Portable Cellular Phone SAR Test Report

Tests Requested By:	Motorola Mobile Devices 600 N. US Highway 45 Libertyville, IL 60048
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Test Laboratory:	Motorola Mobility, Inc. - Product Safety & Compliance Laboratory 600 N. US Highway 45 Libertyville, IL 60048
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Accreditation:

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

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

Testing Laboratory No. 2404

Statement of Compliance:

On the following products or types of products:

On the following products or types of products: Wireless Communications Devices (Examples): Two Way Radios; Portable Phones (including Cellular, Licensed Non-Broadcast and PCS); Low Frequency Readers; and Pagers

Motorola declares under its sole responsibility that the portable cellular telephone model to which this declaration relates, is in conformity with the appropriate General Population/Uncontrolled RF exposure standards, recommendations and guidelines (FCC 47 CFR §2.1093) as well as with CENELEC en50360:2001 and ANSI / IEEE C95.1. It also declares that the product was tested in accordance with IEEE 1528 / CENELEC EN62209-1 (2006), as well as other appropriate measurement standards, guidelines and recommended practices. Any deviations from these standards, guidelines and recommended practices are noted below:

(none)

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1. Introduction

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

For ANSI / IEEE C95.1 (1 g), the final stand-alone SAR readings for this phone are 1.48 W/kg for head-adjacent use and 1.43 W/kg for body-worn use. The final simultaneous-transmission SAR readings for this phone are 1.46 W/kg for head-adjacent use. These measurements were performed using a Dasy4™ v4.7 system manufactured by Schmid & Partner Engineering AG (SPEAG), of Zurich Switzerland.

2. Description of the Device Under Test

2.1 Antenna description

Antenna for 1700 / 1800 / 1900 MHz Bands

Type	Internal	
Location	Top Rear of Transceiver	
Dimensions	Length	56 mm
	Width	13 mm

Antenna for 850 / 900 MHz Bands

Type	Internal	
Location	Bottom Rear of Transceiver	
Dimensions	Length	54 mm
	Width	12 mm

Bluetooth / Wi-Fi Antenna

Type	Internal	
Location	Right-Side Rear of Transceiver	
Dimensions	Length	15 mm
	Width	2 mm

2.2 Device description[1]

Serial Numbers of identical HW used for testing	**351575040007136** (Used for Conducted power & SAR tests of GSM and WiFi) **351575040016095** (Used for Conducted power & SAR tests of WCDMA / FDD modes)								
Mode(s) of Operation	GSM 850	GSM 900	GSM 1800	GSM 1900	WCDMA 850	WCDMA 1700	WCDMA 2100	Wi-Fi 802.11b/g/n	Bluetooth
Modulation Mode(s)	GMSK	GMSK	GMSK	GMSK	QPSK	QPSK	QPSK	BPSK	GFSK
Maximum Output Power Setting	33.0 dBm	33.0 dBm	30.5 dBm	30.5 dBm	24.0 dBm	24.0 dBm	24.0 dBm	20 dBm	10 dBm
Duty Cycle	1:8	1:8	1:8	1:8	1:1	1.1	1:1	1:1	1:1
Transmitting Frequency Range(s)	824.2 - 848.8 MHz	880.2 - 914.8 MHz	1710.2 - 1784.8 MHz	1850.2 - 1909.8 MHz	826.4 - 846.6	1712.4 - 1752.6 MHz	1920.3-1979.7 MHz	2412.0 - 2462.5 MHz	2402.0 - 2483.5 MHz
Production Unit or Identical Prototype (47 CFR §2..908)	Identical Prototype								
Device Category	Portable								
RF Exposure Limits	General Population / Uncontrolled								

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

Mode(s) of Operation	EDGE 850				EDGE 900				EDGE 1800				EDGE 1900			
Modulation	8PSK				8PSK				8PSK				8PSK			
Maximum Output Power Setting	28.5	**26.5**	24.5	22.5	28.5	**26.5**	24.5	22.5	27.5	**25.5**	23.5	21.5	27.5	**25.5**	23.5	21.5
Duty Cycle	1:8	**2:8**	3:8	4:8	1:8	**2:8**	3:8	4:8	1:8	**2:8**	3:8	4:8	1:8	**2:8**	3:8	4:8
Transmitting Frequency Range(s)	824.2 - 848.8 MHz				880.2 - 914.8 MHz				1710.2 - 1784.8 MHz				1850.2 - 1909.8 MHz			

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

3. Test Equipment Used

3.1 Dosimetric System

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

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

Description	Serial Number	Cal Date	Cal Due Date
DASY4™ DAE V1	440	Feb-17-2010	Feb-17-2011
E-Field Probe ES3DV3	3184	Sep-18-2009	Sep-18-2010
DASY4™ DAE V1	703	Sep-17-2009	Sep-17-2010
E-Field Probe ES3DV3	3037	Sep-18-2009	Sep-18-2010
DASY4™ DAE V1	376	Jul-13-2010	Jul-13-2011
E-Field Probe ES3DV3	3124	Aug-11-2010	Aug-11-2011
DASY4™ DAE V1	702	May-18-2010	May-18-2011
E-Field Probe ES3DV3	3183	Jul-14-2010	July-14-2011
S.A.M. Phantom used for 800/900 MHz	TP-1131		
S.A.M. Phantom used for 800/900 MHz	TP-1005		
S.A.M. Phantom used for 1800/1900/2450 MHz	TP-1250		
S.A.M. Phantom used for 1800/1900/2450 MHz	TP-1139		
Dipole Validation Kit, DV835V2	436TR	Mar-17-2010	Mar-17-2011
Dipole Validation Kit, DV835V2	420TR	Mar-17-2010	Mar-17-2011
Dipole Validation Kit, DV1800V2	272TR	Mar-17-2010	Mar-17-2011
Dipole Validation Kit, DV1800V2	259TR	Mar-17-2010	Mar-17-2011
Dipole Validation Kit, DV2450V2	766	Mar-17-2010	Mar-17-2011

3.2 Additional Equipment

Description	Serial Number	Cal Date	Cal Due Date
Signal Generator HP8648C	3847A04822	Apr-22-2009	Apr-22-2011
Power Meter E4419B	GB39511082	Apr-24-2009	Apr-24-2011
Power Sensor #1 - E9301A	US39210915	Dec-04-2009	Dec-04-2010
Power Sensor #2 - E9301A	US39210916	Nov-16-2009	Nov-16-2010
Signal Generator HP8648C	3847A04843	Apr-22-2009	Apr-22-2011
Power Meter E4419B	US39250622	Dec-22-2009	Dec-22-2011
Power Sensor #1 - E9301A	US39210929	Nov-19-2009	Nov-19-2010
Power Sensor #2 - E9301A	US39210930	Nov-19-2009	Nov-19-2010
Signal Generator HP8648C	3847A04810	Oct-30-2009	Oct-30-2011
Power Meter E4419B	GB39511087	Dec-22-2009	Dec-22-2011
Power Sensor #1 - E9301A	US39211007	Dec-04-2009	Dec-04-2010
Power Sensor #2 - E9301A	US39211008	Dec-04-2009	Dec-04-2010
Network Analyzer HP8753ES	US39172529	Jun-04-2010	Jun-04-2011
Dielectric Probe Kit HP85070C	US99360070		

4. Electrical parameters of the tissue simulating liquid

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

Ingredient	835MHz / 900 MHz Head	835MHz / 900 MHz Body	1700MHz 1800MHz 1900 MHz Head	1700MHz 1800 MHz 1900 MHz Body	2450MHz Head	2450 MHz Body
Sugar	57	44.9	--	--	--	--
DGBE	--	--	47	30.8	--	30
Diacetin	--	--	--	--	51	
Water	40.45	53.06	52.62	68.8	48.75	70
Salt	1.45	0.94	0.38	0.4	0.15	--
HEC	1	1	--	--	--	--
Bact.	0.1	0.1	--	--	0.1	--

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

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,** 14 Aug, 2010	42.1	0.93	20.0
		Measured, 22 Aug, 2010	42.2	0.93	20.0
		Measured, 23 Aug, 2010	41.4	0.92	19.9
		Measured, 28 Sep, 2010	42.4	0.93	19.5
		Recommended Limits	41.5 ±5%	0.90 ±5%	18-25
	Body	**Measured,** 16 Aug, 2010	55.6	1.0	20.0
		Measured, 20 Aug, 2010	54.9	1.0	19.8
		Recommended Limits	55.2 ±5%	0.97 ±5%	18-25
1730	Head	**Measured,** 28 Sep, 2010	38.7	1.39	20.0
		Recommended Limits	40.1 ±5%	1.37 ±5%	18-25
	Body	**Measured,** 25 Aug, 2010	51.0	1.51	19.4
		Recommended Limits	53.4 ±5%	1.49 ±5%	18-25
1880	Head	**Measured,** 10 July, 2010	39.3	1.46	19.6
		Measured, 27 Sep, 2010	38.4	1.46	19.0
		Recommended Limits	40.0 ±5%	1.40 ±5%	18-25
	Body	**Measured,** 8 July, 2010	51.0	1.59	20.2
		Recommended Limits	53.3 ±5%	1.52 ±5%	18-25
2450	Head	**Measured,** 18 Aug, 2010	37.4	1.87	19.8
		Measured, 28 Sep, 2010	36.9	1.88	20.4
		Recommended Limits	39.2 ±10%	1.80 ±5%	18-25
	Body	**Measured,** 19 Aug, 2010	49.9	1.99	20.0
		Recommended Limits	52.7 ±10%	1.95 ±5%	18-25

5. System Accuracy Verification

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

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

f (MHz)	Description	SAR (W/kg), 1gram	Dielectric Parameters		Ambient Temp (°C)	Tissue Temp (°C)
			ε_r	σ (S/m)		
835	**Measured,** 9 Jul, 2010	9,43	41.3	0.91	19.8	20.7
	Measured, 14 Aug, 2010	9.68	42.1	0.93	20.0	20.1
	Measured, 20 Aug, 2010	9.58	41.9	0.92	20.0	20.3
	Measured, 22 Aug, 2010	9.65	42.2	0.93	20.6	20.3
	Measured, 23 Aug, 2010	9.30	41.4	0.92	20.5	21.4
	Measured, 28 Sep, 2010	9.90	42.4	0.93	19.8	19.6
	Recommended Limits	9.56	41.5 ±5%	0.97 ±5%	18-25	18-25
1800	**Measured,** 8 Jul, 2010	37.30	38.7	1.37	20.0	20.0
	Measured, 10 Jul, 2010	35.90	39.7	1.37	20.0	19.4
	Measured, 29-Jul, 2010	36.43	39.2	1.37	20.3	19.8
	Measured, 16 Aug,2010	39.63	38.5	1.36	20.3	20.3
	Measured, 24 Aug,2010	35.95	38.7	1.35	20.4	20.3
	Measured, 25 Aug,2010	36.53	38.9	1.37	20.2	20.1
	Measured, 27 Sep, 2010	39.4	38.8	1.39	19.6	19.2
	Measured, 28 Sep, 2010	39.5	38.8	1.37	19.8	19.3
	Recommended Limits	38.40	40.0 ±5%	1.4 ±5%	18-25	18-25
2450	**Measured,** 17 Aug, 2010	55.25	37.4	1.87	20.1	20.0
	Measured, 19 Aug, 2010	54.25	37.4	1.83	20.3	20.4
	Measured, 27 Sep, 2010	56.5	36.9	1.88	20.1	19.4
	Recommended Limits	52.40	39.2 ±10%	1.80 ±5%	18-25	18-25

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

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ES3DV3	SN3037	835	6.25	8 of 9
		1950	4.87	8 of 9
		2450	4.41	8 of 9
	SN3184	835	6.26	8 of 9
		1810	5.14	8 of 9
	SN3124	2450	4.35	8 of 9
	SN3183	1710	5.05	8 of 9

6. Test Results

The test sample was operated using an actual transmission through a base station simulator. The base station simulator was setup to the proper channel, transmitter power level and transmit mode of operation. The phone was tested in the configurations stipulated in [1], [4] and [5]. The phone was positioned into these configurations using the device holder supplied with the DASY4™ SAR measurement system The default settings for the "coarse" and "cube" scans were chosen and used for measurements. The grid spacing of the course scan was set to 15 mm as shown in the SAR plots included in Appendix 2 and 3. Please refer to the DASY4™ manual for additional information on SAR scanning procedures and algorithms used.

The Cellular Phone model covered by this report has the following battery option:
Model SNN5877A - 1500 mAH Battery

The location of peak SAR for a handset is a function of the type of antenna implemented, the frequencies of transmission, the configuration of phone placement against the measurement phantom, the shape of the measurement phantom, any unintended secondary radiating elements on the DUT, etc.. Therefore the location of peak SAR may not coincide with the location of the transmitting antenna.

Below is a test channel to actual channel frequency cross-reference listing:

Tx Band	Chn	F (MHz)
GSM 850	128	824.20
	190	836.60
	251	848.80
WCDMA 850	4132	826.40
	4180	836.00
	4233	846.60
GSM 900	975	880.20
	1	890.20
	62	902.40
	124	914.80
WCDMA 900	2712	882.40
	2787	897.40
	2863	912.60
WCDMA 1700	1312	1712.40
	1413	1732.50
	1513	1752.60

Tx Band	Chn	F (MHz)
GSM 1800	512	1710.20
	700	1747.80
	885	1785.00
GSM 1900	512	1850.20
	661	1880.00
	810	1909.80
WCDMA 1900	9262	1852.40
	9400	1880.00
	9538	1907.60
WCDMA 2100	9612	1922.40
	9750	1950.00
	9888	1977.60
WiFi (802.11b/g)	1	2412.00
	6	2437.00
	11	2462.00

Evaluation of WCDMA Modes

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

Band	Channel	Conducted power (dBm) for WCDMA modes		Conducted Power (dBm) for WCDMA – HSDPA (Rel 5) Modes				Conducted Power (dBm) for WCDMA – HSPA (HSUPA/HSDPA-Rel 6) Modes				
		RMC	AMR	Subtest 1	Subtest 2	Subtest 3	Subtest 4	Subtest 1	Subtest 2	Subtest 3	Subtest 4	Subtest 5
WCDMA 850	4132	**24.13**	24.13	24.09	24.06	24.07	24.07	24.07	24.09	24.08	24.10	24.10
	4180	**24.11**	23.93	23.89	24.05	24.06	24.15	24.17	24.14	24.16	24.14	24.12
	4233	**24.00**	24.13	24.06	24.06	24.03	24.03	24.13	24.05	24.06	24.06	24.06
WCDMA 1700	1312	**23.95**	23.94	23.82	23.96	24.03	24.01	23.9	24.14	24.22	23.89	24.03
	1413	**23.96**	23.92	23.83	23.9	24.01	23.95	23.9	23.89	24.02	23.87	24
	1513	**23.84**	23.78	23.74	23.77	23.84	23.78	23.78	23.77	23.85	23.76	23.84
WCDMA 2100	9612	**24.19**	24.33	24.46	24.29	24.30	24.29	24.17	24.18	24.11	24.21	24.25
	9750	**24.04**	24.16	24.24	24.20	24.19	24.20	24.11	24.10	24.03	24.15	24.16
	9888	**24.04**	24.18	24.22	24.26	24.10	24.13	24.05	24.05	24.02	24.09	24.08

Maximum Power Reduction (MPR)

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

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

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

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

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

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

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

Evaluation of Wi-Fi 802.11 Modes

Per "SAR Measurement Procedures for 802.11 a/b/g Transmitters" (FCC KDB 248227), power measurements were performed for 802.11 operational modes. The conducted power measurements for each mode are shown in the table below. SAR testing for 802.11 modes was performed with the transmitter mode and data rate set to the configurations highlighted in bold below.

Band	Channel	Conducted Power (dBm) for 802.11b Mode Data Rates			
		1 Mbps	2 Mbps	5.5 Mbps	11 Mbps
Wi-Fi 2450 MHz	1	17.04	17.17	17.11	17.1
	6	17.71	17.85	17.71	17.65
	11	18.47	18.54	18.53	18.57

Band	Channel	Conducted Power (dBm) for 802.11g Mode Data Rates							
		6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps
Wi-Fi 2450 MHz	1	14.48	14.58	14.55	14.26	14.02	14.05	12.55	12.58
	6	17.37	17.31	16.83	16.71	14.63	14.69	13.29	13.45
	11	18.17	18.21	17.83	17.43	15.44	15.54	14.2	14.07

Band	Channel	Conducted Power (dBm) for 802.11n Mode Data Rates (20 MHz Channel, 800 ns Guard Interval)							
		6.5 Mbps	13 Mbps	19.5 Mbps	26 Mbps	39 Mbps	52 Mbps	58.5 Mbps	65 Mbps
Wi-Fi 2450 MHz	1	14.23	14.14	13.76	13.68	15.32	13.86	12.38	11.57
	6	17.06	16.64	16.39	14.67	14.5	13.08	13.08	12.12
	11	17.9	17.5	17.01	15.4	15.33	13.92	13.86	12.98

Band	Channel	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	14.34	14.28	13.92	14.04	13.91	12.58	12.57	11.7
	6	17.22	16.74	16.4	14.72	14.66	13.3	13.21	12.49
	11	18.05	17.57	17.23	15.52	15.38	13.97	14.01	13.18

6.1 Head Adjacent Test Results

The SAR results shown in tables 1 through 4 are maximum SAR values averaged over 1 gram of phantom tissue, to demonstrate compliance to [3] and also over 10 grams of phantom tissue, to demonstrate compliance to the [6]. Also shown are the measured conducted output power levels, the temperature of the simulated tissue after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is Extrapolated SAR = Measured 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 tables below also include the highest SAR value summations for primary and secondary co-located transmitters, except as noted below, with the results indicated in italics.

The guidelines provided in "SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas" (KDB publication 648474 - D01 v01r05) were utilized for evaluation of the need for simultaneous transmission SAR testing. These guidelines direct that if the SAR-to-peak-location separation ratio for two simultaneously transmitting antennas is < 0.3 then SAR evaluation for simultaneous transmission is not required. For WCDMA 1700 and Wi-Fi in the Right Head Cheek position the SAR-to-peak-location separation ratio is 0.26, and thus no testing was performed to determine the aggregate 1 g SAR in this configuration. A SAR plot with the Wi-Fi SAR overlaid upon the WCDMA 1900 Right Head Cheek SAR are provided in Appendix 2 for this configuration, to provide visual indication of the separation of the SAR hotspots for each modulation.

For GSM 1900 and Wi-Fi in the Left Head Cheek position the SAR-to-peak-location separation ratio is 0.34.
For WCDMA 850 and Wi-Fi in the Left Head Cheek position the SAR-to-peak-location separation ratio is 0.58.
For WCDMA 1700 and Wi-Fi in the Left Head Cheek position the SAR-to-peak-location separation ratio is 0.40.
For WCDMA 1700 and Wi-Fi in the Left Head Tilt position the SAR-to-peak-location separation ratio is 0.57.
For WCDMA 1700 and Wi-Fi in the Right Head Tilt position the SAR-to-peak-location separation ratio is 0.63.

For these configurations, combined SAR measurements were required to determine the aggregate 1 g SAR for simultaneous transmission evaluation. The results of these measurement are given in table 1 below, with additional SAR plots of the combined measurements provided in Appendix 2.

Additional SAR measurements for simultaneous transmission evaluation were performed for each of the single transmitters using an extended zoom scan. This extended zoom scan was created to encompass the zoom scan volumes that were found previously in each of the single transmit SAR tests. The location of this extended zoom scan was established by using X, Y grid offsets from the "Grid Reference Point" in DASY4.7. The results were then combined via the DASY4.7 Multi-Band Combiner feature. The extended zoom dimensions and the step sizes are given below:

- For WCDMA 850 MHz + Wi-Fi, the outer dimensions of the extended zoom scan were X = 64 mm, Y = 56 mm, Z = 30 mm with a step size of X = 8 mm, Y = 8 mm, Z = 5 mm.
- For GSM 1900 MHz + Wi-Fi, the outer dimensions of the extended zoom scan were X = 48 mm, Y = 88 mm, Z = 30 mm with a step size of X = 8 mm, Y = 8 mm, Z = 5 mm.
- For WCDMA 1700 MHz + Wi-Fi Left Head cheek, the outer dimensions of the extended zoom scan were X = 48 mm, Y = 88 mm, Z = 30 mm with a step size of X = 8 mm, Y = 8 mm, Z = 5 mm.
- For WCDMA 1700 MHz + Wi-Fi Left Head 15degree Tilt, the outer dimensions of the extended zoom scan were X = 40 mm, Y = 64 mm, Z = 30 mm with a step size of X = 8 mm, Y = 8 mm, Z = 5 mm.
- For WCDMA 1700 MHz + Wi-Fi Right Head 15degree Tilt, the outer dimensions of the extended zoom scan were X = 40 mm, Y = 64 mm, Z = 30 mm with a step size of X = 8 mm, Y = 8 mm, Z = 5 mm.

The methods used for these additional SAR measurements for simultaneous transmission evaluation are approved per FCC consultation contained within Pre PBA Tracking Number 294775 for this filing only.

The SAR measurements were performed using the SAM phantoms listed in section 3.1. Since the same phantoms and simulated tissue were used for the system accuracy verification and the device SAR measurements, the Z-axis scans included in Appendix 1 are applicable for verification of simulated tissue depth to be 15.0cm ±0.5cm.

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

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ES3DV3	SN3037	835	6.25	8 of 9
		1950	4.87	8 of 9
		2450	4.41	8 of 9
	SN3184	835	6.26	8 of 9
		1810	5.14	8 of 9
	SN3124	2450	4.35	8 of 9
	SN3183	1710	5.05	8 of 9

Left Head Cheek Position										
					10g SAR value		*1g SAR value*		*Test Plot*	
Transmit Band	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Grid	Plot Pg
GSM 850	**Channel 128**	33.06								
	Channel 190	32.89	20.1	-0.077	0.393	0.40	0.541	0.55		
	Channel 251	32.83								
GSM 1900	**Channel 512**	30.53								
	Channel 661	30.49	**19.6**	**-0.044**	**0.418**	**0.42**	**0.767**	**0.77**	5x5x7	62
	Channel 810	30.34								
WCDMA 1700	**Channel 1312**	23.95	20	0.862	0.649	0.65	1.23	1.23		
	Channel 1413	23.96	19.8	-0.068	0.538	0.55	1.02	1.04		
	Channel 1513	23.84	**19.0**	**-0.014**	**0.608**	**0.61**	**1.26**	**1.26**	7x12x7	58
WCDMA 850	**Channel 4132**	24.13	21.3	0.008	0.677	0.68	0.891	0.89		
	Channel 4180	24.11	19.6	-0.042	0.652	0.66	0.862	0.87		
	Channel 4233	24.00	**19.5**	**-0.002**	**0.786**	**0.79**	**1.07**	**1.07**	9x8x7	55
Wi-Fi 2450 802.11b 1Mbps	**Channel 1**	17.04	**20.4**	**-0.038**	**0.400**	**0.40**	**0.896**	**0.90**	7x12x7	64
	Channel 6	17.71	19.8	-0.274	0.336	0.36	0.732	0.78		
	Channel 11	18.47	19.8	-0.103	0.36	0.34	0.714	0.73		
GSM 850 + Wi-Fi						0.80		0.55 + 0.90 = 1.45		
GSM 1900 + Wi-Fi						0.82		0.98[2]	7x12x7	78-79
WCDMA 1700 + Wi-Fi						1.08		1.28[3]	7x12x7	72-73
WCDMA 850 + Wi-Fi						1.19		1.29[4]	9x8x7	69-71

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

[2] Per KDB publication 648474, simultaneous SAR evaluation was required to determine the aggregate 1-g SAR in this configuration as the SAR-to-peak-location separation ratio is 0.34. See Appendix 2 for SAR plots and further information.
[3] Per KDB publication 648474, simultaneous SAR evaluation was required to determine the aggregate 1-g SAR in this configuration as the SAR-to-peak-location separation ratio is 0.40. See Appendix 2 for SAR plots and further information.
[4] Per KDB publication 648474, simultaneous SAR evaluation was required to determine the aggregate 1-g SAR in this configuration as the SAR-to-peak-location separation ratio is 0.58. See Appendix 2 for SAR plots and further information.

Right Head Cheek Position										
					10g SAR value		*1g SAR value*		*Test Plot*	
Transmit Band	**Description**	**Conducted Output Power (dBm)**	**Temp (°C)**	**Drift (dB)**	**Measured (W/kg)**	**Extrapolated (W/kg)**	**Measured (W/kg)**	**Extrapolated (W/kg)**	**Grid**	**Plot Pg**
GSM 850	**Channel 128**	33.06								
	Channel 190	32.89	**20.0**	**-0.068**	**0.42**	**0.43**	**0.569**	**0.58**	5x5x7	53
	Channel 251	32.83								
GSM 1900	**Channel 512**	30.53								
	Channel 661	30.49	19.6	-0.028	0.279	0.28	0.517	0.52		
	Channel 810	30.34								
WCDMA 1700	**Channel 1312**	23.95	**20.3**	**0.117**	**0.778**	**0.78**	**1.48**	**1.48**	5x5x7	59
	Channel 1413	23.96	19.9	-0.216	0.541	0.57	1.05	1.10		
	Channel 1513	23.84	20.0	-0.092	0.515	0.53	0.994	1.02		
WCDMA 850	**Channel 4132**	24.13	21.3	-0.022	0.767	0.77	1.01	1.02		
	Channel 4180	24.11	19.7	-0.127	0.726	0.75	0.969	1.00		
	Channel 4233	24.00	**21.3**	**0.023**	**0.824**	**0.82**	**1.08**	**1.08**	5x5x7	56
Wi-Fi 2450 802.11b 1Mbps	**Channel 1**	17.04								
	Channel 6	17.71	19.8	0.118	0.204	0.20	0.44	0.44	5x5x7	65
	Channel 11	18.47								
GSM 850 + Wi-Fi						0.63		0.58 + 0.44 = 1.02		
GSM 1900 + Wi-Fi						0.48		0.52 + 0.44 = 0.96		
WCDMA 1700 + Wi-Fi						---		---[5]		
WCDMA 850 + Wi-Fi						1.02		1.08 + 0.44 = 1.52		

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

[5] Per KDB publication 648474, no evaluation was performed to determine the aggregate 1-g SAR in this configuration as the SAR-to-peak-location separation ratio is 0.26. See Appendix 2 for further information.

Left Head 15° Tilt Position										
					10g SAR value		*1g SAR value*		*Test Plot*	
Transmit Band	**Description**	**Conducted Output Power (dBm)**	**Temp (°C)**	**Drift (dB)**	**Measured (W/kg)**	**Extrapolated (W/kg)**	**Measured (W/kg)**	**Extrapolated (W/kg)**	**Grid**	**Plot Pg**
GSM 850	**Channel 128**	33.06								
	Channel 190	32.89	**20.0**	**0.007**	**0.266**	**0.27**	**0.359**	**0.36**	5x5x7	54
	Channel 251	32.83								
GSM 1900	**Channel 512**	30.53	19.6	-0.013	0.478	0.48	0.891	0.89		
	Channel 661	30.49	**19.6**	**-0.040**	**0.501**	**0.51**	**0.941**	**0.95**	5x5x7	63
	Channel 810	30.34	19.6	-0.016	0.410	0.41	0.781	0.78		
WCDMA 1700	**Channel 1312**	23.95	20.0	-0.156	0.495	0.51	0.957	0.99		
	Channel 1413	23.96	19.5	-0.066	0.708	0.72	1.39	1.41		
	Channel 1513	23.84	**19.0**	**-0.077**	**0.718**	**0.73**	**1.44**	**1.47**	6x9x7	60
WCDMA 850	**Channel 4132**	24.13								
	Channel 4180	24.11	19.7	-0.029	0.467	0.47	0.629	0.63		
	Channel 4233	24.00								
Wi-Fi 2450 802.11b 1Mbps	**Channel 1**	17.04								
	Channel 6	17.71	19.8	-0.253	0.0929	0.10	0.169	0.18	5x5x7	66
	Channel 11	18.47								
GSM 850 + Wi-Fi						0.37		0.36 + 0.18 = 0.54		
GSM 1900 + Wi-Fi						0.61		0.95 + 0.18 = 1.13		
WCDMA 1700 + Wi-Fi						0.83		1.46[6]	6x9x7	74-75
WCDMA 850 + Wi-Fi						0.57		0.63 + 0.18 = 0.81		

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

[6] Per KDB publication 648474, simultaneous SAR evaluation was required to determine the aggregate 1-g SAR in this configuration as the SAR-to-peak-location separation ratio is 0.57. See Appendix 2 for SAR plots and further information.

Right Head 15° Tilt Position										
					10g SAR value		*1g SAR value*		*Test Plot*	
Transmit Band	Description	Conducted Output Power (dBm)	Temp (°C)	Drift (dB)	Measured (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Extrapolated (W/kg)	Grid	Plot Pg
GSM 850	**Channel 128**	33.06								
	Channel 190	32.89	20.0	-0.108	0.26	0.27	0.347	0.36		
	Channel 251	32.83								
GSM 1900	**Channel 512**	30.53								
	Channel 661	30.49	19.6	0.0465	0.354	0.35	0.666	0.67		
	Channel 810	30.34								
WCDMA 1700	**Channel 1312**	23.95	20.0	0.232	0.647	0.65	1.32	1.32		
	Channel 1413	23.96	19.0	-0.079	0.653	0.66	1.33	1.35	6x9x7	61
	Channel 1513	23.84	20.0	-0.043	0.669	0.68	1.31	1.32		
WCDMA 850	**Channel 4132**	24.13								
	Channel 4180	24.11	**19.7**	**0.076**	**0.492**	**0.49**	**0.66**	**0.66**	5x5x7	57
	Channel 4233	24.00								
Wi-Fi 2450 802.11b 1Mbps	**Channel 1**	17.04								
	Channel 6	17.71	**19.8**	**-0.051**	**0.0978**	**0.10**	**0.188**	**0.19**	5x5x7	67
	Channel 11	18.47								
GSM 850 + Wi-Fi						0.37		0.36 + 0.19 = 0.55		
GSM 1900 + Wi-Fi						0.45		0.67 + 0.19 = 0.86		
WCDMA 1700 + Wi-Fi						0.76		1.35[7]	6x9x7	76-77
WCDMA 850 + Wi-Fi						0.59		0.66 + 0.19 = 0.85		

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

[7] Per KDB publication 648474, simultaneous SAR evaluation was required to determine the aggregate 1-g SAR in this configuration as the SAR-to-peak-location separation ratio is 0.63. See Appendix 2 for SAR plots and further information.

6.2 Body Worn Test Results

The SAR results shown in tables 5 through 8 are maximum SAR values averaged over 1 gram of phantom tissue, to demonstrate compliance to [3] and also over 10 grams of phantom tissue, to demonstrate compliance to the [6]. Also shown are the measured conducted output power levels, the temperature of the test facility during the test, the temperature of the tissue simulate after the test, the measured drift and the extrapolated SAR. The exact method of extrapolation is Extrapolated SAR = Measured 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. The tables below also include the highest SAR value summations for primary and secondary co-located transmitters, with the results indicated in italics.

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

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

There are no Body-Worn Accessories available for this phone at the time of testing hence the device was tested per the supplement C testing guidelines for devices that do not have body worn accessories. A separation distance of 15mm between the device and the flat phantom was used for testing body-worn SAR. The device was tested with the front and back of the device facing the phantom. 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 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 in the worst-case SAR position and channel configuration from the voice-mode body-worn testing.

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 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	SN3037	835	6.17	8 of 9
		2450	4.29	8 of 9
	SN3184	1810	4.84	8 of 9
		1950	4.81	8 of 9

Body-Worn; Front of Phone 15mm from Phantom								
					10g SAR value		*1g SAR value*	
Transmit Band	**Description**	**Conducted Output Power (dBm)**	**Temp (°C)**	**Drift (dB)**	**Measured (W/kg)**	**Extrapolated (W/kg)**	**Measured (W/kg)**	**Extrapolated (W/kg)**
GSM 850	**Channel 128**	33.06						
	Channel 190	32.89	20.0	-0.031	0.214	0.22	0.292	0.29
	Channel 251	32.83						
GSM 1900	**Channel 512**	30.53						
	Channel 661	30.49	20.2	-0.043	0.0698	0.07	0.115	0.12
	Channel 810	30.34						
WCDMA 1700	**Channel 1312**	23.95						
	Channel 1413	23.96	19.1	-0.053	0.953	0.10	0.151	0.15
	Channel 1513	23.84						
WCDMA 850	**Channel 4132**	24.13						
	Channel 4180	24.11	19.6	-0.075	0.185	0.19	0.251	0.25
	Channel 4233	24.00						
Wi-Fi 2450 802.11b 1Mbps	**Channel 1**	17.04						
	Channel 6	17.71	20.0	-0.138	0.0228	0.02	0.0393	0.04
	Channel 11	18.47						
Bluetooth	**Channel 0**	10.35						
	Channel 39	10.44	20.2	-0.858	0.00221	0.00	0.00374	0.00
	Channel 78	10.22						
GSM 850 + Wi-Fi						0.24		0.29+0.04 = 0.33
GSM 1900 + Wi-Fi						0.09		0.12+0.04 = 0.16
WCDMA 1700 + Wi-Fi						0.12		0.15+0.04 = 0.19
WCDMA 850 + Wi-Fi						0.21		0.25+0.04 = 0.29

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

Body-Worn; Back of Phone 15mm from Phantom								
					10g SAR value		*1g SAR value*	
Transmit Band	**Description**	**Conducted Output Power (dBm)**	**Temp (°C)**	**Drift (dB)**	**Measured (W/kg)**	**Extrapolated (W/kg)**	**Measured (W/kg)**	**Extrapolated (W/kg)**
GSM 850	**Channel 128**	33.06						
	Channel 190	32.89	**20.0**	**-0.047**	**0.415**	**0.42**	**0.567**	**0.57**
	Channel 251	32.83						
GSM 1900	**Channel 512**	30.53						
	Channel 661	30.49	**20.2**	**-0.034**	**0.323**	**0.33**	**0.60**	**0.60**
	Channel 810	30.34						
WCDMA 1700	**Channel 1312**	23.95	19.5	0.125	0.723	0.72	1.36	1.36
	Channel 1413	23.96	19.1	-0.096	0.586	0.60	1.06	1.08
	Channel 1513	23.84	**19.5**	**-0.007**	**0.771**	**0.77**	**1.43**	**1.43**
WCDMA 850	**Channel 4132**	24.13						
	Channel 4180	24.11	**19.8**	**0.024**	**0.455**	**0.46**	**0.618**	**0.62**
	Channel 4233	24.00						
Wi-Fi 2450 802.11b 1Mbps	**Channel 1**	17.04						
	Channel 6	17.71	**20.0**	**-0.029**	**0.0605**	**0.06**	**0.10**	**0.10**
	Channel 11	18.47						
Bluetooth	**Channel 0**	10.35						
	Channel 39	10.44	20.0	0.655	0.00191	0.00	0.00223	0.00
	Channel 78	10.22						
GSM 850 + Wi-Fi						0.48		0.57+0.10 = 0.67
GSM 1900 + Wi-Fi						0.39		0.60+0.10 = 0.70
WCDMA 1700 + Wi-Fi						0.83		1.43+0.10 = 1.53
WCDMA 850 + Wi-Fi						0.52		0.62+0.10 = 0.72

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

GPRS Class 10 (2 Uplink Timeslots) Body-Worn; Back of Phone 25 mm from Phantom								
Transmit Band	**Description**	**Conducted Output Power (dBm)**	**Temp (°C)**	**Drift (dB)**	***10 g SAR value***		***1 g SAR value***	
					Measured (W/kg)	**Extrapolated (W/kg)**	**Measured (W/kg)**	**Extrapolated (W/kg)**
GSM 850	**Channel 128**	31.11						
	Channel 190	30.91	20.0	-0.038	0.839	0.08	0.114	0.12
	Channel 251	30.84						
GSM 1900	**Channel 512**	28.50						
	Channel 661	28.57	19.8	-0.077	0.0878	0.09	0.143	0.15
	Channel 810	28.41						
Wi-Fi 2450 802.11b 1Mbps	**Channel 1**	17.04						
	Channel 6	17.71	20.0	0.0235	0.008	0.01	0.0145	0.01
	Channel 11	18.47						
GSM 850 + WI-FI						0.09		0.12+0.01 = 0.13
GSM 1900 + WI-FI						0.10		0.15+0.01 = 0.16

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

EDGE Class 10 (2 Uplink Timeslots) Body-Worn; Back of Phone 25 mm from Phantom								
Transmit Band	**Description**	**Conducted Output Power (dBm)**	**Temp (°C)**	**Drift (dB)**	***10 g SAR value***		***1 g SAR value***	
					Measured (W/kg)	**Extrapolated (W/kg)**	**Measured (W/kg)**	**Extrapolated (W/kg)**
GSM 850	**Channel 128**	26.70						
	Channel 190	26.49	20.0	-0.005	0.0701	0.07	0.0942	0.09
	Channel 251	26.37						
GSM 1900	**Channel 512**	25.57						
	Channel 661	25.55	19.8	-0.064	0.0481	0.05	0.0792	0.08
	Channel 810	25.42						
GSM 850 + WI-FI						0.08		0.09+0.01 = 0.10
GSM 1900 + WI-FI						0.06		0.08+0.01 = 0.09

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

References

[1] CENELEC, en62209-1:2006 “Human Exposure to Radio Frequency Fields From Hand - Held and Body - Mounted Wireless Communication Devices – Human Models, Instrumentation, and Procedures”

[2] CENELEC, en50360:2001 “Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300MHz – 3GHz)”.

[3] ANSI / IEEE, C95.1 1992 Edition “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300GHz”

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

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

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

Appendix 1

SAR distribution comparison for the system accuracy verification

Date/Time: 7/9/2010 10:41:36 AM

Test Laboratory: Motorola - 835 MHz Performance Check

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:436TR
Procedure Notes: PM1 Power = 200mW Refl.Pwr PM3 = -29.5dB Sim.Temp@SPC = 20.7*C Room Temp @ SPC = 19.8*C
Communication System: CW - Dipole; Frequency: 835 MHz; Communication System Channel Number: 3; Duty Cycle: 1:1
Medium: VALIDATION Only; Medium parameters used: f = 835 MHz; σ = 0.91 mho/m; ε_r = 41.3; ρ = 1000 kg/m^3

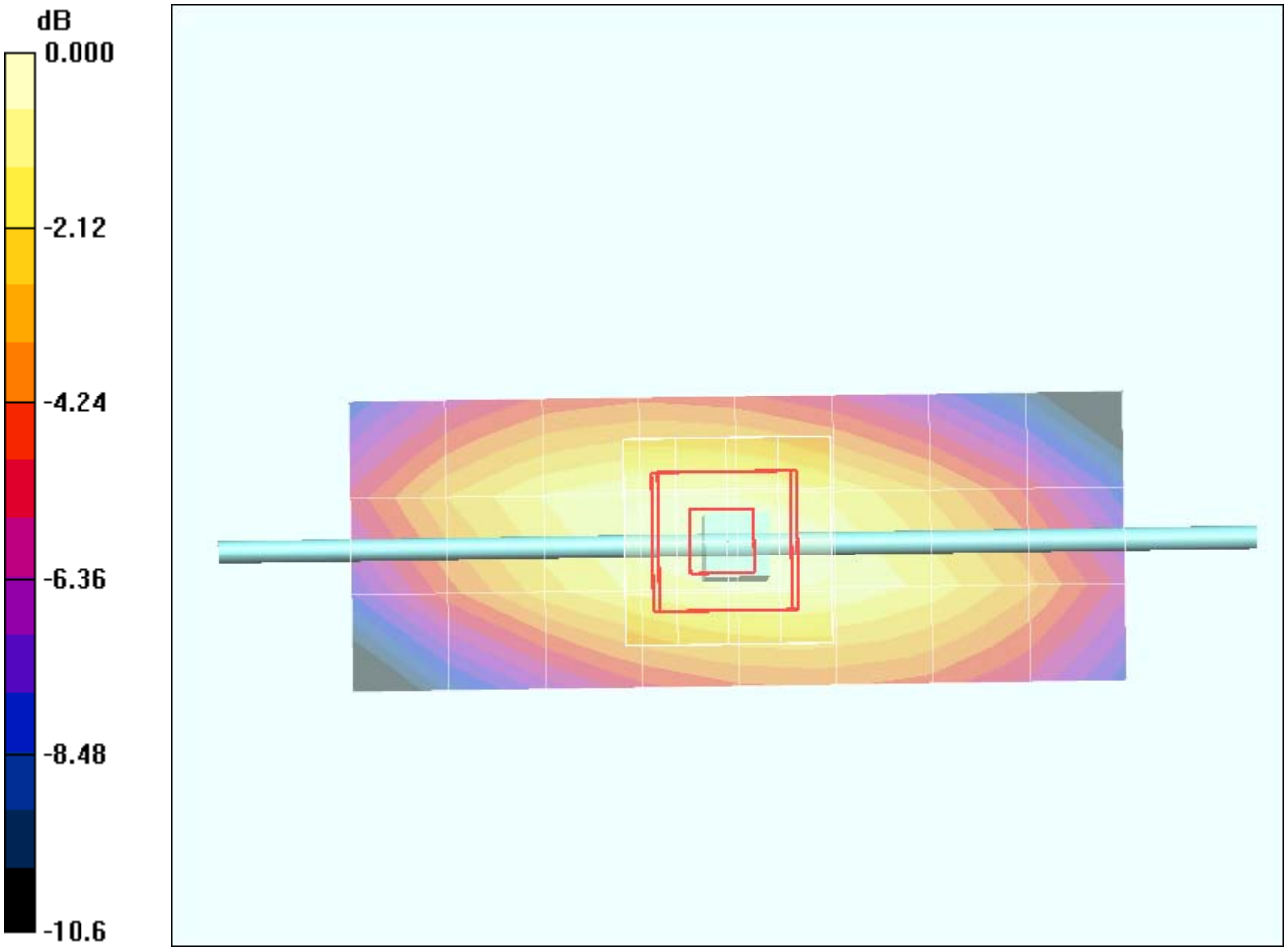
DASY4 Configuration:

- Probe: ES3DV3 - SN3184; ConvF(6.26, 6.26, 6.26); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn440; Calibrated: 2/17/2010
- Phantom: R#4 Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Daily SPC Check/Dipole Area Scan (4x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.79 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 48.3 V/m; Power Drift = -0.012 dB
Peak SAR (extrapolated) = 2.67 W/kg
SAR(1 g) = 1.87 mW/g; SAR(10 g) = 1.23 mW/g
Maximum value of SAR (measured) = 2.03 mW/g

Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 48.3 V/m; Power Drift = -0.012 dB
Peak SAR (extrapolated) = 2.72 W/kg
SAR(1 g) = 1.9 mW/g; SAR(10 g) = 1.25 mW/g
Maximum value of SAR (measured) = 2.06 mW/g



0 dB = 2.06mW/g

Date/Time: 8/14/2010 6:47:54 AM

Test Laboratory: Motorola - 835MHz Performance Check

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:420TR
Procedure Notes: PM2 Power = 201 mW Refl.Pwr PM3 = -24.50 dB Sim.Temp@SPC = 20.1 Room Temp @ SPC = 20
Communication System: CW - Dipole; Frequency: 835 MHz; Communication System Channel Number: 3; Duty Cycle: 1:1
Medium: VALIDATION Only; Medium parameters used: f = 835 MHz; σ = 0.93 mho/m; ε_r = 42.1; ρ = 1000 kg/m^3

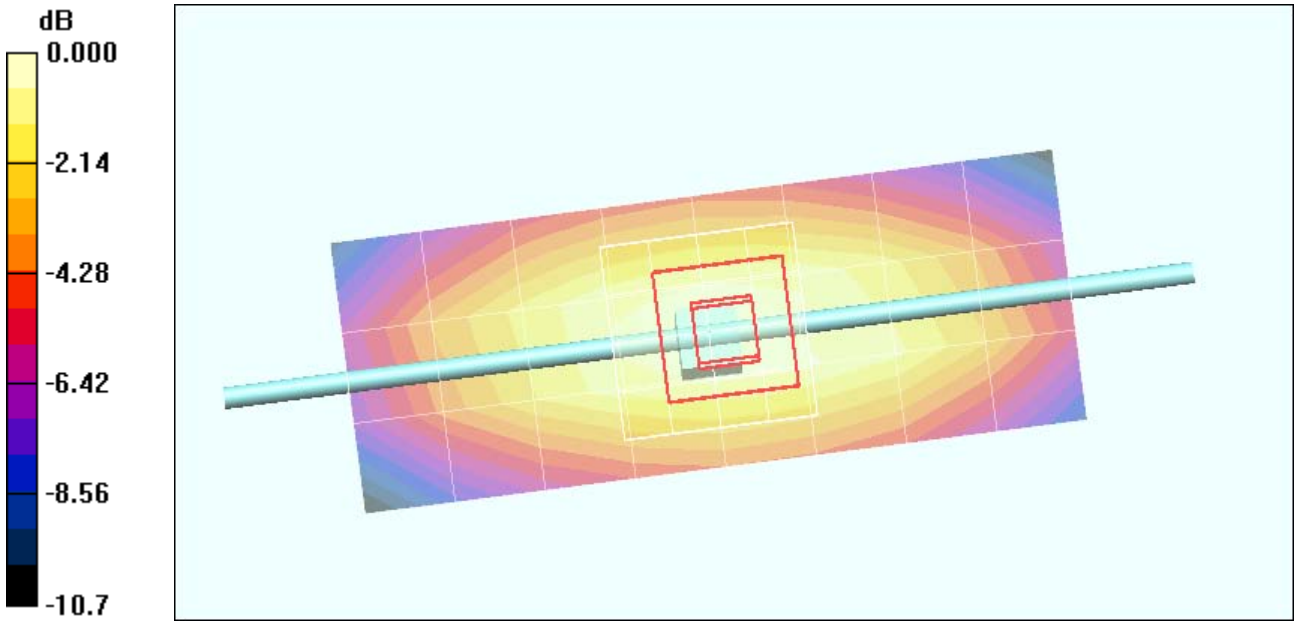
DASY4 Configuration:

- Probe: ES3DV3 - SN3037; ConvF(6.25, 6.25, 6.25); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/17/2009
- Phantom: R1_ Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1005;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Daily SPC Check/Dipole Area Scan (4x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.89 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 48.6 V/m; Power Drift = -0.062 dB
Peak SAR (extrapolated) = 2.71 W/kg
SAR(1 g) = 1.95 mW/g; SAR(10 g) = 1.3 mW/g
Maximum value of SAR (measured) = 2.10 mW/g

Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 48.6 V/m; Power Drift = -0.062 dB
Peak SAR (extrapolated) = 2.77 W/kg
SAR(1 g) = 1.92 mW/g; SAR(10 g) = 1.26 mW/g
Maximum value of SAR (measured) = 2.07 mW/g



Date/Time: 8/20/2010 8:32:06 AM

Test Laboratory: Motorola - 835 MHz Performance Check

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:420TR;
Procedure Notes: PM2 Power = 201 mW Refl.Pwr PM3 = -23.3 dB Sim.Temp@SPC = 20.3 Room Temp @ SPC = 20
Communication System: CW - Dipole; Frequency: 835 MHz; Communication System Channel Number: 3; Duty Cycle: 1:1
Medium: VALIDATION Only; Medium parameters used: f = 835 MHz; σ = 0.92 mho/m; ε_r = 41.9; ρ = 1000 kg/m^3

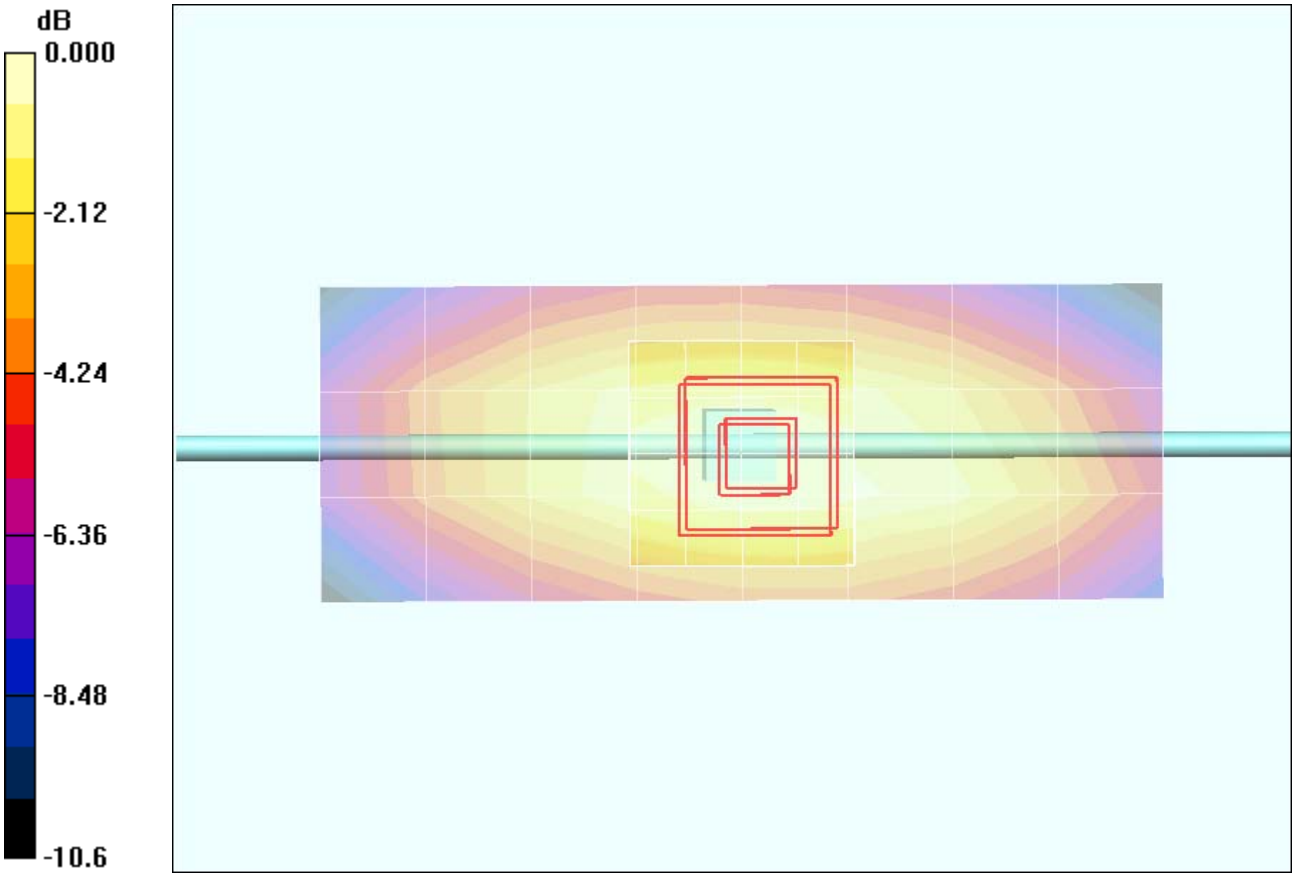
DASY4 Configuration:

- Probe: ES3DV3 - SN3037; ConvF(6.25, 6.25, 6.25); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/17/2009
- Phantom: R1_ Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1005;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Daily SPC Check/Dipole Area Scan (4x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.95 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 48.7 V/m; Power Drift = -0.052 dB
Peak SAR (extrapolated) = 2.66 W/kg
SAR(1 g) = 1.92 mW/g; SAR(10 g) = 1.28 mW/g
Maximum value of SAR (measured) = 2.08 mW/g

Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 48.7 V/m; Power Drift = -0.052 dB
Peak SAR (extrapolated) = 2.76 W/kg
SAR(1 g) = 1.91 mW/g; SAR(10 g) = 1.25 mW/g
Maximum value of SAR (measured) = 2.06 mW/g



0 dB = 2.06mW/g

Date/Time: 8/22/2010 6:49:56 AM

Test Laboratory: Motorola - 835 MHz Performance Check

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:420tr;
Procedure Notes: PM2 Power = 200 mW Refl.Pwr PM3 = -25.78 dB Sim.Temp@SPC = 20.3 Room Temp @ SPC = 20.6
Communication System: CW - Dipole; Frequency: 835 MHz; Communication System Channel Number: 3; Duty Cycle: 1:1
Medium: Low Freq Head; Medium parameters used: f = 835 MHz; σ = 0.93 mho/m; ε_r = 42.2; ρ = 1000 kg/m^3

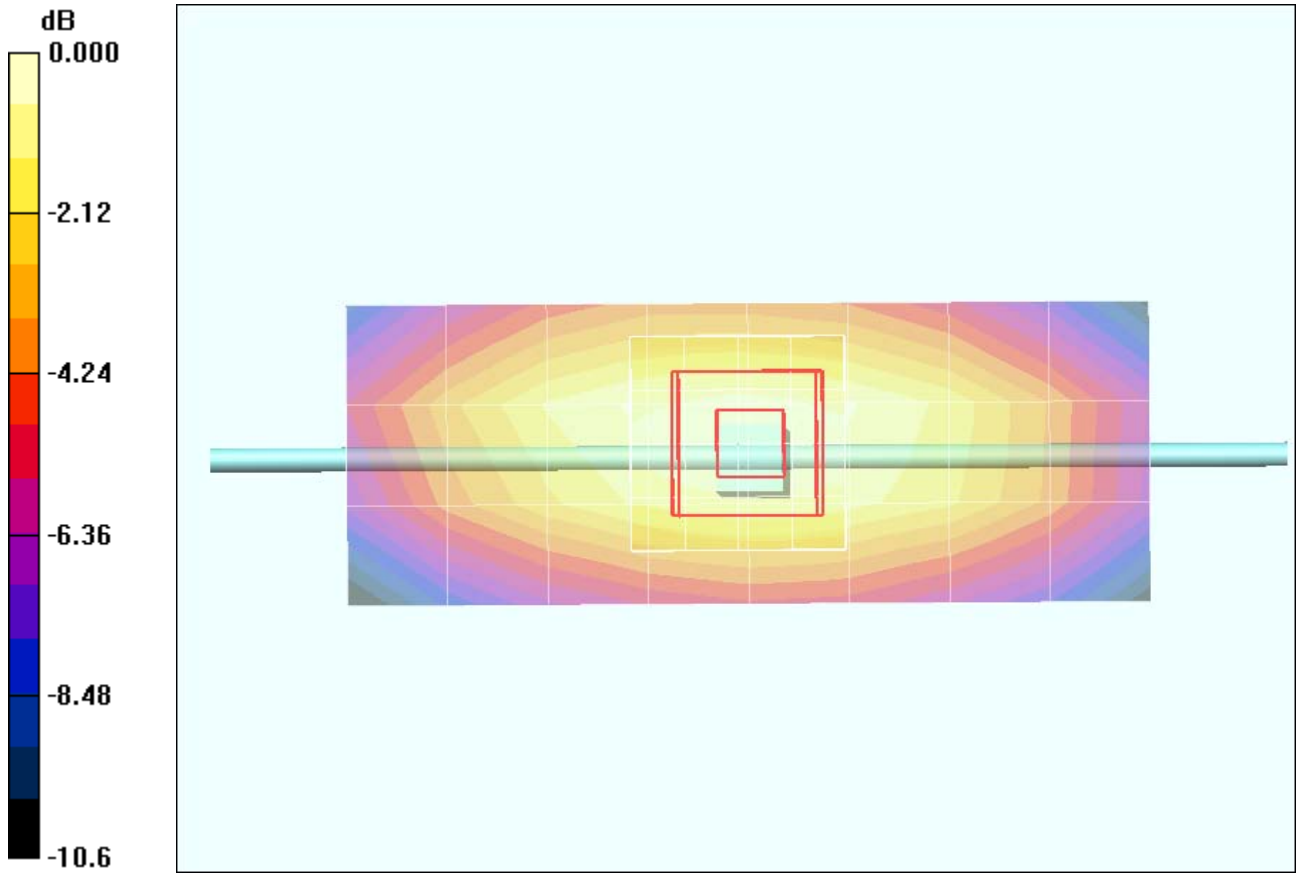
DASY4 Configuration:

- Probe: ES3DV3 - SN3037; ConvF(6.25, 6.25, 6.25); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/17/2009
- Phantom: R1_ Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1005;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Daily SPC Check/Dipole Area Scan (4x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.95 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 48.4 V/m; Power Drift = -0.039 dB
Peak SAR (extrapolated) = 2.69 W/kg
SAR(1 g) = 1.94 mW/g; SAR(10 g) = 1.3 mW/g
Maximum value of SAR (measured) = 2.11 mW/g

Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 48.4 V/m; Power Drift = -0.039 dB
Peak SAR (extrapolated) = 2.77 W/kg
SAR(1 g) = 1.92 mW/g; SAR(10 g) = 1.26 mW/g
Maximum value of SAR (measured) = 2.08 mW/g



0 dB = 2.08mW/g

Date/Time: 8/23/2010 8:30:20 AM

Test Laboratory: Motorola - 835 MHz Performance Check

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:436tr;
Procedure Notes: PM2 Power = 198mW Refl.Pwr PM3 = -28.9dB Sim.Temp@SPC = 21.4*C Room Temp @ SPC = 20.5*C
Communication System: CW - Dipole; Frequency: 835 MHz; Communication System Channel Number: 3; Duty Cycle: 1:1
Medium: VALIDATION Only; Medium parameters used: f = 835 MHz; σ = 0.92 mho/m; ε_r = 41.4; ρ = 1000 kg/m^3

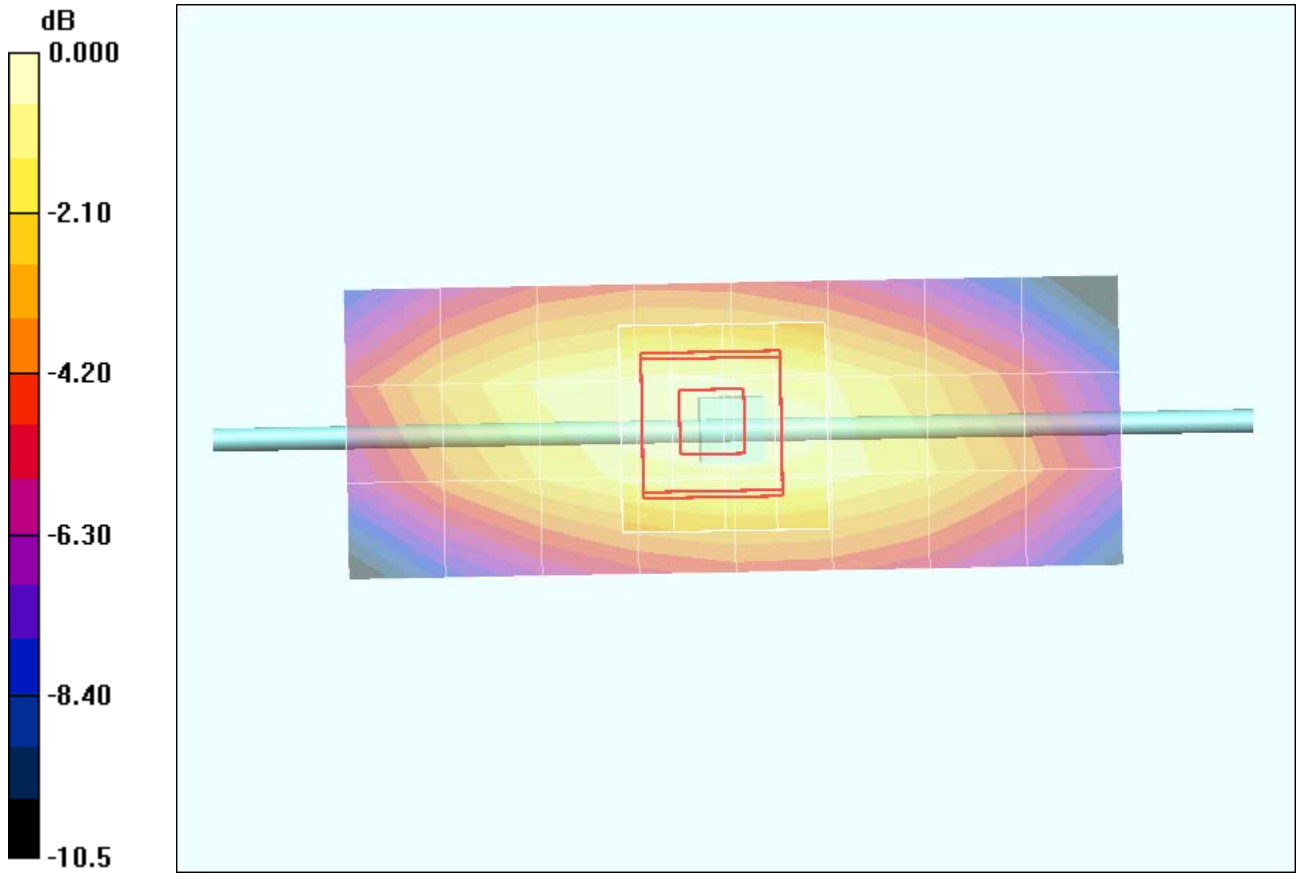
DASY4 Configuration:

- Probe: ES3DV3 - SN3184; ConvF(6.26, 6.26, 6.26); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn440; Calibrated: 2/17/2010
- Phantom: R#4 Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Daily SPC Check/Dipole Area Scan (4x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.75 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 47.6 V/m; Power Drift = -0.045 dB
Peak SAR (extrapolated) = 2.61 W/kg
SAR(1 g) = 1.84 mW/g; SAR(10 g) = 1.22 mW/g
Maximum value of SAR (measured) = 2.00 mW/g

Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 47.6 V/m; Power Drift = -0.045 dB
Peak SAR (extrapolated) = 2.67 W/kg
SAR(1 g) = 1.88 mW/g; SAR(10 g) = 1.24 mW/g
Maximum value of SAR (measured) = 2.03 mW/g



0 dB = 2.03mW/g

Date/Time: 9/28/2010 8:50:14 AM

Test Laboratory: Motorola - 835 MHz System Performance Check

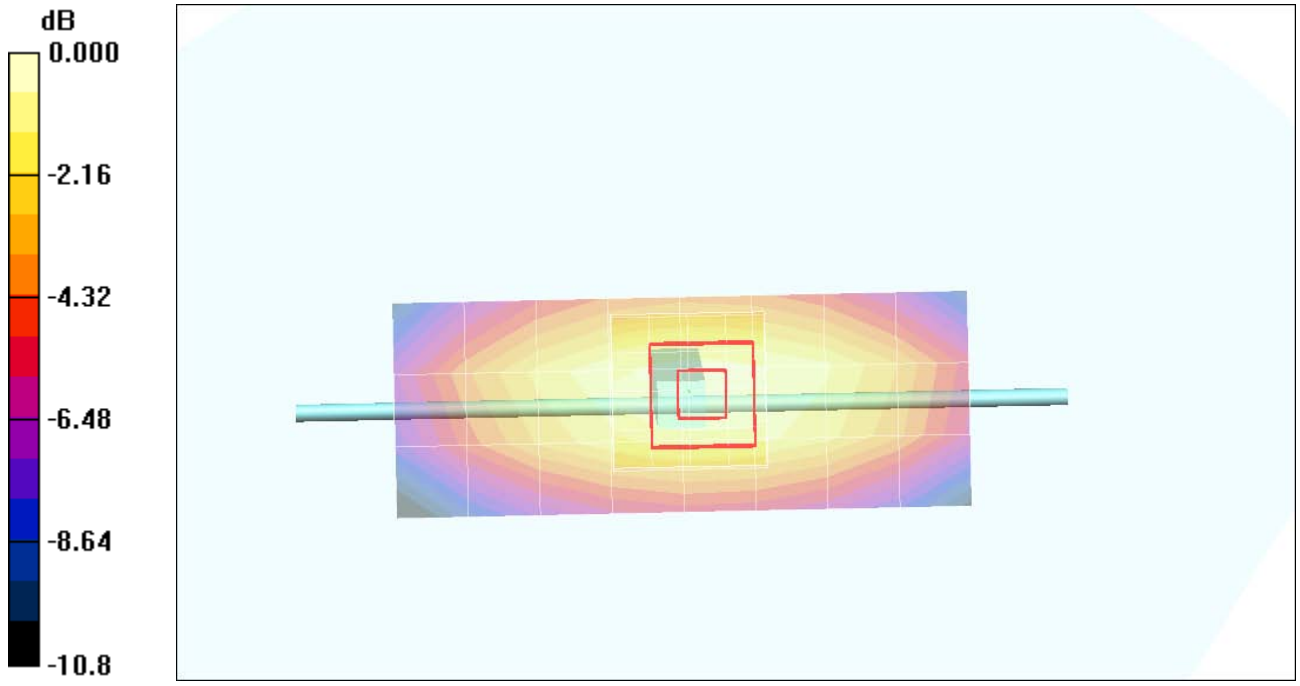
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:420TR;
Procedure Notes: 835 MHz System Performance Check / Power = 200 mW Refl.Pwr PM3 = -24.03dB
Sim.Temp@SPC = 19.6 Room Temp @ SPC = 19.8
Communication System: CW - Dipole; Frequency: 835 MHz; Communication System Channel Number: 3; Duty Cycle: 1:1
Medium: VALIDATION Only; Medium parameters used: f = 835 MHz; σ = 0.93 mho/m; ε_r = 42.4; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3183; ConvF(6.11, 6.11, 6.11); Calibrated: 7/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn702; Calibrated: 5/18/2010
- Phantom: R1_ Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1156;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Daily SPC Check/Dipole Area Scan (4x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.97 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 47.7 V/m; Power Drift = 0.015 dB
Peak SAR (extrapolated) = 2.99 W/kg
SAR(1 g) = 1.98 mW/g; SAR(10 g) = 1.28 mW/g
Maximum value of SAR (measured) = 2.13 mW/g



0 dB = 2.13mW/g

Date/Time: 7/8/2010 7:00:36 AM

Test Laboratory: Motorola

1800MHz Performance Check

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:272TR;
Procedure Notes: PM1 Power = 200 mW Refl.Pwr PM3 = -30.02 dB Sim.Temp@SPC =20.0ºC Room Temp @ SPC = 20.0ºC
Communication System: CW - Dipole; Frequency: 1800 MHz; Communication System Channel Number: 8; Duty Cycle: 1:1
Medium: VALIDATION Only; Medium parameters used: f = 1800 MHz; σ = 1.37 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3

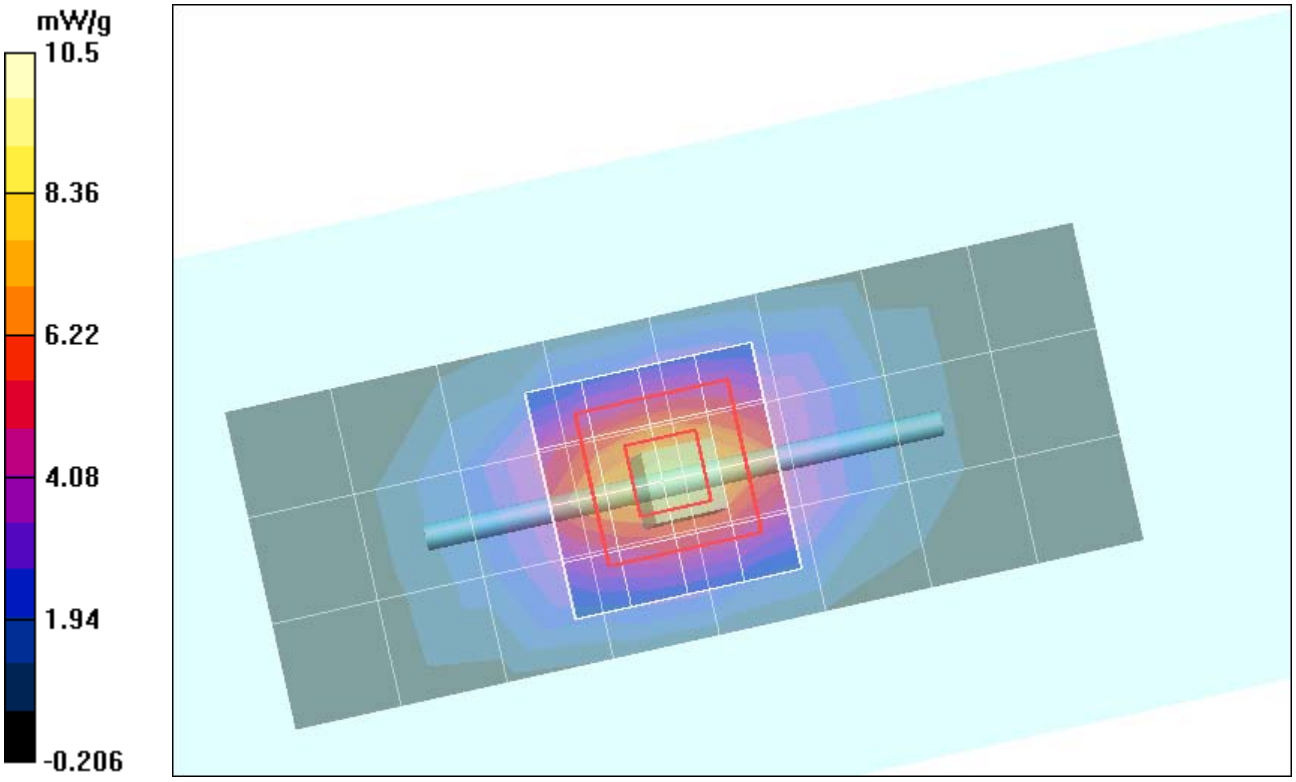
DASY4 Configuration:

- Probe: ES3DV3 - SN3184; ConvF(5.14, 5.14, 5.14); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn440; Calibrated: 2/17/2010
- Phantom: R4 : Sect.1, Amy Twin, Rev.3 (3-Feb-10); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Daily SPC Check/Dipole Area Scan (9x4x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 6.24 mW/g

Daily SPC Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 80.5 V/m; Power Drift = -0.015 dB
Peak SAR (extrapolated) = 12.4 W/kg
SAR(1 g) = 7.38 mW/g; SAR(10 g) = 3.98 mW/g
Maximum value of SAR (measured) = 8.30 mW/g

Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 80.5 V/m; Power Drift = -0.015 dB
Peak SAR (extrapolated) = 12.7 W/kg
SAR(1 g) = 7.54 mW/g; SAR(10 g) = 4.06 mW/g
Maximum value of SAR (measured) = 8.45 mW/g


mW/g
10.5
8.36
6.22
4.08
1.94
-0.206

Date/Time: 7/10/2010 5:11:09 AM

Test Laboratory: Motorola - 1800MHz Performance Check

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:272TR;
Procedure Notes: PM2 Power = 200mW Refl.Pwr PM3 = -30dB Sim.Temp@SPC = 19.4*C Room Temp @ SPC = 20*C
Communication System: CW - Dipole; Frequency: 1800 MHz; Communication System Channel Number: 8; Duty Cycle: 1:1
Medium: VALIDATION Only; Medium parameters used: f = 1800 MHz; σ = 1.37 mho/m; ε_r = 39.7; ρ = 1000 kg/m^3

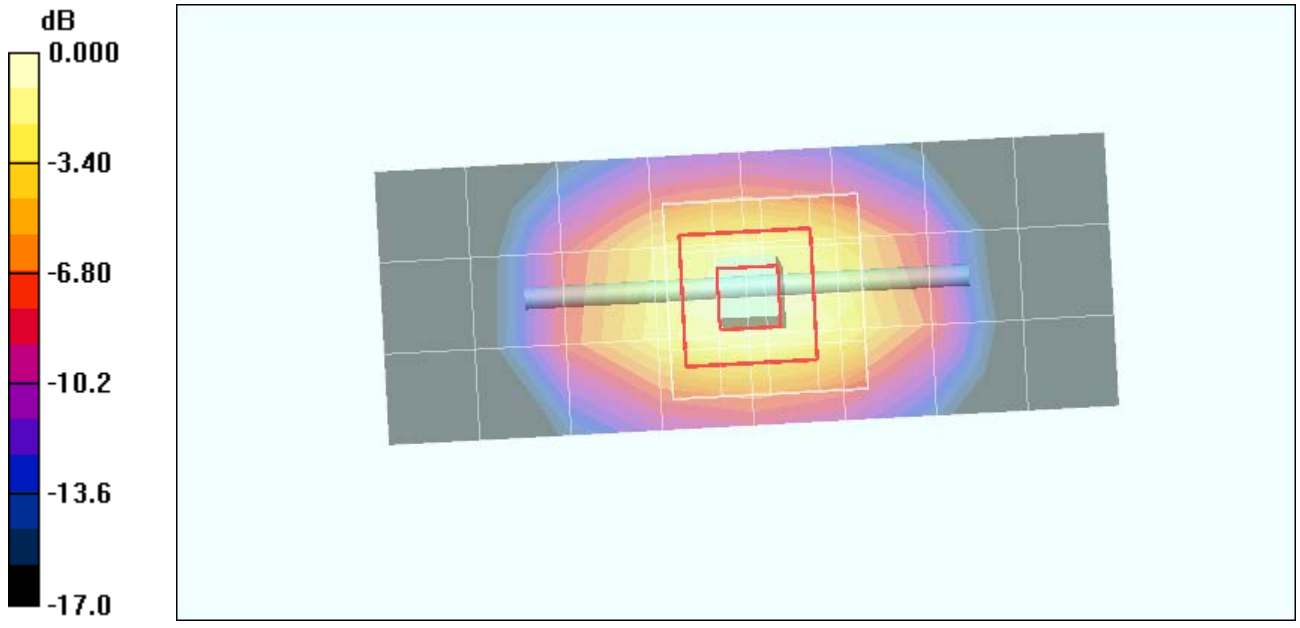
DASY4 Configuration:

- Probe: ES3DV3 - SN3184; ConvF(5.14, 5.14, 5.14); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn440; Calibrated: 2/17/2010
- Phantom: R#4 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1250;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Daily SPC Check/Dipole Area Scan (4x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 6.41 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 78.6 V/m; Power Drift = 0.027 dB
Peak SAR (extrapolated) = 12.0 W/kg
SAR(1 g) = 7.11 mW/g; SAR(10 g) = 3.83 mW/g
Maximum value of SAR (measured) = 8.01 mW/g

Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 78.6 V/m; Power Drift = 0.027 dB
Peak SAR (extrapolated) = 12.2 W/kg
SAR(1 g) = 7.25 mW/g; SAR(10 g) = 3.9 mW/g
Maximum value of SAR (measured) = 8.14 mW/g



Test Laboratory: Motorola - 1800 MHz Performance Check

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:272tr;
Procedure Notes: PM2 Power = 199 mW Refl.Pwr PM3 = -27.55 dB Sim.Temp@SPC = 19.8ºC Room Temp @ SPC = 20.3ºC
Communication System: CW - Dipole; Frequency: 1800 MHz; Communication System Channel Number: 8; Duty Cycle: 1:1
Medium: VALIDATION Only; Medium parameters used: f = 1800 MHz; σ = 1.37 mho/m; ε_r = 39.2; ρ = 1000 kg/m^3

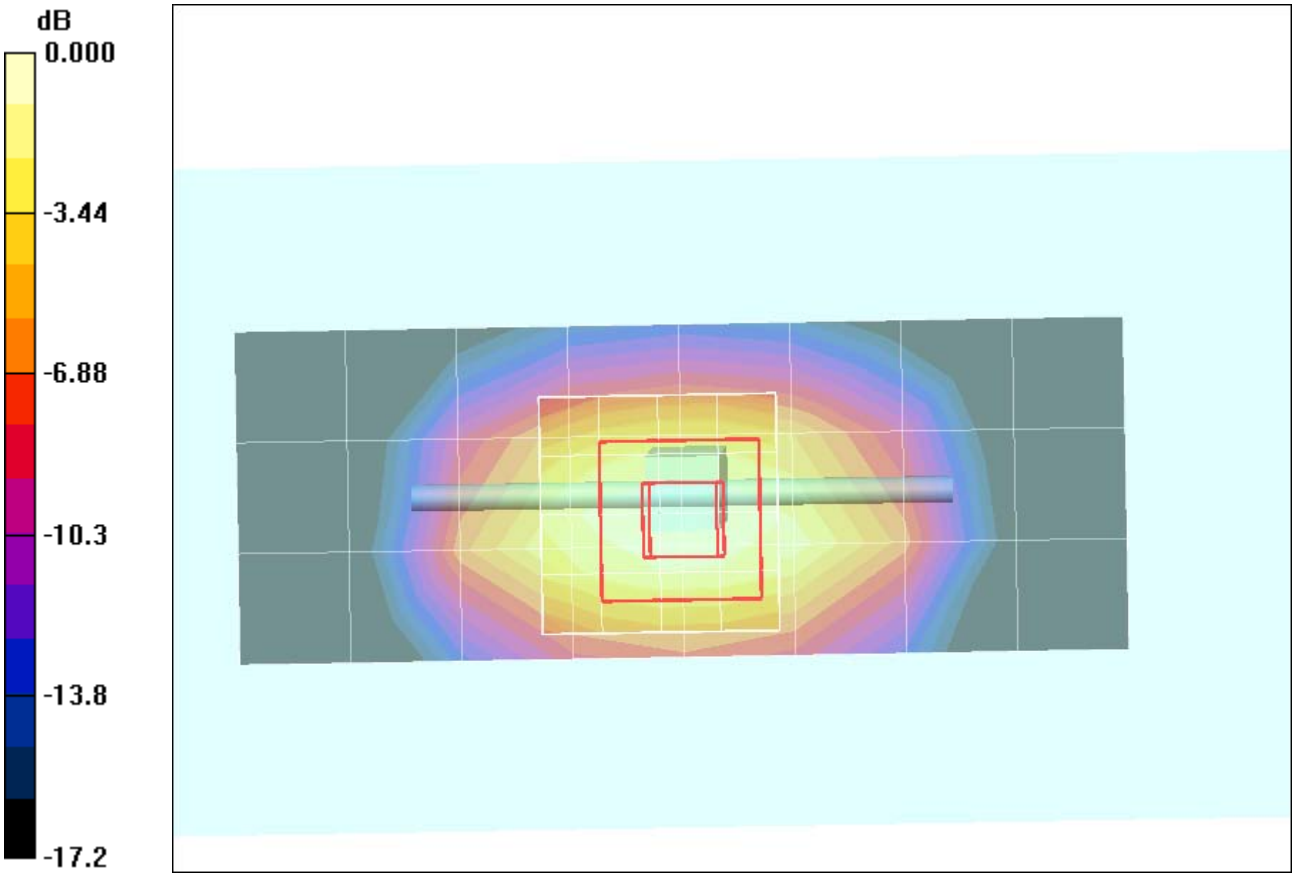
DASY4 Configuration:

- Probe: ES3DV3 - SN3184; ConvF(5.14, 5.14, 5.14); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn440; Calibrated: 2/17/2010
- Phantom: R4 : Sect.1, Amy Twin, Rev.3 (3-Feb-10); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Daily SPC Check/Dipole Area Scan (9x4x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 7.68 mW/g

Daily SPC Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 76.4 V/m; Power Drift = -0.017 dB
Peak SAR (extrapolated) = 12.2 W/kg
SAR(1 g) = 7.19 mW/g; SAR(10 g) = 3.88 mW/g
Maximum value of SAR (measured) = 7.96 mW/g

Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 76.4 V/m; Power Drift = -0.017 dB
Peak SAR (extrapolated) = 12.6 W/kg
SAR(1 g) = 7.38 mW/g; SAR(10 g) = 3.96 mW/g
Maximum value of SAR (measured) = 8.16 mW/g



0 dB = 8.16mW/g

Date/Time: 8/16/2010 7:13:16 AM

Test Laboratory: Motorola - 1800 MHz Performance Check

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:259TR
Procedure Notes: PM2 Power = 203 mW Refl.Pwr PM3 = -21.05 dB Sim.Temp@SPC = 20.3ºC Room Temp @ SPC = 20.3ºC
Communication System: CW - Dipole; Frequency: 1800 MHz; Communication System Channel Number: 8; Duty Cycle: 1:1
Medium: VALIDATION Only; Medium parameters used: f = 1800 MHz; σ = 1.36 mho/m; ε_r = 38.5; ρ = 1000 kg/m^3

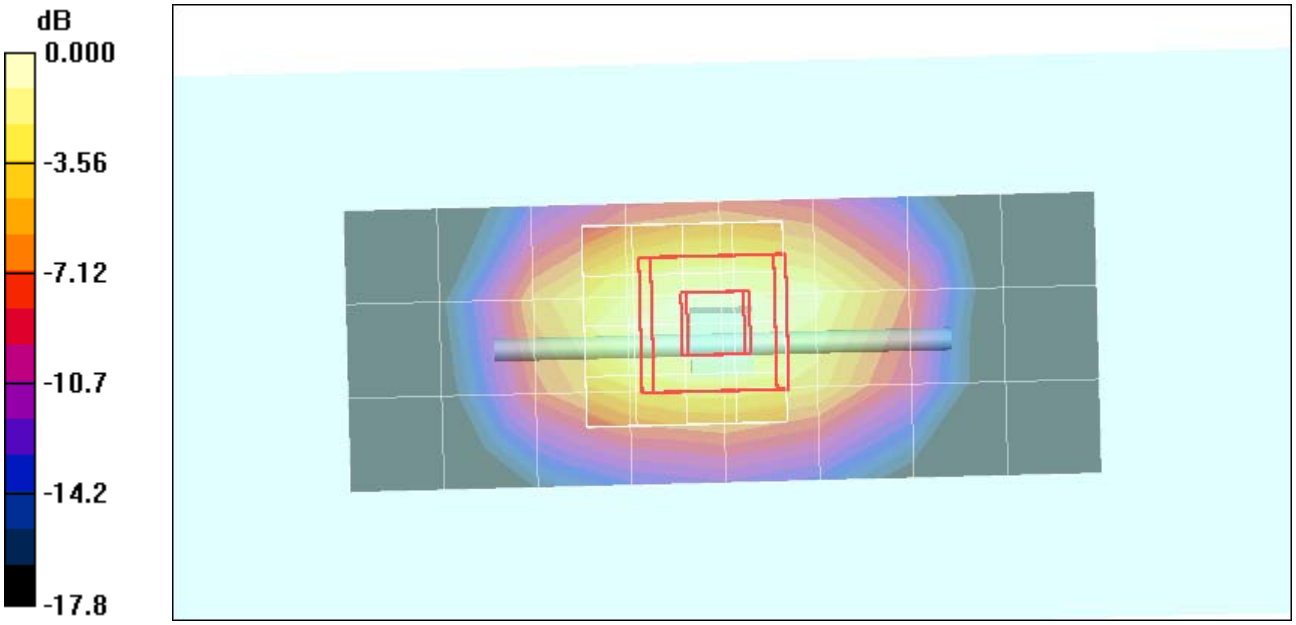
DASY4 Configuration:

- Probe: ES3DV3 - SN3037; ConvF(5.05, 5.05, 5.05); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/17/2009
- Phantom: R1_ 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) = 8.12 mW/g

Daily SPC Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 79.7 V/m; Power Drift = -0.070 dB
Peak SAR (extrapolated) = 13.7 W/kg
SAR(1 g) = 7.97 mW/g; SAR(10 g) = 4.3 mW/g
Maximum value of SAR (measured) = 8.83 mW/g

Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 79.7 V/m; Power Drift = -0.070 dB
Peak SAR (extrapolated) = 14.1 W/kg
SAR(1 g) = 7.88 mW/g; SAR(10 g) = 4.19 mW/g
Maximum value of SAR (measured) = 8.79 mW/g



0 dB = 8.79mW/g

Date/Time: 8/24/2010 7:09:04 AM

Test Laboratory: Motorola - 1800 MHz Performance Check

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:272tr;
Procedure Notes: PM2 Power = 198 mW Refl.Pwr PM3 = -27.00 dB Sim.Temp@SPC = 20.3ºC Room Temp @ SPC = 20.4ºC
Communication System: CW - Dipole; Frequency: 1800 MHz; Communication System Channel Number: 8; Duty Cycle: 1:1
Medium: VALIDATION Only; Medium parameters used: f = 1800 MHz; σ = 1.35 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3

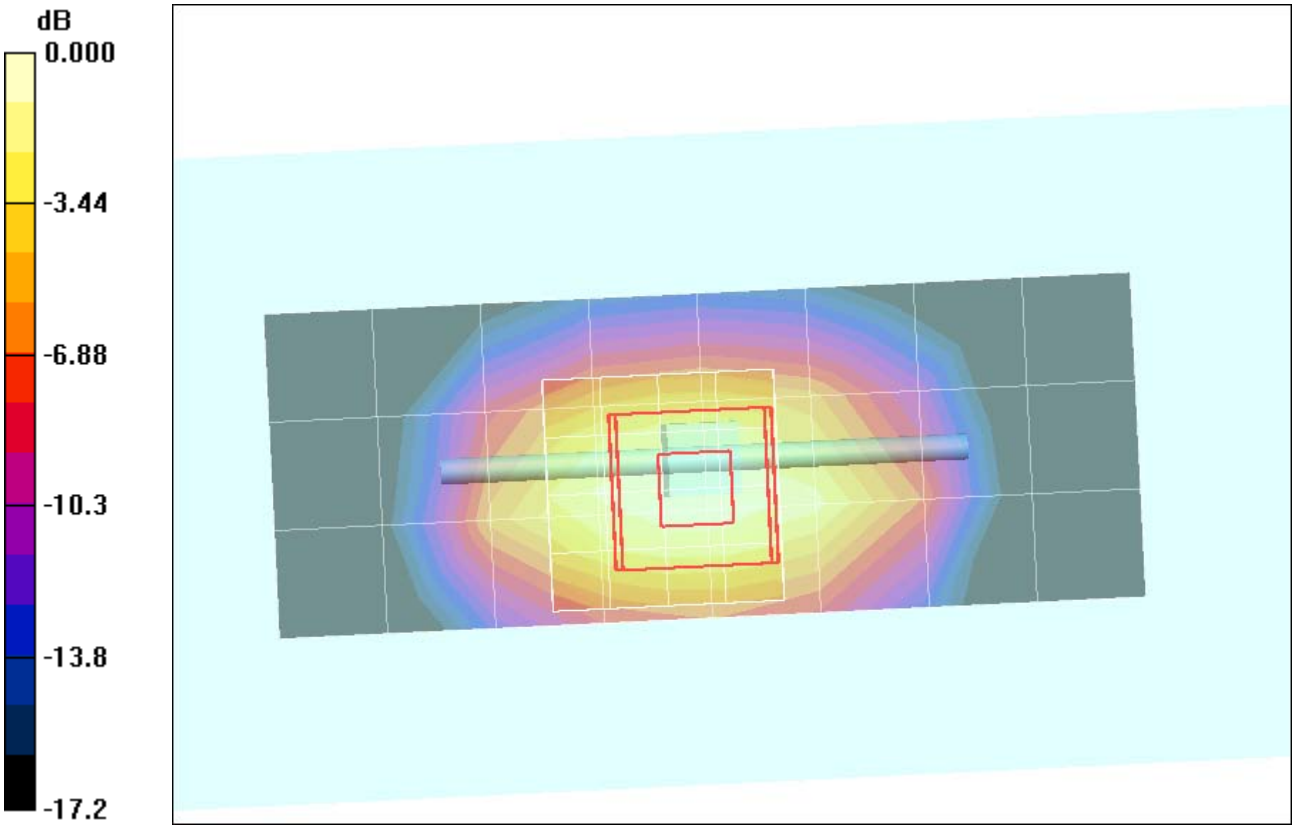
DASY4 Configuration:

- Probe: ES3DV3 - SN3184; ConvF(5.14, 5.14, 5.14); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn440; Calibrated: 2/17/2010
- Phantom: R4 : Sect.1, Amy Twin, Rev.3 (3-Feb-10); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Daily SPC Check/Dipole Area Scan (9x4x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 7.74 mW/g

Daily SPC Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 74.9 V/m; Power Drift = 0.013 dB
Peak SAR (extrapolated) = 12.0 W/kg
SAR(1 g) = 7.08 mW/g; SAR(10 g) = 3.82 mW/g
Maximum value of SAR (measured) = 7.91 mW/g

Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 74.9 V/m; Power Drift = 0.013 dB
Peak SAR (extrapolated) = 12.5 W/kg
SAR(1 g) = 7.3 mW/g; SAR(10 g) = 3.91 mW/g
Maximum value of SAR (measured) = 8.18 mW/g



0 dB = 8.18mW/g

Date/Time: 8/25/2010 7:00:51 AM

Test Laboratory: Motorola - 1800 MHz Performance Check

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:259tr;
Procedure Notes: PM2 Power = 198 mW Refl.Pwr PM3 = -27.00 dB Sim.Temp@SPC = 20.1ºC Room Temp @ SPC = 20.2ºC
Communication System: CW - Dipole; Frequency: 1800 MHz; Communication System Channel Number: 8; Duty Cycle: 1:1
Medium: VALIDATION Only; Medium parameters used: f = 1800 MHz; σ = 1.37 mho/m; ε_r = 38.9; ρ = 1000 kg/m^3

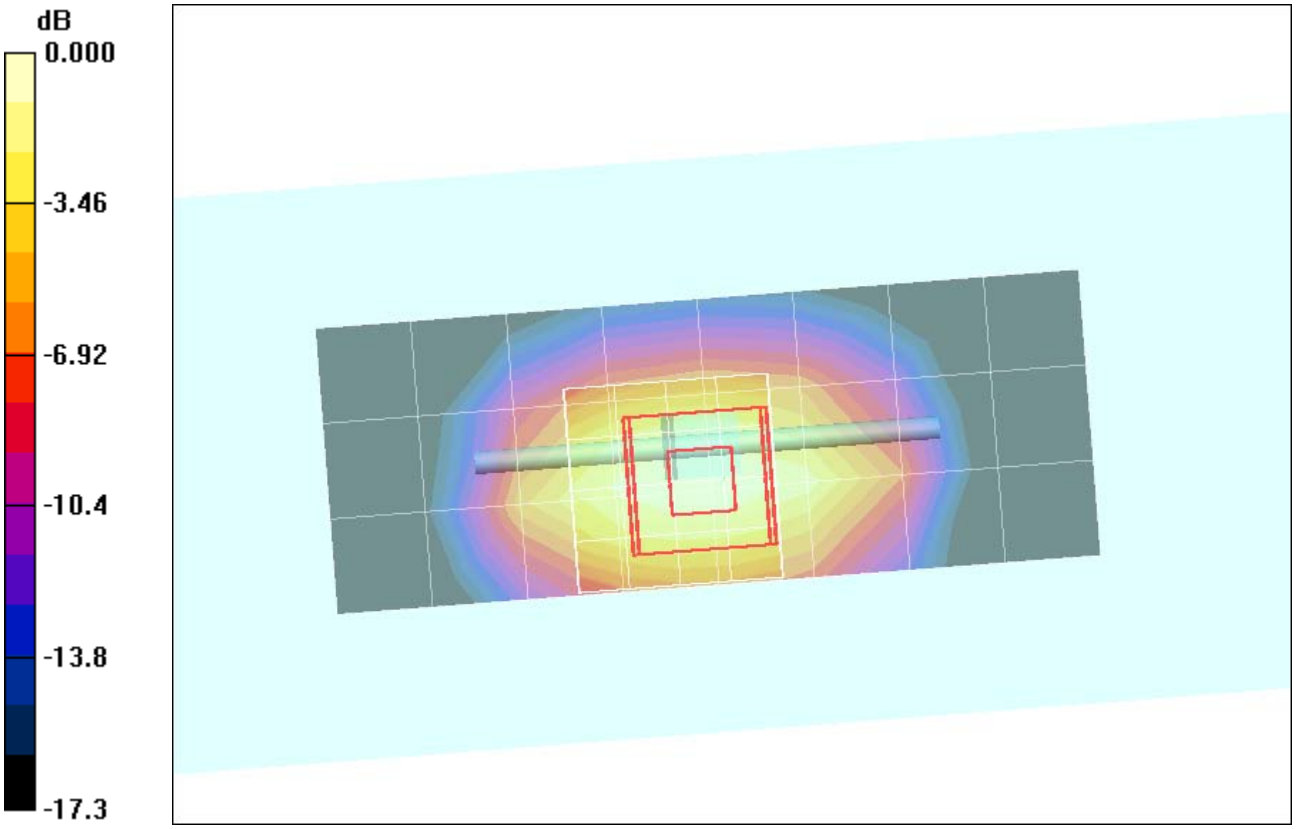
DASY4 Configuration:

- Probe: ES3DV3 - SN3184; ConvF(5.14, 5.14, 5.14); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn440; Calibrated: 2/17/2010
- Phantom: R4 : Sect.1, Amy Twin, Rev.3 (3-Feb-10); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Daily SPC Check/Dipole Area Scan (9x4x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 8.06 mW/g

Daily SPC Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 72.4 V/m; Power Drift = -0.008 dB
Peak SAR (extrapolated) = 12.2 W/kg
SAR(1 g) = 7.21 mW/g; SAR(10 g) = 3.88 mW/g
Maximum value of SAR (measured) = 8.02 mW/g

Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 72.4 V/m; Power Drift = -0.008 dB
Peak SAR (extrapolated) = 12.6 W/kg
SAR(1 g) = 7.4 mW/g; SAR(10 g) = 3.97 mW/g
Maximum value of SAR (measured) = 8.25 mW/g



0 dB = 8.25mW/g 2

Date/Time: 9/27/2010 7:00:03 AM

Test Laboratory: Motorola - 1800 MHz System Performance Check

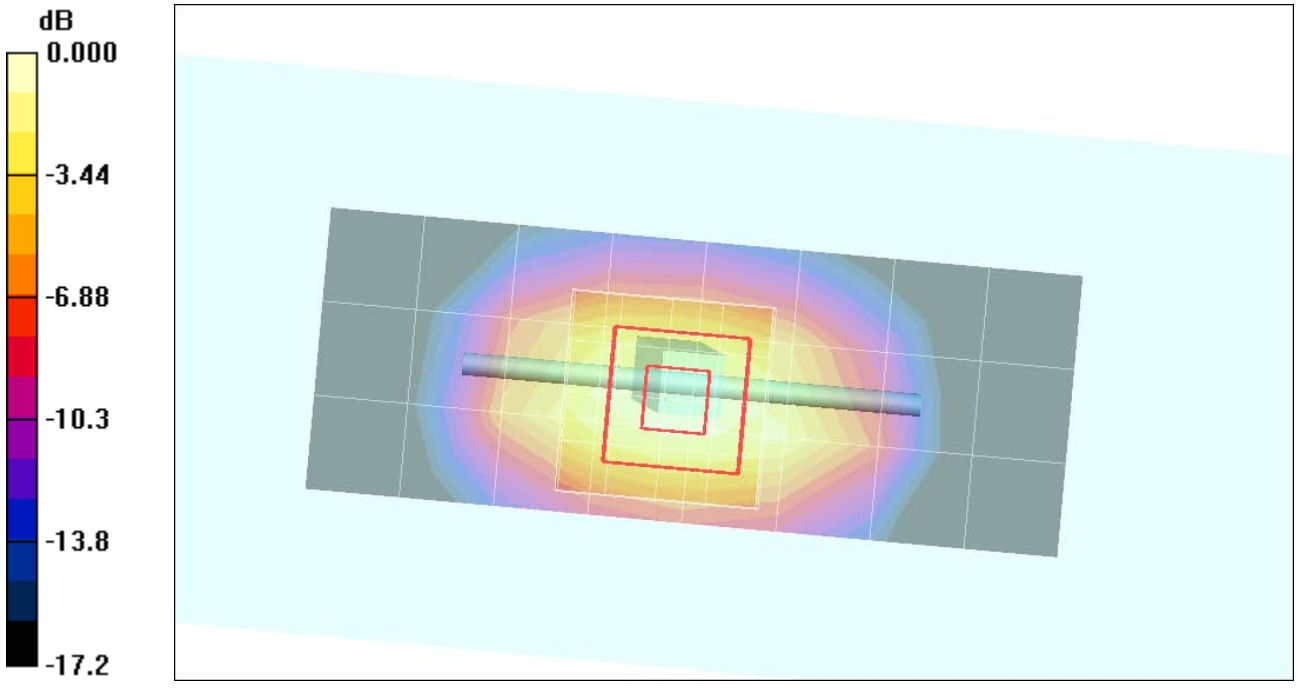
DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:272TR;
Procedure Notes: 1800 MHz System Performance Check / PM2 Power = 196 mW Refl.Pwr PM3 = -25.81 dB
Sim.Temp@SPC = 19.2ºC Room Temp @ SPC = 19.6ºC
Communication System: CW - Dipole; Frequency: 1800 MHz; Communication System Channel Number: 8; Duty Cycle: 1:1
Medium: VALIDATION Only; Medium parameters used: f = 1800 MHz; σ = 1.39 mho/m; ε_r = 38.8; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.89, 4.89, 4.89); Calibrated: 8/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 7/13/2010
- Phantom: R4 : Sect.1, Amy Twin, Rev.3 (3-Feb-10); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Daily SPC Check/Dipole Area Scan (9x4x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 7.95 mW/g

Daily SPC Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 79.0 V/m; Power Drift = -0.033 dB
Peak SAR (extrapolated) = 14.5 W/kg
SAR(1 g) = 7.88 mW/g; SAR(10 g) = 4.15 mW/g
Maximum value of SAR (measured) = 8.77 mW/g



0 dB = 8.77mW/g

Date/Time: 9/28/2010 8:06:37 AM

Test Laboratory: Motorola - 1800 MHz System Performance Check

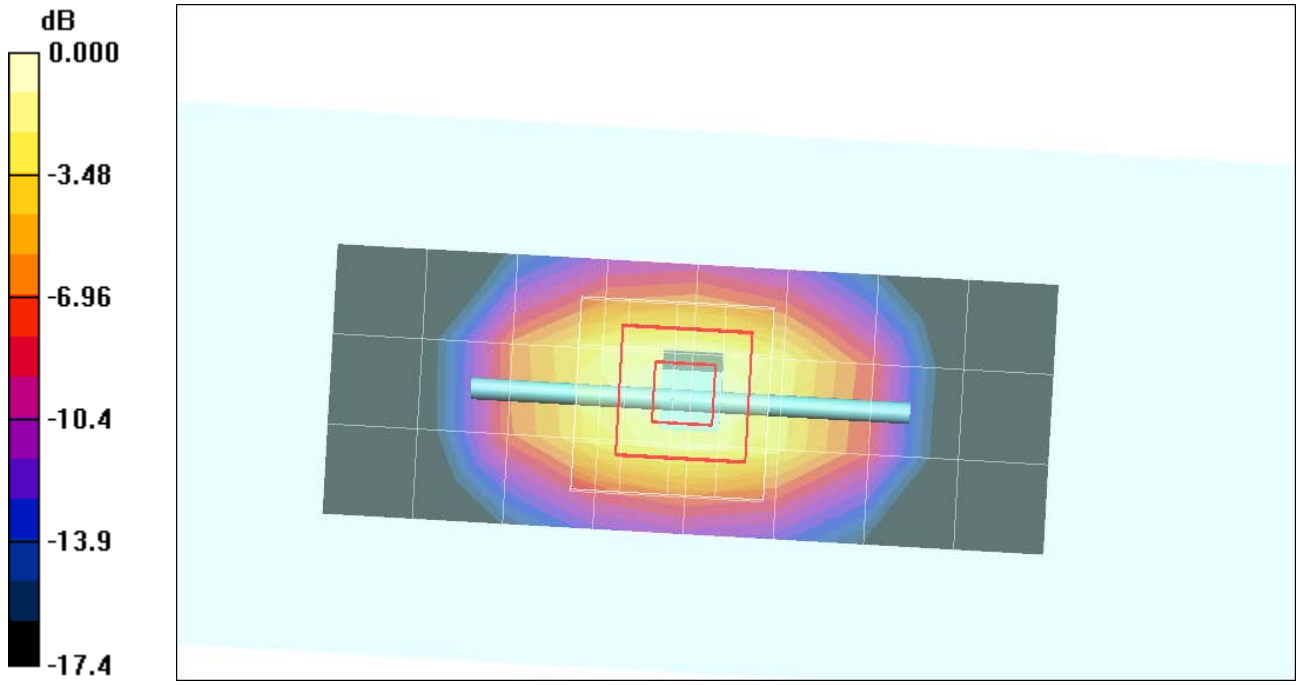
DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:259TR;
Procedure Notes: 1800 MHz System Performance Check / PM2 Power = 200 mW Refl.Pwr PM3 = -22.03 dB Sim.Temp@SPC = 19.3 Room Temp @ SPC = 19.8
Communication System: CW - Dipole; Frequency: 1800 MHz; Communication System Channel Number: 8; Duty Cycle: 1:1
Medium: VALIDATION Only; Medium parameters used: f = 1800 MHz; σ = 1.37 mho/m; ε_r = 38.8; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3183; ConvF(5.05, 5.05, 5.05); Calibrated: 7/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn702; Calibrated: 5/18/2010
- Phantom: R1_ 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) = 6.76 mW/g

Daily SPC Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 80.9 V/m; Power Drift = -0.010 dB
Peak SAR (extrapolated) = 14.5 W/kg
SAR(1 g) = 7.9 mW/g; SAR(10 g) = 4.16 mW/g
Maximum value of SAR (measured) = 8.76 mW/g



0 dB = 8.76mW/g

Date/Time: 8/17/2010 3:52:13 PM

Test Laboratory: Motorola - 2450 MHz Performance Check

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:766;
Procedure Notes: PM2 Power = 200 mW Refl.Pwr PM3 = -20.9 dB Sim.Temp@SPC = 20 Room Temp @ SPC = 20.1
Communication System: CW - Dipole; Frequency: 2450 MHz; Communication System Channel Number: 11; Duty Cycle: 1:1
Medium: VALIDATION Only; Medium parameters used: f = 2450 MHz; σ = 1.87 mho/m; ε_r = 37.4; ρ = 1000 kg/m^3

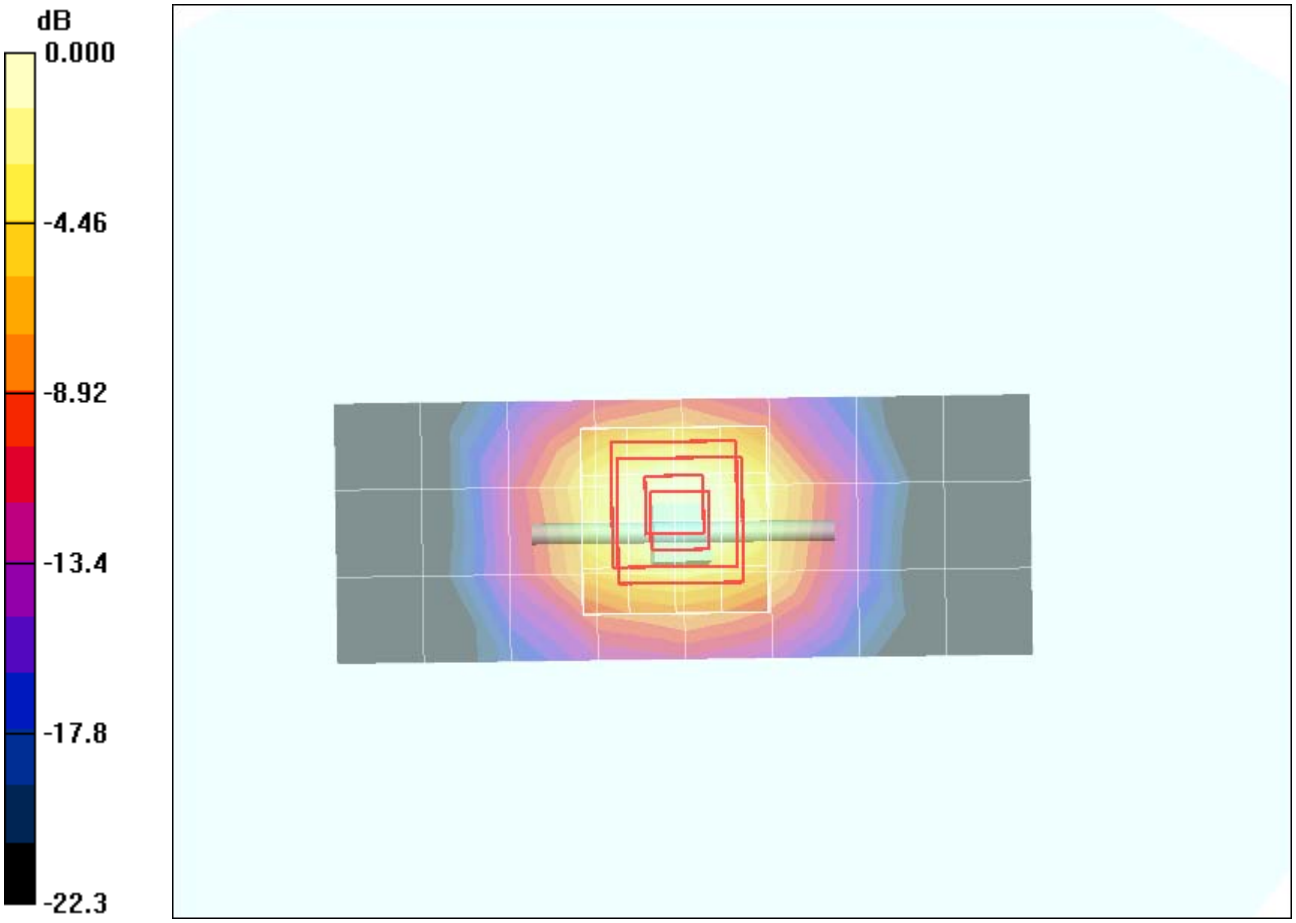
DASY4 Configuration:

- Probe: ES3DV3 - SN3037; ConvF(4.41, 4.41, 4.41); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/17/2009
- Phantom: R1_ Glycol, SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1139;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Daily SPC Check/Dipole Area Scan (4x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 10.1 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 83.1 V/m; Power Drift = -0.056 dB
Peak SAR (extrapolated) = 21.3 W/kg
SAR(1 g) = 11.1 mW/g; SAR(10 g) = 5.26 mW/g
Maximum value of SAR (measured) = 12.6 mW/g

Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 83.1 V/m; Power Drift = -0.056 dB
Peak SAR (extrapolated) = 22.3 W/kg
SAR(1 g) = 11 mW/g; SAR(10 g) = 5.13 mW/g
Maximum value of SAR (measured) = 11.9 mW/g



0 dB = 11.9mW/g

Date/Time: 8/19/2010 7:15:39 AM

Test Laboratory: Motorola - 2450 MHz Performance Check

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:766;
Procedure Notes: PM2 Power = 201 mW Refl.Pwr PM3 = -20.85dB Sim.Temp@SPC = 20.4ºC Room Temp @ SPC = 20.3ºC
Communication System: CW - Dipole; Frequency: 2450 MHz; Communication System Channel Number: 11; Duty Cycle: 1:1
Medium: VALIDATION Only; Medium parameters used: f = 2450 MHz; σ = 1.83 mho/m; ε_r = 37.4; ρ = 1000 kg/m^3

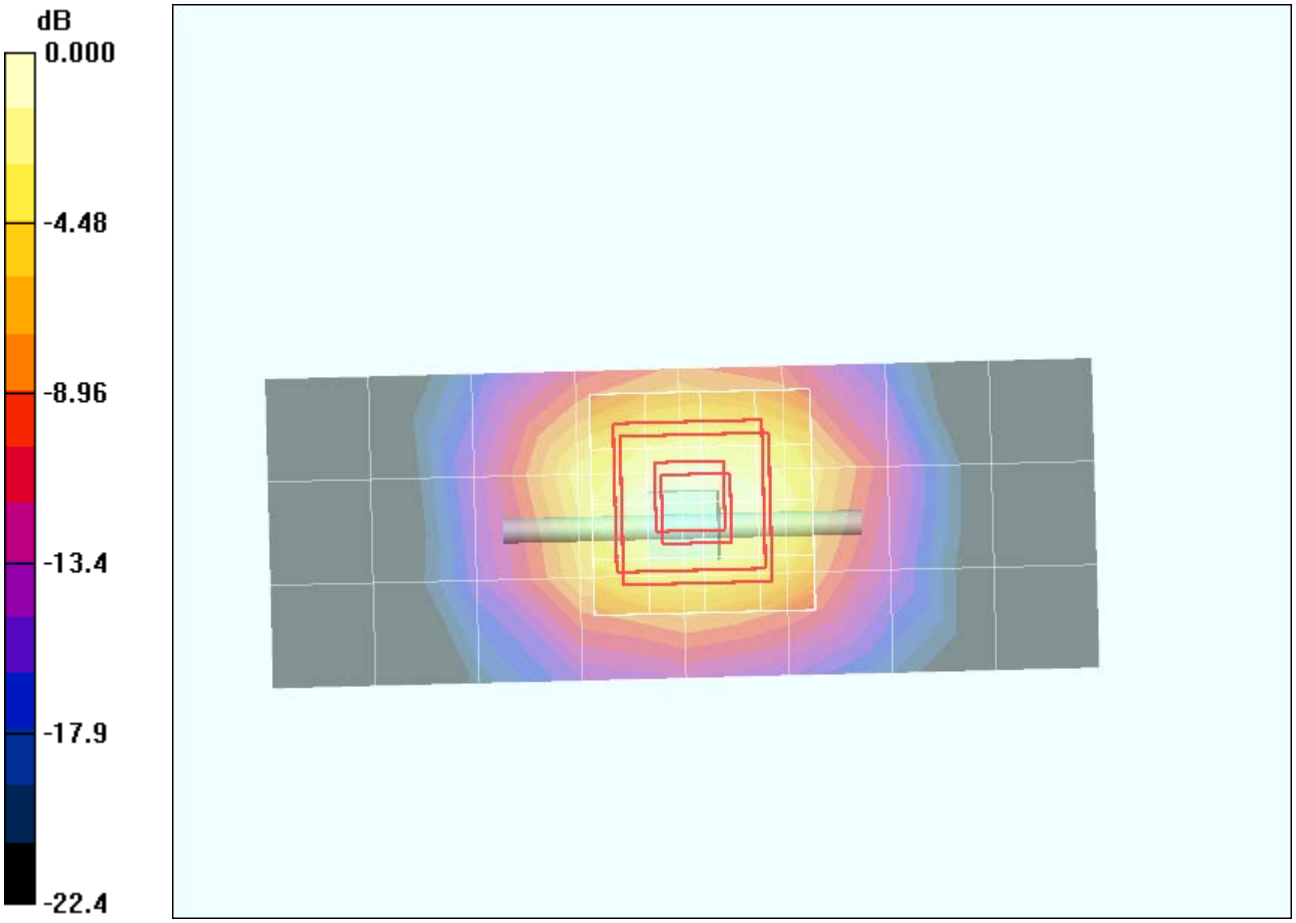
DASY4 Configuration:

- Probe: ES3DV3 - SN3037; ConvF(4.41, 4.41, 4.41); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/17/2009
- Phantom: R1_ Glycol, SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1139;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Daily SPC Check/Dipole Area Scan (4x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 11.1 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 79.6 V/m; Power Drift = -0.013 dB
Peak SAR (extrapolated) = 21.1 W/kg
SAR(1 g) = 10.9 mW/g; SAR(10 g) = 5.2 mW/g
Maximum value of SAR (measured) = 12.4 mW/g

Daily SPC Check/90-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 79.6 V/m; Power Drift = -0.013 dB
Peak SAR (extrapolated) = 21.6 W/kg
SAR(1 g) = 10.8 mW/g; SAR(10 g) = 5.06 mW/g
Maximum value of SAR (measured) = 12.2 mW/g



0 dB = 12.2mW/g

Date/Time: 9/27/2010 2:30:24 PM

Test Laboratory: Motorola - 2450 MHz System Performance Check

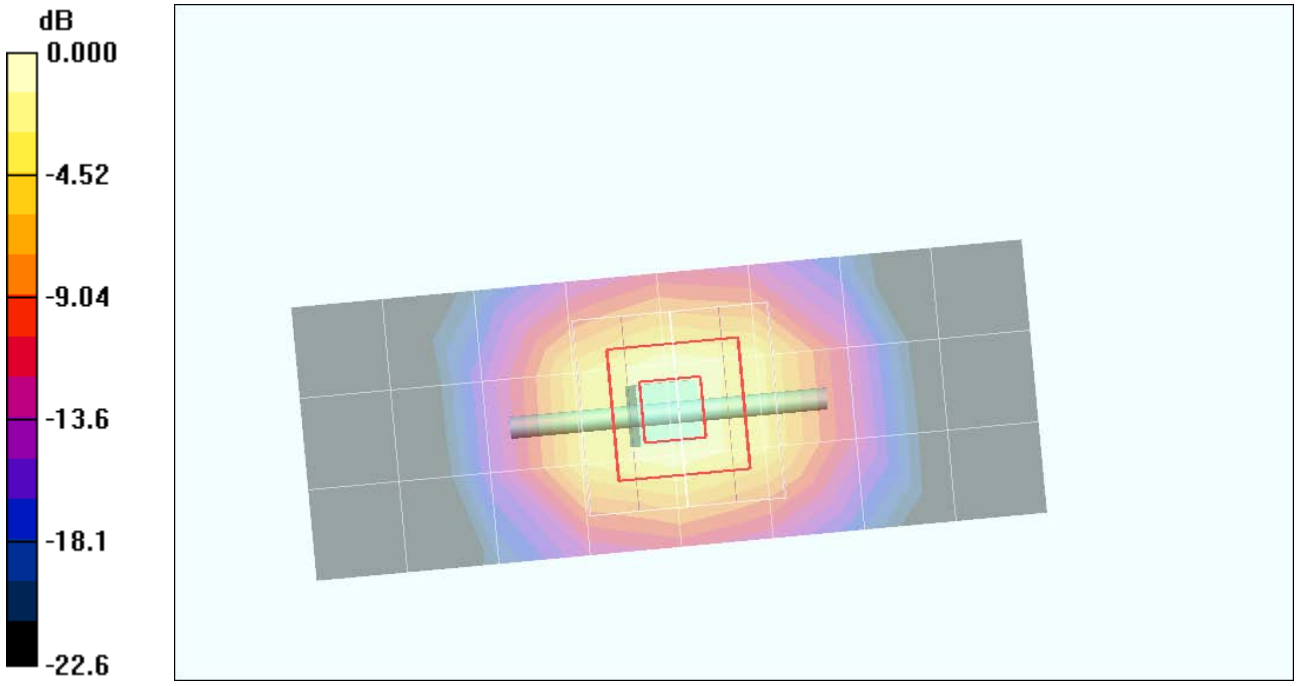
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:766;
Procedure Notes: 2450 MHz System Performance Check / PM2 Power = 201 mW Refl.Pwr PM3 = -30.85dB
Sim.Temp@SPC = 19.4ºC Room Temp @ SPC = 20.1ºC
Communication System: CW - Dipole; Frequency: 2450 MHz; Communication System Channel Number: 11; Duty Cycle: 1:1
Medium: VALIDATION Only; Medium parameters used: f = 2450 MHz; σ = 1.88 mho/m; ε_r = 36.9; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.35, 4.35, 4.35); Calibrated: 8/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 7/13/2010
- Phantom: R#4 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1250;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Daily SPC Check/Dipole Area Scan (4x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 8.70 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 84.7 V/m; Power Drift = -0.001 dB
Peak SAR (extrapolated) = 23.7 W/kg
SAR(1 g) = 11.3 mW/g; SAR(10 g) = 5.21 mW/g
Maximum value of SAR (measured) = 12.9 mW/g



0 dB = 12.9mW/g

Appendix 2

SAR distribution plots for Phantom Head Adjacent Use

Test Laboratory: Motorola - GSM 850 Right Head Cheek Touch

DUT Serial: 351575040007136;
Procedure Notes: Pwr Step: 05 Battery Model #: SNN5877A DEVICE POSITION (cheek or rotated): cheek Communication System: GSM 850; Frequency: 836.6 MHz; Communication System Channel Number: 190; Duty Cycle: 1:8.3

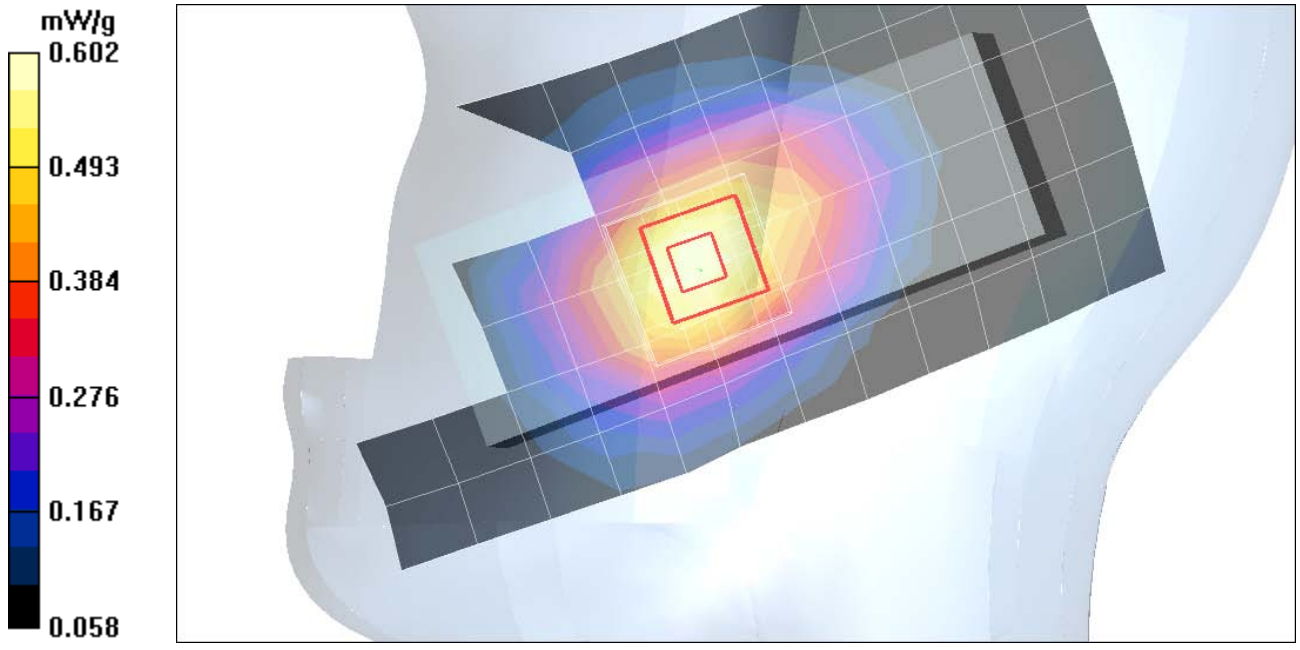
Medium: Low Freq Head; Medium parameters used: f = 835 MHz; σ = 0.93 mho/m; ε_r = 42.1; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3037; ConvF(6.25, 6.25, 6.25); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/17/2009
- Phantom: R1_ Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1005;
- 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) = 0.608 mW/g

Right Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.3 V/m; Power Drift = -0.068 dB
Peak SAR (extrapolated) = 0.679 W/kg
SAR(1 g) = 0.569 mW/g; SAR(10 g) = 0.420 mW/g
Maximum value of SAR (measured) = 0.602 mW/g



Date/Time: 8/14/2010 7:48:22 AM

Test Laboratory: Motorola - GSM 850 Left Head 15 Degree Tilt

DUT Serial: 351575040007136;
Procedure Notes: Pwr Step: 05 Battery Model #: SNN5877A DEVICE POSITION (cheek or rotated): tilt Communication System: GSM 850; Frequency: 836.6 MHz; Communication System Channel Number: 190; Duty Cycle: 1:8.3

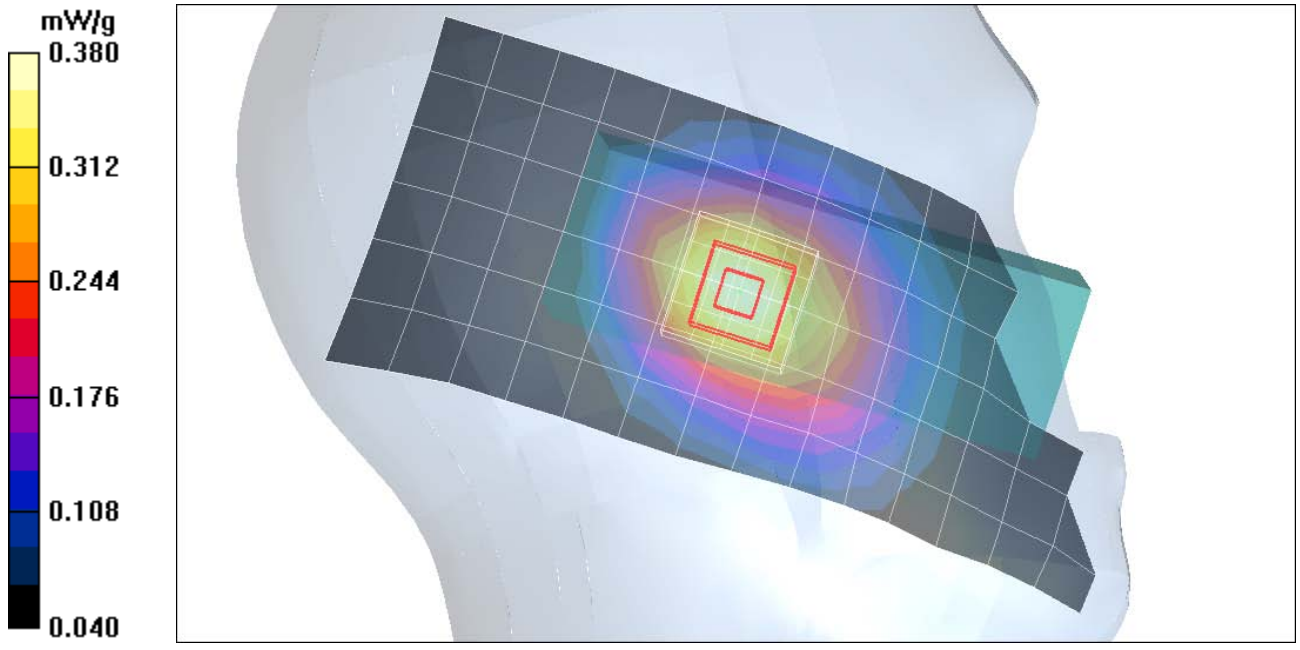
Medium: Low Freq Head; Medium parameters used: f = 835 MHz; σ = 0.93 mho/m; ε_r = 42.1; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3037; ConvF(6.25, 6.25, 6.25); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/17/2009
- Phantom: R1_ Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1005;
- 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) = 0.378 mW/g

Left Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.0 V/m; Power Drift = 0.007 dB
Peak SAR (extrapolated) = 0.439 W/kg
SAR(1 g) = 0.359 mW/g; SAR(10 g) = 0.266 mW/g
Maximum value of SAR (measured) = 0.380 mW/g



Test Laboratory: Motorola - WCDMA 850 Left Head Cheek

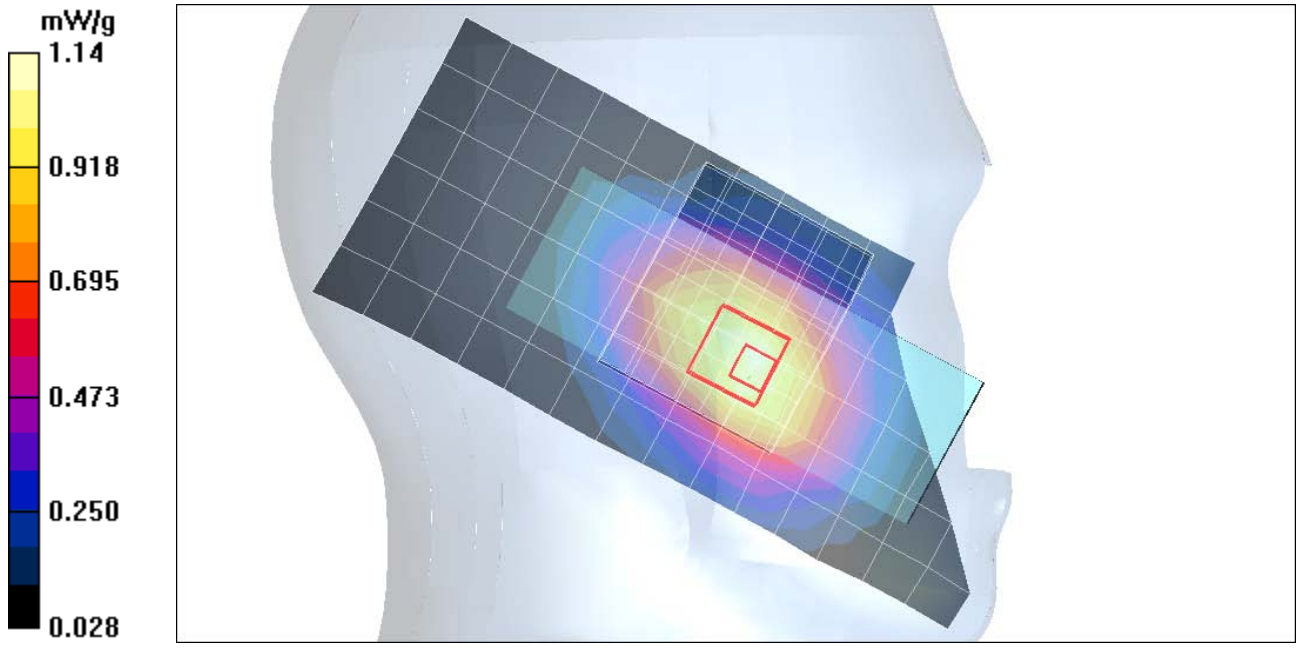
DUT Serial: 351575040016095;
Procedure Notes: Pwr Step: always up Battery Model #: SNN5877A DEVICE POSITION (cheek or rotated): cheek Communication System: 3G-WCDMA 850; Frequency: 846.6 MHz; Communication System Channel Number: 4233; Duty Cycle: 1:1
Medium: Low Freq Head; Medium parameters used: f = 835 MHz; σ = 0.93 mho/m; ε_r = 42.4; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3183; ConvF(6.11, 6.11, 6.11); Calibrated: 7/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn702; Calibrated: 5/18/2010
- Phantom: R1_ Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1156;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Left Head Template/Area Scan - Normal (15mm) (7x17x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.11 mW/g

Left Head Template/MegaZoom Zoom Scan (<=3GHz) (9x8x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 34.6 V/m; Power Drift = -0.002 dB
Peak SAR (extrapolated) = 1.38 W/kg
SAR(1 g) = 1.07 mW/g; SAR(10 g) = 0.786 mW/g
Maximum value of SAR (measured) = 1.14 mW/g



Test Laboratory: Motorola - WCDMA 850 Right Head Cheek Touch

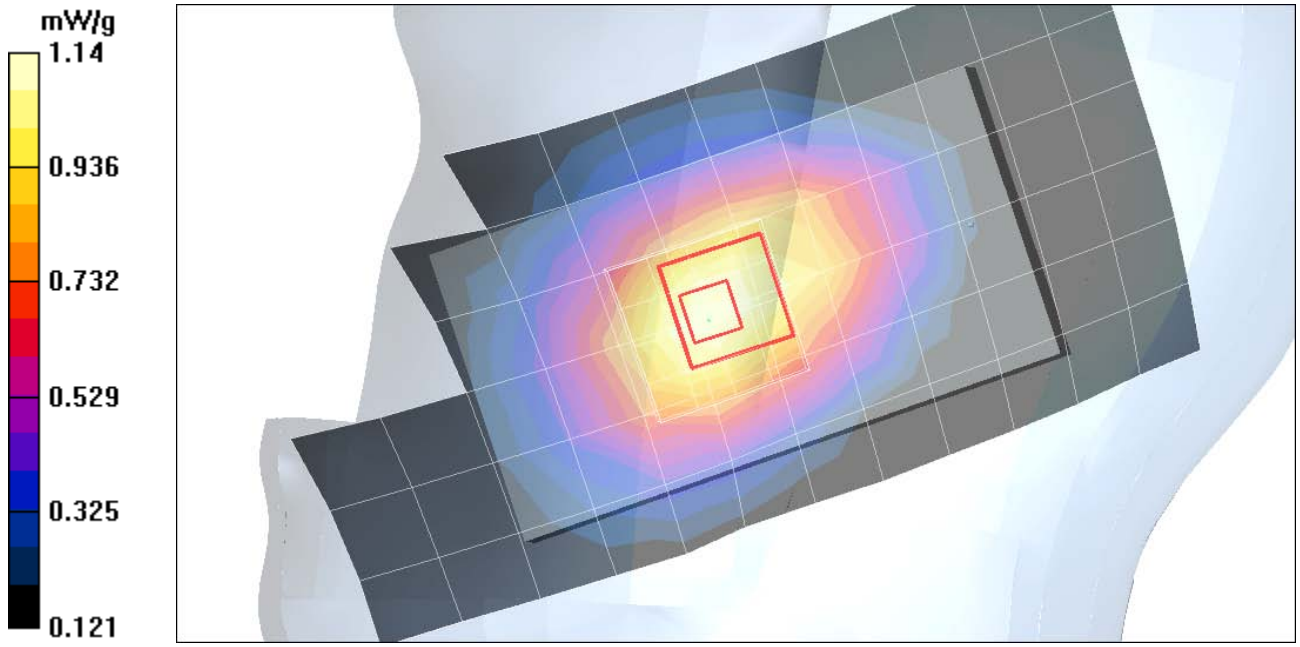
DUT Serial: 351575040016095;
Procedure Notes: Pwr Step: ALL UP BITS Battery Model #: SNN5877A DEVICE POSITION CHEEK
Communication System: 3G-WCDMA 850; Frequency: 846.6 MHz; Communication System Channel Number: 4233; Duty Cycle: 1:1
Medium: Low Freq Head; Medium parameters used: f = 835 MHz; σ = 0.92 mho/m; ε_r = 41.4; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3184; ConvF(6.26, 6.26, 6.26); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn440; Calibrated: 2/17/2010
- Phantom: R#4 Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Right Head Template/Area Scan - Normal (15mm) (7x17x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.14 mW/g

Right Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 34.2 V/m; Power Drift = 0.023 dB
Peak SAR (extrapolated) = 1.28 W/kg
SAR(1 g) = 1.08 mW/g; SAR(10 g) = 0.824 mW/g



Test Laboratory: Motorola - WCDMA 850 - Right Head Tilt

DUT Serial: 351575040016095;
Procedure Notes: Pwr Step: always up Battery Model #: SNN5877A DEVICE POSITION (cheek or rotated): TILT
Communication System: 3G-WCDMA 850; Frequency: 836 MHz; Communication System Channel Number: 4180;
Duty Cycle: 1:1

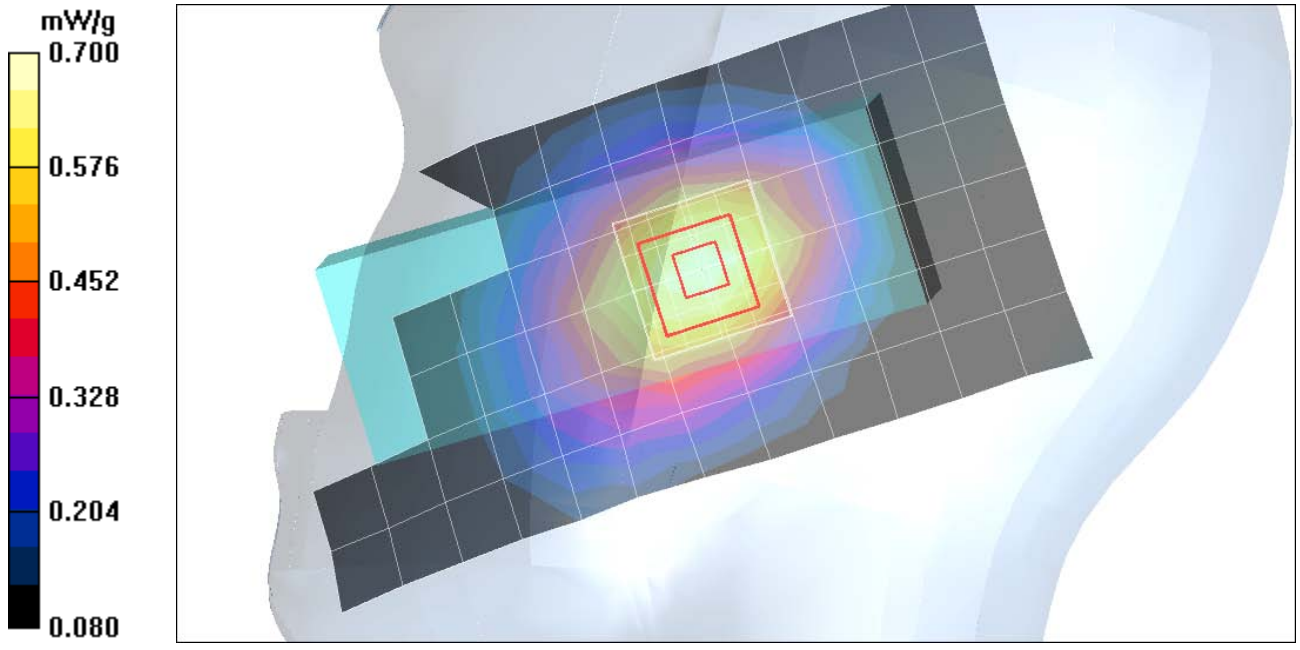
Medium: Low Freq Head; Medium parameters used: f = 835 MHz; σ = 0.93 mho/m; ε_r = 42.2; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3037; ConvF(6.25, 6.25, 6.25); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/17/2009
- Phantom: R1_ Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1005;
- 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) = 0.702 mW/g

Right Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.4 V/m; Power Drift = 0.077 dB
Peak SAR (extrapolated) = 0.794 W/kg
SAR(1 g) = 0.660 mW/g; SAR(10 g) = 0.492 mW/g
Maximum value of SAR (measured) = 0.700 mW/g



Test Laboratory: Motorola - WCDMA 1700 Left Head Cheek Touch

DUT Serial: 351575040016095;
Procedure Notes: Pwr Step: always up Battery Model #: SNN5877A DEVICE POSITION (cheek or rotated): cheek Communication System: 3G/WCDMA 1700; Frequency: 1752.6 MHz; Communication System Channel Number: 1513; Duty Cycle: 1:1

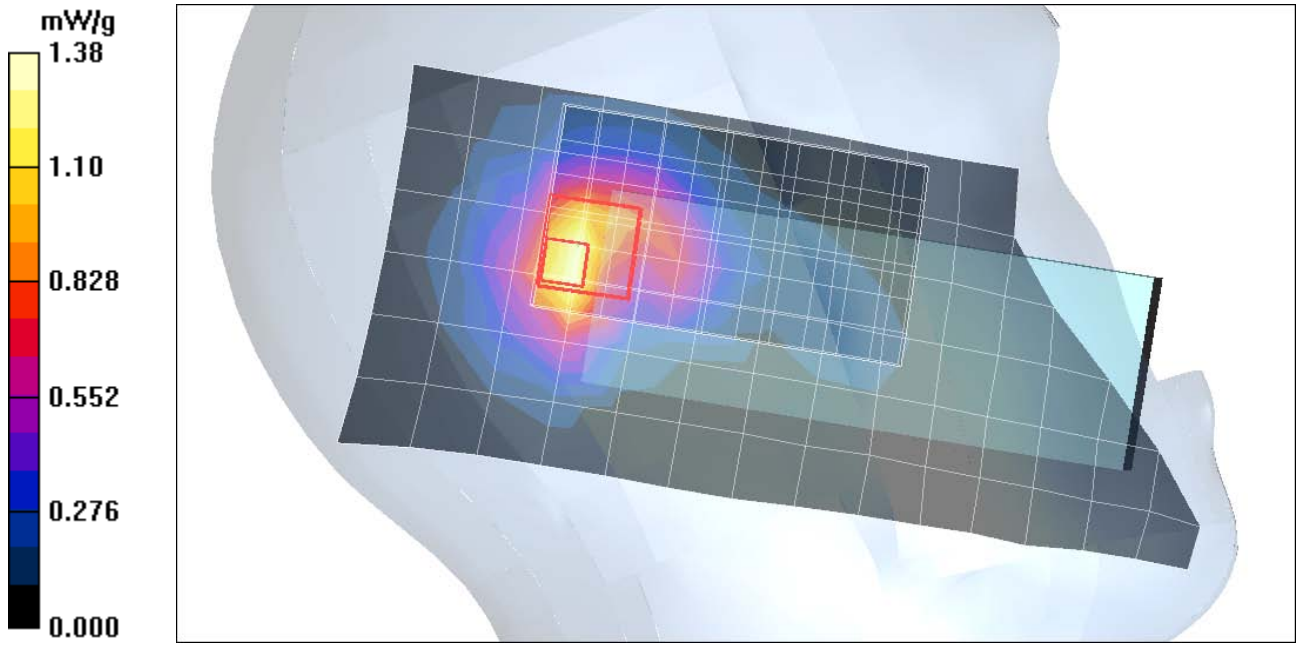
Medium: 1730 Glycol Head; Medium parameters used: f = 1730 MHz; σ = 1.39 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3183; ConvF(5.05, 5.05, 5.05); Calibrated: 7/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn702; Calibrated: 5/18/2010
- Phantom: R1_ Glycol, SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1139;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Left Head Template/Area Scan - Normal (15mm) (7x17x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.36 mW/g

Left Head Template/Zoom Scan (<=3GHz) (7x12x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.7 V/m; Power Drift = -0.014 dB
Peak SAR (extrapolated) = 2.36 W/kg
SAR(1 g) = 1.26 mW/g; SAR(10 g) = 0.608 mW/g
Maximum value of SAR (measured) = 1.38 mW/g



Test Laboratory: Motorola - WCDMA 1700 Right Head Cheek Touch

DUT Serial: 351575040016095;
Procedure Notes: Pwr Step: All Up Bits Battery Model #: SNN5877A DEVICE POSITION (cheek or rotated): Cheek Communication System: 3G/WCDMA 1700; Frequency: 1712.4 MHz; Communication System Channel Number: 1312; Duty Cycle: 1:1

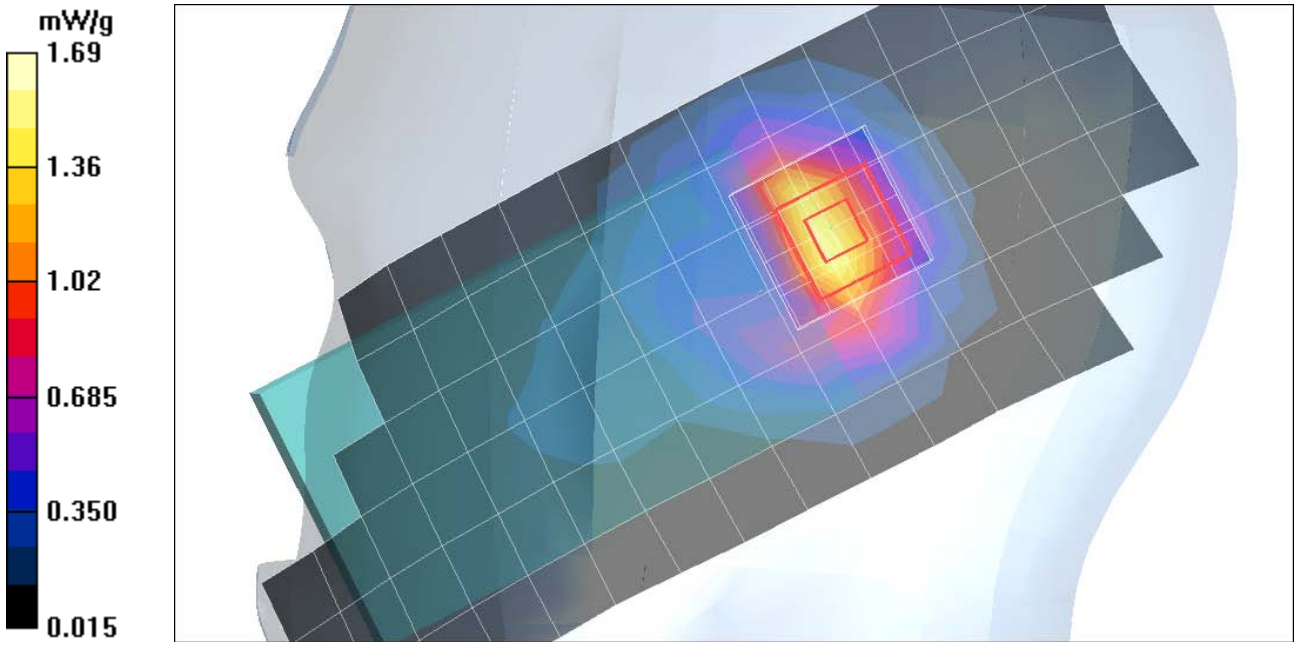
Medium: 1730 Glycol Head; Medium parameters used: f = 1730 MHz; σ = 1.38 mho/m; ε_r = 39.1; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3184; ConvF(5.14, 5.14, 5.14); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn440; Calibrated: 2/17/2010
- Phantom: R#4 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1250;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Right Head Template/Area Scan - Normal Extended (15mm) (7x17x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.58 mW/g

Right Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.4 V/m; Power Drift = 0.117 dB
Peak SAR (extrapolated) = 2.64 W/kg
SAR(1 g) = 1.48 mW/g; SAR(10 g) = 0.778 mW/g
Maximum value of SAR (measured) = 1.69 mW/g



Test Laboratory: Motorola - WCDMA 1700 Left Head 15 DegreeTilt

DUT Serial: 351575040016095;
Procedure Notes: Pwr Step: always up Battery Model #: SNN5877A DEVICE POSITION (cheek or rotated): tilt

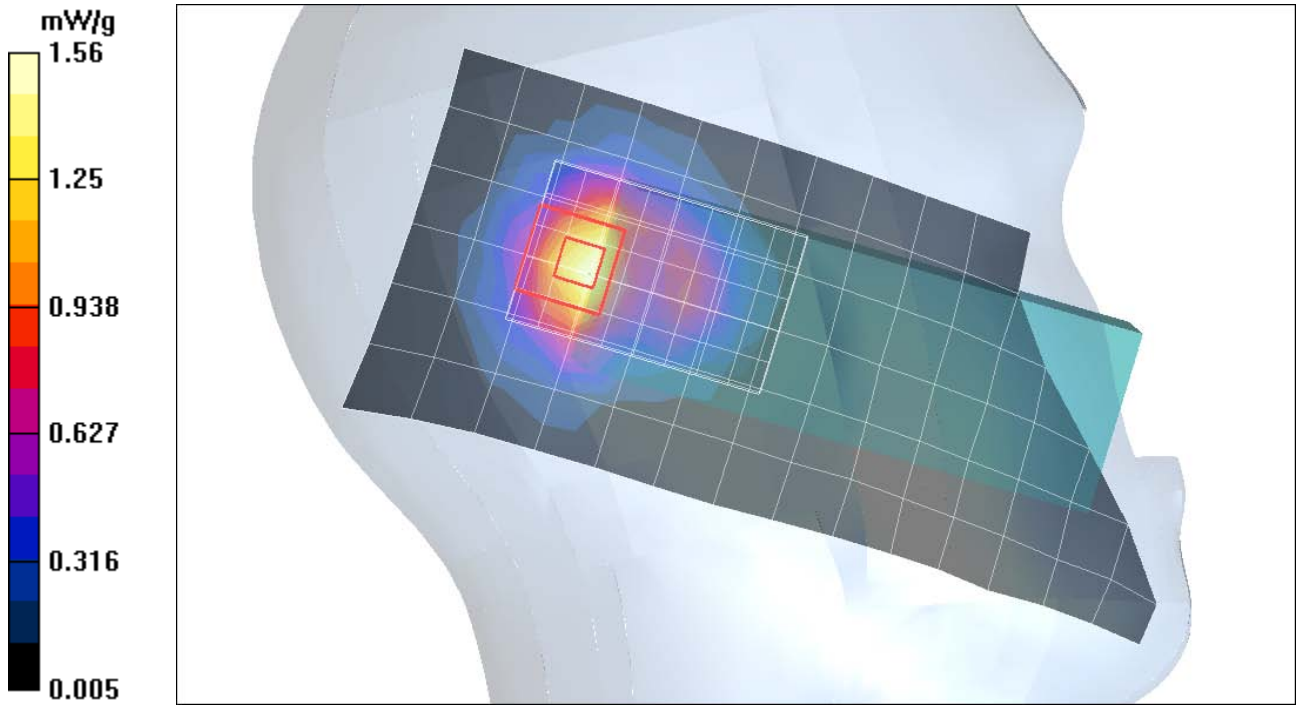
Communication System: 3G/WCDMA 1700; Frequency: 1752.6 MHz;Duty Cycle: 1:1
Medium: 1730 Glycol Head; Medium parameters used: f = 1730 MHz; σ = 1.39 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3183; ConvF(5.05, 5.05, 5.05); Calibrated: 7/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn702; Calibrated: 5/18/2010
- Phantom: R1_ Glycol, SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1139;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Left Head Template/Area Scan - Normal (15mm) (7x17x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.60 mW/g

Left Head Template/MegaZoom Zoom Scan (<=3GHz) (6x9x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 32.1 V/m; Power Drift = -0.077 dB
Peak SAR (extrapolated) = 2.71 W/kg
SAR(1 g) = 1.44 mW/g; SAR(10 g) = 0.718 mW/g
Maximum value of SAR (measured) = 1.56 mW/g



Test Laboratory: Motorola - WCDMA 1700 Right Head 15 Degree Tilt

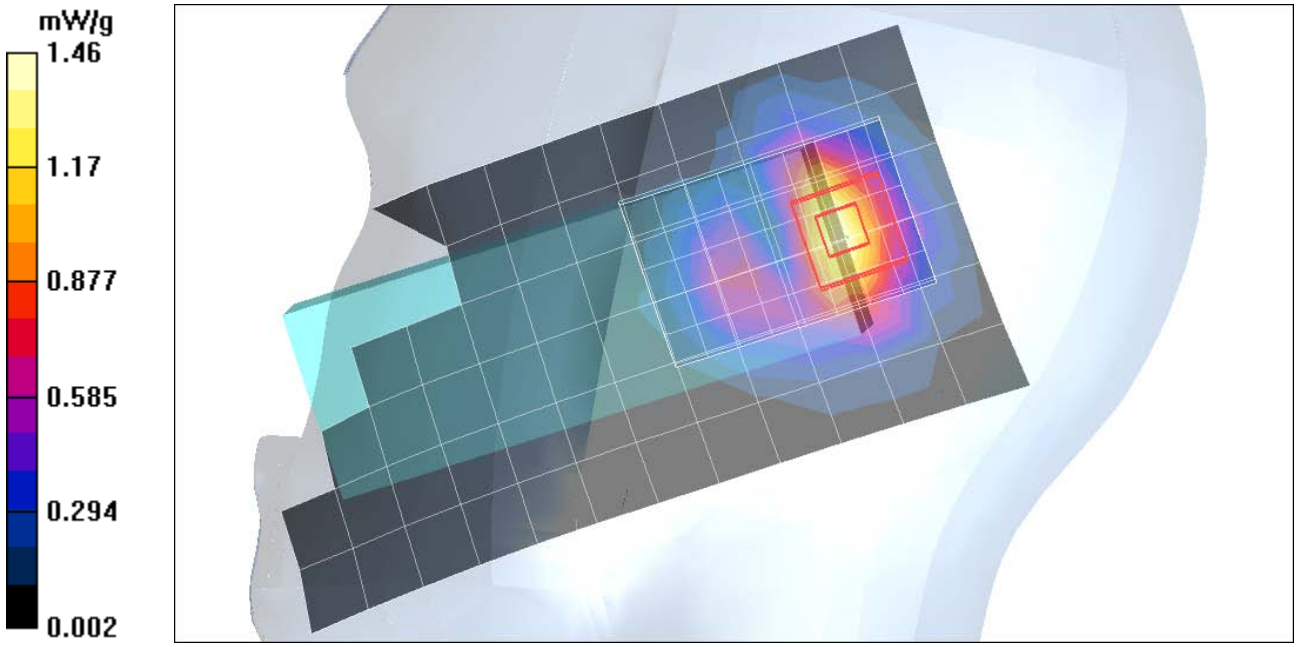
DUT Serial: 351575040016095;
Procedure Notes: Pwr Step: always up Battery Model #: SNN5877A DEVICE POSITION (cheek or rotated): tilt
Communication System: 3G/WCDMA 1700; Frequency: 1732.5 MHz; Communication System Channel Number: 1413; Duty Cycle: 1:1
Medium: 1730 Glycol Head; Medium parameters used: f = 1730 MHz; σ = 1.39 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3183; ConvF(5.05, 5.05, 5.05); Calibrated: 7/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn702; Calibrated: 5/18/2010
- Phantom: R1_ Glycol, SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1139;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Right Head Template/Area Scan - Normal (15mm) (7x17x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.46 mW/g

Right Head Template/MegaZoom Zoom Scan (<=3GHz) (6x9x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.7 V/m; Power Drift = -0.079 dB
Peak SAR (extrapolated) = 2.72 W/kg
SAR(1 g) = 1.33 mW/g; SAR(10 g) = 0.653 mW/g



Date/Time: 7/10/2010 5:41:49 AM

Test Laboratory: Motorola - GSM 1900 Left Head Cheek Touch

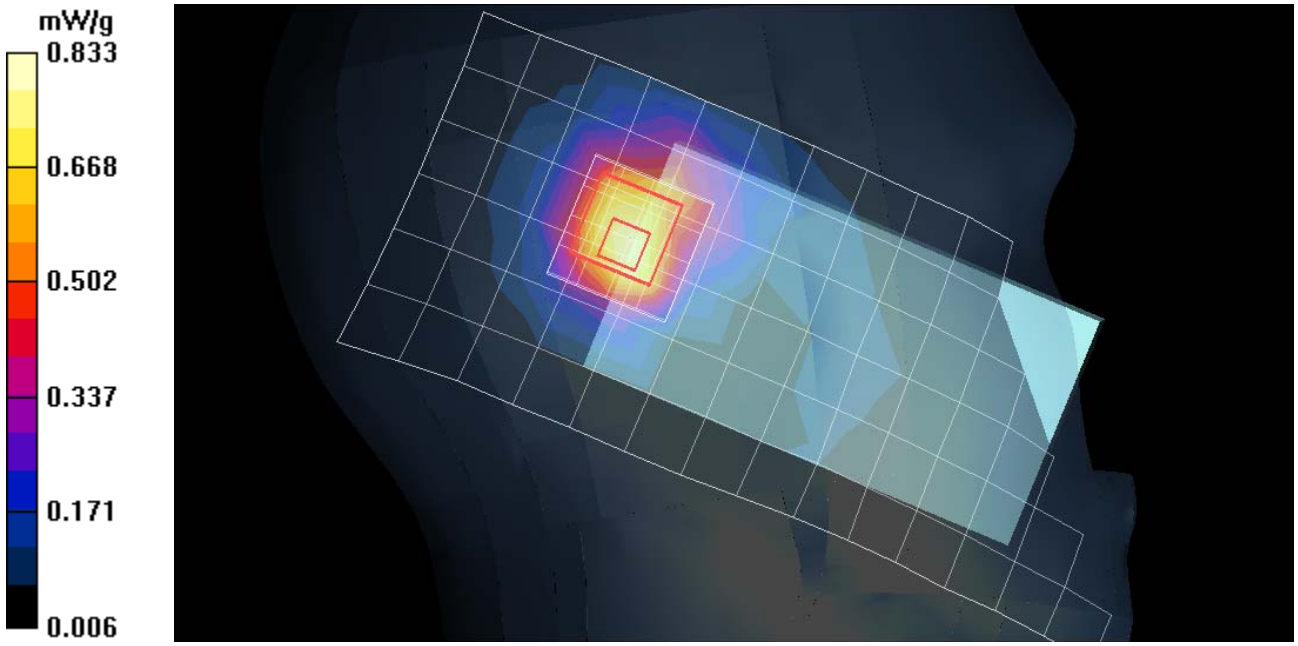
DUT Serial: 351575040007136;
Procedure Notes: Pwr Step: 0 Battery Model #: SNN5877A DEVICE POSITION CHEEK
Communication System: GSM 1900; Frequency: 1880 MHz; Communication System Channel Number: 661; Duty Cycle: 1:8.3
Medium: Regular Glycol Head 1750/1880; Medium parameters used: f = 1880 MHz; σ = 1.46 mho/m; ε_r = 39.3; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3184; ConvF(5.14, 5.14, 5.14); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn440; Calibrated: 2/17/2010
- Phantom: R#4 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1250;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Left Head Template/Area Scan - Normal (15mm) (7x17x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.810 mW/g

Left Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.0 V/m; Power Drift = -0.044 dB
Peak SAR (extrapolated) = 1.40 W/kg
SAR(1 g) = 0.767 mW/g; SAR(10 g) = 0.418 mW/g
Maximum value of SAR (measured) = 0.833 mW/g..



Test Laboratory: Motorola - GSM 1900 Left Head 15 Degree Tilt

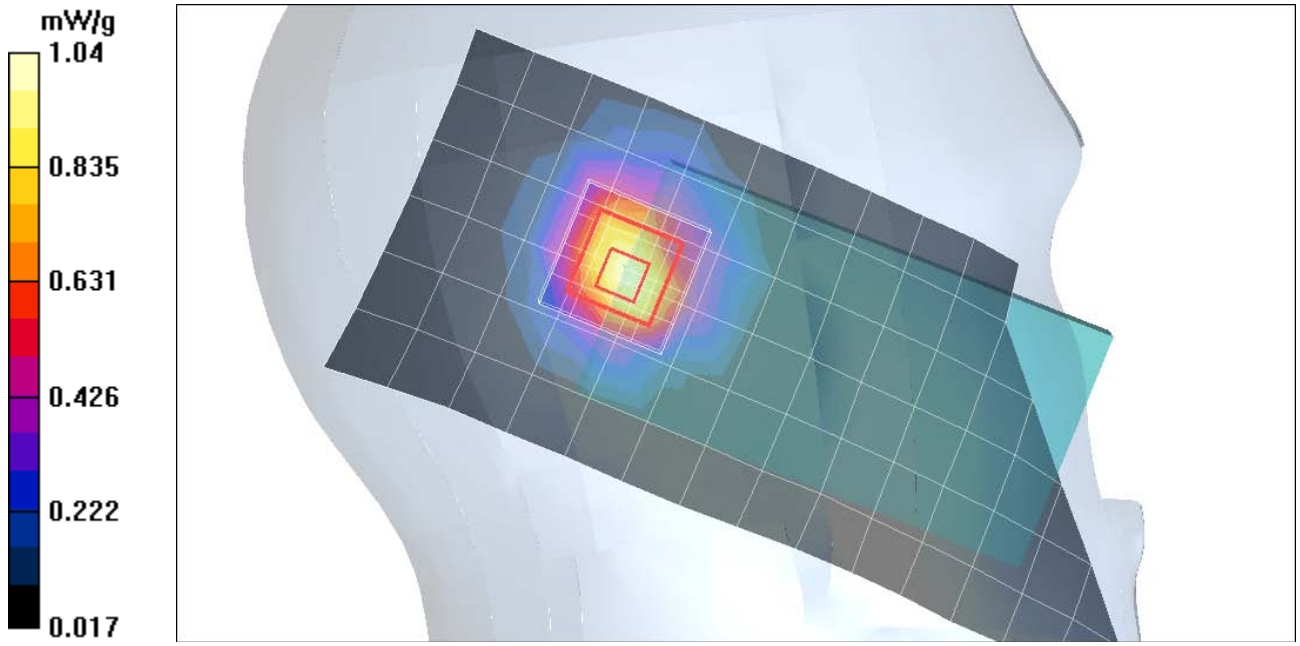
DUT Serial: 351575040007136;
Procedure Notes: Pwr Step: 0 Battery Model #: SNN5877A DEVICE POSITION TILT
Communication System: GSM 1900; Frequency: 1880 MHz; Communication System Channel Number: 661; Duty Cycle: 1:8.3
Medium: Regular Glycol Head 1750/1880; Medium parameters used: f = 1880 MHz; σ = 1.46 mho/m; ε_r = 39.3; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3184; ConvF(5.14, 5.14, 5.14); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn440; Calibrated: 2/17/2010
- Phantom: R#4 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1250;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Left Head Template/Area Scan - Normal (15mm) (7x17x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.01 mW/g

Left Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.3 V/m; Power Drift = -0.040 dB
Peak SAR (extrapolated) = 1.73 W/kg
SAR(1 g) = 0.941 mW/g; SAR(10 g) = 0.501 mW/g
Maximum value of SAR (measured) = 1.04 mW/g



Test Laboratory: Motorola - Wi-Fi Left Head Cheek Touch

DUT Serial: 351575040007136;
Procedure Notes: Pwr Step: 802.11b 1Mpbs Battery Model #: SNN5877A DEVICE POSITION (cheek or rotated): Cheek

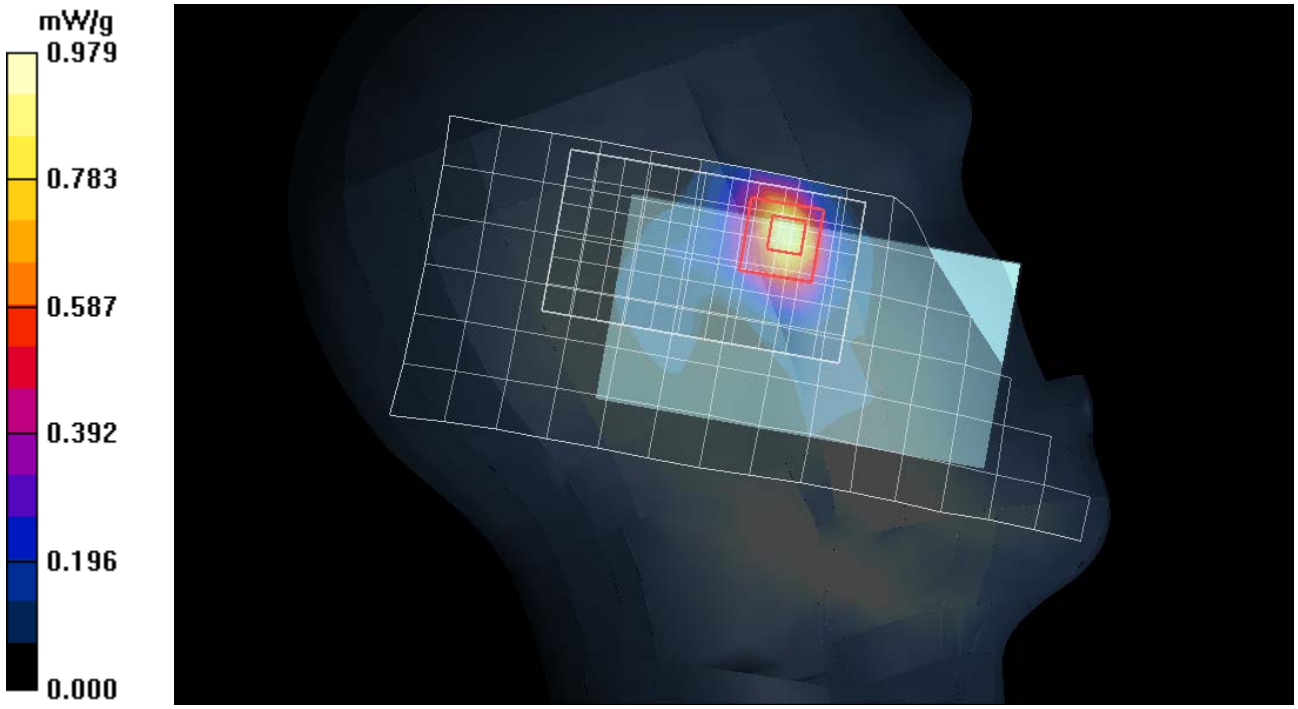
Communication System: Wi-Fi 2450; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium: 2450 Glycol Head; Medium parameters used: f = 2450 MHz; σ = 1.88 mho/m; ε_r = 36.9; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3124; ConvF(4.35, 4.35, 4.35); Calibrated: 8/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 7/13/2010
- Phantom: R#4 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1250;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Left Head Template/Area Scan - Normal (15mm) (7x17x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.999 mW/g

Left Head Template/MegaZoom Zoom Scan (<=3GHz) (7x12x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.9 V/m; Power Drift = -0.038 dB
Peak SAR (extrapolated) = 2.07 W/kg
SAR(1 g) = 0.896 mW/g; SAR(10 g) = 0.400 mW/g
Maximum value of SAR (measured) = 0.979 mW/g



Test Laboratory: Motorola - WiFi - Right Head Cheek Touch

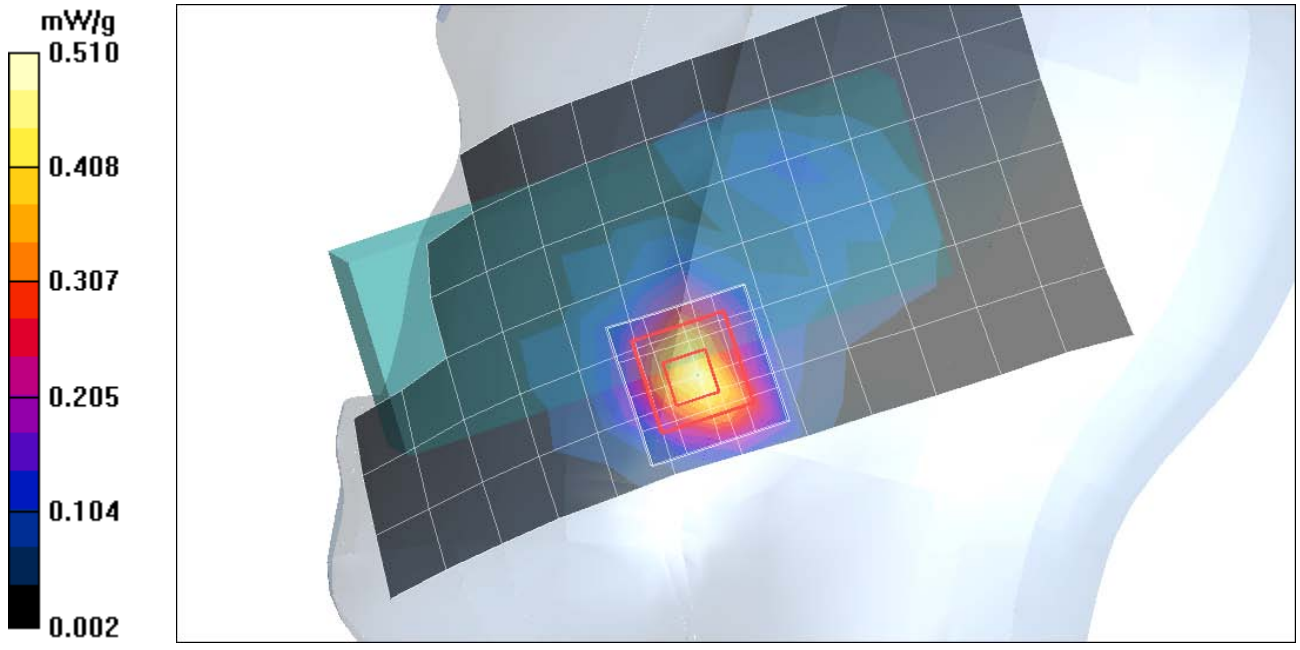
DUT Serial: 351575040007136;
Procedure Notes: Battery Model #: SNN5877A DEVICE POSITION (cheek or rotated): cheek
Communication System: Wi-Fi 2450; Frequency: 2437 MHz; Communication System Channel Number: 6; Duty Cycle: 1:1
Medium: 2450 Glycol Head; Medium parameters used: f = 2450 MHz; σ = 1.87 mho/m; ε_r = 37.4; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3037; ConvF(4.41, 4.41, 4.41); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/17/2009
- Phantom: R1_ Glycol, SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1139;
- 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) = 0.434 mW/g

Right Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.3 V/m; Power Drift = 0.118 dB
Peak SAR (extrapolated) = 0.918 W/kg
SAR(1 g) = 0.440 mW/g; SAR(10 g) = 0.204 mW/g
Maximum value of SAR (measured) = 0.510 mW/g



Test Laboratory: Motorola - WiFi - Left Head 15 Degree Tilt

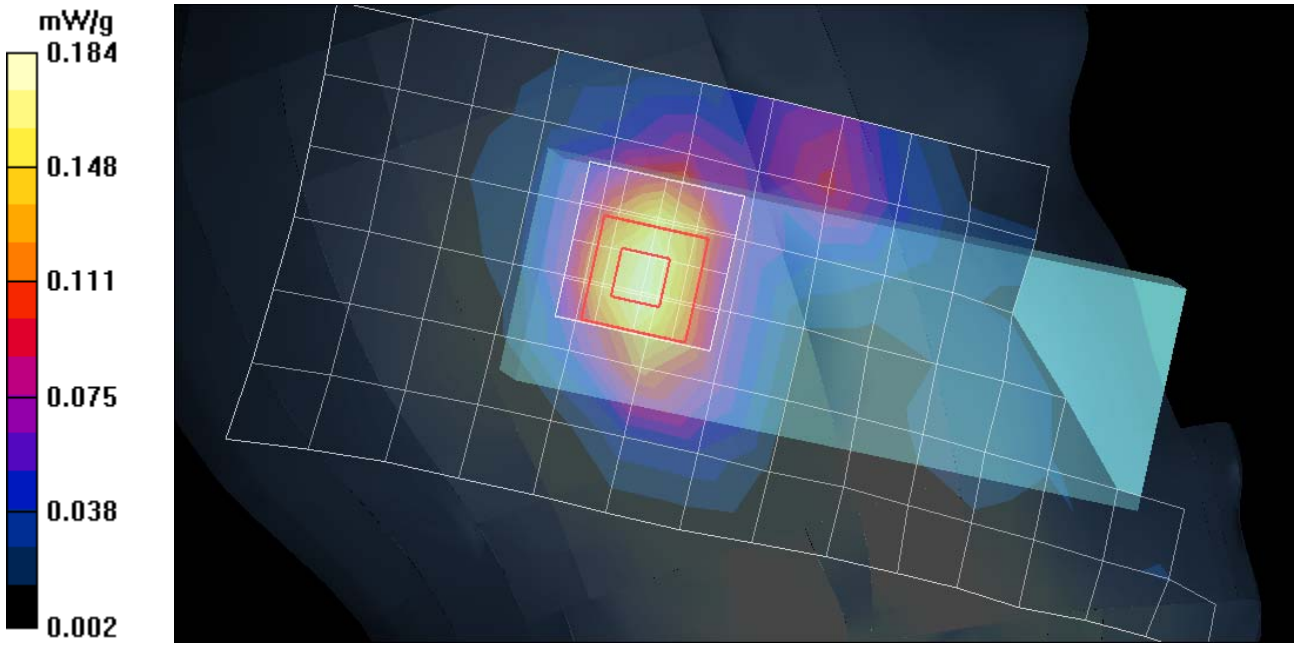
DUT Serial: 351575040007136;
Procedure Notes: Battery Model #: SNN5877A DEVICE POSITION (cheek or rotated): tilt
Communication System: Wi-Fi 2450; Frequency: 2437 MHz; Communication System Channel Number: 6; Duty Cycle: 1:1
Medium: 2450 Glycol Head; Medium parameters used: f = 2450 MHz; σ = 1.87 mho/m; ε_r = 37.4; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3037; ConvF(4.41, 4.41, 4.41); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/17/2009
- Phantom: R1_ Glycol, SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1139;
- 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) = 0.175 mW/g

Left Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.22 V/m; Power Drift = -0.253 dB
Peak SAR (extrapolated) = 0.287 W/kg
SAR(1 g) = 0.169 mW/g; SAR(10 g) = 0.093 mW/g
Maximum value of SAR (measured) = 0.184 mW/g



Test Laboratory: Motorola - WiFi Right Head 15 Degree Tilt

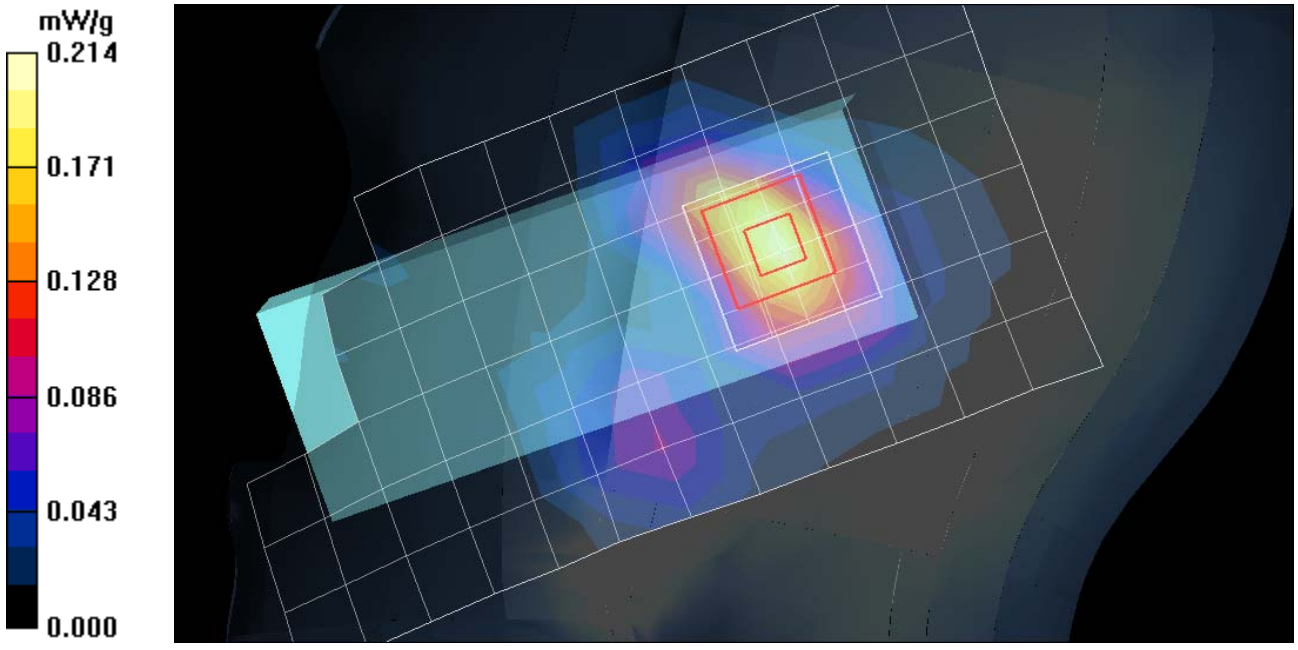
DUT Serial: 351575040007136;
Procedure Notes: Battery Model #: SNN5877A DEVICE POSITION (cheek or rotated): titlt
Communication System: Wi-Fi 2450; Frequency: 2437 MHz; Communication System Channel Number: 6; Duty Cycle: 1:1
Medium: 2450 Glycol Head; Medium parameters used: f = 2450 MHz; σ = 1.87 mho/m; ε_r = 37.4; ρ = 1000 kg/m^3

DASY4 Configuration:

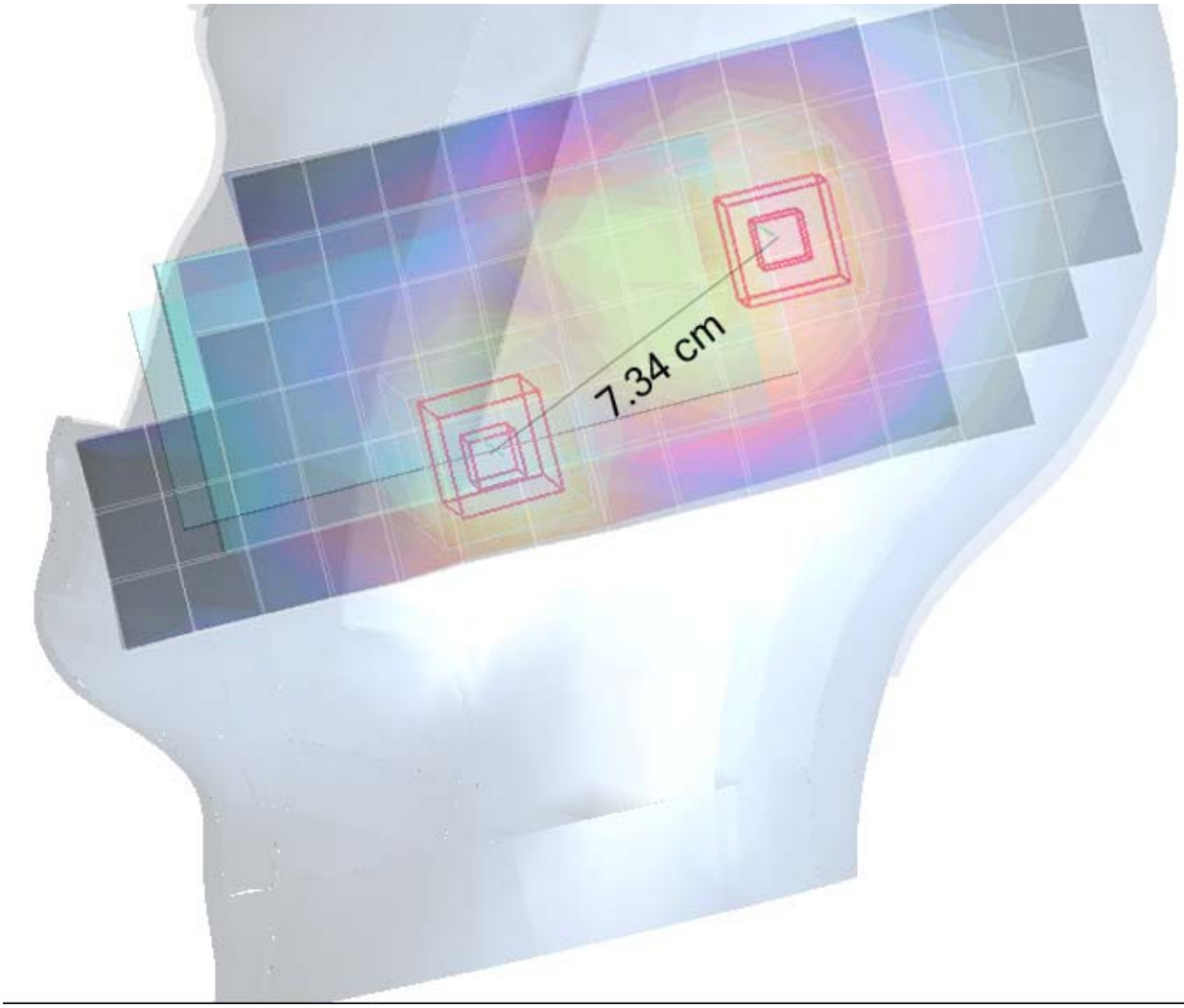
- Probe: ES3DV3 - SN3037; ConvF(4.41, 4.41, 4.41); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/17/2009
- Phantom: R1_ Glycol, SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1139;
- Measurement SW: DASY4, V4.7 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) = 0.165 mW/g

Right Head Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.5 V/m; Power Drift = -0.051 dB
Peak SAR (extrapolated) = 0.338 W/kg
SAR(1 g) = 0.188 mW/g; SAR(10 g) = 0.098 mW/g
Maximum value of SAR (measured) = 0.214 mW/g



The guidelines provided in "SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas" (KDB publication 648474 - D01 v01r05) were utilized for evaluation of the need for simultaneous transmission SAR testing. These guidelines direct that if the SAR-to-peak-location separation ratio for two simultaneously transmitting antennas is < 0.3 then SAR evaluation for simultaneous transmission is not required. For WCDMA 1700 and Wi-Fi in the Right Head Cheek position the SAR-to-peak-location separation ratio is 0.26 (using the standard 5x5x7 measurement grid), and thus no testing was performed to determine the aggregate 1 g SAR in this configuration. A SAR plot with the Wi-Fi SAR overlaid upon the WCDMA 1700 Right Head Cheek SAR are provided in Appendix 2 for this configuration, to provide visual indication of the separation of the SAR hotspots for each modulation.



WCDMA1700 Right Head Cheek SAR overlaid with Wi-Fi Right Head Cheek SAR

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WCDMA 850 and WiFi Left Head Cheek Touch Simultaneous Transmisstion Tests

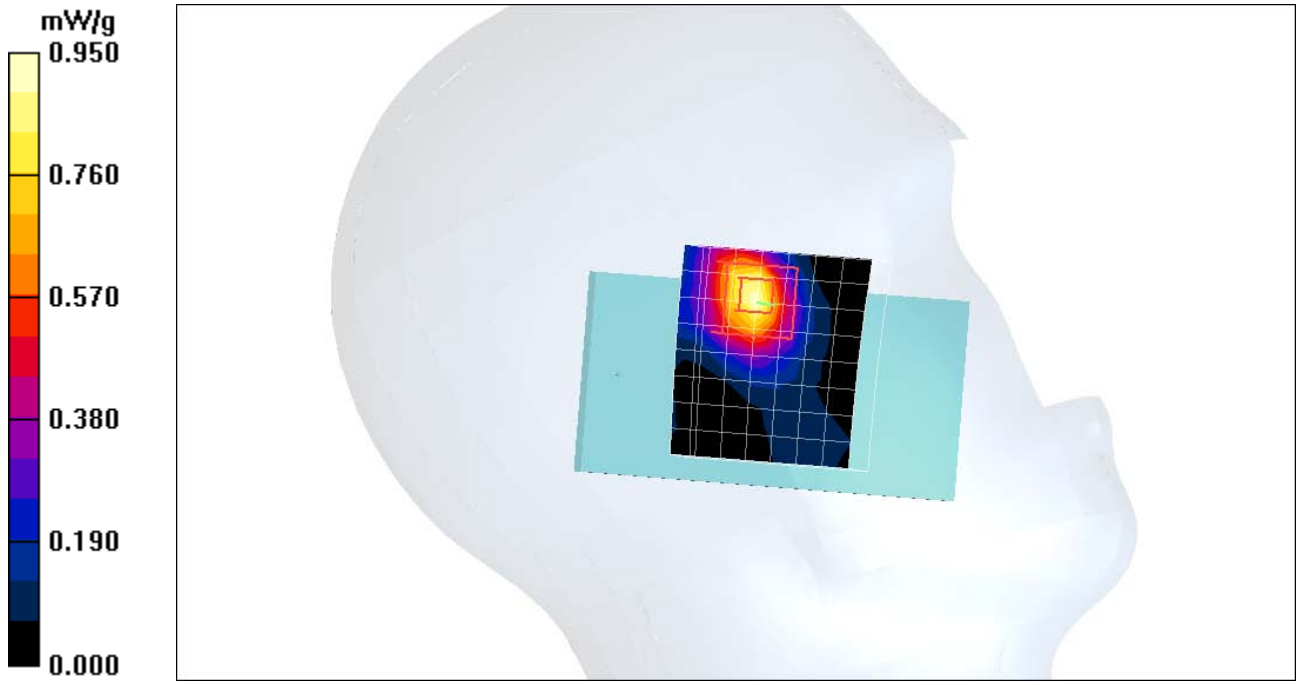
DASY4 Configuration for DASY4, SAM Left Head/Left Head Template/Zoom Scan (<=3GHz):

Date/Time: 9/28/2010 7:09:28 AM
Serial: 351575040007136 FCC ID: IHDP56LC3
Communication System: Wi-Fi 2450; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: f = 2450 MHz; σ = 1.88 mho/m; ε_r = 36.9; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

- Probe: ES3DV3 - SN3124; ConvF(4.35, 4.35, 4.35); Calibrated: 8/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 7/13/2010
- Phantom: R#4 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1250
- Measurement SW: DASY4, V4.7 Build 80

Left Head Template/Zoom Scan (<=3GHz) (9x8x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm; Volume Outer Dimensions: x=64mm, y=56mm, z=30mm
Reference Value = 14.8 V/m; Power Drift = -0.069 dB Peak SAR (extrapolated) = 1.93 W/kg
SAR(1 g) = 0.865 mW/g; SAR(10 g) = 0.393 mW/g Maximum value of SAR (measured) = 0.950 mW/g



DASY4 Configuration for DASY4, SAM Left Head/Left Head Template/Zoom Scan (<=3GHz):

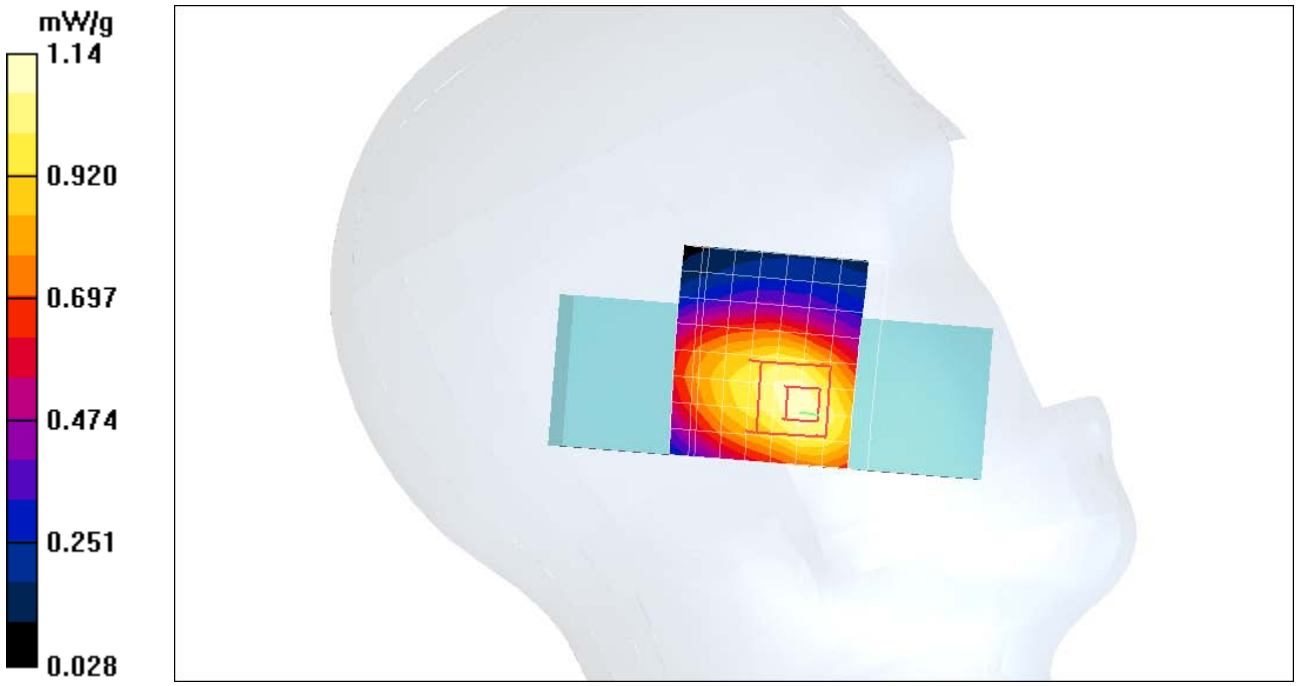
Date/Time: 9/28/2010 11:45:18 AM
Serial: 351575040016095 FCC ID: IHDP56LC3
Communication System: 3G-WCDMA 850; Frequency: 846.6 MHz; Duty Cycle: 1:1
Medium: f = 850 MHz; σ = 0.93 mho/m; ε_r = 42.4; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

- Probe: ES3DV3 - SN3183; ConvF(6.11, 6.11, 6.11); Calibrated: 7/14/2010...

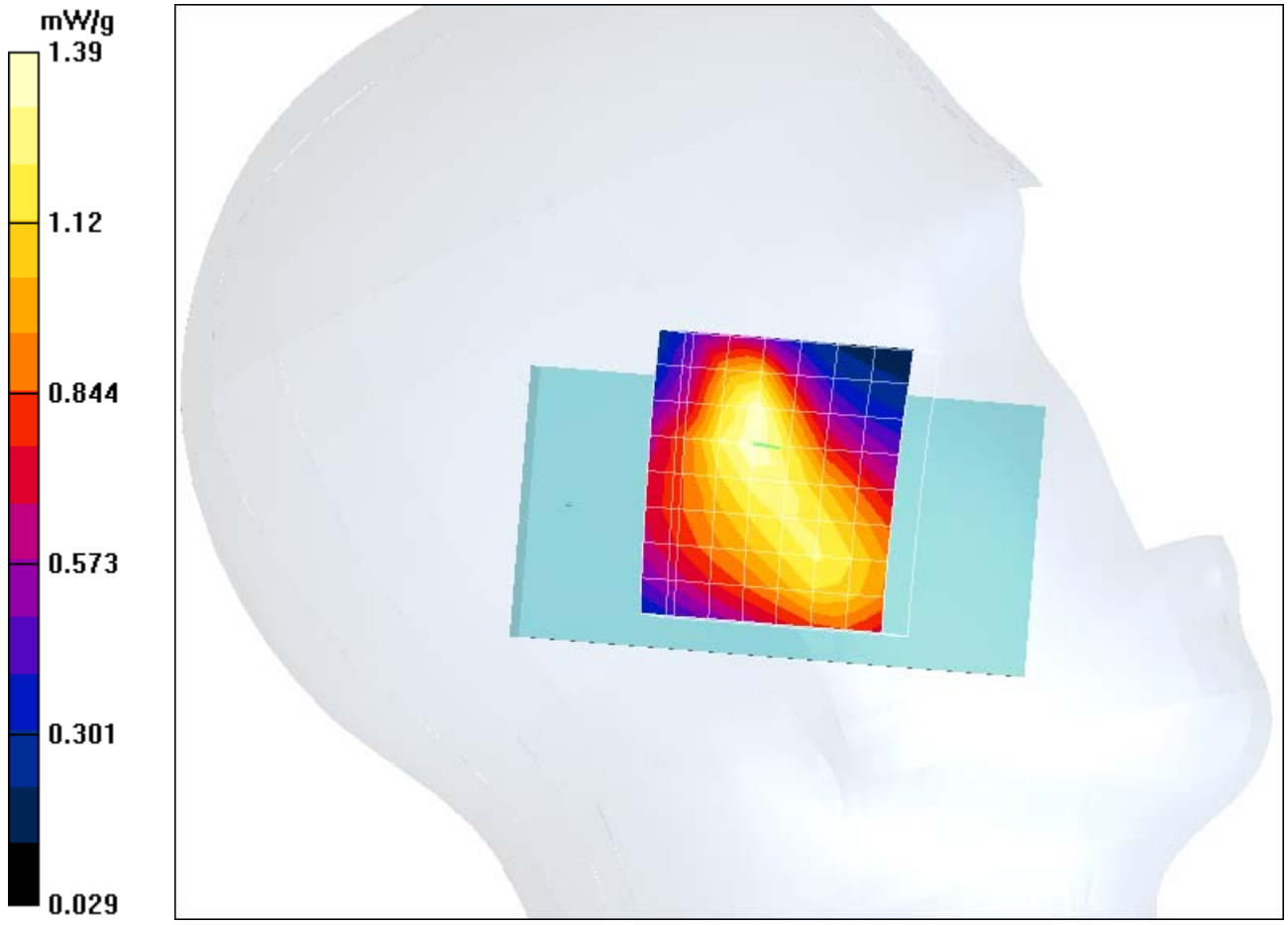
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn702; Calibrated: 5/18/2010
- Phantom: R1_ Sugar SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1156
- Measurement SW: DASY4, V4.7 Build 80

Left Head Template/Zoom Scan (<=3GHz) (9x8x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm; Volume Outer Dimensions: x=64mm, y=56mm, z=30mm
Reference Value = 34.6 V/m; Power Drift = -0.002 dB Peak SAR (extrapolated) = 1.38 W/kg
SAR(1 g) = 1.07 mW/g; SAR(10 g) = 0.786 mW/g Maximum value of SAR (measured) = 1.14 mW/g



Multi Band Result:
SAR(1 g) = 1.29 mW/g; SAR(10 g) = 0.870 mW/g
Maximum value of SAR (measured) = 1.39 mW/g


mW/g
1.39
1.12
0.844
0.573
0.301
0.029

WCDMA 1700 and WiFi Left Head Cheek Simultaneous Transmission

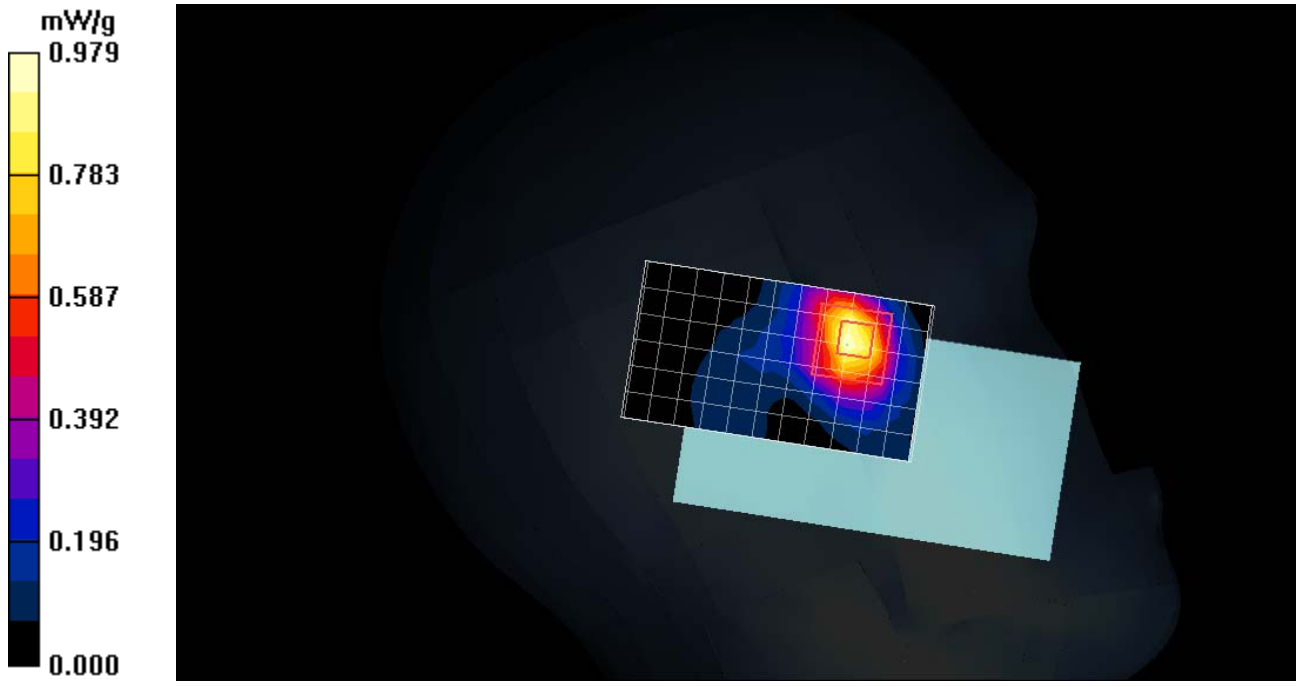
DASY4 Configuration for DASY4, SAM Left Head/Left Head Template/Zoom Scan (<=3GHz):

Date/Time: 9/28/2010 7:43:42 AM
DUT Serial: 351575040007136
Communication System: Wi-Fi 2450; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: f = 2450 MHz; σ = 1.88 mho/m; ε_r = 36.9; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

- Probe: ES3DV3 - SN3124; ConvF(4.35, 4.35, 4.35); Calibrated: 8/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 7/13/2010
- Phantom: R#4 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1250
- Measurement SW: DASY4, V4.7 Build 80

Left Head Template/Zoom Scan (<=3GHz) (7x12x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm; Volume Outer Dimensions: x=48mm, y=88mm, z=30mm
Reference Value = 14.9 V/m; Power Drift = -0.038 dB Peak SAR (extrapolated) = 2.07 W/kg
SAR(1 g) = 0.896 mW/g; SAR(10 g) = 0.400 mW/g Maximum value of SAR (measured) = 0.979 mW/g



DASY4 Configuration for DASY4, SAM Left Head/Left Head Template/Zoom Scan (<=3GHz):

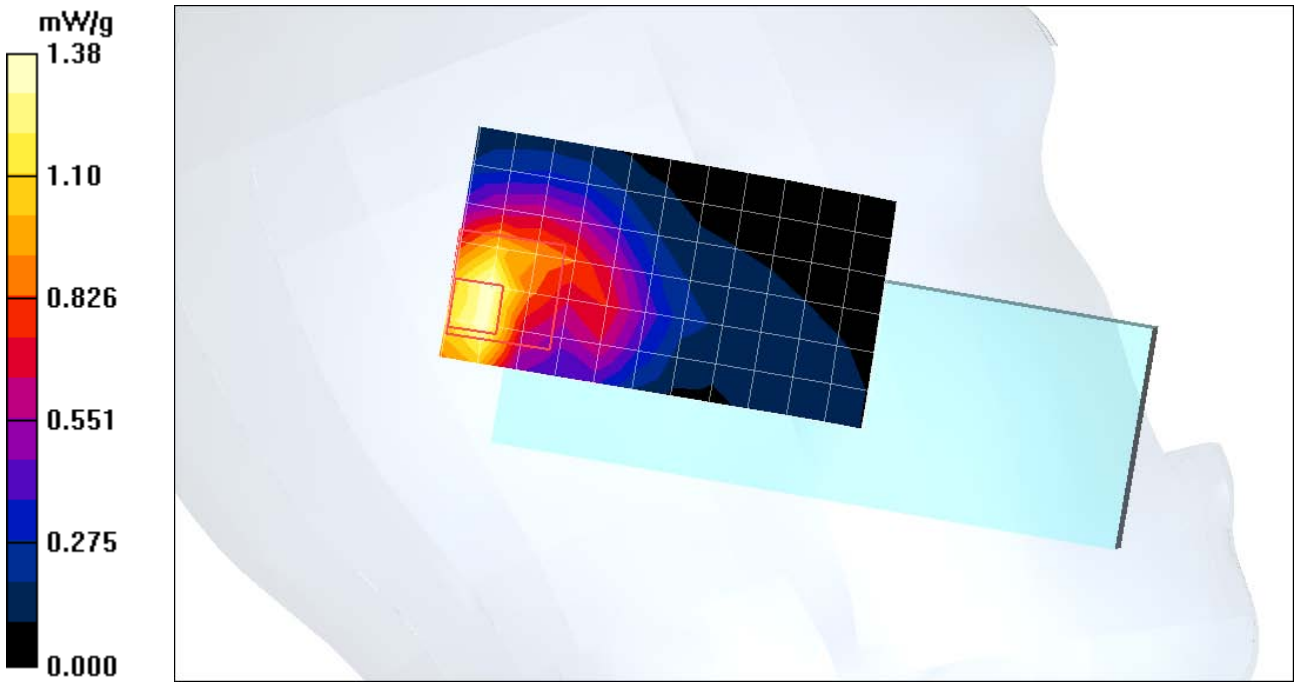
Date/Time: 9/28/2010 1:09:52 PM
DUT Serial: 351575040016095
Communication System: 3G/WCDMA 1700; Frequency: 1752.6 MHz; Duty Cycle: 1:1
Medium: f = 1730 MHz; σ = 1.39 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

- Probe: ES3DV3 - SN3183; ConvF(5.05, 5.05, 5.05); Calibrated: 7/14/2010

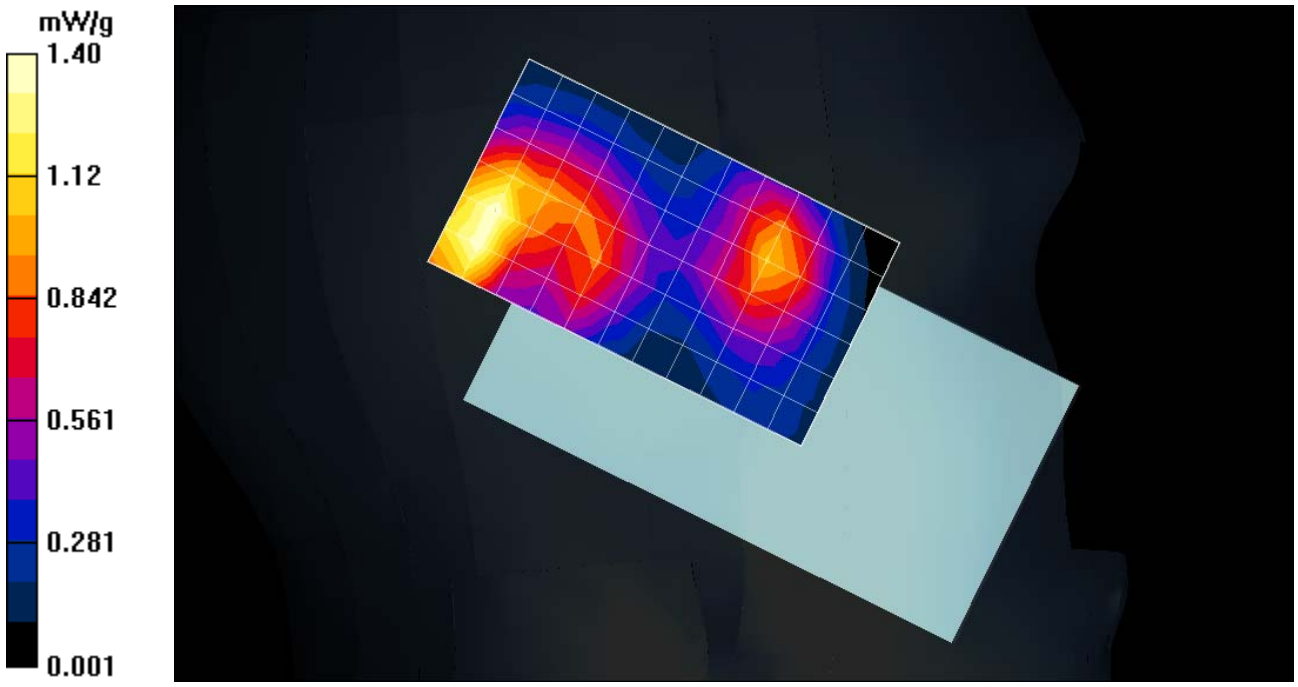
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn702; Calibrated: 5/18/2010
- Phantom: R1_ Glycol, SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1139
- Measurement SW: DASY4, V4.7 Build 80

Left Head Template/Zoom Scan (<=3GHz) (7x12x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm; Volume Outer Dimensions: x=48mm, y=88mm, z=30mm
Reference Value = 31.7 V/m; Power Drift = -0.014 dB Peak SAR (extrapolated) = 2.36 W/kg
SAR(1 g) = 1.26 mW/g; SAR(10 g) = 0.608 mW/g Maximum value of SAR (measured) = 1.38 mW/g



Multi Band Result:
SAR(1 g) = 1.28 mW/g; SAR(10 g) = 0.626 mW/g
Maximum value of SAR (measured) = 1.40 mW/g



Left Head tilt for WCDMA 1700 and WiFi Simultaneous Transmission

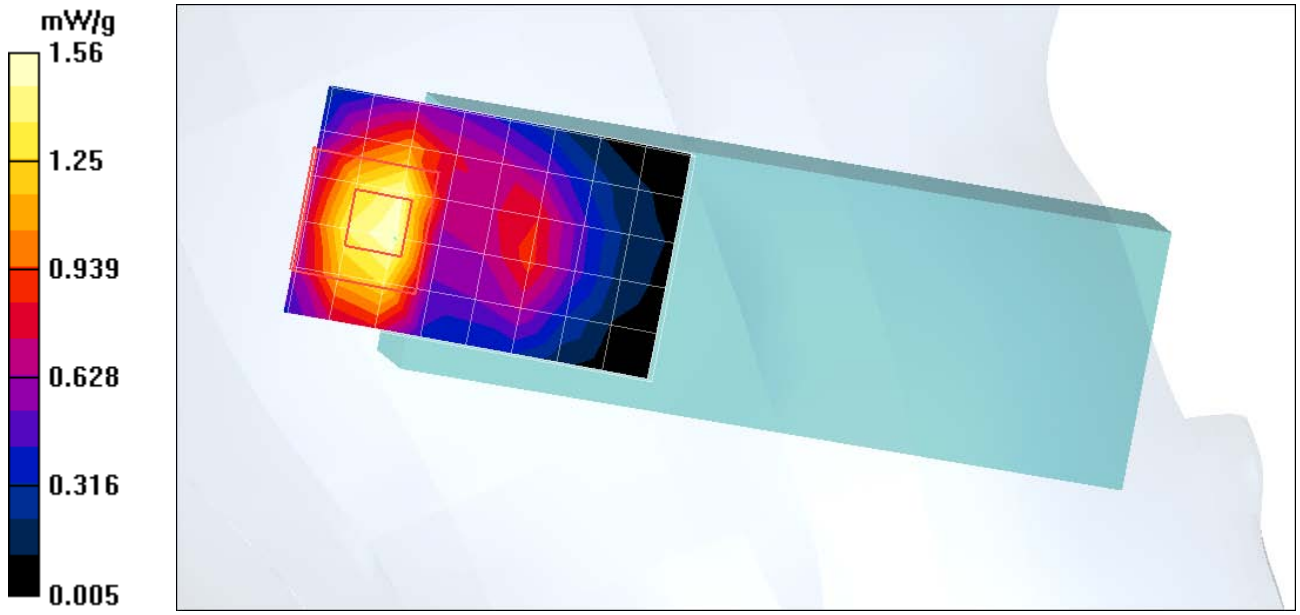
DASY4 Configuration for DASY4, SAM Left Head/Left Head Template/Zoom Scan (<=3GHz):

Date/Time: 9/28/2010 3:12:55 PM
DUT Serial: 351575040016095
Communication System: 3G/WCDMA 1700; Frequency: 1752.6 MHz; Duty Cycle: 1:1
Medium: f = 1730 MHz; σ = 1.39 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

- Probe: ES3DV3 - SN3183; ConvF(5.05, 5.05, 5.05); Calibrated: 7/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn702; Calibrated: 5/18/2010
- Phantom: R1_ Glycol, SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1139
- Measurement SW: DASY4, V4.7 Build 80

Left Head Template/Zoom Scan (<=3GHz) (6x9x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm; Volume Outer Dimensions: x=40mm, y=64mm, z=30mm
Reference Value = 32.1 V/m; Power Drift = -0.077 dB Peak SAR (extrapolated) = 2.71 W/kg
SAR(1 g) = 1.44 mW/g; SAR(10 g) = 0.718 mW/g Maximum value of SAR (measured) = 1.56 mW/g



DASY4 Configuration for DASY4, SAM Left Head/Left Head Template/Zoom Scan (<=3GHz):

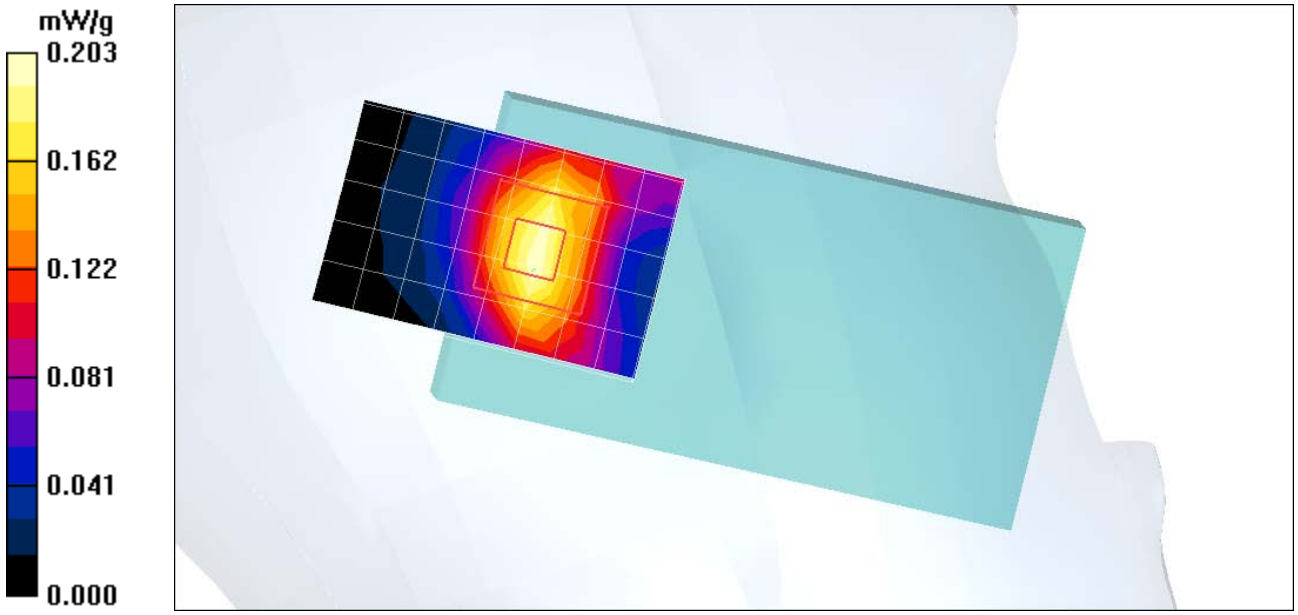
Date/Time: 9/28/2010 8:26:03 AM
DUT Serial: 351575040007136
Communication System: Wi-Fi 2450; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: f = 2450 MHz; σ = 1.88 mho/m; ε_r = 36.9; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

- Probe: ES3DV3 - SN3124; ConvF(4.35, 4.35, 4.35); Calibrated: 8/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 7/13/2010...

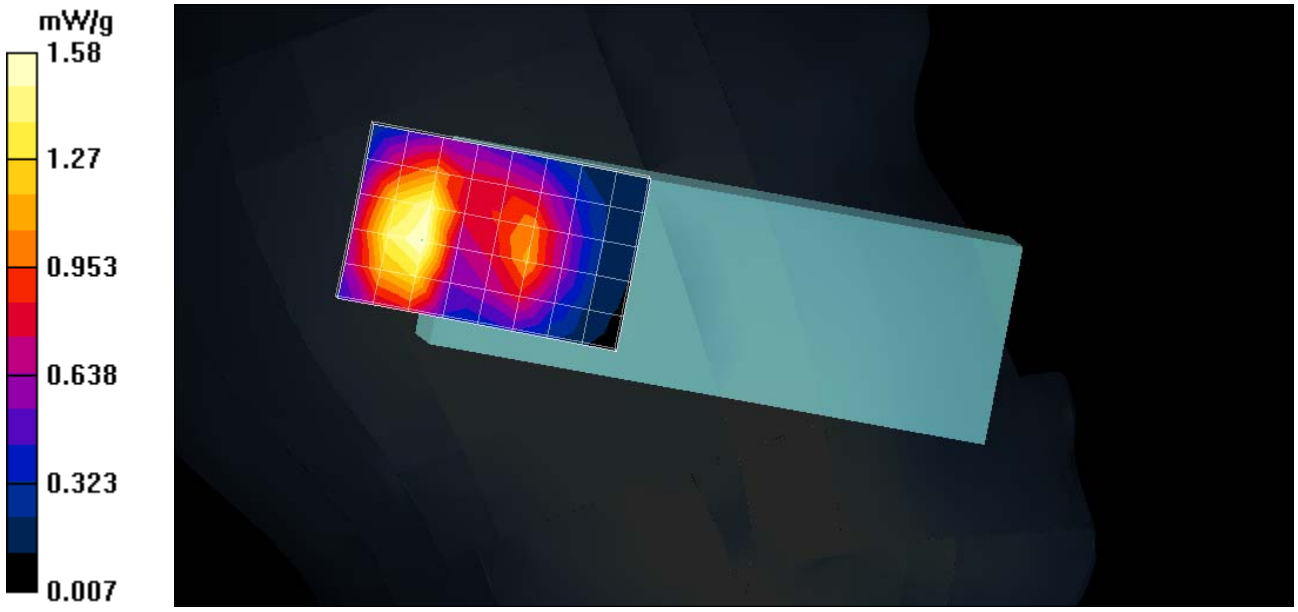
- Phantom: R#4 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1250
- Measurement SW: DASY4, V4.7 Build 80

Left Head Template/Zoom Scan (<=3GHz) (6x9x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm; Volume Outer Dimensions: x=40mm, y=64mm, z=30mm
Reference Value = 10.1 V/m; Power Drift = -0.055 dB Peak SAR (extrapolated) = 0.333 W/kg
SAR(1 g) = 0.182 mW/g; SAR(10 g) = 0.094 mW/g Maximum value of SAR (measured) = 0.203 mW/g



Multi Band Result:
SAR(1 g) = 1.46 mW/g; SAR(10 g) = 0.730 mW/g
Maximum value of SAR (measured) = 1.58 mW/g..



Right Head Tilt for WCDMA 1700 and WiFi Simultaneous Transmission

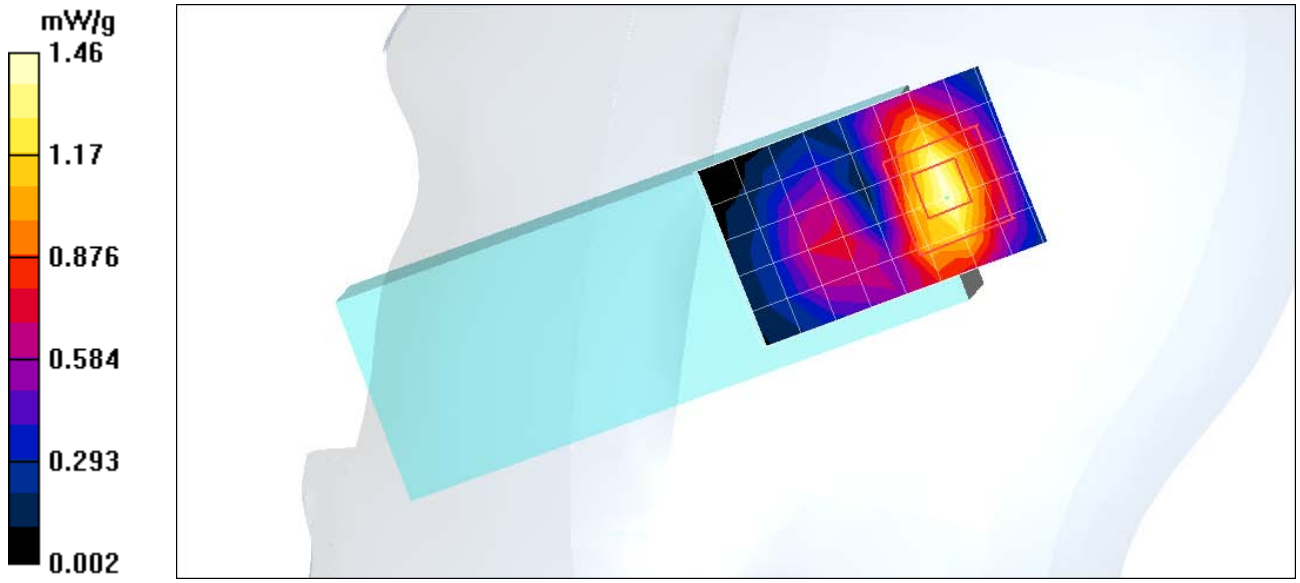
DASY4 Configuration for SAM Right Head/Right Head Template/Zoom Scan (<=3GHz):

Date/Time: 9/28/2010 3:53:37 PM
DUT Serial: 351575040016095
Communication System: 3G/WCDMA 1700; Frequency: 1732.5 MHz; Duty Cycle: 1:1
Medium: f = 1730 MHz; σ = 1.39 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

- Probe: ES3DV3 - SN3183; ConvF(5.05, 5.05, 5.05); Calibrated: 7/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn702; Calibrated: 5/18/2010
- Phantom: R1_ Glycol, SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1139
- Measurement SW: DASY4, V4.7 Build 80

Right Head Template/Zoom Scan (<=3GHz) (6x9x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm; Volume Outer Dimensions: x=40mm, y=64mm, z=30mm
Reference Value = 27.7 V/m; Power Drift = -0.079 dB Peak SAR (extrapolated) = 2.72 W/kg
SAR(1 g) = 1.33 mW/g; SAR(10 g) = 0.653 mW/g Maximum value of SAR (measured) = 1.46 mW/g



DASY4 Configuration for SAM Right Head/Right Head Template/Zoom Scan (<=3GHz):

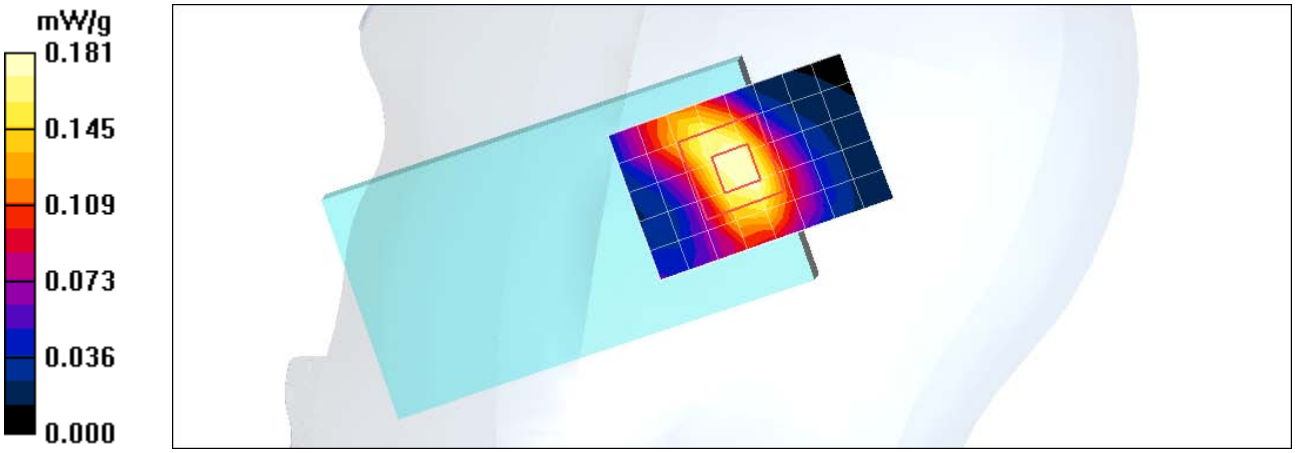
Date/Time: 9/28/2010 9:01:59 AM
DUT Serial: 351575040007136
Communication System: Wi-Fi 2450; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium: f = 2450 MHz; σ = 1.88 mho/m; ε_r = 36.9; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

- Probe: ES3DV3 - SN3124; ConvF(4.35, 4.35, 4.35); Calibrated: 8/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 7/13/2010
- Phantom: R#4 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1250

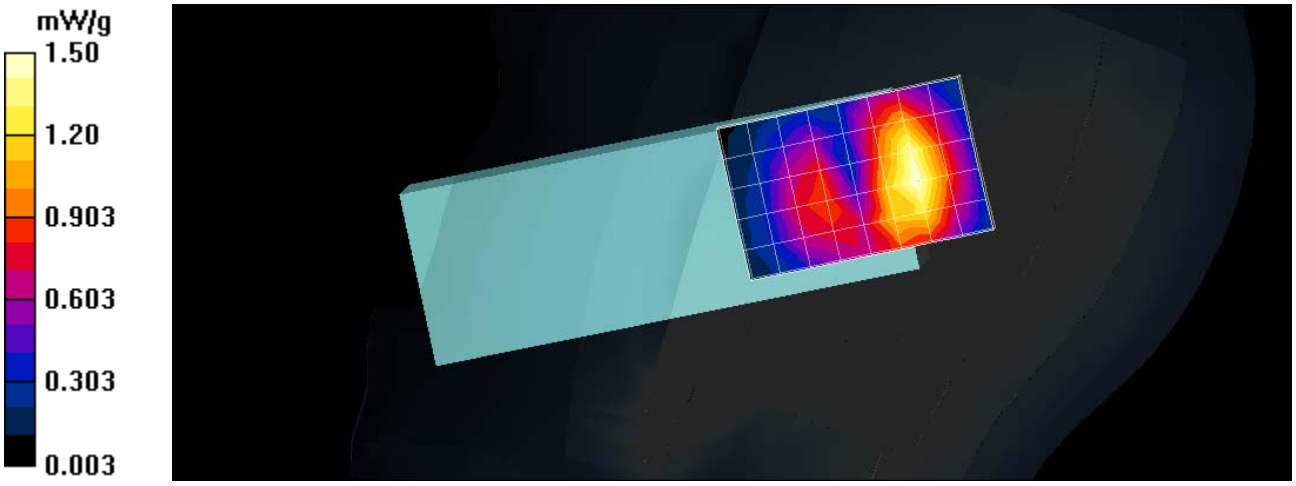
- Measurement SW: DASY4, V4.7 Build 80

Right Head Template/Zoom Scan (<=3GHz) (6x9x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm; Volume Outer Dimensions: x=40mm, y=64mm, z=30mm
Reference Value = 8.95 V/m; Power Drift = -0.128 dB Peak SAR (extrapolated) = 0.326 W/kg
SAR(1 g) = 0.171 mW/g; SAR(10 g) = 0.088 mW/g Maximum value of SAR (measured) = 0.181 mW/g



Multi Band Result:
SAR(1 g) = 1.35 mW/g; SAR(10 g) = 0.681 mW/g
Maximum value of SAR (measured) = 1.50 mW/g



GSM 1900 and WiFi Left Head Cheek Touch - Simultaneous Transmission

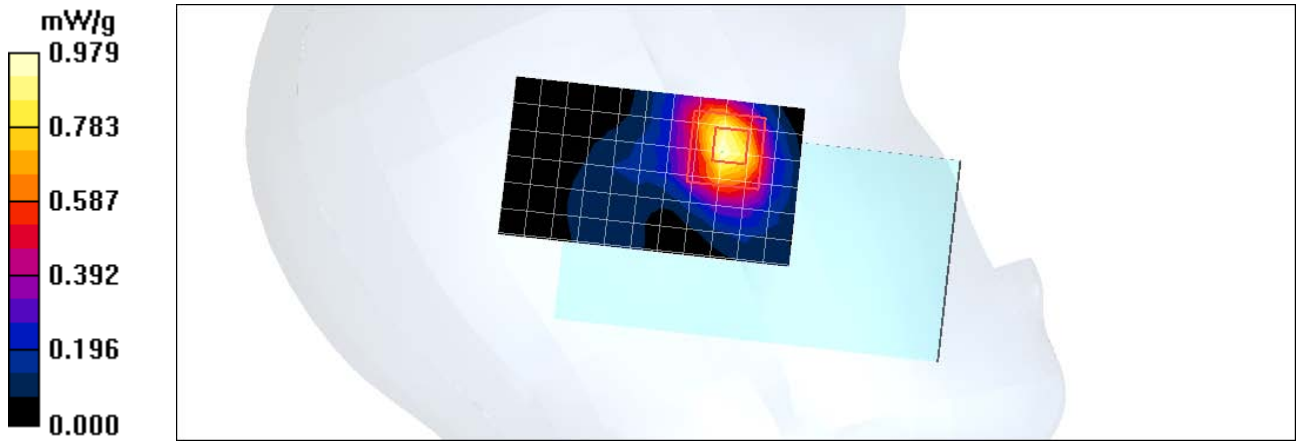
DASY4 Configuration for DASY4, SAM Left Head/Left Head Template/Zoom Scan (<=3GHz):

Date/Time: 9/28/2010 7:43:42 AM
DUT Serial: 351575040007136
Communication System: Wi-Fi 2450; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium: f = 2450 MHz; σ = 1.88 mho/m; ε_r = 36.9; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

- Probe: ES3DV3 - SN3124; ConvF(4.35, 4.35, 4.35); Calibrated: 8/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 7/13/2010
- Phantom: R#4 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1250
- Measurement SW: DASY4, V4.7 Build 80

Left Head Template/Zoom Scan (<=3GHz) (7x12x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm; Volume Outer Dimenstions: x=48mm, y=88mm, z=30mm
Reference Value = 14.9 V/m; Power Drift = -0.038 dB Peak SAR (extrapolated) = 2.07 W/kg
SAR(1 g) = 0.896 mW/g; SAR(10 g) = 0.400 mW/g Maximum value of SAR (measured) = 0.979 mW/g



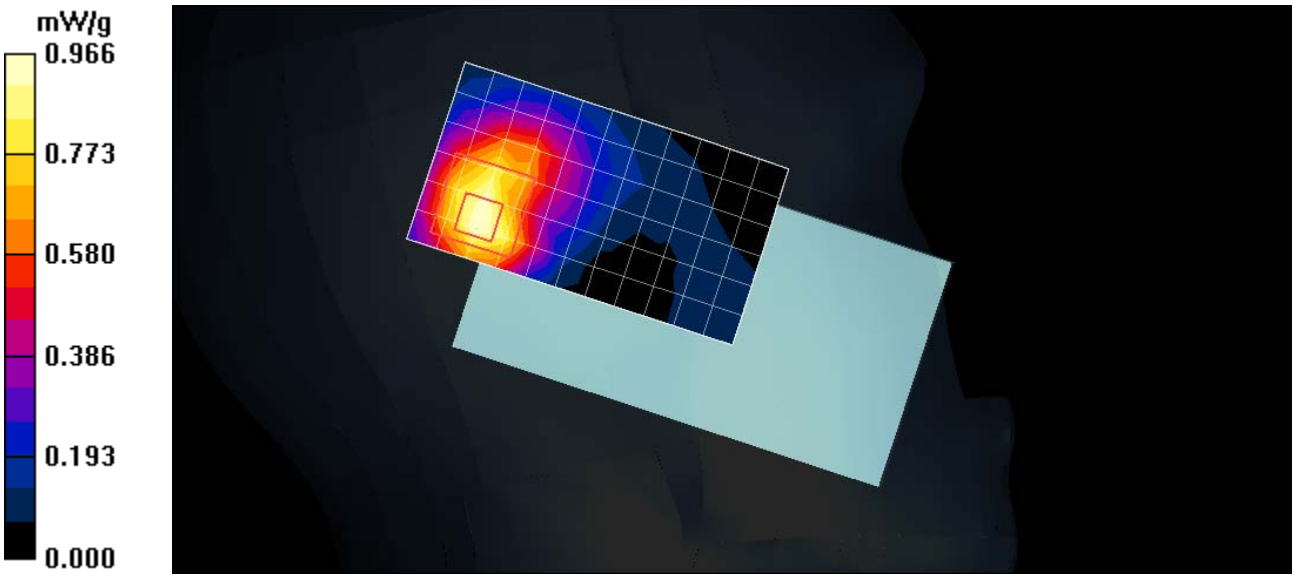
DASY4 Configuration for DASY4, SAM Left Head/Left Head Template/Zoom Scan (<=3GHz):

Date/Time: 9/27/2010 1:37:12 PM
DUT Serial: 351575040007136
Communication System: GSM 1900; Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: f = 1880 MHz; σ = 1.46 mho/m; ε_r = 38.4; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

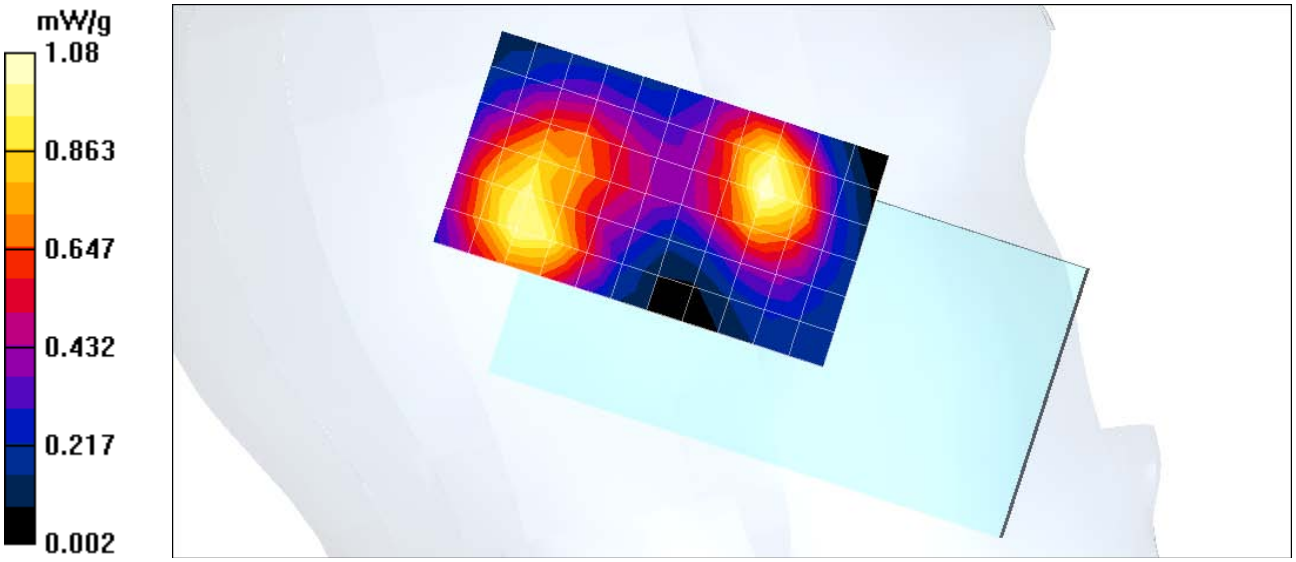
- Probe: ES3DV3 - SN3124; ConvF(4.89, 4.89, 4.89); Calibrated: 8/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn376; Calibrated: 7/13/2010
- Phantom: R#4 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1250
- Measurement SW: DASY4, V4.7 Build 80

Left Head Template/ Zoom Scan (<=3GHz) (7x12x7)/Cube 0:...

Measurement grid: dx=8mm, dy=8mm, dz=5mm; Volume Outer Dimenstions: x=48mm, y=88mm, z=30mm
Reference Value = 23.4 V/m; Power Drift = -0.012 dB Peak SAR (extrapolated) = 1.72 W/kg
SAR(1 g) = 0.886 mW/g; SAR(10 g) = 0.466 mW/g Maximum value of SAR (measured) = 0.966 mW/g



Multi Band Result:
SAR(1 g) = 0.980 mW/g; SAR(10 g) = 0.499 mW/g
Maximum value of SAR (measured) = 1.08 mW/g..



Appendix 3

SAR distribution plots for Body Worn Configuration

Test Laboratory: Motorola - GSM 850 Body Worn

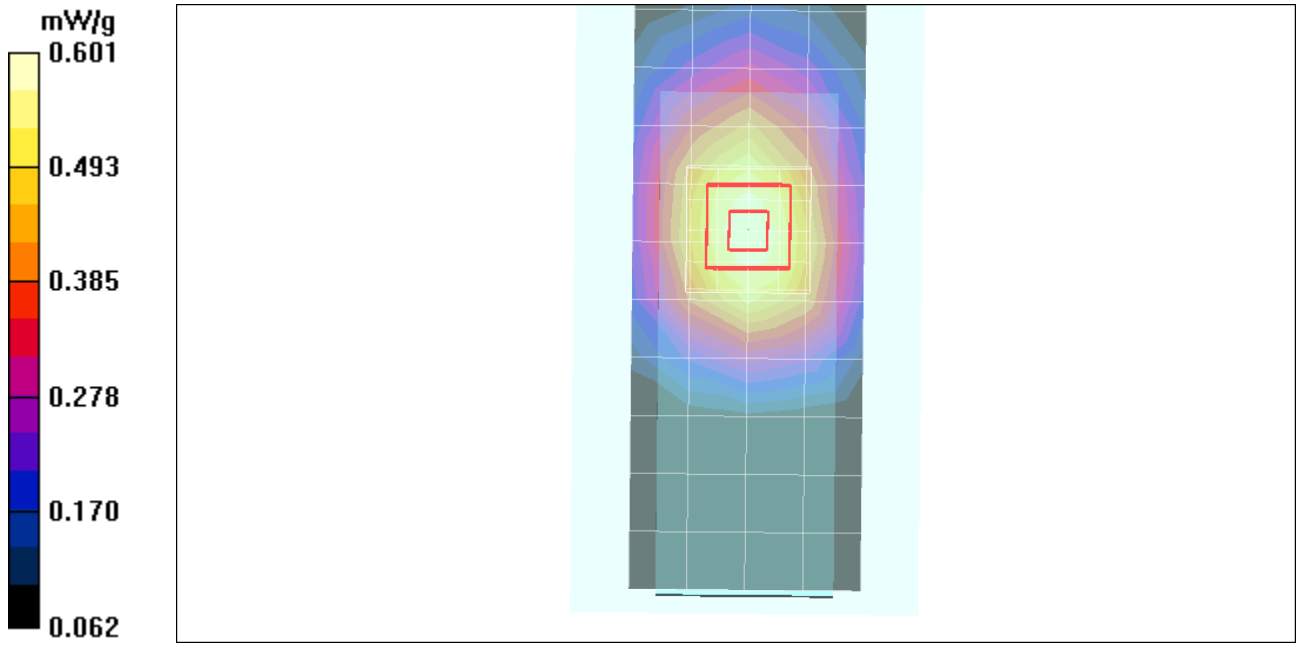
DUT Serial: 351575040007136;
Procedure Notes: Pwr Step: 05 Battery Model #: SNN5877A Accessory Model # = BODY WORN, back OF PHONE 15MM FROM PHANTOM
Communication System: GSM 850; Frequency: 836.6 MHz; Communication System Channel Number: 190; Duty Cycle: 1:8.3
Medium: Low Freq Body; Medium parameters used: f = 835 MHz; σ = 1 mho/m; ε_r = 55.6; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3037; ConvF(6.17, 6.17, 6.17); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/17/2009
- Phantom: R1_ Section 1, Amy Twin, Rev3 (3-Feb-10); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Amy Twin Phone Template/Area Scan - Normal Extended Body (15mm) (16x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.616 mW/g

Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.9 V/m; Power Drift = -0.047 dB
Peak SAR (extrapolated) = 0.710 W/kg
SAR(1 g) = 0.567 mW/g; SAR(10 g) = 0.415 mW/g
Maximum value of SAR (measured) = 0.601 mW/g



Test Laboratory: Motorola - WCDMA 850 Body Worn

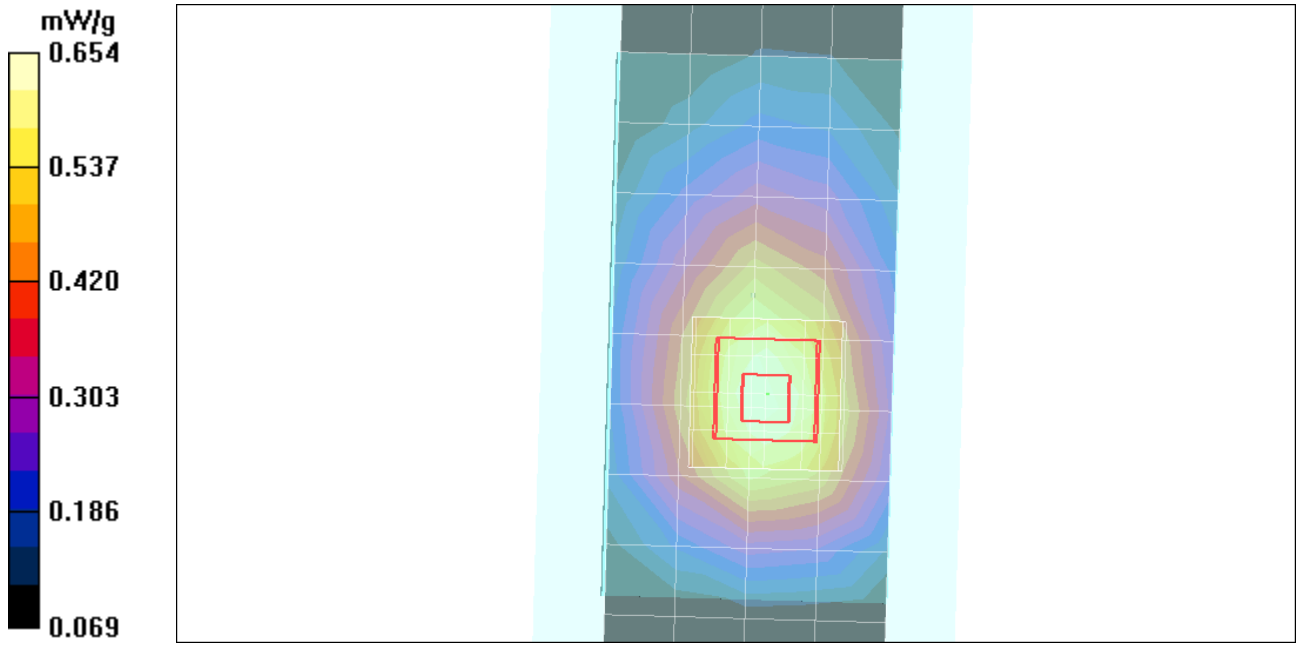
DUT Serial: 351575040016095;
Procedure Notes: Pwr Step: All Up Bits Battery Model #: SNN5877A Accessory Model # = Back of Phone 15mm from Flat Phantom
Communication System: 3G-WCDMA 850; Frequency: 836 MHz; Communication System Channel Number: 4180; Duty Cycle: 1:1
Medium: Low Freq Body; Medium parameters used: f = 835 MHz; σ = 1 mho/m; ε_r = 54.9; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3037; ConvF(6.17, 6.17, 6.17); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/17/2009
- Phantom: R1_ Section 1, Amy Twin, Rev3 (3-Feb-10); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Amy Twin Phone Template/Area Scan - Normal Extended Body (15mm) (16x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.644 mW/g

Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.6 V/m; Power Drift = 0.024 dB
Peak SAR (extrapolated) = 0.774 W/kg
SAR(1 g) = 0.618 mW/g; SAR(10 g) = 0.455 mW/g
Maximum value of SAR (measured) = 0.654 mW/g



Test Laboratory: Motorola - WCDMA 1700 Body Worn

DUT Serial: 351575040016095;
Procedure Notes: Battery Model #: SNN5877A Accessory Model # = Back of Phone 15mm from Flat Phantom

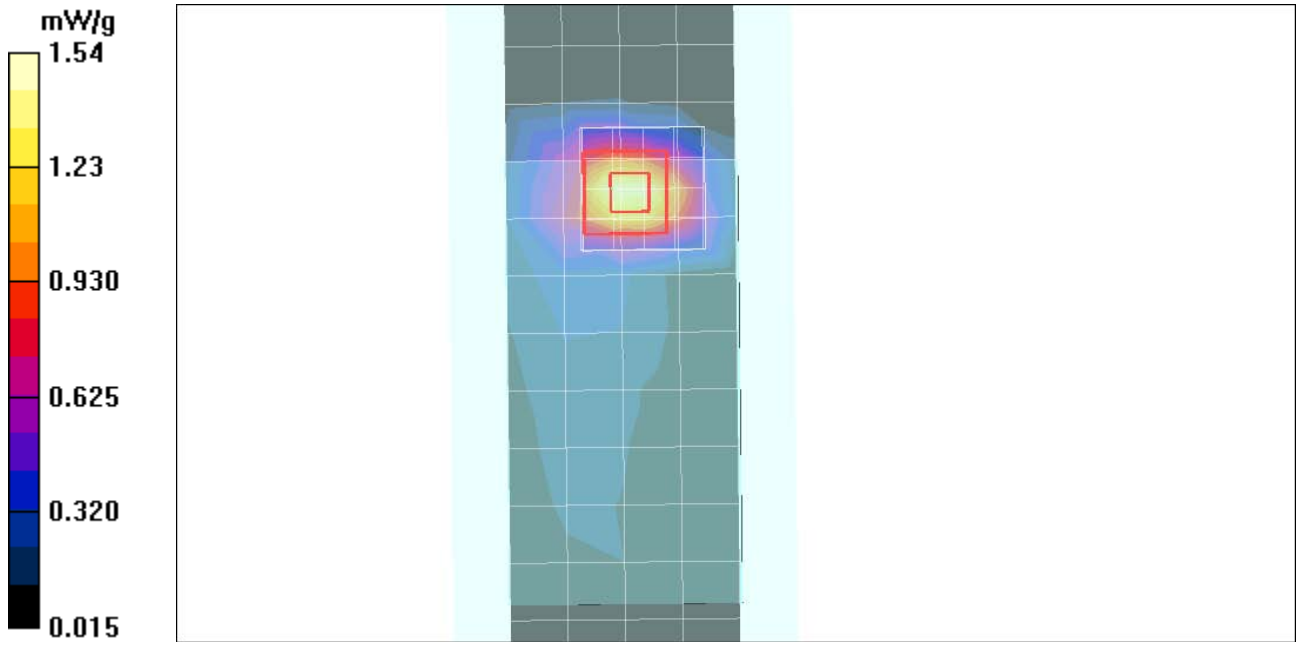
Communication System: 3G/WCDMA 1700; Frequency: 1752.6 MHz; Communication System Channel Number: 1513; Duty Cycle: 1:1
Medium: 1730 Glycol Body; Medium parameters used: f = 1730 MHz; σ = 1.51 mho/m; ε_r = 51; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3184; ConvF(4.84, 4.84, 4.84); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn440; Calibrated: 2/17/2010
- Phantom: R4 : Sect.1, Amy Twin, Rev.3 (3-Feb-10); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Amy Twin Phone Template/Area Scan - Normal Extended Body (15mm) (16x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.24 mW/g

Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.0 V/m; Power Drift = -0.007 dB
Peak SAR (extrapolated) = 2.35 W/kg
SAR(1 g) = 1.43 mW/g; SAR(10 g) = 0.771 mW/g
Maximum value of SAR (measured) = 1.54 mW/g



Test Laboratory: Motorola - GSM 1900 Body Worn

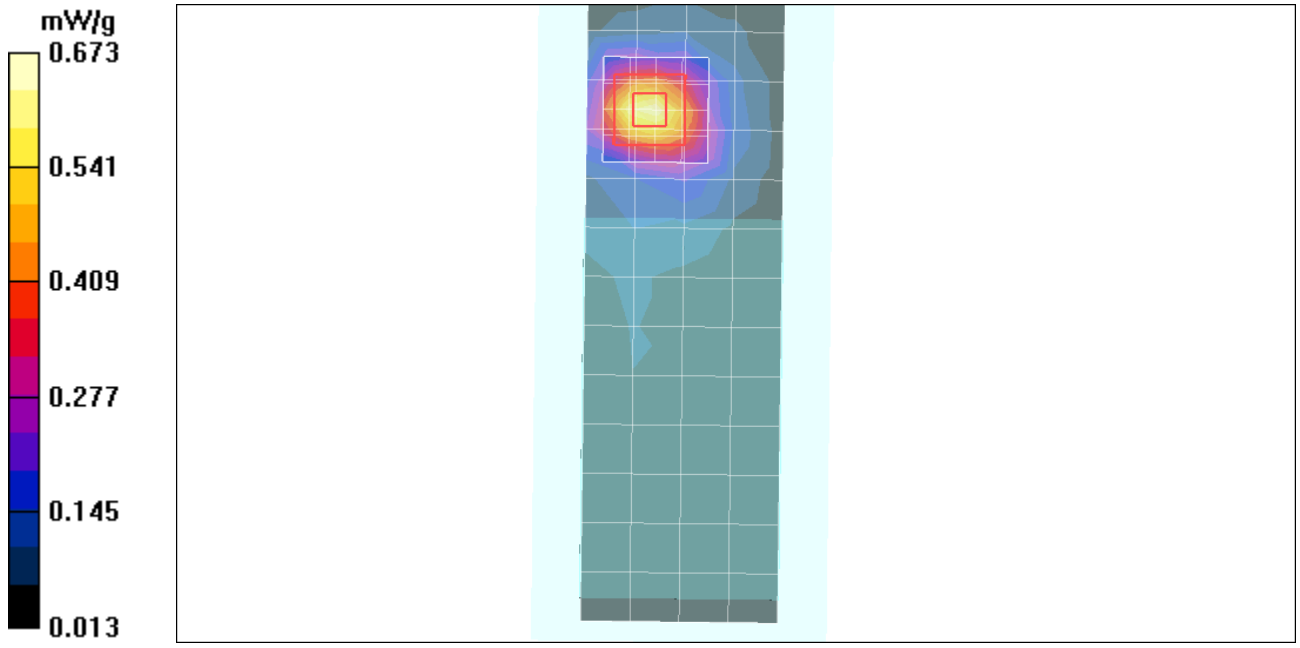
DUT Serial: 351573040004518;
Procedure Notes: Pwr Step: 00 Battery Model #: SNN5877A Accessory Model # = BACK of Phone 15mm from Phantom
Communication System: GSM 1900; Frequency: 1880 MHz; Communication System Channel Number: 661; Duty Cycle: 1:8.3
Medium: Regular Glycol Body 1750/1880; Medium parameters used: f = 1880 MHz; σ = 1.59 mho/m; ε_r = 51; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3184; ConvF(4.84, 4.84, 4.84); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn440; Calibrated: 2/17/2010
- Phantom: R4 : Sect.1, Amy Twin, Rev.3 (3-Feb-10); Type: Amy Twin Flat; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Amy Twin Phone Template/Area Scan - Normal Extended Body (15mm) (16x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.551 mW/g

Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.9 V/m; Power Drift = -0.035 dB
Peak SAR (extrapolated) = 0.995 W/kg
SAR(1 g) = 0.600 mW/g; SAR(10 g) = 0.323 mW/g
Maximum value of SAR (measured) = 0.673 mW/g



Test Laboratory: Motorola - Wi-Fi Body Worn

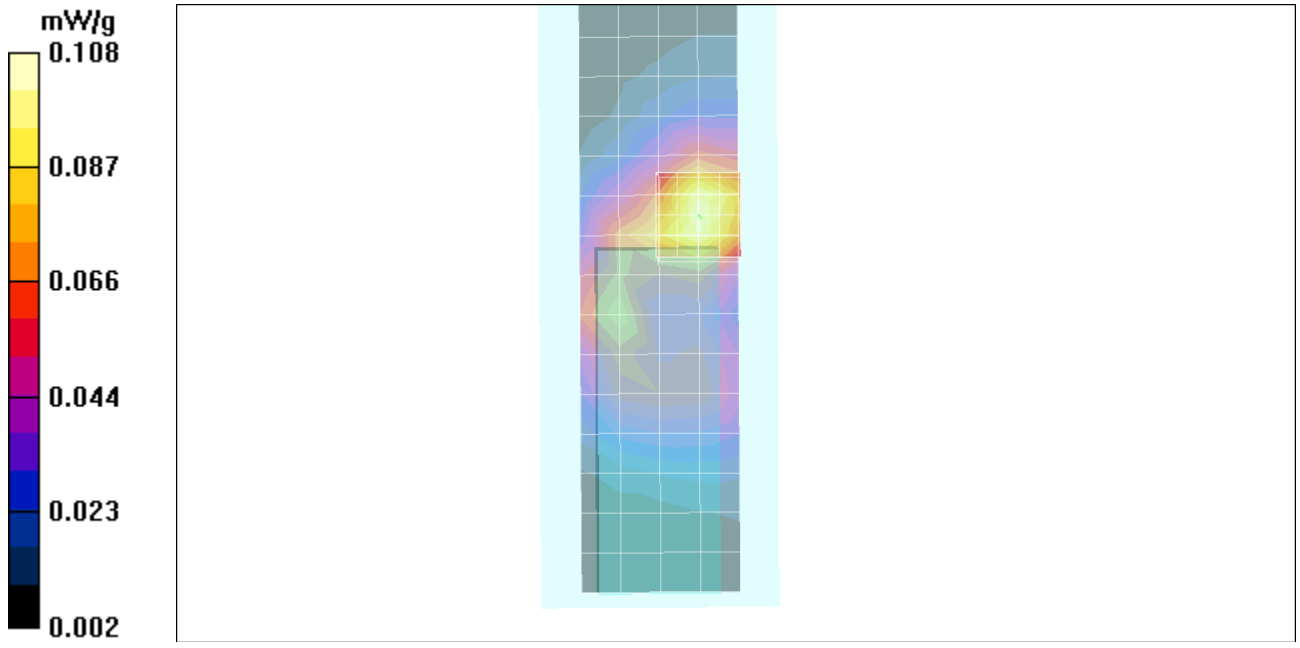
DUT Serial: 351575040007136;
Procedure Notes: Battery Model #: SNN5877A Accessory Model # = BODY WORN, BACK OF PHONE 15MM FROM PHONE
Communication System: Wi-Fi 2450; Frequency: 2437 MHz; Communication System Channel Number: 6; Duty Cycle: 1:1
Medium: 2450 Glycol Body; Medium parameters used: f = 2450 MHz; σ = 1.99 mho/m; ε_r = 49.9; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3037; ConvF(4.29, 4.29, 4.29); Calibrated: 9/18/2009
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn703; Calibrated: 9/17/2009
- Phantom: R1_ 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) = 0.103 mW/g

Amy Twin Phone Template/5x5x7 Zoom Scan (<=3GHz) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.29 V/m; Power Drift = -0.029 dB
Maximum value of SAR (measured) = 0.108 mW/g



Appendix 4

Probe Calibration Certificate

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

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

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

Accreditation No.: SCS 108

Client Motorola MDb

Certificate No: ES3-3183_Jul10

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3183

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

Calibration date: July 14, 2010

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013_Dec09)	Dec-10
DAE4	SN: 660	20-Apr-10 (No. DAE4-660_Apr10)	Apr-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct10

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

Issued: July 15, 2010

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

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

Accredited by the Swiss Accreditation Service (SAS) Accreditation No.: **SCS 108**
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Glossary:

TSL	tissue simulating liquid
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., ϑ = 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 ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *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 ≤ 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:3183

Manufactured:	March 25, 2008
Last calibrated:	August 17, 2009
Recalibrated:	July 14, 2010

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 SN:3183

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.21	1.15	1.07	± 10.1%
DCP (mV)[B]	88.6	86.9	89.5	

Modulation Calibration Parameters

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

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

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).

[B] Numerical linearization parameter: uncertainty not required.

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

DASY/EASY - Parameters of Probe: ES3DV3 SN:3183

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
835	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	6.11	6.11	6.11	0.99	1.04 ± 11.0%
1810	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	5.05	5.05	5.05	0.58	1.33 ± 11.0%
1950	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	4.82	4.82	4.82	0.54	1.37 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	4.49	4.49	4.49	0.44	1.70 ± 11.0%

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

DASY/EASY - Parameters of Probe: ES3DV3 SN:3183

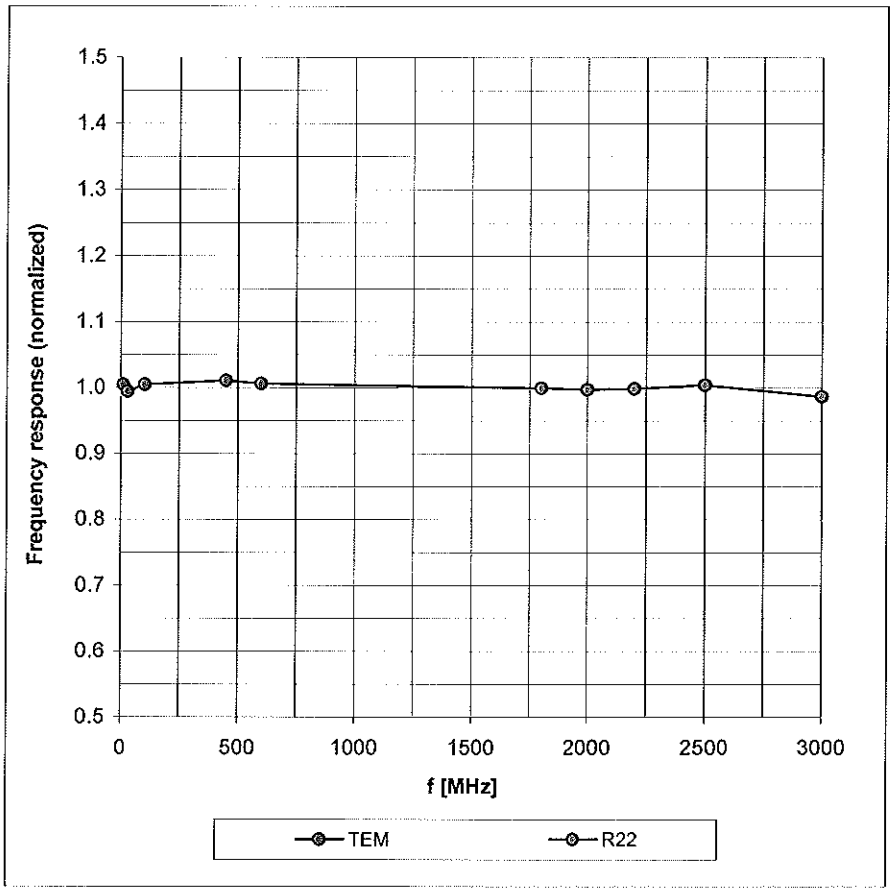
Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
835	± 50 / ± 100	55.2 ± 5%	0.97 ± 5%	6.15	6.15	6.15	0.95	1.10 ± 11.0%
1810	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.84	4.84	4.84	0.39	1.87 ± 11.0%
1950	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.86	4.86	4.86	0.28	2.80 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	4.36	4.36	4.36	0.69	1.31 ± 11.0%

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

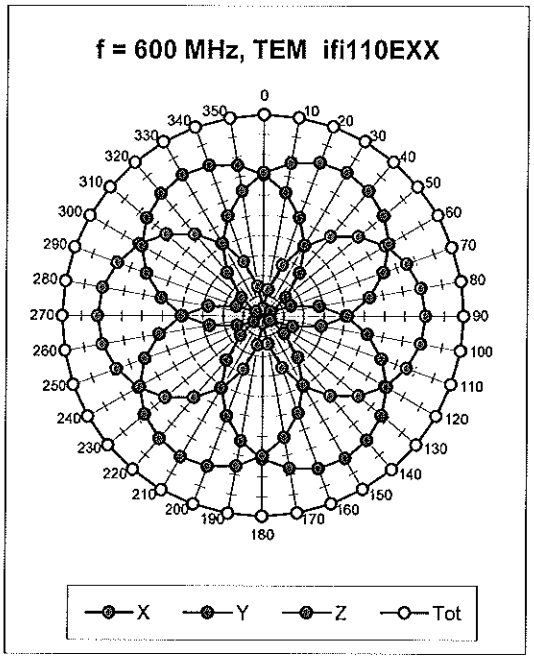
Frequency Response of E-Field

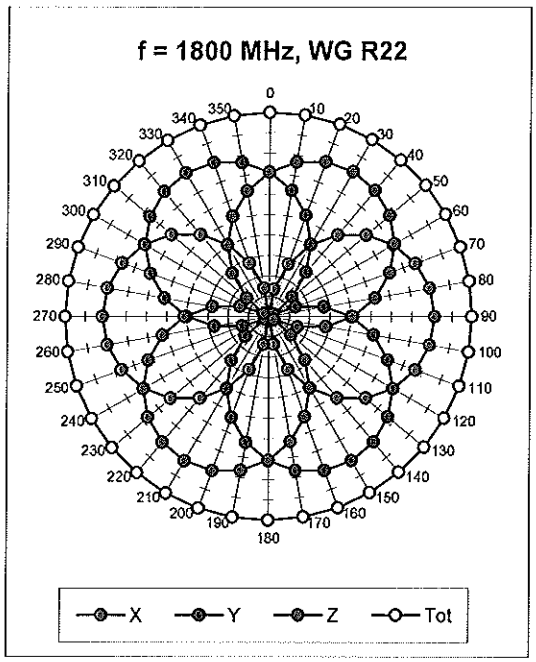
(TEM-Cell:ifi110 EXX, Waveguide: R22)

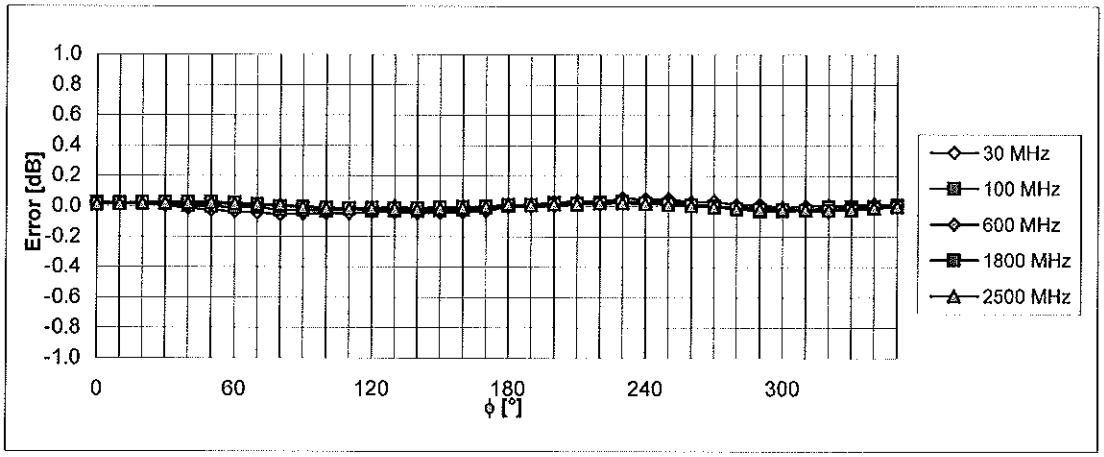


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°



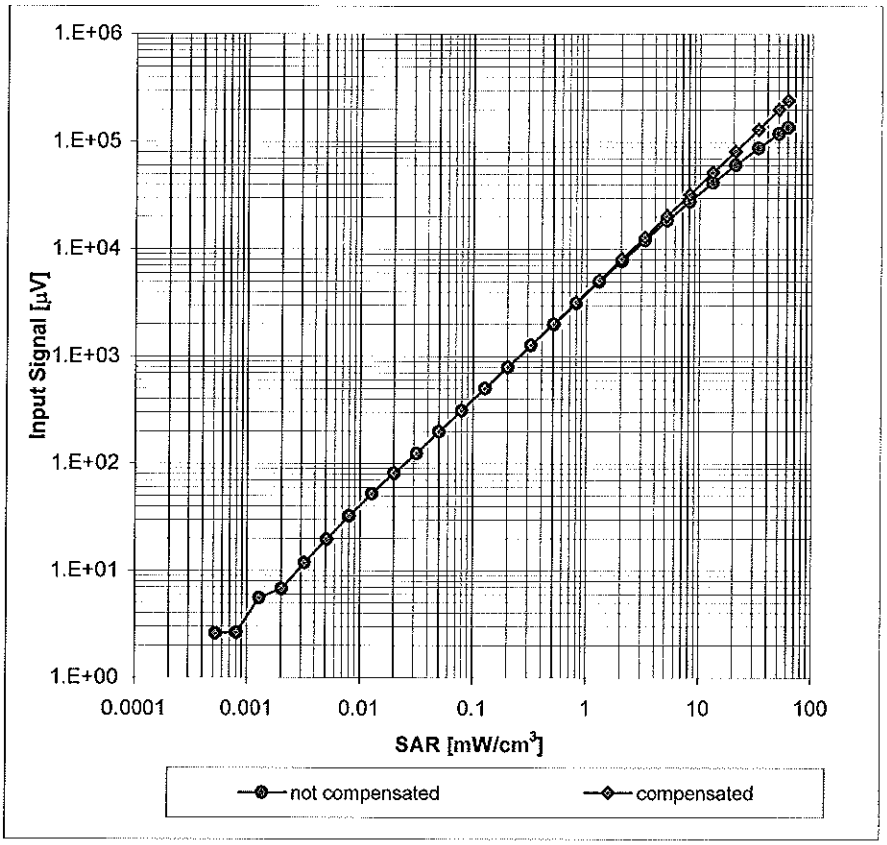


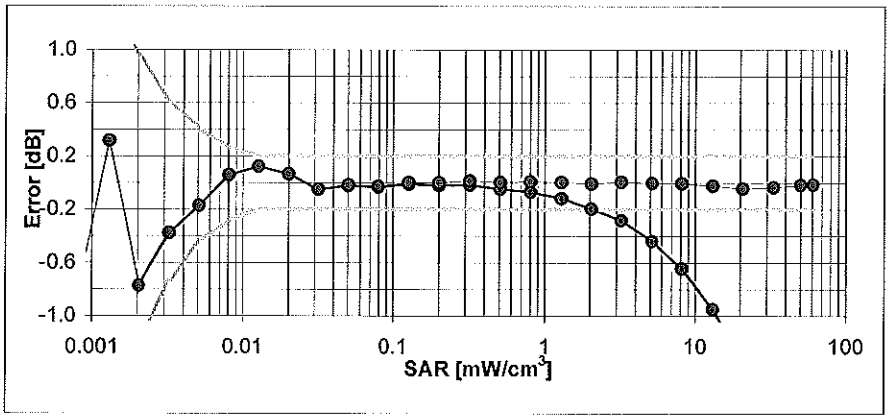


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

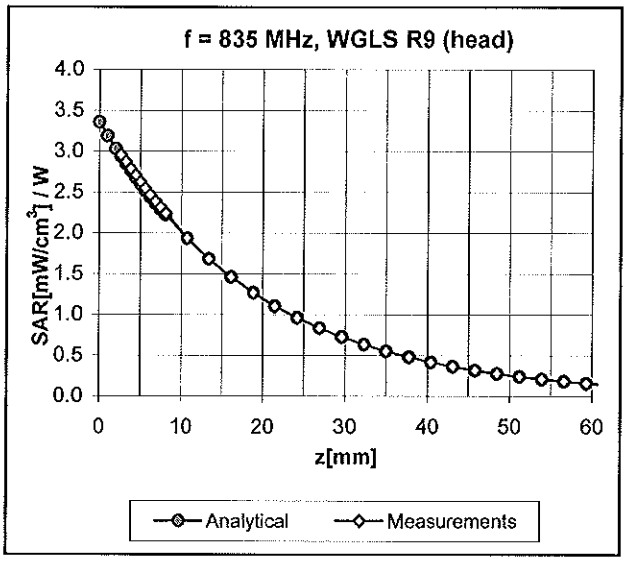
(Waveguide R22, f = 1800 MHz)

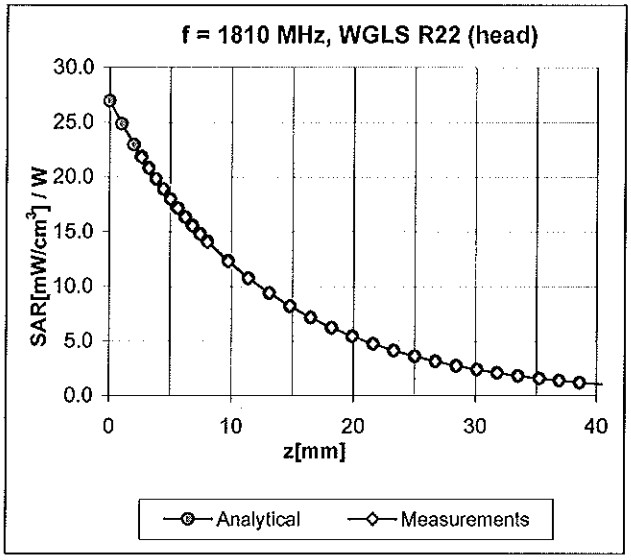




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

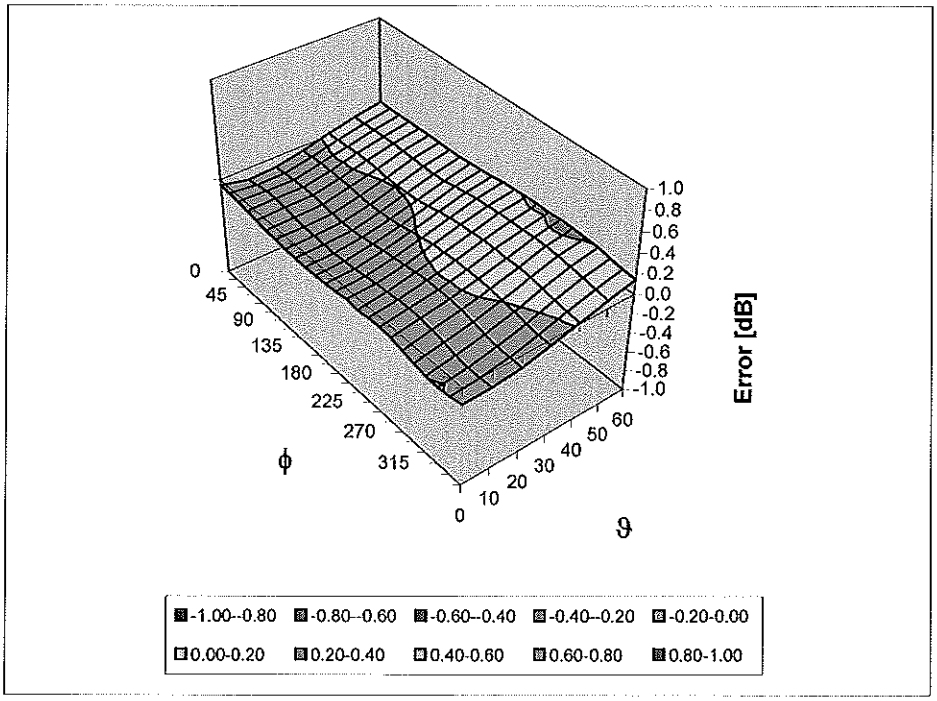
Conversion Factor Assessment





Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Other Probe Parameters

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

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

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Accreditation No.: SCS 108

Client Motorola MDb

Certificate No: ES3-3124_Aug10

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3124

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

Calibration date: August 11, 2010

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	1-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	1-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	30-Dec-09 (No. ES3-3013_Dec09)	Dec-10
DAE4	SN: 660	20-Apr-10 (No. DAE4-660_Apr10)	Apr-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-09)	In house check: Oct10

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 14, 2010

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

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

Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
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 effect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *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:3124

Manufactured:	July 11, 2006
Last calibrated:	April 21, 2009
Recalibrated:	August 11, 2010

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 SN:3124

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.26	1.33	1.34	± 10.1%
DCP (mV)[B]	92.9	96.4	96.7	

Modulation Calibration Parameters

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

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

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).

[B] Numerical linearization parameter: uncertainty not required.

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

DASY/EASY - Parameters of Probe: ES3DV3 SN:3124

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
835	± 50 / ± 100	41.5 ± 5%	0.90 ± 5%	5.89	5.89	5.89	0.97	1.07 ± 11.0%
1810	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	4.89	4.89	4.89	0.49	1.54 ± 11.0%
1950	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	4.68	4.68	4.68	0.50	1.52 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	4.35	4.35	4.35	0.45	1.78 ± 11.0%

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

DASY/EASY - Parameters of Probe: ES3DV3 SN:3124

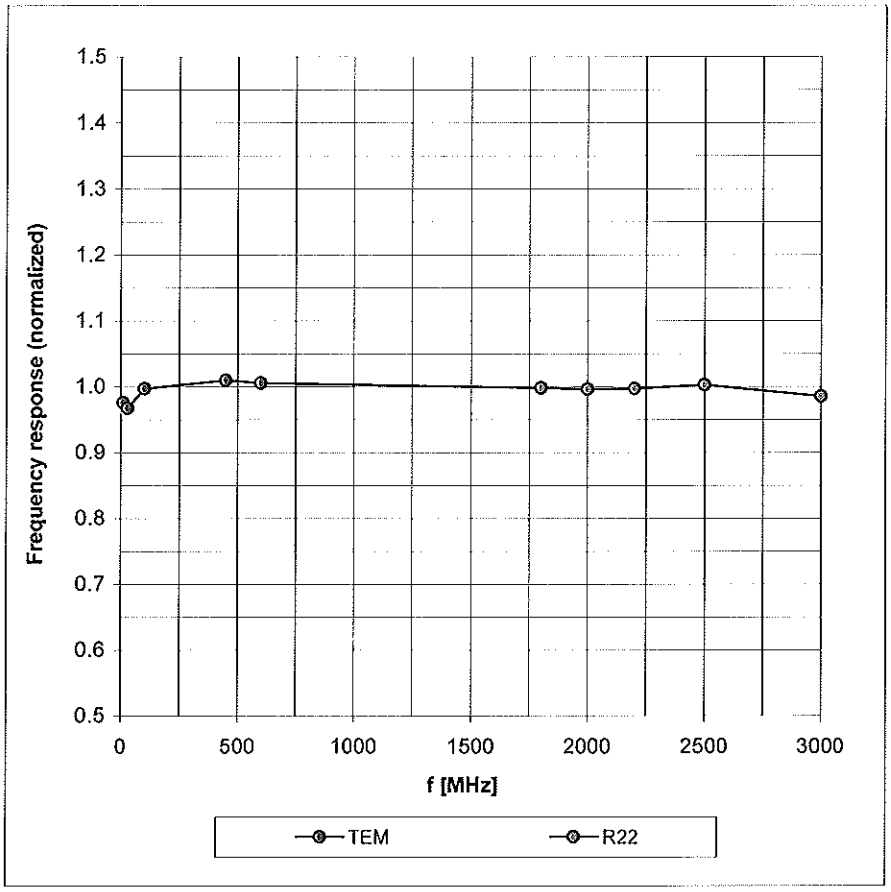
Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz]	Validity [MHz][C]	Permittivity	Conductivity	ConvF X	ConvF Y	ConvF Z	Alpha	Depth Unc (k=2)
835	± 50 / ± 100	55.2 ± 5%	0.97 ± 5%	5.86	5.86	5.86	0.96	1.11 ± 11.0%
1810	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.76	4.76	4.76	0.41	1.84 ± 11.0%
1950	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.78	4.78	4.78	0.32	2.33 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	4.19	4.19	4.19	0.69	1.29 ± 11.0%

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

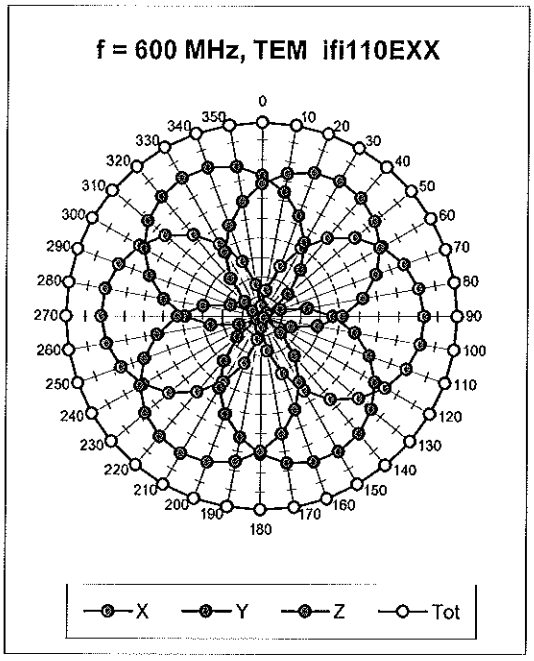
Frequency Response of E-Field

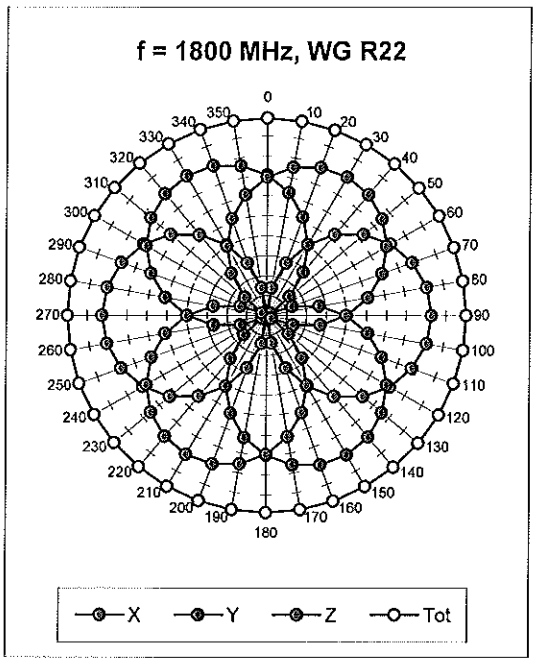
(TEM-Cell:ifi110 EXX, Waveguide: R22)

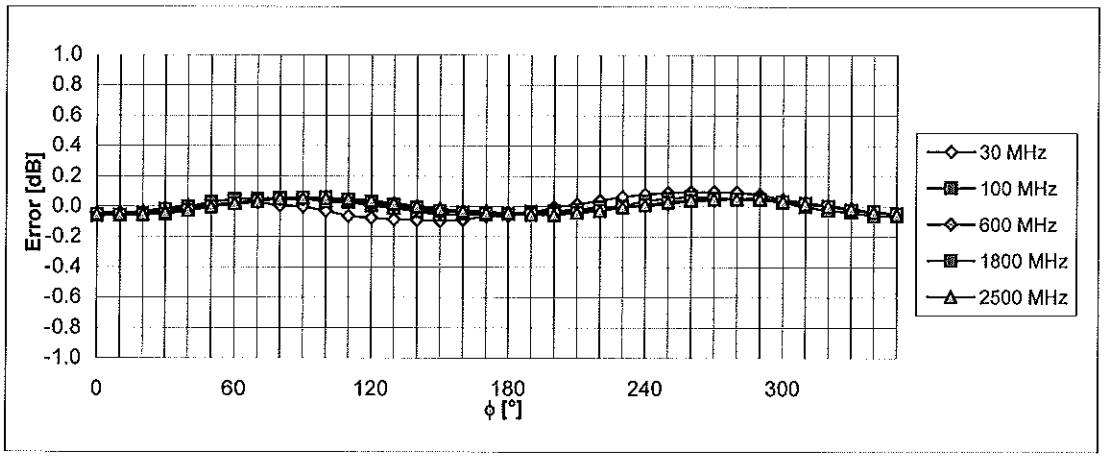


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°



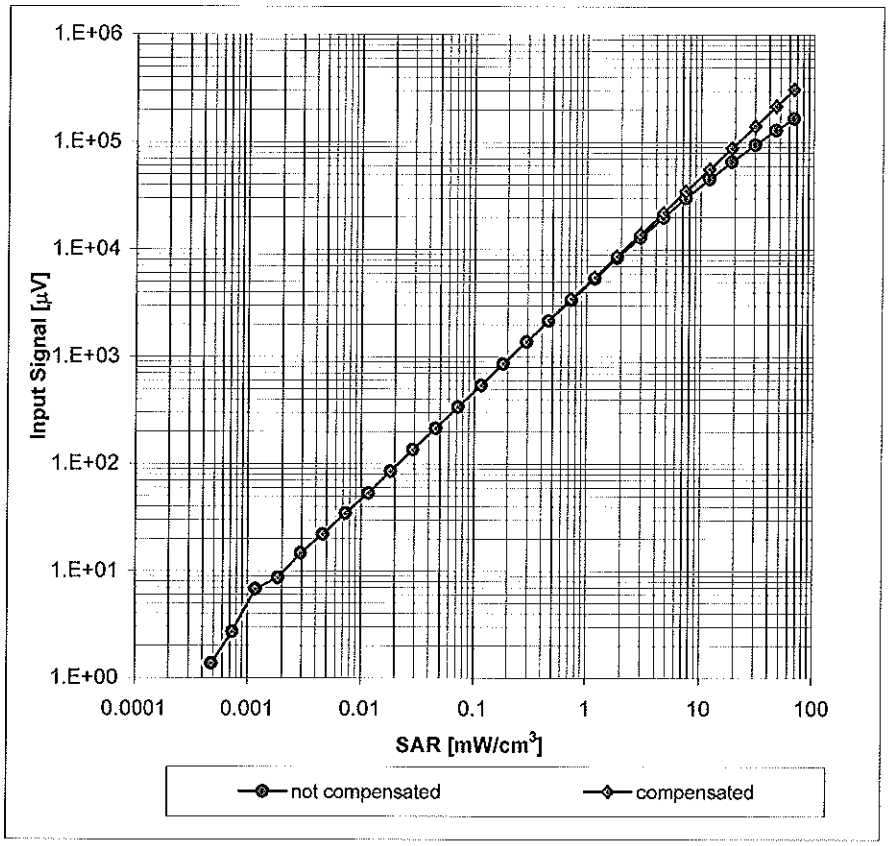


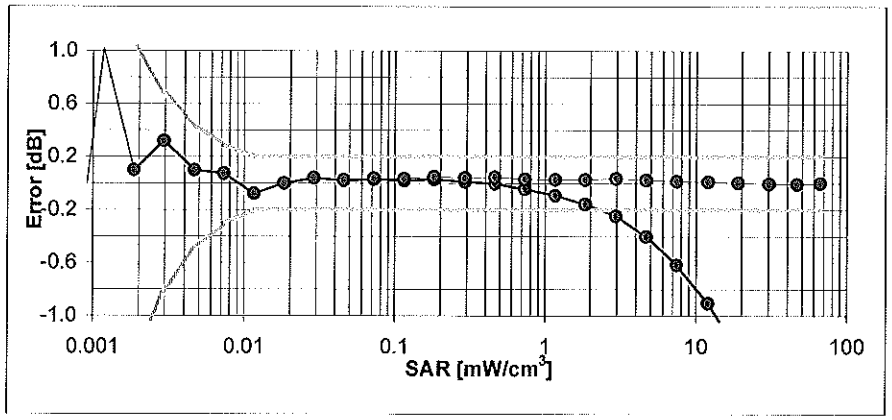


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

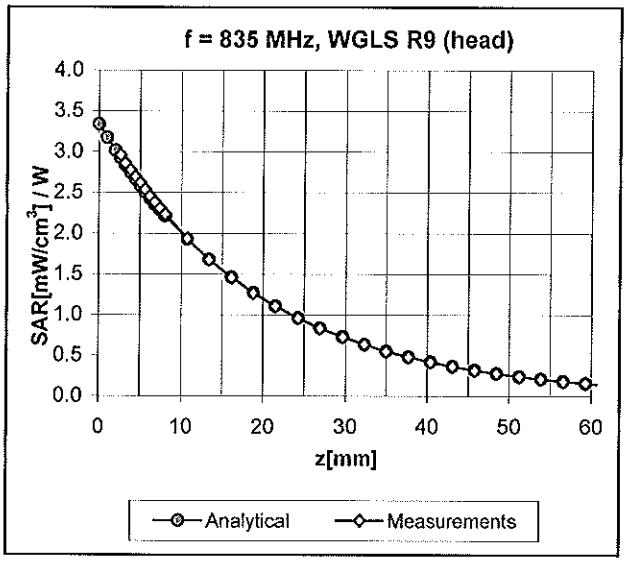
(Waveguide R22, f = 1800 MHz)

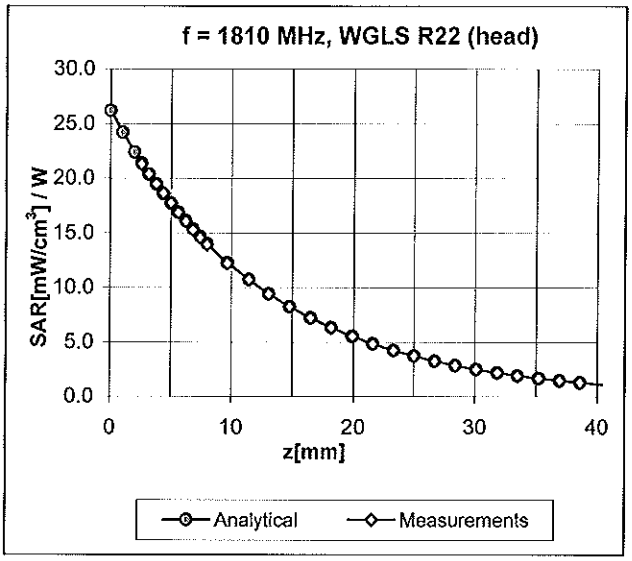




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

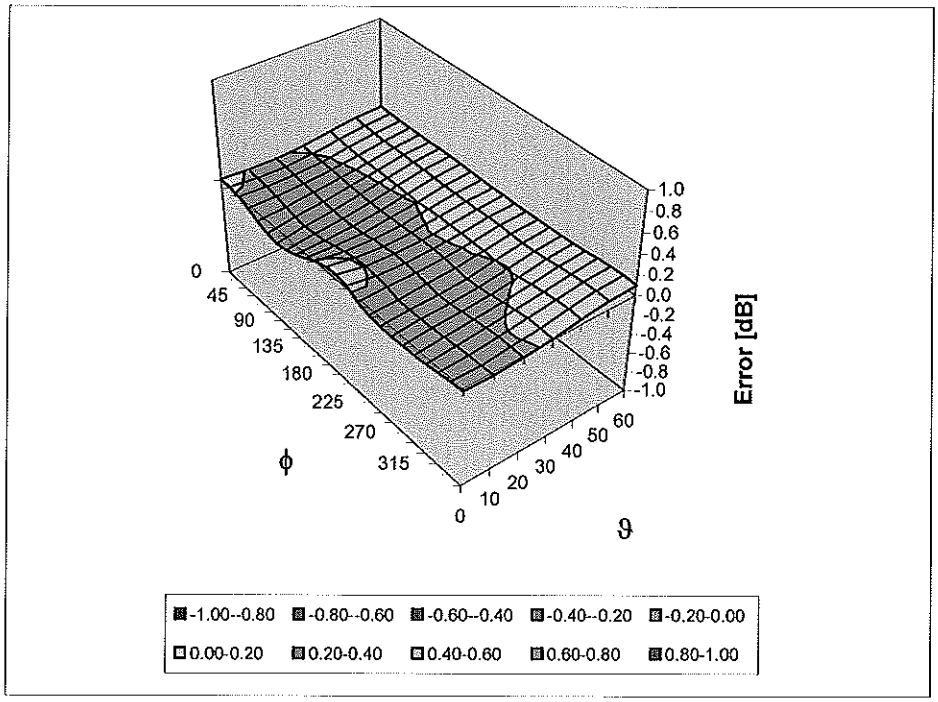
Conversion Factor Assessment





Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Other Probe Parameters

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

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Accreditation No.: SCS 108

Client **Motorola MDb**

Certificate No: ES3-3037_Sep09

CALIBRATION CERTIFICATE

Object	ES3DV3 - SN:3037
Calibration procedure(s)	QA CAL-01.v6, QA CAL-23.v3 and QA CAL-25.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	September 18, 2009
Condition of the calibrated item	In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41495277	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41498087	1-Apr-09 (No. 217-01030)	Apr-10
Reference 3 dB Attenuator	SN: S5054 (3c)	31-Mar-09 (No. 217-01026)	Mar-10
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-09 (No. 217-01028)	Mar-10
Reference 30 dB Attenuator	SN: S5129 (30b)	31-Mar-09 (No. 217-01027)	Mar-10
Reference Probe ES3DV2	SN: 3013	2-Jan-09 (No. ES3-3013_Jan09)	Jan-10
DAE4	SN: 660	9-Sep-08 (No. DAE4-660_Sep08)	Sep-09

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

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

Issued: September 21, 2009

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

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

Probe ES3DV3

SN:3037

Manufactured:	August 21, 2003
Last calibrated:	September 23, 2008
Recalibrated:	September 18, 2009

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ES3DV3 SN:3037

Sensitivity in Free Space[A] Diode Compression[B]

NormX	**1.17** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**95** mV
NormY	**0.81** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**97** mV
NormZ	**0.97** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**97** mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

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

Sensor Center to Phantom Surface Distance		**3.0 mm**	**4.0 mm**
SAR_{be} [%]	Without Correction Algorithm	10.0	6.2
SAR_{be} [%]	With Correction Algorithm	0.8	0.6

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

Sensor Center to Phantom Surface Distance		**3.0 mm**	**4.0 mm**
SAR_{be} [%]	Without Correction Algorithm	9.3	5.9
SAR_{be} [%]	With Correction Algorithm	0.6	0.4

Sensor Offset

Probe Tip to Sensor Center	**2.0** mm

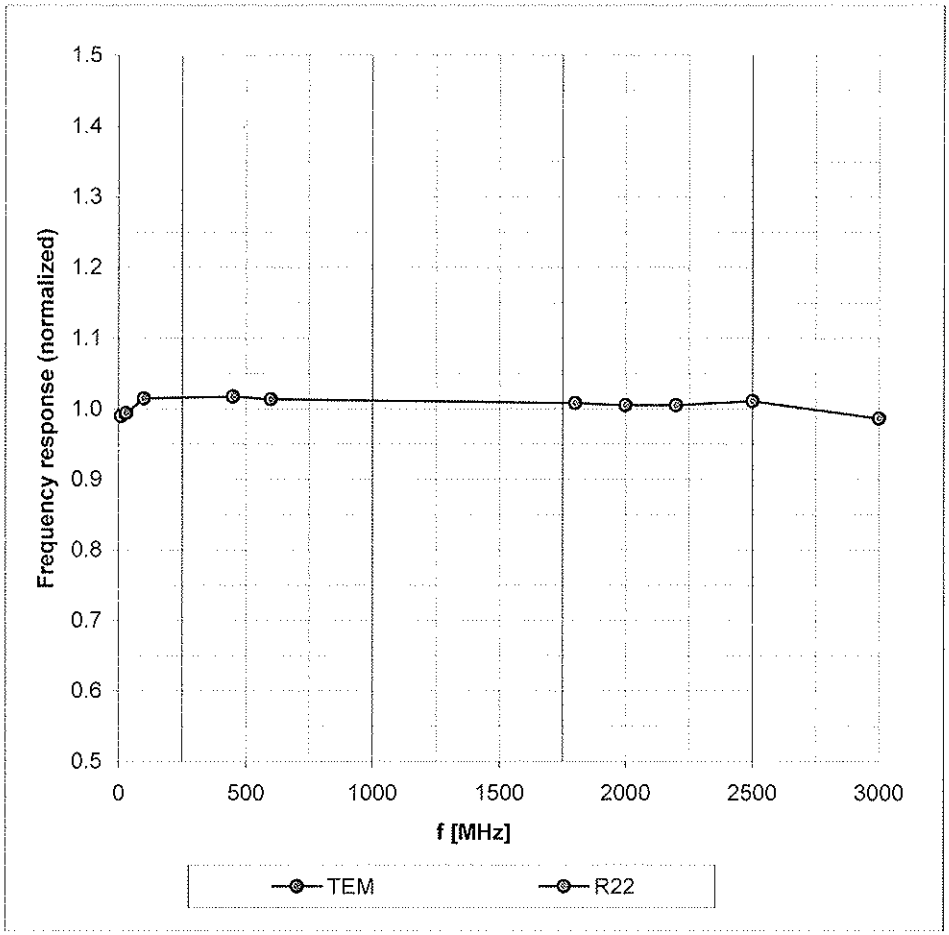
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

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

[B] Numerical linearization parameter: uncertainty not required.

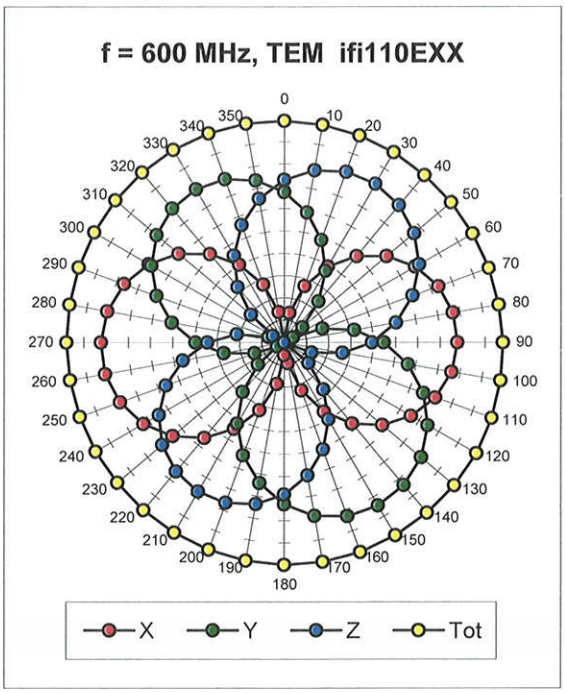
Frequency Response of E-Field

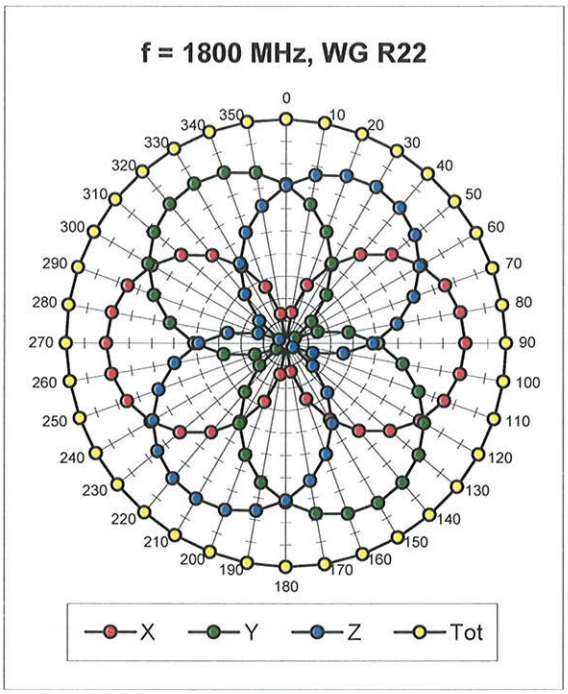
(TEM-Cell:ifi110 EXX, Waveguide: R22)

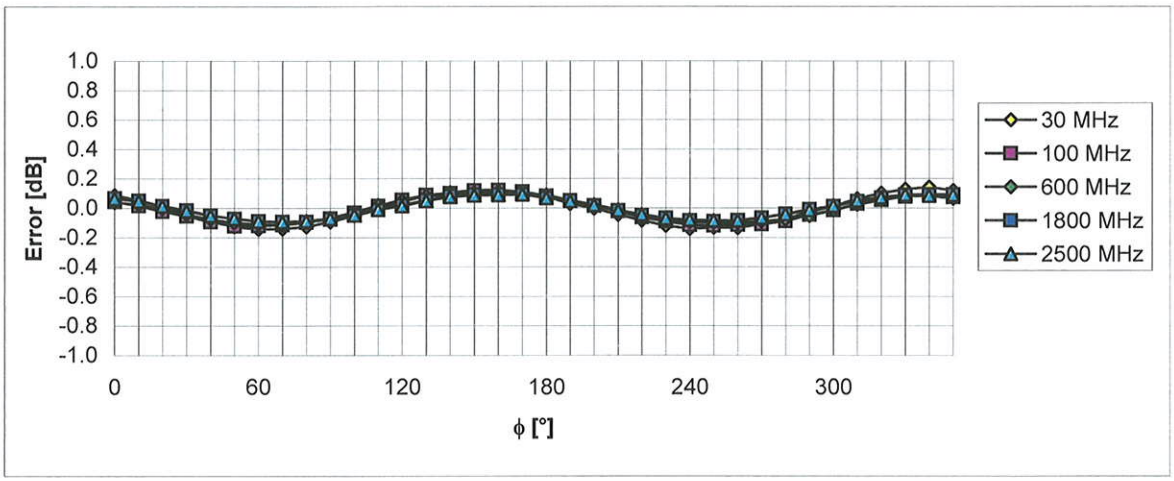


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°



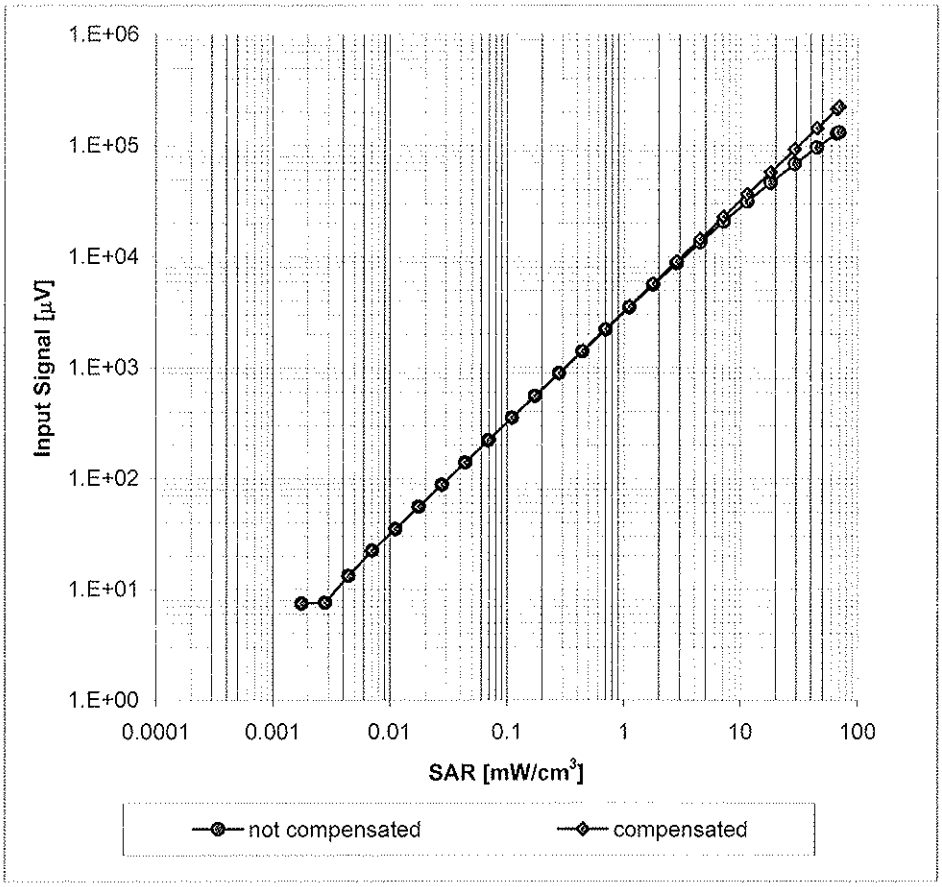


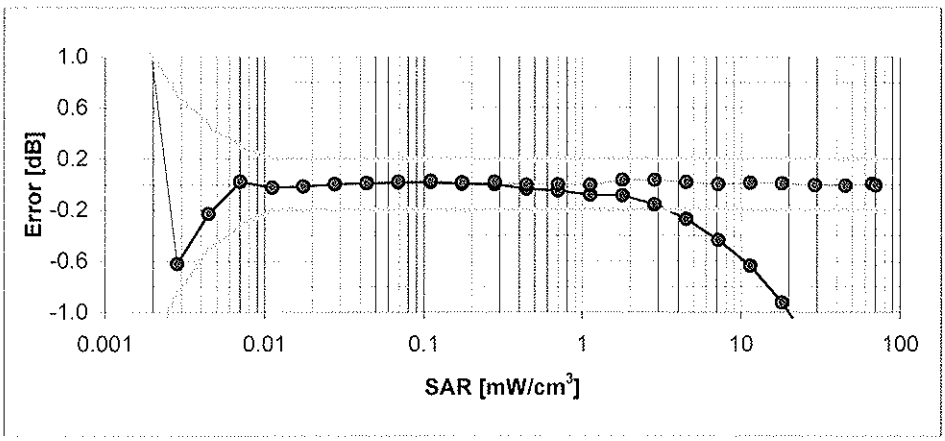


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

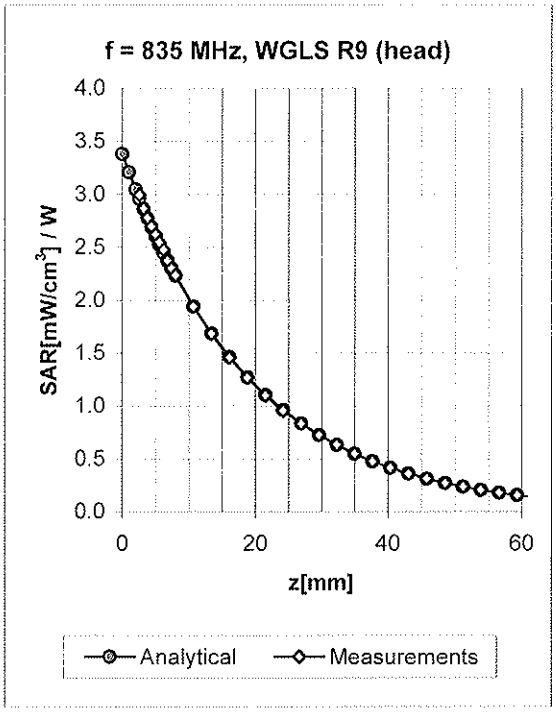
(Waveguide R22, f = 1800 MHz)

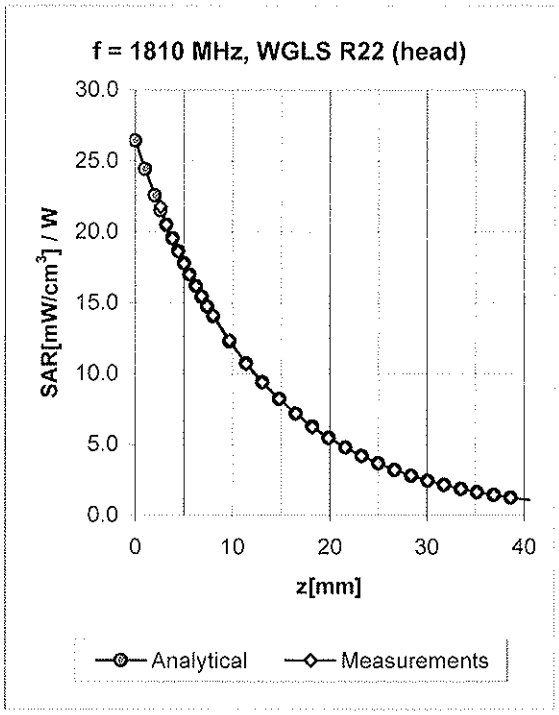




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



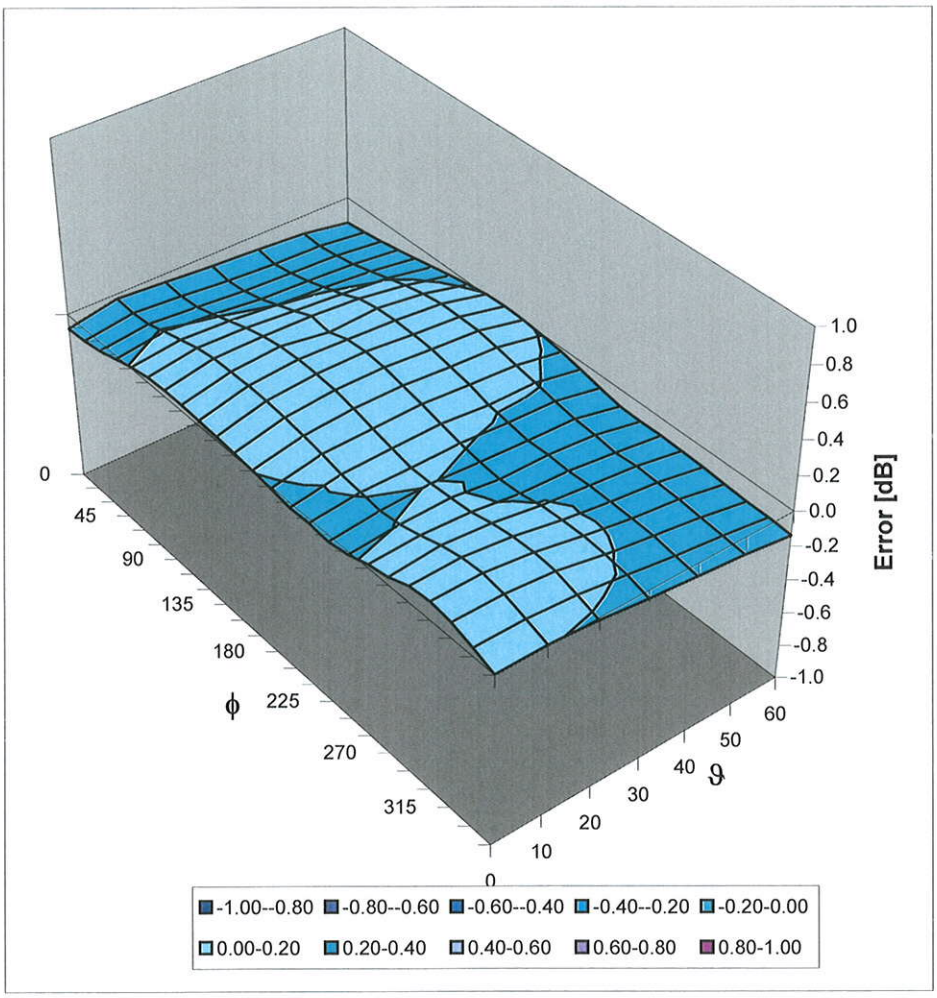


f [MHz]	Validity [MHz][c]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.34	1.78	6.25 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.37	1.74	5.05 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.40	1.62	4.87 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.35	1.96	4.41 ± 11.0% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.75	1.16	6.17 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.36	1.94	4.96 ± 11.0% (k=2)
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.27	3.10	4.78 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.70	1.18	4.29 ± 11.0% (k=2)

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

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Certification of System Performance Check Targets

FCD-1806, rev-1

-Historical Data-

	2450 MHz	
Reference Target:	52.4	**(W/kg)**
Measurement Uncertainty (k=1):	9.0%	
Measurement Period:	*26March09 - 15Mar10*	
# of tests performed:	159	
Grand Average:	54.55	**(W/kg)**
% Delta (Average - Reference Target)	4.1%	
Is % Delta <= Expanded Measurement Uncertainty (k=2)?	**Yes**	
Accept/Reject Average as new system performance check target?	**ACCEPT**	
	Applies to Dipole SN's: **740, 766, 767, 788, 789**	

-New System Performance Check Targets- per WI-0396

(based on analysis of historical data)

Frequency	SAR Target (W/kg)	Permittivity Target +/- %	Conductivity (S/m) Target +/- %
2450 MHz	**54.55**	39.2 +/- 10%	1.80 +/- 5%

-Approvals-

Submitted by: Marge Kaunas Date: 17-Mar-10

Signed: Marge Kaunas

Comments: Data file available upon request.

Approved by: Steve Hauswirth **Date:** 17-Mar-10

Signed: Steven Hauswirth

Comments:

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

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

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

Accreditation No.: SCS 108

Client **Motorola MDb**

Certificate No: ES3-3184_Sep09

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3184

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

Calibration date: September 18, 2009

Condition of the calibrated item: In Tolerance

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41495277	1-Apr-09 (No. 217-01030)	Apr-10
Power sensor E4412A	MY41498087	1-Apr-09 (No. 217-01030)	Apr-10
Reference 3 dB Attenuator	SN: S5054 (3c)	31-Mar-09 (No. 217-01026)	Mar-10
Reference 20 dB Attenuator	SN: S5086 (20b)	31-Mar-09 (No. 217-01028)	Mar-10
Reference 30 dB Attenuator	SN: S5129 (30b)	31-Mar-09 (No. 217-01027)	Mar-10
Reference Probe ES3DV2	SN: 3013	2-Jan-09 (No. ES3-3013_Jan09)	Jan-10
DAE4	SN: 660	9-Sep-08 (No. DAE4-660_Sep08)	Sep-09

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

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

Issued: September 21, 2009

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

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

Probe ES3DV3

SN:3184

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

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ES3DV3 SN:3184

Sensitivity in Free Space[A] Diode Compression[B]

NormX	**1.28** ± 10.1%	$\mu V/(V/m)^2$	DCP X	**91** mV
NormY	**1.36** ± 10.1%	$\mu V/(V/m)^2$	DCP Y	**92** mV
NormZ	**1.27** ± 10.1%	$\mu V/(V/m)^2$	DCP Z	**95** mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

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

Sensor Center to Phantom Surface Distance		**3.0 mm**	**4.0 mm**
SAR_{be} [%]	Without Correction Algorithm	11.1	7.3
SAR_{be} [%]	With Correction Algorithm	0.8	0.5

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

Sensor Center to Phantom Surface Distance		**3.0 mm**	**4.0 mm**
SAR_{be} [%]	Without Correction Algorithm	12.1	8.3
SAR_{be} [%]	With Correction Algorithm	0.8	0.4

Sensor Offset

Probe Tip to Sensor Center	**2.0** mm

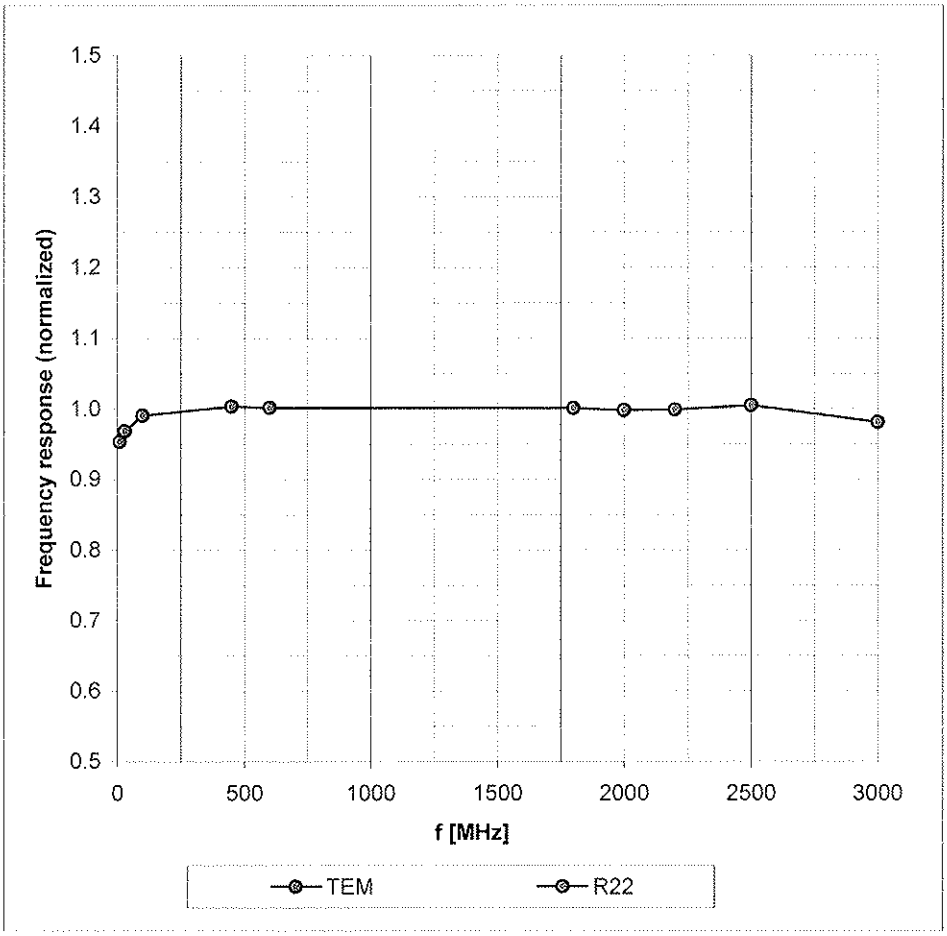
The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

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

[B] Numerical linearization parameter: uncertainty not required.

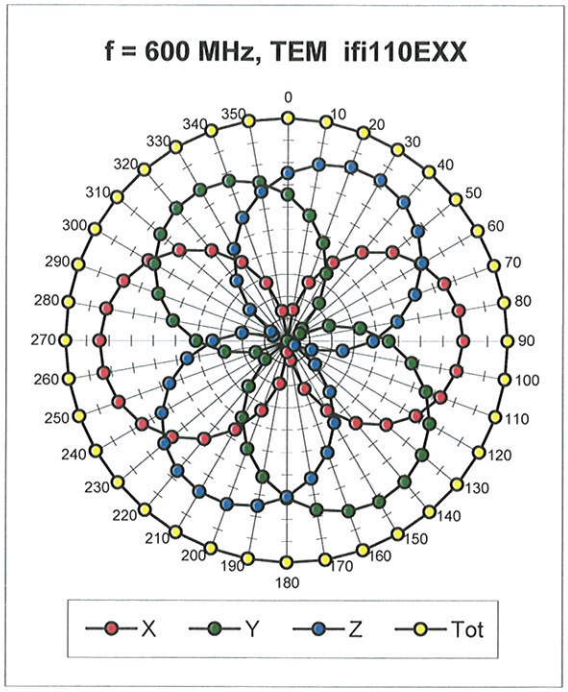
Frequency Response of E-Field

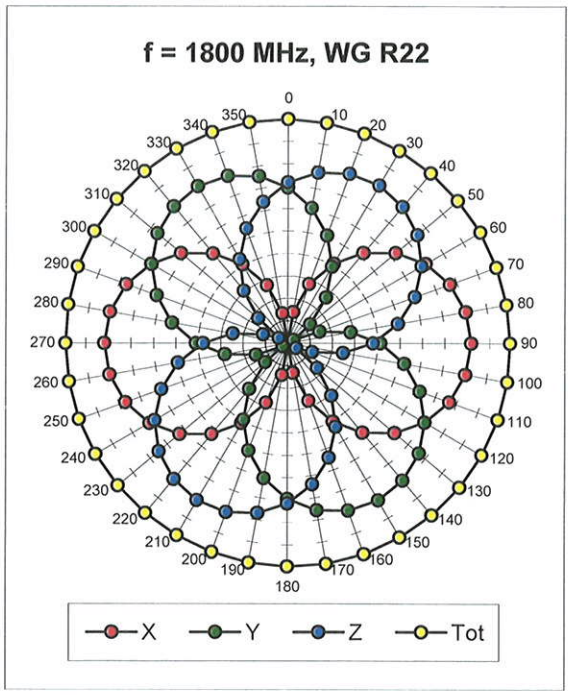
(TEM-Cell:ifi110 EXX, Waveguide: R22)

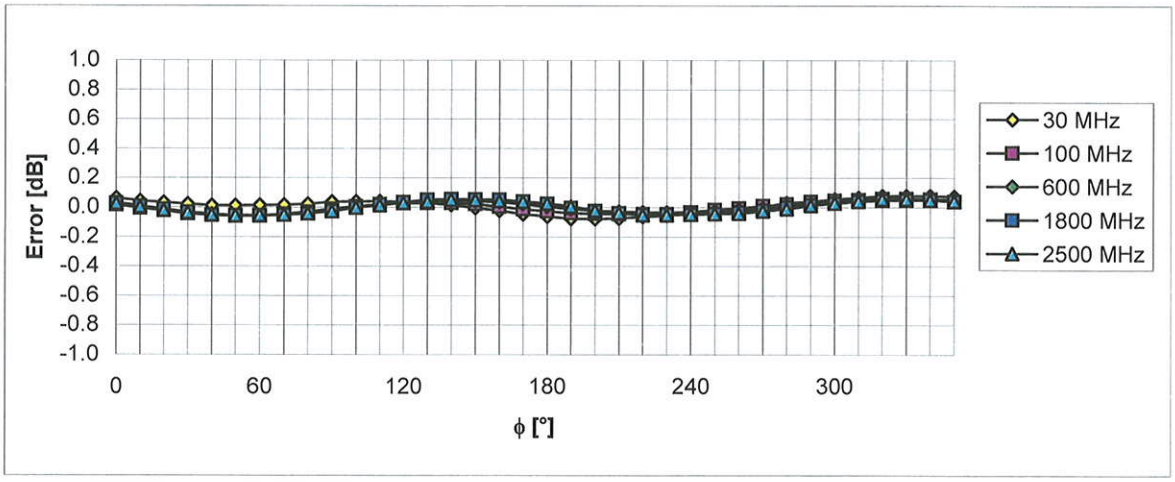


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°



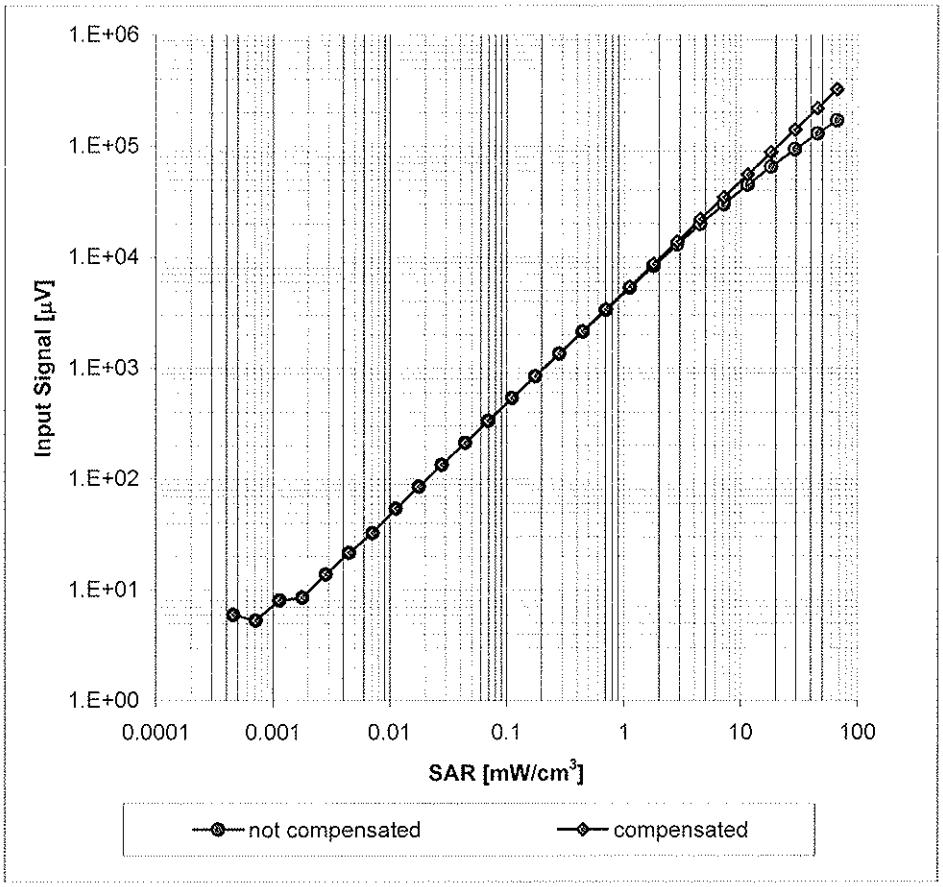


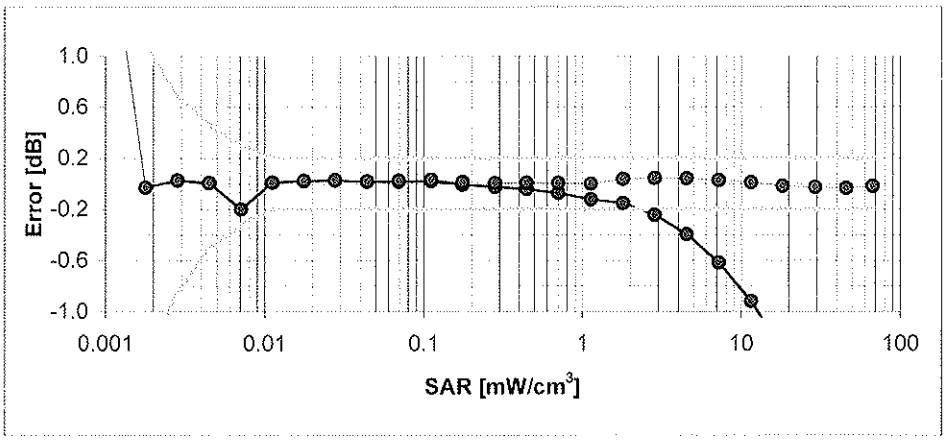


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

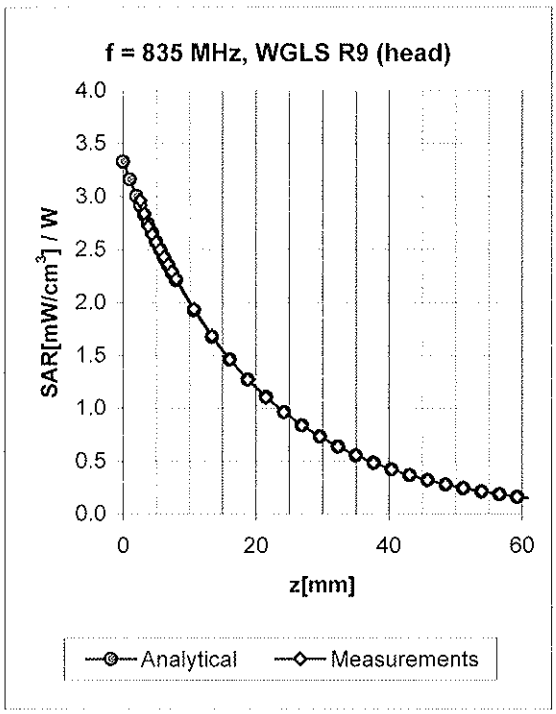
(Waveguide R22, f = 1800 MHz)

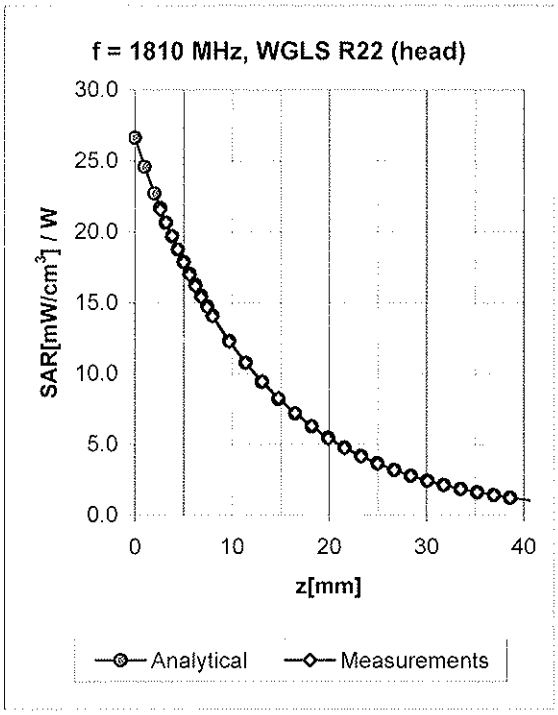




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



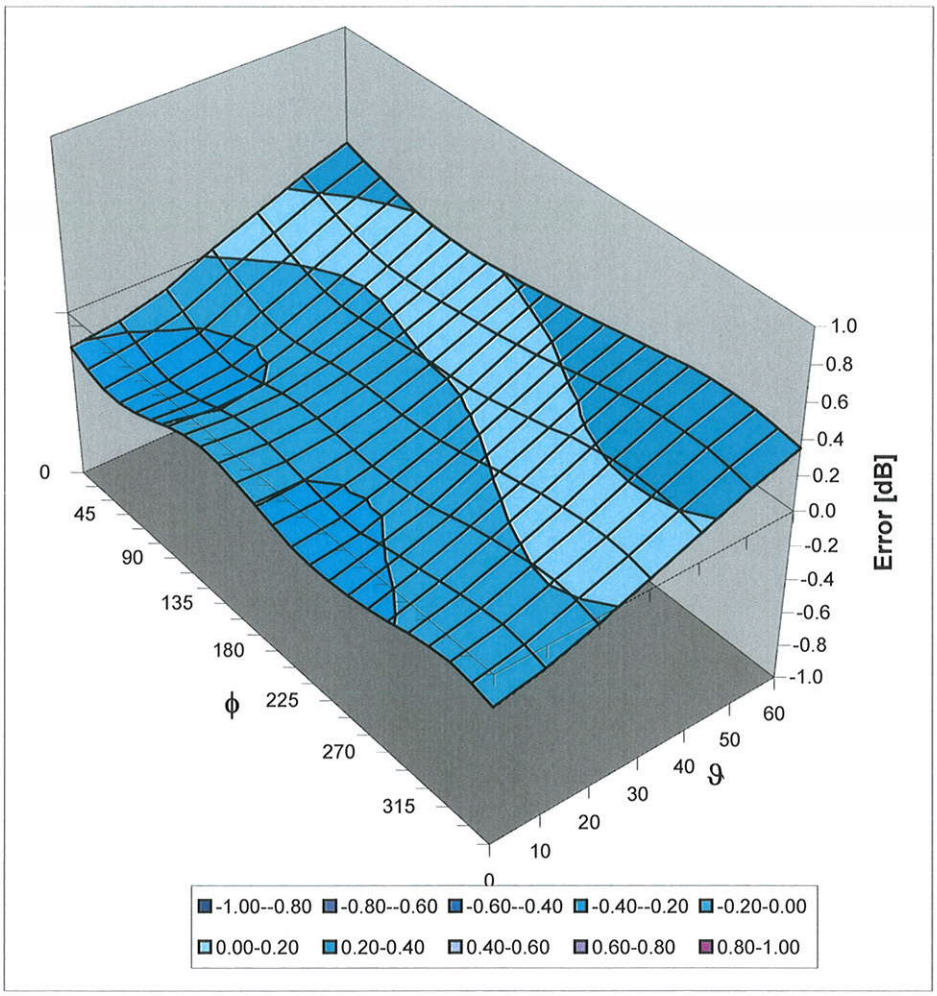


f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.27	2.21	6.26 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.26	2.94	5.14 ± 11.0% (k=2)
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.23	3.55	4.94 ± 11.0% (k=2)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

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

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



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

Appendix 5

Measurement Uncertainty Budget

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

Appendix 6

Dipole Characterization Certificate

Certification of System Performance Check Targets

FCD-1806, rev-1

-Historical Data-

	1800 MHz	
Reference Target:	38.4	**(W/kg)**
Measurement Uncertainty (k=1):	9.0%	
Measurement Period:	*26March09 - 15Mar10*	
# of tests performed:	654	
Grand Average:	38.36	**(W/kg)**
% Delta (Average - Reference Target)	-0.1%	
Is % Delta <= Expanded Measurement Uncertainty (k=2)?	**Yes**	
Accept/Reject Average as new system performance check target?	**ACCEPT**	
	Applies to Dipole SN's: 246tr, 250tr, 251tr, 259tr, 263tr, 271tr, 272tr, 276tr, 277tr, 279tr, 280tr, 281tr, 283tr, 284tr, 2d128, 2d129	

-New System Performance Check Targets- per WI-0396

(based on analysis of historical data)

Frequency	SAR Target (W/kg)	Permittivity Target +/- %	Conductivity (S/m) Target +/- %
1800 MHz	**38.36**	40.0 +/- 5%	1.40 +/- 5%

-Approvals-

Submitted by: Marge Kaunas Date: 17-Mar-10

Signed: Marge Kaunas

Comments: Data file available upon request.

Approved by: Steve Hauswirth **Date:** 17-Mar-10

Signed: Steven Hauswirth

Comments:

Certification of System Performance Check Targets

FCD-1806, rev-1

-Historical Data-

	835 MHz	
Reference Target:	9.56	**(W/kg)**
Measurement Uncertainty (k=1):	9.0%	
Measurement Period:	*26March09 - 15Mar10*	
# of tests performed:	244	
Grand Average:	9.59	**(W/kg)**
% Delta (Average - Reference Target)	0.3%	
Is % Delta <= Expanded Measurement Uncertainty (k=2)?	**Yes**	
Accept/Reject Average as new system performance check target?	**ACCEPT**	
	Applies to Dipole SN's: **432tr, 417tr, 420tr, 422tr, 423tr, 424tr, 425tr, 431tr, 434tr, 421tr, 436tr**	

-New System Performance Check Targets- per WI-0396

(based on analysis of historical data)

Frequency	SAR Target (W/kg)	Permittivity Target +/- %	Conductivity (S/m) Target +/- %
835 MHz	**9.59**	41.5 +/- 5%	0.90 +/- 5%

-Approvals-

Submitted by: Marge Kaunas Date: 17-Mar-10

Signed: Marge Kaunas

Comments: Data file available upon request.

Approved by: Steve Hauswirth **Date:** 17-Mar-10

Signed: Steven Hauswirth

Comments:

Certification of System Performance Check Targets

FCD-1806, rev-1

-Historical Data-

	2450 MHz	
Reference Target:	52.4	**(W/kg)**
Measurement Uncertainty (k=1):	9.0%	
Measurement Period:	*26March09 - 15Mar10*	
# of tests performed:	159	
Grand Average:	54.55	**(W/kg)**
% Delta (Average - Reference Target)	4.1%	
Is % Delta <= Expanded Measurement Uncertainty (k=2)?	**Yes**	
Accept/Reject Average as new system performance check target?	**ACCEPT**	
	Applies to Dipole SN's: **740, 766, 767, 788, 789**	

-New System Performance Check Targets- per WI-0396

(based on analysis of historical data)

Frequency	SAR Target (W/kg)	Permittivity Target +/- %	Conductivity (S/m) Target +/- %
2450 MHz	**54.55**	39.2 +/- 10%	1.80 +/- 5%

-Approvals-

Submitted by: Marge Kaunas Date: 17-Mar-10

Signed: Marge Kaunas

Comments: Data file available upon request.

Approved by: Steve Hauswirth **Date:** 17-Mar-10

Signed: Steven Hauswirth

Comments:

END OF REPORT