



Engineering and Testing for EMC and Safety Compliance



Accredited under A2LA Testing Certificate # 2653.01

### Certification Application Report FCC Part 15.231

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<b>FCC ID</b>	XD4-062009LOTSIGN	<b>Test Report Date</b>	May 28, 2009
<b>Platform</b>	N/A	<b>RTL Work Order Number</b>	2009179
<b>Model #</b>	Lot062009	<b>RTL Quote Number</b>	QRTL08-204A
<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 (10-01-08)		
<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>
314.955	N/A	N/A	117KF1D

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, Industry Canada RSS-210, and ANSI C63.4.

Signature: 

Date: May 28, 2009

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**

The antenna was coiled and R7 changed to 150 ohms to mitigate failing harmonic emissions.

### **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 Supervision Two Inc., Model: Lot062009, FCC ID: XD4-062009LOTSIGN.

## 2 Test Information

### 2.1 Test Justification

The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. 315 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 antenna transmits, receives, and is externally attached. 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 testing purposes. An EUT was also programmed as it will be in normal operation to verify the timing requirements of 15.231. 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	Pass
FCC 15.231(b)(e)	Radiated Emissions	Pass
FCC 15.231(c)	20 dB Bandwidth	Pass

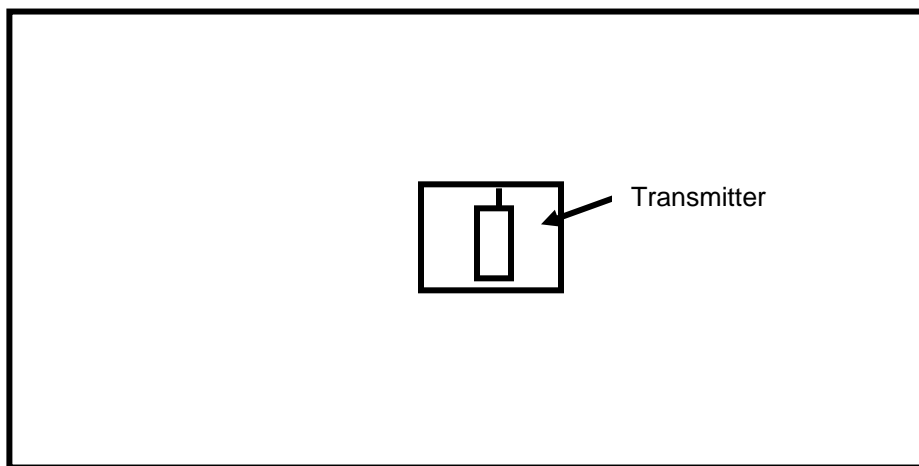
### 2.4 Test System Details

The test sample was received by RTL on May 13, 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	Supervision Two Inc.	Lot062009	N/A	XD4-062009LOTSIGN	1.5 m unshielded serial, 1.5 m shielded USB	18982

## 2.5 Configuration of Tested System

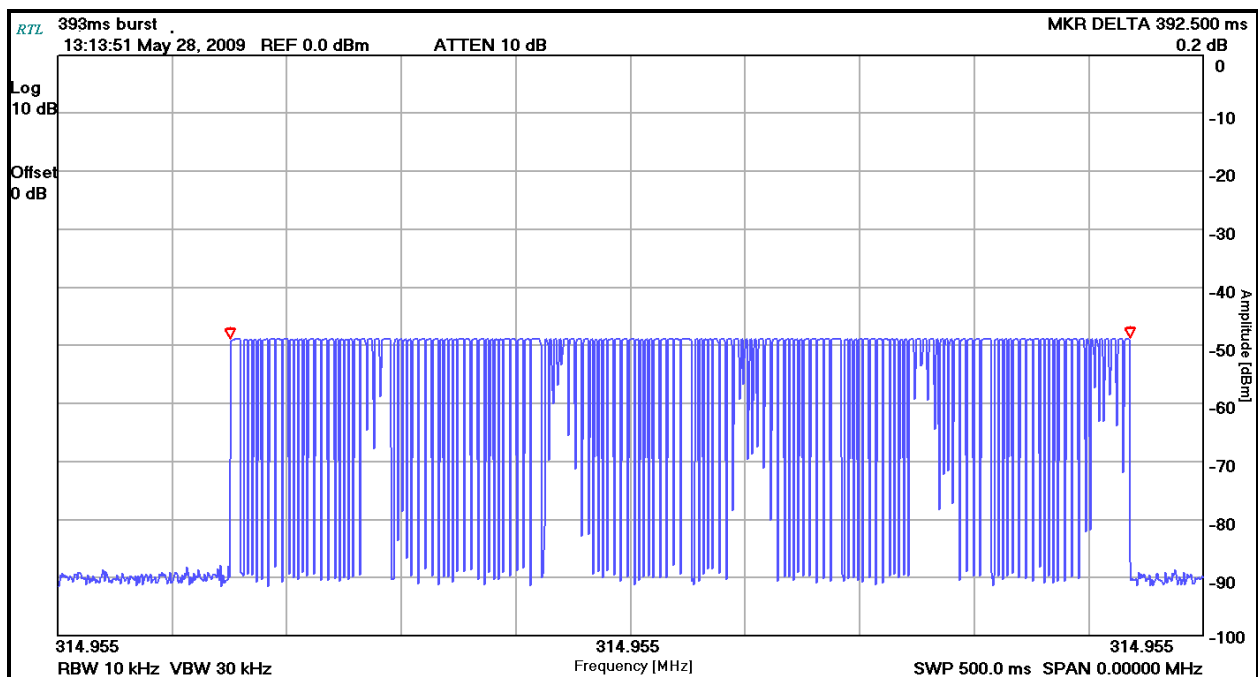


**Figure 2-1: Worst Case Configuration of System under Test**

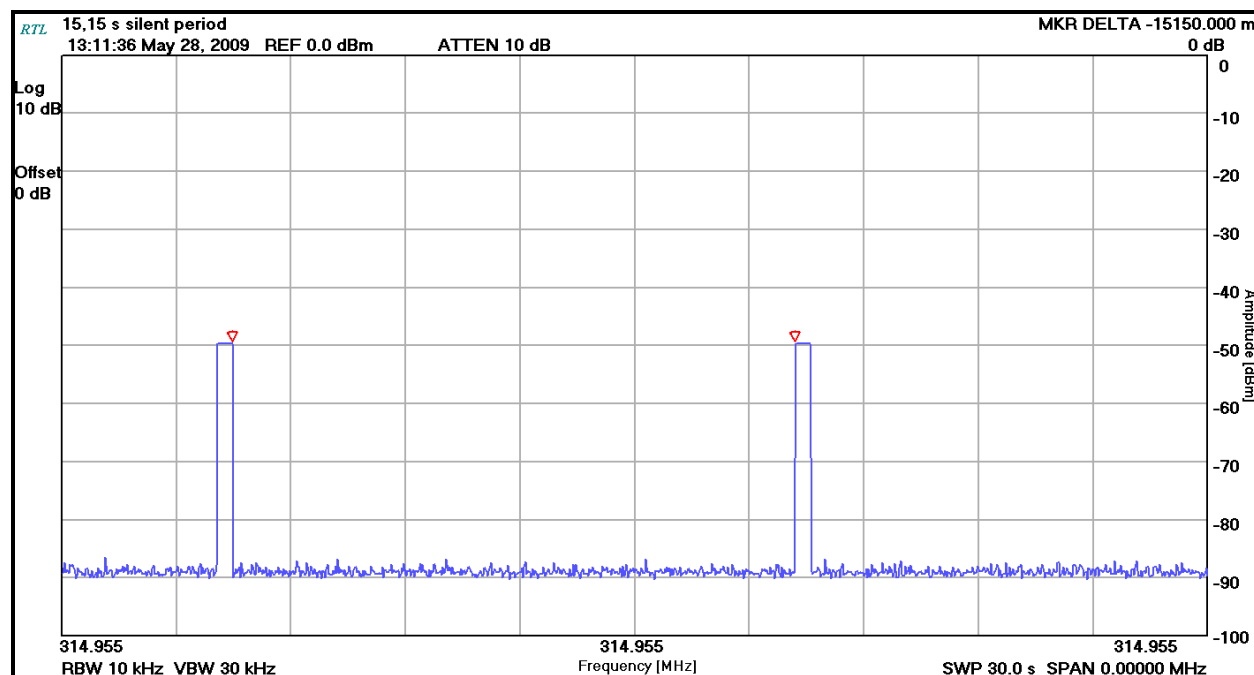
### 3 Transmitter Deactivation - FCC §15.231(e)

Devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

**Plot 3-1: Transmitter Deactivation**



**Plot 3-2: Silent Period (15.15 Seconds)**

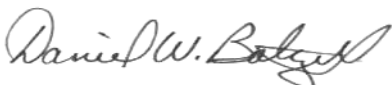


The duration of transmission is a 393 ms burst (ref. plot 3-1). Thirty times the burst period (0.393 s) is 11.8 seconds. The measured silent period is 15.15 seconds. The device meets the requirements of less than 1 second and at least 30 times the duration of the transmission, but not less than 10 seconds.

**Table 3-1: 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	6/23/09

Test Personnel:

Daniel Baltzell Test Engineer	 Signature	May 28, 2009 Date Of Test
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#### **4 Modulated Bandwidth – FCC 15.231(c)**

##### **4.1 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.

##### **4.2 FCC §15.231(c) Limits**

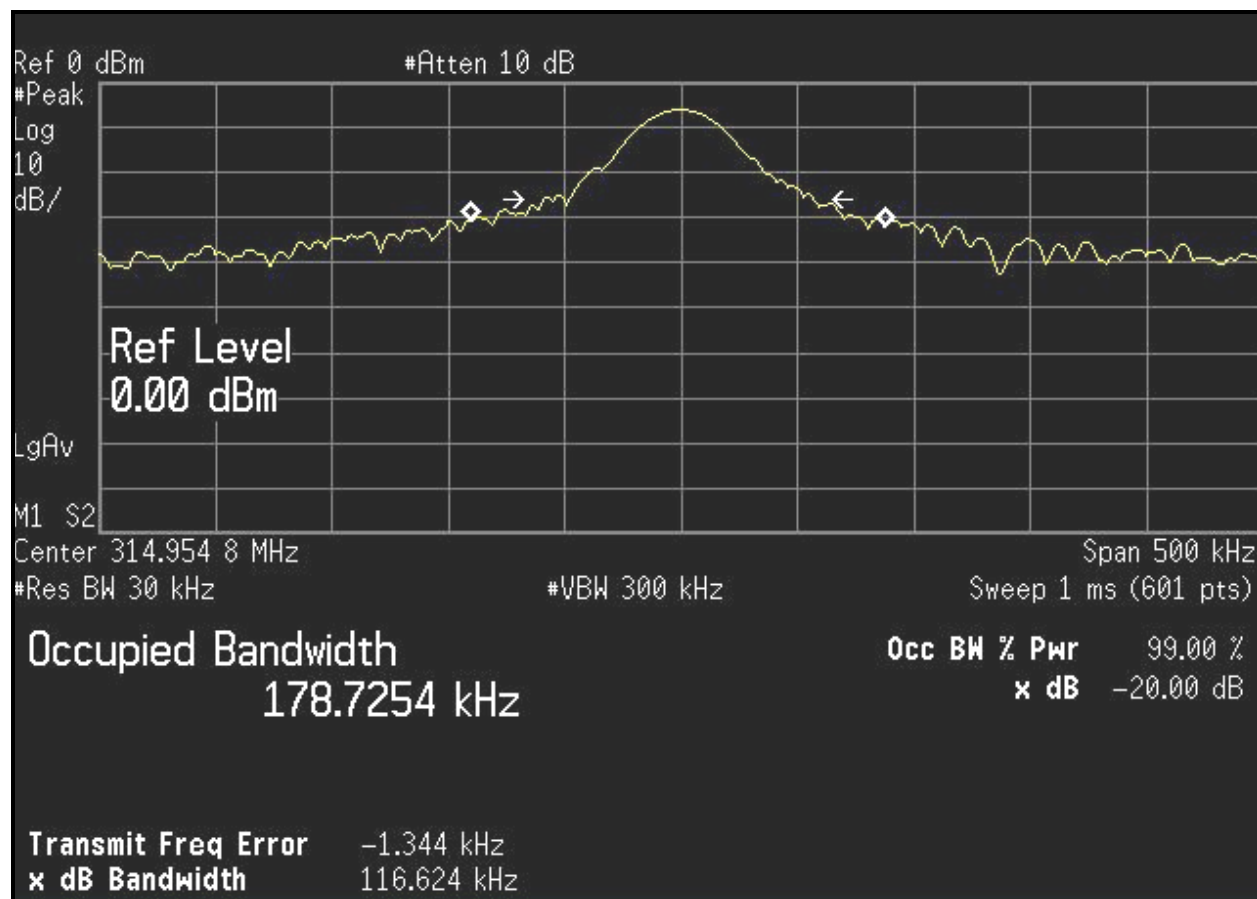
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated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

##### **4.3 Modulated Bandwidth Test Data**

**Table 4-1: 20 dB Modulated Bandwidths**

<b>20 dB Bandwidth (kHz)</b>	<b>Limit (kHz)</b>	<b>Margin (kHz)</b>
116.6	0.25% of 314955 = 787.4	670.8

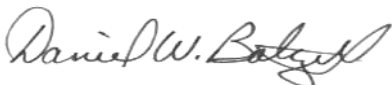
**Plot 4-1: Modulated Bandwidth**



**Table 4-2: 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:

Daniel Baltzell Test Engineer	 Signature	May 26, 2009 Date Of Test
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## 5 Radiated Emissions – FCC 15.109, 15.231(e)

### 5.1 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.

#### 5.1.1 Radiated Fundamental Emissions Limits Test Data

Table 5-1: Radiated Fundamental Emissions (Stand-alone)

Emission Frequency (MHz)	Analyzer Reading (dBuV)	Detector	Pol	Site Correction Factor (dB/m)	Corrected Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
315	80.9	Peak	H	-18.7	62.2	87.7	-25.5
315	80.0	Quasi-peak	H	-18.7	61.3	67.7	-6.4

### 5.2 Radiated Harmonics/Spurious Emissions – FCC §15.231

#### 5.2.1 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.

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


Table 5-2: Radiated Harmonics/Spurious Emissions

Emission Frequency (MHz)	Quasi-peak/ Average Level (dBuV)	Site Correction Factor (dB/m)	Corrected Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
629.910	42.1	-12.5	29.6	47.7	-18.1
944.865	51.3	-9.5	41.8	47.7	-5.9
1259.820	33.7	-3.4	30.3	47.7	-17.4
1574.775	47.1	-1.3	45.8	47.7	-1.9
1889.730	27.4	1.6	29.0	47.7	-18.7
2204.685	47.3	-5.0	42.3	47.7	-5.4
2519.640	49.5	-4.0	45.5	47.7	-2.2
2834.595	38.3	-4.0	34.3	47.7	-13.4
3149.550	48.8	-3.2	45.6	47.7	-2.1

**Table 5-3: Radiated Emissions Test Equipment**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901365	MITEQ	JS4-00102600-41-5P	Amplifier, 0.1-26 GHz, 30dB gain	N/A	3/4/10
900791	Chase	CBL6111B	Bilog antenna (30 MHz – 2000 MHz)	N/A	12/12/10
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	7/31/09
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	6/13/10
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

Test Personnel:

Daniel Baltzell Test Engineer	 Signature	May 26, 2009 Date Of Test
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## 6 Conducted Limits – FCC 15.207

### 6.1 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.

### 6.2 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

### 6.3 Conducted Emissions Test Data

**Table 6-1: Conducted Emissions Test Data - Neutral Side – Line 1**

Temperature: 74°F Humidity: 24%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	QP Limit (dBuV)	QP Margin (dBuV)	AV Limit (dBuV)	AV Margin (dBuV)	Pass/Fail
0.165	Pk	53.4	0.2	53.6			55.2	-1.6	Pass
0.225	Pk	45.3	0.2	45.5			52.6	-7.1	Pass
0.289	Pk	41.4	0.3	41.7			50.6	-8.9	Pass
0.332	Pk	39.4	0.2	39.6			49.4	-9.8	Pass
4.110	Pk	33.8	1.0	34.8			46.0	-11.2	Pass
15.030	Pk	36.5	2.1	38.6			50.0	-11.4	Pass
22.330	Pk	33.5	2.5	36.0			50.0	-14.0	Pass
29.491	Pk	44.4	2.3	46.7			50.0	-3.3	Pass

**Table 6-2: Conducted Emissions Test Data – Hot Side – Line 2**

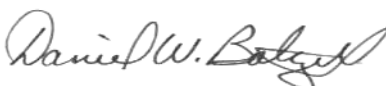
Temperature: 74°F Humidity: 24%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	QP Limit (dBuV)	QP Margin (dBuV)	AV Limit (dBuV)	AV Margin (dBuV)	Pass/Fail
0.158	Av	42.8	0.2	43.0			55.6	-12.6	Pass
0.158	Qp	52.4	0.2	52.6	65.6	-13.0			Pass
0.209	Pk	48.0	0.2	48.2			53.2	-5.0	Pass
0.312	Pk	42.3	0.3	42.6			49.9	-7.3	Pass
3.890	Pk	36.0	1.0	37.0			46.0	-9.0	Pass
14.960	Pk	33.5	2.1	35.6			50.0	-14.4	Pass
29.710	Pk	44.5	2.3	46.8			50.0	-3.2	Pass

**Table 6-3: Conducted Emissions Test Equipment**

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900913	Hewlett Packard	85462A	EMI Receiver RF Section, (9 KHz - 6.5 GHz)	3325A00159	6/15/09
900914	Hewlett Packard	85460A	RF Filter Section, (100 KHz - 6.5 GHz)	3330A00107	6/15/09
901082	AFJ International	LS16/110VAC	16A LISN	16010020081	2/23/10

Test Personnel:

Daniel Baltzell  
Test Engineer



Signature

May 17, 2009  
Date Of Test

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

Client: Supervision Two Inc.  
Model: Lot062009  
Standards: FCC 15.231  
FCC ID: XD4-062009LOTSIGN  
Report #: 2009179

## **7 Conclusion**

The data in this measurement report shows that Supervision Two Inc. Model: Lot062009; FCC ID: XD4-062009LOTSIGN, complies with all the applicable requirements of Parts 2 and 15 of the FCC Rules and Regulations.