Engineering and Testing for EMC and Safety Compliance

Class II Permissive Change Report

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MODEL: Radio Data Gateway (RDG)

FCC ID: OWDTR-0022-E

March 9, 2006

Standards Referenced for this Report	
Part 2: 2003	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 15: 2003	Radio Frequency Devices - §15.109: Radiated Emissions Limits
Part 90: 2003	Private Land Portable Radio Services
ANSI C63.4-2003	American National Standard for Methods of Measurement of Radio Noise Emissions from Low -Voltage Electrical and Electronic Equipment in the Range of 9 kHz – 40 GHz
ANSI/TIA/EIA603-2002	Land Portable FM or PM Communications Equipment - Measurement and Performance Standards
ANSI/TIA/EIA–102.CAAA; 2002	Digital C4FM/CQPSK Transceiver Measurement Methods
RSS-119; Issue 6; 2000	Land Portable and Fixed Radio Transmitters and Receivers 27.41 to 960.0 MHz

Frequency Range	Maximum Measured Output Power (W) Conducted	Frequency Tolerance (ppm)	Emission Designator
806-824, 851-869 MHz	36.4*	.98*	16K0F3E (WB Voice)
806-824, 851-869 MHz	36.4*	.98*	12K8F3E (NPSPAC Voice)
806-824, 851-869 MHz	36.4*	.98*	10K3F1D (2 level WB 9600)
806-824, 851-869 MHz	36.4*	.98*	10K3F1E (2 level WB 9600)
806-824, 851-869 MHz	36.4*	.98*	10K0F1D (2 level NPSPAC 9600)
806-824, 851-869 MHz	36.4*	.98*	10K0F1E (2 level NPSPAC 9600)
806-824, 851-869 MHz	36.4*	.98*	8K0F1D (4 Level)
806-824, 851-869 MHz	36.4*	.98*	8K0F1E (4 Level)

*As appears on original grant

REPORT PREPARED BY TEST ENGINEER: DAN BIGGS

Document Number: 2006008/QRTL05-331

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1 General Information

This Class II Permissive Change report is prepared on behalf of **M/A-COM, Inc**. in accordance with the Federal Communications Commission and Industry Canada Rules and Regulations. The Equipment Under Test (EUT) was the **RDG Base Station; FCC ID: OWDTR-0022-E**. The test results reported in this document relate only to the item that was tested.

All measurements contained in this application were conducted in accordance with FCC Rules and Regulations CFR 47, Industry Canada RSS-119, and ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 2003. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

1.1 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report dated March 3, 1994, submitted to and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 2003).

1.2 Related Submittal(s)/Grant(s)

This is a Class II Permissive Change request for the FCC certification initially issued on June 28, 2004.

The RDG is an application variation of a typical mobile installation. The Radio Data Gateway uses four mobile radios in an equipment rack passing data bi-directionally between an Ethernet LAN connection and over-the-air. The mobile EA Grant is modified to accommodate co-location and licensee MPE aspects of this base unit application. FCC correspondence, included as an exhibit, substantiates the application.

2 Conformance Statement

We, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this attached test record. No modifications were made to the equipment during testing in order to achieve compliance with these standards. The test results relate only to the item that was tested.

Furthermore, there was no deviation from, additions to or exclusions from the above standards for Certification methodology.

Signature:  Date: March 9, 2006

Typed/Printed Name: Desmond A. Fraser Position: President

Signature:  Date: March 9, 2006

Typed/Printed Name: Daniel W. Biggs Position: Test Engineer

3 Tested System Details

Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this testing, as applicable. The EUT was tested on one channel, 851 MHz, for radiated receiver and transmitter emissions testing. Transmitter radiated spurious emissions was tested in digital 9600W mode. Cabinet doors were installed and closed during radiated testing. Photographs of test setups were taken with doors removed.

Table 3-1: Equipment Under Test (EUT)

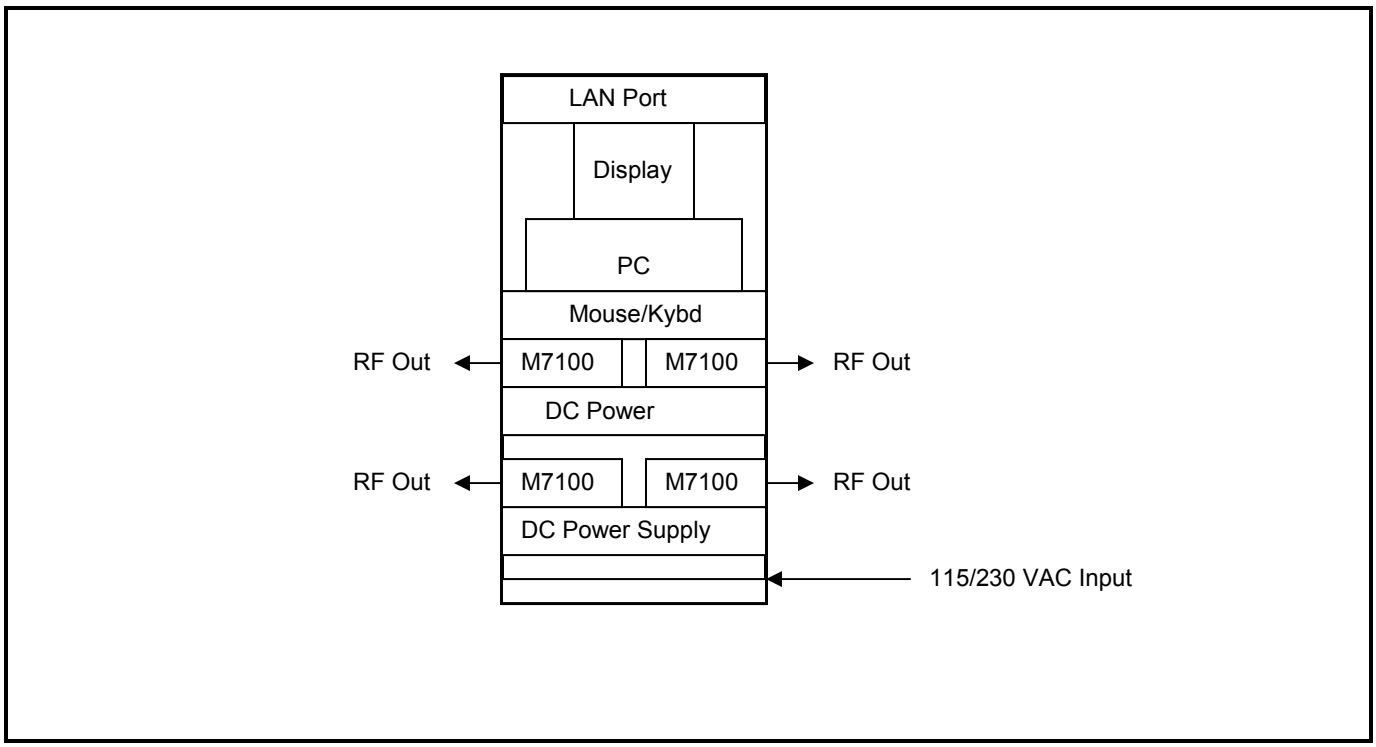
The RDG Base Station contains the following components:

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
Radios	M/A-Com, Inc.	M7100	RU101188V31	OWDTR-0022-E	17115
Radio Shelf	M/A-Com, Inc.	N/A	SXK 107 3828/1	N/A	N/A
Computer	M/A-Com, Inc.	N/A	KDV MU-201094-002	N/A	N/A
Monitor	M/A-Com, Inc.	N/A	KDV 120 1094/10	N/A	N/A
Keyboard	M/A-Com, Inc.	N/A	KDV 120 1094/20	N/A	N/A
Power Supplies	M/A-Com, Inc.	N/A	PS24043-0001	N/A	N/A
Ethernet Hub	M/A-Com, Inc.	N/A	ZAT 510 07/1	N/A	N/A
Fan Assembly	M/A-Com, Inc.	N/A	19C320895	N/A	N/A
AC Outlet Strip	M/A-Com, Inc.	N/A	NED 901 06	N/A	N/A
Cables	M/A-Com, Inc.	N/A	CA0101063-001	N/A	N/A
Cables	M/A-Com, Inc.	N/A	RPM 113 2517/1	N/A	N/A
Ethernet Cable	M/A-Com, Inc.	N/A	19D903880P61	N/A	N/A

Table 3-2: Support Equipment

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
Laptop Computer	Panasonic	CF-28 Toughbook	N/A	N/A	13954

Figure 3-1: Configuration of Tested System



4 FCC Rules and Regulations Part 2 §2.1033(c)(8) Voltages and Currents Through The Final Amplifying Stage

Nominal DC Voltage: 13.8 VDC
Current: 7.5 AMPS

5 FCC Rules and Regulations Part 2 §2.1046(a): RF Power Output: Conducted; RSS-119 §6.2: Output Power Test

5.1 Test Procedure

ANSI/TIA/EIA-603-2002, section 2.2.1

The EUT was connected to a coaxial attenuator having a 50 Ω load impedance.

5.2 Test Data

Table 5-1: RF Power Output (High Power): Carrier Output Power (Unmodulated)

Channel	Frequency (MHz)	RF Power Measured (Watt)*
806.0	806.0	33.9
822.9	822.9	33.9
851.0	851.0	34.7
861.55	861.55	34.7
870.0	870.0	34.7

* Measurement accuracy: +/-.02 dB (logarithmic mode)

Table 5-2: RF Power Output (Rated Power)

Rated Power (W)
35.0

Table 5-3: Test Equipment Used For Testing RF Power Output - Conducted

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901184	Agilent Technologies	E4416A	EPM-P Power Meter, Single Channel	GB41050573	9/21/06
901356	Agilent Technologies	E9323A	Power Sensor	31764-264	9/21/06
900819	Weinschel Corporation	BF0830	Attenuator 10 db	N/A	12/2/08

TEST PERSONNEL:

Dan Biggs		March 7, 2006
Test Engineer	Signature	Date Of Test

6 FCC Rules and Regulations Part 2 §2.1053(a): Field Strength of Spurious Radiation; RSS-119 §6.3: Unwanted Emissions

6.1 Test Procedure

ANSI/TIA/EIA-603-2002, section 2.2.12

Analog Modulation: The transmitter is terminated with a 50 Ω load and is modulated with a 2,500 Hz sine wave at an input level 16 dB greater than that required to produce 50% of the rated system deviation at 1,000 Hz.

Digital Modulation: Modulated to its maximum extent using a pseudo random data sequence – 9600 bps.

The spurious emissions levels were measured and the device under test was replaced by a substitution antenna connected to a signal generator. This signal generator level was then corrected by subtracting the cable loss from the substitution antenna to the signal generator, and the gain of the antenna was further corrected to a half wave dipole.

6.2 Test Data

6.2.1 CFR 47 Part 90.210 Requirements

The worst case emissions test data are shown. The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

Table 6-1: Field Strength of Spurious Radiation – 851.0 MHz; Wide Band; High Power

Limit = 43 + 10 Log P = 58.4 dBc
Conducted Power = 45.4 dBm = 33.7 W

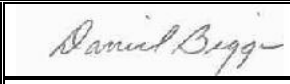
Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1702	32.3	-55.7	5.0	4.7	97.6	-39.2
2553	40.3	-50.2	7.0	6.8	90.0	-31.6
3404	46.8	-45.2	7.6	7.3	84.8	-26.4
4255	48.8	-39.6	7.6	7.4	79.1	-20.7
5106	50.7	-36.3	7.7	7.5	76.0	-17.6
5957	49.0	-38.0	8.5	8.5	77.3	-18.9
6808	40.5	-47.0	8.5	8.3	86.4	-28.0
7659	38.7	-48.6	8.3	8.5	88.0	-29.6
8510	38.8	-43.2	8.4	8.4	83.0	-24.6

*This insertion loss corresponds to the cable connecting the RF Signal Generator to the ½ wave dipole antenna.

Table 6-2: Test Equipment Used for Testing Field Strength of Spurious Radiation

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901053	Schaffner-Chase	CBL6112	Antenna (25 MHz – 2 GHz)	2648	11/1/06
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1 - 26.5 GHz)	3008A00505	8/3/06
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	9/14/06
901281	Rhein Tech Laboratories	PR-1040 (10-2000 MHz)	Amplifier	1004	12/8/06
900928	Hewlett Packard	HP 83752A	Synthesized Sweeper (.01 - 20 GHz)	3610A00866	11/10/06
901426	Insulated Wire Inc.	KPS-1503-3600-KPS	RF Cable, 30'	NA	12/12/06
901425	Insulated Wire, Inc.	KPS-1503-2400-KPS	RF Cable, 20'	NA	12/12/06
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF Cable 36"	NA	12/12/06
900927	Tektronix	ASG 100	Audio Signal Generator	B03274 V2.3	N/A

TEST PERSONNEL:

Daniel Biggs		March 8, 2006
Test Engineer	Signature	Date Of Test

7 AC Conducted Emissions

7.1 Site and Test Description

The power line conducted emission measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50-ohm/50 microhenry Line Impedance Stabilization Network (LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals. The spectrum analyzer was connected to the A.C. line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 100 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 100 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The analyzer's 6 dB bandwidth was set to 9 kHz. Video filter less than 10 times the resolution bandwidth is not used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from 150 kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limits were measured and have been recorded. The limits for Class A and Class B are contained therein.

7.2 Test Limits

Class A Line-Conducted Emissions		
	Limit (dBµV)	
Frequency (MHz)	Quasi-Peak	Average
0.15 to 0.50	79	66
0.50 to 30.0	73	60

Class B Line-Conducted Emissions		
	Limit (dBµV)	
Frequency (MHz)	Quasi-Peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5.00	56	46
5.00 to 30.00	60	50

7.3 Conducted Emissions Test Results

Table 7-1: Conducted Emissions First AC Line In, Standby Mode; Neutral Side (Line 1)

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	Pass/ Fail
0.191	Pk	51.9	0.3	52.2	64.0	-11.8	54.0	-1.8	Pass
0.193	Qp	51.1	0.3	51.4	63.9	-12.5	53.9	-2.5	Pass
0.193	Av	25.4	0.3	25.7	63.9	-38.2	53.9	-28.2	Pass
0.289	Pk	45.1	0.3	45.4	60.6	-15.2	50.6	-5.2	Pass
0.385	Pk	26.4	0.4	26.8	58.2	-31.4	48.2	-21.4	Pass
0.485	Pk	23.8	0.4	24.2	56.3	-32.1	46.3	-22.1	Pass
2.330	Pk	38.3	1.2	39.5	56.0	-16.5	46.0	-6.5	Pass
5.490	Pk	37.0	1.6	38.6	60.0	-21.4	50.0	-11.4	Pass
7.520	Pk	33.8	2.0	35.8	60.0	-24.2	50.0	-14.2	Pass
9.110	Pk	35.4	2.1	37.5	60.0	-22.5	50.0	-12.5	Pass
17.290	Pk	31.3	3.1	34.4	60.0	-25.6	50.0	-15.6	Pass
29.090	Pk	29.1	3.4	32.5	60.0	-27.5	50.0	-17.5	Pass

Table 7-2: Conducted Emissions First AC Line In, Standby Mode; Hot Side (Line 2)

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	Pass/ Fail
0.192	Av	30.4	0.3	30.7	63.9	-33.2	53.9	-23.2	Pass
0.192	Pk	50.4	0.3	50.7	63.9	-13.2	53.9	-3.2	Pass
0.192	Qp	49.6	0.3	49.9	63.9	-14.0	53.9	-4.0	Pass
0.290	Pk	44.6	0.3	44.9	60.5	-15.6	50.5	-5.6	Pass
0.386	Pk	25.1	0.4	25.5	58.1	-32.6	48.1	-22.6	Pass
0.485	Pk	21.9	0.4	22.3	56.3	-34.0	46.3	-24.0	Pass
2.300	Pk	37.2	1.2	38.4	56.0	-17.6	46.0	-7.6	Pass
5.720	Pk	35.4	1.7	37.1	60.0	-22.9	50.0	-12.9	Pass
7.490	Pk	33.7	2.0	35.7	60.0	-24.3	50.0	-14.3	Pass
9.230	Pk	36.2	2.1	38.3	60.0	-21.7	50.0	-11.7	Pass
17.290	Pk	33.8	3.1	36.9	60.0	-23.1	50.0	-13.1	Pass
29.230	Pk	29.3	3.4	32.7	60.0	-27.3	50.0	-17.3	Pass

Table 7-3: Conducted Emissions First AC Line In, Transmit Mode; Neutral Side (Line 1)

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	Pass/ Fail
0.193	Qp	48.1	0.3	48.4	63.9	-15.5	53.9	-5.5	Pass
0.194	Pk	49.1	0.3	49.4	63.9	-14.5	53.9	-4.5	Pass
0.194	Pk	49.2	0.3	49.5	63.9	-14.4	53.9	-4.4	Pass
0.196	Av	24.7	0.3	25.0	63.8	-38.8	53.8	-28.8	Pass
0.291	Pk	41.8	0.3	42.1	60.5	-18.4	50.5	-8.4	Pass
0.350	Pk	23.6	0.3	23.9	59.0	-35.1	49.0	-25.1	Pass
0.391	Pk	24.0	0.4	24.4	58.0	-33.6	48.0	-23.6	Pass
0.471	Pk	21.8	0.4	22.2	56.5	-34.3	46.5	-24.3	Pass
2.330	Pk	35.3	1.2	36.5	56.0	-19.5	46.0	-9.5	Pass
5.280	Pk	33.8	1.6	35.4	60.0	-24.6	50.0	-14.6	Pass
7.400	Pk	32.7	1.9	34.6	60.0	-25.4	50.0	-15.4	Pass
9.140	Pk	33.8	2.1	35.9	60.0	-24.1	50.0	-14.1	Pass
17.260	Pk	31.4	3.1	34.5	60.0	-25.5	50.0	-15.5	Pass
29.320	Pk	32.0	3.4	35.4	60.0	-24.6	50.0	-14.6	Pass

Table 7-4: Conducted Emissions First AC Line In, Transmit Mode; Hot Side (Line 2)

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	Pass/ Fail
0.193	Pk	48.6	0.3	48.9	63.9	-15.0	53.9	-5.0	Pass
0.194	Qp	48.0	0.3	48.3	63.9	-15.6	53.9	-5.6	Pass
0.194	Av	29.4	0.3	29.7	63.9	-34.2	53.9	-24.2	Pass
0.291	Pk	42.5	0.3	42.8	60.5	-17.7	50.5	-7.7	Pass
0.352	Pk	26.0	0.3	26.3	58.9	-32.6	48.9	-22.6	Pass
0.391	Pk	24.2	0.4	24.6	58.0	-33.4	48.0	-23.4	Pass
2.300	Pk	36.6	1.2	37.8	56.0	-18.2	46.0	-8.2	Pass
5.280	Pk	34.0	1.6	35.6	60.0	-24.4	50.0	-14.4	Pass
7.490	Pk	32.2	2.0	34.2	60.0	-25.8	50.0	-15.8	Pass
9.140	Pk	34.9	2.1	37.0	60.0	-23.0	50.0	-13.0	Pass
17.260	Pk	32.9	3.1	36.0	60.0	-24.0	50.0	-14.0	Pass
29.200	Pk	29.7	3.4	33.1	60.0	-26.9	50.0	-16.9	Pass

Notes: Pk = Peak, QP = Quasi-Peak, Av = Average

Table 7-5: Conducted Emissions Second AC Line In, Transmit Mode; Neutral Side (Line 1)

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	Pass/ Fail
0.232	Pk	35.1	0.3	35.4	62.4	-27.0	52.4	-17.0	Pass
0.350	Pk	42.9	0.3	43.2	59.0	-15.8	49.0	-5.8	Pass
0.406	Pk	37.3	0.4	37.7	57.7	-20.0	47.7	-10.0	Pass
0.482	Pk	36.7	0.4	37.1	56.3	-19.2	46.3	-9.2	Pass
3.860	Pk	40.5	1.5	42.0	56.0	-14.0	46.0	-4.0	Pass
9.230	Pk	32.8	2.1	34.9	60.0	-25.1	50.0	-15.1	Pass
14.540	Pk	36.3	2.8	39.1	60.0	-20.9	50.0	-10.9	Pass
18.610	Pk	38.1	3.1	41.2	60.0	-18.8	50.0	-8.8	Pass
28.850	Pk	29.1	3.4	32.5	60.0	-27.5	50.0	-17.5	Pass

Table 7-6: Conducted Emissions Second AC Line In, Transmit Mode; Hot Side (Line 2)

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	Pass/ Fail
0.232	Pk	36.1	0.3	36.4	62.4	-26.0	52.4	-16.0	Pass
0.304	Pk	30.7	0.3	31.0	60.1	-29.1	50.1	-19.1	Pass
0.352	Pk	41.7	0.3	42.0	58.9	-16.9	48.9	-6.9	Pass
0.407	Pk	37.1	0.4	37.5	57.7	-20.2	47.7	-10.2	Pass
0.482	Pk	36.8	0.4	37.2	56.3	-19.1	46.3	-9.1	Pass
2.680	Pk	38.4	1.2	39.6	56.0	-16.4	46.0	-6.4	Pass
3.860	Pk	37.5	1.5	39.0	56.0	-17.0	46.0	-7.0	Pass
8.970	Pk	33.0	2.1	35.1	60.0	-24.9	50.0	-14.9	Pass
14.420	Pk	35.9	2.8	38.7	60.0	-21.3	50.0	-11.3	Pass
17.930	Pk	37.8	3.1	40.9	60.0	-19.1	50.0	-9.1	Pass
29.120	Pk	30.1	3.4	33.5	60.0	-26.5	50.0	-16.5	Pass

Table 7-7: Conducted Emissions Second AC Line In, Standby Mode; Neutral Side (Line 1)

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	Pass/ Fail
0.233	Pk	32.4	0.3	32.7	62.3	-29.6	52.3	-19.6	Pass
0.287	Pk	29.2	0.3	29.5	60.6	-31.1	50.6	-21.1	Pass
0.352	Pk	37.6	0.3	37.9	58.9	-21.0	48.9	-11.0	Pass
0.384	Pk	34.3	0.4	34.7	58.2	-23.5	48.2	-13.5	Pass
0.482	Pk	35.2	0.4	35.6	56.3	-20.7	46.3	-10.7	Pass
3.860	Pk	37.7	1.5	39.2	56.0	-16.8	46.0	-6.8	Pass
9.140	Pk	32.6	2.1	34.7	60.0	-25.3	50.0	-15.3	Pass
13.950	Pk	38.6	2.8	41.4	60.0	-18.6	50.0	-8.6	Pass
17.910	Pk	38.0	3.1	41.1	60.0	-18.9	50.0	-8.9	Pass
29.260	Pk	32.2	3.4	35.6	60.0	-24.4	50.0	-14.4	Pass

Table 7-8: Conducted Emissions Second AC Line In, Standby Mode; Hot Side (Line 2)

Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	FCC B QP Limit (dBuV)	FCC B QP Margin (dBuV)	FCC B AV Limit (dBuV)	FCC B AV Margin (dBuV)	Pass/ Fail
0.179	Pk	31.7	0.3	32.0	64.5	-32.5	54.5	-22.5	Pass
0.233	Pk	32.3	0.3	32.6	62.3	-29.7	52.3	-19.7	Pass
0.286	Pk	29.6	0.3	29.9	60.6	-30.7	50.6	-20.7	Pass
0.350	Pk	39.0	0.3	39.3	59.0	-19.7	49.0	-9.7	Pass
0.384	Pk	34.4	0.4	34.8	58.2	-23.4	48.2	-13.4	Pass
0.482	Pk	35.3	0.4	35.7	56.3	-20.6	46.3	-10.6	Pass
3.860	Pk	41.7	1.5	43.2	56.0	-12.8	46.0	-2.8	Pass
9.410	Pk	31.2	2.1	33.3	60.0	-26.7	50.0	-16.7	Pass
14.220	Pk	39.6	2.8	42.4	60.0	-17.6	50.0	-7.6	Pass
18.200	Pk	38.6	3.1	41.7	60.0	-18.3	50.0	-8.3	Pass
29.060	Pk	31.5	3.4	34.9	60.0	-25.1	50.0	-15.1	Pass

Table 7-9: Test Equipment Used for Testing Conducted Emissions

RTL Asset #	Manufacturer	Model	Part Type	Calibration Due Date
900969	Hewlett Packard	85650	Quasi-Peak Adapter	8/3/06
900930	Hewlett Packard	8566B	Spectrum Analyser Display	8/3/06
900931	Hewlett Packard	8566	Spectrum Analyser	8/3/06
900889	Hewlett Packard	85685A	RF Preselector	4/5/06
901084	AFJ International	LS16	16A LISN	1/23/07

TEST PERSONNEL:

Daniel Biggs		March 7, 2006
Test Engineer	Signature	Date Of Test

8 Radiated Emissions

8.1 Amendments to Emissions Test Methodology

8.1.1 Deviations from Test Methodology

There was no deviation from, additions to, or exclusions from, ANSI C63.4: 2003.

8.2 Radiated Emissions Measurements

8.2.1 Site and Test Description

Before final radiated emissions measurements were made on the OATS, the EUT was scanned indoors at both one and three meter distances. This was done in order to determine its emission spectrum signal. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emission measurements on the OATS, at each frequency, in order to ensure that maximum emission amplitudes were measured. Final radiated emissions measurements were made on the OATS at a distance of 3 meters. The floor-standing EUT was placed on a nonconductive turntable. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the emissions maximum levels. Measurements were taken using both horizontal and vertical antenna polarization. The spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the quasi-peak detection mode. No video filter less than 10 times the resolution bandwidth was used. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

8.2.2 Field Strength Calculations

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FI(dB\mu V/m) = SAR(dB\mu V) + SCF(dB/m)$$

FI = Field Intensity
SAR = Spectrum Analyzer Reading
SCF = Site Correction Factor

The Site Correction Factor (SCF) used in the above equation is determined empirically, and is expressed in the following equation:

$$SCF(dB/m) = -PG(dB) + AF(dB/m) + CL(dB)$$

SCF = Site Correction Factor
PG = Pre-Amplifier Gain
AF = Antenna Factor
CL = Cable Loss

The field intensity in microvolts per meter can then be determined according to the following equation:

$$FI(\mu V/m) = 10^{FI(dB\mu V/m)/20}$$

For example, assume a signal frequency of 125 MHz has a received level measured as 49.3 dBuV. The total Site Correction Factor (antenna factor plus cable loss minus preamplifier gain) for 125 MHz is –11.5 dB/m. The actual radiated field strength is calculated as follows:

$$49.3dB\mu V - 11.5dB/m = 37.8dB\mu V/m$$
$$10^{37.8/20} = 10^{1.89} = 77.6\mu V/m$$

8.2.3 Measurement Uncertainty

Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Other errors have been defined and calculated within the Rhein Tech Quality Manual, Section 6.1. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as well as daily calibration methods, technician training, and emphasis to employees on avoiding error.

8.2.4 Test Limits

FCC Class B Radiated Emissions	
Frequency (MHz)	**At 3m (dBµV/m)**
30-88	40.0
88-216	43.5
216-960	46.0
>1000	54

8.2.5 Radiated Emissions Data

Test was conducted with cabinet doors installed and closed.

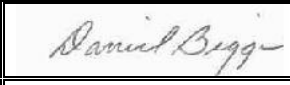
Table 8-1: Radiated Emissions Test Data

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Turntable Azimuth (deg)	Antenna Height (m)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pass/ Fail
75.528	Qp	H	45	2.0	57.2	-22.4	34.8	40.0	-5.2	Pass
151.048	Qp	H	180	2.0	52.3	-17.2	35.1	43.5	-8.4	Pass
167.828	Qp	H	45	1.5	54.5	-18.0	36.5	43.5	-7.0	Pass
168.015	Qp	H	45	1.5	56.8	-18.0	38.8	43.5	-4.7	Pass
234.950	Qp	V	0	1.0	37.4	-16.2	21.2	46.0	-24.8	Pass
369.214	Qp	V	180	1.0	51.9	-11.5	40.4	46.0	-5.6	Pass
537.024	Qp	H	160	1.0	42.7	-7.2	35.5	46.0	-10.5	Pass
570.588	Qp	H	160	1.7	42.1	-6.4	35.7	46.0	-10.3	Pass
637.724	Qp	H	200	1.5	45.2	-5.3	39.9	46.0	-6.1	Pass
704.852	Qp	H	160	1.5	47.1	-4.9	42.2	46.0	-3.8	Pass
768.800	Qp	V	0	1.0	36.9	-3.8	33.1	46.0	-12.9	Pass
779.355	Qp	V	0	1.0	30.8	-3.7	27.1	46.0	-18.9	Pass
785.680	Qp	V	0	1.0	32.1	-3.9	28.2	46.0	-17.8	Pass

Table 8-2: Test Equipment Used for Testing Radiated Emissions

RTL Asset #	Manufacturer	Model	Part Type	Calibration Due Date
900969	Hewlett Packard	85650A	Quasi-Peak Adapter (30 Hz – 40 GHz)	8/3/06
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz – 22 GHz)	8/3/06
901053	Schaffner-Chase	CBL6112	Antenna (25 MHz – 2 GHz)	11/1/06
900930	Hewlett Packard	85662A	Spectrum Analyzer Display	8/3/06
900268	Taylor	5565	Hygrometer / Thermometer	2/15/06

TEST PERSONNEL:

Daniel Biggs		March 7, 2006
Test Engineer	Signature	Date Of Test

9 Conclusion

The data in this measurement report shows that the **M/A-COM, Inc**. Model **RDG, FCC ID: OWDTR-0022-E,** complies with all the requirements of Parts 90, 15 and 2 of the FCC Rules, and Industry Canada RSS-119, Issue 6, 2000.