Testing Service	Appendix D for the BlackBe Report	Page 1(43)		
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Mar 04 – May 13, 2013	RTS-6036-1305-06	L6ARFS120LW	2503A-RFS120LW

APPENDIX D: PROBE & DIPOLE CALIBRATION DATA

Testing Service	Appendix D for the BlackBo Report	erry® Smartphone Mo	odel RFS121LW SAR	Page 2(43)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Mar 04 – May 13, 2013	RTS-6036-1305-06	L6ARFS120LW	2503A-RFS120LW
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Calibration Laboratory of	
Schmid & Partner	
Engineering AG	
Zeughausstrasse 43, 8004 Zurich, Switzerland	





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

Accreditation No.: SCS 108

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

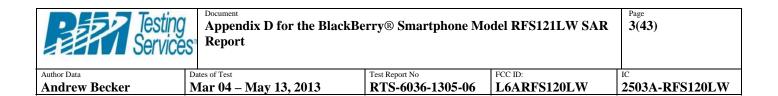
Client RTS (RIM Testing Services)

Certificate No: ES3-3225_Jan13

Dbject	ES3DV3 - SN:32	25	
Calibration procedure(s)	56566 CONTRACTOR DO DO DO DO DO DO DO DO DO	A CAL-23.v4, QA CAL-25.v4 dure for dosimetric E-field probes	
Calibration date:	January 10, 2013	0	
he measurements and the unc	ertainties with confidence pr ucted in the closed laborator	onal standards, which realize the physical units obability are given on the following pages and y facility: environment temperature $(22 \pm 3)^{\circ}C d$	are part of the certificate.
saloration Equipment used (wo	-1		
Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
and the second se			
ower sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Power sensor E4412A Reference 3 dB Attenuator Reference 20 dB Attenuator	SN: S5054 (3c) SN: S5086 (20b)	27-Mar-12 (No. 217-01531) 27-Mar-12 (No. 217-01529)	Apr-13 Apr-13
Power sensor E4412A Reference 3 dB Attenuator Reference 20 dB Attenuator Reference 30 dB Attenuator	SN: S5054 (3c) SN: S5086 (20b) SN: S5129 (30b)	27-Mar-12 (No. 217-01531) 27-Mar-12 (No. 217-01529) 27-Mar-12 (No. 217-01532)	Apr-13 Apr-13 Apr-13
Power sensor E4412A Reference 3 dB Attenuator Reference 20 dB Attenuator Reference 30 dB Attenuator Reference Probe ES3DV2	SN: S5054 (3c) SN: S5086 (20b) SN: S5129 (30b) SN: 3013	27-Mar-12 (No. 217-01531) 27-Mar-12 (No. 217-01529) 27-Mar-12 (No. 217-01532) 28-Dec-12 (No. ES3-3013_Dec12)	Apr-13 Apr-13 Apr-13 Dec-13
Power sensor E4412A Reference 3 dB Attenuator Reference 20 dB Attenuator Reference 30 dB Attenuator Reference Probe ES3DV2	SN: S5054 (3c) SN: S5086 (20b) SN: S5129 (30b)	27-Mar-12 (No. 217-01531) 27-Mar-12 (No. 217-01529) 27-Mar-12 (No. 217-01532)	Apr-13 Apr-13 Apr-13
Power sensor E4412A Reference 3 dB Attenuator Reference 20 dB Attenuator Reference 30 dB Attenuator Reference Probe ES3DV2 DAE4 Secondary Standards	SN: S5054 (3c) SN: S5086 (20b) SN: S5129 (30b) SN: 3013	27-Mar-12 (No. 217-01531) 27-Mar-12 (No. 217-01529) 27-Mar-12 (No. 217-01532) 28-Dec-12 (No. ES3-3013_Dec12)	Apr-13 Apr-13 Apr-13 Dec-13
Power sensor E4412A Reference 3 dB Attenuator Reference 20 dB Attenuator Reference 30 dB Attenuator Reference Probe ES3DV2 DAE4	SN: S5054 (3c) SN: S5086 (20b) SN: S5129 (30b) SN: 3013 SN: 660	27-Mar-12 (No. 217-01531) 27-Mar-12 (No. 217-01529) 27-Mar-12 (No. 217-01532) 28-Dec-12 (No. ES3-3013_Dec12) 20-Jun-12 (No. DAE4-660_Jun12) Check Date (in house)	Apr-13 Apr-13 Apr-13 Dec-13 Jun-13
Power sensor E4412A Reference 3 dB Attenuator Reference 20 dB Attenuator Reference 30 dB Attenuator Reference Probe ES3DV2 DAE4 Secondary Standards	SN: \$5054 (3c) SN: \$5086 (20b) SN: \$5129 (30b) SN: 3013 SN: 660 ID	27-Mar-12 (No. 217-01531) 27-Mar-12 (No. 217-01529) 27-Mar-12 (No. 217-01532) 28-Dec-12 (No. ES3-3013_Dec12) 20-Jun-12 (No. DAE4-660_Jun12)	Apr-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check
Power sensor E4412A Reference 3 dB Attenuator Reference 20 dB Attenuator Reference 30 dB Attenuator Reference Probe ES3DV2 DAE4 Secondary Standards RF generator HP 8648C	SN: \$5054 (3c) SN: \$5086 (20b) SN: \$5129 (30b) SN: 3013 SN: 660 ID US3642U01700	27-Mar-12 (No. 217-01531) 27-Mar-12 (No. 217-01529) 27-Mar-12 (No. 217-01532) 28-Dec-12 (No. ES3-3013_Dec12) 20-Jun-12 (No. DAE4-660_Jun12) Check Date (in house) 4-Aug-99 (in house check Apr-11)	Apr-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check In house check: Apr-13
Power sensor E4412A Reference 3 dB Attenuator Reference 20 dB Attenuator Reference 30 dB Attenuator Reference Probe ES3DV2 DAE4 Secondary Standards RF generator HP 8648C	SN: \$5054 (3c) SN: \$5086 (20b) SN: \$5129 (30b) SN: 3013 SN: 660 ID U\$3642U01700 U\$37390585	27-Mar-12 (No. 217-01531) 27-Mar-12 (No. 217-01529) 27-Mar-12 (No. 217-01532) 28-Dec-12 (No. ES3-3013_Dec12) 20-Jun-12 (No. DAE4-660_Jun12) Check Date (in house) 4-Aug-99 (in house check Apr-11) 18-Oct-01 (in house check Oct-12)	Apr-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check In house check: Apr-13 In house check: Oct-13
Power sensor E4412A Reference 3 dB Attenuator Reference 20 dB Attenuator Reference 30 dB Attenuator Reference Probe ES3DV2 DAE4 Secondary Standards RF generator HP 8648C Network Analyzer HP 8753E	SN: \$5054 (3c) SN: \$5086 (20b) SN: \$5129 (30b) SN: 3013 SN: 660 ID U\$3642U01700 U\$37390585 Name	27-Mar-12 (No. 217-01531) 27-Mar-12 (No. 217-01529) 27-Mar-12 (No. 217-01529) 28-Dec-12 (No. ES3-3013_Dec12) 20-Jun-12 (No. DAE4-660_Jun12) Check Date (in house) 4-Aug-99 (in house check Apr-11) 18-Oct-01 (in house check Oct-12) Function	Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check In house check: Apr-13 In house check: Oct-13

Certificate No: ES3-3225_Jan13

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





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

Accreditation No.: SCS 108

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

Methods Applied and Interpretation of Parameters:

- NORMx,y,z: Assessed for E-field polarization 9 = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E2-field uncertainty inside TSL (see below ConvF).
- NORM(f)x,y,z = NORMx,y,z * frequency_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCPx,y,z: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal 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.

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Andrew Becker	Mar 04 – May 13, 2013	RTS-6036-1305-06	L6ARFS120LW	2503A-RFS120LW

January 10, 2013

Probe ES3DV3

SN:3225

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

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

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Testing Service	del RFS121LW SAR	Page 5(43)		
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Mar 04 – May 13, 2013	RTS-6036-1305-06	L6ARFS120LW	2503A-RFS120LW

January 10, 2013

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

Basic Calibration Parameters

	Sensor X Sensor Y		Sensor Z	Unc (k=2)	
Norm $(\mu V/(V/m)^2)^A$	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 ^E (k=2)
0	CW	X	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%.

- ^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Pages 5 and 6). ^B 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 relationary set of the square of the squa field value.

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Author Data Dates of Test Test Report No FCC ID: IC				
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Mar 04 – May 13, 2013	RTS-6036-1305-06	L6ARFS120LW	2503A-RFS120LW

January 10, 2013

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

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)
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 %

^C 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.
^F At frequencies below 3 GHz, the validity of tissue parameters (z 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 (z and d) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Certificate No: ES3-3225_Jan13

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January 10, 2013

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

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)
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 %

^C 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. ^F Al 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. Al 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.

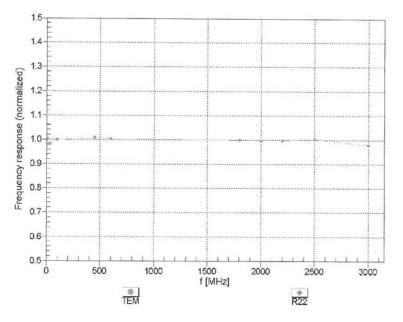
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January 10, 2013

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



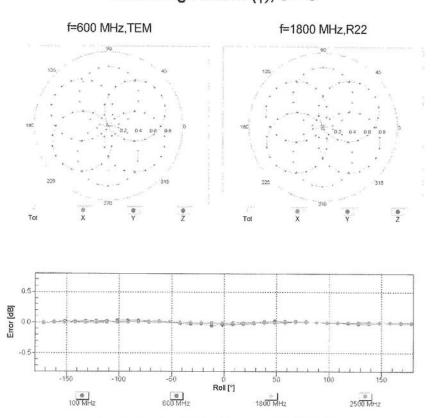
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

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January 10, 2013



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

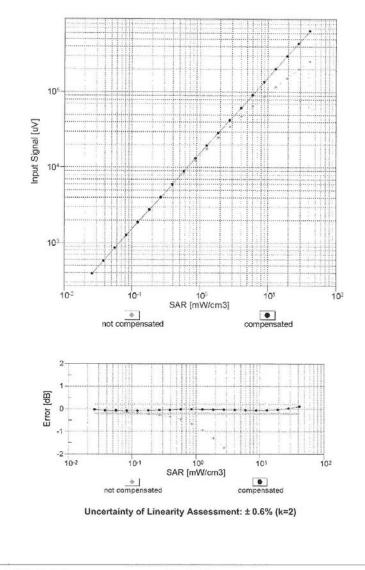
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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January 10, 2013



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

Certificate No: ES3-3225_Jan13

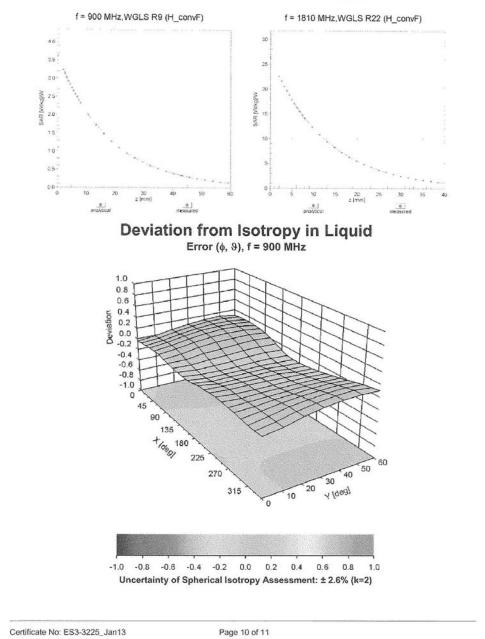
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Testing Service	Appendix D for the BlackBe Report	erry® Smartphone Mo	odel RFS121LW SAR	Page 11(43)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Mar 04 – May 13, 2013	RTS-6036-1305-06	L6ARFS120LW	2503A-RFS120LW

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Conversion Factor Assessment



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Andrew Becker	Mar 04 – May 13, 2013	RTS-6036-1305-06	L6ARFS120LW	2503A-RFS120LW

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

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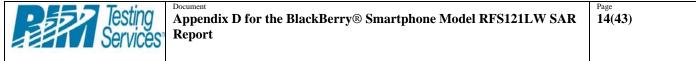
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Client	RTS (RIM Testing Services)	c
Multilate	ral Agreement for the recognition of celibration certifi	86
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Accredite	d by the Swiss Accreditation Service (SAS)	A
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Certificate No: D835V2-4d043_Apr11

Accreditation No.: SCS 108

Object	D835V2 - SN: 4d	1043	
Calibration procedure(s)	QA CAL-05.v8 Calibration proce	dure for dipole validation kits	
Calibration date:	April 07, 2011		
The measurements and the unce	ertainties with confidence p cted in the closed laborato	ional standards, which realize the physical un robability are given on the following pages an ry facility: environment temperature $(22\pm3)^2$	d are part of the cartificate.
Partition of the State of the S	TT a shi a shi sa sa dina shi ta shi ta shi shi ta shi		
Primary Standards	10 #	Cal Date (Certificate No.)	Scheduled Calibration
Primary Standards Power meter EPM-442A	10 # GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Primary Standards Power meter EPM-442A Power sensor HP 8481A	10 # G837480704 US37292783	06-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01266)	Oct-11 Oct-11
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator	10 # G837480704 US37292783 SN: 5086 (20g)	06-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01266) 29-Mar-11 (No. 217-01368)	Oct-11 Oct-11 Apr-12
Primary Standards Power meter EPM-442A Power sensor HP 8481A Peference 20 dB Attenuator Type-N mismatch combination	10 # G837480704 US37292783	06-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01268) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01371)	Oct-11 Oct-11
Primary Standards Power meter EPM-442A Power sensor HP 8481A Peference 20 dB Attenuator Type-N Mismatch combinaton Reference Probe ES3DV3	10 # G837480704 U937292783 SN: 5086 (20g) SN: 5047.2 / 06327	06-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01266) 29-Mar-11 (No. 217-01368)	Oct-11 Oct-11 Apr-12 Apr-12
Primary Standards Power meter EPM-442A Power sensor HP B481A Peference 20 dB Attenuator Type-N Mismatch combination Reference Probe ES3DV3 DAE4	10 # GB37480704 US37292783 SN: 5066 (20g) SN: 5047.2 / 06327 SN: 3205	06-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01268) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01371) 30-Apr-10 (No. ES3-3205_Apr10)	Oct-11 Oct-11 Apr-12 Apr-12 Apr-11
Primary Standards Power meter EPM-442A Power sensor HP 9491A Peference 20 dB Attenuator Type-N Mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards	10 # Q837480704 US37292783 SN: 5066 (209) SN: 5047.2 / 06327 SN: 5047.2 / 06327 SN: 601	06-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01266) 29-Mar-11 (No. 217-01268) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01371) 30-Apr-10 (No. ES3-3205_Apr10) 10-Jan-10 (No. DAE4-601_Jun10)	Oct-11 Oct-11 Apr-12 Apr-12 Apr-11 Jun-11
Primary Standards Power meter EPM-442A Power sonsor HP 8481A Peference 20 dB Attenuator Type-N Mismatch combinaton Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481 A RF generator R&S SMT-06	10 # GB37480704 US37292783 SN: 5066 (20g) SN: 5047.2 / 06327 SN: 601 SN: 601 IO # MY41092317 100005	96-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01266) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01371) 30-Apr-10 (No. ES3-3205_Apr10) 10-Jan-10 (No. DAE 4-601_Jun10) Check Date (in house) 18-Oct-02 (in house check Oct-09) 4-Aug-99 (in house check Oct-09)	Oct-11 Oct-11 Apr-12 Apr-12 Apr-12 Jun-11 Scheduled Check In house check: Oct-11 In house check: Oct-11
Primary Standards Power meter EPM-442A Power sensor HP 8481A Peference 20 dB Attenuator Type-N mismatch combinaton Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06	ID # Q837480704 US37292783 SN: 5086 (20g) SN: 5047.2 / 06327 SN: 3205 SN: 601 IO # MY41092317	06-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01266) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01371) 30-Apr-10 (No. ES3-3205_Apr10) 10-Jan-10 (No. DAE 4-601_Jun10) Check Date (in house) 18-Oct-02 (in house check Oct-09)	Oct-11 Oct-11 Apr-12 Apr-12 Apr-11 Jun-11 Scheduled Check In house check: Oct-11
Primary Standards Power meter EPM-442A Power sensor HP 8481A Peference 20 dB Attenuator Type-N mismatch combinaton Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06	10 # GB37480704 US37292783 SN: 5066 (20g) SN: 5047.2 / 06327 SN: 601 SN: 601 IO # MY41092317 100005	96-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01266) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01371) 30-Apr-10 (No. ES3-3205_Apr10) 10-Jan-10 (No. DAE 4-601_Jun10) Check Date (in house) 18-Oct-02 (in house check Oct-09) 4-Aug-99 (in house check Oct-09)	Oct-11 Oct-11 Apr-12 Apr-12 Apr-12 Jun-11 Scheduled Check In house check: Oct-11 In house check: Oct-11
Primary Standards Power meter EPM-442A Power sensor HP 8481A Peference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer HP 8753E	ID # GB37480704 US37292703 SN: 5086 (20g) SN: 5047 2 / 06327 SN: 601 ID # MY41092317 10005 US37390585 S4206	06-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01266) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01371) 30-Apr-10 (No. 533-3205_Apr10) 10-Jun-10 (No. DAE4-601_Jun10) Check Date (in house) 18-Oct-02 (in house check Oct-09) 4-Aug-99 (in house check Oct-09) 18-Oct-01 (in house check Oct-10)	Oct-11 Oct-11 Apr-12 Apr-12 Apr-11 Jun-11 Scheduled Check In house check: Oct-11 In house check: Oct-11 In house check: Oct-11 Signature
Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 9481A Paference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Sacondary Standards Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer HP 8753E Calibrated by: Approved by:	ID # Q837480704 US37292783 SN: 5086 (209) SN: 5047.2 / 06327 SN: 601 ID # MY41092317 100005 US37390585 S4206 Name	06-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01266) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01371) 30-Apr-10 (No. ES3-3205_Apr10) 10-Jan-10 (No. DAE4-601_Jun10) Check Date (in house) 18-Oct-02 (in house check Oct-09) 4-Aug-99 (in house check Oct-09) 18-Oct-01 (in house check Oct-10) Eurotion	Oct-11 Oct-11 Apr-12 Apr-12 Apr-12 Jun-11 Scheduled Check In house check: Oct-11 In house check: Oct-11 In house check: Oct-11



Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Mar 04 – May 13, 2013	RTS-6036-1305-06	L6ARFS120LW	2503A-RFS120LW

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



S Schweizerischer Kalibrierdienst

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Swiss Calibration Service

S

Accreditation No.: SCS 108

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

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Certificate No: D995V2-4d043_Apr11

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Testing Service	Appendix D for the BlackBo Report	Page 15(43)		
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Mar 04 – May 13, 2013	RTS-6036-1305-06	L6ARFS120LW	2503A-RFS120LW

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 V4.9		
Distance Dipole Center - TSL	15 mm	with Spacer	
Zoom Scan Resolution	dx, dy, dz = 5 mm		
Frequency	835 MHz ± 1 MHz		

Head TSL parameters

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.6 ± 6 %	0.88 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	24 aue m.	

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.33 mW / g
SAR normalized	normalized to 1W	9.32 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.43 mW /g ± 17.0 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
- · · · ·	condition 250 mW input power	1.52 mW / g
SAR averaged over 10 cm ³ (10 g) of Head TSL SAR measured SAR normalized		1.52 mW / g 6.08 mW / g

Certificate No: D835V2-4d043_Apr11

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Testing Service	Document Appendix D for the BlackBerry® Smartphone Model RFS121LW SAR Report			
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Mar 04 – May 13, 2013	RTS-6036-1305-06	L6ARFS120LW	2503A-RFS120LW

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.9 Ω - 3.4 jΩ
Return Loss	- 27.2 dB

General Antenna Parameters and Design

/	
Electrical Delay (one direction)	1.391 ns
	I.

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.

Design Modification by End User

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

Additional EUT Data

1	Manufactured by	SPEAG
	Manufactured on	April 07, 2006

Certificate No: D835V2-4d043_Apr11

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Andrew Becker

RTS-6036-1305-06 L6ARFS120LW 2503A-RFS120LW

DASY5 Validation Report for Head TSL

Date/Time: 07.04.2011 09:28:21

Test Laboratory: SPEAG, Zurich, Switzerland

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

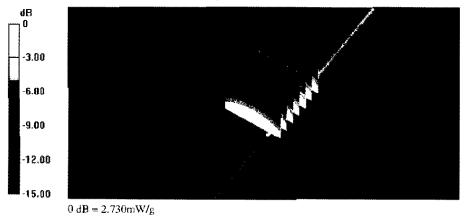
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1 Medium: HSL900 Medium parameters used: f = 835 MHz; $\sigma = 0.88$ mho/m; $\varepsilon_r = 40.6$; $\rho = 1000$ kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 SN3205; ConvF(6.03, 6.03, 6.03); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection) .
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010 *
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001 .
- * Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.4 Build (2829) *

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 57.201 V/m; Power Drift = 0.07 dB Peak SAR (extrapolated) = 3.504 W/kg SAR(1 g) = 2.33 mW/g; SAR(10 g) = 1.52 mW/g Maximum value of SAR (measured) = 2.730 mW/g

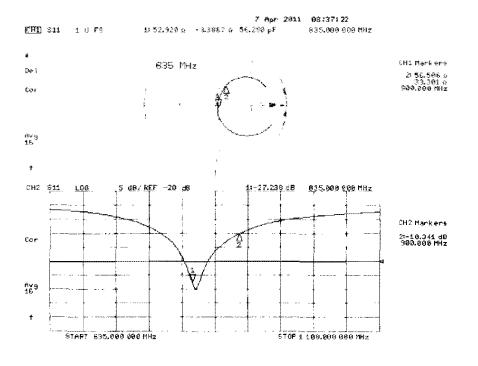


Certificate No: D835V2-4d043_Apr11

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Testing Service	Appendix D for the BlackBo Report	Page 18(43)		
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Mar 04 – May 13, 2013	RTS-6036-1305-06	L6ARFS120LW	2503A-RFS120LW

Impedance Measurement Plot for Head TSL



Certilicate No: D835V2-4d043_Apr11

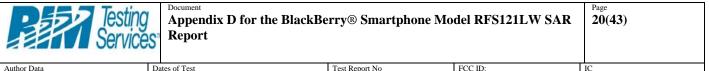
Page 6 of 6

Testing Service	S ^{Document} Appendix D for the BlackB Report	Page 19(43)		
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Mar 04 – May 13, 2013	RTS-6036-1305-06	L6ARFS120LW	2503A-RFS120LW

Calibration Laborator Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zuric		IBC MRA	SNISS CR. D RO RIBRATIO	S C S	Schweizerischer Kalibrierdienst Service suisse d'étalonnage Servizio svizzero di taratura Swiss Calibration Service
Accredited by the Swiss Accredita The Swiss Accreditation Servic Multilateral Agreement for the n	e is one of the signatorie		Accredi	tation I	No.: SCS 108
Client RTS (RIM Test	ing Services)		Certifica	ate No:	D1800V2-2d020_Jan13
CALIBRATION C	ERTIFICATE	man start and start	1999 - 1999 - 19		
Object	D1800V2 - SN: 2	d020	$\sum_{i=1}^{n} \frac{1}{i} \sum_{j=1}^{n} \frac{1}{i} \frac{(n-n)^2}{(n-1)^2} (n$	ji ko	en fer betrigtet
Calibration procedure(s)	QA CAL-05.v9 Calibration proce	dure for dipole	e validation kits	abov	ve 700 MHz
Calibration date:	January 09, 2013	3 h	en fransk fra Fransk fransk		a.e.
All calibrations have been conduc Calibration Equipment used (M&T	TE critical for calibration)			,-	
Primary Standards Power meter EPM-442A	ID #	Cal Date (Certific	the second s		Scheduled Calibration
Power sensor HP 8481A	GB37480704 US37292783	01-Nov-12 (No. 2 01-Nov-12 (No. 2			Oct-13 Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 2			Apr-13
Type-N mismatch combination	SN: 5047.3 / 06327	27-Mar-12 (No. 2 27-Mar-12 (No. 2	그렇게 하는 것이 아무지 않는 것이 같이 같이 같이 같이 않는 것이 같이 많이 많이 많이 했다.		Apr-13
Reference Probe ES3DV3	SN: 3205		ES3-3205_Dec12)		Dec-13
DAE4	SN: 601)AE4-601_Jun12)		Jun-13
Secondary Standards	ID #	Check Date (in h	ouse)		Scheduled Check
Power sensor HP 8481A	MY41092317		use check Oct-11)		In house check: Oct-13
RF generator R&S SMT-06	100005	그는 그는 것이 집에 가지 않는 것이 없는 것이 없다.	use check Oct-11)		In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in ho	use check Oct-12)		In house check: Oct-13
	Name	Fund	tion		Signature
Calibrated by:	Israe El-Naouq	Labo	oratory Technician		Man Un Daarig
Approved by:	Katja Pokovic	Tech	inical Manager		selly
This calibration certificate shall no					Issued: January 9, 2013

Certificate No: D1800V2-2d020_Jan13

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Author Data	Dates of Test	Test Report No
Andrew Becker	Mar 04 – May 13, 2013	RTS-603

6-1305-06 L6ARFS120LW

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



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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

Glossarv:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Certificate No: D1800V2-2d020_Jan13

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Testing Service	Appendix D for the BlackBo Report	erry® Smartphone Mo	odel RFS121LW SAR	Page 21(43)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Mar 04 – May 13, 2013	RTS-6036-1305-06	L6ARFS120LW	2503A-RFS120LW

Measurement Conditions

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

DASY Version	DASY5	V52.8.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1800 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.9 ± 6 %	1.38 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.61 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	38.5 W/kg ± 17.0 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR averaged over 10 cm ³ (10 g) of Head TSL SAR measured	condition 250 mW input power	5.06 W/kg

Certificate No: D1800V2-2d020_Jan13

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Testing Service	Appendix D for the BlackBo Report	erry® Smartphone Mo	odel RFS121LW SAR	Page 22(43)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Mar 04 – May 13, 2013	RTS-6036-1305-06	L6ARFS120LW	2503A-RFS120LW

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	46.2 Ω - 8.3 jΩ
Return Loss	- 20.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.216 ns

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

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	September 07, 2001

Testing Service	Appendix D for the BlackBe Report	erry® Smartphone Mo	del RFS121LW SAR	Page 23(43)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Mar 04 – May 13, 2013	RTS-6036-1305-06	L6ARFS120LW	2503A-RFS120LW

DASY5 Validation Report for Head TSL

Date: 09.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

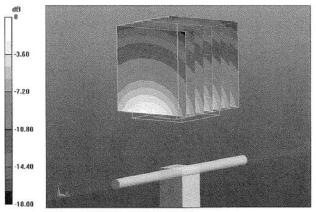
Communication System: CW; Frequency: 1800 MHz Medium parameters used: f = 1800 MHz; σ = 1.38 S/m; ε_r = 38.9; ρ = 1000 kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

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

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 95.870 V/m; Power Drift = 0.04 dB Peak SAR (extrapolated) = 17.5 W/kg SAR(1 g) = 9.61 W/kg; SAR(10 g) = 5.06 W/kg Maximum value of SAR (measured) = 11.8 W/kg



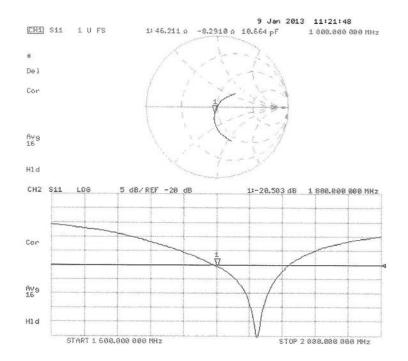
0 dB = 11.8 W/kg = 10.72 dBW/kg

Certificate No: D1800V2-2d020_Jan13

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Testing Service	Appendix D for the BlackB Report	Berry® Smartphone Mo	odel RFS121LW SAR	Page 24(43)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Mar 04 – May 13, 2013	RTS-6036-1305-06	L6ARFS120LW	2503A-RFS120LW

Impedance Measurement Plot for Head TSL



Certificate No: D1800V2-2d020_Jan13

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Andrew Becker Mar 04 – May 13, 2013 RTS-6036-1305-06	L6ARFS120LW	
Author Data Dates of Test Test Report No	FCC ID:]

2503A-RFS120LW

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

Client



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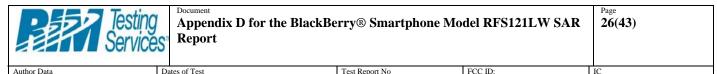
Accreditation No.: SCS 108

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

RTS (RIM Testing Services)

Certificate No: D1900V2-5d075_Apr11

Object	D1900V2 - SN: 5	6d075	
Calibration procedure(s)	QA CAL-05.v8 Calibration proce	dure for dipole validation kits	
Calibration date:	April 5, 2011		
The measurements and the unce	rtainties with confidence p	ional standards, which realize the physical un robability are given on the following pages an ny faolity: environment temperature (22 ± 3)°(d are part of the certificate,
Alberton Carlsmant mad /112	TE critical for calibration)		
Calibration Equipment used (was			
Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Primary Standards Power meter EPM-442A	ID # GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Primary Standards Power meter EPM-442A Power sensor HP 8481A	ID # GB37480704 US37292783	06-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01266)	Oct-11 Oct-11
Primary Standards Power meler EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator	ID # GB37480704 US37292783 SN: 5086 (20g)	06-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01266) 29-Mar-11 (No. 217-01368)	Oct-11 Oct-11 Apr-12
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination	ID # GB37480704 US37292783 SN: 5086 (20g) SN: 5047.2 / 06327	06-Oct-10 (No. 217-01286) 06-Oct-10 (No. 217-01286) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01371)	Oct-11 Oct-11 Apr-12 Apr-12
Primary Standards Power meter EPM-442A Power sensor HP 8481A Peference 20 dB Attenuator Type-N mismatch combination Reterence Probe ES3DV3	ID # GB37480704 US37292783 SN: 5086 (20g)	06-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01266) 29-Mar-11 (No. 217-01368)	Oct-11 Oct-11 Apr-12
Primary Standards Power meter EPM-442A Power sensor HP 9481A Peference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4	ID # GB37480704 US37292783 SN: 5086 (20g) SN: 5047.2 / 06327 SN: 3205	06-Oct-10 (No. 217-01286) 06-Oct-10 (No. 217-01286) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01371) 30-Apr-10 (No. ES3-3206_Apr10)	Oct-11 Oct-11 Apr-12 Apr-12 Apr-11
Primary Standards Power meter EPM-442A Power sensor HP 9481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards	ID # GB37480704 U\$37292783 SN: 5086 (20g) SN: 5047.2706327 SN: 5047.2706327 SN: 601	06-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01266) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01368) 30-Apr-10 (No. ES3-3205_Apr10) 10-Jun-10 (No. DAE4-601_Jun10)	Oct-11 Oct-11 Apr-12 Apr-12 Apr-11 Jun-11
Primary Standards Power meter EPM-442A Power sensor HP 9481A Reference 20 dB Attenuator Type-N mismatch combination Reterance Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A	ID # GB37480704 US37292783 SN: 5086 (20g) SN: 5047.2 / 06327 SN: 3205 SN: 601 ID #	06-Oct-10 (No. 217-01286) 06-Oct-10 (No. 217-01286) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01368) 30-Apr-10 (No. ES3-3205_Apr10) 10-Jun-10 (No. DAE4-601_Jun10) Check Date (in house)	Oct-11 Oct-11 Apr-12 Apr-12 Apr-11 Jun-11 Scheduled Check
Primary Standards Power meler EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reterence Probe ES30V3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06	ID # GB37480704 US37292783 SN: 5066 (20g) SN: 5047.2 / 06327 SN: 3205 SN: 601 ID # MY41092317	06-Oct-10 (No. 217-01286) 06-Oct-10 (No. 217-01286) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01371) 30-Apr-10 (No. ES3-3205_Apr10) 10-Jun-10 (No. DAE4-601_Jun10) Check Date (in house) 16-Oct-02 (in house check Oct-09)	Oct-11 Oct-11 Apr-12 Apr-12 Apr-11 Jun-11 Scheduled Check In house check: Oct-11
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch corrbination Reterance Picbe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer HP 8753E	ID # GB37480704 US37292783 SN: 5086 (20g) SN: 5047.2 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005	06-Oct-10 (No. 217-01286) 06-Oct-10 (No. 217-01286) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01371) 30-Apr-10 (No. ES3-3205_Apr10) 10-Jun-10 (No. DAE4-601_Jun10) Check Date (in house) 16-Oct-02 (in house check Oct-09) 4-Aug-99 (in house check Oct-09)	Oct-11 Oct-11 Apr-12 Apr-12 Apr-12 Jun-11 Scheduled Check In house check: Oct-11 In house check: Oct-11 In house check: Oct-11
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reterance Probe ES30V3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06	ID # GB37480704 U\$37292783 SN: 5086 (20g) SN: 5047.2 / 06327 SN: 6205 SN: 601 ID # MY41092317 100005 U\$37390585 \$4206	06-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01266) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01371) 30-Apr-10 (No. DAE4-601_Jun10) 10-Jun-10 (No. DAE4-601_Jun10) Check Date (in house) 16-Oct-02 (in house check Oct-09) 4-Aug-99 (in house check Oct-09) 18-Oct-01 (in house check Oct-10)	Oct-11 Oct-11 Apr-12 Apr-12 Apr-12 Jun-11 Scheduled Check In house check: Oct-11 In house check: Oct-11 In house check: Oct-11
Primary Standards Power meler EPM-442A Power sensor HP 9481A Pelerence 20 dB Attenuator Type-N mismatch combination Relerence Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer HP 8753E	ID # GB37480704 U\$37292783 SN: 5086 (20g) SN: 5047.2706327 SN: 6205 SN: 601 ID # MY41092317 100005 U\$37390585 \$4206 Name	06-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01266) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01368) 29-Mar-11 (No. 217-01371) 30-Apr-10 (No. ES3-3205_Apr10) 10-Jun-10 (No. DAE4-601_Jun10) Check Date (in house) 16-Oct-02 (in house check Oct-09) 4-Aug-99 (in house check Oct-09) 16-Oct-01 (in house check Oct-09) 16-Oct-01 (in house check Oct-10) Function	Oct-11 Oct-11 Apr-12 Apr-12 Apr-11 Jun-11 Scheduled Check In house check: Oct-11 In house check: Oct-11 In house check: Oct-11



And	rew	Becker	•

Mar 04 – May 13, 2013

RTS-6036-1305-06 L6ARFS120LW

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



Schweizerischer Kellbrierdienst

Service sulsse d'étalonnage

Servizio svizzero di taratura

Swiss Calibration Service

Accreditation No.: SCS 108

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

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Certificate No: D1900V2-5d075_Apr11

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Testing Service	Appendix D for the BlackBo Report	erry® Smartphone Mo	del RFS121LW SAR	Page 27(43)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Mar 04 – May 13, 2013	RTS-6036-1305-06	L6ARFS120LW	2503A-RFS120LW

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, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.8 ± 6 %	1.41 mho/m ± 6 %
Head TSL temperature during test	(21.3 ± 0.2) °C		

SAR result with Head TSL

SAR averaged over 1 cm ² (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.2 mW / g
SAR normalized	normalized to 1W	40.8 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	40.4 mW /g ± 17.0 % (k=2)
	1	
SAR averaged over 10 cm ³ (10 g) of Hesd TSL	condition	
SAR averaged over 10 cm ³ (10 g) of Hesd TSL. SAR measured	condition 250 mW input power	5.29 mW / g
		5.29 mW / g 21.2 mW / g

Certificate No: D1900V2-5d075_Apr11

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Testing Service	Appendix D for the Black Report	kBerry® Smartphone M	odel RFS121LW SAR	Page 28(43)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Mar 04 – May 13, 2013	RTS-6036-1305-06	L6ARFS120LW	2503A-RFS120LW

Appendix

Antenna Parameters with Head TSL

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

General Antenna Parameters and Design

Electrical Delay (one direction)	1.197 ns
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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	January 24, 2006

Certificate No: D1900V2-5d075_Apr11

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Andrew Becker

L6ARFS120LW

2503A-RFS120LW

- -.....

DASY5 Validation Report for Head TSL

Date/Time: 05.04.2011 12:41:39

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d075

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1 Medium: HSL U12 BB Medium parameters used: f = 1900 MHz; $\sigma = 1.41 \text{ mho/m}$; $\varepsilon_r = 39$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

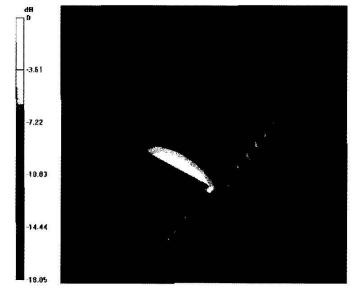
DASY5 Configuration:

- Probe: ES3DV3 SN3205; ConvF(5.09, 5.09, 5.09); Calibrated: 30.04,2010
- Sensor-Surface: 3inm (Machanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.4 Build (2829)

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 97.376 V/m; Power Drift = 0.04 dB Peak SAR (extrapolated) = 18.796 W/kg SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.29 mW/g





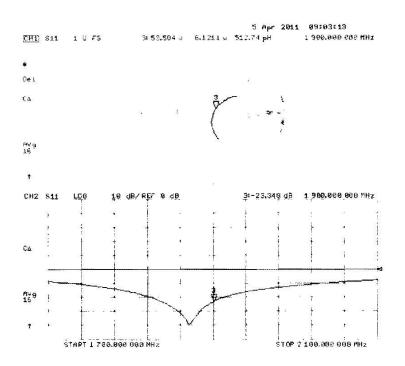
0 dB = 12.480 mW/g

Certificate No: D1900V2-5d075_Apr11

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Testing Service	Appendix D for the BlackBe Report	erry® Smartphone Mo	odel RFS121LW SAR	Page 30(43)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Mar 04 – May 13, 2013	RTS-6036-1305-06	L6ARFS120LW	2503A-RFS120LW

Impedance Measurement Plot for Head TSL



Certificate No: D1900V2-5d075_Apr11

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	Testing Services Report	D for the Black	Berry® Smartphone Me	odel RFS121LW SAR	Page 31(43)
Author Data Andrew Becker	Dates of Test Mar 04 – Ma	v 13. 2013	Test Report No RTS-6036-1305-06	FCC ID: L6ARFS120LW	IC 2503A-RFS120LW
	Calibration Laboratory Schmid & Partner Engineering AG	of		Schweizerischer Kalibrierdiens Service suisse d'étalonnage Servizio svizzero di taratura	ı
	Zeughausstrasse 43, 8004 Zurich,	Switzerland	Maddalation PARATE S	Swiss Calibration Service	
	Accredited by the Swiss Accreditation The Swiss Accreditation Service Multilateral Agreement for the reco	is one of the signatories t	to the EA	on No.: SCS 108	
	Client RTS (RIM Testin	g Services)	Certificate	No: D1900V2-545_Jan13	
	CALIBRATION C	ERTIFICATE	$= \sum_{i=1}^{n-1} \frac{1}{i_i} \sum_{i_j \in \mathcal{I}_i} \frac{1}{i_j} \sum_{i_j \in \mathcal{I}_j} 1$		
	Object	D1900V2 - SN: 54	5 The term of the second pro-		
	Calibration procedure(s)	QA CAL-05.v9 Calibration procedu	ure for dipole validation kits al	bove 700 MHz	
			a Bandar Bandar		
	Calibration date:	January 09, 2013			
	The measurements and the uncert All calibrations have been conduct	ainties with confidence pro ed in the closed laboratory	hal standards, which realize the physical bability are given on the following pages facility: environment temperature (22 ± 3	and are part of the certificate.	
	Calibration Equipment used (M&TI	 critical for calibration) 			
	Primary Standards	ID # GB37480704	Cal Date (Certificate No.)	Scheduled Calibration Oct-13	
	Power meter EPM-442A Power sensor HP 8481A		01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640)	Oct-13	
	Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13	
	Type-N mismatch combination	and the second	27-Mar-12 (No. 217-01533)	Apr-13	
	Reference Probe ES3DV3 DAE4	SN: 3205 SN: 601	28-Dec-12 (No. ES3-3205_Dec12) 27-Jun-12 (No. DAE4-601_Jun12)	Dec-13 Jun-13	
	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-12)	In house check: Oct-13	
			- 1000 a 1000		
	1	Name	Function	Signature	

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Page 1 of 6

Israe El-Naoug

Katja Pokovic

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Calibrated by:

Approved by:

Certificate No: D1900V2-545_Jan13

Laboratory Technician

Technical Manager

reu

Issued: January 9, 2013

ade



Author Data Andrew Becker Dates of Test Mar 04 – May 13, 2013

FCC ID: RTS-6036-1305-06 L6ARFS120LW

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



Test Report No

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

Accreditation No.: SCS 108

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

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Testing Service	Appendix D for the BlackB Report	Berry® Smartphone Mo	odel RFS121LW SAR	Page 33(43)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Mar 04 – May 13, 2013	RTS-6036-1305-06	L6ARFS120LW	2503A-RFS120LW

Measurement Conditions

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

DASY Version	DASY5	V52.8.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.4 ± 6 %	1.38 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL

SAR averaged over 1 cm ³ (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)
	Sector Se	
SAR averaged over 10 cm ³ (10 c) of Head TSI	condition	
SAR averaged over 10 cm ³ (10 g) of Head TSL SAR measured	condition 250 mW input power	5.26 W/kg

Certificate No: D1900V2-545_Jan13

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.0 Ω + 1.7 jΩ
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

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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

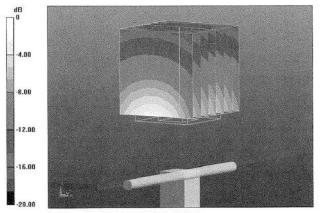
Communication System: CW; Frequency: 1900 MHz Medium parameters used: f = 1900 MHz; $\sigma = 1.38$ S/m; $\varepsilon_r = 39.4$; $\rho = 1000$ kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

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

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 95.493 V/m; Power Drift = 0.05 dB Peak SAR (extrapolated) = 18.1 W/kg SAR(1 g) = 10 W/kg; SAR(10 g) = 5.26 W/kg Maximum value of SAR (measured) = 12.2 W/kg



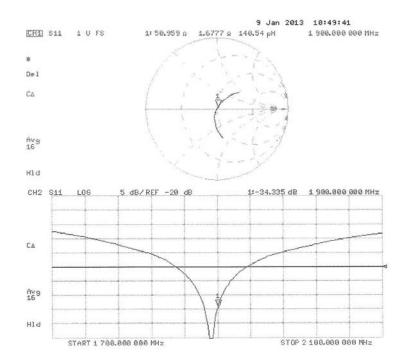
0 dB = 12.2 W/kg = 10.86 dBW/kg

Certificate No: D1900V2-545_Jan13

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Testing Service	Appendix D for the BlackBo Report	erry® Smartphone Mo	odel RFS121LW SAR	Page 36(43)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Mar 04 – May 13, 2013	RTS-6036-1305-06	L6ARFS120LW	2503A-RFS120LW

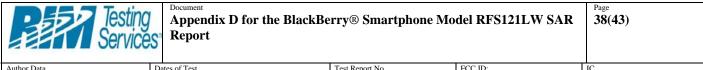
Impedance Measurement Plot for Head TSL



Certificate No: D1900V2-545_Jan13

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Servic	Appen Report		ckBerry® Smartphone M	odel RFS121LW SAR	Page 37(43)
v Becker	Dates of Test Mar 04 –	May 13, 2013	Test Report No RTS-6036-1305-06	FCC ID: L6ARFS120LW	іс 2503А-RFS120L
Schmid & P Engineeri			ILAC MEA R BRAND	S Schweizerischer Kalibri Service suisse d'étaion Servizio svizzero di tare S swiss Calibration Servi	nage atura
The Swiss Accre		on Service (SAS) is one of the signatories cognition of calibration (to the EA	itation No.: SCS 108	
Client RT	5 (RIM Teetin	ng Services)	Certific	ate No: D2450V2-791_Ap	r11
CALIBR	ATION C	ERTIFICATE			
Object		D2450V2 - SN: 7	91		
Calibration proce	edure(\$)	QA CAL-05.v8 Calibration proces	dure for dipole validation kits	5	
Celibration date:	c	April 5, 2011			
This calibration of The measureme All calibrations h	certificate docume ents and the uncert have been conduct	nts the (raceability to naik ainties with contidence pr	onal standards, which realize the phys obability are given on the following pa y facility: environment temperature (22	ges and are part of the certificate.	
This calibration of The measureme All calibrations h Calibration Equi	certificate docume ents and the uncert have been conduct pment used (M&T)	nts the (raceability to naik tainties with confidence pr ed in the closed laborator	obability are given on the following pa	ges and are part of the certificate.	
This calibration of The measureme All calibrations h	certificate docume ents and the uncert have been conduct pment used (M&T) rds	nts the (raceability to nalk tainties with confidence pr ed in the closed laborator E critical for calibration)	obability are given on the following pa y facility: environment temperature (22	ges and are part of the certificate. 2 ± 3)°C and humidity < 70%.	
This calibration of The measureme All calibrations h Calibration Equi Primary Standar Power meter EP Power sensor H	certificate docume ents and the uncert have been conduct pment used (M&T) rds 2M-442A IP 6481A	nts the (raceability to nativ tainties with confidence pr ed in the closed laborator E critical for calibration) ID # GB37480704 US37292783	Cal Date (Certificate No.) 06-Oct-10 (No. 217-01266)	ges and are part of the certificate. 2 ± 3)°C and humidity < 70%. Scheduled Calibratio Oct-11 Oct-11	
This calibration of The measureme All calibrations h Calibration Equi Primary Standar Power meter EP Power sonsor H Reference 20 dB	certificate docume ents and the uncert have been conduct pment used (M&T) rds 2M-442A IP 6481A B Attenuator	nts the (raceability to naik tainties with confidence pr ed in the closed laborator E critical for calibration) ID # GB37490704 US37292783 SN: 5086 (20g)	Cal Date (Certificate No.) 06-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01266) 29-Mar-11 (No. 217-01368)	ges and are part of the certificate. 2 ± 3)°C and humidity < 70%. Scheduled Calibration Oct-11 Oct-11 Apr-12	
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Andrew Becker	Mar 04 – May 13, 2013	RTS-6036-1305-06	L6ARFS120LW
Author Data	Dates of Test	Test Report No	FCC ID:

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



S Schweizerischer Kallbrierdienst

C Service suisse d'étaionnage

Servizio svizzero di laratura Swiss Calibration Service

S

Accreditation No.: SCS 108

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

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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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, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters The following parameters and calculations were applied,

	Temperature	Permittivity	Conductivity
Nominal Heed TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.7 ± 6 %	1.72 mho/m ±6 %
Head TSL temperature during test	(21.0 ± 0.2) °C	*****	

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.3 mW / g
SAR normalized	normalized to 1W	53.2 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	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
CAD monocurod	250 mill input nowine	42 19.1 mild//m

SAR measured	250 mW input power	6.21 mW / g
SAR normalized	normalized to 1W	24.8 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	25.0 mW /g ± 16.5 % (k=2)

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	55.5 Ω + 3.6 jΩ
Return Loss	- 24.1 dB

General Antenna Parameters and Design

F1111111	
Electrical Delay (one direction)	1.152 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	January 24, 2006

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DASY5 Validation Report for Head TSL

Date/Time: 05.04.2011 15:06:24

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1 Medium: HSL U12 BB Medium parameters used: f = 2450 MHz; σ = 1.74 mho/m; ϵ_r = 38.6; ρ = 1000 kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

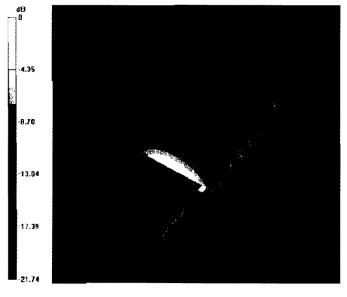
DASY5 Configuration:

- Probe: ES3DV3 SN3205; ConvF(4.53, 4.53, 4.53); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front): Type: QD000P50AA: Serial: 1001
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.4 Build (2829)

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 102.4 V/m; Power Drift = 0.04 dB Peak SAR (extrapolated) = 27.237 W/kg SAR(1 g) = 13.3 mW/g; SAR(10 g) = 6.21 mW/g

Maximum value of SAR (measured) = 16.889 mW/g



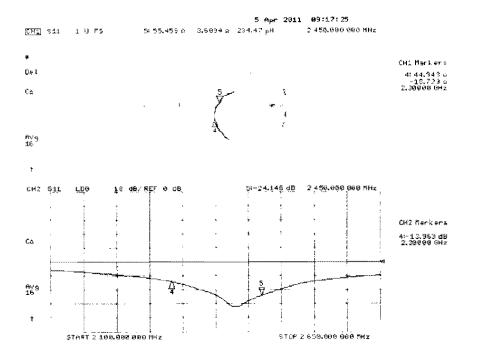
0 dB = 16.890 mW/g

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Impedance Measurement Plot for Head TSL

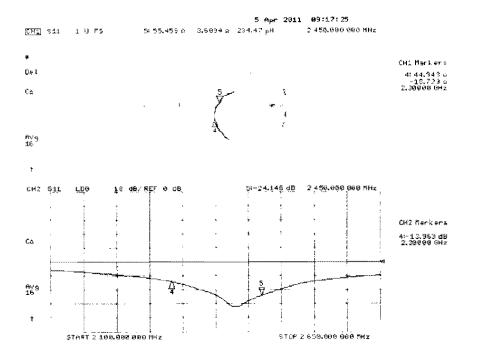


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Impedance Measurement Plot for Head TSL



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