EMI Test Report

Research In Motion Limited

REPORT NO.: RIM-0024-0302-01

PRODUCT MODEL NO: R6230GE
TYPE NAME: BlackBerry Wireless Handheld
FCC ID: L6AR6230GE
IC: 2503A-R6230GE

Date: _____07 March 2003_____

Declaration

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 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: 07 March 2003

M. Attay

Masud S. Attayi, P.Eng.
Senior Engineer, Compliance and Certification Date: 07 March 2003

Reviewed and Approved by:

Paul G Cardinal

Paul G. Cardinal, Ph.D.
Manager, Compliance and Certification Date: 07 March 2003

Table of Contents

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 24 Subpart E, Broadband PCS, Oct 1. 2000
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.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) Rohde & Schwarz, Universal Radio Communication Tester, model number CMU 200, serial number 100250
2) Rohde & Schwarz, Universal Radio Communication Tester, model number CMU 200, serial number 837493/073
3) DC Power Supply, H/P, model 6632B, serial number US37472179

D) Test Voltage

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

E) Test Results Chart

Specifications	Test Type	Meets Requirements	Performed By
FCC CFR 47 Part 24, Subpart E IC RSS-133	Radiated Spurious/harmonic Emission, EIRP	Yes	Masud Attayi
FCC CFR 47 Part 24, Subpart E IC RSS-133	Conducted Emissions, Occupied Bandwidth, Frequency Stability	Yes	Daoud Attayi Maurice Battler

F) Modifications to EUT

No modifications were required to the EUT.

G) Summary of Results

1) The EUT passed the Conducted Spurious Emission requirements in the PCS band as per 47 CFR 2.1057, 47 CFR 24.238 and RSS-133. The EUT was measured on the low, middle and high channels. The frequency range measured was from 10 MHz to 20 GHz. See APPENDIX 1 for the test data.

2) The EUT passed the Occupied Bandwidth and channel mask requirements as per 47 CFR 2.202, 47 CFR 24.238 and RSS-133. The channels measured were low, middle and high. See APPENDIX 1 for the test data.

3) The EUT passed the Conducted RF Output Power requirements. The channels measured were low, middle and high.
See APPENDIX 2 for the test data.

4) The EUT passed the Frequency Stability vs. Temperature and Voltage requirements as per 47 CFR 24.135 and RSS-133. The temperature range was from -30°C to +60°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 (3.5 volts), nominal (3.8 volts) and high (4.1 volts) dc input voltage at each temperature step and channel at maximum output power.
Note: 4.1 volts is the instantaneous turn-on voltage for a fully charged battery. When the device transmits, this voltage drops to the nominal voltage within a few minutes.
See APPENDIX 3 for the test data.

5) The radiated spurious\harmonic emissions and EIRP for the PCS band passed the limits. 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 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 emissions level was recorded. The EUT was measured on the low, middle and high channels.

The radiated harmonics\spurious emissions were measured for the PCS band up to the 10^{th} harmonics for low, middle and high channels. The worst test margin measured was 24.3 dB below the limit at 3819.6 MHz (channel 810).

The highest EIRP in the PCS band measured was 29.69 dBm at 1850.2 MHz (channel 512). To view the test data see APPENDIX 4.

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

H) **Compliance Test Equipment Used**

UNIT	MANUFACTURER	MODEL / SERIAL NUMBER	CAL DUE DATE	USE
Preamplifier system	TDK RF Solutions	PA-02 080010	03-10-02	Radiated Emissions
Preamplifier	Sonoma	310N/11909A 185831	03-10-02	Radiated Emissions
EMC Analyzer	Agilent	E7405A US40240226	03-03-20	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200 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
Hybrid Log Antenna	TDK	HLP-3003C 17301	03-11-30	Radiated Emissions
Dipole Antenna	Schwarzbeck	VHAP 1006	03-09-12	Radiated Emissions
Dipole Antenna	Schwarzbeck	VHAP 1007	03-09-12	Radiated Emissions
Signal Generator	HP	83630B 3844A00927	04-04-30	Radiated Emissions
Universal Radio Communication Tester	Rohde & Schwarz	CMU 200 100251	03-03-27	Conducted Emissions
Spectrum Analyzer	HP	8563E 3745A08112	03-07-31	Conducted Emissions
DC Power Supply	HP	6632B US37472170	03-07-31	Conducted Emissions
Temperature Probe	Hart Scientific	61161-302 21352860	03-09-10	Conducted Emissions
Environmental Chamber	ESPEC Corp.	SH-240S1 91005607	N/R	Conducted Emissions

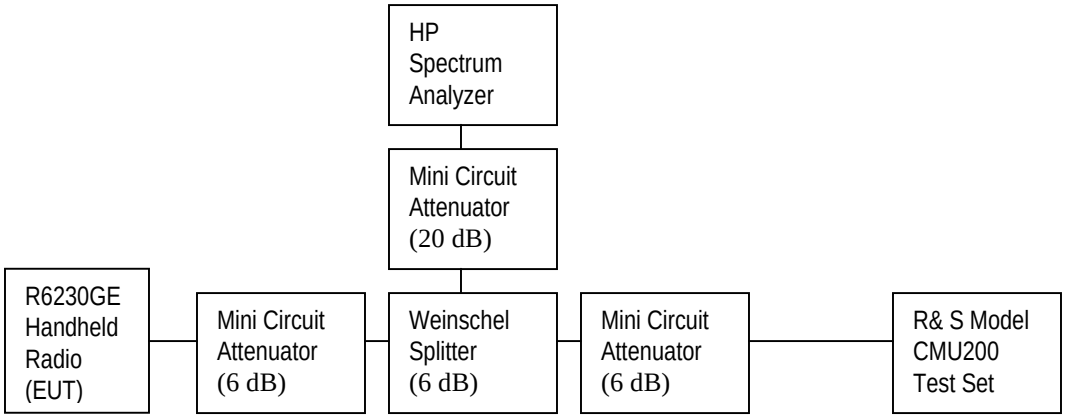
APPENDIX 1

CONDUCTED EMISSIONS TEST DATA/PLOTS

Conducted Emission Test Results

This appendix contains measurement data pertaining to conducted spurious emissions, –26 dBc bandwidth , 99% power bandwidth and the channel mask.

Test Setup Diagram



Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer	HP	8563E	374A08112	30 Hz – 26.5 GHz
Splitter	Weinschel	1515	ME380	DC – 18 GHz
Attenuator	Mini Circuit	MCL BW-S20W2	--	DC – 18 GHz
Attenuator	Mini Circuit	MCL BW-S6W2	--	DC – 18 GHz
Attenuator	Mini Circuit	MCL BW-S6W2	--	DC – 18 GHz
Universal Radio Communication Tester	Rohde & Schwarz	CMU200	100250	--

Conducted Emission Test Data Con't

The conducted spurious emissions – As per 47 CFR 2.202, 47 CFR 2.1057, 47 CFR 24.238 and RSS-133 were measured from 10 MHz to 20 GHz. No emissions could be seen above the noise floor of the spectrum analyzer.

Occupied Bandwidth (99%) and –26 dBc Bandwidth

For the low, middle and high channels, the modulation spectrum was measured by both methods of 99% power bandwidth and –26 dBc bandwidth.
The resolution bandwidth required for out-of-band emissions in the 1 MHz bands immediately outside and adjacent to the frequency block, was determined to be at least 1% of the emission bandwidth.
The worst case –26dBc emission bandwidth for the three channels was measured to be 310 kHz which results in 3.0 kHz resolution bandwidth.
On any frequency outside the frequency block and outside the adjacent 1 MHz bands, a resolution bandwidth of at least 1 MHz was employed.

Test Data for selected Frequencies

PCS Frequency (MHz)	99% Occupied Bandwidth (kHz)	-26dBc Bandwidth (kHz)
1850.2	246	310
1880.0	245	302
1909.8	245	300

Measurement Plots for PCS
Refer to the following measurement plots for more detail.

See Figures 1 to 6 for plots of the Spurious Emission results

See Figures 7 to 12 for the plots of the 99% Occupied Bandwidth and –26 dBc
Carrier Reference at 0.0 dB corresponds to maximum peak output power.

See Figures 13 to 14 for plots of the channel mask results.

The RF power output was at maximum for all the recorded measurements shown below.

Conducted Emission Test Results con't

Figure 1: Spurious Conducted Emissions, Low channel

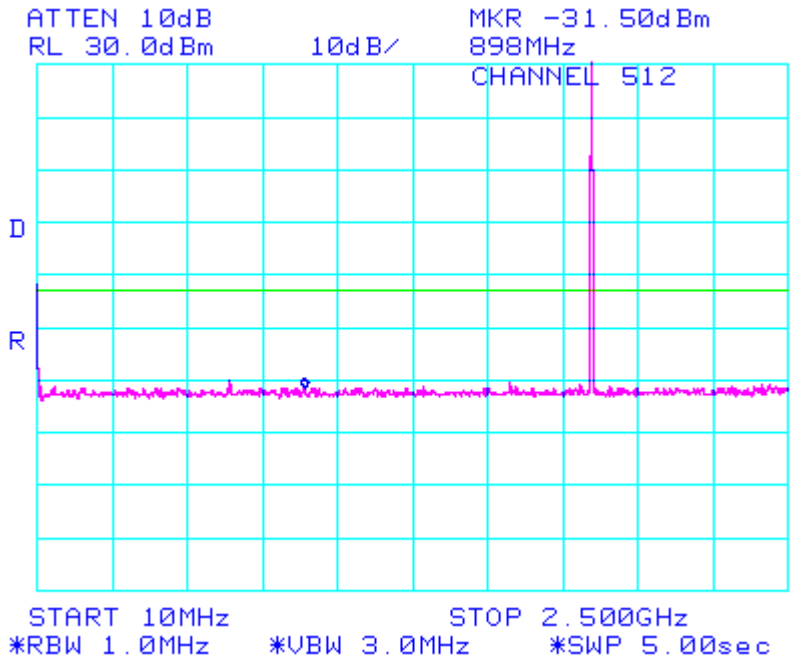
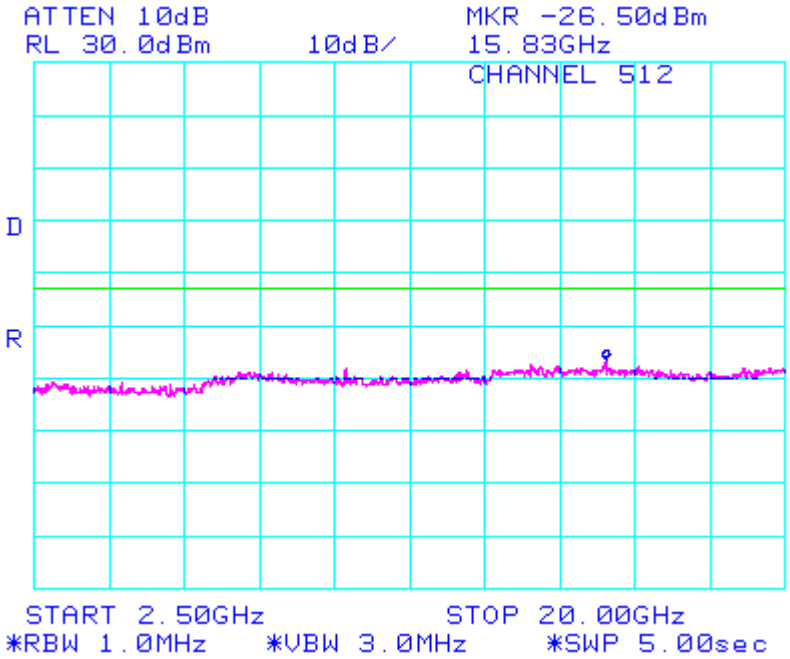


Figure 2: Spurious Conducted Emissions, Low channel



Conducted Emission Test Results Con't

Figure 3: Spurious Conducted Emissions, Middle Channel

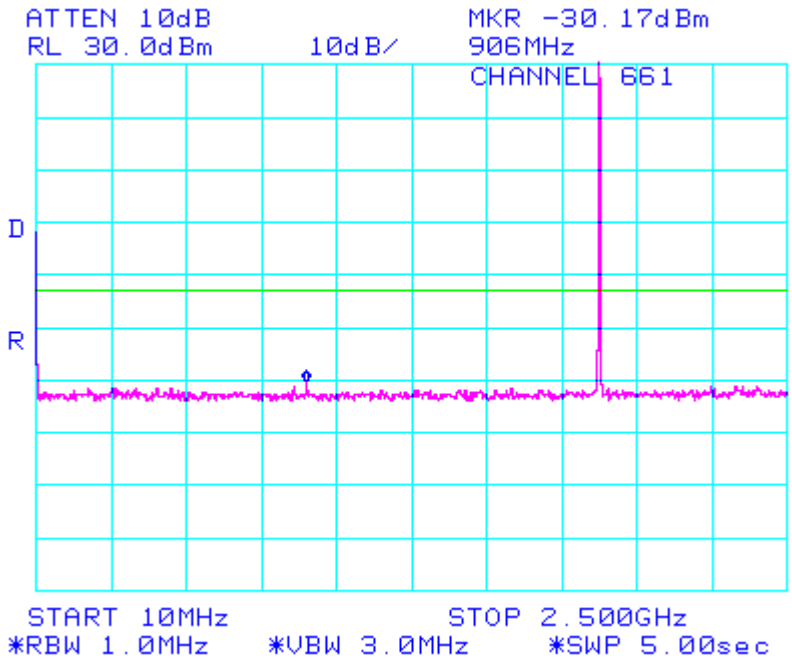
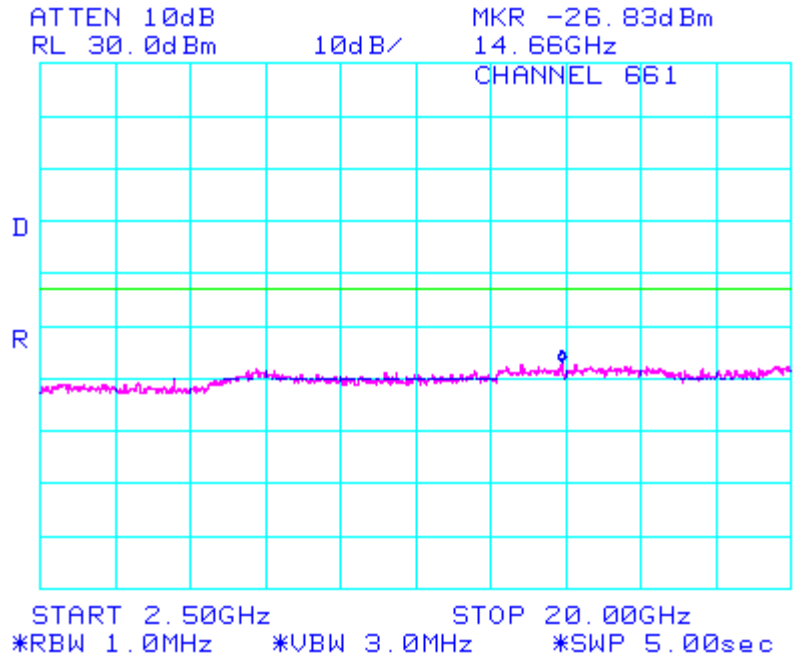


Figure 4: Spurious Conducted Emissions, Middle Channel



Conducted Emission Test Results Con't

Figure 5: Spurious Conducted Emissions, High Channel

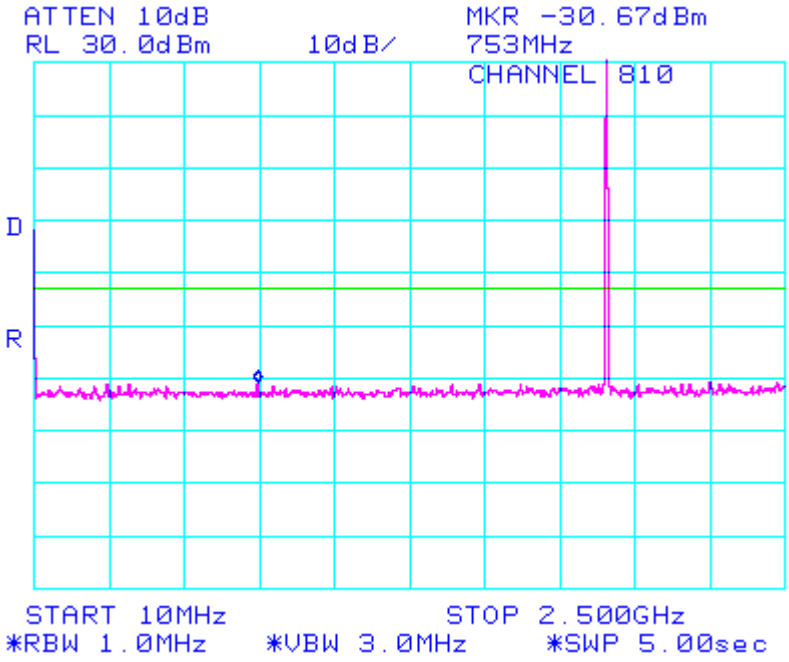
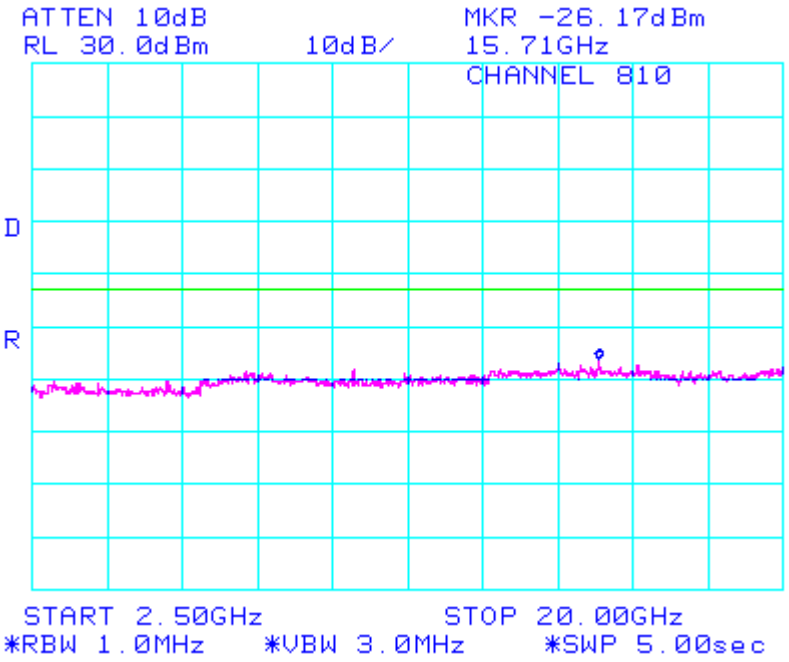


Figure 6: Spurious Conducted Emissions, High Channel



Conducted Emission Test Results Con't

Figure 7: -26dBc bandwidth, Low Channel

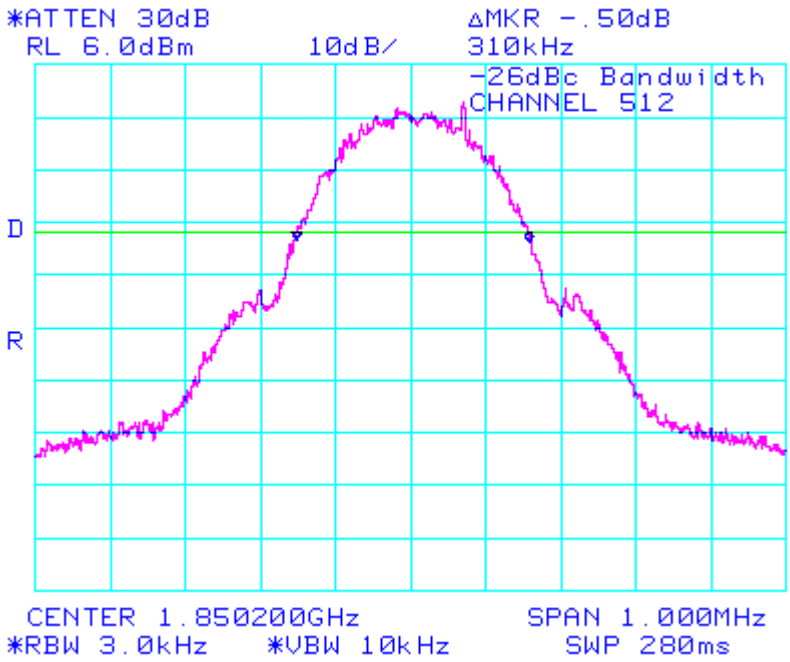
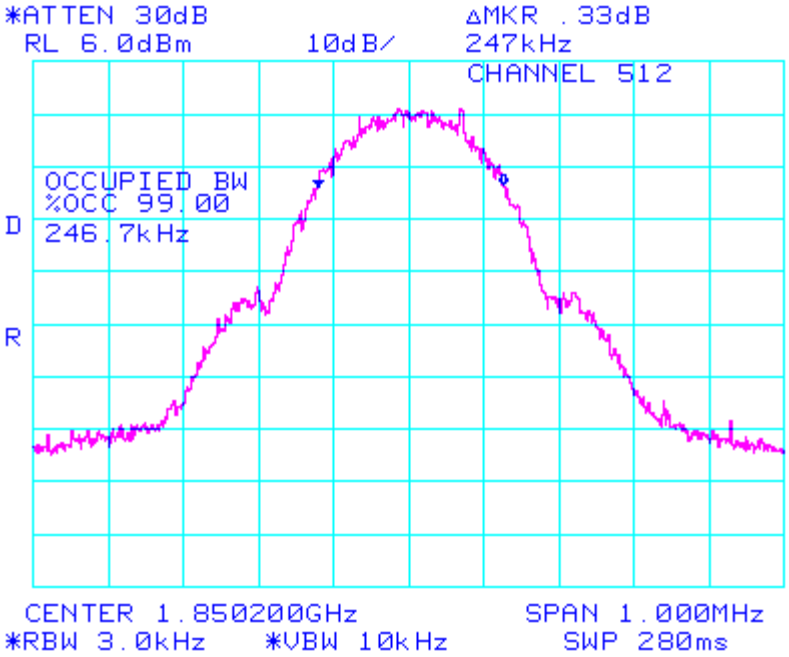


Figure8: Occupied Bandwidth, Low Channel



Conducted Emission Test Results Con't

Figure 9: -26dBc bandwidth, Middle Channel

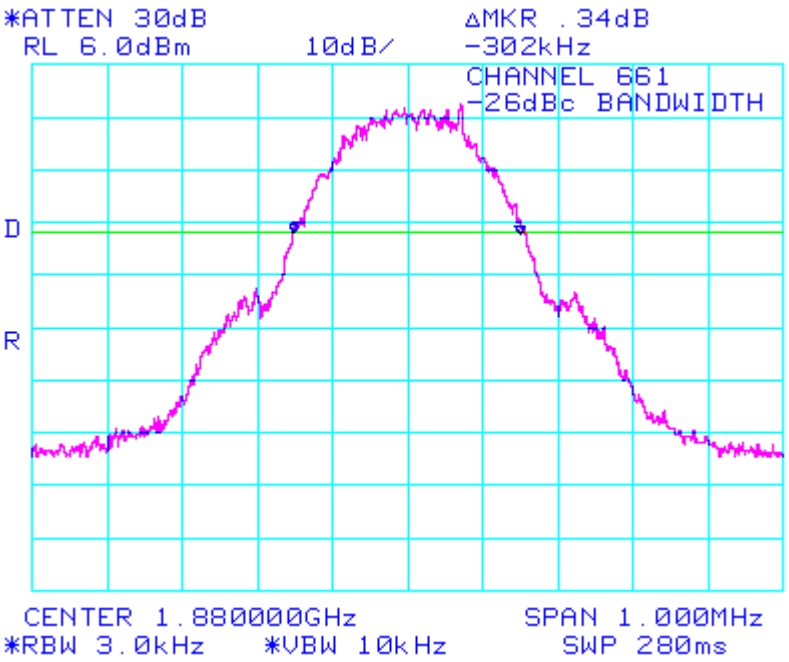
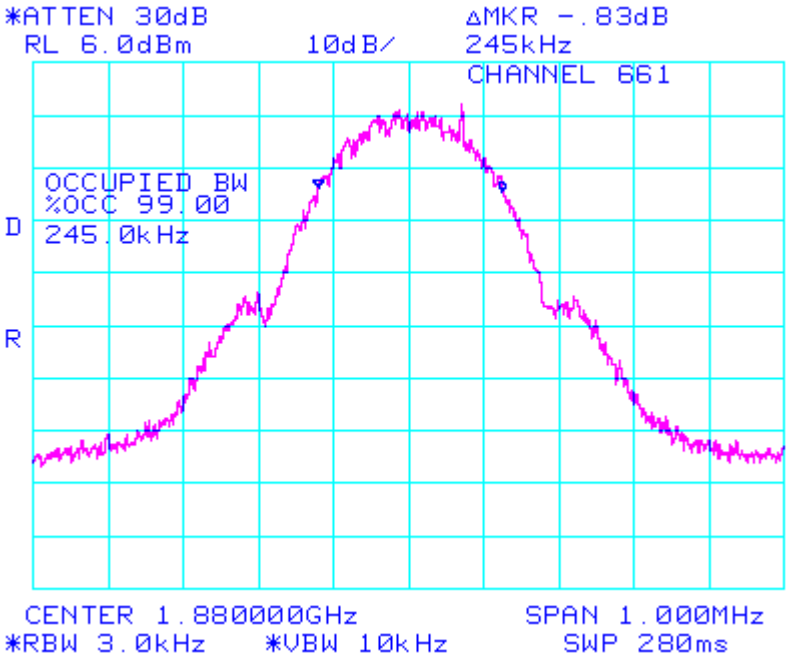


Figure 10: Occupied Bandwidth, Middle Channel



Conducted Emission Test Results Con't

Figure 11: -26dBc bandwidth**, High Channel**

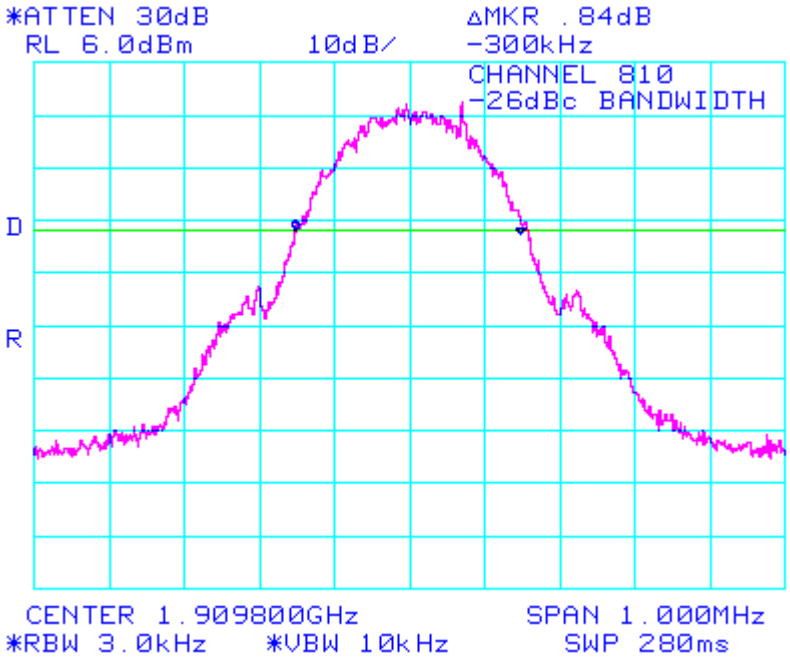
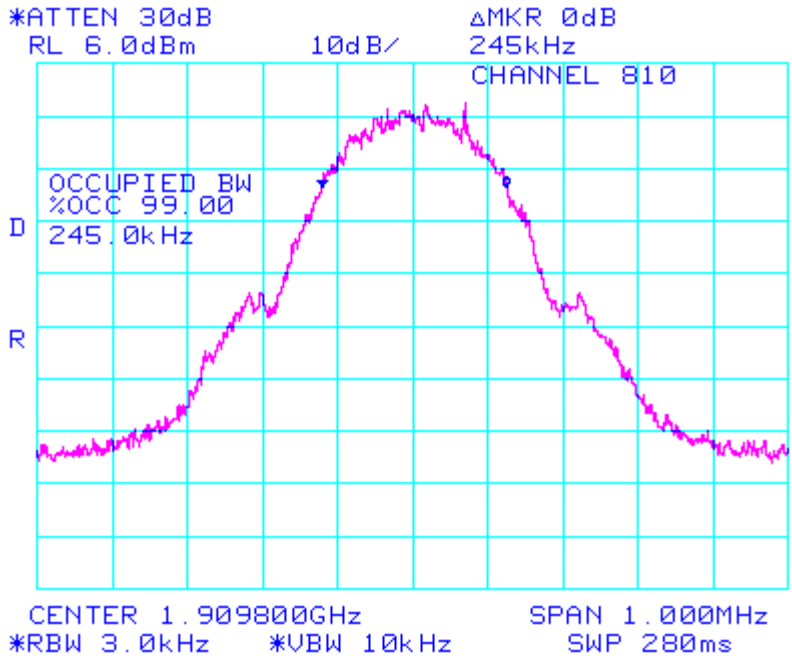


Figure 12: Occupied Bandwidth, High Channel



Conducted Emission Test Results Con't

Figure 13: Low Channel Mask

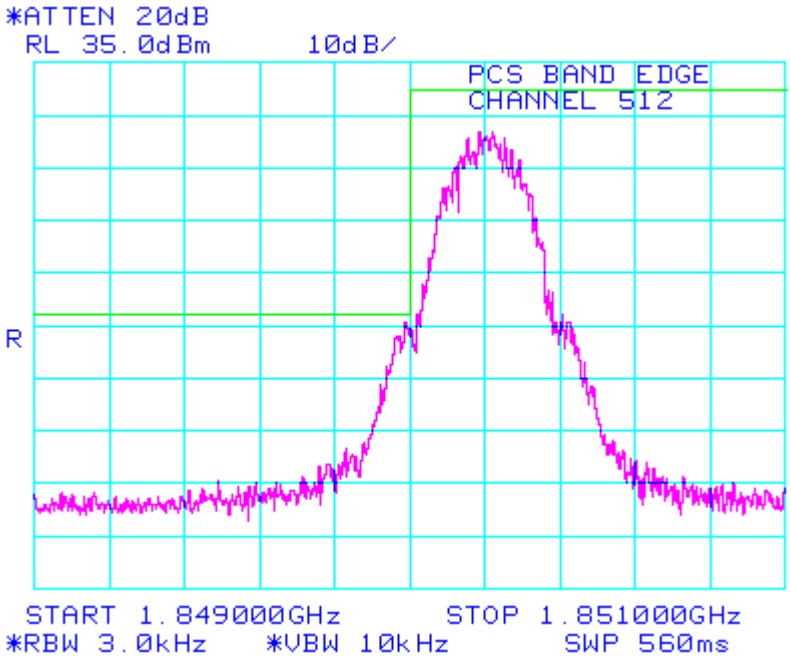
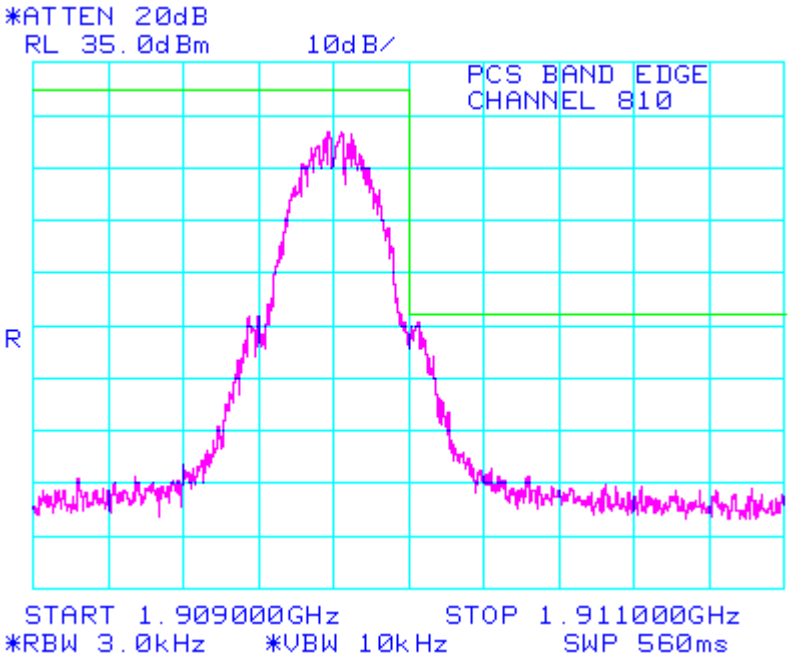
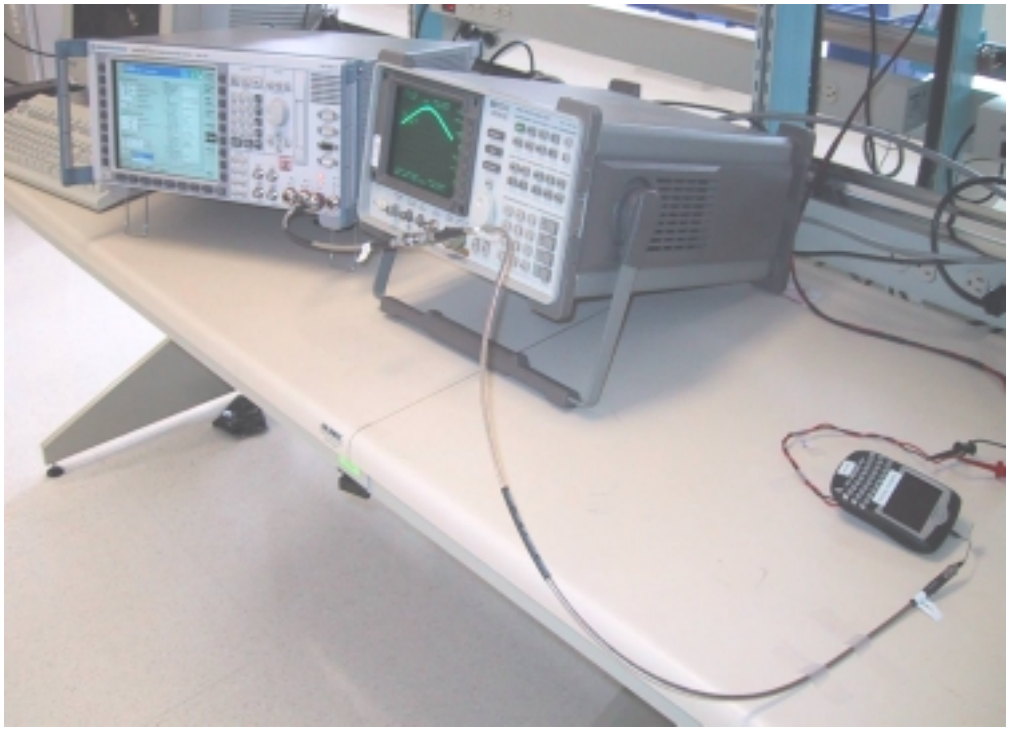


Figure 14: High Channel Mask



Conducted Emission Test-Setup Photo

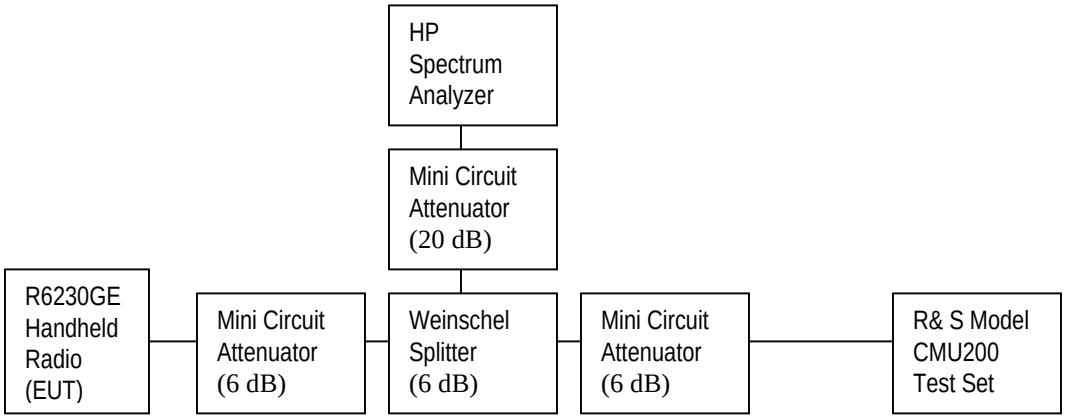
FCC CFR 47 Part 24, Subpart E, RSS-133



APPENDIX 2

CONDUCTED RF OUTPUT POWER TEST DATA

Conducted RF Output Power Test Data

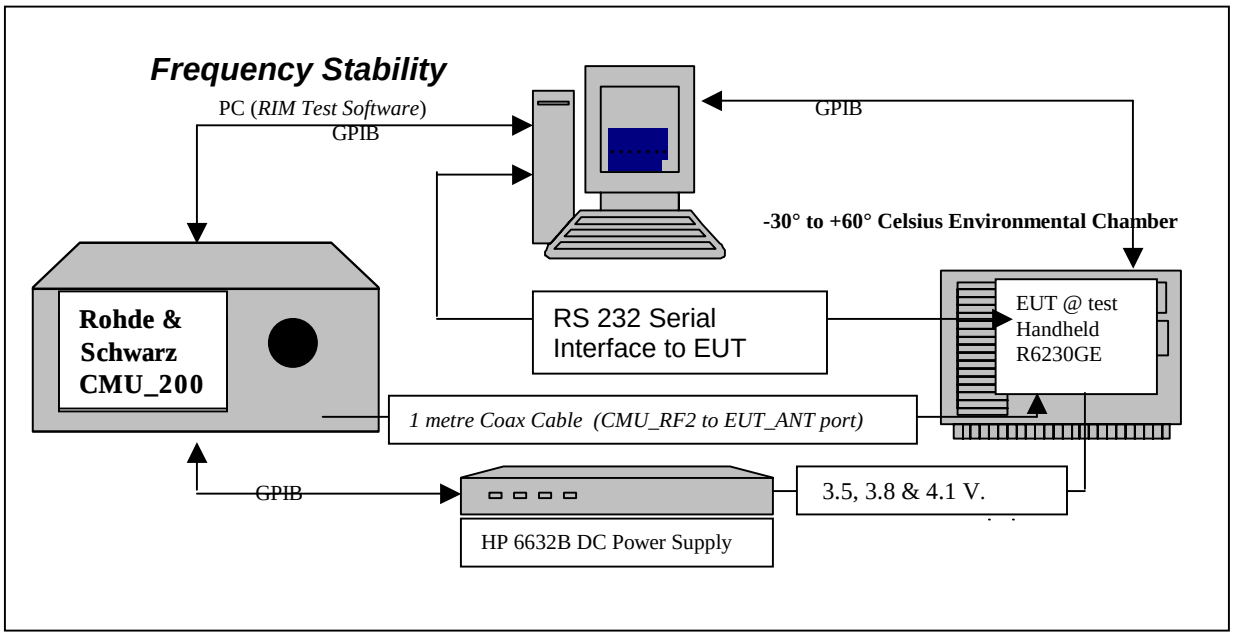


Channel	Frequency (MHz)	Measured Peak Conducted Power (dBm)	Total Correction Factor (dB)	Corrected Peak Conducted Power (dBm)
512	1850.2	-3.0	32.8	29.8
661	1880.0	-3.0	32.8	29.8
810	1909.8	-3.0	32.8	29.8

APPENDIX 3

FREQUENCY STABILITY TEST DATA

Frequency Stability Test Data



SYSTEM	*Model*	*Serial Number*	*Calibration Due Date.*
R & S Universal Radio Communication Test Set	CMU200	100250	29-March-2003
HP System DC Power Supply	6632B	US37472170	31-July-2003
Network Analyzer	HP 8753D	20A80400806	12-Aug-2003
Calibration Kit	HP85033D	3423A02787	28-Sept-2003
Espec Environmental Chamber	SH240S1	91005607	N/A
Hart Temperature Probe	61161-302	21352860	10-Sept-2003

CFR 47 Chapter 1 - Federal Communications Commission Rules

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

The R6230GE handheld, (referred as EUT herein and after) transmitted frequencies are less than 0.1 ppm off the received frequency from the Rhode & Schwarz CMU 200 Universal Radio Communication Test Set.
The R6230GE handheld meets the requirements as stated in CFR 47 chapter 1, Section 24.135 and RSS-133 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 one metre 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 February 18, 2003.

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

A one metre long coax cable was used to complete the RF power measurement.

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

PCS Frequency (MHz)	Cable loss (dB)
1850.2	*0.6*
1880.0	*0.6*
1909.8	*0.6*

Procedure:

The EUT was placed in the Temperature chamber and connected to the 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, then 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 set to the 1900 PCS band. 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 of 1850.2, 1880.0 & 1909.8 MHz.
The power supply was cycled from the minimum voltage of 3.5 volts, to 3.8 volts, and then to 4.1 volts nominal voltage.
The frequency error was measured at a maximum output power of 30 dBm and recorded by the automated system test software.

The EUT output power and frequency was measured at 3.5V, 3.8V,and 4.1VDC. The transmit frequency was varied in 3 steps consisting of 1850.2 MHz, 1880.0 MHz and 1909.8 MHz. 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 1850.2 MHz
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 1880.0 and 1909.8 MHz 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 3.5V, 3.8V, and 4.1 Volts

PCS Channel results: 512, 661, & 810 @ 20°C maximum transmitted power

Traffic Channel Number	*PCS Frequency (MHz*	*PCL (dBm)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
512	1850.2	30	3.5	20	1.16	0.0006
661	1880.0	30	3.5	20	-9.75	0.0051
810	1909.8	30	3.5	20	-1.36	0.0007

Traffic Channel Number	*PCS Frequency (MHz*	*PCL (dBm)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
512	1850.2	30	3.8	20	-2.84	0.0015
661	1880.0	30	3.8	20	19.95	0.0106
810	1909.8	30	3.8	20	-1.49	0.0008

Traffic Channel Number	*PCS Frequency (MHz*	*PCL (dBm)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
512	1850.2	30	4.1	20	7.75	0.0041
661	1880.0	30	4.1	20	10.46	0.0056
810	1909.8	30	4.1	20	15.69	0.0082

Channel Results: 512 @ maximum transmitted power

Traffic Channel Number	*Frequency (MHz)*	*PCL (dBm)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
512	1850.2	30	3.5	-30	-4.33	0.0023
512	1850.2	30	3.5	-20	15.3	0.0083
512	1850.2	30	3.5	-10	0.65	0.0003
512	1850.2	30	3.5	0	6.52	0.0035
512	1850.2	30	3.5	10	13.04	0.0070
512	1850.2	30	3.5	20	1.16	0.0006
512	1850.2	30	3.5	30	-23.18	0.0125
512	1850.2	30	3.5	40	-0.84	0.0005
512	1850.2	30	3.5	50	1.74	0.0009
512	1850.2	30	3.5	60	8.98	0.0049

Traffic Channel Number	*Frequency (MHz)*	*PCL (dBm)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
512	1850.2	30	3.8	-30	-1.94	0.0010
512	1850.2	30	3.8	-20	28.02	0.0151
512	1850.2	30	3.8	-10	-6.52	0.0035
512	1850.2	30	3.8	0	10.72	0.0058
512	1850.2	30	3.8	10	-1.36	0.0007
512	1850.2	30	3.8	20	-2.84	0.0015
512	1850.2	30	3.8	30	7.68	0.0042
512	1850.2	30	3.8	40	5.23	0.0028
512	1850.2	30	3.8	50	28.67	0.0155
512	1850.2	30	3.8	60	-4.00	0.0022

Traffic Channel Number	*Frequency (MHz)*	*PCL (dBm)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
512	1850.2	30	4.1	-30	24.41	0.0013
512	1850.2	30	4.1	-20	10.07	0.0054
512	1850.2	30	4.1	-10	14.21	0.0077
512	1850.2	30	4.1	0	-2.20	0.0012
512	1850.2	30	4.1	10	6.46	0.0035
512	1850.2	30	4.1	20	7.75	0.0042
512	1850.2	30	4.1	30	4.78	0.0026
512	1850.2	30	4.1	40	17.43	0.0094
512	1850.2	30	4.1	50	29.9	0.0162
512	1850.2	30	4.1	60	-0.58	0.0003

Channel Results: 647 @ maximum transmitted power

Traffic Channel Number	*Frequency (MHz)*	*PCL (dBm)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
661	1880.0	30	3.5	-30	8.52	0.0045
661	1880.0	30	3.5	-20	37.45	0.0200
661	1880.0	30	3.5	-10	-3.10	0.0016
661	1880.0	30	3.5	0	0.26	0.0001
661	1880.0	30	3.5	10	-4.00	0.0021
661	1880.0	30	3.5	20	-9.75	0.0052
661	1880.0	30	3.5	30	5.17	0.0028
661	1880.0	30	3.5	40	-8.65	0.0046
661	1880.0	30	3.5	50	-6.91	0.0037
661	1880.0	30	3.5	60	-9.49	0.0050

Traffic Channel Number	*Frequency (MHz)*	*PCL (dBm)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
661	1880.0	30	3.8	-30	12.72	0.0068
661	1880.0	30	3.8	-20	6.26	0.0033
661	1880.0	30	3.8	-10	4.65	0.0025
661	1880.0	30	3.8	0	5.88	0.0031
661	1880.0	30	3.8	10	-4.33	0.0023
661	1880.0	30	3.8	20	19.95	0.0106
661	1880.0	30	3.8	30	11.62	0.0062
661	1880.0	30	3.8	40	8.27	0.0044
661	1880.0	30	3.8	50	-3.55	0.0019
661	1880.0	30	3.8	60	10.78	0.0057

Traffic Channel Number	*Frequency (MHz)*	*PCL (dBm)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
661	1880.0	30	4.1	-30	20.6	0.0110
661	1880.0	30	4.1	-20	12.59	0.0067
661	1880.0	30	4.1	-10	-1.29	0.0007
661	1880.0	30	4.1	0	22.99	0.0122
661	1880.0	30	4.1	10	23.25	0.0124
661	1880.0	30	4.1	20	10.46	0.0056
661	1880.0	30	4.1	30	23.12	0.0123
661	1880.0	30	4.1	40	3.68	0.002
661	1880.0	30	4.1	50	-2.71	0.0014
661	1880.0	30	4.1	60	-8.33	0.0044

Channel Results: 782 @ maximum transmitted power

Traffic Channel Number	*Frequency (MHz)*	*PCL (dBm)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
810	1909.8	30	3.5	-30	14.33	0.0075
810	1909.8	30	3.5	-20	21.7	0.0114
810	1909.8	30	3.5	-10	11.11	0.0058
810	1909.8	30	3.5	0	-1.94	0.0010
810	1909.8	30	3.5	10	7.68	0.0040
810	1909.8	30	3.5	20	1.36	0.0007
810	1909.8	30	3.5	30	9.43	0.0049
810	1909.8	30	3.5	40	1.03	0.0005
810	1909.8	30	3.5	50	-6.26	0.0033
810	1909.8	30	3.5	60	9.23	0.0048

Traffic Channel Number	*Frequency (MHz)*	*PCL (dBm)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
810	1909.8	30	3.8	-30	-6.20	-0.0032
810	1909.8	30	3.8	-20	40.23	0.0211
810	1909.8	30	3.8	-10	8.20	0.0043
810	1909.8	30	3.8	0	18.73	0.0098
810	1909.8	30	3.8	10	-9.49	0.0050
810	1909.8	30	3.8	20	-1.49	0.0008
810	1909.8	30	3.8	30	12.40	0.0065
810	1909.8	30	3.8	40	-4.33	0.0023
810	1909.8	30	3.8	50	-37.71	0.0197
810	1909.8	30	3.8	60	-1.49	0.0008

Traffic Channel Number	*Frequency (MHz)*	*PCL (dBm)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
810	1909.8	30	4.1	-30	5.36	0.0028
810	1909.8	30	4.1	-20	14.08	0.0074
810	1909.8	30	4.1	-10	-0.65	0.0003
810	1909.8	30	4.1	0	9.81	0.0051
810	1909.8	30	4.1	10	20.21	0.0106
810	1909.8	30	4.1	20	15.69	0.0082
810	1909.8	30	4.1	30	20.15	0.0105
810	1909.8	30	4.1	40	-6.20	0.0032
810	1909.8	30	4.1	50	-30.41	0.0159
810	1909.8	30	4.1	60	-1.49	0.0008

APPENDIX 4

RADIATED EMISSIONS TEST DATA

Radiated Emissions Test Data Results

Test Distance is 3.0 metres

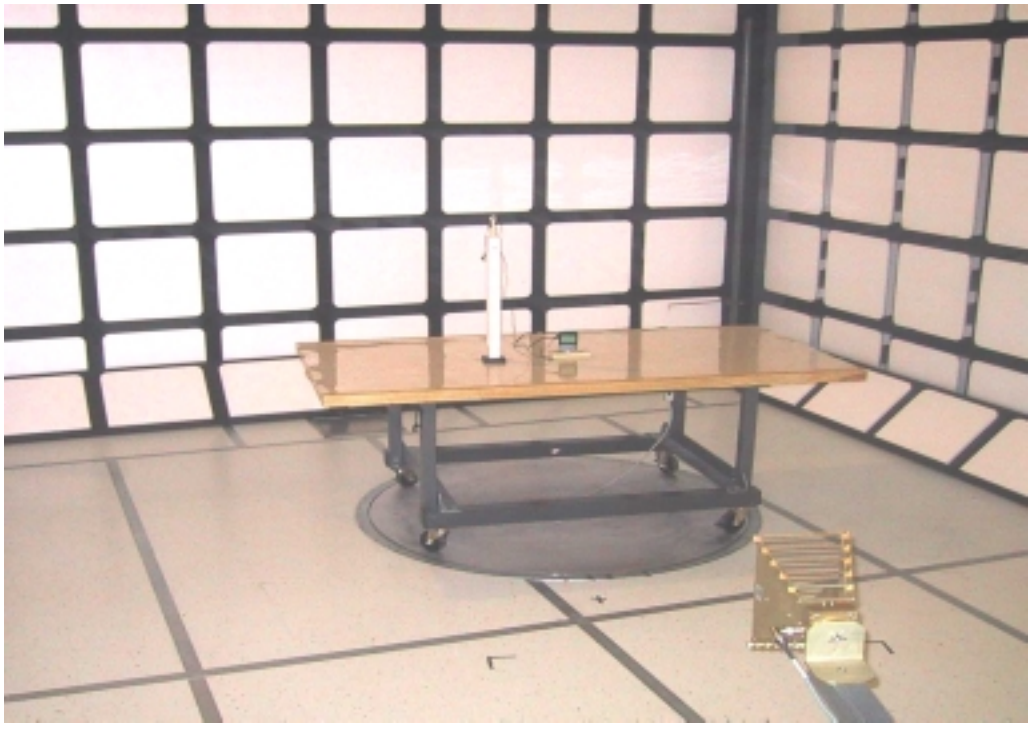
										Substitution Method				
EUT				Receive Antenna			Spectrum Analyzer			Tracking Generator				
Type	Ch	Freq (MHz)	Band	Pol.	Type	Pol.	Reading (dBuV)	Corrected Reading (dBuV)	Max (V,H) dBuV	Reading (dBm)	Corrected Reading (relative to dipole) (dBm)	Pol.	Limit dBm	Diff to Limit (dB)
PCS BAND (EIRP) - handheld standalone, upright position														
F0	512	1850.2	1900	V	Horn	V	94.9	94.9	94.9	-2.4	29.69	VV	33	-3.31
F0	512	1850.2	1900	V	Horn	H	88.9	88.6		-2.0		HH		
F0	661	1880.0	1900	V	Horn	V	91.2	91.2	91.2	-5.1	26.79	VV	33	-6.21
F0	661	1880.0	1900	V	Horn	H	85.3	85.3		-4.9		HH		
F0	810	1909.8	1900	V	Horn	V	92.2	92.2	92.2	-3.7	27.99	VV	33	-5.01
F0	810	1909.8	1900	V	Horn	H	85.2	85.2		-3.8		HH		
PCS BAND (EIRP) - handheld in upright position, connected to Headset														
F0	512	1850.2	1900	V	Horn	V	94.4	94.4	94.4	-2.9	29.19	VV	33	-3.81
F0	512	1850.2	1900	V	Horn	H	86.0	86.0		-2.5		HH		
F0	661	1880.0	1900	V	Horn	V	92.4	92.4	92.4	-3.8	27.99	VV	33	-5.01
F0	661	1880.0	1900	V	Horn	H	85.9	85.9		-3.7		HH		
F0	810	1909.8	1900	V	Horn	V	91.0	91.0	91.0	-4.9	26.79	VV	33	-6.21
F0	810	1909.8	1900	V	Horn	H	85.3	85.3		-5.1		HH		
PCS BAND (EIRP) - handheld in upright position connected to the USB/External Battery Charger (Charger placed on top of the turntable) plus Headset.														
F0	512	1850.2	1900	V	Horn	V	92.9	92.9	92.9	-4.4	27.69	VV	33	-5.31
F0	512	1850.2	1900	V	Horn	H	86.2	86.2		-4.0		HH		
F0	661	1880.0	1900	V	Horn	V	90.9	90.9	90.9	-5.3	26.49	VV	33	-6.51
F0	661	1880.0	1900	V	Horn	H	83.9	83.9		-5.2		HH		
F0	810	1909.8	1900	V	Horn	V	91.8	91.8	91.8	-4.1	27.59	VV	33	-5.41
F0	810	1909.8	1900	V	Horn	H	84.2	84.2		-4.3		HH		

Radiated Emissions Test Data Results con't

Test distance is 3.0 metres.

										Substitution Method				
EUT				Receive Antenna			Spectrum Analyzer			Tracking Generator				
Type	Ch	Freq (MHz)	Band	Pol.	Type	Pol.	Reading (dBuV)	Corrected Reading (dBuV)	Max (V,H) dBuV	Reading (dBm)	Corrected Reading (relative to dipole) (dBm)	Pol.	Limit dBm	Diff to Limit (dB)
PCS BAND (Harmonics) - handheld standalone, upright position (worst configuration)														
Low Channel														
2nd	512	3700.4	1900	V	Horn	V	44.7	44.7	44.7	-41.9	-37.8	VV	-13	-24.8
2nd	512	3700.4	1900	V	Horn	H	NF	NF				HH		
The harmonics were investigated up to the 10th harmonic. No Emissions above the 2nd harmonic could be seen above the spectrum analyzer noise floor.														
Middle Channel														
2nd	661	3760.0	1900	V	Horn	V	44.4	44.4	44.4	-41.0	-37.4	VV	-13	-24.4
2nd	661	3760.0	1900	V	Horn	H	38.5	38.5		-41.7		HH		
The harmonics were investigated up to the 10th harmonic. No Emissions above the 2nd harmonic could be seen above the spectrum analyzer noise floor.														
High Channel														
2nd	810	3819.6	1900	V	Horn	V	44.9	44.9	44.9	-41.1	-37.3	VV	-13	-24.3
2nd	810	3819.6	1900	V	Horn	H	37.8	37.8		-40.9		HH		
The harmonics were investigated up to the 10th harmonic. No Emissions above the 2nd harmonic could be seen above the spectrum analyzer noise floor.														

Radiated Emissions Test Photo con't



Radiated Emissions at 3.0 metres