FCC APPLICATION INQUIRY RESPONSE
MIVWG9701A: INET SPIDER II MODEM
Correspondence Number: NONE
OCTOBER 8, 1998

1.0 Overview

This package was compiled to reply to inquiries made by Mr. Frank Coperich of the FCC regarding the Type Certification Application for the Inet Spider II Modem. Each Inquiry item is listed below followed by the response.

2.0 Inquiry Responses

1. The measured output power levels (various locations) are inconsistent with those on the 731 Form.

Answer:

We request that the Commisson update the rated power to 0.695 watts based on the ERP data presented in Item 2. The previous highest level of almost 1 watt was based on an incorrect correction factor. This is the highest measured power level for this device during the ERP tests.

2. The ERP equation in section 3.2 of Exhibit 6 is incorrect. It should be squared and then divide by 1.64 (dipole gain).

Answer:

We have recently found that the equation which we had been using from the Canadian document NIR-E was incorrect. The correct equation for calculating ERP should be:

$P = \{(E * r)^2\}/30$

Where:

P = ERP in watts

R = distance from EUT to measurement antenna (in this case 3 meters).

E = Measured electric field in V/m

The revised ERP calculations provided in this document are based on this equation. This equation was provided & verified by Messr. Rich Fabina & Joe Dichoso of the

Comission. Based on the measured electric field values hown in the report, the revised ERP (including dipole correction) is shown below:

ERP DATA

Channel	Freq. (MHz)	Mode	Corrected Signal Level (dBuV/m)	Corrected Signal Level (V/m)	ERP Level (Watts)
367	836	CDPD	125.1	1.7989	0.5919
367	836	AMPS	123.4	1.4791	0.4002
799	849	CDPD	125.3	1.8408	0.6198
799	849	AMPS	124	1.5849	0.4595
991	824	CDPD	125.8	1.9498	0.6955
991	824	AMPS	124.5	1.6788	0.5156

3. In section 4.3 of Exhibit 6, the listed dBm are not equivalent to the listed mW. The calculation or conversion used is incorrect.

Answer:

Updated information for this Section was submitted for the last response for this product. The correct conducted power figures are shown below.

CONDUCTED POWER DATA

Channel	Freq. (MHz)	Mode	Corrected Signal Level (dBm)	Conducted Signal Level (Watts)
367	836	CDPD	25	0.3162
367	836	AMPS	24.83	0.3041
799	849	CDPD	23.17	0.2075
799	849	AMPS	22.83	0.1919
991	824	CDPD	24.83	0.3041
991	824	AMPS	24.83	0.3041

4. Section 7.4 of Exhibit 6 describes a CDMA test set for testing this AMPS/CDPD modem?

Answer:

This is a typo. No test set was required. Operation of the Spider II modem was performed via software resident in the host computer. The test data for the Mobile Emissions in the Base Station Band (Section 7.0) was obtained using a HP 8566 Spectrum Analyzer. The ESN compliance referenced in Section 8.0 was verified by data available from the manufacturer indicating that the ESN for the Spider II is compliant

with the data AMPS protocol (including ESN) and that the circuitry for the Spider II is comprised of components which cannot be reset or reconfigured by the user. All electric components are soldered into the PCMCIA assembly and removal of the ESN related components would result in the destruction of the device.

5. Section 9.2 of Exhibit 6 has the wrong SAR limit listed. The limit is 1.6 W/kg, not 4.0 W/kg.

Answer:

Limit stated in this section was derived from the original SAR report. Based on the revised SAR document, this limit should be stated as 1.6 W/kg. Compliance with this spec will be addressed later in this document.

6. The dBm and mW conversion in section 10.2 for the AMPS and CDPD conducted output is incorrect.

Answer:

The corrected conducted power figures for this product are shown under Item 3.

7. The ERP equation listed in Appendix B for effective radiated power is incorrect, therefore, the values listed in the tables are incorrect. The highest listed field strength for CDPD mode computes to almost 1 W EIRP ? This is quite different than those measured in the revised SAR data indicating 25 dBm or lower conducted output for the CDPD mode.

Answer:

Corrected ERP data for the Spider II is shown under Item 2. Corrected data for the conducted power for the Spider II is shown under Item 3.

8. The SAR plots in the revised report have highest 1-g SAR as 9.47 W/kg (same as mW/g) which is much higher than the limit of 1.6 W/kg. But the test configuration photos appear to be identical to those in the previous SAR report which has very low SAR 0.0854 W/kg.

Answer:

The 9.47 W/kg figure was a pre-test validation used to verify that the test setup and instrumentation is operating correctly prior to the formal test. The actual worst case SAR is significantly lower than this figure.

9. The attached E-mails were sent either directly or indirectly to the respective test labs regarding the previous SAR report and general recommendations for testing CDPD modems, which indicated worst exposure to bystanders should be tested.

This typically requires the antenna to be placed within 2-3 cm from a torso phantom, therefore, the worst case coupling condition for a whip antenna requires the antenna to be parallel to the phantom.

Answer:

An addition SAR test of the Spider II Modem was performed in late September of 1998. This test was performed based on 'worst case' setup guidelines provided by the Commission. Data for this test is included in the two Appendices to this document. The first Appendix is the revised test data while the second is the calbration data for the dipole.

10. The problems and discrepancies in output power in the main application should be resolved. The output should be equivalent (or similar) to those reported in the SAR report. More clarification is needed for the supplemental or revised SAR report regarding test position for worst case exposure (bystanders) and discrepancies in reported SAR (0.0854) and those in the plots (9.47). The plots indicate the device is not in compliance with the 1.6 W/kg limit.

Answer:

See answer to Item 9.

11. Previous question regarding the dipole validation data for SAR was not addressed.

Answer:

See answer to Item 9.

APPENDIX A

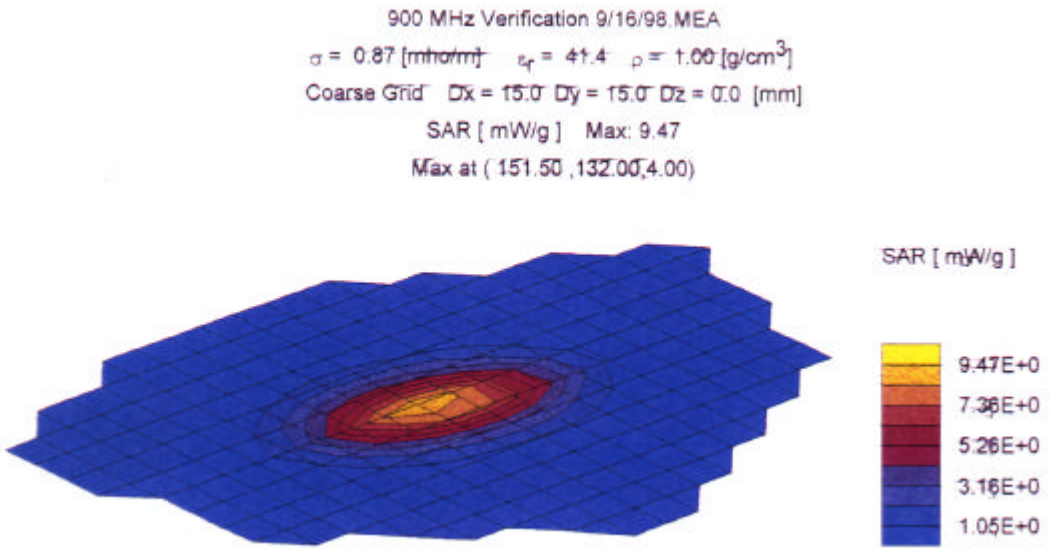
REVISED SAR TEST DATA

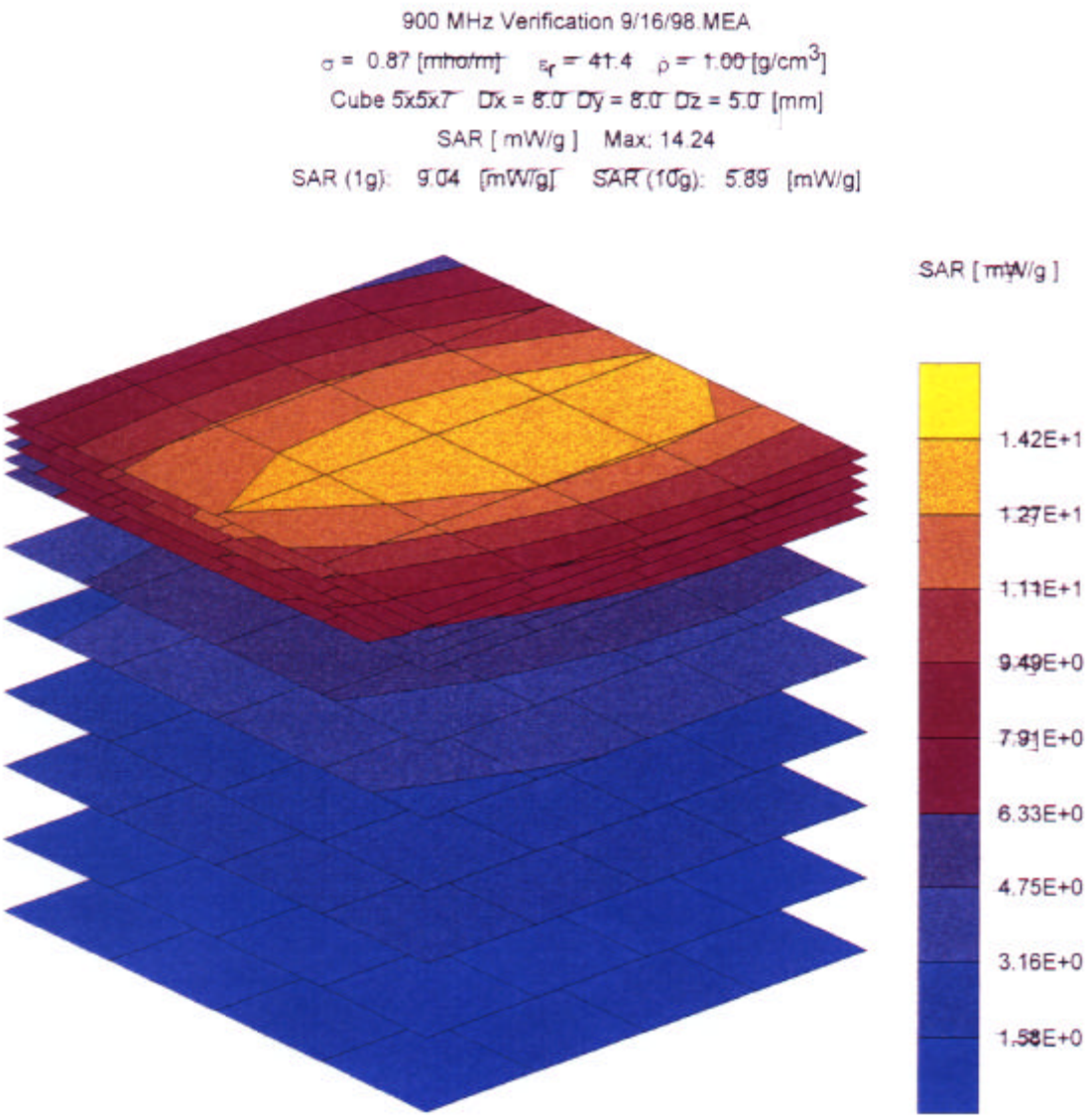
SAR DATA OVERVIEW

The following sections of this SAR data submission for the Spider II Modem are divided into the verification test and the worst case test data based on conversations with the FCC. The first portion of this appendix shows data obtained during a pre-test verification to determine that the SAR test set was operating properly. This involved insertion of a 'dummy' source into the setup and mapping the SAR emissions.

The second portion of this appendix is data for the worst case configuration of the Spider II Modem. These tests were performed in late September of 1998 based on test configurations determined by the FCC.

SETUP VALIDATION DATA



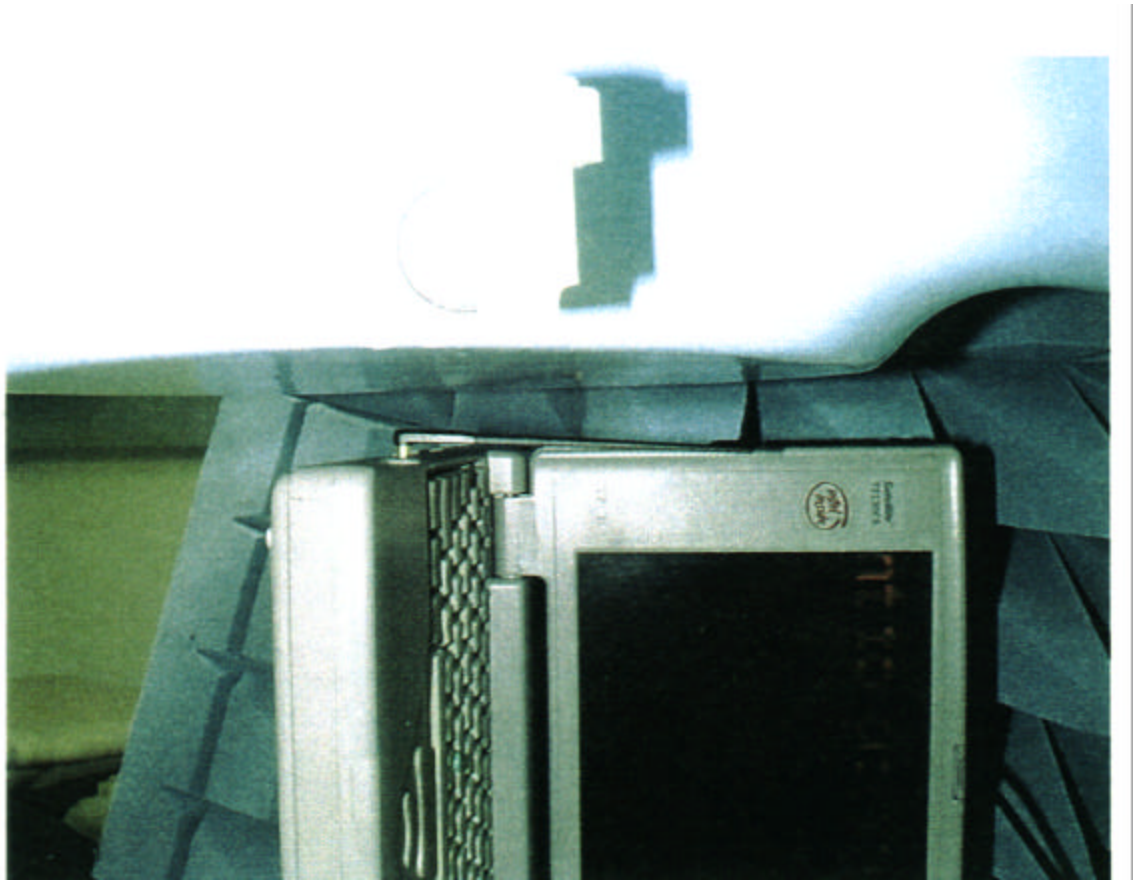

900 MHz Verification 9/16/98.MEA
σ = 0.87 [mho/m] εr = 41.4 ρ = 1.00 [g/cm3]
Cube 5x5x7 Dx = 8.0 Dy = 8.0 Dz = 5.0 [mm]
SAR [mW/g] Max: 14.24
SAR (1g): 9.04 [mW/g] SAR (10g): 5.89 [mW/g]
SAR [mW/g]
1.42E+1
1.27E+1
1.11E+1
9.49E+0
7.91E+0
6.33E+0
4.75E+0
3.16E+0
1.58E+0

WORST CASE TEST DATA

CONFIGURATION #1

The computer with the Spider II installed is facing left with the antenna parallel to the phantom and pointing left, approximately 2.5 cm from the verification point under the phantom.

SETUP PHOTO



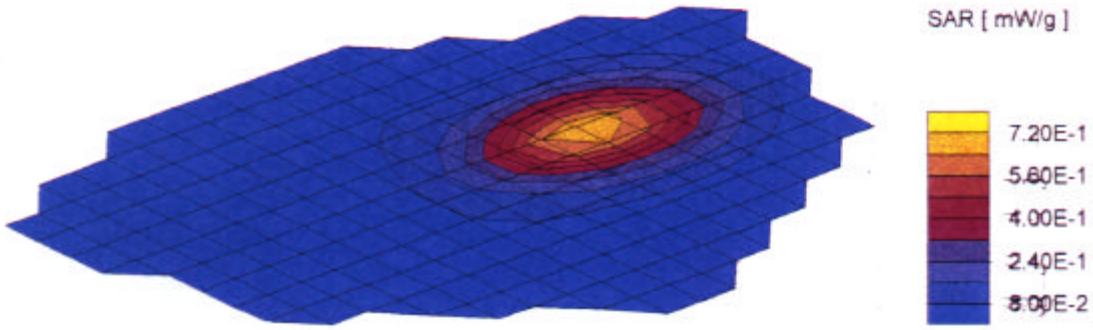
836.01 MHz CDPD Modem, Antenna // Phantom and Pointing Left Side, 9/16/98.MEA

σ = 0.95 [mho/m] ε_r = 54.0 ρ = 1.00 [g/cm^3]

Coarse Grid Dx = 15.0 Dy = 15.0 Dz = 0.0 [mm]

SAR [mW/g] Max: 0.72

Max at (211.50 ,130.50,4.00)



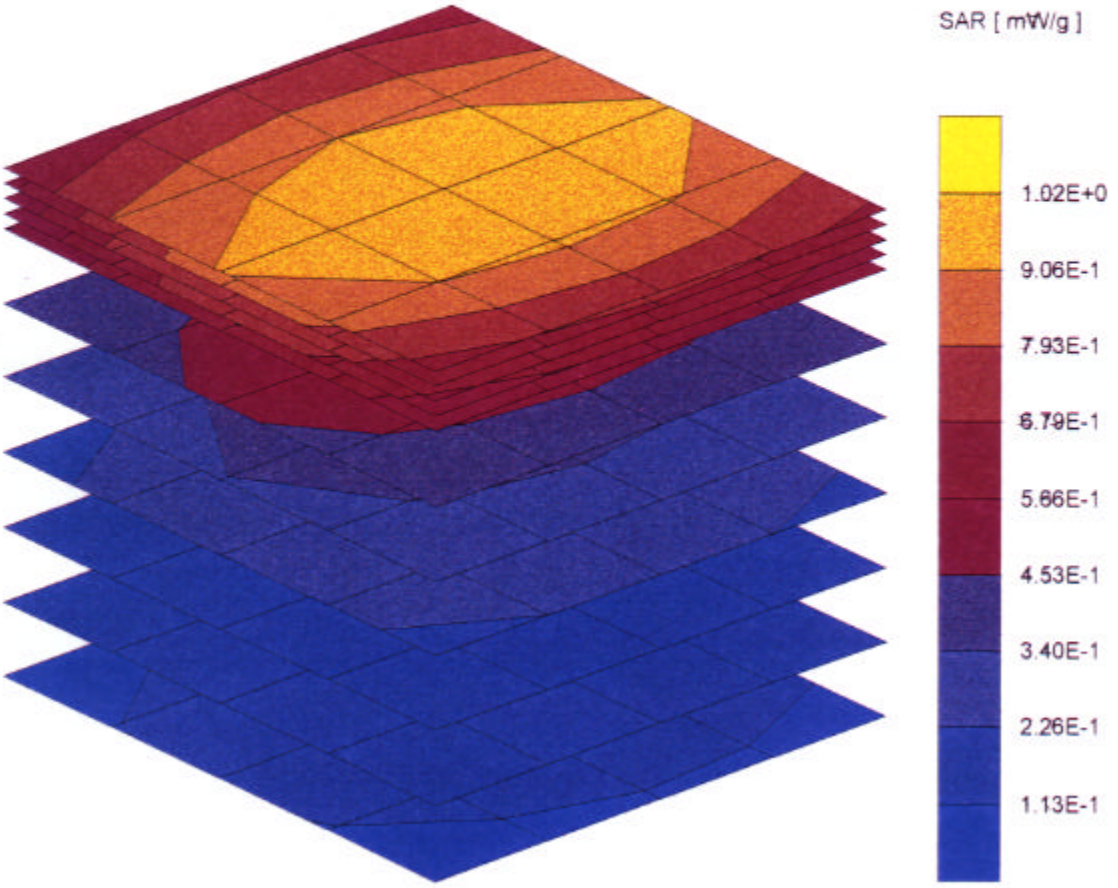
836.01 CDPD Modem, Antenna // Phantom and Pointing Left Side, 9/16/98.MEA

σ = 0.95 [mho/m] ε_r = 54.0 ρ = 1.00 [g/cm^3]

Cube 5x5x7 Dx = 8.0 Dy = 8.0 Dz = 5.0 [mm]

SAR [mW/g] Max: 1.02

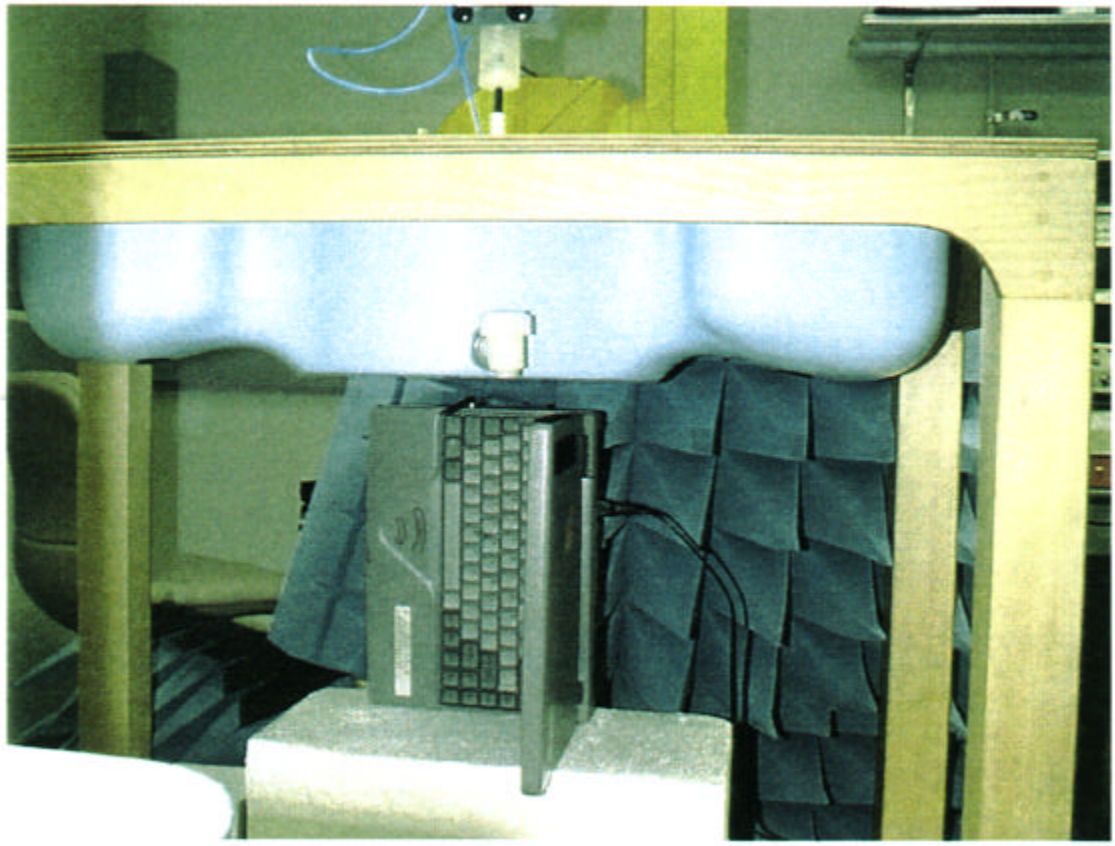
SAR (1g): 0.708 [mW/g] SAR (10g): 0.491 [mW/g]



CONFIGURATION #2

The computer with the Spider II installed is facing forward with the antenna parallel to the phantom and pointing forward, approximately 2.5 cm from the verification point under the phantom.

SETUP PHOTO



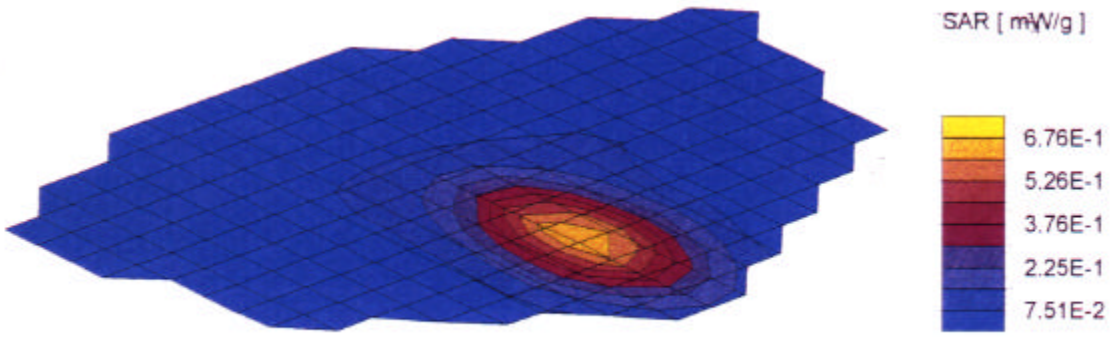
836.01 MHz CDPD Modem, Antenna // phantom and Pointing Forward, 9/16/98.MEA

σ = 0.95 [mho/m] ε_r = 54.0 ρ = 1.00 [g/cm^3]

Coarse Grid Dx = 15.0 Dy = 15.0 Dz = 0.0 [mm]

SAR [mW/g] Max: 0.68

Max at (154.50 ,78.00,4.00)



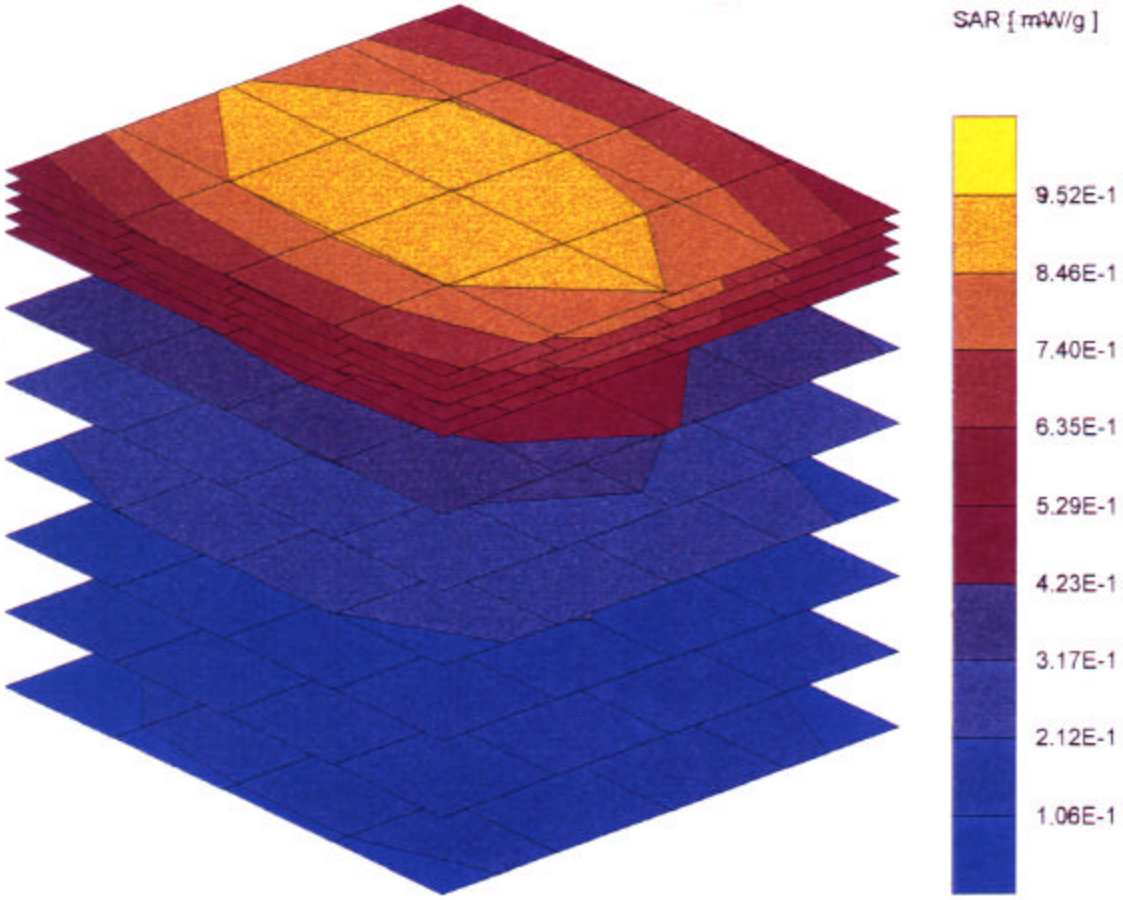
836.01 MHz CDPD Modem, Antenna // phantom and Pointing Forward, 9/16/98.MEA

σ = 0.95 [mho/m] ε_r = 54.0 ρ = 1.00 [g/cm^3]

Cube 5x5x7 dx = 8.0 dy = 8.0 dz = 5.0 [mm]

SAR [mW/g] Max: 0.95

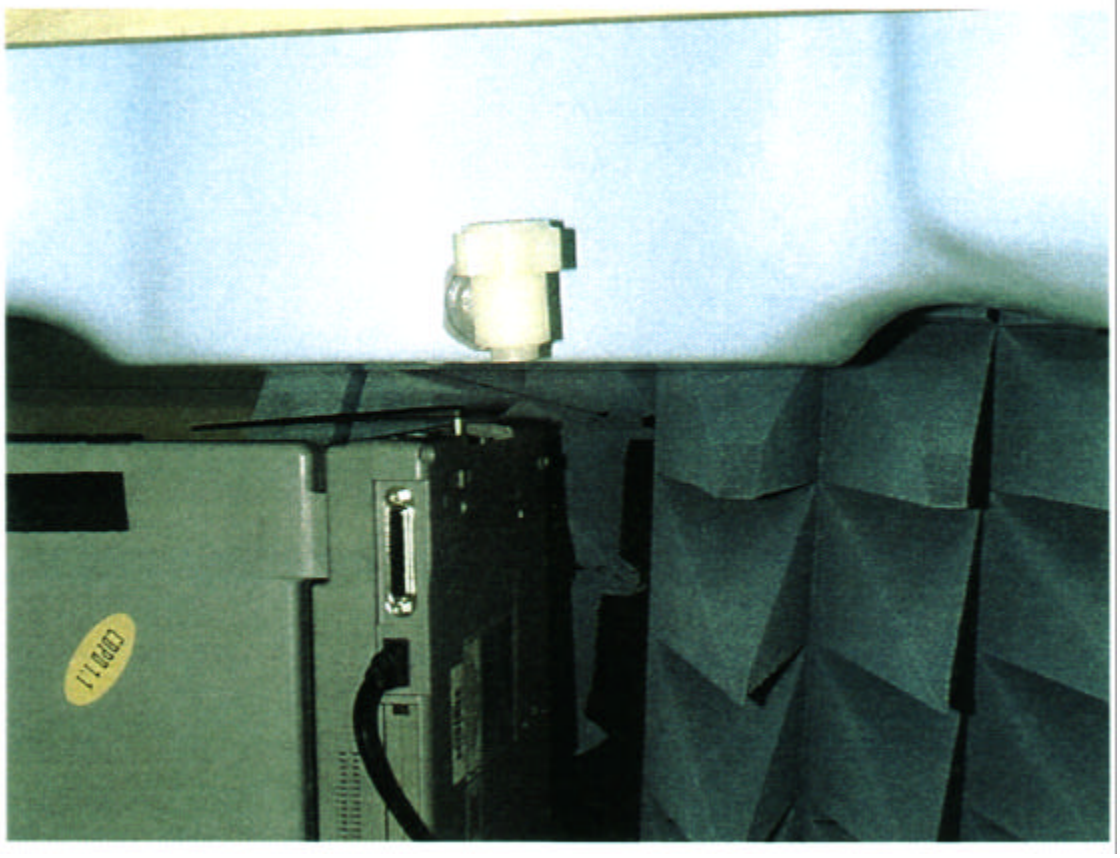
SAR (1g): 0.659 [mW/g] SAR (10g): 0.456 [mW/g]



CONFIGURATION #3

The computer with the Spider II installed is facing right with the antenna parallel to the phantom and pointing right, approximately 2.5 cm from the verification point under the phantom.

SETUP PHOTO



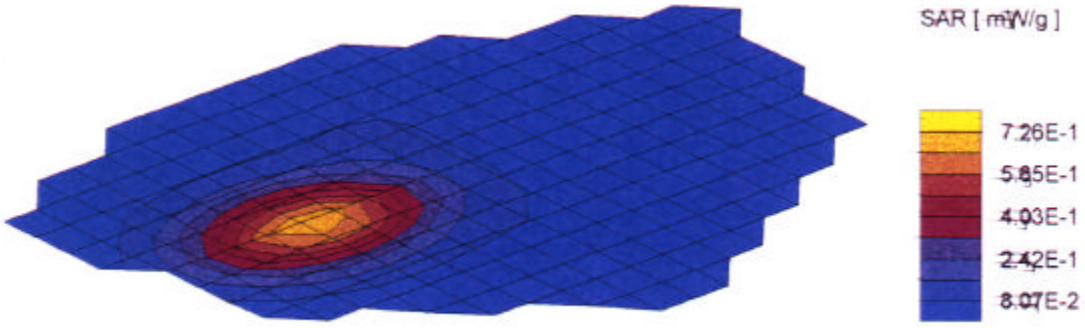
836.01 MHz CDPD Modem, Antenna // Phantom and Pointing Right Side, 9/16/98.MEA

σ = 0.95 [mho/m] ε_r = 54.0 ρ = 1.00 [g/cm^3]

Coarse Grid Dx = 15.0 Dy = 15.0 Dz = 0.0 [mm]

SAR [mW/g] Max: 0.73

Max at (93.00 ,132.00,4.00)



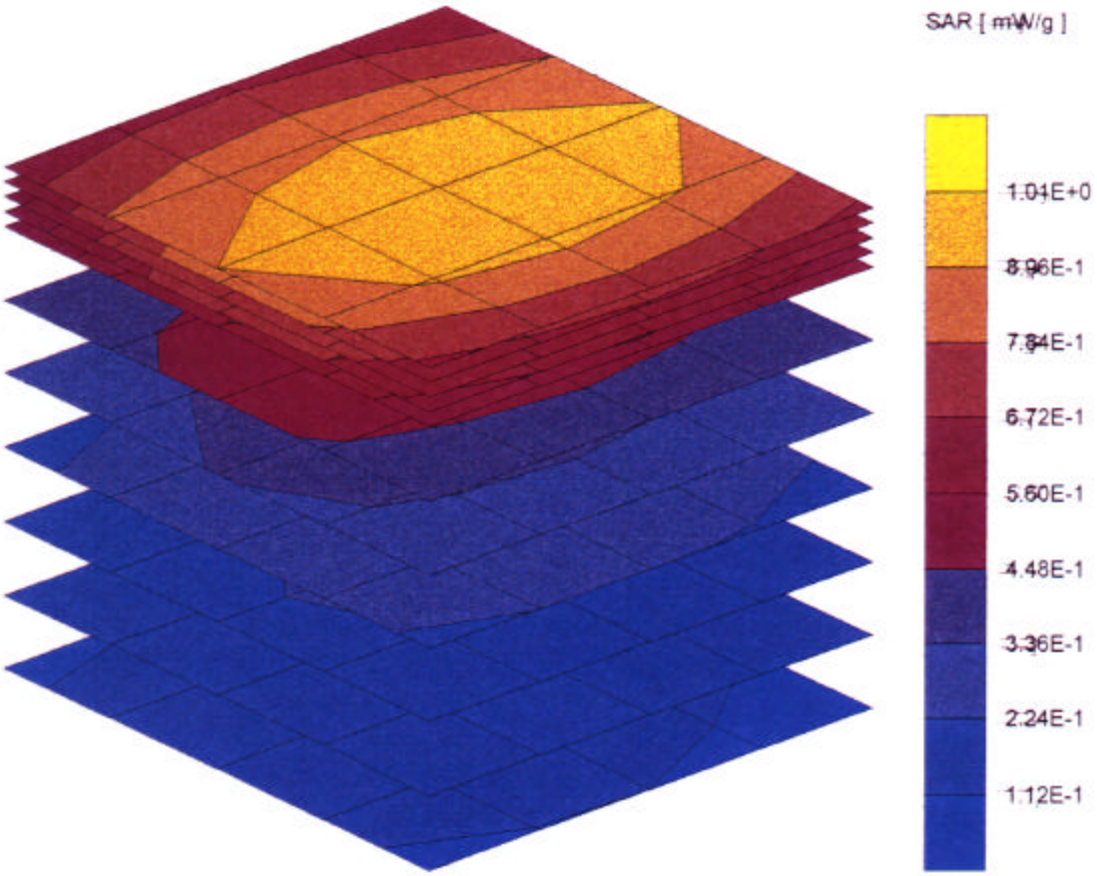
836.01 MHz CDPD Modem, Antenna // Phantom and Pointing Right Side, 9/16/98.MEA

σ = 0.95 [mho/m] ε_r = 54.0 ρ = 1.00 [g/cm^3]

Cube 5x5x7 Dx = 8.0 Dy = 8.0 Dz = 5.0 [mm]

SAR [mW/g] Max: 1.01

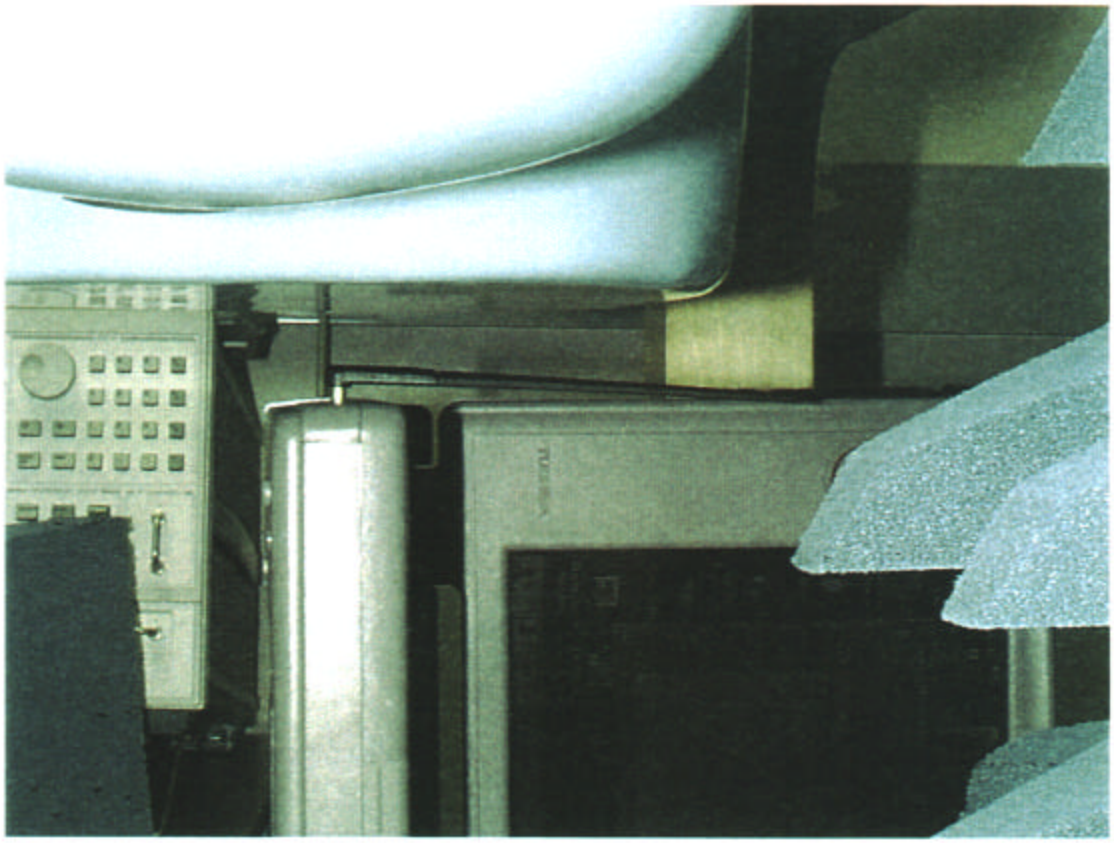
SAR (1g): 0.700 [mW/g] SAR (10g): 0.487 [mW/g]



CONFIGURATION #4

The computer with the Spider II installed is facing backward with the antenna parallel to the phantom and pointing backward, approximately 2.5 cm from the verification point under the phantom.

SETUP PHOTO



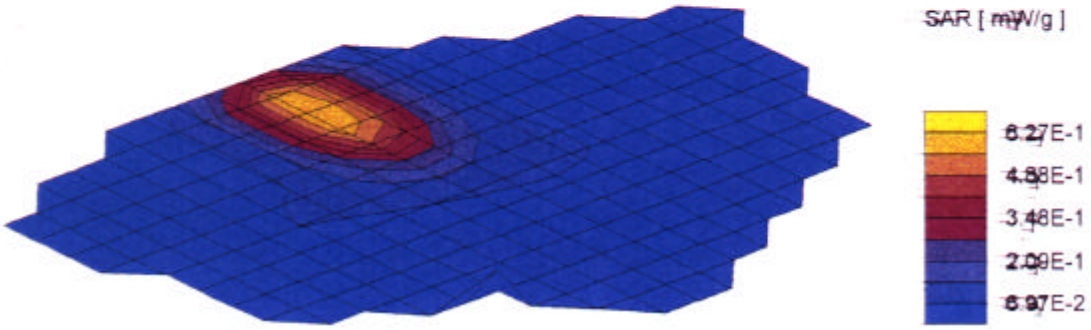
836.01 MHz CDPD Modem, Antenna // Phantom and Pointing Backward, 9/16/98.MEA

σ = 0.95 [mho/m] ε_r = 54.0 ρ = 1.00 [g/cm^3]

Coarse Grid Dx = 15.0 Dy = 15.0 Dz = 0.0 [mm]

SAR [mW/g] Max: 0.63

Max at (154.50 ,189.00,4.00)



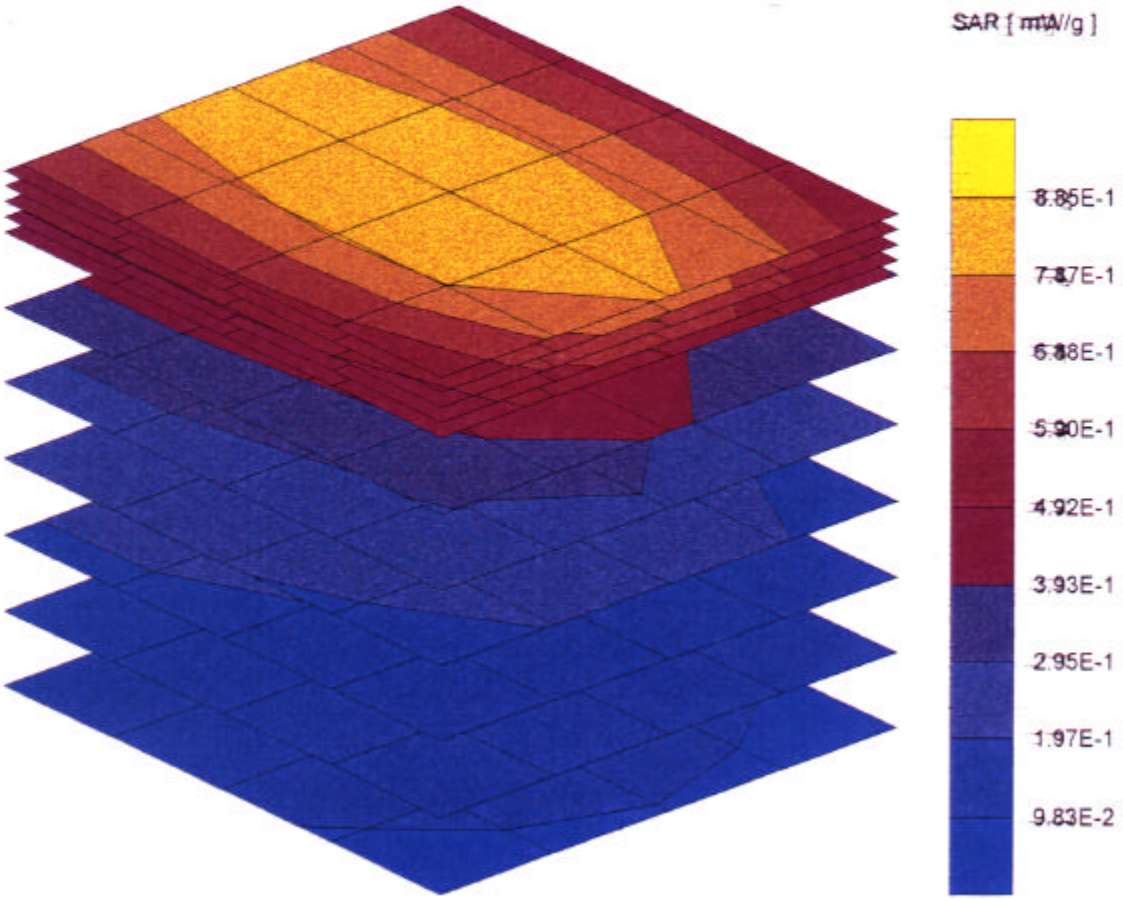
836.01 MHz CDPD Modem, Antenna // Phantom and Pointing Backward, 9/16/98.MEA

σ = 0.95 [mho/m] ε_r = 54.0 ρ = 1.00 [g/cm^3]

Cube 5x5x7 Dx = 8.0 Dy = 8.0 Dz = 5.0 [mm]

SAR [mW/g] Max: 0.89

SAR (1g): 0.618 [mW/g] SAR (10g): 0.437 [mW/g]



GENERAL CLOSEUP OF COMPUTER WITH SPIDER II ADJACENT TO PHANTOM

APPENDIX B

DIPOLE CALIBRATION DATA

Schmid & Partner
Engineering AG

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DASY

Dipole Validation Kit

Type: D900V2

Serial: 011

Manufactured:	June 1996
Calibrated:	July 1997
Recalibrated:	July 1998

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 900 MHz:

Relative Permitivity	**42.8**	± 5%
Conductivity	**0.85 mho/m**	± 5%

The DASY3 System (Software version 3.1) with a dosimetric E-field probe ET3DV4 (SN:1302, Conversion factor 5.5) was used for the measurements.

The dipole was mounted on the small tripod so that the dipole feedpoint was positioned below the centre 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 15mm 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 phantom according to the measurement conditions described in section 1. The results 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:	**9.12 mW/g**
averaged over 10 cm^3 (10 g) of tissue:	**6.00 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 analyser and numerically transformed to the dipole feedpoint. The transformation parameters from the SMA-connector to the dipole feedpoint are:

Electrical delay:	**1.42 ns**	(one direction)
Transmission factor:	**0.984**	(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 900 MHz:	Re{Z} = **48.9 Ω**
	Im {Z} = **-2.4 Ω**
Return Loss at 900 MHz	**31.3 dB**

4. Handling

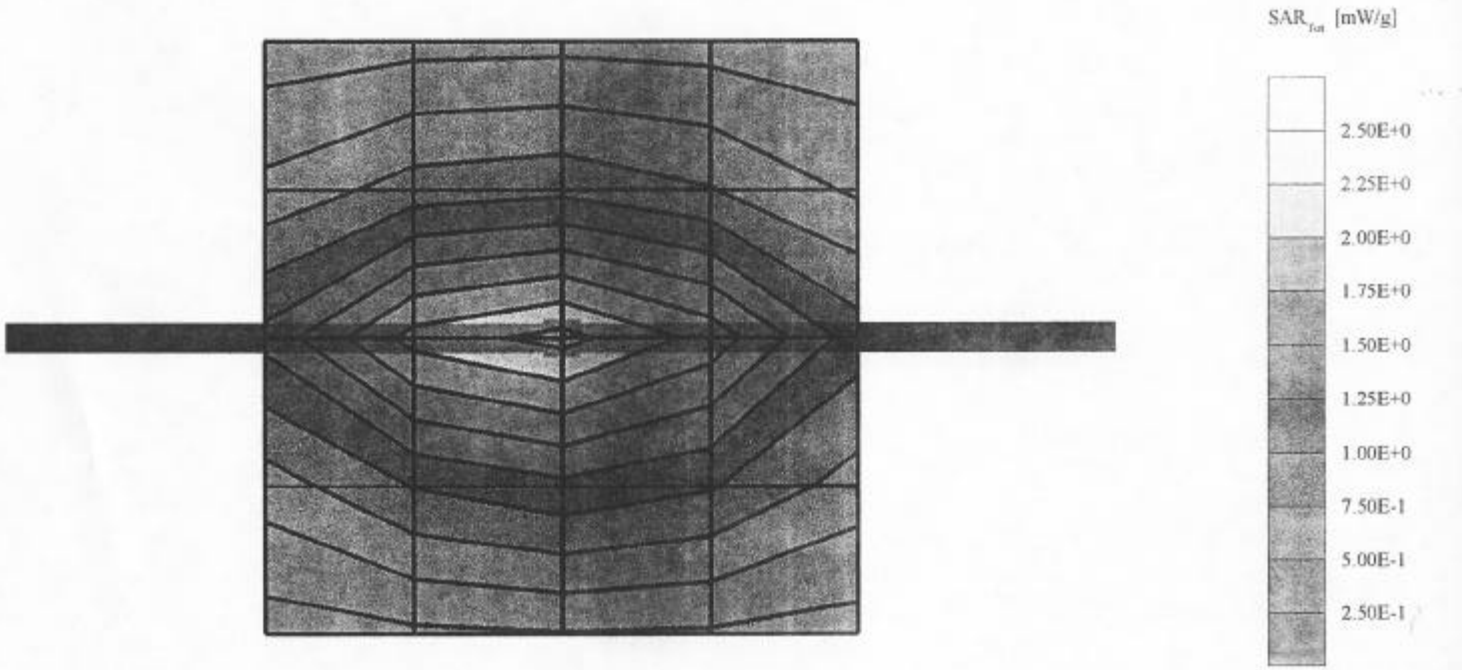
The dipole is made of standard semirigid coaxial cable. The centre conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

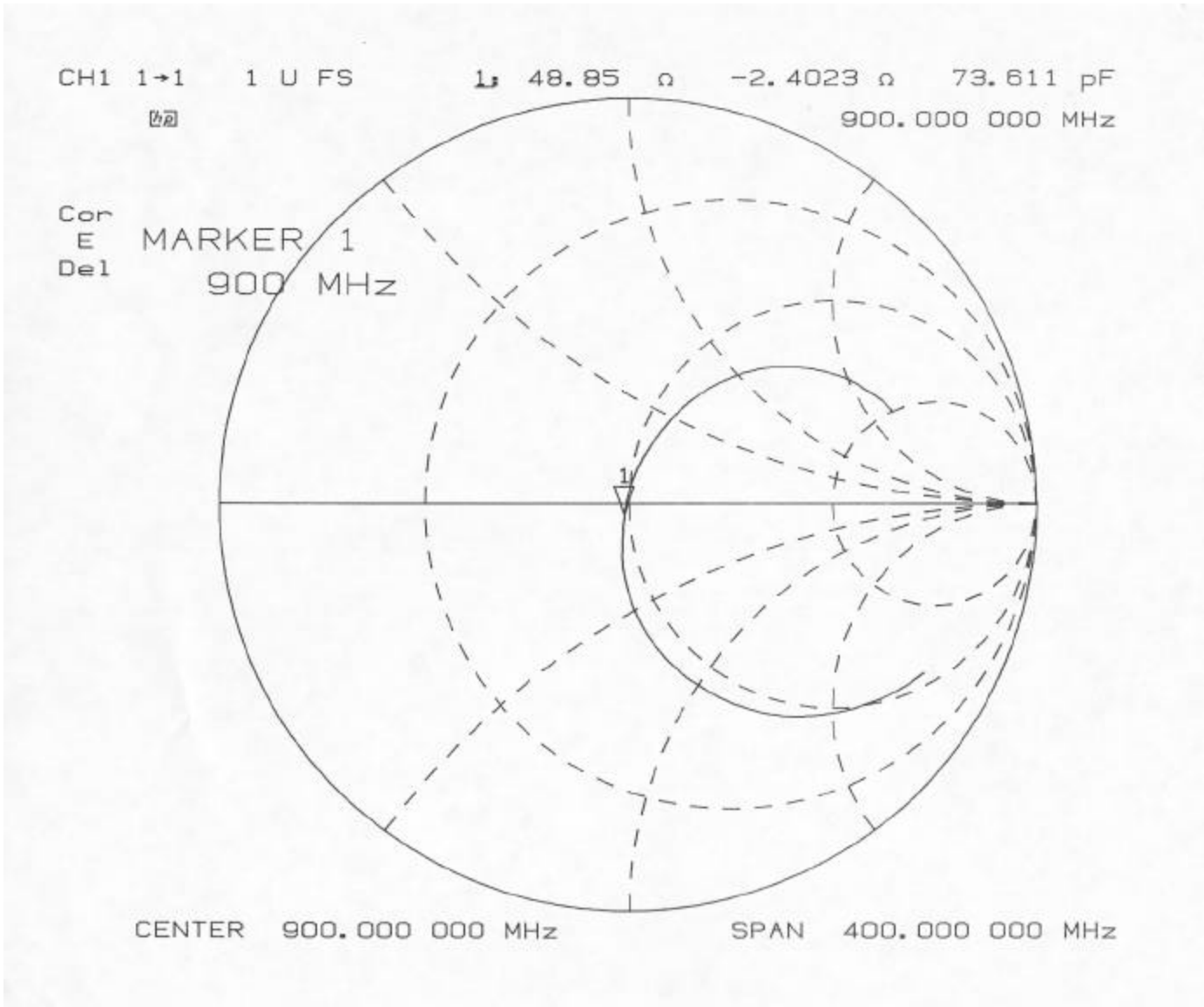
Do not apply excessive force to the dipole arms, because they might bend. If the dipole arms have to be bent back, take care to release stress to the soldered connections near the feedpoint; they might come off.

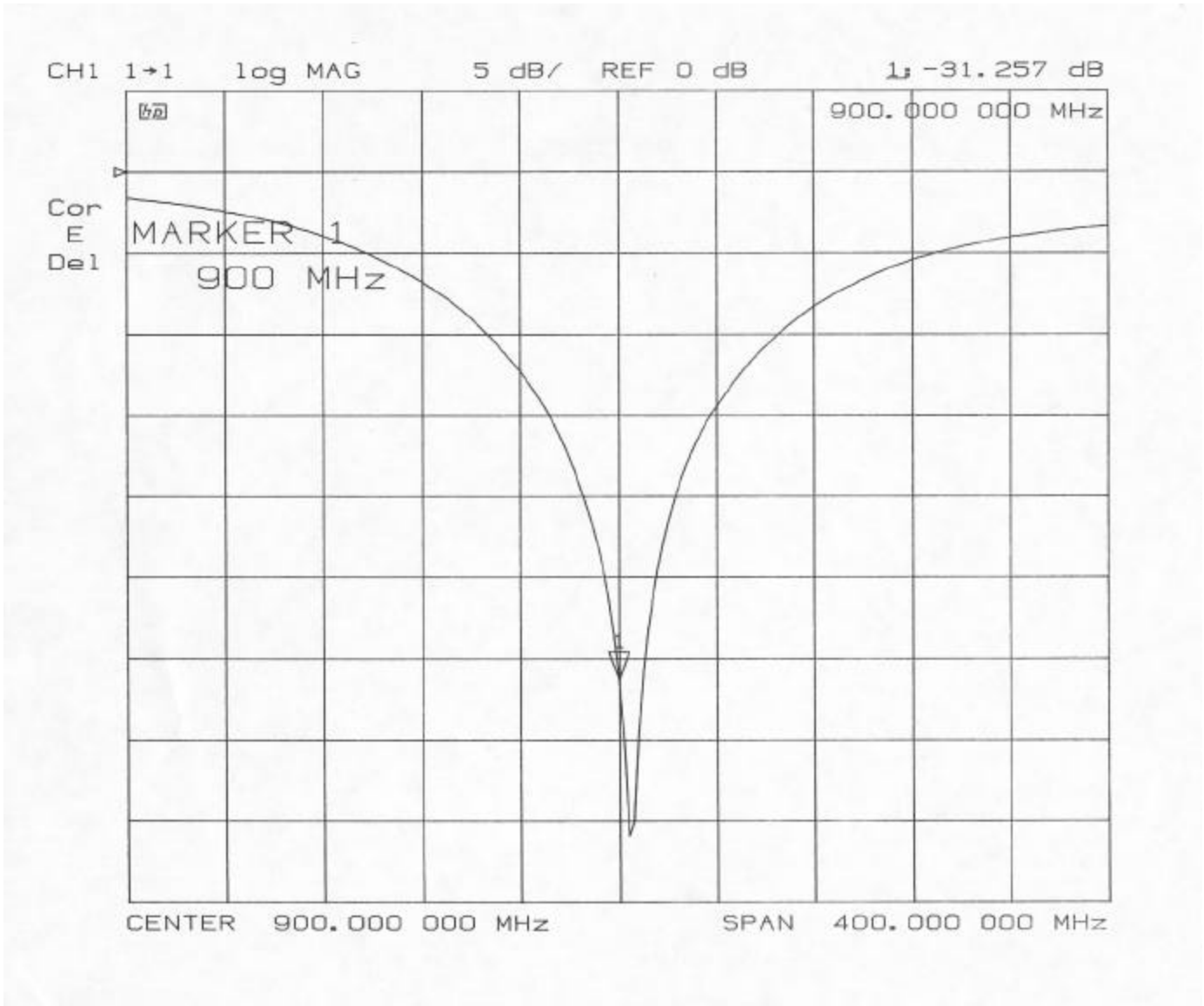
After prolonged use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

Validation Dipole D900V2 SN:011, d = 15mm

Frequency: 900 [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(5.50,5.50,5.50); Brain 900 MHz: σ = 0.85 [mho/m] ε_r = 42.8 ρ = 1.00 [g/cm^3]
Cubes (2): Peak: 3.46 [mW/g] ± 0.00 dB, SAR (1g): 2.28 [mW/g] ± 0.00 dB, SAR (10g): 1.50 [mW/g] ± 0.00 dB, (Worst-case extrapolation)
Penetration depth: 13.0 (12.0, 14.3) [mm]
Powerdrift: -0.01 dB




CH1 1→1 1 U FS
1: 48.85 Ω -2.4023 Ω 73.611 pF
900.000 000 MHz
Cor
E
Del
MARKER 1
900 MHz
1
CENTER 900.000 000 MHz
SPAN 400.000 000 MHz


CH1 1→1 log MAG 5 dB/ REF 0 dB 1: -31.257 dB
900.000 000 MHz
Cor
E
Del
MARKER 1
900 MHz
CENTER 900.000 000 MHz
SPAN 400.000 000 MHz