EMI Test Report

Research In Motion Limited

REPORT NO.: RIM-0203-01

PRODUCT Model No: R6120CN
Type Name: BlackBerry 6750 Wireless Handheld
FCC ID: L6AR6120CN

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

Date: 23 April 2002

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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, Class B Digital Devices, Unintentional Radiators
IC ICES-003, 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 Philips Street
Waterloo, Ontario
Canada, N2L 3W8

The testing began on March 14, 2002 and completed on March 28, 2002. The sample equipment under test (EUT) included:

1. BlackBerry 6750 Wireless Handheld, model number R6120CN, FCC ID L6AR6120CN
2. Docking/Charging Cradle, RIM ASY-04060-001
3. AC Power Adapter, model number PSM05R-068RUS, RIM part number PWR-03846-003 with an output voltage of 6.8 volts dc.
4. Travel Charger, model number PSM05R-050RT, (Rev 01), RIM part number PWR-03581-002 with an output voltage of 5.0 volts dc.
5. Headset, model number HDW-03458-001

C) Support Equipment Used for the Testing of the EUT

1. Agilent, model 8960 (E5515C), serial number GB41070272
2. PC, Dell, model number MMP, serial number 6SPS20B
3. Monitor, KDS, model number KD-1460, serial number 4530019652
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 the RIM'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**

1 CONDUCTED EMISSIONS

The conducted emissions were measured while using the test procedure outlined in CISPR Recommendation 22 through a 50? 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 data taken was read from the instrument's display. The conducted emissions were measured in full system operation with the Travel Charger and also with the Docking/Charging Cradle connected to the ac power adapter.

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 18.8 dB at 2.920 MHz.

Measurement Uncertainty ±2.0 dB

To view the test data/plots, see APPENDIX 1.

2 RADIATED EMISSIONS

The radiated emissions from the EUT were measured while 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 emissions level was recorded. The frequency range measured was from 30 MHz to 11.0 GHz which is the 5^{th} harmonic of the highest RF local oscillator (LO) in the PCS band. Both the horizontal and vertical polarizations 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 Docking/Charging Cradle, RIM ASY-04060-001 which was connected to the dc output of the cradle ac adapter, model number PSM05R-068RUS, RIM part number PWR-03846-003. 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 7.6 dB at 899.49 MHz.

- The handheld was connected to the travel charger, model number PSM05R-050RT operating in idle mode. The EUT's radiated emission levels were compared with respect to the FCC CFR 47 Part 15, Subpart B/IC ICES-003, Class B limit. The EUT **passed** with a worse case emission test margin of 19.5 dB at 35.80 MHz.

The EUT's RF local oscillator emissions were measured in the PCS band on the middle channel (600, 2.1436 GHz) in three configurations:

- Handheld Standalone
- Handheld connected to the Docking/Charging Cradle
- Handheld connected to the Travel Charger

Both the horizontal and vertical polarizations of the emissions were measured. The EUT **passed** with a worse case emission margin of 4.7 dB in the Standalone configuration.

The local oscillator harmonic emissions were measured on the low, middle and high channels (25, 600 and 1175) in the worse configuration of Handheld Standalone. Both the horizontal and vertical polarizations of the emissions were measured. The emissions were measured up to the 5th harmonic. No harmonics of the RF local oscillator (LO) were found.

2 RADIATED EMISSIONS con't

The EUT's RF local oscillator emissions were measured in the cellular band on the middle channel (417, 837.49 MHz) in three configurations.

a. Handheld Standalone
b. Handheld connected to the Docking/Charging Cradle
c. Handheld connected to the Travel Charger

Both the horizontal and vertical polarizations of the emissions were measured. No emissions of the LO were found.

The local oscillator harmonics were measured on the low, middle and high channels (1013, 417 and 777) in the configuration of Handheld Standalone. Both the horizontal and vertical polarizations of the emissions were measured. The emissions were measured up to the 5^{th} harmonic. No emissions of the LO harmonics were found.

Sample Calculation:

Field Strength (dBµV/M) is calculated as follows:
FS = Measured Level (dBµV) + A.F. (dB/m) + Cable Loss (dB) - preamp (dB) + filter loss (dB)

Measurement Uncertainty ±4.0 dB

To view the test data see APPENDIX 2.

H) **Compliance Test Equipment Used**

UNIT	MANUFACTURER	MODEL / SERIAL NUMBER	CAL DUE DATE	USE
Preamplifier system	TDK RF Solutions	PA-02 080010	02-06-21	Radiated Emissions
Preamplifier	Sonoma	310N/11909A 185831	02-06-21	Radiated Emissions
EMC Analyzer	Agilent	E7405A US40240226	02-06-21	Radiated Emissions
L.I.S.N.	Emco	3816/2 1120	02-05-31	Conducted Emissions
L.I.S.N.	Emco	3816/2 1118	02-05-31	Conducted Emissions
Impulse Limiter	Rohde & Schwarz	ESHS-Z2 836248/052	02-05-03	Conducted Emissions
EMI Receiver	Agilent	85462A 3942A00517	02-09-07	Conducted Emissions
RF Filter Section	Agilent	85460A 3704A00481	02-09-07	Conducted 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	02-06-21	Radiated Emissions
Wireless Communications Test Set	Agilent	8960 (E5515C)/GB41070272	02-10-03	Conducted Emissions
Dipole Antenna	Schwarzbeck	VHAP 1006	03-03-05	Radiated Emissions
Dipole Antenna	Schwarzbeck	VHAP 1007	03-03-05	Radiated Emissions

K) **Declaration**

Statement of Performance:

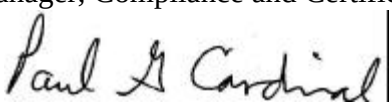
The BlackBerry 6750 Wireless Handheld, model R6120CN, tested with the following accessories: Travel Charger, model number PSM05R-050RT (Rev 01), Docking/Charging Cradle, RIM ASY-04060-001 and AC Power Adapter, model number PSM05R-068RUS when configured and operated per RIM's operation instructions, performs 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.

Tested by:
Masud S. Attayi, P.Eng.
Senior Engineer, Compliance and Certification Date:__22 April 2002_____

Reviewed and Approved by: Date:__23 April 2002_____
Paul G. Cardinal, Ph.D.
Manager, Compliance and Certification



APPENDIX 1

CONDUCTED EMISSIONS TEST DATA/PLOTS

Conducted Emissions Test Results

FCC CFR 47 Part 15, Subpart B, Class B

FREQ. (MHz)	LINE	READING Quasi-Peak (dBµV)	Impulse Limiter loss (dB)	Cable + LISN Loss (dB)	LIMIT (dBµV)	MARGIN (dB)
2.800	L1	16.0	10.0	0.5	48.0	21.5
2.800	L2	16.1	10.0	0.5	48.0	21.4
2.830	L1	16.0	10.0	0.5	48.0	21.5
2.830	L2	13.5	10.0	0.5	48.0	24.0
2.920	L1	18.7	10.0	0.5	48.0	18.8
2.920	L2	18.0	10.0	0.5	48.0	19.5

120 volt, 60 Hz ac input to ac Power Adapter, model number PSM05R-068RUS, RIM part number PWR-03846-003 connected to the Docking/Charging Cradle, RIM ASY-04060-001 which is connected to model number R6120CN.

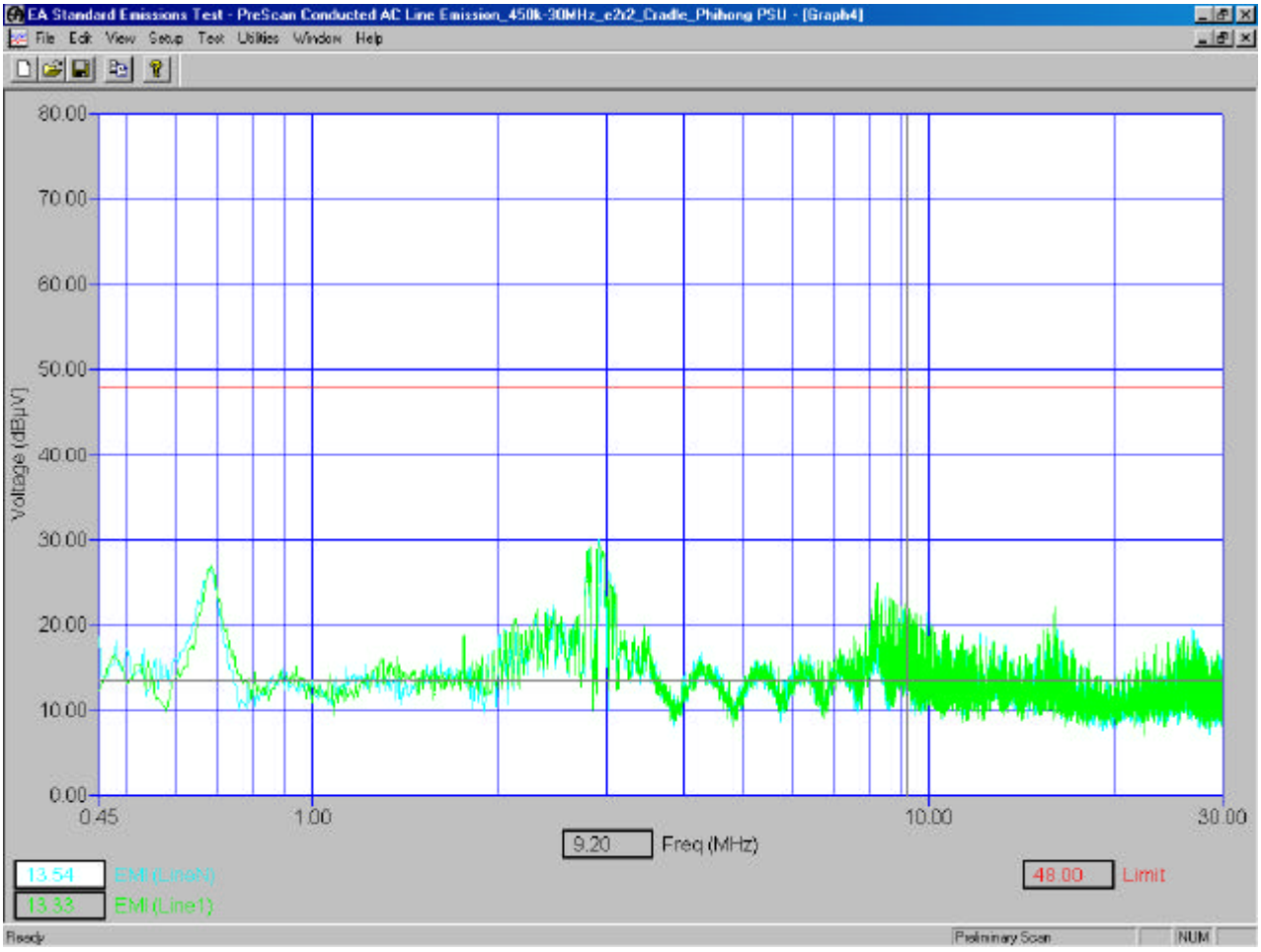
FCC CFR 47 Part 15, Subpart B, Class B

FREQ. (MHz)	LINE	READING Quasi-Peak (dBµV)	Impulse Limiter loss (dB)	Cable + LISN Loss (dB)	LIMIT (dBµV)	MARGIN (dB)
2.800	L1	17.0	10.0	0.5	48.0	20.5
2.800	L2	15.7	10.0	0.5	48.0	21.8
2.900	L1	17.4	10.0	0.5	48.0	20.6
2.900	L2	18.1	10.0	0.5	48.0	19.4
2.920	L1	18.1	10.0	0.5	48.0	19.4
2.920	L2	18.5	10.0	0.5	48.0	19.0

120 volt, 60 Hz ac input to ac Travel Charger, model number PSM05R-050RT, Rev 01, RIM part number PWR-03581-002 connected to model number R6120CN.

Conducted Emission Graph

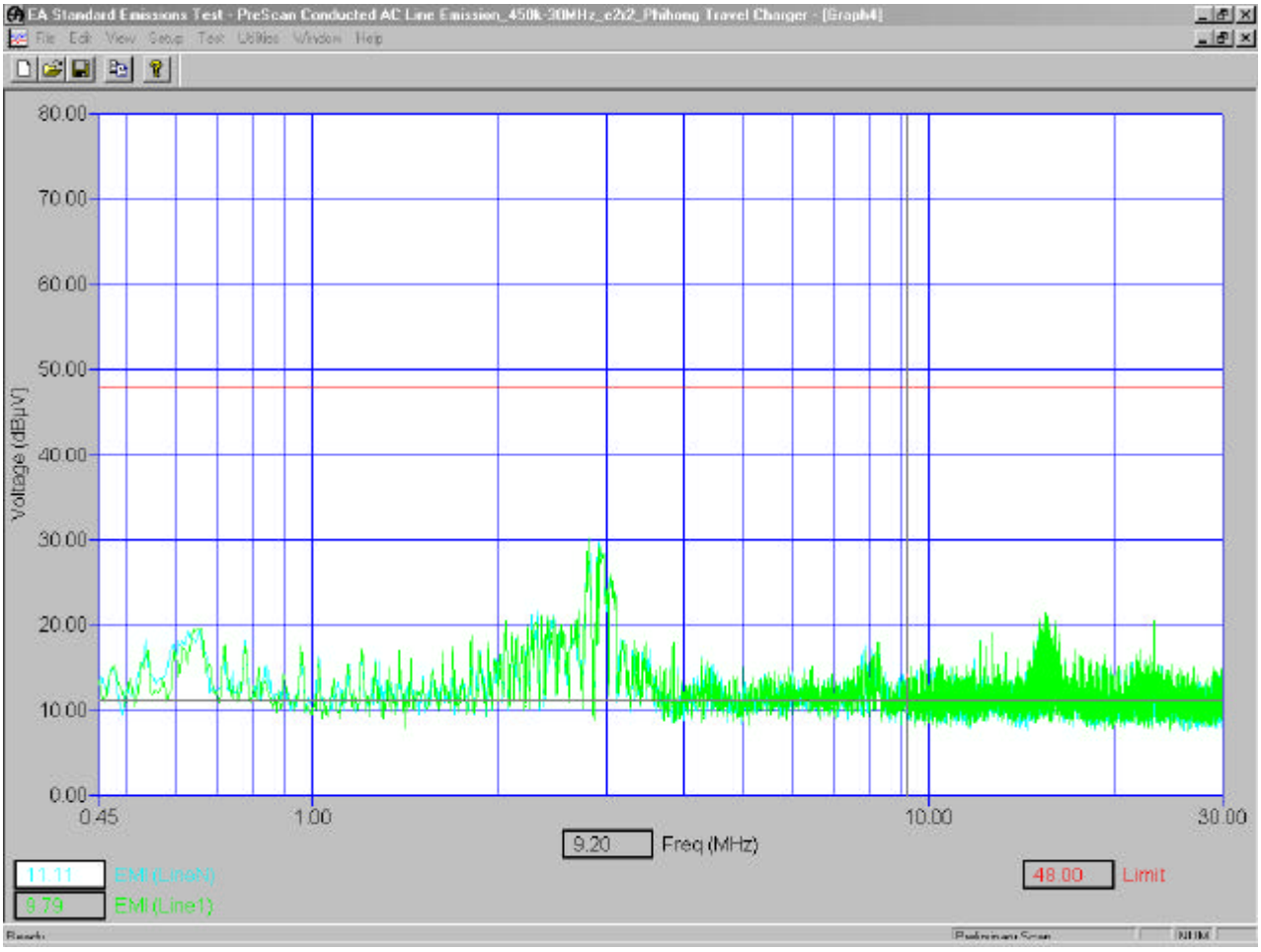
FCC CFR 47 Part 15, Subpart B, Class B



120 volt, 60 Hz ac input to ac power adapter, model number PSM05R-068RUS, RIM part number PWR-03846-003 connected to the Docking/Charging Cradle, RIM ASY-04060-001 which is connected to model number R6120CN.

Conducted Emission Graph

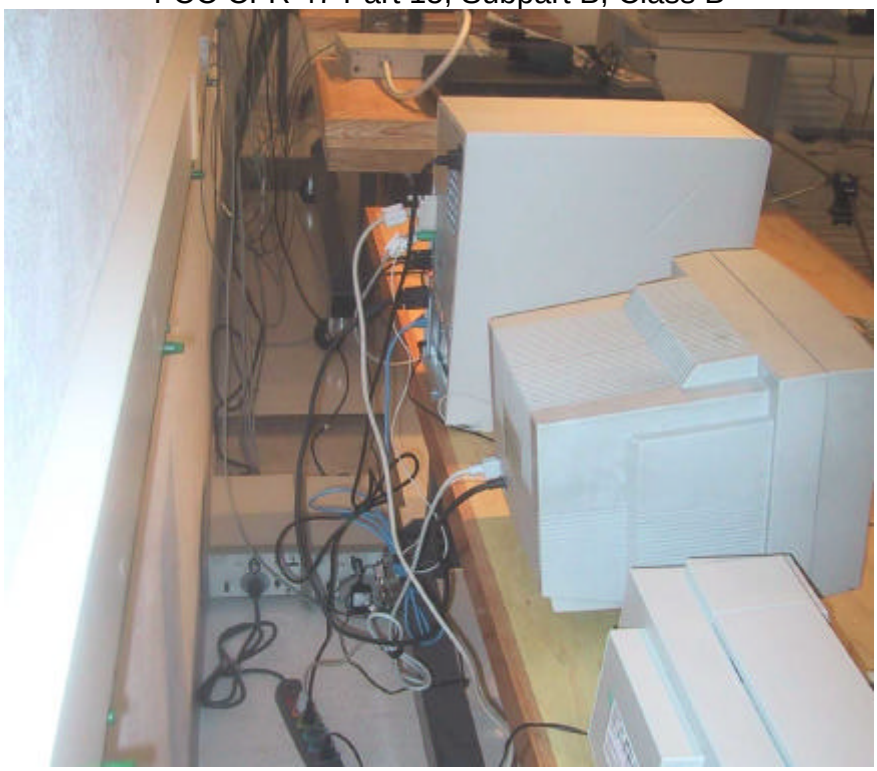
FCC CFR 47 Part 15, Subpart B, Class B

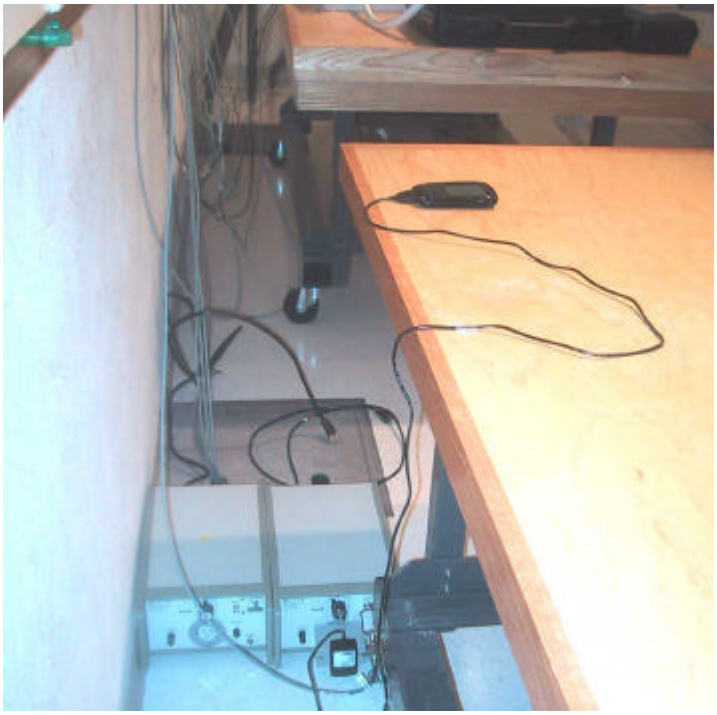


120 volt, 60 Hz ac input to ac Travel Charger, model number PSM05R-050RT, Rev 01, RIM part number PWR-03581-002 connected to model number R6120CN.

Conducted Emission Test-Setup Photo

FCC CFR 47 Part 15, Subpart B, Class B





APPENDIX 2

RADIATED EMISSIONS TEST DATA/PLOTS

Radiated Emissions Test Results

FCC CFR 47 Part 15, Subpart B, Class B March 21, 2002

Operating Mode: The Handheld was connected to the AC Power Adapter, model number PSM05R-068RUS operating in idle mode with the support equipment. 120 volts, 60 Hz ac input.
The EUT was tested as received.

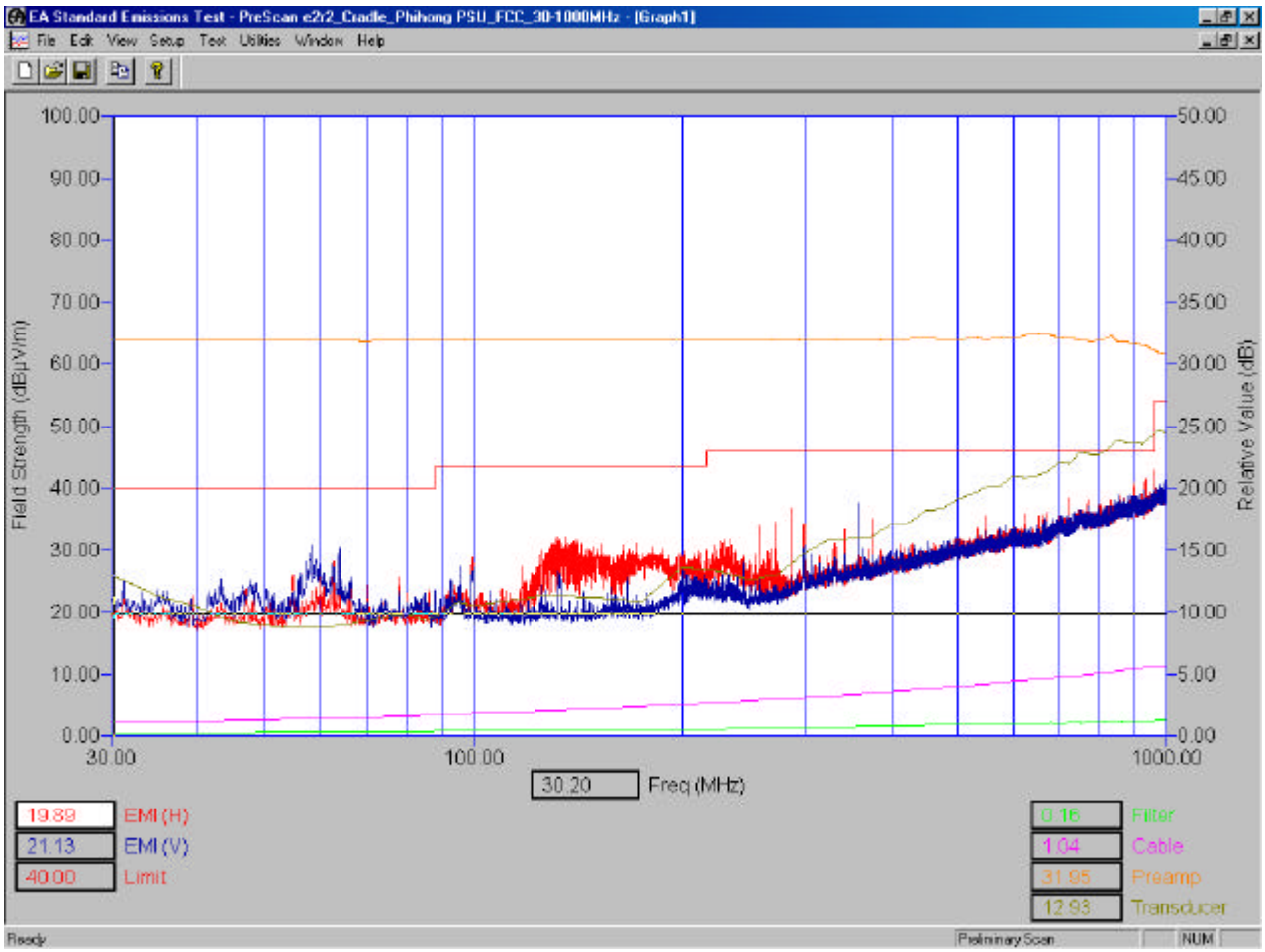
Frequency (MHz)	Pol (V/H)	Detector (Q.P. or (Peak)	Reading @ 3.0 M (dBµV)	Correction Factors for antennae/cables (dB/m)	Level (corr.+ meas.) (dBµV/m)	Limit @ 3.0 M (dBµV/m)	Test Margin (dB)
286.380	H	Q.P.	12.0	17.5	29.5	46.0	16.5
360.05	V	Q.P.	4.6	23.7	27.3	46.0	18.7
583.17	V	Q.P.	9.2	12.7	21.9	46.0	24.1
640.03	V	Q.P.	7.6	17.2	24.8	46.0	21.2
672.120	H	Q.P.	2.9	26.9	29.8	46.0	16.2
720.110	H	Q.P.	6.3	27.8	34.1	46.0	11.9
774.300	V	Q.P.	3.3	25.2	28.5	46.0	17.5
899.490	H	Q.P.	6.5	31.9	38.4	46.0	7.6
927.770	H	Q.P.	1.5	31.5	33.0	46.0	13.0
932.82	H	Q.P.	2.1	31.4	33.5	46.0	12.5

Operating Mode: The Handheld was connected to the Travel Charger, model number PSM05R-050RT, Rev 01, RIM part number PWR-03581-002. 120 volts, 60 Hz ac input.
The EUT was tested as received.

Frequency (MHz)	Pol (V/H)	Detector (Q.P. or (Peak)	Reading @ 3.0 M (dBµV)	Correction Factors for antennae/cables (dB/m)	Level (corr.+ meas.) (dBµV/m)	Limit @ 3.0 M (dBµV/m)	Test Margin (dB)
35.80	H	Q.P.	8.0	12.5	20.5	46.0	19.5

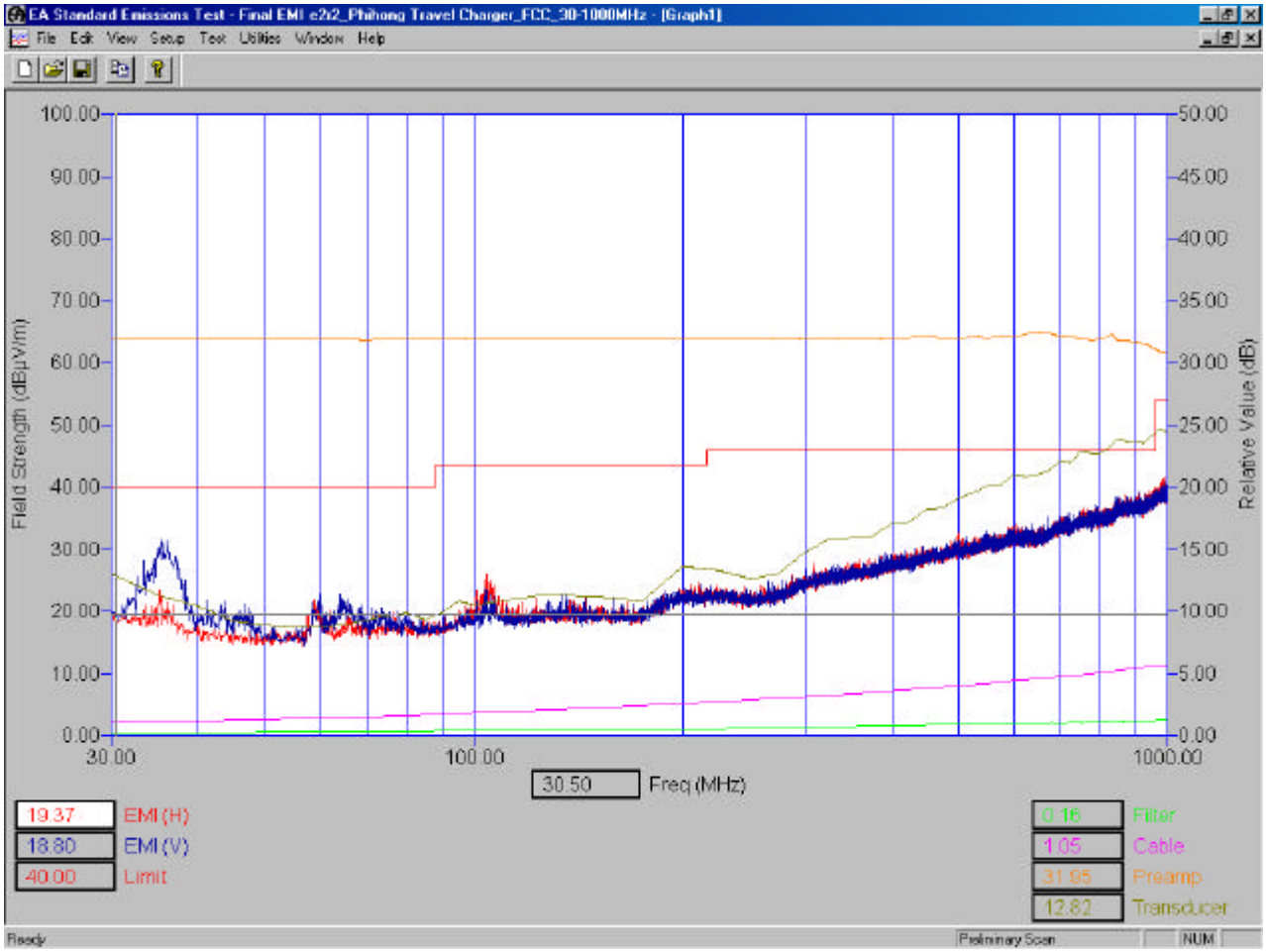
Note: All other emission frequencies were greater than 20 dB margin.

Radiated Emissions Prescan Graph



The handheld was connected to the AC Power Adapter, model number PSM05R-068RUS, RIM part number PWR-03846-003 operating in idle mode with the support equipment. 120 volts, 60 Hz ac input.

Radiated Emissions Prescan Graph



The Handheld was connected to the travel Charger, model number PSM05R-050RT, Rev 01, RIM part number PWR-03581-002. 120 volts, 60 Hz ac input.

Radiated Emissions Test Data con't

											Substitution Method				
EUT					Rx Antenna			Spectrum Analyzer			Tracking Gen				
Type	Channel	Freq (MHz)	Band	Pol.	Ant.Type	Ant Pol.	Dist (m)	Reading (dBuV)	Corrected Reading (dBuV)	Max (V,H)	Reading (dBm)	Corrected Reading (relative to dipole)	Pol	Limit	Diff to Limit (dB)
PCS BAND (Local Oscillator)															
Standalone															
F0	600	54.00	800	V	Horn	V	3	not found	not found	49.3				54	-4.7
F0	600	54.00	800	V	Horn	H	3	42.5	49.3						
With Cradle															
F0	600	54.00	800	V	Horn	V	3	not found	not found	46				54	-8
F0	600	54.00	800	V	Horn	H	3	41.4	46						
With Travel Charger															
F0	600	54.00	800	V	Horn	V	3	41.22	45.82	47.1				54	-6.9
F0	600	54.00	800	V	Horn	H	3	42.5	47.1						
Local Oscillator Harmonic (Standalone, 3 channels)															
Low Channel (2114.85) MHz															
F2	25	4229.70	1900	V	Horn	V	3	not found		0				54	-
F2	25	4229.70	1900	V	Horn	H	3	not found							
F3	25	6344.55	1900	V	Horn	V	3	not found		0				54	-
F3	25	6344.55	1900	V	Horn	H	3	not found							
F4	25	8459.40	1900	V	Horn	V	3	not found		0				54	-
F4	25	8459.40	1900	V	Horn	H	3	not found							
F5	25	10574.25	1900	V	Horn	V	3	not found		0				54	-
F5	25	10574.25	1900	V	Horn	H	3	not found							
Middle Channel (2143.6 MHZ)															
F2	600	4287.20	1900	V	Horn	V	3	not found		0				54	-
F2	600	4287.20	1900	V	Horn	H	3	not found							
F3	600	6430.80	1900	V	Horn	V	3	not found		0				54	-
F3	600	6430.80	1900	V	Horn	H	3	not found							

Radiated Emissions Test Data con't

											Substitution Method				
EUT				Rx Antenna				Spectrum Analyzer			Tracking Gen				
Type	Channel	Freq (MHz)	Band	Pol	Type	Pol	Dist (m)	Reading (dB?V)	Corrected Reading (dB?V)	Max (V,H)	Reading (dBm)	Corrected Reading (relative to dipole)	Pol	Limit	Diff to Limit (dB)
F4	600	8574.40	1900	V	Horn	V	3	not found		0				54	-
F4	600	8574.40	1900	V	Horn	H	3	not found							
F5	600	10718.00	1900	V	Horn	V	3	not found		0				54	-
F5	600	10718.00	1900	V	Horn	H	3	not found							
High **Channel** (2172.35 MHz)															
F2	1175	4344.70	1900	V	Horn	V	3	not found		0				54	-
F2	1175	4344.70	1900	V	Horn	H	3	not found							
F3	1175	6517.05	1900	V	Horn	V	3	not found		0				54	-
F3	1175	6517.05	1900	V	Horn	H	3	not found							
F4	1175	8689.40	1900	V	Horn	V	3	not found		0				54	-
F4	1175	8689.40	1900	V	Horn	H	3	not found							
F5	1175	10861.75	1900	V	Horn	V	3	not found		0				54	-
F5	1175	10861.75	1900	V	Horn	H	3	not found							
Cellular Band (Local Oscillator)															
Standalone															
F0	417	1066.10	800	V	Horn	V	3	not found						54	-
F0	417	1066.10	800	V	Horn	H	3	not found							
With Cradle															
F0	417	1066.10	800	V	Horn	V	3	not found						54	-
F0	417	1066.10	800	V	Horn	H	3	not found							
With Travel Charger															
F0	417	1066.10	800	V	Horn	V	3	not found						54	-
F0	417	1066.10	800	V	Horn	H	3	not found							

Radiated Emissions Test Data con't

											Substitution Method			
EUT				Rx Antenna				Spectrum Analyzer			Tracking Gen			
Type	Channel	Freq (MHz)	Band	Pol	Type	Pol	Dist (m)	Reading (dB?V)	Corrected Reading (dB?V)	Max (V,H)	Reading (dBm)	Corrected Reading (relative to dipole)	Limit	Diff to Limit (dB)
Local Harmonics, (Standalone, 3 channels)														
Low Channel (1053.30 MHz)														
F2	1013	2106.60	1900	V	Horn	V	3	not found					54	-
F2	1013	2106.60	1900	V	Horn	H	3	not found						
F3	1013	3159.90	1900	V	Horn	V	3	not found					54	-
F3	1013	3159.90	1900	V	Horn	H	3	not found						
F4	1013	4213.20	1900	V	Horn	V	3	not found					54	-
F4	1013	4213.20	1900	V	Horn	H	3	not found						
F5	1013	5266.50	1900	V	Horn	V	3	not found					54	-
F5	1013	5266.50	1900	V	Horn	H	3	not found						
Middle Channel (1076.90 MHZ)														
F2	417	2132.20	1900	V	Horn	V	3	not found					54	-
F2	417	2132.20	1900	V	Horn	H	3	not found						
F3	417	3198.30	1900	V	Horn	V	3	not found					54	-
F3	417	3198.30	1900	V	Horn	H	3	not found						
F4	417	4264.40	1900	V	Horn	V	3	not found					54	-
F4	417	4264.40	1900	V	Horn	H	3	not found						
F5	417	5330.50	1900	V	Horn	V	3	not found					54	-
F5	417	5330.50	1900	V	Horn	H	3	not found						
High Channel (1076.90 MHz)														
F2	777	2132.20	1900	V	Horn	V	3	not found					54	-
F2	777	2132.20	1900	V	Horn	H	3	not found						
F3	777	3198.30	1900	V	Horn	V	3	not found					54	-
F3	777	3198.30	1900	V	Horn	H	3	not found						
F4	777	4264.40	1900	V	Horn	V	3	not found					54	-
F4	777	4264.40	1900	V	Horn	H	3	not found						
F5	777	5330.50	1900	V	Horn	V	3	not found					54	-
F5	777	5330.50	1900	V	Horn	H	3	not found						

Radiated emissions in semi- anechoic chamber. Test distance is three metres.

FCC CFR 47 Part 15, Subpart B

Radiated emissions in semi- anechoic chamber. Test distance is three metres.