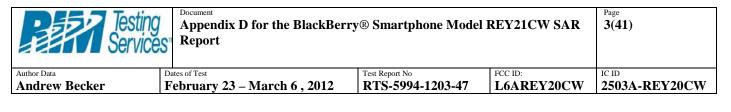
Testing Service	Testing Services Document Appendix D for the BlackBerry® Smartphone Model REY21CW SAR Report				
Author Data	Dates of Test	es of Test Test Report No FCC ID:			
Andrew Becker	February 23 – March 6 , 2012	RTS-5994-1203-47	L6AREY20CW	2503A-REY20CW	

APPENDIX D: PROBE & DIPOLE CALIBRATION DATA

Servicës" R				
Becker Dates of Feb	of Test ruary 23 – March 6,	2012 Test Report No RTS-5994-1203-47	FCC ID: L6AREY20CW	IC ID 2503A-REY20
Calibration Labor Schmid & Partner Engineering AG Zeughausstrasse 43, 8004	-	RECHIRA C SHISS S C S C S C S C S C S C S C S C S C	Schweizerischer Kalibrierdi Service suisse d'étalonnage Servizio svizzero di taratura Swiss Calibration Service	
	editation Service (SAS) ervice is one of the signatories the recognition of calibration	s to the EA	No.: SCS 108	
Client RTS (RIM 1	esting Services)	Certificate No	: ES3-3225_Jan12	
CALIBRATIO	N CERTIFICATE			e K
Object	ES3DV3 - SN:32	25		
Calibration procedure(s)		A CAL-23.v4, QA CAL-25.v4 dure for dosimetric E-field probes		
		date to costine to cherd proces	and the standing of the	
	Uanuary 11, 2012	onal standards, which realize the physical unit	s of measurements (SI).	
This calibration certificate d The measurements and the All calibrations have been o	Uanuary 11, 2012 ocuments the traceability to natio uncertainties with confidence pr		s of measurements (SI). I are part of the certificate.	
This calibration certificate d The measurements and the All calibrations have been o Calibration Equipment used	Uanuary 11, 2012 ocuments the traceability to natio uncertainties with confidence pr onducted in the closed laborator (M&TE critical for calibration)	onal standards, which realize the physical unit obability are given on the following pages and y facility: environment temperature (22 ± 3)*C	s of measurements (SI). I are part of the certificate. and humidity < 70%.	
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Certificate No: ES3-3225_Jan12

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Calibration Laboratory of

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



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Swiss Calibration Service

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS)

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

Glossary:

0.0000	
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 ϕ	φ rotation around probe axis
Polarization 9	9 rotation around an axis that is in the plane normal to probe axis (at measurement center),
	i.e., 9 = 0 is normal to probe axis

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- 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, 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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Author Data	Dates of Test	Test Report No	FCC ID:	IC ID	
Andrew Becker	February 23 – March 6 , 2012				

January 11, 2012

Probe ES3DV3

SN:3225

Manufactured: Calibrated: September 1, 2009 January 11, 2012

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

Certificate No: ES3-3225_Jan12

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Testing Service	Appendix D for the BlackBerr Report	Page 5(41)		
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
Andrew Becker	February 23 – March 6 , 2012	2503A-REY20CW		

January 11, 2012

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) ⁸	101.2	100.8	101.2	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^L (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	107.7	±1.7 %
			Y	0.00	0.00	1.00	113.4	
			Z	0.00	0.00	1.00	110.4	

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 E²-field uncertainty inside TSL (see Pages 5 and 6).

 ⁶ Numerical linearization parameter: uncertainty not equired.
 ⁶ Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the uncertainty is determined using the max. field value.

Certificate No: ES3-3225_Jan12

Testing Service	Appendix D for the BlackBerry Report	Page 6(41)		
Author Data	Dates of Test	es of Test Test Report No FCC ID:		
Andrew Becker	February 23 – March 6 , 2012	RTS-5994-1203-47	L6AREY20CW	2503A-REY20CW

January 11, 2012

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

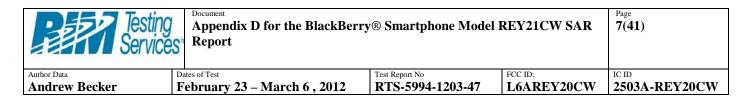
Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^c	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.42	6.42	6.42	0.27	2.04	± 12.0 %
900	41.5	0.97	6.06	6.06	6.06	0.35	1.74	± 12.0 %
1810	40.0	1.40	5.23	5.23	5.23	0.73	1.21	± 12.0 %
1950	40.0	1.40	4.98	4.98	4.98	0.58	1.41	± 12.0 %
2450	39.2	1.80	4.50	4.50	4.50	0.79	1.26	± 12.0 %
2600	39.0	1.96	4.32	4.32	4.32	0.77	1.32	± 12.0 %

^c Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. ^r At frequencies below 3 GHz, the validity of tissue parameters (*ε* and *σ*) can be relaxed to ± 10% if liquid compensation formula is applied to

⁷ At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Certificate No: ES3-3225_Jan12



January 11, 2012

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

f (MHz) ^c	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	_ 55.5	0.96	6.27	6.27	6.27	0.36	1.74	± 12.0 %
900	55.0	1.05	6.07	6.07	6.07	0.29	2.02	± 12.0 %
1810	53.3	1.52	4.92	4.92	4.92	0.50	1.57	± 12.0 %
1950	53.3	1.52	4.87	4.87	4.87	0.59	1.49	± 12.0 %
2450	52.7	1.95	4.30	4.30	4.30	0.68	1.16	± 12.0 %
2600	52.5	2.16	4.12	4.12	4.12	0.80	0.99	± 12.0 %

Calibration Parameter Determined in Body Tissue Simulating Media

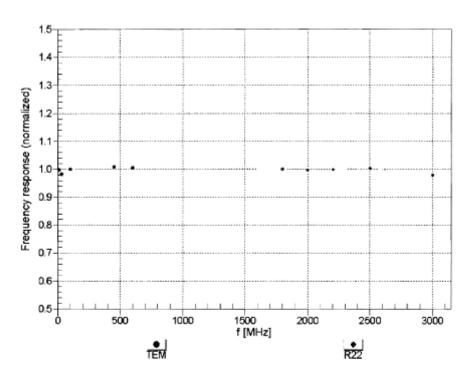
^c Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. ^F At frequencies below 3 GHz, the validity of tissue parameters (c and σ) can be relaxed to ± 10% if liquid compensation formula is applied to

⁷ 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 tissue parameters.

Document Appendix D for the BlackBerry® Smartphone Model REY21CW SAR Report				
Dates of Test	IC ID 2503A-REY20CW			
	Appendix D for the BlackBerr Report	Appendix D for the BlackBerry® Smartphone Model Report Dates of Test	Appendix D for the BlackBerry® Smartphone Model REY21CW SAR Report Dates of Test Test Report No FCC ID:	

January 11, 2012

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



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

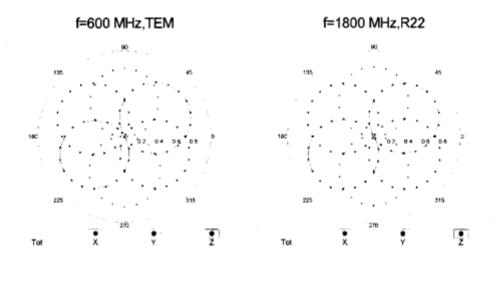
Certificate No: ES3-3225_Jan12

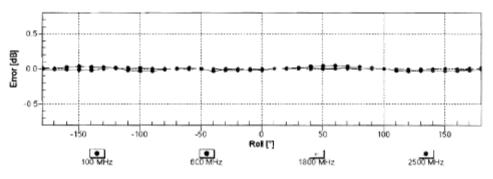
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Testing Service	Document Appendix D for the BlackBerry® Smartphone Model REY21CW SAR Report				
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID	
Andrew Becker	February 23 – March 6 , 2012	bruary 23 – March 6 , 2012 RTS-5994-1203-47 L6AREY20CW			

January 11, 2012

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





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

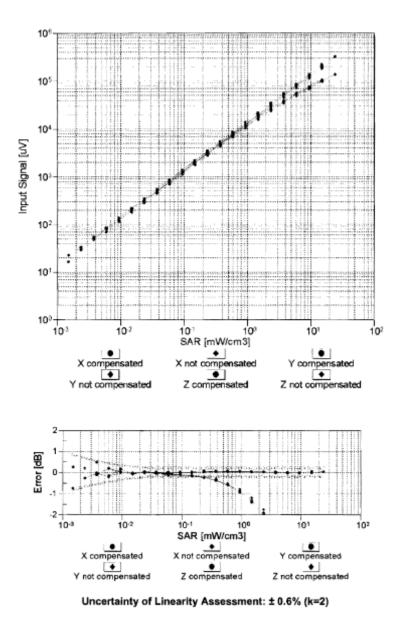
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Testing Service	Appendix D for the BlackBerr Report	ry® Smartphone Model	REY21CW SAR	Page 10(41)
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
Andrew Becker	February 23 – March 6 , 2012	RTS-5994-1203-47	L6AREY20CW	2503A-REY20CW

January 11, 2012

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



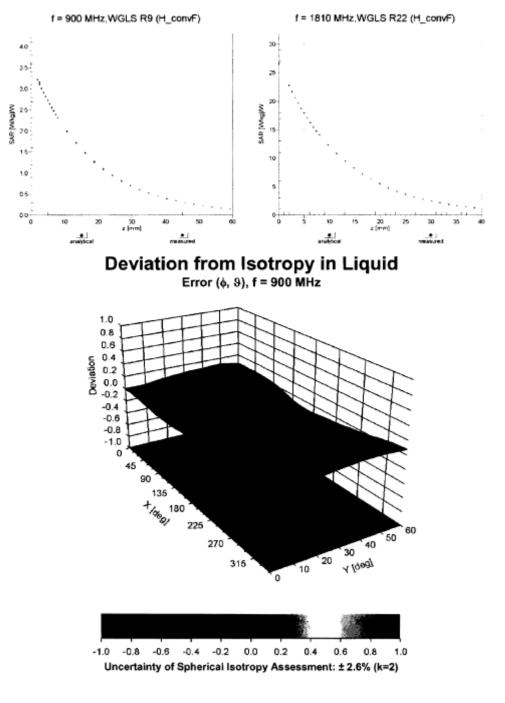
Certificate No: ES3-3225_Jan12

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Testing Service	Appendix D for the BlackBerr Report	Appendix D for the BlackBerry® Smartphone Model REY21CW SAR 11(41) Report 11(41)			
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID	
Andrew Becker	February 23 – March 6 , 2012	RTS-5994-1203-47	L6AREY20CW	2503A-REY20CW	

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Conversion Factor Assessment



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Testing Service		Appendix D for the BlackBerry® Smartphone Model REY21CW SAR 12(41) Report 12(41)				
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Andrew Becker	February 23 – March 6, 2012	RTS-5994-1203-47	L6AREY20CW	2503A-REY20CW		

January 11, 2012

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

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

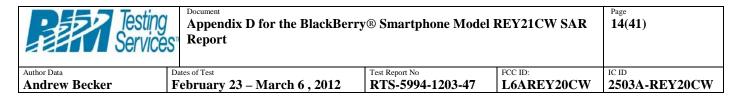
Certificate No: ES3-3225_Jan12

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	Report		del REY21CW SAR	13(41)
	tes of Test ebruary 23 – March 6	, 2012 Test Report No RTS-5994-1203-47	FCC ID: L6AREY20CW	IC ID 2503A-REY2
	4 Zurich, Switzerland	s to the EA	Schweizerischer Kalibrierdiens Service suisse d'étalonnage Servizio svizzero di taratura Swiss Calibration Service No.: SCS 108	51
Client RTS (RIM	Testing Services)	Cartificate No:	ET3-1644_Nov11	
CALIBRATIC	ON CERTIFICATI		And the second s	
Object	ET30V6 - SN:16	4	, secondonest son a sub-	
Calibration procedure(s)	Calibration proce	DA CAL-23.v4, QA CAL-25.v4 dure for dosimetric E-field probes	statistics and the second s	
	And the second second states of the second s	CTTOPE THE GATHER PROPERTY IS A DESCRIPTION	ASTAC AND AND A CONTRACT OF A DESCRIPTION OF A DESCRIPA DESCRIPTION OF A DESCRIPTION OF A DESCRIPTION OF A D	
Calibration date:	November 15, 20	11		
This calibration certificate The measurements and the All calibrations have been	November 15, 20 documents the traceability to nation the uncertainties with confidence pr		of measurements (SP). are part of the certificate.	
This calibration certificate The measurements and th All calibrations have been Calibration Equipment use	November 15, 20 documents the traceability to nation he uncertainties with confidence pro- conducted in the closed laborator ed (M&TE critical for calibration)	111 onal standards, which realize the physical units robability are given on the following pages and y facility: environment temperature (22 ± 3)°C a	of measurements (SI). are part of the certificate. and humidity < 70%.	
This calibration certificate The measurements and th All calibrations have been	November 15, 20 documents the traceability to nation he uncertainties with confidence pro- conducted in the closed laborator	onal standards, which realize the physical units robability are given on the following pages and	of measurements (SP). are part of the certificate.	
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This calibration certificate The measurements and the All calibrations have been Calibration Equipment use Primary Standards Power meter E44198 Power sensor E44198 Power sensor E4412A Reference 3 dB Attenuate Reference 20 dB Attenuate Reference 20 dB Attenuate Reference Probe ES3DV/ DAE4 Secondary Standards RF generator HP 8648C Network Analyzer HP 875	November 15, 20 documents the traceability to nation the uncertainties with confidence pro- conducted in the closed laborator ad (M&TE critical for calibration) ID GB41293874 MY41498087 or SN: S5054 (3c) thor SN: S5054 (3c) thor SN: S5086 (20b) thor SN: S5129 (30b) 2 SN: 3013 SN: 654 ID US3642U01700 53E US37390585 Name Jaton Kestrati	Cal Date (Certificate No.) 31-Mar-11 (No. 217-01372) 29-Mar-11 (No. 217-01372) 31-Mar-11 (No. 217-01372) 31-Mar-11 (No. 217-01372) 29-Mar-11 (No. 217-01367) 29-Mar-11 (No. 217-01367) 29-Mar-11 (No. 217-01367) 29-Mar-11 (No. 217-01370) 29-Dec-10 (No. ES3-3013_Dec10) 3-May-11 (No. DAE4-654_May11) Check Date (in house) 4-Aug-99 (in house check Apr-11) 18-Oct-01 (in house check Apr-11) Teurction	s of measurements (SI). are part of the certificate. and humidity < 70%. Scheduled Calibration Apr-12 Apr-12 Apr-12 Apr-12 Apr-12 Dec-11 May-12 Scheduled Check In house check: Apr-13 In house check: Oct-12	

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Calibration Laboratory of

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



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Swiss Calibration Service

Accreditation No.: SCS 108

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Accredited by the Swiss Accreditation Service (SAS)

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

Glossary:

olossuly.	
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 ϕ	φ rotation around probe axis
Polarization 3	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 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, 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.

Certificate No: ET3-1644_Nov11

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Testing Service	Appendix D for the BlackBerr Report	Appendix D for the BlackBerry® Smartphone Model REY21CW SAR 15(41) Report 15(41)				
Author Data	Dates of Test	s of Test Test Report No FCC ID:				
Andrew Becker	February 23 – March 6 , 2012	RTS-5994-1203-47	L6AREY20CW	2503A-REY20CW		

November 15, 2011

Probe ET3DV6

SN:1644

Manufactured: Calibrated:

November 7, 2001 November 15, 2011

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

Certificate No: ET3-1644_Nov11

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Testing Service	Appendix D for the BlackBerr Report	y® Smartphone Model	REY21CW SAR	Page 16(41)
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
Andrew Becker	February 23 – March 6 , 2012	RTS-5994-1203-47	L6AREY20CW	2503A-REY20CW

November 15, 2011

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1644

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm $(\mu V/(V/m)^2)^A$	1.71	1.97	1.98	± 10.1 %
DCP (mV) ⁸	98.3	98.4	98.1	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	140.4	±2.2 %
			Y	0.00	0.00	1.00	118.6	
			Z	0.00	0.00	1.00	145.5	

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 Numerical linearization parameter: uncertainty not required.

Certificate No: ET3-1644_Nov11

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

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

Testing Service		Appendix D for the BlackBerry® Smartphone Model REY21CW SAR 17(41) Report 17(41)			
Author Data	Dates of Test	FCC ID:	IC ID		
Andrew Becker	February 23 – March 6 , 2012	RTS-5994-1203-47	L6AREY20CW	2503A-REY20CW	

November 15, 2011

DASY/EASY - Parameters of Probe: ET3DV6 - SN:1644

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^c	Relative Permittivity ^F	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.28	6.28	6.28	0.67	1.99	± 12.0 %
900	41.5	0.97	5.96	5.96	5.96	0.72	1.88	± 12.0 %
1810	40.0	1.40	5.10	5.10	5.10	0.63	2.36	± 12.0 %
2450	39.2	1.80	4.34	4.34	4.34	0.89	1.73	± 12.0 %

^c Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. ^f At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to

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

Certificate No: ET3-1644_Nov11

Testing Service	Appendix D for the BlackBerr Report	Page 18(41)		
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
Andrew Becker	February 23 – March 6 , 2012	RTS-5994-1203-47	L6AREY20CW	2503A-REY20CW

November 15, 2011

DASY/EASY - Parameters of Probe: ET3DV6- SN:1644

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) ^c	Relative Permittivity ^F	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.18	6.18	6.18	0.79	1.86	± 12.0 %
900	55.0	1.05	5.92	5.92	5.92	0.61	2.26	± 12.0 %
1810	53.3	1.52	4.69	4.69	4.69	0.65	2.60	± 12.0 %
2450	52.7	1.95	4.14	4.14	4.14	1.00	1.37	± 12.0 %

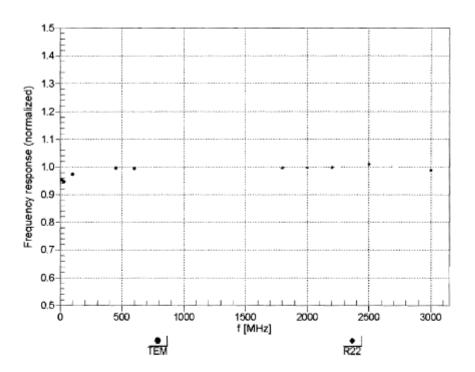
^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
^F At frequencies below 3 GHz, the validity of tissue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

Certificate No: ET3-1644_Nov11

Testing Service	Appendix D for the BlackBerr Report	y® Smartphone Model	REY21CW SAR	Page 19(41)	
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID	
Andrew Becker	February 23 – March 6 , 2012	bruary 23 – March 6 , 2012 RTS-5994-1203-47 L6AREY20CW			

November 15, 2011

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



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

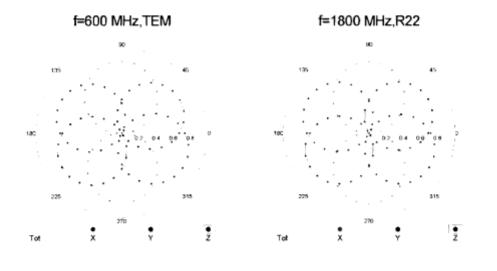
Certificate No: ET3-1644_Nov11

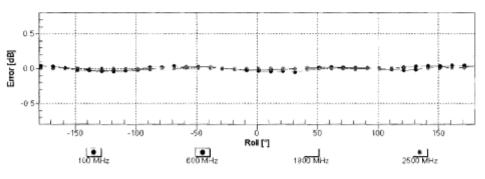
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Testing Service	Appendix D for the BlackBerr Report	Page 20(41)		
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
Andrew Becker	February 23 – March 6 , 2012	RTS-5994-1203-47	L6AREY20CW	2503A-REY20CW

November 15, 2011

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





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

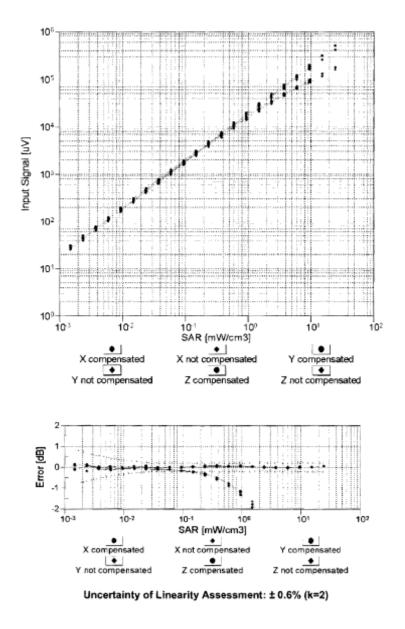
Certificate No: ET3-1644_Nov11

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Testing Service	Appendix D for the BlackBerr Report	y® Smartphone Model	REY21CW SAR	Page 21(41)	
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID	
Andrew Becker	February 23 – March 6 , 2012	bruary 23 – March 6 , 2012 RTS-5994-1203-47 L6AREY20CW			

November 15, 2011

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



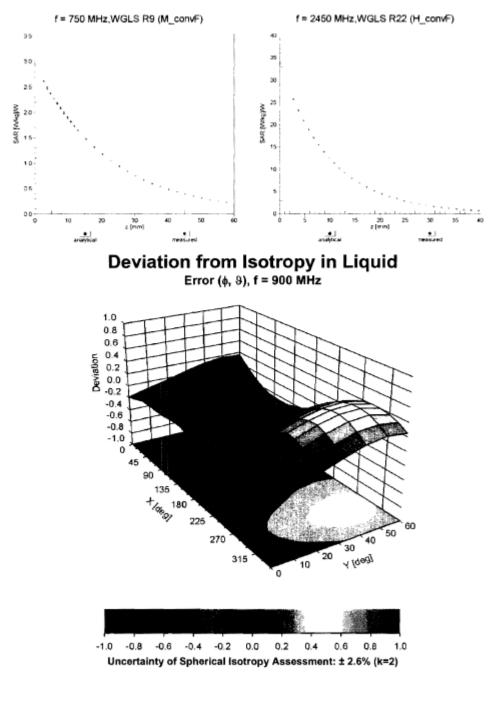
Certificate No: ET3-1644_Nov11

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Testing Service	Appendix D for the BlackBerr Report	Page 22(41)		
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
Andrew Becker	February 23 – March 6 , 2012	RTS-5994-1203-47	L6AREY20CW	2503A-REY20CW

November 15, 2011

Conversion Factor Assessment



Certificate No: ET3-1644_Nov11

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Testing Service	Appendix D for the BlackBerr Report	Page 23(41)		
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
Andrew Becker	February 23 – March 6 , 2012	RTS-5994-1203-47	L6AREY20CW	2503A-REY20CW

November 15, 2011

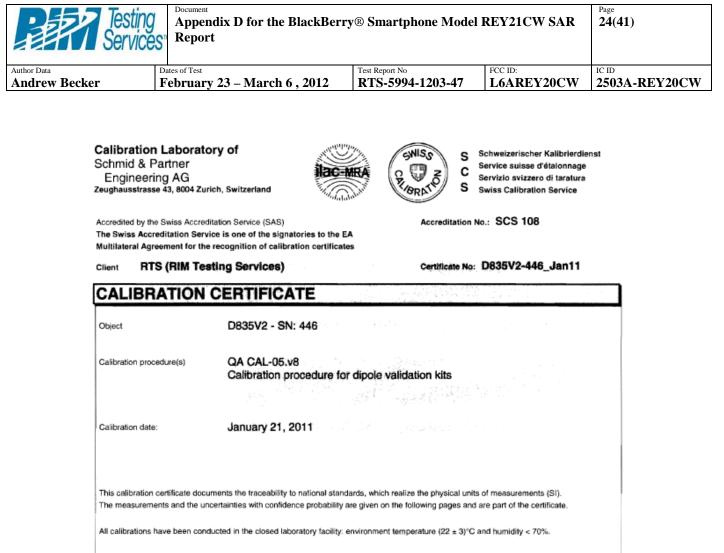
DASY/EASY - Parameters of Probe: ET3DV6 - SN:1644

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

Certificate No: ET3-1644_Nov11

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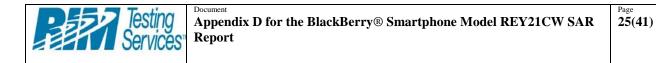


Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	
	1		Scheduled Calibration
Power meter EPM-442A	GB37480704	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11
	Name	Function	Signature
0 m		No	Signature
Calibrated by:	Dimce Illey	Laboratory Technician	D. Silv
Approved by:	Katja Pokovic	Technical Manager	26 Kg
This calibration certificate shall not	be reproduced except in	full without written approval of the laboratory.	Issued: January 21, 2011
		an interest interest approval of the laboratory.	

Certificate No: D835V2-446_Jan11

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Author Data Andrew Becker Dates of Test February 23 – March 6, 2012 Test Report No RTS-5994-1203-47 FCC ID: L6AREY20CW IC ID 2503A-REY20CW

Calibration Laboratory of

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





S Schweizerischer Kalibrierdienst Service suisse d'étalonnage

C 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

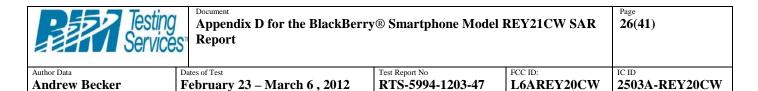
Additional Documentation:

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

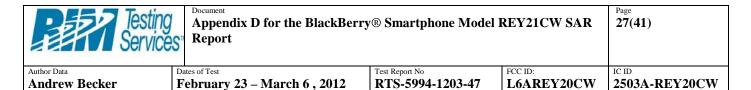
The following parameters and calculations were applied.

	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 ³ (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)
SAH averaged over 10 cm (10 g) of Head ISL	condition	
	condition 250 mW input power	1.56 mW / g
SAR averaged over 10 cm ³ (10 g) of Head TSL SAR measured SAR normalized		1.56 mW / g 6.24 mW / g

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

Γ	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

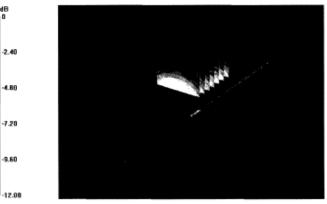
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1 Medium: HSL900 Medium parameters used: f = 835 MHz; σ = 0.89 mho/m; ϵ_r = 41.2; ρ = 1000 kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

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



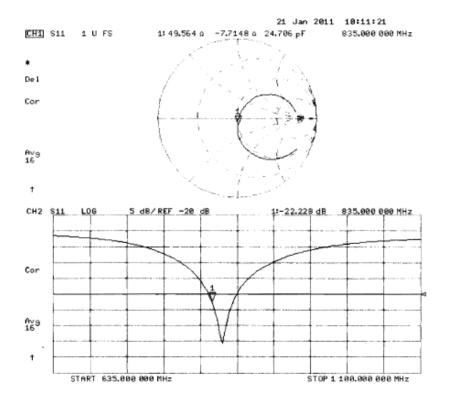


Certificate No: D835V2-446_Jan11

Page 5 of 6

Testing Service		Appendix D for the BlackBerry® Smartphone Model REY21CW SAR		Page 29(41)
Author Data	Dates of Test	Test Report No	FCC ID:	IC ID
Andrew Becker	February 23 – March 6 , 2012	RTS-5994-1203-47	L6AREY20CW	2503A-REY20CW

Impedance Measurement Plot for Head TSL



Certificate No: D835V2-446_Jan11

Page 6 of 6

Services		ix D for the Blac	ekderry@Smartphone Woud	el REY21CW SAR	Page 30(41)
Becker	Dates of Test February 2	23 – March 6 , 20	Test Report No RTS-5994-1203-47	FCC ID: L6AREY20CW	IC ID 2503A-REY20C
Calibration I Schmid & Pa Engineering Zeughausstrasse Accredited by the S The Swiss Accred	urtner g AG 43, 8004 Zurich, Swiss Accreditatio	Switzerland		Service suisse d'étalonnage Servizio svizzero di taratura	e
Multilateral Agree	ment for the rec	ognition of calibration	certificates	D1000/2545 lap11	r ales
		g Services)	Alexandra - Alexandra	la: D1900V2-545_Jan11	and a second
CALIBRA	ATION C	ERTIFICATE		A 201	
Object		D1900V2 - SN: 5	45		
Calibration proced	dure(s)	QA CAL-05.v8 Calibration proce	dure for dipole validation kits		
Calibration date:					
Calcian and a calc		January 15, 2011	na Regional Agrica (Contra en Anna Merri) (Sector) Agrica (Contra en Anna Anna Anna Anna Anna Anna Anna	1. · 영화화가 · · 아니가	
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This calibration ce The measurement All calibrations hav	ertificate documents and the uncertainteet we been conducted	its the traceability to nati ainties with confidence p	onal standards, which realize the physical u robability are given on the following pages a	and are part of the certificate.	
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This calibration ce The measurement All calibrations hav Calibration Equipm Primary Standards Power meter EPM Power sensor HP Reference 20 dB / Type-N mismatch	ertificate documents and the uncerta we been conducte ment used (M&TE s 4442A 8481A Attenuator combination	the traceability to nativality	onal standards, which realize the physical u robability are given on the following pages a sy facility: environment temperature (22 ± 3) Cal Date (Certificate No.) 06-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01266) 30-Mar-10 (No. 217-01158) 30-Mar-10 (No. 217-01162)	and are part of the certificate. °C and humidity < 70%. <u>Scheduled Calibration</u> Oct-11 Oct-11 Mar-11 Mar-11	
This calibration ce The measurement All calibrations hav Calibration Equipm Primary Standards Power meter EPM Power sensor HP Reference 20 dB / Type-N mismatch Reference Probe f	ertificate documents and the uncerta we been conducte ment used (M&TE 5 4-442A 8481A Attenuator combination ES3DV3	ts the traceability to nati ainties with confidence p ad in the closed laborator critical for calibration) ID # GB37480704 US37292783 SN: 5086 (20g) SN: 5047.2 / 06327 SN: 3205	onal standards, which realize the physical u robability are given on the following pages a sy facility: environment temperature (22 ± 3) Cal Date (Certificate No.) 06-Oct-10 (No. 217-01266) 06-Oct-10 (No. 217-01266) 30-Mar-10 (No. 217-01158) 30-Mar-10 (No. 217-01162) 30-Apr-10 (No. ES3-3205_Apr10)	and are part of the certificate. °C and humidity < 70%. <u>Scheduled Calibration</u> Oct-11 Oct-11 Mar-11 Mar-11 Apr-11	
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Certificate No: D1900V2-545_Jan11

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Appendix D for the BlackBerry® Smartphone Model REY21CW SAR

Author Data Andrew Becker Dates of Test February 23 – March 6, 2012

Test Report No RTS-5994-1203-47

GNIS

BRP

FCC ID: L6AREY20CW

IC ID 2503A-REY20CW

Calibration Laboratory of

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



Schweizerischer Kalibrierdienst s Service suisse d'étalonnage

s

Accredited by the Swiss Accreditation Service (SAS)

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

Glossarv:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

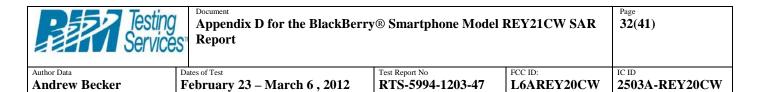
- Measurement Conditions: Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL: The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss: These parameters are measured with the dipole 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 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

- С
 - Servizio svizzero di taratura
 - Swiss Calibration Service

Accreditation No.: SCS 108



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

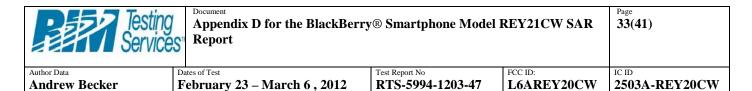
The following parameters and calculations were applied.

	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 ³ (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 ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.26 mW / g
SAR normalized	normalized to 1W	21.0 mW / g
SAR for nominal Head TSL parameters		

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/m³ 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/gMaximum value of SAR (measured) = 12.743 mW/g



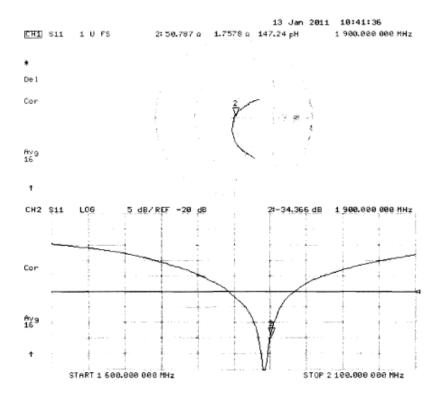
 $0 \, dB = 12.740 \, mW/g$

Certificate No: D1900V2-545_Jan11

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Testing Service	Document Appendix D for the BlackBerry® Smartphone Model REY21CW SAR Report			Page 35(41)	
Author Data	Dates of Test	es of Test Test Report No FCC ID:			
Andrew Becker	February 23 – March 6 , 2012	bruary 23 – March 6, 2012 RTS-5994-1203-47 L6AREY20CW			

Impedance Measurement Plot for Head TSL

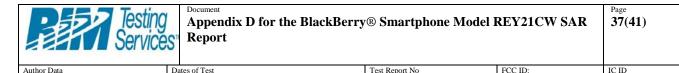


Certificate No: D1900V2-545_Jan11

Page 6 of 6

Becker Februar	ry 23 – March 6 , 2	Test Report No RTS-5994-1203-47	FCC ID: L6AREY20CW	IC ID 2503A-REY2
Calibration Laborator	ry of		Schweizerischer Kalibrier Service suisse d'étalonna	ige
Engineering AG Zeughausstrasse 43, 8004 Zurio	h, Switzerland	RIGRATO S	Servizio svizzero di taratu Swiss Calibration Service	
Accredited by the Swiss Accredit The Swiss Accreditation Servic Multilateral Agreement for the r	e is one of the signatorie	s to the EA	No.: SCS 108	
Client RTS (RIM Test			: D2450V2-747_Nov	41
CALIBRATION O	CERTIFICATE	11551111		
Object	D2450V2 - SN: 7	47	an a	ž.
Calibration procedure(s)	QA CAL-05.v8			p.
		dure for dipole validation kits abo	ove 700 MHz	ž.
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				1
	nents the traceability to nati	111 ional standards, which realize the physical un	its of measurements (SI).	ř.
This calibration certificate docum The measurements and the unc	nents the traceability to nati ertainties with confidence p		its of measurements (SI). d are part of the certificate.	ē.
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Author Data Andrew Becker Dates of Test February 23 – March 6, 2012

RTS-5994-1203-47

FCC ID: L6AREY20CW

IC ID 2503A-REY20CW

Calibration Laboratory of

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





S Schweizerischer Kalibrierdienst

C Service suisse 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	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

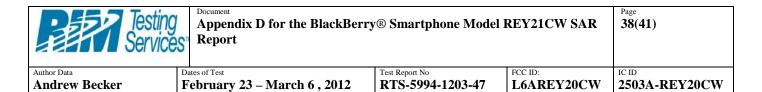
Additional Documentation:

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_Nov11



Measurement Conditions

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

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

Head TSL parameters

The following parameters and calculations were applied.

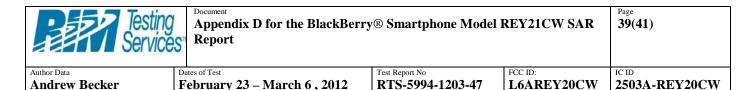
	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.7 ± 6 %	1.84 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL

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

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.39 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	25.3 mW /g ± 16.5 % (k=2)

Certificate No: D2450V2-747_Nov11



Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.5 Ω + 1.3 jΩ
Return Loss	- 31.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.161 ns

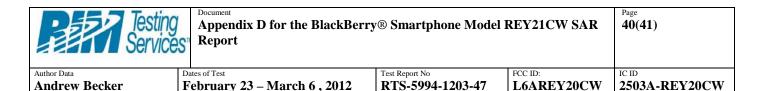
After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 01, 2003

Certificate No: D2450V2-747_Nov11



DASY5 Validation Report for Head TSL

Date: 09.11.2011

Test Laboratory: SPEAG, Zurich, Switzerland

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

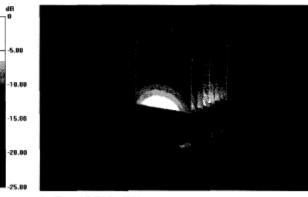
Communication System: CW; Frequency: 2450 MHz Medium parameters used: f = 2450 MHz; $\sigma = 1.84$ mho/m; $\varepsilon_r = 37.7$; $\rho = 1000$ kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

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

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

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



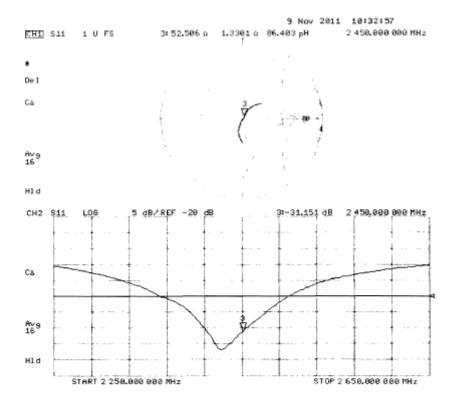
0 dB = 17.780mW/g

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Testing Service	10 Appendix D for the BlackBerry® Smartphone Model REY21CW SAR			Page 41(41)	
Author Data	Dates of Test	s of Test Test Report No FCC ID:			
Andrew Becker	February 23 – March 6 , 2012	1.			

Impedance Measurement Plot for Head TSL



Certificate No: D2450V2-747_Nov11

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