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**DASY**

**Dipole Validation Kit**

**Type: D835V2**

**Serial: 405**

**Manufactured: September 25, 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 835 MHz:

|                        |            |      |
|------------------------|------------|------|
| Relative Dielectricity | 42.0       | ± 5% |
| Conductivity           | 0.88 mho/m | ± 5% |

The DASY3 System (Software version 3.1c) with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 6.27 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 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 phantom according to the measurement conditions described in section 1. The results have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values are:

|                                                    |           |
|----------------------------------------------------|-----------|
| averaged over 1 cm <sup>3</sup> (1 g) of tissue:   | 9.88 mW/g |
| averaged over 10 cm <sup>3</sup> (10 g) of tissue: | 6.36 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:    | 1.449 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 835 MHz: | $\text{Re}\{Z\} = 49.8 \Omega$ |
|                                 | $\text{Im}\{Z\} = 0.4 \Omega$  |
| Return Loss at 835 MHz          | -44.4 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 835 MHz:

|                        |            |           |
|------------------------|------------|-----------|
| Relative Dielectricity | 56.6       | $\pm 5\%$ |
| Conductivity           | 0.93 mho/m | $\pm 5\%$ |

The DASY3 System (Software version 3.1c) 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 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.

## 5. SAR Measurement

Standard SAR-measurements were performed with the phantom according to the measurement conditions described in section 4. The results have been normalized to a dipole input power of 1W (forward power). The resulting averaged SAR-values are:

averaged over 1 cm<sup>3</sup> (1 g) of tissue: 10.1 mW/g

averaged over 10 cm<sup>3</sup> (10 g) of tissue: 6.56 mW/g

2.525

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.

## 6. 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: 1.449 ns (one direction)

Transmission factor: 0.993 (voltage transmission, one direction)

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

Feedpoint impedance at 835 MHz:  $\text{Re}\{Z\} = 45.8 \Omega$

$\text{Im}\{Z\} = -2.3 \Omega$

Return Loss at 835 MHz: -26.4 dB

## 7. Handling

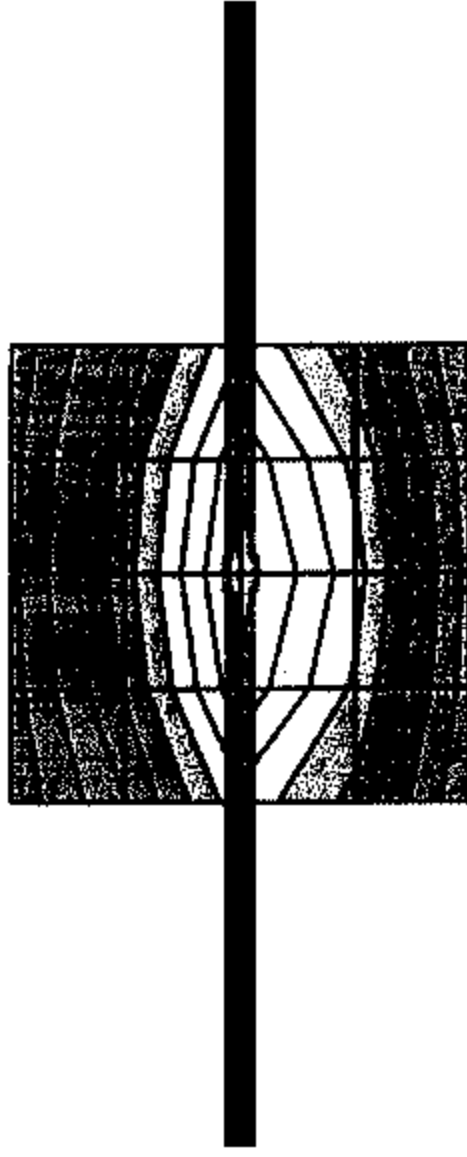
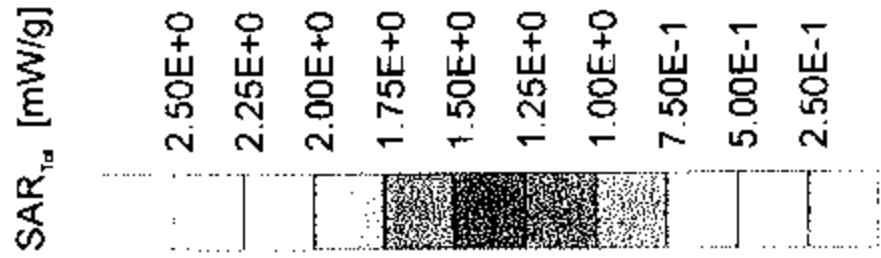
The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

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.

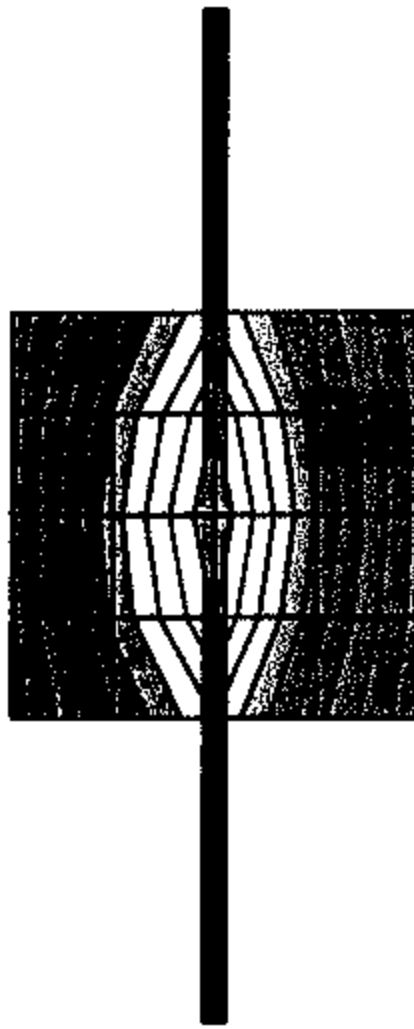
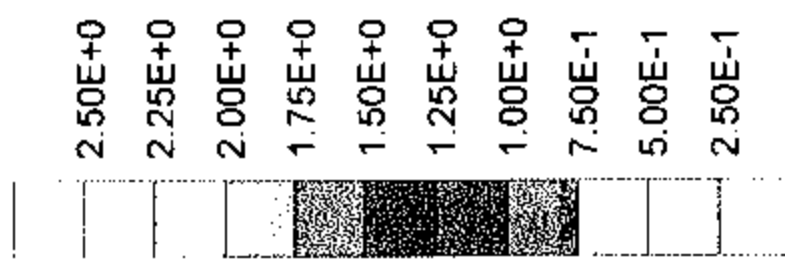
After prolonged use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

# Validation Dipole D835V2 SN:405, d = 15 mm

Frequency 835 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(6.27,6.27,6.27) at 900 MHz; IEEE1528 835 MHz;  $\sigma = 0.88 \text{ mho/m}$ ,  $\epsilon_r = 42.0$ ,  $\rho = 1.00 \text{ g/cm}^3$   
 Cubes (2): Peak:  $3.91 \text{ mW/g} \pm 0.02 \text{ dB}$ , SAR (1g)  $2.47 \text{ mW/g} \pm 0.01 \text{ dB}$ , SAR (10g)  $1.59 \text{ mW/g} \pm 0.02 \text{ dB}$ , (Worst-case extrapolation)  
 Penetration depth: 12.2 (10.9, 13.9) [mm]  
 Powerdrift 0.02 dB



SAR<sub>Td</sub> [mW/g]



13 Feb 2001 20:49:34

CH1 S11 1 U FS

1: +9.836  $\Omega$  0.3672  $\Omega$  69.988 pF

335.000 000 MHz

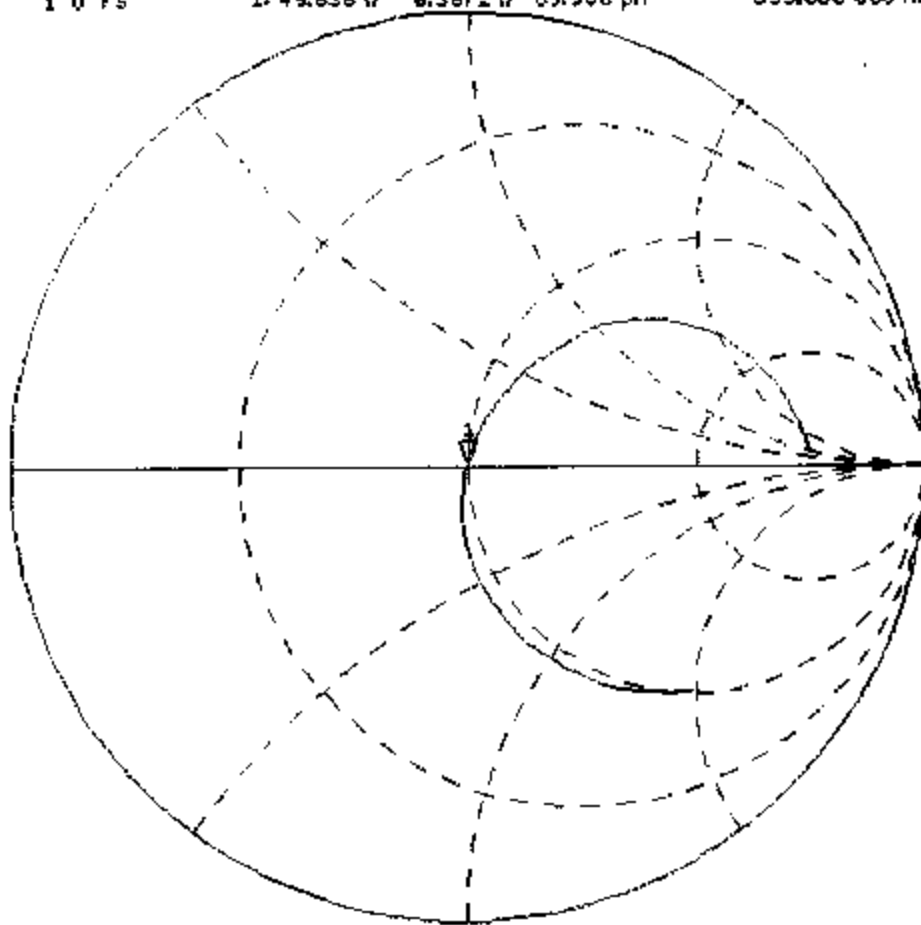
PR  
Del

Cor  
Avg  
16

t

START 700.000 000 MHz

STOP 1100.000 000 MHz



13 Feb 2001 20:49:22

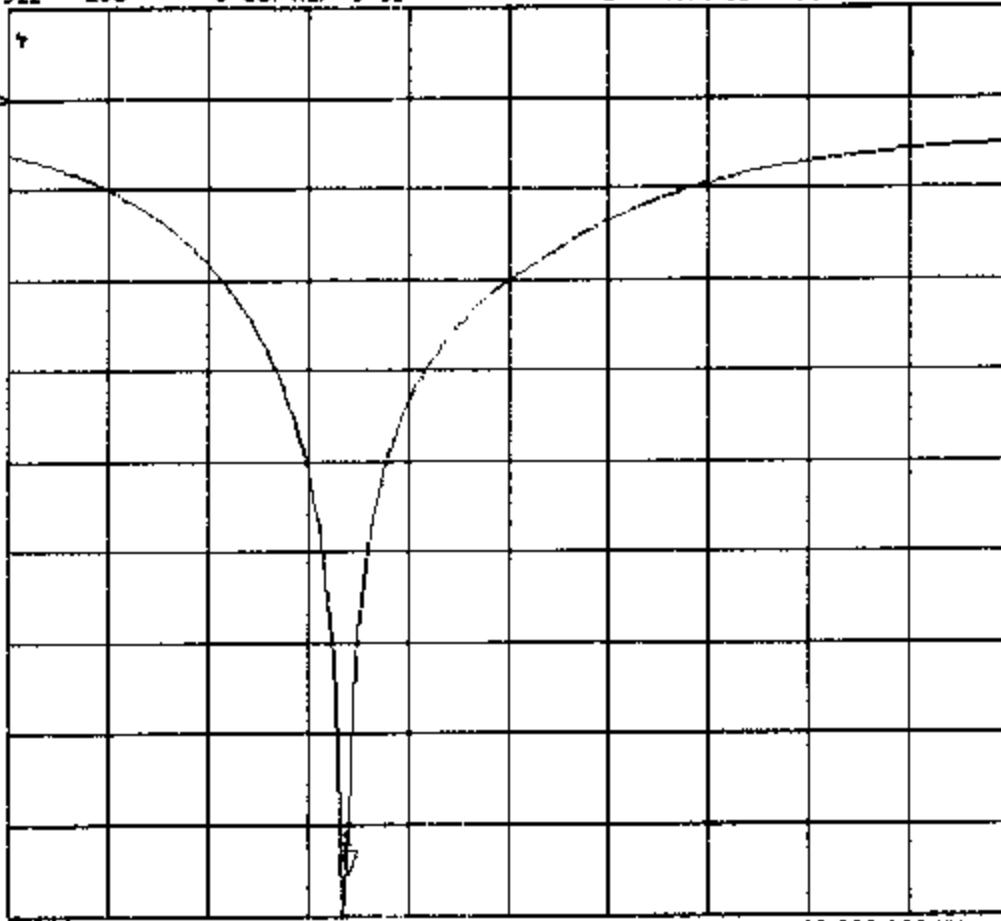
CH1 S11 LOG 5 dB/REF 0 dB

11-44.379 dB 835.000 000 MHz

PRM  
Del

Cor  
Avg  
16

↑



START 700.000 000 MHz

STOP 1 1100.000 000 MHz

13 Feb 2001 18:41:56

CH3 S11 1 U FS

1: 45.834  $\Omega$  -2.2676  $\Omega$  84.057 pF

835.000 000 MHz

PR#  
De1

Cor  
Avg  
16

+

