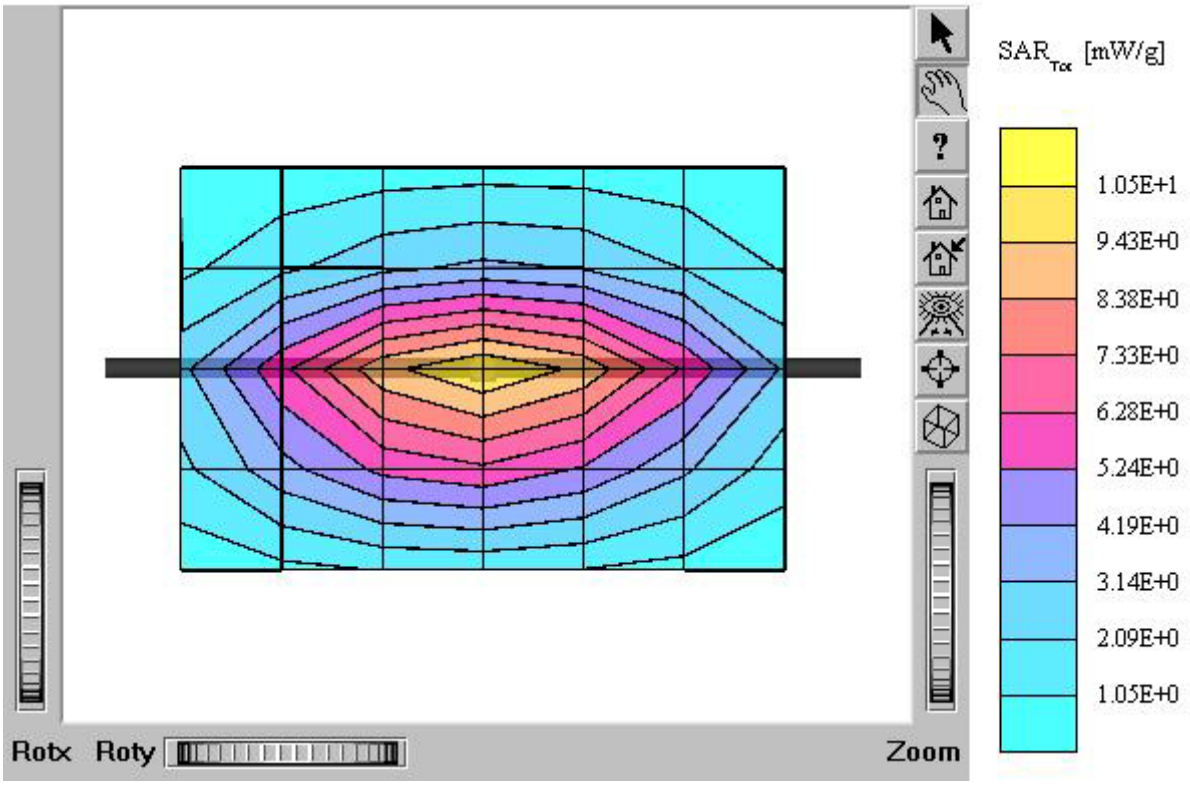
■ Validation Data (835MHz Brain)

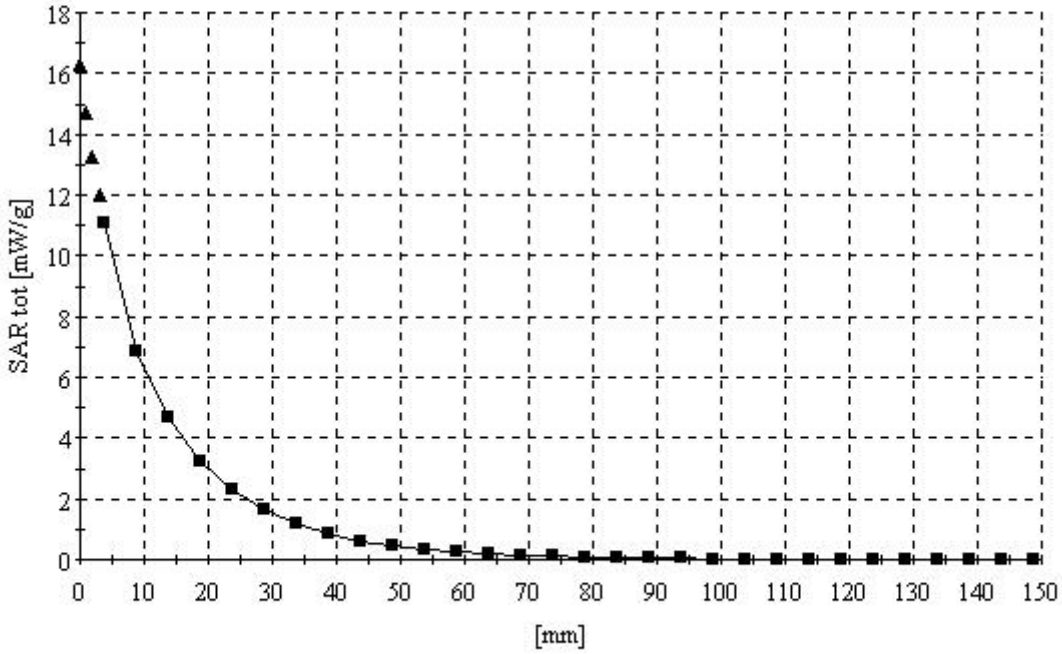
Dipole 835 MHz
SAM II Phantom; Flat Section; Position: (90°,90°); Frequency: 835 MHz
Probe: ET3DV6 - SN1607; ConvF(6.22,6.22,6.22); Crest factor: 1.0; Head 835 MHz: s = 0.88 mho/m e_r = 42.3 r = 1.00 g/cm³
Cubes (2): SAR (1g): 9.98 mW/g ± 0.05 dB, SAR (10g): 6.37 mW/g ± 0.04 dB
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: 0.00 dB
Comment:
835MHz Brain Dipole Validation (D835V2/ S.N: 441)
Antenna Input Power : 30 dBm (1W)
HCT Co., Ltd. Brain Tissue Simulating Liquid
Liquid Temperature : 21.6 °C
Date Tested : November 11, 2004



Dipole 835 MHz

SAM II Phantom; Section; Position: ; Frequency: 835 MHz
Probe: ET3DV6 - SN1607; ConvF(6.22,6.22,6.22); Crest factor: 1.0; Head 835 MHz: s = 0.88 mho/m e, = 42.3 r = 1.00 g/cm³
:
Z-Axis: Dx = 0.0, Dy = 0.0, Dz = 5.0

Comment:
835MHz Brain Dipole Validation (D835V2/ S.N: 441)
Antenna Input Power : 30 dBm (1W)
HCT Co., Ltd. Brain Tissue Simulating Liquid
Liquid Temperature : 21.6 °C
Date Tested : November 11, 2004



■ Dielectric Parameter (835MHz Brain)

Title : AXW-D800
SubTitle : 800MHz Brain
November 11, 2004 09:07 AM

Frequency	e'	e''
800.000000 MHz	42.8854	18.9316
805.000000 MHz	42.8168	18.9423
810.000000 MHz	42.6826	18.9068
815.000000 MHz	42.5911	18.9030
820.000000 MHz	42.5573	18.9474
825.000000 MHz	42.4290	18.9544
830.000000 MHz	42.3679	19.0061
835.000000 MHz	42.2955	19.0502
840.000000 MHz	42.2244	19.0937
845.000000 MHz	42.2218	19.1173
850.000000 MHz	42.1870	19.1707
855.000000 MHz	42.0943	19.1991
860.000000 MHz	42.0409	19.2160
865.000000 MHz	42.0474	19.1540
870.000000 MHz	41.9823	19.1949
875.000000 MHz	41.9380	19.1991
880.000000 MHz	41.9193	19.1503
885.000000 MHz	41.8820	19.1225
890.000000 MHz	41.8238	19.0562
895.000000 MHz	41.7970	18.9763
900.000000 MHz	41.7342	18.9079

■ Dielectric Parameter (835MHz Body)

Title : AXW-D800
SubTitle : 800MHz Body
November 11, 2004 10:17 AM

Frequency	e'	e''
800.000000 MHz	54.0546	20.6571
805.000000 MHz	53.9593	20.6686
810.000000 MHz	53.9185	20.6386
815.000000 MHz	53.8007	20.5468
820.000000 MHz	53.7613	20.4839
825.000000 MHz	53.6975	20.4747
830.000000 MHz	53.6181	20.4493
835.000000 MHz	53.4996	20.3728
840.000000 MHz	53.4412	20.3083
845.000000 MHz	53.3612	20.2416
850.000000 MHz	53.2677	20.2240
855.000000 MHz	53.1911	20.1899
860.000000 MHz	53.1873	20.2043
865.000000 MHz	53.1432	20.1373
870.000000 MHz	53.1011	20.1871
875.000000 MHz	53.0316	20.1886
880.000000 MHz	52.9556	20.1559
885.000000 MHz	52.9277	20.0950
890.000000 MHz	52.9255	20.1134
895.000000 MHz	52.8624	20.0664
900.000000 MHz	52.8097	20.1508

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Federal Office of Metrology and Accreditation
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client H-CT (Dymstec)

Certificate No: D835V2-441_Sep04

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 441
Calibration procedure(s)	QA CAL-05.v6 Calibration procedure for dipole validation kits
Calibration date:	September 16, 2004
Condition of the calibrated item	In Tolerance

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power sensor HP 8481A	US37292783	5-Nov-03 (METAS, No. 252-0254)	Nov-04
Reference 20 dB Attenuator	SN: 5086 (20g)	10-Aug-04 (METAS, No 251-00402)	Aug-05
Reference 10 dB Attenuator	SN: 5047.2 (10r)	10-Aug-04 (METAS, No 251-00402)	Aug-05
Reference Probe ET3DV6	SN 1507	23-Jan-04 (SPEAG, No. ET3-1507_Jan04)	Jan-05
DAE4	SN 601	6-Nov-03 (SPEAG, No. DAE4-601_Jul04)	Jul-05

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	GB43310788	13-Aug-03 (SPEAG, in house check Jan-04)	In house check: Jan-06
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-03)	In house check: Oct-05
RF generator R&S SML-03	100698	27-Mar-02 (SPEAG, in house check Dec-03)	In house check: Dec-05
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Nov-03)	In house check: Nov 04

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

Issued: September 24, 2004

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
Swiss Calibration Service

Accredited by the Swiss Federal Office of Metrology and Accreditation
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
ConF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) CENELEC EN 50361, "Basic standard for the measurement of Specific Absorption Rate related to human exposure to electromagnetic fields from mobile phones (300 MHz - 3 GHz), July 2001
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay*: One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY4	V4.3
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Area Scan resolution	dx, dy = 15 mm	
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.8 ± 6 %	0.92 mho/m ± 6 %
Head TSL temperature during test	(21.2 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	condition	
SAR measured	250 mW input power	2.54 mW / g
SAR normalized	normalized to 1W	10.2 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**10.2 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.65 mW / g
SAR normalized	normalized to 1W	6.60 mW / g
SAR for nominal Head TSL parameters [1]	normalized to 1W	**6.63 mW / g ± 16.5 % (k=2)**

[1] Correction to nominal TSL parameters according to d), chapter "SAR Sensitivities"

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.6 Ω - 6.8 jΩ
Return Loss	23.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.375 ns

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

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.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 9, 2001

DASY4 Validation Report for Head TSL

Date/Time: 09/16/04 14:52:29

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN441

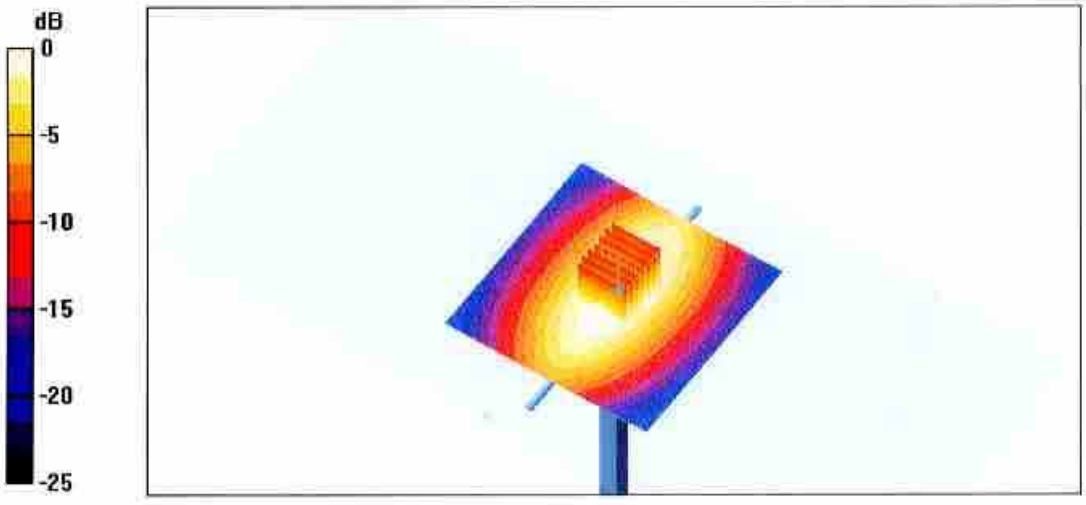
Communication System: CW-835; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: HSL 835 MHz;
Medium parameters used: f = 835 MHz; σ = 0.92 mho/m; ε_r = 41.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(6.3, 6.3, 6.3); Calibrated: 23.01.2004
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 22.07.2004
- Phantom: Flat Phantom half size; Type: QD000P49AA; Serial: SN:1001;
- Measurement SW: DASY4, V4.3 Build 20; Postprocessing SW: SEMCAD, V1.8 Build 126

Pin = 250 mW; d = 15 mm/Area Scan (81x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.74 mW/g

Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.4 V/m; Power Drift = 0.003 dB
Peak SAR (extrapolated) = 3.78 W/kg
SAR(1 g) = 2.54 mW/g; SAR(10 g) = 1.65 mW/g
Maximum value of SAR (measured) = 2.74 mW/g



0 dB = 2.74mW/g

Impedance Measurement Plot for Head TSL