



Engineering and Testing for EMC and Safety Compliance



Accredited under A2LA Testing Certificate # 2653.01

### FCC Part 15.231 Certification Application Report

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<b>FCC ID:</b>	WVJ-BA00010499301	<b>Test Report Date</b>	October 3, 2008
<b>Platform</b>	N/A	<b>RTL Work Order Number</b>	2008165
<b>Model</b>	0104993	<b>RTL Quote Number</b>	QRTL08-300
<b>FCC Classification</b>	DSC – Part 15 Security/Remote Control Transmitter		
<b>FCC Rule Part(s)</b>	Part 15.231: Periodic operation in the band 40.66 – 40.70 MHz and above 70 MHz (10-01-07)		
<b>Digital Interface Information</b>	Digital Interface was found to be compliant		
<b>Receiver Information</b>	Receiver was found to be compliant		
<b>Frequency Range (MHz)</b>	<b>Output Power (W)</b>	<b>Frequency Tolerance</b>	<b>Emission Designator</b>
345.025	N/A	N/A	54K5F1D

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. 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: 

Date: October 3, 2008

Typed/Printed Name: Desmond A. Fraser

Position: President

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## **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 0104993, FCC ID: WVJ-BA00010499301.

## 2 Test Information

### 2.1 Test Justification

The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. 345.025 MHz was tested and investigated from 9 kHz to the 10<sup>th</sup> harmonic. The test results relate only to the item that was tested.

The integrated pcb trace antenna transmits. The IF, LO, and up to the 2<sup>nd</sup> 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 some testing purposes. The carrier was also checked to verify that the information was being transmitted. 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 Line Conducted Emissions	N/A
FCC 15.231(a)	Radiated Emissions	Pass
FCC 15.231(c)	20 dB Bandwidth	Pass

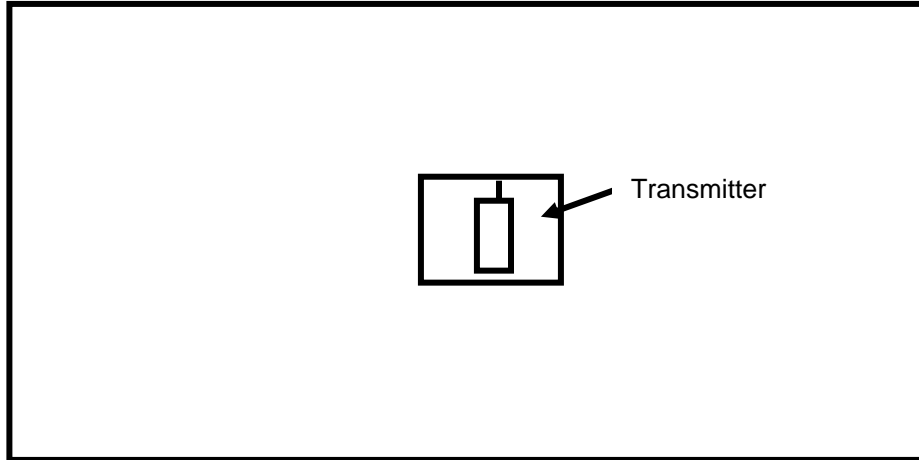
### 2.4 Test System Details

The test sample was received by RTL on September 26, 2008. 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 Corporation	0104993	X71	WVJ-BA00010499301	N/A	18639
Transmitter	Andersen Corporation	0104993	X59	WVJ-BA00010499301	N/A	18640

## 2.5 Configuration of Tested System



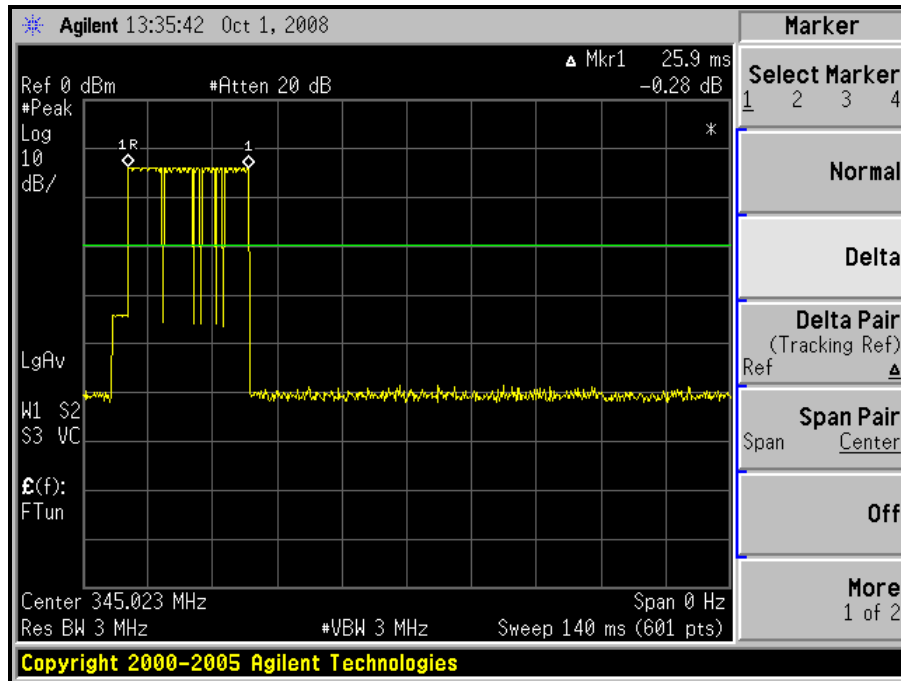
**Figure 2-1: Worst Case Configuration of System under Test**

### 3 Duty Cycle Calculation - FCC 15.35(c)

The EUT uses Manchester encoding, so the “on” time is 50% of the entire packet. The plot below shows the max width of a packet in 100 ms.

Therefore, the duty cycle correction factor is  $-20 \log (0.5 * 25.9 \text{ ms} / 100 \text{ ms}) = -17.8 \text{ dB}$

**Plot 3-1: Pulse Width**



**Table 3-1: Duty Cycle Test Equipment**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	7/31/09

**Test Personnel:**

Richard B. McMurray, P.E.  
 EMC Test Engineer

*Richard B. McMurray*  
 Signature

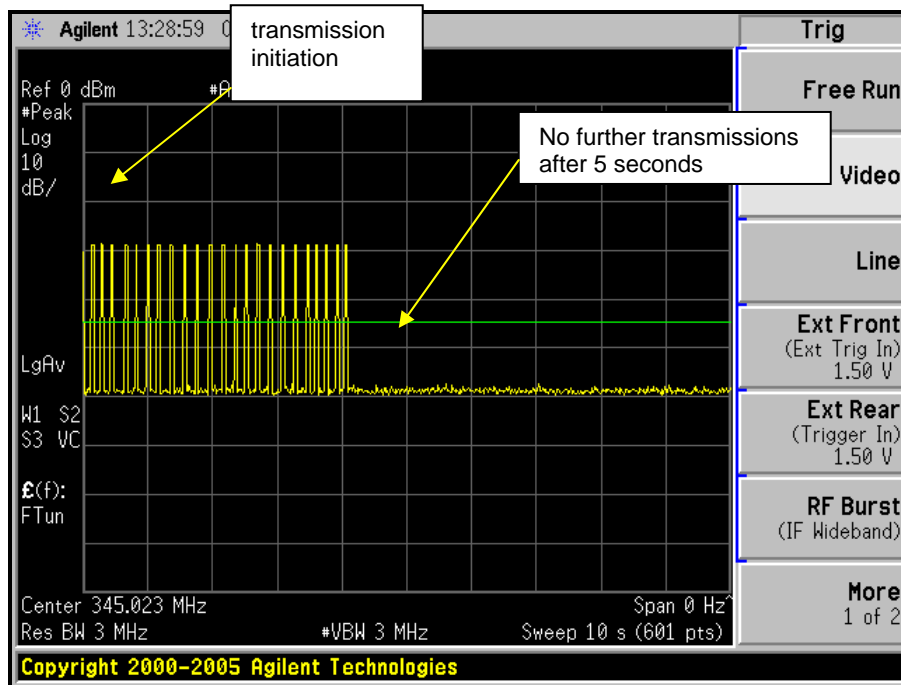
October 1, 2008  
 Date of Test

#### 4 Transmitter Deactivation - FCC 15.231(a)(1)/(2)

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

A transmitter activated automatically shall cease transmission within 5 seconds after activation.  
 The transmitter deactivates itself within the 5 second limit.

**Plot 4-1: Transmitter Deactivation**



**Table 4-1: Transmitter Deactivation Test Equipment**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	7/31/09

**Test Personnel:**

Richard B. McMurray, P.E.  
 EMC Test Engineer

*Richard B. McMurray*  
 Signature

October 1, 2008  
 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, and the video bandwidth set at 30 kHz. The 20 dB bandwidth was measured using the delta marker function.

### 5.2 FCC 15.231(c) Limits

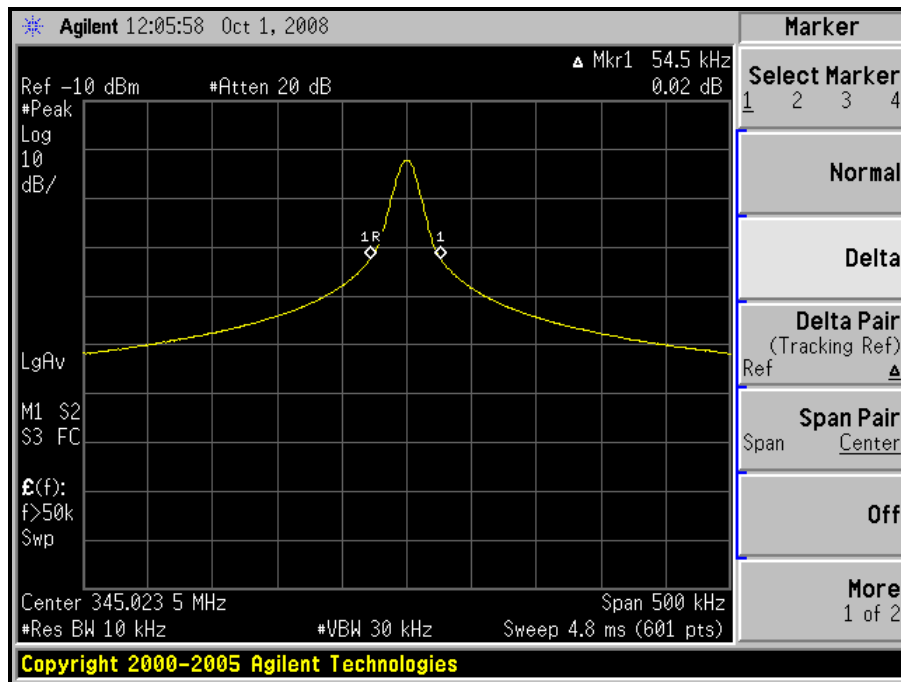
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated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

### 5.3 Modulated Bandwidth Test Data

Table 5-1: 20 dB Modulated Bandwidths

20 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
54.5	0.25% of 345023 = 863	-809

Plot 5-1: Modulated Bandwidth

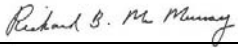


**Table 5-2: Modulated Bandwidth Test Equipment**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	7/31/09

**Test Personnel:**

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Richard B. McMurray, P.E. EMC Test Engineer	 Signature	October 1, 2008 Date of Test
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## 6 Radiated Emissions – FCC 15.109, 15.231

### 6.1 Radiated Fundamental Emissions Test Procedure

Radiated Emissions of the Fundamentals were tested at three meters, and meet the requirements of 6,042 uV/m in 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. The EUT was tested in all three orthogonal planes. Measurement was based on a peak detector, and an average value was calculated based on the duty cycle.

#### 6.1.1 Radiated Fundamental Emissions Limits Test Data

Table 6-1: Radiated Fundamental Emissions

Emission Frequency (MHz)	Analyzer Reading (dBuV)	Detector	Pol	Site Correction Factor (dB)	Duty Cycle Correction (dB)	Corrected Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
345.025	108.6	Peak	V	-16.5	N/A	92.1	97.3	-5.2
345.025	108.6	Average	V	-16.5	-17.8	74.3	77.3	-3.0

### 6.2 Radiated Harmonics/Spurious Emissions – FCC 5.231

#### 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 3 orthogonal planes with the receive antenna in both polarities.

#### 6.2.2 Radiated Harmonics/Spurious Emissions Test Data

Table 6-2: Radiated Spurious Emissions (Peak)

Emission Frequency (MHz)	Peak Analyzer Reading (dBuV)	Site Correction Factor (dB)	Corrected Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)
690.050	68.6	-9.8	58.8	77.3	-18.5
1035.075	66.3	-5.8	60.5	77.3	-16.8
1380.100	58.7	-2.5	56.2	77.3	-21.1
1725.125	50.6	0.3	50.9	77.3	-26.4
2070.150	64.8	-2.5	62.3	77.3	-15.0
2415.175	64.3	-2.9	61.4	77.3	-15.9
2760.200	67.2	-2.4	64.8	77.3	-12.5
3105.225	60.8	-2.0	58.8	77.3	-18.5
3450.250	47.3	-1.6	45.7	77.3	-31.6

**Table 6-3: Radiated Spurious Emissions (Average)**

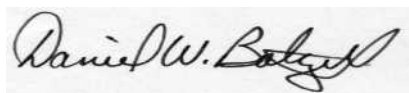
Emission Frequency (MHz)	Corrected Peak Analyzer Reading (dBuV)	Duty Cycle Correction (dB)	Corrected Average Emission Level (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)
690.050	58.8	-17.8	41.0	57.3	-16.3
1035.075	60.5	-17.8	42.7	57.3	-14.6
1380.100	56.2	-17.8	38.4	57.3	-18.9
1725.125	50.9	-17.8	33.1	57.3	-24.2
2070.150	62.3	-17.8	44.5	57.3	-12.8
2415.175	61.4	-17.8	43.6	57.3	-13.7
2760.200	64.8	-17.8	47.0	57.3	-10.3
3105.225	58.8	-17.8	41.0	57.3	-16.3
3450.250	45.7	-17.8	27.9	57.3	-29.4

**Table 6-4: Radiated Emissions Test Equipment**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901053	Schaffner Chase	CBL6112B	Bi-Log Antenna (20MHz-2 GHz)	2648	12/20/08
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	7/31/09
900772	EMCO	3161-02	Horn Antenna (2-4 GHz)	9804-1044	6/13/10
901365	MITEQ	JS4-00102600-41-5P	Amplifier, 0.1-26 GHz, 30dB gain	N/A	10/5/09
901421	Insulated Wire, Inc.	High Frequency RF cable, 30'	Cable	KPS-1503-3600-KPS	10/5/09
901423	Insulated Wire, Inc.	High Frequency RF cable, 36"	Cable	KPS-1503-360-KPS	10/5/09

**Test Personnel:**

Daniel W. Baltzell  
 Test Engineer



Signature

October 9, 2008  
 Date of Test

## 7 Conducted Limits – FCC 15.207

### 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 AC 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, and 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.

### 7.2 Test Limits

Line-Conducted Emissions		
Limit (dB $\mu$ 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 Data**

N/A – EUT is battery operated.

### **8 Conclusion**

The data in this measurement report shows that the Andersen Corporation Model 0104993; FCC ID: WVJ-BA00010499301, complies with all the applicable requirements of Parts 2 and 15 of the FCC Rules.