Portable Cellular Phone SAR Test Report

Tests Requested By:	Motorola Mobility, Inc. 600 N. US Highway 45 Libertyville, IL 60048
Test Report #:	24967-1F
Date of Report:	April 30, 2012
Date of Test:	Apr 4, 2012 – Apr 27, 2012
FCC ID #:	IHDT56NH2
Generic Name:	
Test Laboratory:	Motorola Mobility, Inc. - ADR Test Services Laboratory 600 N. US Highway 45 Libertyville, IL 60048
Report Author:	Katerina Bruggemann Engineer

Accreditation:

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

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

2404

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:

Motorola's ISO 17025 accreditation scope does not currently include SAR testing in the 5 GHz band. Therefore, SAR testing performed in this band was performed outside of our ISO 17025 accreditation. The general procedures and guidelines provided within; FCC KDB 248227 D01, FCC KDB 648474 D01, FCC KDB 865664 D01 and IEC 62209-2 were utilized for testing.

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Revision History

Revision Version	Date	Notes
Rev. 0	30-Apr-2012	Initial report release

1. Introduction

The Motorola Mobility ADR Test Services 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 stand-alone SAR readings for this phone are given in the table below. These measurements were performed using a DASY4™ v4.7 or DASY52™ system manufactured by Schmid & Partner Engineering AG (SPEAG), of Zurich Switzerland.

Transmit Band	Head SAR (1 g $^{W}/_{kg}$)	Body SAR (1 g $^{W}/_{kg}$)	Mobile Hotspot SAR (1 g $^{W}/_{kg}$)
CDMA 800	**0.75**	**0.65**	**0.31**
CDMA 1900	**0.83**	**0.44**	**1.49**
GSM 850	**0.69**	**0.63**	**0.40**
GSM 1900	**0.42**	**0.22**	**0.67**
Wi-Fi 2.45 GHz	**0.28**	**0.01**	**0.10**

2. Description of the Device Under Test

2.1 Antenna description

Main (850/1900 MHz) Antenna

Type	Internal	
Location	Bottom of Transceiver	
Dimensions	Width	2.40 mm
	Length	50.00 mm

Bluetooth/Wi-Fi 2 GHz Antenna

Type	Internal	
Location	Right-Side Rear of Transceiver	
Dimensions	Width	2.56 mm
	Length	12.40 mm

2.2 Device Signaling[1]

Serial Number(s) (Functional Use)	351633050007783 (CDMA/GSM conducted power measurements, CDMA/GSM SAR testing) 351915050001308 (Wi-Fi 2.4 GHz conducted power measurements) 352206050003182 (Wi-Fi 2.4 GHz SAR testing)
Production Unit or Identical Prototype (47 CFR §2..908)	Identical Prototype
Device Category	Portable (Mobile Station Class B)
RF Exposure Limits	General Population / Uncontrolled

Mode(s) of Operation	Modulation Mode(s)	Maximum Output Power Setting	Duty Cycle	Transmitting Frequency Range(s)
CDMA 800	QPSK	25.0 dBm	1:1	824.70 - 848.31 MHz
CDMA 1900	QPSK	25.0 dBm	1:1	1851.20 - 1908.75 MHz
GSM 850	GMSK	33.5 dBm	1:8	824.2 - 848.8 MHz
GSM 1900	GMSK	30.5 dBm	1:8	1850.2 - 1909.8 MHz
Wi-Fi 802.11b/g/n	BPSK	19.26 dBm	1:1	2412.0 - 2462.0 MHz
Bluetooth	GFSK	9.78 dBm	1:1	2402.0 – 2480.0 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 1900			
Modulation	GMSK				GMSK			
Maximum Output Power Setting (dBm)	33.5	30.5	28.5	**27.5**	30.5	27.5	25.5	**24.5**
Time Average Output Power Setting (dBm)	24.5	24.5	24.2	**24.5**	21.5	21.5	21.2	**21.5**
Duty Cycle	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				1850.2 - 1909.8 MHz			

Mode(s) of Operation	EDGE 850				EDGE 1900			
Modulation	8PSK				8PSK			
Maximum Output Power Setting (dBm)	28.1	25.2	23.0	**22.2**	27.2	24.2	22.2	**21.2**
Time Average Output Power Setting (dBm)	19.1	19.2	18.7	**19.2**	18.2	18.2	17.9	**18.2**
Duty Cycle	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				1850.2 - 1909.8 MHz			

[1] **Bolded** entries indicate data mode configurations of highest time-average power output per band and data mode type, and thus wee utilized for SAR testing in this report.

2.2.1 Power limit reduction for Mobile Hotspot functionality

The DUT utilizes reduced limits for the maximum transmit power when the mobile hotspot functionality is enabled. A table of the reduced limits used for testing are given below. A complete description of this functionality is provided in the "Operational Description" contained within Exhibit 12. 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	CDMA 800		
Test Channel	25	600	1175
Maximum Output Power Setting (dBm)	25.0	25.0	25.0
Reduced Maximum Output Power Setting (dBm)	22.0	22.0	22.0

Mode(s) of Operation	CDMA 1900		
Test Channel	25	600	1175
Maximum Output Power Setting (dBm)	25.0	25.0	25.0
Reduced Maximum Output Power Setting (dBm)	22.0	22.0	22.0

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	30.5	28.5	**27.5**	30.5	27.5	25.5	**24.5**
Time Average Output Power Setting (dBm)	24.5	24.5	24.2	**24.5**	21.5	21.5	21.2	**21.5**
Reduced Maximum Output Power Setting (dBm)	30.5	27.5	25.5	24.5	27.5	24.5	22.5	21.5
Reduced Time Average Output Power Setting (dBm)	21.5	21.5	21.2	21.5	18.5	18.5	18.2	18.5

2.3 Device Conducted Power Measurements

2.3.1 CDMA modes

Per the "SAR Measurement Procedures for 3G Devices" released in October, 2007, RC1, RC3 and RC3 (FCH + SCH) CDMA modes, EVDO Rev O, EVDO Rev A were considered. The conducted power measurements (per steps 3, 4 & 10 of section 4.4.5.2 of 3GPP2 C.5.011 / TIA -98-E) for each mode are shown in the table below.

Conducted power (dBm) for CDMA modes						
	Channel	RC1		RC3		RC3 (FCH + SCH)
		SO2	SO55	SO2	SO55	
CDMA 800	1013	25.03	25.06	25.05	25.01	Per Motorola designs, the maximum power, when in a mode that allows supplemental channels, will always be less than the RC3/RC1 maximum conducted power limit.
	384	25.06	25.04	25.07	25.02	
	777	25.01	24.98	24.94	25	
CDMA 1900	25	25.1	25.13	25.2	25	
	600	24.99	25.1	24.99	24.93	
	1175	25.02	25.01	24.93	24.89	

Conducted power (dBm) for EVDO modes					
	Channel	TDSO SO32		EVDO Rev O	EVDO Rev A
		+FCH-SCH	+SCH	RTAP 153.6K	Subtest 2 RETAP
CDMA 800	1013	25.07	25.06	25.15	25.12
	384	25.09	25.09	25.19	25.13
	777	25.04	25.04	25.07	25.09
CDMA 1900	25	25.06	25.1	25.09	25.12
	600	24.96	24.98	25.05	25.11
	1175	24.88	24.81	24.98	25.08

2.3.2 GSM modes

Band	Channel	Conducted power (dBm) for GSM modes[2] (Burst Average Power)								
		GSM *CS Voice* **(1 Slot)**	**GPRS** *PS Data* **(1 Slot)**	**EDGE** *PS Data* **(1 Slot)**	**GPRS** *PS Data* **(2 Slots)**	**EDGE** *PS Data* **(2 Slots)**	**GPRS** *PS Data* **(3 Slots)**	**EDGE** *PS Data* **(3 Slots)**	**GPRS** *PS Data* **(4 Slots)**	**EDGE** *PS Data* **(4 Slots)**
GSM 850	128	33.54	33.41	28.30	30.44	25.28	28.74	23.31	27.85	22.35
	190	33.36	33.25	27.97	30.18	24.98	28.40	22.92	27.57	21.90
	251	33.71	33.62	28.02	30.50	25.02	28.79	23.08	27.34	21.85
GSM 1900	512	30.19	30.29	27.03	27.57	24.01	25.45	22.10	24.61	21.02
	661	30.75	30.80	27.36	27.65	24.24	25.47	22.31	24.63	21.04
	810	30.51	30.67	27.12	27.40	23.99	25.19	22.13	24.42	21.02

Band	Channel	Conducted power (dBm) for GSM modes (Source-Based Time-Averaged Power)								
		GSM *CS Voice* **(1 Slot)**	**GPRS** *PS Data* **(1 Slot)**	**EDGE** *PS Data* **(1 Slot)**	**GPRS** *PS Data* **(2 Slots)**	**EDGE** *PS Data* **(2 Slots)**	**GPRS** *PS Data* **(3 Slots)**	**EDGE** *PS Data* **(3 Slots)**	**GPRS** *PS Data* **(4 Slots)**	**EDGE** *PS Data* **(4 Slots)**
GSM 850	128	24.54	24.41	19.3	24.44	19.28	24.44	19.01	24.85	19.35
	190	24.36	24.25	18.97	24.18	18.98	24.1	18.62	24.57	18.9
	251	24.71	24.62	19.02	24.5	19.02	24.49	18.78	24.34	18.85
GSM 1900	512	21.19	21.29	18.03	21.57	18.01	21.15	17.8	21.61	18.02
	661	21.75	21.8	18.36	21.65	18.24	21.17	18.01	21.63	18.04
	810	21.51	21.67	18.12	21.4	17.99	20.89	17.83	21.42	18.02

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

2.3.3 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 average conducted power measurements for each mode are shown in the tables below. SAR testing for 802.11 was performed with the transmitter set to the lowest data rate on the default test channels **highlighted in bold** in the tables below. The head and body positions that resulted in the highest SAR values were further tested on the additional channels and higher data rates **highlighted in pink** in the tables below. Due to the relatively large number of data rates with measured conducted power exceeding the lowest data rate conducted power by more than 0.25 dB, there will be a large number of tests performed on the configuration that results in the highest measured SAR for the lowest data rate.

Band	Channel	Average Conducted Power (dBm) for 802.11b Mode Data Rates			
		1 Mbps	2 Mbps	5.5 Mbps	11 Mbps
Wi-Fi 2450 MHz	1	**17.15**	17.3	18.34	18.53
	6	**17.52**	17.64	18.72	18.87
	11	**17.91**	17.97	19.2	19.26

Band	Channel	Average 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	17.77	17.67	17.18	17.37	15.81	15.79	14.52	14.55
	6	18.48	18.54	18.11	17.88	16.65	16.41	15	15.25
	11	18.76	18.78	18.4	18.42	16.86	16.87	15.46	15.49

Band	Channel	Average Conducted Power (dBm) for 802.11n Mode Data Rates (20 MHz Channel, 400 ns Guard Interval)							
		7.2 Mbps	14.4 Mbps	21.6 Mbps	28.8 Mbps	43.3 Mbps	57.7 Mbps	65 Mbps	72.2 Mbps
Wi-Fi 2450 MHz	1	16.38	16.89	17.12	15.97	15.9	14.51	14.54	13.72
	6	16.93	17.81	17.72	16.82	16.56	15.26	15.18	14.42
	11	17.47	17.99	18.13	16.83	16.74	15.32	15.33	14.4

Band	Channel	Average 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	16.54	17.18	17.22	16.03	15.97	14.73	14.61	13.73
	6	17.2	17.73	17.78	16.55	16.6	15.29	15.39	14.49
	11	17.57	18.11	18.12	16.81	16.75	15.46	15.38	14.55

3. Test Equipment Used

3.1 Dosimetric System

The Motorola Mobility ADR Test Services Laboratory utilizes a Dosimetric Assessment System (DASY4™ v4.7 or DASY52™) 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 ±10.8% (K=1) with an expanded uncertainty of ±21.6% (K=2). The overall 1 g RSS uncertainty of the measurement system is ±11.1% (K=1) with an expanded uncertainty of ±22.2% (K=2). The measurement uncertainty budget is given in Appendix 5. Per IEEE 1528, this uncertainty budget is applicable to the SAR range of 0.4 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 Date	Cal Due Date
DASY4™ DAE V1	1313	Jan-20-2012	Jan-20-2013
E-Field Probe ES3DV3	3180	Jan-11-2012	Jan-11-2013
DASY4™ DAE V1	437	Feb-09-2012	Feb-09-2013
E-Field Probe ES3DV3	3178	Jan-11-2012	Jan-11-2013
S.A.M. Phantom used for 800/900 MHz	TP-1154		
S.A.M. Phantom used for 1800/1900/2450 MHz	TP-1684		
Dipole Validation Kit, DV835V2	425TR	Jul-08-2011	Jul-08-2012
Dipole Validation Kit, DV1800V2	2d129	Jul 22, 2011	Jul 22, 2012
Dipole Validation Kit, DV2450V2	788	Jul-12-2011	Jul-12-2012

3.2 Additional Equipment

Description	Serial Number	Cal Date	Cal Due Date
Signal Generator HP8648C	3847A04633	Mar-14-2012	Mar-14-2013
Power Meter E4419B	MY45101158	Mar-16-2012	Mar-16-2013
Power Sensor #1 - E9301A	MY41497903	Mar-16-2012	Mar-16-2013
Power Sensor #2 - E9301A	US39211011	Mar-16-2012	Mar-16-2013
Network Analyzer HP8753ES	MY42301800	Jan-27-2012	Jan-27-2013
Dielectric Probe Kit HP85070C	MY44300245		

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 $\rho = 1\ ^{g}/_{cm^3}$ 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].

E-field probes calibrated at 1810 MHz were used for "1900 MHz" band (1850 MHz - 1910 MHz) SAR measurements. FCC KDB 450824 provides additional requirements on page 3 of 6 for SAR testing that is performed with probe calibration points that are more than 50 MHz removed from the measured bands. The KDB requires; "(2) When nominal tissue dielectric parameters are specified in the probe calibration data, the tissue dielectric parameters measured for routine measurements should be less than the target Er and higher than the target Sigma values to minimize SAR underestimations". The 1900 MHz simulated tissues listed below meet this criteria.

f (MHz)	Tissue type	Limits / Measured	Dielectric Parameters		
			ε_r	σ (S/m)	Temp (°C)
835	Head	**Measured,** Apr-02-2012	40.6	0.89	20.5
		Measured, Apr-04-2012	42.6	0.93	20.6
		Measured, Apr-05-2012	41.9	0.92	20.5
		Recommended Limits	41.5 ±5%	0.90 ±5%	18-25
	Body	**Measured,** Apr-12-2012	56.2	1.00	19.8
		Measured, Apr-16-2012	55.6	0.99	19.8
		Measured, Apr-19-2012	55.2	0.98	19.7
		Recommended Limits	55.2 ±5%	0.97 ±5%	18-25
1880	Head	**Measured,** Apr-06-2012	38.1	1.46	21.0
		Measured, Apr-09-2012	38.1	1.46	21.4
		Measured, Apr-27-2012	38.4	1.46	20.5
		Recommended Limits	40.0 ±5%	1.40 ±5%	18-25
	Body	**Measured,** Apr-10-2012	50.8	1.59	20.0
		Measured, Apr-17-2012	51.2	1.58	19.9
		Measured, Apr-17-2012	50.8	1.59	20.0
		Recommended Limits	53.3 ±5%	1.52 ±5%	18-25
2450	Head	**Measured,** Apr-09-2012	39.4	1.83	21.4
		Recommended Limits	39.2 ±10%	1.80 ±5%	18-25
	Body	**Measured,** Apr-04-2012	50.5	2.02	20.5
		Measured, Apr-06-2012	50.2	2.00	20.0
		Recommended Limits	52.7 ±10%	1.95 ±5%	18-25

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

Ingredient	782 / 835 / 900 MHz Head	782 / 835 / 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 Verifications

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

A SAR measurement was performed to verify the measured SAR was within ±10% from the target SAR indicated in Appendix 7. These frequencies are within ±10% of the compliance test mid-band frequency as required in [1] and [5]. The test was conducted on the same days as the measurement of the DUT. Recommended limits for permittivity and conductivity, specified in [5], are shown in the table below. The obtained results from the system accuracy verification are also displayed in the table below. SAR values are normalized to 1 W forward power delivered to the dipole. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values. The distributions of SAR compare well with those of the reference measurements (see Appendix 1). For frequencies below 3 GHz, the simulated tissue depth was verified to be 15.0 cm ± 0.5 cm. Z-axis scans showing the SAR penetration are also included in Appendix 1.

System Accuracy Verification Measurements for Head SAR Measurements						
f (MHz)	Description	SAR (W/kg), 1 gram	Dielectric Parameters		Ambient Temp (°C)	Tissue Temp (°C)
			ε_r	σ (S/m)		
835	**Measured,** Apr-02-2012	9.45	40.6	0.89	22.6	21.0
	Measured, Apr-04-2012	9.90	42.6	0.93	22.1	20.8
	Measured, Apr-05-2012	9.85	41.9	0.92	22.1	20.6
	Recommended Limits	9.13	41.5 ±5%	0.90 ±5%	18-25	18-25
1800	**Measured,** Apr-05-2012	37.0	38.4	1.37	21.7	21.5
	Measured, Apr-09-2012	37.2	38.4	1.38	21.6	21.5
	Measured, Apr-27-2012	37.1	38.7	1.38	21.9	21.5
	Recommended Limits	38.5	40.0 ±5%	1.40 ±5%	18-25	18-25
2450	**Measured,** Apr-09-2012	53.0	39.4	1.83	21.7	21.5
	Recommended Limits	55.2	39.2 ±10%	1.80 ±5%	18-25	18-25

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

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ES3DV3	3180	835	6.07	5 of 11
		1810	5.20	5 of 11
E-Field Probe ES3DV3	3178	2450	4.29	5 of 11

System Accuracy Verification Measurements for Body SAR Measurements						
f (MHz)	Description	SAR (W/kg), 1 gram	Dielectric Parameters		Ambient Temp (°C)	Tissue Temp (°C)
			ε_r	σ (S/m)		
835	**Measured,** Apr-12-2012	9.90	56.2	1.00	21.6	20.5
	Measured, Apr-16-2012	9.70	55.6	0.99	22.2	20.2
	Measured, Apr-19-2012	9.75	55.6	0.99	21.7	19.8
	Recommended Limits	9.35	55.2 ±5%	0.97 ±5%	18-25	18-25
1800	**Measured,** Apr-10-2012	36.0	51.0	1.49	22.1	20.6
	Measured, Apr-16-2012	35.2	51.4	1.48	22.2	21.5
	Measured, Apr-17-2012	35.9	51.0	1.50	22.2	20.5
	Recommended Limits	38.8	53.3 ±5%	1.52 ±5%	18-25	18-25
2450	**Measured,** Apr-04-2012	54.5	50.5	2.02	21.7	20.7
	Measured, Apr-06-2012	50.0	50.8	1.99	22.1	20.3
	Recommended Limits	51.2	52.7 ±10%	1.95 ±5%	18-25	18-25

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

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ES3DV3	3180	835	5.97	6 of 11
		1810	5.09	6 of 11
E-Field Probe ES3DV3	3178	2450	4.13	6 of 11

6. Test Results

For GSM/CDMA modes, the test sample was operated using an actual transmission through a base station simulator. Wi-Fi testing was conducted using manufacturer test mode software, per guidance given in FCC KDB 248227. The base station simulator or test software was set up for the proper channels, transmitter power levels and transmit modes 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 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 Appendices 2 through 4. Please refer to the DASY4™ manual for additional information on SAR scanning procedures and algorithms used.

The inductive charging door serves as the Wireless Power Receiver in an Inductive Charging System. The receiver is a Wireless Power Consortium (WPC) compliant receiver and requires a WPC compliant transmitter to create the appropriate magnetic field in order to function. The receiver is designed to apply power to the phone when placed in the appropriate magnetic field. Please see a more detailed description in Exhibit 12: Operational Description. Please see Exhibit 3 for external photos of the inductive charging door.

All tests will be performed with the plastic door shipped with the DUT. The configurations that result in the highest measured SAR for the cheek touch, 15 degree tilt, body worn and mobile hotspot tests will be repeated with the inductive charging battery door installed.

6.1 Head Adjacent Test Results

The SAR results shown in tables 1 through 5 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 temperature of the simulated tissue after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is:

$$Extrapolated\ SAR = (Measured\ or\ Corrected\ SAR) * 10^{(-drift/10)}$$

The SAR reported at the end of the measurement process by the DASY4™ measurement system can be scaled up by the measured drift to determine the SAR at the beginning of the measurement process. This is the most conservative SAR because it corresponds to the average output power at the beginning of the SAR test. This extrapolation has been done because when the DUT is operating properly it may exhibit a slump in radiated power and SAR over time. This is verified by measuring the SAR drift after the test.

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

The SAR measurements were performed using the SAM phantoms listed in section 3.1. Since the same phantoms and simulated tissue were used for the system accuracy verification and the device SAR measurements, the Z-axis scans included in Appendix 1 are applicable for verification of simulated tissue depth.

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	6.07	5 of 11
		1810	5.20	5 of 11
E-Field Probe ES3DV3	3178	2450	4.29	5 of 11

Left Head Cheek Position

f (MHz)	Mode	Channel	Temp (°C)	Drift (dB)	DUT Power	10 g SAR value		1 g SAR value		Test Plot	
					Measured (dBm)	Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
835	CDMA 800, RC3 SO55	1013			25.05						
		384	20.5	-0.330	25.07	0.457	0.49	0.614	0.66		
		777			24.94						
	GSM 850, CS Voice	128			33.54						
		190	**20.4**	**-0.140**	**33.36**	**0.506**	**0.52**	**0.671**	**0.69**	**5x5x7**	**A-34**
		251			33.71						
1880	CDMA 1900, RC3 SO55	25			25.20						
		600	20.5	0.180	24.99	0.274	0.27	0.440	0.44		
		1175			24.93						
	GSM 1900, CS Voice	512			30.19						
		661	20.2	-0.094	30.75	0.120	0.12	0.200	0.20		
		810			30.51						
2450	802.11b, 1 Mbps	1	21.0	0.192	17.15	0.122	0.12	0.267	0.27		
		6	20.8	0.176	17.52	0.115	0.12	0.253	0.25		
		11	**21.4**	**0.362**	17.91	**0.127**	**0.13**	**0.283**	**0.28**	**5x5x7**	**A-37**
	802.11b, 5.5 Mbps	1	20.6	0.200	18.34	0.104	0.10	0.228	0.23		
		6	20.6	0.030	18.72	0.102	0.10	0.222	0.22		
		11	20.6	0.183	19.20	0.118	0.12	0.263	0.26		
	802.11b, 11 Mbps	1	20.4	0.140	18.53	0.095	0.09	0.208	0.21		
		6	20.4	-0.008	18.87	0.091	0.09	0.204	0.20		
		11	20.4	-0.081	19.26	0.100	0.10	0.222	0.23		
	802.11g, 6 Mbps	1	20.4	0.036	17.77	0.102	0.10	0.224	0.22		
		6	20.4	-0.026	18.48	0.085	0.09	0.187	0.19		
		11	21.0	0.481	18.76	0.101	0.10	0.225	0.23		
	802.11g, 9 Mbps	1	21.0	0.140	17.67	0.099	0.10	0.215	0.22		
		6	21.0	0.217	18.54	0.111	0.11	0.244	0.24		
		11	21.0	0.231	18.78	0.108	0.11	0.240	0.24		
	802.11g, 12 Mbps	6	20.6	0.260	18.11	0.095	0.10	0.209	0.21		
		11	20.6	0.147	18.40	0.102	0.10	0.228	0.23		
	802.11g, 18 Mbps	6	20.4	0.111	17.88	0.089	0.09	0.195	0.20		
		11	20.4	0.350	18.42	0.098	0.10	0.216	0.22		
	802.11n, 14.4 Mbps	6	20.4	0.275	17.81	0.046	0.05	0.098	0.10		
	802.11n, 19.5 Mbps	6	20.4	0.262	17.78	0.041	0.04	0.085	0.09		

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)	Mode	Channel	Temp (°C)	Drift (dB)	DUT Power	10 g SAR value		1 g SAR value		Test Plot	
					Measured (dBm)	Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
835	CDMA 800, RC3 SO55	1013			25.05						
		384	**20.6**	**-0.290**	**25.07**	**0.518**	**0.55**	**0.700**	**0.75**	**5x5x7**	**A-33**
		777			24.94						
	GSM 850, CS Voice	128			33.54						
		190	20.6	-0.190	33.36	0.475	0.50	0.727	0.66		
		251			33.71						
1880	CDMA 1900, RC3 SO55	25	**21.0**	**0.001**	**25.20**	**0.506**	**0.51**	**0.832**	**0.83**	**5x5x7**	**A-35**
		600	20.5	-0.097	24.99	0.479	0.49	0.808	0.83		
		1175	21.0	-0.091	24.93	0.258	0.26	0.431	0.44		
	GSM 1900, CS Voice	512			30.19						
		661	20.5	-0.340	30.75	0.223	0.24	0.373	0.40		
		810			30.51						
2450	802.11b, 1 Mbps	1			17.15						
		6			17.52						
		11	21.0	0.089	17.91	0.109	0.11	0.206	0.21		

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)	Mode	Channel	Temp (°C)	Drift (dB)	DUT Power	10 g SAR value		1 g SAR value		Test Plot	
					Measured (dBm)	Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
835	CDMA 800, RC3 SO55	1013			25.05						
		384	20.5	0.027	25.07	0.288	0.29	0.372	0.37		
		777			24.94						
	GSM 850, CS Voice	128			33.54						
		190	20.4	-0.096	33.36	0.298	0.30	0.383	0.39		
		251			33.71						
1880	CDMA 1900, RC3 SO55	25			25.20						
		600	20.5	-0.091	24.99	0.202	0.21	0.330	0.34		
		1175			24.93						
	GSM 1900, CS Voice	512			30.19						
		661	20.2	0.120	30.75	0.095	0.09	0.154	0.15		
		810			30.51						
2450	802.11b, 1 Mbps	1			17.15						
		6			17.52						
		11	21.2	0.096	17.91	0.036	0.04	0.071	0.07		

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

Right Head 15° Tilt Position

f (MHz)	Mode	Channel	Temp (°C)	Drift (dB)	DUT Power	10 g SAR value		1 g SAR value		Test Plot	
					Measured (dBm)	Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
835	CDMA 800, RC3 SO55	1013			25.05						
		384	**20.5**	**-0.024**	**25.07**	**0.312**	**0.31**	**0.407**	**0.41**	**5x5x7**	**A-38**
		777			24.94						
	GSM 850, CS Voice	128			33.54						
		190	**20.6**	**0.040**	**33.36**	**0.297**	**0.30**	**0.386**	**0.39**	**5x5x7**	**A-39**
		251			33.71						
1880	CDMA 1900, RC3 SO55	25			25.20						
		600	**20.5**	**0.130**	**24.99**	**0.200**	**0.20**	**0.346**	**0.35**	**5x5x7**	**A-40**
		1175			24.93						
	GSM 1900, CS Voice	512			30.19						
		661	**20.5**	**0.190**	**30.75**	**0.094**	**0.09**	**0.161**	**0.16**	**5x5x7**	**A-41**
		810			30.51						
2450	802.11b, 1 Mbps	1			17.15						
		6			17.52						
		11	**21.0**	**0.006**	17.91	**0.052**	**0.05**	**0.096**	**0.10**	**5x5x7**	**A-42**

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

Highest Head, GPRS Class 12

f (MHz)	Mode	Channel	Temp (°C)	Drift (dB)	DUT Power	10 g SAR value		1 g SAR value		Test Plot	
					Measured (dBm)	Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
835	GPRS 850, ***PS Data***	128									
		190	20.5	-0.036	27.57	0.393	0.40	0.528	0.53		
		251									
1880	GPRS 1900, ***PS Data***	512									
		661	**21.4**	**-0.290**	**24.63**	**0.233**	**0.25**	**0.392**	**0.42**	**5x5x7**	**A-36**
		810									

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

6.2 Body Worn Test Results

The SAR results shown in tables 6 through 8 are maximum SAR values averaged over 1 gram of phantom tissue, to demonstrate compliance to [3] and also over 10 grams of phantom tissue, to demonstrate compliance to [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:

$$Extrapolated\ SAR = (Measured\ or\ Corrected\ SAR) * 10^{(-drift/10)}$$

The SAR reported at the end of the measurement process by the DASY4™ measurement system can be scaled up by the measured drift to determine the SAR at the beginning of the measurement process. This is the most conservative SAR because it corresponds to the average output power at the beginning of the SAR test. This extrapolation has been done because when the DUT is operating properly it may exhibit a slump in radiated power and SAR over time. This is verified by measuring the SAR drift after the test.

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

A SPEAG™ MFP V5.1 C Triple Modular Phantom was used for the body-worn tests. The triple modular phantom consists of three identical modules that can be installed and removed separately without emptying the liquid. Each module of the triple phantom is constructed of glass-fiber reinforced vinylester (VG-GF) with a thickness at the bottom of 2.0 mm. It measures 29.2 cm(long) by 17.8 cm(wide) by 17.8 cm(tall). Alternately, a "flat" phantom was used for the body-worn tests. This "flat" phantom is made out of 1" thick natural High Density Polyethylene with a thickness at the bottom of 2.0 mm. It measures 52.7 cm(long) by 26.7 cm(wide) by 21.2 cm(tall). The simulated tissue 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 simulated tissue depth was verified to be 15.0 cm ± 0.5 cm for frequencies less than 3 GHz, or 10.0 cm ± 0.5 cm for frequencies greater than 3 GHz. The same device holder described in section 6 was used for positioning the phone. Functional accessories were divided into two categories, the ones with metal components and the ones with non-metal components. For non-metallic component accessories, testing was performed on the accessory that displayed the closest proximity to the flat phantom. Each metallic component accessory, if any, was checked for uniqueness of metal component so that each is tested with the device. If multiple accessories shared an identical metal component, only the accessory that dictates the closest spacing to the body was tested. The cellular phone was tested with a headset connected to the device for all body-worn SAR measurements.

There are no body-worn accessories available for this phone at the time of testing thus the device was tested per the Supplement C testing guidelines for devices that do not have body-worn accessories. A separation distance of 25 mm between the device and the flat phantom was used for testing body-worn SAR. The chosen separation distance of 25 mm is utilized in order to support any case or holder accessories offered or to be offered by Motorola for this product. 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	5.97	6 of 11
		1810	5.09	6 of 11
E-Field Probe ES3DV3	3178	2450	4.13	6 of 11

Body-Worn, Front of Phone 25 mm from Phantom

f (MHz)	Mode	Channel	Temp (°C)	Drift (dB)	DUT Power	10 g SAR value		1 g SAR value		Test Plot	
					Measured (dBm)	Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
835	CDMA 800, RC3 SO55	1013			25.05						
		384	19.5	-0.110	25.07	0.470	0.48	0.624	0.64		
		777			24.94						
	GSM 850, CS Voice	128			33.54						
		190	19.8	-0.150	33.36	0.441	0.46	0.587	0.61		
		251			33.71						
1880	CDMA 1900, RC3 SO55	25			25.20						
		600	20.0	-0.017	24.99	0.193	0.19	0.315	0.32		
		1175			24.93						
	GSM 1900, CS Voice	512			30.19						
		661	20.0	-0.110	30.75	0.090	0.09	0.147	0.15		
		810			30.51						
2450	802.11b, 1 Mbps	1			17.15						
		6			17.52						
		11	20.5	0.382	17.91	0.000	0.00	0.001	0.00		

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)	Mode	Channel	Temp (°C)	Drift (dB)	DUT Power	10 g SAR value		1 g SAR value		Test Plot	
					Measured (dBm)	Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
835	CDMA 800, RC3 SO55	1013			**25.05**						
		384	**19.5**	**-0.130**	**25.07**	**0.476**	**0.49**	**0.635**	**0.65**	**5x5x7**	**A-44**
		777			24.94						
	GSM 850, CS Voice	128			33.54						
		190	19.8	-0.063	33.36	0.420	0.43	0.560	0.57		
		251			33.71						
1880	CDMA 1900, RC3 SO55	25			25.20						
		600	**20.0**	**-0.029**	**24.99**	**0.269**	**0.27**	**0.440**	**0.44**	**5x5x7**	**A-46**
		1175			24.93						
	GSM 1900, CS Voice	512			30.19						
		661	**20.0**	**-0.085**	**30.75**	**0.129**	**0.13**	**0.211**	**0.22**	**5x5x7**	**A-47**
		810			30.51						
2450	802.11b, 1 Mbps	1	20.5	0.143	17.15	0.000	0.00	0.004	0.00		
		6	20.2	0.095	17.52	0.000	0.00	0.001	0.00		
		11	**20.5**	**-0.452**	17.91	**0.003**	**0.00**	**0.010**	**0.01**		
	802.11b, 5.5 Mbps	1	20.8	0.099	18.34	0.000	0.00	0.002	0.00		
		6	20.8	0.065	18.72	0.000	0.00	0.001	0.00		
		11	20.5	0.096	19.20	0.000	0.00	0.000	0.00		
	802.11b, 11 Mbps	1	20.3	0.733	18.53	0.002	0.00	0.006	0.01		
		6	20.3	0.299	18.87	0.000	0.00	0.001	0.00		
		11	20.3	-0.069	19.26	0.001	0.00	0.004	0.00		
	802.11g, 6 Mbps	1	20.2	0.937	17.77	0.000	0.00	0.001	0.00		
		6	20.2	0.022	18.48	0.000	0.00	0.001	0.00		
		11	20.0	0.274	18.76	0.000	0.00	0.002	0.00		
	802.11g, 9 Mbps	1	20.9	0.119	17.67	0.003	0.00	0.012	0.01		
		6	20.5	0.071	18.54	0.000	0.00	0.002	0.00		
		11	20.9	0.986	18.78	0.005	0.00	0.014	0.01		
	802.11g, 12 Mbps	6	20.0	0.297	18.11	0.001	0.00	0.007	0.01		
		11	20.0	-0.242	18.40	0.000	0.00	0.001	0.00		
	802.11g, 18 Mbps	6	20.0	0.318	17.88	0.000	0.00	0.002	0.00		
		11	20.0	-0.322	18.42	0.001	0.00	0.006	0.01		
	802.11n, 14.4 Mbps	6	20.0	-0.547	17.81	0.000	0.00	0.000	0.00		
	802.11n, 19.5 Mbps	6	20.0	0.424	17.78	0.000	0.00	0.001	0.00		

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

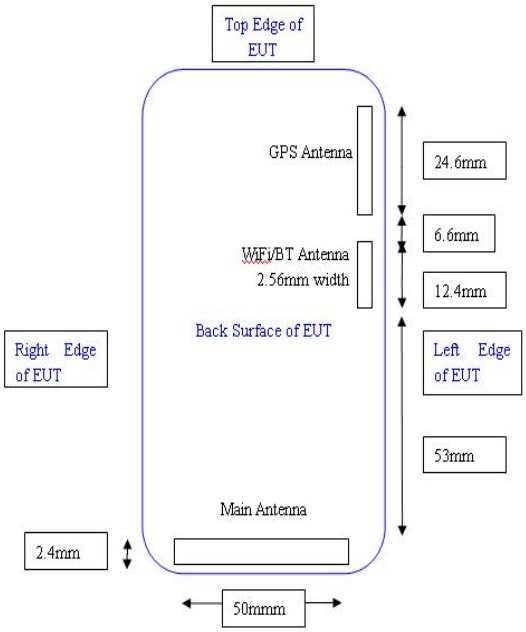
Highest Body, GPRS Class 12

f (MHz)	Mode	Channel	Temp (°C)	Drift (dB)	DUT Power	10 g SAR value		1 g SAR value		Test Plot	
					Measured (dBm)	Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
835	GPRS 850	128									
		190	**19.6**	**0.25**	**27.57**	**0.378**	**0.38**	**0.632**	**0.63**	**5x5x7**	**A-45**
		251									
1880	GPRS 1900	512									
		661	20.0	0.068	24.63	0.121	0.12	0.198	0.20		
		810									

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

6.4 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.



Mobile Hotspot Surfaces for SAR testing						
Mode	Front	Back	Left	Right	Top	Bottom
GSM	Yes	Yes	Yes	Yes	No	Yes
CDMA	Yes	Yes	Yes	Yes	No	Yes
Wi-Fi	Yes	Yes	Yes	No	No	No

The SAR results shown in tables 9 through 13 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:

$$\textit{Extrapolated SAR} = (\textit{Measured or Corrected SAR}) * 10^{(-drift/10)}$$

The SAR reported at the end of the measurement process by the DASY4™ measurement system can be scaled up by the measured drift to determine the SAR at the beginning of the measurement process. This is the most conservative SAR because it corresponds to the average output power at the beginning of the SAR test. This extrapolation has been done because when the DUT is operating properly it may exhibit a slump in radiated power and SAR over time. This is verified by measuring the SAR drift after the test.

The DUT utilizes a reduced limit for the maximum transmit power when the mobile hotspot functionality is enabled, as described above in 2.2.2. A complete description of this functionality is provided in the "Operational Description" contained within Exhibit 12.

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.

A SPEAG™ MFP V5.1 C Triple Modular Phantom was used for the body-worn tests. The triple modular phantom consists of three identical modules that can be installed and removed separately without emptying the liquid. Each module of the triple phantom is constructed of glass-fiber reinforced vinylester (VG-GF) with a thickness at the bottom of 2.0 mm. It measures 29.2 cm(long) by 17.8 cm(wide) by 17.8 cm(tall). Alternately, a "flat" phantom was used for the body-worn tests. This "flat" phantom is made out of 1" thick natural High Density Polyethylene with a thickness at the bottom of 2.0 mm. It measures 52.7 cm(long) by 26.7 cm(wide) by 21.2 cm(tall). The simulated tissue 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 simulated tissue depth was verified to be 15.0 cm ± 0.5 cm for frequencies below 3 GHz, , or 10.0 cm ± 0.5 cm for frequencies greater than 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	5.97	6 of 11
		1810	5.09	6 of 11
E-Field Probe ES3DV3	3178	2450	4.13	6 of 11

Mobile Hotspot, Front of Phone 10 mm from Phantom

f (MHz)	Mode	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value		1 g SAR value		Test Plot	
					Measured (dBm)	Power Reduction (dB)	Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
835	CDMA 800, RC3 SO55	1013			25.05	-3.0						
		384	**19.5**	**0.087**	**25.07**	**-3.0**	**0.201**	**0.20**	**0.305**	**0.31**	**5x5x7**	**A-50**
		777			24.94	-3.0						
	GPRS 850, ***PS Data***	128			27.85	-3.0						
		190	**20.1**	**-0.062**	**27.57**	**-3.0**	**0.300**	**0.30**	**0.393**	**0.40**	**5x5x7**	**A-51**
		251			27.34	-3.0						
1880	CDMA 1900, RC3 SO55	25			25.20	-3.0						
		600	19.6	-0.110	24.99	-3.0	0.336	0.34	0.650	0.67		
		1175			24.93	-3.0						
	GPRS 1900, ***PS Data***	512			24.61	-3.0						
		661	20.2	-0.077	24.63	-3.0	0.149	0.15	0.283	0.29		
		810			24.42	-3.0						
2450	802.11b, 1 Mbps	1			17.15	0.0						
		6			17.52	0.0						
		11	20.5	0.212	17.91	0.0	0.018	0.02	0.039	0.04		

Table 9: SAR measurement results at the highest possible output power, measured against the ICNIRP and ANSI SAR Limit.

Mobile Hotspot, Back of Phone 10 mm from Phantom

f (MHz)	Mode	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value		1 g SAR value		Test Plot	
					Measured (dBm)	Power Reduction (dB)	Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
835	CDMA 800, RC3 SO55	1013			25.05	-3.0						
		384	19.4	-0.250	25.07	-3.0	0.196	0.21	0.283	0.30		
		777			24.94	-3.0						
	GPRS 850, ***PS Data***	128			27.85	-3.0						
		190	20.1	-0.068	27.57	-3.0	0.295	0.30	0.390	0.40		
		251			27.34	-3.0						
1880	CDMA 1900, RC3 SO55	25	19.8	-0.140	25.20	-3.0	0.381	0.39	0.726	0.75		
		600	19.6	-0.073	24.99	-3.0	0.479	0.49	1.02	1.04		
		1175	19.8	-0.063	24.93	-3.0	0.390	0.40	0.791	0.80		
	GPRS 1900, ***PS Data***	512			24.61	-3.0						
		661	20.2	0.012	24.63	-3.0	0.192	0.19	0.364	0.36		
		810			24.42	-3.0						
2450	802.11b, 1 Mbps	1			17.15	0.0						
		6			17.52	0.0						
		11	20.5	0.283	17.91	0.0	0.024	0.02	0.044	0.04		

Table 10: SAR measurement results at the highest possible output power, measured against the ICNIRP and ANSI SAR Limit.

Mobile Hotspot, Left Edge of Phone 10 mm from Phantom

f (MHz)	Mode	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value		1 g SAR value		Test Plot	
					Measured (dBm)	Power Reduction (dB)	Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
835	CDMA 800, RC3 SO55	1013			25.05	-3.0						
		384	19.5	-0.160	25.07	-3.0	0.103	0.11	0.190	0.20		
		777			24.94	-3.0						
	GPRS 850, ***PS Data***	128			27.85	-3.0						
		190	20.0	-0.071	27.57	-3.0	0.169	0.17	0.241	0.24		
		251			27.34	-3.0						
1880	CDMA 1900, RC3 SO55	25			25.20	-3.0						
		600	19.6	-0.380	24.99	-3.0	0.027	0.03	0.052	0.06		
		1175			24.93	-3.0						
	GPRS 1900, ***PS Data***	512			24.61	-3.0						
		661	20.3	0.098	24.63	-3.0	0.092	0.01	0.016	0.02		
		810			24.42	-3.0						
2450	802.11b, 1 Mbps	1	**20.7**	**0.109**	17.15	**0.0**	**0.057**	**0.06**	**0.104**	**0.10**	**5x5x7**	**A-54**
		6	20.7	-0.008	17.52	0.0	0.053	0.05	0.098	0.10		
		11	20.5	-0.053	17.91	0.0	0.045	0.05	0.085	0.09		
	802.11b, 5.5 Mbps	1	20.4	0.030	18.34	0.0	0.054	0.05	0.098	0.10		
		6	20.4	0.113	18.72	0.0	0.050	0.05	0.097	0.10		
		11	20.4	-0.001	19.20	0.0	0.052	0.05	0.095	0.09		
	802.11b, 11 Mbps	1	20.0	0.137	18.53	0.0	0.053	0.05	0.099	0.10		
		6	20.0	0.036	18.87	0.0	0.041	0.04	0.077	0.08		
		11	20.5	-0.020	19.26	0.0	0.043	0.04	0.082	0.08		
	802.11g, 6 Mbps	1	20.0	0.154	17.77	0.0	0.043	0.04	0.083	0.08		
		6	20.0	0.091	18.48	0.0	0.044	0.04	0.081	0.08		
		11	20.0	0.055	18.76	0.0	0.034	0.03	0.067	0.07		
	802.11g, 9 Mbps	1	20.0	0.000	17.67	0.0	0.047	0.05	0.086	0.09		
		6	20.0	0.214	18.54	0.0	0.040	0.04	0.071	0.07		
		11	20.0	0.164	18.78	0.0	0.036	0.04	0.069	0.07		
	802.11g, 12 Mbps	6	20.0	0.114	18.11	0.0	0.033	0.03	0.061	0.06		
		11	20.0	0.040	18.40	0.0	0.032	0.03	0.063	0.06		
	802.11g, 18 Mbps	6	20.0	0.089	17.88	0.0	0.032	0.03	0.063	0.06		
		11	20.0	0.096	18.42	0.0	0.030	0.03	0.060	0.06		
	802.11n, 14.4 Mbps	6	20.0	-0.130	17.81	0.0	0.011	0.01	0.032	0.03		
	802.11n, 19.5 Mbps	6	20.0	0.358	17.78	0.0	0.012	0.01	0.033	0.03		

Table 11: SAR measurement results at the highest possible output power, measured against the ICNIRP and ANSI SAR Limit.

Mobile Hotspot, Bottom Edge of Phone 10 mm from Phantom

f (MHz)	Mode	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value		1 g SAR value		Test Plot	
					Measured (dBm)	Power Reduction (dB)	Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
835	CDMA 800, RC3 SO55	1013			25.05	-3.0						
		384	19.6	0.180	25.07	-3.0	0.013	0.01	0.029	0.03		
		777			24.94	-3.0						
	GPRS 850, ***PS Data***	128			27.85	-3.0						
		190	20.1	-0.430	27.57	-3.0	0.017	0.02	0.029	0.03		
		251			27.34	-3.0						
1880	CDMA 1900, RC3 SO55	25	19.7	0.230	25.20	-3.0	0.640	0.64	1.32	1.32		
		600	**19.7**	**-0.110**	**24.99**	**-3.0**	**0.670**	**0.69**	**1.45**	**1.49**	**5x5x7**	**A-52**
		1175	19.6	0.067	24.93	-3.0	0.601	0.60	1.12	1.12		
	GPRS 1900, ***PS Data***	512			24.61	-3.0						
		661	**20.2**	**0.049**	**24.63**	**-3.0**	**0.344**	**0.34**	**0.674**	**0.67**	**5x5x7**	**A-53**
		810			24.42	-3.0						

Table 12: SAR measurement results at the highest possible output power, measured against the ICNIRP and ANSI SAR Limit.

Mobile Hotspot, Right Edge of Phone 10 mm from Phantom

f (MHz)	Mode	Channel	Temp (°C)	Drift (dB)	DUT Power		10 g SAR value		1 g SAR value		Test Plot	
					Measured (dBm)	Power Reduction (dB)	Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
835	CDMA 800, RC3 SO55	1013			25.05	-3.0						
		384	19.6	0.045	25.07	-3.0	0.114	0.11	0.174	0.17		
		777			24.94	-3.0						
	GPRS 850, ***PS Data***	128			27.85	-3.0						
		190	20.0	-0.170	27.57	-3.0	0.190	0.20	0.274	0.28		
		251			27.34	-3.0						
1880	CDMA 1900, RC3 SO55	25			25.20	-3.0						
		600	19.6	0.032	24.99	-3.0	0.077	0.08	0.145	0.15		
		1175			24.93	-3.0						
	GPRS 1900, ***PS Data***	512			24.61	-3.0						
		661	20.1	-0.047	24.63	-3.0	0.042	0.04	0.072	0.07		
		810			24.42	-3.0						

Table 13: SAR measurement results at the highest possible output power, measured against the ICNIRP and ANSI SAR Limit.

6.5 Description and 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 / CDMA transmitters 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 antenna and the main antenna is 5.3 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 9.51 mW [≤ 24 mW]
2. The separation distance between the Bluetooth antenna and the main antenna is 5.3 cm [≥ 5.0 cm]

For the transmitters requiring stand-alone SAR testing (CDMA, GSM, 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 measurement 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 for Simultaneous SAR (Head, Body, Mobile Hotspot)									
Position	Transmitter Stand-Alone 1 g SAR Values (W/kg)					1 g SAR Summations (W/kg)			
	CDMA 800	GSM 850	CDMA 1900	GSM 1900	Wi-Fi 2450 GHz	CDMA 800+ Wi-Fi	GSM 850+ Wi-Fi	CDMA 1900+ Wi-Fi	GSM 1900+ Wi-Fi
Left Head Cheek	0.66	0.69	0.44	0.20	0.28	0.94	0.97	0.72	0.48
Right Head Cheek	0.75	0.66	0.83	0.42	0.21	0.96	0.87	1.04	0.63
Left Head 15° Tilt	0.37	0.39	0.34	0.15	0.07	0.44	0.46	0.41	0.22
Right Head 15° Tilt	0.41	0.39	0.35	0.16	0.10	0.51	0.49	0.45	0.26
Body Worn, Front of Phone 25 from Phantom	0.64	0.61	0.32	0.15	0.00	0.64	0.61	0.32	0.15
Body Worn, Back of Phone 25 from Phantom (GPRS for 1900)	0.65	0.57	0.44	0.22	0.01	0.66	0.58	0.45	0.23
Mobile Hotspot, Front of Phone 10mm from Phantom	0.31	0.40	0.67	0.29	0.04	0.35	0.44	0.71	0.33
Mobile Hotspot, Back of Phone 10mm from Phantom	0.30	0.40	1.04	0.36	0.04	0.34	0.44	1.08	0.4
Mobile Hotspot, Left Edge of Phone 10mm from Phantom	0.20	0.24	0.06	0.02	0.10	0.3	0.34	0.16	0.12

As no summation of transmitter SAR values results in a value greater than the compliance limit, no measurements for simultaneous SAR are required.

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 1992 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 comparisons for System Accuracy Verifications

System Accuracy Verification Measurements for Head SAR Measurements

Date/Time: 4/2/2012 3:22:57 PM

DUT: Dipole 835 MHz; Type: D835V2; Procedure Notes: 835 MHz System Performance Check / Dipole Sn# 425tr; PM1 Power = 200 mW
Sim.Temp@ meas = 20.8*C; Sim.Temp@ SPC = 21.0*C; Room Temp@ SPC = 22.6*C

Communication System: _CW - Dipole; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: Validation *HEAD Tissue* ; Medium parameters used: f = 835 MHz; σ = 0.89 mho/m; ε_r = 40.6; ρ = 1000 kg/m^3

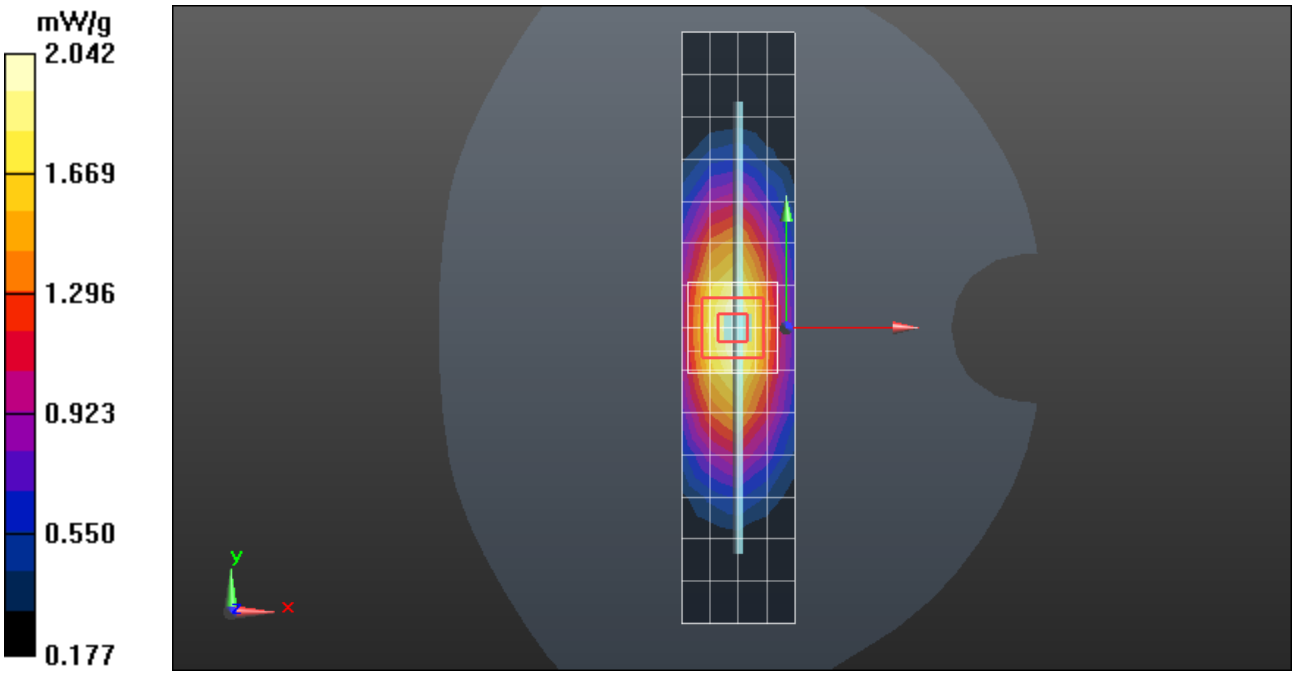
DASY4 Configuration:

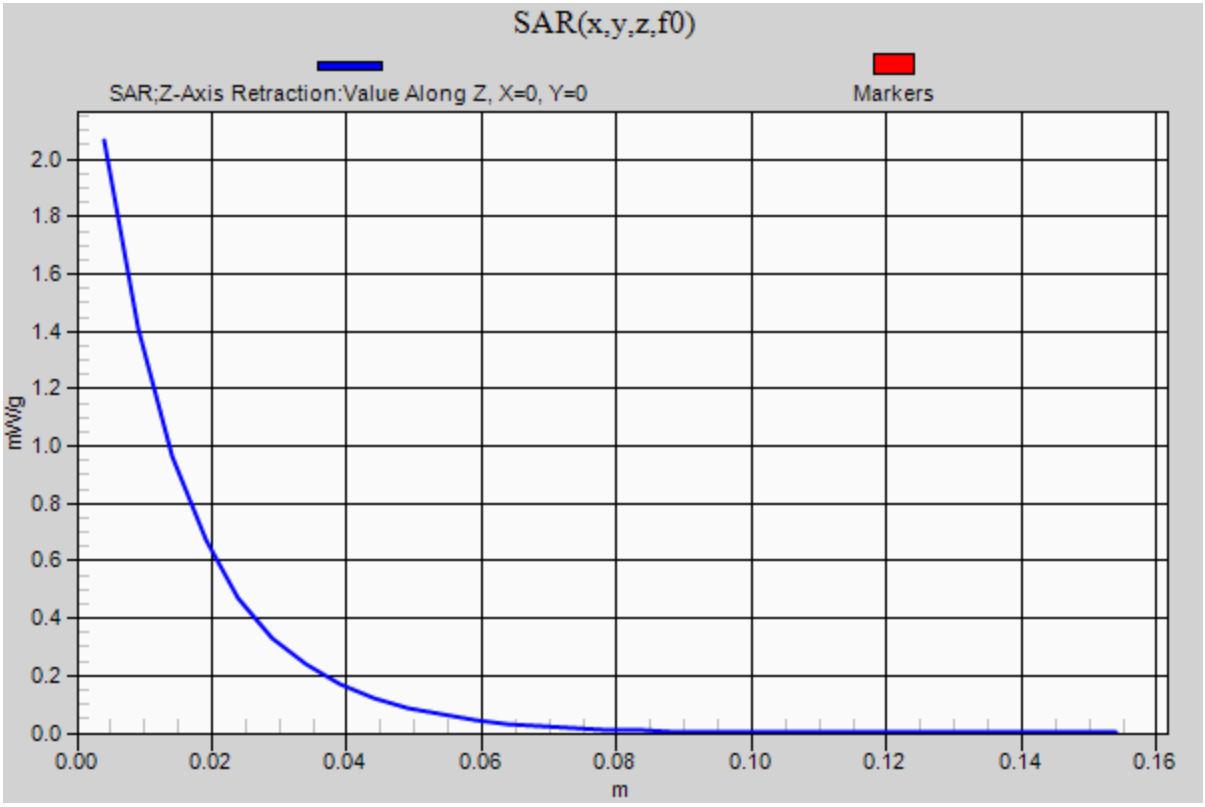
- Probe: ES3DV3 - SN3180; ConvF(6.07, 6.07, 6.07); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R12_ Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1154;
- ; SEMCAD X Version 14.6.4 (4989)

Daily SPC Check/Dipole Area Scan (5x15x1): Measurement grid: dx=10mm, dy=15mm
Maximum value of SAR (measured) = 2.035 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 48.924 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 2.7880
SAR(1 g) = 1.89 mW/g; SAR(10 g) = 1.24 mW/g
Maximum value of SAR (measured) = 2.042 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 2.065 mW/g


mW/g
2.042
1.669
1.296
0.923
0.550
0.177
y
x


SAR(x,y,z,f0)
SAR;Z-Axis Retraction:Value Along Z, X=0, Y=0
Markers
mW/g
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Date/Time: 4/4/2012 10:15:55 AM

DUT: Dipole 835 MHz; Type: D835V2; Procedure Notes: 835 MHz System Performance Check / Dipole Sn# 425tr; PM1 Power = 200 mW
Sim.Temp@ meas = 20.7*C; Sim.Temp@ SPC = 20.8*C; Room Temp@ SPC = 22.1*C

Communication System: _CW - Dipole; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: Validation *HEAD Tissue* ; Medium parameters used: f = 835 MHz; σ = 0.93 mho/m; ε_r = 42.6; ρ = 1000 kg/m^3

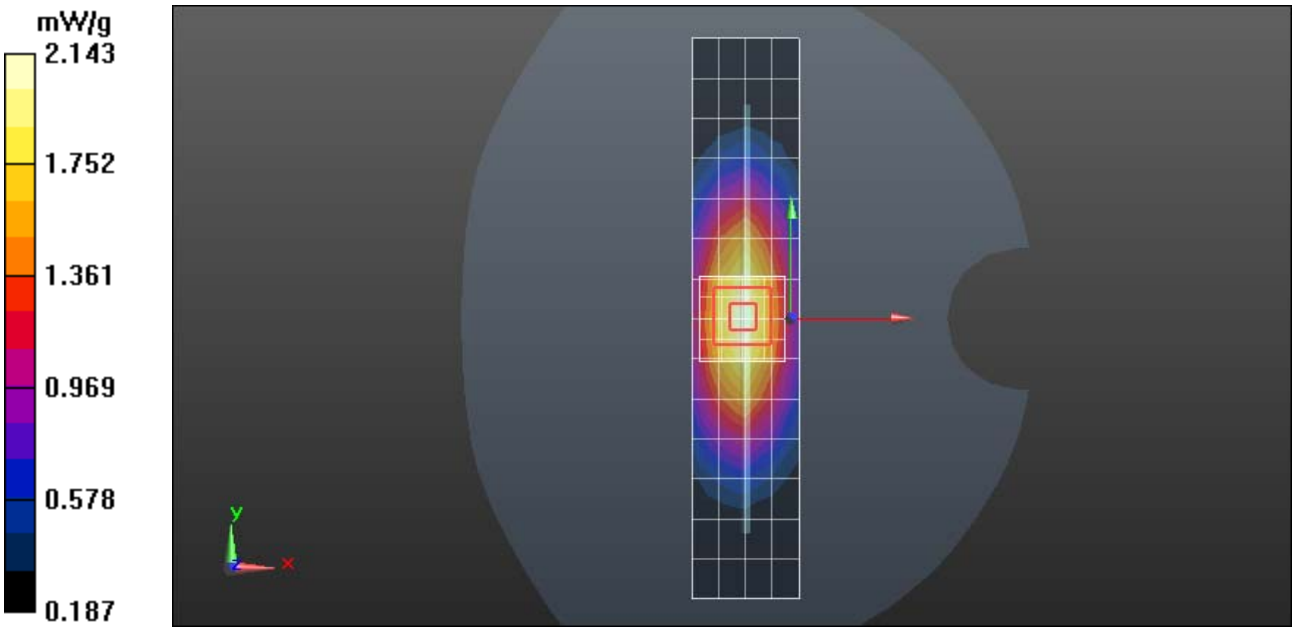
DASY4 Configuration:

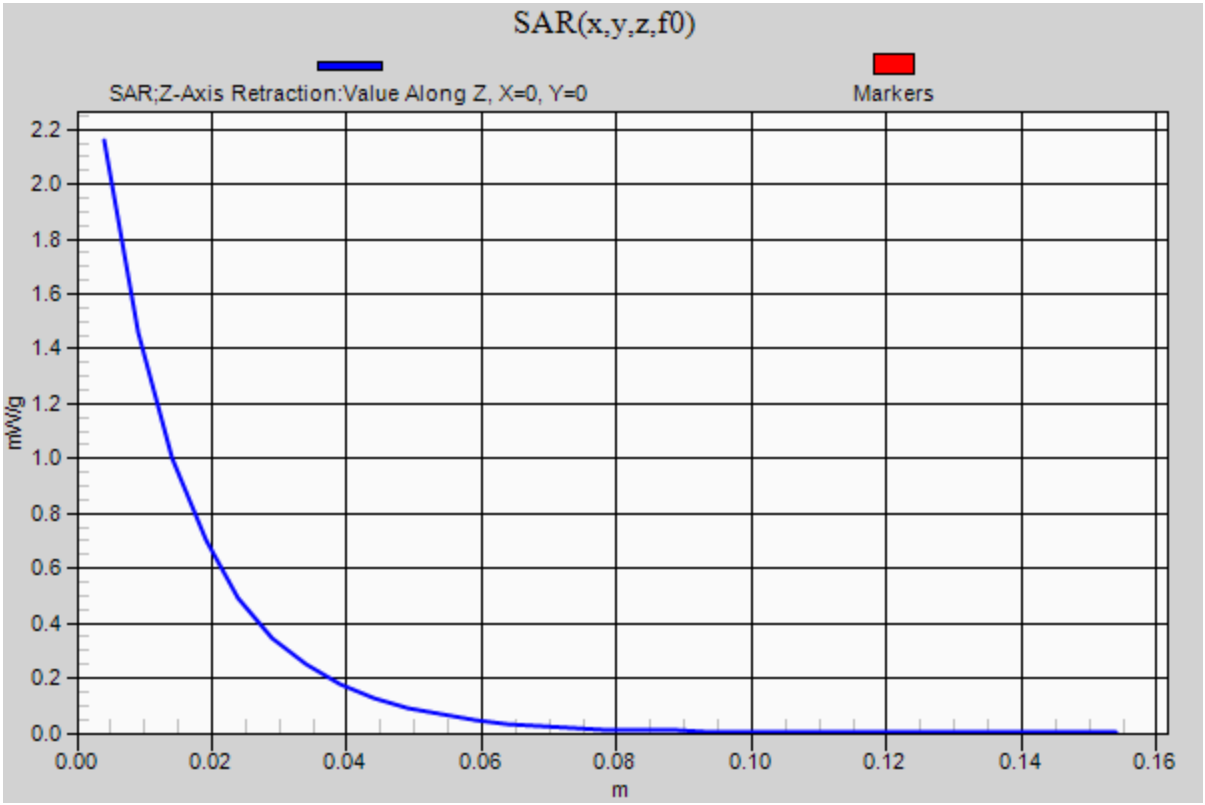
- Probe: ES3DV3 - SN3180; ConvF(6.07, 6.07, 6.07); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R12_ Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1154;
- ; SEMCAD X Version 14.6.4 (4989)

Daily SPC Check/Dipole Area Scan (5x15x1): Measurement grid: dx=10mm, dy=15mm
Maximum value of SAR (measured) = 2.157 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 49.281 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 2.9120
SAR(1 g) = 1.98 mW/g; SAR(10 g) = 1.3 mW/g
Maximum value of SAR (measured) = 2.143 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 2.159 mW/g


mW/g
2.143
1.752
1.361
0.969
0.578
0.187
y
x


SAR(x,y,z,f0)
SAR;Z-Axis Retraction:Value Along Z, X=0, Y=0
Markers
mW/g
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Date/Time: 4/5/2012 10:18:57 AM

DUT: Dipole 835 MHz; Type: D835V2; Procedure Notes: 835 MHz System Performance Check / Dipole Sn# 425tr; PM1 Power = 200 mW
Sim.Temp@ meas = 20.6*C; Sim.Temp@ SPC = 20.6*C; Room Temp@ SPC = 22.1*C

Communication System: _CW - Dipole; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: Validation *HEAD Tissue* ; Medium parameters used: f = 835 MHz; σ = 0.92 mho/m; ε_r = 41.9; ρ = 1000 kg/m^3

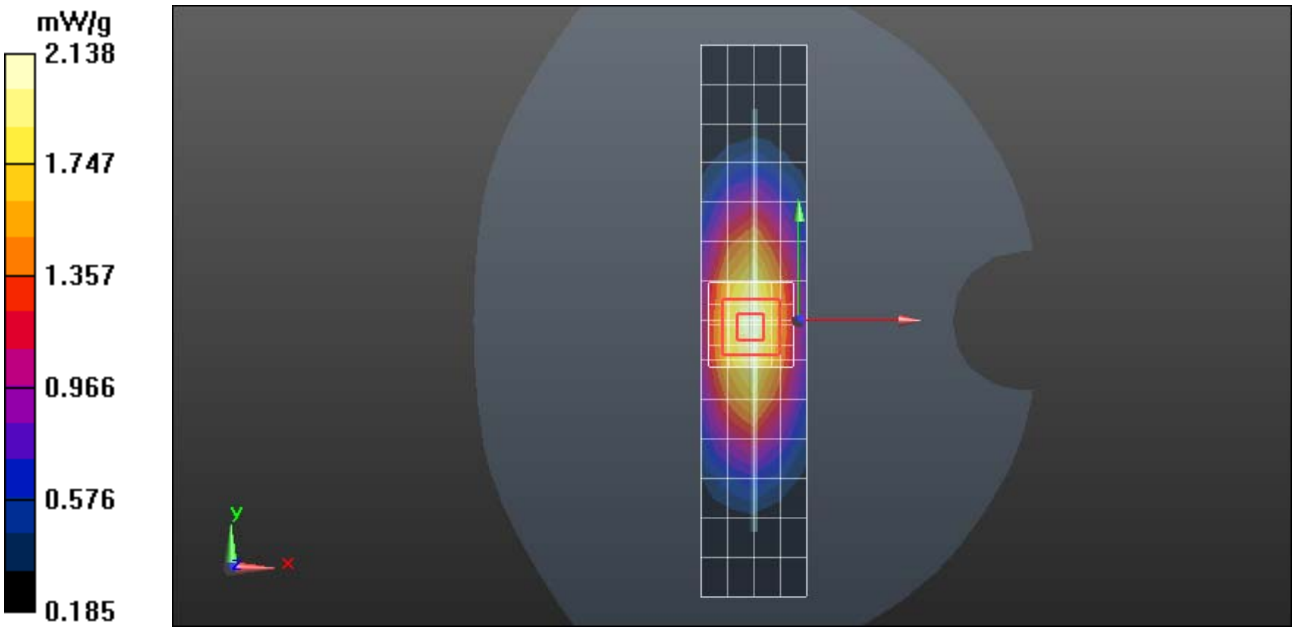
DASY4 Configuration:

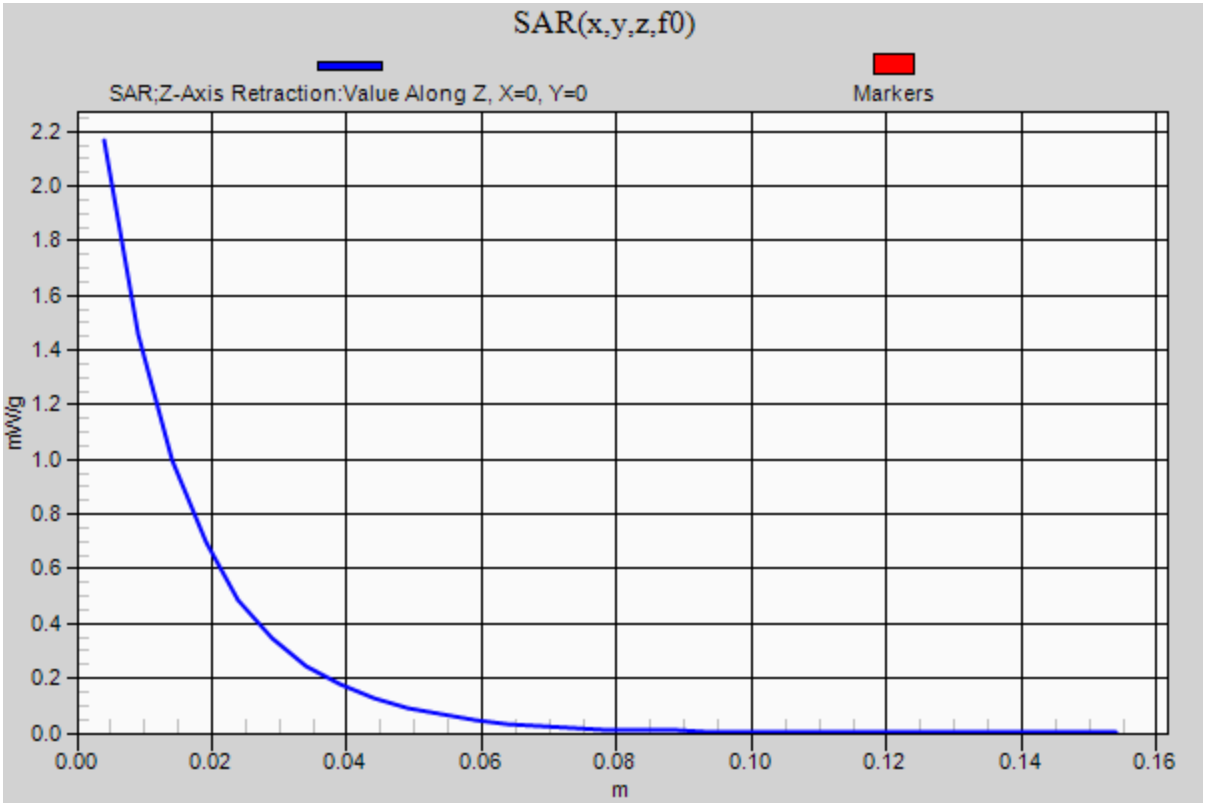
- Probe: ES3DV3 - SN3180; ConvF(6.07, 6.07, 6.07); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R12_ Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1154;
- ; SEMCAD X Version 14.6.4 (4989)

Daily SPC Check/Dipole Area Scan (5x15x1): Measurement grid: dx=10mm, dy=15mm
Maximum value of SAR (measured) = 2.169 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 49.868 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 2.8930
SAR(1 g) = 1.97 mW/g; SAR(10 g) = 1.29 mW/g
Maximum value of SAR (measured) = 2.138 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 2.166 mW/g


mW/g
2.138
1.747
1.357
0.966
0.576
0.185
y
x


SAR(x,y,z,f0)
SAR;Z-Axis Retraction:Value Along Z, X=0, Y=0
Markers
mW/g
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Date/Time: 4/5/2012 2:33:11 PM

DUT: Dipole 1800 MHz; Type: D1800V2; Procedure Notes: 1800 MHz System Performance Check / Dipole Sn# 2d129; PM1 Power = 200 mW
Sim.Temp@ meas = 21.8*C; Sim.Temp@ SPC = 21.5*C; Room Temp@ SPC = 21.7*C

Communication System: _CW - Dipole; Frequency: 1800 MHz; Duty Cycle: 1:1
Medium: Validation *HEAD Tissue* ; Medium parameters used: f = 1800 MHz; σ = 1.37 mho/m; ε_r = 38.4; ρ = 1000 kg/m^3

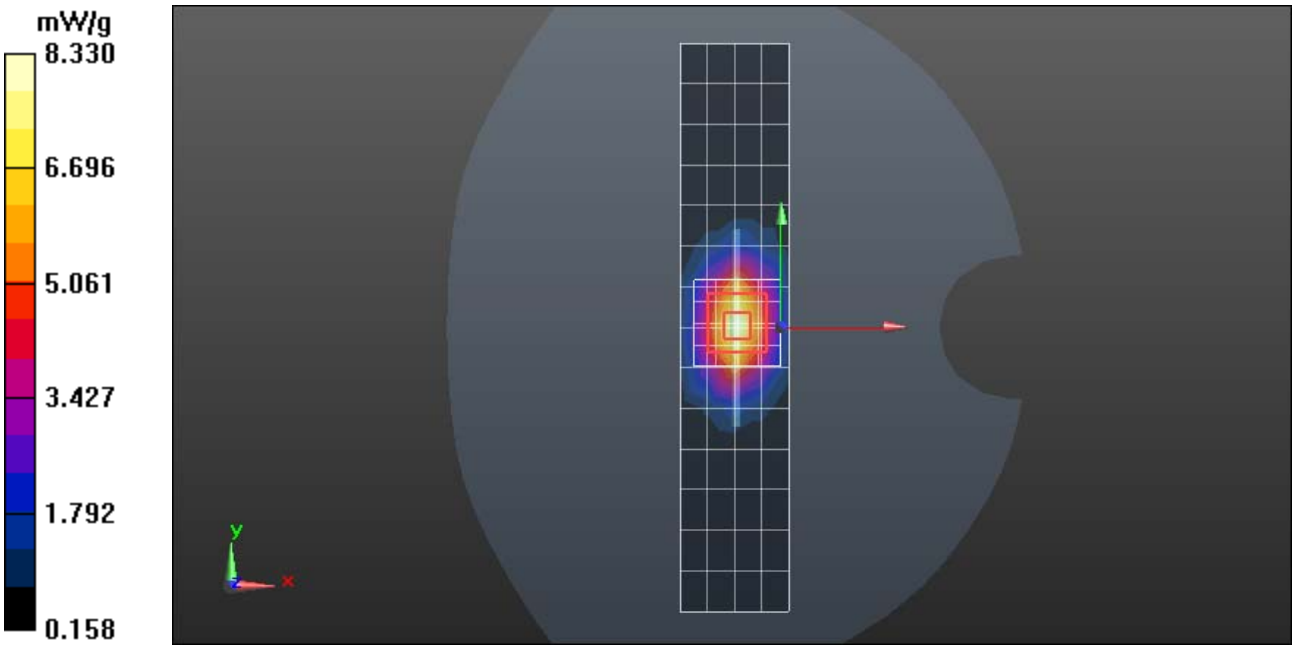
DASY4 Configuration:

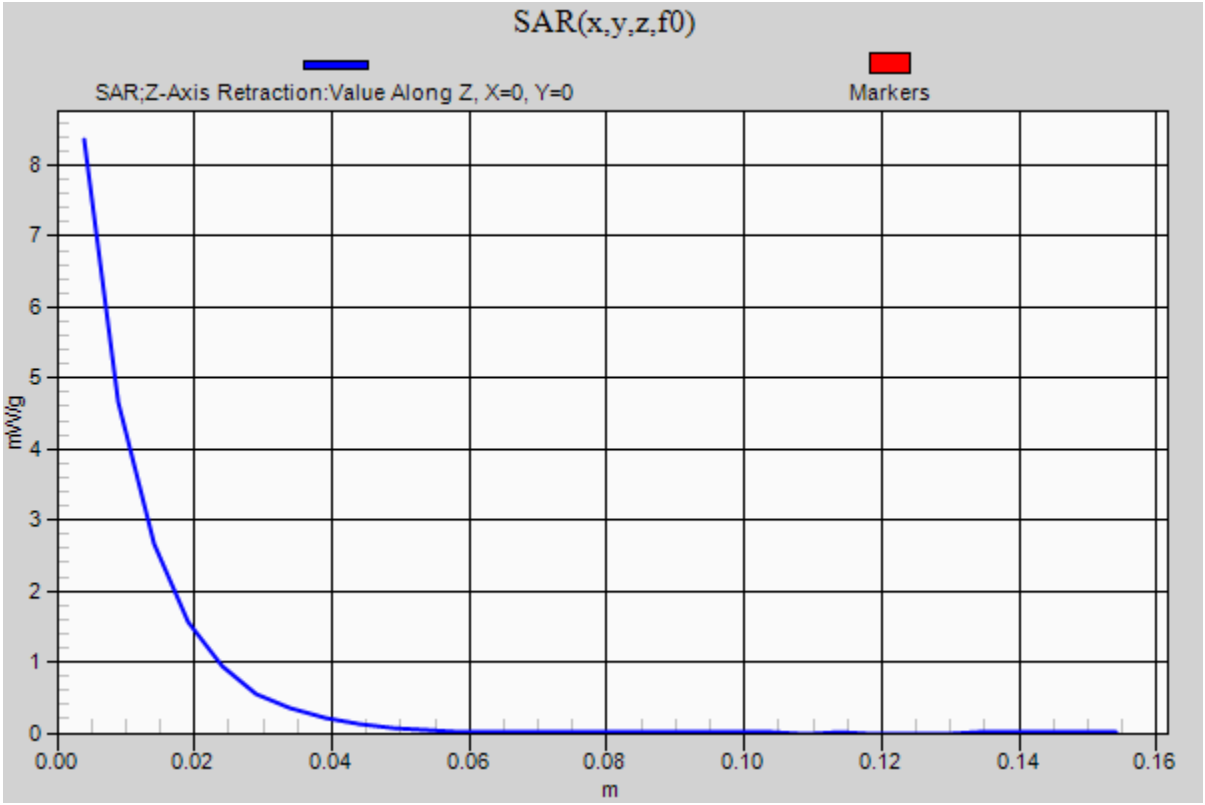
- Probe: ES3DV3 - SN3180; ConvF(5.2, 5.2, 5.2); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R12_ Glycol SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1684;
- ; SEMCAD X Version 14.6.4 (4989)

Daily SPC Check/Dipole Area Scan (5x15x1): Measurement grid: dx=10mm, dy=15mm
Maximum value of SAR (measured) = 8.361 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 79.157 V/m; Power Drift = 0.0092 dB
Peak SAR (extrapolated) = 13.4610
SAR(1 g) = 7.4 mW/g; SAR(10 g) = 3.89 mW/g
Maximum value of SAR (measured) = 8.330 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 8.358 mW/g


mW/g
8.330
6.696
5.061
3.427
1.792
0.158
y
x


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

Date/Time: 4/9/2012 9:59:07 AM

DUT: Dipole 1800 MHz; Type: D1800V2; Procedure Notes: 1800 MHz System Performance Check / Dipole Sn# 2d129; PM1 Power = 200 mW;
Sim.Temp@ meas = 22.1*C; Sim.Temp@ SPC = 21.5*C; Room Temp@ SPC = 21.6*C

Communication System: _CW - Dipole; Frequency: 1800 MHz; Duty Cycle: 1:1
Medium: Validation *HEAD Tissue* ; Medium parameters used: f = 1800 MHz; σ = 1.38 mho/m; ε_r = 38.4; ρ = 1000 kg/m^3

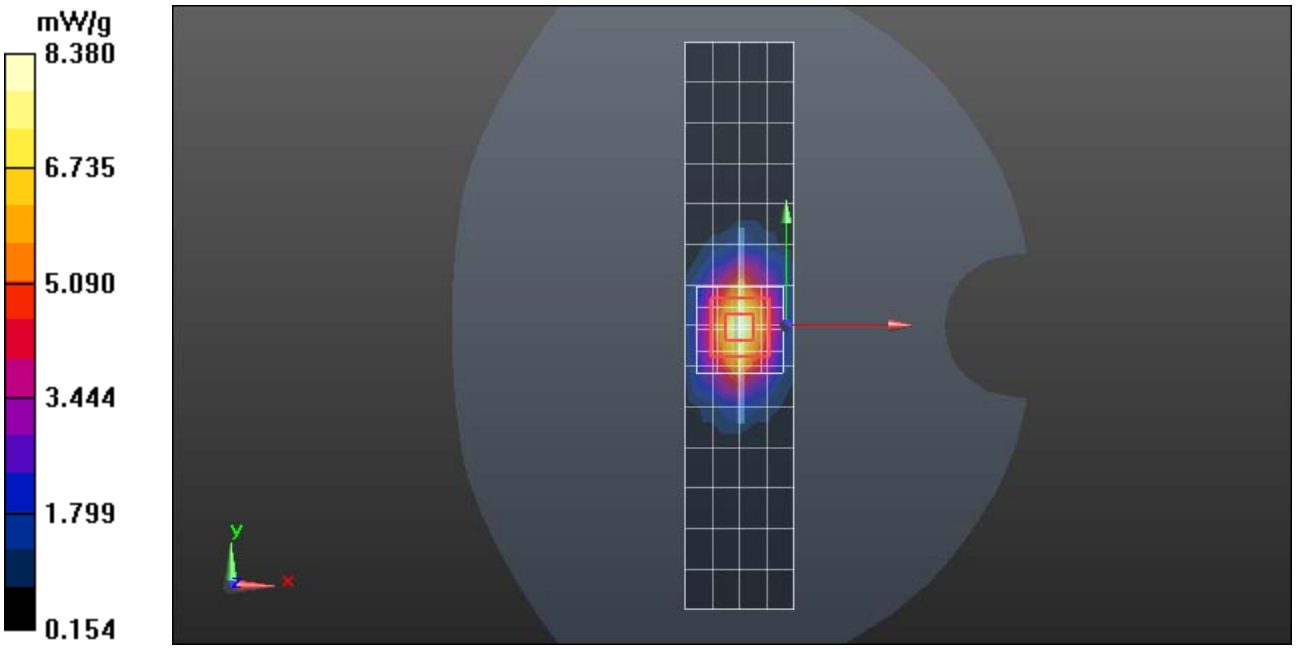
DASY4 Configuration:

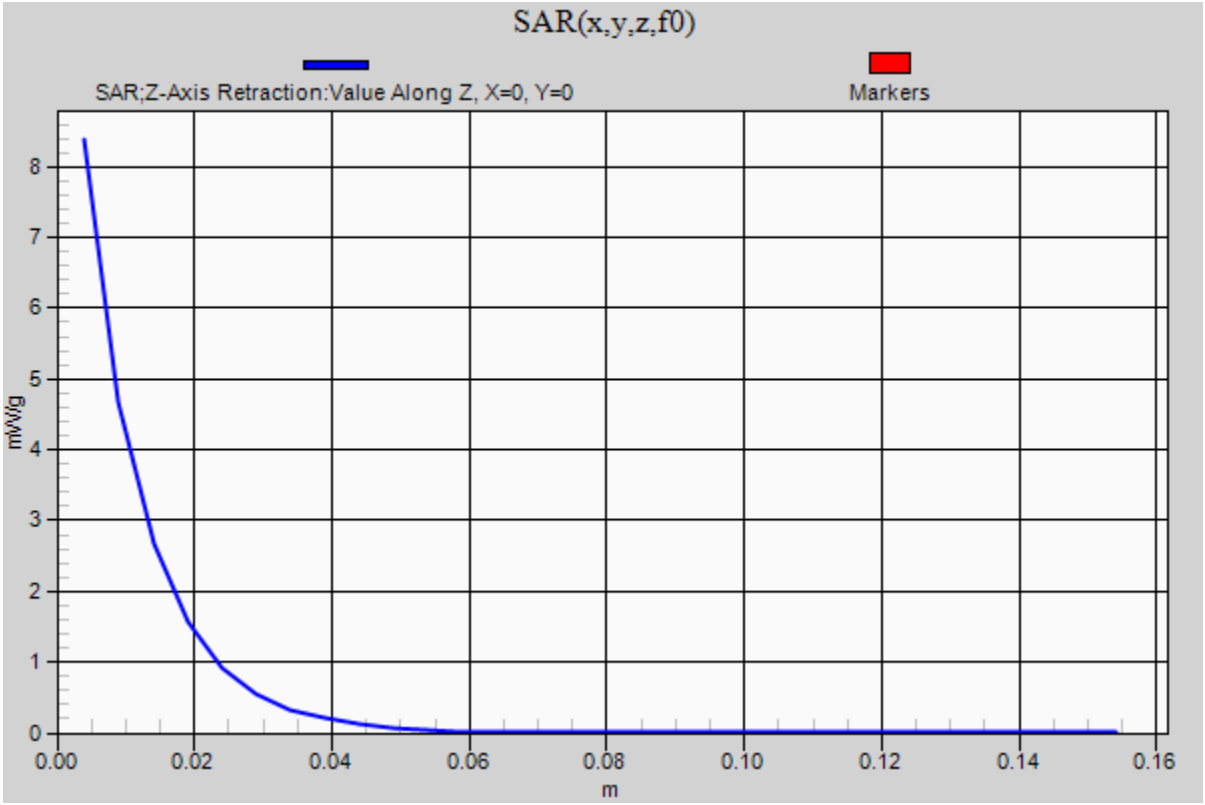
- Probe: ES3DV3 - SN3180; ConvF(5.2, 5.2, 5.2); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R12_ Glycol SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1684;
- ; SEMCAD X Version 14.6.4 (4989)

Daily SPC Check/Dipole Area Scan (5x15x1): Measurement grid: dx=10mm, dy=15mm
Maximum value of SAR (measured) = 8.353 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 79.084 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 13.5210
SAR(1 g) = 7.44 mW/g; SAR(10 g) = 3.91 mW/g
Maximum value of SAR (measured) = 8.380 mW/g

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


mW/g
8.380
6.735
5.090
3.444
1.799
0.154
y
x


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

Date/Time: 4/27/2012 11:03:04 AM

DUT: Dipole 1800 MHz; Type: D1800V2; Procedure Notes: 1800 MHz System Performance Check / Dipole Sn# 2d129; PM1 Power = 200 mW;
Sim.Temp@ meas = 21.7*C; Sim.Temp@ SPC = 21.5*C; Room Temp@ SPC = 21.9*C

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; σ = 1.38 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3

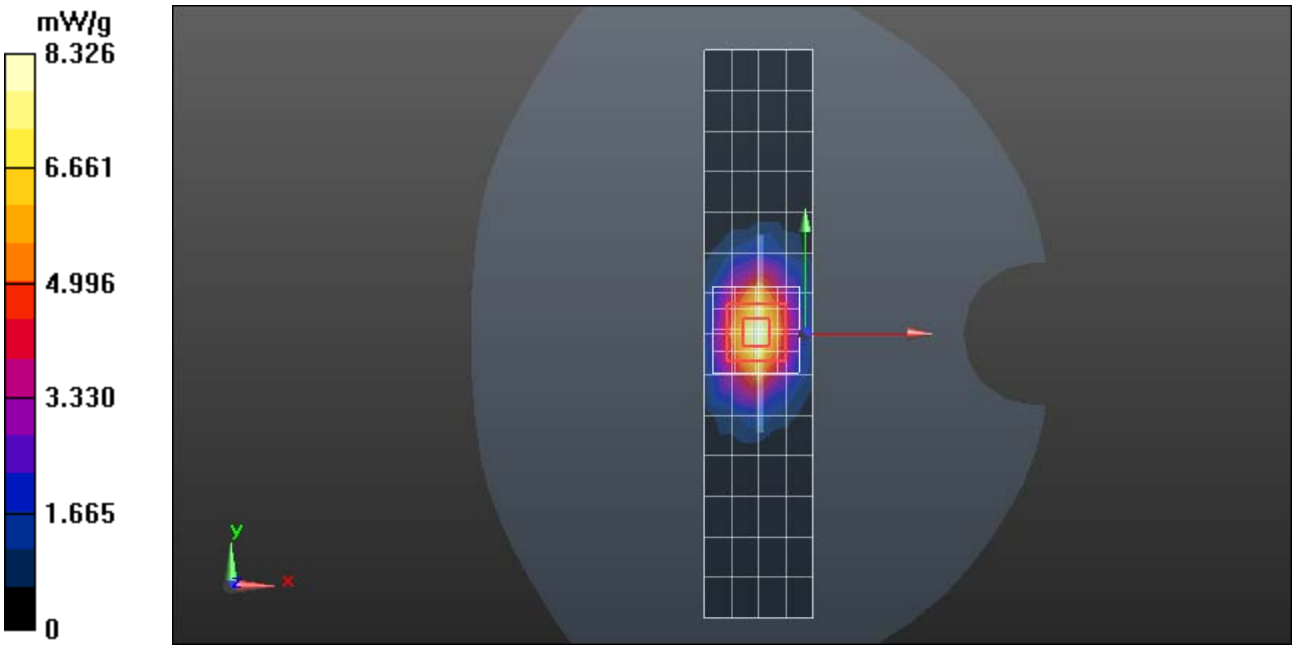
DASY4 Configuration:

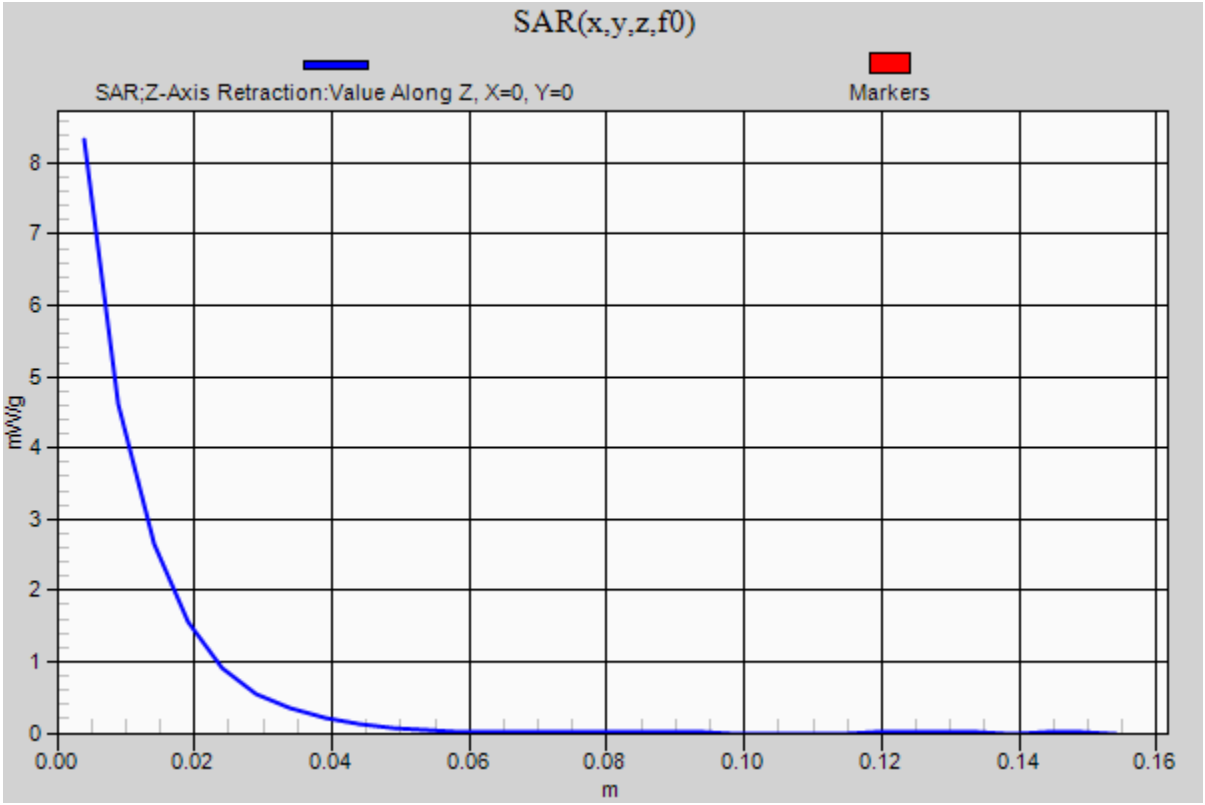
- Probe: ES3DV3 - SN3180; ConvF(5.2, 5.2, 5.2); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R12_ Glycol SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1684;
- ; SEMCAD X Version 14.6.4 (4989)

Daily SPC Check/Dipole Area Scan (5x15x1): Measurement grid: dx=10mm, dy=15mm
Maximum value of SAR (measured) = 8.248 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 78.673 V/m; Power Drift = -0.008 dB
Peak SAR (extrapolated) = 13.6060
SAR(1 g) = 7.42 mW/g; SAR(10 g) = 3.89 mW/g
Maximum value of SAR (measured) = 8.342 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 8.326 mW/g


mW/g
8.326
6.661
4.996
3.330
1.665
0
y
x


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

Date/Time: 4/9/2012 9:52:30 AM

DUT: Dipole 2450 MHz; Type: D2450V2; Procedure Notes: 2450MHz System Performance Check / Dipole Sn# 788; PM1 Power = 200 mW;
Sim.Temp@ meas =21.9*C; Sim.Temp@ SPC = 21.5*C; Room Temp@ SPC = 21.7*C

Communication System: CW - Dipole; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: Validation *HEAD Tissue* ; Medium parameters used: f = 2450 MHz; σ = 1.83 mho/m; ε_r = 39.4; ρ = 1000 kg/m^3

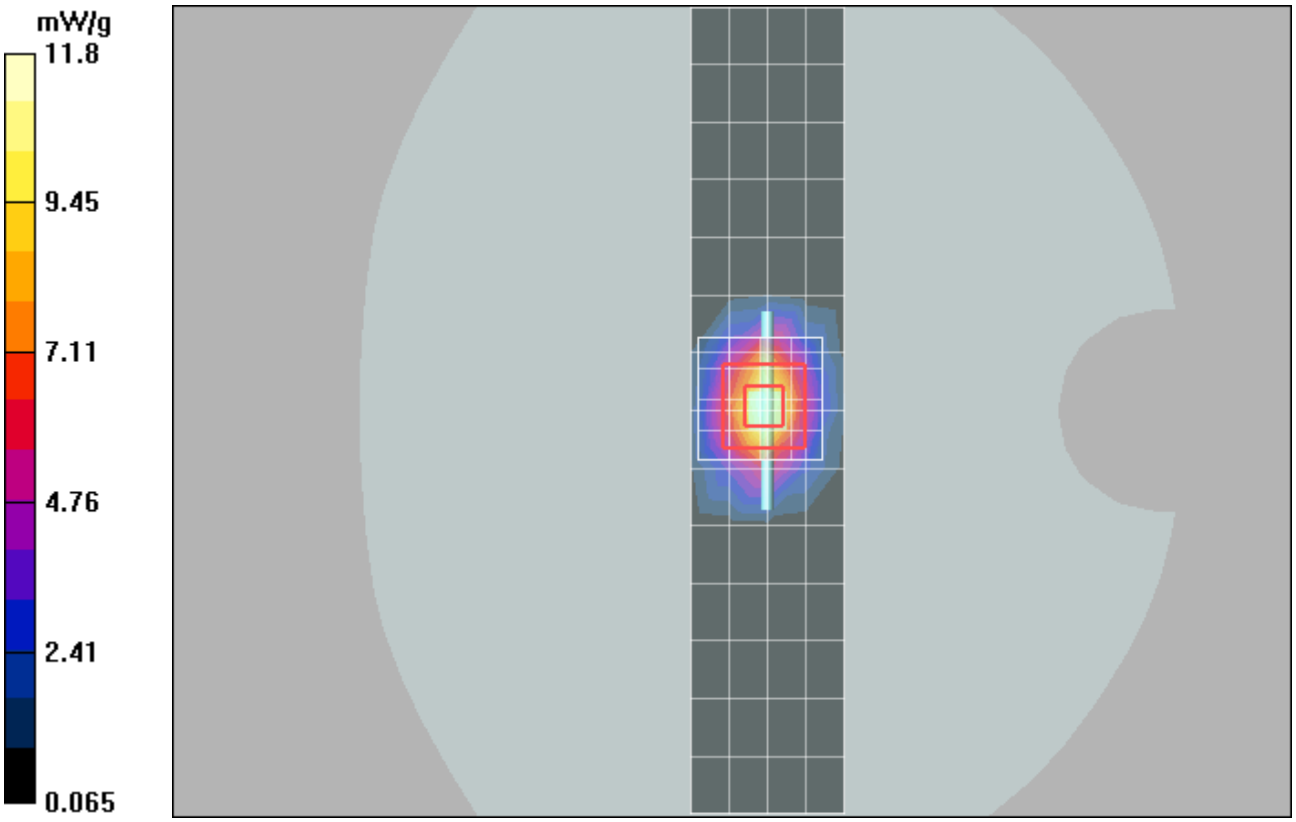
DASY4 Configuration:

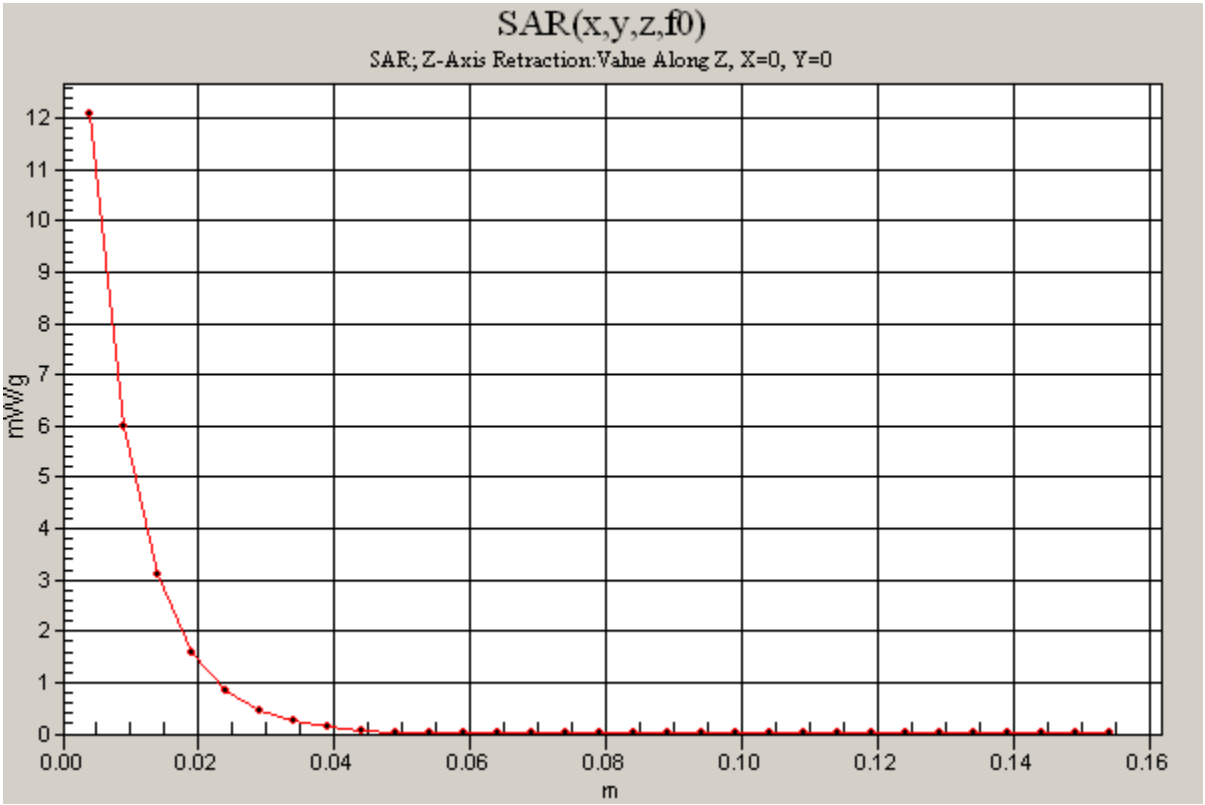
- Probe: ES3DV3 - SN3178; ConvF(4.29, 4.29, 4.29); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn437; Calibrated: 2/9/2012
- Phantom: R11_ Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1160;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Daily SPC Check/Dipole Area Scan (5x15x1): Measurement grid: dx=10mm, dy=15mm
Maximum value of SAR (measured) = 11.7 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 81.3 V/m; Power Drift = -0.075 dB
Peak SAR (extrapolated) = 21.9 W/kg
SAR(1 g) = 10.6 mW/g; SAR(10 g) = 4.93 mW/g
Maximum value of SAR (measured) = 11.8 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 12.1 mW/g


mW/g
11.8
9.45
7.11
4.76
2.41
0.065


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

System Accuracy Verification Measurements for Body SAR Measurements

Date/Time: 4/12/2012 9:46:23 AM

DUT: Dipole 835 MHz; Type: D835V2; Procedure Notes: 835 MHz System Performance Check / Dipole Sn# 425TR; PM1 Power = 200 mW
Sim.Temp@ meas = 20.3*C; Sim.Temp@ SPC =20.5*C; Room Temp@ SPC = 21.6*C

Communication System: _CW - Dipole; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: Validation *BODY Tissue* ; Medium parameters used: f = 835 MHz; σ = 1 mho/m; ε_r = 56.2; ρ = 1000 kg/m^3

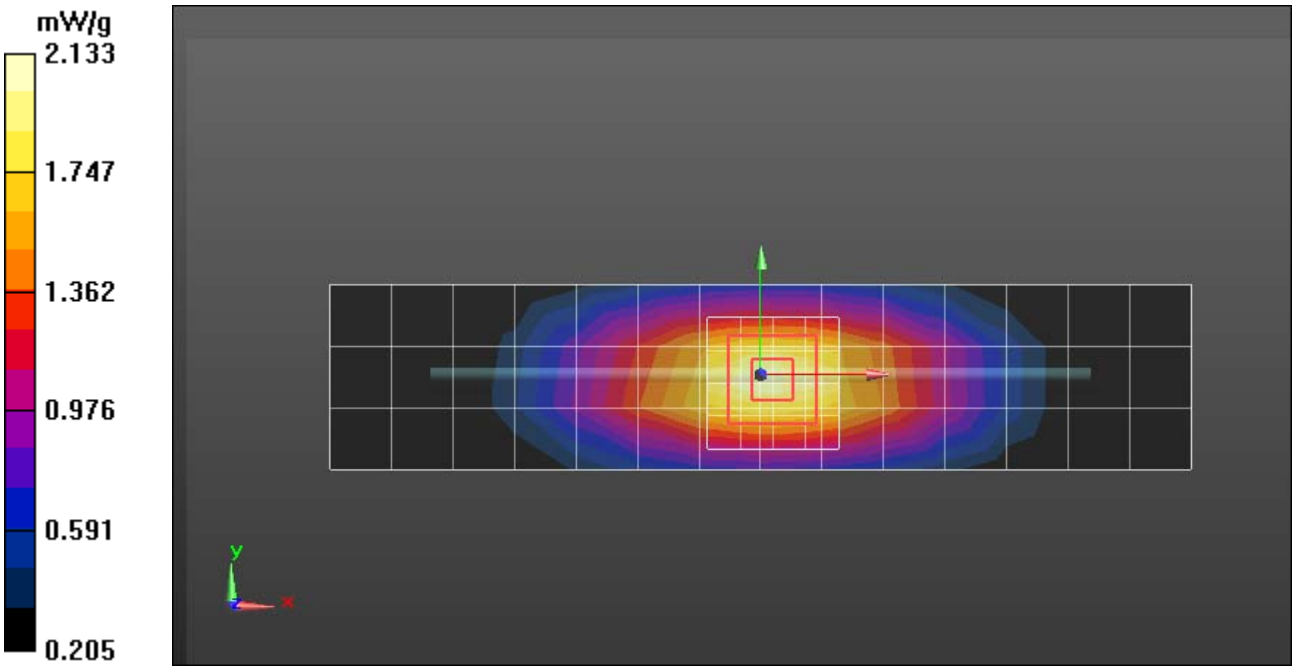
DASY4 Configuration:

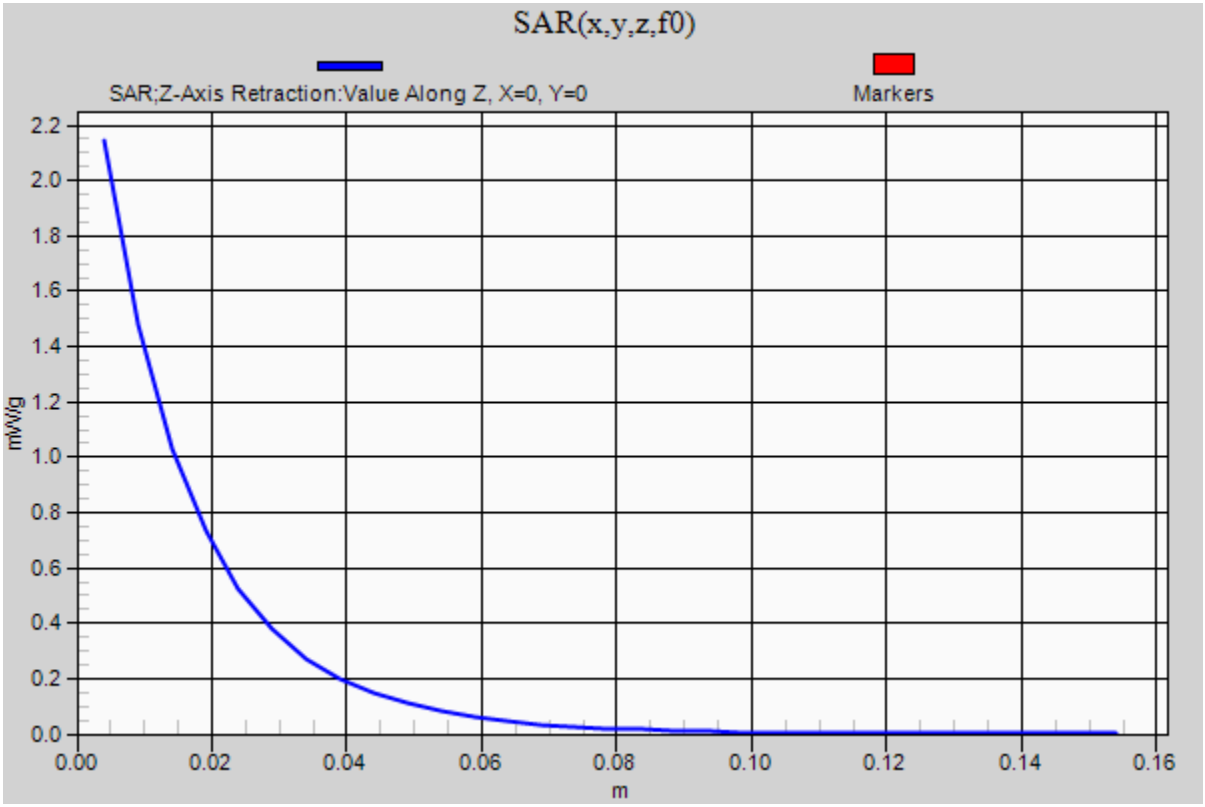
- Probe: ES3DV3 - SN3180; ConvF(5.97, 5.97, 5.97); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R#-12, Triple Flat Phantom 5.1C (Rev.3); Type: QD 000 P51 CA; Serial: n/a;
- ; SEMCAD X Version 14.6.4 (4989)

Daily SPC Check/Dipole Area Scan (4x15x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.887 mW/g

Daily SPC Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 46.777 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 2.8540
SAR(1 g) = 1.98 mW/g; SAR(10 g) = 1.31 mW/g
Maximum value of SAR (measured) = 2.133 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 2.144 mW/g


mW/g
2.133
1.747
1.362
0.976
0.591
0.205
y
x


SAR(x,y,z,f0)
SAR;Z-Axis Retraction:Value Along Z, X=0, Y=0
Markers
mW/g
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Date/Time: 4/16/2012 9:58:23 AM

DUT: Dipole 835 MHz; Type: D835V2; Procedure Notes: 835 MHz System Performance Check / Dipole Sn# 425TR; PM1 Power = 200 mW
Sim.Temp@ meas = 20.7*C; Sim.Temp@ SPC =20.2*C; Room Temp@ SPC =22.2*C

Communication System: _CW - Dipole; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: Validation *BODY Tissue* ; Medium parameters used: f = 835 MHz; σ = 0.99 mho/m; ε_r = 55.6; ρ = 1000 kg/m^3

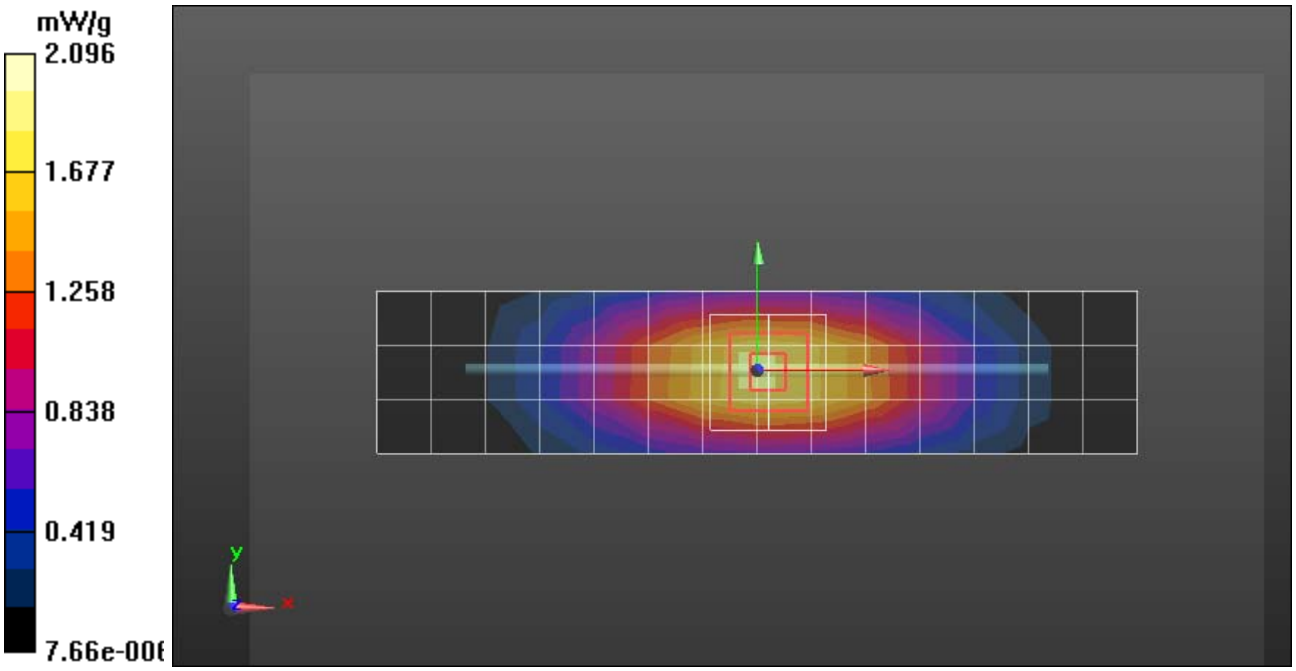
DASY4 Configuration:

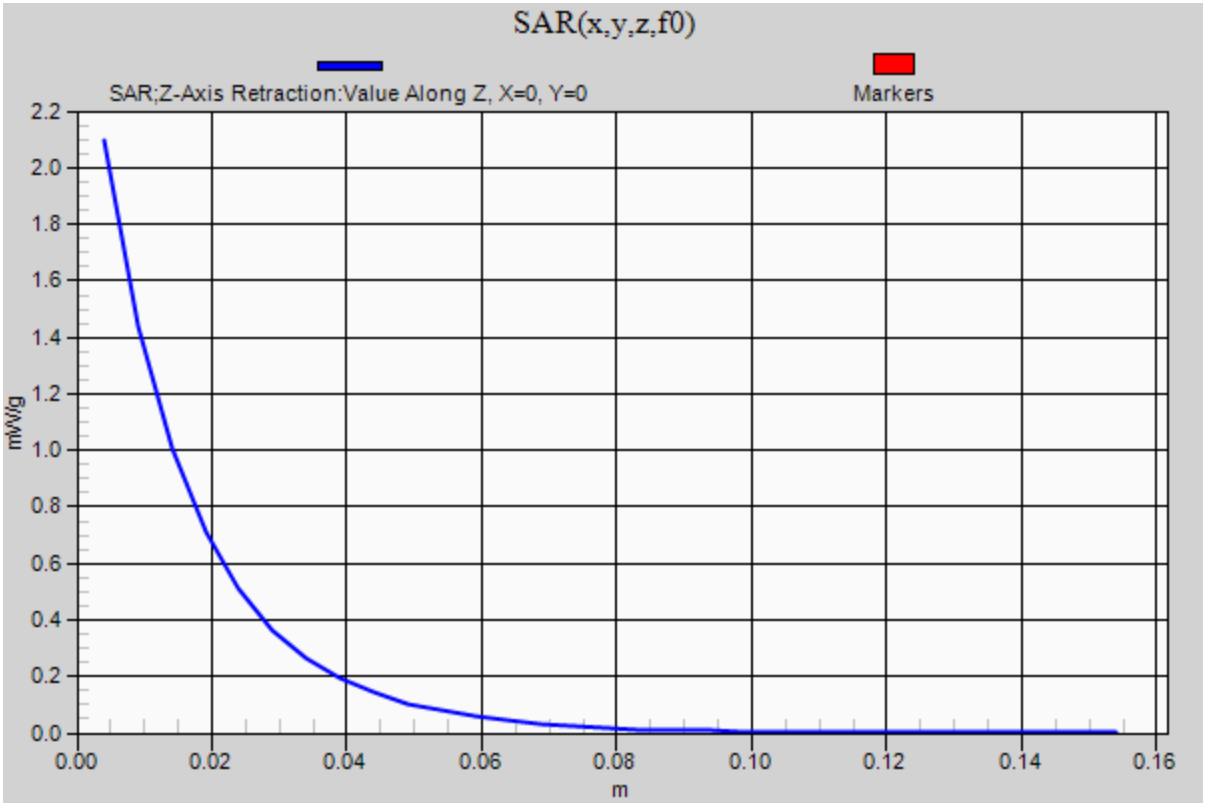
- Probe: ES3DV3 - SN3180; ConvF(5.97, 5.97, 5.97); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R#-12, Triple Flat Phantom 5.1C (Rev.3); Type: QD 000 P51 CA; Serial: n/a;
- ; SEMCAD X Version 14.6.4 (4989)

Daily SPC Check/Dipole Area Scan (4x15x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.799 mW/g

Daily SPC Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 46.660 V/m; Power Drift = -0.0024 dB
Peak SAR (extrapolated) = 2.8010
SAR(1 g) = 1.94 mW/g; SAR(10 g) = 1.28 mW/g
Maximum value of SAR (measured) = 2.093 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 2.096 mW/g


mW/g
2.096
1.677
1.258
0.838
0.419
7.66e-00
y
x


SAR(x,y,z,f0)
SAR;Z-Axis Retraction:Value Along Z, X=0, Y=0
Markers
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
mW/g
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Date/Time: 4/18/2012 5:32:56 PM

DUT: Dipole 835 MHz; Type: D835V2; Procedure Notes: 835 MHz System Performance Check / Dipole Sn# 425TR; PM1 Power = 200 mW
Sim.Temp@ meas = 20.4*C; Sim.Temp@ SPC =19.8*C; Room Temp@ SPC =21.7*C

Communication System: _CW - Dipole; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: Validation *BODY Tissue* ; Medium parameters used: f = 835 MHz; σ = 0.99 mho/m; ε_r = 55.6; ρ = 1000 kg/m^3

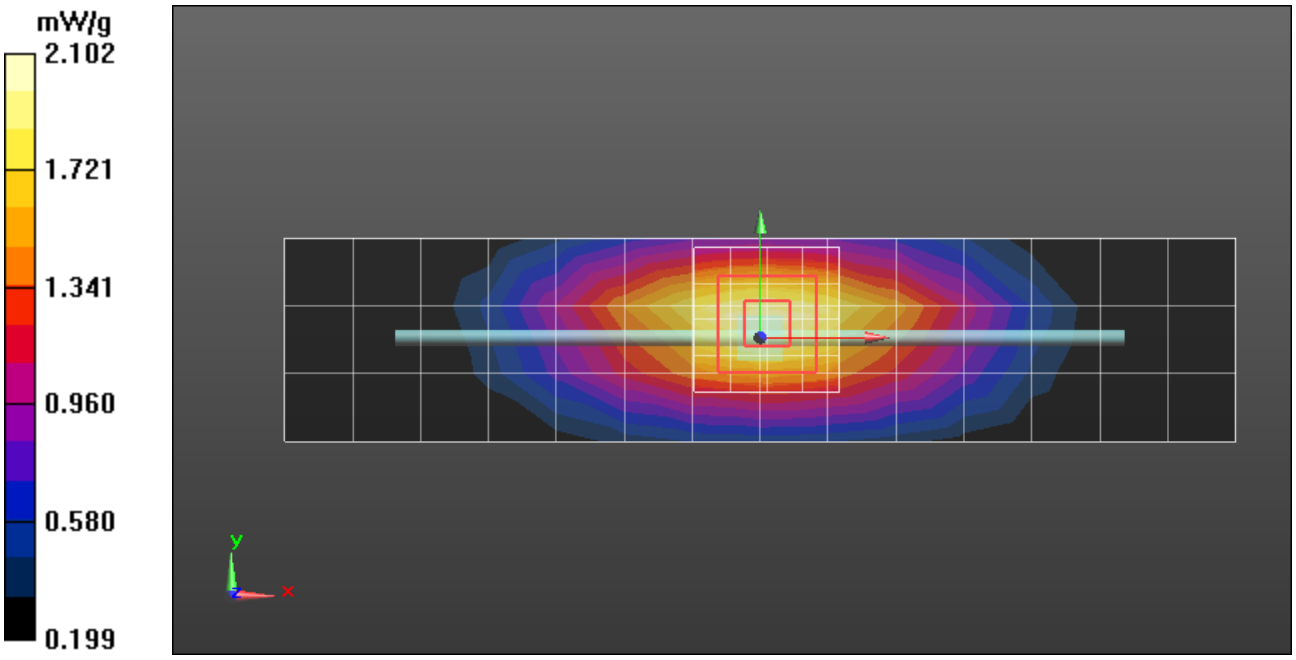
DASY4 Configuration:

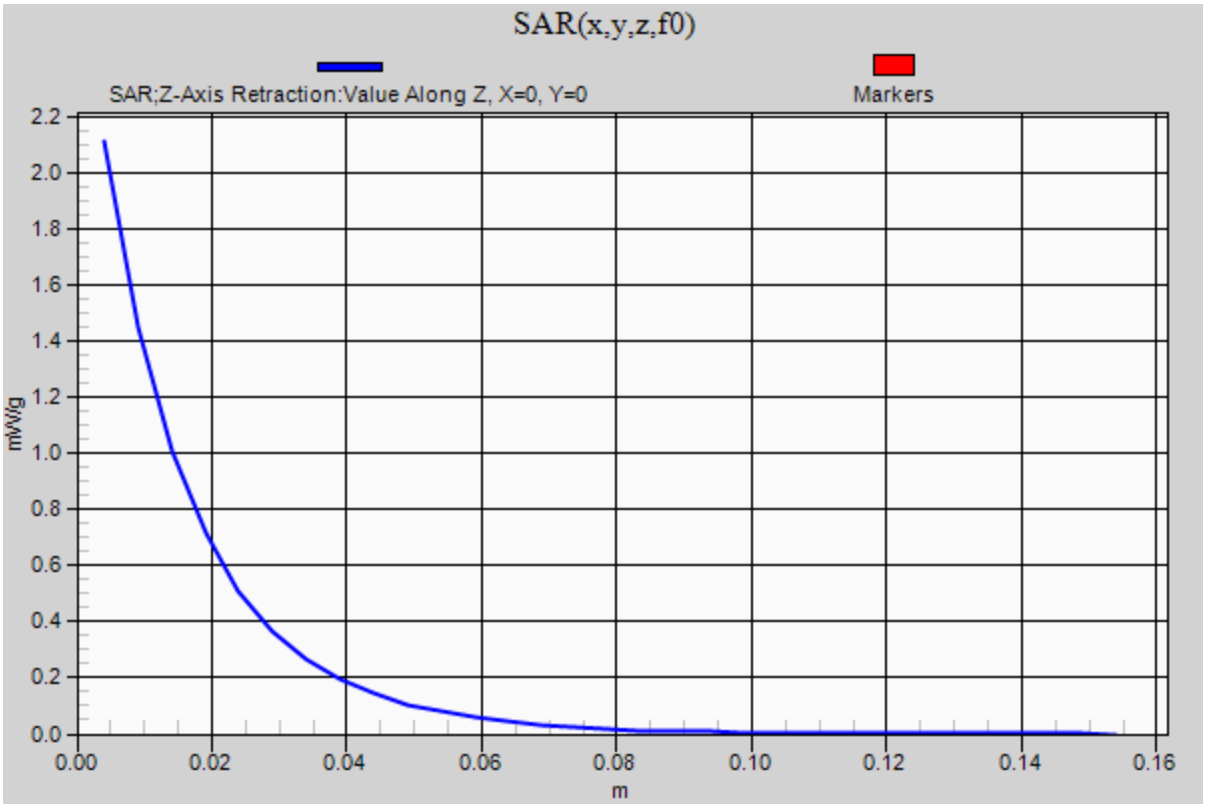
- Probe: ES3DV3 - SN3180; ConvF(5.97, 5.97, 5.97); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R#-12, Triple Flat Phantom 5.1C (Rev.3); Type: QD 000 P51 CA; Serial: n/a;
- ; SEMCAD X Version 14.6.4 (4989)

Daily SPC Check/Dipole Area Scan (4x15x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.008 mW/g

Daily SPC Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 46.302 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 2.8310
SAR(1 g) = 1.95 mW/g; SAR(10 g) = 1.29 mW/g
Maximum value of SAR (measured) = 2.102 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 2.112 mW/g


mW/g
2.102
1.721
1.341
0.960
0.580
0.199
y
x


SAR(x,y,z,f0)
SAR;Z-Axis Retraction:Value Along Z, X=0, Y=0
Markers
mW/g
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
m

Date/Time: 4/10/2012 9:56:08 AM

DUT: Dipole 1800 MHz; Type: D1800V2; Procedure Notes: 1800 MHz System Performance Check / Dipole Sn# 2d129; PM1 Power = 200 mW
Sim.Temp@ meas =21.2*C; Sim.Temp@ SPC = 20.6*C; Room Temp@ SPC = 22.1*C

Communication System: _CW - Dipole; Frequency: 1800 MHz; Duty Cycle: 1:1
Medium: Validation *BODY Tissue* ; Medium parameters used: f = 1800 MHz; σ = 1.49 mho/m; ε_r = 51; ρ = 1000 kg/m^3

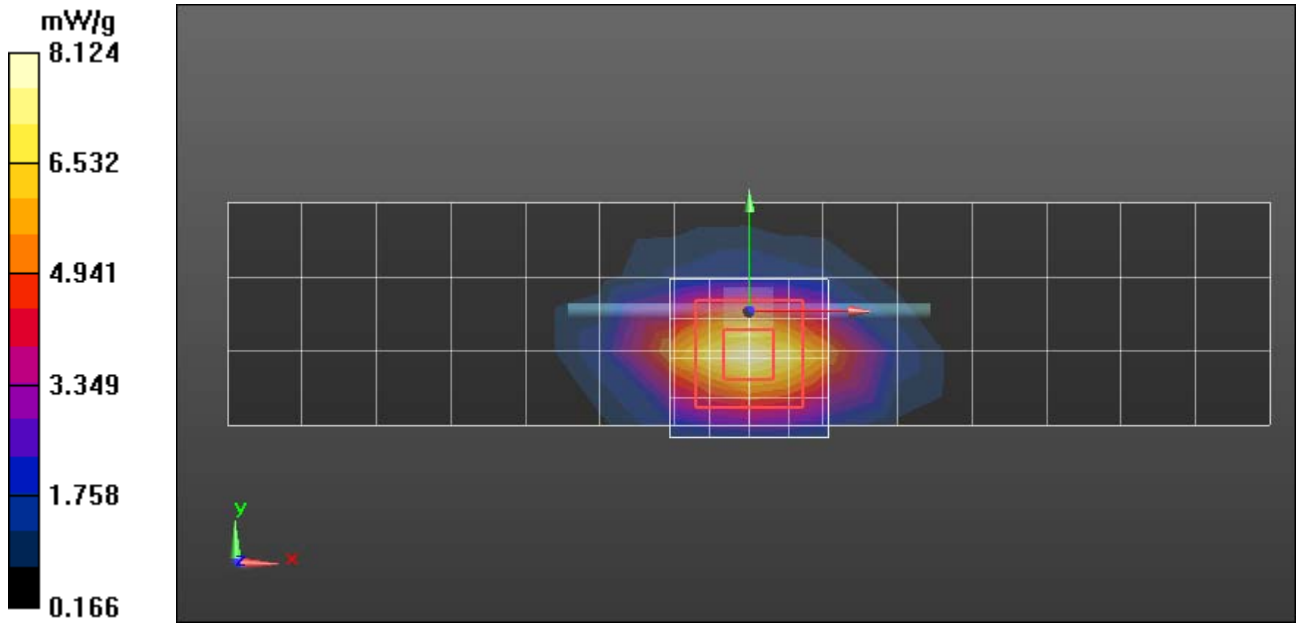
DASY4 Configuration:

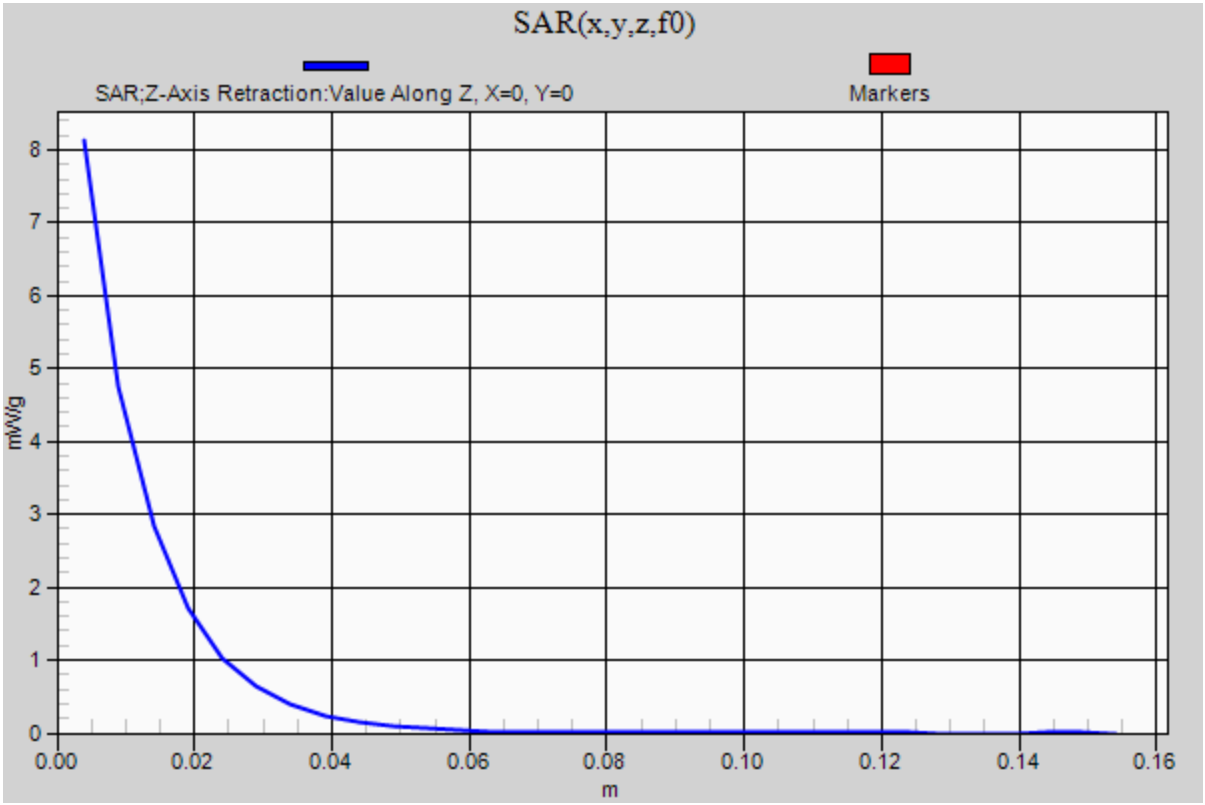
- Probe: ES3DV3 - SN3180; ConvF(5.09, 5.09, 5.09); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R#-12, Triple Flat Phantom 5.1C (Rev.3); Type: QD 000 P51 CA; Serial: n/a;
- ; SEMCAD X Version 14.6.4 (4989)

Daily SPC Check/Dipole Area Scan (4x15x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 8.085 mW/g

Daily SPC Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 59.167 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 12.4210
SAR(1 g) = 7.2 mW/g; SAR(10 g) = 3.83 mW/g
Maximum value of SAR (measured) = 8.124 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 8.131 mW/g




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

Date/Time: 4/16/2012 3:31:47 PM

DUT: Dipole 1800 MHz; Type: D1800V2; Procedure Notes: 1800 MHz System Performance Check / Dipole Sn# 2d129 PM1 Power = 200 mW
Sim.Temp@ meas = 21.8*C; Sim.Temp@ SPC = 21.5*C; Room Temp@ SPC = 22.2*C

Communication System: _CW - Dipole; Frequency: 1800 MHz; Duty Cycle: 1:1
Medium: Validation *BODY Tissue* ; Medium parameters used: f = 1800 MHz; σ = 1.48 mho/m; ε_r = 51.4; ρ = 1000 kg/m^3

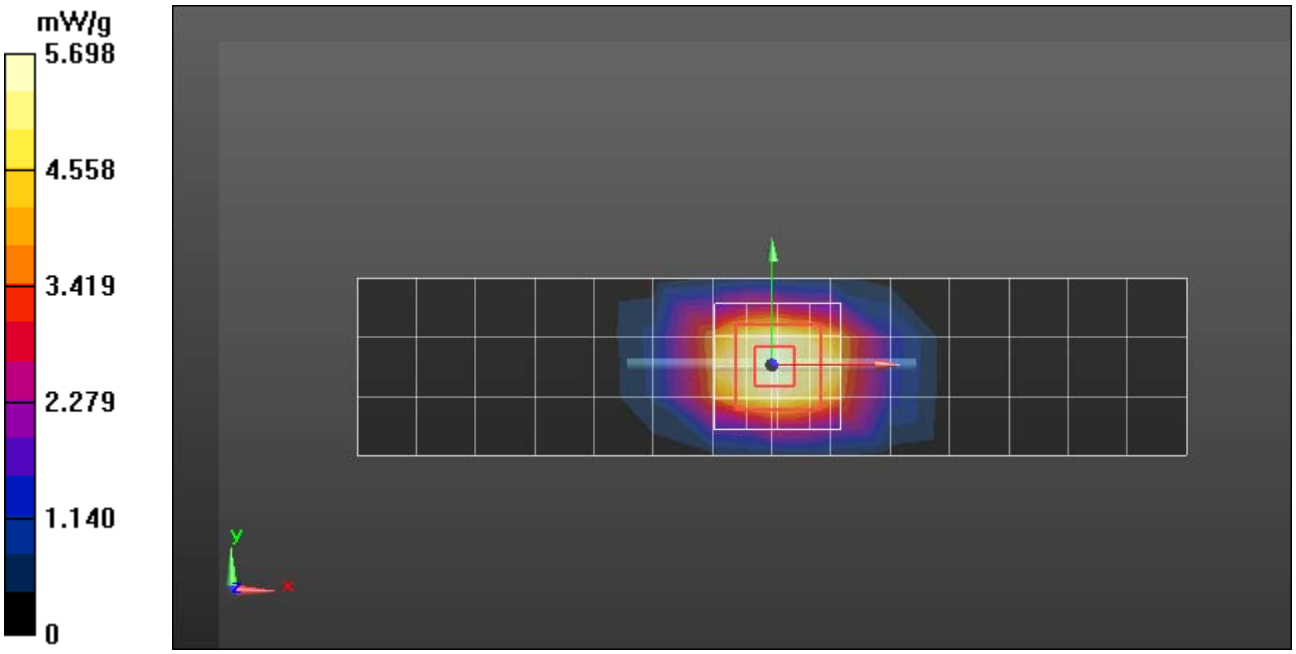
DASY4 Configuration:

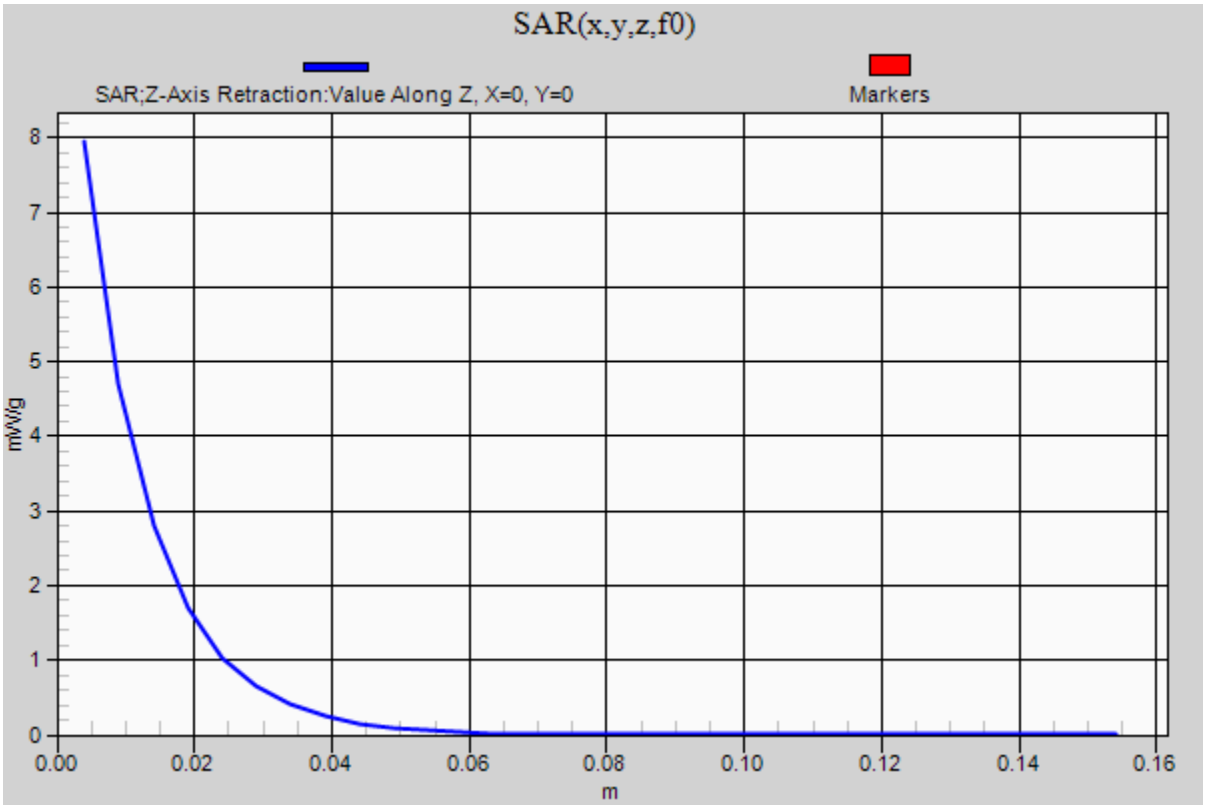
- Probe: ES3DV3 - SN3180; ConvF(5.09, 5.09, 5.09); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R#-12, Triple Flat Phantom 5.1C (Rev.3); Type: QD 000 P51 CA; Serial: n/a;
- ; SEMCAD X Version 14.6.4 (4989)

Daily SPC Check/Dipole Area Scan (4x15x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 5.698 mW/g

Daily SPC Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 75.030 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 12.0410
SAR(1 g) = 7.03 mW/g; SAR(10 g) = 3.76 mW/g
Maximum value of SAR (measured) = 7.922 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 7.947 mW/g


mW/g
5.698
4.558
3.419
2.279
1.140
0
y
x


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

Date/Time: 4/17/2012 2:33:03 PM

DUT: Dipole 1800 MHz; Type: D1800V2; Procedure Notes: 1800 MHz System Performance Check / Dipole Sn# 2d129; PM1 Power = 200 mW;
Sim.Temp@ meas = 20.6*C; Sim.Temp@ SPC = 20.5*C; Room Temp@ SPC = 22.2*C

Communication System: _CW - Dipole; Frequency: 1800 MHz; Duty Cycle: 1:1
Medium: Validation *BODY Tissue* ; Medium parameters used: f = 1800 MHz; σ = 1.5 mho/m; ε_r = 51; ρ = 1000 kg/m^3

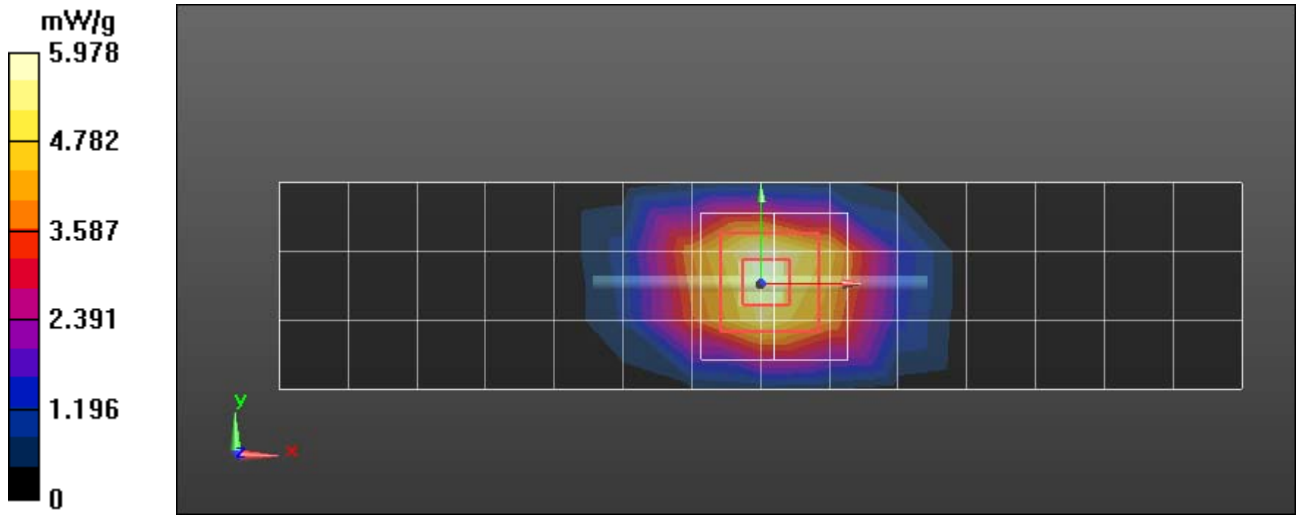
DASY4 Configuration:

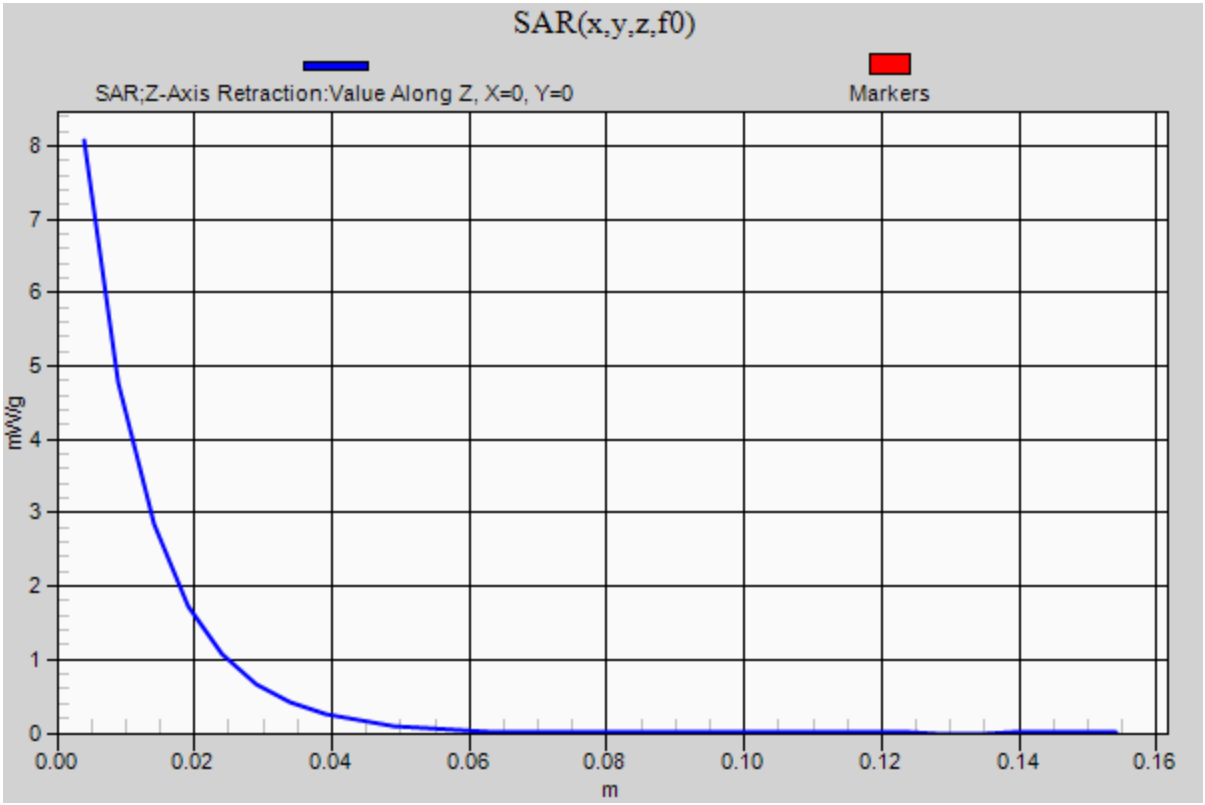
- Probe: ES3DV3 - SN3180; ConvF(5.09, 5.09, 5.09); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R#-12, Triple Flat Phantom 5.1C (Rev.3); Type: QD 000 P51 CA; Serial: n/a;
- ; SEMCAD X Version 14.6.4 (4989)

Daily SPC Check/Dipole Area Scan (4x15x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 5.978 mW/g

Daily SPC Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 75.315 V/m; Power Drift = -0.0068 dB
Peak SAR (extrapolated) = 12.2480
SAR(1 g) = 7.17 mW/g; SAR(10 g) = 3.84 mW/g
Maximum value of SAR (measured) = 8.053 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 8.069 mW/g




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

Date/Time: 4/4/2012 10:04:51 AM

DUT: Dipole 2450 MHz; Type: D2450V2; Procedure Notes: 2450MHz System Performance Check / Dipole Sn# 788; PM1 Power = 200 mW;
Sim.Temp@ meas = 21.2*C; Sim.Temp@ SPC =20.7*C; Room Temp@ SPC = 21.7*C

Communication System: CW - Dipole; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: Validation *BODY Tissue* ; Medium parameters used: f = 2450 MHz; σ = 2.02 mho/m; ε_r = 50.5; ρ = 1000 kg/m^3

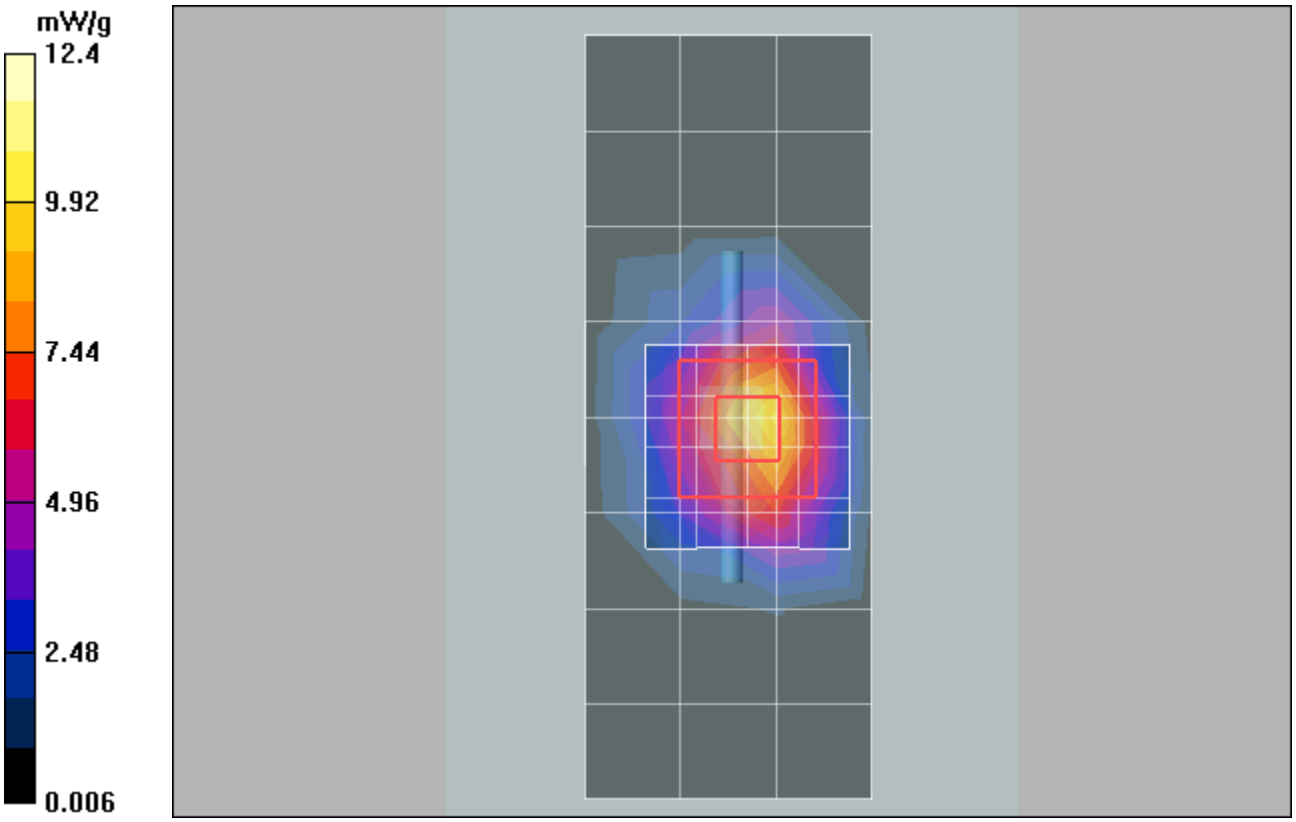
DASY4 Configuration:

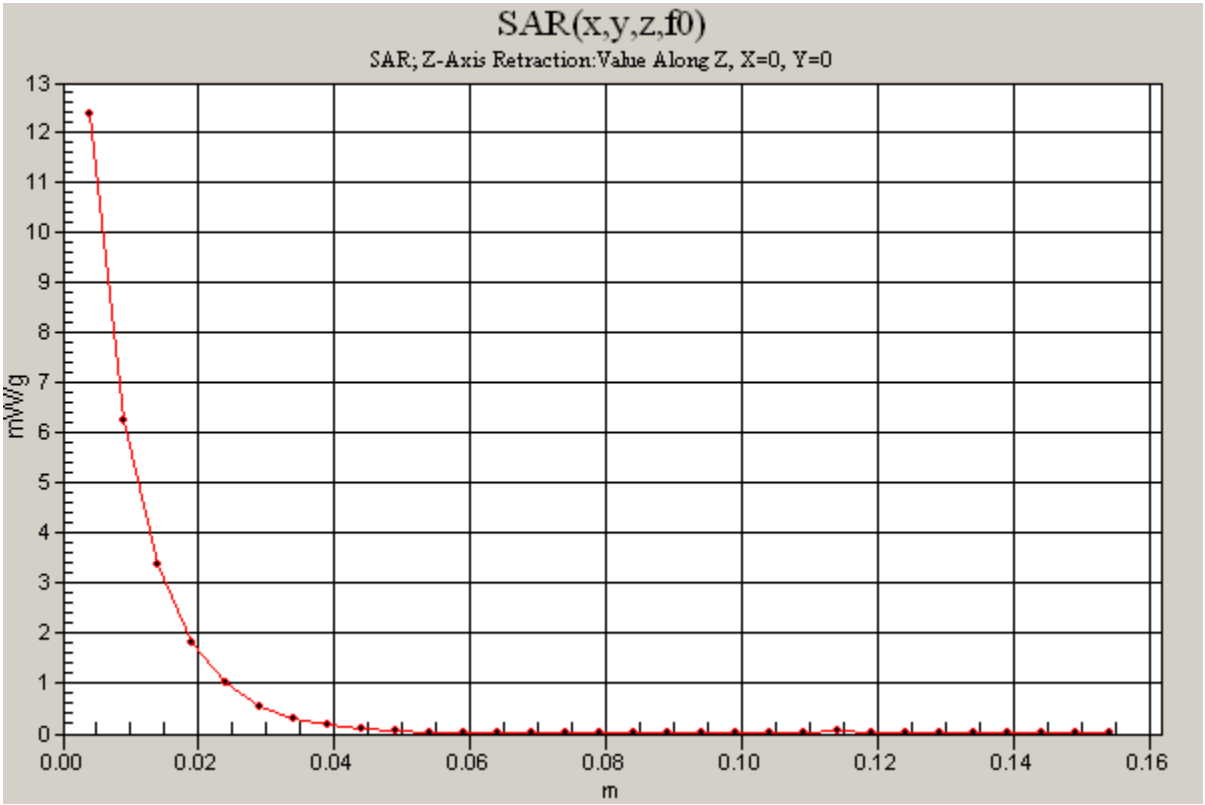
- Probe: ES3DV3 - SN3178; ConvF(4.13, 4.13, 4.13); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn437; Calibrated: 2/9/2012
- Phantom: R11_ Section 2, Amy Twin, Rev3 (3-Feb-10); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Daily SPC Check/Dipole Area Scan (9x4x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 10.3 mW/g

Daily SPC Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 76.6 V/m; Power Drift = -0.016 dB
Peak SAR (extrapolated) = 23.0 W/kg
SAR(1 g) = 10.9 mW/g; SAR(10 g) = 5.02 mW/g
Maximum value of SAR (measured) = 12.1 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 12.4 mW/g


mW/g
12.4
9.92
7.44
4.96
2.48
0.006


SAR(x,y,z,f0)
SAR; Z-Axis Retraction:Value Along Z, X=0, Y=0
mW/g
m
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
0
1
2
3
4
5
6
7
8
9
10
11
12
13

Date/Time: 4/6/2012 10:32:14 AM

DUT: Dipole 2450 MHz; Type: D2450V2; Procedure Notes: 2450 MHz System Performance Check / Dipole Sn# 788; PM1 Power = 200 mW;
Sim.Temp@ meas = 20.3*C; Sim.Temp@ SPC = 20.3*C; Room Temp@ SPC = 22.1*C

Communication System: CW - Dipole; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: Validation *BODY Tissue* ; Medium parameters used: f = 2450 MHz; σ = 1.99 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3

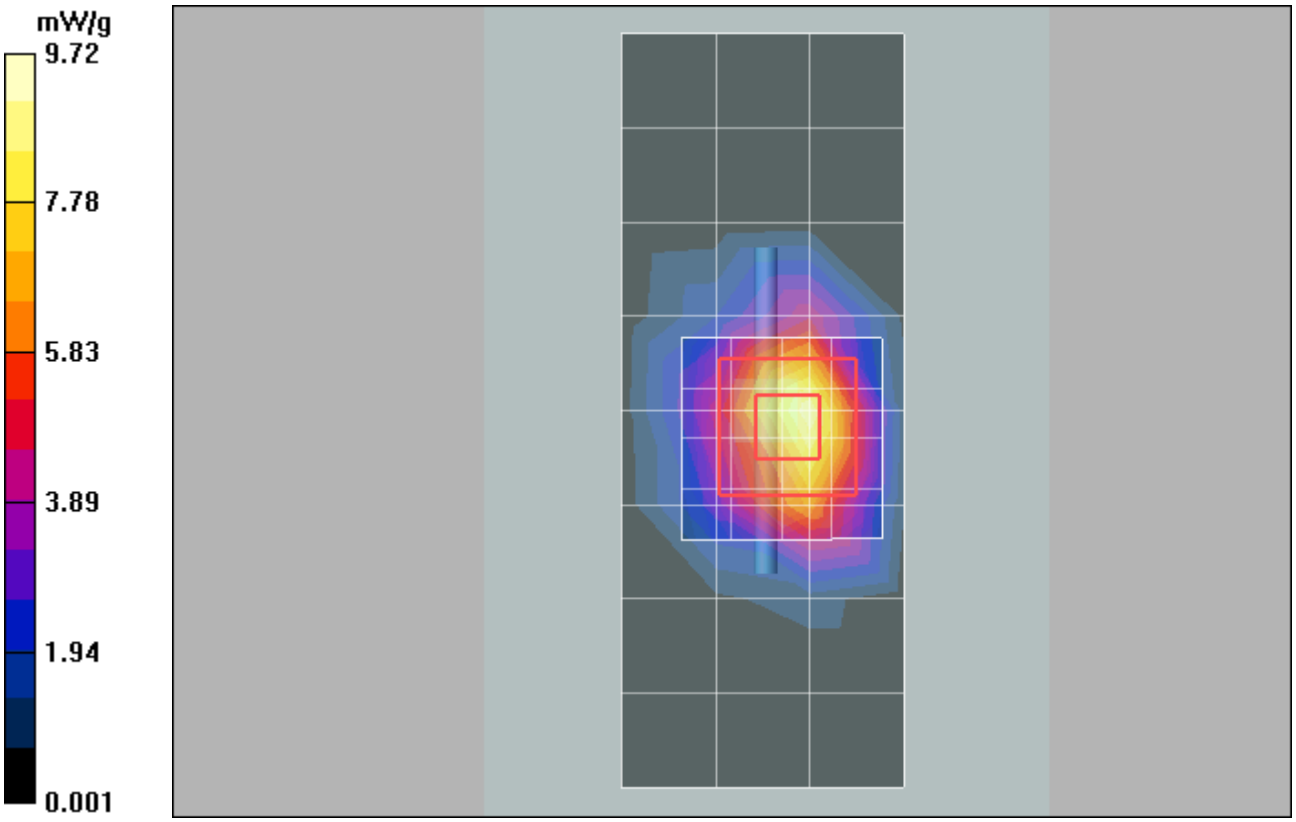
DASY4 Configuration:

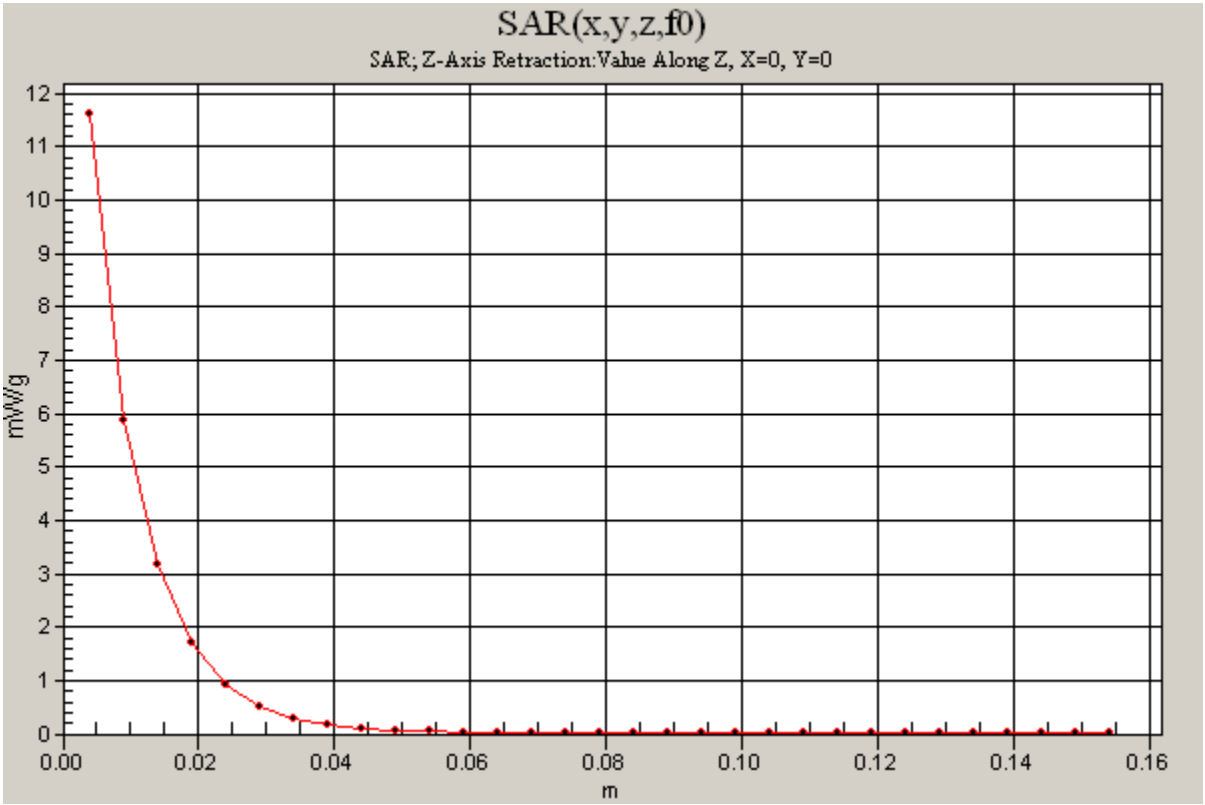
- Probe: ES3DV3 - SN3178; ConvF(4.13, 4.13, 4.13); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn437; Calibrated: 2/9/2012
- Phantom: R11_ Section 2, Amy Twin, Rev3 (3-Feb-10); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Daily SPC Check/Dipole Area Scan (9x4x1): 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 = 72.6 V/m; Power Drift = 0.052 dB
Peak SAR (extrapolated) = 21.1 W/kg
SAR(1 g) = 10 mW/g; SAR(10 g) = 4.63 mW/g
Maximum value of SAR (measured) = 11.3 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 11.6 mW/g


mW/g
9.72
7.78
5.83
3.89
1.94
0.001


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

Appendix 2

SAR distribution plots for Head Adjacent Test Results

Date/Time: 4/5/2012 11:03:32 AM

Serial: 351633050007783; Procedure Notes: Pwr Step: All UP; DEVICE POSITION: Cheek

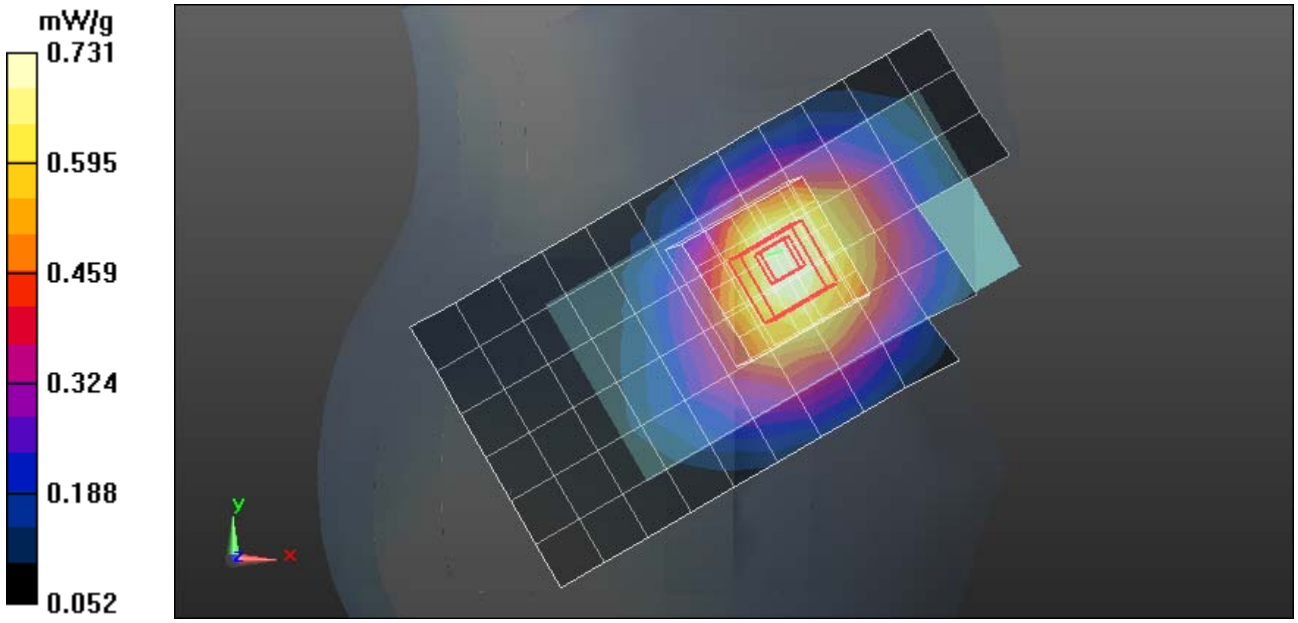
Communication System: _CDMA; Frequency: 836.52 MHz; Communication System Channel Number: 384; Duty Cycle: 1:1
Medium: Low Freq Head; Medium parameters used: f = 835 MHz; σ = 0.92 mho/m; ε_r = 41.9; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(6.07, 6.07, 6.07); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R12_ Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1154;
- ; SEMCAD X Version 14.6.4 (4989)

Right Head Template/Area Scan - Normal (15mm) (7x17x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.763 mW/g

Right Head Template/5x5x7 Zoom Scan (<=3GHz) (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.147 V/m; Power Drift = -0.29 dB
Peak SAR (extrapolated) = 0.9130
SAR(1 g) = 0.700 mW/g; SAR(10 g) = 0.518 mW/g
Maximum value of SAR (measured) = 0.731 mW/g



Date/Time: 4/2/2012 4:53:39 PM

Serial: 351633050007783; Procedure Notes: Pwr Step: 05; DEVICE POSITION: Cheek

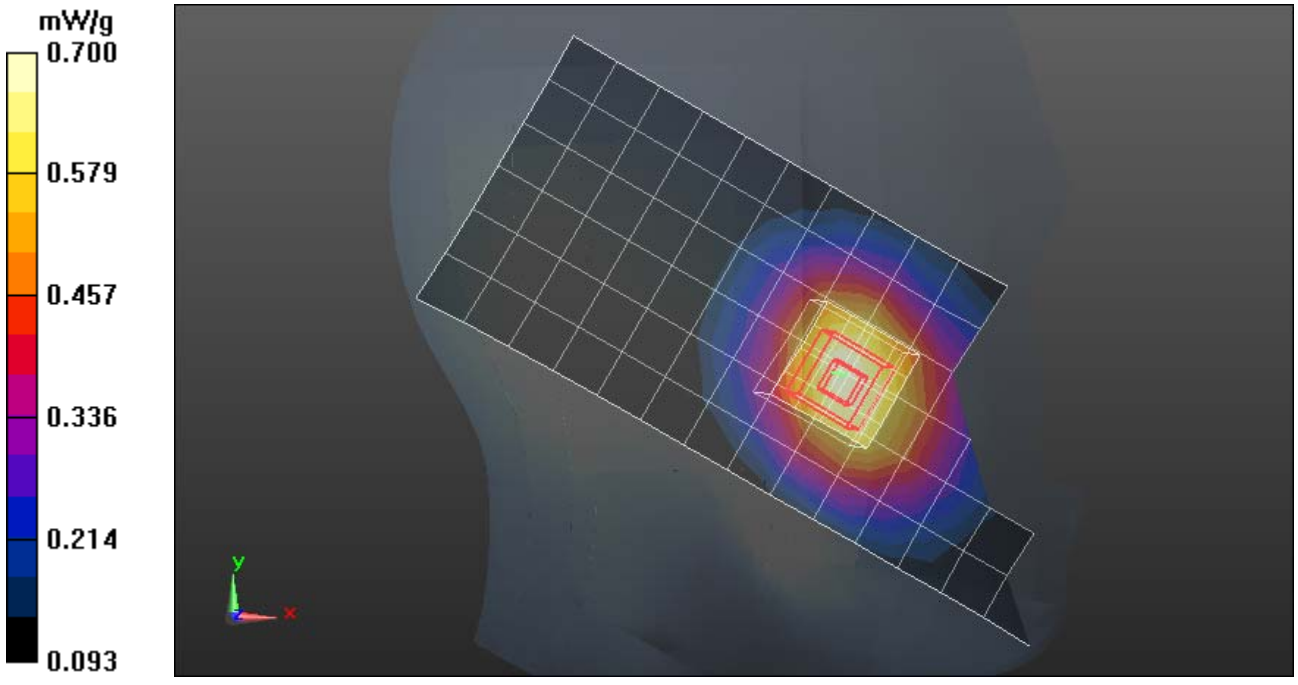
Communication System: _GSM; Frequency: 836.6 MHz; Communication System Channel Number: 190; Duty Cycle: 1:8.30042
Medium: Low Freq Head; Medium parameters used: f = 835 MHz; σ = 0.89 mho/m; ε_r = 40.6; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(6.07, 6.07, 6.07); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R12_ Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1154;
- ; SEMCAD X Version 14.6.4 (4989)

Left Head Template/Area Scan - Normal (15mm) (7x17x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.717 mW/g

Left Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 28.811 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 0.8180
SAR(1 g) = 0.671 mW/g; SAR(10 g) = 0.506 mW/g
Maximum value of SAR (measured) = 0.700 mW/g



Cheek GSM 850

Date/Time: 4/27/2012 11:39:31 AM

Serial: 351633050007783; Procedure Notes: Pwr Step: All UP; DEVICE POSITION: Cheek

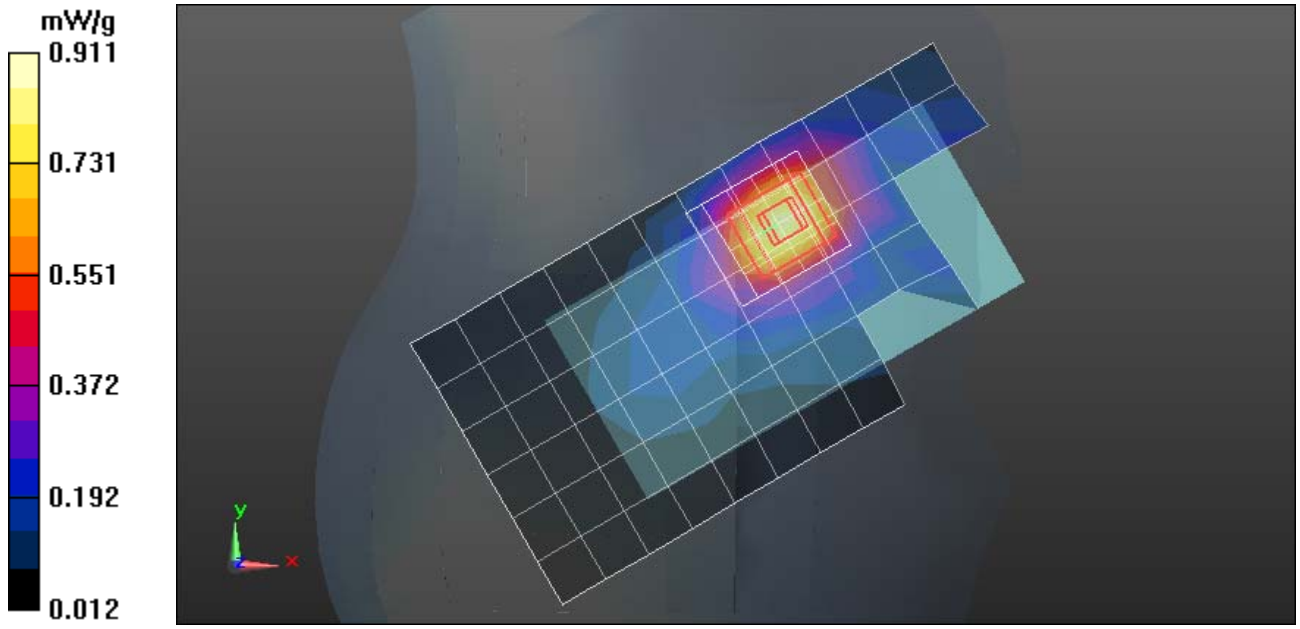
Communication System: _CDMA; Frequency: 1851.25 MHz; Communication System Channel Number: 25; Duty Cycle: 1:1
Medium: Regular Glycol Head 1750/1880; Medium parameters used: f = 1880 MHz; σ = 1.46 mho/m; ε_r = 38.4; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.2, 5.2, 5.2); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R12_ Glycol SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1684;
- ; SEMCAD X Version 14.6.4 (4989)

Right Head Template/Area Scan - Normal (15mm) (7x17x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.789 mW/g

Right Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.285 V/m; Power Drift = 0.0012 dB
Peak SAR (extrapolated) = 1.2650
SAR(1 g) = 0.832 mW/g; SAR(10 g) = 0.506 mW/g
Maximum value of SAR (measured) = 0.911 mW/g



Date/Time: 4/9/2012 10:50:47 AM

Serial: 351633050007783; Procedure Notes: Pwr Step: 0; DEVICE POSITION: Cheek

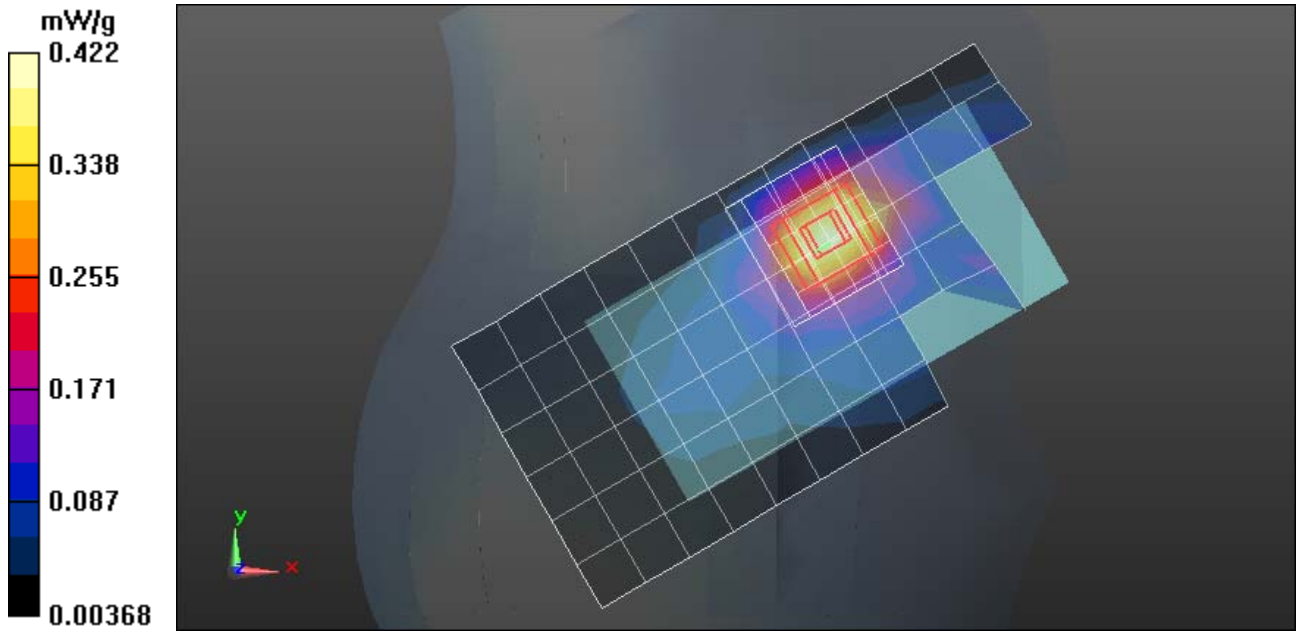
Communication System: _GPRS Class 12; Frequency: 1880 MHz; Communication System Channel Number: 661; Duty Cycle: 1:2.07491
Medium: Regular Glycol Head 1750/1880; Medium parameters used: f = 1880 MHz; σ = 1.46 mho/m; ε_r = 38.1; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.2, 5.2, 5.2); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R12_ Glycol SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1684;
- ; SEMCAD X Version 14.6.4 (4989)

Right Head Template/Area Scan - Normal (15mm) (7x17x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.405 mW/g

Right Head Template/5x5x7 Zoom Scan (<=3GHz) (6x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.187 V/m; Power Drift = -0.29 dB
Peak SAR (extrapolated) = 0.6150
SAR(1 g) = 0.392 mW/g; SAR(10 g) = 0.233 mW/g
Maximum value of SAR (measured) = 0.422 mW/g



Cheek GPRS 1900

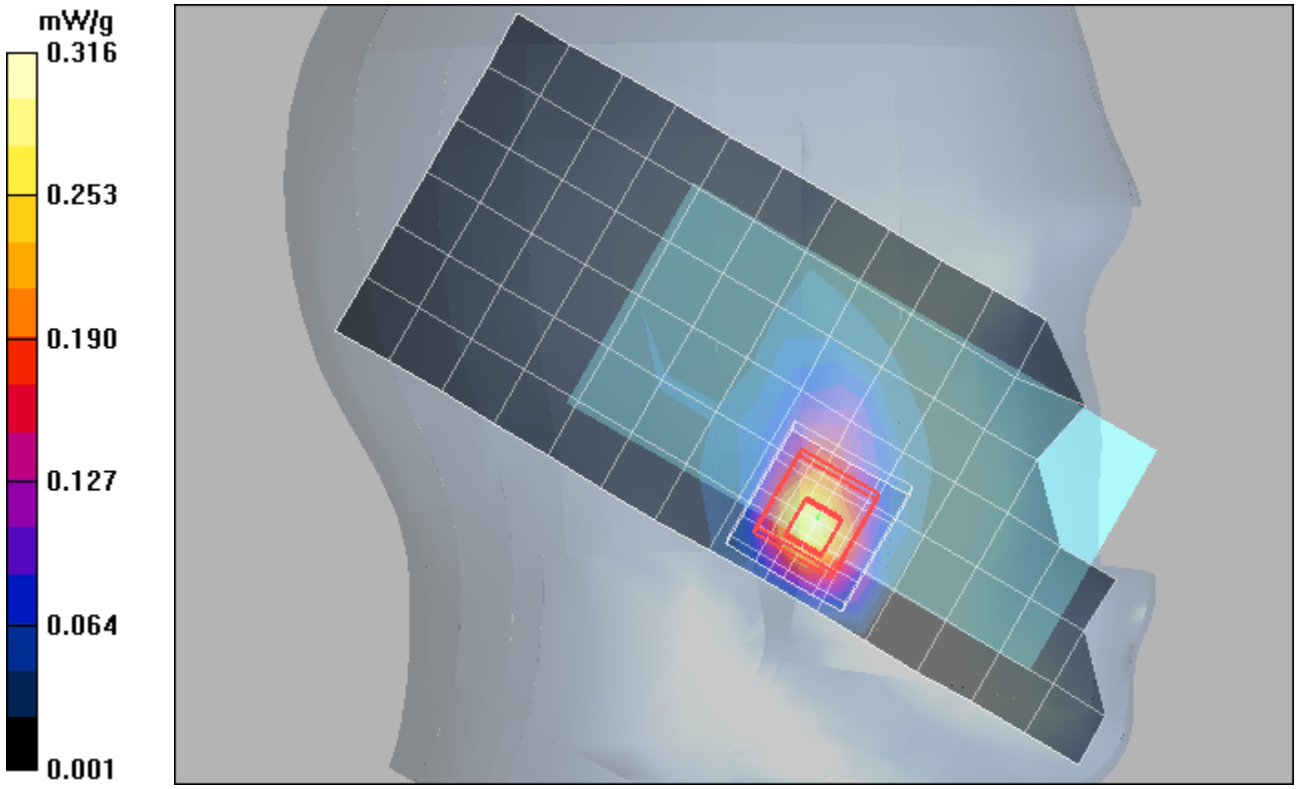
Date/Time: 4/9/2012 10:33:29 AM

Serial: 352206050003182; Procedure Notes: Pwr Step: continuous; DEVICE POSITION: Cheek; Communication System: Wi-Fi 2450; Frequency: 2462 MHz; Communication System Channel Number: 11; Duty Cycle: 1:1; Medium: 2450 Glycol Head; Medium parameters used: f = 2450 MHz; σ = 1.83 mho/m; ε_r = 39.4; ρ = 1000 kg/m^3 ; DASY4 Configuration:

- Probe: ES3DV3 - SN3178; ConvF(4.29, 4.29, 4.29); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn437; Calibrated: 2/9/2012
- 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

Left Head Template/Area Scan - Normal (15mm) (7x17x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.275 mW/g

Left Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.17 V/m; Power Drift = 0.362 dB
Peak SAR (extrapolated) = 0.665 W/kg
SAR(1 g) = 0.283 mW/g; SAR(10 g) = 0.127 mW/g
Maximum value of SAR (measured) = 0.316 mW/g



Date/Time: 4/5/2012 11:25:34 AM

Serial: 351633050007783; Procedure Notes: Pwr Step: All UP; DEVICE POSITION: Tilt

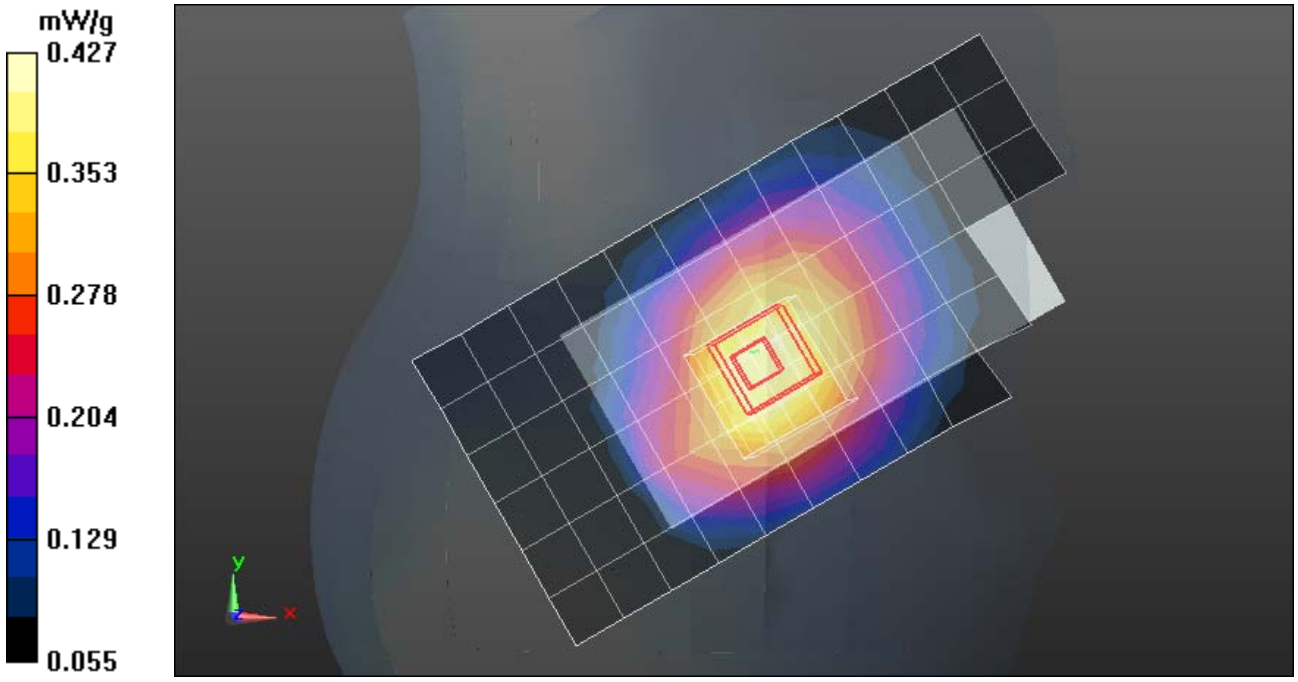
Communication System: _CDMA; Frequency: 836.52 MHz; Communication System Channel Number: 384; Duty Cycle: 1:1
Medium: Low Freq Head; Medium parameters used: f = 835 MHz; σ = 0.92 mho/m; ε_r = 41.9; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(6.07, 6.07, 6.07); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R12_ Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1154;
- ; SEMCAD X Version 14.6.4 (4989)

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 = 21.579 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.4940
SAR(1 g) = 0.407 mW/g; SAR(10 g) = 0.312 mW/g
Maximum value of SAR (measured) = 0.427 mW/g



Date/Time: 4/4/2012 11:18:21 AM

Serial: 351633050007783; Procedure Notes: Pwr Step: 05; DEVICE POSITION: Tilt

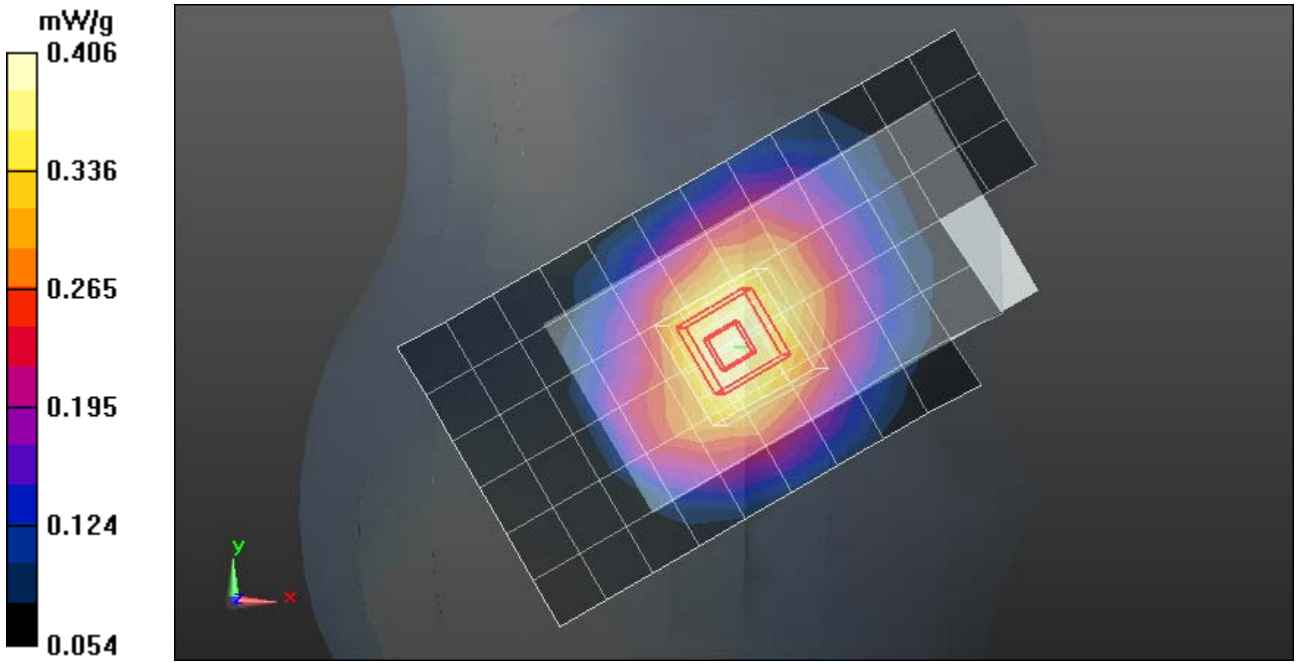
Communication System: _GSM; Frequency: 836.6 MHz; Communication System Channel Number: 190; Duty Cycle: 1:8.30042
Medium: Low Freq Head; Medium parameters used: f = 835 MHz; σ = 0.93 mho/m; ε_r = 42.6; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(6.07, 6.07, 6.07); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R12_ Sugar SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1154;
- ; SEMCAD X Version 14.6.4 (4989)

Right Head Template/Area Scan - Normal (15mm) (7x17x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.387 mW/g

Right Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.773 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.4610
SAR(1 g) = 0.386 mW/g; SAR(10 g) = 0.297 mW/g
Maximum value of SAR (measured) = 0.406 mW/g



Date/Time: 4/6/2012 10:46:01 AM

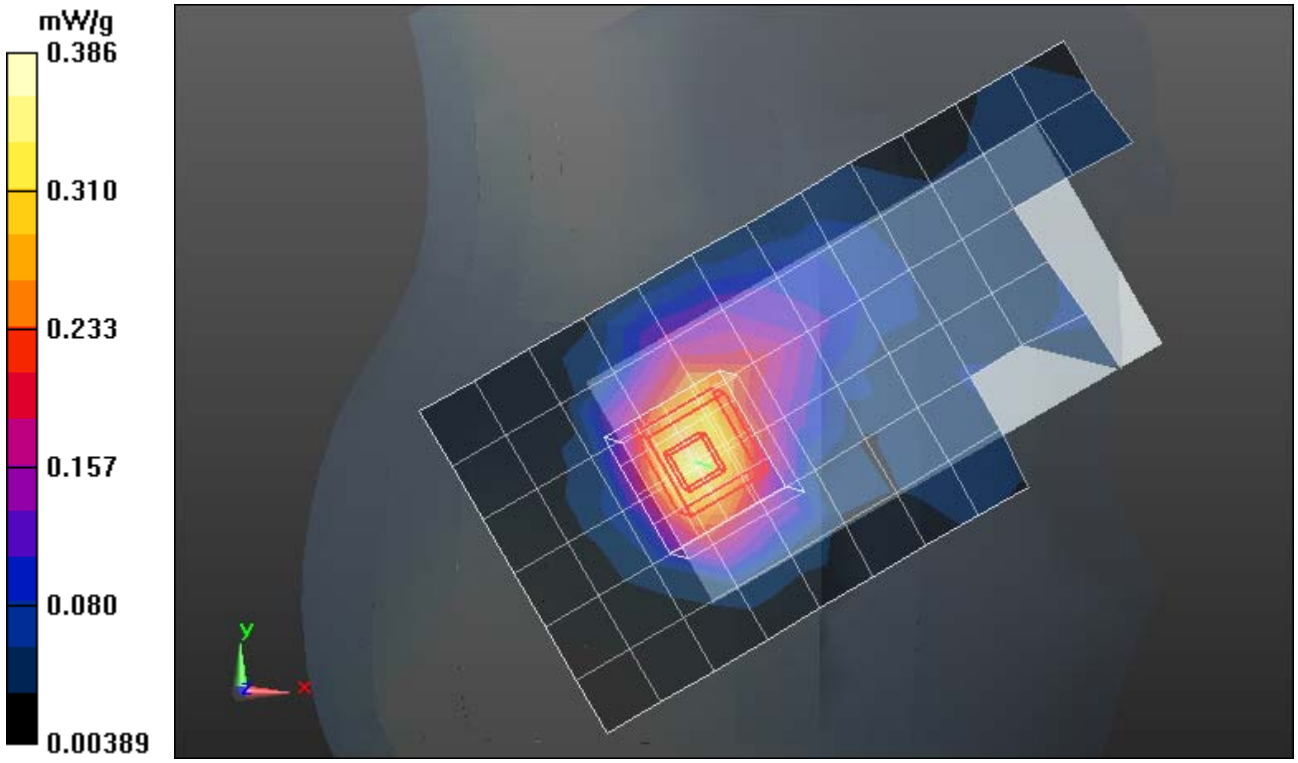
Serial: 351633050007783; Procedure Notes: Pwr Step: All UP; DEVICE POSITION: Tilt; Communication System: _CDMA; Frequency: 1880 MHz; Communication System Channel Number: 600; Duty Cycle: 1:1
Medium: Regular Glycol Head 1750/1880; Medium parameters used: f = 1880 MHz; σ = 1.46 mho/m; ε_r = 38.1; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.2, 5.2, 5.2); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R12_ Glycol SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1684;
- ; SEMCAD X Version 14.6.4 (4989)

Right Head Template/Area Scan - Normal (15mm) (7x17x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.320 mW/g

Right Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.418 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.5610
SAR(1 g) = 0.346 mW/g; SAR(10 g) = 0.200 mW/g
Maximum value of SAR (measured) = 0.386 mW/g



Date/Time: 4/6/2012 9:23:46 AM

Serial: 351633050007783; Procedure Notes: Pwr Step: 0; DEVICE POSITION: Tilt

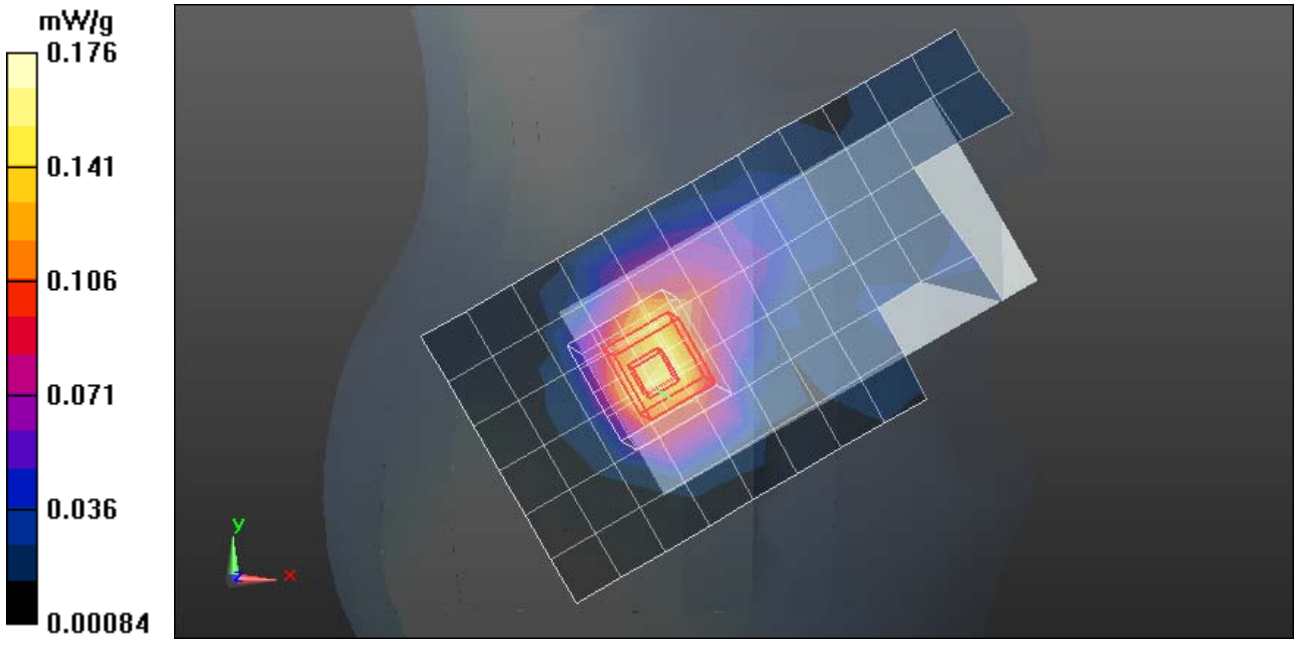
Communication System: _GSM; Frequency: 1880 MHz; Communication System Channel Number: 661; Duty Cycle: 1:8.30042
Medium: Regular Glycol Head 1750/1880; Medium parameters used: f = 1880 MHz; σ = 1.46 mho/m; ε_r = 38.1; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.2, 5.2, 5.2); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R12_ Glycol SAM (extended range), Rev.2 (24-Feb-12); Type: SAM v4.0; Serial: TP-1684;
- ; SEMCAD X Version 14.6.4 (4989)

Right Head Template/Area Scan - Normal (15mm) (7x17x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.157 mW/g

Right Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.655 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 0.2650
SAR(1 g) = 0.161 mW/g; SAR(10 g) = 0.094 mW/g
Maximum value of SAR (measured) = 0.176 mW/g



Tilt GSM 1900

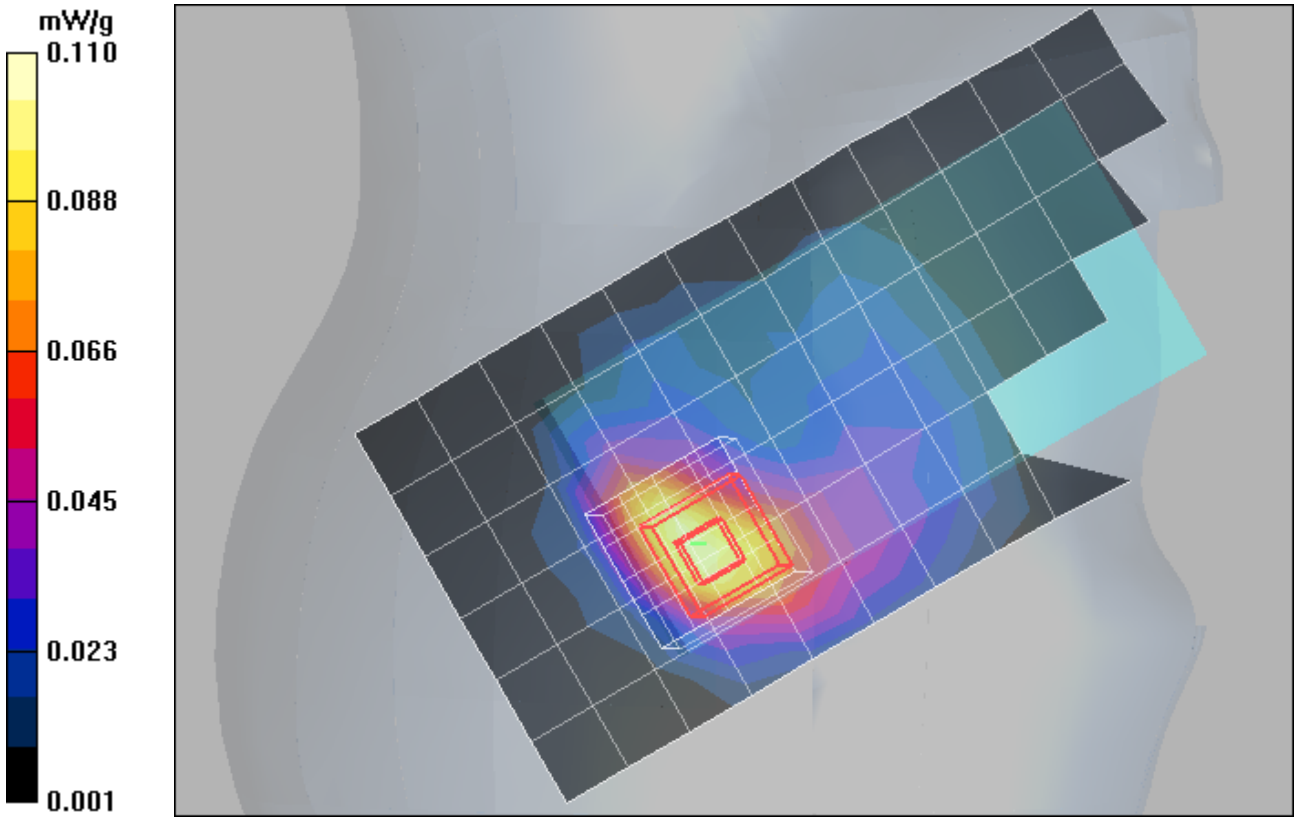
Date/Time: 4/9/2012 12:00:41 PM

Serial: 352206050003182; Procedure Notes: Pwr Step: continuous; DEVICE POSITION: Tilt; Communication System: Wi-Fi 2450; Frequency: 2462 MHz; Communication System Channel Number: 11; Duty Cycle: 1:1; Medium: 2450 Glycol Head; Medium parameters used: f = 2450 MHz; σ = 1.83 mho/m; ε_r = 39.4; ρ = 1000 kg/m^3 ; DASY4 Configuration:

- Probe: ES3DV3 - SN3178; ConvF(4.29, 4.29, 4.29); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn437; Calibrated: 2/9/2012
- 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) = 0.093 mW/g

Right Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.25 V/m; Power Drift = 0.006 dB
Peak SAR (extrapolated) = 0.168 W/kg
SAR(1 g) = 0.096 mW/g; SAR(10 g) = 0.052 mW/g
Maximum value of SAR (measured) = 0.110 mW/g



Appendix 3

SAR distribution plots for Body Worn Test Results

Date/Time: 4/12/2012 3:46:46 PM

Serial: 351633050007783; Procedure Notes: Pwr Step: All UP; DEVICE POSITION: BACK OF PHONE 25MM FROM PHANTOM

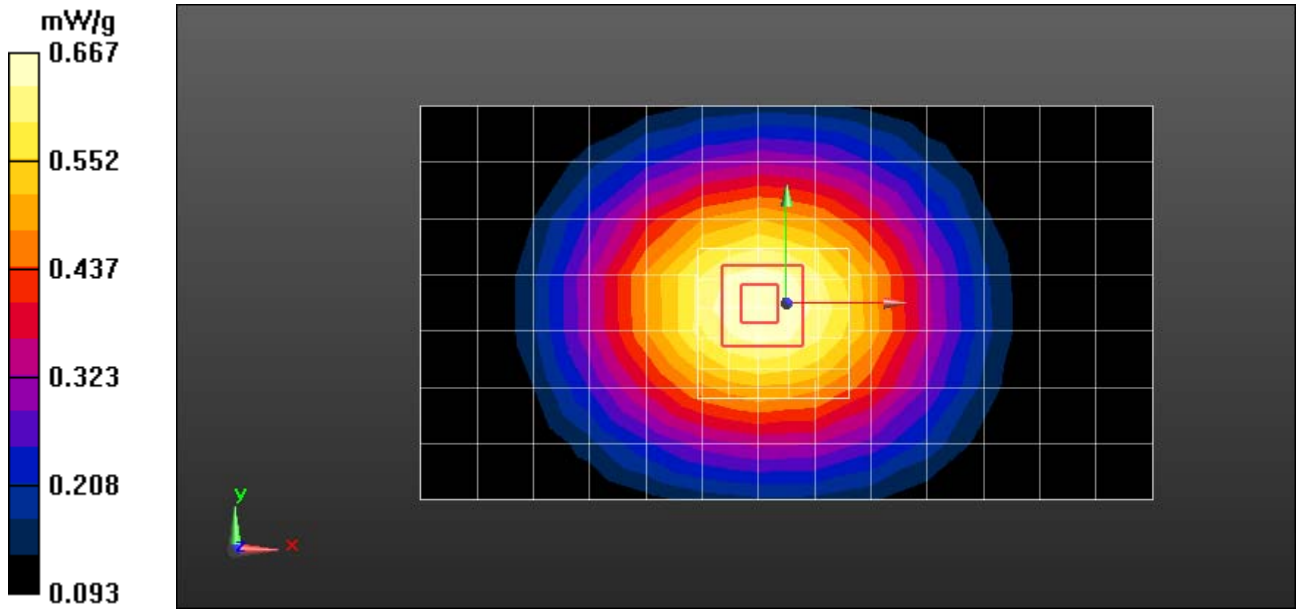
Communication System: _CDMA; Frequency: 836.52 MHz; Communication System Channel Number: 384; Duty Cycle: 1:1
Medium: Low Freq Body; Medium parameters used: f = 835 MHz; σ = 1 mho/m; ε_r = 56.2; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.97, 5.97, 5.97); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R#-12, Triple Flat Phantom 5.1C (Rev.3); Type: QD 000 P51 CA; Serial: n/a;
- ; SEMCAD X Version 14.6.4 (4989)

Triple Flat Phone Template/Area Scan - Normal Body (15mm) (14x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.667 mW/g

Triple Flat Phone Template/5x5x7 Zoom Scan (<=3GHz) (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.232 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.8060
SAR(1 g) = 0.635 mW/g; SAR(10 g) = 0.476 mW/g



Date/Time: 4/12/2012 11:12:16 AM

Serial: 351633050007783; Procedure Notes: Pwr Step: 05; DEVICE POSITION: FRONT OF PHONE 25MM FROM PHANTOM

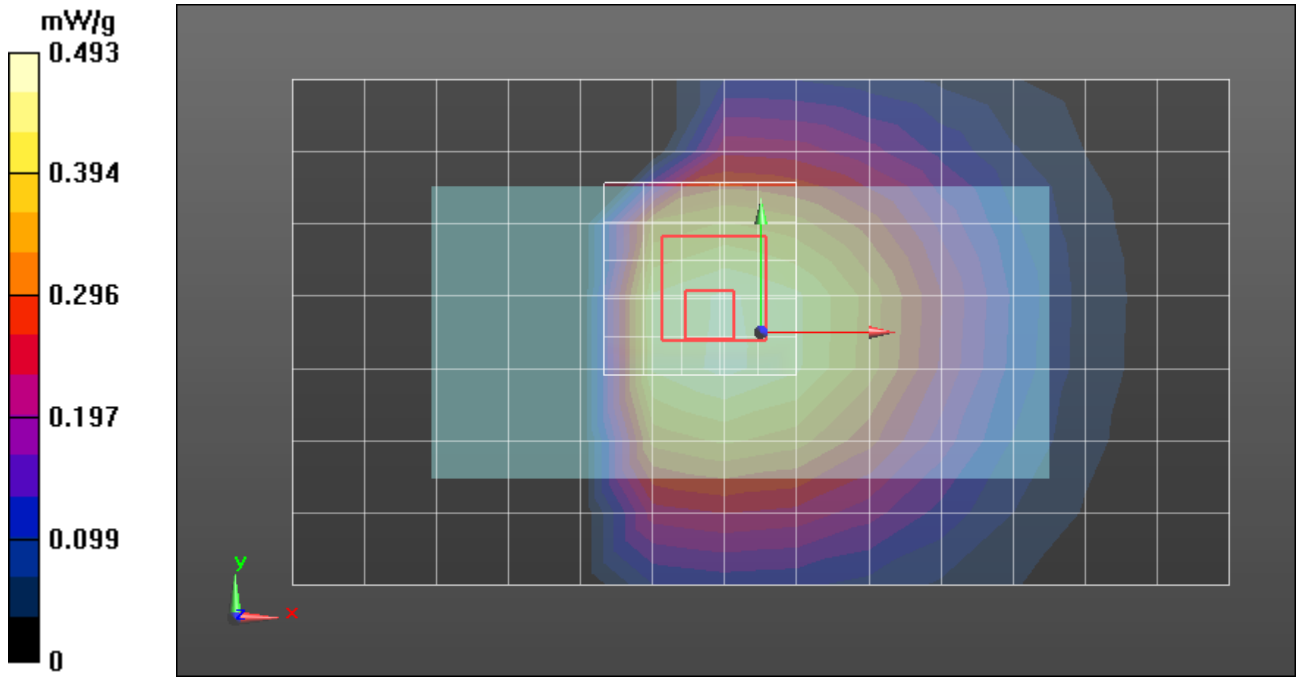
Communication System: _GPRS Class 12; Frequency: 836.6 MHz; Communication System Channel Number: 190; Duty Cycle: 1:2.07491
Medium: Low Freq Body; Medium parameters used: f = 835 MHz; σ = 1 mho/m; ε_r = 56.2; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.97, 5.97, 5.97); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R#-12, Triple Flat Phantom 5.1C (Rev.3); Type: QD 000 P51 CA; Serial: n/a;
- ; SEMCAD X Version 14.6.4 (4989)

Triple Flat Phone Template/Area Scan - Normal Body (15mm) (14x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.472 mW/g

Triple Flat Phone Template/5x5x7 Zoom Scan (<=3GHz) (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.091 V/m; Power Drift = 0.25 dB
Peak SAR (extrapolated) = 1.1820
SAR(1 g) = 0.632 mW/g; SAR(10 g) = 0.378 mW/g
Maximum value of SAR (measured) = 0.493 mW/g



Date/Time: 4/10/2012 1:09:27 PM

Serial: 351633050007783; Procedure Notes: Pwr Step: All UP; DEVICE POSITION: BACK OF PHONE 25MM from Phantom

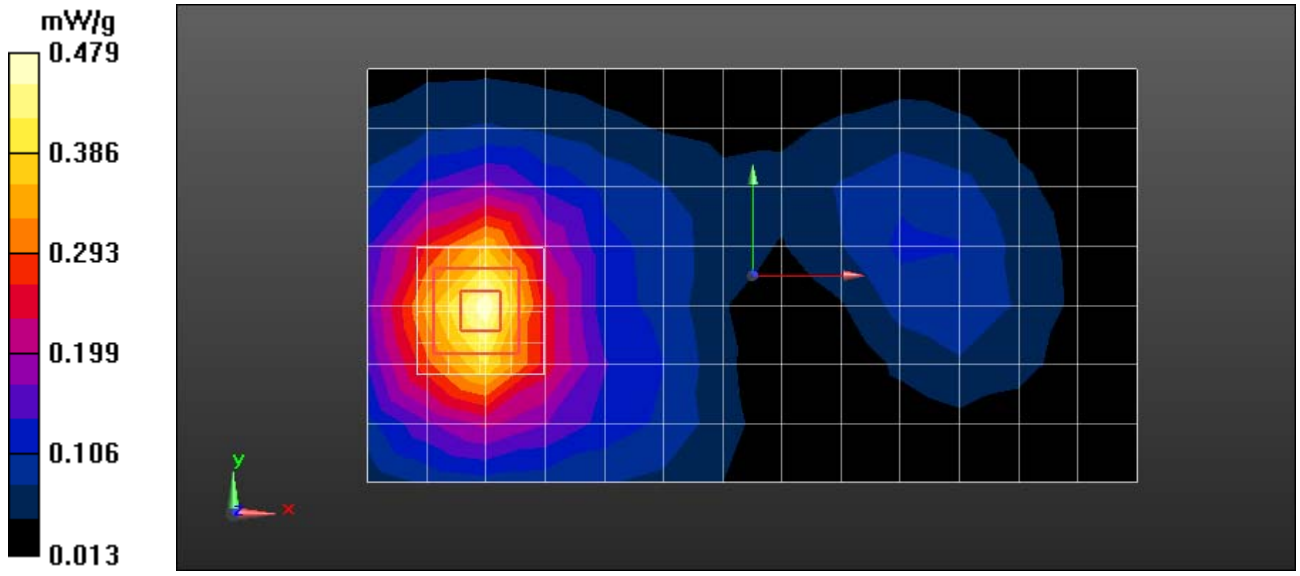
Communication System: _CDMA; Frequency: 1880 MHz; Communication System Channel Number: 600; Duty Cycle: 1:1
Medium: Regular Glycol Body 1750/1880; Medium parameters used: f = 1880 MHz; σ = 1.59 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.09, 5.09, 5.09); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R#-12, Triple Flat Phantom 5.1C (Rev.3); Type: QD 000 P51 CA; Serial: n/a;
- ; SEMCAD X Version 14.6.4 (4989)

Triple Flat Phone Template/Area Scan - Normal Body (15mm) (14x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.474 mW/g

Triple Flat Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.494 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.6730
SAR(1 g) = 0.440 mW/g; SAR(10 g) = 0.269 mW/g
Maximum value of SAR (measured) = 0.479 mW/g



Date/Time: 4/10/2012 11:17:03 AM

Serial: 351633050007783; Procedure Notes: Pwr Step: 0; DEVICE POSITION: BACK OF PHONE 25MM FROM PHANTOM

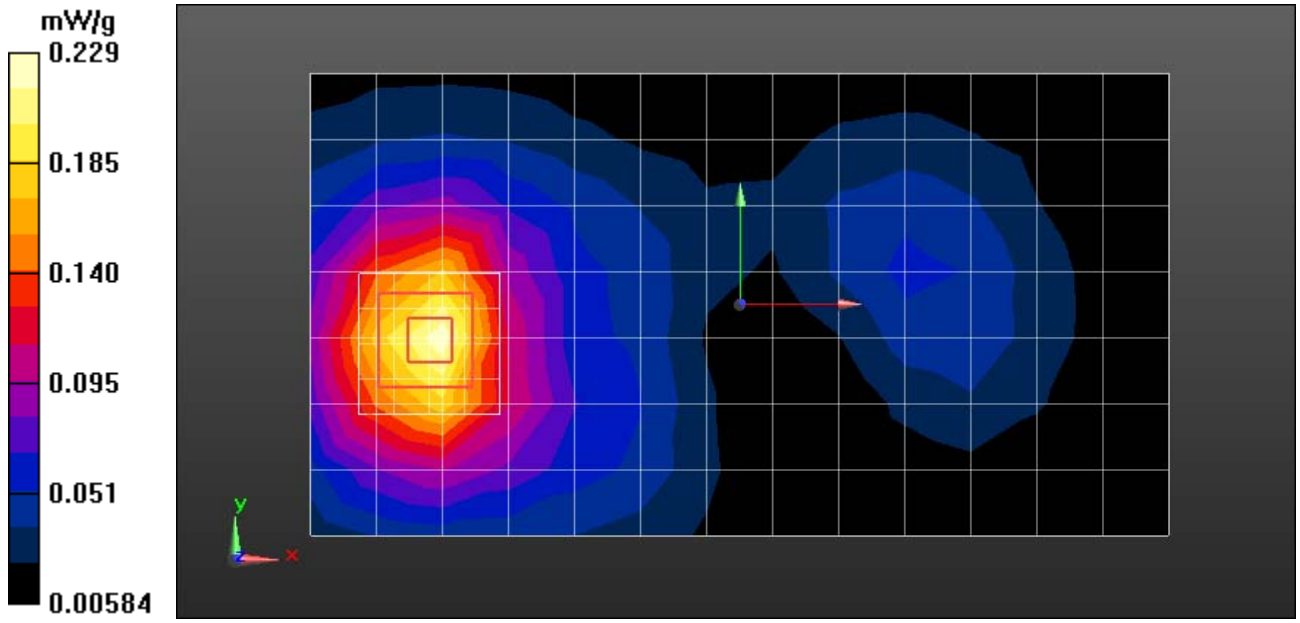
Communication System: _GSM; Frequency: 1880 MHz; Communication System Channel Number: 661; Duty Cycle: 1:8.30042
Medium: Regular Glycol Body 1750/1880; Medium parameters used: f = 1880 MHz; σ = 1.59 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.09, 5.09, 5.09); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R#-12, Triple Flat Phantom 5.1C (Rev.3); Type: QD 000 P51 CA; Serial: n/a;
- ; SEMCAD X Version 14.6.4 (4989)

Triple Flat Phone Template/Area Scan - Normal Body (15mm) (14x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.227 mW/g

Triple Flat Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.807 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.3240
SAR(1 g) = 0.211 mW/g; SAR(10 g) = 0.129 mW/g
Maximum value of SAR (measured) = 0.229 mW/g



Date/Time: 4/4/2012 11:00:23 AM

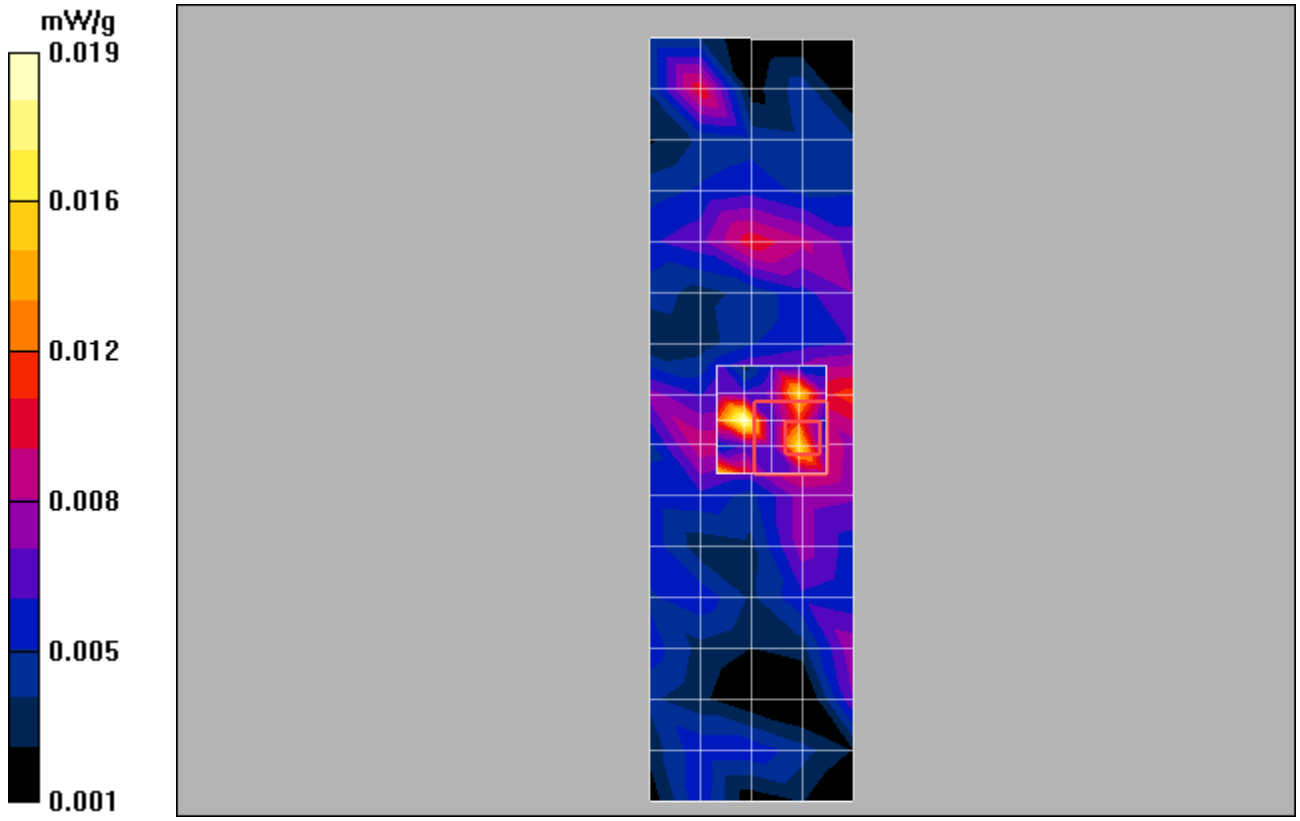
Serial: 352206050003182; Procedure Notes: Pwr Step: continuous; DEVICE POSITION: BODY WORN, BACK OF PHONE 25MM FROM PHONE; Communication System: Wi-Fi 2450; Frequency: 2462 MHz; Communication System Channel Number: 11; Duty Cycle: 1:1; Medium: 2450 Glycol Body; Medium parameters used: f = 2450 MHz; σ = 2.02 mho/m; ε_r = 50.5; ρ = 1000 kg/m^3 ; DASY4 Configuration:

- Probe: ES3DV3 - SN3178; ConvF(4.13, 4.13, 4.13); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn437; Calibrated: 2/9/2012
- 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) = 0.011 mW/g

Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.35 V/m; Power Drift = -0.452 dB
Peak SAR (extrapolated) = 0.032 W/kg
SAR(1 g) = 0.0094 mW/g; SAR(10 g) = 0.00334 mW/g
Maximum value of SAR (measured) = 0.019 mW/g



Appendix 4

SAR distribution plots for Mobile Hotspot Test Results

Date/Time: 4/19/2012 8:36:45 AM

Serial: 351633050007783; Procedure Notes: Pwr Step: All UP; DEVICE POSITION: Body Worn , Front of Phone 10mm from Phantom

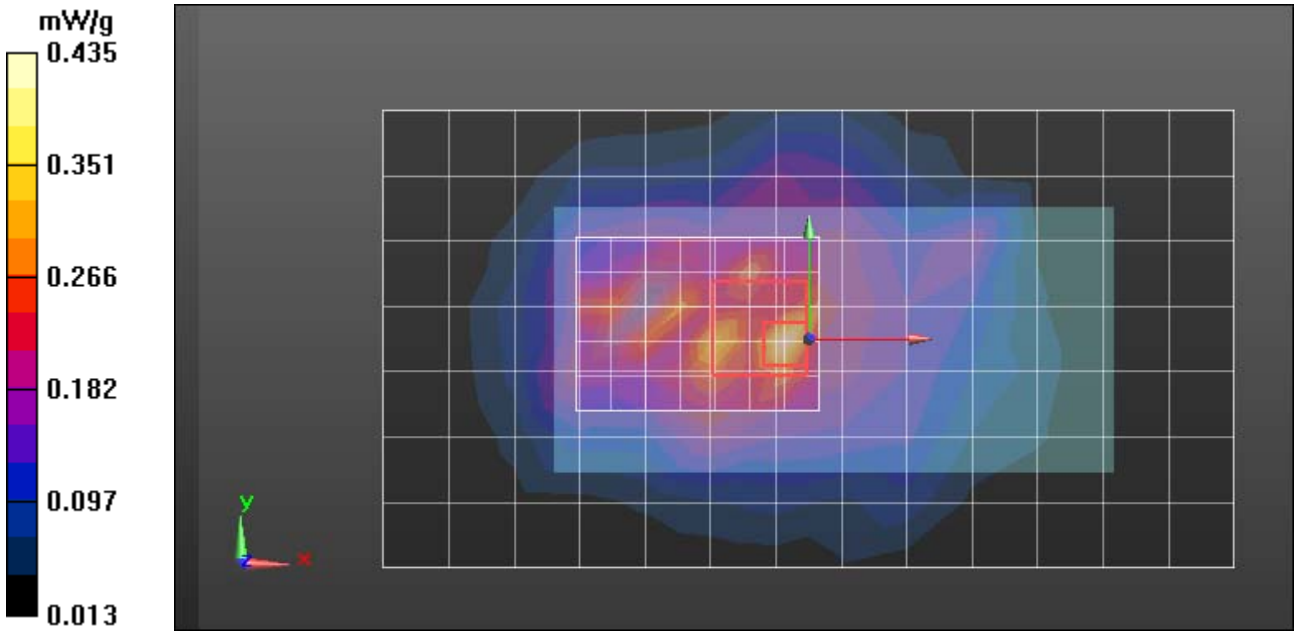
Communication System: _CDMA; Frequency: 836.52 MHz; Communication System Channel Number: 384; Duty Cycle: 1:1
Medium: Low Freq Body; Medium parameters used: f = 835 MHz; σ = 0.98 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.97, 5.97, 5.97); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R#-12, Triple Flat Phantom 5.1C (Rev.3); Type: QD 000 P51 CA; Serial: n/a;
- ; SEMCAD X Version 14.6.4 (4989)

Triple Flat Phone Template/Area Scan - Normal Body (15mm) (14x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.355 mW/g

Triple Flat Phone Template/5x5x7 Zoom Scan (<=3GHz) (8x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.480 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.6890
SAR(1 g) = 0.305 mW/g; SAR(10 g) = 0.201 mW/g
Maximum value of SAR (measured) = 0.435 mW/g



Date/Time: 4/16/2012 12:01:43 PM

Serial: 351633050007783; Procedure Notes: Pwr Step: 05; DEVICE POSITION: GPRS class 12 (4 Upslots) Body Worn, Front of Phone 10mm from Phantom

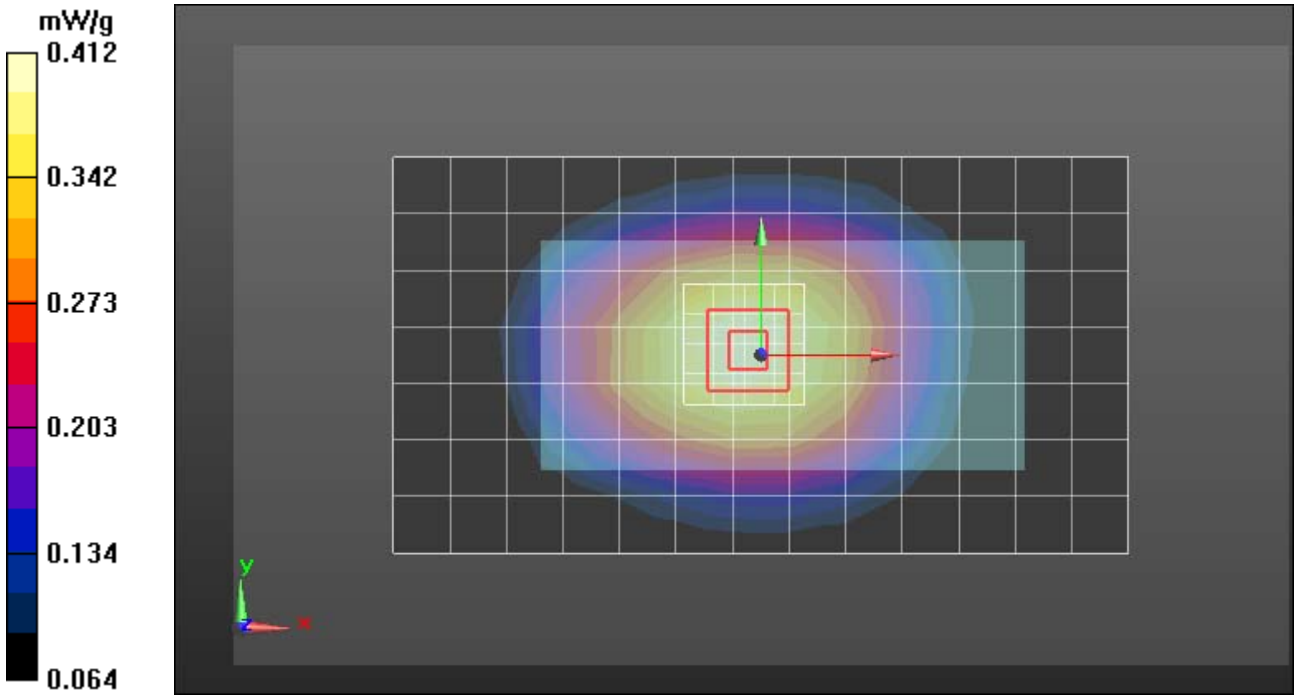
Communication System: _GPRS Class 12; Frequency: 836.6 MHz; Communication System Channel Number: 190; Duty Cycle: 1:2.07491
Medium: Low Freq Body; Medium parameters used: f = 835 MHz; σ = 0.99 mho/m; ε_r = 55.6; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.97, 5.97, 5.97); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R#-12, Triple Flat Phantom 5.1C (Rev.3); Type: QD 000 P51 CA; Serial: n/a;
- ; SEMCAD X Version 14.6.4 (4989)

Triple Flat Phone Template/Area Scan - Normal Body (15mm) (14x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.405 mW/g

Triple Flat Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.482 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.4780
SAR(1 g) = 0.393 mW/g; SAR(10 g) = 0.300 mW/g
Maximum value of SAR (measured) = 0.412 mW/g



Date/Time: 4/17/2012 3:39:21 PM

Serial: 351633050007783; Procedure Notes: Pwr Step: All UP; DEVICE POSITION: Body Worn, Bottom of Phone 10mm from Phantom

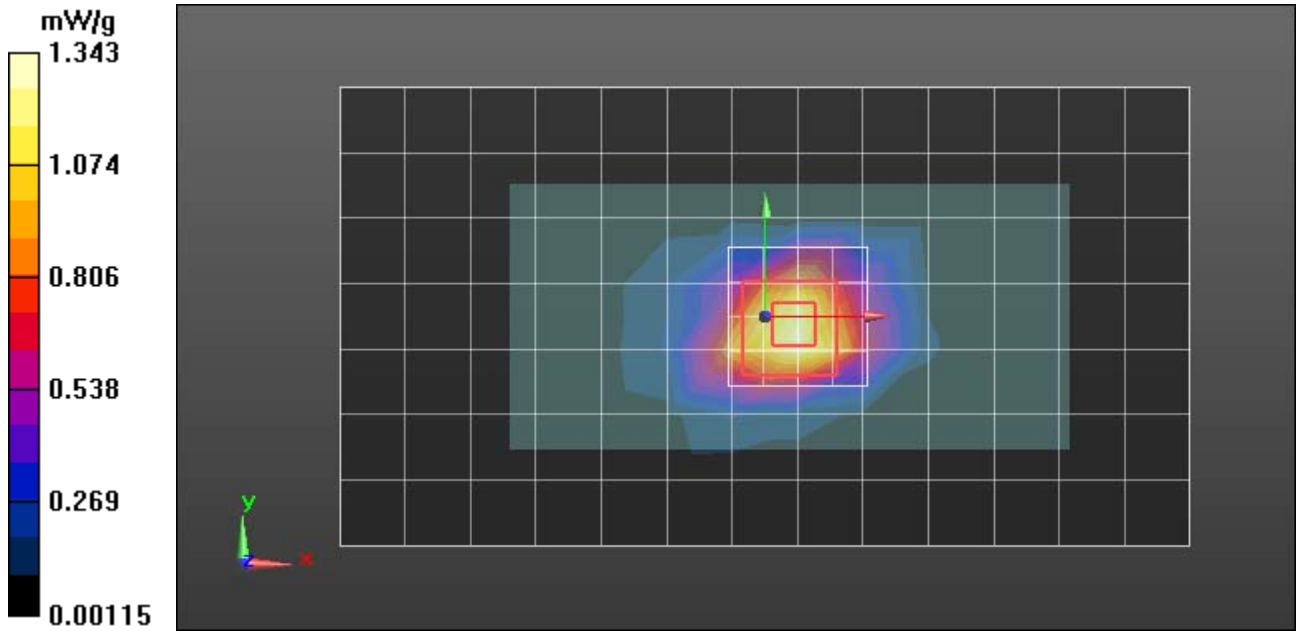
Communication System: _CDMA; Frequency: 1880 MHz; Communication System Channel Number: 600; Duty Cycle: 1:1
Medium: Regular Glycol Body 1750/1880; Medium parameters used: f = 1880 MHz; σ = 1.59 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.09, 5.09, 5.09); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R#-12, Triple Flat Phantom 5.1C (Rev.3); Type: QD 000 P51 CA; Serial: n/a;
- ; SEMCAD X Version 14.6.4 (4989)

Triple Flat Phone Template/Area Scan - Normal Body (15mm) (14x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.343 mW/g

Triple Flat Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.120 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 3.1770
SAR(1 g) = 1.45 mW/g; SAR(10 g) = 0.670 mW/g
Maximum value of SAR (measured) = 1.964 mW/g



Date/Time: 4/17/2012 9:08:25 AM

Serial: 351633050007783; Procedure Notes: Pwr Step: 0; DEVICE POSITION: Mobile Hotspot, Bottom Edge of Phone 10mm from Phantom

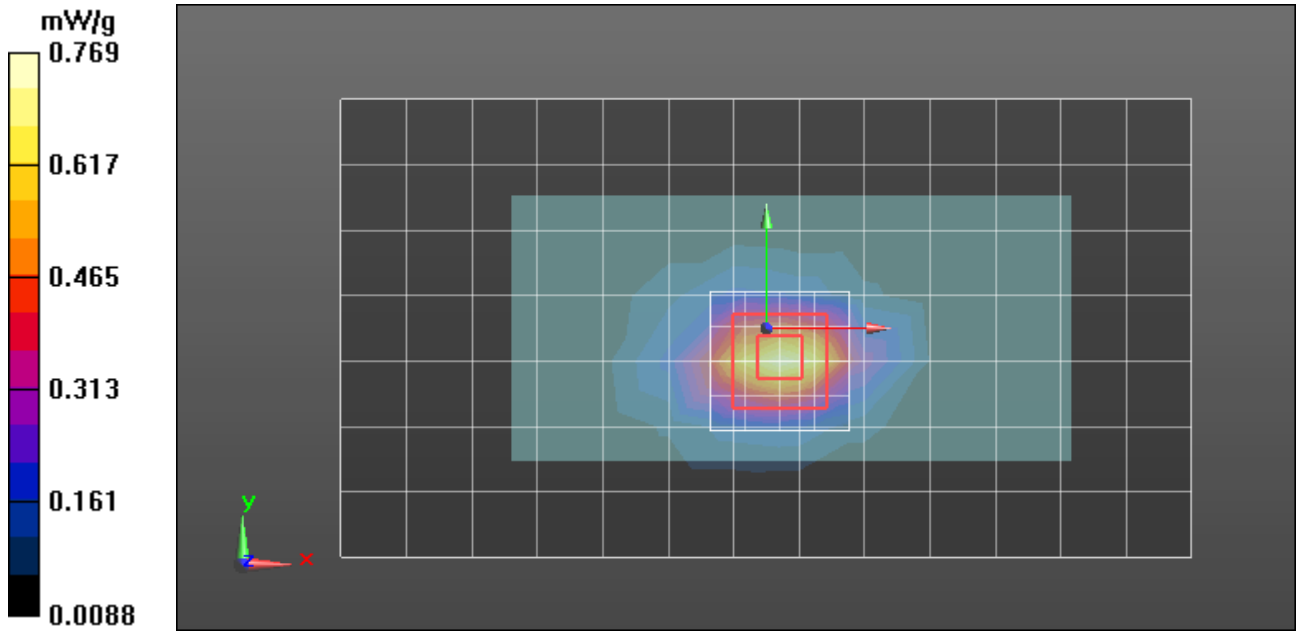
Communication System: _GPRS Class 12; Frequency: 1880 MHz; Communication System Channel Number: 661; Duty Cycle: 1:2.07491
Medium: Regular Glycol Body 1750/1880; Medium parameters used: f = 1880 MHz; σ = 1.58 mho/m; ε_r = 51.2; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3180; ConvF(5.09, 5.09, 5.09); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1313; Calibrated: 1/20/2012
- Phantom: R#-12, Triple Flat Phantom 5.1C (Rev.3); Type: QD 000 P51 CA; Serial: n/a;
- ; SEMCAD X Version 14.6.4 (4989)

Triple Flat Phone Template/Area Scan - Normal Body (15mm) (14x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.736 mW/g

Triple Flat Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.676 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 1.1650
SAR(1 g) = 0.674 mW/g; SAR(10 g) = 0.344 mW/g
Maximum value of SAR (measured) = 0.769 mW/g



Date/Time: 4/6/2012 8:01:43 AM

Serial: 352206050003182; Procedure Notes: Pwr Step: continuous; DEVICE POSITION: Mobile Hotspot, Left edge of Phone 10mm from Phantom; Communication System: Wi-Fi 2450; Frequency: 2412 MHz; Communication System Channel Number: 1; Duty Cycle: 1:1
Medium: 2450 Glycol Body; Medium parameters used: f = 2450 MHz; σ = 2 mho/m; ε_r = 50.2; ρ = 1000 kg/m^3 ; DASY4 Configuration:

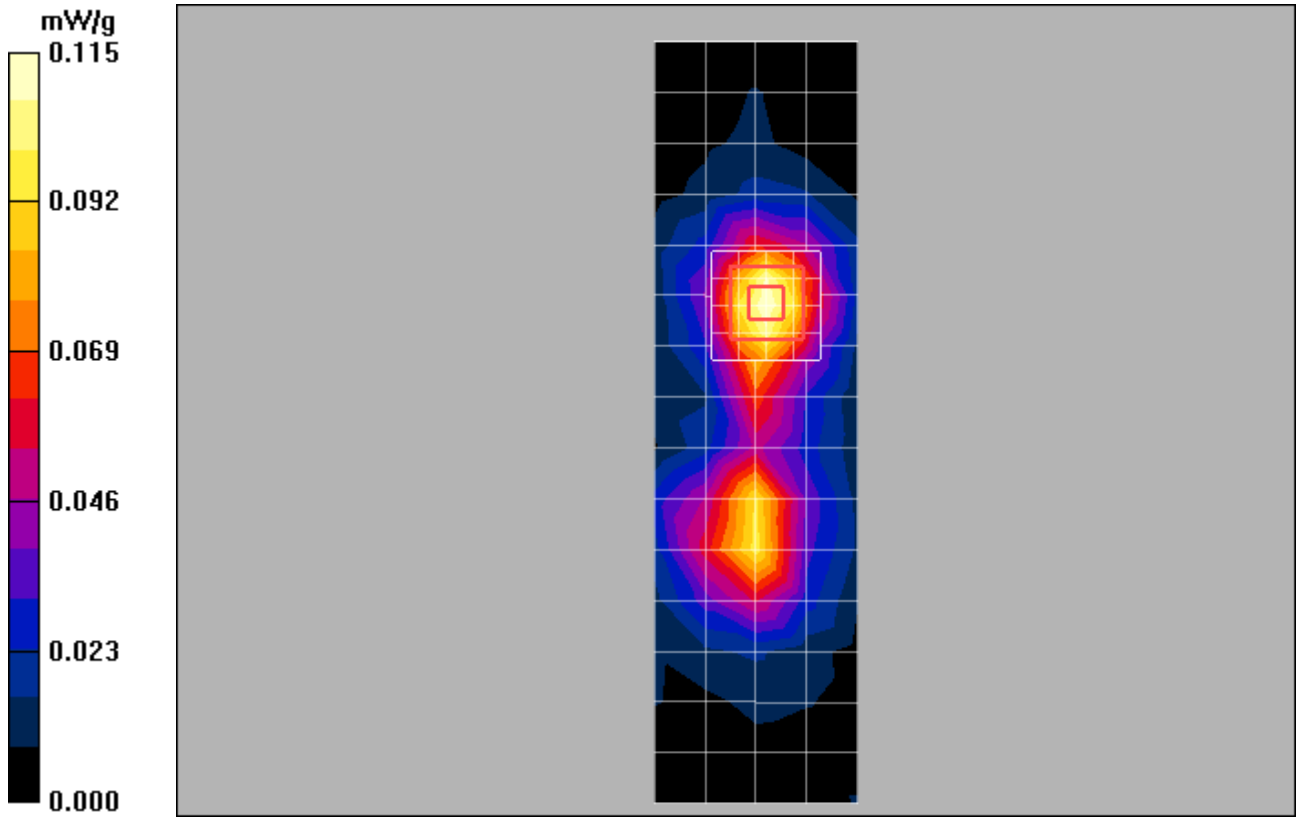
- Probe: ES3DV3 - SN3178; ConvF(4.13, 4.13, 4.13); Calibrated: 1/11/2012
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn437; Calibrated: 2/9/2012
- Phantom: R11_ Section 2, Amy Twin, Rev3 (3-Feb-10); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; 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) = 0.112 mW/g

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

Reference Value = 7.17 V/m; Power Drift = 0.109 dB
Peak SAR (extrapolated) = 0.177 W/kg
SAR(1 g) = 0.104 mW/g; SAR(10 g) = 0.057 mW/g
Maximum value of SAR (measured) = 0.115 mW/g



Appendix 5

Measurement Uncertainty Budget

{note: SAR drift = 0% due to correction for drift in SAR results, fcd being updated}

Uncertainty Budget for Device Under Test, for 735 MHz to 3 GHz

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h = c x f / e*	*i = c x g / e*	*k*
Uncertainty Component	Description IEEE1528(2003) / IEC62209-1(2005)	**Tol. (± %)**	**Prob Dist**	**Div.**	c_i **(1 g)**	c_i **(10 g)**	**1 g** u_i **(±%)**	**10 g** u_i **(±%)**	v_i
Measurement System									
Probe Calibration [ES3DV3]	E.2.1 / 7.2.1	6.0	N	1.00	1	1	6.0	6.0	∞
Axial Isotropy	E.2.2 / 7.2.1.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	E.2.2 / 7.2.1.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	E.2.3 / 7.2.1.5	1.0	R	1.73	1	1	0.6	0.6	∞
Linearity	E.2.4 / 7.2.1.3	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5 / 7.2.1.4	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6 / 7.2.1.6	0.3	N	1.00	1	1	0.3	0.3	∞
Response Time	E.2.7 / 7.2.1.7	1.1	R	1.73	1	1	0.6	0.6	∞
Integration Time	E.2.8 / 7.2.1.8	1.1	R	1.73	1	1	0.6	0.6	∞
RF Ambient Conditions - Noise	E.6.1 / 7.2.3.6	3.0	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1 / 7.2.3.6	3.0	R	1.73	1	1	1.7	1.7	∞
Probe Positioner Mech. Tolerance	E.6.2 / 7.2.2.1	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning w.r.t Phantom	E.6.3 / 7.2.2.3	1.4	R	1.73	1	1	0.8	0.8	∞
Max. SAR Evaluation (ext., int., avg.)	E.5 / 7.2.4	3.4	R	1.73	1	1	2.0	2.0	∞
Test sample Related									
Test Sample Positioning	E.4.2 / 7.2.2.4	3.4	N	1.00	1	1	3.4	3.4	79
Device Holder Uncertainty	E.4.1 / 7.2.2.4.2	4.5	N	1.00	1	1	4.5	4.5	11
SAR drift	6.6.2 / 7.2.3.5	0.0	R	1.73	1	1	0.0	0.0	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1 / 7.2.2.2	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2 / 7.2.3.3	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measurement)	E.3.3 / 7.2.3.3	2.5	N	1.00	0.64	0.43	1.6	1.1	6
Liquid Permittivity (target)	E.3.2 / 7.2.3.4	5.0	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measurement)	E.3.2 / 7.2.3.4	2.3	N	1.00	0.6	0.49	1.4	1.1	6
Combined Standard Uncertainty			RSS				11	11	372
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k*=2				22	22	

Uncertainty Budget for Device Under Test for 3 to 6 GHz

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h = c x f / e*	*i = c x g / e*	*k*
Uncertainty Component	Description IEC62209-2(2010)	**Tol. (± %)**	**Prob Dist**	**Div.**	**c_i (1 g)**	**c_i (10 g)**	**1 g u_i (±%)**	**10 g u_i (±%)**	**v_i**
Measurement System									
Probe Calibration [EX3DV4]	7.2.2.1	6.6	N	1.00	1	1	6.6	6.6	∞
Axial Isotropy	7.2.2.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	7.2.2.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	7.2.2.6	2.0	R	1.73	1	1	1.2	1.2	∞
Linearity	7.2.2.5	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	7.2.2	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	7.2.2.7	0.3	N	1.00	1	1	0.3	0.3	∞
Response Time	7.2.2.8	1.1	R	1.73	1	1	0.6	0.6	∞
Integration Time	7.2.2.9	1.1	R	1.73	1	1	0.6	0.6	∞
RF Ambient Conditions - Noise	7.2.4.5	3.0	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	7.2.4.5	3.0	R	1.73	1	1	1.7	1.7	∞
Probe Positioner Mech. Tolerance	7.2.3.1	1.0	R	1.73	1	1	0.6	0.6	∞
Probe Positioning w.r.t Phantom	7.2.3.3	4.0	R	1.73	1	1	2.3	2.3	∞
Max. SAR Evaluation (ext., int., avg.)	7.2.5.3	4.0	R	1.73	1	1	2.3	2.3	∞
Test sample Related									
Test Sample Positioning	7.2.3.4	3.4	N	1.00	1	1	3.4	3.4	79
Device Holder Uncertainty	7.2.3.4	4.5	N	1.00	1	1	4.5	4.5	11
SAR drift	7.2.2.10	0.0	R	1.73	1	1	0.0	0.0	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	7.2.3.2	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity (target)		5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measurement)	7.2.4.3	3.4	N	1.00	0.64	0.43	2.2	1.5	6
Liquid Permittivity (target)		10.0	R	1.73	0.6	0.49	3.5	2.8	∞
Liquid Permittivity (measurement)	7.2.4.3	2.6	N	1.00	0.6	0.49	1.6	1.3	6
Combined Standard Uncertainty			RSS				12	12	508
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k*=2				24	24	

Appendix 6

Probe Calibration Certificate

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

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Swiss Calibration Service

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

Accreditation No.: SCS 108

Client **Motorola Beijing**

Certificate No: ES3-3178_Jan12

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3178

Calibration procedure(s): QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: January 11, 2012

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	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

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

Issued: January 12, 2012

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

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S Swiss Calibration Service

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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,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:

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

Methods Applied and Interpretation of Parameters:

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

Probe ES3DV3

SN:3178

Manufactured: January 23, 2008
Calibrated: January 11, 2012

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3178

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.31	1.24	1.36	± 10.1 %
DCP (mV)[B]	101.4	94.9	101.0	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	111.2	±2.2 %
			Y	0.00	0.00	1.00	114.8	
			Z	0.00	0.00	1.00	112.7	

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

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3178

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	5.85	5.85	5.85	0.25	2.03	± 12.0 %
835	41.5	0.90	5.65	5.65	5.65	0.27	1.99	± 12.0 %
1810	40.0	1.40	4.88	4.88	4.88	0.80	1.19	± 12.0 %
1950	40.0	1.40	4.69	4.69	4.69	0.73	1.23	± 12.0 %
2450	39.2	1.80	4.29	4.29	4.29	0.80	1.26	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3178

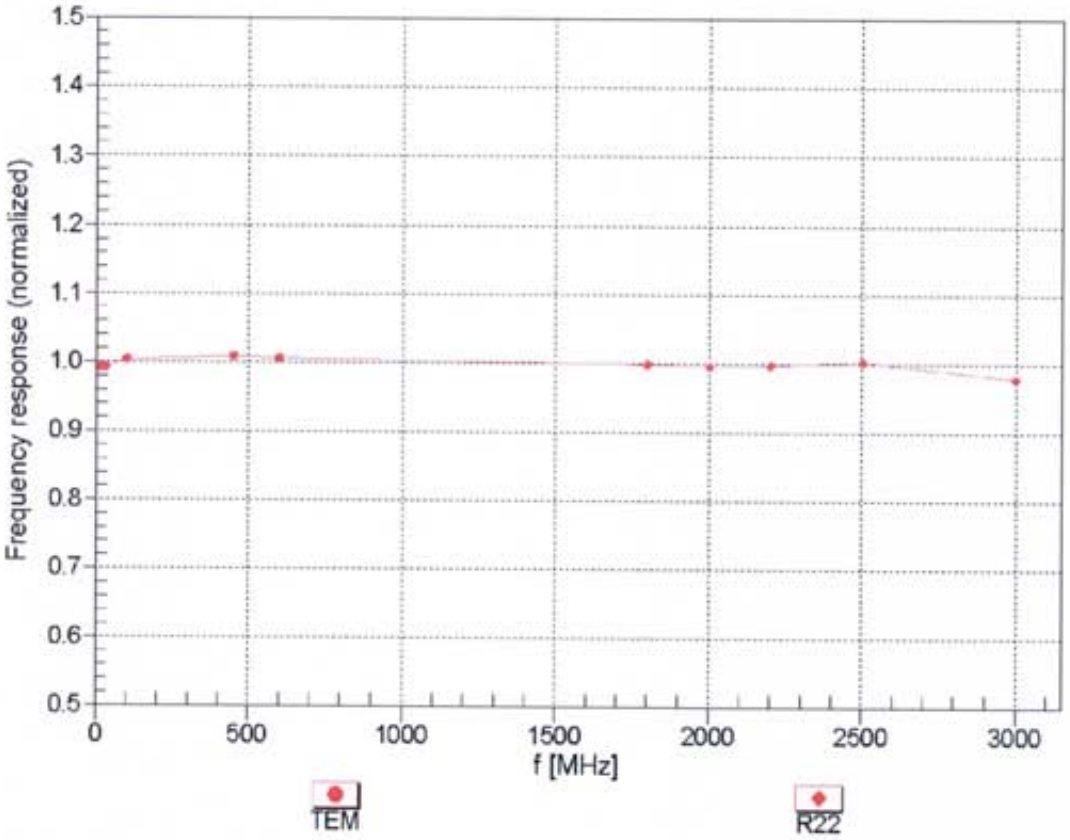
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	5.73	5.73	5.73	0.29	1.89	± 12.0 %
835	55.2	0.97	5.70	5.70	5.70	0.57	1.34	± 12.0 %
1810	53.3	1.52	4.72	4.72	4.72	0.66	1.53	± 12.0 %
1950	53.3	1.52	4.64	4.64	4.64	0.46	1.77	± 12.0 %
2450	52.7	1.95	4.13	4.13	4.13	0.68	1.13	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Frequency Response of E-Field

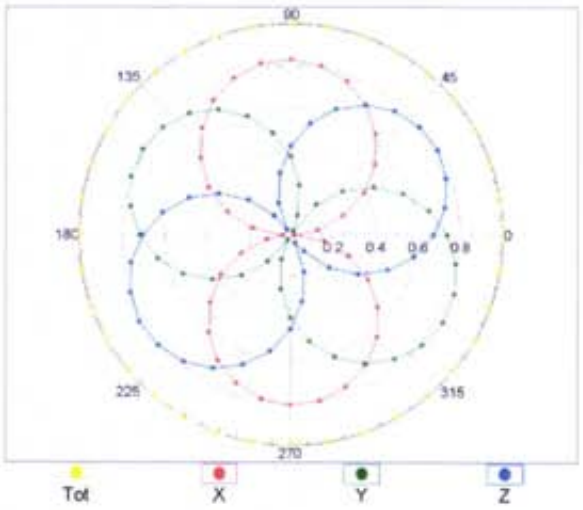
(TEM-Cell:ifi110 EXX, Waveguide: R22)



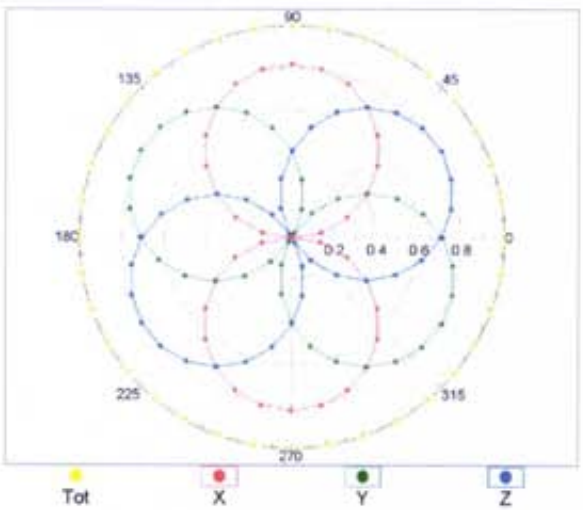
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

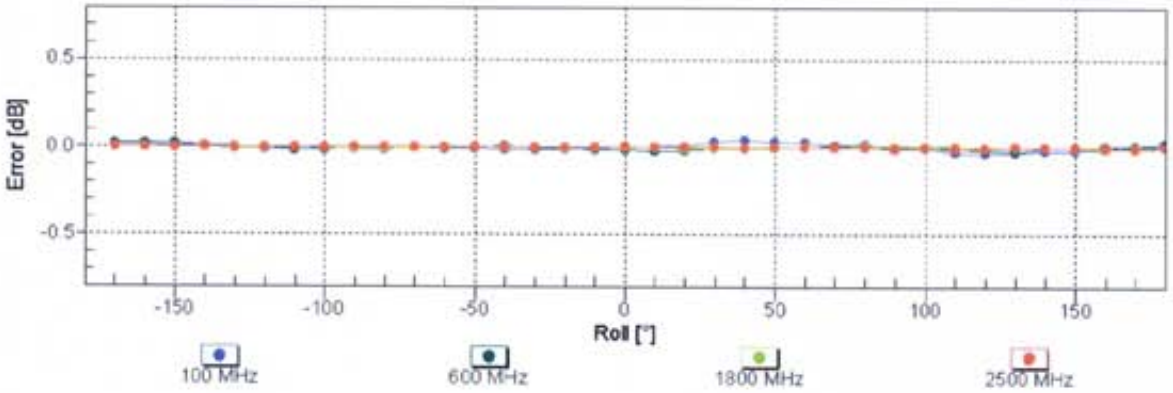
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



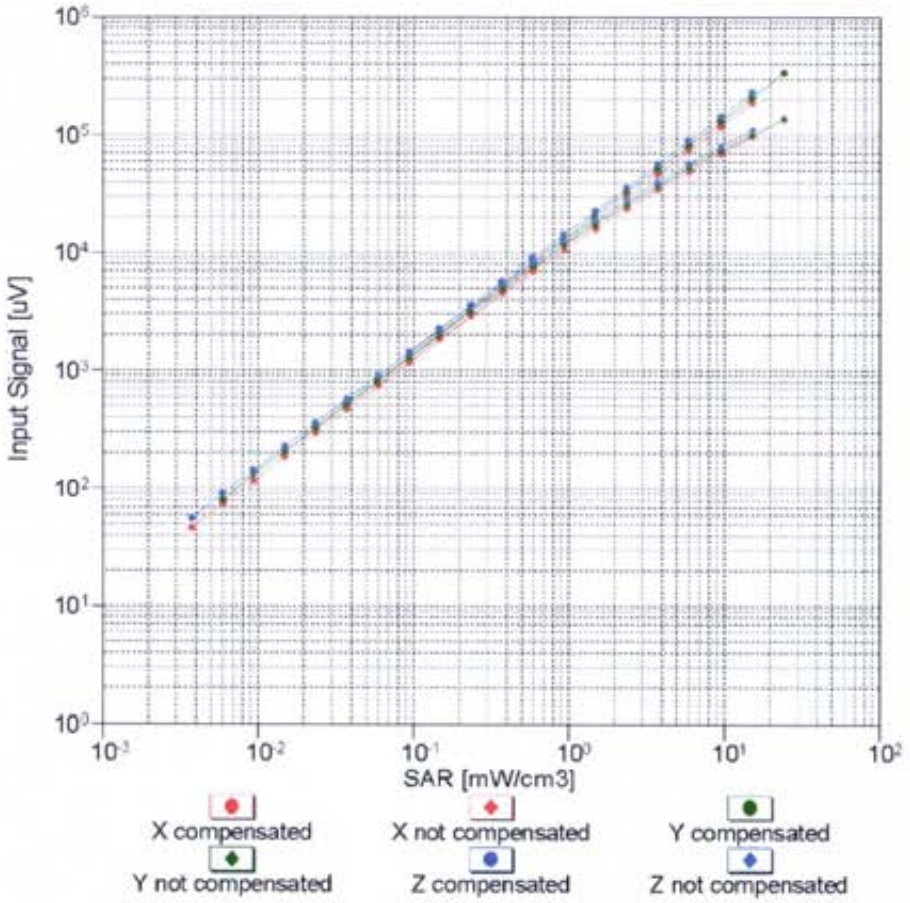
f=1800 MHz,R22

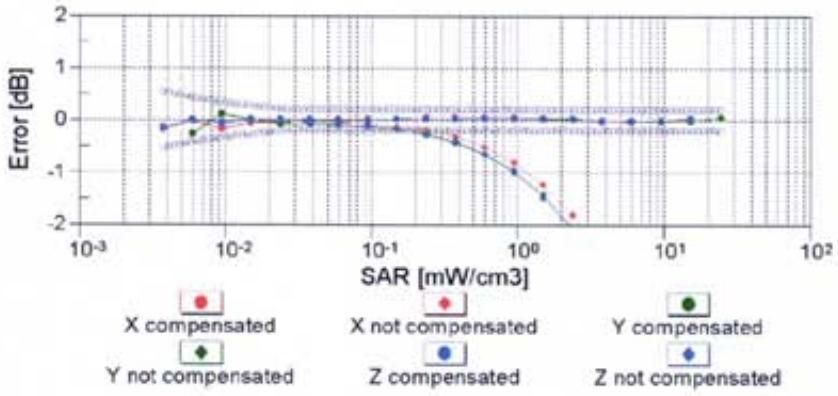




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)

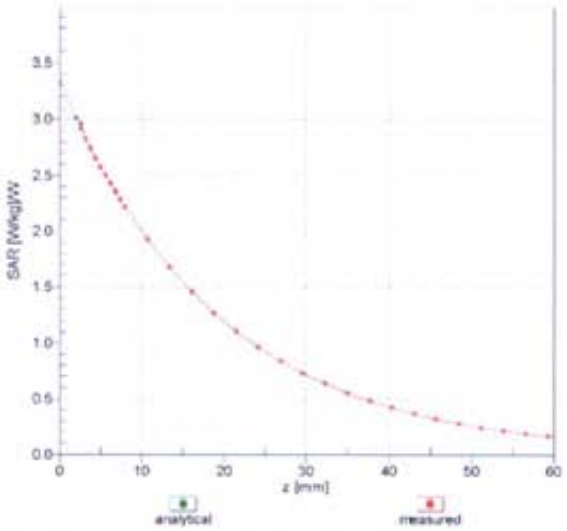




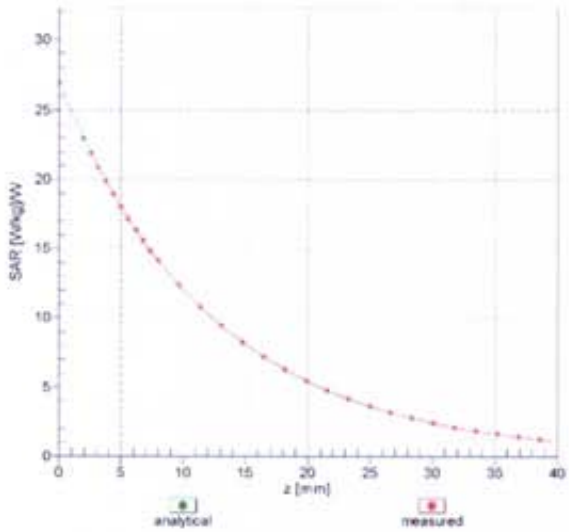
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

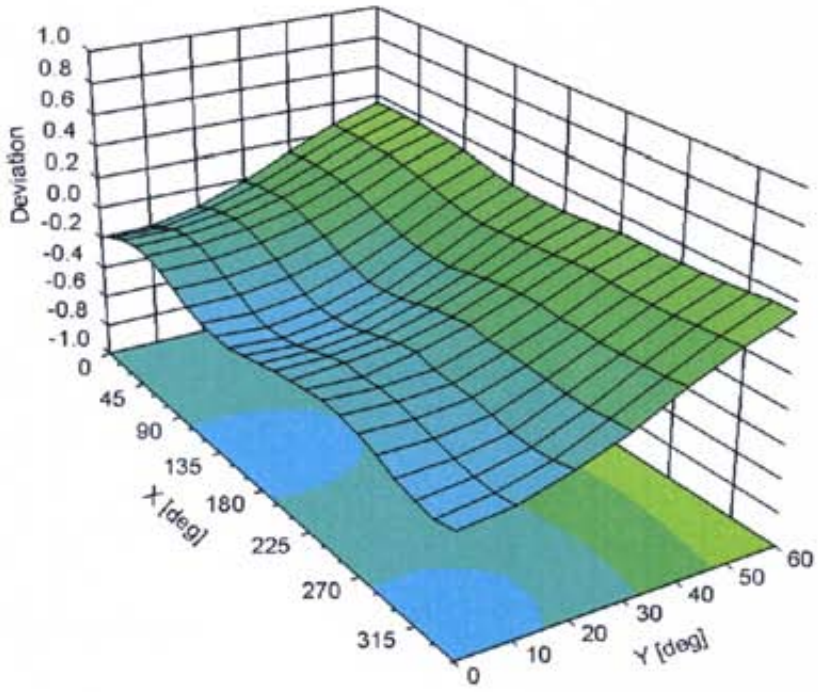


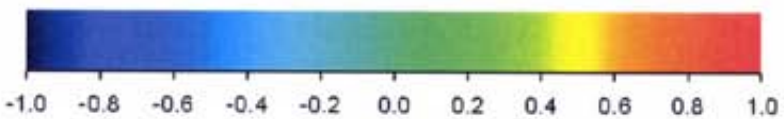
f = 1810 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3178

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 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

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Accreditation No.: SCS 108

Client **Motorola Beijing**

Certificate No: ES3-3180_Jan12

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3180

Calibration procedure(s): QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: January 11, 2012

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	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

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

Issued: January 13, 2012

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

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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,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:

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

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z, VRx,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 *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ES3DV3

SN:3180

Manufactured: March 25, 2008
Calibrated: January 11, 2012

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

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

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.21	1.05	1.01	± 10.1 %
DCP (mV)[B]	101.4	103.7	103.5	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	107.7	±3.0 %
			Y	0.00	0.00	1.00	103.4	
			Z	0.00	0.00	1.00	92.6	

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

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular 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) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.30	6.30	6.30	0.26	1.99	± 12.0 %
835	41.5	0.90	6.07	6.07	6.07	0.41	1.56	± 12.0 %
1810	40.0	1.40	5.20	5.20	5.20	0.43	1.56	± 12.0 %
1950	40.0	1.40	4.97	4.97	4.97	0.72	1.23	± 12.0 %
2450	39.2	1.80	4.51	4.51	4.51	0.77	1.33	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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

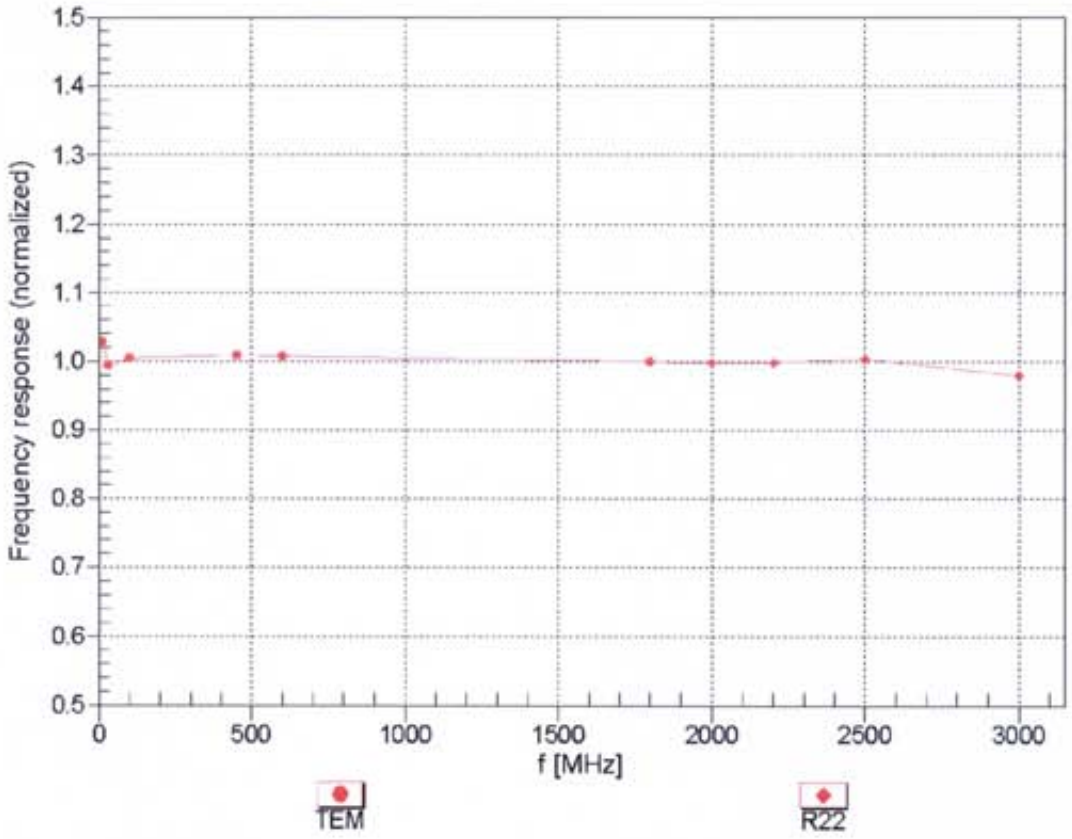
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.06	6.06	6.06	0.35	1.71	± 12.0 %
835	55.2	0.97	5.97	5.97	5.97	0.52	1.36	± 12.0 %
1810	53.3	1.52	5.09	5.09	5.09	0.65	1.58	± 12.0 %
1950	53.3	1.52	5.03	5.03	5.03	0.64	1.52	± 12.0 %
2450	52.7	1.95	4.46	4.46	4.46	0.80	1.21	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Frequency Response of E-Field

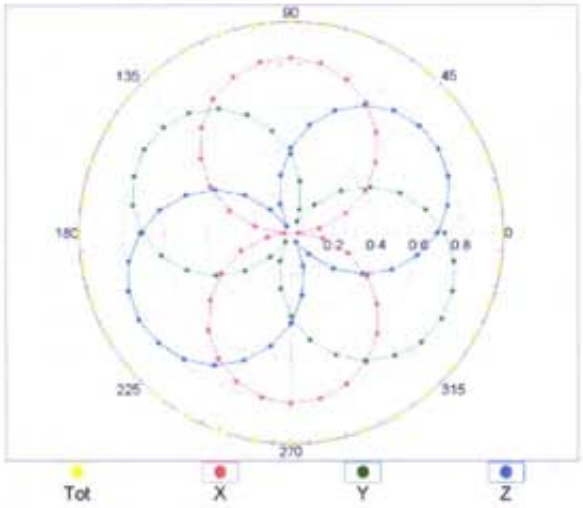
(TEM-Cell:ifi110 EXX, Waveguide: R22)



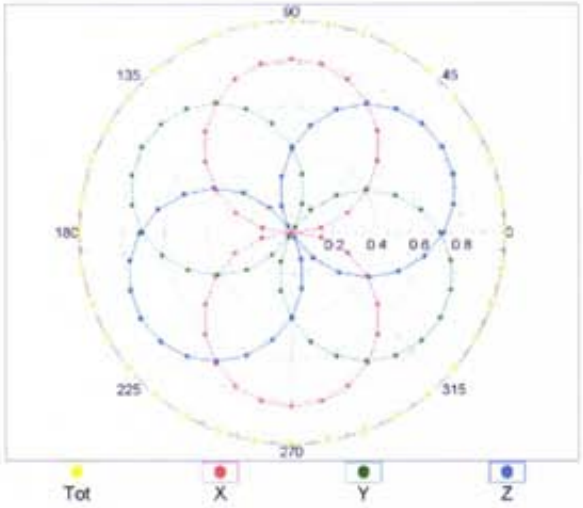
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

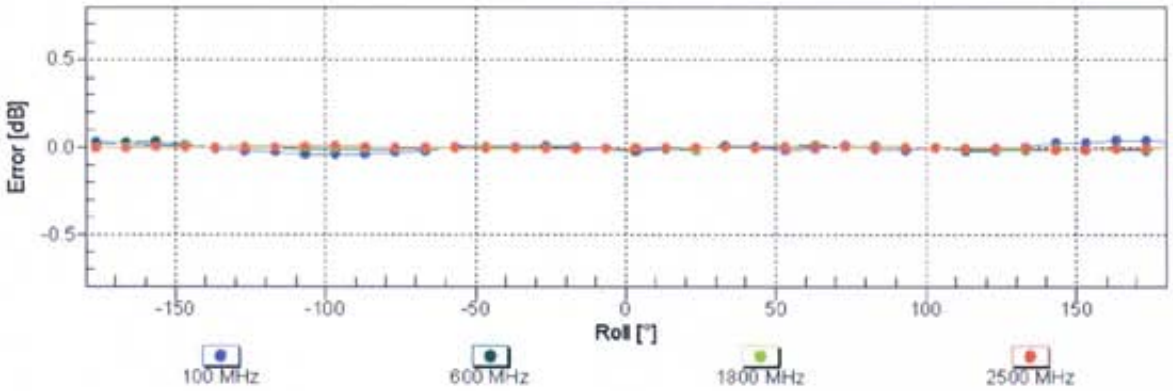
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



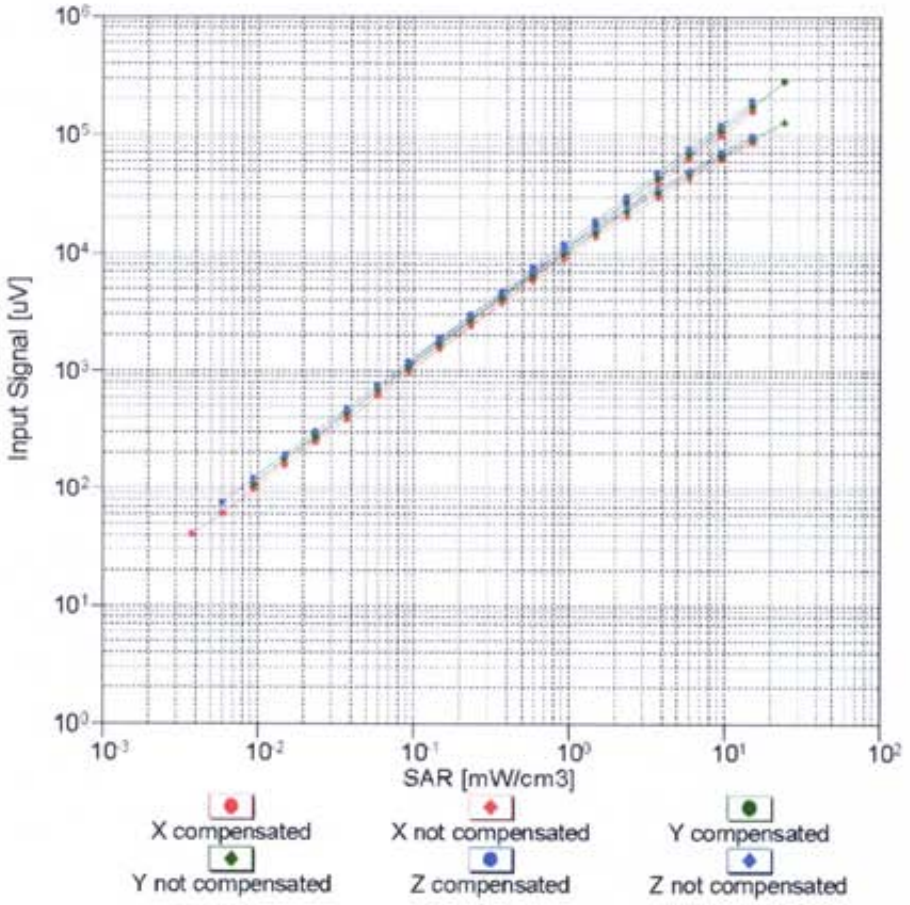
f=1800 MHz,R22

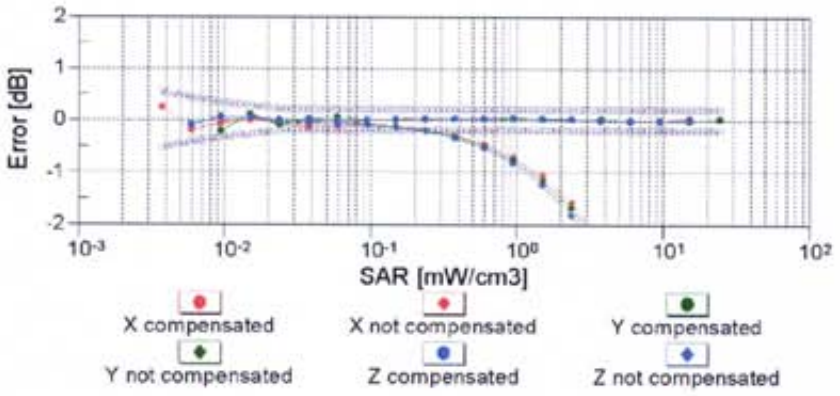




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)

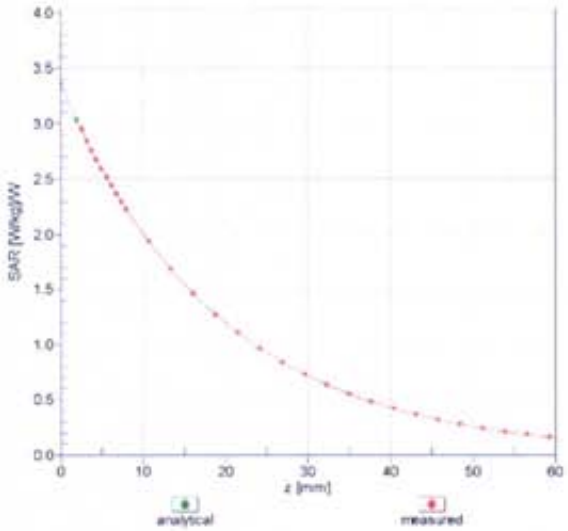




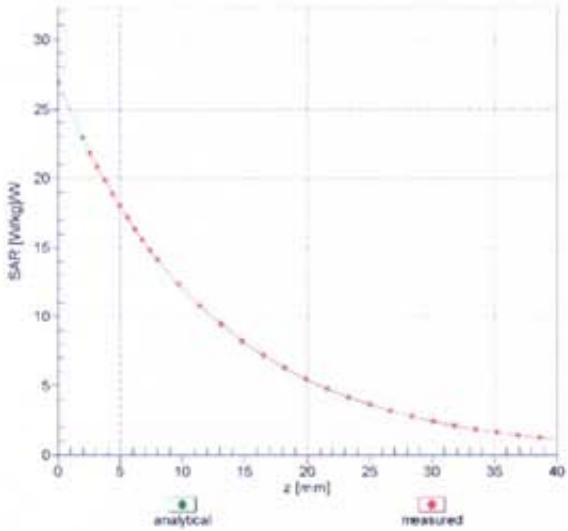
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

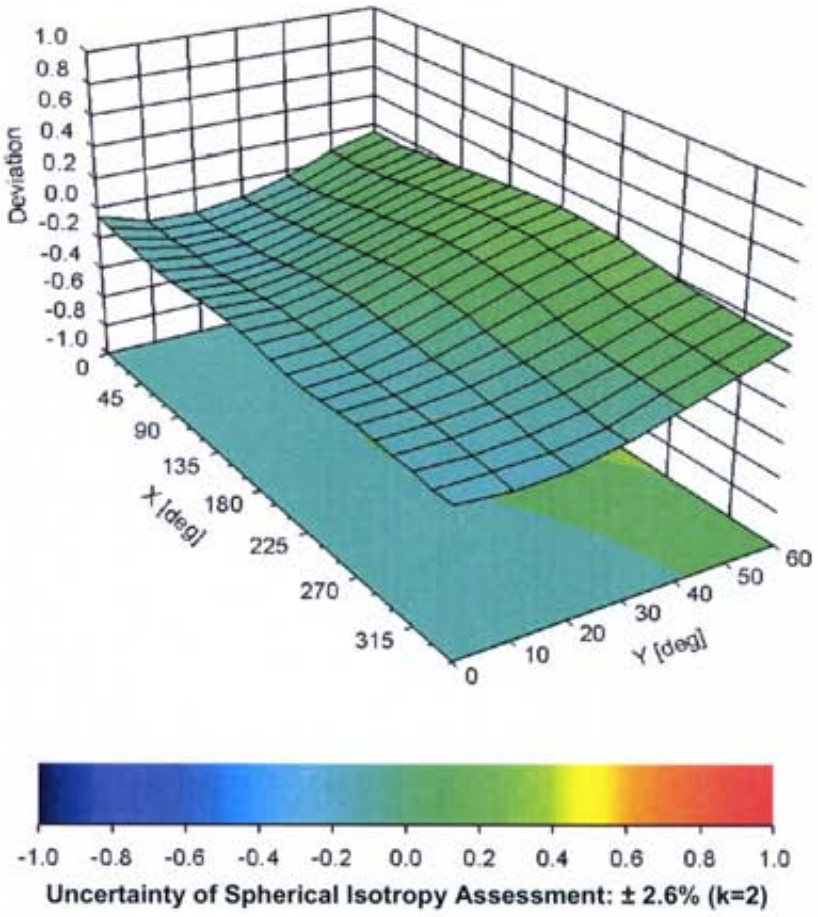


f = 1810 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



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

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

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 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

Appendix 7

Dipole Characterization Certificate

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

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Accreditation No.: SCS 108

Client **Motorola Beijing**

Certificate No: D1800V2-2d129_Jul11

CALIBRATION CERTIFICATE

Object: D1800V2 - SN: 2d129

Calibration procedure(s): QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: July 22, 2011

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 EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Dimce Iliev	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 22, 2011

Calibration Laboratory of
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Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1800 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.2 ± 6 %	1.37 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.55 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**38.5 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.04 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**20.2 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.2 ± 6 %	1.50 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.67 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**38.8 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.14 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**20.6 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.4 Ω - 2.3 jΩ
Return Loss	- 31.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	43.8 Ω - 2.8 jΩ
Return Loss	- 22.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.209 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 27, 2005

DASY5 Validation Report for Head TSL

Date: 20.07.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 2d129

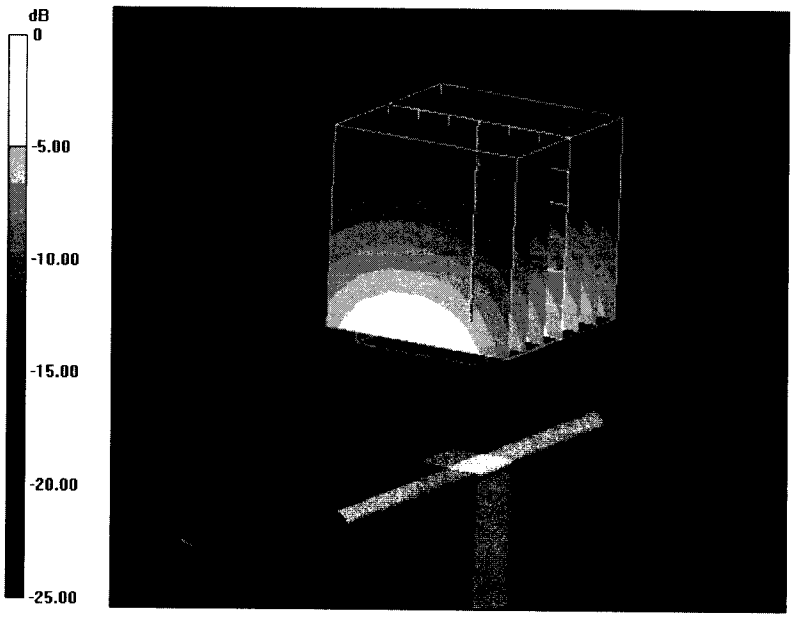
Communication System: CW; Frequency: 1800 MHz
Medium parameters used: f = 1800 MHz; σ = 1.37 mho/m; ε_r = 39.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.07, 5.07, 5.07); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

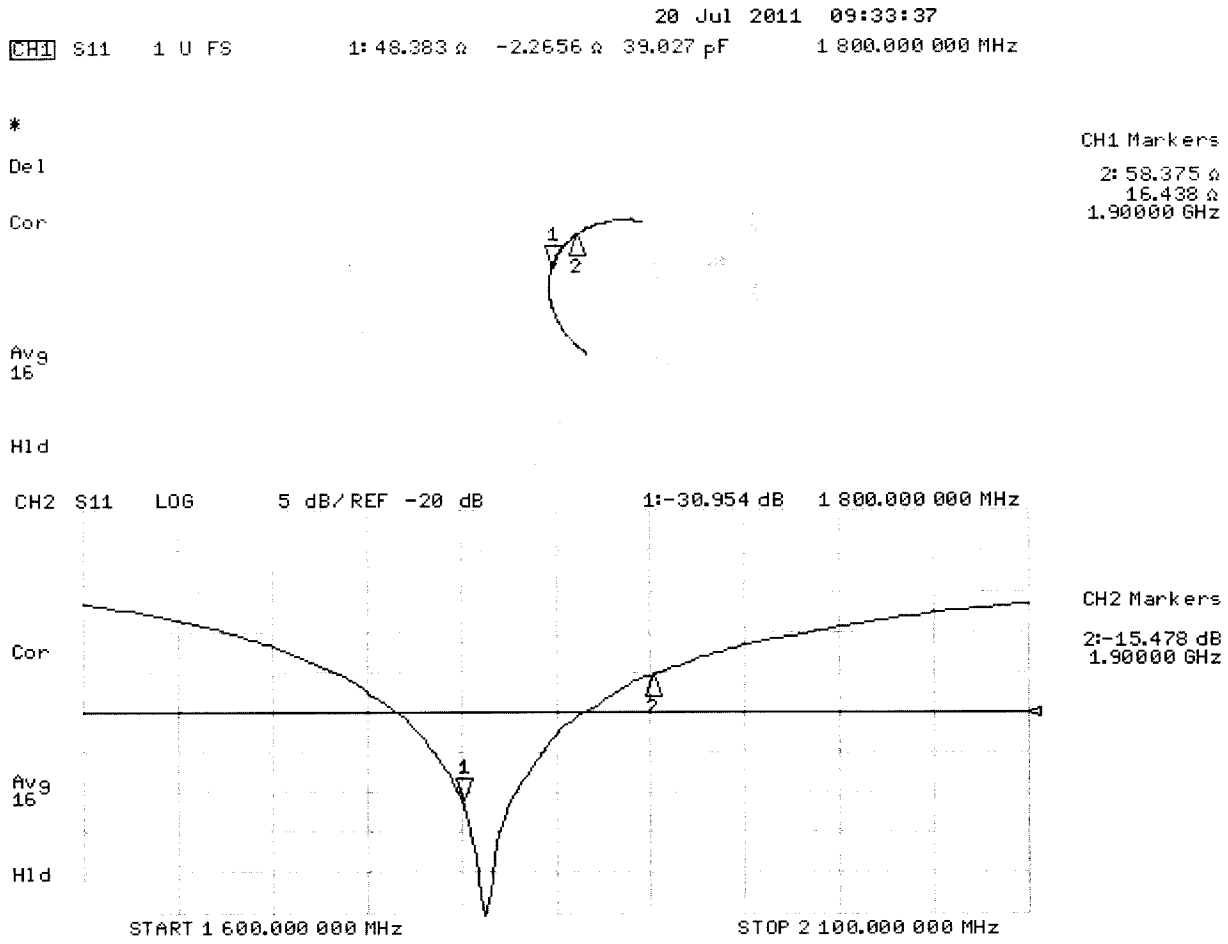
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.826 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 17.101 W/kg
SAR(1 g) = 9.55 mW/g; SAR(10 g) = 5.04 mW/g
Maximum value of SAR (measured) = 12.040 mW/g



0 dB = 12.040mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 22.07.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 2d129

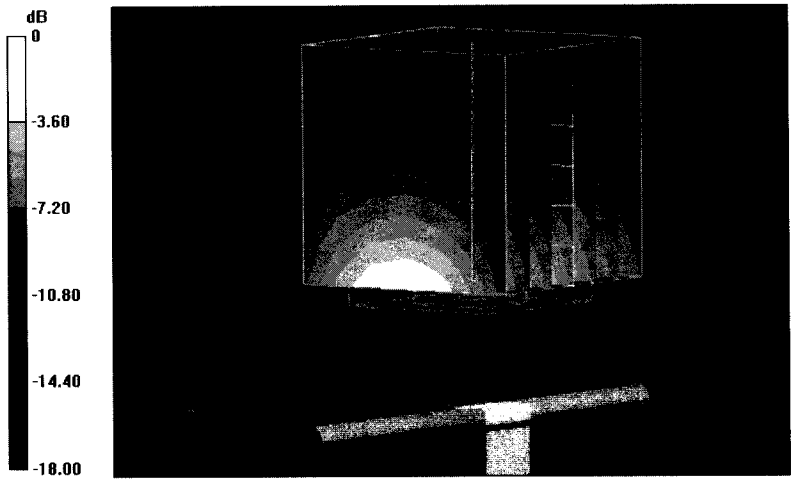
Communication System: CW; Frequency: 1800 MHz
Medium parameters used: f = 1800 MHz; σ = 1.5 mho/m; ε_r = 52.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.74, 4.74, 4.74); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

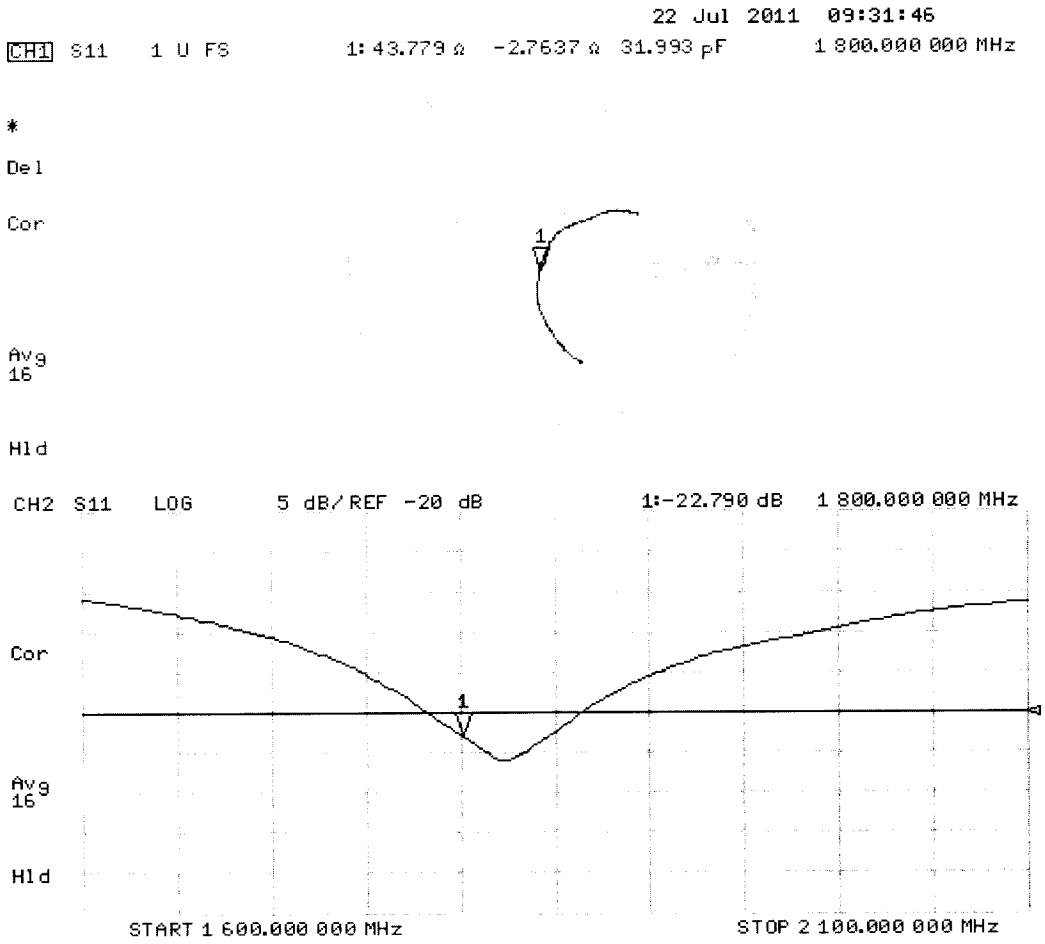
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.128 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 16.950 W/kg
SAR(1 g) = 9.67 mW/g; SAR(10 g) = 5.14 mW/g
Maximum value of SAR (measured) = 12.225 mW/g



0 dB = 12.220mW/g

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 108

Client Motorola MDb

Certificate No: D835V2-425_Jul11

CALIBRATION CERTIFICATE

Object: D835V2 - SN: 425

Calibration procedure(s): QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: July 08, 2011

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 EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

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

Issued: July 12, 2011

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

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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.0 ± 6 %	0.88 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.25 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**9.13 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.47 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**5.94 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.8 ± 6 %	0.98 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.37 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**9.35 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.56 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**6.18 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.0 Ω + 2.7 jΩ
Return Loss	- 28.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.1 Ω + 2.2 jΩ
Return Loss	- 32.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.401 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Design Modification by End User

The dipole has been modified with Teflon Rings (TR) placed within identified markings close to the end of each dipole arm. Calibration has been performed with TR attached to the dipole

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	August 24, 2000

DASY5 Validation Report for Head TSL

Date: 08.07.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 425

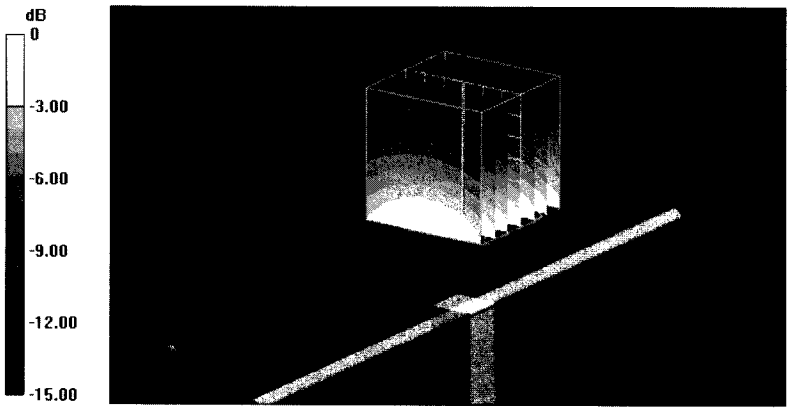
Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.88 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.07, 6.07, 6.07); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

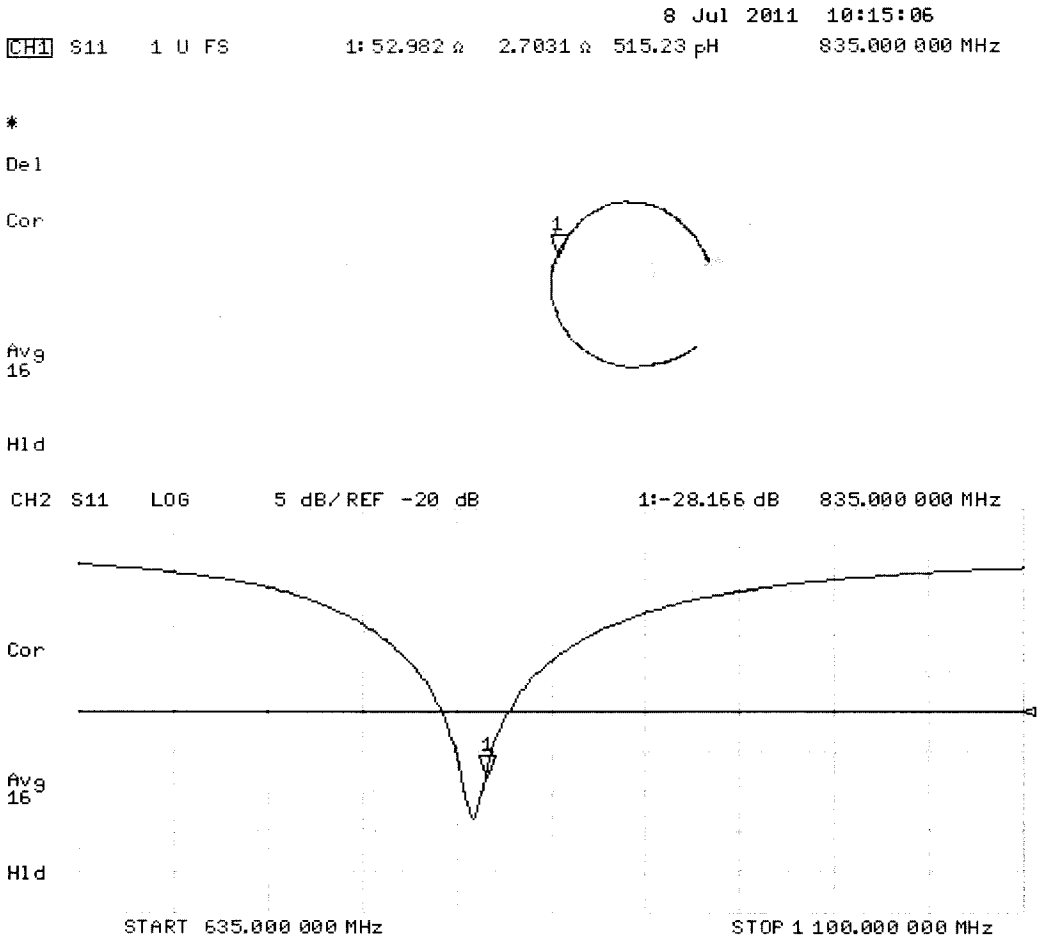
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.396 V/m; Power Drift = 0.004 dB
Peak SAR (extrapolated) = 3.296 W/kg
SAR(1 g) = 2.25 mW/g; SAR(10 g) = 1.47 mW/g
Maximum value of SAR (measured) = 2.624 mW/g



0 dB = 2.620mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 08.07.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 425

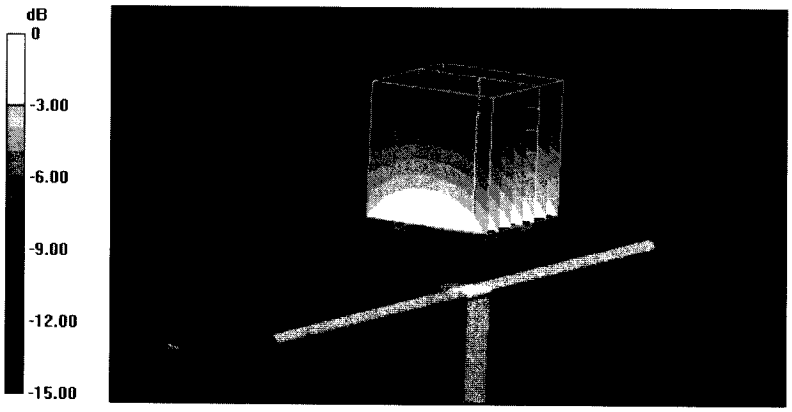
Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.98 mho/m; ε_r = 53.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.02, 6.02, 6.02); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

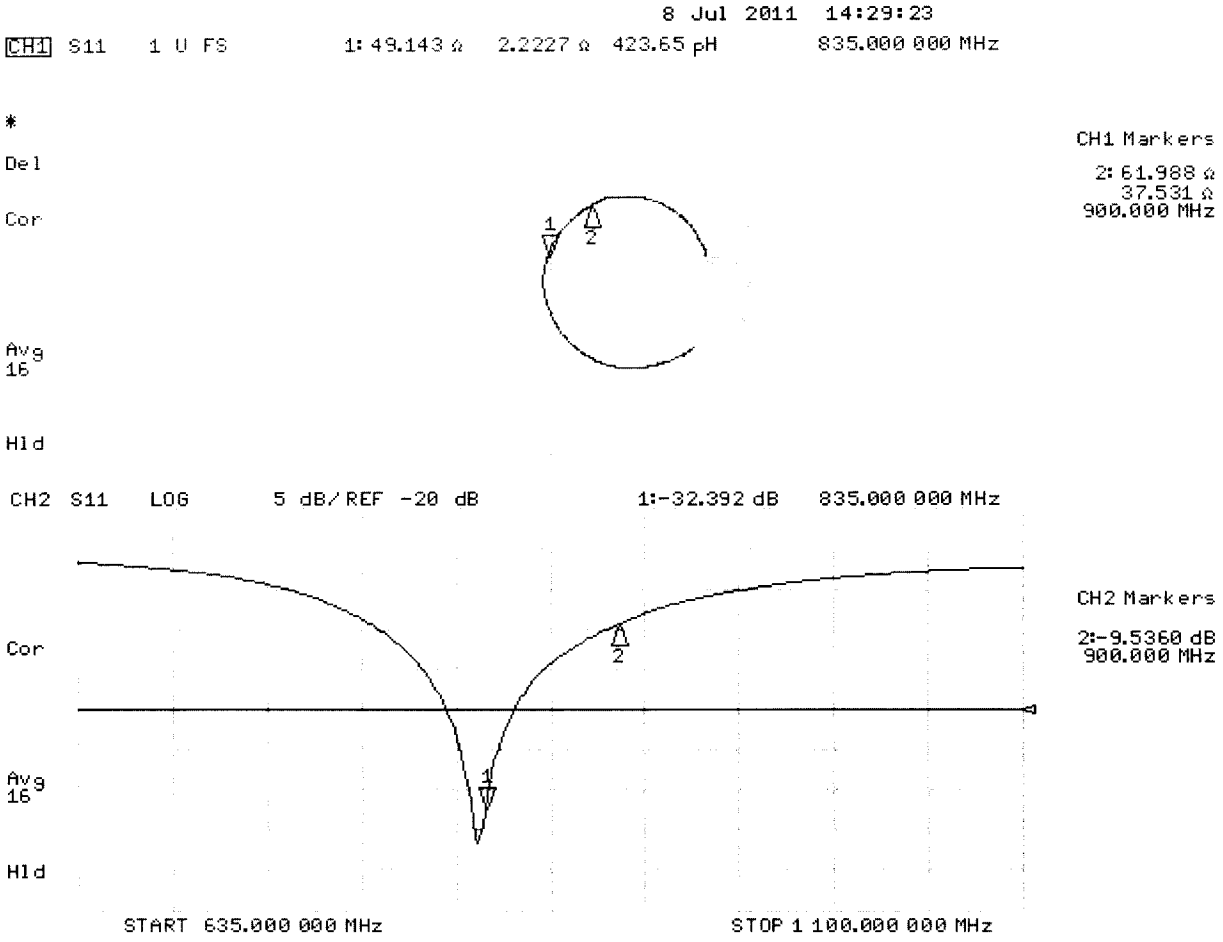
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.024 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.431 W/kg
SAR(1 g) = 2.37 mW/g; SAR(10 g) = 1.56 mW/g
Maximum value of SAR (measured) = 2.759 mW/g



0 dB = 2.760mW/g

Impedance Measurement Plot for Body TSL



Calibration Laboratory of
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Accreditation No.: SCS 108

Client **Motorola Beijing**

Certificate No: D2450V2-788_Jul11

CALIBRATION CERTIFICATE

Object: D2450V2 - SN: 788

Calibration procedure(s): QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: July 12, 2011

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 EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Dimce Iliev	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 12, 2011

Calibration Laboratory of
Schmid & Partner
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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.9 ± 6 %	1.85 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.0 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**55.2 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.49 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**25.8 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.7 ± 6 %	2.00 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.0 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**51.2 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.02 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**23.9 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	55.0 Ω + 4.3 jΩ
Return Loss	- 24.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.9 Ω + 5.6 jΩ
Return Loss	- 25.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.155 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	January 24, 2006

DASY5 Validation Report for Head TSL

Date: 7/12/2011

Test Laboratory: SPEAG

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

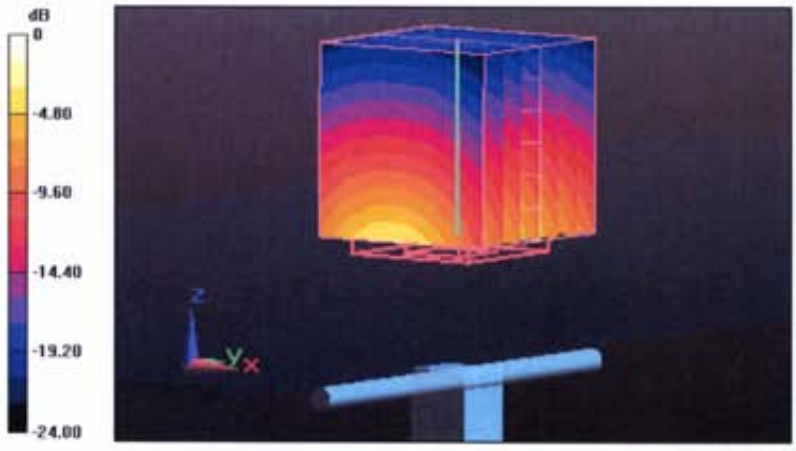
Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: HBBL 1900-3800V3
Medium parameters used: f = 2450 MHz; σ = 1.85 mho/m; ε_r = 38.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 4/29/2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 7/4/2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, Version 52.6 (2)
- SEMCAD X Version 14.4.5 (3634)

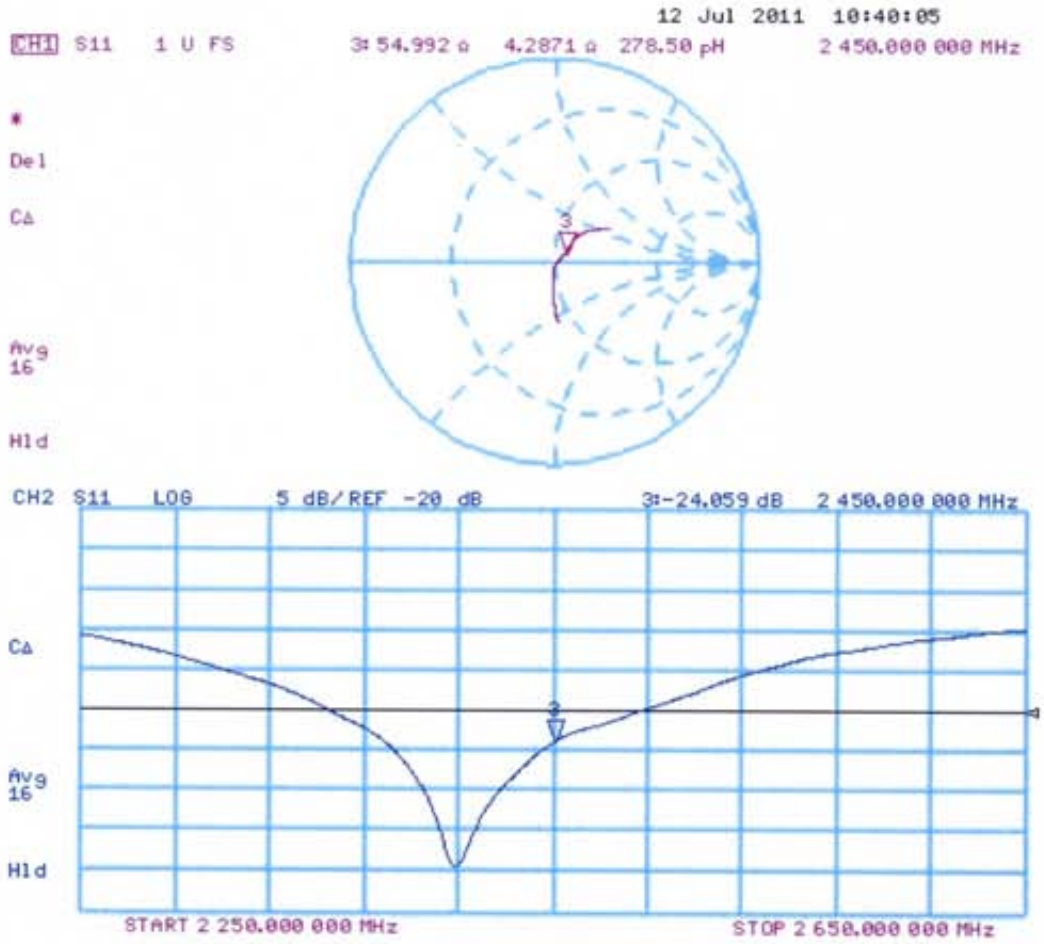
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 102.3 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 28.847 W/kg
SAR(1 g) = 14 mW/g; SAR(10 g) = 6.49 mW/g
Maximum value of SAR (measured) = 17.898 mW/g



0 dB = 17.900mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 12.07.2011

Test Laboratory: SPEAG, Zurich, Switzerland

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

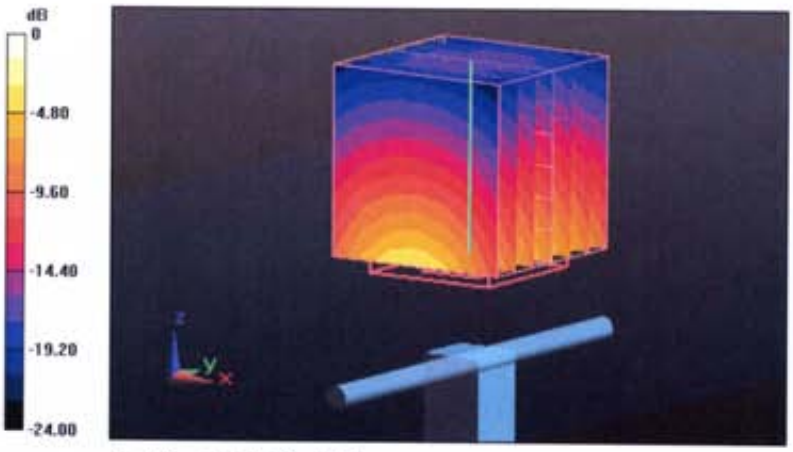
Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.26, 4.26, 4.26); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

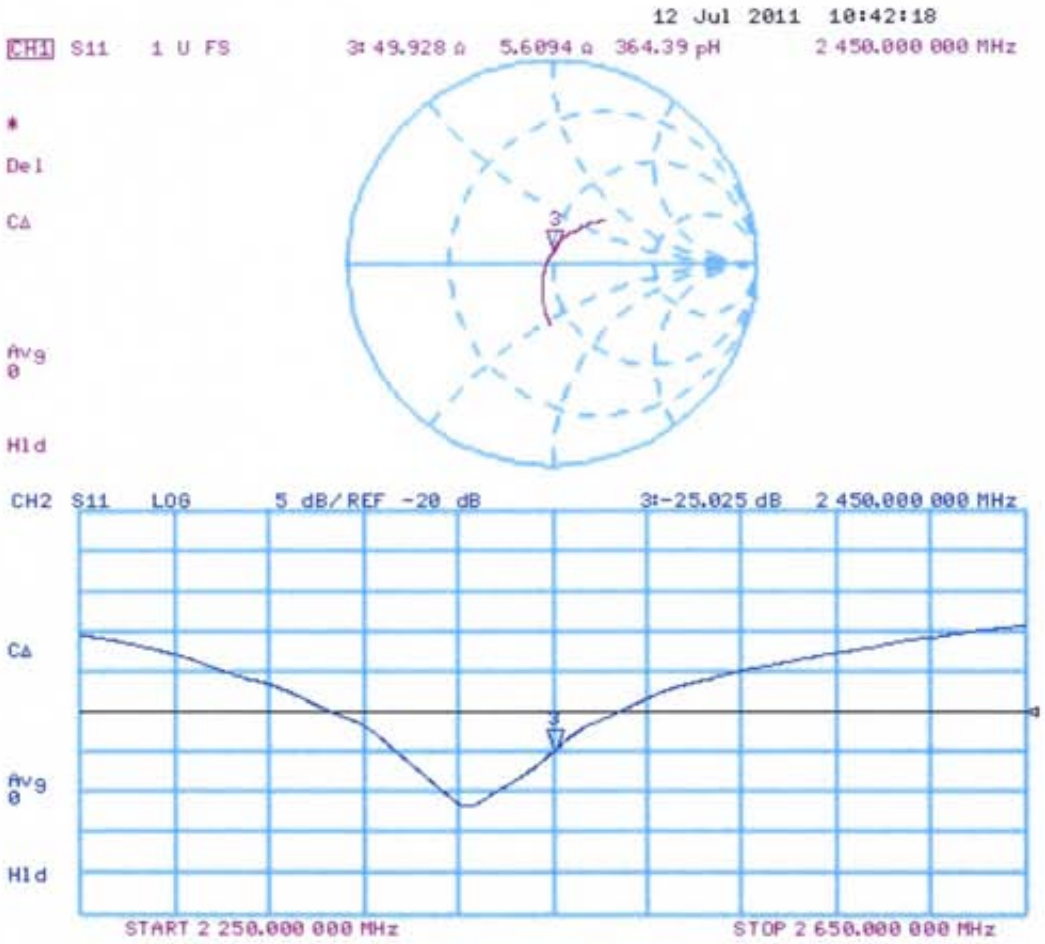
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.028 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 26.823 W/kg
SAR(1 g) = 13 mW/g; SAR(10 g) = 6.02 mW/g
Maximum value of SAR (measured) = 17.108 mW/g



0 dB = 17.110mW/g

Impedance Measurement Plot for Body TSL



END OF REPORT