Testing Service		Appendix D for the BlackBerry® Smartphone Model RFE71UW SAR Report				
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID		
Andrew Becker	July 05 – July 30 , 2012	RTS-5992-1207-37	L6ARFE70UW	2503A-RFE70UW		

APPENDIX D: PROBE & DIPOLE CALIBRATION DATA

<text><text><text><text><text><text><text></text></text></text></text></text></text></text>	Testing Services Repor	ndix D for the BlackBe	rry® Smartphone Model	RFE71UW SAR	Page 2(36)
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<section-header>         CALIBRATION CERTIFICATE         Orgen       ES3DV3 - SN:3225         Calibration procedure()       DCAL-01.96, QCAL-23.94, QACAL-25.94, Calibration procedure for dosimetric E-field probes         Calibration procedure()       DCAL-01.96, QCAL-23.94, QACAL-25.94, Calibration procedure for dosimetric E-field probes         Calibration procedure()       DCAL-01.96, QCAL-23.94, QACAL-25.94, CAL-25.94, CAL-25.94,</section-header>	The Swiss Accreditation Service	is one of the signatories to the E	A	.: SCS 108	
Object     ES3DV3 + SN:3225       Calibration procedure(s)     OL CAL-01,vB, OA CAL-23,v4, OA CAL-25,v4 Calibration procedure for dosimetric E-field probes       Calibration date:     Datary 11, 2012       This calibration certificate documents the traceability to national standards, which reaize the physical units of measurements (S). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate. At calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and hum/dity < 70%. Calibration Equipment used (M&TE critical for calibration)       Primary Standards     ID       Power meter E4413B     GB1223374       Object     2344ar-11 (No. 217-01372)       Apr-12       Power meter E4413B     GB1223374       Stop54 (So)     2344ar-11 (No. 217-01372)       Apr-12       Reference 30 dB Attenuator     Ni: 55056 (So)       Stop54 (So)     2344ar-11 (No. 217-01372)       Apr-12     Apr-12       Reference 30 dB Attenuator     Ni: 55056 (So)       Stop54 (So)     2344ar-11 (No. 217-01370)       Apr-12     Apr-12       Reference 30 dB Attenuator     Ni: 55056 (So)       Stop64 (So)     2344ar-11 (No. 217-01370)       Apr-12     Apr-12       Reference 30 dB Attenuator     Ni: 55056 (So)       Stop64 (So)     2344ar-11 (No. 217-01370)       Apr-12	Client RTS (RIM Testin	ig Services)	Certificate No: E	83-3225_Jan12	
Calibration procedure(s)       DA CAL-01.v8, OA CAL-23.v4, OA CAL-25.v4         Calibration procedure for dissimilation of the construction	CALIBRATION C	ERTIFICATE	5 4 5 5		
Calibration procedure for dosimetric E-field probes         Calibration date:       January 11, 2012         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%.	Object	ES3DV3 - SN:3225			
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 procedure(s)				
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 date:	January 11, 2012			
Power meter E4419B         GB41293874         31-Mar-11 (No. 217-01372)         Apr-12           Power sensor E4412A         MY41498087         31-Mar-11 (No. 217-01372)         Apr-12           Reference 3 dB Attenuator         SN: 55054 (3c)         29-Mar-11 (No. 217-01369)         Apr-12           Reference 20 dB Attenuator         SN: 55066 (20b)         29-Mar-11 (No. 217-01367)         Apr-12           Reference 30 dB Attenuator         SN: 55129 (30b)         29-Mar-11 (No. 217-01367)         Apr-12           Reference 30 dB Attenuator         SN: 55129 (30b)         29-Mar-11 (No. 217-01367)         Apr-12           Reference 30 dB Attenuator         SN: 55129 (30b)         29-Mar-11 (No. 217-01370)         Apr-12           Reference Probe ES3DV2         SN: 3013         29-Dec-11 (No. ES3-3013_Dec11)         Dac-12           DAE4         SN: 654         3-May-11 (No. DAE4-654_May11)         May-12           Secondary Standards         ID         Check Date (in house)         Scheduled Check           RF generator HP 8648C         US3642001700         4-Aug-99 (in house check Oct-11)         In house check. Apr-13           Network Analyzer HP 8753E         US37390585         18-Oct-01 (in house check Oct-11)         In house check. Oct-12           Calibrated by:         Vamme         Function         Signature			nvironment temperature (22 ± 3)°C an	d humidity < 70%.	
Power meter E4419B         GB41293874         31-Mar-11 (No. 217-01372)         Apr-12           Power sensor E4412A         MY41498087         31-Mar-11 (No. 217-01372)         Apr-12           Reference 3 dB Attenuator         SN: 55054 (3c)         29-Mar-11 (No. 217-01369)         Apr-12           Reference 20 dB Attenuator         SN: 55066 (20b)         29-Mar-11 (No. 217-01367)         Apr-12           Reference 20 dB Attenuator         SN: 55066 (20b)         29-Mar-11 (No. 217-01367)         Apr-12           Reference 30 dB Attenuator         SN: 55129 (30b)         29-Mar-11 (No. 217-01367)         Apr-12           Reference 30 dB Attenuator         SN: 55129 (30b)         29-Mar-11 (No. 217-01370)         Apr-12           Reference Probe ES3DV2         SN: 3013         29-Dec-11 (No. ES3-3013_Dec11)         Dac-12           DAE4         SN: 654         3-May-11 (No. DAE4-654_May11)         May-12           Secondary Standards         ID         Check Date (in house)         Scheduled Check           RF generator HP 8648C         US3642U01700         4-Aug-99 (in house check Apr-11)         In house check. Apr-13           Network Analyzer HP 8753E         US37390585         18-Oct-01 (in house check Oct-11)         In house check. Oct-12           Calibrated by:         Vator Kastrati         Usboratory Technidian         Signa	Drimony Standarda		al Data (DatiSasta Mal)	Oshadidad Calibratian	
Power sensor E4412A       MY41498087       31-Mar-11 (No. 217-01372)       Apr-12         Reference 3 dB Attenuator       SN: S5054 (3c)       29-Mar-11 (No. 217-01369)       Apr-12         Reference 20 dB Attenuator       SN: S5086 (20b)       29-Mar-11 (No. 217-01367)       Apr-12         Reference 20 dB Attenuator       SN: S5129 (30b)       29-Mar-11 (No. 217-01370)       Apr-12         Reference 30 dB Attenuator       SN: S5129 (30b)       29-Mar-11 (No. 217-01370)       Apr-12         Reference Probe ES3DV2       SN: 3013       29-Dec-11 (No. ES3-3013_Dec11)       Dec-12         DAE4       SN: 654       3-May-11 (No. DAE4-654_May11)       May-12         Secondary Standards       ID       Check Date (in house)       Scheduled Check         RF generator HP 8648C       US3642U01700       4-Aug-99 (in house check Apr-11)       In house check: Apr-13         Network Analyzer HP 8753E       US37390585       18-Oct-01 (in house check Cct-11)       In house check: Oct-12         Name       Function       Signature         Jeton Kastrati       Liboratory Technician       Apr-4         Approved by:       Katja Pokovle       Technicel Manager			the second se		
Reference 3 dB Attenuator       SN: \$5054 (3c)       29-Mar-11 (No. 217-01369)       Apr-12         Reference 20 dB Attenuator       SN: \$5086 (20b)       29-Mar-11 (No. 217-01367)       Apr-12         Reference 30 dB Attenuator       SN: \$5129 (30b)       29-Mar-11 (No. 217-01367)       Apr-12         Reference 30 dB Attenuator       SN: \$5129 (30b)       29-Mar-11 (No. 217-01370)       Apr-12         Reference Probe ES3DV2       SN: 3013       29-Dec-11 (No. ES3-3013_Dec11)       Dec-12         DAE4       SN: 654       3-May-11 (No. DAE4-654_May11)       May-12         Secondary Standards       ID       Check Date (in house)       Scheduled Check         RF generator HP 8648C       US3642U01700       4-Aug-99 (in house check Apr-11)       In house check. Apr-13         Network Analyzer HP 8753E       US37390585       18-Oct-01 (in house check Oct-11)       In house check. Cot-12         Calibrated by:       Name       Function       Signature         Jeton Kastrati       Usboratory Technician       Ganadee         Approved by:       Katja Pokovle       Technical Manager					
Reference 20 dB Attenuator     SN: \$5086 (20b)     29-Mar-11 (No. 217-01367)     Apr-12       Reference 30 dB Attenuator     SN: \$5129 (30b)     29-Mar-11 (No. 217-01370)     Apr-12       Reference Probe ES3DV2     SN: 3013     29-Dec-11 (No. ES3-3013_Dec11)     Dec-12       DAE4     SN: 654     3-May-11 (No. DAE4-654_May11)     May-12       Secondary Standards     ID     Check Date (in house)     Scheduled Check       RF generator HP 8648C     US3642U01700     4-Aug-99 (in house check Apr-11)     In house check: Apr-13       Network Analyzer HP 8753E     US37390585     18-Oct-01 (in house check Oct-11)     In house check: Cot-12       Calibrated by:     Jaton Kastrati     Laboratory Technician     Signature       Approved by:     Katja Pokovle     Technical Manager     Manager					
Reference 30 dB Attenuator       SN: \$5129 (30b)       29-Mar-11 (No. 217-01370)       Apr-12         Reference Probe ES3DV2       SN: 3013       29-Dec-11 (No. ES3-3013_Dec11)       Dec-12         DAE4       SN: 654       3-May-11 (No. DAE4-654, May11)       May-12         Secondary Standards       ID       Check Date (in house)       Scheduled Check         RF generator HP 8648C       US3642U01700       4-Aug-99 (in house check Apr-11)       In house check. Apr-13         Network Analyzer HP 8753E       US37390585       18-Oct-01 (in house check Oct-11)       In house check. Oct-12         Calibrated by:       Name       Function       Signature         Approved by:       Katja Pokovle       Technical Manager					
Reference Probe ES3DV2     SN: 3013     29-Dec-11 (No. ES3-3013_Dec11)     Dec-12       DAE4     SN: 654     3-May-11 (No. DAE4-654_May11)     May-12       Secondary Standards     ID     Check Date (in house)     Scheduled Check       RF generator HP 8648C     US3642U01700     4-Aug-99 (in house check Apr-11)     In house check Apr-13       Network Analyzer HP 8753E     US37390585     18-Oct-01 (in house check Oct-11)     In house check Oct-12       Calibrated by:     Jaton Kastrati     Usboratory Technician     Signature       Approved by:     Katja Pokovle     Technical Manager     Manager					
DAE4     SN: 654     3-May-11 (No. DAE4-654_May11)     May-12       Secondary Standards     ID     Check Date (in house)     Scheduled Check       RF generator HP 8648C     US3642U01700     4-Aug-99 (in house check Apr-11)     In house check Apr-13       Network Analyzer HP 8753E     US37390585     18-Oct-01 (in house check Cot-11)     In house check Oct-12       Name     Function     Signature       Calibrated by:     Jeton Kastrati     Usboratory Technician       Approved by:     Katja Pokovle     Technical Manager					
Secondary Standards     ID     Check Date (in house)     Scheduled Check       RF generator HP 8648C     US3642U01700     4-Aug-99 (in house check Apr-11)     In house check: Apr-13       Network Analyzer HP 8753E     US37390585     18-Oct-01 (in house check Cot-11)     In house check: Oct-12       Name     Function     Signature       Calibrated by:     Jeton Kastrati     Usboratory Technician       Approved by:     Katja Pokovic     Technical Manager					
RF generator HP 8648C       US3642U01700       4-Aug-98 (in house check Apr-11)       In house check Apr-13         Network Analyzer HP 8753E       US37390585       18-Oct-01 (in house check Oct-11)       In house check Oct-12         Name       Function       Signature         Calibrated by:       Jeton Kastrati       Usboratory Technician         Approved by:       Katja Pokovic       Technical Manager					
Network Analyzer HP 8753E     US37390585     18-Oct-01 (in house check Oct-11)     In house check: Oct-12       Name     Function     Signature       Calibrated by:     Jeton Kastrati     Laboratory Technician       Approved by:     Katja Pokovle     Technical Manager					
Calibrated by: Jeton Kastrati Laboratory Technician Higher Katja Pokovic Technical Manager					
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Include Include 40 (040)	Approved by:	Katja Pokovlo	Technical Manager	getty	t,
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.				Issued: January 12, 2012	

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Andrew Becker	July 05 – July 30 , 2012	RTS-5992-1207-37	L6ARFE70UW	2503A-RFE70UW	

Calibration Laboratory of Schmid & Partner

Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland



Schweizerischer Kalibrierdienst Service suisse d'étalonnage Servizio svizzero di taratura

Swiss Calibration Service

Accreditation No.: SCS 108

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Multilateral Agreement for the recognition of calibration certificates

#### Glossary:

Ologgaly.	
TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization $\phi$	φ rotation around probe axis
Polarization 8	9 rotation around an axis that is in the plane normal to probe axis (at measurement center).
	i.e., 9 = 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
- 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:

- NORMx,y,z: Assessed for E-field polarization a = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E<sup>2</sup>-field uncertainty inside TSL (see below ConvF).
- NORM(f)x,y,z = NORMx,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 with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- Ax,y,z; Bx,y,z; Cx,y,z, VRx,y,z: A, B, C are numerical linearization parameters assessed based on the data of
  power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the
  maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 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 NORMx,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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January 11, 2012

# Probe ES3DV3

# SN:3225

Manufactured: Calibrated: September 1, 2009 January 11, 2012

Calibrated for DASY/EASY Systems (Note: non-compatible with DASY2 system!)

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January 11, 2012

# DASY/EASY - Parameters of Probe: ES3DV3 - SN:3225

#### **Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (µV/(V/m) <sup>2</sup> ) <sup>A</sup>	1.26	1.20	1.30	± 10.1 %
DCP (mV) <sup>8</sup>	101.2	100.8	101.2	

#### Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc <sup>t</sup> (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	107.7	±1.7 %
			Y	0.00	0.00	1.00	113.4	
			Z	0.00	0.00	1.00	110.4	

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%.

<sup>A</sup> The uncertainties of NormX,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Pages 5 and 6).
 <sup>B</sup> Numerical linearization parameter: uncertainty not required.
 <sup>E</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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# DASY/EASY - Parameters of Probe: ES3DV3 - SN:3225

f (MHz) <sup>c</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.42	6.42	6.42	0.27	2.04	± 12.0 %
900	41.5	0.97	6.06	6.06	6.06	0.35	1.74	± 12.0 %
1810	40.0	1.40	5.23	5.23	5.23	0.73	1.21	± 12.0 %
1950	40.0	1.40	4.98	4.98	4.98	0.58	1.41	± 12.0 %
2450	39.2	1.80	4.50	4.50	4.50	0.79	1.26	± 12.0 %
2600	39.0	1.96	4.32	4.32	4.32	0.77	1.32	± 12.0 %

#### Calibration Parameter Determined in Head Tissue Simulating Media

<sup>c</sup> Frequency validity of  $\pm$  100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to  $\pm$  50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. <sup>r</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to  $\pm$  10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to  $\pm$  5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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# DASY/EASY - Parameters of Probe: ES3DV3 - SN:3225

f (MHz) <sup>c</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	_ 55.5	0.96	6.27	6.27	6.27	0.36	1.74	± 12.0 %
900	55.0	1.05	6.07	6.07	6.07	0.29	2.02	± 12.0 %
1810	53.3	1.52	4.92	4.92	4.92	0.50	1.57	± 12.0 %
1950	53.3	1.52	4.87	4.87	4.87	0.59	1.49	± 12.0 %
2450	52.7	1.95	4.30	4.30	4.30	0.68	1.16	± 12.0 %
2600	52.5	2.16	4.12	4.12	4.12	0.80	0.99	± 12.0 %

#### Calibration Parameter Determined in Body Tissue Simulating Media

<sup>c</sup> Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. <sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters (c and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (c and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

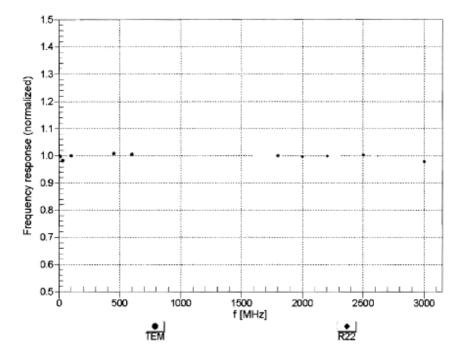
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## Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

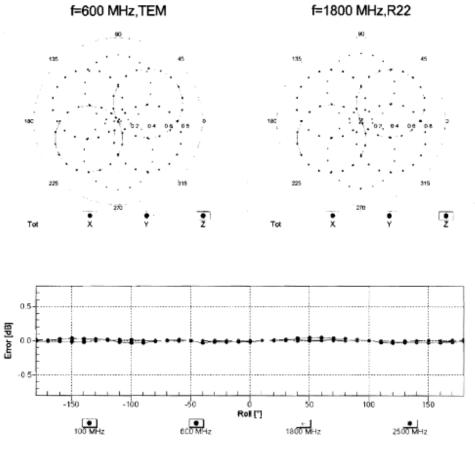
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January 11, 2012

# 



Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

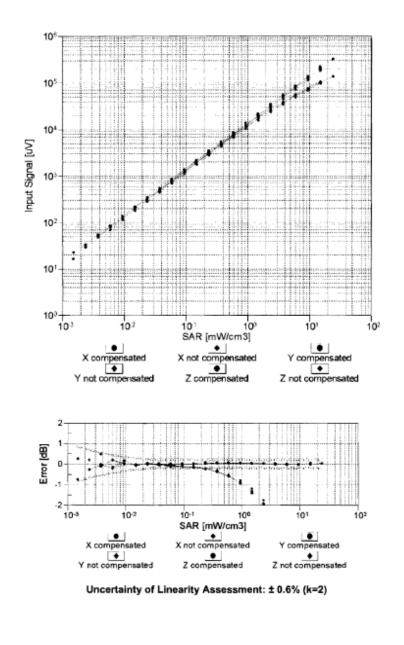
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## Dynamic Range f(SAR<sub>head</sub>) (TEM cell , f = 900 MHz)



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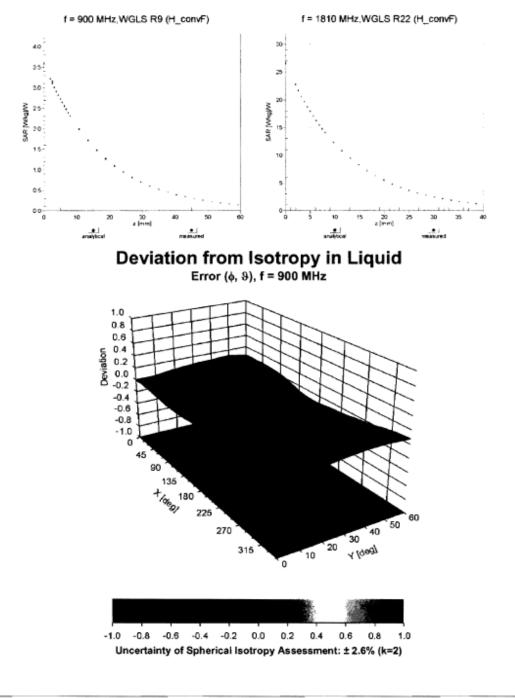
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# **Conversion Factor Assessment**



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January 11, 2012

# DASY/EASY - Parameters of Probe: ES3DV3 - SN:3225

### Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

Certificate No: ES3-3225\_Jan12

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	Document Appendix D for the BlackBerry® Smartphone Model RFE71UW SAR Report				
Author Data	Dates		Test Report No	FCC ID:	IC ID
Andrew Becke	er July	v 05 – July 30 , 2012	RTS-5992-1207-37	L6ARFE70UW	2503A-RFE70UW
	Accredited by the Swiss The Swiss Accreditation Multilateral Agreement	ər	s to the EA certificates	Servizio svizzero di taratura	enst
	· · · · · · · · · · · · · · · · · · ·	ON CERTIFICATE			
	Object	D835V2 - SN: 44	6		
	Calibration procedure(s		dure for dipole validation kits		
	Calibration date:	January 21, 2011	n an tri tri ang		
			onal standards, which realize the physical un robability are given on the following pages a		
			ry facility: environment temperature (22 ± 3)°	C and humidity < 70%.	
	Calibration Equipment	used (M&TE critical for calibration)			
	Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration	
	Power meter EPM-442		06-Oct-10 (No. 217-01266)	Oct-11	
	Power sensor HP 8481 Reference 20 dB Atten	1	06-Oct-10 (No. 217-01266) 30-Mar-10 (No. 217-01158)	Oct-11 Mar-11	
	Reference 20 dB Atten Type-N mismatch com	-	30-Mar-10 (No. 217-01158) 30-Mar-10 (No. 217-01162)	Mar-11 Mar-11	
	Reference Probe ES30		30-Apr-10 (No. ES3-3205_Apr10)	Apr-11	
	DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11	
	Secondary Standards	ID #	Check Date (in house)	Scheduled Check	
	Power sensor HP 8481		18-Oct-02 (in house check Oct-09)	In house check: Oct-11	
	RF generator R&S SM		4-Aug-99 (in house check Oct-09)	In house check: Oct-11	
	Network Analyzer HP 8	753E US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11	
		Name	Function	Signature	
	Calibrated by:	Dimce Iliev	Laboratory Technician	D. Vill	1 478 <b>1</b> 2 7
	Approved by:	Katja Pokovic	Technical Manager	L KJ	
	This calibration certifica	ate shall not be reproduced except in	full without written approval of the laborator	issued: January 21, 2011 y.	

Certificate No: D835V2-446\_Jan11

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Testing	Appendix D for the BlackBerry	Page		
Service	Report	14(36)		
Author Data Andrew Becker	Dates of Test	Test Report No	FCC ID:	<sup>IC ID</sup>
	July 05 – July 30, 2012	RTS-5992-1207-37	L6ARFE70UW	2503А-RFE70UW
Calibration L		SWISS S	Schweizerischer Kalibri	ierdienst

Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland



Service suisse d'étalonnage С Servizio svizzero di taratura

Swiss Calibration Service

Accreditation No.: SCS 108

s

Accredited by the Swiss Accreditation Service (SAS) The Swiss Accreditation Service is one of the signatories to the EA

Multilateral Agreement for the recognition of calibration certificates

#### Glossarv:

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) 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
- 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) DASY4/5 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.

Certificate No: D835V2-446\_Jan11

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Testing Service	Appendix D for the BlackBerr Report	Page 15(36)		
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
Andrew Becker	July 05 – July 30 , 2012	RTS-5992-1207-37	L6ARFE70UW	2503A-RFE70UW

#### Measurement Conditions

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

DASY Version	DASY5	V52.6
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	41.3 ± 6 %	0.89 mho/m ± 6 %
Head TSL temperature during test	(21.8 ± 0.2) °C		

#### SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.39 mW / g
SAR normalized	normalized to 1W	9.56 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.63 mW /g ± 17.0 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.56 mW / g
SAR normalized	normalized to 1W	6.24 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	6.27 mW /g ± 16.5 % (k=2)

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Testing Service	Document Appendix D for the BlackBer Report	ry® Smartphone Model	RFE71UW SAR	Page 16(36)
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
Andrew Becker	July 05 – July 30 , 2012	RTS-5992-1207-37	L6ARFE70UW	2503A-RFE70UW

#### Appendix

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.6 Ω - 7.7 jΩ
Return Loss	- 22.2 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

Certificate No: D835V2-446\_Jan11

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Andrew Becker	July 05 – July 30 , 2012	RTS-5992-1207-37	L6ARFE70UW	2503A-RFE70UW

#### **DASY5 Validation Report for Head TSL**

Date/Time: 21.01.2011 10:18:05

Test Laboratory: SPEAG, Zurich, Switzerland

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

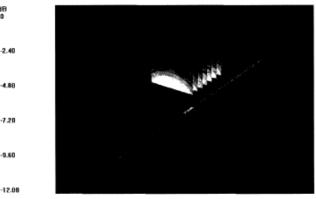
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1 Medium: HSL900 Medium parameters used: f = 835 MHz;  $\sigma$  = 0.89 mho/m;  $\epsilon_r$  = 41.2;  $\rho$  = 1000 kg/m<sup>3</sup> Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 SN3205; ConvF(6.03, 6.03, 6.03); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- · Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.6.1 Build (408)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2595)

#### Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement

grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 57.426 V/m; Power Drift = 0.04 dB Peak SAR (extrapolated) = 3.600 W/kg SAR(1 g) = 2.39 mW/g; SAR(10 g) = 1.56 mW/g Maximum value of SAR (measured) = 2.790 mW/g



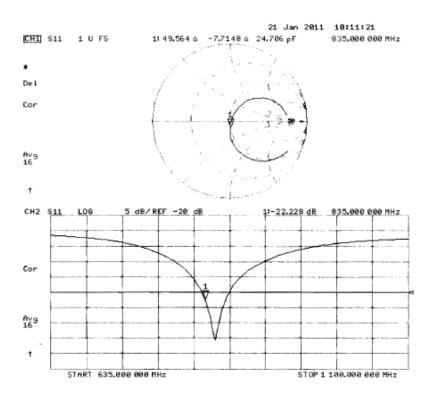
 $0 \, dB = 2.790 \, mW/g$ 

Certificate No: D835V2-446\_Jan11

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Testing Service	Document Appendix D for the BlackB Report	erry® Smartphone Model	RFE71UW SAR	Page 18(36)
Author Data Andrew Becker	Dates of Test	Test Report No	FCC ID:	IC ID
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Impedance Measurement Plot for Head TSL



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	Test	Test Report No	FCC ID:	IC ID
Becker July	05 – July 30 , 2012	RTS-5992-1207-37	L6ARFE70UW	2503A-RFF
Calibration Labora Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 2		Hac MRA SWISS S C D Z R MRATO S	Service suisse d'étalonnage Servizio svizzero di taratura	e
	editation Service (SAS) rvice is one of the signatorie he recognition of calibration	s to the EA	n No.: SCS 108	
_	esting Services)		o: D1800V2-2d020_Jar	n11 🔆
CALIBRATION	I CERTIFICATE			
Object	D1800V2 - SN: 2	d020	laise de la company.	
Calibration procedure(s)	QA CAL-05.v8 Calibration proce	dure for dipole validation kits		
	curnents the traceability to nat	ional standards, which realize the physical u	nits of measurements (SI).	
This calibration certificate de The measurements and the	curnents the traceability to nat uncertainties with confidence p		nits of measurements (SI). nd are part of the certificate.	
This calibration certificate de The measurements and the All calibrations have been ce	curnents the traceability to nat uncertainties with confidence p	ional standards, which realize the physical u robability are given on the following pages a	nits of measurements (SI). nd are part of the certificate.	
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Testing Service	Document Appendix D for the BlackBerry® Smartphone Model RFE71UW SAR Report			Page <b>20(36)</b>
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Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland



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

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS) The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

#### Glossary:

anoooan j.	
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) 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
- 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) DASY4/5 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.

Certificate No: D1800V2-2d020\_Jan11

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Testing Service	Appendix D for the BlackB Report	erry® Smartphone Model	RFE71UW SAR	Page <b>21(36)</b>
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
Andrew Becker	July 05 – July 30 , 2012	RTS-5992-1207-37	L6ARFE70UW	2503A-RFE70UW

#### Measurement Conditions

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

DASY Version	DASY5	V52.6
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	1800 MHz ± 1 MHz	

#### Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.6 ± 6 %	1.38 mho/m ± 6 %
Head TSL temperature during test	(21.3 ± 0.2) °C		

#### SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition		
SAR measured	250 mW input power	9.78 mW / g	
SAR normalized	normalized to 1W	39.1 mW / g	
SAR for nominal Head TSL parameters	normalized to 1W	39.2 mW /g ± 17.0 % (k=2)	
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition		
SAR measured	250 mW input power	5.13 mW / g	
SAR normalized	normalized to 1W	20.5 mW / g	

Certificate No: D1800V2-2d020\_Jan11

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Testing Service	Appendix D for the BlackBerry® Smartphone Model RFE71UW SAR Report			Page <b>22(36)</b>
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
Andrew Becker	July 05 – July 30 , 2012	RTS-5992-1207-37	L6ARFE70UW	2503A-RFE70UW

#### Appendix

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	46.5 Ω - 7.3 jΩ
Return Loss	- 21.5 dB

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1.216 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	September 07, 2001

Certificate No: D1800V2-2d020\_Jan11

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Testing Service	Appendix D for the BlackBerr Report	y® Smartphone Model 1	RFE71UW SAR	Page <b>23(36)</b>
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
Andrew Becker	July 05 – July 30 , 2012	RTS-5992-1207-37	L6ARFE70UW	2503A-RFE70UW

#### DASY5 Validation Report for Head TSL

Date/Time: 13.01.2011 12:34:12

Test Laboratory: SPEAG, Zurich, Switzerland

#### DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:2d020

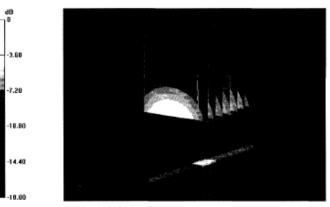
Communication System: CW; Frequency: 1800 MHz; Duty Cycle: 1:1 Medium: HSL U12 BB Medium parameters used: f = 1800 MHz;  $\sigma$  = 1.38 mho/m;  $\epsilon_r$  = 38.7; p = 1000 kg/m<sup>3</sup> Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 SN3205; ConvF(5.05, 5.05, 5.05); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.6.1 Build (408)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2595)

# Pin=250 mW/d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement

grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 96.654 V/m; Power Drift = 0.04 dB Peak SAR (extrapolated) = 17.902 W/kg SAR(1 g) = 9.78 mW/g; SAR(10 g) = 5.13 mW/gMaximum value of SAR (measured) = 12.051 mW/g



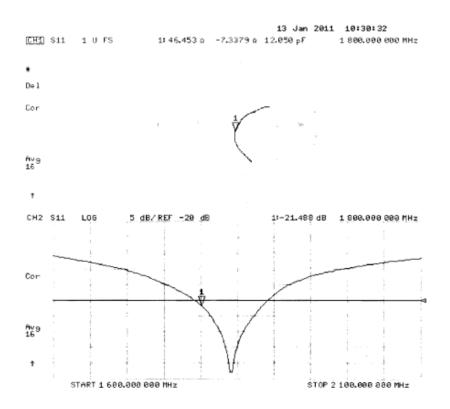
0 dB = 12.050 mW/g

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Testing Service	Appendix D for the BlackBerry® Smartphone Model RFE71UW SAR Report			Page <b>24(36)</b>
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Andrew Becker	July 05 – July 30 , 2012	RTS-5992-1207-37	L6ARFE70UW	2503A-RFE70UW

Impedance Measurement Plot for Head TSL



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	5 – July 30 , 2012	Test Report No <b>RTS-5992-1207-37</b>	FCC ID: L6ARFE70UW	IC ID 2503A-RFE
Calibration Labora Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 z	-		Service suisse d'étalonnag Servizio svizzero di laratur	ge
	editation Service (SAS) rvice is one of the signatorie he recognition of calibration	s to the EA	n No.: SCS 108	
	esting Services)	Service of the servic	la: D1900V2-545_Jan1	1.12 <sup>2</sup> -122
		45		
Calibration procedure(s)	QA CAL-05.v8	dure for dipole validation kits		
Calibration date:	January 13, 2011			
The measurements and the All calibrations have been co	uncertainties with confidence p	onal standards, which realize the physical u robability are given on the following pages a ry facility: environment temperature (22 ± 3)	and are part of the certificate.	-
The measurements and the All calibrations have been co Calibration Equipment used	uncertainties with confidence p nducted in the closed laborator	robability are given on the following pages a y facility: environment temperature ( $22 \pm 3$ )	and are part of the certificate.	-
The measurements and the All calibrations have been co	uncertainties with confidence p nducted in the closed laborator M&TE critical for calibration)	robability are given on the following pages a	and are part of the certificate. °C and humidity < 70%.	
The measurements and the All calibrations have been or Calibration Equipment used Primary Standards	Incertainties with confidence p inducted in the closed laborator M&TE critical for calibration)	robability are given on the following pages a y facility: environment temperature (22 ± 3) Cal Date (Certificate No.)	and are part of the certificate. °C and humidity < 70%. Scheduled Calibration	
The measurements and the All calibrations have been or Calibration Equipment used Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator	Incertainties with confidence p inducted in the closed laborator M&TE critical for calibration) ID # GB37480704 US37292783 SN: 5086 (20g)	Cal Date (Certificate No.) 06-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01266) 30-Mar-10 (No. 217-01158)	C and humidity < 70%. Scheduled Calibration Oct-11 Oct-11 Mar-11	
The measurements and the All calibrations have been or Calibration Equipment used Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination	Incertainties with confidence p inducted in the closed laborator M&TE critical for calibration) ID # GB37480704 US37292783 SN: 5086 (20g) an SN: 5047.2 / 06327	Cal Date (Certificate No.)           06-Oct-10 (No. 217-01266)           06-Oct-10 (No. 217-01266)           30-Mar-10 (No. 217-01158)           30-Mar-10 (No. 217-01162)	and are part of the certificate. *C and humidity < 70%. Scheduled Calibration Oct-11 Oct-11 Mar-11 Mar-11	
The measurements and the All calibrations have been or Calibration Equipment used Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combinati Reference Probe ES3DV3	Incertainties with confidence p inducted in the closed laborator (M&TE critical for calibration) ID # GB37480704 US37292783 SN: 5086 (20g) SN: 5087.2 / 06327 SN: 3205	Cal Date (Certificate No.)           06-Oct-10 (No. 217-01266)           06-Oct-10 (No. 217-01266)           30-Mar-10 (No. 217-01158)           30-Mar-10 (No. 217-01162)           30-Apr-10 (No. 217-01162)	and are part of the certificate. *C and humidity < 70%. Scheduled Calibration Oct-11 Oct-11 Mar-11 Mar-11 Apr-11	
The measurements and the All calibrations have been or Calibration Equipment used Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination	Incertainties with confidence p inducted in the closed laborator M&TE critical for calibration) ID # GB37480704 US37292783 SN: 5086 (20g) an SN: 5047.2 / 06327	Cal Date (Certificate No.)           06-Oct-10 (No. 217-01266)           06-Oct-10 (No. 217-01266)           30-Mar-10 (No. 217-01158)           30-Mar-10 (No. 217-01162)	and are part of the certificate. *C and humidity < 70%. Scheduled Calibration Oct-11 Oct-11 Mar-11 Mar-11	
The measurements and the All calibrations have been or Calibration Equipment used Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combinatis Reference Probe ES3DV3	Incertainties with confidence p inducted in the closed laborator (M&TE critical for calibration) ID # GB37480704 US37292783 SN: 5086 (20g) SN: 5087.2 / 06327 SN: 3205	Cal Date (Certificate No.)           06-Oct-10 (No. 217-01266)           06-Oct-10 (No. 217-01266)           30-Mar-10 (No. 217-01158)           30-Mar-10 (No. 217-01162)           30-Apr-10 (No. 217-01162)	and are part of the certificate. *C and humidity < 70%. Scheduled Calibration Oct-11 Oct-11 Mar-11 Mar-11 Apr-11	
The measurements and the All calibrations have been or Calibration Equipment used Primary Standards Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combinatis Reference Probe ES3DV3 DAE4	Incertainties with confidence p inducted in the closed laborator (M&TE critical for calibration) ID # GB37480704 US37292783 SN: 5086 (20g) on SN: 5047.2 / 06327 SN: 3205 SN: 601	Cal Date (Certificate No.)           06-Oct-10 (No. 217-01266)           06-Oct-10 (No. 217-01266)           30-Mar-10 (No. 217-01158)           30-Mar-10 (No. 217-01152)           30-Apr-10 (No. ES3-3205_Apr10)           10-Jun-10 (No. DAE4-601_Jun10)	C and humidity < 70%. C and humidity < 70%. Scheduled Calibration Oct-11 Oct-11 Mar-11 Mar-11 Apr-11 Jun-11	
The measurements and the All calibrations have been co Calibration Equipment used Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combinatis Reference Probe ES3DV3 DAE4 Secondary Standards	Incertainties with confidence p inducted in the closed laborator (M&TE critical for calibration) ID # GB37480704 US37292783 SN: 5086 (20g) SN: 5047.2 / 06327 SN: 3205 SN: 601 ID #	Cal Date (Certificate No.)           06-Oct-10 (No. 217-01266)           06-Oct-10 (No. 217-01266)           06-Oct-10 (No. 217-01266)           30-Mar-10 (No. 217-01158)           30-Mar-10 (No. 217-01158)           30-Mar-10 (No. 217-01162)           30-Apr-10 (No. 217-01162)           30-Mar-10 (No. 217-01162)           30-Apr-10 (No. DAE4-601_Jun10)           Check Date (in house)	and are part of the certificate. *C and humidity < 70%. Scheduled Calibration Oct-11 Oct-11 Mar-11 Mar-11 Apr-11 Jun-11 Scheduled Check	
The measurements and the All calibrations have been co Calibration Equipment used Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combinatis Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A	uncertainties with confidence p nducted in the closed laborator (M&TE critical for calibration) ID # GB37480704 US37292783 SN: 5086 (20g) SN: 5047.2 / 06327 SN: 3205 SN: 601 ID # MY41092317	Cal Date (Certificate No.)           06-Oct-10 (No. 217-01266)           06-Oct-10 (No. 217-01266)           06-Oct-10 (No. 217-01266)           30-Mar-10 (No. 217-01158)           30-Mar-10 (No. 217-01158)           30-Apr-10 (No. 217-01162)           30-Apr-10 (No. 217-01162)           30-Apr-10 (No. 217-01162)           30-Apr-10 (No. ES3-3205_Apr10)           10-Jun-10 (No. DAE4-601_Jun10)           Check Date (in house)           18-Oct-02 (in house check Oct-09)	and are part of the certificate. *C and humidity < 70%. Scheduled Calibration Oct-11 Oct-11 Mar-11 Mar-11 Jun-11 Jun-11 Scheduled Check In house check: Oct-11	ı
The measurements and the All calibrations have been or Calibration Equipment used Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combinati Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer HP 8753E	Incertainties with confidence p Inducted in the closed laborator (M&TE critical for calibration) ID # GB37480704 US37292783 SN: 5086 (20g) SN: 5086 (20g) SN: 5086 (20g) SN: 5087.2 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005 US37390585 S4206 Name	Cal Date (Certificate No.)           06-Oct-10 (No. 217-01266)           06-Oct-10 (No. 217-01266)           06-Oct-10 (No. 217-01266)           30-Mar-10 (No. 217-01158)           30-Mar-10 (No. 217-01162)           30-Apr-10 (No. 217-01162)           30-Apr-10 (No. 217-01162)           30-Apr-10 (No. 217-01162)           30-Apr-10 (No. 253-3205_Apr10)           10-Jun-10 (No. DAE4-601_Jun10)           Check Date (in house)           18-Oct-02 (in house check Oct-09)           4-Aug-99 (in house check Oct-09)           18-Oct-01 (in house check Oct-10)	and are part of the certificate. *C and humidity < 70%. Scheduled Calibration Oct-11 Oct-11 Mar-11 Mar-11 Apr-11 Jun-11 Scheduled Check In house check: Oct-11 In house check: Oct-11	ı
The measurements and the All calibrations have been or Calibration Equipment used Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combinatii Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06	Incertainties with confidence p inducted in the closed laborator (M&TE critical for calibration) ID # GB37480704 US37292783 SN: 5086 (20g) SN: 5087.2 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005 US37390585 S4206 Name Dimce Rev	Cal Date (Certificate No.)           06-Oct-10 (No. 217-01266)           06-Oct-10 (No. 217-01266)           06-Oct-10 (No. 217-01266)           30-Mar-10 (No. 217-01162)           30-Mar-10 (No. 217-01162)           30-Apr-10 (No. 217-01162)           30-Apr-10 (No. 217-01162)           30-Apr-10 (No. ES3-3205_Apr10)           10-Jun-10 (No. DAE4-601_Jun10)           Check Date (in house)           18-Oct-02 (in house check Oct-09)           4-Aug-99 (in house check Oct-09)           18-Oct-01 (in house check Oct-09)	and are part of the certificate. *C and humidity < 70%. Scheduled Calibration Oct-11 Oct-11 Mar-11 Mar-11 Jun-11 Scheduled Check In house check: Oct-11 In house check: Oct-11	ı

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Andrew Becker	July 05 – July 30 , 2012	ly 05 – July 30 , 2012 RTS-5992-1207-37 L6ARFE70UW				
Calibration	Andrew Becker   July 05 – July 30, 2012   RTS-5992-1207-37   L6ARFE70UW   2503A-RFE70UV					

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



S Schweizerischer Kalibrierdienst Service suisse d'étalonnage

C Service suisse d'etalonnage Servizio svizzero di taratura

S Swiss Calibration Service

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS) The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

#### 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) 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
- 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) DASY4/5 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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	Dates of Test	1			
Andrew Becker	July 05 – July 30 , 2012	RTS-5992-1207-37	L6ARFE70UW	2503A-RFE70UW	

#### Measurement Conditions

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

DASY Version	DASY5	V52.6
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	1900 MHz ± 1 MHz	

#### Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.5 ± 6 %	1.43 mho/m ± 6 %
Head TSL temperature during test	(21.2 ± 0.2) °C		

#### SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.2 mW / g
SAR normalized	normalized to 1W	40.8 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	40.0 mW /g ± 17.0 % (k=2)
		······································
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL SAR measured	condition 250 mW input power	5.26 mW / g
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	

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#### Appendix

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.8 Ω + 1.8 jΩ
Return Loss	- 34.4 dB

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1.199 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	November 15, 2001

Certificate No: D1900V2-545\_Jan11

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Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
Andrew Becker	July 05 – July 30 , 2012	RTS-5992-1207-37	L6ARFE70UW	2503A-RFE70UW

#### DASY5 Validation Report for Head TSL

Date/Time: 13.01.2011 14:52:49

Test Laboratory: SPEAG, Zurich, Switzerland

#### DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:545

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1 Medium: HSL U12 BB Medium parameters used: f = 1900 MHz;  $\sigma = 1.43$  mho/m;  $\varepsilon_r = 38.6$ ;  $\rho = 1000$  kg/m<sup>3</sup> Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 SN3205; ConvF(5.09, 5.09, 5.09); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.6.1 Build (408)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2595)

#### Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement

grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 98.053 V/m; Power Drift = 0.03 dB Peak SAR (extrapolated) = 18.648 W/kg SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.26 mW/g Maximum value of SAR (measured) = 12.743 mW/g



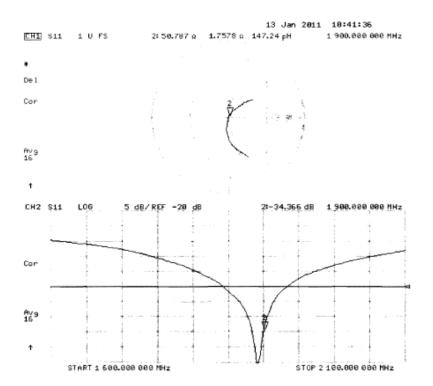
0 dB = 12.740 mW/g

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Andrew Becker	July 05 – July 30 , 2012	RTS-5992-1207-37	L6ARFE70UW	2503A-RFE70UW

Impedance Measurement Plot for Head TSL



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	t T T T 20 2012	Test Report No	FCC ID:	IC ID
ecker July 05	– July 30 , 2012	RTS-5992-1207-37	L6ARFE70UW	2503A-RF
Calibration Laborato Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zur	-	Hac MRA	Service suisse d'étalonnag Servizio svizzero di taratur	je
Accredited by the Swiss Accred The Swiss Accreditation Serv	ice is one of the signatorie	s to the EA	n No.: SCS 108	
Multilateral Agreement for the Client RTS (RIM Ter	ting Services)		a: D2450V2-747_Nov	I.F.
CALIBRATION	CERTIFICATE	11111		
Object	D2450V2 - SN: 7	<b>47</b> i i i i i i i i i i i i i i i i i i i	an an the second second	
Calibration procedure(s)	QA CAL-05.v8			
Canolacon processie(o)		dure for dipole validation kits ab	ove 700 MHz	
	1.8.1	alle da	Sec. 1	
Calibration date:	November 09, 20	11		
This calibration certificate docu	ments the traceability to nat	011 ional standards, which realize the physical u robability are given on the following pages a		
This calibration certificate docu The measurements and the un	ments the traceability to nat certainties with confidence p	Manuto, funito (manuto, malikkano umbilitori prefisio, umbilitori di	nd are part of the certificate.	
This calibration certificate docu The measurements and the un	ments the traceability to nat certainties with confidence p lucted in the closed laborato	ional standards, which realize the physical u robability are given on the following pages a	nd are part of the certificate.	
This calibration certificate docu The measurements and the un All calibrations have been cond	ments the traceability to nat certainties with confidence p lucted in the closed laborato	ional standards, which realize the physical u robability are given on the following pages a	nd are part of the certificate.	
This calibration certificate docu The measurements and the un All calibrations have been cond Calibration Equipment used (N Primary Standards Power meter EPM-442A	ments the traceability to nat certainties with confidence p lucted in the closed laborato &TE critical for calibration) ID #	ional standards, which realize the physical u wobability are given on the following pages a ry facility: environment temperature (22 ± 3) Cal Date (Certificate No.) 05-Oct-11 (No. 217-01451)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Oct-12	
This calibration certificate docu The measurements and the un All calibrations have been cons Calibration Equipment used (N Primary Standards Power meter EPM-442A Power sensor HP 8481A	ments the traceability to nati certainties with confidence p lucted in the closed laborato &TE critical for calibration) ID # GB37480704 US37292783	ional standards, which realize the physical u wobability are given on the following pages a ry facility: environment temperature (22 ± 3) Cal Date (Certificate No.) 05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Oct-12 Oct-12	
This calibration certificate docu The measurements and the un All calibrations have been cons Calibration Equipment used (N Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator	ments the traceability to nati certainties with confidence p lucted in the closed laborato &TE critical for calibration) ID # GB37480704 US37292783 SN: 5086 (20g)	ional standards, which realize the physical u wobability are given on the following pages a ry facility: environment temperature (22 ± 3) Cal Date (Certificate No.) 05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451) 29-Mar-11 (No. 217-01368)	C and humidity < 70%. C and humidity < 70%. Scheduled Calibration Oct-12 Oct-12 Apr-12	
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	Laboratory of	CON CHISC	c Schweizerischer Kali	brierdienst

Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland



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- Servizio svizzero di taratura s
  - Swiss Calibration Service

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS) The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

#### 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) 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
- 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) DASY4/5 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 ٠ 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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Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
Andrew Becker	July 05 – July 30 , 2012	RTS-5992-1207-37	L6ARFE70UW	2503A-RFE70UW

#### Measurement Conditions

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

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
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	37.7 ± 6 %	1.84 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

#### SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition		
SAR measured	250 mW input power	13.8 mW / g	
SAR for nominal Head TSL parameters	normalized to 1W	54.1 mW /g ± 17.0 % (k=2)	
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition		
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL SAR measured	condition 250 mW input power	6.39 mW / g	

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#### Appendix

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.5 Ω + 1.3 jΩ		
Return Loss	- 31.2 dB		

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1.161 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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#### DASY5 Validation Report for Head TSL

Date: 09.11.2011

Test Laboratory: SPEAG, Zurich, Switzerland

#### DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 747

Communication System: CW; Frequency: 2450 MHz Medium parameters used: f = 2450 MHz;  $\sigma$  = 1.84 mho/m;  $\epsilon_r$  = 37.7;  $\rho$  = 1000 kg/m<sup>3</sup> Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- · Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

#### Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 102.1 V/m; Power Drift = 0.04 dB Peak SAR (extrapolated) = 28.853 W/kg SAR(1 g) = 13.8 mW/g; SAR(10 g) = 6.39 mW/g Maximum value of SAR (measured) = 17.782 mW/g



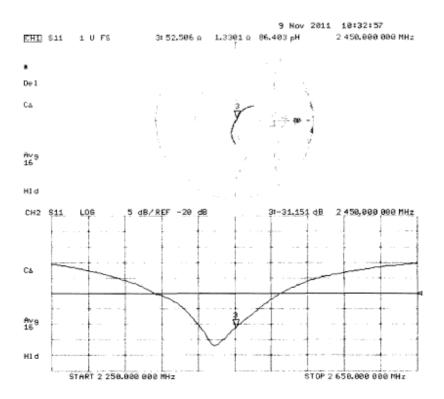
0 dB = 17.780mW/g

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Impedance Measurement Plot for Head TSL



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