

Annex B to Hearing Aid Compatibility RF Emissions Test Report for the BlackBerry® Smartphone model RHL211LW (STV100-3)

Page

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Author Data

Daoud Attayi

Dates of Test
August 31- Sep. 23, 2015

Report No **RTS-6066-1509-21** 

FCC ID L6ARHL210LW

### Annex B: Probe and dipole descriptions and calibration certificates

**B.2** Dipole calibration certificate



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





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Client

Blackberry Waterloo

Accreditation No.: SCS 108

Certificate No: CD835V3-1011\_Nov13

Power sensor HP 8481 A US37292783 09-Oct-13 (No. 217-01827) Power sensor HP 8481 A MY41092317 09-Oct-13 (No. 217-01828) Reference 10 dB Attenuator SN: 5047.2 (10g) 04-Apr-13 (No. 217-01731) Probe ER3DV6 SN: 2336 26-Occ-12 (No. ER3-2336 Dec12) Probe H3DV6 SN: 6065 28-Oec-12 (No. H3-6065 Dec12)	d are part of the certificate.
This calibration certificate documents the traceability to national standards, which realize the physical of the measurements and the uncertainties with confidence probability are given on the following pages at All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3) Calibration Equipment used (M&TE critical for calibration)  Primary Standards    D #	d are part of the certificate  C and humidity < 70%.  Scheduled Calibration  Oct-14  Oct-14  Oct-14  Apr-14
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Primary Standards ID # Cel Date (Certificate No.)  Power meter EPM-442A GB37480704 09-Oct-13 (No. 217-01827)  Power sensor HP 8481A US37292783 09-Oct-13 (No. 217-01827)  Power sensor HP 8481A MY41092317 09-Oct-13 (No. 217-01828)  Reterence 10 dB Attenuator SN: 5047.2 (10g) 04-Apr-13 (No. 217-01731)  Probe ER3DV6 SN: 2336 29-Occ-12 (No. ER3-2336, Dec12)  Probe H3DV6 SN: 6065 28-Dec-12 (No. H3-6065, Dec12)  DAE4 SN: 781 13-Sep-13 (No. DAE4-781_Sep13)  Secondary Standards ID # Check Date (in house)  Power sensor HP Er412A SN: GB42420191 09-Oct-09 (in house check Oct-13)	Oct-14 Oct-14 Oct-14 Apr-14
Power meter EPM-442A GB37480704 09-Oct-13 (No. 217-01827) Power sensor HP 8481A US37292783 09-Oct-13 (No. 217-01827) Power sensor HP 8481A MY41092317 09-Oct-13 (No. 217-01828) Reference 10 dB Attenuator SN: 5047.2 (10g) 04-Apr-13 (No. 217-01731) Probe ER3DV6 SN: 2336 29-Dec-12 (No. ER3-2336, Dec12) Probe H3DV6 SN: 6065 28-Dec-12 (No. H3-6065, Dec12) DAE4 SN: 781 13-Sep-13 (No. DAE4-781_Sep13) Secondary Standards ID # Check Date (in house) Power meter Agitant 4419B SN: GB42420191 09-Oct-09 (in house check Oct-13) Power sensor HP E4412A SN: MY41495277 (01-Apr-08 (in house check Oct-13)	Oct-14 Oct-14 Oct-14 Apr-14
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Power sensor HP 8481A MY41092317 09-Oct-13 (No. 217-01828) Reference 10 dB Attenuator SN: 5047.2 (10g) 04-Apr-13 (No. 217-01731) Probe ER3DV6 SN: 2336 28-Dec-12 (No. ER3-2336 Dec12) Probe H3DV6 SN: 6065 28-Dec-12 (No. H3-9065 Dec12) DAE4 SN: 781 13-Sep-13 (No. DAE4-781_Sep13) Secondary Standards ID # Check Date (in house) Power meter Agitant 44198 SN: G842420191 09-Oct-09 (in house check Oct-13) Power sensor HP E#412A SN: MY41495277 01-Apr-08 (in house check Oct-13)	Oct-14 Apr-14
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Power meter Agitant 4419B SN: GB42420191 09-Oct-09 (in house check Oct-13) Power sensor HP E4412A SN: MY41495277 01-Apr-08 (in house check Oct-13)	Scheduled Check
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Network Analyzer HP 8753E US37390585 18-Oct-01 (in house check Oct-13)	In house check: Oct-14
RF generator R&S SMT-06 SN: 832283/011 27-Aug-12 (in house check Oct-13)	In house check: Oct-15
Name Function	Signature
Calibrated by: Claudio Laubler Laboratory Technician	M
	Ch
Approved by: Fin Bomholt Deputy Technical Manager	= Bondoll
Militarian SA. Hill Madinan	Smitall

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## Annex B to Hearing Aid Compatibility RF Emissions Test Report for the BlackBerry® Smartphone model RHL211LW (STV100-3)

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





S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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#### References

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 American National Standard, Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.

#### Methods Applied and Interpretation of Parameters:

- Coordinate System: y-axis is in the direction of the dipole arms. z-axis is from the basis of the antenna
  (mounted on the table) towards its feed point between the two dipole arms. x-axis is normal to the other axes.
   In coincidence with the standards [1], the measurement planes (probe sensor center) are selected to be at a
  distance of 15 mm above the top metal edge of the dipole arms.
- Measurement Conditions: Further details are available from the hardcopies at the end of the certificate. All
  figures stated in the certificate are valid at the frequency indicated. The forward power to the dipole connector
  is set with a calibrated power meter connected and monitored with an auxiliary power meter connected to a
  directional coupler. While the dipole under test is connected, the forward power is adjusted to the same level.
- Antenna Positioning: The dipole is mounted on a HAC Test Arch phantom using the matching dipole positioner with the arms horizontal and the feeding cable coming from the floor. The measurements are performed in a shielded room with absorbers around the setup to reduce the reflections. It is verified before the mounting of the dipole under the Test Arch phantom, that its arms are perfectly in a line. It is installed on the HAC dipole positioner with its arms parallel below the dielectric reference wire and able to move elastically in vertical direction without changing its relative position to the top center of the Test Arch phantom. The vertical distance to the probe is adjusted after dipole mounting with a DASY5 Surface Check job. Before the measurement, the distance between phantom surface and probe tip is verified. The proper measurement distance is selected by choosing the matching section of the HAC Test Arch phantom with the proper device reference point (upper surface of the dipole) and the matching grid reference point (tip of the probe) considering the probe sensor offset. The vertical distance to the probe is essential for the
- Feed Point Impedance and Return Loss: These parameters are measured using a HP 8753E Vector Network Analyzer. The impedance is specified at the SMA connector of the dipole. The influence of reflections was eliminating by applying the averaging function while moving the dipole in the air, at least 70cm away from any specified.
- E-field distribution: E field is measured in the x-y-plane with an isotropic ER3D-field probe with 100 mW forward power to the antenna feed point. In accordance with [1], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 15 mm (in z) above the metal top of the dipole arms. Two 3D maxima are available near the end of the dipole arms. Assuming the dipole arms are perfectly in one line, the average of these two maxima (in subgrid 2 and subgrid 8) is determined to compensate for any non-parallelity to the measurement plane as well as the sensor displacement. The E-field value stated as calibration value represents the maximum of the interpolated 3D-E-field, in the plane above the dipole surface.

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

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#### **Measurement Conditions**

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

DASY Version	DASY5	V52.8.7
Phantom	HAC Test Arch	
Distance Dipole Top - Probe Center	15mm	
Scan resolution	dx, dy = 5 mm	
Frequency	835 MHz ± 1 MHz	
Input power drift	< 0.05 dB	

#### Maximum Field values at 835 MHz

E-field 15 mm above dipole surface	condition	Interpolated maximum
Maximum measured above high end	100 mW input power	110.1 V / m
Maximum measured above low end	100 mW input power	104.5 V / m
Averaged maximum above arm	100 mW input power	107.3 V / m ± 12.8 % (k=2)

### Appendix

#### **Antenna Parameters**

Frequency	Return Loss	Impedance
800 MHz	16.3 dB	42.8 Ω - 12.4 jΩ
835 MHz	29.4 dB	$51.5 \Omega + 3.1 j\Omega$
900 MHz	16.3 dB	55.5 Ω - 15.3 jΩ
950 MHz	19.6 dB	$44.2 \Omega + 8.1 j\Omega$
960 MHz	16.2 dB	50.8 Ω + 15.7 jΩ

### 3.2 Antenna Design and Handling

The calibration dipole has a symmetric geometry with a built-in two stub matching network, which leads to the enhanced bandwidth.

The dipole is built of standard semirigid coaxial cable. The internal matching line is open ended. The antenna is therefore open for DC signals.

Do not apply force to dipole arms, as they are liable to bend. The soldered connections near the feedpoint may be damaged. After excessive mechanical stress or overheating, check the impedance characteristics to ensure that the internal matching network is not affected.

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

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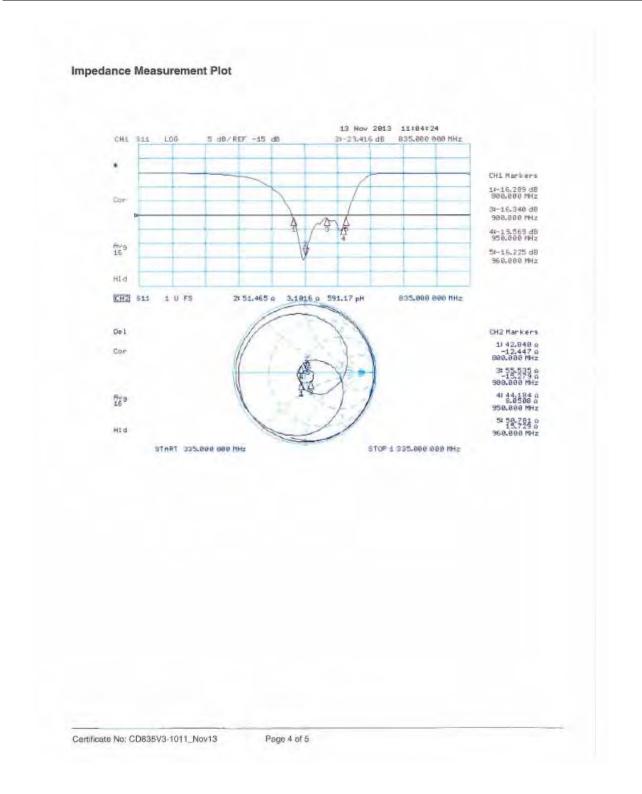
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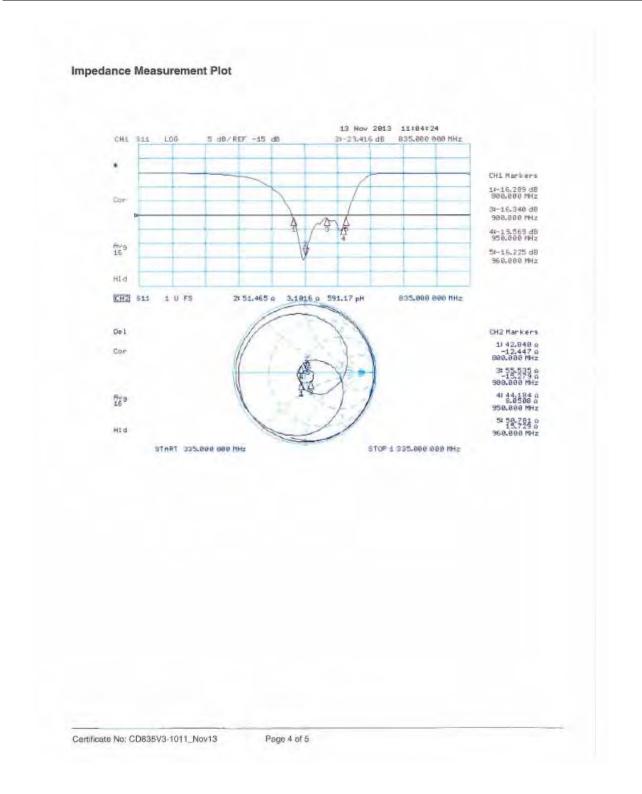
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Client Blackberry Waterloo

Accreditation No.: SCS 108

Certificate No: CD1880V3-1008 Nov13

Object	CD1880V3 - SN	: 1008	
Calibration procedure(s)	QA CAL-20.v6 Calibration process	edure for dipoles in air	
Calibration date:	November 12, 2	013	
The measurements and the unce	ertainties with confidence p	tional standards, which realize the physical units probability are given on the following pages and only bry facility: environment temperature (22 ± 3)°C a	are part of the certificate.
Calibration Equipment used (M&		Cal Date (Cartificate No.)	School and Collection
Primary Standards	10 0	Cal Date (Certificate No.)	Schoduled Calibration
Primary Standards Power meter EPM-442A	(D # GB37480704	09-Oct-13 (No. 217-01827)	Oct-14
Primary Standards	ID # GB37480704 US37292783	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827)	
Primary Standards Power meter EPM-442A Power sensor HP 8481 A	ID # GB37480704 US37292783 MY41082317	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828)	Oct-14 Oct-14
Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A	ID # GB37480704 US37292783	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827)	Oct-14 Oct-14 Oct-14
Primary Standards Power meter EPM-442A Power sensor HP 6481A Power sensor HP 8481A Reference 10 dB Attenuator Probe ER30V6	ID # GB37480704 US37292783 MY41082317 SN: 5047.2 (10q)	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01731)	Oct-14 Oct-14 Oct-14 Apr-14
Primary Standards Power meter EPM-442A Power sensor HP 6481A Power sensor HP 6481A Reference 10 dB Attenuator	ID # GB37480704 US37292783 MY41092317 SN: 5047.2 (10q) SN: 2396	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01731) 28-Dac-12 (No. ER3-2336 Dec12)	Oct-14 Oct-14 Oct-14 Apr-14 Dec-13
Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 10 dB Attenuator Probe ER3DV6 Probe H3DV6	ID # GB37480704 US37292783 MY41092317 SN: 5047.2 (10q) SN: 2398 SN: 8065	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01731) 28-Dec-12 (No. ER3-2336 Dec12) 28-Dec-12 (No. H3-6065_Dec12)	Oct-14 Oct-14 Oct-14 Apr-14 Dec-13 Dec-13
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  figures stated in the certificate are valid at the frequency indicated. The forward power to the dipole connector
  is set with a calibrated power meter connected and monitored with an auxiliary power meter connected to a
  directional coupler. While the dipole under test is connected, the forward power is adjusted to the same level.
- Antenna Positioning: The dipole is mounted on a HAC Test Arch phantom using the matching dipole positioner with the arms horizontal and the feeding cable coming from the floor. The measurements are performed in a shielded room with absorbers around the setup to reduce the reflections. It is verified before the mounting of the dipole under the Test Arch phantom, that its arms are perfectly in a line. It is installed on the HAC dipole positioner with its arms parallel below the dielectric reference wire and able to move elastically in vertical direction without changing its relative position to the top center of the Test Arch phantom. The vertical distance to the probe is adjusted after dipole mounting with a DASY5 Surface Check job. Before the measurement, the distance between phantom surface and probe tip is verified. The proper measurement distance is selected by choosing the matching section of the HAC Test Arch phantom with the proper device reference point (upper surface of the dipole) and the matching grid reference point (tip of the probe) considering the probe sensor offset. The vertical distance to the probe is essential for the
- Feed Point Impedance and Return Loss: These parameters are measured using a HP 8753E Vector Network
  Analyzer. The impedance is specified at the SMA connector of the dipole. The influence of reflections was
  eliminating by applying the averaging function while moving the dipole in the air, at least 70cm away from any
  obstacles.
- E-field distribution: E field is measured in the x-y-plane with an isotropic ER3D-field probe with 100 mW forward power to the antenna feed point. In accordance with [1], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 15 mm (in z) above the metal top of the dipole arms. Two 3D maxima are available near the end of the dipole arms. Assuming the dipole arms are perfectly in one line, the average of these two maxima (in subgrid 2 and subgrid 8) is determined to compensate for any non-parallelity to the measurement plane as well as the sensor displacement. The E-field value stated as calibration value represents the maximum of the interpolated 3D-E-field, in the plane above the dipole surface.

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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## Annex B to Hearing Aid Compatibility RF Emissions Test Report for the BlackBerry® Smartphone model RHL211LW (STV100-3)

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Author Data

Daoud Attavi

Dates of Test

August 31- Sep. 23, 2015

Report No **RTS-6066-1509-21** 

FCC ID L6ARHL210LW

### **Measurement Conditions**

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

DASY5	V52.8.7
HAC Test Arch	
15mm	
dx, dy = 5 mm	
835 MHz ± 1 MHz	
< 0.05 dB	
	HAC Test Arch 15mm  dx, dy = 5 mm 835 MHz ± 1 MHz

#### Maximum Field values at 835 MHz

E-field 15 mm above dipole surface	condition	Interpolated maximum
Maximum measured above high end	100 mW input power	110.1 V / m
Maximum measured above low end	100 mW input power	104.5 V / m
Averaged maximum above arm	100 mW input power	107.3 V / m ± 12.8 % (k=2)

### Appendix

#### **Antenna Parameters**

Frequency	Return Loss	Impedance
800 MHz	16.3 dB	42.8 Ω - 12.4 jΩ
835 MHz	29.4 dB	$51.5 \Omega + 3.1 j\Omega$
900 MHz	16.3 dB	55.5 Ω - 15.3 jΩ
950 MHz	19.6 dB	$44.2 \Omega + 8.1 j\Omega$
960 MHz	16.2 dB	50.8 Ω + 15.7 jΩ

#### 3.2 Antenna Design and Handling

The calibration dipole has a symmetric geometry with a built-in two stub matching network, which leads to the enhanced bandwidth.

The dipole is built of standard semirigid coaxial cable. The internal matching line is open ended. The antenna is therefore open for DC signals.

Do not apply force to dipole arms, as they are liable to bend. The soldered connections near the feedpoint may be damaged. After excessive mechanical stress or overheating, check the impedance characteristics to ensure that the internal matching network is not affected.

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

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Annex B to Hearing Aid Compatibility RF Emissions Test Report for the BlackBerry® Smartphone model RHL211LW (STV100-3)

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Author Data

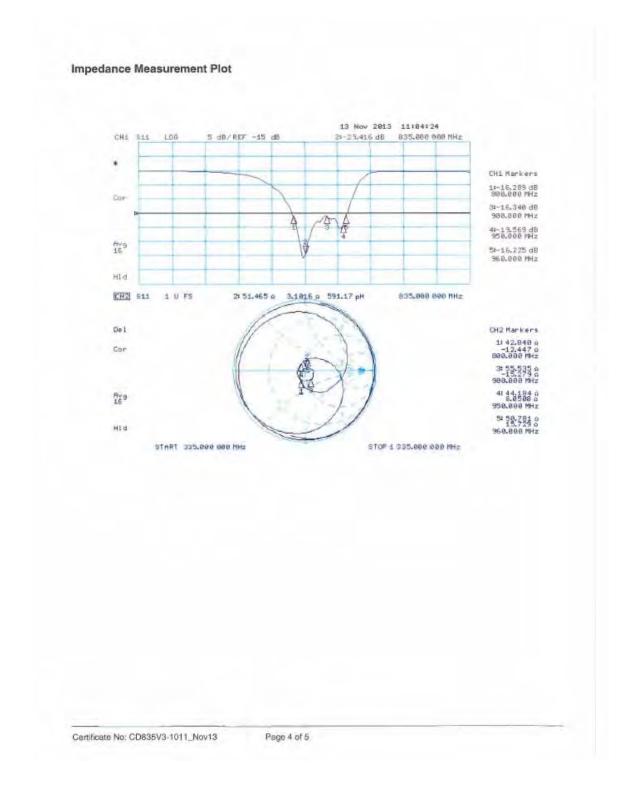
Daoud Attayi

Dates of Test

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Author Data

Daoud Attayi

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FCC ID L6ARHL210LW

#### **DASY5 E-field Result**

Date: 12.11.2013

Test Laboratory, SPEAG Lab2

#### DUT: HAC-Dipole 835 MHz; Type: CD835V3; Serial: CD835V3 - SN: 1011

Communication System: UID 0 - CW; Frequency, 835 MHz. Medium parameters used:  $\sigma = 0$  S/m,  $\epsilon_s = 1$ :  $\rho = 1000$  kg/m<sup>3</sup> Phantom section: RF Section

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

#### DASY52 Configuration:

- Probe: ER3DV6 SN2336; ConvF(1, 1, 1); Calibrated: 28.12.2012;
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 13.09,2013
- Phantom: HAC Test Arch with AMCC; Type: SD HAC PO1 BA, Serial: 1070
- DASY52 52.8.7(1137); SEMCAD X 14.6,10(7164)

#### Dipole E-Field measurement @ 835MHz/E-Scan - 835MHz d=15mm/Hearing Aid Compatibility Test (41x361x1):

Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 111.2 V/m; Power Drift = 0.01 dB
PMR not calibrated, PMF = 1.000 is applied.
E-field emissions = 110.1 V/m
Near-field category: M4 (AWF 0 dB)

#### PMF scaled E-field

Control of the last of the las	Grid 2 M4 104.5 V/m	4
Mr. April 1974 A. S.	Grid 5 M4 62.75 V/m	
	Grid 8 M4 110.1 V/m	



0 dB = 110.1 V/m = 40.84 dBV/m

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





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

Accredited by the Swiss Accreditation Service (SAS)

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

Client Blackberry Waterloo

Accreditation No.: SCS 108

Certificate No: CD1880V3-1008\_Nov13

Dbject	CD1880V3 - SN	: 1008	
Calibration procedure(s)	QA CAL-20.v6 Calibration proce	edure for dipoles in air	
Calibration date:	November 12, 2	013	
The measurements and the unc	vertainties with confidence	tional standards, which realize the physical units probability are given on the following pages and cory facility: environment temperature (22 ± 3)°C a	are part of the certificate.
	RTE critical for calibration)		
		Col Date (Cortificate No.)	Pohadulad Calibration
Primary Standards	1D#	Cal Date (Certificate No.)	Scheduled Calibration
Primary Standards Power meter EPM-442A	ID # GB37480704	09-Oct-13 (No. 217-01827)	Oct-14
Primary Standards Power meter EPM-442A Power sensor HP 8481A	ID# GB37480704 US37292783	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827)	Oct-14 Oct-14
Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A	ID # GB37480704 US37292783 MY41092317	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828)	Oct-14 Oct-14 Oct-14
Califoration Equipment used (MS Primary Standards Power meter EPM-442A Power sensor HIP 8481A Reference 10 dB Attenuator Probe ER3DV5	ID# GB37480704 US37292783	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827)	Oct-14 Oct-14
Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 10 dB Attenuator Probe ER3DV6	GB37480704 US37292783 MY41092317 SN: 5047.2 (10q)	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01731)	Oct-14 Oct-14 Oct-14 Apr-14
Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 10 dB Attenuator Probe ER3DV6 Probe H3DV6	4D # GB37480704 US37292783 MY41092317 SN: 5047.2 (10q) SN: 2336	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01731) 28-Dec-12 (No. ER3-2336, Dec12)	Oct-14 Oct-14 Oct-14 Apr-14 Dec-13
Primary Standards Power meter EPM-442A Power sensor HIP 8481A Power sensor HIP 8481A Reference 10 dB Attenuator	4D # GB37480704 US37292783 MY41092317 SN: 5047.2 (10q) SN: 2336 SN: 6065	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01731) 28-Dec-12 (No. ER3-2396, Dec12) 28-Dec-12 (No. H3-6065_Dec12)	Oct-14 Oct-14 Oct-14 Apr-14 Dec-13 Dec-13
Primary Standards Power meter EPM-442A Power sensor HIP 8481A Power sensor HIP 8481A Reference 10 dB Attenuator Probe ER3DV6 Probe H3DV6 DAE4 Secondary Standards Power meter Agilent 4419B	4D # GB37480704 US37292783 MY41092317 SN: 5047.2 (10q) SN: 2336 SN: 6065 SN: 781	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01731) 28-Dec-12 (No. ER3-2396 Dec12) 28-Dec-12 (No. H3-6065_Dec12) 13-Sep-13 (No. DAE4-781_Sep13) Check Date (in house) 09-Oct-09 (in house)	Oct-14 Oct-14 Oct-14 Apr-14 Dec-13 Dec-13 Sep-14 Scheduled Check In house check: Oct-15
Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 10 dB Attenuator Probe ER3DV6 Probe H3DV6 DAE4 Secondary Standards Power meter Agillent 4419B Power sensor HP E4412A	4D # GB37480704 US37292783 MY41092317 SN: 5047.2 (10q) SN: 2336 SN: 6065 SN: 781 ID # SN: GB42420191 SN: MY41495277	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01828) 04-Apr-13 (No. 217-01731) 28-Dec-12 (No. ER3-2386 Dec12) 28-Dec-12 (No. H3-6065_Dec12) 13-Sep-13 (No. DAE4-781_Sep13) Check Date (In house) 09-Oct-09 (In house check Oct-13) 01-Apr-08 (In house check Oct-13)	Oct-14 Oct-14 Oct-14 Apr-14 Dec-13 Dec-13 Sep-14 Scheduled Check In house check: Oct-15 In house check: Oct-15
Primary Standards Power meter EPM-442A Power sensor HIP 8481A Power sensor HIP 8481A Power sensor HIP 8481A Reference 10 dB Attenuator Probe ER3DV6 DAE4 Secondary Standards Power meter Agilent 4419B Power sensor HIP 8482A	ID # GB37480704 US37292783 MY41092317 SN: 5047.2 (10q) SN: 2336 SN: 6065 SN: 781  ID # SN: GB42420191 SN: MY41499277 SN: US37295597	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01828) 04-Apr-13 (No. 217-01828) 05-Oct-12 (No. H3-6065_Dec12) 13-Sep-13 (No. DAE4-781_Sep13) Check Date (in house) 09-Oct-08 (in house check Oct-13) 01-Apr-08 (in house check Oct-13)	Oct-14 Oct-14 Oct-14 Apr-14 Dec-13 Dec-13 Sep-14 Schaduled Check In house check: Oct-15 In house check: Oct-15
Primary Standards Power meter EPM-442A Power sensor HIP 8481A Power sensor HIP 8481A Reference 10 dB Attenuator Probe ER3DV6 Probe H3DV6 DAE4 Secondary Standards Power meter Agilient 4419B Power sensor HIP E4412A Power sensor HIP 8482A Network Analyzer HIP 8753E	ID # GB37480704 US37292783 MY41092317 SN: 5047.2 (10q) SN: 2336 SN: 6065 SN: 781 ID # SN: GB42420191 SN: MY41495277 SN: US37296597 US37390585	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01828) 04-Apr-13 (No. ER3-2396 Dec12) 28-Dec-12 (No. ER3-2396 Dec12) 13-Sep-13 (No. DAE4-781_Sep13) Check Date (In house check Oct-13) 09-Oct-09 (in house check Oct-13) 19-Oct-09 (in house check Oct-13) 19-Oct-09 (in house check Oct-13)	Oct-14 Oct-14 Oct-14 Oct-14 Apr-14 Dec-13 Dec-13 Sep-14 Schaduled Check In house check: Oct-15 In house check: Oct-15 In house check: Oct-15 In house check: Oct-15
Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 10 dB Attenuator Probe ER3DV6 Probe H3DV6 DAE4 Secondary Standards Power meter Agillent 4419B Power sensor HP E4412A	ID # GB37480704 US37292783 MY41092317 SN: 5047.2 (10q) SN: 2336 SN: 6065 SN: 781  ID # SN: GB42420191 SN: MY41499277 SN: US37295597	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01828) 04-Apr-13 (No. 217-01828) 05-Oct-12 (No. H3-6065_Dec12) 13-Sep-13 (No. DAE4-781_Sep13) Check Date (in house) 09-Oct-08 (in house check Oct-13) 01-Apr-08 (in house check Oct-13)	Oct-14 Oct-14 Oct-14 Apr-14 Dec-13 Dec-13 Sep-14 Schaduled Check In house check: Oct-15 In house check: Oct-15
Primary Standards Power meter EPM-442A Power sensor HIP 8481A Power sensor HIP 8481A Reference 10 dB Attenuator Probe ER3DV6 DAE4 Secondary Standards Power meter Agilient 4419B Power sensor HIP E4412A Power sensor HIP B482A Network Analyzer HIP 8753E	ID # GB37480704 US37292783 MY41092317 SN: 5047.2 (10q) SN: 2336 SN: 6065 SN: 781 ID # SN: GB42420191 SN: MY41495277 SN: US37296597 US37390585	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01828) 04-Apr-13 (No. ER3-2396 Dec12) 28-Dec-12 (No. ER3-2396 Dec12) 13-Sep-13 (No. DAE4-781_Sep13) Check Date (In house check Oct-13) 09-Oct-09 (in house check Oct-13) 19-Oct-09 (in house check Oct-13) 19-Oct-09 (in house check Oct-13)	Oct-14 Oct-14 Oct-14 Oct-14 Apr-14 Dec-13 Dec-13 Sep-14 Schaduled Check In house check: Oct-15 In house check: Oct-15 In house check: Oct-15 In house check: Oct-15
Primary Standards Power meter EPM-442A Power sensor HIP 8481A Power sensor HIP 8481A Reference 10 dB Attenuator Probe ER3DV6 DAE4 Secondary Standards Power meter Agilient 4419B Power sensor HIP E4412A Power sensor HIP B482A Network Analyzer HIP 8753E	4D # GB37480704 US37292783 MY41092317 SN: 5047.2 (10q) SN: 2336 SN: 8065 SN: 781 ID # SN: GB42420191 SN: MY41495277 SN: US37390586 SN: 832283/011	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 04-Apr-13 (No. 217-01828) 04-Apr-13 (No. 217-01731) 28-Dec-12 (No. ER3-2396, Dec12) 28-Dec-12 (No. H3-6065_Dec12) 13-Sep-13 (No. DAE4-781_Sep13) Check Date (In house) 09-Oct-09 (In house check Oct-13) 01-Apr-08 (In house check Oct-13) 09-Oct-09 (In house check Oct-13) 18-Oct-01 (In house check Oct-13) 27-Aug-12 (In house check Oct-13)	Oct-14 Oct-14 Oct-14 Apr-14 Dec-13 Dec-13 Sep-14 Scheduled Check In house check: Oct-15 In house check: Oct-15 In house check: Oct-14 In house check: Oct-14

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Dates of Test

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FCC ID LEARHL210LW

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





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Swiss Calibration Service

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA

Multilateral Agreement for the recognition of calibration certificates

#### References

 ANSI-C63.19-2011
 American National Standard, Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids.

#### Methods Applied and Interpretation of Parameters:

- Coordinate System: y-axis is in the direction of the dipole arms. z-axis is from the basis of the antenna
  (mounted on the table) towards its feed point between the two dipole arms. x-axis is normal to the other axes.
   In coincidence with the standards [1], the measurement planes (probe sensor center) are selected to be at a
  distance of 15 mm above the top metal edge of the dipole arms.
- Measurement Conditions: Further details are available from the hardcopies at the end of the certificate. All
  figures stated in the certificate are valid at the frequency indicated. The forward power to the dipole connector
  is set with a calibrated power meter connected and monitored with an auxiliary power meter connected to a
  directional coupler. While the dipole under test is connected, the forward power is adjusted to the same level.
- Antenna Positioning: The dipole is mounted on a HAC Test Arch phantom using the matching dipole positioner with the arms horizontal and the feeding cable coming from the floor. The measurements are performed in a shielded room with absorbers around the setup to reduce the reflections. It is verified before the mounting of the dipole under the Test Arch phantom, that its arms are perfectly in a line. It is installed on the HAC dipole positioner with its arms parallel below the dielectric reference wire and able to move elastically in vertical direction without changing its relative position to the top center of the Test Arch phantom. The vertical distance to the probe is adjusted after dipole mounting with a DASY5 Surface Check job. Before the measurement, the distance between phantom surface and probe tip is verified. The proper measurement distance is selected by choosing the matching section of the HAC Test Arch phantom with the proper device reference point (upper surface of the dipole) and the matching grid reference point (tip of the probe) considering the probe sensor offset. The vertical distance to the probe is essential for the accuracy.
- Feed Point Impedance and Return Loss: These parameters are measured using a HP 8753E Vector Network Analyzer. The impedance is specified at the SMA connector of the dipole. The influence of reflections was eliminating by applying the averaging function while moving the dipole in the air, at least 70cm away from any obstacles.
- E-field distribution: E field is measured in the x-y-plane with an isotropic ER3D-field probe with 100 mW forward power to the antenna feed point. In accordance with [1], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 15 mm (in z) above the metal top of the dipole arms. Two 3D maxima are available near the end of the dipole arms. Assuming the dipole arms are perfectly in one line, the average of these two maxima (in subgrid 2 and subgrid 8) is determined to compensate for any non-parallelity to the measurement plane as well as the sensor displacement. The E-field value stated as calibration value represents the maximum of the interpolated 3D-E-field, in the plane above the dipole surface.

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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Author Data

Daoud Attayi

Dates of Test

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Report No RTS-6066-1509-21 FCC ID LEARHL210LW

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





S Schweizerlacher Kalibrierdienst
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#### References

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#### Methods Applied and Interpretation of Parameters:

- Coordinate System: y-axis is in the direction of the dipole arms. z-axis is from the basis of the antenna
  (mounted on the table) towards its feed point between the two dipole arms. x-axis is normal to the other axes.
   In coincidence with the standards [1], the measurement planes (probe sensor center) are selected to be at a
  distance of 15 mm above the top metal edge of the dipole arms.
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  figures stated in the certificate are valid at the frequency indicated. The forward power to the dipole connector
  is set with a calibrated power meter connected and monitored with an auxiliary power meter connected to a
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- Feed Point Impedance and Return Loss: These parameters are measured using a HP 8753E Vector Network Analyzer. The impedance is specified at the SMA connector of the dipole. The influence of reflections was eliminating by applying the averaging function while moving the dipole in the air, at least 70cm away from any obstacles.
- E-field distribution: E field is measured in the x-y-plane with an isotropic ER3D-field probe with 100 mW forward power to the antenna feed point. In accordance with [1], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 15 mm (in z) above the metal top of the dipole arms. Two 3D maxima are available near the end of the dipole arms. Assuming the dipole arms are perfectly in one line, the average of these two maxima (in subgrid 2 and subgrid 8) is determined to compensate for any non-parallelity to the measurement plane as well as the sensor displacement. The E-field value stated as calibration value represents the maximum of the interpolated 3D-E-field, in the plane above the dipole surface.

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

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#### Measurement Conditions

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

DASY Version	DASY5	V52.8.7
Phantom	HAC Test Arch	
Distance Dipole Top - Probe Center	15mm	
Scan resolution	dx, dy = 5 mm	
Frequency	1880 MHz ± 1 MHz	
Input power drift	< 0.05 dB	

#### Maximum Field values at 1880 MHz

E-field 15 mm above dipole surface	condition	Interpolated maximum
Maximum measured above high end	100 mW input power	90.8 V / m
Maximum measured above low end	100 mW input power	87.3 V / m
Averaged maximum above arm	100 mW input power	89.0 V / m ± 12.8 % (k=2)

#### Appendix

#### **Antenna Parameters**

Frequency	Return Loss	Impedance
1730 MHz	27.3 dB	52.4 Ω + 3.7 jΩ
1880 MHz	20.3 dB	50.2 Ω + 9.7 jΩ
1900 MHz	20.8 dB	$52.5 \Omega + 9.0 j\Omega$
1950 MHz	28.5 dB	52.5 Ω + 2.9 jΩ
2000 MHz	18.5 dB	43.0 Ω + 8.7 jΩ

### 3.2 Antenna Design and Handling

The calibration dipole has a symmetric geometry with a built-in two stub matching network, which leads to the enhanced bandwidth.

The dipole is built of standard semirigid coaxial cable. The internal matching line is open ended. The antenna is therefore open for DC signals.

Do not apply force to dipole arms, as they are liable to bend. The soldered connections near the feedpoint may be damaged. After excessive mechanical stress or overheating, check the impedance characteristics to ensure that the internal matching network is not affected.

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

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Author Data

Daoud Attayi

Dates of Test

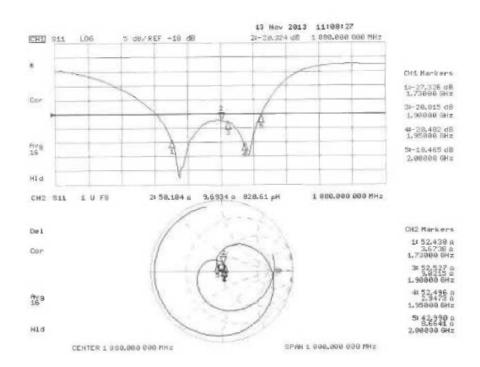
August 31- Sep. 23, 2015

RTS-6066-1509-21

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### Impedance Measurement Plot



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Author Data

Daoud Attayi

Dates of Test

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FCC ID L6ARHL210LW

#### **DASY5 E-field Result**

Date: 12.11.2013

Test Laboratory: SPEAG Lab2

DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: CD1880V3 - SN: 1008

Communication System: UTD 0 - CW; Frequency: 1880 MHz/Medium parameters used:  $\sigma = 0$  S/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup> Phantom section: RF Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

#### DASY52 Configuration:

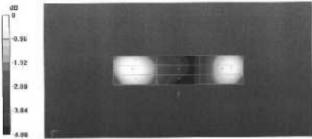
- Probe: ER3DV6 SN2336; ConvF(1, 1, 1); Calibrated: 28.12.2012;
- · Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 13.09.2013
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole E-Field measurement @ 1880MHz/E-Scan - 1880MHz d=15mm/Hearing Aid Compatibility Test (41x181x1):

Interpolated grid: dx=0.5000 mm, dy=0.5000 mm
Device Reference Point: 0, 0, -6.3 mm
Reference Value = 149.9 V/m: Power Drift = 0.00 dB
PMR not calibrated. PMF = 1.000 is applied.
E-field emissions = 90.79 V/m
Near-field entegory: M3 (AWF 0 dB)

#### PMF scaled E-field

	Grid 2 M3 90.79 V/m	
-	Grid 5 M3 70.42 V/m	33 14 1
	Grid 8 M3 87.31 V/m	



0 dB = 90.79 V/m = 39.16 dBV/m

Certificate No: CD1880V3-1008\_Nov13

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**Annex B to Hearing Aid Compatibility RF Emissions Test** Report for the BlackBerry® Smartphone model RHL211LW (STV100-3)

Page

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Author Data **Daoud Attayi**  Dates of Test

August 31- Sep. 23, 2015

Report No RTS-6066-1509-21 FCC ID L6ARHL210LW

Calib Rion Laboratory of Schmald & Partner Englineering AG Zeughe Watrasse 43, 8004 Zurich, Switzerland





Schweizerischer Kalibrierdienst Service sulase d'étalonnege Servizio svizzero di taratura Swiss Calibration Service

Accredit ed by the Swiss Accreditation Service (SAS) Accreditation No.: SCS 0108 The Sw<sup>2 sa</sup>Accreditation Service is one of the signatories to the EA Multilat C13 Agreement for the recognition of calibration certificates

Object	CD2450V3 - SN:	1011	
Calibration procedure(s)	QA CAL-20.v6 Calibration proce	dure for dipoles in air	
Caligra Bos data	March 11, 2015		
The measurements and the unc	perhantles with confidence purched in the closed laborato	onei standards, which realize the physical unit robability are given on the following pages and by facility: environment temperature (22 $\pm$ 3)°C	d are part of the certificate.
Primary Standards	The second secon	E-1 E-1 (E-2)	B 4 1 4 4 2 B 4 4 7 B 7 B 7
	ID #	Call Little (Carringian NO.)	Scheduled Calibration
The second secon	GB37480704	Cal Date (Certificale No.) 07-Oct-14 (No. 217-02020)	Oct-15
Power motor EPM-442A			
Power moter EPM-442A Power sensor HP 8481A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Power moter EPM-442A Power sensor HP 8481A	GB37480704 DS37292783	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020)	Oct-15 Oct-15
Power maler EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 10 dB Attenuator	GB37480704 DS37292783 MY41092317	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021)	Oct-15 Oct-15 Oct-15
Power maler EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 10 dB Affenuator Probe ERSOV6	GB37480704 LIS37292783 MY41092317 SN: 5047.2 / 06327	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01921)	Oct-15 Oct-15 Oct-15 Apr-15
Power maler EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 10 dB Affenuator Probe ERSOV6 Probe HSOV8	GB37480704 US37292783 MY41092317 SN: 5047.2 / 06327 SN: 2396	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01921) 31-Dec-14 (No. ERG-2336_Dec14)	Oct-15 Oct-15 Oct-15 Apr-15 Dec-15
Power mater EPM-442A Power sensor HP 8481A Power sensor HP 8481A	GB37480704 LIS37292783 MY41092317 SN: 5047.2 / 06927 SN: 2336 SN: 8065 SN: 781	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01921) 31-Dec-14 (No. EFG-2336, Dec14) 31-Dec-14 (No. H3-0065, Dec14)	Oct-15 Oct-15 Oct-15 Apr-15 Dec-15 Dec-15
Power make EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 10 dB Attenuator Probe ERSDV6 Probe HSDV6 DAE4 Secondary Standards Power mater Agliorit 44188	GB37480704 LIS37292783 MY41092317 SN: 5047.2 / 06327 SN: 2336 SN: 8065 SN: 781 ID # SN: GB42420191	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-02021) 31-Dec-14 (No. EF9-2336_Dec14) 31-Dec-14 (No. EF9-2336_Dec14) 12-Sep-14 (No. DAE4-781_Sep14) Check Date (in house)	Oct-15 Oct-15 Oct-15 Oct-15 Apr-15 Dec-15 Dec-15 Sep-15 Scheduled Check In house check: Sep-18
Power mater EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 10 dB Attenuator Probe ERSDV6 Probe HSDV6 DAE4 Secondary Standards Power mater Agilent 44188 Power enter Agilent 44188	GB37480704 LIS37292783 MY41092317 SN: 5047.2 / 06027 SN: 2336 SN: 8065 SN: 781 ID # SN: GB42420191 SN: US38485102	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-02021) 03-Apr-14 (No. EFR9-2336, Dec14) 31-Dec-14 (No. EFR9-2336, Dec14) 12-Sep-14 (No. DAE4-781, Sep14) Check Date (in house) 09-Oct-19 (in house check Sep-14) 05-Jan-10 (in house check Sep-14)	Oct-15 Oct-15 Oct-15 Apr-15 Dec-15 Dec-15 Sep-15 Sep-15 Scheduled Check In house check: Sep-18 In house check: Sep-18
Power maler EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 10 dB Affenuator Probe ERSOV6 Probe ERSOV6 DAE4 Secondary Standards Power maler Agilizat 44188 Power sensor HP E4412A Power sensor HP E4412A	GB37480704 IJS37292783 MY41092317 SN: 5047 2 / 06027 SN: 2336 SN: 8065 SN: 781 ID # SN: GB42420191 SN: US38485102 SN: US38485102 SN: US37295507	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-02021) 03-Apr-14 (No. ER3-2336_Doct4) 31-Doc-14 (No. ER3-2336_Doct4) 31-Doc-14 (No. ER3-2336_Doct4) 12-Sep-14 (No. DAS-4-781_Sep14) Check Date (in house) 09-Oct-09 (in house check Sep-14) 05-Jun-10 (in house check Sep-14) 09-Oct-09 (in house check Sep-14)	Oct-15 Oct-15 Oct-15 Apr-15 Dec-15 Dec-15 Sep-15 Scheduled Chock In house check: Sep-16 In house check: Sep-16 In house check: Sep-16
Power maler EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 10 dB Affenuator Probe ERSDV6 Probe ERSDV6 DAE4 Secondary Standards Power meter Aglicrat 4418B Power entsor HP E4412A Power sensor HP 8482A Network Analyzer HP 8753E	GB37480704 I/S37292783 MY41092317 SN: 5047 2 / 06027 SN: 2336 SN: 8005 SN: 781 ID # SN: GB42420191 SN: US36485102 SN: US37295507 US37290585	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-02021) 03-Apr-14 (No. 217-01921) 31-Dec-14 (No. ER3-2336_Dec14) 31-Dec-14 (No. ER3-0956_Dec14) 12-Sep-14 (No. DAE4-781_Sep14) Check Date (in house) 09-Oct-09 (in house check Sep-14) 09-Oct-09 (in house check Sep-14) 09-Oct-09 (in house check Sep-14) 16-Oct-01 (in house check Sep-14)	Oct-15 Oct-15 Oct-15 Oct-15 Dec-15 Dec-15 Sep-15 Sep-15 Scheduled Chock In house check: Sep-16 In house check: Sep-16 In house check: Sep-16 In house check: Oct-15
Power maler EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 10 dB Affenuator Probe ERSDV6 Probe ERSDV6 DAE4 Secondary Standards Power meter Aglicrat 4418B Power entsor HP E4412A Power sensor HP 8482A Network Analyzer HP 8753E	GB37480704 IJS37292783 MY41092317 SN: 5047 2 / 06027 SN: 2336 SN: 8065 SN: 781 ID # SN: GB42420191 SN: US38485102 SN: US38485102 SN: US37295507	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-02021) 03-Apr-14 (No. ER3-2336_Doct4) 31-Doc-14 (No. ER3-2336_Doct4) 31-Doc-14 (No. ER3-2336_Doct4) 12-Sep-14 (No. DAS-4-781_Sep14) Check Date (in house) 09-Oct-09 (in house check Sep-14) 05-Jun-10 (in house check Sep-14) 09-Oct-09 (in house check Sep-14)	Oct-15 Oct-15 Oct-15 Apr-15 Dec-15 Dec-15 Sep-15 Scheduled Chock In house check: Sep-16 In house check: Sep-16 In house check: Sep-16
Power maker EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 10 dB Attenuator Protee ERSDV6 Prote HSDV6 DAE4	GB37480704 I/S37292783 MY41092317 SN: 5047 2 / 06027 SN: 2336 SN: 8005 SN: 781 ID # SN: GB42420191 SN: US36485102 SN: US37295507 US37290585	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01921) 31-Dec-14 (No. ER3-2336_Dec14) 31-Dec-14 (No. ER3-2336_Dec14) 12-Sep-14 (No. DAE4-781_Sep14) 12-Sep-14 (No. DAE4-781_Sep14) 12-Sep-14 (No. DAE4-781_Sep14) 09-Oct-09 (in house check Sep-14) 09-Oct-09 (in house check Sep-14) 18-Oct-01 (in house check Oct-14) 27-Aug-12 (in house check Oct-13) Function	Oct-15 Oct-15 Oct-15 Oct-15 Dec-15 Dec-15 Sep-15 Sep-15 Scheduled Chock In house check: Sep-16 In house check: Sep-16 In house check: Sep-16 In house check: Oct-15
Power maler EPM-442A Power sensor HP 8481A Power sensor HP 8481A Power sensor HP 8481A Reference 10 dB Attenuator Prote ERSOV6 Prote HSOV6 DAE4 Secondary Standards Power miler Aglicrit 4418B Power einsor HP 8482A Network Analyzer HP 8753E	GB37480704 LIS37292783 MY41092317 SN: 5047.2 / 06027 SN: 2336 SN: 8065 SN: 781 ID # SN: GB42420191 SN: US38485102 SN: US37295507 US37290586 SN: 832283/011	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01921) 31-Dec-14 (No. ER3-2336, Dec14) 31-Dec-14 (No. ER3-2336, Dec14) 12-Sep-14 (No. DAE4-781, Sep-14) 12-Sep-14 (No. DAE4-781, Sep-14) 09-Oct-19 (in house check Sep-14) 09-Oct-19 (in house check Sep-14) 18-Oct-01 (in house check Sep-14) 27-Aug-12 (in house check Oct-13)	Oct-15 Oct-15 Oct-15 Oct-15 Apr-15 Dec-15 Dec-15 Sep-15 Scheduled Check In house check: Sep-18 In house check: Sep-18 In house check: Oct-15 In house check: Oct-16
Power maker EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 10 dB Attenuator Probe ERSOV6 Prote HSOV6 DAE4 Secondary Standards Power mater Agilorst 44188 Power emisor HP E4412A Power sensor HP E4412A Network Analyzer HP 8753E RF generator H&S SMT-06	GB37480704 LIS37292783 MY41092317 SN: 5047 2 / 06927 SN: 2336 SN: 8065 SN: 781 ID # SN: GB42420191 SN: US38485102 SN: US37295507 US37290585 SN: 832283/011	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 03-Apr-14 (No. 217-01921) 31-Dec-14 (No. ER3-2336_Dec14) 31-Dec-14 (No. ER3-2336_Dec14) 12-Sep-14 (No. DAE4-781_Sep14) 12-Sep-14 (No. DAE4-781_Sep14) 12-Sep-14 (No. DAE4-781_Sep14) 09-Oct-09 (in house check Sep-14) 09-Oct-09 (in house check Sep-14) 18-Oct-01 (in house check Oct-14) 27-Aug-12 (in house check Oct-13) Function	Oct-15 Oct-15 Oct-15 Oct-15 Apr-15 Dec-15 Dec-15 Sep-15 Scheduled Check In house check: Sep-18 In house check: Sep-18 In house check: Oct-15 In house check: Oct-16

Certificate No: CD2450V3-1011\_Mar15

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## Annex B to Hearing Aid Compatibility RF Emissions Test Report for the BlackBerry® Smartphone model RHL211LW (STV100-3)

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Author Data

Daoud Attavi

Dates of Test

August 31- Sep. 23, 2015

Report No

RTS-6066-1509-21

FCC ID LEARHL210LW

Calib Fitton Laboratory of Schrill & Partner Englineering AG Zeugha Watrasse 43, 8004 Zurich, Switzerland





S Schweizerischer Kallbrierdiensi
C Service suisse d'étalonnage
Servizia svizzaro di taratura
Swies Calibration Service

Accreditation No.: SCS 0108

Accepted (Ly the Swas Acceptation Service (SAS)

The Swiff Acceptation Service is one of the signatories to the EA

Multitation Agreement for the recognition of calibration certificates

#### Refererces

 ANSI-C63.19-2011
 American National Standard, Methods of Measurement of Compitibility between Wireless Communications Devices and Hearing Aids.

#### Methods Applied and Interpretation of Parameters:

- Coordinate System: y-axis is in the direction of the dipole arms, z-axis is from the basis of the antenna
  mounted on the table) towards its feed point between the two dipole arms, x-axis is normal to the other axis
  in coincidence with the standards [1], the measurement planes (probe sensor center) are selected to be at a
  distance of 15 mm above the top metal edge of the dipole arms.
- Measurement Conditions: Further details are available from the hardcopies at the end of the certificate. All
  ligures stated in the certificate are valid at the frequency indicated. The forward power to the dipole connector
  is set with a calibrated power meter connected and monitored with an auxiliary power meter connected to a
  directional coupler. While the dipole under test is connected, the forward power is adjusted to the same level.
- Antenna Positioning: The dipole is mounted on a HAC Test Arch phantom using the matching dipole positioner with the arms horizontal and the feeding cable coming from the floor. The measurements are performed in a shielded room with absorbers around the setup to reduce the reflections. It is verified before the mounting of the dipole under the Test Arch phantom, that its arms are perfectly in a line. It is institled on the HAC dipole positioner with its arms parallel below the dielectric reference wire and able to move elastically in vertical direction without changing its relative position to the top center of the Test Arch phantom. The vertical distance to the probe is adjusted after dipole mounting with a DASY5 Surface Check job. Before the measurement, the distance between phantom surface and probe tip is verified. The proper measurement distance is selected by choosing the matching section of the HAC Test Arch phantom with the proper device reference point (upper surface of the dipole) and the matching grid reference point (tip of the probe) considering the probe sensor offset. The vertical distance to the probe is essential for the securior.
- Feed Point Impedance and Return Loss: These parameters are measured using a HP 8753E Vector Network Analyzer. The impedance is specified at the SMA connector of the dipole. The influence of reflections was eliminating by applying the averaging function while moving the dipole in the air, at least 70cm away from any obstacles.
- E-field distribution: E field is measured in the x-y-plane with an isotropic ER3D-field probe with 100 mW forward power to the antenna feed point. In accordance with [1], the scan area is 20mm wide, its length exceeds the dipole arm length (180 or 90mm). The sensor center is 15 mm (in z) above the metal top of the dipole arms. Two 3D maxima are available near the end of the dipole arms. Assuming the dipole arms are perfectly in one line, the average of these two maxima (in subgrid 2 and subgrid 8) is determined to compensate for any non-parallelity to the measurement plane as well as the sensor displacement. The E-field value stated as calibration value represents the maximum of the interpolated 3D-E-field, in the plane above the dipole surface.

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%.

Combatte No: CD2450V3-1011\_Mir15



## Annex B to Hearing Aid Compatibility RF Emissions Test Report for the BlackBerry® Smartphone model RHL211LW (STV100-3)

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Author Data

Daoud Attayi

Dates of Test

August 31- Sep. 23, 2015

RTS-6066-1509-21

Report No

FCC ID L6ARHL210LW

### Mea ≤urement Conditions

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

DASY Version	DASY5	V52.8.8
Phantom	HAC Test Arch	
Distance Dipole Top - Probe Center	15 mm	
Scan resolution	dx, dy = 5 mm	
Frequency	2450 MHz ± 1 MHz	
Input power drift	< 0.05 dB	

### Maxi mum Field values at 2450 MHz

E-field 15 mm above dipole surface	condition	Interpolated maximum
Maximum measured above high end	100mW input power	88.6V/m = 38.94 dBV/m
Maximum measured above low end	100mW input power	84.4V/m = 38.52 dBV/m
Averaged maximum above arm	100mW input power	86.5V/m ± 12.8 % (k=2)

#### Appendix (Additional assessments outside the scope of SCS 0108)

#### Antenna Parameters

Frequency	Return Loss	Impedance
2250 MHz	17.2 dB	54.5 Ω + 13.9 jΩ
2350 MHz	29.4 dB	$53.4 \Omega + 0.7 j\Omega$
2450 MHz	28.1 dB	$52.9 \Omega + 2.8 j\Omega$
2550 MHz	36.3 dB	51.5 Ω - 0.4 jΩ
2650 MHz	18.0 dB	61.5 $\Omega$ + 8.0 j $\Omega$

#### 3.2 Antenna Design and Handling

The calibration dipole has a symmetric geometry with a built-in two stub matching network, which leads to the enhanced bandwidth.

The dipole is built of standard semirigid coaxial cable. The internal matching line is open ended. The antenna is therefore open for DC signals.

Do not apply force to dipole arms, as they are liable to bend. The soldered connections near the feedpoint may be damaged. After excessive mechanical stress or overheating, check the impedance characteristics to ensure that the internal matching network is not affected.

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

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Annex B to Hearing Aid Compatibility RF Emissions Test Report for the BlackBerry® Smartphone model RHL211LW (STV100-3)

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Author Data

Daoud Attayi

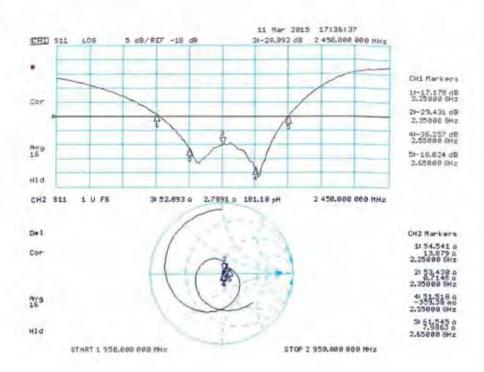
Dates of Test
August 31- Sep. 23, 2015

RTS-6066-1509-21

Report No

FCC ID L6ARHL210LW

## Imperiance Measurement Plot



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Annex B to Hearing Aid Compatibility RF Emissions Test Report for the BlackBerry® Smartphone model RHL211LW (STV100-3)

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Author Data

Daoud Attayi

Dates of Test

August 31- Sep. 23, 2015

Report No **RTS-6066-1509-21** 

FCC ID L6ARHL210LW

### DASY 5E-field Result

Date: 11:03.2015

Ten Labratory: SPEAG Lab2

DUT: #14C Dipole 2450 MHz; Type: CD2450V3; Serial: CD2450V3 - SN: 1011

Commutation System: U(D 0 - CW; Frequency: 2450 MHz Medium parameters used: σ = 0 S/m, c, = 1; ρ = 1000 kg/m<sup>3</sup> Phantor Plection: RF Section Measur Plent Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

### DASY52Configuration:

- Probe: ER3DV6 SN2336; ConvF(1, 1, 1); Calibrated: 31.12.2014;
- Sensor-Surface: (Fix Surface)
- Bectronics: DAE4 Sn781; Calibrated: 12,09.2014
- Phantom: HAC Test Arch with AMCC; Type: SD HAC P01 BA; Serial: 1070
- BASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole E-Field measurement @ 2450MHz/E-Scan - 2450MHz d=15mm/Hearing Ald Compatibility Test (41x181x1):

Interpolated grid; dx=0.5000 mm, dy=0.5000 mm Device Reference Point; 0, 0, -6.3 mm Reference Value = 79.66 V/m; Power Drift = -0.00 dB Applied MIF = 0.00 dB RF audio interference level = 38.94 dBV/m Emission category: M2

#### MIF scaled E-field

	Grid 2 M2 38.52 dBV/m	Grid 3 M2 38.45 dBV/m
Grid 4 MZ		Grid 6 MZ
Grid 7 M2 38,7 dBV/m	Grid 8 M2 38.94 dBV/m	Grid 9 M2 38.87 dBV/m



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