

EGPRS back side High ch,1909Mhz

DUT: Nielson;

Communication System: 1900MHz GPRS; ; Frequency: 1909 MHz;Duty Cycle: 1:2.12

Medium: M1800-B Medium parameters used: $f = 1909$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 53.32$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

- Probe: EX3DV4 - SN3722; ConvF(7.1, 7.1, 7.1); Calibrated: 10/17/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn584; Calibrated: 10/14/2014
- Phantom: SAM with CRP; Type: SAM; Serial: TP 1310
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Area Scan (71x101x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.730 mW/g

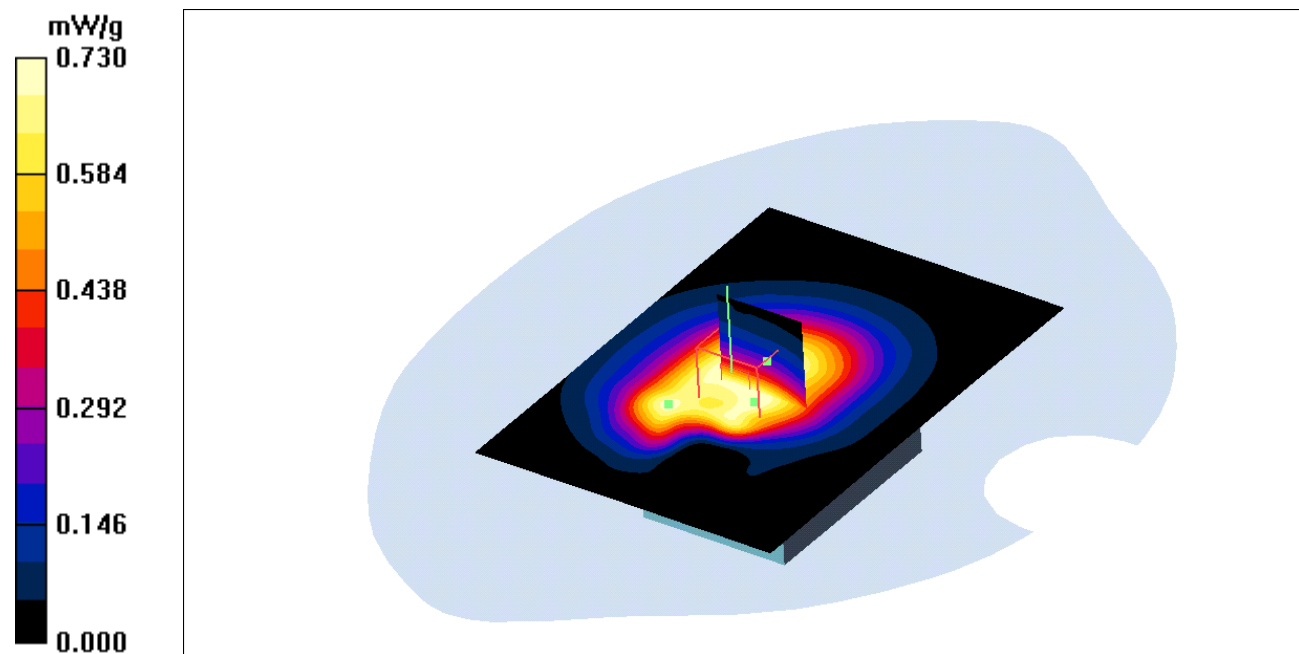
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 20.9 V/m; Power Drift = 0.006 dB

Peak SAR (extrapolated) = 1.08 W/kg

SAR(1 g) = 0.681 mW/g; SAR(10 g) = 0.421 mW/g

Maximum value of SAR (measured) = 0.727 mW/g



WCDMA Low ch,1850Mhz

DUT: Nielson;

Communication System: 1900MHz WCDMA; ; Frequency: 1850 MHz;Duty Cycle: 1:1

Medium: M1800-B Medium parameters used: $f = 1850 \text{ MHz}$; $\sigma = 1.49 \text{ mho/m}$; $\epsilon_r = 52.56$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

- Probe: EX3DV4 - SN3722; ConvF(7.1, 7.1, 7.1); Calibrated: 10/17/2014

- Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE3 Sn584; Calibrated: 10/14/2014

- Phantom: SAM with CRP; Type: SAM; Serial: TP 1310

- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Area Scan (71x101x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 1.39 mW/g

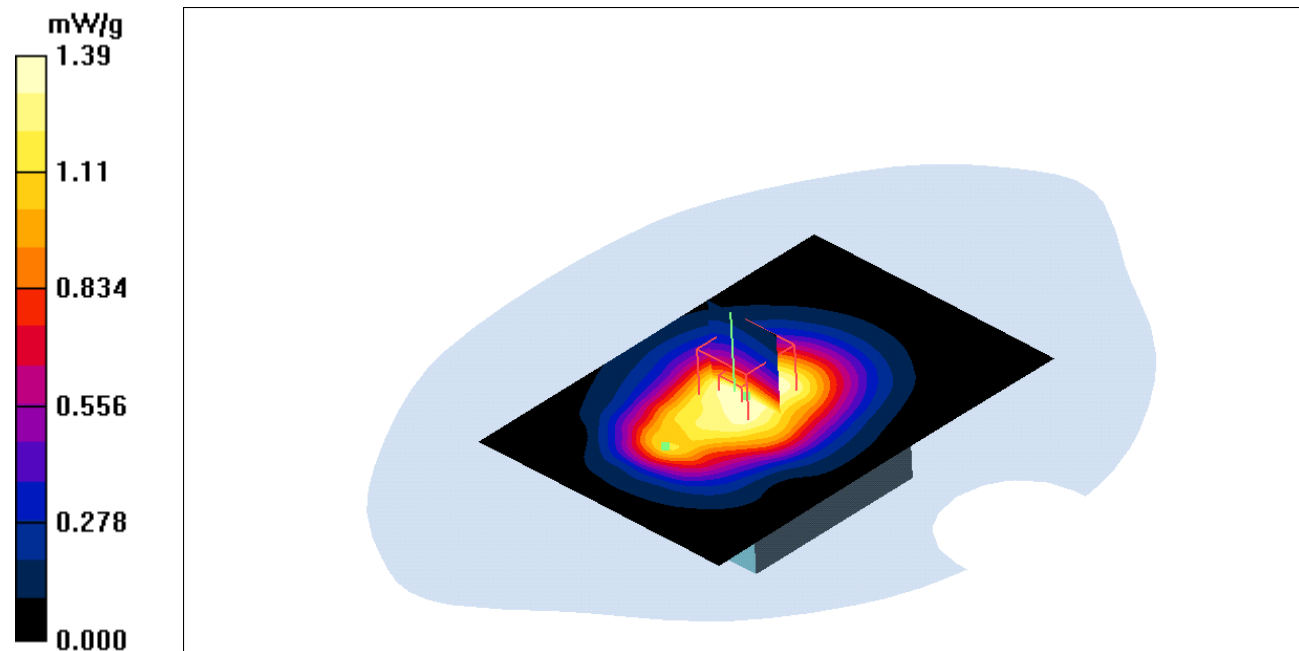
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 29.0 V/m ; Power Drift = 0.129 dB

Peak SAR (extrapolated) = 1.95 W/kg

SAR(1 g) = 1.3 mW/g ; SAR(10 g) = 0.865 mW/g

Maximum value of SAR (measured) = 1.40 mW/g



WCDMA Mid ch,1880Mhz

DUT: Nielson;

Communication System: 1900MHz WCDMA; ; Frequency: 1880 MHz;Duty Cycle: 1:1

Medium: M1800-B Medium parameters used: $f = 1880 \text{ MHz}$; $\sigma = 1.51 \text{ mho/m}$; $\epsilon_r = 52.38$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

- Probe: EX3DV4 - SN3722; ConvF(7.1, 7.1, 7.1); Calibrated: 10/17/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn584; Calibrated: 10/14/2014
- Phantom: SAM with CRP; Type: SAM; Serial: TP 1310
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Area Scan (71x101x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 1.99 mW/g

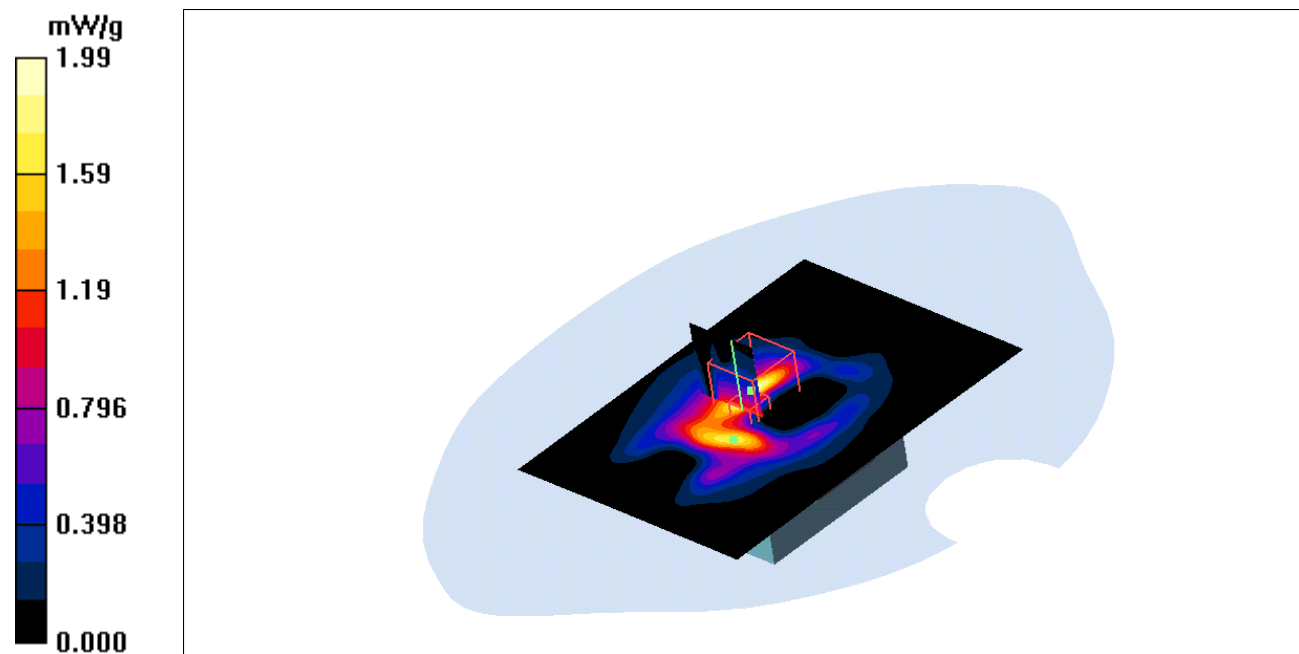
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 27.6 V/m ; Power Drift = -0.097 dB

Peak SAR (extrapolated) = 2.00 W/kg

SAR(1 g) = 1.17 mW/g ; SAR(10 g) = 0.661 mW/g

Maximum value of SAR (measured) = 1.23 mW/g



WCDMA High ch,1909Mhz

DUT: Nielson;

Communication System: 1900MHz GPRS; ; Frequency: 1909 MHz;Duty Cycle: 1:1

Medium: M1800-B Medium parameters used: $f = 1909$ MHz; $\sigma = 1.54$ mho/m; $\epsilon_r = 53.32$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

- Probe: EX3DV4 - SN3722; ConvF(7.1, 7.1, 7.1); Calibrated: 10/17/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn584; Calibrated: 10/14/2014
- Phantom: SAM with CRP; Type: SAM; Serial: TP 1310
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Area Scan (71x101x1): Measurement grid: $dx=15$ mm, $dy=15$ mm

Maximum value of SAR (interpolated) = 1.08 mW/g

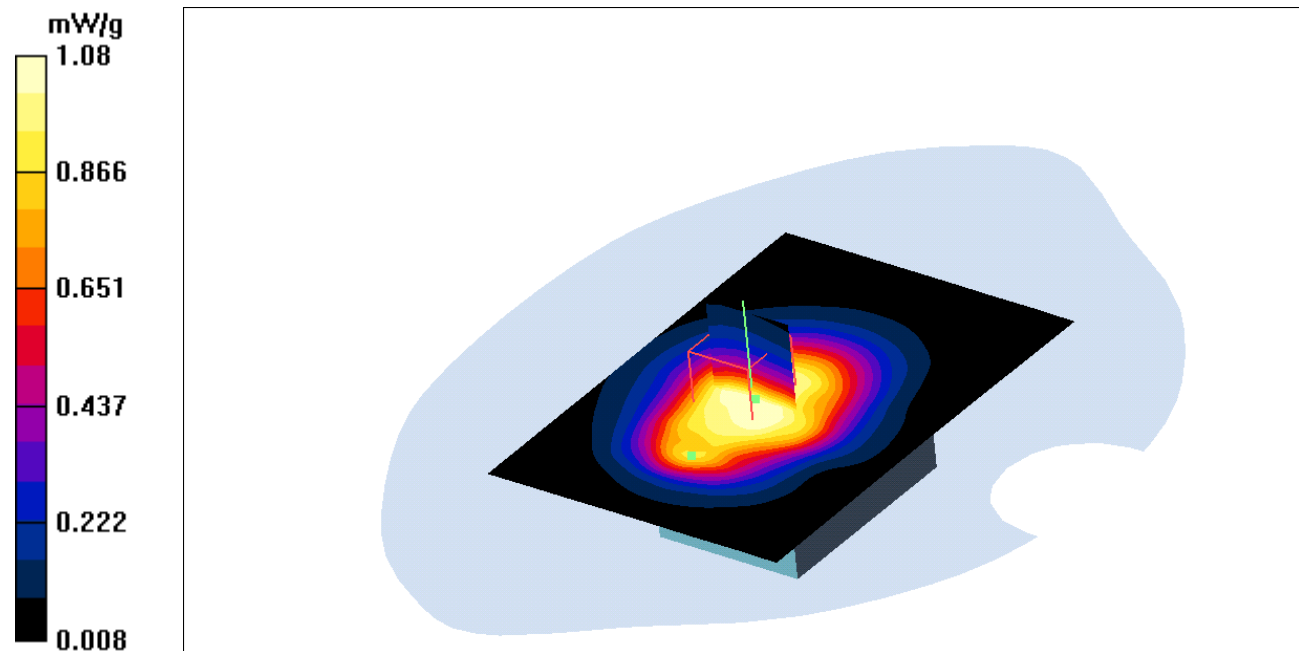
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 25.2 V/m; Power Drift = -0.043 dB

Peak SAR (extrapolated) = 1.87 W/kg

SAR(1 g) = 1.04 mW/g; SAR(10 g) = 0.661 mW/g

Maximum value of SAR (measured) = 1.07 mW/g





APPENDIX B - SYSTEM PERFORMANCE CHECK

835MHz validation

DUT: Dipole 835 MHz; Type: D835V2

Communication System: CW; ; Frequency: 835 MHz; Duty Cycle: 1:1

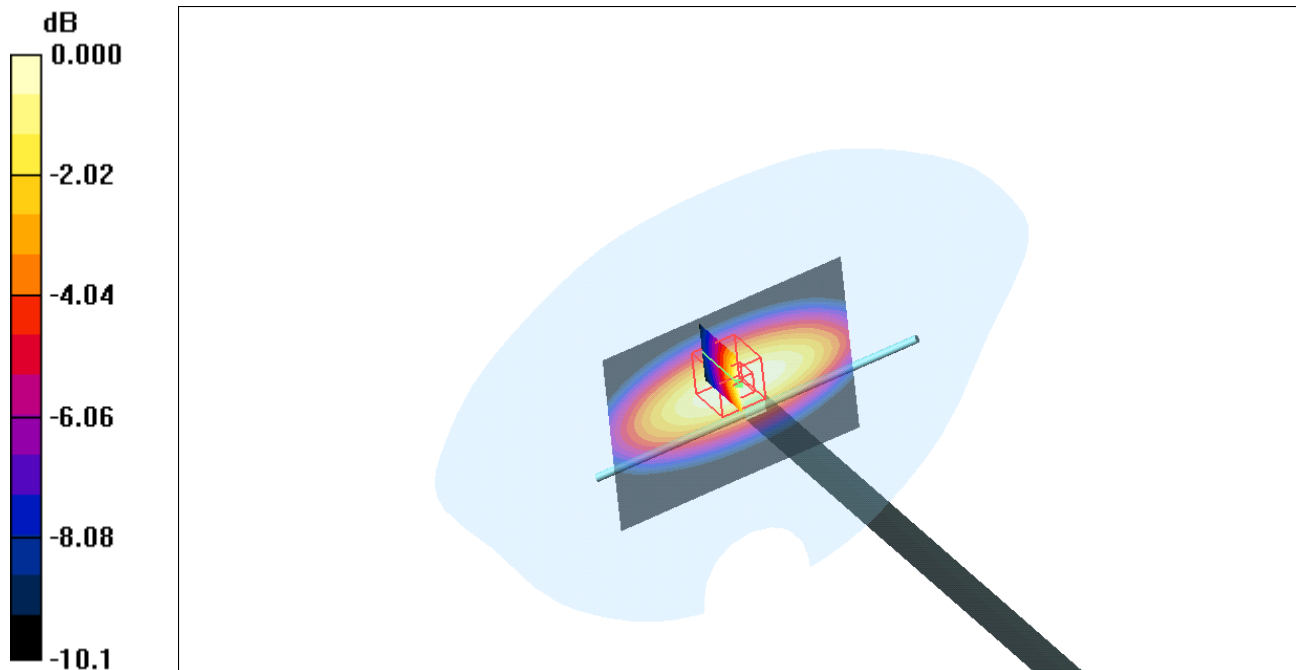
Medium: M900 Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.99 \text{ mho/m}$; $\epsilon_r = 54.36$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

- Probe: EX3DV4 - SN3722; ConvF(8.72, 8.72, 8.72); Calibrated: 10/17/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn584; Calibrated: 10/14/2014
- Phantom: SAM with CRP; Type: SAM; Serial: TP 1310
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Area Scan (61x81x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (interpolated) = 2.71 mW/g

Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$,
 $dy=5\text{mm}$, $dz=5\text{mm}$
Reference Value = 55.1 V/m ; Power Drift = -0.076 dB
Peak SAR (extrapolated) = 3.71 W/kg
SAR(1 g) = 2.47 mW/g ; SAR(10 g) = 1.62 mW/g
Maximum value of SAR (measured) = 2.66 mW/g



1800MHz Body validation

DUT: D1800; Type: 1S2672

Communication System: CW; ; Frequency: 1800 MHz; Duty Cycle: 1:1

Medium: M1800 Medium parameters used: $f = 1800 \text{ MHz}$; $\sigma = 1.45 \text{ mho/m}$; $\epsilon_r = 52.65$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

- Probe: EX3DV4 - SN3722; ConvF(7.1, 7.1, 7.1); Calibrated: 10/17/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn584; Calibrated: 10/14/2014
- Phantom: SAM with CRP; Type: SAM; Serial: TP 1310
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Area Scan (51x81x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (interpolated) = 11.1 mW/g

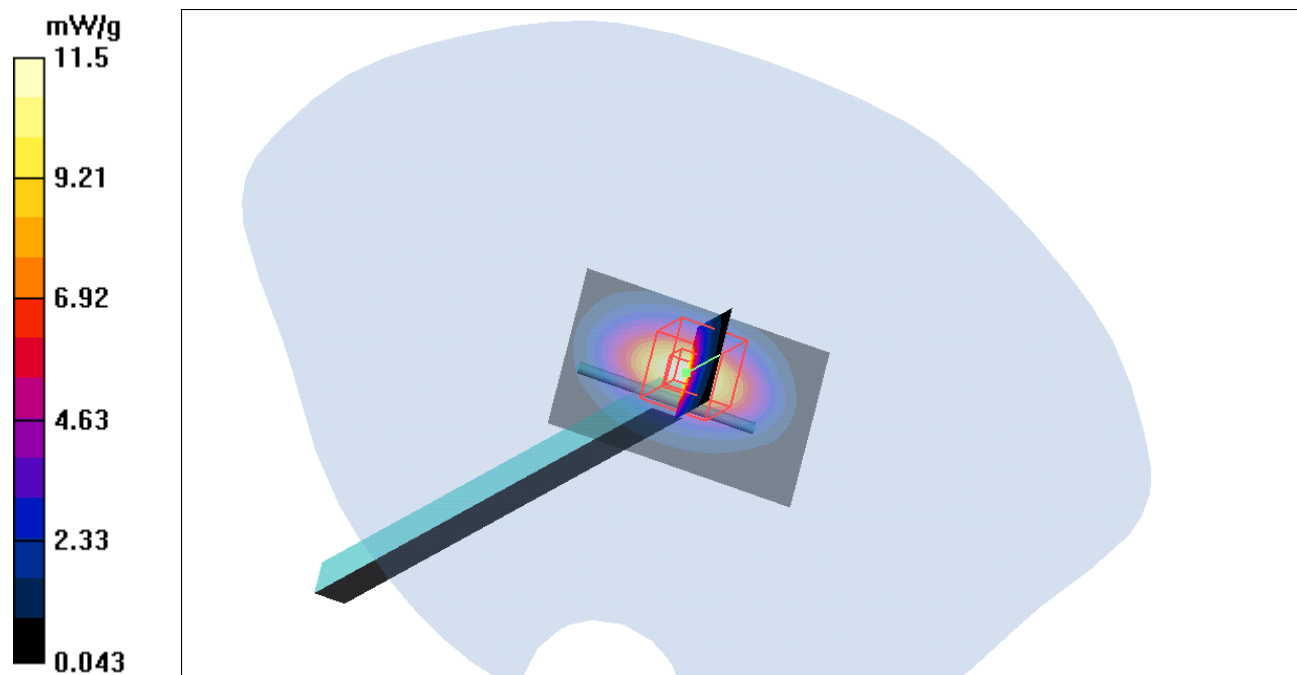
d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 78.9 V/m ; Power Drift = -0.235 dB

Peak SAR (extrapolated) = 18.1 W/kg

SAR(1 g) = 9.96 mW/g ; SAR(10 g) = 5.22 mW/g

Maximum value of SAR (measured) = 10.9 mW/g





APPENDIX C – PROBE CALIBRATION CERTIFICATE



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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

Client **MET Laboratories**

Certificate No: **EX3-3722_Oct14**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3722**

Calibration procedure(s) **QA CAL-01.v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6**
 Calibration procedure for dosimetric E-field probes

Calibration date: **October 17, 2014**

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 $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	03-Apr-14 (No. 217-01911)	Apr-15
Power sensor E4412A	MY41498087	03-Apr-14 (No. 217-01911)	Apr-15
Reference 3 dB Attenuator	SN: S5054 (3c)	03-Apr-14 (No. 217-01915)	Apr-15
Reference 20 dB Attenuator	SN: S5277 (20x)	03-Apr-14 (No. 217-01919)	Apr-15
Reference 30 dB Attenuator	SN: S5129 (30b)	03-Apr-14 (No. 217-01920)	Apr-15
Reference Probe ES3DV2	SN: 3013	30-Dec-13 (No. ES3-3013_Dec13)	Dec-14
DAE4	SN: 660	13-Dec-13 (No. DAE4-660_Dec13)	Dec-14
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

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

Issued: October 20, 2014

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



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

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

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- 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 affect the E^2 -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 with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; D_{x,y,z}; VR_{x,y,z}**: A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to 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.
- Connector Angle**: The angle is assessed using the information gained by determining the NORM_x (no uncertainty required).

Probe EX3DV4

SN:3722

Manufactured: August 14, 2009
Calibrated: October 17, 2014

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3722

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.54	0.51	0.58	± 10.1 %
DCP (mV) ^B	99.4	97.1	99.4	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB/ $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	147.6	±2.2 %
		Y	0.0	0.0	1.0		138.9	
		Z	0.0	0.0	1.0		147.8	

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 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:3722

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 ^G	Depth ^G (mm)	Unct. (k=2)
750	41.9	0.89	8.94	8.94	8.94	0.28	1.15	± 12.0 %
900	41.5	0.97	8.50	8.50	8.50	0.80	0.61	± 12.0 %
1810	40.0	1.40	7.44	7.44	7.44	0.73	0.61	± 12.0 %
2000	40.0	1.40	7.38	7.38	7.38	0.10	0.50	± 12.0 %
2450	39.2	1.80	6.71	6.71	6.71	0.80	0.50	± 12.0 %
5200	36.0	4.66	4.84	4.84	4.84	0.35	1.80	± 13.1 %
5300	35.9	4.76	4.69	4.69	4.69	0.35	1.80	± 13.1 %
5500	35.6	4.96	4.46	4.46	4.46	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.39	4.39	4.39	0.40	1.80	± 13.1 %

^C Frequency validity above 300 MHz 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. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

^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.

^G Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3722

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 ^G	Depth ^G (mm)	Unct. (k=2)
750	55.5	0.96	8.76	8.76	8.76	0.36	0.92	± 12.0 %
900	55.0	1.05	8.51	8.51	8.51	0.80	0.64	± 12.0 %
1810	53.3	1.52	7.16	7.16	7.16	0.36	0.90	± 12.0 %
2000	53.3	1.52	7.27	7.27	7.27	0.40	0.89	± 12.0 %
2450	52.7	1.95	6.71	6.71	6.71	0.80	0.55	± 12.0 %
5200	49.0	5.30	4.20	4.20	4.20	0.45	1.90	± 13.1 %
5300	48.9	5.42	4.06	4.06	4.06	0.45	1.90	± 13.1 %
5500	48.6	5.65	3.70	3.70	3.70	0.50	1.90	± 13.1 %
5800	48.2	6.00	3.82	3.82	3.82	0.50	1.90	± 13.1 %

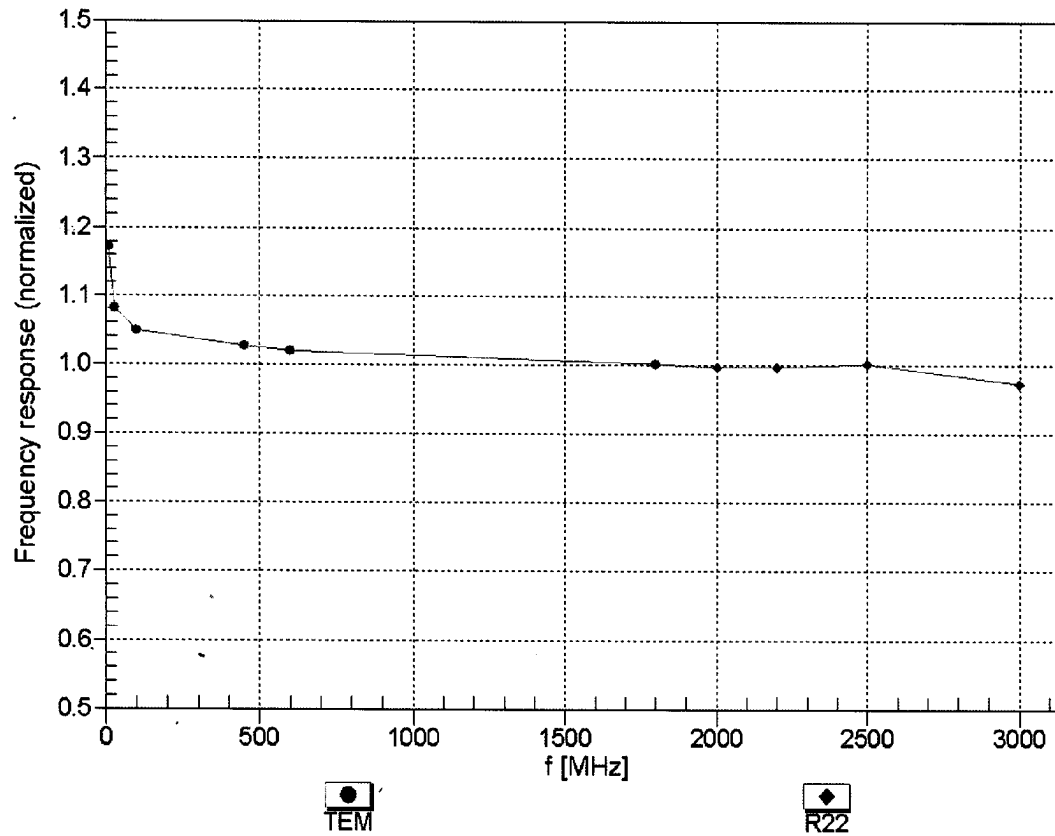
^C Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

^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.

^G Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

Frequency Response of E-Field

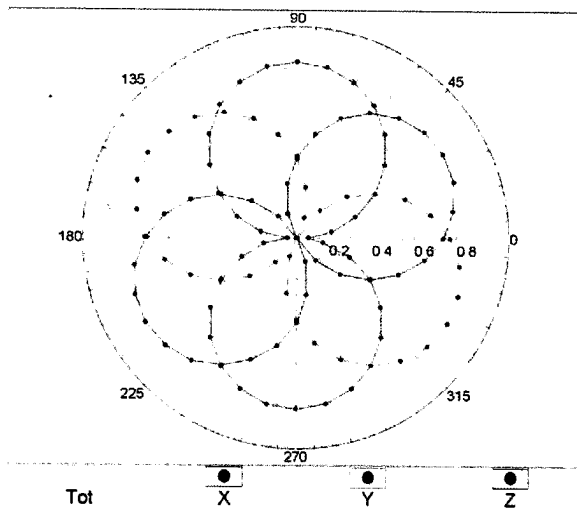
(TEM-Cell:ifi110 EXX, Waveguide: R22)



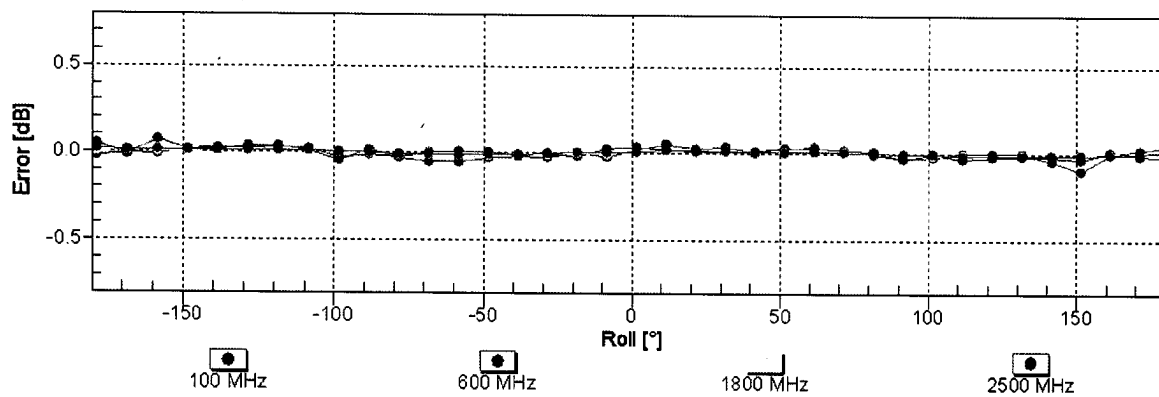
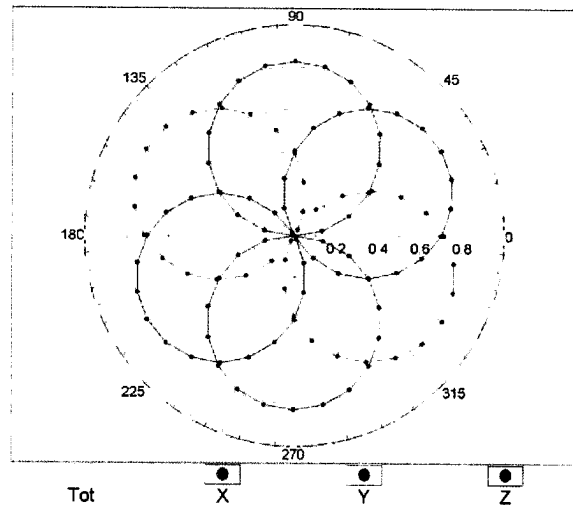
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

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

f=600 MHz, TEM

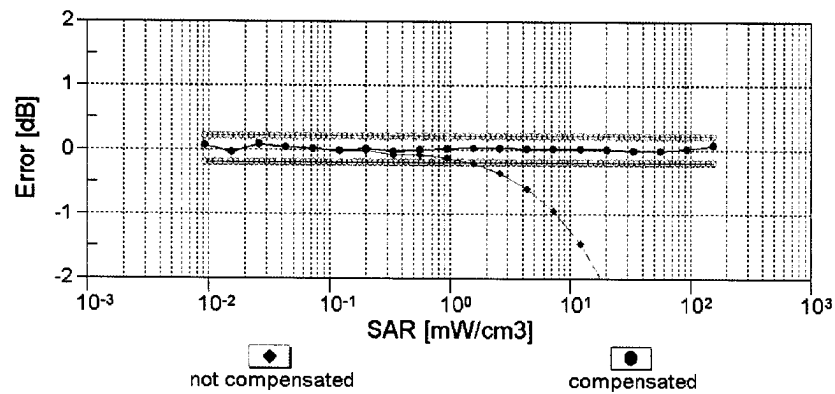
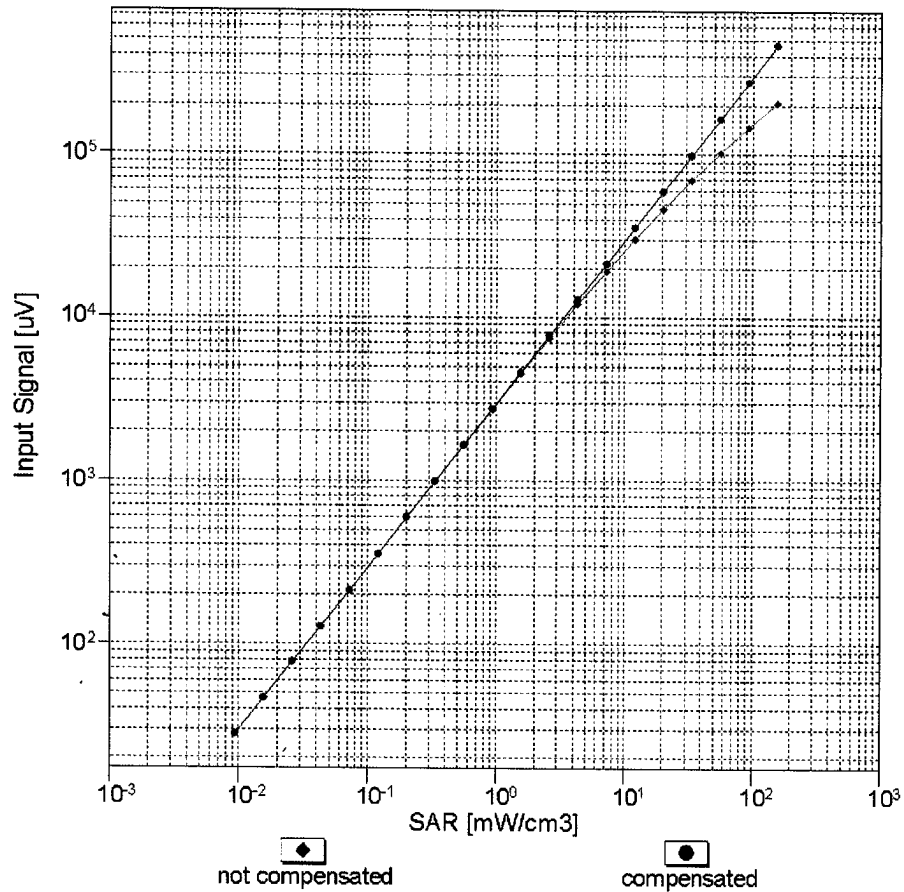


f=1800 MHz, R22



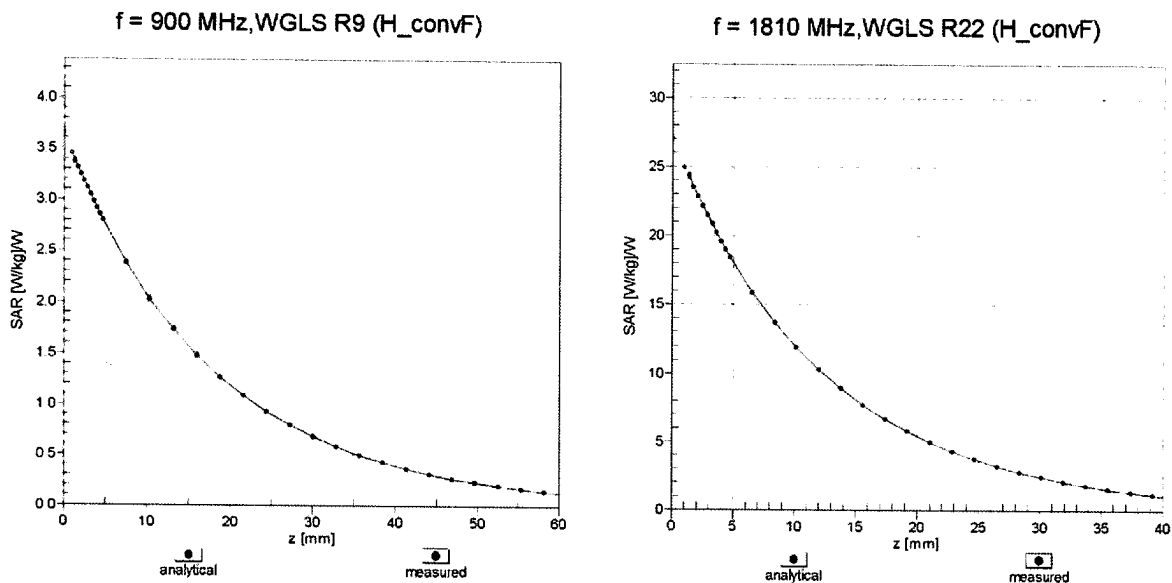
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range f(SAR_{head}) (TEM cell , f_{eval}= 1900 MHz)



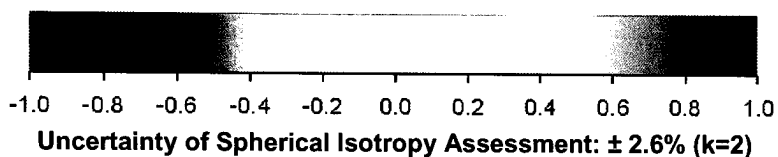
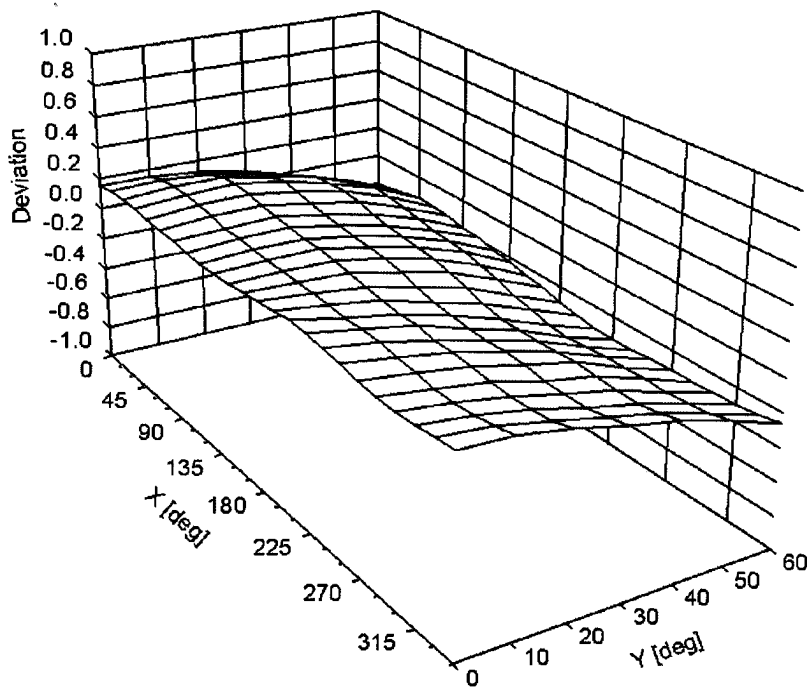
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ , θ), $f = 900 \text{ MHz}$



DASY/EASY - Parameters of Probe: EX3DV4 - SN:3722

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	11.6
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm



APPENDIX D – DIPOLE CALIBRATION CERTIFICATE



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 **MET Laboratories**

Certificate No: **D835V2-4d110_Jul13**

CALIBRATION CERTIFICATE

Object **D835V2 - SN: 4d110**

Calibration procedure(s) **QA CAL-05.v9**
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **July 17, 2013**

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 $(22 \pm 3)^{\circ}\text{C}$ 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	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-13 (No. 217-01736)	Apr-14
Type-N mismatch combination	SN: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
Reference Probe ES3DV3	SN: 3205	28-Dec-12 (No. ES3-3205_Dec12)	Dec-13
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14
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-12)	In house check: Oct-13

Calibrated by: **Name** **Function**
Leif Klysner **Laboratory Technician**

Signature

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

Issued: July 18, 2013

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

Impedance Measurement Plot for Body TSL

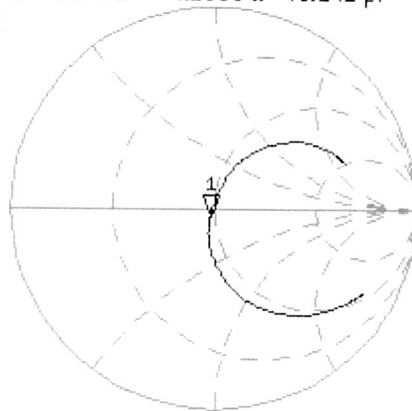
18 Jul 2013 09:09:12
CH1 S11 1 U FS 1: 47.578 Ω -4.1309 Ω 46.142 pF 835.000 000 MHz

*
Del

CA

Avg
16

H1d

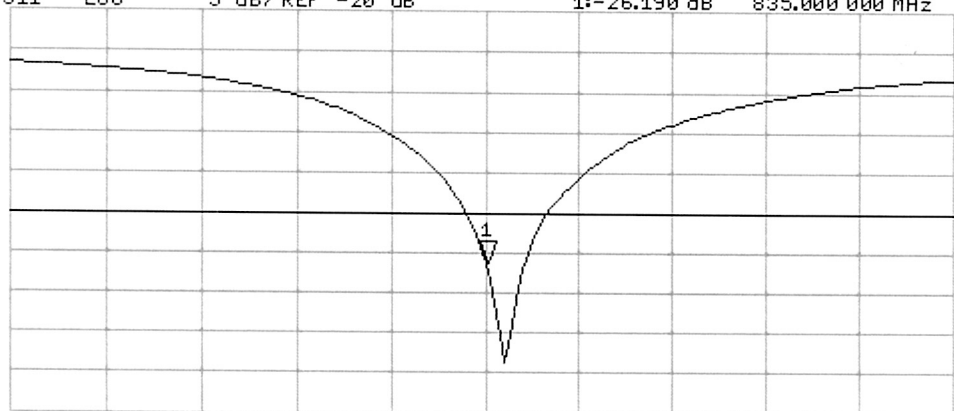


CH2 S11 LOG 5 dB/REF -20 dB 1:-26.190 dB 835.000 000 MHz

CA

Avg
16

H1d



START 635.000 000 MHz

STOP 1 035.000 000 MHz

DASY5 Validation Report for Body TSL

Date: 17.07.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d110

Communication System: UID 0 - CW ; Frequency: 835 MHz

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 1 \text{ S/m}$; $\epsilon_r = 54.9$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.04, 6.04, 6.04); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

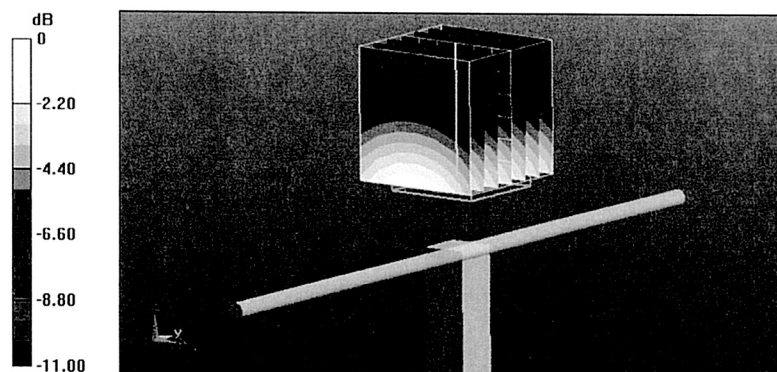
Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 55.327 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.57 W/kg

SAR(1 g) = 2.45 W/kg; SAR(10 g) = 1.61 W/kg

Maximum value of SAR (measured) = 2.84 W/kg

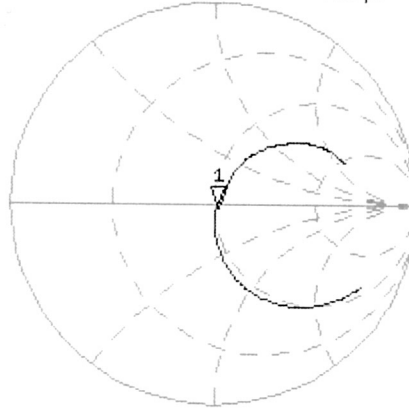


0 dB = 2.84 W/kg = 4.53 dBW/kg

Impedance Measurement Plot for Head TSL

18 Jul 2013 09:47:34
[CH1] S11 1 U FS 1: 51.242 Ω -2.7070 Ω 70.411 pF 835.000 000 MHz

*
De1
CA



Avg
16

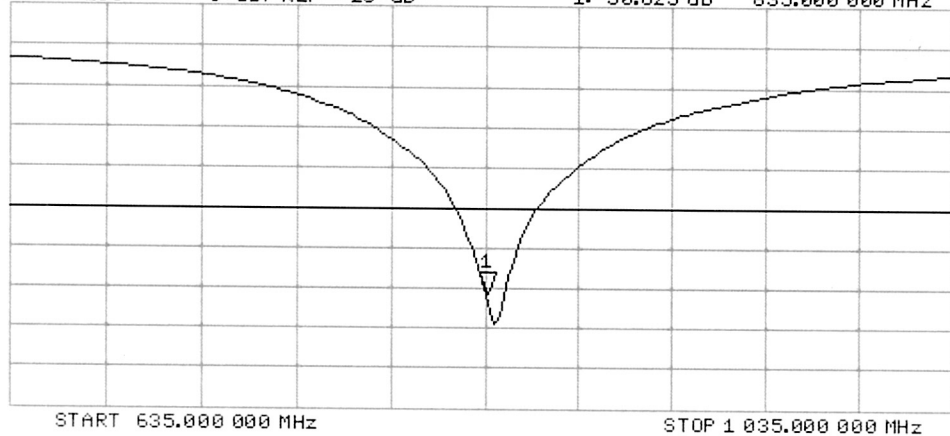
H1d

CH2 S11 LOG 5 dB/REF -20 dB 1:-30.625 dB 835.000 000 MHz

CA

Avg
16

H1d



START 635.000 000 MHz

STOP 1 035.000 000 MHz