

RTS RIM Testing Services	Document Appendix for the BlackBerry® Smartphone Model RCD21IN SAR Report		Page 1(28)
Author Data Jean-Paul Hacquoil	Dates of Test Sep 23 – Oct 21, 2008	Test Report No RTS-1271-0810-07	FCC ID: L6ARCD20IN

APPENDIX D: PROBE & DIPOLE CALIBRATION DATA

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Calibration Laboratory of
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Engineering AG
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Accreditation No.: SCS 108

Client **RIM**

Certificato No: ET3-1642_Jan08

CALIBRATION CERTIFICATE

Object: **ET3DV6 - SN:1642**

Calibration procedure(s): **QA CAL-01.v6
Calibration procedure for dosimetric E-field probes**

Calibration date: **January 18, 2008**

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 meter E4419B	GB41293874	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41495277	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Power sensor E4412A	MY41498087	29-Mar-07 (METAS, No. 217-00670)	Mar-08
Reference 3 dB Attenuator	SN: S5054 (3c)	6-Aug-07 (METAS, No. 217-00719)	Aug-08
Reference 20 dB Attenuator	SN: S5068 (20b)	29-Mar-07 (METAS, No. 217-00671)	Mar-08
Reference 30 dB Attenuator	SN: S5129 (30b)	6-Aug-07 (METAS, No. 217-00720)	Aug-08
Reference Probe ES3D/2	SN: 3013	2-Jan-08 (SPEAG, No. ES3-0013_Jan08)	Jan-08
DAE4	SN: 654	20-Apr-07 (SPEAG, No. DAE4-654_Apr07)	Apr-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (SPEAG, in house check Oct-07)	In house check: Oct-08
Network Analyzer HP 8753E	US37390585	18-Oct-01 (SPEAG, in house check Oct-07)	In house check: Oct-08

	Name	Function	Signature
Calibrated by:	Kotja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: January 18, 2008

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Certificate No: ET3-1642_Jan08

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Accreditation No.: **SCS 108**

Glossary:

TSL tissue simulating liquid
 NORM_{x,y,z} sensitivity in free space
 ConF sensitivity in TSL / NORM_{x,y,z}
 DCP diode compression point
 Polarization ϕ ϕ rotation around probe axis
 Polarization ϑ ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

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) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- *NORM_{x,y,z}*: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). *NORM_{x,y,z}* are only intermediate values, i.e., the uncertainties of *NORM_{x,y,z}* does not effect the E^2 -field uncertainty inside TSL (see below *ConVF*).
- *NORM(f)_{x,y,z} = NORM_{x,y,z} * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConVF*.
- *DCPx,y,z*: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- *ConVF and Boundary Effect Parameters*: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORM_{x,y,z} * ConVF* whereby the uncertainty corresponds to that given for *ConVF*. A frequency dependent *ConVF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

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ET3DV6 SN:1642

January 18, 2008

Probe ET3DV6

SN:1642

Manufactured: November 7, 2001
Last calibrated: January 15, 2007
Recalibrated: January 18, 2008

Calibrated for DASY Systems

(Note: non-compatible with DASY2 system!)

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ET3DV6 SN:1642

January 18, 2008

DASY - Parameters of Probe: ET3DV6 SN:1642

Sensitivity in Free Space^A

NormX	1.67 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$
NormY	1.86 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$
NormZ	1.64 ± 10.1%	$\mu\text{V}/(\text{V}/\text{m})^2$

Diode Compression^B

DCP X	91 mV
DCP Y	91 mV
DCP Z	94 mV

Sensitivity in Tissue Simulating Liquid (Conversion Factors)

Please see Page 8.

Boundary Effect

TSL 900 MHz Typical SAR gradient: 5 % per mm

Sensor Center to Phantom Surface Distance	3.7 mm	4.7 mm
SAR _{iso} [%] Without Correction Algorithm	11.3	6.7
SAR _{iso} [%] With Correction Algorithm	0.8	0.4

TSL 1810 MHz Typical SAR gradient: 10 % per mm

Sensor Center to Phantom Surface Distance	3.7 mm	4.7 mm
SAR _{iso} [%] Without Correction Algorithm	14.0	8.3
SAR _{iso} [%] With Correction Algorithm	0.9	0.7

Sensor Offset

Probe Tip to Sensor Center **2.7 mm**

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Page 8).

^B Numerical linearization parameter: uncertainty not required.

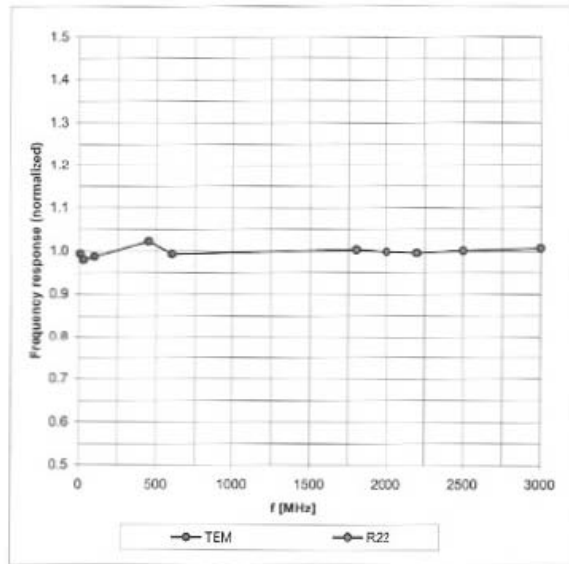
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ET3DV6 SN:1642

January 18, 2008

Frequency Response of E-Field

(TEM-Cell:iff110 EXX, Waveguide: R22)



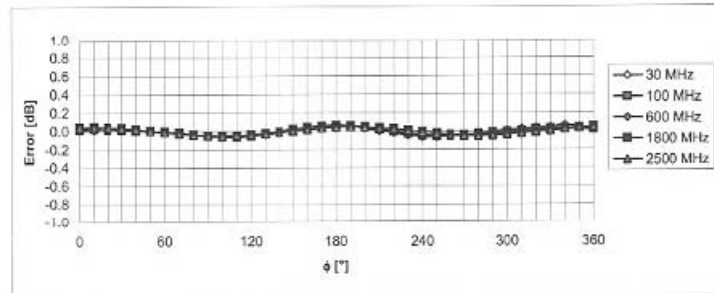
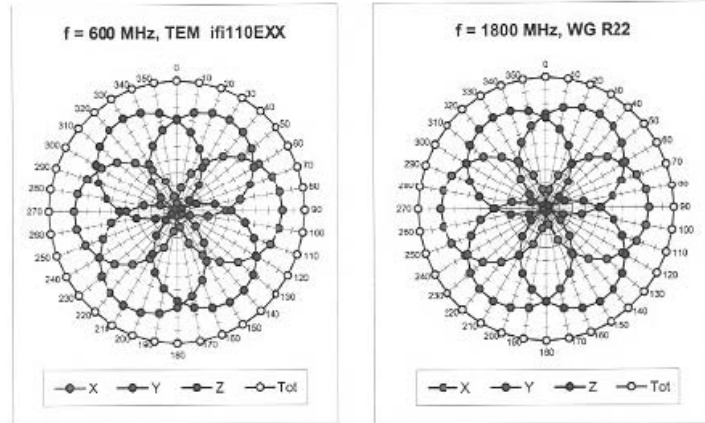
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

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ET3DV6 SN:1642

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Receiving Pattern (ϕ), $\vartheta = 0^\circ$



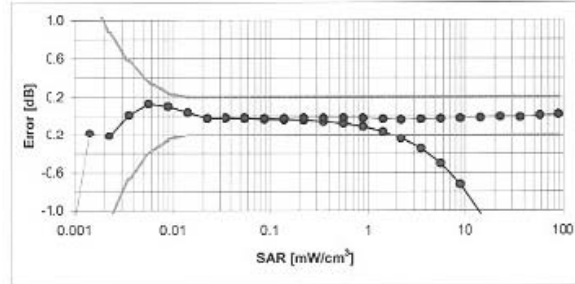
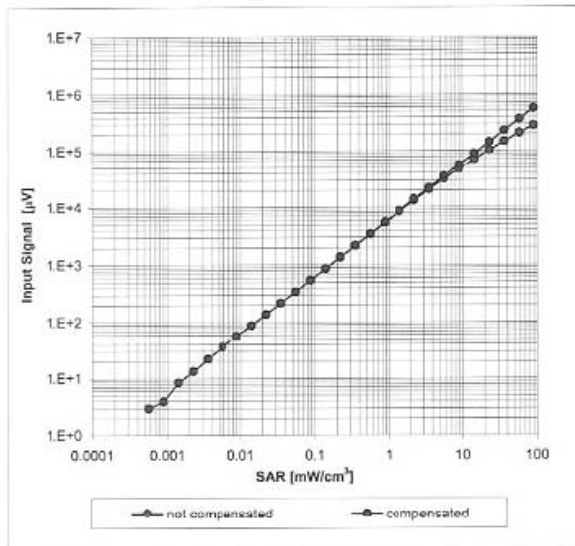
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

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Dynamic Range f(SAR_{head})
(Waveguide R22, f = 1800 MHz)

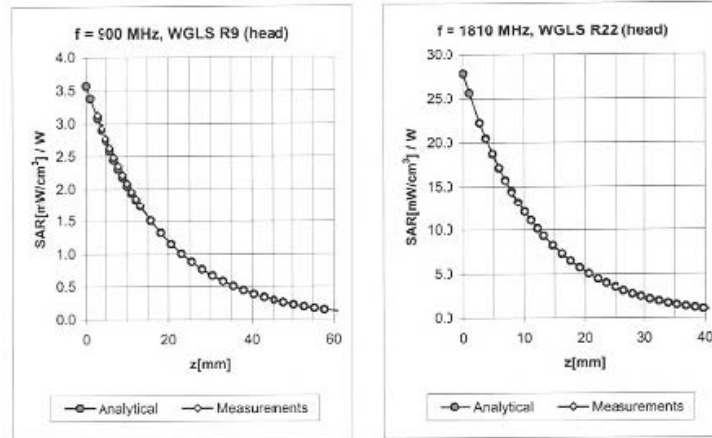


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

ET3DV6 SN:1642

January 18, 2008

Conversion Factor Assessment



f [MHz]	Validity [MHz] ^c	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF	Uncertainty
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.82	1.74	6.42 ± 11.0% (k=2)	
1810	+ 50 / + 100	Head	40.0 ± 5%	1.40 ± 5%	0.52	2.85	5.15 ± 11.0% (k=2)	
1950	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.57	2.49	4.98 ± 11.0% (k=2)	
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.76	1.92	4.52 ± 11.8% (k=2)	
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.85	1.73	6.13 ± 11.0% (k=2)	
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.66	2.70	4.88 ± 11.0% (k=2)	
1950	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.61	2.32	4.56 ± 11.0% (k=2)	
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.81	1.88	4.08 ± 11.8% (k=2)	

^c The validity of ±100 MHz only applies for DAS4 v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

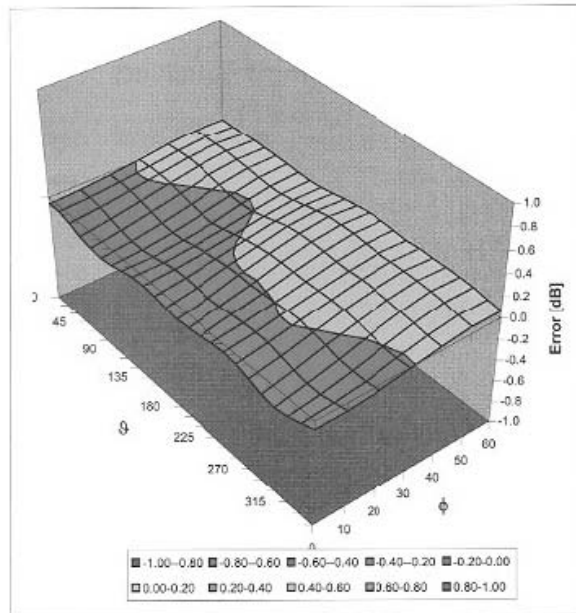
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ET3DV6 SN:1642

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Deviation from Isotropy in HSL

Error (ϕ, θ), $f = 900$ MHz



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ (k=2)

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Accreditation No.: SCS 108

Client **RIM**

Certificate No: D835V2-446_Jan07

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 446
Calibration procedure(s)	QA CAL-05.v6 Calibration procedure for dipole validation kits
Calibration date:	January 8, 2007
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&E critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	03-Oct-06 (METAS, No. 217-00608)	Oct-07
Power sensor HP 8481A	US37292783	03-Oct-06 (METAS, No. 217-00608)	Oct-07
Reference 20 dB Attenuator	SN: 5085 (20g)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference 10 dB Attenuator	SN: 5047.2 (10r)	10-Aug-06 (METAS, No 217-00591)	Aug-07
Reference Probe ET3DVB (HF)	SN 1507	19-Oct-06 (SPEAG, No. ET3-1507_Oct06)	Oct-07
DAE4	SN 907	20-Jul-06 (SPEAG, No. DAE4-907_Jul06)	Jul-07

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-05)	In house check: Oct-07
RF generator Agilent E4421B	MY41000675	11-May-05 (SPEAG, in house check Nov-05)	In house check: Nov-07
Network Analyzer: HP 8753E	US37390585 S4205	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct-07

Calibrated by:	Name	Function	Signature
	Marcel Fahr	Laboratory Technician	

Approved by:	Name	Function	Signature
	Katja Pokovic	Technical Manager	

Issued: January 9, 2007

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Accreditation No.: **SCS 108**

Glossary:

TSL tissue simulating liquid
ConvF 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.

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Measurement Conditions

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

DASY Version	DASY4	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
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	40.2 ± 6 %	0.88 mho/m ± 6 %
Head TSL temperature during test	(22.2 ± 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	2.33 mW / g
SAR normalized	normalized to 1W	9.32 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	9.28 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.52 mW / g
SAR normalized	normalized to 1W	6.08 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	6.04 mW / g ± 16.5 % (k=2)

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

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.8 Ω - 5.8 j Ω
Return Loss	- 24.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.386 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	October 24, 2001

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DASY4 Validation Report for Head TSL

Date/Time: 08.01.2007 11:34:46

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 446

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: HSL 900 MHz;

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.88 \text{ mho/m}$; $\epsilon_r = 40.3$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ET3DV6 - SN1507 (HF); ConvF(6.09, 6.09, 6.09); Calibrated: 19.10.2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn907; Calibrated: 20.07.2006
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; ;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

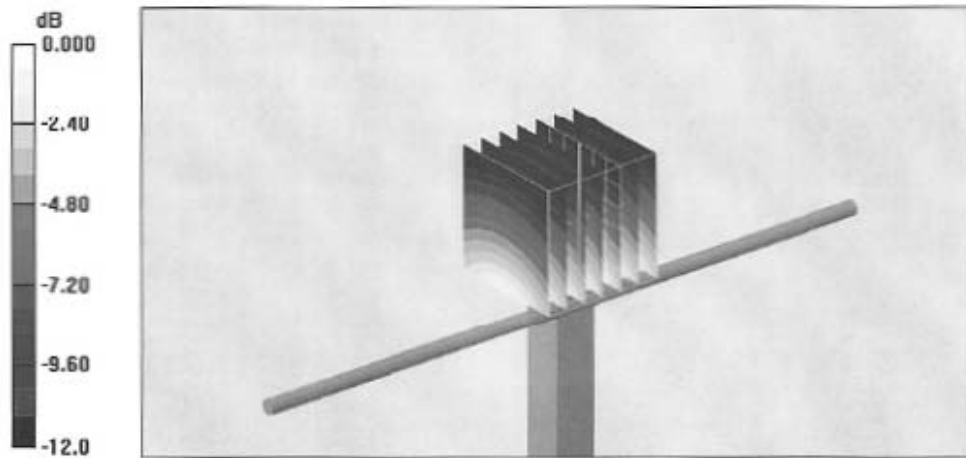
Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.7 V/m; Power Drift = 0.017 dB

Peak SAR (extrapolated) = 3.43 W/kg

SAR(1 g) = 2.33 mW/g; SAR(10 g) = 1.52 mW/g

Maximum value of SAR (measured) = 2.51 mW/g



0 dB = 2.51mW/g

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Accreditation No.: **SCS 108**

Client **RIM**

Certificate No: **D900V2-133_Jan07**

CALIBRATION CERTIFICATE																																															
Object	D900V2 - SN: 133																																														
Calibration procedure(s)	QA CAL-05.v6 Calibration procedure for dipole validation kits																																														
Calibration date:	January 8, 2007																																														
Condition of the calibrated item	In Tolerance																																														
<p>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.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.</p> <p>Calibration Equipment used (M&TE critical for calibration)</p> <table border="1"> <thead> <tr> <th>Primary Standards</th> <th>ID #</th> <th>Cal Date (Calibrated by, Certificate No.)</th> <th>Scheduled Calibration</th> </tr> </thead> <tbody> <tr> <td>Power meter EPM-442A</td> <td>GB37480704</td> <td>03-Oct-06 (METAS, No. 217-00608)</td> <td>Oct-07</td> </tr> <tr> <td>Power sensor HP 8481A</td> <td>US37292783</td> <td>03-Oct-06 (METAS, No. 217-00608)</td> <td>Oct-07</td> </tr> <tr> <td>Reference 20 dB Attenuator</td> <td>SN: 5086 (20g)</td> <td>10-Aug-06 (METAS, No 217-00591)</td> <td>Aug-07</td> </tr> <tr> <td>Reference 10 dB Attenuator</td> <td>SN: 5047.2 (10r)</td> <td>10-Aug-06 (METAS, No 217-00591)</td> <td>Aug-07</td> </tr> <tr> <td>Reference Probe ET3DV6 (HF)</td> <td>SN 1507</td> <td>19-Oct-06 (SPEAG, No. ET3-1507_Oct06)</td> <td>Oct-07</td> </tr> <tr> <td>DAE4</td> <td>SN 907</td> <td>20-Jul-06 (SPEAG, No. DAE4-907_Jul06)</td> <td>Jul-07</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Secondary Standards</th> <th>ID #</th> <th>Check Date (in house)</th> <th>Scheduled Check</th> </tr> </thead> <tbody> <tr> <td>Power sensor HP 8481A</td> <td>MY41092317</td> <td>18-Oct-02 (SPEAG, in house check Oct-05)</td> <td>In house check: Oct-07</td> </tr> <tr> <td>RF generator Agilent E4421B</td> <td>MY41000675</td> <td>11-May-05 (SPEAG, in house check Nov-05)</td> <td>In house check: Nov-07</td> </tr> <tr> <td>Network Analyzer HP 8753E</td> <td>US37390585 S4206</td> <td>18-Oct-01 (SPEAG, in house check Oct-06)</td> <td>In house check: Oct-07</td> </tr> </tbody> </table>				Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration	Power meter EPM-442A	GB37480704	03-Oct-06 (METAS, No. 217-00608)	Oct-07	Power sensor HP 8481A	US37292783	03-Oct-06 (METAS, No. 217-00608)	Oct-07	Reference 20 dB Attenuator	SN: 5086 (20g)	10-Aug-06 (METAS, No 217-00591)	Aug-07	Reference 10 dB Attenuator	SN: 5047.2 (10r)	10-Aug-06 (METAS, No 217-00591)	Aug-07	Reference Probe ET3DV6 (HF)	SN 1507	19-Oct-06 (SPEAG, No. ET3-1507_Oct06)	Oct-07	DAE4	SN 907	20-Jul-06 (SPEAG, No. DAE4-907_Jul06)	Jul-07	Secondary Standards	ID #	Check Date (in house)	Scheduled Check	Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-05)	In house check: Oct-07	RF generator Agilent E4421B	MY41000675	11-May-05 (SPEAG, in house check Nov-05)	In house check: Nov-07	Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Oct-06)	In house check: Oct-07
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Calibrated by:	Name Marcel Fehr	Function Laboratory Technician	Signature 																																												
Approved by:	Katja Pokovic	Technical Manager																																													
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			Issued: January 16, 2007																																												

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**Calibration Laboratory of
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Zeughausstrasse 43, 8004 Zurich, Switzerland



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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
ConvF 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.

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Measurement Conditions

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

DASY Version	DASY4	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	900 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	0.97 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.6 ± 6 %	0.95 mho/m ± 6 %
Head TSL temperature during test	(21.8 ± 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	2.65 mW / g
SAR normalized	normalized to 1W	10.6 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	10.4 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.70 mW / g
SAR normalized	normalized to 1W	6.80 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	6.70 mW / g ± 16.5 % (k=2)

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

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.8 Ω - 9.5 jΩ
Return Loss	- 20.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.401 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	October 25, 2001

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DASY4 Validation Report for Head TSL

Date/Time: 08.01.2007 15:27:21

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 900 MHz; Type: D900V2; Serial: D900V2 - SN:133

Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1

Medium: HSL 900 MHz;

Medium parameters used: $f = 900 \text{ MHz}$; $\sigma = 0.95 \text{ mho/m}$; $\epsilon_r = 39.5$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe ET3DV6 - SN1507 (HF); ConvF(6.01, 6.01, 6.01); Calibrated: 19.10.2006
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn907; Calibrated: 20.07.2006
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; ;
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

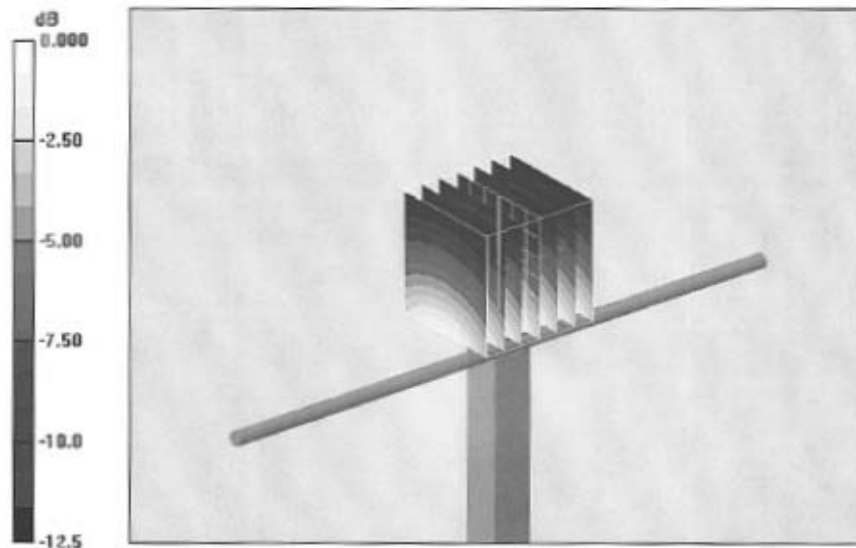
Pin = 250 mW; d = 15 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.2 V/m; Power Drift = 0.018 dB

Peak SAR (extrapolated) = 3.99 W/kg

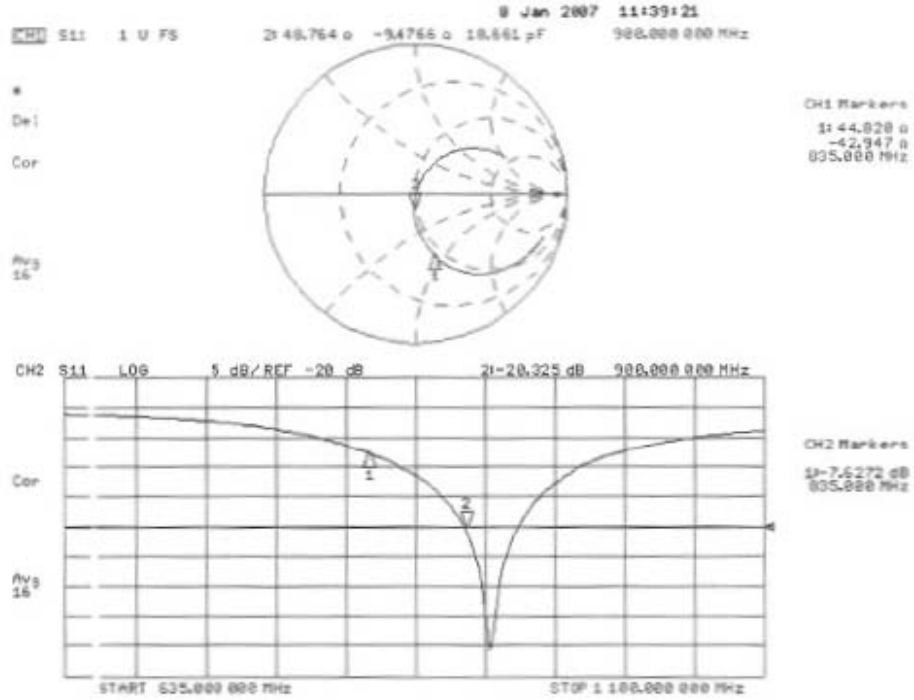
SAR(1 g) = 2.65 mW/g; SAR(10 g) = 1.7 mW/g

Maximum value of SAR (measured) = 2.87 mW/g



RTS RIM Testing Services	Document	Appendix for the BlackBerry® Smartphone Model RCD21IN SAR Report		Page	22(28)
	Author Data	Dates of Test	Test Report No	FCC ID:	
Jean-Paul Hacquoil	Sep 23 – Oct 21, 2008	RTS-1271-0810-07	L6ARCD20IN		

Impedance Measurement Plot for Head TSL



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



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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client **RIM**

Certificate No: D2450V2-747_Nov07

CALIBRATION CERTIFICATE

Object: D2450V2 - SN: 747

Calibration procedure(s): QA CAL-05.v6
 Calibration procedure for dipole validation kits

Calibration date: November 06, 2007

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 meter EPM-442A	GB37480704	04-Oct-07 (METAS, No. 217-00736)	Oct-08
Power sensor HP 8481A	US37292783	04-Oct-07 (METAS, No. 217-00736)	Oct-08
Reference 20 dB Attenuator	SN: 5086 (20g)	07-Aug-07 (METAS, No 217-00718)	Aug-08
Reference 10 dB Attenuator	SN: 5047.2 (10r)	07-Aug-07 (METAS, No 217-00718)	Aug-08
Reference Probe ES3DV2	SN: 3025	26-Oct-07 (SPEAG, No. ES3-3025_Oct07)	Oct-08
DAE4	SN: 601	30-Jan-07 (SPEAG, No. DAE4-601_Jan07)	Jan-08

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (SPEAG, in house check Oct-07)	In house check: Oct-08
RF generator R&S SMT-06	100005	4-Aug-99 (SPEAG, in house check Oct-07)	In house check: Oct-09
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (SPEAG, in house check Oct-07)	In house check: Oct-08

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: November 15, 2007

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Accreditation No.: **SCS 108**

Glossary:

TSL tissue simulating liquid
ConvF 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
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- 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.

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Measurement Conditions

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

DASY Version	DASY4	V4.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.4 ± 6 %	1.85 mho/m ± 6 %
Head TSL temperature during test	(21.5 ± 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	13.6 mW / g
SAR normalized	normalized to 1W	54.4 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	53.2 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.27 mW / g
SAR normalized	normalized to 1W	25.1 mW / g
SAR for nominal Head TSL parameters ¹	normalized to 1W	24.8 mW / g ± 16.5 % (k=2)

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

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.2 Ω + 2.1 j Ω
Return Loss	- 32.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.160 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	December 01, 2003

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	Author Data Jean-Paul Hacquoil	Dates of Test Sep 23 – Oct 21, 2008	Test Report No RTS-1271-0810-07

DASY4 Validation Report for Head TSL

Date/Time: 06.11.2007 15:01:41

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN747

Communication System: CW-2450; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: HSL U10 BB;

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.79$ mho/m; $\epsilon_r = 38$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: ES3DV2 - SN3025 (HF); ConvF(4.41, 4.41, 4.41); Calibrated: 26.10.2007
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.01.2007
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; ;
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 172

Pin = 250 mW; d = 10 mm/Zoom Scan (7x7x7)/Cube 0:

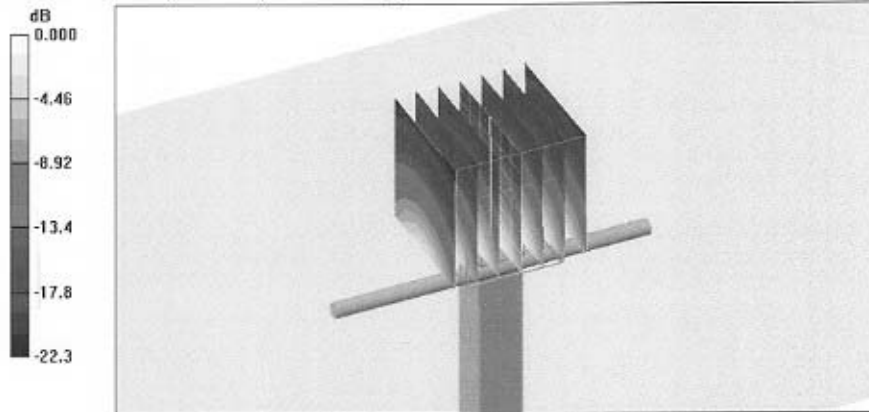
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.4 V/m; Power Drift = 0.016 dB

Peak SAR (extrapolated) = 29.4 W/kg

SAR(1 g) = 13.6 mW/g; SAR(10 g) = 6.27 mW/g

Maximum value of SAR (measured) = 15.4 mW/g



0 dB = 15.4mW/g

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Impedance Measurement Plot for Head TSL

