Testing Service	Services Appendix D for the BlackBerry® Smartphone Model RFP121LW SAR Report				
Author Data	Dates of Test	Test Report No	FCC ID:	IC	
Andrew Becker	Nov 22, 2012 – Feb 28, 2013	RTS-6026-1303-02	L6ARFL110LW L6ARFP120LW	2503A-RFL110LW 2503A-RFP120LW	

# APPENDIX D: PROBE & DIPOLE CALIBRATION DATA



Document

# Appendix D for the BlackBerry® Smartphone Model RFP121LW SAR Report

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Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02 L6ARFL11

FCC ID:

L6ARFL110LW L6ARFP120LW 2503A-RFL110LW 2503A-RFP120LW

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





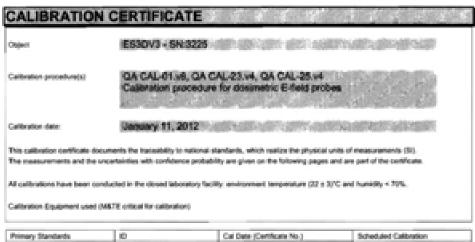
S Schweizerincher Kalibrierdens C Service suitse d'italonnage S Servicio svissero di teratura Swiss Calibration Service

According to the Swiss Accordination Service (SAS)
The Swiss Accordination Service is one of the eignatories to the EA
Multilateral Agreement for the recognition of calibration certificates

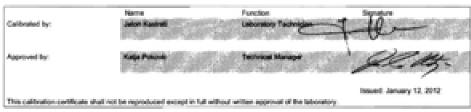
Accreditation No.: SCS 108

Clark RTS (RIM Testing Services)

Curefron No: ES3-3225 Jam12



Primary Standards	0	Cal Date (Certificate No.)	Sicheduled Calibration
Power mater £44198	G841290874	31-Mar-11 (No. 217-01572)	Apr-12:
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr. 131
Reference 3 dB Attenuator	5N: 55054 (No	29-Mar-11 (No. 217-01300)	Apr-12
Reference 20:dB Attenuator	SN: 55086 (20t)	29-Mar-11 (No. 217-01067)	Age-12
Reference 30-dB Attenuator	SN: 85129 (30b)	29-Mar 11 (No. 217-01370)	Apr 12
Reference Probe ESSOV2	SN: 3013	29-Dec-11 (No. ES3-3013, Dec11)	Dec-12
DMER	SN: 654	3/May-11 (No. DAE4-054, May11)	May-12
Secondary Standards	10	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US0840U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 87500	US37590585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12



Certificate No: ES3-3225, Jan12

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# Appendix D for the BlackBerry® Smartphone Model RFP121LW SAR Report

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Author Data

Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02

L6ARFL110LW L6ARFP120LW

FCC ID:

2503A-RFL110LW 2503A-RFP120LW

#### Calibration Laboratory of

Schmid & Partner
Engineering AG
Zeuthaustrasse 40, 8094 Zertob, Setteerland





S Schweizerischer Kalibrierdienst C Service suises d'étalonnage Servicie svizzero di taratura Swiss Calibration Service

Accreditation No.: SCS 108

Accorded by the Swiss Accorditation Service (SAS)
The Swiss Accorditation Service is one of the signaturies to the EA
Multilutural Agreement for the recognition of calibration certificates

Glossary:

TSL Sesue simulating liquid NORMx.y.z sensitivity in free space conff sensitivity in TSL / NORMx.y.z DOP dode compression point

CF crest factor (1/duty, cycle) of the RF signal A, B, C modulation dependent linearization parameters

Polarization o o rotation around probe axis

Polarization 9 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

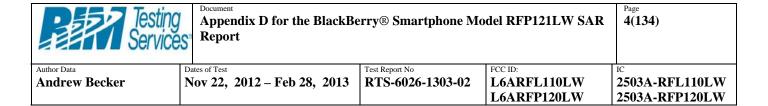
#### Calibration is Performed According to the Following Standards:

- 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
- EC 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 3 = 0 (f s 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide).
   NORMx.y.z are only informediate values, i.e., the uncertainties of NORMx.y.z does not affect the E<sup>E</sup>field uncertainty inside TSL (see below ConvF).
- NORM(f)x,y,z = NORMx,y,z \* frequency\_response (see Frequency Response Chart). This finearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of Corn#.
- 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: 8x,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.
- ConsF and Boundary Effect Planameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for 1 s 800 MHz) and inside waveguide using analytical field distributions based on power measurements for 1 > 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 NORMs, y, z \* ConsF whereby the uncertainty corresponds to that given for ConsF. A frequency dependent. ConsF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical leatropy (3D deviation from leatropy): 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.

Certificate No. ESS-3225\_Jan12 Page 2 of 11



ES30V3 - SN:3225

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!)

Certificate No: ES3-3225\_Jan12

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# Appendix D for the BlackBerry® Smartphone Model RFP121LW SAR Report

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Author Data
Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No **RTS-6026-1303-02** 

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

ES30V3-5N:3225

January 11, 2012

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

#### **Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Wine (km2)
Norm (µV/(V/m) <sup>2</sup> ) <sup>A</sup>	1.26	1.20	1,30	± 10.1%
DCP (mV)*	101.2	100.8	101.2	

#### Modulation Calibration Parameters

UID	Communication System Name	PAR		48	68	68	VR mV	Unc* (k=2)
10000 CW	CW	0.00	X	0.00	0.00	1.00	107.7	81.7%
			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%.

Certificate No. ElS3-3225\_Jan/12

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<sup>\*</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>\*</sup> Numerical Inspiration parameter, uncertainty not required.
\*\*Uncertainty is determined using the max, deviation from linear response applying rectangular distribution and its expressed for the square of the field value.



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Author Data **Andrew Becker**  Dates of Test Nov 22, 2012 – Feb 28, 2013 Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

ESODY3-- SN 3225

January 11, 2012;

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

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

r (MHz) <sup>4</sup>	Relative Permittivity*	Conductivity (Sim)	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unot. (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	1.12.01
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 5
2450	39.2	1.80	4.50	4,50	4.50	0.79	1,26	112.05
2600	39.0	1.96	4.32	4.32	4.32	0.77	1.32	112.05

Certificate No: ES3-3225\_Jan/12

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<sup>&</sup>lt;sup>6</sup> Prequency validity of a 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to a 50 MHz. The uncertainty is the RSS of the Count recontainty at calibration frequency and the uncertainty for the indicated frequency band.
<sup>6</sup> All requencies below 3 SMs. the validity of feases parameters (s. and c) can be retired to a 10% if liquid compensation formula is applied to measured SAM values. All trepercises above 3 GMs, the validity of feases parameters (s. and c) is restricted to a 5%. The uncertainty is the RSS of the Count uncertainty for indicated target feases parameters.



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Author Data **Andrew Becker**  Dates of Test Nov 22, 2012 – Feb 28, 2013

Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

ES30V3- SN 3225

January 11, 2012

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

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

г(мн <sub>ф</sub> с	Relative Permittivity*	Conductivity (S/m)	ComrF 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	1 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	1 12.0 %
2450	52.7	1.95	4.30	4.30	4.30	0.68	1.16	1 12.0 %
2600	52.5	2.16	4.12	4.12	4.12	0.80	0.99	1 12.0 %

Certificate No: ES3-3225\_Jan12

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<sup>&</sup>lt;sup>1</sup> Frequency validity of a 100 MHz only applies for DADY vt.4 and higher (see Page 2), else it is neethined to a 50 MHz. The uncertainty is the RSS of the Conve<sup>2</sup> uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
<sup>2</sup> At hetuancies below 3 GHz. the validity of fiscus parameters (s and e) can be retained to a 10% if liquid compensation formula is applied to measured SARV estims. At frequencies above 3 GHz, the validity of fiscus parameters (s and e) is nestricted to a 5%. The uncertainty is the RSS of the Conve<sup>2</sup> uncertainty for indicated target fiscus parameters.



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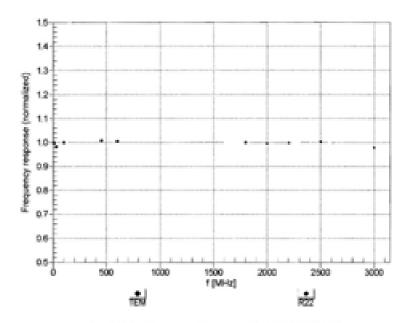
FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

ES30V3- SN:3225

January 11, 2012

# 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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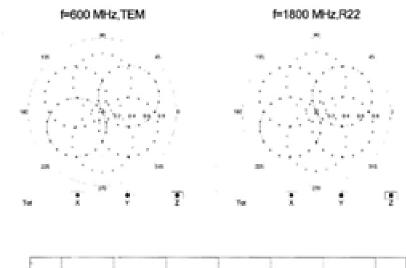
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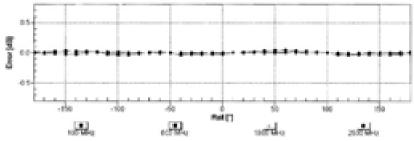
2503A-RFL110LW 2503A-RFP120LW

ES30V3-- SN:3225

January 11, 2012

# Receiving Pattern (¢), 9 = 0°





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

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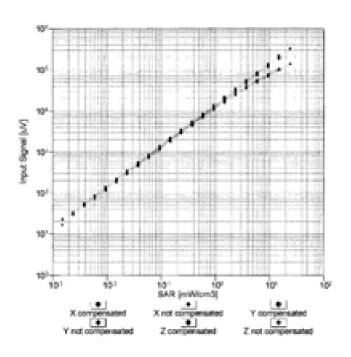
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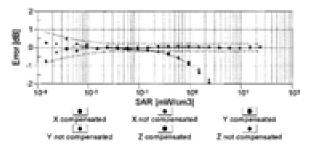
2503A-RFL110LW 2503A-RFP120LW

E\$30V3-5N:3225

January 11, 2012

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





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

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Andrew Becker

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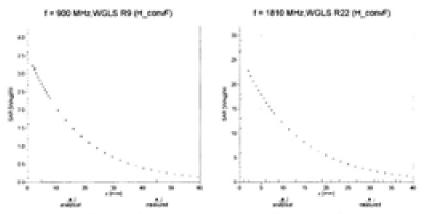
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2503A-RFL110LW 2503A-RFP120LW

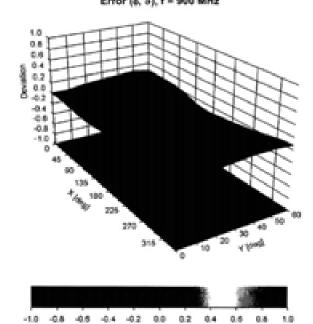
ES30V3-SN:3225

January 11, 2012

### Conversion Factor Assessment



# Deviation from Isotropy in Liquid Error (4, 5), f = 900 MHz



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Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)



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2503A-RFL110LW 2503A-RFP120LW

ES30V3-SN 3225

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

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L6ARFL110LW L6ARFP120LW

FCC ID:

2503A-RFL110LW 2503A-RFP120LW

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





Schweigerlogher Kalibriandianut Service suisse d'étalonnage Servizio evizzeno di terotora Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS):

The Swiss Accreditation Service is one of the signaturies to the EA Multilateral Agreement for the recognition of calibration cortificates

RTS (RIM Testing Services)

According to SCS 108

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Cartificate No: ES3-3225\_Jan13

# CALIBRATION CERTIFICATE

Object ES3DV3 - SN:3225

QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4 Calibration procedure for dosimetric E-field probes

Cultivation date:

Calibration procedure(s)

January 10, 2013

This calibration certificate documents the traceability to national standards, which realize the physical units of me 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 (32 x 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	0	Cal Date (Contrioste No.)	Subeduted Calibration
Power mater E44196	G841290874	29-May-12 (No. 217-01508)	Apr-13
Power sensor E44/GA	M7Y41498987	29-May-12 (No. 217-01508)	Apr/13
Reference 3 dB Attenuarior	59c 55054 (3c)	27 Mar 12 (No. 217-01501)	Apr-13
Balanance 20 dB Attenuator	SN: 55086 (20to)	27 Mar-12 (No. 217-01929)	Apr-13
Reference 30 dB Attenuator	SN: 55529 (30b)	27 Mar-12 (No. 217 01502)	Apr-13
Reference Probe ES30V2	8%: 3013	28-Dec-12 (No. ES3-3013, Dec12)	Dec-13
DAE4	SN: 660	20-Jun-12 (No. DAE4-660_Jun12)	Jun-13
Secondary Standards	· P	Check Date (in house)	Scheduled Check
RF generator HP 9648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 87536	USSTREES	18 Oct-01 (in house check Oct-12) In house check: O	

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	fu
Approved by:	Karja Pokovic	Technical Manager	De de
			tenued: January 14, 2013
This calibration certificati	is a half not be reproduced except in fully	I without written approval of the labora	alory.

Certificate Nov ES3-3225 Jan 53

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Author Data Andrew Becker Dates of Test

Nov 22, 2012 – Feb 28, 2013

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2503A-RFL110LW 2503A-RFP120LW

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





Schweigerischer Kpilbrierdienst 8 Service suisse d'étalonnage G. Servicio sviszero di taratura

8 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:

NORMx,y,z ConvF

tissue simulating liquid sensitivity in free space sensitivity in TSL / NORMx,y,z diede compression point

CF. A, B, C, D

DCP

crest factor (1/duty\_cycle) of the RF signal modulation dependent linearization parameters

Polarization e

e rotation around probe axis

Polarization 8 5 rotation around an axis that is in the plane normal to probe axis (at measurement center),

i.e., 3 = 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

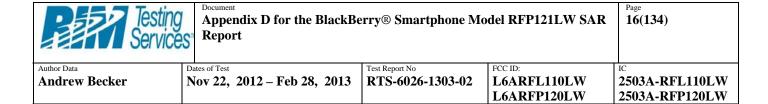
#### Methods Applied and Interpretation of Parameters:

- NORMs, y.z. Assessed for E-field polarization 5 = 0 (f s 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMs,y,z are only intermediate values, i.e., the uncertainties of NORMs,y,z does not affect the E3-field uncertainty inside TSL (see below ConvF).
- NORM/fjx.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
- Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z; A, B, C, D 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.
- Corolf 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 a 50 MHz to a 100
- 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 to (on probe axis). No tolerance required.

Certificate No: ES3-3225, Jan 53

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Testing Service	Appendix D for the BlackBe Report	Appendix D for the BlackBerry® Smartphone Model RFP121LW SAR			
Author Data	Dates of Test	Test Report No	FCC ID:	IC	
Andrew Becker	Nov 22, 2012 – Feb 28, 2013	RTS-6026-1303-02	L6ARFL110LW L6ARFP120LW	2503A-RFL110LW 2503A-RFP120LW	



ES30V3 - SN3225

January 10, 2015

# Probe ES3DV3

SN:3225

Manufactured: Calibrated: September 1, 2009 January 10, 2013

Calibrated for DASY/EASY Systems (Note: non-competible with DASY2 system?)

Certificate No: ES3-3225\_Jan/13

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L6ARFL110LW L6ARFP120LW

FCC ID:

2503A-RFL110LW 2503A-RFP120LW

ES30V3- SN:3225

January 10, 2013

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

#### **Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Une (krd)
Norm (µV/(Vim) <sup>2</sup> ) <sup>a</sup>	1.29	1.19	1.31	± 10.1 %
DCP (mV)*	100.5	101.5	99.9	

#### Modulation Calibration Parameters

UID	Communication System Name		A.	68·/y/	О	0 dB	VR mV	Une* (k=2)
0	CW	X	0.0	0.0	1.0	0.00	157.5	12.7 %
		Y	0.0	0.0	1.0		158.4	
		Z	0.0	0.0	1.0		165.9	

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%.

Certificate No: ES3-3225\_Jan13

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The uncertainties of NormOLY.Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Pages 5 and 6).

Namorical insanisation parameter: uncertainty not required.

Uncertainty is determined using the max, deviation from linear response applying rectangular distribution and is expressed for the square of the

Testing Service	Page <b>18</b> (134)			
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Nov 22, 2012 – Feb 28, 2013	RTS-6026-1303-02	L6ARFL110LW L6ARFP120LW	2503A-RFL110LW 2503A-RFP120LW



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Author Data **Andrew Becker**  Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

6530V3-5N 3235

January 10, 2013

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

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

п(мид)*	Relative Permittivity	Conductivity (Sim)	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Umet. (k=2)
750	41.9	0.89	6.56	6.56	6.56	0.42	1.54	± 12.0 %
900	41.5	0.97	6.19	6.19	6.19	0.43	1.52	± 12.0 %
1810	40.0	1.40	5.35	5.35	5.35	0.63	1.39	± 12.0 %
1950	40.0	1.40	5.09	5.09	5.09	0.80	1.23	± 12.0 %
2450	39.2	1.80	4.65	4.65	4.05	0.61	1.63	± 12.0 %
2600	39.0	1.96	4.43	4.43	4.43	0.80	1.32	± 12.0 %

Certificate No: ES3-3225, Jan 13

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<sup>&</sup>lt;sup>6</sup> Prequency validity of a 100 MHz only applies for DASY v4.4 and higher lake Page 2), else 8 is nestricted to a 50 MHz. The uncertainty is the RSS of the Comiff uncertainty at califoration frequency and the uncertainty for the indicated frequency band.
<sup>7</sup> All frequencies below 3 GHz. The variety of issue parameters (a and 4) can be released to a 10% if liquid componisation formula is applied to measured SAM values. All frequencies allows 3 GHz, the validity of issue parameters (a and 4) is restricted to a 5%. The uncertainty is the RSS of the Comiff uncertainty for indicated target issue parameters.



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Author Data **Andrew Becker**  Dates of Test Nov 22, 2012 – Feb 28, 2013 Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

ES30V3- SN:3225

January 10, 2013

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

# Calibration Parameter Determined in Body Tissue Simulating Media

F (MHa) <sup>C</sup>	Relative Permittivity	Conductivity (Sim)	Convil X	ConvF Y	Convf Z	Alpha	Depth (mm)	Unot. (k=2)
750	55.5	0.96	6.27	6.27	6.27	0.48	1.51	± 12.0 %
900	55.0	1.05	6.12	6.12	6.12	0.73	1.25	1 12.0 %
1810	53.3	1.52	5.04	5.04	5.04	0.57	1,47	± 12.0 %
1950	53.3	1.52	4.94	4.94	4.94	0.58	1.50	± 12.0 %
2450	52.7	1.95	4.35	4,35	4.35	0.70	1.16	± 12.0 %
2600	52.5	2.16	4.11	4.11	4.11	0.67	0.99	a 12.0 %

Certificate No: ES3-3225\_Jan13

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<sup>&</sup>lt;sup>6</sup> Prequency validity of a 100 MHz only agains for DASY v4.4 and higher (see Page 2), also 8 is restricted to a 56 MHz. The uncertainty is the RSS of the Conn4 uncertainty is palled above 3 CHz of the uncertainty for the indicated frequency band.
<sup>8</sup> All frequencies before 3 CHz is validity of fiscuse parameters (a and a) can be released to a 575 if legal compensation formula is applied to measured SAR values. At frequencies above 3 CHz, the validity of fiscus parameters (a and a) is restricted to a 576. The uncertainty is the RSS of the Conn4 uncertainty for indicated larged travel parameters.

Testing Service	Page <b>21</b> (134)			
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Nov 22, 2012 – Feb 28, 2013	RTS-6026-1303-02	L6ARFL110LW L6ARFP120LW	2503A-RFL110LW 2503A-RFP120LW



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Author Data **Andrew Becker**  Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

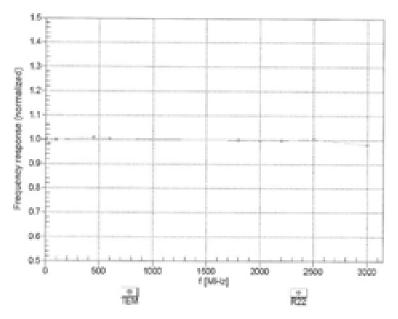
2503A-RFL110LW 2503A-RFP120LW

ES30V3- SW3225

January 10, 2013

# Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)



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

Contribute No: ES3-3225 Jan 13

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Author Data
Andrew Becker

Dates of Test
Nov 22, 2012 – Feb 28, 2013

Test Report No **RTS-6026-1303-02** 

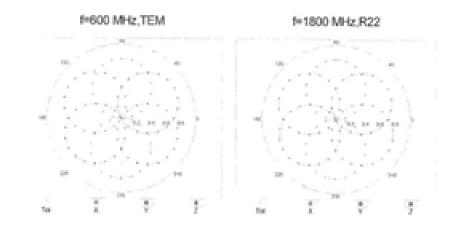
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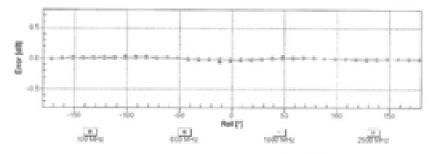
2503A-RFL110LW 2503A-RFP120LW

E530V3-5N:3225

January 10, 2013

# Receiving Pattern (\$\phi\$), 9 = 0°





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

Certificate No: ES3-3225\_Jan13

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Testing Service	Page <b>24(134)</b>			
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Nov 22, 2012 – Feb 28, 2013	RTS-6026-1303-02	L6ARFL110LW L6ARFP120LW	2503A-RFL110LW 2503A-RFP120LW



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Author Data
Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No **RTS-6026-1303-02** 

L6ARFL110LW L6ARFP120LW

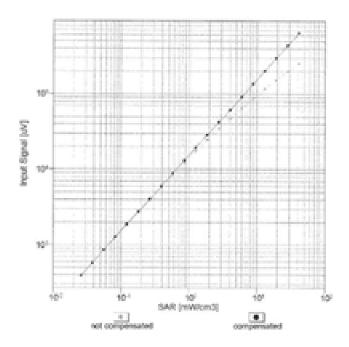
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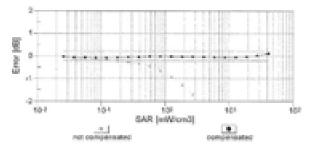
2503A-RFL110LW 2503A-RFP120LW

ES30V3-- SN:3025

January 10, 2013

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





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

Certificate No: ES3-3225, Jan 13

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Author Data

Dates of Test **Andrew Becker** 

Nov 22, 2012 – Feb 28, 2013

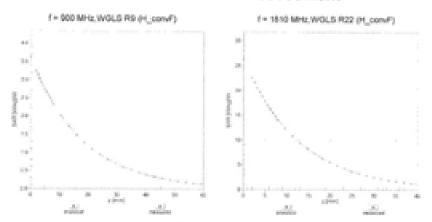
Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

ESSOV3- SN:3225

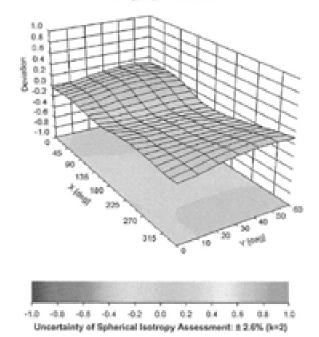
January 10, 2013

# Conversion Factor Assessment



# Deviation from Isotropy in Liquid

Error (4, 8), f = 900 MHz



Conflicate No: ES3-3225, Jan 13

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Testing Service	Page <b>27</b> (134)			
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Nov 22, 2012 – Feb 28, 2013	RTS-6026-1303-02	L6ARFL110LW L6ARFP120LW	2503A-RFL110LW 2503A-RFP120LW



# Appendix D for the BlackBerry $\mathbin{\!@}$ Smartphone Model RFP121LW SAR Report

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Author Data
Andrew Becker

Dates of Test
Nov 22, 2012 – Feb 28, 2013

Test Report No **RTS-6026-1303-02** 

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

ES30V3-- SN:3225

January 10, 2013

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

### Other Probe Parameters

Sersor Arrangement	Triangular
Connector Angle (*)	8.3
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\_Jan13

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**Andrew Becker** 

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02

L6ARFL110LW L6ARFP120LW

FCC ID:

2503A-RFL110LW 2503A-RFP120LW

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





Schweitscher Kalibrierdienst Service suisse d'étalonnage Servicio svissero di teratura **Swiss Calibration Service** 

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

RTS (RIM Testing Services)

Calibration Equipment used (M&TE) critical for calibration)

Accreditation No.: SCS 108

C.

8

Contribute No. EX3-3592\_Nov12

CALIBRATION CERTIFICATE					
Object	EX30V4 - SN:3592				
Calibratius procedure(s)	QA CAL-01 v8, QA CAL-14 v3, QA CAL-23 v4, QA CAL-25 v4 Calibration procedure for dosimetric E-field probes				
Calibration date:	November 14, 2012				
	uments the traceubility is national standards, which realize the physical units of measurements (50), noethindies with confidence probability are given on the following pages and are part of the certificate.				
All satisfactions have been son	ducted in the closed laboratory facility, environment temperature (22 s. 2)°C and hymiotry < 70%.				

Primary Standards	10	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E44190	0841290874	29-Mar-12 (No. 217-01908)	Apr-13
Power sensor E-M 12A	MINER HISBOOK?	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Adenuator	SN: 55054 (3c)	27-Mar-12 (No. 217-01531)	Apr-15
Reference 20 dB Adenuator	5N: 55086 (20b)	27-Mar-12 (No. 217-01529)	Apr-15
Reference 30 dB Attenuator	SN 55129 (30b)	27-Mar-12 (No. 217-01620)	Apr-13
Reference Probe ESSEN2	SNC 3013	29-Dec-11 (No. 853-3013_Dec11)	Dec-12
DAEA	SN: 550	20-Arr-12 (No. DAE4-680_Jun12)	Aire 13
Secondary Standards	0	Check Date (in house)	Scheduled Check
RF generator HP 8646C	US3642U61700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyser HP 67536 US37300565		16-Oct-01 (in house check Oct-10)	In house check: Oct-13

Cariforated by:	Name Claudo Leober	Function Laboratory Technician	(CO)
Approved by:	Katja Polovic	Technical Menager	Delly
This calibration certificate	s shell not be reproduced except in full	without written approval of the laborator	Issued November 14, 2012 V.

Certificate No. EX3-3592\_Nov12

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Author Data Andrew Becker Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02

FCC ID:

L6ARFL110LW L6ARFP120LW 2503A-RFL110LW 2503A-RFP120LW

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





Schweigerischer Kallbeierdenst Service suites d'étalonnesse C) Servicio svicaren di taratura Socios Calibration Service:

Acceptitation 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:

fissue simulating liquid NOFthbuy,z sensitivity in free space ConvE sensitivity in TSL / NORMx.y.z. DOP diade compression point

creat factor (1/duty\_cycle) of the RIF signal OF A. B. C. modulation dependent linearization parameters.

Polarization a e-rotation around probe axis-

Polarization 3 3 rotation around an axis that is in the plane normal to probe axis (at measurement center),

i.e., 3 = 0 is normal to probe axis-

#### Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2903, "IEEE Recommended Practice for Determining the Peak Spelial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wheless 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:

- MORMir.y.z: Assessed for E-field polarization 6 = 0 (f < 900 MHz in TEM-celt f > 1900 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E\*-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 Convil.
- 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 s 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 (alphs, 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 depe ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100
- Spherical isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe lip (on probe axis). No tolerance required.

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Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Nov 22, 2012 – Feb 28, 2013	RTS-6026-1303-02		2503A-RFL110LW
			L6ARFP120LW	2503A-RFP120LW



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Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No **RTS-6026-1303-02** 

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

EXXXV4 - \$N.3592

November 14, 2012

# Probe EX3DV4

SN:3592

Manufactured: Calibrated: September 18, 2006 November 14, 2012

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

Certificate No: EX3-3992\_Nov12

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Author Data **Andrew Becker**  Dates of Test

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Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

EXGDV4-- \$NJ\$592

November 14, 2012

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:3592

#### **Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unio (k=2)
Norm (µW/Wors) <sup>2</sup> ) <sup>4</sup>	0.49	0.47	0.41	2 10.1 %
DCP (nW) <sup>0</sup>	95.2	96.1	100.6	

#### Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unq <sup>2</sup> (k=2)
0	CW	0.00	X	0.0	0.0	1.0	121.4	13.6 %
			Y	0.0	0.0	1.0	104.3	
			1.2	0.0	0.0	1.0	109.2	

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%.

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

Testing Service	Page 34(134)			
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Nov 22, 2012 – Feb 28, 2013	RTS-6026-1303-02	L6ARFL110LW L6ARFP120LW	2503A-RFL110LW 2503A-RFP120LW



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Author Data **Andrew Becker**  Dates of Test Nov 22, 2012 – Feb 28, 2013 Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

EXCIDNA- SNIGNIO

November 14, 2012

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:3592

### Calibration Parameter Determined in Head Tissue Simulating Media

принці!	Relative Permittivity	Conductivity (Sim)	Convil X	ConvF Y	ConvF Z	Alpha	Grapth (mm)	Unet. (k+2)
2600	39.0	1.96	6.45	6.45	6.45	0.53	0.79	± 12.0 %
5200	36,0	4.66	4.73	4.73	4.73	0.40	1.80	± 13.1 %
5500	35.6	4.96	4.28	4.28	4.28	0.44	1.80	± 13.1 %
5800	35.3	5.27	4.12	4.12	4.12	0.48	1.80	1 10.1 %

Gertificate No. EX3-3092, Nov12

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<sup>&</sup>lt;sup>6</sup> Propurately validity of a 100 kBN error ageins for CASY v4.6 and higher (see Page 23, also 8 is restricted to a 50 kBN. The uncertainty is the RSS of the ConvF uncertainty at celebration frequency and the uncertainty for the indicated frequency band.
<sup>8</sup> All frequencies below 3 CH2, the volidity of freeze parameters (i) and ii) can be related to a 10% if liquid compression formula is applied to assessmed SAM volume. A frequencies slows 3 CH2, the volidity of fisces parameters (ii) and iii) is restricted to a 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated larget losses parameters.

Testing Service	Page <b>36(134)</b>			
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Nov 22, 2012 – Feb 28, 2013	RTS-6026-1303-02	L6ARFL110LW L6ARFP120LW	2503A-RFL110LW 2503A-RFP120LW



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Author Data **Andrew Becker**  Dates of Test

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Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

EXCIDIVE- SNI 3592

November 14, 2012:

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:3592

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

r (MHz) <sup>6</sup>	Relative Permittivity	Conductivity (S/n)	ConvF X	CoavF Y	ConvF 2	Alpha	Depth (mm)	Unct. (k=2)
2600	52.5	2.16	6.59	6.59	6.59	0.80	0.50	1 12.0 %
5200	49.0	5.30	4.02	4.02	4.02	0.46	1.90	± 13.1 %
5500	48.6	5.85	3.66	3.66	3.66	0.55	1.90	± 13.1 %
5800	48.2	6.00	3.57	3,57	3.57	0.57	1.90	± 13.1 %

Certificate No: EX3-3592, Nov12

<sup>&</sup>lt;sup>6</sup> Proquency variety of a 100 MHz city applies for DACY will and higher (see Page 2), also it is restricted to a 55 MHz. The uncertainty is the RSS of the Comiff uncertainty at celebration frequency and the uncertainty for the indicated frequency band.
At transporting better 3 GHz, the validity of tissue parameters is and if) can be reliated to a 10% if logist compensation formula is applied to recovered both values. At frequencies better 3 GHz, the validity of tissue-parameters in and in) is restricted to a 5%. The uncertainty is the RSS of the Comiff uncertainty for indicated target tissue parameters.



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Author Data
Andrew Becker

Dates of Test
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Test Report No RTS-6026-1303-02

FCC ID: L6ARFL110LW L6ARFP120LW

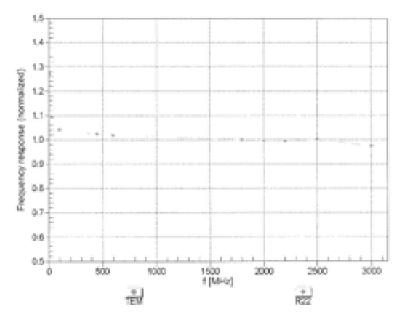
2503A-RFL110LW 2503A-RFP120LW

EX3DV4- SN:3502

November 14, 2012

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

(TEM-Cell:III110 EAX, Waveguide: K22)



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

Certificate No: EX3-3502\_Nov12

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Author Data
Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No **RTS-6026-1303-02** 

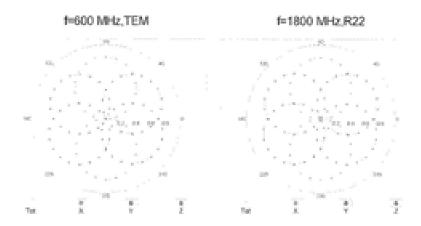
12 L6ARFL110LW L6ARFP120LW

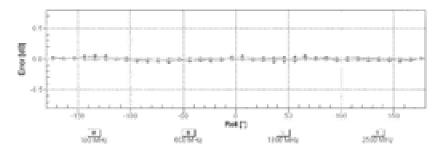
2503A-RFL110LW 2503A-RFP120LW

EX3DV4-5N3692

November 14, 2012

# Receiving Pattern (\$), 9 = 0°





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

Certificate No. EDC)-3592\_Nov12

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Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Nov 22, 2012 – Feb 28, 2013	RTS-6026-1303-02	L6ARFL110LW L6ARFP120LW	2503A-RFL110LW 2503A-RFP120LW



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Author Data **Andrew Becker**  Dates of Test

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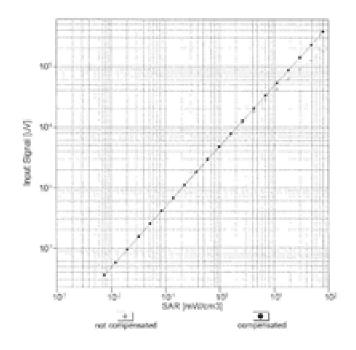
Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

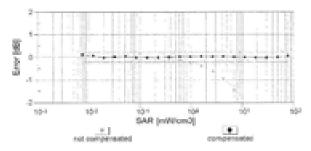
2503A-RFL110LW 2503A-RFP120LW

EX30V4- 8N:3682

November 14, 2012

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





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

Certificate No: EXX-3592, Nov12

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Author Data
Andrew Becker

Dates of Test
Nov 22, 2012 – Feb 28, 2013

Test Report No **RTS-6026-1303-02** 

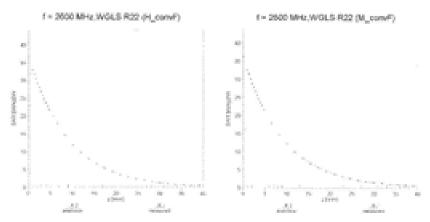
FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

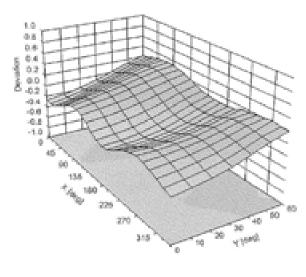
EX3DW-5N:3592

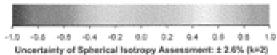
November 14, 2012

## Conversion Factor Assessment



### Deviation from Isotropy in Liquid Error (6, 9), f = 900 MHz





Certificate No: EX3-3592\_Nov12

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Andrew Becker	Nov 22, 2012 – Feb 28, 2013	RTS-6026-1303-02	L6ARFL110LW L6ARFP120LW	2503A-RFL110LW 2503A-RFP120LW



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Author Data **Andrew Becker**  Dates of Test Nov 22, 2012 – Feb 28, 2013 Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

EXCEPTA - SN:3692

November 14, 2012

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:3592

#### Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (*)	-13.6
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

Certificate No: EX3-3592\_Nov12

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**Andrew Becker** 

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No RTS-6026-1303-02

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstranse \$1, 8004 Zurich, Swiggerland





Schweigerischer Kalibrierdienst Service suisse d'étalesnoge Servicio svissoro di taratura Swiss Calibration Service

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

RTS (RIM Testing Services)

Accreditation No.: SCS 108

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C.

Certificate No. ET3-1644\_Nov12

### CALIBRATION CERTIFICATE

Object

ET30V6 - SN:1644

Californion procedure(s):

QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4 Calibration procedure for dosimetric E-field probes

Calibration date:

November 13, 2012

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

Ad quilibrations have been conducted in the closed laboratory facility environment temperature (22 s.3)°C and humidity = 70%.

Calibration Equipment used (MATE ortical for calibration)

Primary Standards	0	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E44199	G841299874	29-Mar-12 (No. 217-01506)	Apr 13
Power siensor E4410A	MY41498087	29-Mar-12 (No. 217-01508)	April 3
Rotlerence 3 offi Attenuator	SAC 55054 (3c)	27-Mar 12 (No. 217-01631)	Apr. 13
Reference 20 dB Attenuator	5A: 55095 (20b)	27-Mar-12 (No. 217-01626)	April 13
Federance 30 dB Abenuator	574: 65129 (30%)	29-Mar-12 (No. 210-01632)	Apr-13
Pelerence Proto ES30Y2	591: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	570:000	20-Jun 12 (No. DAE4400 Jun 12)	Jun-13
Secondary Standards	0	Check Date (in house)	Scheduled Check
RF generator HP 8648C	U/53642U/01700	4-Aug-99 on house check-Apr-110	In/house check: Apr./13
Network Analyzor HF 67550	US37380585	18-Oct-91 on Neuse check Oct-12)	In-house check: Oct-13

Function Segnature Laboratory Technic College shed by: **Technical Manager** Kata Peterido Acceptant by: lasted: November 13, 2012 Tris calibration conflicate shall not be reproduced except in full without written approval of the laboratory.

Certificate No. ET3-1644\_Nov12

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# Appendix D for the BlackBerry® Smartphone Model RFP121LW SAR Report

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Author Data
Andrew Becker

Dates of Test

Nov 22, 2012 - Feb 28, 2013

Test Report No

RTS-6026-1303-02 | I

L6ARFL110LW L6ARFP120LW

FCC ID:

2503A-RFL110LW 2503A-RFP120LW

Calibration Laboratory of Schmid & Partner

Engineering AG Zeoghousstroose 43, 6864 Zurun, Switzerland





S Schweizerischer Kalibrierdionst
C Service sellsse d'étalonnage
Servicie sellssers di teratura
Saloss Calibration Service

Accreditation No.: SCS 108

Accorded by the Swiss Accordination Service (SAS)

The Swiss Accordination Service is one of the signatories to the EA Multitational Agreement for the recognition of calibration certificative.

Glossary:

TSL tissue simulating liquid NORMAx,v.z sensitivity in the space ConvF sensitivity in TSL / NORMx,v.z DCP diode compression point

CF crest factor (Notify cycle) of the RF signal A, B, C modulation dependent linearization perameters

Polarization a crotation around probe axis

Polarization b & notation around an exis that is in the plane normal to probe axis (at measurement center).

i.e., 3 = 0 is normal to probe axis

#### Calibration is Performed According to the Following Standards:

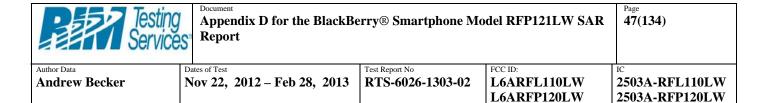
- EEE Std 1529-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SARI) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 82209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)". February 2006

#### Methods Applied and Interpretation of Parameters:

- NORMx,y,z: Assessed for E-field polarization 8 = 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 Correll).
- NORM(f)x,y,z = NORMx,y,z \* frequency\_response (see Frequency Response Charl). 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.r: 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; Vfbx.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 NORMs, y, z \* Cosef whereby the uncertainty corresponds to that given for CorveF. A frequency dependent, CorveF is used in DASY4 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 fint phantom exposed by a patch antenna.
- Sensor Offset. The sensor offset corresponds to the offset of virtual measurement center from the probe tip ion probe axist). No tolerance required.

		-
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ET30W6 - SN:1644

November 13, 2012

# Probe ET3DV6

SN:1644

Manufactured: Calibrated: November 7, 2001 November 13, 2012

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

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2503A-RFL110LW 2503A-RFP120LW

ET30V6- SN:1644

November 13, 2012

# DASY/EASY - Parameters of Probe: ET3DV6 - SN:1644

#### **Basic Calibration Parameters**

	Semsor X	Sensor Y	Serveor Z	Uno (k=2)
Norm (s/W(Vint) <sup>2</sup> ) <sup>A</sup>	1.71	1.97	1.98	± 10.1 %
DCP (mV)	99.5	98.7	97.5	

#### Madelatian Californian Barrandon

UID	Communication System Name	PAR		A dB	46	6B	WR	(km2)
6	CW	0.00	×	0.0	0.0	1.0	193.5	43.5 %
			Y.	0.0	0.0	1.0	212.0	
			2.1	0.0	0.0	1.0	201.7	

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%.

The uncertainties of NorrOCY Z do not affect the E<sup>2</sup> field uncertainty inside TSL (see Pages 5 and 5).

<sup>\*</sup> Numerical linearization parameter: uncertainty not required.

\*\*Uncertainty is determined using the max, deviation from knoor response applying rectangular distribution and is expressed for the equate of the



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Author Data **Andrew Becker**  Dates of Test

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Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

ET30V6- SN:1644

November 13, 2012

# DASY/EASY - Parameters of Probe: ET3DV6 - SN:1644

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

f (MNO)	Relative Permittivity	Conductivity (Site)	Convf X	ConvF Y	ConvF Z	Allpha	Depth (men)	Unct. (k=2)
750	41.9	0.89	6.57	6.57	6.57	0.44	2.25	112.0%
900	41.5	0.97	6.24	6.24	6.24	0.38	2.52	£ 12.0 %
1810	40.0	1.40	5.21	5.21	5.21	0.80	2.10	± 12.0 %
1950	40.0	1,40	5.16	5.16	5.16	0.80	2.09	± 12.0 %
2450	39.2	1.60	4.60	4.00	4.60	0.65	2.00	a 12.0 %

<sup>&</sup>lt;sup>1</sup> Englandly validity of a 100 MHz only applies for DASY will and higher (see Page 2), else it is restricted to a 10 MHz. The uncertainty is the PBSS of the Condif uncertainty at collection bequency and the uncertainty for the indicated bequency band.
At hequanoles below 3 GHz, the validity of tesses parameters (s and o) can be refused to a 10% if liquid compensation formula is applied to instead of the parameters above 3 GHz, the validity of tesses parameters (s and o) is nestroized to a 5%. The uncertainty is me RSSI of the Condif uncertainty for indicated target fiscus parameters.



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Author Data **Andrew Becker**  Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

ET30V6- SN:1644

November 13, 2012

# DASY/EASY - Parameters of Probe: ET3DV6 - SN:1644

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

					-			
f (setes) <sup>o</sup>	Relative Permittivity*	Conductivity (S/m)	ConvF X	Const Y	Const Z	Alipha	Oregaths (Imam)	Unet. (k=2)
750	55.5	0.96	6.30	6.30	6.30	0.33	2.61	£ 12.0 %
900	55.0	1.05	6.06	6.06	6.06	0.31	2,99	± 12.0 %
1810	53.3	1.52	4.75	4.75	4.75	0.80	2.40	± 12.0 %
1950	53.3	1.52	4.75	4.75	4.75	0.80	2.28	± 12.0 %
2450	52.7	1.95	4.11	4.51	4.11	0.50	2.16	± 12.0 %

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<sup>&</sup>lt;sup>6</sup> Precuency validity of s. 100 MHz only applies for DMSY wt 4 and higher (see Page 2), also it is nestricted to a 50 MHz. The uncertainty is the RSS of the Conell uncertainty at calibration frequency and the uncertainty for the indicated frequency texts.
<sup>7</sup> At frequencies below 3 GHz, the validity of tesses parameters (s and e) can be netweed to a 10% if liquid comparestion furniuls is applied to measured SAR values. At frequencies above 3 CHz, the validity of tesses parameters (s and it) is restricted to a 5%. The uncertainty is the RSS-of the Conell uncertainty for indicated larget issue parameters.



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FCC ID: L6ARFL110LW L6ARFP120LW

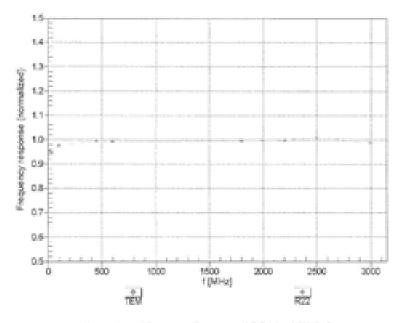
2503A-RFL110LW 2503A-RFP120LW

ET30V6- SN:1644

November 13, 2012

# 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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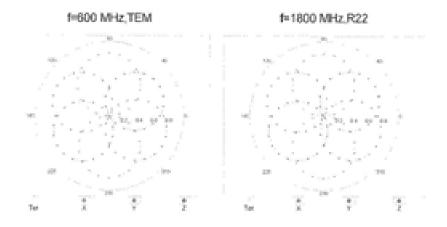
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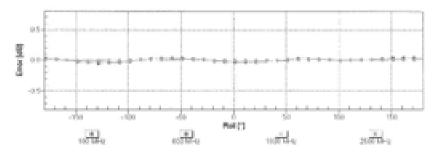
2503A-RFL110LW 2503A-RFP120LW

ET30'V6- SN:1944

November 13, 2012

# Receiving Pattern (6), 9 = 0°





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

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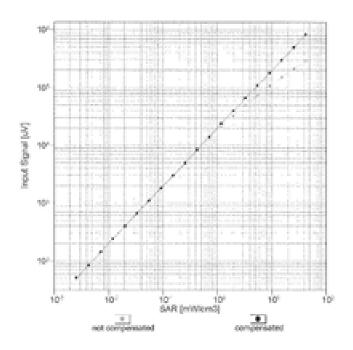
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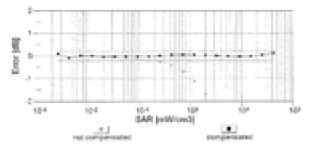
2503A-RFL110LW 2503A-RFP120LW

ET30V6- SN:1644

November 13, 2012

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





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

Certificate No: ET3-1914\_Nov12

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Appendix D for the BlackBerry  $\mathbin{\! @ \hspace{1.5pt} }$  Smartphone Model RFP121LW SAR Report

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Author Data
Andrew Becker

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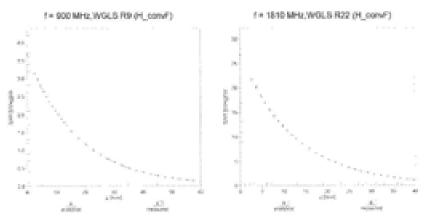
FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

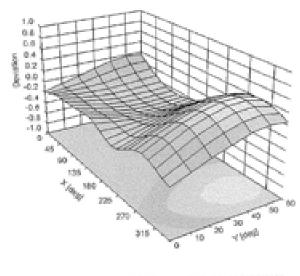
ET30V6- SN:1644

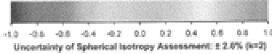
Nevember 13, 2012

# Conversion Factor Assessment



# Deviation from Isotropy in Liquid Error (6, 3), f = 900 MHz





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2503A-RFL110LW 2503A-RFP120LW

ET3096- SN:1644

November 13, 2012

# DASY/EASY - Parameters of Probe: ET3DV6 - SN:1644

#### Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (*)	61.5
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	enabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Dumeter	6.8 mm
Probe Tip to Sensor X Calibration Point	2.7 mm
Probe Tip to Sensor Y Calibration Point	2.7 mm
Probe Tip to Sensor Z Calibration Point	2.7 mm
Recommended Measurement Distance from Surface	4 mm

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Testing Service	Page <b>56(134)</b>			
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Nov 22, 2012 – Feb 28, 2013	RTS-6026-1303-02	L6ARFL110LW L6ARFP120LW	2503A-RFL110LW 2503A-RFP120LW



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Author Data
Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02 L6A

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

Calibration Laboratory of

Schmid & Partner Engineering AG Zeoghevastrasse 40, 8004 Zurich, Switzerland





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Stant RII

Accreditation No.: SCS 108

Certificate No: D750V3-1021\_Jen11

PALIBNATION	CERTIFICATE	8,67	
Otipact	D750V3 - SN: 10	21	1.000
Celibration procedure(s)	QA CAL-05.v8 Calibration proce	dure for dipole validation kits	
Celibration deter	January 05, 2011	M. Mariana and A.	
The measurements and the unco	ertainties with comfidence p	ional standards, which realize the physical un robability are given on the following pages ar	
		ry facility: environment temperature (22 a 311	C and humidity < 70%.
Celibration Equipment used (MM			
Selforation Equipment used (MS Primary (Nandards	TE official for calibration)	ry facility: environment temperature (22 s 311  Cal Date (Certificate No.)  06-Oct-10-No. 217-04366	C and humidity < 10%.  Scheduled Calibration  Oct 11
Selbration Equipment used (M& Primary Standards Power mater EPM-442A	TE critical for calibration)	Cal Date (Certificate No.)	Scheduled Calibration
Selbration Elgapment used (MM Primary Standards Power mater EPIM-442A Power sensor HP 8481A	TE critical for calibration)  10 a  GBS7480704	Cel Date (Certificate No.) 06-Oct-10 (No. 217-01266)	Scheduled Calibration Oct-11
Celibration Equipment used (MS Primary Standards Power meter EPM-442A Power sensor HP 6481A Reference 20 dB Attenuator	TE ortical for calibration)  ID # G8037480704 U507290790	Cel Date (Certificate No.) 06-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01266)	Scheduled Calibration Oct-11 Oct-11
Celibration Equipment used (MS Primary Standards Power meter EPM-442A Power sensor IPP 8481A Reference 20:05 Attenuator Type-N mismatch combination	TE orisical for calibration)  10 # G8037460704 U507292790 SN: 5086 (20g)	Cel Date (Certificate No.) 06-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01266) 30-Mar-10 (No. 217-01156)	Scheduled Calibration Oct-11 Oct-11 Mar-11
Celibration Elgaigment used (MM Primary Standards Power mater EPM-442A Power sensor HP 6461A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ESSOV3	TE oritical for calibration)  ID # G8037480704 U5037292790 SN: 5081-(25g) SN: 5047.2/705027	Cel Dane (Certificate No.) 06-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01266) 30-Mar-10 (No. 217-01166) 30-Mar-10 (No. 217-01162)	Scheduled Galibration Oct-11 Oct-11 Mar-11 Mar-11
Celibration Elgalpment used (MM Primary Standards Power meter EPRA-442A Power sensor INF 8481A Reference 20 dB Attenuator Type-N mismatch-combination Reference Probe ESSOV3 OAE4	TE orisical for calibration)  IQ-a  G8037480704  US07292790  SN: 3086-(20g)  SN: 3047-2-/ 040027  SN: 3025	Cal Date (Certificate No.) 06-Oct-10 (No. 217-04390) 06-Oct-10 (No. 217-04390) 30-Mar-10 (No. 217-04190) 30-Mar-10 (No. 217-04190) 30-Apr-10 (No. E53-3205, Apr10) 10-Jun-10 (No. DAEA-001, Jun10)	Scheduled Calibration Oct-11 Oct-11 Mar-11 Mar-11 Apr-11
Celibration Elgalpment used (MM Primary Standards Power meter EPRA-442A Power sensor HP 8481A Reference 20 dB Attenuator Type N mismatch combination Reference Phobe ESSEV9 0AC4	TE orisical for calibration)  IQ-e G8937480704 U537290790 SN: 5086-(20g) SN: 5047-2-/ 060027 SN: 3005 SN: 601	Cel Date (Certificate No.) 06-Oct-10 (No. 217-01260) 06-Oct-10 (No. 217-01260) 30-Mar-10 (No. 217-01158) 30-Mar-10 (No. 217-01160) 30-Apr-10 (No. ES3-3205, Apr10)	Scheduled Calibration Oct-11 Oct-11 Mar-11 Mar-11 Agr-11 Jun-11
All calibrations have been condu- Celibration Equipment used (MM- Primary Standards Power sensor IPP 8481A Reference 20:09 Attenuator Type-Ni mismatch combination Reference Probe ESSDV9 DAE4 Secondary Standards Power sensor HP 8481A RF generator RBS SMT-06	TE orisical for calibration)  10-e  G8037480704  U5372902760  SN: 5047.2 / 06007  SN: 3005  SN: 601	Cal Date (Certificate No.) 06-Oct-10 (No. 217-01260) 06-Oct-10 (No. 217-01260) 30-Mar-10 (No. 217-01361) 30-Mar-10 (No. 217-01362) 30-Apr-10 (No. E33-3205, Apr10) 10-Jun-10 (No. DAE4-601, Jun10) Check Date (in-frouse)	Scheduled Calibration Oct-11 Oct-11 Mar-11 Mar-11 Age-11 Jun-11 Scheduled Check
Celibration Elgalpment used (MS Primary Standards Power meter EPSA-442A Power sensor HP 6481A Reference 20:05 Attenuator Type-Ni mismatch combination Reference Probe ESSCH/2 0AC4 Secondary Standards Primer sensor HP 6481A RF generator HP 6481A	TE oritical for calibration)  ID # G8037480704 US307292790 SN: 5066-(20g) SN: 5047-2 / 06027 SN: 3005 SN: 601  ID # M9/41082317	Cel Date (Certificate No.) 06-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01266) 30-Mar-10 (No. 217-01168) 30-Mar-10 (No. 217-01168) 30-Apr-10 (No. ESS-3206, Apr-10) 10-Jun-10 (No. DAEA-601, Jun10) Check Date (In-house check Ott-06)	Scheduled Calibration Oct-11 Oct-11 Mar-11 Mar-11 Agr-11 Jun-11 Scheduled Check In House check: Oct-11
Celibration Equipment used (MS Primary Standards Power mater EPM-442A Power sensor HP 8481A Reference 20 dtl Administor Type N mismatch combination Reference Probe ESSOV3 OAE4 Secondary Standards Power sensor HP 8481A	TE orisical for calibration)  IQ-a  G8037480704  US07292790  SN: 3086-(20g)  SN: 3047-2 / 060027  SN: 3005  SN: 601  ID-a  MY41082317 100005  US037390585 S4205	Cal Date (Certificate No.)  06-Oct-10 (No. 217-01290)  06-Oct-10 (No. 217-01290)  30-Mar-10 (No. 217-01190)  30-Mar-10 (No. 217-01190)  30-Apr-10 (No. ES0-3205, Apr10)  10-Jun-10 (No. DAE4-601_Jun10)  Check Date (in-house)  18-Oct-02 (in Nouse check Oct-00)  4-Aug 99 (in Nouse check Oct-00)  18-Oct-01 (in Nouse check Oct-00)	Scheduled Calibration Oct-11 Oct-11 Mar-11 Mar-11 Agr-11 Jun-11 Scheduled Check In house check: Oct-11 In house check: Oct-11 In house check: Oct-11
Celibration Elgalpment used (MS Primary Standards Power meter EPRA-442A Power sensor HP 6481A Reference 20-68 Attenuator Type-N mismatch combination Reference Probe ESSOV3 OAE4 Secondary Standards Power sensor PR-6481A RP generator RB-5 SMT-05 Network Analyzer HP 6753E	TE orisical for calibration)  IQ-#  C8037480704  US37292790  SN: 5086-(20g)  SN: 5047-2 / 060377  SN: 2005  SN: 601  ID-#  MY41082317  100005  US37390585 S4205  Mame	Cel Date (Certificate No.)  06-Oct-10 (No. 217-04260)  06-Oct-10 (No. 217-04260)  20-Man-10 (No. 217-04160)  30-Man-10 (No. 217-04160)  30-Apr-10 (No. ES0-3205, Apr10)  10-Jun-10 (No. DAEA-601_Jun10)  Check Date (In-house)  18-Oct-02 (In-house check Oct-08)  4-Aug-99 (In-house check Oct-08)  18-Oct-01 (In-house check Oct-09)  Function	Scheduled Galibration Oct-11 Oct-11 Mar-11 Mar-11 Agr-11 Jun-11 Scheduled Check In Nouse check: Oct-11 In house check: Oct-11
Celibration Elgalpment used (MS Primary Standards Power meter EPSA-442A Power sensor HP 6481A Reference 20:05 Attenuator Type-Ni mismatch combination Reference Probe ESSCH/2 0AC4 Secondary Standards Primer sensor HP 6481A RF generator HP 6481A	TE orisical for calibration)  IQ-a  G8037480704  US07292790  SN: 3086-(20g)  SN: 3047-2 / 060027  SN: 3005  SN: 601  ID-a  MY41082317 100005  US037390585 S4205	Cal Date (Certificate No.)  06-Oct-10 (No. 217-01290)  06-Oct-10 (No. 217-01290)  30-Mar-10 (No. 217-01190)  30-Mar-10 (No. 217-01190)  30-Apr-10 (No. ES0-3205, Apr10)  10-Jun-10 (No. DAE4-601_Jun10)  Check Date (in-house)  18-Oct-02 (in Nouse check Oct-00)  4-Aug 99 (in Nouse check Oct-00)  18-Oct-01 (in Nouse check Oct-00)	Scheduled Calibration Oct-11 Oct-11 Mar-11 Mar-11 Agr-11 Jun-11 Scheduled Check In house check: Oct-11 In house check: Oct-11 In house check: Oct-11
Celibration Elgalpment used (MS Primary Standards Power meter EPRA-442A Power sensor HP 6481A Reference 20-68 Attenuator Type-N mismatch combination Reference Probe ESSOV3 OAE4 Secondary Standards Power sensor PR-6481A RP generator RB-5 SMT-05 Network Analyzer HP 6753E	TE orisical for calibration)  IQ-#  C8037480704  US37292790  SN: 5086-(20g)  SN: 5047-2 / 060377  SN: 2005  SN: 601  ID-#  MY41082317  100005  US37390585 S4205  Mame	Cel Date (Certificate No.)  06-Oct-10 (No. 217-04260)  06-Oct-10 (No. 217-04260)  20-Man-10 (No. 217-04160)  30-Man-10 (No. 217-04160)  30-Apr-10 (No. ES0-3205, Apr10)  10-Jun-10 (No. DAEA-601_Jun10)  Check Date (In-house)  18-Oct-02 (In-house check Oct-08)  4-Aug-99 (In-house check Oct-08)  18-Oct-01 (In-house check Oct-09)  Function	Scheduled Calibration Oct-11 Oct-11 Mar-11 Mar-11 Agr-11 Jun-11 Scheduled Check In house check: Oct-11 In house check: Oct-11 In house check: Oct-11

Certificate No: D750V3-1001\_Jan11

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



# Appendix D for the BlackBerry® Smartphone Model RFP121LW SAR Report

Page **58(134)** 

Author Data

Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

#### Calibration Laboratory of

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





S Schweiberischer Kaltbrierdiene G Service suisse d'étatonnage Servicie svizzere di taratura S Suries Calibration Service

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Sonice (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 N/A sensitivity in TSL / NORM x,y,z 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
- EC 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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Author Data **Andrew Becker**  Dates of Test Nov 22, 2012 – Feb 28, 2013 Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

#### Measurement Conditions

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	750 MHz ± 1 MHz	

### Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.3 ± 6 %	0.91 mholm ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C		

#### SAR result with Head TSL

SAR averaged over 1 cm2 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.12 mW / g
SAR normalized	normalized to TW	8.48 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	8.36 mW/g x 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.38 mW / g
SAR normalized	normalized to TW	5.52 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	5.45 mW/g a 16.5 % (k=2)

Certificate No: D750V3-1021\_Jan11

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Author Data **Andrew Becker**  Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

#### Appendix

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.1 Ω - 1.7 jΩ
Return Loss	- 29.3 dB

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1.033 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, 2010

Certificate No: D750V3-1021\_Jan11

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Report

**Andrew Becker** 

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

#### DASY5 Validation Report for Head TSL

Date/Time: 05.01.2011 15:51:17

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1021

Communication System: CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium: HSL750

Medium parameters used: f = 750 MHz;  $\sigma = 0.91 \text{ mho/m}$ ;  $\varepsilon_r = 42.3$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

#### DASY5 Configuration:

- Probe: ES3DV3 SN3205; ConvF(6.37, 6.37, 6.37); 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 Build (401)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2595)

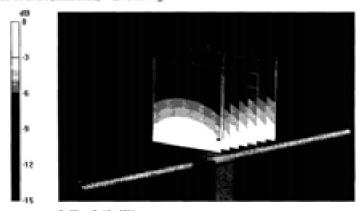
#### Pin=250mW; dip=15mm; dist=3.0mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

dx=5mm, dy=5mm, dz=5mm

Reference Value = 53.5 V/m; Power Drift = -0.00432 dB

Peak SAR (extrapolated) = 3.24 W/kg

SAR(1 g) = 2.12 mW/g; SAR(10 g) = 1.38 mW/gMaximum value of SAR (measured) = 2.48 mW/g



0 dB = 2.48 mW/g

Certificate No: D750V3-1021\_Jan11

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Author Data **Andrew Becker**  Dates of Test

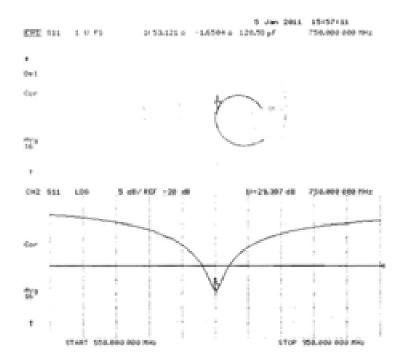
Nov 22, 2012 – Feb 28, 2013

Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

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### Impedance Measurement Plot for Head TSL



Certificate No: D750V3-1021\_Jan11

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# Appendix D for the BlackBerry® Smartphone Model RFP121LW SAR Report

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Author Data
Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02 L6ARF

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

Calibration Laboratory of Schmid & Partner Engineering AG Zeophausstress 43, 8004 Zerich, Switzerland





Schweizerischer Kalibrierdienst
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 Swiss Calibration Service

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

Client RTS (RIM Testing Services)

Certificate No. D750V3-1021\_Jan13

Accreditation No.: SCS 108

			ACT AND DESIGNATION OF THE
Disjoid	D750V3 - SN: 10	21 15 15 15 15 15 15 15 15 15 15 15 15 15	
Calibration procedure(s)	QA CAL-05.v9 Calibration proce	dure for dipole validation kits abo	ove 700 MHz
Calibration date:	January 07, 2013		
The measurements and the viros	rtainties with confidence p	ional standards, which realize the physical or robability are given on the following pages ar ry facility: environment temperature (22 a 3)*	nd are part of the certificate.
Calibration Equipment used (MS	TE critical for calibration)		
Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-440A	G/807480704	61-Nov-12 (No. 217-01640)	Ox1-13
Power meter EPM-442A Power serroor HIP B481A	G807480704 US37290783	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640)	Oxt-13 Oxt-13
Power meter EPM-442A Power sensor HP 8481A Reference 20:d8 Attenuator	GR07480704 US37290780 SN: SG(8 (20k)	01-Nov-12 (No. 217-01040) 01-Nov-12 (No. 217-01040) 27-Mar 12 (No. 217-0100)	Oct-13 Oct-13 Apr-13
Power meter EPM-HCA. Power sensor HP MB1A. Reference 20-dB Attenuator Type-N mismatch combination	GR07480704 US37290785 SN: 5058 (201) SN: 5047.3 / 06027	01-Nov-12 (No. 217-01040) 01-Nov-12 (No. 217-01040) 27-Mar-12 (No. 217-0100) 27-Mar-12 (No. 217-0100)	Ose-13 Ose-13 Apr-13 Apr-13
Power meter EPM-440A Power servor HP BHB1A Reference 30-dB Attenuator Typo-N mitimation combination Reference Probe ES30V3	GR07480704 US37290780 SN: SG(8 (20k)	01-Nov-12 (No. 217-01040) 01-Nov-12 (No. 217-01040) 27-Mar 12 (No. 217-0100)	Oct-13 Oct-13 Apr-13
Power mater EPM-440A Power sensor HP 8481A Reference 30-88 Attenuator Type-N misumatch combination Reference Probe ESSOV3 SASIA	G8537460704 US37290785 SN: S068 (20k) SN: S047.3 / 06507 SN: 3805 SN: 601	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01600) 27-Mar-12 (No. 217-01603) 28-Oec-12 (No. ESS-3005, Dec12) 27-Jun-12 (No. ESS-3005, Dec12)	Oxi-13 Oxi-13 Apr-13 Apr-13 Dec-13 Jun-13
Power meter EPM-440A Power serson HP MilitA Reference 20-d0 Attenuator Type-N misurcatch combination Reference Proke ESSDV3 DACA Secondary Standards	G837460704 US07290785 SN: 5016 (20k) SN: 5017 3 / 06007 SN: 3005 SN: 601	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01600) 27-Mar-12 (No. 217-01600) 29-Dec-12 (No. ESS-3200, Dect2) 27-Jun-12 (No. DAE4-601, Jun12) Check Date (in house)	Ost-13 Ost-13 Apr-13 Apr-13 Dec-13 Jun-13 Sicheduled Check
Power mater EPM-440A Power sensor HP 8481A Reference 20-89 Attenuator Type-N insurration combination Reference Prube ESSOV3 DAG4 Secondary Standards Power sensor HP 8481A	G8537460704 US37290785 SN: S068 (20k) SN: S047.3 / 06507 SN: 3805 SN: 601	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01600) 27-Mar-12 (No. 217-01603) 28-Oec-12 (No. ESS-3005, Dec12) 27-Jun-12 (No. ESS-3005, Dec12)	Oxi-13 Oxi-13 Apr-13 Apr-13 Dec-13 Jun-13
Power mater EPSA-445A. Power sensor HP 8481A. Reference 20-88 Attenuator Type-N miumatoh combination Reference Probe ESSCNO DACA	G8537460704 US37290785 SN: 5058 (20k) SN: 5052 3 / 06007 SN: 3205 SN: 601 ED # MY41000317	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01600) 27-Mar-12 (No. 217-01600) 28-Dec-12 (No. E38-0205, Dec12) 27-Jun-12 (No. E38-0205, Dec12) 27-Jun-12 (No. DAE4-601, Jun12) Check Date (in house)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Sicheduled Check In house check: Oct-13
Power mater EPM-HIDA Power servoir HP 8481A Antenence 20-89 Attenuator Type-N insuración combination federance Probe ES30V3 JA64 Secondary Standards Power servoir HP 8481A W generator HSS SMT-06	G8537460704 US37290780 SN: 5058 (20k) SN: 5058 (20k) SN: 5055 SN: 5055 SN: 601 ID # MYH 1000317 100005	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01600) 27-Mar-12 (No. 217-01600) 28-Doc-12 (No. ESS-0005, Dec12) 27-Jun-12 (No. ESS-0005, Dec12) 27-Jun-12 (No. DAE4-601, Jun12) Check Date (in house) 18-Oct-02 (in house check Oct-11) 04-Aug-09 (in house check Oct-11)	Ost-13 Ost-13 Apr-13 Apr-13 Osc-13 Jun-13 Sicheduled Check In house check: Ost-13 In house check: Ost-13
Power mater EPSA-445A. Power sensor HP 8481A. Reference 20-85 Attenuator type-N misuratoh combination Antenence Proke ESSOV3 DASSA Secondary Standards Power sensor HP 8451A. RF generator RSS SMT-66 Network Analyser HP 8753E	G8537460704 US37290785 SN: S016 (20k) SN: S017 3 / 08507 SN: S01 SN: 601 ID # MY41000317 100005 US37300686 S4206	01-Nov-12 (No. 217-01040) 01-Nov-12 (No. 217-01040) 27-Mar-12 (No. 217-01000) 27-Mar-12 (No. ESS-3005, Dect2) 28-Dec-12 (No. ESS-3005, Dect2) 27-Jun-12 (No. ESS-3005, Dect2) 27-Jun-12 (No. ESS-3005, Dect2) 27-Jun-12 (No. ESS-3005, Dect2) 27-Jun-12 (No. ESS-3005, Dect2) 18-Oct-02 (In house theck Oct-11) 04-Aug-99 (in house check Oct-11) 18-Oct-01 (in house check Oct-12)	Oxi-13 Oxi-13 Apr-13 Apr-13 Dec-13 Jun-13 Sicheduled Check In house check: Oxi-13 In house check: Oxi-13 In house check: Oxi-13
Power meter EPM-44DA Power servoir HP 8481A Reference 20-80 Attenuator Type-N insurració combination Reference Probe ES3DV3 DAG4 Secondary Standanda Prover servoir HP 8481A RF generator RSS SMT-86	G8537460704 US37290785 SN: S016 (20k) SN: S016 (20k) SN: S017 3 / 06507 SN: S005 SN: 601 ID: # Mn+1500317 100005 US37300686 S4006	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01600) 27-Mar-12 (No. ESS-3005, Dect2) 28-Oeo-12 (No. ESS-3005, Dect2) 27-Jun-12 (No. ESS-3005, Dect2) 27-Jun-12 (No. ESS-3005, Dect2) 27-Jun-12 (No. ESS-3005, Dect2) 18-Oct-02 (In house ofteck Oct-11) 04-Aug-09 (In house ofteck Oct-11) 18-Oct-01 (In house ofteck Oct-12)	Oxi-13 Oxi-13 Apr-13 Apr-13 Dec-13 Jun-13 Sicheduled Check In house check: Oxi-13 In house check: Oxi-13 In house check: Oxi-13

Certificate No: D750V3-1021\_Jan13

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Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

#### Calibration Laboratory of

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





Schweizerischer Kalibrierdienst 8

Service suisse d'étalonnage C Carolisis polymers of tarature **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 N/A.

sensitivity in TSL / NORM x,y,z

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
- iii EC 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 PCC 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
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

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%.

Certificate No: D750V3-1021\_Jan 53

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Author Data **Andrew Becker**  Dates of Test Nov 22, 2012 – Feb 28, 2013 Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

#### Measurement Conditions

DASY Version	DASYS	V52.0.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz a 1 MHz	

# Head TSL parameters

inn narameters and calculations were applied The follow

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.4 ± 6 %	0.89 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	2.12 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	8.46 W/kg = 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.51 W/kg a 16.5 % (k=2)

Certificate No: 0750V3-1021\_Jan13

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Author Data **Andrew Becker**  Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No RTS-6026-1303-02

L6ARFL110LW L6ARFP120LW

FCC ID:

2503A-RFL110LW 2503A-RFP120LW

#### Appendix

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	55.7 Ω - 0.2 JΩ
Return Loss	- 25.4 dB

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1.033 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SARI data are not affected by this change. The overall dipole length is still according to the Standard.

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, 2010

Certificate No: D750V3-1021\_Jan13

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# Appendix D for the BlackBerry® Smartphone Model RFP121LW SAR Report

Page **67(134)** 

Author Data
Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02

L6ARFL110LW L6ARFP120LW

FCC ID:

2503A-RFL110LW 2503A-RFP120LW

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

Date: 07.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1021

Communication System: CW; Frequency: 750 MHz.

Medium parameters used: f = 750 MHz;  $\sigma = 0.89 \text{ S/m}$ ;  $\epsilon_r = 41.4$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

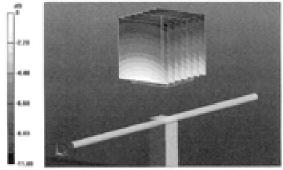
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

#### DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(6.28, 6.28, 6.28); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.4(1052); SEMCAD X 14.6.8(7028)

#### Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 54.107 V/m; Power Drift = 0.01 dB Peak SAR (extrapolated) = 3.23 W/kg SAR(1 g) = 2.12 W/kg; SAR(10 g) = 1.38 W/kg Maximum value of SAR (measured) = 2.47 W/kg



0 dB = 2.47 W/kg = 3.93 dBW/kg



Appendix D for the BlackBerry  ${\bf @}$  Smartphone Model RFP121LW SAR Report

Page **68(134)** 

Author Data
Andrew Becker

Dates of Test

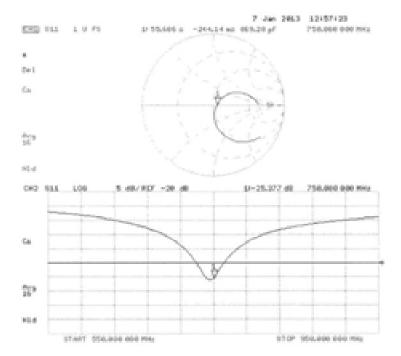
Nov 22, 2012 – Feb 28, 2013

Test Report No **RTS-6026-1303-02** 

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

#### Impedance Measurement Plot for Head TSL



Testing Service	Appendix D for the BlackBo Report	erry® Smartphone Mo	odel RFP121LW SAR	Page <b>69</b> (134)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Nov 22, 2012 – Feb 28, 2013	RTS-6026-1303-02	L6ARFL110LW L6ARFP120LW	2503A-RFL110LW 2503A-RFP120LW



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Author Data **Andrew Becker**  Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

Calibration Laboratory of

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





Schweigerischer Kalibrierdienst Service suisse d'étalonnage Servizio avizzero di taratura Swiss Calibration Service

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The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

RTS (RIM Testing Services)

Accreditation No.: SCS 108

Certificate No: D835V2-446\_Jan11

his cellbration certificate documents the traceability to national standards, which realize the physical units of measurements (SF), he measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.  If cellbrations have been conducted in the closed interestory facility: environment temperature (22 x 5/°C and humidity < 70%. Cellbration Equipment used (MSTE critical for cellbration)  Namery Standards  10 # Cell Cote (Certificate No.) Scheduled Cellbration Cellbrat	oct	D835V2 - SN: 44	6	
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Type N mismatch combination Reference Probe ES30V3 SN: 5017 2 / 06327 SN: 50105 SN: 50	ver sensor HP 8481A	U637292783	96-Oct-10 (No. 217-91266)	Oct-11
Set 3005         SA; 3005         30-Apr-10 (No. ES3-3005, Apr-10)         Apr-11 (No. ES3-3005, Apr-10 (No. ES3-3005, Apr-10)         Apr-11 (No. ES3-300	enemoie 20 dB Attenuator	SN: 5085 (20g)	30 Mar-10 (No. 217-01158)	Milan-111
SAEA SN. 801 10-Jun-10 (No. DAEA-601, Jun-10) Jun-11 Secondary Standards ID # Gheck Date (in house) Scheduled-Check Nover sensor HP 8481A MY41090917 18-Oct-02 (in house check Oct-09) In house check Oct-09 Setwork Analyser HP 8703E US37390585 54206 18-Oct-01 (in house check Oct-10) In house check Oct-00 Setwork Analyser HP 8703E US37390585 54206 18-Oct-01 (in house check Oct-10) In house check Oct-10  Name Function Signature Celtonated by: Laboratory Technician Discuss	- Not and the second of the se	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Milan-111
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Network Analyses HP E750E USST360565 S4206 18-Oct-01 (in house check Oct-10) in house check Oct-  Name Function Signature Omce Stee	erence Probe ES3DV3 E4 condary Standards	5N: 601	10-Jun-10 (No. DAE4-601, Jun10) Check Date (in house)	Jun-11
Coltrated by Dimos Ber Laboratory Technician D'SLLW	erence Probe ES30V3 54 condary Standards ser sensor HP 8481A	5N: 601 ID 6 MY4106017	10-Jun-10 (No. DAE4-601, Jun10)  Check Date (in house)  18-Oxt-02 (in house check Oxt-09)	Jun-11 Sicheduled Check In house check Oct-11
advanced by Direct Bear Laboratory Techniques 0 1844	erence Probe ES30V3 54 condary Standards ser sensor HP 8481A generator R&S SNIT-06	5At 601 10 # MY41092317 100005	10-Jun-10 (No. DAE+601, Jun10)  Check Date (in house)  18-Oct-02 (in house check Oct-08)  4-Aug-99 (in house check Oct-09)	Jun-11 Schoduled-Check In house check: Oct-11 In house check: Oct-11
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w. Kw	erence Probe ES30V3 54 condary Standards ser sensor HP 8481A generator R&S SNIT-06	SAL 601 ID # MY41090317 100005 USSI7390585 S4206	10-Jun-10 (No. DAEA-601, Jun10) Gheck Date (in house) 18-Oxt-02 (in house-sheck Oxt-09) 4-Aug-99 (in house-sheck Oxt-09) 18-Oxt-01 (in house-sheck Oxt-09)	Jun-11 Schookded-Check In house check: Oct-11 In house check: Oct-11 In house check: Oct-11
	erence Probe ESGOV3 EA condary Standards wer sensor HP 8481A generator H&S SMT-06 work Analyser HP 8753E	SAL 601 ID # MY41092317 100005 US37390595 \$4206 Name	10-Jun-10 (No. DAE4-601, Jun10) Gheck Date (in house) 18-Oxt-02 (in house check Oxt-09) 4-Aug-99 (in house check Oxt-09) 18-Oxt-01 (in house check Oxt-10) Function	Jun-11 Schookded Check In house check Oct-11 In house check Oct-11 In house check Oct-11
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Certificate No: D805V2-495\_Jan/11

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Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

FCC ID: RTS-6026-1303-02 L6ARFL110LW

L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

#### Calibration Laboratory of

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





Schweigerischer Kalibrierdieret Service suisse d'étalonnage Servizio svizzero di taratura **Swiss Calibration Service** 

Accordination 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 N/A

sensitivity in TSL / NORM x,y,z 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)\*,
- 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	Marie	COMPANY AND	41,446	Name and Address of the
CONTRACTOR OF STREET	PERSON.	MARKAGE THE	10.70	10000

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Author Data **Andrew Becker**  Dates of Test Nov 22, 2012 – Feb 28, 2013 Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

#### Measurement Conditions

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

DASY Version	DASYS	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	605 MHz = 1 MHz	

#### Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permitsivity	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 % (kin2)

SAR averaged over 10 cm <sup>8</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 a 16.5 % (k+2)

Certificate No: D805V2-466\_Jan/11

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Nov 22, 2012 – Feb 28, 2013

Test Report No RTS-6026-1303-02

L6ARFL110LW L6ARFP120LW

FCC ID:

2503A-RFL110LW 2503A-RFP120LW

#### 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

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**Andrew Becker** 

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02 L6ARFL110LW

FCC ID: L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

#### **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, dv=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/gMaximum value of SAR (measured) = 2.790 mW/g

0 dB = 2.790 mW/g

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**Andrew Becker** 

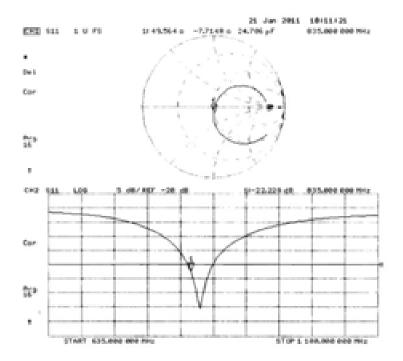
Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

## Impedance Measurement Plot for Head TSL



Certificate No: D835V2-446\_Jan11

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Document

## Appendix D for the BlackBerry® Smartphone Model RFP121LW SAR Report

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Author Data
Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

Calibration Laboratory of Schmid & Partner Engineering AG Zeoghausstrasse 49, 8004 Zurich, Switzerland





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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client

RTS (RIM Testing Services)

Certificate No: D835V2-446\_Jan13

Rject	D835V2 - SN: 44	6	
Calibration procedure(s)	QA CAL-05.v9 Calibration proce	dure for dipole validation kits abo	ove 700 MHz
Calibration date:	January 07, 2013	pointed the expression are	
		onel standards, which reside the physical un rebubliky are given on the following pages ar	
		vocability and given on the tonowing pages an ry facility: environment temperature (32 x 3)*1	
Calibration Equipment used (MA)	TE critical for calibrations		
Primary Standards	10+	Cal Date (Certificate No.)	Scheduled Calibration
	ID # 06027460704	Cal Oute (Certificate No.) 01-Nov-12 (No. 217-01640)	Scheduled Calibration Oct-13
Power meter EPM-442A	1307		
Power meter EPM-HQA Power sensor HP 8481A	G/007400704	01-Nov-12 (No. 217-01640)	Oct-13
Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator	G837480704 US37290783	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640)	Oct-13 Oct-13
Power meter EPM-H42A Power sensor HP S481A Reference 20 dB Attenuator Type-N mismatch combination	G8027480704 U637290783 SAL 5058 (DOL)	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530)	Oct-13 Oct-13 Agr-13
Power meter EPM-HSA. Power sensor HP 8481A. Patenence 20 dB Attenuator Fyge-N mismatch combination Reterence Probe ESSEVO	G837480704 US37290785 SM: SOS8 (30k) SM: SO47.3 / 06307	01-Hox-12 (No. 217-01640) 01-Hox-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. 217-01530)	Oct-13 Oct-13 Agr-13 Agr-13
Power theter EPM-H42A Power sensor HP 848nA Retenence 20 dB Adenuator Fyge-N mismatch combination Retenence Probe ESGEV3 DAE4	G837480704 US37290785 SM: SOS8 (20h) SM: SO47.3 / OE327 SM: SO45	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01630) 27-Mar-12 (No. 217-01630) 28-Dec-12 (No. ES3-3306, Dec10)	Oct-13 Oct-13 Agr-13 Agr-13 Dec-13
Power theter EPM-642A Power sensor HP 848nA Reference 20 dB Attenuator Fyge-M mismatich combination Reference Probe ESSDV3 DA64 Secondary Standards	G892*480704 U637292783 SM 5056 (20k) SM 5047.3 / 06987 SM 5005 SM 601	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. 217-01530) 28-Dec-12 (No. ES3-3005, Dec10) 27-Jun-12 (No. DAE4-601, Juni2)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13
Power theter EPM-642A Power sensor HP 8481A Reference 20 dB Attenuator Fyge-M resmatch combination Reference Probe ESSDV3 DA64 Secondary Standards Power sensor HP 8481A	G852*962704 U637296785 SM 5058 (20%) SM 5047.3 / 06387 SM 5047.3 / 06387 SM 601	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01520) 27-Mar-12 (No. 217-01520) 28-Dec-12 (No. ES3-3906, Dec10) 27-Jun-12 (No. DAE4-601, Jun12) Check Date (in-house)	Oct-13 Oct-13 Agr-13 Agr-13 Dec-13 Jun-13 Scheduled Check
Primary Standards Power meter EPM-442A Power sensor HP 848A Reference 20 dB Attenuator Fyge-N mismatch combination Saltennos Probe ESSEV3 DA64 Secondary Standards Power sensor HP 848A RE generator P&S SMT-95 Network Analyses HP 8753E	G852*962704 U637296785 SM: 5058 (20%) SM: 5058 (20%) SM: 5072.3 / 06367 SM: 5070 SM: 601 ID-# MYH1080317	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. 217-01530) 28-Dec-12 (No. ES3-3205, Dec10) 27-Jun-12 (No. DAE4401, Jun12) Check Date (In house) 18-Got-02 (In house check Oct-11)	Oct-13 Oct-13 Agr-13 Agr-13 Dec-13 Jun-13 Scheduled Check In house check: Oct-13
Power theter EPM-642A Power sensor HP 848nA Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DA64 Secondary Standards Power sensor HP 848nA HF generator P&S 3MT-95	G892*982794 US37292789 SM: 5058 (30%) SM: 5047.3 / 06927 SM: 5005 SM: 601 ID # M741000917 100005	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. 217-01530) 28-Dec-12 (No. ES3-3006, Dec10) 27-Jun-12 (No. DAEA-601, Jun12) Check Date (In-house) 18-Ost-02 (in-house check Oct-11) 04-Aug-99 (in-house check Oct-11)	Oct-13 Oct-13 Agr-13 Agr-13 Dec-13 Jun-13 Scheduled Check In house check: Oct-13 In house check; Oct-13
Power theter EPM-642A Power sensor HP 848nA Reference 20 dB Attenuator Fyge N mismatch combination Reference Probe ES3DV3 DA64 Secondary Standards Proser sensor HP 848nA RF generator R63 SMT-96	G8527460704 US37296785 SM: 5058 (20%) SM: 5047:3 / 06587 SM: 501 SM: 601 ID # M741060317 100005 US37360685 S4208	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. 257-01530) 28-Dec-12 (No. ES3-3005, Dec10) 27-Jun-12 (No. DAE4-601, Juni2) Check Date (in-house) 18-Ost-02 (in-house check Oct-11) 04-Aug-99 (in-house check Oct-11) 18-Ost-01 (in-house check Oct-11)	Oct-13 Oct-13 Agr-13 Agr-13 Dec-13 Jan-13 Scheduled Check In house check: Oct-13 In house check: Oct-13 In house check: Oct-13
Power timeter EPM-642A Power sensor HP 848nA Reference 20 dB Adensator Fyge-N mismatich combination Reference Probe ESGEV3 DA64 Secondary Standards Power sensor HP 860nA RE generator R&S SMT-95 Network Analyses HP 87108	G852*962*95 SN: 5058 (20k) SN: 5058 (20k) SN: 5017-3 / 06587 SN: 5005 SN: 601 ID # MYH1060317 100006 U657390686 54208	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. ES3-3006, Dec10) 28-Dec-12 (No. ES3-3006, Dec10) 27-Jun-12 (No. DAE4-601, Jun12) Check Date (in-house) 18-Out-02 (in house check Oct-11) 04-Aug-99 (in house check Oct-12) Function	Oct-13 Oct-13 Agr-13 Agr-13 Dec-13 Jan-13 Scheduled Check In house check: Oct-13 In house check: Oct-13 In house check: Oct-13

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Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02

FCC ID:

L6ARFL110LW L6ARFP120LW 2503A-RFL110LW 2503A-RFP120LW

Calibration Laboratory of Schmid & Partner

Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland





Schweizerlacher Kalibrierdiener S Service suisse d'étalonnage C Servicio suizones di tambies Swiss Calibration Service

Acceptitation 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

sensitivity in TSL / NORM x,y,z ConvF 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
- 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.

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%.

Certificate No: D835V2-446\_Jan13

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# Appendix D for the BlackBerry $\mathbin{\!@}$ Smartphone Model RFP121LW SAR Report

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Author Data
Andrew Becker

Dates of Test
Nov 22, 2012 – Feb 28, 2013

Test Report No **RTS-6026-1303-02** 

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

#### Measurement Conditions

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

DASY Version	DASYS	V52.8.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz x 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	42.0 ± 6 %	0.92 mholm ± 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	2.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.39 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>2</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.55 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	6.13 W/kg a 16.5 % (k=2)

Certificate No: D635V2-446\_Jan13



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**Andrew Becker** 

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

#### Appendix

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.1 Ω - 6.5 jΩ
Return Loss	- 23.7 dB

#### General Antenna Parameters and Design

Electrical Delay (one direction) 1.385 ns	×		
	ı	Electrical Delay (one direction)	

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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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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Document

## Appendix D for the BlackBerry® Smartphone Model RFP121LW SAR Report

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Author Data
Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No **RTS-6026-1303-02** 

L6ARFL110LW L6ARFP120LW

FCC ID:

2503A-RFL110LW 2503A-RFP120LW

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

Date: 07.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 835 MHz.

Medium parameters used: f = 835 MHz;  $\sigma = 0.92 \text{ S/m}$ ;  $\epsilon_r = 42$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

#### DASY52 Configuration:

Probe: ES3DV3 - SN3205; ConvF(6.05, 6.05, 6.05); Calibrated: 28.12.2012;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn601; Calibrated: 27.06.2012

Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001

DASY52 52.8.4(1052); SEMCAD X 14.6.8(7028)

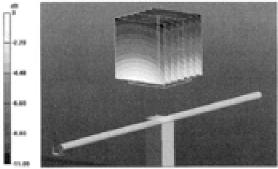
#### Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 56.650 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.61 W/kg

SAR(1 g) = 2.38 W/kg; SAR(10 g) = 1.55 W/kg

Maximum value of SAR (measured) = 2.79 W/kg



0 dB = 2.79 W/kg = 4.46 dBW/kg



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Author Data

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Dates of Test

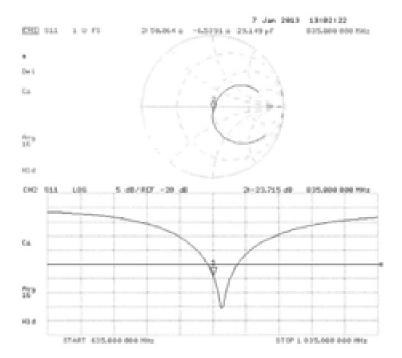
Nov 22, 2012 – Feb 28, 2013

Test Report No **RTS-6026-1303-02** 

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

#### Impedance Measurement Plot for Head TSL



Testing Service	Appendix D for the BlackBe Report	Appendix D for the BlackBerry® Smartphone Model RFP121LW SAR		
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Nov 22, 2012 – Feb 28, 2013	RTS-6026-1303-02	L6ARFL110LW L6ARFP120LW	2503A-RFL110LW 2503A-RFP120LW



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Author Data **Andrew Becker**  Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02

FCC ID:

L6ARFL110LW L6ARFP120LW 2503A-RFL110LW 2503A-RFP120LW

Calibration Laboratory of Schmid & Partner

Engineering AG Zeughausstrassa 43, 9004 Zurich, Switzerland





Schweigerischer Kellbriendienet. Service suisse d'élatonnage Servição eviztero di terroure Swiss Calibration Service

Accredited by the Swits Accreditation Service (SAS) The Swiss Accreditation Service is one of the signetories to the SA Multitational Agreement for the recognition of celibration surtificates

DTS (DIM Testing Services)

Accreditation No.: SCS 108

WHEN DESERVE 44043 April 1

ALIDIATION	ERTIFICATE		
Otyanit	D835V2 - SN: 4d	043	
Califestron-procedure(s)	QA CAL-05.v8 Calibration proce	dure for dipole validation kits	
Calibration date:	April 07, 2011		
The measurements and the unce	estatridos with configuracie p	over standards, which realize the physical or notability are given on the following pages at	d are part of the consticute.
All calibrations have been condu-	cted in the slotted laborator	y laciny, environment temperature (22 x 3)*	C and humidity < 70%
Calibration Equipment used (N&	TE critical for cultivacion)		
Primary Standards	01_	Onl Date (Certificate Nn.)	Schoduled Calibration
Power motor EPM-4/2A	-CIBOLINERD/OH	06-Oct-10 (No. 217 01066)	Op-11
Power person HP 0491A	U887290790	06-Oc#-10 (No. 217-01066)	Opt-11
Pelerence 20 dB Attrouation	SM: 5086 (70g)	29 Mar-11 (No 217-01368)	Apr-12
Type N miswetch combination	SNL 5047.2 / 06007	29-Mar-11 (No. 217-01571)	Apr-12
Pelerance Protes ES00173	SN: 3265	50 Apr 10 (No. ESS-3265, Apr 15)	Apr-11
DAE4	SN 601	10-Jun 10 (No. DAE # 601 Jun 10)	July 11
Secondary Standards	0.	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MNY410902317	18-Oxt-02 (in house check Oct-09)	in house check: Oct-11
RF generator R&S SMT-06	1010/005	4-Aug-99 (in house check Old-0%)	in house check: Oct-11
Network Analyzes INP 87508	US37390585 54296	18-Oct-01 (in house theck Oct-10)	In house check: Ocs 11
	Name	Function	Signature (/)
	Judget Katalinett	Lithoratory Technicism	-t-1/-
Calibrated by:	Prototo Company	5	7-0
Criticaled by	Kata Polonic	Technical Manager	ll kg
		Technical Manager	De Kage bound April 7, 2011

Certificate No: D835V2-46043, April 1

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Author Data

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Dates of Test

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Test Report No **RTS-6026-1303-02** 

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

Calibration Laboratory of

Schmid & Partner
Engineering AG
Zoughaustrasse \$1,000 Darich, Switzerland





S Schweizerleicher Kallbrierdienst
C Service suisse d'étalonnage
Servicio sviggere di terature
S Service Celfontion Service

Accreditation No.: SCS 108

Accepting by the Swinz Acceptation Service (SAS).
The Swise Acceptation Service is one of the alignatories to the EA.
Multilateral Agreement for the recognition of calibration certification.

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
- EC 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.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

Certificate No: D835V2-4d043\_Apr11

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2503A-RFL110LW 2503A-RFP120LW

#### Measurement Conditions

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

DASY Version	DASYS	V52.6.2	
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 a 1 MHz		

## Head TSL parameters

	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	40.6 ± 6 %	0.86 mbolm a 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C		_

#### SAR result with Head TSL

SAR averaged over 1 cm* (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.33 mW / g
SAR normalized	normalized to TW	9.32 mW / g
SAR for nominal Head TSL parameters	normalized to TW	9.43 mW /g x 17.0 % (k-2)

SAR averaged over 10 cm <sup>2</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.52 mW / g
SAR normalized	normalized to TW	6.08 mW / g
SAR for nominal Head TSL parameters	normalized to TW	6.14 mW/g = 16.5 % (k=2)

Certificate No: D835V2-4d043\_April1



Document

## Appendix D for the BlackBerry® Smartphone Model RFP121LW SAR Report

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Author Data
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Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02 | L6ARFL110LW

FCC ID:

L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

#### Appendix

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.9 Q − 3.4 JQ	
Return Loss	- 27.2 dB	

### General Antenna Parameters and Design

Electrical Delay (one direction):	1.391 ns	

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

The dipote is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipote. The artenna 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.

## Design Modification by End User

The dipole has been modified with Tofton Rings (TR) placed within identified markings close to the end of each dipole arm Calibration has been performed with TR stracted to the dipole.

#### Additional EUT Data

Manufactured by	SPEAG	
Manufactured on	April 07, 2006	

Certificate No: D835V2-4d0E3\_April 1

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Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No RTS-6026-1303-02

L6ARFL110LW L6ARFP120LW

FCC ID:

2503A-RFL110LW 2503A-RFP120LW

#### **DASYS Validation Report for Head TSL**

Date/Time: 07.04.2011 09:28:21

Test Laboratory: SPEAG, Zurich, Switzerland

#### DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d043

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

Medium: HSL900

Medium parameters used: f = 835 MHz;  $\sigma = 0.88$  mho/tr;  $c_r = 40.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

#### **DASY5 Configuration:**

Probe: ES3DV3 - SN3205; ConvF(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, V52.6.2 Build (424)

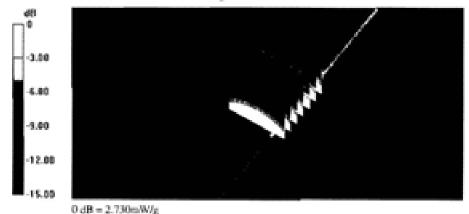
Postprocessing SW: SEMCAD X, V14.4.4 Build (2829)

### Pin=250 mW /d=15mm/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 57.201 V/mc Power Drift = 0.07 dB

Peak SAR (extrapolated) = 3.504 W/kg

SAR(1 g) = 2.33 mW/g; SAR(10 g) = 1.52 mW/gMaximum value of SAR (measured) = 2.730 mW/g



Certificate No: D835V2-4d043\_Apr11

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Dates of Test

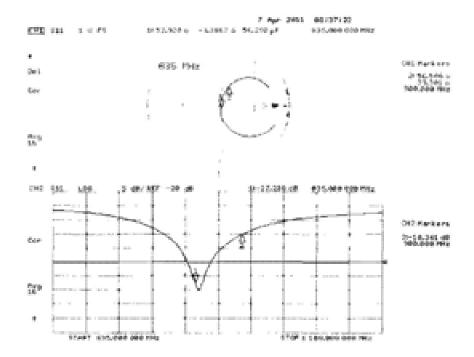
Nov 22, 2012 – Feb 28, 2013

Test Report No **RTS-6026-1303-02** 

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

## Impedance Measurement Plot for Head TSL



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Test Report No

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FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

Calibration Laboratory of Schmid & Partner

Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland





Service suisse d'étalonnage Ö Servizio svizzero di taratura **Swiss Calibration Service** 

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

RTS (RIM Testing Services)

Accreditation No.: SCS 108

Certificate No: D1800V2-2d020\_Jan11

Riject	D1800V2 - SN: 2	4020	Complete State Comple
Calibration procedure(s)	QA CAL-05.v8 Calibration proce	dure for dipole validation kits	
Calibration date:	January 13, 2011	E. S. S. W. Sel E. Stelle Second	
The measurements and the unce	ertainties with confidence p	onal standards, which realize the physical un robability are given on the following pages ar ry facility: environment temperature (52 = 3)*	nd are part of the certificate.
Calibration Equipment used (M&	TE critical for calibration)		
Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	0837480704	06-Oct-10 (No. 217-01266)	Out-11
	US37292763	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: 5086 (29g)	30-Mar-10 (No. 217-01158)	Mar-11
Reference 20:d0 Attenuetor Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference 26 dB Attenuator Type-N mismatch combination Reference Probe ES30V3			
Polerence 20 dB Attenuator Type-N mismatch combination Reference Probe ESSOVS OAEA	SAL 5047.2 / 06327 SAL 3205	30-Mar-10 (No. 217-01162) 30-Apr-10 (No. ES3-3205, Apr-10) 10-Jun-10 (No. DAE4-601, Jun+0)	Mar-11 Apr-11 Jun-11
Power sensor HP 8481A Reference 20:40 Afterwator Type-N mismisch combination Reference Probe ES30V3 DAE4 Secondary Standards Power sensor HP 8481A	SN: 5047.2 / 06027 SN: 3205 SN: 601	30-Mar-10 (No. 217-01162) 30-Apr-10 (No. ES3-3205, Apr-10) 10-Jun-10 (No. DAE4-601, Jun10) Check Date (in house)	Mar-11 Apr-11
Potenence 20:48 Attenuator Type-N mismatch combination Reference Probe ESSOV3 OAE4 Secondary Standards Power sensor HP 8481A	SAL 5047.2 / 06327 SAL 3205 SAL 601	30-Mar-10 (No. 217-01162) 30-Apr-10 (No. ES3-3205, Apr-10) 10-Jun-10 (No. DAE4-601, Jun+0)	Mar-11 Apr-11 Jun-11 Scheduled Check
Polenence 20:45 Attenuator Type-N mismatch combination Reference Probe ESSOV3 DASA Secondary Standards Press sensor HP 6681A RF generator PAS SWT-06	SM: 5047 2 / 06027 SM: 3205 SM: 601 ID-8 MH:1002317	30-Mar-10 (No. 217-01162) 30-Apr-10 (No. ES3-3205, Apr-10) 10-Jun-10 (No. DAE4-601, Jun10) Check Date (in house) 18-Oct-02 (in house shack Oct-09)	Mar-11 Apr-11 Jun-11 Scheduled Check In house check: Ocn 11
Perlenence 20 dB Attenuator Type-N mismistch combination Reference Probe ESSOVS DAEA	SN: 5047.2 / 06027 SN: 3205 SN: 601 ID-# MY41000317 100005	30-Mar-10 (No. 217-01162) 30-Apr-10 (No. ES3-3205, Apr10) 10-Jun-10 (No. DAE-6601, Juni0) Check Date (in house) 18-Ost-02 (in house shack Ost-09) 4-Aug-95 (in house shack Ost-09)	Mar-11 Apr-11 Jun-11 Scheduled Check In Nouse check: Oct-11 In house check: Oct-11
Potenence 20 dB Attenuator Type-N mismatch combination Reference Probe ESSOV3 DAEA Secondary Standards Preser sensor HP 6681A RF generator R&S SMT-06	SN: 5047.2 / 06027 SN: 3205 SN: 601 ID # MYK1002017 100005 U537390586 S4206	30-Mar-10 (No. 237-01162) 30-Apr-10 (No. ES3-3205, Apr-10) 10-Jun-10 (No. DAE-601, Jun60) Check Date (in house) 18-Oxt-02 (in house check Oxt-09) 4-Aug-99 (in house check Oxt-09) 18-Oxt-01 (in house check Oxt-10) Function	Mar-11 Apr-11 Jun-11 Scheduled Check In Nouse check: Oct-11 In house check: Oct-11

Certificate No: D1800V2-26020\_Jan/11

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Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

#### Calibration Laboratory of

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





Schweizerlacher Kalibrierdienst Service suisse d'étalonnage o. Servicia sylvano di teratura Swine Calibration Service.

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Senice (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

ConvE N/A

sensitivity in TSL / NORM x,y,z 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
- 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
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

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**Andrew Becker** 

Dates of Test Nov 22, 2012 – Feb 28, 2013 Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

#### Measurement Conditions

DASY Version	DASYS	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 mholm ± 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 TW	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
SAR for nominal Head TSL parameters	normalized to TW	20.5 mW /g x 16.5 % (k=2)

Certificate No: D1800V2-2d020\_Jan11

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## Appendix D for the BlackBerry® Smartphone Model RFP121LW SAR Report

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Author Data
Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No **RTS-6026-1303-02** 

L6ARFL110LW

FCC ID:

L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

#### Appendix

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	46.5 \(\Omega \cdot 7.3 \) [\Omega \cdot 7.3 \)
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: D1800V2-2x020\_Jav11

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Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No RTS-6026-1303-02

L6ARFL110LW L6ARFP120LW

FCC ID:

2503A-RFL110LW 2503A-RFP120LW

#### 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;  $\sigma = 1.38 \text{ mho/m}$ ;  $\epsilon_r = 38.7$ ;  $\rho = 1000 \text{ kg/m}^3$ 

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)

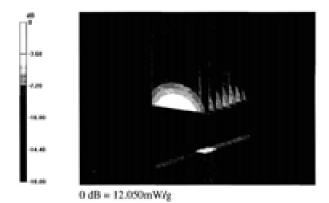
#### Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement

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



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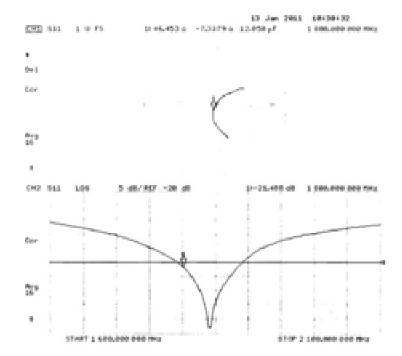
Author Data **Andrew Becker**  Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

#### Impedance Measurement Plot for Head TSL



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2503A-RFL110LW 2503A-RFP120LW

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





Schweizerischer Kalibrierdienst 8 Service suisse d'étalonnage Servizio prizzero di taratura Swiss Calibration Service

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

RTS (RIM Testing Services)

Accreditation No.: SCS 108

Certificate No: D1800V2-2d020\_Jan13

	CERTIFICATE	AND THE PERSON OF THE PERSON O	
Object	D1800V2 - SN: 2	40020	
Calibration procedure(s)	100000000000000000000000000000000000000	dure for dipole validation kits abo	
Cultivation date:	January 09, 2013		
		ional standards, which resize the physical un robability are given on the following pages ar	
All calibrations have been conduc	sted in the closed laborator	ry tacility: environment temperature (22 x 3)*(	C and humidity = 70%.
Calibration Equipment used (M&)	TE ortical for calibration)		
Primary Standards	ID #	Call Date (Cortificate No.)	Scheduled Calibration
Yower meter EPM-642A	GB37480794	01-Nov-12 (No. 217-01640)	Ox8-13
Yower semior HIP 8481A	US07290780	01-Nov-12 (No. 217-01640)	Oxt-13
leference 20 dB Attenuator	SPI: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
ype-N mismatch combination	SRC 5047.3 / 06397	27-Mar-12 (No. 217-01535)	Apr-13
Melerence Prote ESSOVS	5N: 3005	28-Dec-12 (No. ESS-3205_Dec12)	Dec-13
	58Y: 001		
	(815, 567)	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13
ME4	01	27-Jun-12 (No. DADH-601_Jun12)  Check Date (in house)	
DAE4 Secondary Standards			Jun-13 Scheduled Check In house check: Oct-13
DAE14 Secondary Standards Power sensor HP 8481A	01	Check Date (in house)	Scheduled Check
DAE4 Secondary Standards Power sensor HP BHB1A RF generator RES SMT-OS Network Analyzer HP 8753E	ID # MV41082917	Check Date (in house) 18-Oct-02 (in house check Oct-11)	Scheduled Check In house check: Oct-13
DAE4 Secondary Standards Power sensor HP 6481A RF generator RES SMT-06	ID # MY41080317 100006	Check Date (in house) 18-Oct-07 (in house check Oct-11) 04-Aug-99 (in house check Oct-11)	Scheduled Check In house check: Oct-13 In house check: Oct-13
DAEH Secondary Standards Power sensor HP 8H81A IF generator RES SME-OS Network Analyzer HP 8753E	© # MY41092317 100005 US37390595 S4206	Check Date (in house) 18-Oct-07 (in house check Oct-11) 04-Aug-99 (in house check Oct-11) 18-Oct-01 (in house check Oct-12)	Suheduled Check In house check: Oct-13 In house check: Oct-13 In house check: Oct-13 Signature
DAE4 Secondary Standards Power sensor HP 6481A RF generator RES SMT-06	ID # MV41082317* 100006 US3J7360685 S4206 Name Israe EnNance	Check Date (in house) 18-Oct-02 (in house check Oct-11) 04-Aug-02 (in house check Oct-11) 18-Oct-01 (in house check Oct-12) Function Laboratory Technician	Scheduled Check In house check: Oct-13 In house check: Oct-13 In house check: Oct-13

Certificate No: D1800V2-2d020 Jan13

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Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02

L6ARFL110LW L6ARFP120LW

FCC ID:

2503A-RFL110LW 2503A-RFP120LW

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



Schweizerlacher Kalibrierdienst Service suisse d'étalonnage Servicio evizporo di taratura

Swiss Calibration Service

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Sensor (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
- 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
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

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%.

Contificate No: D1800V2-2d020\_Jan13

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# Appendix D for the BlackBerry $\mathbin{\!@}$ Smartphone Model RFP121LW SAR Report

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Author Data
Andrew Becker

Dates of Test Nov 22, 2012 – Feb 28, 2013 Test Report No **RTS-6026-1303-02** 

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

#### Measurement Conditions

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

DASY Version	DASYS	V52.8.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	1-1-1-1
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1800 MHz e 1 MHz	

## Head TSL parameters

The following parameters and calculations were applied.

1	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	30.9 ± 6 %	1.38 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

## SAR result with Head TSL

SAR averaged over 1 cm² (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.61 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	38.5 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>4</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.06 W/kg
SAR for nominal Head TSL parameters	normalized to YW	20.3 W/kg a 16.5 % (k=2)

Certificate No: D1800V2-2d020\_Jan13

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Author Data **Andrew Becker**  Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

#### Appendix

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	46.2 \Omega - 8.3  \Omega
Return Loss	- 20.5 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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

Conflicate No: D1800V2-2d020\_Jan13

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Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

#### DASY5 Validation Report for Head TSL

Date: 09.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 1800 MHz

Medium parameters used: f = 1800 MHz;  $\sigma = 1.38 \text{ S/m}$ ;  $\varepsilon_r = 38.9$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

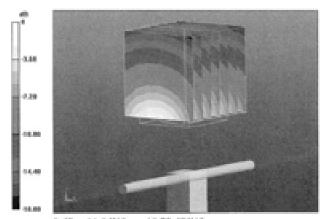
#### DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(5.04, 5.04, 5.04); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.4(1052); SEMCAD X 14.6.8(7028)

#### 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 = 95.870 V/m; Power Drift = 0.04 dB Peak SAR (extrapolated) = 17.5 W/kg

SAR(1|z) = 9.61 W/kg; SAR(10|z) = 5.06 W/kg.Maximum value of SAR (measured) = 11.8 W/kg



0 dB = 11.8 W/kg = 10.72 dBW/kg



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Author Data
Andrew Becker

Dates of Test

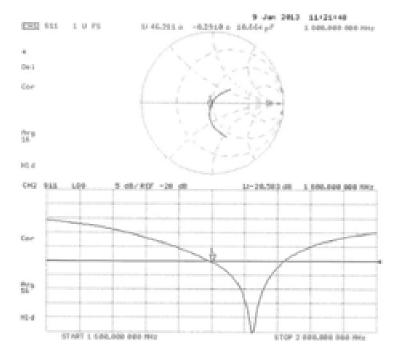
Nov 22, 2012 – Feb 28, 2013

Test Report No **RTS-6026-1303-02** 

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

## Impedance Measurement Plot for Head TSL



	erry® Smartphone Mo	odel RFP121LW SAR	Page 101(134)
Dates of Test	Test Report No	FCC ID:	IC
Nov 22, 2012 – Feb 28, 2013	RTS-6026-1303-02		2503A-RFL110LW 2503A-RFP120LW
	Report  Dates of Test	Appendix D for the BlackBerry® Smartphone Mo Report  Dates of Test  Test Report No	Appendix D for the BlackBerry® Smartphone Model RFP121LW SAR Report  Dates of Test   Test Report No   FCC ID:



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Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02

L6ARFL110LW L6ARFP120LW

FCC ID:

2503A-RFL110LW 2503A-RFP120LW

Calibration Laboratory of

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





S Schweizerischer Kallbrierdenst Service suisse d'étalonnage Servizio svizzero di teratura Swiss Calibration Service

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 celibration certificates

RTS (RIM Testing Services)

Accreditation No.: SCS 108

Certificate No: D1900V2-545\_Jan11

#### CALIBRATION CERTIFICATE Object D1900V2 - SN: 545 QA CAL-05.v8 Calibration procedureout Calibration procedure for dipole validation kits of the same of GARNE January 13, 2011 Cultivation date: This collection conflicate documents the traceability to national standards, which realize the physical units of measurements (Sr). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the contribute. All calibrations have been conducted in the closed laboratory facility: environment temperature (32 a 30°C and humidity < 70%. Calibration Equipment used (M&TE ortical for calibration) Primary Standards 10.4 Call Date (Certificate No.) Scheduled Calibration Proper motor EPM-642A G832480204 95-Oct-10-Res 217-01298) COLUMN Power sensor HP 8481A US37292763 96-Oct-10 (No. 217-01266) Central Reference 20 dB Attenuator SNI: 5086 (20g) 30 Mar 10 (No. 217-01156) Mary 13 Type-M mismatch combination: SNI 5047.2 / 06327 30 Mar 10 (No. 217-01162) May 11 30 Apr.10 (No. ES3-3205, April 0 Reference Probe ESGCV3 SW 3005 Apr. 51 DAILS 574: 601 10-Jun 10 (No. DAE4-601\_Jun 10) June 11 Secretary Standards Check Date (in house): Sicheduled Check MY4nosesn? Power sensor HP BABISA. 18-Oct-02-lin house check Oct-091 In house check: Oct-11 RF generator RAS SAIT-06 100005 4-Aug-99 (in house check Oct-09) In house check: Oct-11 Network Analyzer HP 8753E US37390585 S4206 18-Oct-01 (in house check Oct-10) In house sheck: Oct-11 Function Calibrated by: Laboratory Technicien A DOLLAR WAY OF THE PARTY OF TH Technical Manager Issued: January 14, 2011 This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: D1900V2-545\_Jan11

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Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02

L6ARFL110LW L6ARFP120LW

FCC ID:

2503A-RFL110LW 2503A-RFP120LW

Calibration Laboratory of

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





Schweigeringher Kalibrierdienst Service suisse d'étalonnage Servizio svizzero di taratura Swiss Calibration Service

Accreditation No.: SCS 108

According by the Swiss Accordington 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 N/A

sensitivity in TSL / NORM x,y,z 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)\*,
- 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: D1900V2-545 Jan11

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Author Data **Andrew Becker**  Dates of Test Nov 22, 2012 – Feb 28, 2013 Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

#### Measurement Conditions

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

DASY Version	DASYS	V52.6
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom VS.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

	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 mhoim ± 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 TW	40.8 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	40.0 mW /g x 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.26 mW / g
SAR normalized	normalized to 1W	21.0 mW / g
SAR for nominal Head TSL parameters	normalized to TW	20.8 mW/g ± 16.5 % (k=2)

Certificate No: D1900V2-545\_Jan11

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Author Data **Andrew Becker**  Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02

L6ARFL110LW L6ARFP120LW

FCC ID:

2503A-RFL110LW 2503A-RFP120LW

#### 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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**Andrew Becker** 

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02

FCC ID:

L6ARFL110LW L6ARFP120LW 2503A-RFL110LW 2503A-RFP120LW

#### 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;  $\sigma = 1.43 \text{ mho/m}$ ;  $\varepsilon_t = 38.6$ ;  $\rho = 1000 \text{ kg/m}^3$ 

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)

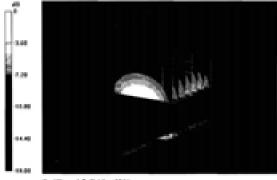
Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement

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/gMaximum value of SAR (measured) = 12.743 mW/g



0 dB = 12.740 mW/g

Certificate No: D1900V2-545\_Jan11

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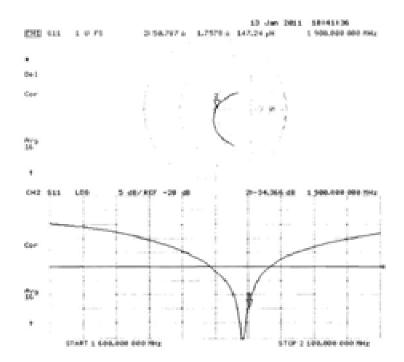


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Author Data **Andrew Becker**  Dates of Test Nov 22, 2012 – Feb 28, 2013 Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

## Impedance Measurement Plot for Head TSL



Certificate No: D1900V2-545\_Jan11

Plage 6 of 6



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Author Data **Andrew Becker**  Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

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





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

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

RTS (RIM Testing Services)

Accreditation No.: SCS 108

Certificate No: D1900V2-545\_Jan13

ALIDITATION	ERTIFICATE		
Rjed	D1900V2 - SN: 5	45 12 12 13 13 13 13 13 13 13	
albration procedure(s)		dure for dipole validation kits abo	we 700 MHz
Calibration debt	January 09, 2013	gloday 110 selesa	
The measurements and the unco	vitainties with confidence pr	onal standards, which realize the physical un obability are given on the following pages an	d are part of the certificate.
I cultirations have been condu	ded in the closed laborator	y facility: environment temperature (32 x 3)*C	5 and humidity < 70%.
Calibration Equipment used (MIS)	TE critical for calibration)		
	TE critical for calibration)	Call Date (Certificate No.)	Scheduled Calibration
nimary Standards		Call Date (Continue No.) 01-Nov-12 (No. 217-01010)	Oct 53
rimary Standards Ower meter EPM-HSSA	10+		Ost 13 Ost 13
rimary Standards Deer meter EPM-HIDA Deer sensor HP 8461A	60 # G8GF480704 USS7290783 SN: 5056 (70k)	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530)	Ore-13 Gen-13 Apr-13
nimary Standards Ower mater EPM-442A Ower sensor HP 8481A eference 20 dB Attenuator	ID # GB07480704 US97290703	01-Nov-12 (No. 217-01040) 01-Nov-12 (No. 217-01040)	Om 13 Om 13
rimary Standards Ower meter EPM-442A Ower sensor HP 8481A eference 20 dB Attenuator yee N microstch combination	60 # G8GF480704 USS7290783 SN: 5056 (70k)	01-Rov-12 (No. 217-01040) 01-Rov-12 (No. 217-01040) 27-Mar-12 (No. 217-01030) 27-Mar-12 (No. 217-01030) 29-Dec-12 (No. ES3-0006, Dec12)	Ost-13 Ost-13 Apr-13 Apr-13 Ost-13
nimary Standards costs mater EPM-442A costs sensor HP 8481A eference 20 dB Attenuator upo N mismatch combination eference Probe ESSOV3	ID # GB37480704 US37290763 SN: 5656 (704) SN: 5647.37.06007	01-Rev-12 (No. 217-01910) 01-Rev-12 (No. 217-01610) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. 217-01530)	Ost-13 Ost-13 Apr-13 Apr-13
rimary Standards Ower meter EPM-44DA Ower sensor HP 8401A eference 20 dB Attenuator yee N mismatch combination eference Probe ESSOVS AE4	50 # GBG/1480704 US37296763 SN: 5658 (70k) SN: 5647.31/160027 SN: 3006	01-Rov-12 (No. 217-01040) 01-Rov-12 (No. 217-01040) 27-Mar-12 (No. 217-01030) 27-Mar-12 (No. 217-01030) 29-Dec-12 (No. ES3-0006, Dec12)	Ost-13 Ost-13 Apr-13 Apr-13 Osc-13
Vinuary Standards  Osetr meter EPM-44CA  Osetr sensor HP 84G1A  televence 20 dB Attenuator  gen N mismatch continuation felorance Prote ESSCN3  AEE  econolary Standards	60 # G807480794 US37290740 SN: 5056 (704) SN: 5047.31 (80027 SN: 3006 SN: 601	01-Rov-12 (No. 217-01640) 01-Rov-12 (No. 217-01640) 27-Mar-12 (No. 217-01630) 27-Mar-12 (No. 217-01630) 29-Dec-12 (No. ES3-0205, Dec12) 27-Jun-12 (No. DAE4-601, Jun12) Check Date-(in house check Oct-11)	Oct-13 Oct-13 Apr-13 Apr-13 Disc-13 Jun-13 Scheck-led Check In house-check: Oct-13
rimary Standards Oses meter EPM-442A Oses sensor HP 8481A eference 20 dB Attanuator ple N mismatch continuation eference Prote ESCOY3 AEI4 econdary Standards Oses pensor HP 8481A	60 # G837480704 U537292763 Snt 5058 (20k) Snt 5056 (20k) Snt 5047.3 / 06027 Snt 506 Snt 601	01-Rov-12 (No. 217-01940) 01-Rov-12 (No. 217-01940) 27-Mar-12 (No. 217-01930) 27-Mar-12 (No. 217-01930) 29-Dec-12 (No. ES3-0205, Dec12) 27-Jun-12 (No. DAE4-601, Jun12) Check (Date-(in house check Oct-11) 98-Dec-02 (in house check Oct-11)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check In house check: Oct-13 In house check: Oct-13
Vincery Standards  Youer meter EPM-H-2A  Youer sensor HP 8481A  telerance 20 dB Attenuator  you N mismatch continuation  telerance Probe ESSCY3  MEA  Jecondary Standards  Youer sensor HP 8481A  Iff generator RBS SMT 06	80 # G837480704 U537292763 Sn: 5058 (204) Sn: 5647.3 / 06327 Sn: 501 80 # MY41092517	01-Rov-12 (No. 217-01640) 01-Rov-12 (No. 217-01640) 27-Mar-12 (No. 217-01630) 27-Mar-12 (No. 217-01630) 29-Dec-12 (No. ES3-0205, Dec12) 27-Jun-12 (No. DAE4-601, Jun12) Check Date-(in house check Oct-11)	Oct-13 Oct-13 Apr-13 Apr-13 Disc-13 Jun-13 Scheck-led Check In house-check: Oct-13
Vincery Standards  Youer meter EPM-H-2A  Youer sensor HP 8481A  telerance 20 dB Attenuator  you N mismatch continuation  telerance Probe ESSCY3  MEA  Jecondary Standards  Youer sensor HP 8481A  Iff generator RBS SMT 06	80 # G8G7480704 USS7290783 SN: 5658 (20k) SN: 5647.37 96307 SN: 5095 SN: 601 B) # MY41080317 100005	01-Rov-12 (No. 217-01940) 01-Rov-12 (No. 217-01940) 27-Mar-12 (No. 217-01930) 27-Mar-12 (No. 217-01930) 29-Dec-12 (No. ES3-0205, Dec12) 27-Jun-12 (No. DAE4-601, Jun12) Check (Date-(in house check Oct-11) 98-Dec-02 (in house check Oct-11)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check In house check: Oct-13 In house check: Oct-13
Subtration Equipment used (MM)  Vision Standards  Vision Sensor ISP 8481A  Vision Sensor ISP 8481A  Seference 20 dB Attenuator  Spe N mismatch combination  Solida  Secondary Standards  Vision Sensor ISP 8481A  Iff generator ISBS SAIT OS  Schools Analyzor ISP 87536  Subtrated by:	60 # GBGI*480704 US37290740 SN: 5568 (704) SN: 5567,37 (60327 SN: 3096 SN: 601  80 # MY41090317 100006 US37380646 54206  Name	01-Nov-12 (No. 217-01040) 01-Nov-12 (No. 217-01040) 27-Mar-12 (No. 217-01030) 27-Mar-12 (No. 217-01030) 28-Dec-12 (No. ESS-0906, Dec-12) 27-Jun-12 (No. ESS-0906, Dec-12) 27-Jun-12 (No. ESS-0906, Dec-12) 27-Jun-12 (No. ESS-0906, Dec-12) 18-Out-12 (No. ESS-0906, Dec-12) 18-Out-12 (No. ESS-0906, Dec-12) 18-Out-12 (No. ESS-0906, Dec-12) 18-Out-12 (In house check Cot-11) 18-Out-11 (In house check Cot-12)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check In house check: Oct-13 In house check: Oct-13
Vincery Standards Voser meter EPM-4402A Voser sensor HP 6401A feference 20 dB Attenuator ference Prote ES302V3 JAE4 Jecondary Standards Voser sensor HP 6401A HF generator R&S SMT-05 Jethnock Analyzor HP 8753E	60 # GBGI*480704 US37290740 SN: 5568 (704) SN: 5567,37 (60327 SN: 3096 SN: 601  80 # MY41090317 100006 US37380646 54206  Name	01-Rov-12 (No. 217-01640) 01-Rov-12 (No. 217-01640) 27-Mar-12 (No. 217-01630) 27-Mar-12 (No. 217-01630) 29-Dec-12 (No. ES3-0205, Dec12) 27-Jun-12 (No. DAE4-601, Jun12) Check Date-(in house check Oct-11) 60-Aug-09 (in house check Oct-11) 18-Oct-01 (in house check Oct-11) 18-Oct-01 (in house check Oct-10)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check In house check: Oct-13 In house check: Oct-13 In house check: Oct-13

Certificate No: D1900V2-545\_Jan13

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Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

Calibration Laboratory of

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





Schweigerischer Kalibrierdienst Service suisse d'étalonnage C Speciale automore di taratura Swiss Calibration Service

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Senior (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

sensitivity in TSL / NORM x,y,z ConvF 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
- 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
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

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%.

Certificate No: D1900V2-545\_Jan13

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Author Data
Andrew Becker

Dates of Test Nov 22, 2012 – Feb 28, 2013 Test Report No **RTS-6026-1303-02** 

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

#### Measurement Conditions

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

DASY Version	DASY5	V52.8.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz a 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	39.4 ± 6 %	1.38 mholm ± 6 %
Head TSL temperature change during test	< 0.5 °C		

# SAR result with Head TSL

SAR averaged over 1 cm <sup>2</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.0 WERg
SAR for nominal Head TSL parameters	normalized to 1W	40.2 W/kg = 17.0 % (k=2)

SAR averaged over 10 cm² (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.26 W/kg
SAR for nominal Head TSL parameters	normalized to TW	21.1 W/kg ± 16.5 % (k×2)

Certificate No: D1900V2-645\_Jan13

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Author Data
Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No **RTS-6026-1303-02** 

L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

# Appendix

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.0 \( \O = 1.7 \) \( \O = 1.7 \)
Return Loss	- 34.3 dB

# General Antenna Parameters and Design

Electrical Delay (one direction)	1.198 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. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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\_Jan13

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**Andrew Becker** 

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

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

Date: 09.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: f = 1900 MHz;  $\sigma = 1.38 \text{ S/m}$ ;  $\epsilon_r = 39.4$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007).

#### DASY52 Configuration:

Probe: ES3DV3 - SN3205; ConvF(4.98, 4.98, 4.98); Calibrated: 28.12.2012;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn601; Calibrated: 27.06.2012

Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001

DASY52 52.8.4(1052); SEMCAD X 14.6.8(7028)

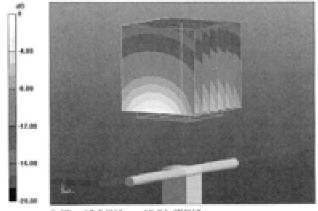
# Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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

Reference Value = 95.493 V/m; Power Drift = 0.05 dB Peak SAR (extrapolated) = 18.1 W/kg

SAR(1 g) = 10 W/kg; SAR(10 g) = 5.26 W/kg

Maximum value of SAR (measured) = 12.2 W/kg



0 dB = 12.2 W/kg = 10.86 dBW/kg



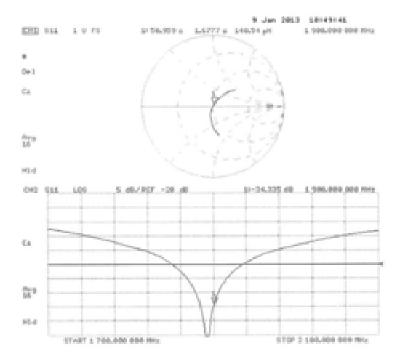
113(134)

**Andrew Becker** 

Dates of Test Nov 22, 2012 – Feb 28, 2013 Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

#### Impedance Measurement Plot for Head TSL



Certificate No: D1900V2-545\_Jan13

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Testing Service	Appendix D for the BlackBo Report	Appendix D for the BlackBerry® Smartphone Model RFP121LW SAR		
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Nov 22, 2012 – Feb 28, 2013	RTS-6026-1303-02	L6ARFL110LW L6ARFP120LW	2503A-RFL110LW 2503A-RFP120LW



# Appendix D for the BlackBerry® Smartphone Model RFP121LW SAR Report

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Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02 L6A

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

Calibration Laboratory of School & Darbor

Schmid & Partner
Engineering AG
Zeughaustrasse 13, 6001 Zurlch, Switzerland





Schweizerlacher Kalibrierdienst
 Bervice suisse d'étalonnage
 Servizio svitzero di lavetura
 Seisa Calibration Service

According by the Swiss Accordinates Service (SAS)
The Swise Accordination Service is one of the signaturies to the EA
Multilelenal Agreement for the recognition of calibration certificates

Client RTS (RIM Testing Services)

Autoreditation No.: SCS 108

Certificate No. D1900V2-5d075\_Apr11

# CALIBRATION CERTIFICATE

Onject D1900V2 - SN: 5d075

Calibration procedure(s) QA CAL-05.v8

Calibration procedure for dipole validation kits

Carbrationidate: April 5, 2011

This collection conflicting documents the inscendibility to national standards, which realize the physical units of measurements (\$0).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All cultivations have been conducted in the closed laboratory lapility; environment temperature (22 x 3)°C and humidity < 70%.

allocation fin-inment used ARLTE calcust by sufficients

Primary Standards	10.6	Gel Date (Gertificate No.)	Scheduled Calibration
Power meter EPM-4404	G007480764	06-Oxt-10 (No. 217-01086)	Gut-11
Power sensor HP \$161A	US07290790	98-Oct-10 (No. 217-01286)	Con-11
Poliprehoe 20:58 Attenuator	SN: 5084 (20g)	29-Mar 11 (No. 217-01585)	Apr-12
Type Ni minmaton combination	SM: 5047.2 / 05007	29-Mar-11 (No. 217-01371)	April 12
Pulerance Probe ESSOV'S	SN: 00:05	30-Apr-16 (No. ES3-3005, Apr-15)	April 1
DAE4	594; 601	10-Jun-10 (No. DAE4461, Jun 10)	Jun-11
Secondary Standards	10.4	Check Date (in house)	Schedwied Check
Power sensor HP shiftA	M1641002317	18-Oct-02 (in house check Oct-09)	in house sheck: Oct-11
RF generator RAS SMT-66	100055	4-Aug-99 (in house shock Oct-99)	In house sheck, Oct 11
Network Analyzor HP 87536	US32300565 \$4006	18-Oct-01 (in house check Oct-10)	In house check: Oci-11
	Name	Bunctor	Service
Calibrated by:	Miles Medi	Laboratory Technicien	thedi
Approved by:	Karja Potento	Taulintesi Manager	000

Certificate No: 01900V2-5d075\_Apr11

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Author Data Andrew Becker Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

Calibration Laboratory of Schmid & Partner

Engineering AG Spontagestranse 43, 5004 Zurich, Switzerland





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Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signaturies to the EA. MultiMeteral Agreement for the recognition of calibration certificates

#### Glossary:

TSI.

tissue simulating liquid

ConvF NAME.

sensitivity in TSL / NORM x,y,z 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
- 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 Compilance 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
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

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Mr. No: ID1900Y2-50075\_Apr11

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Author Data **Andrew Becker**  Dates of Test Nov 22, 2012 – Feb 28, 2013 Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

# Measurement Conditions

DASY Version	DASYS	V52.6.2
Extrapolation	Advanced Extrapolation	
Phentom	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**

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22:0 °G	40:0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.8 ± 6 %	1.41 mhoim ± 6 %
Head TSL temperature during test	(21.3 ± 0.2) °C		

# SAR result with Head TSL

SAR averaged over 1 cm <sup>2</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.2 eW / g
SAR normalized	normalized to 1W	40,8 mW / g
SAR for nominal Head TSL perameters	inormalized to TW	40.4 mW/g = 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SARI measured	250 mW input power	5.29 mW / g
SAR normalized	normalized to TW	21.2 mW/g
SAR for nominal Head TSL paremeters	normalized to 1W	21.0 mW/g a 16.5 % (k-2)

Certificate No: D1900V2-5d075\_April 1

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**Andrew Becker** 

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

# Appendix

# Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.5 Ω + 6.1 jΩ
Return Loss	· 23.3 dB

# General Antenna Parameters and Design

Electrical Delay (one direction)	1.197 ns

After long form 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 coastal 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	January 24, 2006

Certificate No: D1900V2-56075\_Apr11

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Author Data **Andrew Becker**  Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No RTS-6026-1303-02

L6ARFL110LW L6ARFP120LW

FCC ID:

2503A-RFL110LW 2503A-RFP120LW

# **DASY5 Validation Report for Head TSL**

Date/Time: 05.04.2011 12:41:39

Test Laboratory: SPEAG, Zurich, Switzerland

#### DUT: Dipole 1900 MHz; Type: D1900V2; Serial; D1900V2 - SN:58075

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: HSL U12 BB

Medium parameters used: f = 1900 MHz;  $\sigma = 1.41 \text{ mho/m}$ ;  $\epsilon_c = 39$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

# DASY5 Configuration:

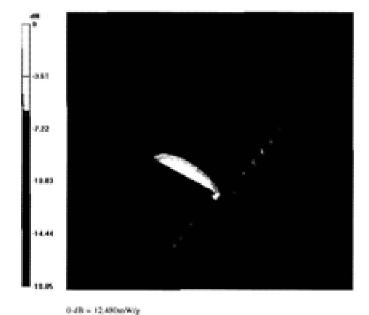
- Probe: ES3DA3 SN3295; ConvEtSJPI, 5.09; 5.09; Culibrated: 30.04,2010
- Sensor-Surface: Jenn (Machanical Surface Detection)
- Electronics: DABI Sn601; Calibrated: 10.06.2010.
- Phanton: Flst Phanton 5.9 (Sout); Type: QD000P50AA; Serial: 1001
- Moseuroment SW: DASY52, V52.6.2 Build (424)
- Puntprocessing SW: SEMCAD X, V14.4.4 Build (2929)

# Head / d=10mm, Pin=250 mW / Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 97.376 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 18.796 W/kg

SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.29 mW/gMaximum value of SAR (measured) = 12.476 mW/g



Certificate No: D1900V2 5d075\_Apr11

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Author Data
Andrew Becker

Dates of Test

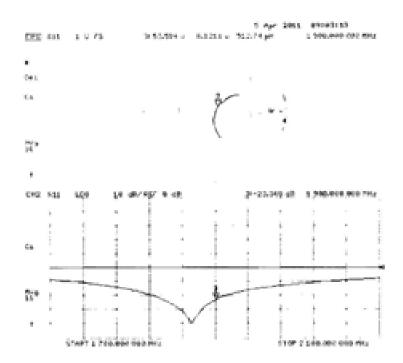
Nov 22, 2012 – Feb 28, 2013

Test Report No **RTS-6026-1303-02** 

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

# Impedance Measurement Plot for Head TSL



Certificate No. D1900V2-5d075\_Apr11

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# Appendix D for the BlackBerry® Smartphone Model RFP121LW SAR Report

121(134)

Author Data
Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No **RTS-6026-1303-02** 

L6ARFL110LW L6ARFP120LW

FCC ID:

2503A-RFL110LW 2503A-RFP120LW

Calibration Laboratory of Schmid & Partner Engineering AG Zeughaustrasse 43, 8004 Zurkih, Switzerlan





Schweizerischer Kalibriendienst Service suisse d'étalonnage Servizio svizzeno di taratura Swise Calibration Service

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The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

RTS (RIM Testing Services)

Certificete No: D2450V2-747\_Nov11

ALIBRATION C	ERTIFICATE		<b>建筑 海 温 1</b> 0
Striet I	02450V2 - SN: 7	<b>17</b> ST ST ST ST ST.	All Company of the Co
Dalibration procedure(s)	QA CAL-05.v8 Calibration proce	dure for dipole validation kits abo	tve 700 MHz
Calibration date:	November 09, 20	CONTRACTOR OF THE SECOND SECON	
			and the second second second
		onal standards, which realize the physical un robability are given on the following pages an	
NI calibrations have been conduc	fied in the closed laborator	ry facility: environment temperature (22 x 3)/4	C and humidity < 70%.
Salibration Equipment used (MIL)	E ortical for calibration)		
and the second second	line.	Gal Date (Certificate No.)	
minery seamperos	100.7	Cer trene (Ceronicine No.)	Scheduled Calibration
	G/807480704	05-Oct-11 (No. 217-01451)	Scheduled Calibration Oct-12
Power meter EPM-44EA	100.0		
Power meter EPM-44DA Power sensor HP 8481A	G657490704	05-Oct-11 (No. 217-01451)	Oct-12
Power meter EPM-442A Power sensor HSP 6481A Reference 20:dS Attenuator	G897480704 US37292789	05-Oct-11 (No. 217-01461) 05-Oct-11 (No. 217-01461)	Oct-12 Oct-12
Power mater EPM-84DA Power sensor HIP 8481A. Reference 20-dB Attenuator Type-N mismatch combination	GRB7480704 US37292793 SA: 5086 (30g)	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451) 29-Mar-11 (No. 217-01366)	Oct-12 Oct-12 Apr-12
Power mater EPM-44EA Power sensor HIP BHB1A Reference 20:48 Attenuator Type-N mismatch combination Reference Probe ESSOVS	G837480704 US37292785 SN: 5086 (20g) SN: 5047.2 / 06327	05-Oct-11 (No. 217-01401) 05-Oct-11 (No. 217-01401) 29-Mar-11 (No. 217-01308) 29-Mar-11 (No. 217-01371)	Oct-12 Oct-12 Apr-12 Apr-12
Power meter EPM-442A Power sensor HIP 8481A. Reference 20:09 Attanuator Fige-N mismatch combination Reference Probe ESSOV3 2AE4	G837480704 US37292785 SN: 5086 (20g) SN: 5047.2 / 06327 SN: 3205	05-Oct-11 (No. 217-01401) 05-Oct-11 (No. 217-01401) 29-Mar-11 (No. 217-01308) 29-Mar-11 (No. 217-01371) 29-Apr-11 (No. 253-3205, Apr-11)	Oct-12 Oct-12 Apr-12 Apr-12 Apr-12
Power meter EPM-440A Power sensor HP 8461A Reference 20-d9 Attenuator Type-N mismatch combination Reference Probe ESSOV3 QAE4 Secondary Standards	0887480704 US37292785 SN: 5086 (I/Og) SN: 5047.2 / 06827 SN: 3205 SN: 601	05-Oct-11 (No. 217-01467) 05-Oct-11 (No. 217-01467) 29-Mar-11 (No. 217-01360) 29-Mar-11 (No. 217-01371) 29-Apr-11 (No. 653-3265, Apr11) 04-Jul-11 (No. DAS4-601_Jul-11)	Oct-12 Oct-12 Apr-12 Apr-12 Apr-12 Apr-12
Power meter EPM-44DA Power sensor HIP 8481A. Reference 20-dB Attenuator Type-N mismatch combination Reference Probe ESSOV3 2AE4 Secondary Standards Power sensor HIP 8481A.	G857460704 US37292765 SAL 5066 (20g) SAL 5066 (20g) SAL 3206 SAL 3206 SAL 601	05-Oct-11 (No. 217-01401) 05-Oct-11 (No. 217-01401) 29-Mar-11 (No. 217-01000) 29-Mar-11 (No. 217-01371) 29-Apr-11 (No. ESS-3016, Apr-11) 04-Aur-11 (No. EASS-401_Jul-11) Check Date (in house)	Oct-12 Oct-12 Apr-12 Apr-12 Apr-12 A#-12 Scheduled Check
Power matter EPM-440A Power sensor HIP 8461A. Reference 20-db Attenuator Type-N mismatch combination Reference Probe ESSOV3 DAE4 Secondary Standards Power sensor HIP 8461A. RF generator RAS SMT-06	G857460704 US37292765 SAL 5086 (20g) SAL 5066 (20g) SAL 3206 SAL 3206 SAL 6011	05-Oct-11 (No. 217-01401) 05-Oct-11 (No. 217-01401) 29-Mar-11 (No. 217-01300) 29-Mar-11 (No. 217-01371) 29-Apr-11 (No. ESS-3205, Apr-11) 06-Jul-11 (No. DAE-401_Jul-11) Check Date (in house check Oct-11)	Oct-12 Oct-12 Apr-12 Apr-12 Apr-12 AB-12 Scheduled Check In house check: Oct-13
Primary Standards Power meter EPM-445A Power sensor HP 8461A Reference 1958 Attenuator Type-Ni mismatch combination Reference Probe ES30V3 0A64 Secondary Standards Power sensor HP 8461A RF generator R&S SMT-06 Network Analyser HP 8753E	G897490704 US37292795 SAL 5086 (20g) SAL 5087 2 / 06327 SAL 5205 SAL 601 ID # MY 81090317 100005	05-Oct-11 (No. 217-01401) 05-Oct-11 (No. 217-01401) 29-Mar-11 (No. 217-0100) 29-Mar-11 (No. 217-0107) 29-Apr-11 (No. 053-0005, April 1) 06-Jul-11 (No. DAE-6401_Jul-11) Check Date (in house) 18-Oct-02 (in house check Oct-11) 06-Aug-09 (in house check Oct-11)	Oct-12 Oct-12 Apr-12 Apr-12 Apr-12 Abl-12 Scheduled Check In house check: Oct-13 In house check: Oct-13
Power meter EPM-440A Power sensor HP 8461A. Reference 20-55 Attenuator Type-1 internation combination Reference Probe ES30V3 GA64 Secondary Standards Power sensor HP 8461A. RF generator R&S SMT-06 Network Analyses HP 87536	G857480704 US37292785 SN: S086 G10g) SN: S047.2 / 06527 SN: S006 SN: 601 ID # MY414000317 100005 US373800585 S4206	05-Oct-11 (No. 217-01467) 05-Oct-11 (No. 217-01467) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01369) 29-Apr-11 (No. 653-0305, Apr11) 04-Jul-11 (No. DAE4-601_Jul-11) Check Gate (in house) 18-Oct-02 (in house check Oct-11) 04-Aug-99 (in house check Oct-11) 18-Oct-01 (in house check Oct-11)	Oct-12 Oct-12 Apr-12 Apr-12 Apr-12 Abl-12 Scheduled Check In house check: Oct-13 In house check: Oct-13
Power matter EPM-44EA Power sensor HIP 8481A Reference 20-dB Attenuator Type-N mismatch combination Reference Probe ESSOV3 DAE4 Secondary Standards Power sensor HIP 8481A RIF generator RAS SMT-05 Network Analyser HIP 8753E Galibrated by:	G857460704 US37292785 SA: 5086 G9g) SA: 5047.2 / 06327 SA: 3205 SA: 601 IO # MY414003917 100005 US37360586 S4206	05-Oct-11 (No. 217-01467) 05-Oct-11 (No. 217-01467) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01369) 29-Apr-11 (No. ESS-0306, Apr11) 04-Jul-11 (No. DAE4-601_Jul-11) Check Date (in house) 18-Oct-02 (in house check Oct-11) 18-Oct-01 (in house check Oct-11) 18-Oct-01 (in house check Oct-11)	Oct-12 Oct-12 Apr-12 Apr-12 Apr-12 Jal-12 Scheduled Check In house check: Oct-13 In house check: Oct-13
Power mater EPM-44DA Power sensor HP 8481A. Reference 20-89 Attenuator Type-N mismatch combination Reference Probe ESSOV3 GAE4 Secondary Standards Power sensor HE 8481A. RF generator R&S SMT-06	G857460704 US37292785 SAL 5086 (20g) SAL 5086 (20g) SAL 5005 SAL 601 ID # MY41002917 100005 US37300585 S4206 Name	05-Oct-11 (No. 217-01467) 05-Oct-11 (No. 217-01467) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01369) 29-Apr-11 (No. ESS-0306, Apr11) 04-Jul-11 (No. DAE4-601_Jul-11) Check Date (in house) 18-Oct-02 (in house check Oct-11) 18-Oct-01 (in house check Oct-11) 18-Oct-01 (in house check Oct-11)	Oct-12 Oct-12 Apr-12 Apr-12 Apr-12 Jal-12 Scheduled Check In house check: Oct-13 In house check: Oct-13

Certificate No: D2450V2-747\_Nov11

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Author Data
Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No **RTS-6026-1303-02** 

FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

Calibration Laboratory of

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





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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:

- 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
- EC 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: D2450V2-747\_Nov11

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Author Data **Andrew Becker**  Dates of Test Nov 22, 2012 – Feb 28, 2013 Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

# Measurement Conditions

DASY Version	DASYS	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 n 1 MHz	

# **Head TSL parameters**

	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 a 6 %
Head TSI, 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	13.6 mW / g
SAR for nominal Head TSL parameters	normalized to IW	54.1 mW/g a 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.39 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	25.3 mW/g ± 16.5 % (k=2)



# Appendix D for the BlackBerry® Smartphone Model RFP121LW SAR Report

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Author Data
Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

RTS-6026-1303-02 L6ARF

L6ARFL110LW L6ARFP120LW

FCC ID:

2503A-RFL110LW 2503A-RFP120LW

# Appendix

# Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.5 \O + 1.3 \O
Return Loss	- 31.2 dB

# General Antenna Parameters and Design

Electrical Delay (one direction)	1.161 ms

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 cosxial 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

Certificate No: D2450V2:747\_Nov11

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# Appendix D for the BlackBerry® Smartphone Model RFP121LW SAR Report

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Author Data
Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No **RTS-6026-1303-02** 

L6ARFL110LW L6ARFP120LW

FCC ID:

2503A-RFL110LW 2503A-RFP120LW

### 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)

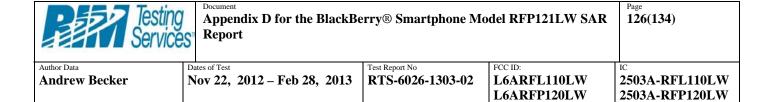
# DASY52 Configuration:

- 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)

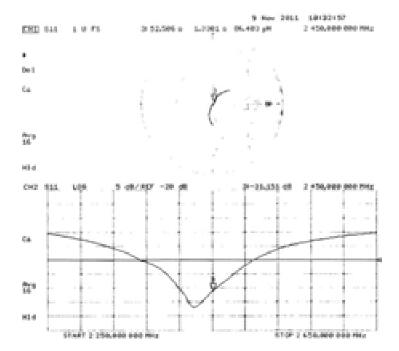
# Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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





# Impedance Measurement Plot for Head TSL



Certificate No: D2450V2-747\_Nov11

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# Appendix D for the BlackBerry® Smartphone Model RFP121LW SAR Report

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Author Data
Andrew Becker

Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No **RTS-6026-1303-02** 

L6ARFL110LW

FCC ID:

L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

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





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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

PITS (RIM Testing Services)

Contribute No: DSGHzV2-1033\_Nov11

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		dure for dipole validation kits bet	
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	States . * ** Parketon	man " " Total and " Philips " " Albada	100
alibration date:	November 15, 20	Market and the second	September 1997
		onal standards, which realize the physical un obshilly are given on the following pages an	
he measurements and the unce	raintes with controllings p	country are given on the following pages an	d are part of the certificate.
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al casonations have been conduc	hed in the closed aborator	A pacifik, eurocomment semberature (55 x 3), c	C and humsdry 4 70%.
Calibration Equipment used (M&)	E official for calibration)		
Name Standards	line	Call Date (Certificate No.)	Subsection Collegeion
	ID #	Cali Date (Certificate No.)	Scheduled Calibration
Ower meter EPM-442A	G837480704	05-Oct-11 (No. 217-01451)	On-12
Ower meter EPM-642A Ower sensor HP 8481A	G837480704 US37290783	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451)	On 15
Yower meter EPM-442A Yower sensor HP 8481A Neference 20 dB Attenuator	G837480704 US37292783 SN: 5086 (20g)	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451) 29-Mar-11 (No. 217-01568)	Oct-12 Oct-12 Apr-12
Yower meter EPM-442A Yower sensor HP 8481A Reference 20 dB Attenuator (yoe N mismatch combination	G837480704 U537291783 SIN 5086 (20g) SIN 50K7.2 / 06327	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451) 29-Mar-11 (No. 217-0136) 29-Mar-11 (No. 217-01371)	Och 12 Och 12 Apr 12 Apr 12
Youer mater EPM-442A Youer sensor HP 8481A Antonence 20 dB Attenuator ype-N mismatch combination feference Probe EXXXV4	G837480704 U537291783 SIN 5086 (20g) SIN 5047.2 / 06327 SIN 3003	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451) 29-Mar-11 (No. 217-0158) 29-Mar-11 (No. 217-01371) 04-Mar-11 (No. EXX-3500_Mar-11)	Oct-12 Oct-12 Apr-12 Apr-12 Mar-12
Youer mater EPM-442A Youer sensor HP 8481A Antonence 20 dB Attenuator ype-N mismatch combination feference Probe EXXXV4	G837480704 U537291783 SIN 5086 (20g) SIN 50K7.2 / 06327	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451) 29-Mar-11 (No. 217-0136) 29-Mar-11 (No. 217-01371)	Och 12 Och 12 Apr 12 Apr 12
Youer meter EPM-642A Youer sensor HP 6481A Millerance 20 dB Attenuator type N mismatch combination feference Probe EX3DV4 ME4 Jecondary Standards	G837480704 U537290783 SRI 5086 (20g) SRI 5047.2 / 04027 SRI 3603 SRI 601	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451) 29-Mar-11 (No. 217-0158) 29-Mar-11 (No. 217-01371) 04-Mar-11 (No. EXX-3500_Mar-11) 04-Mar-11 (No. EXX-3500_Mar-11) Obe(A. Cate (In house)	Oct-12 Oct-12 Apr-12 Apr-12 Mar-12 Jul-12 Scheduled Check
Power meter EPM-642A, Power sensor HP 8481A Neference 20 dB Attenuator Type N mismatch combination Neference Probe EXSDV4 Mills Jecondary Standards Tower sensor HP 8481A	G837480704 U537292783 SRL 5086 (20g) SRL 5087.2 / 08327 SRL 5083 SRL 601 ID # MY41092517	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451) 29-Mar-11 (No. 217-0158) 29-Mar-11 (No. 217-01371) 04-Mar-11 (No. EXG-3500_Mar-11) 04-Jul-11 (No. EXG-4601_Jul-11) Oteck Cate (in house)	Oct-12 Oct-12 Apr-12 Apr-12 Mar-12 Jul-12 Scheduled Check In house check: Oct-13
ower meter EPM-142A Ower sensor HP 8481A Merence 20 dB Attenuator ype N mismatch combination leference Probe EXSDV4 MEx Mecondary Standards Ower sensor HP 8481A If generator R&S SAIT-06	G807480704 U607290783 SRI 5066 (20g) SRI 5047.2 / 06007 SRI 3600 SRI 601 ID # MY41090517 100005	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451) 29-Mar-11 (No. 217-0158) 29-Mar-11 (No. 217-01571) 04-Mar-11 (No. EXX-0500_Mar-11) 04-Jul-11 (No. EXX-0500_Mar-11) Ofecis Cate (in house) 18-Oct-02 (in house check Oct-11) 04-Jul-10 (no. house check Oct-11)	Och 12 Och 12 Agn 12 Agn 12 Agn 12 Jul 12 Scheduled Check In house check: Och 13 In house check: Och 13
Power meter EPM-642A. Power sensor HIP 8481A Reference 20 dB Attenuator Type-N mismatch compression reference Probe EXSDV4 SAE4 Secondary Standards Power sensor HIP 8481A RF generator R&S SAIT-06	G837480704 U637292783 SRL 5086 (20g) SRL 5087.2 / 08327 SRL 9503 SRL 601 ID # MY41092517	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451) 29-Mar-11 (No. 217-0158) 29-Mar-11 (No. 217-01371) 04-Mar-11 (No. EXG-3500_Mar-11) 04-Jul-11 (No. EXG-4601_Jul-11) Oteck Cate (in house)	Oct-12 Oct-12 Apr-12 Apr-12 Mar-12 Jul-12 Scheduled Check In house check: Oct-13
Primary Standards Power motor EPM-442A. Power sensor 19* 8481A. Reference 20 dB Attenuator Type N mismatch combination Reference Probe EXSOV4 DAE4 Secondary Standards Power sensor HP 8481A. RF generator R&S SAIT OB Network Analyzer HP 87536	G807480704 U607290783 SRI 5066 (20g) SRI 5047.2 / 06007 SRI 3600 SRI 601 ID # MY41090517 100005	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451) 29-Mar-11 (No. 217-0158) 29-Mar-11 (No. 217-01571) 04-Mar-11 (No. EXX-0500_Mar-11) 04-Jul-11 (No. EXX-0500_Mar-11) Ofecis Cate (in house) 18-Oct-02 (in house check Oct-11) 04-Jul-10 (no. house check Oct-11)	Och 12 Och 12 Agn 12 Agn 12 Agn 12 Jul 12 Scheduled Check In house check: Och 13 In house check: Och 13
Power meter EPM-642A. Power sensor HP 8481A. Reference 20 dB Attenuator (ype-N mismatch combination felrence Probe EX3DV4 AAEA Jecondary Standards Power sensor HP 8481A If generator R&S SAIT-06 Setwork Analyzer HP 87536	G837480704 U537292783 SRL 5086 (20g) SRL 5087.2 / 06327 SRL 5033 SRL 601 ID # MY41092517 100005 U537300585 54206	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451) 29-Mar-11 (No. 217-0158) 29-Mar-11 (No. 217-0157) 04-Mar-11 (No. EX3-0500_Mar-11) 04-Jul-11 (No. EX5-0500_Mar-11) Of-Sul-11 (No. EX5-0500_Mar-11) Of-Sul-11 (No. EX5-0500_Mar-11) 04-Jul-11 (No. EX5-0500_Mar-11) 18-Oct-02 (in house check Oct-11) 18-Oct-02 (in house check Oct-11) 18-Oct-01 (in house check Oct-11)	Och 12 Och 12 Agn 12 Agn 12 Agn 12 Jul 12 Scheduled Check In house check: Och 13 In house check: Och 13
Power meter EPM-642A. Power sensor HP 8481A. Reference 20 dB Attenuator (ype-N mismatch combination felrence Probe EX3DV4 AAEA Jecondary Standards Power sensor HP 8481A If generator R&S SAIT-06 Setwork Analyzer HP 87536	G837480704 US37290783 SN: 5066 (20g) SN: 5067 2 / 06327 SN: 3008 SN: 601 ID # MY41092317 10005 US37300585 S4206	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451) 29-Mar-11 (No. 217-0158) 29-Mar-11 (No. 217-0157) 04-Mar-11 (No. EX3-0500_Mar-11) 04-Jul-11 (No. EX5-0500_Mar-11) Of-Sul-11 (No. EX5-0500_Mar-11) Of-Sul-11 (No. EX5-0500_Mar-11) 04-Jul-11 (No. EX5-0500_Mar-11) 18-Oct-02 (in house check Oct-11) 18-Oct-02 (in house check Oct-11) 18-Oct-01 (in house check Oct-11)	Och 12 Och 12 Agn 12 Agn 12 Agn 12 Jul 12 Scheduled Check In house check: Och 13 In house check: Och 13
Power moter EPM-642A. Power sensor HIP 8481A. Reference 20 dB Attenuator Typen I mismatch combination Reference Probe EXSDV4 DAS4 Secondary Standards Power sensor HIP 8481A. RF generator R&S SAIT-OS	G837490704 U537290793 SRI 5060 (20g) SRI 5067 2 / 06027 SRI 3608 SRI 601 ID # MY41090317 100005 U537300565 54206	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01371) 04-Mar-11 (No. EX3-3500, Mar-11) 04-Au-11 (No. EX3-3500, Mar-11) 18-Oct-02 (In house check Oct-11) 18-Oct-02 (In house check Oct-11) Function Liablinary Technicus	Och 12 Och 12 Agn 12 Agn 12 Agn 12 Agn 12 Jul 12 Schookind Check In house check Och 13 In house check Och 12 Signature OF Will Signature
Power meter EPM-642A. Power sensor HP 8481A. Reference 20 dB Attenuator Type N mismatch combination Reference Probe EXSDV4 SAE4 Secondary Standards Power sensor HP 8481A. RF generator R&S SAET-OE setwork Analyzer HP 87536	G837490704 U537293783 SN: 5045 (20g) SN: 5047 2 / 06327 SN: 501 ID # MY41090317 100005 U537390685 S4206	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01371) 04-Mar-11 (No. EX3-3500, Mar-11) 04-Au-11 (No. EX3-3500, Mar-11) 18-Oct-02 (In house check Oct-11) 18-Oct-02 (In house check Oct-11) Function Liablinary Technicus	Och 12 Och 12 Agn 12 Agn 12 Agn 12 Agn 12 Jul 12 Schookind Check In house check Och 13 In house check Och 12 Signature OF Will Signature

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Author Data Andrew Becker Dates of Test

Nov 22, 2012 – Feb 28, 2013

Test Report No

FCC ID: RTS-6026-1303-02 L6ARFL110LW L6ARFP120LW

2503A-RFL110LW 2503A-RFP120LW

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





8 Service sulese d'étalonnage C Servizio svizzeno di teratura 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 not applicable or not measured N/A

# 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
- Federal Communications Commission Office of Engineering & Technology (FCC OET). "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fleids; 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
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

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**Andrew Becker** 

Dates of Test Nov 22, 2012 – Feb 28, 2013

Test Report No RTS-6026-1303-02 FCC ID: L6ARFL110LW L6ARFP120LW

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#### Measurement Conditions

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

DASY Version	DASYS	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Plat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5200 MHz a 1 MHz 5500 MHz a 1 MHz 5800 MHz a 1 MHz	

### Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

**	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	36.0	4.66 mholm
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.6 ± 6 %	4.46 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

#### SAR result with Head TSL at \$200 MHz

SAR averaged over 1 cm <sup>2</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.16 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	80.8 mW/g a 17.0 % (k=2)

SAR averaged over 10 cm² (10 g) of Head TSL.	condition	
SAR measured	100 mW input power	2.33 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	23.0 mW/g ± 16.5 % (k=2)

# Head TSL parameters at 5500 MHz

The following parameters and calculations were applied

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.6	4.96 mholm
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.2 ± 6 %	4.75 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

# SAR result with Head TSL at 5500 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.82 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	87.3 mW / g a 17.0 % (k=2)

SAR averaged over 10 cm² (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.50 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	24.7 mW / g a 16.5 % (k=2)

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**Andrew Becker** 

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# Head TSL parameters at 5800 MHz

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.3	5.27 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	33.7 ± 6 %	5.03 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

# SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.03 mW / g
SAR for nominal Head TSL parameters	normalized to TW	79.4 mW / g = 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.28 mW / g
SAR for nominal Head TSL parameters	normalized to TW	22.5 mW/g a 16.5 % (k=2)



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# Appendix

# Antenna Parameters with Head TSL at 5200 MHz

impedance, transformed to feed point	51.1 Ω - 8.7 jΩ
Return Loss	-21.2 (8

# Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	52.3 Ω - 2.7 jΩ
Return Loss	- 29.2 dB

#### Antenna Parameters with Head TSL at 5800 MHz

impedance, transformed to feed point	56.7 Ω - 4.3 jΩ
Return Loss	- 22.6 dB

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1.202 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	July 09, 2004

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### DASY5 Validation Report for Head TSL

Date: 15.11.2011

Test Laboratory: SPEAG, Zurich, Switzerland

#### DUT; Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1033

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz Medium parameters used: f = 5200 MHz;  $\sigma = 4.46 \text{ mho/m}$ ;  $e_r = 34.6$ ;  $\rho = 1000 \text{ kg/m}^3$ . Medium parameters used: f = 5500 MHz;  $\sigma = 4.75 \text{ mho/m}$ ;  $\epsilon_{\rho} = 34.2$ ;  $\rho = 1000 \text{ kg/m}^3$ . Medium parameters used: f = 5800 MHz;  $\sigma = 5.03 \text{ mho/m}; \epsilon_r = 33.7; \rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

#### DASY52 Configuration:

- Probe: EX3DV4 SN3503; ConvF(5.41, 5.41), ConvF(4.91, 4.91, 4.91), ConvF(4.81, 4.81) 4.81): Calibrated: 04.03.2011
- Sensoe-Surface: 1.4mm (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=100mW, dist=10mm, f=5200 MHz/Zoom Scan,

dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm Reference Value = 65.595 V/m; Power Drift = 0.07 dB Peak SAR (extrapolated) = 30.134 W/kg

SAR(1 g) = 8.16 mW/g; SAR(10 g) = 2.33 mW/gMaximum value of SAR (measured) = 18.725 mW/g

# Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dv=4mm, dz=1.4mm

Reference Value = 66.819 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 35.056 W/kg

SAR(1 g) = 8.82 mW/g; SAR(10 g) = 2.5 mW/g

Maximum value of SAR (measured) = 21.019 mW/g

# Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan,

dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 62.220 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 33.743 W/kg

SAR(1 g) = 8.03 mW/g; SAR(10 g) = 2.28 mW/gMaximum value of SAR (measured) = 19.463 mW/g

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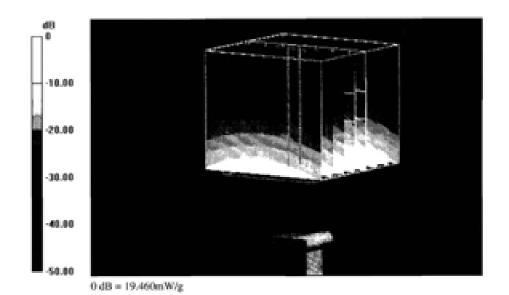
Dates of Test

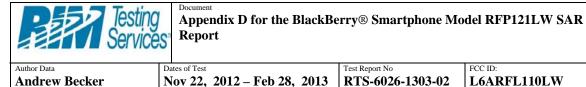
Nov 22, 2012 – Feb 28, 2013

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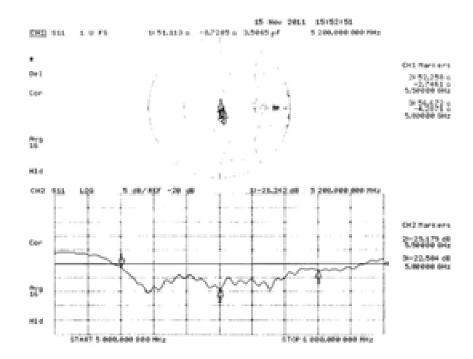
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# Impedance Measurement Plot for Head TSL



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