

# DASY

## Dipole Validation Kit

Type: D900V2

Serial: 156

Manufactured: February 28, 2002  
Calibrated: August 24, 2004

## 1. Measurement Conditions

The measurements were performed in the half size flat phantom filled with **head simulating solution** of the following electrical parameters at 900 MHz:

Relative Dielectricity	<b>41.0</b> $\pm 5\%$
Conductivity	<b>0.97 mho/m</b> $\pm 5\%$

The DASY4 System with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 6.18 at 900 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 15mm from dipole center to the solution surface. The included distance spacer was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 15mm was aligned with the dipole. The 7x7x7 fine cube was chosen for cube integration.

The dipole input power (forward power) was 250mW  $\pm 3\%$ . The results are normalized to 1W input power.

## 2. SAR Measurement with DASY4 System

Standard SAR-measurements were performed according to the measurement conditions described in section 1. The results (see figure supplied) have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values measured with the dosimetric probe ET3DV6 SN:1507 and applying the advanced extrapolation are:

averaged over 1 cm <sup>3</sup> (1 g) of tissue:	<b>10.9 mW/g</b> $\pm 16.8\%$ (k=2) <sup>1</sup>
averaged over 10 cm <sup>3</sup> (10 g) of tissue:	<b>7.00 mW/g</b> $\pm 16.2\%$ (k=2) <sup>1</sup>

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<sup>1</sup> validation uncertainty

### **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:	<b>1.399 ns</b>	(one direction)
Transmission factor:	<b>0.975</b>	(voltage transmission, one direction)

The dipole was positioned at the flat phantom sections according to section 1 and the distance spacer was in place during impedance measurements.

Feedpoint impedance at 900 MHz:	$\text{Re}\{Z\} = 48.8 \Omega$
	$\text{Im}\{Z\} = -7.5 \Omega$
Return Loss at 900 MHz	<b>-22.3 dB</b>

### **4. Measurement Conditions**

The measurements were performed in the half size flat phantom filled with **body simulating solution** of the following electrical parameters at 900 MHz:

Relative Dielectricity	<b>53.9</b>	$\pm 5\%$
Conductivity	<b>1.05 mho/m</b>	$\pm 5\%$

The DASY4 System with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 6.02 at 900 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 15mm from dipole center to the solution surface. The included distance spacer was used during measurements for accurate distance positioning.

The coarse grid with a grid spacing of 15mm was aligned with the dipole. The 7x7x7 fine cube was chosen for cube integration.

The dipole input power (forward power) was 250mW  $\pm 3\%$ . The results are normalized to 1W input power.

## **5. SAR Measurement with DASY4 System**

Standard SAR-measurements were performed according to the measurement conditions described in section 4. The results (see figure supplied) have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values measured with the dosimetric probe ET3DV6 SN:1507 and applying the advanced extrapolation are:

averaged over 1 cm <sup>3</sup> (1 g) of tissue:	<b>10.8 mW/g ± 16.8 % (k=2)<sup>2</sup></b>
averaged over 10 cm <sup>3</sup> (10 g) of tissue:	<b>7.00 mW/g ± 16.2 % (k=2)<sup>2</sup></b>

## **6. Dipole Impedance and Return Loss**

The dipole was positioned at the flat phantom sections according to section 4 and the distance spacer was in place during impedance measurements.

Feedpoint impedance at 900 MHz:	<b>Re {Z} = 45.5 Ω</b>
	<b>Im {Z} = -8.9 Ω</b>
Return Loss at 900 MHz	<b>-19.7 dB</b>

## **7. Handling**

Do not apply excessive force to the dipole arms, because they might bend. Bending of the dipole arms stresses the soldered connections near the feedpoint leading to a damage of the dipole.

## **8. Design**

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.

## **9. Power Test**

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

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<sup>2</sup> validation uncertainty



Date/Time: 08/19/04 14:46:20

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - 156**

Communication System: CW-900; Frequency: 900 MHz; Duty Cycle: 1:1

Medium: HSL 900 MHz;

Medium parameters used:  $f = 900 \text{ MHz}$ ;  $\sigma = 0.97 \text{ mho/m}$ ;  $\epsilon_r = 41$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(6.18, 6.18, 6.18); Calibrated: 1/23/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 7/22/2004
- Phantom: Flat Phantom half size; Type: QD000P49AA; Serial: SN:1001;
- Measurement SW: DASY4, V4.3 Build 16; Postprocessing SW: SEMCAD, V1.8 Build 123

**Pin = 250 mW; d = 15 mm/Area Scan (81x81x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$   
Maximum value of SAR (interpolated) = 2.91 mW/g

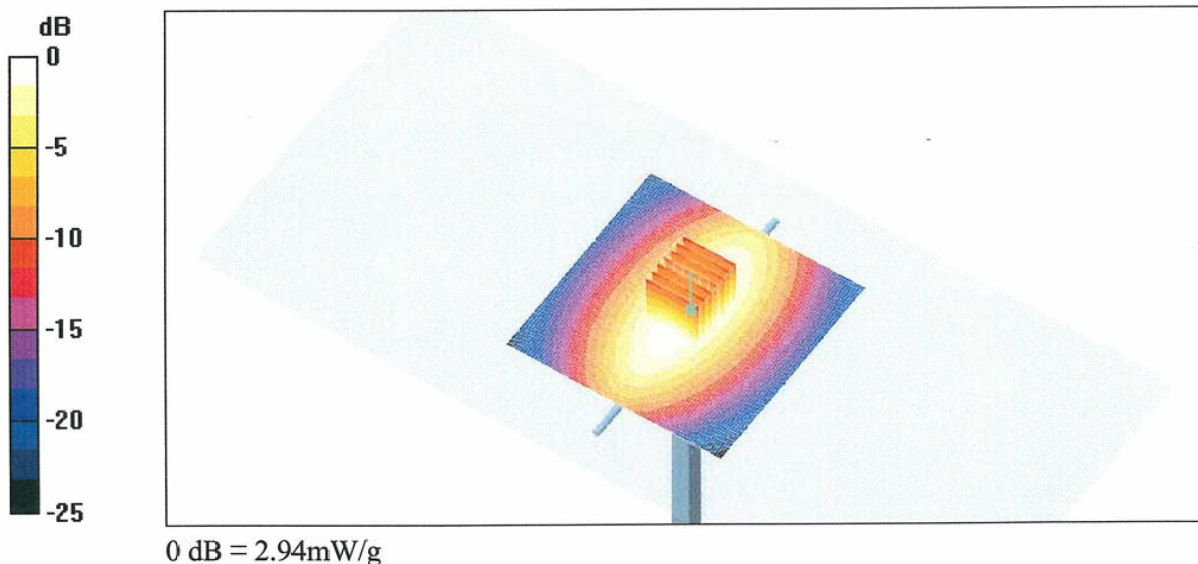
**Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

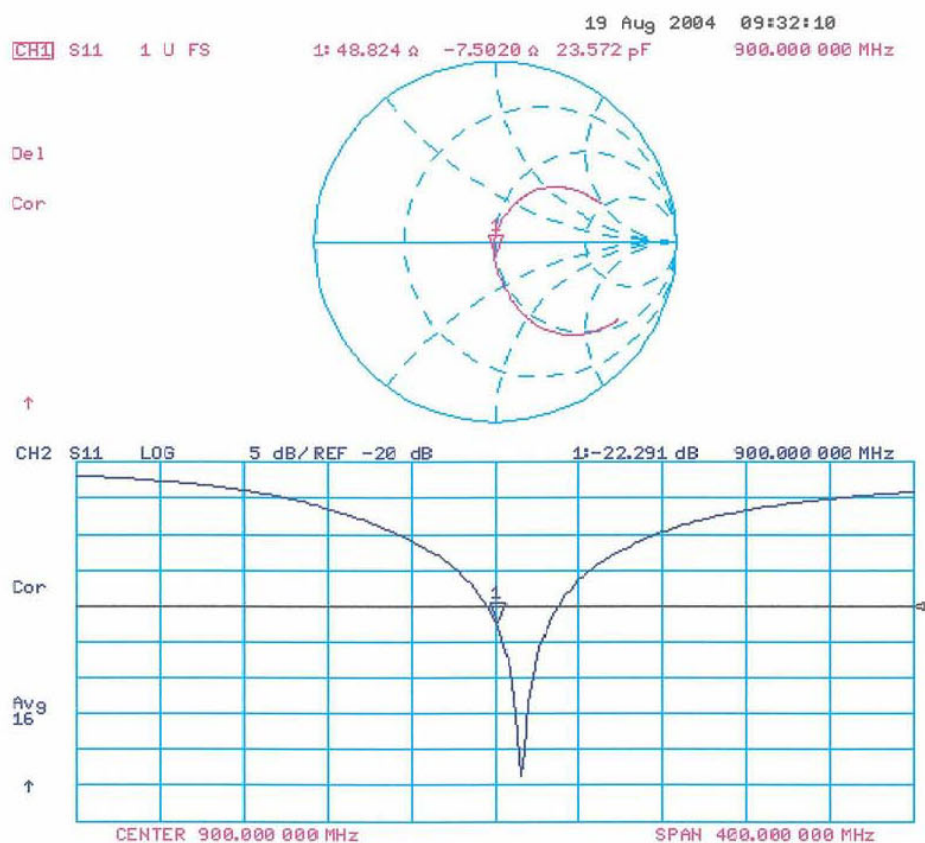
Reference Value = 56.8 V/m; Power Drift = 0.0 dB

Peak SAR (extrapolated) = 4.07 W/kg

**SAR(1 g) = 2.72 mW/g; SAR(10 g) = 1.75 mW/g**

Maximum value of SAR (measured) = 2.94 mW/g





Date/Time: 08/24/04 14:09:24

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN156**

Communication System: CW-900; Frequency: 900 MHz; Duty Cycle: 1:1

Medium: Muscle 900 MHz;

Medium parameters used:  $f = 900 \text{ MHz}$ ;  $\sigma = 1.05 \text{ mho/m}$ ;  $\epsilon_r = 53.9$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(6.02, 6.02, 6.02); Calibrated: 1/23/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 7/22/2004
- Phantom: Flat Phantom half size; Type: QD000P49AA; Serial: SN:1001;
- Measurement SW: DASY4, V4.3 Build 17; Postprocessing SW: SEMCAD, V1.8 Build 124

**Pin = 250 mW; d = 15 mm/Area Scan (81x81x1):** Measurement grid:  $dx=15\text{mm}$ ,  $dy=15\text{mm}$   
Maximum value of SAR (interpolated) = 2.92 mW/g

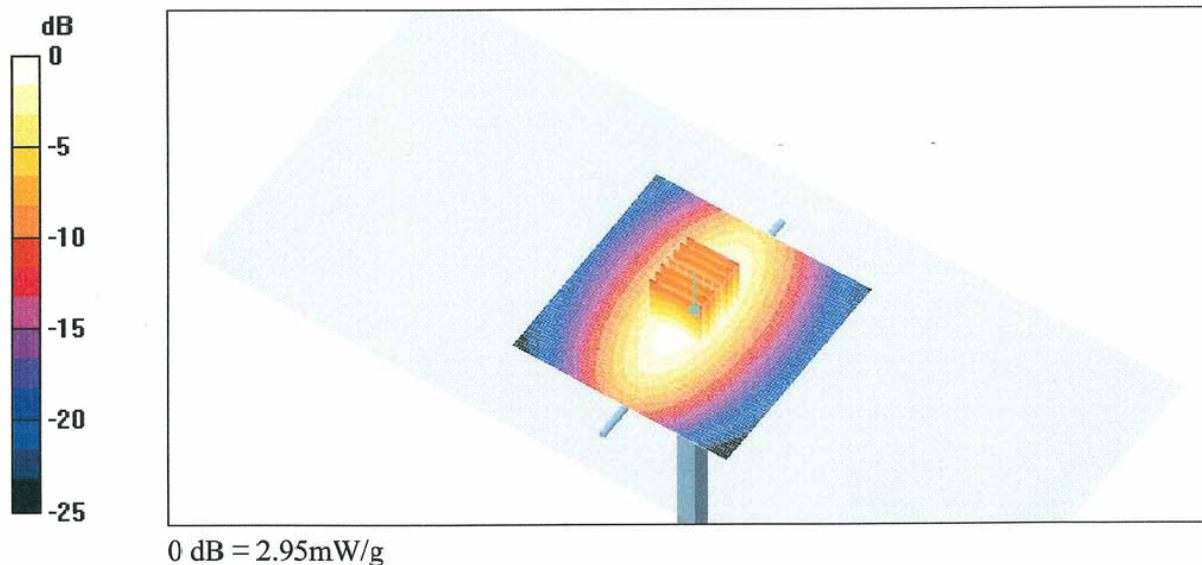
**Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 54.6 V/m; Power Drift = 0.007 dB

Peak SAR (extrapolated) = 3.94 W/kg

**SAR(1 g) = 2.7 mW/g; SAR(10 g) = 1.75 mW/g**

Maximum value of SAR (measured) = 2.95 mW/g



24 Aug 2004 09:54:21  
 [CH1] S11 1 U FS 1: 45.539  $\Omega$  -8.8535  $\Omega$  19.974 pF 900.000 000 MHz

Del

Cor

Avg  
16

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