

# EMI Test Report

Tested in accordance with  
Federal Communications Commission (FCC)  
Personal Communications Services  
CFR 47 Parts 2, 22 and 24  
&  
Industry Canada (IC) RSS-132 and 133

## RIM Testing Services (RTS)

A division of Research In Motion Limited

**REPORT NO:** RTS-1191-0810-20

<b>PRODUCT MODEL NO:</b>	RCC51UW
<b>TYPE NAME:</b>	BlackBerry® smartphone
<b>FCC ID:</b>	L6ARCC50UW
<b>IC:</b>	2503A-RCC50UW
<b>EMISSION DESIGNATOR (GSM):</b>	247KG7W
<b>EMISSION DESIGNATOR (EDGE):</b>	247KGXW

**DATE:** 20 October 2008

<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RCC51UW	
<b>Test Report No.</b> RTS-1191-0810-20	<b>Dates of Test</b> October 14 to 17, 2008	<b>Author Data</b> Shannon Muller

**Statement of Performance:**

The BlackBerry® smartphone, model RCC51UW, part number CER-21466-001 Rev. 1 and accessories when configured and operated per RIM's operation instructions, perform within the requirements of the test standards.

**Declaration:**

We hereby certify that:

The test data reported herein is an accurate record of the performance of the sample(s) tested.

The test results are valid for the tested unit (s) only.

The test equipment used was suitable for the tests performed and within manufacturer's published specifications and operating parameters.

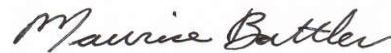
The test methods were consistent with the methods described in the relevant standards.

Documented by:



Shannon Muller  
Compliance Specialist  
Date: 21 October 2008

Reviewed by:



Maurice Battler  
Compliance Specialist  
Date: 22 October 2008

Reviewed by:



Masud S. Attayi, P.Eng.  
Team Lead, Regulatory Compliance  
Date: 22 October 2008

Approved by:



Paul G. Cardinal, Ph.D.  
Director  
Date: 23 October 2008

<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RCC51UW	
<b>Test Report No.</b> RTS-1191-0810-20	<b>Dates of Test</b> October 14 to 17, 2008	<b>Author Data</b> Shannon Muller

## Table of Contents

A	Scope.....	4
B	Associated Documents .....	4
C	Product Identification .....	4
D	Support Equipment Used for the Testing of the EUT .....	5
E	Test Voltage.....	5
F.	Modifications to EUT .....	5
G	Summary of Results .....	6
H)	Compliance Test Equipment Used .....	10
APPENDIX 1 – RADIATED EMMISIONS TEST DATA.....		11

<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RCC51UW	
<b>Test Report No.</b> RTS-1191-0810-20	<b>Dates of Test</b> October 14 to 17, 2008	<b>Author Data</b> Shannon Muller

## A Scope

This report details the results of compliance tests which were performed in accordance to the requirements of:

- FCC CFR 47 Part 2, Oct. 1, 2006
- FCC CFR 47 Part 22, Subpart H, Cellular Radiotelephone Services, Oct. 1, 2006
- FCC CFR 47 Part 24 Subpart E, Broadband PCS, Oct 1. 2006
- Industry Canada, RSS-132 Issue 2, September 2005, Cellular Telephones Employing New Technologies Operating in the Bands 824-849 MHz and 869-894 MHz.
- Industry Canada, RSS-133 Issue 4, February 2008, 2 GHz Personal Communications Services.

## B Associated Documents

1. Test report number RTS-1191-0808-08.

## C Product Identification

Manufactured by Research In Motion Limited whose headquarters is located at:

295 Phillip Street  
 Waterloo, Ontario  
 Canada, N2L 3W8  
 Phone: 519 888 7465  
 Fax: 519 888 6906

The equipment under test (EUT) was tested at the following locations:

RIM Testing Services (RTS) EMI test facility  
 305 Phillip Street  
 Waterloo, Ontario  
 Canada, N2L 3W8  
 Phone: 519 888 7465  
 Fax: 519 888 6906

440 Phillip Street  
 Waterloo, Ontario  
 Canada , N2L 5R9  
 Phone: 519 888 7465  
 Fax: 519 888 6906

The testing was performed from October 14 to 17, 2008.

<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RCC51UW	
<b>Test Report No.</b> RTS-1191-0810-20	<b>Dates of Test</b> October 14 to 17, 2008	<b>Author Data</b> Shannon Muller

The sample EUT included:

SAMPLE	MODEL	CER NUMBER	PIN
1	RCC51UW	CER-21466-001 Rev. 1	20C85601
2	RCC51UW	CER-21466-001 Rev. 1	20C856F6

Radiated Emission testing was performed on samples 1 and 2.

Model Number RCC51UW is identical to RBW71CW except without the CDMA band installed.

Only the characteristics that maybe impacted by the changes from RBW71CW to RCC51UW were re-measured.

#### **D Support Equipment Used for the Testing of the EUT**

No support equipment used. See section H. *Compliance Test Equipment Used.*

#### **E Test Voltage**

The ac input voltage was 120 volts, 60 Hz where applicable. This configuration was per RIM's specifications.

#### **F. Modifications to EUT**

No modifications were required on the EUT.

<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RCC51UW	
<b>Test Report No.</b> RTS-1191-0810-20	<b>Dates of Test</b> October 14 to 17, 2008	<b>Author Data</b> Shannon Muller

## G Summary of Results

SPECIFICATION		TEST TYPE	RESULT	TEST DATA APPENDIX
FCC CFR 47	IC			
Part 2.1051 Part 22.917 Part 22.901	RSS-GEN, 4.9	GSM 850 Conducted Spurious Emissions	See test report RTS-1191-0808-08	-
Part 2.1051 Part 24.238(a)	RSS-GEN, 4.9	GSM PCS Conducted Spurious Emissions	See test report RTS-1191-0808-08	-
Part 2.202 Part 22.917	RSS-GEN, 4.6	GSM 850 Occupied Bandwidth and Channel Mask	See test report RTS-1191-0808-08	-
Part 2.202 Part 24.238	RSS-GEN, 4.6	GSM PCS Occupied Bandwidth and Channel Mask	See test report RTS-1191-0808-08	-
Part 2.1046(a)	RSS-133, 6.4 RSS-132, 4.4	GSM Conducted RF Output Power	See test report RTS-1191-0808-08	-
Part 2.1055(a)(d) Part 22.917	RSS-132, 4.3	GSM 850 Frequency Stability vs. Temperature and Voltage	See test report RTS-1191-0808-08	-
Part 2.1055(a)(d) Part 24.235	RSS-132, 4.3	GSM PCS Frequency Stability vs. Temperature and Voltage	See test report RTS-1191-0808-08	-
Part 22, Subpart H, Part 24, Subpart E	RSS-GEN, 4.9	GSM ERP, EIRP	Pass	1
Part 22, Subpart H Part 24, Subpart E	RSS-GEN, 4.9	GSM Radiated Spurious/Harmonic Emissions	Pass	1

<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RCC51UW	
<b>Test Report No.</b> RTS-1191-0810-20	<b>Dates of Test</b> October 14 to 17, 2008	<b>Author Data</b> Shannon Muller

### Summary of Results cont'd

- 1) For the Tx Conducted Spurious Emissions results in the GSM850 as per 47 CFR 2.1051, CFR 22.917, CFR 22.901(d) and RSS-GEN, 4.9.  
See test report RTS-1191-0808-08.
  
- 2) For the Tx Conducted Spurious Emissions results in the PCS1900 as per 47 CFR 2.1051, CFR 24.238(a) and RSS-GEN, 4.9.  
See test report RTS-1191-0808-08.
  
- 3) For the Occupied Bandwidth and channel mask results in the GSM850 as per 47 CFR 2.202, CFR 22.917 and RSS-GEN, 4.6.  
See test report RTS-1191-0808-08.
  
- 4) For the Occupied Bandwidth and channel mask results in the PCS1900 as per 47 CFR 2.202, CFR 24.238 and RSS-GEN, 4.6.  
See test report RTS-1191-0808-08.
  
- 5) For the Conducted RF Output Power results for the GSM850 and PCS1900 as per 47 CFR 2.1046(a), RSS 133, 6.4 and RSS 132, 4.4.  
See test report RTS-1191-0808-08.
  
- 6) For the Frequency Stability vs. Temperature and Voltage results for GSM850 as per 47 CFR 2.1055(a), 2.1055(d), CFR 22.917 and RSS-132, 4.3.  
See test report RTS-1191-0808-08.
  
- 7) For the Frequency Stability vs. Temperature and Voltage results for the PCS1900 as per 47 CFR 2.1055(a), 2.1055(d), 24.235 and RSS-132, 4.3.  
See test report RTS-1191-0808-08.

<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RCC51UW	
<b>Test Report No.</b> RTS-1191-0810-20	<b>Dates of Test</b> October 14 to 17, 2008	<b>Author Data</b> Shannon Muller

- 8) The radiated spurious emissions/harmonics and ERP/EIRP were measured for GSM850 and PCS bands. The results are within the limits. The EUT was placed on a nonconductive styrofoam table, 100 cm high that was positioned on a remotely controlled turntable. The test distance used between the EUT and the receiving antenna was three metres. Then the emissions were maximized by elevating the antenna in the range of 1 to 4 metres. The turntable was rotated to determine the azimuth of the peak emissions. Both the horizontal and vertical polarizations of the emissions were measured. The maximum emissions level was recorded. The EUT was then substituted with an antenna placed in the same location as the EUT. A Dipole antenna was used for the ERP measurements and a Horn antenna was used for EIRP measurements. The substitution antenna was connected into a signal generator that was set to the test frequency. The emissions were maximized by elevating the antenna in the range of 1 to 4 metres. The signal generator output was then adjusted to match the BlackBerry® smartphone output reading. The signal generator output was recorded. Both the horizontal and vertical polarizations of the emissions were measured.

The measurements were done in a semi-anechoic chamber (SAC) below 1 GHz and a fully-anechoic room (FAR) above 1 GHz. The SAC's FCC registration number is **778487** and the Industry Canada (IC) file number is **2503B-1**. The FAR's FCC registration number is **959115** and the IC file number is **2503C-1**. The EUT was measured on the low, middle and high channels.

The ERP in the GSM850 band, GSM mode was measured on BlackBerry® smartphone, PIN 20C856F6. The highest ERP measured was 29.98 dBm (0.995 W) at 824.20 MHz (channel 128).

The ERP in the GSM850 band, EDGE mode was measured on BlackBerry® smartphone, PIN 20C856F6. The highest ERP measured was 23.18 dBm (0.208 W) at 824.20 MHz (channel 128).

The EIRP in the GSM PCS band, GSM mode was measured on BlackBerry® smartphone, PIN 20C856F6. The highest EIRP measured was 30.17 dBm (1.040 W) at 1909.80 MHz (channel 810).

The EIRP in the GSM PCS band, EDGE mode was measured on BlackBerry® smartphone, PIN 20C856F6. The highest EIRP measured was 26.07 dBm (0.405 W) at 1909.80 MHz (channel 810).



<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RCC51UW	
<b>Test Report No.</b> RTS-1191-0810-20	<b>Dates of Test</b> October 14 to 17, 2008	<b>Author Data</b> Shannon Muller

The radiated carrier harmonics were measured up to the 10<sup>th</sup> harmonic for low, middle and high channels in the GSM850 and PCS bands. Each band was measured in GSM, GPRS, and EDGE mode. Both the horizontal and vertical polarizations were measured. The harmonic emissions above the 4<sup>th</sup> harmonic were in the noise floor (NF) for the GSM850 and PCS bands.

The worst test margin in the GSM850 band for GSM and EDGE modes harmonic emissions measured was 18.22 dB below the limit at 2512.695 MHz.

The worst test margin in the PCS band for GSM and EDGE modes harmonic emissions measured was 4.03 dB below the limit at 1930.872 MHz.

Both the horizontal and vertical polarizations were measured. The emissions due to different simultaneous transmission did not increase the amplitude of any emissions nor did it produce any new inter-modulation products as a result of mixing.

**Sample Calculation:**

Field Strength (dBµV/M) is calculated as follows:

$$FS = \text{Measured Level (dB}\mu\text{V)} + \text{A.F. (dB/m)} + \text{Cable Loss (dB)} - \text{Preamp (dB)} + \text{Filter Loss (dB)}$$

To view the test data see APPENDIX 1.

**Measurement Uncertainty ±4.6 dB**

<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RCC51UW	
<b>Test Report No.</b> RTS-1191-0810-20	<b>Dates of Test</b> October 14 to 17, 2008	<b>Author Data</b> Shannon Muller

## H) Compliance Test Equipment Used

<u>UNIT</u>	<u>MANUFACTURER</u>	<u>MODEL</u>	<u>SERIAL NUMBER</u>	<u>CAL DUE DATE</u> (YY MM DD)	<u>USE</u>
Preamplifier	Sonoma	310N/11909A	185831	08-11-21	Radiated Emissions
Preamplifier system	TDK RF Solutions	PA-02	080010	08-11-16	Radiated Emissions
Preamplifier	Rohde & Schwarz	TS-ANA4-SP	001	09-06-03	Radiated Emissions
Preamplifier	Rohde & Schwarz	TS-ANA-SP	001	09-02-29	Radiated Emissions
Hybrid Log Antenna	TDK	HLP-3003C	017301	08-12-15	Radiated Emissions
Horn Antenna	TDK	HRN-0118	030101	10-07-22	Radiated Emissions
Horn Antenna	TDK	HRN-0118	030201	09-01-17	Radiated Emissions
Horn Antenna	Emco	3117	47653	09-07-03	Radiated Emissions
Horn Antenna	CMT	LHA 0180	R52734-001	09-12-17	Radiated Emissions
Preamplifier	TDK	18-26	030002	08-11-20	Radiated Emissions
Dipole Antenna	Schwarzbeck	UHAP	973	08-12-18	Radiated Emissions
Dipole Antenna	Schwarzbeck	UHAP	1018	09-02-19	Radiated Emissions
EMC Analyzer	Agilent	E7405A	US40240226	09-01-01	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	837493/073	08-12-06	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	112394	08-12-10	Radiated Emissions
EMI Receiver	Rohde & Schwarz	ESIB-40	100255	08-12-24	Radiated Emissions
Environment Monitor	Control Company	1870	230355190	08-12-11	Radiated Emissions
Signal Generator	Agilent	83630B	3844A00927	08-12-28	Radiated Emissions

<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RCC51UW <b>APPENDIX 1</b>	
<b>Test Report No.</b> RTS-1191-0810-20	<b>Dates of Test</b> October 14 to 17, 2008	<b>Author Data</b> Shannon Muller

## APPENDIX 1 – RADIATED EMISSIONS TEST DATA

































<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RCC51UW <b>APPENDIX 1</b>	
<b>Test Report No.</b> RTS-1191-0810-20	<b>Dates of Test</b> October 14 to 17, 2008	<b>Author Data</b> Shannon Muller

Radiated Emissions Test Data Results cont'd

**PCS1900 EDGE**

The environmental tests conditions were: Temperature 23° C  
Pressure 1010-1017 mb  
Relative Humidity 24-31%

Date of Test: October 15 and 17, 2008

Test Distance was 3.0 metres with a height of 1.0 metres, 30 MHz to 1000 MHz and 18 GHz to 20 GHz.

The BlackBerry® smartphone PIN 20C856F6 was in standalone, vertical position.

The measurements were performed in PCS1900 Tx mode, channel 661.

All emissions had a test margin greater than 25.0 dB.

The environmental tests conditions were: Temperature 25-25.5° C  
Pressure 1016-1018 mb  
Relative Humidity 30%

Date of Test: October 14 and 16, 2008

Test Distance was 3.0 metres with a height of 1.0 metres, 1 GHz to 7 GHz and 7 GHz to 18 GHz.

The BlackBerry® smartphone PIN 20C85601 was in standalone, horizontal position.

The measurements were performed in PCS1900 Tx mode, channel 661.

Frequency (MHz)	Antenna		Test Angle (Deg.)	Detector (PK or QP)	Measured Level (dBµV)	Correction Factor for preamp/antenna/cables/ filter (dB)	Field Strength Level (reading+corr) (dBm)	Limit @ 3.0 m (dBm)	Test Margin (dB)
	Pol. (V/H)	Height (metres)							
1989.900	V	1.00	90	PK	66.02	-89.88	-23.85	-13.00	-10.85
11990.250	H	3.22	177	PK	40.43	-67.91	-27.48	-13.00	-14.48
14600.050	H	3.62	0	PK	40.47	-70.00	-29.52	-13.00	-16.52

All other emissions had a test margin greater than 25.0 dB.

