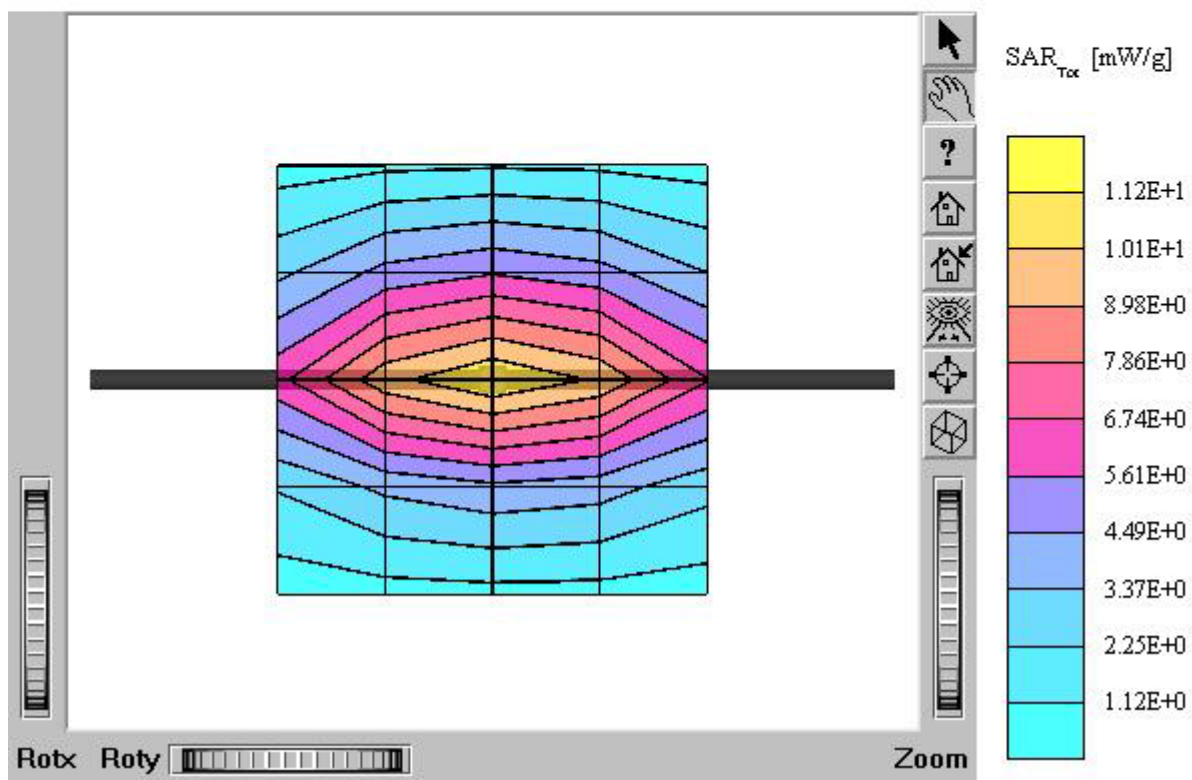


ATTACHMENT Q – DIPOLE VALIDATION

■ Validation Data (835MHz Brain)

Dipole 835 MHz

SAM I Phantom; Flat Section; Position: (90°,90°); Frequency: 835 MHz
Probe: ET3DV6 - SN1609; ConvF(6.63,6.63,6.63); Crest factor: 1.0; Brain 835 MHz: $s = 0.90$
 mho/m $e_r = 43.1$ $r = 1.00$ g/cm^3
Cubes (2): SAR (1g): $10.3 \text{ mW/g} \pm 0.05 \text{ dB}$, SAR (10g): $6.61 \text{ mW/g} \pm 0.04 \text{ dB}$
Coarse: $D_x = 20.0$, $D_y = 20.0$, $D_z = 10.0$
Powerdrift: -0.06 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 : 21.8°C
Date Tested : March 10, 2005



Dipole 835 MHz

SAM I Phantom; Section; Position: ; Frequency: 835 MHz

Probe: ET3DV6 - SN1609; ConvF(6.63,6.63,6.63); Crest factor: 1.0; Brain 835 MHz: $s = 0.90$
 mho/m $\epsilon_r = 43.1$ $\rho = 1.00 \text{ g/cm}^3$

:

Z-Axis: $D_x = 0.0$, $D_y = 0.0$, $D_z = 5.0$

Comment:

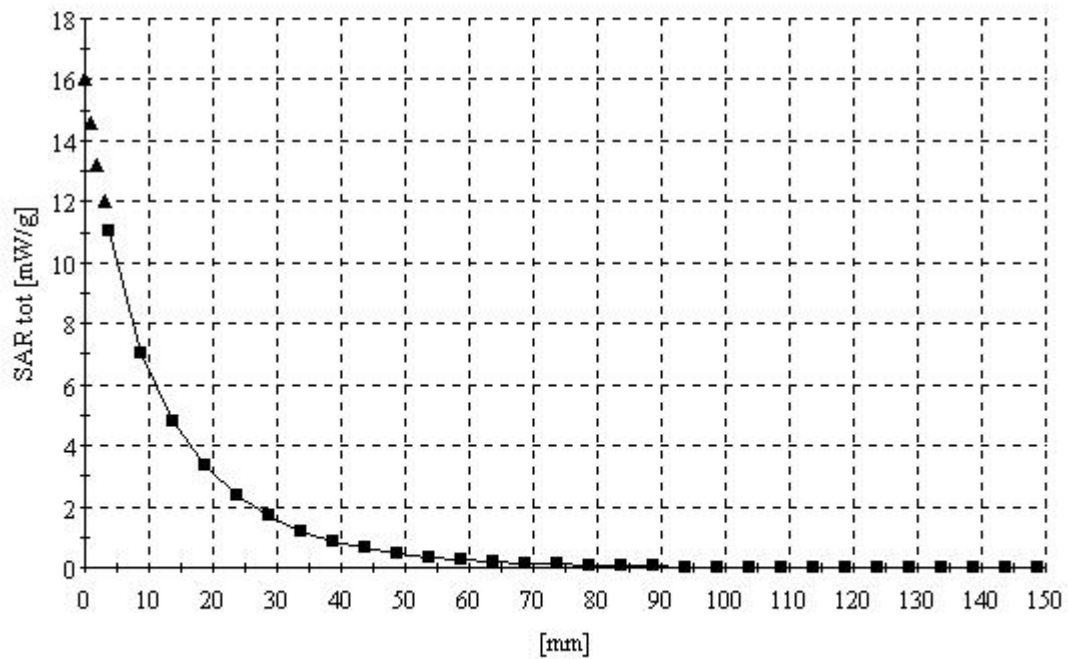
835MHz Brain Dipole Validation (D835V2/ S.N: 441)

Antenna Input Power : 30 dBm (1W)

HCT Co., Ltd. Brain Tissue Simulating Liquid

Liquid Temperature : 21.8 °C

Date Tested : March 10, 2005



■ Dielectric Parameter (835MHz Brain)

Title : AP-100
SubTitle : CDMA BRAIN
March 10, 2005 09:21 AM

Frequency	e'	e''
800.000000 MHz	43.8202	19.2697
805.000000 MHz	43.7514	19.2546
810.000000 MHz	43.6222	19.2895
815.000000 MHz	43.4863	19.2942
820.000000 MHz	43.4448	19.2668
825.000000 MHz	43.3756	19.3064
830.000000 MHz	43.2434	19.2527
835.000000 MHz	43.1476	19.3003
840.000000 MHz	43.1085	19.3207
845.000000 MHz	43.0413	19.3493
850.000000 MHz	43.0492	19.3452
855.000000 MHz	42.9839	19.3729
860.000000 MHz	43.0146	19.3720
865.000000 MHz	42.9492	19.3585
870.000000 MHz	42.9664	19.3102
875.000000 MHz	42.9662	19.3386
880.000000 MHz	42.9319	19.3364
885.000000 MHz	42.9158	19.3085
890.000000 MHz	42.8623	19.2722
895.000000 MHz	42.8388	19.2170
900.000000 MHz	42.7487	19.2029

■ Dielectric Parameter (835MHz Body)

Title : AP-100**SubTitle : CDMA BODY**

March 10, 2005 11:12 AM

Frequency	e'	e''
800.000000 MHz	55.0994	20.4339
805.000000 MHz	55.0505	20.3698
810.000000 MHz	55.0088	20.2925
815.000000 MHz	54.9558	20.2592
820.000000 MHz	54.8851	20.2661
825.000000 MHz	54.8628	20.2498
830.000000 MHz	54.8031	20.2197
835.000000 MHz	54.7564	20.2952
840.000000 MHz	54.6827	20.2652
845.000000 MHz	54.5542	20.2889
850.000000 MHz	54.4465	20.3051
855.000000 MHz	54.3653	20.3008
860.000000 MHz	54.2370	20.2824
865.000000 MHz	54.1760	20.2391
870.000000 MHz	54.0523	20.2524
875.000000 MHz	53.9990	20.2230
880.000000 MHz	53.9551	20.1745
885.000000 MHz	53.8643	20.1658
890.000000 MHz	53.7588	20.1160
895.000000 MHz	53.7356	20.1132
900.000000 MHz	53.6767	20.0307

ATTACHMENT S – DIPOLE CALIBRATION DATA

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



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C Service suisse d'étalonnage
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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 $(22 \pm 3)^\circ\text{C}$ 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-05
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

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: D835V2-441_Sep04

Page 1 of 6

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



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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:

- 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
- 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
- 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:

- 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 $\pm$ 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 $\pm$ 0.2) °C	41.8 $\pm$ 6 %	0.92 mho/m $\pm$ 6 %
Head TSL temperature during test	(21.2 $\pm$ 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 $\pm$ 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 $\pm$ 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 j Ω
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: $f = 835 \text{ MHz}$; $\sigma = 0.92 \text{ mho/m}$; $\epsilon_r = 41.5$; $\rho = 1000 \text{ kg/m}^3$

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

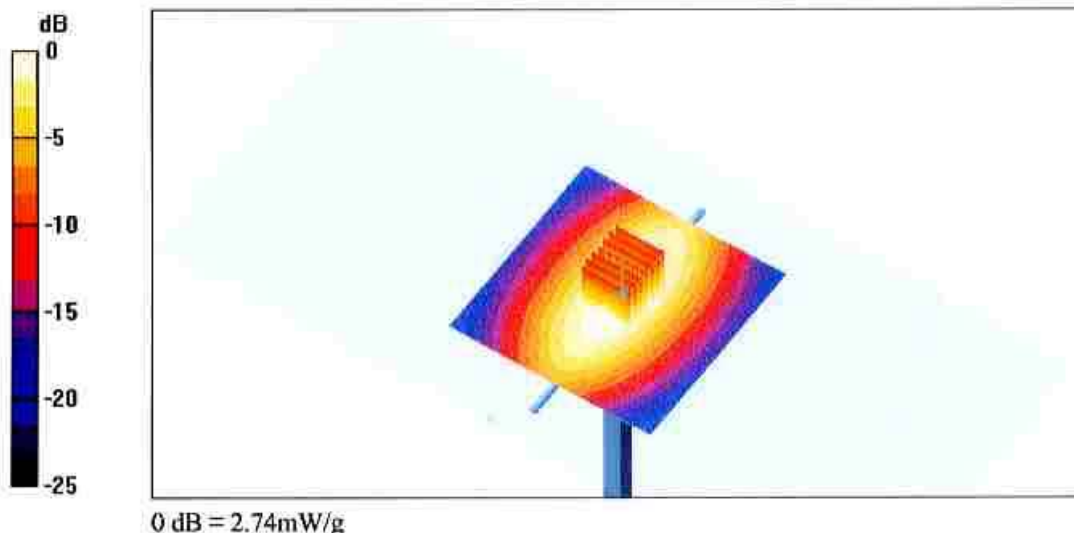
Pin = 250 mW; d = 15 mm/Area Scan (81x81x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$
Maximum value of SAR (interpolated) = 2.74 mW/g**Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$,
 $dz=5\text{mm}$

Reference Value = 56.4 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



Impedance Measurement Plot for Head TSL

