# BlackBerry	′	Appendix A for the B Report	lackBerry® Smartphon	e Model RHA111LV	W SAR	Page 1(61)
Author Data	Dates of Te	est	Test Report No	FCC ID:	IC ID:	
Andrew Becker	June 2	3 – August 5, 2014	RTS-6058-1408-04	L6ARHA110LW	2503A-R	HA110LW

APPENDIX D: PROBE & DIPOLE CALIBRATION DATA



Appendix A for the BlackBerry® Smartphone Model RHA111LW SAR Report

Page **2(61)**

Author Data
Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No

RTS-6058-1408-04

FCC ID: L6ARHA110LW

IC ID:

2503A-RHA110LW

Probe 3225

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





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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

Blackberry Waterloo

Accreditation No.: SCS 108

Certificate No: ES3-3225 Jan14

CALIBRATION CERTIFICATE

Object

ES3DV3 - SN:3225

Calibration procedure(s)

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

Calibration date:

January 22, 2014

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

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	04-Apr-13 (No. 217-01733)	Apr-14
Power sensor E4412A	MY41498087	04-Apr-13 (No. 217-01733)	Apr-14
Reference 3 dB Attenuator	SN: S5054 (3c)	04-Apr-13 (No. 217-01737)	Apr-14
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-13 (No. 217-01735)	Apr-14
Reference 30 dB Attenuator	SN: S5129 (30b)	04-Apr-13 (No. 217-01738)	Apr-14
Reference Probe ES3DV2	SN; 3013	30-Dec-13 (No. ES3-3013_Dec13)	Dec-14
DAE4	SN: 660	13-Dec-13 (No. DAE4-660_Dec13)	Dec-14
Secondary Standards	ID OIL	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check; Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

Name Function Signature

Calibrated by: Israe El-Naouq: Laboratory Technician

Approved by: Katja Pokovic Technical Manager

Issued: January 22, 2014

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

Certificate No: ES3-3225_Jan14

Page 1 of 11



3(61)

Author Data

Dates of Test Andrew Becker

June 23 – August 5, 2014

Test Report No RTS-6058-1408-04 FCC ID:

L6ARHA110LW

IC ID: 2503A-RHA110LW

Calibration Laboratory of

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





S

Schweizerischer Kallbrierdienst S Service suisse d'étalonnage C

Servizio svizzero di taratura Swiss Calibration Service

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS)

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

Glossary:

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

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

Polarization op o rotation around probe axis

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

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

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

Methods Applied and Interpretation of Parameters:

- NORMx,y,z: Assessed for E-field polarization 9 = 0 (f < 900 MHz in TEM-cell; f > 1800 MHz; R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E²-field uncertainty inside TSL (see below ConvF).
- $NORM(f)x,y,z = NORMx,y,z * frequency_response$ (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCPx,y,z: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal
- Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z; A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx, y, z * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from \pm 50 MHz to \pm 100
- Spherical isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset. The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NORMx (no uncertainty required).

Certificate No. ES3-3225 Jan14

Page 2 of 11



Report

Author Data
Andrew Becker
Dates of Test
June 23

June 23 – August 5, 2014

Test Report No **RTS-6058-1408-04**

FCC ID: L6ARHA110LW

IC ID: **2503A-RHA110LW**

4(61)

ES3DV3 - SN:3225

January 22, 2014

Probe ES3DV3

SN:3225

Manufactured: Calibrated:

September 1, 2009 January 22, 2014

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

Certificate No: ES3-3225_Jan14

Page 3 of 11



5(61)

Author Data **Andrew Becker** Dates of Test

June 23 – August 5, 2014

Test Report No RTS-6058-1408-04 FCC ID:

IC ID: L6ARHA110LW

2503A-RHA110LW

ES3DV3-SN:3225

January 22, 2014

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

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm $(\mu V/(V/m)^2)^A$	1.26	1.20	1.30	± 10.1 %
DCP (mV) th	99.9	99.5	100.4	

Modulation Calibration Parameters

O O	Communication System Name		A dB	B dB√μV	С	D dB	VR mV	Unc ^b (k=2)
	CW	X	0.0	0.0 0.0	1.0	0.00	158.9	±2.7 %
		Y	0.0	0.0	1.0		156.6	
		2	0.0	0.0	1.0		165.1	

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: ES3-3225_Jan14

Page 4 of 11

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



Report

6(61)

Author Data Andrew Becker Dates of Test June 23 – August 5, 2014

Test Report No RTS-6058-1408-04 FCC ID: L6ARHA110LW IC ID: 2503A-RHA110LW

ES3DV3-SN:3225

January 22, 2014

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 ⁶	Depth ^G (mm)	Unct. (k=2)
750	41.9	0.89	6.36	6.36	6.36	0.28	1.91	± 12.0 %
900	41.5	0.97	6.05	6.05	6.05	0.49	1.38	± 12.0 %
1810	40.0	1.40	5.24	5.24	5.24	0.69	1.23	± 12.0 %
1950	40.0	1.40	4.97	4.97	4.97	0.73	1.21	± 12.0 %
2450	39.2	1.80	4.64	4.64	4.64	0.80	1.23	± 12.0 %
2600	39.0	1.96	4.33	4.33	4.33	0.75	1,34	± 12.0 %

Certificate No: ES3-3225_Jan14

Page 5 of 11

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

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



7(61)

Author Data **Andrew Becker** Dates of Test

June 23 – August 5, 2014

Test Report No RTS-6058-1408-04 FCC ID:

L6ARHA110LW

IC ID: 2503A-RHA110LW

ES3DV3-SN:3225

January 22, 2014

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 ^G	Depth ^G (mm)	Unct. (k=2)
750	55.5	0.96	6.28	6.28	6.28	0.34	1.84	± 12.0 %
900	55.0	1.05	6.09	6.09	6.09	0.62	1.32	± 12.0 %
1810	53.3	1,52	4.93	4.93	4.93	0.48	1.57	± 12.0 %
1950	53.3	1.52	4.84	4.84	4.84	0.50	1.59	± 12.0 %
2450	52.7	1,95	4.28	4,28	4.28	0.77	1.23	± 12.0 %
2600	52.5	2.16	4.03	4.03	4.03	0.80	1.01	± 12.0 %

Certificate No: ES3-3225 Jan14

Page 6 of 11

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 issue parameters (c and n) 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 (n and n) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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



8(61)

Author Data **Andrew Becker** Dates of Test

June 23 - August 5, 2014

Test Report No RTS-6058-1408-04 FCC ID: L6ARHA110LW

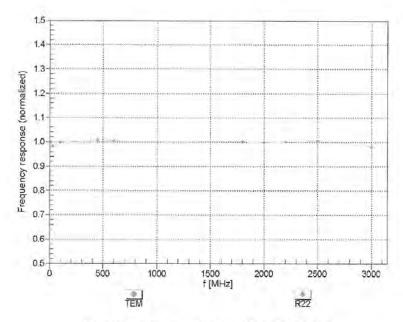
IC ID: 2503A-RHA110LW

ES3DV3-SN:3225

January 22, 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: ES3-3225_Jan14

Page 7 of 11



Page **9(61)**

Author Data
Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No **RTS-6058-1408-04**

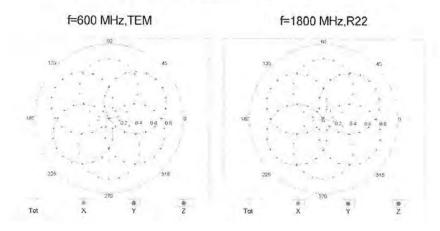
FCC ID: IF L6ARHA110LW 2

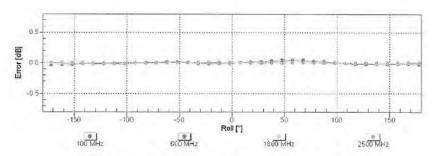
IC ID: **2503A-RHA110LW**

ES3DV3-SN:3225

January 22, 2014

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





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

Certificate No: ES3-3225_Jan14

Page 8 of 11



10(61)

Author Data
Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No **RTS-6058-1408-04**

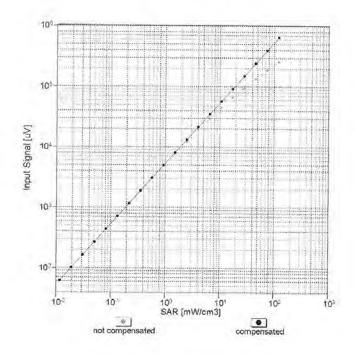
FCC ID: I
L6ARHA110LW 2

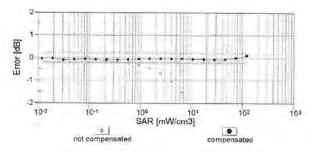
IC ID: **2503A-RHA110LW**

ES3DV3-SN:3225

January 22, 2014

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





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

Certificate No: ES3-3225_Jan14

Page 9 of 11



11(61)

Author Data
Andrew Becker

Dates of Test

June 23 – August 5, 2014

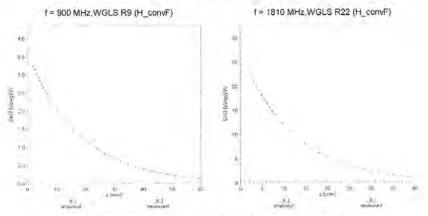
Test Report No RTS-6058-1408-04

FCC ID: I
L6ARHA110LW 2

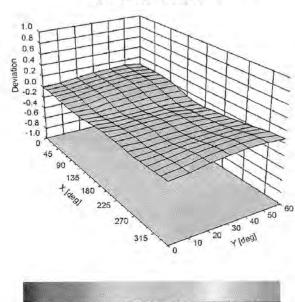
IC ID: **2503A-RHA110LW**

ES3DV3- SN:3225 January 22, 2014

Conversion Factor Assessment



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



-1.0 -0.8 -0.6 -0.4 -0.2 0.0 0.2 0.4 0.6 0.8 1.
Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

Certificate No: ES3-3225_Jan14

Page 10 of 11



Report

Test Report No FCC ID: Author Data Dates of Test IC ID: June 23 - August 5, 2014 RTS-6058-1408-04 L6ARHA110LW 2503A-RHA110LW **Andrew Becker**

ES3DV3- SN:3225

January 22, 2014

12(61)

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

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (*)	8
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	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_Jan14

Page 11 of 11



Appendix A for the BlackBerry® Smartphone Model RHA111LW SAR Report

Author Data
Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No **RTS-6058-1408-04**

FCC ID: L6ARHA110LW

IC ID: 2503A-RHA110LW

13(61)

Probe 3548

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





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Accredited by the Swiss Accreditation Service (SAS)

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Multilateral Agreement for the recognition of calibration certificates

Client Blackberry Waterloo

Certificate No: EX3-3548_Jan14

Accreditation No.: SCS 108

CALIBRATION CERTIFICATE Object EX3DV4 - SN:3548 Calibration procedure(s) QA CAL-01.v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6 Calibration procedure for dosimetric E-field probes Calibration date: January 17, 2014 This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate. All celibrations 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	04-Apr-13 (No. 217-01733)	Apr-14
Power sensor E4412A	MY41498087	04-Apr-13 (No. 217-01733)	Apr-14
Reference 3 dB Attenuator	SN: S5054 (3c)	04-Apr-13 (No. 217-01737)	Apr-14
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-13 (No. 217-01735)	Apr-14
Reference 30 dB Attenuator	SN: S5129 (30b)	04-Apr-13 (No. 217-01738)	Apr-14
Reference Probe ES3DV2	SN: 3013	30-Dec-13 (No. ES3-3013_Dec13)	Dec-14
DAE4	SN: 660	13-Dec-13 (No. DAE4-660_Dec13)	Dec-14
Secondary Standards	10	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	Seif Alger
Approved by:	Kalja Pokovic	Technical Manager	JERK.
			Issued: January 20, 2014

Certificate No: EX3-3548_Jan14

Page 1 of 11



Appendix A for the BlackBerry® Smartphone Model RHA111LW SAR Report

14(61)

Author Data

Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No

RTS-6058-1408-04

FCC ID:

L6ARHA110LW

IC ID:

2503A-RHA110LW

Calibration Laboratory of

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





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

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS)

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

Glossary:

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

CF crest factor (1/duty_cycle) of the RF signal modulation dependent linearization parameters

Polarization ip rotation around probe axis

Polarization 9 8 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

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", hug. 2013.
- Techniques", June 2013
 b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- NORMx,y,z: Assessed for E-field polarization 9 = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz; R22 waveguide).
 NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)x,y,z = NORMx,y,z * frequency_response (see Frequency Response Chart). This linearization is
 implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included
 in the stated uncertainty of ConvF.
- DCPx,y,z: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal 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 Perameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z ** ConvF* whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz
- Spherical isotropy (3D deviation from isotropy); in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset. The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NORMx (no uncertainty required).

Certificate No: EX3-3548_Jan14

Page 2 of 11



15(61)

Author Data
Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No RTS-6058-1408-04

FCC ID: L6ARHA110LW

IC ID: **2503A-RHA110LW**

EX3DV4 - SN:3548

January 17, 2014

Probe EX3DV4

SN:3548

Manufactured: Calibrated:

November 16, 2004 January 17, 2014

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

Certificate No: EX3-3548_Jan14

Page 3 of 11



16(61)

Author Data

Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No RTS-6058-1408-04 FCC ID:

L6ARHA110LW

IC ID: 2503A-RHA110LW

EX3DV4-SN:3548

January 17, 2014

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

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (uV/(V/m) ²) ^A	0.37	0.44	0.42	± 10.1 %
Norm (µV/(V/m) ²) ^A DCP (mV) ^B	100.9	99.2	98.5	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc ^c (k=2)
0	CW	X	0.0	0.0	1.0	0.00	179.3	±3.0 %
		Y	0.0	0.0	1.0		150.2	
		Z	0.0	0.0	1.0		196.1	

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%.

A 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.



17(61)

Author Data **Andrew Becker** Dates of Test

June 23 – August 5, 2014

Test Report No RTS-6058-1408-04 FCC ID:

L6ARHA110LW

IC ID: 2503A-RHA110LW

EX3DV4- \$N:3548

January 17, 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 ⁶	Depth ^G (mm)	Unct. (k=2)
2600	39.0	1.96	7.03	7.03	7.03	0.50	0.77	± 12.0 %
5200	36.0	4.66	5.37	5.37	5.37	0.35	1.80	± 13.1 %
5500	35.6	4.96	4.94	4.94	4.94	0.35	1.80	± 13.1 %
5800	35.3	5.27	4.76	4.76	4.76	0.40	1.80	± 13.1 %

^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.

The frequencies below 3 GHz, the validity of lissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to

Certificate No: EX3-3548 Jan14

Page 5 of 11

At requencies below 3 GHz, the validity of usue parameters (ε and σ) can be relaxed to ± 10% in ignic compensation formula is applied to measured SAR values. Aff requencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConVF uncertainty for indicated target fissue parameters.

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



Report

18(61)

Author Data **Andrew Becker** Dates of Test June 23 – August 5, 2014

RTS-6058-1408-04

Test Report No

FCC ID: L6ARHA110LW

IC ID: 2503A-RHA110LW

EX3DV4- SN:3548

January 17, 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 6	Depth ^G (mm)	Unct. (k=2)
2600	52.5	2.16	6.91	6.91	6.91	0.80	0.50	± 12.0 %
5200	49.0	5.30	4.83	4.83	4.83	0.40	1.90	± 13.1 %
5500	48.6	5.65	4.33	4.33	4.33	0.50	1.90	± 13.1 %
5800	48.2	6.00	4.36	4.36	4.36	0.50	1,90	± 13.1 %

Certificate No: EX3-3548_Jan14

Page 6 of 11

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 cellbration frequency and the uncertainty for the indicated frequency band.

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

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

diameter from the boundary.



19(61)

Author Data
Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No **RTS-6058-1408-04**

FCC ID: L6ARHA110LW

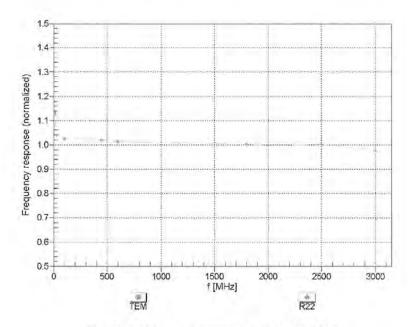
IC ID: **2503A-RHA110LW**

EX3DV4-SN:3548

January 17, 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: EX3-3548_Jan14

Page 7 of 11



Page **20(61)**

Author Data
Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No RTS-6058-1408-04

FCC ID: IC L6ARHA110LW 2

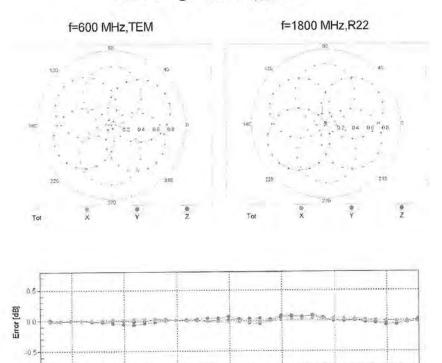
IC ID: **2503A-RHA110LW**

EX3DV4- SN:3548

January 17, 2014

2500 MHz

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



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

Roll [°]

1800 MHz

Certificate No: EX3-3548_Jan14

100 MHz

Page 8 of 11



21(61)

Author Data
Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No **RTS-6058-1408-04**

FCC ID:

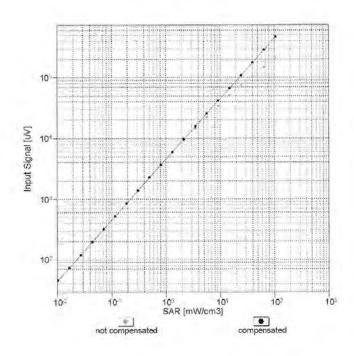
L6ARHA110LW

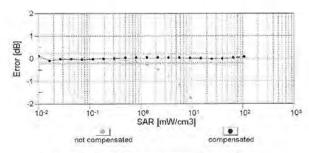
IC ID: **2503A-RHA110LW**

EX3DV4-SN:3548

January 17, 2014

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





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

Certificate No: EX3-3548_Jan14

Page 9 of 11



22(61)

Author Data
Andrew Becker

Dates of Test

June 23 – August 5, 2014

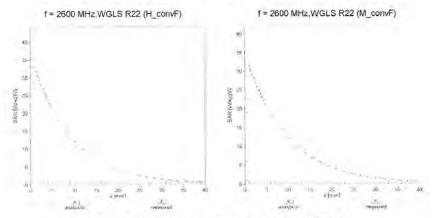
Test Report No RTS-6058-1408-04

FCC ID: IC **L6ARHA110LW** 2

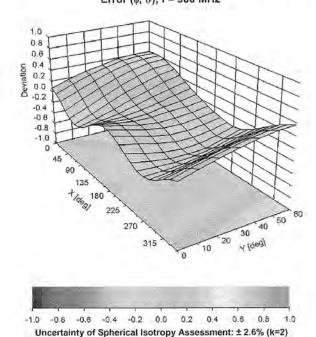
IC ID: **2503A-RHA110LW**

EX3DV4- SN:3548 January 17, 2014

Conversion Factor Assessment



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



Certificate No: EX3-3548_Jan14

Page 10 of 11



Author Data Test Report No FCC ID: Dates of Test IC ID: June 23 - August 5, 2014 RTS-6058-1408-04 L6ARHA110LW 2503A-RHA110LW **Andrew Becker**

EX3DV4-SN:3548

January 17, 2014

23(61)

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

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-70.8
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

Certificate No: EX3-3548_Jan14

Page 11 of 11



Author Data Dates of Test **Andrew Becker**

June 23 – August 5, 2014

Test Report No RTS-6058-1408-04 FCC ID: L6ARHA110LW IC ID:

2503A-RHA110LW

24(61)

750 Dipole

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





Schweizerischer Kalibrierdienst S 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

RTS (RIM Testing Services)

Accreditation No.: SCS 108

Certificate No: D750V3-1021_Jan13

	ERTIFICATE		
Object	D750V3 - SN: 10	21	
Calibration procedure(s)	QA CAL-05.v9 Calibration proce	dure for dipole validation kits abo	ove 700 MHz
Calibration date:	January 07, 2013		
The measurements and the unce	ertainties with confidence p	onal standards, which realize the physical unrobability are given on the following pages any facility: environment temperature $(22\pm3)^\circ$ C	d are part of the certificate.
Calibration Equipment used (M&	TE critical for calibration)		
	Carlo	Cal Date (Certificate No.)	Scheduled Calibration
rimary Standards	ID#	Cal Date (Certificate No.) 01-Nov-12 (No. 217-01640)	Scheduled Calibration Oct-13
rimary Standards Cower meter EPM-442A	Carlo	Cai Date (Certificate No.) 01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640)	Scheduled Calibration Oct-13 Oct-13
Primary Standards Power meter EPM-442A Power sensor HP 8481A	ID # GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator	ID # GB37480704 US37292783	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640)	Oct-13 Oct-13
rimary Standards lower meter EPM-442A lower sensor HP 8481A deference 20 dB Attenuator type-N mismatch combination	ID # GB37480704 US37292783 SN: 5058 (20k)	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530)	Oct-13 Oct-13 Apr-13
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3	(D # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. 217-01533)	Oct-13 Oct-13 Apr-13 Apr-13
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	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)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. 217-01530) 28-Dec-12 (No. ES3-3205_Dec12) 27-Jun-12 (No. DAE4-601_Jun12)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check
rimary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator ype-N mismatch combination Reference Probe ES3DV3 PAE4 Recondary Standards Power sensor HP 8481A	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 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)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check In house check: Oct-13
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317	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)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check In house check: Oct-13 In house check: Oct-13
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005 US37390585 S4206	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. 217-01530) 28-Dec-12 (No. ES3-3205_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)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check In house check: Oct-13 In house check: Oct-13
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Recondary Standards Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer HP 8753E	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005 US37390585 S4206 Name	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. E37-01533) 28-Dec-12 (No. E33-3205_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)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check In house check: Oct-13 In house check: Oct-13
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer HP 8753E	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005 US37390585 S4206	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. 217-01530) 28-Dec-12 (No. ES3-3205_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)	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 Prower meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer HP 8753E Calibrated by:	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005 US37390585 S4206 Name	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. E37-01533) 28-Dec-12 (No. E33-3205_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)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check In house check: Oct-13 In house check: Oct-13

Certificate No: D750V3-1021_Jan13

Page 1 of 6



Appendix A for the BlackBerry® Smartphone Model RHA111LW SAR Report

25(61)

Author Data
Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No RTS-6058-1408-04 FCC ID: L6ARHA110LW

IC ID:

2503A-RHA110LW

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





S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage

Servizio svizzero di taratura Swiss Calibration Service

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS)

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

Glossary:

TSL

tissue simulating liquid

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
- 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: D750V3-1021_Jan13

Page 2 of 6



26(61)

Author Data **Andrew Becker** Dates of Test June 23 – August 5, 2014 Test Report No RTS-6058-1408-04 FCC ID: L6ARHA110LW

IC ID: 2503A-RHA110LW

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	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0,89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) "C	41.4 ± 6 %	0.89 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	Seat	

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.12 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	8.46 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1,38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.51 W/kg ± 16.5 % (k=2)

Certificate No: D750V3-1021_Jan13

Page 3 of 6



Appendix A for the BlackBerry® Smartphone Model RHA111LW SAR Report

27(61)

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Author Data

Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No **RTS-6058-1408-04**

FCC ID: L6ARHA110LW

IC ID:

2503A-RHA110LW

Appendix

Antenna Parameters with Head TSL

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

General Antenna Parameters and Design

Electrical Delay (one direction)	1.033 ns
----------------------------------	----------

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

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 01, 2010

Certificate No: D750V3-1021_Jan13

Page 4 of 6



28(61)

Author Data **Andrew Becker** Dates of Test June 23 – August 5, 2014 Test Report No RTS-6058-1408-04 FCC ID: L6ARHA110LW

IC ID: 2503A-RHA110LW

DASY5 Validation Report for Head TSL

Date: 07.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 750 MHz

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

Phantom section: Flat Section

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

DASY52 Configuration:

Probe: ES3DV3 - SN3205; ConvF(6.28, 6.28, 6.28); Calibrated: 28.12.2012;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn601; Calibrated: 27.06.2012

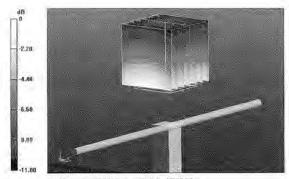
Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001

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

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

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

Maximum value of SAR (measured) = 2.47 W/kg



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



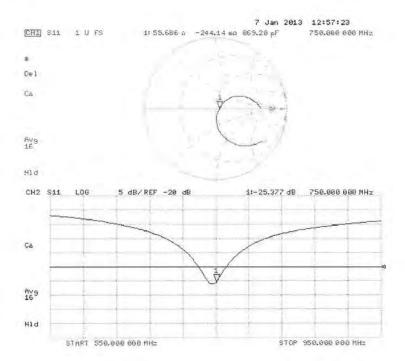
29(61)

Author Data **Andrew Becker** Dates of Test June 23 - August 5, 2014

Test Report No RTS-6058-1408-04 FCC ID: L6ARHA110LW

IC ID: 2503A-RHA110LW

Impedance Measurement Plot for Head TSL



Certificate No: D750V3-1021_Jan13

Page 6 of 6



Appendix A for the BlackBerry® Smartphone Model RHA111LW SAR Report

30(61)

Author Data
Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No **RTS-6058-1408-04**

FCC ID: L6ARHA110LW

IC ID:

2503A-RHA110LW

835 Dipole

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

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

Accreditation No.: SCS 108

Multilateral Agreement for the recognition of calibration certificates

Client RTS (RIM Testing Services)

Certificate No: D835V2-446_Jan13

,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	CERTIFICATE		
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	
The measurements and the unce	ertainties with confidence pr	onal standards, which realize the physical uni robability are given on the following pages an ry facility: environment temperature $(22 \pm 3)^{\circ}$ C	d are part of the certificate.
Calibration Equipment used (M&	TE critical for calibration)		
	TE critical for calibration)	Cal Date (Certificate No.)	Scheduled Calibration
rimary Standards	The state of the s	Cal Date (Certificate No.) 01-Nov-12 (No. 217-01640)	Scheduled Calibration Oct-13
imaty Standards ower meter EPM-442A	ID#		
nimary Standards ower meter EPM-442A ower sensor HP 8481A	ID# GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
rimary Standards ower meter EPM-442A ower sensor HP 8481A leference 20 dB Attenuator	ID # GB37480704 US37292783	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640)	Oct-13 Oct-13
rimary Standards ower meter EPM-442A ower sensor HP 8481A leference 20 dB Attenuator ype-N mismatch combination	ID # GB37480704 US37292783 SN: 5058 (20k)	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530)	Oct-13 Oct-13 Apr-13
rimary Standards ower meter EPM-442A ower sensor HP 8481A leference 20 dB Attenuator ype-N mismatch combination leference Probe ES3DV3	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. 217-01533)	Oct-13 Oct-13 Apr-13 Apr-13
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 AE4	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205	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)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13
Calibration Equipment used (M&T Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 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)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check
rimary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator ype-N mismatch combination Reference Probe ES3DV3 DAE4 Recondary Standards Power sensor HP 8481A	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 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)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check In house check: Oct-13
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317	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)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check In house check: Oct-13 In house check: Oct-13
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005 US37390585 S4206	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. 217-01530) 28-Dec-12 (No. ES3-3205_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)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check In house check: Oct-13 In house check: Oct-13
rimary Standards ower meter EPM-442A ower sensor HP 8481A leference 20 dB Attenuator ype-N mismatch combination leference Probe ES3DV3 IAE4 secondary Standards lower sensor HP 8481A IF generator R&S SMT-06 letwork Analyzer HP 8753E	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005 US37390585 S4206	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. E37-01533) 28-Dec-12 (No. E33-3205_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)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check In house check: Oct-13 In house check: Oct-13
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005 US37390585 S4206	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. 217-01530) 28-Dec-12 (No. ES3-3205_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)	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
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer HP 8753E	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005 US37390585 S4206	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. E37-01533) 28-Dec-12 (No. E33-3205_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)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check In house check: Oct-13 In house check: Oct-13

Certificate No: D835V2-446_Jan13

Page 1 of 6



Appendix A for the BlackBerry® Smartphone Model RHA111LW SAR Report

31(61)

Author Data

Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No

RTS-6058-1408-04

FCC ID:

L6ARHA110LW

IC ID:

2503A-RHA110LW

Calibration Laboratory of Schmid & Partner

Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland ilac MRA



S Schweizerischer Kalibrierdienst Service suisse d'étaionnage

Servizio svizzero di taratura Swiss Calibration Service

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS)

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

Glossary:

TSL ConvF tissue simulating liquid

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

Calibration is Performed According to the Following Standards:

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



Appendix A for the BlackBerry ${\bf @}$ Smartphone Model RHA111LW SAR Report

32(61)

Author Data
Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No **RTS-6058-1408-04**

FCC ID: L6ARHA110LW

IC ID:

2503A-RHA110LW

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	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 ± 6 %	0.92 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	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

Page 3 of 6



Appendix A for the BlackBerry® Smartphone Model RHA111LW SAR Report

Page **33(61)**

Author Data
Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No **RTS-6058-1408-04**

FCC ID: L6ARHA110LW

IC ID:

2503A-RHA110LW

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

A CONTRACTOR OF THE PROPERTY O	
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

Page 4 of 6



Author Data Dates of Test

Andrew Becker June 23 – August 5, 2014 Test Report No RTS-6058-1408-04 FCC ID: L6ARHA110LW

IC ID: 2503A-RHA110LW

34(61)

DASY5 Validation Report for Head TSL

Date: 07.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 835 MHz

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

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)

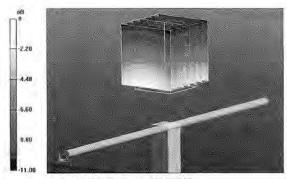
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

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



35(61)

Author Data
Andrew Becker

Dates of Test

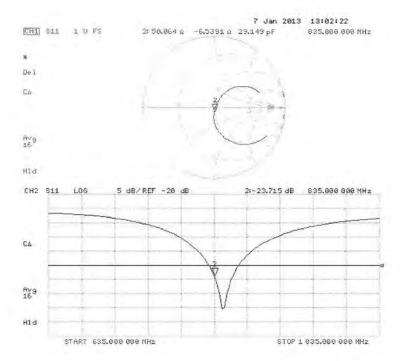
June 23 – August 5, 2014

Test Report No **RTS-6058-1408-04**

FCC ID: I L6ARHA110LW 2

IC ID: **2503A-RHA110LW**

Impedance Measurement Plot for Head TSL



Certificate No: D835V2-446_Jan13

Page 6 of 6



Appendix A for the BlackBerry® Smartphone Model RHA111LW SAR Report

36(61)

Author Data

Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No

RTS-6058-1408-04

FCC ID: L6ARHA110LW

IC ID:

2503A-RHA110LW

1800 Dipole

Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 6004 Zurich, Switzerland





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

Accredited by the Swiss Accreditation Service (SAS)

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

Client

RTS (RIM Testing Services)

Accreditation No.: SCS 108

Certificate No: D1800V2-2d020_Jan13

CALIBRATION CERTIFICATE Object D1800V2 - SN: 2d020 Calibration procedure(s) QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz January 09, 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 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 Cal Date (Certificate No.) Scheduled Calibration 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 Reference 20 dB Attenuator SN: 5058 (20k) 27-Mar-12 (No. 217-01530) Apr-13 Type-N mismatch combination SN: 5047,3 / 06327 27-Mar-12 (No. 217-01533) Apr-13 Reference Probe ES3DV3 SN: 3205 28-Dec-12 (No. ES3-3205_Dec12) Dec-13 SN: 601 27-Jun-12 (No. DAE4-601_Jun12) Jun-13 Secondary Standards ID# Check Date (in house) Scheduled Check MY41092317 Power sensor HP 8481A 18-Oct-02 (in house check Oct-11) In house check: Oct-13 RF generator R&S SMT-06 100005 84-Aug-99 (in house check Oct-11) In house check: Oct-13 US37390585 S4206 Network Analyzer HP 8753E 18-Oct-01 (in house check Oct-12) In house check: Oct-13 Name Function Calibrated by: Israe El-Naoug Laboratory Technician Approved by: Katja Pokovic Technical Manager Issued: January 9, 2013 This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: D1800V2-2d020_Jan13

Page 1 of 6



Appendix A for the BlackBerry® Smartphone Model RHA111LW SAR Report

Page 37(61)

Author Data

Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No

RTS-6058-1408-04

FCC ID:

L6ARHA110LW

IC ID: **2503A-RHA110LW**

Calibration Laboratory of Schmid & Partner Engineering AG

Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland





S Schweizerischer Kallbrierdienst
C Service suisse d'étalonnage

Servizio svizzero di taratura Swiss Calibration Service

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS)

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

Glossary:

TSL

N/A

tissue simulating liquid

ConvF

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: D1800V2-2d020_Jan13

Page 2 of 6



Appendix A for the BlackBerry ${\bf @}$ Smartphone Model RHA111LW SAR Report

38(61)

Author Data
Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No **RTS-6058-1408-04**

FCC ID:

IC ID:

L6ARHA110LW 2503A-RHA110LW

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	(44)	

SAR result with Head TSL

SAR averaged over 1 cm3 (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 measured	250 mW input power	5.06 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.3 W/kg ± 16.5 % (k=2)

Certificate No: D1800V2-2d020_Jan13

Page 3 of 6



Appendix A for the BlackBerry® Smartphone Model RHA111LW SAR Report

39(61)

Author Data
Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No **RTS-6058-1408-04**

FCC ID: L6ARHA110LW

IC ID:

2503A-RHA110LW

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

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	

Certificate No: D1800V2-2d020_Jan13

Page 4 of 6



Author Data **Andrew Becker** Dates of Test June 23 – August 5, 2014 Test Report No RTS-6058-1408-04 FCC ID: L6ARHA110LW

IC ID: 2503A-RHA110LW

40(61)

DASY5 Validation Report for Head TSL

Date: 09.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 1800 MHz

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

Phantom section: Flat Section

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

DASY52 Configuration:

Probe: ES3DV3 - SN3205; ConvF(5.04, 5.04, 5.04); Calibrated: 28.12.2012;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn601; Calibrated: 27.06.2012

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

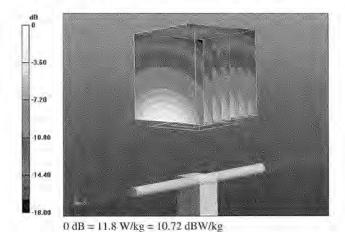
DASY52 52.8.4(1052); SEMCAD X 14.6.8(7028)

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 95.870 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 17.5 W/kg

SAR(1 g) = 9.61 W/kg; SAR(10 g) = 5.06 W/kgMaximum value of SAR (measured) = 11.8 W/kg



Certificate No: D1800V2-2d020_Jan13



41(61)

Author Data
Andrew Becker

Dates of Test

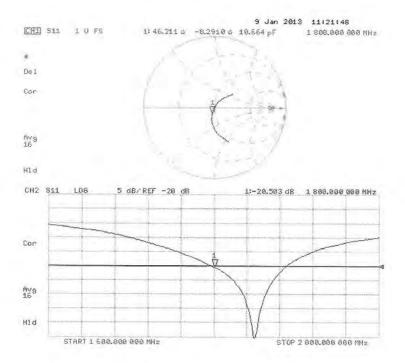
June 23 – August 5, 2014

Test Report No RTS-6058-1408-04

FCC ID: IC **L6ARHA110LW** 2

IC ID: **2503A-RHA110LW**

Impedance Measurement Plot for Head TSL



Certificate No: D1800V2-2d020_Jan13

Page 6 of 6



Appendix A for the BlackBerry® Smartphone Model RHA111LW SAR Report

42(61)

Author Data
Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No **RTS-6058-1408-04**

FCC ID: L6ARHA110LW

IC ID:

2503A-RHA110LW

1900 Dipole

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





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S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)

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

Client RTS (RIM Testing Services)

Accreditation No.: SCS 108

Certificate No: D1900V2-545_Jan13

Object	D1900V2 - SN: 5	45	
Calibration procedure(s)	QA CAL-05.v9		
	Calibration proce	dure for dipole validation kits abo	ove 700 MHz
Calibration date:	January 09, 2013	(-	
	V) 711, V		
			- LY is a succession
		onal standards, which realize the physical un robability are given on the following pages an	
All calibrations have been conduc	cted in the closed laborator	y facility: environment temperature (22 ± 3)°(C and humidity < 70%.
Calibration Equipment used (M&T	TE critical for calibration)		
	TE critical for calibration)	Cal Date (Certificate No.)	Scheduled Calibration
rimary Standards		Cal Date (Certificate No.) 01-Nov-12 (No. 217-01640)	Oct-13
Primary Standards Power meter EPM-442A	ID#		
Primary Standards Power meter EPM-442A Power sensor HP 8481A	ID # GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator	ID # GB37480704 US37292783	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640)	Oct-13 Oct-13
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination	ID # GB37480704 US37292783 SN: 5058 (20k)	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530)	Oct-13 Oct-13 Apr-13
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	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. 217-01533)	Oct-13 Oct-13 Apr-13 Apr-13
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	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)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Referenca Probe ES3DV3 DAE4 Secondary Standards	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01530) 27-Mar-12 (No. 217-01530) 28-Dec-12 (No. ES3-3205_Dec12) 27-Jun-12 (No. DAE4-601_Jun12)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reterence Probe ES3DV3. DAE4 Secondary Standards Power sensor HP 8481A	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 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)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-05	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317	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)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check In house check; Oct-13
Calibration Equipment used (M&T Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reterence Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RE generator R&S SMT-06 Network Analyzer HP 8753E	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005	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)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check In house check; Oct-13 In house check: Oct-13
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-05 Network Analyzer HP 8753E	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005 US37390585 S4206	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01630) 27-Mar-12 (No. 217-01530) 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)	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
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-05	ID # GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005 US37390585 S4206 Name	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 27-Mar-12 (No. 217-01630) 27-Mar-12 (No. 217-01530) 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)	Oct-13 Oct-13 Apr-13 Apr-13 Dec-13 Jun-13 Scheduled Check In house check; Oct-13 In house check: Oct-13 Signature

Certificate No: D1900V2-545_Jan13

Page 1 of 6



43(61)

Author Data

Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No RTS-6058-1408-04 FCC ID:

IC ID: L6ARHA110LW

2503A-RHA110LW

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





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

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS)

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

Glossary:

TSL 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
- 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



44(61)

Author Data **Andrew Becker** Dates of Test June 23 – August 5, 2014 Test Report No RTS-6058-1408-04 FCC ID: L6ARHA110LW

IC ID: 2503A-RHA110LW

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	-	Sale.

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 cm3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.26 W/kg
SAR for nominal Head TSL parameters	normatized to 1W	21.1 W/kg ± 16.5 % (k=2)

Certificate No: D1900V2-545_Jan13

Page 3 of 6



Appendix A for the BlackBerry® Smartphone Model RHA111LW SAR Report

Page **45(61)**

Author Data
Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No **RTS-6058-1408-04**

FCC ID:

L6ARHA110LW 25

IC ID: 2503A-RHA110LW

Appendix

Antenna Parameters with Head TSL

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

General Antenna Parameters and Design

Electrical Delay (one direction)	1.198 ns
Electrical Dolay (offe direction)	11,100 110

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



46(61)

Author Data
Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No **RTS-6058-1408-04**

FCC ID: IC L6ARHA110LW 2

IC ID: 2503A-RHA110LW

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; $\sigma = 1.38 \text{ S/m}$; $\varepsilon_r = 39.4$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

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

Sensor-Surface: 3mm (Mechanical Surface Detection)

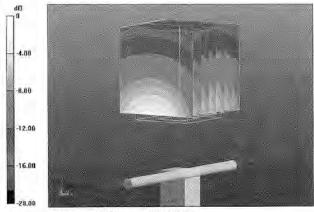
Electronics: DAE4 Sn601; Calibrated: 27.06.2012

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

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

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

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



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

Certificate No: D1900V2-545_Jan13

Page 5 of 6



47(61)

Author Data
Andrew Becker

Dates of Test

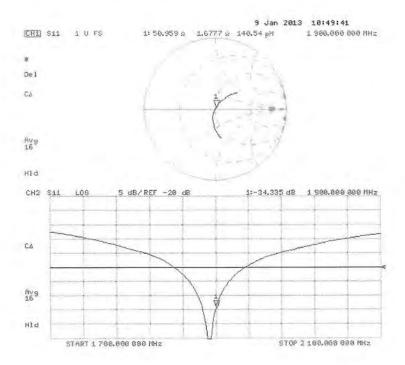
June 23 – August 5, 2014

Test Report No **RTS-6058-1408-04**

FCC ID: I L6ARHA110LW 2

IC ID: **2503A-RHA110LW**

Impedance Measurement Plot for Head TSL



Certificate No: D1900V2-545_Jan13

Page 6 of 6



Author Data

Andrew Becker

Appendix A for the BlackBerry® Smartphone Model RHA111LW SAR Report

Dates of Test

June 23 – August 5, 2014

Test Report No RTS-6058-1408-04 FCC ID: L6ARHA110LW IC ID:

48(61)

2503A-RHA110LW

2450 Dipole

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





Schwelzerischer Kalibrierdlenst Service suisse d'étalonnago 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

Blackberry Waterloo

Accreditation No.: SCS 108

Certificate No: D2450V2-791_Sep13

Object	D2450V2 - SN: 7	91	
Calibration procedure(s)	QA CAL-05.v9 Calibration proces	dure for dipole validation kits abo	ve 700 MHz
Dalibration date;	September 10, 20	013	
The measurements and the unce	rtaintles with confidence pa	orial standards, which realize the physical un robability are given on the following pages an y facility: environment temperature (22 \pm 3) ² (d are part of the certificate.
Drimani Standards	173.16	Cal Date (Certificate No.)	Schoduled Calibration
Primary Standards Power meter EPM-442A	ID # GB37480704	Cal Date (Certificate No.) 01-Nov-12 (No. 217-01640)	Schoduled Calibration Oct-13
Power mater EPM-442A			THE COMMENT OF THE PROPERTY OF
Power meter EPM-442A Power sensor HP 8481A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power meler EPM-442A Power sonsor HP 8481A Reference 20 dB Attenuator	GB37480704 US37292783	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640)	Oct-13 Oct-13
Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Pype-N mismatch combination	GB37480704 US37292783 SN: 5058 (20k)	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736)	Oct-13 Oct-13 Apr-14
Power mater EPM-442A Power sonsor HP 8481A Reference 20 dB Attenuator Fype-N mismatch combination Reference Probe ES3DV3	GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739)	Oct-13 Oct-13 Apr-14 Apr-14
Power mater EPM-442A Power sonsor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4	GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Dac-12 (No. ES3-3205_Dec12)	Oct-13 Oct-13 Apr-14 Apr-14 Dec-13
Power mater EPM-442A Power sonsor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards	GB37480704 US37292783 SN; 5058 (20k) SN; 5047.3 / 96327 SN; 3206 SN; 601	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Dac-12 (No. ESS-3205_Dec12) 25-Apr-13 (No. DAF4-601_Apr13)	Oct-13 Oct-13 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check In house check; Oct-13
	GB87480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 96327 SN: 3205 SN: 601 ID # MY41092317 100005	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Dac-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAF4-601_Apr13) Check Date (in house) 18-Oct-02 (in house check Oct-11) 04-Aug-99 (in house check Oct-11)	Oct-13 Oct-13 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check In house check; Oct-13 In house check; Oct-13
Power mater EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06	GB87480704 US37292763 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Dac-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAF4-601_Apr13) Chock Date (in house)	Oct-13 Oct-13 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check In house check; Oct-13
Power mater EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator rype-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RF generator R&S SMT-06	GB87480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 96327 SN: 3205 SN: 601 ID # MY41092317 100005	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01799) 28-Dac-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAF4-601_Apr13) Chock Date (in house) 18-Oct-02 (in house check Oct-11) 04-Aug-99 (in house check Oct-11) 18-Oct-01 (in house check Oct-12) Function	Oct-13 Oct-13 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check In house check: Oct-13 In house check: Oct-13 Signature
Power mater EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Pype-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RE generator R&S SMT-06 Network Analyzer HP 875SE	GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 96327 SN: 3205 SN: 601 ID # MY41092317 100005 US37390585 \$4206	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01799) 28-Dac-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAF4-601_Apr13) Chock Date (in house) 18-Oct-02 (in house check Oct-11) 04-Aug-99 (in house check Oct-11) 18-Oct-01 (in house check Oct-12) Function	Oct-13 Oct-13 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check In house check: Oct-13 In house check: Oct-13 Signature
Power mater EPM-442A Power sonsor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sonsor HP 8481A	GB37480704 US37292783 SN: 5058 (20k) SN: 5047.3 / 96327 SN: 3205 SN: 601 ID # MY41092317 100005 US37390585 \$4206	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01799) 28-Dac-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAF4-601_Apr13) Chock Date (in house) 18-Oct-02 (in house check Oct-11) 04-Aug-99 (in house check Oct-11) 18-Oct-01 (in house check Oct-12) Function	Oct-13 Oct-13 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check In house check: Oct-13 In house check: Oct-13

Certificate No: D2450V2-791_Sep13

Page 1 of 6



Author Data Dates of Test Andrew Becker

June 23 – August 5, 2014

Test Report No RTS-6058-1408-04 FCC ID: L6ARHA110LW IC ID:

2503A-RHA110LW

49(61)

Calibration Laboratory of Schmid & Partner Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland





Schweizerischer Kallbrierdienst S Service suisse d'étatonnage C Servizio svizzero di taratura Swiss Calibration Service

Accreditation No.: SCS 108

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

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions: Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL: The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss: These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay: One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured: SAR measured at the stated antenna input power.
- SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna
- 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: D2450V2-791_Sep13

Page 2 of 6



50(61)

Author Data **Andrew Becker** Dates of Test

June 23 - August 5, 2014

Test Report No RTS-6058-1408-04 FCC ID:

L6ARHA110LW

IC ID: 2503A-RHA110LW

Measurement Conditions

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

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

Head TSL parameters

The following parameters and calculations were applied.

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

SAR result with Head TSL

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.0 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	51.6 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.03 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.0 W/kg ± 16.5 % (k=2)

Certificate No: D2450V2-791_Sep13

Page 3 of 6



51(61)

Author Data **Andrew Becker** Dates of Test

June 23 – August 5, 2014

Test Report No RTS-6058-1408-04 FCC ID:

L6ARHA110LW

IC ID: 2503A-RHA110LW

Appendix

Antenna Parameters with Head TSL

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

General Antenna Parameters and Design

1.153 ns

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

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	January 24, 2006

Certificate No: D2450V2-791_Sep13

Page 4 of 6



Author Data **Andrew Becker**

June 23 – August 5, 2014

Test Report No RTS-6058-1408-04 FCC ID: L6ARHA110LW

IC ID: 2503A-RHA110LW

52(61)

DASY5 Validation Report for Head TSL

Dates of Test

Date: 10.09,2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 2450 M1Iz

Medium parameters used: f = 2450 MHz; $\sigma = 1.83$ S/m; $\epsilon_r = 39.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

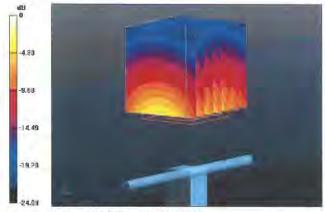
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

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

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 99.824 V/m; Power Drift = 0.04 dB Peak SAR (extrapolated) = 26.7 W/kg SAR(1 g) = 13 W/kg; SAR(10 g) = 6.03 W/kgMaximum value of SAR (measured) = 16.9 W/kg



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

Certificate No: D2450V2-791 Sep13

Page 5 of 6



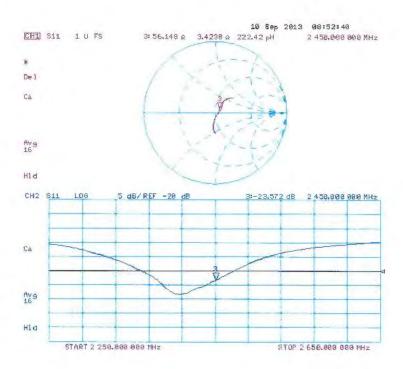
Report

Author Data **Andrew Becker** Dates of Test June 23 – August 5, 2014 Test Report No RTS-6058-1408-04 FCC ID: L6ARHA110LW

IC ID: 2503A-RHA110LW

53(61)

Impedance Measurement Plot for Head TSL



Certificate No: D2450V2-791_Sep13

Page 6 of 6



54(61)

Author Data **Andrew Becker** Dates of Test June 23 – August 5, 2014

Test Report No RTS-6058-1408-04 FCC ID: L6ARHA110LW

IC ID: 2503A-RHA110LW

5000 Dipole

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





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

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Client Blackberry Waterloo

Accreditation No.: SCS 108

Certificate No: D5GHzV2-1033_Nov13

	ERTIFICATE		
Dbject	D5GHzV2 - SN: 1	033	
Calibration procedure(s)	QA CAL-22.v2 Calibration proces	dure for dipole validation kits bet	ween 3-6 GHz
Calibration date:	November 08, 20	13	
The measurements and the unca	ntainties with contidence potential in the closed laborator	onal standards, which realize the physical un obability are given on the following pages an y facility: environment temperature (22 \pm 3)°0	d are part of the certificate.
nimary Standards	10 1	Cal Date (Certificate No.)	Scheduled Calibration
Primary Standards Power mater EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ESSDV3 DAE4	ID # GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601	Cal Date (Certificate No.) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Dec-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAE4-601_Apr13)	Scheduled Calibration Oct-14 Oct-14 Oct-14 Apr-14 Apr-14 Dec-13 Apr-14
Power mater EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ESSDV3 DAE4	GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601	08-0ct-13 (No. 217-01827) 09-0ct-13 (No. 217-01827) 09-0ct-13 (No. 217-01828) 04-Apr-13 (No. 217-01738) 04-Apr-13 (No. 217-01739) 28-0ac-12 (No. ESS-3205_Dec12) 25-Apr-13 (No. DAE4-601_Apr13)	Oct-14 Oct-14 Oct-14 Apr-14 Apr-14 Dec-13
Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attanuator Type-N mismatch combination Reference Probe ES3DV3	GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.9 / 06327 SN: 3205	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Dec-12 (No. ES3-3205_Dec12)	Oct-14 Oct-14 Oct-14 Apr-14 Apr-14 Dec-13 Apr-14
Power mater EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attanuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards RF generator R&S SMT-06	GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Dec-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAE4-601_Apr13) Check Date (in house) 04-Aug-99 (in house check Oct-15)	Oct-14 Oct-14 Oct-14 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check In house chack, Oct-15
Power mater EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 BB Attanuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards HF generator R&S SMT-06 Network Analyzer HP 8753E	GB37480704 US37292783 MY41022317 SN: 5058 (20k) SN: 5047.9 / 06327 SN: 3205 SN: 601 ID # 100005 US37390585 S4206	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01738) 04-Apr-13 (No. 217-01739) 28-Dac-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAE4-601_Apr13) Check Date (in house) 04-Aug-99 (in house check Oct-13) 18-Oct-01 (in house chack Oct-13)	Oct-14 Oct-14 Oct-14 Oct-14 Apr-14 Apr-14 Dac-13 Apr-14 Scheduled Check In house check: Oct-15 In house check: Oct-14

Certificate No: D5GHzV2-1033_Nov13



55(61)

Author Data

Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No

RTS-6058-1408-04

FCC ID: L6ARHA110LW

IC ID:

2503A-RHA110LW

Calibration Laboratory of Schmid & Partner

Engineering AG
Zeughausstrsses 43, 8004 Zurich, Switzerland





Schweizerischer Kallbrierdienst

C Service sulsee d'étalonnage Servizio svizzero di taratura

Accreditation No.: SCS 108

S 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

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) 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%.

Certificate No: D5GHzV2-1033_Nov13

Page 2 of 8



Report

56(61)

Author Data **Andrew Becker** Dates of Test June 23 – August 5, 2014 Test Report No RTS-6058-1408-04 FCC ID: L6ARHA110LW

IC ID: 2503A-RHA110LW

Measurement Conditions

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

DASY Version	DASY5	V52.8.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5200 MHz ± 1 MHz 5500 MHz ± 1 MHz 5800 MHz ± 1 MHz	

Head TSL parameters at 5200 MHz

	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

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.6	4.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) "C	34.6 ± 6 %	4.75 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	_	-

SAR result with Head TSL at 5500 MHz

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.51 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	84.4 W / kg ± 19.9 % (k=2)

SAR averaged over 10 cm3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	23.9 W/kg ± 19.5 % (k=2)

Certificate No: D5GHzV2-1033_Nov13

Page 3 of 8



Report

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57(61)

Author Data
Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No **RTS-6058-1408-04**

FCC ID:

L6ARHA110LW

IC ID: **2503A-RHA110LW**

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 cm3 (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)

Certificate No: D5GHzV2-1033 Nov13

Page 4 of 8



Appendix A for the BlackBerry® Smartphone Model RHA111LW SAR Report

Page **58(61)**

Author Data
Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No **RTS-6058-1408-04**

FCC ID:

L6ARHA110LW 2

IC ID: **2503A-RHA110LW**

Appendix

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	49.1 \(\Omega - 9.6 \)
Return Loss	- 20.3 dB

Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	50:3 Ω - 4.1 μΩ
Return Loss	- 27.7 aB

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 dipote 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



59(61)

Author Data
Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No **RTS-6058-1408-04**

FCC ID: L6ARHA110LW IC ID: **2503A-RHA110LW**

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; $\epsilon_r = 35$; $\rho = 1000$ kg/m³, Medium parameters used: f = 5500 MHz; $\sigma = 4.75$ S/m; $\epsilon_r = 34.6$; $\rho = 1000$ kg/m³

Medium parameters used: f = 5800 MHz; $\sigma = 5.06$ S/m; $\epsilon_r = 34.2$; $\rho = 1000$ 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
- Phamom: 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



60(61)

Author Data
Andrew Becker

Dates of Test

June 23 – August 5, 2014

Test Report No **RTS-6058-1408-04**

FCC ID: I L6ARHA110LW 2

IC ID: **2503A-RHA110LW**





Page **61(61)**

Author Data
Andrew Becker

Dates of Test

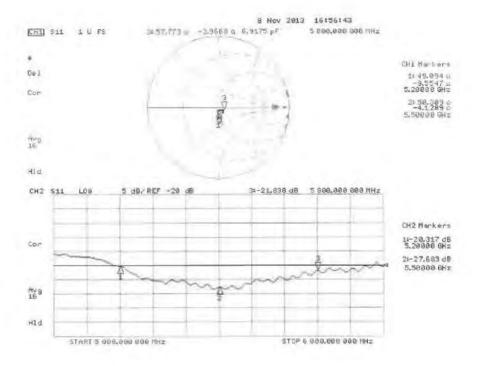
June 23 – August 5, 2014

Test Report No **RTS-6058-1408-04**

FCC ID: I. L6ARHA110LW 2

IC ID: **2503A-RHA110LW**

Impedance Measurement Plot for Head TSL



Certificate No: D5GHzV2-1033_Nov13

Page 8 of 8