

Test Laboratory: Compliance Certification Services

Left Hand Side

DUT: 900MHz Phone; Type: cordless; Serial: N/A

Communication System: 900MHz Band; Frequency: 902.5 MHz; Duty Cycle: 1:10

Medium parameters used (interpolated): $f = 902.5$ MHz; $\sigma = 0.973$ mho/m; $\epsilon_r = 40.3$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Room Ambient Temperature: 23.0deg. C; Liquid Temperature: 22.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3552; ConvF(9.44, 9.44, 9.44); Calibrated: 5/30/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 SN558; Calibrated: 1/20/2006
- Phantom: SAM 2; Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Touch L ch/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.070 mW/g

Touch L ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

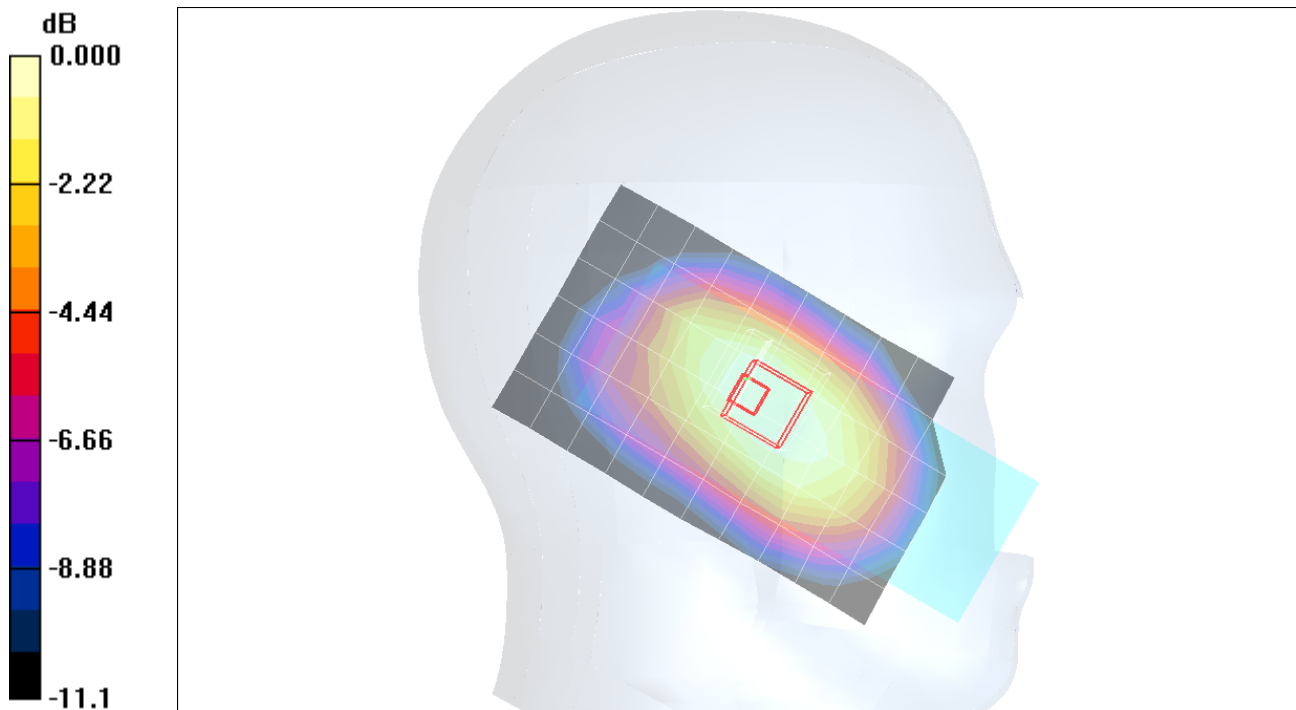
Reference Value = 6.75 V/m; Power Drift = -0.142 dB

Peak SAR (extrapolated) = 0.088 W/kg

SAR(1 g) = 0.063 mW/g; SAR(10 g) = 0.045 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.067 mW/g



0 dB = 0.067mW/g

Test Laboratory: Compliance Certification Services

Left Hand Side

DUT: 900MHz Phone; Type: cordless; Serial: N/A

Communication System: 900MHz Band; Frequency: 914.7 MHz; Duty Cycle: 1:10

Medium parameters used (interpolated): $f = 914.7$ MHz; $\sigma = 0.985$ mho/m; $\epsilon_r = 40.2$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Room Ambient Temperature: 23.0deg. C; Liquid Temperature: 22.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3552; ConvF(9.44, 9.44, 9.44); Calibrated: 5/30/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 SN558; Calibrated: 1/20/2006
- Phantom: SAM 2; Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Touch M ch/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.042 mW/g

Touch M ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

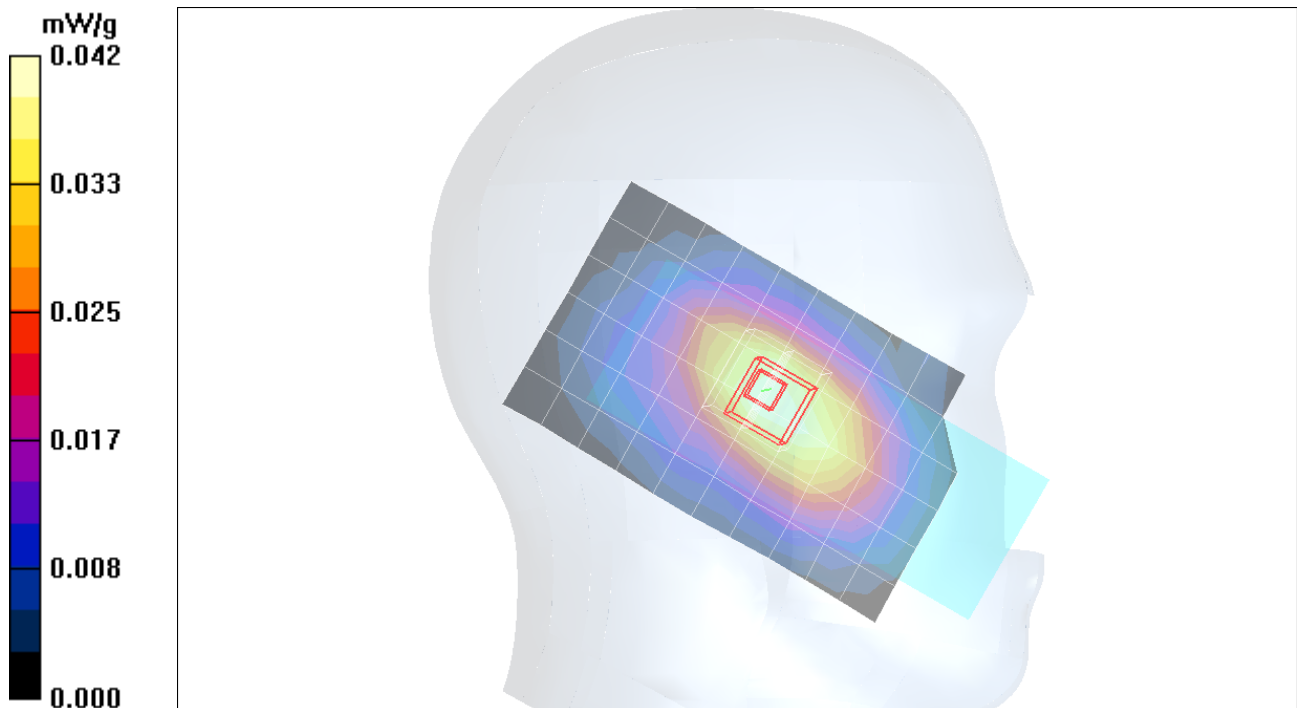
Reference Value = 5.15 V/m; Power Drift = -0.160 dB

Peak SAR (extrapolated) = 0.062 W/kg

SAR(1 g) = 0.041 mW/g; SAR(10 g) = 0.029 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.044 mW/g



Test Laboratory: Compliance Certification Services

Left Hand Side

DUT: 900MHz Phone; Type: cordless; Serial: N/A

Communication System: 900MHz Band; Frequency: 927 MHz; Duty Cycle: 1:10

Medium parameters used (interpolated): $f = 927$ MHz; $\sigma = 0.997$ mho/m; $\epsilon_r = 40$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Room Ambient Temperature: 23.0deg. C; Liquid Temperature: 22.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3552; ConvF(9.44, 9.44, 9.44); Calibrated: 5/30/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 SN558; Calibrated: 1/20/2006
- Phantom: SAM 2; Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Touch H ch/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.031 mW/g

Touch H ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

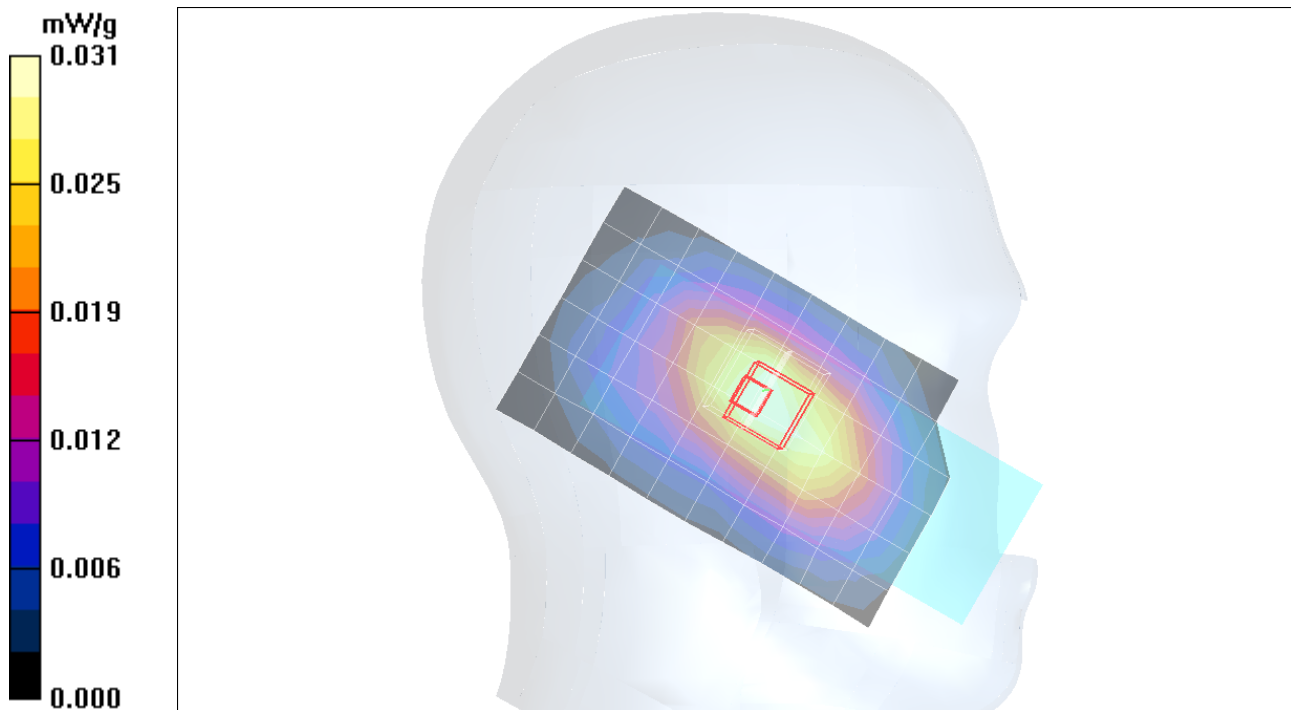
Reference Value = 4.50 V/m; Power Drift = -0.196 dB

Peak SAR (extrapolated) = 0.081 W/kg

SAR(1 g) = 0.031 mW/g; SAR(10 g) = 0.021 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.033 mW/g



Test Laboratory: Compliance Certification Services

Left Hand Side

DUT: 900MHz Phone; Type: cordless; Serial: N/A

Communication System: 900MHz Band; Frequency: 914.7 MHz; Duty Cycle: 1:10

Medium parameters used (interpolated): $f = 914.7$ MHz; $\sigma = 0.985$ mho/m; $\epsilon_r = 40.2$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Room Ambient Temperature: 23.0deg. C; Liquid Temperature: 22.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3552; ConvF(9.44, 9.44, 9.44); Calibrated: 5/30/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 SN558; Calibrated: 1/20/2006
- Phantom: SAM 2; Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Tilt M ch/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.023 mW/g

Tilt M ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

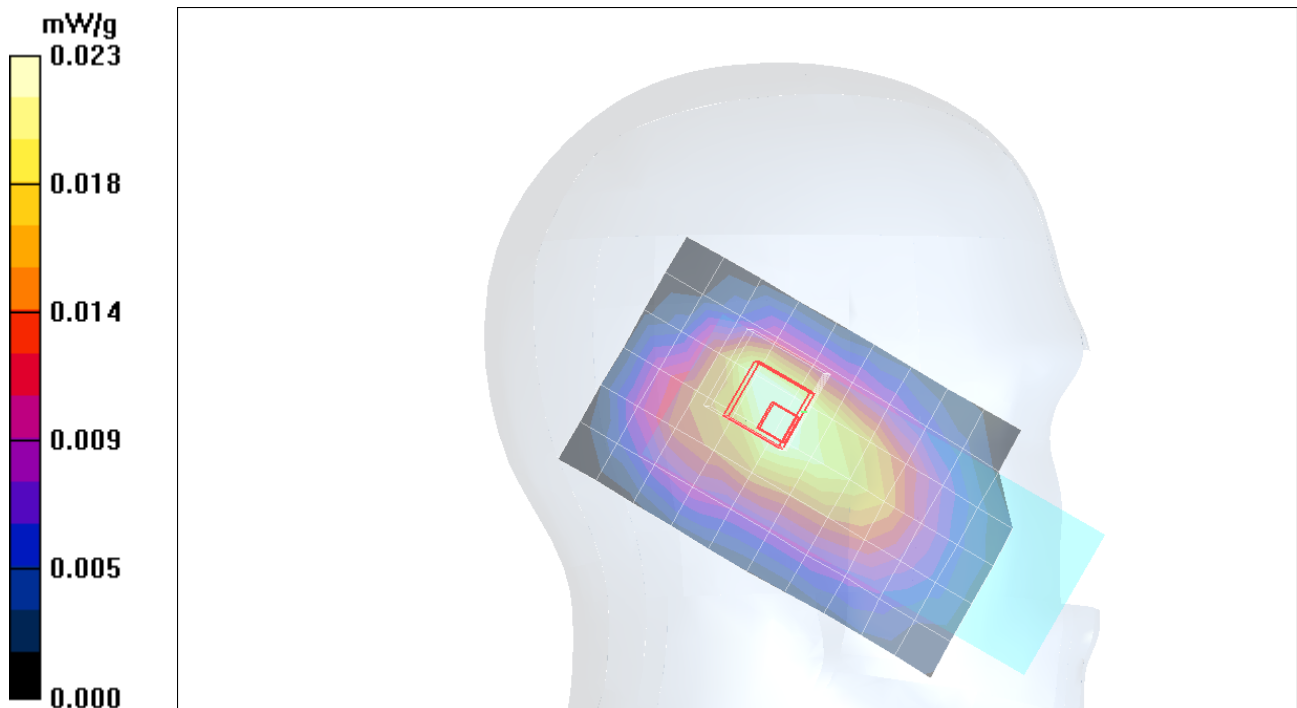
Reference Value = 4.62 V/m; Power Drift = 0.163 dB

Peak SAR (extrapolated) = 0.039 W/kg

SAR(1 g) = 0.022 mW/g; SAR(10 g) = 0.014 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.026 mW/g



Test Laboratory: Compliance Certification Services

Left Hand Side

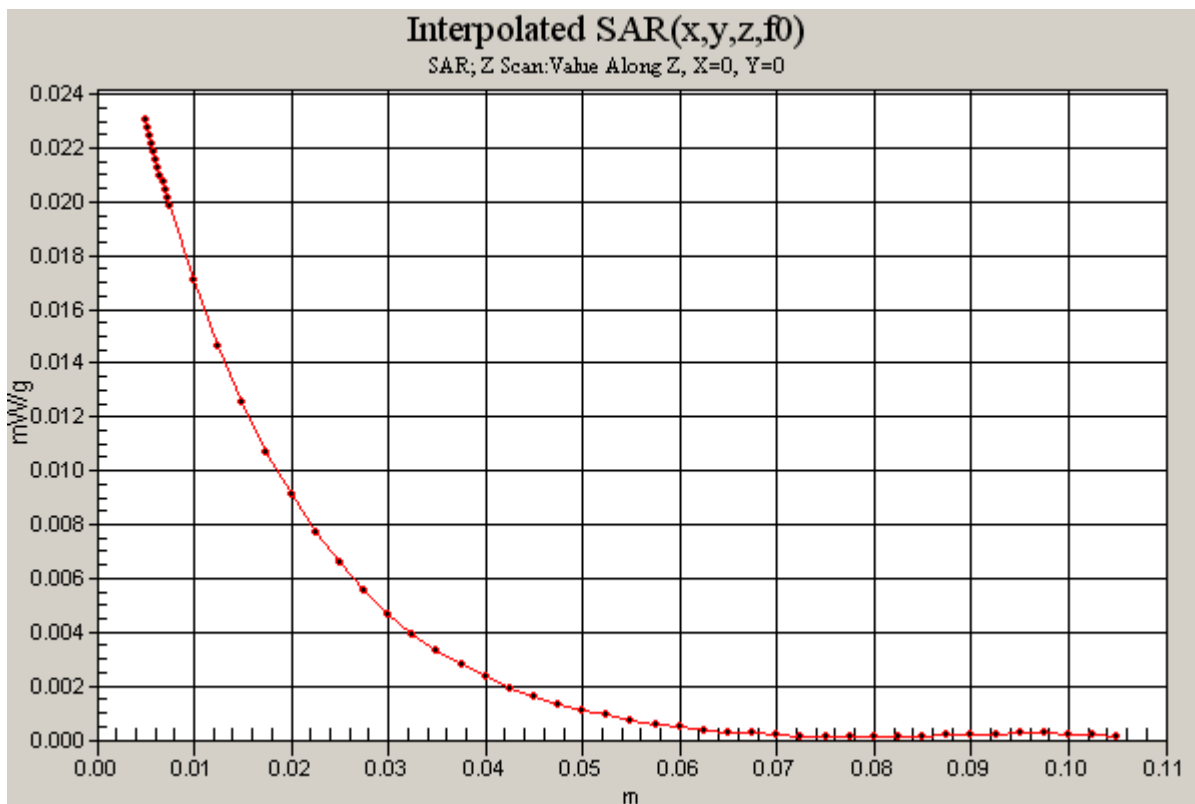
DUT: 900MHz Phone; Type: cordless; Serial: N/A

Communication System: 900MHz Band; Frequency: 927 MHz;Duty Cycle: 1:10

Touch H ch/Z Scan (1x1x51): Measurement grid: dx=20mm, dy=20mm, dz=2.5mm

Info: [Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.023 mW/g



Test Laboratory: Compliance Certification Services

Right Hand Side

DUT: 900MHz Phone; Type: cordless; Serial: N/A

Communication System: 900MHz Band; Frequency: 914.7 MHz; Duty Cycle: 1:10

Medium parameters used (interpolated): $f = 914.7$ MHz; $\sigma = 0.985$ mho/m; $\epsilon_r = 40.2$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Room Ambient Temperature: 23.0deg. C; Liquid Temperature: 22.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3552; ConvF(9.44, 9.44, 9.44); Calibrated: 5/30/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 SN558; Calibrated: 1/20/2006
- Phantom: SAM 2; Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Touch M ch/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.042 mW/g

Touch M ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

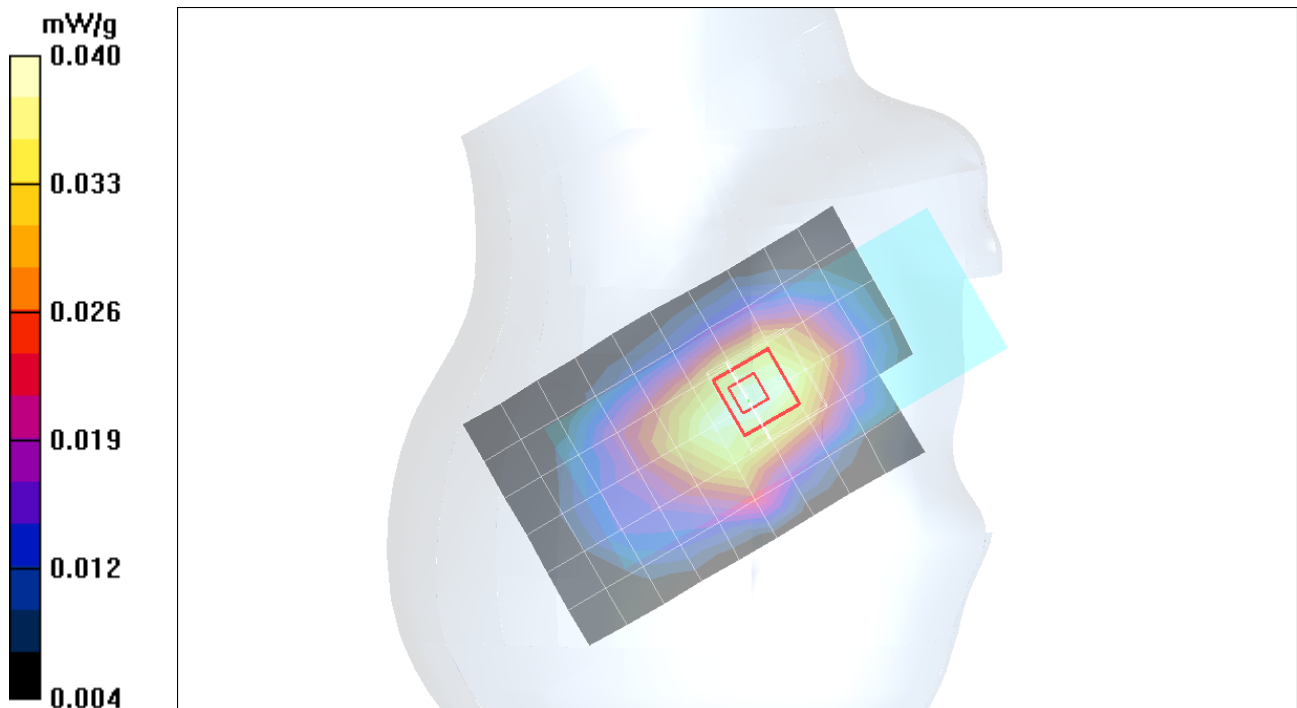
Reference Value = 5.02 V/m; Power Drift = -0.138 dB

Peak SAR (extrapolated) = 0.048 W/kg

SAR(1 g) = 0.039 mW/g; SAR(10 g) = 0.029 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.040 mW/g



Test Laboratory: Compliance Certification Services

Right Hand Side

DUT: 900MHz Phone; Type: cordless; Serial: N/A

Communication System: 900MHz Band; Frequency: 914.7 MHz; Duty Cycle: 1:10

Medium parameters used (interpolated): $f = 914.7$ MHz; $\sigma = 0.985$ mho/m; $\epsilon_r = 40.2$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Room Ambient Temperature: 23.0deg. C; Liquid Temperature: 22.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3552; ConvF(9.44, 9.44, 9.44); Calibrated: 5/30/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 SN558; Calibrated: 1/20/2006
- Phantom: SAM 2; Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

Tilt M ch/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.030 mW/g

Tilt M ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

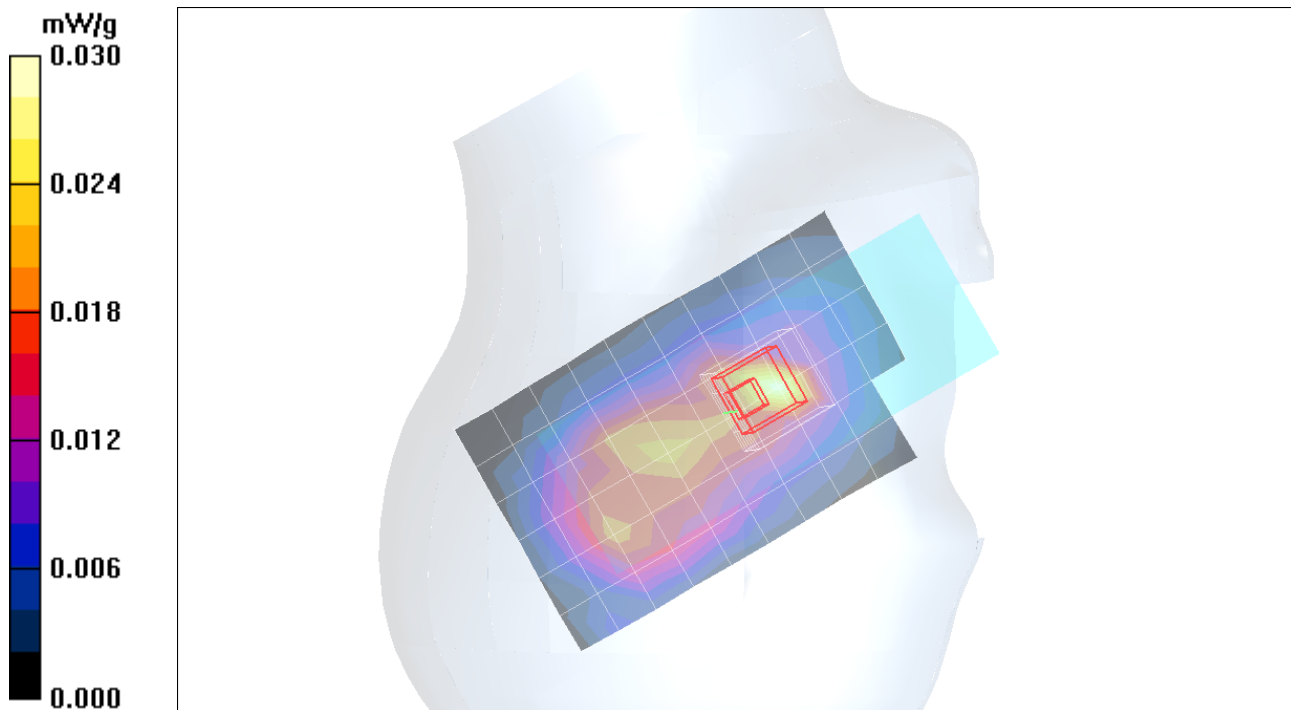
Reference Value = 4.55 V/m; Power Drift = -0.111 dB

Peak SAR (extrapolated) = 0.020 W/kg

SAR(1 g) = 0.015 mW/g; SAR(10 g) = 0.011 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.017 mW/g



Test Laboratory: Compliance Certification Services

Body

DUT: 900MHz Phone; Type: cordless; Serial: N/A

Communication System: 900MHz Band; Frequency: 914.7 MHz;Duty Cycle: 1:10
Medium parameters used (interpolated): $f = 914.7 \text{ MHz}$; $\sigma = 1.04 \text{ mho/m}$; $\epsilon_r = 53.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Room Ambient Temperature: 23.0deg. C; Liquid Temperature: 22.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3552; ConvF(9.37, 9.37, 9.37); Calibrated: 5/30/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 SN558; Calibrated: 1/20/2006
- Phantom: SAM 2; Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

M Ch/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.022 mW/g

M Ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

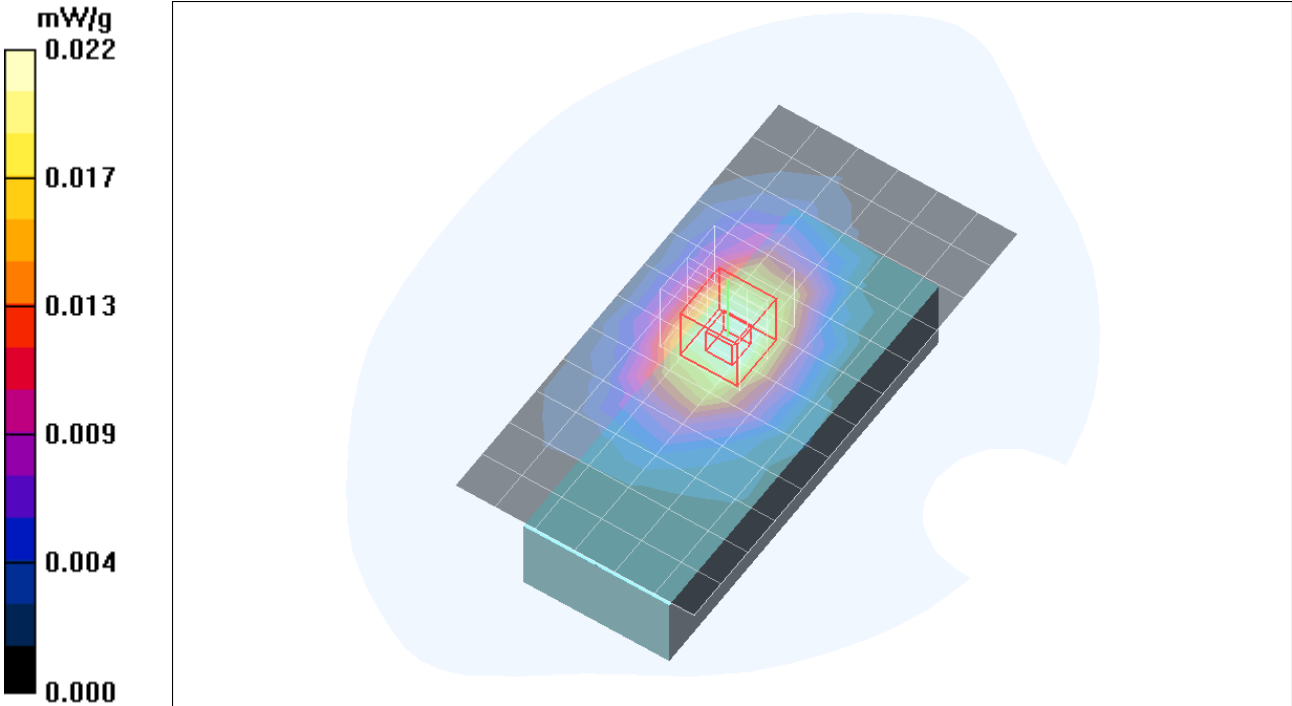
Reference Value = 4.64 V/m; Power Drift = 0.005 dB

Peak SAR (extrapolated) = 0.032 W/kg

SAR(1 g) = 0.022 mW/g; SAR(10 g) = 0.015 mW/g

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.023 mW/g



Test Laboratory: Compliance Certification Services

Body

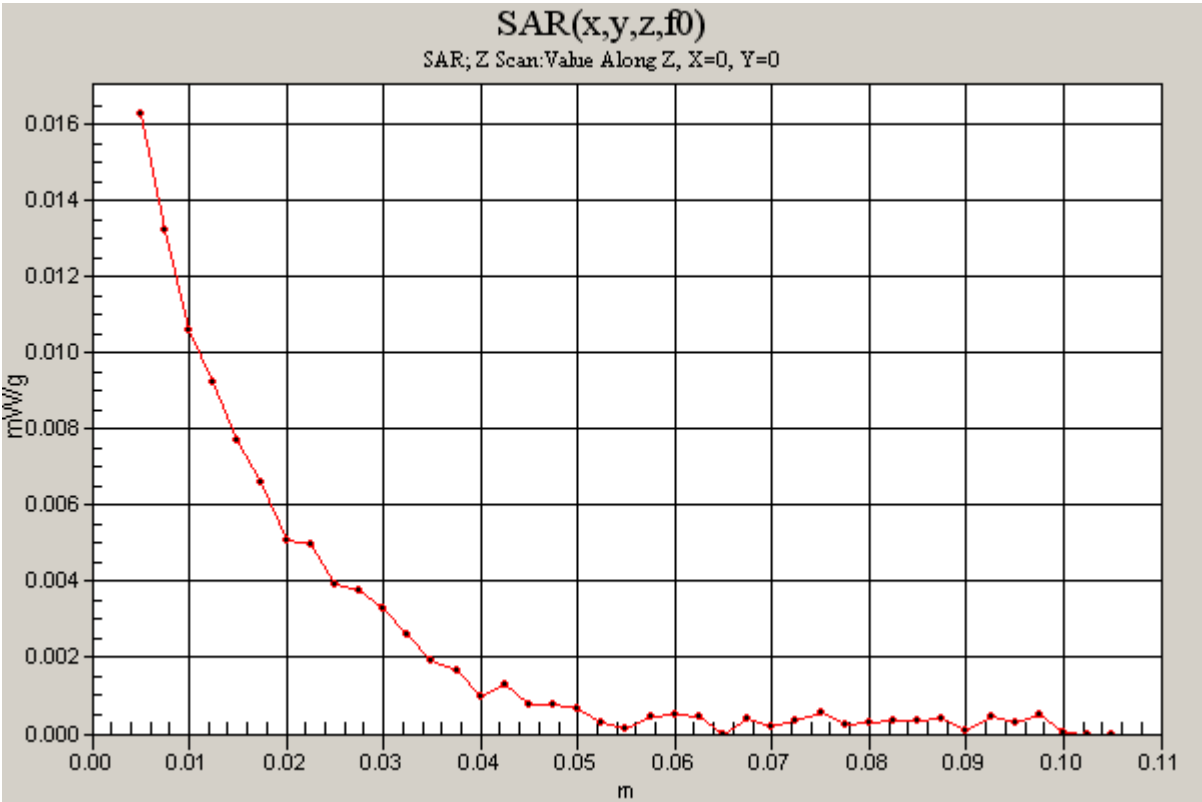
DUT: 900MHz Phone; Type: cordless; Serial: N/A

Communication System: 900MHz Band; Frequency: 914.7 MHz;Duty Cycle: 1:10

M Ch/Z Scan (1x1x41): Measurement grid: dx=20mm, dy=20mm, dz=2.5mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.016 mW/g



Test Laboratory: Compliance Certification Services

System Performance Check @ 900MHz

DUT: Dipole 900 MHz; Type: D900V2; Serial: 108

Communication System: CW 900 MHz; Frequency: 900 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 900 \text{ MHz}$; $\sigma = 0.97 \text{ mho/m}$; $\epsilon_r = 40.3$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

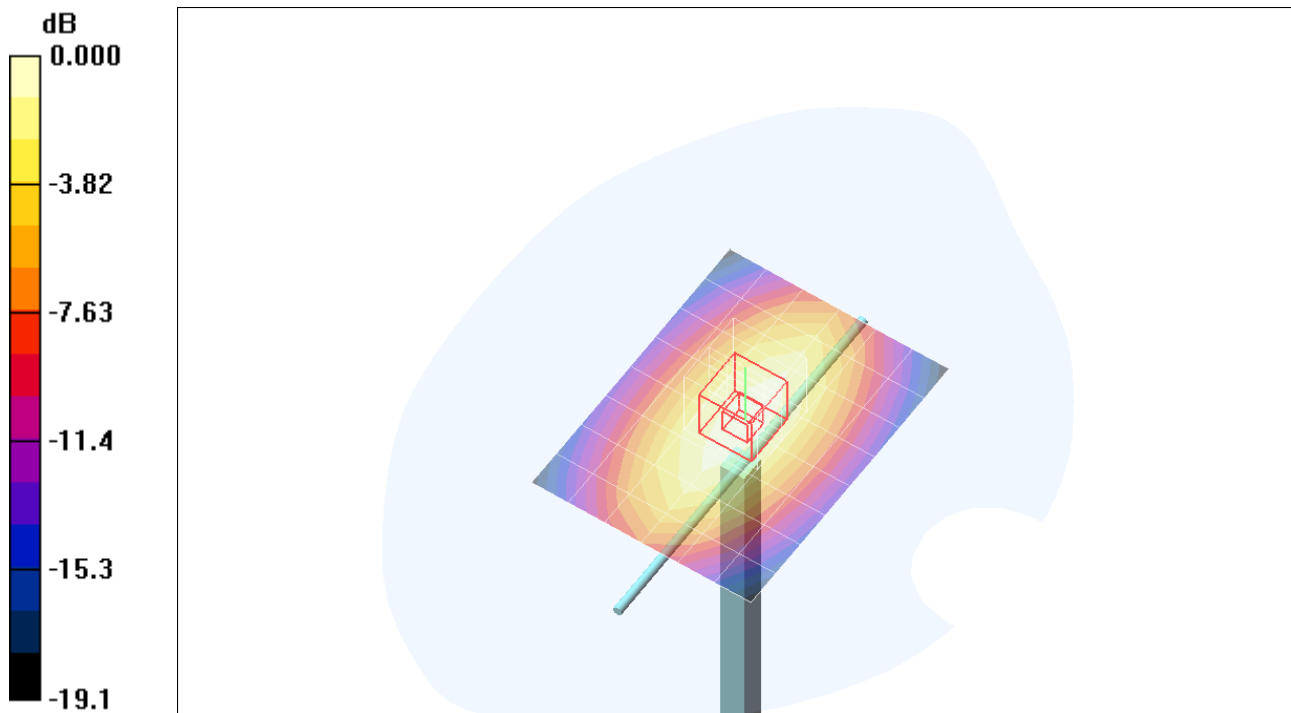
Room Ambient Temperature: 23.0deg. C; Liquid Temperature: 22.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3552; ConvF(9.44, 9.44, 9.44); Calibrated: 5/30/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 SN558; Calibrated: 1/20/2006
- Phantom: SAM 2; Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

system check d=15mm, Pin=250mW/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.80 mW/g

system check d=15mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 54.1 V/m; Power Drift = -0.025 dB
Peak SAR (extrapolated) = 3.90 W/kg
SAR(1 g) = 2.57 mW/g; SAR(10 g) = 1.65 mW/g
Maximum value of SAR (measured) = 2.79 mW/g



0 dB = 2.79mW/g

Test Laboratory: Compliance Certification Services

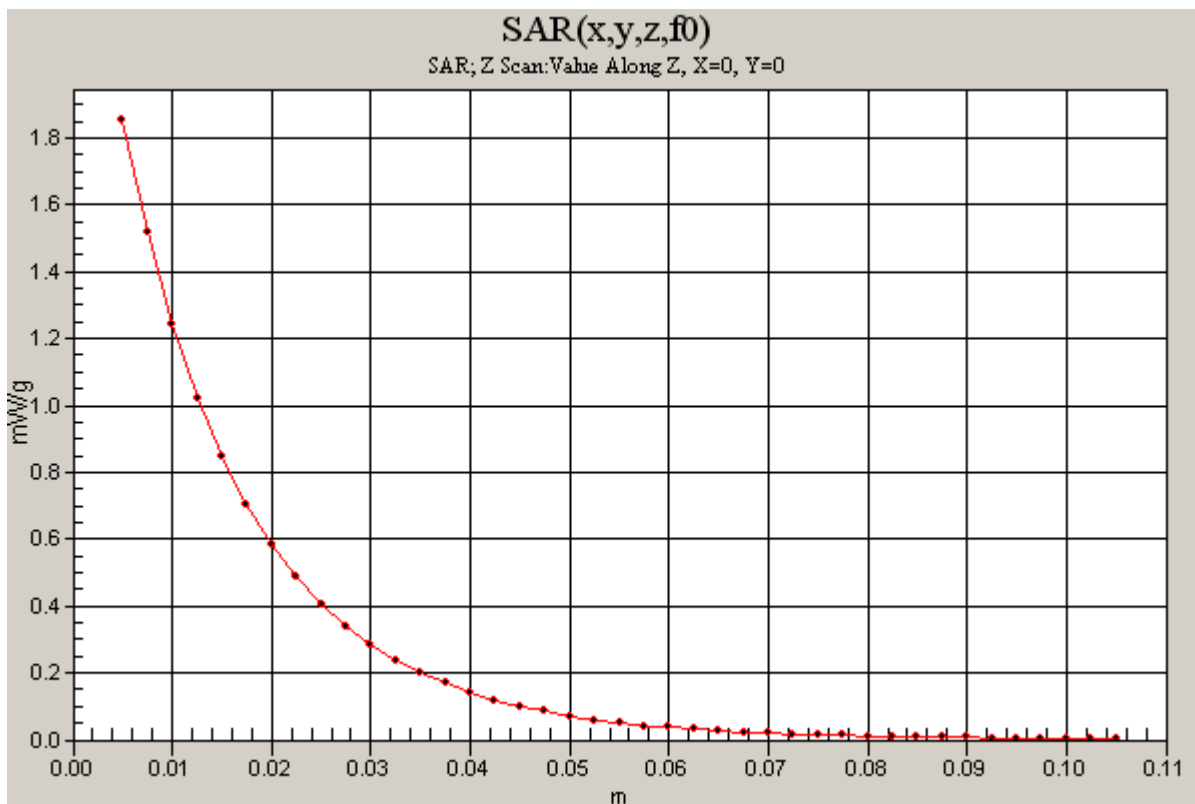
System Performance Check @ 900MHz

DUT: Dipole 900 MHz; Type: D900V2; Serial: 108

Communication System: CW 900 MHz; Frequency: 900 MHz; Duty Cycle: 1:1

system check d=15mm, Pin=250mW/Z Scan (1x1x41): Measurement grid: dx=20mm, dy=20mm, dz=2.5mm

Maximum value of SAR (measured) = 1.85 mW/g



Test Laboratory: Compliance Certification Services

System Performance Check @ 900MHz

DUT: Dipole 900 MHz; Type: D900V2; Serial: 108

Communication System: CW 900 MHz; Frequency: 900 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 900$ MHz; $\sigma = 0.974$ mho/m; $\epsilon_r = 40.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Room Ambient Temperature: 23.0deg. C; Liquid Temperature: 22.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3552; ConvF(9.44, 9.44, 9.44); Calibrated: 5/30/2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 SN558; Calibrated: 1/20/2006
- Phantom: SAM 1; Type: SAM 1; Serial: 1185
- Measurement SW: DASY4, V4.7 Build 44; Postprocessing SW: SEMCAD, V1.8 Build 171

system check d=15mm, Pin=250mW/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
 Maximum value of SAR (measured) = 2.69 mW/g

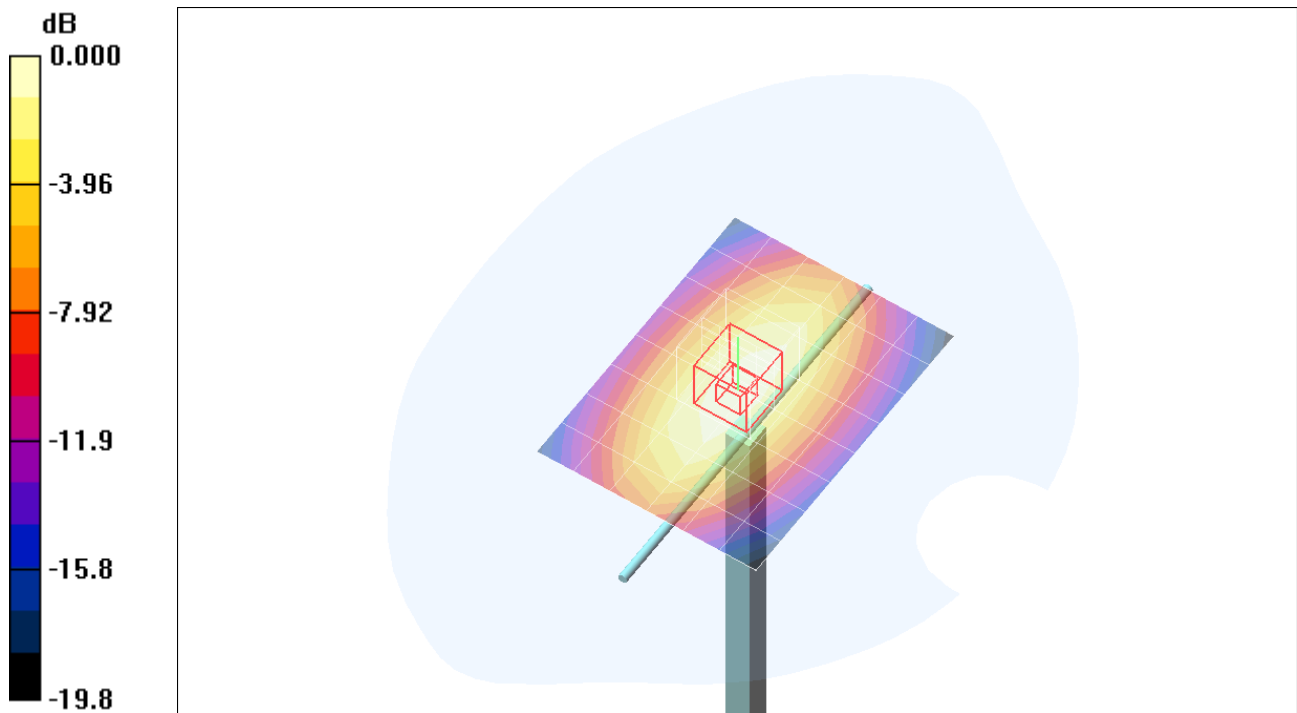
system check d=15mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 52.9 V/m; Power Drift = 0.059 dB

Peak SAR (extrapolated) = 3.89 W/kg

SAR(1 g) = 2.56 mW/g; SAR(10 g) = 1.64 mW/g

Maximum value of SAR (measured) = 2.77 mW/g



0 dB = 2.77mW/g

Test Laboratory: Compliance Certification Services

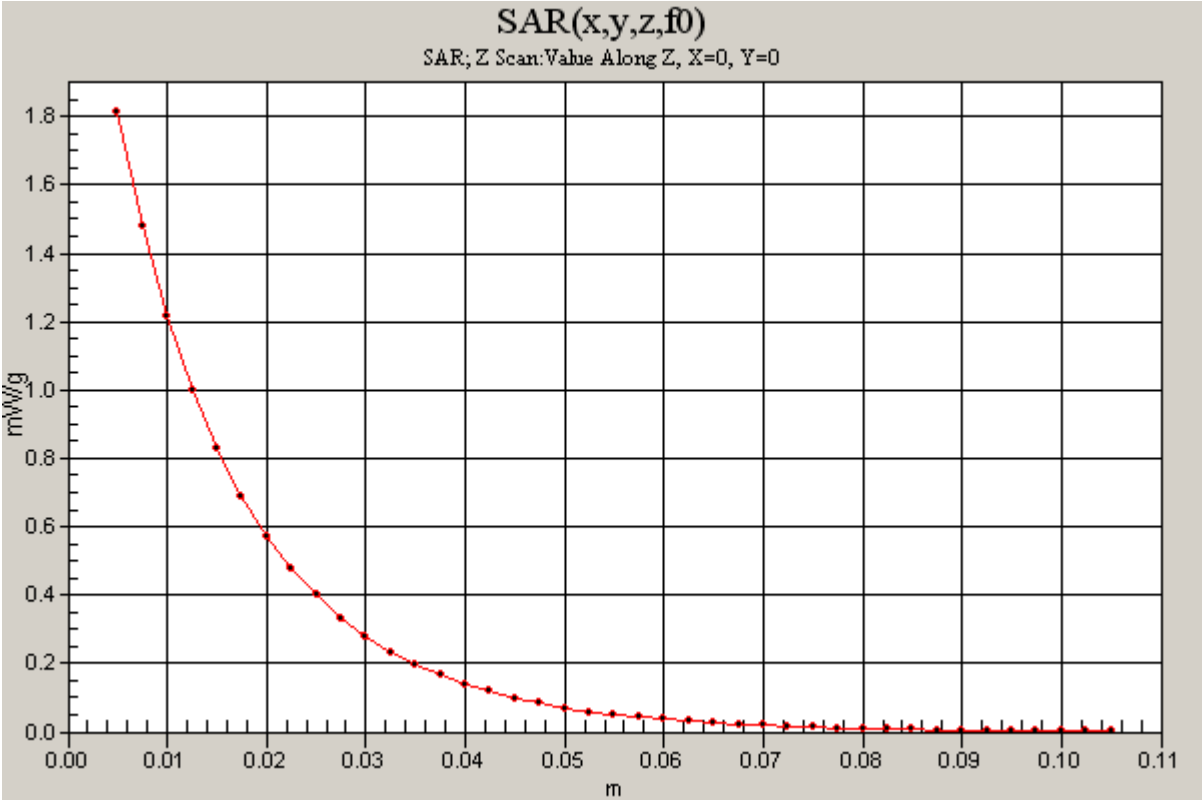
System Performance Check @ 900MHz

DUT: Dipole 900 MHz; Type: D900V2; Serial: 108

Communication System: CW 900 MHz; Frequency: 900 MHz;Duty Cycle: 1:1

system check d=15mm, Pin=250mW/Z Scan (1x1x41): Measurement grid: dx=20mm, dy=20mm, dz=2.5mm

Maximum value of SAR (measured) = 1.81 mW/g



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



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Accredited by the Swiss Federal Office of Metrology and Accreditation
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 **CCS**

Certificate No: **EX3-3552_May06**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN: 3552**

Calibration procedure(s) **QA CAL-01.v5, QA CAL-12.v4 and QA CAL.14.v3
Calibration procedure for dosimetric E-field probes**

Calibration date: **May 30, 2006**

Condition of the calibrated item **In Tolerance**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41495277	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Power sensor E4412A	MY41498087	5-Apr-06 (METAS, No. 251-00557)	Apr-07
Reference 3 dB Attenuator	SN: S5054 (3c)	11-Aug-05 (METAS, No. 251-00499)	Aug-06
Reference 20 dB Attenuator	SN: S5086 (20b)	4-Apr-06 (METAS, No. 251-00558)	Apr-07
Reference 30 dB Attenuator	SN: S5129 (30b)	11-Aug-05 (METAS, No. 251-00500)	Aug-06
Reference Probe ES3DV2	SN: 3013	2-Jan-06 (SPEAG, No. ES3-3013_Jan06)	Jan-07
DAE4	SN: 654	2-Feb-06 (SPEAG, No. DAE4-654_Feb06)	Feb-07
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Nov-05)	In house check: Nov 06

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: May 31, 2006

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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



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

Accredited by the Swiss Federal Office of Metrology and Accreditation
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- CENELEC 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), July 2001

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E²-field uncertainty inside TSL (see below *ConvF*).
- NORM(f)_{x,y,z} = NORM_{x,y,z} * frequency_response** (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * *ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

EX3DV4 SN:3552

May 30, 2006

Probe EX3DV4

SN:3552

Manufactured:	November 7, 2004
Last calibrated:	March 19, 2005
Recalibrated:	May 30, 2006

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: EX3DV4 SN:3552Sensitivity in Free Space^ADiode Compression^B

NormX	0.446 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	93 mV
NormY	0.397 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	93 mV
NormZ	0.466 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	93 mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL **900 MHz** Typical SAR gradient: 5 % per mm

Sensor Center to Phantom Surface Distance		2.0 mm	3.0 mm
SAR _{be} [%]	Without Correction Algorithm	2.9	1.3
SAR _{be} [%]	With Correction Algorithm	0.0	0.0

TSL **1750 MHz** Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance		2.0 mm	3.0 mm
SAR _{be} [%]	Without Correction Algorithm	2.0	1.0
SAR _{be} [%]	With Correction Algorithm	0.3	0.3

Sensor Offset

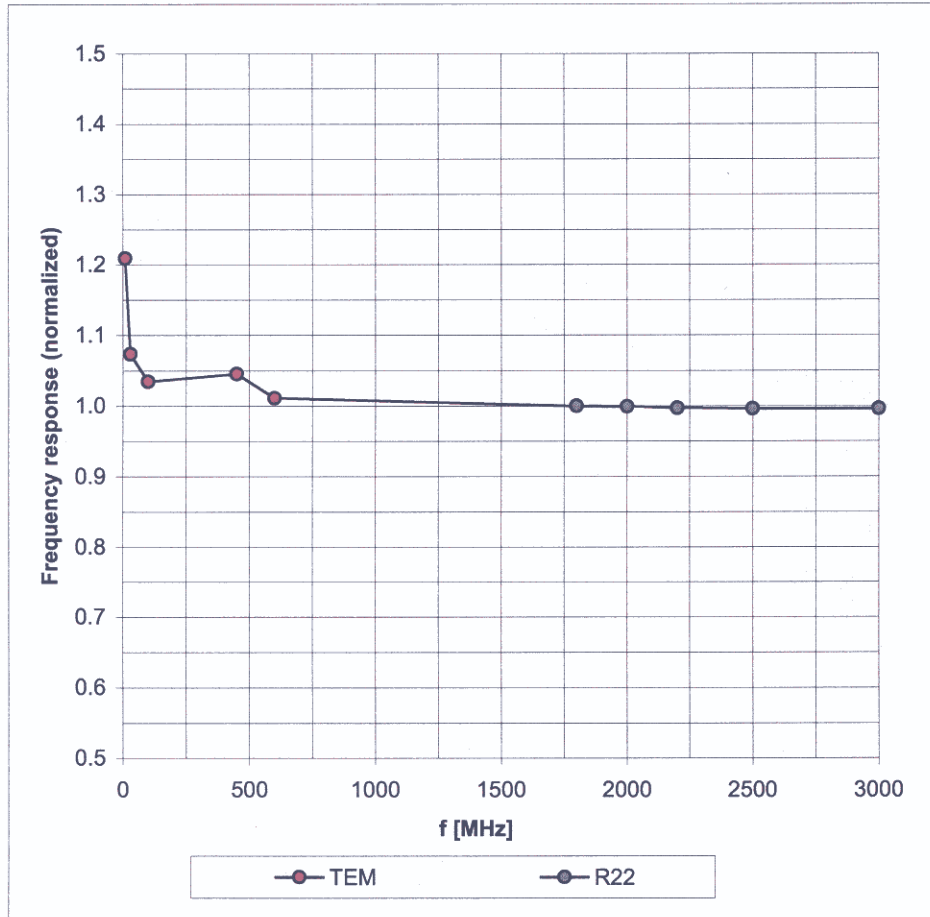
Probe Tip to Sensor Center **1.0 mm**

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

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Page 8).^B Numerical linearization parameter: uncertainty not required.

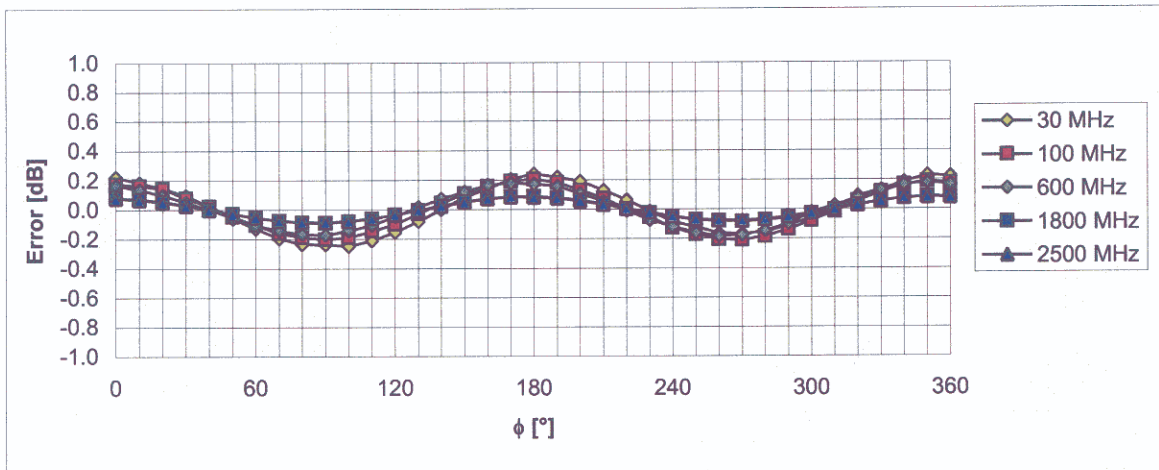
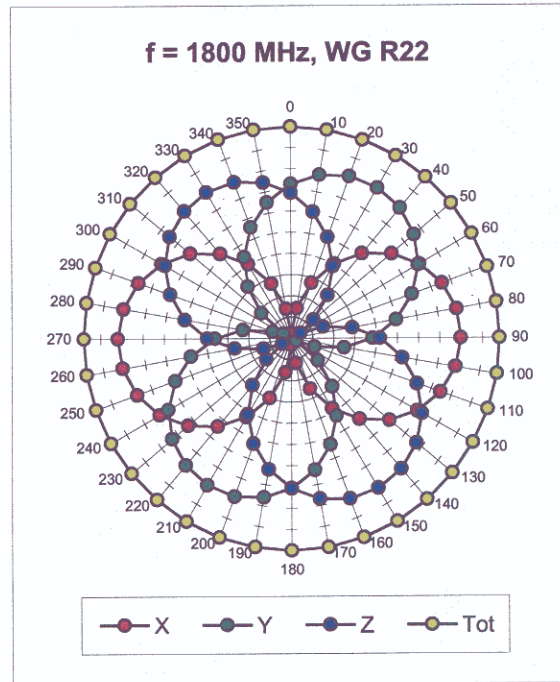
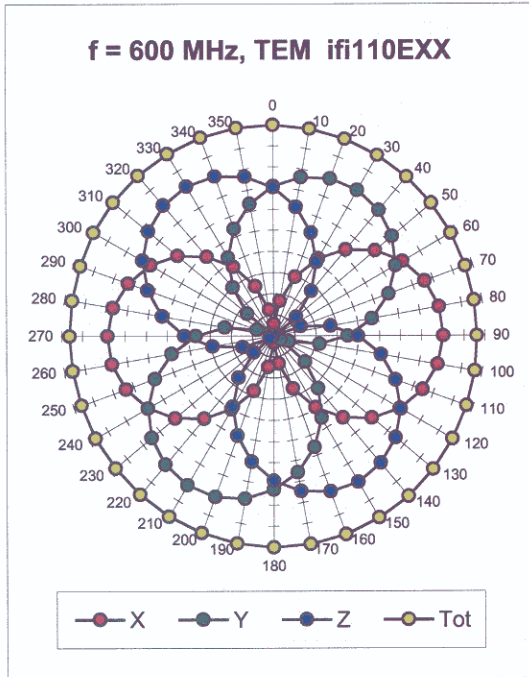
Frequency Response of E-Field

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



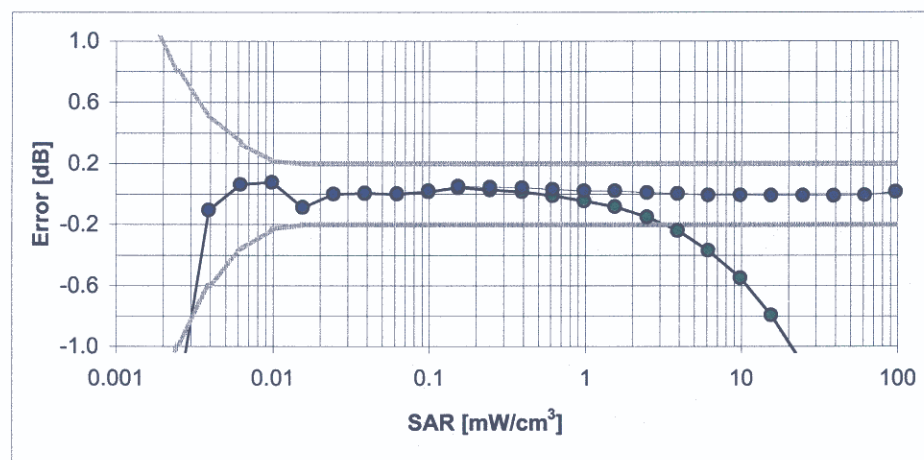
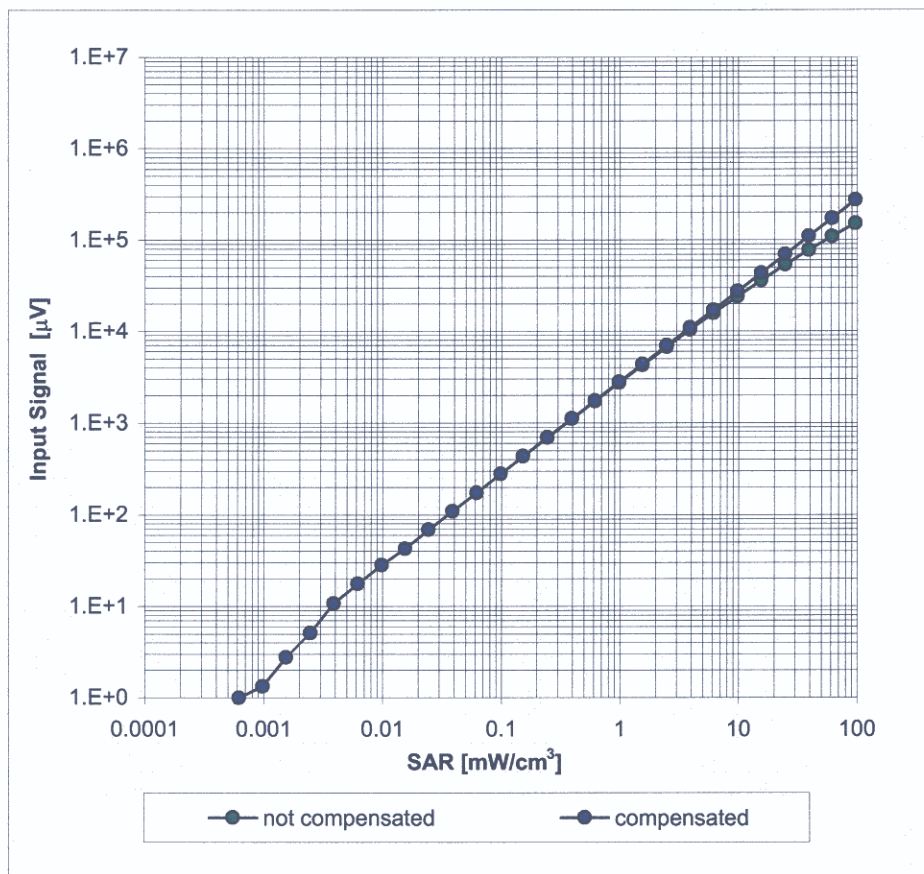
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

Receiving Pattern (ϕ), $\vartheta = 0^\circ$



Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

Dynamic Range $f(\text{SAR}_{\text{head}})$ (Waveguide R22, $f = 1800 \text{ MHz}$)



Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

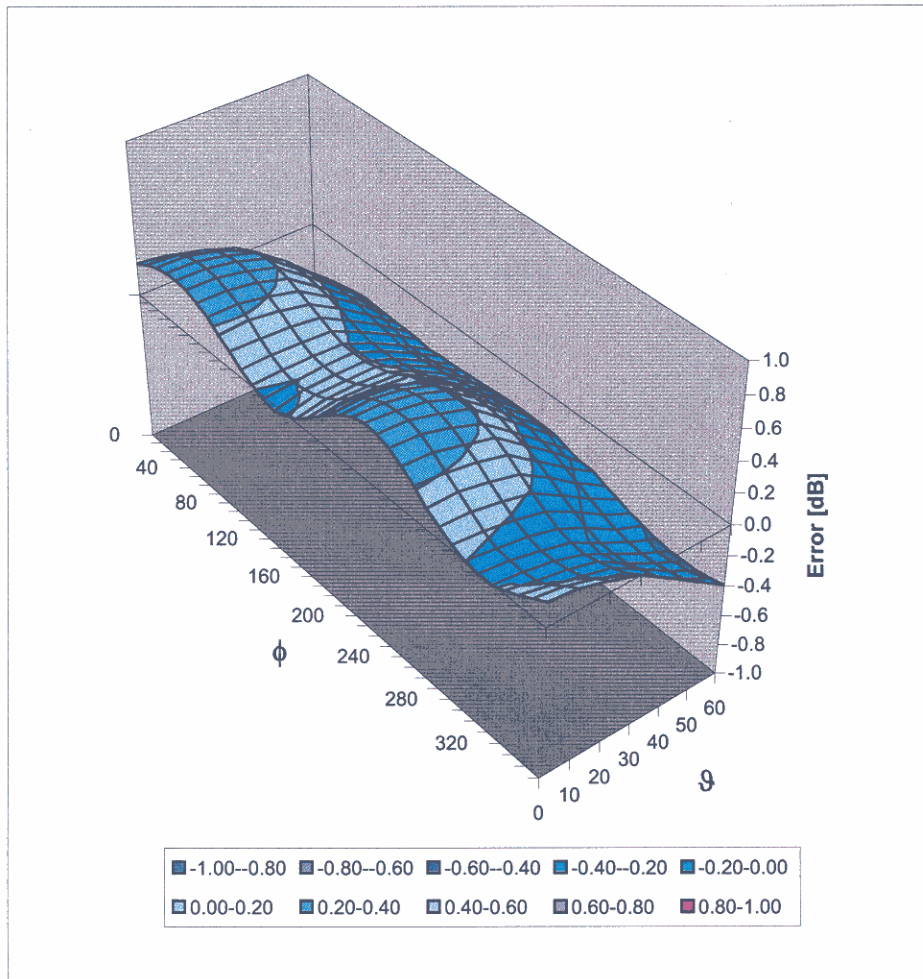
Conversion Factor Assessment

f [MHz]	Validity [MHz] ^c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.39	0.69	9.65 ± 13.3% (k=2)
835	± 50 / ± 100	Head	41.5 ± 5%	0.90 ± 5%	0.16	1.15	9.65 ± 11.0% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.14	1.24	9.44 ± 11.0% (k=2)
1450	± 50 / ± 100	Head	40.5 ± 5%	1.20 ± 5%	0.42	0.71	8.44 ± 11.0% (k=2)
1750	± 50 / ± 100	Head	40.1 ± 5%	1.37 ± 5%	0.45	0.99	8.14 ± 11.0% (k=2)
1900	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.16	2.62	8.00 ± 11.0% (k=2)
2000	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.41	1.00	7.73 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.57	0.80	7.40 ± 11.8% (k=2)
5200	± 50 / ± 100	Head	36.0 ± 5%	4.66 ± 5%	0.30	1.80	4.42 ± 13.1% (k=2)
5500	± 50 / ± 100	Head	35.6 ± 5%	4.96 ± 5%	0.30	1.80	4.12 ± 13.1% (k=2)
5800	± 50 / ± 100	Head	35.3 ± 5%	5.27 ± 5%	0.30	1.80	4.00 ± 13.1% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.50	0.43	10.90 ± 13.3% (k=2)
835	± 50 / ± 100	Body	55.2 ± 5%	0.97 ± 5%	0.22	1.01	9.57 ± 11.0% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.23	0.96	9.37 ± 11.0% (k=2)
1450	± 50 / ± 100	Body	54.0 ± 5%	1.30 ± 5%	0.38	0.79	8.41 ± 11.0% (k=2)
1750	± 50 / ± 100	Body	53.4 ± 5%	1.49 ± 5%	0.42	1.02	7.75 ± 11.0% (k=2)
1900	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.14	3.11	7.60 ± 11.0% (k=2)
2000	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.42	1.03	7.48 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.65	0.74	7.08 ± 11.8% (k=2)
5200	± 50 / ± 100	Body	49.0 ± 5%	5.30 ± 5%	0.28	1.85	4.07 ± 13.1% (k=2)
5500	± 50 / ± 100	Body	48.6 ± 5%	5.65 ± 5%	0.26	1.85	3.69 ± 13.1% (k=2)
5800	± 50 / ± 100	Body	48.2 ± 5%	6.00 ± 5%	0.26	1.85	3.76 ± 13.1% (k=2)

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

Deviation from Isotropy in HSL

Error (ϕ , ϑ), $f = 900$ MHz



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ ($k=2$)



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

Accreditation No.: **SCS 108**

Client **CCS**

Certificate No: **D900V2-108_Feb06**

CALIBRATION CERTIFICATE

Object **D900V2 - SN: 108**

Calibration procedure(s) **QA CAL-05.v6
Calibration procedure for dipole validation kits**

Calibration date: **February 22, 2006**

Condition of the calibrated item **In Tolerance**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Power sensor HP 8481A	US37292783	04-Oct-05 (METAS, No. 251-00516)	Oct-06
Reference 20 dB Attenuator	SN: 5086 (20g)	11-Aug-05 (METAS, No 251-00498)	Aug-06
Reference 10 dB Attenuator	SN: 5047.2 (10r)	11-Aug-05 (METAS, No 251-00498)	Aug-06
Reference Probe ET3DV6 (HF)	SN 1507	28-Oct-05 (SPEAG, No. ET3-1507_Oct05)	Oct-06
DAE4	SN 601	15-Dec-05 (SPEAG, No. DAE4-601_Jan05)	Dec-06
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-05)	In house check: Oct-07
RF generator Agilent E4421B	MY41000675	11-May-05 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Nov-05)	In house check: Nov-06

Calibrated by: **Judith Müller** **Laboratory Technician**

Approved by: **Katja Pokovic** **Technical Manager**

Signature

Issued: February 22, 2006

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- CENELEC 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), July 2001
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4 System Handbook

Methods Applied and Interpretation of Parameters:

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

Measurement Conditions

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

DASY Version	DASY4	V4.6
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Area Scan resolution	dx, dy = 15 mm	
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	900 MHz \pm 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.97 mho/m
Measured Head TSL parameters	(22.0 \pm 0.2) °C	41.8 \pm 6 %	0.96 mho/m \pm 6 %
Head TSL temperature during test	(22.0 \pm 0.2) °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	condition	
SAR measured	250 mW input power	2.69 mW / g
SAR normalized	normalized to 1W	10.8 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	10.9 mW / g \pm 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.73 mW / g
SAR normalized	normalized to 1W	6.92 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	6.97 mW / g \pm 16.5 % (k=2)

¹ Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.0	1.05 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	56.6 ± 6 %	1.00 mho/m ± 6 %
Body TSL temperature during test	(21.9 ± 0.2) °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	condition	
SAR measured	250 mW input power	2.59 mW / g
SAR normalized	normalized to 1W	10.4 mW / g
SAR for nominal Body TSL parameters ²	normalized to 1W	10.9 mW /g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.70 mW / g
SAR normalized	normalized to 1W	6.80 mW / g
SAR for nominal Body TSL parameters ²	normalized to 1W	7.06 mW /g ± 16.5 % (k=2)

² Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.5 Ω - 7.1 j Ω
Return Loss	- 23.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.1 Ω - 9.0 j Ω
Return Loss	- 19.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.397 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	March 9, 2001

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:108

Communication System: CW-900; Frequency: 900 MHz; Duty Cycle: 1:1

Medium: HSL U10 BB;

Medium parameters used: $f = 900$ MHz; $\sigma = 0.966$ mho/m; $\epsilon_r = 41.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(5.8, 5.8, 5.8); Calibrated: 28.10.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; ;
- Measurement SW: DASY4, V4.6 Build 57; Postprocessing SW: SEMCAD, V1.8 Build 160

Pin = 250 mW; d = 10 mm/Area Scan (71x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.92 mW/g

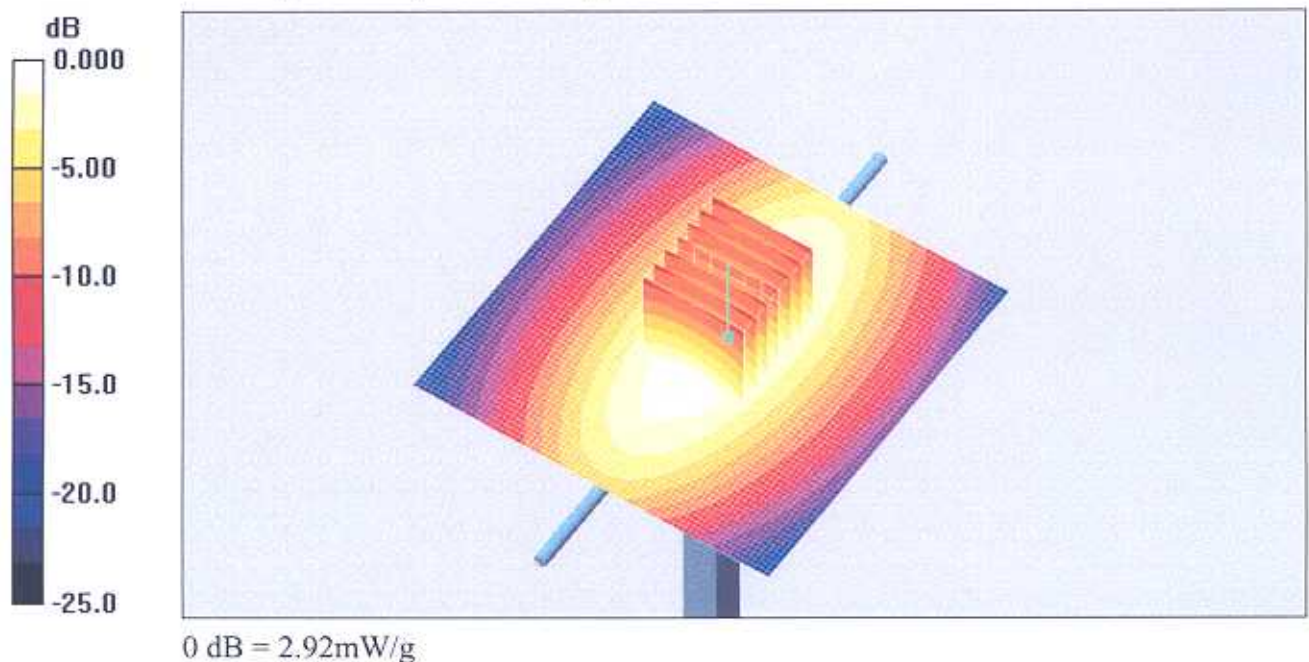
Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.9 V/m; Power Drift = -0.042 dB

Peak SAR (extrapolated) = 4.06 W/kg

SAR(1 g) = 2.69 mW/g; SAR(10 g) = 1.73 mW/g

Maximum value of SAR (measured) = 2.92 mW/g



Impedance Measurement Plot for Head TSL

22 Feb 2006 10:50:35

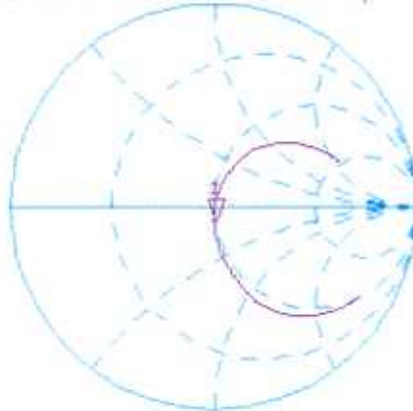
CH1 S11 1 U FS 1: 49.480 Ω -7.0625 Ω 25.039 pF 900.000 000 MHz

*
Del

Cor

Avg
16

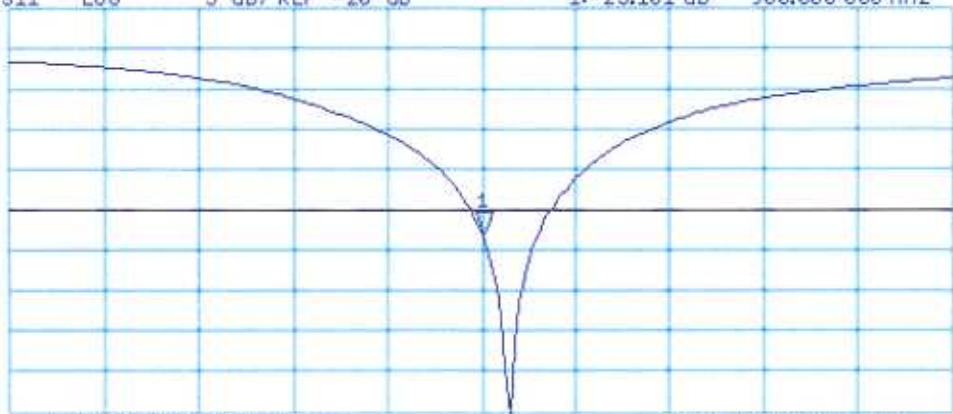
↑



CH2 S11 LOG 5 dB/REF -20 dB 1: -23.101 dB 900.000 000 MHz

Cor

↑



CENTER 900.000 000 MHz

SPAN 400.000 000 MHz

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:108

Communication System: CW900; Frequency: 900 MHz; Duty Cycle: 1:1

Medium: MSL U10;

Medium parameters used: $f = 900$ MHz; $\sigma = 1$ mho/m; $\epsilon_r = 56.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(5.76, 5.76, 5.76); Calibrated: 28.10.2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 15.12.2005
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; ;
- Measurement SW: DASY4, V4.6 Build 57; Postprocessing SW: SEMCAD, V1.8 Build 160

Pin = 250 mW; d = 10 mm/Area Scan (71x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.82 mW/g

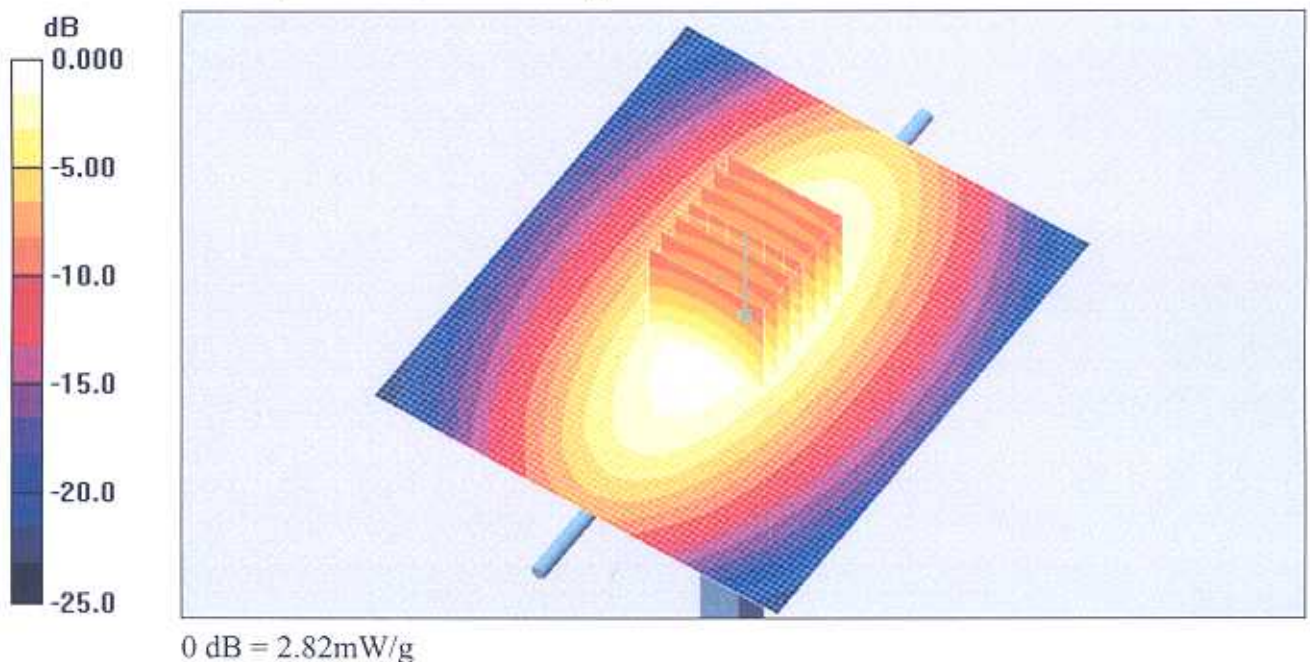
Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.3 V/m; Power Drift = -0.023 dB

Peak SAR (extrapolated) = 3.75 W/kg

SAR(1 g) = 2.59 mW/g; SAR(10 g) = 1.7 mW/g

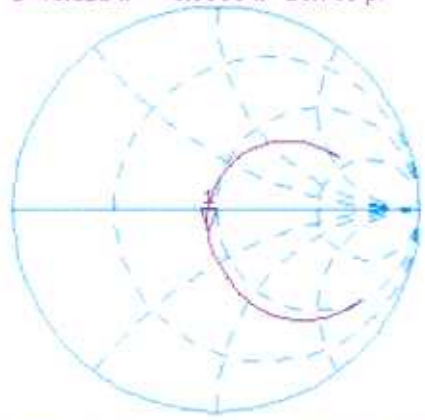
Maximum value of SAR (measured) = 2.82 mW/g



Impedance Measurement Plot for Body TSL

20 Feb 2006 12:15:34
CH1 S11 1 U FS 1: 45.111 Ω -8.9598 Ω 19.739 pF 900.000 000 MHz

*
De1
Ca
Avg
16
†



CH2 S11 LOG 5 dB/REF -20 dB 1: -19.428 dB 900.000 000 MHz

Ca
Avg
16
†

