evaluation for simultaneous transmission is not required. Further, if the SAR-to-peak-location separation ratio for two simultaneously transmitting antennas is less than 0.3 then SAR measurement for simultaneous transmission is likewise not required. Evaluations of the worst-case head and body simultaneous SAR summations and separation ratios are presented in the table below.

Evaluations for Simultaneous SAR						
Cellular Mode	Wi-Fi Mode	Configuration	CDMA Mode 1 g SAR Value (W/kg)	Wi-Fi Mode 1 g SAR Value (W/kg)	Summation 1 g SAR Value (W/kg)	Simultaneous Measurements Required?
GSM 850, CS Voice	Wi-Fi 2450 802.11b, 1 Mbps	Left Cheek	0.42	0.35	0.77	No
GSM 1900, CS Voice	Wi-Fi 2450 802.11b, 1 Mbps	Right Cheek	0.42	0.32	0.74	No
WCDMA 1900, 12.2 kbps RMC	Wi-Fi 2450 802.11b, 1 Mbps	Right Cheek	1.08	0.32	1.40	No
GPRS 850, Class 10	Wi-Fi 2450 802.11b, 1 Mbps	Body Worn, Back of Phone 15 mm	0.47	0.16	0.63	No
GPRS 1900, Class 10	Wi-Fi 2450 802.11b, 1 Mbps		0.37	0.16	0.53	No
WCDMA 1900, 12.2 kbps RMC	Wi-Fi 2450 802.11b, 1 Mbps		0.80	0.16	0.96	No
GPRS 850, Class 10	Wi-Fi 2450 802.11b, 1 Mbps	Body Worn, Mobile Hotspot Mode, Back of Phone 10 mm from Phantom	0.99	0.22	1.21	No
GPRS 1900, Class 10	Wi-Fi 2450 802.11b, 1 Mbps		1.02	0.22	1.24	No
WCDMA 1900, 12.2 kbps RMC	Wi-Fi 2450 802.11b, 1 Mbps		0.86	0.22	1.08	No

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	365	Sep-8-2011
DASY4™ DAE V1	440	Feb-17-2011
E-Field Probe ES3DV3	3180	May-20-2011
	3184	Sep-18-2011
S.A.M. Phantom used for 800/900 MHz	TP-1407	
S.A.M. Phantom used for 1800/1900/2450 MHz	TP-1160	
Dipole Validation Kit, DV835V2	432TR	Jan-11-2013
Dipole Validation Kit, DV1800V2	283TR	Nov-10-2012
Dipole Validation Kit, DV2450V2	766	Mar-17-2011
	788	Nov-11-2012

3.2 Additional Equipment

Description	Serial Number	Cal Date	Cal Due Date
Signal Generator HP8648C	3847A04843	Apr-22-2009	Apr-22-2011
Power Meter E4419B	US39250622	Dec-22-2009	Dec-22-2011
Power Sensor #1 - E9301A	US39210929	Nov-19-2009	Nov-19-2010
Power Sensor #2 - E9301A	US39210930	Nov-19-2009	Nov-19-2010
Signal Generator HP8648C	3847A04810	Oct-30-2009	Oct-30-2011
Power Meter E4419B	GB39511087	Dec-22-2009	Dec-22-2011
Power Sensor #1 - E9301A	US39211007	Dec-04-2009	Dec-04-2010
Power Sensor #2 - E9301A	US39211008	Dec-04-2009	Dec-04-2010
Network Analyzer HP8753ES	US39172529	Jun-04-2010	Jun-04-2011
Dielectric Probe Kit HP85070C	US99360070		

Description	Serial Number	Cal Date	Cal Due Date
Signal Generator HP8648C	3847A04982	Nov-18-2009	Nov-18-2011
Power Meter E4419B	GB39511082	Apr-24-2009	Apr-24-2011
Power Sensor #1 - E9301A	US39210918	Oct-25-2010	Oct-25-2011
Power Sensor #2 - E9301A	US39210917	Oct-25-2010	Oct-25-2011
Signal Generator HP8648C	3847A04810	Oct-30-2009	Oct-30-2011
Power Meter E4419B	GB39511087	Dec-22-2009	Dec-22-2011
Power Sensor #1 - E9301A	US39211006	Oct-25-2010	Oct-25-2011
Power Sensor #2 - E9301A	US39210934	Oct-25-2010	Oct-25-2011
Signal Generator HP8648C	3429A00286	Nov-23-2009	Nov-23-2011
Power Meter E4419B	US39250622	Dec-22-2009	Dec-22-2011
Power Sensor #1 - E9301A	US39210931	Oct-25-2010	Oct-25-2011
Power Sensor #2 - E9301A	US39210932	Oct-25-2010	Oct-25-2011
Network Analyzer HP8753ES	US39172529	Jun-04-2010	Jun-04-2011
Dielectric Probe Kit HP85070C	US99360070		

4. Electrical parameters of the tissue simulating liquid

Prior to conducting SAR measurements, the relative permittivity, ϵ_r , and the conductivity, σ , of the tissue simulating liquids were measured with a HP85070 Dielectric Probe Kit. These values, along with the temperature of the simulated tissue are shown in the table below. The recommended limits for permittivity and conductivity are also shown. A mass density of $\rho = 1 \text{ g/cm}^3$ 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		
			ϵ_r	σ (S/m)	Temp ($^{\circ}\text{C}$)
835	Head	Measured, Apr-1-2011	40.8	0.90	21.3
		Recommended Limits	41.5 \pm 5%	0.90 \pm 5%	18-25
	Body	Measured, Apr-2-2011	53.5	0.97	20.9
		Measured, Apr-8-2011	53.0	0.96	20.3
Recommended Limits	55.2 \pm 5%	0.97 \pm 5%	18-25		
1880	Head	Measured, Apr-6-2011	38.9	1.45	20.3
		Measured, Apr-7-2011	38.4	1.44	20.7
		Recommended Limits	40.0 \pm 5%	1.40 \pm 5%	18-25
	Body	Measured, Apr-6-2011	50.8	1.57	21.2
		Measured, Apr-7-2011	50.7	1.59	20.0
		Measured, Apr-8-2011	51.0	1.57	19.9
Recommended Limits	53.3 \pm 5%	1.52 \pm 5%	18-25		
2450	Head	Measured, Aug-25-2010	37.0	1.89	20.0
		Recommended Limits	39.2 \pm 10%	1.80 \pm 5%	18-25
	Body	Measured, Aug-26-2010	50.0	2.03	19.9
		Measured, Apr-08-2011	50.7	19.99	19.8
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 $\pm 10\%$ from the target SAR indicated in Appendix 6. These frequencies are within $\pm 10\%$ of the compliance test mid-band frequency as required in [1] and [5]. The test was conducted on the same days as the measurement of the DUT. Recommended limits for permittivity and conductivity, specified in [5], are shown in the table below. The obtained results from the system accuracy verification are also displayed in the table below. SAR values are normalized to 1 W forward power delivered to the dipole. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values. The distributions of SAR compare well with those of the reference measurements (see Appendix 1). The tissue stimulant depth was verified to be 15.0 cm \pm 0.5 cm. Z-axis scans showing the SAR penetration are also included in Appendix 1.

f (MHz)	Description	SAR (W/kg), 1 gram	Dielectric Parameters		Ambient Temp (°C)	Tissue Temp (°C)
			ϵ_r	σ (S/m)		
835	Measured, Apr-01-2011	9.90	40.8	0.90	22.7	20.5
	Measured, Apr-02-2011	9.90	40.7	0.91	22.4	20.2
	Measured, Apr-08-2011	9.75	40.9	0.91	21.7	20.6
	Recommended Limits	9.58	41.5 $\pm 5\%$	0.90 $\pm 5\%$	18-25	18-25
1800	Measured, Mar-31-2011	38.6	39.3	1.36	23.0	20.7
	Measured, Apr-06-2011	38.40	39.2	1.37	21.6	20.4
	Measured, Apr-07-2011	36.50	38.8	1.36	21.3	20.3
	Measured, Apr-08-2011	36.60	38.4	1.36	20.7	20.3
	Recommended Limits	38.30	40.0 $\pm 5\%$	1.40 $\pm 5\%$	18-25	18-25
2450	Measured, Aug-25-2010	55.00	37.0	1.89	20.0	20.0
	Measured, Aug-26-2010	54.25	36.6	1.85	20.3	20.0
	Recommended Limits	54.55	39.2 $\pm 10\%$	1.80 $\pm 5\%$	18-25	18-25
	Measured, Apr-08-2011	57.50	36.8	1.81	21.3	20.2
	Recommended Limits	53.40	39.2 $\pm 10\%$	1.80 $\pm 5\%$	18-25	18-25

The following probe conversion factors were used on the E-Field probe(s) used for the system accuracy verification measurements:

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ES3DV3	3180	835	6.01	8 of 9
		1810	5.03	8 of 9
		2450	4.42	8 of 9
	3184	2450	4.44	8 of 9

6. Test Results

The test sample was operated using an actual transmission through a base station simulator. The base station simulator was set up to the proper channel, transmitter power level and transmit mode of operation. The phone was tested in the configurations stipulated in [1], [4] and [5]. The phone was positioned into these configurations using the device holder supplied with the DASY4™ SAR measurement system. The measured dielectric constant of the material used for the device holder is less than 2.9 and the loss tangent is less than 0.02 ($\pm 30\%$) at 850 MHz. The default settings for the “coarse” and “cube” scans were chosen and used for measurements. The grid spacing of the coarse scan was set to 15 mm or less as shown in the SAR plots included in Appendix 2 and 3. Please refer to the DASY4™ manual for additional information on SAR scanning procedures and algorithms used.

The Cellular Phone model covered by this report has the following battery options:
Model SNN5843A - 1390 mAH Battery

The battery SNN5843A was used to do all of the SAR testing. The phone was placed in the SAR measurement system with a fully charged battery.

6.1 Head Adjacent Test Results

The SAR results shown in tables 1 through 4 are maximum SAR values averaged over 1 gram of phantom tissue, to demonstrate compliance to [3] and also over 10 grams of phantom tissue, to demonstrate compliance to the [6]. Also shown are the measured conducted output power levels, the temperature of the simulated tissue after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is $\text{Extrapolated SAR} = \text{Measured SAR} * 10^{(-\text{drift}/10)}$. The SAR reported at the end of the measurement process by the DASY4™ measurement system can be scaled up by the measured drift to determine the SAR at the beginning of the measurement process. This is the most conservative SAR because it corresponds to the average output power at the beginning of the SAR test. This extrapolation has been done because when the DUT is operating properly it may exhibit a slump in radiated power and SAR over time. This is verified by measuring the SAR drift after the test.

The left head and right head SAR contour distributions are similar. Because of this similarity, the cheek/touch and 15° tilt test conditions with the highest SAR values in each band are indicated as bold numbers in the following tables and are included in Appendix 2. All other test conditions measured lower SAR values than those included in Appendix 2. The tables below also include the highest SAR value summations for primary and secondary co-located transmitters, with the results indicated in italics.

The SAR measurements were performed using the SAM phantoms listed in section 3.1. Since the same phantoms and simulated tissue were used for the system accuracy verification and the device SAR measurements, the Z-axis scans included in Appendix 1 are applicable for verification of simulated tissue depth to be 15.0 cm \pm 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	3180	835	6.01	8 of 9
		1810	5.03	8 of 9
	3184	2450	4.44	8 of 9

Left Head Cheek Position								
f (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
GSM 850	Channel 128	33.34						
	Channel 190	33.35	19.8	-0.139	0.31	0.32	0.407	0.42
	Channel 251	33.52						
GSM 1900	Channel 512	30.57						
	Channel 661	30.35	20.0	0.00556	0.139	0.14	0.23	0.23
	Channel 810	30.67						
WCDMA 1900	Channel 9262	24.00						
	Channel 9400	24.07	19.6	-0.00802	0.38	0.38	0.626	0.63
	Channel 9538	24.01						
WI-FI 2450 802.11b 1 Mbps	Channel 1	17.55	20.0	-0.104	0.110	0.11	0.212	0.22
	Channel 6	18.19	20.0	0.035	0.184	0.18	0.351	0.35
	Channel 11	18.59	20.0	-0.020	0.163	0.16	0.322	0.32

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)	10 g SAR value		1 g SAR value	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
GSM 850	Channel 128	33.34						
	Channel 190	33.35	20.0	-0.17	0.312	0.32	0.413	0.43
	Channel 251	33.52						
GSM 1900	Channel 512	30.57						
	Channel 661	30.35	19.9	-0.0522	0.239	0.25	0.419	0.42
	Channel 810	30.67						
WCDMA 1900	Channel 9262	24.00	19.7	-0.00323	0.567	0.57	0.946	0.95
	Channel 9400	24.07	19.7	0.0236	0.639	0.64	1.08	1.08
	Channel 9538	24.01	19.7	-0.00174	0.485	0.49	0.82	0.82
WI-FI 2450 802.11b 1 Mbps	Channel 1	17.55						
	Channel 6	18.19	20.0	0.392	0.165	0.17	0.315	0.32
	Channel 11	18.59						

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

Left Head 15° Tilt Position								
f (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
GSM 850	Channel 128	33.34						
	Channel 190	33.35	19.9	-0.293	0.234	0.25	0.311	0.33
	Channel 251	33.52						
GSM 1900	Channel 512	30.57						
	Channel 661	30.35	19.9	-0.0759	0.0984	0.10	0.174	0.18
	Channel 810	30.67						
WCDMA 1900	Channel 9262	24.00						
	Channel 9400	24.07	19.6	0.0314	0.23	0.23	0.409	0.41
	Channel 9538	24.01						
Wi-Fi 2450 802.11b 1 Mbps	Channel 1	17.55						
	Channel 6	18.19	20.0	-0.045	0.132	0.13	0.222	0.22
	Channel 11	18.59						

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

Right Head 15° Tilt Position								
f (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
GSM 850	Channel 128	33.34						
	Channel 190	33.35	19.8	-0.00756	0.218	0.22	0.291	0.29
	Channel 251	33.52						
GSM 1900	Channel 512	30.57						
	Channel 661	30.35	19.8	-0.0617	0.103	0.10	0.178	0.18
	Channel 810	30.67						
WCDMA 1900	Channel 9262	24.00						
	Channel 9400	24.07	19.6	0.0124	0.265	0.27	0.459	0.46
	Channel 9538	24.01						
Wi-Fi 2450 802.11b 1 Mbps	Channel 1	17.55						
	Channel 6	18.19	20.0	0.063	0.068	0.07	0.129	0.13
	Channel 11	18.59						

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

6.2 Body Worn Test Results

The SAR results shown in tables 5 through 9 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 [6]. Also shown are the measured conducted output power levels, the temperature of the test facility during the test, the temperature of the tissue simulate after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is $\text{Extrapolated SAR} = \text{Measured SAR} * 10^{(-\text{drift}/10)}$. The SAR reported at the end of the measurement process by the DASY4™ measurement system can be scaled up by the measured drift to determine the SAR at the beginning of the measurement process. This is the most conservative SAR because it corresponds to the average output power at the beginning of the SAR test. This extrapolation has been done because when the DUT is operating properly it may exhibit a slump in radiated power and SAR over time. This is verified by measuring the SAR drift after the test.

The test conditions that produced the highest SAR values in each band are indicated as bold numbers in the following tables and are included in Appendix 3. All other test conditions measured lower SAR values than those included in Appendix 3. The tables below also include the highest SAR value summations for primary and secondary co-located transmitters, with the results indicated in italics.

A “flat” phantom was for the body-worn tests. This “flat” phantom is made out of 1” thick natural High Density Polyethylene with a thickness at the bottom equal to 2.0 mm. It measures 52.7 cm(long) x 26.7 cm(wide) x 21.2 cm(tall). The measured dielectric constant of the material used is less than 2.3 and the loss tangent is less than 0.0046 at frequencies up to 2.184 GHz.

The tissue stimulant depth was verified to be 15.0 cm ± 0.5 cm. The same device holder described in section 6 was used for positioning the phone. The functional accessories were divided into two categories, the ones with metal components and the ones with non-metal components. For non-metallic component accessories, testing was performed on the accessory that displayed the closest proximity to the flat phantom. Each metallic component accessory, if any, was checked for uniqueness of metal component so that each is tested with the device. If multiple accessories shared an identical metal component, only the accessory that dictates the closest spacing to the body was tested. The cellular phone was tested with a headset connected to the device for all body-worn SAR measurements.

There are no body-worn accessories available for this phone at the time of testing thus the device was tested per the Supplement C testing guidelines for devices that do not have body-worn accessories. A separation distance of 15 mm between the device and the flat phantom was used for testing body-worn SAR. The device was tested with the front and back of the device facing the phantom. Both sides of the device were tested for Body SAR for the purpose of including the SAR evaluation for body-worn accessories that support the device with the front side facing the user.

The cellular phone was also tested in data mode operations. For these tests, a separation distance of 25 mm between the device and the flat phantom was used. The device was tested in the worst-case SAR position and channel configuration from the voice-mode body-worn testing.

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	3180	835	6.01	8 of 9
		1810	4.71	8 of 9
	3184	2450	4.28	8 of 9

Body Worn, Front of Phone 15 mm from Phantom								
f (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
GSM 850	Channel 128	33.34						
	Channel 190	33.35	19.7	-0.082	0.194	0.20	0.262	0.27
	Channel 251	33.52						
GSM 1900	Channel 512	30.57						
	Channel 661	30.35	20.5	-0.0658	0.184	0.19	0.299	0.30
	Channel 810	30.67						
WCDMA 1900	Channel 9262	24.00						
	Channel 9400	24.07	20.3	-0.00979	0.376	0.38	0.606	0.61
	Channel 9538	24.01						
WI-FI 2450 802.11b 1 Mbps	Channel 1	17.55						
	Channel 6	18.19	19.9	-0.095	0.015	0.01	0.025	0.03
	Channel 11	18.59						

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

Body Worn, Back of Phone 15 mm from Phantom								
f (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
GSM 850	Channel 128	33.34						
	Channel 190	33.35	19.7	-0.104	0.343	0.35	0.463	0.47
	Channel 251	33.52						
GSM 1900	Channel 512	30.57						
	Channel 661	30.35	20.3	-0.0602	0.225	0.23	0.36	0.37
	Channel 810	30.67						
WCDMA 1900	Channel 9262	24.00						
	Channel 9400	24.07	20.3	-0.183	0.482	0.50	0.765	0.80
	Channel 9538	24.01						
WI-FI 2450 802.11b 1 Mbps	Channel 1	17.55	20.0	-0.088	0.020	0.02	0.036	0.04
	Channel 6	18.19	19.9	-0.053	0.025	0.03	0.046	0.05
	Channel 11	18.59	20.0	-0.026	0.085	0.09	0.155	0.16

Table 6: 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								
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)
WI-FI 2450 802.11b 1 Mbps	Channel 1	17.55						
	Channel 6	18.19						
	Channel 11	18.59	19.8	-0.137	0.018	0.02	0.031	0.03

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

GPRS Class 10 (2 Uplink Timeslots) Mode Body-Worn, Back of Phone 25 mm from Phantom								
f (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
GSM 850	Channel 128	31.48						
	Channel 190	31.30	19.8	-0.319	0.351	0.38	0.469	0.50
	Channel 251	31.60						
GSM 1900	Channel 512	28.63						
	Channel 661	28.56	19.9	-0.0973	0.11	0.11	0.169	0.17
	Channel 810	28.70						

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

EDGE Class 10 (2 Uplink Timeslots) Mode Body-Worn, Back of Phone 25 mm from Phantom								
f (MHz)	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value	
					Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
GSM 850	Channel 128	26.65						
	Channel 190	26.52	19.8	0.336	0.114	0.11	0.149	0.15
	Channel 251	26.67						
GSM 1900	Channel 512	25.69						
	Channel 661	25.51	19.9	-0.151	0.04	0.04	0.0615	0.06
	Channel 810	25.64						

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

6.3 Mobile Hotspot Test Results

The DUT is capable of functioning as a Wi-Fi to Cellular mobile hotspot. Additional SAR testing was performed according to the interim test guidelines provided at the October 2010 TCB Workshop. Testing was performed with a separation of 1 cm between the DUT and the “flat” phantom. The DUT was positioned for SAR tests with the front and back surfaces facing the phantom, and also with the edges facing the phantom in which the transmitting antenna is < 2.5 cm from the edge. Each transmit band was utilized for SAR testing, but only the “mode” within each band that exhibited the highest SAR results from section 6.2 was used.

The SAR results shown in tables 10 through 14 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 [6]. Also shown are the temperature of the simulated tissue after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is $\text{Extrapolated SAR} = \text{Measured SAR} * 10^{-(\text{drift}/10)}$. The SAR reported at the end of the measurement process by the DASY4™ measurement system can be scaled up by the measured drift to determine the SAR at the beginning of the measurement process. This is the most conservative SAR because it corresponds to the average output power at the beginning of the SAR test. This extrapolation has been done because when the DUT is operating properly it may exhibit a slump in radiated power and SAR over time. This is verified by measuring the SAR drift after the test.

The DUT utilizes a reduced limit for the maximum transmit power when the mobile hotspot functionality is enabled. A description of this functionality is provided in the “Operational Description” contained within Exhibit 12. This description was also discussed within FCC KDB 631391.

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 4. All other test conditions measured lower SAR values than those included in Appendix 4.

The guidelines provided in “SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas” (KDB publication 648474 - D01 v01r05) were utilized for evaluation of the need for simultaneous transmission SAR testing. These guidelines direct that if the sum of the 1 g SAR measured for the individual simultaneously transmitting antennas is less than the SAR limit, SAR evaluation for simultaneous transmission is not required. Further, if the SAR-to-peak-location separation ratio for two simultaneously transmitting antennas is less than 0.3 then SAR evaluation for simultaneous transmission is likewise not required. Evaluations for the simultaneous SAR sums are presented in the tables below.

A “flat” phantom was for the body-worn tests. This “flat” phantom is made out of 1” thick natural High Density Polyethylene with a thickness at the bottom equal to 2.0 mm. It measures 52.7 cm (long) x 26.7 cm (wide) x 21.2 cm (tall).

The simulated tissue depth was verified to be 15.0 cm ± 0.5 cm for frequencies below 3 GHz. The same device holder described in section 6 was used for positioning the phone.

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

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ES3DV3	3180	835	6.01	6 of 11
		1900	4.71	6 of 11
		2450	4.22	6 of 11

Mobile Hotspot Mode, Bottom Edge of Phone 10 mm from Phantom							
<i>f</i> (MHz)	Channel	Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value	
				Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
GPRS 850 Class 10	128						
	190	20.8	-0.153	0.0348	0.04	0.0576	0.06
	251						
GPRS 1900 Class 10	512	20.1	-0.0422	0.507	0.51	0.921	0.93
	661	20.3	-0.171	0.437	0.45	0.789	0.82
	810	20.0	-0.0733	0.293	0.30	0.533	0.54
WCDMA 1900	9262	19.3	0.0326	0.434	0.43	0.786	0.79
	9400	19.3	0.0426	0.45	0.45	0.819	0.82
	9538	19.2	-0.0395	0.329	0.33	0.601	0.61

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

Mobile Hotspot Mode, Right Edge of Phone 10 mm from Phantom							
<i>f</i> (MHz)	Channel	Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value	
				Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
GPRS 850 Class 10	128						
	190	20.5	-0.0154	0.262	0.26	0.378	0.38
	251						
GPRS 1900 Class 10	512						
	661	19.8	-0.0686	0.091	0.09	0.158	0.16
	810						
WCDMA 1900	9262						
	9400	19.5	-0.0764	0.107	0.11	0.187	0.19
	9538						

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

Mobile Hotspot Mode, Left Edge of Phone 10 mm from Phantom							
<i>f</i> (MHz)	Channel	Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value	
				Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
GPRS 850 Class 10	128						
	190	20.3	-0.0101	0.233	0.23	0.336	0.34
	251						
GPRS 1900 Class 10	512						
	661	19.8	-0.0146	0.0601	0.06	0.101	0.10
	810						
WCDMA 1900	9262						
	9400	19.5	-0.00449	0.079	0.08	0.135	0.14
	9538						
2450 802.11b, 11Mbps	1						
	6						
	11	20.1	-0.0626	0.122	0.12	0.235	0.24

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

Mobile Hotspot Mode, Front of Phone 10 mm from Phantom							
<i>f</i> (MHz)	Channel	Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value	
				Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
GPRS 850 Class 10	128						
	190	20.5	-0.0221	0.391	0.39	0.514	0.52
	251						
GPRS 1900 Class 10	512						
	661	19.7	-0.084	0.337	0.34	0.556	0.57
	810						
WCDMA 1900	9262						
	9400	19.6	0.0282	0.419	0.42	0.694	0.69
	9538						
2450 802.11b, 11Mbps	1						
	6						
	11	20.0	0.0509	0.0466	0.05	0.0816	0.08

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

Mobile Hotspot Mode, Back of Phone 10 mm from Phantom							
<i>f</i> (MHz)	Channel	Temp (°C)	Drift (dB)	10 g SAR value		1 g SAR value	
				Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)
GPRS 850 Class 10	128	20.5	0.00458	0.744	0.74	0.994	0.99
	190	20.6	-0.175	0.685	0.69	0.88	0.92
	251	20.5	-0.0551	0.558	0.57	0.748	0.76
GPRS 1900 Class 10	512	20.6	-0.0103	0.582	0.58	1.02	1.02
	661	19.7	-0.0856	0.458	0.47	0.762	0.78
	810	20.6	-0.0706	0.339	0.34	0.569	0.58
WCDMA 1900	9262	19.7	-0.0622	0.471	0.48	0.812	0.82
	9400	19.7	-0.0161	0.514	0.52	0.853	0.86
	9538	19.7	-0.0323	0.395	0.40	0.647	0.65
2450 802.11b, 11Mbps	1						
	6						
	11	20.0	0.0455	0.121	0.12	0.216	0.22

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

References

- [1] CENELEC, en62209-1:2006 “Human Exposure to Radio Frequency Fields From Hand - Held and Body - Mounted Wireless Communication Devices – Human Models, Instrumentation, and Procedures”
- [2] CENELEC, en50360:2001 “Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300 MHz – 3 GHz)”.
- [3] ANSI / IEEE, C95.1 1999 Edition “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”
- [4] FCC OET Bulletin 65 Supplement C 01-01
- [5] IEEE 1528 2003 Edition “IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”
- [6] ICNIRP Guidelines “Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz)”

Appendix 1

SAR distribution comparison for the system accuracy verification

Test Laboratory: MOTOROLA 835 MHz System Performance Check

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:432tr;

Procedure Notes: PM1 Power = 200 mW Refl.Pwr PM3 = - 24.3dB [Sim.Temp@SPC](#) = 20.5 Room Temp @ SPC = 22.7

Communication System: CW - Dipole; Frequency: 835 MHz; Communication System Channel Number: 3; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used: $f = 835$ MHz; $\sigma = 0.9$ mho/m; $\epsilon_r = 40.8$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(6.01, 6.01, 6.01); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 9/8/2010
- Phantom: R11_Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1407;
- 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) = 1.90 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 49.6 V/m; Power Drift = -0.158 dB

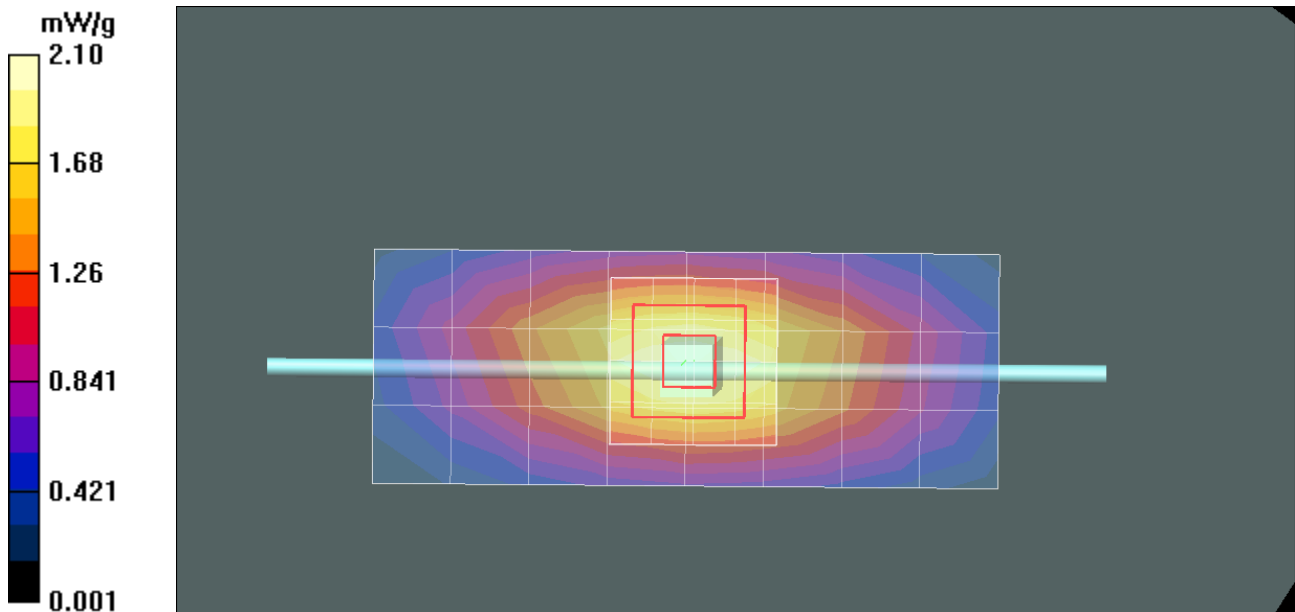
Peak SAR (extrapolated) = 2.96 W/kg

SAR(1 g) = 1.97 mW/g; SAR(10 g) = 1.28 mW/g

Maximum value of SAR (measured) = 2.13 mW/g

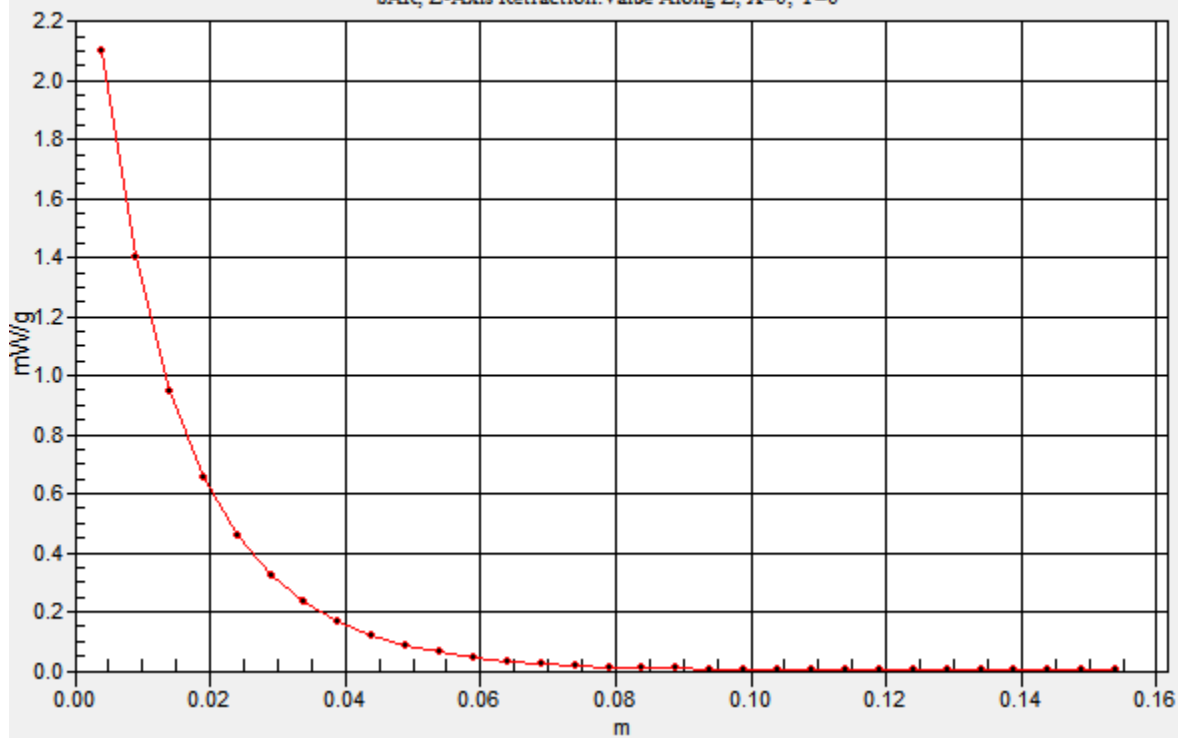
Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 2.10 mW/g



SAR(x,y,z,f0)

SAR; Z-Axis Retraction: Value Along Z, X=0, Y=0



Test Laboratory: MOTOROLA 835 MHz System Performance Check

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:432tr;

Procedure Notes: PM1 Power = 200 mW Refl.Pwr PM3 = - 24.3dB [Sim.Temp@SPC](#) =20.2 Room Temp @ SPC =22.4

Communication System: CW - Dipole; Frequency: 835 MHz; Communication System Channel Number: 3; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used: $f = 835$ MHz; $\sigma = 0.91$ mho/m; $\epsilon_r = 40.7$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(6.01, 6.01, 6.01); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 9/8/2010
- Phantom: R11_ Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1407;
- 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) = 1.85 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

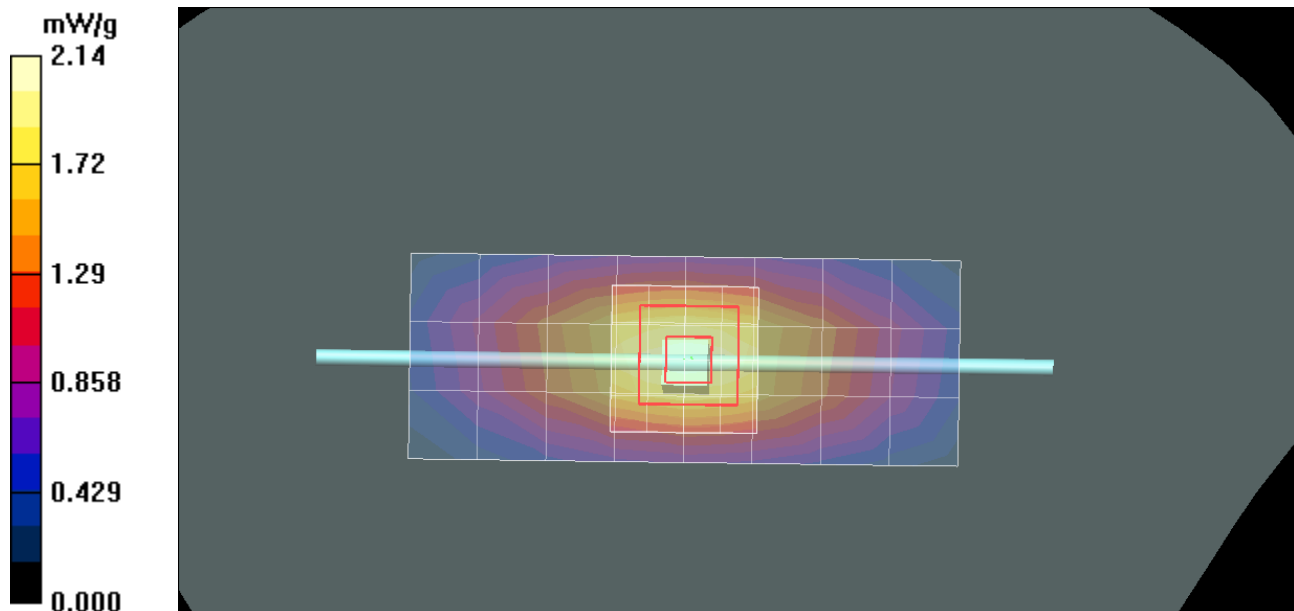
Reference Value = 49.8 V/m; Power Drift = -0.121 dB

Peak SAR (extrapolated) = 2.98 W/kg

SAR(1 g) = 1.98 mW/g; SAR(10 g) = 1.28 mW/g

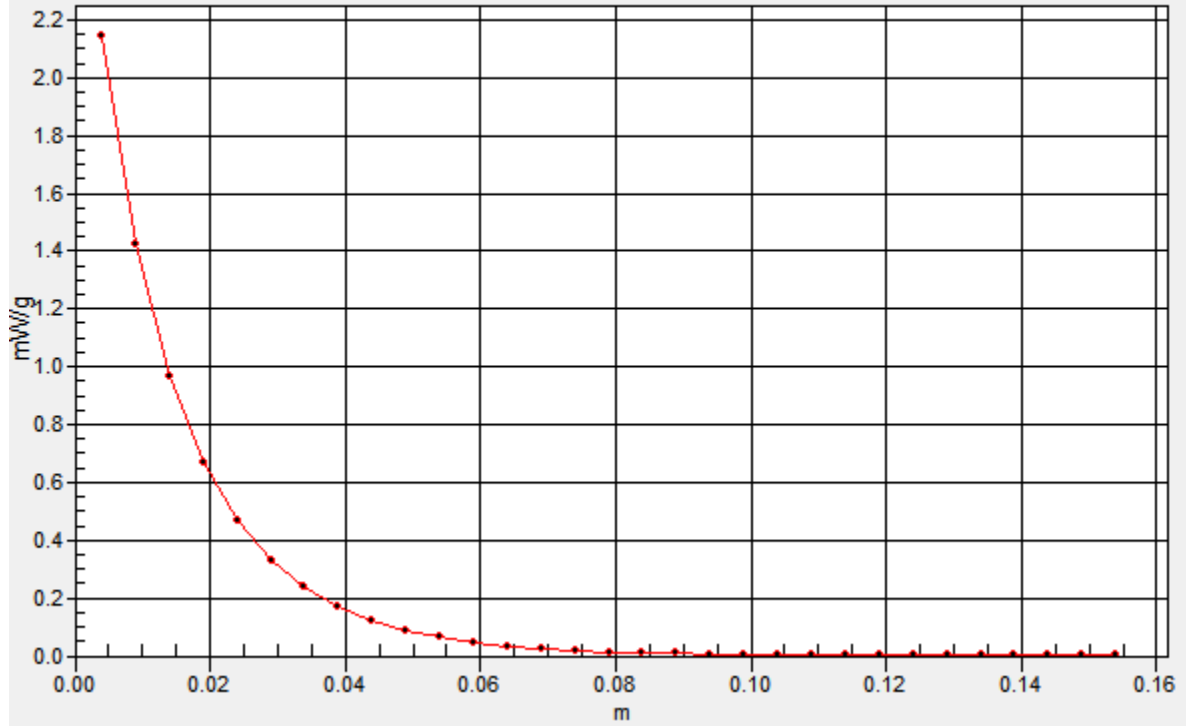
Maximum value of SAR (measured) = 2.14 mW/g

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



SAR(x,y,z,f0)

SAR; Z-Axis Retraction: Value Along Z, X=0, Y=0



Test Laboratory: MOTOROLA 835 MHz System Performance Check

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:432tr;

Procedure Notes: PM1 Power = 200 mW Refl.Pwr PM3 = - 24.8dB [Sim.Temp@SPC](#) = 20.6 Room Temp @ SPC =21.7

Communication System: CW - Dipole; Frequency: 835 MHz; Communication System Channel Number: 3; Duty Cycle: 1:1

Medium: Validation *HEAD Tissue* ; Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.91 \text{ mho/m}$; $\epsilon_r = 40.9$; $\rho = 1000 \text{ kg/m}^3$

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(6.01, 6.01, 6.01); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 9/8/2010
- Phantom: R11_Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1407;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Daily SPC Check/Dipole Area Scan (4x9x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 1.92 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

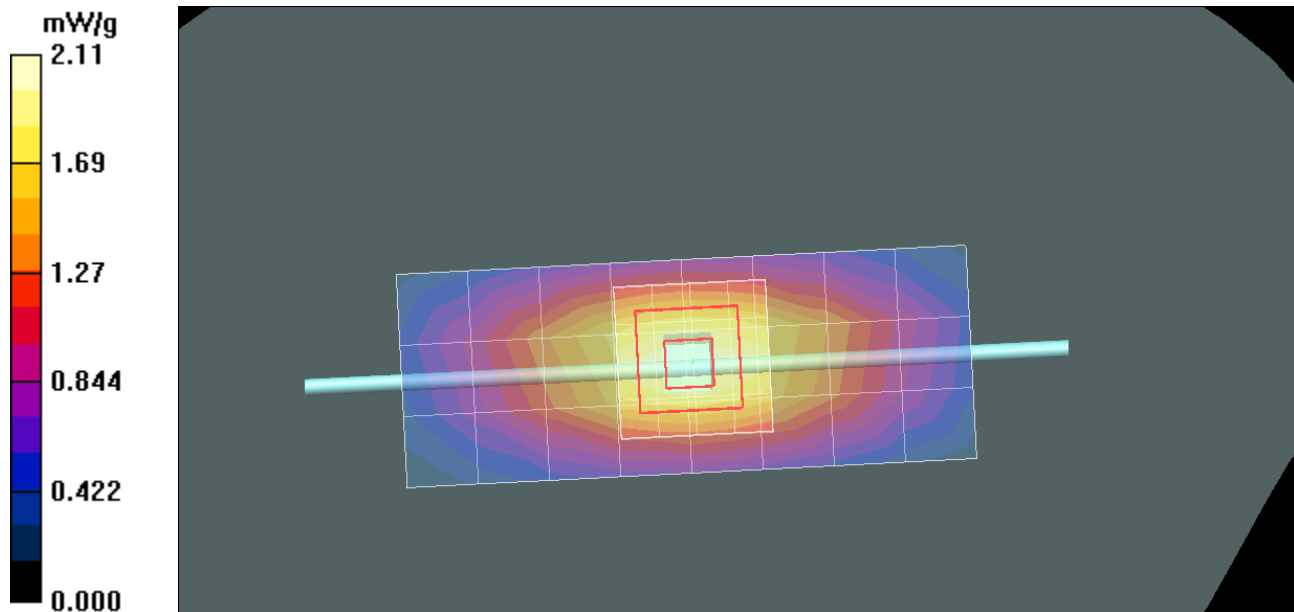
Reference Value = 49.4 V/m; Power Drift = -0.131 dB

Peak SAR (extrapolated) = 2.92 W/kg

SAR(1 g) = 1.95 mW/g; SAR(10 g) = 1.27 mW/g

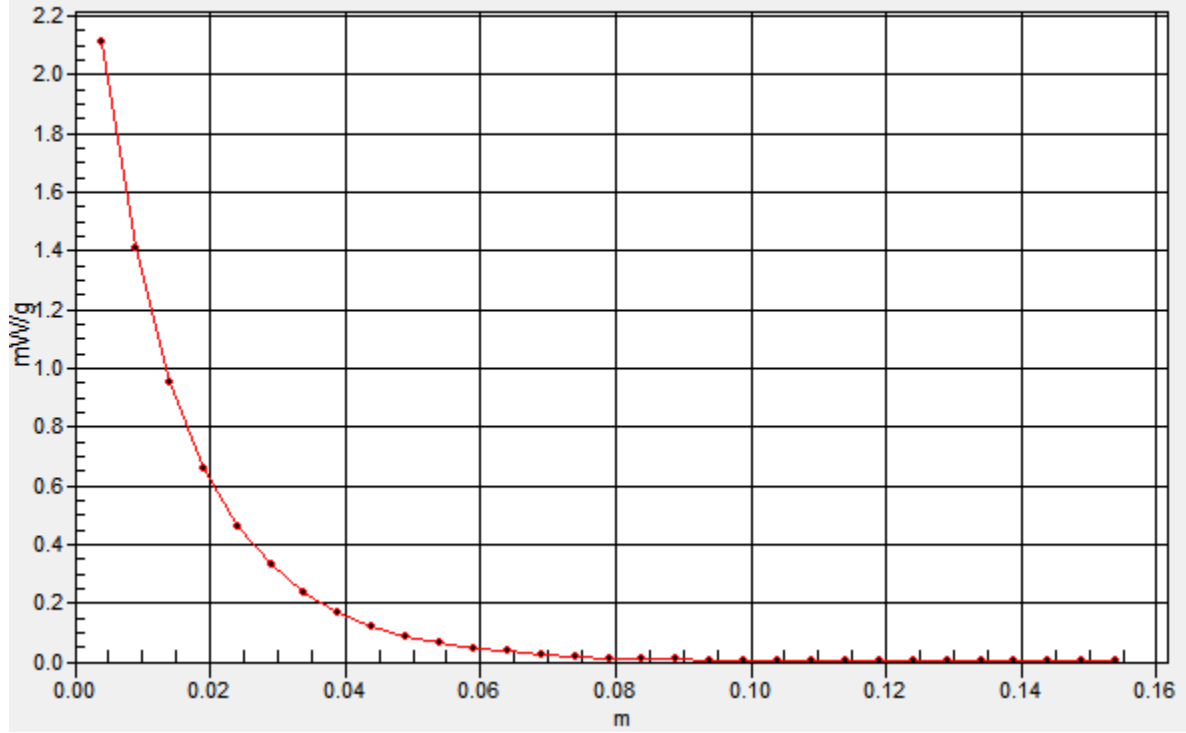
Maximum value of SAR (measured) = 2.11 mW/g

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



SAR(x,y,z,f0)

SAR; Z-Axis Retraction: Value Along Z, X=0, Y=0



Test Laboratory: MOTOROLA 1800 MHz System Performance Check

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:283tr;

Procedure Notes: PM1 Power = 200 mW Refl.Pwr PM3 = -31 dB [Sim.Temp@SPC](#) = 20.7 Room Temp @ SPC = 23
Communication System: CW - Dipole; Frequency: 1800 MHz; Communication System Channel Number: 8; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used: $f = 1800$ MHz; $\sigma = 1.36$ mho/m; $\epsilon_r = 39.3$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.03, 5.03, 5.03); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 9/8/2010
- Phantom: R11_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1160;
- 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) = 6.49 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 = 0.009 dB

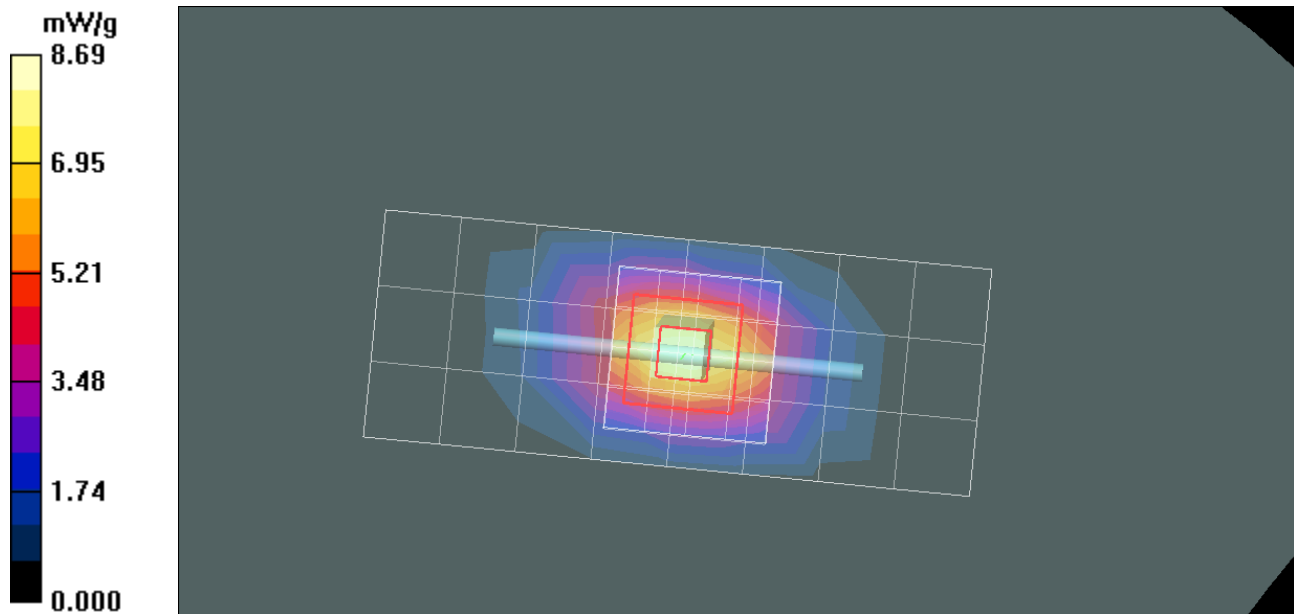
Peak SAR (extrapolated) = 14.4 W/kg

SAR(1 g) = 7.72 mW/g; SAR(10 g) = 4.04 mW/g

Maximum value of SAR (measured) = 8.64 mW/g

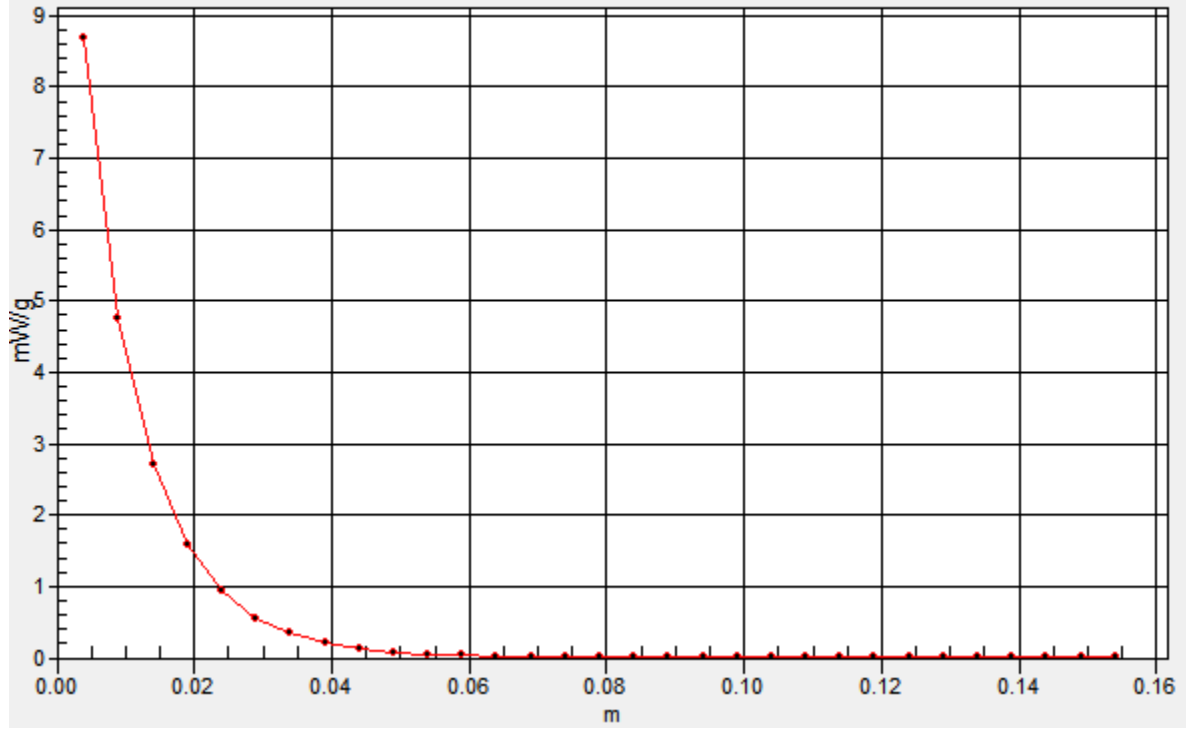
Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 8.69 mW/g



SAR(x,y,z,f0)

SAR; Z-Axis Retraction: Value Along Z, X=0, Y=0



Test Laboratory: MOTOROLA 1800 MHz System Performance Check

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:283tr;

Procedure Notes: PM1 Power = 200 mW Refl.Pwr PM3 = -32.7 dB [Sim.Temp@SPC](#) = 20.4 Room Temp @ SPC = 21.6

Communication System: CW - Dipole; Frequency: 1800 MHz; Communication System Channel Number: 8; Duty Cycle: 1:1

Medium: VALIDATION Only; Medium parameters used: $f = 1800$ MHz; $\sigma = 1.37$ mho/m; $\epsilon_r = 39.2$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.03, 5.03, 5.03); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 9/8/2010
- Phantom: R11_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1160;
- 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) = 6.29 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 = 0.017 dB

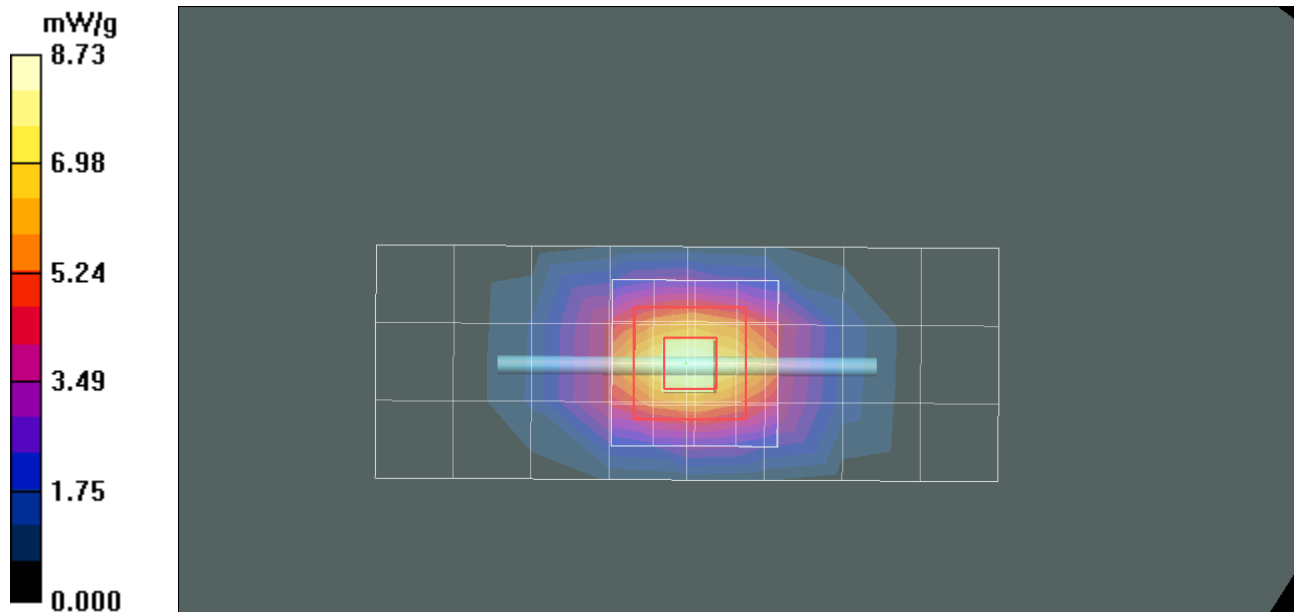
Peak SAR (extrapolated) = 14.2 W/kg

SAR(1 g) = 7.68 mW/g; SAR(10 g) = 4.03 mW/g

Maximum value of SAR (measured) = 8.62 mW/g

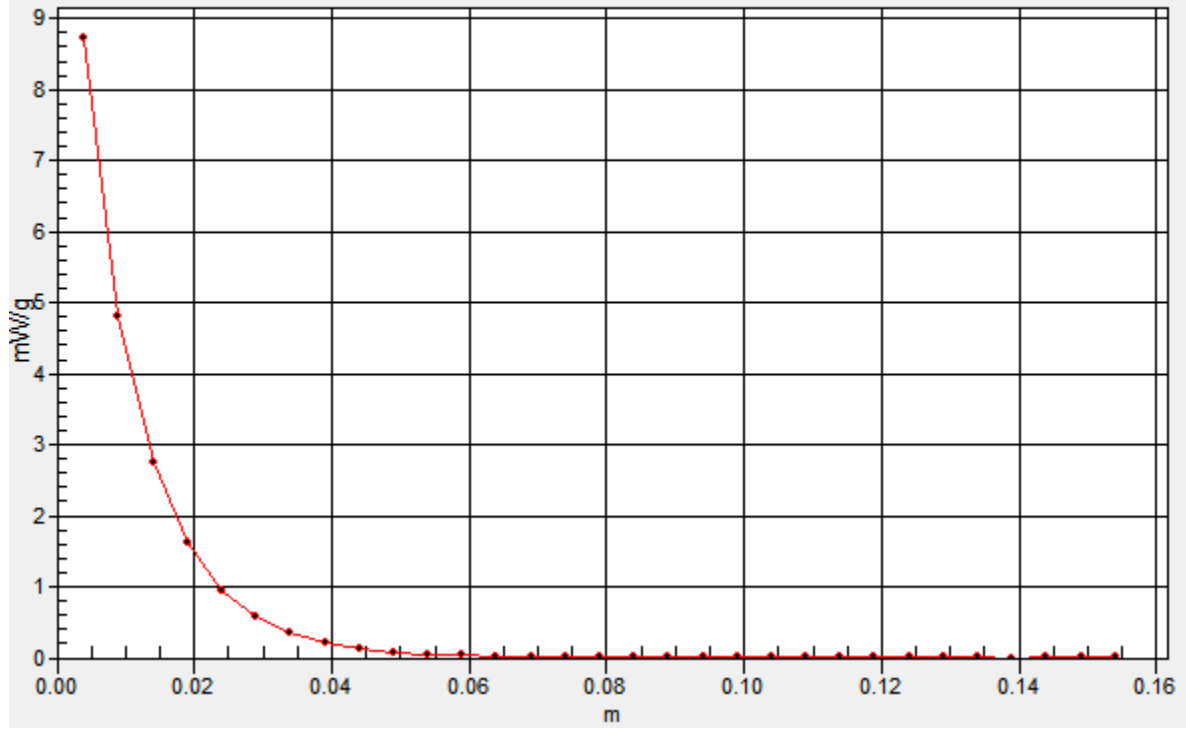
Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 8.73 mW/g



SAR(x,y,z,f0)

SAR; Z-Axis Retraction: Value Along Z, X=0, Y=0



Test Laboratory: MOTOROLA 1800 MHz System Performance Check

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:283tr;

Procedure Notes: PM1 Power = 200 mW Refl.Pwr PM3 = -32.1 dB [Sim.Temp@SPC](#) = 20.3 Room Temp @ SPC = 21.3

Communication System: CW - Dipole; Frequency: 1800 MHz; Communication System Channel Number: 8; Duty Cycle: 1:1

Medium: Validation *HEAD Tissue* ; Medium parameters used: $f = 1800$ MHz; $\sigma = 1.36$ mho/m; $\epsilon_r = 38.8$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.03, 5.03, 5.03); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 9/8/2010
- Phantom: R11_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1160;
- 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) = 6.30 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 78.7 V/m; Power Drift = 0.013 dB

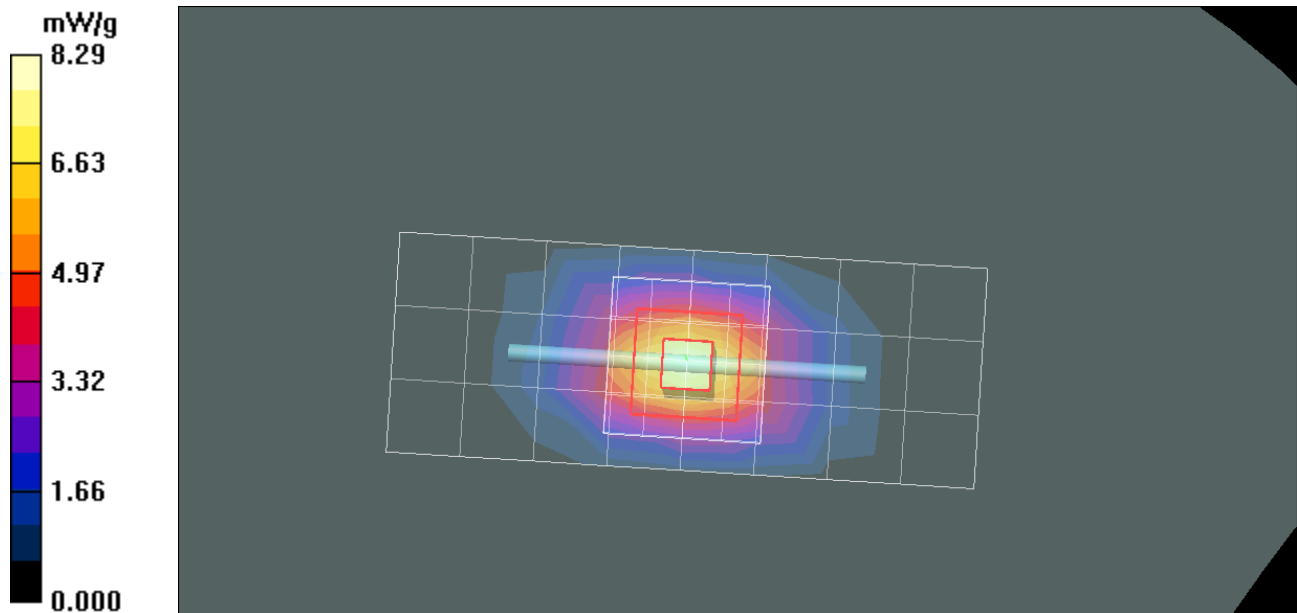
Peak SAR (extrapolated) = 13.4 W/kg

SAR(1 g) = 7.3 mW/g; SAR(10 g) = 3.84 mW/g

Maximum value of SAR (measured) = 8.16 mW/g

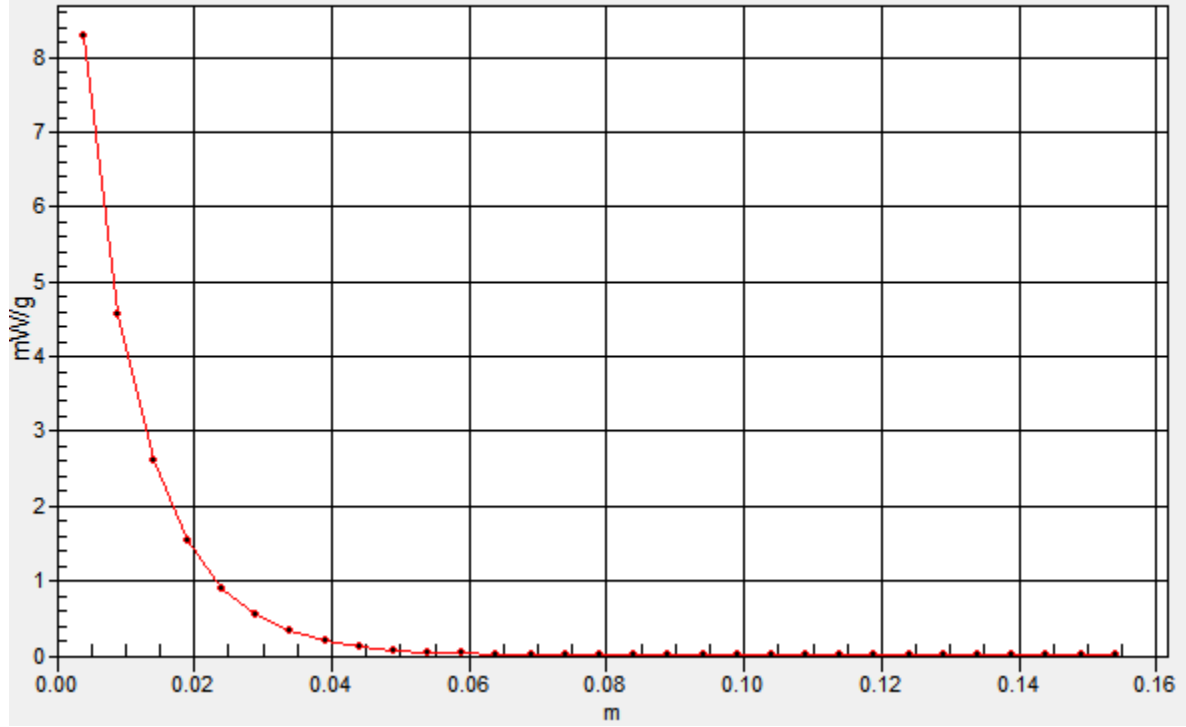
Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 8.29 mW/g



SAR(x,y,z,f0)

SAR; Z-Axis Retraction: Value Along Z, X=0, Y=0



Test Laboratory: MOTOROLA 1800 MHz System Performance Check

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:283tr;

Procedure Notes: PM1 Power = 200 mW Refl.Pwr PM3 = -32.72dB [Sim.Temp@SPC](#) = 20.3 Room Temp @ SPC =20.7

Communication System: CW - Dipole; Frequency: 1800 MHz; Communication System Channel Number: 8; Duty Cycle: 1:1

Medium: Validation *HEAD Tissue* ; Medium parameters used: $f = 1800$ MHz; $\sigma = 1.36$ mho/m; $\epsilon_r = 38.4$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.03, 5.03, 5.03); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 9/8/2010
- Phantom: R11_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1160;
- 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) = 6.62 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 77.4 V/m; Power Drift = 0.026 dB

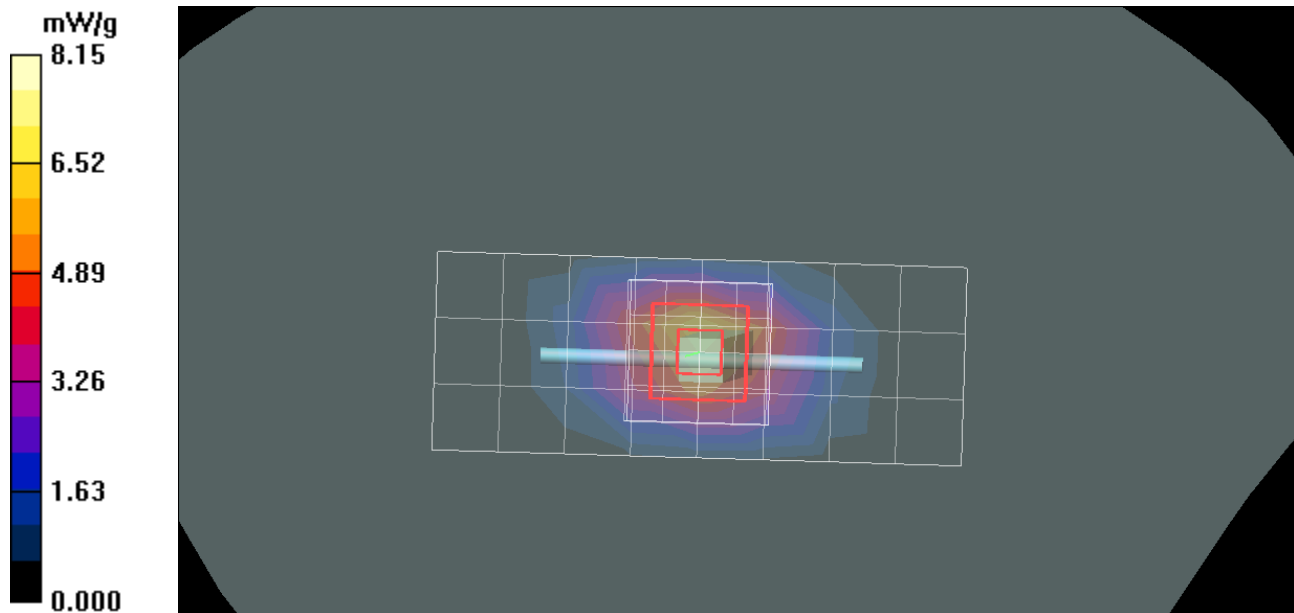
Peak SAR (extrapolated) = 13.6 W/kg

SAR(1 g) = 7.32 mW/g; SAR(10 g) = 3.82 mW/g

Maximum value of SAR (measured) = 8.24 mW/g

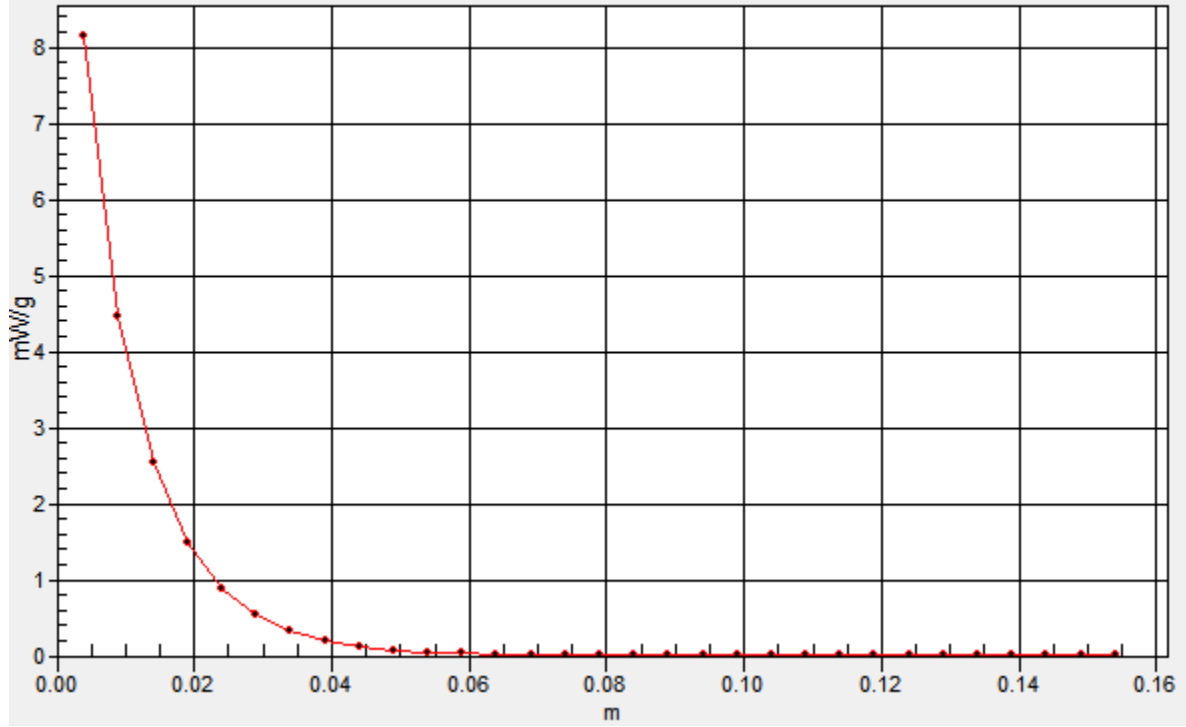
Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 8.15 mW/g



SAR(x,y,z,f0)

SAR; Z-Axis Retraction: Value Along Z, X=0, Y=0



Test Laboratory: Motorola - Aug-25-2010 2450 MHz

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 766; FCC ID: IHDP56LK1

Procedure Notes: 2450 MHz System Performance Check; Dipole Sn# 766; Input Power = 200 mW

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

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

Medium: VALIDATION Only

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.89$ mho/m; $\epsilon_r = 37$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ES3DV3 - SN3184; ConvF(4.44, 4.44, 4.44); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn440; Calibrated: 2/17/2010
- Phantom: R#4 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1250;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 9.72 mW/g

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

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

Reference Value = 81.9 V/m; Power Drift = -0.002 dB; Peak SAR (extrapolated) = 21.3 W/kg

SAR(1 g) = 10.8 mW/g; SAR(10 g) = 5.09 mW/g; Maximum value of SAR (measured) = 12.3 mW/g

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

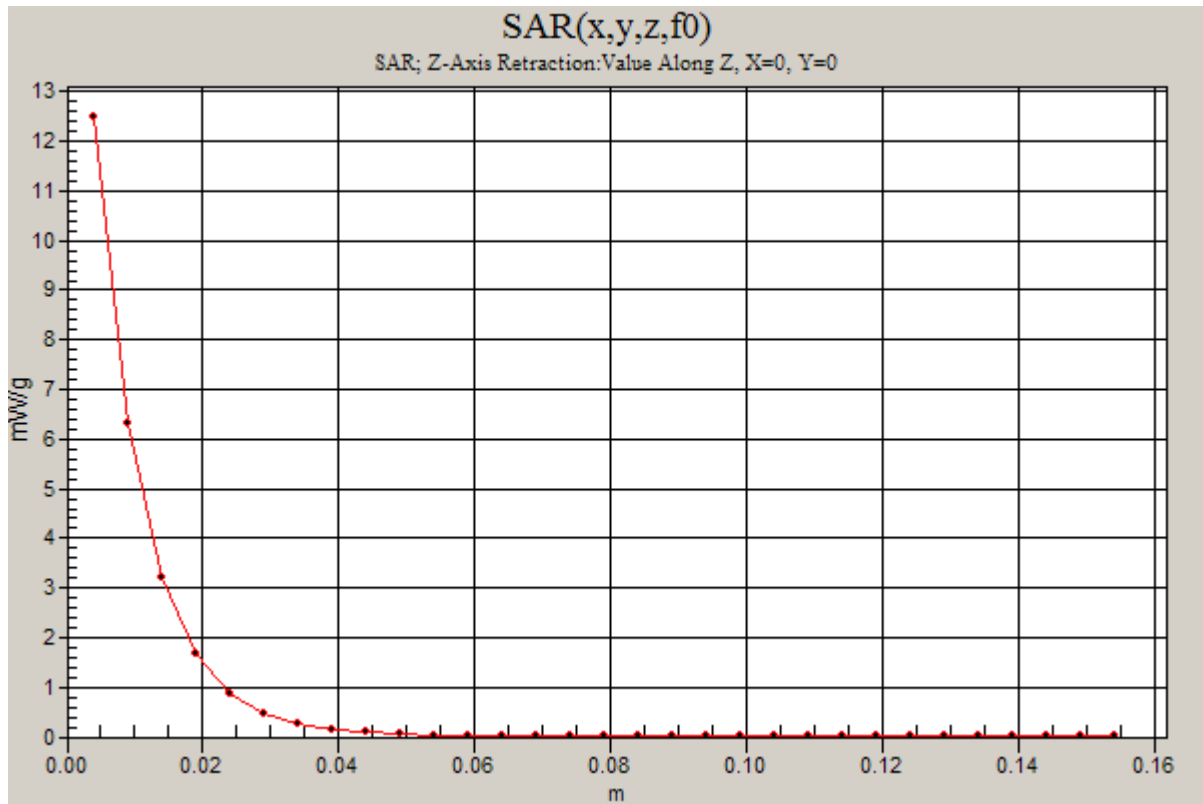
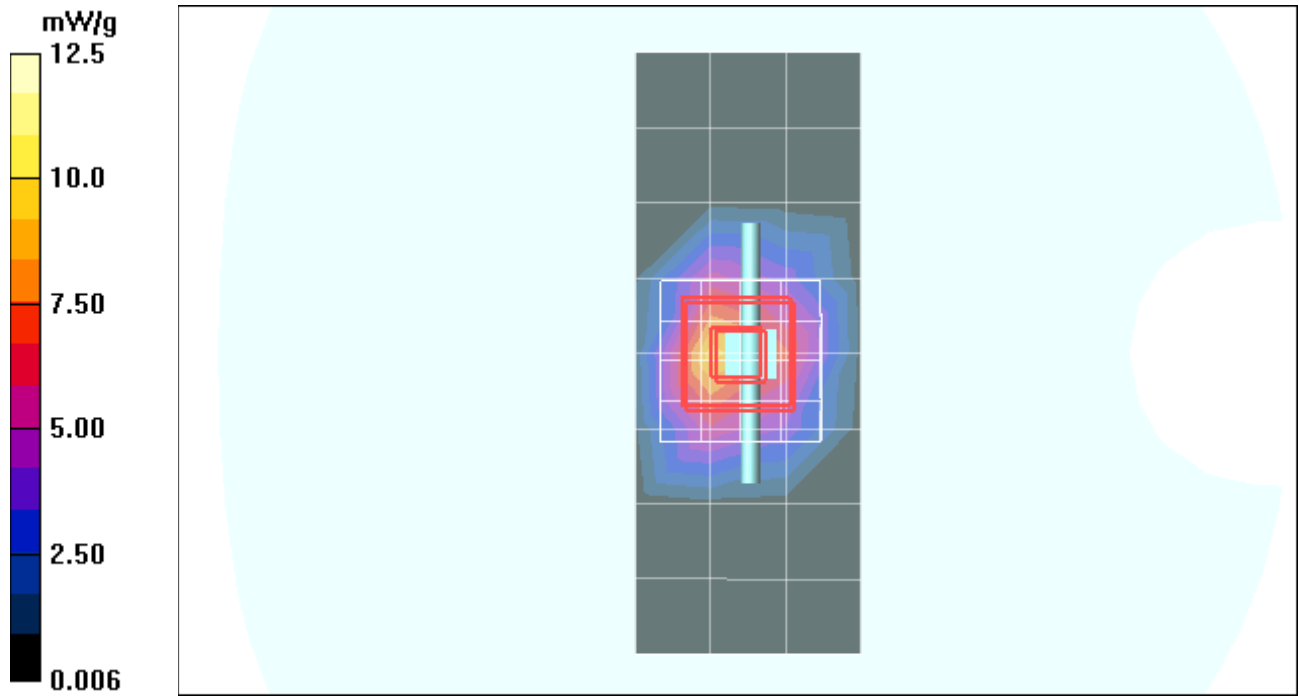
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 81.9 V/m; Power Drift = -0.002 dB; Peak SAR (extrapolated) = 22.5 W/kg

SAR(1 g) = 11.2 mW/g; SAR(10 g) = 5.2 mW/g; Maximum value of SAR (measured) = 12.7 mW/g

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

Measurement grid: dx=20mm, dy=20mm, dz=5mm; Maximum value of SAR (measured) = 12.5 mW/g



Test Laboratory: Motorola - Aug-26-2010 2450 MHz

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 766; FCC ID: IHDP56LK1

Procedure Notes: 2450 MHz System Performance Check; Dipole Sn# 766; Input Power = 200 mW

Sim.Temp@meas = 20.0°C; Sim.Temp@SPC = 20.0°C; Room Temp @ SPC = 20.3°C

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

Medium: VALIDATION Only

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.85$ mho/m; $\epsilon_r = 36.6$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ES3DV3 - SN3184; ConvF(4.44, 4.44, 4.44); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn440; Calibrated: 2/17/2010
- Phantom: R#4 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1250;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 9.46 mW/g

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

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

Reference Value = 83.3 V/m; Power Drift = -0.037 dB; Peak SAR (extrapolated) = 21.2 W/kg

SAR(1 g) = 10.7 mW/g; SAR(10 g) = 5.01 mW/g; Maximum value of SAR (measured) = 12.2 mW/g

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

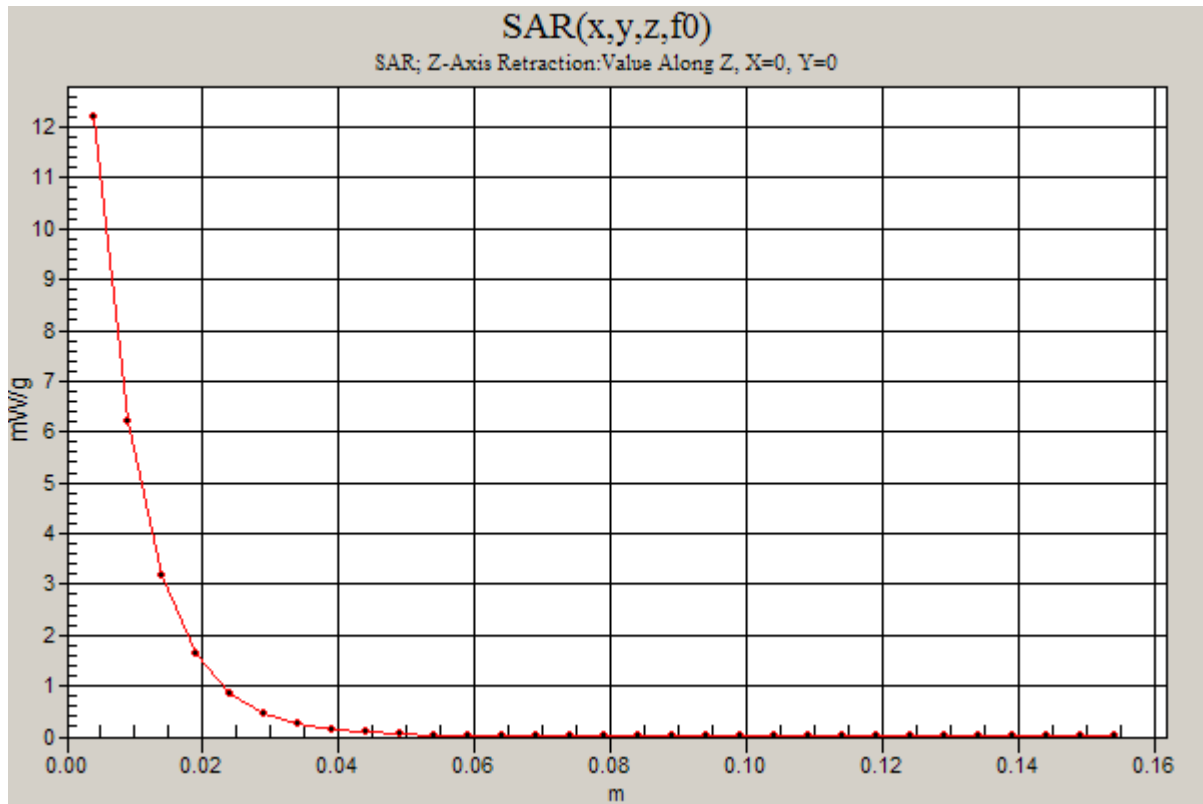
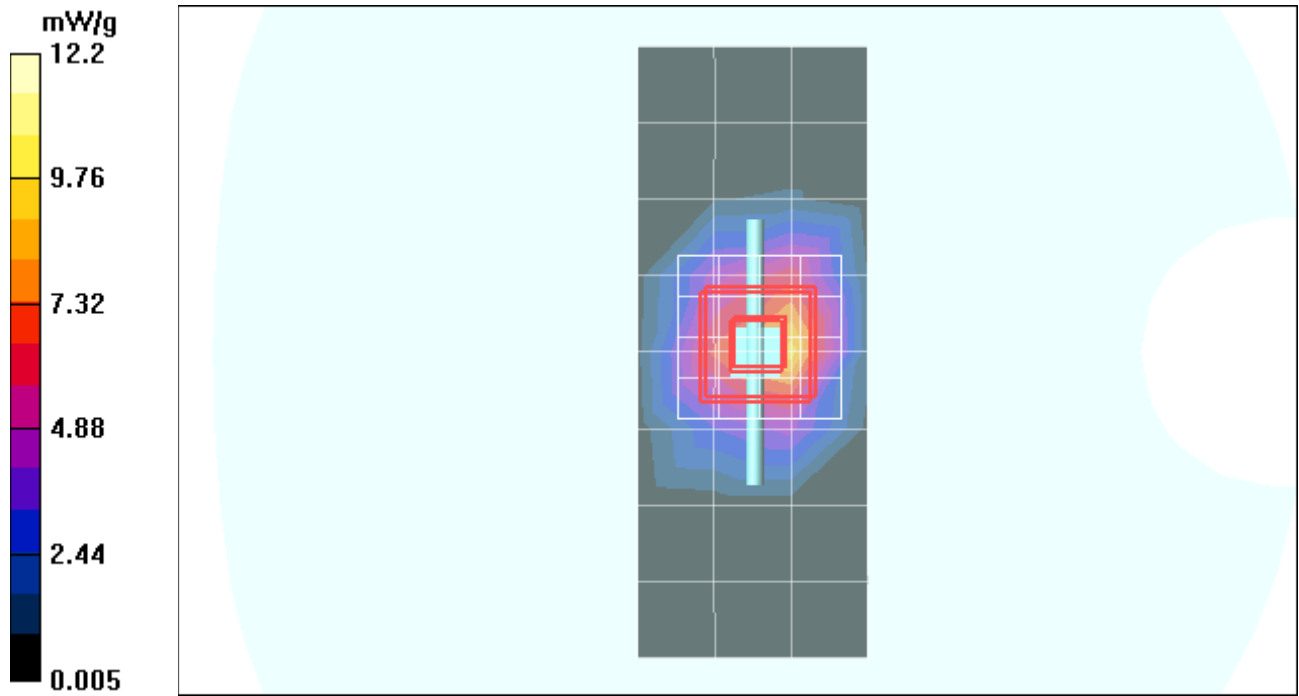
Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 83.3 V/m; Power Drift = -0.037 dB; Peak SAR (extrapolated) = 22.0 W/kg

SAR(1 g) = 11 mW/g; SAR(10 g) = 5.12 mW/g; Maximum value of SAR (measured) = 12.4 mW/g

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

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



Test Laboratory: MOTOROLA 2450 MHz System Performance Check

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:788;

Procedure Notes: PM1 Power = 200 mW Refl.Pwr PM3 = - 26.1dB [Sim.Temp@SPC](#) = 20.2 Room Temp @ SPC = 21.3

Communication System: CW - Dipole; Frequency: 2450 MHz; Communication System Channel Number: 11; Duty Cycle: 1:1

Medium: Validation *HEAD Tissue* ; Medium parameters used: $f = 2450$ MHz; $\sigma = 1.81$ mho/m; $\epsilon_r = 36.8$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(4.42, 4.42, 4.42); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 9/8/2010
- Phantom: R11_ Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1160;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Daily SPC Check/Dipole Area Scan (4x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 9.48 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

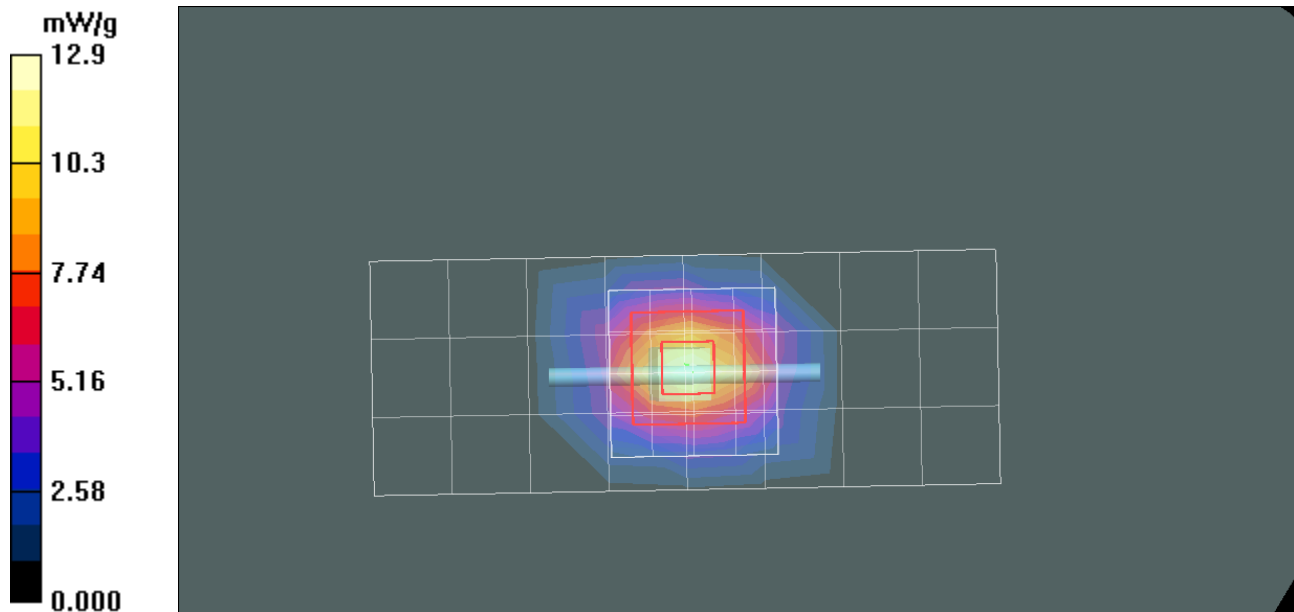
Reference Value = 85.8 V/m; Power Drift = 0.000 dB

Peak SAR (extrapolated) = 24.3 W/kg

SAR(1 g) = 11.5 mW/g; SAR(10 g) = 5.24 mW/g

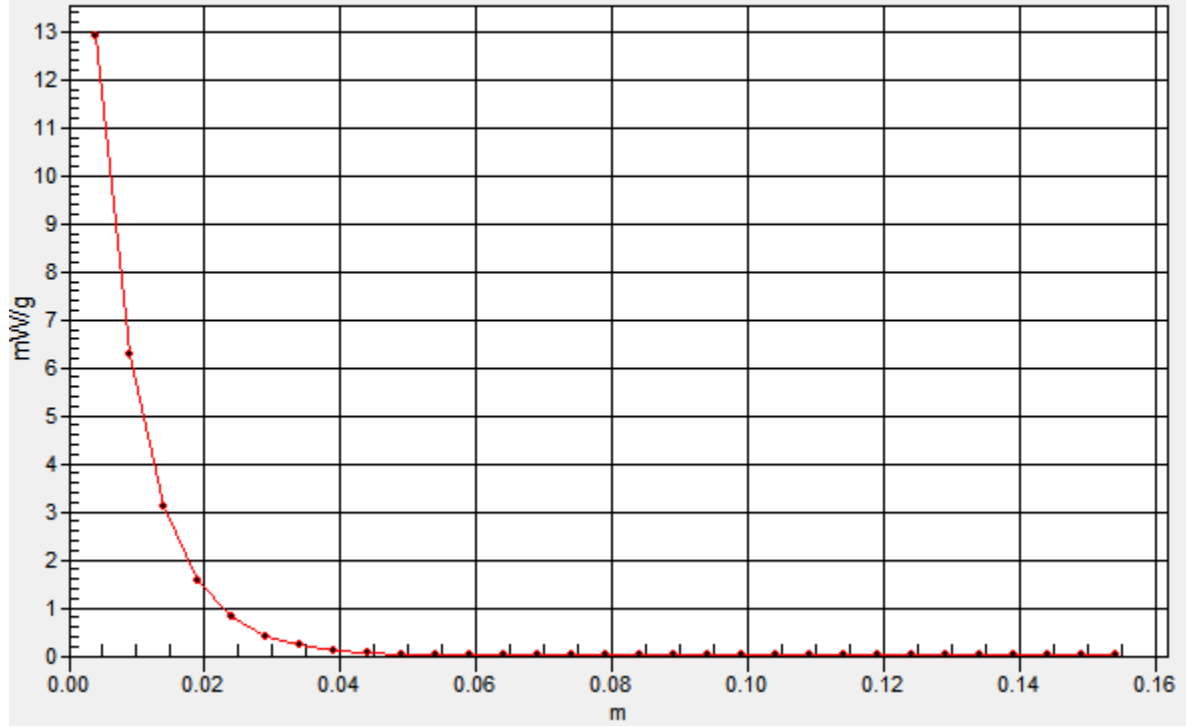
Maximum value of SAR (measured) = 12.9 mW/g

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



SAR(x,y,z,f0)

SAR; Z-Axis Retraction: Value Along Z, X=0, Y=0



Appendix 2

SAR distribution plots for Phantom Head Adjacent Use

Test Laboratory: MOTOROLA GSM 850 MHz Cheek Touch

DUT Serial: 355499040005626; FCC ID: IHDT56MW2

Procedure Notes: Pwr Step: 05 Battery Model #: SNN5843A DEVICE POSITION (cheek or rotated): Cheek
Communication System: GSM 850; Frequency: 836.6 MHz; Communication System Channel Number: 190; Duty
Cycle: 1:8.3

Medium: Low Freq Head; Medium parameters used: $f = 835$ MHz; $\sigma = 0.9$ mho/m; $\epsilon_r = 40.8$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(6.01, 6.01, 6.01); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 9/8/2010
- Phantom: R11_ Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1407;
- 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) = 0.438 mW/g

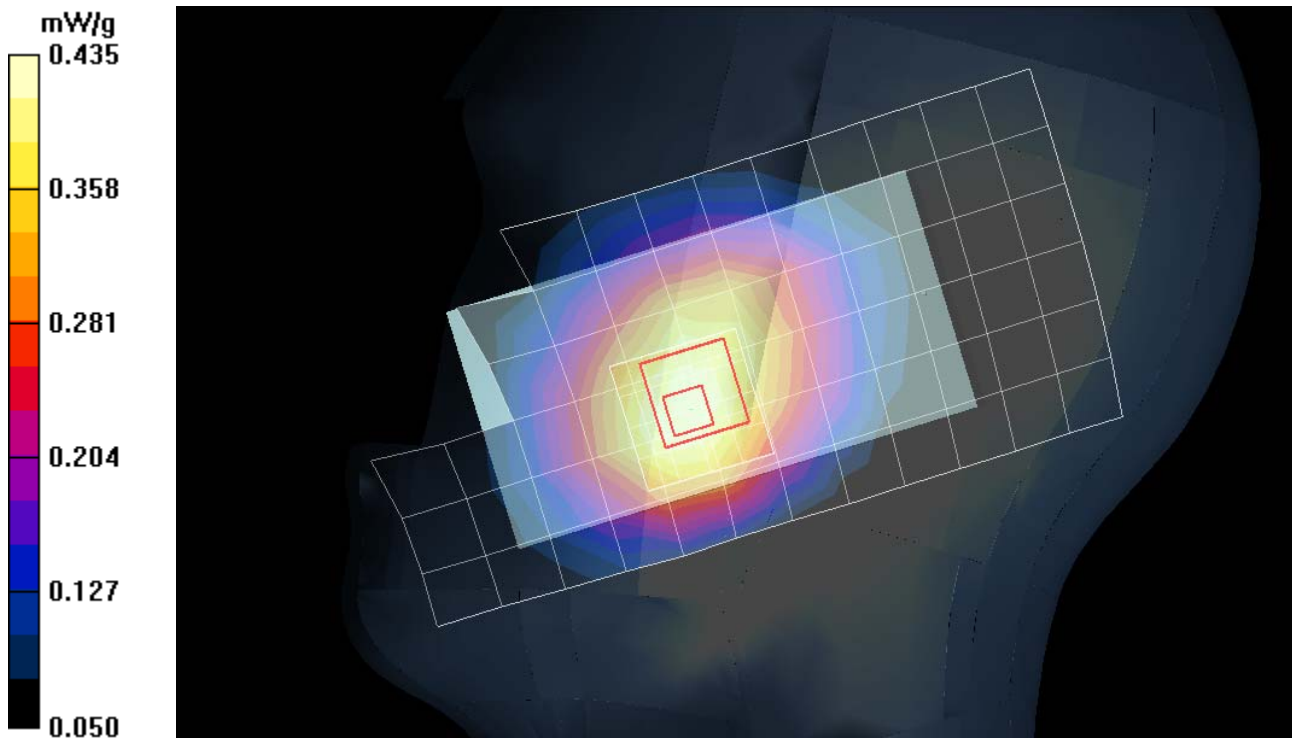
Right Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm,
dy=8mm, dz=5mm

Reference Value = 22.4 V/m; Power Drift = -0.170 dB

Peak SAR (extrapolated) = 0.532 W/kg

SAR(1 g) = 0.413 mW/g; SAR(10 g) = 0.312 mW/g

Maximum value of SAR (measured) = 0.435 mW/g



Test Laboratory: MOTOROLA GSM 850 MHz 15 Degree Tilt

DUT Serial: 355499040005626; FCC ID: IHDT56MW2

Procedure Notes: Pwr Step: 05 Battery Model #: SNN5843A DEVICE POSITION (cheek or rotated): Rotated
Communication System: GSM 850; Frequency: 836.6 MHz; Communication System Channel Number: 190; Duty
Cycle: 1:8.3

Medium: Low Freq Head; Medium parameters used: $f = 835$ MHz; $\sigma = 0.9$ mho/m; $\epsilon_r = 40.8$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(6.01, 6.01, 6.01); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 9/8/2010
- Phantom: R11_ Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1407;
- 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) = 0.329 mW/g

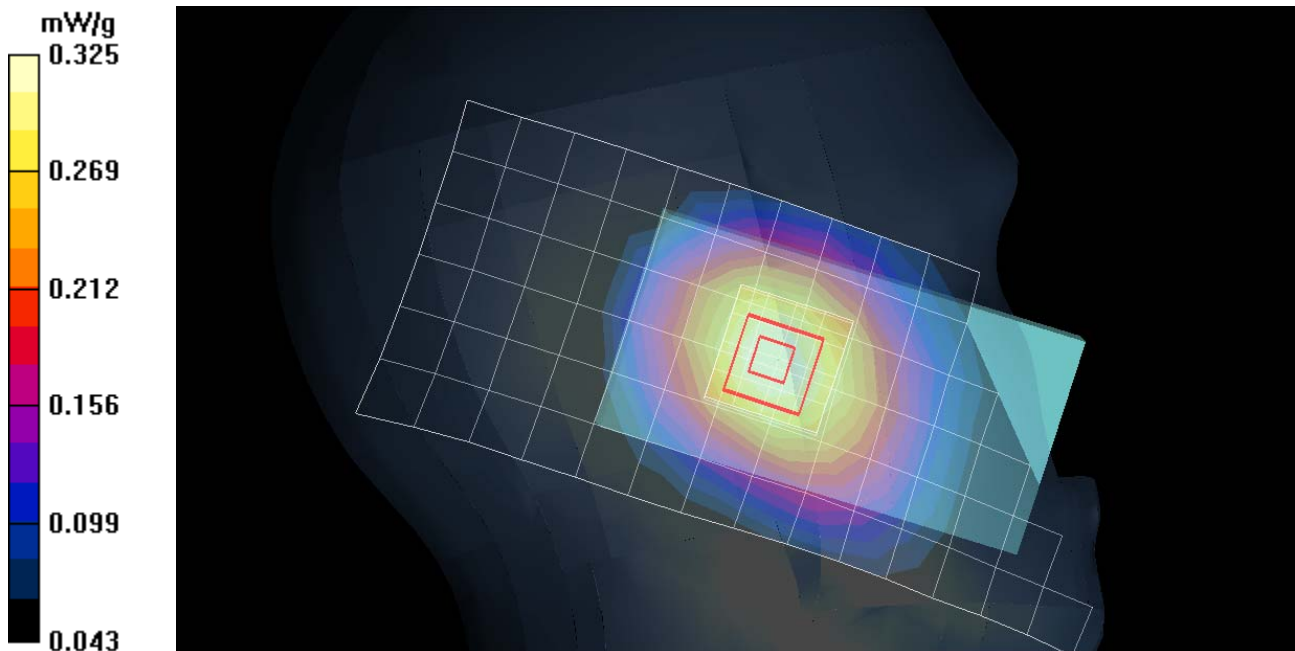
Left Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm,
dz=5mm

Reference Value = 19.2 V/m; Power Drift = -0.293 dB

Peak SAR (extrapolated) = 0.389 W/kg

SAR(1 g) = 0.311 mW/g; SAR(10 g) = 0.234 mW/g

Maximum value of SAR (measured) = 0.325 mW/g



Test Laboratory: MOTOROLA GSM 1900 MHz Cheek Touch

DUT Serial: 355499040005626; FCC ID: IHDT56MW2

Procedure Notes: Pwr Step: 00 Battery Model #: SNN5843A DEVICE POSITION (cheek or rotated): Cheek
Communication System: GSM 1900; Frequency: 1880 MHz; Communication System Channel Number: 661; Duty
Cycle: 1:8.3

Medium: Regular Glycol Head 1750/1880; Medium parameters used: $f = 1880$ MHz; $\sigma = 1.45$ mho/m; $\epsilon_r = 38.9$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.03, 5.03, 5.03); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 9/8/2010
- Phantom: R11_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1160;
- 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) = 0.432 mW/g

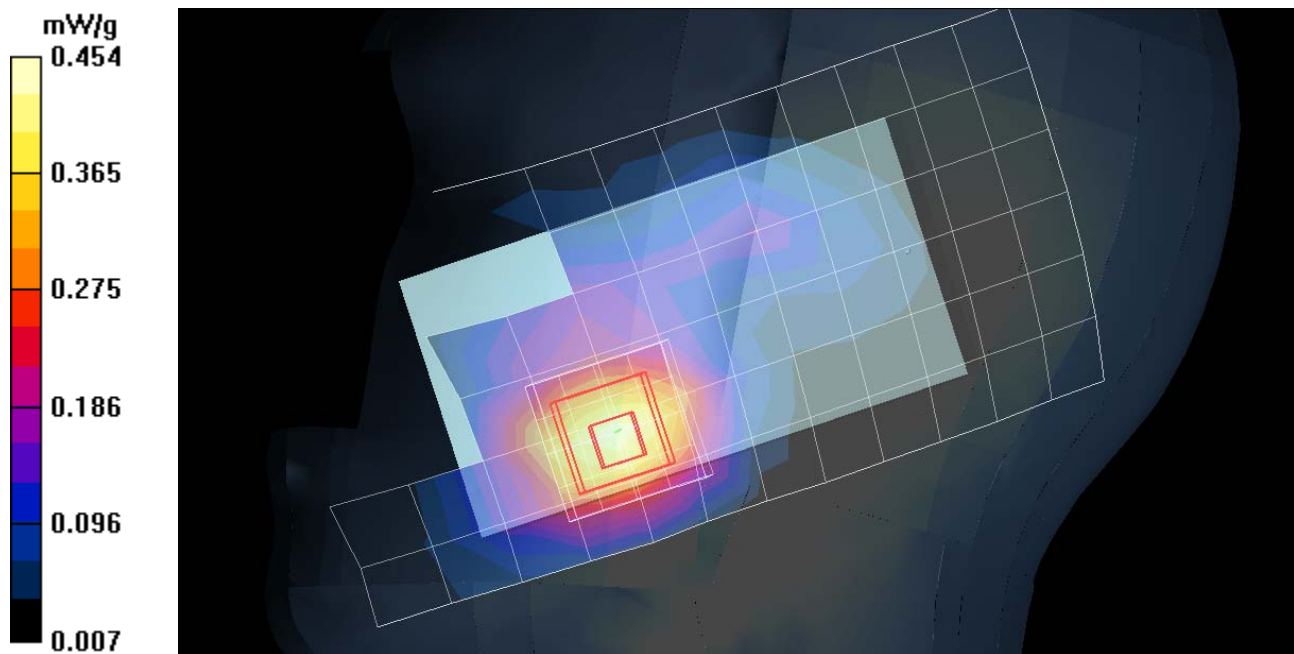
Right Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.4 V/m; Power Drift = -0.052 dB

Peak SAR (extrapolated) = 0.665 W/kg

SAR(1 g) = 0.419 mW/g; SAR(10 g) = 0.249 mW/g

Maximum value of SAR (measured) = 0.454 mW/g



Test Laboratory: MOTOROLA GSM 1900 MHz 15 Degree Tilt

DUT Serial: 355499040005626; FCC ID: IHDT56MW2

Procedure Notes: Pwr Step: 00 Battery Model #: SNN5843A DEVICE POSITION (cheek or rotated): Rotated
Communication System: GSM 1900; Frequency: 1880 MHz; Communication System Channel Number: 661; Duty
Cycle: 1:8.3

Medium: Regular Glycol Head 1750/1880; Medium parameters used: $f = 1880$ MHz; $\sigma = 1.45$ mho/m; $\epsilon_r = 38.9$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.03, 5.03, 5.03); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 9/8/2010
- Phantom: R11_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1160;
- 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) = 0.166 mW/g

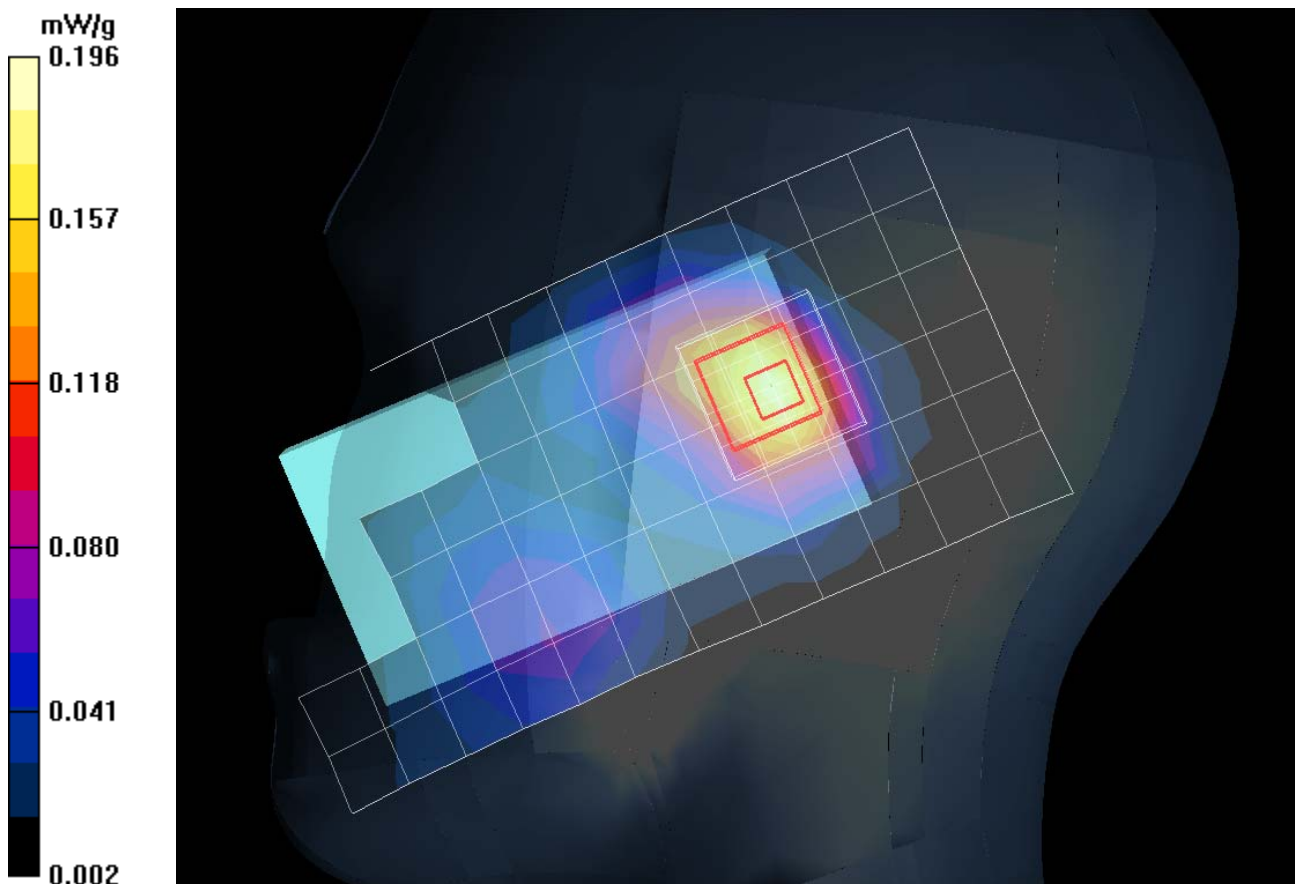
Right Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.1 V/m; Power Drift = -0.062 dB

Peak SAR (extrapolated) = 0.297 W/kg

SAR(1 g) = 0.178 mW/g; SAR(10 g) = 0.103 mW/g

Maximum value of SAR (measured) = 0.196 mW/g



Test Laboratory: MOTOROLA WCDMA 1900 MHz Cheek Touch

DUT Serial: 355499040005626; FCC ID: IHDT56MW2

Procedure Notes: Pwr Step: All Up Battery Model #: SNN5843A DEVICE POSITION (cheek or rotated): Cheek
Communication System: 3G/WCDMA 1900; Frequency: 1880 MHz; Communication System Channel Number:
9400; Duty Cycle: 1:1

Medium: Regular Glycol Head 1750/1880; Medium parameters used: $f = 1880$ MHz; $\sigma = 1.44$ mho/m; $\epsilon_r = 38.4$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.03, 5.03, 5.03); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 9/8/2010
- Phantom: R11_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1160;
- 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) = 1.09 mW/g

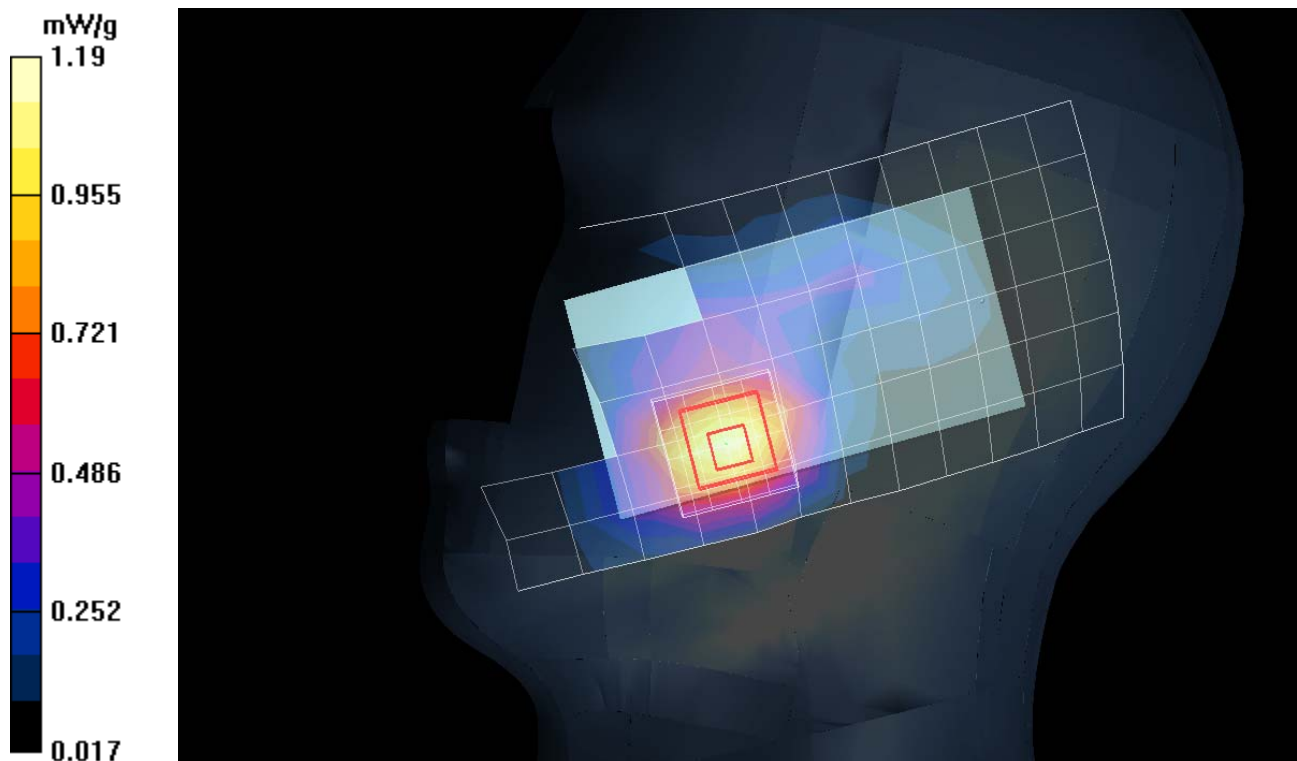
Right Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 24.6 V/m; Power Drift = 0.024 dB

Peak SAR (extrapolated) = 1.70 W/kg

SAR(1 g) = 1.08 mW/g; SAR(10 g) = 0.639 mW/g

Maximum value of SAR (measured) = 1.19 mW/g



Test Laboratory: MOTOROLA WCDMA 1900 MHz 15 Degree Tilt

DUT Serial: 355499040005626; FCC ID: IHDT56MW2

Procedure Notes: Pwr Step: All Up Battery Model #: SNN5843A DEVICE POSITION (cheek or rotated): Rotated
Communication System: 3G/WCDMA 1900; Frequency: 1880 MHz; Communication System Channel Number:
9400; Duty Cycle: 1:1

Medium: Regular Glycol Head 1750/1880; Medium parameters used: $f = 1880$ MHz; $\sigma = 1.44$ mho/m; $\epsilon_r = 38.4$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.03, 5.03, 5.03); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 9/8/2010
- Phantom: R11_Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1160;
- 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) = 0.408 mW/g

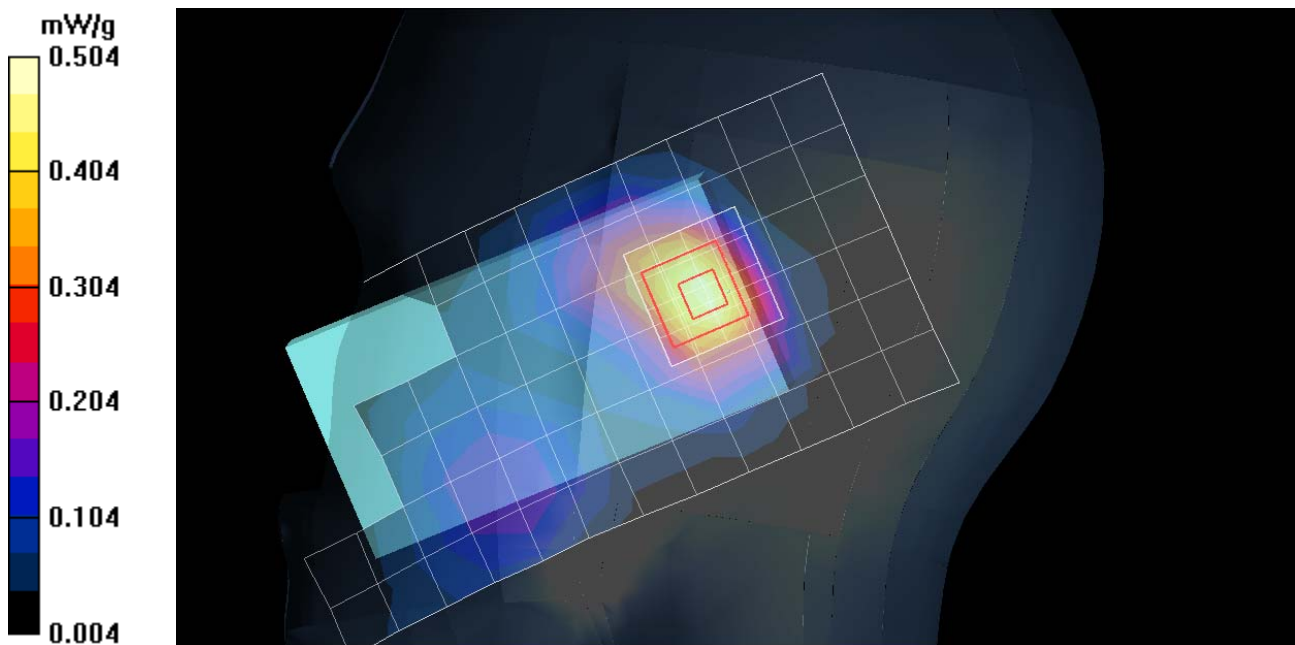
Right Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.0 V/m; Power Drift = 0.012 dB

Peak SAR (extrapolated) = 0.758 W/kg

SAR(1 g) = 0.459 mW/g; SAR(10 g) = 0.265 mW/g

Maximum value of SAR (measured) = 0.504 mW/g



Test Laboratory: Motorola - Wi-Fi 2450 Cheek

Serial: KVT00L0154; FCC ID: IHDP56LK1

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

Battery Model #: SNN5843A; DEVICE POSITION: Cheek

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

Medium: 2450 Glycol Head

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.89$ mho/m; $\epsilon_r = 37$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ES3DV3 - SN3184; ConvF(4.44, 4.44, 4.44); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn440; Calibrated: 2/17/2010
- Phantom: R#4 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1250;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

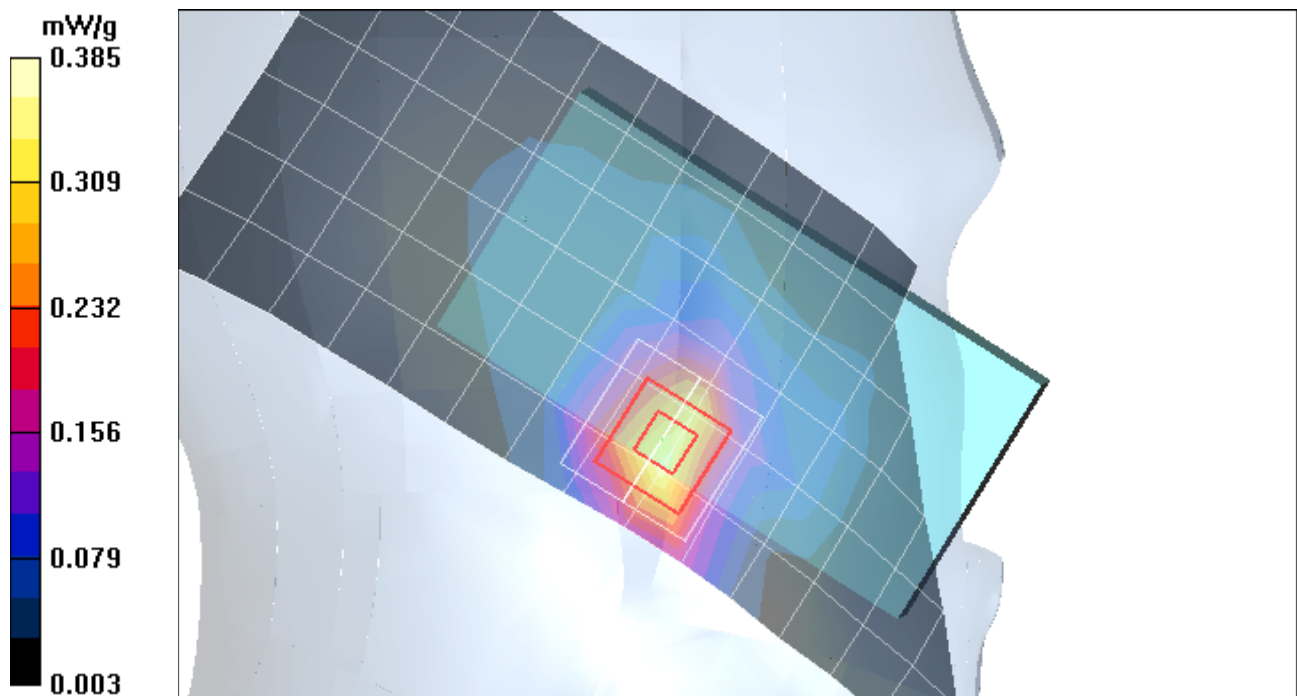
Measurement grid: $dx=15$ mm, $dy=15$ mm; Maximum value of SAR (measured) = 0.352 mW/g

Left Head Template/5x5x7 Zoom Scan (≤ 3 GHz) (5x5x7)/Cube 0:

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

Reference Value = 10.8 V/m; Power Drift = 0.035 dB; Peak SAR (extrapolated) = 0.631 W/kg

SAR(1 g) = 0.351 mW/g; SAR(10 g) = 0.184 mW/g; Maximum value of SAR (measured) = 0.385 mW/g



Test Laboratory: Motorola - Wi-Fi 2450 Tilt

Serial: KVT00L0154; FCC ID: IHDP56LK1

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

Battery Model #: SNN5843A; DEVICE POSITION: Tilt

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

Medium: 2450 Glycol Head

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.89$ mho/m; $\epsilon_r = 37$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ES3DV3 - SN3184; ConvF(4.44, 4.44, 4.44); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn440; Calibrated: 2/17/2010
- Phantom: R#4 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1250;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

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

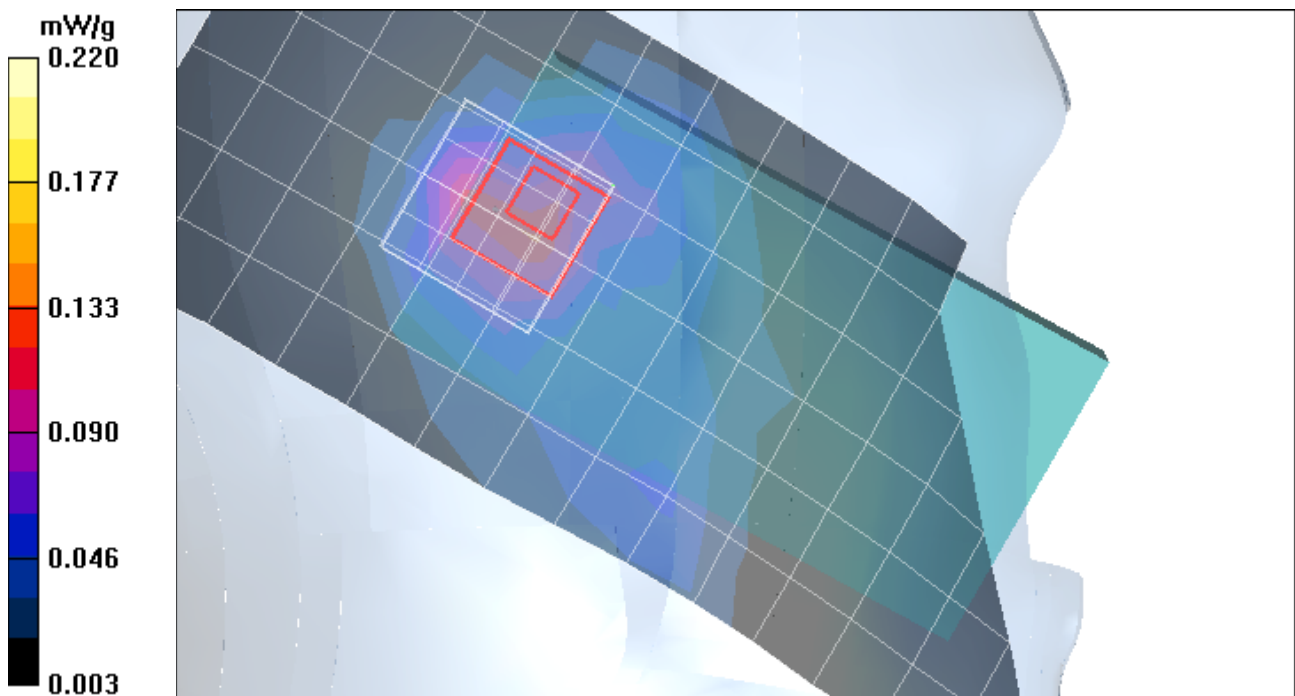
Measurement grid: $dx=15$ mm, $dy=15$ mm; Maximum value of SAR (measured) = 0.122 mW/g

Left Head Template/5x5x7 Zoom Scan (≤ 3 GHz) (5x5x7)/Cube 0:

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

Reference Value = 7.96 V/m; Power Drift = -0.045 dB; Peak SAR (extrapolated) = 0.688 W/kg

SAR(1 g) = 0.222 mW/g; SAR(10 g) = 0.132 mW/g; Maximum value of SAR (measured) = 0.688 mW/g



Appendix 3

SAR distribution plots for Body Worn Configuration

Test Laboratory: Motorola GSM 850 MHz Body Worn

DUT Serial: 355499040005683; FCC ID: IHDT56MW2

Procedure Notes: Pwr Step: 05 Battery Model #: SNN5843A Accessory Model # = Back of phone 25mm from Phantom

Communication System: GPRS 850 - Class 10; Frequency: 836.6 MHz; Communication System Channel Number: 190; Duty Cycle: 1:4.15

Medium: Low Freq Body; Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.97 \text{ mho/m}$; $\epsilon_r = 53.5$; $\rho = 1000 \text{ kg/m}^3$

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(6.01, 6.01, 6.01); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 9/8/2010
- Phantom: R11_ Section 2, Amy Twin, Rev3 (3-Feb-10); 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 Extended Body (15mm) (16x7x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 0.494 mW/g

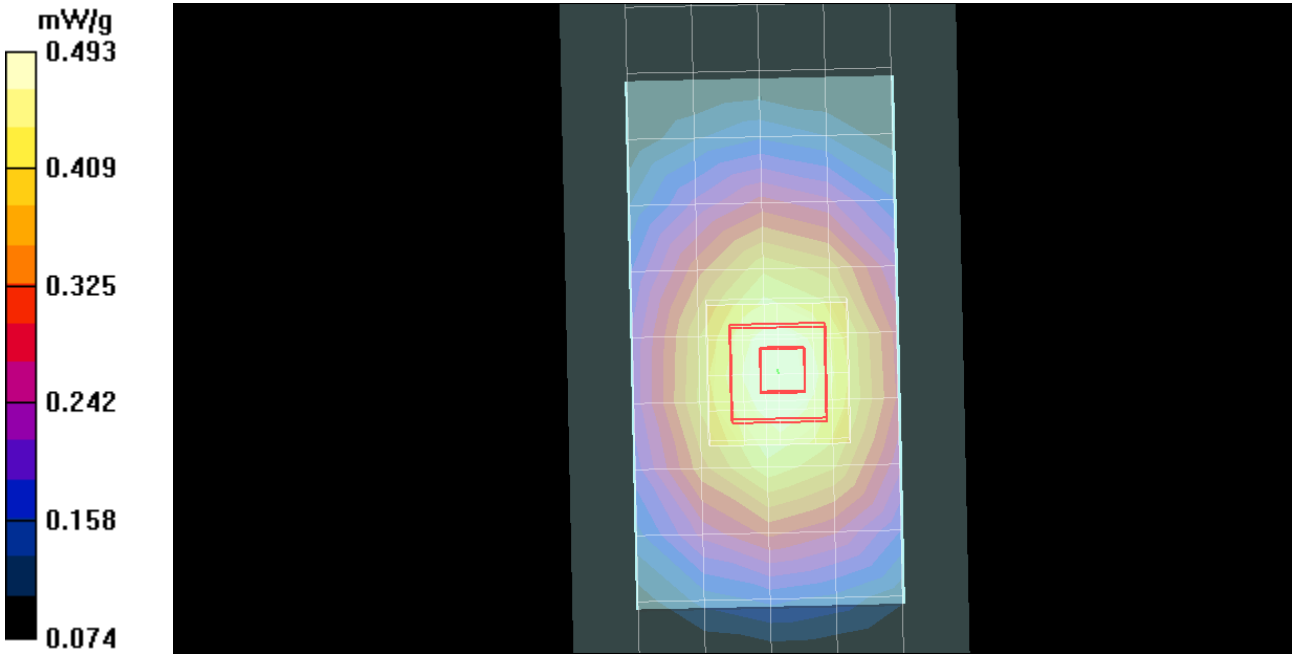
Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 22.7 V/m; Power Drift = -0.319 dB

Peak SAR (extrapolated) = 0.599 W/kg

SAR(1 g) = 0.469 mW/g; SAR(10 g) = 0.351 mW/g

Maximum value of SAR (measured) = 0.493 mW/g



Test Laboratory: Motorola GSM 1900 MHz Body Worn

DUT Serial: 355499040005626; FCC ID: IHDT56MW2

Procedure Notes: Pwr Step: 00 Battery Model #: SNN5843A Accessory Model # = Back of phone 15mm from Phantom

Communication System: GSM 1900; Frequency: 1880 MHz; Communication System Channel Number: 661; Duty Cycle: 1:8.3

Medium: Regular Glycol Body 1750/1880; Medium parameters used: $f = 1880$ MHz; $\sigma = 1.57$ mho/m; $\epsilon_r = 50.8$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(4.71, 4.71, 4.71); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 9/8/2010
- Phantom: R11_ Section 1, Amy Twin, Rev3 (3-Feb-10); 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 Extended Body (15mm) (16x7x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.363 mW/g

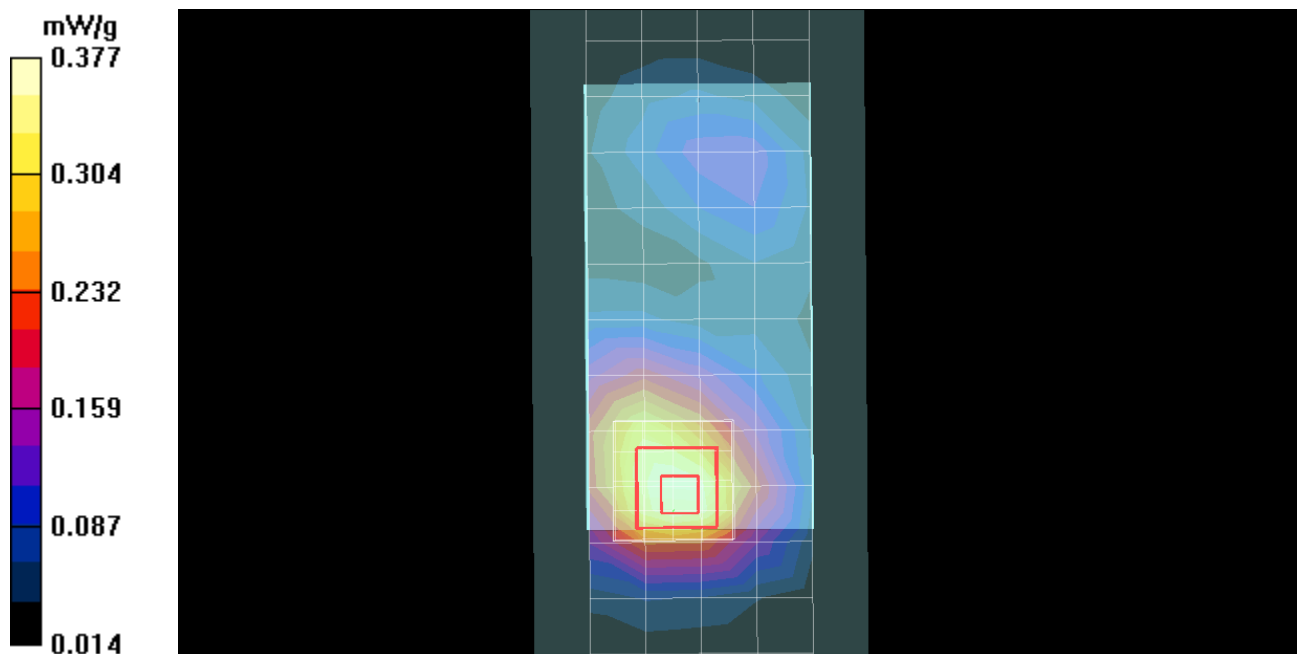
Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.0 V/m; Power Drift = -0.060 dB

Peak SAR (extrapolated) = 0.545 W/kg

SAR(1 g) = 0.360 mW/g; SAR(10 g) = 0.225 mW/g

Maximum value of SAR (measured) = 0.377 mW/g



Test Laboratory: Motorola WCDMA 1900 MHz Body Worn

DUT Serial: 355499040005626; FCC ID: IHDT56MW2

Procedure Notes: Pwr Step: All Up Antenna Position: Fixed Battery Model #: SNN5843A Accessory Model # =Back of phone 15mm from Phantom

Communication System: 3G/WCDMA 1900; Frequency: 1880 MHz; Communication System Channel Number: 9400; Duty Cycle: 1:1

Medium: Regular Glycol Body 1750/1880; Medium parameters used: $f = 1880$ MHz; $\sigma = 1.59$ mho/m; $\epsilon_r = 50.7$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(4.71, 4.71, 4.71); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 9/8/2010
- Phantom: R11_ Section 1, Amy Twin, Rev3 (3-Feb-10); 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 Extended Body (15mm) (16x7x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.840 mW/g

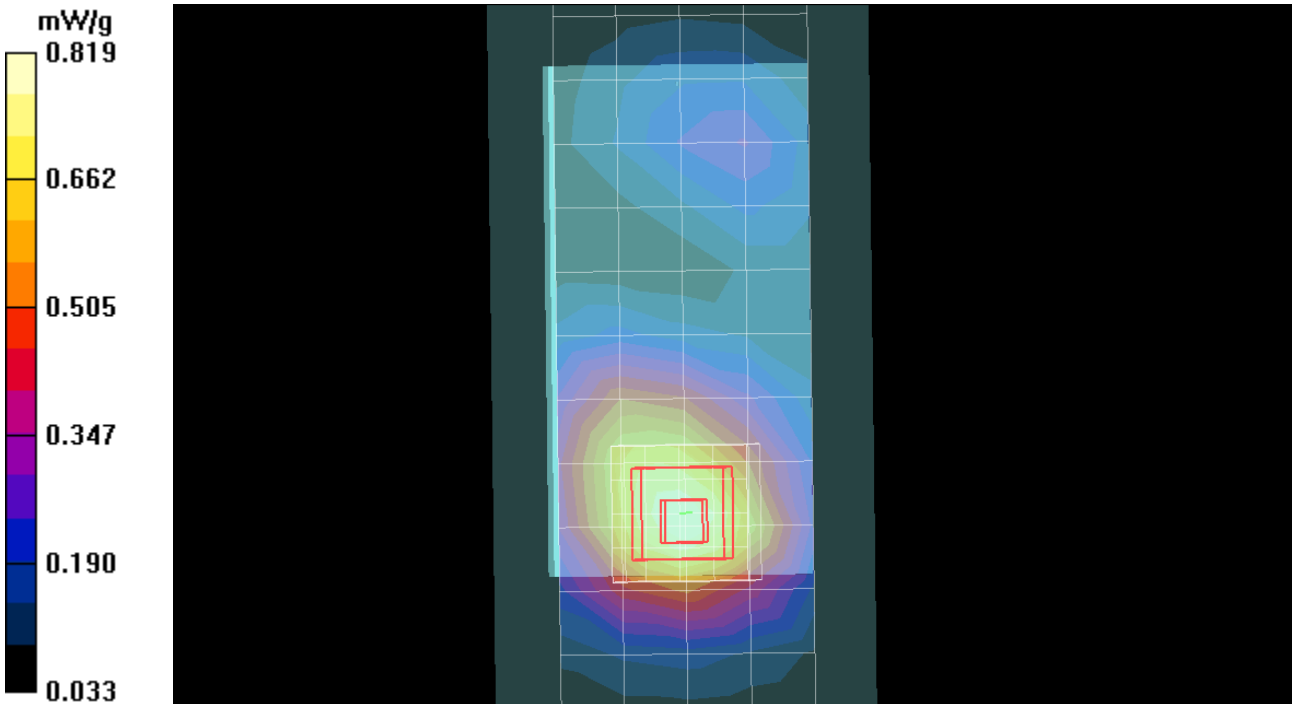
Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 23.5 V/m; Power Drift = -0.182 dB

Peak SAR (extrapolated) = 1.16 W/kg

SAR(1 g) = 0.765 mW/g; SAR(10 g) = 0.482 mW/g

Maximum value of SAR (measured) = 0.819 mW/g



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

Serial: KVT00L0154; FCC ID: IHDP56LK1

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

Device Position: Body Worn, Back of Phone 15 mm from Phantom

Communication System: Wi-Fi 2450; Frequency: 2462 MHz; Channel Number: 11; Duty Cycle: 1:1

Medium: 2450 Glycol Body

Medium parameters used: $f = 2450$ MHz; $\sigma = 2.03$ mho/m; $\epsilon_r = 50$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ES3DV3 - SN3184; ConvF(4.28, 4.28, 4.28); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn440; Calibrated: 2/17/2010
- Phantom: R4 : Sect.1, Amy Twin, Rev.3 (3-Feb-10); 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):

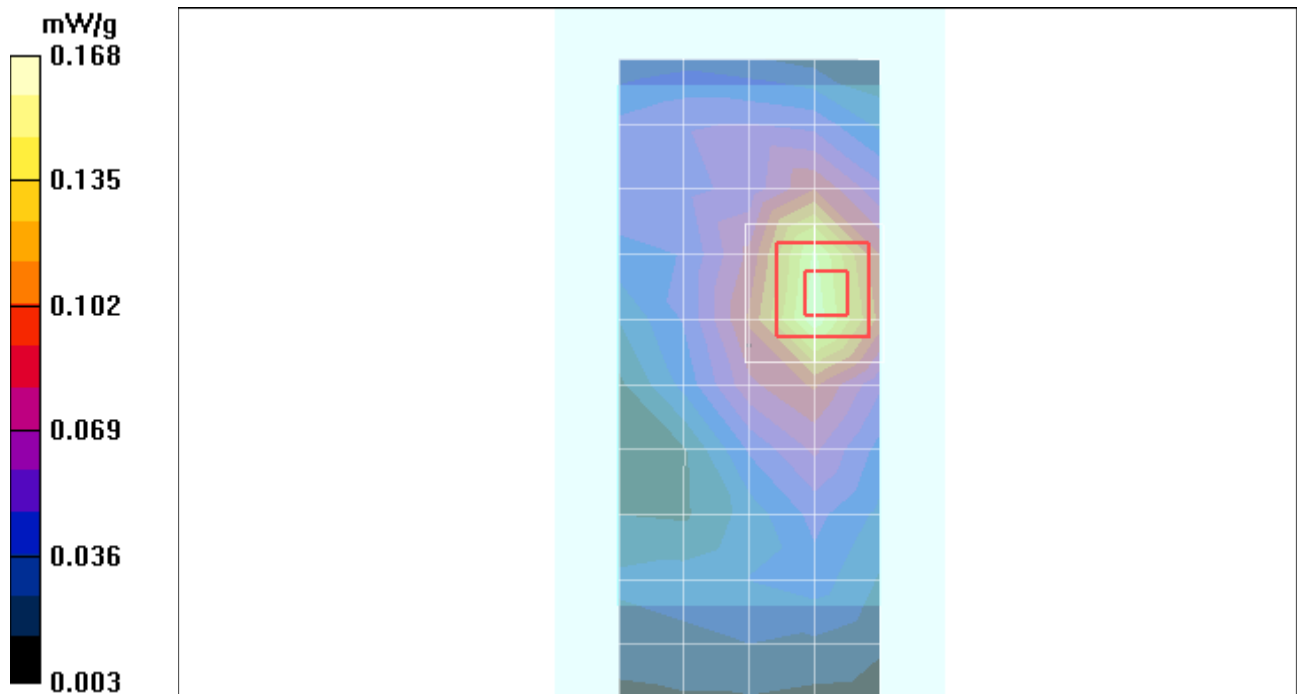
Measurement grid: dx=15mm, dy=15mm; Maximum value of SAR (measured) = 0.155 mW/g

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

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

Reference Value = 7.16 V/m; Power Drift = -0.026 dB; Peak SAR (extrapolated) = 0.272 W/kg

SAR(1 g) = 0.155 mW/g; SAR(10 g) = 0.085 mW/g; Maximum value of SAR (measured) = 0.168 mW/g



Appendix 4

SAR distribution plots for Mobile Hotspot Configuration

Test Laboratory: Motorola GSM 850 MHz WiFi Mode Test

DUT Serial: 355499040005683; FCC ID: IHDT56MW2

Procedure Notes: Pwr Step: 05 Antenna Position: Fixed Battery Model #: SNN5843 Accessory Model # = Back of Phone 10mm from Phantom

Communication System: GPRS 850 - Class 10; Frequency: 824.2 MHz; Communication System Channel Number: 128; Duty Cycle: 1:4.15

Medium: Low Freq Body; Medium parameters used: $f = 835$ MHz; $\sigma = 0.96$ mho/m; $\epsilon_r = 53$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(6.01, 6.01, 6.01); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 9/8/2010
- Phantom: R11_ Section 1, Amy Twin, Rev3 (3-Feb-10); 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 Extended Body (15mm) (16x7x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.04 mW/g

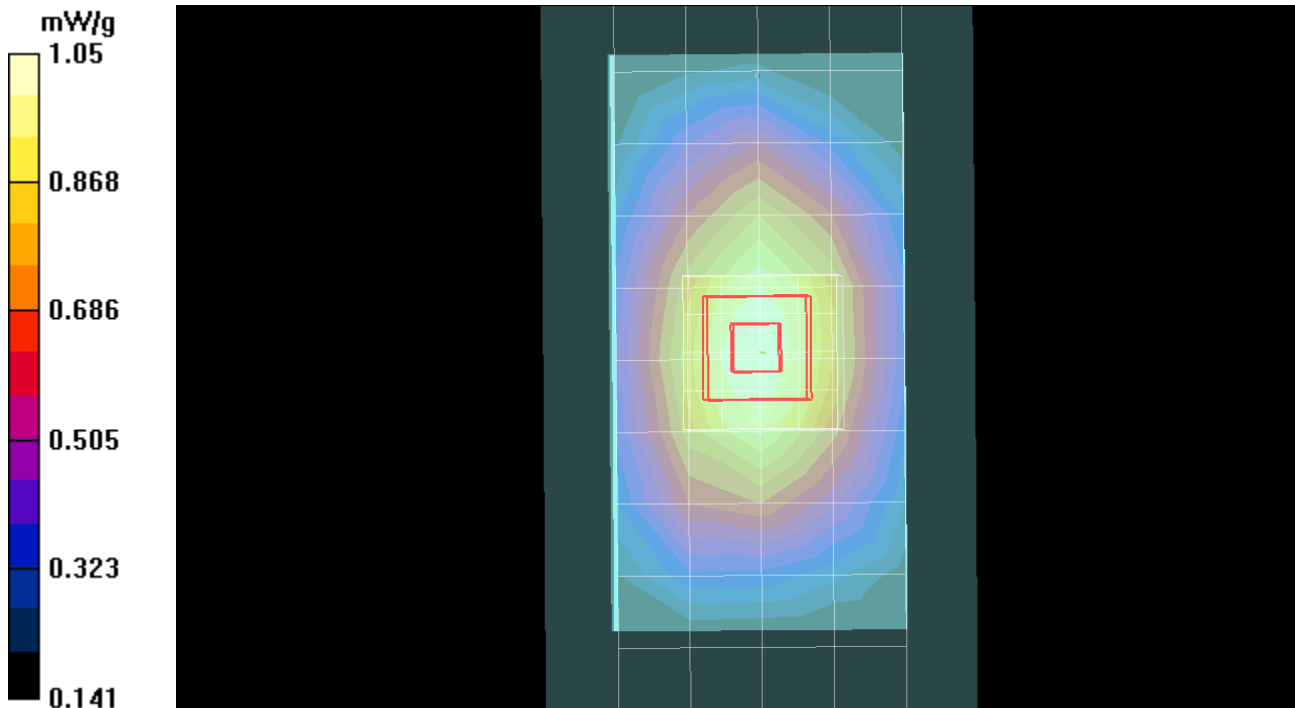
Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 32.3 V/m; Power Drift = 0.005 dB

Peak SAR (extrapolated) = 1.25 W/kg

SAR(1 g) = 0.994 mW/g; SAR(10 g) = 0.744 mW/g

Maximum value of SAR (measured) = 1.05 mW/g



Test Laboratory: Motorola GSM 1900 MHz WiFi Hotspot Mode Test

DUT Serial: 355499040005683; FCC ID: [IHDT56MW2](#)

Procedure Notes: Pwr Step: 00 Battery Model #: SNN5843A Accessory Model # =Back of Phone 10mm from Phantom

Communication System: GPRS 1900 - Class 10; Frequency: 1850.2 MHz; Communication System Channel Number: 512; Duty Cycle: 1:4.15

Medium: Regular Glycol Body 1750/1880; Medium parameters used: $f = 1880$ MHz; $\sigma = 1.57$ mho/m; $\epsilon_r = 51$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(4.71, 4.71, 4.71); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 9/8/2010
- Phantom: R11_ Section 2, Amy Twin, Rev3 (3-Feb-10); 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 Extended Body (15mm) (16x7x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.963 mW/g

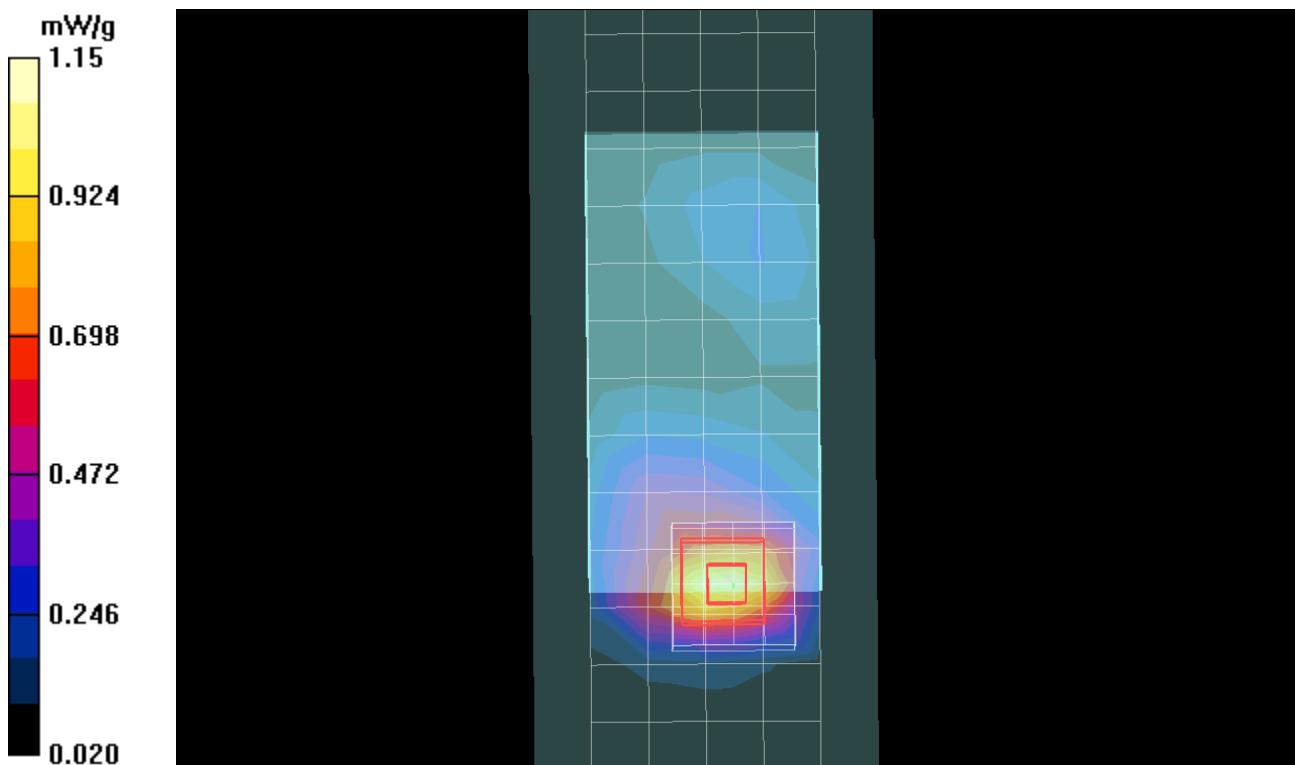
Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 19.3 V/m; Power Drift = -0.010 dB

Peak SAR (extrapolated) = 1.63 W/kg

SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.582 mW/g

Maximum value of SAR (measured) = 1.15 mW/g



Test Laboratory: Motorola WCDMA 1900 MHz WiFi Hotspot Mode Test

DUT Serial: 355499040005683; FCC ID: IHDT56MW2

Procedure Notes: Pwr Step: All up Battery Model #: SNN5843A Accessory Model # =Back of Phone 10mm from Phantom

Communication System: 3G/WCDMA 1900; Frequency: 1880 MHz; Communication System Channel Number: 9400; Duty Cycle: 1:1

Medium: Regular Glycol Body 1750/1880; Medium parameters used: $f = 1880$ MHz; $\sigma = 1.59$ mho/m; $\epsilon_r = 50.7$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(4.71, 4.71, 4.71); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 9/8/2010
- Phantom: R11_ Section 1, Amy Twin, Rev3 (3-Feb-10); 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 Extended Body (15mm) (16x7x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.885 mW/g

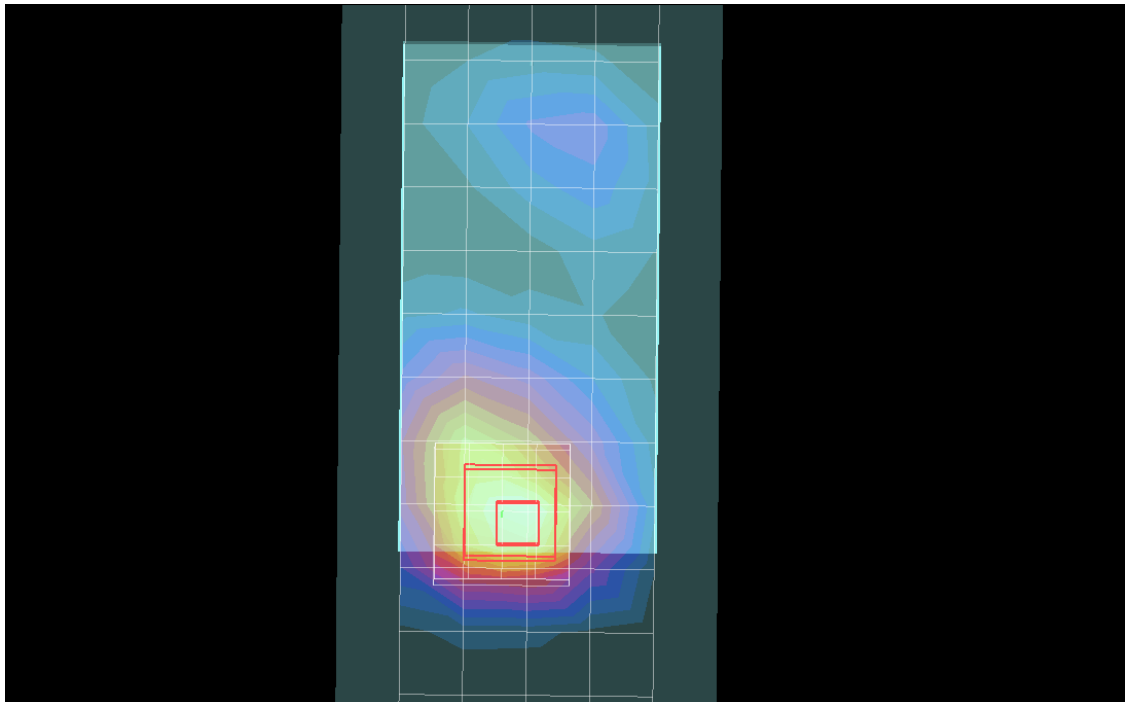
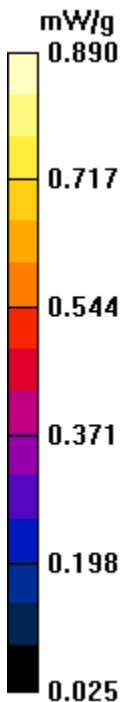
Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 22.6 V/m; Power Drift = -0.016 dB

Peak SAR (extrapolated) = 1.32 W/kg

SAR(1 g) = 0.853 mW/g; SAR(10 g) = 0.514 mW/g

Maximum value of SAR (measured) = 0.890 mW/g...



Test Laboratory: Motorola WiFi 2450MHz Hotspot Mode Test

DUT Serial: 355499040005626; FCC ID: IHDT56MW2

Procedure Notes: Pwr Step: Max Battery Model #: SNN5843A Accessory Model # = Left Edge of Phone 10mm from Phantom

Communication System: Wi-Fi 2450; Frequency: 2462 MHz; Communication System Channel Number: 11; Duty Cycle: 1:1

Medium: 2450 Glycol Body; Medium parameters used: $f = 2450$ MHz; $\sigma = 1.99$ mho/m; $\epsilon_r = 50.7$; $\rho = 1000$ kg/m³

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(4.22, 4.22, 4.22); Calibrated: 5/20/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn365; Calibrated: 9/8/2010
- Phantom: R11_ Section 2, Amy Twin, Rev3 (3-Feb-10); 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 Extended Body (15mm) (16x7x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.267 mW/g

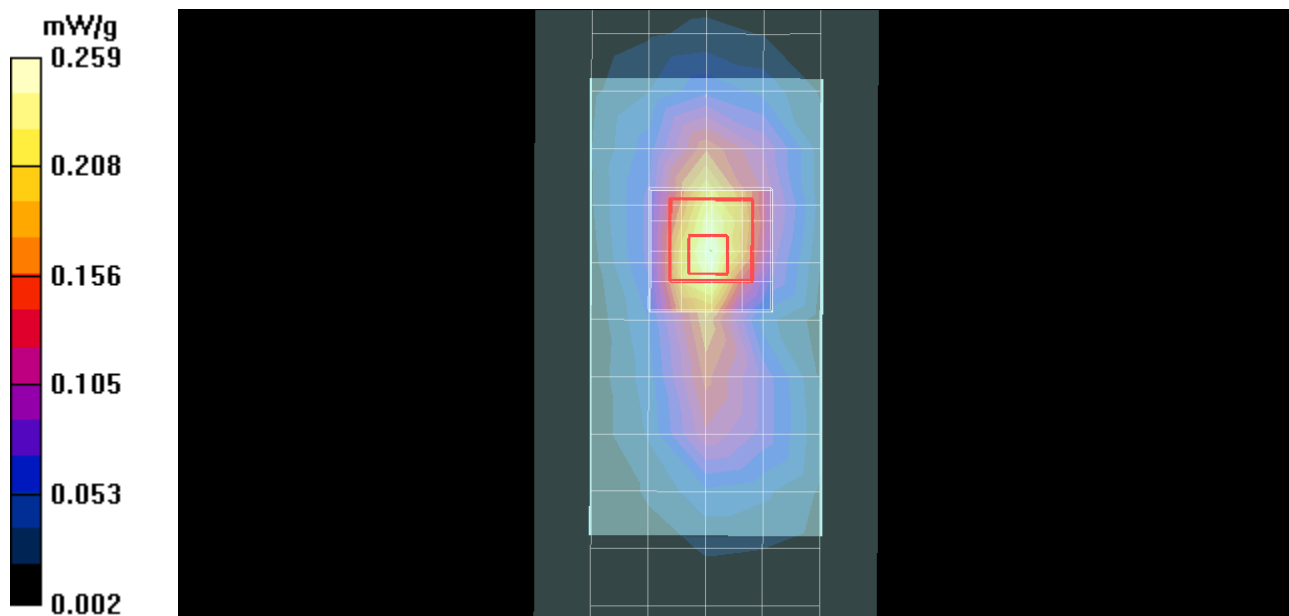
Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.6 V/m; Power Drift = -0.063 dB

Peak SAR (extrapolated) = 0.472 W/kg

SAR(1 g) = 0.235 mW/g; SAR(10 g) = 0.122 mW/g

Maximum value of SAR (measured) = 0.259 mW/g



Appendix 5

Measurement Uncertainty Budget

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	$e = f(d,k)$	<i>f</i>	<i>g</i>	$h = c \times f / e$	$i = c \times g / e$	<i>k</i>
Uncertainty Component	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
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

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: **ES3-3184_Sep09**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3184**

Calibration procedure(s) **QA CAL-01.v6, QA CAL-23.v3 and QA CAL-25.v2
 Calibration procedure for dosimetric E-field probes**

Calibration date: **September 18, 2009**

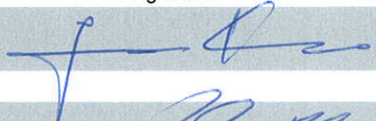
Condition of the calibrated item **In Tolerance**


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

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

Calibration Equipment used (M&TE critical for calibration)

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

Calibrated by: **Jeton Kastrati** (Name) **Laboratory Technician** (Function)  (Signature)

Approved by: **Katja Pokovic** (Name) **Technical Manager** (Function)  (Signature)

Issued: September 21, 2009

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 _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,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:

- 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_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E²-field uncertainty inside TSL (see below *ConvF*).
- NORM(f)_{x,y,z}** = NORM_{x,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*.
- DCP_{x,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 NORM_{x,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:3184

Manufactured:	August 19, 2008
Last calibrated:	September 22, 2008
Recalibrated:	September 18, 2009

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ES3DV3 SN:3184

Sensitivity in Free Space^A

NormX	1.28 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$
NormY	1.36 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$
NormZ	1.27 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$

Diode Compression^B

DCP X	91 mV
DCP Y	92 mV
DCP Z	95 mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL **835 MHz** **Typical SAR gradient: 5 % per mm**

Sensor Center to Phantom Surface Distance		3.0 mm	4.0 mm
SAR _{be} [%]	Without Correction Algorithm	11.1	7.3
SAR _{be} [%]	With Correction Algorithm	0.8	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	12.1	8.3
SAR _{be} [%]	With Correction Algorithm	0.8	0.4

Sensor Offset

Probe Tip to Sensor Center **2.0 mm**

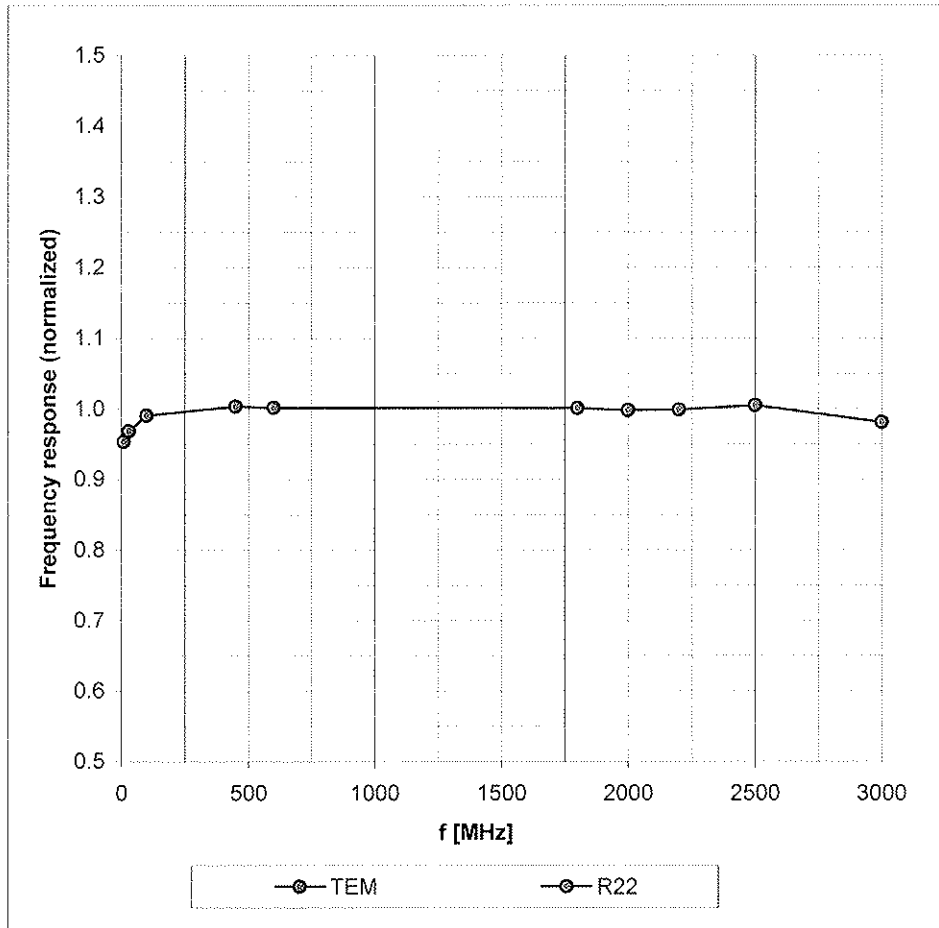
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Page 8).

^B Numerical linearization parameter: uncertainty not required.

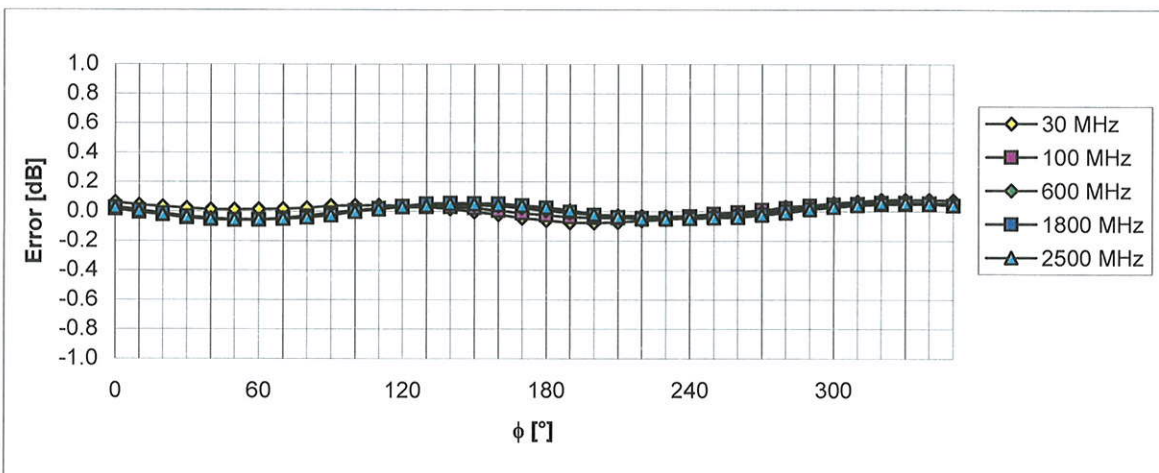
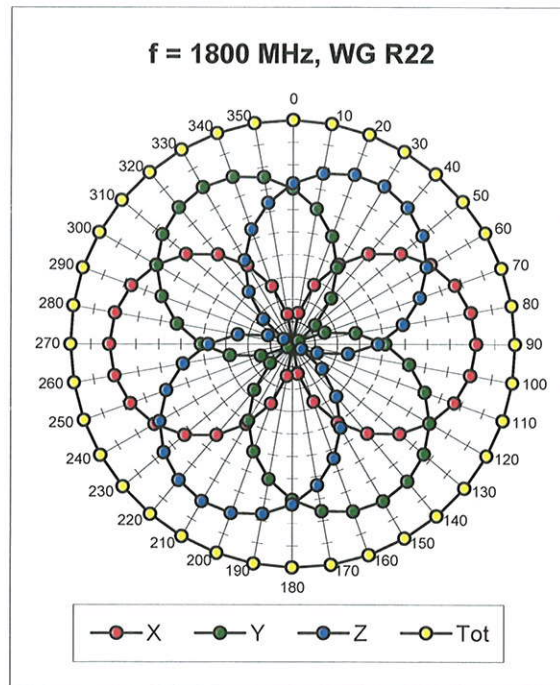
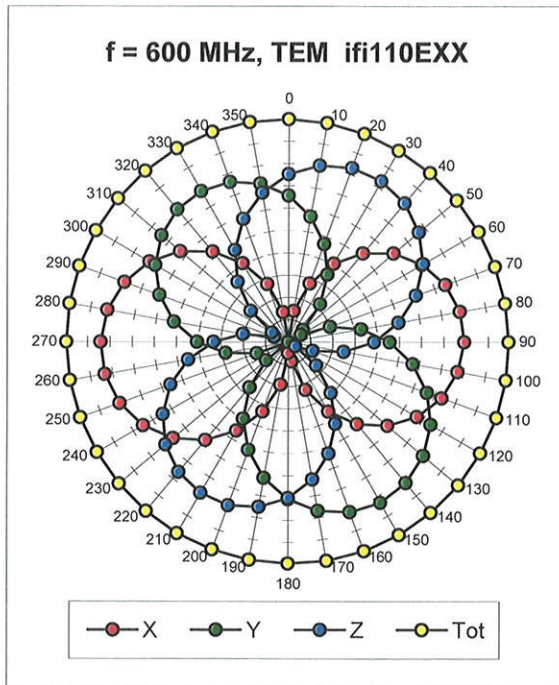
Frequency Response of E-Field

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



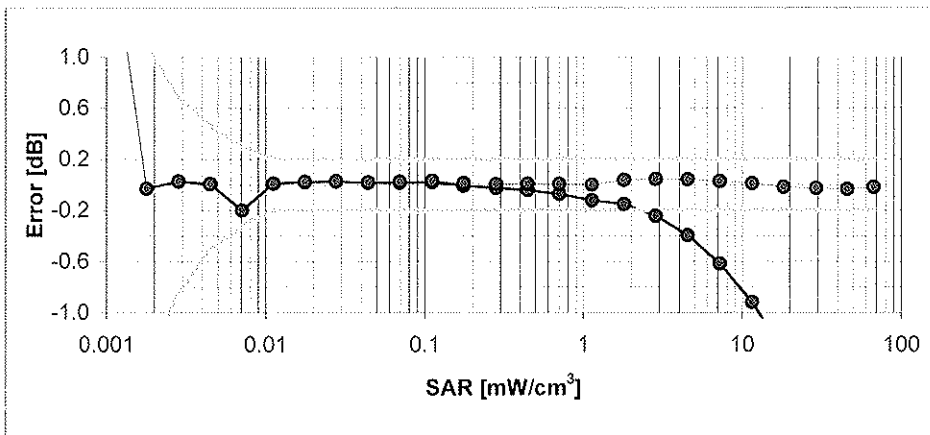
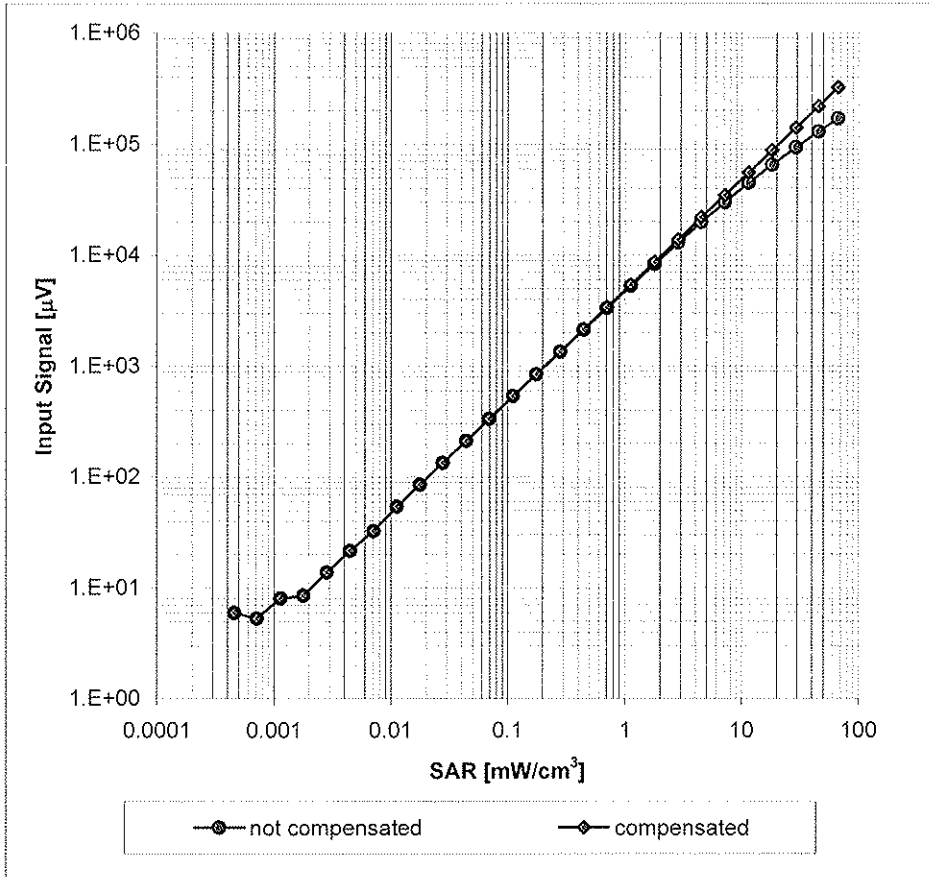
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

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



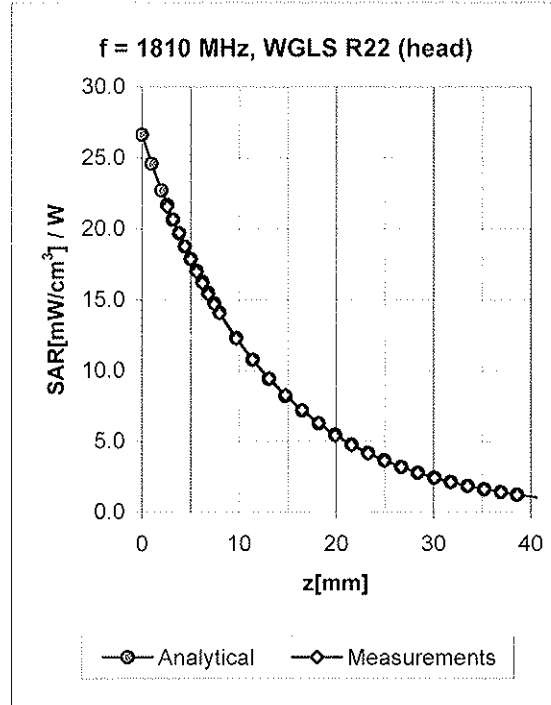
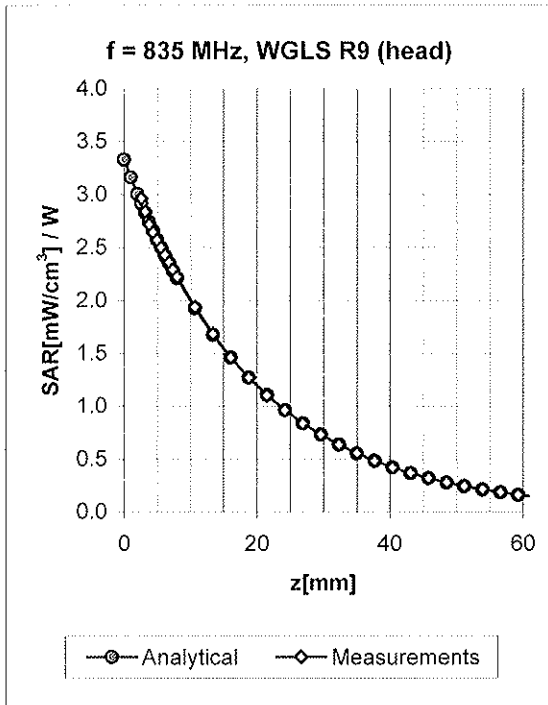
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

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

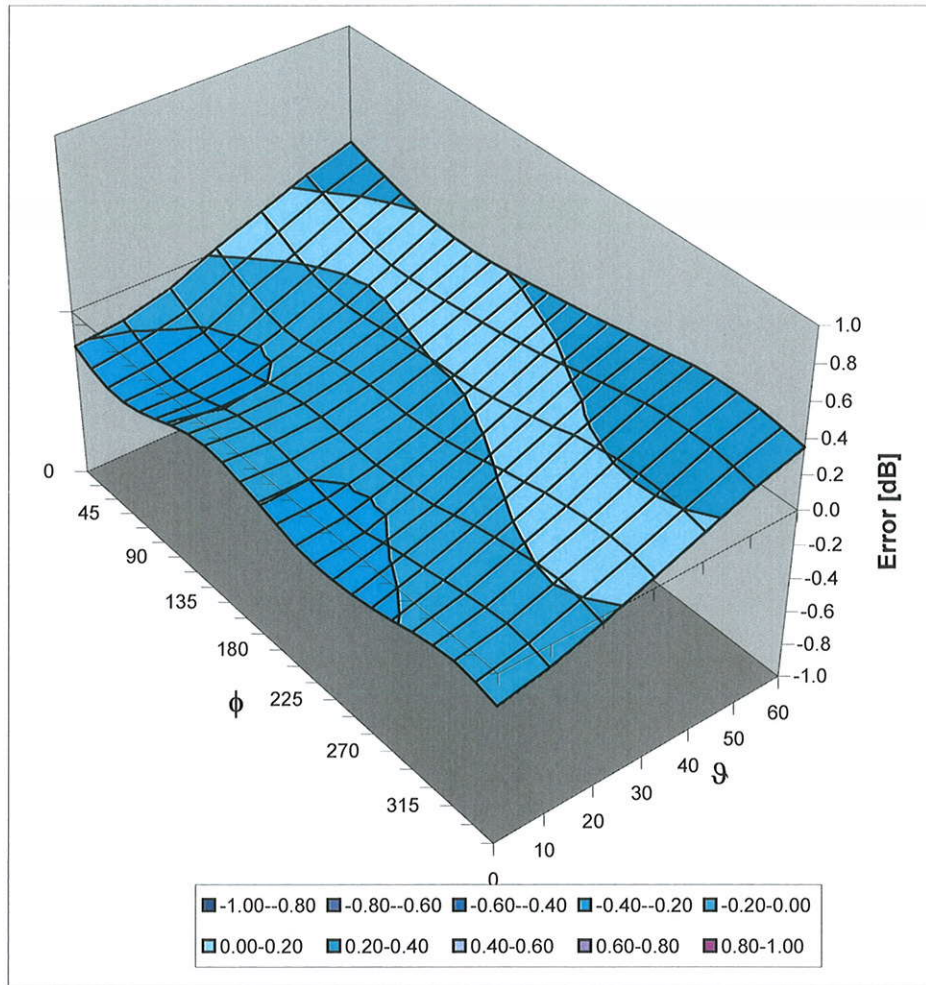


f [MHz]	Validity [MHz] ^c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.27	2.21	6.26 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.26	2.94	5.14 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.23	3.55	4.94 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.34	2.33	4.44 ± 11.0% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.32	1.92	6.08 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.37	2.02	4.84 ± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.30	2.95	4.81 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.99	1.20	4.28 ± 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: $\pm 2.6\%$ ($k=2$)



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 Beijing**

Certificate No: **ES3-3180_May10**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3180**

Calibration procedure(s) **QA CAL-01.v6, QA CAL-23.v3 and QA CAL-25.v2
Calibration procedure for dosimetric E-field probes**

Calibration date: **May 20, 2010**

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-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013_Dec09)	Dec-10
DAE4	SN: 660	20-Apr-10 (No. DAE4-660_Apr10)	Apr-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct10

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 22, 2010

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 _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
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:

- 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_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E^2 -field uncertainty inside TSL (see below *ConvF*).
- NORM(f)_{x,y,z}** = NORM_{x,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*.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}**: A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- 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_{x,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:3180

Manufactured:	March 25, 2008
Last calibrated:	July 21, 2009
Recalibrated:	May 20, 2010

Calibrated for DASYS/EASY Systems

(Note: non-compatible with DASYS2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 SN:3180

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	1.22	1.06	1.04	± 10.1%
DCP (mV) ^B	94.9	92.3	94.5	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc ^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300.0	± 1.5%
			Y	0.00	0.00	1.00	300.0	
			Z	0.00	0.00	1.00	300.0	

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 E²-field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the maximum deviation from linear response applying recatangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 SN:3180

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz] ^c	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
835	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	6.01	6.01	6.01	0.63	1.21 ± 11.0%
1810	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	5.03	5.03	5.03	0.55	1.34 ± 11.0%
1950	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	4.81	4.81	4.81	0.41	1.57 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	4.42	4.42	4.42	0.41	1.72 ± 11.0%

^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.

DASY/EASY - Parameters of Probe: ES3DV3 SN:3180

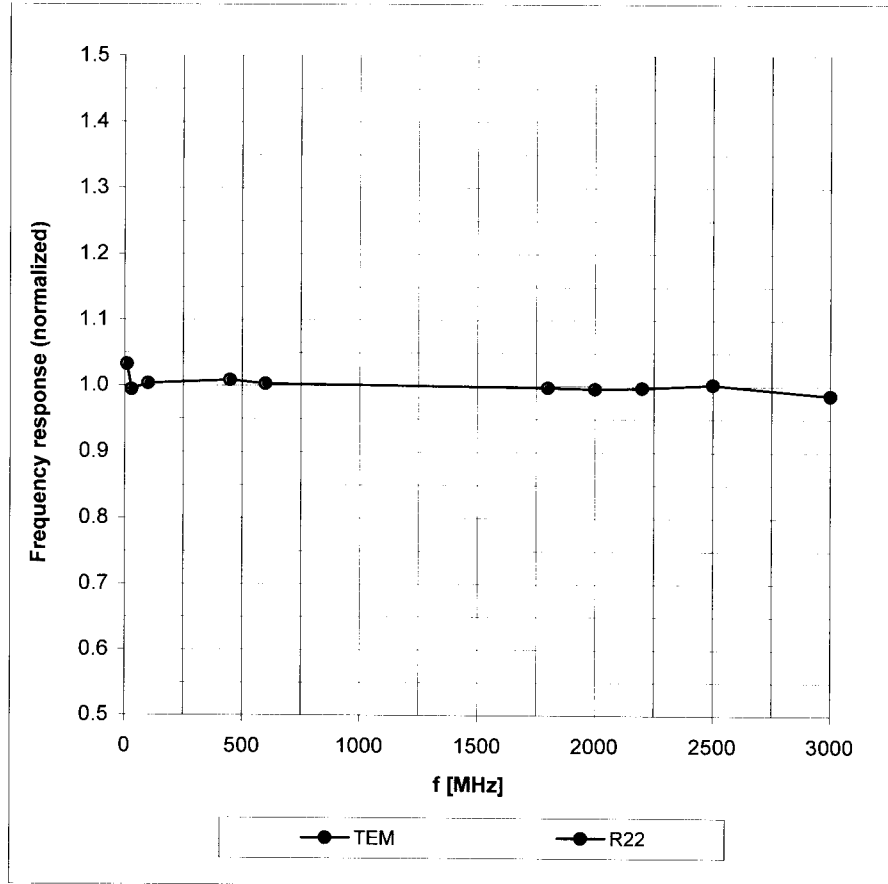
Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz] ^c	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
835	± 50 / ± 100	55.2 ± 5%	0.97 ± 5%	6.01	6.01	6.01	0.77	1.14 ± 11.0%
1810	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.71	4.71	4.71	0.31	2.14 ± 11.0%
1950	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.72	4.72	4.72	0.30	2.62 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	4.22	4.22	4.22	0.67	1.29 ± 11.0%

^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.

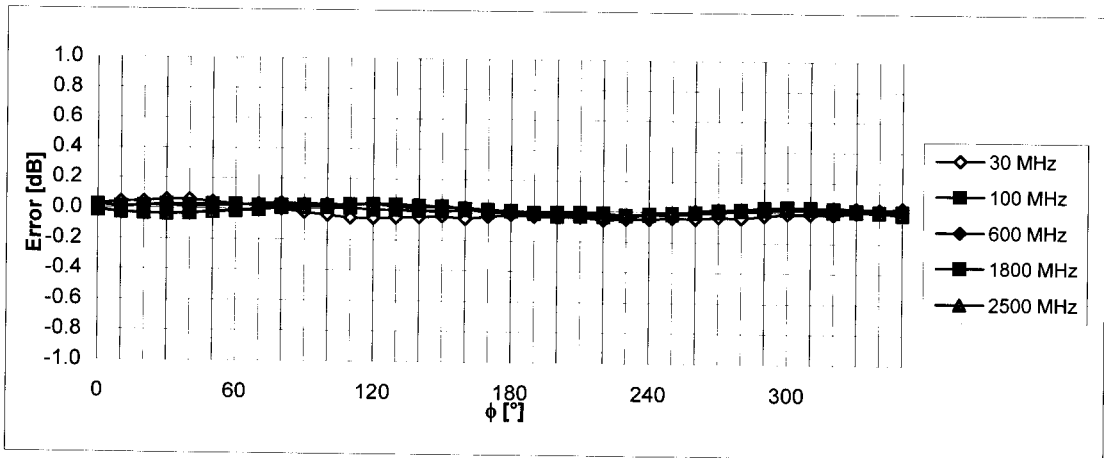
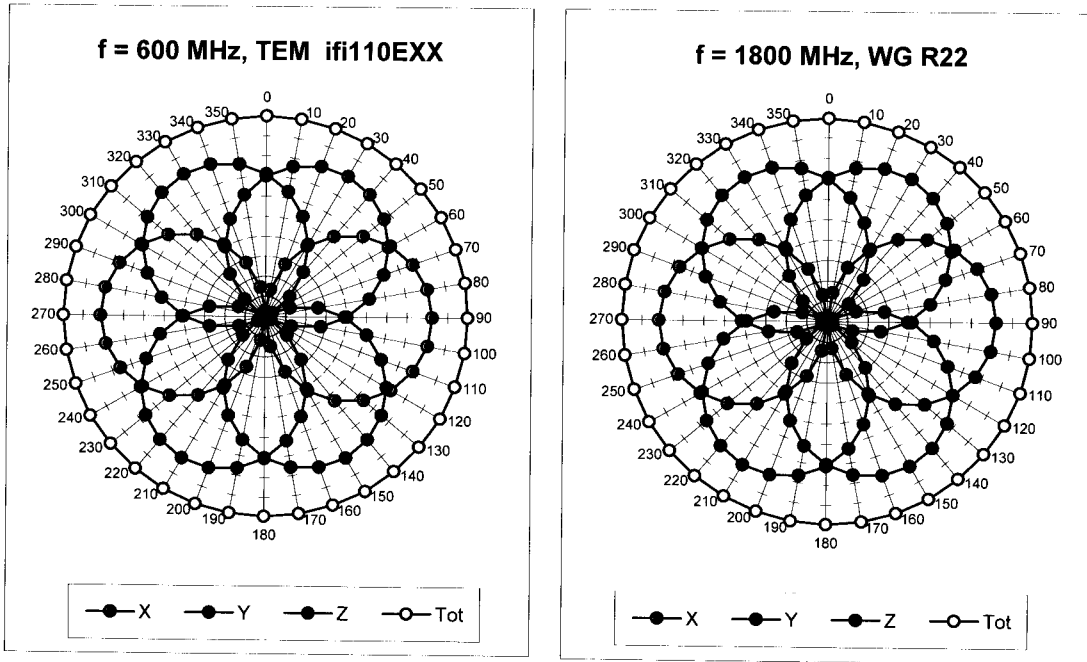
Frequency Response of E-Field

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



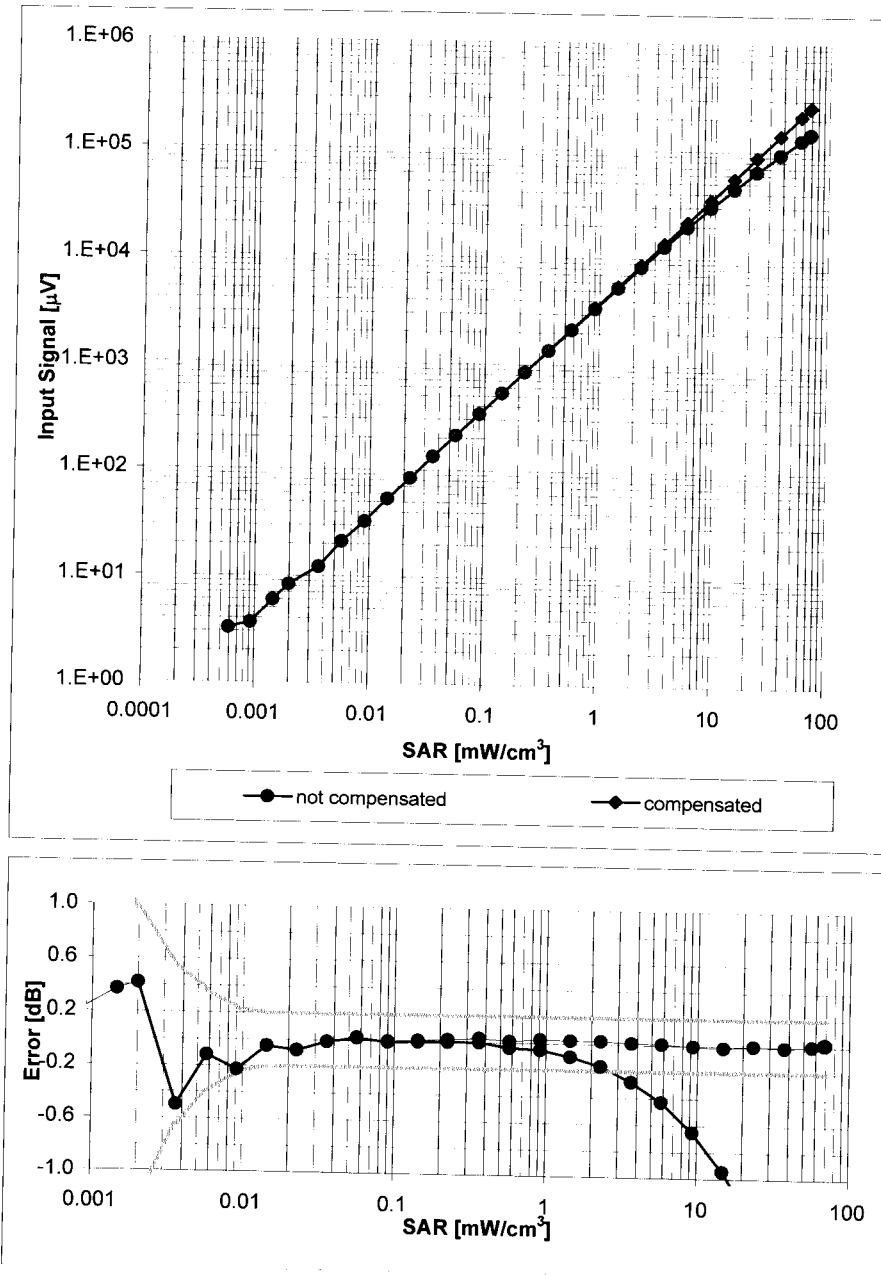
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

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



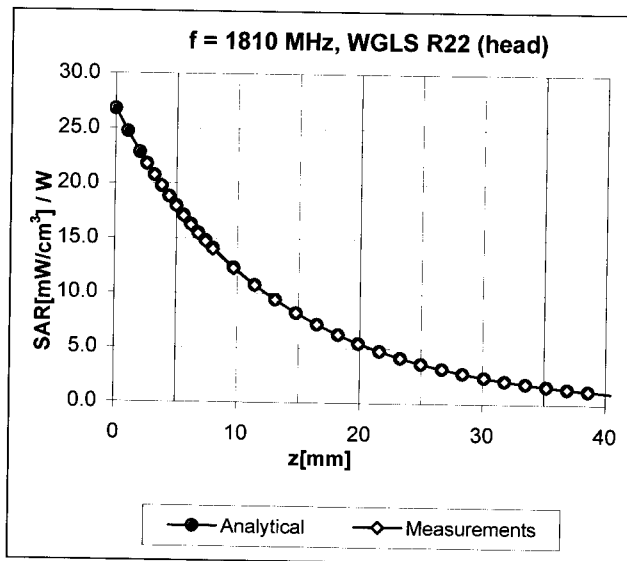
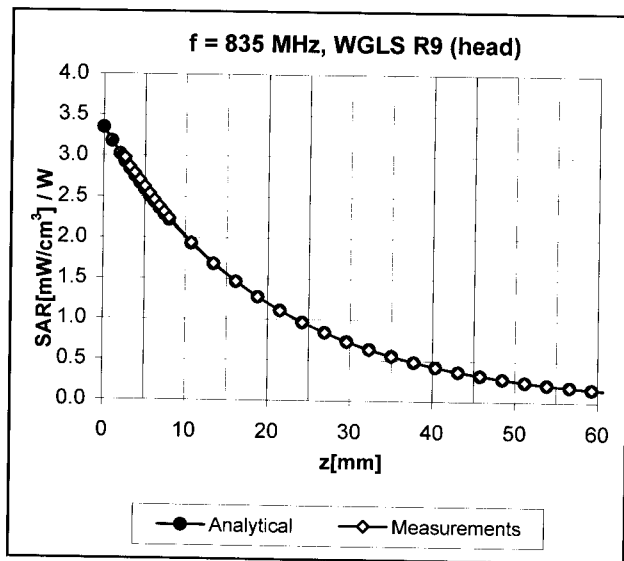
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

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



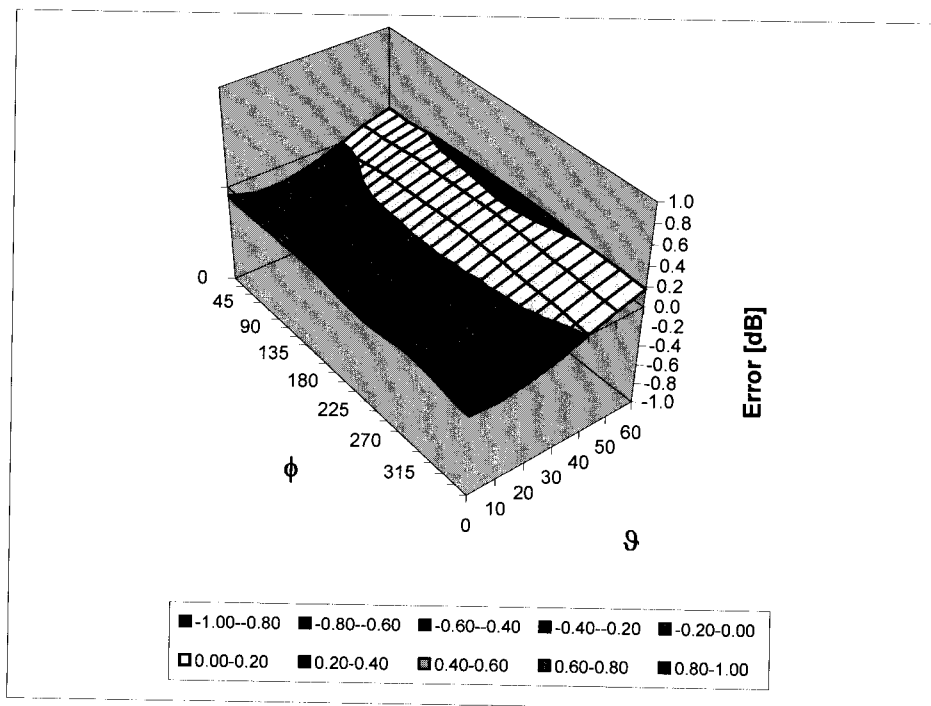
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in HSL

Error (ϕ, θ), f = 900 MHz



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

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4.0 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

END OF REPORT