

EMI Test Report



Research In Motion Limited

REPORT NO.: RIM-0024-0302-05

PRODUCT MODEL NO.: R6230GE

TYPE NAME: BlackBerry Wireless Handheld

FCC ID: L6AR6230GE

IC: 2503A-R6230GE

Date: _____ 07 March 2003 _____

Statement of Performance:

The BlackBerry Wireless Handheld, model R6230GE ASY-05707-001 Rev.C, tested with the following accessories: Travel Charger model number PSM05R-050Q part number ASY-04078-001, Audio Headset part number HDW-03458-001, USB data cable model number HDW-04162-001 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 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:

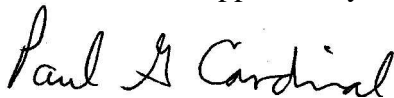


Masud S. Attayi, P.Eng.

Senior Compliance and Certification Engineer

Date: 07 March 2003

Reviewed and Approved by:



Paul G. Cardinal, Ph.D.

Manager, Compliance and Certification

Date: 07 March 2003

Table of Contents

| | |
|--|-------|
| A) Scope | Pg. 3 |
| B) Product Identification | Pg. 3 |
| C) Support Equipment Used for Testing of the EUT | Pg. 3 |
| D) Test Voltage | Pg. 4 |
| E) Test Results Chart | Pg. 4 |
| F) Modifications to EUT | Pg. 4 |
| G) Summary of Results | Pg. 4 |
| H) Compliance Test Equipment Used | Pg. 6 |

Appendix 1 Conducted Emissions Test Data/Plots

Appendix 2 Radiated Emissions Test Data

A) Scope

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

FCC CFR 47 Part 15, Subpart B, Oct. 1, 2000, Class B Digital Devices, Unintentional Radiators
IC ICES-003, Nov. 22, 1997, Class B Digital Devices, Unintentional Radiators

B) Product Identification

The equipment under test (EUT) was tested at the Research In Motion (RIM) EMI test facility, located at:

305 Phillip Street
Waterloo, Ontario
Canada, N2L 3W8
Phone: 519 888 7465
Fax: 519 888 6906
Web Site: www.rim.net

The testing began on February 17, 2003 and completed on February 28, 2003. The sample equipment under test (EUT) included:

- 1) BlackBerry Wireless Handheld, model number R6230GE, ASY-05707-001 Rev. C, PIN 2002004, IMEI 001020.00.027096.0, FCC ID L6AR6230GE, IC: 2503A-R6230GE.
- 2) USB data cable, model number HDW-04162-001, 1.4 metres long.
- 3) Travel Charger, model number PSM05R-050Q, part number ASY-04078-001 with an output voltage of 5.0 volts dc.
- 4) Headset, model number HDW-03458-001. The lead length was 1.25 metres long.

The transmit frequency ranges for the BlackBerry Wireless Handheld are: GSM band 880 to 915 MHz, DCS band 1710-1785 MHz and PCS band 1850 to 1910 MHz. Only the PCS band emissions were measured since the GSM 900 and DCS 1800 bands are not licensed bands in North America and therefore not tested.

C) Support Equipment Used for the Testing of the EUT

1. PC System, Myraid, model EN-P3B-F, serial number CCC0004078
2. Monitor, ViewSonic, model number VCDTS23103-2M, serial number 24B022952648
3. Printer, H/P, model number C5884A, serial number US8251W0VQ
4. Rohde & Schwarz, Universal Radio Communication Tester, model CMU200, serial number 837493/073

D) Test Voltage

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

E) Test Results Chart

| SPECIFICATION | Test Type | MEETS REQUIREMENTS | Performed By |
|--|-----------|-----------------------|--------------|
| FCC CFR 47 Part 15, Subpart B IC ICES-003 | Class B | Yes | Masud Attayi |

F) Modifications to EUT

No modifications were required on the EUT.

G) Summary of Results**a) CONDUCTED EMISSIONS**

The conducted emissions were measured while using the test procedure outlined in CISPR Recommendation 22 through a 50 Ω 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 a spectrum analyzer system with characteristics that duplicate those of the receiver specified in CISPR Publication 16.

The Travel Charger was connected to the handheld. The ac input to the Travel Charger was 120 volts, 60 Hz.

The sample EUT's conducted emissions were compared with respect to the FCC CFR 47 Part 15, Subpart B/IC ICES-003, Class B limit. The sample EUT had a worse case test margin of 23.0 dB at 0.710 MHz.

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 wooden table, 80 cm high that was positioned on a remotely rotatable turntable. The test distance used between the EUT and the receiving antenna was three metres. 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**. The turntable was rotated to determine the azimuth of the peak emissions. At this point 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 9 GHz which is the 5th harmonic of the highest RF local oscillator (LO) in the PCS band. Both the horizontal and vertical polarisations of the emissions were measured.

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

The following test configurations were measured:

- The handheld was connected to the Travel Charger via the USB data cable.
- The handheld was connected to the PC via the USB data cable for charging and data link.
- The handheld was in an upright position, standalone.

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, Class B limit.

The system **passed** with a worse case emission test margin of 11.56 dB at 503.440 MHz.

The EUT's RF local oscillator emissions were measured in the PCS band on the low, middle and high channels (512, 661 and 810) in the handheld standalone configuration in the upright position. Both the horizontal and vertical polarizations were measured up the 5th harmonic. No harmonics of the RF local oscillator were found above the spectrum analyzer noise floor.

The EUT's IF local oscillator emissions were measured in the low channel and high channel up to the 5th harmonic with the handheld in idle mode.

Both the horizontal and vertical polarizations of the emissions were measured. No fundamental or harmonics of the local oscillator were found above the spectrum analyzer noise floor.

Sample Calculation:

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

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

Measurement Uncertainty ±4.0 dB

To view the test data see APPENDIX 2.

Report No. RIM-0024-0302-05

Test Date: February 17 to 28, 2003

I) Compliance Test Equipment Used

| <u>UNIT</u> | <u>MANUFACTURER</u> | <u>MODEL</u> / <u>SERIAL NUMBER</u> | <u>CAL</u> <u>DUE</u> <u>DATE</u> | <u>USE</u> |
|--------------------------------------|---------------------|-------------------------------------|---|---------------------|
| | | | | |
| Preamplifier | Sonoma | 310N/11909A 185831 | 03-10-02 | Radiated Emissions |
| Preamplifier System | TDK | PA-02 080010 | 03-10-02 | Radiated Emissions |
| EMC Analyzer | Agilent | E7405A US40240226 | 03-03-21 | Radiated Emissions |
| Hybrid Log Antenna | TDK | HLP-3003C 17301 | 03-11-30 | Radiated Emissions |
| Universal Radio Communication Tester | Rohde & Schwarz | CMU200 837493/073 | 03-03-20 | Radiated Emissions |
| Horn Antenna | TDK | HRN-0118 130092 | 03-08-14 | Radiated Emissions |
| Horn Antenna | TDK | HRN-0118 030201 | 03-11-12 | Radiated Emissions |
| L.I.S.N. | Emco | 3816/2 1120 | 03-08-29 | Conducted Emissions |
| L.I.S.N. | Emco | 3816/2 1118 | 03-08-29 | Conducted Emissions |
| Impulse Limiter | Rohde & Schwarz | ESHS-Z2 836248/052 | 03-10-04 | Conducted Emissions |
| EMI Receiver | Agilent | 85462A 3942A00517 | 03-04-04 | Conducted Emissions |
| RF Filter Section | Agilent | 85460A 3704A00481 | 03-04-04 | Conducted Emissions |
| Signal Generator | HP | 83630B 3844A00927 | 04-04-30 | Radiated Emissions |
| Dipole Antenna | Schwarzbeck | VHAP 1006 | 03-09-12 | Radiated Emissions |
| Dipole Antenna | Schwarzbeck | VHAP 1007 | 03-09-12 | Radiated Emissions |
| | | | | |
| | | | | |

APPENDIX 1

CONDUCTED EMISSIONS TEST DATA/PLOTS

Conducted Emissions Test Results

FCC CFR 47 Part 15, Subpart B, Class B

February 28, 2003

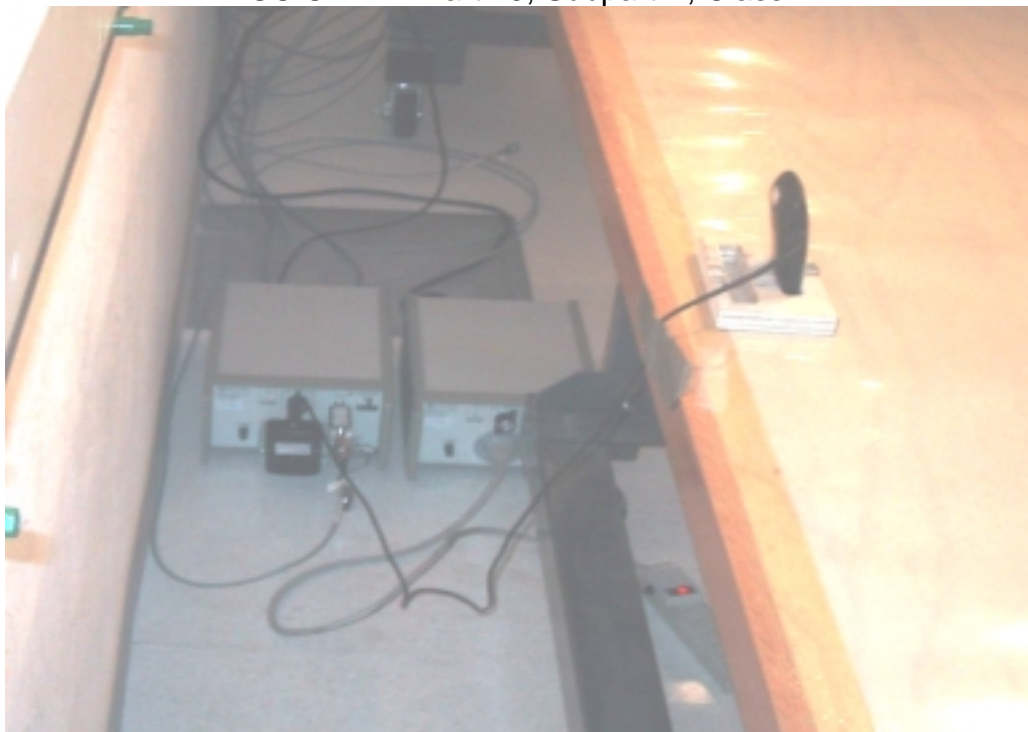
Operating Mode: The Travel Charger was connected to the handheld in battery charge mode. The ac input to the Travel Charger was 120 volts, 60 Hz.

| Frequency (MHz) | Line | <u>READING</u> Quasi-Peak (dB μ V) | Correction Factors for Impulse Limiter, LISN, Cable (dB) | QP Level (reading + Corr.Factor) (dB) | Limit (dB μ V) | Margin (dB) |
|--------------------|------|--|--|---|-----------------------|----------------|
| 0.710 | N | 15.18 | 9.80 | 24.98 | 48.0 | -23.02 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

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

Conducted Emission Test-Setup Photo

FCC CFR 47 Part 15, Subpart B, Class B



APPENDIX 2

RADIATED EMISSIONS TEST DATA

Radiated Emissions Test Results

FCC CFR 47 Part 15, Subpart B, Class B

February 10, 2003

Operating Mode: The handheld was connected to the Support PC System via the USB data cable. The handheld was operating in charging mode with data flood running. The Headset was connected to the handheld. The ac input to the support PC was 120 volts, 60 Hz.

| Frequency (MHz) | <u>Antenna</u> | | Test Angle (Deg.) | Detector (Q.P. or Peak) | Measured Level (dB μ V) | Correction Factors for preamp/antenna/cables/ filter (dB/m) | Field Strength Level (reading+corr.) (dB μ V/m) | Limit @ 3.0 m (dB μ V/m) | Test Margin (dB) |
|--------------------|----------------|--------------------|-------------------------|-------------------------------|-----------------------------------|--|--|------------------------------------|------------------------|
| | Pol. (V/H) | Height (metres) | | | | | | | |
| 120.120 | H | 1.54 | 124 | Q.P. | 50.35 | -18.76 | 31.59 | 43.5 | -11.91 |
| 156.010 | H | 2.33 | 351 | Q.P. | 50.16 | -18.51 | 31.65 | 43.5 | -11.85 |
| 201.350 | H | 1.82 | 179 | Q.P. | 43.90 | -15.58 | 28.32 | 43.5 | -15.18 |
| 500.380 | V | 1.73 | 182 | Q.P. | 41.18 | -8.31 | 32.87 | 46.0 | -13.13 |
| 503.380 | H | 2.02 | 34 | Q.P. | 35.56 | -8.27 | 27.29 | 46.0 | -18.71 |
| 503.440 | V | 1.66 | 177 | Q.P. | 42.71 | -8.27 | 34.44 | 46.0 | -11.56 |
| 600.980 | H | 1.66 | 97 | Q.P. | 39.26 | -5.68 | 33.58 | 46.0 | -12.42 |
| 604.050 | V | 1.63 | 18 | Q.P. | 36.51 | -5.69 | 30.82 | 46.0 | -15.18 |
| 624.110 | V | 2.09 | 137 | Q.P. | 29.03 | -5.82 | 23.21 | 46.0 | -22.79 |
| 704.290 | V | 1.40 | 353 | Q.P. | 34.71 | -4.43 | 30.28 | 46.0 | -15.72 |
| | | | | | | | | | |
| | | | | | | | | | |

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

Radiated Emissions Test Results con't

FCC CFR 47 Part 15, Subpart B, Class B

February 28, 2003

Operating Mode: The handheld was connected to the Travel Charger via the USB data cable. The handheld was operating in charging mode. The Headset was connected to the handheld. The ac input to the Travel Charger was 120 volts, 60 Hz.

| Frequency (MHz) | Antenna | | Test Angle (Deg.) | Detector (Q.P. or Peak) | Measured Level (dBµV) | Correction Factors 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) | | | | | | | |
| 143.200 | H | 2.00 | 139 | Q.P. | 41.77 | -18.49 | 23.28 | 43.5 | -20.22 |
| 143.600 | H | 1.57 | 185 | Q.P. | 42.13 | -18.49 | 23.64 | 43.5 | -19.86 |
| 147.800 | H | 2.08 | 130 | Q.P. | 42.97 | -18.47 | 24.50 | 43.5 | -19.00 |
| 155.400 | V | 1.94 | 126 | Q.P. | 37.66 | -18.51 | 19.15 | 43.5 | -24.35 |
| 156.000 | H | 1.65 | 135 | Q.P. | 48.37 | -18.51 | 29.86 | 43.5 | -13.64 |
| 156.000 | V | 1.57 | 214 | Q.P. | 46.50 | -18.51 | 27.99 | 43.5 | -15.51 |
| 208.100 | H | 2.56 | 178 | Q.P. | 42.26 | -14.41 | 26.67 | 43.5 | -16.83 |
| 221.000 | V | 1.40 | 174 | Q.P. | 42.48 | -15.63 | 26.85 | 46.0 | -19.15 |
| | | | | | | | | | |
| | | | | | | | | | |

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

Radiated Emissions Test Results con't

The measurements were performed with the handheld in standalone mode in the upright position (highest emissions configuration).

Test Distance is 3.0 metres.

PCS Band

February 14, 2003

| Type | Channel | Frequency | Antenna | | Reading | Corrected Reading | Limit | Diff. To Limit |
|---|---------|-----------|---------|-----|---------|-------------------|----------|----------------|
| | | (MHz) | Type | Pol | (dBuV) | (dBuV) | (dBuv/m) | (dB) |
| PCS BAND (Local Oscillator) | | | | | | | | |
| Transmit RF Local Oscillator (LO) | | | | | | | | |
| Low Channel | | | | | | | | |
| F0 | 512 | 1423.20 | Horn | V | NF | NF | 54 | |
| F0 | 512 | 1423.20 | Horn | H | NF | | | |
| The LO was measured up to the 5 th harmonic No Emissions could be seen above the spectrum analyzer noise floor. | | | | | | | | |
| Middle Channel | | | | | | | | |
| F0 | 661 | 1453.00 | Horn | V | NF | NF | 54 | |
| F0 | 661 | 1453.00 | Horn | H | NF | | | |
| The LO was measured up to the 5 th harmonic No Emissions could be seen above the spectrum analyzer noise floor. | | | | | | | | |
| High Channel | | | | | | | | |
| F0 | 810 | 1482.80 | Horn | V | NF | NF | 54 | |
| F0 | 810 | 1482.80 | Horn | H | NF | | | |
| The LO was measured up to the 5 th harmonic No Emissions could be seen above the spectrum analyzer noise floor. | | | | | | | | |



Report No. RIM-0024-0302-05

Test Date: February 17 to 28, 2003

Radiated Emissions Test Data con't

| Type | Channel | Frequency | Antenna | | Reading | Corrected Reading | Limit | Diff. To Limit |
|---|---------|-----------|---------|-----|---------|-------------------|----------|----------------|
| | | (MHz) | Type | Pol | (dBuV) | (dBuV) | (dBuv/m) | (dB) |
| Receive RF Local Oscillator (LO) | | | | | | | | |
| Low Channel | | | | | | | | |
| F0 | 512 | 1930.10 | Horn | V | NF | NF | 54 | |
| F0 | 512 | 1930.10 | Horn | H | NF | | | |
| The LO was measured up to the 5 th harmonic No Emissions could be seen above the spectrum analyzer noise floor. | | | | | | | | |
| Middle Channel | | | | | | | | |
| F0 | 661 | 1959.90 | Horn | V | NF | NF | 54 | |
| F0 | 661 | 1959.90 | Horn | H | NF | | | |
| The LO was measured up to the 5 th harmonic No Emissions could be seen above the spectrum analyzer noise floor. | | | | | | | | |
| High Channel | | | | | | | | |
| F0 | 810 | 1989.70 | Horn | V | NF | NF | 54 | |
| F0 | 810 | 1989.70 | Horn | H | NF | | | |
| The LO was measured up to the 5 th harmonic No Emissions could be seen above the spectrum analyzer noise floor. | | | | | | | | |



Report No. RIM-0024-0302-05

Test Date: February 17 to 28, 2003

Radiated Emissions Test Data con't

| Type | Channel | Frequency | Antenna | | Reading | Corrected Reading | Limit | Diff. To Limit |
|---|---------|-----------|---------|-----|---------|-------------------|----------|----------------|
| | | (MHz) | Type | Pol | (dBuV) | (dBuV) | (dBuv/m) | (dB) |
| IF Local Oscillator (Tx/Rx mode @ middle Channel 661 – 1880 MHz) | | | | | | | | |
| F0 | | 854.00 | Horn | V | NF | NF | 54 | |
| F0 | | 854.00 | Horn | H | NF | | | |
| The LO was measured up to the 5 th harmonic No Emissions could be seen above the spectrum analyzer noise floor. | | | | | | | | |

Radiated Emissions Test Photo

Radiated Emissions Test Photo