

Calibration Certificate

1900 MHz System Validation Dipole

Type:

D1900V2

Serial Number:

541

Place of Calibration:

Zurich

Date of Calibration:

September 3, 2005

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:

Thomas Kappeler

Approved by:

[Signature]

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DASY3

Dipole Validation Kit

Type: D1900V2

Serial: 541

Manufactured: July 26, 2001
Calibrated: September 3, 2005

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	39.5	$\pm 5\%$
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 cm ³ (1 g) of tissue:	41.6 mW/g
averaged over 10 cm ³ (10 g) of tissue:	21.4 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:	1.214 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:	$\text{Re}\{Z\} = 45.4 \, \Omega$
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	$\text{Im}\{Z\} = -9.8 \, \Omega$
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Return Loss at 1900 MHz	- 19.0 dB
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4. Handling

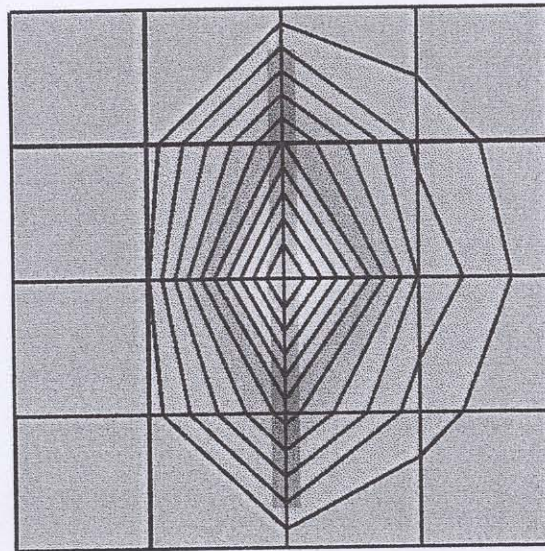
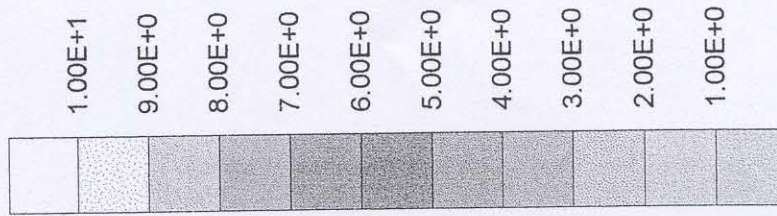
The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

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

Validation Dipole D1900V2 SN:541, 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(5.57, 5.57) at 1800 MHz; IEEE1528 1900 MHz; $\sigma = 1.47$ mho/m $\epsilon_r = 39.5$ $\rho = 1.00$ g/cm³
Cubes (2): Peak: 19.8 mW/g ± 0.00 dB, SAR (1g): 10.4 mW/g ± 0.02 dB, SAR (10g): 5.36 mW/g ± 0.03 dB, (Worst-case extrapolation)
Penetration depth: 8.2 (7.8, 9.2) [mm]
Powerdrift: -0.05 dB

SAR_{Tot} [mW/g]

1 Sep 2025 19:06:05

CH1 S11 1 U FS

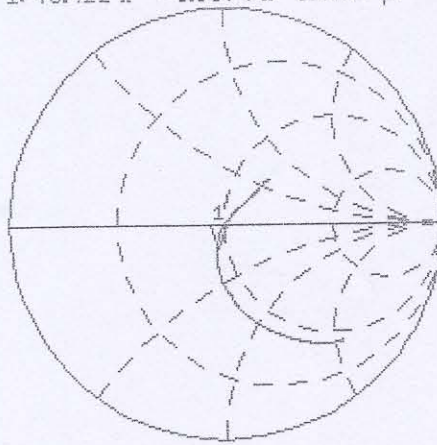
1: 45.422 Ω -9.8574 Ω 8.4977 pF

1 900.000 000 MHz

De1

PRm
Cor
Avg
16

↑



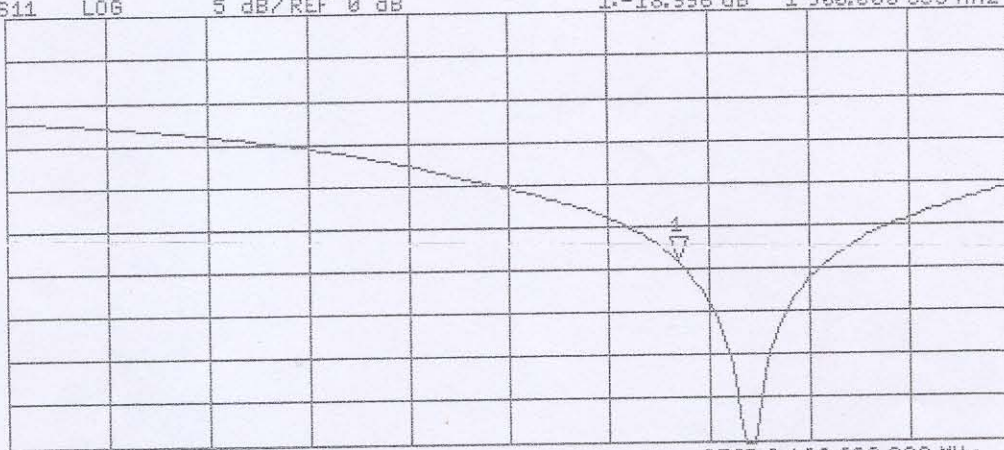
CH2 S11 LOG

5 dB/REF 0 dB

1: -18.995 dB 1 900.000 000 MHz

PRm
Cor

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START 1 500.000 000 MHz

STOP 2 100.000 000 MHz