Sony Ericsson

Company Internal
REPORT

Prepared (also subject responsible if other)		No.		
BA/SEMC/CVVBAU *Rob Carr*		*CVDVBA11:035.*		
Approved	Checked	Date	Rev	Reference
BA/SEMC/CVVBAU Jon Kenny	110309	*110225*	A	File

Test Report issued by Accredited SAR Laboratory

for

FCC ID: PY7A3880087 (R800a)

to

FCC OET BULLETIN 65 SUPPLEMENT C 01-01
IEEE STD 1528:2003
IC RSS-102 ISSUE 4

Date of test: February 8th 2011 to February 24th 2011

Laboratory:
Sony Ericsson SAR Test Laboratory
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Statement of Compliance

Sony Ericsson Mobile Communications AB declares under its sole responsibility that the product

Sony Ericsson Type AAD-3880087-BV; FCC ID PY7A3880087; IC 4170B-A3880087

to which this declaration relates, is in conformity with the appropriate RF exposure standards recommendations and guidelines. It also declares that the product was tested in accordance with the appropriate measurement standards, guidelines and recommended practices. Any deviations from these standards, guidelines and recommended practices are noted below:

(None)

This laboratory is accredited to ISO/IEC 17025 (SWEDAC accreditation no. 1847).

SWEDAC ACKREDITERING 1847 ISO/IEC 17025

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The results and statements contained herein relate only to the items tested. The names of individuals involved may be mentioned only in connection with the statements or results from this report.

Sony Ericsson encourages all feedback, both positive and negative, on this report.

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1 Introduction

In this test report, compliance of the Sony Ericsson FCC ID: PY7A3880087 (R800a) portable telephone with RF safety guidelines is demonstrated. The applicable RF safety guidelines and the SAR measurement specifications used for the test are described in the SAR Measurement Specifications of Wireless Handsets [1].

2 Customer details

Company Name:	Sony Ericsson Mobile Communications AB
Address:	Nya Vattentornet Lund SE-221 88 Sweden
Contact Name:	Mattias Wideheim

3 Device Under Test

3.1 Antenna Description

Type	Internal antenna	
Location	Bottom of phone	
Main and WLAN antennas distance	89 mm	
Dimensions	Max length	13 mm
	Max width	45 mm
Configuration	Monopole Antenna	

3.2 Device Description

Device model	AAD-3880087-BV								
Market name	R800a								
Serial number (EUT #)	CB5A1CGKNX(#19641) CB5A1CGKH7(#19676) CB5A1CGKVL (#19643) - WLAN								
Mode (EUT #)	GSM 850 (#19641)			GSM 850 (#19676)			GSM 1900 (#19641)		
Crest factor	8.3			8.3			8.3		
Multiple access scheme	TDMA			TDMA			TDMA		
Channel No.	128	190	251	128	190	251	512	661	885
Measured Power Level [dBm] [1]	33.3	33.3	33.4	33.5	33.5	33.5	30.5	30.5	30.3
Product Maximum power Level [dBm][1]	33.5	33.5	33.5	33.5	33.5	33.5	30.5	30.5	30.5
Data mode	GPRS			GPRS			GPRS		
Crest factor	4.15 (2TX)			4.15 (2TX)			4.15 (2TX)		
Measured Power Level [dBm] [1]	31.4	31.5	31.5	31.5	31.5	31.5	28.4	28.3	28.3
Product Maximum power Level [dBm][1]	31.5	31.5	31.5	31.5	31.5	31.5	28.5	28.5	28.5
Crest factor	3.1125 (3TX)			3.1125 (3TX)			3.1125 (3TX)		
Measured Power Level [dBm] [1]	30.4	30.3	30.3	30.4	30.3	30.3	27.4	27.5	27.4
Product Maximum power Level [dBm][1]	30.5	30.5	30.5	30.5	30.5	30.5	27.5	27.5	27.5
Crest factor	2.075 (4TX)			2.075 (4TX)			2.075 (4TX)		
Measured Power Level [dBm] [1]	29.5	29.5	29.5	28.5	28.5	28.4	26.4	26.4	26.3
Product Maximum power Level [dBm][1]	29.5	29.5	29.5	28.5	28.5	28.5	26.5	26.5	26.5
Data mode	EDGE			EDGE			EDGE		
Crest factor	4.15 (2TX)			4.15 (2TX)			4.15 (2TX)		
Measured Power Level [dBm] [1]	23.1	23.2	23.2	24.3	24.3	24.2	24.0	23.8	23.9
Product Maximum power Level [dBm][1]	25.5	25.5	25.5	25.5	25.5	25.5	24.5	24.5	24.5
Crest factor	3.1125 (3TX)			3.1125 (3TX)			3.1125 (3TX)		
Measured Power Level [dBm] [1]	22.0	22.1	22.1	23.2	23.2	23.2	22.9	22.9	22.6
Product Maximum power Level [dBm][1]	24.5	24.5	24.5	24.5	24.5	24.5	23.5	23.5	23.5
Crest factor	2.075 (4TX)			2.075 (4TX)			2.075 (4TX)		
Measured Power Level [dBm] [1]	20.9	20.9	21.0	22.1	22.0	21.9	22.0	21.9	21.5
Product Maximum power Level [dBm][1]	23.5	23.5	23.5	23.5	23.5	23.5	22.5	22.5	22.5
Transmitting frequency range [MHz]	824.0 - 849.0			824.0 - 849.0			1850.0 - 1910.0		

[1] These values are supplied by the customer

Mode	UMTS 2			UMTS 5		
Crest factor	1			1		
Multiple access scheme	WCDMA			WCDMA		
Channel No.	9262	9400	9538	4132	4183	4233
Measured Power Level [dBm] [1] (#19641) Circuit switched	24.5	24.3	24.4	24.4	24.5	24.3
Measured Power Level [dBm] [1] (#19641) HSPA	24.5	24.3	24.2	24.2	24.5	24.5
Measured Power Level [dBm] [1] (#19676) Circuit switched	24.3	24.3	24.2	24.3	24.3	24.3
Measured Power Level [dBm] [1] (#19676) HSPA	24.4	24.5	24.3	23.8	24.5	24.2
Product Maximum power Level [dBm][1]	24.5	24.5	24.5	24.5	24.5	24.5
Data Mode	(See section 3.3)			(See section 3.3)		
Transmitting frequency range [MHz]	1852.4 – 1907.6			826.4 – 846.6		

UMTS Band2 Hotspot:

There is power reduction enabled for this model (R800a) for band UMTS 2. The power reduction is enabled when the user enables hotspot mode via the manufacturer software. The table below shows the measured powers with hotspot enabled for UMTS 2.

Mode	UMTS 2 Hot Spot		
Crest factor	1		
Multiple access scheme	WCDMA		
Channel No.	9262	9400	9538
Measured Power Level [dBm] [1] (#19676)	22.8	22.6	22.5
Product Maximum power Level [dBm][1]	22.8	22.6	22.5
Data Mode	(See section 3.3)		
Transmitting frequency range [MHz]	1852.4 – 1907.6		

GPRS Multislot class	12
EDGE class	12
GPRS Capability class	B
BT class and conducted power	Class 1, 10 mW
Prototype or production unit	Preproduction
Hardware Version	AP2
Software version	3.0.A.2.157 ETS v.75_6 (#19643 WLAN)
Device category	Portable
RF exposure environment	General population / uncontrolled

[1] These values are supplied by the customer

WLAN Output Power					
Mode	Max Output Power [1] (dBm)	Factory Tolerance [1] (dB)	EUT (#19643) Measured Ave Power (dBm) [1]		
			Ch 1	Ch 6	Ch 11
802.11b 1Mbit/sec	17.5	1	17.0	17.1	17.0
802.11b 2Mbit/sec			16.8	17.2	17.0
802.11b 5.5Mbit/sec			16.8	17.1	16.9
802.11b 11Mbit/sec			16.9	17.0	16.8
802.11g 6Mbit/sec	16.5	1	15.4	16.2	16.1
802.11g 9Mbit/sec			15.4	16.2	16.1
802.11g 12Mbit/sec			15.4	16.2	16.1
802.11g 18Mbit/sec			15.4	16.2	16.1
802.11g 24Mbit/sec			15.3	16.2	16.1
802.11g 36Mbit/sec			15.4	16.2	16.1
802.11g 48Mbit/sec	15.5		14.5	15.3	15.1
802.11g 54Mbit/sec			14.4	15.3	15.1
802.11n 6.5Mbit/sec	14.0	1	13.6	13.6	13.5
802.11n 13Mbit/sec			13.6	13.5	13.7
802.11n 19.5Mbit/sec			13.6	13.7	13.6
802.11n 26Mbit/sec			13.6	13.7	13.7
802.11n 39Mbit/sec			13.3	13.9	13.7
802.11n 52Mbit/sec			13.6	14.0	13.7
802.11n 58Mbit/sec			13.6	13.7	13.7
802.11n 65Mbit/sec			13.3	13.9	13.8

[1] These values are supplied by the customer

Mode	Factory Tolerance [1] (dB)	EUT (#19643) Measured Peak Power (dBm) [1]		
		Ch 1	Ch 6	Ch 11
802.11b 1Mbit/sec	1	19.6	19.7	19.6
802.11b 2Mbit/sec		19.4	19.8	19.6
802.11b 5.5Mbit/sec		19.4	19.7	19.5
802.11b 11Mbit/sec		19.5	19.6	19.4
802.11g 6Mbit/sec	1	22.6	23.4	23.3
802.11g 9Mbit/sec		22.6	23.4	23.3
802.11g 12Mbit/sec		22.6	23.4	23.3
802.11g 18Mbit/sec		22.6	23.4	23.3
802.11g 24Mbit/sec		22.5	23.4	23.3
802.11g 36Mbit/sec		22.6	23.4	23.3
802.11g 48Mbit/sec		21.7	22.5	22.3
802.11g 54Mbit/sec		21.6	22.5	22.3
802.11n 6.5Mbit/sec	1	21.7	21.7	21.6
802.11n 13Mbit/sec		21.7	21.6	21.8
802.11n 19.5Mbit/sec		21.7	21.8	21.7
802.11n 26Mbit/sec		21.7	21.8	21.8
802.11n 39Mbit/sec		21.4	22.0	21.8
802.11n 52Mbit/sec		21.7	22.1	21.8
802.11n 58Mbit/sec		21.7	21.8	21.8
802.11n 65Mbit/sec		21.4	22.0	21.9

[1] These values are supplied by the customer

3.3 HSPA Power Characteristics

The conducted power of the device was confirmed in two UMTS circuit switched modes (RMC and Voice) and four HSDPA modes. A CMU-200 was used to establish the call processing and modulation settings and an RF power meter was used for measurement. For all HSDPA measurements, the following settings were applied:

H-SET3 QPSK
CQI feedback=2msec
ΔACK=5 ΔNACK=5 ΔCQI=2

The results (including relevant CMU settings) are presented in the following table:

EUT# 19641					Band 2				Band 5	
				Freq(MHz)	1852,4	1880,0	1907,6	826,4	836,4	846,6
	βC	βD	ΔHS	max->	24,6	24,6	24,6	24,6	24,6	24,6
CS - RMC	8	15	-		24.55	24.28	24.49	24.85	24.25	24.54
CS - voice	8	15	-		24.55	24.28	24.49	24.85	24.25	24.54
HSDPA - 1	2	15	8		24.57	24.27	24.53	24.81	24.30	24.51
HSDPA - 2	12	15	8		24.58	24.25	24.55	24.92	24.27	24.57
HSDPA - 3	15	8	8		24.07	23.75	24.05	24.37	23.80	24.10
HSDPA - 4	15	4	8		24.08	23.76	24.05	24.40	23.82	24.11

EUT# 19676					Band 2				Band 5	
				Freq.(MHz)	1852,4	1880,0	1907,6	826,4	836,4	846,6
	βC	βD	ΔHS	max->	24,6	24,6	24,6	24,6	24,6	24,6
CS - RMC	8	15	-		24.27	24.16	24.05	24.58	24.31	24.48
CS - voice	8	15	-		24.27	24.16	24.05	24.58	24.31	24.48
HSDPA - 1	2	15	8		24.24	24.22	24.04	24.56	24.30	24.46
HSDPA - 2	12	15	8		24.31	24.21	24.07	24.57	24.35	24.51
HSDPA - 3	15	8	8		23.82	23.72	23.59	24.11	23.79	24.04
HSDPA - 4	15	4	8		23.83	23.73	23.58	24.13	23.81	24.05

The measured 1-gram averaged SAR values of the device against head and body are provided in the results chapter. For head and body measurement, the unit was measured in the following (CS) voice modes:

RMC=12.2, β_c=8, β_d=15

For body measurement, the unit was measured according FCC guidance with following HSDPA settings:

RMC=12.2, β_c=9, β_d=15, ΔACK=5, ΔNACK=5, ΔCQI=2

In HSUPA mode, additional code channels (E-DPCCH, E-DPDCHn) are added for data transfer in the uplink at higher bit rates.

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5 sub-tests are defined by 3GPP TS 34.121 [7] according to the following table:

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ec} (SF)	β_{ed} (code)	CM (dB)(2)	MPR (dB)	AG(4) Index	E-TFCI
1	11/15(3)	15/15(3)	64	11/15(3)	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1}:47/15 β_{ed2}:47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15(4)	15/15(4)	64	15/15(4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK}, Δ_{CQI} = 8 <==> $A_{hs} = \beta_{hs}/\beta_c$ = 30/15 <==> β_{hs} = 30/15 * β_c
Note 2: CM = 1 for β_c/β_d = 12/15, β_{hs}/β_c = 24/15. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference
Note 3: For sub-test 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15
Note 4: For sub-test 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 14/15 and β_d = 15/15
Note 5: Testing UE using E-DPDCH Physical Layer category 1 sub-test 3 is not required according to TS 25.306 Table 5.1g
Note 6: β_{ed} cannot be set directly; it is set by Absolute Grant Value

EUT# 19641		Band 2			Band 5		
	Freq. (MHz)	1852,4	1880,0	1907,6	826,4	836,4	846,6
	max->	24,6	24,6	24,6	24,6	24,6	24,6
HSUPA - Sub-test 1		24.29	24.31	24.21	24.64	23.36	23.93
HSUPA - Sub-test 2		22.56	22.52	22.48	22.98	22.72	22.89
HSUPA - Sub-test 3		23.21	23.33	23.16	23.55	22.77	23.37
HSUPA - Sub-test 4		23.31	22.66	23.41	23.34	22.75	23.11
HSUPA - Sub-test 5		24.34	24.22	24.29	24.62	23.34	23.90

EUT# 19676		Band 2			Band 5		
	Freq. (MHz)	1852,4	1880,0	1907,6	826,4	836,4	846,6
	max->	24,6	24,6	24,6	24,6	24,6	24,6
HSUPA - Sub-test 1		24.14	23.88	23.68	23.99	23.54	23.99
HSUPA - Sub-test 2		22.40	22.16	22.47	22.94	22.67	22.95
HSUPA - Sub-test 3		23.12	22.82	22.59	23.25	22.99	22.93
HSUPA - Sub-test 4		22.80	23.11	22.91	22.98	22.70	23.18
HSUPA - Sub-test 5		24.25	23.89	23.69	23.99	23.53	23.98

NOTE: None of the HSDPA/HSUPA settings leads to conducted power values exceeding the conducted power in RMC mode by more than 0.25 dB.
So no additional SAR measurements are required for those test modes.

NOTE: According to the subtest settings shown in Table above a Maximum Power Reduction (MPR) of up to 2dB can be expected in HSUPA subtest 2 - 4. The WCDMA measurement results may show a lower power reduction depending on the chipset features of the DUT.

4 Test equipment

4.1 Dosimetric system

SAR measurements were made using the DASY4 professional system (software version 4.7, Build 55) with SAM twin phantom, manufactured by Schmid & Partner Engineering AG (SPEAG). The list of calibrated equipment is given below.

SAR System 1

Description	Inventory Number	Due Date
Signal generator HP SMY02	3.110	2011-04
Directional coupler HP778D	15.233	None
Power meter R&S NRVD	4.073	2011-04
Power sensor R&S NRV-Z5	4.074	2011-04
Power sensor R&S NRV-Z5	4.076	2011-04
Network analyzer Agilent 8719D	2.022	2011-04
Dielectric probe kit HP8507C	14.046	Self Cal
R&S CMU200	FB000539	2011-04
DASY4 DAE3	448	2011-11
E-field probe ET3DV6	1610	2011-11

SAR System 2

Description	Inventory Number	Due Date
Signal generator HP E4433B	1.045	2011-04
Directional coupler HP778D	FB000506	None
Power meter R&S NRVD	FB000511	2011-04
Power sensor R&S NRV-Z5	FB000512	2011-04
Power sensor R&S NRV-Z5	FB000513	2011-04
R&S CMU200	FB000534	2011-05
DASY4 DAE3	432	2011-05
E-field probe ET3DV6	1586	2011-05

Dipoles

Description	Serial Number	Due Date
Dipole Validation Kit, D835V2	438	2011-05
Dipole Validation Kit, D1900V2	539	2011-10
Dipole Validation Kit, D1900V2	536	2011-05
Dipole Validation Kit, D2450V2	721	2011-10

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5 Electrical parameters on 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 the dielectric probe kit. These values are shown in the table below. The mass density, ρ, entered into the DASY4 software is also given. Recommended limits for permittivity ε_r, conductivity σ and mass density ρ are also shown.

f [MHz]	Tissue type	Measured / Recommended	Dielectric Parameters		Density
			ε_r	σ [S/m]	ρ [g/cm³]
835	Head	Measured, 2011-02-08	41.52	0.89	1.00
		Recommended	41.50	0.90	1.00
835	Head	Measured, 2011-02-15	41.14	0.88	1.00
		Recommended	41.50	0.90	1.00
835	Head	Measured, 2011-02-17	40.41	0.87	1.00
		Recommended	41.50	0.90	1.00
835	Body	Measured, 2011-02-09	52.70	0.97	1.00
		Recommended	55.20	0.97	1.00
835	Body	Measured, 2011-02-18	52.59	0.96	1.00
		Recommended	55.20	0.97	1.00
835	Body	Measured, 2011-02-11	52.59	0.95	1.00
		Recommended	55.20	0.97	1.00
1900	Head	Measured, 2011-02-10	38.71	1.45	1.00
		Recommended	40.00	1.40	1.00
1900	Head	Measured, 2011-02-22	38.59	1.46	1.00
		Recommended	40.00	1.40	1.00
1900	Body	Measured, 2011-02-14	50.90	1.54	1.00
		Recommended	53.30	1.52	1.00
1900	Body	Measured, 2011-02-21	50.77	1.53	1.00
		Recommended	53.30	1.52	1.00
1900	Body	Measured, 2011-02-22	50.67	1.55	1.00
		Recommended	53.30	1.52	1.00
2450	Head	Measured, 2011-02-24	37.40	1.88	1.00
		Recommended	39.20	1.80	1.00
2450	Body	Measured, 2011-02-23	50.67	1.95	1.00
		Recommended	52.70	1.95	1.00

6 System accuracy verification

A system accuracy verification of the DASY4 was performed using the dipole validation kit listed in section 4.1. The system verification test was conducted on the same day as the measurement of the DUT. The ambient humidity and temperature of test facility were kept between the range 30-70% and 20.0-25.0 °C respectively.
RF noise had been measured in liquid when all RF equipment in lab was switched off. Measured value was 0.0002 mW/g in 1g mass.

f_0 [MHz]	Tissue type	Measured / Reference	SAR [W/kg] 10g	Dielectric Parameters		Density	Liquid T[°C]
				ε_r	σ [S/m]	ρ [g/cm³]	
835	Head	Measured, 2011-02-08	6.56	41.52	0.89	1.00	22.6
		Reference	6.28	41.50	0.90	1.00	22.0
835	Head	Measured, 2011-02-15	6.52	41.14	0.88	1.00	22.4
		Reference	6.28	41.50	0.90	1.00	22.0
835	Head	Measured, 2011-02-17	6.40	40.41	0.87	1.00	22.4
		Reference	6.28	41.50	0.90	1.00	22.0
835	Body	Measured, 2011-02-09	6.80	52.70	0.97	1.00	23.4
		Reference	6.47	55.20	0.97	1.00	22.0
835	Body	Measured, 2011-02-18	6.72	52.59	0.96	1.00	23.9
		Reference	6.47	55.20	0.97	1.00	22.0
835	Body	Measured, 2011-02-11	6.60	52.59	0.95	1.00	23.7
		Reference	6.47	55.20	0.97	1.00	22.0
1900	Head	Measured, 2011-02-10	19.24	38.71	1.45	1.00	22.7
		Reference	20.70	40.00	1.40	1.00	22.0
1900	Head	Measured, 2011-02-22	20.16	38.59	1.46	1.00	22.5
		Reference	20.70	40.00	1.40	1.00	22.0
1900	Body	Measured, 2011-02-14	19.88	50.90	1.54	1.00	23.5
		Reference	20.90	53.30	1.52	1.00	22.0
1900	Body	Measured, 2011-02-21	19.24	50.77	1.53	1.00	23.9
		Reference	20.90	53.30	1.52	1.00	22.0
1900	Body	Measured, 2011-02-22	19.60	50.67	1.55	1.00	23.3
		Reference	20.90	53.30	1.52	1.00	22.0
2450	Head	Measured, 2011-02-24	25.40	37.40	1.88	1.00	23.5
		Reference	24.50	39.20	1.80	1.00	22.0
2450	Body	Measured, 2011-02-23	25.76	50.67	1.95	1.00	23.5
		Reference	23.60	52.70	1.95	1.00	22.0

Sony Ericsson

Company Internal
REPORT

Prepared (also subject responsible if other)
BA/SEMC/CVVBAU *Rob Carr*

No.
CVDVBA11:035.

Approved
BA/SEMC/CVVBAU Jon Kenny

Checked
110309

Date
110225

Rev
A

Reference
File

7 SAR measurement uncertainty

SAR measurement uncertainty evaluation for Sony Ericsson PY7A3880087 (R800a) phone According to IEEE 1528

Uncertainty Component	Uncer. (%)	Prob Dist.	Div.	C_i	1g mass
Measurement System					
Probe Calibration	±5.9	N	1	1	±5.9
Axial Isotropy	±4.7	R	√3	0.7	±1.9
Spherical Isotropy	±9.6	R	√3	0.7	±3.9
Boundary effect	±1.0	R	√3	1	±0.6
Probe linearity	±4.7	R	√3	1	±2.7
Detection limit	±1.0	R	√3	1	±0.6
Readout electronics	±0.3	N	1	1	±0.3
Response time	±0.8	R	√3	1	±0.5
Integration time	±2.6	R	√3	1	±1.5
RF Ambient Conditions	±3.0	R	√3	1	±1.7
Mech. Constraints of robot	±0.4	R	√3	1	±0.2
Probe positioning	±2.9	R	√3	1	±1.7
Extrap, interpolation and integration	±1.0	R	√3	1	±0.6
Measurement System Uncertainty					*±8.4*
Test Sample Related					
Device positioning	±3.5	N	1	1	±3.5
Device holder uncertainty	±3.5	N	1	1	±3.5
Power drift	±5.0	R	√3	1	±2.9
Test Sample Related Uncertainty					*±5.5*
Phantom and Tissue Parameters					
Phantom uncertainty	±4.0	R	√3	1	±2.3
Liquid conductivity (measured)	±2.5	R	1	0.64	±1.6
Liquid conductivity (target)	±5.0	R	√3	0.64	±1.8
Liquid Permittivity (measured)	±2.5	R	1	0.6	±1.5
Liquid Permittivity (target)	±5.0	R	√3	0.6	±1.7
Phantom and Tissue Parameters Uncertainty					*±4.1*
Combined standard uncertainty					*±10.8*
Extended standard uncertainty (k=2)					***±21.6***

8 Test results

The ambient humidity and temperature of test facility were kept between the range 30-70% and 20.0-25.0 °C respectively. A base station simulator was used to control the device during the SAR measurement. The DUT was supplied with a fully charged battery for each measurement.

For head measurement, the DUT was tested on the right-hand side and the left-hand side of the phantom, in two phone positions, cheek (touch) and tilt (cheek + 15°). The DUT was tested at the lowest, middle and highest frequencies in the transmission band. The measured 1-gram averaged SAR values of the DUT towards the head are provided in Table 1.

For body measurement the DUT was tested with the back (antenna) and front (display) towards the phantom flat section with 15 mm distance in speech mode and 10mm in data mode (Due to product supporting Wi-Fi Hot Spot).For data mode the GPRS slot configuration resulting in the highest SAR was assessed and tested along with 3G and WLAN. For all modes, the device was tested at the lowest, middle and highest frequencies in the transmission band. For portable hands free (PHF) usage the Sony Ericsson head set MH-650 was connected to the DUT. The measured 1-gram averaged SAR values of the DUT towards the body are provided in Table 2 and 3.

Band	Channel	Measured output power[1] [dBm]	Position	Liquid T [°C]	Measured SAR [W/kg] Left-hand 1g mass	Measured SAR [W/kg] Right-hand 1g mass
GSM 850	128	33.3	Cheek	22.6	0.24	0.21
			Tilt	22.6	-	-
	190	33.3	Cheek	22.6	0.30	0.30
			Tilt	22.6	0.22	0.24
	251	33.4	Cheek	22.6	**0.33**	0.32
			Tilt	22.6	-	-
GSM 1900	512	30.5	Cheek	23.4	0.30	0.22
			Tilt	23.4	-	-
	661	30.5	Cheek	23.4	**0.31**	0.23
			Tilt	23.4	0.14	0.14
	810	30.3	Cheek	23.4	0.24	0.21
			Tilt	23.4	-	-
UMTS 2	9262	24.5	Cheek	22.5	**0.60**	0.44
			Tilt	22.5	-	-
	9400	24.3	Cheek	22.5	0.57	0.49
			Tilt	22.5	0.30	0.24
	9538	24.4	Cheek	22.5	0.54	0.54
			Tilt	22.5	-	-
UMTS 5	4132	24.4	Cheek	22.4	0.36	0.37
			Tilt	22.4	-	-
	4183	24.5	Cheek	22.4	0.32	0.33
			Tilt	22.4	0.26	0.30
	4233	24.3	Cheek	22.4	**0.39**	0.35
			Tilt	22.4	-	-
WLAN 802.11b 1 Mbps	1	17.0	Cheek	23.5	0.06	0.05
			Tilt	23.5	-	-
	6	17.1	Cheek	23.5	**0.07**	0.05
			Tilt	23.5	0.06	0.05
	11	16.7	Cheek	23.5	0.07	0.06
			Tilt	23.5	-	-

Table 1: SAR measurement result for Sony Ericsson PY7A3880087 telephone at highest possible output power. Measured towards the head.

[1] Measured output values were provided by the customer.

Band	Channel	Measured output power[1] [dBm]	Position / Mode (Speech 15mm)(Data 10mm)	Liquid T [°C]	Measured SAR [W/kg] 1g mass
GSM 850	128	33.3	Back / Speech	23.4	0.86
		30.4	Back / GPRS x3 Slot	23.9	1.11
	190	33.3	Back / Speech	23.4	1.01
		33.3	Back / PHF	23.4	0.93
		31.5	Back / GPRS x2 Slot	23.9	1.18
		30.3	Back / GPRS x3 Slot	23.9	1.30
		28.5	Back / GPRS x4 Slot	23.9	1.10
	251	33.4	Back / Speech	23.4	0.93
		30.3	Back / GPRS x3 Slot	23.9	**1.37**
			Front to Phantom/GPRS x3 Slot	23.9	0.58
			Top of phone / GPRS x3 Slot	23.9	0.03
			Bottom of phone / GPRS x3 Slot	23.9	0.20
			LHS of phone / GPRS x3 Slot	23.9	0.69
			RHS of phone / GPRS x3 Slot	23.9	0.53
		23.2	Back / EDGE x3 Slot	23.9	0.33
GSM 1900	512	30.5	Back / Speech	23.5	0.38
		27.4	Back / GPRS x3 Slot	23.5	1.19
	661	30.5	Back / Speech	23.5	0.49
		30.5	Back / PHF	23.5	0.52
		28.3	Back / GPRS x2 Slot	23.5	1.03
		26.4	Back / GPRS x4 Slot	23.5	1.07
		27.5	Back / GPRS x3 Slot	23.5	**1.44**
			Front to Phantom/GPRS x3 Slot	23.5	0.73
			Top of phone / GPRS x3 Slot	23.5	0.09
			Bottom of phone / GPRS x3 Slot	23.5	1.18
			LHS of phone / GPRS x3 Slot	23.5	0.19
			RHS of phone / GPRS x3 Slot	23.5	0.29
		22.9	Back / EDGE x3 Slot	23.5	0.55
	810	30.3	Back / Speech	23.5	0.43
		27.4	Back / GPRS x3 Slot	23.5	1.34
UMTS 5	4132	24.4	Back / Speech	23.7	0.84
		24.4	Back / PHF	23.7	0.65
		24.2	Back / HSUPA	23.7	1.12
			Back / HSDPA	23.7	**1.15**
			Front to Phantom/ HSDPA	23.7	0.40
			Top of phone / HSDPA	23.7	0.02
			Bottom of phone / HSDPA	23.7	0.13
			LHS of phone / HSDPA	23.7	0.24
			RHS of phone / HSDPA	23.7	0.36
	4183	24.5	Back / Speech	23.7	0.74
		24.5	Back / HSDPA	23.7	1.03
	4233	24.3	Back / Speech	23.7	0.80
		24.5	Back / HSDPA	23.7	1.05

Table 2: SAR measurement result for Sony Ericsson PY7A3880087 telephone at highest possible output power. Measured towards the body.

[1] Measured output values were provided by the customer.

Band	Channel	Measured output power[1] [dBm]	Position / Mode (Data 10mm)	Liquid T [°C]	Measured SAR [W/kg] 1g mass
WLAN 802.11b 1 Mbps	1	17.0	Back / WLAN	23.5	0.08
	6	17.1	Back / WLAN	23.5	0.07
	11	17.0	Back / WLAN	23.5	**0.09**
			Front to Phantom/ WLAN	23.5	0.02
			Top of phone / WLAN	23.5	0.06
			Bottom of phone / WLAN	23.5	0.01
			LHS of phone / WLAN	23.5	0.02
			RHS of phone / WLAN	23.5	0.02

Table 2(Continued): SAR measurement result for Sony Ericsson PY7A3880087 telephone at highest possible output power. Measured towards the body.

Band	Channel	Measured output power[1] [dBm]	Position / Mode	Distance	Liquid T [°C]	Measured SAR [W/kg] 1g mass
UMTS 2 (Body Data Mode)	9262	24.3	Back / Speech	15mm	23.9	0.64
	9400	24.3	Back / Speech	15mm	23.9	0.75
	9538	24.2	Back / Speech	15mm	23.9	0.84
			Back / PHF	15mm	23.9	0.82
	9262	24.4	Back / HSDPA	15mm	23.9	0.61
	9400	24.5	Back / HSDPA	15mm	23.9	0.71
	9538	24.3	Back / HSDPA	15mm	23.9	0.73
		24.3	Back / HSUPA	15mm	23.9	0.73
		24.3	Front to Phantom/ HSDPA	15mm	23.9	0.38
UMTS 2 (Wi-Fi Hotspot Mode)	9262	22.8	Back / HSDPA	10mm	23.3	0.79
	9400	22.6	Back / HSDPA	10mm	23.3	0.93
	9538	22.5	Back / HSUPA	10mm	23.3	**0.98**
			Back / HSDPA	10mm	23.3	0.96
			Front to Phantom/ HSDPA	10mm	23.3	0.37
			Top of phone / HSDPA	10mm	23.3	0.04
			Bottom of phone / HSDPA	10mm	23.3	0.76
			LHS of phone / HSDPA	10mm	23.3	0.11
			RHS of phone / HSDPA	10mm	23.3	0.19

Table 3: SAR measurement result for Sony Ericsson PY7A3880087 telephone at highest possible output power. Measured towards the body.

9 References

[1] R.Plicanic. “SAR Measurement Specification of Wireless Handsets”. Sony Ericsson SAR Test Laboratory internal document GUG/N 03:141

[2] FCC. “Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields: Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radio Frequency Emissions.” Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97- 01).

[3] IEEE. “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques.” Std 1528-2003. June. 2003.

[4] IEC 62209-1. "Procedure to measure the Specific Absorption Rate (SAR) for hand-held mobile wireless devices in the frequency range of 300 MHz to 3 GHz". February 2005.

[5] FCC KDB648474. "SAR Evaluation Consideration for HANDSETS with Multiple Transmitters and Antenna", April 2008.

[6] FCC KDB248227. "SAR Measurement procedure for 802.11a/b/g Transmitters”, May 2007.

[7] PBA KDB Input Tracking number #703553 regarding function of HSUPA MPR (Maximum Power Reduction) of Qualcomm RF chipset.

Appendix

9.1 Photographs of the device under test

Front

Back

Sides

Back side with battery

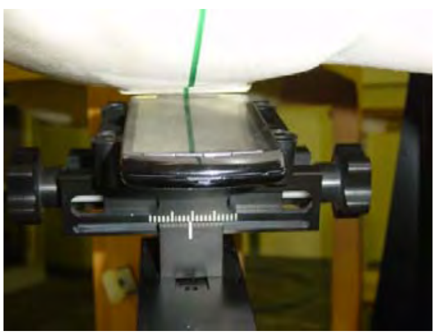
Top Edge to Phantom

Bottom Edge to Phantom

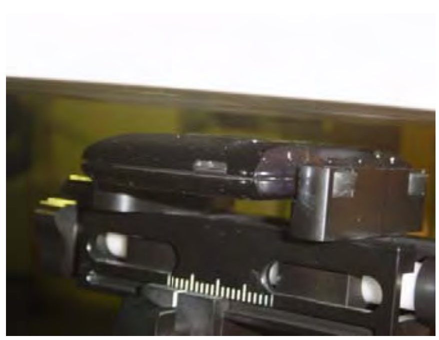
Side Edge to Phantom

9.2 Device position at SAM Twin Phantom

DUT position towards the head: Cheek (touch) position



DUT position towards the head: Tilt (touch + 15°) position



DUT position towards the body

9.3 Attachments

- System validation
- Measurement plots for head and body position
- Probe calibration
- Dipole calibration

Date/Time: 2/9/2011 8:54:49 AM

Test Laboratory: Sony Ericsson Mobile Communications

Validation 835 Body 09-02-2011

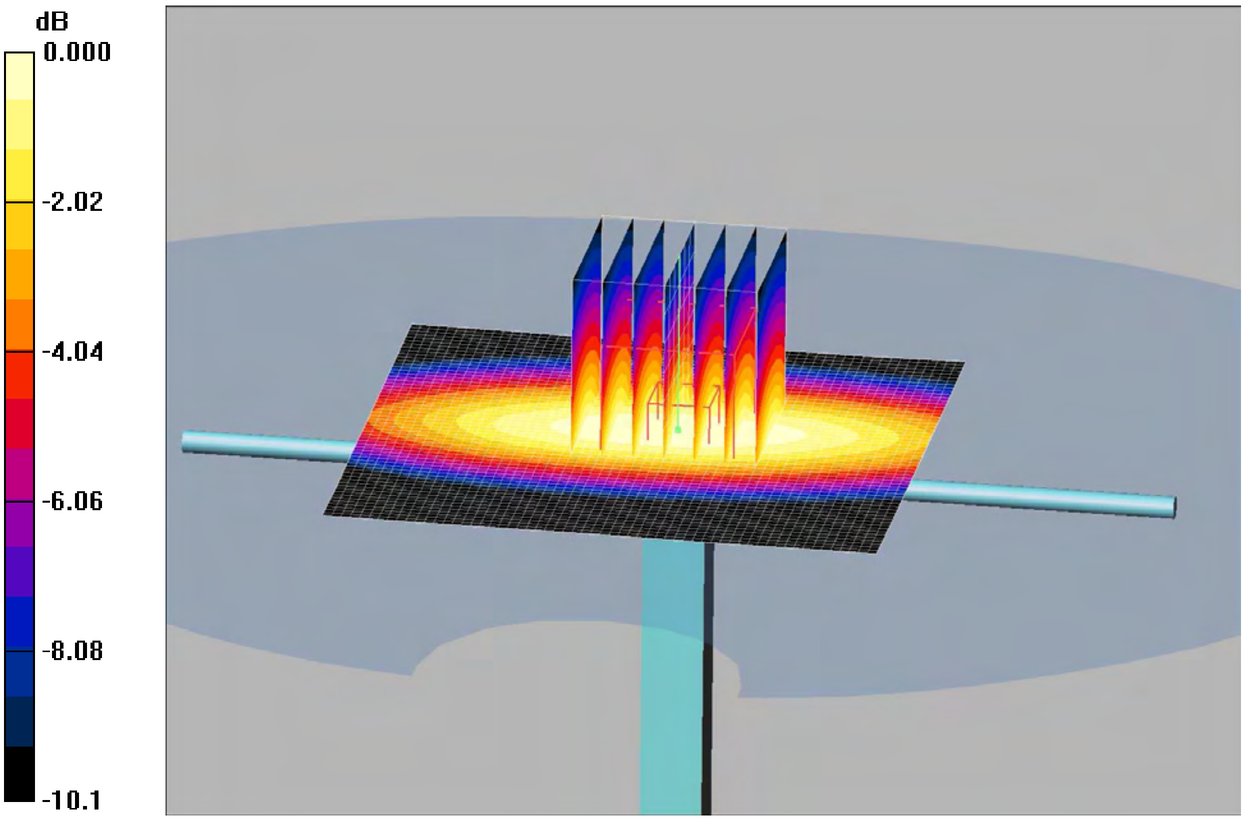
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:438

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835 MHz; σ = 0.967 mho/m; ε_r = 52.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(6.18, 6.18, 6.18); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: SAM with CRP (Low Band Body); Type: SAM; Serial: TP: 1031
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Unnamed procedure/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.78 mW/g
Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.7 V/m; Power Drift = 0.008 dB
Peak SAR (extrapolated) = 3.72 W/kg
SAR(1 g) = 2.59 mW/g; SAR(10 g) = 1.7 mW/g
Maximum value of SAR (measured) = 2.80 mW/g



0 dB = 2.80mW/g

Date/Time: 2/18/2011 8:34:16 AM

Test Laboratory: Sony Ericsson Mobile Communications

Validation 835 Body 18-02-2011

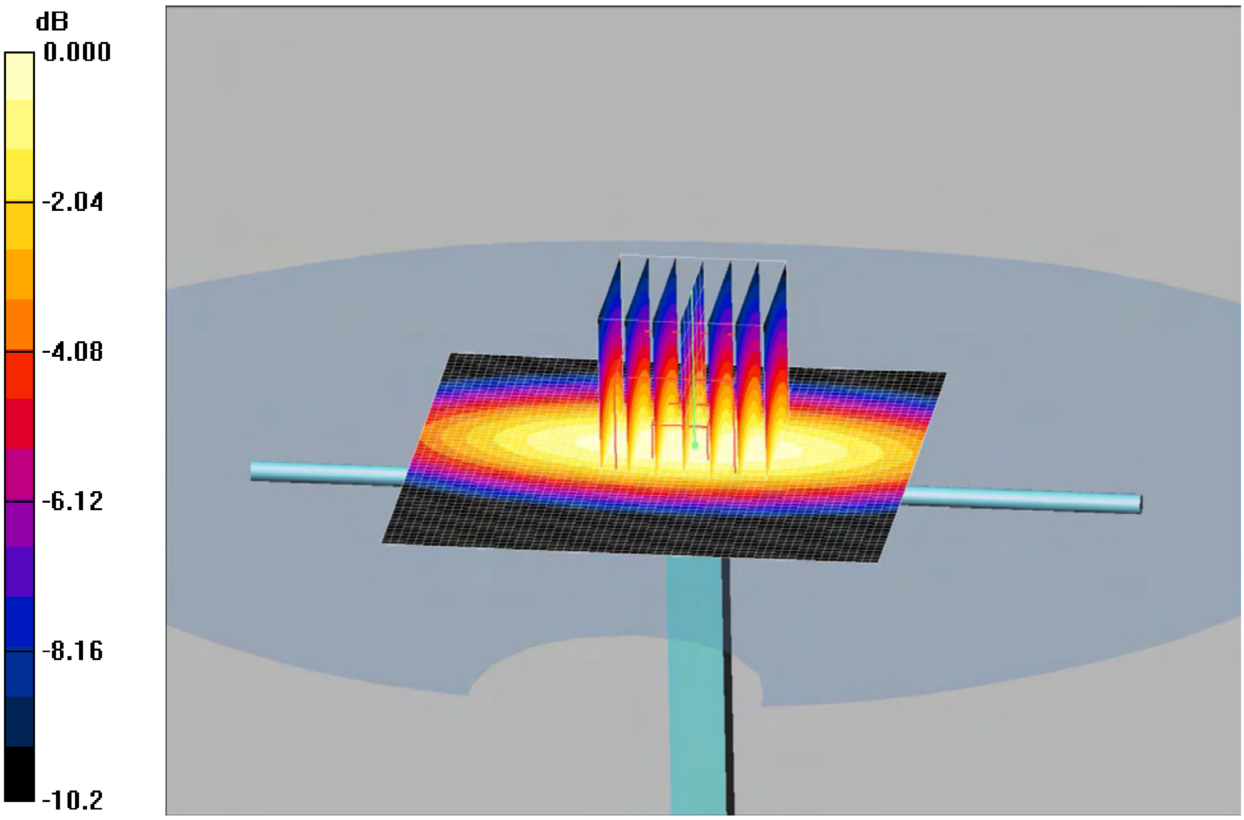
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:438

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835 MHz; σ = 0.963 mho/m; ε_r = 52.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(6.18, 6.18, 6.18); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: SAM with CRP (Low Band Body); Type: SAM; Serial: TP: 1031
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Unnamed procedure/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.72 mW/g
Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.5 V/m; Power Drift = 0.050 dB
Peak SAR (extrapolated) = 3.67 W/kg
SAR(1 g) = 2.55 mW/g; SAR(10 g) = 1.68 mW/g
Maximum value of SAR (measured) = 2.75 mW/g



0 dB = 2.75mW/g

Date/Time: 2/11/2011 8:22:48 AM

Test Laboratory: Sony Ericsson Mobile Communications

Validation_835_Body_UMTS5_11-02-2011

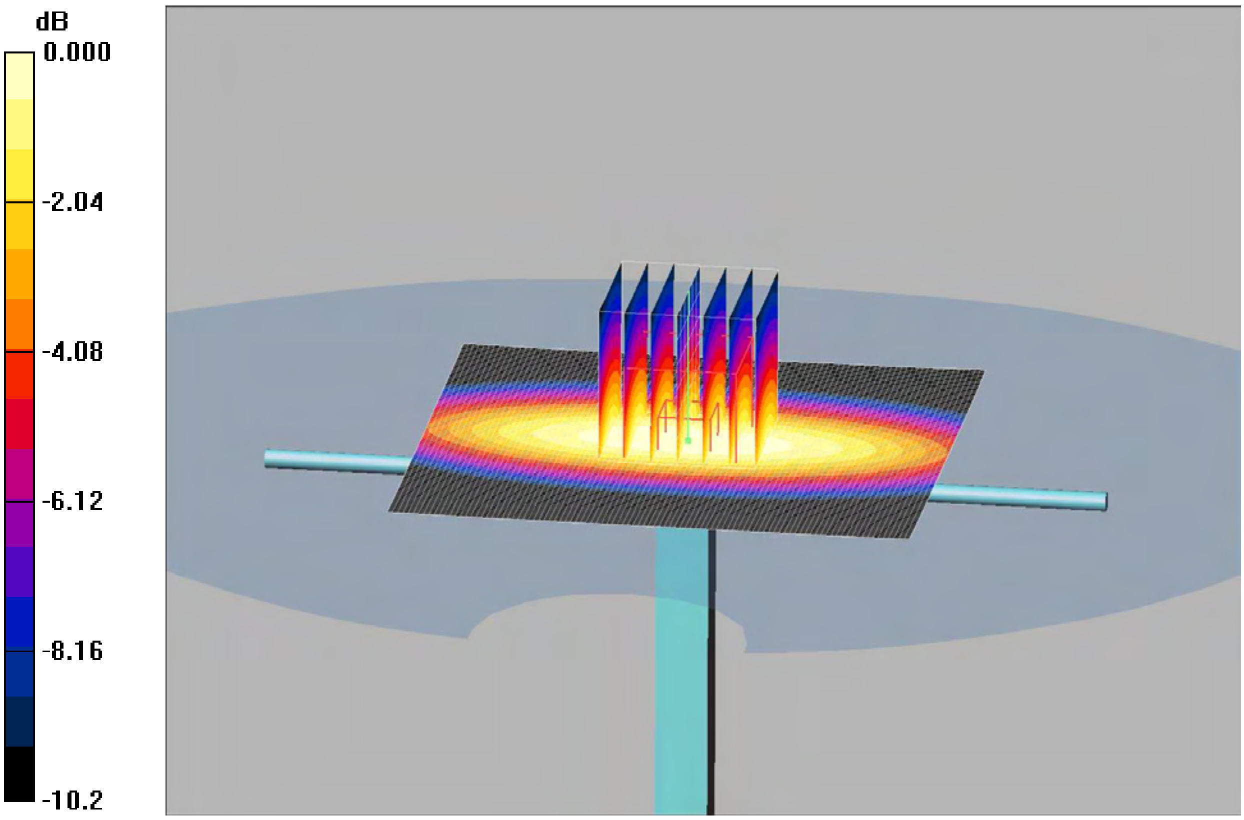
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:438

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835.057 MHz; σ = 0.95 mho/m; ε_r = 52.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(6.18, 6.18, 6.18); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: SAM with CRP (Low Band Body); Type: SAM; Serial: TP: 1031
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Unnamed procedure/Area Scan (101x101x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 2.71 mW/g
Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.0 V/m; Power Drift = -0.011 dB
Peak SAR (extrapolated) = 3.58 W/kg
SAR(1 g) = 2.5 mW/g; SAR(10 g) = 1.65 mW/g
Maximum value of SAR (measured) = 2.70 mW/g



0 dB = 2.70mW/g

Date/Time: 10/02/2011 09:11:13

Test Laboratory: Sony Ericsson Mobile Communications International AB

Validation-D1900-10-02-11

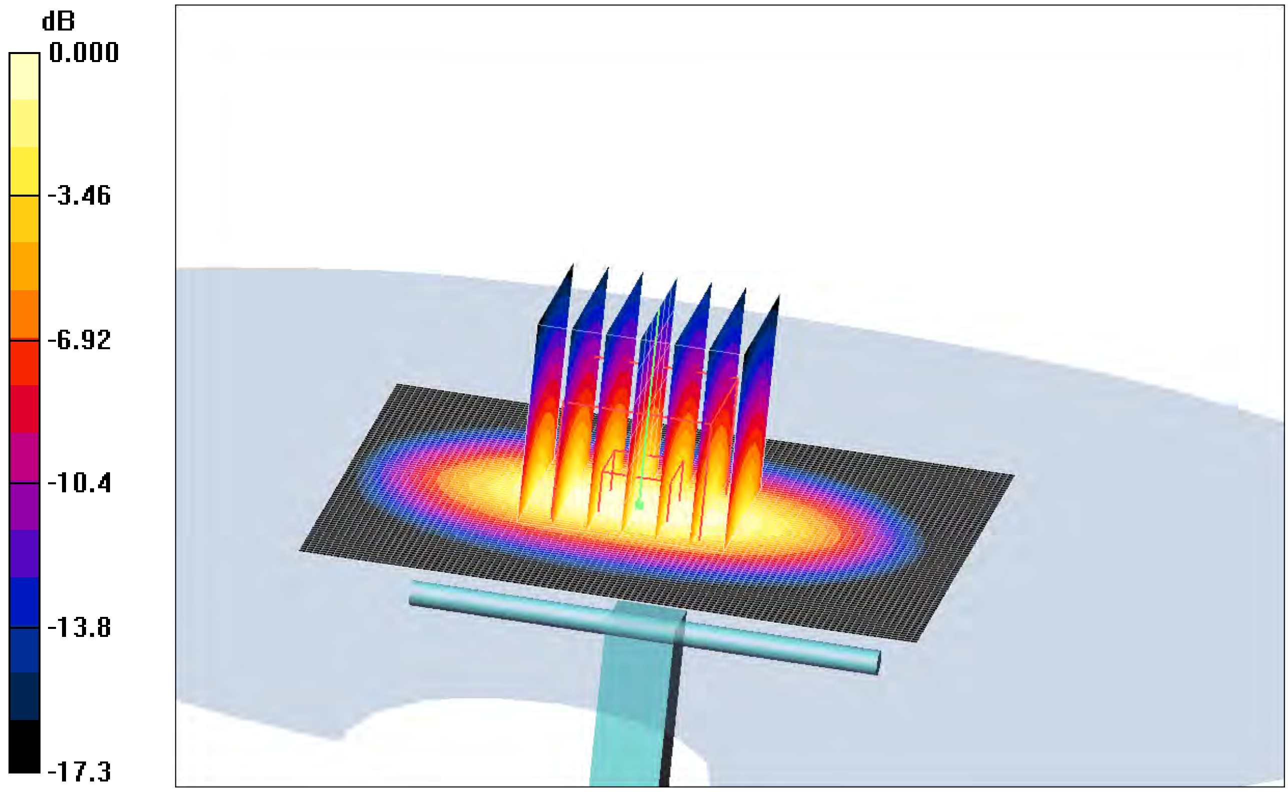
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:536

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1900 MHz; σ = 1.45 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(5.18, 5.18, 5.18); Calibrated: 16/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 17/11/2010
- Phantom: SAM-1; Type: SAM; Serial: 1437
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (81x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 10.4 mW/g
d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 88.8 V/m; Power Drift = 0.025 dB
Peak SAR (extrapolated) = 15.3 W/kg
SAR(1 g) = 9.12 mW/g; SAR(10 g) = 4.81 mW/g
Maximum value of SAR (measured) = 10.4 mW/g



0 dB = 10.4mW/g

Date/Time: 2/14/2011 10:08:13 AM

Test Laboratory: Sony Ericsson Mobile Communications

Validation-D1900-14-02-11

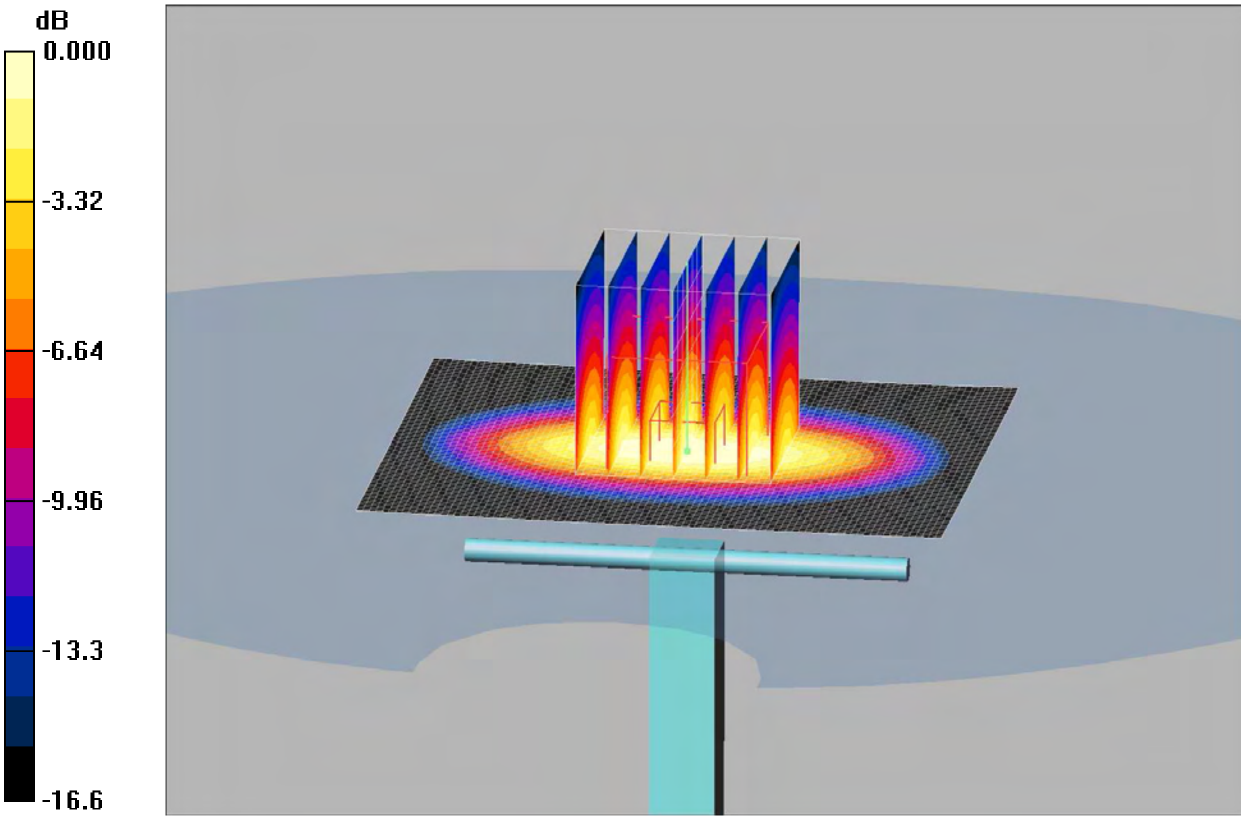
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:539

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1900 MHz; σ = 1.54 mho/m; ε_r = 50.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(4.55, 4.55, 4.55); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: SAM with CRP (High Band Body); Type: SAM; Serial: TP: 1020
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (81x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 10.8 mW/g
d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.7 V/m; Power Drift = -0.089 dB
Peak SAR (extrapolated) = 14.8 W/kg
SAR(1 g) = 9.26 mW/g; SAR(10 g) = 4.97 mW/g
Maximum value of SAR (measured) = 10.5 mW/g



0 dB = 10.5mW/g

Date/Time: 22/02/2011 08:51:35

Test Laboratory: Sony Ericsson Mobile Communications International AB

Validation-D1900-22-02-11

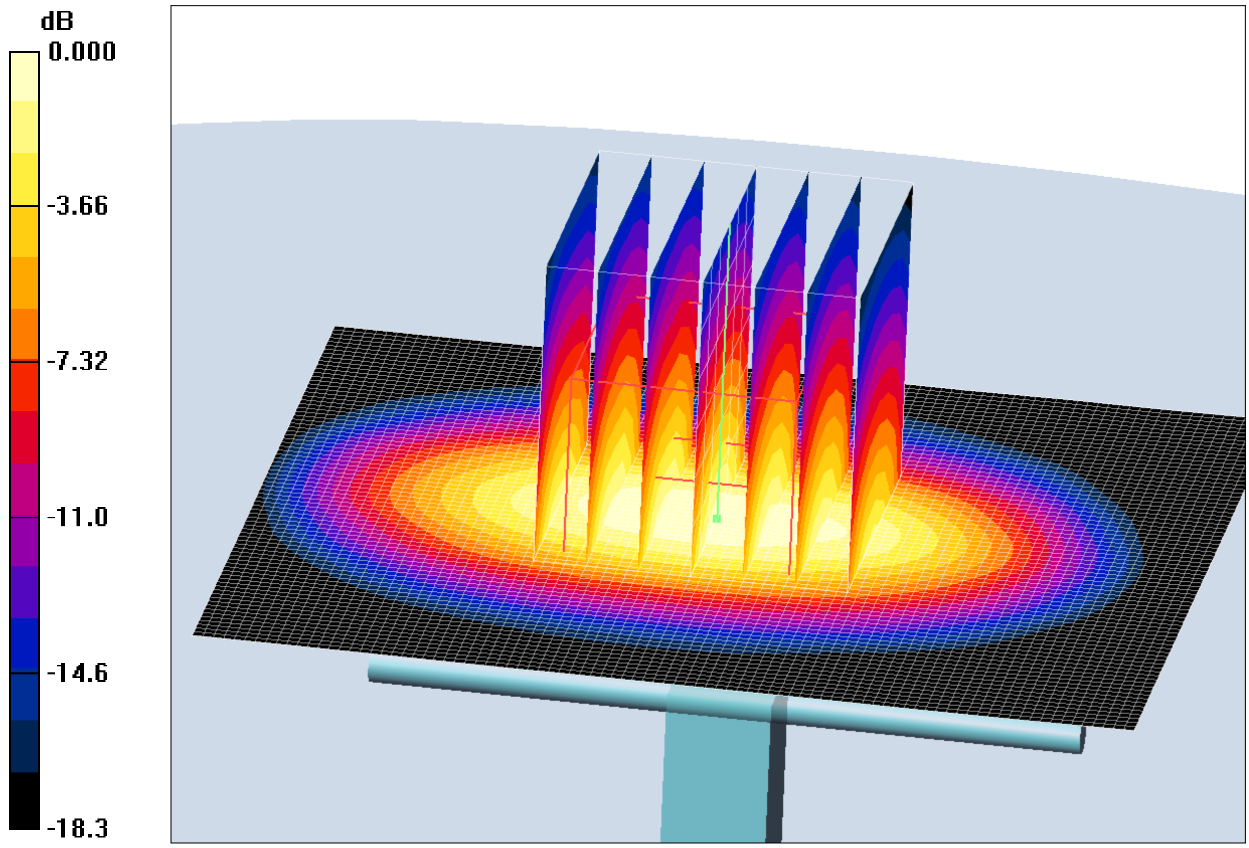
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:536

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1900 MHz; σ = 1.46 mho/m; ε_r = 38.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(5.18, 5.18, 5.18); Calibrated: 16/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 17/11/2010
- Phantom: SAM-1; Type: SAM; Serial: 1437
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (81x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 10.3 mW/g
d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 87.6 V/m; Power Drift = 0.071 dB
Peak SAR (extrapolated) = 16.1 W/kg
SAR(1 g) = 9.5 mW/g; SAR(10 g) = 5.04 mW/g
Maximum value of SAR (measured) = 10.8 mW/g



0 dB = 10.8mW/g

Date/Time: 2/21/2011 8:42:20 AM

Test Laboratory: Sony Ericsson Mobile Communications

Validation-D1900-21-02-11

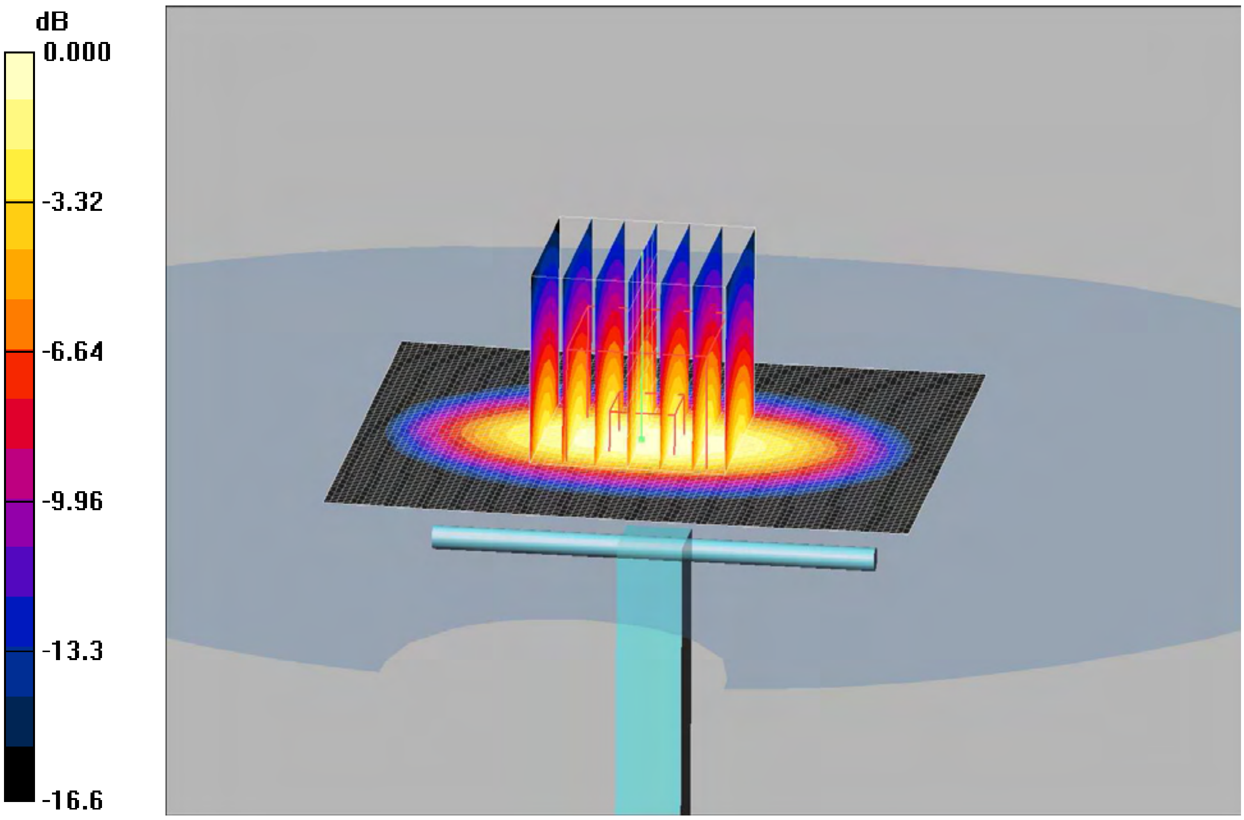
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:539

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1900 MHz; σ = 1.53 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(4.55, 4.55, 4.55); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: SAM with CRP (High Band Body); Type: SAM; Serial: TP: 1020
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (81x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 10.4 mW/g
d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.6 V/m; Power Drift = -0.076 dB
Peak SAR (extrapolated) = 14.3 W/kg
SAR(1 g) = 8.94 mW/g; SAR(10 g) = 4.81 mW/g
Maximum value of SAR (measured) = 10.1 mW/g



0 dB = 10.1mW/g

Date/Time: 2/22/2011 8:36:41 AM

Test Laboratory: Sony Ericsson Mobile Communications

Validation-D1900-UMTS2-22-02-11

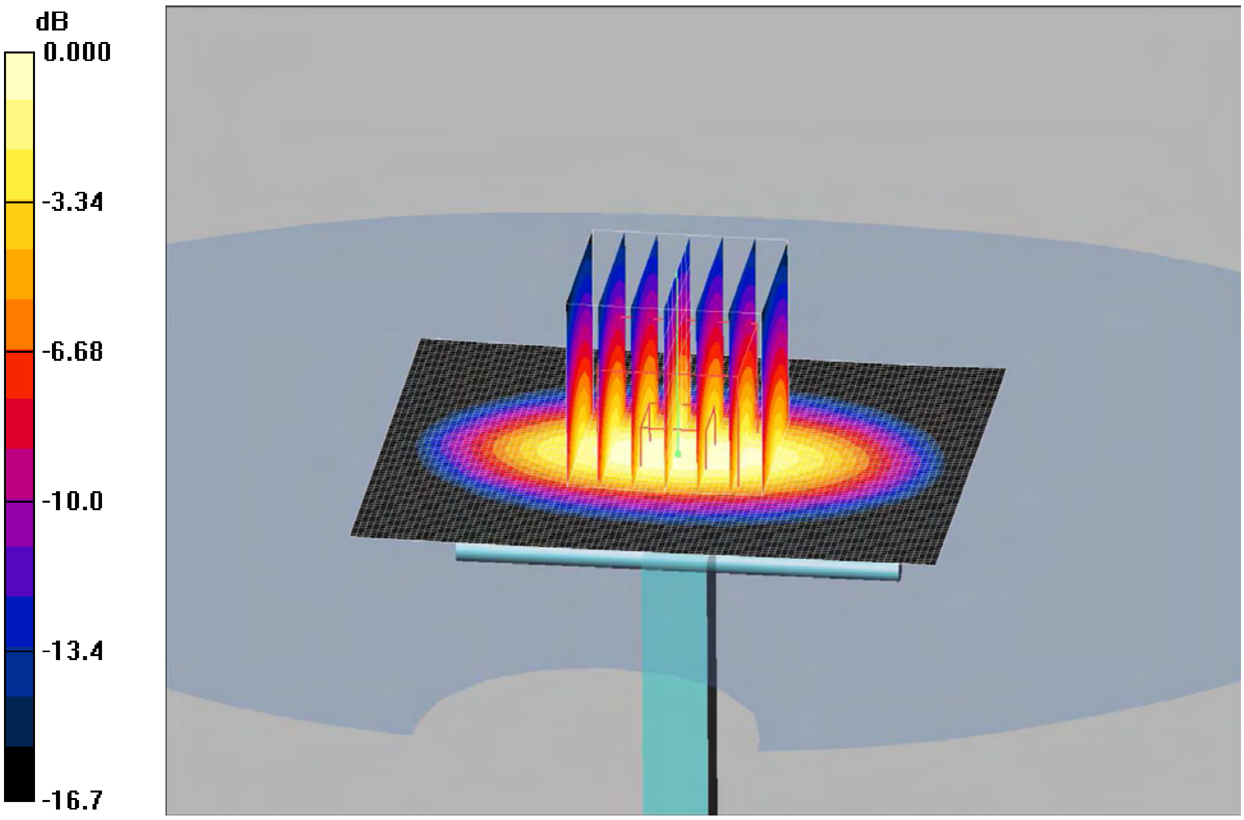
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:539

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1900 MHz; σ = 1.55 mho/m; ε_r = 50.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(4.55, 4.55, 4.55); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: SAM with CRP (High Band Body); Type: SAM; Serial: TP: 1020
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (81x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 10.5 mW/g
d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.5 V/m; Power Drift = -0.041 dB
Peak SAR (extrapolated) = 14.5 W/kg
SAR(1 g) = 9.1 mW/g; SAR(10 g) = 4.9 mW/g
Maximum value of SAR (measured) = 10.4 mW/g



0 dB = 10.4mW/g

Date/Time: 2/23/2011 9:22:42 AM

Test Laboratory: Sony Ericsson Mobile Communications

Validation-D2450-23-02-11

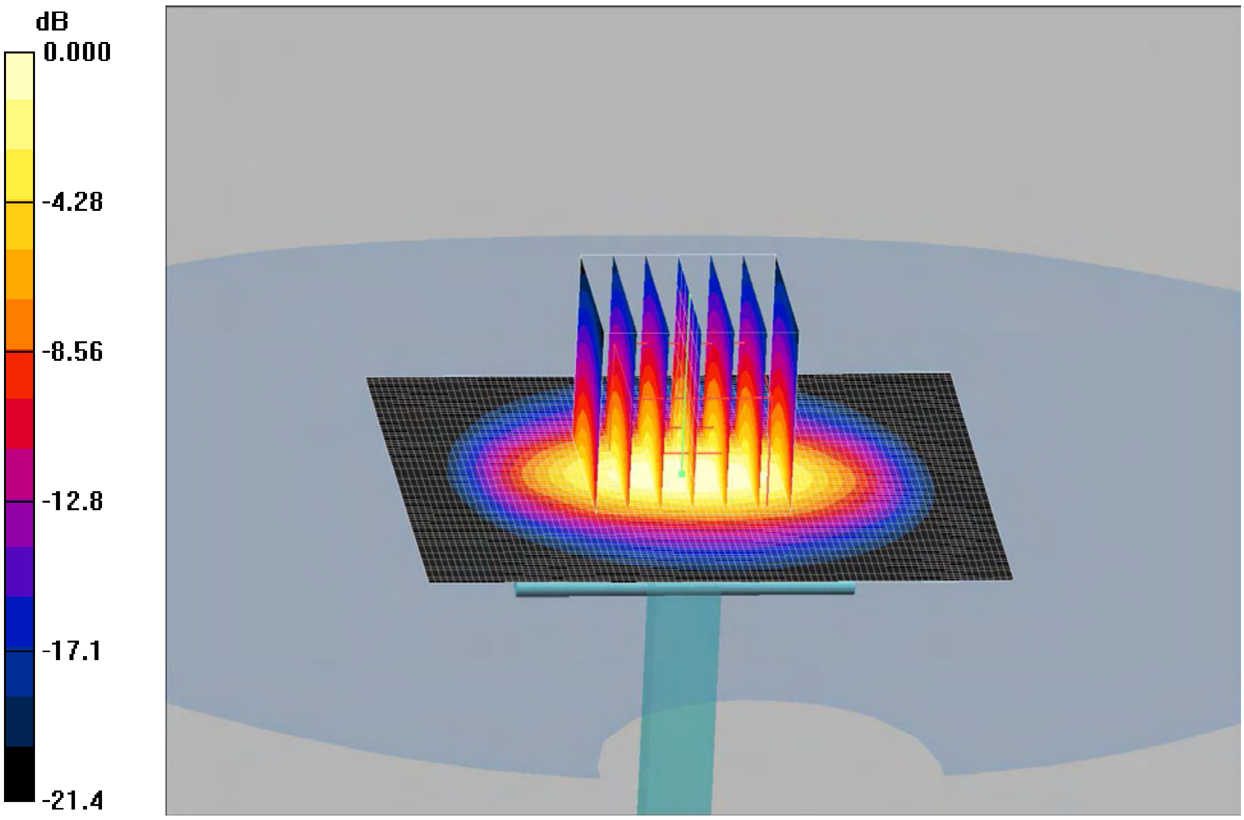
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:721

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2450 MHz; σ = 1.96 mho/m; ε_r = 50.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(4.09, 4.09, 4.09); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: WLAN Body SAM; Type: SAM; Serial:
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

  d=10mm, Pin=250mW/Area Scan (81x91x1): Measurement grid: dx=10mm, dy=10mm
  Maximum value of SAR (interpolated) = 15.9 mW/g
  d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
  Reference Value = 91.6 V/m; Power Drift = -0.027 dB
  Peak SAR (extrapolated) = 33.5 W/kg
  SAR(1 g) = 14.1 mW/g; SAR(10 g) = 6.44 mW/g
  Maximum value of SAR (measured) = 15.6 mW/g



0 dB = 15.6mW/g

Date/Time: 2/24/2011 8:24:26 AM

Test Laboratory: Sony Ericsson Mobile Communications

Validation-D2450-24-02-10

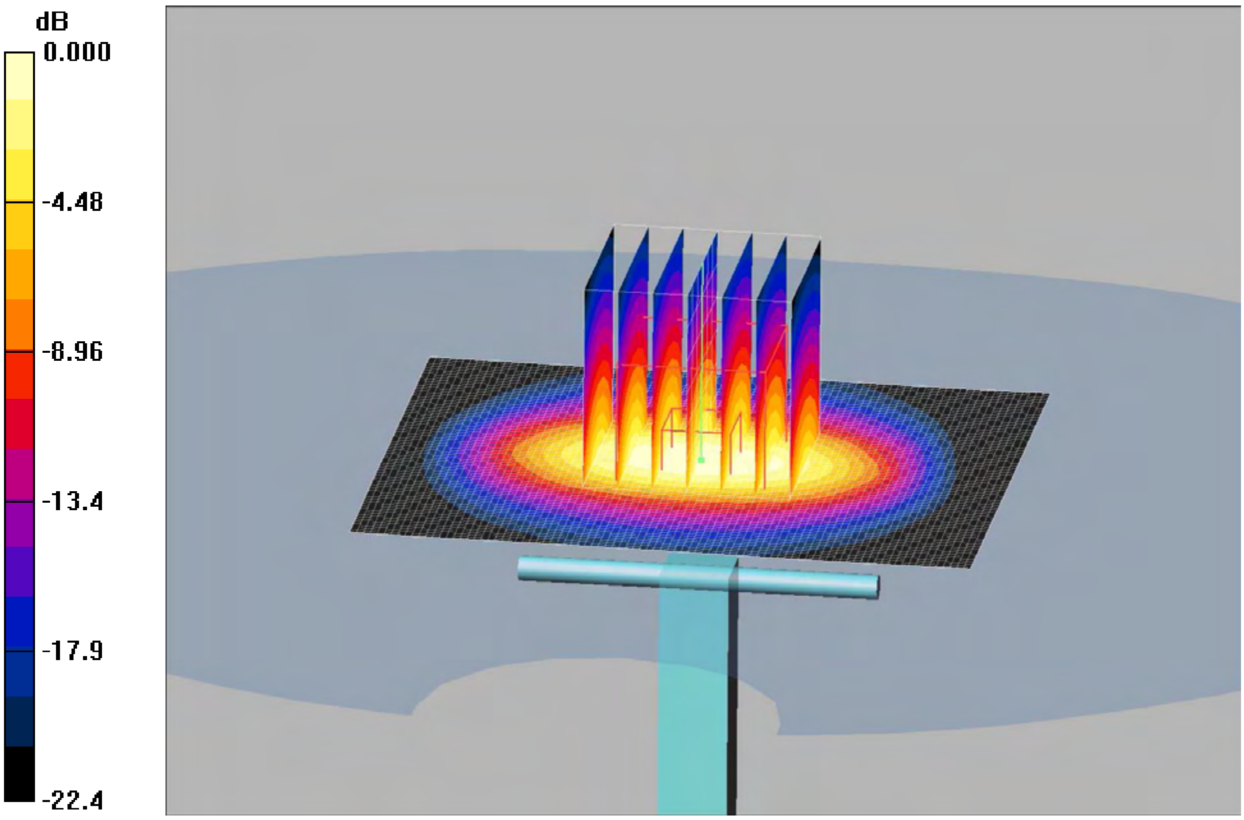
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:721

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2450 MHz; σ = 1.89 mho/m; ε_r = 37.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(4.49, 4.49, 4.49); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: WLAN (Head) SAM with CRP; Type: SAM; Serial:
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=250mW/Area Scan (81x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 15.7 mW/g
d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.1 V/m; Power Drift = -0.096 dB
Peak SAR (extrapolated) = 31.6 W/kg
SAR(1 g) = 13.9 mW/g; SAR(10 g) = 6.35 mW/g
Maximum value of SAR (measured) = 15.7 mW/g



0 dB = 15.7mW/g

Date/Time: 08/02/2011 09:35:58

Test Laboratory: Sony Ericsson Mobile Communications International AB

Validation-D850-08-02-11

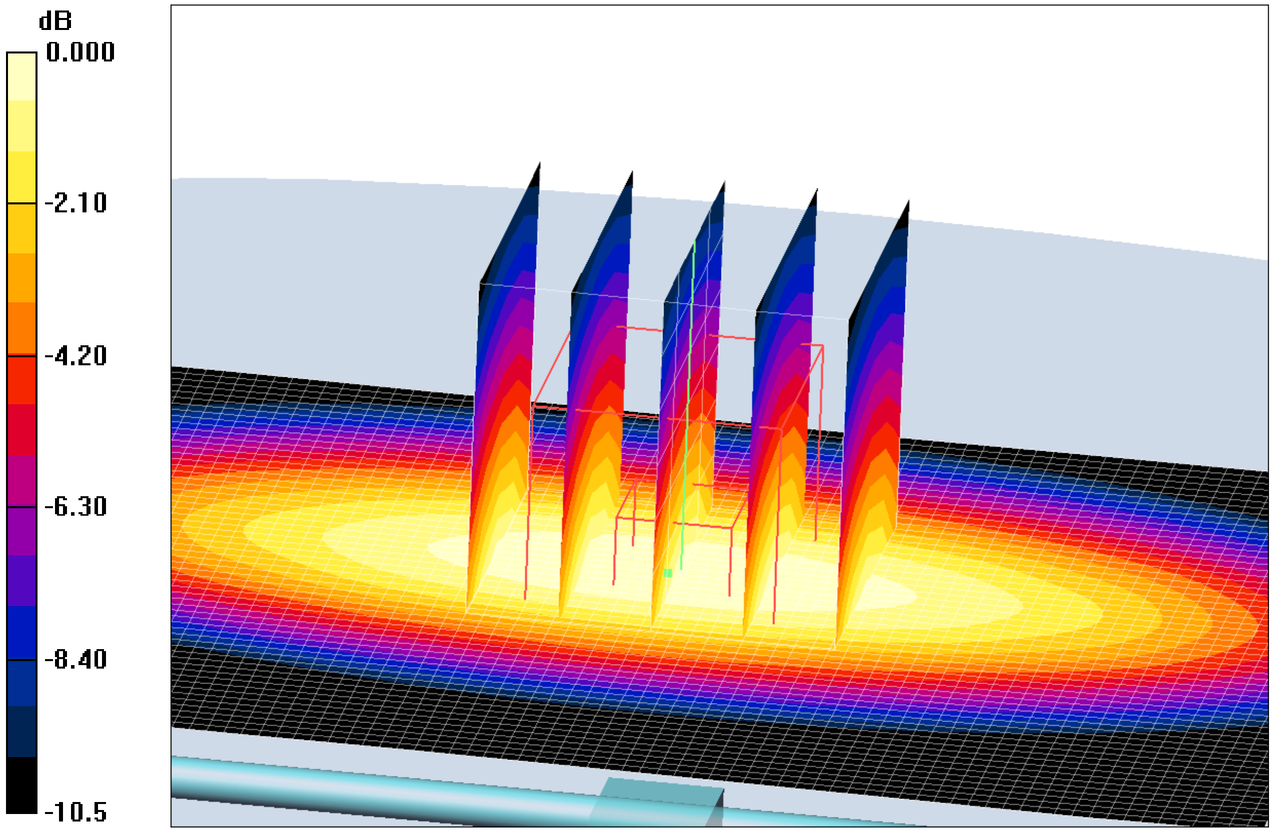
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:438

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835 MHz; σ = 0.886 mho/m; ε_r = 41.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(6.32, 6.32, 6.32); Calibrated: 16/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 17/11/2010
- Phantom: SAM-2; Type: SAM; Serial: 1025
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 186

d=15mm, Pin=250mW/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.70 mW/g
d=15mm, Pin=250mW/Zoom Scan (7x7x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 57.5 V/m; Power Drift = -0.025 dB
Peak SAR (extrapolated) = 3.60 W/kg
SAR(1 g) = 2.5 mW/g; SAR(10 g) = 1.64 mW/g
Maximum value of SAR (measured) = 2.71 mW/g



0 dB = 2.71mW/g

Date/Time: 15/02/2011 09:08:59

Test Laboratory: Sony Ericsson Mobile Communications International AB

Validation-D850-15-02-11

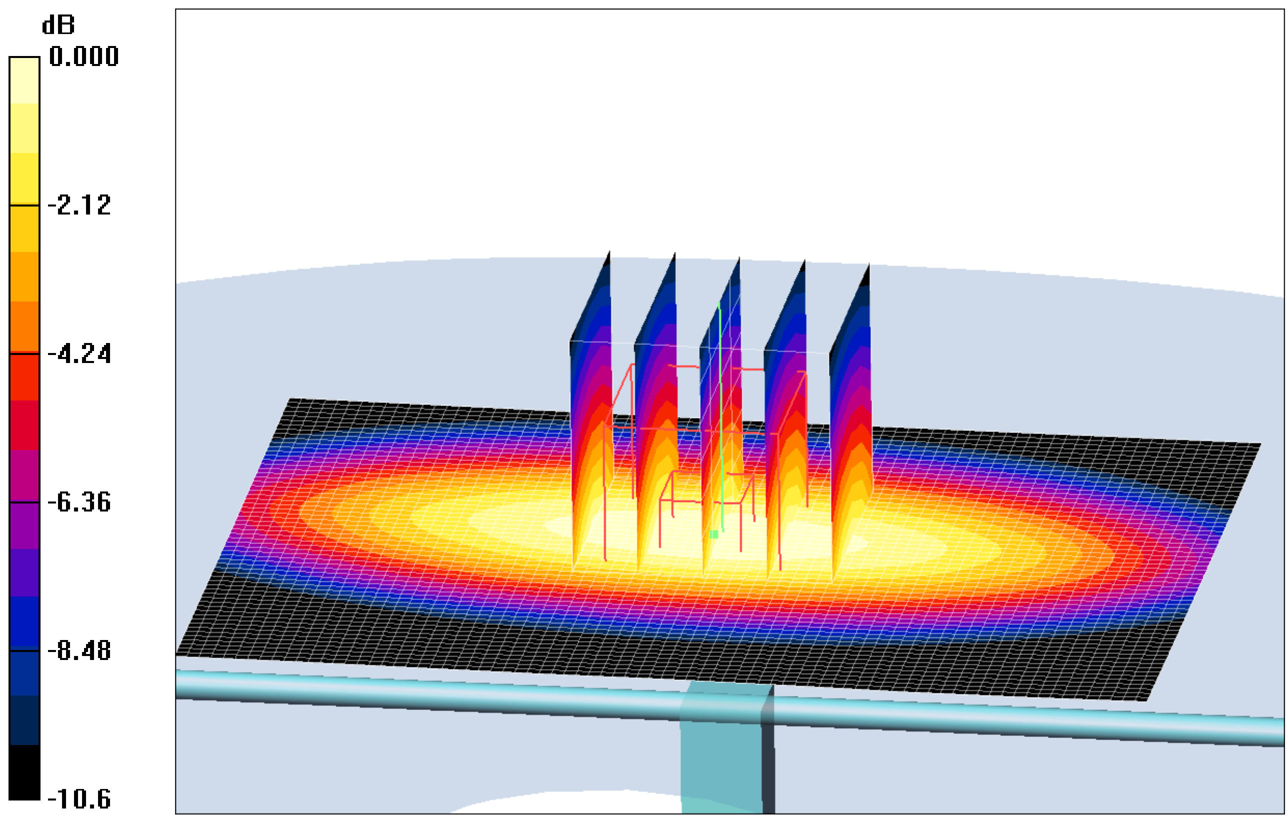
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:438

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835 MHz; σ = 0.888 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(6.32, 6.32, 6.32); Calibrated: 16/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 17/11/2010
- Phantom: SAM-2; Type: SAM; Serial: 1025
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 186

d=15mm, Pin=250mW/Area Scan (61x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.67 mW/g
d=15mm, Pin=250mW/Zoom Scan (7x7x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 56.8 V/m; Power Drift = 0.013 dB
Peak SAR (extrapolated) = 3.60 W/kg
SAR(1 g) = 2.49 mW/g; SAR(10 g) = 1.63 mW/g
Maximum value of SAR (measured) = 2.70 mW/g



0 dB = 2.70mW/g

Date/Time: 2/14/2011 11:51:38 AM

Test Laboratory: Sony Ericsson Mobile Communications

Zeus1256-Body-Flat10mm-GPRS1900-3Tx-High

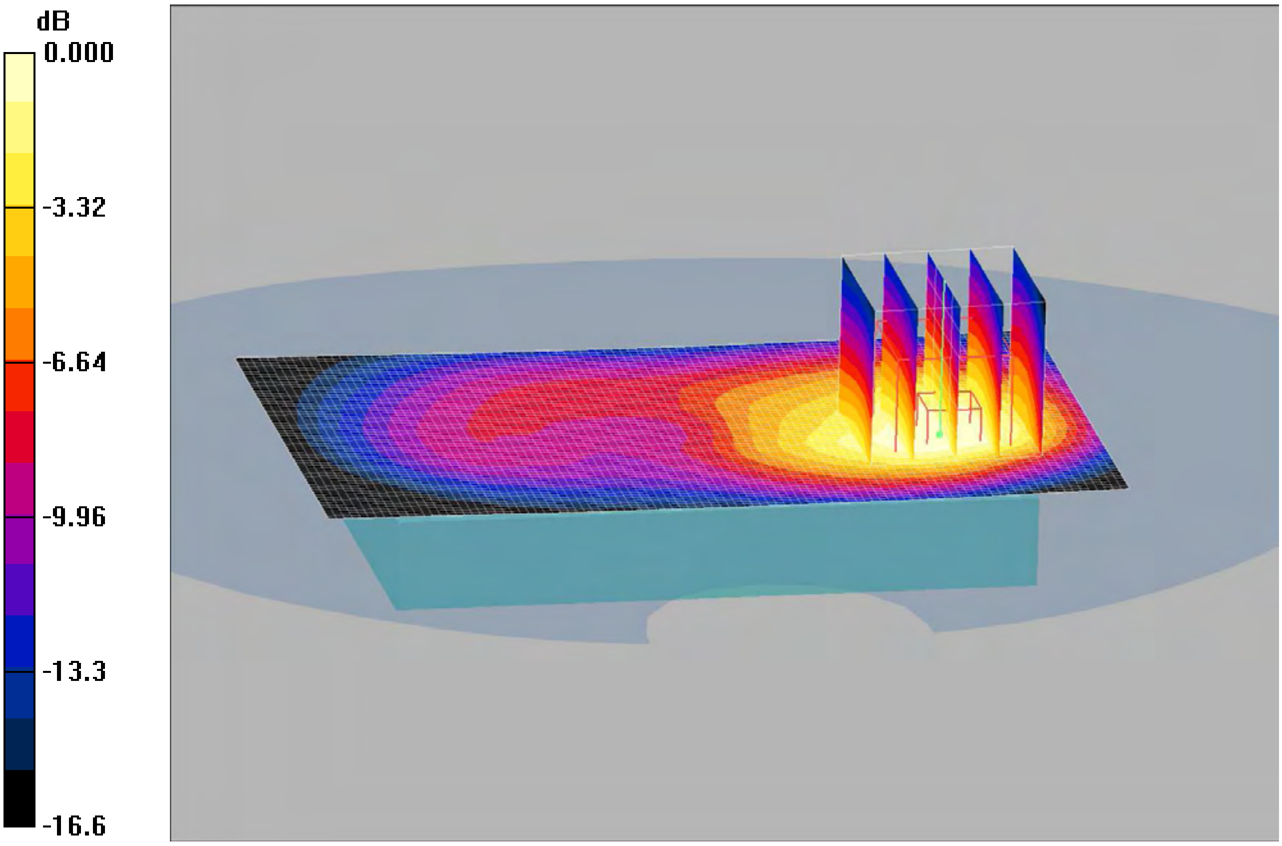
DUT: Zeus; Type: DUT; Serial: 19641

Communication System: GPRS 1900; Frequency: 1909.8 MHz;Duty Cycle: 1:3.1125
Medium parameters used: f = 1909.8 MHz; σ = 1.55 mho/m; ε_r = 50.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(4.55, 4.55, 4.55); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: SAM with CRP (High Band Body); Type: SAM; Serial: TP: 1020
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body 3/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.60 mW/g
Body 3/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.1 V/m; Power Drift = -0.078 dB
Peak SAR (extrapolated) = 2.16 W/kg
SAR(1 g) = 1.34 mW/g; SAR(10 g) = 0.787 mW/g
Maximum value of SAR (measured) = 1.46 mW/g



0 dB = 1.46mW/g

Date/Time: 2/14/2011 12:09:36 PM

Test Laboratory: Sony Ericsson Mobile Communications

Zeus1256-Body-Flat10mm-GPRS1900-3Tx-Low

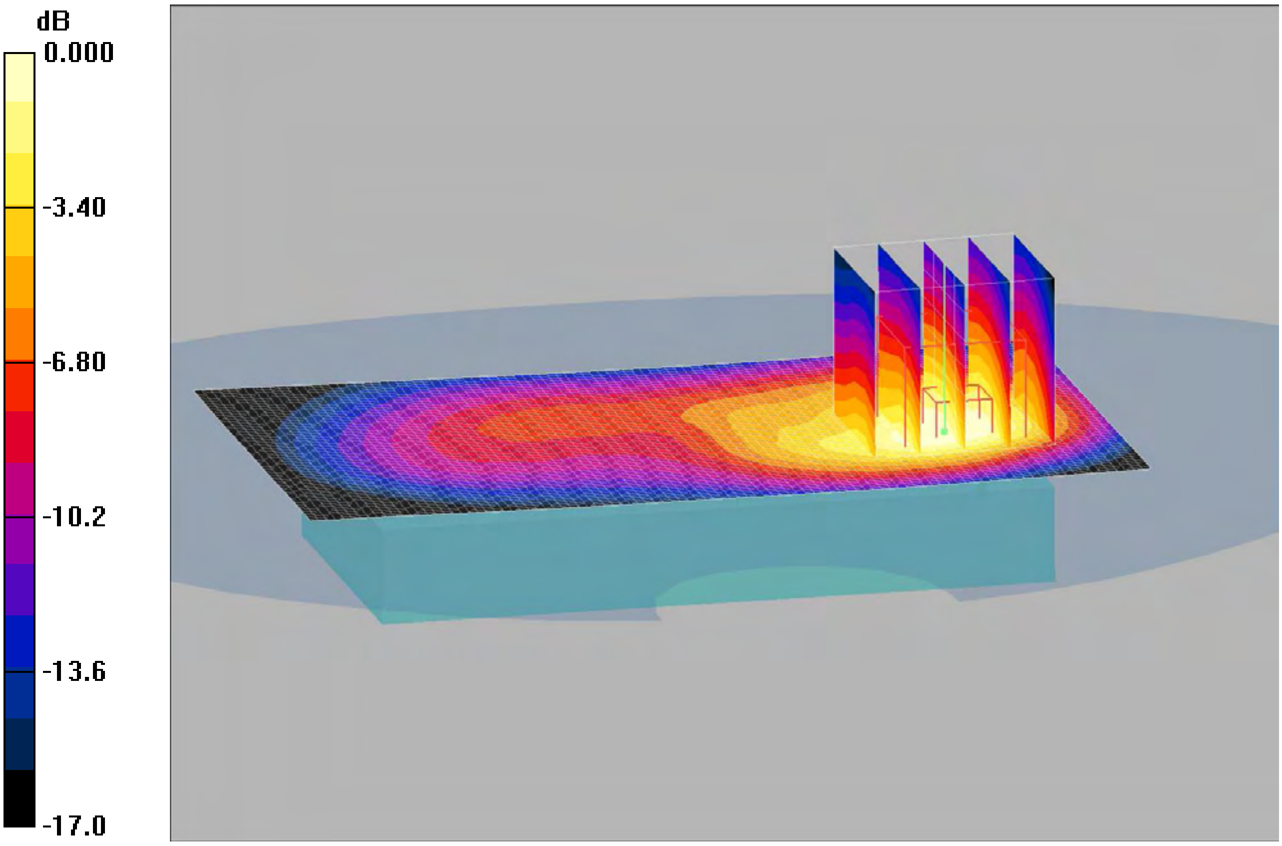
DUT: Zeus; Type: DUT; Serial: 19641

Communication System: GPRS 1900; Frequency: 1850.2 MHz;Duty Cycle: 1:3.1125
Medium parameters used: f = 1850.2 MHz; σ = 1.49 mho/m; ε_r = 51.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(4.55, 4.55, 4.55); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: SAM with CRP (High Band Body); Type: SAM; Serial: TP: 1020
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body 2/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.36 mW/g
Body 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.2 V/m; Power Drift = -0.191 dB
Peak SAR (extrapolated) = 1.86 W/kg
SAR(1 g) = 1.19 mW/g; SAR(10 g) = 0.679 mW/g
Maximum value of SAR (measured) = 1.31 mW/g



0 dB = 1.31mW/g

Date/Time: 2/14/2011 11:13:57 AM

Test Laboratory: Sony Ericsson Mobile Communications

Zeus1256-Body-Flat10mm-GPRS1900-3Tx-Mid

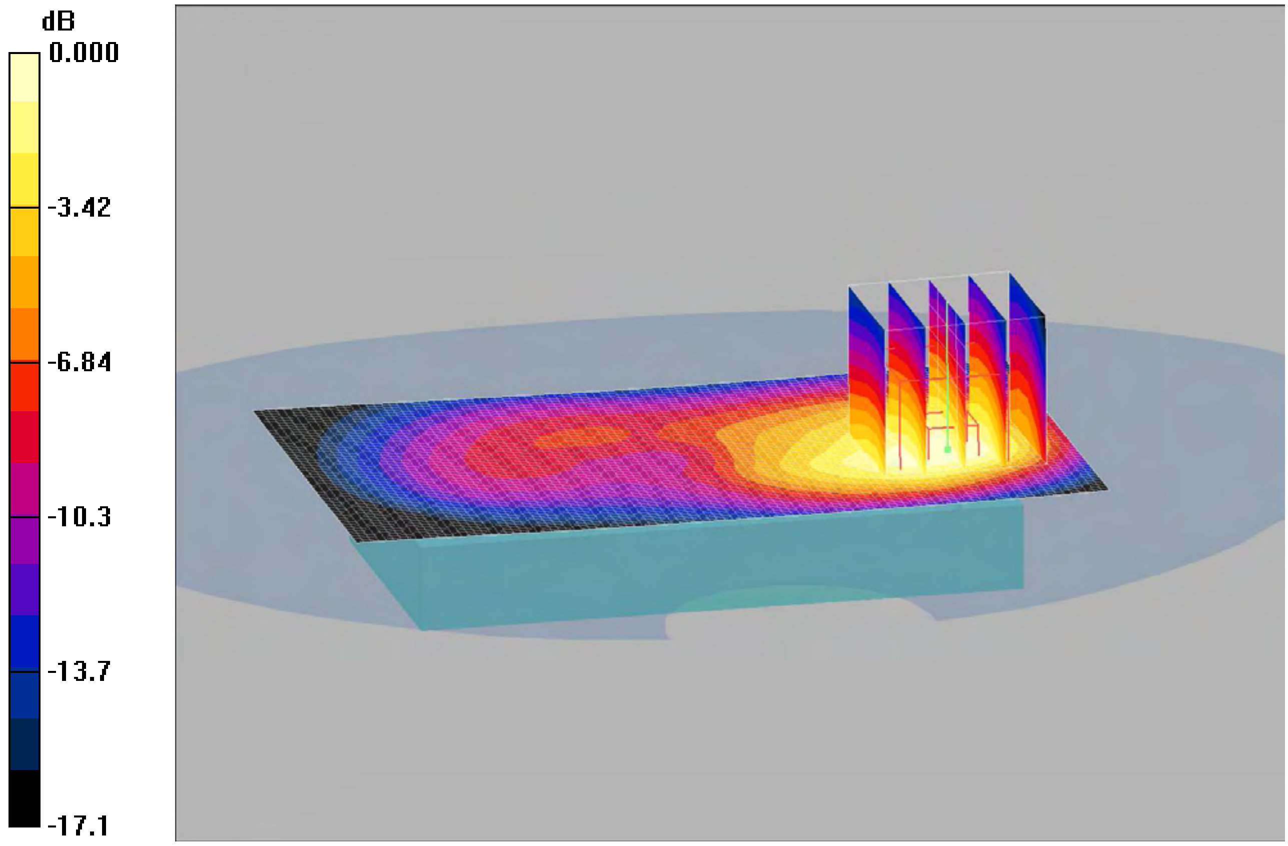
DUT: Zeus; Type: DUT; Serial: 19641

Communication System: GPRS 1900; Frequency: 1880 MHz;Duty Cycle: 1:3.1125
Medium parameters used (interpolated): f = 1880 MHz; σ = 1.52 mho/m; ε_r = 51; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(4.55, 4.55, 4.55); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: SAM with CRP (High Band Body); Type: SAM; Serial: TP: 1020
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.61 mW/g
Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.8 V/m; Power Drift = -0.185 dB
Peak SAR (extrapolated) = 2.26 W/kg
SAR(1 g) = 1.44 mW/g; SAR(10 g) = 0.846 mW/g
Maximum value of SAR (measured) = 1.61 mW/g



0 dB = 1.61mW/g

Date/Time: 2/18/2011 11:09:06 AM

Test Laboratory: Sony Ericsson Mobile Communications

Zeus1256-Body-Flat10mm-GPRS850-3Tx-High

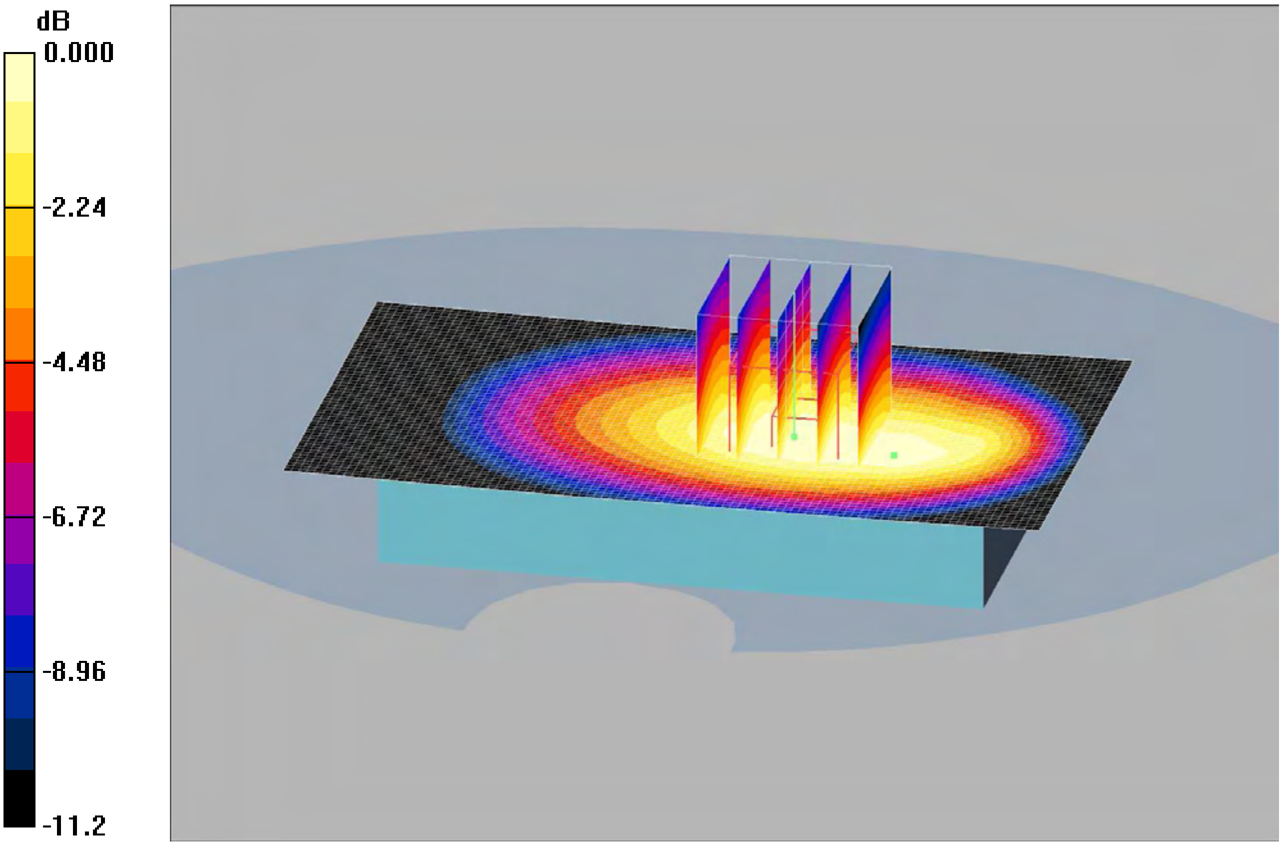
DUT: Zeus; Type: DUT; Serial: 19676

Communication System: GSM 850; Frequency: 848.8 MHz;Duty Cycle: 1:3.1125
Medium parameters used: f = 848.8 MHz; σ = 0.976 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(6.18, 6.18, 6.18); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: SAM with CRP (Low Band Body); Type: SAM; Serial: TP: 1031
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

  Body 3/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
  Maximum value of SAR (interpolated) = 1.49 mW/g
  Body 3/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
  Reference Value = 35.1 V/m; Power Drift = -0.184 dB
  Peak SAR (extrapolated) = 1.88 W/kg
  SAR(1 g) = 1.37 mW/g; SAR(10 g) = 0.947 mW/g
  Maximum value of SAR (measured) = 1.45 mW/g



0 dB = 1.45mW/g

Date/Time: 2/18/2011 10:42:25 AM

Test Laboratory: Sony Ericsson Mobile Communications

Zeus1256-Body-Flat10mm-GPRS850-3Tx-Low

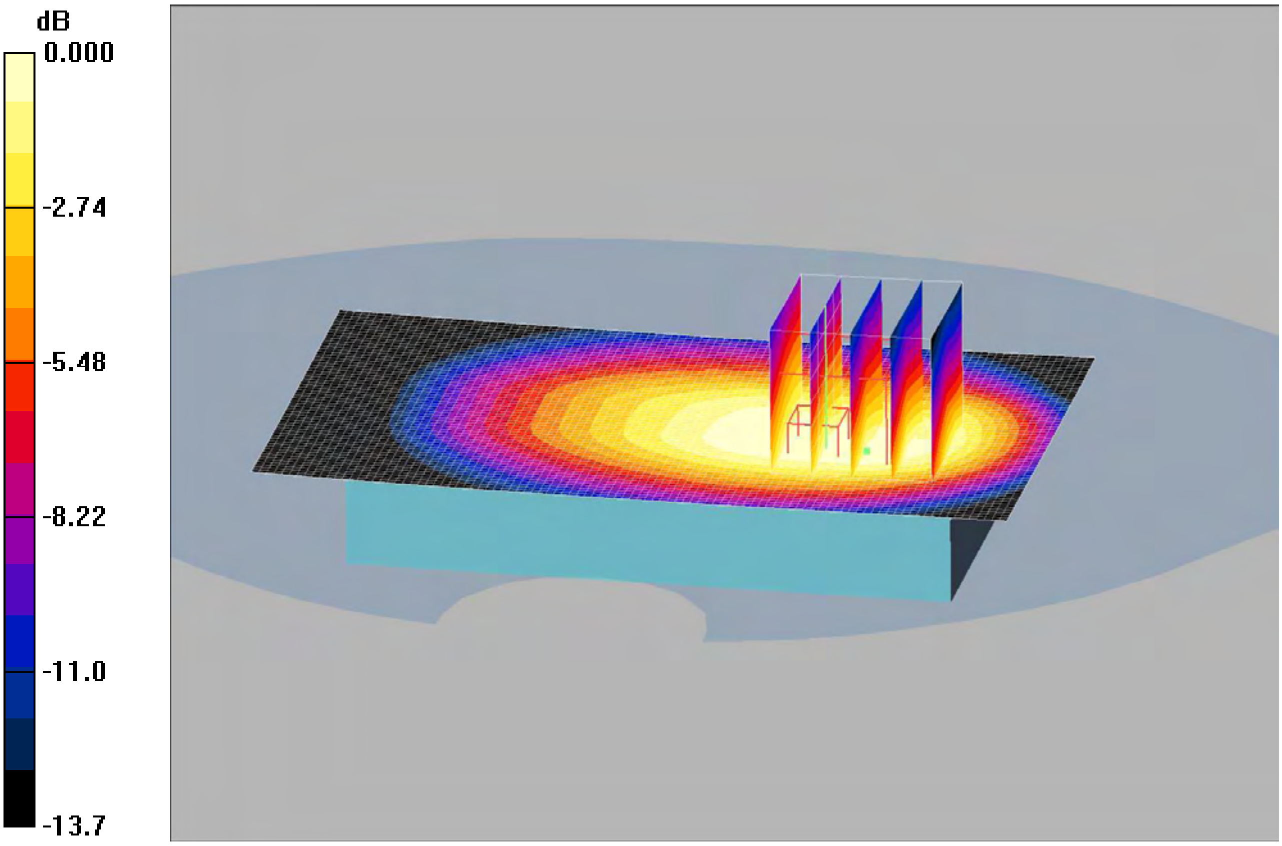
DUT: Zeus; Type: DUT; Serial: 19676

Communication System: GSM 850; Frequency: 824.2 MHz;Duty Cycle: 1:3.1125
Medium parameters used: f = 824.2 MHz; $\sigma = 0.952$ mho/m; $\varepsilon_r = 52.7$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(6.18, 6.18, 6.18); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: SAM with CRP (Low Band Body); Type: SAM; Serial: TP: 1031
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body 2/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.26 mW/g
Body 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.2 V/m; Power Drift = -0.214 dB
Peak SAR (extrapolated) = 1.83 W/kg
SAR(1 g) = 1.11 mW/g; SAR(10 g) = 0.720 mW/g
Maximum value of SAR (measured) = 1.24 mW/g



0 dB = 1.24mW/g

Date/Time: 2/18/2011 9:45:33 AM

Test Laboratory: Sony Ericsson Mobile Communications

Zeus1256-Body-Flat10mm-GPRS850-3Tx-Mid

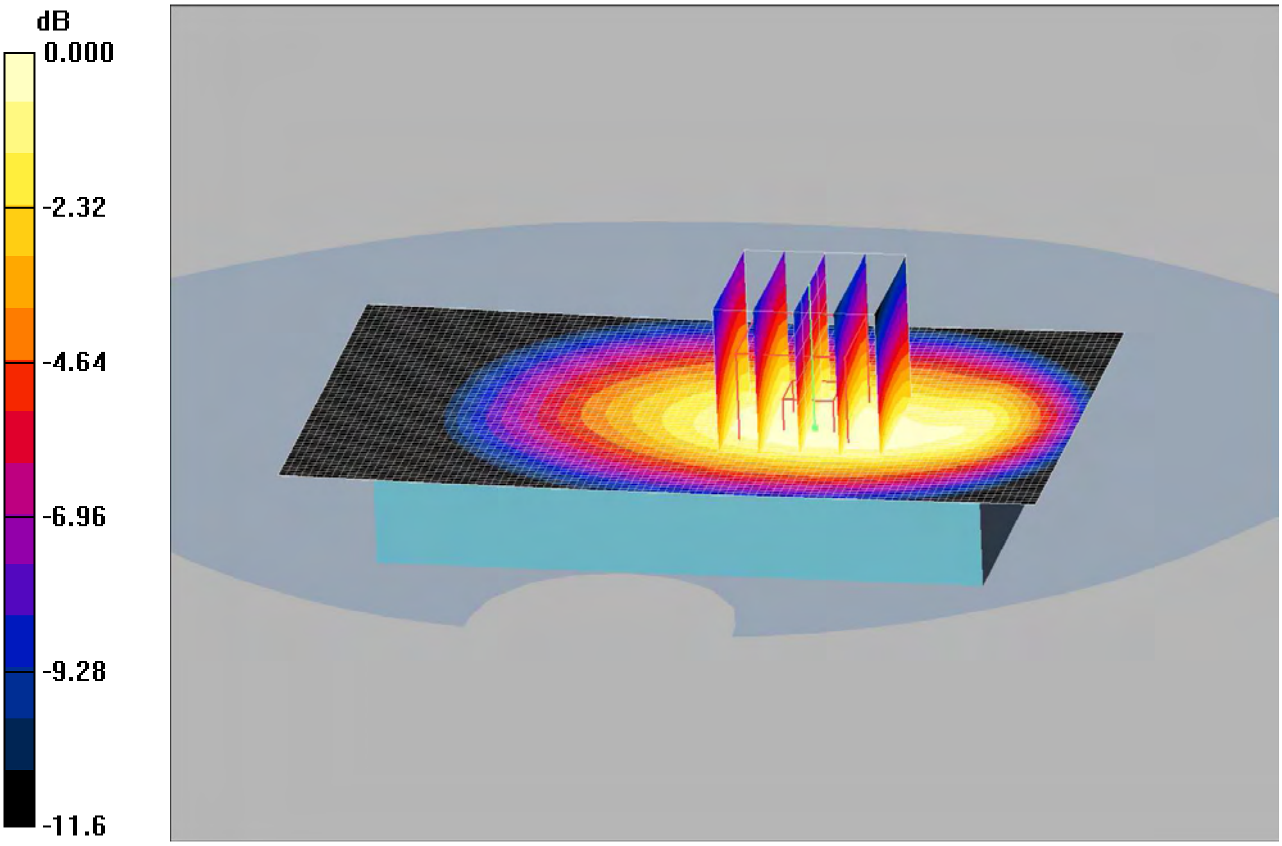
DUT: Zeus; Type: DUT; Serial: 19676

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:3.1125
Medium parameters used: f = 836.851 MHz; σ = 0.966 mho/m; ε_r = 52.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(6.18, 6.18, 6.18); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: SAM with CRP (Low Band Body); Type: SAM; Serial: TP: 1031
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

  Body 1/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
  Maximum value of SAR (interpolated) = 1.41 mW/g
  Body 1/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
  Reference Value = 33.5 V/m; Power Drift = -0.211 dB
  Peak SAR (extrapolated) = 1.76 W/kg
  SAR(1 g) = 1.3 mW/g; SAR(10 g) = 0.909 mW/g
  Maximum value of SAR (measured) = 1.38 mW/g



0 dB = 1.38mW/g

Date/Time: 2/22/2011 10:21:55 AM

Test Laboratory: Sony Ericsson Mobile Communications

Zeus1256-Body-Flat10mm-UMTS2-HSPA-High

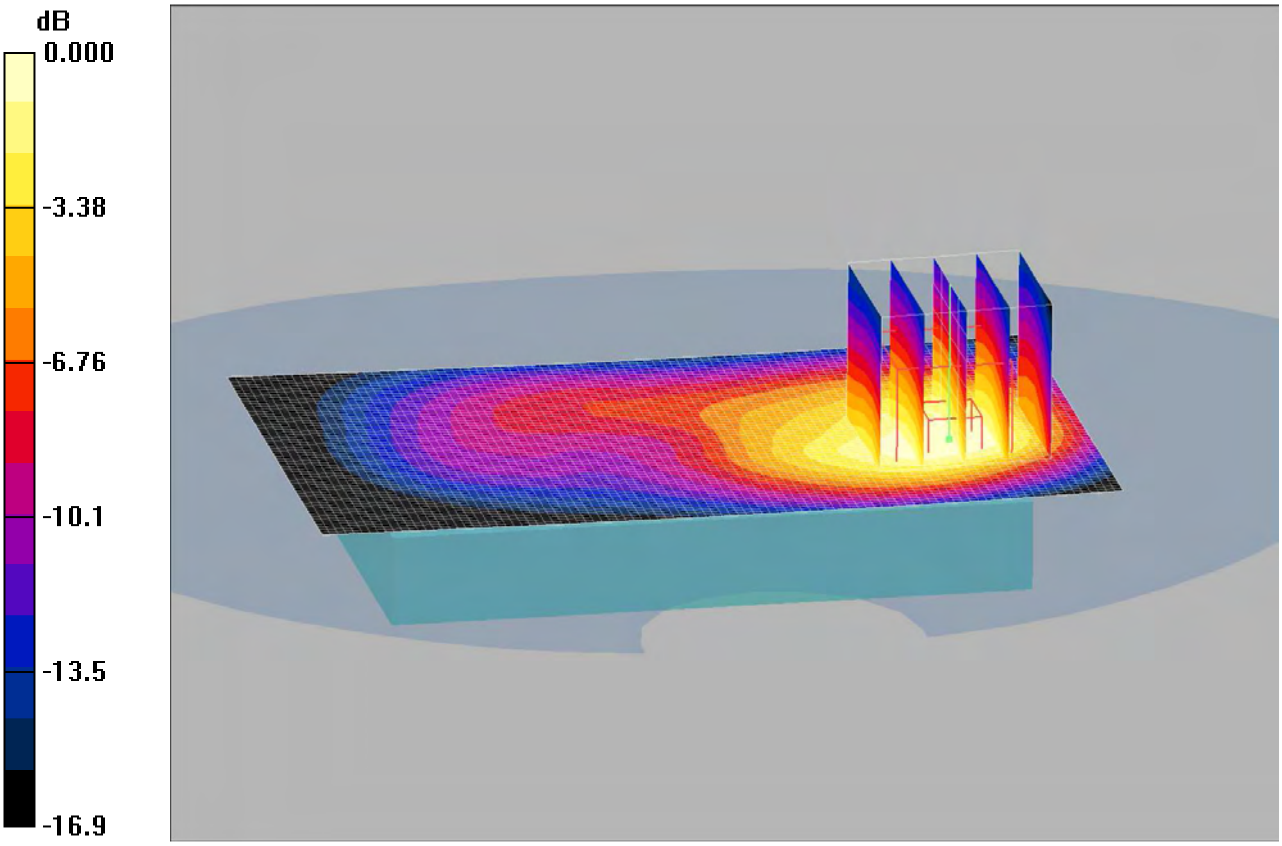
DUT: Zeus; Type: DUT; Serial: 19676

Communication System: WCDMA Band II; Frequency: 1907.6 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1907.6 MHz; σ = 1.56 mho/m; ε_r = 50.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(4.55, 4.55, 4.55); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: SAM with CRP (High Band Body); Type: SAM; Serial: TP: 1020
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body 3/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.11 mW/g
Body 3/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.6 V/m; Power Drift = -0.126 dB
Peak SAR (extrapolated) = 1.51 W/kg
SAR(1 g) = 0.955 mW/g; SAR(10 g) = 0.557 mW/g
Maximum value of SAR (measured) = 1.06 mW/g



0 dB = 1.06mW/g

Date/Time: 2/22/2011 9:32:23 AM

Test Laboratory: Sony Ericsson Mobile Communications

Zeus1256-Body-Flat10mm-UMTS2-HSPA-Low

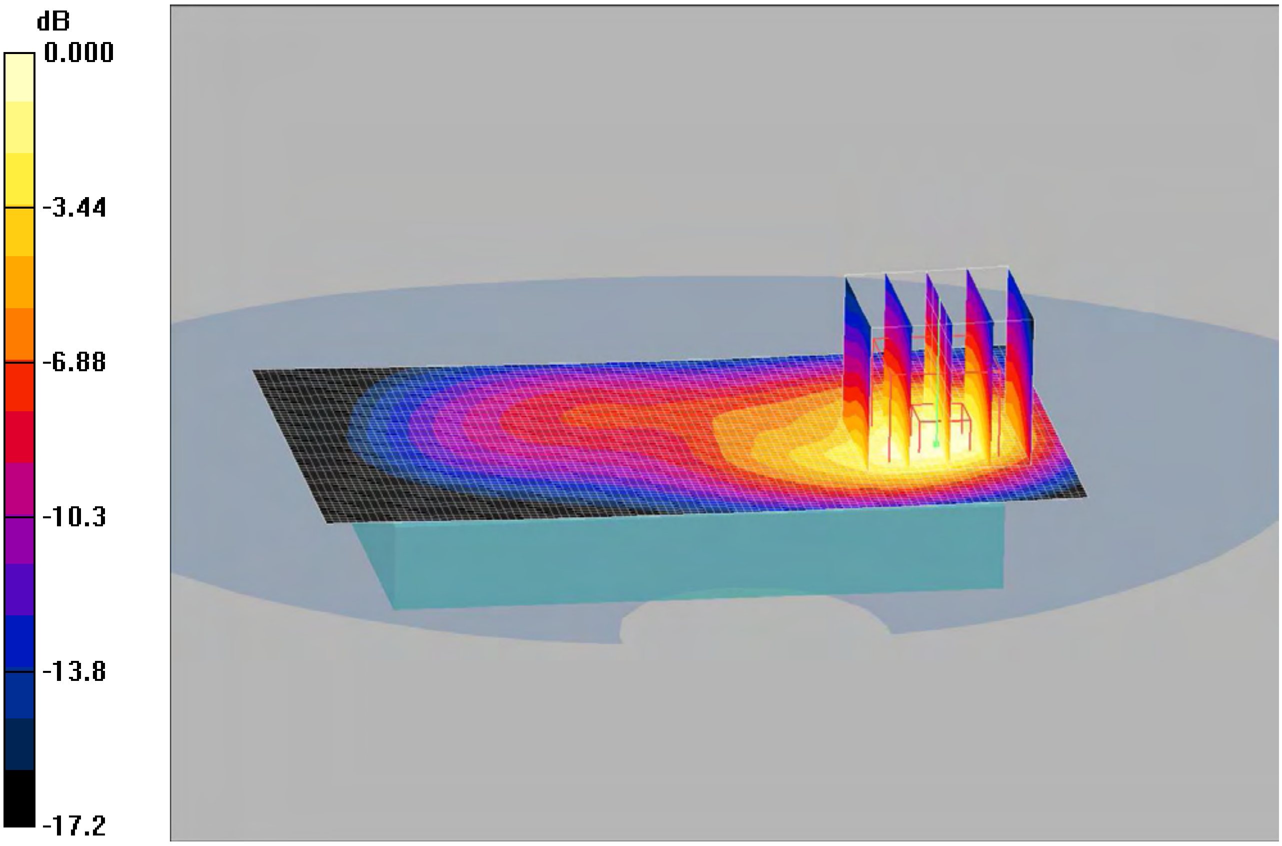
DUT: Zeus; Type: DUT; Serial: 19676

Communication System: WCDMA Band II; Frequency: 1852.4 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1852.4 MHz; σ = 1.5 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(4.55, 4.55, 4.55); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: SAM with CRP (High Band Body); Type: SAM; Serial: TP: 1020
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.850 mW/g
Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.3 V/m; Power Drift = -0.080 dB
Peak SAR (extrapolated) = 1.22 W/kg
SAR(1 g) = 0.791 mW/g; SAR(10 g) = 0.454 mW/g
Maximum value of SAR (measured) = 0.889 mW/g



0 dB = 0.889mW/g

Date/Time: 2/22/2011 9:48:37 AM

Test Laboratory: Sony Ericsson Mobile Communications

Zeus1256-Body-Flat10mm-UMTS2-HSPA-Mid

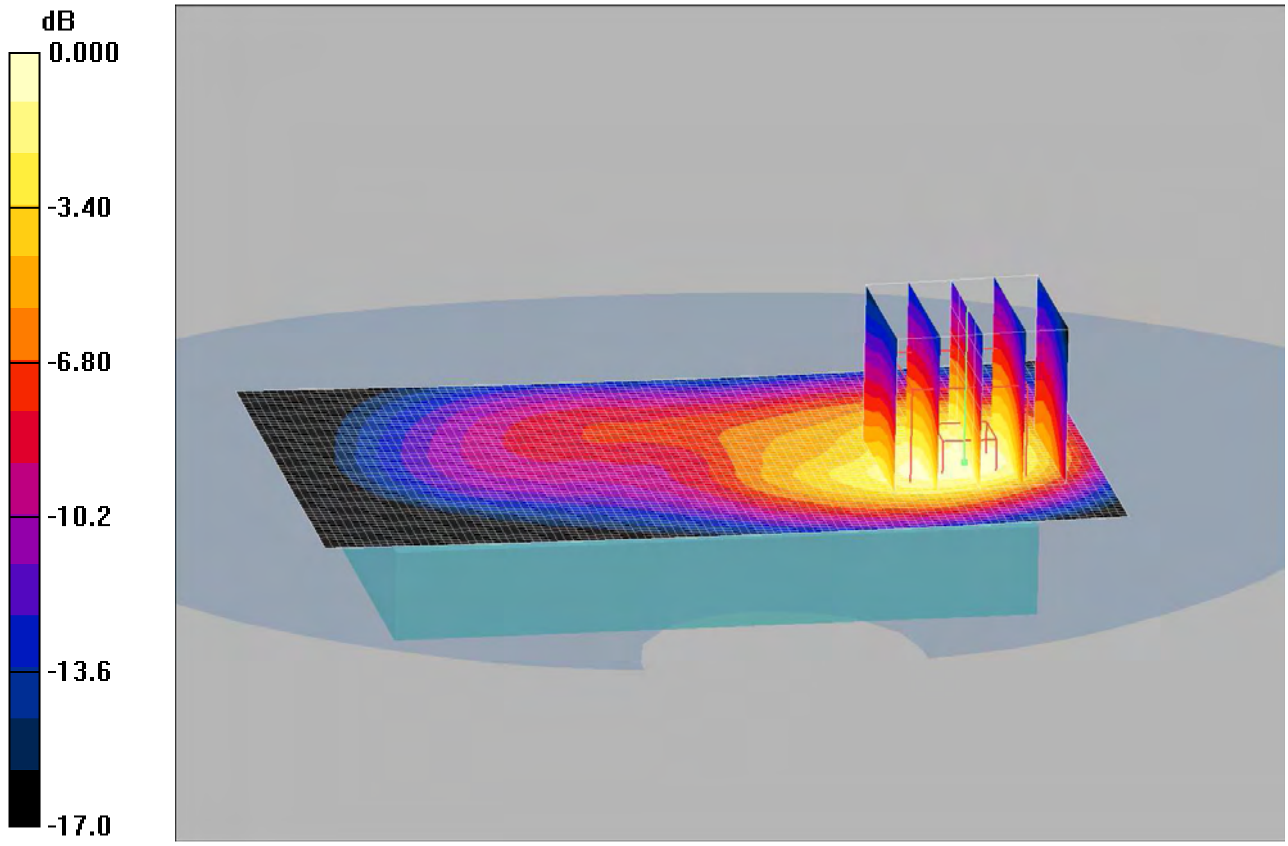
DUT: Zeus; Type: DUT; Serial: 19676

Communication System: WCDMA Band II; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1880 MHz; σ = 1.53 mho/m; ε_r = 50.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(4.55, 4.55, 4.55); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: SAM with CRP (High Band Body); Type: SAM; Serial: TP: 1020
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body 2/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.02 mW/g
Body 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.6 V/m; Power Drift = -0.003 dB
Peak SAR (extrapolated) = 1.43 W/kg
SAR(1 g) = 0.928 mW/g; SAR(10 g) = 0.536 mW/g
Maximum value of SAR (measured) = 1.03 mW/g



0 dB = 1.03mW/g

Date/Time: 2/11/2011 10:49:42 AM

Test Laboratory: Sony Ericsson Mobile Communications

Zeus1256-Body-Flat10mm-UMTS5-HSDPA-High

DUT: Zeus; Type: DUT; Serial: 19641

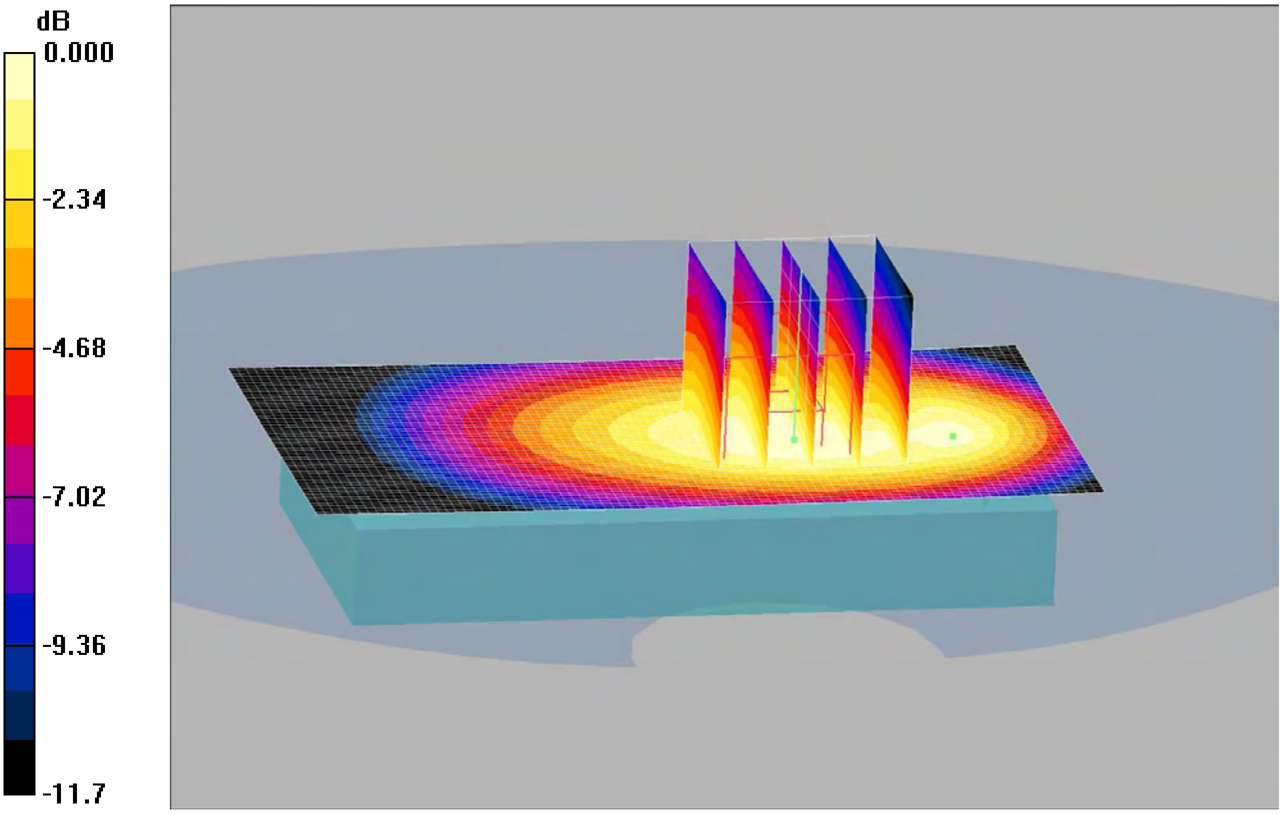
Communication System: WCDMA Band V; Frequency: 846.6 MHz;Duty Cycle: 1:1
Medium parameters used: f = 846.6 MHz; σ = 0.961 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(6.18, 6.18, 6.18); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: SAM with CRP (Low Band Body); Type: SAM; Serial: TP: 1031
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body 3/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.12 mW/g

Body 3/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 30.6 V/m; Power Drift = -0.099 dB
Peak SAR (extrapolated) = 1.43 W/kg
SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.728 mW/g
Maximum value of SAR (measured) = 1.12 mW/g



0 dB = 1.12mW/g

Date/Time: 2/11/2011 10:13:22 AM

Test Laboratory: Sony Ericsson Mobile Communications

Zeus1256-Body-Flat10mm-UMTS5-HSDPA-Low

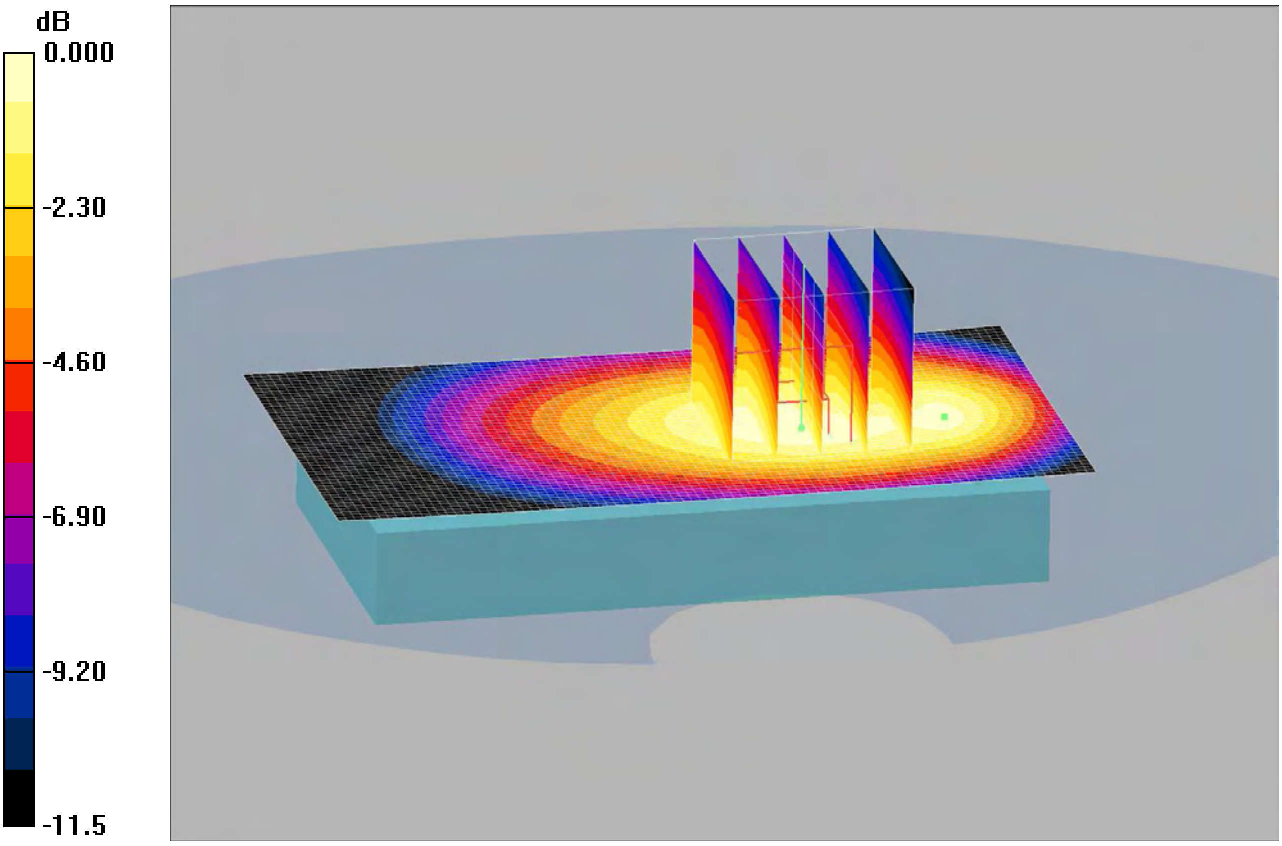
DUT: Zeus; Type: DUT; Serial: 19641

Communication System: WCDMA Band V; Frequency: 826.4 MHz;Duty Cycle: 1:1
Medium parameters used: f = 826.4 MHz; $\sigma = 0.941$ mho/m; $\varepsilon_r = 52.7$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(6.18, 6.18, 6.18); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: SAM with CRP (Low Band Body); Type: SAM; Serial: TP: 1031
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.20 mW/g
Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.6 V/m; Power Drift = 0.071 dB
Peak SAR (extrapolated) = 1.58 W/kg
SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.799 mW/g
Maximum value of SAR (measured) = 1.23 mW/g



0 dB = 1.23mW/g

Date/Time: 2/11/2011 10:26:16 AM

Test Laboratory: Sony Ericsson Mobile Communications

Zeus1256-Body-Flat10mm-UMTS5-HSDPA-Mid

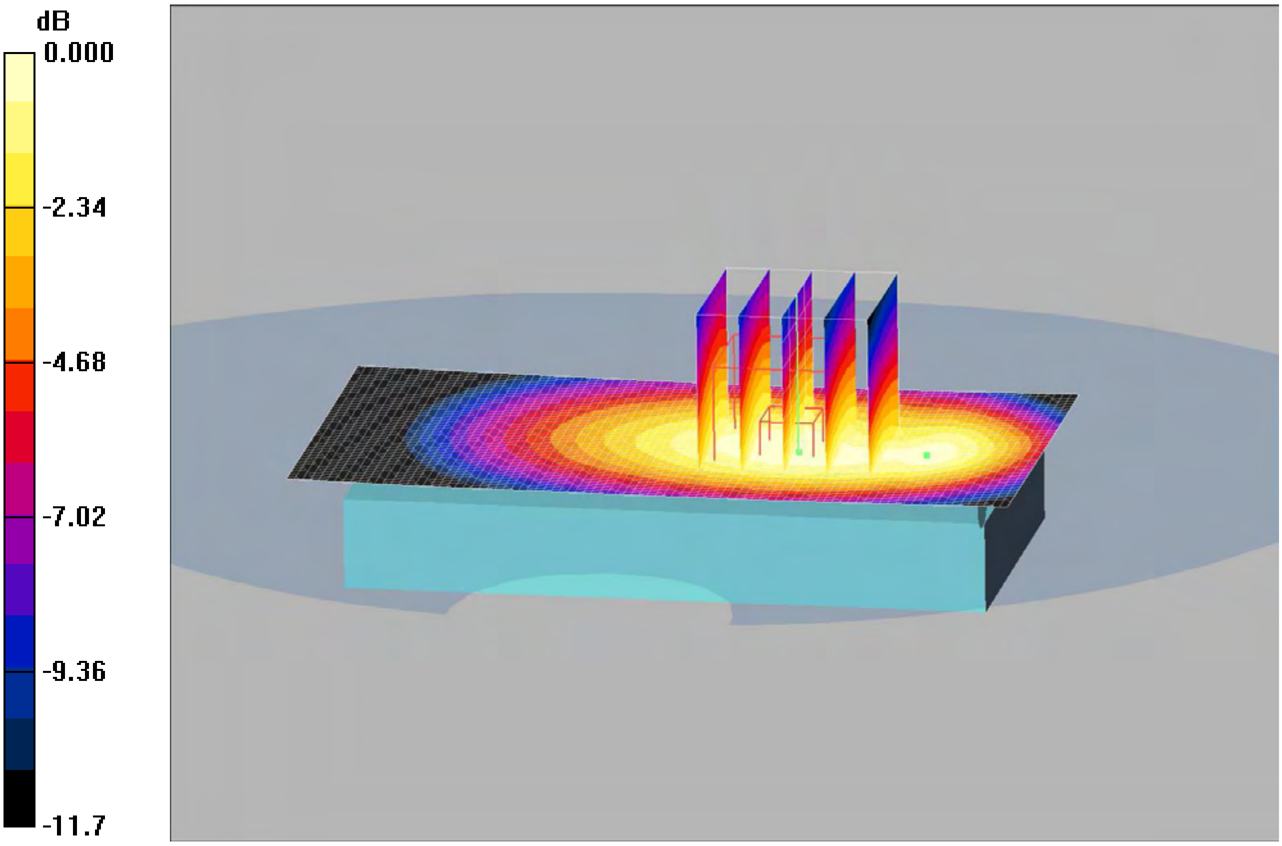
DUT: Zeus; Type: DUT; Serial: 19641

Communication System: WCDMA Band V; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used: f = 836.789 MHz; σ = 0.952 mho/m; ε_r = 52.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(6.18, 6.18, 6.18); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: SAM with CRP (Low Band Body); Type: SAM; Serial: TP: 1031
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body 2/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.08 mW/g
Body 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 30.2 V/m; Power Drift = -0.058 dB
Peak SAR (extrapolated) = 1.40 W/kg
SAR(1 g) = 1.03 mW/g; SAR(10 g) = 0.715 mW/g
Maximum value of SAR (measured) = 1.09 mW/g



0 dB = 1.09mW/g

Date/Time: 2/23/2011 11:26:34 AM

Test Laboratory: Sony Ericsson Mobile Communications

Zeus1256-Body-Flat10mm-WLAN-High

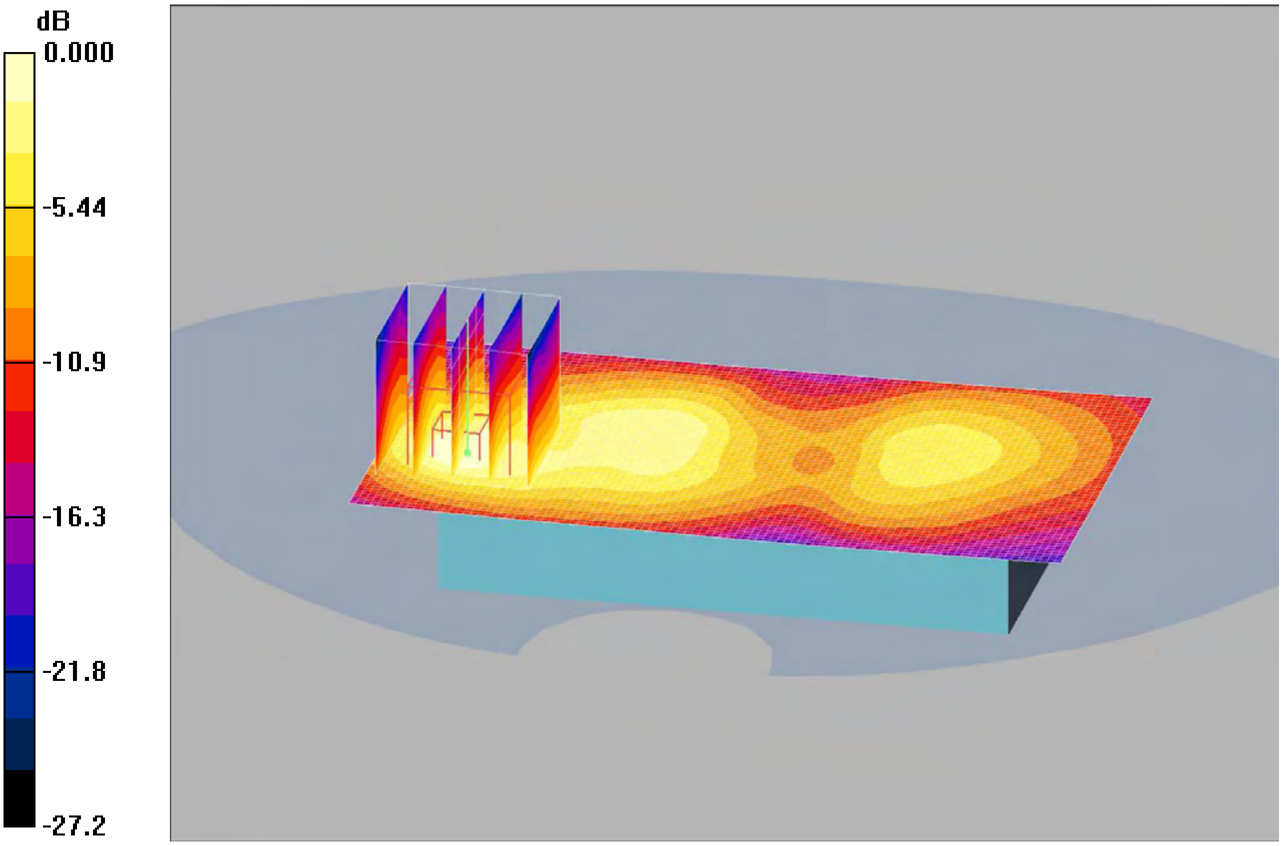
DUT: Zeus; Type: DUT; Serial: 19643

Communication System: WLAN; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.97 mho/m; ε_r = 50.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(4.09, 4.09, 4.09); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: WLAN Body SAM; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

  Body 3/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
  Maximum value of SAR (interpolated) = 0.099 mW/g
  Body 3/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
  Reference Value = 3.23 V/m; Power Drift = 0.008 dB
  Peak SAR (extrapolated) = 0.207 W/kg
  SAR(1 g) = 0.088 mW/g; SAR(10 g) = 0.040 mW/g
  Maximum value of SAR (measured) = 0.097 mW/g



0 dB = 0.097mW/g

Date/Time: 2/23/2011 10:35:11 AM

Test Laboratory: Sony Ericsson Mobile Communications

Zeus1256-Body-Flat10mm-WLAN-Low

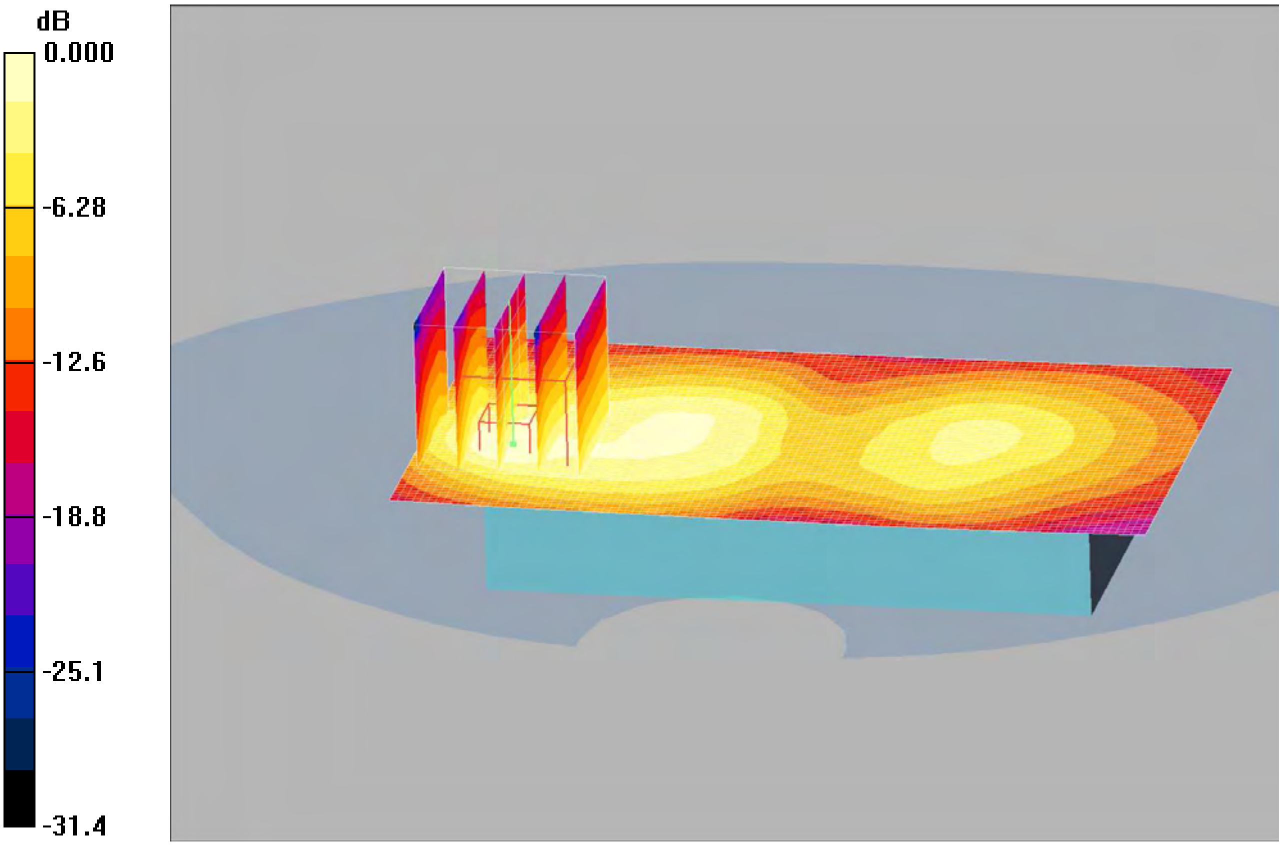
DUT: Zeus; Type: DUT; Serial: 19643

Communication System: WLAN; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2412 MHz; σ = 1.9 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(4.09, 4.09, 4.09); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: WLAN Body SAM; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body 1/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.086 mW/g
Body 1/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.81 V/m; Power Drift = 0.136 dB
Peak SAR (extrapolated) = 0.173 W/kg
SAR(1 g) = 0.076 mW/g; SAR(10 g) = 0.037 mW/g
Maximum value of SAR (measured) = 0.085 mW/g



0 dB = 0.085mW/g

Date/Time: 2/23/2011 11:06:23 AM

Test Laboratory: Sony Ericsson Mobile Communications

Zeus1256-Body-Flat10mm-WLAN-Mid

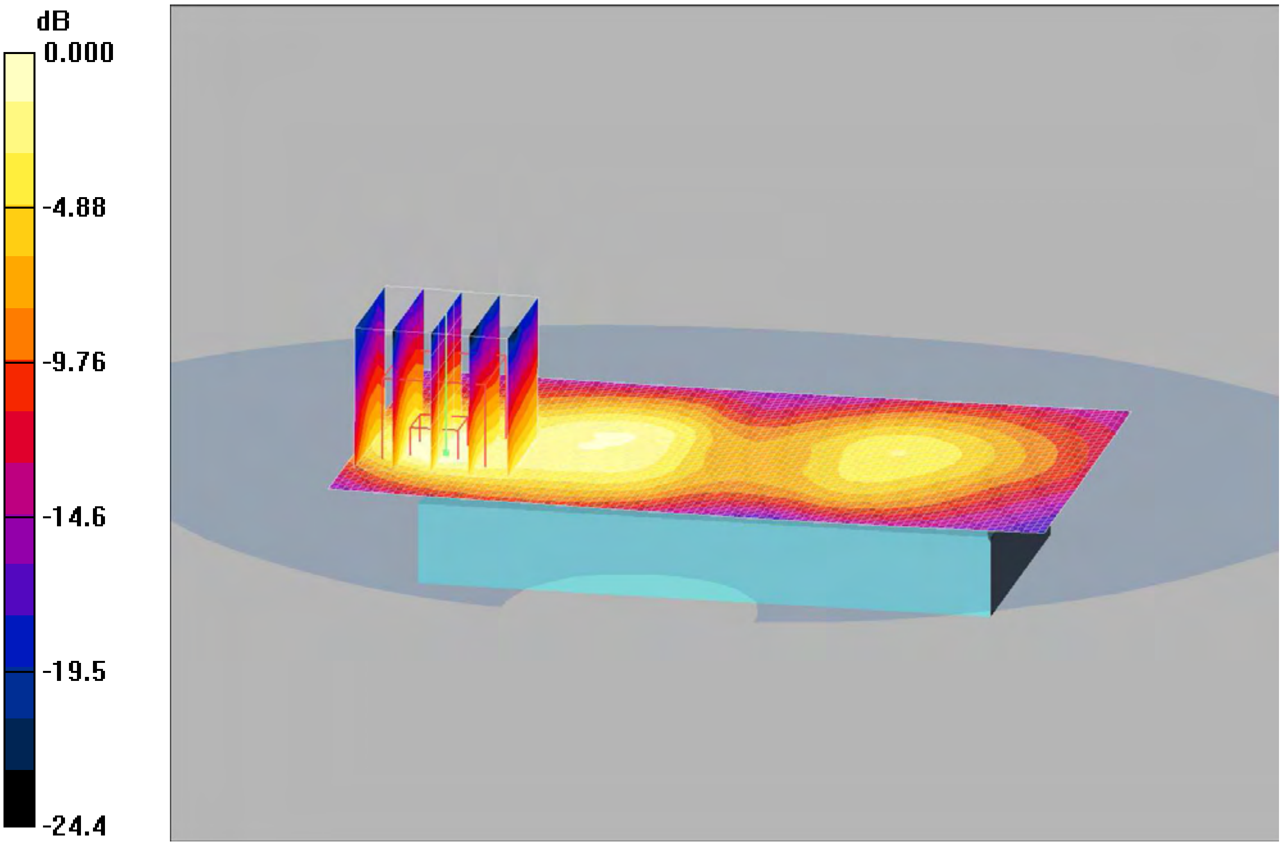
DUT: Zeus; Type: DUT; Serial: 19643

Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437.71 MHz; σ = 1.94 mho/m; ε_r = 50.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(4.09, 4.09, 4.09); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: WLAN Body SAM; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body 2/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.081 mW/g
Body 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.70 V/m; Power Drift = -0.072 dB
Peak SAR (extrapolated) = 0.163 W/kg
SAR(1 g) = 0.070 mW/g; SAR(10 g) = 0.033 mW/g
Maximum value of SAR (measured) = 0.076 mW/g



0 dB = 0.076mW/g

Date/Time: 2/14/2011 3:04:37 PM

Test Laboratory: Sony Ericsson Mobile Communications

Zeus1256-Body-Flat15mm-GSM1900-Speech-Mid

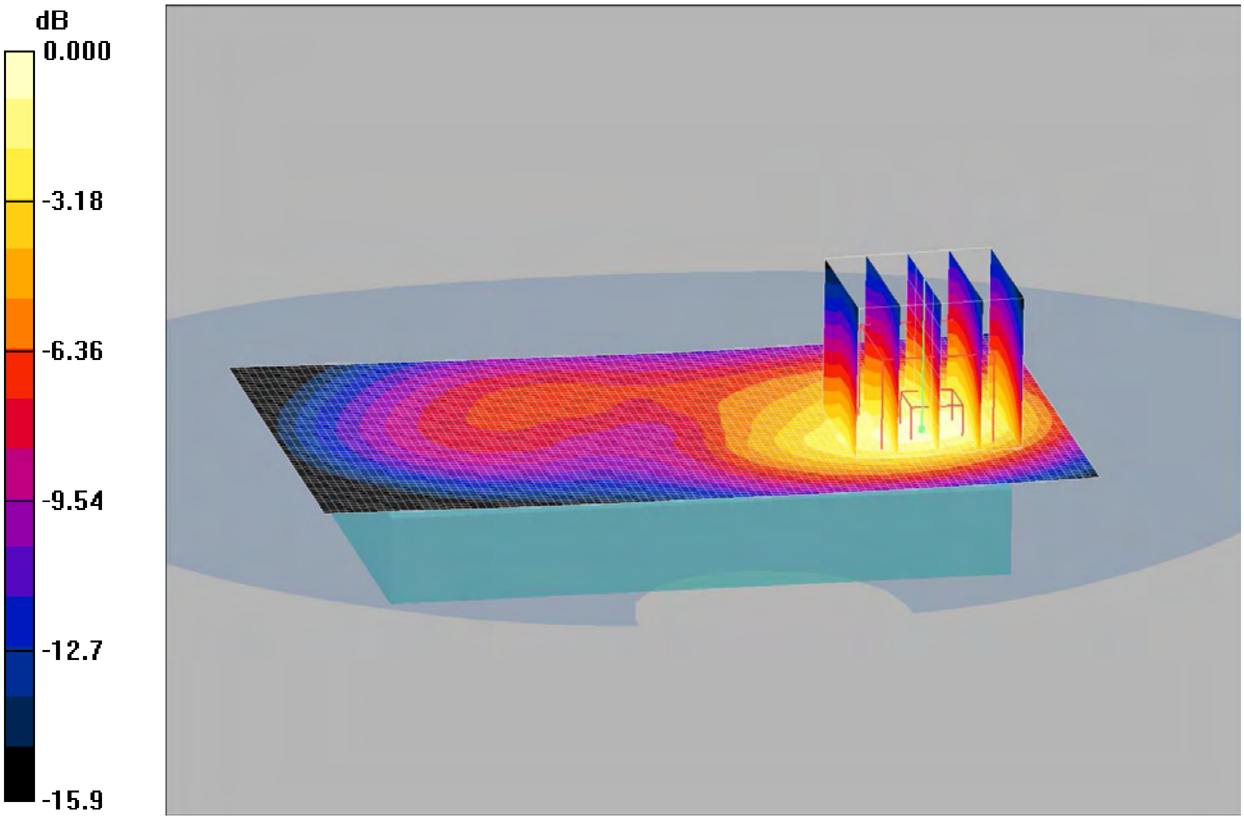
DUT: Zeus; Type: DUT; Serial: 19641

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 1880 MHz; σ = 1.52 mho/m; ε_r = 51; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(4.55, 4.55, 4.55); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: SAM with CRP (High Band Body); Type: SAM; Serial: TP: 1020
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body PHF/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.524 mW/g
Body PHF/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.94 V/m; Power Drift = -0.103 dB
Peak SAR (extrapolated) = 0.805 W/kg
SAR(1 g) = 0.521 mW/g; SAR(10 g) = 0.311 mW/g
Maximum value of SAR (measured) = 0.569 mW/g



0 dB = 0.569mW/g

Date/Time: 2/9/2011 4:54:48 PM

Test Laboratory: Sony Ericsson Mobile Communications

Zeus1256-Body-Flat15mm-GSM850-Speech-Mid

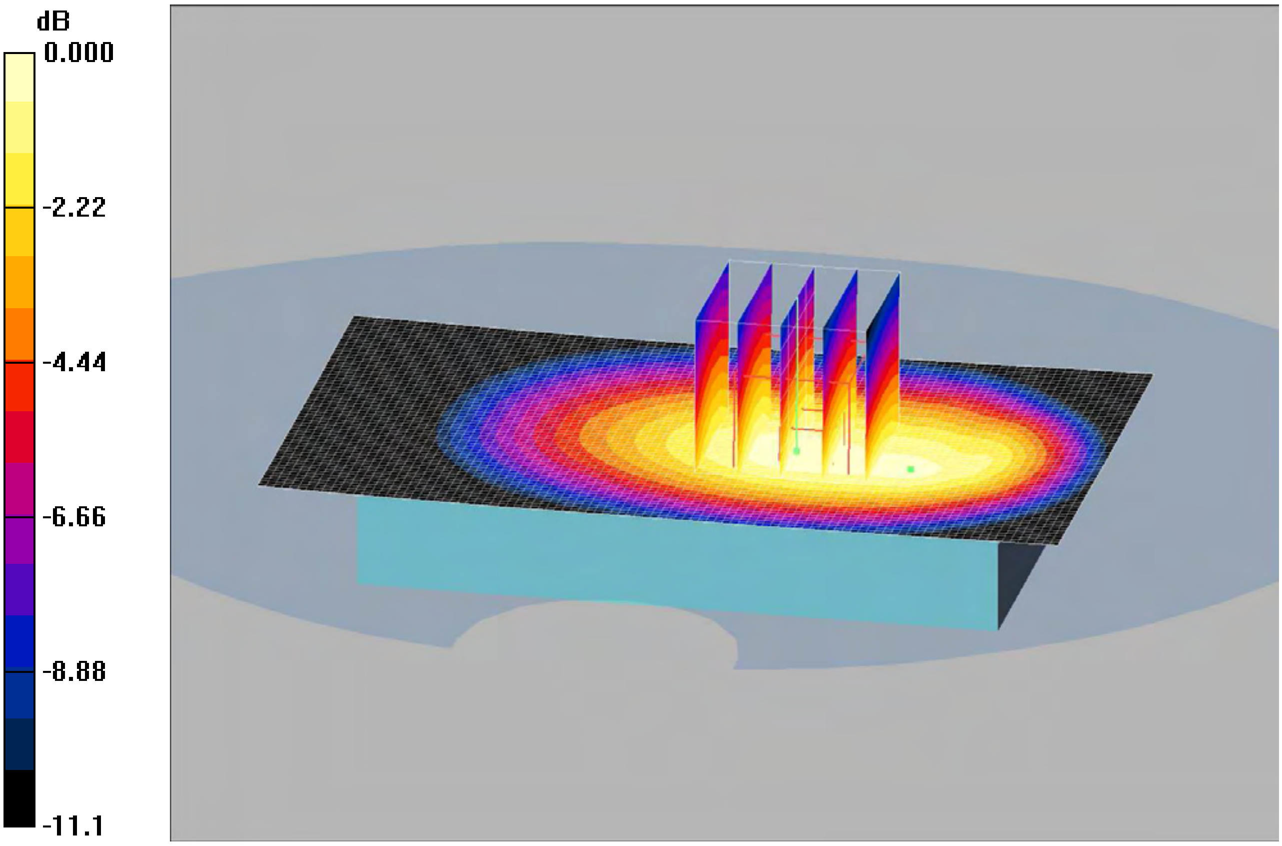
DUT: Zeus; Type: DUT; Serial: 19641

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 836.851 MHz; σ = 0.969 mho/m; ε_r = 52.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(6.18, 6.18, 6.18); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: SAM with CRP (Low Band Body); Type: SAM; Serial: TP: 1031
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body 2/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.02 mW/g
Body 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 28.7 V/m; Power Drift = 0.165 dB
Peak SAR (extrapolated) = 1.38 W/kg
SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.701 mW/g
Maximum value of SAR (measured) = 1.07 mW/g



0 dB = 1.07mW/g

Date/Time: 2/21/2011 10:53:24 AM

Test Laboratory: Sony Ericsson Mobile Communications

Zeus1256-Body-Flat15mm-UMTS2-Speech-High

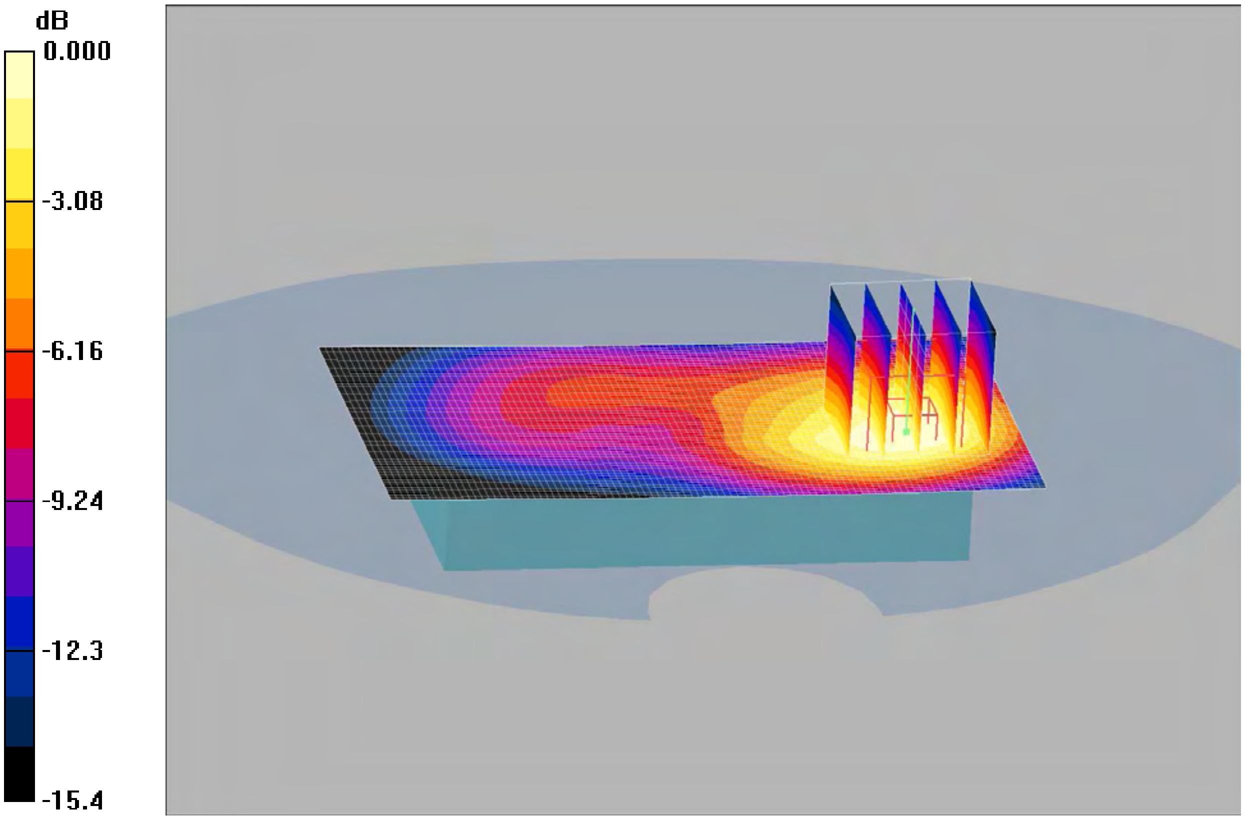
DUT: Zeus; Type: DUT; Serial: 19676

Communication System: WCDMA Band II; Frequency: 1907.6 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1907.6 MHz; σ = 1.54 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(4.55, 4.55, 4.55); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: SAM with CRP (High Band Body); Type: SAM; Serial: TP: 1020
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body PHF/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.908 mW/g
Body PHF/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.8 V/m; Power Drift = -0.125 dB
Peak SAR (extrapolated) = 1.25 W/kg
SAR(1 g) = 0.823 mW/g; SAR(10 g) = 0.503 mW/g
Maximum value of SAR (measured) = 0.898 mW/g



0 dB = 0.898mW/g

Date/Time: 2/11/2011 8:58:06 AM

Test Laboratory: Sony Ericsson Mobile Communications

Zeus1256-Body-Flat15mm-UMTS5-Speech-Low

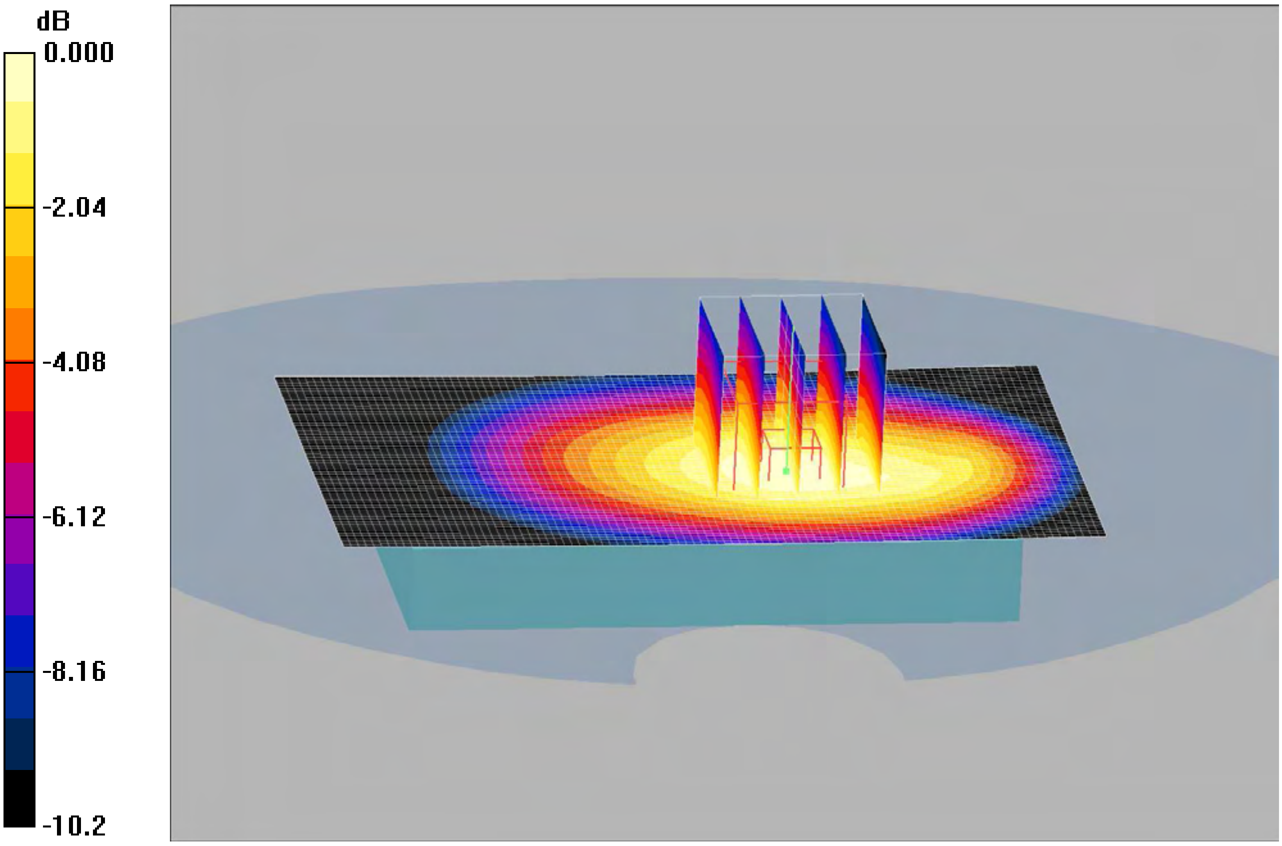
DUT: Zeus; Type: DUT; Serial: 19641

Communication System: WCDMA Band V; Frequency: 826.4 MHz;Duty Cycle: 1:1
Medium parameters used: f = 826.4 MHz; σ = 0.941 mho/m; ε_r = 52.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(6.18, 6.18, 6.18); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: SAM with CRP (Low Band Body); Type: SAM; Serial: TP: 1031
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.872 mW/g
Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 28.2 V/m; Power Drift = -0.059 dB
Peak SAR (extrapolated) = 1.11 W/kg
SAR(1 g) = 0.841 mW/g; SAR(10 g) = 0.598 mW/g
Maximum value of SAR (measured) = 0.894 mW/g



0 dB = 0.894mW/g

Date/Time: 10/02/2011 10:30:44

Test Laboratory: Sony Ericsson Mobile Communications International AB

Zeus1256-LeftHandSide-GSM1900-Tilt-Middle

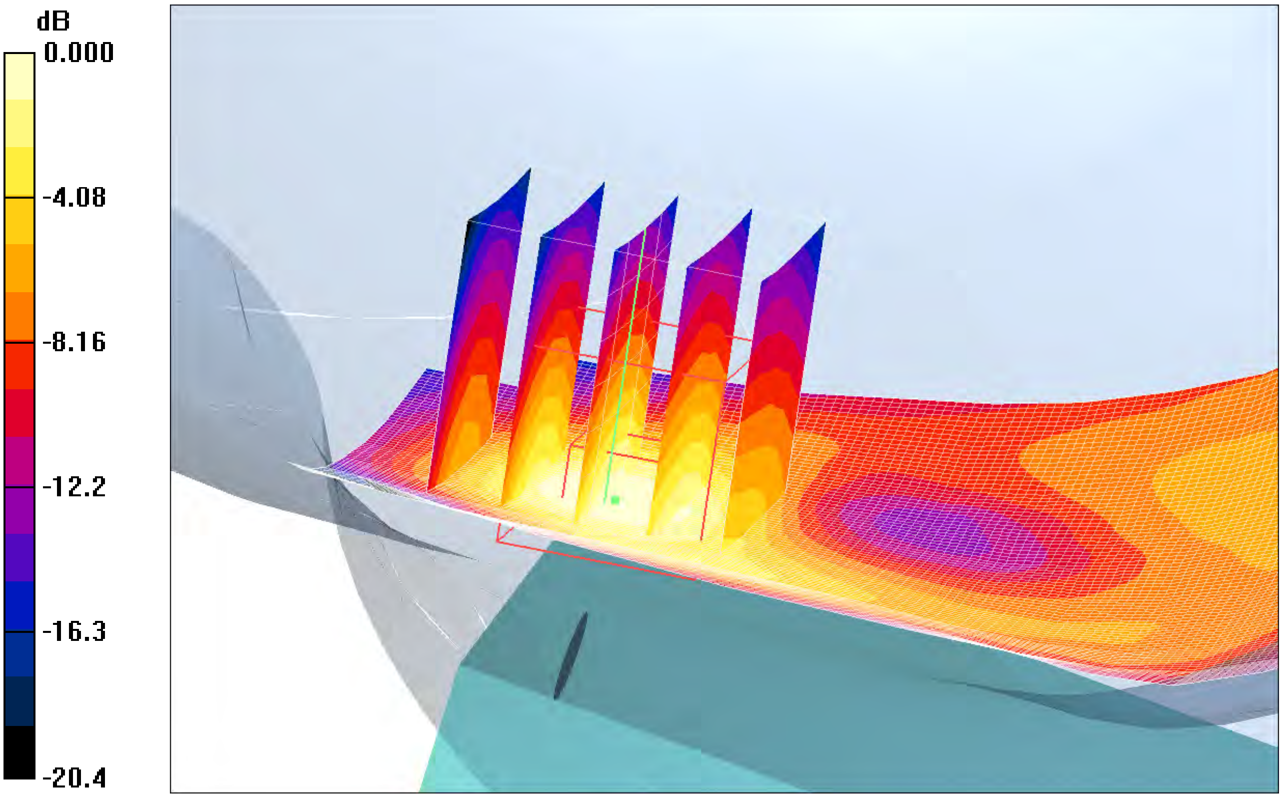
DUT: Zeus; Type:DUT; Serial:#19641

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 1880 MHz; σ = 1.43 mho/m; ε_r = 38.8; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(5.18, 5.18, 5.18); Calibrated: 16/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 17/11/2010
- Phantom: SAM-1; Type: SAM; Serial: 1437
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 186

Tilt/Area Scan (91x151x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.164 mW/g
Tilt/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.0 V/m; Power Drift = -0.176 dB
Peak SAR (extrapolated) = 0.229 W/kg
SAR(1 g) = 0.141 mW/g; SAR(10 g) = 0.075 mW/g
Maximum value of SAR (measured) = 0.156 mW/g



0 dB = 0.156mW/g

Date/Time: 10/02/2011 10:09:09

Test Laboratory: Sony Ericsson Mobile Communications International AB

Zeus1256-LeftHandSide-GSM1900-Touch-Middle

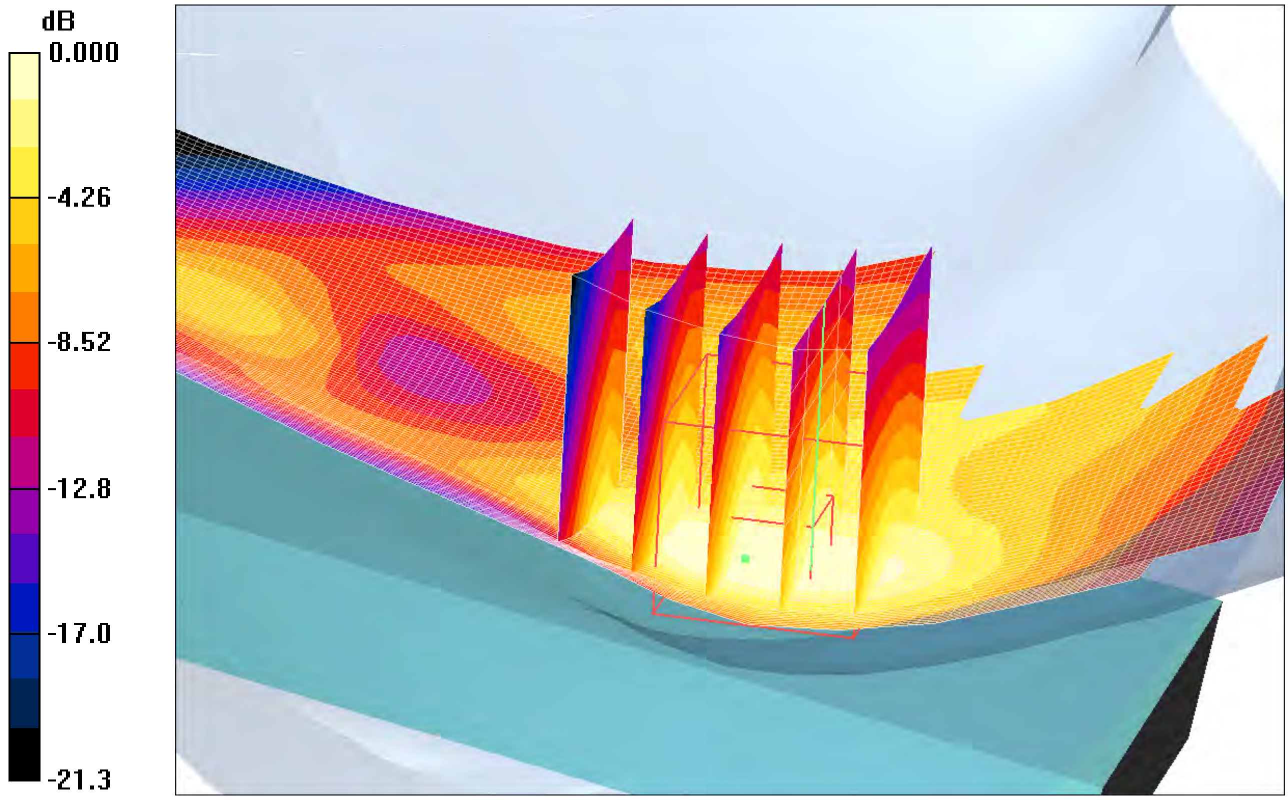
DUT: Zeus; Type:DUT; Serial:#19641

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 1880 MHz; σ = 1.43 mho/m; ε_r = 38.8; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(5.18, 5.18, 5.18); Calibrated: 16/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 17/11/2010
- Phantom: SAM-1; Type: SAM; Serial: 1437
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 186

  Touch/Area Scan (91x151x1): Measurement grid: dx=10mm, dy=10mm
  Maximum value of SAR (interpolated) = 0.350 mW/g
  Touch/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
  Reference Value = 9.30 V/m; Power Drift = -0.008 dB
  Peak SAR (extrapolated) = 0.451 W/kg
  SAR(1 g) = 0.313 mW/g; SAR(10 g) = 0.186 mW/g
  Maximum value of SAR (measured) = 0.341 mW/g



0 dB = 0.341mW/g

Date/Time: 08/02/2011 10:28:38

Test Laboratory: Sony Ericsson Mobile Communications International AB

Zeus1256-LeftHandSide-GSM850-Tilt-Middle

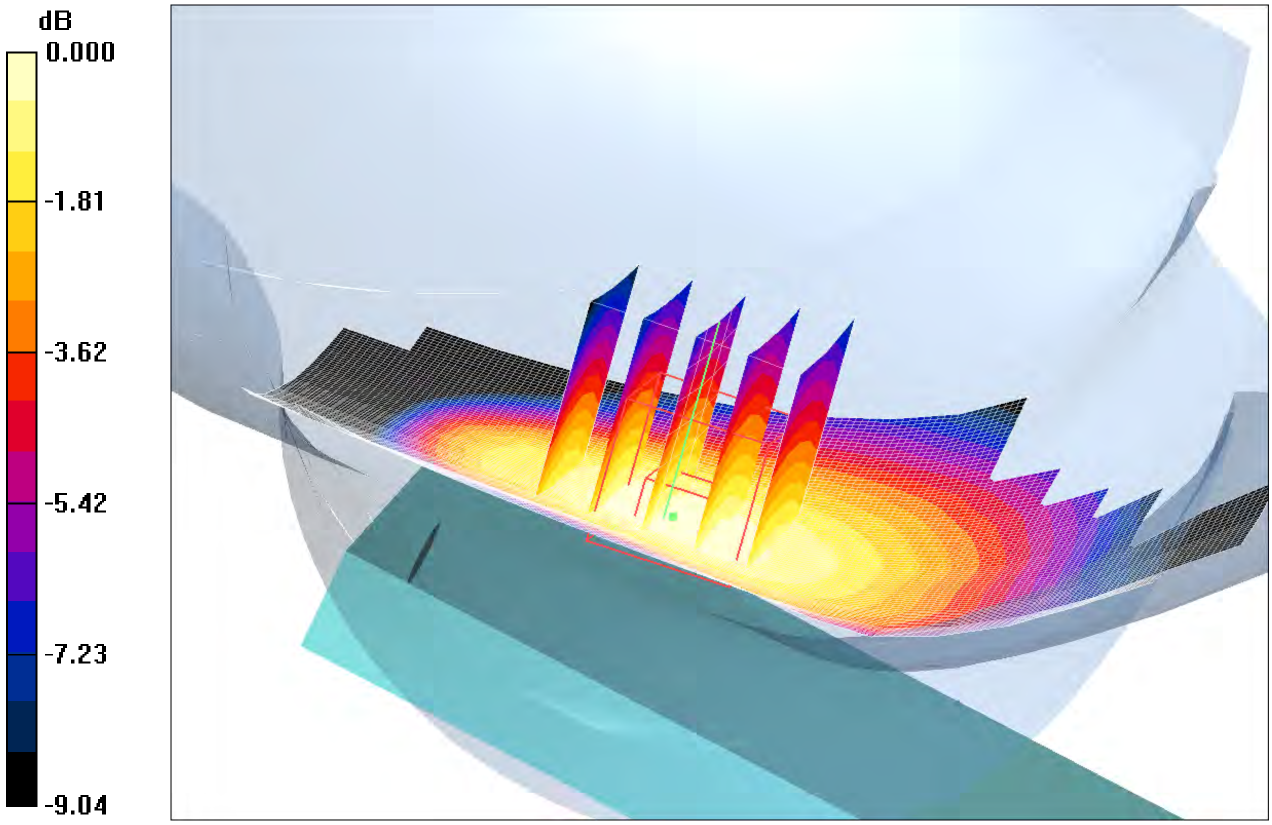
DUT: Zeus; Type:DUT; Serial:#19641

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 836.851 MHz; σ = 0.888 mho/m; ε_r = 41.5; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(6.32, 6.32, 6.32); Calibrated: 16/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 17/11/2010
- Phantom: SAM-2; Type: SAM; Serial: 1025
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 186

Tilt/Area Scan (91x151x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.233 mW/g
Tilt/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.1 V/m; Power Drift = -0.095 dB
Peak SAR (extrapolated) = 0.268 W/kg
SAR(1 g) = 0.218 mW/g; SAR(10 g) = 0.166 mW/g
Maximum value of SAR (measured) = 0.231 mW/g



0 dB = 0.231mW/g

Date/Time: 08/02/2011 11:54:18

Test Laboratory: Sony Ericsson Mobile Communications International AB

Zeus1256-LeftHandSide-GSM850-Touch-High

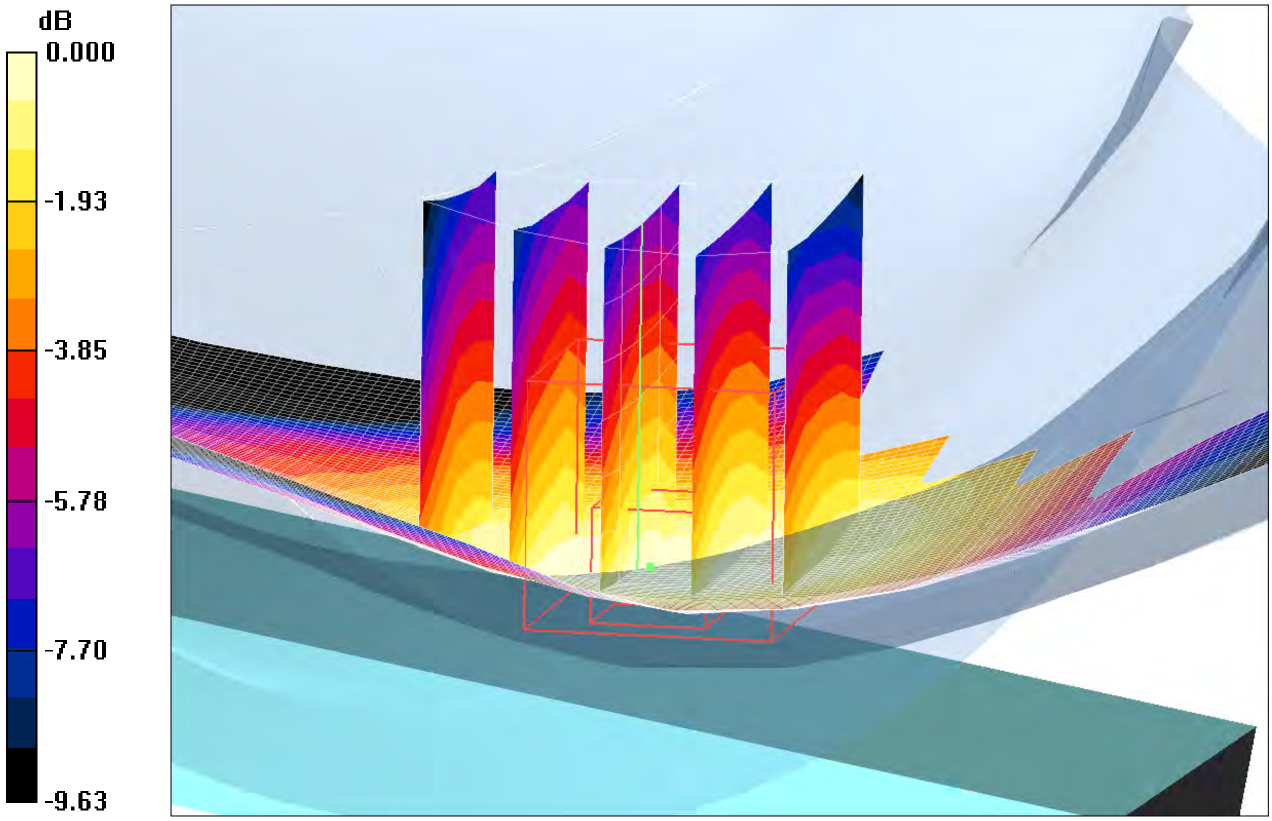
DUT: Zeus; Type:DUT; Serial:#19641

Communication System: GSM 850; Frequency: 848.8 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 848.8 MHz; σ = 0.898 mho/m; ε_r = 41.4; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(6.32, 6.32, 6.32); Calibrated: 16/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 17/11/2010
- Phantom: SAM-2; Type: SAM; Serial: 1025
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 186

Touch 3/Area Scan (91x151x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.350 mW/g
Touch 3/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.27 V/m; Power Drift = 0.081 dB
Peak SAR (extrapolated) = 0.419 W/kg
SAR(1 g) = 0.326 mW/g; SAR(10 g) = 0.243 mW/g
Maximum value of SAR (measured) = 0.347 mW/g



0 dB = 0.347mW/g

Date/Time: 22/02/2011 10:25:59

Test Laboratory: Sony Ericsson Mobile Communications International AB

Zeus1256-LeftHandSide-UMTS2-Tilt-Middle

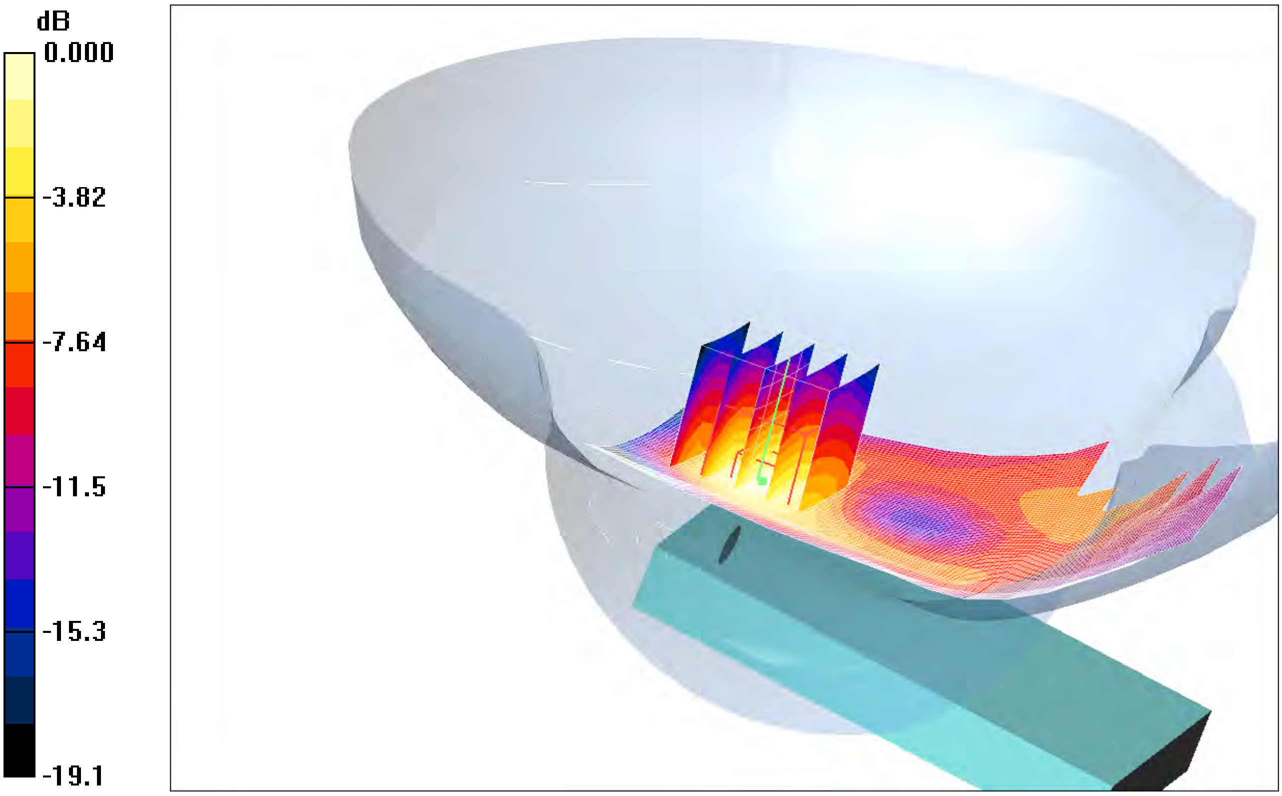
DUT: Zeus; Type:DUT; Serial:#19641

Communication System: WCDMA Band 2; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1880 MHz; σ = 1.45 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(5.18, 5.18, 5.18); Calibrated: 16/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 17/11/2010
- Phantom: SAM-1; Type: SAM; Serial: 1437
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 186

Tilt/Area Scan (91x151x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.359 mW/g
Tilt/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.2 V/m; Power Drift = 0.038 dB
Peak SAR (extrapolated) = 0.492 W/kg
SAR(1 g) = 0.304 mW/g; SAR(10 g) = 0.164 mW/g
Maximum value of SAR (measured) = 0.345 mW/g



0 dB = 0.345mW/g

Date/Time: 22/02/2011 11:03:57

Test Laboratory: Sony Ericsson Mobile Communications International AB

Zeus1256-LeftHandSide-UMTS2-Touch-Low

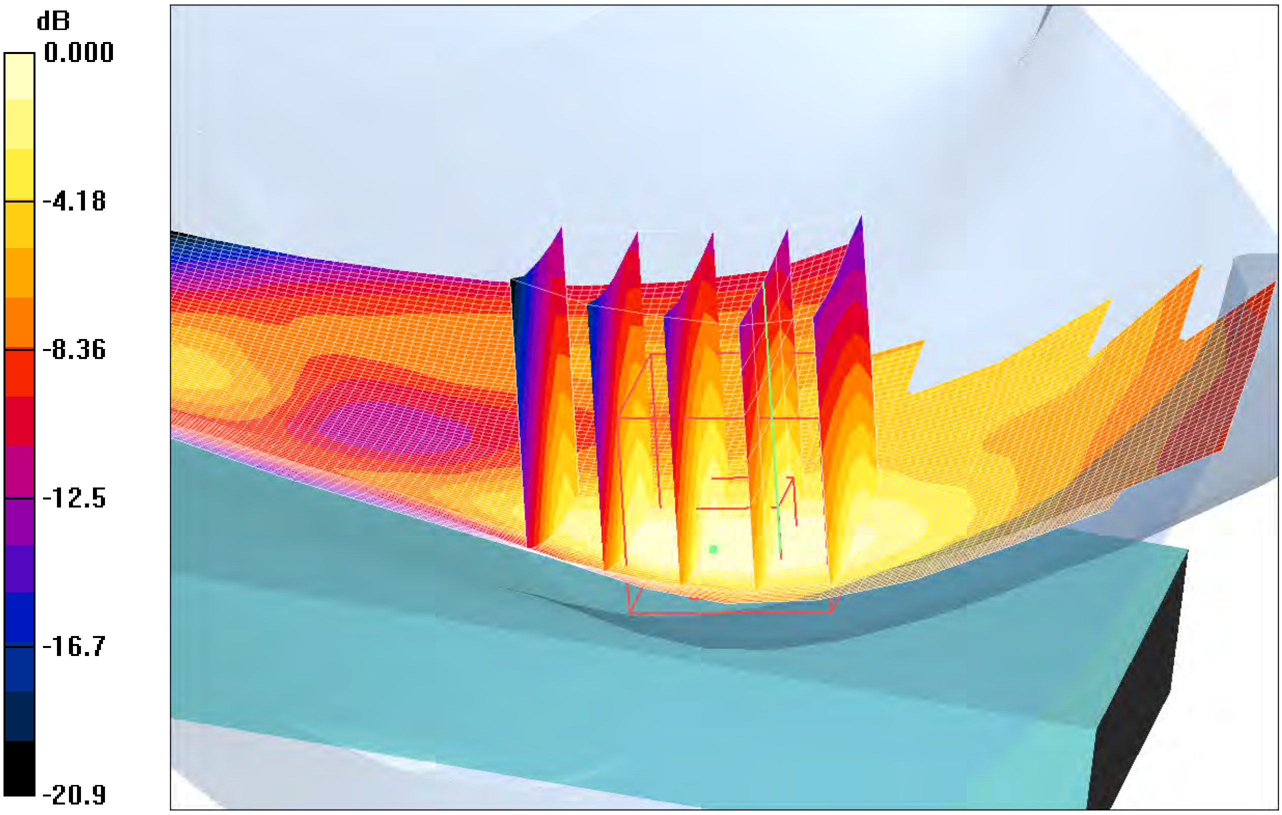
DUT: Zeus; Type:DUT; Serial:#19641

Communication System: WCDMA Band 2; Frequency: 1852.4 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1852.4 MHz; σ = 1.42 mho/m; ε_r = 38.8; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(5.18, 5.18, 5.18); Calibrated: 16/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 17/11/2010
- Phantom: SAM-1; Type: SAM; Serial: 1437
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 186

Touch 2/Area Scan (91x151x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.670 mW/g
Touch 2/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.1 V/m; Power Drift = -0.037 dB
Peak SAR (extrapolated) = 0.859 W/kg
SAR(1 g) = 0.599 mW/g; SAR(10 g) = 0.354 mW/g
Maximum value of SAR (measured) = 0.653 mW/g



0 dB = 0.653mW/g

Date/Time: 15/02/2011 10:11:23

Test Laboratory: Sony Ericsson Mobile Communications International AB

Zeus1256-LeftHandSide-UMTS5-Tilt-Middle

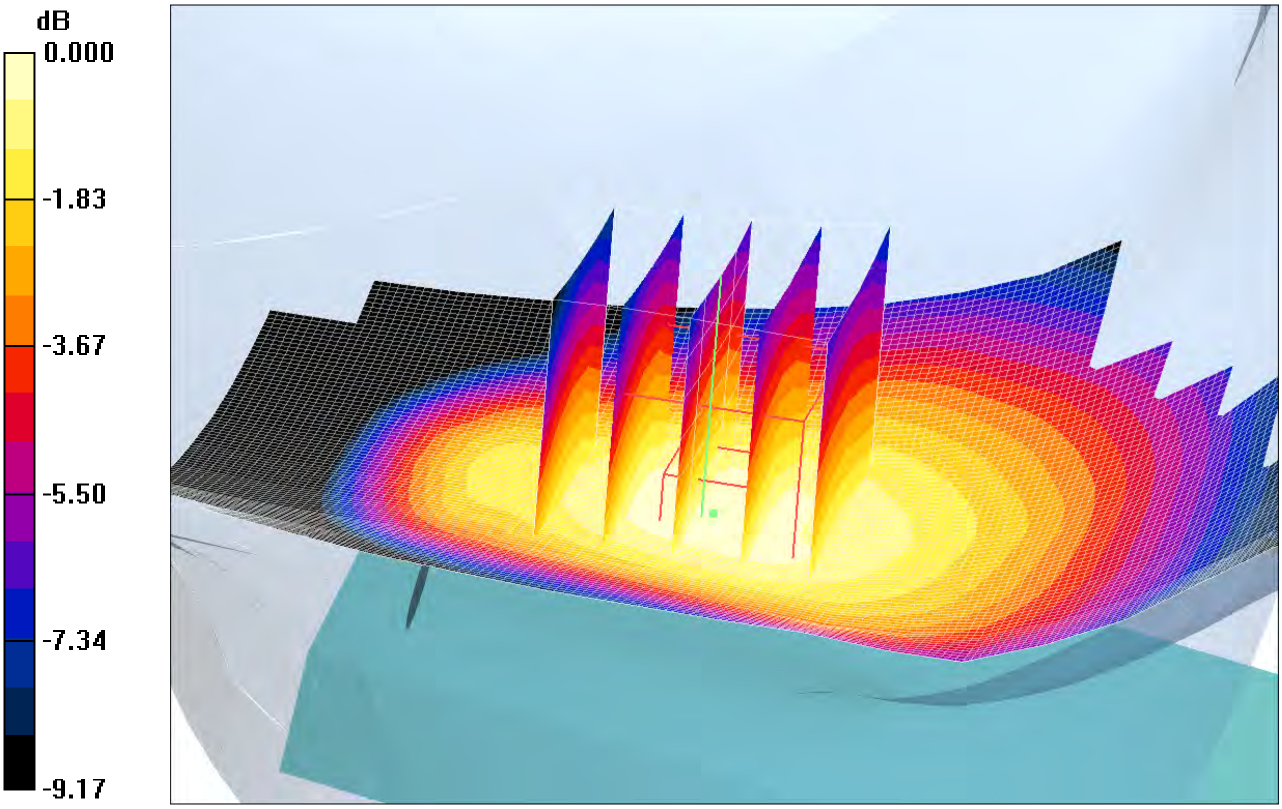
DUT: Zeus; Type:DUT; Serial:#19641

Communication System: WCDMA Band5; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used: f = 836.851 MHz; σ = 0.89 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(6.32, 6.32, 6.32); Calibrated: 16/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 17/11/2010
- Phantom: SAM-2; Type: SAM; Serial: 1025
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 186

Tilt/Area Scan (91x151x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.275 mW/g
Tilt/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.3 V/m; Power Drift = 0.125 dB
Peak SAR (extrapolated) = 0.321 W/kg
SAR(1 g) = 0.259 mW/g; SAR(10 g) = 0.196 mW/g
Maximum value of SAR (measured) = 0.272 mW/g



0 dB = 0.272mW/g

Date/Time: 15/02/2011 10:58:19

Test Laboratory: Sony Ericsson Mobile Communications International AB

Zeus1256-LeftHandSide-UMTS5-Touch-High

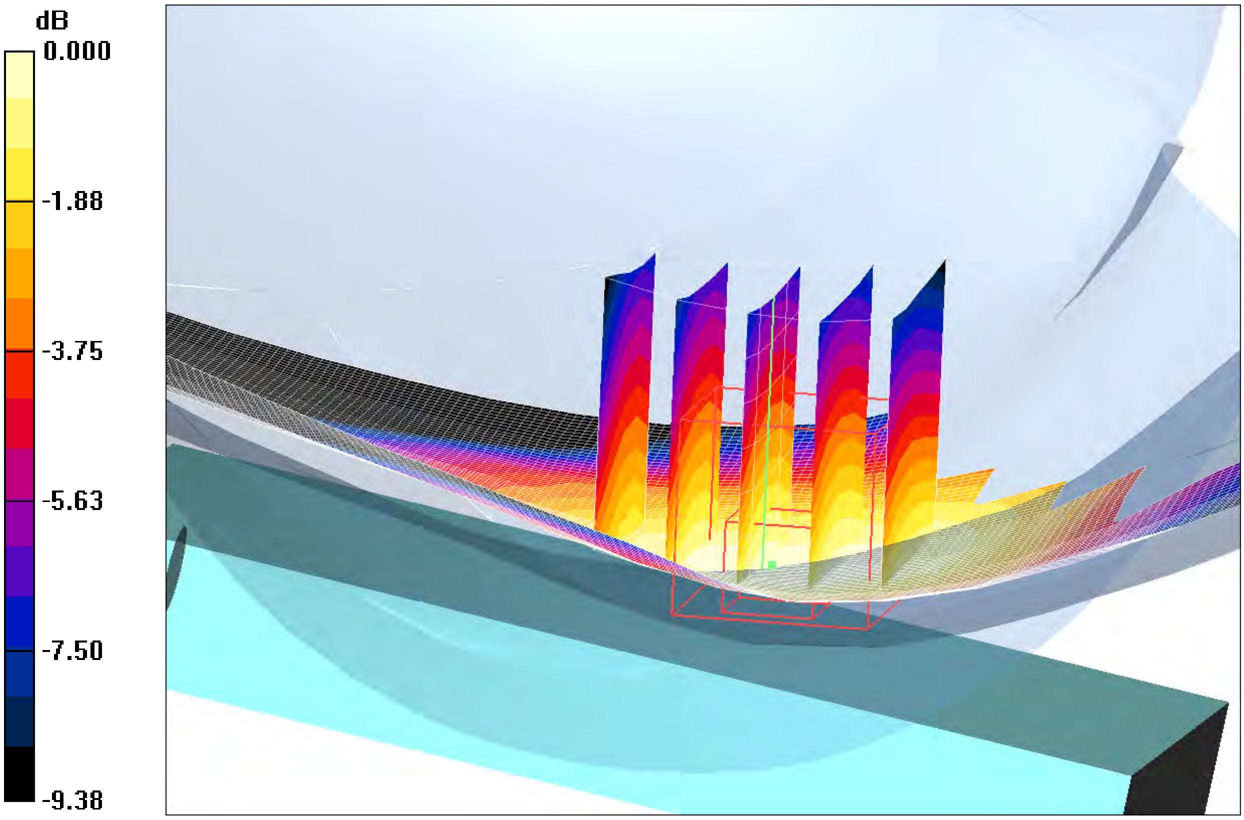
DUT: Zeus; Type:DUT; Serial:#19641

Communication System: WCDMA Band5; Frequency: 846.6 MHz;Duty Cycle: 1:1
Medium parameters used: f = 846.691 MHz; σ = 0.898 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(6.32, 6.32, 6.32); Calibrated: 16/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 17/11/2010
- Phantom: SAM-2; Type: SAM; Serial: 1025
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 186

Touch 3/Area Scan (91x151x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.406 mW/g
Touch 3/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.78 V/m; Power Drift = 0.092 dB
Peak SAR (extrapolated) = 0.493 W/kg
SAR(1 g) = 0.389 mW/g; SAR(10 g) = 0.289 mW/g
Maximum value of SAR (measured) = 0.412 mW/g



0 dB = 0.412mW/g

Date/Time: 2/24/2011 10:29:02 AM

Test Laboratory: Sony Ericsson Mobile Communications

Zeus1256-LeftHandSide-WLAN-High-Touch

DUT: Zeus; Type: DUT; Serial: 19643

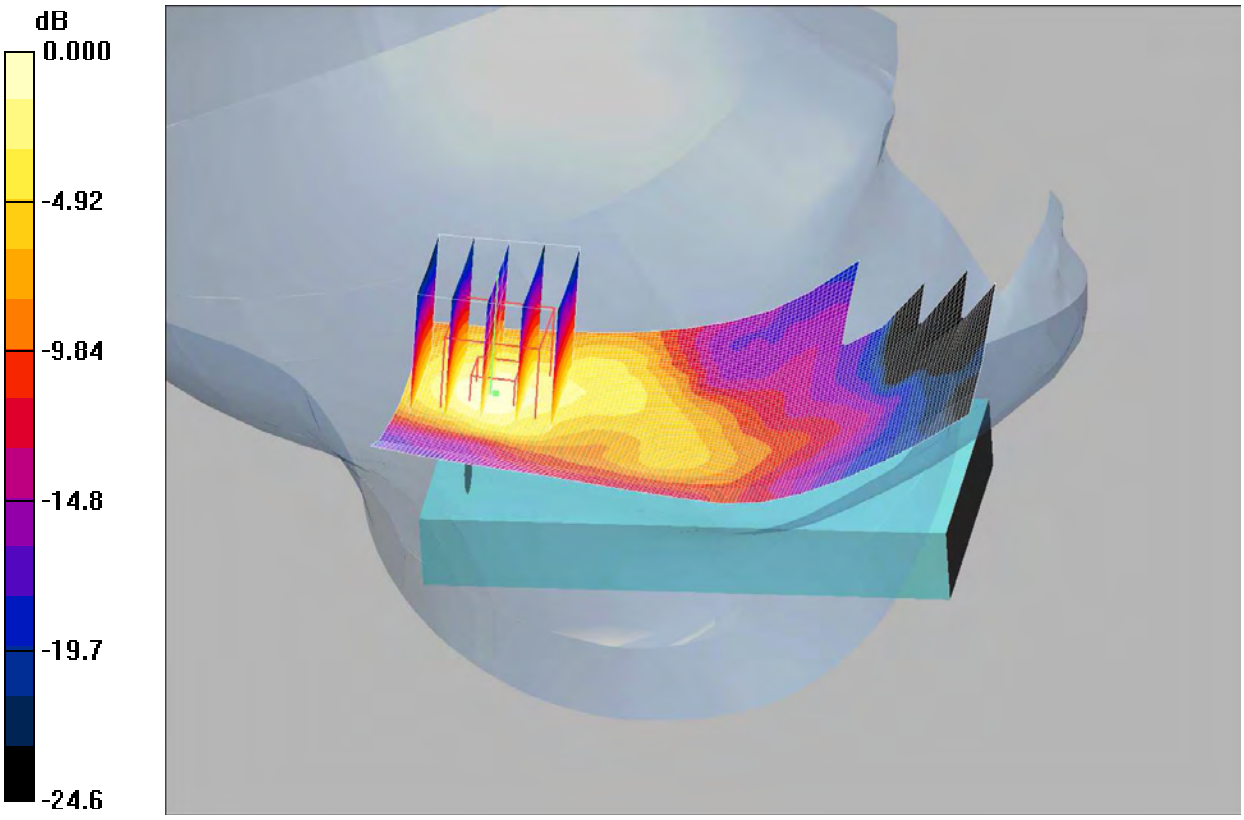
Communication System: WLAN; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.9 mho/m; ε_r = 37.4; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(4.49, 4.49, 4.49); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: WLAN (Head) SAM with CRP; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

  Touch position 3/Area Scan (81x141x1): Measurement grid: dx=10mm, dy=10mm
  Maximum value of SAR (interpolated) = 0.087 mW/g

  Touch position 3/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
  Reference Value = 5.37 V/m; Power Drift = 0.034 dB
  Peak SAR (extrapolated) = 0.164 W/kg
  SAR(1 g) = 0.074 mW/g; SAR(10 g) = 0.035 mW/g
  Maximum value of SAR (measured) = 0.084 mW/g



0 dB = 0.084mW/g

Date/Time: 2/24/2011 9:25:21 AM

Test Laboratory: Sony Ericsson Mobile Communications

Zeus1256-LeftHandSide-WLAN-Mid-Tilt

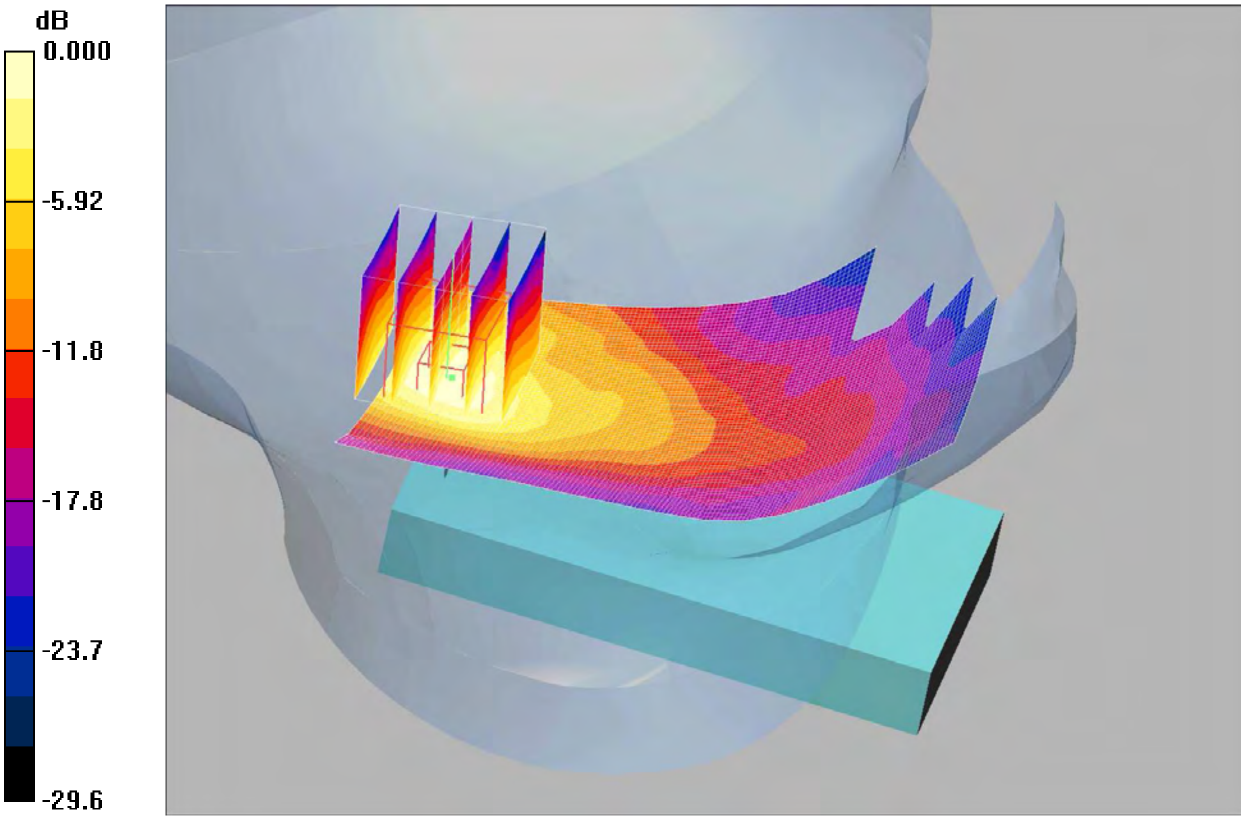
DUT: Zeus; Type: DUT; Serial: 19643

Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437.71 MHz; σ = 1.87 mho/m; ε_r = 37.4; ρ = 1000 kg/m^3
Phantom section: Left Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(4.49, 4.49, 4.49); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: WLAN (Head) SAM with CRP; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

  Tilt position/Area Scan (81x141x1): Measurement grid: dx=10mm, dy=10mm
  Maximum value of SAR (interpolated) = 0.063 mW/g
  Tilt position/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
  Reference Value = 5.91 V/m; Power Drift = 0.031 dB
  Peak SAR (extrapolated) = 0.133 W/kg
  SAR(1 g) = 0.061 mW/g; SAR(10 g) = 0.030 mW/g
  Maximum value of SAR (measured) = 0.066 mW/g



0 dB = 0.066mW/g

Date/Time: 10/02/2011 13:49:34

Test Laboratory: Sony Ericsson Mobile Communications International AB

Zeus1256-RightHandSide-GSM1900-Tilt-Middle

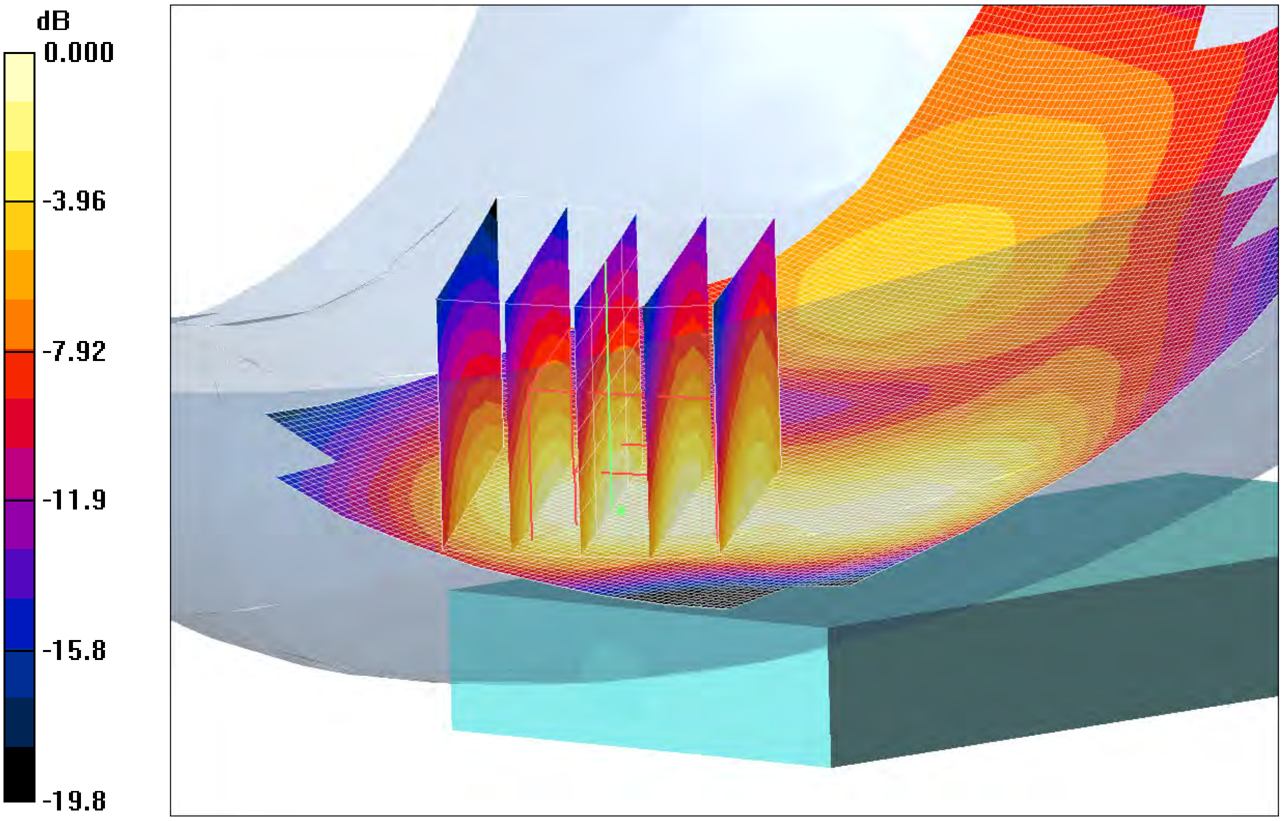
DUT: Zeus; Type:DUT; Serial:#19641

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 1880 MHz; σ = 1.43 mho/m; ε_r = 38.8; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(5.18, 5.18, 5.18); Calibrated: 16/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 17/11/2010
- Phantom: SAM-1; Type: SAM; Serial: 1437
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 186

Tilt/Area Scan (91x151x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.155 mW/g
Tilt/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.1 V/m; Power Drift = -0.143 dB
Peak SAR (extrapolated) = 0.208 W/kg
SAR(1 g) = 0.135 mW/g; SAR(10 g) = 0.075 mW/g
Maximum value of SAR (measured) = 0.150 mW/g



0 dB = 0.150mW/g

Date/Time: 10/02/2011 13:27:51

Test Laboratory: Sony Ericsson Mobile Communications International AB

Zeus1256-RightHandSide-GSM1900-Touch-Middle

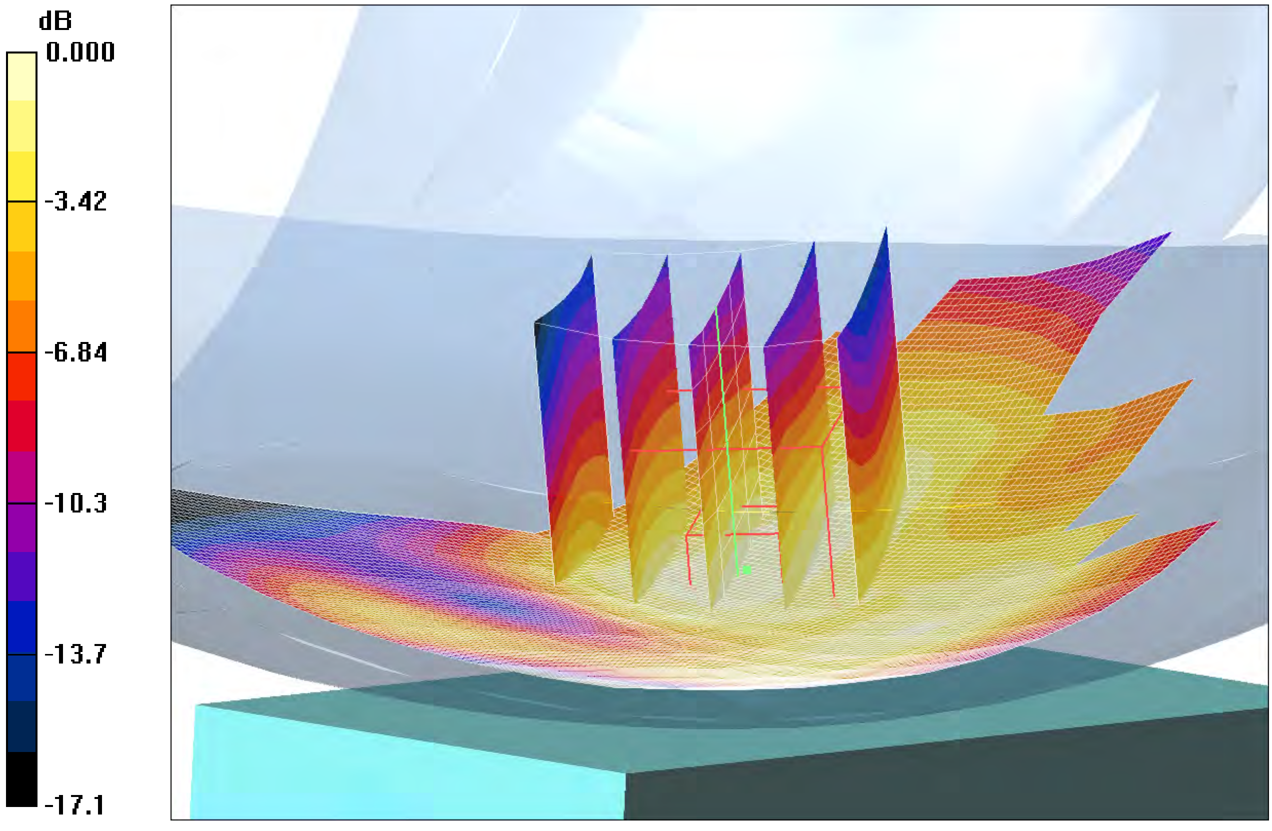
DUT: Zeus; Type:DUT; Serial:#19641

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 1880 MHz; σ = 1.43 mho/m; ε_r = 38.8; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(5.18, 5.18, 5.18); Calibrated: 16/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 17/11/2010
- Phantom: SAM-1; Type: SAM; Serial: 1437
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 186

Touch/Area Scan (91x151x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.232 mW/g
Touch/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.50 V/m; Power Drift = 0.115 dB
Peak SAR (extrapolated) = 0.321 W/kg
SAR(1 g) = 0.226 mW/g; SAR(10 g) = 0.143 mW/g
Maximum value of SAR (measured) = 0.246 mW/g



0 dB = 0.246mW/g

Date/Time: 08/02/2011 13:37:06

Test Laboratory: Sony Ericsson Mobile Communications International AB

Zeus1256-RightHandSide-GSM850-Tilt-Middle

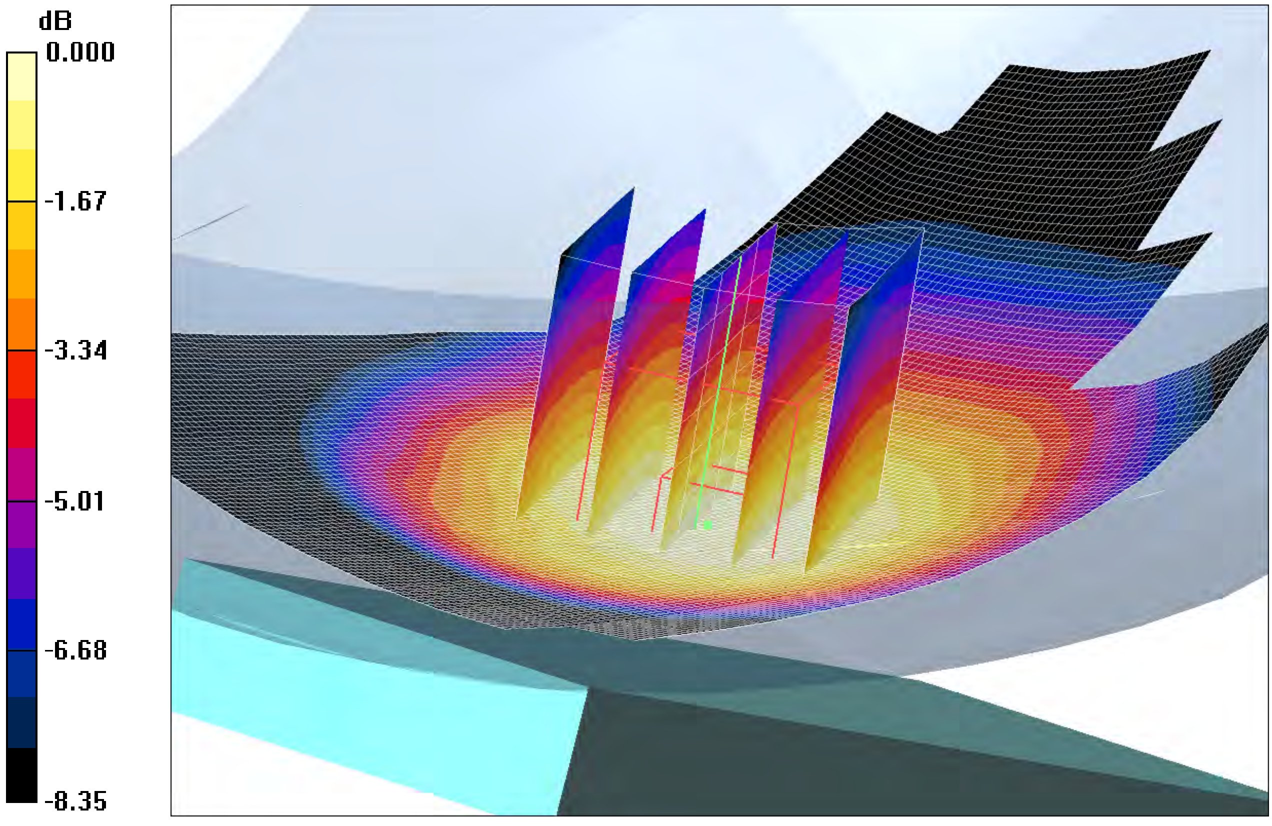
DUT: Zeus; Type:DUT; Serial:#19641

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 836.851 MHz; σ = 0.888 mho/m; ε_r = 41.5; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(6.32, 6.32, 6.32); Calibrated: 16/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 17/11/2010
- Phantom: SAM-2; Type: SAM; Serial: 1025
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 186

Tilt/Area Scan (91x151x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.259 mW/g
Tilt/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.7 V/m; Power Drift = -0.120 dB
Peak SAR (extrapolated) = 0.291 W/kg
SAR(1 g) = 0.238 mW/g; SAR(10 g) = 0.184 mW/g
Maximum value of SAR (measured) = 0.250 mW/g



0 dB = 0.250mW/g

Date/Time: 08/02/2011 13:15:35

Test Laboratory: Sony Ericsson Mobile Communications International AB

Zeus1256-RightHandSide-GSM850-Touch-Middle

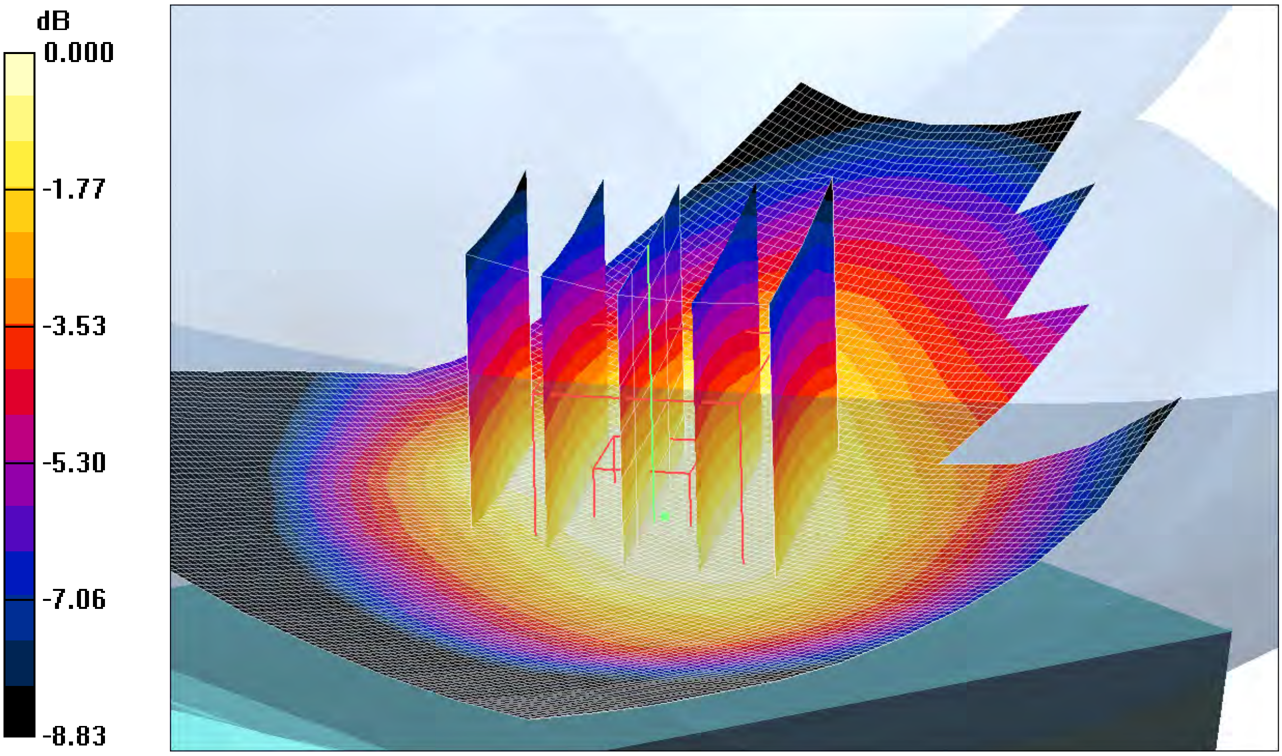
DUT: Zeus; Type:DUT; Serial:#19641

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 836.851 MHz; σ = 0.888 mho/m; ε_r = 41.5; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(6.32, 6.32, 6.32); Calibrated: 16/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 17/11/2010
- Phantom: SAM-2; Type: SAM; Serial: 1025
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 186

Touch/Area Scan (91x151x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.330 mW/g
Touch/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.85 V/m; Power Drift = -0.088 dB
Peak SAR (extrapolated) = 0.389 W/kg
SAR(1 g) = 0.298 mW/g; SAR(10 g) = 0.222 mW/g
Maximum value of SAR (measured) = 0.316 mW/g



0 dB = 0.316mW/g

Date/Time: 22/02/2011 13:22:19

Test Laboratory: Sony Ericsson Mobile Communications International AB

Zeus1256-RightHandSide-UMTS2-Tilt-Middle

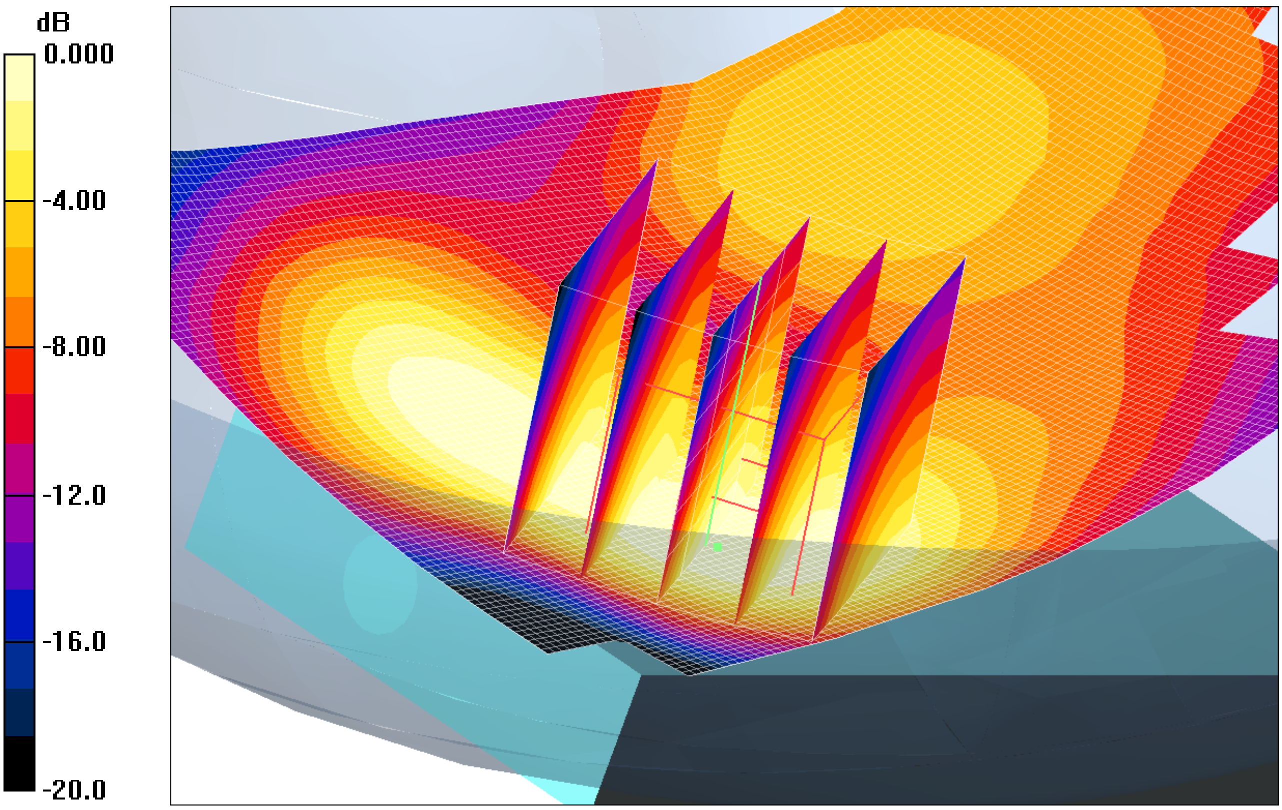
DUT: Zeus; Type:DUT; Serial:#19641

Communication System: WCDMA Band 2; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1880 MHz; σ = 1.45 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(5.18, 5.18, 5.18); Calibrated: 16/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 17/11/2010
- Phantom: SAM-1; Type: SAM; Serial: 1437
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 186

Tilt/Area Scan (91x151x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.289 mW/g
Tilt/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.1 V/m; Power Drift = -0.020 dB
Peak SAR (extrapolated) = 0.373 W/kg
SAR(1 g) = 0.243 mW/g; SAR(10 g) = 0.145 mW/g
Maximum value of SAR (measured) = 0.260 mW/g



0 dB = 0.260mW/g

Date/Time: 2/22/2011 3:07:16 PM

Test Laboratory: Sony Ericsson Mobile Communications International AB

Zeus1256-RightHandSide-UMTS2-Touch-High

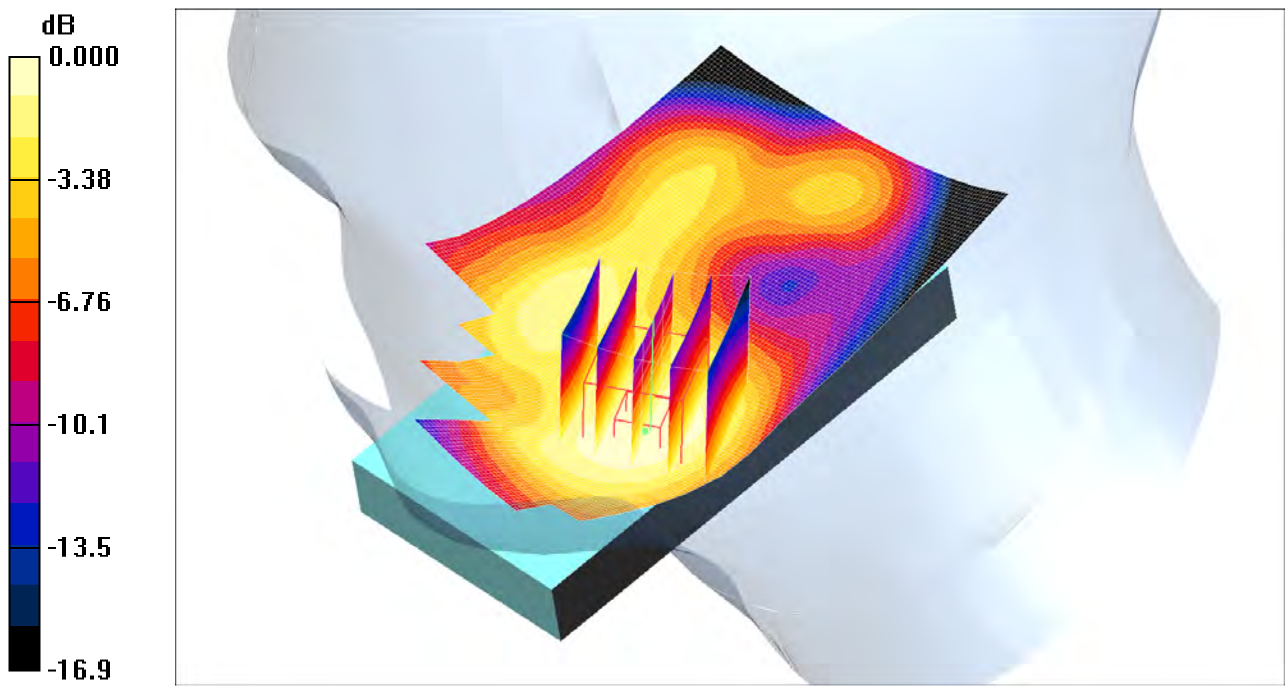
DUT: Zeus; Type: DUT; Serial: 19641

Communication System: WCDMA Band 2; Frequency: 1907.6 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1907.6 MHz; σ = 1.47 mho/m; ε_r = 38.6; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(5.18, 5.18, 5.18); Calibrated: 11/16/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 11/17/2010
- Phantom: SAM-1; Type: SAM; Serial: 1437
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Touch 3/Area Scan (91x151x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.586 mW/g
Touch 3/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.4 V/m; Power Drift = -0.083 dB
Peak SAR (extrapolated) = 0.781 W/kg
SAR(1 g) = 0.544 mW/g; SAR(10 g) = 0.342 mW/g
Maximum value of SAR (measured) = 0.589 mW/g



0 dB = 0.589mW/g

Date/Time: 22/02/2011 12:54:56

Test Laboratory: Sony Ericsson Mobile Communications International AB

Zeus1256-RightHandSide-UMTS2-Touch-Middle

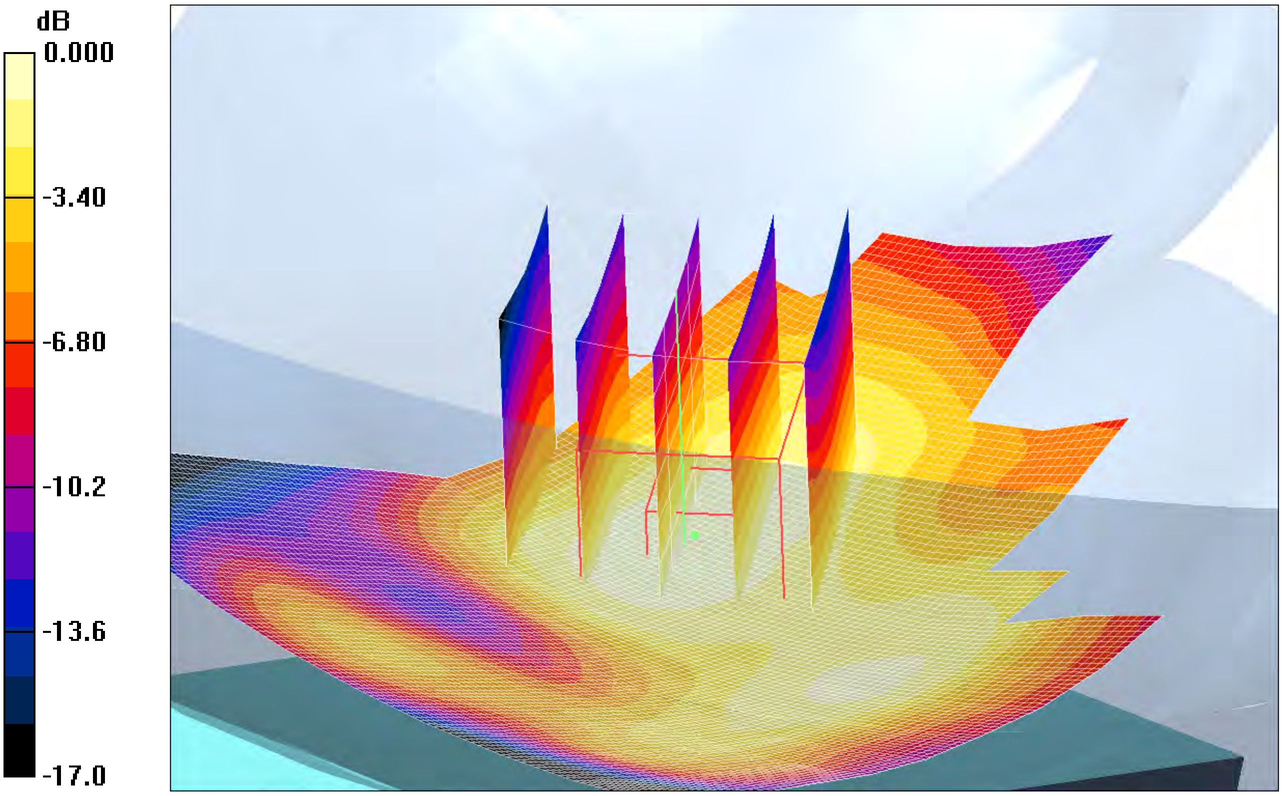
DUT: Zeus; Type:DUT; Serial:#19641

Communication System: WCDMA Band 2; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1880 MHz; σ = 1.45 mho/m; ε_r = 38.7; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(5.18, 5.18, 5.18); Calibrated: 16/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 17/11/2010
- Phantom: SAM-1; Type: SAM; Serial: 1437
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 186

  Touch/Area Scan (91x151x1): Measurement grid: dx=10mm, dy=10mm
  Maximum value of SAR (interpolated) = 0.545 mW/g
  Touch/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
  Reference Value = 12.5 V/m; Power Drift = -0.158 dB
  Peak SAR (extrapolated) = 0.702 W/kg
  SAR(1 g) = 0.493 mW/g; SAR(10 g) = 0.309 mW/g
  Maximum value of SAR (measured) = 0.536 mW/g



0 dB = 0.536mW/g

Date/Time: 15/02/2011 12:03:24

Test Laboratory: Sony Ericsson Mobile Communications International AB

Zeus1256-RightHandSide-UMTS5-Tilt-Middle

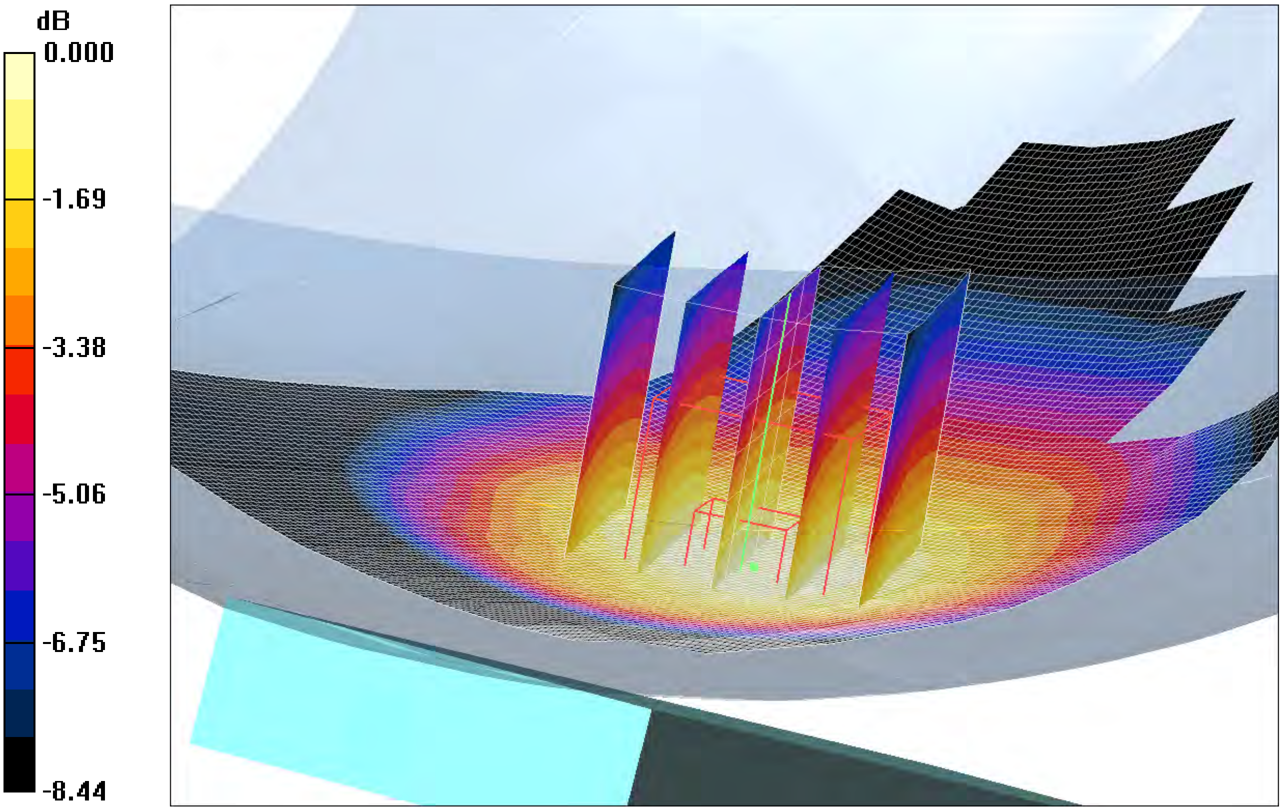
DUT: Zeus; Type:DUT; Serial:#19641

Communication System: WCDMA Band5; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used: f = 836.851 MHz; σ = 0.89 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(6.32, 6.32, 6.32); Calibrated: 16/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 17/11/2010
- Phantom: SAM-2; Type: SAM; Serial: 1025
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 186

Tilt/Area Scan (91x151x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.309 mW/g
Tilt/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.7 V/m; Power Drift = 0.017 dB
Peak SAR (extrapolated) = 0.355 W/kg
SAR(1 g) = 0.295 mW/g; SAR(10 g) = 0.226 mW/g
Maximum value of SAR (measured) = 0.312 mW/g



0 dB = 0.312mW/g

Date/Time: 15/02/2011 11:37:05

Test Laboratory: Sony Ericsson Mobile Communications International AB

Zeus1256-RightHandSide-UMTS5-Touch-Middle

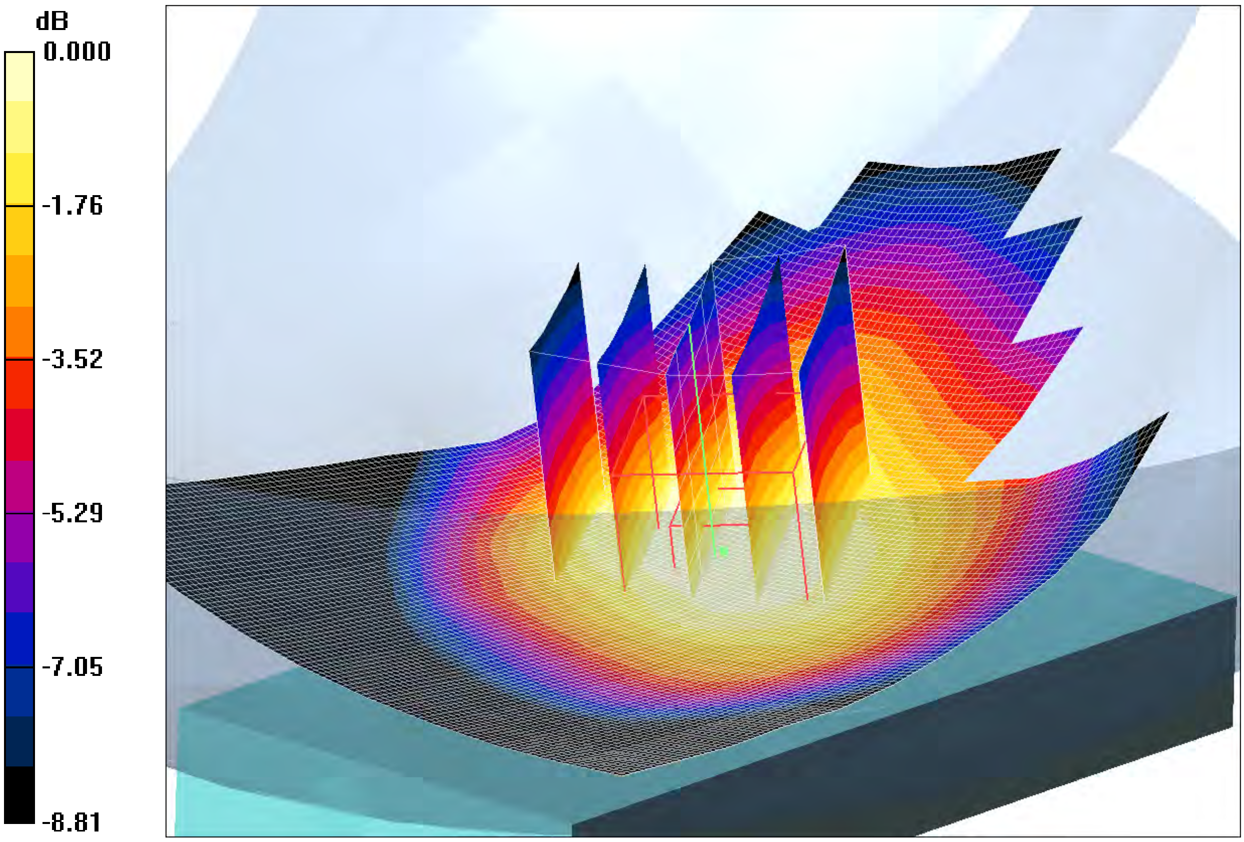
DUT: Zeus; Type:DUT; Serial:#19641

Communication System: WCDMA Band5; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used: f = 836.851 MHz; σ = 0.89 mho/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1610; ConvF(6.32, 6.32, 6.32); Calibrated: 16/11/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn448; Calibrated: 17/11/2010
- Phantom: SAM-2; Type: SAM; Serial: 1025
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 186

Touch/Area Scan (91x151x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.346 mW/g
Touch/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.73 V/m; Power Drift = -0.003 dB
Peak SAR (extrapolated) = 0.425 W/kg
SAR(1 g) = 0.332 mW/g; SAR(10 g) = 0.249 mW/g
Maximum value of SAR (measured) = 0.352 mW/g



0 dB = 0.352mW/g

Date/Time: 2/24/2011 1:49:12 PM

Test Laboratory: Sony Ericsson Mobile Communications

Zeus1256-RightHandSide-WLAN-High-Touch

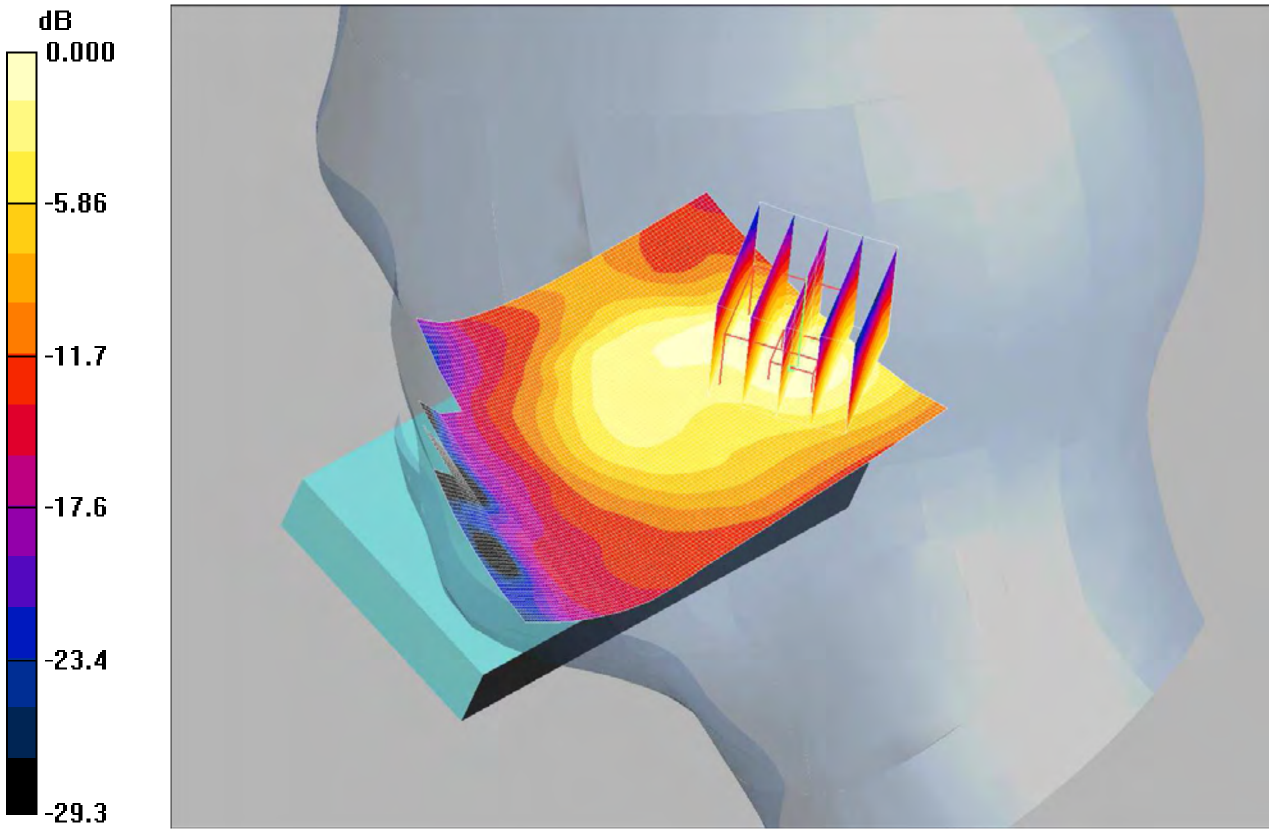
DUT: Zeus; Type: DUT; Serial: 19643

Communication System: WLAN; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.9 mho/m; ε_r = 37.4; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(4.49, 4.49, 4.49); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: WLAN (Head) SAM with CRP; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Touch position 3/Area Scan (81x141x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.067 mW/g
Touch position 3/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.57 V/m; Power Drift = -0.047 dB
Peak SAR (extrapolated) = 0.135 W/kg
SAR(1 g) = 0.061 mW/g; SAR(10 g) = 0.029 mW/g
Maximum value of SAR (measured) = 0.069 mW/g



0 dB = 0.069mW/g

Date/Time: 2/24/2011 12:58:45 PM

Test Laboratory: Sony Ericsson Mobile Communications

Zeus1256-RightHandSide-WLAN-Mid-Tilt

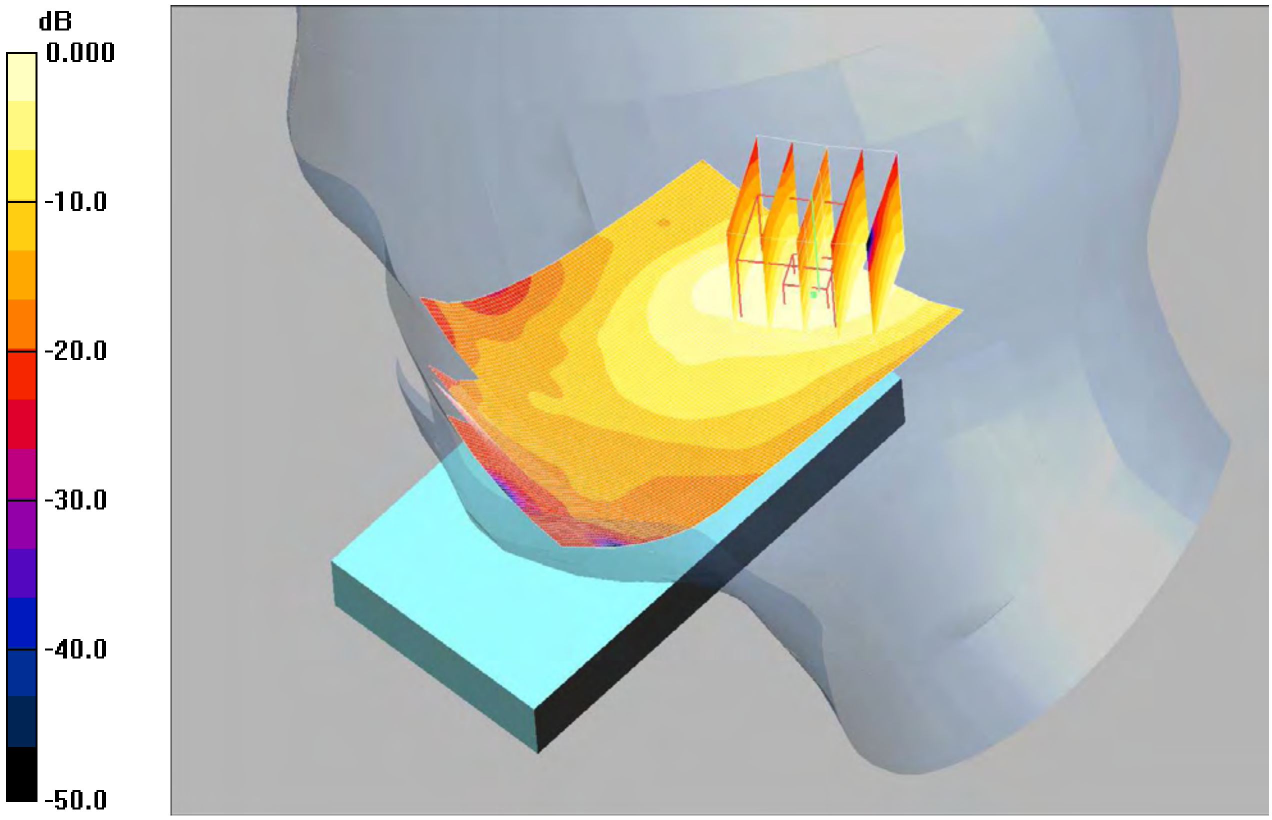
DUT: Zeus; Type: DUT; Serial: 19643

Communication System: WLAN; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437.71 MHz; σ = 1.87 mho/m; ε_r = 37.4; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1586; ConvF(4.49, 4.49, 4.49); Calibrated: 5/14/2010
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn432; Calibrated: 5/18/2010
- Phantom: WLAN (Head) SAM with CRP; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Tilt position/Area Scan (81x141x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.061 mW/g
Tilt position/Zoom Scan (5x5x7) (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.73 V/m; Power Drift = -0.343 dB
Peak SAR (extrapolated) = 0.115 W/kg
SAR(1 g) = 0.053 mW/g; SAR(10 g) = 0.026 mW/g
Maximum value of SAR (measured) = 0.059 mW/g



0 dB = 0.059mW/g

Sony Ericsson

Company Internal
INSTRUCTION

Prepared (also subject responsible if other)		No.		
LD/SEMC/BGUG/NM Ramadan Plicanic		GUG/N 03:141		
Approved	Checked	Date	Rev	Reference
LD/SEMC/BGUG/NMC Mats Hansson		060220	E	File

Sony Ericsson SAR Measurement Specification of Wireless Terminals

Contents

1. Introduction and scope

It is a Sony Ericsson policy that all RF transmitting product models shall comply with relevant recommendations, standards and regulations on human exposure to electromagnetic fields. In the reference section below, the most important RF safety guidelines are listed [9-13]. If no national standard or regulation is available in a country, the international recommendation from ICNIRP [9] shall be applied.

The RF safety guidelines specify *basic restrictions* and *reference level*s. In the frequency range of interest for mobile communications, the basic restrictions are expressed as Specific Absorption Rate (SAR) limits and the reference levels as field strength or power density limits. The reference levels are provided for the purpose of simple measurements of compliance with the basic restrictions, and they are primarily applicable in the far-field region of a RF source. Measured values greater than the reference levels do not necessarily mean that the basic restrictions are exceeded.

In the near-field region of mobile communication devices (handsets), field strength values exceeding the reference levels may be observed. Compliance with the basic SAR restrictions has therefore to be verified. SAR (W/kg) is a measure of the rate of RF energy absorption in tissue. The localized SAR limits depend on whether the device is classified for use by the general public (uncontrolled environment) or workers (controlled environment). Mobile communication equipment are usually used by the general public and should consequently be in compliance with the general public limits, which are 2.0 W/kg averaged in 10 gram of tissue in the ICNIRP guidelines [9] and 1.6 W/kg averaged in 1 gram in the ANSI/IEEE standard [10]. Because of the lower limit and the smaller averaging mass, the ANSI/IEEE limit is slightly more conservative than the ICNIRP limit. The averaging times are also different, 6 minutes in the ICNIRP recommendations and 30 minutes in the IEEE guidelines.

This document describes the SAR measurement procedures used by the SAR testing laboratories of Sony Ericsson. SAR measurement standardization is currently evolving. Many standards and guidelines have recently been released [1, 2 and 5] or are in progress (e.g. [3, 4]). Sony Ericsson is firmly committed to using the latest technology and the latest standards to ensure that the SAR measurements are of the highest quality.

2. References

SAR measurement standards and guidelines

The following standards and guidelines are used as a basis for the SAR measurement specification described herein. Although these documents are well harmonized, some differences exist. References [1] and [2] are approved European standards, [5] is IEEE standard, [3] and [4] draft measurement standards and references [6] are published guidelines. This measurement specification closely conforms to these documents.

[1] European Standard EN 50360, “Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300 MHz – 3 GHz)”, CENELEC, July 2001.

[2] European Standard EN 50361, “Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz – 3 GHz)”, CENELEC, July 2001.

[3] IEC 62209_Part1 (CD), “Procedure to determine the Specific Absorption Rate (SAR) for hand-held mobile wireless devices in the frequency range of 300 MHz to 3 GHz”, IEC, February 2005

[4] IEC 62209 Part 2, “Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation, and Procedures, Part 2: Procedure to measure the Specific Absorption Rate (SAR) for two-way radios, palmtop terminals, laptop terminals, desktop terminals, and body-mounted devices including accessories and multiple transmitters”, Draft Version 0.6, October 2002

[5] Standard 1528-2003, “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques”, IEEE, June, 2003,

[6] Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01), “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”, FCC, June 2001.

[7] Radiocommunications (Electromagnetic Radiation Human Exposure) Standard 2003, Australian Communications Authority (ACA), February 2003.

[8] ARIB Standard STD-T56, "Method of Measuring the Specific Absorption Rate from Portable Wireless Terminals", 2nd Edition, Association of Radio Industries and Businesses, January 24th, 2002. (Translation by Asia Technical Translation Pty Ltd 10/04/02).

Other references

[9] ICNIRP, "Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz)", International Commission on Non-Ionizing Radiation Protection (ICNIRP), Health Physics, vol. 74, pp 494-522, April 1998.

[10] ANSI/IEEE C95.1-1992, "Safety levels with respect to human exposure to radio frequency electromagnetic fields, 3 kHz to 300 GHz", The Institute of Electrical and Electronics Engineers Inc., New York, 1992.

[11] CENELEC ENV 50166-2, "Human exposure to electromagnetic fields: High-frequency (10 kHz – 300 GHz)", European Prestandard, European Committee for Electrotechnical Standardization (CENELEC), January 1995.

[12] MPT, "Radio-radiation protection guidelines for human exposure to electromagnetic fields", Telecommunications Technology Council, Ministry of Posts and Telecommunications, Japan, April 1997.

[13] AS/NZS 2772.1(Int):1998, Interim Australian/New Zealand Standard, "Radiofrequency fields, Part 1: Maximum exposure levels – 3 kHz to 300 GHz", Standards Australia/Standards New Zealand, 1998.

[14] FCC Report and Order, ET Docket 93-62, FCC 96-326, Federal Communications Commission (FCC), August 1996.

[15] Safety code 6, Canadian Standard, Health Canada, 1999.

[16] Thomas Schmid, Oliver Egger, Niels Kuster, "Automated E-field scanning system for dosimetric assessments", *IEEE Transactions on Microwave Theory and Techniques*, vol. 44, pp. 105-113, January 1996.

[17] Schmid & Partner Engineering AG, "DASY3 User Manual", August 1999 Edition, Zurich, Switzerland.

[18] Klaus Meier, Michael Burkhardt, Thomas Schmid and Niels Kuster, "Broadband calibration of E-field probes in lossy media", *IEEE transactions on Microwave Theory and Techniques*, vol. 44, no. 10, pp. 1954-1962, October 1996.

[19] K. Pokovic, T Schmid and N. Kuster, "E-field Probe with Improved Isotropy in Brain Simulating Liquids", *Proceedings ELMAR*, Zadar, Croatia, June 23-25, 1996.

[20] NIS 81, "The treatment of uncertainty in EMC measurements", Technical Report, NAMAS Executive, National Physical Laboratory, Teddington, Middlesex, England, Edition 1, May 1994.

[21] Barry N. Taylor and Christ E. Kuyatt, "Guidelines for evaluating and expressing the uncertainty of NIST measurement results", NIST Technical Report 1297, National Institute of Standards and Technology, September 1994.

[22] T. Schmid and N. Kuster, "Preliminary uncertainty budget for SAR evaluations with DASY3," contribution to IEEE Standards Coordinating Committee 34, Subcommittee 2, July, 1998.

[23] ISO/IEC Guide Expres (1995-01),"Guide to the expression of uncertainty in measurement (1995)", Ed. 1.0 English, 1995.

[24] HP 8752C Network analyzer User's guide. Hewlett Packard part number 08752-90157.

[25] HP 85070D Dielectric probe kit manual, Hewlett Packard part number 85070-90009.

[26] M. Siegbahn, "A SAR test procedure for wireless devices with simultaneous multi-band transmission", EAB/TF-02:118, Rev. A, November 19, 2002

3. Physical quantities, units and constants

The physical quantities, units and constants given in section 3 of [2] and section 4 of [3] are applicable for this procedure document.

4. Definitions

The definitions given in section 4 of [2], section 3 of [3] and section 2 of [4] apply.

5. Measurement system specifications

Requirements and recommendations are listed in section 5 of [2] and [3] and in sections 3, 4 of 5 of [4].

5.1 General

Requirements and recommendations are listed in section 5.1 of [2] and [3] and in section 5.6.1.1 of [4].

Tests are performed using a miniature electric field probe that is positioned by a robot whose movements are software controlled. The probes are positioned to measure the internal electric field of a liquid-filled phantom representing the human head while the phantom is exposed to electromagnetic energy from a wireless device. The software processes the electric field data to determine the SAR distribution and the highest mass-averaged SAR.

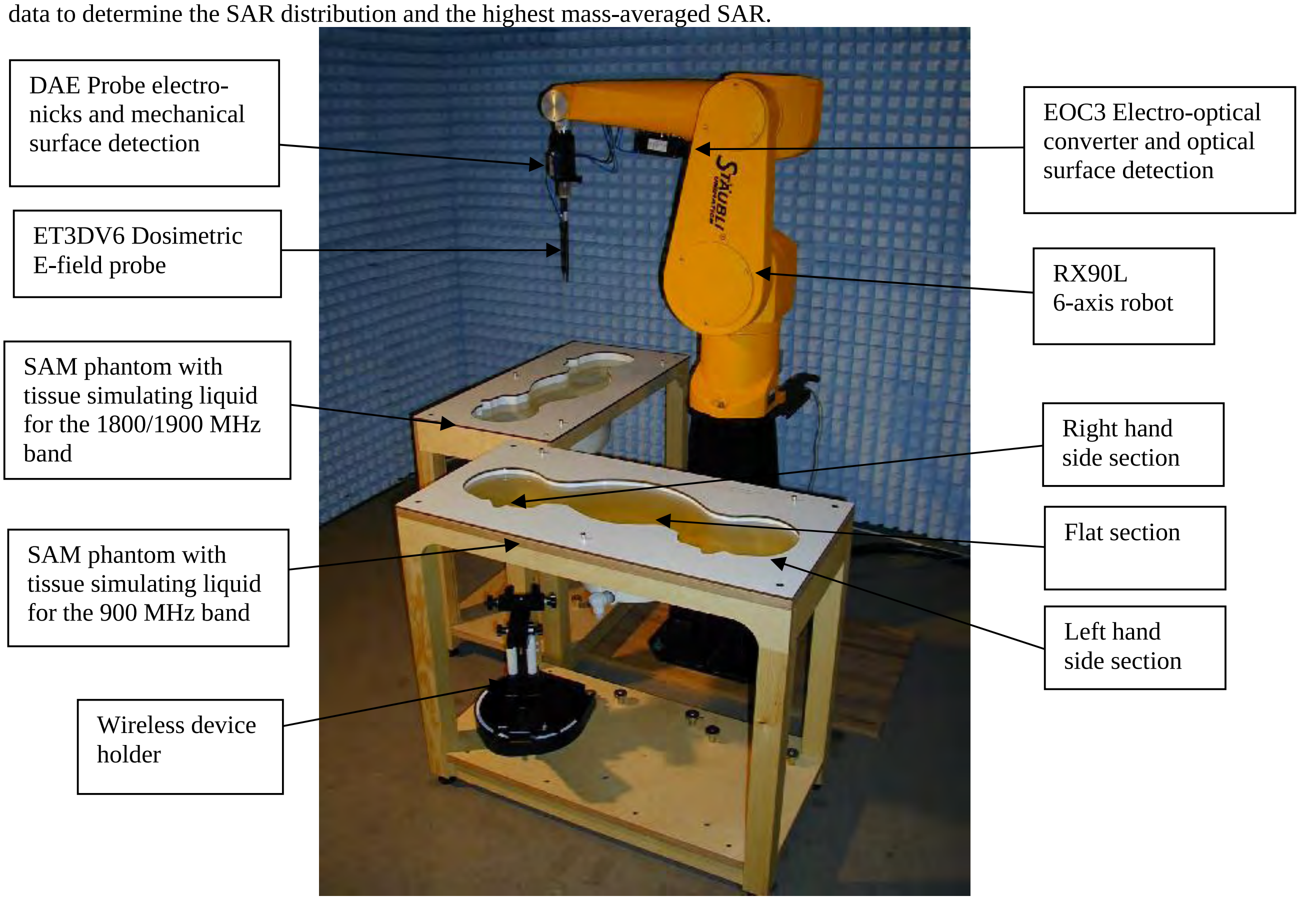


Figure 5.1 SAR measurement system

The SAR measurement system used in the Sony Ericsson SAR testing laboratories is the DASY near-field scanner manufactured by Schmid & Partner Engineering AG (SPEAG). The system is based on the E-field probe technique and includes a high precision 6-axis robot, liquid-filled plastic phantoms and miniature electric field probes [16, 17]. The specifications of the system are further described below. Figure 5.1 is a picture of the SAR measurement system.

The Ericsson SAR testing laboratories conform to the following environmental conditions:

- Measurements are conducted in a metal screen room, which is designed to provide shielding from external radiofrequency signals and to prevent devices under test from interfering with local wireless networks.
- The ambient temperature is kept in the range 20 – 25°C (this simultaneously satisfies several recommendations and requirements [2-5], which are 15 – 30°C, 18 – 25°C and 20 – 26°C, respectively).
- The relative humidity of the laboratory is kept within 30 – 70% [5].
- During measurements, the temperature of the liquid is kept within ±2 °C of the temperature at which the dielectric parameters were measured [2-4].
- The ambient noise level is kept low so that the 1-gram averaged SAR is below 12 mW/kg when the device under test (DUT) is turned off (this simultaneously satisfies the requirements of [2] and [4]).

5.2 Phantom

Phantom requirements and specifications are provided in section 5.2 of [2] and [3] and in section 4 of [4 and 5].

The phantom used is an implementation of the Specific Anthropomorphic Mannequin (SAM) model [2-5]. It consists of three measurement areas or sections, one section corresponding to right hand side use and an identical but mirrored section for the left-hand side. In the middle of the phantom there is a flat section for tests of mobile phones when worn on the body. The flat section is also used for system validation.

The phantom shell was manufactured by SPEAG to meet stringent shape, thickness and material requirements [2-5]. The length and width of the flat section are at least 0.75 λ_0 and 0.6 λ_0 respectively at frequencies of 824 MHz and above (λ_0 = wavelength in air).

The phantom is filled with a tissue simulating liquid to a depth of at least 15 cm at each ear reference point [2-5]. The dielectric properties of the liquid conform to all the tabulated values [2-5]. Liquids are prepared according to Annex A and dielectric properties are measured according to Annex B.

5.3 SAR measurement equipment

Measurement equipment requirements and specifications are provided in section 5.3 of [2] and [3] and in section 3 of [4 and 5].

The Dosimetric Assessment System (DASY) Professional by Schmid & Partner Engineering AG consists of the dosimetric probe ET3DV6 connected to the readout electronics DAE3 which is attached to the tool joint of a Stäubli RX90L 6-axis high precision robot. The measurement signal is transferred via a fiber optical link from the DAE3 to the electro-optical converter EOC3 that is connected to the ISA type PC card in the system computer.

The dosimetric probe is sensitive to E-fields and incorporates three dipoles arranged so that the overall response is close to isotropic [14, 15]. The probe sensors are covered by an outer protective shell made of plastic, which is resistant to organic solvents i.e. glycol. In the center line of the probe an optical fiber for surface detection is located. The table below summarizes the technical data of this probe. The E-fields probes have been calibrated once per year and after calibration Technical Lead Engineer or Technical Engineer are responsible to change correction factor in DASY system software for each probes. Other probe parameters are provided in the uncertainty budget in Section 7.

The DAE probe electronics incorporates one measurement amplifier for each sensor dipole and a mechanical surface detection system that automatically stops the robot in a probe collision emergency. The fiber optical surface detection system is located in the EOC. Either the mechanical or the optical surface detection system is used for controlling the distance between the probe and the inner surface of the phantom shell.

Property	**Data**
Frequency range	30 MHz – 3 GHz
Linearity	± 0.2 dB
Dynamic Range	5 μW/kg - >100 W/kg
Tip diameter (including protective cover)	6.8 mm
Distance from probe tip to sensors	2.7 mm
Length of sensor dipoles	3 mm
Optical surface detection repeatability	± 0.2 mm

Table 5.1 The technical data for the SAR probe ET3DV6.

Property	**Data**
Frequency range	10 MHz – 6 GHz
Linearity	± 0.2 dB
Dynamic Range	5 μW/kg - >100 W/kg
Tip diameter (including protective cover)	4 mm
Distance from probe tip to sensors	2 mm
Length of sensor dipoles	2 mm
Optical surface detection repeatability	± 0.2 mm

Table 5.2 The technical data for the SAR probe ES3DV3

The data acquisition electronic have been calibrated once per year and after calibration Technical Lead Engineer or Technical Engineer are responsible to change correction factor in DASY system software for each DAE.. System performance check is conducted for the complete system for each relevant tissue equivalent liquid at the appropriate frequency.

5.4 Scanning system

Requirements and recommendations are listed in section 5.4 of [2] and [3] and in section 5.5 of [4 and 5].

The robotic scanning system works in such a way that the system identifies the measurement areas in the phantom shell by three reference points located on the phantom table and a laser beam on the robot stand which determines the alignment of the probe. The coordinates of the three reference point are entered into the system by manually steering the robotic arm so that the probe tip is above each of these points. Measurement grids can then be defined in each of the available measurement sections of the phantom, the right ear section, the left ear section and in the middle of the shell, the flat section. The robotic arm automatically positions the probe in the selected measurement grid and the distance from the probe tip to the inner surface of the phantom shell is controlled by either a mechanical or an optical surface detection system. The measurement grids are defined so that the whole tested device is covered. During the measurement the local SAR results can be continuously monitored.

5.5 Wireless device holder

Requirements and recommendations are listed in section 5.5 of [2] and [3] and in section 4.1.4 of [4 and 5].

The wireless device holder is a positioning system that allows for very accurate and repeatable device positioning [17]. Tilt and rotation angles have a positioning repeatability better than 1°. Care is taken at the laboratory to ensure that the wireless device is placed in the holder in such a way that the holder has a minimal effect on the measured results. Test personnel are trained on proper positioning techniques.

5.6 Other equipment

Requirements and recommendations are listed in section 5.6 of [2] and [3] and in section 5.5 of [4 and 5].

The measurement system also includes dipole antennas for system performance checking and system validation procedures at frequency bands of interest. The dipole antennas conform to the specifications of Annex G of [3] and Annex F of [4]. These dipole antennas are checked yearly according to the following items:

- dipole arms are parallel to a flat surface with a tolerance of 2°.
- return loss at the center frequency is below –20 dB while the dipole is positioned under the flat phantom according to Section 7 of [4].
- current distribution along the dipole is symmetric within 5%, as measured using an H-field probe.
- SAR is measured in a flat phantom and compared with reference SAR values in Table D.1 of [3] or in Table 7.1 of [4 and 5].

SAR measurement system performance check is described in detail in Annex D.

6 Protocol for SAR assessment

Requirements and recommendations are listed in section 6 of [2] and [3] and in section 5 of [4 and 5].

This section presents an overview of the process of assessing SAR for a wireless terminal in Sony Ericsson SAR testing laboratories, the setup of the tested device and the measurement system, which tests are performed and how the test results are processed.

6.1 Measurement preparation

Requirements and recommendations are listed in section 6.1 of [2] and [3] and in section 5.4 and 5.6 of [4 and 5].

Prior to conducting SAR measurements of the DUT, the dielectric properties of the tissue simulating liquid are measured (see Annex B). System performance check (see Annex D) is performed prior to the SAR measurements or when any part of the SAR testing system has been altered, which includes change of probe and calibration of tissue simulating liquid etc.

For SAR compliance measurements, the peak output power level of the mobile phone is set to the maximum power level of that device with a digital radio tester acting as a base station. The peak power level is measured with either a power meter, a sensor suitable for the carrier frequency and the duty cycle, or a digital radio tester.

Tests are conducted for each of the test configurations of the DUT (operational modes, test frequencies, and configurations).

If the device is intended to be used next to the ear, it is positioned next to the SAM head phantom in the “cheek” and “tilt” positions on both the left and right sides of the phantom according to section 5.4 of [4 and 5].

If the device is intended to be used while placed against the body, the phone is tested on the flat section of the phantom. The device, with its original carry case(s) and with hands-free accessories, shall be positioned on the phantom simulating the intended use position, i.e. with the case placed against the phantom shell. Alternatively, the device can be placed against the phantom using a spacer that separates the device from the phantom by the minimum distance allowable using all carry cases. Additional guidance given in [5] on conducting body-worn measurements should be followed.

6.2 Tests to be performed

Requirements and recommendations are listed in section 6.2 of [2] and [3] and in section 5.6 of [4 and 5].
A wireless handset can have many test conditions (operational modes, test frequencies, configurations and test positions against the phantom). At a minimum, the steps outlined in the above listed sections are followed to determine the maximum spatial-averaged SAR of the device.

6.3 Measurement procedure

Requirements and recommendations are listed in section 6.3 of [2] and [3] and in section 5.6 of [4 and 5].
The measurement procedure is described in detail in Annex C. The measurement procedure can be summarized in the following steps:

1. Setup of DASY: liquid parameters, test device properties, probe, DAE and measurement areas are specified in the system configuration setting.

2. Setup of the device: positioning on the phantom, output power level and test channel are selected and checked.
3. SAR measurement, the following measurement jobs are conducted:
   - Reference measurement where the robot moves the probe to a fixed reference position in the tissue liquid and the E-field is recorded.
   - Coarse SAR scan with grid covering the whole device for finding maximum.
   - Fine cubical SAR scan around maximum for obtaining mass averaged SAR.
   - Second reference measurement for checking device output power drift. Repeat the SAR measurement if the drift is higher than ±5% (±0.21dB).
   - Surface checks (optional) where the robot repeatedly moves the probe to the phantom surface at a specified point to check the repeatability of the mechanical and optical surface detection are conducted before the reference measurements if needed. If the repeatability is greater than ±0.1 mm, the system should be inspected (e.g. check for air bubbles trapped under the probe) and the surface check procedure should be repeated.

6.4 Post processing

Requirements and recommendations are listed in section 6.4 of [2] and [3] and in section 5.5 of [4 and 5].
The specific absorption rate (SAR) is calculated from the recorded E-fields by the following expression:

$$SAR = \sigma \frac{E^2}{\rho}$$

where σ is the measured electric conductivity (S/m) of the liquid, *E* is the measured root-mean-squared E field (V/m), and ρ is the chosen tissue density (ρ = 1000 kg/m^3 = 1 g/cm^3 should always be used [2,4 and 5]). The SAR distribution of the tested device is determined by a coarse scan where the probe is moved in a coarse grid following the inner surface of the phantom. The size of the scanned region should be large enough to guarantee that all possible SAR peaks are included. The distance between adjacent measured points should be 10 – 20 mm [2-5]. Spline interpolation is then used to determine the point of maximum SAR.
The mass averaged SAR is determined by a fine cubical scan, a measurement taken on a fine grid around the position of the maximum SAR. The grid typically consists of 5x5x7 points with 8 mm between the individual points [2] and thus contains about 27 grams of tissue. Numerical extrapolation is then used to determine the SAR values between measurement points in the cube and in the small region between the cube and the inner surface of the phantom where the E-field sensors cannot be positioned. The extrapolation distance is the sum of the probe tip - sensor offset, the surface detection distance and the grid offset. The extrapolation is based on fourth-order polynomial functions. Next, a 3D-spline interpolation algorithm is used to interpolate the measured data to a 1g cube (20x20x20=8000 points) over which the SAR is averaged. The cube is shifted throughout the fine scan area until the highest averaged SAR is found. The same procedure is repeated for the 10 gram cube

(also 20x20x20=8000 points). If the 1g and 10g maximum SAR is found when the averaging cube is touching any side of the measurement grid a message “Maximum outside” is given and a second fine scan has to be conducted. This in order to assess the absolute maximum mass averaged SAR.

7 Measurement uncertainty

Requirements and recommendations are listed in section 7 of [2] and [3] and in sections 3 and 4 of [4 and 5].
The measurement uncertainty of the DASY has been determined according to the NIS81 [18] and NIST1297 documents [19]. The total uncertainty of the SAR assessment is composed of two main factors: measurement uncertainty and source uncertainty. Each of these uncertainties consists of a number of individual factors. A detailed breakdown of uncertainties, according to T. Schmid *et. al*. [20], is provided in Annex E. The combined uncertainty (k=1) of the 1g SAR assessment is ± 13.6% and for 10g SAR assessments ± 13.3%. The extended uncertainties (k=2) is ± 27.1% and ± 26.6% for 1g and 10g assessments, respectively [21].

Annex A Tissue simulating material preparation

This section describes the preparation procedure for the tissue simulating liquids used in SAR testing.

A.1 Liquid parameters

The liquids prepared for the SAR testing meet both the requirements of [2] in table 1 and the requirements of [3] and [4 and 5] in table 2. The parameters below are applicable to average head tissue simulating material. Since dielectric parameters for average body tissue have not yet been developed, liquids meeting the below stated data are also used for measurements of body SAR. The parameters for a liquid used in SAR measurements has to be within ±5% of the target values.

Frequency (MHz)	ε_r	σ (S/m)
300	45	0.85
450	44	0.88
900	42	0.99
1450	41	1.20
1800	40	1.38
2450	39	1.84
3000	39	2.40

Table A.1. The dielectric properties of tissue simulating material given in [2].

Frequency (MHz)	ε_r	σ (S/m)
300	45.3	0.87
450	43.5	0.87
835	41.5	0.90
900	41.5	0.97
1450	40.5	1.20
1800	40.0	1.40
1900	40.0	1.40
2000	40.0	1.40
2450	39.2	1.80
3000	38.5	2.40

Table A.2. The dielectric properties of tissue simulating material given in [3], [5] and [6].

A.2 Liquid recipes

Ingredients

Water	distilled water
Sugar	as available in food shops
Salt	as available in food shops (Note, no iodine!)
Cellulose	HEC Hydroxyethyl-cellulose (Optional ingredient)
Preservative	Preventol D7 Bayer AG or Sodium Nitrate
DGBE	Diethyleneglycolbutyl ether (CAS No. 112-34-5)

Note 1: It is important to follow the instructions provided in the Material Safety Data Sheet (MSDS) for any material, or any local regulations. It is also important to have material handling procedures (including procedures for handling, storage and disposal).

Sony Ericsson

Company Internal
INSTRUCTION

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Checked:
Date: 060220
Rev: E
Reference: File

Note 2: Similar materials can also be substituted for the ones above (e.g. deionized water instead of distilled water). The specifications of the materials (e.g. purity) are not critical (although they may change the recipes below), because the after the tissue simulating liquid is made, its dielectric parameters must be verified to be within the target ranges.

Preparation equipment

- Balance (range: 0-6000 g, accuracy: ± 0.1g)
- Stirrer with hotplate
- Jars and beakers
- Mixing spoon

Liquids for the 835 MHz and 900 MHz

	835 MHz and 900 MHz head	
Ingredient	**weight (%)**	**weight (g)**
Distilled water	40.29	532.63
HEC	0.24	3.20
NaCl	1.40	18.29
Preservative	0.18	2.4
Sugar	57.90	765.49
Total amount		**1322.00**
Goal		
Frequency (MHz)	835	900
Relative Permittivity	41.5	41.5
Conductivity	0.90	0.97

	835 MHz and 900 MHz body	
Ingredient	**weight (%)**	**weight (g)**
Distilled water	50.75	633.91
HEC	-	0.00
NaCl	0.94	11.76
Preservative	0.10	1.2
Sugar	48.21	602.12
Total amount		**1249.00**
Goal		
Frequency (MHz)	835	900
Relative Permittivity	55.2	55.0
Conductivity	0.97	1.05

Liquids for the 1800 MHz and 1900 MHz

	1800 MHz and 1900 MHz head	
Ingredient	**weight (%)**	**weight (g)**

Distilled water	55.24	552.42
DGBE	44.45	444.52
NaCl (Salt)	0.31	3.06
Total amount		**1000.00**
Goal Frequency (MHz) Relative Permittivity Conductivity	 1800 40.0 1.40	 1900 40.0 1.40

	1800 MHz and 1900 MHz body	
Ingredient	**weight (%)**	**weight (g)**
Distilled water	70.17	701.66
DGBE	29.44	294.42
NaCl (Salt)	0.39	3.92
Total amount		**1000.00**
Goal Frequency (MHz) Relative Permittivity Conductivity	 1800 53.3 1.52	 1900 53..3 1.52

Liquids for the 2450 MHz

	2450 MHz head	
Ingredient	**weight (%)**	**weight (g)**
Distilled water	55.0	550.00
DGBE	45.0	450.00
Total amount		**1000.00**
Goal Frequency (MHz) Relative Permittivity Conductivity	 2450 39.2 1.80	

	2450 MHz body	
Ingredient	**weight (%)**	**weight (g)**
Distilled water	68.64	686.64
DGBE	31.37	313.65
Total amount		**1000.00**
Goal Frequency (MHz) Relative Permittivity Conductivity	 2450 52.7 1.95	

A.2 Preparation procedure

Sugar-based liquids

Add the water to a large container. Begin heating and stirring.

Add the cellulose, preservative and salt (if required). While keeping the container covered, leave the solution on the heating plate until the mixture becomes sufficiently transparent and homogeneous. The temperature of the mixture should be hot enough to aid in mixing the ingredients but cool enough to prevent a significant amount of water evaporation.

Add the sugar. Hand stirring may be necessary at the beginning until the sugar is sufficiently dissolved.

Keep the liquid hot and the container covered until the solids are dissolved and the liquid is homogenous.

Turn the hotplate off and allow the liquid to cool off to room temperature prior to performing dielectric measurements.

Alcohol-based liquids

1. Add all the ingredients in a large container.
2. Stir until the liquids are solved.

A.3 Tissue liquid maintenance

In order to keep the dielectric parameters of the tissue simulating liquids within their target ranges, ingredients may be added to adjust the parameters. For example, one can add water to increase the permittivity, sugar to reduce the permittivity or salt to increase the conductivity. Parameters should each be within a ±5% range of target values.

A batch of tissue simulating liquid may last several months or more but regular maintenance is necessary in order to keep the dielectric properties within target ranges. The electrical parameters of the tissue simulating liquids are assessed prior to SAR compliance testing and checked that they are within tolerance of the specified values (see tables above). The parameters are subject to small variations due to evaporation, and ingredients have to be added on a regular basis in order to adjust the parameters. The amount of ingredient to add depends on the parameter deviations and the total liquid volume and is therefore not easily calculated. However, based on experience, for sugar-salt-water liquids a rule of thumb can be applied: to a 25-liter liquid with a permittivity deviation of about -7% and a conductivity deviation around -3% to -7%, 200 – 400 grams of water should be added. It is recommended that a batch be disposed of and replaced with a new batch when it becomes difficult to keep its dielectric parameters within the ranges specified.

Annex B: Dielectric property measurements

This annex describes the procedures used to measure the dielectric properties of the tissue simulating liquid.

B.1 Equipment

- HP network analyzer, models in the HP8753 series, HP8752C or similar
- HP dielectric probe kit HP85070 of versions A, B, C or D [25]
- HP 85070 software (any software version)
- PC using GPIB card [24] for communication with network analyzer
- Syringe
- Small glass jars for liquid samples
- Thermometer

B.2 Procedure for testing tissue simulating liquid

1. Turn the NWA (Network analyzer) on and allow it to warm up.
2. Start the PC and run the HP 85070 software.
3. Mount dielectric probe kit so that interconnecting cable to NWA will not be moved during measurement or calibration.
4. Perform calibration according to the HP85070 manual [25]. In short the following steps are covered:
    - Inspect the probe and ensure that it is properly cleaned.
    - Pour distilled water in a sample container and measure the water temperature.
    - Set start and stop frequency, frequency step and water temperature.
    - Perform calibration measurement with probe in air, connected to short circuiting block and in distilled water. Assure proper contact which requires attaching the block firmly. Monitor the polar chart on the network analyzer to assure good contact as explained in the manual.
5. Assure that the probe is thoroughly cleaned before performing the measurement.
6. Inspect the liquid for in homogeneities. Surface bubbles can be moved to one side, but if there are numerous bubbles throughout the liquid (e.g. as happens after a new liquid has been poured into a phantom), wait until the bubbles have floated to the surface before proceeding. Also remove any debris or lumps in the liquid.
7. Stir the liquid to be measured.
8. Measure the temperature of the tissue simulating liquid in the phantom. Save value for reference, SAR measurements are only conducted for temperatures $\pm 2^{o}$C from this reference temperature.
9. Extract a sample (approximately 50 ml or more).
10. Measure liquid shortly after calibration of the network analyzer and at most within an hour of this calibration. It is also important to measure the liquid sample soon after extracting it so that evaporation and temperature variation do not affect the results.
11. Immerse the dielectric probe in the liquid sample. Check that there are no air bubbles in front of the opening in the dielectric probe kit.
12. Perform measurements. Repeat measurement five times to increase reliability and use average value for comparison with target value. If a single measurement deviates substantially from the rest then redo that measurement to reject possible artifact. The accuracy specified by the dielectric probe kit manufacturer [23] is ±5% for the dielectric constant ε' and ±0.05 for the loss tangent $\varepsilon''/\varepsilon'$.
13. Conductivity σ can be calculated from ε'' according to
$$\sigma = \omega\varepsilon_{o}\varepsilon'' \cong \varepsilon'' f\text{ (GHz)}/18.$$
14. Clean the probe thoroughly after use.
15. Pour the sample back into the phantom.

Annex C: SAR measurement procedure

This section gives a step-by-step procedure for measuring the DUT. The instructions of this section are only valid under the assumption that the measurement equipment is calibrated. More information is found in the user manual for the measurement system [13].

C.1 Initial setup

1. Ensure that the computer, robot controller and DAE are turned on, and that the DASY software is running.
2. Press the robot button on the toolbar to set up the communications between the software and the robot. Go through the self-check procedure in the software to ensure that the system is properly running and set up for measurement.
3. Choose the appropriate test configuration in the "Setup" menu. NOTE, check that the medium parameters in the "options" window are equal to those measured previously with the dielectric probe kit for the liquid in the phantom.
5. Remove the plastic cover on the phantom.
6. Verify that the system knows the reference points on the phantom. Check the distance between the reference points and the probe tip with the plastic spacer. If it does not accurately locate one or more of the points, install the reference points. Should the installation fail to give results within the tolerances set out in the factory settings for the phantom, the procedure will give an error and the user will have to reinstall the reference points. Afterwards, move the probe to the resting point above the flat section.
7. Stir the liquid in the phantom to ensure that it is homogeneous. Surface bubbles can be moved to one side, but if there are numerous bubbles throughout the liquid (e.g. as happens after a new liquid has been poured into a phantom), wait until the bubbles have floated to the surface before proceeding. Also remove any debris or lumps in the liquid.
8. Measure the temperature of the tissue simulating liquid in the phantom. The liquid temperature has to be within ±2 °C of the temperature recorded when the electrical parameters were measured.

C.2 Measurement procedure

The following steps should be carried out for each of the test conditions described in Section 6.2.

1. Open the appropriate predefined measurement file or prepare a new measurement file by selecting jobs from the menu. The measurement file contains the following jobs: reference measurement, drift measurement, coarse scan covering the whole device, two cubical fine scans and a final drift measurement. The recording time for the coarse and fine scans is 1 second, which gives sufficient accuracy, but for reference/drift measurements 4 seconds giving increased noise-reduction. Additionally, a surface check can be inserted before the reference/drift measurements. During this check, the robot repeatedly moves the probe to the phantom surface at a specified point to check the repeatability of the mechanical and optical surface detection. If the repeatability is worse than ±0.1 mm, the system should be inspected (e.g. check for air bubbles trapped under the probe) and the surface check procedure should be repeated. Save the measurement file under an appropriate name.
2. Move the probe so that the tip is below the surface of the liquid in the selected measurement section. Stir the liquid again to remove any bubbles trapped under the probe tip.
3. Power on the DUT and set it to transmit at full power in one of the operational configurations (as described in Section 6.1). Check the signal with the spectrum analyzer.
4. Position the DUT against the phantom in one of the required test positions (as described in Section 6.1).
5. Select and start the first five measurement jobs; reference measurement, 3-minute time sweep, drift measurement, the coarse and one fine scan). Note the time sweep can be omitted once the device has warmed up.

6. Check the measured fine scan when the measurement jobs have been completed. If the maximum SAR has been found within the measured grid (no system message “Maximum outside”) delete the second fine scan in the file and proceed with the final drift measurement. Otherwise, measure both the second fine scan and the drift measurement. Additionally, check for local maxima of at least 50% of maximum SAR.

7. Check the system drift. If the measurement data is not within ±5% (±0.21 dB), check the DUT and change battery if necessary, check the DASY and repeat the measurement. If the drift cannot be maintained within 5%, add the drift to the measured SAR value.

8. Save the measurement data and enter it into the laboratory log.

C.3 Post measurement procedure

When the SAR measurements are finished, do the following:

1. Power off the DUT.
2. Move the probe to the resting point and clean it with water.
3. Put the plastic cover on the phantom.

Annex D: Measurement system performance check and validation

D.1 General

Measurement system validation consists of three procedures:
1. System performance checking
2. System validation
3. Inter laboratory comparison

These three procedures are defined in section 7 of [4 and 5]. System performance checking and inter laboratory comparison are also described in Annex D of [2] (they are called Simplified performance checking and system validation, respectively) and in Annex D of [3].

System performance checking is conducted prior to the SAR testing of a wireless device with a reference dipole antenna and the flat section of the SAM phantom. The results are compared to reference data provided by the system manufacturer, Schmid & Partner Engineering AG. The DASY3 manufacturer conducts system validation. Inter laboratory comparison between the Ericsson SAR testing laboratories is conducted according to a separate procedure.

D.2 System performance check procedure

System performance check is conducted according to the following steps.

Setup of the dipole antenna

1. Turn on the signal generator, power meter and power amplifier (if used). Allow them sufficient time to warm up, to reduce drift.
2. Position the dipole antenna under the flat phantom and adjust the height of the stand until the specified spacer is touching the shell of the flat phantom. The center of the dipole antenna should be positioned under the middle of the flat phantom, as indicated by a mark on the flat phantom.
3. Connect one end of the coax line to the power meter sensor and the other end to the output of the signal generator. If the power amplifier is used, connect it between the signal generator and the power meter sensor.
4. Set the signal generator to transmit in CW mode and ensure that any signal modulation is turned off. This ensures that the power amplifier will transmit a pure sinusoid.
5. Set the frequency of the signal generator to the resonant frequency of the dipole antenna.
6. Set the output power of the signal generator (and optionally adjust the gain of the power amplifier) so that the same amount of power as used by the system manufacturer at calibration is delivered to the power meter.
7. Disconnect the coax line from the power meter and connect it to the dipole antenna.

Setup of the DASY

1. Mount the 3D electric field probe, as shown in the SPEAG manual.
2. Remove the plastic cover on the phantom.
3. Power up the DAE. The LED indicates that the power is on.
4. Power up the computer.
5. Turn on the robot controller
6. Start the DASY software on the computer.

7. Choose the appropriate measurement configuration in the "Setup" menu of the software for the dipole measurement. Record the dielectric constant and conductivity of the liquid in the program.

8. Press the robot button on the toolbar to set up the communications between the software and the robot. Go through the self-check procedure in the software to ensure that the system is properly running and set up for measurement.

9. Verify that the robot knows the reference points on the phantom. Check the distance between the reference points and the probe tip with the plastic spacer. If it does not accurately locate one or more of the reference points to within ±5 mm, install the reference points. Should the installation fail to give results within the tolerances set out in the factory settings for the phantom, the procedure will give an error and the user will have to reinstall the reference points. Afterward, move the probe to the resting point above the flat section.

10. Measure the temperature of the tissue simulating liquid in the phantom. The liquid temperature has to be within ±2 °C of the temperature recorded when the electrical parameters were measured.

Measurement procedure

1. Open a measurement file. Select the predefined dipole test provided by SPEAG. This file includes all of the necessary measurements for the dipole test. Rename the file with an appropriate name and save it in the appropriate directory.

2. Tell the robot to move the probe tip below the surface of the liquid. Stir the liquid again to remove any bubbles trapped under the probe tip.

3. Select and start the measurement jobs in the file. These include the reference check, coarse scan, fine scan, and drift measurements.

Analysis of measured data

1. Normalize the measurement data to 1 Watt and compare the one-gram and ten-gram averaged peak SAR values to the standard values provided in the reference documents. If they do not agree within ±10%, check the system parameters (e.g. antenna output power, dielectric parameters of the tissue simulating liquid, homogeneity of the liquid) and repeat the measurement.

2. Also check that the distribution of measured SAR agrees with that provided in the reference data. The peak SAR should be located over the center of the dipole, and the SAR should monotonically decrease away from this point. If the SAR distribution does not compare well with the reference data, repeat the measurement.

3. Make sure that the drift measurement is within ±5% (±0.2 dB). If not, check the system parameters and repeat the measurement.

4. Save the measurement data and enter it into the logbook.

5. Move the probe out of the liquid and clean it with warm water.

Annex E Uncertainty budgets for 1g and 10g SAR assessments with DASY

E.1 Uncertainty budget for measurements of 1g mass averaged SAR

Error description	Uncertainty (%)	Distrib.	Divisor	c_i 1g	Standard unc 1g (%)	v_i^2 or v_{eff}
Measurement system						
Probe calibration	± 4.4	Normal	1	1	± 4.4	∞
Axial isotropy	± 4.7	Rectang.	√3	$(1-c_p)^{1/2}$	± 1.9	∞
Spherical isotropy	± 9.6	Rectang.	√3	$(c_p)^{1/2}$	± 3.9	∞
Spatial resolution	± 0.0	Rectang.	√3	1	± 0.0	∞
Boundary effects	± 5.5	Rectang.	√3	1	± 3.2	∞
Probe linearity	± 4.7	Rectang.	√3	1	± 2.7	∞
Detection limit	± 1.0	Rectang.	√3	1	± 0.6	∞
Readout electronics	± 1.0	Normal	1	1	± 1.0	∞
Response time	± 0.8	Rectang.	√3	1	± 0.5	∞
Integration time	± 1.4	Rectang.	√3	1	± 0.8	∞
RF ambient conditions	± 3.0	Rectang.	√3	1	± 1.7	∞
Mech. Constraints of robot	± 0.4	Rectang.	√3	1	± 0.2	∞
Probe positioning	± 2.9	Rectang.	√3	1	± 1.7	∞
Extrap. and integration	± 3.9	Rectang.	√3	1	± 2.3	∞
Test sample related						
Device positioning	± 6.0	Normal	0.89	1	± 6.7	12
Device holder uncertainty	± 5.0	Normal	0.84	1	± 5.9	8
Power drift	± 5.0	Rectang.	√3	1	± 2.9	∞
Phantom and setup						
Phantom uncertainty	± 4.0	Rectang.	√3	1	± 2.3	∞
Liquid conductivity (target)	± 5.0	Rectang.	√3	0.6	± 1.7	∞
Liquid conductivity (meas)	± 10.0	Rectang.	√3	0.6	± 3.5	∞
Liquid permittivity (target)	± 5.0	Rectang.	√3	0.6	± 1.7	∞
Liquid permittivity (meas)	± 5.0	Rectang.	√3	0.6	± 1.7	∞
Combined standard uncertainty					± 13.6	
Extended standard uncertainty (k=2)					**± 27.1**	

E.2 Uncertainty budget for measurements of 10g mass averaged SAR

Error description	Uncertainty (%)	Distrib.	Divisor	c_i 10g	Standard unc 10g (%)	v_i^2 or v_{eff}
Measurement system						
Probe calibration	± 4.4	Normal	1	1	± 4.4	∞
Axial isotropy	± 4.7	Rectang.	√3	$(1-c_p)^{1/2}$	± 1.9	∞
Spherical isotropy	± 9.6	Rectang.	√3	$(c_p)^{1/2}$	± 3.9	∞
Spatial resolution	± 0.0	Rectang.	√3	1	± 0.0	∞
Boundary effects	± 5.5	Rectang.	√3	1	± 3.2	∞
Probe linearity	± 4.7	Rectang.	√3	1	± 2.7	∞
Detection limit	± 1.0	Rectang.	√3	1	± 0.6	∞
Readout electronics	± 1.0	Normal	1	1	± 1.0	∞
Response time	± 0.8	Rectang.	√3	1	± 0.5	∞
Integration time	± 1.4	Rectang.	√3	1	± 0.8	∞
RF ambient conditions	± 3.0	Rectang.	√3	1	± 1.7	∞
Mech. Constraints of robot	± 0.4	Rectang.	√3	1	± 0.2	∞
Probe positioning	± 2.9	Rectang.	√3	1	± 1.7	∞
Extrap. and integration	± 3.9	Rectang.	√3	1	± 2.3	∞
Test sample related						
Device positioning	± 6.0	Normal	0.89	1	± 6.7	12
Device holder uncertainty	± 5.0	Normal	0.84	1	± 5.9	8
Power drift	± 5.0	Rectang.	√3	1	± 2.9	∞
Phantom and setup						
Phantom uncertainty	± 4.0	Rectang.	√3	1	± 2.3	∞
Liquid conductivity (target)	± 5.0	Rectang.	√3	0.6	± 1.4	∞
Liquid conductivity (meas)	± 10.0	Rectang.	√3	0.6	± 2.9	∞
Liquid permittivity (target)	± 5.0	Rectang.	√3	0.6	± 1.4	∞
Liquid permittivity (meas)	± 5.0	Rectang.	√3	0.6	± 1.4	∞
Combined standard uncertainty					± 13.3	
Extended standard uncertainty (k=2)					**± 26.6**	