### BlackBerry

Appendix C for the BlackBerry® Smartphone Model RHT181LW (STV100-2) SAR Report Part 1/2

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Author Data
Andrew Becker

Dates of Test
Oct 06 – Nov 02, 2015

RTS-6066-1511-01

Test Report No

FCC ID: L6ARHT180LW

#### APPENDIX C: PROBE & DIPOLE CALIBRATION DATA PART 1 OF 2

Note: Model RHM181LW was tested using the external lab CETECOM ICT Services GmbH. Information regarding the SAR test results and procedures for model: RHM181LW were taken from the CETECOM SAR test report for model RHM181LW, report number 1-0042/15-01-15-A

Appendix C for the BlackBerry® Smartphone Model RHT181LW (STV100-2) SAR Report Part 1/2

Author Data
Andrew Becker

Document
Appendix C for the BlackBerry® Smartphone Model RHT181LW (STV100-2) SAR Report Part 1/2

Test Report No
RTS-6066-1511-01

L6ARHT180LW

## **Calibration Files for Model RHT181LW**

*** BlackBerry	/	Appendix C for the BlackBerry® Smartphone Model RHT181LW (STV100-2) SAR Report Part 1/2			
Author Data	Dates of Te	est	Test Report No	FCC ID:	
Andrew Becker	Oct 06	- Nov 02, 2015	RTS-6066-1511-01	L6ARHT180LW	

## **Probe 1643**



Document

## Appendix C for the BlackBerry® Smartphone Model RHT181LW (STV100-2) SAR Report Part 1/2

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Author Data

Andrew Becker

Dates of Test

Oct 06 - Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID:

L6ARHT180LW

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





S Schweizerischer Kalibrierdienst
C Service sulsse d'étalonnage
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Swiss Calibration Service

Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS)

The wiss Accreditation Service is one of the signaturies to the EA Multilateral Agreement for the recognition of calibration certificates

chen

Blackberry Waterloo

Certificate No: ET3-1643 Mar15

### **CALIBRATION CERTIFICATE**

Object

ET3DV6 - SN:1643

Calibration procedure(s)

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

Calibration date:

March 13, 2015

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	(D)	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E44198	GB41293874	03-Apr-14 (No. 217-01911)	Apr-15
Power sensor E4412A	MV41498087	03-Apr-14 (No. 217-01911)	Apr-15
Reference 3 dB Attenuator	SN: S5054 (3c)	03-Apr-14 (No. 217-01915)	Apr-15
Reference 20 dB Attenuator	SN: S5277 (20x)	03-Apr-14 (No. 217-01919)	Apr-15
Reference 30 dB Attenuator	SN: S5129 (30b)	03-Apr-14 (No. 217-01920)	Apr-15
Reference Proba ES3DV2	SN: 3013	38-Dec-14 (No. ES3-3013_Dec14)	Dec-15
DAE4	SN: 660	14-Jan-15 (No. DAE4-860 Jan15)	Jan-16
Secondary Standards	10	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check; Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-14)	In house chack: Oct-15

Calibrated by:

Israe Elnaouq

Function Laboratory Technician

Approved by:

Katja Pokovic

Technical Manager

issued: March 13, 2015

This ballbration cartificate shall not be reproduced except in full without written approval of the laboratory

Certificate No: ET3-1643\_Mar15

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## Appendix C for the BlackBerry® Smartphone Model RHT181LW (STV100-2) SAR Report Part 1/2

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Author Data

Andrew Becker

Dates of Test

Oct 06 - Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID:

L6ARHT180LW

Calbration Laboratory of

Schnid & Partner Eligineering AG Zeu 9 hausstrasse 43, 8004 Zurich, Switzerland





S Schweizerlischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di faratura
Swiss Calibration Service

Accreditation No.: SCS 0108

Appreciate by the Swas Accreditation Service (SA9)

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

Glossary:

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

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

Polafization m in rotation around probe axis

Potalization 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

Conhector Angle information used in DASY system to align probe sensor X to the robot coordinate system

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

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) In the Human Head from Wireless Communications Devices: Measurement Techniques," June 2013
- Techniques", June 2013
  b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

### Methods Applied and Interpretation of Parameters:

- NORMx,y,z: Assessed for E-field polarization 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 E<sup>2</sup>-field uncertainty inside TSL (see below ConvF).
- NORM(f)x,y,z = NORMx,y,z \* frequency\_response (see Frequency Response Chart). This linearization is
  implemented in OASY4 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 (elpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z \* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NORMx (no uncertainty required).

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Author Data
Andrew Becker

Dates of Test
Oct 06 – Nov 02, 2015

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FCC ID: L6ARHT180LW

# Probe ET3DV6

SN:1643

Manufactured: Calibrated:

November 7, 2001 March 13, 2015

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

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ETૐD/6-SN:1643

March 13, 2015

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

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
NO (μV/(V/m)2)A	1.76	1.95	1.75	± 10.1 %
DCP (mV)B	101.5	100.5	102.4	

Medulation Calibration Parameters

UIP	Communication System Name		A dB	B dB√μV	С	D dB	VR mV	Unc <sup>E</sup> (k=2)
0	CW	X	0.0	0.0	1.0	0.00	261.1	±3.8 %
		Y	0.0	0.0	1.0		237.4	
		Z	0.0	0.0	1.0		267.0	

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

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

Numerical linearization parameter; uncertainty not required.

Numerical linearization parameter; uncertainty not required.

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



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Author Data **Andrew Becker**  Dates of Test Oct 06 - Nov 02, 2015 Test Report No RTS-6066-1511-01 FCC ID: L6ARHT180LW

ET/30V6- SN:1643

March 13, 2015

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

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

f (MHz) <sup>C</sup>	Relative Permittivity F	Conductivity (S/m) F	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unct. (k=2)
750	41.9	0.89	6.69	6.69	6.69	0.32	3.00	± 12.0 %
900	41.5	0.97	6.09	6.09	6.09	0.33	3.00	± 12.0 %
1810	40.0	1.40	5.18	5.18	5.18	0.80	2.02	± 12.0 %
1950	40.0	1.40	4.93	4.93	4.93	0.80	2.06	± 12.0 %
2450	39.2	1.80	4.58	4.58	4.58	0.80	1.62	± 12.0 %

<sup>&</sup>lt;sup>C</sup> Frequency validity above 300 MHz 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. 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 frequency validity or an be extended to ± 110 MHz.

\*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.

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



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Author Data **Andrew Becker**  Dates of Test Oct 06 - Nov 02, 2015 Test Report No RTS-6066-1511-01 FCC ID: L6ARHT180LW

ET 230V6- SN:1643

March 13, 2015

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

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

f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unct. (k=2)
750	55.5	0.96	6.29	6.29	6.29	0.36	2.49	± 12.0 %
900	55.0	1.05	6.00	6.00	6.00	0.33	3.00	± 12.0 %
1810	53.3	1.52	4.50	4.50	4.50	0.80	2.60	± 12.0 %
1950	53.3	1.52	4.56	4.56	4.56	0.80	2.23	± 12.0 %
2450	52.7	1.95	3.93	3.93	3.93	0.70	1.60	± 12.0 %

<sup>&</sup>lt;sup>6</sup> Frequency validity above 300 MHz 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. 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 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 frequency

salidity can be extended to ± 110 MHz.

F At frequencies below 3 GHz, the validity of tissue parameters (s and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to

At requencies below 3 GHz, the valuity or issue parameters (s and o) can be relaxed to ± 10% if injude compensation formula is applied to the account of the ConvF uncertainty for indicated target tissue parameters.

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



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Author Data
Andrew Becker

Dates of Test
Oct 06 – Nov 02, 2015

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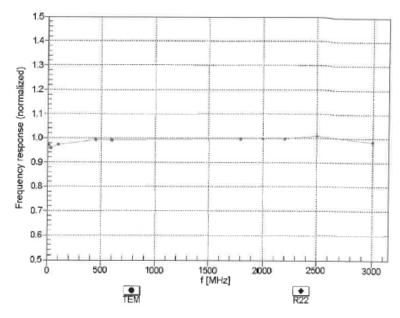
FCC ID: L6ARHT180LW

ET'30V6- SN:1643

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### 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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Oct 06 – Nov 02, 2015

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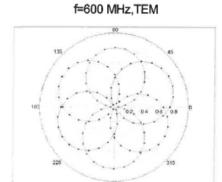
FCC ID: L6ARHT180LW

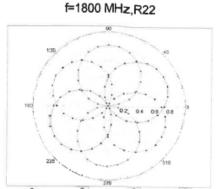
ET/30V6- SN:1643

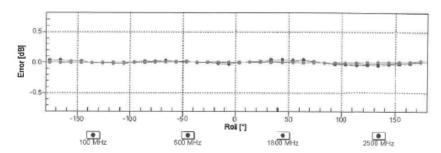
Tot

March 13, 2015

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







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

Certificate No: ET3-1643\_Mar15

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Oct 06 – Nov 02, 2015

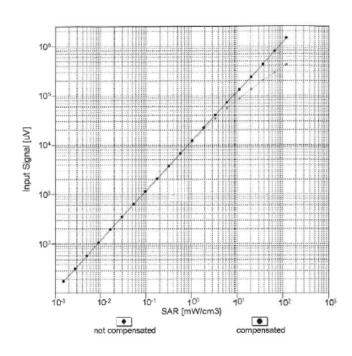
Test Report No **RTS-6066-1511-01** 

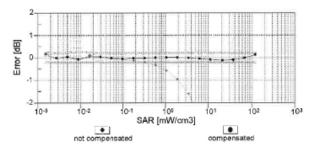
FCC ID: L6ARHT180LW

ET/30/v6~ SN:1643

March 13, 2015

### Dynamic Range f(SAR<sub>head</sub>) (TEM cell , f<sub>eval</sub>= 1900 MHz)





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

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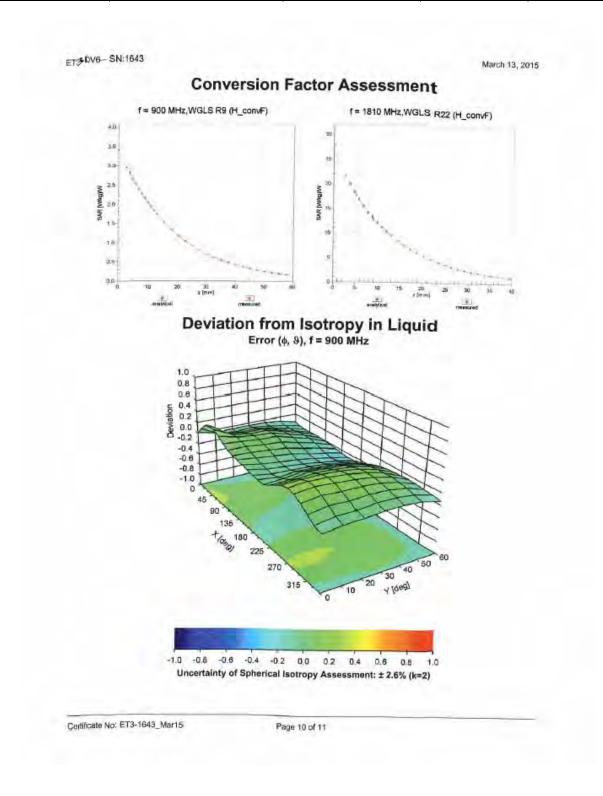
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Andrew Becker

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ET/30V6- SN:1643

March 13, 2015

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

#### Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	3.8
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	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
	4 111111

*## BlackBerry	/	Appendix C for the BlackBerry® Smartphone Model RHT181LW (STV100-2) SAR Report Part 1/2			Page 15(81)	
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Andrew Becker	Oct 06	- Nov 02, 2015	RTS-6066-1511-01	L6ARHT180LW		

## 750 Dipole

## \*\*\* BlackBerry

Appendix C for the BlackBerry® Smartphone Model RHT181LW

(STV100-2) SAR Report Part 1/2

Author Data

**Andrew Becker** 

Dates of Test Oct 06 - Nov 02, 2015 Test Report No RTS-6066-1511-01 FCC ID: L6ARHT180LW 16(81)

Calibration Laboratory of Schr & Partner En Sheering AG Zeughanstrasse 43, 8004 Zurich, Switzerland





Schweizerischer Kalibrierdienst Service auisse d'étalonnage C Servizio svizzero di taratura **Swiss Calibration Service** 

Accreditation No.: SCS 0108

Accred the by the Swiss Accreditation Service (SAS) The Swils Accreditation Service is one of the signatories to the EA Multilate al Agreement for the recognition of calibration certificates

Calibration procedure(s)  Calibration procedure for dipole validation kits above 700 MHz  Calibration procedure for dipole validation kits above 700 MHz  Calibration date:  March 11, 2015  This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurement and the uncertainties with conflidence probability are given on the following pages and are part of the certificate. All calibrations have been conducted in the closed faboratory facility: environment temperature (22 ± 3)°C and faumidaty < 70%.  Calibration Equipment used (M&TE critical for calibration)  Primary Standards  Diff. Calibration (Certificate No.) Scheduled Check (Certificate No.) Sc	CALIBRATION C	ERTIFICATE		
Calibration procedure for dipole validation kits above 700 MHz  Calibration procedure for dipole validation kits above 700 MHz  Calibration date: March 11, 2015  This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurement 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: anvironment temperature (22 ± 3)°C and humidity < 70%.  Calibration Equipment used (M&TE critical for calibration)  Primary Standards    D #	Object	D750V3 - SN:10	21	
This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.  All calibrations have been conducted in the closed laboratory facility: anvironment temperature (22 ± 3)°C and humidaty < 70%.  Calibration Equipment used (M&TE critical for calibration)  Primary Standards  ID # Cal Date (Certificate No.) Scheduled Calibration  Power meter EPM-442A GB87480704 07-Oct-14 (No. 217-02020) Oct-15  Power sensor HP 6481A US\$7792783 07-Oct-14 (No. 217-02020) Oct-15  Power sensor HP 8481A MY41092317 07-Oct-14 (No. 217-02021) Oct-15  Power sensor HP 8481A MY41092317 07-Oct-14 (No. 217-02021) Oct-15  Type-N mismatch combination SN: 5084 (20k) 03-Apr-14 (No. 217-01918) Apr-15  Type-N mismatch combination SN: 5047-2 / 06327 03-Apr-14 (No. 217-01921) Apr-15  Reference Probe ES3DV3 SN: 300 30-Dec-14 (No. ES3-3205_Dec-14) Dec-15  SN: 601 18-Aug-14 (No. DAE4-601_Aug-14) Aug-15  Secondary Standards  ID # Check Date (in house) Scheduled Check  Network Analyzer HP 8753E US37390565 S4206 18-Oct-01 (in house check Oct-14) In house check: Oct-  Name Function Signature  Calibrated by: Michael Weber Laboratory Technician	Calibrathn procedure(s)	The state of the s	dure for dipole validation kits ab	ove 700 MHz
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 humidaty < 70%.  Calibration Equipment used (M&TE critical for calibration)  Primary Standards ID # Cal Date (Certificate No.) Scheduled Calibration  Power meter EPM-442A GB37480704 07-Oct-14 (No. 217-02020) Oct-15  Power sensor HP 9481A US37292783 07-Oct-14 (No. 217-02020) Oct-15  Power sensor HP 8481A MY41092317 07-Oct-14 (No. 217-02021) Oct-15  Power sensor HP 8481A MY41092317 07-Oct-14 (No. 217-01918) Apr-15  Typu-N mismatch combination SN: 5058 (20k) 03-Apr-14 (No. 217-01918) Apr-15  Reference 20 dB Attenuator SN: 5058 (20k) 03-Apr-14 (No. 217-01919) Apr-15  Reference Probe ES3DV3 SN: 3205 30-Dec-14 (No. ES3-3205_Dac-14) Dec-15  AB-4 SN: 601 18-Aug-14 (No. DAE4-601_Aug-14) Aug-15  Secondary Standards ID # Check Date (in house) Scheduled Check  Network Analyzer HP 8753E US37390595 S4206 18-Oct-01 (in house check Oct-13) In house check: Oct-  Name Function Signature  Calibratical by: Michael Weber: Leboratory Technician	Calibration date:	March 11, 2015		
Primary Standards	The measurements and the uncer All calibrations have been conduc	tainties with confidence p	rcbability are given on the following pages a	nd are part of the certificate.
Power meter EPM-442A   GB37480704   07-Oct-14 (No. 217-02020)   Oct-15	Primary Standards	lip e	Cal Date (Certificate No.)	Scherbilled Californian
Power sensor HP 8481A				
SN: 5058 (20k)   03-Apr-14 (No. 217-01918)   Apr-15	ower sensor HF 6481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
SN: 5047.2 / 06327   03-Apr-14 (No. 217-01921)   Apr-15     Reference Probe ES3DV3   SN: 3205   30-Dec-14 (No. ES3-3205_Dec14)   Dec-15     DAE4   SN: 601   18-Aug-14 (No. DAE4-601_Aug14)   Aug-15     Secondary Standards   ID #   Check Date (in house)   Scheduled Check     To generator P&S SMT-06   100005   04-Aug-99 (in house check Oct-13)   In house check: Oct-   Network Analyzer HP 8753E   US37390585 S4206   18-Oct-01 (in house check Oct-14)   In house check: Oct-   Calibrated by:   Name   Function   Signature     Calibrated by:   Laboratory Technician   Signature	Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
SN: 3205   30-Dec-14 (No. ES3-3205_Dec-14)   Dec-15	teference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Secondary Standards  ID # Check Date (in house)  Scheduled Check  To generator R&S SMT-06 100005 04-Aug-99 (in house check Oct-13) In house check: Oct-  letwork Analyzer HP 8753E US37390585 S4206 18-Oct-01 (in house check Oct-14)  Name Function Signature  Celibrated by: Michael Weber Laboratory Technician	ype-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Secondary Standards: ID # Check Date (in house) Scheduled Check  RF generator R&S SMT-06 100005 04-Aug-99 (in house check Oct-13) In house check: Oct-  Network Analyzer HP 8753E US37390595 S4206 18-Oct-01 (in house check Oct-14) In house check: Oct-  Name Function Signature  Calibrated by: Michael Weber: Laboratory Technician	Reference Probé ES3DV3	37.7.2344	30-Dec-14 (No. ES3-3205_Dec14)	Dec-15
RF generator R&S SMT-06 to 0005 04-Aug-99 (in house check Oct-13) In house check: Oct-Network Analyzer HP 8753E US37390585 S4206 18-Oct-01 (in house check Oct-14) In house check: Oct-Network Analyzer HP 8753E US37390585 S4206 18-Oct-01 (in house check Oct-14) In house check: Oct-In hou	DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15
Name Function Signature Michael Weber: Laboratory Technician	Secondary Standards	ID#	Check Date (in house)	Scheduled Check
Name Function Signature Calibrated by: Michael Weber: Laboratory Technician	RF generator R&S SMT-06.	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-15
Calibrated by: Michael Weber: Laboratory Technician	Network Analyzer HP 8753E	US37390585 S4205	18-Oct-01 (in house check Oct-14)	In house check: Oct-15
Calibrated by: Michael Weber: Laboratory Technician			4000	Annalas
11.16/27		The state of the s	A CONTROL OF THE PARTY OF THE P	Signature
Approved by: Kata Pokowo Technical Manager	Celibrated by:	Michael Weber	Laboratory Technician	Milles
200	Approved by:	Katja Pokovo	Technical Manager	se ill

Certificat e No: D750V3-1021\_Mar15

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Appendix C for the BlackBerry® Smartphone Model RHT181LW

(STV100-2) SAR Report Part 1/2

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Author Data

Andrew Becker

Dates of Test

Oct 06 - Nov 02, 2015

Test Report No

FCC ID:

RTS-6066-1511-01

L6ARHT180LW

Calib ation Laboratory of

Schmill & Partner En@heering AG Zeughi<sup>s Vi</sup>strasse 43, 8004 Zurich, Switzerland





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

Accreditation No.: SCS 0108

Accredital by the Swiss Accreditation Service (SAS) The Sylville Accreditation Service is one of the signatories to the EA Multila to all Agreement for the recognition of calibration certificates

Glossiry:

TSL ConvF N/A

tissue simulating liquid

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

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "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
- 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
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

#### Additional Documentation:

d) DASY4/5 System Handbook

#### Methods Applied and Interpretation of Parameters:

- Measurement Conditions: Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL: The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss: These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay: One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured: SAR measured at the stated antenna input power.
- SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna 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
proba bility of approximately 95%.	

Certificate No: D750V3-1021 Mar15

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Author Data
Andrew Becker

Dates of Test
Oct 06 - Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID: L6ARHT180LW

Mea∮ rement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

#### Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.8 ± 6 %	0.90 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	****	

#### SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.10 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	8.28 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.42 W/kg ± 16.5 % (k=2)



Author Data **Andrew Becker**  Dates of Test Oct 06 – Nov 02, 2015 Test Report No RTS-6066-1511-01 FCC ID: L6ARHT180LW 19(81)

#### App€ndix (Additional assessments outside the scope of SCS 0108)

#### Ante Ina Parameters with Head TSL

Inpedance, transformed to feed point	55.3 Ω + 0.3 jΩ	
Return Loss	- 25.9 dB	

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1.032 ns
Piccincal Dolay (one direction)	1.002 110

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

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

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

#### Additional EUT Data

Manufactured by	SPEAG	
Manufactured on	December 01, 2010	

Certificate No: D750V3-1021\_Mar15

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Author Data **Andrew Becker**  Dates of Test Oct 06 - Nov 02, 2015 Test Report No RTS-6066-1511-01 FCC ID: L6ARHT180LW

#### DAS 15 Validation Report for Head TSL

Date: 11.03.2015

Test Horatory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW: Frequency: 750 MHz Medium parameters used: f = 750 MHz;  $\sigma = 0.9 \text{ S/m}$ ;  $\epsilon_r = 40.8$ ;  $p = 1000 \text{ kg/m}^3$ Phantom section: Flat Section

Meas rement Standard; DASY5 (IEEE/IEC/ANSI C63.19-2011)

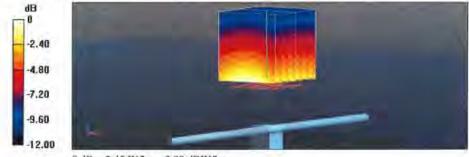
DAS Y52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(6.44, 6.44, 6.44); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 54.15 V/m; Power Drift = -0.06 dB Peak SAR (extrapolated) = 3.15 W/kg SAR(1 g) = 2.1 W/kg; SAR(10 g) = 1.37 W/kg

Maximum value of SAR (measured) = 2.45 W/kg



0 dB = 2.45 W/kg = 3.89 dBW/kg

Certificate No: D750V3-1021\_Mar15

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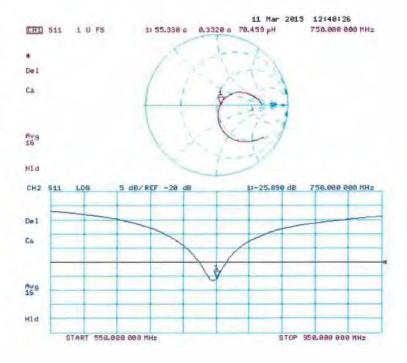
Author Data
Andrew Becker

Dates of Test
Oct 06 – Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID: L6ARHT180LW

### Imperdance Measurement Plot for Head TSL



Certificate No: D750V3-1021\_Mar15

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*** BlackBerry	y	Appendix C for the (STV100-2) SAR R	e BlackBerry® Smartpho Report Part 1/2	ne Model RHT181LV	V	Page <b>22(81)</b>
Author Data	Dates of Te	est	Test Report No	FCC ID:		
Andrew Becker	Oct 06	– Nov 02, 2015	RTS-6066-1511-01	L6ARHT180LW		

## 835 Dipole



Appendix C for the BlackBerry® Smartphone Model RHT181LW

(STV100-2) SAR Report Part 1/2

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Author Data **Andrew Becker**  Dates of Test

Oct 06 - Nov 02, 2015

Test Report No RTS-6066-1511-01 FCC ID:

L6ARHT180LW

CaliPlation Laboratory of Schr nd & Partner En Gneering AG Zough Stasse 43, 8004 Zurich, Switzerland





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

Accreditation No.: SCS 0108

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

Blackberry Waterloo

Certificate No: D835V2-446 Mar15

#### CALIBRATION CERTIFICATE D835V2 - SN:446 Object Callor Blon procedure(s) QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz Calibration date: March 11, 2015 This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate. All calibrations have been conducted in the closed laboratory facility: anvironment temperature (22 ± 3) °C and humidity < 70%. Calibration Equipment used (M&TE critical for calibration) Cal Date (Certificate No.) Scheduled Calibration ID.W. Primary Standards Oct-15 Power meter EPM-442A GB37480704 07-Oct-14 (No. 217-02020) Power sensor HP 8481A US37292783 07-Oct-14 (No. 217-02020) Oct-15 Power sensor HP 8481A MY41092317 07-Oct-14 (No. 217-02021) Oct-15 SN: 5058 (20k) 03-Apr-14 (No. 217-01918) Apr-15 Reference 20 dB Attenuator SN: 5047.2 / 05327 03-Apr-14 (No. 217-01921) Apr-15 Type-N mismatch combination 30-Dec-14 (No. ES3 3205\_Dec14) SN: 3205 Dec-15 Reference Probe ES3DV3 DAE4 SN: 601 18-Aug-14 (No. DAE4-601\_Aug14) Aug-15 Secondary Standards Scheduled Check ID # Check Date (In house) RF generator R&S SMT-06 100005 04-Aug-99 (in house check Oct-13) In house check: Oct-16 US37390585 S4206 18-Oct-01 (in house check Oct-14) In house check: Oct-15 Network Analyzer HP 8753E Function Mame Calibrated by: Michael Weber Laboratory Technician Technical Manager Katja Pokovic Approved by: Issued March 12, 2015 This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No. D835V2-446 Mar15

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Appendix C for the BlackBerry® Smartphone Model RHT181LW

(STV100-2) SAR Report Part 1/2

24(81)

Author Data

Andrew Becker

Dates of Test

Oct 06 - Nov 02, 2015

Test Report No RTS-6066-1511-01 FCC ID:

L6ARHT180LW

Califration Laboratory of Schrild & Partner

Er#9ineering AG Zeugh Bastrasse 43, 6004 Zurich, Switzerland





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

Accreditation No.: SCS 0108

Accredisd by the Swiss Accreditation Service (SAS) The S'Miss Accreditation Service is one of the signatories to the EA Multil Alirel Agreement for the recognition of calibration certificates

Glossary:

TSL

tissue simulating liquid

Conve N/A

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

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "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
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

#### Additional Documentation:

d) DASY4/5 System Handbook

#### Methods Applied and Interpretation of Parameters:

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

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

Certificate No: D835V2-446 Mar15

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Author Data
Andrew Becker

Dates of Test
Oct 06 - Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID: L6ARHT180LW

#### Mea Surement Conditions

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

DASY Version	DASY5	V52.8.8
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	40.6 ± 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 <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.28 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.54 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	6.06 W/kg ± 16.5 % (k=2)

Certificate No: D835V2-446\_Mar15



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## Appendix C for the BlackBerry® Smartphone Model RHT181LW (STV100-2) SAR Report Part 1/2

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Author Data
Andrew Becker

Dates of Test
Oct 06 – Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID:

L6ARHT180LW

#### App€\dix (Additional assessments outside the scope of SCS 0108)

#### Ante na Parameters with Head TSL

Inpedance, transformed to feed point	50.6 Ω - 4.8 jΩ
Return Loss	- 26.4 dB

#### Gen€ral Antenna Parameters and Design

~	
Electrical Delay (one direction)	1.383 ns

After IOng 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 "Measu\*erment Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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

#### **Additional EUT Data**

Manufactured by	SPEAG		
Manufactured on	October 24, 2001		

Certificate No: D835V2-446\_Mar15

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Appendix C for the BlackBerry® Smartphone Model RHT181LW

(STV100-2) SAR Report Part 1/2

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Author Data
Andrew Becker

Dates of Test
Oct 06 – Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID: L6ARHT180LW

#### DAS 15 Validation Report for Head TSL

Date: 11,03.2015

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used; f = 835 MHz;  $\sigma = 0.92$  S/m;  $\varepsilon_r = 40.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

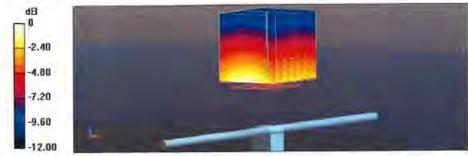
#### DAS \$52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(6.2, 6.2, 6.2); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L., Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

### 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 = 56.83 V/m; Power Drift = 0.02 dB Peak SAR (extrapolated) = 3.55 W/kg SAR(1 g) = 2.37 W/kg; SAR(10 g) = 1.54 W/kg

Maximum value of SAR (measured) = 2.78 W/kg



0 dB = 2.78 W/kg = 4.44 dBW/kg

Certificate No: D835V2-446\_Mar15

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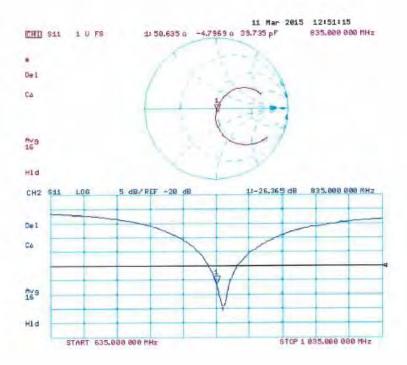
Author Data
Andrew Becker

Dates of Test
Oct 06 – Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID: L6ARHT180LW

### Imp@fance Measurement Plot for Head TSL



Certificate No: D835V2-446\_Mar15

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**≅** BlackBerry

Appendix C for the BlackBerry® Smartphone Model RHT181LW (STV100-2) SAR Report Part 1/2

Page **29(81)** 

Author Data
Andrew Becker

Dates of Test
Oct 06 - Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID: L6ARHT180LW

## 1900 Dipole

Calf bration Laboratory of Sch mid & Partner Schweizerischer Kalibrierdienst Service suisse d'étalonnage C Engineering AG Servizio svizzero di taratura Zeugf susstrasse 43, 8004 Zurich, Switzerland Swiss Calibration Service Accredited by the Swiss Accreditation Service (SAS) Accreditation No.: SCS 0108 The Swiss Accreditation Service is one of the signatories to the EA Multifateral Agreement for the recognition of calibration certificates Blackberry Waterloo Certificate No: D1900V2-545\_Mar15 **CALIBRATION CERTIFICATE** Object D1900V2 - SN:545 Calibration procedure(s) Calibration procedure for dipole validation kits above 700 MHz Calibration date: March 12, 2015 This calibration conditions documents like traceability to national standards, which realize the physical units of measurements (Sf) The measurements and the uncertainties with confidence probability are given on the following pages and any part of the certificate. All calibrations have been conducted in the closed laboratory facility; environment temperature (22 ± 3)°C and humidity < 70%. Calibration Equipment used (M&TE critical for calibration) Primary Standards Cal Date (Certificate No.) Scheduled Calibration Power meter EPM-442A GB37480704 07-Oct-14 (No. 217-02020) Oct-15 Power sensor HP 8481A US37292783 07-Oct-14 (No. 217-02020) Oct-15 Power sensor HP 8481A MY41092317 07-Oct-14 (No. 217-02021) Oct-15 Reference 20 dB Attenuator SN: 5058 (20k) 03-Apr-14 (No. 217-01918) Apr-15 Type-N mismatch combination SN: 5047.2 / 06327 03-Apr-14 (No. 217-01921) Apr-15 Reference Probe ES3DV3 SN: 3205 30-Dec-14 (No. ES3-3205\_Dec14) Dec-15 DAE4 SN: 601 18-Aug-14 (No. DAE4-601\_Aug14) Aug-15 Secondary Standards ID # Check Date (in house) Scheduled Check FIF generator R&S SMT-06 100005 04-Aug-99 (in house check Oct-13) In house check: Oct-16 Network Analyzer HP 8753E US37390585 S4206 18-Oct-01 (in house check Oct-14) In house check; Oct-15 Function Calibrated by: Cliudio Laublar Laboratory Technician Approved by: Katja Pokovic Technical Manager issued: March 13, 2015 This calibration certificate shall not be reproduced except in full without written approval of the laboratory

Certificate No: D1900V2-545\_Mar15

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## \*\*\* BlackBerry

Appendix C for the BlackBerry® Smartphone Model RHT181LW (STV100-2) SAR Report Part 1/2

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Author Data

Andrew Becker

Dates of Test

Oct 06 – Nov 02, 2015

Test Report No

FCC ID:

RTS-6066-1511-01

L6ARHT180LW

Cal bration Laboratory of Sch mid & Partner

Engineering AG
Zeug Frausstrasse 43, 8004 Zurich, Switzerland





S Schwelzerischer Kellbrierdiener
C Service suisse d'étalonnage
Servizio svizzero di taratura
Swiss Calibration Service

Accreditation No.: SCS 0108

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

Glossary:

TSL Con VF

N/A

tissue simulating liquid

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

Cali bration is Performed According to the Following Standards:

- a) 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
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

#### Additional Documentation:

d) DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

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

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

Certificate No: D1900V2-545\_Mar15

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Author Data **Andrew Becker**  Dates of Test Oct 06 - Nov 02, 2015 Test Report No RTS-6066-1511-01 FCC ID: L6ARHT180LW

### Me@surement Conditions

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

ASY Version	DASY5	V52.8.8
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

A second second second second	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	39.0 ± 6 %	1.38 mho/m ± 6 %	
Head TSL temperature change during test	< 0.5 °C	100		

#### SAR result with Head TSL

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.88 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	39.6 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.18 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.8 W/kg ± 16.5 % (k=2)

Certificate No: D1900V2-545\_Mar15



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Author Data
Andrew Becker

Dates of Test
Oct 06 – Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID: L6ARHT180LW

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

50.9  \Omega + 0.9  \Omega		
- 37.7 dB		

### Gen eral Antenna Parameters and Design

	V
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. On some of the dipoles, small end capsare 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		

Certificale No: D1900V2-545\_Mar15

Page 4 of 6

\*\*\* BlackBerry

Appendix C for the BlackBerry® Smartphone Model RHT181LW (STV100-2) SAR Report Part 1/2

Page **33(81)** 

Author Data
Andrew Becker

Dates of Test
Oct 06 – Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID: L6ARHT180LW

#### DASY5 Validation Report for Head TSL

Test Laboratory: SPEAG, Zurich, Switzerland

Date: 12,03,2015

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

Con munication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: f = 1900 MHz;  $\sigma = 1.38$  S/m;  $\varepsilon_r = 39$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Pharatom section: Flat Section

Mea-surement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

#### DAS Y52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(5, 5, 5); Calibrated: 30,12,2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## 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 = 96.17 V/m; Power Drift = 0.04 dB Peak SAR (extrapolated) = 18.1 W/kg SAR(1 g) = 9.88 W/kg; SAR(10 g) = 5.18 W/kg Maximum value of SAR (measured) = 12.1 W/kg





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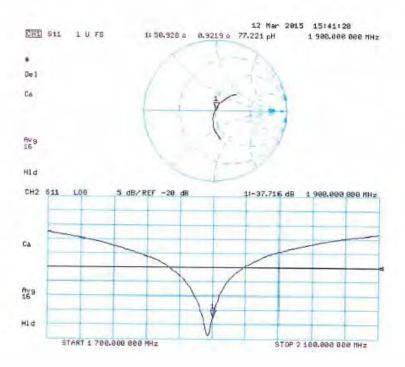
Author Data
Andrew Becker

Dates of Test
Oct 06 – Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID: L6ARHT180LW

### Impedance Measurement Plot for Head TSL



Certificate No: D1900V2-545\_Mar15

Page 6 of 6

## **Calibration Files for Model RHK211LW**

*## BlackBerry	Appendix C for the BlackBerry® Smartphone Model RHT181LW (STV100-2) SAR Report Part 1/2				V	Page 36(81)
Author Data	Dates of Te	st	Test Report No	FCC ID:		
Andrew Becker	Oct 06	- Nov 02, 2015	RTS-6066-1511-01	L6ARHT180LW		

**Probe 3225** 



Document

# Appendix C for the BlackBerry® Smartphone Model RHT181LW (STV100-2) SAR Report Part 1/2

Page **37(81)** 

Author Data
Andrew Becker

Dates of Test

Oct 06 - Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID:

L6ARHT180LW

Ca libration Laboratory of Sc fimid & Partner En§neering AG Zeu Shahstrasso 43, 8004 Zurich, Switzerland





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

Accreditation No.: SCS 0108

Accoredity by the Swiss Accreditation Service (SAS)

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

Clie M

Blackberry Waterloo

Cartificate No: ES3-3225\_Feb15

CALIBRATION CERTIFICATE

Object

ES3DV3 - SN:3225

Callibration procedure(s)

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

Cali bration date:

February 25, 2015

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

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E44198	GB41293874	03-Apr-14 (No. 217-01911)	Apr-15
Power sensor E4412A	MY41498087	03-Apr-14 (No. 217-01911)	Apr-15
Reference 3 dB Attenuator	SN: S5054 (3c)	03-Apr-14 (No. 217-01915)	Apr-15
Reference 20 dB Attenuator	SN; S5277 (20x)	03-Apr-14 (No. 217-01919)	Apr-15
Reference 30 dB Attenuator	SN: S5129 (30b)	03-Apr-14 (No. 217-01920)	Apr-15
Reference Probe ES3DV2	SN: 3013	30-Dec-14 (No. ES3-3013_Dec14)	Dec-15
DAE4	SN: 660	14-Jan-15 (No. DAE4-660_Jan15)	Jan-16
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8848C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

Calibrated by:

Claudio Leubler

Claudio Leubler

Claudio Leubler

Eaboratory Technician

Approved by:

Katja Pokovic

Fechnical Manager

Issued: February 25, 2015

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

Certificate No: ES3-3225 Feb15

Page 1 of 11



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Author Data

Andrew Becker

Dates of Test

Oct 06 - Nov 02, 2015

Test Report No

FCC ID:

RTS-6066-1511-01

L6ARHT180LW

Calilitration Laboratory of Schhid & Partner ⊮ngineering AG Zeu⊈husstrasse 43, 8004 Zurich, Switzerland





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

Accreditation No.: SCS 0108

Acc regard by the Swiss Accreditation Service (SAS)

The Siss Accreditation Service is one of the signatories to the EA Mus filteral Agreement for the recognition of calibration certificates

#### GI@%sary:

TSL-NO Rlix,y,z Corty? tissue simulating liquid sensitivity in free space sensitivity in TSL / NORMx,y,z diode compression point

DCIP CF A, Ø, C, D

crest factor (1/duty\_cycle) of the RF signal modulation dependent linearization parameters

Polarization φ

φ rotation around probe axis

Polarization 8

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

Cornector Angle

information used in DASY system to align probe sensor X to the robot coordinate system

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

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

#### Methods Applied and Interpretation of Parameters:

- NORMx,y,z: Assessed for E-field polarization 9 = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E<sup>2</sup>-field uncertainty inside TSL (see below ConvF).
- NORM(f)x,y,z = NORMx,y,z \* frequency\_response (see Frequency Response Chart). This linearization is
  implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included
  in the stated uncertainty of ConvF.
- DCPx,y,z: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- 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.
- Connector Angle: The angle is assessed using the information gained by determining the NORMx (no uncertainty required).

Certificate No: ES3-3225 Feb15

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Author Data
Andrew Becker

Dates of Test
Oct 06 – Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID: L6ARHT180LW

# Probe ES3DV3

SN:3225

Manufactured: Repaired:

Calibrated:

September 1, 2009 February 18, 2015 February 25, 2015

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

Certificate No: ES3-3225\_Feb15

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Author Data **Andrew Becker**  Dates of Test Oct 06 – Nov 02, 2015 Test Report No RTS-6066-1511-01 FCC ID: L6ARHT180LW

ES:30/3-SN:3225

February 25, 2015

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

#### B# Sc Calibration Parameters

Do o delibration i arai	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
N (μV/(V/m)²) <sup>Δ</sup>	1.07	1.00	1.12	± 10.1 %
DCF (mV)B	107.0	106.0	105.6	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	С	D dB	WR mV	Unc <sup>⊆</sup> (k=2)
0	CW	X	0.0	0.0	1.0	0.00	196.9	±3.3 %
		Y	0.0	0.0	1.0		189.2	
		Z	0.0	0.0	1.0		195.9	

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%.

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

<sup>5</sup> Numerical linearization parameter; uncertainty not required.

<sup>6</sup> Uncortainty is determined using the max, deviation from linear response applying rectangular distribution and is expressed for the square of the field value.



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Author Data **Andrew Becker**  Dates of Test Oct 06 – Nov 02, 2015 Test Report No RTS-6066-1511-01 FCC ID: L6ARHT180LW

ES \$10/3- SN:3225

February 25, 2015

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

#### Ca likration Parameter Determined in Head Tissue Simulating Media

f(MHz) C	Relative Permittivity <sup>F</sup>	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha <sup>6</sup>	Depth <sup>6</sup> (mm)	Unct. (k=2)
750	41.9	0.89	6.50	6.50	6.50	0.61	1.31	± 12.0 %
900	41.5	0.97	6.22	6.22	6.22	0.30	1.84	± 12.0 %
1810	40.0	1.40	5.26	5.26	5.26	0.50	1.46	± 12.0 %
_1950	40.0	1.40	5.01	5.01	5.01	0.80	1.11	± 12.0 %
_2300	39.5	1.67	4.77	4.77	4.77	0.75	1.25	± 12.0 %
_2450	39.2	1.80	4.60	4.60	4.60	0.57	1.49	± 12.0 %
2600	39.0	1.96	4.40	4.40	4.40	0.72	1.30	± 12.0 %

<sup>&</sup>lt;sup>6</sup> Frequency validity above 300 MHz 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. 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 frequency validity can be extended to ± 110 MHz.

F. At frequencies below 3 GHz, the validity of tissue parameters (c and d) can be relaxed to ± 10% if liquid compensation formula is applied to

Certificate No: ES3-3225\_Feb15

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At requences elected 3 GHz, the validity of issue parameters (c and o) can be reased to 2 Hz/s it rights compensation formula is applied to the assert ASR values. At frequencies above 3 GHz, the validity of tissue parameters (s and o) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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



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Author Data
Andrew Becker

Dates of Test
Oct 06 – Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID: L6ARHT180LW

ES 5 D'3 SN:3225

February 25, 2015

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

#### Ca Iltration Parameter Determined in Body Tissue Simulating Media

f MHz) <sup>C</sup>	Relative Permittivity <sup>f</sup>	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha <sup>6</sup>	Depth <sup>G</sup> (mm)	Unct. (k=2)
750	55.5	0.96	6.19	6.19	6.19	0.80	1.23	± 12.0 %
_900	55.0	1.05	6.07	6.07	6.07	0.53	1.41	± 12.0 %
1810	53.3	1.52	4.89	4.89	4.89	0.63	1.46	± 12.0 %
1950	53.3	1.52	4.86	4.86	4.86	0.44	1.86	± 12.0 %
2300	52.9	1.81	4.48	4.48	4.48	0.80	1.29	± 12.0 %
2450	52.7	1.95	4.34	4.34	4.34	0.72	1.14	± 12.0 %
2600	52.5	2.16	4.06	4.06	4.06	0.80	1.08	± 12.0 %

<sup>&</sup>lt;sup>6</sup> Frequency validity above 300 MHz 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. 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 frequency validity has extended in ± 110 MHz.

Certificate No: ES3-3225\_Feb15

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validity can be extended to ± 110 MHz.

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

headsold SNV between the following a first parameters.

Approximation for indicated target tissue parameters,

Approximation for indicated target tissue parameters.

Approximation for indicated target tissue parameters,

Approximat



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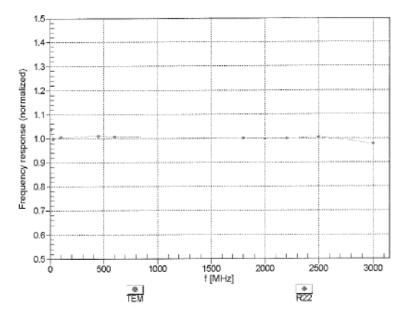
Author Data **Andrew Becker**  Dates of Test Oct 06 – Nov 02, 2015 Test Report No RTS-6066-1511-01 FCC ID: L6ARHT180LW

ESP<sup>D\3</sup>~ SN:3225

February 25, 2015

# 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\_Feb15

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Author Data
Andrew Becker

Dates of Test
Oct 06 – Nov 02, 2015

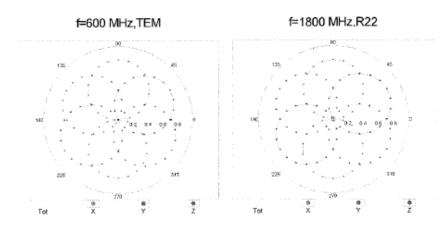
Test Report No **RTS-6066-1511-01** 

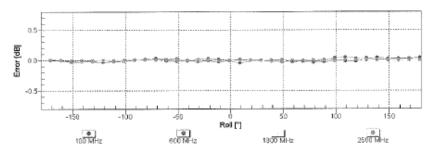
FCC ID: L6ARHT180LW

ESS D/3- SN:3225

February 25, 2015

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





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

Certificate No: ES3-3225\_Feb15

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Author Data
Andrew Becker

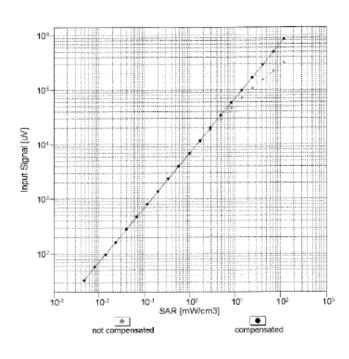
Dates of Test

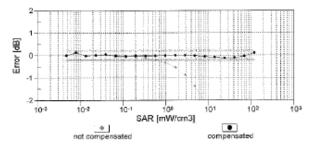
Oct 06 - Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID: L6ARHT180LW

(TEM cell , feval= 1900 MHz)





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

Certificate No: ES3-3225\_Feb15

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Author Data

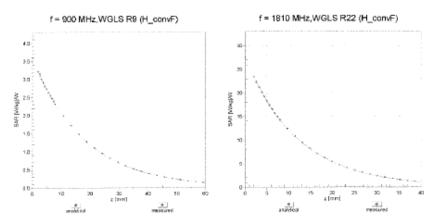
**Andrew Becker** 

Dates of Test Oct 06 - Nov 02, 2015 Test Report No RTS-6066-1511-01 FCC ID: L6ARHT180LW

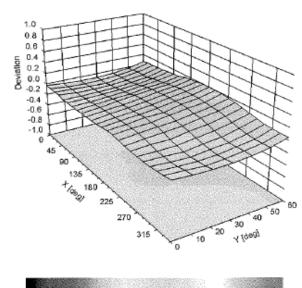
ES 20/3-SN:3225

February 25, 2015

### Conversion Factor Assessment



## Deviation from Isotropy in Liquid Error (¢, 9), f = 900 MHz



8.0 -1.0 -0.8 -0.6 -0.4 -0.2 0.0 0.2 0.4 0.6 Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

Certificate No: ES3-3225\_Feb15

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Author Data
Andrew Becker

Dates of Test
Oct 06 – Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID: L6ARHT180LW

ES学<sup>D)</sup>3-- SN:3225

February 25, 2015

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

#### Ot Probe Parameters

S@⊓or Arrangement	Triangular
Conjector Angle (°)	-61.4
Mechanical Surface Detection Mode	enabled
OPIkal Surface Detection Mode	disabled
Prote Overall Length	337 mm
Prote Body Diameter	10 mm
Tip length	10 mm
Tip Diameter	4 mm
Prote Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Prote Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

Certificate No: ES3-3225\_Feb15

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*** BlackBerry	y	Appendix C for the (STV100-2) SAR R	e BlackBerry® Smartpho Report Part 1/2	ne Model RHT181LV		Page <b>48</b> (81)
Author Data	Dates of Te	est	Test Report No	FCC ID:		
Andrew Becker	Oct 06	5 – Nov 02, 2015 RTS-6066-1511-01 L6ARHT180LW				

**Probe 3592** 



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Author Data **Andrew Becker**  Dates of Test

Oct 06 - Nov 02, 2015

Test Report No RTS-6066-1511-01 FCC ID:

L6ARHT180LW

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





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Blackberry Waterloo

Accreditation No.: SCS 108

Certificate No: EX3-3592\_Nov14

# CALIBRATION CERTIFICATE Object EX3DV4 - SN:3592

QA CAL-01.v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6 Calibration procedure(s)

Calibration procedure for dosimetric E-field probes

Calibration date: November 10, 2014

This calibration certificate documents the traccability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID:	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	G841293874	03-Apr-14 (No. 217-01911)	Apr-15
Power sensor E4412A	MY41498087	03-Apr-14 (No. 217-01911)	Apr-15
Reference 3 dB Artenueior	SN: S5054 (3c)	. 03 Apr-14 (No. 217-01915)	Apr-16
Reference 20 dB Attenuator	SN: S5277 (20x)	(3-Apr-14 (No. 217-01919)	Apr-15
Reference 30 dB Attenuator	SN; S5129 (30b)	03-Apr-14 (No. 217-01920)	Ap~15
Reference Probe ES3DV2	5N: 3013	30-Dec-13 (No. ES3-3013, Dec13)	Dec-14
DAE4	SN: 660	13-Dec-13 (No. DAE4-960_Dec13)	Dec-14
Secondary Standards	(1)	Gheck Date (in house)	Scheduled Check
RI- generator HP 8648C	U\$3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753F	US37390585	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

Name Function Laboratory Technician Calibrated by: Leif Klysner Technical Manager Approved by: Ketja Pukovic Issued: November 10, 2014 This celluration certificate shall not be reproduced except in full without written approval of the laboratory

Certificate No: EX3-3592\_Nov14

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ument

# Appendix C for the BlackBerry® Smartphone Model RHT181LW (STV100-2) SAR Report Part 1/2

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Author Data

**Andrew Becker** 

Dates of Test

Oct 06 – Nov 02, 2015

Test Report No

FCC ID:

RTS-6066-1511-01

L6ARHT180LW

#### Calibration Laboratory of

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





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

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS)

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

#### Glossary:

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

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

Polarization φ o rotation around probe axis

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

i.e.,  $\theta = 0$  is normal to probe axis

Connector Angle information used in DASY system to align probe sensor X to the robot coordinate system

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

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

#### Methods Applied and Interpretation of Parameters:

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   NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E<sup>2</sup>-field uncertainty inside TSL (see below ConvF).
- NORM(f)x,y,z = NORMx,y,z \* frequency response (see Frequency Response Chart). This linearization is
  implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included
  in the stated uncertainty of ConvF.
- DCPx,y,z: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- 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 1 < 800 MHz) and inside waveguide using analytical field distributions based on power measurements for 1 > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z \* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy): In a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset. The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NORMx (no uncertainty required).

Certificate No. EX3-3592 Nov14

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Appendix C for the BlackBerry® Smartphone Model RHT181LW

(STV100-2) SAR Report Part 1/2

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Author Data **Andrew Becker**  Dates of Test Oct 06 - Nov 02, 2015 Test Report No RTS-6066-1511-01 FCC ID: L6ARHT180LW

EX3DV4 - SN: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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Author Data **Andrew Becker**  Dates of Test Oct 06 – Nov 02, 2015 Test Report No RTS-6066-1511-01 FCC ID: L6ARHT180LW

EX3DV4-SN:3592

November 10, 2014

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

#### **Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Nomi (µV/(V/m)2)A	0.48	0.47	0.40	±10.1 %
DCP (mV) <sup>A</sup>	95,2	98.0	98.8	-

#### Modulation Calibration Parameters

מוט	Communication System Name		A dB	B dB√μV	C	dB	VR mV	Unc <sup>E</sup> (k=2)
0	CW	X	0.0	0.0	1.0	0.00	145.9	±3.3 %
	1000	Y	0.0	0,0	1.0		156.9	
		Z	0.0	0.0	1.0		149.1	

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

Certificate No: EX3-3592\_Nov14

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

<sup>&</sup>lt;sup>B</sup> Numerical linearization parameter, uncertainty not required.
Euch certainty is determined using the max, deviation from linear response applying rectangular distribution and is expressed for the square of the field value.



53(81)

Author Data **Andrew Becker**  Dates of Test Oct 06 - Nov 02, 2015

Test Report No RTS-6066-1511-01 FCC ID: L6ARHT180LW

EX3DV4-SN:3592

November 10, 2014

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

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

f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) F	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unct. (k=2)
2600	39.0	1.96	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	35.5	5.07	4,20	4.20	4,20	0.40	1.80	± 13.1 %
5750	35.4	5.22	4.34	4.34	4.34	0.40	1.80	± 13.1 %

Errequency validity above 300 MHz of ± 100 MHz only applies for DASY v1.4 and higher (add Page 2), also it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at dailbration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 84, 128, 190 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

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

Alpha Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less from ± 1% for frequencies aclow 3 GHz and below ± 2% for frequencies between 3-8 GHz at any distance larger than half the probe to diameter from the boundary.

Certificate No. EX3-3592 Nov14

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diameter from the boundary.



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Author Data **Andrew Becker**  Dates of Test Oct 06 - Nov 02, 2015

Test Report No RTS-6066-1511-01 FCC ID: L6ARHT180LW

EX3DV4 SN:3592

November 10, 2014

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

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

f (MHz) c	Relative Permittivity	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>C</sup> (mm)	Unct. (k=2)
2600	52.5	2.18	6.84	6.84	6,84	0.78	0.62	± 12.0 %
5250	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	3.81	3.81	0.50	1.90	± 13.1 %

Frequency validity above 300 MHz of ± 103 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. 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 frequency validity can be extended to ± 110 MHz.

At frequencies below 3 GHz, the validity of tissue parameters (c and c) can be released to ± 10% if liquid compansation formula is applied to

Certificate No: EX3-3592\_Nov14

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At frequencies below 3 GHz, the validity of tissue parameters (clandic) can be relaxed to ± 10% if liquid compansation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (clandic) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated larger its issue parameters.

Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and heliow ± 2% for frequencies between 3.6 GHz at any distance larger than half the probe lip claimater from the boundary.



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Author Data
Andrew Becker

Dates of Test
Oct 06 – Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID: L6ARHT180LW

EX3DV4- 5N:3592

November 10, 2014

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

1.5 Frequency response (normalized) 1.1 1.0 0.9 0.8 0.7 0.6 0.5-2500 1000 2000 3000 Ó 500 1500 f [MHz] TEM R22

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

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Author Data
Andrew Becker

Dates of Test
Oct 06 – Nov 02, 2015

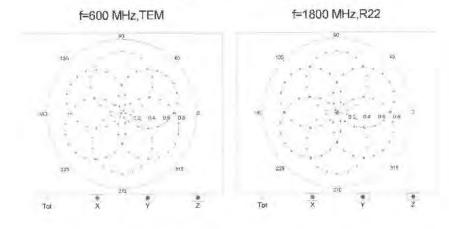
Test Report No **RTS-6066-1511-01** 

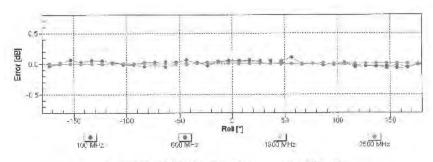
FCC ID: **L6ARHT180LW** 

EX3DV4- SN:3592

November 10, 2014

# Receiving Pattern (\$\phi\$), 9 = 0°





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

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Author Data
Andrew Becker

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Oct 06 – Nov 02, 2015

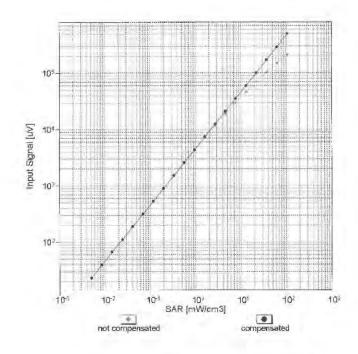
Test Report No **RTS-6066-1511-01** 

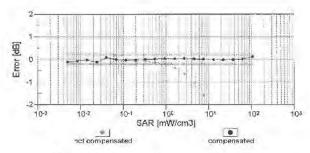
FCC ID: L6ARHT180LW

EX3DV4 SN:3592

November 10, 2014

# Dynamic Range f(SAR<sub>head</sub>) (TEM cell , f<sub>eval</sub>= 1900 MHz)





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

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Author Data

Dates of Test **Andrew Becker** 

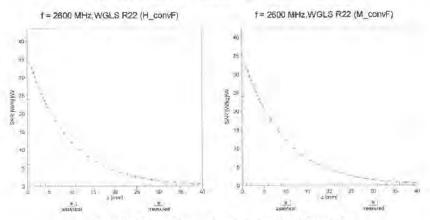
Oct 06 - Nov 02, 2015

Test Report No RTS-6066-1511-01 FCC ID: L6ARHT180LW

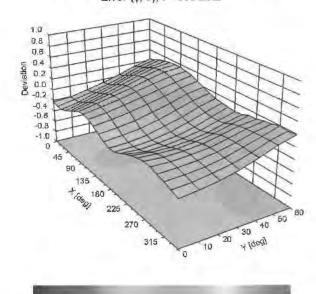
EX3DV4-SN:3592

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# **Conversion Factor Assessment**



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



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

0.8

-1.0 -0.8 -0.8 -0.4 -0.2 0.0 0.2 0.4 0.6



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Author Data
Andrew Becker

Dates of Test
Oct 06 – Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID: L6ARHT180LW

EX3DV4-SN:3592

November 10, 2014

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

#### Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (*)	-13.3
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	mm f
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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*** BlackBerry	/	Appendix C for the E (STV100-2) SAR Rep	BlackBerry® Smartpho oort Part 1/2	ne Model RHT181LV	V	Page <b>60(81)</b>
Author Data	Dates of Te	est	Test Report No	FCC ID:		
Andrew Becker	Oct 06	6 – Nov 02, 2015	RTS-6066-1511-01	L6ARHT180LW		

2450 Dipole



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Author Data

**Andrew Becker** 

Dates of Test

Oct 06 – Nov 02, 2015

Test Report No RTS-6066-1511-01 FCC ID:

L6ARHT180LW

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





Service suisse d'étalonnago Servizio svizzero di taratura Swiss Calibration Service

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

Blackberry Waterloo

Accreditation No.: SCS 108

C

Certificate No: D2450V2-791\_Sep13

Annual Control	Carrent arr	4.0	
Object	D2450V2 - SN: 7	91	
Calibration procedure(s)	QA CAL-05.v9		
	Calibration proce	dure for dipole validation kits abo	ve 700 MHz
Calibration date:	September 10, 20	013	
	1,3,40,41,0,0,0,0,0		
This calibration certificate docum	ents the traceability to nati	onal standards, which realize the physical un	its of measuraments (SI).
The measurements and the unce	rtaintles with confidence p	robability are given on the following pages an	d are part of the certificate.
All calibrations have been condu	cted in the closed laborator	y facility: environment temperature (22 $\pm$ 3) $\%$	3 and humidity $< 70\%$ .
Calibration Equipment used (M&	TE critical for calibration)		
	TE critical for calibration)	Cal Date (Certificate No.)	Scheduled Calibration
Primary Standards		Cal Date (Certificate No.) 01-Nov-12 (No. 217-01690)	Scheduled Calibration Oct-13
Primary Standards Power meter EPM-442A	ID #		The state of the s
Primary Standards Power mater CPM-442A Power sensor HP 8481A	ID # GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator	ID # GB37480704 US37292783	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640)	Oct-13 Oct-13
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attanuator Type-N mismatch combination	ID# GB37480704 US37292763 SN: 5058 (20k)	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736)	Oct-13 Oct-13 Apr-14
Primary Standards Power mater CPM-442A Power sensor HP 8481A Heference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3	ID # GB37480704 US37292763 SN: 5058 (20k) SN: 5047.3 / 06327	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739)	Oct-13 Oct-13 Apr-14 Apr-14
Primary Standards Power meter EPM-442A Power sensor HP 5481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4	ID # GB37480704 US37292763 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205	01-Nov-12 (No. 217-018/0) 01-Nov-12 (No. 217-016/0) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Doc-12 (No. ESS-3205_Dec12)	Oct-13 Oct-13 Apr-14 Apr-14 Dec-13
Primary Standards Power mater EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards	ID # GB37480704 US37292763 SN: 5058 (20k) SN: 5047.3 / 06397 SN: 3205 SN: 601	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Dac: 12 (No. ESS:3205_Dec12) 25-Apr-13 (No. DAF4-601_Apr13)	Oct-13 Oct-13 Apr-14 Apr-14 Dec-13 Apr-14
Primary Standards Power mater EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A	ID# GB37480704 US37292763 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01799) 28-Doc-12 (No. ESS-3205_Dec12) 25-Apr-13 (No. OAF4-601_Apr13) Chock Date (in house)	Oct-13 Oct-13 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check
Primary Standards Power maler CPM-442A Power sensor HP 8481A Heferenue 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3	ID# GB37480704 US37292763 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MYd1092317	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Dac-12 (No. ESS-3205_Dec12) 25-Apr-13 (No. OAF1-601_Apr13) Check Date (in house)	Oct-13 Oct-13 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check In house check; Oct-13
Power sensor HP 8481A RF generator R&S SMT-06	ID # GB37480704 US37292763 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005	01-Nov-12 (No. 217-01640) 01-Nov-12 (No. 217-01640) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Doc-12 (No. ESS-3205_Dec12) 25-Apr-13 (No. DAF1-601_Apr13) Check Date (in house) 18-Oct-02 (in house check Oct-11) 04-Aug-99 (in house check Oct-11)	Oct-13 Oct-13 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check In house check; Oct-13 In house check; Oct-13
Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RE generator R6S SMT-06	ID# GB37480704 US37292763 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005 US37390585 \$4206	01-Nov-12 (No. 217-01840) 01-Nov-12 (No. 217-01840) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 127-01739) 28-Dac-12 (No. ESS-3205_Dec12) 25-Apr-13 (No. DAF4-601_Apr13) Check Date (in house) 18-Oct-02 (in house check Oct-11) 04-Aug-99 (in house check Oct-11) 18-Ox1-01 (in house check Oct-12)	Oct-13 Oct-13 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check In house check; Oct-13 In house check; Oct-13 Signature
Primary Standards Power meter EPM-442A Power sensor HP 8481A Heferenue 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards Power sensor HP 8481A RE generator R&S SMT-06 Network Analyzer HP 8753E	ID# GB37480704 US37297763 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601 ID # MY41092317 100005 US37390585 \$4206	01-Nov-12 (No. 217-01840) 01-Nov-12 (No. 217-01840) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 127-01739) 28-Dac-12 (No. ESS-3205_Dec12) 25-Apr-13 (No. DAF4-601_Apr13) Check Date (in house) 18-Oct-02 (in house check Oct-11) 04-Aug-99 (in house check Oct-11) 18-Ox1-01 (in house check Oct-12)	Oct-13 Oct-13 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check In house check: Oct-13 In house check: Oct-13 In house check: Oct-13

Certificate No: D2450V2-791\_Sep13

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Appendix C for the BlackBerry® Smartphone Model RHT181LW

(STV100-2) SAR Report Part 1/2

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Author Data

Andrew Becker

Dates of Test

Oct 06 - Nov 02, 2015

Test Report No

RTS-6066-1511-01

L6ARHT180LW

FCC ID:

Calibration Laboratory of

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





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

Swiss Calibration Service Accreditation No.: SCS 108

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

Glossary:

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

Calibration is Performed According to the Following Standards:

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

#### Additional Documentation:

d) DASY4/5 System Handbook

#### Methods Applied and Interpretation of Parameters:

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

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

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# Appendix C for the BlackBerry® Smartphone Model RHT181LW (STV100-2) SAR Report Part 1/2

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Author Data
Andrew Becker

Dates of Test
Oct 06 - Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID: L6ARHT180LW

#### **Measurement Conditions**

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

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

#### Head TSL parameters

The following parameters and calculations were applied.

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

#### SAR result with Head TSL

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

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

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Document

# Appendix C for the BlackBerry® Smartphone Model RHT181LW (STV100-2) SAR Report Part 1/2

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Author Data
Andrew Becker

Dates of Test
Oct 06 – Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID: L6ARHT180LW

#### Appendix

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	56 1 Ω + 3.4 <u>Ι</u> Ω	
Return Loss	- 23.6 dB	

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1.153 ns

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

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

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

#### Additional EUT Data

Manufactured by	SPEAG	
Manufactured on	January 24, 2006	

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Appendix C for the BlackBerry® Smartphone Model RHT181LW

(STV100-2) SAR Report Part 1/2

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Author Data
Andrew Becker

Dates of Test
Oct 06 – Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID:

L6ARHT180LW

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

Date: 10.09,2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

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

Medium parameters used: f = 2450 MHz;  $\sigma = 1.83$  S/m;  $\epsilon_r = 39.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

#### DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(4.52, 4.52, 4.52); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics; DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

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

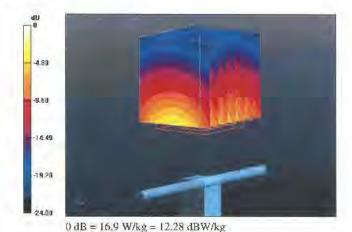
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 99.824 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 26.7 W/kg

SAR(1 g) = 13 W/kg; SAR(10 g) = 6.03 W/kg

Maximum value of SAR (measured) = 16.9 W/kg



Certificate No: D2450V2-791 Sep13

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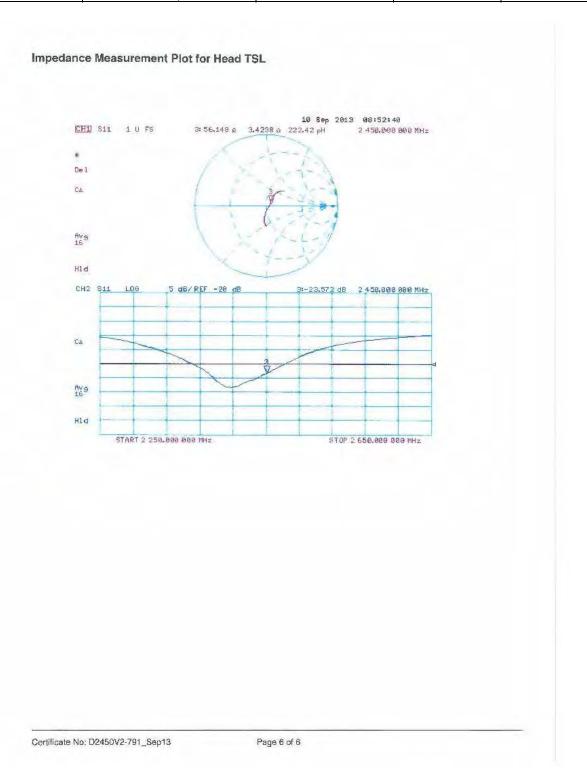
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Author Data
Andrew Becker

Dates of Test
Oct 06 – Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

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Author Data
Andrew Becker

Dates of Test

Oct 06 – Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID: L6ARHT180LW

Calibration Laboratory of Schmid & Partner

Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland





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Servizio svizzero di taratura
S Swise Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the sign

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

Blackberry Waterloo

Accreditation No.: SCS 108

Certificate No: D2450V2-747\_Nov13

CALIBRATION (	JEITH IOAH		
Object	D2450V2 - SN: 7	747	
Calibration procedure(s)	QA CAL-05.v9 Calibration proce	edure for dipole validation kits at	pove 700 MHz
Calibration date:	November 14, 20	013	
This calibration certificate docum The measurements and the unce	ents the traceability to nat ertainties with confidence p	ional standards, which realize the physical or probability are given on the following pages or	units of measurements (SI). and are part of the cartificate.
			°C and humidity < 70%.
All calibrations have been condu	cled in the closed laborato	iry facility: srivironment temperature (22 $\pm$ 3)	°C and humidity < 70%.
All calibrations have been conducted to the calibration Equipment used (M&	cled in the closed laborato		°C and humidity < 70%.  Scheduled Calibration
All calibrations have been conducted in the calibration Equipment used (M& Primary Standards Power meter EPM-442A	cled in the closed laborato	ry facility: environment temperature (22 $\pm$ 3)	
All calibrations have been condu- calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A	cled in the closed laborato TE critical for calibration) ID #	ry facility: environment temperature (22 ± 3)  Cal Date (Certificate No.)	Scheduled Calibration
All calibrations have been condu- calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A	Cled in the closed laborator TE critical for calibration) ID # GBS7480704	ry facility: environment temperature (22 ± 3)  Cal Date (Certificate No.)  09-Oct-13 (No. 217-01827)	Scheduled Calibration Oct-14
All calibrations have been condu- Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator	TE critical for calibration)  ID if  GBS7480704  US37292783  MY41092317  SN: 5058 (20k)	ry facility: environment temperature (22 ± 3)  Cal Date (Certificate No.)  09-Oct-13 (No. 217-01827)  09-Oct-13 (No. 217-01827)	Scheduled Calibration Oct-14 Oct-14
All calibrations have been condu- Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination	ID if GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.3 / 06327	Cal Date (Certificate No.)  99-Oct-13 (No. 217-01827)  99-Oct-13 (No. 217-01827)  99-Oct-13 (No. 217-01828)  04-Apr-13 (No. 217-01736)  04-Apr-13 (No. 217-01739)	Scheduled Calibration Oct-14 Oct-14 Oct-14 Apr-14 Apr-14
All calibrations have been condu- Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3	Cled in the closed laborator)  ID #  GBS7480704  US37292783  MY41092317  SN: 5058 (20k)  SN: 5047.3 / 06327  SN: 3205	Cai Date (Certificate No.)  09-Oct-13 (No. 217-01827)  09-Oct-13 (No. 217-01827)  09-Oct-13 (No. 217-01828)  04-Apr-13 (No. 217-01736)  04-Apr-13 (No. 217-01739)  26-Dec-12 (No. ES3-3206_Dec12)	Scheduled Calibration Oct-14 Oct-14 Oct-14 Apr-14 Apr-14 Dec-13
All calibrations have been condu- calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3	ID if GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.3 / 06327	Cal Date (Certificate No.)  99-Oct-13 (No. 217-01827)  99-Oct-13 (No. 217-01827)  99-Oct-13 (No. 217-01828)  04-Apr-13 (No. 217-01736)  04-Apr-13 (No. 217-01739)	Scheduled Calibration Oct-14 Oct-14 Oct-14 Apr-14 Apr-14
All calibrations have been condu- Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards	Cled in the closed laborator)  ID #  GBS7480704  US37292783  MY41092317  SN: 5058 (20k)  SN: 5047.3 / 06327  SN: 3205	Cai Date (Certificate No.)  09-Oct-13 (No. 217-01827)  09-Oct-13 (No. 217-01827)  09-Oct-13 (No. 217-01828)  04-Apr-13 (No. 217-01736)  04-Apr-13 (No. 217-01739)  26-Dec-12 (No. ES3-3206_Dec12)	Scheduled Calibration Oct-14 Oct-14 Oct-14 Apr-14 Apr-14 Dec-13
All calibrations have been condu- Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards RF generator R&S SMT-06	Definition of the closed laborator of the continuation of the cont	Cal Date (Certificate No.)  09-Oct-13 (No. 217-01827)  09-Oct-13 (No. 217-01827)  09-Oct-13 (No. 217-01828)  04-Apr-13 (No. 217-01736)  04-Apr-13 (No. 217-01739)  26-Dec-12 (No. ES3-3205_Dec12)  25-Apr-13 (No. DAE4-601_Apr13)	Scheduled Calibration Oct-14 Oct-14 Oct-14 Apr-14 Apr-14 Apr-14 Dec-13 Apr-14
All calibrations have been condu- Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards RF generator R&S SMT-06	ID #  GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.3 / 06327 SN: 3205 SN: 601	Cal Date (Certificate No.)  09-Oct-13 (No. 217-01827)  09-Oct-13 (No. 217-01827)  09-Oct-13 (No. 217-01828)  04-Apr-13 (No. 217-01736)  04-Apr-13 (No. 217-01739)  26-Dec-12 (No. ES3-3206_Dec12)  25-Apr-13 (No. DAE4-601 Apr13)  Check Date (in house)	Scheduled Calibration Oct-14 Oct-14 Oct-14 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check
	Cled in the closed laborator)  ID #  GB37480704  US37292783  MY41092317  SN: 5058 (20k)  SN: 5047.3 / 06327  SN: 3205  SN: 601  ID #  100005  US37390585 S4206	Cal Date (Certificate No.)  09-Oct-13 (No. 217-01827)  09-Oct-13 (No. 217-01827)  09-Oct-13 (No. 217-01828)  04-Apr-13 (No. 217-01736)  04-Apr-13 (No. 217-01739)  26-Dec 12 (No. ES3-3205_Dec12)  25-Apr-13 (No. DAE4-601 Apr13)  Check Date (In house)  04-Aug-99 (In house check Oct-13)  18-Oct-01 (In house check Oct-13)	Scheduled Calibration Oct-14 Oct-14 Oct-14 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check In house check: Oct-15 In house check: Oct-14
All calibrations have been condu- Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Power Sensor HP 8483E Power HP 8483E Power HP 8483E	Cled in the closed laborator)  ID #  GB37480704  US37292783  MY41092317  SN: 5058 (20k)  SN: 5047.3 / 06327  SN: 3205  SN: 601  ID #  100005  US37390585 S4206  Name	Cal Date (Certificate No.)  09-Oct-13 (No. 217-01827)  09-Oct-13 (No. 217-01827)  09-Oct-13 (No. 217-01828)  04-Apr-13 (No. 217-01736)  04-Apr-13 (No. 217-01736)  04-Apr-13 (No. 217-01739)  26-Dec 12 (No. ES3-3206_Dec12)  25-Apr-13 (No. DAE4-601 Apr13)  Check Date (in house)  04-Aug-99 (in house check Oct-13)  18-Oct-01 (in house check Oct-13)	Scheduled Calibration Oct-14 Oct-14 Oct-14 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check In house check: Oct-15 In house check: Oct-14
All calibrations have been condu- Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards RF generator R&S SMT-06	Cled in the closed laborator)  ID #  GB37480704  US37292783  MY41092317  SN: 5058 (20k)  SN: 5047.3 / 06327  SN: 3205  SN: 601  ID #  100005  US37390585 S4206	Cal Date (Certificate No.)  09-Oct-13 (No. 217-01827)  09-Oct-13 (No. 217-01827)  09-Oct-13 (No. 217-01828)  04-Apr-13 (No. 217-01736)  04-Apr-13 (No. 217-01739)  26-Dec 12 (No. ES3-3205_Dec12)  25-Apr-13 (No. DAE4-601 Apr13)  Check Date (In house)  04-Aug-99 (In house check Oct-13)  18-Oct-01 (In house check Oct-13)	Scheduled Calibration Oct-14 Oct-14 Oct-14 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check In house check: Oct-15 In house check: Oct-14

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# **≅** BlackBerry

Appendix C for the BlackBerry® Smartphone Model RHT181LW (STV100-2) SAR Report Part 1/2

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Author Data
Andrew Becker

Dates of Test

Oct 06 – Nov 02, 2015

Test Report No

FCC ID:

RTS-6066-1511-01 L6ARHT180LW

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





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

Swiss Calibration Service

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS)

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

Glossary:

TSL tissue simulating liquid

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

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "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
- EC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

#### **Additional Documentation:**

d) DASY4/5 System Handbook

#### Methods Applied and Interpretation of Parameters:

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



Appendix C for the BlackBerry® Smartphone Model RHT181LW

(STV100-2) SAR Report Part 1/2

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Author Data **Andrew Becker**  Dates of Test Oct 06 - Nov 02, 2015 Test Report No RTS-6066-1511-01 FCC ID: L6ARHT180LW

#### Measurement Conditions

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

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

### Head TSL parameters

The following parameters and calculations were applied

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.7 ± 6 %	1.84 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	****	

#### SAR result with Head TSL

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.3 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	52.8 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.17 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.6 W/kg ± 16.5 % (k=2)



Appendix C for the BlackBerry® Smartphone Model RHT181LW

(STV100-2) SAR Report Part 1/2

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Author Data
Andrew Becker

Dates of Test

Oct 06 - Nov 02, 2015

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FCC ID: L6ARHT180LW

#### Appendix

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.8 Ω + 1.7 jΩ	
Return Loss	- 32.2 dB	

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1.159 ns

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

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

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

#### Additional EUT Data

Manufactured by	SPEAG		
Manufactured on	December 01, 2003		

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

Date: 14.11.2013

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 2450 MHz.

Medium parameters used: f = 2450 MHz;  $\sigma = 1.84 \text{ S/m}$ ;  $\epsilon_r = 39.7$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

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

#### DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(4.52, 4.52, 4.52); Calibrated: 28.12.2012;
- · Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

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

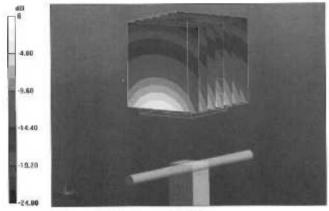
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.651 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 27.8 W/kg

SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.17 W/kg

Maximum value of SAR (measured) = 16.8 W/kg



0 dB = 16.8 W/kg = 12.25 dBW/kg

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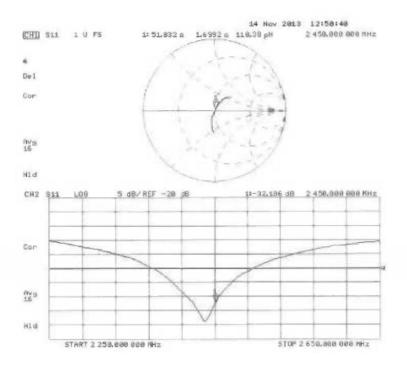
Author Data
Andrew Becker

Dates of Test
Oct 06 – Nov 02, 2015

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## Impedance Measurement Plot for Head TSL



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Andrew Becker	Oct 06	- Nov 02, 2015	RTS-6066-1511-01	L6ARHT180LW		

# 5000 Dipole



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Author Data **Andrew Becker**  Dates of Test

Oct 06 – Nov 02, 2015

Test Report No RTS-6066-1511-01 FCC ID:

L6ARHT180LW

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





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

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

Blackberry Waterloo

Accreditation No.: SCS 108

C

Certificate No: D5GHzV2-1033 Nov13

Object	D5GHzV2 - SN: 1	033	
Calibration procedure(s)	QA CAL-22.v2 Calibration proces	dure for dipole validation kits bet	ween 3-6 GHz
Calibration date:	November 08, 20	13	
The measurements and the unc	cartainties with confidence plucted in the closed laborator	onal standards, which realize the physical un robability are given on the following pages an $y$ facility: environment temperature (22 $\pm$ 3)°C	d are part of the certificate:
Primary Standards	1D 2	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704 US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ESSDV3 DAE4	MY41092317 SN: 5058 (20k) SN: 5047 3 / 06327 SN: 3205 SN: 601	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Dac-12 (No. ESS-3205_Dec12) 25-Apr-13 (No. DAE4-601_Apri3)	Oct-14 Oct-14 Apr-14 Apr-14 Dao-13 Apr-14
Power sensor HP 8481A Seference 20 dB Attenuator Type-N mismatch combination Reference Probe ESSDV3 DAE4	MY41092317 SN: 5058 (20k) SN: 5047 3 / 06327 SN: 3205	09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Dac-12 (No. ES3-3205_Dec12)	Oct-14 Apr-14 Apr-14 Dec-13
Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3	MY41092317 SN: 5058 (20k) SN: 5047 3 / 06827 SN: 3205 SN: 601	09-Oct-13 (No. 217-01628) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Dac-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAE4-601_Apr13)	Oct-14 Apr-14 Apr-14 Dac-13 Apr-14
Power sensor HP 8481A Reference 20 db Attenuator Type-N mismatch combination Reference Probe ESSDV3 DAE4 Secondary Standards RF generator R&S SMT-06	MY41092317 SN: 5058 (20k) SN: 5047 3 / 06327 SN: 3205 SN: 601	08-Oct-13 (No. 217-01826) 04-Apr-13 (No. 217-01736) 04-Apr-13 (No. 217-01739) 28-Dac-12 (No. ES3-3205_Dec12) 25-Apr-13 (No. DAE4-601_Apri3) Check Date (in house check Oct-13)	Oct-14 Apr-14 Apr-14 Dec-13 Apr-14 Scheduled Check In house check: Oct-15

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Appendix C for the BlackBerry® Smartphone Model RHT181LW (STV100-2) SAR Report Part 1/2

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Author Data

**Andrew Becker** 

Dates of Test

Oct 06 - Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID:

L6ARHT180LW

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





Schweizerischer Kaltbrierdienst Service suisse d'étalonnage

C Servizio svizzero di taratura

S Swiss Calibration Service

Accreditation No.: SCS 108

Accordined by the Swiss Accreditation Service (SAS)

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

#### Glossary:

TSL ConvF

N/A

tissue simulating liquid

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

Calibration is Performed According to the Following Standards:

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

#### Additional Documentation:

d) DASY4/5 System Handbook

#### Methods Applied and Interpretation of Parameters:

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

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

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(STV100-2) SAR Report Part 1/2

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Author Data **Andrew Becker**  Dates of Test Oct 06 – Nov 02, 2015 Test Report No RTS-6066-1511-01 FCC ID: L6ARHT180LW

#### 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, d2 = 1.4 mm	Graded Batio = 1.4 (Z direction)
Frequency	5200 MHz ± 1 MHz 5500 MHz ± 1 MHz 5800 MHz ± 1 MHz	

### Head TSL parameters at 5200 MHz

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	36.0	4.66 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) "C	35.0 ± 6 %	4.46 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

#### SAR result with Head TSL at 5200 MHz

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

SAR averaged over 10 cm3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.28 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	22.6 W/kg ± 19.5 % (k=2)

### Head TSL parameters at 5500 MHz

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

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

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

SAR averaged over 10 cm3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2,41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	23.9 W/kg ± 19.5 % (k=2)

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Author Data
Andrew Becker

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Head TSL parameters at 5800 MHz

The following parameters and calculations were applied.

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

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

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.01 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	79.4 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.28 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	22.6 W/kg ± 19.5 % (k=2)

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Dates of Test
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#### Appendix

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

Impedance, transformed to feed point	49.1 (2 - 9.6 jt)
Return Loss	- 20.3 dB

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

Impedance, transformed to feed point	50.3 Ω - 4.1 jΩ
Return Loss	- 27.7 aB

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

Impedance, transformed to feed point	57,8 12 - 4.0 jt2
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 dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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

#### Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 09, 2004

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Appendix C for the BlackBerry® Smartphone Model RHT181LW

(STV100-2) SAR Report Part 1/2

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Author Data **Andrew Becker**  Dates of Test Oct 06 - Nov 02, 2015 Test Report No RTS-6066-1511-01 FCC ID: L6ARHT180LW

#### 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

Medium parameters used: f = 5200 MHz;  $\sigma = 4.46 \text{ S/m}$ ;  $\epsilon_r = 35$ ;  $\rho = 1000 \text{ kg/m}^3$ . Medium parameters used: f = 5500 MHz;  $\sigma = 4.75$  S/m;  $\varepsilon_i = 34.6$ ;  $\rho = 1000$  kg/m<sup>3</sup> Medium parameters used:  $\Gamma = 5800 \text{ MHz}$ ;  $\sigma = 5.06 \text{ S/m}$ ;  $\epsilon_r = 34.2$ ;  $\rho = 1000 \text{ kg/m}^3$ 

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: 1.4mm (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

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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Author Data
Andrew Becker

Dates of Test
Oct 06 – Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID: L6ARHT180LW



Certificate No: D5GHzV2-1033\_Nov13



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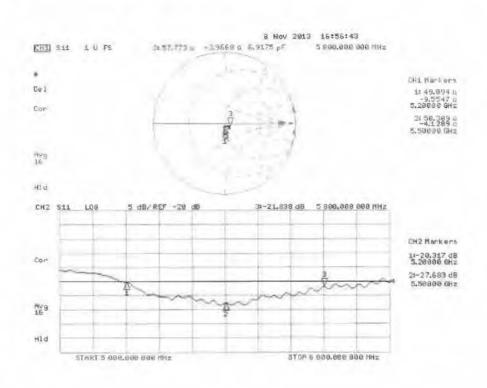
Author Data
Andrew Becker

Dates of Test
Oct 06 – Nov 02, 2015

Test Report No **RTS-6066-1511-01** 

FCC ID: L6ARHT180LW

#### Impedance Measurement Plot for Head TSL



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