≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR				
Author Data	Dates of Test	Test Report No	FCC ID:	IC		
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW		
	March 24-26, 2014					
	December 8-12, 2014					

APPENDIX D: PROBE & DIPOLE CALIBRATION DATA

Revision History					
Rev. Number	Date	Changes			
Initial	Aug 19, 2013				
Rev 2	Sep 15, 2013	Separated data and report for model RFY111LW			
Rev 3	Sep 18, 2013	Added re-used SAR test data from model RFW121LW to address FCC OET requirement.			
Rev 4	Dec 15, 2014	Added equipment used for 802.11a Hotspot mode SAR testing 1. Page 51-69			

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR				
Author Data	Dates of Test	Test Report No	FCC ID:	IC		
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	March 24-26, 2014					
	December 8-12, 2014					

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

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

Client RTS (RIM Testing Services)

Certificate No: ES3-3225_Jan13

Accreditation No.: SCS 108

CALIBRATION CERTIFICATE Object ES3DV3 - SN:3225 Calibration procedure(s) QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4 Calibration procedure for dosimetric E-field probes Calibration date: January 10, 2013 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	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	28-Dec-12 (No. ES3-3013_Dec12)	Dec-13
DAE4	SN: 660	20-Jun-12 (No. DAE4-660_Jun12)	Jun-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

Name	Function	Signature
Jeton Kastrati	Laboratory Technician	£ 11
Katja Pokovic	Technical Manager	12211
		Jan Dig
		Issued: January 14, 2013
	Jeton Kastrati	Jeton Kastrati Laboratory Technician

Certificate No: ES3-3225_Jan13

Page 1 of 11

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR				
Author Data	Dates of Test	Test Report No	FCC ID:	IC		
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	March 24-26, 2014					
	December 8-12, 2014					

Calibration Laboratory of

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





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Servizio svizzero di taratura
Swiss Calibration Service

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS)

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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 φ φ rotation around probe axis

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

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

Calibration is Performed According to the Following Standards:

- 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
- ib) 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 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 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.

Page 2 of 11

Certificate No: ES3-3225_Jan13

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR				
Author Data	Dates of Test	Test Report No	FCC ID:	IC		
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW		
	March 24-26, 2014					
	December 8-12, 2014					

ES3DV3 - SN:3225 January 10, 2013

Probe ES3DV3

SN:3225

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

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

Certificate No: ES3-3225_Jan13

Page 3 of 11

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR				
Author Data	Dates of Test	Test Report No	FCC ID:	IC		
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW		
	March 24-26, 2014					
	December 8-12, 2014					

ES3DV3- SN:3225 January 10, 2013

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

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (µV/(V/m) ²) ^A	1.29	1.19	1.31	± 10.1 %
DCP (mV) ^e	100.5	101.5	99.9	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dBõV	С	D dB	VR mV	Unc ^t (k=2)
0	CW X 0	0.0	0.0	1.0	0.00	157.5	±2.7 %	
		Y	0.0	0.0	1.0		158.4	
		Z	0.0	0.0	1.0		165.9	

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

Certificate No: ES3-3225_Jan13

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

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.

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR				
Author Data	Dates of Test	Test Report No	FCC ID:	IC		
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW		
	March 24-26, 2014					
	December 8-12, 2014					

January 10, 2013

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

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^c	Relative Permittivity	Conductivity (S/m) F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.56	6.56	6.56	0.42	1.54	± 12.0 %
900	41.5	0.97	6.19	6.19	6.19	0.43	1.52	± 12.0 %
1810	40.0	1.40	5.35	5,35	5.35	0.63	1.39	± 12.0 %
1950	40.0	1.40	5.09	5.09	5.09	0.80	1.23	± 12.0 %
2450	39.2	1.80	4.65	4.65	4.65	0.61	1.63	± 12.0 %
2600	39.0	1.96	4.43	4.43	4.43	0.80	1.32	± 12.0 %

Certificate No. ES3-3225_Jan13

Page 5 of 11

The Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ±50 MHz. The uncertainty is the RSS of the Corn/F uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

At frequencies below 3 GHz, the validity of tissue parameters (s 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 Corn/F uncertainty for indicated farget tissue parameters.

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR				
Author Data	Dates of Test	Test Report No	FCC ID:	IC		
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW		
	March 24-26, 2014					
	December 8-12, 2014					

January 10, 2013

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

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) ^C	Relative Permittivity	Conductivity (S/m) F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.27	6.27	6.27	0.48	1,51	± 12.0 %
900	55.0	1.05	6.12	6.12	6,12	0.73	1.25	± 12.0 %
1810	53.3	1.52	5.04	5.04	5.04	0.57	1.47	± 12.0 %
1950	53.3	1.52	4.94	4.94	4.94	0.58	1.50	± 12.0 %
2450	52.7	1.95	4.35	4,35	4.35	0.70	1.16	± 12.0 %
2600	52.5	2.16	4.11	4.11	4.11	0.67	0.99	± 12.0 %

Certificate No: ES3-3225_Jan13

Page 6 of 11

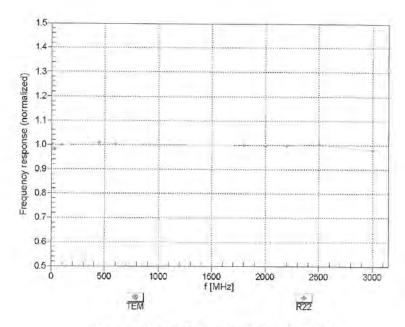
¹ Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

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

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR			
Author Data	Dates of Test	Test Report No	FCC ID:	IC	
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW	
	March 24-26, 2014				
	December 8-12, 2014				

January 10, 2013

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



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

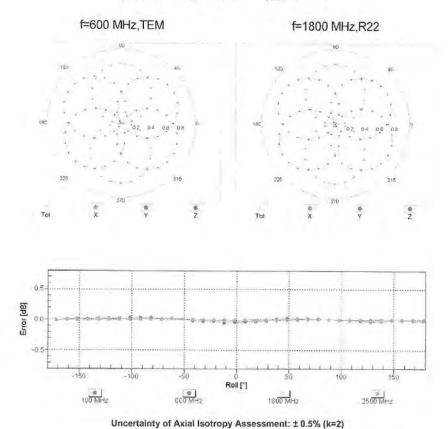
Certificate No: ES3-3225_Jan13

Page 7 of 11

≅ BlackBerry		Appendix D for the Black Report Rev 4	Page 9 (69)		
Author Data	D	ates of Test	Test Report No	FCC ID:	IC
Andrew Becker	J	uly 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	N	March 24-26, 2014			
	\mathbf{L}	December 8-12, 2014			

January 10, 2013

Receiving Pattern (ϕ), $9 = 0^{\circ}$



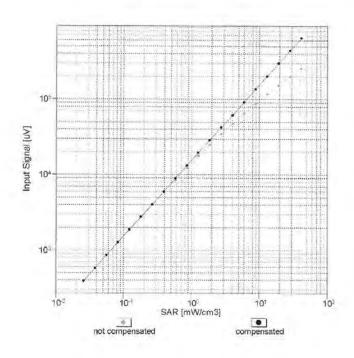
Certificate No: ES3-3225_Jan13

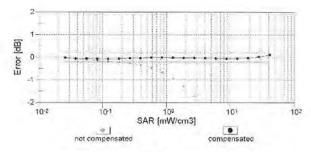
Page 8 of 11

≅ BlackBerry		Appendix D for the Black Report Rev 4	Page 10(69)		
Author Data	D	ates of Test	Test Report No	FCC ID:	IC
Andrew Becker	J	uly 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	N	1arch 24-26, 2014			
	\mathbf{L}	December 8-12, 2014			

January 10, 2013

Dynamic Range f(SAR_{head}) (TEM cell , f = 900 MHz)



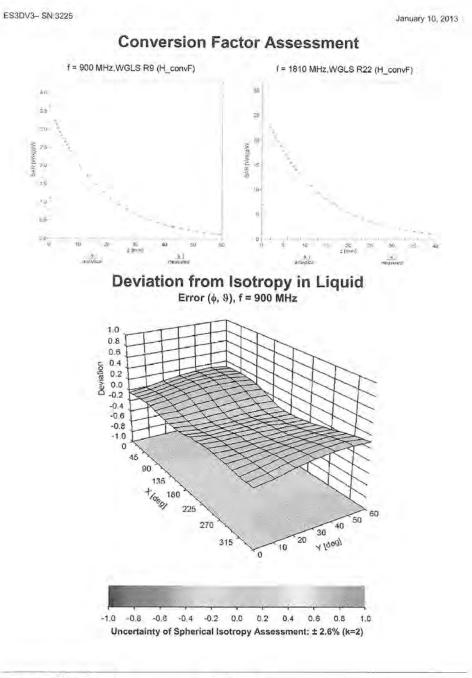


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Certificate No: ES3-3225_Jan13

Page 9 of 11

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR				
Author Data	Dates of Test	Test Report No	FCC ID:	IC		
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW		
	March 24-26, 2014					
	December 8-12, 2014					



≅BlackBerry	Appendix D for the Bla Report Rev 4	Page 12(69)		
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	March 24-26, 2014			
	December 8-12, 2014			

January 10, 2013

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

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	8.3
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

Certificate No: ES3-3225_Jan13

Page 11 of 11

Author Data Andrew Becker Author 24-26, 2014 December 8-12, 2014 Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR Report No RTS-6046-1308-34 Rev 6 RTS-6046-1308-34 Rev 6 RTS-6046-1308-34 Rev 6 RTS-6046-1308-34 Rev 6

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Client RTS (RIM Testing Services)

Certificate No: EX3-3548 Jan 13

Accreditation No.: SCS 108

CALIBRATION CERTIFICATE

Object EX3DV4 - SN:3548

Calibration procedure(s) QA CAL-01.v8, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4

Calibration procedure for dosimetric E-field probes

Calibration date: January 15, 2013

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 al	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	28-Dec-12 (No. ES3-3013_Dec12)	Dec-13
DAE4	SN: 660	20-Jun-12 (No. DAE4-660_Jun12)	Jun-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

	Name	Function	Signature	
Calibrated by:	Jeton Kastrati	Laboratory Technician	- 1 C	
Approved by:	Katia Pokovic	Technical Manager	NAPP	
			Marie May	
			Issued: January 15, 2013	
This calibration certificat	e shall not be reproduced except in full	without written approval of the lab		

Certificate No: EX3-3548_Jan13 Page 1 of 11

Author Data Andrew Becker Document Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR Report Rev 4 Author Data Andrew Becker Dates of Test July 02 -August 15, 2013 March 24-26, 2014 December 8-12, 2014 Page 14(69) Page 14(69) Page 14(69)

Calibration Laboratory of

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Zeughausstrasse 43, 8004 Zurich, Switzerland





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Servizio svizzero di taratura
Swiss Calibration Service

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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

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 φ rotation around probe axis

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

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- 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 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 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.

Certificate No: EX3-3548 Jan13 Page 2 of 11

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR				
Author Data	Dates of Test	Test Report No	FCC ID:	IC		
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW		
	March 24-26, 2014					
	December 8-12, 2014					

Probe EX3DV4

SN:3548

Manufactured: Calibrated:

November 16, 2004 January 15, 2013

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

Certificate No: EX3-3548_Jan13

Page 3 of 11

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR				
Author Data	Dates of Test	Test Report No	FCC ID:	IC		
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW		
	March 24-26, 2014					
	December 8-12, 2014					

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3548

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm $(\mu V/(V/m)^2)^A$	0.36	0.44	0.43	± 10.1 %
DCP (mV) ⁶	103.2	98.0	98.7	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	С	D dB	VR mV	Unc [±] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	181.3	±3.3 %
		Υ	0.0	0.0	1.0		149.2	
		Z.	0.0	0.0	1.0		198.9	

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%.

⁶ 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.

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

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR				
Author Data	Dates of Test	Test Report No	FCC ID:	IC		
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW		
	March 24-26, 2014					
	December 8-12, 2014					

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3548

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
2600	39.0	1.96	7.15	7.15	7.15	0.47	0.86	± 12.0 %
5200	36.0	4.66	5.13	5.13	5.13	0.40	1.80	± 13.1 %
5500	35.6	4.96	4.79	4.79	4.79	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.61	4.61	4.61	0.45	1.80	± 13.1 %

Certificate No: EX3-3548_Jan13 Page 5 of 11

⁰ Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the Com/F uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

FAt frequencies below 3 GHz, the validity of tissue parameters (s and o) 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 (s and o) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR				
Author Data	Dates of Test	Test Report No	FCC ID:	IC		
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW		
	March 24-26, 2014					
	December 8-12, 2014					

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3548

Calibration Parameter Determined in Body Tissue Simulating Media

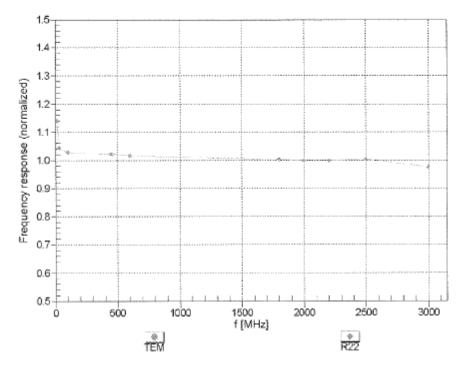
f (MHz) ^C	Relative Permittivity F	Conductivity (S/m) F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
2600	52.5	2.16	7.08	7.08	7.08	0.80	0.50	± 12.0 %
5200	49.0	5.30	4.68	4.68	4.68	0.52	1.90	± 13.1 %
5500	48.6	5.65	4.15	4.15	4.15	0.52	1.90	± 13.1 %
5800	48.2	6.00	4.19	4.19	4.19	0.60	1.90	± 13.1 %

Page 6 of 11 Certificate No: EX3-3548_Jan13

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

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR				
Author Data	Dates of Test	Test Report No	FCC ID:	IC		
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW		
	March 24-26, 2014					
	December 8-12, 2014					

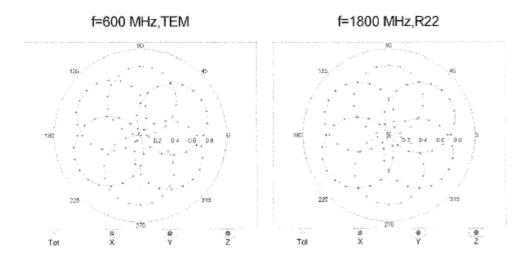
Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)

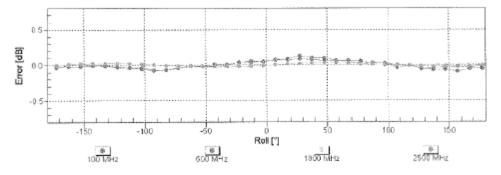


Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR				
Author Data	Dates of Test	Test Report No	FCC ID:	IC		
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW		
	March 24-26, 2014					
	December 8-12, 2014					

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

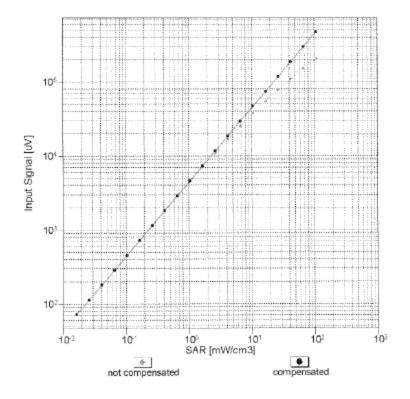


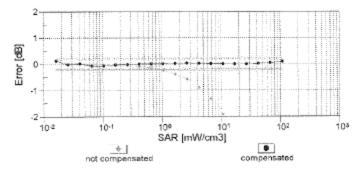


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR			
Author Data	Dates of Test	Test Report No	FCC ID:	IC	
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW	
	March 24-26, 2014				
	December 8-12, 2014				

Dynamic Range f(SAR_{head}) (TEM cell , f = 900 MHz)



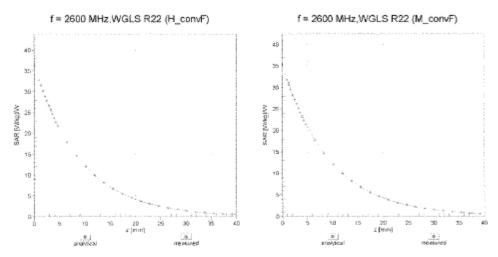


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Certificate No: EX3-3548_Jan13 Page 9 of 11

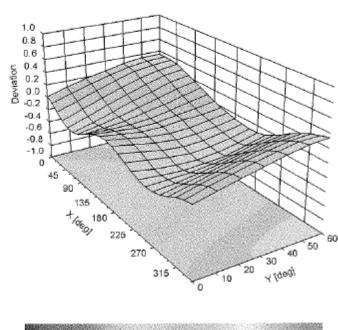
≅BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR			
Author Data	Dates of Test	Test Report No	FCC ID:	IC	
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW	
	March 24-26, 2014				
	December 8-12, 2014				

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (¢, 9), f = 900 MHz



≅BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR				
Author Data	Dates of Test	Test Report No	FCC ID:	IC		
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW		
	March 24-26, 2014					
	December 8-12, 2014					

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3548

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-72.5
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR Report Rev 4		
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	March 24-26, 2014			
	December 8-12, 2014			

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Client RTS (RIM Testing Services)

Accreditation No.: SCS 108

Certificate No: D835V2-446_Jan13

Object	D835V2 - SN: 44	6	
Calibration procedure(s)	QA CAL-05.v9 Calibration proce	dure for dipole validation kits abo	ove 700 MHz
Calibration date:	January 07, 2013	3	
		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	ry facility: environment temperature (22 ± 3)°0	C and humidity < 70%.
all calibrations have been conductable calibration Equipment used (M&		y facility: environment temperature $(22 \pm 3)^{\circ}$	C and humidity < 70%.
Calibration Equipment used (M&		y facility: environment temperature (22 ± 3)°6 Cal Date (Certificate No.)	C and humidity < 70%. Scheduled Calibration
Calibration Equipment used (M& Primary Standards Power meter EPM-442A	TE critical for calibration) ID # GB37480704	Cal Date (Certificate No.) 01-Nov-12 (No. 217-01640)	Scheduled Calibration Oct-13
Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A	ID # GB37480704 US37292783	Cal Date (Certificate No.) 01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640)	Scheduled Calibration Oct-13 Oct-13
Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator	ID # GB37480704 US37292783 SN: 5058 (20k)	Cal Date (Certificate No.) 01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530)	Scheduled Calibration Oct-13 Oct-13 Apr-13
Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327	Cal Date (Certificate No.) 01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. 217-01533)	Scheduled Calibration Oct-13 Oct-13 Apr-13 Apr-13
Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator	ID # GB37480704 US37292783 SN: 5058 (20k)	Cal Date (Certificate No.) 01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530)	Scheduled Calibration Oct-13 Oct-13 Apr-13
Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dtl Attenuator ype-M mismatch combination Reference Probe ES3DV3	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205	Cal Date (Certificate No.) 01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. 217-01533) 28-Dec-12 (No. ES3-3205_Dec12)	Scheduled Calibration Oct-13 Oct-13 Apr-13 Apr-13 Dec-13
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	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601	Cal Date (Certificate No.) 01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. 217-01533) 28-Dec-12 (No. ES3-3205_Dec12) 27-Jun-12 (No. DAE4-601_Jun12)	Scheduled Calibration Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13
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	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601	Cal Date (Certificate No.) 01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. 217-01533) 28-Dec-12 (No. ES3-3205_Dec12) 27-Jun-12 (No. DAE4-601_Jun12) Check Date (in house)	Scheduled Calibration Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check
Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ESSDV3 DAE4	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317	Cal Date (Certificate No.) 01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. 217-01533) 28-Dec-12 (No. ES3-3205_Dec12) 27-Jun-12 (No. DAE4-601_Jun12) Check Date (in house)	Scheduled Calibration Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check In house check: Oct-13
Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ESSDV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005 US37390585 S4206	Cal Date (Certificate No.) 01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. 217-01533) 28-Dec-12 (No. ES3-3205_Dec12) 27-Jun-12 (No. DAE4-601_Jun12) Check 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)	Scheduled Calibration Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check In house check: Oct-13 In house check: Oct-13 In house check: Oct-13
Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator type-N mismatch combination teference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06 Jetwork Analyzer HP 8753E	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005 US37390585 S4206	Cal Date (Certificate No.) 01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. 217-01533) 28-Dec-12 (No. ES3-3205_Dec12) 27-Jun-12 (No. DAE4-601_Jun12) Check 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)	Scheduled Calibration Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check In house check: Oct-13 In house check: Oct-13
Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ESSDV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005 US37390585 S4206	Cal Date (Certificate No.) 01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. 217-01533) 28-Dec-12 (No. ES3-3205_Dec12) 27-Jun-12 (No. DAE4-601_Jun12) Check 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)	Scheduled Calibration Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check In house check: Oct-13 In house check: Oct-13 In house check: Oct-13

Certificate No: D835V2-446_Jan13

Page 1 of 6

≅ BlackBerry	Appendix D for the Black Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR Report Rev 4		
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	March 24-26, 2014			
	December 8-12 2014			

Calibration Laboratory of

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Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland





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Glossary:

TSL tissue simulating liquid

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions: Further details are available from the Validation Report at the end
 of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL: The dipole is mounted with the spacer to position its feed
 point exactly below the center marking of the flat phantom section, with the arms oriented
 parallel to the body axis.
- Feed Point Impedance and Return Loss: These parameters are measured with the dipole
 positioned under the liquid filled phantom. The impedance stated is transformed from the
 measurement at the SMA connector to the feed point. The Return Loss ensures low
 reflected power. No uncertainty required.
- Electrical Delay: One-way delay between the SMA connector and the antenna feed point.
 No uncertainty required.
- · SAR measured: SAR measured at the stated antenna input power.
- SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

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

Certificate No: D835V2-446_Jan13

Page 2 of 6

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR Report Rev 4		
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	July 02 – August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	March 24-26, 2014			
	December 8-12, 2014			

Measurement Conditions

DASY Version	DASY5	V52.8.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy , $dz = 5 mm$	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters
The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.0 æ 6 %	0.92 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	on.	1444

SAR result with Head TSL

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2,38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.39 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.55 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	6.13 W/kg ± 16.5 % (k=2)

Certificate No: D835V2-446_Jan13

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR		
Author Data	Dates of Test	Test Report No	FCC ID:	IC
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	March 24-26, 2014			
	December 8-12, 2014			

Appendix

Antenna Parameters with Head TSL

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

General Antenna Parameters and Design

Electrical Delay (one direction)	1.385 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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

Additional EUT Data

Manufactured by	SPEAG	
Manufactured on	October 24, 2001	

Certificate No: D835V2-446_Jan13

≅ BlackBerry	Appendix D for the Bla Report Rev 4	nckBerry® Smartphone Mod	el RFY111LW SAR	Page 28 (69)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	March 24-26, 2014			
	December 8-12, 2014			

DASY5 Validation Report for Head TSL

Date: 07.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 835 MHz

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

Phantom section: Flat Section

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

DASY52 Configuration:

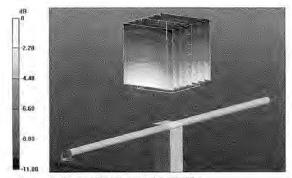
- Probe: ES3DV3 SN3205; ConvF(6.05, 6.05, 6.05); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.4(1052); SEMCAD X 14.6.8(7028)

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 56.650 V/m; Power Drift = 0.01 dB Peak SAR (extrapolated) = 3.61 W/kg

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

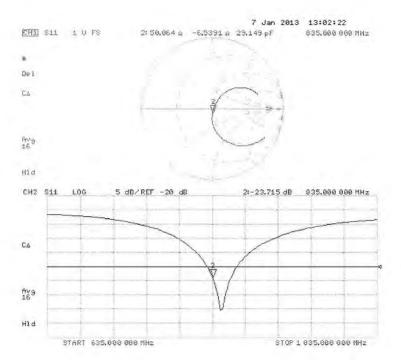
Maximum value of SAR (measured) = 2.79 W/kg



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

≅BlackBerry	Appendix D for the Bla Report Rev 4	ckBerry® Smartphone Modo	el RFY111LW SAR	Page 29 (69)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	March 24-26, 2014			
	December 8-12, 2014			

Impedance Measurement Plot for Head TSL



∷ BlackBerry	Appendix D for the Bla Report Rev 4	nckBerry® Smartphone Mode	I RFY111LW SAR	Page 30(69)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	March 24-26, 2014			
	December 8-12, 2014			

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RTS (RIM Testing Services)

Certificate No: D1900V2-545 Jan13

Accreditation No.: SCS 108

CALIBRATION CERTIFICATE Object D1900V2 - SN: 545 Calibration procedure(s) **QA CAL-05.v9** Calibration procedure for dipole validation kits above 700 MHz Calibration date: January 09, 2013 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 laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%. Calibration Equipment used (M&TE critical for calibration) Scheduled Calibration ID# Cal Date (Certificate No.) Primary Standards Power meter EPM-442A GB37480704 01-Nov-12 (No. 217-01640) Oct-13 Power sensor HP 8481A US37292783 01-Nov-12 (No. 217-01640) Oct-13 SN: 5058 (20k) 27-Mar-12 (No. 217-01530) Apr-13 Reference 20 dB Attenuator 27-Mar-12 (No. 217-01533) Apr-13 Type-N mismatch combination SN: 5047.3 / 06327 Reference Probe ES3DV3 28-Dec-12 (No. ES3-3205_Dec12) Dec-13 SN: 3205 27-Jun-12 (No. DAE4-601_Jun12) Jun-13 DAF4 SN: 601 Scheduled Check Secondary Standards ID# Check Date (in house) 18-Oct-02 (in house check Oct-11) Power sensor HP 8481A MY41092317 In house check: Oct-13 04-Aug-99 (in house check Oct-11) In house check: Oct-13 RF generator R&S SMT-06 100005 Network Analyzer HP 8753E US37390585 S4206 18-Oct-01 (in house check Oct-12) In house check: Oct-13 Name Function Laboratory Technician Calibrated by: Israe El-Naoug Kalja Pokovic Technical Manager Approved by: Issued: January 9, 2013 This calibration certificate shall not be reproduced except in full without written approval of the laboratory

Certificate No: D1900V2-545_Jan13

Page 1 of 6

≅ BlackBerry	Appendix D for the Bla Report Rev 4	ckBerry® Smartphone Modo	el RFY111LW SAR	Page 31(69)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
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	December 8-12, 2014			

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





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

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- EC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions: Further details are available from the Validation Report at the end
 of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL: The dipole is mounted with the spacer to position its feed
 point exactly below the center marking of the flat phantom section, with the arms oriented
 parallel to the body axis.
- Feed Point Impedance and Return Loss: These parameters are measured with the dipole
 positioned under the liquid filled phantom. The impedance stated is transformed from the
 measurement at the SMA connector to the feed point. The Return Loss ensures low
 reflected power, No uncertainty required.
- Electrical Delay: One-way delay between the SMA connector and the antenna feed point.
 No uncertainty required.
- · SAR measured: SAR measured at the stated antenna input power.
- SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

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

Certificate No: D1900V2-545_Jan13

Page 2 of 6

≅ BlackBerry	Appendix D for the Bla Report Rev 4	ckBerry® Smartphone Mode	RFY111LW SAR	Page 32(69)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	March 24-26, 2014			
	December 8-12, 2014			

Measurement Conditions DASY system configuration, as

DASY Version	DASY5	V52.8.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy , $dz = 5 mm$	
Frequency	1900 MHz ± 1 MHz	
(104)mono)	7.9 4.4 3.50 (M-34.7 1.15) ···	

Head TSL parameters

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22,0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.4 ± 6 %	1.38 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	10.0 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	40.2 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.26 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	21.1 W/kg ± 16.5 % (k=2)

≅BlackBerry	Appendix D for the B Report Rev 4	lackBerry® Smartphone Mod	el RFY111LW SAR	Page 33(69)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	July 02 –August 15, 2013	3 RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	March 24-26, 2014			
	December 8-12, 2014			

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$51.0 \Omega + 1.7 \Omega$	
Return Loss	- 34.3 dB	

General Antenna Parameters and Design

1.198 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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

Additional EUT Data

Manufactured by	SPEAG	
Manufactured on	November 15, 2001	

Certificate No: D1900V2-545_Jan13

Page 4 of 6

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR			
Author Data	Dates of Test	Test Report No	FCC ID:	IC	
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW	
	March 24-26, 2014				
	December 8-12, 2014				

DASY5 Validation Report for Head TSL

Date: 09.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System; CW; Frequency: 1900 MHz

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

Phantom section: Flat Section

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

DASY52 Configuration:

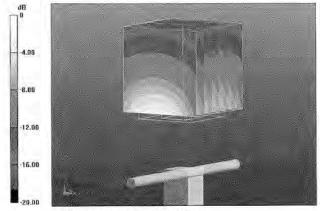
- Probe: ES3DV3 SN3205; ConvF(4.98, 4.98, 4.98); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.4(1052); SEMCAD X 14.6.8(7028)

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 95.493 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 18.1 W/kg

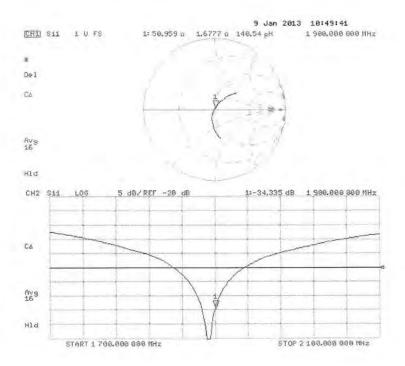
SAR(1 g) = 10 W/kg; SAR(10 g) = 5.26 W/kgMaximum value of SAR (measured) = 12.2 W/kg



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

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR			
Author Data	Dates of Test	Test Report No	FCC ID:	IC	
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW	
	March 24-26, 2014				
	December 8-12, 2014				

Impedance Measurement Plot for Head TSL



≅ BlackBerry	Appendix D for the Bla Report Rev 4	Page 36(69)		
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	March 24-26, 2014			
	December 8-12, 2014			

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

ATS (RIM Testing Services)

Accreditation No.: SCS 108

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S

Certificate No: D2450V2-747_Nov11 CALIBRATION CERTIFICATE Object D2450V2 - SN: 747 QA CAL-05.v8 Calibration procedure(s) Calibration procedure for dipole validation kits above 700 MHz November 09, 2011 Calibration date: 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) Cal Date (Certificate No.) Scheduled Calibration Primary Standards ID# Power meter EPM-442A GB37480704 05-Oct-11 (No. 217-01451) Oct-12 Power sensor HP 8481A US37292783 05-Oct-11 (No. 217-01451) Oct-12 Reference 20 dB Attenuator SN: 5086 (20g) 29-Mar-11 (No. 217-01368) Apr-12 Type-N mismatch combination SN: 5047.2 / 06327 29-Mar-11 (No. 217-01371) Apr-12 Reference Probe ES3DV3 29-Apr-11 (No. ES3-3205_Apr11) SN: 3205 Apr-12 DAE4 SN: 601 04-Jul-11 (No. DAE4-601_Jul11) Jul-12 Secondary Standards ID# Check Date (in house) Scheduled Check Power sensor HP 8481A MY41092317 18-Oct-02 (in house check Oct-11) In house check: Oct-13 RF generator R&S SMT-06 100005 04-Aug-99 (in house check Oct-11) In house check: Oct-13 Network Analyzer HP 8753E US37390585 S4206 18-Oct-01 (In house check Oct-11) In house check: Oct-12 Name Function Calibrated by: Approved by: Issued: November 9, 2011 This calibration certificate shall not be reproduced except in full without written approval of the laboratory

Certificate No: D2450V2-747 Nov11

Page 1 of 6

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Page 37(69)			
Author Data	Dates of Test	ates of Test Test Report No FCC ID:			
Andrew Becker		RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW	
	March 24-26, 2014				
	December 8-12, 2014				

Calibration Laboratory of Schmid & Partner

Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland





S Schweizerlscher Kalibrierdlenst
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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. 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 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- EC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions: Further details are available from the Validation Report at the end
 of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL: The dipole is mounted with the spacer to position its feed
 point exactly below the center marking of the flat phantom section, with the arms oriented
 parallel to the body axis.
- Feed Point Impedance and Return Loss: These parameters are measured with the dipole
 positioned under the liquid filled phantom. The impedance stated is transformed from the
 measurement at the SMA connector to the feed point. The Return Loss ensures low
 reflected power. No uncertainty required.
- Electrical Delay: One-way delay between the SMA connector and the antenna feed point.
 No uncertainty required.
- SAR measured: SAR measured at the stated antenna input power.
- SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

Certificate No: D2450V2-747_Nov11	Page 2 of 6	

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR			
Author Data	Dates of Test	Test Report No	FCC ID:	IC	
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW	
	March 24-26, 2014				
	December 8-12, 2014				

Measurement Conditions

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

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz ≠ 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters
The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22,0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.7 ± 6 %	1,84 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	1H-E	

SAR result with Head TSL

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

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6,39 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	25.3 mW /g ± 16.5 % (k=2)

Certificate No: D2450V2-747_Nov11

Page 3 of 6

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR			
Author Data	Dates of Test	Test Report No	FCC ID:	IC	
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW	
	March 24-26, 2014				
	December 8-12, 2014				

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$52.5 \Omega + 1.3 j\Omega$
Return Loss	- 31.2 dB

General Antenna Parameters and Design

	-
Electrical Delay (one direction)	1.161 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the

feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG		
Manufactured on	December 01, 2003		

Certificate No: D2450V2-747_Nov11

≅BlackBerry		Appendix D for the Black Report Rev 4	Page 40 (69)		
Author Data	D	ates of Test	Test Report No	FCC ID:	IC
Andrew Becker	J	uly 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	N	March 24-26, 2014			
	$ \mathbf{L} $	December 8-12, 2014			

DASY5 Validation Report for Head TSL

Date: 09,11.2011

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 2450 MHz

Medium parameters used: f = 2450 MHz; $\sigma = 1.84$ mho/m; $\varepsilon_r = 37.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

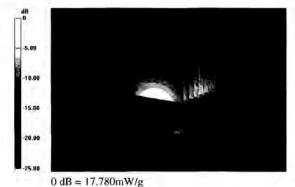
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

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

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

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



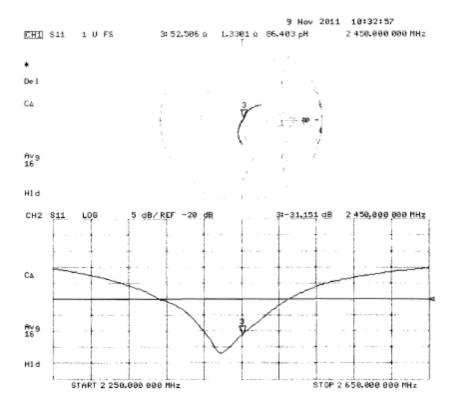
Transcription and a

Certificate No: D2450V2-747_Nov11

Page 5 of 6

∷ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR			
Author Data	Dates of Test	Test Report No	FCC ID:	IC	
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW	
	March 24-26, 2014				
	December 8-12, 2014				

Impedance Measurement Plot for Head TSL



≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR			
Author Data	Dates of Test	Test Report No	FCC ID:	IC	
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW	
	March 24-26, 2014				
	December 8-12, 2014				

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S Swiss Calibration Service

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

Multilateral Agreement for the recognition of calibration certificates

RTS (RIM Testing Services)

Certificate No: D5GHzV2-1033_Nov11

Accreditation No.: SCS 108

Calibration procedure for dipole validation kits between 3-6 GHz November 15, 2011 November 22 ± 3)**C and humidity < 70%. Scheduled Calibration Equipment used (M&TE critical for calibration) November EPM-442A GB37480704 GB374	pject	D5GHzV2 - SN:	1033	coattable to the control of
This calibration date: November 15, 2011 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. It 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) Conservation Equipment	Calibration procedure(s)	Calibration avena	MANUFACTURE TO THE SECOND PROPERTY OF THE PROP	A Longitude Cold Cold
Content Cont	Calibration date:			
Calibration Equipment used (M&TE critical for calibration) Primary Standards ID # Cal Date (Certificate No.) Scheduled Calibration Power meter EPM-442A GB37480704 05-Oct-11 (No. 217-01451) Oct-12 Power sensor HP 8481A US37292783 05-Oct-11 (No. 217-01451) Oct-12 Reference 20 dB Attenuator SN: 5086 (20g) 29-Mar-11 (No. 217-01368) Apr-12 Type-N mismatch combination SN: 5047.2 / 06327 29-Mar-11 (No. 217-01371) Apr-12 Reference Probe EX3DV4 SN: 3503 04-Mar-11 (No. EX3-3503_Mar-11) Mar-12 DAE4 SN: 601 04-Jul-11 (No. DAE4-601_Jul-11) Jul-12 Secondary Standards ID # Check Date (in house) Scheduled Check Power sensor HP 8481A MY41092317 18-Oct-02 (in house check Oct-11) In house check: Oct-13 Reference PR&S SMT-06 US37390685 S4206 18-Oct-01 (in house check Oct-11) In house check: Oct-13 Name Function Signature Dimce Illex Laboratory Technician				
Primary Standards ID # Cal Date (Certificate No.) Scheduled Calibration Prover meter EPM-442A G637480704 05-Oct-11 (No. 217-01451) Oct-12 Prover sensor HP 8481A US37292783 05-Oct-11 (No. 217-01451) Oct-12 Prover sensor HP 8481A US37292783 O5-Oct-11 (No. 217-01451) Oct-12 Prover sensor HP 8481A US37292783 O5-Oct-11 (No. 217-01368) Apr-12 Prover Sensor HP 8481A Ott-12 (No. 217-01371) Oct-12 Prover sensor HP 8481A Ott-12 (No. 217-01371) Oct-12 Prover sensor HP 8481A Oct-12 (In house) Oct-13 Prover sensor HP 8481A Oct-13 (In house check Oct-11) In house check: Oct-13 Prover sensor HP 8753E US37390585 S4206 18-Oct-01 (In house check Oct-11) In house check: Oct-12 Name Function Signature Dirnice Illex Dirnice Ille	All calibrations have been condu	cted in the closed laborator	ry facility: environment temperature (22 ± 3)°C	C and humidity < 70%.
Content Cont	Calibration Equipment used (M&	TE critical for calibration)		
Power sensor HP 8481A Reference 20 dB Attenuator SN: 5086 (20g) 29-Mar-11 (No. 217-01368) Apr-12 Reference Probe EX3DV4 SN: 5087-2 / 06327 29-Mar-11 (No. 217-01371) Apr-12 Reference Probe EX3DV4 SN: 3503 04-Mar-11 (No. EX3-3503_Mar-11) Mar-12 DAE4 SN: 601 04-Jul-11 (No. DAE4-601_Jul11) Jul-12 Secondary Standards ID # Check Date (in house) Scheduled Check Power sensor HP 8481A MY41092317 18-Oct-02 (in house check Oct-11) In house check: Oct-13 RF generator R&S SMT-06 Network Analyzer HP 8753E US37390685 S4206 18-Oct-01 (in house check Oct-11) In house check: Oct-12 Name Function Signature Dimce lilex Laboratory Technician				
SN: 5086 (20g) 29-Mar-11 (No. 217-01368) Apr-12	rimary Standards	ID#	Call Date (Certificate No.)	Scheduled Calibration
SN: 5047.2 / 06327 29-Mar-11 (No. 217-01371) Apr-12				
SN: 3503	ower meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
SN: 601	Power meter EPM-442A Power sensor HP 8481A	GB37480704 US37292783	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451)	Oct-12 Oct-12
Secondary Standards ID # Check Date (in house) Scheduled Check Nower sensor HP 8481A MY41092317 18-Oct-02 (in house check Oct-11) In house check: Oct-13 In house check: Oct-12 Name Function Signature Direct liev Laboratory Technician	Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator	GB37480704 US37292783 SN: 5086 (20g)	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451) 29-Mar-11 (No. 217-01368)	Oct-12 Oct-12 Apr-12
Nower sensor HP 8481A IF generator R&S SMT-06 Ietwork Analyzer HP 8753E Name Name Function Laboratory Technician Name Signature Laboratory Technician Nower sensor HP 8481A MY41092317 18-Oct-02 (in house check Oct-11) In house check: Oct-13 In house check:	Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination	GB37480704 US37292783 SN: 5086 (20g) SN: 5047.2 / 06327	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01371)	Oct-12 Oct-12 Apr-12 Apr-12
AF generator R&S SMT-06 Network Analyzer HP 8753E 100005 04-Aug-99 (in house check Oct-11) In house check: Oct-13 In house check: Oct-12 Name Function Signature Dimce lilev Laboratory Technician	Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4	GB37480704 US37292783 SN: 5086 (20g) SN: 5047.2 / 06327 SN: 3503	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01371) 04-Mar-11 (No. EX3-3503_Mar11)	Oct-12 Oct-12 Apr-12 Apr-12 Mar-12
Name Punction Laboratory Technician US37390585 S4206 18-Oct-01 (in house check Oct-11) In house check: Oct-12 Name Punction Laboratory Technician	Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenustor (ype-N mismatch combination Reference Probe EX3DV4 AAE4	GB37480704 US37292783 SN: 5086 (20g) SN: 5047.2 / 06327 SN: 3503 SN: 601	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01371) 04-Mar-11 (No. EX3-3503_Mar11) 04-Jul-11 (No. DAE4-601_Jul11)	Oct-12 Oct-12 Apr-12 Apr-12 Mar-12 Jul-12
Name Function Signature Calibrated by: Direct like Laboratory Technician D-XXXX	Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Fype-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards	GB37480704 US37292783 SN: 5086 (20g) SN: 5047.2 / 06327 SN: 3503 SN: 601	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01371) 04-Mar-11 (No. EX3-3503_Mar/11) 04-Jul-11 (No. DAE4-601_Jul11) Check Date (in house)	Oct-12 Oct-12 Apr-12 Apr-12 Mar-12 Jul-12 Scheduled Check
Calibrated by: Direce Illev Laboratory Technician 0-2000	Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power sensor HP 8481A	GB37480704 US37292783 SN: 5086 (20g) SN: 5047.2 / 06327 SN: 3503 SN: 601	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01371) 04-Mar-11 (No. EX3-3503_Mar/11) 04-Jul-11 (No. DAE4-601_Jul/11) Check Date (in house)	Oct-12 Oct-12 Apr-12 Apr-12 Mar-12 Jul-12 Scheduled Check In house check: Oct-13
U XXX	Primary Standards Power meter EPM-442A Power sensor HP B481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power sensor HP B481A RF generator R&S SMT-06 Network Analyzer HP 8753E	GB37480704 US37292783 SN: 5086 (20g) SN: 5047.2 / 06327 SN: 3503 SN: 601 ID # MY41092317 100005	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01371) 04-Mar-11 (No. EX3-3503_Mar11) 04-Jul-11 (No. DAE4-601_Jul11) Check Date (in house) 18-Oct-02 (in house check Oct-11)	Oct-12 Oct-12 Apr-12 Apr-12 Apr-12 Mar-12 Jul-12 Scheduled Check In house check: Oct-13 In house check: Oct-13
Approved by: Katja Pokovio Fechnical Manager	Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06	GB37480704 US37292783 SN: 5086 (20g) SN: 5047.2 / 06327 SN: 3503 SN: 601 ID # MY41092317 100005 US37390585 S4206	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. EX3-3503_Mar11) 04-Mar-11 (No. DAE4-601_Jul11) Check 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-11)	Oct-12 Oct-12 Apr-12 Apr-12 Mar-12 Jul-12 Scheduled Check In house check: Oct-13 In house check: Oct-13 In house check: Oct-12
	Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator (ype-N mismatch combination Reference Probe EX3DV4)AE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer HP 8753E	GB37480704 US37292783 SN: 5086 (20g) SN: 5047.2 / 06327 SN: 3503 SN: 601 ID # MY41092317 100005 US37390585 S4206 Name	05-Oct-11 (No. 217-01451) 05-Oct-11 (No. 217-01451) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. EX3-3503_Mar11) 04-Mar-11 (No. DAE4-601_Jul11) Check 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-11)	Oct-12 Oct-12 Apr-12 Apr-12 Mar-12 Jul-12 Scheduled Check In house check: Oct-13 In house check: Oct-13 In house check: Oct-12

Certificate No: D5GHzV2-1033_Nov11

Page 1 of 8

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR		
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	March 24-26, 2014			
	December 8-12, 2014			

Calibration Laboratory of Schmid & Partner

Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland





S Schweizerischer Kalibrierdienst
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:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- EC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions: Further details are available from the Validation Report at the end
 of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL: The dipole is mounted with the spacer to position its feed
 point exactly below the center marking of the flat phantom section, with the arms oriented
 parallel to the body axis.
- Feed Point Impedance and Return Loss: These parameters are measured with the dipole
 positioned under the liquid filled phantom. The impedance stated is transformed from the
 measurement at the SMA connector to the feed point. The Return Loss ensures low
 reflected power. No uncertainty required.
- Electrical Delay: One-way delay between the SMA connector and the antenna feed point.
 No uncertainty required.
- SAR measured: SAR measured at the stated antenna input power.
- SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

Certificate No: D5GHzV2-1033_Nov11 Page 2 of 8

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR			
Author Data	Dates of Test	Test Report No	FCC ID:	IC	
Andrew Becker		RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW	
	March 24-26, 2014				
	December 8-12, 2014				

Measurement Conditions

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

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom 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	34.6 ± 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 ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.16 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	80.8 mW /g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.33 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	23.0 mW /g ± 16.5 % (k=2)

Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

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

SAR result with Head TSL at 5500 MHz

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

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.50 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	24.7 mW / g ± 16.5 % (k=2)

Certificate No: D5GHzV2-1033_Nov11

≅ BlackBerry	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR Report Rev 4			Page 45(69)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	March 24-26, 2014			
	December 8-12, 2014			

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	33.7 ± 6 %	5.03 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.03 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	79.4 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2,28 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	22.5 mW / g ± 16.5 % (k=2)

≅ BlackBerry	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR Report Rev 4			Page 46(69)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	March 24-26, 2014			
	December 8-12, 2014			

Appendix

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	51.1 Ω - 8.7 jΩ
Return Loss	- 21.2 dB

Antenna Parameters with Head TSL at 5500 MHz

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

Antenna Parameters with Head TSL at 5800 MHz

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

General Antenna Parameters and Design

Electrical Delay (one direction)	1.202 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 09, 2004

Certificate No: D5GHzV2-1033_Nov11

≅ BlackBerry	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR Report Rev 4			Page 47(69)
Author Data	Dates of Test	IC		
Andrew Becker	•	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	March 24-26, 2014			
	December 8-12, 2014			

DASY5 Validation Report for Head TSL

Date: 15.11.2011

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz Medium parameters used: f = 5200 MHz; $\sigma = 4.46$ mho/m; $\epsilon_r = 34.6$; $\rho = 1000$ kg/m³, Medium parameters used: f = 5500 MHz; $\sigma = 4.75$ mho/m; $\epsilon_r = 34.2$; $\rho = 1000$ kg/m³, Medium parameters used: f = 5800 MHz; $\sigma = 5.03$ mho/m; $\epsilon_r = 33.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 SN3503; ConvF(5.41, 5.41, 5.41), ConvF(4.91, 4.91, 4.91), ConvF(4.81, 4.81, 4.81); Calibrated: 04.03.2011
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.6.2(482); SEMCAD X 14.4.5(3634)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 65.595 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 30.134 W/kg

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

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

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

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

Peak SAR (extrapolated) = 35.056 W/kg

SAR(1 g) = 8.82 mW/g; SAR(10 g) = 2.5 mW/gMaximum value of SAR (measured) = 21.019 mW/g

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

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

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

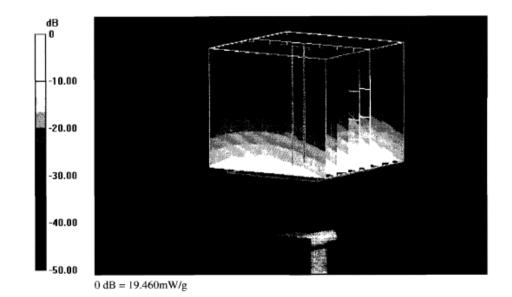
Peak SAR (extrapolated) = 33.743 W/kg

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

Certificate No: D5GHzV2-1033_Nov11

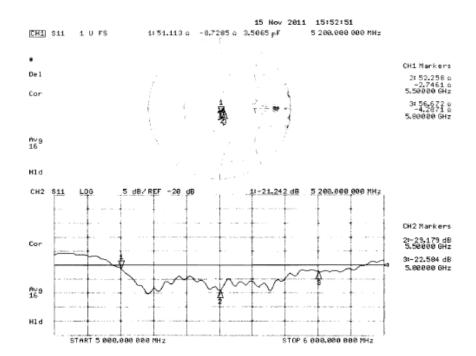
Page 6 of 8

≅ BlackBerry	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR Report Rev 4			Page 48(69)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	March 24-26, 2014			
	December 8-12, 2014			



≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR						
Author Data	Dates of Test	Test Report No	FCC ID:	IC				
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW				
	March 24-26, 2014							
	December 8-12, 2014							

Impedance Measurement Plot for Head TSL



∷ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR						
Author Data	Dates of Test	Test Report No	FCC ID:	IC				
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW				
	March 24-26, 2014							
	December 8-12, 2014							

Author Data Andrew Becker Document Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR Report Rev 4 Dates of Test July 02 -August 15, 2013 March 24-26, 2014 December 8-12, 2014 Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR RTS-6046-1308-34 Rev 6 RTS-6046-1308-34 Rev 6 L6ARFY110LW Page 51(69) IC 2503A-RFY110LW

Probe 3592

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





Schweizerischer Kallbrierdienst Service suisse d'étalonnage Servizio svizzero di taratura Swiss Catibration Service

Accredited by the Swiss Accreditation Service (SAS)

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

Multitateral Agreement for the recognition of calibration certificates

EX3DV4-SN:3592

Client

Object

Blackberry Waterloo

Certificate No: EX3-3592 Nov14

Accreditation No.: SCS 108

CALIBRATION CERTIFICATE

. . .

Calibration procedure(s)

QA CAL-61,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 calthration cartificate 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 (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 ESUDV2	SN: 3013	30-Dec-13 (No. ES3-3013, Dec13)	Dec-14
DAE4	SN: 860	13-Dec-13 (No. DAE4-660_Dec13)	Dec-14
Secondary Standards	(0)	Check Date (in house)	Scheduled Check
RI- generator HP 8648C	US3642U01700	4-Aug-89 (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 sheck: Ost-16

	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	Seef My
Approved by:	Kalja Pukovic	Technical Manager	RE US
			Issued: November 10, 2014

Certificate No. EX3-3592_Nov14

Page 1 of 11

≅ BlackBerry		Appendix D for the Black Report Rev 4	Page 52(69)		
Author Data	D	ates of Test	Test Report No	FCC ID:	IC
Andrew Becker	J	uly 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	N	Iarch 24-26, 2014			
	Г	ecember 8-12, 2014			

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)

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Glossary:

TSL tissue simulating liquid
NORMx,y,z sensitivity in free space
ConvF sensitivity in TSL / NORMx,y,z
diode compression point
CF crest factor (1/duty cycle) of th

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

Polarization φ σ 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., $\theta = 0$ 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:

- 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

Methods Applied and Interpretation of Parameters:

- NORMx,y,z' Assessed for E-field polarization 3 = 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 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 diode.
- ConvF and Boundary Effect Parameters: 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 * 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. EX3-3592 Nov14

Page 2 of 11

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR						
Author Data	Dates of Test	Test Report No	FCC ID:	IC				
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW				
	March 24-26, 2014							
	December 8-12, 2014							

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

Page 3 of 11

≅ BlackBerry	A	ocument Appendix D for the Blac Report Rev 4	Page 54(69)		
Author Data	Dates o	of Test	Test Report No	FCC ID:	IC
Andrew Becker	July 02 –August 15, 2013		RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	Mar	rch 24-26, 2014			
	Dec	ember 8-12, 2014			

November 10, 2014 EX3DV4-SN:3592

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

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)	
Norm (µV/(V/m) ²) ^A	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	С	D dB	VR mV	Unc ^E (k=2)
0	CW	×	0.0	0.0	1.0	0.00	145.9	±3.3 %
	10-11-11-11	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

Page 4 of 11

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

⁴ Numerical linearization parameter, uncertainty not required.
E Uncertainty is determined using the max, deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR					
Author Data	Dates of Test	Test Report No	FCC ID:	IC			
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW			
	March 24-26, 2014						
	December 8-12, 2014						

EX3DV4-SN:3592

November 10, 2014

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

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (Sim) F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (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 350 MHz of ± 100 MHz only applies for DASY v1.4 and higher (ace Page 2), else it is restricted to ± 50 MHz. The uncertainty is the HSS 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, 84, 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 (a and a) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of lissue parameters ic and a) is restricted to ± 5%. The uncertainty is the RSS of the CanvF uncertainty for indicated target tissue parameters.

Alpha/Depth are determined during calibration. SPERAS 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 3-8 GHz at any distance larger than half the probe to diemeter from the boundary.

Certificate No. EX3-3592 Nov14

Page 5 of 11

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR						
Author Data	Dates of Test	Test Report No	FCC ID:	IC				
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW				
	March 24-26, 2014							
	December 8-12, 2014							

EX3DV4 8N: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 F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha ³	Depth ^C (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 trequencies below 3 GHz, the validity of tissue parameters (c and c) can be released to ± 10% if figured compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (c and d) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated larger tissue parameters.

Alpha/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 heliow ± 2% for frequencies between 3 6 GHz at any distance larger than balf the probe tip claimeter from the boundary.

Certificate No. EX3-3592_Nov14

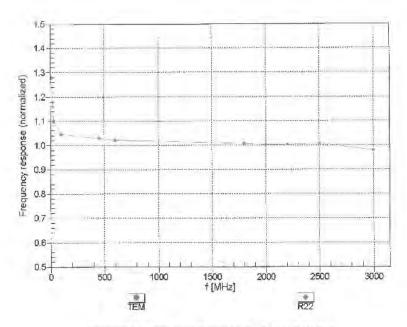
Page 6 of 11

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR				
Author Data	Dates of Test	Test Report No	FCC ID:	IC		
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW		
	March 24-26, 2014					
	December 8-12, 2014					

EX3DV4- SN:3592

November 10, 2014

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



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

Certificate No: EX3-3592 Nov14

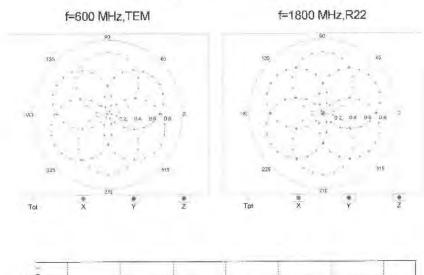
Page 7 of 11

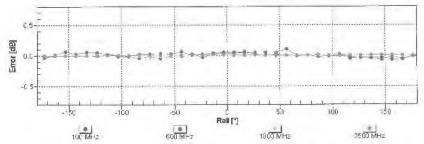
≅BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR			
Author Data	Dates of Test	Test Report No	FCC ID:	IC	
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW	
	March 24-26, 2014				
	December 8-12, 2014				

EX3DV4- SN:3592

November 10, 2014

Receiving Pattern (\$\phi\$), 9 = 0°





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

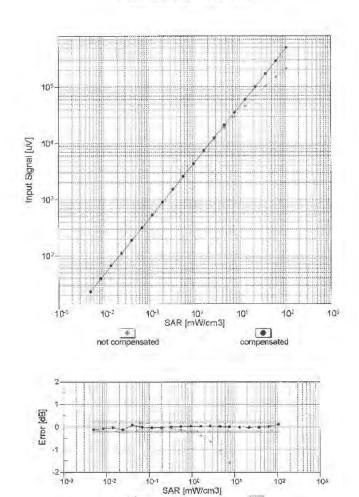
Certificate No: EX3-3592_Nov14

Page 8 of 11

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR		
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	March 24-26, 2014			
	December 8-12, 2014			

EX3DV4 SN:3592 November 10, 2014

Dynamic Range f(SAR_{head}) (TEM cell , f_{eval}= 1900 MHz)



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

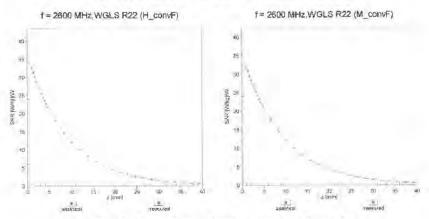
Certificate No: EX3-3592 Nov14

Page 9 of 11

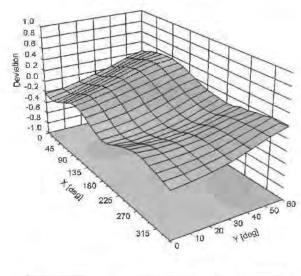
≅BlackBerry					Page 60(69)
Author Data	Dates of Test	Test Report No		FCC ID:	IC
Andrew Becker	July 02 –Augus	t 15, 2013 RTS-6046-	1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	March 24-26, 2	2014			
	December 8-12	2014			

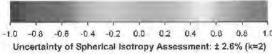
EX3DV4- SN:3592 November 10, 2014

Conversion Factor Assessment



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





Certificate No: EX3-3592_Nov14

Page 10 of 11

≅BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR			
Author Data	Dates of Test	Test Report No	FCC ID:	IC	
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW	
	March 24-26, 2014				
	December 8-12, 2014				

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 mm
Tip Length	9 mm
Tip Diameter	2,5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1,4 mm

Certificate No: EX3-3592_Nov14

Page 11 of 11

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR				
Author Data	Dates of Test	Test Report No	FCC ID:	IC		
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW		
	March 24-26, 2014					
	December 8-12, 2014					

5000 Dipole

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





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Cliant

Blackberry Waterloo

Certificate No: D5GHzV2-1033_Nov13

Accreditation No.: SCS 108

CALIBRATION CERTIFICATE D5GHzV2 - SN: 1033 Object **QA CAL-22.V2** Calibration procedure(s) Calibration procedure for dipole validation kits between 3-6 GHz November 08, 2013 Calibration date: This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (Si). The measurements and the uncertainties with contidence 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 numidity < 70%. Calibration Equipment used (M&TE critical for calibration) Cal Date (Certificate No.) Scheduled Calibration Primary Standards Power meter EPM-442A GB37480704 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) Oct-14 D\$37292783 Power sensor HP 8481A 09-Oct-13 (No. 217-01828). Oct-14 Power sensor HP 8481A MY41092317 Reference 20 dB Attenuator SN: 5058 (20k) 04-Apr 13 (No. 217-01736) Apr-14 Type-N mismatch combination SN: 5047.3 / 06327 04-Apr-13 (No. 217-01739) Apr-14 SN: 3205 28-Dec-12 (No. ES3-3205_Dec12) Reference Probe ES3DV3 25-Apr-13 (No. DAE4-601_Apr13) Apr-14 DAEA SN: 801 Secondary Standards De Check Date (in house) Scheduled Check 04-Aug-99 (in house check Oct-13) In house check: Oct-15 RF generator R&S SMT-06 100005 US37390585 S4206 18-Oct-01 (in house check Oct-13) In house check: Oct-14 Nelwork Analyzer HP 8753E Function Name Laboratory Technician Calibrated by: Claudio Leubler Technical Manager Approved by: Katja Poković Issued: November 8, 2013. This calibration cartificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: D5GHzV2-1033_Nov13

Page 1 of 8

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR		
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	March 24-26, 2014			
	December 8-12, 2014			

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





S Schweizerischer Kalibrierdienst
Service sulsse d'étalennage
Servizie svizzere 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%.

Certificaté No: D5GHzV2-1033_Nov13

Page 2 of 8

≅BlackBerry	Appendix D for the Bla Report Rev 4	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR			
Author Data	Dates of Test	Test Report No	FCC ID:	IC	
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW	
	March 24-26, 2014				
	December 8-12, 2014				

Measurement Conditions

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 cm3 (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 mhq/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)

Certificate No: D5GHzV2-1033_Nov13

Page 3 of 8

≅ BlackBerry			Page 65(69)	
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	March 24-26, 2014			
	December 8-12, 2014			

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 ³ (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)

≅ BlackBerry		Appendix D for the Black Report Rev 4	ckBerry® Smartphone Model	RFY111LW SAR	Page 66(69)
Author Data	Da	ates of Test	Test Report No	FCC ID:	IC
Andrew Becker	J	uly 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	N	Iarch 24-26, 2014			
	\mathbf{n}	ecember 8-12, 2014			

Appendix

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	49.1 Ω - 9.6 Ω
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 Ω - 4.0 jΩ		
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-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	July 09, 2004		

Certificate No: D5GHzV2-1033 Nov13

Page 5 of 8

≅ BlackBerry	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR Report Rev 4			Page 67(69)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	March 24-26, 2014			
	December 8-12, 2014			

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; $\sigma = 4.46$ S/m; $\epsilon_e = 35$; $\rho = 1000$ kg/m³, Medium parameters used: f = 5500 MHz; $\sigma = 4.75$ S/m; $\epsilon_e = 34.6$; $\rho = 1000$ kg/m³ Medium parameters used: f = 5800 MHz; $\sigma = 5.06$ S/m; $\epsilon_e = 34.2$; $\rho = 1000$ kg/m³

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

Certificate No: D5GHzV2-1033_Nov13

Page 6 of 8

≅ BlackBerry	Appendix D for the Bla Report Rev 4	Page 68(69)		
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	March 24-26, 2014			
	December 8-12, 2014			



∷ BlackBerry	Appendix D for the BlackBerry® Smartphone Model RFY111LW SAR Report Rev 4			Page 69(69)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	July 02 –August 15, 2013	RTS-6046-1308-34 Rev 6	L6ARFY110LW	2503A-RFY110LW
	March 24-26, 2014			
	December 8-12, 2014			

Impedance Measurement Plot for Head TSL

