

# **EMI Test Report**

Tested in accordance with  
Federal Communications Commission (FCC)  
Personal Communications Services  
CFR 47, Parts 15, Subpart B  
&  
Industry Canada (IC), ICES-003

## **RIM Testing Services (RTS)**

**A division of Research In Motion Limited**

**REPORT NO.:** RTS-0510-0706-07

**PRODUCT MODEL NO.:** RBJ41GW  
**TYPE NAME:** BlackBerry® smartphone  
**FCC ID:** L6ARBJ40GW  
**IC:** 2503A-RBJ40GW

**DATE:** 20 June 2007

<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RBJ41GW	
<b>Test Report No.</b> RTS-0510-0706-07	<b>Dates of Test</b> May 24 to 30, 2007	<b>Author Data</b> V. Olaganathan

**Statement of Performance:**

The BlackBerry® smartphone, model RBJ41GW, part number CER-15665-001 Rev 3, 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.

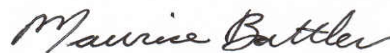
The test methods were consistent with the methods described in the relevant standards.

Tested and documented by:



Vimal Olaganathan  
Compliance Specialist  
Date: 20 Jun 2007

Reviewed by:



Maurice Battler  
Compliance Specialist  
Date: 28 Jun 2007

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Date: 28 Jun 2007

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Director  
Date: 29 Jun 2007

<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RBJ41GW	
<b>Test Report No.</b> RTS-0510-0706-07	<b>Dates of Test</b> May 24 to 30, 2007	<b>Author Data</b> V. Olaganathan

## Table of Contents

A.	Scope .....	4
B.	Associated Document.....	4
C.	Product Identification.....	4
D.	Support Equipment Used for the Testing of the EUT .....	5
E.	Test Voltage .....	5
F.	Test Results Chart.....	6
G.	Modifications to EUT .....	6
H.	Summary of Results .....	6
I.	Compliance Test Equipment Used .....	9
APPENDIX 1 - AC LINE CONDUCTED EMISSIONS TEST DATA .....		10
APPENDIX 2 - RADIATED EMISSIONS TEST DATA.....		17

<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RBJ41GW	
<b>Test Report No.</b> RTS-0510-0706-07	<b>Dates of Test</b> May 24 to 30, 2007	<b>Author Data</b> V. Olaganathan

## A. Scope

This report details the results of compliance tests that were performed in accordance with the requirements of:

- FCC CFR 47 Part 15, Subpart B, August 14 2006, Class B Digital Devices, Unintentional Radiators
- IC ICES-003 Issue 4, February 2004, Class B Digital Devices, Unintentional Radiators
- EN55022: 1998 A1:2000/A2:2003 Conducted/Radiated Emissions Class B

## B. Associated Document

1. Document number RTS-0510-RBJ41GW-03

## C. Product Identification

Manufactured by Research In Motion Limited 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 RIM Testing Services (RTS) EMI test facility, located at:

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

The testing was performed on May 24 to 30, 2007.

<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RBJ41GW	
<b>Test Report No.</b> RTS-0510-0706-07	<b>Dates of Test</b> May 24 to 30, 2007	<b>Author Data</b> V. Olaganathan

The sample EUT included:

SAMPLE	MODEL	CER NUMBER	PIN
1	RBJ41GW	CER-15665-001 Rev. 2	205E51F4
2	RBJ41GW	CER-15665-001 Rev. 3	205C6EEA

To view the differences between CER-15665-001 Rev 2 and CER-15665-001 Rev 3, see document number RTS-0510-RBJ41GW-03.

#### BlackBerry® smartphone Accessories Tested

- 1) Folding Blade Charger, part number ASY-07040-001 with an output voltage of 5.0 volts dc, 0.75 amps and attached USB cable with a lead length of 1.80 metres.
- 2) Alternative Captive Cable Charger, part number HDW-14917-001 with an output voltage of 5.0 volts dc, 0.5 amps and attached USB cable with a lead length of 1.80 metres.
- 3) Captive Cable Charger, part number ASY-07559-001 with an output voltage of 5.0 volts dc, 0.5 amps and attached USB cable with a lead length of 1.80 metres.
- 4) Alternative Folding Blade Charger, part number ASY-12709-001 with an output voltage of 5.0 volts dc, 0.75 amps with an attached USB cable with a length of 1.80 metres.
- 5) BlackBerry® Power Station, part number HDW-12736-001 Rev. 1
- 6) BlackBerry® Power Station, part number HDW-12736-001 Rev. 2
- 7) Stereo Headset, 3.5mm, part number HDW-14322-001, 1.3 metres long.
- 8) USB data cable, part number HDW-06610-001, 1.45 metres long.
- 9) Mini External Battery Charger, part number HDW-12738-001
- 10) TTY Adapter (3.5 mm plug to 2.5 mm jack), part number HDW-15306-002
- 11) Stereo Headset, 2.5mm, part number HDW-13019-001, 1.3 metres long

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

- 1) PC System, Myraid, model EN-P3B-7, serial number CCC0004078
- 2) Monitor, ViewSonic, model number VCDTS23103-2M, serial number 4B022952648
- 3) Printer, H/P, model number C5884A, serial number US8251W0VQ

#### **E. Test Voltage**

The ac input voltage was 120/230 volts, 60/50 Hz where applicable. This configuration was per RIM's specifications.

<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RBJ41GW	
<b>Test Report No.</b> RTS-0510-0706-07	<b>Dates of Test</b> May 24 to 30, 2007	<b>Author Data</b> V. Olaganathan

## F. Test Results Chart

SPECIFICATION	Test Type	MEETS REQUIREMENTS	Performed By
FCC CFR 47 Part 15, Subpart B IC ICES-003 Radiated Unintentional Spurious Emissions	Class B	Yes	Vimal Olaganathan Caitlin O'Neill
FCC CFR 47 Part 15, Subpart B IC ICES-003 Conducted AC Line Emission	Class B	Yes	Vimal Olaganathan Caitlin O'Neill

## G. Modifications to EUT

No modifications were required on the EUT.

## H. Summary of Results

SPECIFICATION		TEST TYPE	RESULT	TEST DATA APPENDIX
FCC CFR 47	IC			
Part 15, Subpart B	ICES-003	Conducted AC Line Emission	Pass	1
Part 15, Subpart B	ICES-003	Radiated Unintentional Spurious Emissions	Pass	2

<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RBJ41GW	
<b>Test Report No.</b> RTS-0510-0706-07	<b>Dates of Test</b> May 24 to 30, 2007	<b>Author Data</b> V. Olaganathan

#### a) AC LINE CONDUCTED EMISSIONS

The conducted emissions were measured using the test procedure outlined in CISPR Recommendation 22 through a 50 Ohm Line Impedance Stabilization Network (LISN), which was inserted in the power line to the equipment to provide the specified impedance for measurements. The EUT was placed on a nonconductive wooden table, 80 cm high that was positioned 40 cm from a vertical ground plane. The RF output of the network was connected to an EMI receiver system with characteristics that duplicate those of the receiver specified in CISPR Publication 16.

The following test configurations were measured. The input voltage was 230 V, 50 Hz. The Handheld was in idle and battery charging mode.

1. The BlackBerry® smartphone PIN 205E51F4, was connected to the Captive Cable Charger.
2. The BlackBerry® smartphone PIN 205E51F4, was connected to the Alternative Folding Blade Charger and Stereo Headset.
3. The BlackBerry® smartphone PIN 205E51F4, was connected to the Alternative Captive Cable Charger and the Stereo Headset through a TTY adapter.

The sample EUT's conducted emissions were compared with respect to the FCC CFR 47 Part 15, Subpart B, IC ICES-003, and EN55022 Class B limit. The sample EUT had a worse case test margin of 16.60 dB at 0.266 MHz below the Quasi-Peak limit using the QP detector for the Alternative Captive Cable Charger, test configuration 3.

#### **Measurement Uncertainty ±2.0 dB**

To view the test data/plots, see APPENDIX 1.

#### b) RADIATED EMISSIONS

The radiated emissions from the EUT were measured using the methods outlined in CISPR Recommendation 22. The EUT was placed on a nonconductive styrofoam table, 80 cm high that was positioned on a remote controlled turntable. The test distance used between the EUT and the receiving antenna was three metres. The turntable was rotated to determine the azimuth of the peak emissions. Then the emissions were maximized by elevating the antenna in the range of 1 to 4 metres. The maximum emission level was recorded. The frequency range measured was from 30 MHz to 1.0 GHz. Both the horizontal and vertical polarisations of the emissions were measured.

The measurements were done in a semi-anechoic chamber. The semi-anechoic chamber FCC registration number is **778487** and the Industry Canada file number is **IC4240**.

<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RBJ41GW	
<b>Test Report No.</b> RTS-0510-0706-07	<b>Dates of Test</b> May 24 to 30, 2007	<b>Author Data</b> V. Olaganathan

The EUT was configured and operated to produce the maximum radiated emissions while still keeping within RIM's specifications.

The Handheld was in idle and battery charging mode. The input voltage was 120 V, 60 Hz for modes 1-4, 6-7 and 230 V, 50 Hz for mode 5. The following test configurations were measured:

1. The BlackBerry® smartphone PIN 205E51F4, was connected to the Folding Blade Charger and to the Stereo Headset through the TTY Adapter.
2. The BlackBerry® smartphone PIN 205E51F4, was connected to the Captive Cable Charger and to the Stereo Headset.
3. The BlackBerry® smartphone PIN 205E51F4, was connected to the Alternative Folding Blade Charger.
4. The BlackBerry® smartphone PIN 205E51F4 in Bluetooth transmit mode and battery charging mode was connected to the MDS rev1, and a PC through the USB port.
5. The BlackBerry® smartphone PIN 205E51F4 in Bluetooth transmit mode and battery charging mode was connected to the MDS rev1, and a PC through the USB port.
6. The BlackBerry® smartphone PIN 205E51F4 in wi-fi 802.11b/g transmit mode and battery charging mode was connected to the MDS rev2, which was connected to an extra Bluetooth headset.
7. The BlackBerry® smartphone PIN 205E51F4 in wi-fi 802.11b/g transmit mode and battery charging mode was connected to the Alternative Captive Cable Charger and a mono headset (2.5mm) through a headset adapter.

The system's radiated emission levels in idle mode were compared with respect to the FCC CFR 47 Part 15, Subpart B, IC ICES-003, and EN55022 Class B limit. The system met the requirements with a worse case emission test margin of 12.81 dB at 36.942 MHz using test configuration 5.

**Sample Calculation:**

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

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

**Measurement Uncertainty ±4.0 dB**

To view the test data see APPENDIX 2.



<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RBJ41GW	
<b>Test Report No.</b> RTS-0510-0706-07	<b>Dates of Test</b> May 24 to 30, 2007	<b>Author Data</b> V. Olaganathan

## I. 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	07-11-23	Radiated Emissions
Preamplifier system	TDK RF Solutions	PA-02	080010	07-11-22	Radiated Emissions
EMI Receiver	Agilent	8546A	3942A00517	07-09-21	Conducted/Radiated Emissions
RF Filter Section	Agilent	85460A	3704A00481	07-09-21	Conducted/Radiated Emissions
Digital Multimeter	Hewlett Packard	34401A	US36042324	07-09-19	Conducted/Radiated Emissions
Environment Monitor	Control Company	1870	230355190	07-12-28	Conducted/Radiated Emissions
L.I.S.N.	Emco	3816/2	1120	08-08-28	Conducted Emissions
Impulse Limiter	Rohde & Schwarz	ESHS-Z2	836248/052	07-11-20	Conducted Emissions
Hybrid Log Antenna	TDK	HLP-3003C	17401	08-08-04	Radiated Emissions
Universal Radio Communication Tester	R&S	CMU 200	837493/073	07-12-01	Radiated/Conducted Emission
Wifi Router AP	Cisco	AIR-AP1232AG-A-K9	FTX1026E0F2	N/R	Radiated/Conducted Emission
EMC Analyzer	Agilent	E7405A	US40240226	07-10-20	Radiated Emissions

<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RBJ41GW	
<b>Test Report No.</b> RTS-0510-0706-07	<b>Dates of Test</b> May 24 to 30, 2007	<b>Author Data</b> V. Olaganathan

## APPENDIX 1 - AC LINE CONDUCTED EMISSIONS TEST DATA

<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RBJ41GW	
<b>Test Report No.</b> RTS-0510-0706-07	<b>Dates of Test</b> May 24 to 30, 2007	<b>Author Data</b> V. Olaganathan

### AC Conducted Emissions Test Results

The environmental test conditions were:    Temperature            24°C  
    Pressure                        1018mb  
    Relative Humidity        30%

### Test Configuration 1

FCC CFR 47 Part 15, Subpart B (CISPR 22), IC ICES-003, Class B

Date of test: May 25, 2007

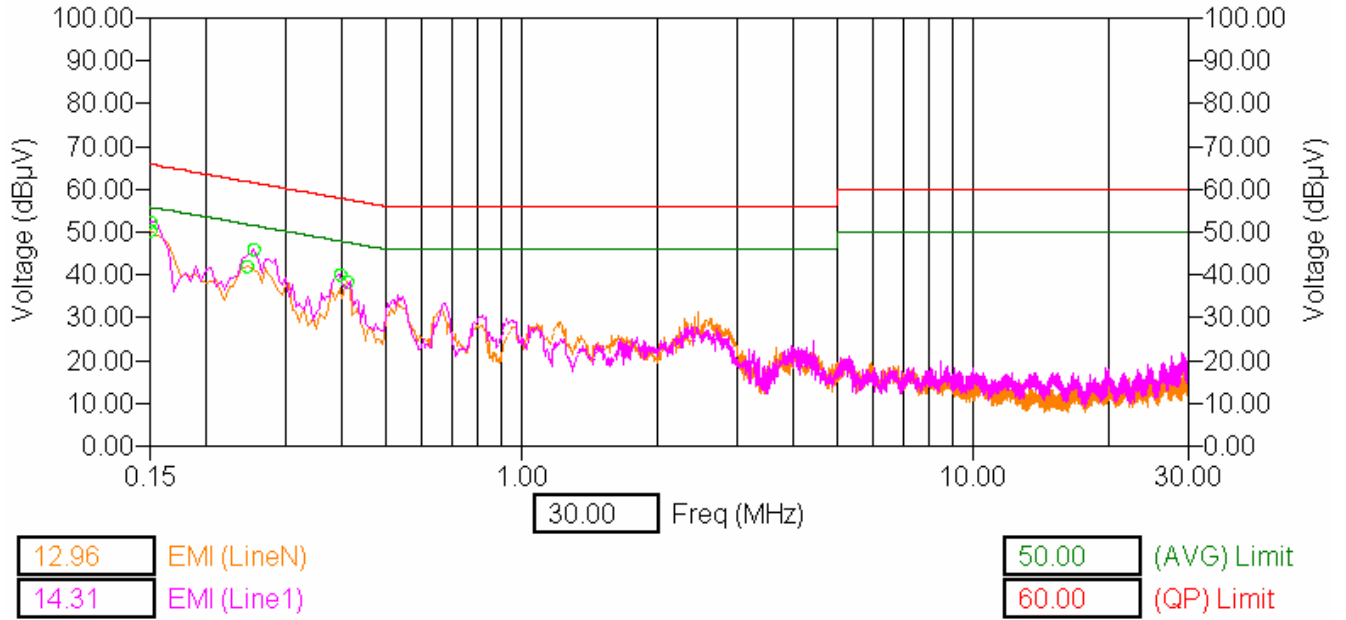
Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dB)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)	Margin (AV) Limits (dB)
0.152	N	36.98	9.82	46.80	66.00	56.00	-19.20	-9.20
0.151	L1	38.30	9.82	48.12	66.00	56.00	-17.88	-7.88
0.247	N	25.98	9.86	35.84	61.92	51.92	-26.09	-16.09
0.269	L1	34.13	9.86	43.99	61.59	51.59	-17.60	-7.60
0.398	L1	28.16	9.82	37.98	57.96	47.96	-19.98	-9.98
0.401	N	23.92	9.82	33.74	57.65	47.65	-23.90	-13.90

All other emission levels had a test margin of greater than 25 dB.

See graph 1 for the measurement plot.

<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RBJ41GW	
<b>Test Report No.</b> RTS-0510-0706-07	<b>Dates of Test</b> May 24 to 30, 2007	<b>Author Data</b> V. Olaganathan

AC Conducted Emissions Test Graph 1



Test Configuration 1

<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RBJ41GW	
Test Report No. RTS-0510-0706-07	Dates of Test May 24 to 30, 2007	Author Data V. Olaganathan

### AC Conducted Emissions Test Results

The environmental test conditions were:

Temperature	24°C
Pressure	1017mb
Relative Humidity	30%

### Test Configuration 2

FCC CFR 47 Part 15, Subpart B (CISPR 22), IC ICES-003, Class B

Date of test: May 24, 2007

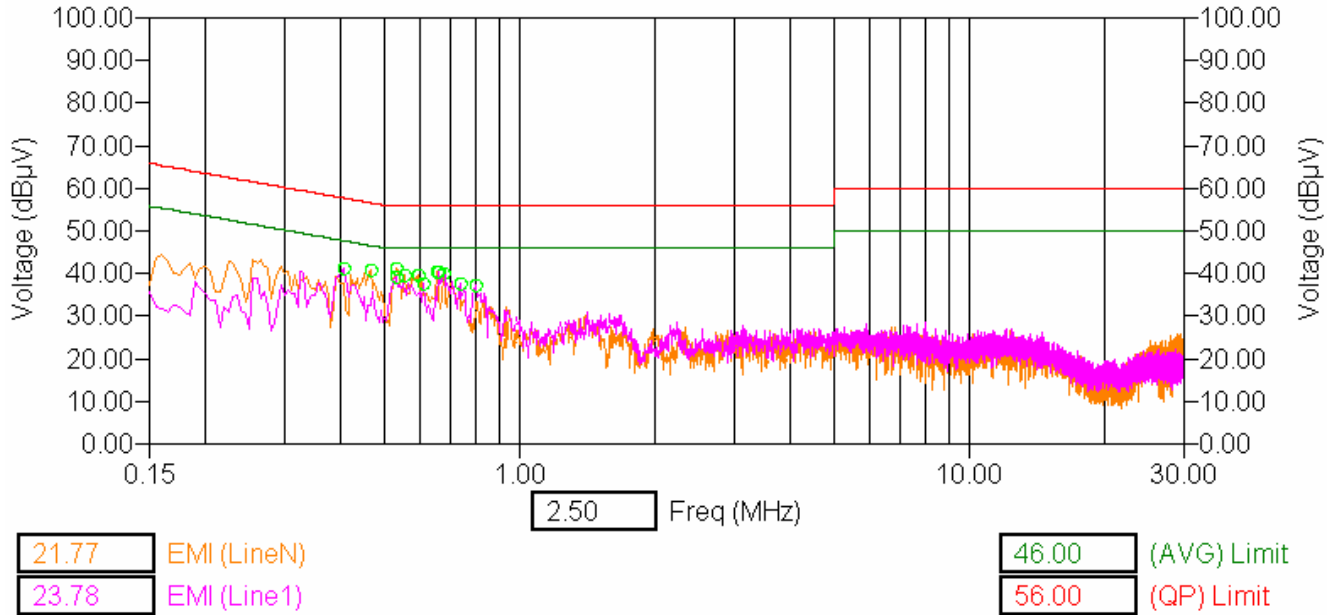
Frequency (MHz)	Line	Reading (QP) (dBµV)	Correction Factor (dB)	Corrected Reading (QP) (dB)	Limit (QP) (dBµV)	Limit (AV) (dBµV)	Margin (QP) Limits (dB)	Margin (AV) Limits (dB)
0.407	L1	29.15	9.82	38.97	57.75	47.75	-18.78	-8.78
0.461	N	25.22	9.84	35.06	56.60	46.60	-21.54	-11.54
0.537	N	28.79	9.84	38.63	56.00	46.00	-17.37	-7.37
0.526	L1	26.33	9.84	36.17	56.00	46.00	-19.83	-9.83
0.558	N	25.80	9.84	35.64	56.00	46.00	-20.36	-10.36
0.587	N	24.54	9.84	34.38	56.00	46.00	-21.62	-11.62
0.602	L1	23.27	9.85	33.12	56.00	46.00	-22.88	-12.88
0.654	N	27.15	9.87	37.02	56.00	46.00	-18.98	-8.98
0.659	L1	26.89	9.87	36.76	56.00	46.00	-19.24	-9.24
0.664	N	26.76	9.86	36.62	56.00	46.00	-19.38	-9.38
0.723	L1	25.87	9.86	35.73	56.00	46.00	-20.27	-10.27
0.787	L1	25.88	9.87	35.75	56.00	46.00	-20.25	-10.25

All other emission levels had a test margin of greater than 25 dB.

See graph 2 for the measurement plot.

<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RBJ41GW	
<b>Test Report No.</b> RTS-0510-0706-07	<b>Dates of Test</b> May 24 to 30, 2007	<b>Author Data</b> V. Olaganathan

AC Conducted Emissions Test Graph 2

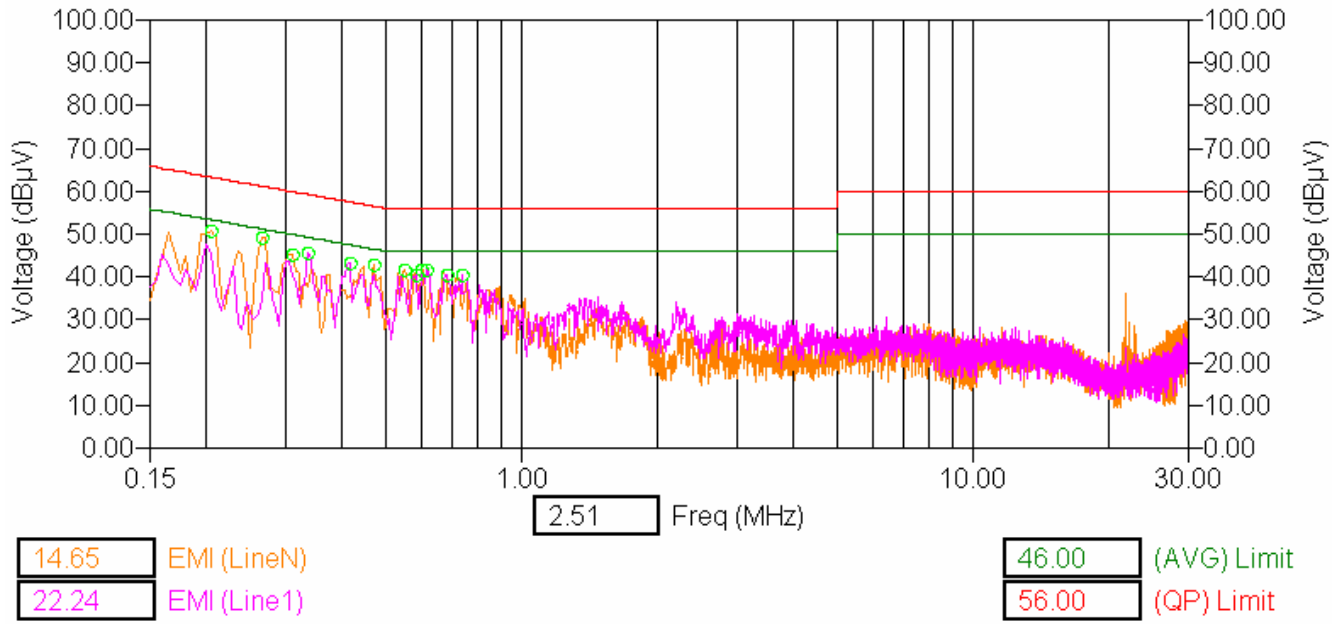


Test Configuration 2



<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RBJ41GW	
<b>Test Report No.</b> RTS-0510-0706-07	<b>Dates of Test</b> May 24 to 30, 2007	<b>Author Data</b> V. Olaganathan

### AC Conducted Emissions Test Graph 3



### Test Configuration 3



<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RBJ41GW	
<b>Test Report No.</b> RTS-0510-0706-07	<b>Dates of Test</b> May 24 to 30, 2007	<b>Author Data</b> V. Olaganathan

## APPENDIX 2 - RADIATED EMMISIONS TEST DATA

<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RBJ41GW	
<b>Test Report No.</b> RTS-0510-0706-07	<b>Dates of Test</b> May 24 to 30, 2007	<b>Author Data</b> V. Olaganathan

Radiated Emissions Test Results

The environmental test conditions were:

Temperature	25°C
Pressure	1020 mb
Relative Humidity	30%

Test Configuration 1

FCC CFR 47 Part 15 Subpart B, IC ICES-003 and EN 55022, Class B

Date of test: May 29, 2007

Test Distance was 3.0 metres.

Frequency (MHz)	Antenna		Test Angle (Deg.)	Detector (Q.P. or Peak)	Measured Level (dB $\mu$ V)	Correction Factor for preamp/antenna / cables/ filter (dB/m)	Field Strength Level (reading+corr) (dB $\mu$ V/m)	Limit @ 3.0 m (dB $\mu$ V/m)	Test Margin (dB)
	Pol. (V/H)	Height (metres)							
-	-	-	-	-	-	-	-	-	-

All emission levels had a test margin of greater than 25 dB.









<b>RTS</b> RIM Testing Services	EMI Test Report for the BlackBerry® smartphone Model RBJ41GW	
<b>Test Report No.</b> RTS-0510-0706-07	<b>Dates of Test</b> May 24 to 30, 2007	<b>Author Data</b> V. Olaganathan

### Test Configuration 6

The environmental test conditions were:

Temperature	25°C
Pressure	1021 mb
Relative Humidity	30%

Date of test: May 29, 2007  
Test Distance was 3.0 metres.

Frequency (MHz)	Antenna		Test Angle (Deg.)	Detector (Q.P. or Peak)	Measured Level (dBµV)	Correction Factor for preamp/antenna / cables/ filter (dB/m)	Field Strength Level (reading+corr) (dBµV/m)	Limit @ 3.0 m (dBµV/m)	Test Margin (dB)
	Pol. (V/H)	Height (metres)							
32.960	H	3.99	97	QP	39.18	-19.04	20.14	40	-19.86
36.942	V	1.54	328	QP	46.59	-21.46	25.13	40	-14.87
109.552	H	2.71	103	QP	46.19	-21.71	24.48	40	-15.52

All other emission levels had a test margin of greater than 25 dB.

