Appendix 8

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DIPOLE VALIDATION KIT

DASY

Dipole Validation Kit

Type: D1800V2

Serial:207

Manufactured:	July 1997
Calibrated:	August 1998
Calibration due:	August 2000

1.   Measurement Conditions

The measurements were performed in the flat section of the new generic twin phantom (shell thickness 2mm) filled with brain simulating sugar solution of the following electrical parameters at 1800 MHz:

Relative Dielectricity	**40.1**	± 5%
Conductivity	**1.65 mho/m**	± 10%

The DASY3 System (Software version 3.0b) with a dosimetric E-field probe ET3DV4 (SN:1302, conversion factor 4.6) was used for the measurements.

The dipole feedpoint was positioned below the centre marking and oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10mm from dipole centre 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 normalised 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 normalised to a dipole input power of 1W (forward power). The resulting averaged SAR-values are:

averaged over 1 cm^3 (1 g) of tissue: **37.1 mW/g**

averaged over 10 cm^3 (10 g) of tissue: **18.5 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 Impedanc and return loss

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

Electrical delay:	**1.236 ns**	(one direction)
Transmission factor:	**0.971**	(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\} = $ **49.9** Ω

$Im \{Z\} = $ **-1.5** Ω

Return Loss at 1800 MHz   **- 36.0 dB**

4.   Handling

The dipole is made of standard semirigid coaxial cable. The centre 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:207, d = 10mm

Frequency: 1800 [MHz]; Antenna Input Power: 250 [mW]
Generic Twin Phantom; Flat Section; Grid Spacing: Dx = 20.0, Dy = 20.0, Dz = 10.0
Probe: ET3DV5 - SN1302/DAE3; ConvF(4.60,4.60,4.60); Brain 1800 MHz: σ = 1.65 [mho/m] ε_r = 40.1 ρ = 1.00 [g/cm³]
Cubes (2): Peak: 18.1 [mW/g] $\pm$ 0.02 dB, SAR (1g): 9.27 [mW/g] $\pm$ 0.03 dB, SAR (10g): 4.63 [mW/g] $\pm$ 0.04 dB, (Worst-case extrapolation)
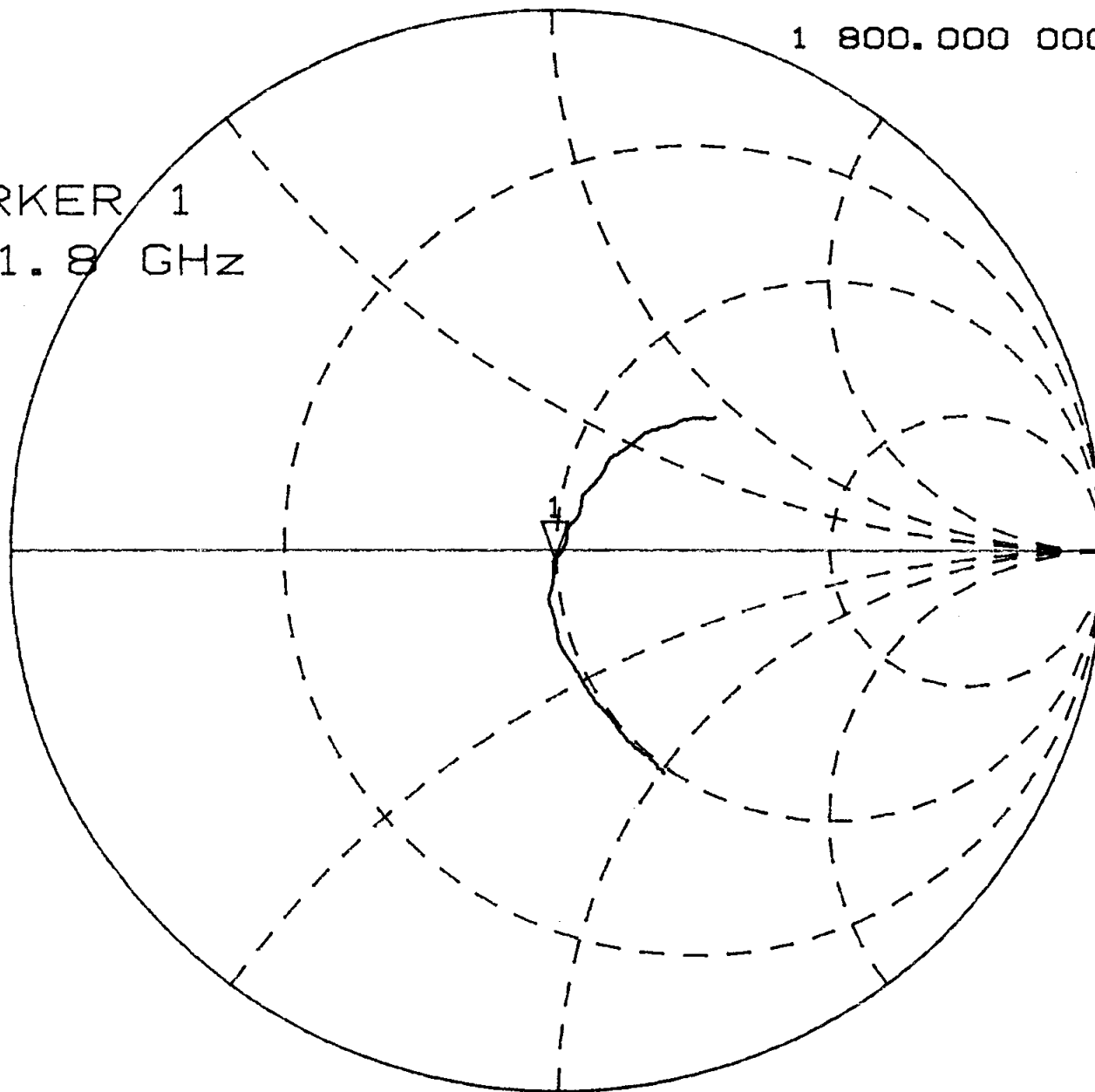Penetration depth: 7.2 (7.0, 7.8) [mm]

SAR_{Tot} [mW/g]

9.00E+0
8.00E+0
7.00E+0
6.00E+0
5.00E+0
4.00E+0
3.00E+0
2.00E+0
1.00E+0
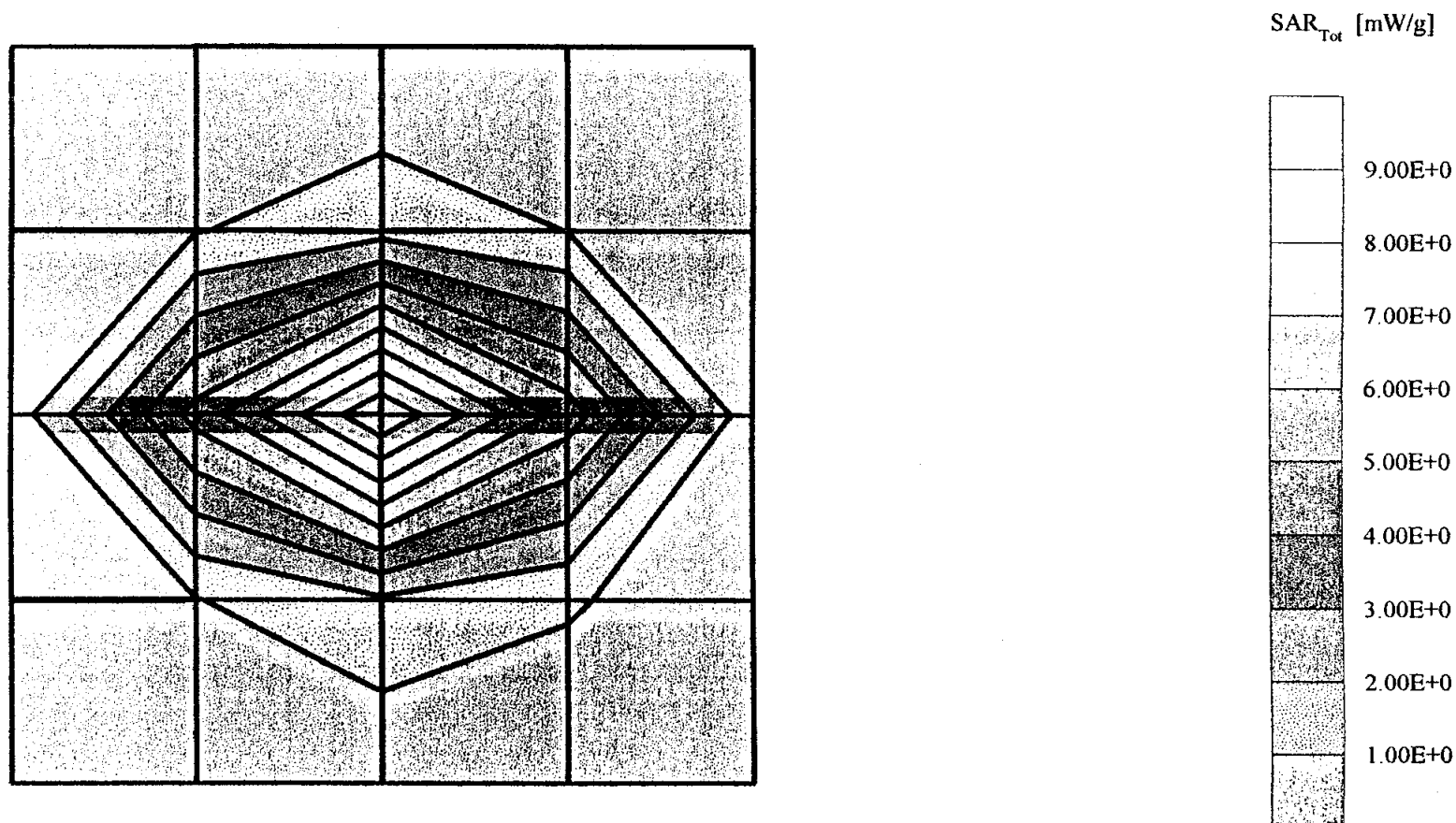
CH1 S$_{11}$ 1 U FS   1: 49.887 Ω   -1.4648 Ω   60.361 pF

1 800.000 000 MHz

Cor
Del   MARKER 1
       1.8 GHz

CENTER 1 800.000 000 MHz   SPAN 400.000 000 MHz

CH1 S_{11} log MAG   5 dB/   REF 0 dB   1: −36.004 dB

1 800.000 000 MHz

Cor
Del

MARKER 1

1.8 GHz

CENTER 1 800.000 000 MHz   SPAN 400.000 000 MHz