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Job Number: 1001357672
Project Number: 11CA14710
File Number: MC15896
Date: 2011-03-29
Model: HQ-J-DK420-WH
FCC ID: JPZ0078 IC Number: 2851A-JPZ0078

Electromagnetic Compatibility Test Report

For

LUTRON ELECTRONICS INC

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Underwriters Laboratories Inc.
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Job Number: 1001357672 File Number: MC15896 Page 2 of 61
Model Number: HQ-J-DK420-WH
Client Name: LUTRON ELECTRONICS INC
FCC ID: JPZ0078 IC Number: 2851A-JPZ0078

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: **Steve O'Donnell**
Title: **Senior Technician**
Phone: **(610) 282-7342**
E-mail: **ssodonnell@lutron.com**

Test Report Date: **2011-03-29**

Product Type: **Wall-mounted low voltage keypad**

Product standards **FCC Part 15, Subpart B, FCC Part 15 Subpart C, RSS-GEN,
RSS-210**

Model Number: **HQ-J-DK420-WH**

Sample Serial Number: **Non-serialized production unit**

EUT Category: **Periodic Low Power Transceiver**

Testing Start Date: **2011-03-22**

Date Testing Complete: **2011-03-29**

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.

This report may contain test results that are not covered by the NVLAP or A2LA accreditation. The scope of accreditation is limited to the specific tests that are listed on the NVLAP and/or A2LA websites referenced at the end of this report.

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Report Revision History

Revision Date	Description	Revised By	Revision Reviewed By
None	Original	-	-

1.0 GENERAL - Product Description

1.1 Equipment Description

The DUT is a wall-mounted low voltage keypad. It contains an FM transceiver and an antenna which is not accessible to the user. It is used as part of an integrated lighting control system. The purpose of the RF communication is to transmit and receive signals. Transmitted commands allow the triggering of system events. Received commands allow for updating control indicator status.

Model number HQ-J-DK420-WH represents HQ-J-DK420 and HQ-J-DK420-DEMO. According to the manufacturer the model number differences are marketing purposes only. For Industry Canada the model number is HQ-JDK420.

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

Antenna description: Part of the RF circuit board.

The EUT is only intended in being installed in the upright position and does not transmit at predetermined intervals.

1.2 Equipment Marking Plate

Not available at time of test.

1.3 Device Configuration During Test

1.3.1 Equipment Used During Test:

Use	Product Type	Manufacturer	Model	Comments
EUT	Modular transmitter	LUTRON ELECTRONICS INC	HQ-J-DK420-WH	None
AE	Power Supply	LUTRON ELECTRONICS INC	QPS-1-50	Not part of EUT

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	DC	N	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:

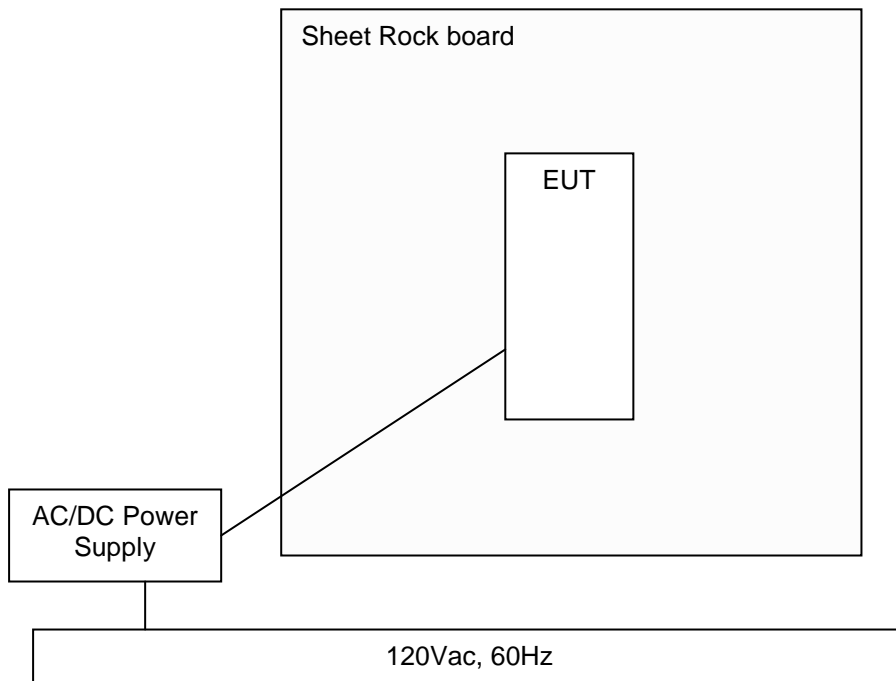
Frequency (MHz)	Description
24	Oscillator
26	Oscillator
32	Oscillator
151	mDDR
454	iMX233
431-437	Channel operating range.

1.3.4 Power Interface:

Mode # /Rated	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
1	24	-	-	DC	1	Supplied by either 120Vac external power supply (not part of EUT) or by QS Link from a Lutron controller.

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	433MHz, normally operating
4	Receiving at 431MHz
5	Receiving at 437MHz

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	2011
47 CFR Part 15, Subpart C	Code of Federal Regulations, Part 15, Radio Frequency Devices	2011
RSS-GEN, Issue 3	General Requirements and Information for the Certification of Radiocommunication Equipment	2010
RSS-210, Issue 8	Low-power License-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment	2010

2.4 Results Summary

This product is considered a periodic transmitter with a verified 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
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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, RSS-GEN, RSS-210	
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	4
1	1	5
Supplementary information: None		

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	2011-01-27	2012-01-31
LISN	Solar	9252-50-R-24-BNC	ME5A-636	2011-02-04	2012-02-28
Switch Driver	HP	11713A	44397	N/A	N/A
RF Switch Box	UL	4	44404	N/A	N/A
Measurement Software	UL	Version 9.3	44736	N/A	N/A
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43734	2010-03-08	2010-03-08
Multimeter	Fluke	87V	44547	2011-02-01	2011-02-29

Job Number: 1001357672
Model Number: HQ-J-DK420-WH
Client Name: LUTRON ELECTRONICS INC
FCC ID: JPZ0078

File Number: MC15896

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Figure 1 Test Setup for Conducted Emissions



Figure 2 Conducted Emissions Graph - TX

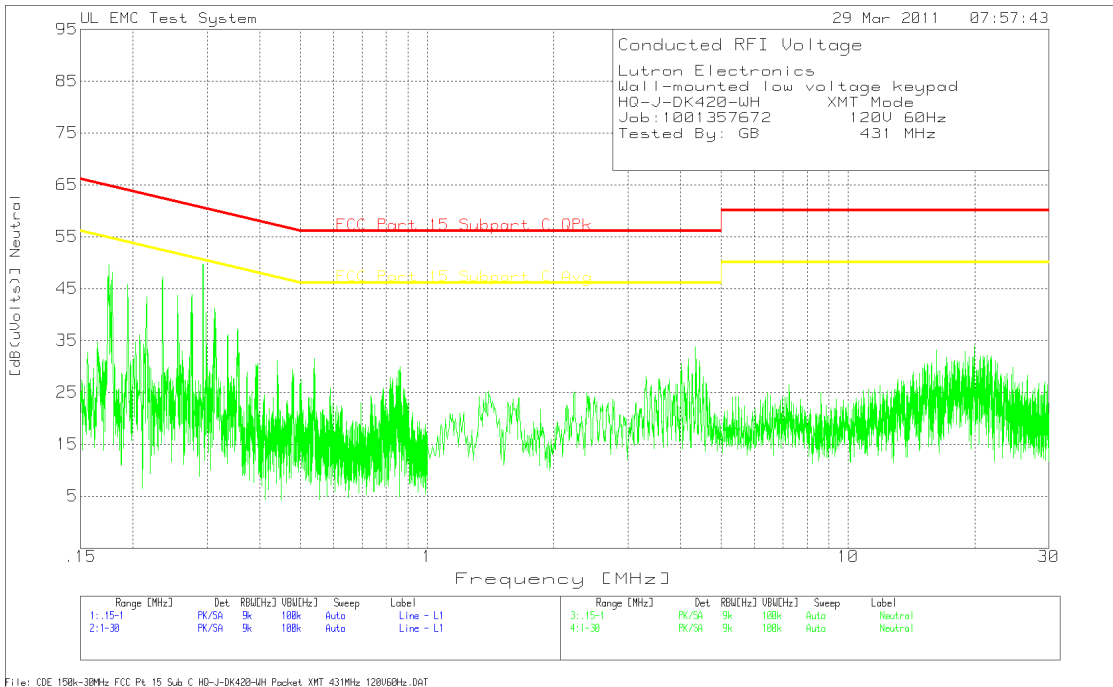
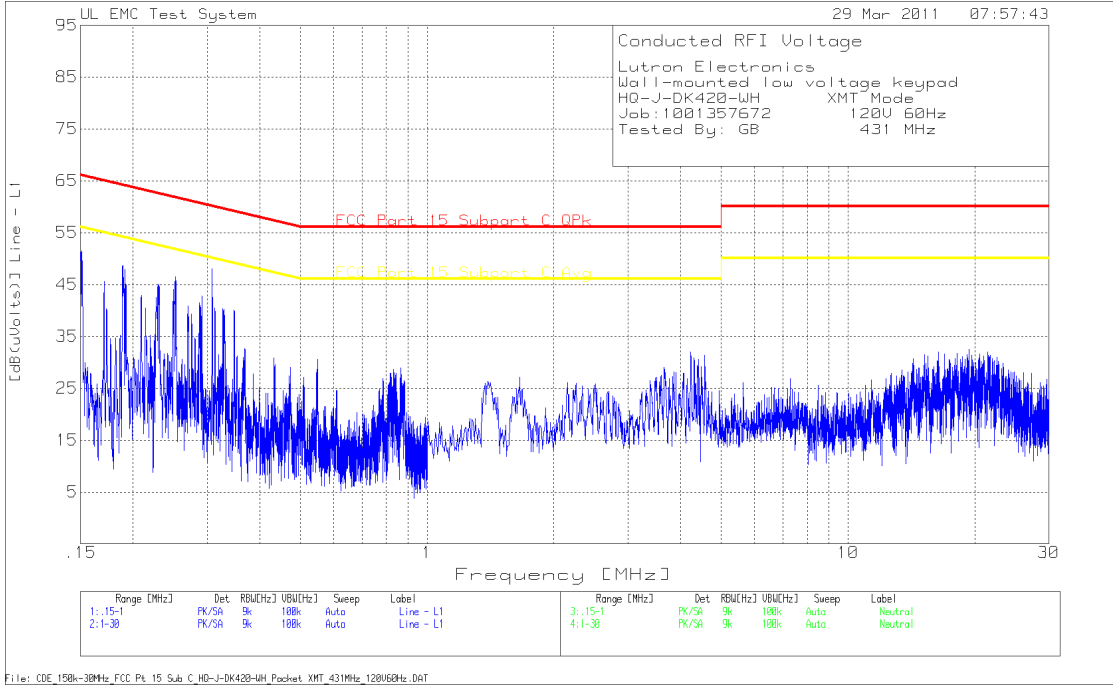


Table 3 Conducted Emissions Data Points - TX

Lutron Electronics										
Wall-mounted low voltage keypad										
HQ-J-DK420-WH XMT Mode										
Job:1001357672 120V 60Hz										
Tested By: GB 431 MHz										
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Limit 1	Margin 1[dB]	Limit 2	Margin 2[dB]
Number	Frequency	Reading	Type	Factor	Factor	[dB(uVolts)]				
	[MHz]	[dB(uV)]		[dB]	[dB]					
Line - L1 .15 - 1MHz										
1	0.15119	39.85	PK	11.6	0	51.45	65.9	-14.45	55.9	-4.45
2	0.18911	37.43	PK	11.2	0	48.63	64.1	-15.47	54.1	-5.47
3	0.19149	36.73	PK	11.2	0	47.93	64	-16.07	54	-6.07
4	0.22958	34.16	PK	10.9	0	45.06	62.5	-17.44	52.5	-7.44
5	0.2527	35.66	PK	10.9	0	46.56	61.7	-15.14	51.7	-5.14
6	0.30813	37.34	PK	10.7	0	48.04	60	-11.96	50	-1.96
Neutral .15 - 1MHz										
7	0.17534	38.28	PK	11.3	0	49.58	64.7	-15.12	54.7	-5.12
8	0.17857	36.93	PK	11.3	0	48.23	64.6	-16.37	54.6	-6.37
9	0.19421	34.74	PK	11.2	0	45.94	63.9	-17.96	53.9	-7.96
10	0.23519	36.38	PK	10.9	0	47.28	62.3	-15.02	52.3	-5.02
11	0.29342	39.05	PK	10.7	0	49.75	60.4	-10.65	50.4	-0.65
12	0.27651	33.21	PK	10.8	0	44.01	60.9	-16.89	50.9	-6.89
LIMIT 1: FCC Part 15 Subpart C QPk										
LIMIT 2: FCC Part 15 Subpart C Avg										
LIMIT 3: NONE										
LIMIT 4: NONE										
LIMIT 5: NONE										
LIMIT 6: NONE										
PK - Peak detector										
QP - Quasi-Peak detector										
LnAv - Linear Average detector										
LgAv - Log Average detector										
Av - Average detector										
CAV - CISPR Average detector										
RMS - RMS detection										
CRMS - CISPR RMS detection										

Job Number: 1001357672 File Number: MC15896 Page 17 of 61
 Model Number: HQ-J-DK420-WH
 Client Name: LUTRON ELECTRONICS INC
 FCC ID: JPZ0078 IC Number: 2851A-JPZ0078

Lutron Electronics									
Wall-mounted low voltage keypad									
HQ-J-DK420-WH XMT Mode									
Job:1001357672 120V 60Hz									
Tested By: GB 431 MHz									
Test	Meter	Detector	Gain/Loss	Transducer	Level	Limit 1	Margin 1[dB]	Limit 2	Margin 2[dB]
Frequency	Reading	Type	Factor	Factor	[dB(uVolts)]				
[MHz]	[dB(uV)]		[dB]	[dB]					
Line - L1 .15 - 1MHz									
0.15083	19.11	Av	11.6	0	30.71	66	-35.29	56	-25.29
0.18951	18.99	Av	11.2	0	30.19	64.1	-33.91	54.1	-23.91
0.19141	19.17	Av	11.2	0	30.37	64	-33.63	54	-23.63
0.22937	16.85	Av	10.9	0	27.75	62.5	-34.75	52.5	-24.75
0.25291	16.59	Av	10.9	0	27.49	61.7	-34.21	51.7	-24.21
0.3083	13.34	Av	10.7	0	24.04	60	-35.96	50	-25.96
Neutral .15 - 1MHz									
0.17535	16.41	Av	11.3	0	27.71	64.7	-36.99	54.7	-26.99
0.17885	16.74	Av	11.3	0	28.04	64.5	-36.46	54.5	-26.46
0.19361	18.5	Av	11.2	0	29.7	63.9	-34.2	53.9	-24.2
0.23538	15.54	Av	10.9	0	26.44	62.3	-35.86	52.3	-25.86
0.29324	13.74	Av	10.7	0	24.44	60.4	-35.96	50.4	-25.96
0.27626	14.04	Av	10.8	0	24.84	60.9	-36.06	50.9	-26.06
NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).									
PK - Peak detector									
QP - Quasi-Peak detector									
LnAv - Linear Average detector									
LgAv - Log Average detection									
Av - average detection									
CAV - CISPR average detection									
RMS - RMS detection									
CRMS - CISPR RMS detection									
LIMIT 1: FCC Part 15 Subpart C QPk									
LIMIT 2: FCC Part 15 Subpart C Avg									

Figure 3 Conducted Emissions Graph - TX

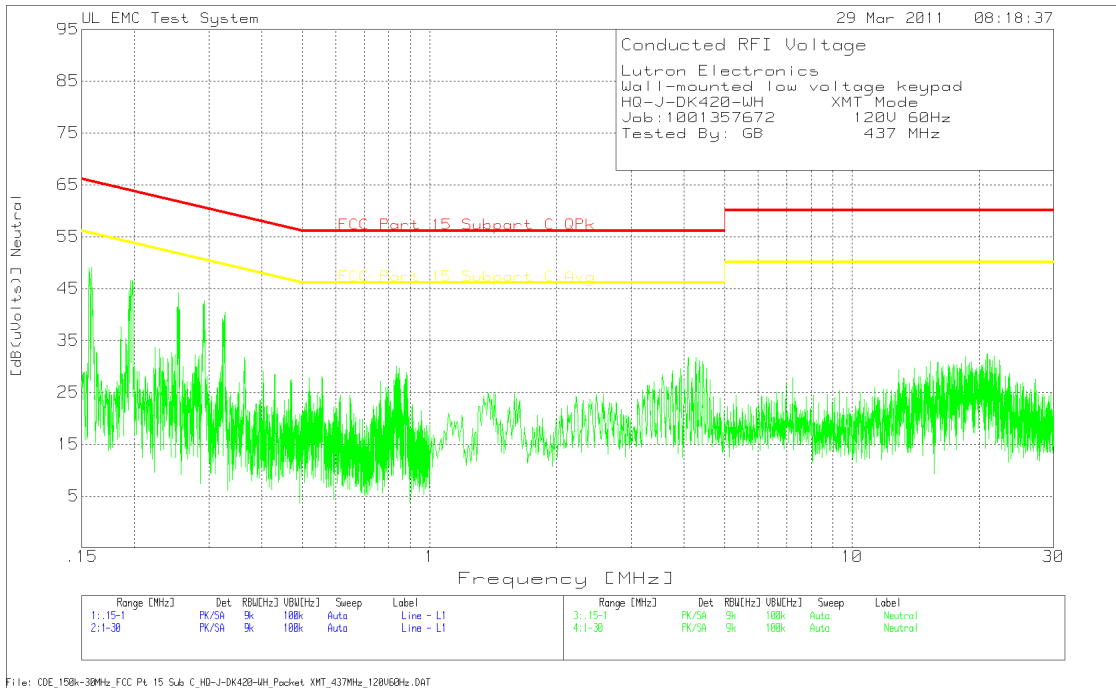
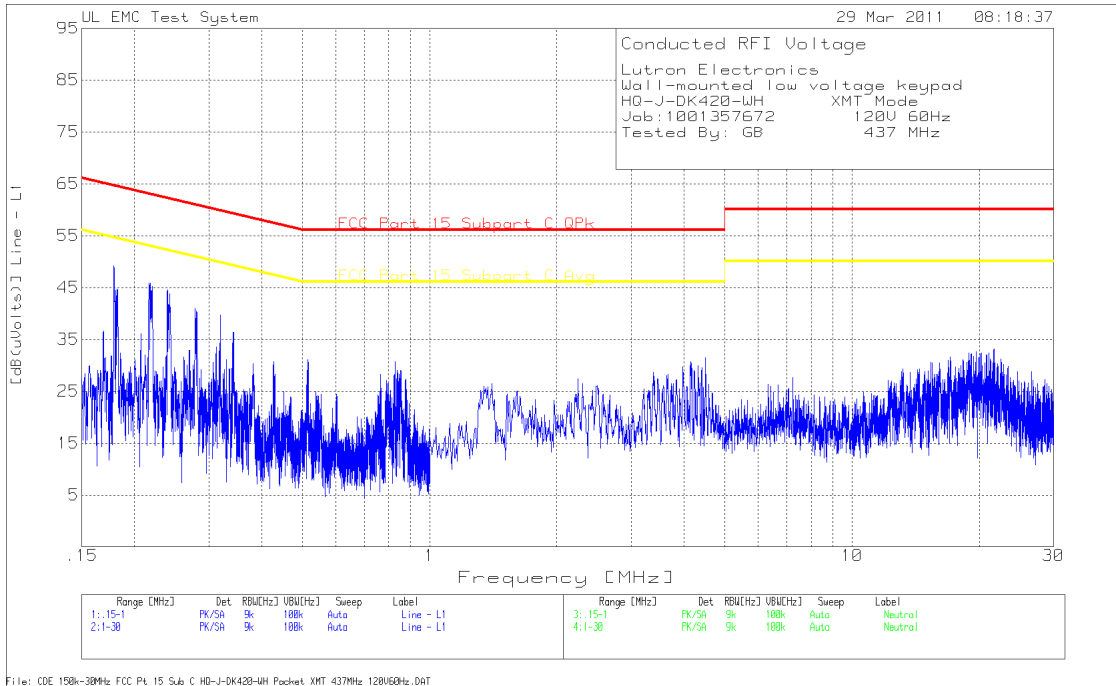


Table 4 Conducted Emissions Data Points - TX

Lutron Electronics										
Wall-mounted low voltage keypad										
HQ-J-DK420-WH XMT Mode										
Job:1001357672 120V 60Hz										
Tested By: GB 437 MHz										
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Limit 1	Margin 1 [dB]	Limit 2	Margin 2 [dB]
Number	Frequency	Reading	Type	Factor	Factor	[dB(uVolts)]				
	[MHz]	[dB(uV)]		[dB]	[dB]					
Line - L1 .15 - 1MHz										
1	0.17891	37.86	PK	11.3	0	49.16	64.5	-15.34	54.5	-5.34
2	0.18078	33.17	PK	11.3	0	44.47	64.4	-19.93	54.4	-9.93
3	0.18248	33.27	PK	11.3	0	44.57	64.4	-19.83	54.4	-9.83
4	0.21818	34.84	PK	11	0	45.84	62.9	-17.06	52.9	-7.06
5	0.23944	33.68	PK	10.9	0	44.58	62.1	-17.52	52.1	-7.52
6	0.27855	30.14	PK	10.8	0	40.94	60.9	-19.96	50.9	-9.96
Neutral .15 - 1MHz										
7	0.15629	37.39	PK	11.5	0	48.89	65.7	-16.81	55.7	-6.81
8	0.1585	37.51	PK	11.5	0	49.01	65.5	-16.49	55.5	-6.49
9	0.19795	35.53	PK	11.1	0	46.63	63.7	-17.07	53.7	-7.07
10	0.19557	35.29	PK	11.2	0	46.49	63.8	-17.31	53.8	-7.31
11	0.25423	33.21	PK	10.9	0	44.11	61.6	-17.49	51.6	-7.49
12	0.29249	31.95	PK	10.7	0	42.65	60.5	-17.85	50.5	-7.85
LIMIT 1: FCC Part 15 Subpart C QPk										
LIMIT 2: FCC Part 15 Subpart C Avg										
PK - Peak detector										
QP - Quasi-Peak detector										
LnAv - Linear Average detector										
LgAv - Log Average detector										
Av - Average detector										
CAV - CISPR Average detector										
RMS - RMS detection										
CRMS - CISPR RMS detection										

Job Number: 1001357672 File Number: MC15896 Page 20 of 61
 Model Number: HQ-J-DK420-WH
 Client Name: LUTRON ELECTRONICS INC
 FCC ID: JPZ0078 IC Number: 2851A-JPZ0078

Lutron Electronics									
Wall-mounted low voltage keypad									
HQ-J-DK420-WH XMT Mode									
Job:1001357672 120V 60Hz									
Tested By: GB 437 MHz									
Test	Meter	Detector	Gain/Loss	Transducer	Level	Limit 1	Margin 1[dB]	Limit 2	Margin 2[dB]
Frequency	Reading	Type	Factor	Factor	[dB(uVolts)]				
[MHz]	[dB(uV)]		[dB]	[dB]					
Line - L1 .15 - 1MHz									
0.17892	15.97	Av	11.3	0	27.27	64.5	-37.23	54.5	-27.23
0.18103	15.79	Av	11.3	0	27.09	64.4	-37.31	54.4	-27.31
0.18237	15.74	Av	11.3	0	27.04	64.4	-37.36	54.4	-27.36
0.21854	14.93	Av	11	0	25.93	62.9	-36.97	52.9	-26.97
0.23997	15.28	Av	10.9	0	26.18	62.1	-35.92	52.1	-25.92
0.27837	13.2	Av	10.8	0	24	60.9	-36.9	50.9	-26.9
Neutral .15 - 1MHz									
0.15661	16.96	Av	11.5	0	28.46	65.6	-37.14	55.6	-27.14
0.15878	16.79	Av	11.5	0	28.29	65.5	-37.21	55.5	-27.21
0.19843	17.28	Av	11.1	0	28.38	63.7	-35.32	53.7	-25.32
0.19517	17	Av	11.2	0	28.2	63.8	-35.6	53.8	-25.6
0.25418	13.84	Av	10.9	0	24.74	61.6	-36.86	51.6	-26.86
0.29252	12.94	Av	10.7	0	23.64	60.5	-36.86	50.5	-26.86
NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).									
PK - Peak detector									
QP - Quasi-Peak detector									
LnAv - Linear Average detector									
LgAv - Log Average detection									
Av - average detection									
CAV - CISPR average detection									
RMS - RMS detection									
CRMS - CISPR RMS detection									
LIMIT 1: FCC Part 15 Subpart C QPk									
LIMIT 2: FCC Part 15 Subpart C Avg									

Figure 4 Conducted Emissions Graph - RX

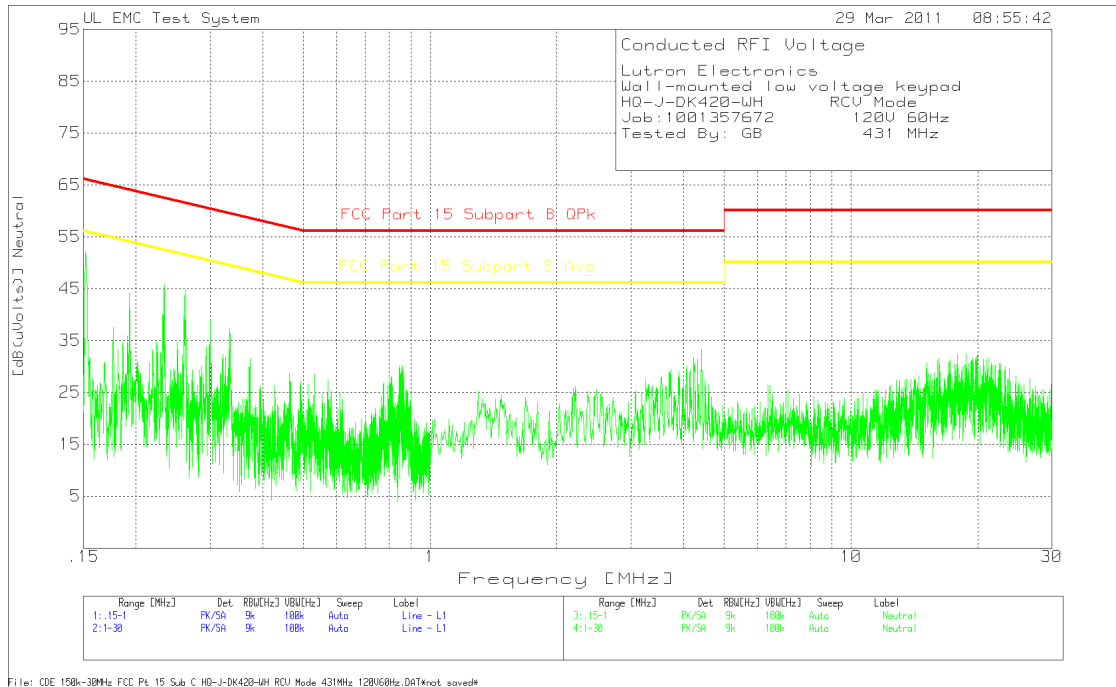
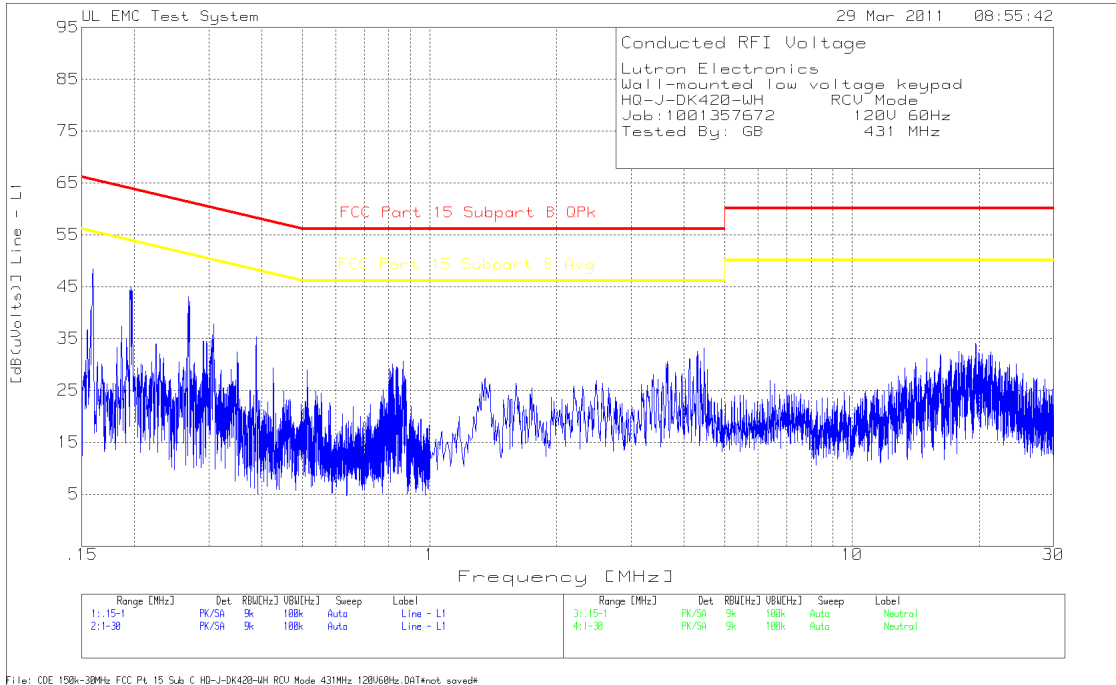


Table 5 Conducted Emissions Data Points - RX

Lutron Electronics										
Wall-mounted low voltage keypad										
HQ-J-DK420-WH RCV Mode										
Job:1001357672 120V 60Hz										
Tested By: GB 431 MHz										
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Limit 1	Margin 1[dB]	Limit 2	Margin 2[dB]
Number	Frequency	Reading	Type	Factor	Factor	[dB(uVolts)]				
	[MHz]	[dB(uV)]		[dB]	[dB]					
Line - L1 .15 - 1MHz										
1	0.15944	36.92	PK	11.5	0	48.42	65.5	-17.08	55.5	-7.08
2	0.19523	31.45	PK	11.2	0	42.65	63.8	-21.15	53.8	-11.15
3	0.19761	31.73	PK	11.1	0	42.83	63.7	-20.87	53.7	-10.87
4	0.26817	32.31	PK	10.8	0	43.11	61.2	-18.09	51.2	-8.09
5	0.26987	31.3	PK	10.8	0	42.1	61.1	-19	51.1	-9
6	0.30813	27.16	PK	10.7	0	37.86	60	-22.14	50	-12.14
Neutral .15 - 1MHz										
7	0.15187	40.57	PK	11.6	0	52.17	65.9	-13.73	55.9	-3.73
8	0.19268	33.05	PK	11.2	0	44.25	63.9	-19.65	53.9	-9.65
9	0.23349	34.84	PK	10.9	0	45.74	62.3	-16.56	52.3	-6.56
10	0.26052	32.95	PK	10.8	0	43.75	61.4	-17.65	51.4	-7.65
11	0.26239	33.67	PK	10.8	0	44.47	61.4	-16.93	51.4	-6.93
12	0.30031	28.4	PK	10.7	0	39.1	60.2	-21.1	50.2	-11.1
LIMIT 1: FCC Part 15 Subpart B QPk										
LIMIT 2: FCC Part 15 Subpart B Avg										
PK - Peak detector										
QP - Quasi-Peak detector										
LnAv - Linear Average detector										
LgAv - Log Average detector										
Av - Average detector										
CAV - CISPR Average detector										
RMS - RMS detection										
CRMS - CISPR RMS detection										

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 Model Number: HQ-J-DK420-WH
 Client Name: LUTRON ELECTRONICS INC
 FCC ID: JPZ0078 IC Number: 2851A-JPZ0078

Lutron Electronics									
Wall-mounted low voltage keypad									
HQ-J-DK420-WH RCV Mode									
Job:1001357672 120V 60Hz									
Tested By: GB 431 MHz									
Test	Meter	Detector	Gain/Loss	Transducer	Level	Limit 1	Margin 1[dB]	Limit 2	Margin 2[dB]
Frequency	Reading	Type	Factor	Factor	[dB(uVolts)]				
[MHz]	[dB(uV)]		[dB]	[dB]					
Line - L1 .15 - 1MHz									
0.15924	16.73	Av	11.5	0	28.23	65.5	-37.27	55.5	-27.27
0.19485	16.99	Av	11.2	0	28.19	63.8	-35.61	53.8	-25.61
0.19768	16.99	Av	11.1	0	28.09	63.7	-35.61	53.7	-25.61
0.26831	13.21	Av	10.8	0	24.01	61.2	-37.19	51.2	-27.19
0.27	13.4	Av	10.8	0	24.2	61.1	-36.9	51.1	-26.9
0.30806	12.15	Av	10.7	0	22.85	60	-37.15	50	-27.15
Neutral .15 - 1MHz									
0.15149	16.5	Av	11.6	0	28.1	65.9	-37.8	55.9	-27.8
0.19287	17.13	Av	11.2	0	28.33	63.9	-35.57	53.9	-25.57
0.23371	13.69	Av	10.9	0	24.59	62.3	-37.71	52.3	-27.71
0.26026	12.87	Av	10.8	0	23.67	61.4	-37.73	51.4	-27.73
0.26209	12.84	Av	10.8	0	23.64	61.4	-37.76	51.4	-27.76
0.30021	11.94	Av	10.7	0	22.64	60.2	-37.56	50.2	-27.56
NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).									
PK - Peak detector									
QP - Quasi-Peak detector									
LnAv - Linear Average detector									
LgAv - Log Average detection									
Av - average detection									
CAV - CISPR average detection									
RMS - RMS detection									
CRMS - CISPR RMS detection									
LIMIT 1: FCC Part 15 Subpart B QPk									
LIMIT 2: FCC Part 15 Subpart B Avg									

Figure 5 Conducted Emissions Graph - RX

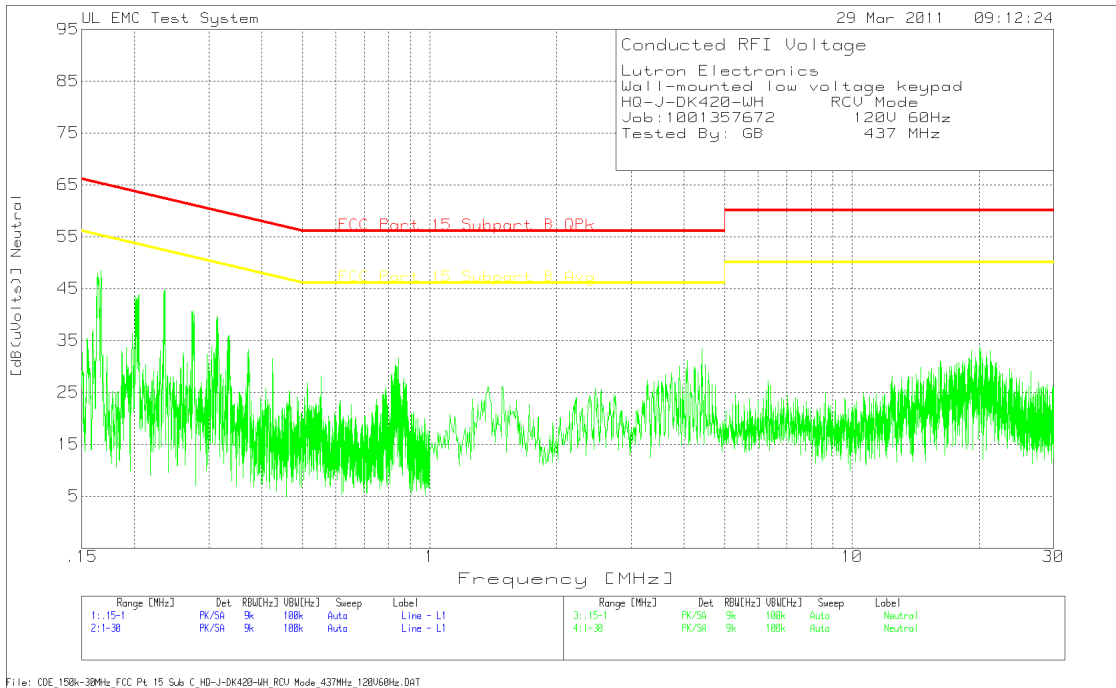
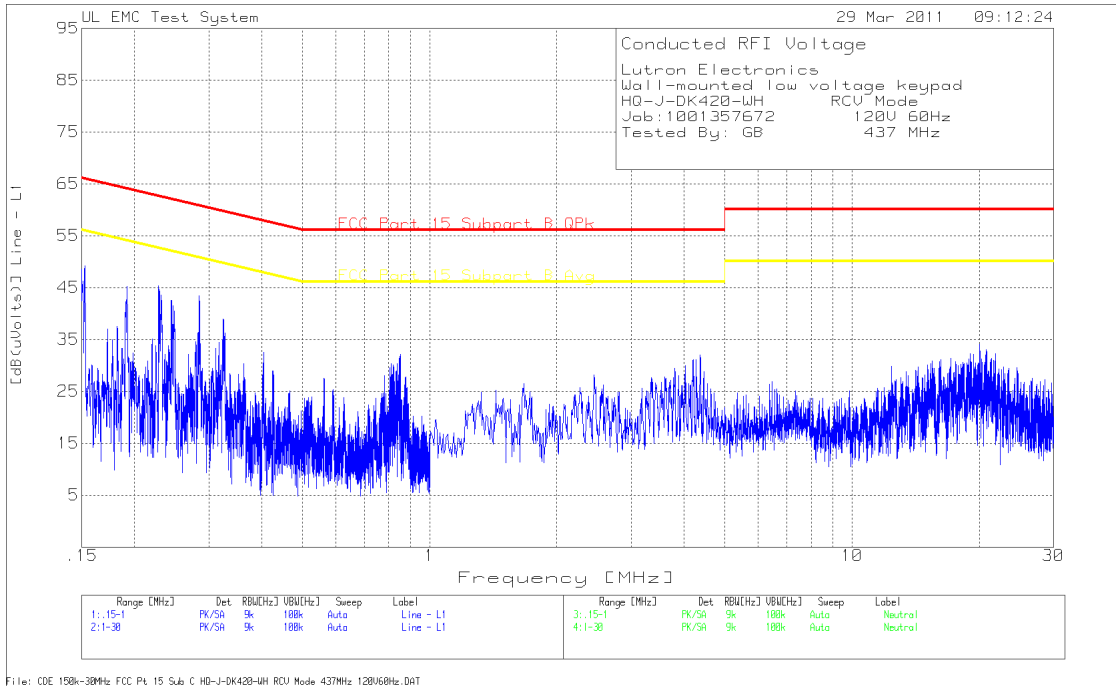


Table 6 Conducted Emissions Data Points - RX

Lutron Electronics										
Wall-mounted low voltage keypad										
HQ-J-DK420-WH RCV Mode										
Job:1001357672 120V 60Hz										
Tested By: GB 437 MHz										
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Limit 1	Margin 1[dB]	Limit 2	Margin 2[dB]
Number	Frequency	Reading	Type	Factor	Factor	[dB(uVolts)]				
	[MHz]	[dB(uV)]		[dB]	[dB]					
Line - L1 .15 - 1MHz										
1	0.15085	34.04	PK	11.6	0	45.64	66	-20.36	56	-10.36
2	0.15272	37.17	PK	11.6	0	48.77	65.9	-17.13	55.9	-7.13
3	0.19183	33.84	PK	11.2	0	45.04	64	-18.96	54	-8.96
4	0.22788	34.12	PK	11	0	45.12	62.5	-17.38	52.5	-7.38
6	0.28484	32.63	PK	10.8	0	43.43	60.7	-17.27	50.7	-7.27
Neutral .15 - 1MHz										
5	0.23621	33.87	PK	10.9	0	44.77	62.2	-17.43	52.2	-7.43
7	0.16377	36.54	PK	11.4	0	47.94	65.3	-17.36	55.3	-7.36
8	0.16666	37.11	PK	11.4	0	48.51	65.1	-16.59	55.1	-6.59
9	0.2005	32.49	PK	11.1	0	43.59	63.6	-20.01	53.6	-10.01
10	0.20475	32.68	PK	11.1	0	43.78	63.4	-19.62	53.4	-9.62
11	0.23519	33.76	PK	10.9	0	44.66	62.3	-17.64	52.3	-7.64
12	0.23638	32.25	PK	10.9	0	43.15	62.2	-19.05	52.2	-9.05
LIMIT 1: FCC Part 15 Subpart C QPk										
LIMIT 2: FCC Part 15 Subpart C Avg										
PK - Peak detector										
QP - Quasi-Peak detector										
LnAv - Linear Average detector										
LgAv - Log Average detector										
Av - Average detector										
CAV - CISPR Average detector										
RMS - RMS detection										
CRMS - CISPR RMS detection										

Job Number: 1001357672 File Number: MC15896 Page 26 of 61
 Model Number: HQ-J-DK420-WH
 Client Name: LUTRON ELECTRONICS INC
 FCC ID: JPZ0078 IC Number: 2851A-JPZ0078

Lutron Electronics									
Wall-mounted low voltage keypad									
HQ-J-DK420-WH RCV Mode									
Job:1001357672 120V 60Hz									
Tested By: GB 437 MHz									
Test	Meter	Detector	Gain/Loss	Transducer	Level	Limit 1	Margin 1[dB]	Limit 2	Margin 2[dB]
Frequency	Reading	Type	Factor	Factor	[dB(uVolts)]				
[MHz]	[dB(uV)]		[dB]	[dB]					
Line - L1 .15 - 1MHz									
0.15028	18.59	Av	11.6	0	30.19	66	-35.81	56	-25.81
0.15291	17.51	Av	11.6	0	29.11	65.8	-36.69	55.8	-26.69
0.19175	18.19	Av	11.2	0	29.39	64	-34.61	54	-24.61
0.22765	15.78	Av	11	0	26.78	62.5	-35.72	52.5	-25.72
0.28517	13.07	Av	10.8	0	23.87	60.7	-36.83	50.7	-26.83
Neutral .15 - 1MHz									
0.23641	15.14	Av	10.9	0	26.04	62.2	-36.16	52.2	-26.16
0.16432	15.33	Av	11.4	0	26.73	65.2	-38.47	55.2	-28.47
0.16649	15.58	Av	11.4	0	26.98	65.1	-38.12	55.1	-28.12
0.2001	16.78	Av	11.1	0	27.88	63.6	-35.72	53.6	-25.72
0.20467	14.8	Av	11.1	0	25.9	63.4	-37.5	53.4	-27.5
0.2355	14.52	Av	10.9	0	25.42	62.3	-36.88	52.3	-26.88
0.23682	14.08	Av	10.9	0	24.98	62.2	-37.22	52.2	-27.22
NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).									
PK - Peak detector									
QP - Quasi-Peak detector									
LnAv - Linear Average detector									
LgAv - Log Average detection									
Av - average detection									
CAV - CISPR average detection									
RMS - RMS detection									
CRMS - CISPR RMS detection									
LIMIT 1: FCC Part 15 Subpart C QPk									
LIMIT 2: FCC Part 15 Subpart C Avg									

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 7 Occupied Bandwidth Configuration Settings

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

Table 8 Occupied Bandwidth Spectrum Analyzer Settings

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

Table 9 Occupied Bandwidth Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
Spectrum Analyzer	Agilent	E4446A	70728	2010-02-04	2013-02-04
Dipole Antenna	EMCO	3121C	3359	2010-12-08	2011-12-09
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43734	2010-03-08	2012-03-08
Multimeter	Fluke	87V	64386	2011-02-02	2012-02-29

Job Number: 1001357672
Model Number: HQ-J-DK420-WH
Client Name: LUTRON ELECTRONICS INC
FCC ID: JPZ0078

File Number: MC15896
IC Number: 2851A-JPZ0078

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Figure 6 Test Setup for Occupied Bandwidth

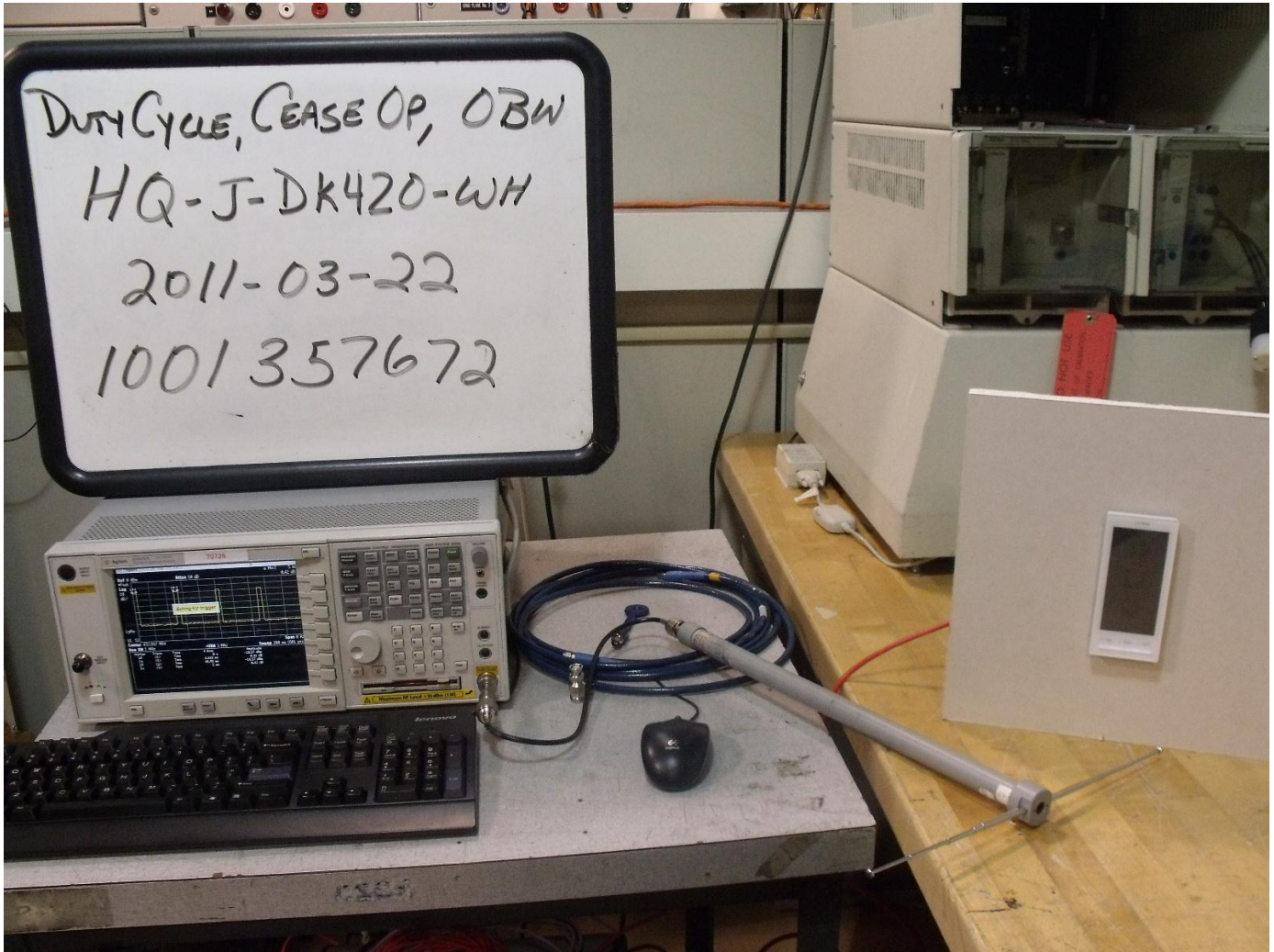
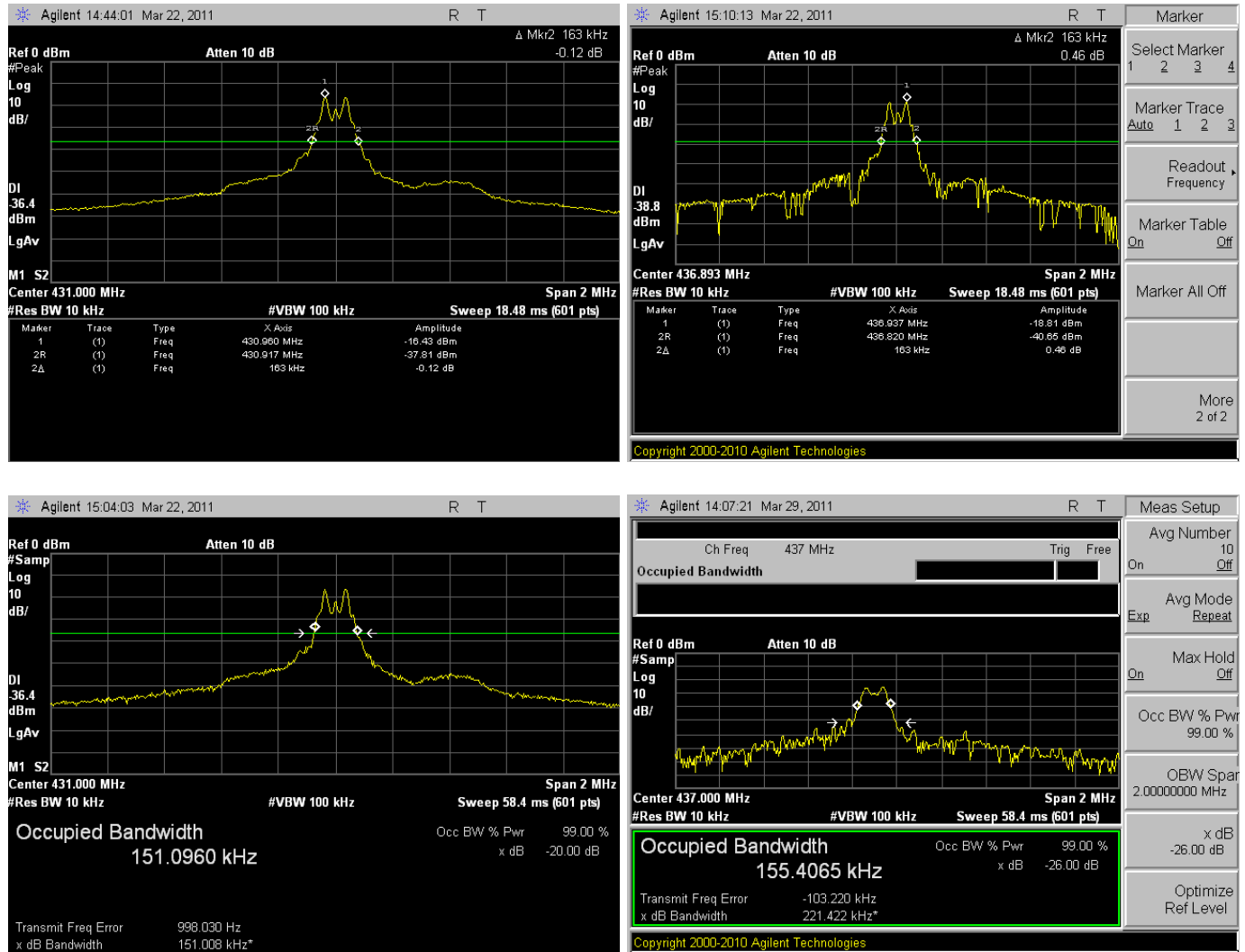


Table 10 Occupied Bandwidth Test Data

Power Mode	Frequency (MHz)	20dB OBW (kHz)	99% OBW (kHz)	Limit (MHz)	Result
AC	431	163	151.1	1.08	Pass
AC	437	163	155.4	1.09	Pass

Figure 7 Occupied Bandwidth Graph



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 11 Cease Operation Configuration Settings

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

Table 12 Cease Operation Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
Spectrum Analyzer	Agilent	E4446A	70728	2010-02-04	2013-02-04
Dipole Antenna	EMCO	3121C	3359	2010-12-08	2011-12-09
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43734	2010-03-08	2012-03-08
Multimeter	Fluke	87V	64386	2011-02-02	2012-02-29

Job Number: 1001357672
Model Number: HQ-J-DK420-WH
Client Name: LUTRON ELECTRONICS INC
FCC ID: JPZ0078

File Number: MC15896
IC Number: 2851A-JPZ0078

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Figure 8 Test Setup for Cease Operation

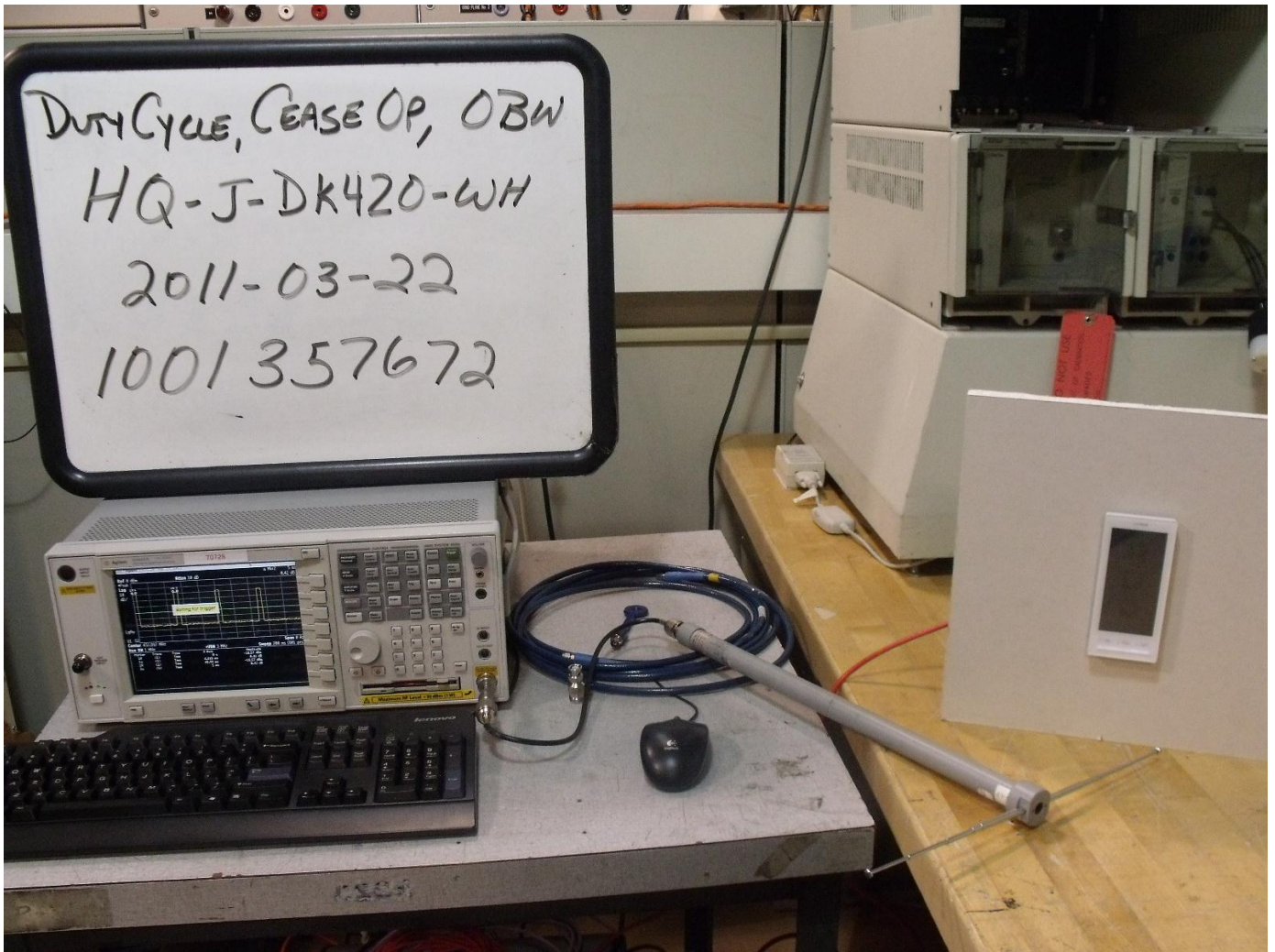
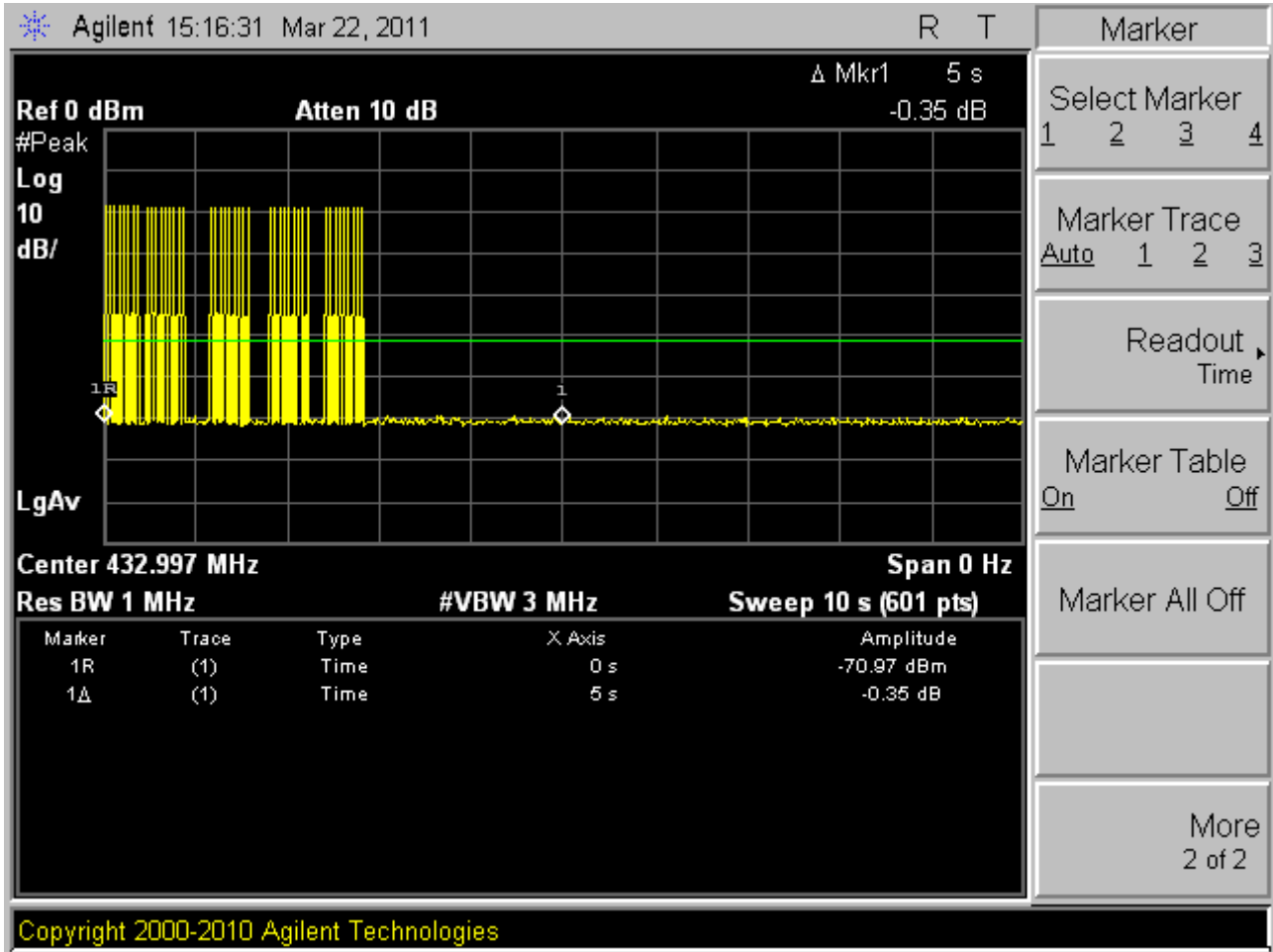


Figure 9 Cease Operation Graph



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, ANSI C63.10:2009, RSS-GEN, RSS-210
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 13 Pulse Train Configuration Settings

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

Table 14 Pulse Train Calculation

Pulse Width (mS)	Total Transmission time or 100ms which ever is lesser	Average Correction Factor (dB) $20\log\left(\frac{PulseWidth}{TotalTransmissionTime}\right)$
$(1 \times 4.333) + (1 \times 5) = 9.333$	100	-20.6

Table 15 Pulse Train Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
Spectrum Analyzer	Agilent	E4446A	70728	2010-02-04	2013-02-04
Dipole Antenna	EMCO	3121C	3359	2010-12-08	2011-12-09
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43734	2010-03-08	2012-03-08
Multimeter	Fluke	87V	64386	2011-02-02	2012-02-29

Job Number: 1001357672
Model Number: HQ-J-DK420-WH
Client Name: LUTRON ELECTRONICS INC
FCC ID: JPZ0078

File Number: MC15896
IC Number: 2851A-JPZ0078

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Figure 10 Test Setup for Pulse Train

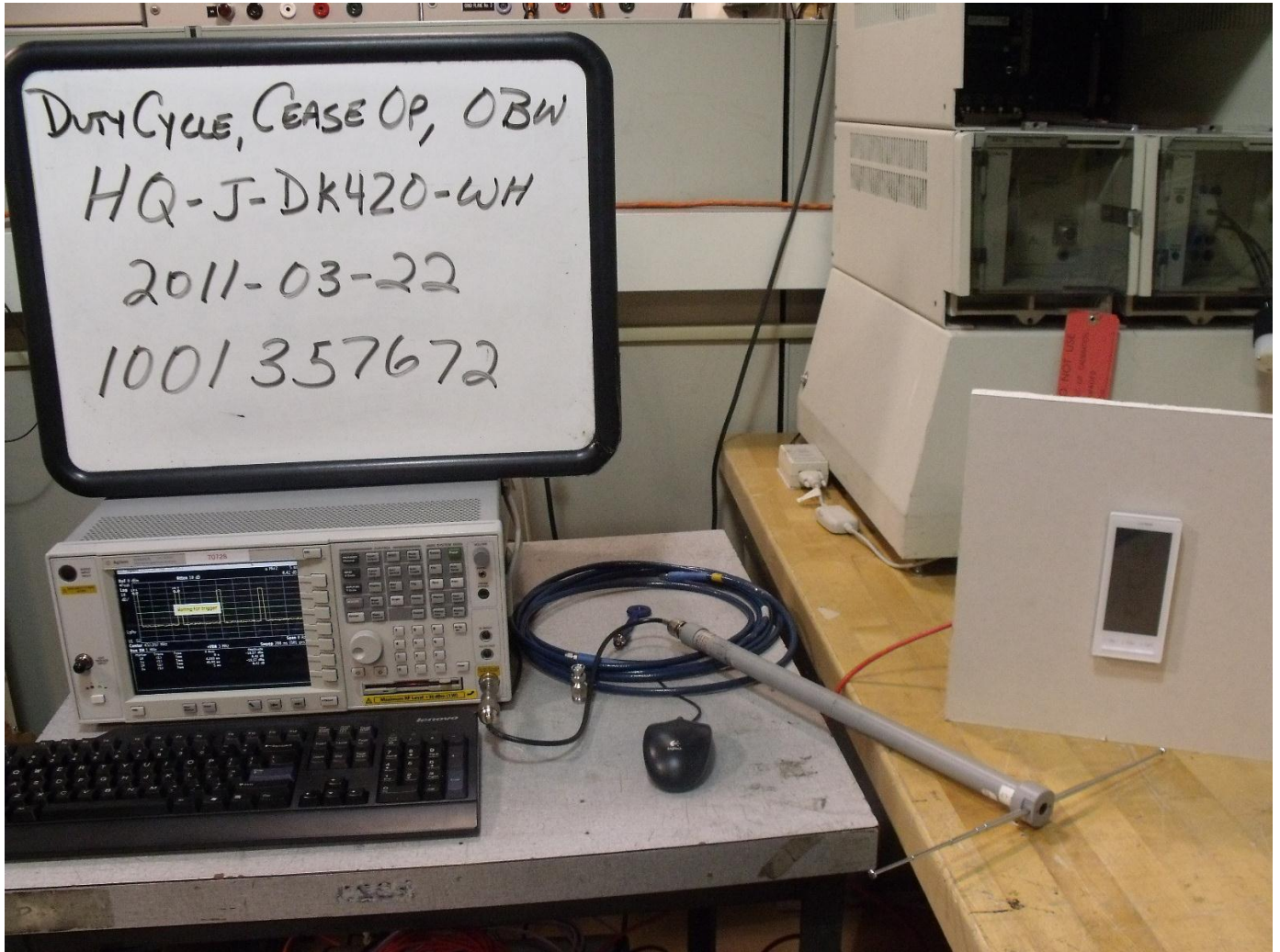
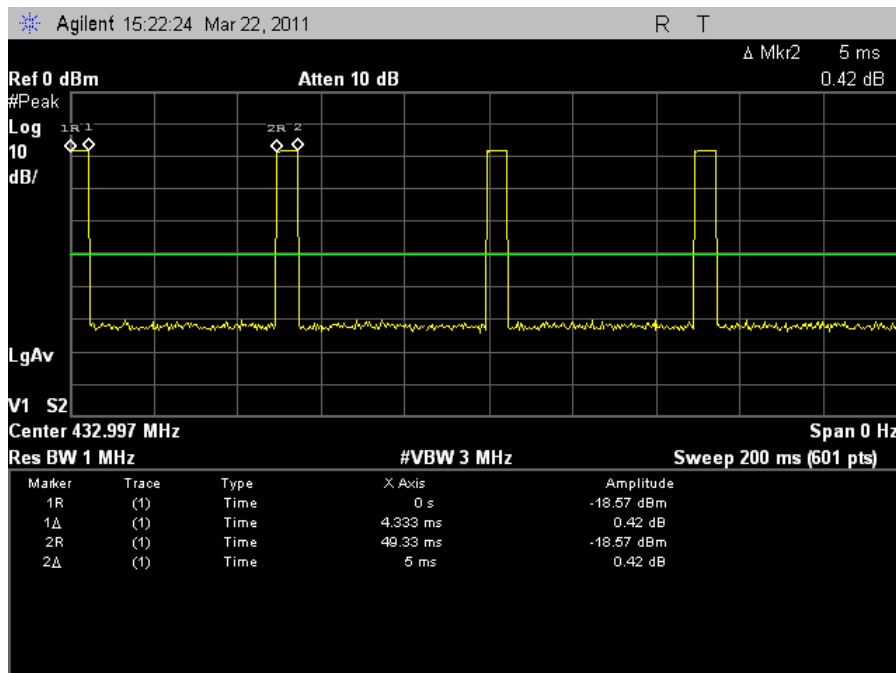
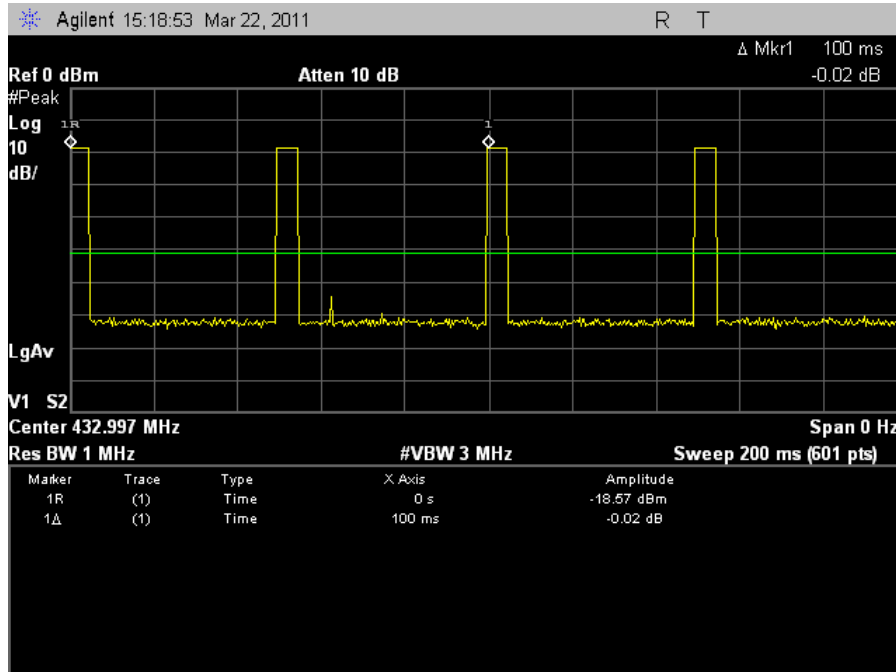


Figure 11 Pulse Train Graph



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 C63.4:2003. 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; 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	(3 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	-	-
1000-5000	-	-	54
431	-	80.7	-
437	-	80.9	-
Harmonics of the Fundamental 431	-	-	60.7
Harmonics of the Fundamental 437	-	-	60.9
Supplementary information: Spurious limits are only applied against products of the transmitter. All other emissions must meet the general limits. Emissions of clocks related to the transmit frequencies and associated harmonics below 30MHz do not fall in restricted bands.			

Table 16 Radiated Emissions EUT Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
1	1	2
Supplementary information:		

Table 17 Radiated Emissions Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
30-1000MHz					
EMI Receiver	Rohde & Schwarz	ESIB40	34968	2011-03-01	2012-03-01
Bicon Antenna	Schaffner	VBA6106A	43441	2010-09-09	2010-09-09
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	4268	2010-12-07	2012-12-07
Multimeter	Fluke	87V	64386	2011-02-01	2012-02-29
Above 1GHz (Band Optimized System)					
Spectrum Analyzer	Agilent	E7405A	19695	2011-02-01	2012-02-01
Horn Antenna (1-2 GHz)	ETS	3161-01	51442	2008-03-28	See * below
Horn Antenna (2-4 GHz)	ETS	3161-02	48107	2007-09-27	See * below
Horn Antenna (4-8 GHz)	ETS	3161-03	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
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	4268	2010-12-07	2012-12-07
Multimeter	Fluke	87V	64386	2011-02-02	2012-02-29

Job Number: 1001357672 File Number: MC15896 Page 38 of 61
 Model Number: HQ-J-DK420-WH
 Client Name: LUTRON ELECTRONICS INC
 FCC ID: JPZ0078 IC Number: 2851A-JPZ0078

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
<p>* - 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.</p> <p>* 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.</p>					

Figure 12 Test setup for Radiated Emissions

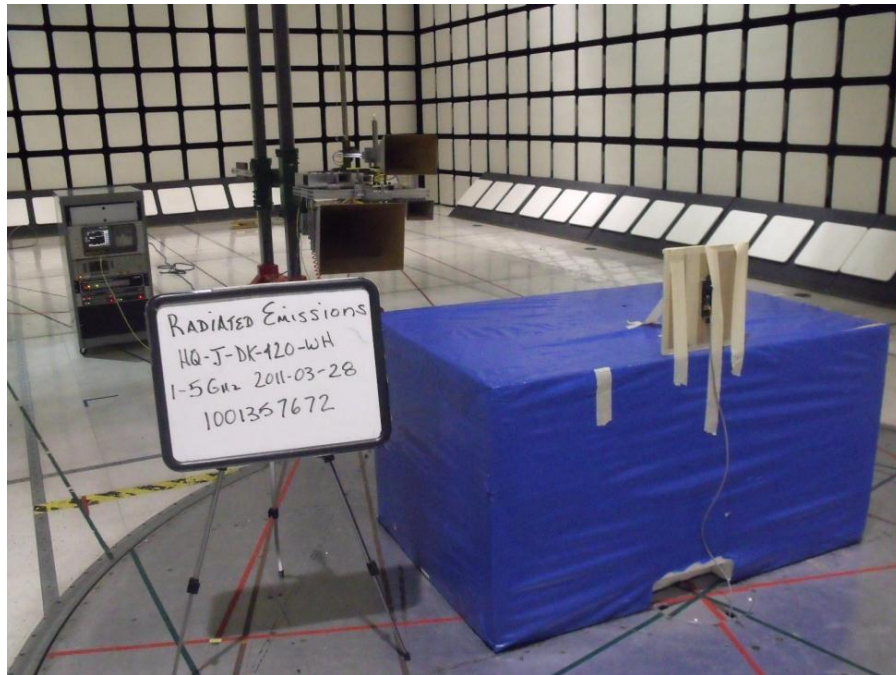


Figure 13 Radiated Emissions Graph

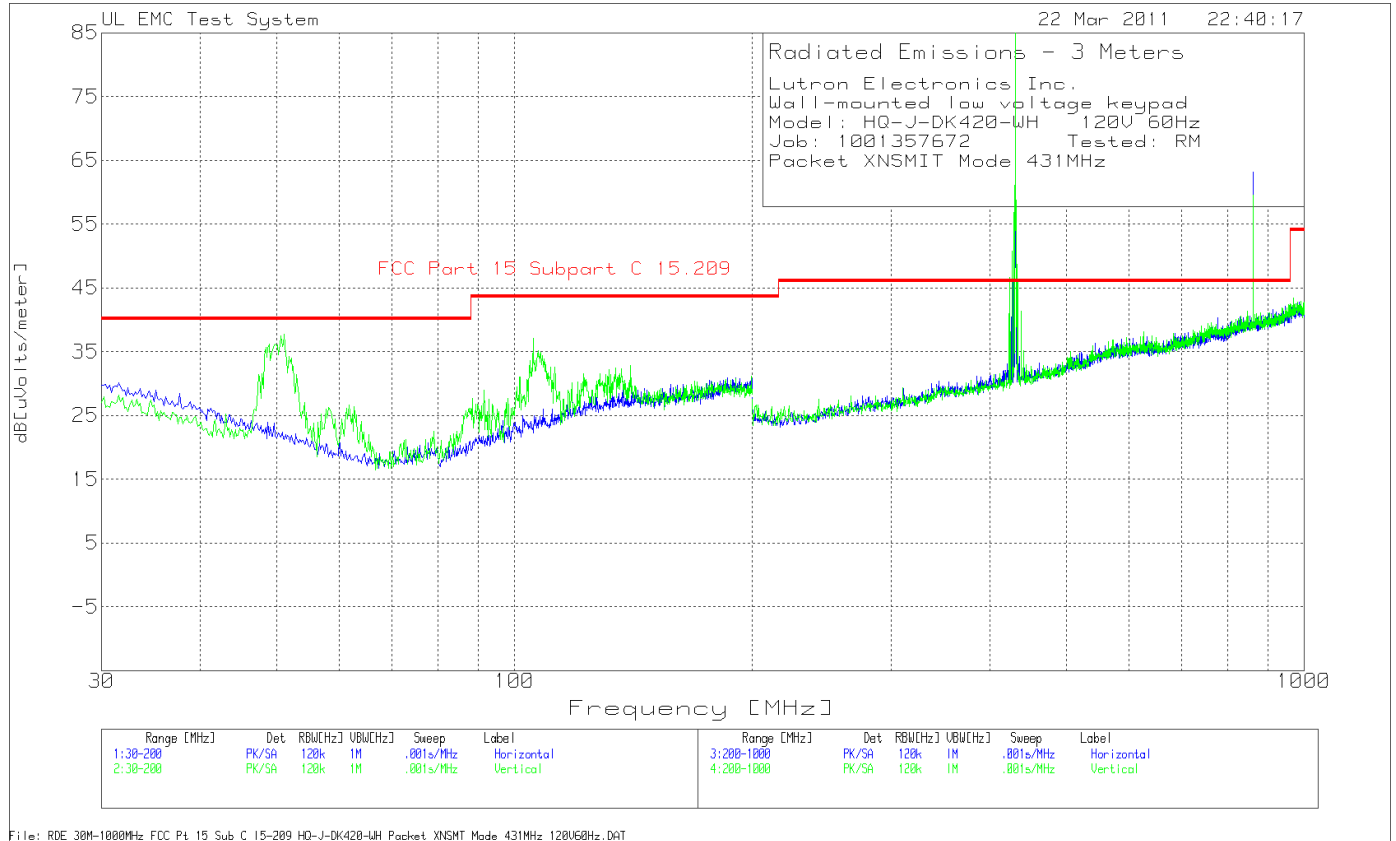


Table 18 Radiated Emissions Data Points

Lutron Electronics Inc.														
Wall-mounted low voltage keypad														
Model: HQ-J-DK420-WH 120V 60Hz														
Job: 1001357672 Tested: RM														
Packet XNSMIT Mode 431MHz														
Test	Meter	Detector	Gain/Loss	Transducer	Level	DCF	Corrected Level	Limit 1	Margin 1[dB]	Limit 2	Margin 2[dB]	Azimuth [degs]	Height [cm]	Polarity
Frequency [MHz]	Reading [dB(uV)]	Type	Factor [dB]	Factor [dB]	dB[uVolts/meter]	[dB]	dB[uVolts/meter]							
Vertical 30 - 200MHz														
49.2288	20.69	QP	0.7	10.3	31.69	-	-	40	-8.31	-	-	26	134	Vert
51.1011	18.99	QP	0.7	10.1	29.79	-	-	40	-10.21	-	-	303	112	Vert
Horizontal 200 - 1000MHz														
430.9469	70.02	PK	2.3	16.8	89.12	-20.5	68.62	-	-	80.7	-12.08	351	102	Horz
862.0586	41.12	PK	3.4	23.1	67.62	-20.5	47.12	-	-	60.7	-13.58	30	107	Horz
426.1131	7.48	QP	2.3	16.6	26.38	-	-	46	-19.62	-	-	234	147	Horz
428.9868	13.74	QP	2.3	16.8	32.84	-	-	46	-13.16	-	-	75	148	Horz
432.5163	13.47	QP	2.3	16.9	32.67	-	-	46	-13.33	-	-	92	135	Horz
Vertical 200 - 1000MHz														
431.0205	79.28	PK	2.3	16.4	97.98	-20.5	77.48	-	-	80.7	-3.22	17	134	Vert
861.9103	42.33	PK	3.4	23.1	68.83	-20.5	48.33	-	-	60.7	-12.37	66	120	Vert
426.9135	15.17	QP	2.3	16.3	33.77	-	-	46	-12.23	-	-	3	139	Vert
428.9927	20.77	QP	2.3	16.4	39.47	-	-	46	-6.53	-	-	350	133	Vert
422.9115	7.17	QP	2.3	16.3	25.77	-	-	46	-20.23	-	-	22	113	Vert
424.1121	8.57	QP	2.3	16.3	27.17	-	-	46	-18.83	-	-	175	115	Vert
432.9137	19.67	QP	2.3	16.5	38.47	-	-	46	-7.53	-	-	348	128	Vert
433.7169	14.4	QP	2.3	16.5	33.2	-	-	46	-12.8	-	-	15	124	Vert
438.1191	7.36	QP	2.3	16.6	26.26	-	-	46	-19.74	-	-	21	143	Vert
LIMIT 1: FCC Part 15 Subpart C 15.209														
LIMIT 1: FCC Part 15 Subpart C 15.231														
LIMIT 3: NONE														
LIMIT 4: NONE														
LIMIT 5: NONE														
LIMIT 6: NONE														
PK - Peak detector (Maximized)														
QP - Quasi-Peak detector														
LnAv - Linear Average detector														
LgAv - Log Average detector														
Av - Average detector														
CAV - CISPR Average detector														
RMS - RMS detection														
CRMS - CISPR RMS detection														

Figure 14 Radiated Emissions Graph

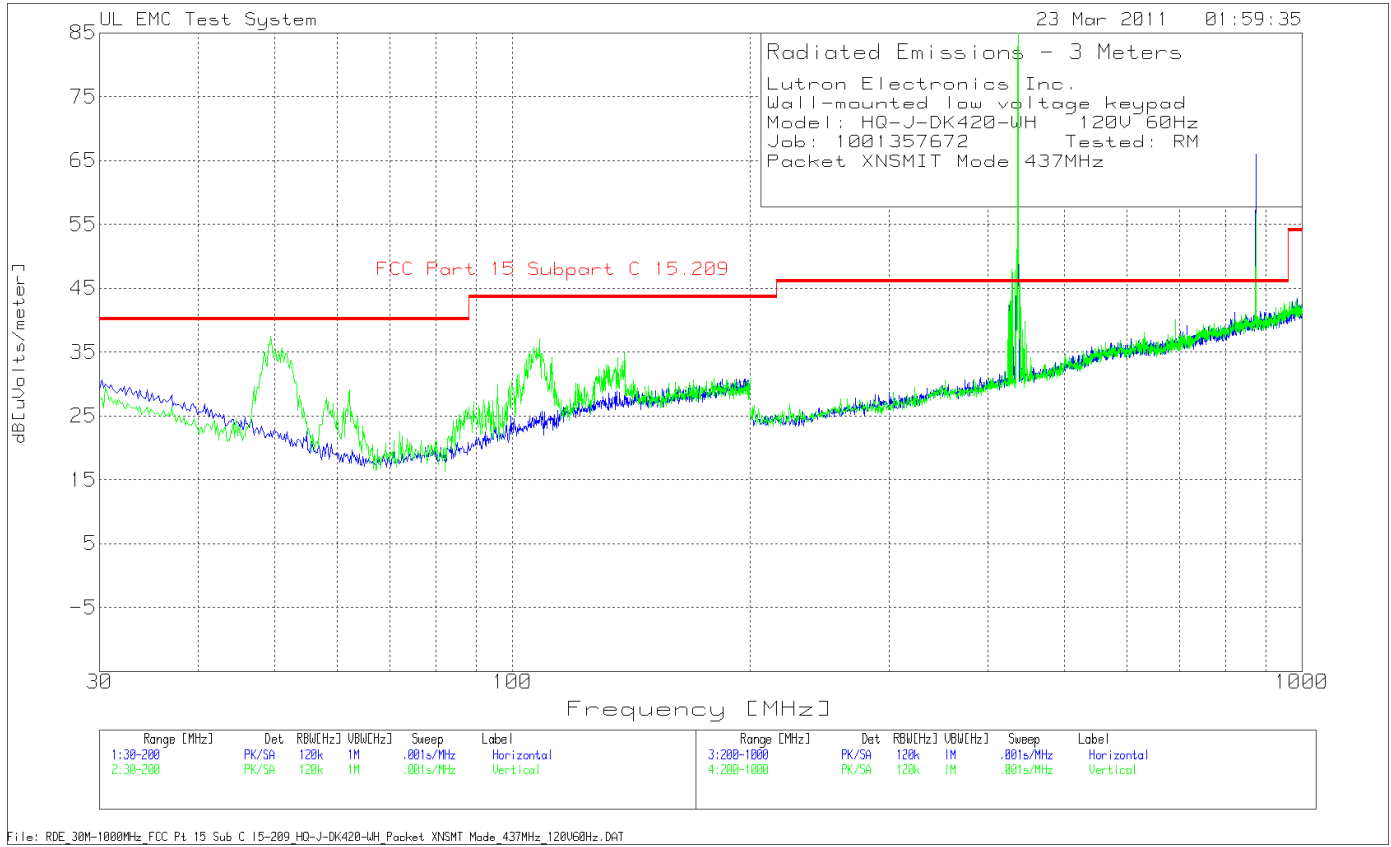


Table 19 Radiated Emissions Data Points

Lutron Electronics Inc.
 Wall-mounted low voltage keypad
 Model: HQ-J-DK420-WH 120V 60Hz
 Job: 1001357672 Tested: RM
 Packet XNSMIT Mode 437MHz

Test	Meter	Detector	Gain/Loss	Transducer	Level	DCF	Corrected Level	Limit 1	Margin 1	Limit 2	Margin 2	Azimuth	Height [cm]	Polarity
Frequency [MHz]	Reading [dB(uV)]	Type	Factor [dB]	Factor [dB]	Level [dB(uVolts/meter)]	[dB]	Level [dB(uVolts/meter)]		[dB]		[dB]	[degs]		
Vertical 30 - 200MHz														
49.2167	22.12	QP	0.7	10.3	33.12	-		40	-6.88	-	-	0	106	Vert
51.1011	18.52	QP	0.7	10.1	29.32	-		40	-10.68	-	-	172	126	Vert
Horizontal 200 - 1000MHz														
436.9233	69.47	PK	2.3	16.9	88.67	-20.5	68.17	-	42.67	80.9	-12.73	119	151	Horz
873.8622	43.44	PK	3.4	23	69.84	-20.5	49.34	-	23.84	60	-10.66	176	151	Horz
425.3127	7.17	QP	2.3	16.6	26.07	-		46	-19.93	-	-	88	150	Horz
433.3167	7.72	QP	2.3	16.9	26.92	-		46	-19.08	-	-	90	159	Horz
434.9175	9.3	QP	2.3	16.9	28.5	-		46	-17.5	-	-	120	141	Horz
822.3112	7.72	QP	3.3	22.7	33.72	-		46	-12.28	-	-	223	400	Horz
Vertical 200 - 1000MHz														
436.8467	77.03	PK	2.3	16.6	95.93	-20.5	75.43	-	49.93	80.9	-5.47	24	130	Vert
873.8592	38.57	PK	3.4	23.2	65.17	-20.5	44.67	-	19.17	60	-15.33	137	164	Vert
424.9125	10.15	QP	2.3	16.3	28.75	-		46	-17.25	-	-	3	135	Vert
429.3147	9.25	QP	2.3	16.4	27.95	-		46	-18.05	-	-	27	145	Vert
432.9165	11.82	QP	2.3	16.5	30.62	-		46	-15.38	-	-	0	136	Vert
435.3177	18.24	QP	2.3	16.5	37.04	-		46	-8.96	-	-	22	120	Vert
439.3197	13.56	QP	2.3	16.7	32.56	-		46	-13.44	-	-	18	123	Vert
440.1201	10.54	QP	2.3	16.7	29.54	-		46	-16.46	-	-	22	126	Vert
691.0455	7.42	QP	3.1	20.9	31.42	-		46	-14.58	-	-	6	113	Vert

LIMIT 1: FCC Part 15 Subpart C 15.209
 LIMIT 2: FCC Part 15 Subpart C 15.231
 LIMIT 3: NONE
 LIMIT 4: NONE
 LIMIT 5: NONE
 LIMIT 6: NONE

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

Figure 15 Radiated Emissions Graph

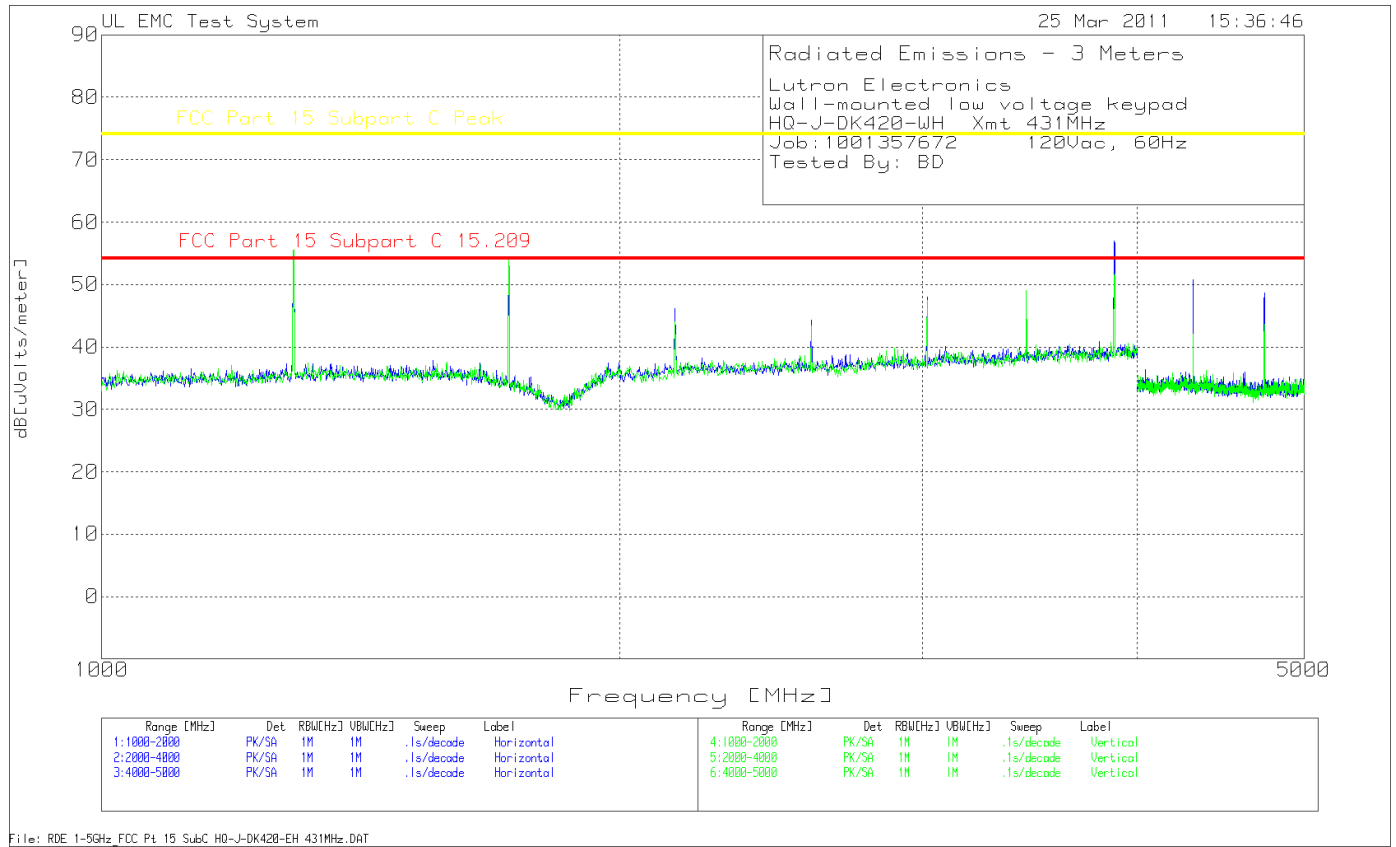


Table 20 Radiated Emissions Data Points

Lutron Electronics
 Wall-mounted low voltage keypad
 HQ-J-DK420-WH Xmt 431MHz
 Job:1001357672 120Vac, 60Hz
 Tested By: BD

Test	Meter	Detector	Gain/Loss	Transducer	Level	DCF	Corrected Level	Limit 1	Margin 1[dB]	Limit 2	Margin 2[dB]	Azimuth [degs]	Height [cm]	Polarity
Frequency [MHz]	Reading [dB(uV)]	Type	Factor [dB]	Factor [dB]	dB[uVolts/meter]	[dB]	dB[uVolts/meter]							
Horizontal 1000 - 2000MHz														
1293	85.18	PK	-44.41	20.5	61.27	-20.5	40.77	54	-13.23	74	-12.73	120	341	Horz
1724	79.84	PK	-44.13	20.8	56.51	-20.5	36.01	54	-17.99	74	-17.49	241	323	Horz
Horizontal 2000 - 4000MHz														
2155	71.98	PK	-43.39	21.4	49.99	-20.5	29.49	54	-24.51	74	-24.01	154	151	Horz
2586.7	64.61	PK	-42.49	21.3	43.42	-20.5	22.92	54	-31.08	74	-30.58	239	270	Horz
3016.68	74.94	PK	-41.97	21.5	54.47	-20.5	33.97	54	-20.03	74	-19.53	157	268	Horz
3448.27	72.78	PK	-41.73	22.1	53.15	-20.5	32.65	54	-21.35	74	-20.85	195	144	Horz
3878.84	77.36	PK	-41.91	22.6	58.05	-20.5	37.55	54	-16.45	74	-15.95	96	204	Horz
Horizontal 4000 - 5000MHz														
4309.6	76.37	PK	-51.74	27.7	52.33	-20.5	31.83	54	-22.17	74	-21.67	252	333	Horz
4740.66	72.76	PK	-52.59	27.2	47.37	-20.5	26.87	54	-27.13	74	-26.63	82	373	Horz
Vertical 1000 - 2000MHz														
1293.425	80.87	PK	-44.39	20.5	56.98	-20.5	36.48	54	-17.52	74	-17.02	69	356	Vert
1724.405	79.02	PK	-44.11	20.8	55.71	-20.5	35.21	54	-18.79	74	-18.29	117	324	Vert
Vertical 2000 - 4000MHz														
2155.25	70.98	PK	-43.38	21	48.6	-20.5	28.1	54	-25.9	74	-25.4	163	398	Vert
2585.43	65.86	PK	-42.46	21.5	44.9	-20.5	24.4	54	-29.6	74	-29.1	6	386	Vert
3016.85	69.96	PK	-41.97	21.7	49.69	-20.5	29.19	54	-24.81	74	-24.31	96	224	Vert
3448.04	73.29	PK	-41.73	22.2	53.76	-20.5	33.26	54	-20.74	74	-20.24	213	355	Vert
3879.32	74.97	PK	-41.92	22.6	55.65	-20.5	35.15	54	-18.85	74	-18.35	187	367	Vert
Vertical 4000 - 5000MHz														
4309.85	70.66	PK	-51.73	27.8	46.73	-20.5	26.23	54	-27.77	74	-27.27	196	363	Vert
4740.02	67.93	PK	-52.6	27.1	42.43	-20.5	21.93	54	-32.07	74	-31.57	112	365	Vert

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

Note: Limit 1 is applied against the corrected level and Limit 2 is applied against the uncorrected level

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

Figure 16 Radiated Emissions Graph

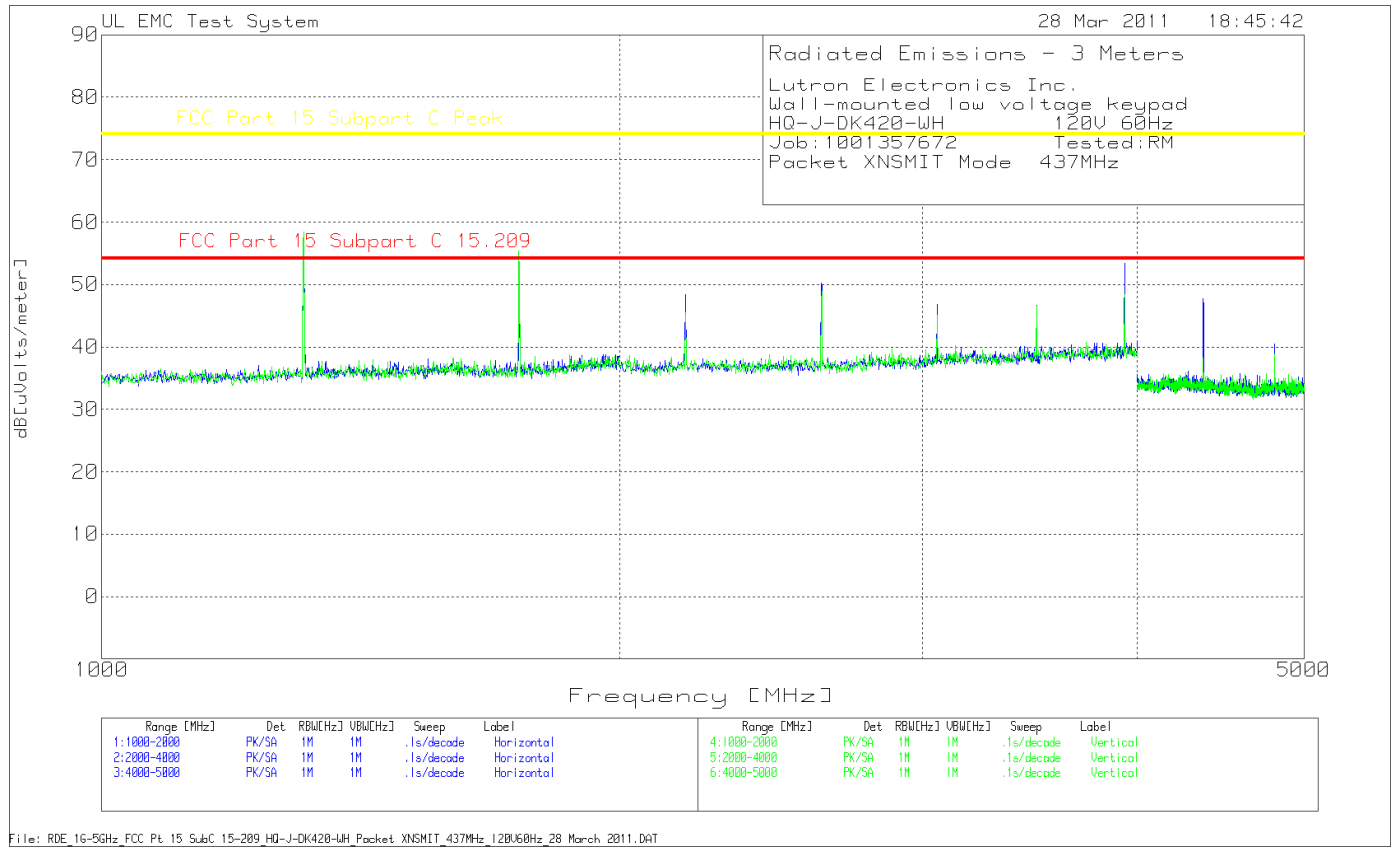


Table 21 Radiated Emissions Data Points

Lutron Electronics Inc.
 Wall-mounted low voltage keypad
 HQ-J-DK420-WH 120V 60Hz
 Job:1001357672 Tested:RM
 Packet XNSMIT Mode 437MHz

Test	Meter	Detector	Gain/Loss	Transducer	Level	DCF	Corrected Level	Limit 1	Margin 1	Limit 2	Margin 2	Azimuth	Height [cm]	Polarity
Frequency [MHz]	Reading [dB(uV)]	Type	Factor [dB]	Factor [dB]	dB[uVolts/meter]	[dB]	dB[uVolts/meter]		[dB]		[dB]	[degs]		
Horizontal 1000 - 2000MHz														
1310.8	82.81	PK	-44.35	20.5	58.96	-20.5	38.46	54	-15.54	74	-15.04	280	225	Horz
1747.6875	79.45	PK	-44.13	20.8	56.12	-20.5	35.62	54	-18.38	74	-17.88	244	239	Horz
Horizontal 2000 - 4000MHz														
2184.6625	72.51	PK	-43.19	21.5	50.82	-20.5	30.32	54	-23.68	74	-23.18	4	353	Horz
2621.3375	73.59	PK	-42.5	21.4	52.49	-20.5	31.99	54	-22.01	74	-21.51	217	319	Horz
3058.3125	74.02	PK	-41.88	21.6	53.74	-20.5	33.24	54	-20.76	74	-20.26	162	324	Horz
3494.9875	74.73	PK	-41.72	22.2	55.21	-20.5	34.71	54	-19.29	74	-18.79	191	268	Horz
3931.8125	73.93	PK	-41.71	22.7	54.92	-20.5	34.42	54	-19.58	74	-19.08	130	279	Horz
Horizontal 4000 - 5000MHz														
4369.2875	74.43	PK	-51.65	27.6	50.38	-20.5	29.88	54	-24.12	74	-23.62	241	286	Horz
4806.1875	71.37	PK	-52.55	27.1	45.92	-20.5	25.42	54	-28.58	74	-28.08	88	241	Horz
Vertical 1000 - 2000MHz														
1310.5875	82.19	PK	-44.36	20.5	58.33	-20.5	37.83	54	-16.17	74	-15.67	73	216	Vert
1747.5	83.17	PK	-44.13	20.8	59.84	-20.5	39.34	54	-14.66	74	-14.16	358	386	Vert
Vertical 2000 - 4000MHz														
2184.675	72.61	PK	-43.19	21.2	50.62	-20.5	30.12	54	-23.88	74	-23.38	210	390	Vert
2621.6125	71.9	PK	-42.5	21.4	50.8	-20.5	30.3	54	-23.7	74	-23.2	6	370	Vert
3058.525	68.03	PK	-41.89	21.8	47.94	-20.5	27.44	54	-26.56	74	-26.06	99	358	Vert
3495.45	73.77	PK	-41.72	22.4	54.45	-20.5	33.95	54	-20.05	74	-19.55	201	341	Vert
3931.9625	72.09	PK	-41.71	22.7	53.08	-20.5	32.58	54	-21.42	74	-20.92	157	355	Vert
Vertical 4000 - 5000MHz														
4368.8	68.96	PK	-51.64	27.7	45.02	-20.5	24.52	54	-29.48	74	-28.98	37	363	Vert
4805.6875	69.74	PK	-52.55	27.3	44.49	-20.5	23.99	54	-30.01	74	-29.51	283	375	Vert

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

Note: Limit 1 is applied against the corrected level and Limit 2 is applied against the uncorrected level

- PK - Peak detector (Maximized)
- QP - Quasi-Peak detector
- LnAv - Linear Average detector
- LgAv - Log Average detector
- Av - Average detector
- CAV - CISPR Average detector
- RMS - RMS detection
- CRMS - CISPR 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 and 3-meter 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, RSS-GEN	
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	(3 meter measurement distance)
Limits - Class B		
Frequency (MHz)	Limit (dBµV/m)	
	Quasi-Peak	Average
30 to 230	30	NA
230 to 1000	37	NA
1000-2000	NA	54
Supplementary information: None		

Table 22 Radiated Emissions EUT Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	4
1	1	5
Supplementary information: None		

Table 23 Radiated Emissions Test Equipment

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
30-1000MHz					
EMI Receiver	Rohde & Schwarz	ESIB40	34968	2011-03-01	2012-03-01
Bicon Antenna	Schaffner	VBA6106A	43441	2010-09-09	2011-09-09
Log-P Antenna	Schaffner	UPA6109	44067	2010-04-26	2011-04-26
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	4268	2010-12-07	2012-12-07
Multimeter	Fluke	87V	64386	2011-02-01	2012-02-29
Above 1GHz (Band Optimized System)					
Spectrum Analyzer	Agilent	E7405A	19695	2011-02-01	2012-02-01
Horn Antenna (1-2 GHz)	ETS	3161-01	51442	2008-03-28	See * below
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	4268	2010-12-07	2012-12-07
Multimeter	Fluke	87V	64386	2011-02-02	2012-02-29

Job Number: 1001357672 File Number: MC15896 Page 50 of 61
 Model Number: HQ-J-DK420-WH
 Client Name: LUTRON ELECTRONICS INC
 FCC ID: JPZ0078 IC Number: 2851A-JPZ0078

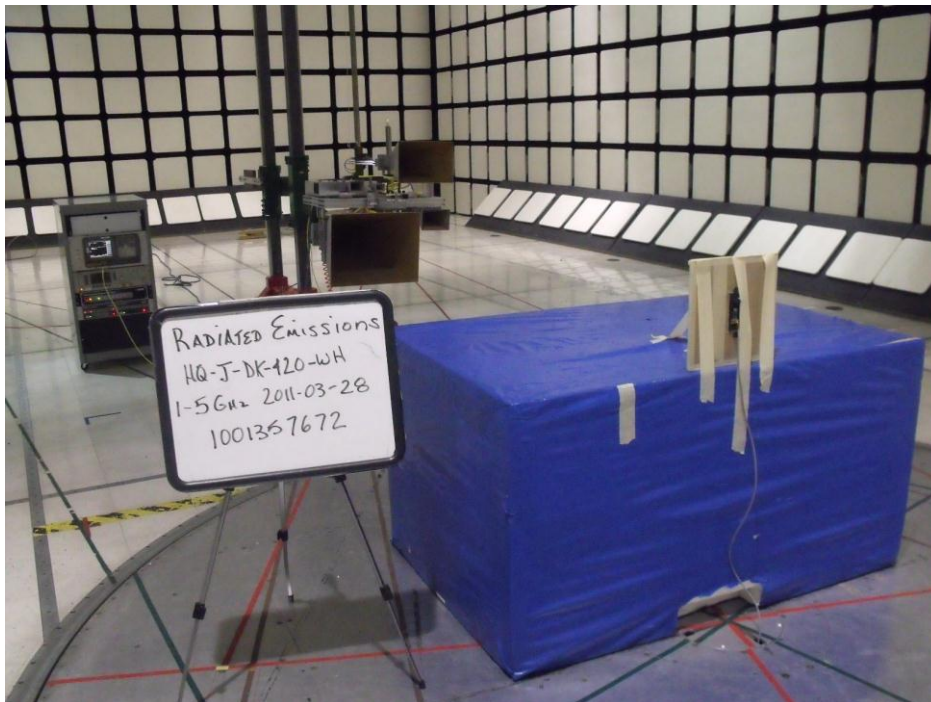
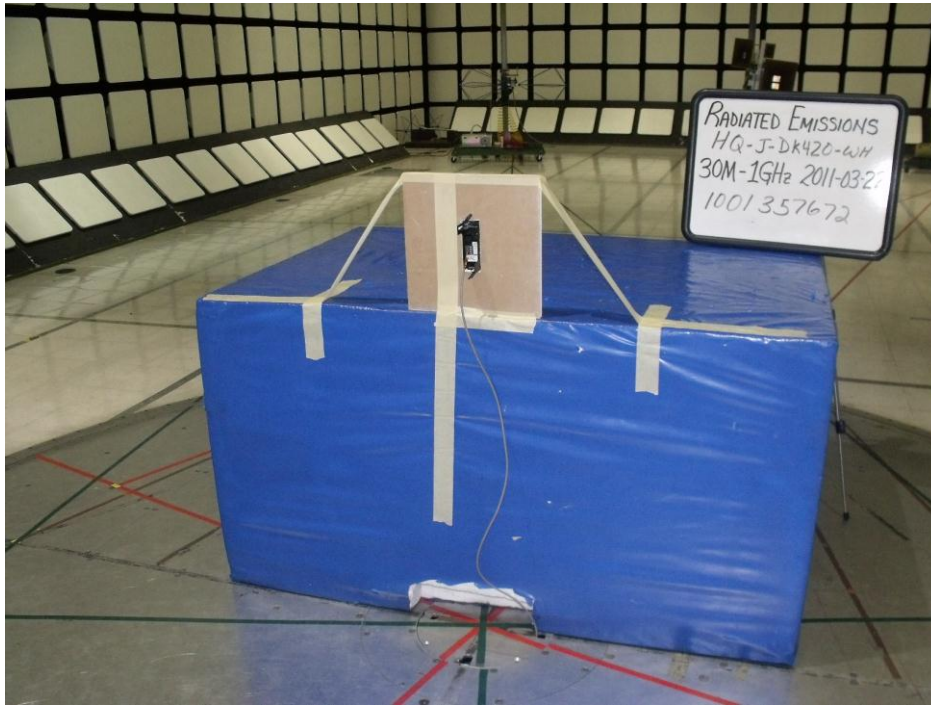
Test Equipment Used

Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
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* - 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.

Figure 17 Test setup for Radiated Emissions



Setup for 1-2 GHz is not changed from setup for 1-5GHz, only EUT operating mode changes.

Figure 18 Radiated Emissions Graph

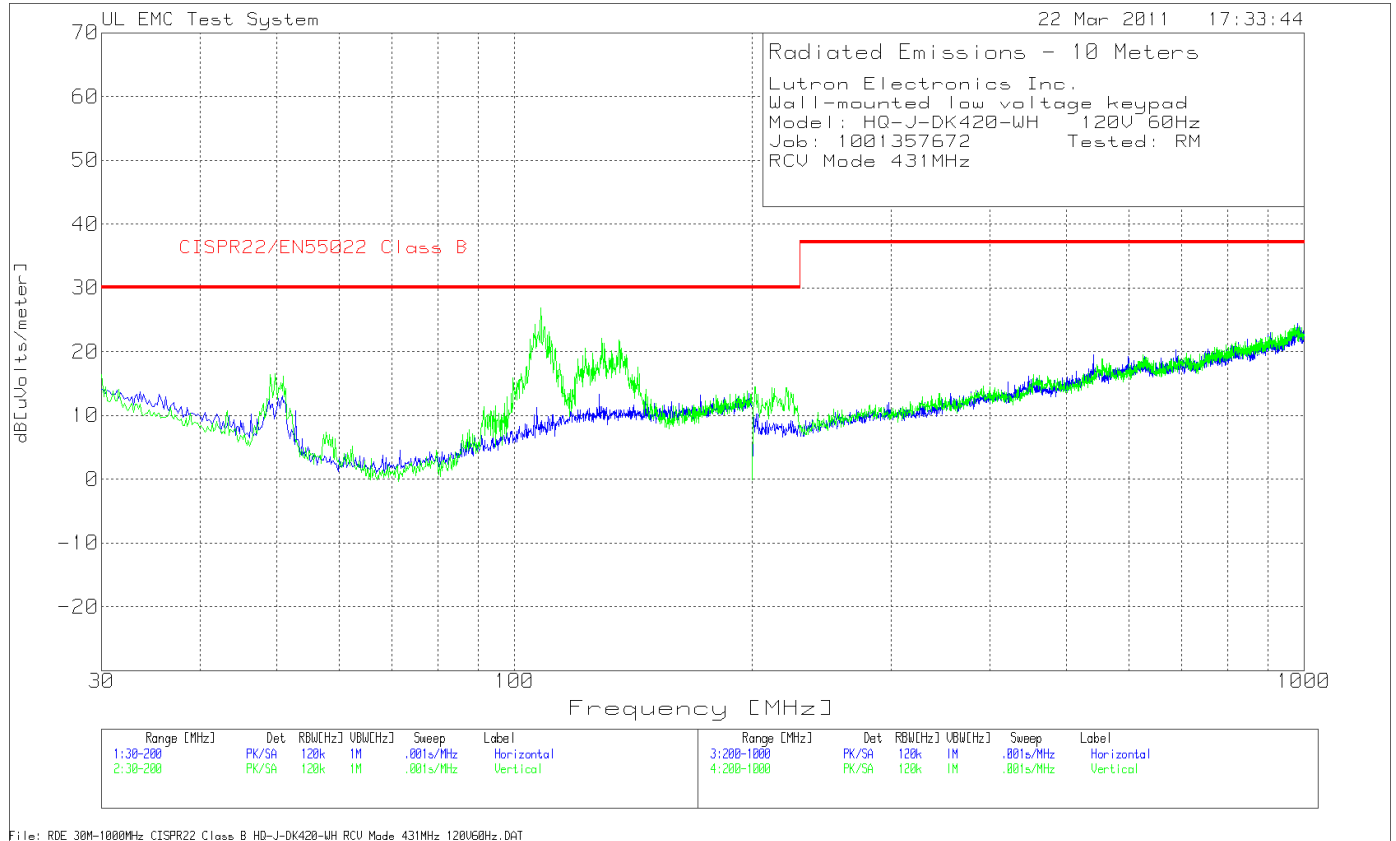


Table 24 Radiated Emissions Data Points

Lutron Electronics Inc.											
Wall-mounted low voltage keypad											
Model: HQ-J-DK420-WH 120V 60Hz											
Job: 1001357672 Tested: RM											
RCV Mode 431MHz											
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Limit 1	Margin 1[dB]	Azimuth [degs]	Height [cm]	Polarity
Number	Frequency [MHz]	Reading [dB(uV)]	Type	Factor [dB]	Factor [dB]	dB[uVolts/meter]					
Horizontal 30 - 200MHz											
1	50.7608	39.61	PK	-35.9	9.4	13.11	30	-16.89	325	250	Horz
Vertical 30 - 200MHz											
2	49.7397	42.6	PK	-35.9	9.8	16.5	30	-13.5	164	100	Vert
3	107.9379	50.49	PK	-35.6	12	26.89	30	-3.11	195	100	Vert
4	129.039	44.15	PK	-35.6	13.6	22.15	30	-7.85	164	100	Vert
Horizontal 200 - 1000MHz											
5	540.9705	32.6	PK	-32.2	19.1	19.5	37	-17.5	219	300	Horz
Vertical 200 - 1000MHz											
6	625.8129	30.97	PK	-31.8	20.4	19.57	37	-17.43	2	100	Vert
LIMIT 1: CISPR22/EN55022 Class B											
PK - Peak detector											
QP - Quasi-Peak detector											
LnAv - Linear Average detector											
LgAv - Log Average detector											
Av - Average detector											
CAV - CISPR Average detector											
RMS - RMS detection											
CRMS - CISPR RMS detection											
Lutron Electronics Inc.											
Modular Low Power Transmitter											
Model: HQ-J-DK420-WH 120V 60Hz											
Job: 1001357672 Tested: RM											
RCV Mode 431MHz											
Test	Meter	Detector	Gain/Loss	Transducer	Level	Limit 1	Margin 1[dB]	Azimuth [degs]	Height [cm]	Polarity	
Frequency [MHz]	Reading [dB(uV)]	Type	Factor [dB]	Factor [dB]	dB[uVolts/meter]						
Vertical 30 - 200MHz											
107.8518	46.39	QP	-35.6	12	22.79	30	-7.21	294	145	Vert	
LIMIT 1: CISPR22/EN55022 Class B											
PK - Peak detector											
QP - Quasi-Peak detector											
LnAv - Linear Average detector											
LgAv - Log Average detector											
Av - Average detector											
CAV - CISPR Average detector											
RMS - RMS detection											
CRMS - CISPR RMS detection											

Figure 19 Radiated Emissions Graph

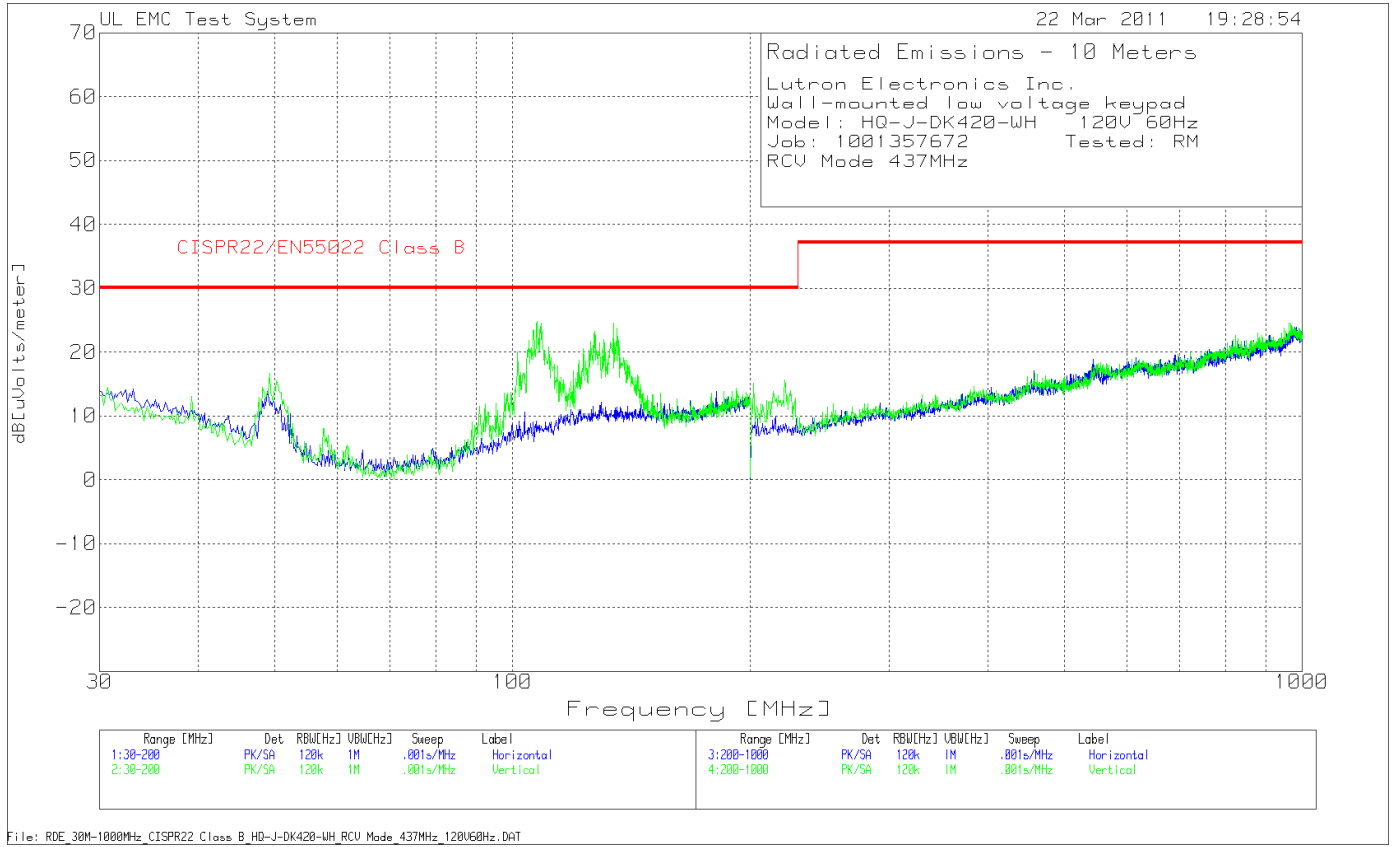


Table 25 Radiated Emissions Data Points

Lutron Electronics Inc.											
Wall-mounted low voltage keypad											
Model: HQ-J-DK420-WH 120V 60Hz											
Job: 1001357672 Tested: RM											
RCV Mode 437MHz											
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Limit 1	Margin	Azimuth	Height [cm]	Polarity
Number	Frequency	Reading	Type	Factor	Factor	dB[uVolts/ meter]					
	[MHz]	[dB(uV)]		[dB]	[dB]				[degs]		
Horizontal 30 - 200MHz											
1	48.8889	39.44	PK	-35.9	10.3	13.84	30	-16.16	1	400	Horz
Vertical 30 - 200MHz											
2	49.2292	42.52	PK	-35.9	10.1	16.72	30	-13.28	232	100	Vert
3	107.4274	48.26	PK	-35.6	12.1	24.76	30	-5.24	135	100	Vert
4	134.3143	46	PK	-35.6	14.1	24.5	30	-5.5	232	100	Vert
5	127.1672	45.51	PK	-35.6	13.3	23.21	30	-6.79	265	100	Vert
Horizontal 200 - 1000MHz											
6	543.3717	31.86	PK	-32.2	19.2	18.86	37	-18.14	180	300	Horz
Vertical 200 - 1000MHz											
7	221.2106	38.84	PK	-34.5	11.3	15.64	30	-14.36	41	400	Vert
8	962.7814	31.6	PK	-31.2	24.1	24.5	37	-12.5	107	100	Vert
LIMIT 1: CISPR22/EN55022 Class B											
PK - Peak detector											
QP - Quasi-Peak detector											
LnAv - Linear Average detector											
LgAv - Log Average detector											
Av - Average detector											
CAV - CISPR Average detector											
RMS - RMS detection											
CRMS - CISPR RMS detection											
Lutron Electronics Inc.											
Modular Low Power Transmitter											
Model: HQ-J-DK420-WH 120V 60Hz											
Job: 1001357672 Tested: RM											
RCV Mode 437MHz											
Test	Meter	Detector	Gain/Loss	Transducer	Level	Limit 1	Margin	Azimuth	Height [cm]	Polarity	
Frequency	Reading	Type	Factor	Factor	dB[uVolts/ meter]						
[MHz]	[dB(uV)]		[dB]	[dB]				[degs]			
Vertical 30 - 200MHz											
107.7426	46.29	QP	-35.6	12	22.69	30	-7.31	286	135	Vert	
134.3	36.8	QP	-35.6	14.1	15.3	30	-14.7	105	100	Vert	
LIMIT 1: CISPR22/EN55022 Class B											
PK - Peak detector											
QP - Quasi-Peak detector											
LnAv - Linear Average detector											
LgAv - Log Average detector											
Av - Average detector											
CAV - CISPR Average detector											
RMS - RMS detection											
CRMS - CISPR RMS detection											

Figure 20 Radiated Emissions Graph



Table 26 Radiated Emissions Data Points

Lutron Electronics											
Wall-mounted low voltage keypad											
HQ-J-DK420-WH RCV Mode											
Job:1001357672 120V 60Hz											
Tested By: GB 431 MHz											
Marker	Test	Meter	Detector	Gain/Loss	Transducer	Level	Limit 1	Margin	Azimuth	Height [cm]	Polarity
Number	Frequency [MHz]	Reading [dB(uV)]	Type	Factor [dB]	Factor [dB]	dB[uVolts/meter]		1[dB]	[degs]		
Horizontal 1000 - 2000MHz											
1	1073.658	61.89	PK	-44.62	19.8	37.07	54	-16.93	85	250	Horz
2	1494.382	61.37	PK	-44.32	20.8	37.85	54	-16.15	189	250	Horz
3	1880.15	60.95	PK	-43.86	21.5	38.59	54	-15.41	345	250	Horz
Vertical 1000 - 2000MHz											
4	1088.639	61.54	PK	-44.59	19.9	36.85	54	-17.15	261	101	Vert
5	1207.241	61.35	PK	-44.45	19.9	36.8	54	-17.2	192	249	Vert
6	1449.438	61.3	PK	-44.39	20.7	37.61	54	-16.39	279	249	Vert
LIMIT 1: FCC Part 15 Subpart B											
PK - Peak detector											
QP - Quasi-Peak detector											
LnAv - Linear Average detector											
LgAv - Log Average detector											
Av - Average detector											
CAV - CISPR Average detector											
RMS - RMS detection											
CRMS - CISPR RMS detection											

Job Number: 1001357672
Model Number: HQ-J-DK420-WH
Client Name: LUTRON ELECTRONICS INC
FCC ID: JPZ0078

File Number: MC15896
IC Number: 2851A-JPZ0078

Figure 21 Radiated Emissions Graph



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, G-226 (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

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