

# EMI Test Report

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



## Research In Motion Limited

**REPORT NO.:** RIM-0060-0309-03

**PRODUCT MODEL NO.:** RAN21CN  
**TYPE NAME:** BlackBerry Wireless Handheld  
**FCC ID:** L6ARAN21CN  
**IC:** 2503A-RAN21CN

**Date:** \_\_\_\_\_ 27 November, 2003 \_\_\_\_\_

Report No. RIM-0060-0309-03

Test Date: November 21 to 23, 2003

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**Statement of Performance:**

The BlackBerry Wireless Handheld, model RAN21CN, ASY-06708-001, tested with the following accessories: Travel Charger model number PSM05R-050Q part number ASY-04078-001, USB Docking/Charging Cradle part number ASY-05821-001, Audio Headset part number HDW-03458-001, External Battery Charger, model number BCM6710A, ASY-06630-001 and USB Data Cable part number ASY-06005-001 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: 04 December 2003

Reviewed and Approved by:



Paul G. Cardinal, Ph.D.

Manager, Compliance and Certification

Date: 05 December 2003

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**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](http://www.rim.net)

The testing began on November 21, 2003 and completed on November 23, 2003. The sample equipment under test (EUT) included:

1. BlackBerry Wireless Handheld, model number RAN21CN, ASY-06708-001, identification number E2PRF05, FCC ID L6ARAN21CN, IC: 2503A-RAN21CN.
2. Travel Charger, model number PSM05R-050Q, part number ASY-04078-001 with an output voltage of 5.0 volts dc. The output lead length was 1.94 metres long.
3. USB Docking/Charging Cradle part number ASY-05821-001. The lead length was 1.9 metres.
4. External Battery Charger model number BCM6710A, ASY-06630-001. The dc output was rated at 4.2 volts, 0.75 amps for charging the internal battery and 5.1 volts, 0.75 amps for charging an external battery.
5. USB Data Cable part number ASY-06005-001. The lead length was 1.4 metres long.
6. Headset model number HDW-03458-001. The lead length was 1.25 metres long.

The transmit frequency bands for the Handheld are: Cellular 824 to 849 MHz and PCS 1850 to 1910 MHz.

**C) Support Equipment Used for the Testing of the EUT**

- 1) Agilent Wireless Communication Test Set, model 8960, serial number GB41070272
- 2) PC System, Myraid, model EN-P3B-7, serial number CCC0004078
- 3) Monitor, ViewSonic, model number VCDTS23103-2M, serial number 24B022952648
- 4) Printer, H/P, model number C5884A, serial number US8251W0VQ

**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 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 Travel Charger was connected to the Handheld in battery charge mode.
- The External Battery Charger was connected to the Handheld in battery charge mode.

The ac input was 120 volts, 60 Hz.

The sample EUT's conducted emissions were compared with respect to the FCC CFR 47 Part 15, Subpart B and IC ICES-003, Class B limit. The sample EUT's lowest emission test margin was 12.13 dB at 0.484 MHz.

**Measurement Uncertainty  $\pm 2.0$  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 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 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**.

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.
- The Handheld was connected to the support PC via the USB Docking/Charging Cradle for charging and data link.
- The Handheld was connected to the External Battery Charger.

The system's radiated emission levels in idle mode were compared with respect to the FCC CFR 47 Part 15, Subpart B and IC ICES-003, Class B limit.

The system **passed** with the lowest emission test margin of 2.09 dB at 66.033 MHz.

**Sample Calculation:**

Field Strength (dB $\mu$ V/M) is calculated as follows:

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

**Measurement Uncertainty  $\pm 4.0$  dB**

To view the test data see APPENDIX 2.

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## H) Compliance Test Equipment Used

<u>UNIT</u>	<u>MANUFACTURER</u>	<u>MODEL / SERIAL NUMBER</u>	<u>CAL DUE DATE</u> (YY MM DD)	<u>USE</u>
Preamplifier	Sonoma	310N/11909A 185831	04-11-05	Radiated Emissions
Preamplifier system	TDK	PA-02 080010	04-11-05	Radiated Emissions
EMC Analyzer	Agilent	E7405A US40240226	04-07-31	Radiated Emissions
Hybrid Log Antenna	TDK	HLP-3003C 017301	03-12-11	Radiated Emissions
Wireless Communication Test Set	Agilent	8960 US41070110	05-08-13	Conducted/radiated Emissions
L.I.S.N.	Emco	3816/2 1120	04-08-25	Conducted Emissions
L.I.S.N.	Emco	3816/2 1118	04-08-25	Conducted Emissions
Impulse Limiter	Rohde & Schwarz	ESHS-Z2 836248/052	04-11-03	Conducted Emissions
EMI Receiver	Agilent	85462A 3942A00517	04-09-04	Conducted Emissions
RF Filter Section	Agilent	85460A 3704A00481	04-09-04	Conducted Emissions

## APPENDIX 1

### CONDUCTED EMISSIONS TEST DATA/PLOTS



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Test Date: November 21 to 23, 2003

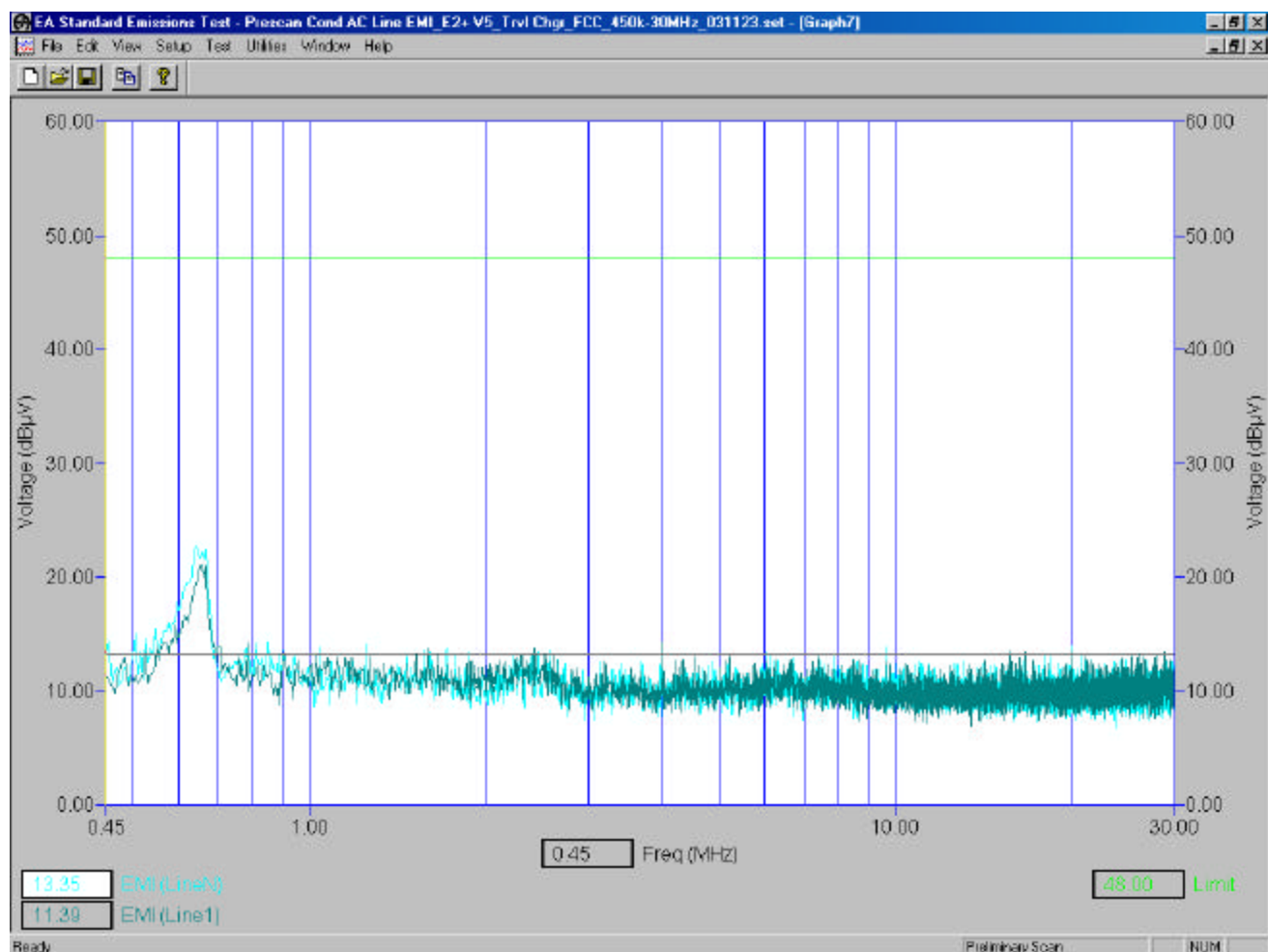
### Conducted Emissions Test Results

FCC CFR 47 Part 15, Subpart B, Class B

November 23, 2003

Operating Mode: The Handheld was operating in battery charging mode. The ac input to the Travel Charger was 120 volts, 60 Hz.

Frequency (MHz)	Line	<u>READING</u> Quasi-Peak (dB $\mu$ V)	Correction Factors for Impulse Limiter, LISN, Cable (dB)	QP Level (reading + Corr.Factor) (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)
All the emission levels had a test margin of greater than 25 dB.						





Report No. RIM-0060-0309-03

Test Date: November 21 to 23, 2003

Conducted Emissions Test Results Cont'd

FCC CFR 47 Part 15, Subpart B, Class B

November 23, 2003

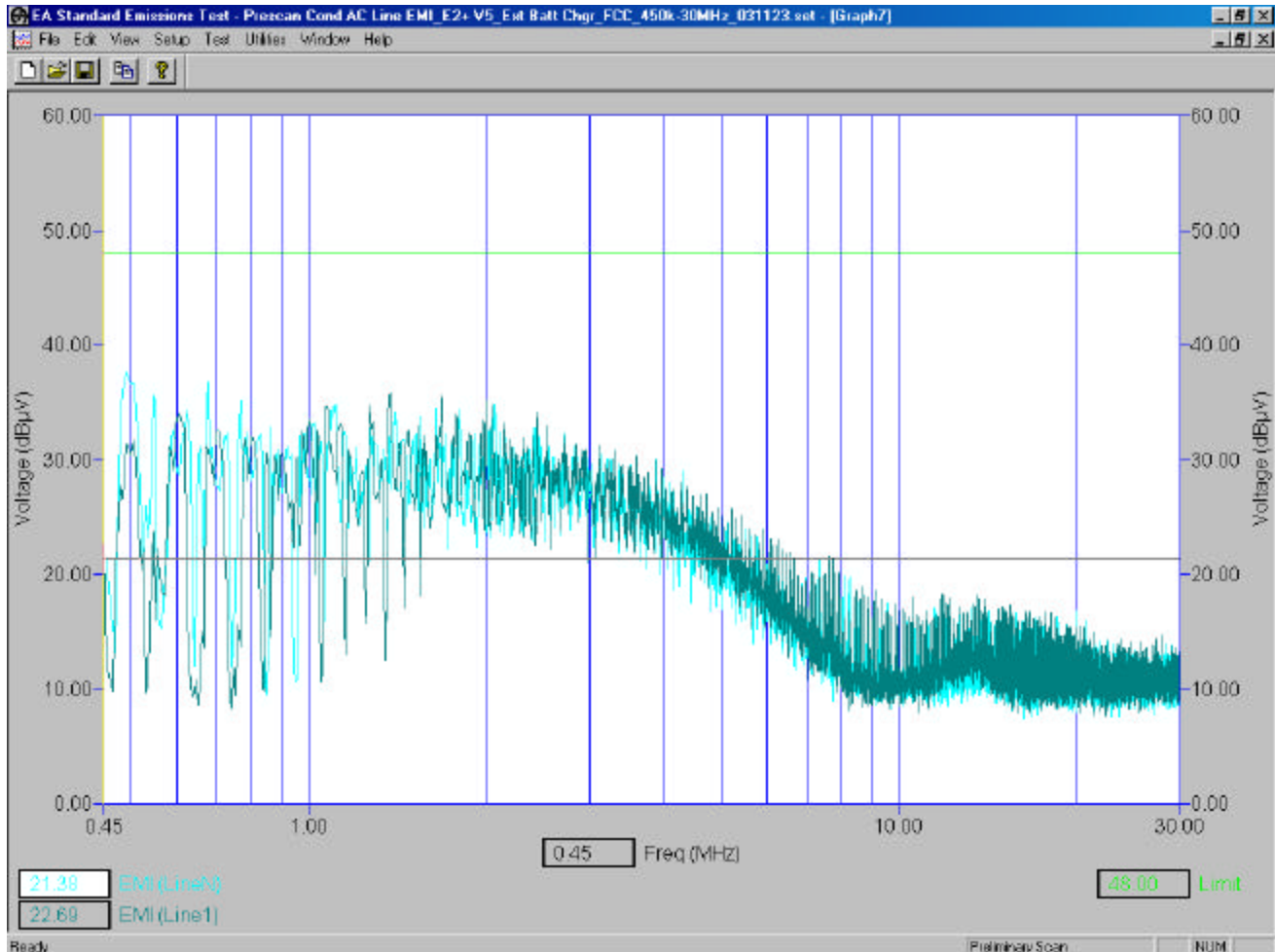
Operating Mode: The Handheld was operating in battery charging mode and a battery was charging in the External Battery Charger. The ac input to the External Battery Charger was 120 volts, 60 Hz.

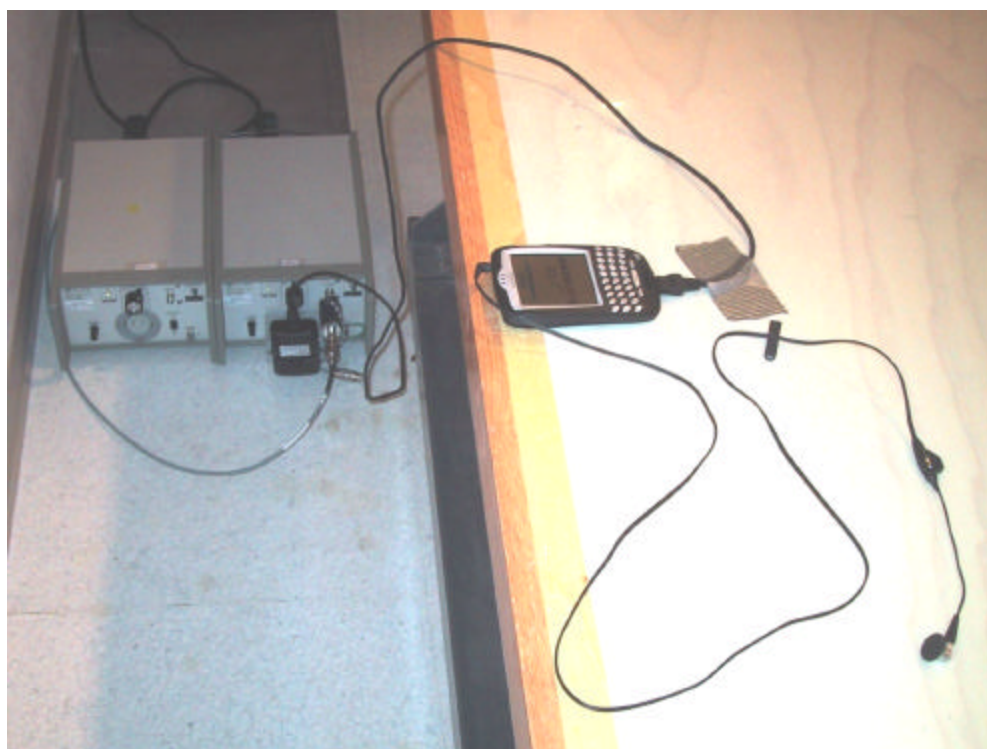
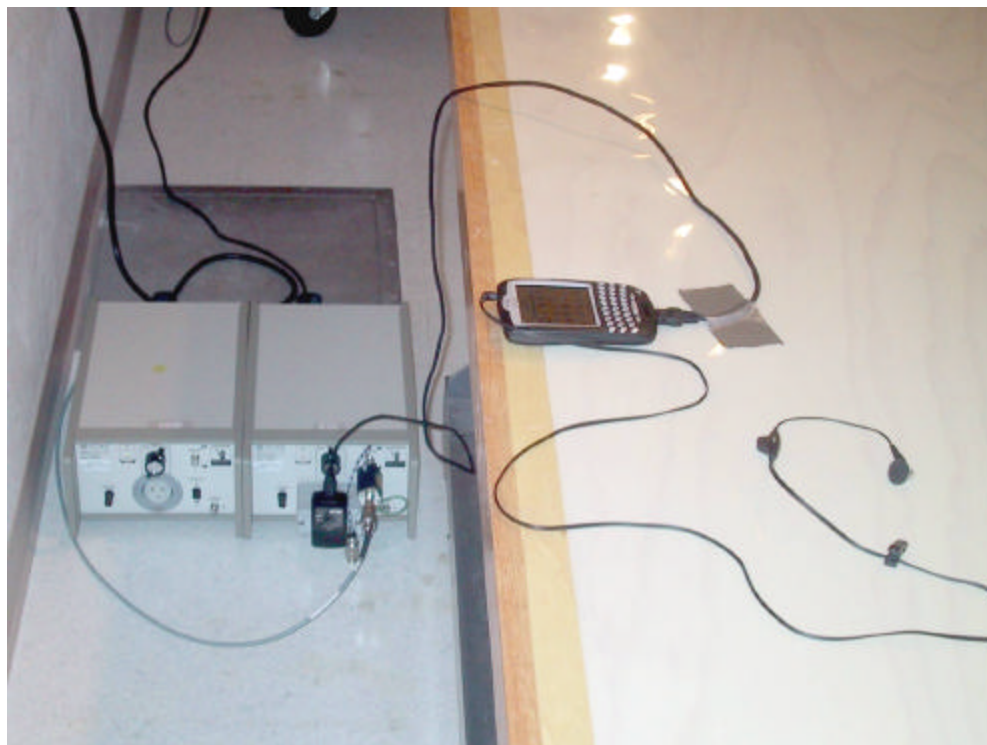
Frequency (MHz)	Line	READING Quasi-Peak (dBμV)	Correction Factors for Impulse Limiter, LISN, Cable (dB)	QP Level (reading + Corr.Factor) (dBμV)	Limit (dBμV)	Margin (dB)
0.484	N	26.04	9.83	35.87	48.0	-12.13
0.555	N	14.19	9.84	24.03	48.0	-23.97
0.675	N	20.18	9.85	30.03	48.0	-17.97
0.779	N	22.78	9.86	32.64	48.0	-15.36
1.074	H	21.07	9.90	30.97	48.0	-17.03
1.097	N	21.74	9.90	31.64	48.0	-16.36
1.262	H	21.18	9.89	31.07	48.0	-16.93
1.387	H	19.35	9.89	29.24	48.0	-18.76
1.672	H	20.58	9.88	30.46	48.0	-17.54
1.988	H	18.25	9.88	28.13	48.0	-19.87
2.028	H	20.07	9.88	29.95	48.0	-18.05
2.062	N	17.92	9.88	27.80	48.0	-20.20

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

### Conducted Emissions Test Graph

The Handheld was operating in battery charging mode and a battery was charging in the External Battery Charger. The ac input to the External Battery Charger was 120 volts, 60 Hz.



Conducted Emission Test-Setup Photos

## APPENDIX 2

### RADIATED EMISSIONS TEST DATA

### Radiated Emissions Test Results

FCC CFR 47 Part 15, Subpart B, Class B

November 21, 2003

**Operating Mode:** The Handheld was connected to the Travel Charger. The ac input to the Travel Charger was 120 volts, 60 Hz. The Handheld was operating in battery charging mode. The Headset was connected to the Handheld.

Test Distance was 3.0 metres.

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)							
38.896	V	1.91	37	Q.P.	52.67	-20.07	32.60	40.0	-7.40
41.110	H	2.71	124	Q.P.	44.77	-20.47	24.30	40.0	-15.70
45.221	V	1.43	100	Q.P.	44.73	-21.31	23.42	40.0	-16.58
50.073	V	1.69	302	Q.P.	43.75	-21.49	22.26	40.0	-17.74
51.870	H	3.33	126	Q.P.	46.67	-21.50	25.17	40.0	-14.83
63.890	V	2.70	75	Q.P.	44.78	-21.20	23.58	40.0	-16.42
70.978	V	2.13	327	Q.P.	52.74	-20.60	32.14	40.0	-7.86
71.026	H	2.88	173	Q.P.	48.16	-20.59	27.57	40.0	-12.43
74.335	H	1.00	227	Q.P.	36.08	-20.35	15.73	40.0	-24.27
200.260	V	1.54	124	Q.P.	37.71	-14.99	22.72	43.5	-20.78
829.261	H	2.57	317	Q.P.	22.43	-1.26	21.17	46.0	-24.83

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

### Radiated Emissions Test Results Cont'd

FCC CFR 47 Part 15, Subpart B, Class B

November 23, 2003

Operating Mode: The Handheld was connected to the support PC via the USB Docking/Charging Cradle for charging and data link. The Headset was connected to the Handheld. The ac input voltage to the support PC was 120 volts, 60 Hz.

Test Distance was 3.0 metres.

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)							
63.732	H	3.39	87	Q.P.	55.53	-21.20	34.33	40.0	-5.67
63.817	V	1.80	286	Q.P.	55.88	-21.20	34.68	40.0	-5.32
64.566	V	1.47	100	Q.P.	54.27	-21.18	33.09	40.0	-6.91
65.483	V	1.93	129	Q.P.	56.99	-21.09	35.90	40.0	-4.10
65.518	H	4.00	239	Q.P.	54.62	-21.10	33.52	40.0	-6.48
66.022	H	2.83	61	Q.P.	57.63	-21.04	36.59	40.0	-3.41
66.033	V	1.92	144	Q.P.	58.97	-21.06	37.91	40.0	-2.09
66.626	V	2.01	134	Q.P.	56.01	-21.00	35.01	40.0	-4.99
66.727	H	3.67	55	Q.P.	55.31	-21.00	34.31	40.0	-5.69
72.012	V	1.42	100	Q.P.	55.33	-20.53	34.80	40.0	-5.20
604.343	H	1.09	173	Q.P.	35.51	-4.86	30.65	46.0	-15.35

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

### Radiated Emissions Test Results Cont'd

FCC CFR 47 Part 15, Subpart B, Class B

November 23, 2003

Operating Mode: The Handheld was connected to the External Battery Charger. The ac input to the External Charger was 120 volts, 60 Hz. The Handheld was operating in battery charging mode and a battery was charging in the External Battery Charger. The Headset was connected to the Handheld.

Test Distance was 3.0 metres.

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)							
69.133	V	2.27	272	Q.P.	39.42	-20.78	18.64	40.0	-21.36
122.295	H	2.87	169	Q.P.	48.28	-18.25	30.03	43.5	-13.47
131.416	H	3.01	344	Q.P.	48.27	-18.11	30.16	43.5	-13.34
831.324	H	2.39	132	Q.P.	22.41	-1.21	21.20	46.0	-24.80
879.479	H	3.43	180	Q.P.	21.87	-0.70	21.17	46.0	-24.83
884.919	V	1.66	224	Q.P.	21.79	-0.66	21.13	46.0	-24.87

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



Radiated Emissions Test Photos