1. DIPOLE ANTENNA

The dipole antenna, which is manufactured by Schmid & Partner Engineering AG, is matched to be used near flat phantom filled with tissue simulating solution. Length of the dipole is 68 mm with overall height of 300mm. A specific distance holder is used in the positioning of the antenna to ensure correct spacing between the phantom and the dipole. Manufacturer's reference dipole data is presented as a part of this supplemental report.

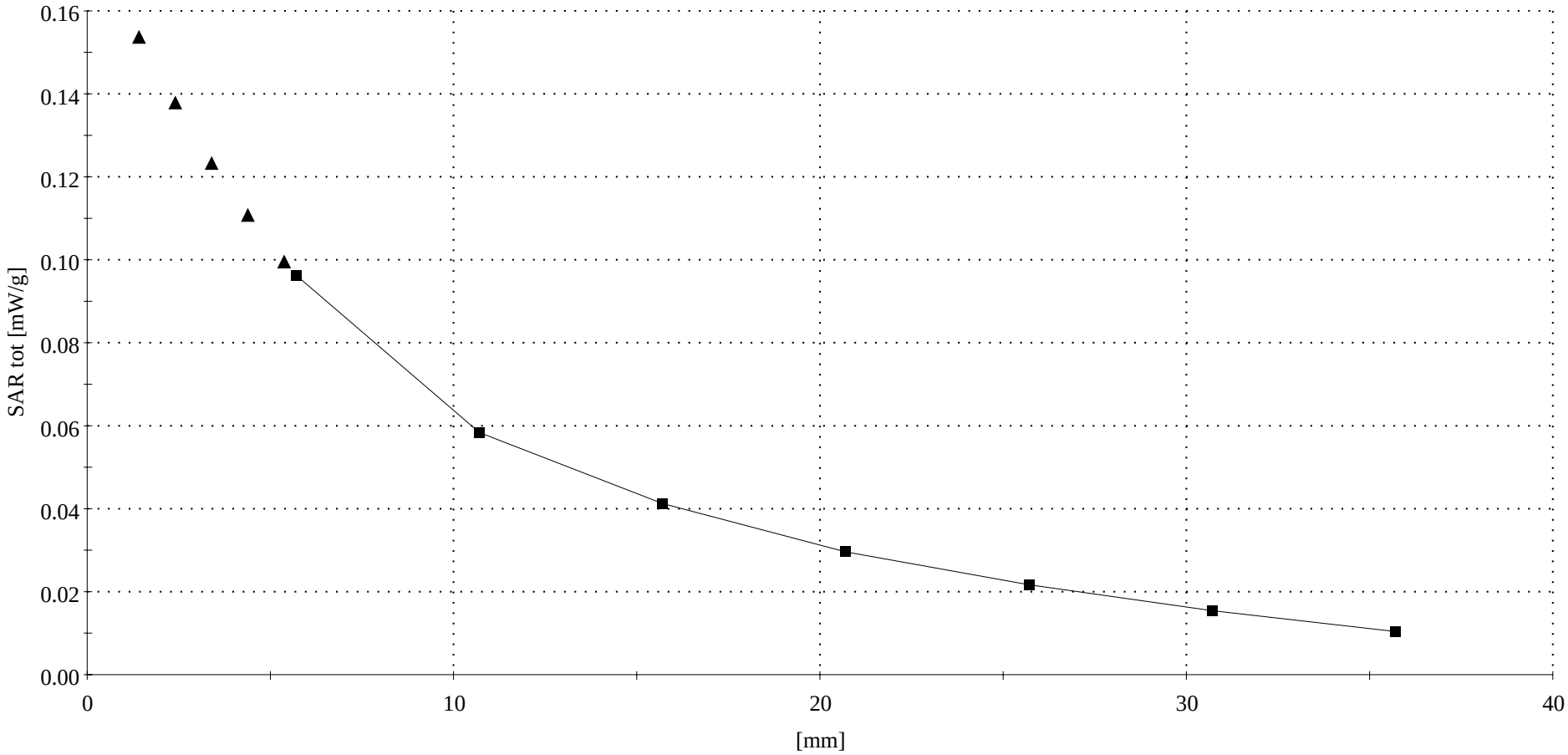
2. Z-PLOTS

Z-plots of maximum measurement results in 'at the ear' –position (PDNRAB-3N) and 'body-worn' –positions (PDNRAB-3N, CSL-26) in GSM1900 mode are presented as a part of this supplemental report.

01/15/02

PDNRAB-3N

SAM 1 Phantom; Left Hand Section; Position: cheek; Frequency: 1850 MHz
Probe: ET3DV6 - SN1381; ConvF(5.22,5.22,5.22); Crest factor: 8.0; Brain 1880 MHz SCC34: σ = 1.42 mho/m ε = 39.3 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.425 mW/g, SAR (10g): 0.270 mW/g
Cube 5x5x7: Dx = 8.0, Dy = 8.0, Dz = 5.0



01/16/02

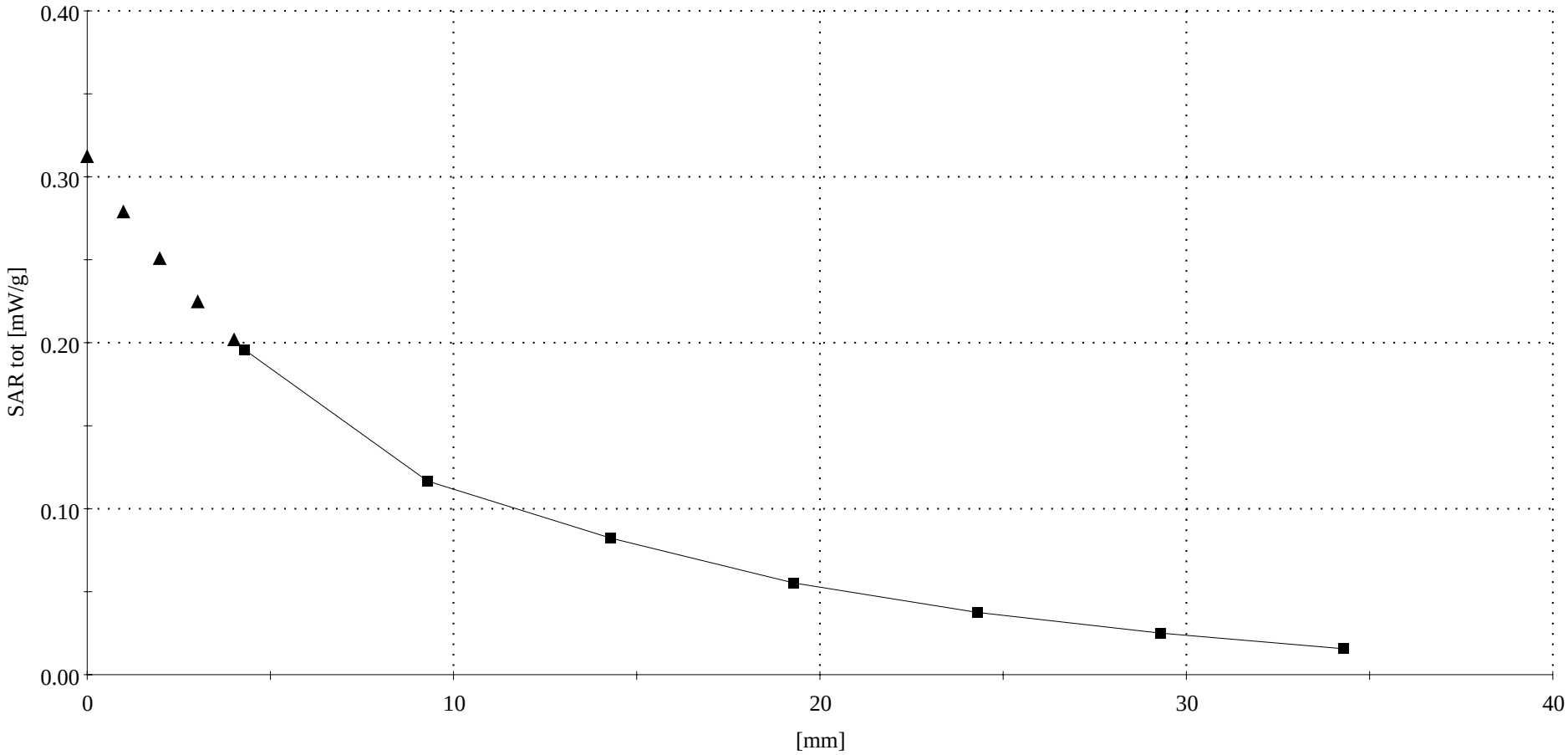
PDNRAB-3N, CSL-26

SAM 1 Phantom; Flat Section; Position: body worn; Frequency: 1850 MHz

Probe: ET3DV6 - SN1381; ConvF(4.96,4.96,4.96); Crest factor: 8.0; Muscle 1880MHz: σ = 1.47 mho/m ε = 53.4 ρ = 1.00 g/cm^3

Cube 5x5x7: SAR (1g): 0.329 mW/g, SAR (10g): 0.210 mW/g

Cube 5x5x7: Dx = 8.0, Dy = 8.0, Dz = 5.0



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DASY3

Dipole Validation Kit

Type: D1900V2

Serial: 511

Manufactured: October 20, 1999
Calibrated: February 13, 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 1900 MHz:

Relative permitivity	**39.2**	± 5%
Conductivity	**1.47 mho/m**	± 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 ± 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 cm^3 (1 g) of tissue:	**42.8 mW/g**
averaged over 10 cm^3 (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:	**1.205 ns**	(one direction)
Transmission factor:	**0.983**	(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:	Re{Z} = **50.1 Ω**
	Im {Z} = **-1.5 Ω**
Return Loss at 1900 MHz	**- 34.9 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 1900 MHz:

Relative permitivity	**53.5**	± 5%
Conductivity	**1.46 mho/m**	± 10%

The DASY3 System (Software version 3.1c) with a dosimetric E-field probe ET3DV6 (SN:1507, conversion factor 4.85 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 ± 3 %. The results are normalized to 1W input power.

6. 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 cm^3 (1 g) of tissue:	**42.4 mW/g**
averaged over 10 cm^3 (10 g) of tissue:	**22.0 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.

7. 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:	**1.205 ns**	(one direction)
Transmission factor:	**0.983**	(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:	Re{Z} = **45.3 Ω**
	Im {Z} = **-1.0 Ω**
Return Loss at 1900 MHz	**- 25.6 dB**

8. Handling

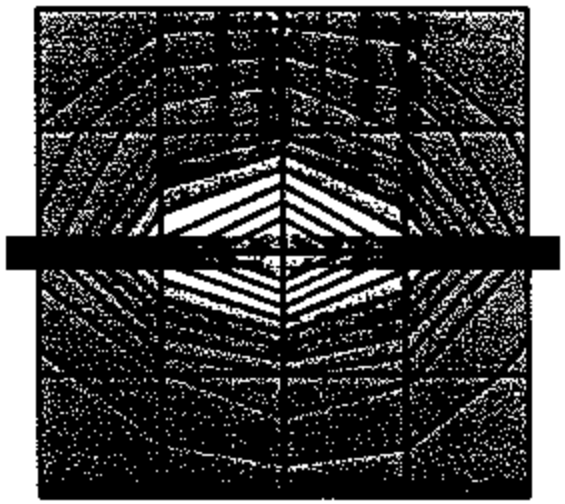
The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

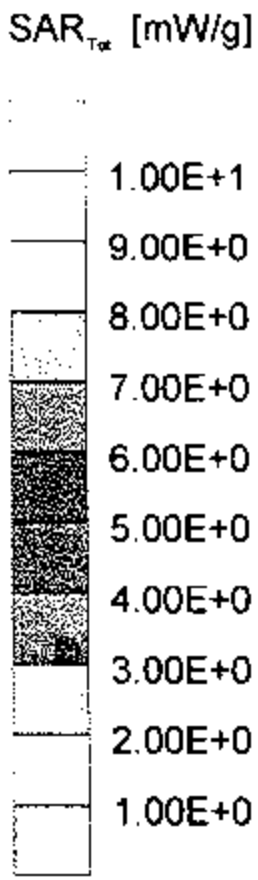
Do not apply excessive force to the dipole arms, because they might bend. If the dipole arms have to be bent back, take care to release stress to the soldered connections near the feedpoint; they might come off.

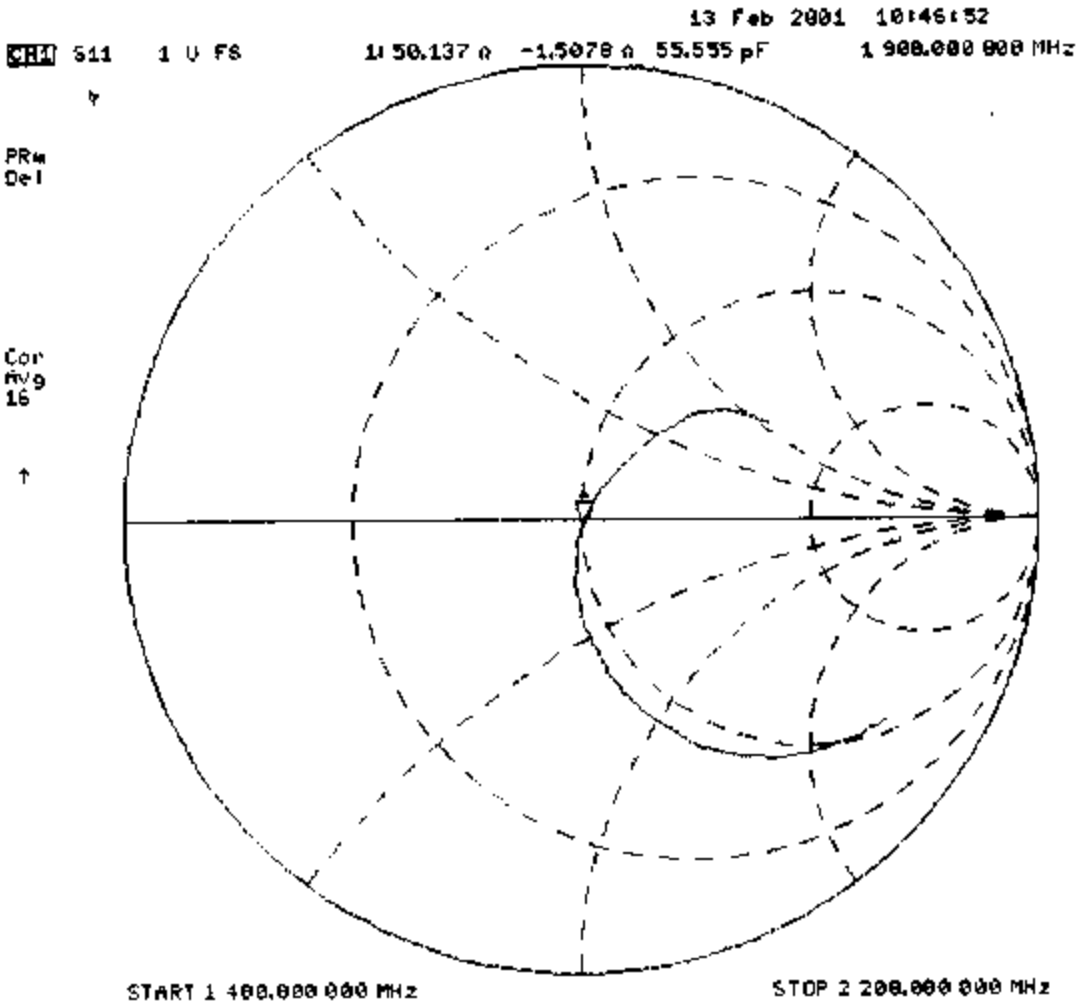
After prolonged use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

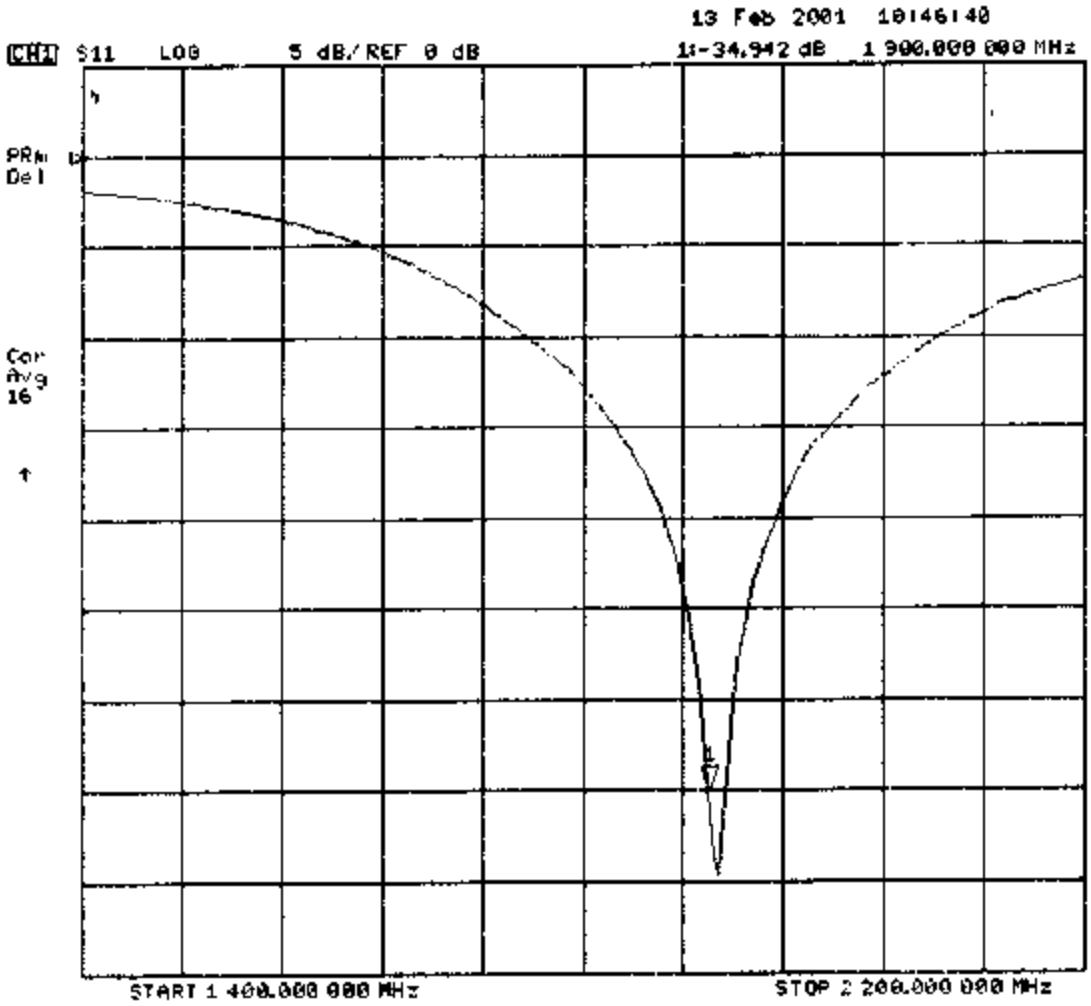
Validation Dipole D1900V2 SN:511, d = 10 mm

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 ; σ = **1.47 mho/m** ε_r = **39.2** ρ = 1.00 g/cm^3
Cubes (2). Peak: 20.6 mW/g ± 0.02 dB, SAR (1g). **10.7** mW/g ± 0.03 dB, SAR (10g): 5.47 mW/g ± 0.03 dB, (Worst-case extrapolation)
Penetration depth. 7.9 (7.4, 9.1) [mm]
Powerdrift. 0.00 dB



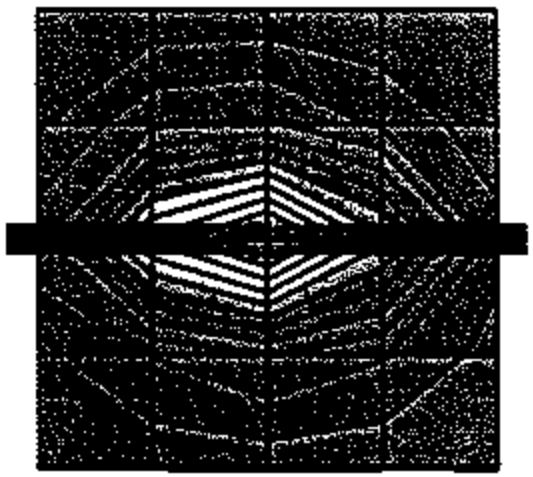


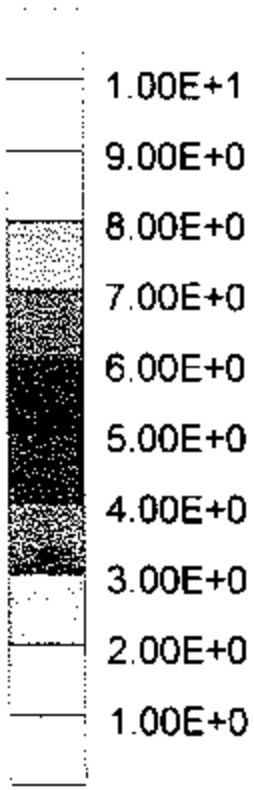

13 Feb 2001 10:46:52
CH1 S11 1 U FS
1: 50.137 Ω -1.5078 Ω 55.555 pF
1 900.000 000 MHz
PRm
Del
Cor
MV9
16
START 1 400.000 000 MHz
STOP 2 200.000 000 MHz

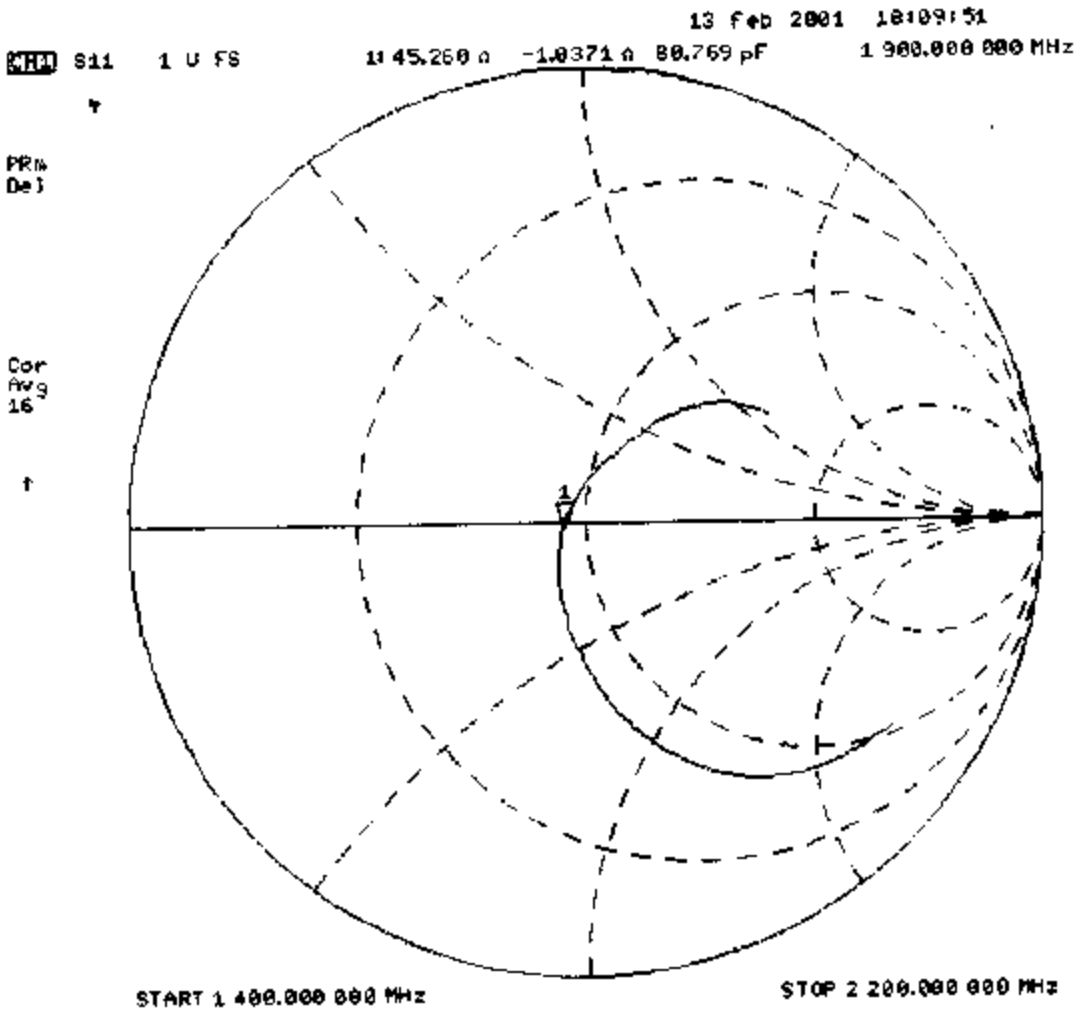

13 Feb 2001 10:46:40
CH1 S11 LOG 5 dB/ REF 0 dB
1:-34.942 dB 1 900.000 000 MHz
PRm
Del
Cor
Avg
16
START 1 400.000 000 MHz
STOP 2 200.000 000 MHz

Validation Dipole D1900V2 SN:511, 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(4.85,4.85,4.85) at 1800 MHz; **Muscle 1900 MHz**, σ = 1.46 mho/m ε_r = 53.5 ρ = 1.00 g/cm^3
Cubes (2): Peak: 20.0 mW/g ± 0.06 dB, SAR (1g): 10.6 mW/g ± 0.05 dB, SAR (10g): 5.49 mW/g ± 0.04 dB, (Worst-case extrapolation)
Penetration depth: 8.7 (7.9, 10.3) [mm]
Powerdrift: 0.01 dB






13 Feb 2001 18:09:51
CH1 S11 1 U FS
1: 45.260 Ω -1.0371 Ω 80.769 pF
1 900.000 000 MHz
PRm
Del
Cor
Avg
16
START 1 400.000 000 MHz
STOP 2 200.000 000 MHz