TCC
Nokia

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SAR Compliance Test Report

Test report no.:	FCC_RM-852_01	**Date of report:**	2012-06-01
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Measurements made by:	Zhang Luwen		
Tested device:	RM-852		
FCC ID:	QTLRM-852	**IC:**	661AB-RM852
Supplement reports:	SAR_Photo_RM-852_02		
Testing has been carried out in accordance with:	**47CFR §2.1093** Radiofrequency Radiation Exposure Evaluation: Portable Devices **FCC OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01)** Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields **RSS-102** Evaluation Procedure for Mobile and Portable Radio Transmitters with Respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields **IEEE 1528 - 2003** IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Technique		
Documentation:	The documentation of the testing performed on the tested devices is archived for 15 years at TCC Nokia.		
Test results:	**The tested device complies with the requirements in respect of all parameters subject to the test.** The test results and statements relate only to the items tested. The test report shall not be reproduced except in full, without written approval of the laboratory.		

Date and signatures:

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1. SUMMARY OF SAR TEST REPORT

1.1 Test Details

Period of test	2012-05-28 to 2012-05-31
SN, HW and SW numbers of tested device	SN: 004402/13/921604/2; 004402/13/921605/9, HW: 0202, SW: tnd12w19, DUT: 52588
Batteries used in testing	BL-4U, DUT: 52591, 52590
Headsets used in testing	WH-102, DUT: 52541
Other accessories used in testing	-
State of sample	Prototype unit
Notes	-

1.2 Maximum Results

The maximum measured SAR values for Head configuration and Body Worn configuration are given in section 1.2.1 and 1.2.2 respectively. The device conforms to the requirements of the standard(s) when the maximum measured SAR value is less than or equal to the limit.

1.2.1 Head Configuration

Mode	Ch / *f*(MHz)	Conducted power	Position	Measured SAR value (1g avg)	Scaled* SAR value (1g avg)	SAR limit (1g avg)	Result
GSM 850	251 / 848.8	32.5 dBm	Left, Cheek	0.761 W/kg	**0.85 W/kg**	1.6 W/kg	PASSED
GSM 1900	512 / 1850.2	30.5 dBm	Right, Cheek	0.797 W/kg	**0.89 W/kg**	1.6 W/kg	PASSED

1.2.2 Body Worn Configuration

Mode	Ch / *f*(MHz)	Conducted power	Separation distance	Measured SAR value (1g avg)	Scaled* SAR value (1g avg)	SAR limit (1g avg)	Result
GSM 850	251 / 848.8	32.5 dBm	1.5 cm	0.710 W/kg	**0.80 W/kg**	1.6 W/kg	PASSED
GSM 1900	512 / 1850.2	30.5 dBm	1.5 cm	0.430 W/kg	**0.48 W/kg**	1.6 W/kg	PASSED

* SAR values are scaled up by 12% to cover measurement drift. As a consequence of this upwards correction of the SAR values, the contribution of measurement drift to the overall measurement uncertainty (Section 6) is reduced to zero.

1.2.3 Summary SAR data

		FCC-defined SAR values for the Grants of Equipment Authorization
Maximum Cellular/AWS/PCS Head SAR value		**0.89 W/kg**
Maximum WLAN Head SAR value		-
{Max + Max} Simultaneous Head SAR value	-	
Maximum Cellular/AWS/PCS Body SAR value		**0.80 W/kg**
Maximum WLAN Body SAR value		-
{Max + Max} Simultaneous Body SAR value	-	
Maximum Product Specific (Wireless Router) SAR value		**-**
Maximum Simultaneous SAR value		**-**

1.2.4 Maximum Drift

Maximum drift covered by 12% scaling up of the SAR values	Maximum drift during measurements
0.5dB	0.34 dB

1.2.5 Measurement Uncertainty

Expanded Uncertainty (k=2) 95%	± 25.8%

2. DESCRIPTION OF THE DEVICE UNDER TEST

Device category	Portable
Exposure environment	General population / uncontrolled

Modes of Operation	Bands	Modulation Mode	Duty Cycle	Transmitter Frequency Range (MHz)
GSM	850 1900	GMSK	1/8	824 – 849 1850 – 1910
GPRS	850 1900	GMSK	1/8 to 4/8	824 – 849 1850 – 1910
BT	2450	GFSK	1	2402 – 2480

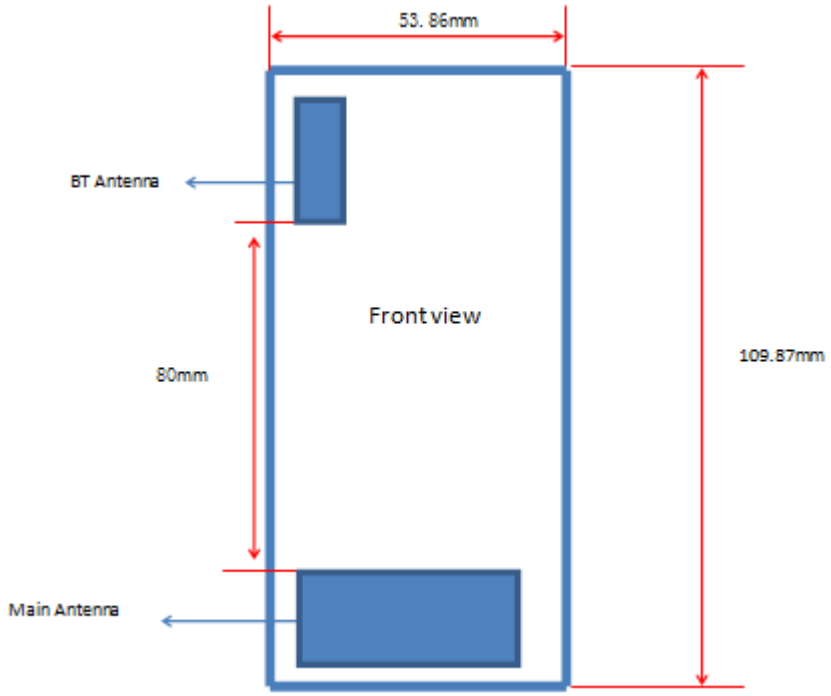
This is a dual-SIM device. As both SIMs use the same antenna and transmitter chain, full evaluation of this device has been made by activating a single SIM only.

This is a BT Class 1 device; as its power tuning target is 6 dBm (4 mW), SAR testing was deemed unnecessary

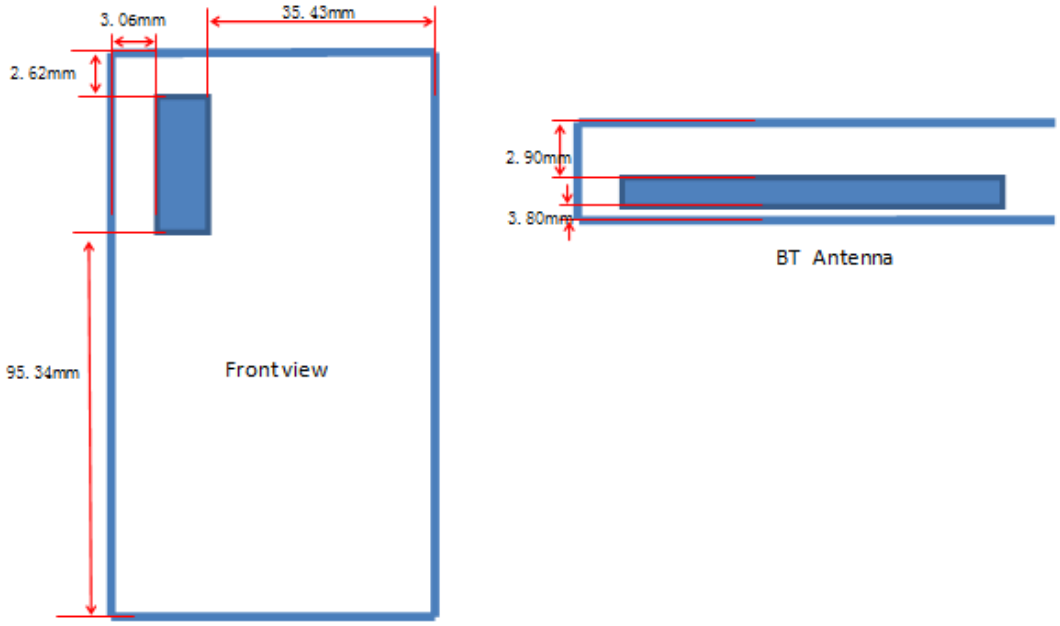
2.1 Description of the Antenna

The device has internal antennas for cellular/PCS and BT use. The cellular/PCS antenna is located at the bottom underneath the back cover. The BT antenna is located at the top underneath the back cover. The device dimensions, antenna locations and antenna interdistances are illustrated below.

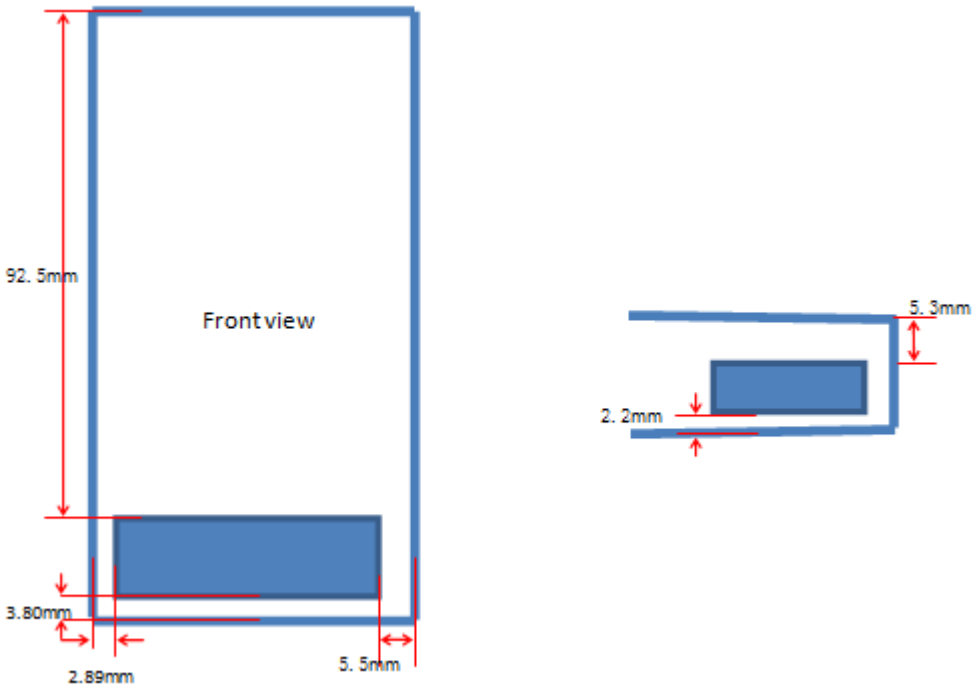
Phone Outside Dimension and Distance Between Main Antenna, BT Antenna



Distance between Device Edges and Faces and BT Antenna



Distance between Device Edges and Faces and Main Antenna



3. TEST CONDITIONS

3.1 Temperature and Humidity

Ambient temperature (°C):	20.5 – 22.5
Ambient humidity (RH %):	35 - 55

3.2 Test Signal, Frequencies and Output Power

The device was put into operation by using a call tester. Communication between the device and the call tester was established by air link.

The device output power was set to maximum power level for all tests; a fully charged battery was used for every test sequence.

This device was tested in all the available multi-slot GMSK GPRS modes.

In all operating bands the measurements were performed on lowest, middle and highest channels.

3.3 Test Cases and Test Minimisation

The tested device examined in this report may not incorporate all of the features described in the text that follows, but its SAR evaluation will have been subjected to the same considerations and test logic described below.

Whilst it's possible to identify the maximum SAR test cases from inspection of the conducted power levels given in the Results tables (Section 7), different modes in the same band and multi-slot transmit GSM/GPRS modes can create some difficulties. Therefore the sequence of the SAR tests made in evaluating this device has used test logic that is based on measured SAR values. Comparison of measured SAR values in this way, can also allow some test minimization (i.e. test elimination) to be made.

For example, when SAR testing multi-slot GSM/GPRS/EGPRS modes, it is an inefficient use of test resources to fully SAR test every test configuration in each of the different modes as these modes have a fixed power relationship between them that is the same, irrespective of the test configuration. In the case of multi-slot GSM/GPRS modes, a single comparative SAR test - using the same test channel and test configuration – is made in each of the n-slot modes; the mode with the highest measured SAR value is then subjected to full SAR testing in all test configurations. These comparative SAR tests (same frequency, same test configuration) are regarded as extremely accurate as they are relative tests in which the tested device changes neither its frequency nor its position between tests. For different modes that operate in the

same band and use the same antenna e.g. GSM/GPRS850 and WCDMA850, full SAR testing is carried out in the GSM/GPRS850 mode but WCDMA850 testing is limited to 3 channel testing in the maximum SAR test configuration for GSM/GPRS850.

Multi-slot SAR testing against the Head is always performed whenever such a device offers Push to Talk over cellular with the internal earpiece active, Dual Transfer Mode (i.e. the ability to transmit voice and data simultaneously using the same transmitter) or has WLAN (which enables a Voice over IP call to take place whilst the device can simultaneously transmit data on a cellular band). Whenever a device has an intended multi-slot use against the head, it is also Head SAR tested in EGPRS mode. It should be noted that EGPRS transmit modes can have either GMSK or 8PSK modulation but, when tested, only 8PSK EGPRS will appear explicitly in the results tables, as GMSK EGPRS mode has identical time-averaged power to the reported GPRS mode.

Devices that have flips or slides are fully SAR tested in all device configurations consistent with their intended usage. For example, flip phones that can receive a call in closed mode are SAR tested against the head in both open and closed configurations. Similarly, slide phones are fully SAR tested in all slide configurations in which calls are intended to be made or received.

In the results tables in Section 7, the maximum SAR value for the 'basic' tests (i.e. left cheek, left tilt, right cheek and right tilt in Head SAR testing; with and without headset with the back &/or display side facing the flat phantom in Body SAR testing) is bolded for each band. In some cases, after full testing of the basic SAR test configurations has been completed, additional checking SAR tests are made. These checking tests are always based on the bolded result from the 'basic' testing. When the SAR value of a checking test exceeds the maximum value from the basic tests, it is also bolded and used as the basis for any further checking tests that might be needed.

Checking tests are largely voluntary and can cover optional batteries, different camera slide positions, optional covers, etc. In the case of optional batteries, if the construction of the optional battery is significantly different to the battery used in the full testing e.g. if the outer can is floating electrically rather than grounded, then the maximum SAR test configuration in each band is tested with the optional battery in 3 channels. For camera slides, if the slide material is metal, then checking tests in 3 channels are again run for the maximum SAR test configuration in each band. For plastic camera slides, SAR checking is only carried out in the channel that provided the maximum SAR value for the original. Optional front and back covers are tested if their shape differs significantly from the original or if their metallic content varies by more than 15% from the original; in the former case, the testing depends on the extent of the physical differences, whereas in the latter case, 3 channel SAR testing is performed in every band in the max SAR test configuration.

4. DESCRIPTION OF THE TEST EQUIPMENT

4.1 Measurement System and Components

The measurements were performed using an automated DASY near-field scanning system manufactured by Schmid & Partner Engineering AG (SPEAG) in Switzerland. The SAR extrapolation algorithm used in all measurements was the 'advanced extrapolation' algorithm.

The following table lists calibration dates of SPEAG components:

Test Equipment	Serial Number	Calibration date	Calibration expiry
DAE 4	1319	2012-02	2013-02
E-field Probe ES3DV3	3836	2012-02	2013-02
Dipole Validation Kit, D835V2	479	2011-03	2013-03
Dipole Validation Kit, D1900V2	547	2011-10	2013-10
DASY4 software	Version 4.7	-	-

Additional test equipment used in testing:

Test Equipment	Model	Serial Number	Calibration date	Calibration expiry
Signal Generator	E4432B	US40052231	2012-04	2013-04
Call Tester	CMU200	835352/008	-	-
Amplifier	AR 5SIG4M3	302339	-	-
RF Network Analyzer	8753ES	My40002096	2012-04	2013-04
Dielectric Probe Kit	85070C	2577	-	-
Power Meter	Agilent E4419B	My41291520	2012-04	2013-04
Power Sensor	Agilent 8482A	US37295411	2012-04	2013-04

4.1.1 Isotropic E-field Probe Type ES3DV3

Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., butyl diglycol)
Calibration	Calibration certificate in Appendix D
Frequency	10 MHz to 4 GHz (dosimetry); Linearity: ± 0.2 dB (30 MHz to 4 GHz)
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.3 dB in HSL (rotation normal to probe axis)
Dynamic Range	5 µW/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm Tip length: 20 mm Body diameter: 12 mm Tip diameter: 3.9 mm Distance from probe tip to dipole centers: 2.0 mm
Application	General dosimetry up to 4 GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms

4.2 Phantoms

The phantom used for all tests i.e. for both system checks and device testing, was the twin-headed "SAM Phantom", manufactured by SPEAG. The phantom conforms to the requirements of IEEE 1528 - 2003.

System checking was performed using the flat section, whilst Head SAR tests used the left and right head profile sections. Body SAR testing also used the flat section between the head profiles.

The SPEAG device holder (see Section 5.1) was used to position the device in all tests whilst a tripod was used to position the validation dipoles against the flat section of phantom.

4.3 Tissue Simulants

Recommended values for the dielectric parameters of the tissue simulants are given in IEEE 1528 - 2003 and FCC Supplement C to OET Bulletin 65. All tests were carried out using simulants whose dielectric parameters were within ± 5% of the recommended values. All tests were carried out within 24 hours of measuring the dielectric parameters.

The depth of the tissue simulant was at least 15.0 cm measured from the ear reference point during system checking and device measurements.

4.3.1 Tissue Simulant Recipes

The following recipe(s) were used for Head and Body tissue simulant(s):

800MHz band

Ingredient	Head (% by weight)	Body (% by weight)
Deionised Water	39.74	55.97
HEC	0.25	1.21
Sugar	58.31	41.76
Preservative	0.15	0.27
Salt	1.55	0.79

1900MHz band

Ingredient	Head (% by weight)	Body (% by weight)
Deionised Water	54.50	70.25
Tween 20	45.23	29.41
Salt	0.27	0.34

4.3.2 System Checking

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulants were measured every day using the dielectric probe kit and the network analyser. A system check measurement was made following the determination of the dielectric parameters of the simulant, using the dipole validation kit. A power level of 250 mW was supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom. The system checking results (dielectric parameters and SAR values) are given in the table below.

System checking, head tissue simulant

f[MHz]	Description	SAR [W/kg], 1g	Dielectric Parameters		Temp [°C]
			ε_r	σ [S/m]	
835	Reference result	2.39	41.0	0.89	
	± 10% window	2.15 – 2.63			
	IEEE1528 / IEC62209 Standard targets		41.5	0.90	
	2012-05-28	2.44	41.3	0.87	21.3
1900	Reference result	10.4	39.5	1.43	
	± 10% window	9.4 – 11.4			
	IEEE1528 / IEC62209 Standard targets		40.0	1.40	
	2012-05-29	9.84	39.2	1.44	21.4

System checking, body tissue simulant

f[MHz]	Description	SAR [W/kg], 1g	Dielectric Parameters		Temp [°C]
			ε_r	σ [S/m]	
835	Reference result ± 10% window	2.52 2.27 – 2.77	54.3	0.99	
	FCC Supplement C / RSS-102 targets		55.2	0.97	
	2012-05-31	2.43	54.0	0.96	21.2

Plots of the system checking scans are given in Appendix A.

4.3.3 Tissue Simulants used in the Measurements

Head tissue simulant measurements

f [MHz]	Description	Dielectric Parameters		Temp [°C]
		ε_r	σ [S/m]	
836	Recommended value	41.5	0.90	
	± 5% window	39.4 – 43.6	0.86 – 0.95	
	2012-05-28	41.2	0.87	21.3
1880	Recommended value	40.0	1.40	
	± 5% window	38.0 – 42.0	1.33 – 1.47	
	2012-05-29	39.3	1.42	21.4

Body tissue simulant measurements

f [MHz]	Description	Dielectric Parameters		Temp [°C]
		ε_r	σ [S/m]	
836	Recommended value	55.2	0.97	
	± 5% window	52.4 – 58.0	0.92 – 1.02	
	2012-05-31	54.0	0.96	21.2
1880	Recommended value	53.3	1.52	
	± 5% window	50.6 – 56.0	1.44 – 1.60	
	2012-05-29	51.9	1.53	21.4

Dielectric parameter data for the band edges is given in Appendix C.

5. DESCRIPTION OF THE TEST PROCEDURE

5.1 Device Holder

The device was placed in the device holder (illustrated below) that is supplied by SPEAG as an integral part of the Dasy system.

Device holder supplied by SPEAG

A Nokia designed spacer (illustrated below) was used to position the device within the SPEAG holder. The spacer positions the device so that the holder has minimal effect on the test results but still holds the device securely. The spacer was removed before the tests.

Nokia spacer

5.2 Test Positions

5.2.1 Against Phantom Head

Measurements were made in “cheek” and “tilt” positions on both the left hand and right hand sides of the phantom.

The positions used in the measurements were according to IEEE 1528 - 2003 "IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques".

5.2.2 Body Worn Configuration

The device was placed in the SPEAG holder using the Nokia spacer and placed below the flat section of the phantom. The distance between the device and the phantom was kept at the separation distance indicated in the Section 1.2.2 using a separate flat spacer that was

removed before the start of the measurements. The device was oriented with both sides facing the phantom to find the highest results.

Nokia body-worn accessories are commonly available for the separation distance used in this testing.

5.3 Scan Procedures

First, area scans were used for determination of the field distribution. Next, a zoom scan, a minimum of 5x5x7 points covering a volume of at least 30x30x30mm, was performed around the highest E-field value to determine the averaged SAR value. Drift was determined by measuring the same point at the start of the area scan and again at the end of the zoom scan.

5.4 SAR Averaging Methods

The maximum SAR value was averaged over a cube of tissue using interpolation and extrapolation.

The interpolation, extrapolation and maximum search routines within Dasy4 are all based on the modified Quadratic Shepard's method (Robert J. Renka, "Multivariate Interpolation Of Large Sets Of Scattered Data", University of North Texas ACM Transactions on Mathematical Software, vol. 14, no. 2, June 1988, pp. 139-148).

The interpolation scheme combines a least-square fitted function method with a weighted average method. A trivariate 3-D / bivariate 2-D quadratic function is computed for each measurement point and fitted to neighbouring points by a least-square method. For the zoom scan, inverse distance weighting is incorporated to fit distant points more accurately. The interpolating function is finally calculated as a weighted average of the quadratics.

In the zoom scan, the interpolation function is used to extrapolate the Peak SAR from the deepest measurement points to the inner surface of the phantom.

6. MEASUREMENT UNCERTAINTY

Table 6.1 – Measurement uncertainty evaluation

Uncertainty Component	Section in IEEE 1528	Tol. (%)	Prob Dist	Div	c_i	$c_i . u_i$ (%)	v_i
Measurement System							
Probe Calibration	E2.1	±5.9	N	1	1	±5.9	∞
Axial Isotropy	E2.2	±4.7	R	√3	$(1-c_p)^{1/2}$	±1.9	∞
Hemispherical Isotropy	E2.2	±9.6	R	√3	$(c_p)^{1/2}$	±3.9	∞
Boundary Effect	E2.3	±1.0	R	√3	1	±0.6	∞
Linearity	E2.4	±4.7	R	√3	1	±2.7	∞
System Detection Limits	E2.5	±1.0	R	√3	1	±0.6	∞
Readout Electronics	E2.6	±1.0	N	1	1	±1.0	∞
Response Time	E2.7	±0.8	R	√3	1	±0.5	∞
Integration Time	E2.8	±2.6	R	√3	1	±1.5	∞
RF Ambient Conditions - Noise	E6.1	±3.0	R	√3	1	±1.7	∞
RF Ambient Conditions - Reflections	E6.1	±3.0	R	√3	1	±1.7	∞
Probe Positioner Mechanical Tolerance	E6.2	±0.4	R	√3	1	±0.2	∞
Probe Positioning with respect to Phantom Shell	E6.3	±2.9	R	√3	1	±1.7	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E5	±3.9	R	√3	1	±2.3	∞
Test sample Related							
Test Sample Positioning	E4.2	±6.0	N	1	1	±6.0	11
Device Holder Uncertainty	E4.1	±5.0	N	1	1	±5.0	7
Output Power Variation - SAR drift measurement	6.6.3	±0.0	R	√3	1	±0.0	∞
Phantom and Tissue Parameters							
Phantom Uncertainty (shape and thickness tolerances)	E3.1	±4.0	R	√3	1	±2.3	∞
Conductivity Target - tolerance	E3.2	±5.0	R	√3	0.64	±1.8	∞
Conductivity - measurement uncertainty	E3.3	±5.5	N	1	0.64	±3.5	5
Permittivity Target - tolerance	E3.2	±5.0	R	√3	0.6	±1.7	∞
Permittivity - measurement uncertainty	E3.3	±2.9	N	1	0.6	±1.7	5
Combined Standard Uncertainty			RSS			**±12.9**	116
Coverage Factor for 95%			**k=2**				
Expanded Uncertainty						**±25.8**	

7. RESULTS

The measured Head SAR values for the test device are tabulated below:

850MHz Head SAR results

Mode	Test configuration		SAR, averaged over 1g (W/kg)		
			Ch 128 824.2 MHz	Ch 190 836.6 MHz	Ch 251 848.8 MHz
GSM	Conducted Power		32.5 dBm	32.5 dBm	32.5 dBm
	Left	Cheek	0.551	0.685	**0.761**
		Tilt	-	0.461	-
	Right	Cheek	-	0.599	-
		Tilt	-	0.461	-

1900MHz Head SAR results

Mode	Test configuration		SAR, averaged over 1g (W/kg)		
			Ch 512 1850.2 MHz	Ch 661 1880.0 MHz	Ch 810 1909.8 MHz
GSM	Conducted Power		30.5 dBm	30.5 dBm	30.5 dBm
	Left	Cheek	-	0.593	-
		Tilt	-	0.297	-
	Right	Cheek	**0.797**	0.737	0.792
		Tilt	-	0.359	-

The measured Body SAR values for the test device are tabulated below:

850MHz Body SAR results

Mode	Device orientation	Test configuration	SAR, averaged over 1g (W/kg)		
			Ch 128 824.2 MHz	Ch 190 836.6 MHz	Ch 251 848.8 MHz
GSM		**Conducted Power**	**32.5 dBm**	**32.5 dBm**	**32.5 dBm**
	Display facing phantom	Without headset	-	0.492	-
		Headset WH-102	-	0.401	-
	Back facing phantom	Without headset	0.592	0.682	**0.710**
		Headset WH-102	-	0.570	-
2-slot GPRS		**Conducted Power**	**-**	**29.5 dBm**	**-**
	Display facing phantom	Without headset	-	0.420	-
		Headset WH-102	-	-	-
	Back facing phantom	Without headset	-	-	-
		Headset WH-102	-	-	-
3-slot GPRS		**Conducted Power**	**-**	**27.7 dBm**	**-**
	Display facing phantom	Without headset	-	0.425	-
		Headset WH-102	-	-	-
	Back facing phantom	Without headset	-	-	-
		Headset WH-102	-	-	-
4-slot GPRS		**Conducted Power**	**-**	**26.5 dBm**	**-**
	Display facing phantom	Without headset	-	0.421	-
		Headset WH-102	-	-	-
	Back facing phantom	Without headset	-	-	-
		Headset WH-102	-	-	-

1900MHz Body SAR results

Mode	Device orientation	Test configuration	SAR, averaged over 1g (W/kg)		
			Ch 512 1850.2 MHz	Ch 661 1880.0 MHz	Ch 810 1909.8 MHz
GSM		Conducted Power	30.5 dBm	30.5 dBm	30.5 dBm
	Display facing phantom	Without headset	**0.430**	0.355	0.342
		Headset WH-102	-	0.307	-
	Back facing phantom	Without headset	-	0.295	-
		Headset WH-102	-	0.274	-
2-slot GPRS		Conducted Power	-	27.5 dBm	-
	Display facing phantom	Without headset	-	0.337	-
		Headset WH-102	-	-	-
	Back facing phantom	Without headset	-	-	-
		Headset WH-102	-	-	-
3-slot GPRS		Conducted Power	-	25.7 dBm	-
	Display facing phantom	Without headset	-	0.308	-
		Headset WH-102	-	-	-
	Back facing phantom	Without headset	-	-	-
		Headset WH-102	-	-	-
4-slot GPRS		Conducted Power	-	24.5 dBm	-
	Display facing phantom	Without headset	-	0.308	-
		Headset WH-102	-	-	-
	Back facing phantom	Without headset	-	-	-
		Headset WH-102	-	-	-

Plots of the Measurement scans are given in Appendix B.

APPENDIX A: SYSTEM CHECKING SCANS

Date/Time: 2012-05-28 10:03:35

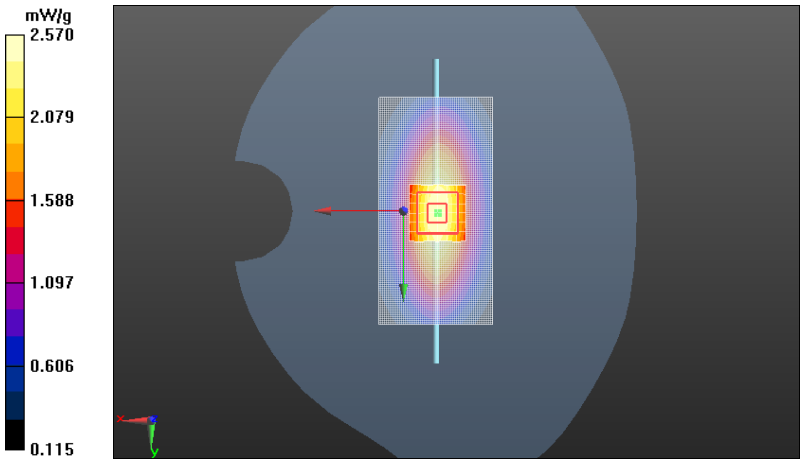
Test Laboratory: TCC Nokia
Type: D835V2; Serial: 479

Communication System: CW835
Frequency: 835 MHz; Duty Cycle: 1:1
Medium: Head 835; Medium Notes: Medium Temperature: t= 21.3 C
Medium parameters used: f = 835 MHz; σ = 0.874 mho/m; ε_r = 41.261; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(8.54, 8.54, 8.54); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM1; Type: SAM; Serial: TP - 01097
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

d=15mm, Pin=250mW/Area Scan (61x121x1): Measurement grid: dx=10mm, dy=10mm
Reference Value = 55.337 V/m
Fast SAR: SAR(1 g) = 2.39 mW/g
Fast SAR(10 g) = 1.62 mW/g
Maximum value of SAR (interpolated) = 2.57 mW/g

d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.337 V/m
Peak SAR (extrapolated) = 3.649 mW/g
SAR(1 g) = 2.44 mW/g
SAR(10 g) = 1.6 mW/g
Power Drift = -0.06 dB
Maximum value of SAR (measured) = 2.64 mW/g



Date/Time: 2012-05-29 9:44:50

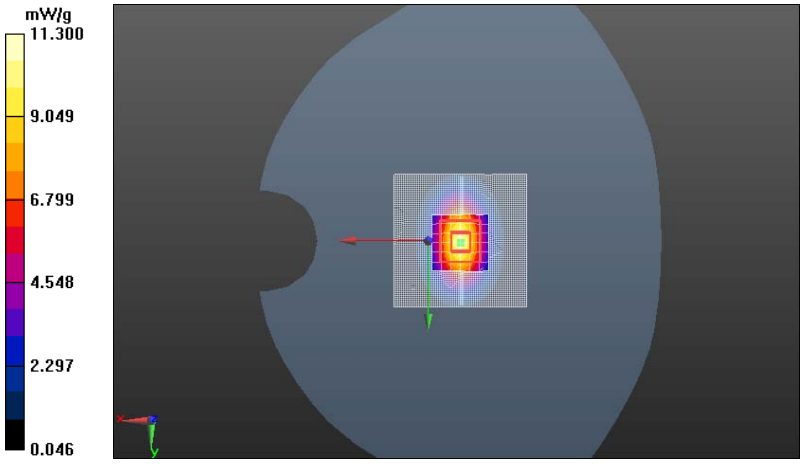
Test Laboratory: TCC Nokia
Type: D1900V2; Serial: 547

Communication System: CW1900
Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: Head 1900; Medium Notes: Medium Temperature: t=21.4
Medium parameters used: f = 1900 MHz; σ = 1.439 mho/m; ε_r = 39.182; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(7.66, 7.66, 7.66); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM4; Type: SAM; Serial: TP - 1427
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

d=10mm, Pin=250mW/Area Scan (71x71x1): Measurement grid: dx=10mm, dy=10mm
Reference Value = 88.695 V/m
Fast SAR: SAR(1 g) = 9.94 mW/g
Fast SAR(10 g) = 5.23 mW/g
Maximum value of SAR (interpolated) = 11.3 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 88.695 V/m
Peak SAR (extrapolated) = 18.679 mW/g
SAR(1 g) = 9.84 mW/g
SAR(10 g) = 5.07 mW/g
Power Drift = -0.08 dB
Maximum value of SAR (measured) = 11.1 mW/g



Date/Time: 2012-05-31 9:51:06

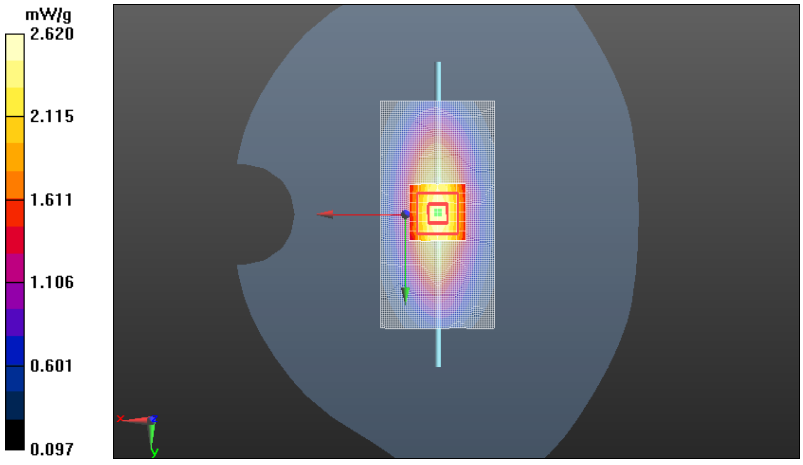
Test Laboratory: TCC Nokia
Type: D835V2; Serial: 479

Communication System: CW835
Frequency: 835 MHz; Duty Cycle: 1:1
Medium: Body 835; Medium Notes: Medium Temperature: t= 21.2 C
Medium parameters used: f = 835 MHz; σ = 0.958 mho/m; ε_r = 54.019; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(8.83, 8.83, 8.83); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM2; Type: SAM; Serial: TP - 1508
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

d=15mm, Pin=250mW/Area Scan (61x121x1): Measurement grid: dx=10mm, dy=10mm
Reference Value = 52.358 V/m
Fast SAR: SAR(1 g) = 2.44 mW/g
Fast SAR(10 g) = 1.64 mW/g
Maximum value of SAR (interpolated) = 2.62 mW/g

d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.358 V/m
Peak SAR (extrapolated) = 3.625 mW/g
SAR(1 g) = 2.43 mW/g
SAR(10 g) = 1.59 mW/g
Power Drift = -0.02 dB
Maximum value of SAR (measured) = 2.64 mW/g



APPENDIX B: MEASUREMENT SCANS

Date/Time: 2012-05-28 13:56:45

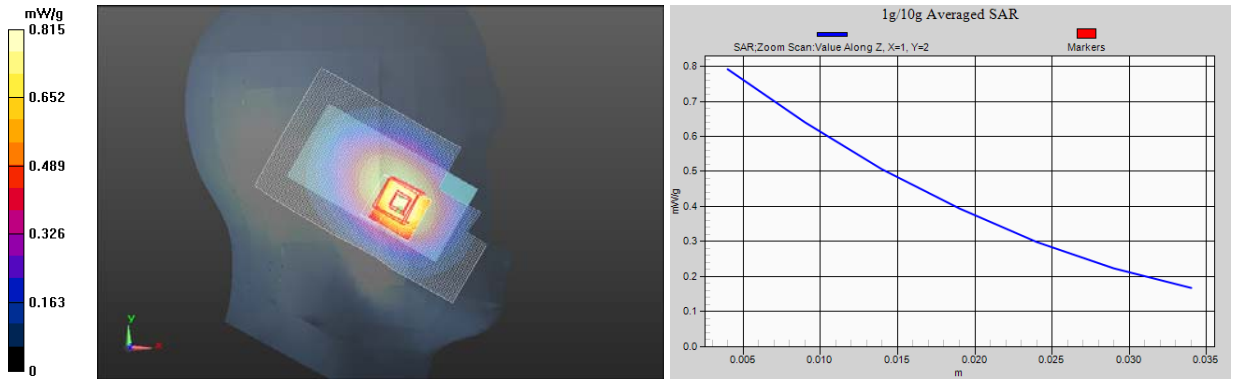
Test Laboratory: TCC Nokia
Type: RM-852; Serial: 004402/13/921604/2; 004402/13/921605/9

Communication System: GSM850
Frequency: 848.8 MHz; Duty Cycle: 1:8.3
Medium: Head 835; Medium Notes: Medium Temperature: t= 21.3 C
Medium parameters used: f = 849 MHz; σ = 0.886 mho/m; ε_r = 41.058; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(8.54, 8.54, 8.54); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM1; Type: SAM; Serial: TP - 01097
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Cheek - High/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 12.678 V/m
Fast SAR: SAR(1 g) = 0.760 mW/g
Fast SAR(10 g) = 0.527 mW/g
Maximum value of SAR (interpolated) = 0.815 mW/g

Cheek - High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 12.678 V/m
Peak SAR (extrapolated) = 0.964 mW/g
SAR(1 g) = 0.761 mW/g
SAR(10 g) = 0.562 mW/g
Power Drift = -0.00 dB
Maximum value of SAR (measured) = 0.792 mW/g



Date/Time: 2012-05-28 12:54:48

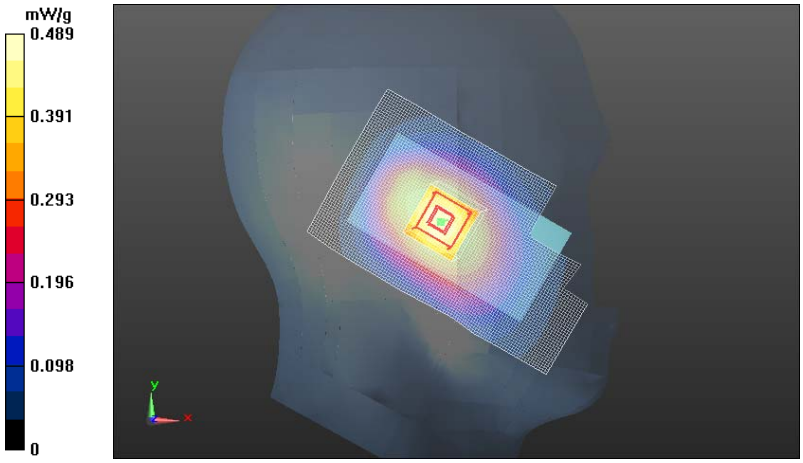
Test Laboratory: TCC Nokia
Type: RM-852; Serial: 004402/13/921604/2; 004402/13/921605/9

Communication System: GSM850
Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: Head 835; Medium Notes: Medium Temperature: t= 21.3 C
Medium parameters used: f = 837 MHz; σ = 0.876 mho/m; ε_r = 41.236; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(8.54, 8.54, 8.54); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM1; Type: SAM; Serial: TP - 01097
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Tilt - Middle/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 18.506 V/m
Fast SAR: SAR(1 g) = 0.458 mW/g
Fast SAR(10 g) = 0.320 mW/g
Maximum value of SAR (interpolated) = 0.489 mW/g

Tilt - Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 18.506 V/m
Peak SAR (extrapolated) = 0.597 mW/g
SAR(1 g) = 0.461 mW/g
SAR(10 g) = 0.339 mW/g
Power Drift = -0.03 dB
Maximum value of SAR (measured) = 0.490 mW/g



Date/Time: 2012-05-28 13:07:40

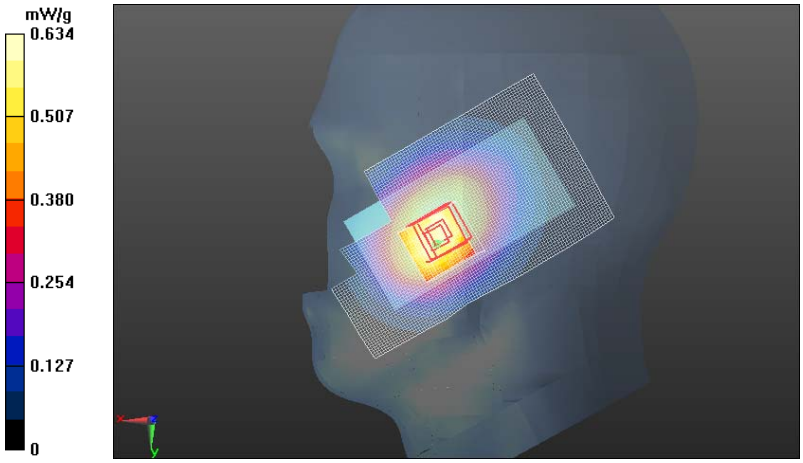
Test Laboratory: TCC Nokia
Type: RM-852; Serial: 004402/13/921604/2; 004402/13/921605/9

Communication System: GSM850
Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: Head 835; Medium Notes: Medium Temperature: t= 21.3 C
Medium parameters used: f = 837 MHz; σ = 0.876 mho/m; ε_r = 41.236; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(8.54, 8.54, 8.54); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM1; Type: SAM; Serial: TP - 01097
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Cheek - Middle/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 10.459 V/m
Fast SAR: SAR(1 g) = 0.599 mW/g
Fast SAR(10 g) = 0.421 mW/g
Maximum value of SAR (interpolated) = 0.634 mW/g

Cheek - Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 10.459 V/m
Peak SAR (extrapolated) = 0.783 mW/g
SAR(1 g) = 0.599 mW/g
SAR(10 g) = 0.447 mW/g
Power Drift = -0.18 dB
Maximum value of SAR (measured) = 0.620 mW/g



Date/Time: 2012-05-28 13:30:12

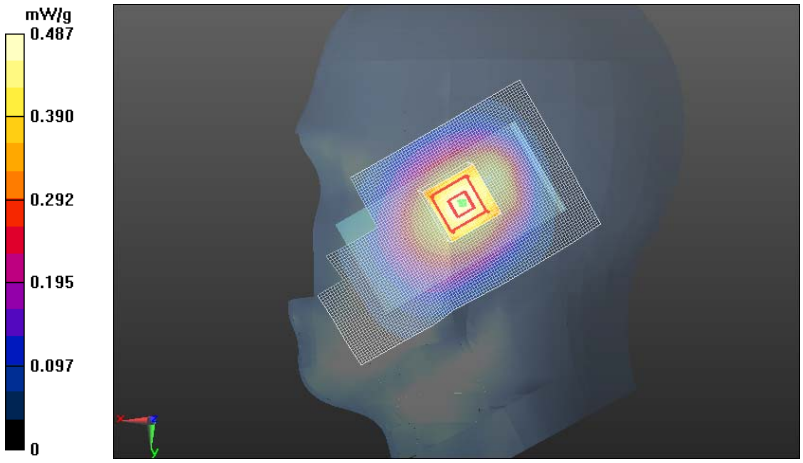
Test Laboratory: TCC Nokia
Type: RM-852; Serial: 004402/13/921604/2; 004402/13/921605/9

Communication System: GSM850
Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: Head 835; Medium Notes: Medium Temperature: t= 21.3 C
Medium parameters used: f = 837 MHz; σ = 0.876 mho/m; ε_r = 41.236; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(8.54, 8.54, 8.54); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM1; Type: SAM; Serial: TP - 01097
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Tilt - Middle/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 18.329 V/m
Fast SAR: SAR(1 g) = 0.458 mW/g
Fast SAR(10 g) = 0.320 mW/g
Maximum value of SAR (interpolated) = 0.487 mW/g

Tilt - Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 18.329 V/m
Peak SAR (extrapolated) = 0.588 mW/g
SAR(1 g) = 0.461 mW/g
SAR(10 g) = 0.339 mW/g
Power Drift = -0.03 dB
Maximum value of SAR (measured) = 0.487 mW/g



Date/Time: 2012-05-29 10:08:42

Test Laboratory: TCC Nokia
Type: RM-852; Serial: 004402/13/921604/2; 004402/13/921605/9

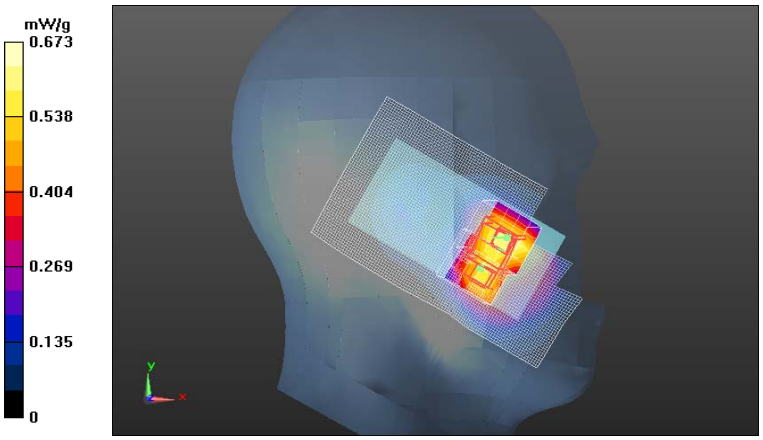
Communication System: GSM 1900
Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: Head 1900; Medium Notes: Medium Temperature: t=21.4
Medium parameters used: f = 1880 MHz; σ = 1.421 mho/m; ε_r = 39.27; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(7.66, 7.66, 7.66); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM4; Type: SAM; Serial: TP - 1427
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Cheek - Middle/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 8.389 V/m
Fast SAR: SAR(1 g) = 0.594 mW/g
Fast SAR(10 g) = 0.355 mW/g
Maximum value of SAR (interpolated) = 0.673 mW/g

Cheek - Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 8.389 V/m
Peak SAR (extrapolated) = 0.959 mW/g
SAR(1 g) = 0.593 mW/g; SAR(10 g) = 0.364 mW/g
power Drift = -0.12 dB
Maximum value of SAR (measured) = 0.641 mW/g

Cheek - Middle/Zoom Scan 2 (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 8.389 V/m
Peak SAR (extrapolated) = 0.904 mW/g
SAR(1 g) = 0.535 mW/g; SAR(10 g) = 0.338 mW/g
Power Drift = -0.12 dB
Maximum value of SAR (measured) = 0.603 mW/g



Date/Time: 2012-05-29 10:39:27

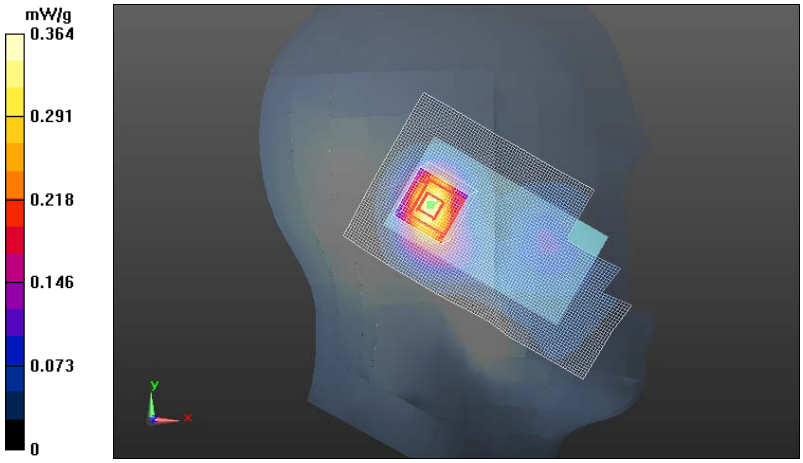
Test Laboratory: TCC Nokia
Type: RM-852; Serial: 004402/13/921604/2; 004402/13/921605/9

Communication System: GSM 1900
Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: Head 1900; Medium Notes: Medium Temperature: t=21.4
Medium parameters used: f = 1880 MHz; σ = 1.421 mho/m; ε_r = 39.27; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(7.66, 7.66, 7.66); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM4; Type: SAM; Serial: TP - 1427
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Tilt - Middle/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 14.526 V/m
Fast SAR: SAR(1 g) = 0.318 mW/g
Fast SAR(10 g) = 0.175 mW/g
Maximum value of SAR (interpolated) = 0.364 mW/g

Tilt - Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 14.526 V/m
Peak SAR (extrapolated) = 0.461 mW/g
SAR(1 g) = 0.297 mW/g
SAR(10 g) = 0.178 mW/g
Power Drift = 0.04 dB
Maximum value of SAR (measured) = 0.323 mW/g



Date/Time: 2012-05-29 11:07:06

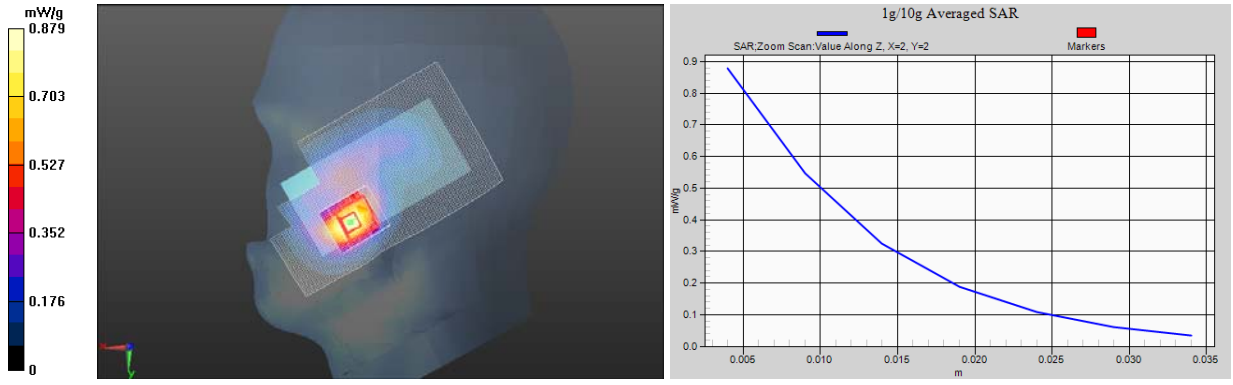
Test Laboratory: TCC Nokia
Type: RM-852; Serial: 004402/13/921604/2; 004402/13/921605/9

Communication System: GSM1900
Frequency: 1850.2 MHz; Duty Cycle: 1:8.3
Medium: Head 1900; Medium Notes: Medium Temperature: t=21.4
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.39 mho/m; ε_r = 39.402; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(7.66, 7.66, 7.66); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM4; Type: SAM; Serial: TP - 1427
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Cheek - Low/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 8.081 V/m
Fast SAR: SAR(1 g) = 0.779 mW/g
Fast SAR(10 g) = 0.426 mW/g
Maximum value of SAR (interpolated) = 0.879 mW/g

Cheek - Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 8.081 V/m
Peak SAR (extrapolated) = 1.369 mW/g
SAR(1 g) = 0.797 mW/g
SAR(10 g) = 0.437 mW/g
Power Drift = 0.15 dB
Maximum value of SAR (measured) = 0.878 mW/g



Date/Time: 2012-05-29 11:31:11

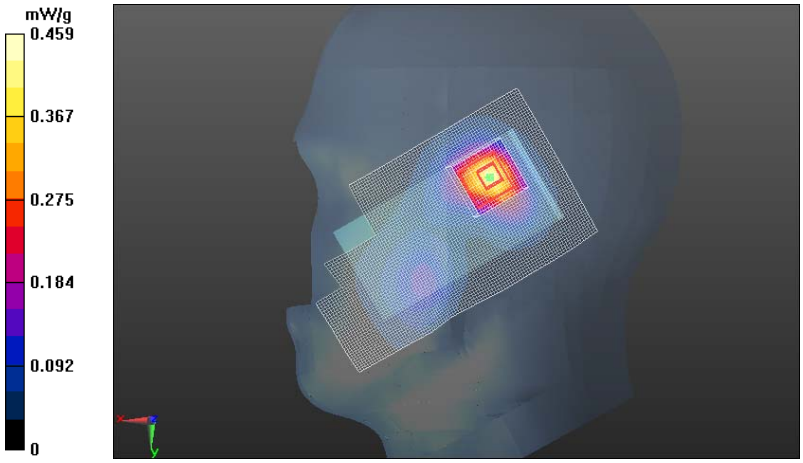
Test Laboratory: TCC Nokia
Type: RM-852; Serial: 004402/13/921604/2; 004402/13/921605/9

Communication System: GSM 1900
Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: Head 1900; Medium Notes: Medium Temperature: t=21.4
Medium parameters used: f = 1880 MHz; σ = 1.421 mho/m; ε_r = 39.27; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(7.66, 7.66, 7.66); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM4; Type: SAM; Serial: TP - 1427
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Tilt - Middle/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 14.164 V/m
Fast SAR: SAR(1 g) = 0.383 mW/g
Fast SAR(10 g) = 0.205 mW/g
Maximum value of SAR (interpolated) = 0.459 mW/g

Tilt - Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 14.164 V/m
Peak SAR (extrapolated) = 0.574 mW/g
SAR(1 g) = 0.359 mW/g
SAR(10 g) = 0.207 mW/g
Power Drift = -0.00 dB
Maximum value of SAR (measured) = 0.395 mW/g



Date/Time: 2012-05-31 11:04:04

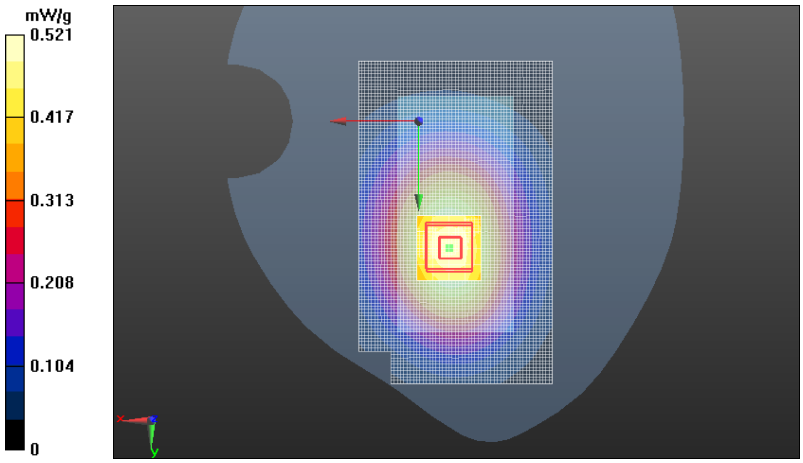
Test Laboratory: TCC Nokia
Type: RM-852; Serial: 004402/13/921604/2; 004402/13/921605/9

Communication System: GSM850
Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: Body 835; Medium Notes: Medium Temperature: t= 21.2 C
Medium parameters used: f = 837 MHz; σ = 0.961 mho/m; ε_r = 53.97; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(8.83, 8.83, 8.83); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM2; Type: SAM; Serial: TP - 1508
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Body - Middle - No Accessory - Display Facing Phantom/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 10.459 V/m
Fast SAR: SAR(1 g) = 0.493 mW/g
Fast SAR(10 g) = 0.350 mW/g
Maximum value of SAR (interpolated) = 0.521 mW/g

Body - Middle - No Accessory - Display Facing Phantom/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 10.459 V/m
Peak SAR (extrapolated) = 0.633 mW/g
SAR(1 g) = 0.492 mW/g
SAR(10 g) = 0.365 mW/g
Power Drift = -0.05 dB
Maximum value of SAR (measured) = 0.520 mW/g



Date/Time: 2012-05-31 11:18:41

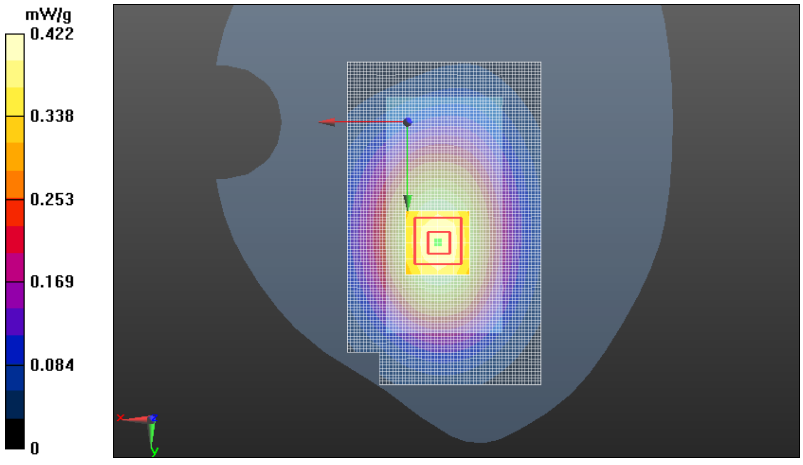
Test Laboratory: TCC Nokia
Type: RM-852; Serial: 004402/13/921604/2; 004402/13/921605/9

Communication System: GSM850
Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: Body 835; Medium Notes: Medium Temperature: t= 21.2 C
Medium parameters used: f = 837 MHz; σ = 0.961 mho/m; ε_r = 53.97; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(8.83, 8.83, 8.83); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM2; Type: SAM; Serial: TP - 1508
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Body - Middle - Headset WH-102 - Display Facing Phantom/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 11.682 V/m
Fast SAR: SAR(1 g) = 0.400 mW/g
Fast SAR(10 g) = 0.284 mW/g
Maximum value of SAR (interpolated) = 0.422 mW/g

Body - Middle - Headset WH-102 - Display Facing Phantom/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 11.682 V/m
Peak SAR (extrapolated) = 0.515 mW/g
SAR(1 g) = 0.401 mW/g
SAR(10 g) = 0.298 mW/g
Power Drift = -0.05 dB
Maximum value of SAR (measured) = 0.422 mW/g



Date/Time: 2012-05-31 12:30:09

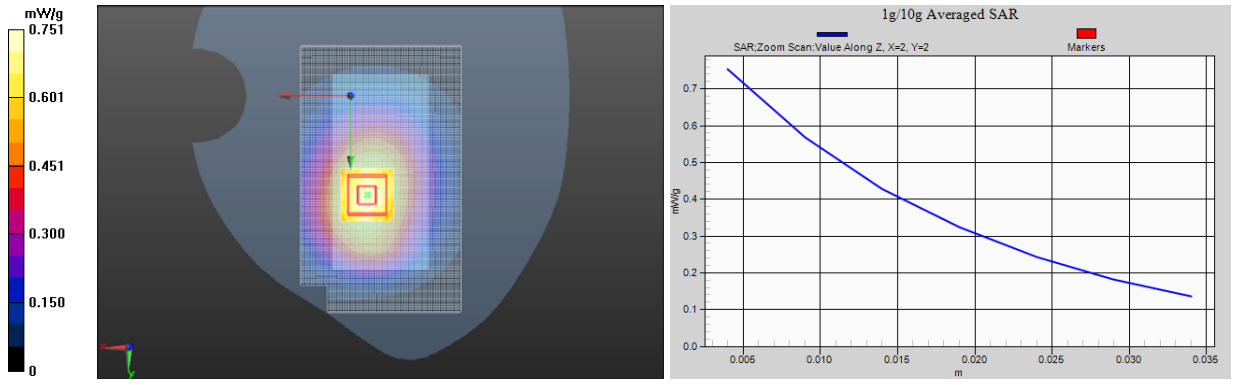
Test Laboratory: TCC Nokia
Type: RM-852; Serial: 004402/13/921604/2; 004402/13/921605/9

Communication System: GSM850
Frequency: 848.8 MHz; Duty Cycle: 1:8.3
Medium: Body 835; Medium Notes: Medium Temperature: t= 21.2 C
Medium parameters used: f = 849 MHz; σ = 0.973 mho/m; ε_r = 53.833; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(8.83, 8.83, 8.83); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM2; Type: SAM; Serial: TP - 1508
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Body - High - No Accessory - Back Facing Phantom/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 12.728 V/m
Fast SAR: SAR(1 g) = 0.708 mW/g
Fast SAR(10 g) = 0.497 mW/g
Maximum value of SAR (interpolated) = 0.751 mW/g

Body - High - No Accessory - Back Facing Phantom/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 12.728 V/m
Peak SAR (extrapolated) = 0.935 mW/g
SAR(1 g) = 0.710 mW/g
SAR(10 g) = 0.514 mW/g
Power Drift = -0.10 dB
Maximum value of SAR (measured) = 0.753 mW/g



Date/Time: 2012-05-31 11:28:55

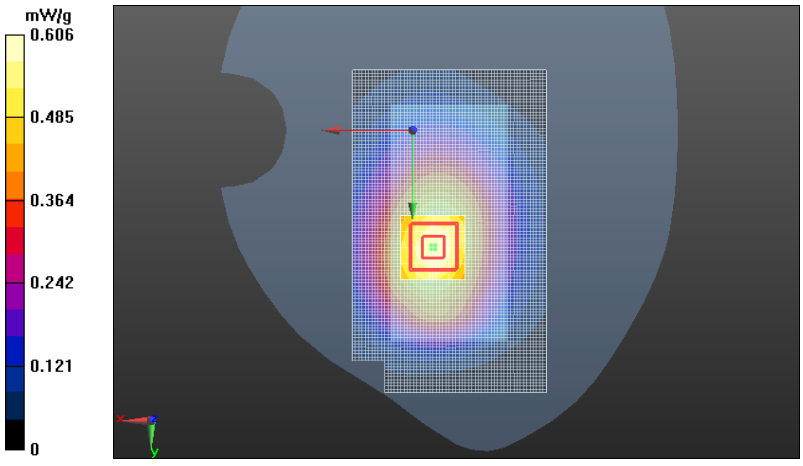
Test Laboratory: TCC Nokia
Type: RM-852; Serial: 004402/13/921604/2; 004402/13/921605/9

Communication System: GSM850
Frequency: 836.6 MHz; Duty Cycle: 1:8.3
Medium: Body 835; Medium Notes: Medium Temperature: t= 21.2 C
Medium parameters used: f = 837 MHz; σ = 0.961 mho/m; ε_r = 53.97; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(8.83, 8.83, 8.83); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM2; Type: SAM; Serial: TP - 1508
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Body - Middle - Headset WH-102 - Back Facing Phantom/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 13.665 V/m
Fast SAR: SAR(1 g) = 0.571 mW/g
Fast SAR(10 g) = 0.402 mW/g
Maximum value of SAR (interpolated) = 0.606 mW/g

Body - Middle - Headset WH-102 - Back Facing Phantom/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 13.665 V/m
Peak SAR (extrapolated) = 0.749 mW/g
SAR(1 g) = 0.570 mW/g
SAR(10 g) = 0.415 mW/g
Power Drift = -0.01 dB
Maximum value of SAR (measured) = 0.603 mW/g



Date/Time: 2012-05-31 10:16:35

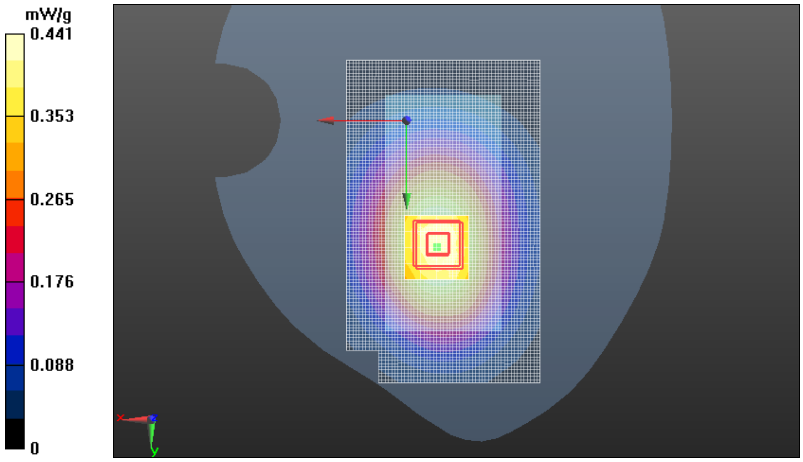
Test Laboratory: TCC Nokia
Type: RM-852; Serial: 004402/13/921604/2; 004402/13/921605/9

Communication System: 2-slot GPRS850
Frequency: 836.6 MHz; Duty Cycle: 1:4.2
Medium: Body 835; Medium Notes: Medium Temperature: t= 21.2 C
Medium parameters used: f = 837 MHz; σ = 0.961 mho/m; ε_r = 53.97; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(8.83, 8.83, 8.83); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM2; Type: SAM; Serial: TP - 1508
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Body - Middle - No Accessory - Display Facing Phantom/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 9.692 V/m
Fast SAR: SAR(1 g) = 0.417 mW/g
Fast SAR(10 g) = 0.296 mW/g
Maximum value of SAR (interpolated) = 0.441 mW/g

Body - Middle - No Accessory - Display Facing Phantom/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 9.692 V/m
Peak SAR (extrapolated) = 0.538 mW/g
SAR(1 g) = 0.420 mW/g
SAR(10 g) = 0.312 mW/g
Power Drift = 0.10 dB
Maximum value of SAR (measured) = 0.443 mW/g



Date/Time: 2012-05-31 10:31:51

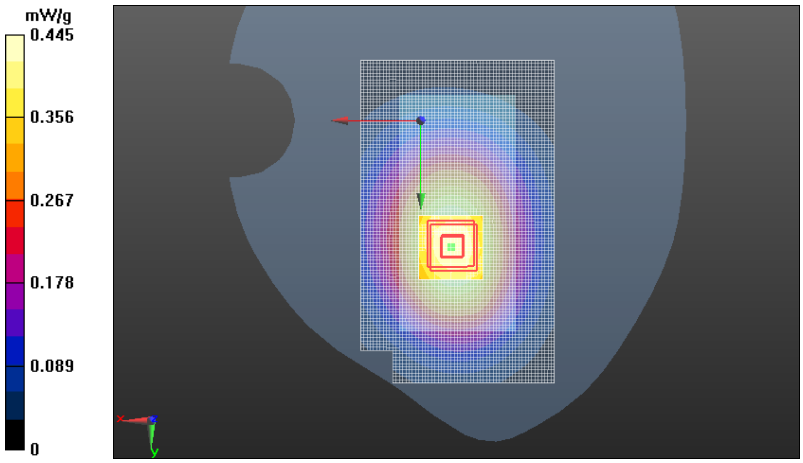
Test Laboratory: TCC Nokia
Type: RM-852; Serial: 004402/13/921604/2; 004402/13/921605/9

Communication System: 3-slot GPRS850
Frequency: 836.6 MHz; Duty Cycle: 1:2.8
Medium: Body 835; Medium Notes: Medium Temperature: t= 21.2 C
Medium parameters used: f = 837 MHz; σ = 0.961 mho/m; ε_r = 53.97; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(8.83, 8.83, 8.83); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM2; Type: SAM; Serial: TP - 1508
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Body - Middle - No Accessory - Display Facing Phantom/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 9.867 V/m
Fast SAR: SAR(1 g) = 0.421 mW/g
Fast SAR(10 g) = 0.299 mW/g
Maximum value of SAR (interpolated) = 0.445 mW/g

Body - Middle - No Accessory - Display Facing Phantom/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 9.867 V/m
Peak SAR (extrapolated) = 0.547 mW/g
SAR(1 g) = 0.425 mW/g
SAR(10 g) = 0.315 mW/g
Power Drift = -0.01 dB
Maximum value of SAR (measured) = 0.449 mW/g



Date/Time: 2012-05-31 10:45:41

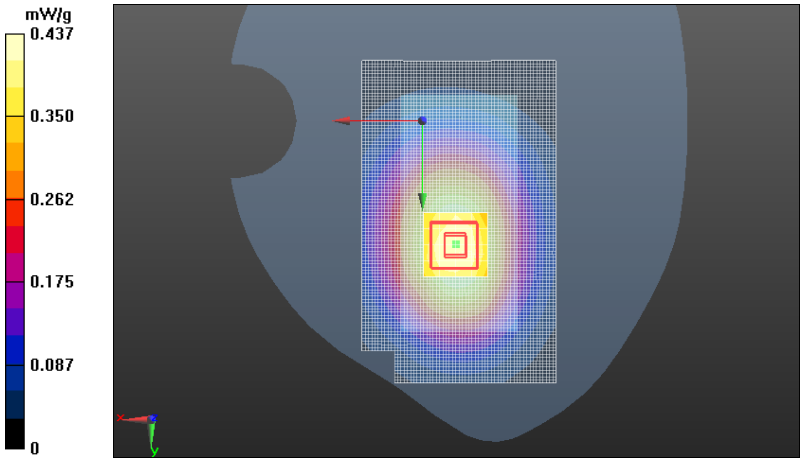
Test Laboratory: TCC Nokia
Type: RM-852; Serial: 004402/13/921604/2; 004402/13/921605/9

Communication System: 4-slot GPRS850
Frequency: 836.6 MHz; Duty Cycle: 1:2.08
Medium: Body 835; Medium Notes: Medium Temperature: t= 21.2 C
Medium parameters used: f = 837 MHz; σ = 0.961 mho/m; ε_r = 53.97; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(8.83, 8.83, 8.83); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM2; Type: SAM; Serial: TP - 1508
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Body - Middle - No Accessory - Display Facing Phantom/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 9.897 V/m
Fast SAR: SAR(1 g) = 0.414 mW/g
Fast SAR(10 g) = 0.295 mW/g
Maximum value of SAR (interpolated) = 0.437 mW/g

Body - Middle - No Accessory - Display Facing Phantom/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 9.897 V/m
Peak SAR (extrapolated) = 0.543 mW/g
SAR(1 g) = 0.421 mW/g
SAR(10 g) = 0.312 mW/g
Power Drift = 0.03 dB
Maximum value of SAR (measured) = 0.443 mW/g



Date/Time: 2012-05-29 16:07:14

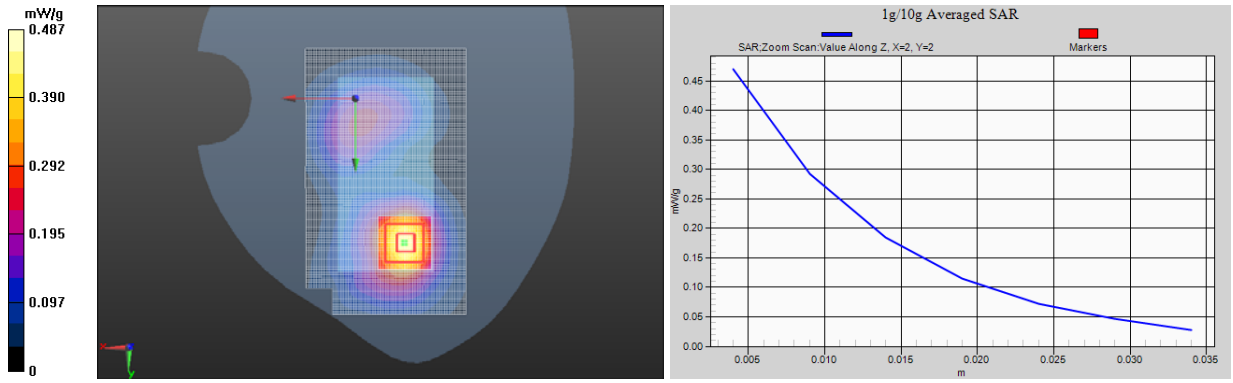
Test Laboratory: TCC Nokia
Type: RM-852; Serial: 004402/13/921604/2; 004402/13/921605/9

Communication System: GSM1900
Frequency: 1850.2 MHz; Duty Cycle: 1:8.3
Medium: Body 1900; Medium Notes: Medium Temperature: t=21.3
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.501 mho/m; ε_r = 51.982; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(7.2, 7.2, 7.2); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM3; Type: SAM; Serial: TP - 1567
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Body - Low - No Accessory - Display Facing Phantom/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 10.917 V/m
Fast SAR: SAR(1 g) = 0.436 mW/g
Fast SAR(10 g) = 0.251 mW/g
Maximum value of SAR (interpolated) = 0.487 mW/g

Body - Low - No Accessory - Display Facing Phantom/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 10.917 V/m
Peak SAR (extrapolated) = 0.690 mW/g
SAR(1 g) = 0.430 mW/g
SAR(10 g) = 0.255 mW/g
Power Drift = -0.01 dB
Maximum value of SAR (measured) = 0.470 mW/g



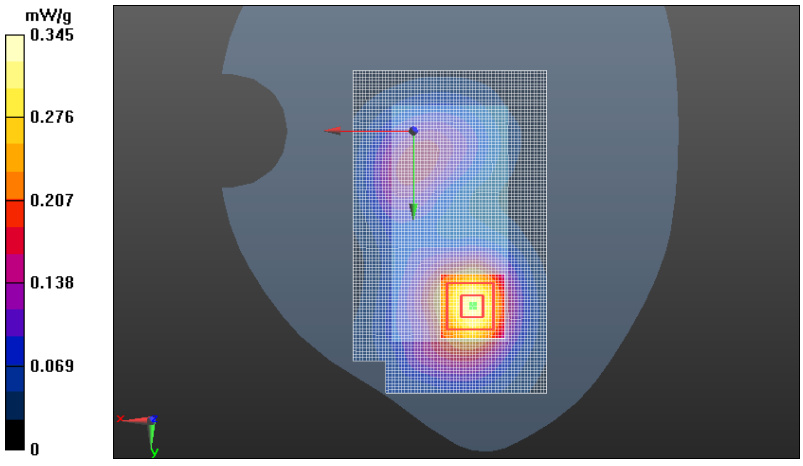
Test Laboratory: TCC Nokia
Type: RM-852; Serial: 004402/13/921604/2; 004402/13/921605/9

Communication System: GSM 1900
Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: Body 1900; Medium Notes: Medium Temperature: t=21.3
Medium parameters used: f = 1880 MHz; σ = 1.531 mho/m; ε_r = 51.855; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(7.2, 7.2, 7.2); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM3; Type: SAM; Serial: TP - 1567
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Body - Middle - Headset WH-102 - Display Facing Phantom/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 9.080 V/m
Fast SAR: SAR(1 g) = 0.311 mW/g
Fast SAR(10 g) = 0.180 mW/g
Maximum value of SAR (interpolated) = 0.345 mW/g

Body - Middle - Headset WH-102 - Display Facing Phantom/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 9.080 V/m
Peak SAR (extrapolated) = 0.496 mW/g
SAR(1 g) = 0.307 mW/g
SAR(10 g) = 0.184 mW/g
Power Drift = 0.04 dB
Maximum value of SAR (measured) = 0.333 mW/g



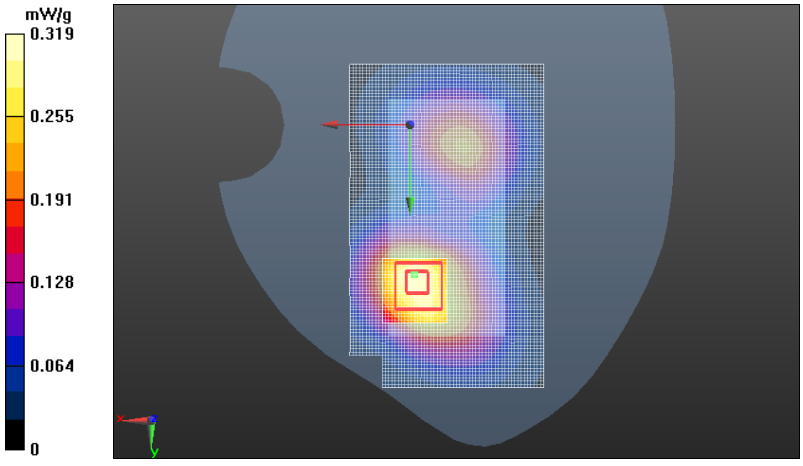
Test Laboratory: TCC Nokia
Type: RM-852; Serial: 004402/13/921604/2; 004402/13/921605/9

Communication System: GSM 1900
Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: Body 1900; Medium Notes: Medium Temperature: t=21.3
Medium parameters used: f = 1880 MHz; σ = 1.531 mho/m; ε_r = 51.855; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(7.2, 7.2, 7.2); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM3; Type: SAM; Serial: TP - 1567
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Body - Middle - No Accessory - Back Facing Phantom/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 10.843 V/m
Fast SAR: SAR(1 g) = 0.296 mW/g
Fast SAR(10 g) = 0.181 mW/g
Maximum value of SAR (interpolated) = 0.319 mW/g

Body - Middle - No Accessory - Back Facing Phantom/Zoom Scan 3 (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 10.843 V/m
Peak SAR (extrapolated) = 0.468 mW/g
SAR(1 g) = 0.295 mW/g
SAR(10 g) = 0.182 mW/g
Power Drift = 0.06 dB
Maximum value of SAR (measured) = 0.316 mW/g



Date/Time: 2012-05-29 15:37:43

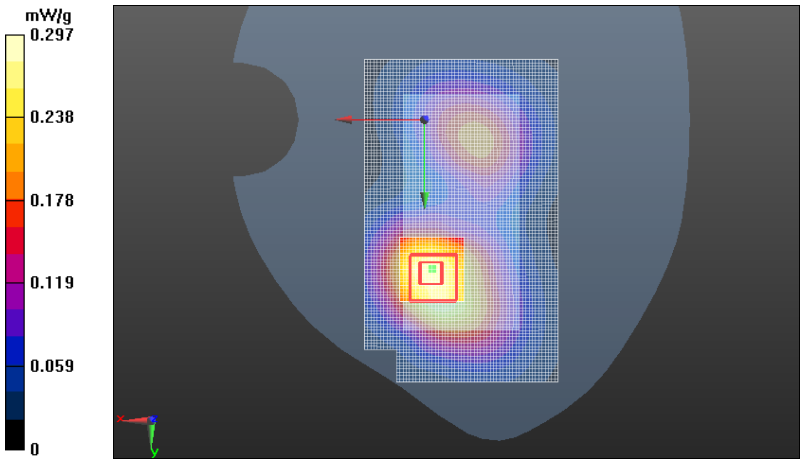
Test Laboratory: TCC Nokia
Type: RM-852; Serial: 004402/13/921604/2; 004402/13/921605/9

Communication System: GSM 1900
Frequency: 1880 MHz; Duty Cycle: 1:8.3
Medium: Body 1900; Medium Notes: Medium Temperature: t=21.3
Medium parameters used: f = 1880 MHz; σ = 1.531 mho/m; ε_r = 51.855; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(7.2, 7.2, 7.2); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM3; Type: SAM; Serial: TP - 1567
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Body - Middle - Headset WH-102 - Back Facing Phantom/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 10.502 V/m
Fast SAR: SAR(1 g) = 0.276 mW/g
Fast SAR(10 g) = 0.169 mW/g
Maximum value of SAR (interpolated) = 0.297 mW/g

Body - Middle - Headset WH-102 - Back Facing Phantom/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 10.502 V/m
Peak SAR (extrapolated) = 0.432 mW/g
SAR(1 g) = 0.274 mW/g
SAR(10 g) = 0.171 mW/g
Power Drift = -0.04 dB
Maximum value of SAR (measured) = 0.297 mW/g



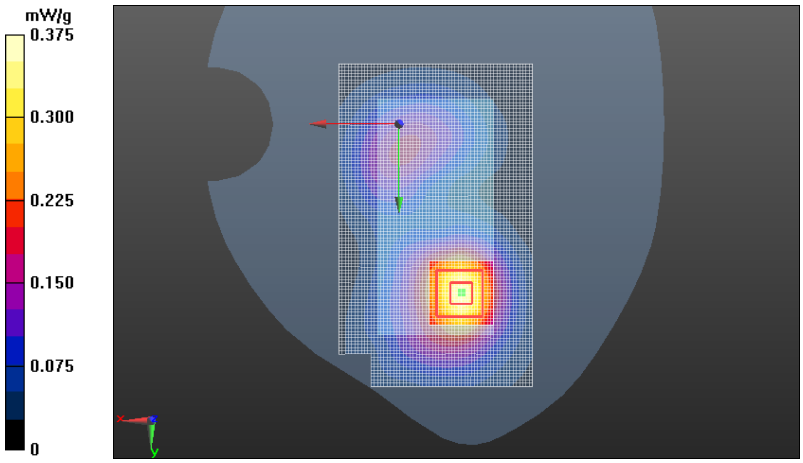
Test Laboratory: TCC Nokia
Type: RM-852; Serial: 004402/13/921604/2; 004402/13/921605/9

Communication System: 2-slot GPRS1900
Frequency: 1880 MHz; Duty Cycle: 1:4.2
Medium: Body 1900; Medium Notes: Medium Temperature: t=21.3
Medium parameters used: f = 1880 MHz; σ = 1.531 mho/m; ε_r = 51.855; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(7.2, 7.2, 7.2); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM3; Type: SAM; Serial: TP - 1567
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Body - Middle - No Accessory - Display Facing Phantom/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 9.520 V/m
Fast SAR: SAR(1 g) = 0.339 mW/g
Fast SAR(10 g) = 0.196 mW/g
Maximum value of SAR (interpolated) = 0.375 mW/g

Body - Middle - No Accessory - Display Facing Phantom/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 9.520 V/m
Peak SAR (extrapolated) = 0.544 mW/g
SAR(1 g) = 0.337 mW/g
SAR(10 g) = 0.200 mW/g
Power Drift = -0.09 dB
Maximum value of SAR (measured) = 0.368 mW/g



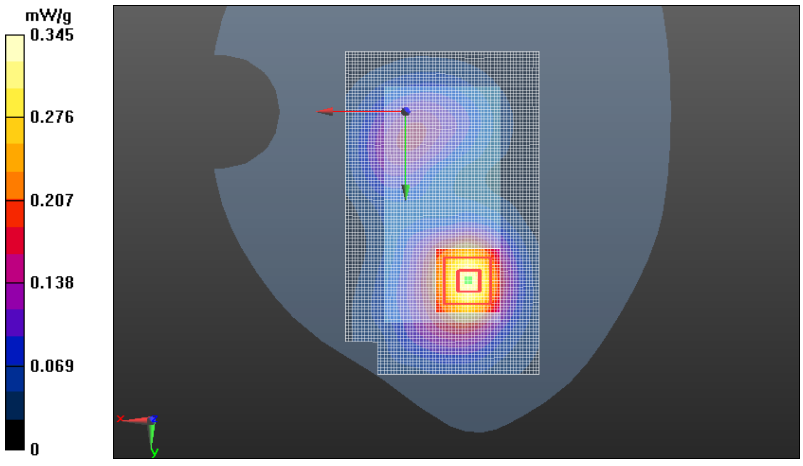
Test Laboratory: TCC Nokia
Type: RM-852; Serial: 004402/13/921604/2; 004402/13/921605/9

Communication System: 3-slot GPRS1900
Frequency: 1880 MHz; Duty Cycle: 1:2.8
Medium: Body 1900; Medium Notes: Medium Temperature: t=21.3
Medium parameters used: f = 1880 MHz; σ = 1.531 mho/m; ε_r = 51.855; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(7.2, 7.2, 7.2); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM3; Type: SAM; Serial: TP - 1567
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Body - Middle - No Accessory - Display Facing Phantom/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 9.040 V/m
Fast SAR: SAR(1 g) = 0.311 mW/g
Fast SAR(10 g) = 0.179 mW/g
Maximum value of SAR (interpolated) = 0.345 mW/g

Body - Middle - No Accessory - Display Facing Phantom/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 9.040 V/m
Peak SAR (extrapolated) = 0.498 mW/g
SAR(1 g) = 0.308 mW/g
SAR(10 g) = 0.182 mW/g
Power Drift = 0.06 dB
Maximum value of SAR (measured) = 0.339 mW/g



Date/Time: 2012-05-29 15:09:59

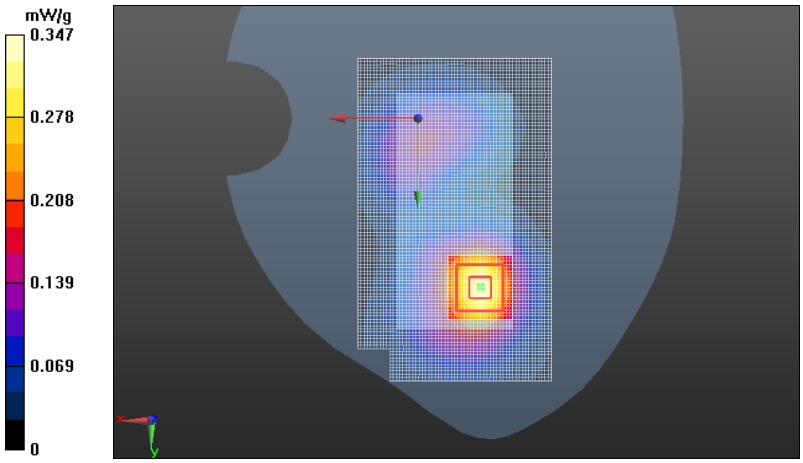
Test Laboratory: TCC Nokia
Type: RM-852; Serial: 004402/13/921604/2; 004402/13/921605/9

Communication System: 4-slot GPRS1900
Frequency: 1880 MHz; Duty Cycle: 1:2.08
Medium: Body 1900; Medium Notes: Medium Temperature: t=21.3
Medium parameters used: f = 1880 MHz; σ = 1.531 mho/m; ε_r = 51.855; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: EX3DV4 - SN3836
- ConvF(7.2, 7.2, 7.2); Calibrated: 2012-02-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2012-02-15
- Phantom: SAM3; Type: SAM; Serial: TP - 1567
- Measurement SW: DASY4, Version 4.7 (80); SEMCAD X Version 14.6.5 (6469)

Body - Middle - No Accessory - Display Facing Phantom/Area Scan (61x101x1): Measurement grid: dx=15mm, dy=15mm
Reference Value = 9.104 V/m
Fast SAR: SAR(1 g) = 0.313 mW/g
Fast SAR(10 g) = 0.180 mW/g
Maximum value of SAR (interpolated) = 0.347 mW/g

Body - Middle - No Accessory - Display Facing Phantom/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 9.104 V/m
Peak SAR (extrapolated) = 0.496 mW/g
SAR(1 g) = 0.308 mW/g
SAR(10 g) = 0.182 mW/g
Power Drift = -0.08 dB
Maximum value of SAR (measured) = 0.337 mW/g



APPENDIX C: DIELECTRIC PARAMETERS OF THE TISSUE SIMULANTS

Head tissue simulant dielectric parameters used in the measurements:

f (MHz)	Date	Dielectric Parameters					
		128		190		251	
		εr	σ [S/m]	εr	σ [S/m]	εr	σ [S/m]
GSM/GPRS850	2012-05-28	41.4	0.86	41.2	0.87	41.1	0.89
f (MHz)	Date	Dielectric Parameters					
		512		661		810	
		εr	σ [S/m]	εr	σ [S/m]	εr	σ [S/m]
GSM/GPRS1900	2012-05-29	39.4	1.39	39.3	1.42	39.2	1.44

Body tissue simulant dielectric parameters used in the measurements:

f (MHz)	Date	Dielectric Parameters					
		128		190		251	
		εr	σ [S/m]	εr	σ [S/m]	εr	σ [S/m]
GSM/GPRS850	2012-05-31	54.1	0.95	54.0	0.96	53.8	0.97
f (MHz)	Date	Dielectric Parameters					
		512		661		810	
		εr	σ [S/m]	εr	σ [S/m]	εr	σ [S/m]
GSM/GPRS1900	2012-05-29	52.0	1.50	51.9	1.53	51.7	1.56

APPENDIX D: RELEVANT PAGES FROM PROBE CALIBRATION REPORT(S)

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

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

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

Accreditation No.: SCS 108

Client Nokia Beijing TCC

Certificate No: EX3-3836_Feb12

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3836

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

Calibration date: February 20, 2012

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

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

Issued: February 21, 2012

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3836

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.40	0.47	0.45	± 10.1 %
DCP (mV)[B]	89.1	99.3	95.9	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	101.5	±3.0 %
			Y	0.00	0.00	1.00	111.8	
			Z	0.00	0.00	1.00	105.9	

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

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3836

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
835	41.5	0.90	8.54	8.54	8.54	0.67	0.68	± 12.0 %
1750	40.1	1.37	7.92	7.92	7.92	0.38	0.91	± 12.0 %
1900	40.0	1.40	7.66	7.66	7.66	0.74	0.66	± 12.0 %

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

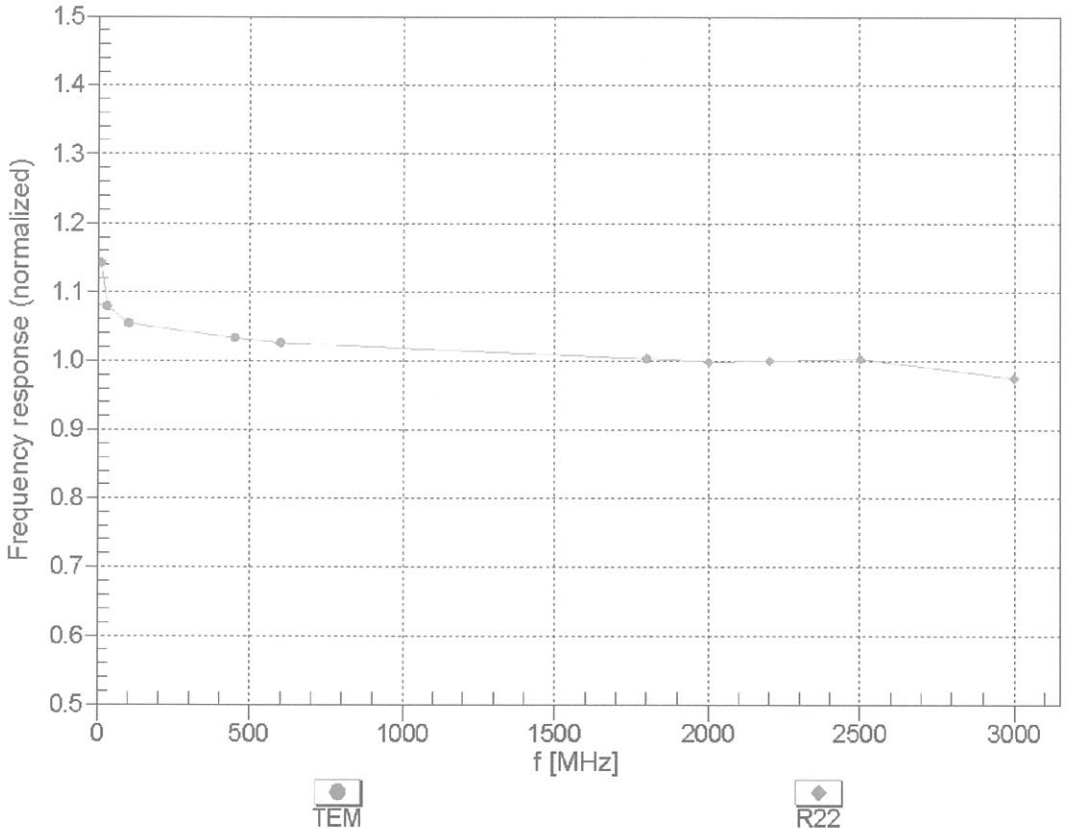
DASY/EASY - Parameters of Probe: EX3DV4 - SN:3836

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
835	55.2	0.97	8.83	8.83	8.83	0.80	0.65	± 12.0 %
1750	53.4	1.49	7.64	7.64	7.64	0.49	0.81	± 12.0 %
1900	53.3	1.52	7.20	7.20	7.20	0.42	0.82	± 12.0 %

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

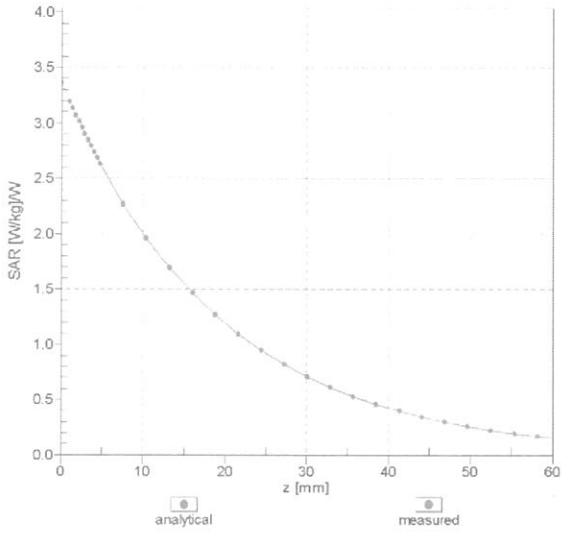
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



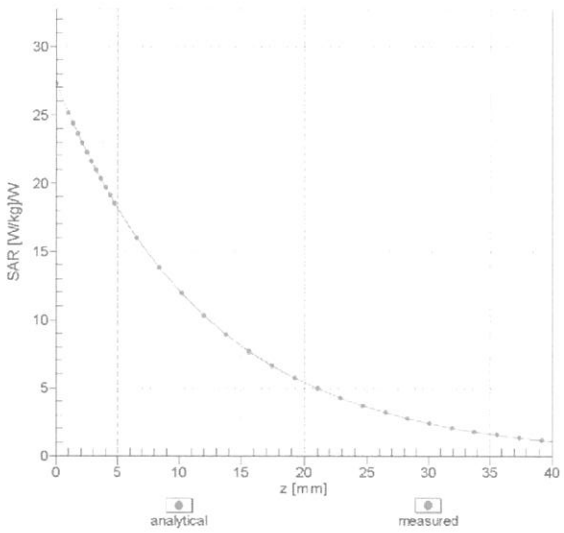
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

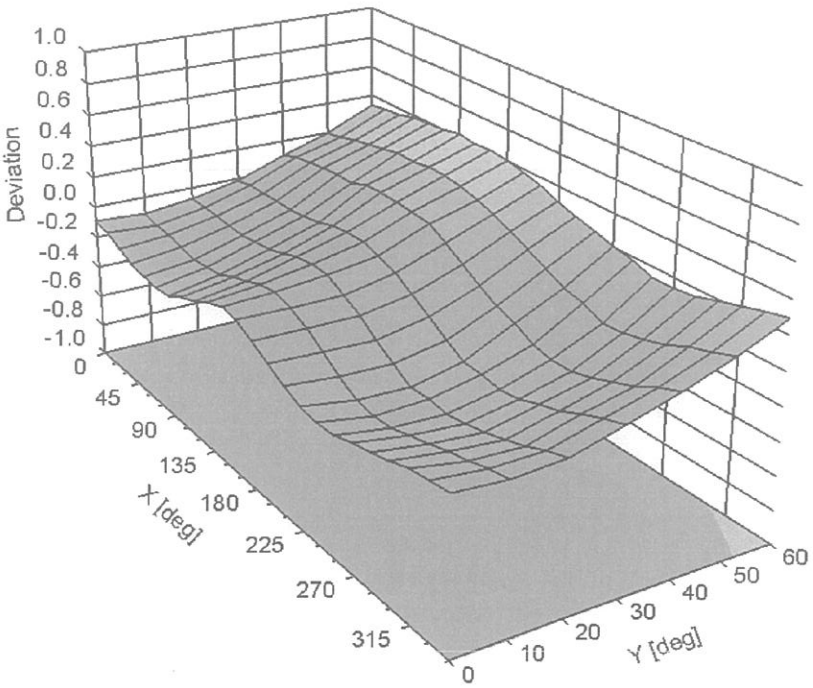


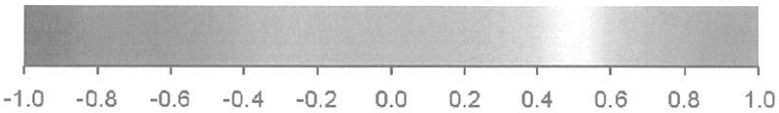
f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





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

APPENDIX E: RELEVANT PAGES FROM DIPOLE VALIDATION KIT REPORT(S)

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

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

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

Accreditation No.: SCS 108

Client Nokia Beijing TCC

Certificate No: D835V2-479_Mar11

CALIBRATION CERTIFICATE

Object: D835V2 - SN: 479

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

Calibration date: March 9, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

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

Issued: March 10, 2011

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.2 Ω - 3.3 jΩ
Return Loss	- 29.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.0 Ω - 5.2 jΩ
Return Loss	- 24.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.388 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	January 28, 2003

Date/Time: 09.03.2011 14:54:54

Test Laboratory: SPEAG, Zurich, Switzerland

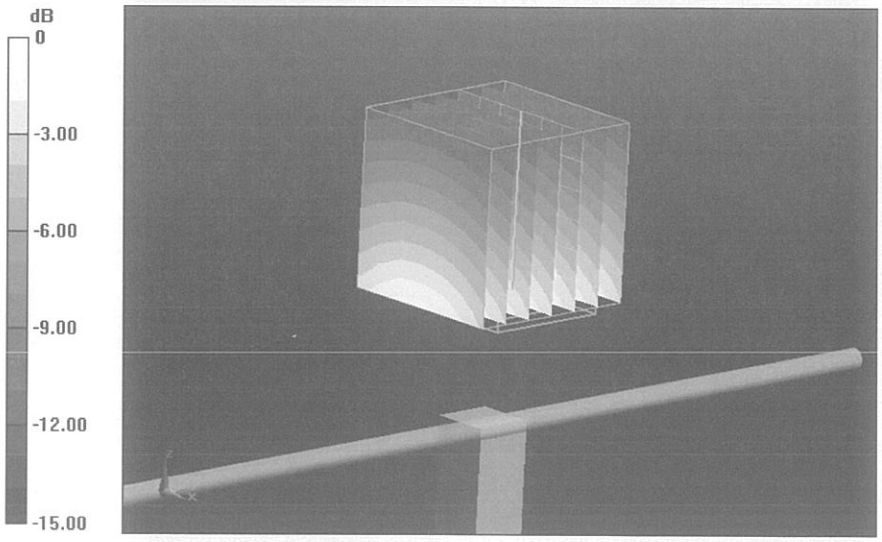
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:479

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL900
Medium parameters used: f = 835 MHz; σ = 0.89 mho/m; ε_r = 41; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

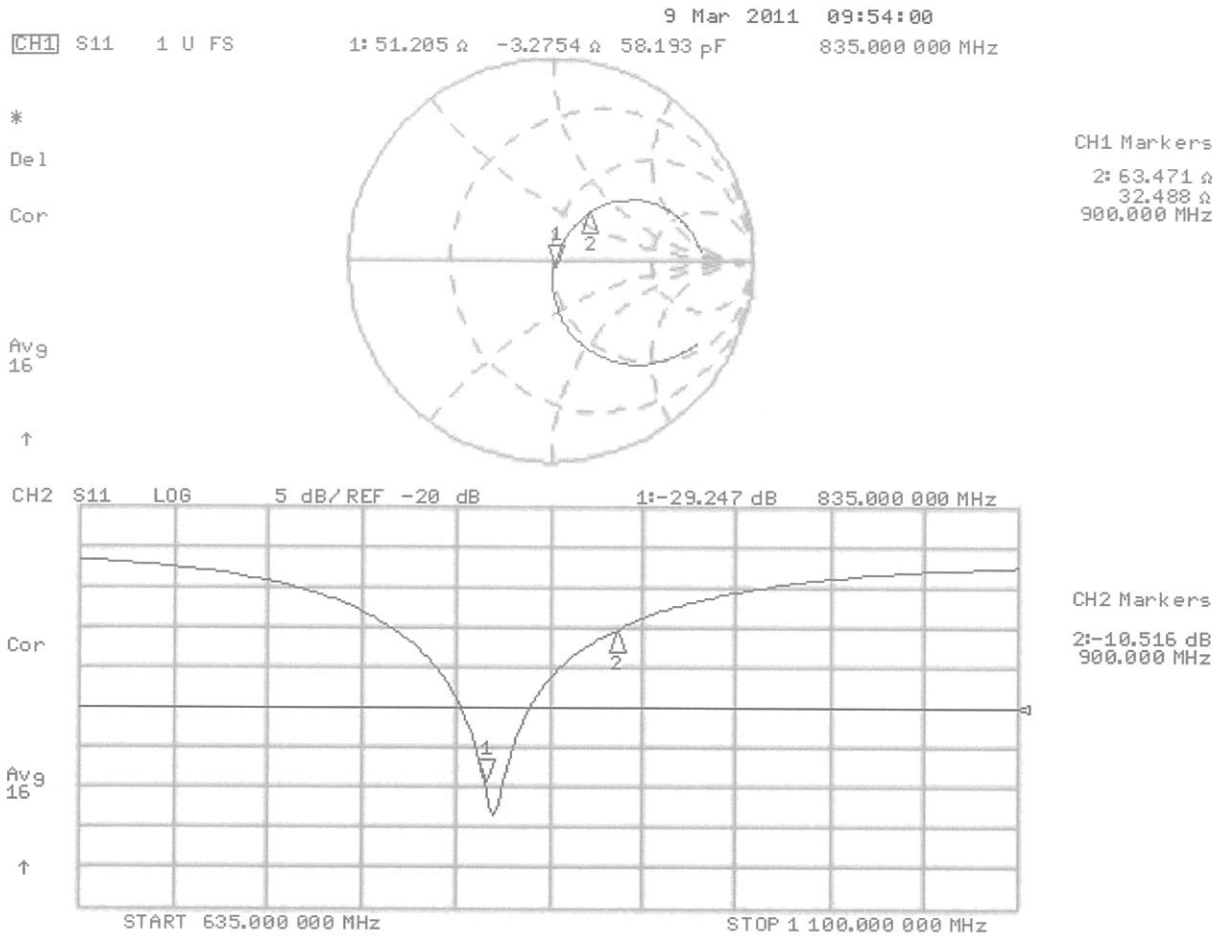
- Probe: ES3DV3 - SN3205; ConvF(6.03, 6.03, 6.03); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.6 Build 2, Version 52.6.2 (424)
- Postprocessing SW: SEMCAD X, V14.4 Build 4, Version 14.4.4 (2829)

Head/d=15mm, Pin=250 mW, dist=3.0mm (ES-Probe) 2/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.436 V/m; Power Drift = 0.0071 dB
Peak SAR (extrapolated) = 3.602 W/kg
SAR(1 g) = 2.39 mW/g; SAR(10 g) = 1.56 mW/g
Maximum value of SAR (measured) = 2.795 mW/g



0 dB = 2.790mW/g

Impedance Measurement Plot for Head TSL



Date/Time: 09.03.2011 10:34:32

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:479

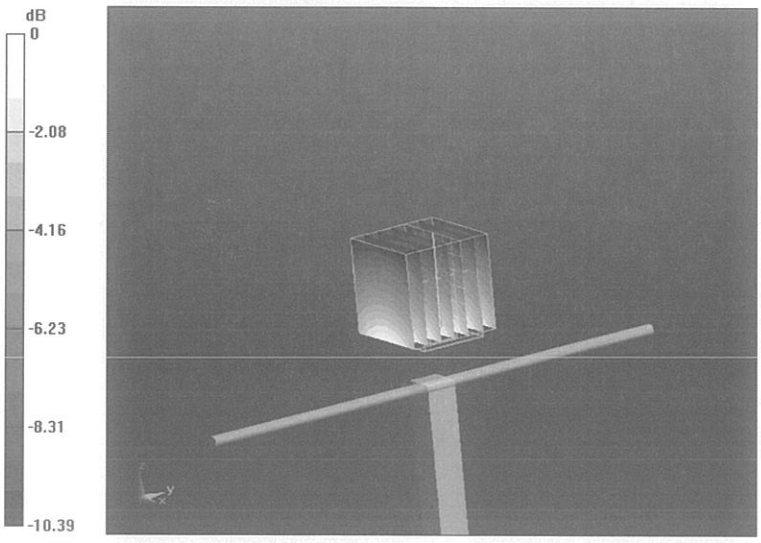
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: MSL900
Medium parameters used: f = 835 MHz; σ = 0.99 mho/m; ε_r = 54.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.86, 5.86, 5.86); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.6 Build 2, Version 52.6.2 (424)
- Postprocessing SW: SEMCAD X, V14.4 Build 4, Version 14.4.4 (2829)

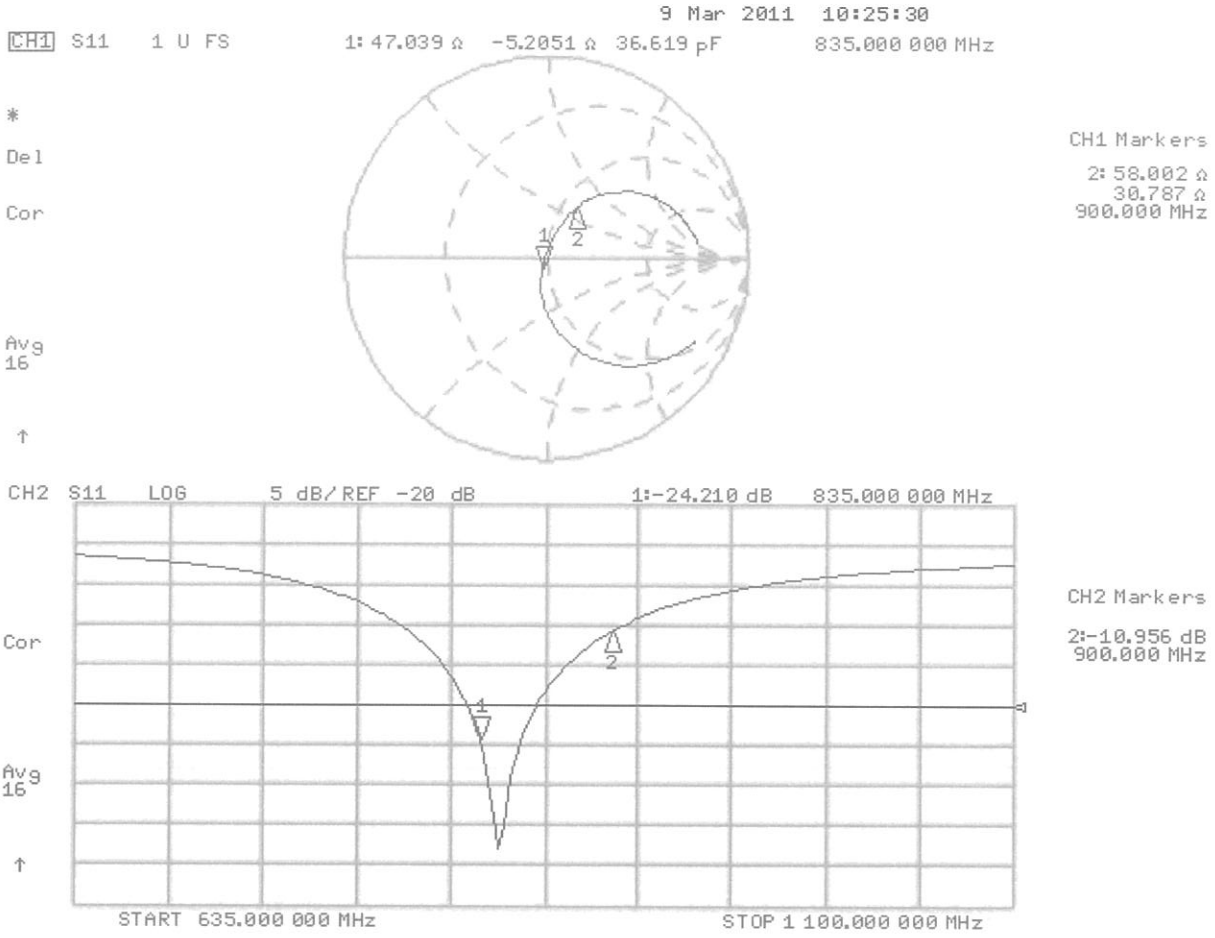
Body/d=15mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.238 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.717 W/kg
SAR(1 g) = 2.52 mW/g; SAR(10 g) = 1.65 mW/g
Maximum value of SAR (measured) = 2.938 mW/g



0 dB = 2.940mW/g

Impedance Measurement Plot for Body TSL



Dipole D835V2 – SN: 479 Antenna Parameters

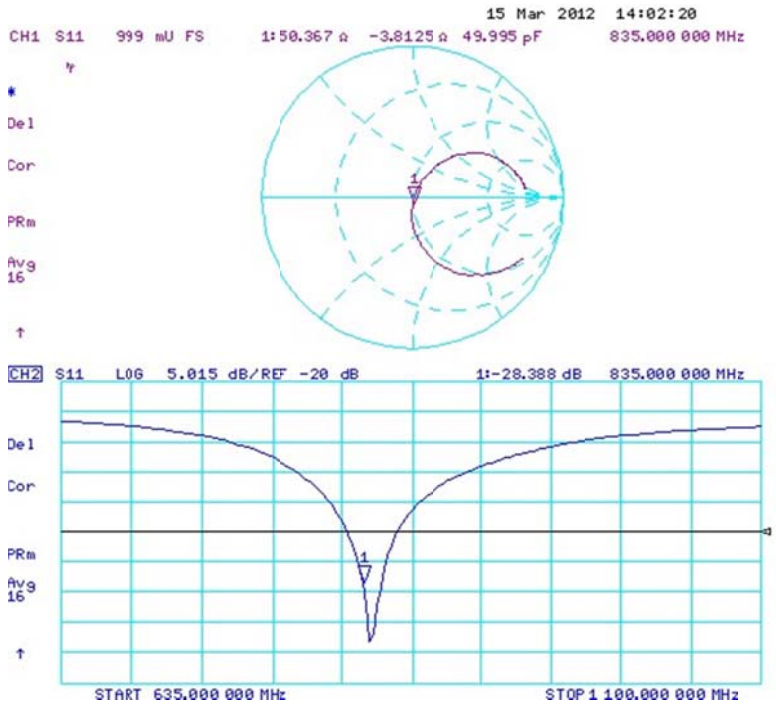
Antenna Parameters with Head TSL

	Calibration certificate	Annual measurement 2012-03-15
Impedance, transformed to feed point	51.2 Ω - 3.3 jΩ	50.4 Ω - 3.8 jΩ
Return loss	- 29.2 dB	- 28.4 dB

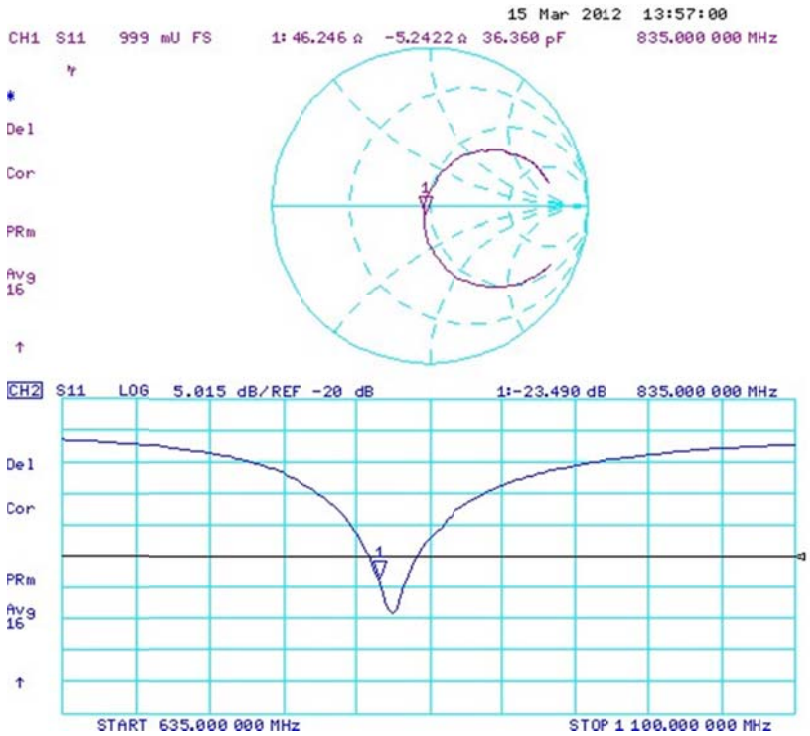
Antenna Parameters with Body TSL

	Calibration certificate	Annual measurement 2012-03-15
Impedance, transformed to feed point	47.0 Ω - 5.2 jΩ	46.2 Ω - 5.2 jΩ
Return loss	- 24.2 dB	- 23.5 dB

Impedance Measurement plot for Head TSL 835



Impedance Measurement plot for Body TSL 835



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

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

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

Accreditation No.: SCS 108

Client Nokia Beijing TCC

Certificate No: D1900V2-547_Oct11

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 547
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	October 20, 2011

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

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

Issued: October 20, 2011

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.5 Ω + 4.3 jΩ
Return Loss	- 27.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.8 Ω + 3.5 jΩ
Return Loss	- 26.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.191 ns

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

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

Design Modification by End User

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 15, 2001

Date: 20.10.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 547

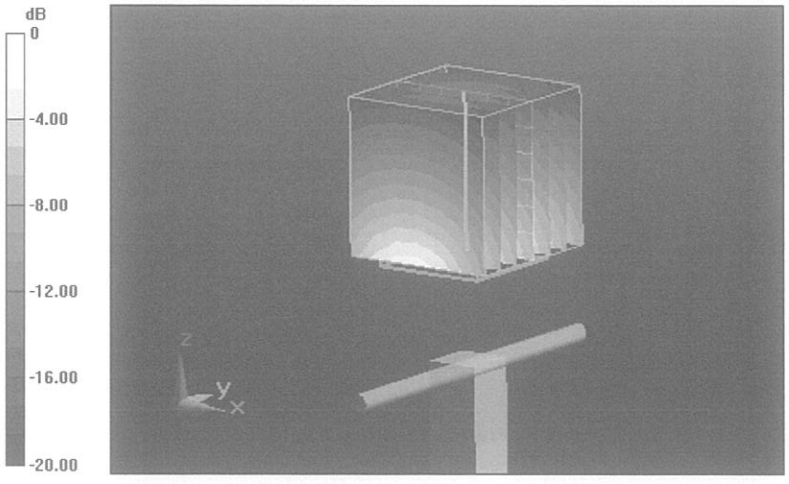
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.43 mho/m; ε_r = 39.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.01, 5.01, 5.01); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

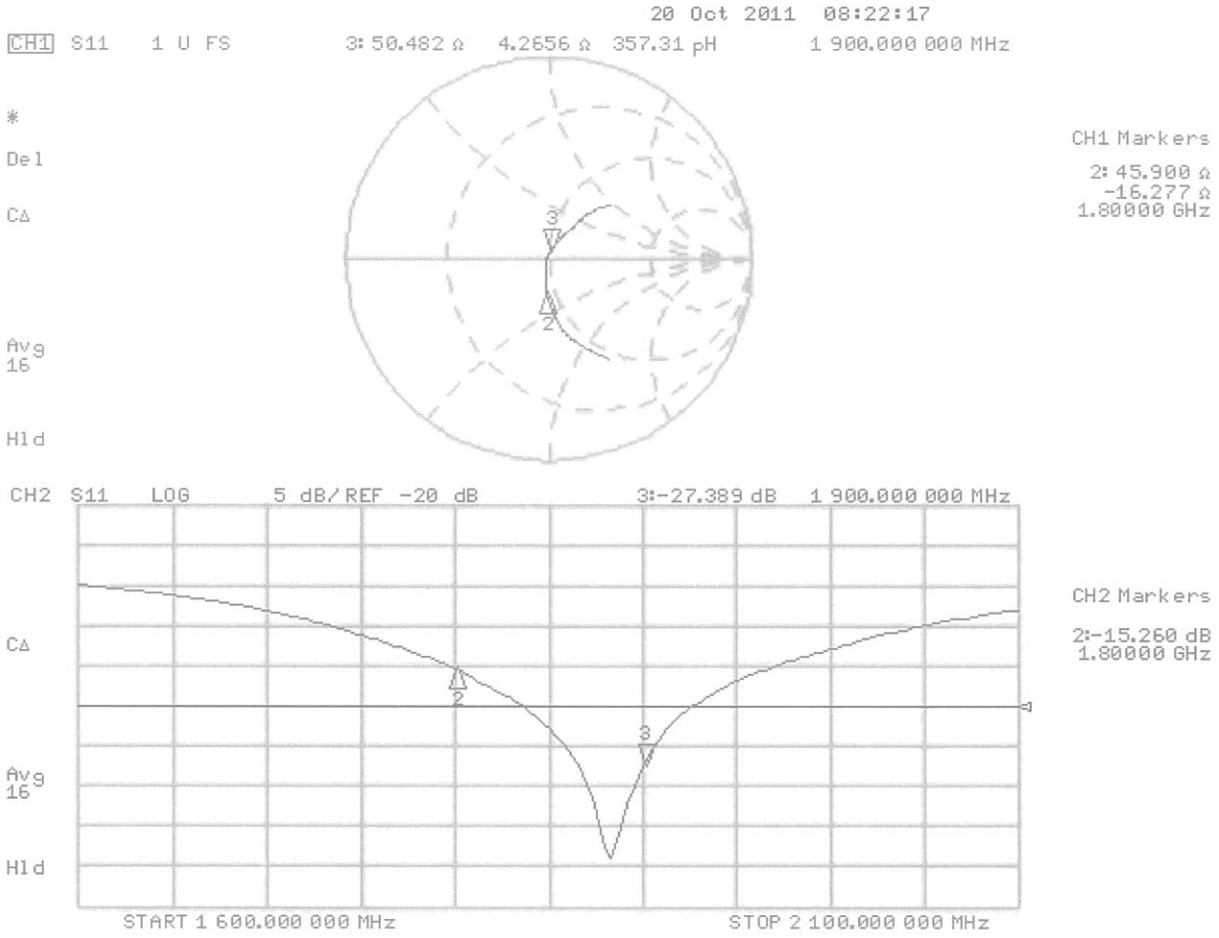
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 99.072 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 19.037 W/kg
SAR(1 g) = 10.4 mW/g; SAR(10 g) = 5.4 mW/g
Maximum value of SAR (measured) = 13.012 mW/g



0 dB = 13.010mW/g

Impedance Measurement Plot for Head TSL



Date: 18.10.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 547

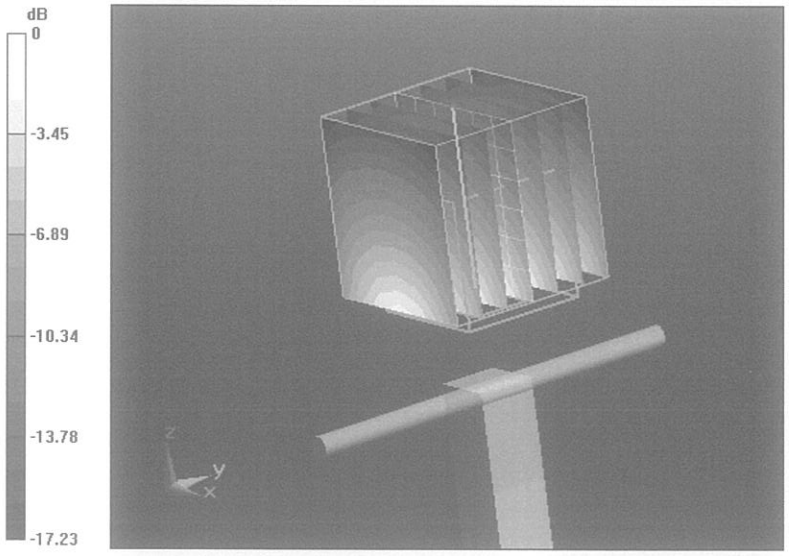
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.59 mho/m; ε_r = 54.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.62, 4.62, 4.62); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

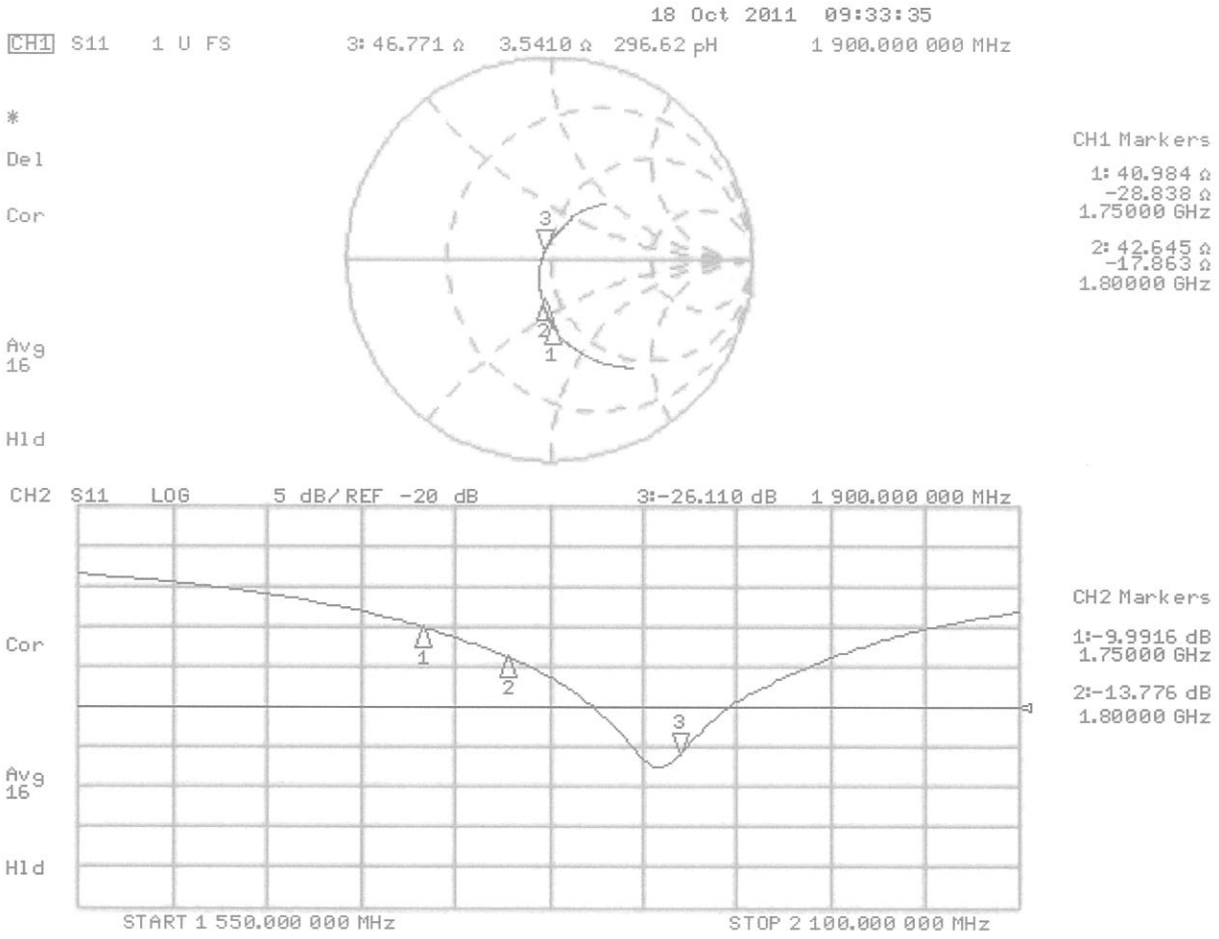
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.823 V/m; Power Drift = 0.0092 dB
Peak SAR (extrapolated) = 18.788 W/kg
SAR(1 g) = 10.6 mW/g; SAR(10 g) = 5.5 mW/g
Maximum value of SAR (measured) = 13.491 mW/g



0 dB = 13.490mW/g

Impedance Measurement Plot for Body TSL



Dipole D1900V2 – SN: 547 Antenna Parameters

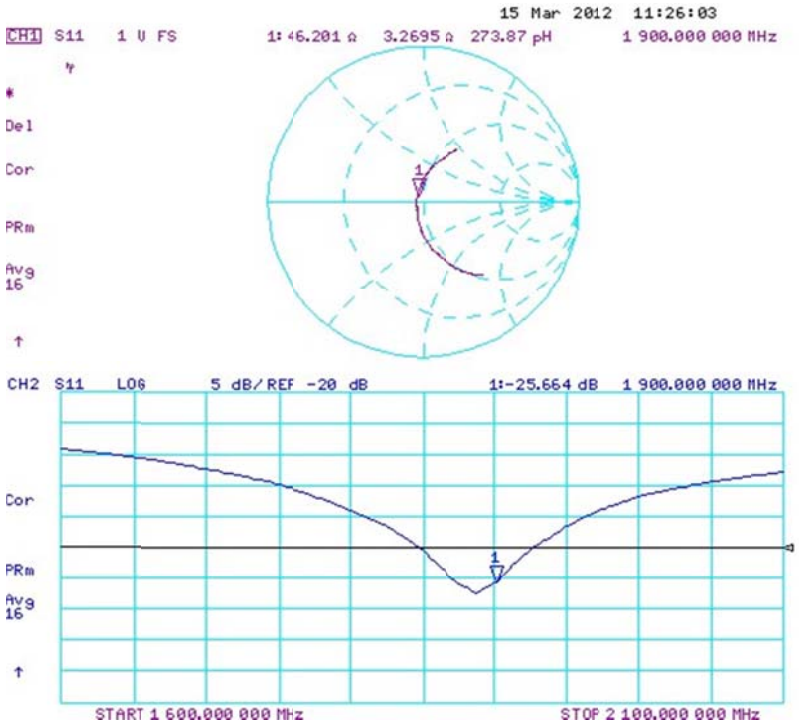
Antenna Parameters with Head TSL

	Calibration certificate	Annual measurement 2012-03-15
Impedance, transformed to feed point	50.5 Ω + 4.3 jΩ	46.2 Ω + 3.3 jΩ
Return loss	- 27.4 dB	- 25.7 dB

Antenna Parameters with Body TSL

	Calibration certificate	Annual measurement 2012-03-15
Impedance, transformed to feed point	46.8 Ω + 3.5 jΩ	49.2 Ω + 4.0 jΩ
Return loss	- 26.1 dB	- 27.8 dB

Impedance Measurement plot for Head TSL 1900



Impedance Measurement plot for Body TSL 1900