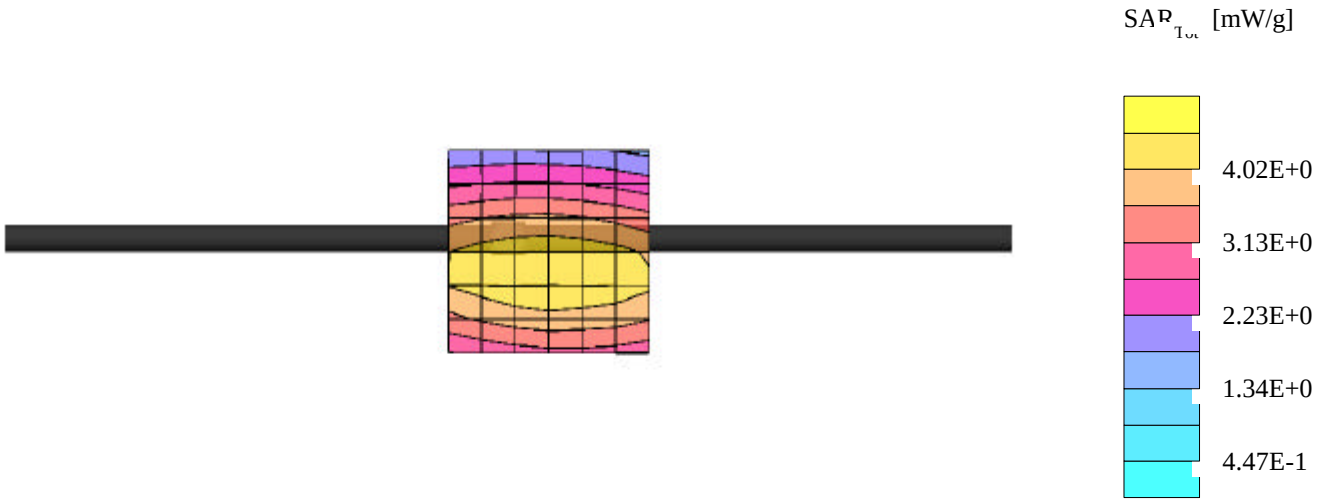
10. ANNEX B: VALIDATION PLOTS

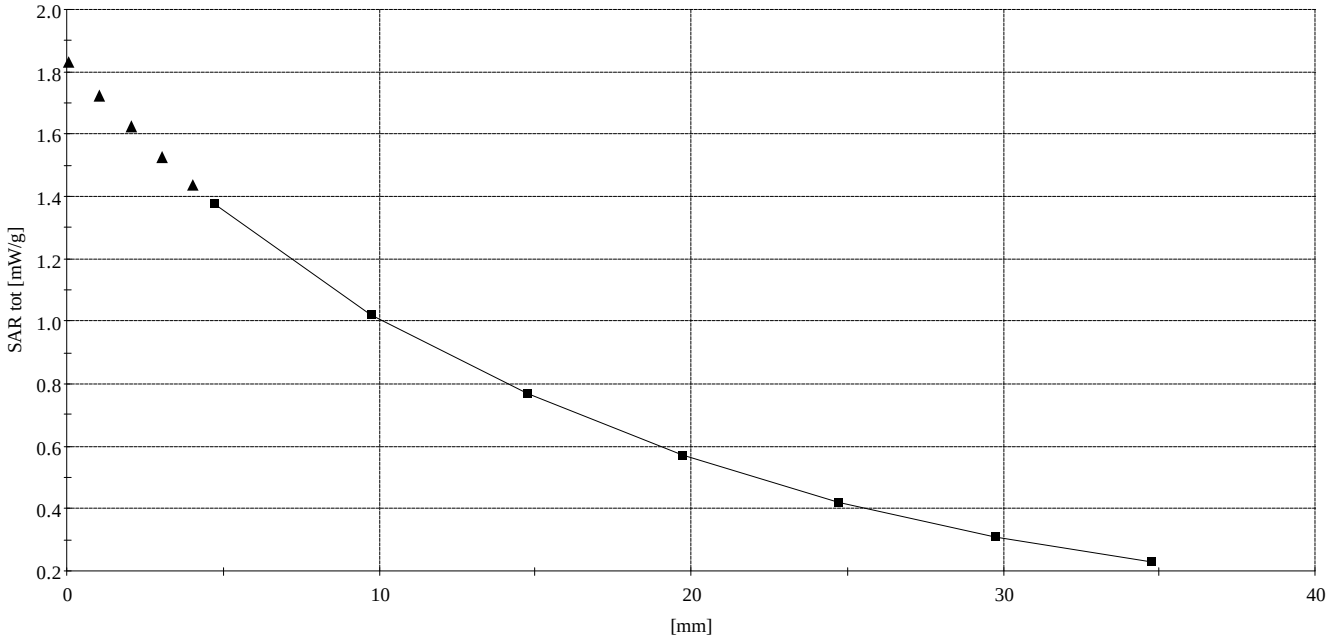
Dipole 900 MHz

SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 900 MHz
; 10; Probe: ET3DV6R - SN1429-1; ConvF(6.20,6.20,6.20); Crest factor: 1.0; Brain 900 MHz (SAM): σ = 0.95 mho/m ε_r = 40.9 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 2.87 mW/g, SAR (10g): 1.83 mW/g, (Worst-case extrapolation)
Cube 7x7x7: Dx = 5.0, Dy = 5.0, Dz = 5.0



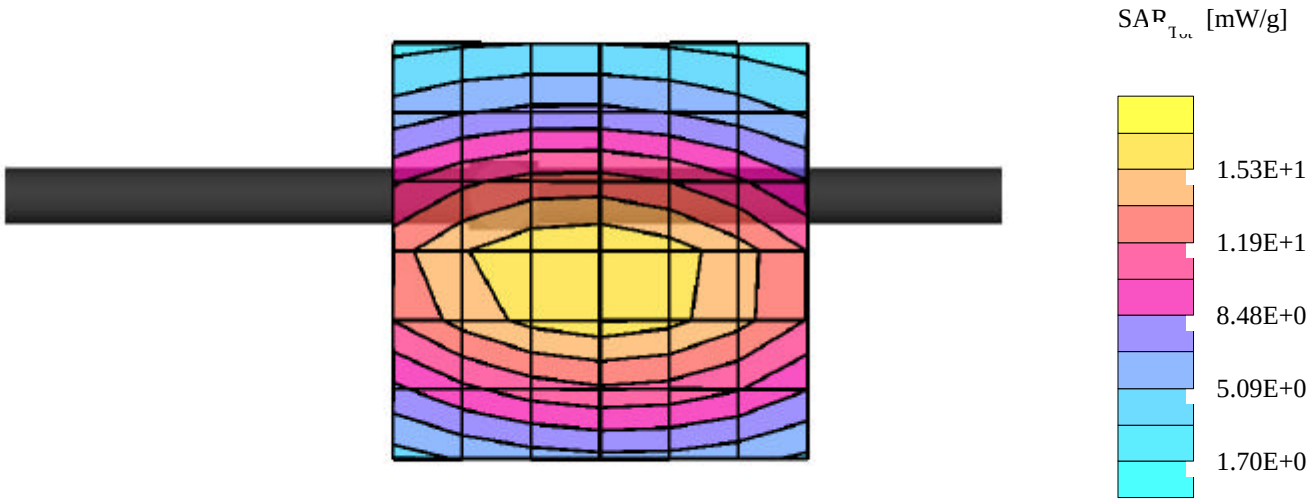
Dipole 900 MHz

SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 900 MHz
; 10; Probe: ET3DV6R - SN1429-1; ConvF(6.20,6.20,6.20); Crest factor: 1.0; Brain 900 MHz (SAM): σ = 0.95 mho/m ε_r = 40.9 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 2.87 mW/g, SAR (10g): 1.83 mW/g, (Worst-case extrapolation)
Cube 7x7x7: Dx = 5.0, Dy = 5.0, Dz = 5.0



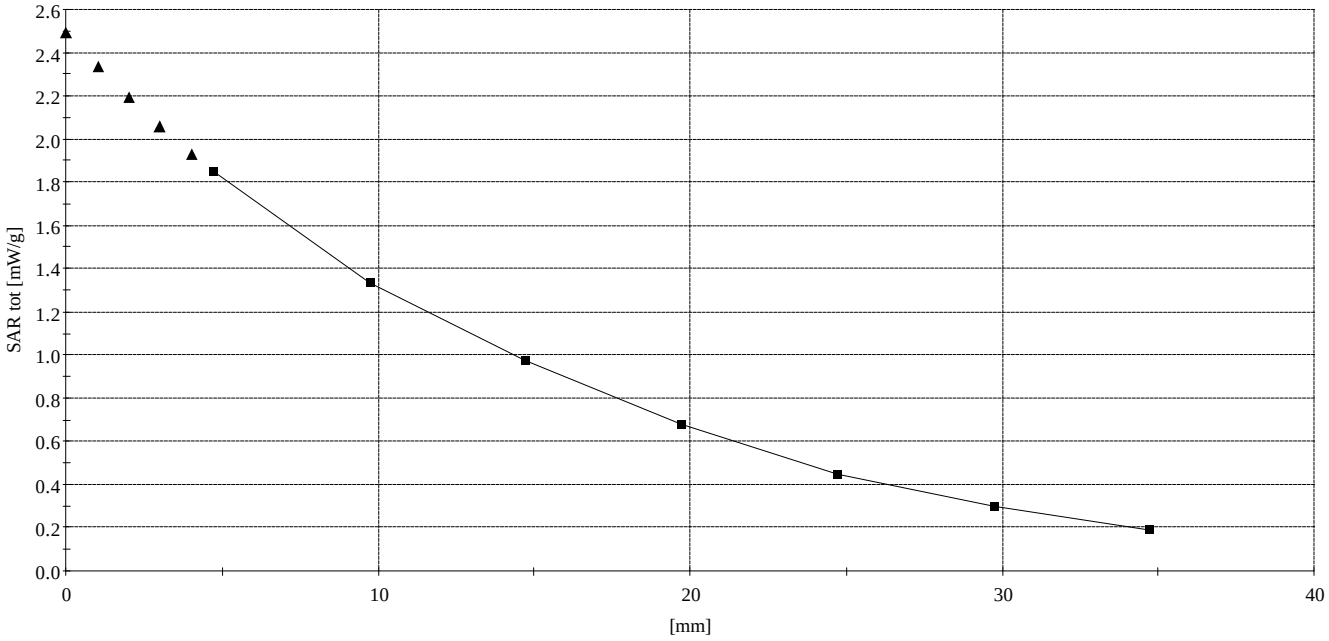
Dipole 1800 MHz

SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 1800 MHz
; 11; Probe: ET3DV6R - SN1429-1; ConvF(5.17,5.17,5.17); Crest factor: 1.0; Brain 1800 MHz (SAM): σ = 1.35 mho/m ε_r = 38.7 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 9.52 mW/g, SAR (10g): 4.99 mW/g, (Worst-case extrapolation)
Cube 7x7x7: Dx = 5.0, Dy = 5.0, Dz = 5.0



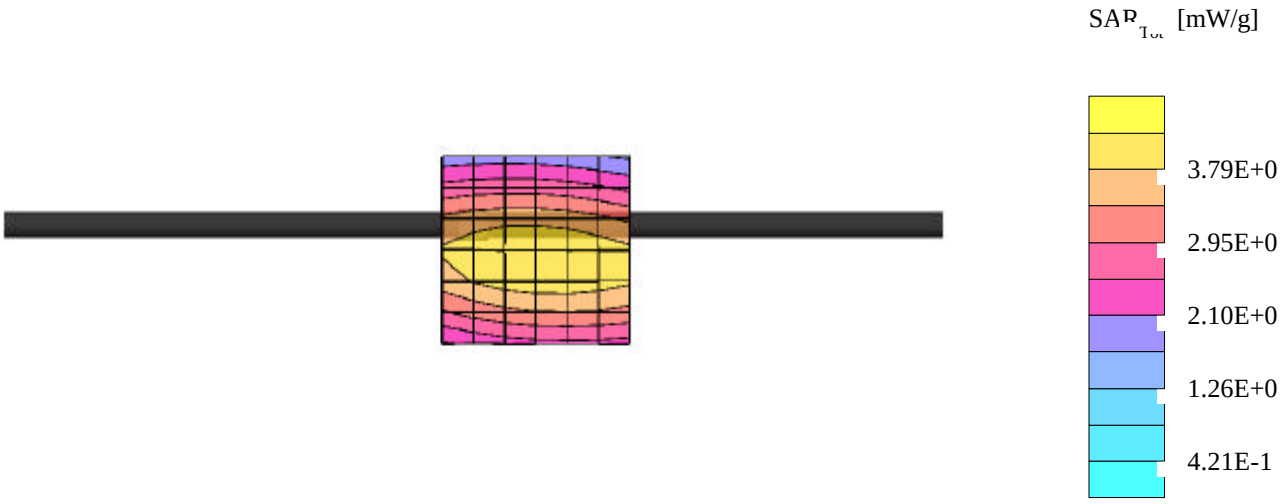
Dipole 1800 MHz

SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 1800 MHz
; 11; Probe: ET3DV6R - SN1429-1; ConvF(5.17,5.17,5.17); Crest factor: 1.0; Brain 1800 MHz (SAM): σ = 1.35 mho/m ε_r = 38.7 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 9.64 mW/g, SAR (10g): 5.05 mW/g, (Worst-case extrapolation)
Cube 7x7x7: Dx = 5.0, Dy = 5.0, Dz = 5.0



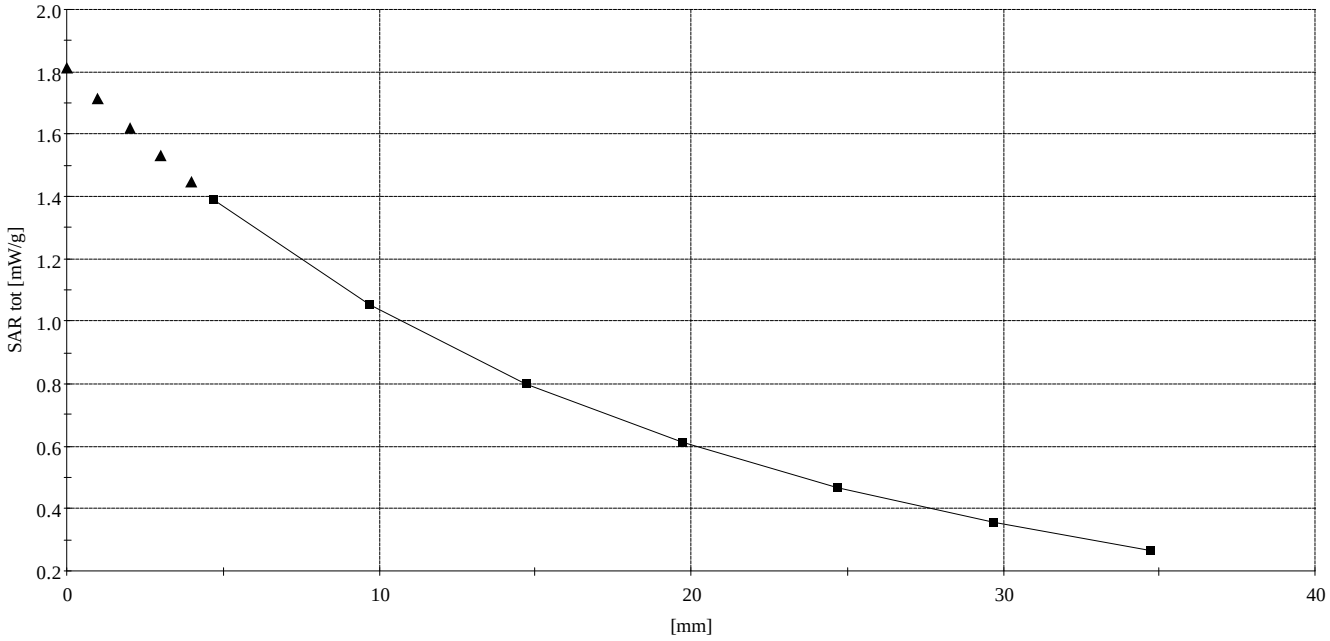
Dipole 900 MHz

SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 900 MHz
; 10; Probe: ET3DV6R - SN1429-1; ConvF(6.20,6.20,6.20); Crest factor: 1.0; Validation Body 836 (SAM): σ = 1.00 mho/m ε_r = 56.3 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 2.77 mW/g, SAR (10g): 1.79 mW/g, (Worst-case extrapolation)
Cube 7x7x7: Dx = 5.0, Dy = 5.0, Dz = 5.0



Dipole 900 MHz

SAM Phantom; Flat Section; Position: (90°,90°); Frequency: 900 MHz
; 10; Probe: ET3DV6R - SN1429-1; ConvF(6.20,6.20,6.20); Crest factor: 1.0; Validation Body 836 (SAM): σ = 1.00 mho/m ε_r = 56.3 ρ = 1.00 g/cm^3
Cube 7x7x7: SAR (1g): 2.77 mW/g, SAR (10g): 1.79 mW/g, (Worst-case extrapolation)
Cube 7x7x7: Dx = 5.0, Dy = 5.0, Dz = 5.0



11. ANNEX C: CALIBRATION CERTIFICATES

Schmid & Partner
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Calibration Certificate

Dosimetric E-Field Probe

Type:	**ET3DV6R**
Serial Number:	**1431**
Place of Calibration:	**Zurich**
Date of Calibration:	**December 19, 2001**
Calibration Interval:	**12 months**

17752

Schmid & Partner Engineering AG hereby certifies, that this device has been calibrated on the date indicated above. The calibration was performed in accordance with specifications and procedures of Schmid & Partner Engineering AG.

Wherever applicable, the standards used in the calibration process are traceable to international standards. In all other cases the standards of the Laboratory for EMF and Microwave Electronics at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland have been applied.

Calibrated by:	
Approved by:	

Schmid & Partner
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Telephone +41 1 245 97 00, Fax +41 1 245 97 79

Probe ET3DV6R

SN:1431

Manufactured: May 18, 2001
Calibrated: December 19, 2001

Calibrated for System DASY3

DASY3 - Parameters of Probe: ET3DV6R SN:1431

Sensitivity in Free Space

Diode Compression

NormX	**2.33** $\mu V/(V/m)^2$		DCP X	**99** mV
NormY	**2.23** $\mu V/(V/m)^2$		DCP Y	**99** mV
NormZ	**2.02** $\mu V/(V/m)^2$		DCP Z	**99** mV

Sensitivity in Tissue Simulating Liquid

Head **450 MHz** ε_r **= 43.5 ± 5%** σ **= 0.87 ± 10% mho/m**

ConvF X	**6.65**	extrapolated	Boundary effect:	
ConvF Y	**6.65**	extrapolated	Alpha	**0.57**
ConvF Z	**6.65**	extrapolated	Depth	**1.84**

Head **800 - 1000 MHz** ε_r **= 39.0 - 43.5** σ **= 0.80 - 1.10 mho/m**

ConvF X	**6.09**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.09**	± 9.5% (k=2)	Alpha	**0.57**
ConvF Z	**6.09**	± 9.5% (k=2)	Depth	**1.95**

Head **1500 MHz** ε_r **= 40.4 ± 5%** σ **= 1.23 ± 10% mho/m**

ConvF X	**5.33**	interpolated	Boundary effect:	
ConvF Y	**5.33**	interpolated	Alpha	**0.57**
ConvF Z	**5.33**	interpolated	Depth	**2.10**

Head **1700 - 1910 MHz** ε_r **= 39.5 - 41.0** σ **= 1.20 - 1.55 mho/m**

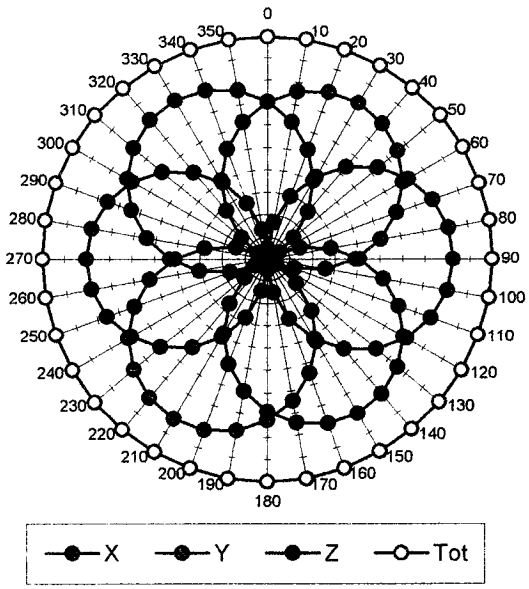
ConvF X	**4.95**	± 9.5% (k=2)	Boundary effect:	
ConvF Y	**4.95**	± 9.5% (k=2)	Alpha	**0.57**
ConvF Z	**4.95**	± 9.5% (k=2)	Depth	**2.17**

Sensor Offset

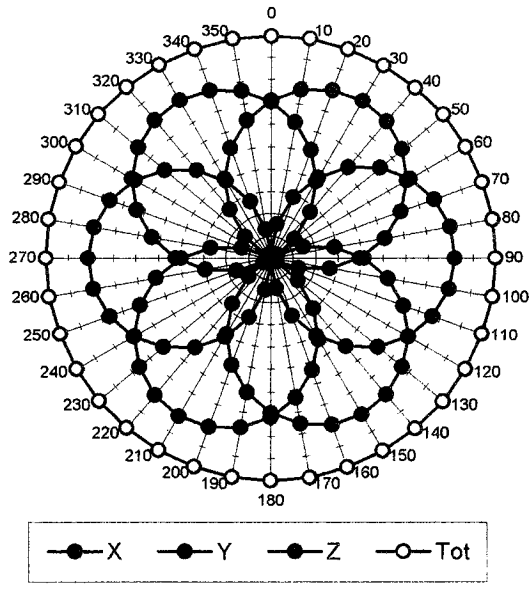
Probe Tip to Sensor Center	**2.7**	mm

Receiving Pattern (ϕ), θ = 0°

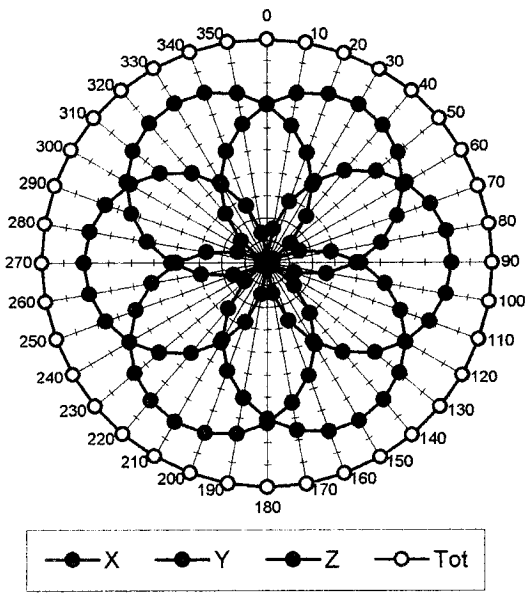
f = 30 MHz, TEM cell ifi110



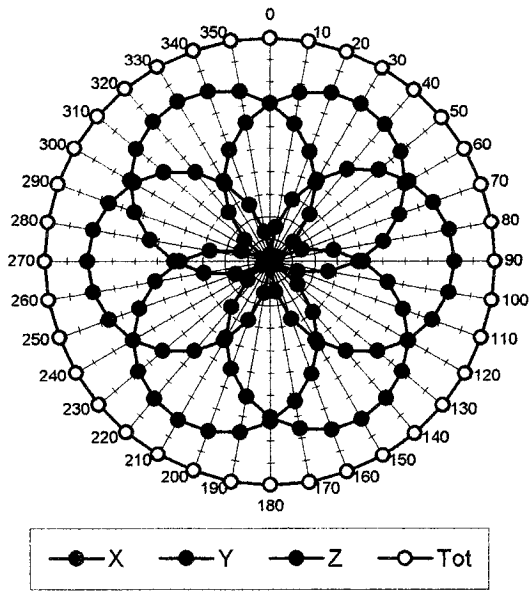
f = 100 MHz, TEM cell ifi110

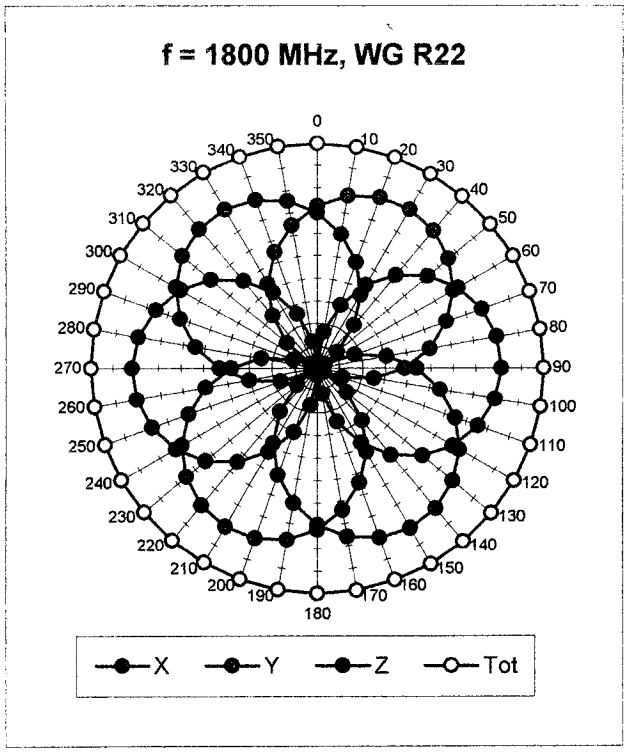


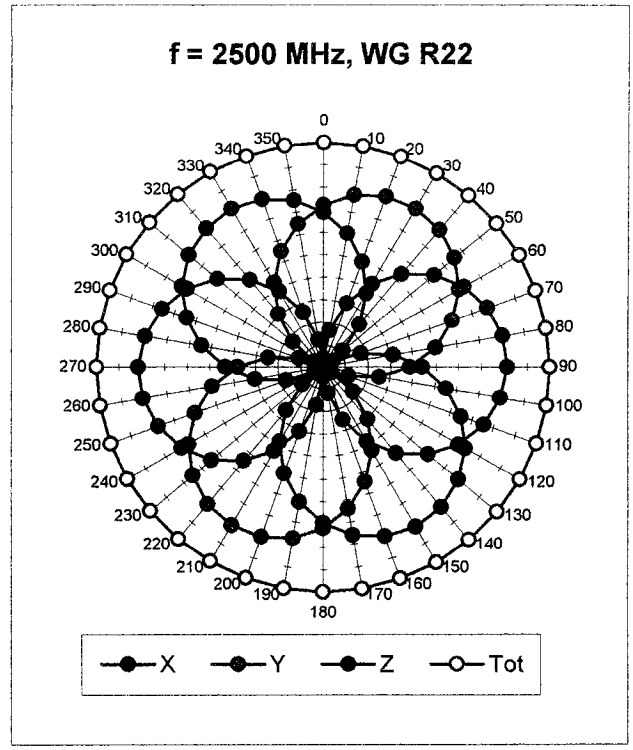
f = 300 MHz, TEM cell ifi110



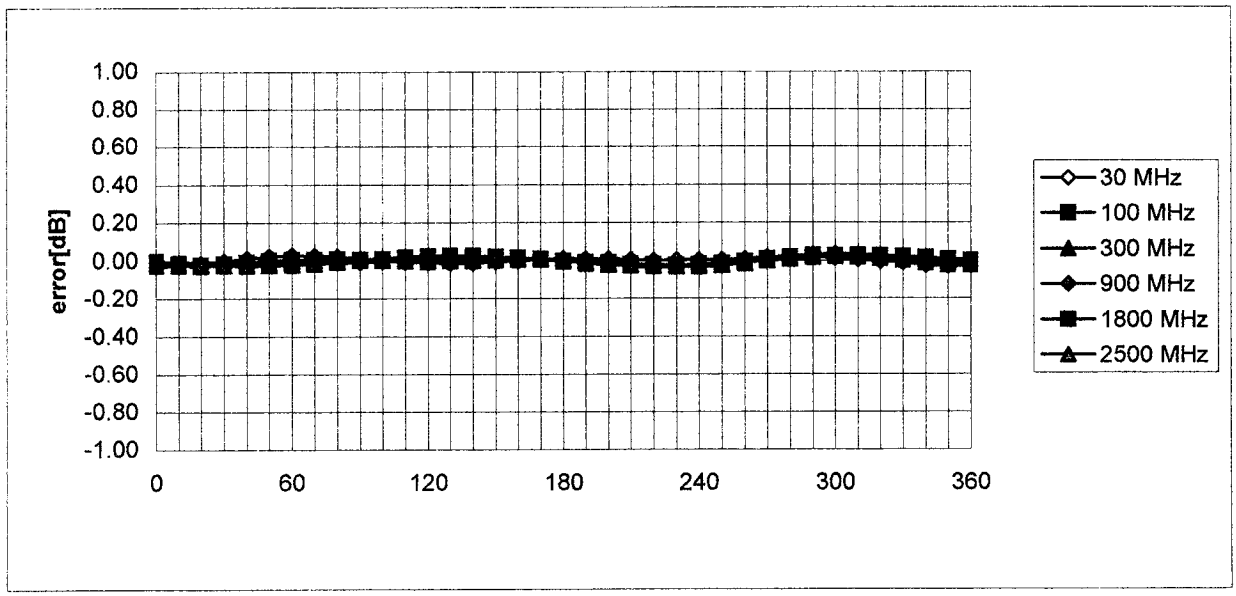
f = 900 MHz, TEM cell ifi110





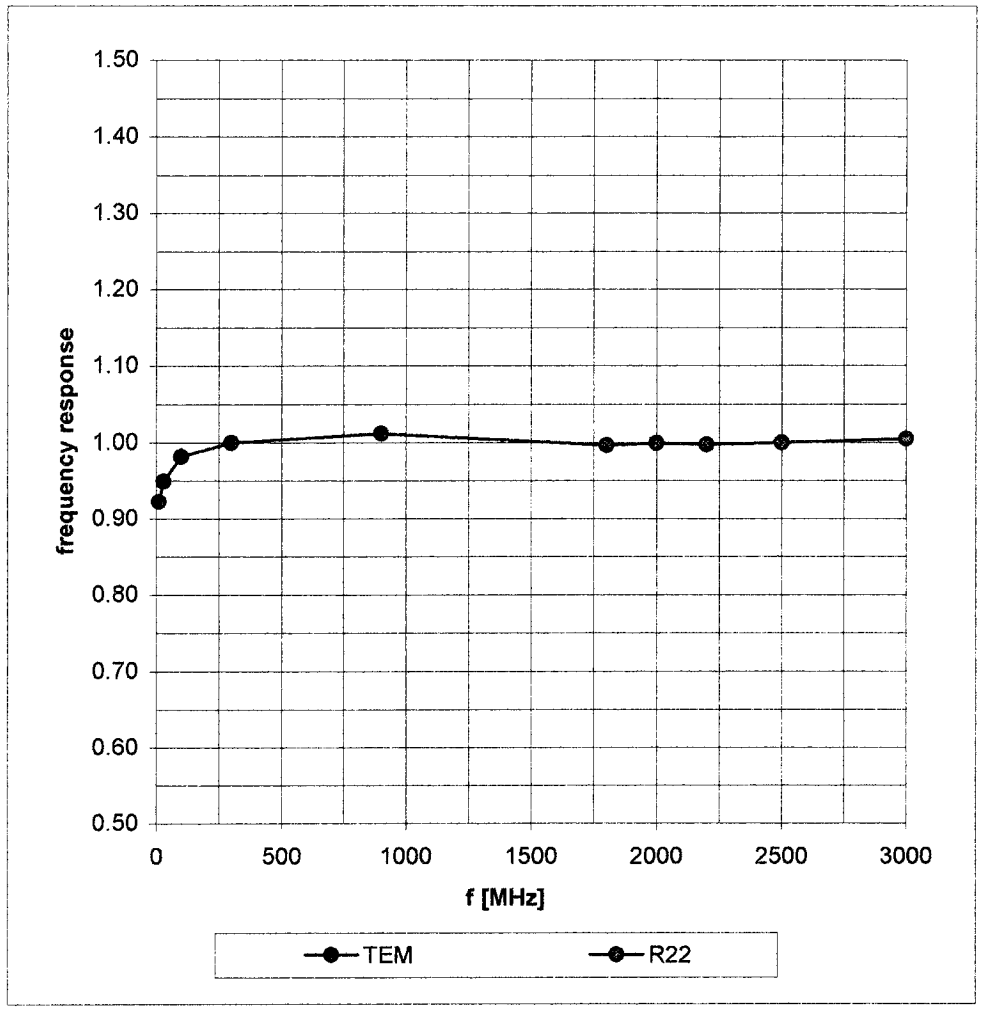


Isotropy Error (ϕ), θ = 0°



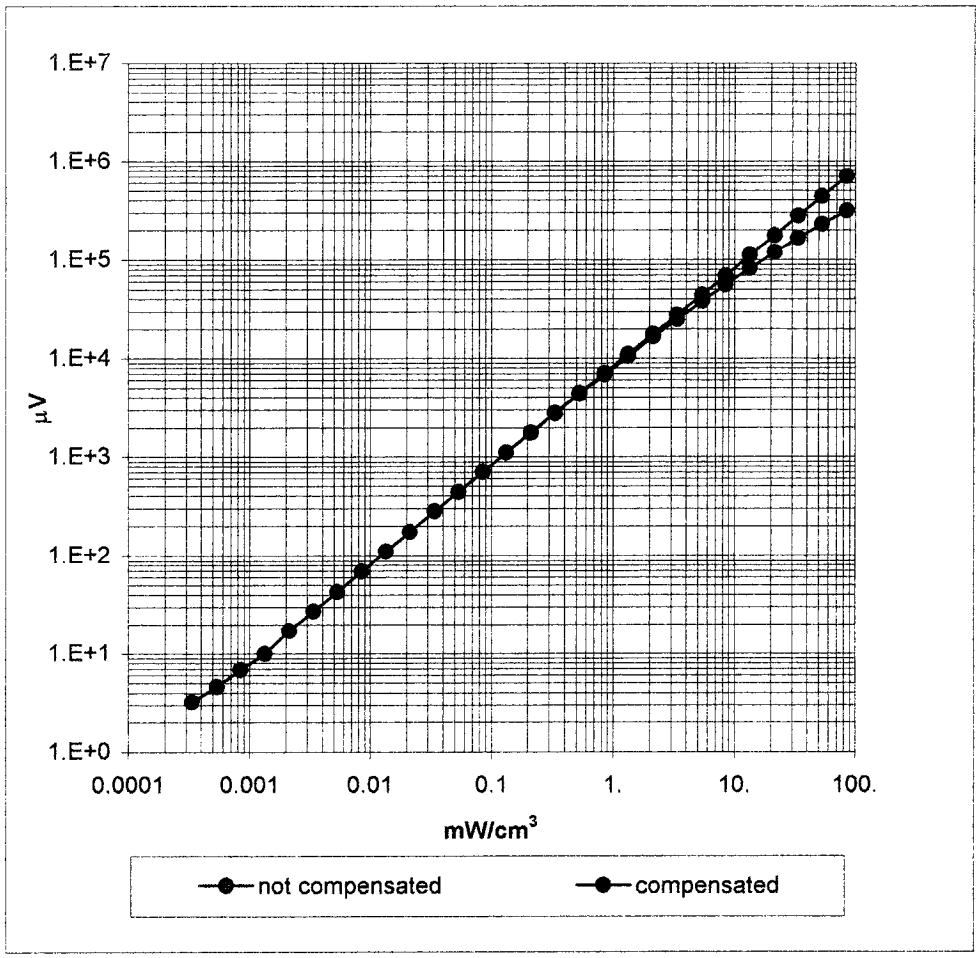
Frequency Response of E-Field

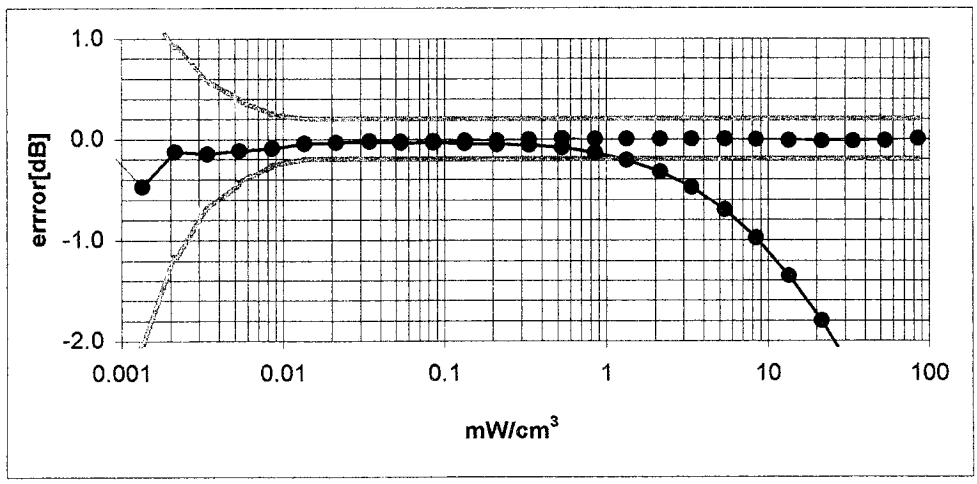
(TEM-Cell:ifi110, Waveguide R22)



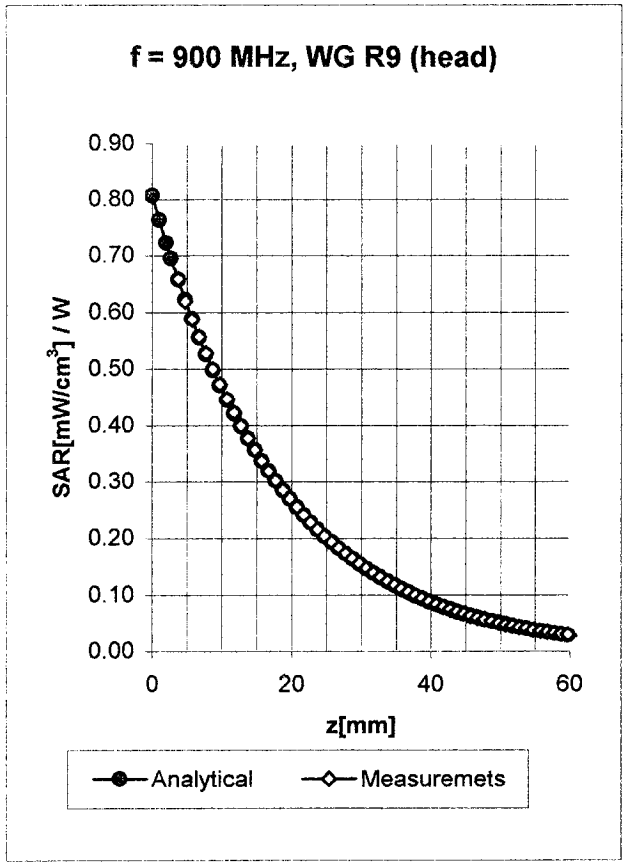
Dynamic Range f(SAR_{brain})

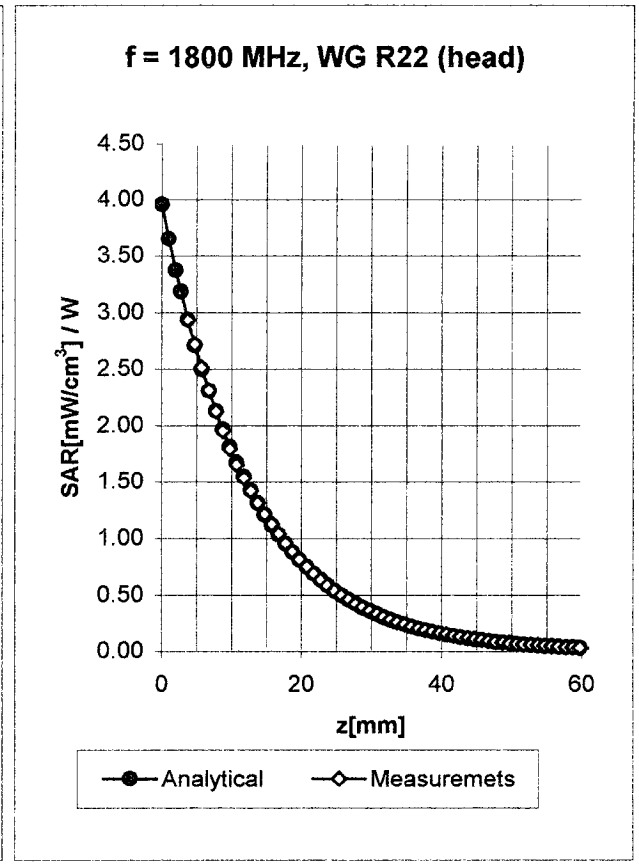
(Waveguide R22)





Conversion Factor Assessment





Head **800 - 1000 MHz** ε_r **= 39.0 - 43.5** σ **= 0.80 - 1.10 mho/m**

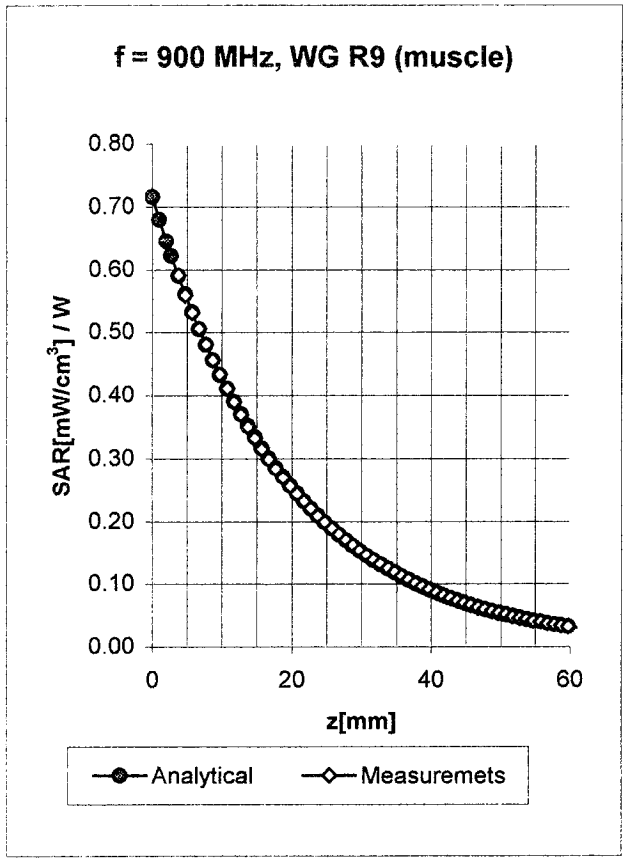
ConvF X	**6.09** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**6.09** ± 9.5% (k=2)	Alpha	**0.57**
ConvF Z	**6.09** ± 9.5% (k=2)	Depth	**1.95**

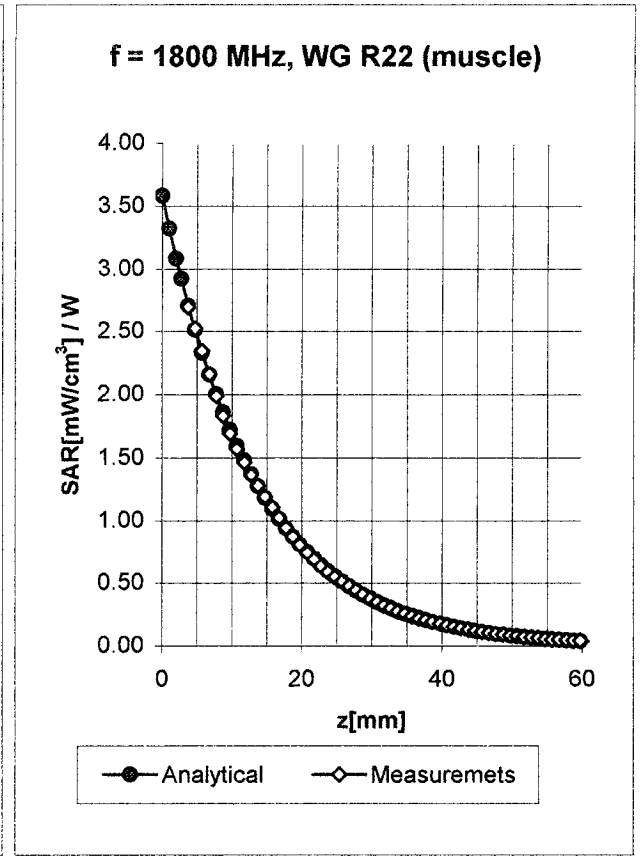
Head **1700 - 1910 MHz** ε_r **= 39.5 - 41.0** σ **= 1.20 - 1.55 mho/m**

ConvF X	**4.95** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**4.95** ± 9.5% (k=2)	Alpha	**0.57**
ConvF Z	**4.95** ± 9.5% (k=2)	Depth	**2.17**

ET3DV6R SN:1431

Conversion Factor Assessment





Muscle **900 MHz** ε_r **= 52.3 - 57.8** σ **= 0.96 - 1.15 mho/m**

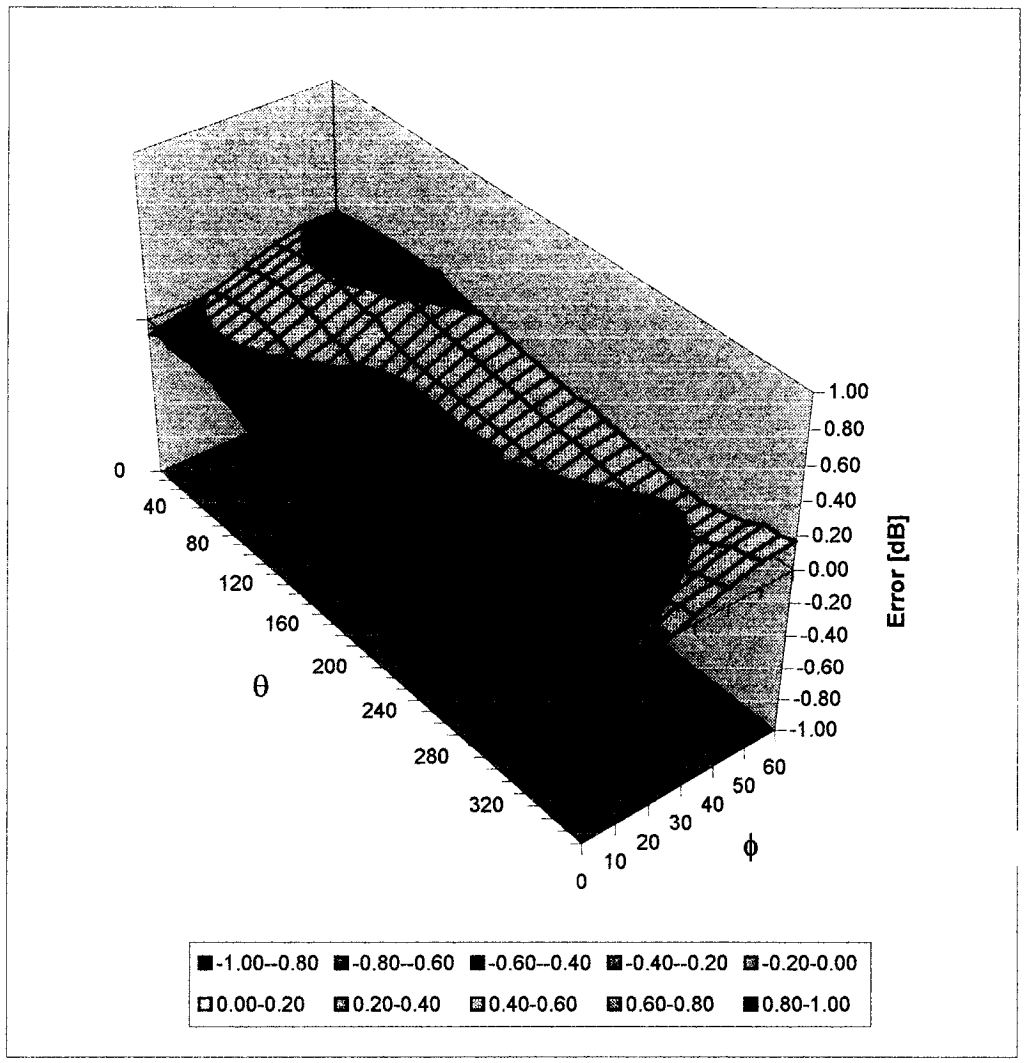
ConvF X	**5.85** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**5.85** ± 9.5% (k=2)	Alpha	**0.58**
ConvF Z	**5.85** ± 9.5% (k=2)	Depth	**2.01**

Muscle **1800 MHz** ε_r **= 50.6 - 56.0** σ **= 1.35 - 1.65 mho/m**

ConvF X	**4.52** ± 9.5% (k=2)	Boundary effect:	
ConvF Y	**4.52** ± 9.5% (k=2)	Alpha	**0.70**
ConvF Z	**4.52** ± 9.5% (k=2)	Depth	**2.17**

Deviation from Isotropy in HSL

Error (θ,φ), f = 900 MHz



17556

Schmid & Partner
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Calibration Certificate

Dosimetric E-Field Probe

Type:	**ET3DV6R**
Serial Number:	**1429**
Place of Calibration:	**Zurich**
Date of Calibration:	**September 4, 2001**
Calibration Interval:	**12 months**

Schmid & Partner Engineering AG hereby certifies, that this device has been calibrated on the date indicated above. The calibration was performed in accordance with specifications and procedures of Schmid & Partner Engineering AG.

Wherever applicable, the standards used in the calibration process are traceable to international standards. In all other cases the standards of the Laboratory for EMF and Microwave Electronics at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland have been applied.

Calibrated by:	
Approved by:	Kalić Katja

Schmid & Partner
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Telephone +41 1 245 97 00, Fax +41 1 245 97 79

Probe ET3DV6R

SN:1429

Manufactured: May 7, 2001
Calibrated: September 4, 2001

Calibrated for System DASY3

DASY3 - Parameters of Probe: ET3DV6R SN:1429

Sensitivity in Free Space

NormX	**2.22** $\mu V/(V/m)^2$
NormY	**2.11** $\mu V/(V/m)^2$
NormZ	**2.31** $\mu V/(V/m)^2$

Diode Compression

DCP X	**98** mV
DCP Y	**98** mV
DCP Z	**98** mV

Sensitivity in Tissue Simulating Liquid

Head **450 MHz** ε_r **= 43.5 ± 5%** σ **= 0.87 ± 10% mho/m**

ConvF X	**6.71**	extrapolated	Boundary effect:	
ConvF Y	**6.71**	extrapolated	Alpha	**0.39**
ConvF Z	**6.71**	extrapolated	Depth	**2.05**

Head **900 MHz** ε_r **= 42 ± 5%** σ **= 0.97 ± 10% mho/m**

ConvF X	**6.20**	± 7% (k=2)	Boundary effect:	
ConvF Y	**6.20**	± 7% (k=2)	Alpha	**0.44**
ConvF Z	**6.20**	± 7% (k=2)	Depth	**2.10**

Head **1500 MHz** ε_r **= 40.4 ± 5%** σ **= 1.23 ± 10% mho/m**

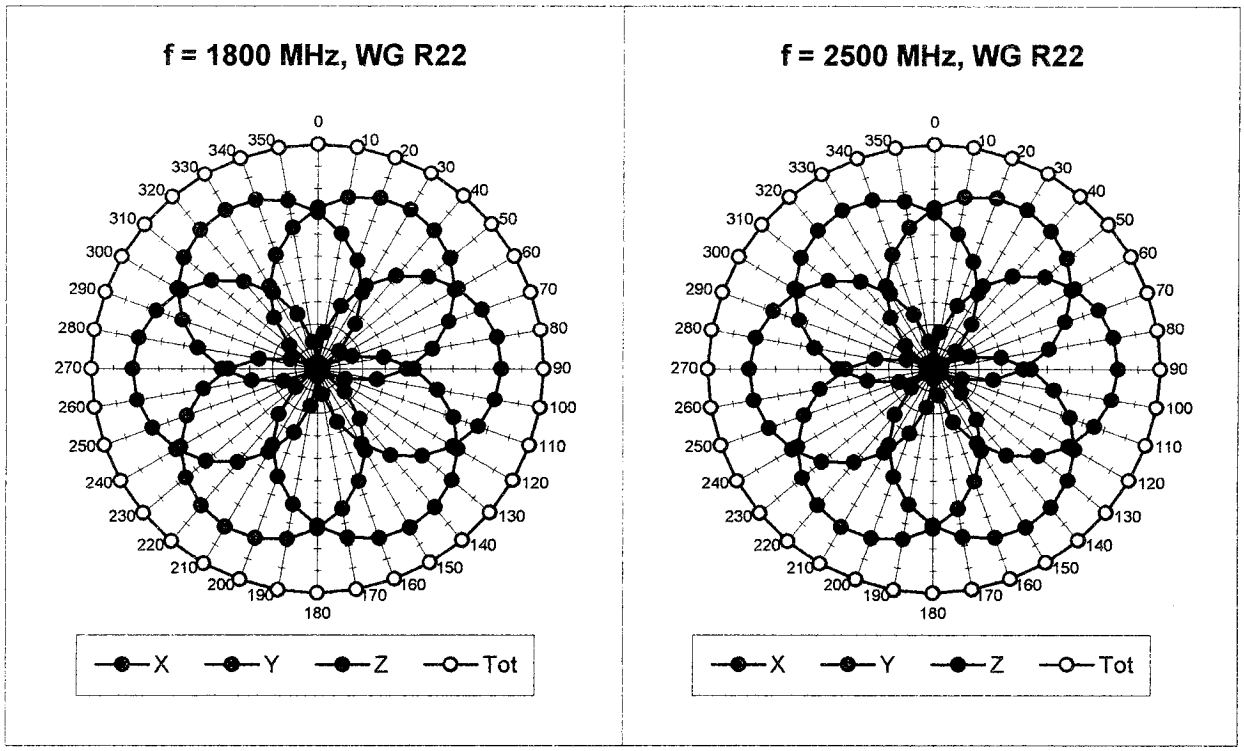
ConvF X	**5.51**	interpolated	Boundary effect:	
ConvF Y	**5.51**	interpolated	Alpha	**0.51**
ConvF Z	**5.51**	interpolated	Depth	**2.16**

Head **1800 MHz** ε_r **= 40 ± 5%** σ **= 1.40 ± 10% mho/m**

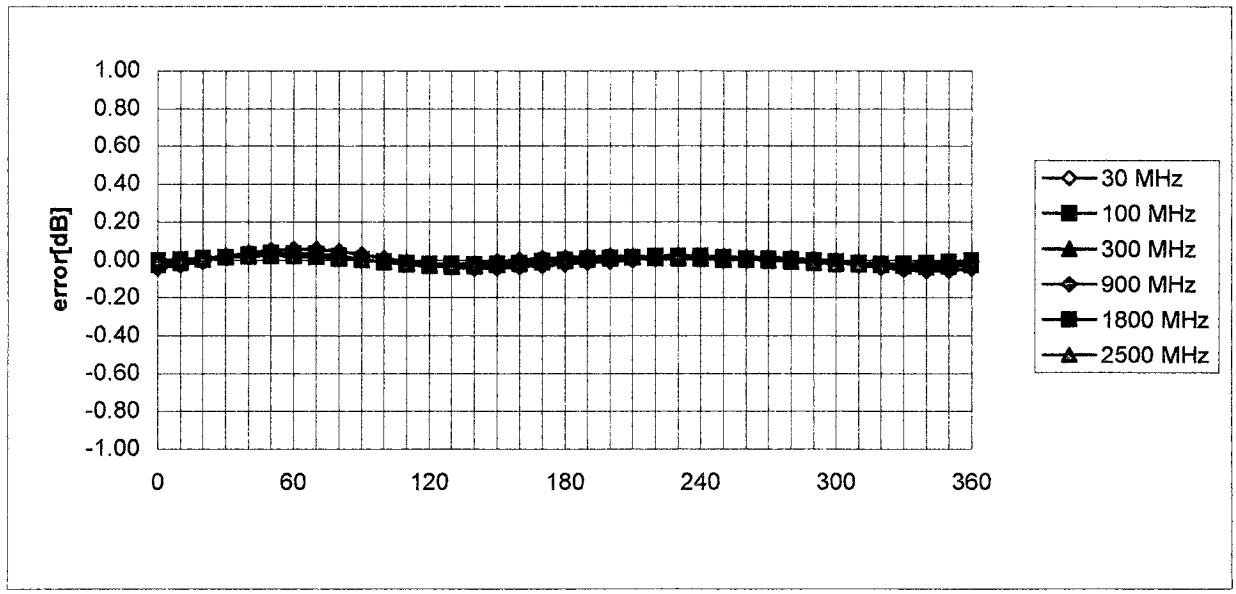
ConvF X	**5.17**	± 7% (k=2)	Boundary effect:	
ConvF Y	**5.17**	± 7% (k=2)	Alpha	**0.54**
ConvF Z	**5.17**	± 7% (k=2)	Depth	**2.18**

Sensor Offset

Probe Tip to Sensor Center	**2.7**	mm

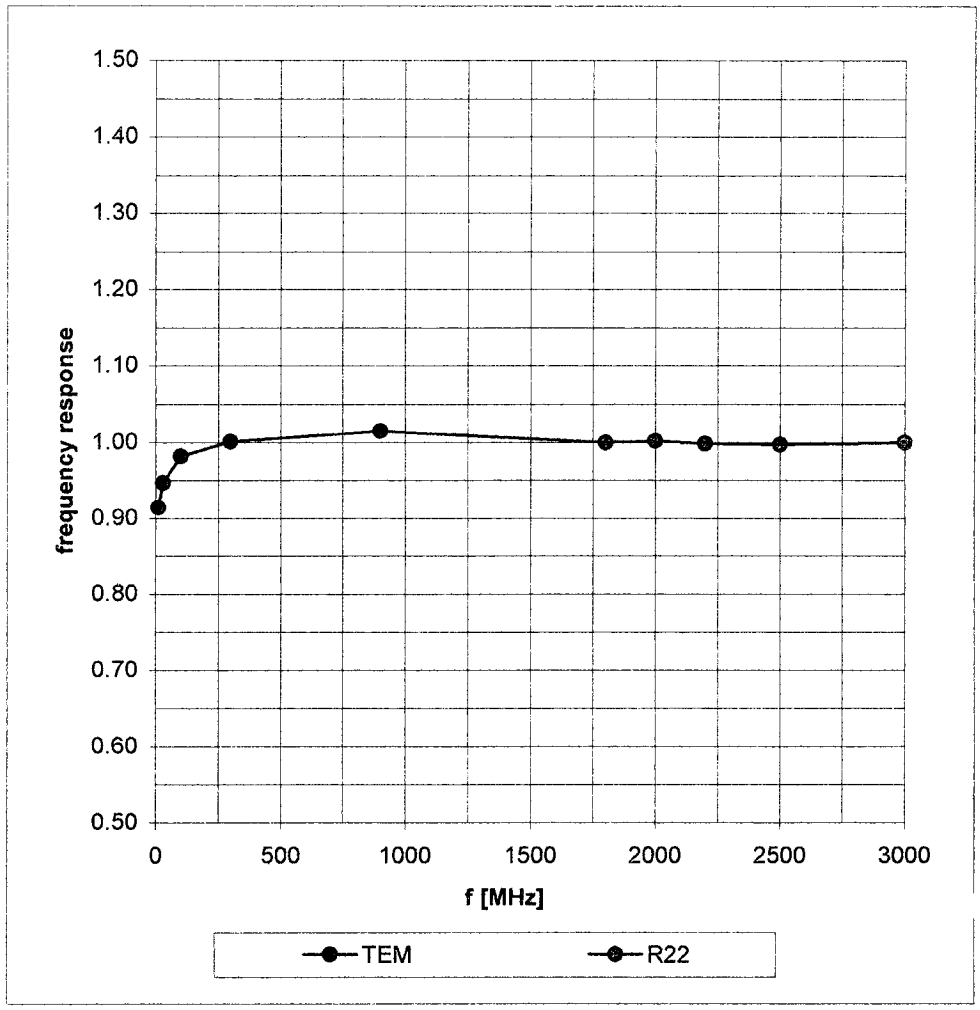


Isotropy Error (ϕ), θ = 0°



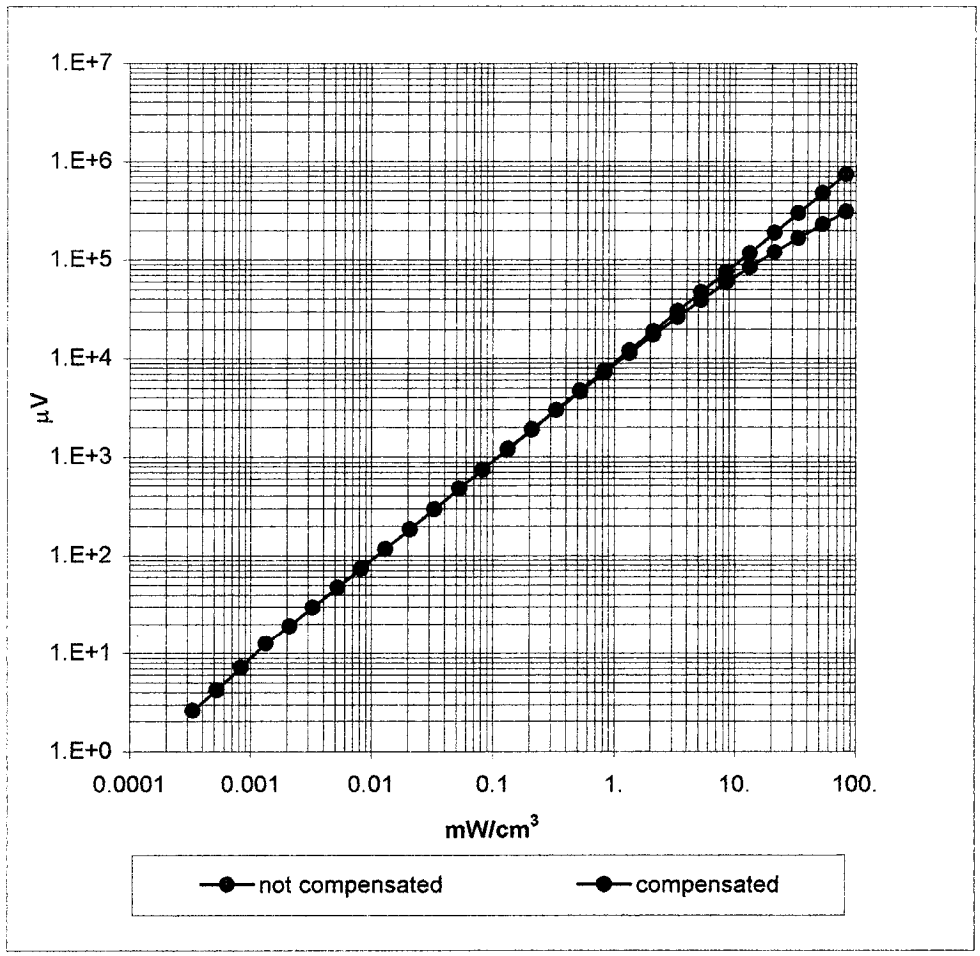
Frequency Response of E-Field

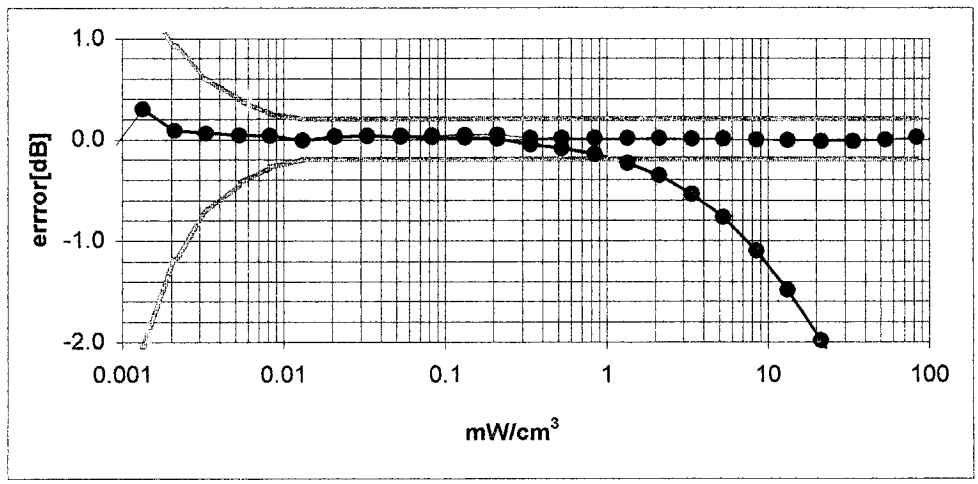
(TEM-Cell:ifi110, Waveguide R22)



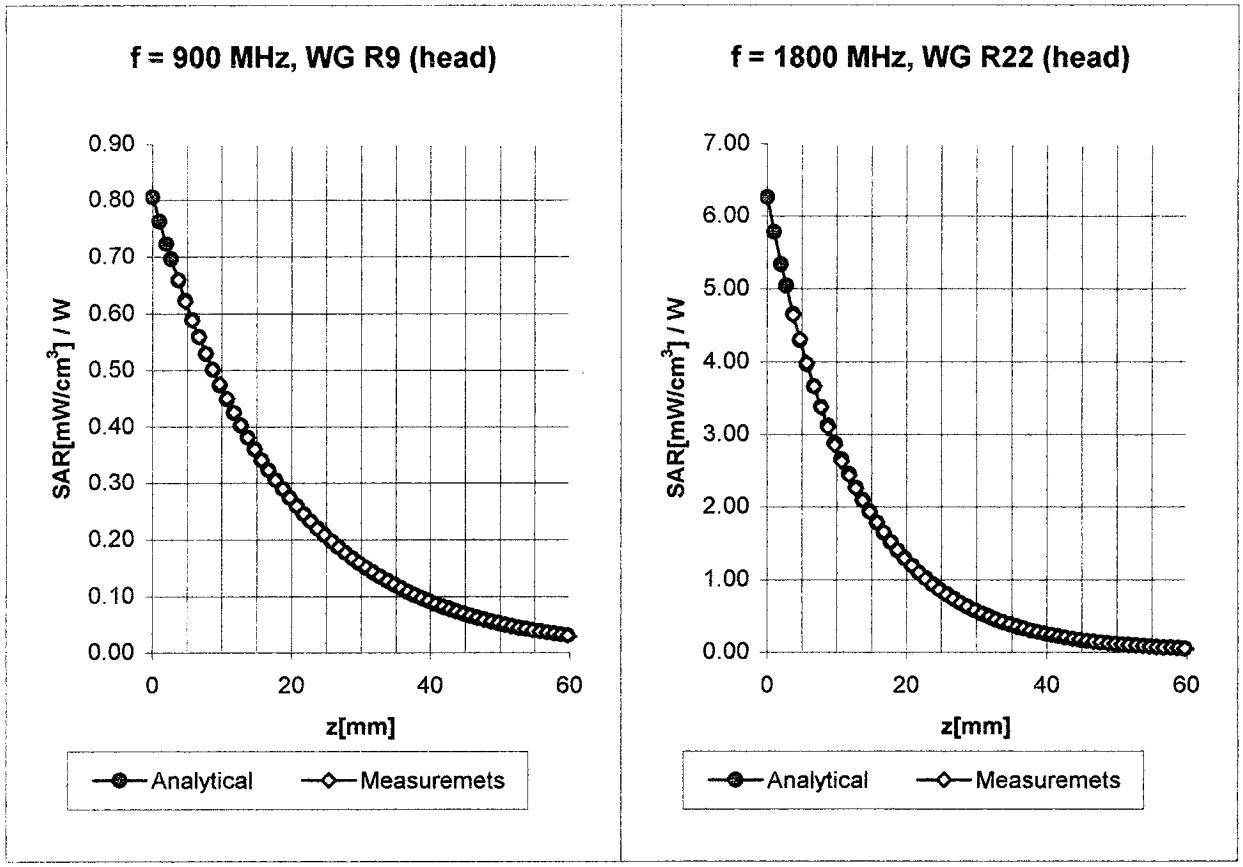
Dynamic Range f(SAR_{brain})

(Waveguide R22)





Conversion Factor Assessment



Head **900 MHz** ε_r **= 42 ± 5%** σ **= 0.97 ± 10% mho/m**

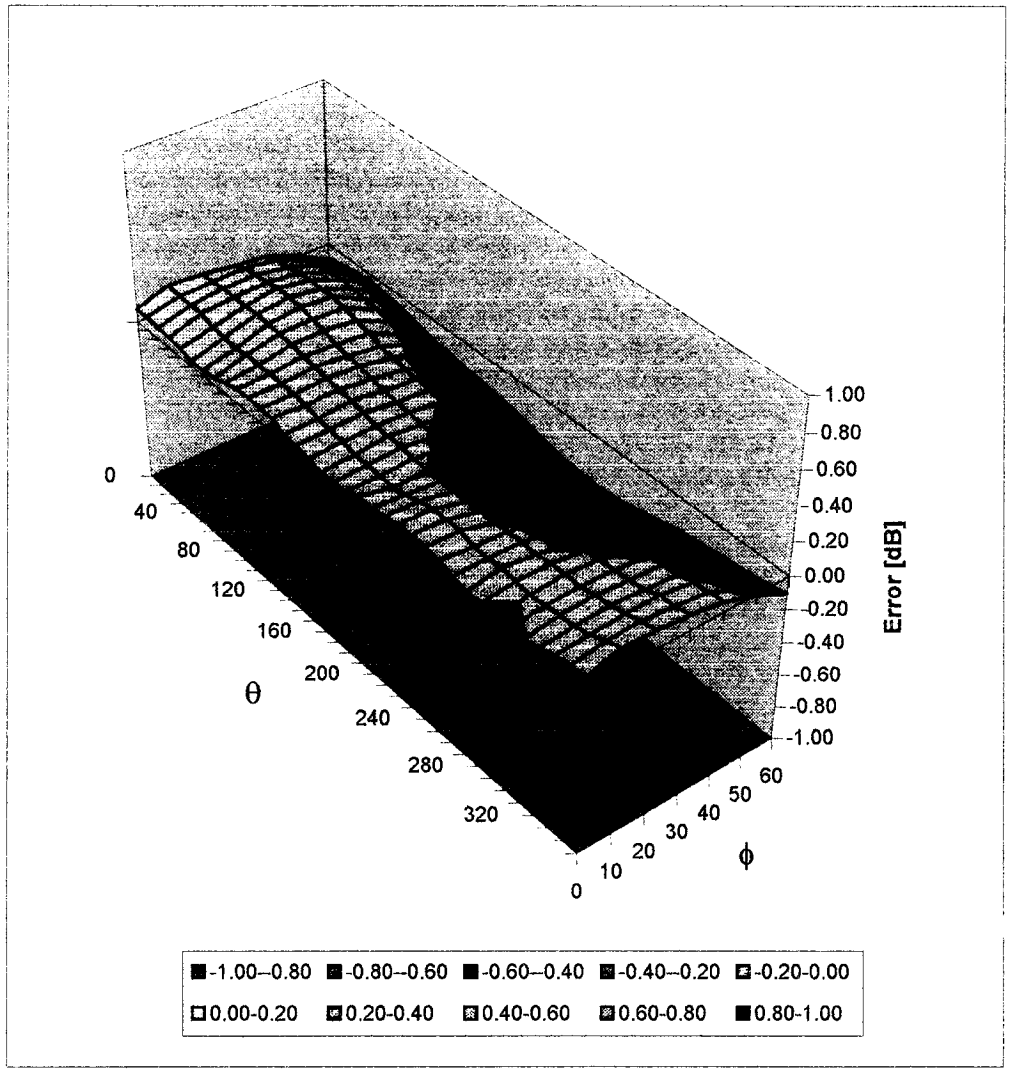
ConvF X	**6.20**	± 7% (k=2)	Boundary effect:	
ConvF Y	**6.20**	± 7% (k=2)	Alpha	**0.44**
ConvF Z	**6.20**	± 7% (k=2)	Depth	**2.10**

Head **1800 MHz** ε_r **= 40 ± 5%** σ **= 1.40 ± 10% mho/m**

ConvF X	**5.17**	± 7% (k=2)	Boundary effect:	
ConvF Y	**5.17**	± 7% (k=2)	Alpha	**0.54**
ConvF Z	**5.17**	± 7% (k=2)	Depth	**2.18**

Deviation from Isotropy in HSL

Error (θ,ϕ), f = 900 MHz



Schmid & Partner
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Calibration Certificate

1800 MHz System Validation Dipole

Type:	**D1800V2**
Serial Number:	**230**
Place of Calibration:	**Zurich**
Date of Calibration:	**October 25, 2001**
Calibration Interval:	**24 months**

Schmid & Partner Engineering AG hereby certifies, that this device has been calibrated on the date indicated above. The calibration was performed in accordance with specifications and procedures of Schmid & Partner Engineering AG.

Wherever applicable, the standards used in the calibration process are traceable to international standards. In all other cases the standards of the Laboratory for EMF and Microwave Electronics at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland have been applied.

Calibrated by:	Kalcovic Katja
Approved by:	

Schmid & Partner
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

DASY

Dipole Validation Kit

Type: D1800V2

Serial: 230

Manufactured: February 26, 1998
Calibrated: October 25, 2001

1. Measurement Conditions

The measurements were performed in the flat section of the new generic twin phantom filled with head simulating glycol solution of the following electrical parameters at 1800 MHz:

Relative Dielectricity	**40.7**	± 5%
Conductivity	**1.35 mho/m**	± 5%

The DASY3 System (Software version 3.1d) with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 5.57 at 1800 MHz) was used for the measurements.

The dipole was mounted on the small tripod so that the dipole feedpoint was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10mm from dipole center to the solution surface. The included distance holder was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 15mm was aligned with the dipole. The 5x5x7 fine cube was chosen for cube integration. Probe isotropy errors were cancelled by measuring the SAR with normal and 90° turned probe orientations and averaging.
The dipole input power (forward power) was 250mW ± 3 %. The results are normalized to 1W input power.

2. SAR Measurement

Standard SAR-measurements were performed with the phantom according to the measurement conditions described in section 1. The results have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values are:

averaged over 1 cm^3 (1 g) of tissue:	**37.4 mW/g**
averaged over 10 cm^3 (10 g) of tissue:	**19.7 mW/g**

Note: If the liquid parameters for validation are slightly different from the ones used for initial calibration, the SAR-values will be different as well. The estimated sensitivities of SAR-values and penetration depths to the liquid parameters are listed in the DASY Application Note 4: 'SAR Sensitivities'.

3. Dipole Impedance and Return Loss

The impedance was measured at the SMA-connector with a network analyzer and numerically transformed to the dipole feedpoint. The transformation parameters from the SMA-connector to the dipole feedpoint are:

Electrical delay:	**1.213 ns**	(one direction)
Transmission factor:	**0.990**	(voltage transmission, one direction)

The dipole was positioned at the flat phantom sections according to section 1 and the distance holder was in place during impedance measurements.

Feedpoint impedance at 1800 MHz:	Re{Z} = **49.3 Ω**
	Im {Z} = **-6.2 Ω**
Return Loss at 1800 MHz	**-24.0dB**

4. Measurement Conditions

The measurements were performed in the flat section of the new generic twin phantom filled with muscle simulating glycol solution of the following electrical parameters at 1800 MHz:

Relative Dielectricity	**53.5**	± 5%
Conductivity	**1.45 mho/m**	± 5%

The DASY3 System (Software version 3.1d) with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 4.85 at 1800 MHz) was used for the measurements.

The dipole was mounted on the small tripod so that the dipole feedpoint was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10mm from dipole center to the solution surface. The included distance holder was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 15mm was aligned with the dipole. The 5x5x7 fine cube was chosen for cube integration. Probe isotropy errors were cancelled by measuring the SAR with normal and 90° turned probe orientations and averaging.
The dipole input power (forward power) was 250mW ± 3 %. The results are normalized to 1W input power.

5. SAR Measurement

Standard SAR-measurements were performed with the phantom according to the measurement conditions described in section 4. The results have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values are:

averaged over 1 cm^3 (1 g) of tissue:	**40.8 mW/g**
averaged over 10 cm^3 (10 g) of tissue:	**21.4 mW/g**

Note: If the liquid parameters for validation are slightly different from the ones used for initial calibration, the SAR-values will be different as well. The estimated sensitivities of SAR-values and penetration depths to the liquid parameters are listed in the DASY Application Note 4: 'SAR Sensitivities'.

6. Dipole Impedance and Return Loss

The dipole was positioned at the flat phantom sections according to section 4 and the distance holder was in place during impedance measurements.

Feedpoint impedance at 1800 MHz:	Re{Z} = **44.7 Ω**
	Im {Z} = **-6.5Ω**
Return Loss at 1800 MHz	**-21.1 dB**

7. Handling

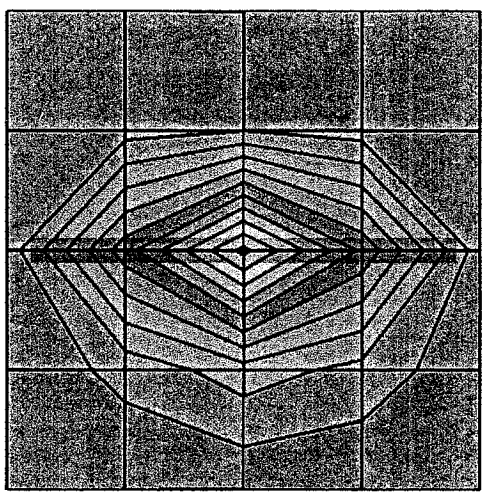
The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

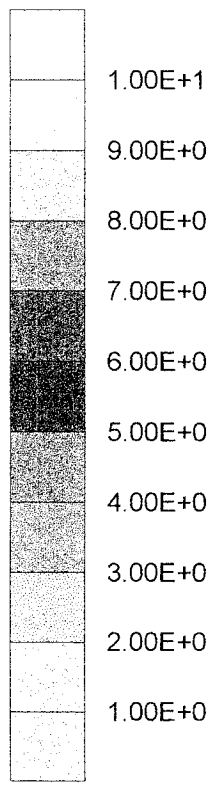
Do not apply excessive force to the dipole arms, because they might bend. If the dipole arms have to be bent back, take care to release stress to the soldered connections near the feedpoint; they might come off.

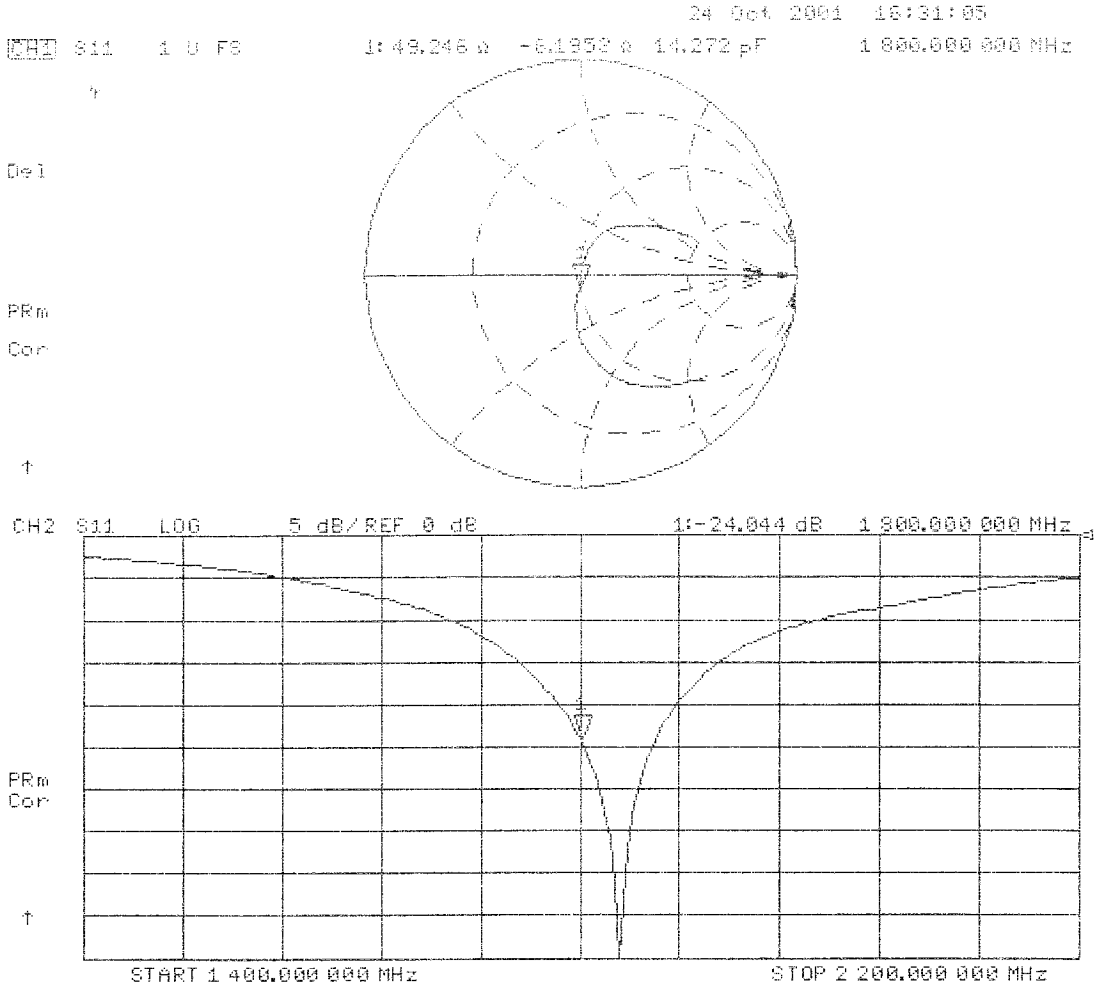
After prolonged use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

Validation Dipole D1800V2 SN:230, d = 10 mm

Frequency: 1800 MHz; Antenna Input Power: 250 [mW]
SAM Phantom; Flat Section; Grid Spacing: Dx = 20.0, Dy = 20.0, Dz = 10.0
Probe: ET3DV6 - SN1507; ConvF(5.57,5.57,5.57) at 1800 MHz; IEEE1528 1800 MHz ; σ = 1.35 mho/m ε_r = 40.7 ρ = 1.00 g/cm^3
Cubes (2): Peak: 17.5 mW/g ± 0.02 dB, SAR (1g): 9.36 mW/g ± 0.01 dB, SAR (10g): 4.92 mW/g ± 0.02 dB, (Worst-case extrapolation)
Penetration depth: 8.5 (7.9, 9.6) [mm]
Powerdrift: -0.03 dB

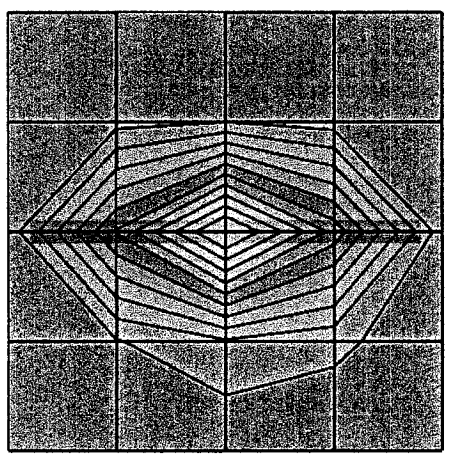


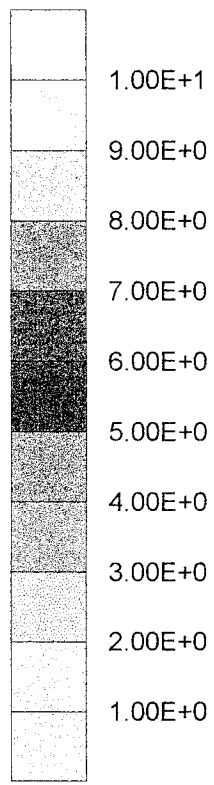


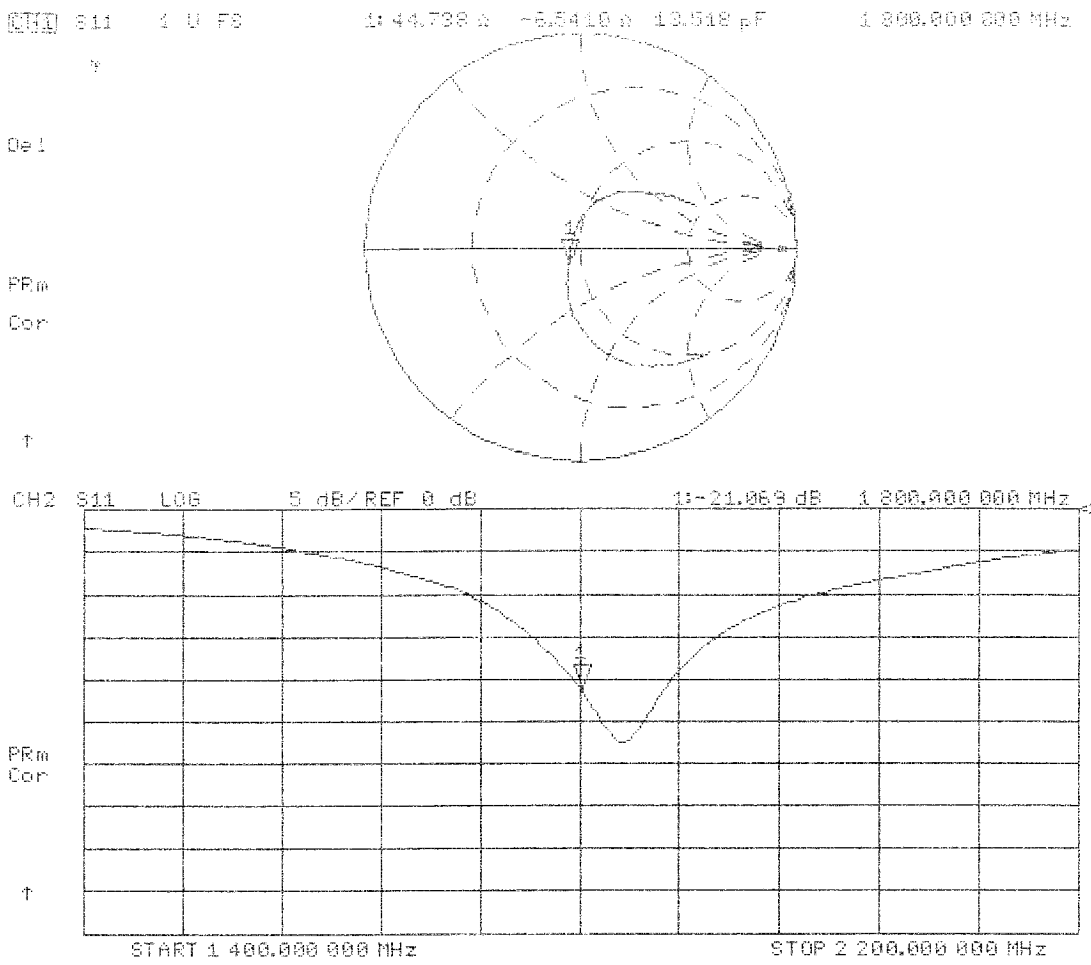

24 Oct 2001 10:31:05
CH1 S11 1 U FS 1: 49.246 Ω -6.1852 Ω 14.272 pF 1 800.000 000 MHz
Del
PRm
Cor
CH2 S11 LOG 5 dB/ REF 0 dB 1:-24.044 dB 1 800.000 000 MHz
PRm
Cor
START 1 400.000 000 MHz
STOP 2 200.000 000 MHz

Validation Dipole D1800V2 SN:230, d = 10 mm

Frequency: 1800 MHz; Antenna Input Power: 250 [mW]
SAM Phantom; Flat Section; Grid Spacing: Dx = 20.0, Dy = 20.0, Dz = 10.0
Probe: ET3DV6 - SN1507; ConvF(4.85,4.85,4.85) at 1800 MHz; Muscle 1800 MHz; σ = 1.45 mho/m ε_r = 53.5 ρ = 1.00 g/cm^3
Cubes (2): Peak: 19.2 mW/g ± 0.01 dB, SAR (1g): 10.2 mW/g ± 0.02 dB, SAR (10g): 5.34 mW/g ± 0.02 dB, (Worst-case extrapolation)
Penetration depth: 8.8 (7.9, 10.3) [mm]
Powerdrift: -0.03 dB

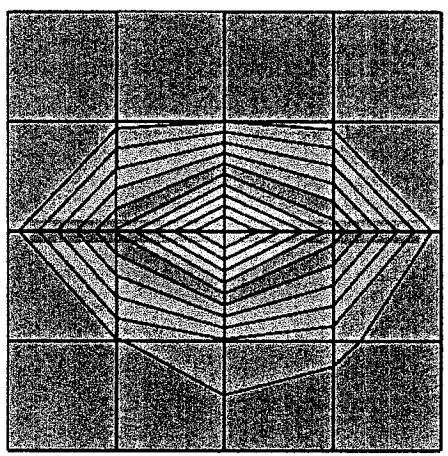


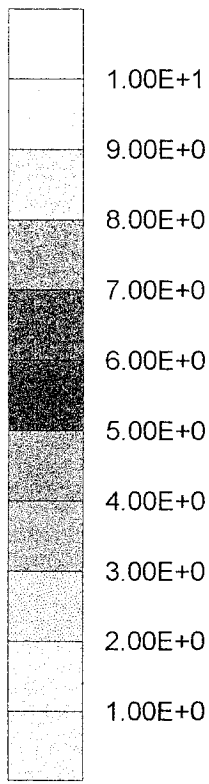


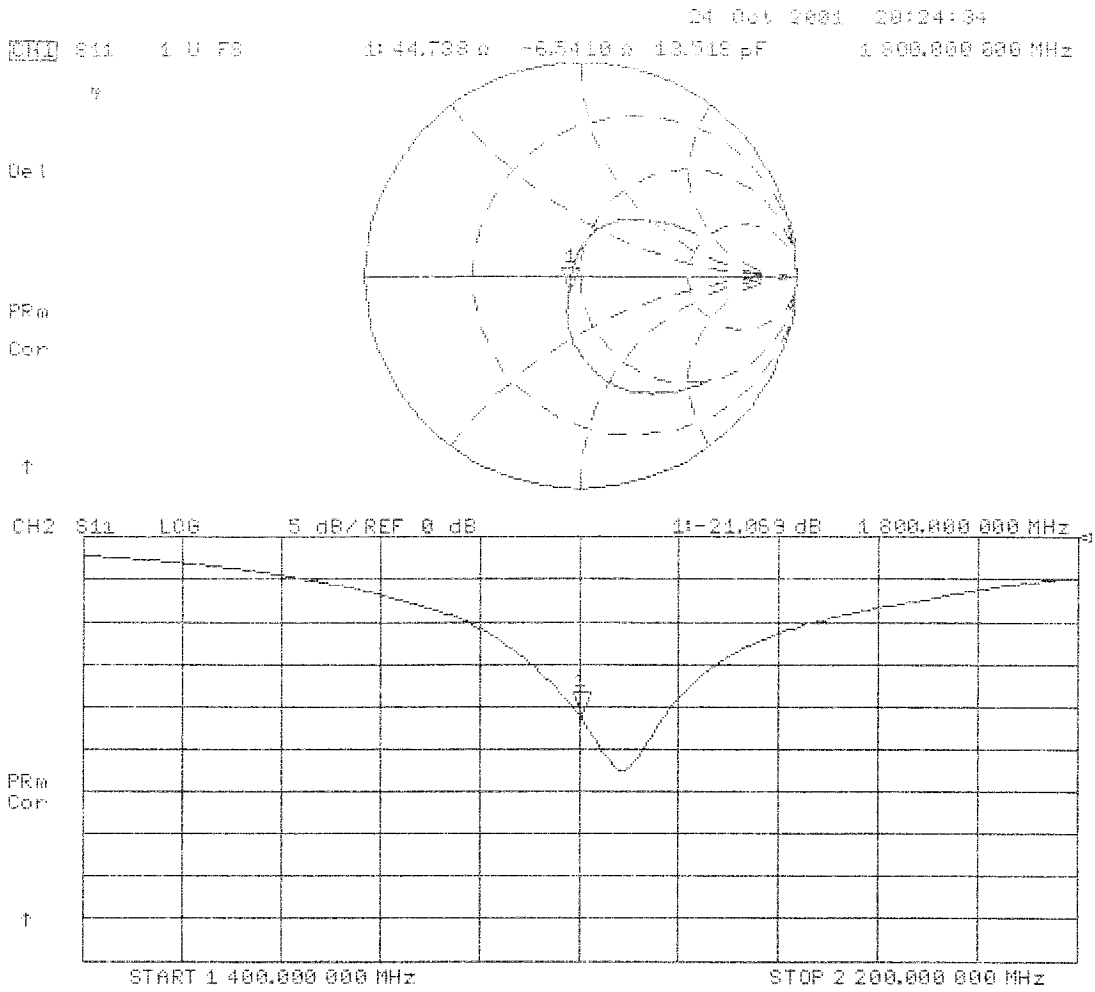

24 Oct 2001 20:24:3
CH1 S11 1 U FS 1: 44.739 Ω -6.5410 Ω 13.518 pF 1 800.000 000 MHz
Del
PRm
Cor
CH2 S11 LOG 5 dB/ REF 0 dB 1:-21.069 dB 1 800.000 000 MHz
PRm
Cor
START 1 400.000 000 MHz
STOP 2 200.000 000 MHz

Validation Dipole D1800V2 SN:230, d = 10 mm

Frequency: 1800 MHz; Antenna Input Power: 250 [mW]
SAM Phantom; Flat Section; Grid Spacing: Dx = 20.0, Dy = 20.0, Dz = 10.0
Probe: ET3DV6 - SN1507; ConvF(4.85,4.85,4.85) at 1800 MHz; Muscle 1800 MHz; σ = 1.45 mho/m ε_r = 53.5 ρ = 1.00 g/cm^3
Cubes (2): Peak: 19.2 mW/g ± 0.01 dB, SAR (1g): 10.2 mW/g ± 0.02 dB, SAR (10g): 5.34 mW/g ± 0.02 dB, (Worst-case extrapolation)
Penetration depth: 8.8 (7.9, 10.3) [mm]
Powerdrift: -0.03 dB






24 Oct 2001 20:24:34
CH1 S11 1 U FS 1: 44.738 Ω -6.5410 Ω 13.918 pF 1 900.000 000 MHz
Uel
PRm
Cor
CH2 S11 LOG 5 dB/ REF 0 dB 1: -21.069 dB 1 800.000 000 MHz
PRm
Cor
START 1 400.000 000 MHz
STOP 2 200.000 000 MHz

Schmid & Partner
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Calibration Certificate

900 MHz System Validation Dipole

Type:	**D900V2**
Serial Number:	**033**
Place of Calibration:	**Zurich**
Date of Calibration:	**October 23, 2001**
Calibration Interval:	**24 months**

Schmid & Partner Engineering AG hereby certifies, that this device has been calibrated on the date indicated above. The calibration was performed in accordance with specifications and procedures of Schmid & Partner Engineering AG.

Wherever applicable, the standards used in the calibration process are traceable to international standards. In all other cases the standards of the Laboratory for EMF and Microwave Electronics at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland have been applied.

Calibrated by:	
Approved by:	

Schmid & Partner
Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

DASY

Dipole Validation Kit

Type: D900V2

Serial: 033

Manufactured: July 9, 1998
Calibrated: October 23, 2001

1. Measurement Conditions

The measurements were performed in the flat section of the new generic twin phantom filled with head simulating solution of the following electrical parameters at 900 MHz:

Relative Dielectricity	**41.5**	± 5%
Conductivity	**0.97 mho/m**	± 5%

The DASY3 System (Software version 3.1c) with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 6.27 at 900 MHz) was used for the measurements.

The dipole was mounted on the small tripod so that the dipole feedpoint was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 15mm from dipole center to the solution surface. The included distance holder was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 15mm was aligned with the dipole. The 5x5x7 fine cube was chosen for cube integration. Probe isotropy errors were cancelled by measuring the SAR with normal and 90° turned probe orientations and averaging.
The dipole input power (forward power) was 250mW ± 3 %. The results are normalized to 1W input power.

2. SAR Measurement

Standard SAR-measurements were performed with the phantom according to the measurement conditions described in section 1. The results have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values are:

averaged over 1 cm^3 (1 g) of tissue:	**11.44 mW/g**
averaged over 10 cm^3 (10 g) of tissue:	**7.24 mW/g**

Note: If the liquid parameters for validation are slightly different from the ones used for initial calibration, the SAR-values will be different as well.

3. Dipole Impedance and Return Loss

The impedance was measured at the SMA-connector with a network analyzer and numerically transformed to the dipole feedpoint. The transformation parameters from the SMA-connector to the dipole feedpoint are:

Electrical delay:	**1.417 ns**	(one direction)
Transmission factor:	**0.993**	(voltage transmission, one direction)

The dipole was positioned at the flat phantom sections according to section 1 and the distance holder was in place during impedance measurements.

Feedpoint impedance at 900 MHz:	Re{Z} = **50.5 Ω**
	Im {Z} = **-1.8 Ω**
Return Loss at 900 MHz	**-34.7 dB**

4. Measurement Conditions

The measurements were performed in the flat section of the new generic twin phantom filled with muscle simulating solution of the following electrical parameters at 900 MHz:

Relative Dielectricity	**55.4**	± 5%
Conductivity	**1.04 mho/m**	± 5%

The DASY3 System (Software version 3.1c) with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 6.02 at 900 MHz) was used for the measurements.

The dipole was mounted on the small tripod so that the dipole feedpoint was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 15mm from dipole center to the solution surface. The included distance holder was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 15mm was aligned with the dipole. The 5x5x7 fine cube was chosen for cube integration. Probe isotropy errors were cancelled by measuring the SAR with normal and 90° turned probe orientations and averaging.
The dipole input power (forward power) was 250mW ± 3 %. The results are normalized to 1W input power.

5. SAR Measurement

Standard SAR-measurements were performed with the phantom according to the measurement conditions described in section 4. The results have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values are:

averaged over 1 cm^3 (1 g) of tissue:	**11.84 mW/g**
averaged over 10 cm^3 (10 g) of tissue:	**7.52 mW/g**

Note: If the liquid parameters for validation are slightly different from the ones used for initial calibration, the SAR-values will be different as well.

6. Dipole Impedance and Return Loss

The dipole was positioned at the flat phantom sections according to section 4 and the distance holder was in place during impedance measurements.

Feedpoint impedance at 900 MHz:	Re{Z} = **47.1 Ω**
	Im {Z} = **-3.7 Ω**
Return Loss at 900 MHz	**-25.8 dB**

7. Handling

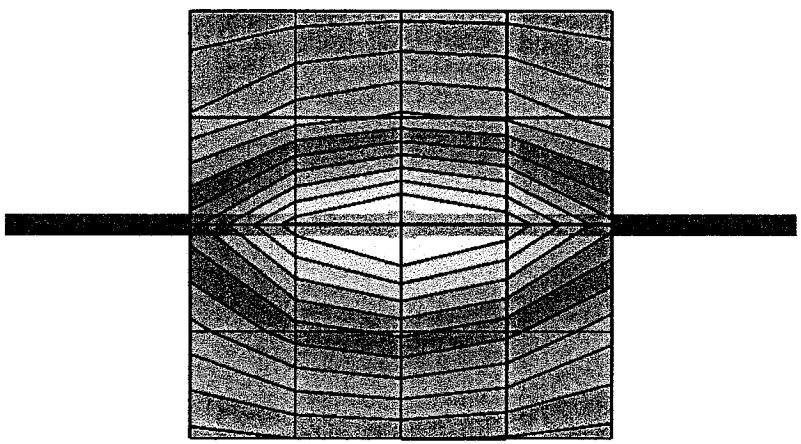
The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

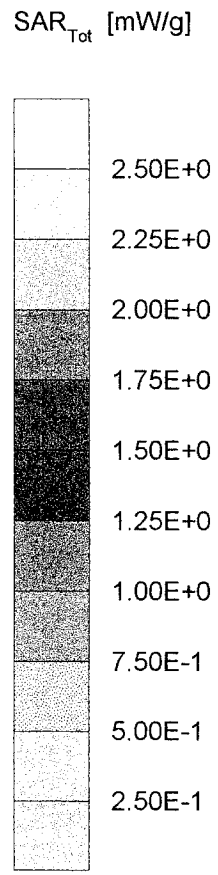
Do not apply excessive force to the dipole arms, because they might bend. If the dipole arms have to be bent back, take care to release stress to the soldered connections near the feedpoint; they might come off.

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

Validation Dipole D900V2 SN:033, d = 15 mm

Frequency: 900 MHz; Antenna Input Power: 250 [mW]
SAM Phantom; Flat Section; Grid Spacing: Dx = 20.0, Dy = 20.0, Dz = 10.0
Probe: ET3DV6 - SN1507; ConvF(6.27,6.27,6.27) at 900 MHz; IEEE1528 900 MHz; σ = 0.97 mho/m ε_r = 41.5 ρ = 1.00 g/cm^3
Cubes (2): Peak: 4.62 mW/g ± 0.04 dB, SAR (1g): 2.86 mW/g ± 0.02 dB, SAR (10g): 1.81 mW/g ± 0.01 dB, (Worst-case extrapolation)
Penetration depth: 11.5 (10.2, 13.2) [mm]
Powerdrift: 0.00 dB





23 Oct 2001 11:28:08

CH1 S11 1 U FS 1: 50.498 Ω -1.7754 Ω 99.606 pF 900.000 000 MHz

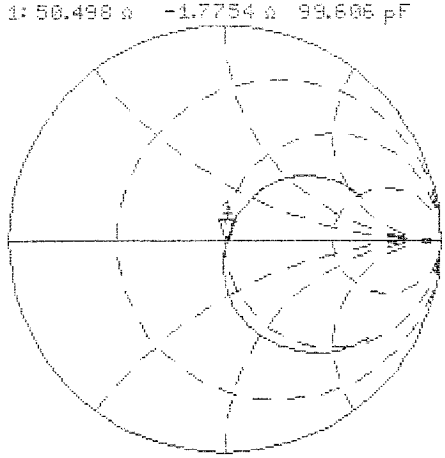
Del

PRm

Cor

Avg

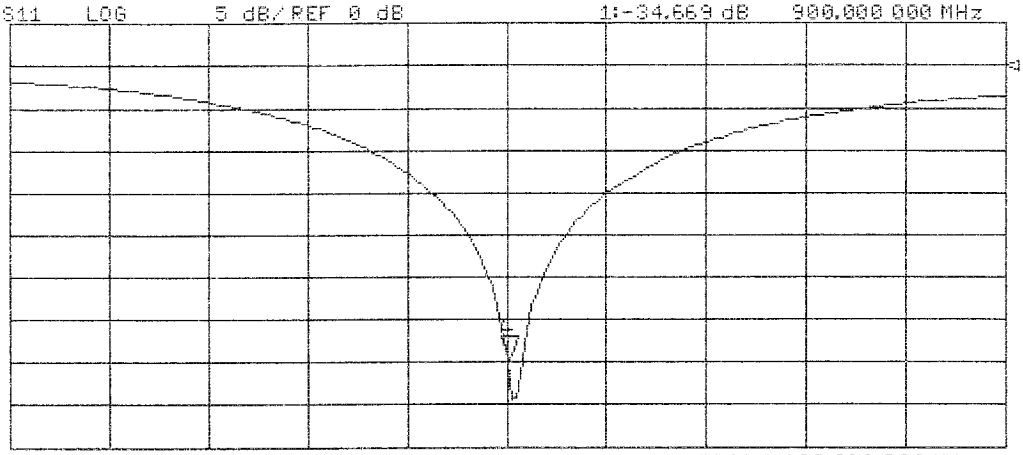
16



CH2 S11 LOG 5 dB/ REF 0 dB 1:-34.669 dB 900.000 000 MHz

PRm

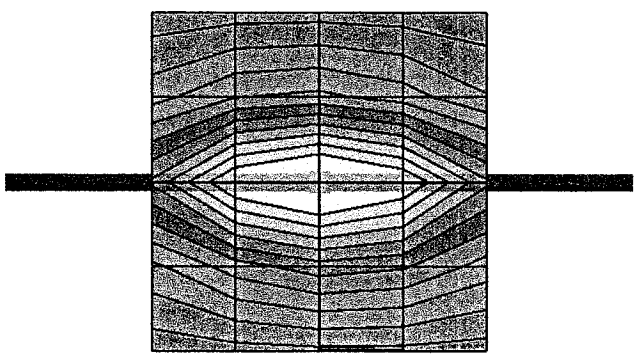
Cor

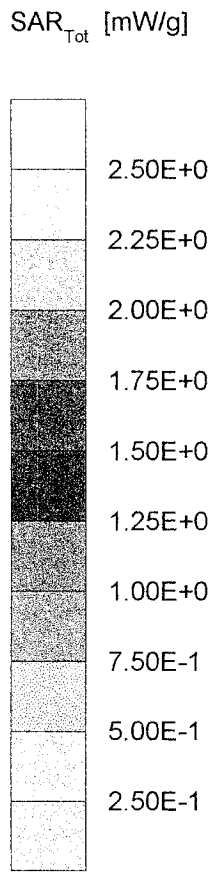


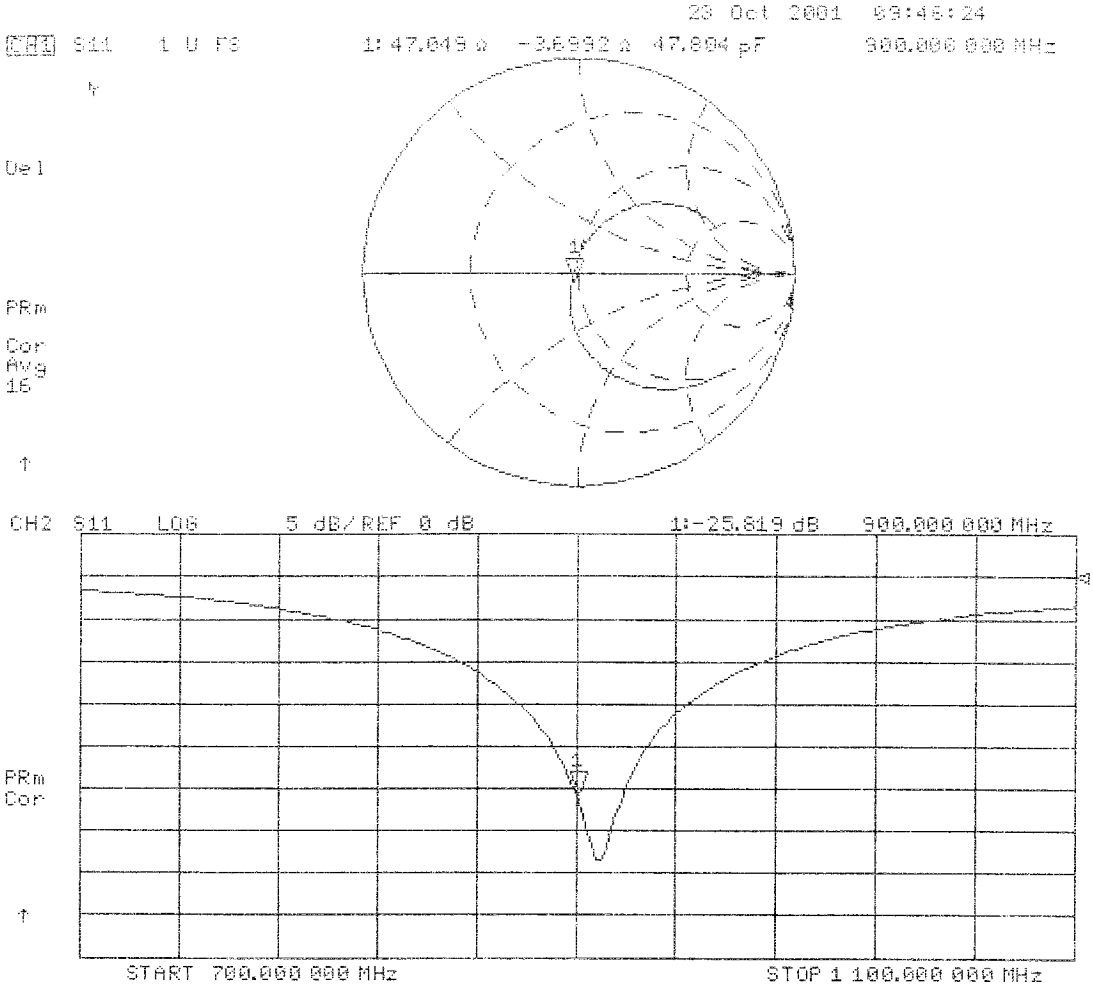
START 700.000 000 MHz STOP 1 100.000 000 MHz

Validation Dipole D900V2 SN:033, d = 15 mm

Frequency: 900 MHz; Antenna Input Power: 250 [mW]
SAM Phantom; Flat Section; Grid Spacing: Dx = 20.0, Dy = 20.0, Dz = 10.0
Probe: ET3DV6 - SN1507; ConvF(6.02,6.02,6.02) at 900 MHz; Muscle 900 MHz; σ = 1.04 mho/m ε_r = 55.4 ρ = 1.00 g/cm^3
Cubes (2): Peak: 4.76 mW/g ± 0.02 dB, SAR (1g): 2.96 mW/g ± 0.02 dB, SAR (10g): 1.88 mW/g ± 0.01 dB, (Worst-case extrapolation)
Penetration depth: 11.9 (10.5, 13.7) [mm]
Powerdrift: -0.01 dB






28 Oct 2001 09:46:24
CH1 S11 1 U FS 1: 47.049 Ω -3.6992 Δ 47.804 pF 900.000 000 MHz
Del
PRm
Cor
Avg
16
CH2 S11 LOG 5 dB/ REF 0 dB 1:-25.819 dB 900.000 000 MHz
PRm
Cor
START 700.000 000 MHz
STOP 1 100.000 000 MHz