

EMI Test Report



Research In Motion Limited

REPORT NO.: RIM-0207-03

PRODUCT Model No: R6510IN
Type Name : BlackBerry iDEN Wireless Handheld
FCC ID: L6AR6510IN
IC: 2503A-R6510IN

Approved by: _____ *Paul G. Cardinal* _____
Paul G. Cardinal, Ph.D.
Manager, Compliance and Certification

Date: 14 August, 2002



Table of Contents

A) Scope	Pg. 2
B) Associated Document	Pg. 2
C) Product Identification	Pg. 2
D) Support Equipment Used for Testing of the EUT	Pg. 3
E) Test Voltage	Pg. 3
F) Test Results Chart	Pg. 3
G) Modifications to EUT	Pg. 3
H) Summary of Results	Pg. 4
I) Compliance Test Equipment Used	Pg. 5
J) Declaration	Pg. 6
Appendix 1 Radiated Spurious/Harmonic Emissions and ERP Test Data	



RESEARCH IN MOTION

Report No. RIM-0207-03
2002

Page 2 of 6

Test Date: July 18,





A) Scope

This report and test report RIM-0206-02 detail the results of compliance tests which were performed in accordance with the requirements of:

FCC CFR 47 Part 2, Subpart L, Marketing of Radio Frequency Devices

FCC CFR 47 Part 90, Subpart I, General Technical Standards

Industry Canada, RSS-119 Issue 6, March 25/00, Land Mobile and Fixed Radio Transmitters and Receivers 27.41 to 960 MHz.

B) Associated Document

Test Report number RIM-0206-02

C) Product Identification

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

305 Phillip Street

Canada, N2L 3W8

Phone: 519 888 7465

Fax: 519 888 6906

Web Site: www.rim.net

The testing began on July 18, 2002 and was completed on July 18, 2002. The sample equipment under test (EUT) was a BlackBerry Wireless Handheld, model number R6510IN, FCC ID: L6AR6510IN, IC: 2503A-R6510IN, Rev. 4

The BlackBerry Wireless Handheld is an 800 MHz portable unit that uses two digital technologies: Quad 16QAM and Time Division Multiple Access (TDMA).

The BlackBerry Wireless Handheld that was measured in test report RIM-0206-02 was Rev. 2.

The differences between Rev. 2 and Rev. 4 models are:

the Main Board:

- o was changed to a 1-6-1 stackup from a 2-6-2.
- o four Debug Connectors were removed.
- o USB circuit was added.

the Daughter Card:

- o the NiTi wire length of the antenna was shortened by 10 mm.
- o the associated antenna matching network was updated.



RESEARCH IN MOTION

Report No. RIM-0207-03
2002

Page 4 of 6

Test Date: July 18,

Only the measurements that would be impacted by the changes from the Handheld Rev. 2 to the Handheld Rev. 4 were remeasured.



D) Support Equipment Used for the Testing of the EUT

1. PC System, Myraid, model EN-P3B-F, serial number CC0004078
2. Monitor, Mag Technology Co. Ltd., model MAG DX15T, serial number MA4254048362

E) Test Voltage

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

F) Test Results Chart

SPECIFICATION	Test Type	MEETS REQUIREMENTS	Performed By
FCC CFR 47 Part 2, Subpart L IC RSS-119	Radiated Spurious/harmonic Emissions, ERP	Yes	Masud Attayi
FCC CFR 47 Part 2, Subpart L, Part 90, Subpart I IC RSS-119	Conducted Emissions, Occupied Bandwidth	Yes, as per test report RIM-0206-02	Jonathan Doll Maurice Battler
FCC CFR 47, Part 2.947, 2.1055 and 90.213 IC RSS-119	Frequency Stability	Yes, as per test report RIM-0206-02	Jonathan Doll Maurice Battler Iain Wilson

G) Modifications to EUT

No modifications were required to the EUT.



H) Summary of Results

- 1) The EUT passed the Occupied Bandwidth and emission mask requirements as per 47 CFR 2.1049, 2.1053, 90.210 and 90.691. The channels measured were low, middle and high. See test report RIM-0206-02, APPENDIX 1 for the test data.
- 2) The EUT passed the Conducted Spurious Emissions requirements as per 47 CFR 2.1051. The EUT was measured in the middle channel. The frequency range investigated was from 10 MHz to 9 GHz. See test report RIM-0206-02, APPENDIX 1 for the test data.
- 3) The EUT passed the Conducted RF Output Power requirements as per 47 CFR 2.1046 and 2.1033. The channels measured were low, middle and high. See test report RIM-0206-02, APPENDIX 2 for the test data.
- 4) The EUT passed the Frequency Stability vs. Temperature and Voltage requirements as per CFR 47 2.1055, 90.213 and RSS-119. The maximum frequency error measured was less than 1 PPM. The temperature range was from -30°C to +55°C in 10 degree temperature steps. The EUT was measured on low, middle and high channels at each temperature step. The EUT was measured at low (3.50 volts), nominal (3.80 volts) and high (4.20 volts) dc input voltage at each temperature step and channel at maximum output power. The handheld's frequency was locked to the base station simulator. See test report RIM-0206-02, APPENDIX 3 for the test data.
- 5) The radiated spurious emissions/harmonics and ERP were measured. The results are within the limits. The EUT was placed on a nonconductive wooden table, 80 cm high that was positioned on a remotely rotateable turntable. The test distance used between the EUT and the receiving antenna was three metres. 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 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 levels were recorded. The EUT was measured on low, middle and high channels.

The radiated spurious emissions/harmonics investigated was not measurable above the 2nd harmonic since it was below the noise floor of the analyzer. The harmonics were investigated up to the 10th harmonic.

The worst test margin for radiated spurious emissions measured was 25.6 dB below the limit at 1649.975 MHz.



To view the test data see APPENDIX 1

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

I) Compliance Test Equipment Used

UNIT	MANUFACTURER	MODEL/SERIAL NUMBER		CAL DUE DATE	USE
Preamplifier system	TDK RF Solutions	PA-02	080010	02-12-21	Radiated Emissions
Preamplifier	EMC Automation	PA-02-1	030002	02-12-21	Radiated Emissions
Double Ridged Waveguide Horn Antenna.	EMC	3116	2538	02-12-21	Radiated Emissions
Linear Power Supply	EMC Automation	LPS-04	2001300	02-12-21	Radiated Emissions
Preamplifier	Sonoma	310N/11909A	185831	02-12-21	Radiated Emissions
EMC Analyzer	Agilent	E7405A	US40240226	03-03-21	Radiated Emissions
Hybrid Log Antenna	TDK	HLP-3003C	17301	02-10-03	Radiated Emissions
Horn Antenna	TDK	HRN-0118	090301	02-10-03	Radiated Emissions
Horn Antenna	TDK	HRN-0118	090601	02-10-03	Radiated Emissions
Signal Generator	HP	83630B	3844A00927	04-04-30	Radiated Emissions
Dipole Antenna	Schwarzbeck	VHAP	1006	03-03-05	Radiated Emissions
Dipole Antenna	Schwarzbeck	VHAP	1007	03-03-05	Radiated Emissions



J) **Declaration**

Statement of Performance:

The BlackBerry Wireless Handheld, model R6510IN Rev. 4, 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.

The test equipment was used within its published operating parameters.

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

Maurice Battler
Compliance Specialist

Date: 25 July 2002

Masud S. Attayi, P.Eng.
Senior Engineer, Compliance and Certification

Date: 25 July 2002

Reviewed and Approved by:

Paul G. Cardinal, Ph.D.
Manager, Compliance and Certification

Date: 14 August 2002

APPENDIX 1

RADIATED SPURIOUS/HARMONIC EMISSIONS AND ERP TEST DATA



Radiated Emissions Test Data Results

The EUT was measured using the test configuration that produced the highest emission levels as per test report number RIM-0206-02.

The handheld was in an upright position with its antenna extended. The modulation scheme used was QAM 16, 1/6 timeslot per frame.

EUT			Receive Antenna			Spectrum Analyzer			Substitution Method				
Type	Ch.	Frequency (MHz)	Antenna Type	Pol	Test Dist. (m)	Reading (dBuV)	Corrected Reading (dBuV)	Max. (V,H)	Tracking Generator				
									Reading (dBuV)	Corrected Reading (relative to dipole)	Pol.	Limit	Diff. To Limit (dB)
<u>ERP</u>													
F0	Low	806.0125	Dipole	V	3	88.6	88.6	88.6	13.3	29.6	VV	39.0	-9.4
F0	Low	806.0125	Dipole	H	3	79.5	79.5		11.1		HH		
F0	Mid	815.5000	Dipole	V	3	87.1	87.1	87.1	11.9	28.2	VV	39.0	-10.8
F0	Mid	815.5000	Dipole	H	3	80.7	80.7		10.3		HH		
F0	High	824.9875	Dipole	V	3	89.5	89.5	89.5	14.5	30.8	VV	39.0	-8.2
F0	High	824.9875	Dipole	H	3	79.5	79.5		12.3		HH		



Radiated Emissions Test Data Results Con't

The EUT was measured using the test configuration that produced the highest emission levels as per test report number RIM-0206-02.

The handheld was in an upright position with its antenna extended. The modulation scheme used was QAM 16, 1/6 timeslot per frame.

EUT			Receive Antenna			Spectrum Analyzer			Substitution Method				
Type	Ch.	Frequency (MHz)	Antenna Type	Pol	Test Dist. (m)	Reading (dBuV)	Corrected Reading (dBuV)	Max. (V,H)	Tracking Generator				
									Reading (dBuV)	Corrected Reading (relative to dipole)	Pol.	Limit	Diff. To Limit (dB)
Harmonics													
2nd	Low	1612.0250	Horn	V	3	54.8	54.8	54.8	-41.0	-40.3	VV	-13	-27.3
2nd	Low	1612.0250	Horn	H	3	50.4	50.4		-40.6		HH		
2nd	Mid	1631.0000	Horn	V	3	52.9	52.9	52.9	-41.5	-40.5	VV	-13	-27.5
2nd	Mid	1631.0000	Horn	H	3	50.3	50.3		-40.8		HH		
2nd	High	1649.975	Horn	V	3	52.2	52.2	52.2	-39.3	-38.6	VV	-13	-25.6
2nd	High	1649.975	Horn	H	3	47.9	47.9		-38.9		HH		

No emissions above the 2nd harmonics could be seen above the spectrum analyzer's noise floor. The harmonics were investigated up to the 10th harmonic.

Radiated Emissions Test Data Results Con't

Radiated Emissions Test Photo



Radiated Emissions at 3.0 metres