APPENDIX 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:	ET3DV6
Serial Number:	1395
Place of Calibration:	Zurich
Date of Calibration:	August 27, 2002
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:	N.Vetter
Approved by:	[signature]

Schmid & Partner
Engineering AG

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

Probe ET3DV6

SN:1395

Manufactured: October 1, 1999
Last calibration: July 25, 2001
Recalibrated: August 27, 2002

Calibrated for System DASY3

DASY3 - Parameters of Probe: ET3DV6 SN:1395

Sensitivity in Free Space

NormX	1.69	$\mu V/(V/m)^2$
NormY	1.73	$\mu V/(V/m)^2$
NormZ	1.67	$\mu V/(V/m)^2$

Diode Compression

DCP X	94	mV
DCP Y	94	mV
DCP Z	94	mV

Sensitivity in Tissue Simulating Liquid

Head 900 MHz $\varepsilon_r = 41.5 \pm 5\%$ $\sigma = 0.97 \pm 5\%$ mho/m
Head 835 MHz $\varepsilon_r = 41.5 \pm 5\%$ $\sigma = 0.90 \pm 5\%$ mho/m

ConvF X	6.3	± 9.5% (k=2)	Boundary effect:	
ConvF Y	6.3	± 9.5% (k=2)	Alpha	0.42
ConvF Z	6.3	± 9.5% (k=2)	Depth	2.57

Head 1800 MHz $\varepsilon_r = 40.0 \pm 5\%$ $\sigma = 1.40 \pm 5\%$ mho/m
Head 1900 MHz $\varepsilon_r = 40.0 \pm 5\%$ $\sigma = 1.40 \pm 5\%$ mho/m

ConvF X	5.4	± 9.5% (k=2)	Boundary effect:	
ConvF Y	5.4	± 9.5% (k=2)	Alpha	0.61
ConvF Z	5.4	± 9.5% (k=2)	Depth	2.26

Boundary Effect

Head 900 MHz Typical SAR gradient: 5 % per mm

Probe Tip to Boundary		1 mm	2 mm
SAR_{be} [%]	Without Correction Algorithm	11.5	6.7
SAR_{be} [%]	With Correction Algorithm	0.3	0.6

Head 1800 MHz Typical SAR gradient: 10 % per mm

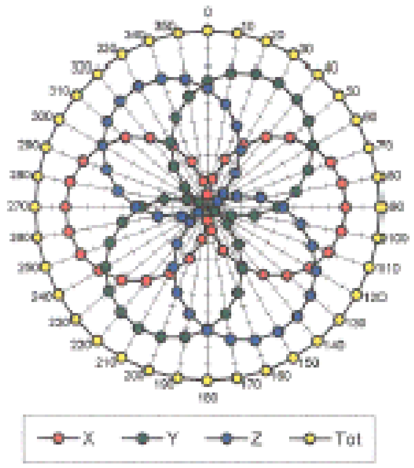
Probe Tip to Boundary		1 mm	2 mm
SAR_{be} [%]	Without Correction Algorithm	13.2	8.4
SAR_{be} [%]	With Correction Algorithm	0.1	0.2

Sensor Offset

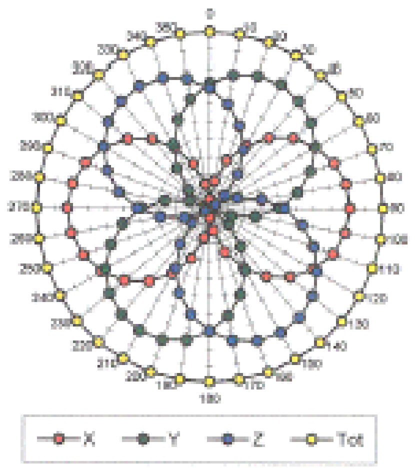
Probe Tip to Sensor Center	2.7	mm
Optical Surface Detection	1.4 ± 0.2	mm

Receiving Pattern (ϕ), θ = 0°

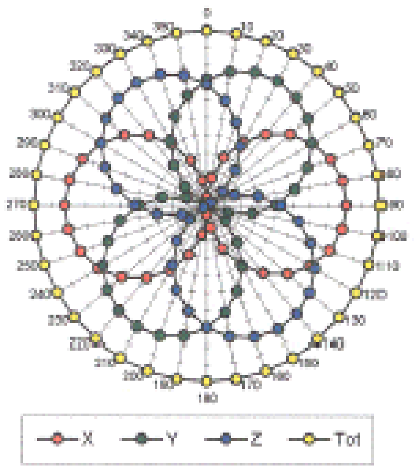
f = 30 MHz, TEM cell ifi110



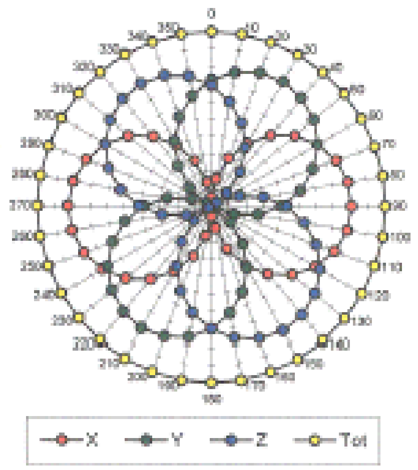
f = 100 MHz, TEM cell ifi110

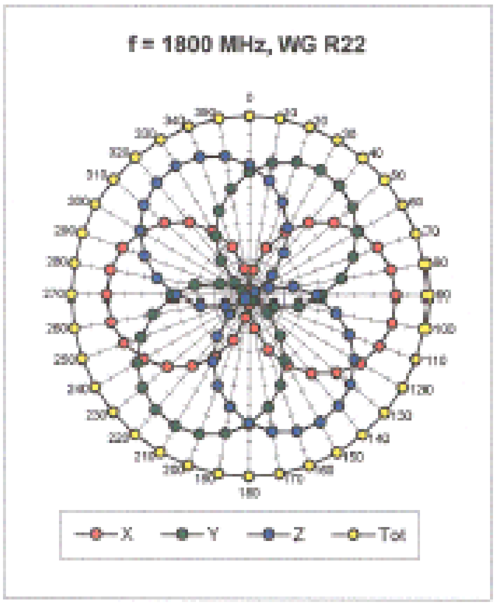


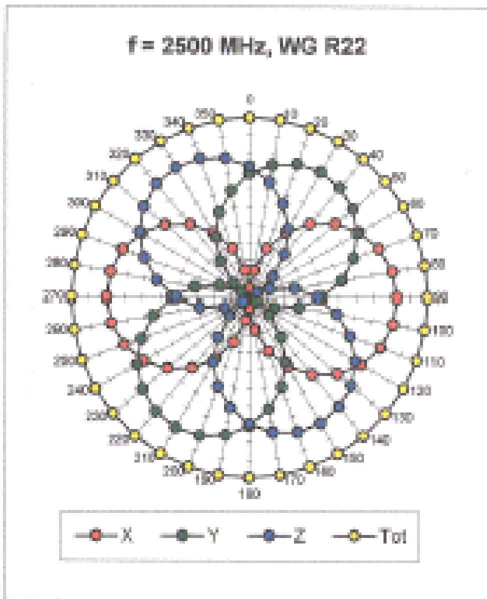
f = 300 MHz, TEM cell ifi110



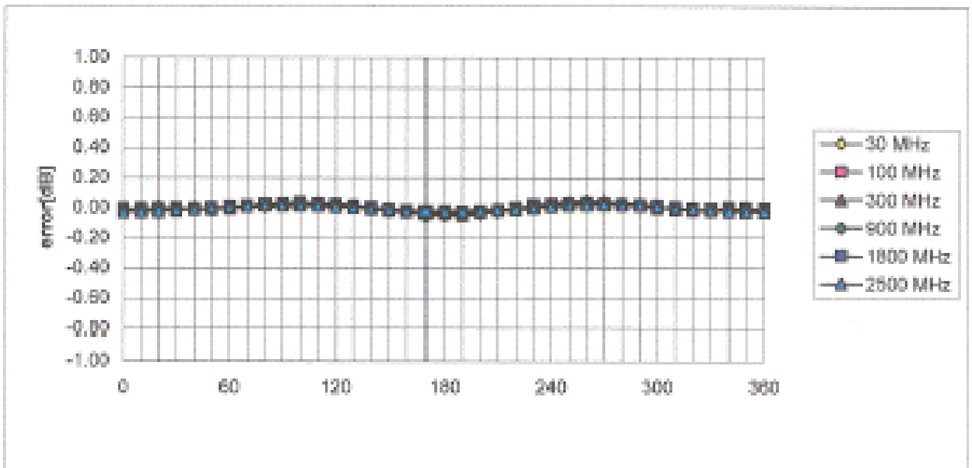
f = 900 MHz, TEM cell ifi110





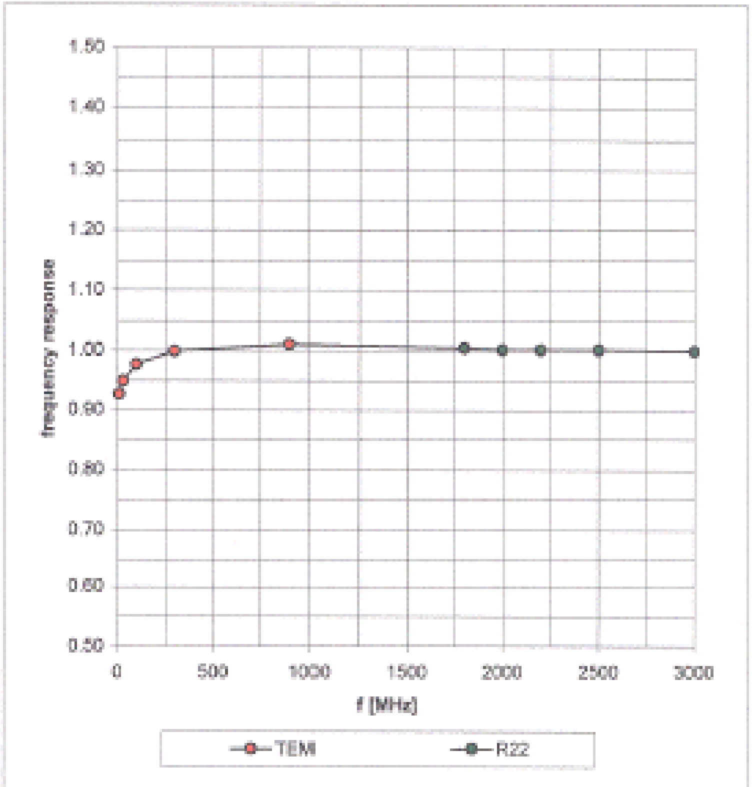


Isotropy Error (ϕ), θ = 0°



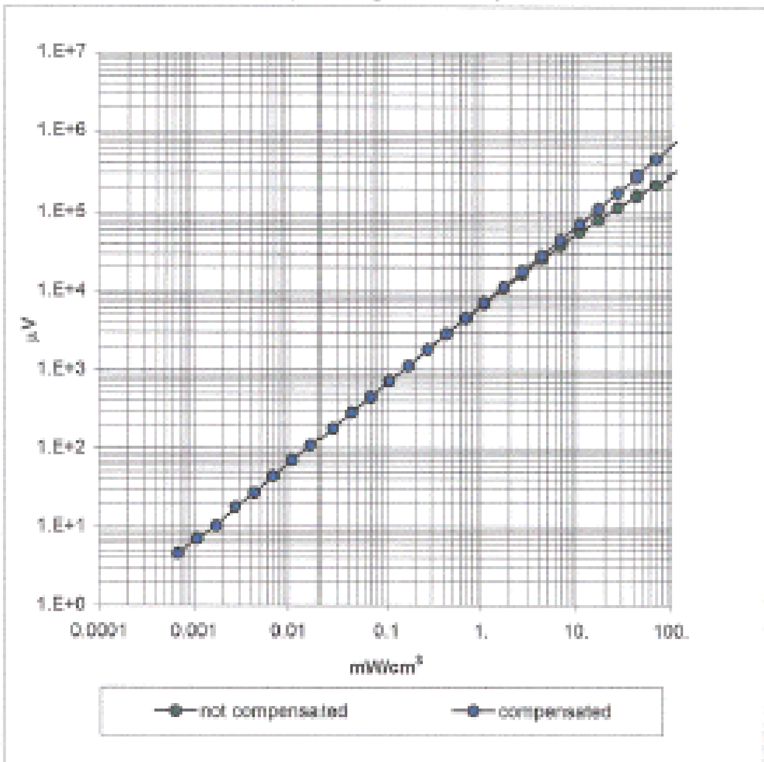
Frequency Response of E-Field

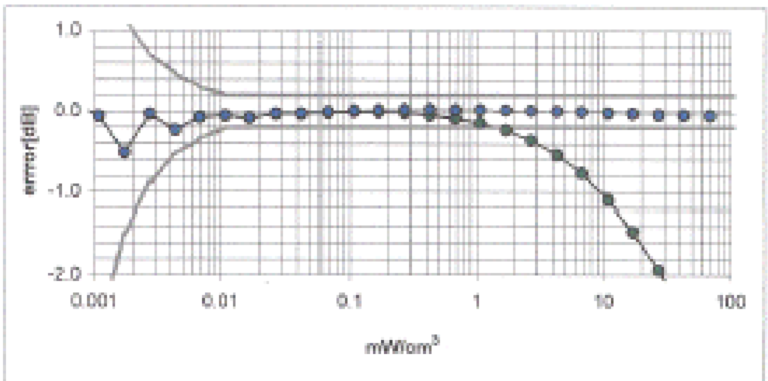
(TEM-Cell:ifi110, Waveguide R22)



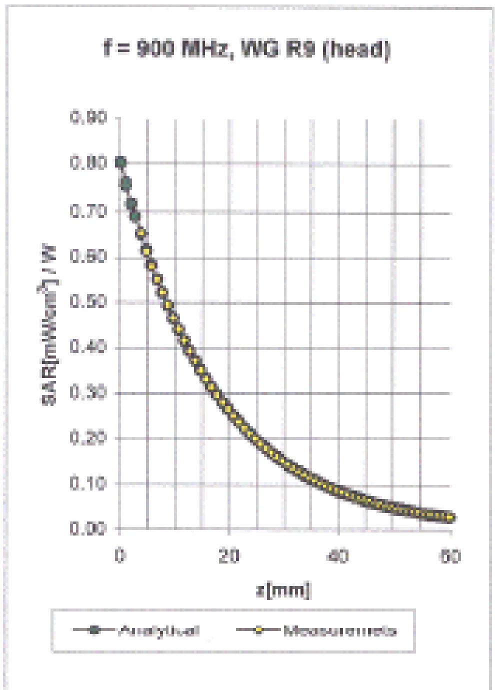
Dynamic Range f(SAR_{brain})

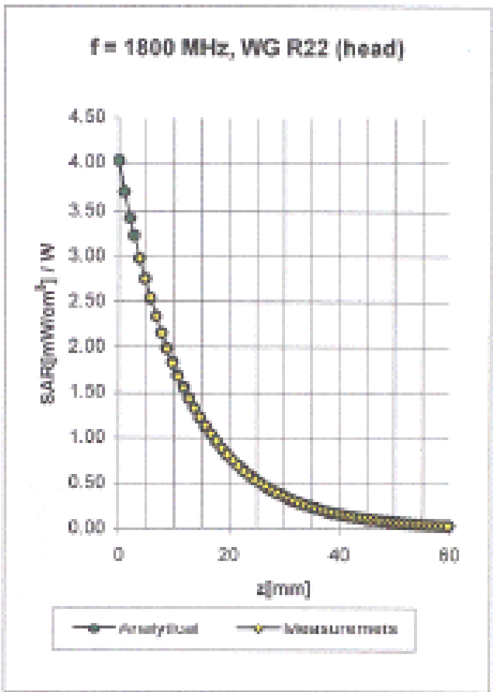
(Waveguide R22)





Conversion Factor Assessment

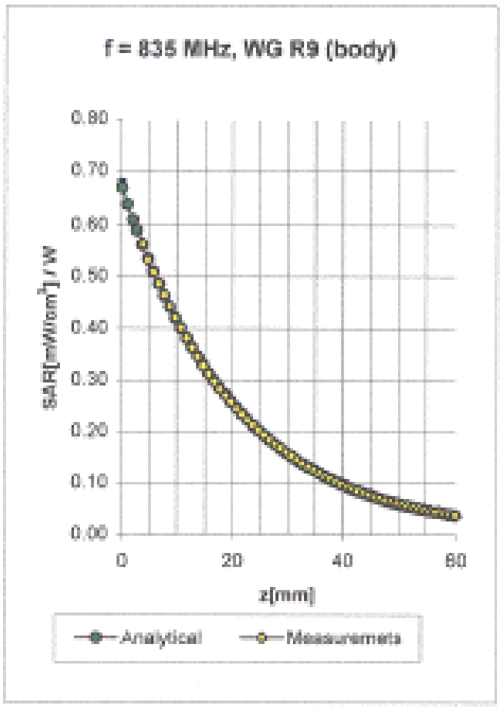


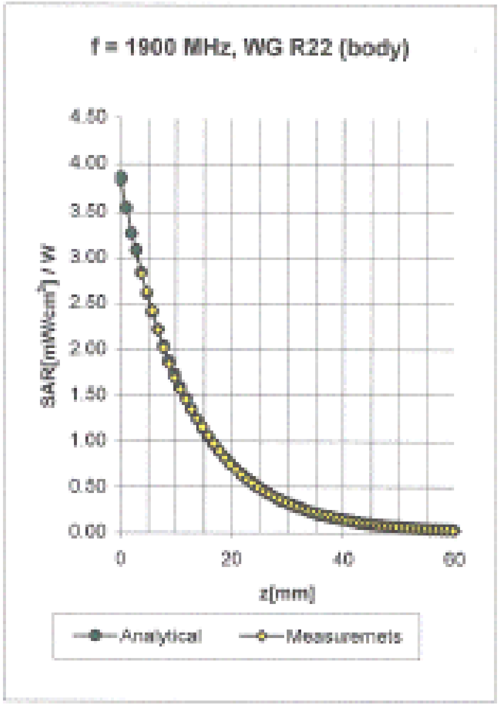


Head	**900 MHz**		ε_r = **41.5 ± 5%**	σ = **0.97 ± 5% mho/m**	
Head	**835 MHz**		ε_r = **41.5 ± 5%**	σ = **0.90 ± 5% mho/m**	
	ConvF X	**6.3** ± 9.5% (k=2)		Boundary effect:	
	ConvF Y	**6.3** ± 9.5% (k=2)		Alpha	**0.42**
	ConvF Z	**6.3** ± 9.5% (k=2)		Depth	**2.57**

Head	**1800 MHz**		ε_r = **40.0 ± 5%**	σ = **1.40 ± 5% mho/m**	
Head	**1900 MHz**		ε_r = **40.0 ± 5%**	σ = **1.40 ± 5% mho/m**	
	ConvF X	**5.4** ± 9.5% (k=2)		Boundary effect:	
	ConvF Y	**5.4** ± 9.5% (k=2)		Alpha	**0.61**
	ConvF Z	**5.4** ± 9.5% (k=2)		Depth	**2.26**

Conversion Factor Assessment



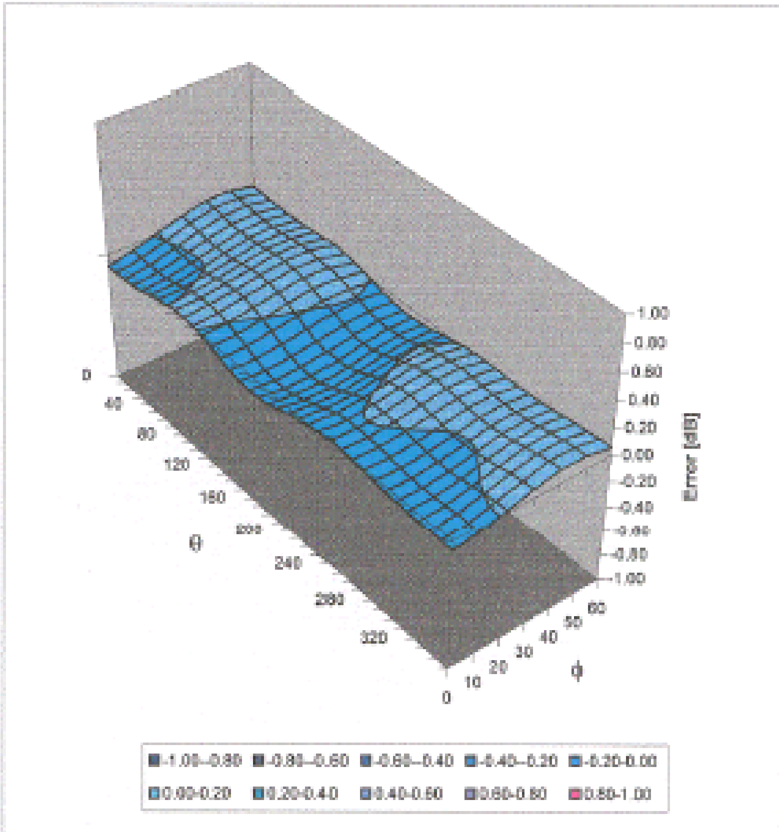


Body	835 MHz		ε_r = 55.2 ± 5%	σ = 0.97 ± 5% mho/m	
Body	900 MHz		ε_r = 55.0 ± 5%	σ = 1.05 ± 5% mho/m	
	ConvF X	6.2	± 9.5% (k=2)	Boundary effect:	
	ConvF Y	6.2	± 9.5% (k=2)	Alpha	0.50
	ConvF Z	6.2	± 9.5% (k=2)	Depth	2.28

Body	1900 MHz		ε_r = 53.3 ± 5%	σ = 1.52 ± 5% mho/m	
Body	1800 MHz		ε_r = 53.3 ± 5%	σ = 1.52 ± 5% mho/m	
	ConvF X	4.9	± 9.5% (k=2)	Boundary effect:	
	ConvF Y	4.9	± 9.5% (k=2)	Alpha	0.84
	ConvF Z	4.9	± 9.5% (k=2)	Depth	2.01

Deviation from Isotropy in HSL

Error (θ,ϕ), f = 900 MHz



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

Client Nokia Salo (TTC)

CALIBRATION CERTIFICATE

Object(s)	ET3DV6 - SN 1396
Calibration procedure(s)	QA CAL-01.v2 Calibration procedure for dosimetric E-field probes
Calibration date:	January 15, 2003
Condition of the calibrated item	In Tolerance (according to the specific calibration document)

This calibration statement documents traceability of M&TE used in the calibration procedures and conformity of the procedures with the ISO/IEC 17025 international standard.

All calibrations have been conducted in the closed laboratory facility: environment temperature 22 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date	Scheduled Calibration
RF generator HP 8684C	US3642U01700	4-Aug-99 (in house check Aug-02)	In house check: Aug-05
Power sensor E4412A	MY41495277	8-Mar-02	Mar-03
Power sensor HP 8481A	MY41092180	18-Sep-02	Sep-03
Power meter EPM E4419B	GB41293874	13-Sep-02	Sep-03
Network Analyzer HP 8753E	US38432426	3-May-00	In house check: May 03
Fluke Process Calibrator Type 702	SN: 6295803	3-Sep-01	Sep-03

	Name	Function	Signature
Calibrated by:	Nico Vetterli	Technician	O. Vetterli
Approved by:	Katja Pokovic	Laboratory Director	Pokovic Katja

Date issued: January 16, 2003

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.

Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland, Telephone +41 1 245 97 00, Fax +41 1 245 97 79

Probe ET3DV6

SN:1396

Manufactured:	October 1, 1999
Last calibration:	January 29, 2002
Recalibrated:	January 15, 2003

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

DASY - Parameters of Probe: ET3DV6 SN:1396

Sensitivity in Free Space

NormX	1.72	$\mu V/(V/m)^2$
NormY	1.73	$\mu V/(V/m)^2$
NormZ	1.84	$\mu V/(V/m)^2$

Diode Compression

DCP X	93	mV
DCP Y	93	mV
DCP Z	93	mV

Sensitivity in Tissue Simulating Liquid

Head 900 MHz ε_r = 41.5 ± 5% σ = 0.97 ± 5% mho/m
Head 835 MHz ε_r = 41.5 ± 5% σ = 0.90 ± 5% mho/m

ConvF X	6.9	± 9.5% (k=2)	Boundary effect:	
ConvF Y	6.9	± 9.5% (k=2)	Alpha	0.35
ConvF Z	6.9	± 9.5% (k=2)	Depth	2.53

Head 1800 MHz ε_r = 40.0 ± 5% σ = 1.40 ± 5% mho/m
Head 1900 MHz ε_r = 40.0 ± 5% σ = 1.40 ± 5% mho/m

ConvF X	5.6	± 9.5% (k=2)	Boundary effect:	
ConvF Y	5.6	± 9.5% (k=2)	Alpha	0.46
ConvF Z	5.6	± 9.5% (k=2)	Depth	2.71

Boundary Effect

Head 900 MHz Typical SAR gradient: 5 % per mm

Probe Tip to Boundary	1 mm	2 mm
SAR_{be} [%] Without Correction Algorithm	9.2	5.2
SAR_{be} [%] With Correction Algorithm	0.3	0.5

Head 1800 MHz Typical SAR gradient: 10 % per mm

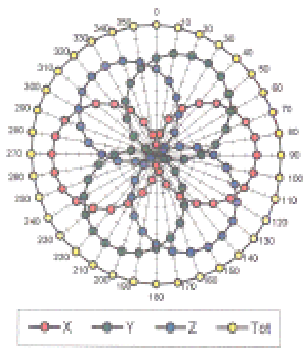
Probe Tip to Boundary	1 mm	2 mm
SAR_{be} [%] Without Correction Algorithm	13.1	8.9
SAR_{be} [%] With Correction Algorithm	0.2	0.1

Sensor Offset

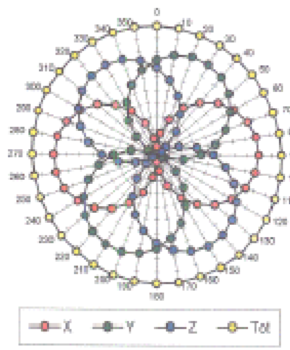
Probe Tip to Sensor Center	2.7	mm
Optical Surface Detection	1.5 ± 0.2	mm

Receiving Pattern (ϕ), $\theta = 0°$

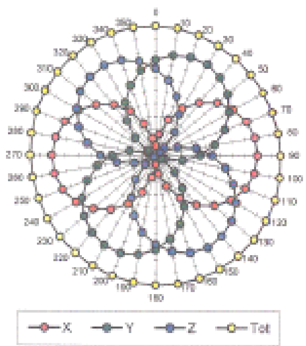
f = 30 MHz, TEM cell ifi110



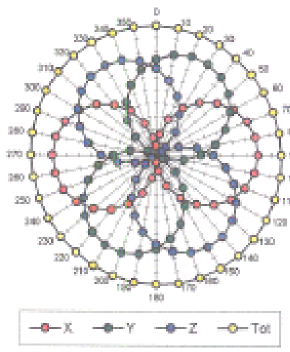
f = 100 MHz, TEM cell ifi110

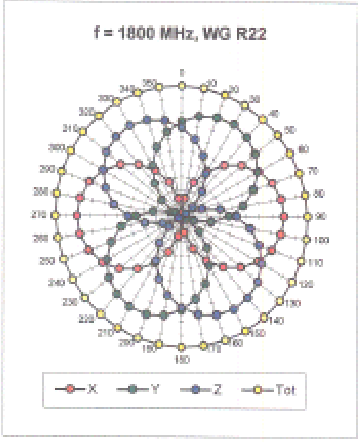


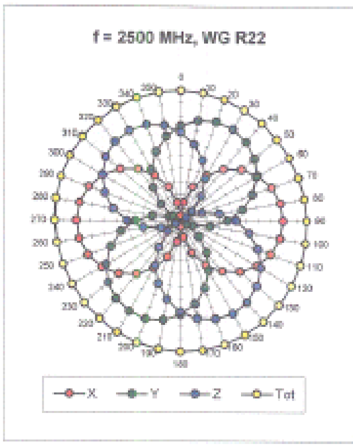
f = 300 MHz, TEM cell ifi110



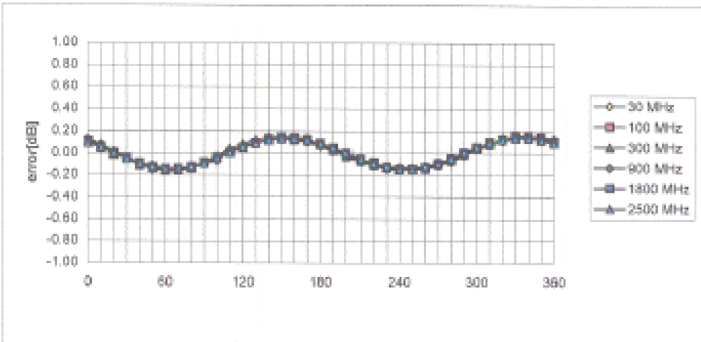
f = 900 MHz, TEM cell ifi110





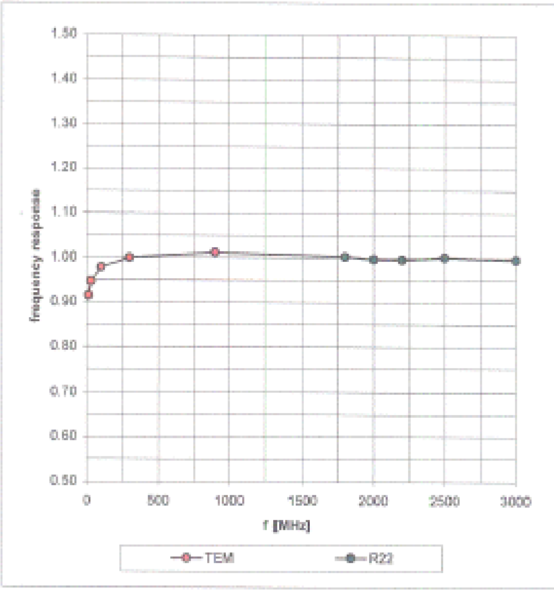


Isotropy Error (ϕ), θ = 0°



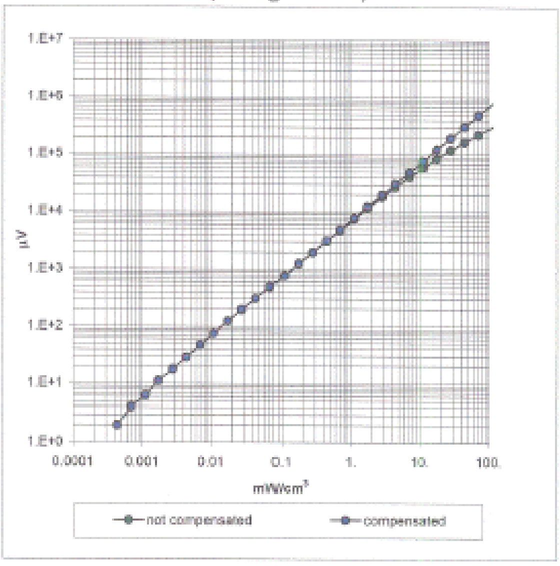
Frequency Response of E-Field

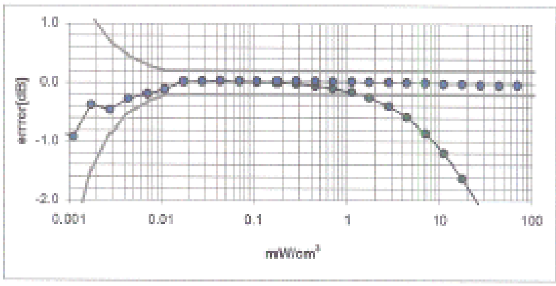
(TEM-Cell:ifi110, Waveguide R22)



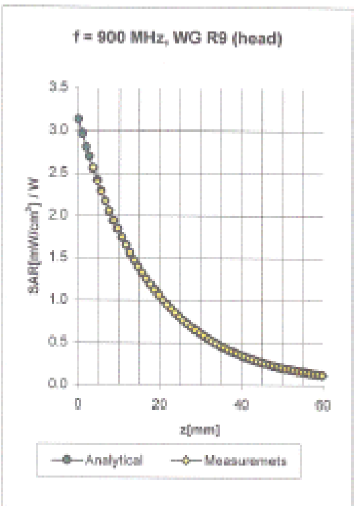
Dynamic Range f(SAR_{brain})

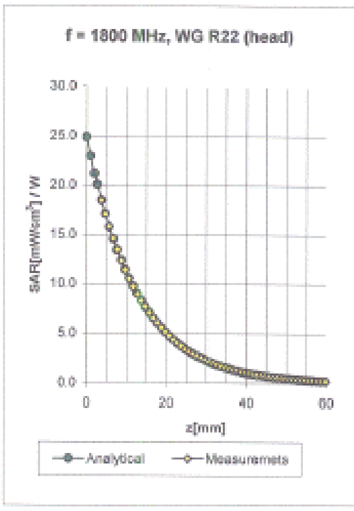
(Waveguide R22)





Conversion Factor Assessment

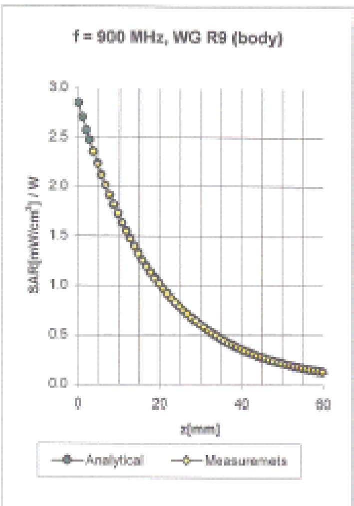


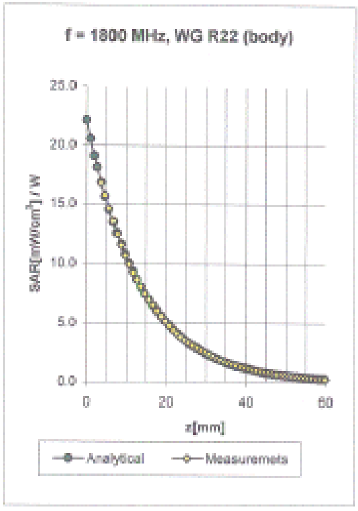


Head	900 MHz		ε_r = 41.5 ± 5%	σ = 0.97 ± 5% mho/m	
Head	835 MHz		ε_r = 41.5 ± 5%	σ = 0.90 ± 5% mho/m	
	ConvF X	6.9	± 9.5% (k=2)	Boundary effect:	
	ConvF Y	6.9	± 9.5% (k=2)	Alpha	0.35
	ConvF Z	6.9	± 9.5% (k=2)	Depth	2.53

Head	1800 MHz		ε_r = 40.0 ± 5%	σ = 1.40 ± 5% mho/m	
Head	1900 MHz		ε_r = 40.0 ± 5%	σ = 1.40 ± 5% mho/m	
	ConvF X	5.6	± 9.5% (k=2)	Boundary effect:	
	ConvF Y	5.6	± 9.5% (k=2)	Alpha	0.46
	ConvF Z	5.6	± 9.5% (k=2)	Depth	2.71

Conversion Factor Assessment



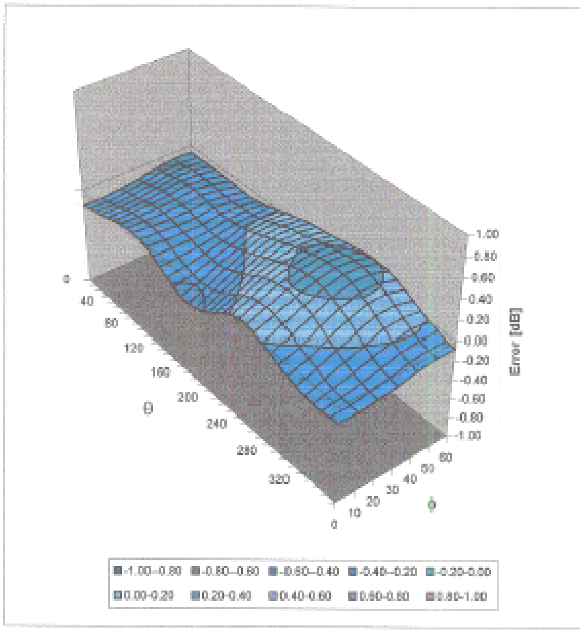


Body	900 MHz	ε_r = 55.0 ± 5%		σ = 1.05 ± 5% mho/m
Body	835 MHz	ε_r = 55.2 ± 5%		σ = 0.97 ± 5% mho/m
	ConvF X	**6.6** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**6.6** ± 9.5% (k=2)	Alpha	**0.36**
	ConvF Z	**6.6** ± 9.5% (k=2)	Depth	**2.57**

Body	1800 MHz	ε_r = 53.3 ± 5%		σ = 1.52 ± 5% mho/m
Body	1900 MHz	ε_r = 53.3 ± 5%		σ = 1.52 ± 5% mho/m
	ConvF X	**5.1** ± 9.5% (k=2)	Boundary effect:	
	ConvF Y	**5.1** ± 9.5% (k=2)	Alpha	**0.53**
	ConvF Z	**5.1** ± 9.5% (k=2)	Depth	**2.75**

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

900 MHz System Validation Dipole

Type:	**D900V2**
Serial Number:	**056**
Place of Calibration:	**Zurich**
Date of Calibration:	**January 29, 2002**
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:	N. Kolos E. Meriam
Approved by:	Alain Katja

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: 056

Manufactured: September 25, 1999
Calibrated: January 29, 2002

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	**41.1**	± 5%
Conductivity	**0.95 mho/m**	± 5%

The DASY3 System (Software version 3.1d) with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 6.48 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 20mm 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: **11.1 mW/g**

averaged over 10 cm^3 (10 g) of tissue: **7.00 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:	**1.348 ns**	(one direction)
Transmission factor:	**0.986**	(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} = **50.2 Ω**
	Im {Z} = **-0.7 Ω**
Return Loss at 900 MHz	**-42.9 dB**

4. Measurement Conditions

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

Relative Dielectricity	**54.8**	± 5%
Conductivity	**1.03 mho/m**	± 5%

The DASY3 System (Software version 3.1d) with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 6.17 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 20mm 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:	**11.7 mW/g**
averaged over 10 cm^3 (10 g) of tissue:	**7.44 mW/g**

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} = **45.7 Ω**
	Im {Z} = **-2.4 Ω**
Return Loss at 900 MHz	**-25.7 dB**

7. Handling

Do not apply excessive force to the dipole arms, because they might bend. Bending of the dipole arms stresses the soldered connections near the feedpoint leading to a damage of the dipole.

8. Design

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.

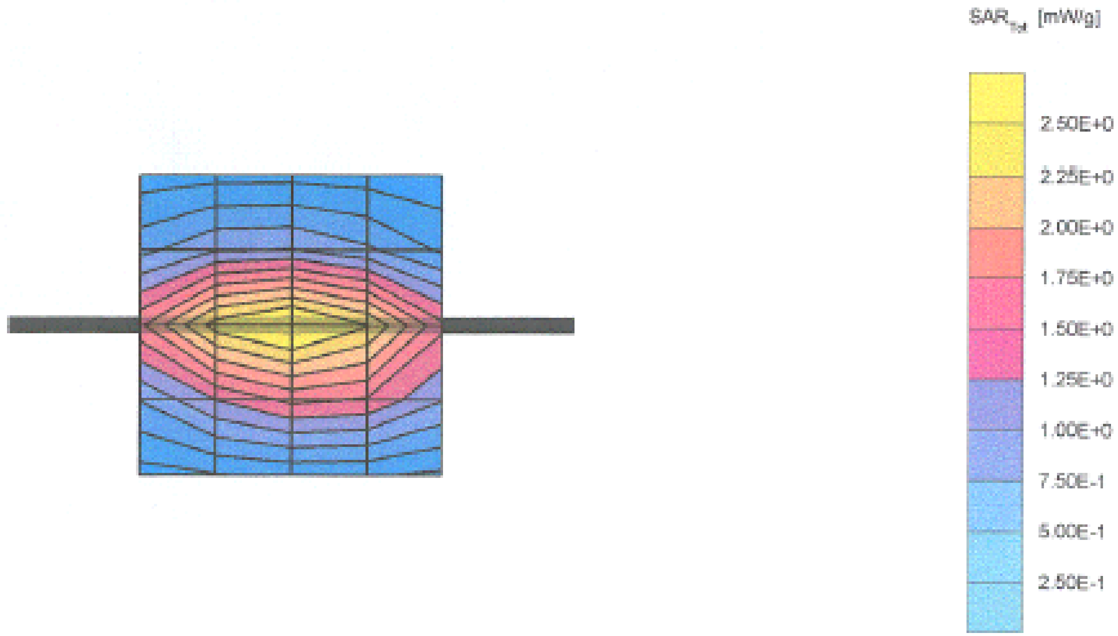
9. Power Test

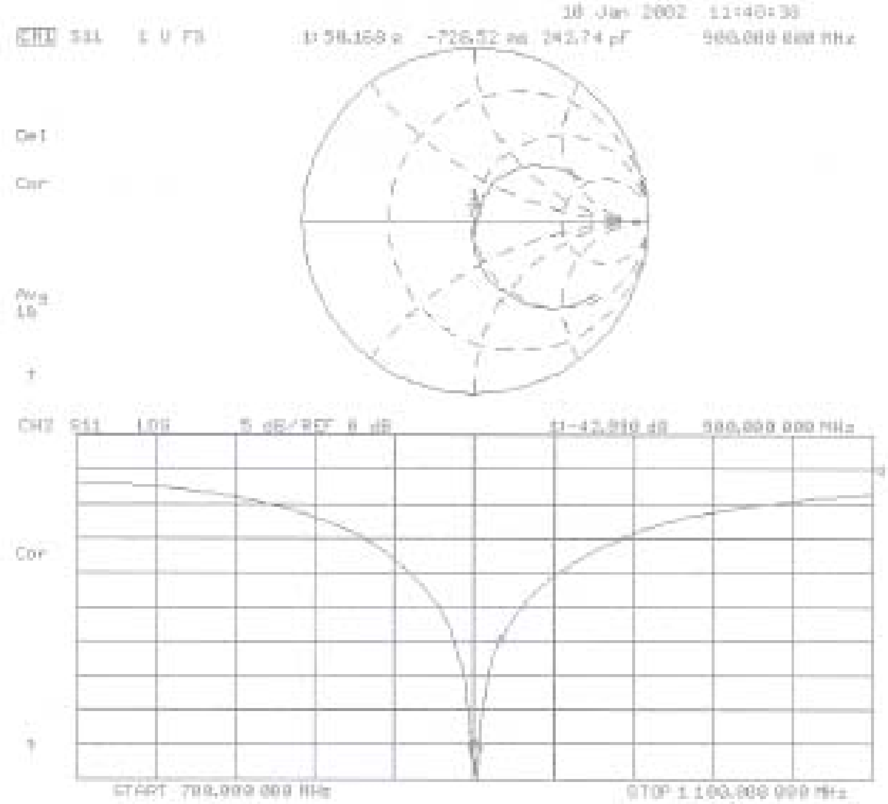
After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

01/28/02

Validation Dipole D900V2 SN:056, 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(6.48,6.48,6.48) at 900 MHz; IEEE1528 900 MHz; σ = 0.95 mho/m ϵ_r = 41.1 ρ = 1.00 g/cm³
Cubes (2): Peak: 4.48 mW/g ± 0.01 dB, SAR (1g): 2.78 mW/g ± 0.02 dB, SAR (10g): 1.75 mW/g ± 0.02 dB, (Worst-case extrapolation)
Penetration depth: 11.5 (10.3, 13.0) [mm]
Powerdrift: -0.02 dB

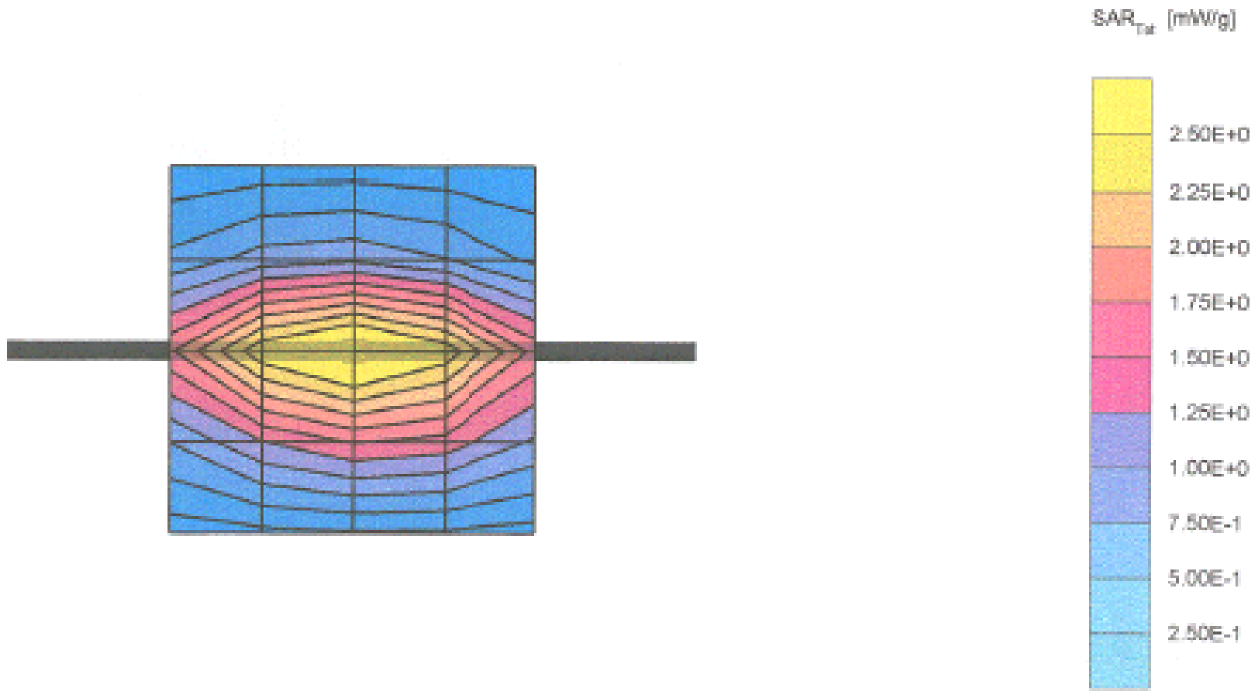


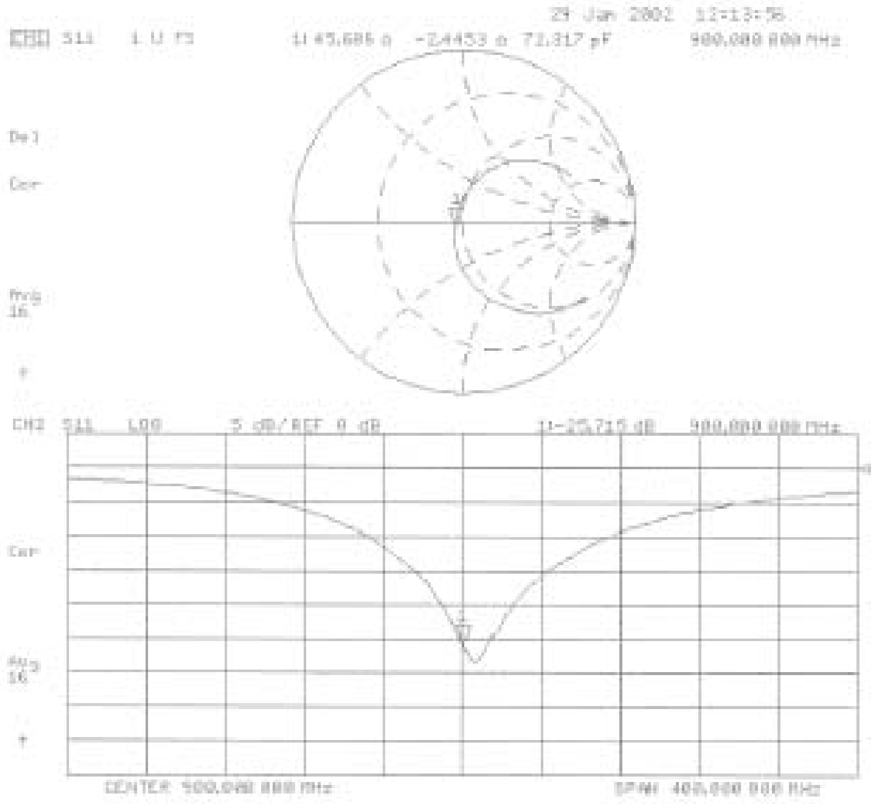

18 Jan 2002 11:40:38
CH1 S11 1 U FS
1: 50.168 Ω -726.52 mΩ 243.74 pF 900.000 000 MHz
Del
Cor
Avg
16
CH2 S11 LOG 5 dB/REF 0 dB
1:-42.010 dB 900.000 000 MHz
Cor
START 700.000 000 MHz
STOP 1 100.000 000 MHz

01/29/02

Validation Dipole D900V2 SN:056, 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(6.17,6.17,6.17) at 900 MHz; Muscle 900 MHz; σ = 1.03 mho/m ϵ_r = 54.8 ρ = 1.00 g/cm^3
Cubes (2): Peak: 4.65 mW/g ± 0.01 dB, SAR (1g): 2.92 mW/g ± 0.00 dB, SAR (10g): 1.86 mW/g ± 0.01 dB, (Worst-case extrapolation)
Penetration depth: 12.0 (10.7, 13.7) [mm]
Powerdrift: -0.02 dB




29 Jan 2002 12:13:56
CH1 S11 1 U FS
1: 45.686 Ω -2.4453 Ω 72.317 pF 900.000 000 MHz
Del
Cor
Avg
16
CH2 S11 LOG 5 dB/REF 0 dB
1:-25.715 dB 900.000 000 MHz
Cor
Avg
16
CENTER 900.000 000 MHz
SPAN 400.000 000 MHz

Schmid & Partner
Engineering AG

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

Calibration Certificate

1800 MHz System Validation Dipole

Type:	**D1800V2**
Serial Number:	**256**
Place of Calibration:	**Zurich**
Date of Calibration:	**January 29, 2002**
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: D1800V2

Serial: 256

Manufactured: December 23, 1999
Calibrated: January 29, 2002

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	**39.6**	± 5%
Conductivity	**1.37 mho/m**	± 5%

The DASY3 System (Software version 3.1d) with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 5.31 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 20mm 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:	**40.0 mW/g**
averaged over 10 cm^3 (10 g) of tissue:	**20.8 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:	**1.180 ns**	(one direction)
Transmission factor:	**0.980**	(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} = **47.3 Ω**
	Im {Z} = **-6.6 Ω**
Return Loss at 1800 MHz	**-22.7 dB**

4. Measurement Conditions

The measurements were performed in the flat section of the new generic twin phantom filled with body 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 5.0 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 20mm 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:	**39.5 mW/g**
averaged over 10 cm^3 (10 g) of tissue:	**20.4 mW/g**

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} = **43.2 Ω**
	Im {Z} = **-6.3 Ω**
Return Loss at 1800 MHz	**-20.1 dB**

7. Handling

Do not apply excessive force to the dipole arms, because they might bend. Bending of the dipole arms stresses the soldered connections near the feedpoint leading to a damage of the dipole.

8. Design

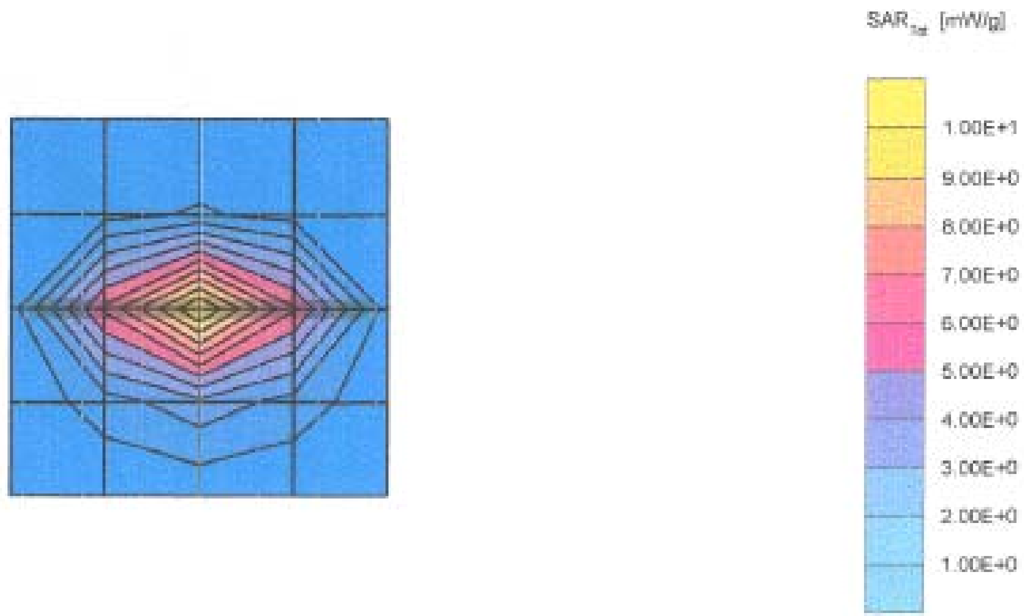
The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

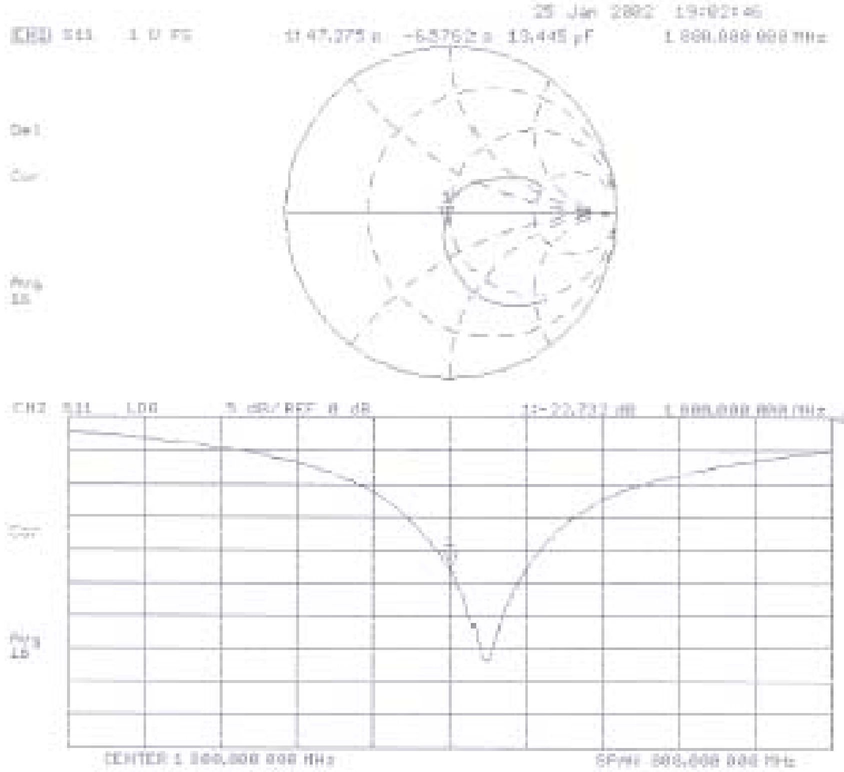
9. Power Test

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

Validation Dipole D1800V2 SN:256, 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(5.31,5.31,5.31) at 1800 MHz; IEEE1528 1800 MHz ; σ = 1.37 mho/m ϵ_r = 39.6 ρ = 1.00 g/cm³
Cubes (2): Peak: 18.9 mW/g ± 0.04 dB, SAR (1g): 9.99 mW/g ± 0.01 dB, SAR (10g): 5.19 mW/g ± 0.01 dB, (Worst-case extrapolation)
Penetration depth: 8.2 (7.7, 9.2) [mm]
Powerdrift: -0.02 dB




Del
Cor
Avg
CH2 S11 LOG
Cor
Avg

01/29/02

Validation Dipole D1800V2 SN:256, 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(5.00,5.00,5.00) at 1800 MHz; Muscle 1800 MHz; σ = 1.45 mho/m ϵ_r = 53.5 ρ = 1.00 g/cm³
Cubes (2): Peak: 18.7 mW/g ± 0.02 dB, SAR (1g): 9.87 mW/g ± 0.01 dB, SAR (10g): 5.11 mW/g ± 0.01 dB, (Worst-case extrapolation)
Penetration depth: 8.4 (7.7, 9.8) [mm]
Powerdrift: -0.01 dB