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DATE OF REPORT: 2013-07-13  
IC: 10282-GX70101

**FCC CFR47 PART 15 SUBPART C  
INDUSTRY CANADA RSS-210 ISSUE 8**

**CERTIFICATION TEST REPORT**

**HUBBELL INC  
40 WATERVIEW DR  
SHELTON, CT 06484**

**MODEL NUMBER: WLCU301 AND WLCA**

**FCC ID: GX70101  
IC: 10282-GX70101**

**REPORT NUMBER: 12CA64699**

**ISSUE DATE: 2013-07-13**

*Prepared for*  
**HUBBELL INC  
40 WATERVIEW DR  
SHELTON, CT 06484**

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
--	2013-06-26	Initial Issue	Joseph Danisi
Rev. 1	2013-07-13	Added correct Log periodic Antenna, corrected set up photo information, Revised orientation photo, clarified 5 sec. cease operation	Joseph Danisi

## TABLE OF CONTENTS

<b>1. ATTESTATION OF TEST RESULTS .....</b>	<b>4</b>
<b>2. TEST METHODOLOGY .....</b>	<b>5</b>
<b>3. FACILITIES AND ACCREDITATION .....</b>	<b>5</b>
<b>4. CALIBRATION AND UNCERTAINTY .....</b>	<b>5</b>
4.1. <i>MEASURING INSTRUMENT CALIBRATION .....</i>	<i>5</i>
4.2. <i>SAMPLE CALCULATION .....</i>	<i>5</i>
4.3. <i>MEASUREMENT UNCERTAINTY.....</i>	<i>5</i>
<b>5. EQUIPMENT UNDER TEST.....</b>	<b>6</b>
5.1. <i>DESCRIPTION OF EUT .....</i>	<i>6</i>
5.2. <i>DESCRIPTION OF AVAILABLE ANTENNAS .....</i>	<i>6</i>
5.3. <i>SOFTWARE AND FIRMWARE.....</i>	<i>6</i>
5.4. <i>WORST-CASE CONFIGURATION AND MODE.....</i>	<i>6</i>
5.5. <i>MODIFICATIONS .....</i>	<i>6</i>
5.6. <i>DESCRIPTION OF TEST SETUP.....</i>	<i>7</i>
<b>6. TEST AND MEASUREMENT EQUIPMENT .....</b>	<b>9</b>
<b>7. ANTENNA PORT TEST RESULTS.....</b>	<b>11</b>
7.1. <i>20 dB AND 99% BW.....</i>	<i>11</i>
7.2. <i>DUTY CYCLE.....</i>	<i>15</i>
7.3. <i>TRANSMISSION TIME.....</i>	<i>18</i>
<b>8. RADIATED EMISSION TEST RESULTS.....</b>	<b>20</b>
8.1. <i>TX RADIATED SPURIOUS EMISSION .....</i>	<i>20</i>
8.2. <i>RX RADIATED SPURIOUS EMISSION.....</i>	<i>33</i>
<b>9. AC MAINS LINE CONDUCTED EMISSIONS.....</b>	<b>38</b>
<b>10. SETUP PHOTOS .....</b>	<b>47</b>

# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** HUBBELL INC  
40 WATERVIEW DR  
SHELTON, CT 06484

**EUT DESCRIPTION:** Relay Module

**MODEL:** WLCU301 and WLCA

**SERIAL NUMBER:** Non -Serialized

**DATE TESTED:** 2013-04-26 to 2013-06-26

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART C	Pass
INDUSTRY CANADA RSS-210 Issue 8, Annex 1	Pass
INDUSTRY CANADA RSS-GEN Issue 3	Pass

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards, using test results reported in the test report documents referenced below and/or documentation furnished by the applicant. All indications of Pass/Fail in this report are opinions expressed by UL LLC based on interpretations of these calculations. The results show that the equipment is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation, as described by the referenced documents. This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL By:

Tested By:



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Name: Bob DeLisi  
WiSE Principal Engineer  
UL LLC

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Name: Joseph Danisi  
WiSE Project Lead  
UL LLC

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 1285 Walt Whitman Rd. Melville, NY 11747, USA.

UL Melville is accredited by NVLAP, Laboratory Code 100255-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/1002550.htm>.

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

### 4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	± 3.3 dB
Radiated Disturbance, 30 to 1000 MHz	± 4.00 dB

Uncertainty figures are valid to a confidence level of 95%.

## **5. EQUIPMENT UNDER TEST**

### **5.1. DESCRIPTION OF EUT**

The EUT is a wireless relay intended for transmission of command signals which allows triggering of system events.

### **5.2. DESCRIPTION OF AVAILABLE ANTENNAS**

The radio utilizes an integral permanently attached monopole antenna.

### **5.3. SOFTWARE AND FIRMWARE**

The EUT driver software installed during testing was As Sold Code

The test utility software used during testing was FCC Code

### **5.4. WORST-CASE CONFIGURATION AND MODE**

The worst case configuration was determined as X axis therefore the remaining testing was evaluated at this location.

The WLCU301 was a representative samples which was worst case model number WLCA is identical to WLCU301 accept for the following differences WLCU301 represents the fully populated version of the assembly and includes power supply, 24 to 3.3V LDO, relay, processor, and RF components where the WLCA does not include the line 24V supply or the relay, and only includes the RF module and antenna power to this module is provided exteranlly from a 24V DC supply.

### **5.5. MODIFICATIONS**

No modifications were made during testing.

## 5.6 DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Load	Power Resistor	N/A	N/A	N/A

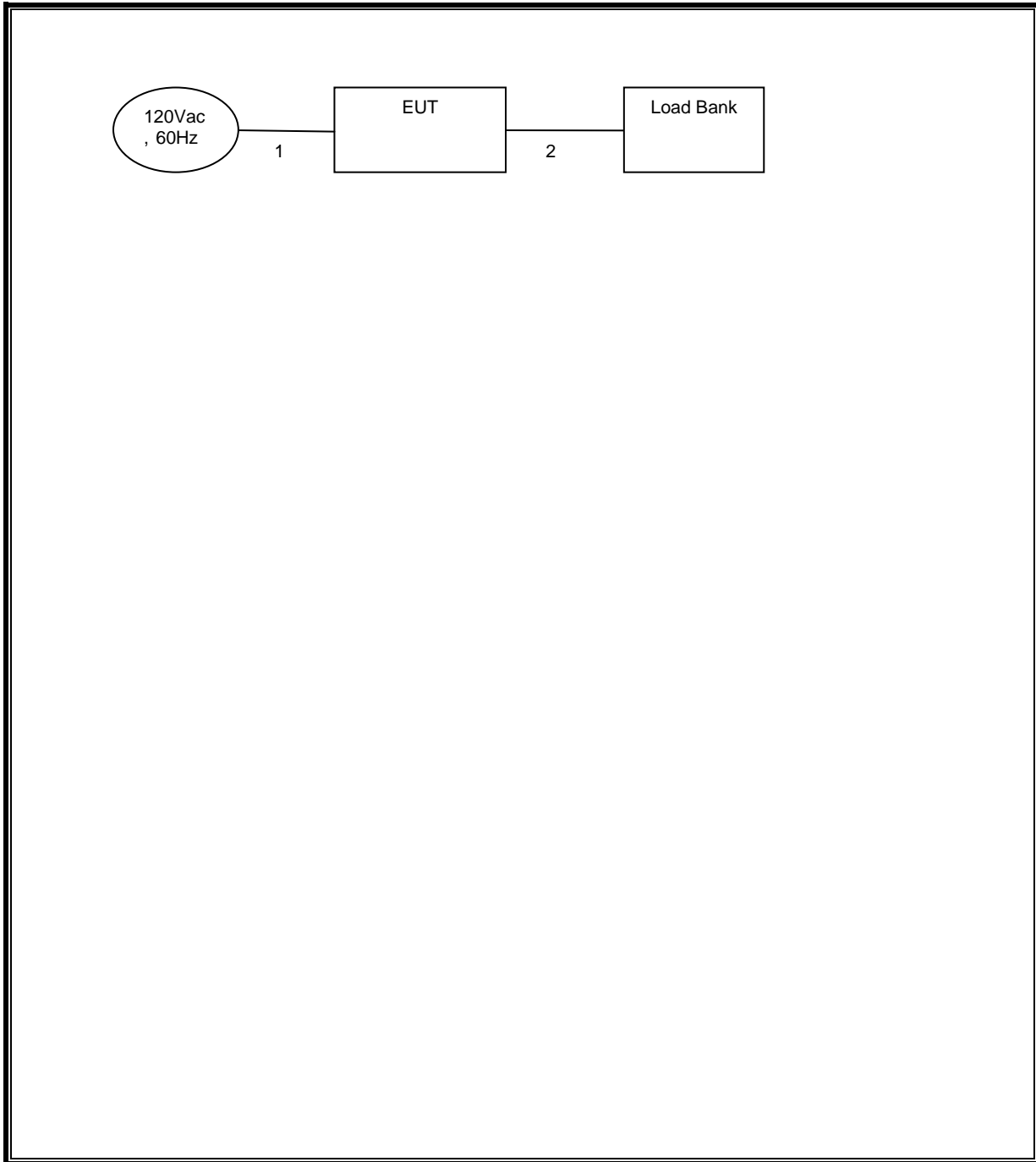
### I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	Power cord	Unshielded	2m	None
2	DC	1	Wires	Unshielded	1m	None

### TEST SETUP

The WLC301 EUT was configured per the manufacture Hubbell Inc. with a load resistor bank set as a typically application.

**SETUP DIAGRAM FOR TESTS**





## 6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
30-1000MHz					
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081	2013-01-29	2014-01-31
Bicon Antenna	Schaffner	VBA6106A	43441	2013-11-12	2014-11-12
Log-P Antenna	Schaffner	UPA6109	44068	2013-04-03	2014-04-03
Bias Tee	Miteq	AM-1523-7687	44392	N/A	N/A
Bias Tee	Miteq	AM-1523-7687	44393	N/A	N/A
Preamp	Miteq	AM-3A-000110-7687	44391	N/A	N/A
Preamp	Miteq	AM-3A-000110-7687	44394	N/A	N/A
Switch Driver	HP	11713A	ME7A-627	N/A	N/A
System Controller	Sunol Sciences	SC99V	44396	N/A	N/A
Camera Controller	Panasonic	WV-CU254	44395	N/A	N/A
RF Switch Box	UL	1	44398	N/A	N/A
Measurement Software	UL	Version 9.5	44740	2012-12-22	2014-12-22
Multimeter	Fluke	83III	ME5B-305	2013-01-28	2014-01-31

Above 1GHz (Band Optimized System)					
Spectrum Analyzer	Agilent	E4446A	72823	2013-01-29	2014-01-31
Horn Antenna (1-2 GHz)	ETS	3161-01 (26°)**	51442	2008-03-28	See * below
Horn Antenna (2-4 GHz)	ETS	3161-02 (22°)**	48107	2007-09-27	See * below
Horn Antenna (4-8 GHz)	ETS	3161-03 (22°)**	48106	2007-09-27	See * below
Signal Path Controller	HP	11713A	50250	N/A	N/A
Gain Controller	HP	11713A	50251	N/A	N/A
System Controller	UL	BOMS2	50252	N/A	N/A
Measurement Software	UL	Version 9.5	44740	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2012-12-22	2014-12-22
Multimeter	Fluke	87V	64386	2013-01-28	2014-01-31

\* - Note: As allowed by the calibration standard ANSI C63.4 Section 4.4.2, standard gain horns need only a one-time calibration. Only if physical damage occurs will the horn antenna require re-calibration.

Gain standard horn antennas (sometimes called standard gain horn antennas) need not be calibrated beyond that which is provided by the manufacturer unless they are damaged or deterioration is suspected, or they are used at a distance closer than  $2D^2/\lambda$ . Gain standard horn antennas have gains that are fixed by their dimensions and dimensional tolerances.

\*\* - Number in parentheses denotes antenna beam width.

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
Conducted Emissions – GP 1					
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081	2013-01-29	2014-01-31
LISN	Solar	9252-50-R-24-BNC	ME5A-636	2013-02-01	2014-02-28
Switch Driver	HP	11713A	44397	N/A	N/A
RF Switch Box	UL	4	44404	N/A	N/A
Measurement Software	UL	Version 9.5	44736	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43734	2012-03-13	2014-03-13
Multimeter	Fluke	87V	64386	2013-01-28	2014-01-31

Bench Tests					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
RF Room 2					
Spectrum Analyzer	Agilent	E4446A	72822	2013-01-29	2014-01-31
Dipole Antenna	EMCO	3121C	3359	2012-12-27	2013-12-27
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2012-12-22	2014-12-22
Measurement Software	UL	Version 9.5	44740	N/A	N/A
Multimeter	Fluke	87V	64386	2013-01-28	2014-01-31

## 7. ANTENNA PORT TEST RESULTS

### 7.1. 20 dB AND 99% BW

#### LIMITS

FCC §15.231 (c)

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.

IC A1.1.3

For the purpose of Section A1.1, the 99% Bandwidth shall be no wider than 0.25% of the center frequency for devices operating between 70-900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency.

#### TEST PROCEDURE

ANSI C63.4

The transmitter output is connected to the spectrum analyzer.

20dB Bandwidth: The RBW is set to 10 KHz. The VBW is set to 100 KHz. The sweep time is coupled. Bandwidth is determined at the points 20 dB down from the modulated carrier.

99% Bandwidth: The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

**RESULTS**

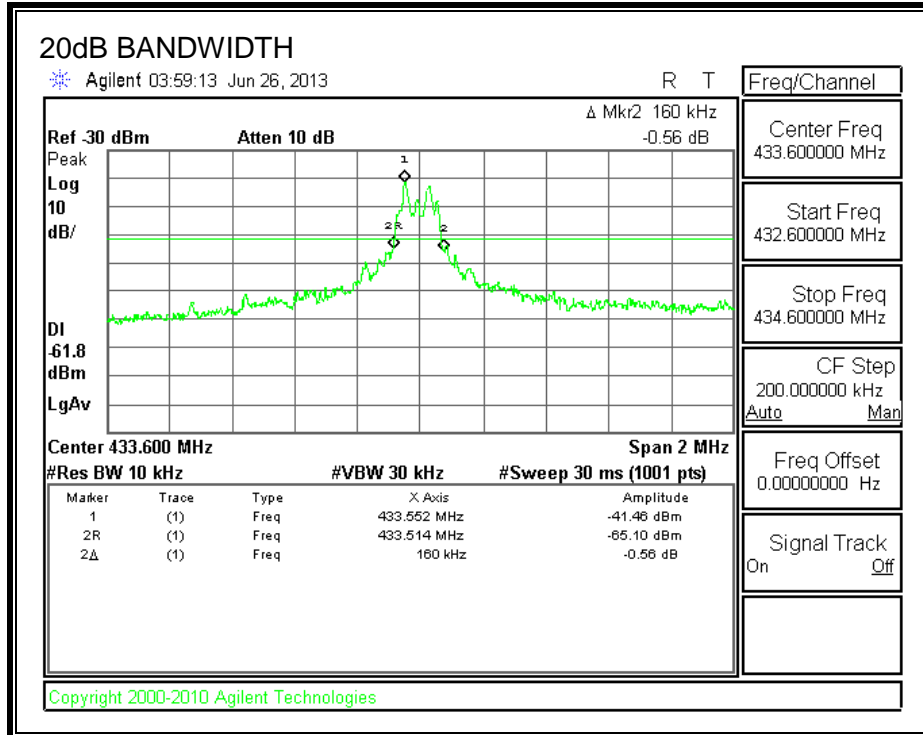
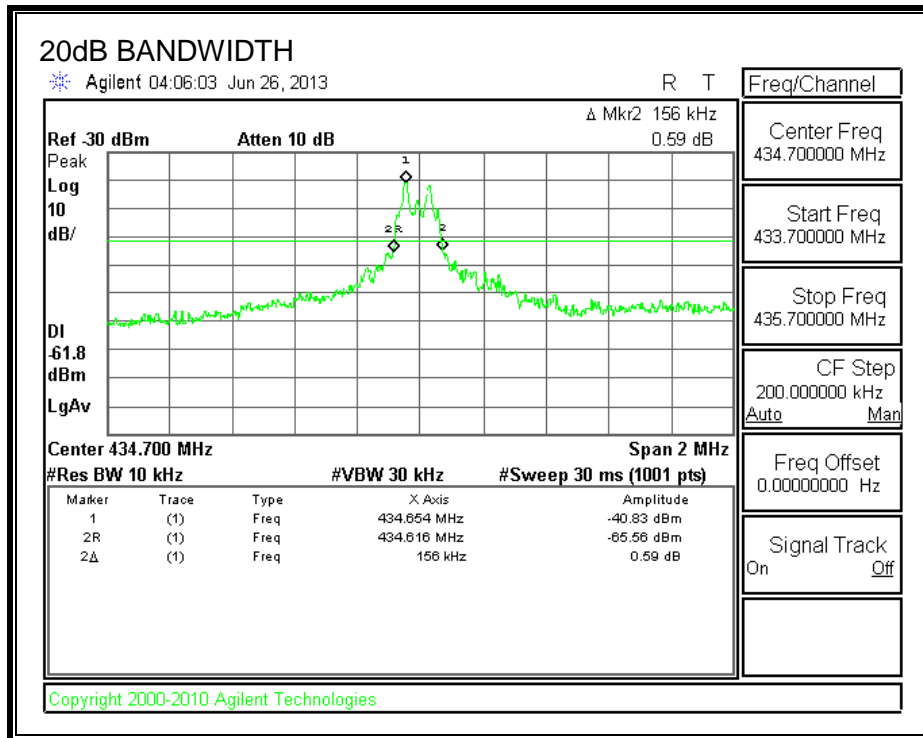
No non-compliance noted:

<b>Frequency (MHz)</b>	<b>20dB Bandwidth (kHz)</b>	<b>Limit (kHz)</b>	<b>Margin (kHz)</b>
433.6	160	1084	-924
434.7	156	1086.75	-930.75

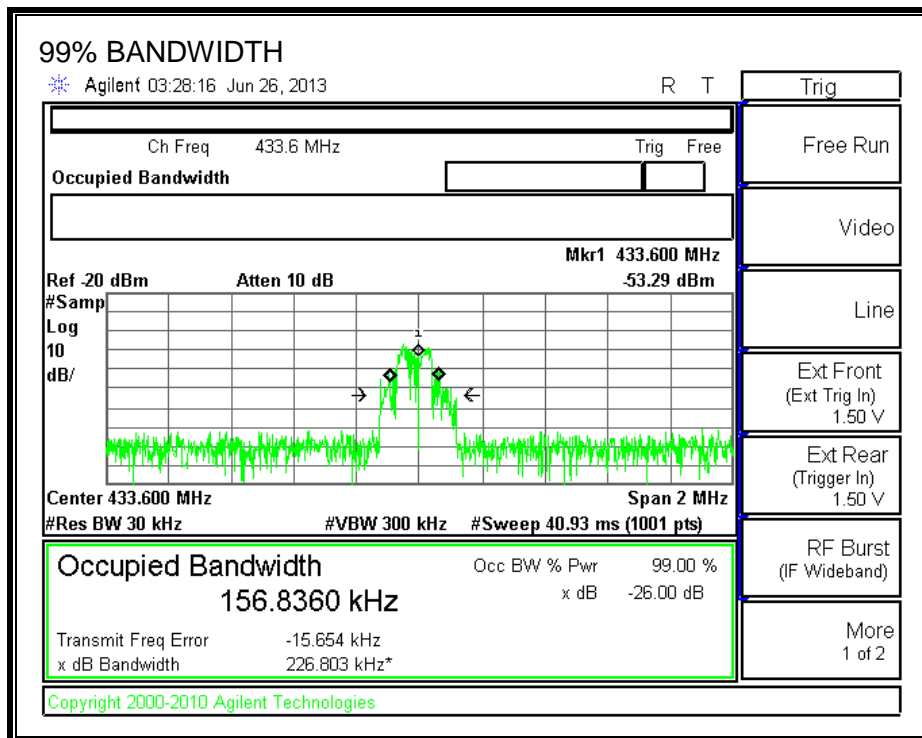
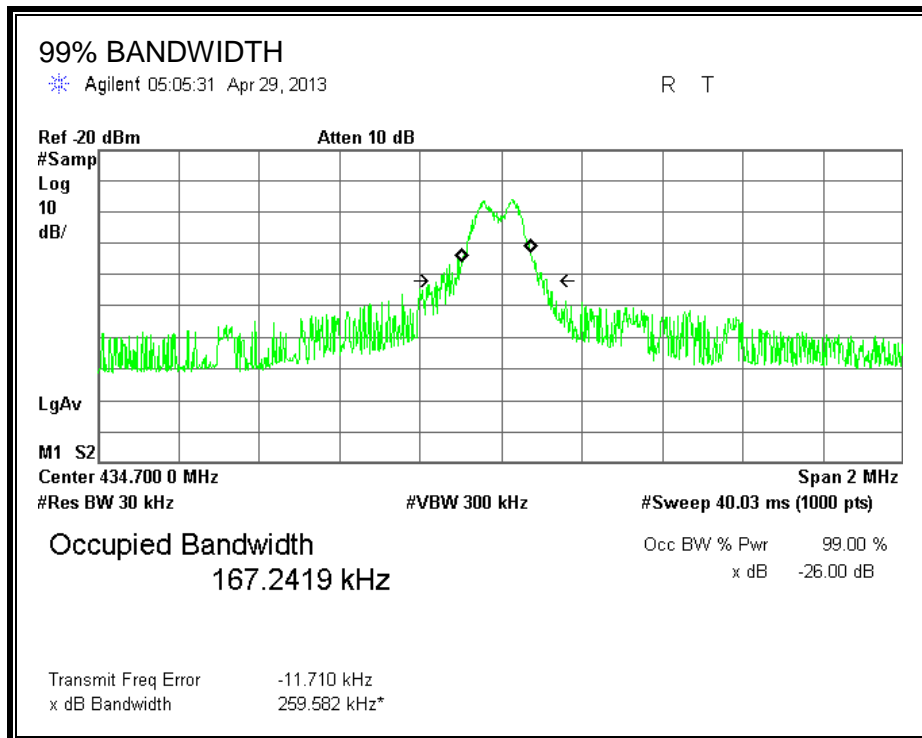
99% Bandwidth

<b>Frequency (MHz)</b>	<b>99% Bandwidth (kHz)</b>	<b>Limit (kHz)</b>	<b>Margin (kHz)</b>
433.6	156.8	1084	-927.2
434.7	167.24	1086.75	-919.51

20dB BANDWIDTH



99% BANDWIDTH



## 7.2 DUTY CYCLE

### LIMITS

FCC §15.35 (c)

The measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer or radiated field strength. The RBW is set to 1 MHz and the VBW is set to 1 MHz. The sweep time is coupled and the span is set to 0 Hz. The number of pulses is measured and calculated in a 100 ms scan.

### CALCULATION

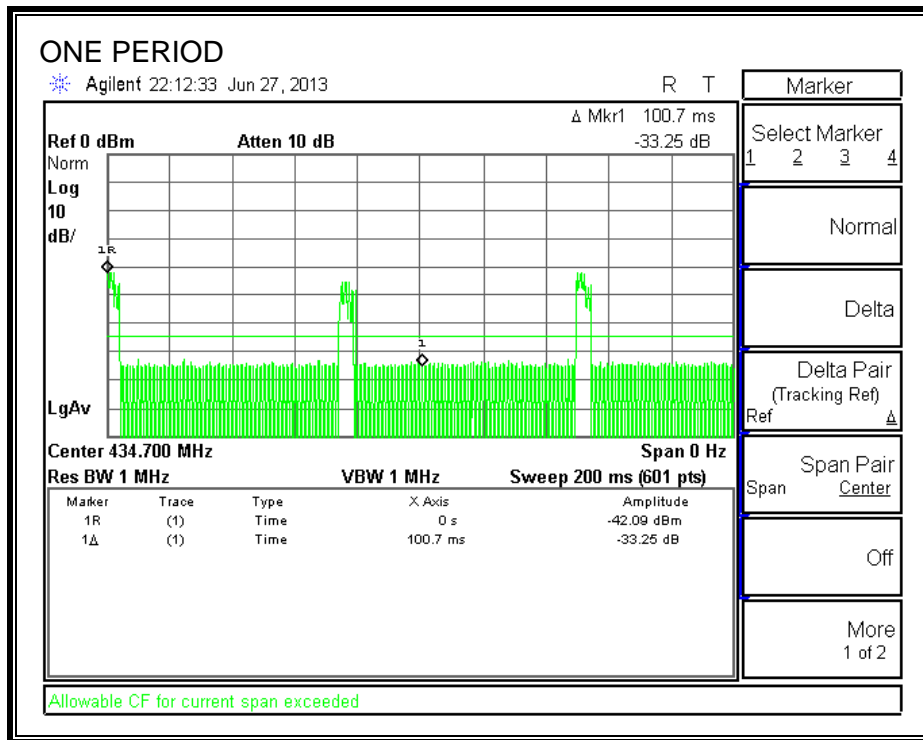
Average Reading = Peak Reading (dBuV/m) + 20log (Duty Cycle), Where Duty Cycle is (# of long pulses \* long pulse width) + (# of short pulses \* short pulse width) / 100 or T

### RESULTS

No non-compliance noted:

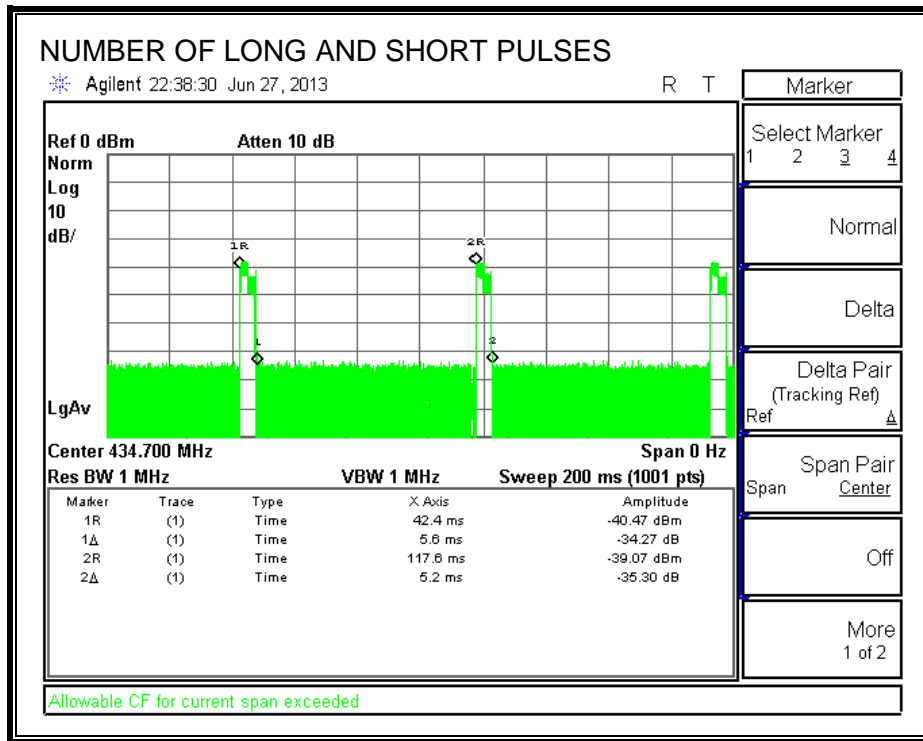
One Period (ms)	Long Pulse Width (ms)	# of Long Pulses	Short Width (ms)	# of Short Pulses	Duty Cycle	20*Log Duty Cycle (dB)
100	5.6	1	5.20	1	0.108	-19.33

**ONE PERIOD**





**NUMBER OF LONG PULSES AND SHORT PULSE WIDTH**



## 7.3 TRANSMISSION TIME

### LIMITS

FCC §15.231 (a) (2)

IC A1.1.1 (b)

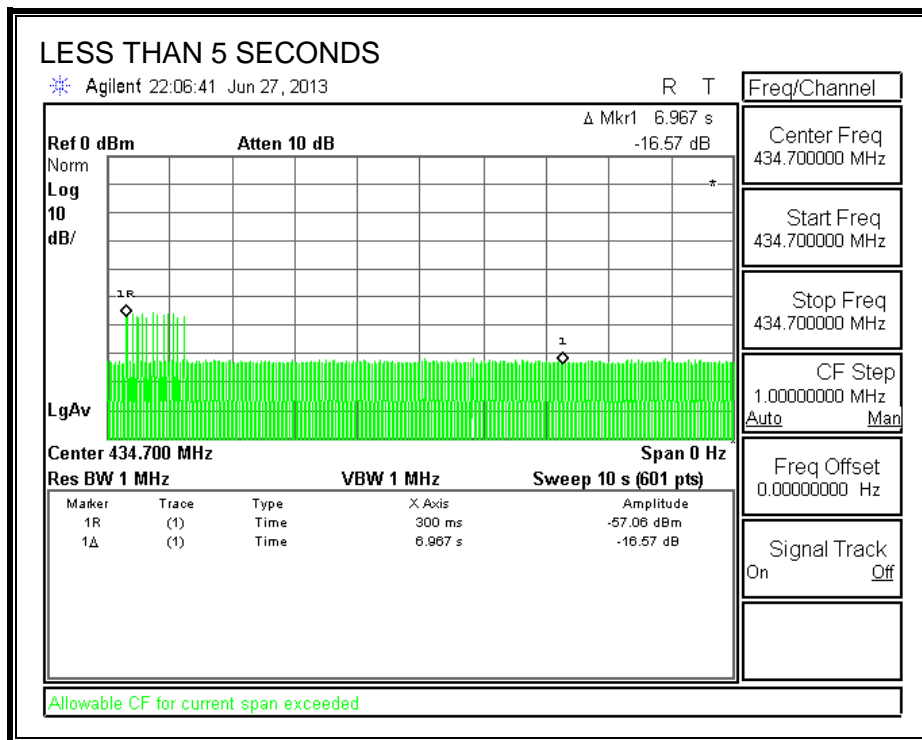
A transmitter activated automatically shall cease transmission within 5 seconds after activation.

### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer or radiated field strength. The RBW is set to 1 MHz and the VBW is set to 1 MHz. The sweep time is set to 10 seconds and the span is set to 0 Hz.

### RESULTS

No non-compliance noted:



## 8. RADIATED EMISSION TEST RESULTS

### 8.1. TX RADIATED SPURIOUS EMISSION

#### LIMITS

FCC §15.231 (b)  
 IC A1.1.2

In addition to the provisions of § 15.205, the field strength of emissions from Intentional radiators operated under this section shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental Frequency (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40.66 - 40.70	2,250	225
70 - 130	1,250	125
130 - 174	1,250 to 3,750 <sup>1</sup>	125 to 375 <sup>1</sup>
174 - 260	3,750	375
260 - 470	3,750 to 12,500 <sup>1</sup>	375 to 1,250 <sup>1</sup>
Above 470	12,500	1,250

<sup>1</sup> Linear interpolation

§15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41	322 - 335.4		

1 Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.  
2 Above 38.6

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 88	100 **	3
88 216	150 **	3
216 960	200 **	3
Above 960	500	3

\*\* Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 72 MHz, 76 88 MHz, 174 216 MHz or 470 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

## **TEST PROCEDURE**

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

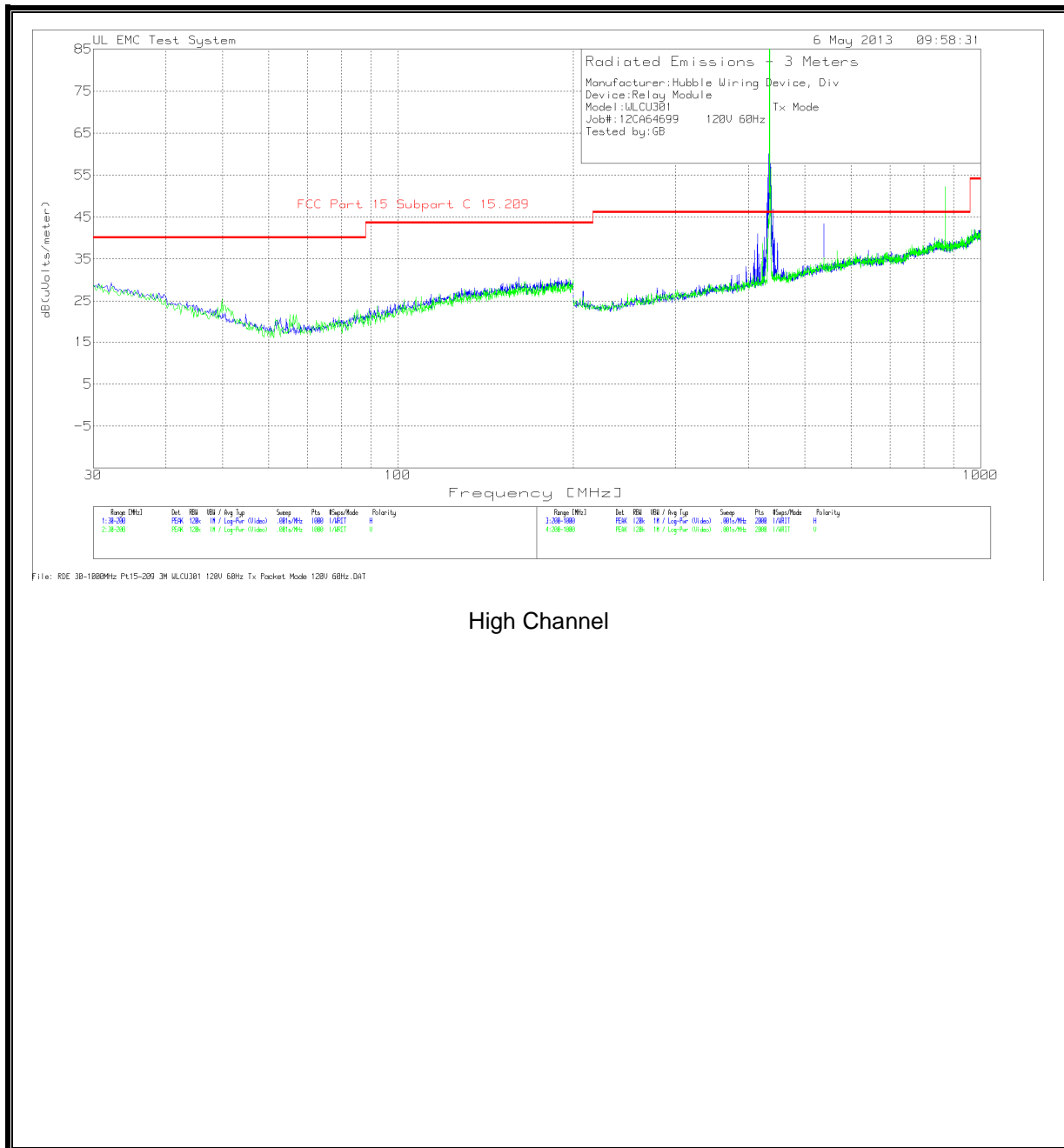
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

## **RESULTS**

No non-compliance noted:

Note: Frequencies not in a restricted band the 15.209 limits were applied in lieu of the 15.231(b)(3) limits unless otherwise noted in the data.

**FUNDAMENTAL, HARMONICS AND TX SPURIOUS EMISSION (30 – 1000 MHz)**



High Channel

Manufacturer: Hubbell Inc.

Device: Wireless Relay Module

Model:WLCU301 Tx Mode

Job#:12CA64699 120V 60Hz

Tested by: GB

Horizontal 200 - 1000MHz

Test Frequency	Meter Reading(dBuV)	Detector	AF-54 [dB/m]	GL-3M [dB]	dB(uVolts/meter)	DC factor [dB]	Corrected Reading dB(uVolts/meter)	FCC Pt 15 Subpart C 15.231	Margin (dB)	FCC Pt 15 Subpart C Peak	Margin (dB)	FCC Pt 15 Subpart C 15.209	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
434.5173	79.74	PK	16.5	1.4	97.64	-19.33	78.31	80.8	-2.49	100.8	-3.16	-	-	348	200	Horz
414.5073	23.8	PK	15.8	1.4	41	-	-	-	-	-	-	46	-5	172	200	Horz
538.5693	23.02	PK	18.9	1.5	43.42	-	-	-	-	-	-	46	-2.58	348	200	Horz
869.5348	27.5	PK	22.5	2.2	52.2	-19.33	32.87	60.8	-27.93	80.8	-47.93	-	-	141	200	Horz

Vertical 200 - 1000MHz

Test Frequency	Meter Reading(dBuV)	Detector	AF-54 [dB/m]	GL-3M [dB]	dB(uVolts/meter)	DC factor [dB]	Corrected Reading dB(uVolts/meter)	FCC Pt 15 Subpart C 15.231	Margin (dB)	FCC Pt 15 Subpart C Peak	Margin (dB)	FCC Pt 15 Subpart C 15.209	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
434.5173	76.48	PK	16.5	1.4	94.38	-19.33	75.05	80.8	-5.75	100.8	-6.42	-	-	281	200	Vert
869.5348	27.49	PK	22.5	2.2	52.19	-19.33	32.86	60.8	-27.94	80.8	-47.94	-	-	276	100	Vert

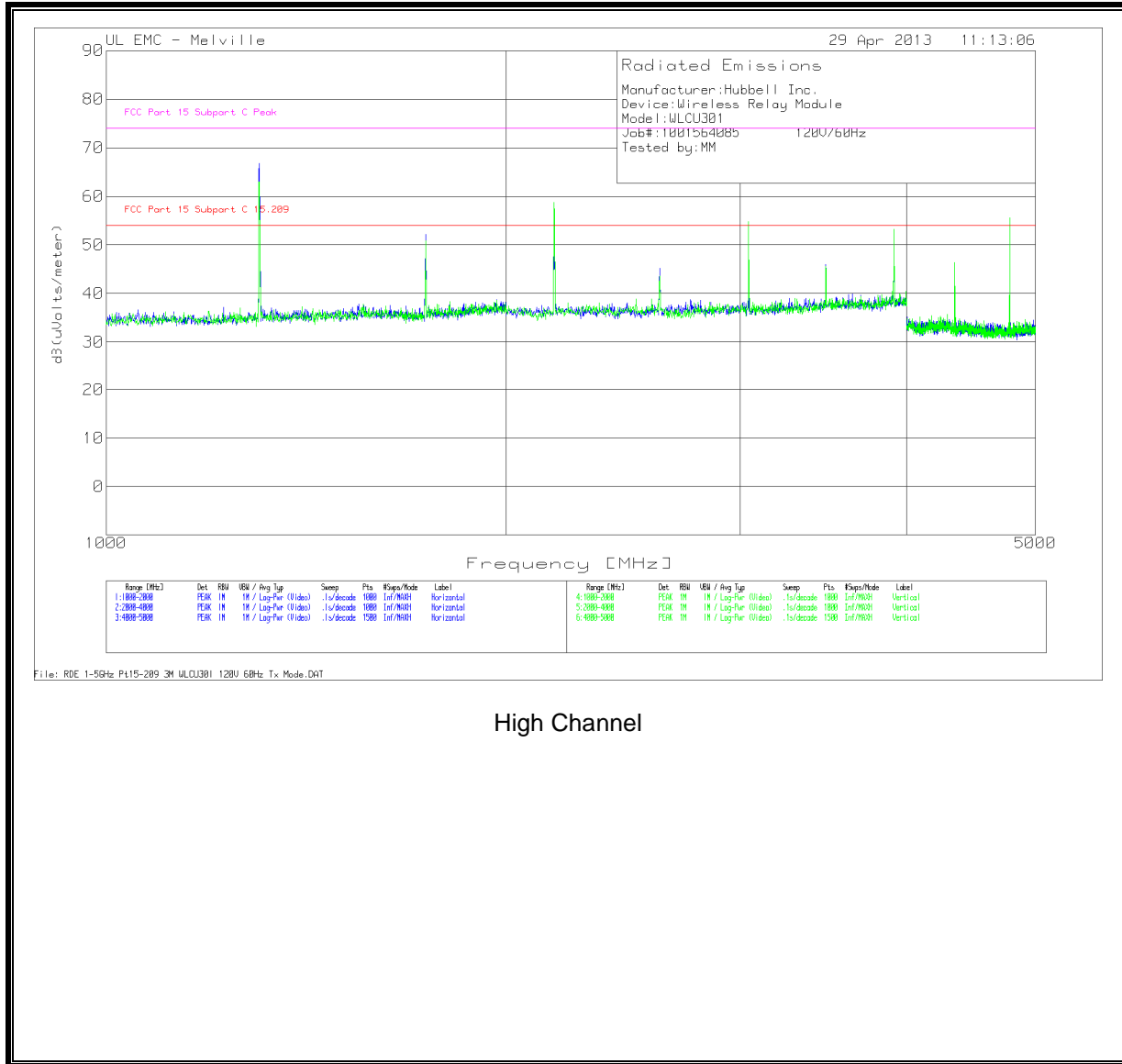
PK - Peak detector

QP - Quasi-Peak detector





• **HARMONICS AND TX SPURIOUS EMISSIONS ABOVE 1GHz**



Manufacturer: Hubbell Inc.  
 Device: Wireless Relay Module  
 Model: WLCU301  
 Job#: 1001564085 120V/60Hz  
 Tested by: MM

1000 - 2000MHz

Test Frequency	Meter Reading	Detector	AF-51442	BOMS Factor [dB]	DC factor [dB]	Corrected Reading dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1304.14	87.31	PK	20.5	-44.87	-19.33	43.61	54	-10.39	74	-30.39	281	114	Vert
1304.14	91.18	PK	20.5	-44.87	-19.33	47.48	54	-6.52	74	-26.52	279	349	Horz
1738.91	75.83	PK	20.8	-44.39	-19.33	32.91	54	-21.1	74	-41.09	2	164	Horz
1738.99	74.41	PK	20.8	-44.4	-19.33	31.48	54	-22.52	74	-42.52	203	182	Vert
Test Frequency	Meter Reading	Detector	AF-48107	BOMS Factor [dB]	DC factor [dB]	Corrected Reading dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
2173.222	81.5	PK	21.4	-43.85	-19.33	39.72	54	-14.28	74	-34.28	2	283	Vert
2173.222	75.37	PK	21.4	-43.85	-19.33	33.59	54	-20.41	74	-40.41	227	340	Horz
2608	66.98	PK	21.3	-43.14	-19.33	25.81	54	-28.19	74	-48.19	152	120	Horz
2608	63.3	PK	21.3	-43.14	-19.33	22.13	54	-31.87	74	-51.87	55	374	Vert

PK - Peak detector



Manufacturer: Hubbell Inc.  
 Device: Wireless Relay Module  
 Model:WLCU301  
 Job#:1001564085 120V/60Hz  
 Tested by: MM

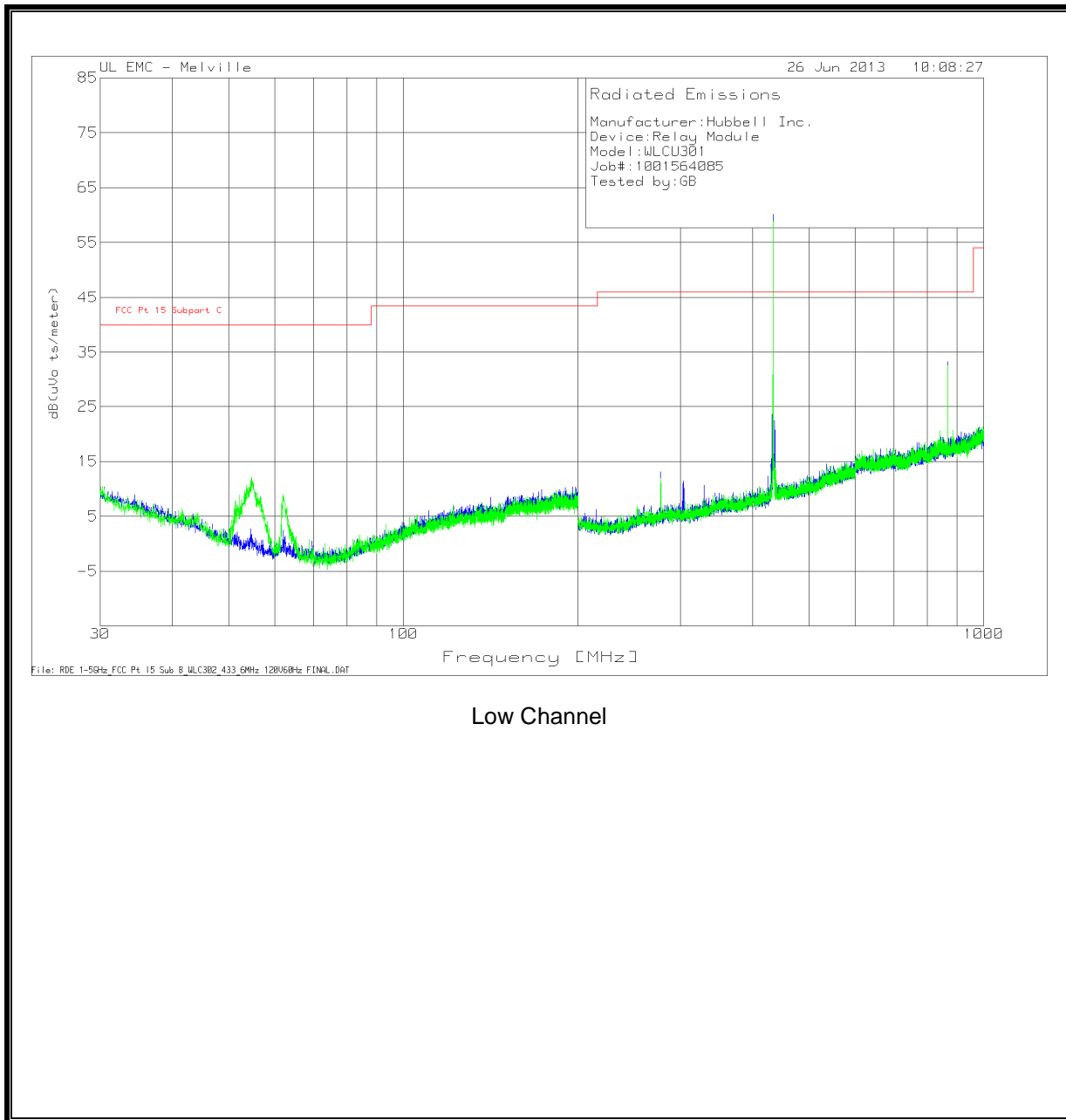
Test Frequency	Meter Reading	Detector	AF-48107	BOMS Factor [dB]	DC factor [dB]	Corrected Reading dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
3043.18	75.65	PK	21.6	-42.57	-19.33	35.35	54	-18.65	74	-38.65	0	361	Vert
3043.11	65.56	PK	21.6	-42.58	-19.33	25.25	54	-28.75	74	-48.75	60	274	Horz
3477.732	66.14	PK	22.2	-42.35	-19.33	26.66	54	-27.34	74	-47.34	14	324	Horz
3913	67.08	PK	22.6	-42.39	-19.33	27.96	54	-26.04	74	-46.04	35	297	Horz
3913	72.92	PK	22.6	-42.39	-19.33	33.8	54	-20.2	74	-40.2	35	297	Vert

4000 - 5000MHz

Test Frequency	Meter Reading	Detector	AF-48106	BOMS Factor [dB]	DC factor [dB]	Corrected Reading dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
4347.565	71.21	PK	27.7	-52.74	-19.33	26.84	54	-27.16	74	-47.16	36	245	Vert
4347.565	69.99	PK	27.7	-52.71	-19.33	25.65	54	-28.35	74	-48.35	36	245	Horz
4782.522	81.71	PK	27.7	-52.71	-19.33	37.37	54	-16.63	74	-36.63	36	245	Vert
4782.522	81.75	PK	27.1	-53.33	-19.33	36.19	54	-17.81	74	-37.81	281	221	Horz

PK - Peak detector

**FUNDAMENTAL, HARMONICS AND TX SPURIOUS EMISSION (30 – 1000 MHz)**



REPORT NO: 12CA64699  
 FCC ID: GX70101

DATE OF REPORT: 2013-07-13  
 IC: 10282-GX70101

Manufacturer: Hubbell Inc.  
 Device: Wireless Relay Module  
 Model: WLCU301  
 Job#: 1001564085 120V/60Hz  
 Tested by: MM

Horizontal 200 - 1000MHz

Test Frequency	Meter Reading(dBuV)	Detector	AF-54 [dB/m]	GL-3M [dB]	dB(uVolts/meter)	DC factor [dB]	Corrected Reading dB(uVolts/meter)	FCC Pt 15 Subpart C 15.231	Margin (dB)	FCC Pt 15 Subpart C Peak	Margin (dB)	FCC Pt 15 Subpart C 15.209	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
433.6	76.84	PK	16.3	1.4	94.54	-19.33	75.24	80.8	-5.56	100.8	-25.56	-	-	348	200	Horz
867.2	28.47	PK	22.4	2.1	52.96	-19.33	33.64	60.8	-27.16	80.8	-47.16	-	-	141	100	Horz

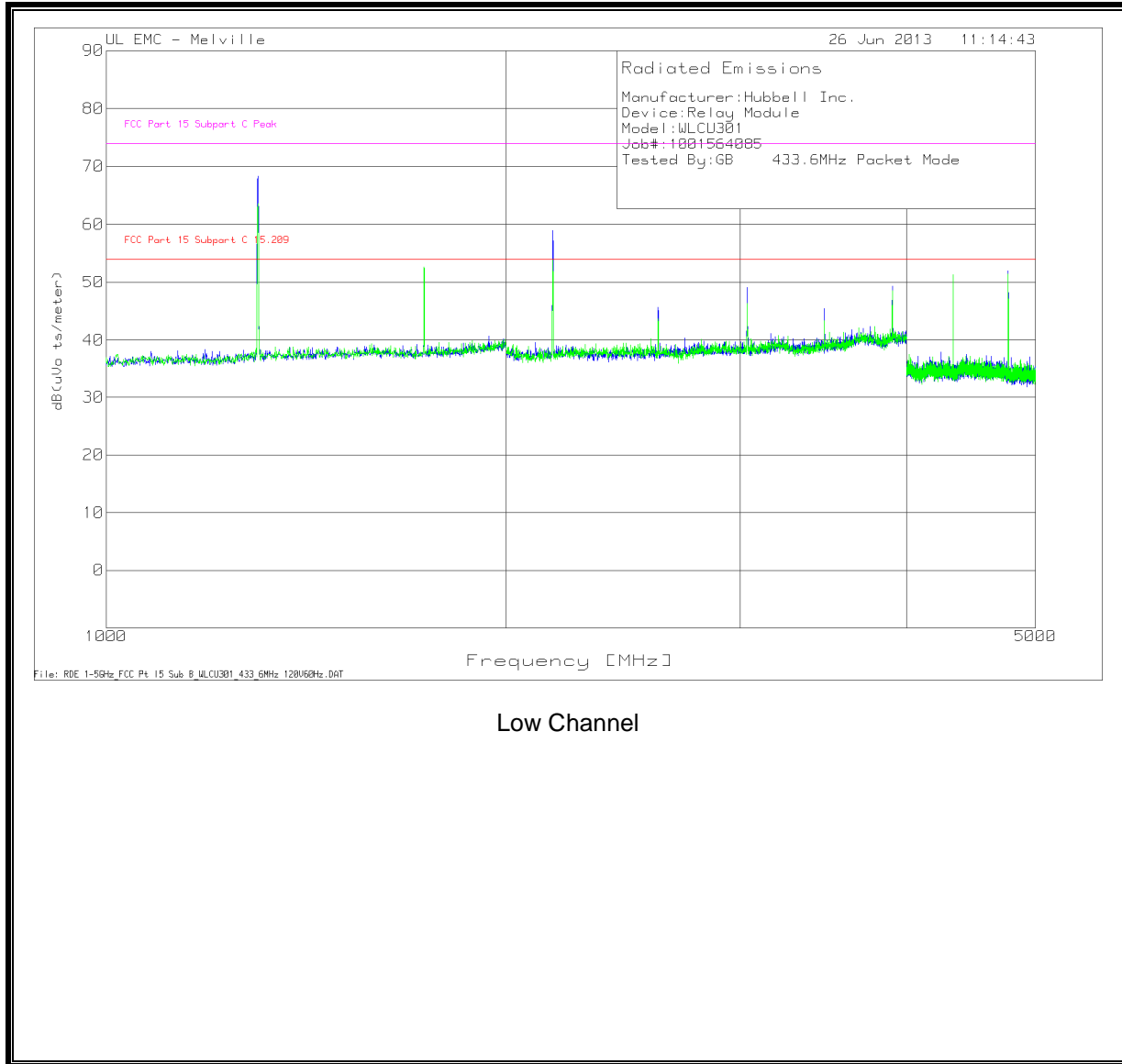
Vertical 200 - 1000MHz

Test Frequency	Meter Reading(dBuV)	Detector	AF-54 [dB/m]	GL-3M [dB]	dB(uVolts/meter)	DC factor [dB]	Corrected Reading dB(uVolts/meter)	FCC Pt 15 Subpart C 15.231	Margin (dB)	FCC Pt 15 Subpart C Peak	Margin (dB)	FCC Pt 15 Subpart C 15.209	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
433.6	74.59	PK	16.5	1.4	92.49	-19.33	73.16	80.8	-7.64	100.8	-27.64	-	-	181	200	Vert
867.1	24.8	PK	22.5	2.1	49.4	-19.33	30.07	60.8	-30.73	80.8	-50.73	-	-	276	200	Vert

PK - Peak detector



- HARMONICS AND TX SPURIOUS EMISSIONS ABOVE 1GHz**



Manufacturer: Hubbell Inc.  
 Device: Wireless Relay Module  
 Model:WLCU301  
 Job#:1001564085  
 Tested By: GB 433.6MHz Packet Mode

1000 - 2000MHz

Test Frequency	Meter Reading (dBuV)	Detector	AF-51442 [dB/m]	BOMS Factor [dB]	DC factor [dB]	Corrected Reading dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1300.595	94.54	PK	20.5	-44.35	-19.33	51.36	54	-2.64	74	-22.64	349	396	H
1300.67	92.49	PK	20.5	-44.35	-19.33	49.31	54	-4.69	74	-24.69	92	264	V
1734.235	75.92	PK	20.8	-44.14	-19.33	33.25	54	-20.75	74	-40.75	135	316	H
1734.375	76.5	PK	20.8	-44.14	-19.33	33.83	54	-20.17	74	-40.17	29	151	V

2000 - 4000MHz

Test Frequency	Meter Reading (dBuV)	Detector	AF-48107 [dB/m]	BOMS Factor [dB]	DC factor [dB]	Corrected Reading dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
2168.105	82.11	PK	21.4	-43.14	-19.33	41.04	54	-12.96	74	-32.96	30	312	H
2168.213	77.02	PK	21.4	-43.14	-19.33	35.95	54	-18.05	74	-38.05	14	331	V
2601.37	70.99	PK	21.3	-42.43	-19.33	30.53	54	-23.47	74	-43.47	255	246	V
2601.473	69.55	PK	21.3	-42.43	-19.33	29.09	54	-24.91	74	-44.91	142	335	H
3035	75.87	PK	21.6	-41.6	-19.33	36.54	54	-17.46	74	-37.46	57	311	H
3469.115	70.68	PK	22.2	-41.4	-19.33	32.15	54	-21.85	74	-41.85	170	303	H
3902	63.14	PK	22.6	-41.02	-19.33	25.39	54	-28.61	74	-48.61	161	148	H

PK - Peak detector



Manufacturer: Hubbell Inc.  
 Device: Wireless Relay Module  
 Model:WLCU301  
 Job#:1001564085  
 Tested By: GB 433.6MHz Packet Mode

4000 - 5000MHz

Test Frequency	Meter Reading (dBuV)	Detector	AF-48106 [dB/m]	BOMS Factor [dB]	DC factor [dB]	Corrected Reading dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
4335	71.23	PK	27.7	-51.7	-19.33	27.9	54	-26.1	74	-46.1	57	246	H
4769.114	74.6	PK	27.1	-52.01	-19.33	30.36	54	-23.64	74	-43.64	217	270	H

2000 - 4000MHz

Test Frequency	Meter Reading (dBuV)	Detector	AF-48107 [dB/m]	BOMS Factor [dB]	DC factor [dB]	Corrected Reading dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
3035.279	67.87	PK	21.7	-41.58	-19.33	28.06	54	-25.94	74	-45.94	193	106	V
3468	64.02	PK	22.3	-41.4	-19.33	25.59	54	-28.41	74	-48.41	70	274	V
3902	65.57	PK	22.6	-41.02	-19.33	27.82	54	-26.18	74	-46.18	96	204	V

4000 - 5000MHz

Test Frequency	Meter Reading (dBuV)	Detector	AF-48106 [dB/m]	BOMS Factor [dB]	DC factor [dB]	Corrected Reading dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
4336	77.05	PK	27.8	-51.63	-19.33	33.89	54	-20.11	74	-40.11	89	158	V
4768.973	80.08	PK	27.2	-52.44	-19.33	35.51	54	-18.49	74	-38.49	110	383	V

PK - Peak detector



## 8.2 RX RADIATED SPURIOUS EMISSION

### LIMITS

IC RSS-Gen Issue 2, section 7.2.3.2

All spurious emissions shall comply with the limits shown below:

Limits for radiated disturbance of Class B ITE at measuring distance of 3 m	
Frequency range (MHz)	Quasi-peak limits (dB $\mu$ V/m)
30 to 88	40
88 to 216	43.5
216 to 960	46
Above 960 MHz	54

Note: The lower limit shall apply at the transition frequency.

### TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to receive in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

The spectrum from 30 MHz to 5th harmonic is investigated with the transmitter set to the middle channel.

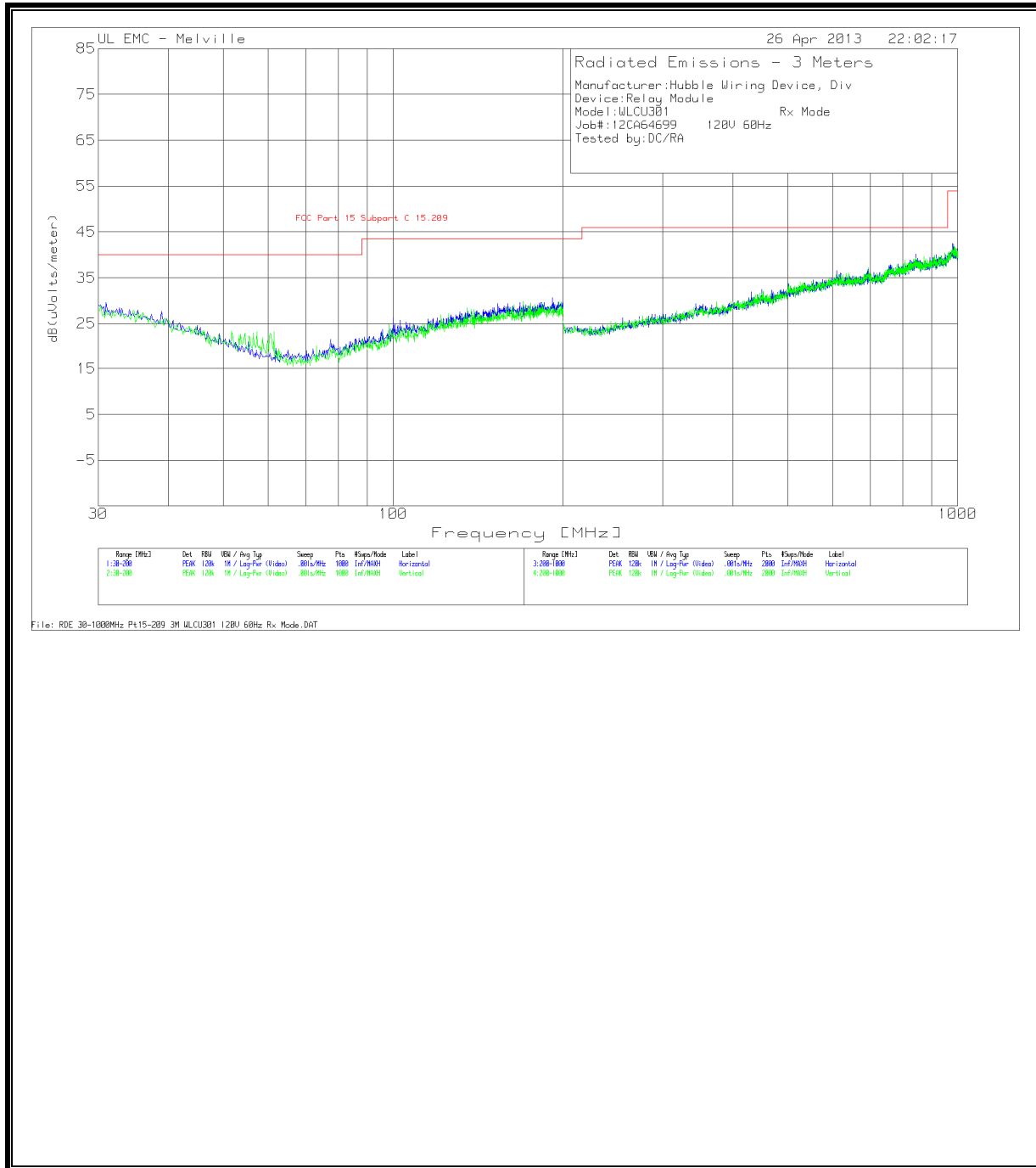
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

### RESULTS

No non-compliance noted:



**RECEIVER SPURIOUS EMISSION (30MHz - 1GHz)**



Manufacturer: Hubbell Inc.

Device: Relay Module

Model: WLCU301 Rx Mode

Job#: 12CA64699 120V 60Hz

Tested by: DC/RA

Horizontal 30 - 200MHz

Marker No.	Test Frequency	Meter Reading	Detector	AF-43441	GL-3M	dB(uVolts/meter)	FCC Part 15	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
							Subpart C 15.209				
1	31.021	12.05	PK	17.5	0	29.55	40	-10.45	233	200	Horz
2	191.4915	14.08	PK	15.7	0.8	30.58	43.5	-12.92	208	100	Horz

Vertical 30 - 200MHz

Marker No.	Test Frequency	Meter Reading	Detector	AF-43441	GL-3M	dB(uVolts/meter)	FCC Part 15	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
							Subpart C 15.209				
3	61.4815	16.63	PK	6.2	0.2	23.03	40	-16.97	161	100	Vert
4	134.995	13.82	PK	14	0.6	28.42	43.5	-15.08	110	100	Vert

Horizontal 200 - 1000MHz

Marker No.	Test Frequency	Meter Reading	Detector	AF-44067	GL-3M	dB(uVolts/meter)	FCC Part 15	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
							Subpart C 15.209				
5	610.2051	14.64	PK	20.2	1.7	36.54	46	-9.46	142	200	Horz

Vertical 200 - 1000MHz

Marker No.	Test Frequency	Meter Reading	Detector	AF-44067	GL-3M	dB(uVolts/meter)	FCC Part 15	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
							Subpart C 15.209				
6	872.3362	15.11	PK	22.5	2.1	39.71	46	-6.29	134	400	Vert

PK - Peak detector

QP - Quasi-Peak detector

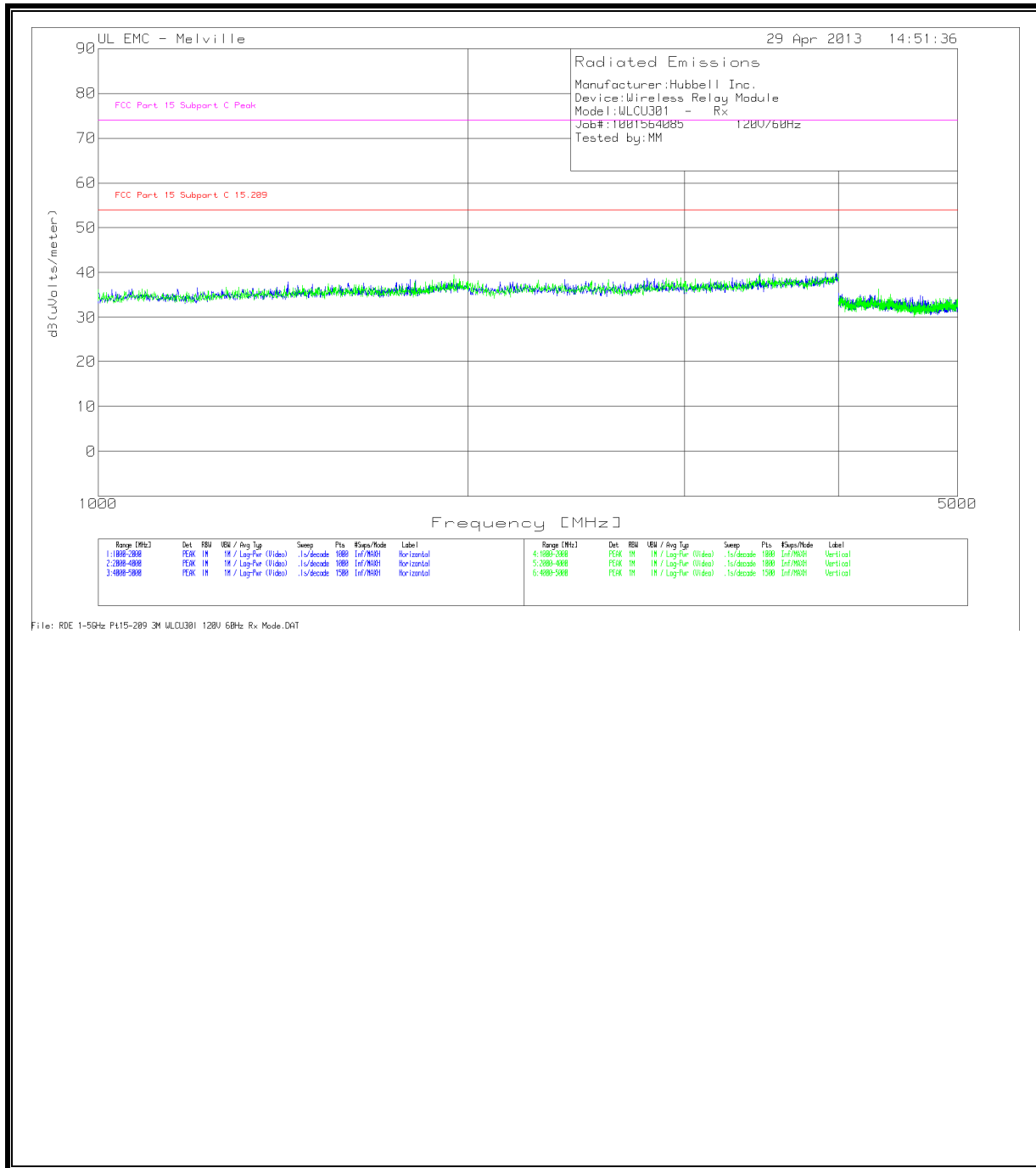
LnAv - Linear Average detector

LgAv - Log Average detector

Av - Average detector

CAV - CISPR Average detector

**RECEIVER SPURIOUS EMISSION ABOVE 1GHz**



Manufacturer: Hubbell Inc.  
 Device: Wireless Relay Module  
 Model:WLCU301 - Rx  
 Job#:1001564085 120V/60Hz  
 Tested by: MM

Horizontal 1000 - 2000MHz

Marker No.	Test Frequency	Meter Reading	Detector	AF-51442	BOMS Factor (dB)	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1065.065	61.36	PK	19.8	-44.86	36.3	54	-17.7	74	-37.7	53	250	Horz
2	1204.204	61.83	PK	19.8	-45.01	36.62	54	-17.38	74	-37.38	71	250	Horz
3	1427.427	62.07	PK	20.7	-44.81	37.96	54	-16.04	74	-36.04	71	250	Horz
4	1790.791	60.5	PK	21	-44.54	36.96	54	-17.04	74	-37.04	89	99	Horz

Horizontal 2000 - 4000MHz

Marker No.	Test Frequency	Meter Reading	Detector	AF-48107	BOMS Factor (dB)	dB(uVolts/meter)	FCC Part 15 Subpart C 15.209	Margin (dB)	FCC Part 15 Subpart C Peak	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
5	2396.396	60.68	PK	21.1	-43.35	38.43	54	-15.57	74	-35.57	357	249	Horz
6	2832.833	59.81	PK	21.8	-42.94	38.67	54	-15.33	74	-35.33	280	249	Horz

PK - Peak detector  
 QP - Quasi-Peak detector  
 LnAv - Linear Average detector  
 LgAv - Log Average detector  
 Av - Average detector

## 9. AC MAINS LINE CONDUCTED EMISSIONS

### LIMITS

§15.207 (a)  
IC RSS-GEN, Section 7.2.2

Frequency of emission (MHz)	Conducted Limit (dBµV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

\* Decreases with the logarithm of the frequency.

### TEST PROCEDURE

ANSI C63.4

### RESULTS

No non-compliance noted:

**6 WORST EMISSIONS**

Manufacturer: HUBBELL INC  
 Device: Relay Module  
 Model:WLCU301 434.7MHz  
 Job:1001564085 120V/60Hz  
 Tested by: AA

Line - L1 .15 - 30MHz

Test	Meter	Detector	5A636 L1 (dB)	(dB(uVolts))	FCC Part 15 Subpart C QPk	Margin	FCC Part 15 Subpart C Avg	Margin
0.294	20.67	Av	10	30.67	60.4	-29.73	50.4	-19.73
0.348	18.24	Av	10	28.24	59	-30.76	49	-20.76
0.753	17.26	Av	10	27.26	56	-28.74	46	-18.74
0.888	18.17	Av	10	28.17	56	-27.83	46	-17.83
1.1265	17.41	Av	10	27.41	56	-28.59	46	-18.59
1.257	17.61	Av	10.1	27.71	56	-28.29	46	-18.29

Neutral .15 - 30MHz

Test	Meter	Detector	5A636 L4Neut (dB)	(dB(uVolts))	FCC Part 15 Subpart C QPk	Margin	FCC Part 15 Subpart C Avg	Margin
0.2985	20.79	Av	10	30.79	60.3	-29.51	50.3	-19.51
0.3975	19.09	Av	10	29.09	57.9	-28.81	47.9	-18.81
0.528	22.95	Av	10.1	33.05	56	-22.95	46	-12.95
0.6855	19.83	Av	10.1	29.93	56	-26.07	46	-16.07
0.942	18.38	Av	10.1	28.48	56	-27.52	46	-17.52
1.00275	22.08	Av	10.1	32.18	56	-23.82	46	-13.82
1.176	17.22	Av	10.1	27.32	56	-28.68	46	-18.68
1.4055	19.73	Av	10.1	29.83	56	-26.17	46	-16.17

PK - Peak detector  
 QP - Quasi-Peak detector  
 LnAv - Linear Average detector  
 LgAv - Log Average detector  
 Av - Average detector

Manufacturer: HUBBELL INC  
 Device: Relay Module  
 Model:WLCU301 434.7MHz  
 Job:1001564085 120V/60Hz  
 Tested by: AA

Line - L1 .15 - 30MHz

Test Frequency	Meter Reading	Detector	5A636 L1		FCC Part 15 Subpart C		FCC Part 15 Subpart C	
			[dB]	(dB(uVolts))	QPk	Margin	C Avg	Margin
0.2958	38	QP	10	48	60.36	-12.36	50.36	-2.36
0.3507	33.26	QP	10	43.26	58.95	-15.69	48.95	-5.69
0.7548	31.56	QP	10	41.56	56	-14.44	46	-4.44
0.8871	31.41	QP	10	41.41	56	-14.59	46	-4.59
1.122	31.63	QP	10	41.63	56	-14.37	46	-4.37
1.2552	31.94	QP	10.1	42.04	56	-13.96	46	-3.96

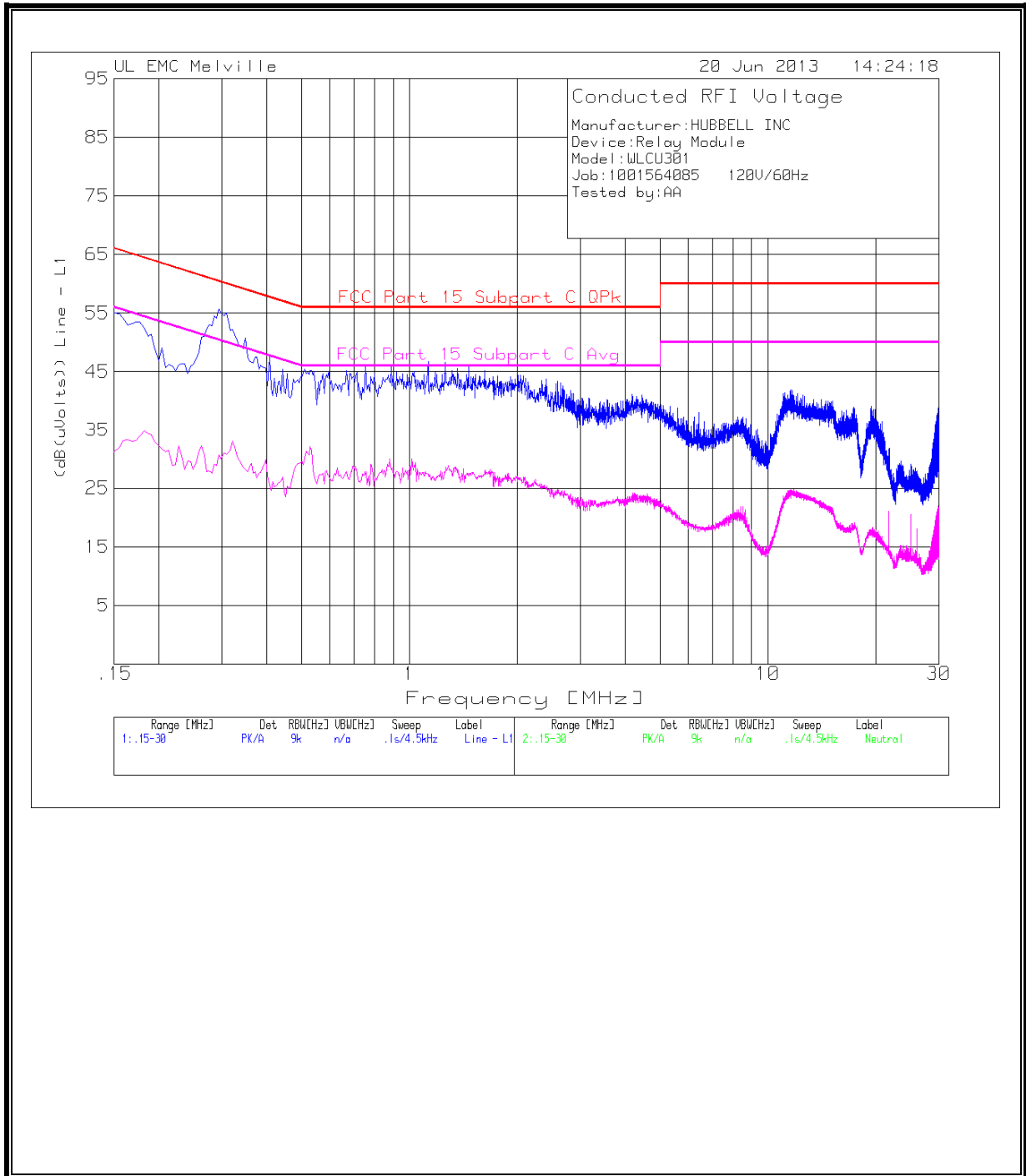
Neutral .15 - 30MHz

Test Frequency	Meter Reading	Detector	5A636 L4Neut		FCC Part 15 Subpart C		FCC Part 15 Subpart C	
			[dB]	(dB(uVolts))	QPk	Margin	C Avg	Margin
0.2949	38.36	QP	10	48.36	60.39	-12.03	50.39	-2.03
0.3966	33.38	QP	10.1	43.48	57.92	-14.44	47.92	-4.44
0.5244	37.46	QP	10.1	47.56	56	-8.44	46	1.56
0.6855	34.96	QP	10.1	45.06	56	-10.94	46	-0.94
0.9465	33.31	QP	10.1	43.41	56	-12.59	46	-2.59
1.00275	36.26	QP	10.1	46.36	56	-9.64	46	0.36
1.1778	31.8	QP	10.1	41.9	56	-14.1	46	-4.1
1.401	34.92	QP	10.1	45.02	56	-10.98	46	-0.98

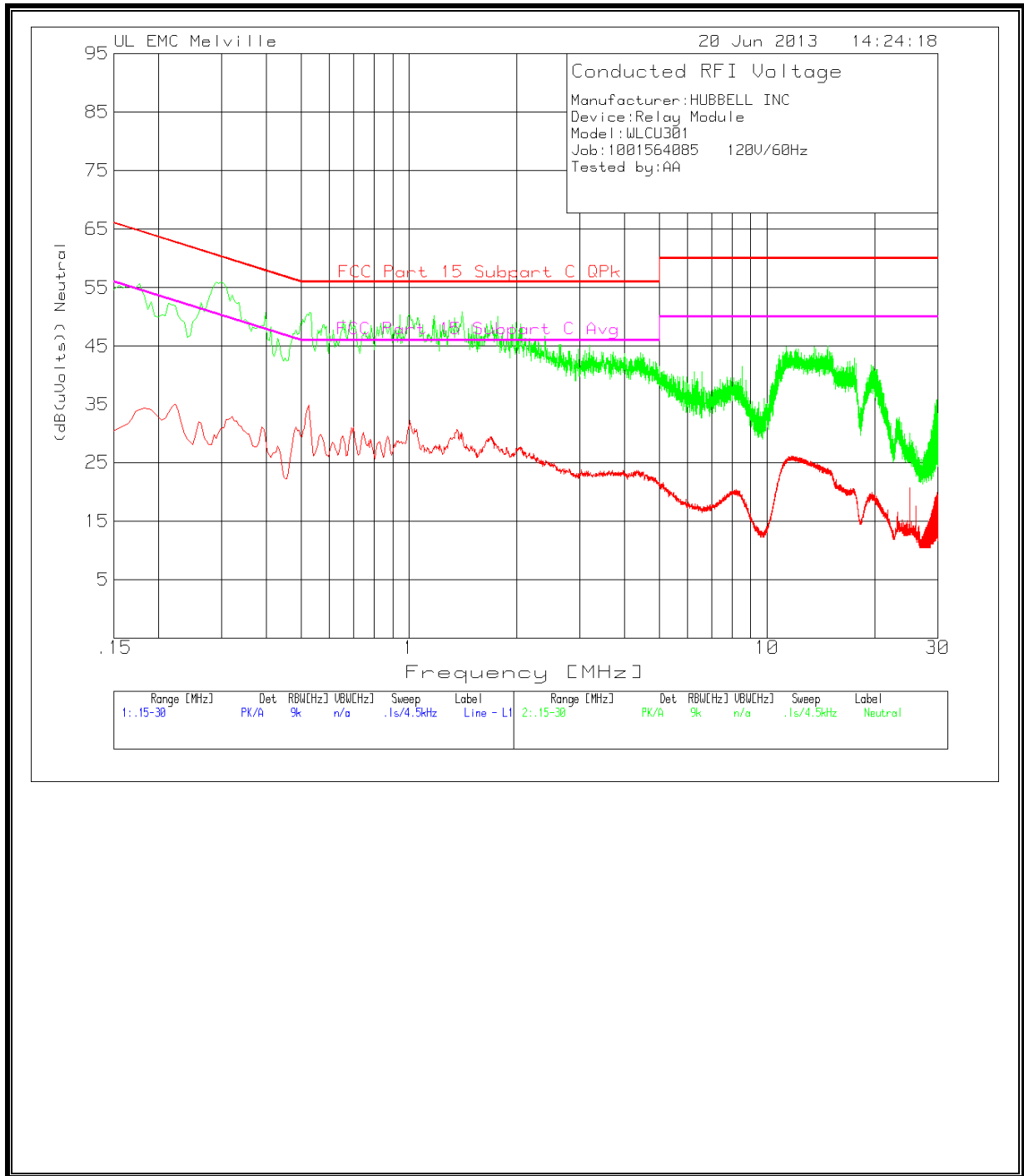
PK - Peak detector  
 QP - Quasi-Peak detector  
 LnAv - Linear Average detector  
 LgAv - Log Average detector  
 Av - Average detector



**LINE 1 RESULTS**



**LINE 2 RESULTS**



**6 WORST EMISSIONS**

Manufacturer: HUBBELL INC  
 Device: Relay Module  
 Model:WLCU301 433.63MHz  
 Job:1001564085 120V/60Hz  
 Tested by: JD

Line - L1 .15 - 30MHz

Test Frequency	Meter Reading	Detector	5A636 L1 (dB)	(dB(uVolts))	FCC Part 15 Subpart C QPk	Margin	FCC Part 15 Subpart C Avg	Margin
0.1545	43.92	PK	10	53.92	65.8	-11.88	55.8	-1.88
0.1545	21.5	Av	10	31.5	65.8	-34.3	55.8	-24.3
0.303	42.77	PK	10	52.77	60.2	-7.43	50.2	2.57
0.303	21.36	Av	10	31.36	60.2	-28.84	50.2	-18.84
0.483	32.21	PK	10	42.21	56.3	-14.09	46.3	-4.09
0.483	17.85	Av	10	27.85	56.3	-28.45	46.3	-18.45
0.663	30.95	PK	10	40.95	56	-15.05	46	-5.05
0.663	12.52	Av	10	22.52	56	-33.48	46	-23.48
0.879	32.51	PK	10	42.51	56	-13.49	46	-3.49
0.879	17.08	Av	10	27.08	56	-28.92	46	-18.92
1.4145	32.98	PK	10.1	43.08	56	-12.92	46	-2.92
1.4145	12.67	Av	10.1	22.77	56	-33.23	46	-23.23
2.0625	30.63	PK	10.1	40.73	56	-15.27	46	-5.27
2.0625	11.92	Av	10.1	22.02	56	-33.98	46	-23.98
2.4405	30.79	PK	10.1	40.89	56	-15.11	46	-5.11
2.4405	10.42	Av	10.1	20.52	56	-35.48	46	-25.48
2.6655	29.63	PK	10.1	39.73	56	-16.27	46	-6.27
2.6655	9.85	Av	10.1	19.95	56	-36.05	46	-26.05

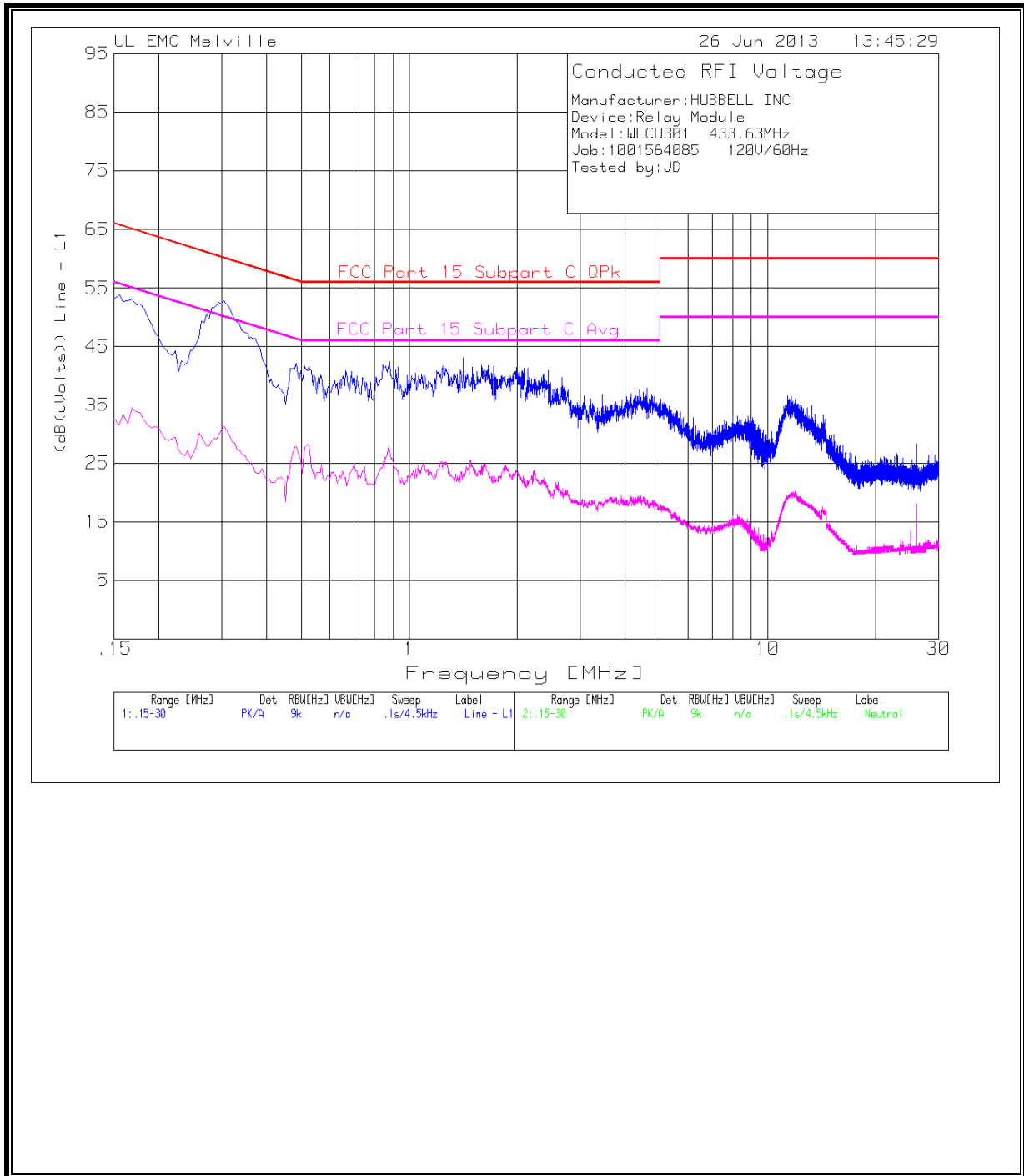
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 Device: Relay Module  
 Model:WLCU301 433.63MHz  
 Job:1001564085 120V/60Hz  
 Tested by: JD

Neutral .15 - 30MHz

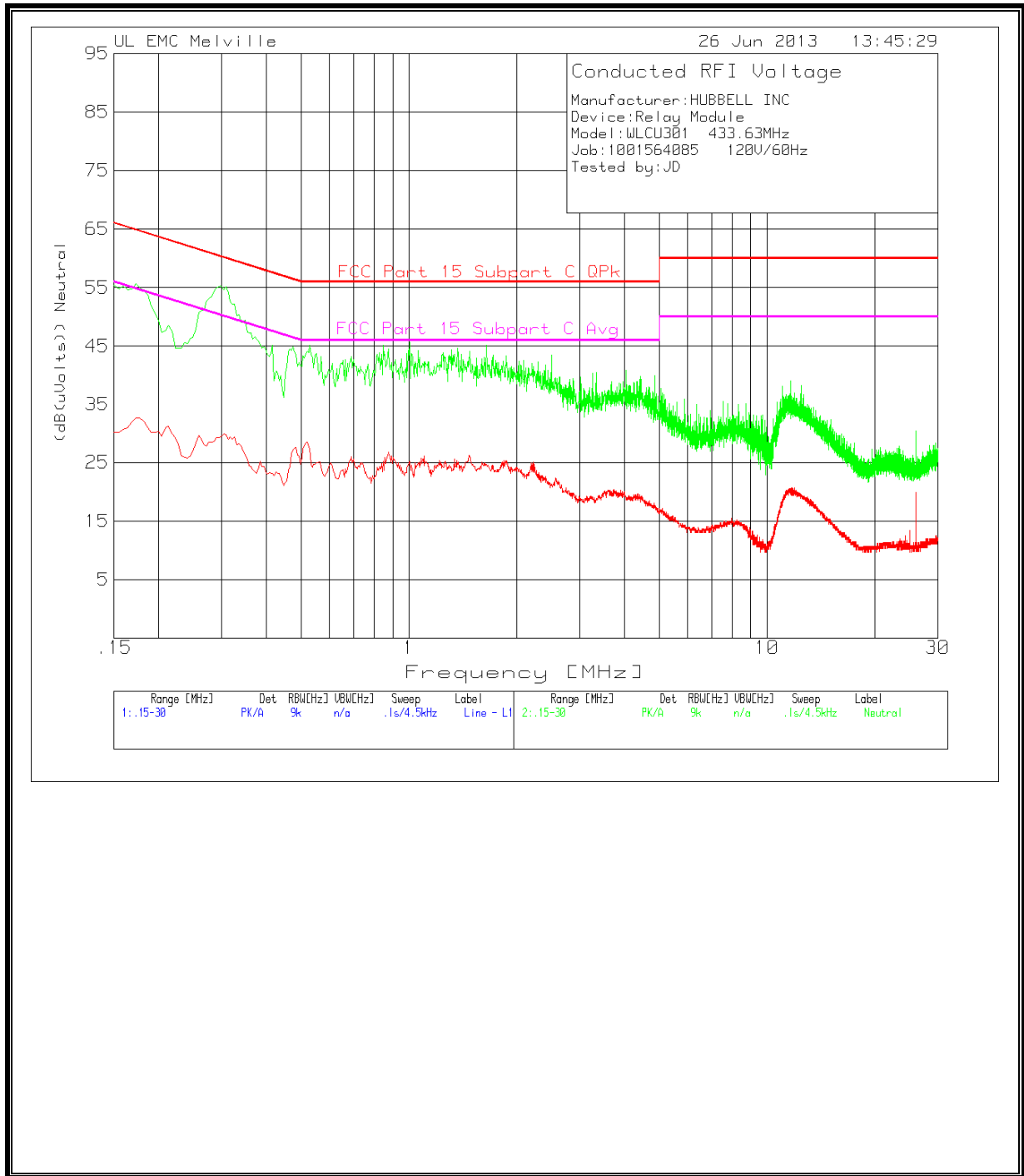
Test Frequency	Meter Reading	Detector	5A636 L4Neut (dB)	(dB(uVolts))	FCC Part 15 Subpart C QPk	Margin	FCC Part 15 Subpart C Avg	Margin
0.1725	45.67	PK	10	55.67	64.8	-9.13	54.8	0.87
0.1725	22.65	Av	10	32.65	64.8	-32.15	54.8	-22.15
0.2985	44.27	PK	10	54.27	60.3	-6.03	50.3	4.97
0.2985	19.38	Av	10	29.38	60.3	-30.92	50.3	-20.92
0.474	34.98	PK	10	44.98	56.4	-11.42	46.4	-1.42
0.474	17.21	Av	10	27.21	56.4	-29.19	46.4	-19.19
0.528	35.03	PK	10.1	45.13	56	-10.87	46	-0.87
0.528	17.31	Av	10.1	27.41	56	-28.59	46	-18.59
0.69	33.11	PK	10.1	43.21	56	-12.79	46	-2.79
0.69	15.92	Av	10.1	26.02	56	-29.98	46	-19.98
0.8475	35.05	PK	10.1	45.15	56	-10.85	46	-0.85
0.8475	15.07	Av	10.1	25.17	56	-30.83	46	-20.83
1.005	35.56	PK	10.1	45.66	56	-10.34	46	-0.34
1.005	15.07	Av	10.1	25.17	56	-30.83	46	-20.83
1.365	34.54	PK	10.1	44.64	56	-11.36	46	-1.36
1.365	14.85	Av	10.1	24.95	56	-31.05	46	-21.05
1.644	35.09	PK	10.1	45.19	56	-10.81	46	-0.81
1.644	14.62	Av	10.1	24.72	56	-31.28	46	-21.28
2.499	33.44	PK	10.1	43.54	56	-12.46	46	-2.46
2.499	11	Av	10.1	21.1	56	-34.9	46	-24.9

PK - Peak detector  
 QP - Quasi-Peak detector  
 LnAv - Linear Average detector  
 LgAv - Log Average detector  
 Av - Average detector

**LINE 1 RESULTS**

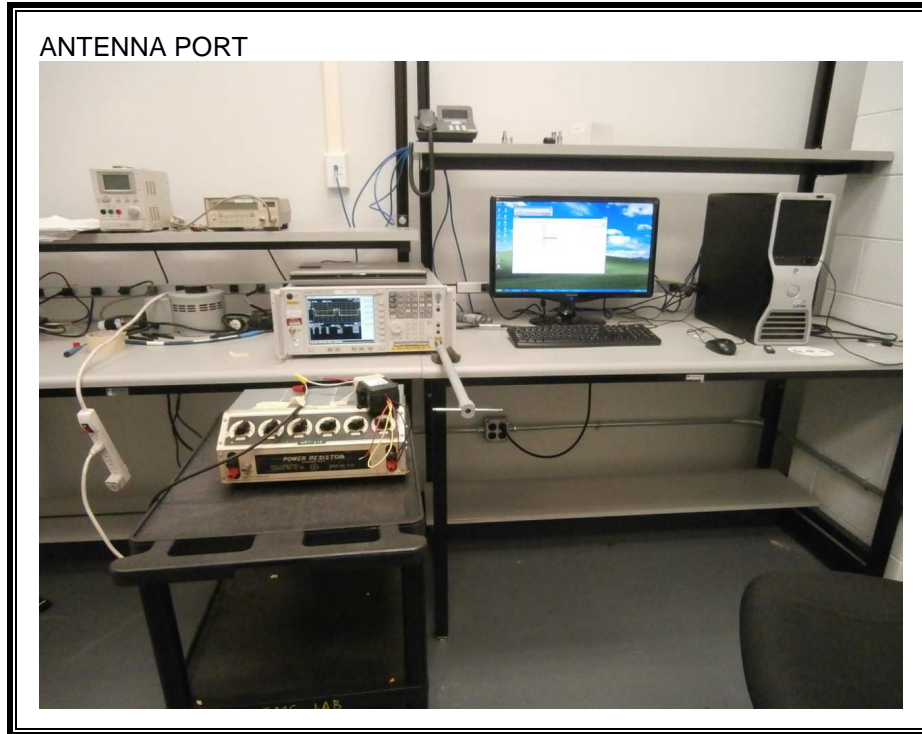


**LINE 2 RESULTS**

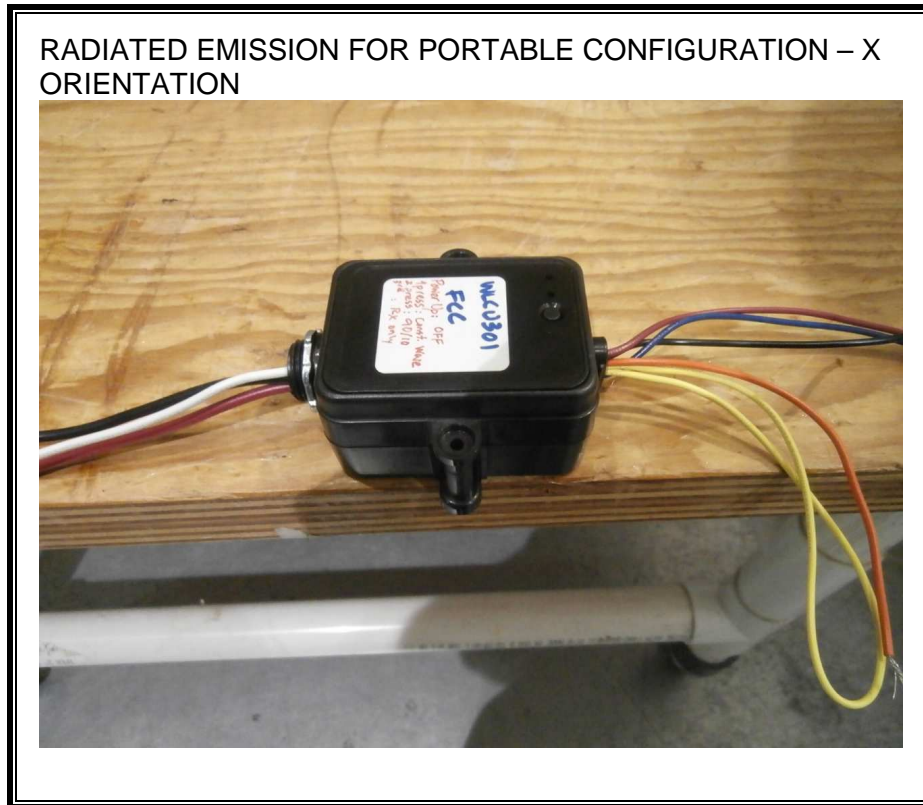


## 10. SETUP PHOTOS

### ANTENNA PORT

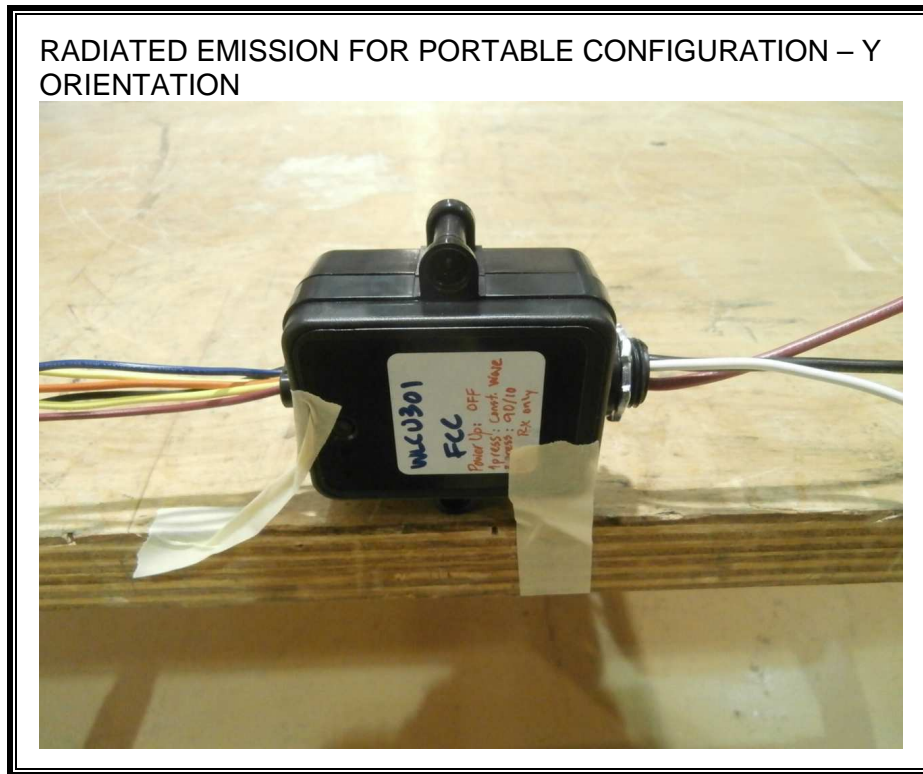


**RADIATED EMISSION FOR PORTABLE CONFIGURATION – X ORIENTATION**





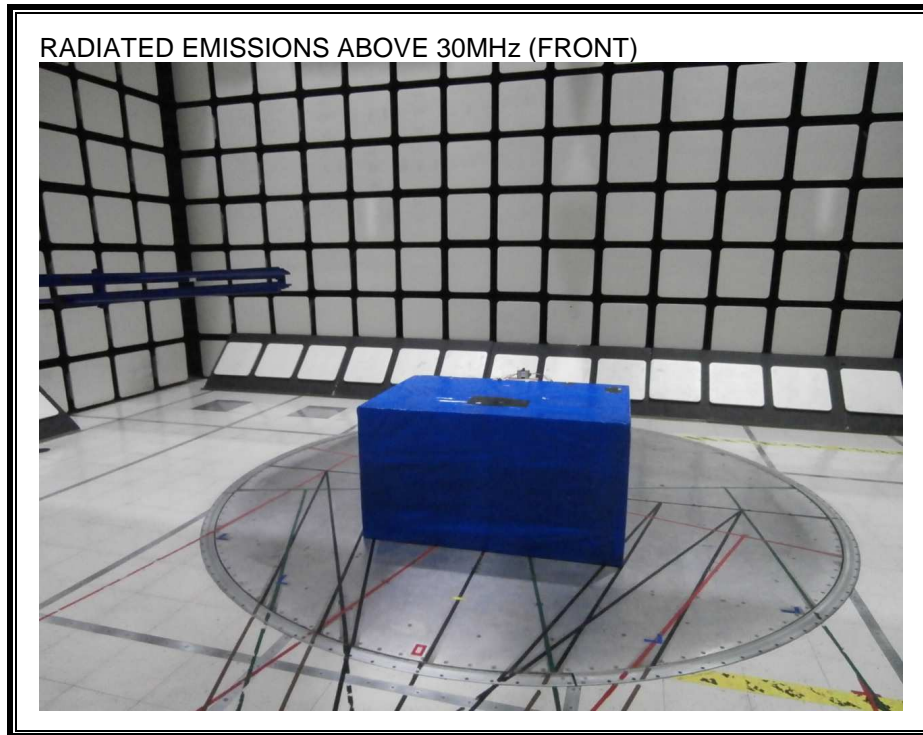
**RADIATED EMISSION FOR PORTABLE CONFIGURATION – Y ORIENTATION**



**RADIATED EMISSION FOR PORTABLE CONFIGURATION – Z ORIENTATION**



**RADIATED EMISSION ABOVE 30 MHz**

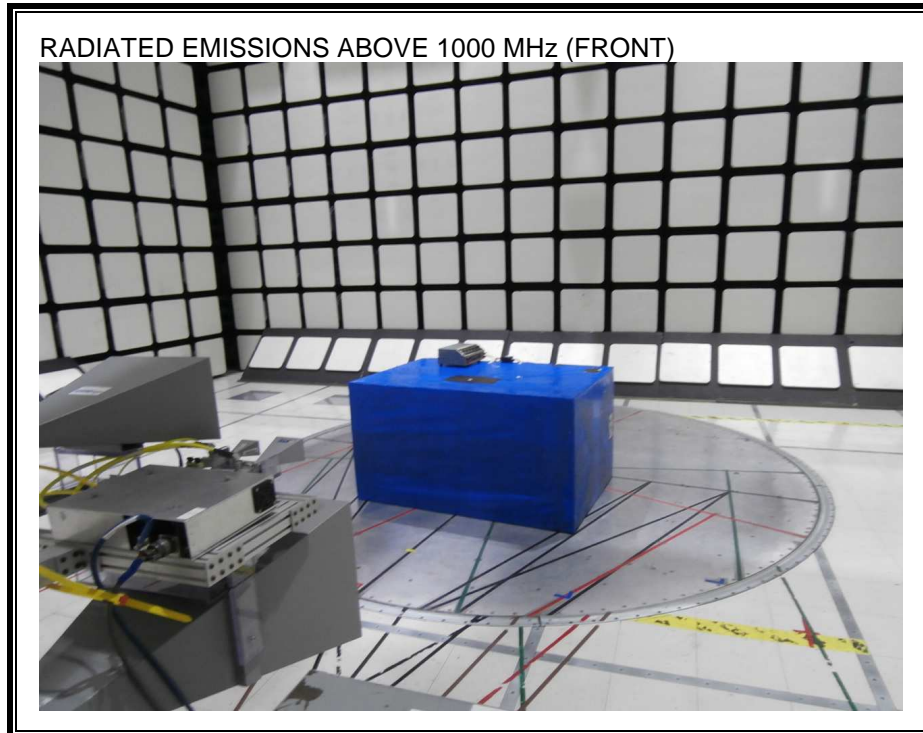


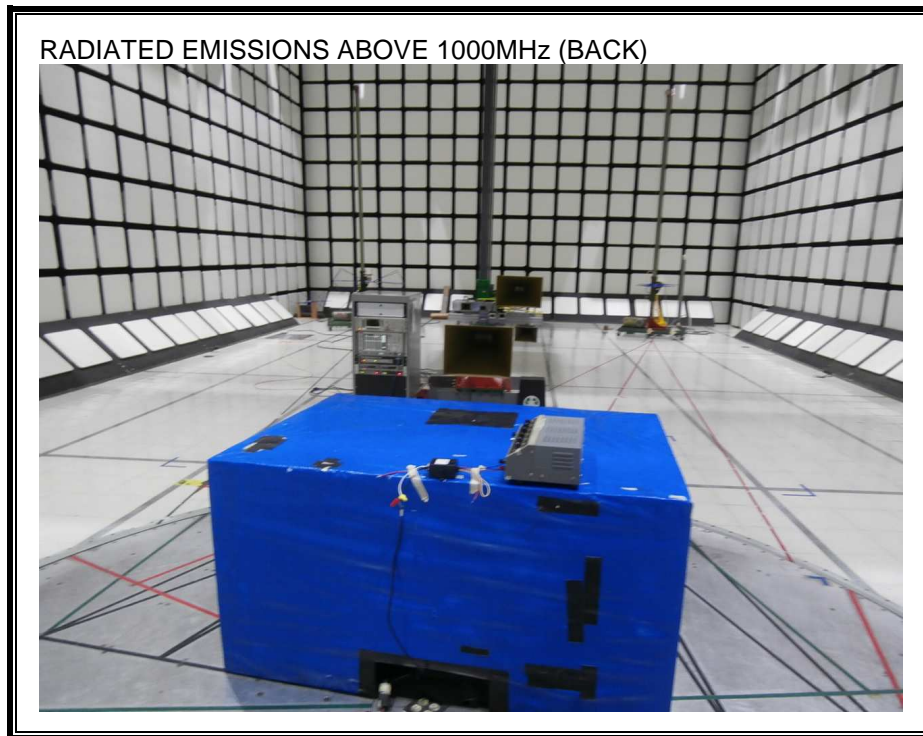
Note: The Log periodic antenna was taken as a representative test photo however a biconical was also utilized for testing as well which is not shown in set up photo.



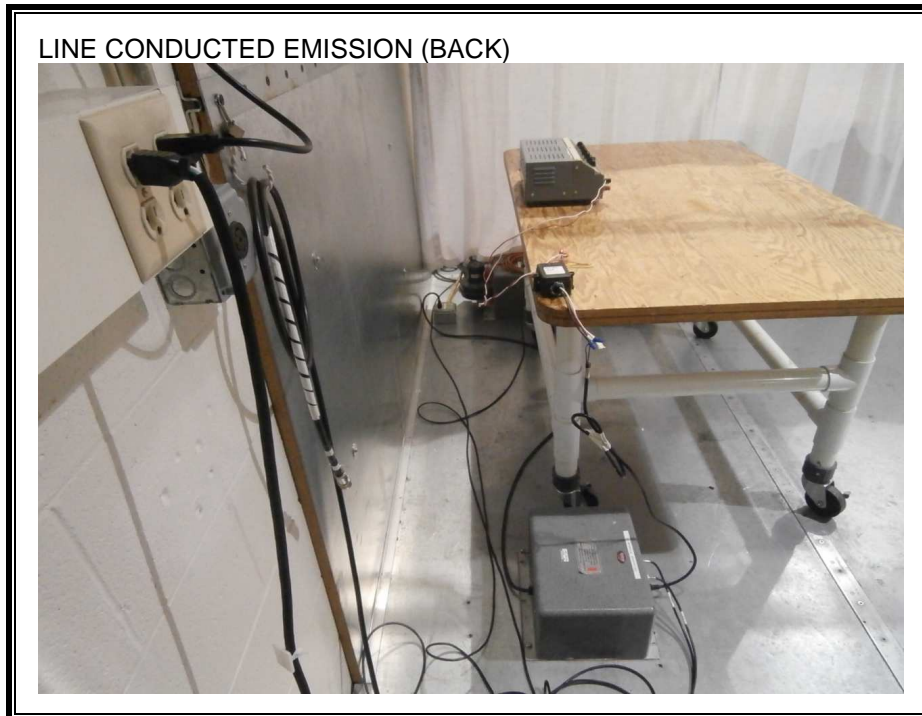
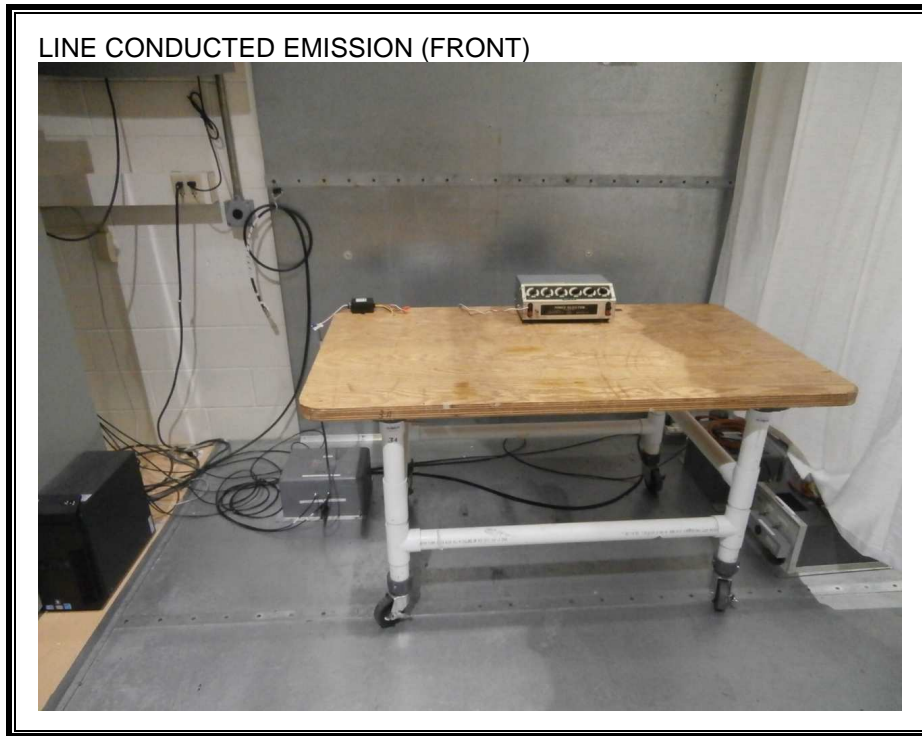
Note: The Log periodic antenna was taken as a representative test photo however a biconical was also utilized for testing as well which is not shown in set up photo.

**RADIATED EMISSION ABOVE 1000 MHz**





**AC MAINS LINE CONDUCTED EMISSION**



## END OF REPORT