

**6. Input Offset Measurement (cont'd)**

Input shorted

in $\mu\text{V}$	Average	min. Offset	max. Offset	Std. Deviation
Channel X	-0.02	-0.85	0.97	0.27
Channel Y	-0.69	-2.12	0.97	0.35
Channel Z	-0.96	-2.39	0.43	0.35

**7. Input Offset Current**

Nominal Input circuitry offset current on all channels: &lt;25fA

**8. Input Resistance**

In MOhm	Calibrating	Measuring
Channel X	0.2001	199.9
Channel Y	0.1999	203.3
Channel Z	0.2000	200.4

**9. Low Battery Alarm Voltage**

in V	Alarm Level
Supply (+ Vcc)	7.72
Supply (- Vcc)	7.55

**10. Power Consumption**

in mA	Switched off	Stand by	Transmitting
Supply (+ Vcc)	0.00	8.71	14.4
Supply (- Vcc)	-0.01	-8.03	-9.20



## **D4: 1900MHZ SYSTEM VALIDATION DIPOLE**

Client **Auden > Chunghwa Telecom**

**CALIBRATION CERTIFICATE**



Object(s) **D1900V2 - SN:5d036**  
 Calibration procedure(s) **QA CAL-05.v2  
 Calibration procedure for dipole validation kits**  
 Calibration date: **August 25, 2003**  
 Condition of the calibrated item **In Tolerance (according to the specific calibration document)**

This calibration statement documents traceability of M&TE used in the calibration procedures and conformity of the procedures with the ISO/IEC 17025 international standard.

All calibrations have been conducted in the closed laboratory facility: environment temperature 22 +/- 2 degrees Celsius and humidity < 75%.

Calibration Equipment used (M&TE critical for calibration)

Model Type	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
RF generator R&S SML-03	100698	27-Mar-2002 (R&S, No. 20-92389)	In house check: Mar-05
Power sensor HP 8481A	MY41092317	18-Oct-02 (Agilent, No. 20021018)	Oct-04
Power sensor HP 8481A	US37292783	30-Oct-02 (METAS, No. 252-0236)	Oct-03
Power meter EPM E442	GB37480704	30-Oct-02 (METAS, No. 252-0236)	Oct-03
Network Analyzer HP 8753E	US37390585	18-Oct-01 (Agilent, No. 24BR1033101)	In house check: Oct 03

	Name	Function	Signature
Calibrated by:	Judith Mueller	Technician	
Approved by:	Katja Pokovic	Laboratory Director	

Date issued: August 28, 2003

This calibration certificate is issued as an intermediate solution until the accreditation process (based on ISO/IEC 17025 International Standard) for Calibration Laboratory of Schmid & Partner Engineering AG is completed.

# DASY

## Dipole Validation Kit

Type: D1900V2

Serial: 5d036

Manufactured: May 8, 2003

Calibrated: August 25, 2003

## 1. Measurement Conditions

The measurements were performed in the flat section of the SAM twin phantom filled with **head simulating solution** of the following electrical parameters at 1900 MHz:

Relative Dielectricity	<b>40.2</b>	$\pm 5\%$
Conductivity	<b>1.46 mho/m</b>	$\pm 5\%$

The DASY4 System with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 5.2 at 1900 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 10mm 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: **41.2 mW/g  $\pm 16.8\%$  (k=2)<sup>1</sup>**

averaged over 10 cm<sup>3</sup> (10 g) of tissue: **21.4 mW/g  $\pm 16.2\%$  (k=2)<sup>1</sup>**

---

<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:           **1.186 ns**   (one direction)  
Transmission factor:       **0.985**     (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 1900 MHz:            $\text{Re}\{Z\} = \mathbf{50.3 \Omega}$

$\text{Im}\{Z\} = \mathbf{4.2 \Omega}$

Return Loss at 1900 MHz                   **-27.6 dB**

### 4. Measurement Conditions

The measurements were performed in the flat section of the SAM twin phantom filled with body simulating glycol solution of the following electrical parameters at 1900 MHz:

Relative Dielectricity                   **50.9**            $\pm 5\%$   
Conductivity                               **1.60 mho/m**    $\pm 5\%$

The DASY4 System with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 4.8 at 1900 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 10mm 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.



Test Laboratory: SPEAG, Zurich, Switzerland  
 File Name: SN5d036\_SN1507\_HSL1900\_220803.da4

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN5d036**  
**Program: Dipole Calibration**

Communication System: CW-1900; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: HSL 1900 MHz ( $\sigma = 1.46$  mho/m,  $\epsilon_r = 40.17$ ,  $\rho = 1000$  kg/m<sup>3</sup>)

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(5.2, 5.2, 5.2); Calibrated: 1/18/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 - SN411; Calibrated: 1/16/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006
- Measurement SW: DASY4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

**$P_{in} = 250$  mW;  $d = 10$  mm/Area Scan (81x81x1): Measurement grid:  $dx=15$ mm,  $dy=15$ mm**

Reference Value = 94.4 V/m

Power Drift = 0.002 dB

Maximum value of SAR = 11.6 mW/g

**$P_{in} = 250$  mW;  $d = 10$  mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm**

Peak SAR (extrapolated) = 17.9 W/kg

SAR(1 g) = 10.3 mW/g; SAR(10 g) = 5.35 mW/g

Reference Value = 94.4 V/m

Power Drift = 0.002 dB

Maximum value of SAR = 11.6 mW/g



0 dB = 11.6mW/g



22 Aug 2003 14:15:23

CH1 S11 1 U FS

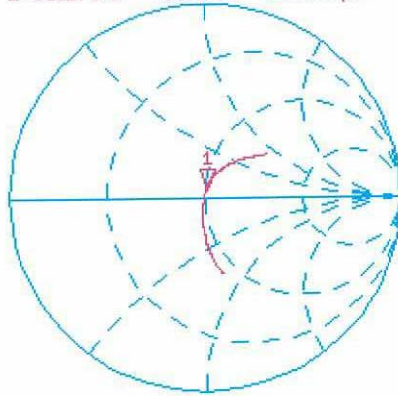
1: 50.270  $\Omega$  4.1758  $\Omega$  349.79 pF 1 900.000 000 MHz

Del

Cor

Avg  
16

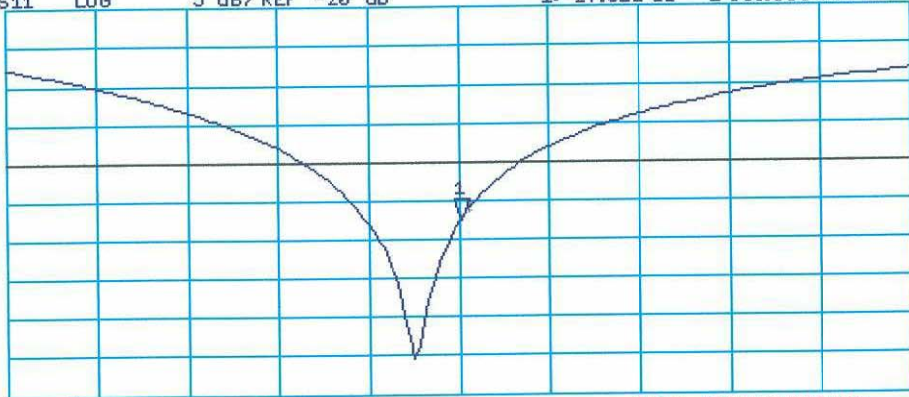
↑



CH2 S11 LOG 5 dB/REF -20 dB 1:-27.621 dB 1 900.000 000 MHz

Cor

↑



CENTER 1 900.000 000 MHz

SPAN 400.000 000 MHz

Test Laboratory: SPEAG, Zurich, Switzerland  
 File Name: SN5d036\_SN1507\_M1900\_250803.da4

**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN5d036**  
**Program: Dipole Calibration**

Communication System: CW-1900; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: Muscle 1900 MHz ( $\sigma = 1.6$  mho/m,  $\epsilon_r = 50.87$ ,  $\rho = 1000$  kg/m<sup>3</sup>)

Phantom section: Flat Section

Measurement Standard: DASYS4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(4.8, 4.8, 4.8); Calibrated: 1/18/2003
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 - SN411; Calibrated: 1/16/2003
- Phantom: SAM with CRP - TP1006; Type: SAM 4.0; Serial: TP:1006
- Measurement SW: DASYS4, V4.1 Build 47; Postprocessing SW: SEMCAD, V1.6 Build 115

**$P_{in} = 250$  mW;  $d = 10$  mm/Area Scan (81x81x1):** Measurement grid:  $dx=15$ mm,  $dy=15$ mm

Reference Value = 92.8 V/m

Power Drift = -0.0006 dB

Maximum value of SAR = 12.1 mW/g

**$P_{in} = 250$  mW;  $d = 10$  mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

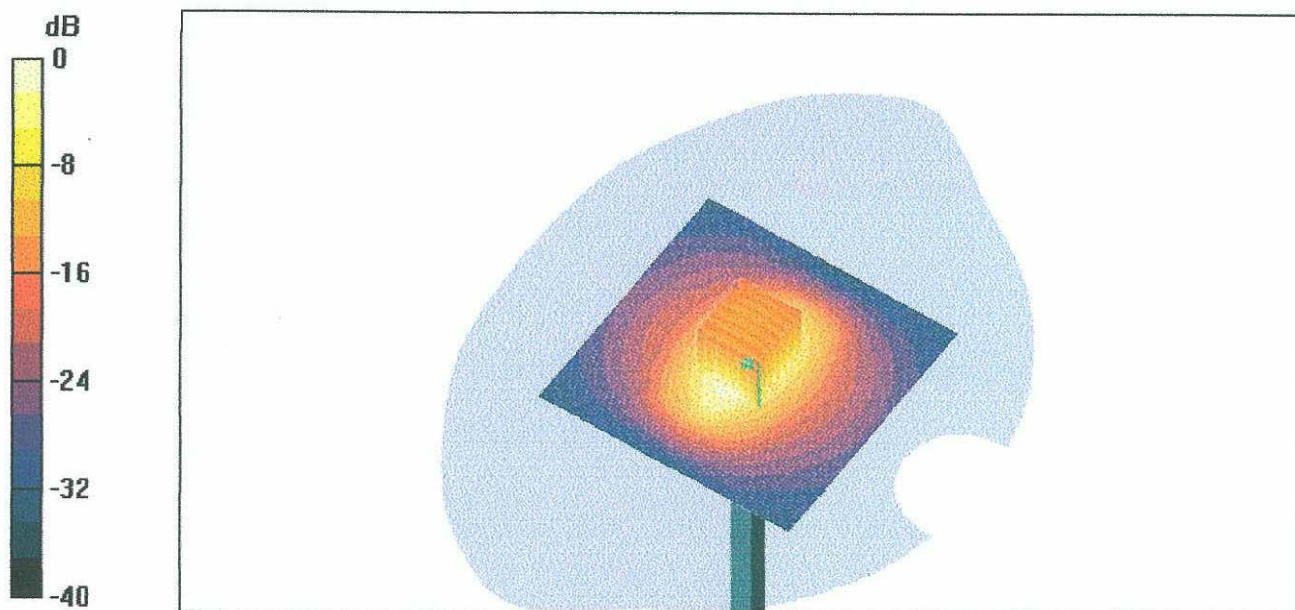
Peak SAR (extrapolated) = 19 W/kg

SAR(1 g) = 10.9 mW/g; SAR(10 g) = 5.64 mW/g

Reference Value = 92.8 V/m

Power Drift = -0.0006 dB

Maximum value of SAR = 12.2 mW/g



0 dB = 12.2mW/g

25 Aug 2003 12:16:27

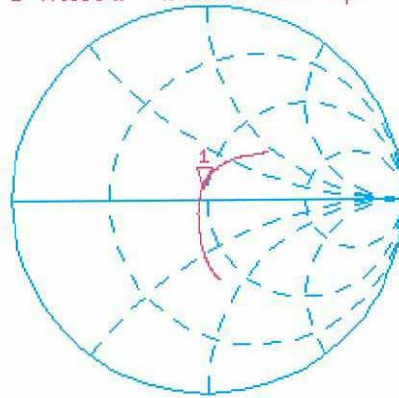
CH1 S11 1 U FS 1: 47.000  $\Omega$  4.9004  $\Omega$  410.48 pH 1 900.000 000 MHz

De1

Cor

Avg  
16

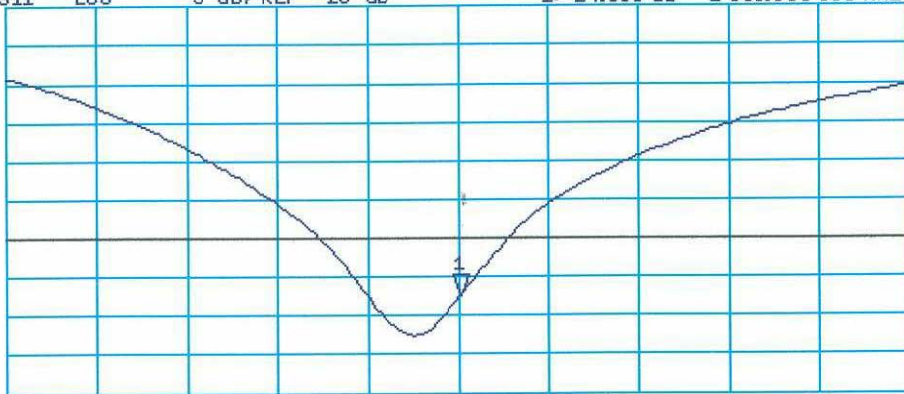
↑



CH2 S11 LOG 3 dB/REF -20 dB 1:-24.555 dB 1 900.000 000 MHz

Cor

↑



CENTER 1 900.000 000 MHz

SPAN 400.000 000 MHz