Underwriters Laboratories Inc.
1285 Walt Whitman Rd.
Melville, NY 11747

www.ul.com/emc
(631) 271-6200

Job Number:	1001308601
Project Number:	10CA58536
File Number:	MC16478
Date:	14 Dec 2010
Model:	LR-HVAC-1
FCC ID: JPZ0073	IC ID: 2851A-JPZ0073

Electromagnetic Compatibility Test Report

For

LUTRON ELECTRONICS INC

Test Report Details

Tests Performed By:	**Underwriters Laboratories Inc. 1285 Walt Whitman Rd. Melville, NY 11747**
Tests Performed For:	**LUTRON ELECTRONICS INC 7200 SUTTER ROAD COOPERBURG, PA 18036**
Applicant Contact: Phone: E-mail:	**BOB SPEHALSKI (610) 282-7424 RSPEHALSKI@LUTRON.COM**
Test Report Date:	**14 Dec 2010**
Product Type:	**RF Adapter**
Product standards	**FCC Part 15, Subpart C, 15.231**
Model Number:	**LR-HVAC-1**
Sample Serial Number:	**Not Available**
EUT Category:	**Periodic Low Power Transmitter**
Testing Start Date:	**18 Nov 2010**
Date Testing Complete:	**29 Nov 2010**
Overall Results:	**Compliant**

Underwriters Laboratories Inc. reports apply only to the specific samples tested under stated test conditions. All samples tested were in good operating condition throughout the entire test program. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. Underwriters Laboratories Inc. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from Underwriters Laboratories Inc. issued reports. This report shall not be used to claim, constitute or imply product certification, approval, or endorsement by NVLAP, NIST, A2LA, or any agency of the US government.

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Report Revision History

Revision Date	Description	Revised By	Revision Reviewed By
None	Original	N/A	N/A

1.0 G E N E R A L - Product Description

1.1 Equipment Description

The LR-HVAC-1 is a heating ventilation and air conditioning controller.

Per FCC Part 2.1093 (C) this device is not required to undergo testing for radio-frequency radiation exposure.

Antenna description: Permanently attached to the RF circuit board and the transmit antenna type is a dipole antenna

1.2 Equipment Marking Plate

Not Available

1.3 Device Configuration During Test

1.3.1 Equipment Used During Test:

Use	Product Type	Manufacturer	Model	Comments
EUT	RF Adapter	LUTRON ELECTRONICS INC	LR-HVAC-1	None
Note: **EUT** - Equipment Under Test, **AE** - Auxiliary/Associated Equipment, or **SIM** - Simulator (Not Subjected to Test)				

1.3.2 Input/Output Ports:

Port #	Name	Type*	Cable Max. >3m (Y/N)	Cable Shielded (Y/N)	Comments
0	Enclosure	N/E	—	—	None
1	Mains	AC	Y	N	None

Note:
AC = AC Power Port DC = DC Power Port N/E = Non-Electrical
I/O = Signal Input or Output Port (Not Involved in Process Control)
TP = Telecommunication Ports

1.3.3 EUT Internal Operating Frequencies:

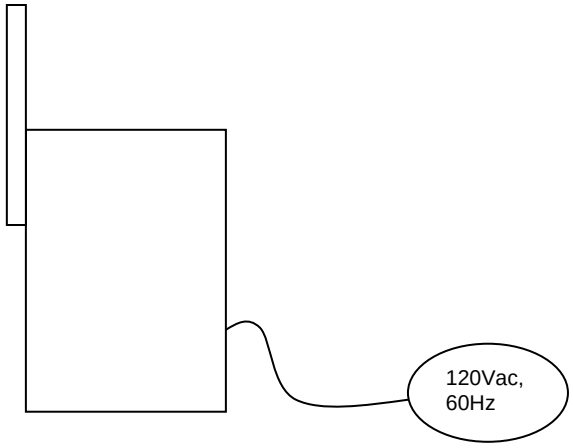
Frequency (MHz)	Description
26	Clock
13	Bus
26	Crystal
0.203	IF
3	SPI
0.0625	Data
431-437	Fo band

1.3.4 Power Interface:

Mode # /Rated	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
Rated	120	-	-	AC – 60Hz	1	None
1	120	-	-	AC – 60Hz	1	None

1.4 Block Diagram:

The diagram below illustrates the configuration of the equipment above.



1.5 EUT Configurations

Mode #	Description
1	Stand-alone

1.6 EUT Operation Modes

Mode #	Description
1	Constant transmitting at 431MHz, packet mode
2	Constant transmitting at 437MHz, packet mode
3	Receive mode 431MHz
4	Receive mode 437MHz
5	433MHz, normally operating
6	Receive Mode at 434MHz

2.0 Summary

The tests listed in the Summary of Testing section of this report have been performed and the results recorded by Underwriters Laboratories Inc. in accordance with the procedures stated in each test requirement and specification. The applicant determined the list of tests performed were applicable to the Equipment Under Test. As a result, the subject product has been verified to comply or not comply as noted in the Summary of Testing with each test specification. The test results relate only to the items tested.

2.1 Deviations from standard test methods

None

2.2 Device Modifications Necessary for Compliance

None

2.3 Reference Standards

Standard Number	Standard Name	Standard Date
47 CFR Part 15, Subpart B	Code of Federal Regulations, Part 15, Radio Frequency Devices	2009
47 CFR Part 15, Subpart C	Code of Federal Regulations, Part 15, Radio Frequency Devices	2009
RSS-GEN, Issue 7	General Requirements and Information for the Certification of Radiocommunication Equipment	2007
RSS-210, Issue 2	Low-power License-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment	2007

2.4 Results Summary

This product is considered Periodic Transmitter with a Class B receiver

Requirement – Test	Result (Compliant / Non-Compliant)*
Cease Operation	Compliant
Conducted Emissions - Mains	Compliant
Occupied Bandwidth	Compliant
99% Power Occupied Bandwidth	Compliant
Pulse Train - Averaging Factor	Compliant
Radiated Emissions - Intentional	Compliant
Radiated Emissions - Unintentional	Compliant

Test Engineer:

Bob DeLisi (Ext.22452)
Senior Staff Engineer
International EMC Services
Conformity Assessment Services-

Reviewer:

Mike Antola(Ext.23053)
Senior Project Engineer
International EMC Services
Conformity Assessment Services

Any information and documentation involving UL Mark services are provided on behalf of Underwriters Laboratories Inc. (UL) or any authorized licensee of UL.

3.0 Calibration of Equipment Used for Measurement

All test equipment and test accessories are calibrated on a regular basis. The maximum time between calibrations is one year or the manufacturers' recommendation, whichever is less.

All test equipment calibrations are traceable to the National Institute of Standards and Technology (NIST); therefore, all test data recorded in this report is traceable to NIST.

4.0 Emissions Test Results

The emissions tests were performed according to following regulations:

---------- United States ----------

Code of Federal Regulations Title 47	Part 15, Subpart B, Radio Frequency Devices
Code of Federal Regulations Title 47	Part 15, Subpart C, Radio Frequency Devices
Industry Canada	RSS-GEN, RSS-210

Unless specified otherwise in the individual Methods, the tests shall be conducted under the following ambient conditions. Confirmation of these conditions shall be verified at the time the test is conducted.

Ambient Temperature, °C	22.5 ± 2.5	Relative Humidity, %	45 ± 15	Barometric Pressure, mBar	950 ± 150

Sample Calculations
Radiated Field Strength and Conducted Emissions data contained within this report is calculated on the following basis:

Field Strength (dBuV/m) = Meter Reading (dBuV) + AF (dB/m) - Gain (dB) + Cable Loss (dB)
Conducted Voltage (dBuV) = Meter Reading (dBuV) + Cable Loss (dB) + LISN IL (dB)
Conducted Current (dBuA) = Meter Reading (dBuV) + Cable Loss (dB) - Transducer Factor (dBohms)

4.1 Test Conditions and Results – MAINS TERMINAL – CONDUCTED EMISSIONS

Test Description	Measurements were made on a ground plane. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on mains lines were made at the output of the AMN.		
Basic Standard		FCC Part 15, Subpart C, 15.231	
UL LPG		80-EM-S0026	
		Frequency range on each side of line	Measurement Point
Fully configured sample scanned over the following frequency range		150kHz to 30MHz	Mains
Limits - Class B			
Frequency (MHz)	Limit (dBµV)		
	Quasi-Peak	Average	
0.15-0.5	66 to 56	56 to 46	
0.5-5	56	46	
5-30	60	50	
Supplementary information: None			

Table 1 Conducted Emissions EUT Configuration Settings

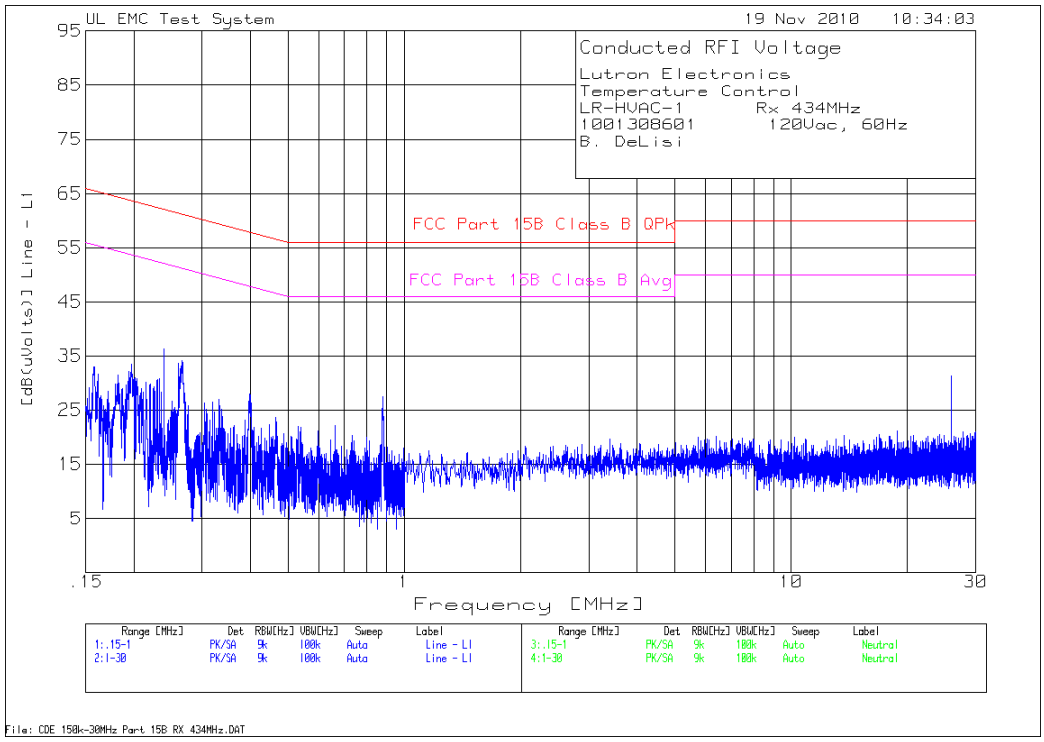
Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
1	1	2
1	1	6
Supplementary information: Since the transmit and receive circuit have regulated power, receive mode was investigated and only the worst case mode reported.		

Table 2 Conducted Emissions Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
Conducted Emissions – GP 1					
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081	2010-01-12	2011-01-12
LISN	Solar	9252-50-R-24-BNC	ME5A-636	2010-03-31	2011-03-31
Switch Driver	HP	11713A	44397	N/A	N/A
RF Switch Box	UL	4	44404	N/A	N/A
Measurement Software	UL	Version 9.3	44736	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43734	2010-03-08	2012-03-08
Multimeter	Fluke	87V	44547	2010-03-08	2012-03-08

Figure 1 Test Setup for Conducted Emissions

Figure 2 Conducted Emissions Graph – RX 434MHz



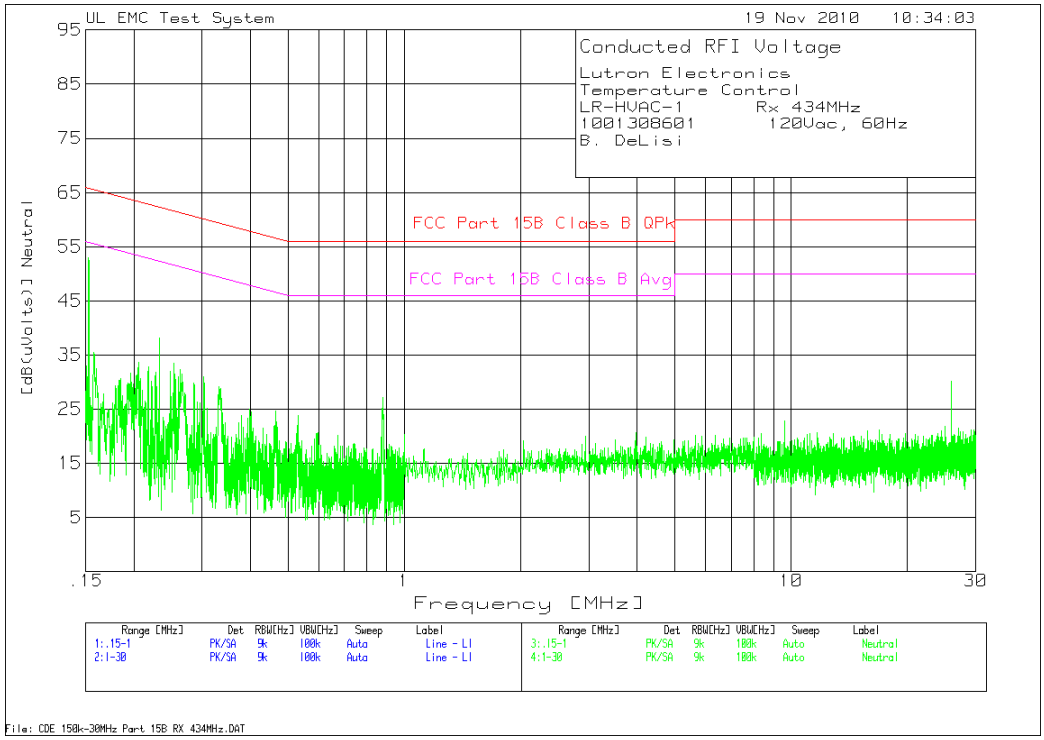


Table 3 Conducted Emissions Data Points – RX 434MHz

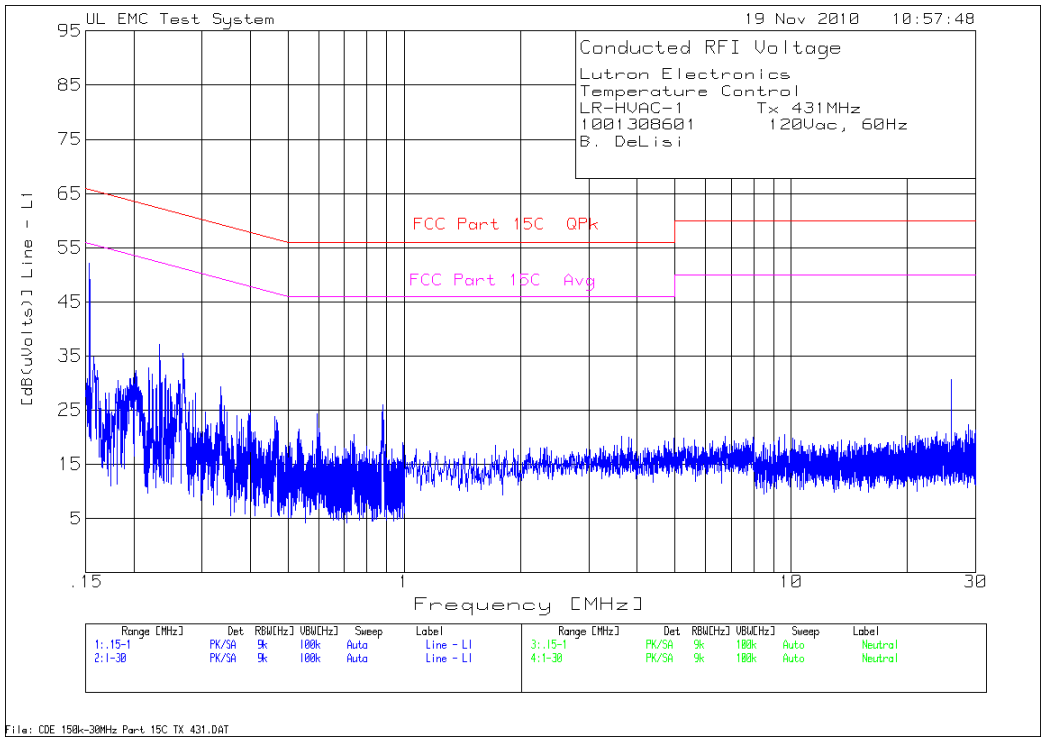
Lutron Electronics
Temperature Control
LR-HVAC-1 Rx 434MHz
1001308601 120Vac, 60Hz
B. DeLisi

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4	5	6
Line - L1 .15 - 1MHz											
1	.26069	23.63 PK	10	0	33.63	61.4	51.4	-	-	-	-
				Margin [dB]		-27.77	-17.77	-	-	-	-
2	.39774	17.9 PK	10	0	27.9	57.9	47.9	-	-	-	-
				Margin [dB]		-30	-20	-	-	-	-
3	.87809	16.9 PK	10	0	26.9	56	46	-	-	-	-
				Margin [dB]		-29.1	-19.1	-	-	-	-
Line - L1 1 - 30MHz											
4	6.40668	9.99 PK	10.2	0	20.19	60	50	-	-	-	-
				Margin [dB]		-39.81	-29.81	-	-	-	-
5	14.52831	7.82 PK	10.8	0	18.62	60	50	-	-	-	-
				Margin [dB]		-41.38	-31.38	-	-	-	-
6	26.0088	19.29 PK	11.3	0	30.59	60	50	-	-	-	-
				Margin [dB]		-29.41	-19.41	-	-	-	-
Neutral .15 - 1MHz											
7	.15255	42.83 PK	10.1	0	52.93	65.9	55.9	-	-	-	-
				Margin [dB]		-12.97	-2.97	-	-	-	-
8	.2323	28.06 PK	10.1	0	38.16	62.4	52.4	-	-	-	-
				Margin [dB]		-24.24	-14.24	-	-	-	-
9	.33211	19.11 PK	10.1	0	29.21	59.4	49.4	-	-	-	-
				Margin [dB]		-30.19	-20.19	-	-	-	-
10	.8803	17.06 PK	10.1	0	27.16	56	46	-	-	-	-
				Margin [dB]		-28.84	-18.84	-	-	-	-
Neutral 1 - 30MHz											
11	2.93759	9.75 PK	10.2	0	19.95	56	46	-	-	-	-
				Margin [dB]		-36.05	-26.05	-	-	-	-
12	26.003	18.46 PK	11.7	0	30.16	60	50	-	-	-	-
				Margin [dB]		-29.84	-19.84	-	-	-	-

LIMIT 1: FCC Part 15B Class B QPk
LIMIT 2: FCC Part 15B Class B Avg

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detection
Av - average detection
CAV - CISPR average detection
RMS - RMS detection
CRMS - CISPR RMS detection

Figure 3 Conducted Emissions Graph – TX 431MHz



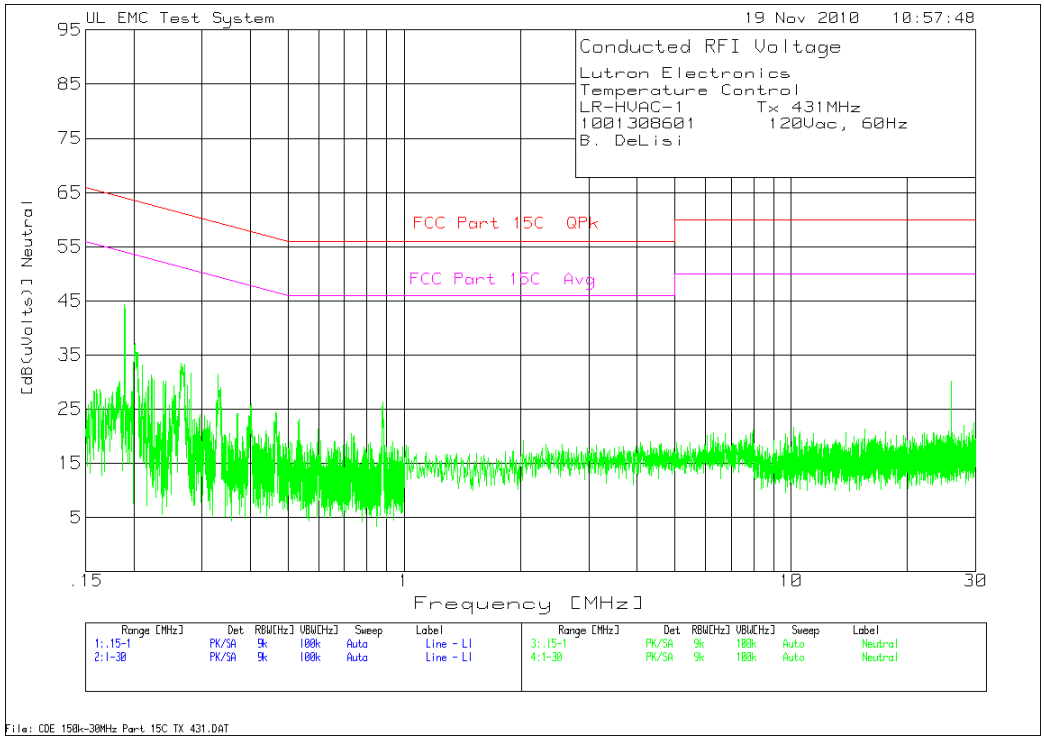


Table 4 Conducted Emissions Data Points – TX 431MHz

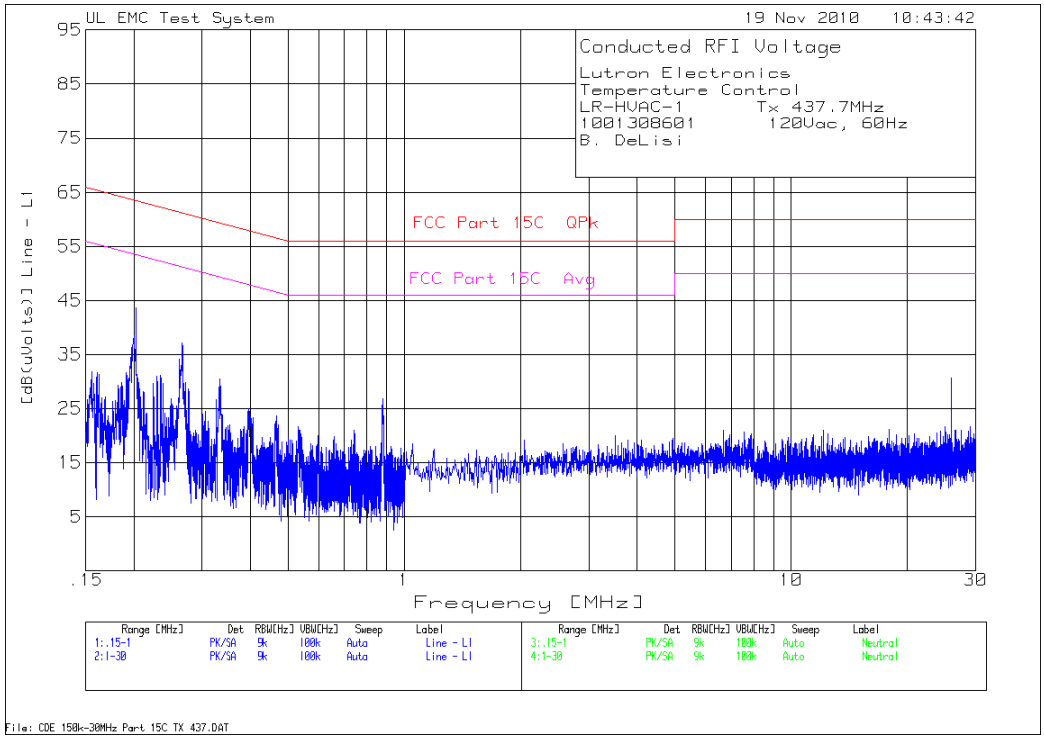
Lutron Electronics
Temperature Control
LR-HVAC-1 Tx 431MHz
1001308601 120Vac, 60Hz
B. DeLisi

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4	5	6
Line - L1 .15 - 1MHz											
1	.15323	42.08 PK	10	0	52.08	65.8	55.8	-	-	-	-
				Margin [dB]		-13.72	-3.72	-	-	-	-
2	.23298	27.14 PK	10	0	37.14	62.3	52.3	-	-	-	-
				Margin [dB]		-25.16	-15.16	-	-	-	-
3	.26783	25.44 PK	10	0	35.44	61.2	51.2	-	-	-	-
				Margin [dB]		-25.76	-15.76	-	-	-	-
4	.59583	14.34 PK	10	0	24.34	56	46	-	-	-	-
				Margin [dB]		-31.66	-21.66	-	-	-	-
5	.87401	13.33 PK	10	0	23.33	56	46	-	-	-	-
				Margin [dB]		-32.67	-22.67	-	-	-	-
Line - L1 1 - 30MHz											
6	26.0088	19.3 PK	11.3	0	30.6	60	50	-	-	-	-
				Margin [dB]		-29.4	-19.4	-	-	-	-
Neutral .15 - 1MHz											
7	.18911	34.35 PK	10	0	44.35	64.1	54.1	-	-	-	-
				Margin [dB]		-19.75	-9.75	-	-	-	-
8	.20084	27.05 PK	10	0	37.05	63.6	53.6	-	-	-	-
				Margin [dB]		-26.55	-16.55	-	-	-	-
9	.26443	23.32 PK	10.1	0	33.42	61.3	51.3	-	-	-	-
				Margin [dB]		-27.88	-17.88	-	-	-	-
10	.33007	21.45 PK	10.1	0	31.55	59.4	49.4	-	-	-	-
				Margin [dB]		-27.85	-17.85	-	-	-	-
11	.87775	16.14 PK	10.1	0	26.24	56	46	-	-	-	-
				Margin [dB]		-29.76	-19.76	-	-	-	-
Neutral 1 - 30MHz											
12	26.0088	17.36 PK	11.7	0	29.06	60	50	-	-	-	-
				Margin [dB]		-30.94	-20.94	-	-	-	-

LIMIT 1: FCC Part 15C QPk
LIMIT 2: FCC Part 15C Avg

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detection
Av - average detection
CAV - CISPR average detection
RMS - RMS detection
CRMS - CISPR RMS detection

Figure 4 Conducted Emissions Graph – TX 437MHz



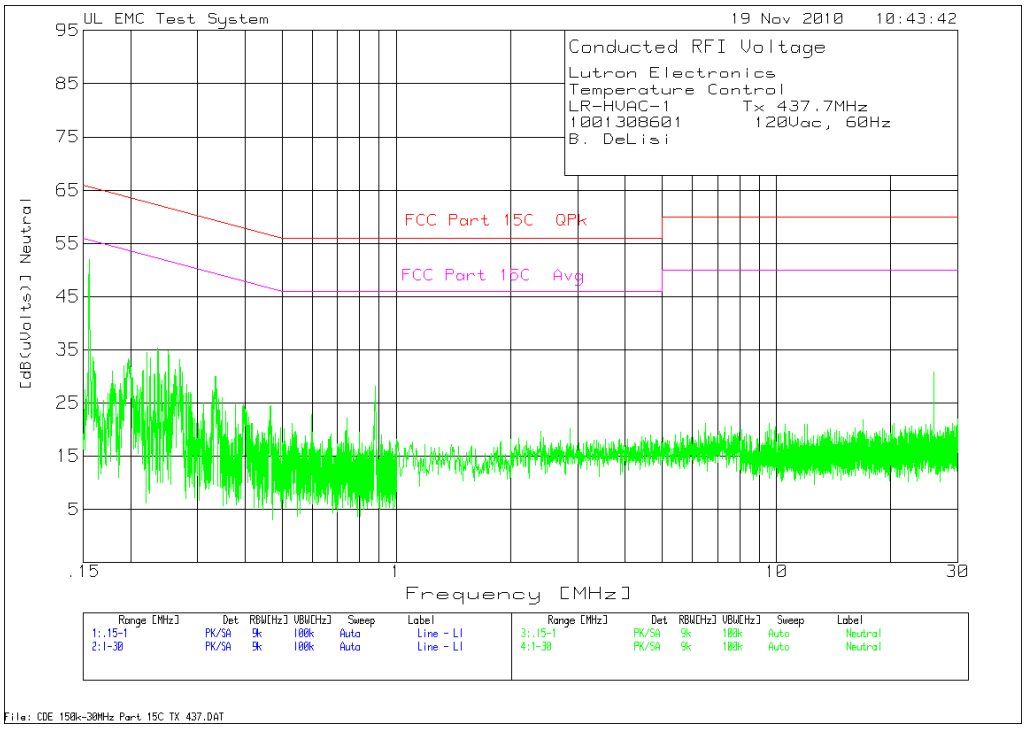


Table 5 Conducted Emissions Data Points – TX 437MHz

Lutron Electronics
Temperature Control
LR-HVAC-1 Tx 437.7MHz
1001308601 120Vac, 60Hz
B. DeLisi

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4	5	6
Line - L1 .15 - 1MHz											
1	.2022	33.55 PK	10	0	43.55	63.5	53.5	-	-	-	-
				Margin [dB]		-19.95	-9.95	-	-	-	-
2	.26613	24.79 PK	10	0	34.79	61.2	51.2	-	-	-	-
				Margin [dB]		-26.41	-16.41	-	-	-	-
3	.33262	20.54 PK	10	0	30.54	59.4	49.4	-	-	-	-
				Margin [dB]		-28.86	-18.86	-	-	-	-
4	.39621	14.98 PK	10	0	24.98	57.9	47.9	-	-	-	-
				Margin [dB]		-32.92	-22.92	-	-	-	-
5	.87911	16.73 PK	10	0	26.73	56	46	-	-	-	-
				Margin [dB]		-29.27	-19.27	-	-	-	-
Line - L1 1 - 30MHz											
6	26.003	19.39 PK	11.3	0	30.69	60	50	-	-	-	-
				Margin [dB]		-29.31	-19.31	-	-	-	-
Neutral .15 - 1MHz											
7	.15544	41.78 PK	10.1	0	51.88	65.7	55.7	-	-	-	-
				Margin [dB]		-13.82	-3.82	-	-	-	-
8	.22039	24.36 PK	10.1	0	34.46	62.8	52.8	-	-	-	-
				Margin [dB]		-28.34	-18.34	-	-	-	-
9	.23485	25.2 PK	10.1	0	35.3	62.3	52.3	-	-	-	-
				Margin [dB]		-27	-17	-	-	-	-
10	.25134	24.66 PK	10.1	0	34.76	61.7	51.7	-	-	-	-
				Margin [dB]		-26.94	-16.94	-	-	-	-
11	.33398	19.92 PK	10	0	29.92	59.4	49.4	-	-	-	-
				Margin [dB]		-29.48	-19.48	-	-	-	-
12	.8786	18.02 PK	10.1	0	28.12	56	46	-	-	-	-
				Margin [dB]		-27.88	-17.88	-	-	-	-
Neutral 1 - 30MHz											
13	26.003	19.02 PK	11.7	0	30.72	60	50	-	-	-	-
				Margin [dB]		-29.28	-19.28	-	-	-	-

LIMIT 1: FCC Part 15C QPk
LIMIT 2: FCC Part 15C Avg

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detection
Av - average detection
CAV - CISPR average detection
RMS - RMS detection
CRMS - CISPR RMS detection

Lutron Electronics
Temperature Control
LR-HVAC-1 Tx 437.7MHz
1001308601 120Vac, 60Hz
B. DeLisi

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4	5	6
Line - L1 .15 - 1MHz										
.2014	21.98 Av	10	0	31.98	63.6	53.6	-	-	-	-
			Margin [dB]:		-31.62	-21.62	-	-	-	-
Neutral .15 - 1MHz										
.15588	18.02 Av	10.1	0	28.12	65.7	55.7	-	-	-	-
			Margin [dB]:		-37.58	-27.58	-	-	-	-

NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).

LIMIT 1: FCC Part 15C QPk
LIMIT 2: FCC Part 15C Avg

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - average log detection
Av - average detection
CAV - CISPR average detection
RMS - RMS detection
CRMS - CISPR RMS detection

4.2 Test Conditions and Results – Occupied Bandwidth

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the spectrum analyzer resolution bandwidth set per the appropriate standard.
Basic Standard	FCC Part 15, Subpart C, 15.215; ANSI C63.10:2009, RSS-GEN
Occupied Bandwidth Limits	
0.25% of Fundamental	

Table 6 Occupied Bandwidth Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
1	1	2
Supplementary information: None		

Table 7 Occupied Bandwidth Spectrum Analyzer Settings

Resolution Bandwidth (MHz)	Occupied Bandwidth Requirements	
	dBc	%
10kHz	-20	99
Supplementary information: None		

Table 8 Occupied Bandwidth Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal	Cal Due
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081	2010-01-12	2011-01-12
Dipole Antenna	EMCO	3121C	3359	2009-11-16	2010-11-30
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2010-03-08	2012-03-08
Multimeter	Fluke	87V	44547	2010-02-01	2011-02-01

Figure 5 Test Setup for Occupied Bandwidth

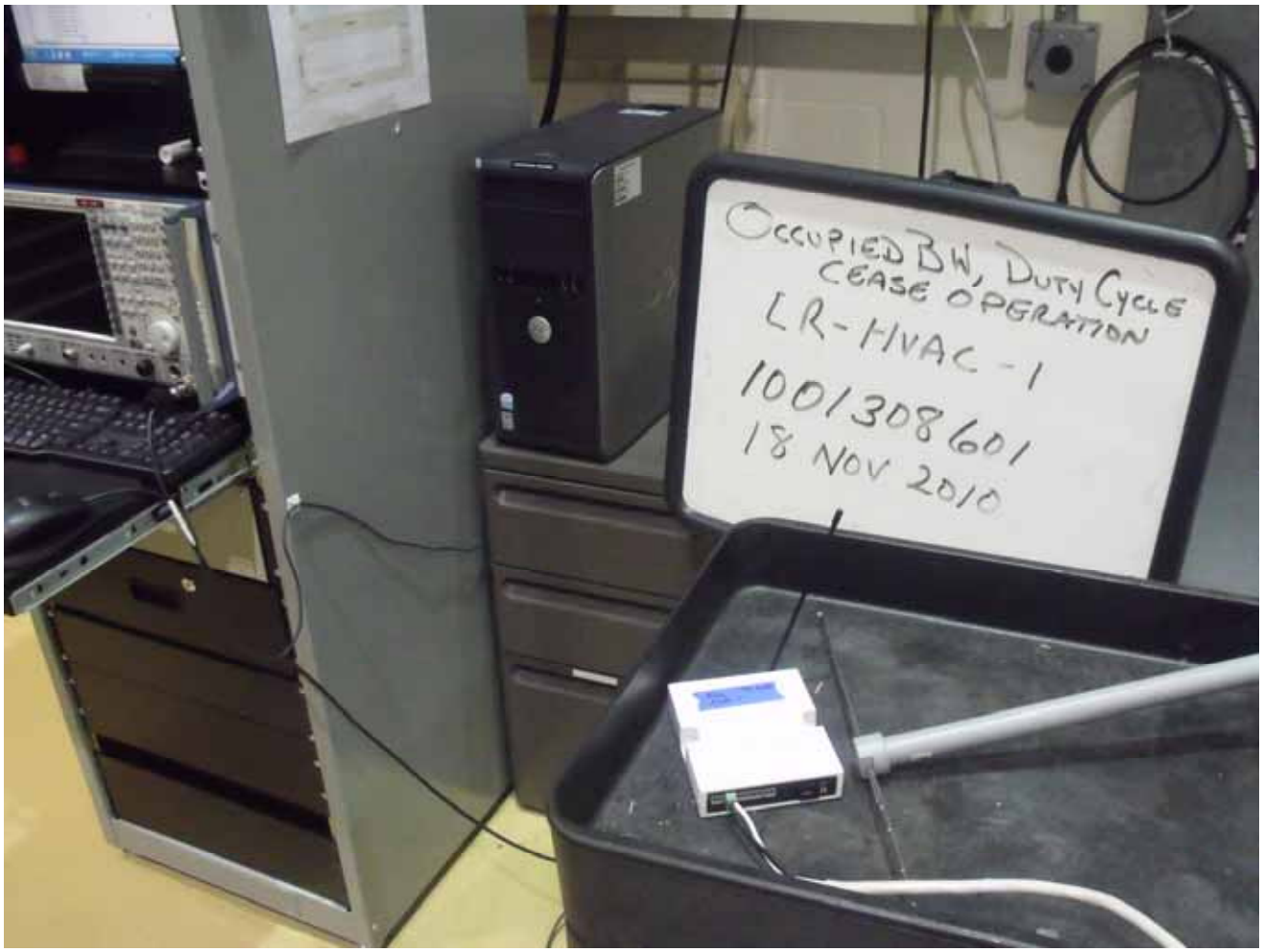


Table 9 Occupied Bandwidth Results

Power Mode	Frequency (MHz)	20dB OBW (kHz)	99% OBW (kHz)	Limit (MHz)	Result
AC	431	147.8	137.8	1.08	Pass
AC	437	150.3	142.7	1.09	Pass

Figure 6 Occupied Bandwidth Graph – OBW 431MHz (20dB)

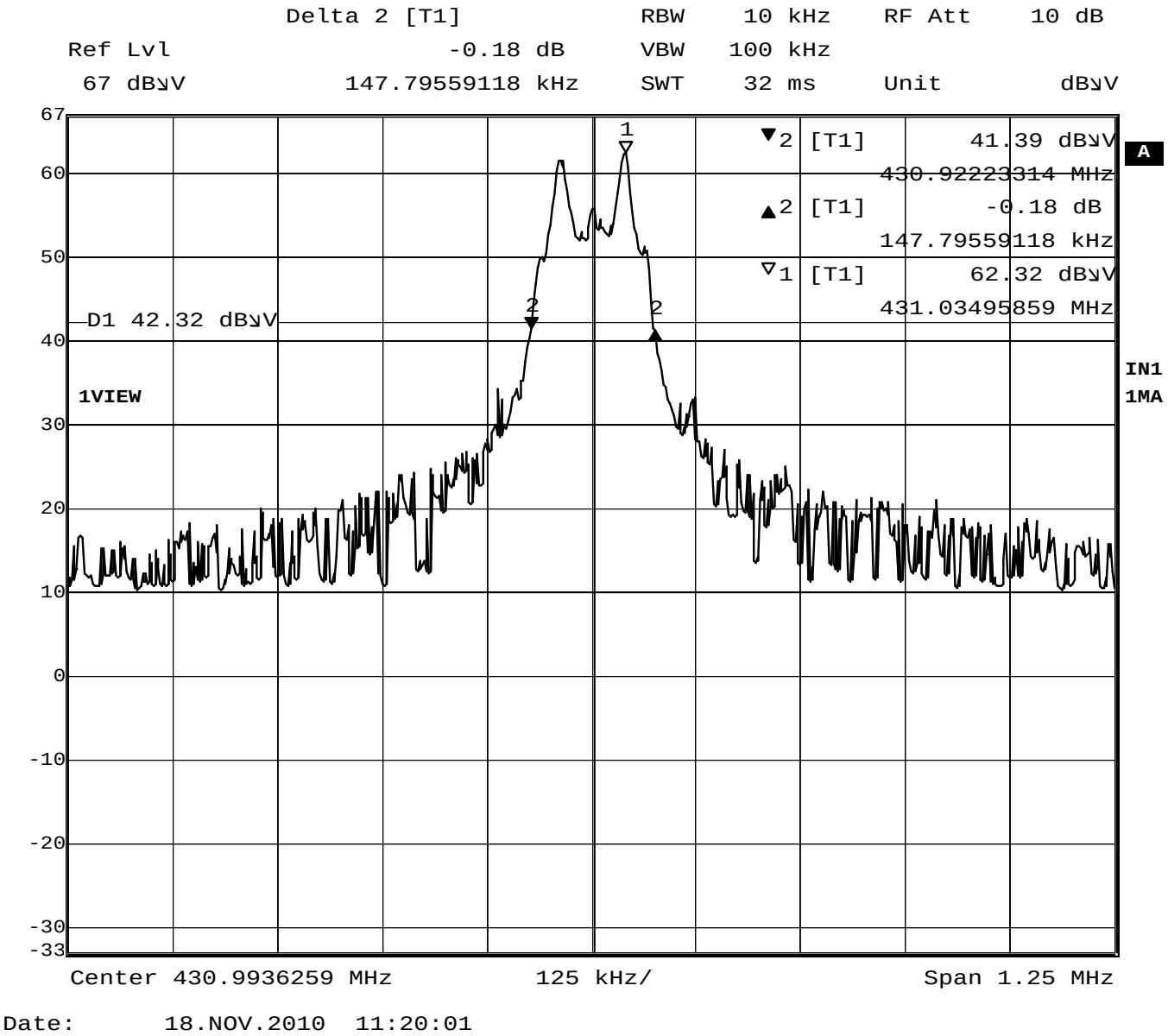


Figure 7 Occupied Bandwidth Graph – OBW 437MHz (20dB)

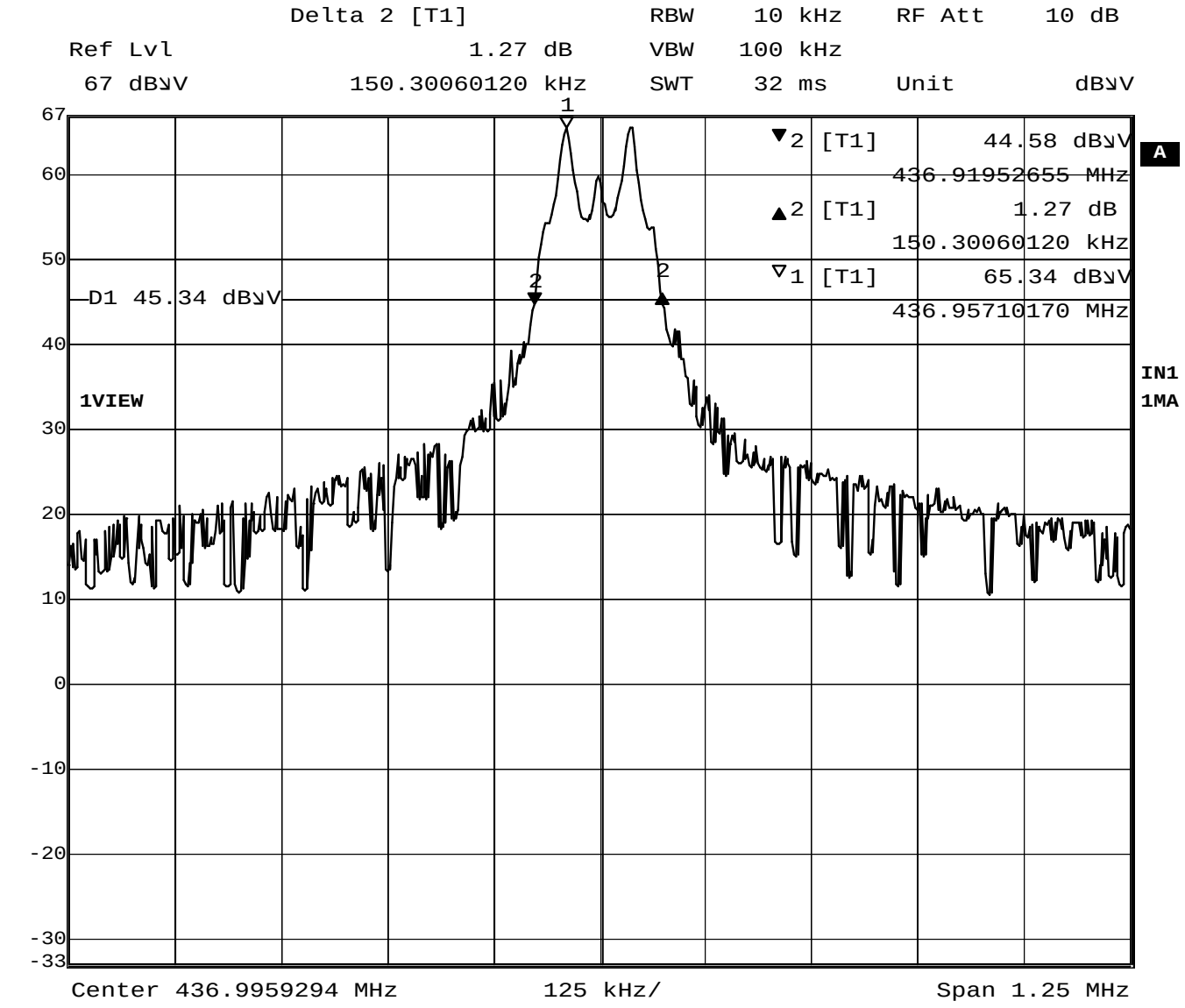


Figure 8 Occupied Bandwidth Graph – OBW 431MHz (99Percent)

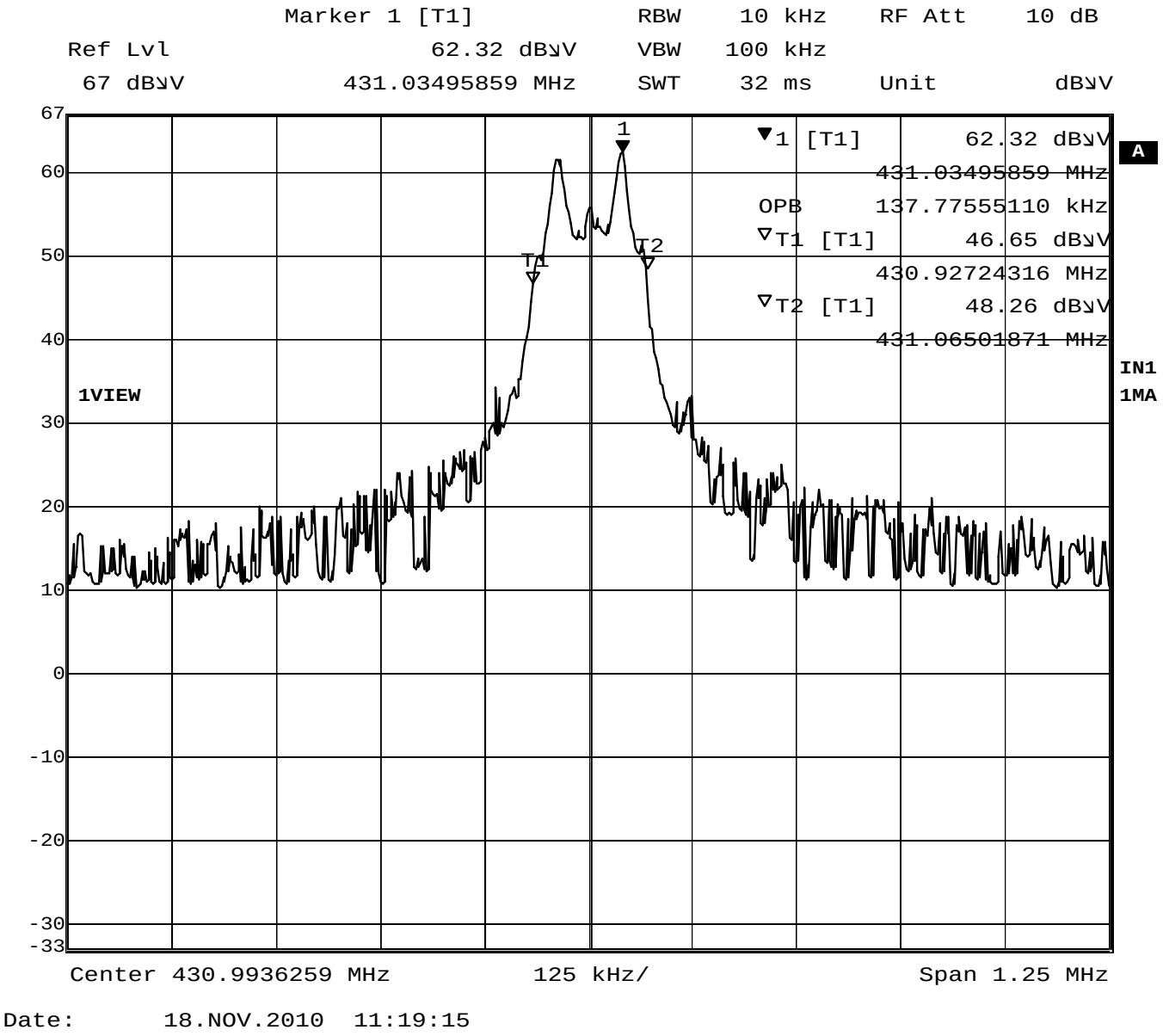
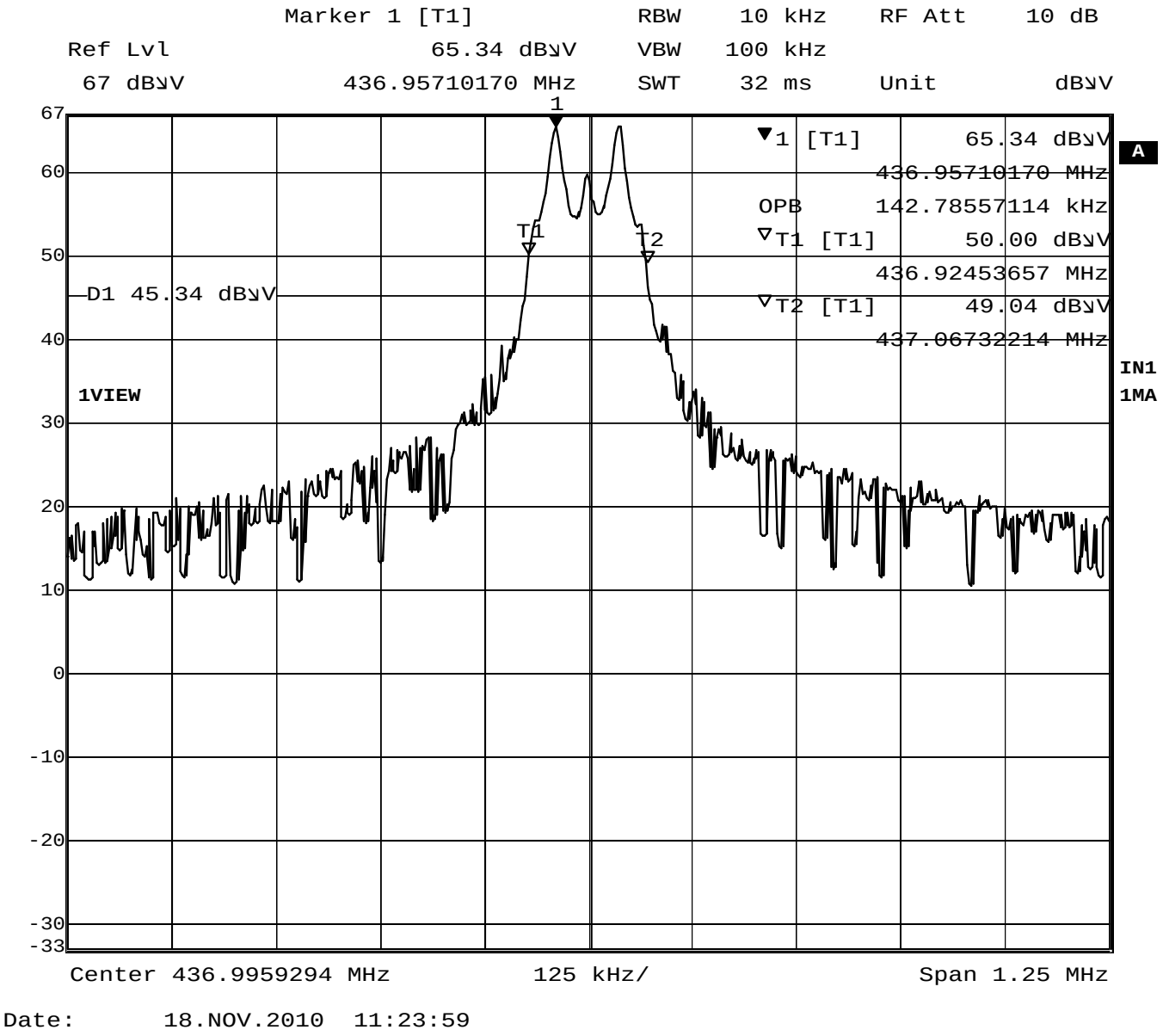


Figure 9 Occupied Bandwidth Graph – OBW 437MHz (99Percent)



4.3 Test Conditions and Results – Cease Operation

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the transmission time measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	FCC Part 15, Subpart C, 15.215; ANSI C63.10:2009, RSS-GEN
Cease Operation Limits	
The transmissions shall stop within 5 seconds of either a button being released or if automatically controlled transmissions shall be stopped 5 seconds after transmissions begin.	

Table 10 Cease Operation Configuration Settings

Power Interface Mode	EUT Configurations Mode	EUT Operation Mode
1	1	5
Supplementary information: None		

Table 11 Cease Operation Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal	Cal Due
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081	2010-01-12	2011-01-12
Dipole Antenna	EMCO	3121C	3359	2009-11-16	2010-11-30
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2010-03-08	2012-03-08
Measurement Software	UL	Version 9.3	44740	N/A	N/A
Multimeter	Fluke	87V	44547	2010-02-01	2011-02-01

Figure 10 Test Setup for Cease Operation

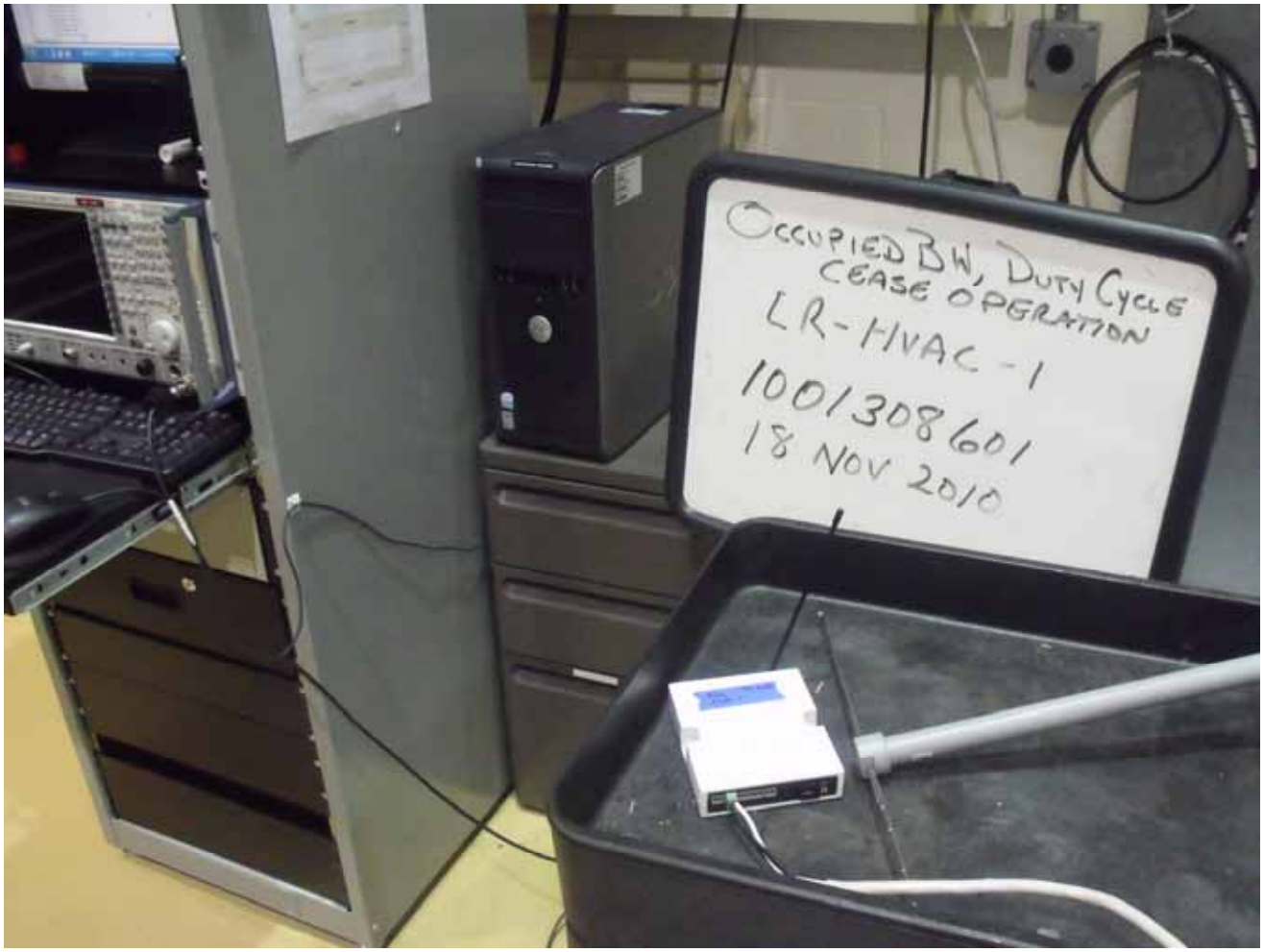
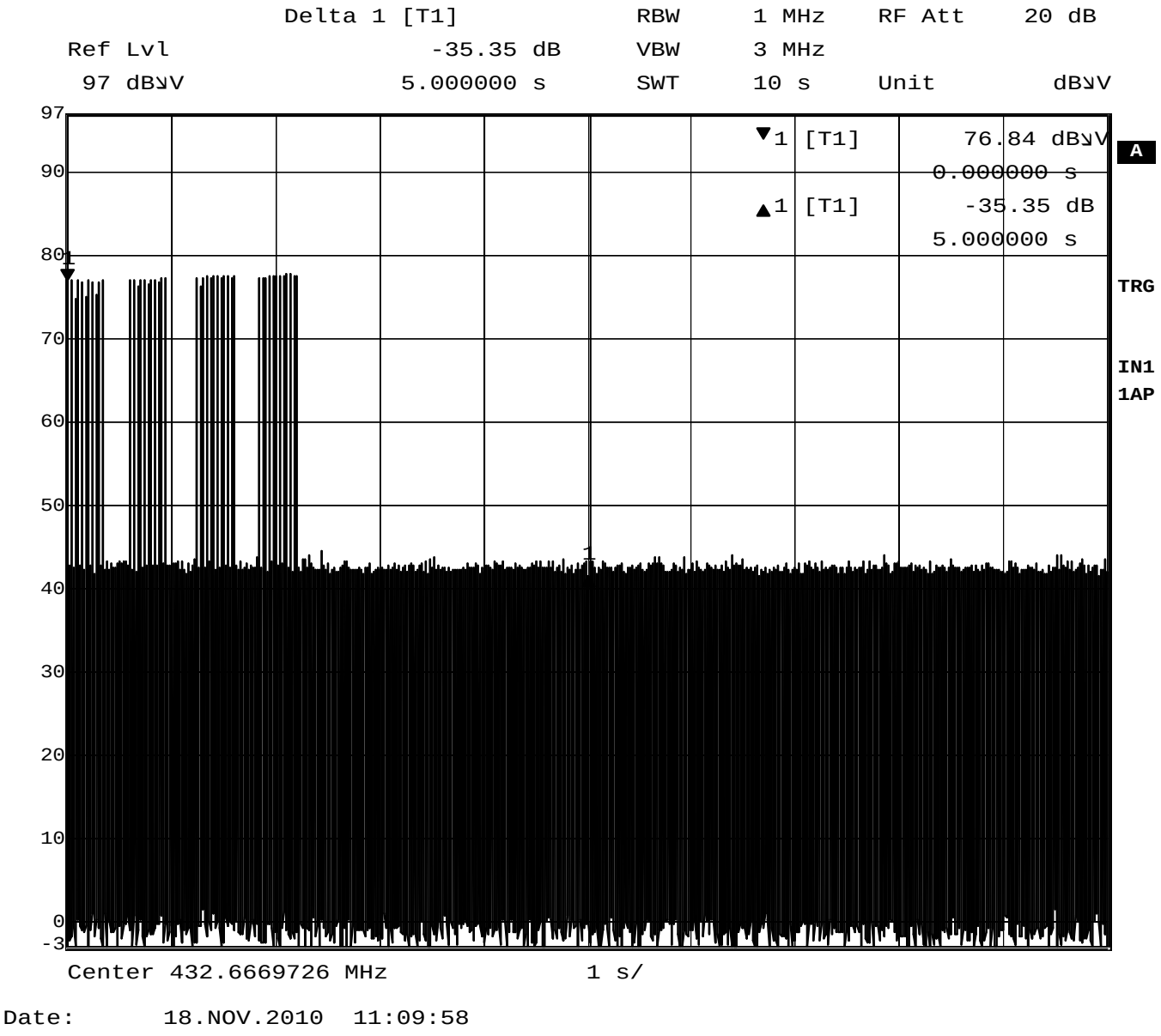


Figure 11 Cease Operation Graph



4.4 Test Conditions and Results – Pulse Train

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The pulse train was measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	FCC Part 15 Subpart A, 15.35
Pulse Train Limits	
There are no limits for this test. This data is used to calculate the averaging correction factor that is applied to the measured peak radiated emissions results.	

Table 12 Pulse Train Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	5
Supplementary information: None		

Table 13 Pulse Train Calculation

Pulse Width (mS)	Total Transmission time or 100ms which ever is lesser	Average Correction Factor (dB) $20\log\left(\frac{PulseWidth}{TotalTransmissionTime}\right)$
9.6	100	-20.4

Table 14 Pulse Train Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal	Cal Due
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081	2010-01-12	2011-01-12
Dipole Antenna	EMCO	3121C	3359	2009-11-16	2010-11-30
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268	2010-03-08	2012-03-08
Measurement Software	UL	Version 9.3	44740	N/A	N/A
Multimeter	Fluke	87V	44547	2010-02-01	2011-02-01

Figure 12 Test Setup for Pulse Train

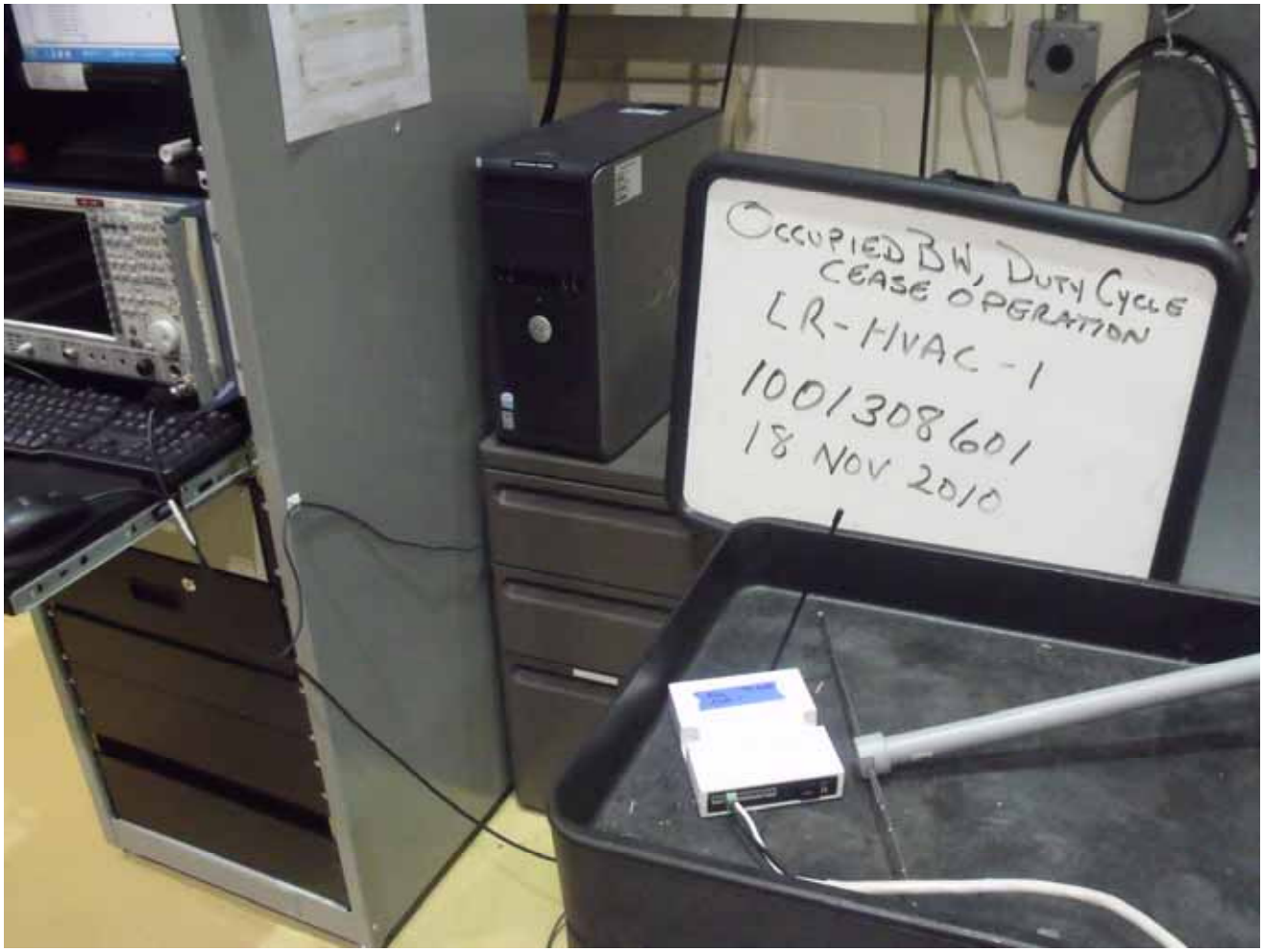
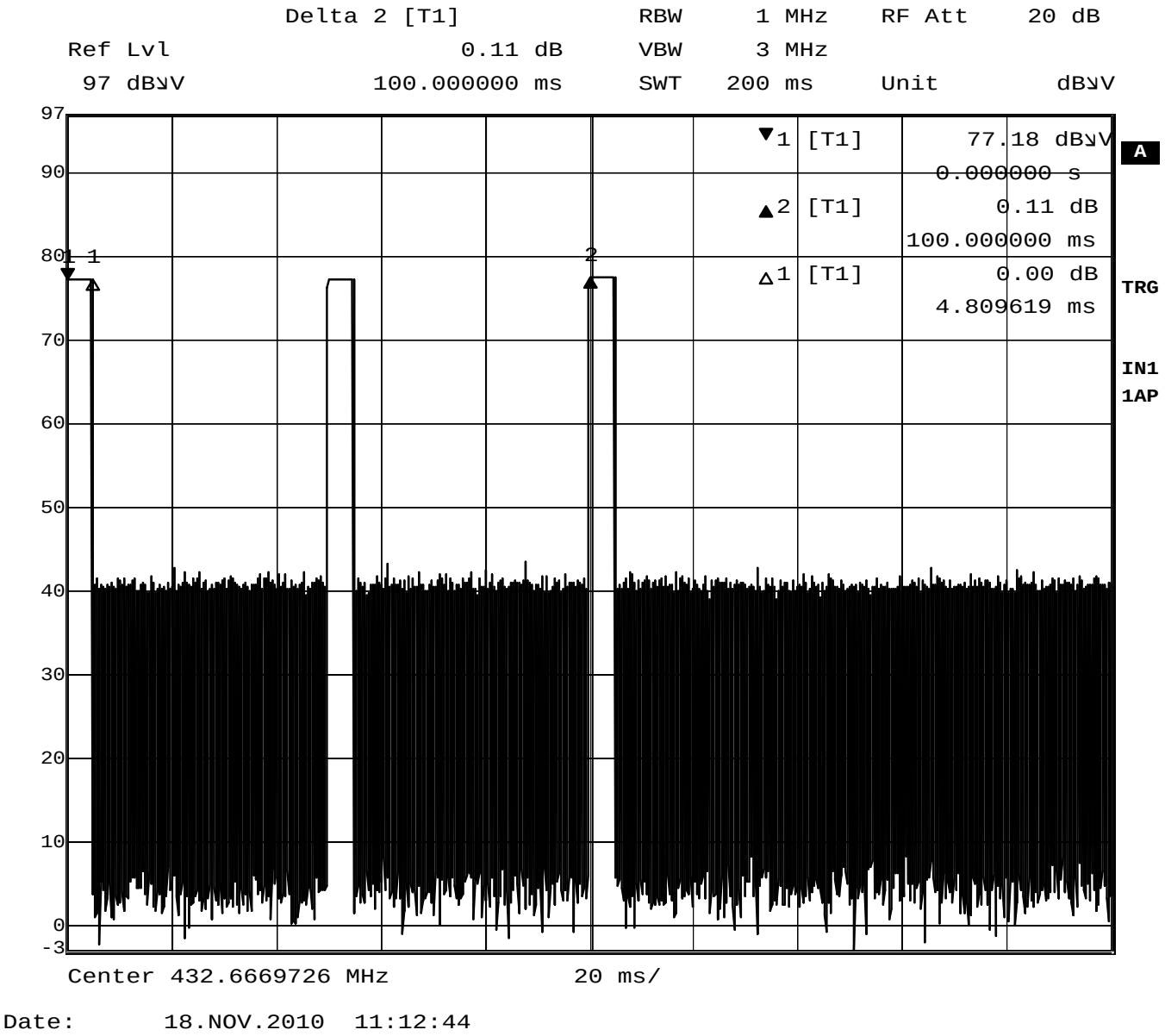


Figure 13 Pulse Train Graph



4.5 Test Conditions and Results – RADIATED EMISSIONS - Intentional

Test Description	Measurements were made in a 10-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meters. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.

Basic Standard	FCC Part 15, Subpart C, 15.209, 15.231; ANSI C63.10:2009, RSS-210	
UL LPG	80-EM-S0029	
	Frequency range	Measurement Point
Fully configured sample scanned over the following frequency range	30 MHz – 1GHz	(3 meter measurement distance)
Fully configured sample scanned over the following frequency range	1GHz – 5 GHz	(4 meter measurement distance)

Limits

Frequency (MHz)	Limit (dBµV/m)		
	Quasi-Peak	Average	
	General Emissions	Fundamental	Spurious
0.009 – 0.490	128.5 – 93.8	-	-
0.490 – 1.705	73.8 – 63	-	-
1.705 – 30	69.5	-	-
30 – 88	40	-	-
88 – 216	43.5	-	-
216-960	46	-	-
960-1000	54	-	-
1000-10000	-	-	51.5
431	-	80.7	-
437	-	80.9	-
Harmonics of the Fundamental 431	-	-	60.7 @ 3-meters 58.2 @ 4-meters
Harmonics of the Fundamental 437	-	-	60.9 @ 3-meters 58.4 @ 4-meters

Supplementary information: Spurious limits are only applied against products of the transmitter. All other emissions must meet the general limits.

Table 15 Radiated Emissions EUT Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
1	1	2
Supplementary information: None		

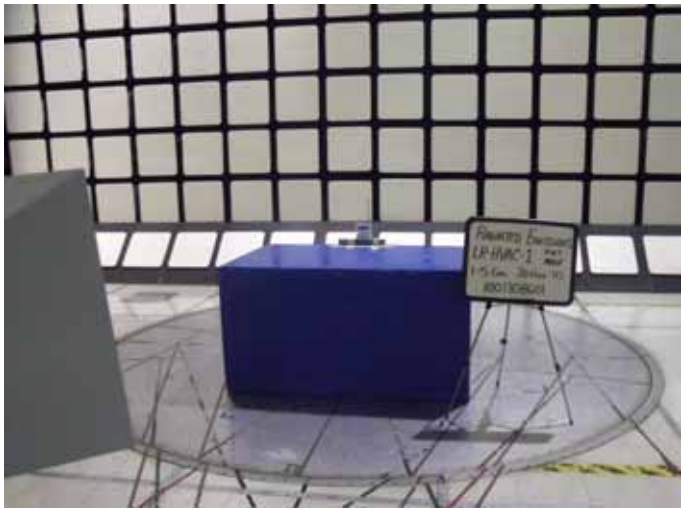
Table 16 Radiated Emissions Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
30-1000MHz					
EMI Receiver	Rohde & Schwarz	ESIB40	34968	2010-02-22	2011-02-22
Bicon Antenna	Schaffner	VBA6106A	43441	2010-09-09	2011-09-09
Log-P Antenna	Schaffner	UPA6109	44067	2010-04-26	2011-04-26
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 9.3	44740	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43734	2010-03-08	2012-03-08
Multimeter	Fluke	83III	ME5B-305	2010-02-01	2011-02-01
Above 1GHz (Band Optimized System)					
Spectrum Analyzer	Agilent	E7405A	19695	2010-02-01	2011-02-01
Horn Antenna (1-2 GHz)	ETS	3161-01	51442	N/A	N/A
Horn Antenna (2-4 GHz)	ETS	3161-02	48107	N/A	N/A
Horn Antenna (4-8 GHz)	ETS	3161-03	48106	N/A	N/A
Signal Path Controller	HP	11713A	50250	N/A	N/A
Gain Controller	HP	11713A	50251	N/A	N/A
RF Switch / Preamp Fixture	UL	BOMS1	50249	N/A	N/A
System Controller	UL	BOMS2	50252	N/A	N/A
Measurement Software	UL	Version 9.3	44740	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43734	2010-03-08	2012-03-08
Multimeter	Fluke	83III	ME5B-305	2010-02-01	2011-02-01

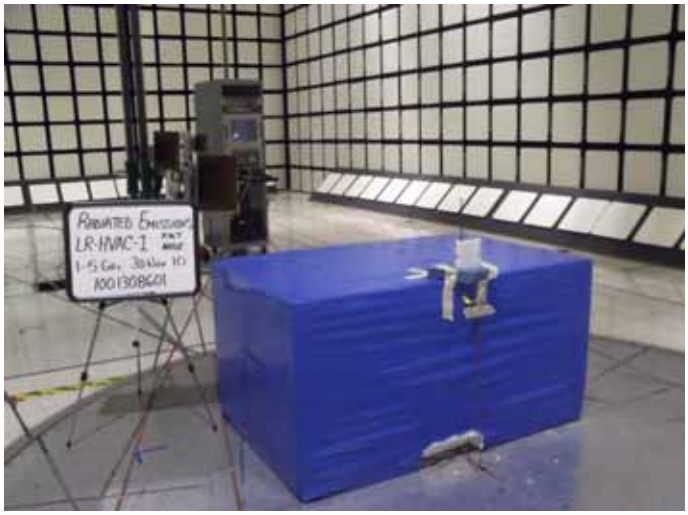
Figure 14 Test setup for Radiated Emissions – 30M 1GHz XNSMIT Mode

Front View

Rear View



Front View



Rear View

Figure 15 Radiated Emissions Graph - 431MHz

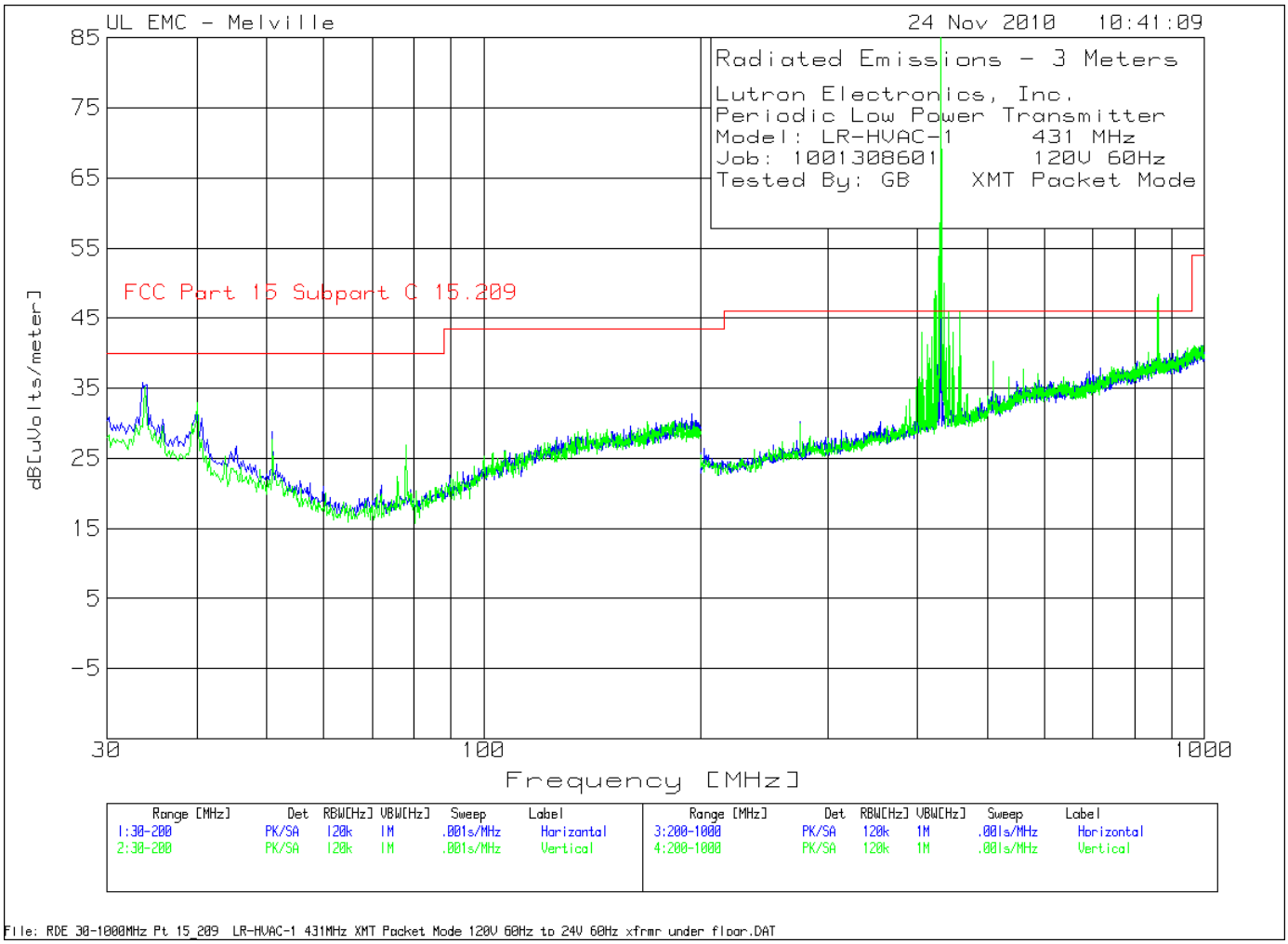


Table 17 Radiated Emissions Data Points – 431MHz

Lutron Electronics, Inc.
Periodic Low Power Transmitter
Model: LR-HVAC-1 431 MHz
Job: 1001308601 120V 60Hz
Tested By: GB XMT Packet Mode

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4	5	6
Horizontal 30 - 200MHz											
1	33.5736	18.24 PK	.3	17.3	35.84	40	-	-	-	-	-
	Azimuth:358	Height:123 Horz		Margin [dB]		-4.16	-	-	-	-	-
Vertical 30 - 200MHz											
2	33.9139	19.19 PK	.3	15.7	35.19	40	-	-	-	-	-
	Azimuth:358	Height:100 Vert		Margin [dB]		-4.81	-	-	-	-	-
Horizontal 200 - 1000MHz											
3	429.3147	27.71 PK	1.2	16.8	45.71	46	-	-	-	-	-
	Azimuth:164	Height:300 Horz		Margin [dB]		-.29	-	-	-	-	-
4	430.9155	73.88 PK	1.2	16.8	91.88	46	-	-	-	-	-
	Azimuth:342	Height:200 Horz		Margin [dB]		45.88	-	-	-	-	-
Vertical 200 - 1000MHz											
5	404.9025	25.94 PK	1.1	16	43.04	46	-	-	-	-	-
	Azimuth:292	Height:101 Vert		Margin [dB]		-2.96	-	-	-	-	-
6	413.3067	23.82 PK	1.1	16.3	41.22	46	-	-	-	-	-
	Azimuth:355	Height:101 Vert		Margin [dB]		-4.78	-	-	-	-	-
7	418.5093	24.97 PK	1.1	16.3	42.37	46	-	-	-	-	-
	Azimuth:18	Height:101 Vert		Margin [dB]		-3.63	-	-	-	-	-
8	422.1111	30.44 PK	1.1	16.3	47.84	46	-	-	-	-	-
	Azimuth:93	Height:101 Vert		Margin [dB]		1.84	-	-	-	-	-
9	424.1121	30.29 PK	1.1	16.3	47.69	46	-	-	-	-	-
	Azimuth:226	Height:101 Vert		Margin [dB]		1.69	-	-	-	-	-
10	425.3127	26.02 PK	1.1	16.3	43.42	46	-	-	-	-	-
	Azimuth:126	Height:300 Vert		Margin [dB]		-2.58	-	-	-	-	-
11	428.1141	36.22 PK	1.2	16.4	53.82	46	-	-	-	-	-
	Azimuth:226	Height:200 Vert		Margin [dB]		7.82	-	-	-	-	-
12	429.7149	40.94 PK	1.2	16.4	58.54	46	-	-	-	-	-
	Azimuth:193	Height:300 Vert		Margin [dB]		12.54	-	-	-	-	-

LIMIT 1: FCC Part 15 Subpart C 15.209

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

Lutron Electronics, Inc.
Periodic Low Power Transmitter
Model: LR-HVAC-1 431 MHz
Job: 1001308601 120V 60Hz
Tested By: GB XMT Packet Mode

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4	5	6
13	431.3157	59.2 PK	1.2	16.4	76.8	46	-	-	-	-	-
	Azimuth:342	Height:200 Vert		Margin [dB]		30.8	-	-	-	-	-
14	433.7169	23.57 PK	1.2	16.5	41.27	46	-	-	-	-	-
	Azimuth:159	Height:300 Vert		Margin [dB]		-4.73	-	-	-	-	-
15	434.9175	28.45 PK	1.1	16.5	46.05	46	-	-	-	-	-
	Azimuth:342	Height:300 Vert		Margin [dB]		.05	-	-	-	-	-
16	435.7179	32.4 PK	1.1	16.5	50	46	-	-	-	-	-
	Azimuth:126	Height:200 Vert		Margin [dB]		4	-	-	-	-	-
17	438.1191	23.11 PK	1.1	16.6	40.81	46	-	-	-	-	-
	Azimuth:18	Height:300 Vert		Margin [dB]		-5.19	-	-	-	-	-
18	441.7209	28.04 PK	1.2	16.7	45.94	46	-	-	-	-	-
	Azimuth:93	Height:101 Vert		Margin [dB]		-.06	-	-	-	-	-
19	442.9215	22.7 PK	1.2	16.7	40.6	46	-	-	-	-	-
	Azimuth:27	Height:200 Vert		Margin [dB]		-5.4	-	-	-	-	-
20	447.7239	24.91 PK	1.2	16.8	42.91	46	-	-	-	-	-
	Azimuth:226	Height:101 Vert		Margin [dB]		-3.09	-	-	-	-	-
21	456.9285	27.63 PK	1.3	17	45.93	46	-	-	-	-	-
	Azimuth:355	Height:101 Vert		Margin [dB]		-.07	-	-	-	-	-
22	862.3312	23.76 PK	1.6	23.1	48.46	46	-	-	-	-	-
	Azimuth:18	Height:101 Vert		Margin [dB]		2.46	-	-	-	-	-

LIMIT 1: FCC Part 15 Subpart C 15.209

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

Lutron Electronics, Inc.
Periodic Low Power Transmitter
Model: LR-HVAC-1 431 MHz
Job: 1001308601 120V 60Hz
Tested By: GB XMT Packet Mode

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4	5	6
Horizontal 30 - 200MHz										
33.57	6.16 QP	.3	17.3	23.76	40	-	-	-	-	-
Azimuth: 318	Height:288 Horz		Margin [dB]:	-16.24		-	-	-	-	-
Vertical 30 - 200MHz										
33.98	6.16 QP	.4	15.6	22.16	40	-	-	-	-	-
Azimuth: 67	Height:291 Vert		Margin [dB]:	-17.84		-	-	-	-	-
Horizontal 200 - 1000MHz										
429.3	8.07 QP	1.2	16.8	26.07	46	-	-	-	-	-
Azimuth: 0	Height:337 Horz		Margin [dB]:	-19.93		-	-	-	-	-
430.9649	70.81 PK	1.2	16.8	68.41*	-	80.7	-	-	-	-
Azimuth: 63	Height:170 Horz		Margin [dB]:	-		-12.23	-	-	-	-
Vertical 200 - 1000MHz										
404.8647	11.36 QP	1.1	16	28.46	46	-	-	-	-	-
Azimuth: 141	Height:194 Vert		Margin [dB]:	-17.54		-	-	-	-	-
413	7.78 QP	1.1	16.3	25.18	46	-	-	-	-	-
Azimuth: 177	Height:247 Vert		Margin [dB]:	-20.82		-	-	-	-	-
418.48	7.66 QP	1.1	16.3	25.06	46	-	-	-	-	-
Azimuth: 19	Height:385 Vert		Margin [dB]:	-20.94		-	-	-	-	-
422.2653	8.3 QP	1.1	16.3	25.7	46	-	-	-	-	-
Azimuth: 171	Height:188 Vert		Margin [dB]:	-20.3		-	-	-	-	-
424.288	8.19 QP	1.1	16.3	25.59	46	-	-	-	-	-
Azimuth: 355	Height:289 Vert		Margin [dB]:	-20.41		-	-	-	-	-
425.4	9.54 QP	1.1	16.3	26.94	46	-	-	-	-	-
Azimuth: 259	Height:230 Vert		Margin [dB]:	-19.06		-	-	-	-	-

***Duty cycle correction factor of -20.4dB applied (See section 4.4 for calculations)**

LIMIT 1: FCC Part 15 Subpart C 15.209
LIMIT 2: FCC Part 15 Subpart C 15.231

PK - Peak detector (Maximized)
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

Lutron Electronics, Inc.
Periodic Low Power Transmitter
Model: LR-HVAC-1 431 MHz
Job: 1001308601 120V 60Hz
Tested By: GB XMT Packet Mode

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4	5	6
Vertical 200 - 1000MHz										
429.8	25.56 QP	1.2	16.4	43.16	46	-	-	-	-	-
Azimuth: 130	Height:118 Vert		Margin [dB]:	-2.84	-	-	-	-	-	
428.11	20 QP	1.2	16.4	37.6	46	-	-	-	-	-
Azimuth: 71	Height:133 Vert		Margin [dB]:	-8.4	-	-	-	-	-	
431.0401	78.25 PK	1.2	16.4	75.45*	-	80.7	-	-	-	-
Azimuth: 85	Height:131 Vert		Margin [dB]:	-	-	-5.25	-	-	-	
433.3731	22.15 QP	1.2	16.5	39.85	46	-	-	-	-	-
Azimuth: 117	Height:139 Vert		Margin [dB]:	-6.15	-	-	-	-	-	
434.9175	10.75 QP	1.1	16.5	28.35	46	-	-	-	-	-
Azimuth: 82	Height:252 Vert		Margin [dB]:	-17.65	-	-	-	-	-	
435.7179	10.88 QP	1.1	16.5	28.48	46	-	-	-	-	-
Azimuth: 134	Height:186 Vert		Margin [dB]:	-17.52	-	-	-	-	-	
438	8.19 QP	1.1	16.6	25.89	46	-	-	-	-	-
Azimuth: 87	Height:299 Vert		Margin [dB]:	-20.11	-	-	-	-	-	
441.7	8.13 QP	1.2	16.7	26.03	46	-	-	-	-	-
Azimuth: 178	Height:199 Vert		Margin [dB]:	-19.97	-	-	-	-	-	
443	8.01 QP	1.2	16.7	25.91	46	-	-	-	-	-
Azimuth: 237	Height:215 Vert		Margin [dB]:	-20.09	-	-	-	-	-	
447.7	7.96 QP	1.2	16.8	25.96	46	-	-	-	-	-
Azimuth: 135	Height:247 Vert		Margin [dB]:	-20.04	-	-	-	-	-	
457	26.98 QP	1.3	17	45.28	46	-	-	-	-	-
Azimuth: 46	Height:131 Vert		Margin [dB]:	-.72	-	-	-	-	-	
861.9231	22.73 PK	1.6	23.1	47.43	-	60.7	-	-	-	-
Azimuth: 213	Height:125 Vert		Margin [dB]:	-	-	-13.27	-	-	-	
457	27.03 QP	1.3	17	45.33	46	-	-	-	-	-
Azimuth: 55	Height:124 Vert		Margin [dB]:	-.67	-	-	-	-	-	
457	27.54 QP	1.3	17	45.84	46	-	-	-	-	-
Azimuth: 49	Height:118 Vert		Margin [dB]:	-.16	-	-	-	-	-	

***Duty cycle correction factor of -20.4dB applied (See section 4.4 for calculations)**

LIMIT 1: FCC Part 15 Subpart C 15.209
LIMIT 2: FCC Part 15 Subpart C 15.231

PK - Peak detector (Maximized)
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector

RMS - RMS detection

Figure 16 Radiated Emissions Graph - 437MHz

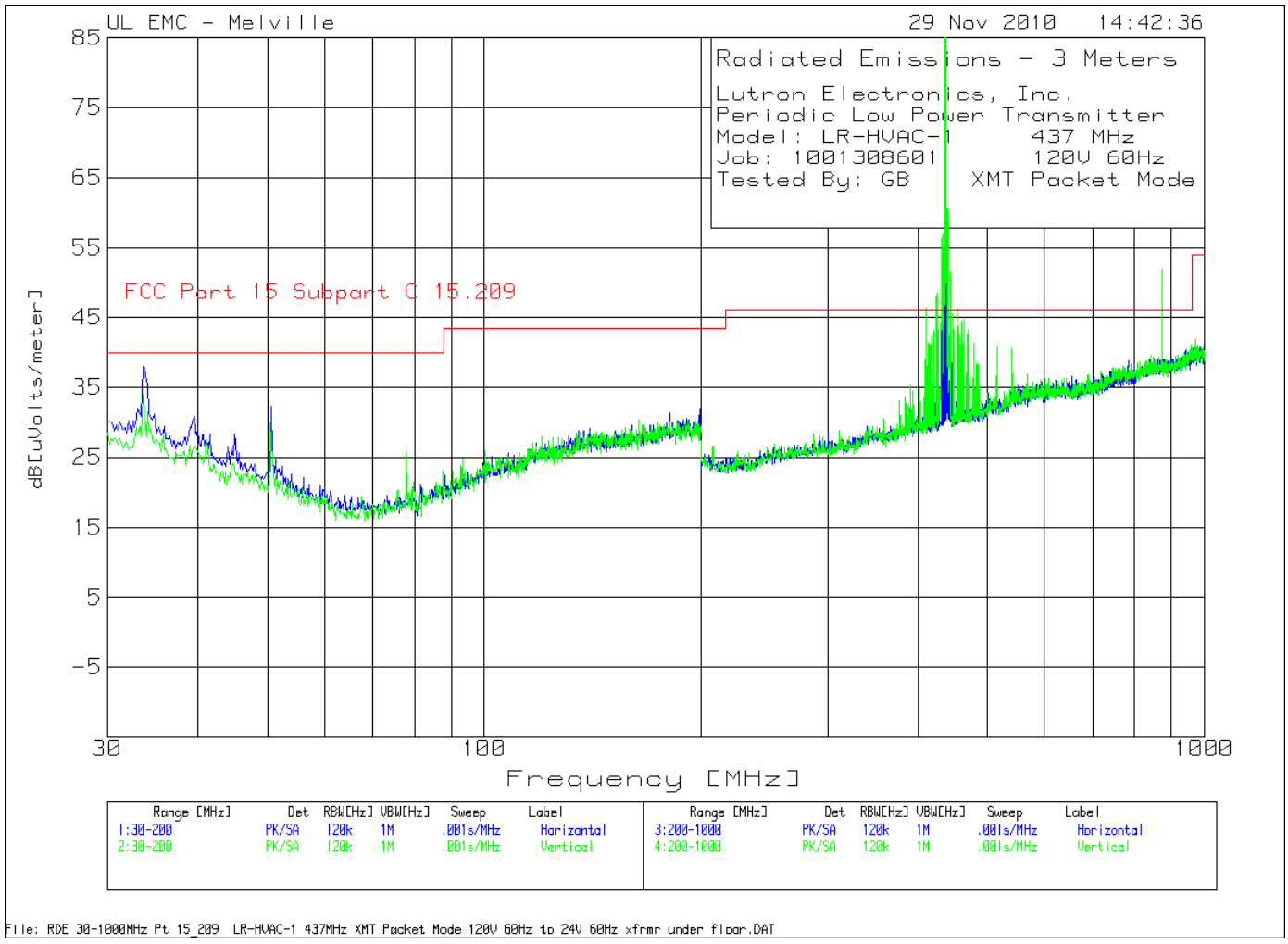


Table 18 Radiated Emissions Data Points – 437MHz

Lutron Electronics, Inc.
Periodic Low Power Transmitter
Model: LR-HVAC-1 437 MHz
Job: 1001308601 120V 60Hz
Tested By: GB XMT Packet Mode

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4	5	6
Horizontal 30 - 200MHz											
1	33.5736	20.52 PK	.3	17.3	38.12	40	-	-	-	-	-
	Azimuth:1	Height:300 Horz		Margin [dB]		-1.88	-	-	-	-	-
Horizontal 200 - 1000MHz											
2	431.3157	28.43 PK	1.2	16.8	46.43	46	-	-	-	-	-
	Azimuth:343	Height:200 Horz		Margin [dB]		.43	-	-	-	-	-
3	433.3167	23.99 PK	1.2	16.9	42.09	46	-	-	-	-	-
	Azimuth:226	Height:101 Horz		Margin [dB]		-3.91	-	-	-	-	-
4	434.5173	31.23 PK	1.1	16.9	49.23	46	-	-	-	-	-
	Azimuth:358	Height:101 Horz		Margin [dB]		3.23	-	-	-	-	-
5	437.3187	46.38 PK	1.1	16.9	64.38	46	-	-	-	-	-
	Azimuth:61	Height:400 Horz		Margin [dB]		18.38	-	-	-	-	-
6	438.1191	25.07 PK	1.1	17	43.17	46	-	-	-	-	-
	Azimuth:160	Height:200 Horz		Margin [dB]		-2.83	-	-	-	-	-
7	438.9195	32.1 PK	1.2	17	50.3	46	-	-	-	-	-
	Azimuth:61	Height:200 Horz		Margin [dB]		4.3	-	-	-	-	-
8	441.3207	24.46 PK	1.2	17	42.66	46	-	-	-	-	-
	Azimuth:61	Height:400 Horz		Margin [dB]		-3.34	-	-	-	-	-
9	443.3217	22.01 PK	1.2	17.1	40.31	46	-	-	-	-	-
	Azimuth:17	Height:200 Horz		Margin [dB]		-5.69	-	-	-	-	-
10	874.3372	20.24 PK	1.6	23	44.84	46	-	-	-	-	-
	Azimuth:290	Height:200 Horz		Margin [dB]		-1.16	-	-	-	-	-
Vertical 200 - 1000MHz											
11	410.9055	29.05 PK	1.1	16.2	46.35	46	-	-	-	-	-
	Azimuth:357	Height:101 Vert		Margin [dB]		.35	-	-	-	-	-
12	414.1071	23.97 PK	1.1	16.3	41.37	46	-	-	-	-	-
	Azimuth:325	Height:200 Vert		Margin [dB]		-4.63	-	-	-	-	-
13	414.9075	23.83 PK	1.1	16.3	41.23	46	-	-	-	-	-
	Azimuth:343	Height:101 Vert		Margin [dB]		-4.77	-	-	-	-	-
14	416.9085	23.62 PK	1.1	16.3	41.02	46	-	-	-	-	-
	Azimuth:27	Height:101 Vert		Margin [dB]		-4.98	-	-	-	-	-

LIMIT 1: FCC Part 15 Subpart C 15.209

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

Lutron Electronics, Inc.
Periodic Low Power Transmitter
Model: LR-HVAC-1 437 MHz
Job: 1001308601 120V 60Hz
Tested By: GB XMT Packet Mode

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4	5	6
Vertical 200 - 1000MHz ----------											
15	418.5093	24.91 PK	1.1	16.3	42.31	46	-	-	-	-	-
	Azimuth:193	Height:200 Vert		Margin [dB]		-3.69	-	-	-	-	-
16	420.9105	25.67 PK	1.1	16.3	43.07	46	-	-	-	-	-
	Azimuth:357	Height:200 Vert		Margin [dB]		-2.93	-	-	-	-	-
17	423.7119	30.73 PK	1.1	16.3	48.13	46	-	-	-	-	-
	Azimuth:60	Height:101 Vert		Margin [dB]		2.13	-	-	-	-	-
18	425.3127	27.17 PK	1.1	16.3	44.57	46	-	-	-	-	-
	Azimuth:60	Height:101 Vert		Margin [dB]		-1.43	-	-	-	-	-
19	426.5133	25.83 PK	1.1	16.3	43.23	46	-	-	-	-	-
	Azimuth:357	Height:300 Vert		Margin [dB]		-2.77	-	-	-	-	-
20	430.9155	36.51 PK	1.2	16.4	54.11	46	-	-	-	-	-
	Azimuth:193	Height:200 Vert		Margin [dB]		8.11	-	-	-	-	-
21	432.1161	38.8 PK	1.2	16.4	56.4	46	-	-	-	-	-
	Azimuth:355	Height:101 Vert		Margin [dB]		10.4	-	-	-	-	-
22	432.9165	39.25 PK	1.2	16.5	56.95	46	-	-	-	-	-
	Azimuth:17	Height:101 Vert		Margin [dB]		10.95	-	-	-	-	-
23	434.5173	37.19 PK	1.1	16.5	54.79	46	-	-	-	-	-
	Azimuth:17	Height:300 Vert		Margin [dB]		8.79	-	-	-	-	-
24	435.3177	35.1 PK	1.1	16.5	52.7	46	-	-	-	-	-
	Azimuth:355	Height:400 Vert		Margin [dB]		6.7	-	-	-	-	-
25	436.9185	79.96 PK	1.1	16.6	97.66	46	-	-	-	-	-
	Azimuth:343	Height:101 Vert		Margin [dB]		51.66	-	-	-	-	-
26	438.5193	49.41 PK	1.2	16.6	67.21	46	-	-	-	-	-
	Azimuth:325	Height:101 Vert		Margin [dB]		21.21	-	-	-	-	-
27	440.5203	42.43 PK	1.2	16.7	60.33	46	-	-	-	-	-
	Azimuth:355	Height:101 Vert		Margin [dB]		14.33	-	-	-	-	-
28	443.7219	33.75 PK	1.2	16.7	51.65	46	-	-	-	-	-
	Azimuth:126	Height:200 Vert		Margin [dB]		5.65	-	-	-	-	-

LIMIT 1: FCC Part 15 Subpart C 15.209

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

Lutron Electronics, Inc.
Periodic Low Power Transmitter
Model: LR-HVAC-1 437 MHz
Job: 1001308601 120V 60Hz
Tested By: GB XMT Packet Mode

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4	5	6
Vertical 200 - 1000MHz											
29	447.7239	27.6 PK	1.2	16.8	45.6	46	-	-	-	-	-
	Azimuth:126	Height:200 Vert		Margin [dB]		-.4	-	-	-	-	-
30	454.1271	27.91 PK	1.3	16.9	46.11	46	-	-	-	-	-
	Azimuth:292	Height:101 Vert		Margin [dB]		.11	-	-	-	-	-
31	455.7279	25.57 PK	1.3	16.9	43.77	46	-	-	-	-	-
	Azimuth:259	Height:101 Vert		Margin [dB]		-2.23	-	-	-	-	-
32	456.9285	24.26 PK	1.3	17	42.56	46	-	-	-	-	-
	Azimuth:226	Height:200 Vert		Margin [dB]		-3.44	-	-	-	-	-
33	458.1291	22.81 PK	1.3	17	41.11	46	-	-	-	-	-
	Azimuth:343	Height:101 Vert		Margin [dB]		-4.89	-	-	-	-	-
34	460.1301	26.14 PK	1.2	17.1	44.44	46	-	-	-	-	-
	Azimuth:27	Height:101 Vert		Margin [dB]		-1.56	-	-	-	-	-
35	462.9315	26.36 PK	1.2	17.2	44.76	46	-	-	-	-	-
	Azimuth:27	Height:200 Vert		Margin [dB]		-1.24	-	-	-	-	-
36	468.9345	24.21 PK	1.2	17.3	42.71	46	-	-	-	-	-
	Azimuth:193	Height:101 Vert		Margin [dB]		-3.29	-	-	-	-	-
37	470.9355	24.77 PK	1.2	17.3	43.27	46	-	-	-	-	-
	Azimuth:27	Height:101 Vert		Margin [dB]		-2.73	-	-	-	-	-
38	873.937	27.12 PK	1.6	23.2	51.92	46	-	-	-	-	-
	Azimuth:357	Height:101 Vert		Margin [dB]		5.92	-	-	-	-	-

LIMIT 1: FCC Part 15 Subpart C 15.209

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

Lutron Electronics, Inc.
Periodic Low Power Transmitter
Model: LR-HVAC-1 437 MHz
Job: 1001308601 120V 60Hz
Tested By: GB XMT Packet Mode

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4	5	6
Horizontal 30 - 200MHz										
33.57	5.57 QP	.3	17.3	23.17	40	-	-	-	-	-
Azimuth: 209	Height:145 Horz		Margin [dB]:		-16.83	-	-	-	-	-
Horizontal 200 - 1000MHz										
436.98	75.19 PK	1.1	16.9	72.79*	-	80.9	-	-	-	-
Azimuth: 27	Height:182 Horz		Margin [dB]:		-	-8.11	-	-	-	-
435.11	12.7 QP	1.1	16.9	30.7	46	-	-	-	-	-
Azimuth: 342	Height:190 Horz		Margin [dB]:		-15.3	-	-	-	-	-
439	17.97 QP	1.2	17	36.17	46	-	-	-	-	-
Azimuth: 57	Height:177 Horz		Margin [dB]:		-9.83	-	-	-	-	-
431.4	7.17 QP	1.2	16.8	25.17	46	-	-	-	-	-
Azimuth: 252	Height:114 Horz		Margin [dB]:		-20.83	-	-	-	-	-
433.3	8.73 QP	1.2	16.9	26.83	46	-	-	-	-	-
Azimuth: 347	Height:186 Horz		Margin [dB]:		-19.17	-	-	-	-	-
438.2	23.77 QP	1.1	17	41.87	46	-	-	-	-	-
Azimuth: 20	Height:175 Horz		Margin [dB]:		-4.13	-	-	-	-	-
441.3	7.17 QP	1.2	17	25.37	46	-	-	-	-	-
Azimuth: 277	Height:209 Horz		Margin [dB]:		-20.63	-	-	-	-	-
443.35	7.23 QP	1.2	17.1	25.53	46	-	-	-	-	-
Azimuth: 164	Height:365 Horz		Margin [dB]:		-20.47	-	-	-	-	-

***Duty cycle correction factor of -20.4dB applied (See section 4.4 for calculations)**

LIMIT 1: FCC Part 15 Subpart C 15.209
LIMIT 2: FCC Part 15 Subpart C 15.231

PK - Peak detector (Maximized)
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

Lutron Electronics, Inc.
Periodic Low Power Transmitter
Model: LR-HVAC-1 437 MHz
Job: 1001308601 120V 60Hz
Tested By: GB XMT Packet Mode

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4	5	6
874.0411	31.7 PK	1.6	23	56.3	-	60.9	-	-	-	-
Azimuth: 20	Height:221 Horz		Margin [dB]:		-	-4.6	-	-	-	-
Vertical 200 - 1000MHz										
437	71.49 PK	1.1	16.6	68.79*	-	80.9	-	-	-	-
Azimuth: 320	Height:130 Vert		Margin [dB]:		-	-12.11	-	-	-	-
438.5	24.18 QP	1.2	16.6	41.98	46	-	-	-	-	-
Azimuth: 339	Height:288 Vert		Margin [dB]:		-4.02	-	-	-	-	-
440.52	18.47 QP	1.2	16.7	36.37	46	-	-	-	-	-
Azimuth: 281	Height:139 Vert		Margin [dB]:		-9.63	-	-	-	-	-
443.72	17.88 QP	1.2	16.7	35.78	46	-	-	-	-	-
Azimuth: 329	Height:125 Vert		Margin [dB]:		-10.22	-	-	-	-	-
447.72	17.3 QP	1.2	16.8	35.3	46	-	-	-	-	-
Azimuth: 34	Height:129 Vert		Margin [dB]:		-10.7	-	-	-	-	-
454.13	17.1 QP	1.3	16.9	35.3	46	-	-	-	-	-
Azimuth: 288	Height:145 Vert		Margin [dB]:		-10.7	-	-	-	-	-
455.73	17.1 QP	1.3	16.9	35.3	46	-	-	-	-	-
Azimuth: 3	Height:115 Vert		Margin [dB]:		-10.7	-	-	-	-	-
455.73	8.89 QP	1.3	16.9	27.09	46	-	-	-	-	-
Azimuth: 3	Height:115 Vert		Margin [dB]:		-18.91	-	-	-	-	-
456.93	8.57 QP	1.3	17	26.87	46	-	-	-	-	-
Azimuth: 7	Height:106 Vert		Margin [dB]:		-19.13	-	-	-	-	-
458.13	8.01 QP	1.3	17	26.31	46	-	-	-	-	-
Azimuth: 303	Height:127 Vert		Margin [dB]:		-19.69	-	-	-	-	-
460.13	8.46 QP	1.2	17.1	26.76	46	-	-	-	-	-
Azimuth: 358	Height:124 Vert		Margin [dB]:		-19.24	-	-	-	-	-

***Duty cycle correction factor of -20.4dB applied (See section 4.4 for calculations)**

LIMIT 1: FCC Part 15 Subpart C 15.209
LIMIT 2: FCC Part 15 Subpart C 15.231

PK - Peak detector (Maximized)
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

Lutron Electronics, Inc.
Periodic Low Power Transmitter
Model: LR-HVAC-1 437 MHz
Job: 1001308601 120V 60Hz
Tested By: GB XMT Packet Mode

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4	5	6
Vertical 200 - 1000MHz										
463.0342	33.71 PK	1.2	17.2	52.11**	-	60.9	-	-	-	-
Azimuth: 344	Height:129 Vert		Margin [dB]:		-	-8.79	-	-	-	-
468.93	7.84 QP	1.2	17.3	26.34	46	-	-	-	-	-
Azimuth: 296	Height:121 Vert		Margin [dB]:		-19.66	-	-	-	-	-
470.94	8.07 QP	1.2	17.3	26.57	46	-	-	-	-	-
Azimuth: 360	Height:104 Vert		Margin [dB]:		-19.43	-	-	-	-	-
411.0373	28.54 QP	1.1	16.2	45.84	46	-	-	-	-	-
Azimuth: 50	Height:125 Vert		Margin [dB]:		-.16	-	-	-	-	-
414.11	7.78 QP	1.1	16.3	25.18	46	-	-	-	-	-
Azimuth: 33	Height:110 Vert		Margin [dB]:		-20.82	-	-	-	-	-
414.91	7.72 QP	1.1	16.3	25.12	46	-	-	-	-	-
Azimuth: 119	Height:128 Vert		Margin [dB]:		-20.88	-	-	-	-	-
416.91	8.07 QP	1.1	16.3	25.47	46	-	-	-	-	-
Azimuth: 113	Height:110 Vert		Margin [dB]:		-20.53	-	-	-	-	-
418.51	8.46 QP	1.1	16.3	25.86	46	-	-	-	-	-
Azimuth: 63	Height:123 Vert		Margin [dB]:		-20.14	-	-	-	-	-
420.91	8.68 QP	1.1	16.3	26.08	46	-	-	-	-	-
Azimuth: 109	Height:141 Vert		Margin [dB]:		-19.92	-	-	-	-	-

***Duty cycle correction factor of -20.4dB applied (See section 4.4 for calculations)**
** - determined this frequency is a product of the transmitter circuitry. Spurious emission limit applied

LIMIT 1: FCC Part 15 Subpart C 15.209
LIMIT 2: FCC Part 15 Subpart C 15.231

PK - Peak detector (Maximized)
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4	5	6
423.71	10.1 QP	1.1	16.3	27.5	46	-	-	-	-	-
Azimuth: 336	Height:143 Vert		Margin [dB]:		-18.5	-	-	-	-	-
425.31	11.2 QP	1.1	16.3	28.6	46	-	-	-	-	-
Azimuth: 348	Height:122 Vert		Margin [dB]:		-17.4	-	-	-	-	-
426.51	12.07 QP	1.1	16.3	29.47	46	-	-	-	-	-
Azimuth: 135	Height:113 Vert		Margin [dB]:		-16.53	-	-	-	-	-
430.92	17.14 QP	1.2	16.4	34.74	46	-	-	-	-	-
Azimuth: 351	Height:122 Vert		Margin [dB]:		-11.26	-	-	-	-	-
432.12	18.74 QP	1.2	16.4	36.34	46	-	-	-	-	-
Azimuth: 346	Height:144 Vert		Margin [dB]:		-9.66	-	-	-	-	-
432.92	20.46 QP	1.2	16.5	38.16	46	-	-	-	-	-
Azimuth: 336	Height:134 Vert		Margin [dB]:		-7.84	-	-	-	-	-
434.52	24.72 QP	1.1	16.5	42.32	46	-	-	-	-	-
Azimuth: 349	Height:111 Vert		Margin [dB]:		-3.68	-	-	-	-	-
874.0731	34.73 PK	1.6	23.2	59.53	-	60.9	-	-	-	-
Azimuth: 38	Height:231 Vert		Margin [dB]:		-	-1.37	-	-	-	-

***Duty cycle correction factor of -20.4dB applied (See section 4.4 for calculations)**

LIMIT 1: FCC Part 15 Subpart C 15.209
LIMIT 2: FCC Part 15 Subpart C 15.231

PK - Peak detector (Maximized)
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

Figure 17 Radiated Emissions Graph, 431MHz

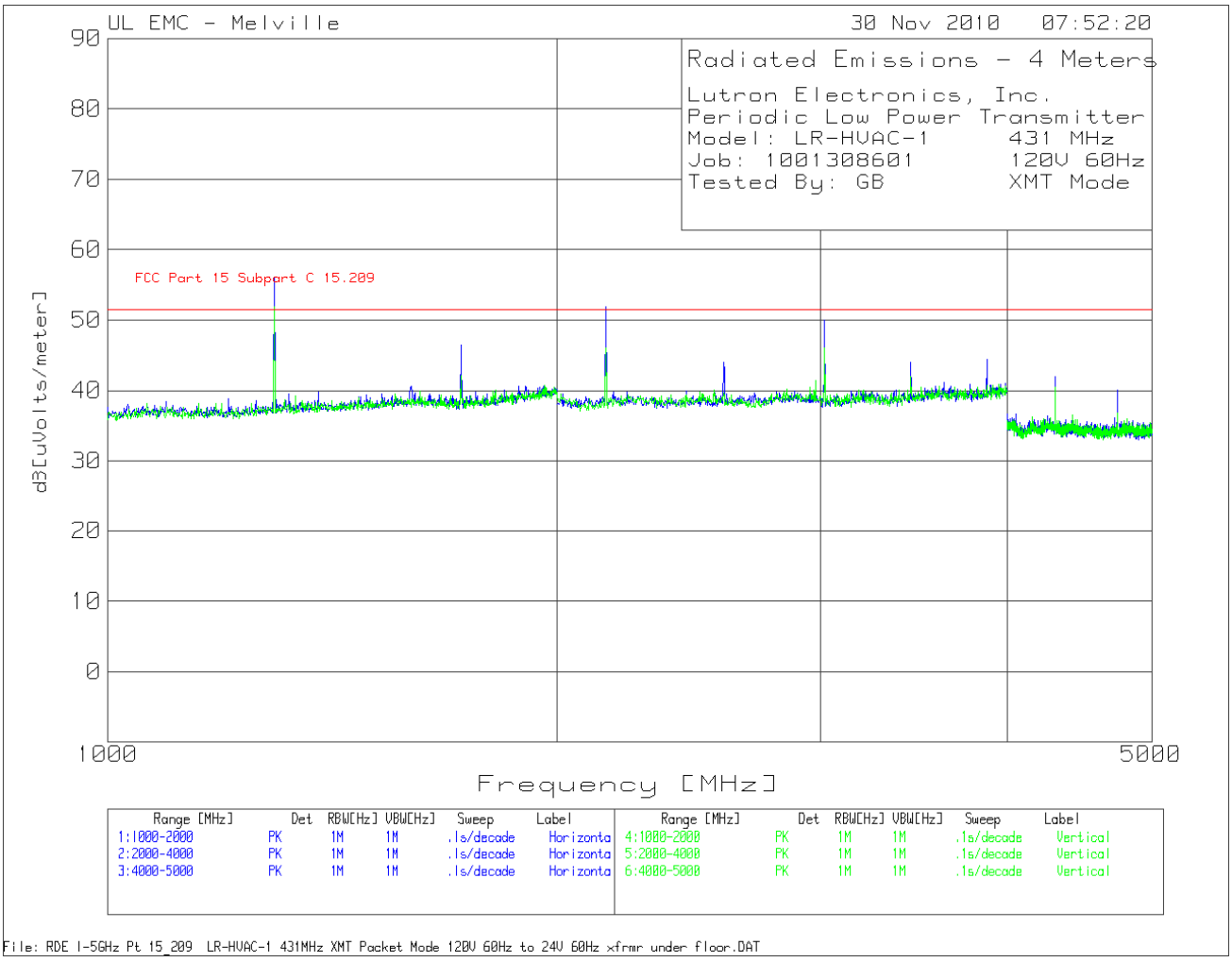


Table 19 Radiated Emissions Data Points, 431MHz

Lutron Electronics, Inc.
Periodic Low Power Transmitter
Model: LR-HVAC-1 431 MHz
Job: 1001308601 120V 60Hz
Tested By: GB XMT Mode

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4	5	6
Horizontal 1000 - 2000MHz											
1	1292.135	80.83 PK	-45.13	20.4	56.1	51.5	-	-	-	-	-
		Height:100 Horz		Margin [dB]		4.6	-	-	-	-	-
2	1724.095	70.02 PK	-44.38	20.8	46.44	51.5	-	-	-	-	-
		Height:100 Horz		Margin [dB]		-5.06	-	-	-	-	-
Horizontal 2000 - 4000MHz											
3	2154.806	74.74 PK	-44.21	21.4	51.93	51.5	-	-	-	-	-
		Height:250 Horz		Margin [dB]		.43	-	-	-	-	-
4	2584.27	66.16 PK	-43.49	21.3	43.97	51.5	-	-	-	-	-
		Height:100 Horz		Margin [dB]		-7.53	-	-	-	-	-
5	3018.727	71.49 PK	-42.94	21.5	50.05	51.5	-	-	-	-	-
		Height:100 Horz		Margin [dB]		-1.45	-	-	-	-	-
6	3448.19	64.85 PK	-42.96	22.1	43.99	51.5	-	-	-	-	-
		Height:100 Horz		Margin [dB]		-7.51	-	-	-	-	-
7	3877.653	64.74 PK	-42.94	22.6	44.4	51.5	-	-	-	-	-
		Height:100 Horz		Margin [dB]		-7.1	-	-	-	-	-
Horizontal 4000 - 5000MHz											
8	4310.316	66.96 PK	-52.63	27.7	42.03	51.5	-	-	-	-	-
		Height:250 Horz		Margin [dB]		-9.47	-	-	-	-	-
9	4741.265	66.14 PK	-53.29	27.2	40.05	51.5	-	-	-	-	-
		Height:250 Horz		Margin [dB]		-11.45	-	-	-	-	-
Vertical 1000 - 2000MHz											
10	1292.135	76.62 PK	-45.13	20.4	51.89	51.5	-	-	-	-	-
		Height:100 Vert		Margin [dB]		.39	-	-	-	-	-
11	1724.095	65.73 PK	-44.38	20.8	42.15	51.5	-	-	-	-	-
		Height:100 Vert		Margin [dB]		-9.35	-	-	-	-	-

LIMIT 1: FCC Part 15 Subpart C 15.209
LIMIT 2: NONE
LIMIT 3: NONE
LIMIT 4: NONE
LIMIT 5: NONE
LIMIT 6: NONE

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

Vertical 2000 - 4000MHz ----------											
12	2154.806	69.27 PK	-44.21	21	46.06	51.5	-	-	-	-	-
		Height:249 Vert	Margin [dB]			-5.44	-	-	-	-	-
13	3018.727	67.32 PK	-42.94	21.7	46.08	51.5	-	-	-	-	-
		Height:249 Vert	Margin [dB]			-5.42	-	-	-	-	-
14	3448.19	62.75 PK	-42.96	22.2	41.99	51.5	-	-	-	-	-
		Height:100 Vert	Margin [dB]			-9.51	-	-	-	-	-
Vertical 4000 - 5000MHz ----------											
15	4309.484	65.34 PK	-52.64	27.8	40.5	51.5	-	-	-	-	-
		Height:249 Vert	Margin [dB]			-11	-	-	-	-	-
16	4740.433	62.98 PK	-53.3	27.1	36.78	51.5	-	-	-	-	-
		Height:100 Vert	Margin [dB]			-14.72	-	-	-	-	-

LIMIT 1: FCC Part 15 Subpart C 15.209
LIMIT 2: NONE
LIMIT 3: NONE
LIMIT 4: NONE
LIMIT 5: NONE
LIMIT 6: NONE

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

Lutron Electronics, Inc.
Periodic Low Power Transmitter
Model: LR-HVAC-1 431 MHz
Job: 1001308601 120V 60Hz
Tested By: GB XMT Mode

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4	5	6
Horizontal 1000 - 2000MHz										
1293.5125	79.63 PK	-45.15	20.5	54.98	-	58.2	-	-	-	-
Azimuth: 181	Height:296 Horz		Margin [dB]:		-	-3.22	-	-	-	-
1724	72.99 PK	-44.39	20.8	49.4	51.5	-	-	-	-	-
Azimuth: 190	Height:310 Horz		Margin [dB]:		-2.1	-	-	-	-	-
Horizontal 2000 - 4000MHz										
2155.125	77.07 PK	-44.21	21.4	54.26	-	58.2	-	-	-	-
Azimuth: 203	Height:309 Horz		Margin [dB]:		-	-3.94	-	-	-	-
2586.25	67.49 PK	-43.49	21.3	45.3	51.5	-	-	-	-	-
Azimuth: 179	Height:374 Horz		Margin [dB]:		-6.2	-	-	-	-	-
3017.105	72.56 PK	-42.93	21.5	51.13	51.5	-	-	-	-	-
Azimuth: 160	Height:161 Horz		Margin [dB]:		-.37	-	-	-	-	-
3448.235	68.46 PK	-42.96	22.1	47.6	51.5	-	-	-	-	-
Azimuth: 223	Height:378 Horz		Margin [dB]:		-3.9	-	-	-	-	-
3878.4125	65.3 PK	-42.93	22.6	44.97	51.5	-	-	-	-	-
Azimuth: 150	Height:295 Horz		Margin [dB]:		-6.53	-	-	-	-	-
Horizontal 4000 - 5000MHz										
4310	68.32 PK	-52.63	27.7	43.39	51.5	-	-	-	-	-
Azimuth: 199	Height:233 Horz		Margin [dB]:		-8.11	-	-	-	-	-
4740.45	68 PK	-53.3	27.2	41.9	51.5	-	-	-	-	-
Azimuth: 246	Height:270 Horz		Margin [dB]:		-9.6	-	-	-	-	-

***Duty cycle correction factor of -20.4dB applied (See section 4.4 for calculations)**

LIMIT 1: FCC Part 15 Subpart C 15.209
LIMIT 2: FCC Part 15 Subpart C 15.231

PK - Peak detector (Maximized)
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

Test Frequency [MHz]	Meter Reading [dB(uV)]		Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4	5	6
Vertical 1000 - 2000MHz											
1292.925	78.25	PK	-45.16	20.5	53.59	-	58.2	-	-	-	-
Azimuth: 203	Height:322	Vert		Margin [dB]:		-	-4.61	-	-	-	-
1724	68.6	PK	-44.39	20.8	45.01	51.5	-	-	-	-	-
Azimuth: 299	Height:394	Vert		Margin [dB]:		-6.49	-	-	-	-	-
Vertical 2000 - 4000MHz											
2155.025	71.05	PK	-44.21	21	47.84	51.5	-	-	-	-	-
Azimuth: 290	Height:393	Vert		Margin [dB]:		-3.66	-	-	-	-	-
3017.025	69.06	PK	-42.93	21.7	47.83	51.5	-	-	-	-	-
Azimuth: 305	Height:337	Vert		Margin [dB]:		-3.67	-	-	-	-	-
3448	65.38	PK	-42.96	22.2	44.62	51.5	-	-	-	-	-
Azimuth: 265	Height:312	Vert		Margin [dB]:		-6.88	-	-	-	-	-
Vertical 4000 - 5000MHz											
4309.5625	65.39	PK	-52.64	27.8	40.55	51.5	-	-	-	-	-
Azimuth: 304	Height:307	Vert		Margin [dB]:		-10.95	-	-	-	-	-
4741.1875	65.14	PK	-53.29	27.1	38.95	51.5	-	-	-	-	-
Azimuth: 272	Height:354	Vert		Margin [dB]:		-12.55	-	-	-	-	-

***Duty cycle correction factor of -20.4dB applied (See section 4.4 for calculations)**

LIMIT 1: FCC Part 15 Subpart C 15.209
LIMIT 2: FCC Part 15 Subpart C 15.231

PK - Peak detector (Maximized)
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

Figure 18 Radiated Emissions Graph, 437MHz

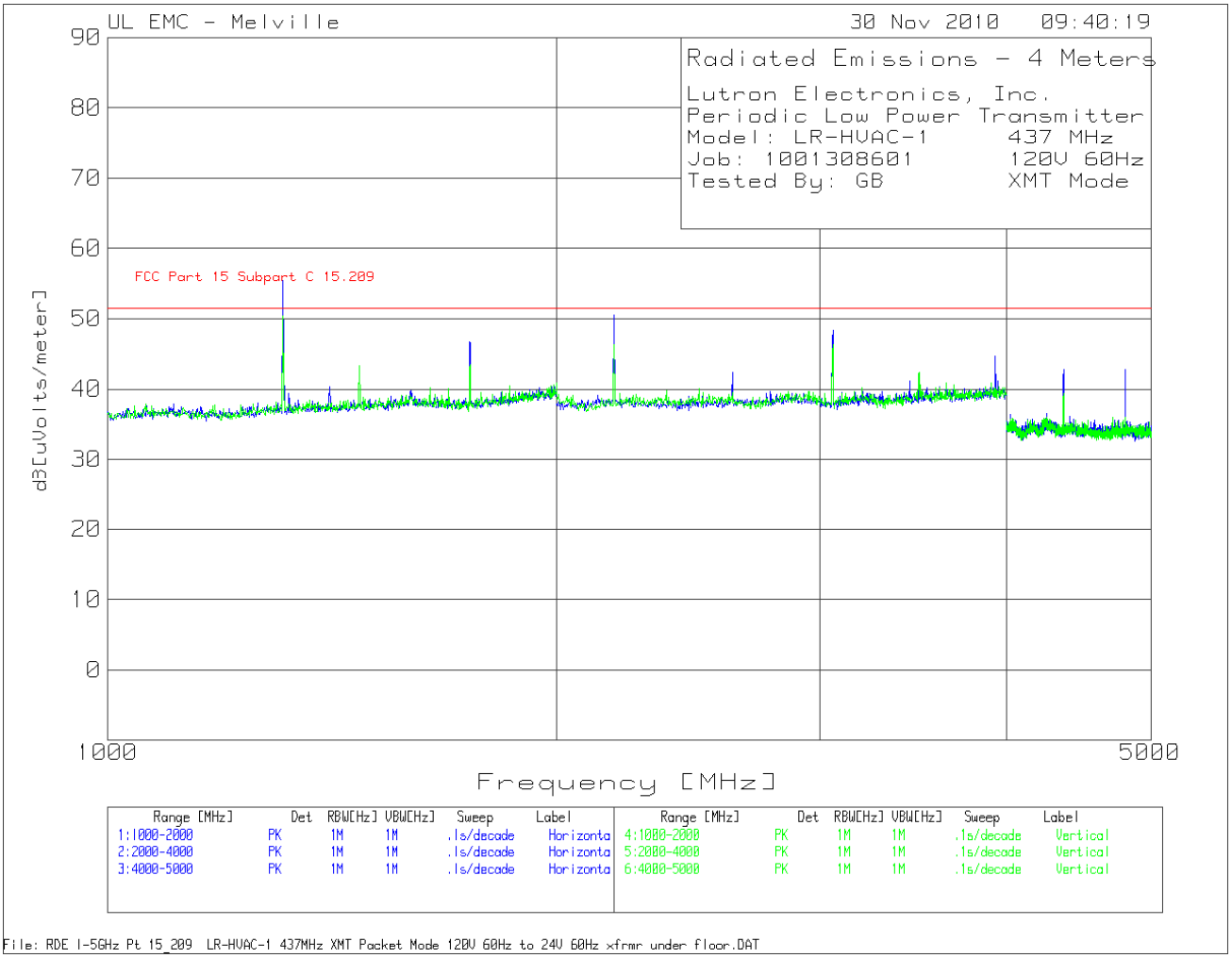


Table 20 Radiated Emissions Data Points, 437MHz

Lutron Electronics, Inc.
Periodic Low Power Transmitter
Model: LR-HVAC-1 437 MHz
Job: 1001308601 120V 60Hz
Tested By: GB XMT Mode

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4	5	6
Horizontal 1000 - 2000MHz											
1	1310.861	80.08 PK	-45.09	20.5	55.49	51.5	-	-	-	-	-
		Height:100 Horz		Margin [dB]		3.99	-	-	-	-	-
2	1408.24	64.76 PK	-45.05	20.7	40.41	51.5	-	-	-	-	-
		Height:250 Horz		Margin [dB]		-11.09	-	-	-	-	-
3	1747.815	70.25 PK	-44.35	20.8	46.7	51.5	-	-	-	-	-
		Height:100 Horz		Margin [dB]		-4.8	-	-	-	-	-
Horizontal 2000 - 4000MHz											
4	2184.769	73 PK	-44	21.5	50.5	51.5	-	-	-	-	-
		Height:250 Horz		Margin [dB]		-1	-	-	-	-	-
5	2621.723	64.5 PK	-43.56	21.4	42.34	51.5	-	-	-	-	-
		Height:101 Horz		Margin [dB]		-9.16	-	-	-	-	-
6	3061.174	69.79 PK	-42.99	21.6	48.4	51.5	-	-	-	-	-
		Height:101 Horz		Margin [dB]		-3.1	-	-	-	-	-
7	3445.693	62.1 PK	-42.97	22.1	41.23	51.5	-	-	-	-	-
				Margin [dB]		-10.27	-	-	-	-	-
8	3932.584	64.82 PK	-42.81	22.7	44.71	51.5	-	-	-	-	-
				Margin [dB]		-6.79	-	-	-	-	-
Horizontal 4000 - 5000MHz											
9	4370.216	67.94 PK	-52.71	27.6	42.83	51.5	-	-	-	-	-
				Margin [dB]		-8.67	-	-	-	-	-
10	4807.82	69.28 PK	-53.54	27.1	42.84	51.5	-	-	-	-	-
				Margin [dB]		-8.66	-	-	-	-	-

LIMIT 1: FCC Part 15 Subpart C 15.209
LIMIT 2: NONE
LIMIT 3: NONE
LIMIT 4: NONE
LIMIT 5: NONE
LIMIT 6: NONE

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4	5	6
Vertical 1000 - 2000MHz											
11	1310.861	74.97 PK	-45.09	20.5	50.38	51.5	-	-	-	-	-
				Margin [dB]		-1.12	-	-	-	-	-
12	1474.407	67.32 PK	-44.79	20.8	43.33	51.5	-	-	-	-	-
				Margin [dB]		-8.17	-	-	-	-	-
13	1749.064	67.03 PK	-44.33	20.8	43.5	51.5	-	-	-	-	-
				Margin [dB]		-8	-	-	-	-	-
Vertical 2000 - 4000MHz											
14	2184.769	69.16 PK	-44	21.2	46.36	51.5	-	-	-	-	-
				Margin [dB]		-5.14	-	-	-	-	-
15	3061.174	67.48 PK	-42.99	21.8	46.29	51.5	-	-	-	-	-
				Margin [dB]		-5.21	-	-	-	-	-
16	3498.127	62.8 PK	-42.86	22.4	42.34	51.5	-	-	-	-	-
				Margin [dB]		-9.16	-	-	-	-	-
Vertical 4000 - 5000MHz											
17	4370.216	64.38 PK	-52.71	27.7	39.37	51.5	-	-	-	-	-
				Margin [dB]		-12.13	-	-	-	-	-

LIMIT 1: FCC Part 15 Subpart C 15.209
LIMIT 2: NONE
LIMIT 3: NONE
LIMIT 4: NONE
LIMIT 5: NONE
LIMIT 6: NONE

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

Lutron Electronics, Inc.
Periodic Low Power Transmitter
Model: LR-HVAC-1 437 MHz
Job: 1001308601 120V 60Hz
Tested By: GB XMT Mode

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4	5	6
Horizontal 1000 - 2000MHz										
1310.7875	83.22 PK	-45.08	20.5	38.24*	51.5	-	-	-	-	-
Azimuth: 185	Height:312 Horz		Margin [dB]:		-13.26	-	-	-	-	-
1407.85	62.62 PK	-45.05	20.7	38.27	51.5	-	-	-	-	-
Azimuth: 94	Height:237 Horz		Margin [dB]:		-13.23	-	-	-	-	-
1747.7625	73.1 PK	-44.35	20.8	49.55	51.5	-	-	-	-	-
Azimuth: 204	Height:218 Horz		Margin [dB]:		-1.95	-	-	-	-	-
Horizontal 2000 - 4000MHz										
2185	76.08 PK	-44	21.5	53.58	-	58.4	-	-	-	-
Azimuth: 214	Height:398 Horz		Margin [dB]:		-	-4.82	-	-	-	-
2622	67.77 PK	-43.56	21.4	45.61	-	58.4	-	-	-	-
Azimuth: 201	Height:357 Horz		Margin [dB]:		-	-12.79	-	-	-	-
3059.425	72.85 PK	-42.94	21.6	51.51	-	58.4	-	-	-	-
Azimuth: 155	Height:399 Horz		Margin [dB]:		-	-6.89	-	-	-	-
3446	60.71 PK	-42.96	22.1	39.85	51.5	-	-	-	-	-
Azimuth: 53	Height:354 Horz		Margin [dB]:		-11.65	-	-	-	-	-
3932.7625	65.5 PK	-42.82	22.7	45.38	51.5	-	-	-	-	-
Azimuth: 234	Height:350 Horz		Margin [dB]:		-6.12	-	-	-	-	-

***Duty cycle correction factor of -20.4dB applied (See section 4.4 for calculations)**

LIMIT 1: FCC Part 15 Subpart C 15.209
LIMIT 2: FCC Part 15 Subpart C 15.231

PK - Peak detector (Maximized)
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4	5	6
Horizontal 4000 - 5000MHz										
4370	70.31 PK	-52.71	27.6	45.2	51.5	-	-	-	-	-
Azimuth: 147	Height:267 Horz		Margin [dB]:	-6.3		-	-	-	-	-
4806.475	69.77 PK	-53.55	27.1	43.32	51.5	-	-	-	-	-
Azimuth: 173	Height:378 Horz		Margin [dB]:	-8.18		-	-	-	-	-
Vertical 1000 - 2000MHz										
1311.0375	76.83 PK	-45.09	20.5	31.84*	51.5	-	-	-	-	-
Azimuth: 155	Height:210 Vert		Margin [dB]:	-19.66		-	-	-	-	-
1474.675	62.26 PK	-44.79	20.8	38.27	51.5	-	-	-	-	-
Azimuth: 223	Height:242 Vert		Margin [dB]:	-13.23		-	-	-	-	-
1748.2	70.42 PK	-44.36	20.8	46.86	51.5	-	-	-	-	-
Azimuth: 121	Height:381 Vert		Margin [dB]:	-4.64		-	-	-	-	-
Vertical 2000 - 4000MHz										
2184.8625	69.69 PK	-44	21.2	46.89	51.5	-	-	-	-	-
Azimuth: 303	Height:379 Vert		Margin [dB]:	-4.61		-	-	-	-	-
3058.763	68.61 PK	-42.93	21.8	47.48	51.5	-	-	-	-	-
Azimuth: 126	Height:366 Vert		Margin [dB]:	-4.02		-	-	-	-	-
3496.475	62.83 PK	-42.88	22.4	42.35	51.5	-	-	-	-	-
Azimuth: 0	Height:377 Vert		Margin [dB]:	-9.15		-	-	-	-	-
Vertical 4000 - 5000MHz										
4370.075	65.92 PK	-52.71	27.7	40.91	51.5	-	-	-	-	-
Azimuth: 169	Height:373 Vert		Margin [dB]:	-10.59		-	-	-	-	-

***Duty cycle correction factor of -20.4dB applied (See section 4.4 for calculations)**

LIMIT 1: FCC Part 15 Subpart C 15.209
LIMIT 2: FCC Part 15 Subpart C 15.231

PK - Peak detector (Maximized)
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection

4.6 Test Conditions and Results – RADIATED EMISSIONS - Unintentional

Test Description	Measurements were made in a 10-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4:2003. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 10-meter below 1GHz and 4-meters above 1GHz. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.

Basic Standard	FCC Part 15, Subpart B	
UL LPG	80-EM-S0029	
	Frequency range	Measurement Point
Fully configured sample scanned over the following frequency range	30MHz – 1GHz	(10 meter measurement distance)
Fully configured sample scanned over the following frequency range	1GHz – 2GHz	(4 meter measurement distance)

Limits - Class B

Frequency (MHz)	Limit (dBµV/m)	
	Quasi-Peak	Average
30 to 230	30	NA
230 to 1000	37	NA
1000 to 2000	NA	51.5

Supplementary information: None

Table 21 Radiated Emissions EUT Configuration Settings

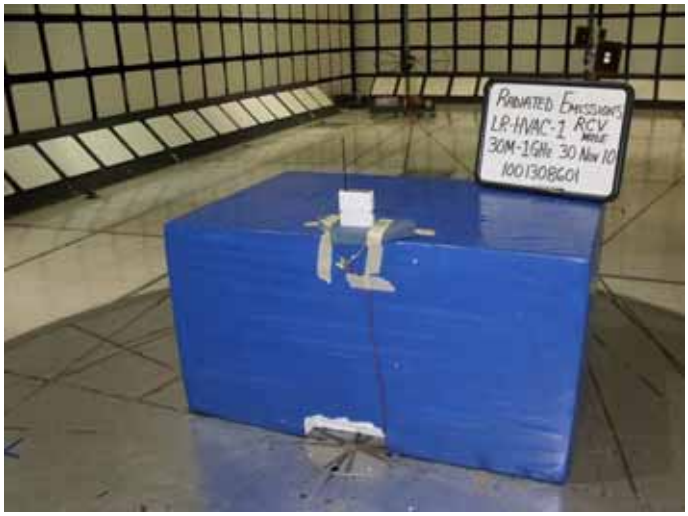
Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	3
1	1	4
Supplementary information: None		

Table 22 Radiated Emissions Test Equipment

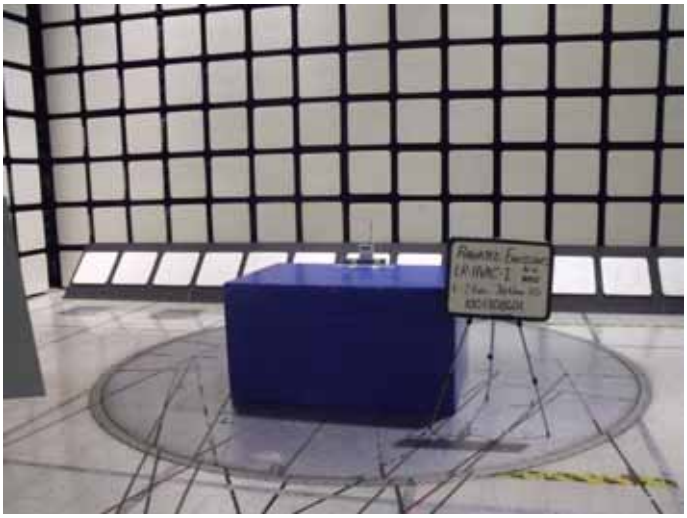
Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
30-1000MHz					
EMI Receiver	Rohde & Schwarz	ESIB40	34968	2010-02-22	2011-02-22
Bicon Antenna	Schaffner	VBA6106A	54	2010-04-05	2011-04-05
Log-P Antenna	Schaffner	UPA6109	44068	2010-04-05	2011-04-05
Bias Tee	Miteq	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 9.3	44740	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43734	2010-03-08	2012-03-08
Multimeter	Fluke	83III	ME5B-305	2010-02-01	2011-02-01
Above 1GHz (Band Optimized System)					
Spectrum Analyzer	Agilent	E7405A	19695	2010-02-01	2011-02-01
Horn Antenna (1-2 GHz)	ETS	3161-01	51442	N/A	N/A
Signal Path Controller	HP	11713A	50250	N/A	N/A
Gain Controller	HP	11713A	50251	N/A	N/A
RF Switch / Preamp Fixture	UL	BOMS1	50249	N/A	N/A
System Controller	UL	BOMS2	50252	N/A	N/A
Measurement Software	UL	Version 9.3	44740	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43734	2010-03-08	2012-03-08
Multimeter	Fluke	83III	ME5B-305	2010-02-01	2011-02-01

Figure 19 Test setup for Radiated Emissions

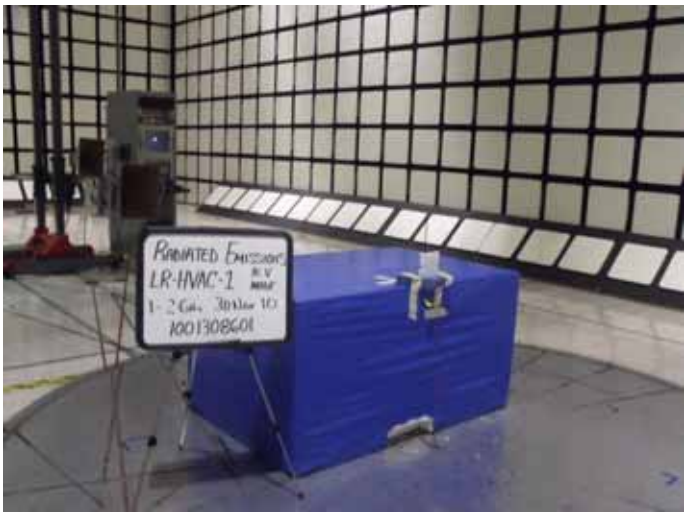
Front View



Rear View



Front View



Rear View

Figure 20 Radiated Emissions Graph – 431MHz

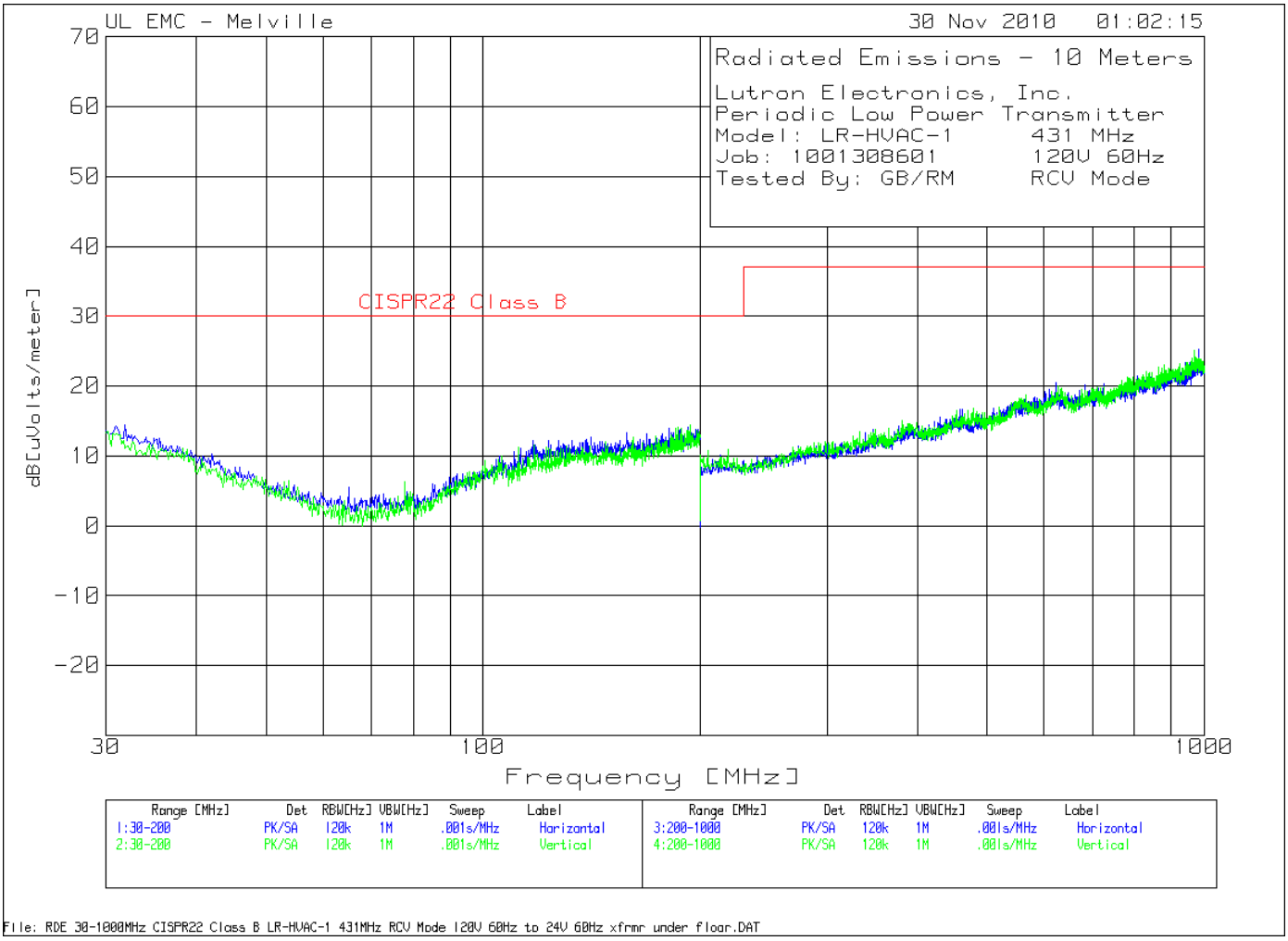


Table 23 Radiated Emissions Data Points - 431MHz

Lutron Electronics, Inc.
Periodic Low Power Transmitter
Model: LR-HVAC-1 431 MHz
Job: 1001308601 120V 60Hz
Tested By: GB/RM RCV Mode

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4	5	6
Horizontal 30 - 200MHz											
1	31.8719	33.45 PK	-36	17	14.45	30	-	-	-	-	-
	Azimuth:36	Height:400 Horz		Margin [dB]		-15.55	-	-	-	-	-
2	65.0551	35.03 PK	-35.7	6.2	5.53	30	-	-	-	-	-
	Azimuth:295	Height:100 Horz		Margin [dB]		-24.47	-	-	-	-	-
Vertical 30 - 200MHz											
3	77.988	34.98 PK	-35.7	7	6.28	30	-	-	-	-	-
	Azimuth:197	Height:100 Vert		Margin [dB]		-23.72	-	-	-	-	-
4	186.2162	33.57 PK	-35.3	15.9	14.17	30	-	-	-	-	-
	Azimuth:69	Height:100 Vert		Margin [dB]		-15.83	-	-	-	-	-
Horizontal 200 - 1000MHz											
5	622.2111	32.23 PK	-31.9	20.1	20.43	37	-	-	-	-	-
	Azimuth:308	Height:200 Horz		Margin [dB]		-16.57	-	-	-	-	-
6	983.5918	32.35 PK	-31.3	24.3	25.35	37	-	-	-	-	-
	Azimuth:153	Height:400 Horz		Margin [dB]		-11.65	-	-	-	-	-
Vertical 200 - 1000MHz											
7	380.8904	32.54 PK	-33.2	15.8	15.14	37	-	-	-	-	-
	Azimuth:358	Height:400 Vert		Margin [dB]		-21.86	-	-	-	-	-
8	967.984	32.32 PK	-31.6	24.4	25.12	37	-	-	-	-	-
	Azimuth:119	Height:400 Vert		Margin [dB]		-11.88	-	-	-	-	-

LIMIT 1: CISPR22 Class B

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

Figure 21 Radiated Emissions Graph – 437MHz

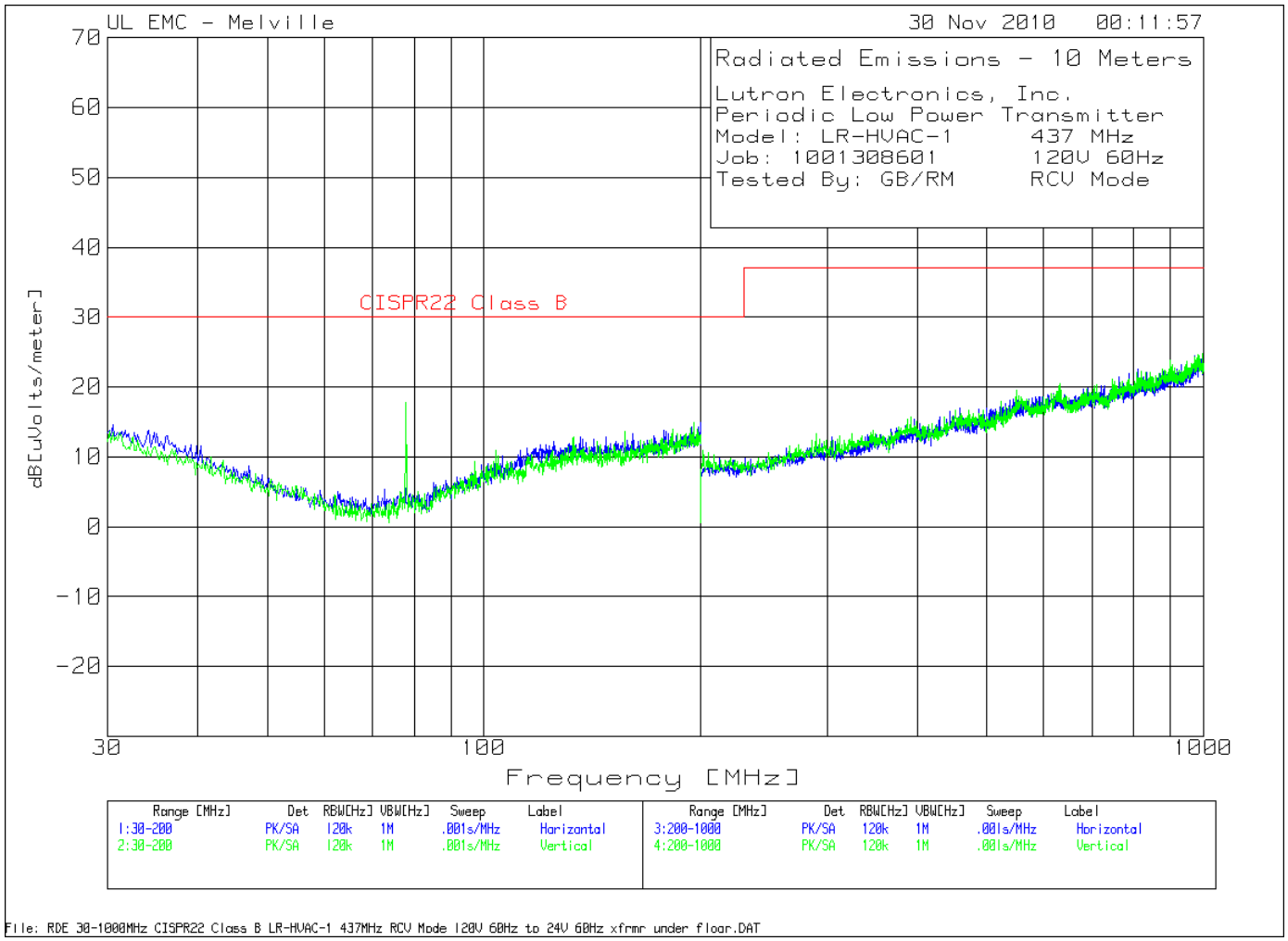


Table 24 Radiated Emissions Data Points - 437 MHz

Lutron Electronics, Inc.
Periodic Low Power Transmitter
Model: LR-HVAC-1 437 MHz
Job: 1001308601 120V 60Hz
Tested By: GB/RM RCV Mode

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4	5	6
Horizontal 30 - 200MHz											
1	34.2543	33.71 PK	-36	16.1	13.81	30	-	-	-	-	-
	Azimuth:133	Height:250 Horz		Margin [dB]		-16.19	-	-	-	-	-
2	161.031	33.79 PK	-35.4	14.9	13.29	30	-	-	-	-	-
	Azimuth:260	Height:100 Horz		Margin [dB]		-16.71	-	-	-	-	-
Vertical 30 - 200MHz											
3	77.988	46.52 PK	-35.7	7	17.82	30	-	-	-	-	-
	Azimuth:358	Height:100 Vert		Margin [dB]		-12.18	-	-	-	-	-
4	133.2933	34.36 PK	-35.5	14	12.86	30	-	-	-	-	-
	Azimuth:133	Height:100 Vert		Margin [dB]		-17.14	-	-	-	-	-
Horizontal 200 - 1000MHz											
5	458.1291	33.04 PK	-32.8	16.8	17.04	37	-	-	-	-	-
	Azimuth:323	Height:100 Horz		Margin [dB]		-19.96	-	-	-	-	-
6	811.906	32.5 PK	-32	22	22.5	37	-	-	-	-	-
	Azimuth:84	Height:400 Horz		Margin [dB]		-14.5	-	-	-	-	-
Vertical 200 - 1000MHz											
7	392.096	32.53 PK	-32.9	16.1	15.73	37	-	-	-	-	-
	Azimuth:49	Height:400 Vert		Margin [dB]		-21.27	-	-	-	-	-
8	980.7904	31.36 PK	-31.4	24.6	24.56	37	-	-	-	-	-
	Azimuth:115	Height:300 Vert		Margin [dB]		-12.44	-	-	-	-	-

LIMIT 1: CISPR22 Class B

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

Figure 22 Radiated Emissions Graph - 431MHz

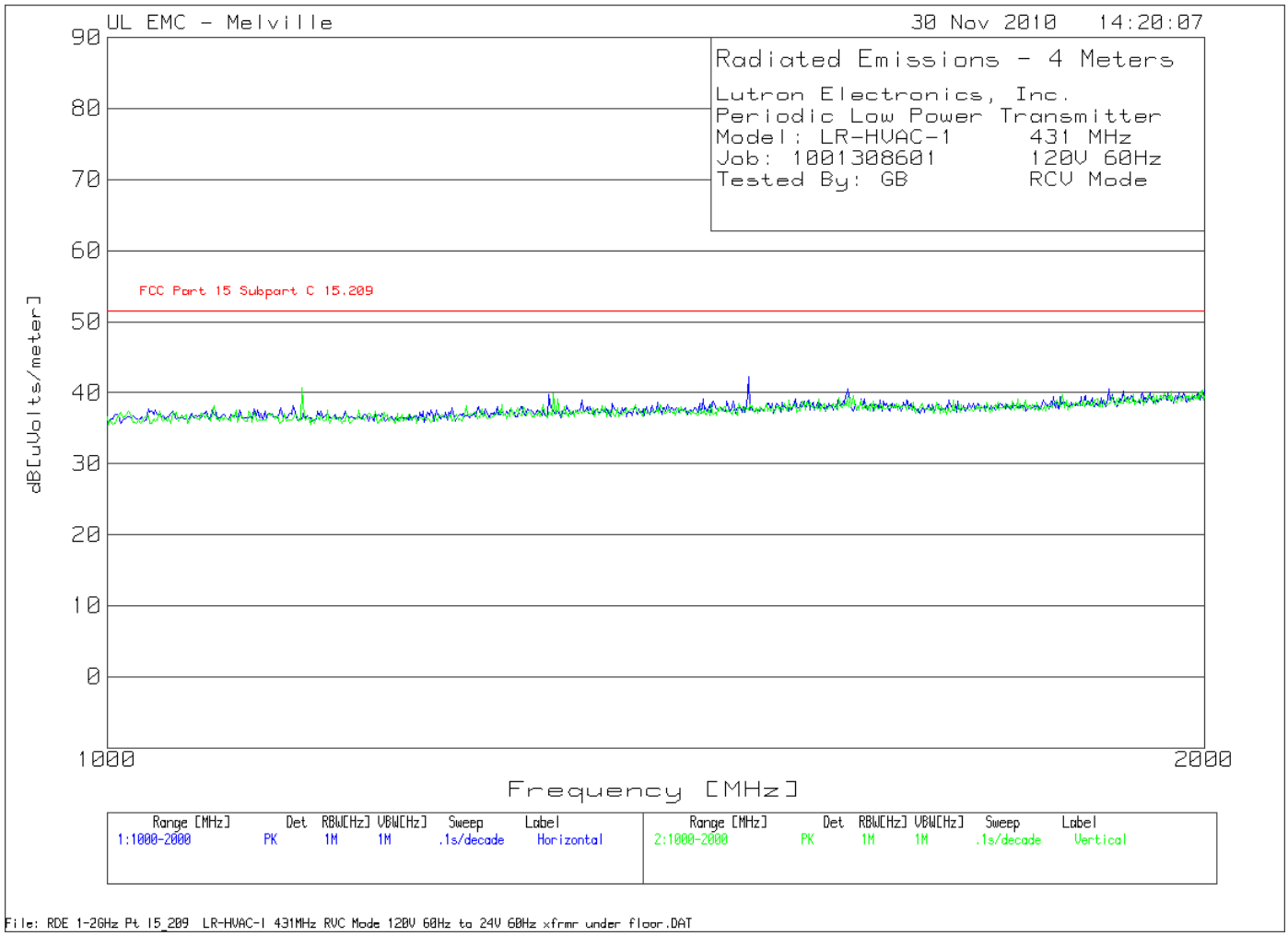


Table 25 Radiated Emissions Data Points, 431MHz

Lutron Electronics, Inc.
Periodic Low Power Transmitter
Model: LR-HVAC-1 431 MHz
Job: 1001308601 120V 60Hz
Tested By: GB RCV Mode

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4	5	6
Horizontal 1000 - 2000MHz											
2	1322.097	64.4 PK	-45.1	20.5	39.8	51.5	-	-	-	-	-
		Height:99 Horz		Margin [dB]		-11.7	-	-	-	-	-
4	1456.929	63.15 PK	-44.83	20.8	39.12	51.5	-	-	-	-	-
		Height:99 Horz		Margin [dB]		-12.38	-	-	-	-	-
5	1499.376	66.23 PK	-44.81	20.8	42.22	51.5	-	-	-	-	-
		Height:99 Horz		Margin [dB]		-9.28	-	-	-	-	-
6	1596.754	63.79 PK	-44.52	21.2	40.47	51.5	-	-	-	-	-
		Height:99 Horz		Margin [dB]		-11.03	-	-	-	-	-
Vertical 1000 - 2000MHz											
1	1131.086	66.04 PK	-45.25	19.9	40.69	51.5	-	-	-	-	-
		Height:250 Vert		Margin [dB]		-10.81	-	-	-	-	-
3	1325.843	64.44 PK	-45.1	20.6	39.94	51.5	-	-	-	-	-
		Height:250 Vert		Margin [dB]		-11.56	-	-	-	-	-

LIMIT 1: FCC Part 15 Subpart C 15.209
LIMIT 2: NONE
LIMIT 3: NONE
LIMIT 4: NONE
LIMIT 5: NONE
LIMIT 6: NONE

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

Figure 23 Radiated Emissions Graph - 437MHz

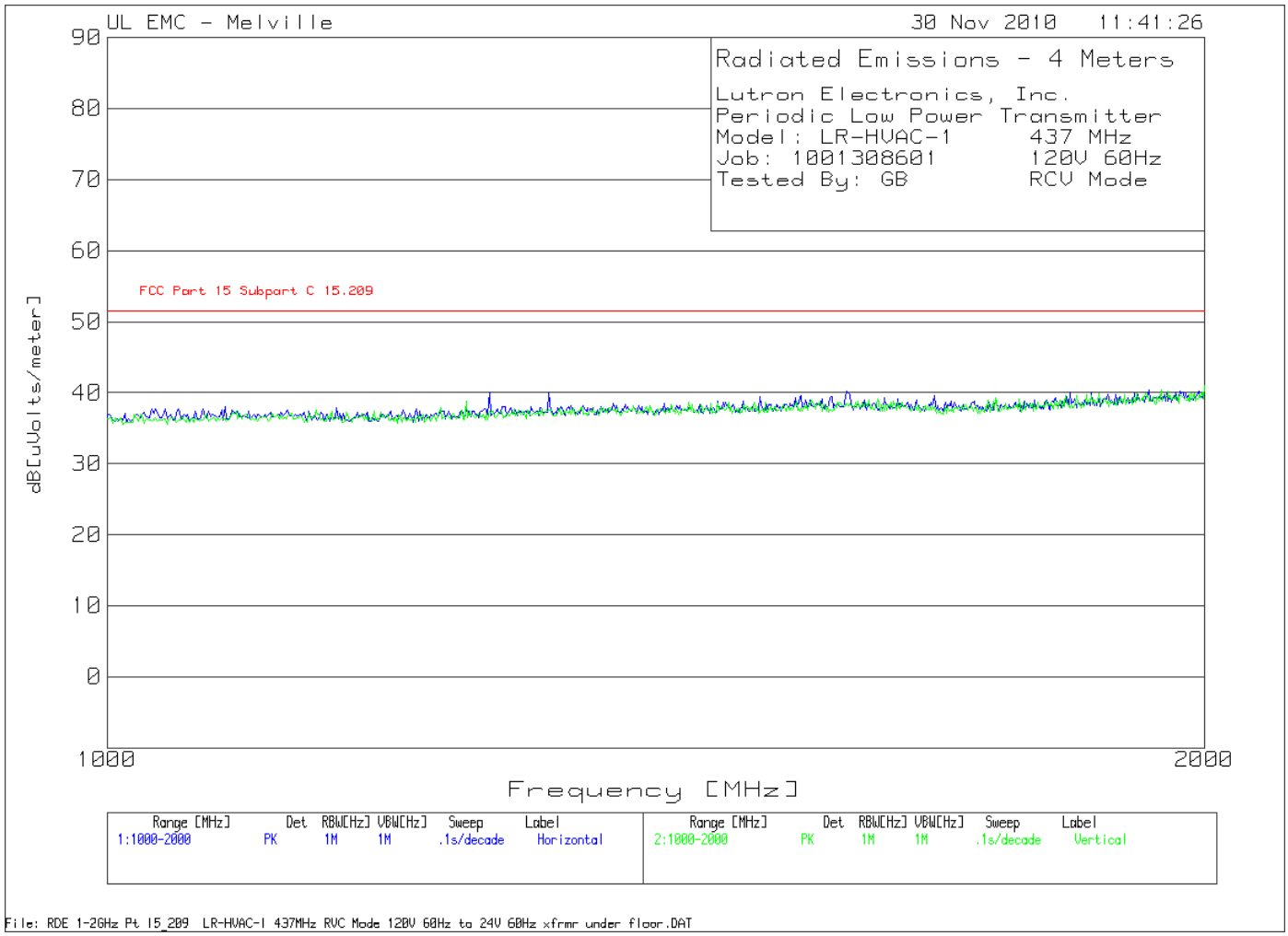


Table 26 Radiated Emissions Data Points, 431MHz

Lutron Electronics, Inc.
Periodic Low Power Transmitter
Model: LR-HVAC-1 437 MHz
Job: 1001308601 120V 60Hz
Tested By: GB RCV Mode

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4	5	6
Horizontal 1000 - 2000MHz											
1	1031.211	63.52 PK	-45.23	19.5	37.79	51.5	-	-	-	-	-
		Height:100 Horz		Margin [dB]		-13.71	-	-	-	-	-
2	1273.408	64.88 PK	-45.08	20.3	40.1	51.5	-	-	-	-	-
		Height:250 Horz		Margin [dB]		-11.4	-	-	-	-	-
3	1322.097	64.64 PK	-45.1	20.5	40.04	51.5	-	-	-	-	-
		Height:100 Horz		Margin [dB]		-11.46	-	-	-	-	-
4	1595.506	63.48 PK	-44.53	21.2	40.15	51.5	-	-	-	-	-
		Height:100 Horz		Margin [dB]		-11.35	-	-	-	-	-
5	1686.642	63.29 PK	-44.49	20.8	39.6	51.5	-	-	-	-	-
		Height:100 Horz		Margin [dB]		-11.9	-	-	-	-	-
6	1837.703	63.02 PK	-44.13	21.2	40.09	51.5	-	-	-	-	-
		Height:100 Horz		Margin [dB]		-11.41	-	-	-	-	-

LIMIT 1: FCC Part 15 Subpart C 15.209
LIMIT 2: NONE
LIMIT 3: NONE
LIMIT 4: NONE
LIMIT 5: NONE
LIMIT 6: NONE

PK - Peak detector
QP - Quasi-Peak detector
LnAv - Linear average detector
LgAv - Average log detector
Av - Average detector
CAV - CISPR Average detector
RMS - RMS detection
CRMS - CISPR RMS detection

Appendix A

Accreditations and Authorizations

NVLAP Lab code: 100255-0

NVLAP: The National Institute of Standards and Technology (NIST) administers the National Voluntary Laboratory Accreditation Program (NVLAP). NVLAP is comprised of laboratory accreditation programs (LAPs) which are established on the basis of requests and demonstrated need. Each LAP includes specific calibration and/or test standards and related methods and protocols assembled to satisfy the unique needs for accreditation in a field of testing or calibration. NVLAP accredits public and private laboratories based on evaluation of their technical qualifications and competence to carry out specific calibrations or tests. Accreditation criteria are established in accordance with the U.S. Code of Federal Regulations (CFR, Title 15, Part 285), NVLAP Procedures and General Requirements, and encompass the requirements of ISO/IEC 17025. For a full scope listing see http://ts.nist.gov/ts/htdocs/210/214/scopes/1002550.htm

FCC: Details of the measurement facilities used for these tests have been filed with the Federal Communications Commission's Laboratory in Columbia, Maryland (Ref. No. 91040).

Industry Canada Industrie Canada

Industry of Canada: Accredited by Industry Canada for performance of radiated measurements. Our test site complies with RSP 100, Issue 7, Section 3.3. File #: IC 2181

VCCI: Accepted as an Associate Member to the VCCI. The measurement facilities detailed in this test report have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. Registration Nos.: (Radiated Emissions) R-797, (Conducted Emissions) C-832, C-83400, and C-81879 and (Conducted Emissions - Telecommunications Ports) T-1582 and T-1583.

ICASA: ICASA (Independent Communications Authority of South Africa) has appointed UL as a Designated Test Laboratory to test Telecommunications equipment for type approval in compliance with CISPR 22 to assist in fulfilling its mandate under section 54(1) of the Telecommunications Act, 1996 (Act 103 of 1996).

NIST/CAB: Validated by the European Commission as a U.S. Conformity Assessment Body (CAB) of the U.S.-EU Mutual Recognition Agreement (MRA) for the Electromagnetic Compatibility - Council Directive 2004/108/EC, Annex III (2-3). Also validated for the Telecommunication Equipment-Council Directive 99/5/EC, Annex III and IV, Identification Number: 0983.
NIST/CAB: Provisioned to act as a U.S. Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the Asia Pacific Economic Cooperation (APEC) MRA between the American Institute in Taiwan (AIT) and the United States. Our laboratory is considered qualified to test equipment subject to the applicable EMC regulations of the Chinese Taipei Bureau of Standards, Metrology and Inspection (BSMI) which require testing to CNS 13438 (CISPR 22).
NIST/CAB: Recognized by the Infocomm Development Authority of Singapore (IDA) under the Asia Pacific Economic Cooperation Mutual Recognition Agreement (APEC MRA). Our laboratory is provisionally designated to act as a Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the APEC MRA. Our scope of designation includes IDA TS EMC (CISPR 22), IEC 61000-4-2, -4-3, -4-4, -4-5, and -4-6

Compliance Certificate

Company Name and Location: LUTRON ELECTRONICS INC
7200 SUTTER ROAD COOPERBURG, PA 18036

File Number: MC16478 ***Date of Report:***

Product Description: RF Adapter

Investigated in accordance with FCC Part 15, Subpart C, 15.231(2009)

Model Designation: HZ00095 ***Serial Number:***

Job Number: 1001308601

Project Number:

A sample of the product described above has been investigated by Underwriters Laboratories Inc. in accordance with the requirements indicated above and has been found in compliance with those requirements as shown in the Test Report Ref. No. 1001308601 which forms part of this Certificate. It is the responsibility of the company shown above that the products it produces are in compliance with the applicable requirements.

The name of Underwriters Laboratories (UL), any abbreviation thereof, or any symbol shall not be used on or in connection with the product unless and until specifically authorized by UL.

Tested by: *Reviewed by:*