EMI Test Report

Tested in accordance with

Federal Communications Commission (FCC)
Personal Communications Services
CFR 47, Parts 2 and 90
and
Industry Canada, RSS-119

Research In Motion Limited

REPORT NO.: RIM-0048-0306-06

PRODUCT MODEL NO: RAM10MN
TYPE NAME: BlackBerry Wireless Handheld
FCC ID: L6ARAM10MN
IC: 2503A-RAM10MN

Date: 21 July 2003

Declaration

Statement of Performance:

The Moditex BlackBerry Wireless Handheld, model RAM10MN ASY-06245-002 tested with the following accessories: Travel Charger model number SPS-015, part number ASY-02488-001, AC Power Adapter part number PWR-02232-002 and Docking/Charging Cradle model number ASY-02556-001 when configured and operated per RIM's operation instructions, performs within the requirements of the test standards.

Declaration:

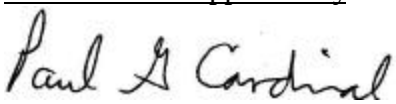
We hereby certify that:
The test data reported herein is an accurate record of the performance of the sample(s) tested.
The test equipment used was suitable for the tests performed and within the manufacturers published specifications and operating parameters.
The test methods were consistent with the methods described in the relevant standards.

Tested by

Maurice Battler
Compliance Specialist Date: 21 July 2003

Masud S. Attayi, P.Eng.
Senior Compliance Engineer Date: 24 July 2003

Reviewed and Approved by:



Paul G. Cardinal, Ph.D.
Manager, Compliance and Certification Date: 07 August 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 90, Oct. 1, 2000
Industry Canada, RSS-119 Issue 6, March 25, 2000, Land Mobile and Fixed Radio Transmitters and Receivers, 27.41 to 960 MHz.

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 June 23, 2003 and completed on July 15, 2003. The sample equipment under test (EUT) included:

1a) BlackBerry Wireless Handheld, model number RAM10MN, ASY-06245-002, RF PCB version 002, PIN 10331647, S/N 031/17/156156, FCC ID L6ARAM10MN, IC: 2503A-RAM10MN.
1b) BlackBerry Wireless Handheld, model number RAM10MN, ASY-06245-002, RF PCB version 002, PIN 10331652, S/N 031/17/156161, FCC ID L6ARAM10MN, IC: 2503A-RAM10MN.
2) Travel Charger, model number SPS-015, part number ASY-02488-001 with an output voltage of 4.2 volts dc.
3) AC Power Adapter, part number PWR-02232-002 with an output voltage of 12.0 volts dc.
4) Docking/Charging Cradle, model number ASY-02556-001.

The transmit frequency band for the Handheld is 896 to 901 MHz.

C) Support Equipment Used for the Testing of the EUT

1) PC System, Myraid, model EW.76BXA, serial number CCC9908102 with Moditex Config Tool software.
2) Monitor, Mag Technology Co. Ltd., RIM Asset Number 00015
3) DC Power Supply, H/P, model 6632B, serial number US37472179
4) Signal Generator, model number 8646A, serial number 3838A02755

D) Test Voltage

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

E) Test Results Chart

SPECIFICATION	Test Type	MEETS REQUIREMENTS	Performed By
FCC CFR 47 Part 2, Subpart N IC RSS-119	ERP	Yes	Masud Attayi
FCC CFR 47 Part 2, Subpart J IC RSS-119	Radiated Spurious/harmonic Emissions	Yes	Masud Attayi
FCC CFR 47 Part 2, Subpart J, Part 90, Subpart I IC RSS-119	Conducted Emissions, Occupied Bandwidth	Yes	Maurice Battler
FCC CFR 47, Part 2.947, 2.1055 and 90.213 IC RSS-119	Frequency Stability	Yes	Maurice Battler

F) Modifications to EUT

No modifications were required to the EUT.

G) **Summary of Results**

1) The EUT passed the Conducted Spurious Emissions requirements as per 47 CFR 2.1051. The EUT was measured on the low, middle and high channels. The frequency range investigated was from 10 MHz to 10 GHz.
See APPENDIX 1 for the test data.

2) The EUT passed the Occupied Bandwidth/Bandwidth Limitation requirements per 47 CFR 2.1049, 47 CFR 90.210 (j) and RSS-119. The channels measured were low, middle and high at high low power levels.
See APPENDIX 1 for the test data.

3) The EUT passed the Conducted RF Output Power requirements as per 47 CFR 2.1046. 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 2.1055 and RSS-119.
The maximum frequency error measured was less than 1.5 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 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 rotatable turntable The test distance used between the EUT and the receiving antenna was three metres. At this point the emissions were maximized by elevating the antenna in the range of 1 to 4 metres. The turntable was rotated to determine the azimuth of the peak emissions. The maximum emissions level was recorded. 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 EUT was measured on the low, middle and high channels.

The highest ERP measured was 29.5 dBm at 896.0 MHz (Channel 480).

To view the test data see APPENDIX 4.

The radiated carrier harmonics were measured up to the 10th harmonic for low, middle and high channels.
The worst test margin measured was more than 20 dB below the limit.

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 (YY MO DD)	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	03-09-21	Radiated Emissions
Horn Antenna	TDK	HRN-0118	130092	03-08-14	Radiated Emissions
Horn Antenna	TDK	HRN-0118	030201	03-12-11	Radiated Emissions
Hybrid Log Antenna	TDK	HLP-3003C	017301	03-12-11	Radiated Emissions
Dipole Antenna	Schwarzbeck	VHAP	1006	03-09-12	Radiated Emissions
Dipole Antenna	Schwarzbeck	VHAP	1007	03-09-12	Radiated Emissions
Synthesized Sweeper	Agilent	83630B	3844A00927	04-04-30	Radiated Emissions
Signal Generator	HP	8646A	3838A02755	03-08-07	Radiated Emissions
Spectrum Analyzer	HP	8563E	3745A08112	03-07-31	Conducted Emissions
DC Power Supply	HP	6632B	US37472170	03-07-31	Conducted Emissions Frequency Stability
Temperature Probe	Hart Scientific	61161-302	21352860	03-09-10	Frequency Stability
Environmental Chamber	ESPEC Corp.	SH-240S1	91005607	N/R	Frequency Stability
RF Communication Set	HP	8920B	US38141353	03-08-12	Frequency Stability
Universal Counter	HP	53131A	3736A19048	03-08-02	Frequency Stability
Power Meter	HP	EPM-441A	GB37481284	03-08-06	Frequency Stability
Power Sensor	HP	ECP-E18A	US39181260	03-08-06	Frequency Stability
Power Meter	Giga-Tronics	8541C	1837762	03-08-12	Conducted RF Power
Power Sensor	Giga-Tronics	80401A	1835838	03-10-30	Conducted RF Power

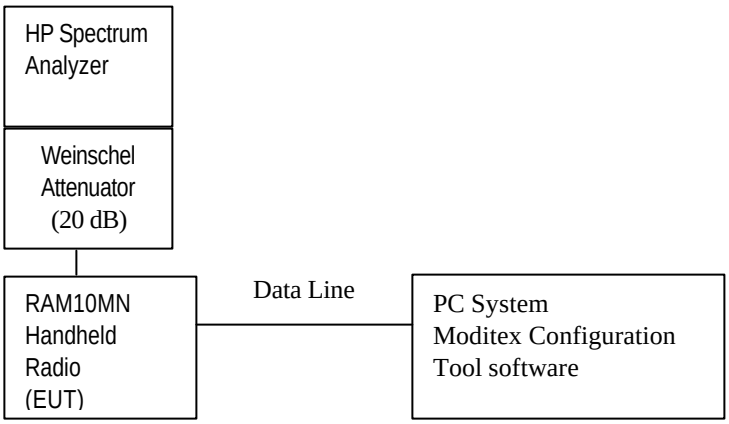
APPENDIX 1

CONDUCTED EMISSIONS TEST DATA/PLOTS

Conducted Emission Test Results

This appendix contains measurement data pertaining to conducted spurious emissions, and occupied bandwidth.

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
Attenuator	Weinschel	33-20-33	BL8170	DC – 18 GHz
Moditex Configuration Tool software	PC System	EW76BXA	CCC9908102	N/A

The conducted spurious emissions – As per 47 CFR 2.1051 and IC RSS-119 were measured from 10 MHz to 10 GHz. The low, middle and high channels were measured with an unmodulated carrier and with a modulated carrier. The EUT has a test margin of greater than 20 dB.
See figures 1 to 12 for the plots of the conducted spurious emissions.

Occupied Bandwidth/Bandwidth Limitations – As per 47 CFR 90.210 (j) and IC RSS-119 the EUT was measured at high power (33 dBm) and low power (18 dBm). The low, middle and high channels were measured with an unmodulated carrier and with a modulated carrier.
Refer to the following measurement plots for more detail.
See Figures 13 to 16 for plots of the low channel results.
See Figures 17 to 20 for plots of the middle channel results.
See Figures 21 to 24 for plots of the high channel results.

Conducted Emission Test Results con't

Figure 1: Spurious Conducted Emissions, Low channel (unmodulated carrier)

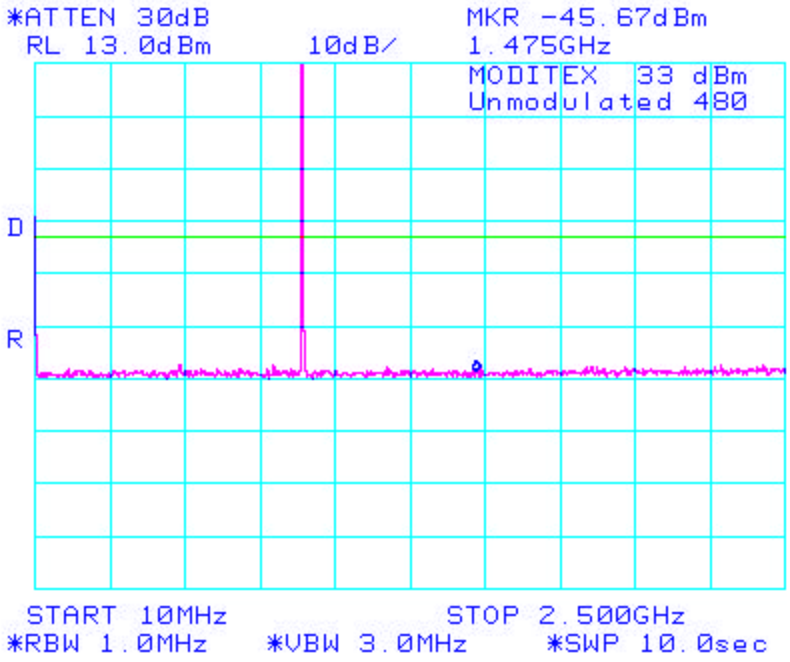
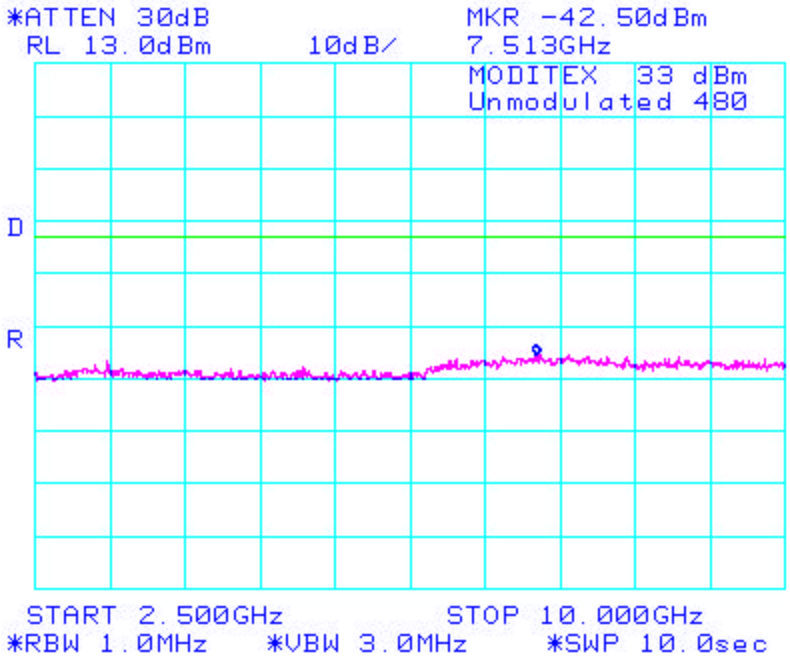


Figure 2: Spurious Conducted Emissions, Low channel (unmodulated carrier)



Conducted Emission Test Results Con't

Figure 3: Spurious Conducted Emissions, Middle Channel (unmodulated carrier)

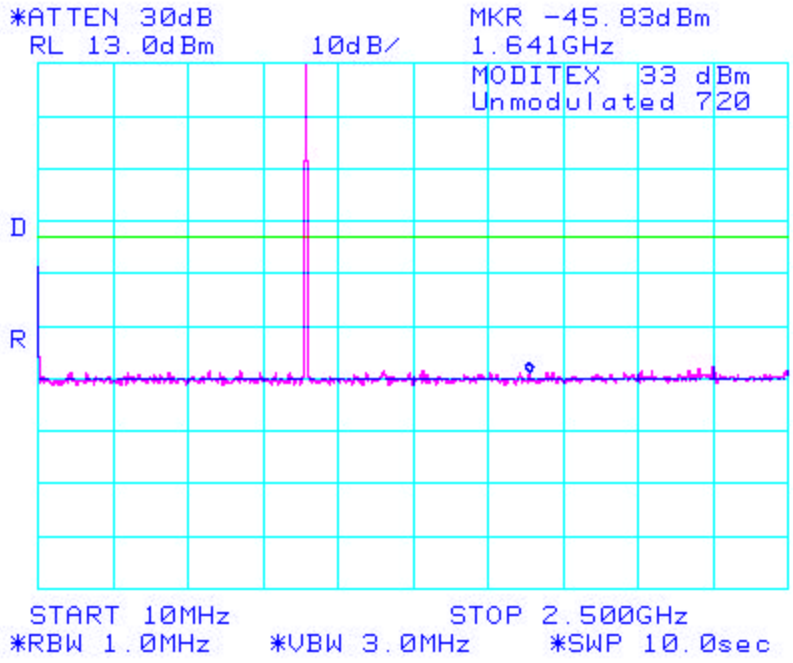
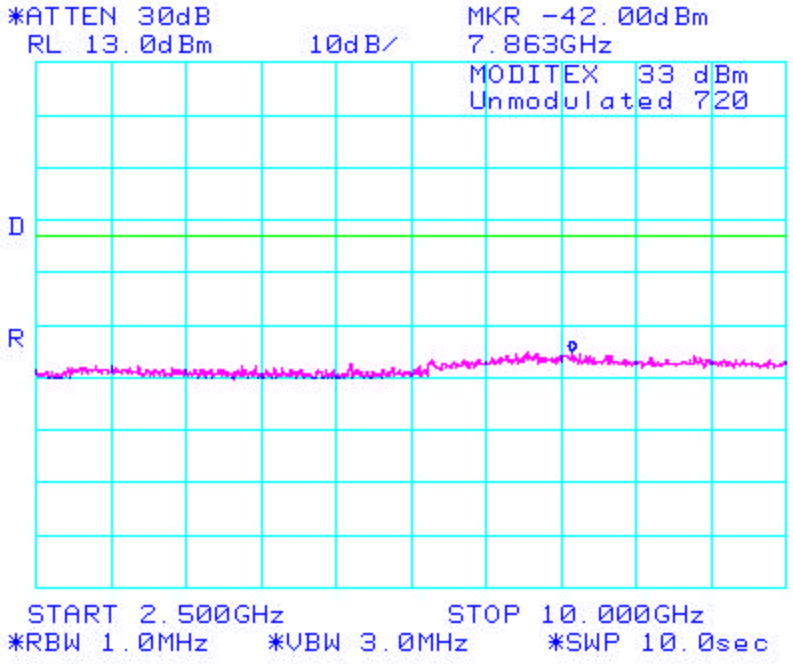


Figure 4: Spurious Conducted Emissions, Middle Channel (unmodulated carrier)



Conducted Emission Test Results Con't

Figure 5: Spurious Conducted Emissions, High Channel (unmodulated carrier)

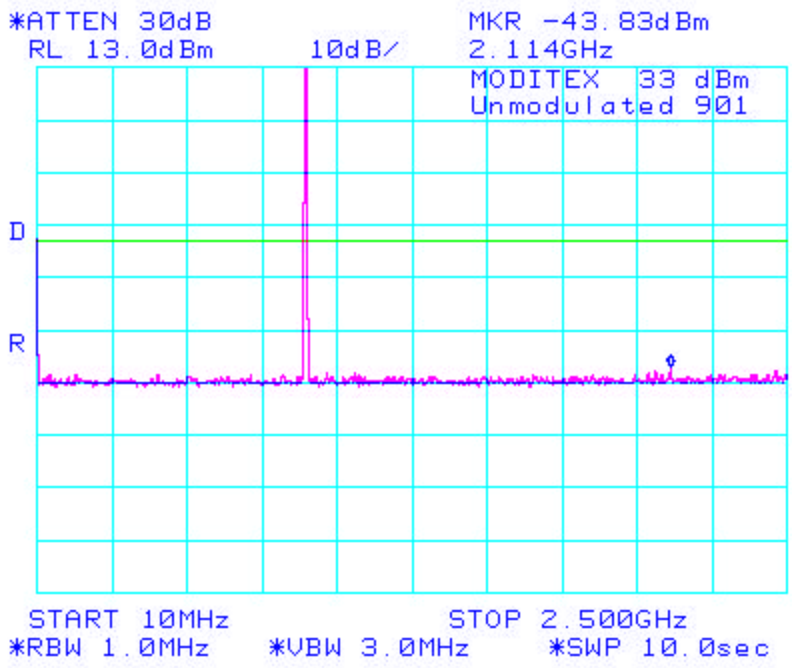
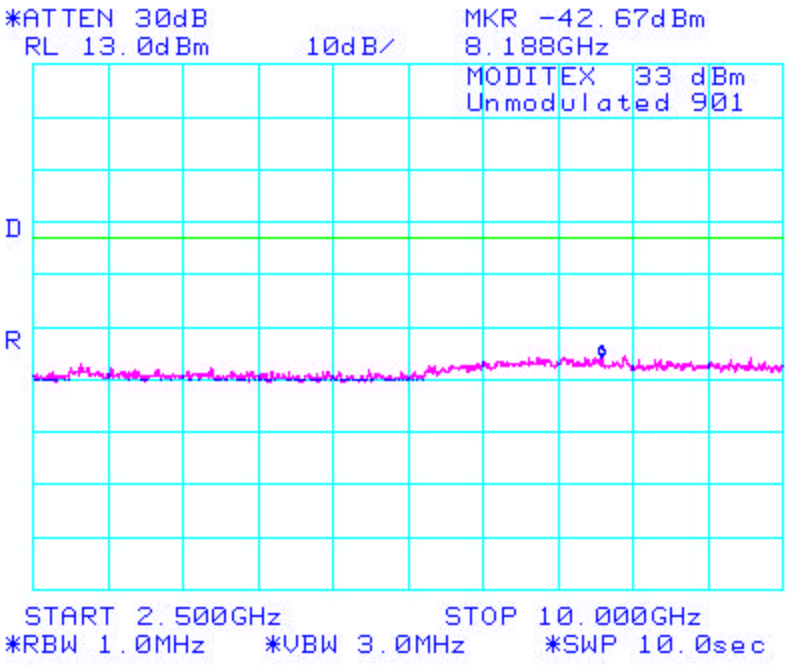


Figure 6: Spurious Conducted Emissions, High Channel (unmodulated carrier)



Conducted Emission Test Results Con't

Figure 7: Spurious Conducted Emissions, Low Channel (modulated carrier)

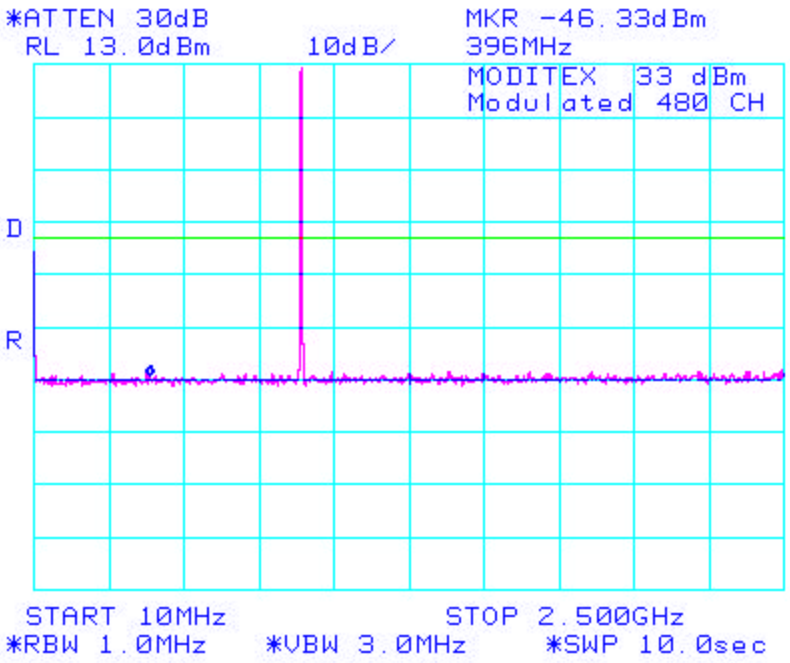
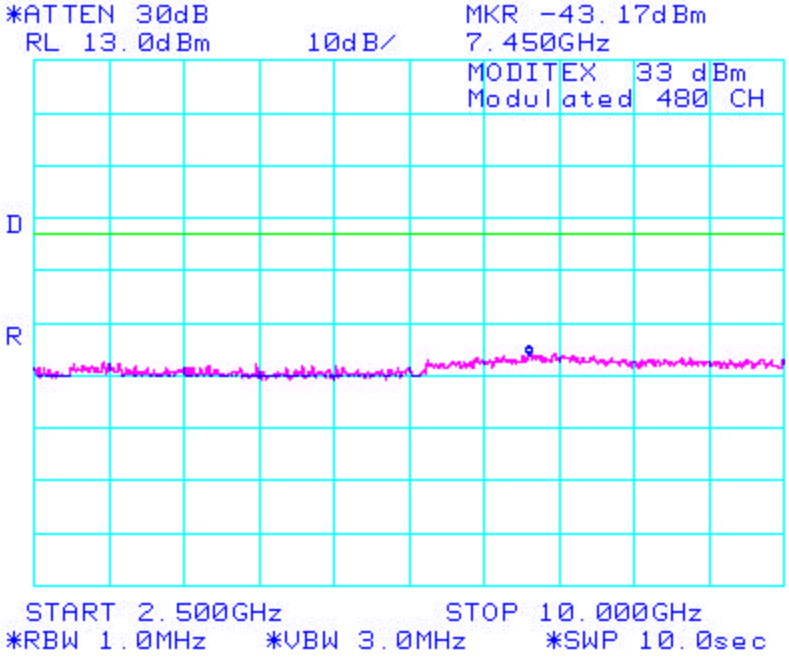


Figure 8: Spurious Conducted Emissions, Low Channel (modulated carrier)



Conducted Emission Test Results Con't

Figure 9: Spurious Conducted Emissions, Middle Channel (modulated carrier)

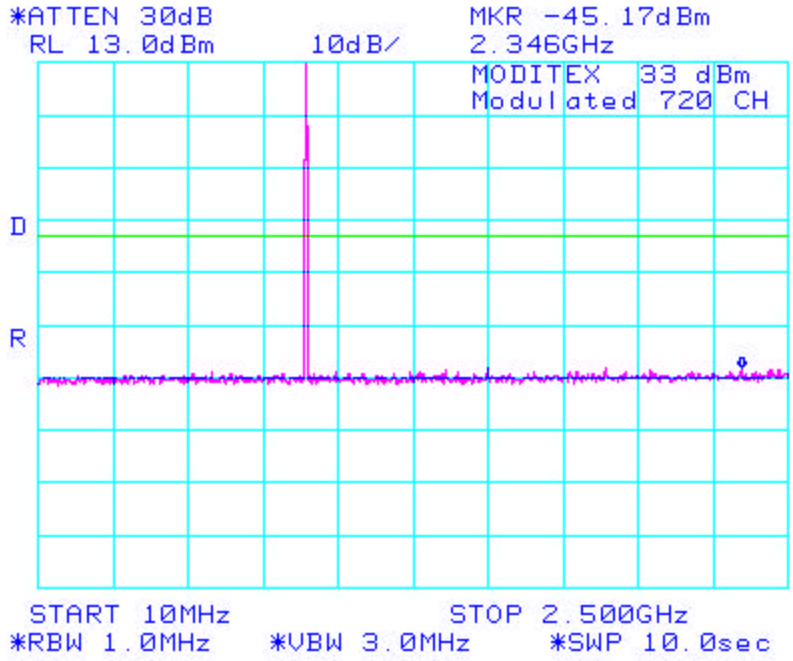
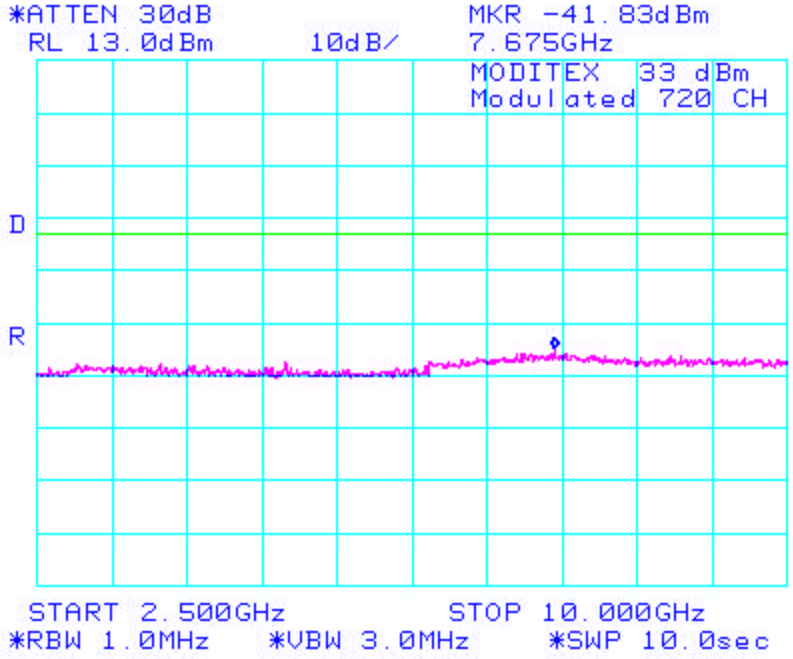


Figure 10: Spurious Conducted Emissions, Middle Channel (modulated carrier)



Conducted Emission Test Results Con't

Figure 11: Spurious Conducted Emissions, High Channel (modulated carrier)

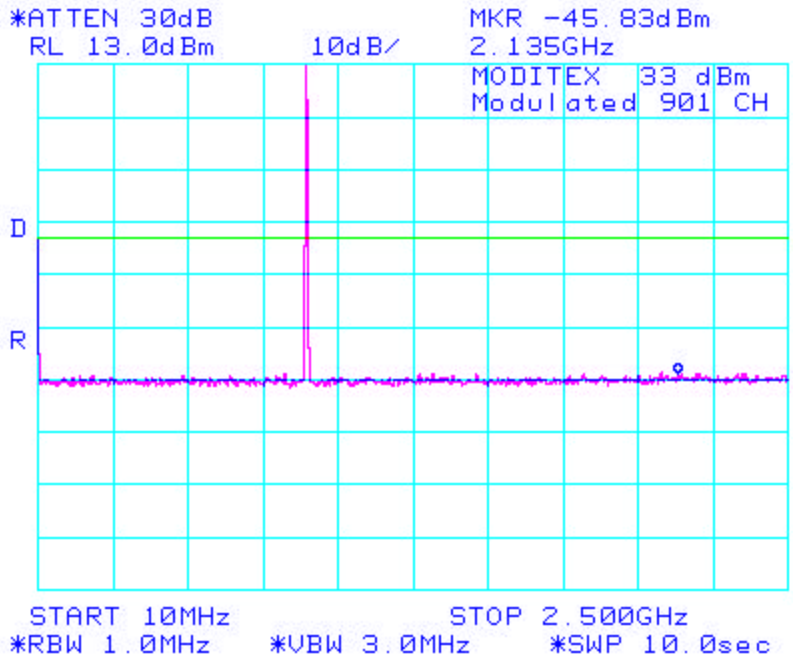
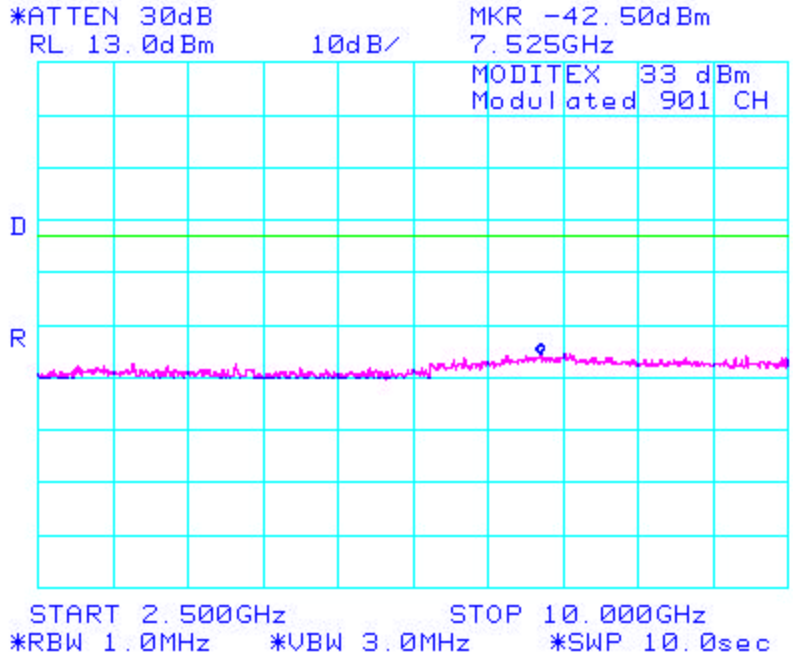


Figure 12: Spurious Conducted Emissions, High Channel (modulated carrier)



Conducted Emission Test Results Con't

Figure 13: Occupied Bandwidth/Bandwidth Limitations, Unmodulated Carrier, High Power, Low Channel

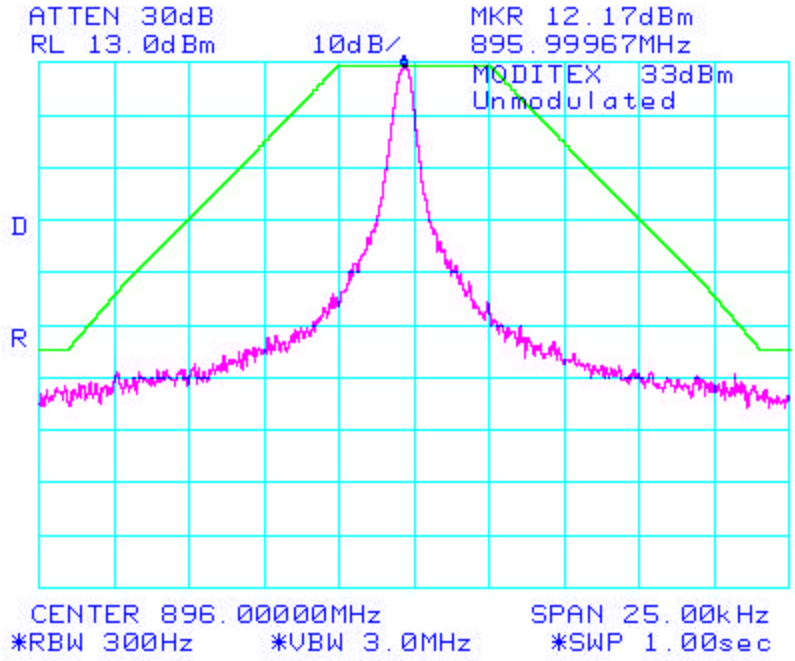
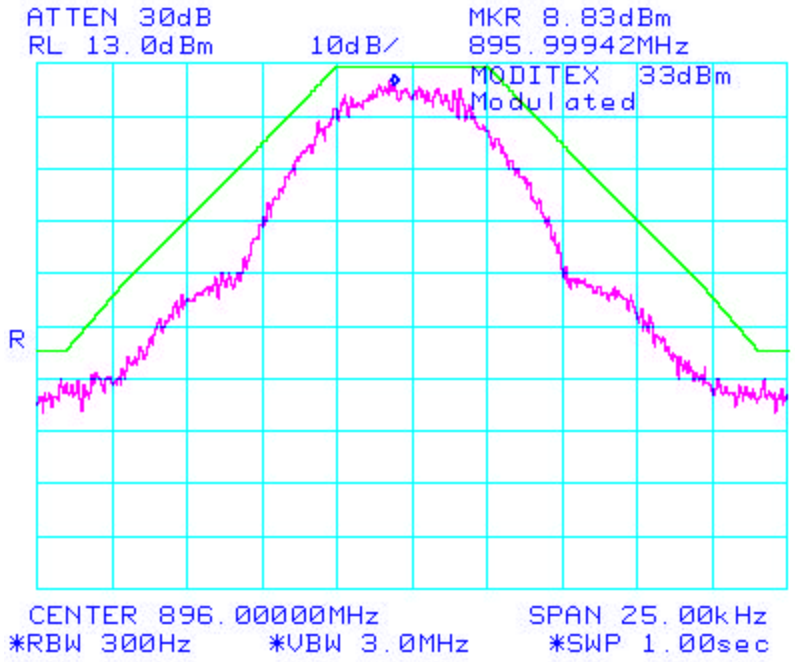


Figure 14: Occupied Bandwidth/Bandwidth Limitations, modulated Carrier, High Power, Low Channel



Conducted Emission Test Results Con't

Figure 15: Occupied Bandwidth/Bandwidth Limitations, Unmodulated Carrier, Low Power, Low Channel

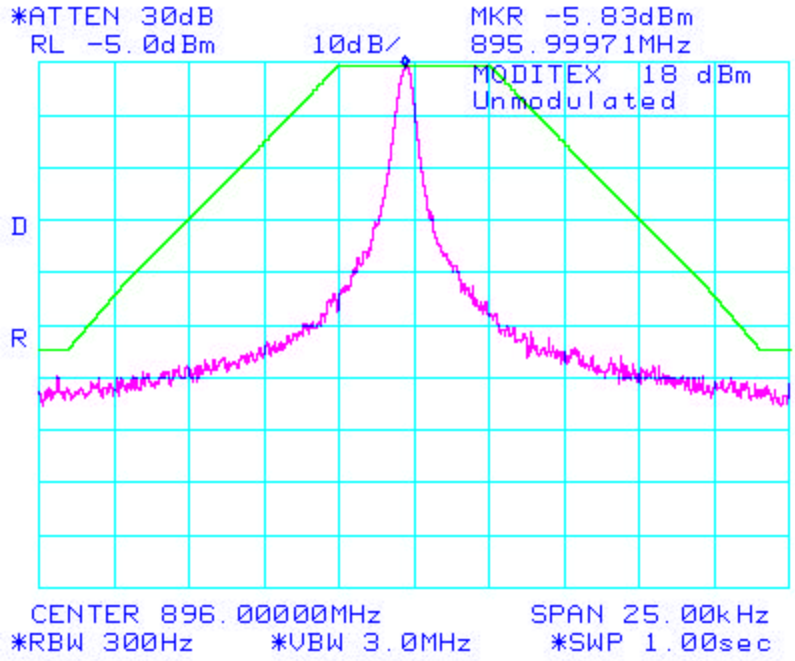
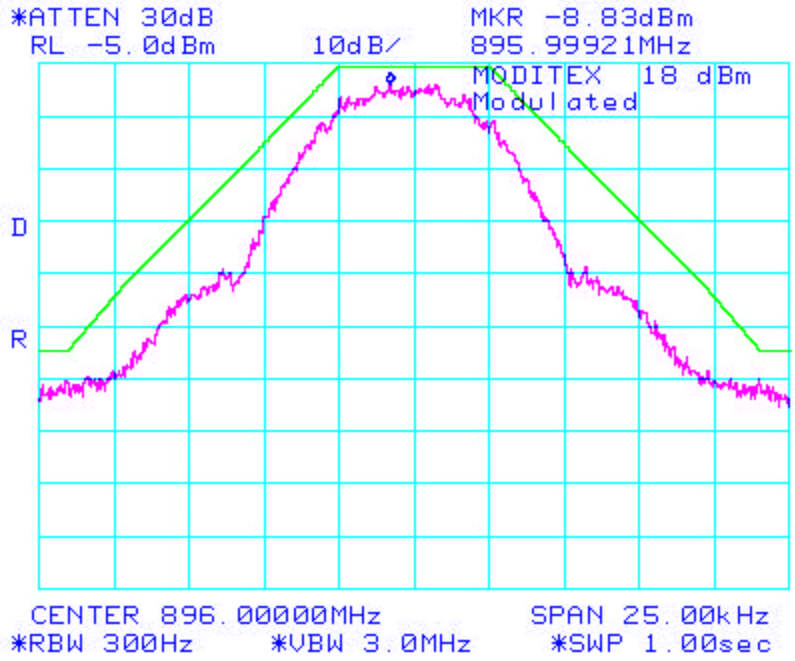


Figure 16: Occupied Bandwidth/Bandwidth Limitations, modulated Carrier, Low Power, Low Channel



Conducted Emission Test Results Con't

Figure 17: **Occupied Bandwidth/Bandwidth Limitations, Unmodulated Carrier, High Power, Middle Channel**

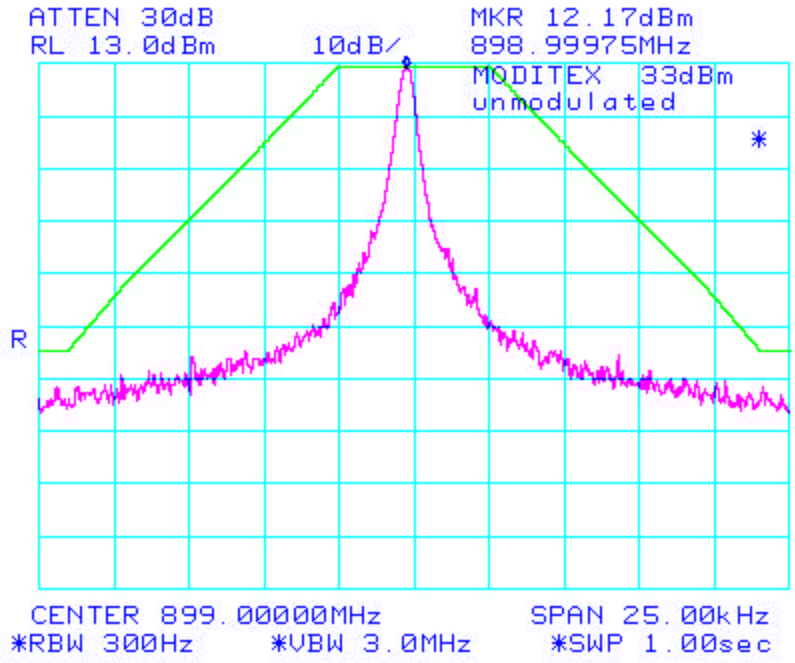
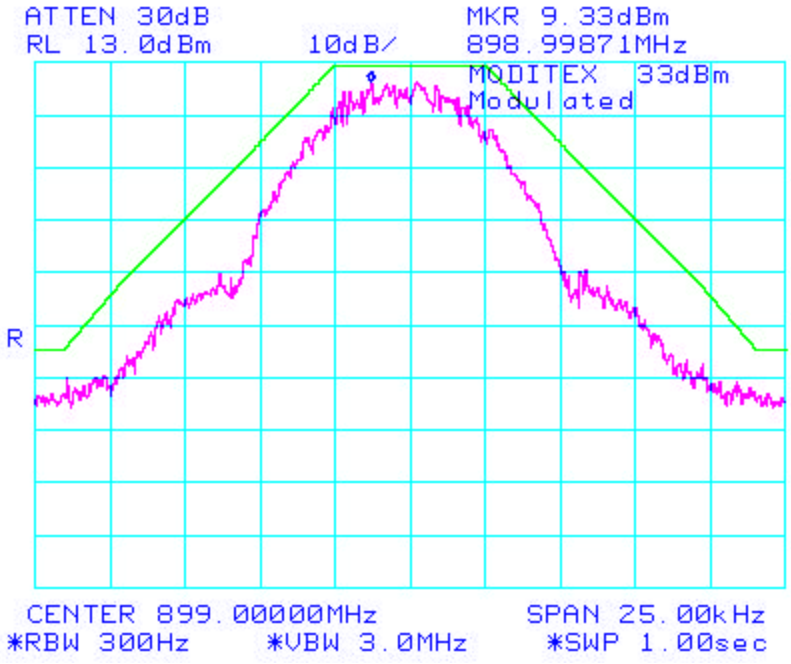


Figure 18: Occupied Bandwidth/Bandwidth Limitations, modulated Carrier, High Power, Middle Channel



Conducted Emission Test Results Con't

Figure 19: **Occupied Bandwidth/Bandwidth Limitations, Unmodulated Carrier, Low Power, Middle Channel**

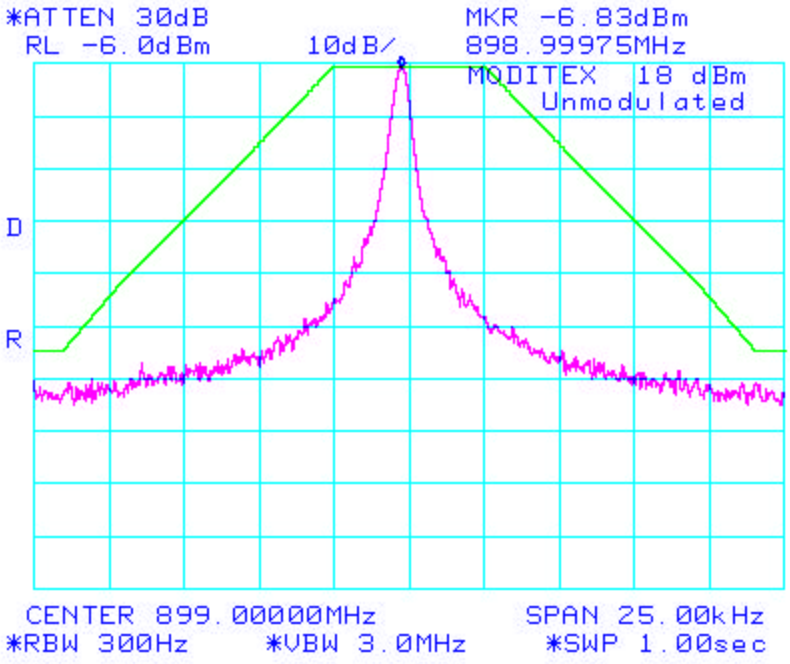
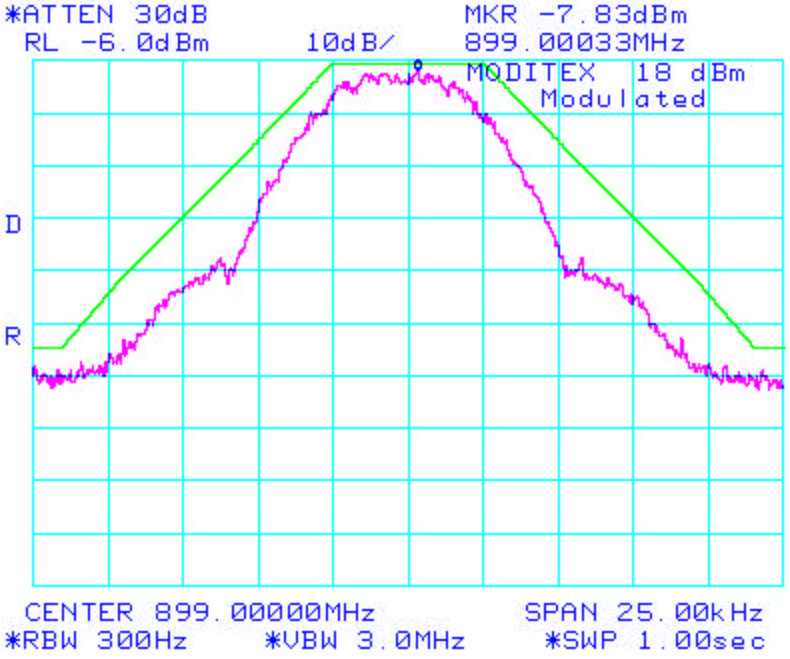


Figure 20: Occupied Bandwidth/Bandwidth Limitations, modulated Carrier, Low Power, Middle Channel



Conducted Emission Test Results Con't

Figure 21: Occupied Bandwidth/Bandwidth Limitations, Unmodulated Carrier, High Power, High Channel

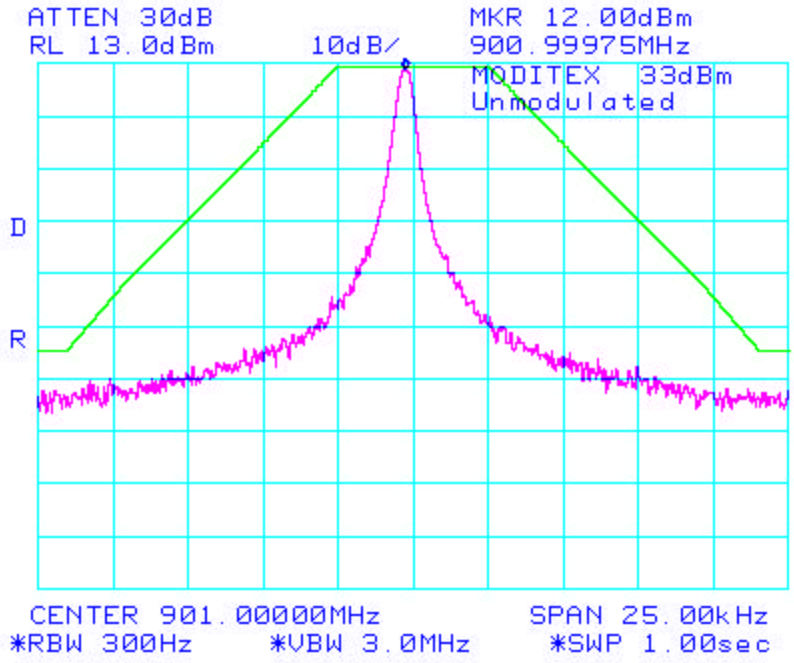
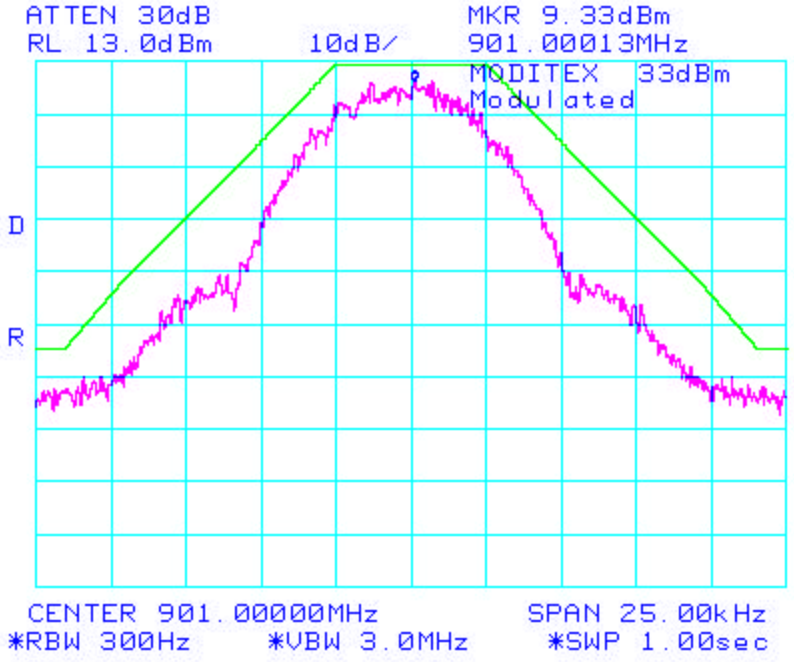


Figure 22: Occupied Bandwidth/Bandwidth Limitations, modulated Carrier, High Power, High Channel



Conducted Emission Test Results Con't

Figure 23: **Occupied Bandwidth/Bandwidth Limitations, Unmodulated Carrier, Low Power, High Channel**

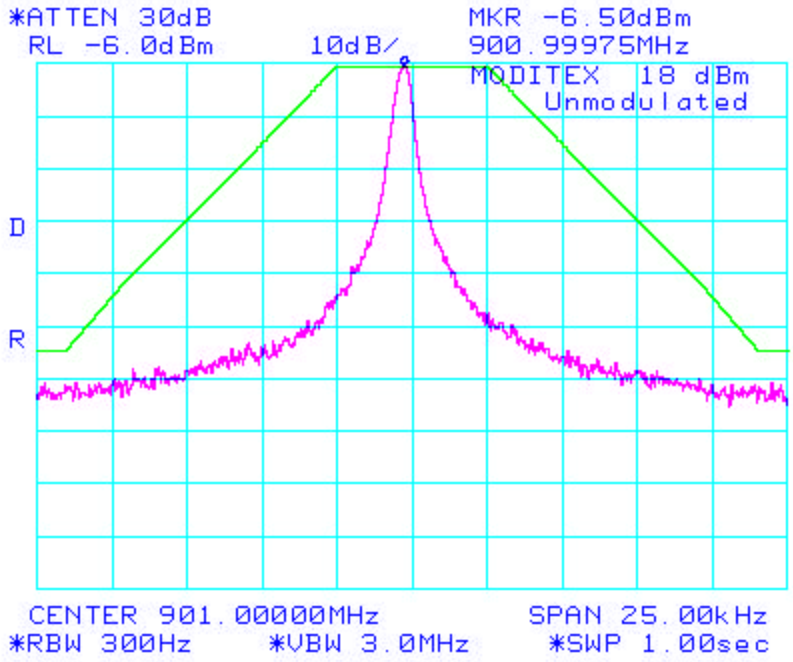
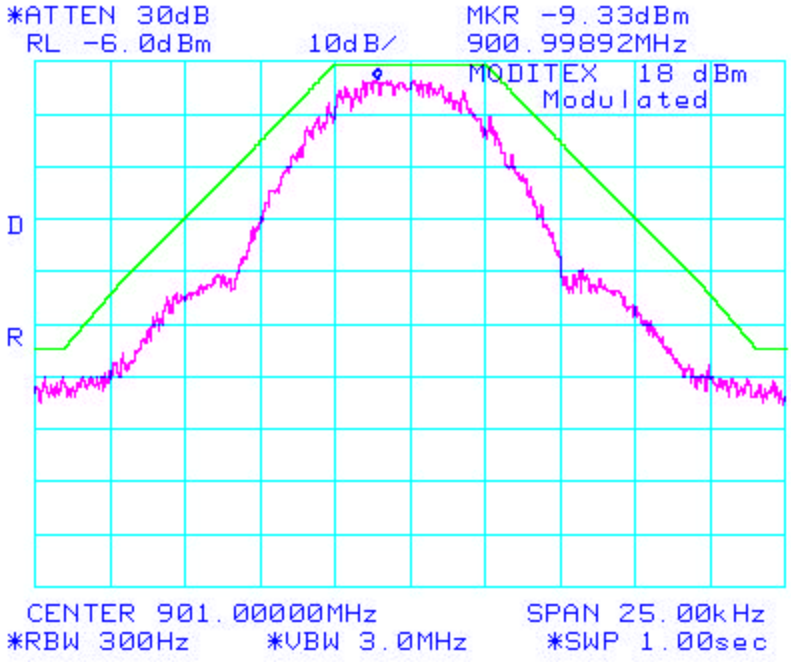
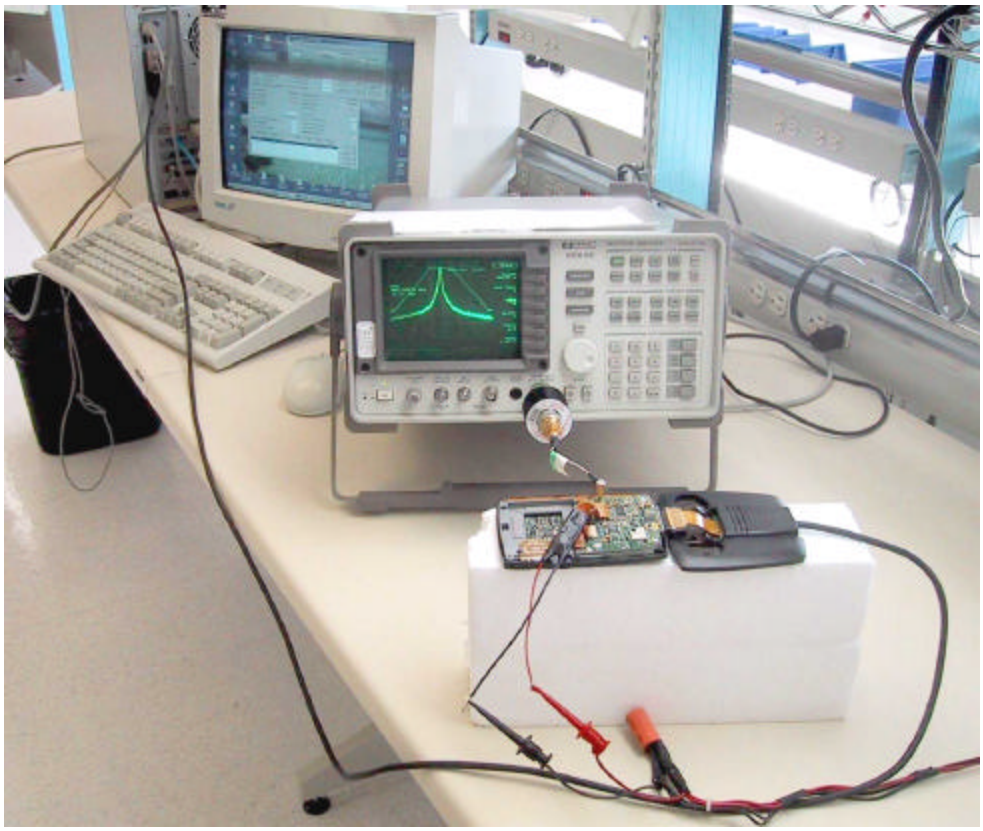


Figure 24: Occupied Bandwidth/Bandwidth Limitations, modulated Carrier, Low Power, High Channel



Conducted Emission Test-Setup Photo

FCC CFR 47 Part 2 Subpart J, RSS-119

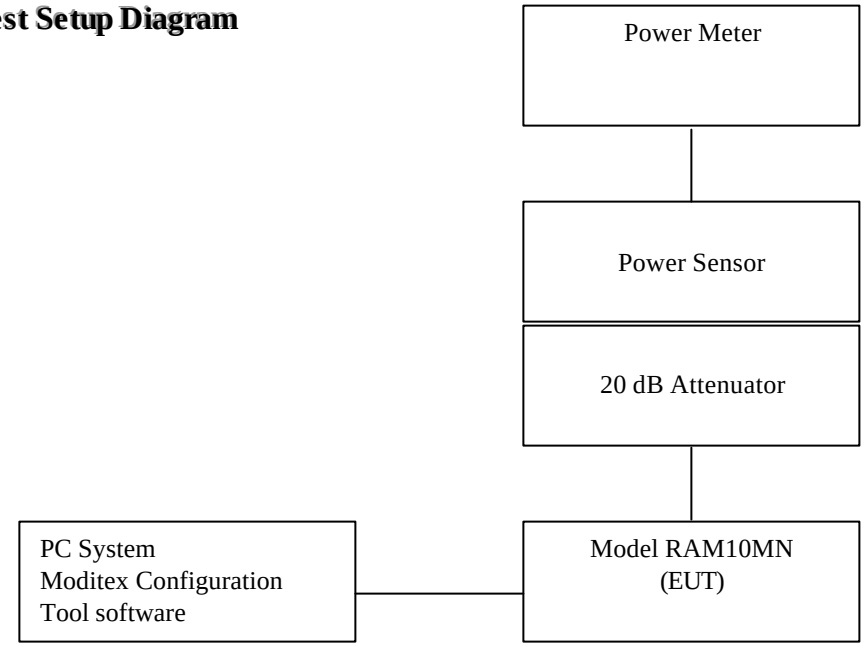


APPENDIX 2

CONDUCTED RF OUTPUT POWER TEST DATA

Conducted RF Output Power Test Data

Test Setup Diagram



Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Power Meter	Giga-Tronics	8541C	1837762	.01 – 18.0 GHz
Power Sensor	Giga-Tronics	80401A	1835838	.01 – 18.0 GHz
Attenuator, 20 dB, 25 W	Weinschel	33-20-33	BL8170	DC – 18 GHz
Moditex Configuration Tool software	PC System	EW76BXA	CCC9908102	N/A

Test Data

RF Power Output at Maximum

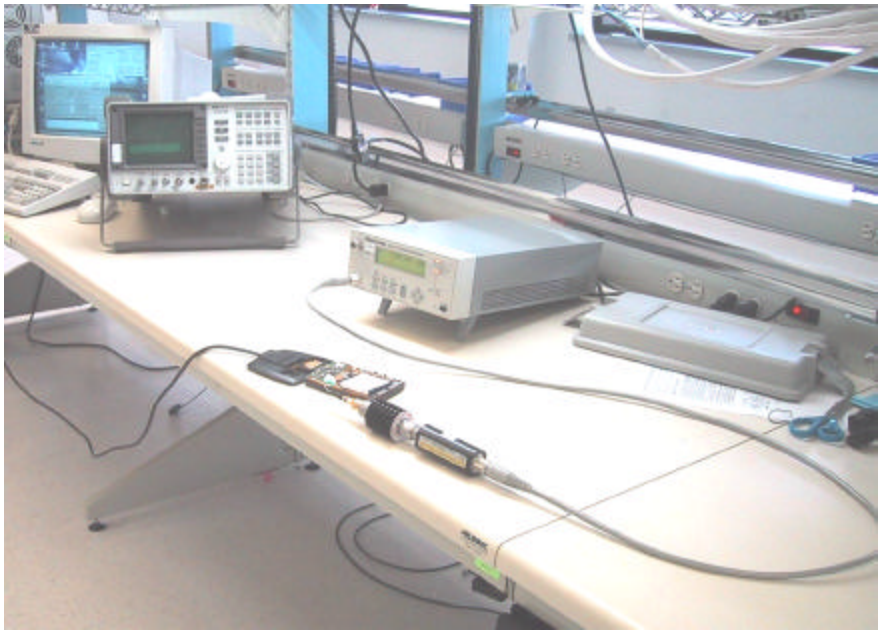
At three transmit frequencies the maximum radio output power level was measured using the power meter. The calibrated insertion loss measured for the attenuator and cable assembly was added to the power measurements which produced the following results.

Test Data

Peak nominal output power is 33 dBm.

Channel	Frequency (MHz)	Measured Peak Conducted Power (dBm)	Total Correction Factor (dB)	Corrected Peak Conducted Power (dBm)
480	896	12.41	20.4	32.81
720	899	12.51	20.4	32.91
880	901	12.45	20.4	32.85

Conducted RF Output Power Test Data Photo



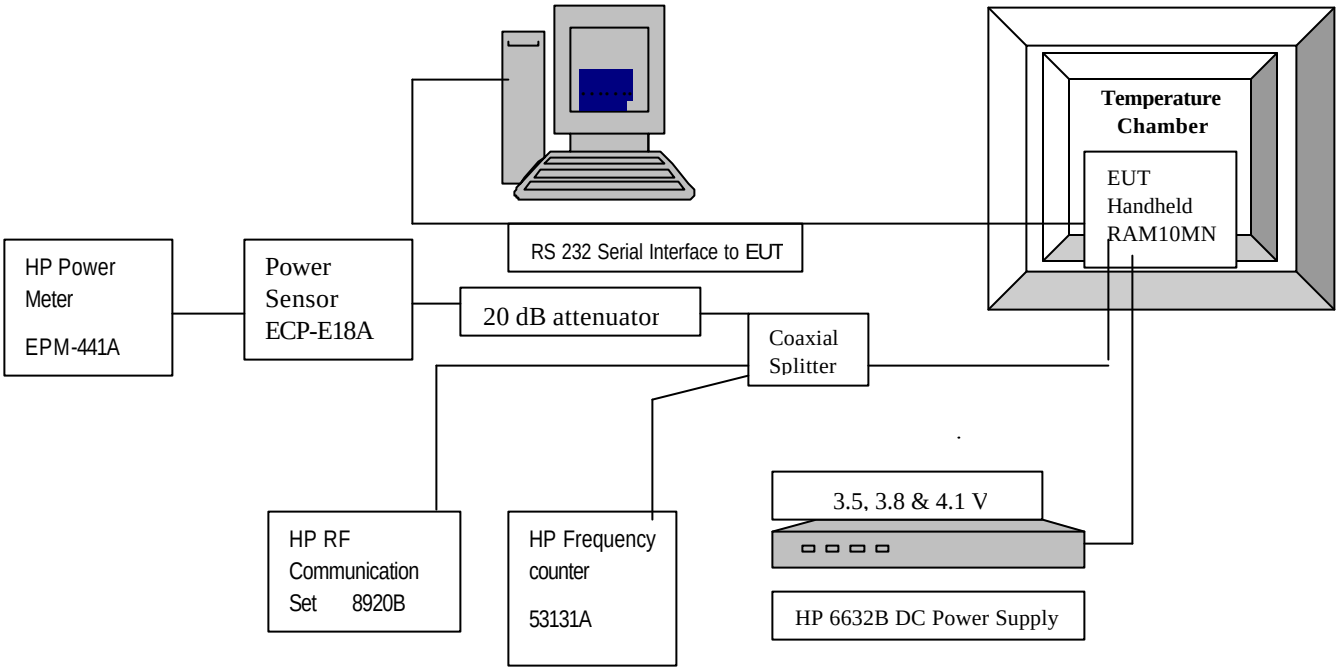
APPENDIX 3

FREQUENCY STABILITY TEST DATA

Frequency Stability Test Data

Procedure:

The Handheld was placed in the Temperature chamber and connected to the instruments outside as shown in the figure below. Dry air was pumped inside the temperature chamber to maintain a back pressure during the test. The Radio was kept in the off condition at all times except when the measurements were to be made.



IEEE 488 Serial Interface from PC to test equipment.

SYSTEM	***Model***	***Serial Number***
HP Universal Counter	53131A	3736A19048
HP System DC Power Supply	6632B	US37472170
HP RF Communication Set	8920B	US38141353
HP Power Sensor	ECP-E18A	US39181260
HP Power Meter	EPM-441A	GB37481284
Weinschel 20 dB Attenuator	33-20-33	BL8170
Calibration Kit	HP85033D	3423A02787
Espec Environmental Chamber	SH240S1	91005607
Hart Temperature Probe	61161-302	21352860
Mini-Circuits Coaxial 3 way Splitter	ZN3PD	15542

CFR 47 Chapter 1 - Federal Communications Commission Rules

Part 2.947, 2.1055 and 90.213

Required Measurements for Frequency Stability

Procedures
Temperature Variation
Voltage Variation

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

The BlackBerry model number RAM10MN transmitted frequency stability is less than 1.5 ppm of the ideal transmit frequency. The frequency accuracy is measured by the HP53310A Universal Counter.

The BlackBerry model number RAM10MN meets the requirements as stated in CFR 47 chapter 1, Section 2.947, 2.1055 and 90.213, and RSS-119 Frequency Stability.

Frequency Stability measurement devices were configured as presented in the block diagram recording frequency, temperatures, and stepped voltages which were controlled via GPIB interfaces linked to the Environmental chamber, a Battery Simulator, a RF Communication Set, Power Meter and the Universal Counter. The EUT is located inside the environmental chamber.

Calibration for the Cable Loss was performed in the RF Laboratory on 14 July 2003.

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:

Frequency (MHz)	Cable loss (dB)
896	*2.1*
899	2.1
901	2.1

Procedure:

The EUT was placed in the Temperature chamber and connected to Frequency Counter and the RF Communication Set 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 test equipment 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's RF output is GMSK modulated by the RF Communication Set 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 896, 899, and 901 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, measurement/control equipment 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 measurement equipment.
6. Command the EUT to switch to the low channel.
7. Enable the voltage to the EUT.
8. EUT is commanded to Transmit.
9. Software logs the following data from the Universal Counter, power supply and temperature chamber: Traffic Channel Number, Traffic Channel Frequency, Power Level, Chamber Temperature, Supply Voltage, Power, Frequency Error.
10. The software 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.

Moditex Channel results: channels 480, 720 and 880 @ 20°C maximum transmitted power

Traffic Channel Number	*Frequency (MHz)*	*Transmit Power (dBm)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
480	896.0	33	3.5	20	184.5	0.2059
720	899.0	33	3.5	20	104.0	0.1161
880	901.0	33	3.5	20	-23.0	-0.0257

Traffic Channel Number	*Frequency (MHz)*	*Transmit Power (dBm)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
480	896.0	33	3.8	20	200.0	0.2232
720	899.0	33	3.8	20	43.0	0.0480
880	901.0	33	3.8	20	-17.5	-0.0195

Traffic Channel Number	*Frequency (MHz)*	*Transmit Power (dBm)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
480	896.0	33	4.1	20	189.5	0.2115
720	899.0	33	4.1	20	19.5	0.0218
880	901.0	33	4.1	20	-26.5	-0.0296

Moditex Results: channel 480 @ maximum transmitted power

Traffic Channel Number	*Frequency (MHz)*	*Transmit Power (dBm)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
480	896.0	33	3.5	-30	-929.0	-1.0368
480	896.0	33	3.5	-20	378.5	0.4224
480	896.0	33	3.5	-10	513.5	0.5731
480	896.0	33	3.5	0	500.0	0.5580
480	896.0	33	3.5	10	304.0	0.3393
480	896.0	33	3.5	20	184.5	0.2059
480	896.0	33	3.5	30	-44.0	-0.0491
480	896.0	33	3.5	40	-149.0	-0.1663
480	896.0	33	3.5	50	-26.0	-0.0290
480	896.0	33	3.5	60	38.0	0.0424

Traffic Channel Number	*Frequency (MHz)*	*Transmit Power (dBm)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
480	896.0	33	3.8	-30	-258.5	-0.2885
480	896.0	33	3.8	-20	487.0	0.5435
480	896.0	33	3.8	-10	506.0	0.5647
480	896.0	33	3.8	0	444.5	0.4961
480	896.0	33	3.8	10	345.5	0.2856
480	896.0	33	3.8	20	200.0	0.2232
480	896.0	33	3.8	30	-159.5	-0.1780
480	896.0	33	3.8	40	-115.5	-0.1289
480	896.0	33	3.8	50	-48.0	-0.0536
480	896.0	33	3.8	60	-64.0	-0.0714

Traffic Channel Number	*Frequency (MHz)*	*Transmit Power (dBm)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
480	896.0	33	4.1	-30	-951.0	-1.0614
480	896.0	33	4.1	-20	416.0	0.4643
480	896.0	33	4.1	-10	530.0	0.5915
480	896.0	33	4.1	0	450.0	0.5022
480	896.0	33	4.1	10	321.0	0.3583
480	896.0	33	4.1	20	189.5	0.2115
480	896.0	33	4.1	30	-133.0	-0.1484
480	896.0	33	4.1	40	-166.0	-0.1853
480	896.0	33	4.1	50	-11.5	-0.0128
480	896.0	33	4.1	60	-40.5	-0.0452

Moditex Results: channel 720 @ maximum transmitted power

Traffic Channel Number	*Frequency (MHz)*	*Transmit Power (dBm)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
720	899.0	33	3.5	-30	-231.5	-0.2584
720	899.0	33	3.5	-20	418.5	0.4671
720	899.0	33	3.5	-10	534.0	0.5960
720	899.0	33	3.5	0	461.0	0.5145
720	899.0	33	3.5	10	364.5	0.4068
720	899.0	33	3.5	20	104.0	0.1161
720	899.0	33	3.5	30	-58.5	-0.0653
720	899.0	33	3.5	40	-166.0	-0.1857
720	899.0	33	3.5	50	2.0	0.0022
720	899.0	33	3.5	60	7.0	0.0045

Traffic Channel Number	*Frequency (MHz)*	*Transmit Power (dBm)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
720	899.0	33	3.8	-30	-68.5	-0.0765
720	899.0	33	3.8	-20	384.0	0.4286
720	899.0	33	3.8	-10	508.5	0.5675
720	899.0	33	3.8	0	395.0	0.4408
720	899.0	33	3.8	10	270.0	0.3013
720	899.0	33	3.8	20	43.0	0.0480
720	899.0	33	3.8	30	-122.0	-0.1362
720	899.0	33	3.8	40	-66.5	-0.0742
720	899.0	33	3.8	50	78.0	0.0871
720	899.0	33	3.8	60	-71.0	-0.0792

Traffic Channel Number	*Frequency (MHz)*	*Transmit Power (dBm)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
720	899.0	33	4.1	-30	-66.5	-0.0742
720	899.0	33	4.1	-20	413.5	0.4615
720	899.0	33	4.1	-10	508.0	0.5670
720	899.0	33	4.1	0	422.5	0.4715
720	899.0	33	4.1	10	309.5	0.3454
720	899.0	33	4.1	20	19.5	0.0218
720	899.0	33	4.1	30	-107.0	-0.1194
720	899.0	33	4.1	40	-33.0	-0.0368
720	899.0	33	4.1	50	72.0	0.0804
720	899.0	33	4.1	60	49.5	0.0552

Moditex Results: channel 880 @ maximum transmitted power

Traffic Channel Number	*Frequency (MHz)*	*Transmit Power (dBm)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
880	901.0	33	3.5	-30	-217.5	-0.2427
880	901.0	33	3.5	-20	484.5	0.5407
880	901.0	33	3.5	-10	508.5	0.5675
880	901.0	33	3.5	0	388.5	0.4336
880	901.0	33	3.5	10	314.0	0.3504
880	901.0	33	3.5	20	-23.0	-0.0257
880	901.0	33	3.5	30	-21.0	0.0234
880	901.0	33	3.5	40	-82.0	-0.0915
880	901.0	33	3.5	50	168.5	0.1881
880	901.0	33	3.5	60	15.5	0.0173

Traffic Channel Number	*Frequency (MHz)*	*Transmit Power (dBm)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
880	901.0	33	3.8	-30	-1.5	-0.0017
880	901.0	33	3.8	-20	379.0	0.4230
880	901.0	33	3.8	-10	501.5	0.5597
880	901.0	33	3.8	0	367.0	0.4010
880	901.0	33	3.8	10	303.0	0.3382
880	901.0	33	3.8	20	-17.5	-0.0195
880	901.0	33	3.8	30	-190.5	-0.2126
880	901.0	33	3.8	40	-21.5	-0.0240
880	901.0	33	3.8	50	133.5	0.1490
880	901.0	33	3.8	60	104.0	0.1161

Traffic Channel Number	*Frequency (MHz)*	*Transmit Power (dBm)*	*Voltage (Volts)*	*Temperature (Celsius)*	*Frequency Error (Hz)*	*PPM*
880	901.0	33	4.1	-30	-86.5	-0.0965
880	901.0	33	4.1	-20	439.5	0.4905
880	901.0	33	4.1	-10	491.0	0.5480
880	901.0	33	4.1	0	390.0	0.4353
880	901.0	33	4.1	10	243.0	0.2712
880	901.0	33	4.1	20	-26.5	-0.0296
880	901.0	33	4.1	30	-188.0	-0.2098
880	901.0	33	4.1	40	-56.5	-0.0631
880	901.0	33	4.1	50	37.5	0.0419
880	901.0	33	4.1	60	35.0	0.0391

APPENDIX 4

RADIATED EMISSIONS TEST DATA

Radiated Emissions Test Data Results

Test distance is 3.0 metres, at max. power of 33 dBm

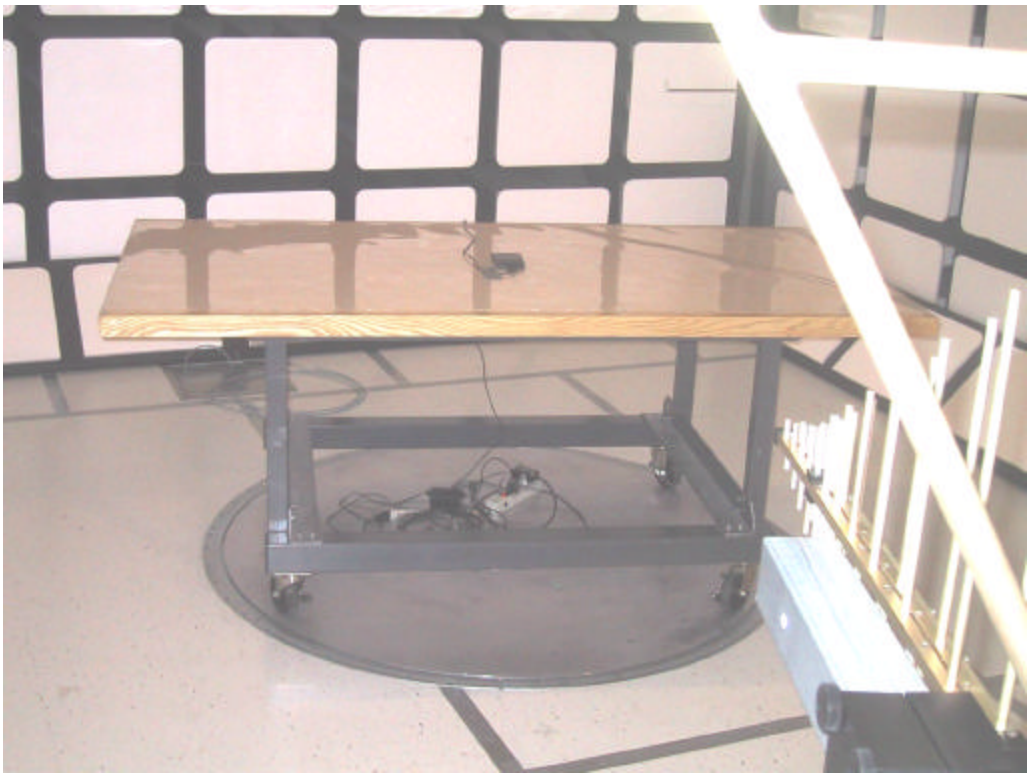
EUT				Rx Antenna		Spectrum Analyzer		Substitution Method Tracking Generator				
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Max (V,H)	Reading (dBm)	Corrected Reading (relative to dipole)	Pol.	Limit	Diff to Limit (dB)
Band (ERP)												
Handheld Standalone, upright position												
F0	480	896.00	900	Dipole	V	84.6	84.6	11.0	26.5	VV	33.0	-6.6
F0	480	896.00	900	Dipole	H	70.4		9.0		HH		
F0	720	899.00	900	Dipole	V	84.1	84.1	10.5	26.0	VV	33.0	-7.1
F0	720	899.00	900	Dipole	H	70.2		8.7		HH		
F0	880	901.00	900	Dipole	V	83.8	83.8	10.6	26.1	VV	33.0	-7.0
F0	880	901.00	900	Dipole	H	71.5		8.6		HH		
Handheld horizontal, connected to the Travel Charger												
F0	480	896.00	900	Dipole	V	79.2	87.6	14.0	29.5	VV	33.0	-3.6
F0	480	896.00	900	Dipole	H	87.6		12.1		HH		
F0	720	899.00	900	Dipole	V	79.4	87.3	13.9	29.4	VV	33.0	-3.7
F0	720	899.00	900	Dipole	H	87.3		11.9		HH		
F0	880	901.00	900	Dipole	V	79.5	86.8	13.7	29.2	VV	33.0	-3.9
F0	880	901.00	900	Dipole	H	86.8		11.7		HH		
Handheld in Cradle, connected to the power adapter												
F0	480	896.00	900	Dipole	V	80.3	80.3	6.6	22.1	VV	33.0	-11.0
F0	480	896.00	900	Dipole	H	80.0		4.6		HH		
F0	720	899.00	900	Dipole	V	80.0	80.3	6.7	22.2	VV	33.0	-10.9
F0	720	899.00	900	Dipole	H	80.3		4.8		HH		
F0	880	901.00	900	Dipole	V	79.1	80.0	6.7	22.2	VV	33.0	-10.9
F0	880	901.00	900	Dipole	H	80.0		4.8		HH		

Radiated Emissions Test Data Results con't

Test distance is 3.0 metres, at max. power of 33 dBm

EUT					Rx Antenna		Spectrum Analyzer	Substitution Method Tracking Generator				
Type	Ch	Frequency (MHz)	Band	Type	Pol.	Reading (dBuV)	Max (V,H)	Reading (dBm)	Corrected Reading (relative to dipole)	Pol.	Limit	Diff to Limit (dB)
Harmonics												
Handheld Standalone, upright position												
Low Channel												
2nd	480	1792.0	900	Horn	V	59.6	59.6	-37.8	-34.0	VV	-13	-21.0
2nd	480	1792.0	900	Horn	H	54.8				HH		
The harmonics were investigated up to the 10th harmonic. Emissions above the 2nd harmonic were in the NF.												
Middle Channel												
2nd	720	1798.0	900	Horn	V	59.0	59.0	-38.2	-34.3	VV	-13	-21.3
2nd	720	1798.0	900	Horn	H	54.0				HH		
The harmonics were investigated up to the 10th harmonic. Emissions above the 2nd harmonic were in the NF.												
High Channel												
2nd	880	1802.0	900	2nd	2nd	59.7	59.7	-37.6	-33.4	VV	-13.	-20.4
2nd	880	1802.0	900	2nd	2nd	53.9				HH		
The harmonics were investigated up to the 10th harmonic. Emissions above the 2nd harmonic were in the NF.												

Radiated Emissions Test Photo



Radiated Emissions at 3.0 metres