Testing Services <sup>**</sup>	Document Appendix D for the Black	Page 1(64)		
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
Hang Wang	Feb 7 – May 25, 2011	RTS-3933-1105-11	L6ARDU70CW	2503A-RDU70CW

### APPENDIX D: PROBE & DIPOLE CALIBRATION DATA

위	Testing Services™	Document Appendix	D for the Black	Berry® Smartphone Mo	del RDU71CW	Page <b>2(64</b> )
ata Wang		Dates of Test Feb 7 – Ma	ny 25, 2011	Test Report No RTS-3933-1105-11	FCC ID: L6ARDU70CW	іс ір 2503А-RDU70C
	Schmid & Enginee		-	Hac MRA Republic	S Schweizerischer Ka Service suisse d'éta Servizio svizzero di S Swiss Calibration S	alonnage taratura
	The Swiss Acc	creditation Servic	ation Service (SAS) te is one of the signator recognition of calibratio	ies to the EA	editation No.: SCS 108	
	Client R	TS (RIM Test	ing Services)	्रम् हर्मे	licate No: ET3-1643_Ma	r10
	CALIBI	RATION	CERTIFICAT	E		
	Object		ET3DV6 - SN:1	643		
	Calibration pro	ocedure(s)		QA CAL-23.v3 and QA CAL redure for dosimetric E-field		
	Calibration dat					
		te:	March 9, 2010	₩ <sup>81</sup>		
	This calibratio The measurer	on certificate docum ments and the unce	nents the traceability to na ertainties with confidence	ational standards, which realize the phy probability are given on the following p	ages and are part of the certific	
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Hang Wang

Dates of Test Feb 7 – May 25, 2011 **2503A-RDU70CW** 

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

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

Accreditation No.: SCS 108

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:

olocouly.	
TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization $\phi$	φ rotation around probe axis
Polarization 9	9 rotation around an axis that is in the plane normal to probe axis (at measurement center),
	i.e., 9 = 0 is normal to probe axis

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

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- 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 effect the E<sup>2</sup>-field uncertainty inside TSL (see below ConvF).
- NORM(f)x,y,z = NORMx,y,z \* frequency\_response (see Frequency Response Chart). This linearization is
  implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included
  in the stated uncertainty of ConvF.
- DCPx, y, z: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- Ax,y,z; Bx,y,z; Cx,y,z, VRx,y,z; A, B, C are numerical linearization parameters assessed based on the data of
  power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the
  maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z \* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom
  exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

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## Probe ET3DV6

## SN:1643

Manufactured: Last calibrated: Recalibrated: November 7, 2001 March 10, 2009 March 9, 2010

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

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

#### **Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (µV/(V/m) <sup>2</sup> ) <sup>A</sup>	1.75	2.01	1.79	± 10.1%
DCP (mV) <sup>B</sup>	93.2	91.0	90.9	

#### Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	С	VR mV	Unc <sup>E</sup> (k=2)
10000	cw	0.00	×	0.00	0.00	1.00	300.0	± 1.5%
			Y	0.00	0.00	1.00	300.0	
			Z	0.00	0.00	1.00	300.0	

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

^ The uncertainties of NormX,Y,Z do not affect the  $\vec{E}$ -field uncertainty inside TSL (see Pages 5 and 8).

<sup>9</sup> Numerical linearization parameter: uncertainty not required.

<sup>E</sup> Uncertainty is determined using the maximum deviation from linear response applying recatangular distribution and is expressed for the square of the field value.

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

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

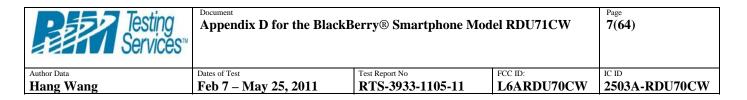
f [MHz]	Validity [MHz] <sup>C</sup>	Permittivity	Conductivity	ConvF X Co	nvFY Co	nvF Z	Alpha	Depth Unc (k=2)
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	6.01	6.01	6.01	0.42	2.35 ± 11.0%
1810	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	4.99	4.99	4.99	0.62	2.35 ± 11.0%
1950	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	4.74	4.74	4.74	0.79	2.10 ± 11.0%

<sup>12</sup> The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency

and the uncertainty for the indicated frequency band

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

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

f [MHz]	Validity [MHz] <sup>C</sup>	Permittivity	Conductivity	ConvF X Co	nvFY Co	nvF Z	Alpha	Depth Unc (k=2)
900	± 50 / ± 100	55.0 ± 5%	1.05 ± 5%	5.93	5.93	5.93	0.33	2.77 ± 11.0%
1810	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.58	4.58	4.58	0.75	2.63 ± 11.0%
1950	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.54	4.54	4.54	0.99	2.20 ± 11.0%

<sup>c</sup> The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency

and the uncertainty for the indicated frequency band.

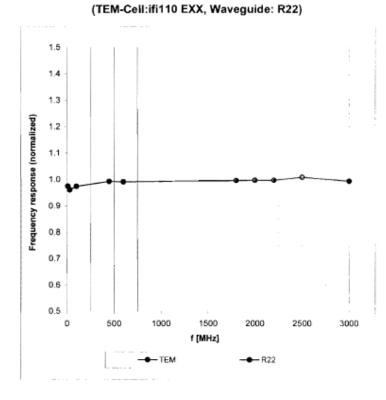
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## Frequency Response of E-Field



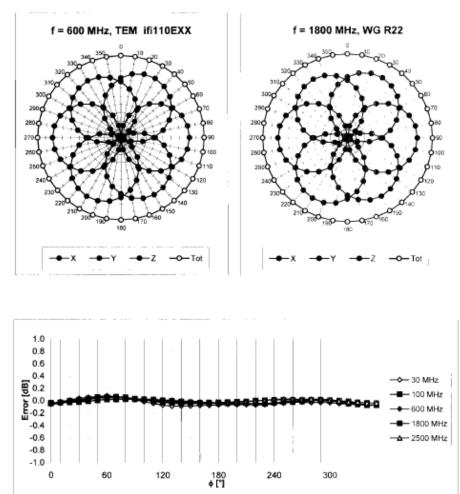
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

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

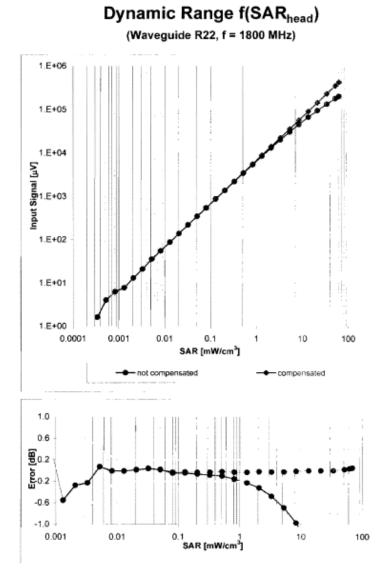
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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

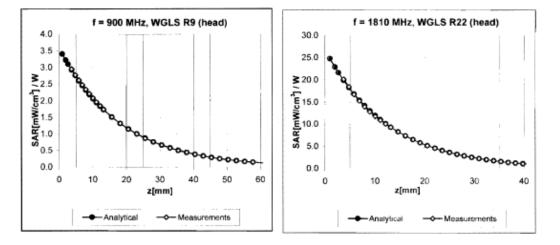
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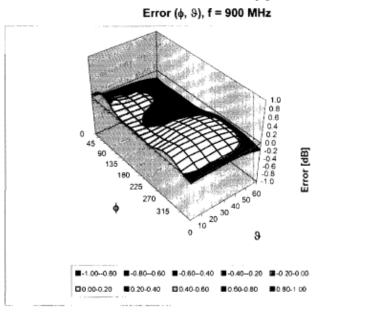
Testing Services™	Appendix D for the BlackBerry® Smartphone Model RDU71CW			Page 11(64)
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March 9, 2010



## **Conversion Factor Assessment**

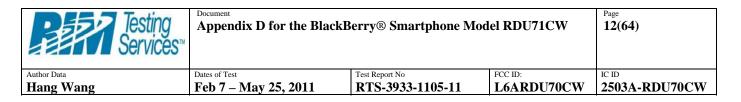
**Deviation from Isotropy in HSL** 



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

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## **Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	enabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	6.8 mm
Probe Tip to Sensor X Calibration Point	2.7 mm
Probe Tip to Sensor Y Calibration Point	2.7 mm
Probe Tip to Sensor Z Calibration Point	2.7 mm
Recommended Measurement Distance from Surface	4 mm

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	b 7 – May 25, 201	-	L6ARDU70CW	2503A-RDU7(
Calibration Laborato Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zur	-	Hac MRA Representation S C C Z Z S Representation S	Schweizerlscher Kalibriere Service suisse d'étalonnag Servizio svizzero di taratur Swiss Calibration Service	je -
Accredited by the Swiss Accred The Swiss Accreditation Servi Multilateral Agreement for the	ice is one of the signatori	es to the EA	1 No.: SCS 108	
Client RTS (RIM Tes	ting Services)	Certificate N	: ES3-3225_Jan11	
CALIBRATION	CERTIFICAT	Er series		
Object	ES3DV3 - SN:3	<b>225</b>	an Martin Contractor Statistics	
Calibration procedure(s)	Calibration proc	QA CAL-23.v4 and QA CAL-25.v3 edure for dosimetric E-field probe		
	소 소 소 소 소 소	그 집에 가지 않는 것을 가지 않는 것을 많이 많다.		
Calibration date:	January 13, 201		n senten en e	
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Certificate No: ES3-3225\_Jan11

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Appendix D for the BlackBerry® Smartphone Model RDU71CW

Test Report No

Hang Wang

#### Dates of Test Feb 7 – May 25, 2011

RTS-3933-1105-11

0CW 2503A-RDU70CW

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

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Document

Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization o	φ rotation around probe axis
Polarization 9	9 rotation around an axis that is in the plane normal to probe axis (at measurement center),
	i.e., 9 = 0 is normal to probe axis

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

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

#### Methods Applied and Interpretation of Parameters:

- NORMx, y, z: Assessed for E-field polarization 9 = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx, y, z are only intermediate values, i.e., the uncertainties of NORMx, y, z does not effect the E<sup>2</sup>-field uncertainty inside TSL (see below *ConvF*).
- NORM(f)x,y,z = NORMx,y,z \* frequency\_response (see Frequency Response Chart). This linearization is
  implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included
  in the stated uncertainty of ConvF.
- DCPx, y, z: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- Ax,y,z; Bx,y,z; Cx,y,z, VRx,y,z; A, B, C are numerical linearization parameters assessed based on the data of
  power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the
  maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z \* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom
  exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

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Hang Wang	Feb 7 – May 25, 2011	2503A-RDU70CW		

January 13, 2011

# Probe ES3DV3

## SN:3225

Manufactured: Last calibrated: Recalibrated: September 1, 2009 December 11, 2009 January 13, 2011

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

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Dates of Test	IС ID 2503А-RDU70CW		
		Dates of Test Test Report No	r · · · ·

January 13, 2011

## 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	1.21	1.31	± 10.1%
DCP (mV) <sup>8</sup>	102.1	100.8	99.1	

#### **Modulation Calibration Parameters**

סוט	Communication System Name	PAR		A dB	B dBuV	С	VR mV	Unc <sup>E</sup> (k=2)
10000	cw	0.00	х	0.00	0.00	1.00	149.8	± 2.6 %
			Y	0.00	0.00	1.00	148.1	
			Z	0.00	0.00	1.00	110.7	

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

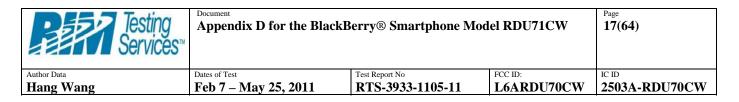
<sup>A</sup> The uncertainties of NormX, Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Pages 5 and 6).

<sup>8</sup> Numerical linearization parameter, uncertainty not required.

<sup>c</sup> Uncertainty is determined using the maximum deviation from linear response applying recatangular distribution and is expressed for the square of the field value.

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

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

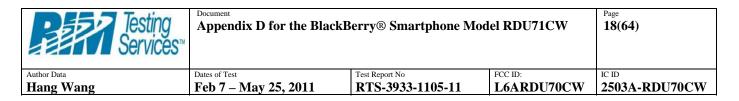
f [MHz]	Validity [MHz] <sup>C</sup>	Permittivity	Conductivity	ConvF X Co	nvFY Conv	FZ	Alpha	Depth Unc (k=2)
750	± 50 / ± 100	41.9 ± 5%	0.89 ± 5%	6.47	6.47	6.47	0.89	1.08 ± 11.0%
900	± 50 / ± 100	41.5 ± 5%	0.97 ± 5%	6.11	6.11	6.11	0.81	1.10 ± 11.0%
1810	± 50 / ± 100	40.0 ± 5%	$1.40 \pm 5\%$	5.26	5.26	5.26	0.37	1.68 ± 11.0%
1950	± 50 / ± 100	40.0 ± 5%	1.40 ± 5%	4.98	4.98	4.98	0.48	1.51 ± 11.0%
2450	± 50 / ± 100	39.2 ± 5%	1.80 ± 5%	4.60	4.60	4.60	0.52	1.54 ± 11.0%
2600	± 50 / ± 100	$39.0\pm5\%$	1.96 ± 5%	4.52	4.52	4.52	0.53	1.58 ± 11.0%

<sup>c</sup> The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency

and the uncertainty for the indicated frequency band.

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

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

f (MHz)	Validity [MHz] <sup>C</sup>	Permittivity	Conductivity	ConvF X Co	nvFY Con	vFZ	Alpha	Depth Unc (k=2)
750	± 50 / ± 100	$55.5 \pm 5\%$	0.96 ± 5%	6.30	6.30	6.30	0.76	1.17 ± 11.0%
900	± 50 / ± 100	$55.0 \pm 5\%$	1.05 ± 5%	6.12	6.12	6.12	0.72	1.20 ±11.0%
1810	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.88	4.88	4.88	0.26	2.70 ± 11.0%
1950	± 50 / ± 100	53.3 ± 5%	1.52 ± 5%	4.89	4.89	4.89	0.33	2.28 ± 11.0%
2450	± 50 / ± 100	52.7 ± 5%	1.95 ± 5%	4.43	4.43	4.43	0.99	1.04 ± 11.0%
2600	± 50 / ± 100	52.5 ± 5%	2.16 ± 5%	4.29	4.29	4.29	0.99	1.05 ± 11.0%

<sup>©</sup> The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency

and the uncertainty for the indicated frequency band.

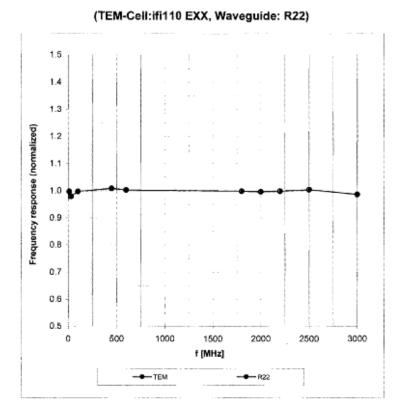
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Hang Wang	Feb 7 – May 25, 2011	RTS-3933-1105-11	L6ARDU70CW	2503A-RDU70CW

January 13, 2011

## Frequency Response of E-Field



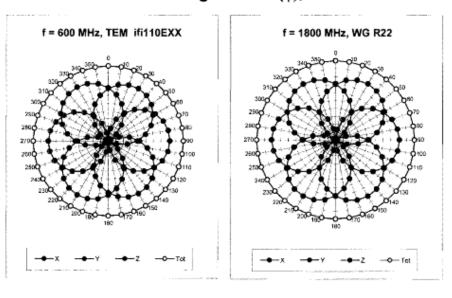
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

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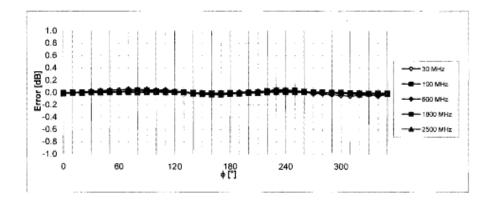
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## Receiving Pattern ( $\phi$ ), $\vartheta$ = 0°



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

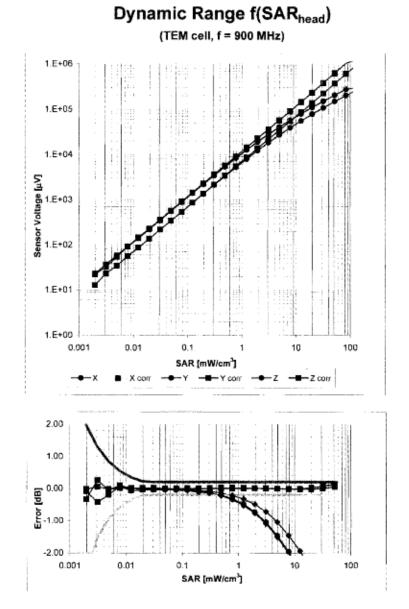
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Author Data	Dates of Test	IC ID		
Hang Wang	Feb 7 – May 25, 2011	RTS-3933-1105-11	L6ARDU70CW	2503A-RDU70CW

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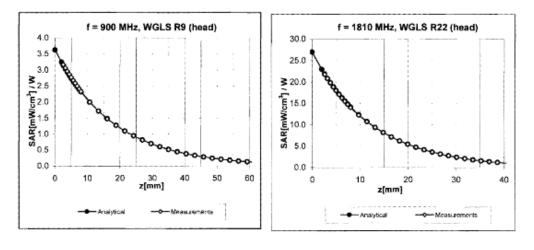
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

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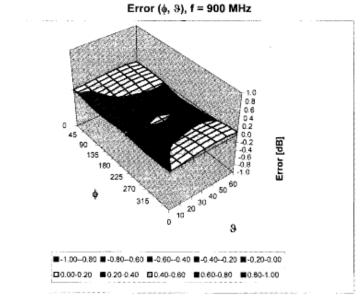
Testing Services™	Appendix D for the BlackB	Page 22(64)		
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
Hang Wang	I I I I I I I I I I I I I I I I I I I			2503A-RDU70CW

January 13, 2011



## **Conversion Factor Assessment**

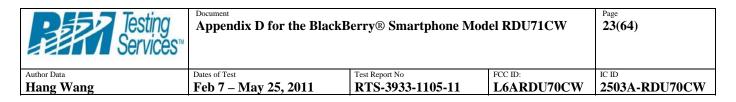
**Deviation from Isotropy in HSL** 



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

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## **Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

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Services™				
<sup>a</sup> Wang	Dates of Test Feb 7 – May 25, 2011	Test Report No RTS-3933-1105-11	FCC ID: L6ARDU70CW	IC ID 2503A-RDU700
Calibration Labo Schmid & Partner Engineering AG Zeughausstrasse 43, 800		HAC MEA ( C V z)	S Schweizerischer Kalibo Service suisse d'étalor Servizio svizzero di tar S Swiss Calibration Serv	nnage ratura
The Swiss Accreditation	ccreditation Service (SAS) Service is one of the signatori or the recognition of calibration	ies to the EA	on No.: SCS 108	
Client RTS (RIM	Testing Services)	Certificate	No: EX3-3548_Jan11	1
CALIBRATIC	ON CERTIFICAT	E	an a	
Object	EX3DV4 - SN:3	<b>548</b> (1997) Viet Filler (1997) (1997)		
Calibration procedure(s)	Calibration proc	QA CAL-14.v3, QA CAL-23.v4 a edure for dosimetric E-field prob		
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	documents the traceability to na	tional standards, which realize the physical	units of measurements (SI).	
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Hang Wang

Dates of Test Feb 7 – May 25, 2011 Test Report No **RTS-3933-1105-11**  FCC ID: L6ARDU70CW

CW 2503A-RDU70CW

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





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Document

Accreditation No.: SCS 108

#### Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization $\phi$	φ rotation around probe axis
Polarization 9	9 rotation around an axis that is in the plane normal to probe axis (at measurement center).
	i.e., 9 = 0 is normal to probe axis

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

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

#### Methods Applied and Interpretation of Parameters:

- NORMx, y, z: Assessed for E-field polarization 9 = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx, y, z are only intermediate values, i.e., the uncertainties of NORMx, y, z does not effect the E<sup>2</sup>-field uncertainty inside TSL (see below ConvF).
- NORM(f)x,y,z = NORMx,y,z \* frequency\_response (see Frequency Response Chart). This linearization is
  implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included
  in the stated uncertainty of ConvF.
- DCPx,y,z: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- Ax,y,z; Bx,y,z; Cx,y,z, VRx,y,z; A, B, C are numerical linearization parameters assessed based on the data of
  power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the
  maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z \* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom
  exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

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January 20, 2011

# Probe EX3DV4

## SN:3548

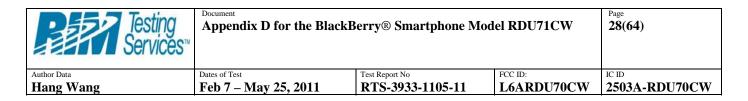
Manufactured: Last calibrated: Recalibrated: November 16, 2004 January 21, 2010 January 20, 2011

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

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

#### **Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (µV/(V/m) <sup>2</sup> ) <sup>A</sup>	0.35	0.44	0.45	± 10.1%
DCP (mV) <sup>8</sup>	101.4	100.4	99.2	

#### **Modulation Calibration Parameters**

UID	Communication System Name	PAR		A dB	B dBuV	с	VR mV	Unc <sup>E</sup> (k=2)
10000	cw	0.00	х	0.00	0.00	1.00	128.8	± 2.9 %
			Y	0.00	0.00	1.00	139.9	
			z	0.00	0.00	1.00	142.9	

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

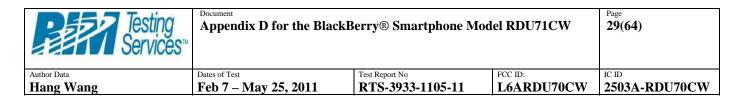
<sup>^</sup> The uncertainties of NormX,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Pages 5 and 6).

<sup>8</sup> Numerical linearization parameter: uncertainty not required.

\* Uncertainty is determined using the maximum deviation from linear response applying recatangular distribution and is expressed for the square of the field value.

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

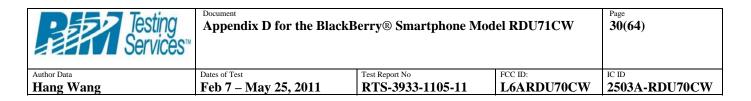
#### Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz]	Validity [MHz] <sup>C</sup>	Permittivity	Conductivity	ConvF X Co	nvFY Cor	nvF Z	Alpha	Depth Unc (k=2)
2600	± 50 / ± 100	39.0 ± 5%	1.96 ± 5%	7.08	7.08	7.08	0.23	1.34 ± 11.0%
5200	± 50 / ± 100	36.0 ± 5%	4.66 ± 5%	5.01	5.01	5.01	0.40	1.80 ± 13.1%
5500	± 50 / ± 100	35.6 ± 5%	4.96 ± 5%	4.63	4.63	4.63	0.50	1.80 ± 13.1%
5800	± 50 / ± 100	35.3 ± 5%	5.27 ± 5%	4.42	4.42	4.42	0.50	1.80 ± 13.1%

<sup>c</sup> The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

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

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

f [MHz]	Validity [MHz] <sup>C</sup>	Permittivity	Conductivity	ConvF X Cor	nvFY Cor	wF Z	Alpha	Depth Unc (k=2)
2600	± 50 / ± 100	52.5 ± 5%	2.16 ± 5%	7.12	7.12	7.12	0.67	0.71 ±11.0%
5200	± 50 / ± 100	49.0 ± 5%	5.30 ± 5%	4.79	4.79	4.79	0.45	1.90 ± 13.1%
5500	± 50 / ± 100	48.6 ± 5%	$5.65 \pm 5\%$	4.29	4.29	4.29	0.50	1.90 ± 13.1%
5800	± 50 / ± 100	48.2 ± 5%	6.00 ± 5%	4.08	4.08	4.08	0.60	1.90 ± 13.1%

<sup>C</sup> The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency

and the uncertainty for the indicated frequency band.

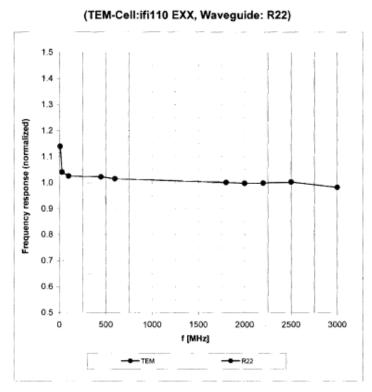
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## Frequency Response of E-Field



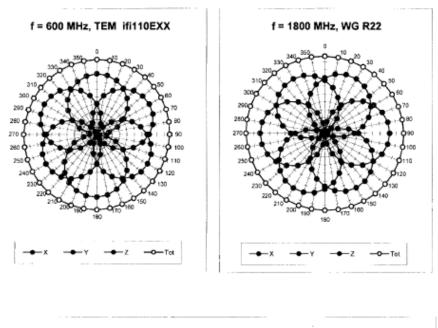
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

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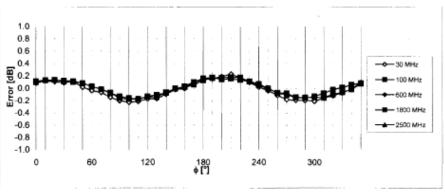
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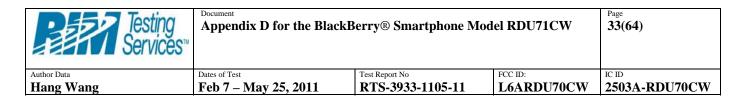


## Receiving Pattern ( $\phi$ ), $\vartheta = 0^{\circ}$

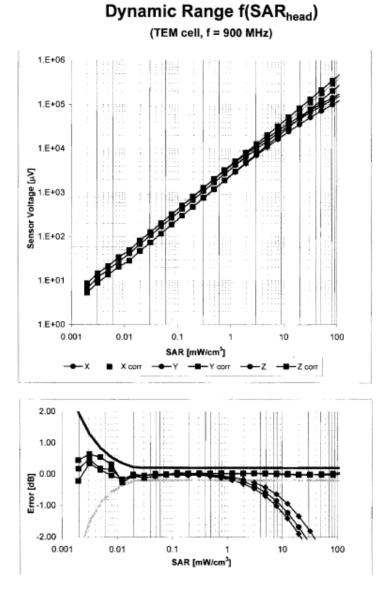


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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

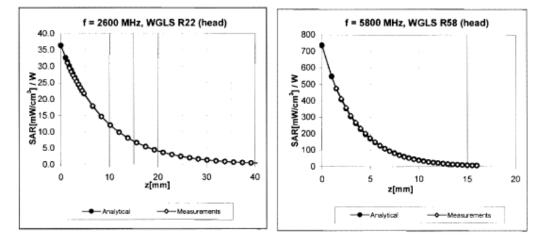
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Testing Services <sup>**</sup>	Appendix D for the Black	Berry® Smartphone Mod	lel RDU71CW	Page 34(64)
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
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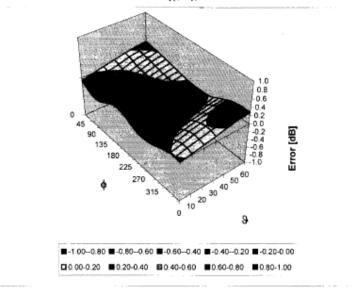
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## **Conversion Factor Assessment**

## **Deviation from Isotropy in HSL**

Error (\$, 3), f = 900 MHz



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

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Testing Services™	Document Appendix D for the BlackE	Berry® Smartphone Mod	lel RDU71CW	Page <b>35(64)</b>
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January 20, 2011

## **Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	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

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FK.	Services™	Appendix D for the l	BlackBerry® Smartphone M	lodel RDU71CW	Page 36(64)
<sup>Data</sup> g Wang		Dates of Test Feb 7 – May 25, 2011	Test Report No RTS-3933-1105-11	FCC ID: L6ARDU70CW	IC ID 2503А-RDU70CV
	Calibration Labo Schmid & Partne Engineering AG Zeughausstrasse 43, 800	ar	Iac-MRA Reparted as	Service suisse d'étalonnag Servizio svizzero di taratura	e
	The Swiss Accreditation	Accreditation Service (SAS) n Service is one of the signator for the recognition of calibratio	ries to the EA	on No.: SCS 108	
	Client RTS (RIN	I Testing Services)	Certificate I	No: D835V2-446_Jan11	
	CALIBRATIC	ON CERTIFICAT	E		
	Object	D835V2 - SN: 4	<b>146</b>		
	Calibration procedure(s)		edure for dipole validation kits		
	Calibration date:	January 21, 201	11 - Gold Bell, og or sækjelde		
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Appendix D for the BlackBerry® Smartphone Model RDU71CW

Hang Wang

#### Dates of Test Feb 7 – May 25, 2011

Test Report No RTS-3933-1105-11 FCC ID: L6ARDU70CW

## **2503A-RDU70CW**

Calibration Laboratory of

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

Document





Schweizerischer Kalibrierdienst Service suisse d'étalonnage

Service suisse d'etalonnage 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) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

## Additional Documentation:

d) DASY4/5 System Handbook

## Methods Applied and Interpretation of Parameters:

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

Certificate No: D835V2-446\_Jan11



#### Measurement Conditions

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

DASY Version	DASY5	V52.6
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	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	41.3 ± 6 %	0.89 mho/m ± 6 %
Head TSL temperature during test	(21.8 ± 0.2) °C		

#### SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.39 mW / g
SAR normalized	normalized to 1W	9.56 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.63 mW /g ± 17.0 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.56 mW / g
SAR normalized	normalized to 1W	6.24 mW / g
SAR for nominal Head TSL parameters		

Certificate No: D835V2-446\_Jan11



#### Appendix

#### Antenna Parameters with Head TSL

[	Impedance, transformed to feed point	49.6 Ω - 7.7 jΩ
	Return Loss	- 22.2 dB

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1.386 ns

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

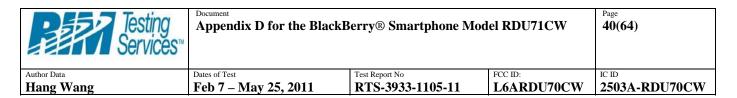
The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

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

#### Additional EUT Data

Manufactured by	SPEAG
Manufactured on	October 24, 2001

Certificate No: D835V2-446\_Jan11



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

Date/Time: 21.01.2011 10:18:05

Test Laboratory: SPEAG, Zurich, Switzerland

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

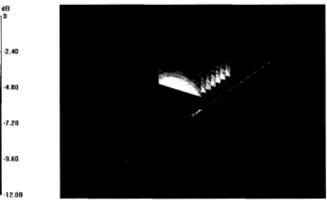
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1 Medium: HSL900 Medium parameters used: f = 835 MHz;  $\sigma$  = 0.89 mho/m;  $\epsilon_r$  = 41.2;  $\rho$  = 1000 kg/m<sup>3</sup> Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 SN3205; ConvF(6.03, 6.03, 6.03); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.6.1 Build (408)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2595)

#### Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement

grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 57.426 V/m; Power Drift = 0.04 dB Peak SAR (extrapolated) = 3.600 W/kg SAR(1 g) = 2.39 mW/g; SAR(10 g) = 1.56 mW/g Maximum value of SAR (measured) = 2.790 mW/g



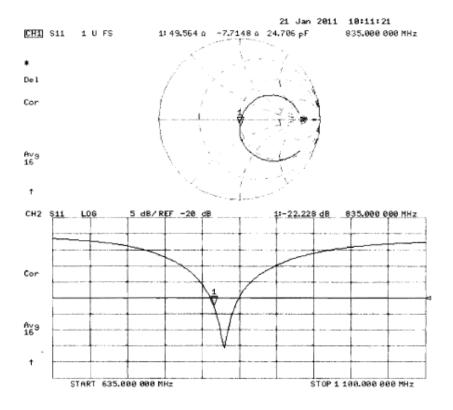


Certificate No: D835V2-446\_Jan11

Page 5 of 6

Testing Services <sup>™</sup>	Document Appendix D for the BlackE	Berry® Smartphone Mod	lel RDU71CW	Page 41(64)
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
Hang Wang	Feb 7 – May 25, 2011	RTS-3933-1105-11	L6ARDU70CW	2503A-RDU70CW

## Impedance Measurement Plot for Head TSL



Certificate No: D835V2-446\_Jan11

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Vang F	eb 7 – May 25, 2011	RTS-3933-1105-11	L6ARDU70CW	2503A-RDU7
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Accredited by the Swiss Accre The Swiss Accreditation Ser Multilateral Agreement for th	vice is one of the signatorie	s to the EA	No.: SCS 108	
Client RTS (RIM Te	sting Services)	Certificate N	a: D1900V2-545_Ja	n11
CALIBRATION	CERTIFICATE			
Object	D1900V2 - SN: 5	45 Commission of Annals Provident		
Calibration procedure(s)	QA CAL-05.v8 Calibration proce	dure for dipole validation kits		
				and the second sec
Calibration date:	January 13, 201			
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Certificate No: D1900V2-545\_Jan11

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Appendix D for the BlackBerry® Smartphone Model RDU71CW

Test Report No

Hang Wang

#### Dates of Test Feb 7 – May 25, 2011

RTS-3933-1105-11

FCC ID: L6ARDU70CW

## **70CW 2503A-RDU70CW**

Calibration Laboratory of

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

Document



- GNISS C R R BRATOS
  - S Schweizerischer Kalibrierdienst

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

## Calibration is Performed According to the Following Standards:

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

## Additional Documentation:

d) DASY4/5 System Handbook

## Methods Applied and Interpretation of Parameters:

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

Certificate No: D1900V2-545\_Jan11

Page 2 of 6



#### Measurement Conditions

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

DASY Version	DASY5	V52.6
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

#### Head TSL parameters

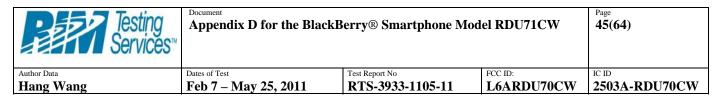
The following parameters and calculations were applied.

	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	38.5 ± 6 %	1.43 mho/m ± 6 %
Head TSL temperature during test	(21.2 ± 0.2) °C		

## SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.2 mW / g
SAR normalized	normalized to 1W	40.8 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	40.0 mW /g ± 17.0 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
	condition 250 mW input power	5.26 mW / g
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL SAR measured SAR normalized		5.26 mW / g 21.0 mW / g

Certificate No: D1900V2-545\_Jan11



#### Appendix

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.8 Ω + 1.8 jΩ
Return Loss	- 34.4 dB

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1.199 ns

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

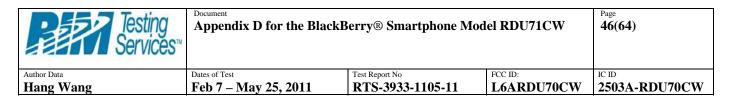
The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.

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

#### Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 15, 2001

Certificate No: D1900V2-545\_Jan11



#### DASY5 Validation Report for Head TSL

Date/Time: 13.01.2011 14:52:49

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1 Medium: HSL U12 BB Medium parameters used: f = 1900 MHz;  $\sigma$  = 1.43 mho/m;  $\varepsilon_r$  = 38.6;  $\rho$  = 1000 kg/m<sup>3</sup> Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 SN3205; ConvF(5.09, 5.09, 5.09); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.6.1 Build (408)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2595)

# Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.053 V/m; Power Drift = 0.03 dB Peak SAR (extrapolated) = 18.648 W/kg SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.26 mW/g Maximum value of SAR (measured) = 12.743 mW/g



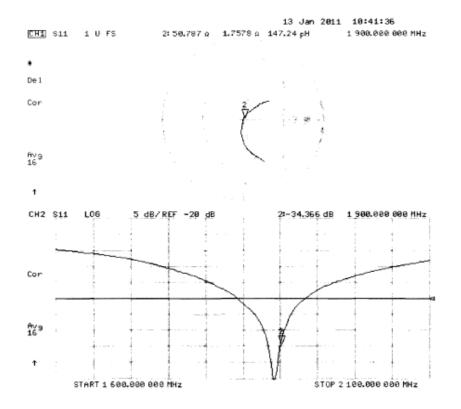
0 dB = 12.740 mW/g

Certificate No: D1900V2-545\_Jan11

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Testing Services™			Page 47(64)	
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
Hang Wang	Feb 7 – May 25, 2011	RTS-3933-1105-11	L6ARDU70CW	2503A-RDU70CW

#### Impedance Measurement Plot for Head TSL



Certificate No: D1900V2-545\_Jan11

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ang	Dates of Test Feb 7 – May 25, 2011	Test Report No <b>RTS-3933-1105-11</b>	FCC ID: L6ARDU70CW	IC ID 2503A-RDU7
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Client RTS (RIM 1	Festing Services)	Certificate N	o: D2450V2-747_No	iv09
CALIBRATIO	N CERTIFICATE	tes <u>senna antes</u>		
Object	D2450V2 - SN/7	47	le 1 Stark Cliff	91
Calibration procedure(s)	QA CAL-05, v7 Calibration proce	dure for dipole validation kits		
Calibration date:				1
Calibration date.	November 11, 20	<b>09</b> // // // // // /////////////////////	1.	
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Certificate No: D2450V2-747\_Nov09

Page 1 of 6



Appendix D for the BlackBerry® Smartphone Model RDU71CW

Test Report No

Hang Wang

#### Dates of Test Feb 7 – May 25, 2011

RTS-3933-1105-11

FCC ID: L6ARDU70CW

**70CW 2503A-RDU70CW** 

## Calibration Laboratory of

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





S Schweizerischer Kalibrierdienst

C Service suisse d'étalonnage

Servizio svizzero di taratura Suiss Calibration Service

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

Document

## Glossary:

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

## Calibration is Performed According to the Following Standards:

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

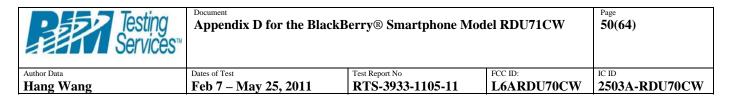
## Additional Documentation:

d) DASY4/5 System Handbook

## Methods Applied and Interpretation of Parameters:

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

Certificate No: D2450V2-747\_Nov09



#### Measurement Conditions

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

DASY Version	DASY5	V5.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

#### Head TSL parameters

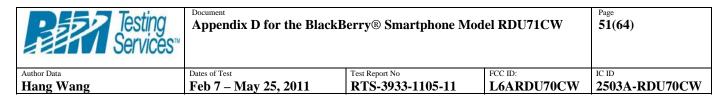
The following parameters and calculations were applied.

	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	39.1 ± 6 %	1.78 mho/m ± 6 %
Head TSL temperature during test	(21.3 ± 0.2) °C		

#### SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.3 mW / g
SAR normalized	normalized to 1W	53.2 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	53.4 mW /g ± 17.0 % (k=2)
SAP averaged over 10 cm <sup>3</sup> (10 c) of Head TSI	condition	
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL SAR measured	condition 250 mW input power	6.23 mW / g
		6.23 mW / g 24.9 mW / g
SAR measured	250 mW input power	

Certificate No: D2450V2-747\_Nov09



#### Appendix

## Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.9 Ω + 0.9 jΩ
Return Loss	- 33.9 dB

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1.161 ns

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

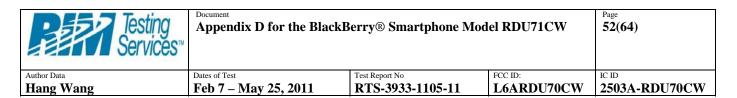
The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

#### Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 01, 2003

Certificate No: D2450V2-747\_Nov09

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## DASY5 Validation Report for Head TSL

Date/Time: 11.11.2009 15:04:10

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1 Medium: HSL U11 BB Medium parameters used: f = 2450 MHz;  $\sigma$  = 1.79 mho/m;  $\varepsilon_r$  = 39.2;  $\rho$  = 1000 kg/m<sup>3</sup> Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

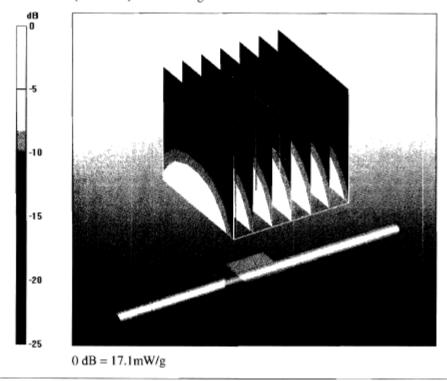
DASY5 Configuration:

- Probe: ES3DV3 SN3205; ConvF(4.53, 4.53, 4.53); Calibrated: 26.06.2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

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

Measurement grid: dx=5mm, dy=5mm, dz=5mmReference Value = 101.3 V/m; Power Drift = 0.067 dB Peak SAR (extrapolated) = 27 W/kg SAR(1 g) = 13.3 mW/g; SAR(10 g) = 6.23 mW/g

Maximum value of SAR (measured) = 17.1 mW/g

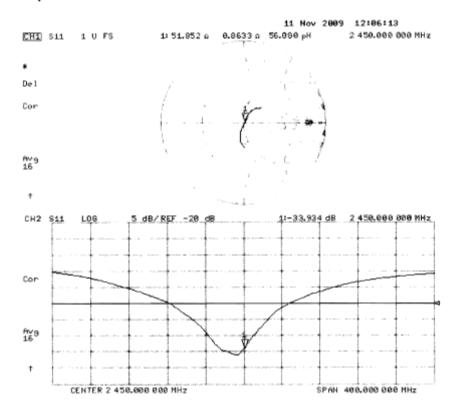


Certificate No: D2450V2-747\_Nov09

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Testing Services™			Page 53(64)	
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
Hang Wang	Feb 7 – May 25, 2011	RTS-3933-1105-11	L6ARDU70CW	2503A-RDU70CW

## Impedance Measurement Plot for Head TSL



Certificate No: D2450V2-747\_Nov09

Page 6 of 6

Testing Services™	Appendix D for the I	BlackBerry® Smartphone M	Iodel RDU71CW	Page 54(64)
ata g Wang	Dates of Test Feb 7 – May 25, 2011	Test Report No <b>RTS-3933-1105-11</b>	FCC ID: L6ARDU70CW	IC ID 2503A-RDU70CV
Calibration Labo Schmid & Partner Engineering AG Zeughausstrasse 43, 800	_	Hac MRA	S Schweizerischer Kalibri C Service suisse d'étalonn Servizio svizzero di tara S Swiss Calibration Service	nage atura
	ccreditation Service (SAS) Service is one of the signatorie or the recognition of calibration	es to the EA	tion No.: SCS 108	
Client RTS (RIM	Testing Services)	Certificat	e No: D5GHzV2-1033_N	lov09
CALIBRATIC	ON CERTIFICATE			
Object	D5GHzV2 - SN:	1033		
Calibration procedure(s)	QA CAL-22.v1 Calibration proce	edure for dipole validation kits l	between 3-6 GHz	
Calibration date:	November 13, 20	009		
This calibration certificate The measurements and t All calibrations have been	documents the traceability to nat he uncertainties with confidence p	009 tional standards, which realize the physica probability are given on the following page bry facility: environment temperature (22 ±	s and are part of the certificate.	
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Appendix D for the BlackBerry® Smartphone Model RDU71CW

Test Report No

Hang Wang

#### Dates of Test Feb 7 – May 25, 2011

RTS-3933-1105-11

FCC ID: L6ARDU70CW

IC ID 2503A-RDU70CW

Calibration Laboratory of

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



- NIS s ORD

С 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

Document

Glossarv:

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

## Calibration is Performed According to the Following Standards:

- a) IEC Std 62209 Part 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", Draft Version 0.9, December 2004
- b) 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:

c) 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 ٠ 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 ٠ connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

Certificate No: D5GHzV2-1033\_Nov09

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Schweizerischer Kalibrierdienst s

Service suisse d'étalonnage

Accreditation No.: SCS 108

Testing Services <sup>**</sup>	Document Appendix D for the BlackBerry® Smartphone Model RDU71CW		Page 56(64)	
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
Hang Wang	Feb 7 – May 25, 2011	RTS-3933-1105-11	L6ARDU70CW	2503A-RDU70CW

#### Measurement Conditions

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

DASY Version	DASY5	V5.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Area Scan resolution	dx, dy = 10 mm	
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 2.5 mm	
Frequency	5200 MHz ± 1 MHz 5500 MHz ± 1 MHz 5800 MHz ± 1 MHz	

#### Head TSL parameters at 5200 MHz

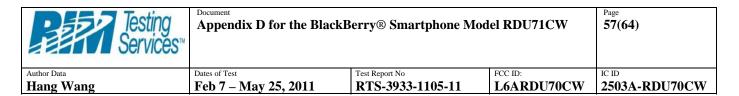
The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	36.0	4.66 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.4 ± 6 %	4.54 mho/m ± 6 %
Head TSL temperature during test	(22.5 ± 0.2) °C		

## SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	condition	
SAR measured	100 mW input power	7.75 mW / g
SAR normalized	normalized to 1W	77.5 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	77.2 mW / g ± 19.9 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.19 mW / g
SAR normalized	normalized to 1W	21.9 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	21.8 mW / g ± 19.5 % (k=2)



#### Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.6	4.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.6 ± 6 %	4.93 mho/m ± 6 %
Head TSL temperature during test	(22.5 ± 0.2) °C		

#### SAR result with Head TSL at 5500 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	condition	
SAR measured	100 mW input power	8.29 mW / g
SAR normalized	normalized to 1W	82.9 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	82.9 mW / g ± 19.9 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.32 mW / g
SAR normalized	normalized to 1W	23.2 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	23.2 mW / g ± 19.5 % (k=2)

#### 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 %	5.10 mho/m ± 6 %
Head TSL temperature during test	(22.5 ± 0.2) °C		

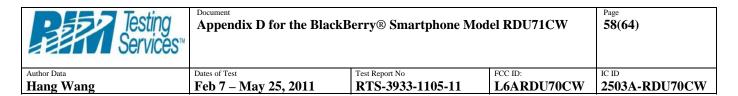
#### SAR result with Head TSL at 5800 MHz

SAR for nominal Head TSL parameters

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	condition	
SAR measured	100 mW input power	7.62 mW / g
SAR normalized	normalized to 1W	76.2 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	75.6 mW / g ± 19.9 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.15 mW / g
		24 E
SAR normalized	normalized to 1W	21.5 mW / g

normalized to 1W

21.3 mW / g ± 19.5 % (k=2)



#### Body TSL parameters at 5500 MHz

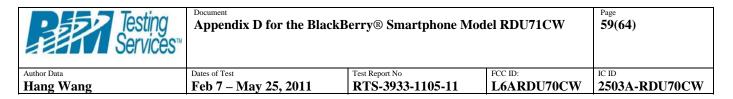
The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.6	5.65 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.5±6%	5.86 mho/m ± 6 %
Body TSL temperature during test	(22.5 ± 0.2) °C		

## SAR result with Body TSL at 5500 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	condition	
SAR measured	100 mW input power	8.22 mW / g
SAR normalized	normalized to 1W	82.2 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	81.9 mW / g ± 19.9 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.28 mW / g
SAR normalized	normalized to 1W	22.8 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	22.7 mW / g ± 19.5 % (k=2)



#### Appendix

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

Impedance, transformed to feed point	50.1 Ω - 9.2 jΩ
Return Loss	-20.7 dB

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

Impedance, transformed to feed point	51.2 Ω - 4.2 jΩ
Return Loss	-27.3 dB

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

Impedance, transformed to feed point	56.0 Ω - 2.6 jΩ
Return Loss	-24.2 dB

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

Impedance, transformed to feed point	51.1 Ω - 3.0 jΩ
Return Loss	-29.9 dB

#### **General Antenna Parameters and Design**

Electrical Delay (one direction)	1.202 ns

After long term use with 40 W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the

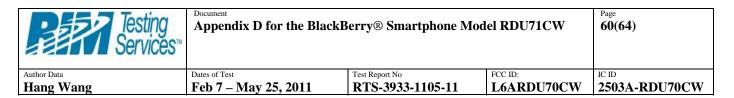
feedpoint may be damaged.

#### Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 09, 2004

Certificate No: D5GHzV2-1033\_Nov09

Page 6 of 11



## DASY5 Validation Report for Head TSL

Date/Time: 12,11.2009 13:12:49

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz; Duty Cycle: 1:1 Medium: HSL 3-6 GHz Medium parameters used: f = 5200 MHz;  $\sigma = 4.53$  mho/m;  $\varepsilon_r = 35.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used: f = 5500 MHz;  $\sigma = 4.81$  mho/m;  $\varepsilon_r = 34.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used: f = 5800MHz;  $\sigma = 5.08$  mho/m;  $\varepsilon_r = 34.3$ ;  $\rho = 1000$  kg/m<sup>3</sup> Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

#### DASY5 Configuration:

- Probe: EX3DV4 SN3503; ConvF(5.36, 5.36, 5.36), ConvF(4.85, 4.85, 4.85), ConvF(4.74, 4.74, 4.74); Calibrated: 11.03.2009
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- · Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

## Configuration D5GHzV2 Dipole (Head)/d=10mm, Pin=250mW, f=5200 MHz/Area Scan

(91x91x1): Measurement grid: dx=10mm, dy=10mm Maximum value of SAR (interpolated) = 15.4 mW/g

#### Configuration D5GHzV2 Dipole/d=10mm, Pin=250mW, f=5200 MHz/Zoom Scan

(4x4x2.5mm), dist=2mm (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm Reference Value = 64.7 V/m; Power Drift = 0.035 dB Peak SAR (extrapolated) = 30 W/kg SAR(1 g) = 7.75 mW/g; SAR(10 g) = 2.19 mW/g Maximum value of SAR (measured) = 15.3 mW/g

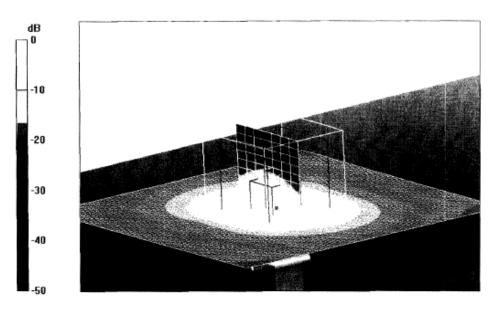
Configuration D5GHzV2 Dipole/d=10mm, Pin=250mW, f=5500 MHz/Zoom Scan (4x4x2.5mm), dist=2mm (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm Reference Value = 65.4 V/m; Power Drift = 0.057 dB Peak SAR (extrapolated) = 33.8 W/kg SAR(1 g) = 8.29 mW/g; SAR(10 g) = 2.32 mW/g Maximum value of SAR (measured) = 16.5 mW/g

```
Configuration D5GHzV2 Dipole/d=10mm, Pin=250mW, f=5800 MHz/Zoom Scan
(4x4x2.5mm), dist=2mm (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 61.7 V/m; Power Drift = 0.067 dB
Peak SAR (extrapolated) = 32.4 W/kg
SAR(1 g) = 7.62 mW/g; SAR(10 g) = 2.15 mW/g
```

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Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
Hang Wang	Feb 7 – May 25, 2011	RTS-3933-1105-11	L6ARDU70CW	2503A-RDU70CW



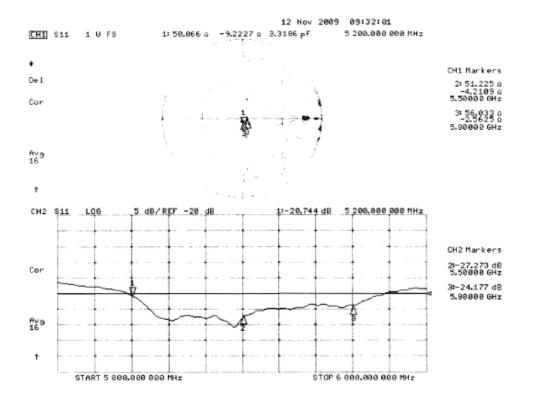
0 dB = 15.3 mW/g

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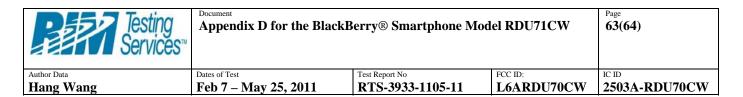
Testing Services™	Appendix D for the BlackB	Page 62(64)		
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
Hang Wang	Feb 7 – May 25, 2011	RTS-3933-1105-11	L6ARDU70CW	2503A-RDU70CW

#### Impedance Measurement Plot for Head TSL



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## DASY5 Validation Report for Body TSL

Date/Time: 13.11.2009 12:28:18

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: CW; Frequency: 5500 MHz; Duty Cycle: 1:1 Medium: MSL 3-6 GHz Medium parameters used: f = 5500 MHz;  $\sigma$  = 5.83 mho/m;  $\epsilon_r$  = 47.6;  $\rho$  = 1000 kg/m<sup>3</sup> Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

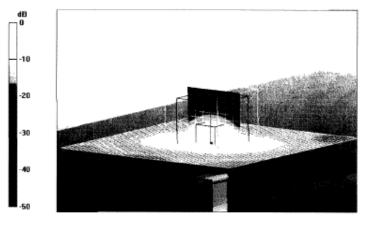
- Probe: EX3DV4 SN3503; ConvF(4.37, 4.37, 4.37); Calibrated: 11.03.2009
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 07.03.2009
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY5, V5.2 Build 157; SEMCAD X Version 14.0 Build 57

#### Configuration D5GHzV2 Dipole/d=10mm, Pin=250mW, f=5500 MHz/Area Scan

(91x91x1): Measurement grid: dx=10mm, dy=10mm Maximum value of SAR (interpolated) = 16.2 mW/g

## Configuration D5GHzV2 Dipole/d=10mm, Pin=250mW, f=5500 MHz/Zoom Scan

(4x4x2.5mm), dist=2mm (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm Reference Value = 59.5 V/m; Power Drift = -0.044 dB Peak SAR (extrapolated) = 33.3 W/kg SAR(1 g) = 8.22 mW/g; SAR(10 g) = 2.28 mW/g Maximum value of SAR (measured) = 16.4 mW/g



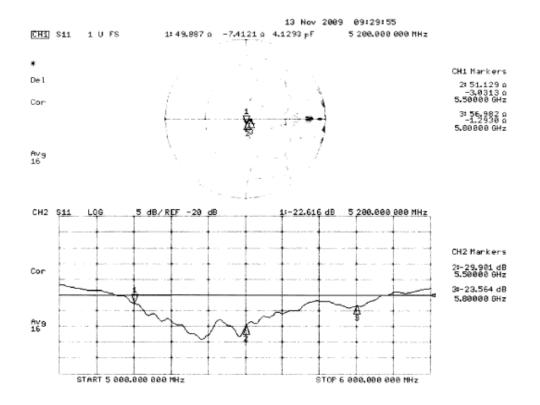
<sup>0</sup> dB = 16.4mW/g

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Testing Services™	Appendix D for the Black	Page 64(64)		
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
Hang Wang	Feb 7 – May 25, 2011	RTS-3933-1105-11	L6ARDU70CW	2503A-RDU70CW

## Impedance Measurement Plot for Body TSL



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