Testing Services™	Annex B to Hearing Aid Compatibility RF Emissions Test Report for the BlackBerry® Smartphone model RCP51UW		Page 1(13)	
Author Data	Dates of Test	Report No	FCC ID	
Daoud Attayi	Aug 10-20, 2009	RTS-1765-0908-17	L6ARCP50U	W

# Annex B: Probe and dipole descriptions and calibration certificates

**B.2** Dipole calibration certificate

	Aug 10-20, 20	09 RTS-1765-09	08-17	FCC ID L6ARCP50	UW
Calibration Laborator Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zuric Accredited by the Swiss Accred The Swiss Accreditation Servic Multilateral Agreement for the r Client RIM CALIBRATION ( Object	h, Switzerland ditation Service (SAS) e is one of the signatorie ecognition of calibration CERTIFICATE CD835V3 - SN: 1	s to the EA certificates Certificate No	Schweizerischer Service suisse d' Servizio svizzero Swiss Calibration No.: SCS 108 o: CD835V3-10	étalonnage di taratura n Service	
Calibration procedure(s)	QA CAL-20.v4				
Calibration date: Condition of the calibrated item		dure for dipoles in air 17			
Calibration date: Condition of the calibrated item This calibration certificate docum	Calibration proce November 7, 200 In Tolerance ents the traceability to natic ted in the closed laborator		its of measurements C and humidity < 70%	(SI). 6.	
Calibration date: Condition of the calibrated item This calibration certificate docum All calibrations have been condu Calibration Equipment used (M&	Calibration proce November 7, 200 In Tolerance tents the traceability to natic ted in the closed laborator TE critical for calibration)	7 onal standards, which realize the physical un y facility: environment temperature (22 ± 3)°0	C and humidity < 70%	6.	
Calibration date: Condition of the calibrated item This calibration certificate docum All calibrations have been condu Calibration Equipment used (M& Primary Standards	Calibration proce November 7, 200 In Tolerance tents the traceability to natic ted in the closed laborator TE critical for calibration)	17 onal standards, which realize the physical un	its of measurements C and humidity < 709 Scheduled C Oct-08	6.	
Calibration date: Condition of the calibrated item This calibration certificate docum All calibrations have been condu Calibration Equipment used (M& Primary Standards Power meter EPM-442A	Calibration proce November 7, 200 In Tolerance ents the traceability to natic ted in the closed laborator TE critical for calibration) ID # GB37480704	7 onal standards, which realize the physical un y facility: environment temperature (22 ± 3)°0 <u>Cal Date (Calibrated by, Certificate No.)</u> 04-Oct-07 (METAS, No. 217-00736)	C and humidity < 70% Scheduled C	6.	
Calibration date: Condition of the calibrated item This calibration certificate docum All calibrations have been condu Calibration Equipment used (M& Primary Standards	Calibration proce November 7, 200 In Tolerance tents the traceability to natic ted in the closed laborator TE critical for calibration)	7 onal standards, which realize the physical un y facility: environment temperature (22 ± 3)°0 Cal Date (Calibrated by, Certificate No.)	C and humidity < 70% Scheduled C Oct-08 Oct-08	6.	
Calibration date: Condition of the calibrated item This calibration certificate docum All calibrations have been condu Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A	Calibration proce November 7, 200 In Tolerance ents the traceability to natic ted in the closed laborator TE critical for calibration) ID # GB37480704 US37292783	7 onal standards, which realize the physical un y facility: environment temperature (22 ± 3)°( <u>Cal Date (Calibrated by, Certificate No.)</u> 04-Oct-07 (METAS, No. 217-00736) 04-Oct-07 (METAS, No. 217-00736)	C and humidity < 70% Scheduled C Oct-08 Oct-08 6) Dec-07	6.	
Calibration date: Condition of the calibrated item This calibration certificate docum All calibrations have been condu Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Probe ER3DV6	Calibration proce November 7, 200 In Tolerance ents the traceability to natic ted in the closed laborator TE critical for calibration) ID # GB37480704 US37292783 SN: 2336	7 onal standards, which realize the physical un y facility: environment temperature (22 ± 3)°( Cal Date (Calibrated by, Certificate No.) 04-Oct-07 (METAS, No. 217-00736) 04-Oct-07 (METAS, No. 217-00736) 27-Dec-06 (SPEAG, No. ER3-2336_Dec0)	Scheduled C           Oct-08         Oct-08           Oct-08         Oct-07	6.	
Calibration date: Condition of the calibrated item This calibration certificate docum All calibrations have been condu Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Probe ER3DV6 Probe H3DV6 DAE4	Calibration proce November 7, 200 In Tolerance The closed laborator TE critical for calibration) ID # GB37480704 US37292783 SN: 2336 SN: 2336 SN: 781	7 onal standards, which realize the physical un y facility: environment temperature (22 ± 3)°( Cal Date (Calibrated by, Certificate No.) 04-Oct-07 (METAS, No. 217-00736) 04-Oct-07 (METAS, No. 217-00736) 27-Dec-06 (SPEAG, No. ER3-2336_Dec00 27-Dec-06 (SPEAG, No. H3-6065-Dec06) 2-Oct-07 (SPEAG, No. DAE4-781_Oct07)	Scheduled C           Oct-08           Oct-08           Oct-08           6)         Dec-07           Dec-07           Oct-08	&.	
Calibration date: Condition of the calibrated item This calibration certificate docum All calibrations have been condu Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Probe ER3DV6 Probe H3DV6 DAE4 Secondary Standards	Calibration proce November 7, 200 In Tolerance ents the traceability to natic ted in the closed laborator TE critical for calibration) ID # GB37480704 US37292783 SN: 2336 SN: 2336 SN: 6065 SN: 781 ID #	7 Cal Date (Calibrated by, Certificate No.) 04-Oct-07 (METAS, No. 217-00736) 04-Oct-07 (METAS, No. 217-00736) 04-Oct-07 (METAS, No. 217-00736) 27-Dec-06 (SPEAG, No. ER3-2336_Dec00) 27-Dec-06 (SPEAG, No. H3-6065-Dec06) 2-Oct-07 (SPEAG, No. DAE4-781_Oct07) Check Date (in house)	C and humidity < 70% Scheduled C Oct-08 Oct-08 6) Dec-07 Dec-07 Oct-08 Scheduled C	&. alibration	
Calibration date: Condition of the calibrated item This calibration certificate docum All calibrations have been condu Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Probe ER3DV6 Probe H3DV6 DAE4 Secondary Standards Power meter EPM-4419B	Calibration proce November 7, 200 In Tolerance ents the traceability to natic ted in the closed laborator TE critical for calibration) ID # GB37480704 US37292783 SN: 2336 SN: 6065 SN: 781 ID # GB42420191	7 Cal Date (Calibrated by, Certificate No.) 04-Oct-07 (METAS, No. 217-00736) 04-Oct-07 (METAS, No. 217-00736) 04-Oct-07 (METAS, No. 217-00736) 27-Dec-06 (SPEAG, No. ER3-2336_Dec00 27-Dec-06 (SPEAG, No. H3-6065-Dec06) 2-Oct-07 (SPEAG, No. DAE4-781_Oct07) Check Date (in house) 11-May-05 (SPEAG, in house check Oct -	C and humidity < 70% Scheduled C Oct-08 Oct-08 6) Dec-07 Dec-07 Oct-08 Scheduled C 07) In house che	&. alibration Check sck: Nov-08	
Calibration date: Condition of the calibrated item This calibration certificate docum All calibrations have been condu Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Probe ER3DV6 Probe H3DV6 DAE4 Secondary Standards Power meter EPM-4419B Power sensor HP 8482A	Calibration proce November 7, 200 In Tolerance ents the traceability to natic ted in the closed laborator TE critical for calibration) ID # GB37480704 US37292783 SN: 2336 SN: 6065 SN: 781 ID # GB42420191 US37295597	7 Cal Date (Calibrated by, Certificate No.) 04-Oct-07 (METAS, No. 217-00736) 04-Oct-07 (METAS, No. 217-00736) 27-Dec-06 (SPEAG, No. ER3-2336_Dec00 27-Dec-06 (SPEAG, No. BR3-2336_Dec00 2-Oct-07 (SPEAG, No. DAE4-781_Oct07) Check Date (in house) 11-May-05 (SPEAG, in house check Oct -1 11-May-05 (SPEAG, in house check	Scheduled C           Oct-08         Oct-08           Oct-08         Oct-08           Bec-07         Oct-08           Scheduled C         Oct-08           Scheduled C         Oct-08           Oct-08         Scheduled C           Oct-08         In house che           07)         In house che	&. Calibration Check eck: Nov-08 sck: Nov-08	
Calibration date: Condition of the calibrated item This calibration certificate docum All calibrations have been condu Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Probe H3DV6 DAE4 Secondary Standards Power meter EPM-4419B Power sensor HP 8482A Power sensor HP 8482A	Calibration proce November 7, 200 In Tolerance ents the traceability to natic ted in the closed laborator TE critical for calibration) ID # GB37480704 US37292783 SN: 2336 SN: 6065 SN: 781 ID # GB42420191 US37295597 3318A09450	7 Cal Date (Calibrated by, Certificate No.) 04-Oct-07 (METAS, No. 217-00736) 04-Oct-07 (METAS, No. 217-00736) 04-Oct-07 (METAS, No. 217-00736) 27-Dec-06 (SPEAG, No. ER3-2365_Dec0) 27-Dec-06 (SPEAG, No. BCR3-2365_Dec0) 2-Oct-07 (SPEAG, No. DAE4-781_Oct07) Check Date (in house) 11-May-05 (SPEAG, in house check Oct -1 08-Jan-02 (SPEAG, in house check Oct -0 08-Jan-02 (SPEAG, in house check Oct -	Scheduled C           Oct-08           Oct-08           Oct-08           Oct-08           Scheduled C           Oct-08           Scheduled C           Oct-08           Scheduled C           Oct-08           Oct-08           Scheduled C           07)           In house che           07)           In house che           07)	&. Salibration Check sck: Nov-08 sck: Nov-08 sck: Nov-08	
Calibration date: Condition of the calibrated item This calibration certificate docum All calibrations have been condu Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Probe ER3DV6 Probe H3DV6 DAE4 Secondary Standards Power meter EPM-4419B Power sensor HP 8482A	Calibration proce November 7, 200 In Tolerance ents the traceability to natic ted in the closed laborator TE critical for calibration) ID # GB37480704 US37292783 SN: 2336 SN: 6065 SN: 781 ID # GB42420191 US37295597	7 Cal Date (Calibrated by, Certificate No.) 04-Oct-07 (METAS, No. 217-00736) 04-Oct-07 (METAS, No. 217-00736) 27-Dec-06 (SPEAG, No. ER3-2336_Dec00 27-Dec-06 (SPEAG, No. BR3-2336_Dec00 2-Oct-07 (SPEAG, No. DAE4-781_Oct07) Check Date (in house) 11-May-05 (SPEAG, in house check Oct -1 11-May-05 (SPEAG, in house check	Scheduled C           Oct-08         Oct-08           Oct-08         Oct-08           Oct-08         Oct-08           Scheduled C         Oct-08           Scheduled C         Oct-08           Scheduled C         Oct-08           Oct-08         Scheduled C           07)         In house che           07)         In house che           07)         In house che           07)         In house che           07)         In house che	<ul> <li>Selibration</li> <li>Sheck</li> <li>Sheck</li> <li>Nov-08</li> <li>Nov-08</li> <li>Nov-08</li> <li>Nov-08</li> <li>Nov-08</li> <li>Nov-08</li> <li>Nov-09</li> </ul>	
Calibration date: Condition of the calibrated item This calibration certificate docum All calibrations have been condu Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Probe H3DV6 DAE4 Secondary Standards Power meter EPM-4419B Power sensor HP 8482A Power sensor HP 8482A Power sensor HP 8482A Network Analyzer HP 8753E RF generator E4433B	Calibration proce November 7, 200 In Tolerance ents the traceability to natic ted in the closed laborator TE critical for calibration) ID # GB37480704 US37292783 SN: 2336 SN: 6065 SN: 781 ID # GB42420191 US37295597 3318A09450 US37390585 MY 41310391	7 Cal Date (Calibrated by, Certificate No.) 04-Oct-07 (METAS, No. 217-00736) 04-Oct-07 (METAS, No. 217-00736) 27-Dec-06 (SPEAG, No. ER3-2365_Dec0) 27-Dec-06 (SPEAG, No. ER3-2365_Dec0) 27-Dec-06 (SPEAG, No. DAE4-781_Oct07) Check Date (in house) 11-May-05 (SPEAG, in house check Oct -1 11-May-05 (SPEAG, in house check Oct -1 08-Jan-02 (SPEAG, in house check Oct -1 08-Jan-02 (SPEAG, in house check Oct -1 18-Oct-01 (SPEAG, in house check Oct -1 18-Oct-01 (SPEAG, in house check Oct -1 18-Oct-01 (SPEAG, in house check Oct -1 22-Nov-04 (SPEAG, in house check Oct -1 Function	Scheduled C           Oct-08         Oct-08           Oct-08         Oct-08           Oct-08         Oct-08           Scheduled C         Oct-08           Scheduled C         Oct-08           Scheduled C         Oct-08           Oct-08         Scheduled C           07)         In house che           07)         In house che           07)         In house che           07)         In house che           07)         In house che	<ul> <li>Selibration</li> <li>Sheck</li> <li>Sheck</li> <li>Nov-08</li> <li>Nov-08</li> <li>Nov-08</li> <li>Nov-08</li> <li>Nov-08</li> <li>Nov-08</li> <li>Nov-09</li> </ul>	
Calibration date: Condition of the calibrated item This calibration certificate docum All calibrations have been condu Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Probe ER3DV6 Probe H3DV6 DAE4 Secondary Standards Power meter EPM-4419B Power sensor HP 8482A Power sensor HP 8482H Network Analyzer HP 8753E	Calibration proce November 7, 200 In Tolerance ents the traceability to nati- cted in the closed laborator TE critical for calibration) ID # GB37480704 US37292783 SN: 2336 SN: 6065 SN: 781 ID # GB42420191 US37295597 3318A09450 US37390585 MY 41310391	7 Cal Date (Calibrated by, Certificate No.) 04-Oct-07 (METAS, No. 217-00736) 04-Oct-07 (METAS, No. 217-00736) 27-Dec-06 (SPEAG, No. ER3-2336_Dec0) 27-Dec-06 (SPEAG, No. ER3-2336_Dec0) 27-Dec-06 (SPEAG, No. DAE4-781_Oct07) Check Date (in house) 11-May-05 (SPEAG, in house check Oct - 11-May-05 (SPEAG, in house check Oct - 08-Jan-02 (SPEAG, in house check Oct - 18-Oct-01 (SPEAG, in house check Oct - 18-Oct-01 (SPEAG, in house check Oct - 18-Oct-01 (SPEAG, in house check Oct - 22-Nov-04 (SPEAG, in house check Oct -	Scheduled C Oct-08 Oct-08 6) Dec-07 Dec-07 Oct-08 Scheduled C 07) In house che 07) In house che 07) In house che 07) In house che 07) In house che	<ul> <li>Selibration</li> <li>Sheck</li> <li>Sheck</li> <li>Nov-08</li> <li>Nov-08</li> <li>Nov-08</li> <li>Nov-08</li> <li>Nov-08</li> <li>Nov-08</li> <li>Nov-09</li> </ul>	
Calibration date: Condition of the calibrated item This calibration certificate docum All calibrations have been condu Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Probe H3DV6 DAE4 Secondary Standards Power meter EPM-4419B Power sensor HP 8482A Power sensor HP 8482A Power sensor HP 8482A Network Analyzer HP 8753E RF generator E4433B	Calibration proce November 7, 200 In Tolerance ents the traceability to natic ted in the closed laborator TE critical for calibration) ID # GB37480704 US37292783 SN: 2336 SN: 6065 SN: 781 ID # GB42420191 US37295597 3318A09450 US37390585 MY 41310391	7 Cal Date (Calibrated by, Certificate No.) 04-Oct-07 (METAS, No. 217-00736) 04-Oct-07 (METAS, No. 217-00736) 27-Dec-06 (SPEAG, No. ER3-2365_Dec0) 27-Dec-06 (SPEAG, No. ER3-2365_Dec0) 27-Dec-06 (SPEAG, No. DAE4-781_Oct07) Check Date (in house) 11-May-05 (SPEAG, in house check Oct -1 11-May-05 (SPEAG, in house check Oct -1 08-Jan-02 (SPEAG, in house check Oct -1 08-Jan-02 (SPEAG, in house check Oct -1 18-Oct-01 (SPEAG, in house check Oct -1 18-Oct-01 (SPEAG, in house check Oct -1 18-Oct-01 (SPEAG, in house check Oct -1 22-Nov-04 (SPEAG, in house check Oct -1 Function	Scheduled C Oct-08 Oct-08 6) Dec-07 Dec-07 Oct-08 Scheduled C 07) In house che 07) In house che 07) In house che 07) In house che 07) In house che	<ul> <li>Selibration</li> <li>Sheck</li> <li>Sheck</li> <li>Nov-08</li> <li>Nov-08</li> <li>Nov-08</li> <li>Nov-08</li> <li>Nov-08</li> <li>Nov-08</li> <li>Nov-09</li> </ul>	

This report shall <u>NOT</u> be reproduced except in full without the written consent of RIM Testing Services Copyright 2005-2009, RIM Testing Services, A division of Research In Motion Limited



# Annex B to Hearing Aid Compatibility RF Emissions Test Report for the BlackBerry® Smartphone model RCP51UW

WISS

BRI

Page

Author Data **Daoud Attayi**  Dates of Test Aug 10-20, 2009 Report No RTS-1765-0908-17

L6ARCP50UW

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



Schweizerischer Kalibrierdlenst s Service suisse d'étalonnage

С Servizio svizzero di taratura

s Swiss Calibration Service

Accreditation No.: SCS 108

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

# References

ANSI-C63.19-2006 [1]

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

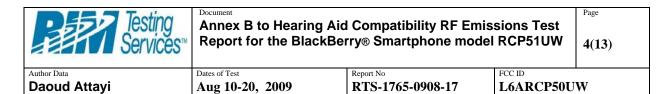
### Methods Applied and Interpretation of Parameters:

- 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 standard [1], the measurement planes (probe sensor center) are selected to be at a distance of 10 mm above the top 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 DASY4 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 10 mm (in z) above the 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, 10mm above the dipole surface.
- H-field distribution: H-field is measured with an isotropic H-field probe with 100mW forward power to the antenna feed point, in the x-y-plane. The scan area and sensor distance is equivalent to the E-field scan. The maximum of the field is available at the center (subgrid 5) above the feed point. The H-field value stated as calibration value represents the maximum of the interpolated H-field, 10mm above the dipole surface at the feed point.

Certificate No: CD835V3-1011 Nov07

Page 2 of 6

This report shall NOT be reproduced except in full without the written consent of RIM Testing Services Copyright 2005-2009, RIM Testing Services, A division of Research In Motion Limited



# **1 Measurement Conditions**

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

DASY Version	DASY4	V4.7 B55
DASY PP Version	SEMCAD	V1.8 B176
Phantom	HAC Test Arch	SD HAC P01 BA, #1070
Distance Dipole Top - Probe Center	10 mm	
Scan resolution	dx, dy = 5 mm	area = 20 x 180 mm
Frequency	835 MHz ± 1 MHz	
Forward power at dipole connector	20.0 dBm = 100mW	
Input power drift	< 0.05 dB	

# 2 Maximum Field values

condition	interpolated maximum
100 mW forward power	0.458 A/m

E-field 10 mm above dipole surface	condition	Interpolated maximum
Maximum measured above high end-	100 mW forward power	167.1 V/m
Maximum measured above low end	100 mW forward power	160.1 V/m
Averaged maximum above arm	100 mW forward power	163.6 V/m

Uncertainty for E-field measurement: 12.8% (k=2)

# 3 Appendix

# 3.1 Antenna Parameters

Frequency	Return Loss	Impedance
800 MHz	16.2 dB	(42.9 – j12.6) Ohm
835 MHz	26.3 dB	( 51.2 + j4.8 ) Ohm
900 MHz	16.5 dB	(56.7 - j14.6) Ohm
950 MHz	19.8 dB	(43.9 + j7.4) Ohm
960 MHz	16.3 dB	( 50.3 + j15.5 ) Ohm

# 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.

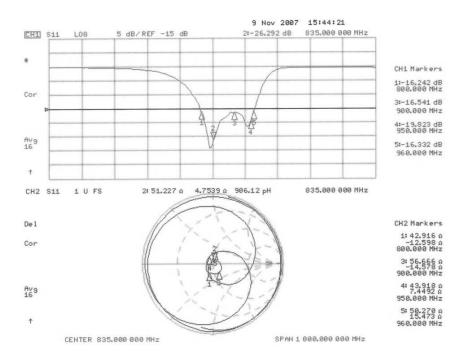
Certificate No: CD835V3-1011\_Nov07

Page 3 of 6

Testing Services™	Annex B to Hearing Aid Compatibility RF Emissions Test Report for the BlackBerry® Smartphone model RCP51UW		Page <b>5(13)</b>	
Author Data	Dates of Test	Report No	FCC ID	
Daoud Attayi	Aug 10-20, 2009	RTS-1765-0908-17	L6ARCP50U	W

# 3.3 Measurement Sheets

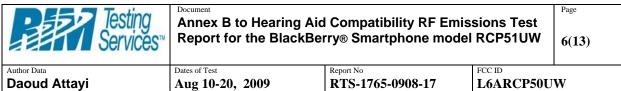
3.3.1 Return Loss and Smith Chart



Certificate No: CD835V3-1011\_Nov07

Page 4 of 6

This report shall <u>NOT</u> be reproduced except in full without the written consent of RIM Testing Services Copyright 2005-2009, RIM Testing Services, A division of Research In Motion Limited



Author Data	Dates of Test	Report No	FCC ID
Daoud Attayi	Aug 10-20, 2009	RTS-1765-0908-17	L6ARCP50UW

### 3.3.2 DASY4 H-field result

Date/Time: 07.11.2007 12:08:55

Test Laboratory: SPEAG Lab 2

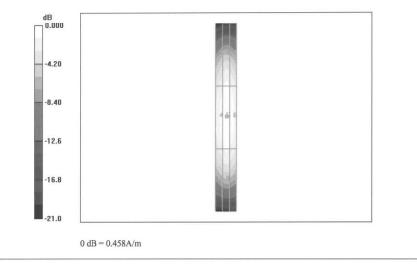
DUT: HAC-Dipole 835 MHz; Type: CD835V3; Serial: 1011 Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1 Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup> Phantom section: H Dipole Section Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration:

- Probe: H3DV6 SN6065; Calibrated: 27.12.2006
- . Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 02.10.2007 .
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 1070 .
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176 .

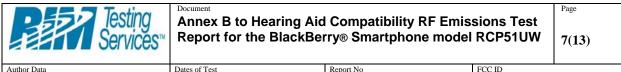
H Scan - Sensor Center 10mm above CD835 Dipole/Hearing Aid Compatibility Test (41x361x1): Measurement grid: dx=5mm, dy=5mm Maximum value of peak Total field = 0.458 A/m Probe Modulation Factor = 1.00 Device Reference Point: 0.000, 0.000, 354.7 mm Reference Value = 0.484 A/m; Power Drift = 0.007 dBHearing Aid Near-Field Category: M4 (AWF 0 dB)

Grid 1	Grid 2	Grid 3
0.378 M4	0.409 M4	0.394 M4
Grid 4	Grid 5	Grid 6
<b>0.424 M4</b>	<b>0.458 M</b> 4	<b>0.442 M4</b>
Grid 7	Grid 8	Grid 9
0.373 M4	0.401 M4	0.386 M4



Certificate No: CD835V3-1011\_Nov07

Page 5 of 6



Author Data	Dates of Test	Report No	FCC ID
Daoud Attayi	Aug 10-20, 2009	RTS-1765-0908-17	L6ARCP50UW

### 3.3.3 DASY4 E-Field result

Date/Time: 07.11.2007 14:04:24

Test Laboratory: SPEAG Lab 2

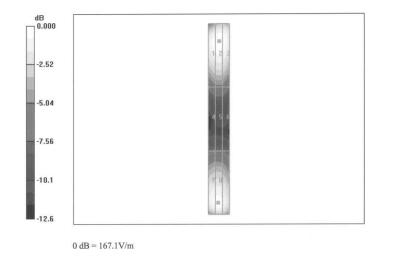
**DUT: HAC-Dipole 835 MHz; Type: D835V3; Serial: 1011** Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1 Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup> Phantom section: E Dipole Section Measurement Standard: DASY4 (High Precision Assessment) DASY4 Configuration:

- Probe: ER3DV6 SN2336; ConvF(1, 1, 1); Calibrated: 27.12.2006
- Sensor-Surface: (Fix Surface) .
- Electronics: DAE4 Sn781; Calibrated: 02.10.2007 .
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 1070 •
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176 .

# E Scan - Sensor Center 10mm above CD835 Dipole/Hearing Aid Compatibility Test (41x361x1):

Measurement grid: dx=5mm, dy=5mm Maximum value of peak Total field = 167.1 V/m Probe Modulation Factor = 1.00 Device Reference Point: 0.000, 0.000, 354.7 mm Reference Value = 103.6 V/m; Power Drift = 0.012 dB Hearing Aid Near-Field Category: M4 (AWF 0 dB)

Grid 1 162.5 M4	Grid 2 167.1 M4	Grid 3 163.4 M4
Grid 4	Grid 5	Grid 6
87.2 M4	89.4 M4	87.1 M4
Grid 7	Grid 8	Grid 9
156.2 M4	160.1 M4	152.8 M4



Certificate No: CD835V3-1011\_Nov07

Page 6 of 6

ıd Attayi	Dates of Aug	Test 10-20, 2009	Report No RTS-1765-0908-17	FCC ID L6ARCP50U	JW
Engineeri Zeughausstrass	ng AG se 43, 8004 Zurici	n, Switzerland	SNISS BC-MRA Proprio	Schweizerischer Kalibrierdien: Service suisse d'étalonnage Servizio svizzero di taratura Swiss Calibration Service	st
The Swiss Accr	editation Service	itation Service (SAS) is one of the signator cognition of calibratic	ies to the EA	No.: SCS 108	
Client	N		Certificate No	: CD1880V3-1008_Nov0	7
CALIBR	ATION C	ERTIFICAT	E		
Object		CD1880V3 - SN	1: 1008		
Calibration proc	edure(s)	QA CAL-20.v4 Calibration proc	edure for dipoles in air		
Calibration date	c	N			
		November 8, 20	007		
Condition of the		In Tolerance	007		
This calibration All calibrations h	e calibrated item certificate docume have been conduc ipment used (M&T PM-442A IP 8481A PM-4419B IP 8482A IP 8482H IP 8482H er HP 8753E	In Tolerance	ational standards, which realize the physical untropy facility: environment temperature ( $22 \pm 3$ )°C	C and humidity < 70%. Scheduled Calibration Oct-08 Oct-08 Dec-07 Dec-07 Oct-08 Scheduled Check I/7) In house check: Nov-08 I/7) In house check: Nov-09	
This calibration All calibrations h Calibration Equi Primary Standar Power meter EF Power sensor H Probe ER3DV6 DAE4 Secondary Stan Power sensor H Power sensor H Power sensor H Network Analyzo	e calibrated item certificate docume have been conduc ipment used (M&T PM-442A IP 8481A PM-4419B IP 8482A IP 8482H IP 8482H er HP 8753E	In Tolerance           ants the traceability to nated in the closed laborat           E critical for calibration)           ID #           GB37480704           US37292783           SN: 6065           SN: 781           ID #           GB42420191           US37295597           3318A09450           US37390585	ational standards, which realize the physical un tory facility: environment temperature (22 ± 3)°C Cal Date (Calibrated by, Certificate No.) 04-Oct-07 (METAS, No. 217-00736) 27-Dec-06 (SPEAG, No. 217-00736) 27-Dec-06 (SPEAG, No. 18-2036, Dec06) 2-Oct-07 (SPEAG, No. H3-6065_Dec06) 2-Oct-07 (SPEAG, No. DAE4-781_Oct07) Check Date (in house) 11-May-05 (SPEAG, in house check Oct-0 11-May-05 (SPEAG, in house check Oct-0 08-Jan-02 (SPEAG, in house check Oct-0 18-Oct-01 (SPEAG, in house check Oct-0	C and humidity < 70%.  Scheduled Calibration Oct-08 Oct-08 Dec-07 Oct-08 Scheduled Check  T) In house check: Nov-08 T) In house check: Nov-08 T) In house check: Nov-08 T) In house check: Nov-09 T) In house check: Nov-09 Signature	
This calibration All calibrations h Calibration Equi Primary Standar Power meter EF Power sensor H Probe ER3DV6 DAE4 Secondary Stan Power meter EF Power sensor H Power sensor H Network Analyzz RF generator EA	e calibrated item certificate docume have been conduc ipment used (M&T PM-442A IP 8481A PM-4419B IP 8482A IP 8482H IP 8482H er HP 8753E	In Tolerance           ents the traceability to nated in the closed laboration           E critical for calibration)           ID #           GB37480704           US37292783           SN: 2336           SN: 6065           SN: 781           ID #           GB42420191           US37295597           3318A09450           US3730585           MY 41310391	ational standards, which realize the physical un tory facility: environment temperature (22 ± 3)*0 O4-Oct-07 (METAS, No. 217-00736) 04-Oct-07 (METAS, No. 217-00736) 27-Dec-06 (SPEAG, No. H3-2336_Dec0) 27-Dec-06 (SPEAG, No. H3-6065_Dec06) 2-Oct-07 (SPEAG, No. DAE4-781_Oct07) Check Date (in house) 11-May-05 (SPEAG, in house check Oct-0 11-May-05 (SPEAG, in house check Oct-0 08-Jan-02 (SPEAG, in house check Oct-0 08-Jan-02 (SPEAG, in house check Oct-0 18-Oct-01 (SPEAG, in house check Oct-0 22-Nov-04 (SPEAG, in house check Oct-0 22-Nov-04 (SPEAG, in house check Oct-0	C and humidity < 70%.  Scheduled Calibration Oct-08 Oct-08 Dec-07 Oct-08 Scheduled Check  T) In house check: Nov-08 T) In house check: Nov-08 T) In house check: Nov-08 T) In house check: Nov-09 T) In house check: Nov-09 Signature	
This calibration All calibrations h Calibration Equi Primary Standar Power meter EF Power sensor H Probe ER3DV6 DAE4 Secondary Stan Power meter EF Power sensor H Power sensor H Network Analyzz RF generator EA	e calibrated item certificate docume have been conduc ipment used (M&T PM-442A IP 8481A PM-4419B IP 8482A IP 8482H IP 8482H er HP 8753E	In Tolerance           ents the traceability to nated in the closed laboration           E critical for calibration)           ID #           GB37480704           US37292783           SN: 2336           SN: 6065           SN: 781           ID #           GB42420191           US37295597           3318A09450           US3730585           MY 41310391	ational standards, which realize the physical un tory facility: environment temperature (22 ± 3)*0 O4-Oct-07 (METAS, No. 217-00736) 04-Oct-07 (METAS, No. 217-00736) 27-Dec-06 (SPEAG, No. H3-2336_Dec0) 27-Dec-06 (SPEAG, No. H3-6065_Dec06) 2-Oct-07 (SPEAG, No. DAE4-781_Oct07) Check Date (in house) 11-May-05 (SPEAG, in house check Oct-0 11-May-05 (SPEAG, in house check Oct-0 08-Jan-02 (SPEAG, in house check Oct-0 08-Jan-02 (SPEAG, in house check Oct-0 18-Oct-01 (SPEAG, in house check Oct-0 22-Nov-04 (SPEAG, in house check Oct-0 22-Nov-04 (SPEAG, in house check Oct-0	C and humidity < 70%. Scheduled Calibration Oct-08 Oct-08 6) Dec-07 Oct-08 Scheduled Check 17) In house check: Nov-08 17) In house check: Nov-08 17) In house check: Nov-08 17) In house check: Nov-09 17) In house check: Nov-09 17) In house check: Nov-09	

This report shall <u>NOT</u> be reproduced except in full without the written consent of RIM Testing Services Copyright 2005-2009, RIM Testing Services, A division of Research In Motion Limited



d Attayi	Aug 10-20, 2009	RTS-1765-0908-17	L6A1
ita	Dates of Test	Report No	FCC ID

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



WISS	S	Sci
	C	Ser
V Z		Se
D Z	S	Sw

vice suisse d'étalonnage vizio svizzero di taratura ss Calibration Service

weizerischer Kalibrierdienst

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-C63.19-2006 [1] American National Standard for 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 standard [1], the measurement planes (probe sensor center) are selected to be at a distance of 10 mm above the top 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 DASY4 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 10 mm (in z) above the 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, 10mm above the dipole surface.
- H-field distribution: H-field is measured with an isotropic H-field probe with 100mW forward power to the antenna feed point, in the x-y-plane. The scan area and sensor distance is equivalent to the E-field scan. The maximum of the field is available at the center (subgrid 5) above the feed point. The H-field value stated as calibration value represents the maximum of the interpolated H-field, 10mm above the dipole surface at the feed point.

Certificate No: CD1880V3-1008\_Nov07

Page 2 of 6

Testing Services™	Annex B to Hearing Aid Report for the BlackBe			Page 10(13)
Author Data	Dates of Test	Report No	FCC ID	
Daoud Attayi	Aug 10-20, 2009	RTS-1765-0908-17	L6ARCP50U	W

10			

#### **1 Measurement Conditions**

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

DASY Version	DASY4	V4.7 B55
DASY PP Version	SEMCAD	V1.8 B176
Phantom	HAC Test Arch	SD HAC P01 BA, #1070
Distance Dipole Top - Probe Center	10 mm	
Scan resolution	dx, dy = 5 mm	area = 20 x 90 mm
Frequency	1880 MHz ± 1 MHz	
Forward power at dipole connector	20.0 dBm = 100mW	
Input power drift	< 0.05 dB	

# 2 Maximum Field values

H-field 10 mm above dipole surface	condition	Interpolated maximum
Maximum measured	100 mW forward power	0.465 A/m
Incertainty for H-field measurement: 8 2% (k=	2)	

for H-field measurement: 8.2% (K=2)

E-field 10 mm above dipole surface	condition	Interpolated maximum
Maximum measured above high end	100 mW forward power	133.7 V/m
Maximum measured above low end	100 mW forward power	133.5 V/m
Averaged maximum above arm	100 mW forward power	133.6 V/m

Uncertainty for E-field measurement: 12.8% (k=2)

### 3 Appendix

# 3.1 Antenna Parameters

Frequency	Return Loss	Impedance	
1710 MHz	22.2 dB	( 52.3 + j7.6 ) Ohm	
1880 MHz	20.5 dB	( 49.7 + j9.4 ) Ohm	
1900 MHz	20.7 dB	(52.2 + j9.2) Ohm	
1950 MHz	27.8 dB	( 52.4 + j3.4 ) Ohm	
2000 MHz	19.2 dB	(43.7 + j8.2) Ohm	

### 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.

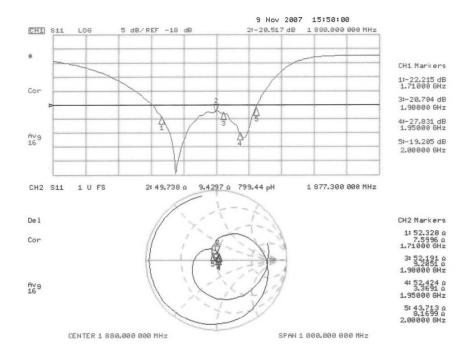
Certificate No: CD1880V3-1008\_Nov07

Page 3 of 6

Testing Services™	Document Annex B to Hearing Aid Compatibility RF Emissions Test Report for the BlackBerry® Smartphone model RCP51UW		Page 11(13)	
Author Data	Dates of Test	Report No	FCC ID	
Daoud Attayi	Aug 10-20, 2009	RTS-1765-0908-17	L6ARCP50U	W

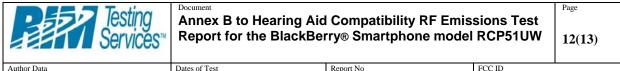
### 3.3 Measurement Sheets

3.3.1 Return Loss and Smith Chart



Certificate No: CD1880V3-1008\_Nov07

Page 4 of 6



Author Data	Dates of Test	Report No	FCC ID
Daoud Attayi	Aug 10-20, 2009	RTS-1765-0908-17	L6ARCP50UW

### 3.3.2 DASY4 H-Field Result

Date/Time: 08.11.2007 11:15:44

Test Laboratory: SPEAG Lab 2

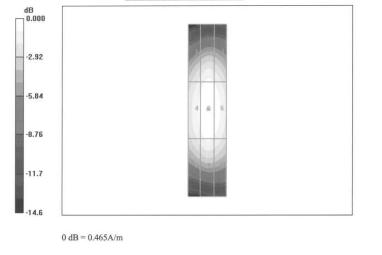
**DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: 1008** Communication System: CW; Frequency: 1880 MHz; Duty Cycle: 1:1 Medium parameters used:  $\sigma = 0$  mho/m,  $\epsilon_r = 1$ ;  $\rho = 1$  kg/m<sup>3</sup> Phantom section: H Dipole Section Measurement Standard: DASY4 (High Precision Assessment)

DASY4 Configuration: Probe: H3DV6 - SN6065; Calibrated: 27.12.2006

- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 02.10.2007
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 1070
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

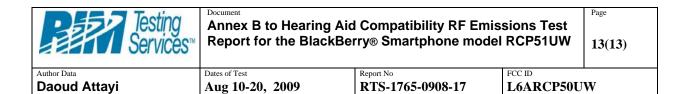
H Scan - Sensor Center 10mm above CD1880V3 Dipole/Hearing Aid Compatibility Test (41x181x1): Measurement grid: dx=5mm, dy=5mm Maximum value of peak Total field = 0.465 A/m Probe Modulation Factor = 1.00 Device Reference Point: 0.000, 0.000, 354.7 mm Reference Value = 0.490 A/m; Power Drift = -0.001 dB Hearing Aid Near-Field Category: M2 (AWF 0 dB)

> Peak H-field in A/m Grid 3 Grid 1 Grid 2 0.395 M2 0.428 M2 0.415 M2 Grid 4 Grid 5 Grid 6 0.434 M2 0.465 M2 0.451 M2 Grid 7 Grid 8 Grid 9 0.423 M2 0.409 M2 0.394 M2



Certificate No: CD1880V3-1008\_Nov07

Page 5 of 6



#### 3.3.2 DASY4 E-Field Result

Date/Time: 07.11.2007 15:57:04

Test Laboratory: SPEAG Lab 2

**DUT: HAC Dipole 1880 MHz; Type: CD1880V3; Serial: 1008** Communication System: CW; Frequency: 1880 MHz; Duty Cycle: 1:1 Medium parameters used:  $\sigma = 0$  mho/m,  $\varepsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup> Phantom section: E Dipole Section Measurement Standard: DASY4 (High Precision Assessment)

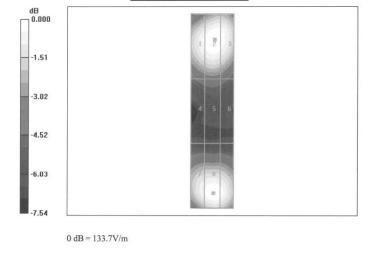
DASY4 Configuration:

- Probe: ER3DV6 SN2336; ConvF(1, 1, 1); Calibrated: 27.12.2006
- Sensor-Surface: (Fix Surface)
- Electronics: DAE4 Sn781; Calibrated: 02.10.2007
- Phantom: HAC Test Arch with Coil; Type: SD HAC P01 BA; Serial: 1070
- Measurement SW: DASY4, V4.7 Build 55; Postprocessing SW: SEMCAD, V1.8 Build 176

E Scan - Sensor Center 10mm above CD1880V3 Dipole/Hearing Aid Compatibility Test (41x181x1): Measurement grid: dx=5mm, dy=5mm Maximum value of peak Total field = 133.7 V/m Probe Modulation Factor = 1.00 Device Reference Point: 0.000, 0.000, 354.7 mm Reference Value = 149.2 V/m; Power Drift = 0.031 dB

Hearing Aid Near-Field Category: M2 (AWF 0 dB)

Peak E-field in V/m Grid 1 Grid 2 Grid 3 128.8 M2 133.7 M2 132.1 M2 Grid 5 Grid 4 Grid 6 88.1 M3 90.8 M3 87.7 M3 Grid 7 Grid 8 Grid 9 127.1 M2 133.5 M2 130.8 M2



Certificate No: CD1880V3-1008\_Nov07

Page 6 of 6