
Calibration Data for the Reports:

Dosimetric Assessment of the Sagem P52-0, Sagem P52-2, Sagem P52-6 According to the FCC Requirements

March 08, 2002

IMST GmbH

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Customer

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approval of the testing laboratory.

Schmid & Partner Engineering AG

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Calibration Certificate

Dosimetric E-Field Probe

Type:

ET3DV6

Serial Number:

1579

Place of Calibration:

Zurich

Date of Calibration:

May 11, 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:

N. Elisei Novara

Approved by:

Shari Khatja

**Schmid & Partner
Engineering AG**

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Probe ET3DV6

SN:1579

Manufactured:	May 7, 2001
Calibrated:	May 11, 2001

Calibrated for System DASY3

ET3DV6 SN:1579

DASY3 - Parameters of Probe: ET3DV6 SN:1579**Sensitivity in Free Space****Diode Compression**

NormX	1.73 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP X	99 mV
NormY	1.72 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP Y	99 mV
NormZ	1.94 $\mu\text{V}/(\text{V}/\text{m})^2$	DCP Z	99 mV

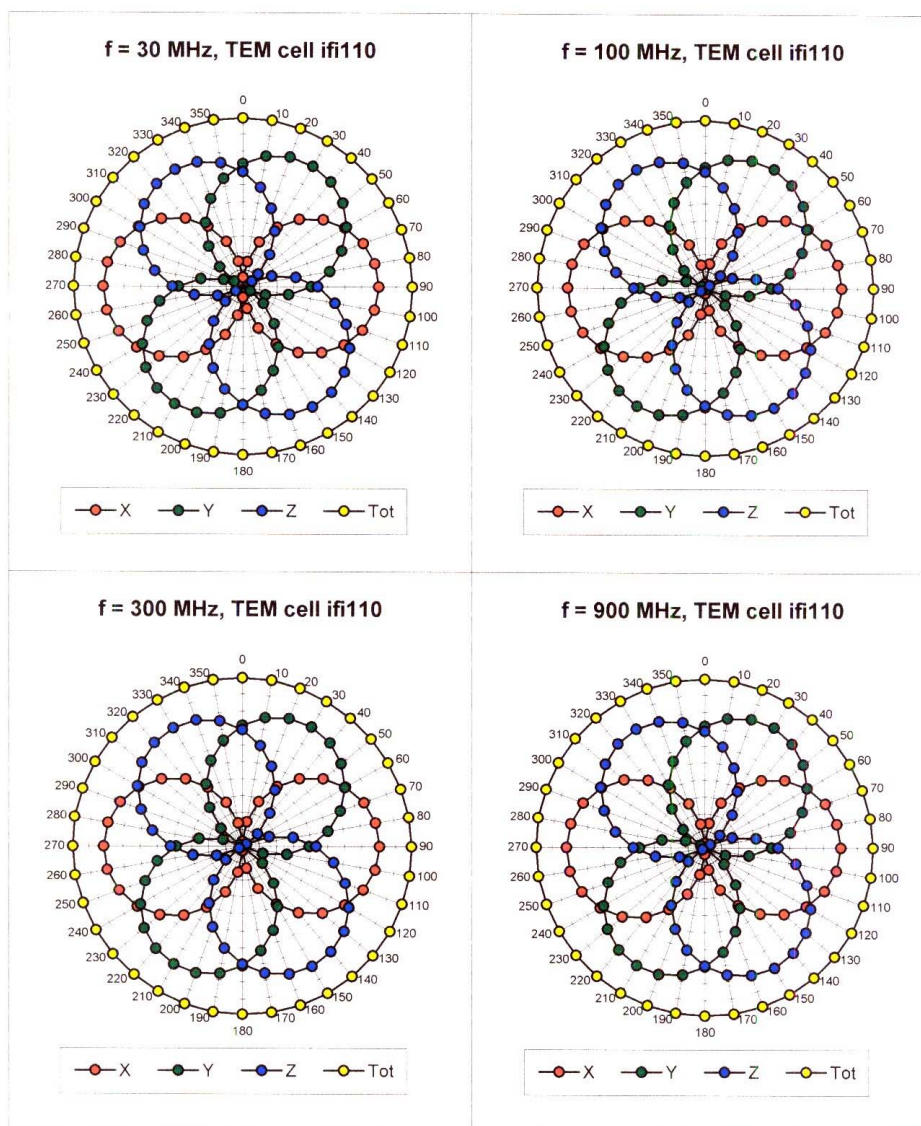
Sensitivity in Tissue Simulating Liquid

Head	450 MHz	$\epsilon_r = 43.5 \pm 5\%$	$\sigma = 0.87 \pm 10\% \text{ mho/m}$
ConvF X	7.38	extrapolated	Boundary effect
ConvF Y	7.38	extrapolated	Alpha 0.43
ConvF Z	7.38	extrapolated	Depth 2.18
Head	900 MHz	$\epsilon_r = 42 \pm 5\%$	$\sigma = 0.97 \pm 10\% \text{ mho/m}$
ConvF X	6.78	$\pm 7\% (k=2)$	Boundary effect
ConvF Y	6.78	$\pm 7\% (k=2)$	Alpha 0.47
ConvF Z	6.78	$\pm 7\% (k=2)$	Depth 2.11
Head	1500 MHz	$\epsilon_r = 40.4 \pm 5\%$	$\sigma = 1.23 \pm 10\% \text{ mho/m}$
ConvF X	5.97	interpolated	Boundary effect
ConvF Y	5.97	interpolated	Alpha 0.53
ConvF Z	5.97	interpolated	Depth 2.03
Head	1800 MHz	$\epsilon_r = 40 \pm 5\%$	$\sigma = 1.40 \pm 10\% \text{ mho/m}$
ConvF X	5.57	$\pm 7\% (k=2)$	Boundary effect
ConvF Y	5.57	$\pm 7\% (k=2)$	Alpha 0.55
ConvF Z	5.57	$\pm 7\% (k=2)$	Depth 1.99

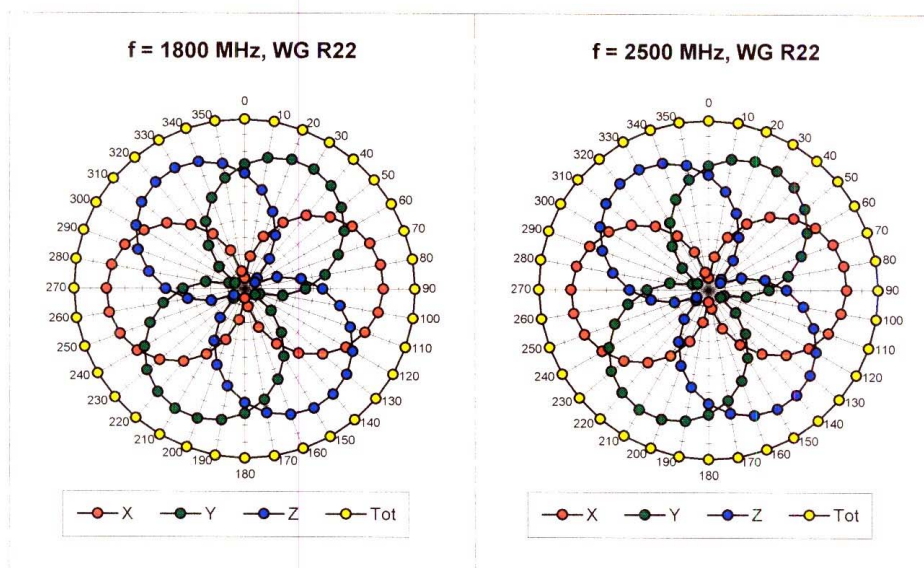
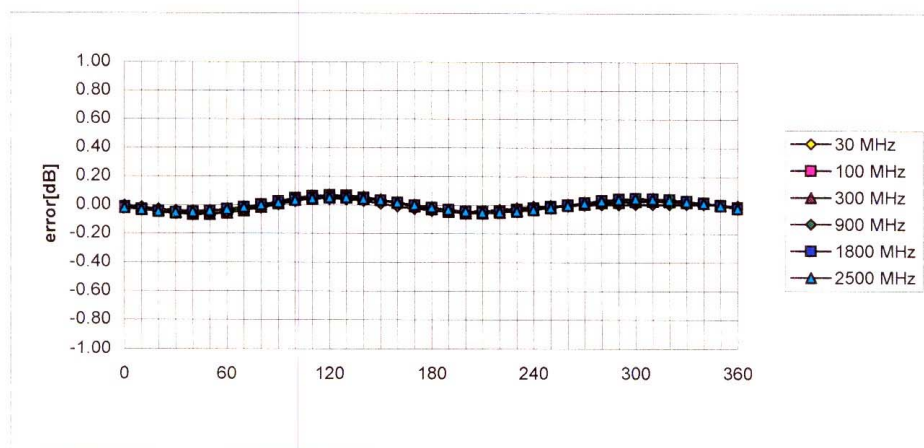
Sensor Offset

Probe Tip to Sensor Center	2.7	mm
Optical Surface Detection	1.2 $\pm$ 0.2	mm

ET3DV6 SN:1579

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

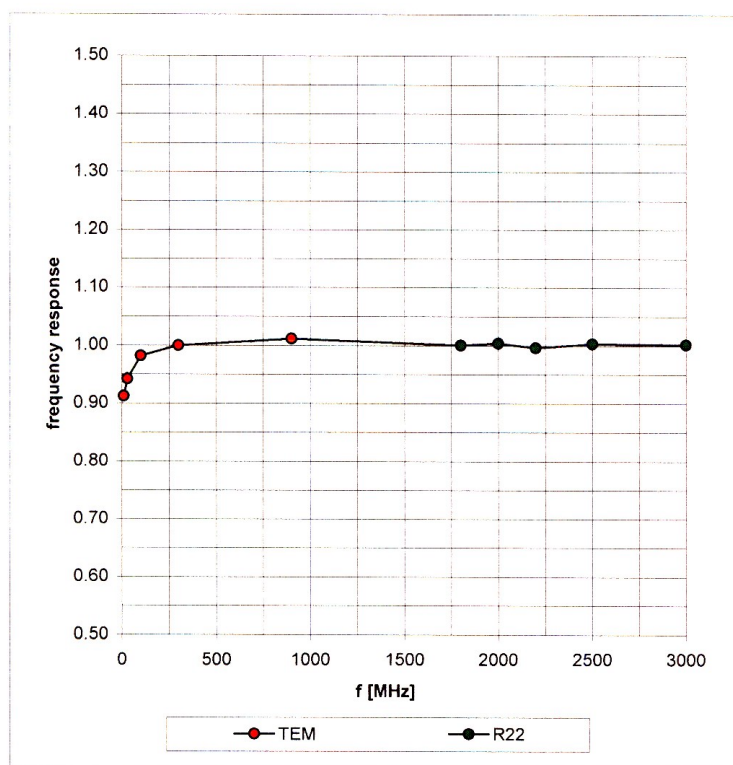
ET3DV6 SN:1579

Isotropy Error (ϕ), $\theta = 0^\circ$ 

ET3DV6 SN:1579

Frequency Response of E-Field

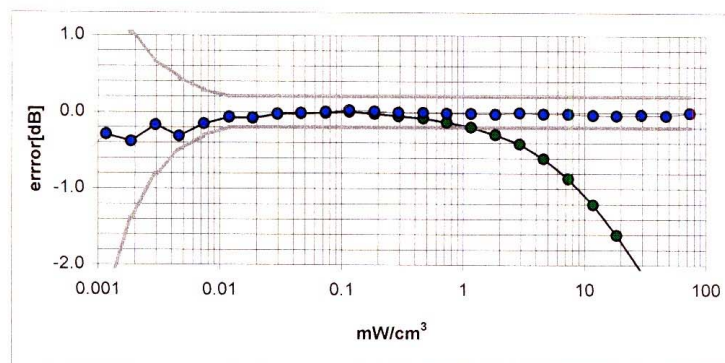
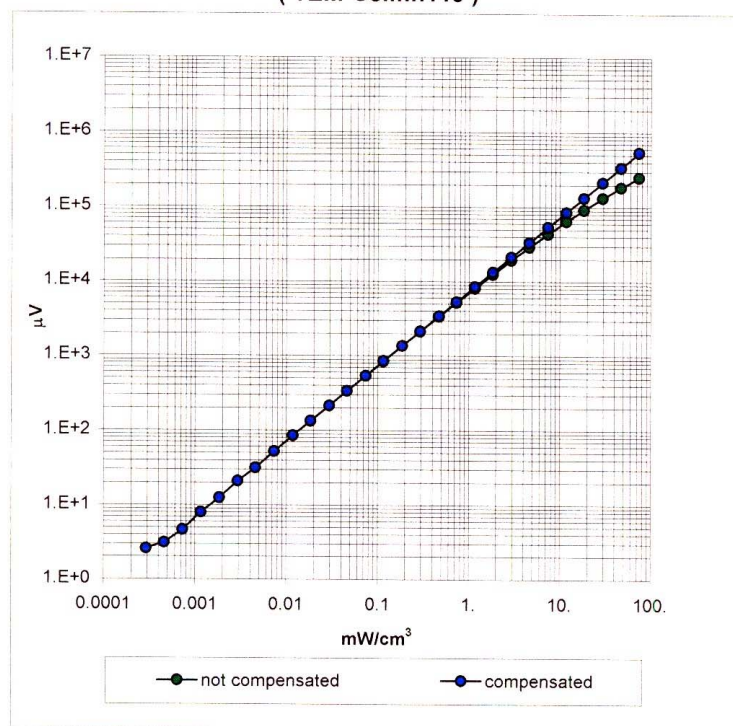
(TEM-Cell:ifi110, Waveguide R22)



ET3DV6 SN:1579

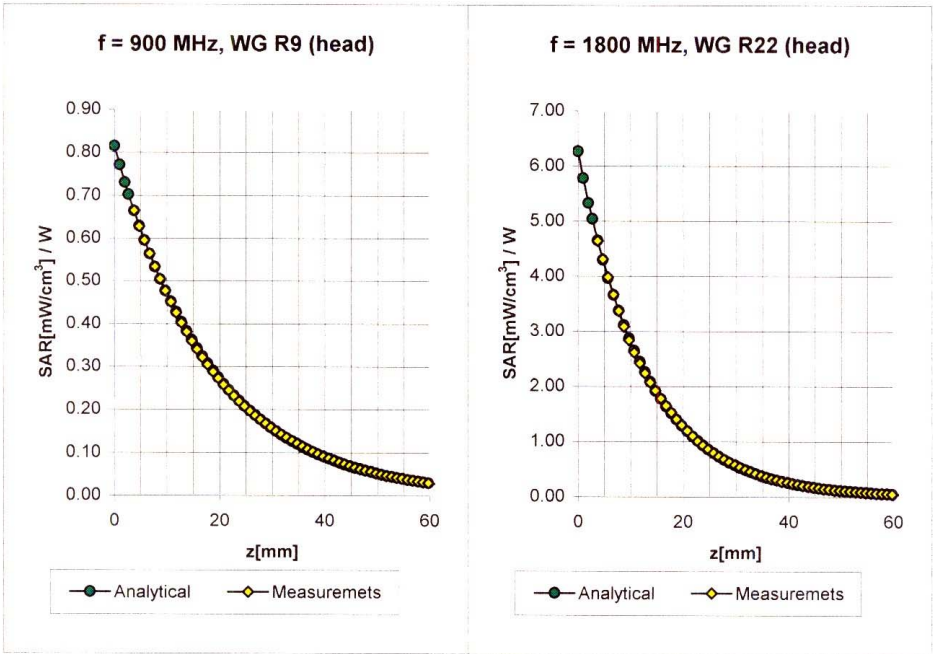
Dynamic Range f(SAR_{brain})

(TEM-Cell:ifi110)



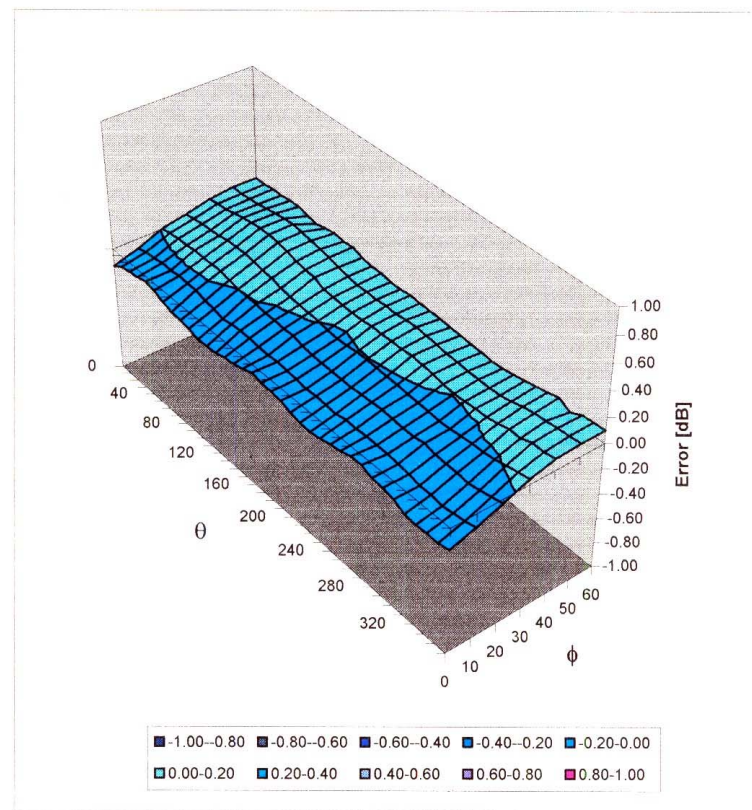
ET3DV6 SN:1579

Conversion Factor Assessment



Head	900 MHz	$\epsilon_r = 42 \pm 5\%$	$\sigma = 0.97 \pm 10\% \text{ mho/m}$
	ConvF X	6.78 $\pm 7\%$ (k=2)	Boundary effect:
	ConvF Y	6.78 $\pm 7\%$ (k=2)	Alpha 0.47
	ConvF Z	6.78 $\pm 7\%$ (k=2)	Depth 2.11
Head	1800 MHz	$\epsilon_r = 40 \pm 5\%$	$\sigma = 1.40 \pm 10\% \text{ mho/m}$
	ConvF X	5.57 $\pm 7\%$ (k=2)	Boundary effect:
	ConvF Y	5.57 $\pm 7\%$ (k=2)	Alpha 0.55
	ConvF Z	5.57 $\pm 7\%$ (k=2)	Depth 1.99

ET3DV6 SN:1579

Deviation from Isotropy in HSLError (θ, ϕ), $f = 900$ MHz

Schmid & Partner Engineering AG

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Additional Conversion Factors for Dosimetric E-Field Probe

Type:

ET3DV6

Serial Number:

1579

Place of Assessment:

Zurich

Date of Assessment:

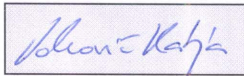
August 22, 2001

Probe Calibration Date:

May 11, 2001

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 900 MHz or at 1800 MHz.

Assessed by:



Dosimetric E-Field Probe ET3DV6 SN:1579Conversion factor ($\pm$ standard deviation)835 MHz ConvF $6.9 \pm 8\%$ $\epsilon_r = 41.5 \pm 5\%$
 $\sigma = 0.90 \pm 10\% \text{ mho/m}$
(head tissue)835 MHz ConvF $6.6 \pm 8\%$ $\epsilon_r = 56.1 \pm 5\%$
 $\sigma = 0.95 \pm 10\% \text{ mho/m}$
(body tissue)1900 MHz ConvF $5.4 \pm 8\%$ $\epsilon_r = 40.0 \pm 5\%$
 $\sigma = 1.4 \pm 10\% \text{ mho/m}$
(head tissue)1900 MHz ConvF $4.9 \pm 8\%$ $\epsilon_r = 54.2 \pm 5\%$
 $\sigma = 1.5 \pm 10\% \text{ mho/m}$
(body tissue)

Schmid & Partner Engineering AG

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Calibration Certificate

1900 MHz System Validation Dipole

Type:

D1900V2

Serial Number:

535

Place of Calibration:

Zurich

Date of Calibration:

Apr. 24, 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:

M. F. ...

Approved by:

... Kaja

**Schmid & Partner
Engineering AG**

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DASY3

Dipole Validation Kit

Type: D1900V2

Serial: 535

Manufactured: March 22, 2001

Calibrated: April 24, 2001

1. Measurement Conditions

The measurements were performed in the flat section of the new generic twin phantom filled with brain simulating sugar solution of the following electrical parameters at 1900 MHz:

Relative permittivity	39.2	$\pm 5\%$
Conductivity	1.47 mho/m	$\pm 10\%$

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

The dipole feedpoint was positioned below the center marking and 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 $\pm 3\%$. The results are normalized to 1W input power.

2. SAR Measurement

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

averaged over 1 cm³ (1 g) of tissue: **43.2 mW/g**

averaged over 10 cm³ (10 g) of tissue: **21.9 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:	1.204 ns	(one direction)
Transmission factor:	0.988	(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 1900 MHz:	$\text{Re}\{Z\} = \mathbf{51.0\ \Omega}$
	$\text{Im}\{Z\} = \mathbf{-0.1\ \Omega}$
Return Loss at 1900 MHz	- 40.3 dB

4. 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.

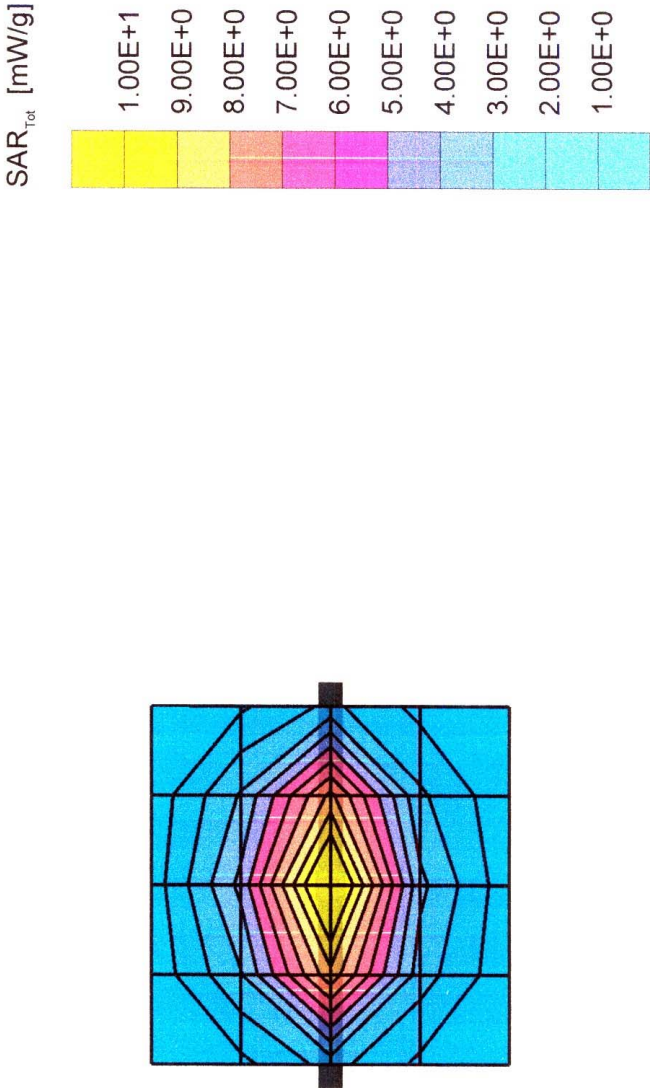
Do not apply excessive force to the dipole arms, because they might bend. If the dipole arms have to be bent back, take care to release stress to the soldered connections near the feedpoint; they might come off.

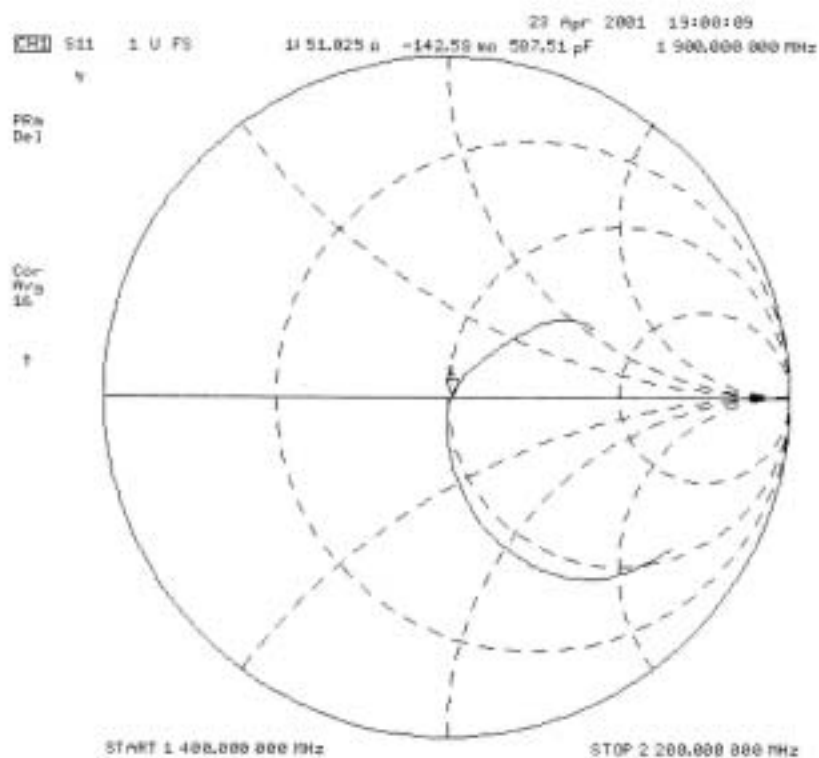
After prolonged use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

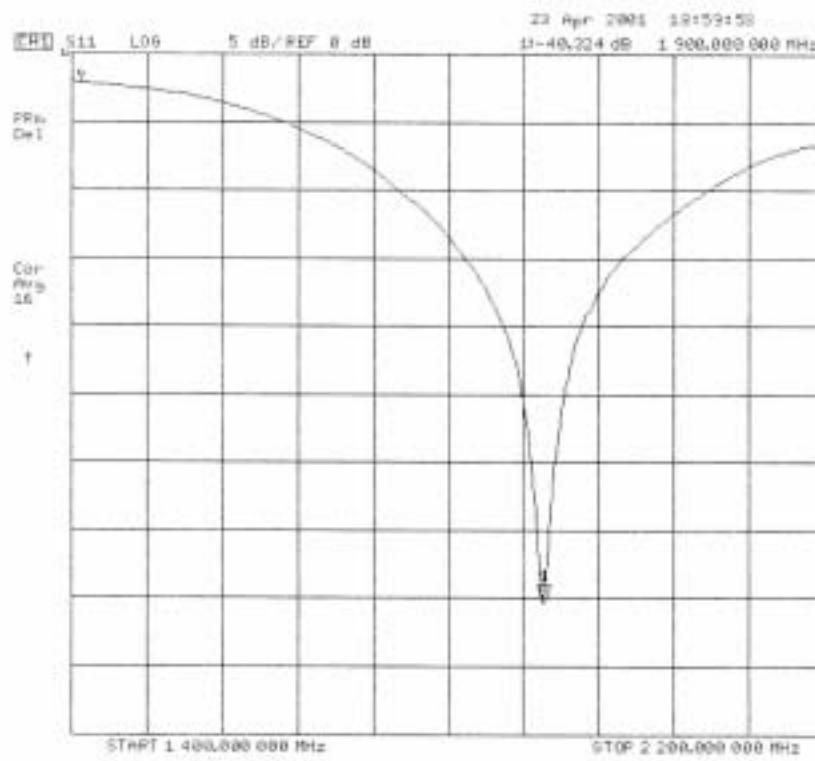
04/23/01

Validation Dipole D1900V2 SN:535, d = 10 mm

Frequency: 1900 MHz; Antenna Input Power: 250 [mW]
Generic Twin Phantom; Flat Section; Grid Spacing: Dx = 15.0, Dy = 15.0, Dz = 10.0
Probe: ET3DV6 - SN1507; ConvF(5.57,5.57,5.57) at 1800 MHz; IEEE1528-1900 MHz; $\sigma = 1.47$ mho/m $\epsilon_r = 39.2$ $\rho = 1.00$ g/cm³
Cubes (2): Peak: 20.8 mW/g ± 0.04 dB, SAR (1g): 10.8 mW/g ± 0.03 dB, SAR (10g): 5.48 mW/g ± 0.02 dB. (Worst-case extrapolation)
Penetration depth: 7.8 (7.4, 8.9) [mm]
Powerdrift: 0.01 dB







Schmid & Partner Engineering AG

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Calibration Certificate

1900 MHz System Validation Dipole (Muscle Tissue)

Type:

D1900V2

Serial Number:

535

Place of Calibration:

Zurich

Date of Calibration:

August 23, 2001

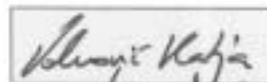
Calibration Interval:

24 months

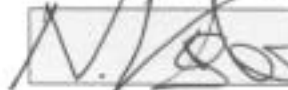
Schmid & Partner Engineering AG hereby certifies, that this device has been calibrated on the date indicated above. The calibration was performed in accordance with specifications and procedures of Schmid & Partner Engineering AG.

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**

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DASY

Dipole Validation Kit

Type: D1900V2

Serial: 535

Manufactured: March 22, 2001
Calibrated: August 23, 2001

1. 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 1900 MHz:

Relative Dielectricity	53.5	$\pm 5\%$
Conductivity	1.46 mho/m	$\pm 5\%$

The DASY3 System (Software version 3.1c) with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 5.0 at 1900 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 $\pm 3\%$. 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:	40.8 mW/g
averaged over 10 cm ³ (10 g) of tissue:	21.2 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:	1.203 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 1900 MHz:	$\text{Re}\{Z\} = 42.0 \, \Omega$
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	$\text{Im}\{Z\} = -9.5 \, \Omega$
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Return Loss at 1900 MHz	-17.5 dB
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4. 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.

08/23/01

Validation Dipole D1900V2 SN:535, d = 10 mm

Frequency: 1900 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 1900 MHz; Muscle 1900 MHz; $\sigma = 1.46 \text{ mho/m}$ $\epsilon_r = 53.5$ $\rho = 1.00 \text{ g/cm}^3$
Cubes (2): Peak: 19.1 mW/g $\pm 0.04 \text{ dB}$, SAR (1g): 10.2 mW/g $\pm 0.03 \text{ dB}$, SAR (10g): 5.29 mW/g $\pm 0.03 \text{ dB}$, (Worst-case extrapolation)
Penetration depth: 8.8 (7.9, 10.5) [mm]
Powerdrift: 0.01 dB

