



Engineering and Testing for EMC and Safety Compliance




Accredited under A2LA Testing Certificate # 2653.01

FCC Part 15.231 Certification Application Report

Test Lab: Rhein Tech Laboratories, Inc. Tel: 703-689-0368 360 Herndon Parkway Fax: 703-689-2056 Suite 1400 Web: www.rheintech.com Herndon, VA 20170 Email: atcinfo@rheintech.com		Applicant: Andersen Corporation Phone: 651-264-4980 100 Fourth Avenue North Fax: 651-264-4980 Bayport, MN 55003-1096 Contact: Sachin Gore	
FCC ID	WVJ-CA00010521701	Test Report Date	August 4, 2009
Platform	N/A	RTL Work Order Number	2009232
Model #	0105217	RTL Quote Number	QRTL09-353
FCC Classification	DSC – Part 15 Security/Remote Control Transmitter		
FCC Rule Part(s)	Part 15.231: Periodic operation in the band 40.66 – 40.70 MHz and above 70 MHz (10-01-08)		
Procedure or Other Guidance	ANSI C63.4-2003 Standard for Methods of Measurement of Radio-Noise Emissions		
Digital Interface Information	N/A		
Frequency Range (MHz)	Output Power (W)	Frequency Tolerance	Emission Designator
345.025	N/A	N/A	N/A

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. Modifications made to the equipment during testing in order to achieve compliance with these standards are listed in the report.

Furthermore, there was no deviation from, additions to, or exclusions from the applicable parts of FCC Part 2, FCC Part 15 and ANSI C63.4.

Signature: 
Typed/Printed Name: Desmond A. Fraser

Date: August 5, 2009
Position: President

This report may not be reproduced, except in full, without the written approval of Rhein Tech Laboratories, Inc. and Andersen Corporation. The test results reported relate only to the item tested.

Table of Contents

1	General Information	4
1.1	Scope	4
1.2	Modifications	4
1.3	Test Facility	4
1.4	Related Submittal(s)/Grant(s)	4
2	Test Information	5
2.1	Test Justification	5
2.2	Exercising the EUT	5
2.3	Test Result Summary	5
2.4	Test System Details	5
2.5	Configuration of Tested System	6
3	Duty Cycle Calculation - FCC §15.35(c).....	6
4	Transmitter Deactivation – FCC §15.231(a)(2)	9
5	Modulated Bandwidth – FCC §15.231(c)	10
5.1	Modulated Bandwidth Test Procedure	10
5.2	FCC §15.231(c) Limits	10
5.3	Modulated Bandwidth Test Data	10
6	Radiated Emissions – FCC §15.209, §15.231	12
6.1	Radiated Fundamental Emissions Test Procedure	12
6.1.1	Radiated Fundamental Emissions Limits Test Data	12
6.2	Radiated Harmonics/Spurious Emissions – FCC §15.231	12
6.2.1	Radiated Emissions Harmonics/Spurious Test Procedure	12
7	Conducted Emissions.....	14
7.1	Site and Test Description	14
7.2	Test Limits.....	14
7.3	Conducted Emissions Test Results	14
8	Conclusion.....	15

Table Index

Table 2-1:	Test Result Summary with FCC Rules and Regulations	5
Table 2-2:	Equipment Under Test (EUT).....	5
Table 3-1:	Duty Cycle Test Equipment	8
Table 4-1:	Transmitter Deactivation Test Equipment	9
Table 5-1:	20 dB Modulated Bandwidths	10
Table 5-2:	Modulated Bandwidth Test Equipment	11
Table 6-1:	Radiated Fundamental Emissions	12
Table 6-2:	Radiated Spurious Harmonics; 345.025 MHz	13
Table 6-3:	Radiated Emissions Test Equipment	13

Figure Index

Figure 2-1:	Worst Case Configuration of System under Test.....	6
-------------	--	---

Plot Index

Plot 3-1:	Total Pulse Train Length – 25.6 ms.....	7
Plot 3-2:	Total Pulse on Time within 25.6 ms Pulse Train Less than 50%.....	8
Plot 4-1:	Transmitter Deactivation	9
Plot 5-1:	Modulated Bandwidth – 345.025 MHz.....	10

Appendix Index

Appendix A:	FCC/TCB Agency Authorization Letter	16
Appendix B:	FCC Confidentiality Request Letter	17
Appendix C:	ID Label and Label Location	18
Appendix D:	Operational Description	19
Appendix E:	Schematics	20
Appendix F:	Block Diagram.....	21
Appendix G:	Manual.....	22
Appendix H:	Test Photographs	23
Appendix I:	External Photographs.....	24
Appendix J:	Internal Photographs.....	25

Photograph Index

Photograph 1:	ID Label Sample and Location	18
Photograph 2:	Radiated Emissions – Front View	23
Photograph 3:	EUT	24
Photograph 4:	PCB Front	25
Photograph 5:	PCB Back.....	26

1 General Information

1.1 Scope

FCC Rules Part 15.231: Periodic operation in the band 40.66–40.70 MHz and above 70 MHz.

1.2 Modifications

N/A

1.3 Test Facility

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

1.4 Related Submittal(s)/Grant(s)

This is an original certification application for Andersen Corporation Model 0105217, FCC ID: WVJ-CA00010521701.

2 Test Information

2.1 Test Justification

The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. The EUT's frequencies were tested and investigated from 9 kHz to the 10th harmonic. The test results relate only to the item that was tested.

The antenna transmits, receives, and is internal. The IF, LO, and up to the 2nd LO, were investigated and tested, and found to be compliant for unintentional emissions compliance.

2.2 Exercising the EUT

The EUT was adapted to continuously transmit for testing purposes. The carrier was also checked to verify that the information was being transmitted. The unit was reprogrammed for normal operation for the duty cycle plots and transmission requirement of 15.231(a)(2).

There were no deviations from the test standard(s) and/or methods.

2.3 Test Result Summary

Table 2-1: Test Result Summary with FCC Rules and Regulations

Standard	Test	Pass/Fail Or N/A
FCC 15.207	AC Conducted Emissions	N/A
FCC 15.231(a)(2)	Transmitter Deactivation	Pass
FCC 15.231(b)	Radiated Emissions	Pass
FCC 15.231(c)	20 dB Bandwidth	Pass

2.4 Test System Details

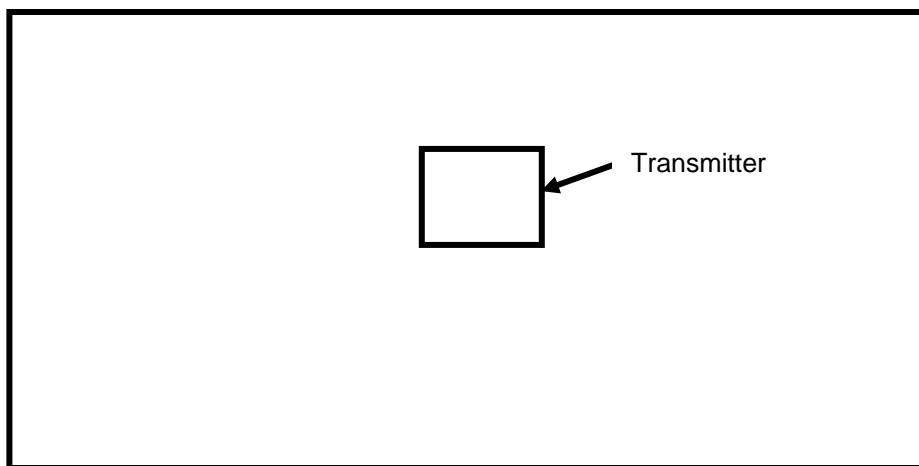
The test samples were received on August 3, 2009. The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system, are shown in the following table.

Table 2-2: Equipment Under Test (EUT)

Part	Manufacturer	Model	Serial Number	FCC ID	Cable Description	RTL Bar Code
Transmitter	Andersen Corp.	0105217	C0	WVJ-CA00010521701	N/A	19134
Transmitter	Andersen Corp.	0105217	C2	WVJ-CA00010521701	N/A	19135

2.5 Configuration of Tested System

Figure 2-1: Worst Case Configuration of System under Test

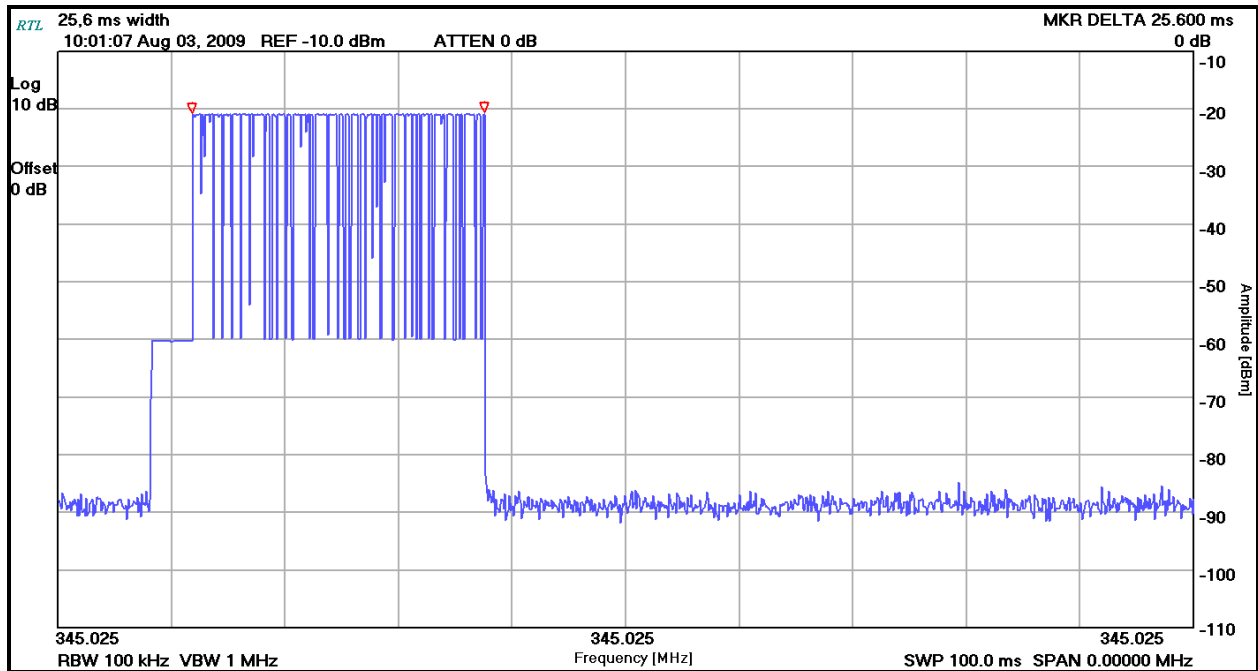


3 Duty Cycle Calculation - FCC §15.35(c)

A standard transmission consists of firmware limiting the timing to 50% of the packet size or a 12.95 ms pulse within a 100 ms timeframe.

$$20 \log (13/100) = -17.7 \text{ dB}$$

Plot 3-1: Total Pulse Train Length – 25.6 ms



Plot 3-2: Total Pulse on Time within 25.6 ms Pulse Train Less than 50%

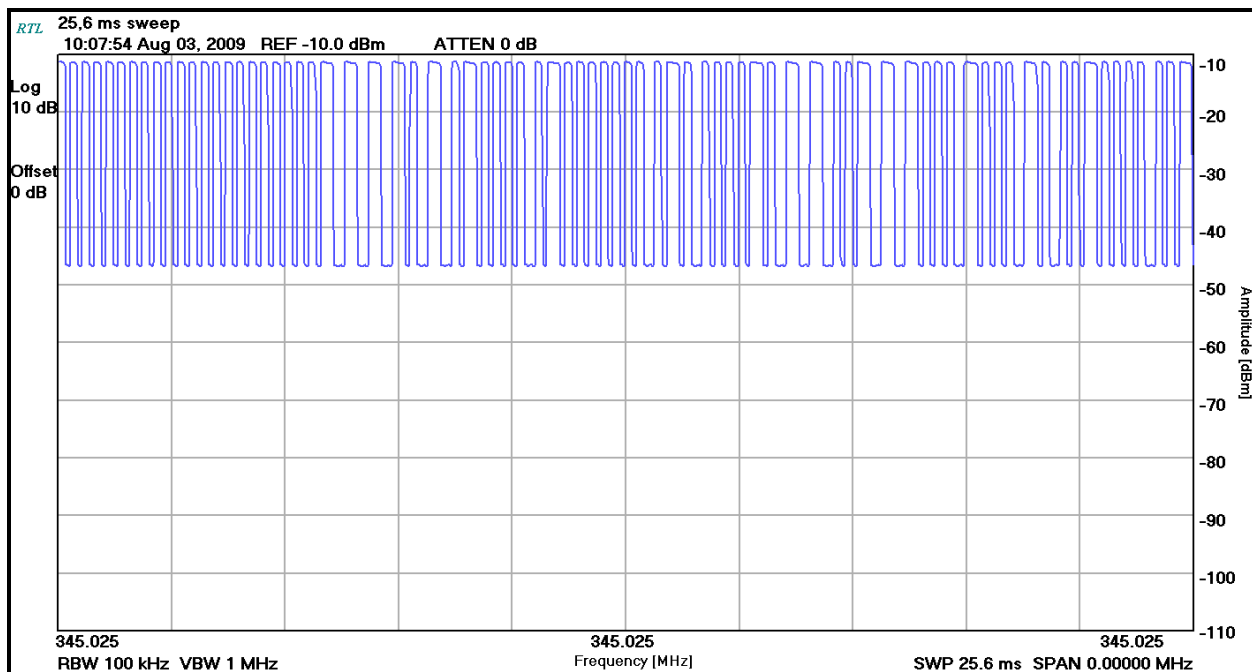
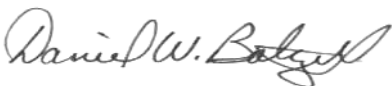


Table 3-1: Duty Cycle Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	6/23/10

Test Personnel:

Daniel Baltzell Test Engineer	 Signature	August 3, 2009 Date of Test
----------------------------------	--	--------------------------------

4 Transmitter Deactivation – FCC §15.231(a)(2)

A transmitter activated automatically shall cease transmission within 5 seconds after activation.

Plot 4-1: Transmitter Deactivation

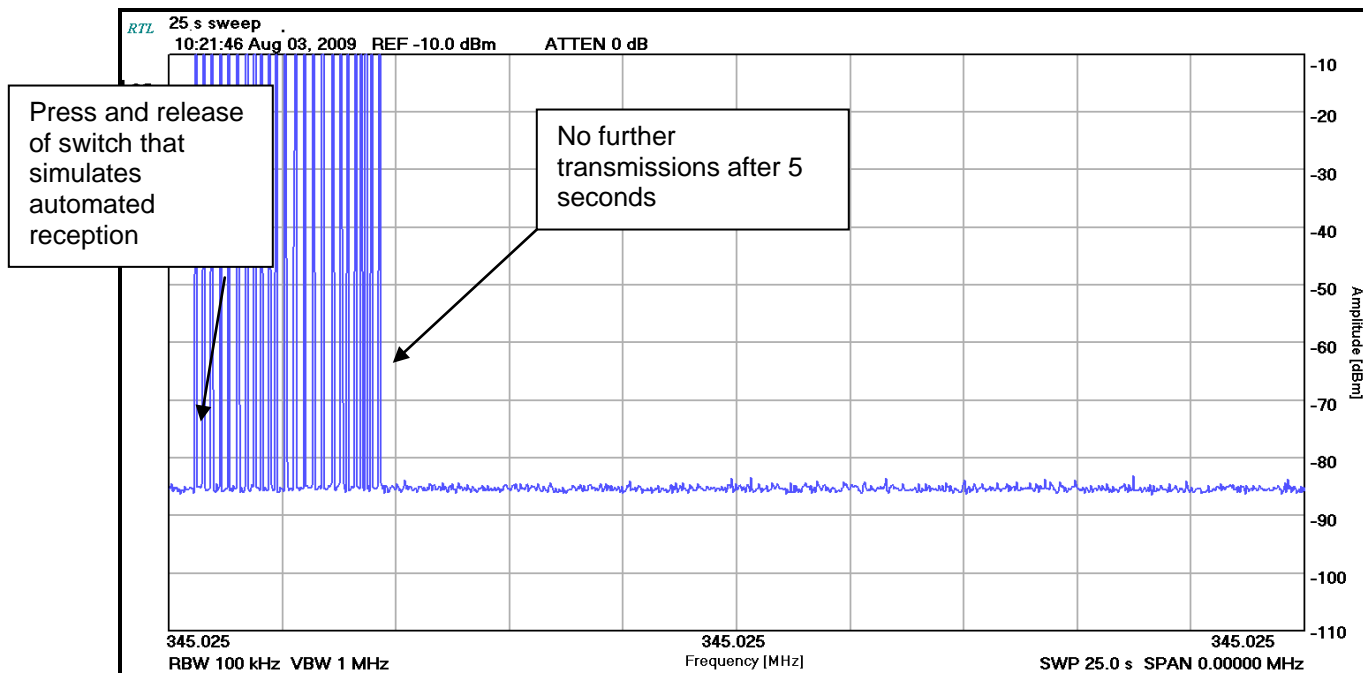


Table 4-1: Transmitter Deactivation Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	6/23/10

Test Personnel:

Daniel Baltzell
 Test Engineer

Signature

August 3, 2009
 Date of Test

5 Modulated Bandwidth – FCC §15.231(c)

5.1 Modulated Bandwidth Test Procedure

The minimum 20 dB bandwidth was measured using a 50 ohm spectrum analyzer with the resolution bandwidth set at 10 kHz (1% of span), and the video bandwidth set at 1 MHz. The spectrum analyzer's display markers were set to -20 dB using max hold until the spectrum was filled and a plot taken.

5.2 FCC §15.231(c) Limits

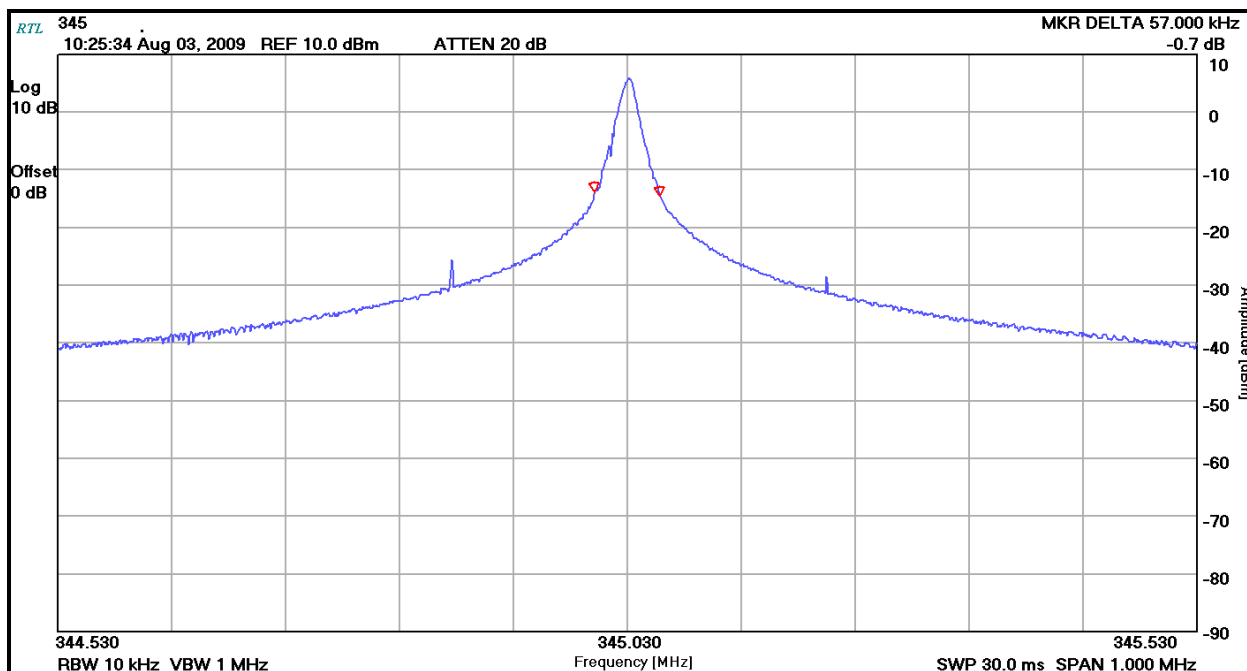
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

5.3 Modulated Bandwidth Test Data

Table 5-1: 20 dB Modulated Bandwidths

Frequency (MHz)	20 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
345.025	57	0.25% of 345025 = 862.5625	805.5625

Plot 5-1: Modulated Bandwidth – 345.025 MHz



Rhein Tech Laboratories, Inc.
360 Herndon Parkway
Suite 1400
Herndon, VA 20170
<http://www.rheintech.com>

Client: Andersen Corporation
Model: 0105217
Standard: FCC 15.231
FCC ID: WVJ-CA00010521701
Report #: 2009232

Table 5-2: Modulated Bandwidth Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	6/23/10

Test Personnel:

Daniel Baltzell Test Engineer	 Signature	August 3, 2009 Date of Test
----------------------------------	--	--------------------------------

6 Radiated Emissions – FCC §15.209, §15.231

6.1 Radiated Fundamental Emissions Test Procedure

Radiated emissions of the fundamentals were tested at three meters, and meet the requirements of average mode, and 20 dB higher in peak mode. The limit is calculated from a linear interpolation between 3,750 and 12,500 uV/m, and from 260-470 MHz, or 7292.7 uV/m at 345.025 MHz. The EUT was tested in all three orthogonal planes. Measurement was based on a peak detector and an average level was calculated. The average level was compared to the average limit as per 15.231(b) and the peak level was compared to the average limit +20 dB per 15.35(b).

6.1.1 Radiated Fundamental Emissions Limits Test Data

Table 6-1: Radiated Fundamental Emissions

Frequency (MHz)	Peak Analyzer Reading (dBuV)	Site Correction Factor (dBm)	Peak Level Corrected (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)	Duty Cycle Correction (dB)	Calculated Average Level (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)
345.025	107.0	-18.6	88.4	97.3	-8.9	-17.7	70.7	77.3	-6.6

6.2 Radiated Harmonics/Spurious Emissions – FCC §15.231

6.2.1 Radiated Emissions Harmonics/Spurious Test Procedure

Radiated emissions of the harmonics were tested at three meters. The EUT was tested in the three orthogonal planes with the receive antenna in both polarities. The emissions were maximized per ANSI C63.4:2003 8.3.1.2; that is, the measurement antenna height was varied between 1 and 4 m, and the EUT was rotated through 360° on a rotating turntable until the maximum emissions were found. Both horizontal and vertical measurement antenna polarizations were used. A resolution bandwidth of 100 kHz was used for frequencies less than 1000 MHz, and a resolution bandwidth of 1 MHz was used for frequencies greater than or equal to 1000 MHz.

Table 6-2: Radiated Spurious Harmonics; 345.025 MHz


Frequency (MHz)	Peak Analyzer Reading (dBuV)	Site Correction Factor (dBm)	Peak Level Corrected (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)	Duty Cycle Correction (dB)	Calculated Average Level (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)
690.050	70.9	-12.2	58.7	77.3	-18.6	-17.7	41.0	57.3	-16.3
1035.075	63.3	-2.0	61.3	77.3	-16.0	-17.7	43.6	57.3	-13.7
1380.100	44.5	0.3	44.8	77.3	-32.5	-17.7	27.1	57.3	-30.2
1725.125	47.8	2.9	50.7	77.3	-26.6	-17.7	33.0	57.3	-24.3
2070.150	49.6	-1.1	48.5	77.3	-28.8	-17.7	30.8	57.3	-26.5
2415.175	62.3	-0.4	61.9	77.3	-15.4	-17.7	44.2	57.3	-13.1
2760.200	48.1	-0.5	47.6	77.3	-29.7	-17.7	29.9	57.3	-27.4
3105.225	59.9	-3.2	56.7	77.3	-20.6	-17.7	39.0	57.3	-18.3
3450.250	51.2	-2.9	48.3	77.3	-29.0	-17.7	30.6	57.3	-26.7

Table 6-3: Radiated Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900724	Antenna Research Associates, Inc.	LPB-2520	LOG/Bicon Antenna (25 – 1000 MHz)	1037	7/17/10
901365	MITEQ	JS4-00102600-41-5P	Amplifier, 0.1-26 GHz, 30 dB gain	N/A	3/4/10
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	6/14/10
901215	Hewlett Packard	8596EM	Portable Spectrum Analyzer (9 kHz – 12.8 GHz)	3826A00144	10/23/09
901516	Insulated Wire Inc.	KPS-1503-2400-KPS	RF cable, 20'	NA	10/17/09
901517	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	10/17/09
900878	Rhein Tech Laboratories	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	Not Required
901242	Rhein Tech Laboratories	WRT-000-0003	Wood rotating table	N/A	Not Required

Test Personnel:

Daniel Baltzell
 Test Engineer



Signature

August 3, 2009
 Date of Tests

7 Conducted Emissions

7.1 Site and Test Description

The power line conducted emissions 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 (dB μ V)		
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 (dB μ V)		
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

Testing is N/A – the EUT is battery powered.

Rhein Tech Laboratories, Inc.
360 Herndon Parkway
Suite 1400
Herndon, VA 20170
<http://www.rheintech.com>

Client: Andersen Corporation
Model: 0105217
Standard: FCC 15.231
FCC ID: WVJ-CA00010521701
Report #: 2009232

8 Conclusion

The data in this measurement report shows that Andersen Corporation Model 0105217, FCC ID: WVJ-CA00010521701, complies with all the applicable requirements of Parts 2 and 15 of the FCC Rules.