*** BlackBerry	/	Appendix C for the (STV100-1) SAR R	BlackBerry® Smartpho eport	ne Model RHK211L	W	Page <b>1(91)</b>
Author Data	Dates of Te	st	Test Report No	FCC ID:	IC	
Andrew Becker	July 1	5 – Sept 21, 2015	RTS-6066-1509-15	L6ARHK210LW	2503A-R	RHK210LW

### APPENDIX C: PROBE & DIPOLE CALIBRATION DATA

\*\*\* BlackBerry

Document

Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

Page **2(91)** 

Author Data
Andrew Becker

Dates of Test **July 15 – Sept 21, 2015** 

Test Report No **RTS-6066-1509-15** 

FCC ID: L6ARHK210LW

2503A-RHK210LW

### **Probe 1643**

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





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

Accreditation No.: SCS 0108

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

Blackberry Waterloo

Certificate No: ET3-1643 Mar15

CALIBRATION CERTIFICATE

Deject ET3DV6 - SN:1643

Calibration procedure(s) QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v6
Calibration procedure for dosimetric E-field probes

Calibration date: March 13, 2015

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID.	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	03-Apr-14 (No. 217-01911)	Apr-15
Power sensor E4412A	MY41498097	03-Apr-14 (No. 217-01911)	Apr-15
Reference 3 dB Attenuator	SN: S5054 (3c)	03-Apr-14 (No. 217-01915)	Apr-15
Reference 20 dB Attenuator	SN: S5277 (20x)	03-Apr-14 (No. 217-01919)	Apr-15
Reference 30 dB Attenuator	SN: S5129 (30b)	03-Apr-14 (No. 217-01920)	Apr-15
Reference Probe ES3DV2	SN: 3013	30-Dec-14 (No. ES3-3013_Dec14)	Dec-15
DAE4	SN: 660	14-Jan-15 (No. DAE4-660 Jan15)	Jan-16
Secondary Standards	10	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check; Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

Calibrated by:

Israer Elnanting

Approved by:

Katja Pokovic

Technical Manager

Issued: March 13, 2015

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

Certificate No: ET3-1643\_Mar15

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### \*\*\* BlackBerry

Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

3(91)

Author Data

Andrew Becker

Dates of Test

July 15 – Sept 21, 2015

Test Report No RTS-6066-1509-15 FCC ID:

L6ARHK210LW

2503A-RHK210LW

Calbration Laboratory of Schnid & Partner Eligineering AG Zeu 91 ausstrasse 43, 8004 Zurich, Switzerland





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

Accreditation No.: SCS 0108

Approvided by the Swiss Accreditation Service (SAS)

The Sviss Accreditation Service is one of the signatures to the EA. Muffilteral Agreement for the recognition of calibration certificates

Glossary:

NORUX, y.z CONVE DCP

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

crest factor (1/duty\_cycle) of the RF signal modulation dependent linearization parameters A, B.C.D

Potatization m o rotation around probe axis

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

i.e., 9 = 0 is normal to probe axis

information used in DASY system to align probe sensor X to the robot coordinate system Conhector Angle

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

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement
- Techniques', June 2013 IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

### Methods Applied and Interpretation of Parameters:

- NORMx,y,z: Assessed for E-field polarization 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'-field uncertainty inside TSL (see below ConvF).
- 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,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.
- ConvF and Boundary Effect Parameters: Assessed in flat phanton: 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 (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,v.z.\* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100
- Spherical isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the Information gained by determining the NORMx (no uncertainty required),

Certificate No; ET3-1643\_Mar16

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Author Data
Andrew Becker

Dates of Test **July 15 – Sept 21, 2015** 

Test Report No **RTS-6066-1509-15** 

FCC ID: 1. L6ARHK210LW 2.

2503A-RHK210LW

# Probe ET3DV6

SN:1643

Manufactured: Calibrated:

November 7, 2001 March 13, 2015

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

(Note: non-compatible with DAS12 system)

Certificate No: ET3-1643\_Mar15

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Author Data **Andrew Becker**  Dates of Test

**July 15 – Sept 21, 2015** 

Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

ETૐD/6-SN:1643

March 13, 2015

### DASY/EASY - Parameters of Probe: ET3DV6 - SN:1643

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
NQ <sup>m</sup> (μV/(V/m) <sup>2</sup> ) <sup>A</sup>	1.76	1.95	1.75	± 10.1 %
DCP (mV)B	101.5	100.5	102.4	

Modulation Calibration Parameters

UIP	Communication System Name		A dB	B dB√μV	С	D dB	VR mV	Unc <sup>E</sup> (k=2)
0	CW	X	0.0	0.0	1.0	0.00	261.1	±3.8 %
		Y	0.0	0.0	1.0		237.4	
		Z	0.0	0.0	1.0		267.0	

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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The uncertainties of NormX,Y,Z do not affect the E2-field uncertainty inside TSL (see Pages 5 and 6).

Numerical linearization parameter; uncertainty not required.

Numerical linearization 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.



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Author Data **Andrew Becker**  Dates of Test **July 15 – Sept 21, 2015**  Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

ET/30V6- SN:1643

March 13, 2015

### DASY/EASY - Parameters of Probe: ET3DV6 - SN:1643

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

f (MHz) <sup>C</sup>	Relative Permittivity F	Conductivity (S/m) F	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unct. (k=2)
750	41.9	0.89	6.69	6.69	6.69	0.32	3.00	± 12.0 %
900	41.5	0.97	6.09	6.09	6.09	0.33	3.00	± 12.0 %
1810	40.0	1.40	5.18	5.18	5.18	0.80	2.02	± 12.0 %
1950	40.0	1.40	4.93	4.93	4.93	0.80	2.06	± 12.0 %
2450	39.2	1.80	4.58	4.58	4.58	0.80	1.62	± 12.0 %

<sup>&</sup>lt;sup>C</sup> Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity or an be extended to ± 110 MHz.

\*At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

\*Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

Certificate No: ET3-1643\_Mar15



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Author Data **Andrew Becker**  Dates of Test

**July 15 – Sept 21, 2015** 

Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

ET 20V6- SN:1643

March 13, 2015

### DASY/EASY - Parameters of Probe: ET3DV6 - SN:1643

### Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unct. (k=2)
750	55.5	0.96	6.29	6.29	6.29	0.36	2.49	± 12.0 %
900	55.0	1.05	6.00	6.00	6.00	0.33	3.00	± 12.0 %
1810	53.3	1.52	4.50	4.50	4.50	0.80	2.60	± 12.0 %
1950	53.3	1.52	4.56	4.56	4.56	0.80	2.23	± 12.0 %
2450	52.7	1.95	3.93	3.93	3.93	0.70	1.60	± 12.0 %

<sup>&</sup>lt;sup>6</sup> Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency

Certificate No: ET3-1643\_Mar15

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salidity can be extended to ± 110 MHz.

At frequencies below 3 GHz, the validity of tissue parameters (s and o) can be relaxed to ± 10% if liquid compensation formula is applied to

At requencies below 3 GHz, the valuity or issue parameters (s and o) can be relaxed to ± 10% if injude compensation formula is applied to the account of the ConvF uncertainty for indicated target tissue parameters.

Apha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.



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Author Data
Andrew Becker

Dates of Test **July 15 – Sept 21, 2015** 

Test Report No **RTS-6066-1509-15** 

FCC ID: L6ARHK210LW

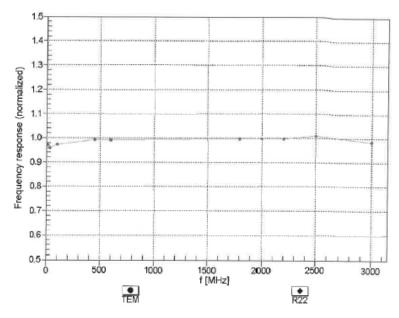
2503A-RHK210LW

ET 30V6- SN:1643

March 13, 2015

### 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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Author Data
Andrew Becker

Dates of Test **July 15 – Sept 21, 2015** 

Test Report No **RTS-6066-1509-15** 

FCC ID: L6ARHK210LW

2503A-RHK210LW

ET 30V6- SN:1643

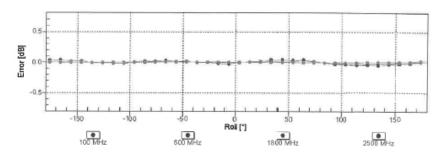
Tot

March 13, 2015

### Receiving Pattern ( $\phi$ ), $\vartheta = 0^{\circ}$

f=600 MHz,TEM





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

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Appendix C for the BlackBerry® Smartphone Model RHK211LW

(STV100-1) SAR Report

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Author Data
Andrew Becker

Dates of Test

July 15 – Sept 21, 2015

Test Report No **RTS-6066-1509-15** 

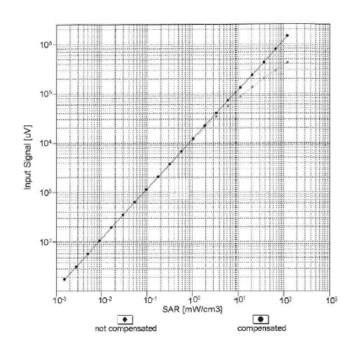
FCC ID: L6ARHK210LW

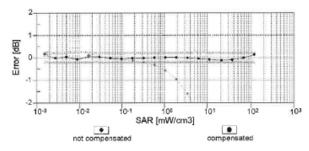
2503A-RHK210LW

ET/30/v6~ SN:1643

March 13, 2015

### Dynamic Range f(SAR<sub>head</sub>) (TEM cell , f<sub>eval</sub>= 1900 MHz)





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

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Author Data
Andrew Becker

Dates of Test **July 15 – Sept 21, 2015** 

Test Report No **RTS-6066-1509-15** 

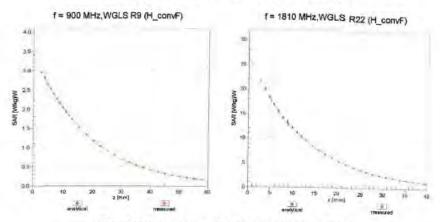
FCC ID: L6ARHK210LW

2503A-RHK210LW

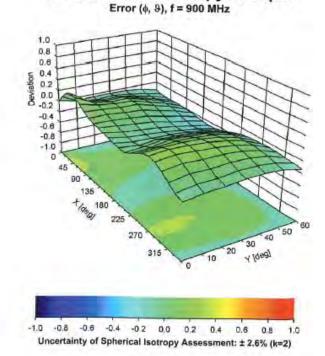


March 13, 2015

### Conversion Factor Assessment



### Deviation from Isotropy in Liquid



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# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data
Andrew Becker

Dates of Test

July 15 – Sept 21, 2015

Test Report No **RTS-6066-1509-15** 

FCC ID: L6ARHK210LW

2503A-RHK210LW

ET/30V6- SN:1643

March 13, 2015

### DASY/EASY - Parameters of Probe: ET3DV6 - SN:1643

### Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	3.8
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	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

Certificate No: ET3-1643\_Mar15

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*: BlackBerry	,	Appendix C for the B (STV100-1) SAR Rep	lackBerry® Smartphone ort	e Model RHK211LV	W	Page 13(91)
Author Data	Dates of Te	st	Test Report No	FCC ID:	IC	
Andrew Becker	July 1	5 – Sept 21, 2015	RTS-6066-1509-15	L6ARHK210LW	2503A-R	HK210LW

# **Probe 3225**

## \*\*\* BlackBerry

Document

# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data
Andrew Becker

Dates of Test

**July 15 – Sept 21, 2015** 

Test Report No **RTS-6066-1509-15** 

L6ARHK210LW

FCC ID:

2503A-RHK210LW

Ca libration Laboratory of Sc firid & Partner En§ineering AG Zeu €hasstrasse 43,8004 Zurich, Switzerland





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

S Swiss Calibration Service
Accreditation No.: SCS 0108

Accoredity by the Swiss Accreditation Service (SAS)

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Blackberry Waterloo

Certificate No: ES3-3225\_Feb15

### CALIBRATION CERTIFICATE

Object

ES3DV3 - SN:3225

Callibration procedure(s)

QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v6 Calibration procedure for dosimetric E-field probes

Cali bration date:

February 25, 2015

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).

The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	03-Apr-14 (No. 217-01911)	Apr-15
Powersensor E4412A	MY41498087	03-Apr-14 (No. 217-01911)	Apr-15
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Reference 20 dB Attenuator	SN; S5277 (20x)	03-Apr-14 (No. 217-01919)	Apr-15
Reference 30 dB Attenuator	SN: S5129 (30b)	03-Apr-14 (No. 217-01920)	Apr-15
Reference Probe ES3DV2	SN: 3013	30-Dec-14 (No. ES3-3013_Dec14)	Dec-15
DAE4	SN: 660	14-Jan-15 (No. DAE4-660_Jan15)	Jan-16
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8848C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

Calibrated by:

Name
Function
Laboratory Technician

Approved by:

Katja Pokovic

Technical Manager

Issued: February 25, 2015

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

Certificate No: ES3-3225 Feb15

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### \*\*\* BlackBerry

### Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data

Andrew Becker

Dates of Test

July 15 – Sept 21, 2015

Test Report No

RTS-6066-1509-15

FCC ID: L6ARHK210LW

2503A-RHK210LW

Ca <sup>lit</sup>ration Laboratory of Schhid & Partner Figineering AG Zeu Shusstrasse 43, 8004 Zurich, Switzerland





Schweizerischer Kalibrierdienst s Service suisse d'étalonnage С Servizio svizzero di taratura Swiss Calibration Service

Accreditation No.: SCS 0108

Acc F<sup>eq</sup>ted by the Swiss Accreditation Service (SAS)

The Shiss Accreditation Service is one of the signatories to the EA Mulf tiliteral Agreement for the recognition of calibration certificates

#### GIP%sary:

NO RIIX, y, z CorTVR

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

DCP CF Ã, B, C, D

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

Polarization o

φ rotation around probe axis

Polarization 8

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

i.e., 9 = 0 is normal to probe axis

Cornector Angle

information used in DASY system to align probe sensor X to the robot coordinate system

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

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

### Methods Applied and Interpretation of Parameters:

- NORMx,y,z: Assessed for E-field polarization 9 = 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 E2-field uncertainty inside TSL (see below ConvF).
- NORM(f)x,y,z = NORMx,y,z \* frequency\_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCPx,y,z: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal
- 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
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z \* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy); in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required
- Connector Angle: The angle is assessed using the information gained by determining the NORMx (no uncertainty required).

Certificate No: ES3-3225 Feb15

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Author Data
Andrew Becker

Dates of Test **July 15 – Sept 21, 2015** 

Test Report No **RTS-6066-1509-15** 

FCC ID: L6ARHK210LW

2503A-RHK210LW

# Probe ES3DV3

SN:3225

Manufactured: Repaired: September 1, 2009 February 18, 2015

Calibrated:

February 25, 2015

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

Certificate No: ES3-3225\_Feb15

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Author Data **Andrew Becker**  Dates of Test

**July 15 – Sept 21, 2015** 

Test Report No RTS-6066-1509-15

FCC ID: L6ARHK210LW

2503A-RHK210LW

ES:30/3-SN:3225

February 25, 2015

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

#### B# Sc Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
NΦ <sup>(h)</sup> (μV/(V/m) <sup>2</sup> ) <sup>A</sup>	1.07	1.00	1.12	± 10.1 %
DCF (mV)8	107.0	106.0	105.6	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	С	D dB	VR mV	Unc <sup>±</sup> (k=2)
0	CW	X	0.0	0.0	1.0	0.00	196.9	±3.3 %
		Y	0.0	0.0	1.0		189.2	
		Z	0.0	0.0	1.0		195.9	

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\_Feb15

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

<sup>5</sup> Numerical linearization parameter; uncertainty not required.

<sup>6</sup> Uncortainty is determined using the max, deviation from linear response applying rectangular distribution and is expressed for the square of the field value.



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Author Data **Andrew Becker**  Dates of Test

**July 15 – Sept 21, 2015** 

Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

ES \$10/3- SN:3225

February 25, 2015

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

### Ca libration Parameter Determined in Head Tissue Simulating Media

f(MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha <sup>6</sup>	Depth <sup>6</sup> (mm)	Unct. (k=2)
750	41.9	0.89	6.50	6.50	6.50	0.61	1.31	± 12.0 %
900	41.5	0.97	6.22	6.22	6.22	0.30	1.84	± 12.0 %
1810	40.0	1.40	5.26	5.26	5.26	0.50	1.46	± 12.0 %
1950	40.0	1.40	5.01	5.01	5.01	0.80	1.11	± 12.0 %
2300	39.5	1.67	4.77	4.77	4.77	0.75	1.25	± 12.0 %
2450	39.2	1.80	4.60	4.60	4.60	0.57	1.49	± 12.0 %
2600	39.0	1.96	4.40	4.40	4.40	0.72	1.30	± 12.0 %

<sup>&</sup>lt;sup>6</sup> Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

F. At frequencies below 3 GHz, the validity of tissue parameters (c and d) can be relaxed to ± 10% if liquid compensation formula is applied to

Certificate No: ES3-3225\_Feb15

Page 5 of 11

At requences elected 3 GHz, the valency or issue parameters (c and or) can be resized to 2 Hz/s in rique compensation formula is applied to the assert AR values. At frequencies above 3 GHz, the validity of tissue parameters (s and or) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

ApplieDepth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip digmeter from the boundary.



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Author Data **Andrew Becker**  Dates of Test

**July 15 – Sept 21, 2015** 

Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

ES 5 D 3 SN:3225

February 25, 2015

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

#### Ca Iltration Parameter Determined in Body Tissue Simulating Media

f MHz) C	Relative Permittivity <sup>f</sup>	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha <sup>6</sup>	Depth <sup>G</sup> (mm)	Unct. (k=2)
750	55.5	0.96	6.19	6.19	6.19	0.80	1.23	± 12.0 %
900	55.0	1.05	6.07	6.07	6.07	0.53	1.41	± 12.0 %
1810	53.3	1.52	4.89	4.89	4.89	0.63	1.46	± 12.0 %
1950	53.3	1.52	4.86	4.86	4.86	0.44	1.86	± 12.0 %
2300	52.9	1.81	4.48	4.48	4.48	0.80	1.29	± 12.0 %
2450	52.7	1.95	4.34	4.34	4.34	0.72	1.14	± 12.0 %
2600	52.5	2.16	4.06	4.06	4.06	0.80	1.08	± 12.0 %

<sup>&</sup>lt;sup>6</sup> Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the CorvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 310 MHz is ± 10, 25, 40, 50 and 70 MHz for CorvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency

Certificate No: ES3-3225\_Feb15

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below 310 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

At frequencies below 3 GHz, the validity of tissue parameters (c and d) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (s and d) is restricted to ± 5%. The uncertainty is the RSS of the ContF uncertainty for indicated target tissue parameters.

AphraDepth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip digm-eter from the boundary.



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Author Data
Andrew Becker

Dates of Test **July 15 – Sept 21, 2015** 

Test Report No **RTS-6066-1509-15** 

FCC ID:

L6ARHK210LW

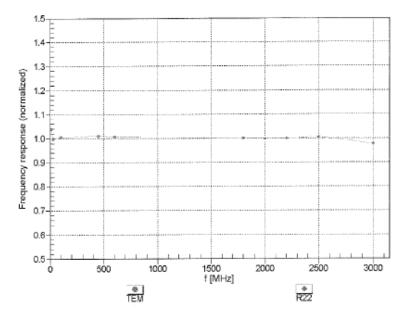
2503A-RHK210LW

ESS<sup>D</sup>3- SN:3225

February 25, 2015

### Frequency Response of E-Field

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



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

Certificate No: ES3-3225\_Feb15

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Author Data
Andrew Becker

Dates of Test **July 15 – Sept 21, 2015** 

Test Report No **RTS-6066-1509-15** 

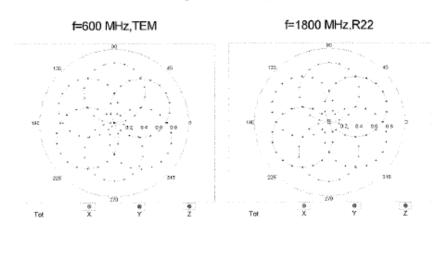
FCC ID: I. L6ARHK210LW 2

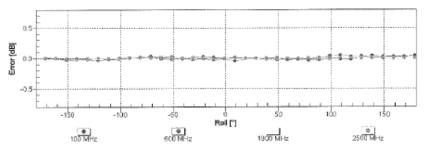
2503A-RHK210LW

ES D/3- SN:3225

February 25, 2015

### Receiving Pattern ( $\phi$ ), $\vartheta = 0^{\circ}$





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

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Appendix C for the BlackBerry® Smartphone Model RHK211LW

(STV100-1) SAR Report

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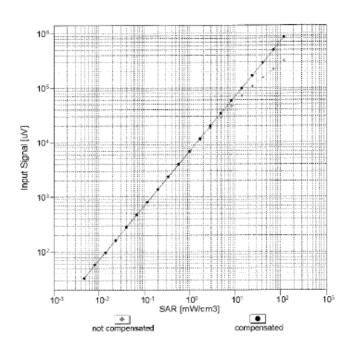
Author Data **Andrew Becker** 

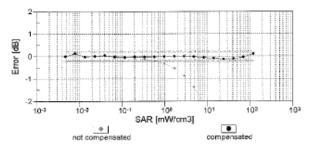
Dates of Test **July 15 – Sept 21, 2015** 

Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

### (TEM cell , feval= 1900 MHz)





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

Certificate No: ES3-3225\_Feb15

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Appendix C for the BlackBerry® Smartphone Model RHK211LW

(STV100-1) SAR Report

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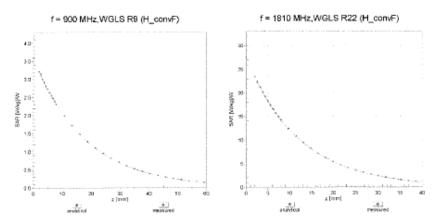
Author Data **Andrew Becker**  Dates of Test July 15 – Sept 21, 2015 Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

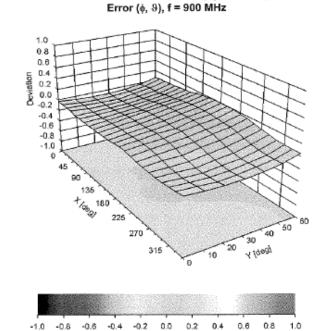
ES 20/3-SN:3225

February 25, 2015

### Conversion Factor Assessment



### Deviation from Isotropy in Liquid



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

Certificate No: ES3-3225\_Feb15

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Author Data
Andrew Becker

Dates of Test **July 15 – Sept 21, 2015** 

Test Report No **RTS-6066-1509-15** 

FCC ID: L6ARHK210LW

2503A-RHK210LW

ES学<sup>D/</sup>3- SN:3225

February 25, 2015

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

### Ot Probe Parameters

S@ <sup>∩t</sup> or Arrangement	Triangular
Conjector Angle (°)	-61.4
Medianical Surface Detection Mode	enabled
Op <sup>1k</sup> al Surface Detection Mode	disabled
Prote Overall Length	337 mm
Prote Body Diameter	10 mm
Tip length	10 mm
Tip Diameter	4 mm
Prote Tip to Sensor X Calibration Point	2 mm
Prote Tip to Sensor Y Calibration Point	2 mm
Prote Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

Certificate No: ES3-3225\_Feb15

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≅ BlackBerry		Appendix C for the B (STV100-1) SAR Rep	W	Page 25(91)		
Author Data	Dates of Te	est	Test Report No	FCC ID:	IC	
Andrew Becker	July 1	5 – Sept 21, 2015	RTS-6066-1509-15	L6ARHK210LW	2503A-R	RHK210LW

# **Probe 3592**

## **∷** BlackBerry

Document

# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data
Andrew Becker

Dates of Test

July 15 – Sept 21, 2015

Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

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





S Schweizenischer Kallbrierdienst
C Service suisse d'étalonnage
Servizio svizzero di taratura
Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)

Accreditation Service is one of the signatories to the EA

Client

Blackberry Waterloo

Certificate No: EX3-3592\_Nov14

CALIBRATION CERTIFICATE

Multilateral Agreement for the recognition of calibration certificates

Object

EX3DV4 - SN:3592

Calibration procedure(s)

QA CAL-01,v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6

Calibration procedure for dosimetric E-field probes

Calibration date:

November 10, 2014

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).

The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID:	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	03-Apr-14 (No. 217-01911)	Apr-15
Power sensor E4412A	MY41498087	03-Apr-14 (No. 217-01911)	Apr-15
Reference 3 dB Attenuator	SN: S5054 (3u)	. 03 Apr-14 (No. 217-01915)	Apr-15
Reference 20 dB Attenuator	SN: S5277 (20x)	(3-Apr-14 (No. 217-01919)	Apr-15
Reference 30 dB Attenuator	SN; S5129 (30b)	03-Apr-14 (No. 217-01920)	Apr-15
Reference Probe ESUDV2	5N: 3013	30-Dec-13 (No. ES3-3013, Dec13)	Dec-14
DAE4	SN: 660	13-Dec-13 (No. DAE4-960_Dec13)	Dec-14
Secondary Standards	(0)	Gheck Date (in house)	Schadulad Check
RI- generator HP 8648C	U83642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753F	US37390585	18-Oct-01 (in house check Oct-14)	In house check: Ost-16

Name Function Signature
Calibrated by: Leif Klyanes Labaratory Technician

Approved by: Ketja Pukovic Technical Manager

Issued: November 10, 2014

This celluration certificate shall not be reproduced except in full without written approval of the liaboratory.

Certificate No: EX3-3592\_Nov14

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# **≅** BlackBerry

Document

# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

27(91)

Author Data

Andrew Becker

Dates of Test

July 15 – Sept 21, 2015

Test Report No

RTS-6066-1509-15

FCC ID: L6ARHK210LW

2503A-RHK210LW

### Calibration Laboratory of

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





S Schweizerlscher Kalibrierdiensi
C Service suisse d'étalonnage
Servizio svizzero di taratura
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 NORMx,y,z sensitivity in free space ConvF sensitivity in TSL / NORMx,y,z DCP diode compression point

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

Polarization q 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., 8 = 0 is normal to probe axis

Connector Angle information used in DASY system to align probe sensor X to the robot coordinate system

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

- i) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1. "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)". February 2005

### Methods Applied and Interpretation of Parameters:

- NORMx,y,z: Assessed for E-field polarization 9 = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide).
   NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E<sup>2</sup>-field uncertainty inside TSL (see below ConvF).
- NORM(f)x,y,z = NORMx,y,z \* frequency response (see Frequency Response Chart). This linearization is
  implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included
  in the stated uncertainty of ConvF.
- DCPx,y,z: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- Ax,y,z; Bx,y,z; Cx,y,z; 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 clode.
- ConvF and Boundary Effect Perameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for 1 < 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 NORMx,y,z \* CornvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy): In a field of low gradients realized using a flat phantom
  exposed by a patch antenna.
- Sensor Offset. The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NORMx (no uncertainty required).

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Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data
Andrew Becker

Dates of Test

July 15 – Sept 21, 2015

Test Report No **RTS-6066-1509-15** 

FCC ID: L6ARHK210LW

2503A-RHK210LW

EX3DV4 - SN:3592

November 10, 2014

# Probe EX3DV4

SN:3592

Manufactured: Calibrated: September 18, 2006 November 10, 2014

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

Certificate No: EX3-3592 Nov14

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Author Data **Andrew Becker**  Dates of Test **July 15 – Sept 21, 2015**  Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

EX3DV4-SN:3592

November 10, 2014

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

#### **Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Nomi (µV/(V/m) <sup>2</sup> ) <sup>A</sup>	0.48	0.47	0.40	±10.1 %
DCP (mV)	95,2	98.0	98.8	-

### Modulation Calibration Parameters

מוט	Communication System Name		A dB	B dB√μV	C	dB	VR mV	Unc <sup>E</sup> (k=2)
0	CW	X	0.0	0.0	1.0	0.00	145.9	±3.3 %
	10-51	Y	0.0	0,0	1.0		156.9	
		Z	0.0	0.0	1.0		149.1	

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: EX3-3592\_Nov14

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 $<sup>^{\</sup>Lambda}$  The uncertainties of NormX, Y.Z do not affect the E $^{2}$  field uncertainty inside TSL (see Pages 5 and 6).

<sup>&</sup>lt;sup>B</sup> Numerical linearization parameter, uncertainty not required.
Euch certainty is determined using the max, deviation from linear response applying rectangular distribution and is expressed for the square of the field value.



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Author Data **Andrew Becker**  Dates of Test

July 15 – Sept 21, 2015

Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

EX3DV4-SN:3592

November 10, 2014

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

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

f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unct. (k=2)
2600	39.0	1.96	6.80	6.80	6.80	0.36	0.93	±12.0 %
5250	35.9	4.71	4.63	4.63	4.63	0.35	1.80	± 13.1 %
5600	35.5	5.07	4.20	4.20	4.20	0.40	1.80	± 13.1 %
5750	35.4	5.22	4.34	4.34	4.34	0.40	1.80	± 13.1 %

Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v1.4 and higher (see Page 2), also it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvE uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 45, 50 and 70 MHz for ConvE assessments at 30, 84, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

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validity can be extended to ± 110 MHz.

At frequencies below 3 GHz, the validity of tissue parameters (a and a) can be released to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (a and b) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncortainty for indicated target tissue parameters.

AlphaPerbh are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies ballow 3 GHz and below ± 2% for frequencies between 3-8 GHz at any distance larger than half the probe to

diameter from the boundary.



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Author Data **Andrew Becker**  Dates of Test

July 15 – Sept 21, 2015

Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

EX3DV4 SN:3592

November 10, 2014

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

### Calibration Parameter Determined in Body Tissue Simulating Media

F(MHz) C	Relative Permittivity	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>C</sup> (mm)	Unct. (k=2)
2600	52.5	2.18	6.84	6.84	6,84	0.78	0.62	± 12.0 %
5250	48,9	5.36	4.06	4.06	4.06	0.45	1.90	± 13.1 %
5600	48.5	5.77	3.78	3.78	3.78	0.45	1.90	± 13.1 %
5750	48.3	5.94	3.81	3.81	3.81	0.50	1.90	± 13.1 %

Frequency validity above 300 MHz of ± 103 MHz only applies for DASY V4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

At frequencies below 3 GHz, the validity of tissue parameters (cland of can be released to ± 10% if liquid compansation formula is applied to

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At requencies below 3 GHz, the validity or issue parameters (a and a) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated largel tissue parameters.

Apha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always loss than ± 1% for frequencies below 3 GHz and helow ± 2% for frequencies between 3.6 GHz at any distance larger than half the probe tip claimator from the boundary.



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Author Data
Andrew Becker

Dates of Test **July 15 – Sept 21, 2015** 

Test Report No **RTS-6066-1509-15** 

FCC ID: IC L6ARHK210LW 2

2503A-RHK210LW

EX3DV4- 5N:3592

November 10, 2014

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

1.5 Frequency response (normalized) 1.1 1.0 0.9 0.8 0.7 0.6 0.5 2500 1000 2000 3000 Ó 500 1500 f [MHz] TEM R22

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

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EX3DV4-SN:3592

Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data
Andrew Becker

Dates of Test **July 15 – Sept 21, 2015** 

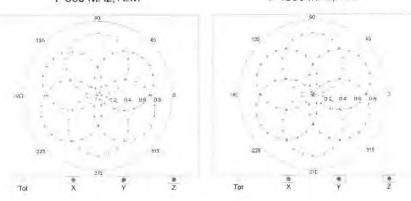
Test Report No **RTS-6066-1509-15** 

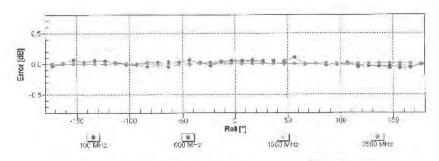
FCC ID: 1 L6ARHK210LW 2

November 10, 2014

2503A-RHK210LW







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

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Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data
Andrew Becker

Dates of Test **July 15 – Sept 21, 2015** 

Test Report No **RTS-6066-1509-15** 

FCC ID: 1. L6ARHK210LW 2.

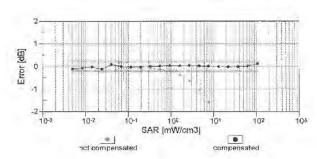
2503A-RHK210LW

EX3DV4 SN:3592

November 10, 2014

### Dynamic Range f(SAR<sub>head</sub>) (TEM cell , f<sub>eval</sub>= 1900 MHz)

10<sup>5</sup> 10<sup>2</sup> 10<sup>3</sup> 10<sup>3</sup> 10<sup>3</sup> 10<sup>3</sup> 10<sup>3</sup> SAR [mW/cm3]



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

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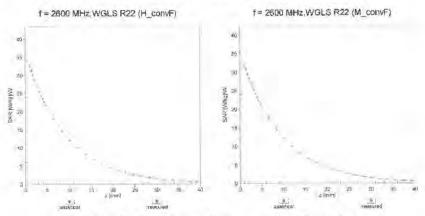
Author Data **Andrew Becker**  Dates of Test July 15 – Sept 21, 2015 Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

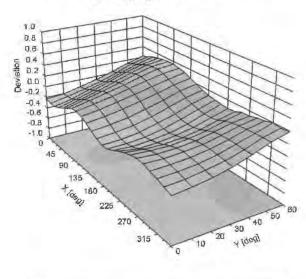
EX3DV4- SN:3592

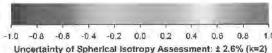
November 10, 2014

### **Conversion Factor Assessment**



### Deviation from Isotropy in Liquid Error (φ, θ), f = 900 MHz





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# Appendix C for the BlackBerry $\otimes$ Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data
Andrew Becker

Dates of Test

July 15 – Sept 21, 2015

Test Report No **RTS-6066-1509-15** 

FCC ID: L6ARHK210LW

2503A-RHK210LW

EX3DV4-SN:3592

November 10, 2014

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

### Other Probe Parameters

Sensor Arrangement	Triangular		
Connector Angle (*)	-13.3		
Mechanical Surface Detection Mode	enabled		
Optical Surface Detection Mode	disabled		
Probe Overall Length	337 mm		
Probe Body Diameter	10 m		
Tip Length	9 mn		
Tip Diameter	2.5 mm		
Probe Tip to Sensor X Calibration Point	mm f		
Probe Tip to Sensor Y Calibration Point	1 mm		
Probe Tip to Sensor Z Calibration Point	1 mm		
Recommended Measurement Distance from Surface	1,4 mm		

Certifinate No: EX3-3592\_Nov14

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Appendix C for the BlackBerry® Smartphone Model RHK211LW

(STV100-1) SAR Report

37(91)

Author Data **Andrew Becker**  Dates of Test July 15 – Sept 21, 2015

RTS-6066-1509-15

FCC ID: L6ARHK210LW

2503A-RHK210LW

# 750 Dipole

Test Report No

Calibation Laboratory of Schroll & Partner Engheering AG Zeughattasse 43, 8004 Zurich, Switzerland





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

Accreditation No.: SCS 0108

Accred He by the Swiss Accreditation Service (SAS) The Sylis Accreditation Service is one of the signatories to the EA Multila to al Agreement for the recognition of calibration certificates

Blackberry Waterloo

Certificate No: D750V3-1021 Mar15

#### CALIBRATION CERTIFICATE D750V3 - SN:1021 Object QA CAL-05.v9 Calibration procedure(s) Calibration procedure for dipole validation kits above 700 MHz March 11, 2015 Calibration date: This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (St). 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 faboratory facility; environment temperature (22 ± 3)°C and humidity < 70%. Calibration Equipment used (M&TE critical for calibration) Primary Standards ID # Cal Date (Certificate No.) Scheduled Calibration GB37480704 Power mater EPM-442A 07-Oct-14 (No. 217-02020) Oct-15 US37292783 Power sensor HP 8481A 07-Oct-14 (No. 217-02020) Oct-15 Power sensor HP 8481A MY41092317 07-Oct-14 (No. 217-02021) Oct-15 Reference 20 dB Attenuator SN: 5058 (20k) 03-Apr-14 (No. 217-01918) Apr-15 Type-N mismatch combination SN: 5047.2 / 06327 03-Apr-14 (No. 217-01921) Apr-15 Reference Probe ES3DV3 SN: 3205 30-Dec-14 (No. ES3-3205, Dec14) Dec-15 DAE4 SN: 601 18-Aug-14 (No. DAE4-601\_Aug14) Aug-15 Secondary Standards Check Date (in Nouse) Scheduled Check RF generator R&S SMT-06 100005 04-Aug-99 (in house check Oct-13) In house check: Oct-1ff Network Analyzer HP 8753E US37390585 S4206 In house check: Oct-15 18-Oct-01 (in house check Oct-14) Name Function Calibrated by: Michael Weber Laboratory Technician Approved by: Katja Pokovic Technical Manager Issued: March 11, 2015 This calls ration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificat-e No: D750V3-1021\_Mar15

Page 1 of 6

Document

# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

38(91)

Author Data

Andrew Becker

Dates of Test

**July 15 – Sept 21, 2015** 

Test Report No

RTS-6066-1509-15

FCC ID: L6ARHK210LW

2503A-RHK210LW

Calibation Laboratory of

Schmill & Partner Engheering AG Zeugharustrasse 43, 8004 Zurich, Switzerland





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

Accreditation No.: SCS 0108

Accordite by the Swiss Accorditation Service (SAS)

The Swift Accreditation Service is one of the signatories to the EA

Multile \*\*\* of Agreement for the recognition of calibration certificates

Glossary:

ConvF

N/A

tissue simulating liquid

sensitivity in TSL / NORM x,y,z not applicable or not measured

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

### **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	rement
multiplied by the coverage factor k=2, which for a normal distribution corresponds to a co	verage
proba bility of approximately 95%.	

Certificate No. D750V3-1021\_Mar15

Page 2 of 6



# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

39(91)

Author Data **Andrew Becker** 

Dates of Test

**July 15 – Sept 21, 2015** 

Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

# Measurement Conditions

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

DASY Version	DASY5	V52.8.8
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 ± 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	40.8 ± 6 %	0.90 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	2.10 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	8.28 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	1.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.42 W/kg ± 16.5 % (k=2)

Certificate No: D750V3-1021\_Mar15



# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

Page 40(91)

Author Data
Andrew Becker

Dates of Test **July 15 – Sept 21, 2015** 

Test Report No **RTS-6066-1509-15** 

FCC ID: L6ARHK210LW

2503A-RHK210LW

### App@ndix (Additional assessments outside the scope of SCS 0108)

### Ante Ina Parameters with Head TSL

Inpedance, transformed to feed point	$55.3 \Omega + 0.3 j\Omega$	
Return Loss	- 25.9 dB	

#### General Antenna Parameters and Design

~	
Electrical Delay (one direction)	1.032 ns

After IOng 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	December 01, 2010

Certificate No: D750V3-1021\_Mar15

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# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

Page 41(91)

Author Data
Andrew Becker

Dates of Test **July 15 – Sept 21, 2015** 

Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

### DAS YS Validation Report for Head TSL

Date: 11.03.2015

Test Liboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 750 MHz

Mediun parameters used: f = 750 MHz;  $\sigma = 0.9 \text{ S/m}$ ;  $\epsilon_r = 40.8$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Meas trement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

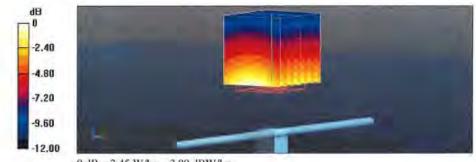
#### DAS Y52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(6.44, 6.44, 6.44); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

### 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 = 54.15 V/m; Power Drift = -0.06 dB Peak SAR (extrapolated) = 3.15 W/kg

SAR(1 g) = 2.1 W/kg; SAR(10 g) = 1.37 W/kgMaximum value of SAR (measured) = 2.45 W/kg



0 dB = 2.45 W/kg = 3.89 dBW/kg

Certificate No: D750V3-1021\_Mar15

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Appendix C for the BlackBerry® Smartphone Model RHK211LW

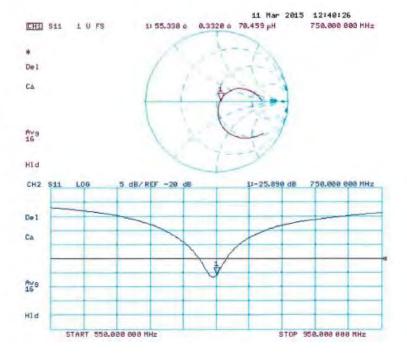
(STV100-1) SAR Report

42(91)

Author Data **Andrew Becker**  Dates of Test July 15 – Sept 21, 2015 Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

### Imperiance Measurement Plot for Head TSL



Certificate No: D750V3-1021\_Mar15

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*: BlackBerry	/					Page 43(91)
Author Data	Dates of Te	st	Test Report No	FCC ID:	IC	
Andrew Becker	July 1	5 – Sept 21, 2015	RTS-6066-1509-15	L6ARHK210LW	2503A-R	HK210LW

# 835 Dipole

# **≅** BlackBerry

# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

44(91)

Author Data

**Andrew Becker** 

Dates of Test

**July 15 – Sept 21, 2015** 

Test Report No

RTS-6066-1509-15

FCC ID: L6ARHK210LW

2503A-RHK210LW

CaliPlation Laboratory of Schrnd & Partner En Sneering AG Zough Alstrasse 43, 8004 Zurich, Switzerland





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

Accreditation No.: SCS 0108

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

**Blackberry Waterloo** 

Certificate No: D835V2-446\_Mar15

Object	D835V2 - SN:446		
Callor@fon procedure(s)	QA CAL-05.v9 Calibration proce	dure for dipole validation kits abo	ove 700 MHz
Calibration date:	March 11, 2015		
		onal standards, which realize the physical un robability are given on the following pages an	
All calibrations have been condu	cted in the closed laborato	ry lacility: environment temperature (22 ± 3)*(	C and numidity < 70%.
All calibrations have been condu Calibration Equipment used [M&		ry facility: environment temperature (22 ± 3)*(	C and humidity < 70%.
		ry lacility: environment temperature (22 ± 3)*( Cal Date (Certificate No.)	C and humidity < 70%.  Scheduled Calibration
Calibration Equipment used [M&	TE critical for calibration)	Cal Date (Certificate No.) 07-Oct-14 (No. 217-02020)	Scheduled Calibration Oct-15
Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A	TE critical for calibration)  ID #  GB37480704  US37292783	Cal Date (Certificate No.) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020)	Scheduled Calibration Oct-15 Oct-15
Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A	TE critical for calibration)  ID.#  GB37480704 US37292783 MY41092317	Cal Date (Certificate No.) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021)	Scheduled Calibration Oct-15 Oct-15
Calibration Equipment used [M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator	TE critical for calibration)  ID,#  GB37480704  US37292783  MV41092317  SN: 5058 (20k)	Cal Date (Certificate No.) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01918)	Scheduled Calibration Oct-15 Oct-15 Apr-15
Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination	TE critical for calibration)  ID.#  GB37480704  US37292783  MY41092317  SN: 5058 (20k)  SN: 5047.2 / 06327	Cal Date (Certificate No.) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01918) 03-Apr-14 (No. 217-01921)	Scheduled Calibration Oct-15 Oct-15 Oct-15 Apr-15 Apr-15
Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3	TE critical for calibration)  ID,#  GB37480704  US37292783  MV41092317  SN: 5058 (20k)	Cal Date (Certificate No.) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01918)	Scheduled Calibration Oct-15 Oct-15 Apr-15
Calibration Equipment used [M& Primary Standards. Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4	TE entical for calibration)  ID.#  GB37480704  US37292783  MY41092317  SN: 5058 (20k)  SN: 5047 2 / 06327  SN: 3205  SN: 601	Cal Date (Certificate No.) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 03-Apr-14 (No. 217-01918) 03-Apr-14 (No. 217-01918) 30-Dec-14 (No. ES3-3205_Dec14) 18-Aug-14 (No. DAE4-601_Aug14)	Scheduled Calibration Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Dec-15
Calibration Equipment used [M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards	TE critical for calibration)  ID.#  GB37480704 US37292783 MV41092317 SN: 5058 (20k) SN: 5047 2 / 06327 SN: 3205 SN: 601	Cal Date (Certificate No.) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01918) 03-Apr-14 (No. 217-01918) 18-Dec-14 (No. ES3-3205_Dec14) 18-Aug-14 (No. DAE4-601_Aug14) Check Date (inhouse)	Scheduled Calibration Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Dec-15 Aug-15 Scheduled Check
Calibration Equipment used (M& Primary Standards. Prower meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ESSIDV3 DAE4. Secondary Standards	TE entical for calibration)  ID.#  GB37480704  US37292783  MY41092317  SN: 5058 (20k)  SN: 5047 2 / 06327  SN: 3205  SN: 601	Cal Date (Certificate No.) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 03-Apr-14 (No. 217-01918) 03-Apr-14 (No. 217-01918) 30-Dec-14 (No. ES3-3205_Dec14) 18-Aug-14 (No. DAE4-601_Aug14)	Scheduled Calibration Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Dec-15 Aug-15
Calibration Equipment used (M& Primary Standards. Prower meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ESSIDV3 DAE4. Secondary Standards	TE critical for calibration)  ID.#  GB37480704  US37292783  MY41092317  SN: 5058 (20k)  SN: 5047.2 / 06327  SN: 3205  SN: 601  ID.#  100005  US37390585 S4206	Cal Date (Certificate No.) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01918) 03-Apr-14 (No. 217-01921) 30-Dec-14 (No. ES3-3205_Dec14) 18-Aug-14 (No. DAE4-601_Aug14) Check Date (Inhouse) 04-Aug-99 (in house check Oct-13) 18-Oct-01 (in house check Oct-14)	Scheduled Calibration Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Dec-15 Aug-15 Scheduled Check In house check: Oct-16 In house check: Oct-16
Calibration Equipment used (M& Primary Standards. Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards RE generator R&S SMT-06 Network Analyzer HP 8753E	TE entical for calibration)    ID.#     GB37480704     US37292783     MY41092317     SN: 5058 (20k)     SN: 5047 2 / 06327     SN: 3205     SN: 601     ID.#     100005     US37390585 S4208     Name	Cal Date (Certificate No.)  07-Oct-14 (No. 217-02020)  07-Oct-14 (No. 217-02020)  07-Oct-14 (No. 217-02020)  03-Apr-14 (No. 217-02021)  03-Apr-14 (No. 217-01918)  03-Apr-14 (No. ES3-3205_Dec14)  18-Aug-14 (No. DAE4-601_Aug14)  Check Date (Inhouse)  04-Aug-99 (in house check Oct-13)  18-Oct-01 (in house check Oct-14)	Scheduled Calibration Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Dec-15 Aug-15 Scheduled Check In house check: Oct-16 In house check: Oct-16
Calibration Equipment used [M& Primary Standards. Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4	TE critical for calibration)  ID.#  GB37480704  US37292783  MY41092317  SN: 5058 (20k)  SN: 5047.2 / 06327  SN: 3205  SN: 601  ID.#  100005  US37390585 S4206	Cal Date (Certificate No.) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01918) 03-Apr-14 (No. 217-01921) 30-Dec-14 (No. ES3-3205_Dec14) 18-Aug-14 (No. DAE4-601_Aug14) Check Date (Inhouse) 04-Aug-99 (in house check Oct-13) 18-Oct-01 (in house check Oct-14)	Scheduled Calibration Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Apr-15 Dec-15 Aug-15 Scheduled Check In house check: Oct-16

Certificate No: D835V2-446\_Mar15

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Document

# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

Page 45(91)

Author Data

Andrew Becker

Dates of Test

**July 15 – Sept 21, 2015** 

Test Report No

RTS-6066-1509-15

FCC ID: L6ARHK210LW

2503A-RHK210LW

Califration Laboratory of

SchrTld & Partner Ert9ineering AG Zeughr<sup>2</sup>isstrasse 43, 8004 Zurich, Switzerland





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Schweizerischer Kalibrierdienst Service suisse d'étalonnage Servizie avizzero di taratura Swiss Calibration Service

Accreditation No.: SCS 0108

Accreditation Service (SAS)

The S<sup>M</sup>as Accreditation Service is one of the signatories to the EA Multil<sup>®</sup>Brai 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 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- 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) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

### 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 Mar15

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# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

46(91)

Author Data **Andrew Becker** 

Dates of Test

**July 15 – Sept 21, 2015** 

Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

# Mea Surement Conditions

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

DASY Version	DASY5	V52.8.8
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 ± 1 MHz	

### Head TSL parameters

The following parameters and calculations were applied

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.6 ± 6 %	0.92 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	2.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.28 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	1.54 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	6.06 W/kg ± 16.5 % (k=2)

Certificate No: D835V2-446\_Mar15



# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data
Andrew Becker

Dates of Test

July 15 – Sept 21, 2015

Test Report No **RTS-6066-1509-15** 

FCC ID:

L6ARHK210LW

2503A-RHK210LW

# App€\dix (Additional assessments outside the scope of SCS 0108)

#### Ante na Parameters with Head TSL

Inpedance, transformed to feed point	50.6 Ω - 4.8 jΩ
Return Loss	- 26.4 dB

### Gen€ral Antenna Parameters and Design

$\sim$	
Electrical Delay (one direction)	1.383 ns

After IOng 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 "Measu\*erment 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

Certificate No: D835V2-446\_Mar15

Page 4 of 6



# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

Page 48(91)

Author Data
Andrew Becker

Dates of Test

**July 15 – Sept 21, 2015** 

Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

# DAS \$5 Validation Report for Head TSL

Date: 11.03.2015

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used: f = 835 MHz;  $\sigma = 0.92$  S/m;  $\epsilon_r = 40.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

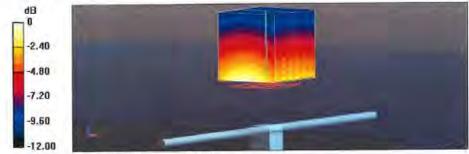
Meas rement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

### DAS \$52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(6.2, 6.2, 6.2); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# 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 = 56.83 V/m; Power Drift = 0.02 dB Peak SAR (extrapolated) = 3.55 W/kg SAR(1 g) = 2.37 W/kg; SAR(10 g) = 1.54 W/kg Maximum value of SAR (measured) = 2.78 W/kg



0 dB = 2.78 W/kg = 4.44 dBW/kg

Certificate No: D835V2-446\_Mar15

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Appendix C for the BlackBerry® Smartphone Model RHK211LW

(STV100-1) SAR Report

49(91)

Author Data **Andrew Becker** 

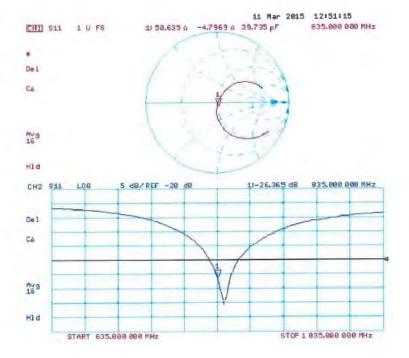
Dates of Test

July 15 – Sept 21, 2015

Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

# Impedance Measurement Plot for Head TSL



Certificate No: D835V2-446\_Mar15

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Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

50(91)

Author Data

**Andrew Becker** 

Dates of Test

July 15 – Sept 21, 2015

Test Report No

RTS-6066-1509-15

FCC ID: L6ARHK210LW

2503A-RHK210LW

# **1800 Dipole**

Cal bration Laboratory of Sch mil & Partner Engheering AG Zeug Paustrasse 43, 8004 Zurich, Switzerland





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

Accreditation No.: SCS 0108

Accredite by the Swiss Accreditation Service (SAS) The Swis Accreditation Service is one of the signatories to the EA Multi lale at Agreement for the recognition of calibration certificates

**Blackberry Waterloo** 

Certificate No: D1800V2-2d020\_Mar15 CALIBRATION CERTIFICATE Object D1800V2 - SN: 2d020 Calibration procedure(s) QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz Calibration date: March 12, 2015 This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate All calibrations have been conducted in the closed laboratory facility: environment temperature (22  $\pm$  3) $^{\circ}$ C and humidity < 70%. Calibration Equipment used (M&TE critical for calibration) Primary Standards ID # Cal Date (Certificate No.) Scheduled Calibration Power meter EPM-442A GB37480704 07-Oct-14 (No. 217-02020) Oct-15 Power sensor HP 8481A US37292783 07-Oct-14 (No. 217-02020) Power sensor HP 8481A MY41092317 07-Oct-14 (No. 217-02021) Oct-15 Reference 20 dB Attenuator SN: 5058 (20k) 03-Apr-14 (No. 217-01918) Apr-15 Type-N mismatch combination SN: 5047.2 / 06327 03-Apr-14 (No. 217-01921) Apr-15 Reference Probe ES3DV3 SN: 3205 30-Dec-14 (No. ES3-3205\_Dec14) Dec-15 DAE4 SN: 601 18-Aug-14 (No. DAE4-601\_Aug14) Aug-15 Secondary Standards ID# Check Date (in house) Scheduled Check RF generator R&S SMT-06 100005 04-Aug-99 (in house check Oct-13) In house check: Oct-16 Network Analyzer HP 8753E US37390585 S4206 18-Oct-01 (in house check Oct-14) In house check: Oct-15 Name Function Calibrated by: Claudio Leubler Laboratory Technician Approved by: Katja Pokovic Technical Manager Issued: March 13, 2015 This calibration certificate shall not be reproduced except in full without written approval of the laboratory

Certificate No: D1800V2-2d020\_Mar15

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Appendix C for the BlackBerry® Smartphone Model RHK211LW

(STV100-1) SAR Report

51(91)

Author Data

Andrew Becker

Dates of Test

July 15 – Sept 21, 2015

Test Report No

RTS-6066-1509-15

FCC ID: L6ARHK210LW

2503A-RHK210LW

# Cali bration Laboratory of

Schmid & Partner Engineering AG Zeug Pausstrasse 43, 8004 Zurich, Switzerland





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

Accreditation No.: SCS 0108

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

Glossary:

TSL Con VF

N/A

tissue simulating liquid

sensitivity in TSL / NORM x,v,z not applicable or not measured

Cali bration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

#### 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: D1800V2-2d020\_Mar15

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# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

Fage **52(91)** 

Author Data
Andrew Becker

Dates of Test **July 15 – Sept 21, 2015** 

Test Report No **RTS-6066-1509-15** 

FCC ID: L6ARHK210LW

2503A-RHK210LW

Me@strement Conditions

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

Dasy Version	DASY5	V52.8.8
Etrapolation	Advanced Extrapolation	1.000
Plantom	Modular Flat Phantom	
Detance Dipole Center - TSL	10 mm	with Spacer
Zom Scan Resolution	dx, $dy$ , $dz = 5 mm$	and a parent
Frequency	1800 MHz ± 1 MHz	

Head 7SL 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	39.1 ± 6 %	1.41 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	9.71 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>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.08 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.2 W/kg ± 16.5 % (k=2)



# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

Fage **53(91)** 

Author Data
Andrew Becker

Dates of Test **July 15 – Sept 21, 2015** 

Test Report No **RTS-6066-1509-15** 

FCC ID: L6ARHK210LW

2503A-RHK210LW

# Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

45.8 Ω - 8,4 jΩ
- 20.2 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1915
	1.215 ns

After fong 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 and ded to the dipole arms in order to improve matching when loaded according to the position as explained in the 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

Certificate No: D1800V2-2d020\_Mar15

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Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data
Andrew Becker

Dates of Test **July 15 – Sept 21, 2015** 

Test Report No **RTS-6066-1509-15** 

FCC ID: L6ARHK210LW

Date: 12.03.2015

2503A-RHK210LW

# DASY5 Validation Report for Head TSL

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 1800 MHz

Medium parameters used: f = 1800 MHz;  $\sigma = 1.41$  S/m;  $\varepsilon_r = 39.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phan tom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DAS Y52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(5.06, 5.06, 5.06); Calibrated; 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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 = 94.84 V/m; Power Drift = 0.03 dB Peak SAR (extrapolated) = 17.9 W/kg SAR(1 g) = 9.71 W/kg; SAR(10 g) = 5.08 W/kg Maximum value of SAR (measured) = 12.0 W/kg



0 dB = 12.0 W/kg = 10.79 dBW/kg



Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

Page **55(91)** 

Author Data
Andrew Becker

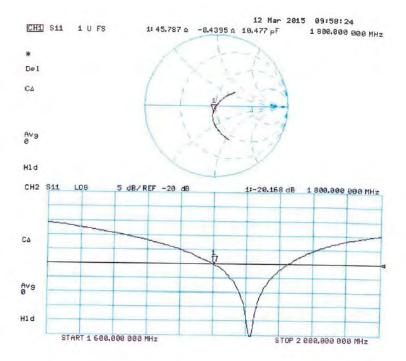
Dates of Test **July 15 – Sept 21, 2015** 

Test Report No **RTS-6066-1509-15** 

FCC ID: I L6ARHK210LW 2

2503A-RHK210LW

# Impedance Measurement Plot for Head TSL



Certificate No: D1800V2-2d020\_Mar15

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# **1900 Dipole**

Document

# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data

Andrew Becker

Dates of Test

**July 15 – Sept 21, 2015** 

Test Report No **RTS-6066-1509-15** 

FCC ID: L6ARHK210LW

2503A-RHK210LW

Calf bration Laboratory of Schmid & Partner

Engineering AG
Zeugrausstrasse 43, 8004 Zurich, Switzerland





Schweizerischer Kalibrierdienst Service suisse d'étalonnage 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

Multifaleral Agreement for the recognition of calibration certificates

Blackberry Waterloo

Accreditation No.: SCS 0108

Certificate No: D1900V2-545\_Mar15

# CALIBRATION CERTIFICATE

Object

D1900V2 - SN:545

Calin ration procedure(s)

QA CAL-05.v9

Calibration procedure for dipole validation kits above 700 MHz

Calibration date:

March 12, 2015

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID a	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-14 (No. ES3-3205_Dec14)	Dec-15
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-16
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	in house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house chirck Oct-14)	In house check: Oct-15
	Name	Function	Signature \
Calibrated by:	Claudio Leubler	Laboratory Technician	Signatura
			A Company

Certificate No: D1900V2-545\_Mar15

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Appendix C for the BlackBerry® Smartphone Model RHK211LW

(STV100-1) SAR Report

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Author Data

Andrew Becker

Dates of Test

July 15 – Sept 21, 2015

Test Report No

RTS-6066-1509-15

FCC ID: L6ARHK210LW

2503A-RHK210LW

Cal # bration Laboratory of

Sch mid & Partner Emgineering AG Zeug Frausstrasse 43, 8004 Zurich, Switzerland





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

Accreditation No.: SCS 0108

Accres cited by the Swiss Accreditation Service (SAS)

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

Glossary:

TSL Con VF tissue simulating liquid

sensitivity in TSL / NORM x,y,z not applicable or not measured N/A

Cali bration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013

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

c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

#### 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\_Mar15

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# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data **Andrew Becker**  Dates of Test

July 15 – Sept 21, 2015

Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

# Me@surement Conditions

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

ASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
hantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, $dy$ , $dz = 5 mm$	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters
The following parameters and calculations were applied.

and the second second second second	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	39.0 ± 6 %	1.38 mho/m ± 5 %
Head TSL temperature change during test	< 0.5 °C	122	-

### 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	9,88 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	39.6 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	5.18 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.8 W/kg ± 16.5 % (k=2)

Certificate No: D1900V2-545\_Mar15



# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

Fage **59(91)** 

Author Data
Andrew Becker

Dates of Test

July 15 – Sept 21, 2015

Test Report No **RTS-6066-1509-15** 

FCC ID: L6ARHK210LW

2503A-RHK210LW

# Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

50.9 \( \Omega + 0.9 \)
-37.7 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. 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 shill 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	

Certificale No: D1900V2-545\_Mar15

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**≅** BlackBerry

Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

60(91)

Author Data **Andrew Becker**  Dates of Test July 15 – Sept 21, 2015 Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

## DASY5 Validation Report for Head TSL

Test Laboratory: SPEAG, Zurich, Switzerland

Date: 12.03,2015

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

Con munication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: f = 1900 MHz;  $\sigma = 1.38 \text{ S/m}$ ;  $\epsilon_r = 39$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Pharatom section: Flat Section

Mea-surement Standard: DASY5 (IEEE/IEC/ANSI C63:19-2011)

### DAS Y52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(5, 5, 5); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# 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 = 96.17 V/m; Power Drift = 0.04 dB Peak SAR (extrapolated) = 18.1 W/kg SAR(1 g) = 9.88 W/kg; SAR(10 g) = 5.18 W/kgMaximum value of SAR (measured) = 12.1 W/kg



0 dB = 12.1 W/kg = 10.83 dBW/kg



Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data
Andrew Becker

Dates of Test **July 15 – Sept 21, 2015** 

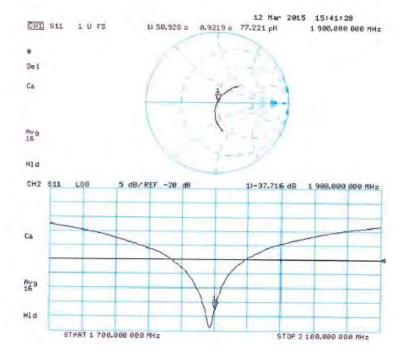
Test Report No **RTS-6066-1509-15** 

FCC ID:

L6ARHK210LW

2503A-RHK210LW

# Impredance Measurement Plot for Head TSL



Certificate No: D1900V2-545 Mar15

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### BlackBerry	/	Appendix C for the B (STV100-1) SAR Rep	lackBerry® Smartphorort	ne Model RHK211LV	W	Page <b>62(91)</b>
Author Data	Dates of Te	st	Test Report No	FCC ID:	IC	
Andrew Becker	July 1	5 – Sept 21, 2015	RTS-6066-1509-15	L6ARHK210LW	2503A-R	HK210LW

# 2450 Dipole

Document

# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

63(91)

Author Data

Andrew Becker

Dates of Test

**July 15 – Sept 21, 2015** 

Test Report No

RTS-6066-1509-15

FCC ID: L6ARHK210LW

2503A-RHK210LW

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





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C Service suisse d'étalonnago
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Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the sign:

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

client Blackberry Waterloo

Accreditation No.: SCS 108

Certificate No: D2450V2-791\_Sep13

Object	D2450V2 - SN: 7	91	
Calibration procedure(s)	QA CAL-05.v9		
	Calibration proce	dure for dipole validation kits abo	eve 700 MHz
Calibration date;	September 10, 20	113	
	Copiolina i c, E		
	and the tennestillity to such	with abundance, which realize the obvioled we	its of magnutaments (SI)
	And the second of the second s	onal standards, which realize the physical un robability are given on the following pages an	
All calibrations have been condu	cted in the closed laborator	y facility: environment temperature (22 $\pm$ 3) $^{\circ}$	3 and humidity $< 70\%$ .
Calibration Equipment used (M&	(E critical for calibration)		
	ID #	Cal Date (Certificate No.)	Schoduled Calibration
Primary Standards		Cel Date (Certificate No.) 01-Nov-12 (No. 217-01640)	Scheduled Calibration Oct-13
Primary Standards Power mater EPM-442A	ID ti	The state of the s	
Primary Standards Power meter EPM-442A Power sensor HP 8481A	ID # GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Primary Standards Power meter EPM-442A Power sonsor HP 8481A Reference 20 dB Attenuator	ID # GB37480704 US37292783	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640)	Oct-13 Oct-13
Primary Standards Power meter EPM-442A Power sonsor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination	ID # GB37480704 US37292763 SN: 5058 (20k) SN: 5047.3 / 06327	01-Nov-12 (No. 217-01840) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739)	Oct-13 Oct-13 Apr-14 Apr-14
Primary Standards Power mater EPM-442A Power sonsor HP 8481A Heference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3	ID # GB37480704 US37292783 SN: 5058 (20k)	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736)	Oct-13 Oct-13 Apr-14
Primary Standards Power mater EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards	ID # GB37480704 US37292763 SN: 5058 (20k) SN: 5047.3 / 96327 SN: 3205	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Dac-12 (No. ES3-3205_Dec12)	Oct-13 Oct-13 Apr-14 Apr-14 Deu-13 Apr-14 Scheduled Check
Primary Standards Power mater EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Dac-12 (No. ESS-3205_Dec12) 25-Apr-13 (No. DAF4-601_Apr13)	Oct-13 Oct-13 Apr-14 Apr-14 Deu-13 Apr-14
Primary Standards Power mater EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A	ID# GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01799) 28-Dac-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAF4-601_Apr13) Chock Date (in house)	Oct-13 Oct-13 Apr-14 Apr-14 Deu-13 Apr-14 Scheduled Check
Primary Standards Power mater EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 96327 SN: 3205 SN: 601 ID # MY41092317	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Dac-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAF4-601_Apr13) Chock Date (in house)	Oct-13 Oct-13 Apr-14 Apr-14 Deu-13 Apr-14 Scheduled Gheck In house check; Oct-13
Primary Standards Power mater EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06	ID # GB87480704 US37292763 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01736) 28-Dac-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAF4-601_Apr13) Chock Date (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-12)	Oct-13 Oct-13 Apr-14 Apr-14 Deu-13 Apr-14 Scheduled Check In house check: Oct-13 In house check: Oct-13 Signature
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4  Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer HP 8753E	ID# GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005 US37390585 \$4206	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01736) 28-Dac-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAF4-601_Apr13) Chock Date (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-12)	Oct-13 Oct-13 Apr-14 Apr-14 Deu-13 Apr-14 Scheduled Check In house check: Oct-13 In house check: Oct-13 Signature
Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4  Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer HP 8753E  Calibrated by  Approved by:	ID# GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005 US37390585 \$4206	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01736) 28-Dac-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAF4-601_Apr13) Chock Date (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-12)	Oct-13 Oct-13 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check In house check; Oct-13 In house check; Oct-13 In house check; Oct-13

Certificate No: D2450V2-791\_Sep13

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Document

# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

64(91)

Author Data

Andrew Becker

Dates of Test

July 15 – Sept 21, 2015

Test Report No

RTS-6066-1509-15

FCC ID: L6ARHK210LW

2503A-RHK210LW

# Calibration Laboratory of

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





Schweizerischer Kallbrierdienst
 Service suisse d'étatonnage
 Servizio svizzero di taratura
 Swiss Callbratton Service

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA

Multilateral Agreement for the recognition of calibration certificates

#### Glossary:

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

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

- a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

### 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%.

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# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data
Andrew Becker

Dates of Test

July 15 – Sept 21, 2015

Test Report No **RTS-6066-1509-15** 

FCC ID: L6ARHK210LW

2503A-RHK210LW

# Measurement Conditions

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

DASY Version	DASY5	V52.8.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

### Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22,0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) "C	39.4 ± 6 %	1.83 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	1-44	-

### SAR result with Head TSL

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.0 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	51.6 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	6.03 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.0 W/kg ± 16.5 % (k=2)

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# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data
Andrew Becker

Dates of Test

**July 15 – Sept 21, 2015** 

Test Report No **RTS-6066-1509-15** 

FCC ID: L6ARHK210LW

2503A-RHK210LW

### Appendix

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	56 1 Ω + 3,4 jΩ	
Return Loss	- 23.6 dB	

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.153 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	January 24, 2006

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# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data
Andrew Becker

Dates of Test **July 15 – Sept 21, 2015** 

Test Report No **RTS-6066-1509-15** 

FCC ID: L6ARHK210LW

2503A-RHK210LW

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

Date: 10.09,2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type; D2450V2; Serial: D2450V2 - SN: 791

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used: f = 2450 MHz;  $\sigma = 1.83$  S/m;  $\epsilon_r = 39.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

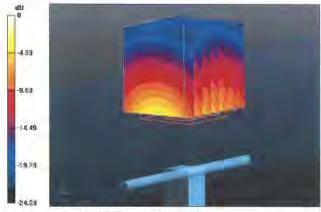
### DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(4.52, 4.52, 4.52); Calibrated: 28.12,2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics; DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

# 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 = 99.824 V/m; Power Drift = 0.04 dB Peak SAR (extrapolated) = 26.7 W/kg SAR(1 g) = 13 W/kg; SAR(10 g) = 6.03 W/kg

Maximum value of SAR (measured) = 16.9 W/kg



0 dB = 16.9 W/kg = 12.28 dBW/kg

Certificate No: D2450V2-791 Sep13

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Appendix C for the BlackBerry  $\otimes$  Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data
Andrew Becker

Dates of Test

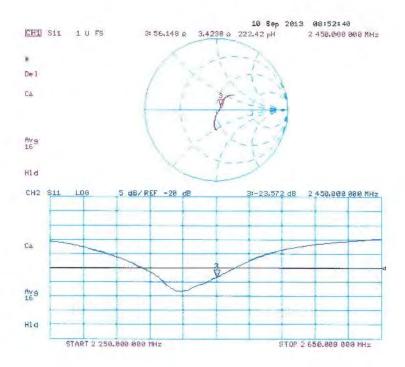
July 15 – Sept 21, 2015

Test Report No **RTS-6066-1509-15** 

FCC ID: L6ARHK210LW

2503A-RHK210LW

# Impedance Measurement Plot for Head TSL



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# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data
Andrew Becker

Dates of Test

July 15 – Sept 21, 2015

Test Report No **RTS-6066-1509-15** 

FCC ID: L6ARHK210LW

2503A-RHK210LW

Calibration Laboratory of

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





S Schweizerischer Kalibrierdienst
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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 Blackberry Waterloo

Accreditation No.: SCS 108

Certificate No: D2450V2-747\_Nov13

	CERTIFICATE		
Object	D2450V2 - SN: 7	747	
Calibration procedure(s)	QA CAL-05.v9 Calibration proce	dure for dipole validation kits a	bove 700 MHz
Calibration date:	November 14, 20	013	
The measurements and the unge	rtainties with confidence p	ional standards, which realize the physical robability are given on the following pages by facility: environment temperature (22 $\pm$ 3	and are part of the certificate.
Calibration Equipment used (M&	(E critical for calibration)		
rimary Stendards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
	ID # GB37480704	Cal Date (Certificate No.) 09-Oct-13 (No. 217-01827)	Scheduled Calibration Oct-14
ower meter EPM-442A ower sensor HP 8481A	-		
ower meter EPM-442A ower sensor HP 8481A	GB37480704	09-Oct-13 (No. 217-01827)	Oct-14
ower meter EPM-442A ower sensor HP 8481A ower sensor HP 8481A	GB37480704 US37292783	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827)	Oct-14 Oct-14
ower meter EPM-442A lower sensor HP 8481A lower sensor HP 8481A leference 20 dB Attenuator	GB37480704 US37292783 MY41092317	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828)	Oct-14 Oct-14 Oct-14
ower meter EPM-442A ower sensor HP 8481A ower sensor HP 8481A beference 20 dB Attenuator type-N mismatch combination	GB37480704 US37292783 MY41092317 SN: 5058 (20k)	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01736)	Oct-14 Oct-14 Oct-14 Apr-14
ower meter EPM-442A lower sensor HP 8481A lower sensor HP 8481A leference 20 dB Attenuator lype-N mismatch combination leference Probe ES3DV3	GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.3 / 06327	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739)	Oct-14 Oct-14 Oct-14 Apr-14 Apr-14
ower meter EPM-442A lower sensor HP 8481A lower sensor HP 8481A leference 20 dB Attenuator lype-IN mismatch combination leference Probe ES3DV3	GB37480704 US37292763 MY41092317 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Dec-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAE4-601 Apr13)	Oct-14 Oct-14 Oct-14 Apr-14 Apr-14 Dec-13 Apr-14
Ower meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 2D dB Attenuator Type-N mismatch combination Reference Probe ES3DV3	GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Dec-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAE4-601 Apr13) Check Date (in house)	Oct-14 Oct-14 Oct-14 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check
Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 2D dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 JAE4 Recondary Standards RF generator R&S SMT-06	GB87480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Dec-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAE4-601 Apr13)	Oct-14 Oct-14 Oct-14 Apr-14 Apr-14 Dec-13 Apr-14
Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 2D dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 JAE4 Recondary Standards RF generator R&S SMT-06	GB87480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01738) 04-Apr-13 (No. 217-01739) 28-Dec-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAE4-601 Apr13) Check Date (in house)	Oct-14 Oct-14 Oct-14 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check In house check: Oct-15 In house check: Oct-14
Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Recondary Standards Reference R&S SMT-06 Retwork Analyzer HP 8753E	GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # 100005 US37390585 S4206	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01738) 04-Apr-13 (No. 217-01739) 28-Dec-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAE4-601 Apr13) Check Date (in house) 04-Aug-99 (in house check Oct-13) 18-Oct-01 (in house check Oct-13)	Oct-14 Oct-14 Oct-14 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check In house check: Oct-15 In house check: Oct-14
Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Reference 20 dB Attenuator Reference Probe ES3DV3 DAE4 Recondary Standards RF generator R&S SMT-06 Retwork Analyzer HP 8753E	GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # 100005 US37390585 S4206	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01738) 04-Apr-13 (No. 217-01739) 28-Dec-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAE4-601 Apr13) Check Date (in house) 04-Aug-99 (in house check Oct-13) 18-Oct-01 (in house check Oct-13)	Oct-14 Oct-14 Oct-14 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check In house check: Oct-15 In house check: Oct-14

Certificate No: D2450V2-747\_Nov13

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Appendix C for the BlackBerry® Smartphone Model RHK211LW

(STV100-1) SAR Report

FCC ID: L6ARHK210LW

2503A-RHK210LW

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Author Data Andrew Becker Dates of Test July 15 – Sept 21, 2015

RTS-6066-1509-15

Test Report No

Calibration Laboratory of Schmid & Partner

Engineering AG Zeughausstrasse 43, 8004 Zurich. Switzerland





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

sensitivity in TSL / NORM x,y,z ConvF not applicable or not measured N/A

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)\*, February 2005
- c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

### 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%.

# ### BlackBerry

Appendix C for the BlackBerry  $\otimes$  Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data
Andrew Becker

Dates of Test **July 15 – Sept 21, 2015** 

Test Report No **RTS-6066-1509-15** 

FCC ID: L6ARHK210LW

2503A-RHK210LW

### Measurement Conditions

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

DASY Version	DASY5	V52.8.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

# Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.7 ± 6 %	1.84 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	****	

# SAR result with Head TSL

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.3 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	52.8 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.17 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.6 W/kg ± 16.5 % (k=2)



# Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data **Andrew Becker**  Dates of Test **July 15 – Sept 21, 2015** 

Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

#### Appendix

# Antenna Parameters with Head TSL

Impedance, transformed to feed point	$51.8 \Omega + 1.7 j\Omega$	
Return Loss	- 32.2 dB	

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.159 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	December 01, 2003	

Certificate No: D2450V2-747\_Nov13

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**:**:: BlackBerry

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Author Data | Dates of Test | Test Report No | FCC ID: | IC |
Andrew Becker | July 15 - Sept 21, 2015 | RTS-6066-1509-15 | L6ARHK210LW | 2503A-RHK210LW

## **∷** BlackBerry

Appendix C for the BlackBerry® Smartphone Model RHK211LW

(STV100-1) SAR Report

74(91)

Author Data **Andrew Becker**  Dates of Test **July 15 – Sept 21, 2015**  Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

#### DASY5 Validation Report for Head TSL

Date: 14.11.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 2450 MHz.

Medium parameters used: f = 2450 MHz;  $\sigma = 1.84$  S/m;  $\epsilon_r = 39.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

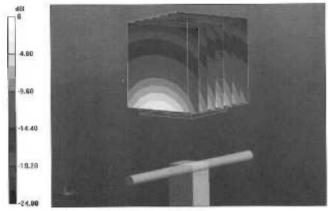
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

#### DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(4.52, 4.52, 4.52); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

## 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 = 98.651 V/m; Power Drift = 0.07 dB Peak SAR (extrapolated) = 27.8 W/kg SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.17 W/kgMaximum value of SAR (measured) = 16.8 W/kg



0 dB = 16.8 W/kg = 12.25 dBW/kg

Certificate No: D2450V2-747\_Nov13

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**:**:: BlackBerry

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Author Data | Dates of Test | Test Report No | FCC ID: | IC |
Andrew Becker | July 15 - Sept 21, 2015 | RTS-6066-1509-15 | L6ARHK210LW | 2503A-RHK210LW



Author Data

**Andrew Becker** 

July 15 – Sept 21, 2015

Appendix C for the BlackBerry® Smartphone Model RHK211LW

(STV100-1) SAR Report

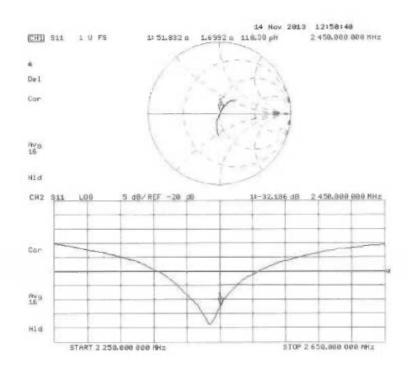
Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

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## Impedance Measurement Piot for Head TSL

Dates of Test



Certificate No: D2450V2-747\_Nov13

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## **≅** BlackBerry

Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

77(91)

Author Data **Andrew Becker**  Dates of Test

**July 15 – Sept 21, 2015** 

Test Report No RTS-6066-1509-15

FCC ID: L6ARHK210LW

2503A-RHK210LW

## 2600 Dipole

Cali Prition Laboratory of Schrill & Partner En Gheering AG Zeugh autstrasse 43, 8004 Zurich, Switzerland





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

Accreditation No.: SCS 0108

Accreditation Service (SAS) The Sevis Accreditation Service is one of the signatories to the EA Multil<sup>st te</sup>al Agreement for the recognition of calibration certificates

MEDIATION	CERTIFICATI		
Object	D2600V2 - SN: 1	1033	
Calibration procedure(s)	QA CAL-05.v9 Calibration proce	edure for dipole validation kits abo	ove 700 MHz
Calibraten date	March 13, 2015		
		ional standards, which realize the physical un sebability are given on live following pages ar	
		ry facility; environment temperature (22 $\pm$ 3)°(	C and humidity < 70%.
Calibration Equipment used (M&	TE critical for calibration)		
Calibration Equipment used (M&)	TE critical for calibration)	Csi Date (Certificate No.)	Scheduled Calibration
calibration Equipment used (M& Primary Standards Power meter EPM-442A	TE critical for calibration)	Csi Date (Certificate No.) 07-Oct-14 (No. 217-02020)	Scheduled Calibration Oct-15
nationation Equipment used (M& mary Standards lower meter EPM-442A lower sensor HP 8481A	TE critical for calibration)  ID #  GB37480704  US37292783	Csi Date (Certificate No.) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020)	Scheduled Calibration Oct-15 Oct-15
calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A	TE critical for calibration)  ID #  GB37480704  US37292783  MY41092317	Csi Date (Certificate No.) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021)	Scheduled Calibration Oct-15 Oct-15 Oct-15
Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Altenuator	TE critical for calibration)  ID #  GB37480704  US37292783	Cal Date (Certificate No.) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01918)	Scheduled Calibration Oct-15 Oct-15 Oct-15 Apr-15
Calibration Equipment used (M& Primary Standards Power meter EPM 442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Altenuator Type-N mismatch combination	TE critical for calibration)  (ID #  GB37480704  US37292783  MY41092317  SN: 5058 (20k)  SN: 5047.2706327	Car Date (Certificate No.) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01918) 03-Apr-14 (No. 217-01921)	Scheduled Calibration Oct-15 Oct-15 Oct-15 Apr-15 Apr-15
nimary Standards ower meter EPM-442A lower sensor HP 8481A lower sensor HP 8481A leference 20 dB Altenuator ype-N mismatch combination leference Probe ES3DV3	ID #  GB37480704  US37292783  MY41092317  SN: 5058 (20k)	Cal Date (Certificate No.) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01918)	Scheduled Calibration Oct-15 Oct-15 Oct-15 Apr-15
Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4	TE critical for calibration)  ID #  GB37480704  US37292783  MY41092317  SN: 5058 (20k)  SN: 5047.2 / 06327  SN: 3205	Cal Date (Certilicate No.)  07-Oct-14 (No. 217-02020)  07-Oct-14 (No. 217-02020)  07-Oct-14 (No. 217-02021)  03-Apr-14 (No. 217-01918)  03-Apr-14 (No. 217-01921)  30-Dec-14 (No. ES3-3205_Dec14)  18-Aug-14 (No. DAE4-601_Aug14)  Check Date (in house)	Scheduled Calibration Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Dec-15
Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Altenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4	ID #  GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3205 SN: 601	Csi Date (Certificate No.)  07-Oct-14 (No. 217-02020)  07-Oct-14 (No. 217-02020)  07-Oct-14 (No. 217-02021)  03-Apr-14 (No. 217-01918)  03-Apr-14 (No. 217-01921)  30-Dec-14 (No. ES3-3205_Dic14)  18-Aug-14 (No. DAE4-601_Aug14)	Scheduled Calibration Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Apr-15 Apr-15 Dec-15 Aug-15 Scheduled Check
Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Altenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4	ID #  GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3205 SN: 601	Cal Date (Certilicate No.)  07-Oct-14 (No. 217-02020)  07-Oct-14 (No. 217-02020)  07-Oct-14 (No. 217-02021)  03-Apr-14 (No. 217-01918)  03-Apr-14 (No. 217-01921)  30-Dec-14 (No. ES3-3205_Dec14)  18-Aug-14 (No. DAE4-601_Aug14)  Check Date (in house)	Scheduled Calibration Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Apr-15 Dec-15 Aug-15
Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Altenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4	TE critical for calibration)  ID #  GB37480704  US37292783  MY41092317  SN: 5056 (20k)  SN: 5047.2 / 06327  SN: 3205  SN: 601  ID #  100005  US37390585 S4206	Car Date (Certificate No.)  07-Oct-14 (No. 217-02020)  07-Oct-14 (No. 217-02020)  07-Oct-14 (No. 217-02021)  03-Apr-14 (No. 217-01918)  03-Apr-14 (No. 217-01921)  30-Dec-14 (No. ES3-3205_Dec14)  18-Aug-14 (No. DAE4-601_Aug14)  Check Date (in house)  04-Aug-99 (in house check Oct-13)  16-Oct-01 (in house check Oct-14)	Scheduled Calibration Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Dec-15 Aug-15 Scheduled Check In house check: Oct-16 In house check: Oct-16
Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Altenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards HF generator R&S SMT-06 Network Analyzer HP 8753E	ID #  GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3205 SN: 601  JD #  100005 US37390585 S4206	Car Date (Certificate No.) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01918) 03-Apr-14 (No. 217-01921) 30-Dec-14 (No. ES3-3205_Dec14) 18-Aug-14 (No. DAE4-601_Aug14) Check Date (in house) 04-Aug-99 (in house check Oct-13) 18-Oct-01 (in house check Oct-14)	Scheduled Calibration Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Apr-15 Apr-15 Scheduled Check In house check: Oct-16
Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4	TE critical for calibration)  ID #  GB37480704  US37292783  MY41092317  SN: 5056 (20k)  SN: 5047.2 / 06327  SN: 3205  SN: 601  ID #  100005  US37390585 S4206	Car Date (Certificate No.)  07-Oct-14 (No. 217-02020)  07-Oct-14 (No. 217-02020)  07-Oct-14 (No. 217-02021)  03-Apr-14 (No. 217-01918)  03-Apr-14 (No. 217-01921)  30-Dec-14 (No. ES3-3205_Dec14)  18-Aug-14 (No. DAE4-601_Aug14)  Check Date (in house)  04-Aug-99 (in house check Oct-13)  16-Oct-01 (in house check Oct-14)	Scheduled Calibration Oct-15 Oct-15 Oct-15 Apr-15 Apr-15 Dec-15 Aug-15 Scheduled Check In house check: Oct-16 In house check: Oct-16

Certificate No: D2600V2-1033\_Mar15

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## \*\*\* BlackBerry

Document

## Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data

Andrew Becker

Dates of Test

July 15 – Sept 21, 2015

Test Report No

RTS-6066-1509-15

FCC ID: L6ARHK210LW

2503A-RHK210LW

Cali Phtion Laboratory of Schr Till & Partner Err Sheering AG Zeugh Subtrasse 43, 8004 Zurich, Switzerland





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

Accreditation No.: SCS 0108

Accreditation Service is one of the sign

The S<sup>avits</sup> Accreditation Service is one of the signatories to the EA Multiperion Agreement for the recognition of calibration certificates

#### Glos sary:

TSL ConvF

N/A

tissue simulating liquid

sensitivity in TSL / NORM x,y,z not applicable or not measured

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- 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) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

#### 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 state	d as the standard und	certainty of n	neasurement
multiplied by the coverage is probability of approximately	factor k=2, which for a	normal distribution co	orresponds t	o a coverage

Certificate No: D2600V2-1033 Mar15

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## Appendix C for the BlackBerry $\otimes$ Smartphone Model RHK211LW (STV100-1) SAR Report

79(91)

Author Data
Andrew Becker

Dates of Test **July 15 – Sept 21, 2015** 

Test Report No **RTS-6066-1509-15** 

FCC ID: L6ARHK210LW

2503A-RHK210LW

## Med surement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zeom Scan Resolution	dx, dy, dz = 5 mm	
Fiequency	2600 MHz ± 1 MHz	

### Head TSL parameters

The following parameters and calculations were applied

	Temperature	Permittivity	Conductivity
Neminal Head TSL parameters	22.0 °C	39.0	1,96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) "C	37.2 ± 6 %	2.00 mho/m ± 6.%
Head TSL temperature change during test	< 0.5 °C	-600	-

### 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	14.3 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	56.1 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	25.0 W/kg ± 16.5 % (k=2)

Certificate No: D2600V2-1033\_Mar15



## Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data
Andrew Becker

Dates of Test

July 15 – Sept 21, 2015

Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

### App endix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

in pedance, transformed to feed point	48.7 Ω - 5.3 μΩ
Return Loss	- 25.2 dB

### Gen eral Antenna Parameters and Design

and the state of t	
Electrical Delay (one direction)	1.152 ns
The state of the s	1102118

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

The dispose is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dispose. The antenna is therefore short-circuited for DC-signals. On some of the dispose, small end caps are added to the dispose 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 dispose length is still according to the Standard.

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

#### Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 03, 2009

Certificate No: D2600V2-1033\_Mar15

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## Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data
Andrew Becker

Dates of Test

**July 15 – Sept 21, 2015** 

Test Report No **RTS-6066-1509-15** 

FCC ID: L6ARHK210LW

2503A-RHK210LW

## DAS ¥5 Validation Report for Head TSL

Date: 13.03.2015

Test Laboratory: SPEAG, Zurich, Switzerland

DUT = Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1033

Communication System: UID 0 - CW; Frequency: 2600 MHz

Medi um parameters used: f = 2600 MHz;  $\sigma = 2 \text{ S/m}$ ;  $\varepsilon_r = 37.2$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

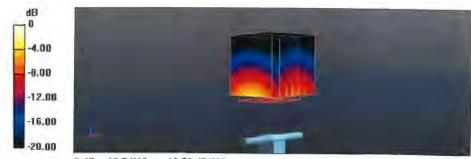
#### DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(4.49, 4.49, 4.49); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 101.6 V/m; Power Drift = 0.04 dB Peak SAR (extrapolated) = 30.3 W/kg SAR(1 g) = 14.3 W/kg; SAR(10 g) = 6.33 W/kg

Maximum value of SAR (measured) = 18.7 W/kg



0 dB = 18.7 W/kg = 12.72 dBW/kg

Certificate No. D2600V2-1033\_Mar15

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Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data
Andrew Becker

Dates of Test **July 15 – Sept 21, 2015** 

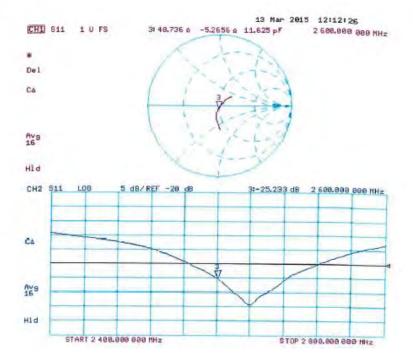
| 1

Test Report No **RTS-6066-1509-15** 

FCC ID: L6ARHK210LW

2503A-RHK210LW

## Impedance Measurement Plot for Head TSL



Certificate No: D2600V2-1033\_Mar15

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<b>∷</b> BlackBe	erry	Appendix C for the (STV100-1) SAR R	e BlackBerry® Smartpho Report	ne Model RHK211L	W Page 83(91)
Author Data	Dates of Te	st	Test Report No	FCC ID:	IC
Andrew Becker	July 15	5 – Sept 21, 2015	RTS-6066-1509-15	L6ARHK210LW	2503A-RHK210LW

# 5000 Dipole

## **≅** BlackBerry

### Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

84(91)

Author Data **Andrew Becker**  Dates of Test

**July 15 – Sept 21, 2015** 

Test Report No RTS-6066-1509-15 FCC ID: L6ARHK210LW

2503A-RHK210LW

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





Schweizerischer Kallbrierdienst Service suisse d'étalonnage C 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

Client Blackberry Waterloo

Accreditation No.: SCS 108

Certificate No: D5GHzV2-1033\_Nov13

Calibration procedure(s)  Calibration procedure(s)  Calibration date:  Note  This calibration certificate documents the measurements and the uncartaintic calibrations have been conducted in the calibration Equipment used (M&TE critic calibration	the closed laboration)  3 337480704 337292783	dure for dipole validation kits bet	nits of measurements (SI). nd are part of the certificate.
Calibration date: Northis calibration certificate documents the The measurements and the uncartaintic All calibrations have been conducted in the Calibration Equipment used (M&TE critic Primary Standards ID Power meter EPM-442A GB Power sensor HP 8481A MY Reference 20 dB Attenuator Type-N mismatch combination SN Reference Probe ES3DV3 SN	e traceability to natives with confidence profile (for calibration)	onal standards, which realize the physical unobability are given on the following pages at y facility: environment temperature (22 ± 3)."  Cal Date (Certificate No.)  09-Oct-13 (No. 217-01827)	nits of measurements (SI).  Indiane part of the certificate.  C and humidity < 70%.  Scheduled Calibration  Oct-14
This calibration certificate documents the The measurements and the uncartainties. All calibrations have been conducted in the Calibration Equipment used (M&TE critics Primary Standards ID Power meter EPM-442A GE Power sensor HP 8481A US Power sensor HP 8481A MY Reference 20 dB Attenuator SN Type-N mismatch combination SN Reference Probe ES3DV3 SN	the traceability to native swith confidence or the closed laboration;  a 337480704 537292783	onal standards, which realize the physical unobability are given on the following pages at y facility: environment temperature (22 ± 3)*  Cal Date (Certificate No.)  09-Oct-13 (No. 217-01827)	nd are part of the certificate.  C and humidity < 70%.  Scheduled Calibration  Oct-14
The measurements and the uncartaintic  All calibrations have been conducted in t  Calibration Equipment used (M&TE critic  Primary Standards ID  Power meter EPM-442A GB  Power sensor HP 3481A MY  Reference 20 dB Attenuator  Type-N mismatch combination  Reference Probe ES3DV3 SN	the closed laboration)  the closed laboration)  the closed laboration)  the closed laboration)	obability are given on the following pages at y facility: environment temperature (22 ± 3)*  Cal Date (Certificate No.)  09-Oct-13 (No. 217-01827)	nd are part of the certificate.  C and humidity < 70%.  Scheduled Calibration  Oct-14
Calibration Equipment used (M&TE critic Primary Standards ID Power meter EPM-442A GB Power sensor HP 8481A US Power sensor HP 8481A MY Reference 20 db Attenuator Type-N mismatch combination Reference Probe ESSDV3 SN	ical for calibration)  9  337480704  S37292783	Cal Date (Certificate No.) 09-Oct-13 (No. 217-01827)	Scheduled Calibration Oct-14
Primary Standards ID Power meter EPM-442A GE Power sensor HP 3481A US Power sensor HP 8481A MY Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 SN	# 537480704 537292783	09-Oct-13 (No. 217-01827)	Oct-14
Power meter EPM-442A GB Power sensor HP 8481A US Power sensor HP 8481A MY Reference 20 dB Attenuator SN Type-N mismatch combination SN Reference Probe ES3DV3 SN	537480704 537292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A US Power sensor HP 8481A MY Reference 20 db Attenuator SN Type-N mismatch combination SN Reference Probe ES3DV3 SN	337292783		
Power sensor HP 8481A MY Reference 20 db Attenuator SN Type-N mismatch combination SN Reference Probe ES3DV3 SN		09-Oct-13 (No. 217-01827)	Det 4.4
Reference 20 dB Attenuator SN Type-N mismatch combination SN Reference Probe ES3DV3 SN	V440000317	se see to product a court	200
Type-N mismatch combination SN Reference Probe ES3DV3 SN	Y41092317	08-Oct-13 (No. 217-01626)	Oct-14
Reference Probe ES3DV3 SN	V: 5058 (20k)	04-Apr-13 (Na. 217-01736)	Apr-14
CONTRACTOR	N: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
DAE4 SN	N: 3205	28-Dec-12 (No. ES3-3205_Dec12)	Dac-13
	V: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14
Secondary Standards		Check Dale (in house)	Scheduled Check
Oddoniem y with row as	10005	04-Aug-99 (in house check Oct-13)	In house check: Oct-15
	\$37390585 \$4206	18-Oct-01 (in house check Oct-13)	In house check: Oct-14
No	ame	Function	Signature
	audio Leubler	Laboratory Technician	
California by.	ayero Ceublei	Constitution ( Constitution )	CKY
Approved by: Kai	itja Pokovic	Technical Manager	fell the
			Issued: November 8, 2013

Certificate No: D5GHzV2-1033\_Nov13

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## \*\*\* BlackBerry

Document

## Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data

Andrew Becker

Dates of Test

**July 15 – Sept 21, 2015** 

Test Report No

RTS-6066-1509-15

FCC ID: L6ARHK210LW

w 250

2503A-RHK210LW

Calibration Laboratory of Schmid & Partner

Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland





S Schweizerischer Kallbrierdienst

C Service suisse d'étalonnage

Servizio svizzero di taratura
S Swiss Calibration Service

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS)

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

#### Glossary:

TSL

tissue simulating liquid

ConvF sensitivity in TSL / NORM x,y,z N/A not applicable or not measured

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

- a) IEC 62209-2, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation, and Procedures"; Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for including accessories and multiple transmitters", March 2010
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"
- c) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013

#### 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%.

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## Appendix C for the BlackBerry® Smartphone Model RHK211LW (STV100-1) SAR Report

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Author Data
Andrew Becker

Dates of Test **July 15 – Sept 21, 2015** 

Test Report No **RTS-6066-1509-15** 

FCC ID: L6ARHK210LW

2503A-RHK210LW

#### Measurement Conditions

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

DASY Version	DASY5	V52.8.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat 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 ± 1 MHz 5500 MHz ± 1 MHz 5800 MHz ± 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 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) "C	35.0 ± 6 %	4.46 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	-	-

#### SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.99 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	79.4 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.28 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	22.6 W/kg ± 19.5 % (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 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) "C	34.6 ± 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 cm3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.51 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	84.4 W / kg ± 19.9 % (k=2)

SAR averaged over 10 cm3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2,41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	23.9 W/kg ± 19.5 % (k=2)

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Head TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	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	34.2 ± 6 %	5.06 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		-

#### SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.01 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	79.4 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.28 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	22.6 W/kg ± 19.5 % (k=2)

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#### Appendix

#### Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	49.1 Ω - 9.6 μΩ
Return Loss	- 20.3 dB

#### Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	50.3 Ω - 4.1 jΩ
Return Loss	- 27.7 dB

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

Impedance, transformed to feed point	57.8 (2 - 4.0 )(2
Return Loss	~ 21,8 dB

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1,213 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-signats. 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	July 09, 2004

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## **≅** BlackBerry

Document

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#### DASY5 Validation Report for Head TSL

Date: 08.11.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz

Medium parameters used: f = 5200 MHz; σ = 4.46 S/m;  $ε_r = 35$ ; ρ = 1000 kg/m<sup>3</sup>. Medium parameters used: f = 5500 MHz; σ = 4.75 S/m;  $ε_r = 34.6$ ; ρ = 1000 kg/m<sup>3</sup> Medium parameters used: f = 5800 MHz; σ = 5.06 S/m;  $ε_r = 34.2$ ; ρ = 1000 kg/m<sup>3</sup>

Phantom section: Flat Section

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

#### DASY52 Configuration:

- Probe: EX3DV4 SN3503; ConvF(5.41, 5.41, 5.41); Calibrated: 28.12.2012, ConvF(4.91, 4.91, 4.91); Calibrated: 28.12.2012, ConvF(4.81, 4.81, 4.81); Calibrated: 28.12.2012;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8,7(1137); SEMCAD X 14.6.10(7164)

## 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 = 64.635 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 29.5 W/kg

SAR(1 g) = 7.99 W/kg; SAR(10 g) = 2.28 W/kg

Maximum value of SAR (measured) = 18.4 W/kg

### Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan,

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

Reference Value = 64.397 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 33.8 W/kg

SAR(1 g) = 8.51 W/kg; SAR(10 g) = 2.41 W/kg

Maximum value of SAR (measured) = 20.3 W/kg

## 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 = 61.128 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 33.0 W/kg

SAR(1 g) = 8.01 W/kg; SAR(10 g) = 2.28 W/kg

Maximum value of SAR (measured) = 19.2 W/kg

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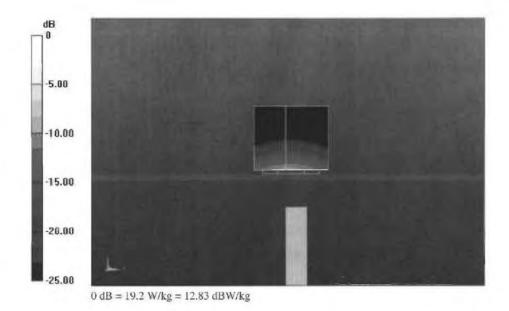
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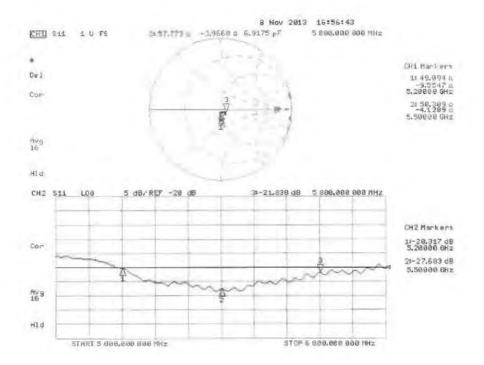
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Author Data **Andrew Becker**  Dates of Test July 15 – Sept 21, 2015

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### Impedance Measurement Plot for Head TSL



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