

EMI Test Report

Tested in accordance with
Federal Communications Commission (FCC)
Personal Communications Services
CFR 47, Parts 2, 22 and 24

RIM Testing Services (RTS)

A division of Research In Motion Limited

REPORT NO.: RTS-0447-0606-18

PRODUCT MODEL NO.: RBH42GW, RBH44GW
TYPE NAME: BlackBerry
FCC ID: L6ARBH40GW
IC: 2503A-RBH40GW

DATE: 27-July-06

RTS RIM Testing Services	EMI Test Report for the BlackBerry Handheld Models RBH42GW, RBH44GW (BT off by SW)	
Test Report No. RTS-0447-0606-18	Dates of Test June 22-28, July 18, 2006	Author Data M. Attayi

Statement of Performance:

The BlackBerry Wireless Handheld, models RBH42GW and RBH44GW (BT off by SW), ASY-12892-001 Rev A_ASY-08740-003 Rev A and accessories when configured and operated per RIM's operation instructions, performs 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 by:



Edward A. Davidian
Compliance Specialist
Date: July 28, 2006

Reviewed by:

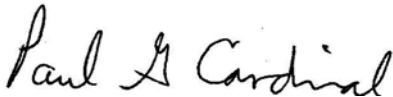


Maurice Battler
Compliance Specialist
Date: July 28, 2006



Masud S. Attayi, P.Eng.
Senior Compliance Engineer,
Date: 28-Jul-06

Approved by:



Paul G. Cardinal, Ph.D.
Manager
Date: 28-Jul-06

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Test Report No. RTS-0447-0606-18	Dates of Test June 22-28, July 18, 2006	Author Data M. Attayi

Table of Contents

A. Scope4

B. Associated Documents.....4

C. Product Identification.....4

D. Support Equipment Used for the Testing of the EUT5

E. Test Voltage5

F. Test Results Chart.....5

G. Modifications to EUT5

H. Summary of Results6

I. Compliance Test Equipment Used9

APPENDIX 1 – RADIATED EMMISIONS TEST DATA.....10

RTS RIM Testing Services	EMI Test Report for the BlackBerry Handheld Models RBH42GW, RBH44GW (BT off by SW)	
Test Report No. RTS-0447-0606-18	Dates of Test June 22-28, July 18, 2006	Author Data M. Attayi

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, 2000

FCC CFR 47 Part 22, Subpart H, Cellular Radiotelephone Services, Oct. 1, 2000

FCC CFR 47 Part 24 Subpart E, Broadband PCS, Oct 1. 2000

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 3, June 2005, 2 GHz Personal Communications Services.

B. Associated Documents

None.

C. Product Identification

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 June on 22-28, July 18, 2006. The sample EUT included:

1. BlackBerry model RBH42GW, PIN: 204156DE, ASY-12892-001 Rev A_ASY-08740-003 Rev A
2. Blackberry model RBH42GW, PIN 20484B6A, ASY-12892-001 Rev A_ASY-08740-003 Rev A

The transmit frequency bands operating in North America for the handheld are: GSM 824 to 849 MHz, PCS 1850 to 1910 MHz and Bluetooth 2402 to 2480 MHz.

RTS RIM Testing Services	EMI Test Report for the BlackBerry Handheld Models RBH42GW, RBH44GW (BT off by SW)	
Test Report No. RTS-0447-0606-18	Dates of Test June 22-28, July 18, 2006	Author Data M. Attayi

D. Support Equipment Used for the Testing of the EUT

- 1) Communication Tester, Rohde & Schwarz, model CMU 200, serial number 837493/073

E. Test Voltage

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

F. Test Results Chart

SPECIFICATION	TEST TYPE	MEETS REQUIREMENTS	PERFORMED BY
FCC CFR 47 Part 22, Subpart H IC RSS-132	Radiated Spurious/harmonic Emissions, ERP, LO	Yes	Edward Davidian and Masud Attayi
FCC CFR 47 Part 2, Subpart J, Part 22, Subpart H IC RSS-132	Conducted Output Power Conducted Emissions, Occupied Bandwidth, Frequency Stability	See Test Report RTS-0101-0508-08A	-
FCC CFR 47 Part 24, Subpart E IC RSS-133	Radiated Spurious/harmonic Emissions, EIRP, LO	Yes	Edward Davidian and Masud Attayi
FCC CFR 47 Part 24, Subpart E IC RSS-133	Conducted Emissions, Occupied Bandwidth, Frequency Stability	See Test Report RTS-0101-0508-08A	-

G. Modifications to EUT

No modifications were required on the EUT.

RTS RIM Testing Services	EMI Test Report for the BlackBerry Handheld Models RBH42GW, RBH44GW (BT off by SW)	
Test Report No. RTS-0447-0606-18	Dates of Test June 22-28, July 18, 2006	Author Data M. Attayi

H. Summary of Results

- 1) For Conducted Spurious Emissions requirements in the GSM850 band as per 47 CFR 2.1051, CFR 22.917, CFR 22.901(d) and RSS-132, see RTS-0101-0508-08A, Appendix 1 for test data.
- 2) For Conducted Spurious Emissions requirements in the PCS band as per 47 CFR 2.1051, CFR 24.238(a) and RSS-133, see RTS-0101-0508-08A, Appendix 1 for test data.
- 3) For Occupied Bandwidth and channel mask requirements in the GSM850 band as per 47 CFR 2.202, CFR 22.917 and RSS-132, see RTS-0101-0508-08A, Appendix 1 for test data.
- 4) For Occupied Bandwidth and channel mask requirements in the PCS band as per 47 CFR 2.202, CFR 24.238 and RSS-133, see RTS-0101-0508-08A, Appendix 1 for test data.
- 5) For Conducted RF Output Power requirements for both the GSM850 and PCS bands as per 47 CFR 2.1046(a), see RTS-0101-0508-08A, see Appendix 2 for test data.
- 6) For Frequency Stability vs. Temperature and Voltage requirements for GSM850 band as per 47 CFR 2.1055(a), 2.1055(d), CFR 22.917 and RSS-132, see RTS-0101-0508-08A, Appendix 3 for test data.
- 7) For Frequency Stability vs. Temperature and Voltage requirements for the PCS band as per 47 CFR 2.1055(a), 2.1055(d), 24.235 and RSS-133, see RTS-0101-0508-08A, Appendix 3 for test data.
- 8) The radiated spurious emissions/harmonics and ERP/EIRP were measured for both 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 EUT height of one metre was set in order to align it with the lowest height of the receiving antenna. 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. The maximum emissions level was recorded. Both the horizontal and vertical polarisations 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

RTS RIM Testing Services	EMI Test Report for the BlackBerry Handheld Models RBH42GW, RBH44GW (BT off by SW)	
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ERP measurements and a Horn antenna was used for EIRP measurements. After the final maximum reading was obtained the Handheld was substituted with a dipole or horn antenna, which was placed in the same location as the Handheld. 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 Handheld output reading. The signal generator output was recorded. Both the horizontal and vertical polarisations of the emissions were measured.

The measurements were performed in a semi-anechoic chamber. The semi-anechoic chamber FCC registration number is **778487** and the Industry Canada file number is **IC4240**. The EUT was measured on the low, middle and high channels.

The highest ERP in the GSM850 band measured was 29.95 dBm at 824.2 MHz (channel 128).

The highest EIRP in the PCS band measured was 29.6 dBm at 1880.00 MHz (channel 661).

The radiated carrier harmonics were measured up to the 10th harmonic for low, middle and high channels in the GSM850 band and PCS band. Both the horizontal and vertical polarizations were measured. The harmonic emissions above the 4th harmonic were in the noise floor (NF) for the GSM850 band and above the 2nd harmonic for the PCS band.

The worst test margin for GSM850 band harmonic emissions measured was 28.1 dB below the limit at 1675.20 MHz.

The worst test margin for PCS band harmonic emissions measured was 19.1 dB below the limit at 3760 MHz.

The EUT's RF local oscillator (LO) emissions were measured in the GSM850 band and PCS band in the standalone configuration in the thumbwheel down position on the low and high channels. Both the horizontal and vertical polarizations were measured. The RF LO emissions were in the NF.

RTS RIM Testing Services	EMI Test Report for the BlackBerry Handheld Models RBH42GW, RBH44GW (BT off by SW)	
Test Report No. RTS-0447-0606-18	Dates of Test June 22-28, July 18, 2006	Author Data M. Attayi

Sample Calculation:

Field Strength (dB μ V/M) is calculated as follows:

FS = Measured Level (dB μ V) + A.F. (dB/m) + Cable Loss (dB) - Preamp (dB) + Filter Loss (dB)

Measurement Uncertainty ± 4.0 dB

To view the test data see APPENDIX 4.

RTS RIM Testing Services	EMI Test Report for the BlackBerry Handheld Models RBH42GW, RBH44GW (BT off by SW)	
Test Report No. RTS-0447-0606-18	Dates of Test June 22-28, July 18, 2006	Author Data M. Attayi

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	06-11-27	Radiated Emissions
Preamplifier system	TDK RF Solutions	PA-02	080010	06-11-25	Radiated Emissions
Hybrid Log Antenna	TDK	HLP-3003C	017401	06-07-21	Radiated Emissions
Horn Antenna	TDK	HRN-0118	130092	06-09-24	Radiated Emissions
Horn Antenna	TDK	HRN-0118	30101	06-07-21	Radiated Emissions
Horn Antenna	Emco	3116	2538	06-09-27	Radiated Emissions
Preamplifier	TDK	18-26	3002	06-11-28	Radiated Emissions
Dipole Antenna	Schwarzbeck	UHAP	973	06-12-13	Radiated Emissions
Dipole Antenna	Schwarzbeck	UHAP	974	06-09-21	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	837493/073	07-03-03	Radiated Emissions
EMI Receiver	Rohde & Schwarz	ESIB-40	100255	07-05-11	Radiated Emissions
Environment Monitor	Control Company	1870	230355190	06-12-23	Radiated Emissions

RTS RIM Testing Services	EMI Test Report for the BlackBerry Handheld Models RBH42GW, RBH44GW (BT off by SW)	
Test Report No. RTS-0447-0606-18	Dates of Test June 22-28, July 18, 2006	Author Data M. Attayi

APPENDIX 1 – RADIATED EMISSIONS TEST DATA

RTS RIM Testing Services	EMI Test Report for the BlackBerry Handheld Models RBH42GW, RBH44GW (BT off by SW)	
Test Report No. RTS-0447-0606-18	Dates of Test June 22-28, July 18, 2006	Author Data M. Attayi

Radiated Emissions Test Data Results

The environmental tests conditions were: Temperature 24⁰ C
Pressure 1018 mb
Relative Humidity 32

Test distance is 3.0 metres

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method				
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Max (V,H) (dBuV)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Dipole)	Limit (dBm)	Diff. To Limit (dB)
GSM850 Band (ERP)												
Handheld Standalone, thumbwheel down												
F0	128	824.20	850	Dipole	V	76.9	87.4	V-V	14.8	29.95	38.50	-8.55
F0	128	824.20	850	Dipole	H	87.4		H-H	13			
F0	195	837.60	850	Dipole	V	75.6	86.2	V-V	13	28.15	38.50	-10.35
F0	195	837.60	850	Dipole	H	86.2		H-H	11.7			
F0	251	848.80	850	Dipole	V	75.4	86.0	V-V	12.1	27.25	38.50	-11.25
F0	251	848.80	850	Dipole	H	86		H-H	11.8			

ERP = Generator Level + Antenna Gain – Cable Loss + Preamp Gain

RTS RIM Testing Services	EMI Test Report for the BlackBerry Handheld Models RBH42GW, RBH44GW (BT off by SW)	
Test Report No. RTS-0447-0606-18	Dates of Test June 22-28, July 18, 2006	Author Data M. Attayi

Radiated Emissions Test Data Results cont'd

Test distance is 3.0 metres

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method				
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Max (V,H) (dBuV)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to dipole)	Limit (dBm)	Diff to Limit (dB)
GSM850 Band (Harmonics) Handheld Standalone, thumbwheel down												
Low Channel – 824.2 MHz												
2nd	128	1648.40	850	Horn	V	53.7	53.7	V-V	-10.9	-47.5	-13	-34.5
2nd	128	1648.40	850	Horn	H	53.1						
3rd	128	2472.60	850	Horn	V	48.5	48.5	V-V	-6.6	-42.9	-13	-29.9
3rd	128	2472.60	850	Horn	H	46.2						
4th	128	3296.80	850	Horn	V	46.5	46.5	V-V	-6.4	-42.5	-13	-29.5
4th	128	3296.80	850	Horn	H	45.6						

The harmonics were investigated up to the 10th harmonic.
Emissions above the 4th harmonic were in the noise floor (NF)

RTS RIM Testing Services	EMI Test Report for the BlackBerry Handheld Models RBH42GW, RBH44GW (BT off by SW)	
Test Report No. RTS-0447-0606-18	Dates of Test June 22-28, July 18, 2006	Author Data M. Attayi

Radiated Emissions Test Data Results cont'd

Test distance is 3.0 metres

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method				
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Max (V,H) (dBuV)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to dipole)	Limit (dBm)	Diff to Limit (dB)
GSM850 Band (Harmonics) Handheld Standalone, thumbwheel down												
Mid Channel –837.60 MHz												
2nd	195	1675.20	850	Horn	V	52.9	52.9	V-V	-4.5	-41.1	-13	-28.1
2nd	195	1675.20	850	Horn	H	50.1						
3rd	195	2512.80	850	Horn	V	NF		V-V			-13	
3rd	195	2512.80	850	Horn	H	NF	-		-	-		-
4th	195	3350.40	850	Horn	V	45.1	45.1	V-V	-8.2	-44.3	-13	-31.3
4th	195	3350.40	850	Horn	H	NF						

The harmonics were investigated up to the 10th harmonic.
Emissions above the 4th harmonic were in the NF.

RTS RIM Testing Services	EMI Test Report for the BlackBerry Handheld Models RBH42GW, RBH44GW (BT off by SW)	
Test Report No. RTS-0447-0606-18	Dates of Test June 22-28, July 18, 2006	Author Data M. Attayi

Radiated Emissions Test Data Results cont'd

Test distance is 3.0 metres

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method				
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Max (V,H) (dBuV)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to dipole)	Limit (dBm)	Diff to Limit (dB)
GSM850 Band (Harmonics) Handheld Standalone, thumbwheel down												
High Channel – 848.8 MHz												
2nd	251	1697.60	850	Horn	V	53.1	53.1	V-V	-11.2	-47.8	-13	-34.8
2nd	251	1697.60	850	Horn	H	52.8						
3rd	251	2546.40	850	Horn	V	45.6	45.6	V-V	-9.6	-45.9	-13	-32.9
3rd	251	2546.40	850	Horn	H	NF						

The harmonics were investigated up to the 10th harmonic.
Emissions above the 3rd harmonic were in the NF.

RTS RIM Testing Services	EMI Test Report for the BlackBerry Handheld Models RBH42GW, RBH44GW (BT off by SW)	
Test Report No. RTS-0447-0606-18	Dates of Test June 22-28, July 18, 2006	Author Data M. Attayi

Radiated Emissions Test Data Results cont'd

Test distance is 3.0 metres

EUT				Rx Antenna		Spectrum Analyzer		Substitution Method					
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Max (V,H) (dBuV)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to dipole)	Limit (dBm)	Diff to Limit (dB)	
GSM BAND													
RF Local Oscillator (LO ₁) Handheld Standalone, thumbwheel down													
Low Channel (824.2 MHz)													
F0	128	1648.40	850	Horn	V	NF	N/A	N/A	V-V	N/A	N/A	-13	N/A
F0	128	1648.40	850	Horn	H	NF							
Emissions were in the NF.													
High Channel (848.8 MHz)													
F0	251	1697.60	850	Horn	V	NF	N/A	N/A	V-V	N/A	N/A	-13	N/A
F0	251	1697.60	850	Horn	H	NF							
Emissions were in the NF.													
RF LO₂													
Low Channel (824.2 MHz)													
F0	128	3476.80	850	Horn	V	NF	N/A	N/A	V-V	N/A	N/A	-13	N/A
F0	128	3476.80	850	Horn	H	NF							
Emissions were in the NF.													
High Channel (848.8 MHz)													
F0	251	3575.20	850	Horn	V	NF	N/A	N/A	V-V	N/A	N/A	-13	N/A
F0	251	3575.20	850	Horn	H	NF							
Emissions were in the NF.													

RTS RIM Testing Services	EMI Test Report for the BlackBerry Handheld Models RBH42GW, RBH44GW (BT off by SW)	
Test Report No. RTS-0447-0606-18	Dates of Test June 22-28, July 18, 2006	Author Data M. Attayi

Radiated Emissions Test Data Results cont'd

Test Distance was 3.0 metres.

PCS Band

								Substitution Method				
EUT				Receive Antenna		Spectrum Analyzer		Tracking Generator				
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Max (V,H) dBuV	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Isotropic Radiator) (dBm)	Limit (dBm)	Diff to Limit (dB)
PCS BAND (EIRP)												
Handheld Standalone, horizontal												
F0	512	1850.20	1900	Horn	V	83.2	91.3	V-V	-8.2	27.6	33	-5.4
F0	512	1850.20	1900	Horn	H	91.3		H-H	-8			
F0	661	1880.00	1900	Horn	V	82.4	92.2	V-V	-6.5	29.6	33	-3.4
F0	661	1880.00	1900	Horn	H	92.2		H-H	-6			
F0	810	1909.80	1900	Horn	V	82.5	91.6	V-V	-6.8	29.3	33	-3.7
F0	810	1909.80	1900	Horn	H	91.6		H-H	-6.3			

EIRP = Tracking Generator Level + Antenna Factor – Cable Loss + Preamp Gain

RTS RIM Testing Services	EMI Test Report for the BlackBerry Handheld Models RBH42GW, RBH44GW (BT off by SW)	
Test Report No. RTS-0447-0606-18	Dates of Test June 22-28, July 18, 2006	Author Data M. Attayi

Radiated Emissions Test Data Results cont'd

Test Distance was 3.0 metres.

PCS Band

								Substitution Method				
EUT				Receive Antenna		Spectrum Analyzer		Tracking Generator				
Type	Ch	Frequency (MHz)	Band	Pol. Type	Pol.	Reading (dBuV)	Max (V,H) (dBuV)	Pol. Tx-Rx	Reading (dBm)	Corrected Reading (relative to Isotropic Radiator) (dBm)	Limit (dBm)	Diff to Limit (dB)
PCS BAND (Harmonics)												
Handheld standalone, thumbwheel down												
Low Channel 1850.20 MHz												
2 nd	512	3700.40	1900	Horn	V	46.6	47.2	V-V	-13.9	-36.5	-13	-23.5
2 nd	512	3700.40	1900	Horn	H	47.2						
The harmonics were investigated up to the 10th harmonic. Emissions above the 2 nd harmonic were in the NF												
Middle Channel 1880.00 MHz												
2 nd	661	3760.00	1900	Horn	V	47.8	49.8	V-V	-9.5	-32.1	-13	-19.1
2 nd	661	3760.00	1900	Horn	H	49.8						
The harmonics were investigated up to the 10th harmonic. Emissions above the 2 nd harmonic were in the NF												
High Channel 1909.8 MHz												
2 nd	810	3819.60	1900	Horn	V	47.8	48	V-V	-13	-35.6	-13	-22.6
2 nd	810	3819.60	1900	Horn	H	48						
The harmonics were investigated up to the 10th harmonic. Emissions above the 2 nd harmonic were in the NF												

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Test Report No. RTS-0447-0606-18	Dates of Test June 22-28, July 18, 2006	Author Data M. Attayi

Radiated Emissions Test Results cont'd

Test Distance was 3.0 metres.

PCS Band

EUT				Rx Antenna		Spectrum Analyzer			Substitution Method				
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Corrected Reading (dBuV)	Max (V,H) (dBuV)	Pol. Tx- Rx	Reading (dBm)	Corrected Reading (relative to Isotropic Radiator) (dBm)	Limit (dBm)	Diff to Limit (dB)
RF LO₁													
Handheld standalone, thumbwheel down													
Low Channel													
F0	512	3700.4	1900	Horn	V	NF	NF	N/A	V-V	N/A	N/A	-13	N/A
F0	512	3700.4	1900	Horn	H	NF							
Emissions were in the NF													
High Channel													
F0	810	3819.6	1900	Horn	V	NF	NF	N/A	V-V	N/A	N/A	-13	N/A
F0	810	3819.6	1900	Horn	H	NF							
Emissions were in the NF													
RF LO₂													
Low Channel													
F0	512	3860.4	1900	Horn	V	NF	NF	N/A	V-V	N/A	N/A	-13	N/A
F0	512	3860.4	1900	Horn	H	NF							
Emissions were in the NF													
High Channel													
F0	810	3979.6	1900	Horn	V	NF	NF	N/A	V-V	N/A	N/A	-13	N/A
F0	810	3979.6	1900	Horn	H	NF							
Emissions were in the NF.													