MOTOROLA

Class II Permissive Change Portable Cellular Phone SAR Test Report

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

Test Report #: 24799/24606-1F Rev. A
Date of Report: Nov 7, 2011
Date of Test: Nov 4 - 7, 2011
FCC ID #: IHDP56ME1
Generic Name: M0C1D

Test Laboratory: Motorola Mobility, Inc. - ADR Test Services Laboratory
600 N. US Highway 45
Libertyville, IL 60048

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Accreditation:

UKAS TESTING
2404

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)

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

Statement of Compliance:

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

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

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Revision History

Revision Version	Date	Notes
Rev. 0	Nov-07-2011	Initial report release.
Rev. A	Nov-08-2011	Added power reduction methods employed in Section 6.0 svLTE power reduction used for testing added to Section 7 Various typos in Section 7. Added Table #'s to Section 7.

1. Introduction

The Motorola Mobility ADR Test Services Laboratory has performed measurements of the maximum potential exposure to the user of portable cellular phone IHDP56ME1 when used with the Lapdock™ 500 accessory covered by this test report. The Specific Absorption Rate (SAR) of this product was measured. The portable cellular phone was setup, and the Lapdock ™ 500 was tested in accordance with [1], [4] and [5]. The SAR values measured for the portable cellular phone when used with the Lapdock™ 500 are below the maximum recommended levels of 1.6 W/kg in a 1 g average set in [3] and 2.0 W/kg in a 10 g average set in [2].

For ANSI / IEEE C95.1 (1 g), the final stand-alone SAR readings for this phone are given in the table below. These measurements were performed using a Dasy4™ v4.7 system manufactured by Schmid & Partner Engineering AG (SPEAG), of Zurich Switzerland.

Transmit Band	w/ Lapdock 500 Accessory SAR (1 g W/kg)
LTE Band 13	0.34
CDMA 800	1.42
CDMA 1900	1.24
Wi-Fi 2.45 GHz	0.49

Section 2 Provided for Reference Only - Specifying Phone Utilized for Testing

2. Description of the Phone Used for Accessory Testing

2.1 Antenna description

CDMA (800/1900 MHz) Antenna

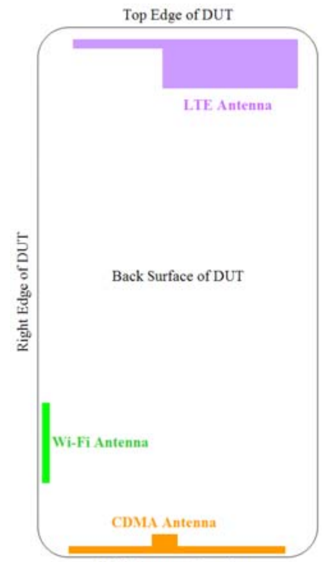
Type	Internal	
Location	Bottom Rear of Transceiver	
Dimensions	Width	4 mm
	Length	54 mm

LTE (782 MHz) Antenna

Type	Internal	
Location	Top Rear of Transceiver	
Dimensions	Width	12 mm
	Length	53 mm

Bluetooth/Wi-Fi 2 GHz Antenna

Type	Internal	
Location	Right-Edge Rear of Transceiver	
Dimensions	Width	2 mm
	Length	19 mm



DUT Antenna Locations

2.2 Device Signaling[1]

Serial Number(s) (Functional Use)	LS4V230044 (CDMA SAR testing) LS4V230052 (LTE SAR testing) LS4V230079 (svLTE SAR testing)
Production Unit or Identical Prototype (47 CFR §2..908)	Identical Prototype
Device Category	Portable (Mobile Station Class B)
RF Exposure Limits	General Population / Uncontrolled

Mode(s) of Operation	Modulation Mode(s)	Maximum Output Power Setting	Duty Cycle	Transmitting Frequency Range(s)
LTE Band 13	QPSK, 16QAM	25.0 dBm	1:1	777 - 787 MHz (1 Channel, 10 MHz wide)
CDMA 800	QPSK	24.5 dBm	1:1	824.70 - 848.31 MHz
CDMA 1900	QPSK	25.0 dBm	1:1	1851.20 - 1908.75 MHz
Wi-Fi 802.11b/g/n	BPSK	18.5 dBm	1:1	2412.0 - 2462.5 MHz
Bluetooth	GFSK	10 dBm	1:1	2402.0 - 2483.5 MHz

Note: This device supports voice call functionality over GSM and WCDMA on non-US cellular networks. The GSM/WCDMA network functions have been disabled by firmware and are SIM locked for all US operators. Further information regarding this functionality is contained within Exhibit 12.

[1] **Bolded** entries 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.

2.2.1 LTE Device Description

LTE Summary Information per FCC KDB 941225

	FCC ID			IHDP56ME1
	Form Factor			Handset
1	**Frequency Range**			777 MHz - 787 MHz
2	**Channel Bandwidths**			10 MHz
3	**L,M,H Channel Numbers and Frequencies**			
	Low	**Mid**	**High**	
	N/A	23230 (782 MHz)	N/A	
4	**UE Category**			1
	Modulations Supported			QPSK, 16QAM
5	**Description of LTE Tx and Antenna Implementation**			1 TX/RX Antenna; 1 RX Antenna
6	**LTE Voice Available?**			Yes (VOIP Only)
	Hotspot with LTE + Wi-Fi?			Yes
	Hotspot with LTE + Wi-Fi active with 1x Voice sessions?			Yes
7 (a)	**LTE MPR Permanently Implemented per 3GPP TS 36.101?**			Yes
7 (b)	**A-MPR disabled (by setting NS=01 on the R&S CMW500)?**			Yes
8	**Conducted power table providing 1 RB (lower and upper edge), 50% RB (centered) and 100% RB**			Yes
9	**Table provided specifying other US wireless operating modes?**			Yes
10	**Table provided specifying maximum average conducted power for these other wireless modes**			Yes
11	**Table provided identifying simultaneous transmission conditions?**			Yes
12	**Power Reduction used for SAR compliance?**			Yes (see section 2.2.2)
	Power Reduction used for CDMA?			Yes
	Power Reduction used for LTE?			Yes
	Power Reduction used for svLTE?			Yes
13	**Test Equipment used**			CMW500 SW version 2.0.20.10

LTE Maximum Power Reduction (MPR) conditions are defined in 3GPP 36-521, section 6.2.3.3:

6.2.3.3 Minimum conformance requirements

For UE Power Class 3, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2.3-1 due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3.3-1.

Table 6.2.3.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth configuration [RB]						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

For the UE maximum output power modified by MPR, the power limits specified in subclause 6.2.5.3 apply. The normative reference for this requirement is TS 36.101 clause 6.2.3.

For the DUT architecture, MPR is permanently implemented. Per the chart above, for a 10 MHz bandwidth the following MPR is used:

Modulation	# of RBs	MPR (dB)
QPSK	>12	1
16 QAM	<= 12	1
16 QAM	> 12	2

The table applies for any RB start value. RBs are assigned contiguously.

Thus, given a maximum power of 25 dBm and the MPR described above, the power for the SAR test cases are as follows:

Test Case	Max Power (dBm)
QPSK, Start RB: 12, RB Alloc 50%	24
QPSK, Start RB: 0, RB Alloc 100%	24
QPSK, Start RB: 49, RB Alloc: 1 RB @ high channel edge	25
QPSK, Start RB: 0, RB Alloc: 1 RB @ low channel edge	25
16QAM, Start RB: 12, RB Alloc 50%	23
16QAM, Start RB: 0, RB Alloc 100%	23
16QAM, Start RB: 49, RB Alloc: 1 RB @ high channel edge	24
16QAM, Start RB: 0, RB Alloc: 1 RB @ low channel edge	24

The DUT supports Simultaneous Voice and LTE (svLTE), allowing a CDMA voice call while simultaneously providing an LTE link for data transport on the cellular network. When operating during svLTE, a reduced maximum LTE transmit power limit is enforced to ensure SAR exposure compliance is maintained. This reduced limit is also enforced when operating as a mobile hotspot during svLTE. When these combinations of functionalities are not in use, the LTE transmitter operates at full maximum power. A table of the reduced limits used for testing are given below.

Mode(s) of Operation	LTE Band 13							
Test Channel	23230							
Modulation	QPSK				16QAM			
RB Allocation	50%	100%	1 RB @HIGH EDGE	1 RB @LOW EDGE	50%	100%	1 RB @HIGH EDGE	1 RB @LOW EDGE
Maximum Output Power Setting (dBm)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Output Power Setting with MPR (dBm)	24.0	24.0	25.0	25.0	23.0	23.0	24.0	24.0
svLTE Reduced Maximum Output Power Setting (dBm)	22.0	22.0	23.0	23.0	21.0	21.0	22.0	22.0
Reduction Target (dB)	-3	-3	-2	-2	-4	-4	-3	-3

2.3 Device Conducted Power Measurements

2.3.1 LTE modes

Measured Conducted Power (dBm) for LTE modes								
Modulation	Channel Bandwidth	RB Allocation Size	RB Offset	Measured Power (dBm)	Power Limit with MPR (dBm)	MPR Target (dB)	Measured reduction from maximum limit	Notes
QPSK	10 MHz	1	0	24.70	25.00	0	0 dB	-
		1	49	24.85	25.00	0	0 dB	-
		50%	12	23.93	24.00	-1	-1.07 dB	MPR enabled
		100%	0	23.83	24.00	-1	-1.17 dB	MPR enabled
16QAM	10 MHz	1	0	24.05	24.00	-1	-0.95 dB	MPR enabled
		1	49	24.20	24.00	-1	-0.80 dB	MPR enabled
		50%	12	23.07	23.00	-2	-1.93 dB	MPR enabled
		100%	0	22.90	23.00	-2	-2.10 dB	MPR enabled

2.3.2 CDMA modes

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

Measured Conducted Power (dBm) for CDMA modes							
		Loopback		Data[2]		EVDO Rev. O[2]	EVDO Rev. A[2]
Band	Channel	RC3 SO55	RC1 SO55	TDSO SO32 + FCH-SCH	TDSO SO32 + SCH	RTAP 153.6k	Subtype 2 RETAP
CDMA 800	1013	24.52	24.47	24.47	22.85	24.20	23.87
	384	24.60	24.59	24.59	23.06	24.29	23.92
	777	24.36	24.31	24.31	22.99	24.01	23.64
CDMA 1900	25	25.20	25.24	25.24	25.24	24.28	23.99
	600	25.16	25.27	25.27	25.27	24.29	23.95
	1175	24.93	25.06	25.06	24.01	24.19	23.83

2.3.3 Wi-Fi 802.11 modes

Per "SAR Measurement Procedures for 802.11 a/b/g Transmitters" (FCC KDB 248227), power measurements were performed for 802.11 operational modes. The average conducted power measurements for each mode are shown in the tables below. SAR testing for 802.11 was performed with the transmitter set to the lowest data rate on the default test channels **highlighted in bold** in the tables below. The head and body positions that resulted in the highest SAR values were further tested on the additional channels and higher data rates **highlighted in pink** in the tables below.

Band	Channel	Measured Average Conducted Power (dBm) for 802.11b Mode Data Rates			
		1 Mbps	2 Mbps	5.5 Mbps	11 Mbps
Wi-Fi 2450 MHz	1	**17.52**	17.53	17.54	17.53
	6	**18.04**	17.89	17.79	17.76
	11	**18.51**	18.59	18.67	18.62

Band	Channel	Measured Average Conducted Power (dBm) for 802.11g Mode Data Rates							
		6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps
Wi-Fi 2450 MHz	1	16.73	16.73	16.26	16.03	13.63	13.71	12.09	12.08
	6	17.19	17.21	16.93	16.65	14.27	14.13	12.41	12.6
	11	17.75	17.79	17.18	17.04	14.73	14.76	12.92	12.95

Band	Channel	Measured Average Conducted Power (dBm) for 802.11n Mode Data Rates (20 MHz Channel, 800 ns Guard Interval)							
		6.5 Mbps	13 Mbps	19.5 Mbps	26 Mbps	39 Mbps	52 Mbps	58.5 Mbps	65 Mbps
Wi-Fi 2450 MHz	1	15.70	16.17	15.85	13.76	13.72	11.96	11.89	10.99
	6	16.23	16.54	16.27	14.37	14.26	12.66	12.44	11.52
	11	16.69	17.09	16.79	14.80	14.70	13.00	12.99	12.03

[2] The DUT system architecture does not support simultaneous voice and data during a single CDMA session to the cellular network. Operation in this mode is for data transmission only.

Band	Channel	Measured Average Conducted Power (dBm) for 802.11n Mode Data Rates (20 MHz Channel, 400 ns Guard Interval)							
		7.2 Mbps	14.4 Mbps	21.6 Mbps	28.8 Mbps	43.3 Mbps	57.7 Mbps	65 Mbps	72.2 Mbps
Wi-Fi 2450 MHz	1	15.54	16.00	15.61	13.79	13.56	11.80	11.74	10.88
	6	16.11	16.70	16.21	14.28	14.12	12.42	12.39	11.55
	11	16.60	17.08	16.76	14.81	14.65	12.74	12.82	11.94

3. Test Equipment Used

3.1 Dosimetric System

The Motorola Mobility ADR Test Services Laboratory utilizes a Dosimetric Assessment System (Dasy4™ v4.7) manufactured by Schmid & Partner Engineering AG (SPEAG™), of Zurich Switzerland. All the SAR measurements are taken within a shielded enclosure. The overall 10 g RSS uncertainty of the measurement system is ±10.8% (K=1) with an expanded uncertainty of ±21.6% (K=2). The overall 1 g RSS uncertainty of the measurement system is ±11.1% (K=1) with an expanded uncertainty of ±22.2% (K=2). The measurement uncertainty budget is given in Appendix 4. Per IEEE 1528, this uncertainty budget is applicable to the SAR range of 0.4 W/kg to 10 W/kg.

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

Description	Serial Number	Cal Date	Cal Due Date
DASY4™ DAE V1	699	Sep-22-2011	Sep-22-2012
E-Field Probe ES3DV3	3115	Jan-12-2011	Jan-12-2012
S.A.M. Phantom used for 800/1900/2450 MHz	TP-1131		
Dipole Validation Kit, DV835V2	420TR	Jul-8-2011	Jul-8-2012
Dipole Validation Kit, DV1800V2	250TR	Mar-17-2011	Mar-17-2012
Dipole Validation Kit, DV2450V2	863	Mar-17-2011	Mar-17-2012

3.2 Additional Equipment

Description	Serial Number	Cal Date	Cal Due Date
Signal Generator HP8648C	3847A04982	Nov-18-2009	Nov-18-2011
Power Meter E4419B	GB39510900	Mar-28-2011	Mar-28-2013
Power Sensor #1 - E9301A	US39211007	Aug-16-2011	Aug-16-2012
Power Sensor #2 - E9301A	US39211008	Aug-16-2011	Aug-16-2012
Signal Generator HP8648C	3847A04632	Aug-13-2011	Aug-13-2013
Power Meter E4419B	GB39511087	Dec-22-2009	Dec-22-2011
Power Sensor #1 - E9301A	US39211007	Aug-25-2011	Aug-25-2012
Power Sensor #2 - E9301A	US39211008	Aug-25-2011	Aug-25-2012
Signal Generator HP8648C	3847A04843	Mar-28-2011	Mar-28-2013
Power Meter E4419B	GB39511084	Mar-28-2011	Mar-28-2013
Power Sensor #1 - E9301A	US39210929	Mar-31-2011	Mar-31-2012
Power Sensor #2 - E9301A	US39210930	Mar-31-2011	Mar-31-2012
Network Analyzer HP8753ES	US39171846	May-19-2011	May-19-2012
Dielectric Probe Kit HP85070C	US99360070		

4. Electrical parameters of the tissue simulating liquid

Prior to conducting SAR measurements, the relative permittivity, ε_r, and the conductivity, σ, of the tissue simulating liquids were measured with a HP85070 Dielectric Probe Kit These values, along with the temperature of the simulated tissue are shown in the table below. The recommended limits for permittivity and conductivity are also shown. A mass density of ρ= 1 $^{g}/_{cm^3}$ was entered into the system in all the cases. It can be seen that the measured parameters are within tolerance of the recommended limits specified in [1] and [5].

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

The probe calibration frequency and the system accuracy verifications were performed at 835 MHz. The center of the LTE Band 13 transmit band is 782 MHz. The difference exceeds the ± 50 MHz window specified in FCC KDB 450824 D01. Therefore calculations are given to perform a SAR correction for deviations of the complex permittivity and conductivity from simulated tissue targets if the deviation is in the direction that does not result in a "conservative" SAR result. The sensitivity coefficients for frequencies within "Attachment 1: Tissue Parameter Variations" of FCC KDB 450824 were used.

This attachment provides:

450 MHz tissue has sensitivity coefficients for ε_r of -0.46 and for σ of +0.43
800 MHz tissue has sensitivity coefficients for ε_r of -0.57 and for σ of +0.59

A linear approximation to get the values for 782 MHz (the frequency of the center of the transmit band) were performed. The sensitivity coefficients used for 782 MHz were: ε_r of -0.56434 and σ of +0.581771.

These coefficients were then applied to the delta between the measured conductivity and the target conductivity using the formula:

$$\Delta SAR = S_\varepsilon \, \Delta\varepsilon + S_\sigma \, \Delta\sigma$$

Here, $S_\varepsilon = \partial SAR/\partial\varepsilon$ and $S_\sigma = \partial SAR/\partial\sigma$ are sensitivity coefficients, representing the sensitivity of SAR to permittivity and conductivity, respectively.

The measured SAR is then corrected by the delta SAR to compensate for the change in conductivity using the formula:

$$SAR_{Corrected} = \frac{SAR_{Measured}}{(1+\Delta SAR)}$$

This correction has been applied to the conditions resulting in the worst-case SAR values found in testing (to maintain conservativeness), and can be seen in the data tables provided in section 6 below.

f (MHz)	Tissue type	Limits / Measured	Dielectric Parameters		
			ε_r	σ (S/m)	Temp (°C)
782	**Body**	**Measured,** Nov-07-2011	55.9	0.92	20.0
		Recommended Limits	55.4 ±5%	0.966 ±5%	18-25
835	**Body**	**Measured,** Nov-04-2011	55.3	0.98	18.4
		Recommended Limits	55.2 ±5%	0.97 ±5%	18-25
1880	**Body**	**Measured,** Nov-07-2011	50.7	1.58	18.6
		Recommended Limits	53.3 ±5%	1.52 ±5%	18-25
2450	**Body**	**Measured,** Nov-03/04-2011	50.1	1.94	20.2
		Recommended Limits	52.7 ±5%	1.95 ±5%	18-25

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

Ingredient	782 / 835 / 900 MHz Head	782 / 835 / 900 MHz Body	1800 MHz / 1900 MHz Head	1800 MHz / 1900 MHz Body	2450 MHz Head	2450 MHz Body
Sugar	57	44.9	--	--	--	--
DGBE	--	--	47	30.8	--	30
Diacetin	--	--	--	--	51	--
Water	40.45	53.06	52.62	68.8	48.75	70
Salt	1.45	0.94	0.38	0.4	0.15	--
HEC	1	1	--	--	--	--
Bact.	0.1	0.1	--	--	0.1	--

5. System Accuracy Verifications

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

A SAR measurement was performed to verify the measured SAR was within ±10% from the target SAR indicated in Appendix 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 1 W forward power delivered to the dipole. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values. The distributions of SAR compare well with those of the reference measurements (see Appendix 1). The simulated tissue depth was verified to be 15.0 cm ± 0.5 cm. Z-axis scans showing the SAR penetration are also included in Appendix 1. All system accuracy verifications were performed within 24 hours of SAR testing. The same phantoms, simulated tissue and test equipment were used for these verifications and the SAR testing.

System Accuracy Verification Measurements for Body SAR Measurements							
f (MHz)	Description	Measured SAR (W/kg), 1 gram	Normalized SAR (W/kg), 1 gram	Dielectric Parameters		Ambient Temp (°C)	Tissue Temp (°C)
				ε_r	σ (S/m)		
835	**Measured,** Nov-04-2011	1.95	9.75	55.3	0.98	21.7	20.7
	Measured, Nov-07-2011	1.93	9.65	55.4	0.97	21.7	21.0
	Recommended Limits	2.38	9.39	55.2 ±5%	0.97 ±5%	18-25	18-25
1800	**Measured,** Nov-07-2011	7.26	36.3	50.9	1.48	21.7	20.5
	Recommended Limits	9.08	37.2	53.3 ±5%	1.52 ±5%	18-25	18-25
2450	**Measured,** Nov-03-2011	11.3	56.5	50.1	1.94	21.5	20.7
	Recommended Limits	13.2	52.8	52.7 ±5%	1.95 ±5%	18-25	18-25

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

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ES3DV3	3115	835	5.88	6 of 11
		1810	4.61	6 of 11
		2450	4.12	6 of 11

6. Lapdock 500 Accessory Test Results

The DUT supports the use of the Motorola Lapdock™ 500. The SAR results above were utilized to determine the channel that results in the highest measured SAR value when in proximity of the user's body. SAR testing was performed with the DUT placed into the Lapdock™ 500 and the Lapdock™ 500 placed for testing per FCC KDB 616217. For CDMA and LTE modes, the test sample was operated using an actual transmission through a base station simulator. Wi-Fi testing was conducted using manufacturer test mode software, per guidance given in FCC KDB 248227. The base station simulator or test software was set up for the proper channels, transmitter power levels and transmit modes of operation.

The Motorola Lapdock™ 500 supports the use of data modes within the phone for a data connection to the Internet. While the phone is attached to the Lapdock™ 500, the phone is still able to make an receive calls. These calls can be simultaneous to the data transmission, if the technology in the phone supports this (eg: WiFi and CDMA). An evaluation of the simultaneous transmitter SAR is provided in section 6.5. The 5 GHz WiFi modes (802.11a/n) do not operate in with Lapdock™ 500. While in the Lapdock™ 500, the phone will still utilize the LTE MPR and svLTE power reductions mentioned in Section 2.2.1, but the other power reduction methods for the mobile hotspot configuration in the phone are not applicable.

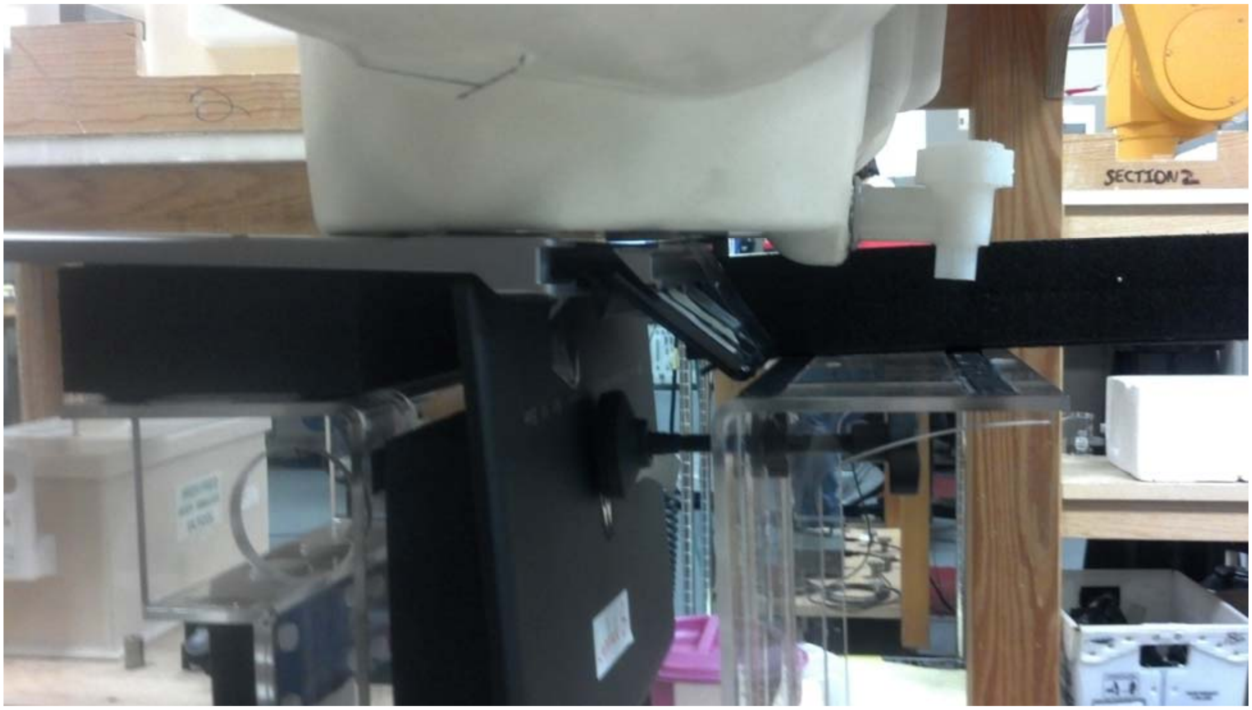
The SAR results shown in table 1 are maximum SAR values averaged over 1 gram of phantom tissue, to demonstrate compliance to [3] and also over 10 grams of phantom tissue, to demonstrate compliance to [6]. Also shown are the temperature of the simulated tissue after the test, the measured drift, the measured conducted output power levels, power reduction amount (when applicable), the measured SAR corrected for probe calibration (when applicable), and the extrapolated SAR. The exact method of extrapolation is:

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

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

The 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 2.

The SAR measurements were performed using the flat section of the SAM phantoms listed in section 3.1. The simulated tissue depth was verified to be 15.0 cm ± 0.5 cm. The DUT and Lapdock™ 500 were placed using a Laptop Extension Kit available from SPEAG™ that facilitates the testing of larger devices according to IEC 62209-2 (e.g., laptops, cameras, etc.). The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin-SAM Phantoms.



The following probe conversion factors were used on the E-Field probe(s) used for the Lapdock™ 500 body measurements:

Description	Serial Number	f (MHz)	Conversion Factor	Cal Cert pg #
E-Field Probe ES3DV3	3115	835	5.88	6 of 11
		1810	4.61	6 of 11
		2450	4.12	6 of 11

Lapdock against Body, Bottom Surface of Lapdock 500 Placed 0 mm from Phantom, Screen opened 90 degrees															
***f* (MHz)**	**Mode**	**Battery/ Accessory**	**Channel**	**Temp (°C)**	**Drift (dB)**	**DUT Power**		**10 g SAR value**			**1 g SAR value**			**Test Plot**	
						Measured (dBm)	Power Reduction (dB)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Measured (W/kg)	Corrected (W/kg)	Extrapolated (W/kg)	Grid	Plot Page
782	**LTE Band 13, 16QAM (1 RB @ Low)**	SNN5899A	23230	**20.9**	**-0.96**	**24.05**		**0.203**	**0.207**	**0.26**	**0.267**	**0.276**	**0.34**	**19x8x7**	**29**
	svLTE Band 13, 16QAM (1 RB @ Low)		23230	**20.9**	**-0.183**	**24.05**	**-3.0**	**0.101**	**0.103**	**0.11**	**0.132**	**0.136**	**0.14**	**19x8x7**	**30**
835	**CDMA 800, RC3 TDSO32 (FCH -SCH)**		1013	20.7	-0.213	24.52		0.938		0.99	1.32		1.39		
			384	**20.7**	**0.0662**	**24.60**		**1.02**		**1.02**	**1.42**		**1.42**	**19x8x7**	
			777	20.5	0.0346	24.36		0.933		0.93	1.29		1.29		
1880	**CDMA 1900, RC3 TDSO32 (FCH -SCH)**		25	20.3	20.3	25.20		0.598		0.61	1.07		1.10		
			600	**20.5**	**-0.146**	**25.16**		**0.715**		**0.74**	**1.20**		**1.24**	**19x8x7**	
			1175	20.6	0.022	24.93		0.682		0.68	1.15		1.15		
2450	**802.11b, 1 Mbps**		1												
			6												
			11	**20.3**	**-0.203**	**18.51**		**0.20**		**0.21**	**0.465**		**0.49**	**19x8x7**	

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

7.0 Description and Evaluation of Simultaneous Transmitters

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

By device design the CDMA and LTE transmitters may operate simultaneously with either the Wi-Fi 802.11 transmitter or the Bluetooth transmitter. The separation distance between the Wi-Fi 802.11/Bluetooth antenna and the CDMA antenna is 1.67 cm, and the separation between the Wi-Fi 802.11/Bluetooth antenna and the LTE antenna is 9.1 cm. Pictorial representation of the antenna locations and separation distances are given in Exhibit 7d of the original filing.

The Bluetooth transmitter of the device under test can be excluded from stand-alone and simultaneous SAR evaluation, per the highlighted requirements from FCC KDB 648474, as follows. Note that Bluetooth mode is not intended for use in configurations against the head or during mobile hotspot operation, and this evaluation considers only the body-worn configuration.

1. The highest output conducted power measured for Bluetooth on the device under test is 8.77 mW [≤ 14 mW]
2. The separation distance between the Bluetooth antenna and the CDMA antenna is 1.67 cm [< 2.5 cm]

The Wi-Fi and the Bluetooth cannot transmit simultaneously, so there is no co-location test requirement for Wi-Fi and Bluetooth. CDMA supports both voice and data transmission, though not simultaneously. LTE and Wi-Fi support data transmission only.

Description of Simultaneous Transmit Capabilities				
Transmitter Combinations		Scenario Supported?	Supported for Mobile Hotspot?	Notes
#1	CDMA (1x Voice) + CDMA (1x Data)	No	No	DUT system architecture does not support simultaneous voice and data during a CDMA session on the cellular network
#2	CDMA (1x Voice) + CDMA (EVDO)	No	No	
#3	CDMA (1x Data) + CDMA (EVDO)	No	No	DUT system architecture supports only one data link per CDMA session
#4	CDMA (1x Voice) + LTE	Yes	No	*svLTE* – LTE operates at reduced power, see section 2.2.2
#5	CDMA (1x Data) + LTE	No	No	DUT system architecture supports only one data link per cellular session
	CDMA (EVDO) + LTE	No	No	DUT system architecture supports only one data link per cellular session
#6	CDMA (1x Voice) + Wi-Fi	Yes	No	Supported for voice plus background data
#7	CDMA (1x Data) + Wi-Fi	Yes	Yes	Supported for mobile hotspot operation only.
	CDMA (EVDO) + Wi-Fi	Yes	Yes	
#8	LTE + Wi-Fi	Yes	Yes	
#9	CDMA (1x Voice) + LTE + Wi-Fi	Yes	Yes	CDMA operates at reduced power during mobile hotspot operation; *svLTE during Mobile Hotspot* – LTE operates at reduced power See section 2.2.2

Table 2: Simultaneous Transmit Capabilities.

For the transmitters requiring stand-alone SAR testing (CDMA, LTE, and Wi-Fi 802.11), the KDB guidelines direct that if the sum of the 1 g SAR measured for the simultaneously transmitting antennas is less than the SAR limit, SAR measurement for simultaneous transmission is not required. Further, if the SAR-to-peak-location separation ratio for two simultaneously transmitting antennas is less than 0.3 then SAR measurement for simultaneous transmission is likewise not required. Evaluations of the body simultaneous SAR summations for the worst-case SAR transmitter configurations are presented in the tables below. The orientation the phone is held in the Lapdock™ 500 results in the measured SAR hotspots being very close to each other. Therefore the SPLSR will be > 0.3 because the distance is very short.

The following LapDock™ 500 position SAR summations for simultaneous evaluation are provided to demonstrate a data link (over WiFi) with a simultaneous voice call (over GSM, WCDMA), and additionally evaluations for mobile hotspot connections (WiFi connected to one of the cellular data modes).

Evaluations for Simultaneous SAR, LapDock (0 mm) position Mobile Hotspot functionality disabled									
Transmitter Stand-Alone 1 g SAR Values (W/kg)						**1 g SAR Summations (W/kg)**			
Position	**CDMA 800**	***CDMA 1900***	***LTE Band 13***	***LTE Band 13 (svLTE)***	**Wi-Fi 2450**	**CDMA 800 (voice) + svLTE B13**	**CDMA 1900 (voice) + svLTE B13**	**CDMA 800 (voice) + Wi-Fi 2450**	**CDMA 1900 (voice) + Wi-Fi 2450**
Bottom Surface of Lapdock 0 mm from Phantom	1.42	1.24	0.34	0.14	0.49	1.56	1.38	**>1.60**	**>1.60**

Table 3: Simultaneous SAR Evaluation with MHS disabled.

Evaluations for Simultaneous SAR, LapDock (0 mm) position Mobile Hotspot functionality enabled										
Transmitter Stand-Alone 1 g SAR Values (W/kg)						**1 g SAR Summations (W/kg)**				
Position	**CDMA 800**	***CDMA 1900***	***LTE Band 13***	***LTE Band 13 (svLTE)***	**Wi-Fi 2450**	**CDMA 800 (data) + Wi-Fi 2450**	**CDMA 1900 (data) + Wi-Fi 2450**	**LTE B13 + Wi-Fi 2450**	**CDMA 800 (voice) + svLTE B13 + Wi-Fi 2450**	**CDMA1900 (voice) + svLTE B13 + Wi-Fi 2450**
Bottom Surface of Lapdock 0 mm from Phantom	1.42	1.24	0.34	0.14	0.49	**>1.60**	**>1.60**	0.83	**>1.60**	**>1.60**

Table 4: Simultaneous SAR Evaluation with MHS enabled.

The indicated conditions above require a simultaneous SAR measurement.

Simultaneous Transmit Measurement:

For the configurations noted as requiring simultaneous SAR evaluation, combined SAR measurements were required to determine the aggregate 1 g SAR. 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. For this case, the outer dimensions of the extended zoom scan were X = 144 mm, Y = 56 mm, Z = 30 mm with a step size of X = 8 mm, Y = 8 mm, Z = 5 mm.

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 SEMCAD X Combined Multi Band Averaged SAR tool. Use of this tool allows for a complete three-way combination of the SAR measurements, including compensations for power drift and corrections for probe calibration required for LTE Band 13 measurements.

A comparison can be performed between the stand-alone measurements for each noted transmitter and the measurements provided for simultaneous transmission. The measurements were not performed sequentially and thus may show slightly different results due to a number of reasons including, but not limited to, slight differences in DUT positioning.

Measurements for Simultaneous SAR		
Transmitter Modes	**Aggregate 1 g (W/kg)**	**Plot Pages**
CDMA 800 (voice) + Wi-Fi 2450	**1.56**	**35**
CDMA 800 (data) + Wi-Fi 2450	**1.56**	**35**
CDMA 1900 (voice) + Wi-Fi 2450	**1.50**	**36-37**
CDMA 1900 (data) + Wi-Fi 2450	**1.50**	**36-37**
CDMA 800 (voice) + svLTE B13* + Wi-Fi 2450	**1.59**	**38-39**
CDMA1900 (voice) + svLTE B13* + Wi-Fi 2450	**1.52**	**40-41**

Table 5: Simultaneous SAR Measurements.

The CDMA data SAR results were also used for the CDMA voice because the average power for the two modes (RC3 SO55 and RC3 TDSO/SO32) was within 0.25 dB. Plots for these measurements and their three-way combination are provided in Appendix 3. The svLTE B13 SAR results utilize the svLTE power reduction provided in section 2.2.1

References

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

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

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

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

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

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

Appendix 1

SAR distribution comparisons for System Accuracy Verifications

Date/Time: 11/4/2011 11:27:12 AM

Test Laboratory: Motorola Mobility - 835 MHz System Performance Check

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:420
Procedure Notes: PM1 Power = 200 mW Refl.Pwr PM3 = -20dB Sim.Temp@SPC = 20.7°C Room Temp @ SPC = 21.7°C
Communication System: CW - Dipole; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: BIG BODY Validation *BODY Tissue* ; Medium parameters used: f = 835 MHz; σ = 0.98 mho/m; ε_r = 55.3; ρ = 1000 kg/m^3

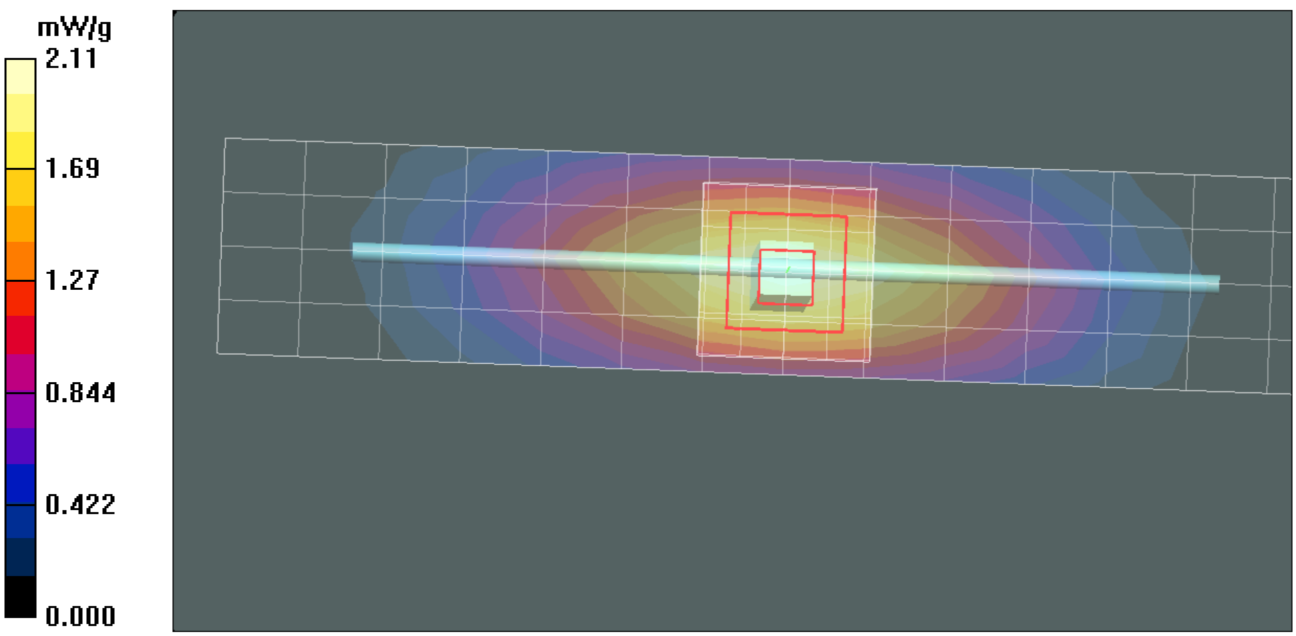
DASY4 Configuration:

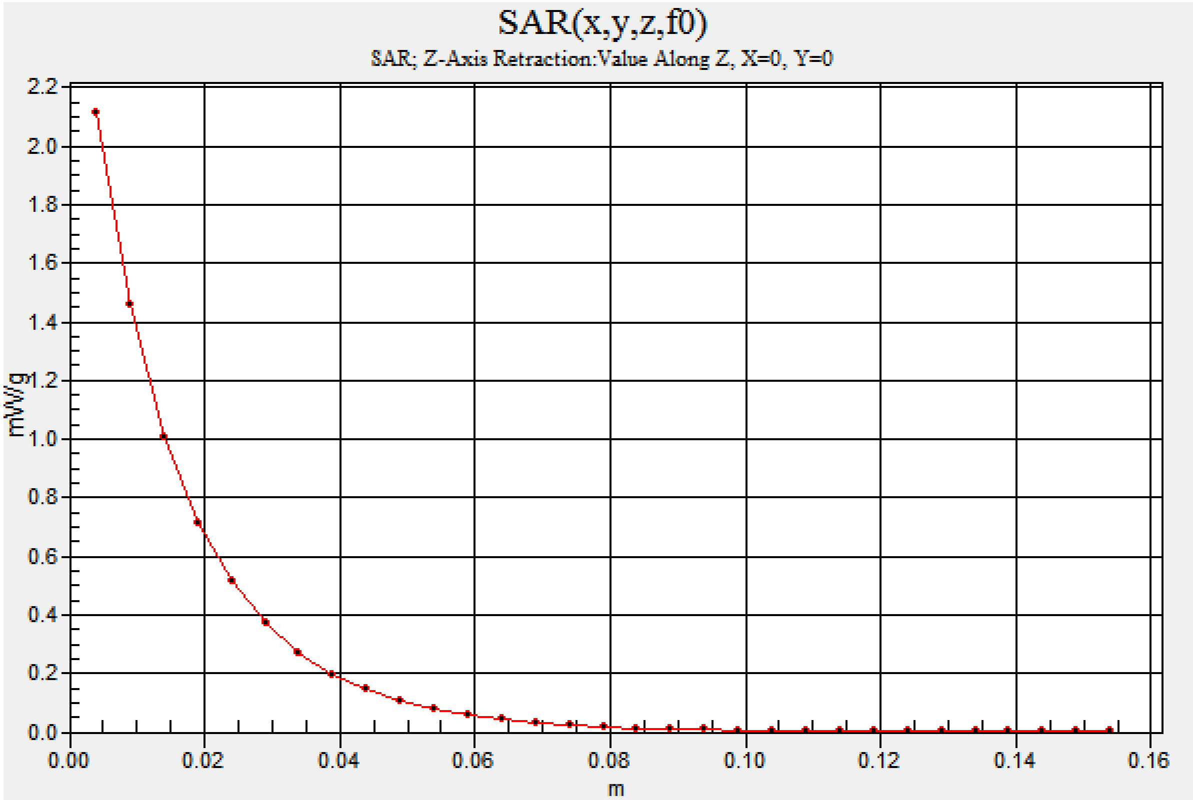
- Probe: ES3DV3 - SN3115; ConvF(5.88, 5.88, 5.88); Calibrated: 1/12/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn699; Calibrated: 9/22/2011
- Phantom: R#-6 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Daily SPC Check/Dipole Area Scan (5x15x1): Measurement grid: dx=10mm, dy=15mm
Maximum value of SAR (measured) = 2.10 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 47.1 V/m; Power Drift = -0.004 dB
Peak SAR (extrapolated) = 2.82 W/kg
SAR(1 g) = 1.95 mW/g; SAR(10 g) = 1.29 mW/g
Maximum value of SAR (measured) = 2.12 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 2.11 mW/g




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

Test Laboratory: Motorola Mobility - 835 MHz System Performance Check

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:420
Procedure Notes: PM1 Power = 200mW Refl.Pwr PM3 = -19.6dB Sim.Temp@SPC = 21°C Room Temp @ SPC = 21.7°C
Communication System: CW - Dipole; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: BIG BODY Validation *BODY Tissue* ; Medium parameters used: f = 835 MHz; σ = 0.97 mho/m; ε_r = 55.4; ρ = 1000 kg/m^3

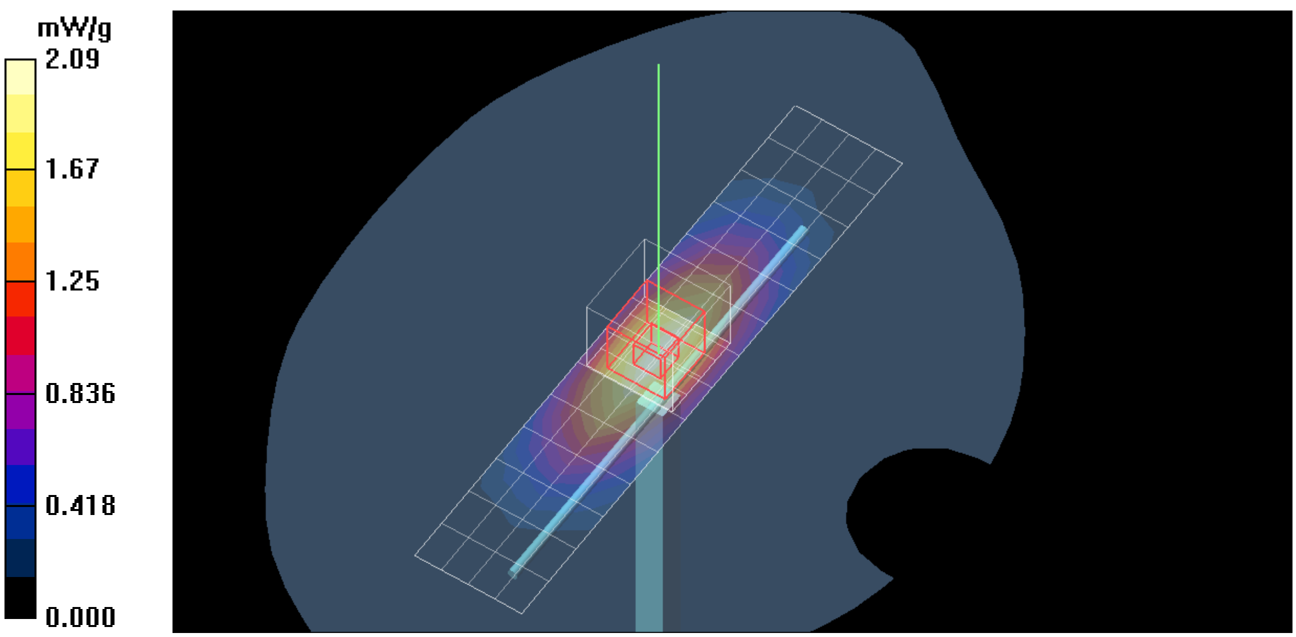
DASY4 Configuration:

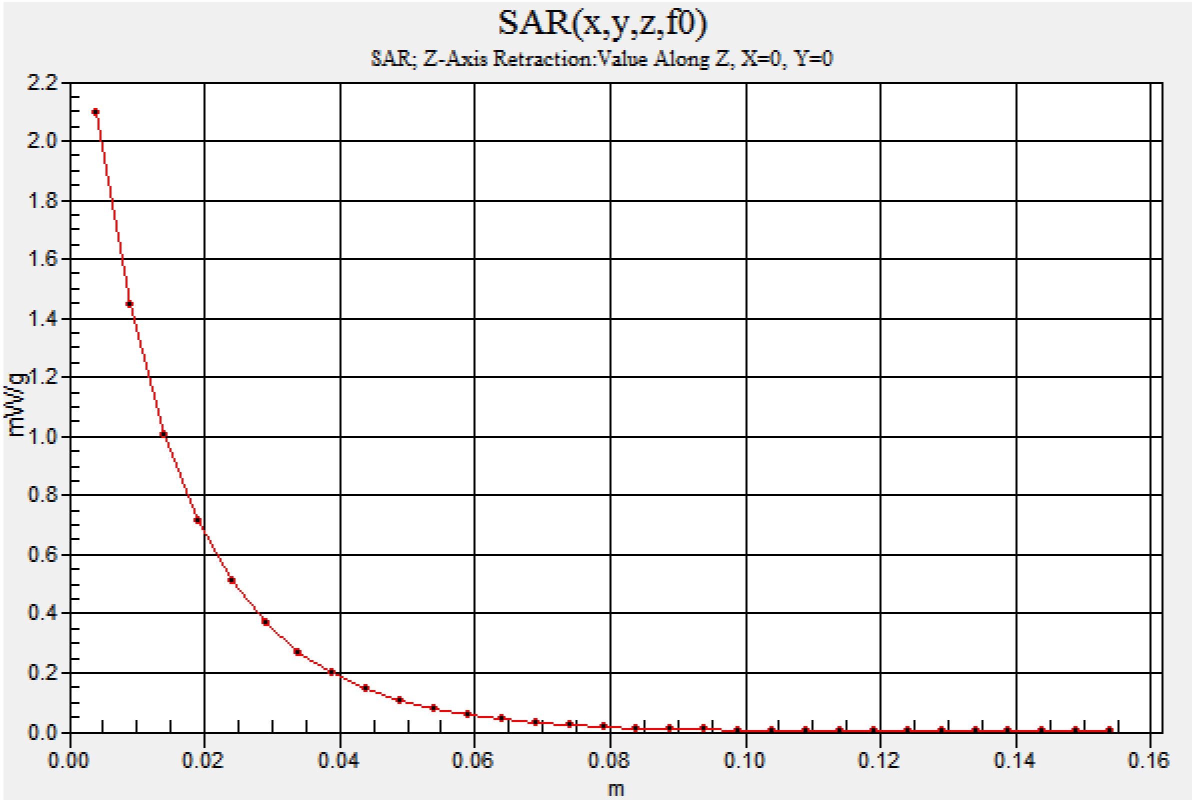
- Probe: ES3DV3 - SN3115; ConvF(5.88, 5.88, 5.88); Calibrated: 1/12/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn699; Calibrated: 9/22/2011
- Phantom: R#-6 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Daily SPC Check/Dipole Area Scan (5x15x1): Measurement grid: dx=10mm, dy=15mm
Maximum value of SAR (measured) = 2.09 mW/g

Daily SPC Check/0-Degree, 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 47.1 V/m; Power Drift = 0.006 dB
Peak SAR (extrapolated) = 2.78 W/kg
SAR(1 g) = 1.93 mW/g; SAR(10 g) = 1.28 mW/g

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




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

Date/Time: 11/7/2011 1:33:21 PM

Test Laboratory: Motorola Mobility - 1800 MHz System Performance Check

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:250
Procedure Notes: PM1 Power = 200 mW Refl.Pwr PM3 = -25.4dB Sim.Temp@SPC = 20.5掳C Room Temp @ SPC = 21.7掳C
Communication System: CW - Dipole; Frequency: 1800 MHz;Duty Cycle: 1:1
Medium: Validation *BODY Tissue* ; Medium parameters used: f = 1800 MHz; σ = 1.48 mho/m; ε_r = 50.9; ρ = 1000 kg/m^3

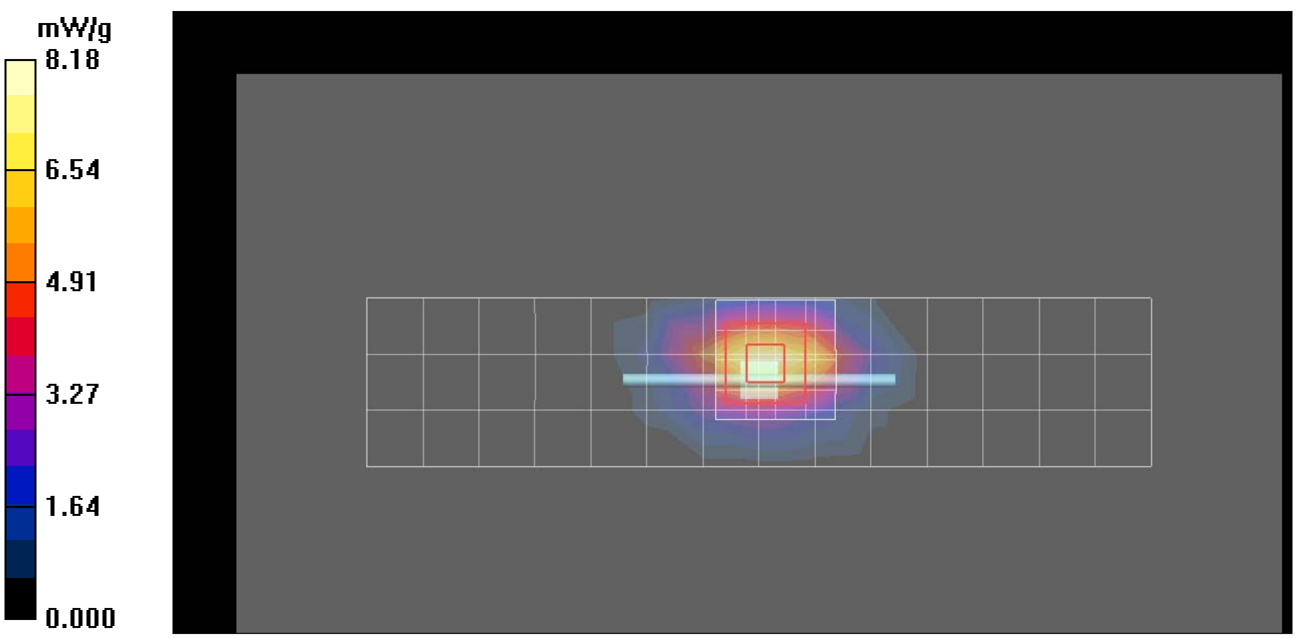
DASY4 Configuration:

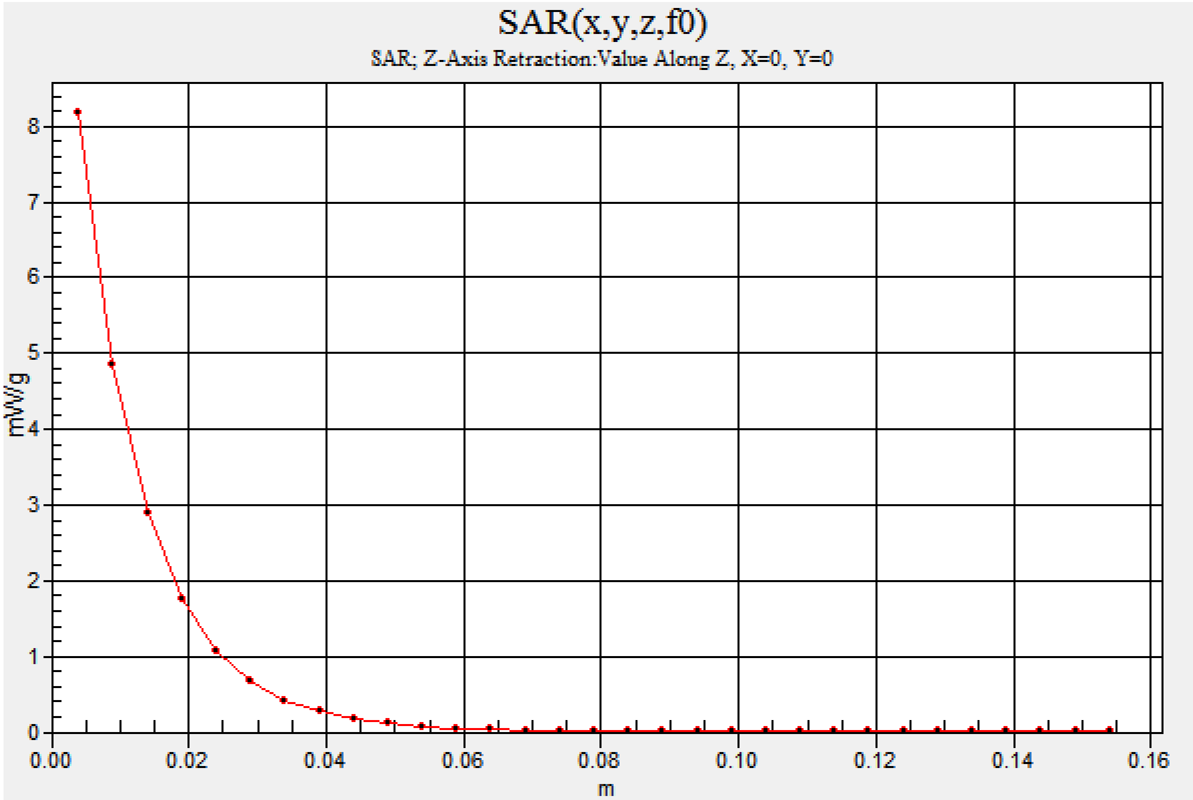
- Probe: ES3DV3 - SN3115; ConvF(4.61, 4.61, 4.61); Calibrated: 1/12/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn699; Calibrated: 9/22/2011
- Phantom: R#-6, Triple Flat Phantom 5.1C (Rev.3); Type: QD 000 P51 CA; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Daily SPC Check/Dipole Area Scan (4x15x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 7.97 mW/g

Daily SPC Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 71.3 V/m; Power Drift = -0.018 dB
Peak SAR (extrapolated) = 12.3 W/kg
SAR(1 g) = 7.26 mW/g; SAR(10 g) = 3.92 mW/g
Maximum value of SAR (measured) = 8.12 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 8.18 mW/g





SAR(x,y,z,f0)
SAR; Z-Axis Retraction:Value Along Z, X=0, Y=0
mW/g
m

Date/Time: 11/3/2011 7:40:16 AM

Test Laboratory: Motorola Mobility - 2450 MHz System Performance Check

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:863
Procedure Notes: PM1 Power = 200 mW Refl.Pwr PM3 = -18.70 dB Sim.Temp@SPC = 20.7°C Room Temp @ SPC = 21.5°C
Communication System: CW - Dipole; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: Validation *BODY Tissue* ; Medium parameters used: f = 2450 MHz; σ = 1.94 mho/m; ε_r = 50.1; ρ = 1000 kg/m^3

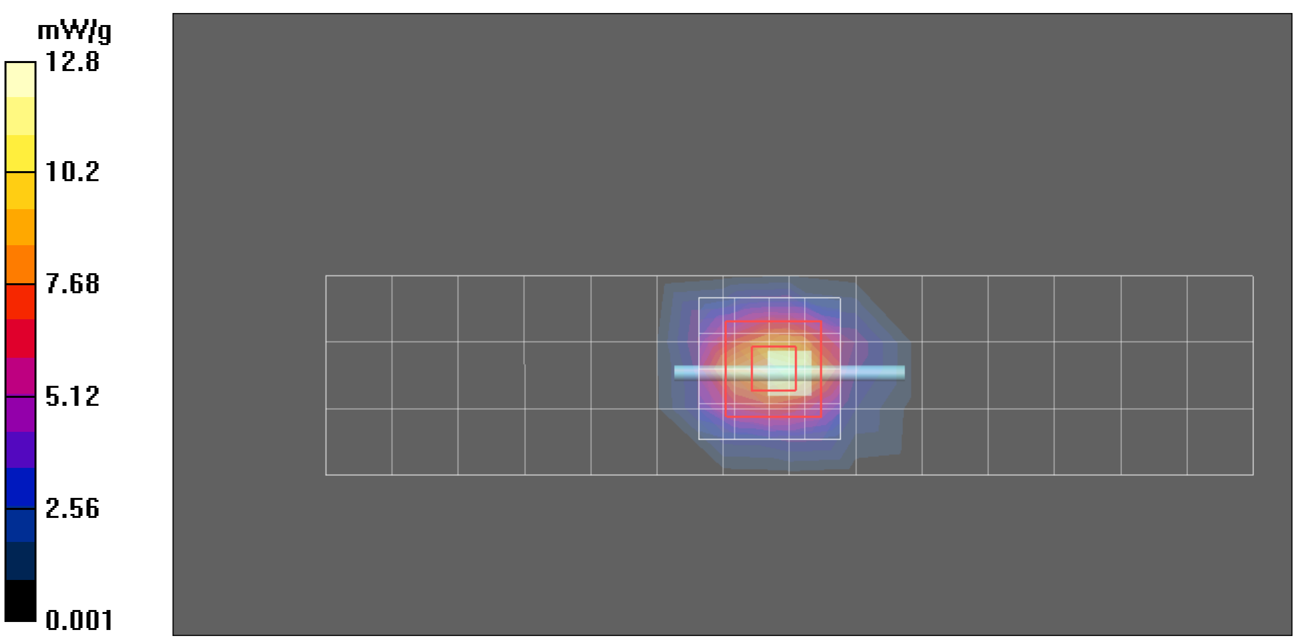
DASY4 Configuration:

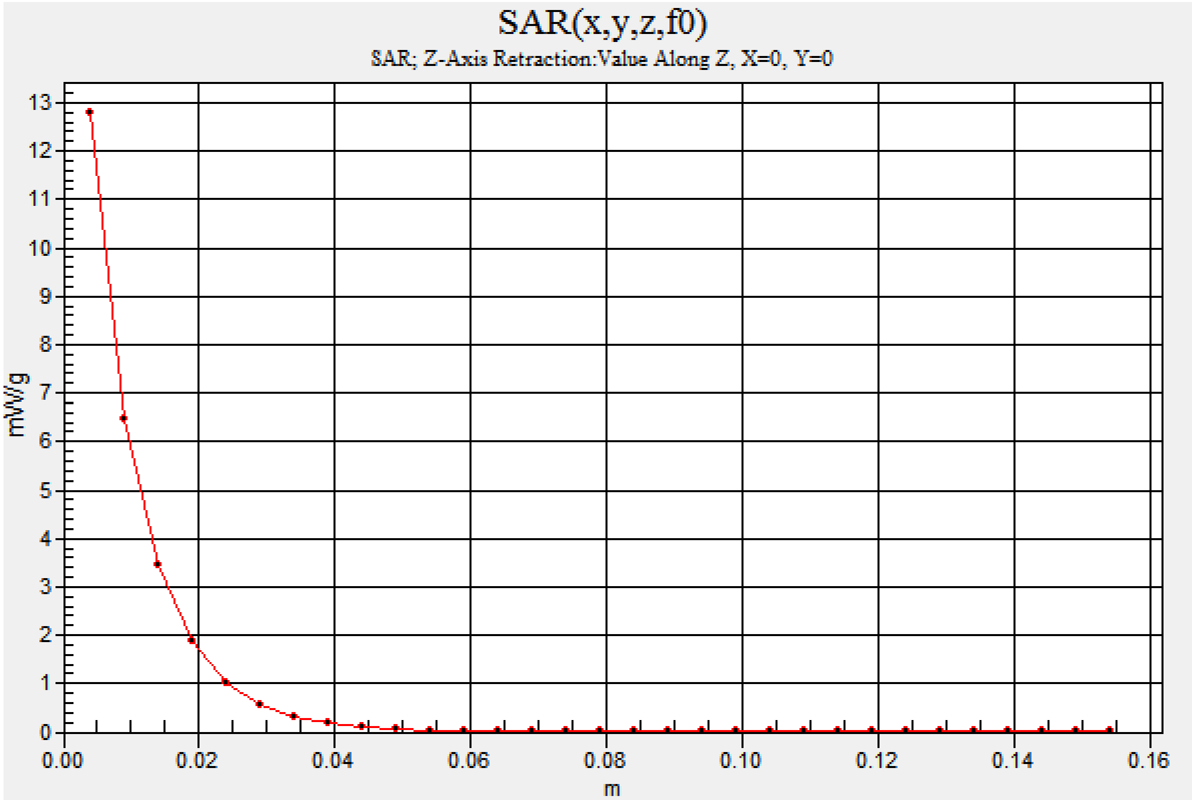
- Probe: ES3DV3 - SN3115; ConvF(4.12, 4.12, 4.12); Calibrated: 1/12/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn699; Calibrated: 9/22/2011
- Phantom: R#-6, Triple Flat Phantom 5.1C (Rev.3); Type: QD 000 P51 CA; Serial: n/a;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Daily SPC Check/Dipole Area Scan (4x15x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 9.58 mW/g

Daily SPC Check/0-Degree 5x5x7 Cube (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 79.8 V/m; Power Drift = -0.032 dB
Peak SAR (extrapolated) = 24.2 W/kg
SAR(1 g) = 11.3 mW/g; SAR(10 g) = 5.24 mW/g
Maximum value of SAR (measured) = 12.7 mW/g

Daily SPC Check/Z-Axis Retraction (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 12.8 mW/g




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

Appendix 4

SAR distribution plots for Lapdock Accessory Test Results

Date/Time: 11/7/2011 12:45:00 PM

Test Laboratory: Motorola Mobility - LTE Band 13

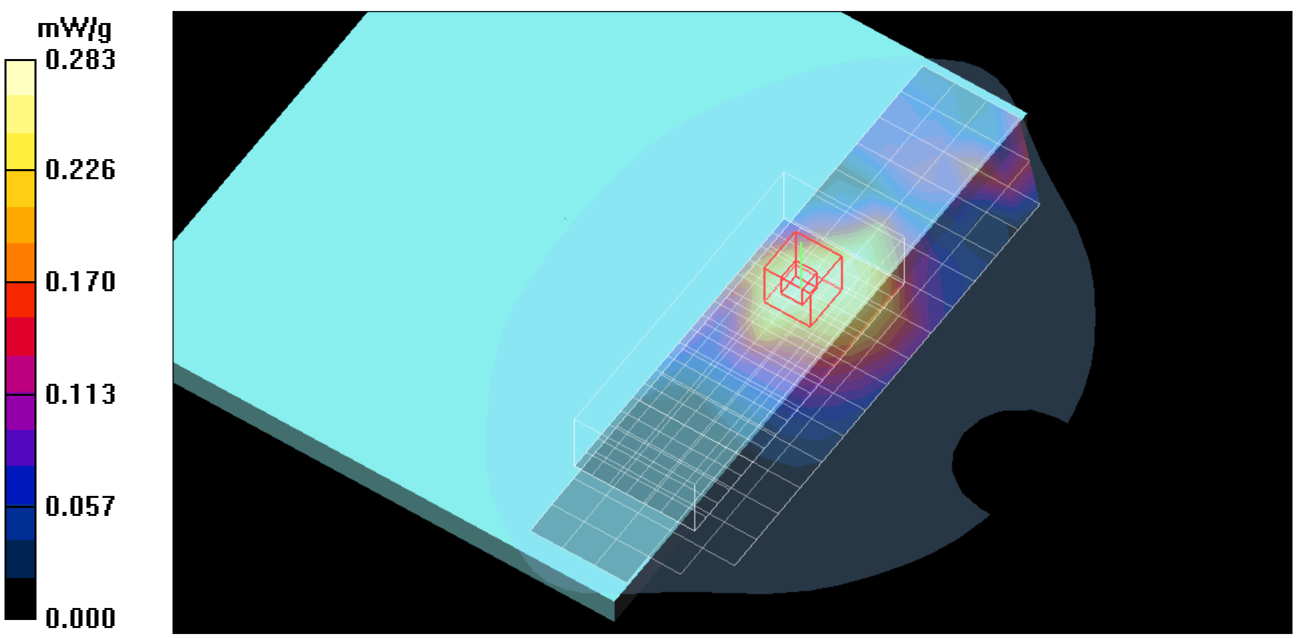
DUT: LapDock 2 Premium with Phone Serial: LS4V230052, FCC ID: IHDP56ME1
Procedure Notes: Pwr Step: 16QAM, 1 RB @ Low End Battery Model #: INTERNAL Accessory Model # = DUT in Lapdock 0mm from Flat Phantom
Communication System: LTE Band 13; Frequency: 782 MHz;Duty Cycle: 1:1
Medium: BIG BODY Low Freq Body; Medium parameters used: f = 782 MHz; $\sigma = 0.92$ mho/m; $\varepsilon_r = 55.9$; $\rho = 1000$ kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3115; ConvF(5.88, 5.88, 5.88); Calibrated: 1/12/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn699; Calibrated: 9/22/2011
- Phantom: R#-6 Glycol 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

SAM Phone Against Flat Section/Tablet Long Edge Area Scan - Body (15mm) (21x6x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.327 mW/g

SAM Phone Against Flat Section/MegaZoom Zoom Scan (<=3GHz) (19x8x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.1 V/m; Power Drift = -0.960 dB
Peak SAR (extrapolated) = 0.327 W/kg
SAR(1 g) = 0.267 mW/g; SAR(10 g) = 0.203 mW/g
Maximum value of SAR (measured) = 0.283 mW/g



Date/Time: 11/7/2011 11:53:37 AM

Test Laboratory: Motorola Mobility - svLTE

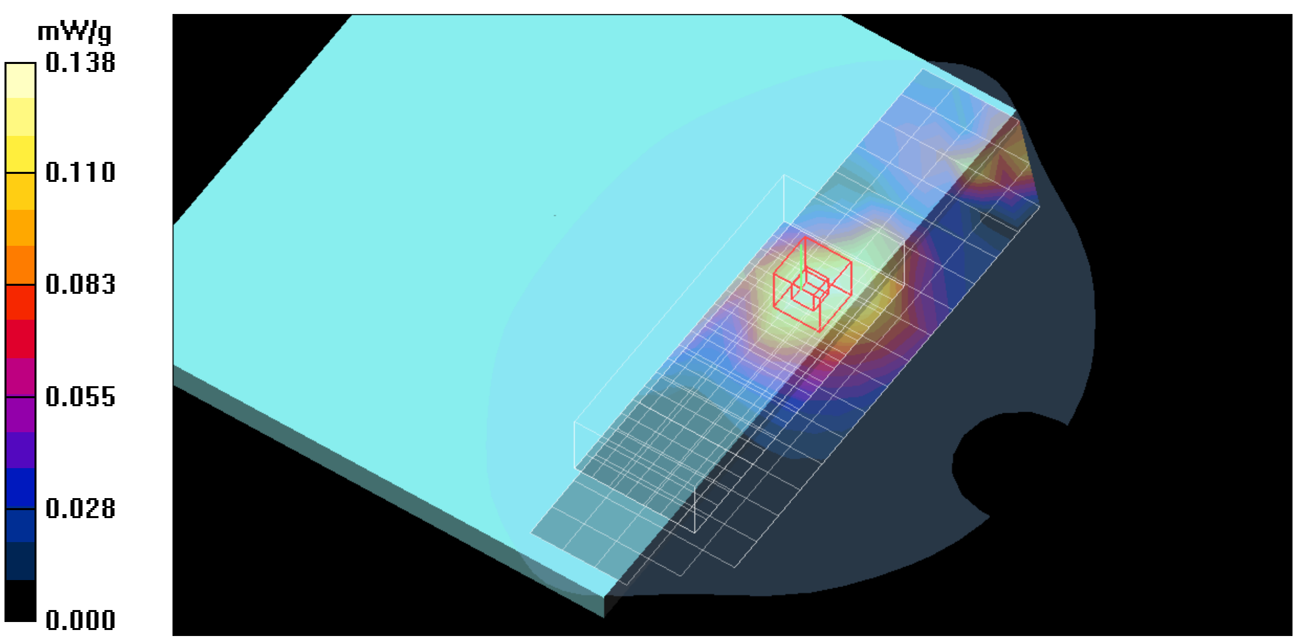
DUT: LapDock 2 Premium with Phone Serial: LS4V230079, FCC ID: IHDP56ME1
Procedure Notes: Pwr Step: 16QAM, 1 RB @ Low End Battery Model #: INTERNAL Test Configuration = DUT in Lapdock 0mm from Flat Phantom
Communication System: LTE Band 13; Frequency: 782 MHz;Duty Cycle: 1:1
Medium: BIG BODY Low Freq Body; Medium parameters used: f = 782 MHz; σ = 0.92 mho/m; ε_r = 55.9; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3115; ConvF(5.88, 5.88, 5.88); Calibrated: 1/12/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn699; Calibrated: 9/22/2011
- Phantom: R#-6 Glycol 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

SAM Phone Against Flat Section/Tablet Long Edge Area Scan - Body (15mm) (21x6x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.140 mW/g

SAM Phone Against Flat Section/MegaZoom Zoom Scan (<=3GHz) (19x8x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.8 V/m; Power Drift = -0.183 dB
Peak SAR (extrapolated) = 0.161 W/kg
SAR(1 g) = 0.132 mW/g; SAR(10 g) = 0.101 mW/g
Maximum value of SAR (measured) = 0.138 mW/g



Date/Time: 11/4/2011 12:45:55 PM

Test Laboratory: Motorola Mobility - CDMA 800

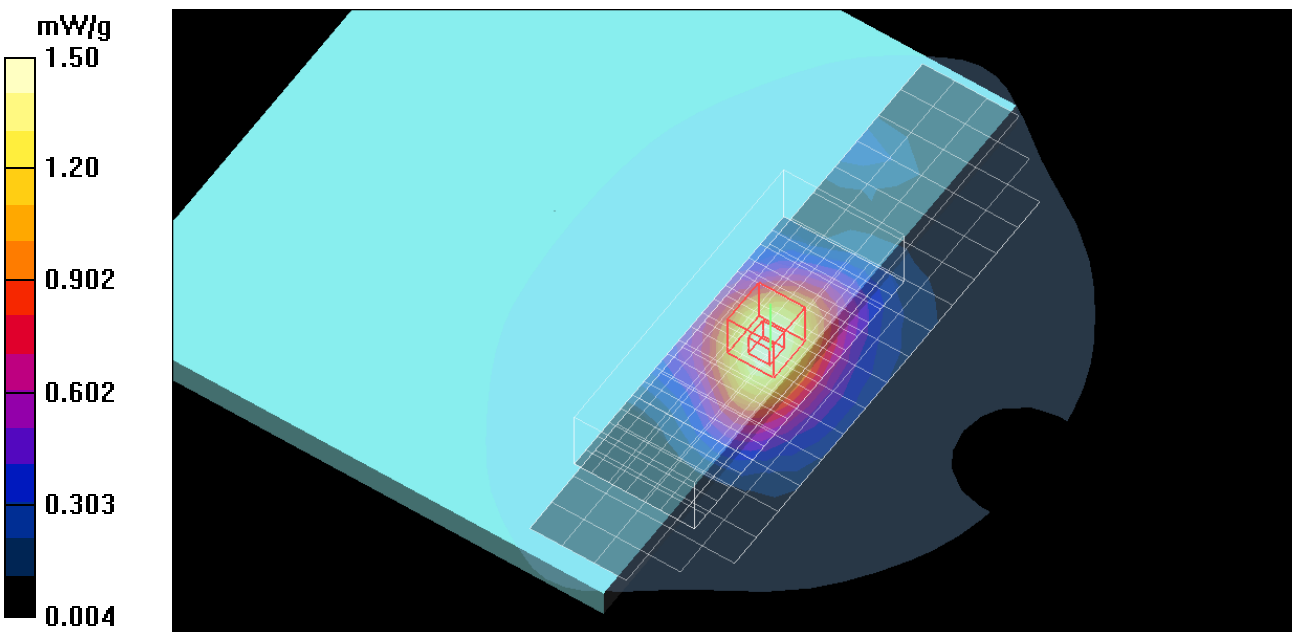
DUT: LapDock 2 Premium with Phone Serial: LS4V230079, FCC ID: IHDP56ME1
Procedure Notes: Pwr Step: ALL UP BITS - TD-SO32 (FCH-SCH) Battery Model #: INTERNAL Test Configuration = DUT in Lapdock 0mm from Flat Phantom
Communication System: CDMA 835; Frequency: 836.52 MHz;Duty Cycle: 1:1
Medium: BIG BODY Low Freq Body; Medium parameters used: f = 835 MHz; $\sigma = 0.98$ mho/m; $\varepsilon_r = 55.3$; $\rho = 1000$ kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3115; ConvF(5.88, 5.88, 5.88); Calibrated: 1/12/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn699; Calibrated: 9/22/2011
- Phantom: R#-6 Glycol 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

SAM Phone Against Flat Section/Tablet Long Edge Area Scan - Body (15mm) (21x6x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.46 mW/g

SAM Phone Against Flat Section/MegaZoom Zoom Scan (<=3GHz) (19x8x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 37.9 V/m; Power Drift = 0.066 dB
Peak SAR (extrapolated) = 1.96 W/kg
SAR(1 g) = 1.42 mW/g; SAR(10 g) = 1.02 mW/g
Maximum value of SAR (measured) = 1.50 mW/g



Date/Time: 11/7/2011 2:11:46 PM

Test Laboratory: Motorola Mobility - CDMA 1900

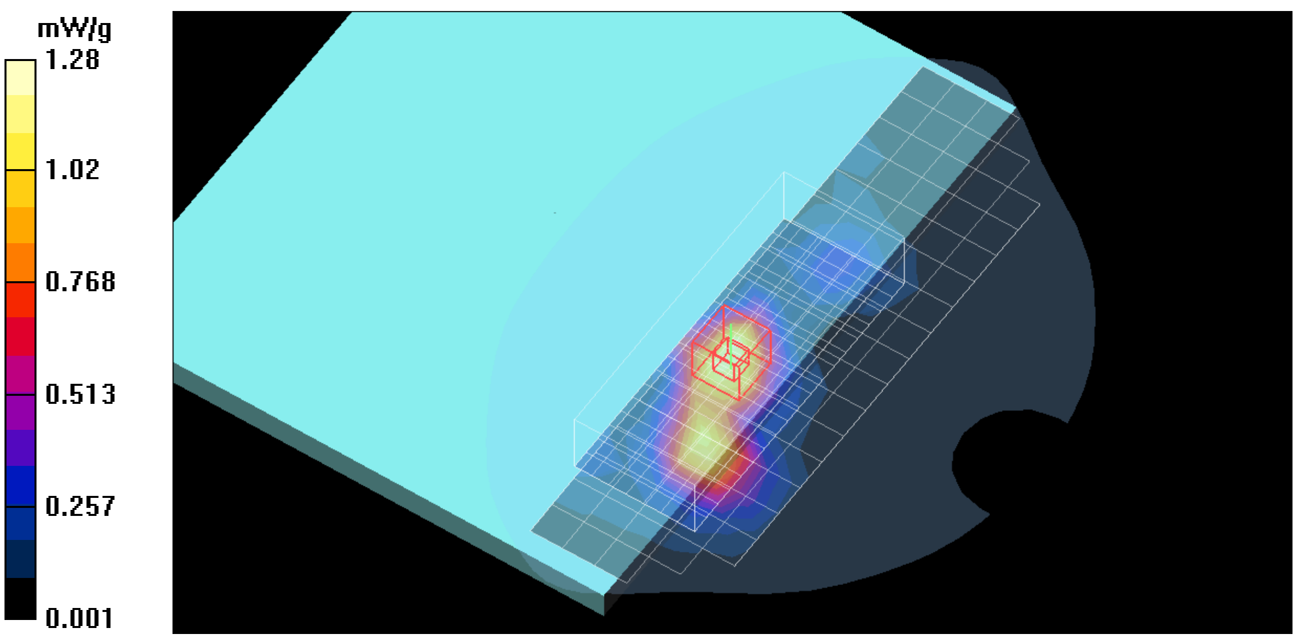
DUT: LapDock 2 Premium with Phone Serial: LS4V230079, FCC ID IHDP56ME1
Procedure Notes: Pwr Step: ALL UP BITS TD-SO32 (+FCH-SCH) Battery Model #: INTERNAL Test Configuration = DUT in Lapdock 0mm from Flat Phantom
Communication System: CDMA 1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: Regular Glycol Body 1750/1880; Medium parameters used: f = 1880 MHz; σ = 1.58 mho/m; ε_r = 50.7; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3115; ConvF(4.61, 4.61, 4.61); Calibrated: 1/12/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn699; Calibrated: 9/22/2011
- Phantom: R#-6 Glycol 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

SAM Phone Against Flat Section/Tablet Long Edge Area Scan - Body (15mm) (21x6x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.23 mW/g

SAM Phone Against Flat Section/MegaZoom Zoom Scan (<=3GHz) (19x8x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.4 V/m; Power Drift = -0.146 dB
Peak SAR (extrapolated) = 1.91 W/kg
SAR(1 g) = 1.2 mW/g; SAR(10 g) = 0.715 mW/g
Maximum value of SAR (measured) = 1.28 mW/g



Date/Time: 11/4/2011 12:11:38 AM

Test Laboratory: Motorola Mobility - 2450 MHz WiFi

DUT: LapDock 2 Premium with Phone Serial: LS4V230079, FCC ID: IHDP56ME1

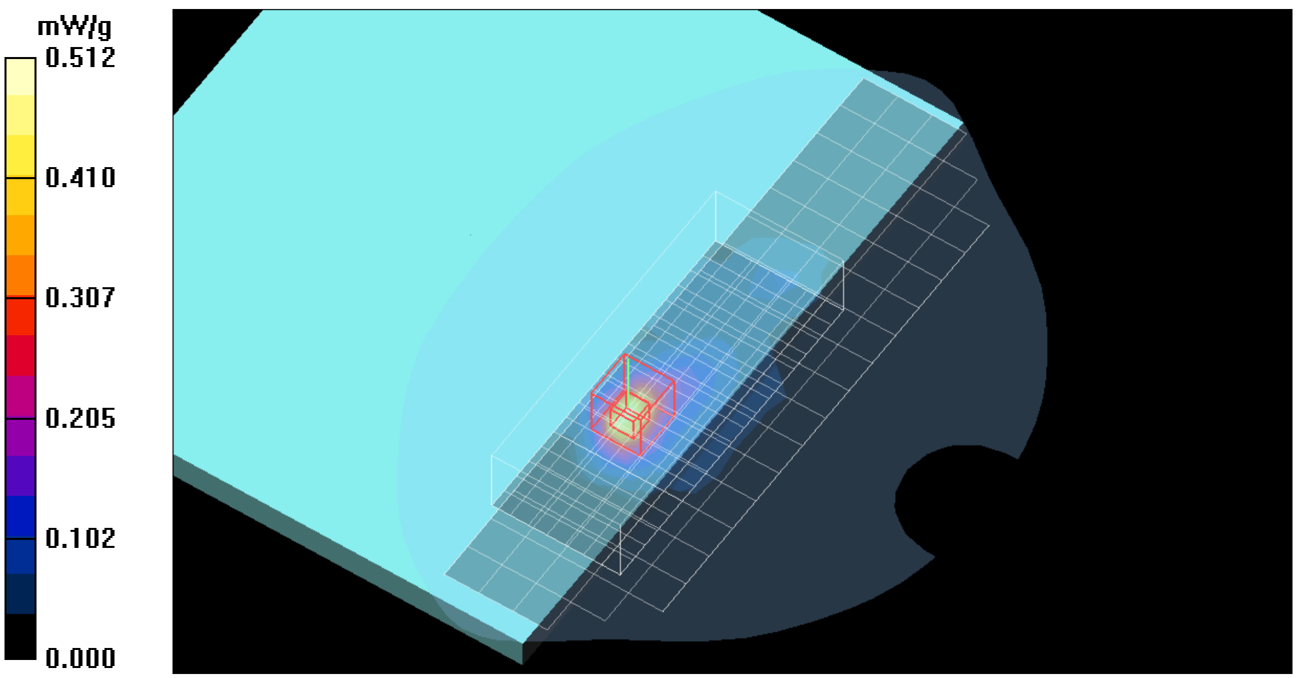
Procedure Notes: 802.11b 1 Mbps Chn 11 Battery Model #: Internal Test Configuration = DUT in Lapdock 0mm from Flat Phantom
Communication System: Wi-Fi 2450; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: 2450 Glycol Body; Medium parameters used: f = 2450 MHz; σ = 1.94 mho/m; ε_r = 50.1; ρ = 1000 kg/m^3

DASY4 Configuration:

- Probe: ES3DV3 - SN3115; ConvF(4.12, 4.12, 4.12); Calibrated: 1/12/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn699; Calibrated: 9/22/2011
- Phantom: R#-6 Glycol 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

SAM Phone Against Flat Section/MegaZoom Zoom Scan (<=3GHz) (19x8x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.81 V/m; Power Drift = -0.203 dB
Peak SAR (extrapolated) = 1.04 W/kg
SAR(1 g) = 0.465 mW/g; SAR(10 g) = 0.200 mW/g
Maximum value of SAR (measured) = 0.512 mW/g

SAM Phone Against Flat Section/Tablet Long Edge Area Scan - Body (15mm) (21x6x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.462 mW/g



Appendix 6

SAR distribution plots for Simultaneous Transmission

CDMA 800 w/ 2450 MHz WiFi Simultaneous Transmit Evaluation

DASY4 Configuration for MegaZoom for 24799-1, SAM Flat Lapdock Template/SAM Lapdock Against Flat Section/MegaZoom Zoom Scan (<=3GHz):

Date/Time: 11/4/2011 12:11:38 AM
DUT: Lapdock 2 Premium with Phone Serial: LS4V230044, FCC ID IHDP56ME1
Communication System: Wi-Fi 2450; Frequency: 2462 MHz; Duty Cycle: 1:1
Medium: 2450 Glycol Body Medium parameters used: f = 2450 MHz; σ = 1.94 mho/m; ε_r = 50.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

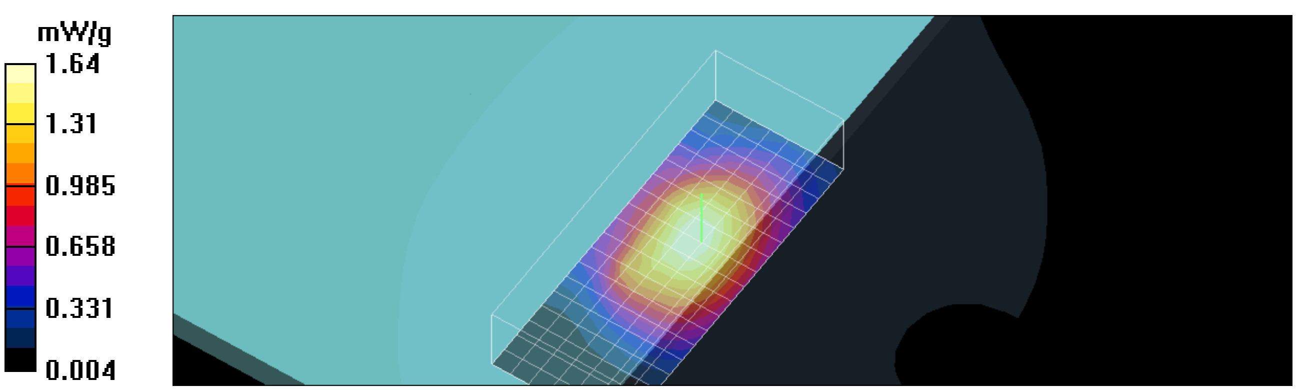
- Probe: ES3DV3 - SN3115; ConvF(4.12, 4.12, 4.12); Calibrated: 1/12/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn699; Calibrated: 9/22/2011
- Phantom: R#-6 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131
- Measurement SW: DASY4, V4.7 Build 80

DASY4 Configuration for MegaZoom for 24799-1, SAM Flat Lapdock Template/SAM Lapdock Against Flat Section/MegaZoom Zoom Scan (<=3GHz):

Date/Time: 11/4/2011 12:55:24 PM
DUT: Lapdock 2 Premium with Phone Serial: LS4V230044, FCC ID IHDP56ME1
Communication System: CDMA 835; Frequency: 836.52 MHz; Duty Cycle: 1:1
Medium: BIG BODY Low Freq Body Medium parameters used: f = 835 MHz; σ = 0.98 mho/m; ε_r = 55.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

- Probe: ES3DV3 - SN3115; ConvF(5.88, 5.88, 5.88); Calibrated: 1/12/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn699; Calibrated: 9/22/2011
- Phantom: R#-6 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131
- Measurement SW: DASY4, V4.7 Build 80

Multi Band Result:
SAR(1 g) = 1.56 mW/g; SAR(10 g) = 1.1 mW/g
Maximum value of SAR (measured) = 1.64 mW/g



CDMA 1900 w/ 2450 MHz WiFi Simultaneous Transmit Evaluation

DASY4 Configuration for MegaZoom for 24799-1, SAM Flat Lapdock Template/SAM Lapdock Against Flat Section/MegaZoom Zoom Scan (<=3GHz):

Date/Time: 11/7/2011 2:21:39 PM
DUT: LapDock 2 Premium with Phone Serial: LS4V230044, FCC ID: IHDP56ME1
Communication System: CDMA 1900; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: Regular Glycol Body 1750/1880 Medium parameters used: f = 1880 MHz; σ = 1.58 mho/m; ε_r = 50.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

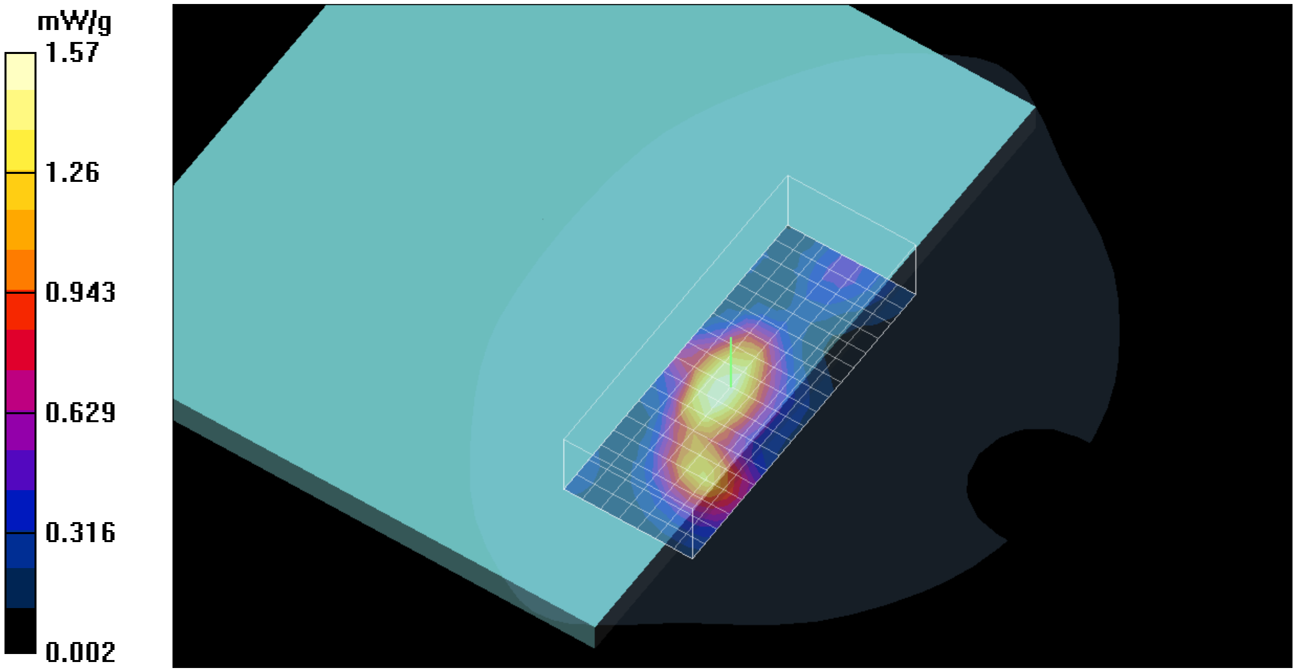
- Probe: ES3DV3 - SN3115; ConvF(4.61, 4.61, 4.61); Calibrated: 1/12/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn699; Calibrated: 9/22/2011
- Phantom: R#-6 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131
- Measurement SW: DASY4, V4.7 Build 80

DASY4 Configuration for MegaZoom for 24799-1, SAM Flat Lapdock Template/SAM Lapdock Against Flat Section/MegaZoom Zoom Scan (<=3GHz):

Date/Time: 11/4/2011 12:11:38 AM
DUT: LapDock 2 Premium with Phone Serial: LS4V230044, FCC ID: IHDP56ME1
Communication System: Wi-Fi 2450; Frequency: 2462 MHz; Duty Cycle: 1:1
Medium: 2450 Glycol Body Medium parameters used: f = 2450 MHz; σ = 1.94 mho/m; ε_r = 50.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

- Probe: ES3DV3 - SN3115; ConvF(4.12, 4.12, 4.12); Calibrated: 1/12/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn699; Calibrated: 9/22/2011
- Phantom: R#-6 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131
- Measurement SW: DASY4, V4.7 Build 80

Multi Band Result:
SAR(1 g) = 1.5 mW/g; SAR(10 g) = 0.870 mW/g
Maximum value of SAR (measured) = 1.57 mW/g



mW/g
1.57
1.26
0.943
0.629
0.316
0.002

CDMA 800 (voice) w/ 2450 MHz Wifi and svLTE Band 13 Mobile Hotspot

DASY4 Configuration for MegaZoom for 24799-1, SAM Flat Lapdock Template//SAM Lapdock Against Flat Section/MegaZoom Zoom Scan (<=3GHz):

Date/Time: 11/4/2011 12:55:24 PM
DUT: LapDock 2 Premium with Phone Serial: LS4V230044, FCC ID: IHDP56ME1

Communication System: CDMA 835; Frequency: 836.52 MHz; Duty Cycle: 1:1
Medium: BIG BODY Low Freq Body Medium parameters used: f = 835 MHz; $\sigma = 0.98$ mho/m; $\varepsilon_r = 55.3$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

- Probe: ES3DV3 - SN3115; ConvF(5.88, 5.88, 5.88); Calibrated: 1/12/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn699; Calibrated: 9/22/2011
- Phantom: R#-6 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131
- Measurement SW: DASY4, V4.7 Build 80

DASY4 Configuration for MegaZoom for 24799-1, SAM Flat Lapdock Template//SAM Lapdock Against Flat Section/MegaZoom Zoom Scan (<=3GHz):

Date/Time: 11/4/2011 12:11:38 AM
DUT: LapDock 2 Premium with Phone Serial: LS4V230079, FCC ID: IHDP56ME1

Communication System: Wi-Fi 2450; Frequency: 2462 MHz; Duty Cycle: 1:1
Medium: 2450 Glycol Body Medium parameters used: f = 2450 MHz; $\sigma = 1.94$ mho/m; $\varepsilon_r = 50.1$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

- Probe: ES3DV3 - SN3115; ConvF(4.12, 4.12, 4.12); Calibrated: 1/12/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn699; Calibrated: 9/22/2011
- Phantom: R#-6 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131
- Measurement SW: DASY4, V4.7 Build 80

DASY4 Configuration for MegaZoom for 24799-1, SAM Flat Lapdock Template//SAM Lapdock Against Flat Section/MegaZoom Zoom Scan (<=3GHz):

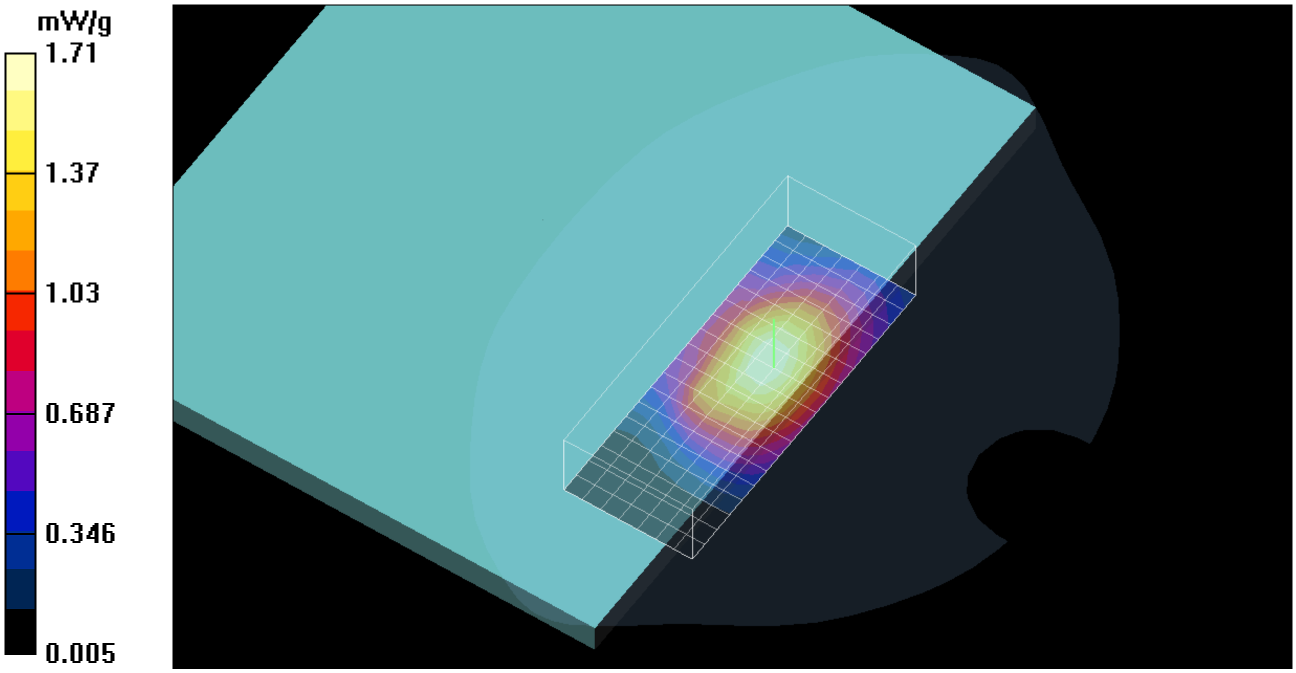
Date/Time: 11/7/2011 12:03:33 PM
DUT: LapDock 2 Premium with Phone Serial: LS4V230044, FCC ID: IHDP56ME1

Communication System: LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: BIG BODY Low Freq Body Medium parameters used: f = 782 MHz; $\sigma = 0.92$ mho/m; $\varepsilon_r = 55.9$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

- Probe: ES3DV3 - SN3115; ConvF(5.88, 5.88, 5.88); Calibrated: 1/12/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn699; Calibrated: 9/22/2011

- Phantom: R#-6 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131
- Measurement SW: DASY4, V4.7 Build 80

Multi Band Result:
SAR(1 g) = 1.59 mW/g; SAR(10 g) = 1.14 mW/g
Maximum value of SAR (measured) = 1.71 mW/g



CDMA 1900 (voice) w/ 2450 MHz WiFi and svLTE Band 13 Mobile Hotspot

DASY4 Configuration for MegaZoom for 24799-1, SAM Flat Lapdock Template/SAM Lapdock Against Flat Section/MegaZoom Zoom Scan (<=3GHz):

Date/Time: 11/7/2011 12:03:33 PM
DUT: LapDock 2 Premium with Phone Serial: LS4V230079, FCC ID: IHDP56ME1
Communication System: LTE Band 13; Frequency: 782 MHz; Duty Cycle: 1:1
Medium: BIG BODY Low Freq Body Medium parameters used: f = 782 MHz; $\sigma = 0.92$ mho/m; $\varepsilon_r = 55.9$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

- Probe: ES3DV3 - SN3115; ConvF(5.88, 5.88, 5.88); Calibrated: 1/12/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn699; Calibrated: 9/22/2011
- Phantom: R#-6 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131
- Measurement SW: DASY4, V4.7 Build 80

DASY4 Configuration for MegaZoom for 24799-1, SAM Flat Lapdock Template/SAM Lapdock Against Flat Section/MegaZoom Zoom Scan (<=3GHz):

Date/Time: 11/7/2011 2:21:39 PM
DUT: LapDock 2 Premium with Phone Serial: LS4V230044, FCC ID: IHDP56ME1
Communication System: CDMA 1900; Frequency: 1880 MHz; Duty Cycle: 1:1
Medium: Regular Glycol Body 1750/1880 Medium parameters used: f = 1880 MHz; $\sigma = 1.58$ mho/m; $\varepsilon_r = 50.7$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

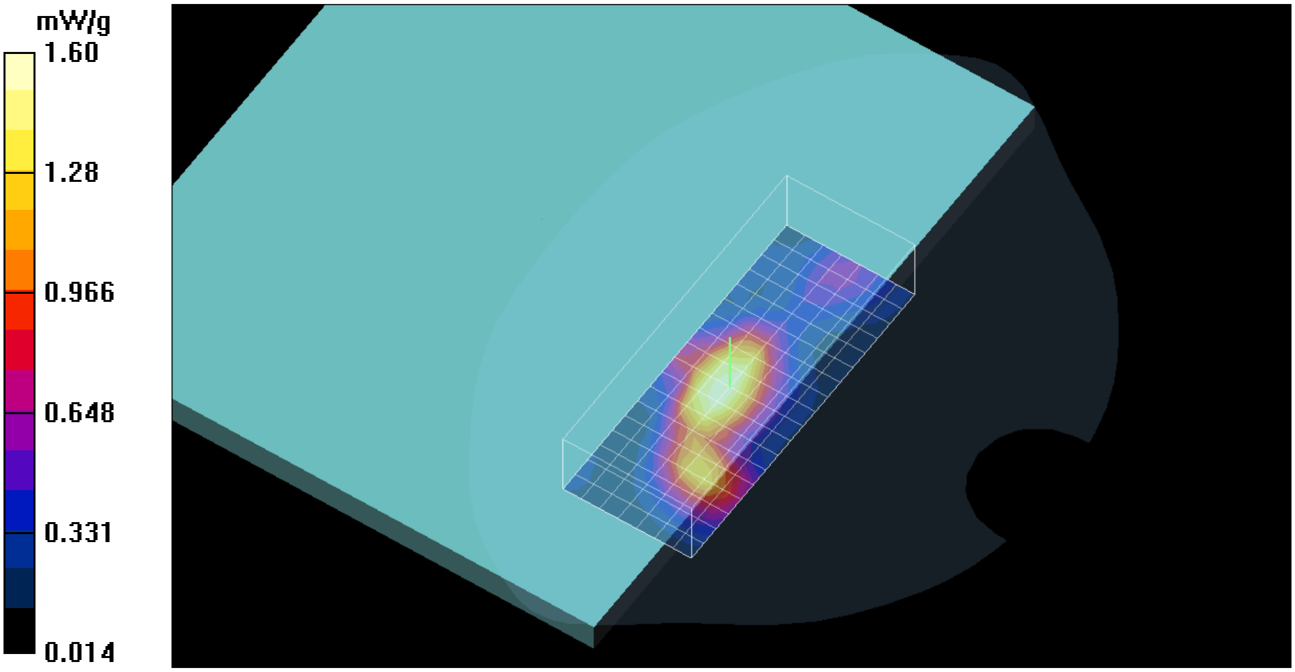
- Probe: ES3DV3 - SN3115; ConvF(4.61, 4.61, 4.61); Calibrated: 1/12/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn699; Calibrated: 9/22/2011
- Phantom: R#-6 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131
- Measurement SW: DASY4, V4.7 Build 80

DASY4 Configuration for MegaZoom for 24799-1, SAM Flat Lapdock Template/SAM Lapdock Against Flat Section/MegaZoom Zoom Scan (<=3GHz):

Date/Time: 11/4/2011 12:11:38 AM
DUT: LapDock 2 Premium with Phone Serial: LS4V230044, FCC ID: IHDP56ME1
Communication System: Wi-Fi 2450; Frequency: 2462 MHz; Duty Cycle: 1:1
Medium: 2450 Glycol Body Medium parameters used: f = 2450 MHz; $\sigma = 1.94$ mho/m; $\varepsilon_r = 50.1$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

- Probe: ES3DV3 - SN3115; ConvF(4.12, 4.12, 4.12); Calibrated: 1/12/2011
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn699; Calibrated: 9/22/2011
- Phantom: R#-6 Glycol SAM (extended range), Rev.1 (25-Mar-05); Type: SAM v4.0; Serial: TP-1131
- Measurement SW: DASY4, V4.7 Build 80

Multi Band Result:
SAR(1 g) = 1.52 mW/g; SAR(10 g) = 0.895 mW/g
Maximum value of SAR (measured) = 1.60 mW/g



Appendix 7

Measurement Uncertainty Budget

Uncertainty Budget for Device Under Test, for 735 MHz to 2 GHz

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h = c x f / e*	*i = c x g / e*	*k*
Uncertainty Component	Description IEEE1528(2003) / IEC62209-1(2005)	**Tol. (± %)**	**Prob Dist**	**Div.**	**c_i (1 g)**	**c_i (10 g)**	**1 g u_i (±%)**	**10 g u_i (±%)**	**v_i**
Measurement System									
Probe Calibration [ES3DV3]	E.2.1 / 7.2.1	5.5	N	1.00	1	1	5.5	5.5	∞
Axial Isotropy	E.2.2 / 7.2.1.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	E.2.2 / 7.2.1.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	E.2.3 / 7.2.1.5	1.0	R	1.73	1	1	0.6	0.6	∞
Linearity	E.2.4 / 7.2.1.3	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5 / 7.2.1.4	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6 / 7.2.1.6	0.3	N	1.00	1	1	0.3	0.3	∞
Response Time	E.2.7 / 7.2.1.7	1.1	R	1.73	1	1	0.6	0.6	∞
Integration Time	E.2.8 / 7.2.1.8	1.1	R	1.73	1	1	0.6	0.6	∞
RF Ambient Conditions - Noise	E.6.1 / 7.2.3.6	3.0	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1 / 7.2.3.6	3.0	R	1.73	1	1	1.7	1.7	∞
Probe Positioner Mech. Tolerance	E.6.2 / 7.2.2.1	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning w.r.t Phantom	E.6.3 / 7.2.2.3	1.4	R	1.73	1	1	0.8	0.8	∞
Max. SAR Evaluation (ext., int., avg.)	E.5 / 7.2.4	3.4	R	1.73	1	1	2.0	2.0	∞
Test sample Related									
Test Sample Positioning	E.4.2 / 7.2.2.4	3.4	N	1.00	1	1	3.4	3.4	79
Device Holder Uncertainty	E.4.1 / 7.2.2.4.2	4.5	N	1.00	1	1	4.5	4.5	11
SAR drift	6.6.2 / 7.2.3.5	0.0	R	1.73	1	1	0.0	0.0	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1 / 7.2.2.2	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2 / 7.2.3.3	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measurement)	E.3.3 / 7.2.3.3	2.5	N	1.00	0.64	0.43	1.6	1.1	6
Liquid Permittivity (target)	E.3.2 / 7.2.3.4	5.0	R	1.73	0.6	0.49	1.7	1.4	∞
Liquid Permittivity (measurement)	E.3.2 / 7.2.3.4	2.3	N	1.00	0.6	0.49	1.4	1.1	6
Combined Standard Uncertainty			RSS				11	11	338
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k*=2				22	21	

Uncertainty Budget for Device Under Test, for 2 GHz to 3 GHz

a	*b*	*c*	*d*	*e = f(d,k)*	*f*	*g*	*h = c x f / e*	*i = c x g / e*	*k*
Uncertainty Component	Description IEEE1528(2003) / IEC62209-1(2005)	**Tol. (± %)**	**Prob Dist**	**Div.**	**c_i (1 g)**	**c_i (10 g)**	**1 g u_i (±%)**	**10 g u_i (±%)**	**v_i**
Measurement System									
Probe Calibration [ES3DV3]	E.2.1 / 7.2.1	5.5	N	1.00	1	1	5.5	5.5	∞
Axial Isotropy	E.2.2 / 7.2.1.2	4.7	R	1.73	0.707	0.707	1.9	1.9	∞
Hemispherical Isotropy	E.2.2 / 7.2.1.2	9.6	R	1.73	0.707	0.707	3.9	3.9	∞
Boundary Effect	E.2.3 / 7.2.1.5	1.0	R	1.73	1	1	0.6	0.6	∞
Linearity	E.2.4 / 7.2.1.3	4.7	R	1.73	1	1	2.7	2.7	∞
System Detection Limits	E.2.5 / 7.2.1.4	1.0	R	1.73	1	1	0.6	0.6	∞
Readout Electronics	E.2.6 / 7.2.1.6	0.3	N	1.00	1	1	0.3	0.3	∞
Response Time	E.2.7 / 7.2.1.7	1.1	R	1.73	1	1	0.6	0.6	∞
Integration Time	E.2.8 / 7.2.1.8	1.1	R	1.73	1	1	0.6	0.6	∞
RF Ambient Conditions - Noise	E.6.1 / 7.2.3.6	3.0	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1 / 7.2.3.6	3.0	R	1.73	1	1	1.7	1.7	∞
Probe Positioner Mech. Tolerance	E.6.2 / 7.2.2.1	0.4	R	1.73	1	1	0.2	0.2	∞
Probe Positioning w.r.t Phantom	E.6.3 / 7.2.2.3	1.4	R	1.73	1	1	0.8	0.8	∞
Max. SAR Evaluation (ext., int., avg.)	E.5 / 7.2.4	3.4	R	1.73	1	1	2.0	2.0	∞
Test sample Related									
Test Sample Positioning	E.4.2 / 7.2.2.4	3.4	N	1.00	1	1	3.4	3.4	79
Device Holder Uncertainty	E.4.1 / 7.2.2.4.2	4.5	N	1.00	1	1	4.5	4.5	11
SAR drift	6.6.2 / 7.2.3.5	0.0	R	1.73	1	1	0.0	0.0	∞
Phantom and Tissue Parameters									
Phantom Uncertainty	E.3.1 / 7.2.2.2	4.0	R	1.73	1	1	2.3	2.3	∞
Liquid Conductivity (target)	E.3.2 / 7.2.3.3	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity (measurement)	E.3.3 / 7.2.3.3	2.5	N	1.00	0.64	0.43	1.6	1.1	6
Liquid Permittivity (target)	E.3.2 / 7.2.3.4	10.0	R	1.73	0.6	0.49	3.5	2.8	∞
Liquid Permittivity (measurement)	E.3.2 / 7.2.3.4	2.3	N	1.00	0.6	0.49	1.4	1.1	6
Combined Standard Uncertainty			RSS				11	11	392
Expanded Uncertainty (95% CONFIDENCE LEVEL)			*k*=2				22	22	

Appendix 8

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: ES3-3115_Jan11

CALIBRATION CERTIFICATE

Object	ES3DV3 - SN:3115
Calibration procedure(s)	QA CAL-01.v7, QA CAL-23.v4 and QA CAL-25.v3 Calibration procedure for dosimetric E-field probes
Calibration date:	January 12, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter 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	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
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-10)	In house check: Oct-11

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

Issued: January 13, 2011

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

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

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

Accreditation No.: **SCS 108**

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:3115

Manufactured:	March 6, 2006
Last calibrated:	January 19, 2010
Recalibrated:	January 12, 2011

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 SN:3115

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.29	1.30	1.18	± 10.1%
DCP (mV)[B]	100.2	102.3	101.3	

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	113.4	± 2.4 %
			Y	0.00	0.00	1.00	150.5	
			Z	0.00	0.00	1.00	142.6	

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

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

[B] Numerical linearization parameter: uncertainty not required.

[E] Uncertainty is determined using the 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:3115

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%	5.87	5.87	5.87	0.34	1.74	± 11.0%
1810	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	5.02	5.02	5.02	0.43	1.62	± 11.0%
1950	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	4.80	4.80	4.80	0.62	1.36	± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	4.39	4.39	4.39	0.94	1.13	± 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:3115

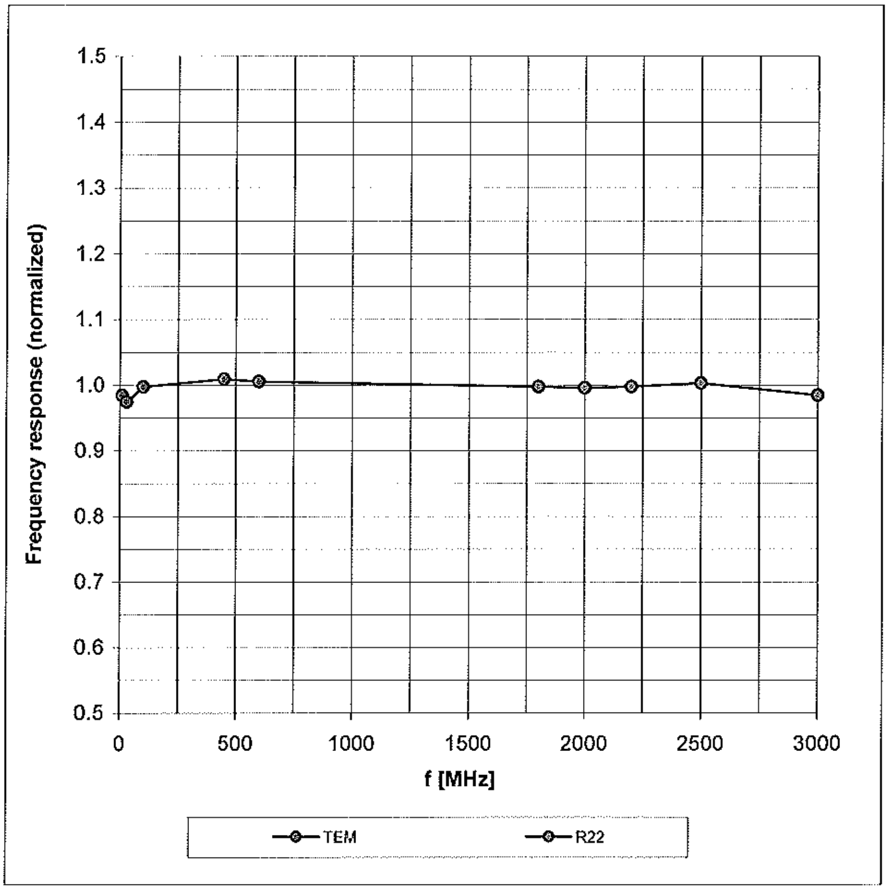
Calibration Parameter Determined in Body Tissue Simulating Media

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%	5.88	5.88	5.88	0.57	1.41	± 11.0%
1810	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.61	4.61	4.61	0.33	2.26	± 11.0%
1950	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.57	4.57	4.57	0.36	2.19	± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	4.12	4.12	4.12	0.99	0.75	± 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.

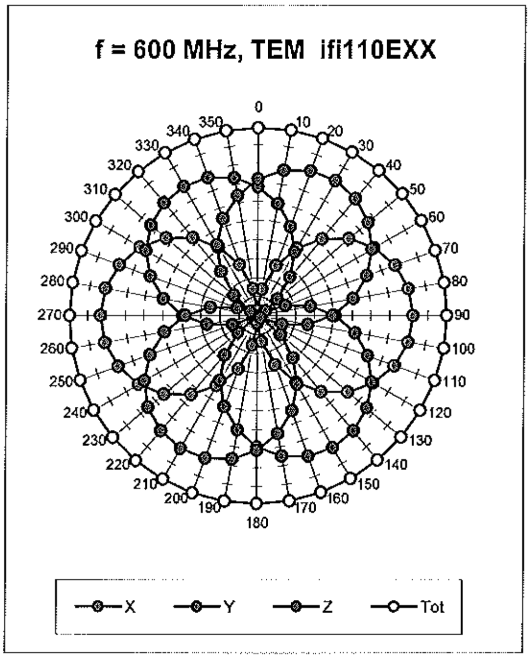
Frequency Response of E-Field

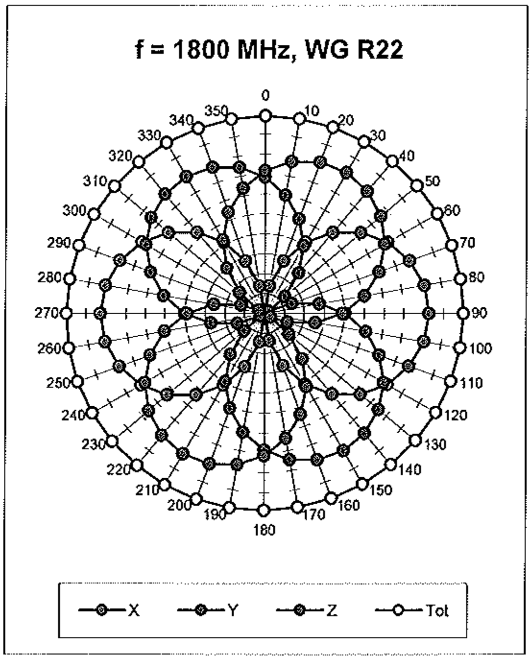
(TEM-Cell:ifi110 EXX, Waveguide: R22)

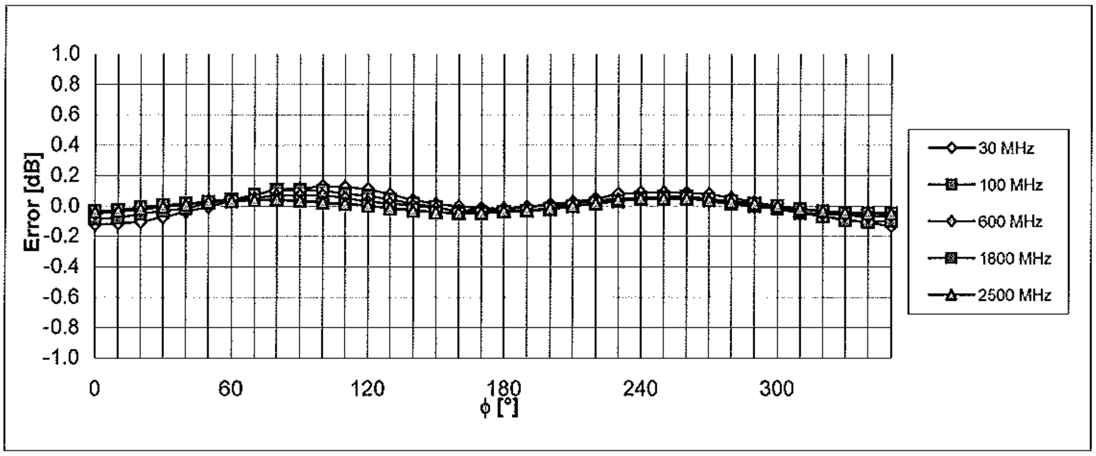


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), ϑ = 0°



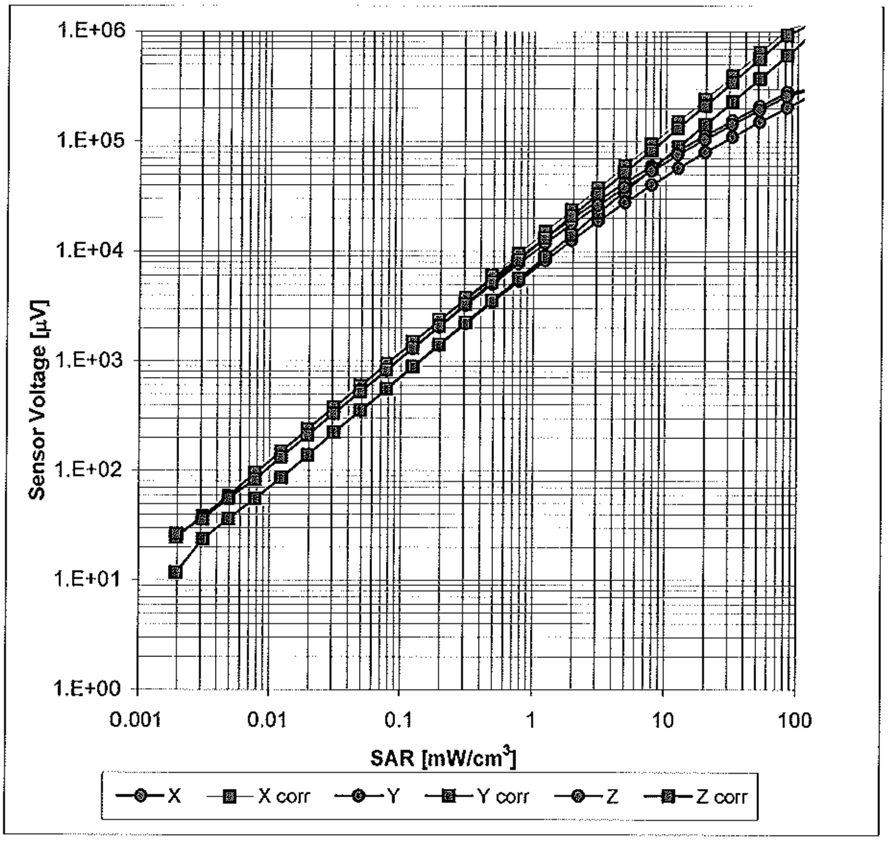


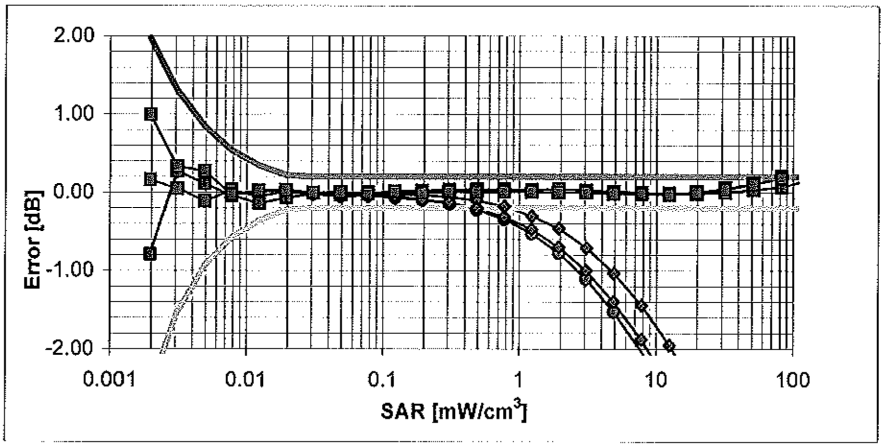


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

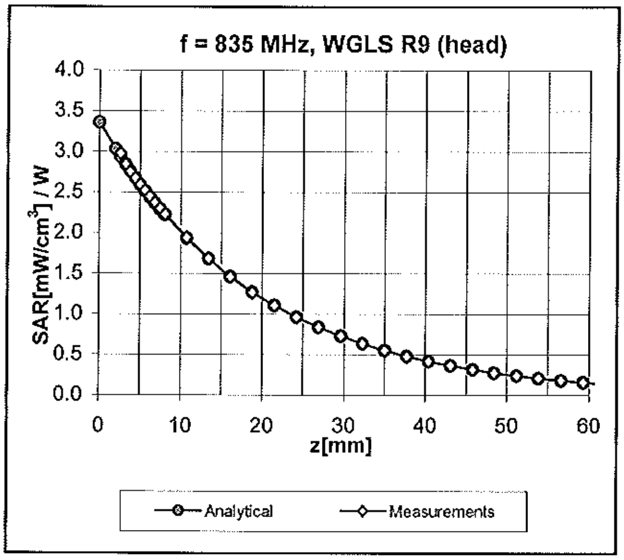
(TEM cell, f = 900 MHz)

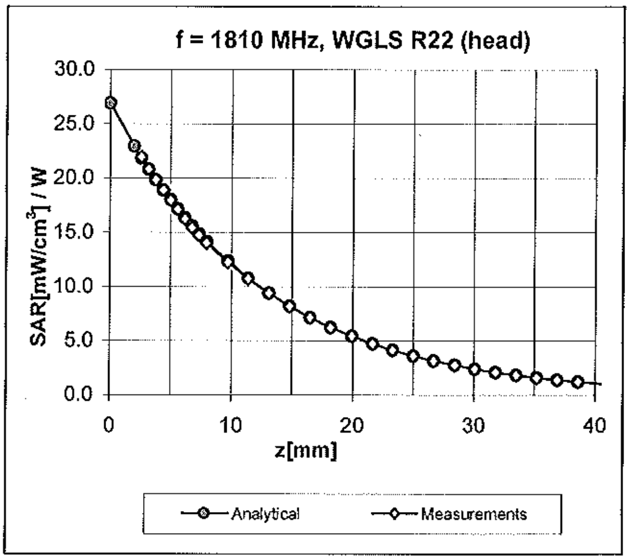




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

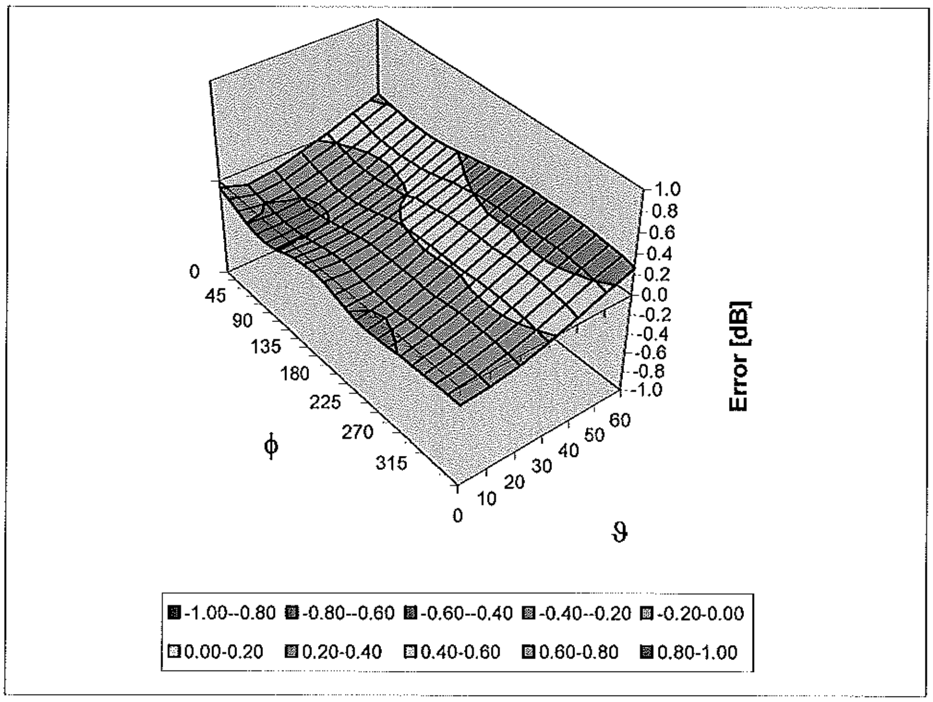
Conversion Factor Assessment





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 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

Appendix 9

Dipole Characterization 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: **D2450V2-863_Mar11**

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 863
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits
Calibration date:	March 17, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

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

Issued: March 17, 2011

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.7 ± 6 %	1.72 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.3 mW / g
SAR normalized	normalized to 1W	53.2 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**54.2 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.23 mW / g
SAR normalized	normalized to 1W	24.9 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**25.1 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.5 ± 6 %	1.92 mho/m ± 6 %
Body TSL temperature during test	(21.0 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.2 mW / g
SAR normalized	normalized to 1W	52.8 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**52.8 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.11 mW / g
SAR normalized	normalized to 1W	24.4 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**24.4 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.1 Ω + 2.9 jΩ
Return Loss	- 27.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.5 Ω + 5.2 jΩ
Return Loss	- 25.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.165 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	April 23, 2010

DASY5 Validation Report for Head TSL

Date/Time: 17.03.2011 13:48:21

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:863

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: HSL U12 BB
Medium parameters used: f = 2450 MHz; σ = 1.72 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

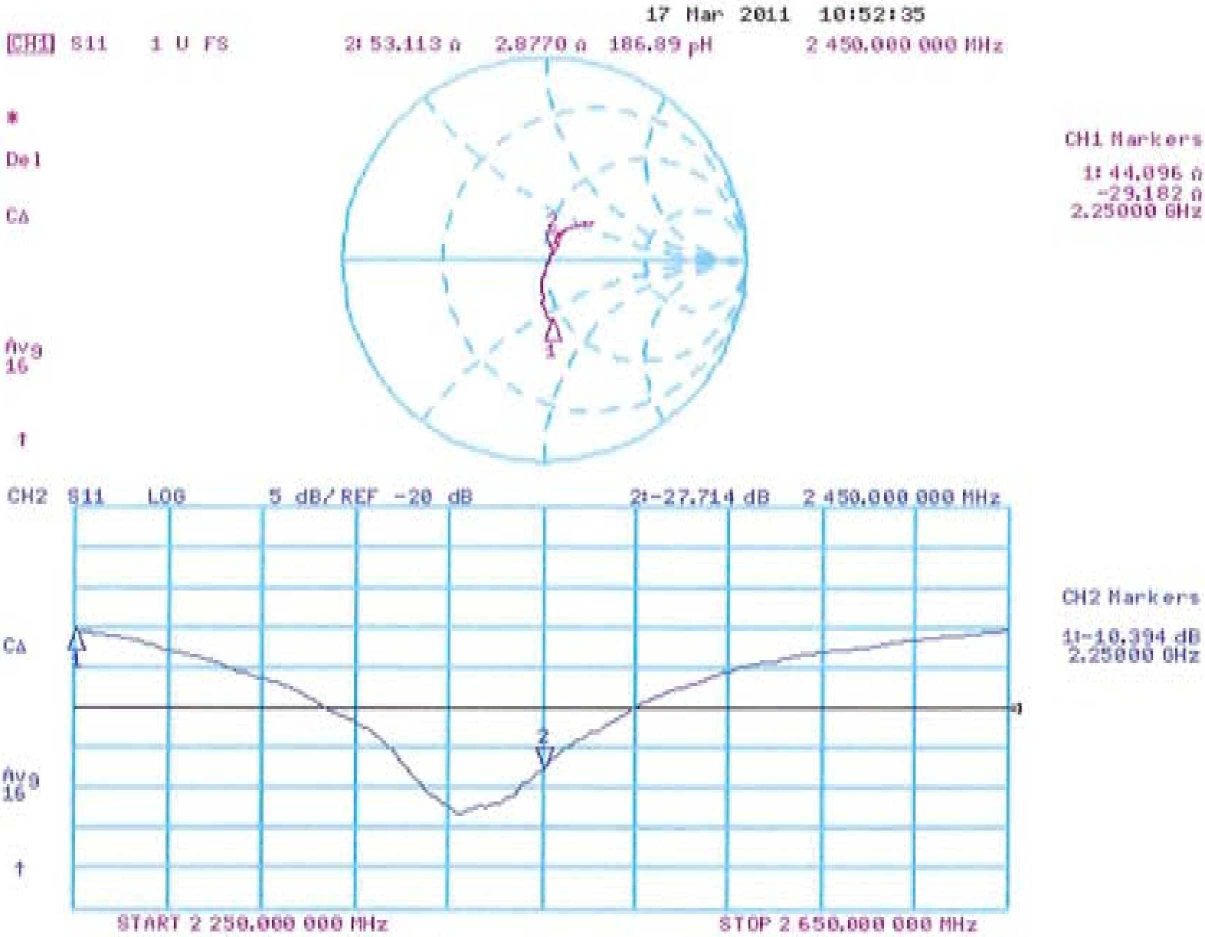
DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.53, 4.53, 4.53); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.4 Build (2829)

Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe) /Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 104.8 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 27.215 W/kg
SAR(1 g) = 13.3 mW/g; SAR(10 g) = 6.23 mW/g
Maximum value of SAR (measured) = 17.128 mW/g

0 dB = 17.130mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date/Time: 08.03.2011 15:14:58

Test Laboratory: SPEAG, Zurich, Switzerland

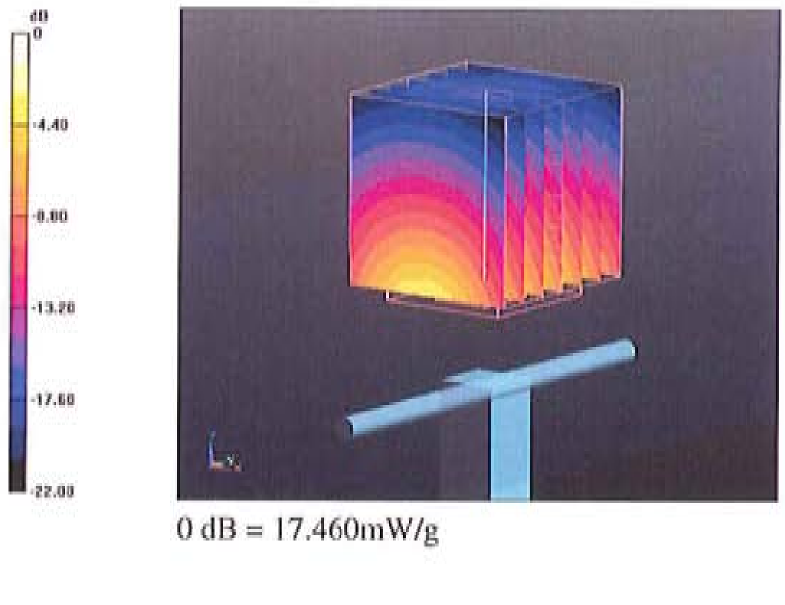
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:863

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: MSL U12 BB
Medium parameters used: f = 2450 MHz; σ = 1.93 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

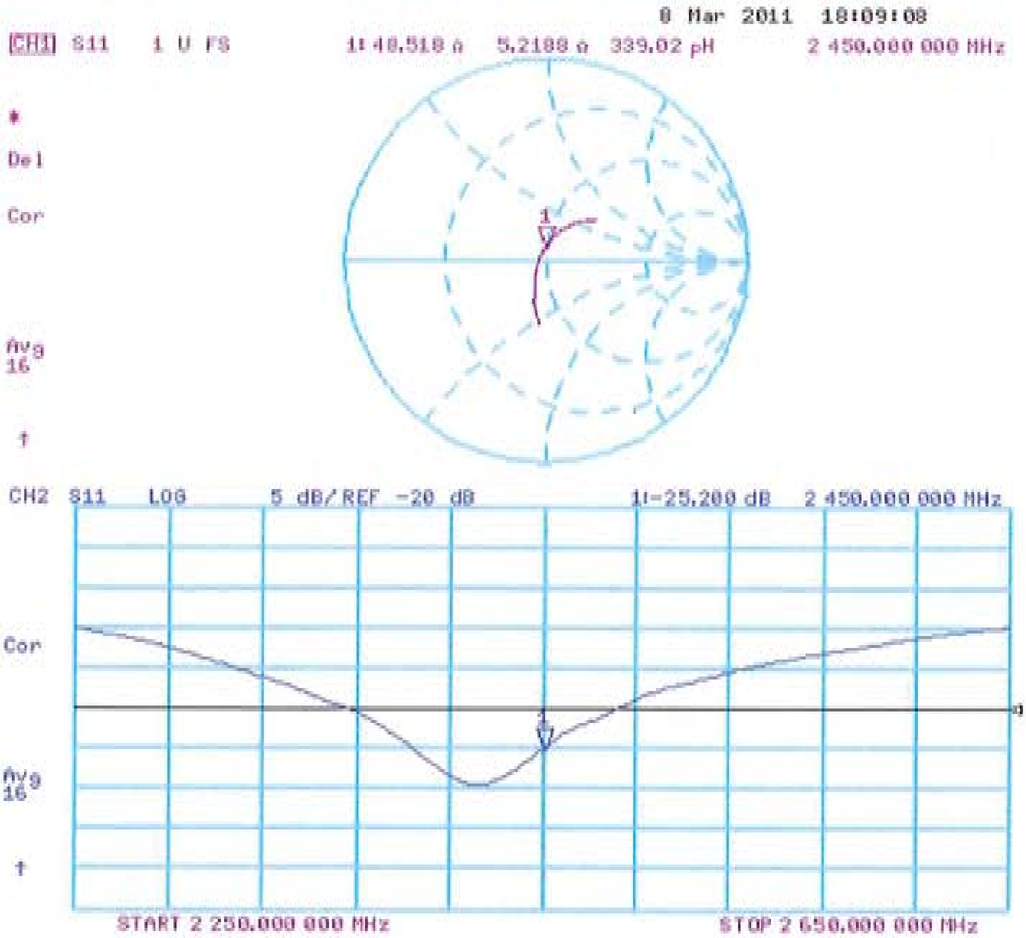
- Probe: ES3DV3 - SN3205; ConvF(4.31, 4.31, 4.31); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.4 Build (2829)

Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.651 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 27.947 W/kg
SAR(1 g) = 13.2 mW/g; SAR(10 g) = 6.11 mW/g
Maximum value of SAR (measured) = 17.459 mW/g



0 dB = 17.460mW/g

Impedance Measurement Plot for Body TSL



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: **D1800V2-250_Mar11**

CALIBRATION CERTIFICATE

Object	D1800V2 - SN: 250
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits
Calibration date:	March 17, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

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

Issued: March 18, 2011

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1800 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.4 ± 6 %	1.35 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.47 mW / g
SAR normalized	normalized to 1W	37.9 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**38.6 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.99 mW / g
SAR normalized	normalized to 1W	20.0 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**20.1 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.2 ± 6 %	1.45 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.08 mW / g
SAR normalized	normalized to 1W	36.3 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**37.2 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	4.81 mW / g
SAR normalized	normalized to 1W	19.2 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**19.4 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.8 Ω + 5.5 jΩ
Return Loss	- 25.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.1 Ω + 5.6 jΩ
Return Loss	- 23.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.208 ns

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

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

Design Modification by End User

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	September 25, 1999

DASY5 Validation Report for Head TSL

Date/Time: 17.03.2011 11:03:14

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:250

Communication System: CW; Frequency: 1800 MHz; Duty Cycle: 1:1
Medium: HSL U12 BB
Medium parameters used: f = 1800 MHz; σ = 1.35 mho/m; ε_r = 39.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

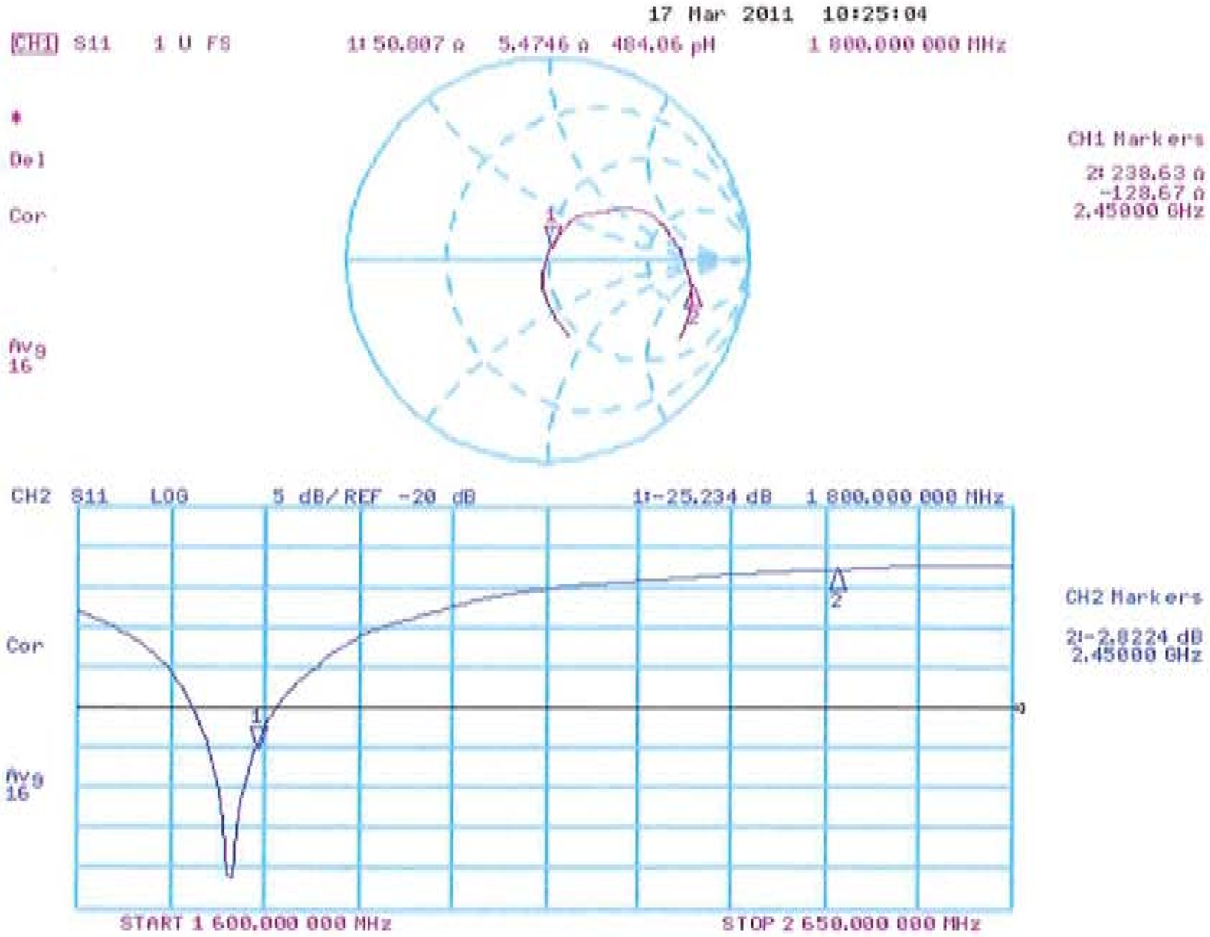
- Probe: ES3DV3 - SN3205; ConvF(5.05, 5.05, 5.05); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.4 Build (2829)

Head/d=10mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.117 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 17.216 W/kg
SAR(1 g) = 9.47 mW/g; SAR(10 g) = 4.99 mW/g
Maximum value of SAR (measured) = 11.641 mW/g

0 dB = 11.640mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date/Time: 17.03.2011 15:52:49

Test Laboratory: SPEAG, Zurich, Switzerland

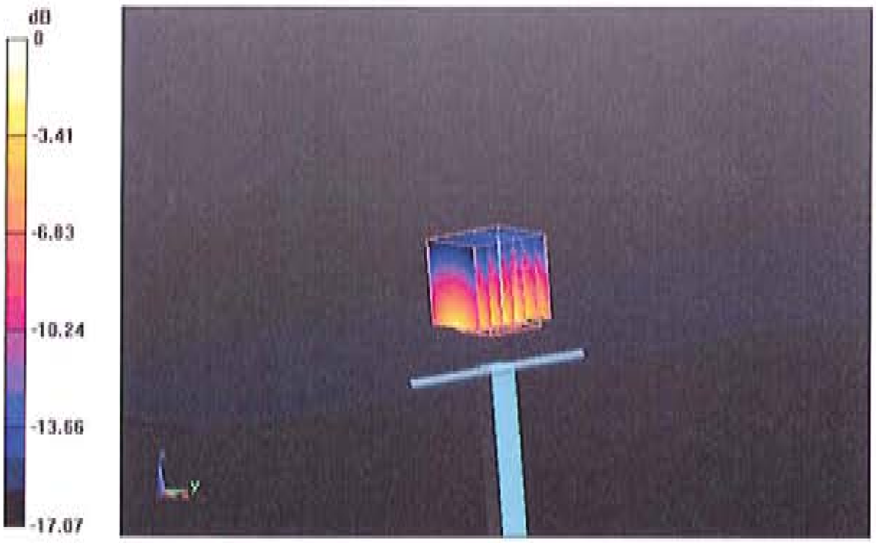
DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:250

Communication System: CW; Frequency: 1800 MHz; Duty Cycle: 1:1
Medium: MSL U12 BB
Medium parameters used: f = 1800 MHz; σ = 1.45 mho/m; ε_r = 52.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

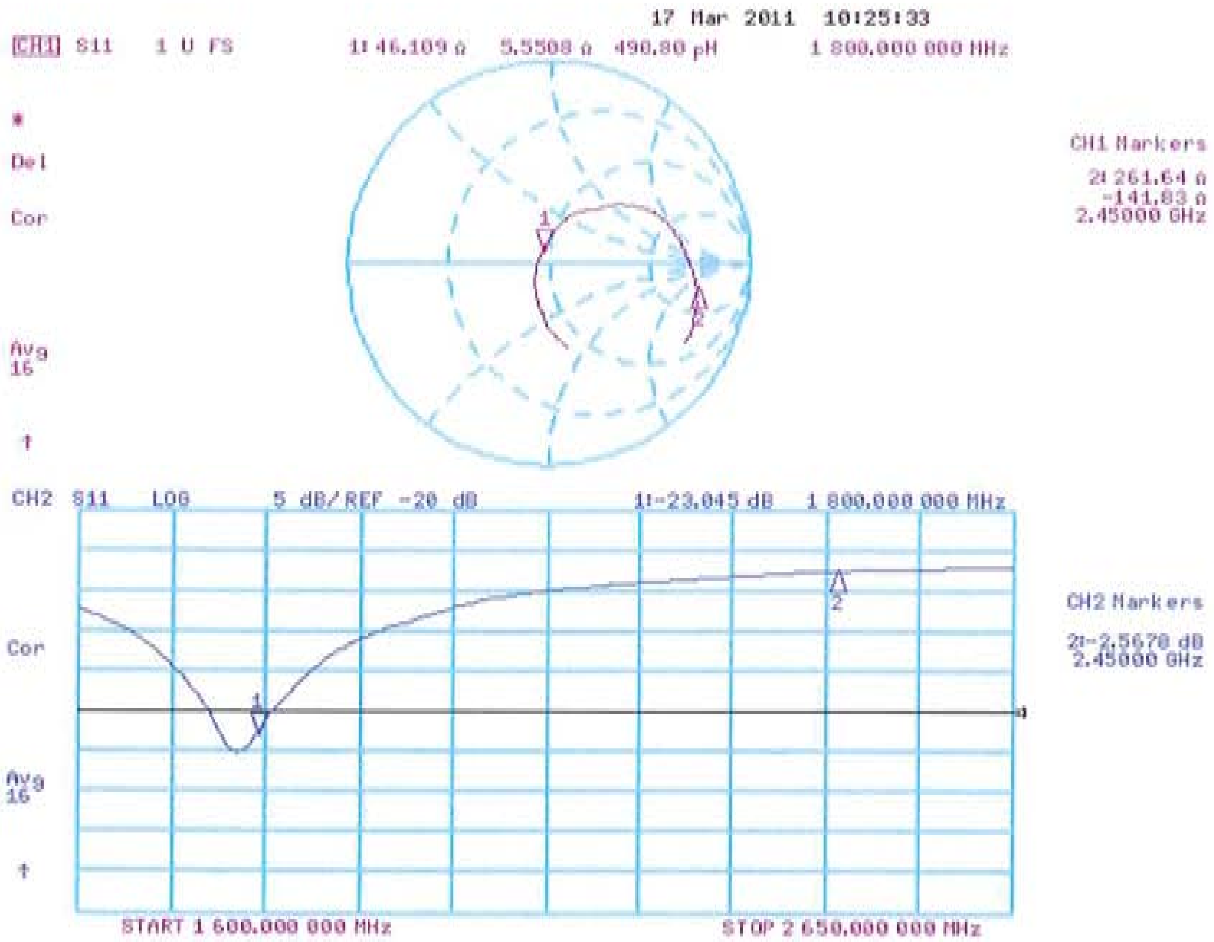
- Probe: ES3DV3 - SN3205; ConvF(4.74, 4.74, 4.74); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.4 Build (2829)

Body/d=10mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.370 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 15.727 W/kg
SAR(1 g) = 9.08 mW/g; SAR(10 g) = 4.81 mW/g
Maximum value of SAR (measured) = 11.477 mW/g



0 dB = 11.480mW/g

Impedance Measurement Plot for Body TSL



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

S **Schweizerischer Kalibrierdienst**
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Accreditation No.: SCS 108

Client **Motorola MDb**

Certificate No: **D835V2-420_Jul11**

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 420
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	July 08, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

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

Issued: July 12, 2011

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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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**

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

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

Head TSL parameters

The following parameters and calculations were applied.

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

SAR result with Head TSL

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

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.48 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**5.98 mW /g ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

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

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.38 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**9.39 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.57 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**6.22 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.2 Ω + 0.1 jΩ
Return Loss	- 52.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.4 Ω - 1.0 jΩ
Return Loss	- 28.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.401 ns

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

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

Design Modification by End User

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 23, 1999

DASY5 Validation Report for Head TSL

Date: 08.07.2011

Test Laboratory: SPEAG, Zurich, Switzerland

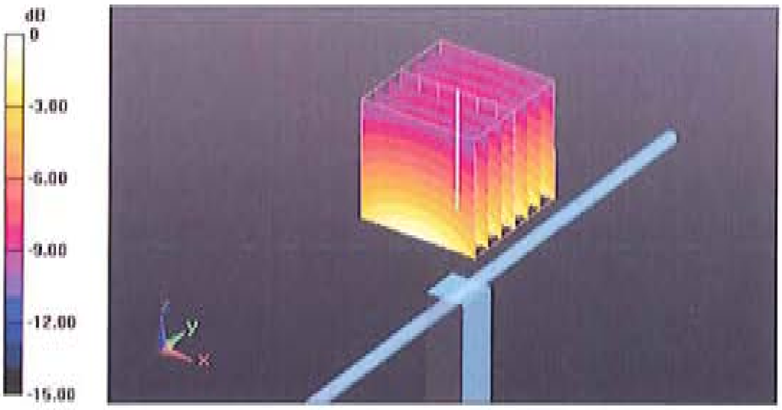
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 420

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

DASY52 Configuration:

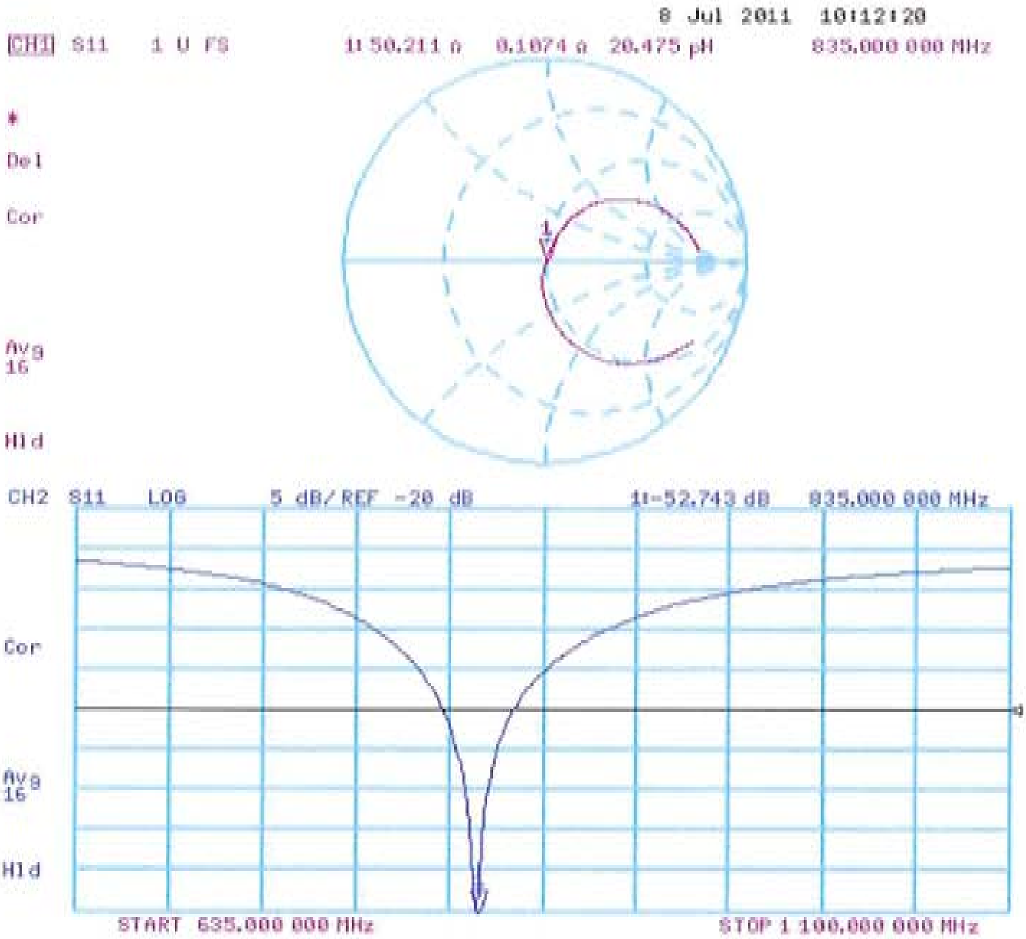
- Probe: ES3DV3 - SN3205; ConvF(6.07, 6.07, 6.07); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.430 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.291 W/kg
SAR(1 g) = 2.25 mW/g; SAR(10 g) = 1.48 mW/g
Maximum value of SAR (measured) = 2.629 mW/g



0 dB = 2.630mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 08.07.2011

Test Laboratory: SPEAG, Zurich, Switzerland

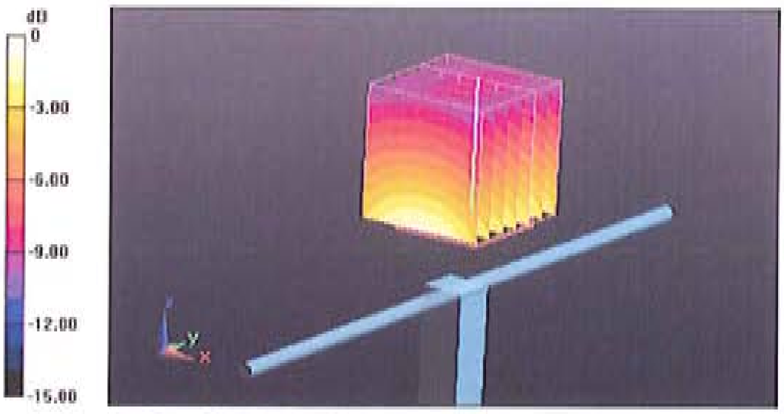
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 420

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

DASY52 Configuration:

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

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.233 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.447 W/kg
SAR(1 g) = 2.38 mW/g; SAR(10 g) = 1.57 mW/g
Maximum value of SAR (measured) = 2.773 mW/g



0 dB = 2.770mW/g

Impedance Measurement Plot for Body TSL