Calibration Laboratory of

Schmid & Partner Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland

Client

CCS, USA

Object(s)	D1800V2 - SN:294		
Calibration procedure(s)	QA CAL-05.v2 Calibration procedure for dipole validation kits		
Calibration date:	March 18, 20	04	
Condition of the calibrated item	In Tolerance (according to the specific calibration document)		
17025 international standard. All calibrations have been conduc	cted in the closed laborat	E used in the calibration procedures and conformity of tory facility: environment temperature 22 +/- 2 degrees	
17025 international standard. All calibrations have been conduct Calibration Equipment used (M& Model Type	cted in the closed laborat TE critical for calibration)	tory facility: environment temperature 22 +/- 2 degrees Cal Date (Calibrated by, Certificate No.)	
17025 international standard. All calibrations have been conduct Calibration Equipment used (M& Wodel Type Power meter EPM E442	oted in the closed laboration) ID # GB37480704	cory facility: environment temperature 22 +/- 2 degrees Cal Date (Calibrated by, Certificate No.) 6-Nov-03 (METAS, No. 252-0254)	Scheduled Calibration Nov-04
17025 international standard. All calibrations have been conduct Calibration Equipment used (M&' Model Type Power meter EPM E442 Power sensor HP 8481A	ID # GB37480704 US37292783	Cal Date (Calibrated by, Certificate No.) 6-Nov-03 (METAS, No. 252-0254) 6-Nov-03 (METAS, No. 252-0254)	Scheduled Calibration Nov-04 Nov-04
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17025 international standard. All calibrations have been conduct Calibration Equipment used (M&' Model Type Power meter EPM E442 Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SML-03 Network Analyzer HP 8753E	ID # GB37480704 US37292783 MY41092317 100698 US37390585	Cal Date (Calibrated by, Certificate No.) 6-Nov-03 (METAS, No. 252-0254) 6-Nov-03 (METAS, No. 252-0254) 18-Oct-02 (Agilent, No. 20021018) 27-Mar-2002 (R&S, No. 20-92389) 18-Oct-01 (SPEAG, in house check Nov-03)	Scheduled Calibration Nov-04 Nov-04 Oct-04 In house check; Mar-05 In house check; Oct 05
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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.

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DASY

Dipole Validation Kit

Type: D1800V2

Serial: 294

March 22, 2001 Manufactured: Calibrated:

March 18, 2004

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 1800 MHz:

Relative Dielectricity 39.2 $\pm 5\%$ Conductivity 1.37 mho/m $\pm 5\%$

The DASY4 System with a dosimetric E-field probe ET3DV6 (SN:1507, Conversion factor 5.08 at 1800 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 $250 \text{mW} \pm 3 \%$. 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 <u>advanced extrapolation</u> are:

averaged over 1 cm³ (1 g) of tissue: $40.0 \text{ mW/g} \pm 16.8 \% (k=2)^{1}$

averaged over 10 cm³ (10 g) of tissue: 21.3 mW/g \pm 16.2 % (k=2)¹

¹ 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: 1.197 ns (one direction)

Transmission factor: 0.978 (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 1800 MHz: $Re\{Z\} = 48.2 \Omega$

Im $\{Z\} = -8.2 \Omega$

Return Loss at 1800 MHz -21.4 dB

4. 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.

5. 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.

Power Test

After long term use with 40W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

Date/Time: 03/18/04 11:13:05

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN294

Communication System: CW-1800; Frequency: 1800 MHz; Duty Cycle: 1:1

Medium: HSL 1800 MHz;

Medium parameters used: f = 1800 MHz; $\sigma = 1.37 \text{ mho/m}$; $\varepsilon_r = 39.2$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 SN1507; ConvF(5.08, 5.08, 5.08); Calibrated: 1/23/2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn411; Calibrated: 11/6/2003
- Phantom: SAM with CRP TP1006; Type: SAM 4.0; Serial: TP:1006;
- Measurement SW: DASY4, V4.2 Build 42; Postprocessing SW: SEMCAD, V1.8 Build 110

Pin = 250 mW; d = 10 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm Reference Value = 92.9 V/m; Power Drift = -0.0 dB Maximum value of SAR (interpolated) = 11.6 mW/g

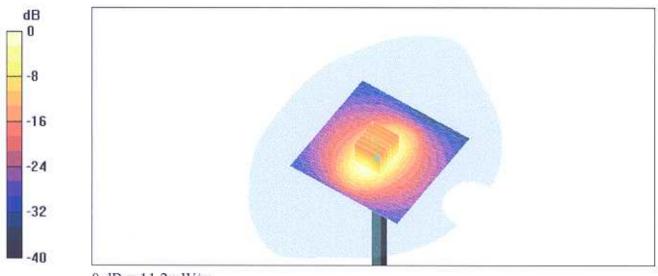
Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5 mm, dy=5 mm, dz=5 mm

Reference Value = 92.9 V/m; Power Drift = -0.0 dB

Maximum value of SAR (measured) = 11.2 mW/g

Peak SAR (extrapolated) = 17.6 W/kg

SAR(1 g) = 10 mW/g; SAR(10 g) = 5.33 mW/g



0 dB = 11.2 mW/g

