EMI Test Report

Tested in accordance with
Federal Communications Commission (FCC)
Personal Communications Services
CFR 47, Parts 2, 22 and 24
and
Industry Canada, RSS-133 and RSS-128

Research In Motion Limited

REPORT NO.: RIM-0086-0406-10

PRODUCT MODEL NO: RAP40GW
TYPE NAME: BlackBerry Wireless Handheld
FCC ID: L6ARAP40GW
IC: 2503A-RAP40GW

Date: _____08 July 2004_____

Declaration

Statement of Performance:

The BlackBerry Wireless Handheld, model RAP40GW ASY-07029-001, revision 1G 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 the manufacturers published specifications and operating parameters.
The test methods were consistent with the methods described in the relevant standards.

Tested by

Maurice Battler

Maurice Battler
Compliance Specialist Date: 08 July 2004

M. Attay

Masud S. Attayi, P.Eng.
Senior Compliance and Certification Engineer Date: 09 July 2004

Reviewed and Approved by:

Paul G Cardinal

Paul G. Cardinal, Ph.D.
Manager, Compliance and Certification Date: 09 July 2004

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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-128 Issue 2, Rev 1, Nov. 6/99, 800 MHz Dual-Mode TDMA Cellular Telephones
Industry Canada, RSS-133 Issue 2, Rev. 1 Nov. 6/1999, 2.0 GHz Personal Communications Services

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.com

The testing began on April 30, 2004 and completed on May 03, 2004. The sample equipment under test (EUT) was a BlackBerry Wireless Handheld, model number RAP40GW, ASY-07029-001 revision 1G, RF PCB version 003, PIN 201052B1, FCC ID L6ARAP40GW, IC: 2503A-RAP40GW.

The transmit frequency ranges for the BlackBerry Wireless Handheld model number RAP40GW are: GSM850 824 to 849 MHz, GSM 880 to 915 MHz, DCS 1710 to 1785 MHz, PCS 1850 to 1910 MHz, Bluetooth 2402 to 2480 MHz.

C) Associated Document

1. Test report number RIM-0086-0404-01

D) Support Equipment Used for the Testing of the EUT

1) Communication Tester, Rohde & Schwarz, model CMU 200, serial number 100251
2) DC Power Supply, H/P, model 6632B, serial number US37472178

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-128	Radiated Spurious/harmonic Emissions, ERP, LO	See test report RIM-0086-0404-01	Masud Attayi
FCC CFR 47 Part 2, Subpart J, Part 22, Subpart H IC RSS-128	Conducted Output Power Conducted Emissions, Occupied Bandwidth,	See test report RIM-0086-0404-01	Maurice Battler
IC RSS-128	Frequency and Power Stability	Yes	Maurice Battler
FCC CFR 47 Part 24, Subpart E IC RSS-133	Radiated Spurious/harmonic Emissions, EIRP, LO	See test report RIM-0086-0404-01	Masud Attayi
FCC CFR 47 Part 24, Subpart E IC RSS-133	Conducted Emissions, Occupied Bandwidth, Frequency Stability	See test report RIM-0086-0404-01	Maurice Battler

G) Modifications to EUT

No modifications were required to the EUT.

H) Summary of Results

1) The EUT passed the Frequency Stability and Power vs. Temperature and Voltage requirements for GSM850 band as per RSS-128.
The maximum frequency error measured was less than 0.1 ppm.
The temperature range was from -30°C to +60°C in 10° temperature steps. The EUT was measured on low, middle and high channels at each temperature step. The EUT was measured at low (3.5 volts), nominal (3.8 volts) and high (4.1 volts) dc input voltage at each temperature step and channel at maximum output power.
See APPENDIX 1 for the test data.

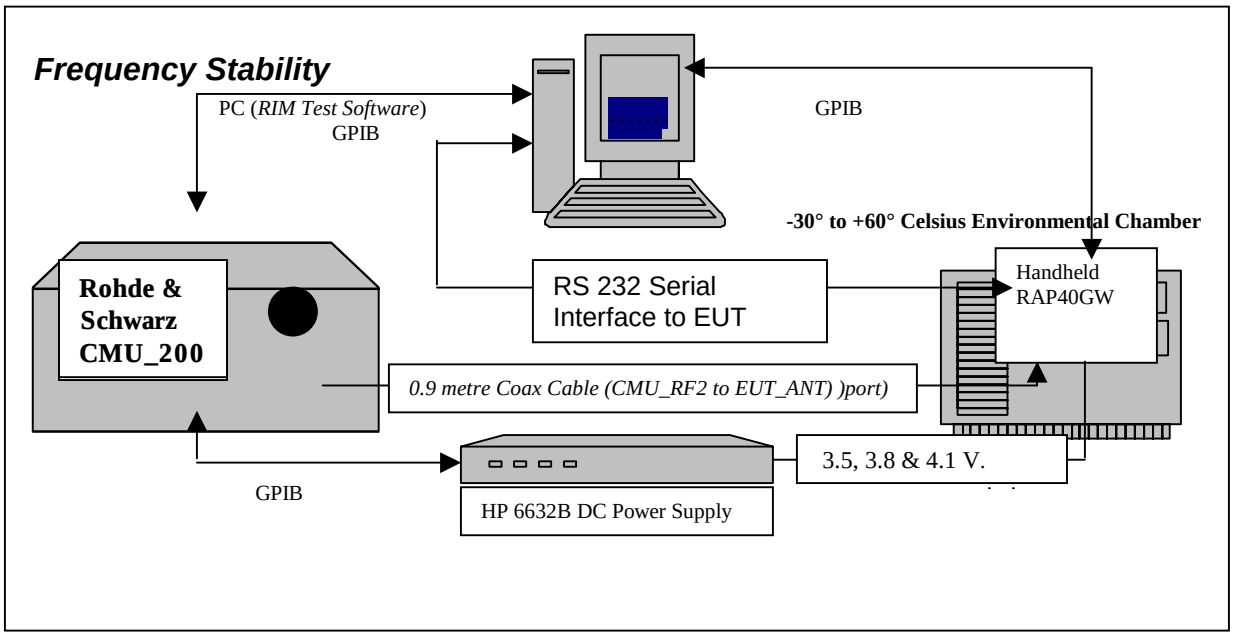
I) Compliance Test Equipment Used

UNIT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL DUE DATE (YY MM DD)	USE
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200	100251	05-04-21	Frequency Stability
DC Power Supply	HP	6632B	US37472178	04-08-01	Frequency Stability
Temperature Probe	Hart Scientific	61161-302	21352860	04-09-15	Frequency Stability
Environmental Chamber	ESPEC Corp.	SH-240S1	91005607	N/R	Frequency Stability

APPENDIX 1

FREQUENCY STABILITY TEST DATA

Frequency Stability Test Data



SYSTEM	*Model*	*Serial Number*	*Calibration Due Date.*
R & S Universal Radio Communication Test Set	CMU200	100251	21-April-2005
HP System DC Power Supply	6632B	US37472178	01-Aug-2004
Network Analyzer	HP 8753D	3410A07083	31-July-2004
Calibration Kit	HP85033C	2920A02997	20-Aug-2004
Espec Environmental Chamber	SH240S1	91004919	N/A
Hart Temperature Probe	61161-302	21352860	15-Sept-2004

CFR 47 Chapter 1 - Federal Communications Commission Rules

Part 2 Required Measurements
2.995 Frequency Stability - Procedures
(a,b) Frequency Stability - Temperature Variation
(d) Frequency Stability - Voltage Variation

24.235 *Frequency Stability.*
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

The RAP40GW handheld, (referred as EUT herein and after) transmitted frequencies are less than 0.1 ppm of the received frequency from the Rhode & Schwarz CMU 200 Universal Radio Communication Test Set.

The EUT meets the requirements as stated in CFR 47 chapter 1, Section 22.917 and RSS-128 Frequency Stability.

Frequency Stability measurement devices were configured as presented in the block diagram recording frequency, power, data, temperatures, and stepped voltages controlled via a GPIB interface linked to the Environmental chamber, a DC power supply, and the Communications Test Set. A 0.9-meter coax cable was calibrated to characterize the insertion loss for the transmitted frequencies between the RF input/output of the CMU 200 and the EUT antenna port; located inside the environmental chamber.

Calibration for the Cable Loss was performed in the RF Laboratory on 30 April 2004.

Procedure:
Full_ Two port Calibration of 8720D using the 85033D was completed.

The cable assembly from the RF input to the RF output was measured at the following Frequencies:

GSM 850 Frequency (MHz)	Cable loss (dB)
824.2	*0.83*
836.4	*0.83*
848.6	*0.83*

Procedure:

The EUT was placed in the Temperature chamber and connected to CMU 200 outside as shown in the figure above. Dry air was pumped inside the temperature chamber to maintain a backpressure during the test. The EUT was kept in the off condition at all times except when the measurements were to be made.

The chamber was switched on and the temperature was set to -30°C.
After the chamber stabilized at -30 °C there was a soak period of one hour to alleviate moisture in the chamber, the EUT voltage was enabled.
The system software recorded the frequency, power, and associated measurements.

A Computer system controlled the automated software. This application was given the command of activating all machines intrinsic to the temperature and voltage tests controlling the CMU 200 via the GPIB Bus. The Environmental Chamber was instructed through an RS-232 serial line. The EUT dialogue was passed through a serial connection.

The EUT repetitively transmitted 100 bursts for each set of programmed parameters recording temperature, voltage settings, and systematically selected frequencies. The power supply was cycled from minimum voltage 3.5 volts, to 3.8 volts to 4.1 volts nominal voltage.
The frequency error was measured at a maximum output power and recorded by the automated system test software.

The EUT output power and frequency was measured at 3.5 volts, 3.8 volts and 4.1 volts. The transmit frequency was varied in 3 steps consisting of 824.2, 836.4, and 848.6 MHz for the GSM850 band. This frequency was recorded in MHz and deviation from nominal, in Parts Per Million.

After the initial one-hour soak at the beginning of the start of the measurement tests, a period of thirty minutes soak was initialized between each ascending temperature step, before proceeding to the next measurement test cycle.

PROCEDURE:

The test system software for commencing the Frequency Stability Tests carried through the following cycle.

1. Switch on the HP 6632B power supply; CMU 200 Communications test Set, and Environmental Chamber.
2. Start test program
3. Set the Temperature to –30 degrees Celsius and maintain a period of one- hour soak time, with the EUT supply voltage disabled.
4. Set power supply voltage to 3.5 Volts.
5. Set up CMU 200 Radio Communication Tester.
6. Command the CMU 200 to switch to the low channel.
7. Enable the voltage to the EUT, and connect a link to the CMU 200 test set.
8. EUT is commanded to Transmit 100 Bursts.
9. Software logs the following data from the CMU 200, power supply and temperature chamber: Traffic Channel Number, Traffic Channel Frequency, Power Level, Chamber Temperature, Supply Voltage, Power, Frequency Error.
10. The CMU 200 commands the EUT to change frequency to the middle channel and high channel and repeats steps 7 to 9.
11. Repeat steps 5 to 10 changing the supply voltage to 3.8 Volts
12. Increase temperature by 10°C and soak for 1/2 hour.
13. Repeat steps 4 - 12 for temperatures –30 degrees to 60 degrees Celsius.
14. Repeat steps 5 to 10 changing the supply voltage to 4.1 Volts

Procedure 5 to 10 was repeated at room temperature (20°C) with the power supply voltage set to 3.5, 3.8 and 4.1 Volts.

The maximum frequency error in the GSM850 band measured was 0.0756 PPM.

GSM850 Channel results: channels 128, 189 and 250 @ 20°C maximum transmitted power

Traffic Channel Number	GSM850 Frequency (MHz)	Transmit Power (dBm)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.2	32.78	3.5	20	30.740	0.0373
189	836.4	32.87	3.5	20	35.640	0.0426
250	848.6	32.99	3.5	20	53.340	0.0629

Traffic Channel Number	GSM850 Frequency (MHz)	Transmit Power (dBm)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.2	32.80	3.8	20	30.740	0.0373
189	836.4	32.90	3.8	20	35.640	0.0426
250	848.6	33.02	3.8	20	53.340	0.0629

Traffic Channel Number	GSM850 Frequency (MHz)	Transmit Power (dBm)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.2	32.85	4.1	20	30.930	0.0375
189	836.4	32.96	4.1	20	31.960	0.0382
250	848.6	33.08	4.1	20	56.440	0.0665

GSM850 Results: channel 128 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Transmit Power (dBm)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.2	33.18	3.5	-30	60.250	0.0731
128	824.2	33.12	3.5	-20	46.490	0.0564
128	824.2	33.02	3.5	-10	49.200	0.0597
128	824.2	32.96	3.5	0	19.050	0.0231
128	824.2	32.87	3.5	10	23.440	0.0284
128	824.2	32.78	3.5	20	30.740	0.0373
128	824.2	32.71	3.5	30	47.650	0.0578
128	824.2	32.64	3.5	40	48.690	0.0591
128	824.2	32.54	3.5	50	50.560	0.0613
128	824.2	32.46	3.5	60	62.180	0.0754

Traffic Channel Number	Frequency (MHz)	Transmit Power (dBm)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.2	33.16	3.8	-30	45.780	0.0555
128	824.2	33.10	3.8	-20	39.450	0.0479
128	824.2	33.03	3.8	-10	48.300	0.0586
128	824.2	32.94	3.8	0	-27.830	-0.0338
128	824.2	32.87	3.8	10	-13.240	-0.0161
128	824.2	32.80	3.8	20	30.740	0.0373
128	824.2	32.72	3.8	30	48.620	0.0590
128	824.2	32.66	3.8	40	48.950	0.0594
128	824.2	32.58	3.8	50	51.530	0.0625
128	824.2	32.50	3.8	60	53.210	0.0646

Traffic Channel Number	Frequency (MHz)	Transmit Power (dBm)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
128	824.2	33.23	4.1	-30	47.400	0.0575
128	824.2	33.15	4.1	-20	39.650	0.0481
128	824.2	33.07	4.1	-10	45.590	0.0553
128	824.2	33.01	4.1	0	-21.570	-0.0262
128	824.2	32.94	4.1	10	27.830	0.0338
128	824.2	32.85	4.1	20	30.930	0.0375
128	824.2	32.79	4.1	30	54.050	0.0656
128	824.2	32.71	4.1	40	45.780	0.0555
128	824.2	32.62	4.1	50	57.730	0.0700
128	824.2	32.52	4.1	60	61.020	0.0740

GSM850 Results: channel 189 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Transmit Power (dBm)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
189	836.4	33.32	3.5	-30	56.500	0.0676
189	836.4	33.22	3.5	-20	51.140	0.0611
189	836.4	33.14	3.5	-10	44.810	0.0536
189	836.4	33.05	3.5	0	49.530	0.0592
189	836.4	32.97	3.5	10	54.950	0.0657
189	836.4	32.87	3.5	20	35.640	0.0426
189	836.4	32.78	3.5	30	51.210	0.0612
189	836.4	32.71	3.5	40	50.040	0.0598
189	836.4	32.62	3.5	50	51.720	0.0618
189	836.4	32.53	3.5	60	54.890	0.0656

Traffic Channel Number	Frequency (MHz)	Transmit Power (dBm)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
189	836.4	33.31	3.8	-30	54.820	0.0655
189	836.4	33.23	3.8	-20	49.980	0.0598
189	836.4	33.15	3.8	-10	48.300	0.0577
189	836.4	33.05	3.8	0	49.590	0.0593
189	836.4	32.99	3.8	10	47.980	0.0574
189	836.4	32.90	3.8	20	35.640	0.0426
189	836.4	32.83	3.8	30	53.720	0.0642
189	836.4	32.74	3.8	40	51.920	0.0621
189	836.4	32.67	3.8	50	56.630	0.0677
189	836.4	32.56	3.8	60	53.010	0.0634

Traffic Channel Number	Frequency (MHz)	Transmit Power (dBm)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
189	836.4	33.35	4.1	-30	54.180	0.0648
189	836.4	33.28	4.1	-20	52.170	0.0624
189	836.4	33.20	4.1	-10	45.010	0.0538
189	836.4	33.12	4.1	0	46.490	0.0556
189	836.4	33.04	4.1	10	54.630	0.0653
189	836.4	32.96	4.1	20	31.960	0.0382
189	836.4	32.87	4.1	30	53.590	0.0641
189	836.4	32.79	4.1	40	49.590	0.0593
189	836.4	32.71	4.1	50	58.760	0.0703
189	836.4	32.61	4.1	60	57.660	0.0689

GSM850 Results: channel 250 @ maximum transmitted power

Traffic Channel Number	Frequency (MHz)	Transmit Power (dBm)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
250	848.6	33.45	3.5	-30	59.020	0.0695
250	848.6	33.37	3.5	-20	56.630	0.0667
250	848.6	33.27	3.5	-10	53.140	0.0626
250	848.6	33.17	3.5	0	48.040	0.0566
250	848.6	33.08	3.5	10	42.550	0.0501
250	848.6	32.99	3.5	20	53.340	0.0629
250	848.6	32.91	3.5	30	50.750	0.0598
250	848.6	32.82	3.5	40	46.620	0.0549
250	848.6	32.72	3.5	50	58.570	0.0690
250	848.6	32.63	3.5	60	58.500	0.0689

Traffic Channel Number	Frequency (MHz)	Transmit Power (dBm)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
250	848.6	33.44	3.8	-30	57.340	0.0676
250	848.6	33.35	3.8	-20	61.540	0.0725
250	848.6	33.28	3.8	-10	51.400	0.0606
250	848.6	33.19	3.8	0	40.550	0.0478
250	848.6	33.12	3.8	10	43.390	0.0511
250	848.6	33.02	3.8	20	53.340	0.0629
250	848.6	32.94	3.8	30	47.400	0.0559
250	848.6	32.86	3.8	40	44.490	0.0524
250	848.6	32.78	3.8	50	58.050	0.0684
250	848.6	32.67	3.8	60	64.180	0.0756

Traffic Channel Number	Frequency (MHz)	Transmit Power (dBm)	Voltage (Volts)	Temperature (Celsius)	Frequency Error (Hz)	PPM
250	848.6	33.50	4.1	-30	55.660	0.0656
250	848.6	33.43	4.1	-20	57.600	0.0679
250	848.6	33.35	4.1	-10	54.370	0.0641
250	848.6	33.26	4.1	0	40.680	0.0479
250	848.6	33.17	4.1	10	46.430	0.0547
250	848.6	33.08	4.1	20	56.440	0.0665
250	848.6	33.01	4.1	30	47.270	0.0557
250	848.6	32.91	4.1	40	46.430	0.0547
250	848.6	32.82	4.1	50	57.020	0.0672
250	848.6	32.72	4.1	60	61.800	0.0728