SlackBerry	Appendix D for the BlackBe Report Rev 2	Appendix D for the BlackBerry® Smartphone Model RFQ111LW SAR				
Author Data	Dates of Test	Test Report No	FCC ID:	IC		
Andrew Becker	Apr 02 - May 14, 2013 Mar 26 – 28, Dec. 10-12, 2014					

APPENDIX D: PROBE & DIPOLE CALIBRATION DATA

Revision History					
Rev. Number	Date	Changes			
Initial	May 31, 2013				
Rev 2	Dec 17, 2014	Added equipment used for 802.11a Hotspot mode SAR testing 1. Page 14-24			

SlackBerry	Document Appendix D for the BlackBe Report Rev 2	Appendix D for the BlackBerry® Smartphone Model RFQ111LW SAR				
	Dates of Test	tes of Test Test Report No FCC ID:				
Andrew Becker	Apr 02 - May 14, 2013	L6ARFQ110LW	2503A-RFQ110LW			
	Mar 26 – 28, Dec. 10-12, 2014	Rev 3	_	_		

oredited by the Swiss Accredit	tation Service (SAS)	Accreditation N	to: SCS 108
e Swiss Accreditation Servi utilateral Agreement for the	ce is one of the signatorie	s to the EA	
lent RTS (RIM Tes	ting Services)	Certificate No:	ES3-3225_Jan13
ALIBRATION	CERTIFICATI	E	
bject	ES3DV3 - SN:32	25	
Calibration procedum(s)	CONTRACTOR AND A DESCRIPTION OF A DESCRI	DA CAL-23.v4, QA CAL-25.v4 dure for dosimetric E-field probes	
Calibration date:	January 10, 2015	3	
		onal standards, which realize the physical units	
The measurements and the unc	entainties with confidence p	robability are given on the following pages and	are part of the certificate.
The measurements and the unc	entainties with confidence p ucted in the closed laborator		are part of the certificate.
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The measurements and the unc all calibrations have been cond Calibration Equipment used (Mi Primary Standards Power motor E44195 Power sensor E44195 Reference 3 dB Attenuator Reference 30 dB Attenuator Reference 30 dB Attenuator	ertainties with confidence pr ucted in the closed laborator &TE critical for calibration) 40 G84125/3874 MY45498087 SN: S5056 (30) SN: S5086 (20)	cobability are given on the following pages and ry facility: environment temperature (22 ± 3)*C / Cal Date (Centificate No.) 29-Mar-12 (No. 217-01508) 29-Mar-12 (No. 217-01508) 27-Mar-12 (No. 217-01509) 27-Mar-12 (No. 217-01509)	are part of the certificate. and humidity < 70%. Scheduled Calibration Apr-13 Apr-13 Apr-13 Apr-13 Apr-13 Dec-13
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The measurements and the unc All calibrations have been cond Calibration Equipment used (Mi Primary Standards Power motor E441105 Power remoir E441105 Power sensor E4412A Reference 3 dB Attenuator Reference 3 dB Attenuator Reference 30 dB Attenuator Reference Probe ES3DV2 DAE4	ertainties with confidence p ucted in the closed laborator &TE critical for calibration) 0 084125/3874 Mr45696087 SNr 55586 (206) SNr 55586 (206) SNr 55589 (206) SNr 55589 (206) SNr 55589 (206) SNr 55129 (208)	robability are given on the following pages and ry facility: environment temperature (22 ± 3)°C / Cal Date (Centificate No.) 29-Mar 12 (No. 217 01508) 29-Mar 12 (No. 217 01508) 27-Mar 12 (No. 217 01501) 27-Mar 12 (No. 217 01531) 27-Mar 12 (No. 217 01532) 27-Mar 12 (No. 217 01532) 29-Jun 12 (No. DAE4 065 Jun 12)	are part of the certificate. and humidity < 70%. Scheduled Calibration Apr-13 Apr-13 Apr-13 Apr-13 Apr-13 Dec-13
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The measurements and the unit All calibrations have been condi- Calibration Equipment used (Mi Primary Standards Power sensor E4419A Reference 3 dB Abenuator Reference 9 hobe E33DV2 DAE4 Secondary Standards RF generator HP 80480 Network Analyzer HP 8753E	ertainties with confidence p ucted in the closed laborator ATE critical for calibration) 40 40 40 40 40 40 40 40 40 40	robability are given on the following pages and ry facility: environment temperature (22 ± 3)°C / Cal Date (Certificate No.) 29-Mar 12 (No. 217-01508) 29-Mar 12 (No. 217-01508) 27-Mar 12 (No. 217-01509) 27-Mar 12 (No. 217-01509) 27-Mar 12 (No. 217-01530) 28-Oec-12 (No. 553-3013, Dec12) 29-Jan 12 (No. 553-3013, Dec12) 29-Jan 12 (No. 553-3013, Dec12) 20-Jan 12 (No. 553-3013, Dec12)	are part of the certificate. and humidity < 70%. Schedulet Calibration Apr-13 Apr-13 Apr-13 Apr-13 Apr-13 Apr-13 Dec-13 Jan-13 Dec-13 Jan-13 Schedulet Check in house check: Apr-13 In house check: Oct-13
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	Mar 26 – 28, Dec. 10-12, 2014	Rev 3				

Calibration Laboratory of	1.2
Schmid & Partner	-
Engineering AG	- P
Zeughausstrasse 43, 8004 Zurich, Switzerland	



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

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Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS)

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

Closeson

Glossary:	
TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx, y, z
DCP	diade compression point
CF	crest factor (1/duty_cycle) of the RF signal
A. B. C. D	modulation dependent linearization parameters
Polarization o	e rotation around probe axis
Polarization 5	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:

- NORMs, y.z: Assessed for E-field polarization 8 = 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 Charl). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCPx,y,z: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- Ax,y,z: Bx,y,z: Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx.y.z * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

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ES3DV3 - 5N:3225

January 10, 2013

Probe ES3DV3

SN:3225

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

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

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ES30V3- SN:3225

January 10, 2013

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

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k#2)
Norm (µV/(V/m) ²) ⁴	1.29	1.19	1.31	± 10.1 %
DCP (mV) ⁸	100.5	101.5	99.9	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dBõV	c	0 d6	VR mV	Unc [®] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	157.5	12.7 %
S		Y	0.0	0.0	1.0	10,000,000	158.4	Service Contern
		Z	0.0	0.0	1.0	S	165.9	

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

- ^b The uncertainties of NormX,Y,Z do not affect the E¹-field uncertainty inside TSL (see Pages 5 and 6). Numerical inecarcation parameter: uncertainty not required. ⁴ Uncertainty is determined using the mix, deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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ES30V3- SN:3225

January 10, 2013

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

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity"	Conductivity (S/m)	ConvF X	Conv# Y	Conv∉ Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.56	8.56	8.56	0.42	1.54	± 12.0 %
900	41.5	0.97	6.19	6.19	6.19	0.43	1.52	± 12.0 %
1810	40.0	1.40	5.35	5.35	5.35	0.63	1.39	± 12.0 %
1950	40.0	1.40	5.09	5.09	5.09	0.80	1.23	± 12.0 %
2450	39.2	1.80	4.65	4.65	4.65	0.61	1.63	± 12.0 %
2600	39.0	1.96	4.43	4.43	4.43	0.80	1.32	± 12.0 %

⁶ Frequency validity of ± 100 MHz only opplies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the Conil⁶ uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
⁷ At treguencies below 3 CHz, the validity of issue parameters (*i* and *i*) can be relaxed to ± 10% if liquid componisation formula is applied to measured SAR values. At thefunctions above 3 CHz, the validity of issue parameters (*i* and *i*) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target (seve parameters).

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ES3DV3- SN:3225

January 10, 2013

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

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (Sim)	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.27	8.27	6.27	0.48	1.51	± 12.0 %
900	55.0	1.05	6.12	6.12	6.12	0.73	1.25	# 12.0 %
1810	53.3	1.52	5.04	5.04	5.04	0.57	1.47	± 12.0 %
1950	53.3	1.52	4.94	4.94	4.94	0.58	1.50	± 12.0 %
2450	52.7	1.95	4,35	4.35	4.35	0.70	1.16	# 12.0 5
2600	52.5	2.16	4.11	4.11	4.11	0.67	0.99	# 12.0 9

^C Foregoency 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 RSE of the ConsF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
⁷ At frequencies torbox 3 Chtz, the validity of tissue parameters (*x* and *x*) can be refused to ± 10% if liquid compensation formula is applied to measured SAR values. A frequencies above 3 Chtz, the validity of tissue parameters (*x* and *x*) is restricted to ± 5%. The uncertainty is the RSE of the ConsF uncertainty for indicated farget lissue parameters.

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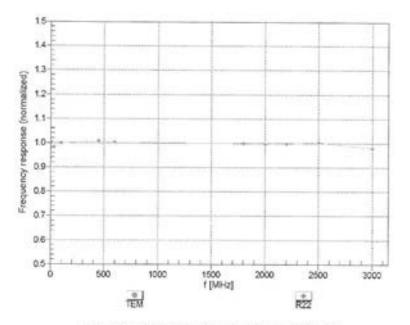
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ES30V3- SN:3225

January 10, 2013

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



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

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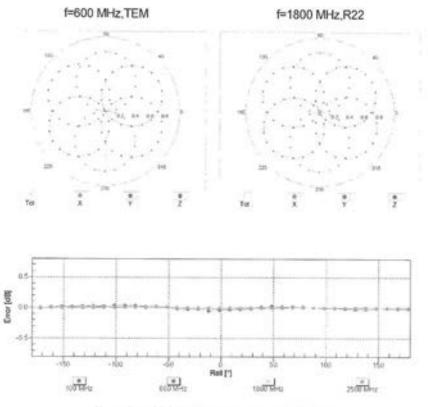
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E\$30V3- 5N 3225

January 10, 2013

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



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

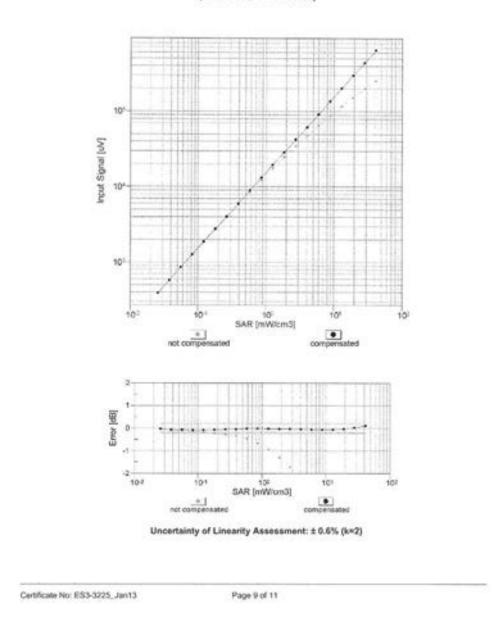
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ES3DV3- 5N:3225

January 10, 2013



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

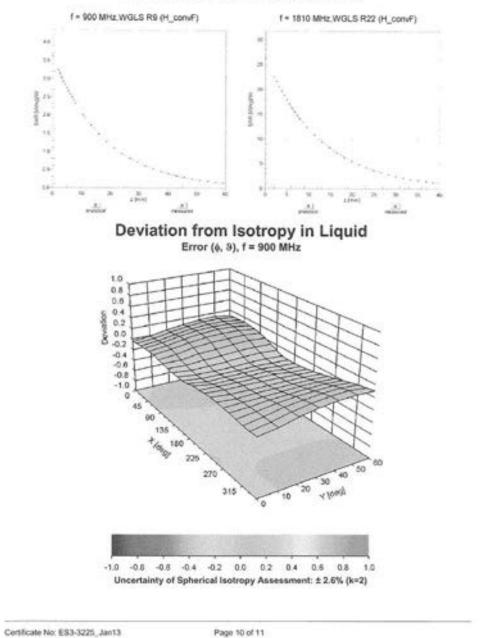
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Andrew Becker	Apr 02 - May 14, 2013 Mar 26 – 28, Dec. 10-12, 2014	RTS-6026-1305-18 Rev 3	L6ARFQ110LW	2503A-RFQ110LW

ES30V3- SN 3225

January 10, 2013

Conversion Factor Assessment



SlackBerry	Appendix D for the BlackBe Report Rev 2	erry® Smartphone Mo	odel RFQ111LW SAR	Page 12(63)
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Andrew Becker	r · · · · · · · · · · ·	RTS-6026-1305-18 Rev 3	L6ARFQ110LW	2503A-RFQ110LW

ES30V3- SN 3225

January 10, 2013

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

Other Probe Parameters

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

Certificato No: ES3-3225_Jan13

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Author Data Andrew Becker	Dates of Test Apr 02 - May 14, 2013	Test Report No RTS-6026-1305-18	FCC ID: L6ARFQ110LW	^{IC} 2503А-RFQ110LW
	Mar 26 – 28, Dec. 10-12, 2014	Rev 3	~	C

SlackBerry	Document Appendix D for the BlackBe Report Rev 2	rry® Smartphone Mo	del RFQ111LW SAR	Page 14(63)
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Andrew Becker	Apr 02 - May 14, 2013	RTS-6026-1305-18	L6ARFQ110LW	2503A-RFQ110LW
	Mar 26 – 28, Dec. 10-12, 2014	Rev 3	-	C C

generator HP M648C Howork Analyzer HP 8763P alitested by: spproved by:	Name Left Klysner Katja Politores	Function Laboratory Technician Technical Manager	Seef Man-
Nohwork Analyzer HP 87538	100000	Laboratory Technician	Seef May
Nohwork Analyzer HP 87538	100000		Bigosture
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Figuration HP M668C	U337390686	18-Oct-01 (in house check Ool-14)	3's house at each: Oct-55
	US3042U01700	4-Aug-99 (in house sheck Apr-13)	In house check: Apr-10
accordary Standards	10	Check Date (in house)	Scheduled Check
ME4	5N: 660	13-Dec-13 (No. DAE4 660, Dec13)	Dep 14
toference Probe ES30V2	5N: 3013	30-Dep-13 (No. 653-3013, Dec13)	Dec-14
Inference 30 dB Attenuator	SN: 66129 (308)	03-Apr-14 (No. 217-01920)	Apr-15
leference 20 dB Attenuator	SN: 85277 (20x)	(3)-Apr-14 (No. 217-01910)	Apr-15
Reference 3 dB Attenuation	SN: 55054 (3c)	03 Apr 14 (No. 217-01915)	Agr-15
Ower service E4412A	MY41498007	03-Apr-14 (No. 21/-01011)	Apr-15
Power mater E44108	Gibi1293874	03-Apr-14 (No. 217-01011)	Apr.15
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		onal standards, which realize the physical units	
albration sate:	November 10, 20	154	
	Calibration proce	dure for dosimetric E-field probes	
albration procedure(x)	QA CAL-01.v9, Q	A CAL-14 V4, DA CAL-23 V5, DA	CAL-25.V6
fault	EX3DV4 - SN:35	92	
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*** BlackBerry	Appendix D for the BlackBe Report Rev 2	Page 15(63)		
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Andrew Becker	Apr 02 - May 14, 2013	RTS-6026-1305-18	L6ARFQ110LW	2503A-RFQ110LW
	Mar 26 – 28, Dec. 10-12, 2014			C

Calibration Labo Schmid & Partner		S	SAUSS	Schweizerischer Kalibrierdienst Service subse d'étalomose
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Accredited by the Swisa A	corectization Service (SAS)			Accessionation No.: SCS 108
	Service is one of the signat or the recognition of calibrat			
Glossary:				
TSL	tissue simulating liqu			
NORMx,y.z. Conv/F	sensitivity in free spa sensitivity in TSL / N			
CP	diode compression p			
0F	crest factor (1/duty_c		hal	
, B, C, D	modulation depender	nt linearization para	meters	
Polarization (r	o rotation around pro	ibe axis		
Polarization 8	i.e., 8 = 0 is normal t	o probe axis		be axis (at measurement center),
Connector Angle	information used in E	ASY system to ally	yn probe sensor X	to the robot coordinate system
	rformed According			
	ate (SAR) in the Human			teek Spalial-Averaged Specific s Devices: Measurement
		The Scientific Ablery	etion Rete (SAR) f	or hand-held devices used in close
	he ear (frequency range			
	and Interpretation			
NORMx.y.z i	Assessed for E-field poli re only intermediate val- wide TSL (see below Co	ues, i.e., the uncert	ainties of NQRMx,	alt; f > 1800 MHz; R22 waveguide), y,z does not affect the E ² -field
Implemented				nse Chart). This linearization is (the frequency response is included
 DCPx,y,z*D0 				the data of power sweep with CW hodia.
 PAR: PAR is characteristic 	the Peak to Average Ra a	itio that is not calib	rated but determin	ed based on the signal
the data of p		modulation signal.	The parameters do	on parameters assessed based on o not depend on frequency nor ross the diode.
 ConvF and 8 Standard for measuremen boundary co- used in DAS to NCRMs, y, ConvF is use 	coundary Effect Paramet f < 800 MHz) and inside to for f > 800 MHz. The mpenetrion (alpha, dept Y4 software to improve) z * ConvF whereby the I	ters: Assessed in fl waveguide using a same setups are u m) of which typical (probe accuracy clor uncertainty corresp	at phantom using 8 inalytical field distr sed for assessment incertainty values is to the boundary onds to that given	E-field (or Temperature Transfer Rutions based on power W of the parameters applied for are given. These parameters are . The sensitivity in TSL corresponds for ConvF. A frequency dependent validity from ± 50 MHz to ± 100
MHz.	tropy (3D deviation from		and the second second	

- 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.
- Convector Angle: The angle is assessed using the information gained by determining the NORMs (no uncertainty required).

Gortificate No. EK3-3592. Nov14

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Andrew Becker	Apr 02 - May 14, 2013 Mar 26 – 28, Dec. 10-12, 2014	RTS-6026-1305-18 Rev 3	L6ARFQ110LW	2503A-RFQ110LW		

EX30V4 - 5N:3592

November 10, 2014

Probe EX3DV4

SN:3592

Manufactured: Calibrated: September 18, 2006 November 10, 2014

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

Certificate No. EX3-3592 Nov14

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Andrew Becker	I i i j i i	RTS-6026-1305-18 Rev 3	L6ARFQ110LW	2503A-RFQ110LW		

EX3DV4-SN 3592

November 10, 2014

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

Basic Calibration Parameters

	Sensor X	Sensor Y	Senaor Z	Unc (k+2)
Norm (µV/(V/m) ²) ²	0.48	0.47	0.40	± 10.1 %
DCP (mV)*	95.2	98.0	98.8	100000000000000000000000000000000000000

Modulation Calibration Parameters

UID	Communication System Name		dB	Β σ8√μV	c	D dB	WR mV	Uns" (k=2)
0	CW	X	0.0	0.0	1.0	0.00	145.9	23.3 %
		Y	0.0	0.0	1.0		155.9	
1		Z	0.0	0.0	1.0	1	140.1	· · · ·

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

- ⁶ The uncertainties of NormXYZ do not affect the E¹-field uncertainty inside TSL (we Pages 5 and 6).
 ⁹ Namerical locarization parameter: uncertainty not required.
 ⁸ Uncertainty is dotomined using the max, deviation from linear response applying rectangular distribution and is expressed for the spisare of the field varia.

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Andrew Becker	I · · · · · · · · · ·	RTS-6026-1305-18 Rev 3	L6ARFQ110LW	2503A-RFQ110LW		

EX30V4- SN:3502

November 10, 2014

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

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

f (MHz) C	Relative Permittivity"	Conductivity (5/m)	ConvF X	ConvF Y	ConvF Z	Alpha	Depth ⁶ (mm)	Unot. (k=2)
2800	39.0	1.98	6.80	6.80	6.80	0.36	0.93	± 12.0 %
5250	35.9	4.71	4.63	4.63	4.63	0.35	1,80	± 13.1 %
5600	35.6	5.07	4.20	4.20	4.20	0.40	1.90	# 13.1 %
5750	35.4	5.22	4.34	4.34	4.34	0.40	1.80	# 13.1 %

⁶ Prequency wildly above 300 MHz of ± 100 MHz only applies for ISASY vI A and higher (ace Page 2), ether it is restricted to ± 50 MHz. The increatingly in the HSS of the Con-E accordancy at calibration frequency and the uncertaining for the indicated frequency band. Frequency wildly below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for Con-F accordancy and the uncertaining for the indicated frequency band. Frequency wildly can be extended to ± 110 MHz.
A thousands below 3 GHz, the validity of texase parameters (*z* and *e*) can be released to ± 10% // lay/d comparation formula is applied to necessarily to indicate above 3 GHz, the validity of tissue parameters (*z* and *e*) can be released to ± 10%. This uncertainty is the RSS of the Con-F accordancy wildly of tissue parameters (*z* and *e*) can be released to ± 10%. This uncertainty is the RSS of the Con-F accordancy and the validity of tissue parameters (*z* and *e*) can be released to ± 10%. This uncertainty is the RSS of the Con-F accordancy and the two seconds blows 3 GHz, the validity of tissue parameters (*z* and *e*) is restricted to a 10%. This uncertainty is the RSS of the Con-F accordance band at the two seconds below 3 GHz, the validity of tissue parameters (*z* and *e*) is restricted to a 10%. This uncertainty is the RSS of the Con-F accordance band at the text and *e*) the text at text at text at the text at text.

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EX30V4 SN:3592

November 10, 2014

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

Calibration Parameter Determined in Body Tissue Simulating Media

r (MHz) ^c	Relative Permittivity ^r	Conductivity (\$/m)*	ConvF X	CorvFY	ConvF Z	A)pha ^G	Depth C (non)	Unst. (ic=2)
2600	52.5	2.15	6.84	6.84	6.84	0.78	0.62	± 12.0 %
6250	48.9	5.36	4.06	4.06	4.06	0.45	1.90	± 13,1 %
5600	48.5	5.77	3.78	3,78	3,78	0.45	1.90	# 13.1 %
5750	48.3	5.94	3.81	3.61	3.81	0.50	1.90	# 13.1 %

⁶ Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 7), site # is restricted to a 50 MHz. The uncertainty is the R55 of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency hand. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz theorem, validity can be estimated to a 110 MHz. The uncertainty of lissue parameters (c and s) can be released to ± 10% H lissue 5 GHz theorem, validity of these parameters (c and s) can be released to ± 10%. The uncertainty is the R53 of the ConvF is indicated to a 50 GHz. The uncertainty is the R53 of the ConvF is indicated to a 100 MHz.

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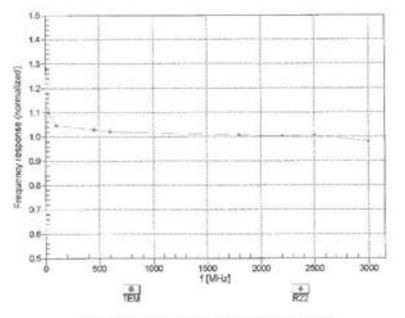
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EX30V4- 5N:3592

November 10, 2014

Frequency Response of E-Field (TEM-Cell:Ifi110 EXX, Waveguide: R22)



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

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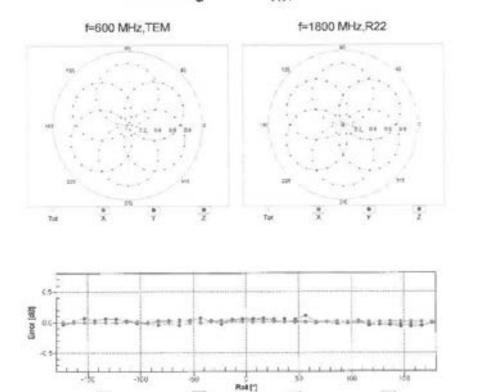
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Andrew Becker		RTS-6026-1305-18		2503A-RFQ11

EX30V4- SN:3502

November 10, 2014

200 100

Receiving Pattern (\$), 9 = 0°



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

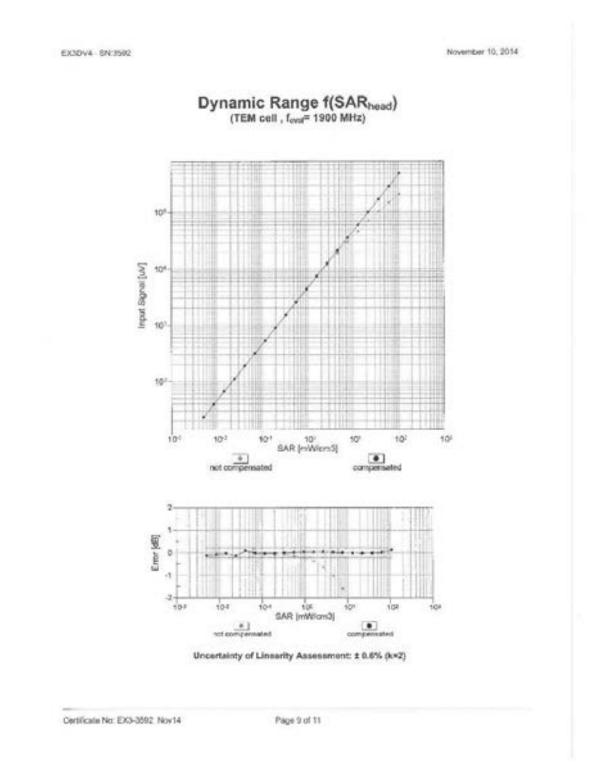
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Certificate No: EX3-3592_Nov14

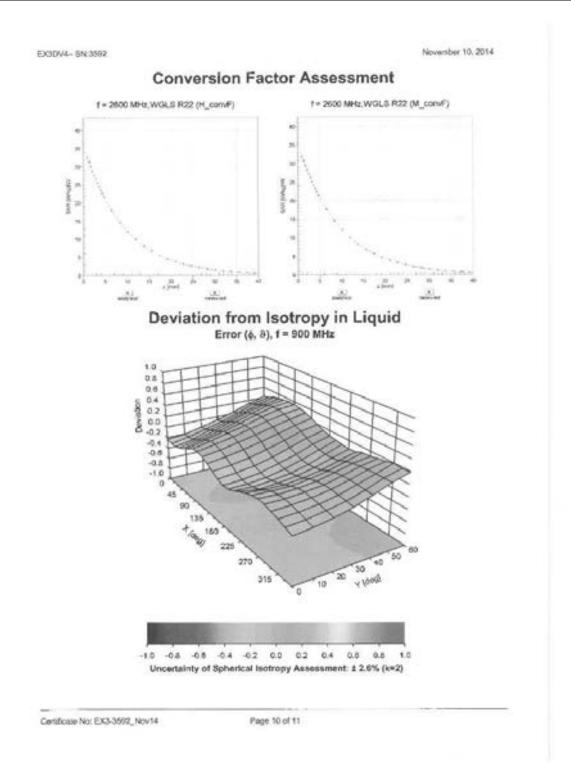
100 100-10

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EX3DV4~ SN 3592

November 10, 2014

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

Other Probe Parameters

Sensor Amangement	Triangular
Connector Arigle (*)	-13.3
Mechanical Surface Delection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diaméter	2.5 mm
Probe Tip to Sensor X Calibration Point	min 1
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

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	Mar 26 – 28, Dec. 10-12, 2014	Rev 3	-	

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Calibration Laboratory Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurict		ACCINERA (SANISO P. D. Z. BORDAT	S Schweizerlischer Kalibrierdienst Service suisse d'étalonnage Servizio svizzero di taratura S Swiss Calibration Service
Accredited by the Swiss Accredital The Swiss Accreditation Service Multilateral Agreement for the re	is one of the signatorie	s to the EA	ation No.: SCS 108
Client RTS (RIM Testi	ng Services)	Certifica	te No: D835V2-446_Jan13
CALIBRATION C	ERTIFICATE		的名称的复数形式
Object	D835V2 - SN: 44	6	
Calibration procedure(s)	QA CAL-05.v9 Calibration proce	dure for dipole validation kits	above 700 MHz
Calibration date:	January 07, 2013		
All calibrations have been conduc Calibration Equipment used (M&T		y facility: environment temperature (22	# 3)°C and humidity < 70%,
Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.3 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3 DAE4	SN: 3205 SN: 601	28-Dec-12 (No. ES3-3205_Dec12) 27-Jun-12 (No. DAE4-601_Jun12)	Dec-13 Jun-13
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-05	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	U\$37390585 \$4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13
	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	Ellen
Approved by:	Katja Pokovic	Technical Manager	John hop-
This calibration certificate shall no	ot be reproduced except in	full without written approval of the labo	Issued: January 8, 2013 ratory.
Certificate No: D835V2-446_Ja		Page 1 of 6	

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



S Schweizerischer Kalibrierdienst

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Servizio svizzero di taratura Si fueira Catilizativa Reputera

5 Swiss Calibration Service

Accreditation No.: SCS 108

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

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

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Measurement Conditions

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

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

Head TSL parameters

The following parameters and calculations were applied.

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

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.39 W/kg ± 17.0 % (k=2)
SAR averaged over 10 cm ² (10 g) of Head TSL	condition	
SAR averaged over 10 cm ² (10 g) of Head TSL SAR measured	condition 250 mW input power	1.55 W/kg

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Appendix

Antenna Parameters with Head TSL

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

General Antenna Parameters and Design

Electrical Delay (one direction)	1.385 ns
----------------------------------	----------

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

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

No excessive force must be applied to the clipole 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: D635V2-446_Jan13

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DASY5 Validation Report for Head TSL

Date: 07.01.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

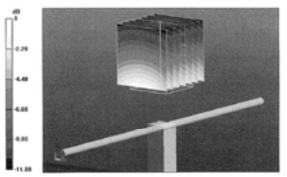
Communication System: CW; Frequency: 835 MHz Medium parameters used: f = 835 MHz; $\sigma = 0.92$ S/m; $\epsilon_r = 42$; $\rho = 1000$ kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

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

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 56.650 V/m; Power Drift = 0.01 dB Peak SAR (extrapolated) = 3.61 W/kg SAR(1 g) = 2.38 W/kg; SAR(10 g) = 1.55 W/kg Maximum value of SAR (measured) = 2.79 W/kg



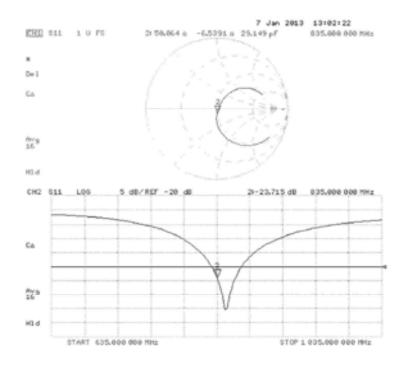
0 dB = 2.79 W/kg = 4.46 dBW/kg

Certificate No: D835V2-446_Jan13

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*** BlackBerry	Appendix D for the BlackBo Report Rev 2	erry® Smartphone Mo	odel RFQ111LW SAR	Page 30(63)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Apr 02 - May 14, 2013 Mar 26 – 28, Dec. 10-12, 2014	RTS-6026-1305-18 Rev 3	L6ARFQ110LW	2503A-RFQ110LW

Impedance Measurement Plot for Head TSL



Certificate No: D835V2-446_Jan13

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Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Apr 02 - May 14, 2013 Mar 26 – 28, Dec. 10-12, 2014	RTS-6026-1305-18 Rev 3	L6ARFQ110LW	2503A-RFQ110LW

Calibration Laborat Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zu	Nac MEA	GRANSS GRANSS GRANSS GRANSS Service subsed d'falonnege Service subsed d'falonnege
	diston Service (SAS) vice is one of the algostories to the EA e recognition of calibration certificates	Accreditation No: SCS 108
Client RTS (RIM Te	sting Services)	Certificate No: D1900V2-5d075_Apr11
CALIBRATION	CERTIFICATE	
Object	D1900V2 - SN: 5d075	
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipol	e validation kits

This calibration contribute documents the traceability to national standards, which realize the physical units of measurements (St). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate. All calibrations have been conducted in the closed laboratory facility: environment temperature (22 + 3)*C and humidity < 70%. Colibration Equipment used (M&TE cetcal for calibration). Primary Standards 101 Cel Date (Certificate No.) Scheduled Calibration G007480704 Power meter EPM-442A 06-Oct-10 (No. 217-01266) Oct-11 Power sensor HP 8461A US37292783 00 Oct.10 (No 217-01286) Oct-11 Polonence 20 dB Attenuator SN: 5086 (20g) 29 Mar 11 (No. 217 (1368) Ape-12 Apr-12 Apr-11 Type N mismatch combination SN: 5047.2/08027 29-Mar-11 (No. 217-01371) neo Probe ES30V3 LANK SOCK 30 Apr-10 (No. ES3-3205 Apr15)

Contraction of the state of the	and a second second	the car is a brain when an end when and		
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11	
Secondary Standards	10.4	Check Date (in house)	Scheduled Check	
Power senace HP 8481A	MY41002317	18-Oct-02 (in house chuck Oct-09)	in house check: Oct-11	
RF generator R&S SMT-08	100095	4-Aug 99 (in house check Oct-09)	In house check, Oct-11	
Network Analyzor HP 8753E	0537390585 54206	18-Oct-01 (in house check Oct-10)	in house check: Oci-11	
	Name	Function	Signature	
Calibratied by:	htte hieli	Laboratory Technician	ritedi	
	122120200101			
Approved by:	Katja Pokovic	Technical Manager	Relle	
			have a design state	
			Issued April 8, 2011	
This calculor certificate shall r	not be reproduced except in	full without withen approval of the laborato	xy.	-

Centificate No: D1900V2-5d075_Apr11

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*** BlackBerry	Appendix D for the BlackBe Report Rev 2	erry® Smartphone Mo	odel RFQ111LW SAR	Page 32(63)
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Andrew Becker	Apr 02 - May 14, 2013 Mar 26 – 28, Dec. 10-12, 2014	RTS-6026-1305-18 Rev 3	L6ARFQ110LW	2503A-RFQ110LW

Calibration Laboratory of Schmid & Partner Engineering AG Zeoghaceterasse 43, 5004 Zurich, Switzerland



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 - Servizio svizzero di taroluro
- S Swiss Calibration Service

Accreditation No.: SCS 108

Accedited by the Swiss Acceditation Service (SAS) The Swiss Acceditation Service is one of the eignetonies to the EA Multileteral Agreement for the recognition of calibration certificates

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

Certificate No: D1900V2-5d075_Apr11

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*** BlackBerry	Appendix D for the BlackBo Report Rev 2	Appendix D for the BlackBerry® Smartphone Model RFQ111LW SAR		
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Apr 02 - May 14, 2013 Mar 26 – 28, Dec. 10-12, 2014	RTS-6026-1305-18 Rev 3	L6ARFQ110LW	2503A-RFQ110LW

Measurement Conditions

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	17.126-044
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 perameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.8 ± 6 %	1.41 mholm ± 6 %
Head TSL temperature during test	(21.3 ± 0.2) °C		

SAR result with Head TSL

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

SAR averaged over 10 cm ² (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.29 mW / g
SAR normalized	normalized to 1W	21.2 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	21.0 mW /g ± 16.5 % (k=2)

Certificate No: D1900V2-5d075_Apr11

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*** BlackBerry	Appendix D for the BlackBe Report Rev 2	Appendix D for the BlackBerry® Smartphone Model RFQ111LW SAR		
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Apr 02 - May 14, 2013 Mar 26 – 28, Dec. 10-12, 2014	RTS-6026-1305-18 Rev 3	L6ARFQ110LW	2503A-RFQ110LW

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.5 G + 6.1 jQ
Return Loss	- 23.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.197 ns
A STATE OF A	

After long term use with 100W radiated power, only a slight warming of the dipole near the teodpoint 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	ŚPEAG		
Manufactured on	January 24, 2006		

Certificate No: D1900V2-5r075_Apr11

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*** BlackBerry	Document Appendix D for the BlackBerry® Smartphone Model RFQ111LW SAR Report Rev 2			Page 35(63)
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Andrew Becker	Apr 02 - May 14, 2013	RTS-6026-1305-18	L6ARFQ110LW	2503A-RFQ110LW
	Mar 26 – 28, Dec. 10-12, 2014	Rev 3		

DASY5 Validation Report for Head TSL

Date/Time: 05.04.2011 12:41:39

Test Laboratory: SPEAG, Zurich, Switzerland

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

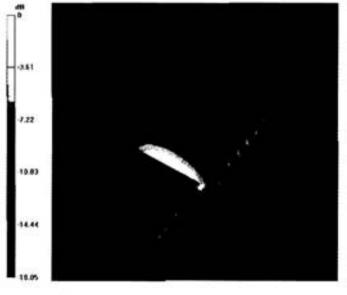
Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1 Medium: HSL U12 BB Medium parameters used: f = 1900 MHz; σ = 1.41 mho/m; r_{s} = 39; ρ = 1000 kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANS1 C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 SN3205; ConvE15.09, 5.091; Calibrated. 30.04,3010
- Sensor-Surface: John (Mochanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA: Senal: 1001
- Measurement SW: DASY52, V52.6.2 Build (424)
 Postporcessing SW: SEMCAD X, V14.4.4 Build (2829)
- Ludiscond on Observity of Local Inter-

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 97.376 V/m; Power Drift = 0.04 dB Peak SAR (extrapolated) = 18.796 W/kg SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.29 mW/g Maximum value of SAR (measured) = 12.476 mW/g



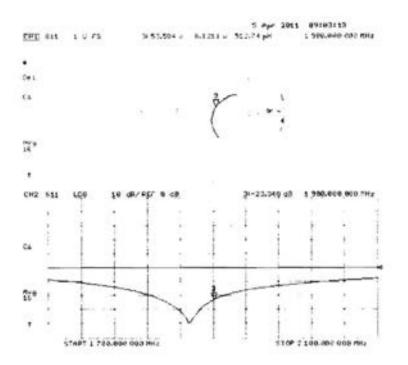
0 dB = 12.480mW/g

Centificate No: D1900V2-5d075_Apr11

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*** BlackBerry	Appendix D for the BlackBe Report Rev 2	Appendix D for the BlackBerry® Smartphone Model RFQ111LW SAR		
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Apr 02 - May 14, 2013 Mar 26 – 28, Dec. 10-12, 2014	RTS-6026-1305-18 Rev 3	L6ARFQ110LW	2503A-RFQ110LW

Impedance Measurement Plot for Head TSL



Certificate No. D1900V2-5d075_Apr11

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*** BlackBerry	Appendix D for the BlackBe Report Rev 2	erry® Smartphone Mo	odel RFQ111LW SAR	Page 37(63)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Apr 02 - May 14, 2013	RTS-6026-1305-18	L6ARFQ110LW	2503A-RFQ110LW
	Mar 26 – 28, Dec. 10-12, 2014	Rev 3	-	-

Calibration Laborator Schmid & Partner Engineering AG Reghausstrasse 43, 8004 Zuriet		ACCHEA CONSS	S Schweizerischer Kalibrierdienst C Service suisse d'étalonnage Servicio svizzero di taratura S Swiss Calibration Service
Accredited by the Swiss Accredite The Swiss Accreditation Service Autilitateral Agreement for the re	is one of the signatories	s to the EA	Itation No.: SCS 108
Client RTS (RIM Testi			cate No: D1900V2-545_Jan13
CALIBRATION C	ERTIFICATE		
Object	D1900V2 - SN: 5	45	
Calibration procedure(s)	QA CAL-05.v9 Calibration proce	dure for dipole validation kit	s above 700 MHz
Calibration date:	January 09, 2013	Constant of Constant	
Calibration Equipment used (M&) Primary Standards	TE critical for calibration)	Cal Date (Certificate No.)	Schedulod Calibration
Power meter EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.3 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3 DAE4	SN: 3205 SN: 601	28-Dec-12 (No. ES3-3205_Dec12) 27-Jun-12 (No. DAE4-601_Jun12)	
Secondary Standards	10 *	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	
Network Analyzer HP 8753E	U\$37390585 \$4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13
	Name	Function	Signature
Calibrated by:	Israe El-Naouq	Laboratory Technician	Arran al-Daou
Approved by:	Katja Pokovic	Technical Manager	Leky
This calibration certificate shall n	of be reproduced except in	full without written approval of the tal	Issued: January 9, 2013 boratory.
entilicate No: D1900V2-545		Page 1 of 6	

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Andrew Becker	Apr 02 - May 14, 2013	RTS-6026-1305-18	L6ARFQ110LW	2503A-RFQ110LW
	Mar 26 – 28, Dec. 10-12, 2014	Rev 3		

Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8001 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:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

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Andrew Becker	Apr 02 - May 14, 2013	RTS-6026-1305-18	L6ARFQ110LW	2503A-RFQ110LW
	Mar 26 – 28, Dec. 10-12, 2014	Rev 3	-	

Measurement Conditions

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

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

Head TSL parameters

The following parameters and calculations were applied.

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

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.0 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	40.2 W/kg ± 17.0 % (k=2)
SAR averaged over 10 cm ² (10 g) of Head TSL	condition	
SAR averaged over 10 cm ² (10 g) of Head TSL SAR measured	condition 250 mW input power	5.26 W/kg
		5.26 W/kg 21.1 W/kg ± 16.5 % (k=2)

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SlackBerry	Appendix D for the BlackBo Report Rev 2	erry® Smartphone Mo	odel RFQ111LW SAR	Page 40(63)
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Apr 02 - May 14, 2013 Mar 26 – 28, Dec. 10-12, 2014	RTS-6026-1305-18 Rev 3	L6ARFQ110LW	2503A-RFQ110LW

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.0 Ω + 1.7 jΩ
Return Loss	- 34.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.198 ns.
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 15, 2001

Centilicate No: D1900V2-545_Jan13

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Andrew Becker	Apr 02 - May 14, 2013 Mar 26 – 28, Dec. 10-12, 2014	RTS-6026-1305-18 Rev 3	L6ARFQ110LW	2503A-RFQ110LW

DASY5 Validation Report for Head TSL

Date: 09.01.2013

Test Laboratory: SPEAG, Zarich, Switzerland

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

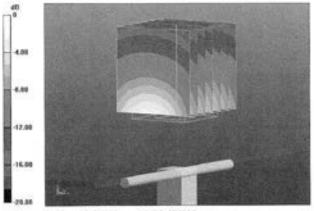
Communication System: CW; Frequency: 1900 MHz Medium parameters used: f = 1900 MHz; $\sigma = 1.38$ S/m; $\epsilon_e = 39.4$; $\rho = 1000$ kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

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

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 95,493 V/m; Power Drift = 0.05 dB Peak SAR (extrapolated) = 18.1 W/kg SAR(1 g) = 10 W/kg; SAR(10 g) = 5.26 W/kg Maximum value of SAR (measured) = 12.2 W/kg



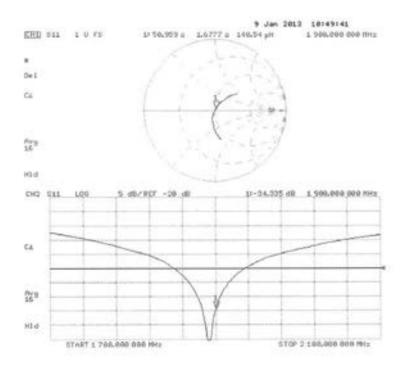
0 dB = 12.2 W/kg = 10.86 dBW/kg

Certificate No: D1900V2-545_Jan13

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*** BlackBerry	Appendix D for the BlackBe Report Rev 2	Appendix D for the BlackBerry® Smartphone Model RFQ111LW SAR		
Author Data	Dates of Test	Test Report No	FCC ID:	IC
Andrew Becker	Apr 02 - May 14, 2013 Mar 26 – 28, Dec. 10-12, 2014	RTS-6026-1305-18 Rev 3	L6ARFQ110LW	2503A-RFQ110LW

Impedance Measurement Plot for Head TSL



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SlackBerry	Appendix D for the BlackBe Report Rev 2	Appendix D for the BlackBerry® Smartphone Model RFQ111LW SAR		
Author Data Andrew Becker	Dates of Test Apr 02 - May 14, 2013	Test Report No RTS-6026-1305-18	FCC ID: L6ARFQ110LW	IC 2503A-RFQ110LW
Anurew Decker	Mar 26 – 28, Dec. 10-12, 2014		LUARTQIIULW	2505A-KrQ110LW

*** BlackBerry	Appendix D for the BlackBe Report Rev 2	Appendix D for the BlackBerry® Smartphone Model RFQ111LW SAR			
Author Data	Dates of Test	s of Test Test Report No FCC ID:			
Andrew Becker	Apr 02 - May 14, 2013	RTS-6026-1305-18	L6ARFQ110LW	2503A-RFQ110LW	
	Mar 26 – 28, Dec. 10-12, 2014	Rev 3			

ccredited by the Swiss Accredita	ation Service (SAS)	Accreditatio	n No.: SCS 108
he Swiss Accreditation Servic			
ultilateral Agreement for the r	-		
lient RTS (RIM Test	ing Services)	Certificate 3	a: D2450V2-747_Nov11
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Xbject	D2450V2 - SN: 7	47 5 37 38 38 8 38	SAN SHALL
Calibration procedure(s)	QA CAL-05.v8	GREATSATEMENTSATEM	
	Calibration proce	dure for dipole validation kits ab	ove 700 MHz
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Calibration date:	November 09, 20	HIMANIA	SAN AND AND AND AND AND AND AND AND AND A
		ional standards, which realize the physical u	
		ional standards, which realize the physical u robability are given on the following pages a	
The measurements and the unco	etainties with confidence p	robability are given on the following pages a	ind are part of the certificate.
The measurements and the unco	etainties with confidence p		ind are part of the certificate.
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SlackBerry	Appendix D for the BlackBe Report Rev 2	Appendix D for the BlackBerry® Smartphone Model RFQ111LW SAR				
Author Data	Dates of Test	of Test Report No FCC ID:				
Andrew Becker	Apr 02 - May 14, 2013 Mar 26 – 28, Dec. 10-12, 2014	RTS-6026-1305-18 Rev 3	L6ARFQ110LW	2503A-RFQ110LW		

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



- S Schweizerischer Kalibrierdienst Service suisse d'étalonnage
- C Service suisse c'etarchitage
- S Swiss Calibration Service

Accreditation No.: SCS 108

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

Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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	Mar 26 – 28, Dec. 10-12, 2014		LUARIQIIULW	2505A-KI Q110LW

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Measurement Conditions

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

the reasoning parameters and calculations we	Temperature	Permittivity

-

No.Rinal Head TSL parameters	2240 °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		

Conductivity

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 averaged over 10 cm ³ (10 g) of Head TSL SAR measured	condition 250 mW input power	6.39 mW / g

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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

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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

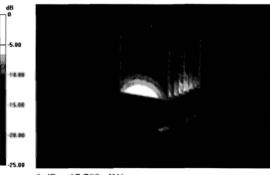
Communication System: CW; Frequency: 2450 MHz Medium parameters used: f = 2450 MHz; $\sigma = 1.84$ mho/m; $\epsilon_r = 37.7$; $\rho = 1000$ kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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



 $0 \, dB = 17.780 \, mW/g$

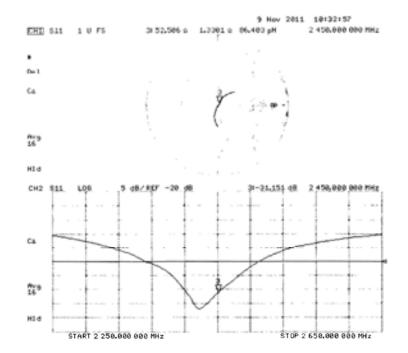
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Impedance Measurement Plot for Head TSL



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	Mar 26 – 28, Dec. 10-12, 2014			2505/1-Ki Q110LW

SlackBerry	Appendix D for the BlackBe Report Rev 2	Appendix D for the BlackBerry® Smartphone Model RFQ111LW SAR		
Author Data Andrew Becker	Dates of Test Apr 02 - May 14, 2013	Test Report No RTS-6026-1305-18	FCC ID: L6ARFQ110LW	^{IC} 2503А-RFQ110LW
	Mar 26 – 28, Dec. 10-12, 2014	Rev 3		

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	Dates of Test Apr 02 - May 14, 2013 Mar 26 – 28, Dec. 10-12, 2014	Test Report No RTS-6026-1305-18 Rev 3	FCC ID: L6ARFQ110LW	^{IC} 2503A-RFQ110LW

consideri by the Switz Accredita he Swise Accreditation Service kultilatural Agreement for the m	e is one of the signatories	to the EA	No.: SCS 108
lient Blackberry Wa	torioo	Certificate No	r D5GHzV2-1033_Nov13
CALIBRATION C	ERTIFICATE		
Object	D5GH2V2 - SN: 1	1033	
Calibration procedure(6)	QA CAL-22.v2 Calibration proce	dure for dipole validation kits bet	ween 3-6 GHz
Calibration date:	November 08, 20	13	
The measurements and the unce All calibrations have been condu	atainties with confidence p cried in the closed laborator	onal standords, which wallas the physical en coasility are given on the following pages to y facility: environment temporature (22 a 3)1	ad are part of the certificate.
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	Mar 26 – 28, Dec. 10-12, 2014	Rev 3		

Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstresse 43, 8034 Zurich, Switzerland



- Schweizerischer Kalibrierdienet s
- Service suisse d'étalonnage C
- Servizio svizzero di taratura ŝ
- Swiss Calibration Service

Acceditation No.: SCS 108

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

Glossary:

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

Calibration is Performed According to the Following Standards:

- a) IEC 62209-2, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation, and Procedures"; Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for including accessories and multiple transmitters*, March 2010
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"
- c) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

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Measurement Conditions

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

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

Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	36.0	4.66 minorm
Measured Hood TSL parameters	(22.0 ± 0.2) °C	35.0 ± 6 %	4,46 mholm ± 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.99 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	79.4 W/kg + 19.9 % (k=2)
	1	
SAR averaged over 10 cm ² (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.28 W/kg

Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

and the second	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.6	4.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.6 = 6 %	4.75 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		<u>111</u>

SAR result with Head TSL at 5500 MHz

SAR averaged over 1 cm ² (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.51 W/kg
SAR for nominal Hood TSL parameters	normalized to 1W	84.4 W / kg = 19.9 % (k+2)
		and the second se
SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
	condition 100 mW input power	2.41 Wikg

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Head TSL parameters at 5800 MHz

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.3	5.27 mho/m
Measured Head TSL parametera	(22.0 ± 0.2) °C	34.2 ± 6 %	5.06 mho/m = 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm ² (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.01 W/Ag
SAR for nominal Head TSL parameters	normalized to 1W	79.4 W/kg ± 19.9 % (k+2)

SAR averaged over 10 cm ² (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.26 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	22.6 W/kg ± 19.5 % (ke2)

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Appendix

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	48.1 Ω - 9.6 jΩ	
Return Loss	- 20.3 dB	

Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	50.3 (2 - 4,1)32
Return Loss	- 27.7 aB

Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	57.8 G = 4.0 jG		
Return Loss	- 21.8 dB		

General Antenna Parameters and Design

Electrical Delay (one direction)	1.213 ns

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

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

No excessive force must be applied to the clipole 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		

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DASY5 Validation Report for Head TSL

Date: 08.11.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW ; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz

Medium parameters used: f = 5200 MFIz; $\sigma = 4.46 \text{ S/m}$; $\epsilon_r = 35$; $\rho = 1000 \text{ kg/m}^3$, Medium parameters used: f = 5500 MHz; $\sigma = 4.75 \text{ S/m}$; $\epsilon_r = 34.6$; $\rho = 1000 \text{ kg/m}^3$, Medium parameters used: f = 5800 MHz; $\sigma = 5.06 \text{ S/m}$; $\epsilon_r = 34.2$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section Measurement Standard: DASY5 (TEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: EX3DV4 SN3503; ConvF(5.41, 5.41, 5.41); Calibrated: 28.12.2012, ConvF(4.91, 4.91, 4.91); Calibrated: 28.12.2012, ConvF(4.81, 4.81, 4.81); Calibrated: 28.12.2012;
- Sensor-Surface: L4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm Reference Value = 64.635 V/m; Power Drift = -0.04 dB Peak SAR (extrapolated) = 29.5 W/kg SAR(1 g) = 7.99 W/kg; SAR(10 g) = 2.28 W/kg Maximum value of SAR (measured) = 18.4 W/kg

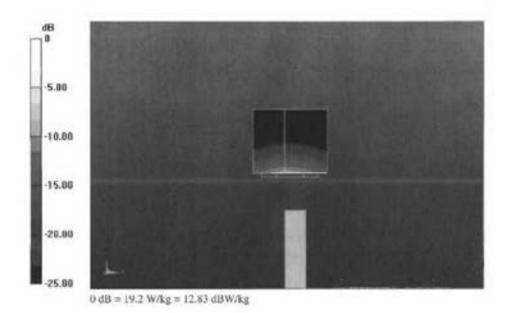
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm Reference Value = 64.397 V/m; Power Drift = 0.02 dB Peak SAR (extrapolated) = 33.8 W/kg SAR(1 g) = 8.51 W/kg; SAR(10 g) = 2.41 W/kg Maximum value of SAR (measured) = 20.3 W/kg

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Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan,
dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 61.128 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 33.0 W/kg
SAR(1 g) = 8.01 W/kg; SAR(10 g) = 2.28 W/kg
Maximum value of SAR (measured) = 19.2 W/kg
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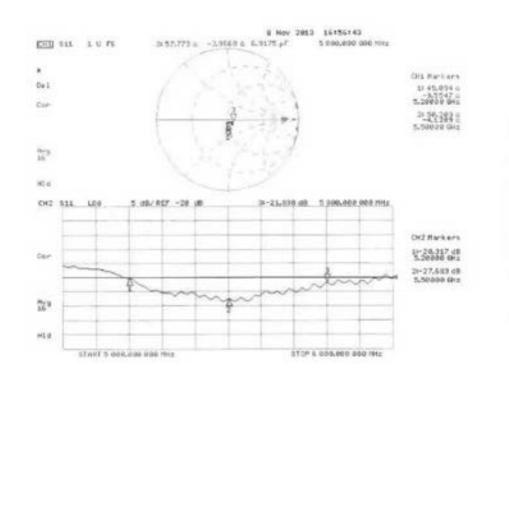


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Impedance Measurement Plot for Head TSL



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