

Appendix 3

Dipole Calibration Certificate

Calibration Certificate

1800 MHz System Validation Dipole

Type:

D1800V2

Serial Number:

279

Place of Calibration:

Zurich

Date of Calibration:

Jan. 4, 2001

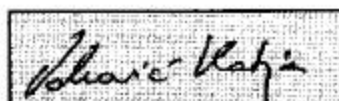
Calibration Interval:

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:



DASY

Dipole Validation Kit

Type: D1800V2

Serial: 279

Manufactured: November 25, 2000
Calibrated: January 4, 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 1800 MHz:

Relative Dielectricity	40.0	$\pm 5\%$
Conductivity	1.71 mho/m	$\pm 5\%$

The DASY3 System (Software version 3.1c) with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 5.67 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 $\pm 3\%$. 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:	44.4 mW/g
averaged over 10 cm ³ (10 g) of tissue:	22.1 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:	1.215 ns	(one direction)
Transmission factor:	0.994	(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:	$\text{Re}\{Z\} = 53.4 \Omega$
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$\text{Im}\{Z\} = -0.3 \Omega$
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Return Loss at 1800 MHz	-30.0 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.

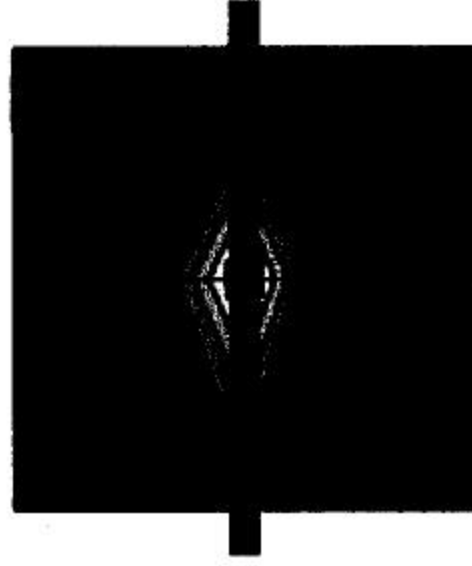
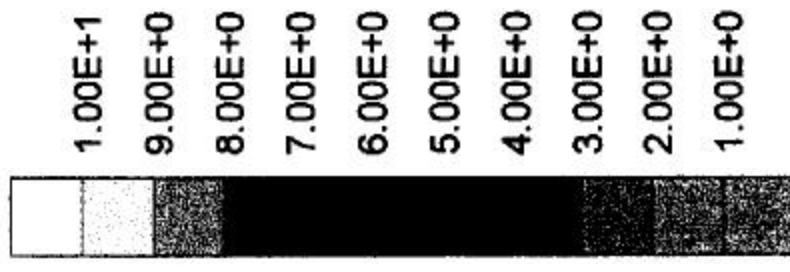
Do not apply excessive force to the dipole arms, because they might bend. If the dipole arms have to be bent back, take care to release stress to the soldered connections near the feedpoint; they might come off.

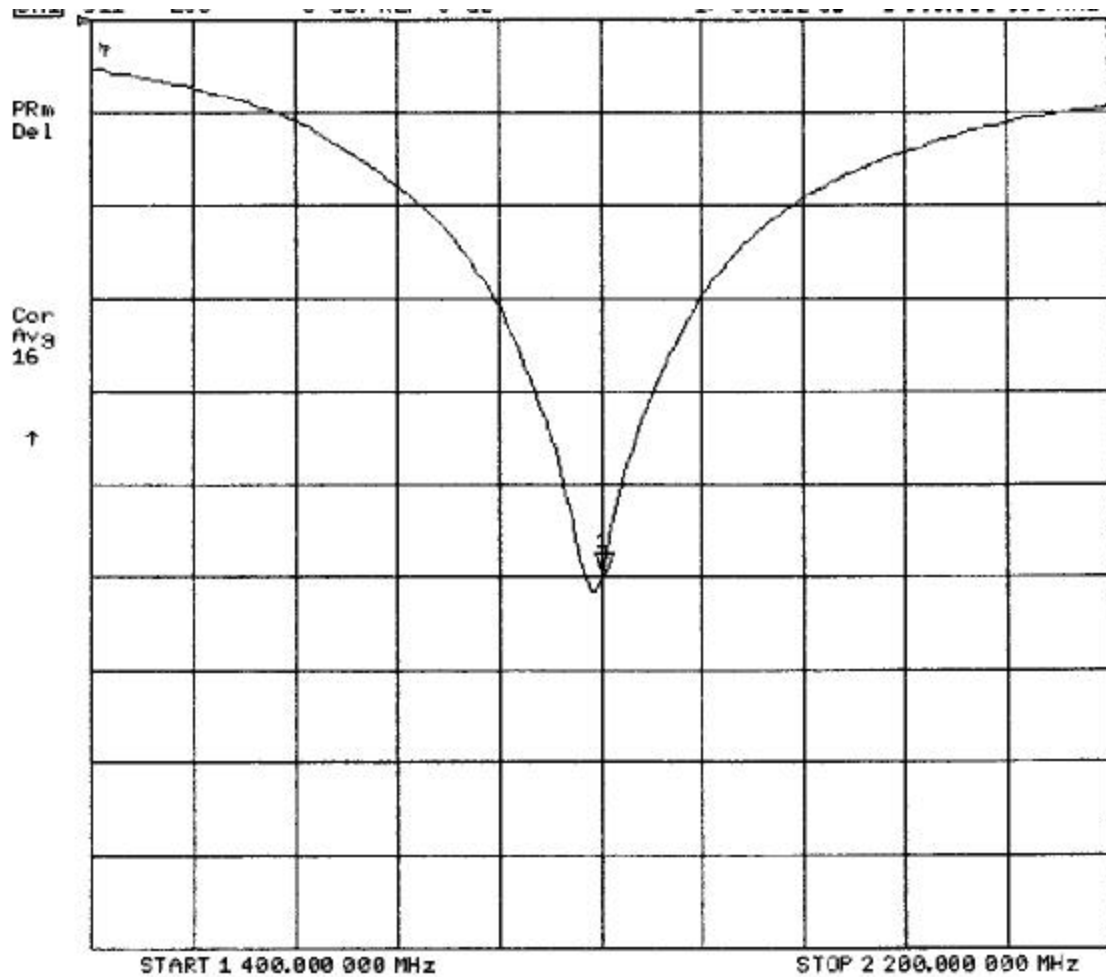
After prolonged use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

Radiation Dipole D1800V2 SN:279, d = 10 mm

Frequency: 1800 MHz; Antenna Input Power: 250 [mW]
 Phantom: ET3DV6 - SN1507; Grid Spacing: Dx = 15.0, Dy = 15.0, Dz = 10.0
 Flat Section: Brain 1800 MHz; $\sigma = 1.71 \text{ mho/m}$; $\epsilon_r = 40.0$; $\rho = 1.00 \text{ g/cm}^3$
 SAR (1g): 11.1 mW/g $\pm 0.00 \text{ dB}$, SAR (10g): 5.53 mW/g $\pm 0.00 \text{ dB}$, (Worst-case extrapolation)
 Peak: 22.1 mW/g $\pm 0.00 \text{ dB}$, SAR (1g): 11.1 mW/g $\pm 0.00 \text{ dB}$, SAR (10g): 5.53 mW/g $\pm 0.00 \text{ dB}$, (Worst-case extrapolation)
 Position depth: 7.2 (6.8, 8.0) [mm]
 Drift: -0.00 dB

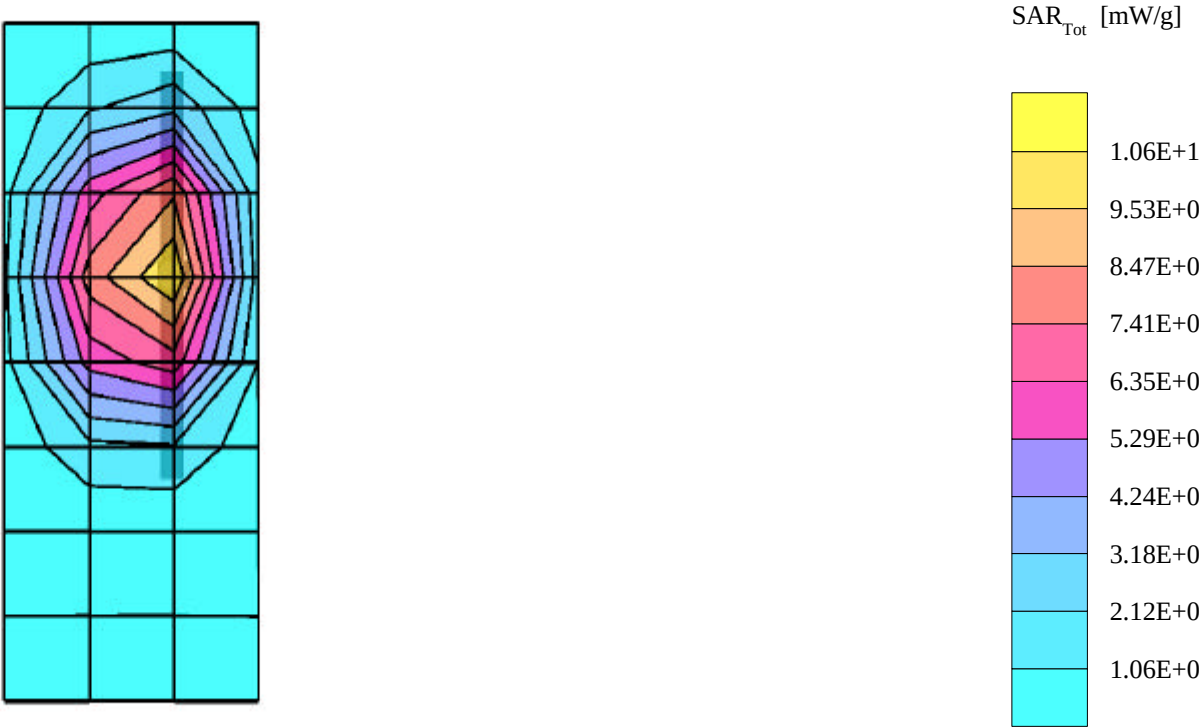
SAR_{1g} [mW/g]





Dipole 1800 MHz

1800 MHz Dipole Validation / Dipole Sn# 280 / Forward Power = 252mW / Simulant Temp at time of measurement 20c
R5 Amy Twin Phantom 2.3 Phantom; Section2 Section; Position: (90°,180°); Frequency: 1800 MHz
Probe: ET3DV6 - SN1522 Validation; ConvF(5.40,5.40,5.40); Crest factor: 1.0; Validation 1800 MHz: $\sigma = 1.75 \text{ mho/m}$ $\epsilon_r = 39.4$ $\rho = 1.00 \text{ g/cm}^3$
Cubes (2): SAR (1g): 11.6 mW/g $\pm 0.13 \text{ dB}$, SAR (10g): 5.71 mW/g $\pm 0.11 \text{ dB}$, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 10.0
Penetration depth: 7.0 (6.7, 7.7) [mm]
Powerdrift: -0.00 dB

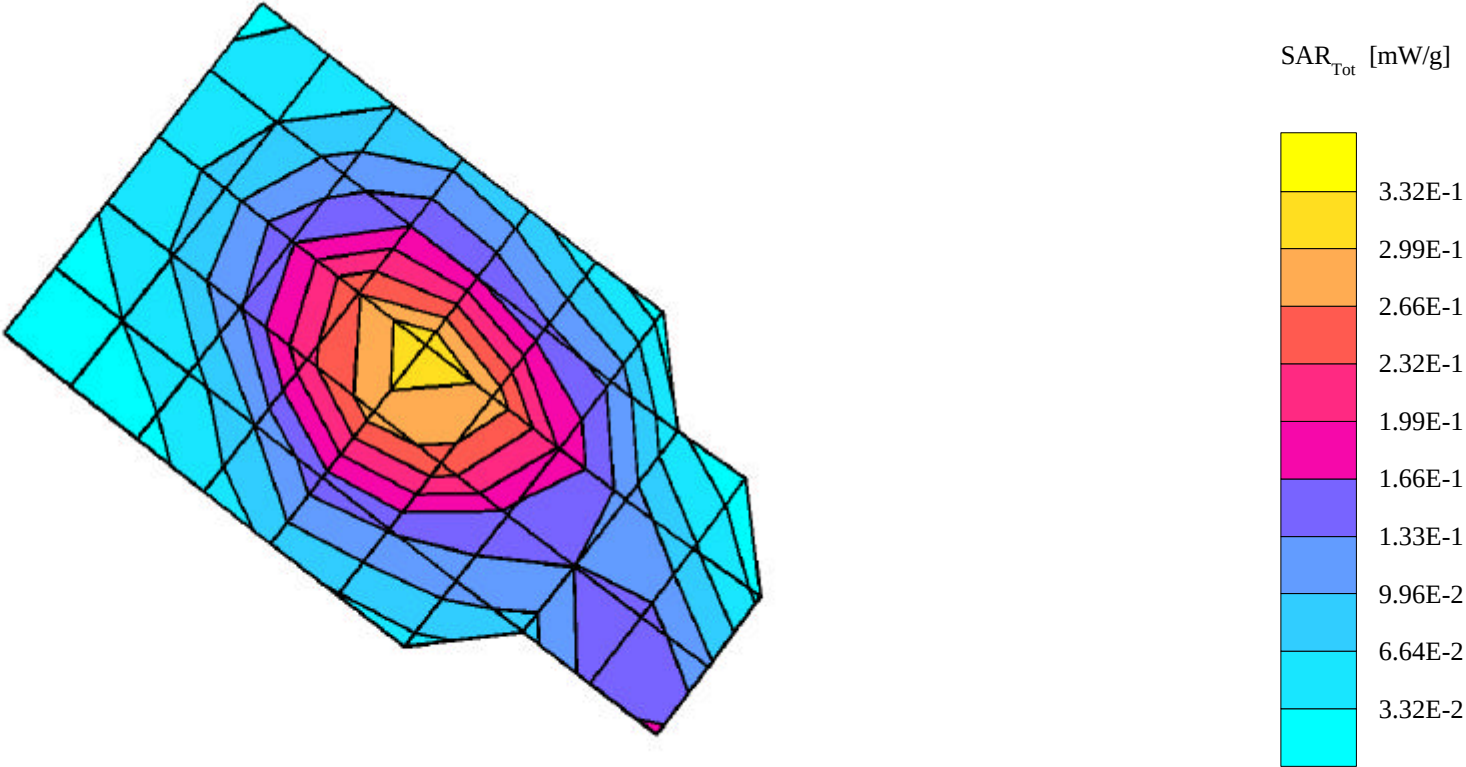


Appendix 4

SAR Distribution Plot for Tilted Head Position

SN# 350652800000300

Ch# 512/ Pwr Step:00 - testmode 15 degree / Antenna Position:Fixed
R5 Skipper Left Head (Glycol) Phantom; Left Head Section; Position: (80°,180°); Frequency: 1850 MHz
Probe: ET3DV6 - SN1522 Brain (Glycol); ConvF(5.16,5.16,5.16); Crest factor: 8.0; Head Glycol 1900 MHz: $\sigma = 1.48 \text{ mho/m}$ $\epsilon_r = 38.2$ $\rho = 1.00 \text{ g/cm}^3$
Cube 7x7x7: SAR (1g): 0.317 mW/g, SAR (10g): 0.189 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 9.8 (8.7, 11.3) [mm]
Powerdrift: -0.03 dB



SN# 350652800000300

Ch# 512/ Pwr Step:00 - testmode 15 degree / Antenna Position:Fixed
R5 Ginger Right Head (Glycol) Phantom; Right Head Section; Position: (80°,180°); Frequency: 1850 MHz
Probe: ET3DV6 - SN1522 Brain (Glycol); ConvF(5.16,5.16,5.16); Crest factor: 8.0; Head Glycol 1900 MHz: $\sigma = 1.48 \text{ mho/m}$ $\epsilon_r = 38.2$ $\rho = 1.00 \text{ g/cm}^3$
Cube 7x7x7: SAR (1g): 0.267 mW/g, SAR (10g): 0.169 mW/g, (Worst-case extrapolation)
Coarse: Dx = 15.0, Dy = 15.0, Dz = 15.0
Penetration depth: 11.1 (9.9, 12.6) [mm]
Powerdrift: -0.09 dB

