Underwriters Laboratories Inc.
1285 Walt Whitman Road
Melville, New York 11747-3081
(631) 271-6200

Report of Measurements
of Electromagnetic Compatibility Testing

Test Report File No.:	**NC2219**	Date of issue: 11/7/02
Applicant:	Lutron Electronics Co. Inc.	
Model :	H-RFP-1P	
Product Type:	RF Processor	
Power Supply:	120Vac, 60Hz	
Manufacturer:	Same As Applicant	
License holder:	Same As Applicant	
Address:	7200 Sutron Road Coopersburg, PA 18036	
Test Type:	☒ **Compliance Investigation** ☐ **Manufacturer's Specification**	
Test Project Number: References(s)	02ME20017 FCC ID: JPZ0023	

Report Directory

1.0 G E N E R A L - Product Description

Device Function: The H-RFP acts as a data storage hub of an integrated lighting control system. It contains a FM transceiver and an antenna. The purpose of the RF communication is to transmit and receive command signals. Transmitted commands allow the triggering of system events and the updating of control indicator status.

RF Function: The receiver down converts a 431-437MHz-carrier frequency using a 420.3-426.3MHz voltage-controlled oscillator producing a 10.7MHz IF signal. The signal is further processed to decode data. The transmitter uses the voltage-controlled oscillator, which is frequency modulated, and power amplifier to produce the modulated carrier. The H-RFP contains a micro controller running at 52MHz to ensure that all transmissions stop within 5 seconds of a button release or within 5 seconds on the beginning of a transmission. A transmission shall automatically cease within 5 seconds after activation. The ceasing of the transmission is accomplished via the micro controller. Modulation is FM, sometimes referred to as Frequency Shift Keyed (FSK), data at 62.5kbps. The antenna is permanently attached and cannot be modified or easily replaced by the user since the fastening mechanism is located inside the sheet metal enclosure. This sheet metal enclosure is closed securely by several odd screws and by keying features in the sheet metal itself.

Analog Function: The H-RFP obtains power through a 120Vac to 24Vdc Class 2 transformer or 15Vdc Class 2 transformer. The voltage is then down converted with a switching buck converter to produce a 5Vdc output, which is used to power all analog and micro controller activities.
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1.1 Device Configuration During Test

The device under test was tested in normal orientation that represents the worst-case orientation.

The device was tested in two modes of operation:

1. Continuously transmitting an intentional radio frequency in Continuous Wave (CW).

2. Standby mode (Receive). The device is waiting to receive a signal source.

The manufacturer configured the device.

The device was powered with 120VAC, 60Hz.

Device	Manufacturer	Model Number	Serial Number	FCC ID
RF Processor	Lutron	H-RFP	N/A	JPZ0023
AC-DC Adapter Class 2	LEI	LEI-4	N/A	----------

"The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report"

1.2 Deviations from ANSI C63.4

☒ Not applicable, the ANSI C63.4 test measurements procedures were employed

☐ As described below:

1.3 Device Modifications Necessary for Compliance

☐ N/A

☒ As described below:

1.4 Test Summary

Test	Basic Standard	Considered	Tested	In Compliance
Conducted Voltage Emissions (Continuous Data Transmit Mode)	FCC Part 15 Subpart B, Class B. Paragraph 15.205	✓	✓	✓
Radiated Emissions	FCC Part 15 Subpart C, Class B, Intentional Radiators, Paragraph 15.209	✓	✓	✓
Radiated Emissions	FCC Part 15 Subpart B, Class B, Un-Intentional Radiators, Paragraph 15.109	✓	✓	✓
Cease Operation < 5 seconds	FCC Part 15 Subpart C, Paragraph 15.231	✓	✓	✓
Occupied Bandwidth	FCC Part 15 Subpart C, Paragraph 15.231	✓	✓	✓
Pulse Train Measurements Over One Complete Pulse Train	FCC Part 15 Subpart A, Paragraph 15.35	✓	✓	✓

2.0 EMISSIONS TEST REGULATIONS

FCC Part 15, Subpart B, Paragraph 15.107 & 15.109
FCC Part 15 Subpart C, Paragraph 15.205, 15.207, 15.209 & 15.231

2.1 EUT OPERATION MODE - EMISSIONS TESTS

☒ Normal operation Mode: Continuous Data Transmit for Conducted Emissions, Constant (Continuous) Wave Transmit and Receive modes for all other tests

2.1.1 Conducted Emissions Tests

☒ **Test Applicable** ☐ **Test Not Applicable**

Temperature:	21.1	°C
Humidity:	40	%RH
Pressure:	1035	milbar
Date test performed:	18 October 2002	

Mode: "Continuous Data Transmit" @ 437 MHz was determined worst-case emissions.

Frequency range on each side of line. **Measurement Point**

☒150kHz to 30MHz ☒ Voltage ☒ Mains

Test equipment used for conducted emissions:

☒ **ES126** **Rhode & Schwartz** **EMI Receiver** **Equipment No.: ME5B-081**
Range: 150k-30MHz Last Calibration Date: 20 August 2002 Calibration Due Date: 20 August 2003

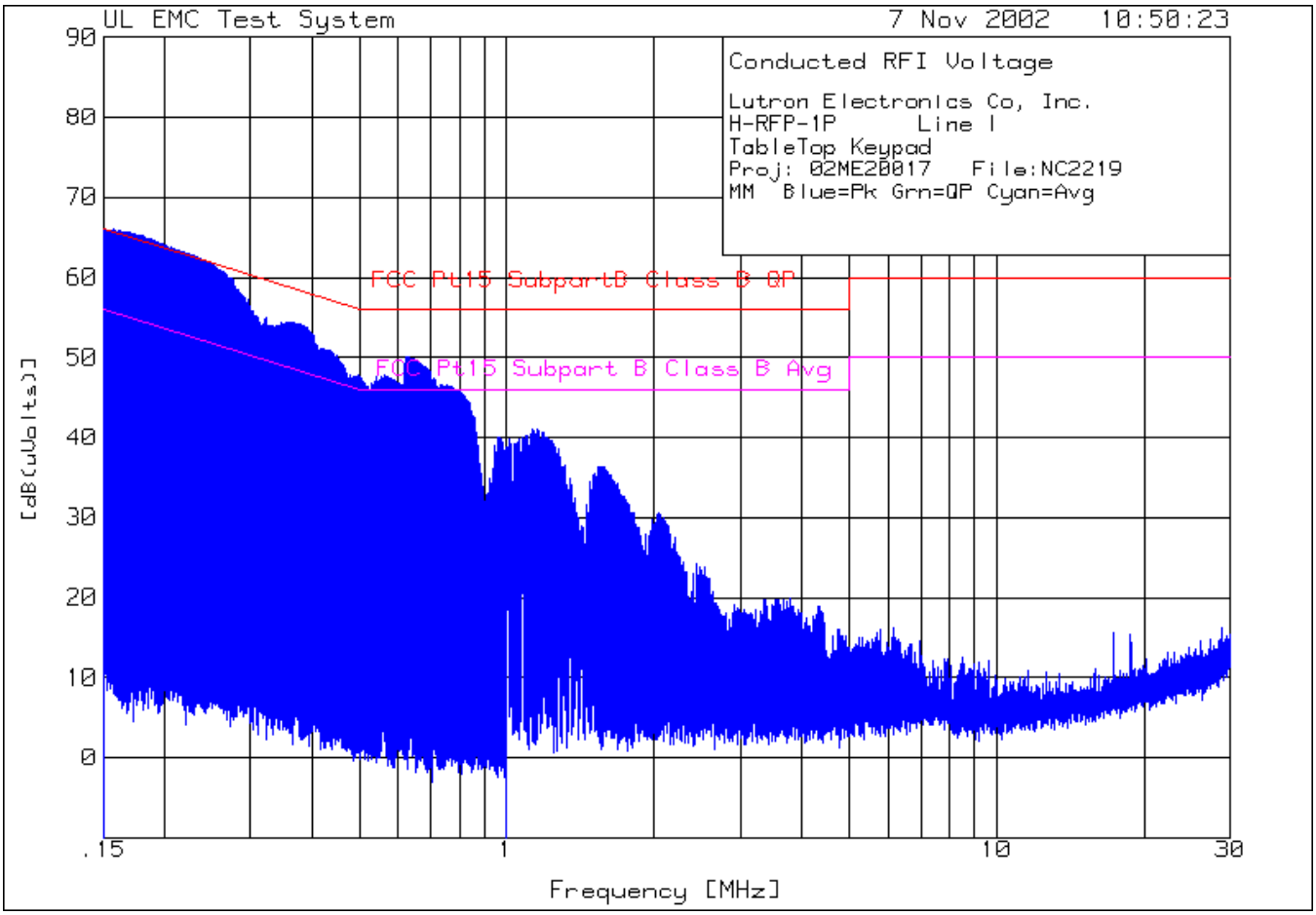
Test Accessories for Conducted Emissions:

☒ **11947A** **Hewlett Packard** **Transient Limiter** **Equipment No.: ME5A-443**
Last Calibration Date: 16 January 2002 Calibration Due Date: 16 January 2003

☒ **9252-50-R-24-BNC** **Solar Electronics** **LISN** **Equipment No.: ME5A-637**
Last Calibration Date: 04 April 2002 Calibration Due Date: 04 April 2002

☒ **Temp/Pressure** **Oakton** **Barometer** **Equipment No.: ME4-263**
Range: 900-1045mbar Last Calibration Date: 02 April 2002 Calibration Due Date: 02 April 2003

☒ **453320** **Ex-Tech** **Hydro-Thermometer Equipment No.: ME4-264**
Range: 0-80% Last Calibration Date: 02 April 2002 Calibration Due Date: 02 April 2003



Transmit at 437MHz

UL EMC Test System

7 Nov 2002 10:50:23

Lutron Electronics Co, Inc.
H-RFP-1P Line 1
TableTop Keypad
Proj: 02ME20017 File:NC2219
MM Blue=Pk Grn=QP Cyan=Avg

Frequency [MHz]	Reading [dB(uV)]	Factor [dB]	Factor [dB]	[dB(uVolts)]		
Range: 1 .15 - 1MHz						
.1506	49.05 qp	10.3	0	59.35+	66	56
		Margin [dB]:		-6.65	3.35	
.16864	49.27 qp	10.3	0	59.57+	65	55
		Margin [dB]:		-5.43	4.57	
.18298	48.58 qp	10.3	0	58.88+	64.3	54.3
		Margin [dB]:		-5.42	4.58	
.20572	47.27 qp	10.3	0	57.57+	63.4	53.4
		Margin [dB]:		-5.83	4.17	
.23097	45.34 qp	10.3	0	55.64+	62.4	52.4
		Margin [dB]:		-6.76	3.24	
.25583	43.56 qp	10.3	0	53.86+	61.6	51.6
		Margin [dB]:		-7.74	2.26	
.274	41.39 qp	10.3	0	51.69+	61	51
		Margin [dB]:		-9.31	.69	
.28533	39.61 qp	10.3	0	49.91	60.7	50.7
		Margin [dB]:		-10.79	-.79	
.29576	38.61 qp	10.3	0	48.91	60.4	50.4
		Margin [dB]:		-11.49	-1.49	
.30627	38.03 qp	10.3	0	48.33	60.1	50.1
		Margin [dB]:		-11.77	-1.77	

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

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - denotes average log detection
avem - denotes EMI average detection

LIMIT 1: FCC Pt15 SubpartB Class B QP

UL EMC Test System

7 Nov 2002 10:50:23

Lutron Electronics Co, Inc.
H-RFP-1P Line 1
TableTop Keypad
Proj: 02ME20017 File:NC2219
MM Blue=Pk Grn=QP Cyan=Avg

Frequency [MHz]	Reading [dB(uV)]	Factor [dB]	Factor [dB]	[dB(uVolts)]		
Range: 1 .15 - 1MHz						
.63144	31.81 qp	10.3	0	42.11	56	46
			Margin [dB]:	-13.89	-3.89	

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LIMIT 1: FCC Pt15 SubpartB Class B QP
LIMIT 2: FCC Pt15 Subpart B Class B Avg
LIMIT 3: NONE
LIMIT 4: NONE
LIMIT 5: NONE
LIMIT 6: NONE

UL EMC Test System

7 Nov 2002 10:50:23

Lutron Electronics Co, Inc.
H-RFP-1P Line 1
TableTop Keypad
Proj: 02ME20017 File:NC2219
MM Blue=Pk Grn=QP Cyan=Avg

Frequency [MHz]	Reading [dB(uV)]		Factor [dB]	Factor [dB]	[dB(uVolts)]	
Range: 1 .15 - 1MHz						
.15061	19.65	avem	10.3	0	29.95	66	56
		Margin [dB]:			-36.05	-26.05	
.16873	18.89	avem	10.3	0	29.19	65	55
		Margin [dB]:			-35.81	-25.81	
.18293	18.13	avem	10.3	0	28.43	64.4	54.4
		Margin [dB]:			-35.97	-25.97	
.20565	16.72	avem	10.3	0	27.02	63.4	53.4
		Margin [dB]:			-36.38	-26.38	
.23093	14.89	avem	10.3	0	25.19	62.4	52.4
		Margin [dB]:			-37.21	-27.21	
.2558	12.21	avem	10.3	0	22.51	61.6	51.6
		Margin [dB]:			-39.09	-29.09	
.27393	10.94	avem	10.3	0	21.24	61	51
		Margin [dB]:			-39.76	-29.76	
.28534	10.48	avem	10.3	0	20.78	60.7	50.7
		Margin [dB]:			-39.92	-29.92	
.29581	9.97	avem	10.3	0	20.27	60.4	50.4
		Margin [dB]:			-40.13	-30.13	
.30635	9.62	avem	10.3	0	19.92	60.1	50.1
		Margin [dB]:			-40.18	-30.18	

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

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LIMIT 1: FCC Pt15 SubpartB Class B QP

UL EMC Test System

7 Nov 2002 10:50:23

Lutron Electronics Co, Inc.
H-RFP-1P Line 1
TableTop Keypad
Proj: 02ME20017 File:NC2219
MM Blue=Pk Grn=QP Cyan=Avg

Frequency [MHz]	Reading [dB(uV)]	Factor [dB]	Factor [dB]	[dB(uVolts)]		
Range: 1 .15 - 1MHz						
.32168	9.54 avem	10.3	0	19.84	59.7	49.7
			Margin [dB]:	-39.86	-29.86	
.34508	9.05 avem	10.3	0	19.35	59.1	49.1
			Margin [dB]:	-39.75	-29.75	
.36136	8.62 avem	10.3	0	18.92	58.7	48.7
			Margin [dB]:	-39.78	-29.78	
.37971	8.1 avem	10.3	0	18.4	58.3	48.3
			Margin [dB]:	-39.9	-29.9	
.39872	6.55 avem	10.3	0	16.85	57.9	47.9
			Margin [dB]:	-41.05	-31.05	
.421	6.41 avem	10.3	0	16.71	57.4	47.4
			Margin [dB]:	-40.69	-30.69	
.45051	4.78 avem	10.3	0	15.08	56.9	46.9
			Margin [dB]:	-41.82	-31.82	
.49973	3.16 avem	10.3	0	13.46	56	46
			Margin [dB]:	-42.54	-32.54	
.55787	3.32 avem	10.3	0	13.62	56	46
			Margin [dB]:	-42.38	-32.38	
.61995	4.15 avem	10.3	0	14.45	56	46
			Margin [dB]:	-41.55	-31.55	
.64	2.87 avem	10.3	0	13.17	56	46
			Margin [dB]:	-42.83	-32.83	
.66253	3.16 avem	10.3	0	13.46	56	46
			Margin [dB]:	-42.54	-32.54	
.69102	2.71 avem	10.3	0	13.01	56	46
			Margin [dB]:	-42.99	-32.99	
.77257	1.16 avem	10.3	0	11.46	56	46
			Margin [dB]:	-44.54	-34.54	
.95979	-1.28 avem	10.3	0	9.02	56	46
			Margin [dB]:	-46.98	-36.98	
Range: 2 1 - 30MHz						

1.15315	-1.67	avem	10.3	0	8.63	56	46
				Margin [dB]:	-47.37	-37.37	

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

pk - Peak detector
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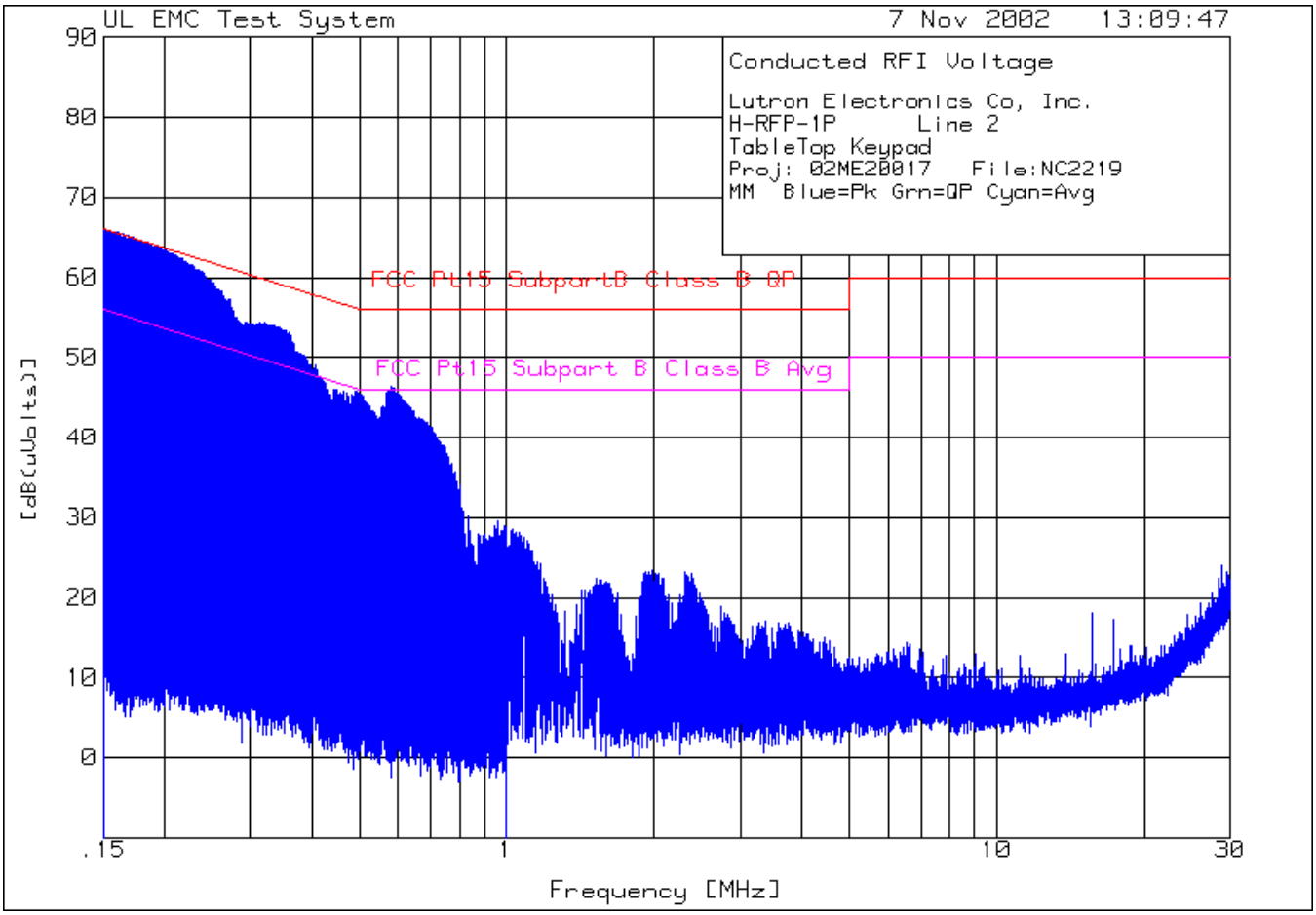
LIMIT 1: FCC Pt15 SubpartB Class B QP
LIMIT 2: FCC Pt15 Subpart B Class B Avg
LIMIT 3: NONE
LIMIT 4: NONE
LIMIT 5: NONE
LIMIT 6: NONE


UL EMC Test System
7 Nov 2002 13:09:47
Conducted RFI Voltage
Lutron Electronics Co, Inc.
H-RFP-1P Line 2
TableTop Keypad
Proj: 02ME20017 File:NC2219
MM Blue=Pk Grn=QP Cyan=Avg
FCC Pt15 SubpartB Class B QP
FCC Pt15 Subpart B Class B Avg
dB(uVolts)
90
80
70
60
50
40
30
20
10
0
.15
1
10
30
Frequency [MHz]

UL EMC Test System

7 Nov 2002 13:09:47

Lutron Electronics Co, Inc.
H-RFP-1P Line 2
TableTop Keypad
Proj: 02ME20017 File:NC2219
MM Blue=Pk Grn=QP Cyan=Avg

Frequency [MHz]	Reading [dB(uV)]	Factor [dB]	Factor [dB]	[dB(uVolts)]		
Range: 1 .15 - 1MHz						
.15298	49.25 qp	10.3	0	59.55+	65.8	55.8
		Margin [dB]:		-6.25	3.75	
.1616	49.19 qp	10.3	0	59.49+	65.4	55.4
		Margin [dB]:		-5.91	4.09	
.17215	48.54 qp	10.3	0	58.84+	64.9	54.9
		Margin [dB]:		-6.06	3.94	
.1907	47.41 qp	10.3	0	57.71+	64	54
		Margin [dB]:		-6.29	3.71	
.20954	46.06 qp	10.3	0	56.36+	63.2	53.2
		Margin [dB]:		-6.84	3.16	
.23631	43.46 qp	10.3	0	53.76+	62.2	52.2
		Margin [dB]:		-8.44	1.56	
.25252	42.01 qp	10.3	0	52.31+	61.7	51.7
		Margin [dB]:		-9.39	.61	
.26972	39.93 qp	10.3	0	50.23	61.1	51.1
		Margin [dB]:		-10.87	-.87	
.27154	39.59 qp	10.3	0	49.89	61.1	51.1
		Margin [dB]:		-11.21	-1.21	
.30261	36.97 qp	10.3	0	47.27	60.2	50.2
		Margin [dB]:		-12.93	-2.93	
.33074	36.3 qp	10.3	0	46.6	59.4	49.4
		Margin [dB]:		-12.8	-2.8	
.36132	35.33 qp	10.3	0	45.63	58.7	48.7
		Margin [dB]:		-13.07	-3.07	
.38022	34.08 qp	10.3	0	44.38	58.3	48.3
		Margin [dB]:		-13.92	-3.92	
.40122	31.94 qp	10.3	0	42.24	57.8	47.8
		Margin [dB]:		-15.56	-5.56	
.42679	28.99 qp	10.3	0	39.29	57.3	47.3
		Margin [dB]:		-18.01	-8.01	
.44902	28.75 qp	10.3	0	39.05	56.9	46.9

		Margin [dB]:		-17.85	-7.85	
.48094	28.01 qp	10.3	0	38.31	56.3	46.3
		Margin [dB]:		-17.99	-7.99	
.50411	26.56 qp	10.3	0	36.86	56	46
		Margin [dB]:		-19.14	-9.14	
.52412	25.49 qp	10.3	0	35.79	56	46
		Margin [dB]:		-20.21	-10.21	
.55927	27.04 qp	10.3	0	37.34	56	46
		Margin [dB]:		-18.66	-8.66	
.57881	27.3 qp	10.3	0	37.6	56	46
		Margin [dB]:		-18.4	-8.4	
.58733	27 qp	10.3	0	37.3	56	46
		Margin [dB]:		-18.7	-8.7	
.60832	27.22 qp	10.3	0	37.52	56	46
		Margin [dB]:		-18.48	-8.48	
.63425	26.32 qp	10.3	0	36.62	56	46
		Margin [dB]:		-19.38	-9.38	
.6692	24.83 qp	10.3	0	35.13	56	46
		Margin [dB]:		-20.87	-10.87	
.69872	23.41 qp	10.3	0	33.71	56	46
		Margin [dB]:		-22.29	-12.29	
.72514	21.93 qp	10.3	0	32.23	56	46
		Margin [dB]:		-23.77	-13.77	
.74905	20.8 qp	10.3	0	31.1	56	46
		Margin [dB]:		-24.9	-14.9	
.76239	19.49 qp	10.3	0	29.79	56	46
		Margin [dB]:		-26.21	-16.21	
.78531	17.72 qp	10.3	0	28.02	56	46
		Margin [dB]:		-27.98	-17.98	

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

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - denotes average log detection
avem - denotes EMI average detection

LIMIT 1: FCC Pt15 SubpartB Class B QP
LIMIT 2: FCC Pt15 Subpart B Class B Avg
LIMIT 3: NONE
LIMIT 4: NONE
LIMIT 5: NONE
LIMIT 6: NONE

UL EMC Test System

7 Nov 2002 13:09:47

Lutron Electronics Co, Inc.
H-RFP-1P Line 2
TableTop Keypad
Proj: 02ME20017 File:NC2219
MM Blue=Pk Grn=QP Cyan=Avg

Frequency [MHz]	Reading [dB(uV)]		Factor [dB]	Factor [dB]	[dB(uVolts)]		
Range: 1 .15 - 1MHz							
.15297	18.59	avem	10.3	0	28.89	65.8	55.8
		Margin [dB]:			-36.91	-26.91	
.16157	18.45	avem	10.3	0	28.75	65.4	55.4
		Margin [dB]:			-36.65	-26.65	
.17208	18.15	avem	10.3	0	28.45	64.9	54.9
		Margin [dB]:			-36.45	-26.45	
.19067	17.04	avem	10.3	0	27.34	64	54
		Margin [dB]:			-36.66	-26.66	
.20951	15.83	avem	10.3	0	26.13	63.2	53.2
		Margin [dB]:			-37.07	-27.07	
.23627	13.85	avem	10.3	0	24.15	62.2	52.2
		Margin [dB]:			-38.05	-28.05	
.25253	12.28	avem	10.3	0	22.58	61.7	51.7
		Margin [dB]:			-39.12	-29.12	
.26964	10.85	avem	10.3	0	21.15	61.1	51.1
		Margin [dB]:			-39.95	-29.95	
.27152	10.61	avem	10.3	0	20.91	61.1	51.1
		Margin [dB]:			-40.19	-30.19	
.30258	9.09	avem	10.3	0	19.39	60.2	50.2
		Margin [dB]:			-40.81	-30.81	
.33078	8.56	avem	10.3	0	18.86	59.4	49.4
		Margin [dB]:			-40.54	-30.54	
.36133	7.39	avem	10.3	0	17.69	58.7	48.7
		Margin [dB]:			-41.01	-31.01	
.38022	6.03	avem	10.3	0	16.33	58.3	48.3
		Margin [dB]:			-41.97	-31.97	
.40118	4.51	avem	10.3	0	14.81	57.8	47.8
		Margin [dB]:			-42.99	-32.99	
.42676	3.81	avem	10.3	0	14.11	57.3	47.3
		Margin [dB]:			-43.19	-33.19	
.44891	3.76	avem	10.3	0	14.06	56.9	46.9

		Margin [dB]:		-42.84	-32.84	
.48095	1.28 avem	10.3	0	11.58	56.3	46.3
		Margin [dB]:		-44.72	-34.72	
.50408	1.78 avem	10.3	0	12.08	56	46
		Margin [dB]:		-43.92	-33.92	
.52411	2.01 avem	10.3	0	12.31	56	46
		Margin [dB]:		-43.69	-33.69	
.55933	1.33 avem	10.3	0	11.63	56	46
		Margin [dB]:		-44.37	-34.37	
.57881	1.62 avem	10.3	0	11.92	56	46
		Margin [dB]:		-44.08	-34.08	
.58737	1.35 avem	10.3	0	11.65	56	46
		Margin [dB]:		-44.35	-34.35	
.60832	1.1 avem	10.3	0	11.4	56	46
		Margin [dB]:		-44.6	-34.6	
.63428	.69 avem	10.3	0	10.99	56	46
		Margin [dB]:		-45.01	-35.01	
.66914	-.43 avem	10.3	0	9.87	56	46
		Margin [dB]:		-46.13	-36.13	
.69872	-.89 avem	10.3	0	9.41	56	46
		Margin [dB]:		-46.59	-36.59	
.72517	-1.48 avem	10.3	0	8.82	56	46
		Margin [dB]:		-47.18	-37.18	
.7491	-1.88 avem	10.3	0	8.42	56	46
		Margin [dB]:		-47.58	-37.58	
.76238	-2.15 avem	10.3	0	8.15	56	46
		Margin [dB]:		-47.85	-37.85	
.78528	-2.42 avem	10.3	0	7.88	56	46
		Margin [dB]:		-48.12	-38.12	

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

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
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avem - denotes EMI average detection

LIMIT 1: FCC Pt15 SubpartB Class B QP
LIMIT 2: FCC Pt15 Subpart B Class B Avg
LIMIT 3: NONE
LIMIT 4: NONE
LIMIT 5: NONE
LIMIT 6: NONE

Conducted Emission Test Set-Up 150k-30MHz

2.1.2 Cease Operation Within 5 Seconds

☒ Test Applicable ☐ Test Not Applicable

Temperature: 21.2°C
Humidity: 42%RH
Pressure: 1025 milbar
Date test performed : 17 October 2002

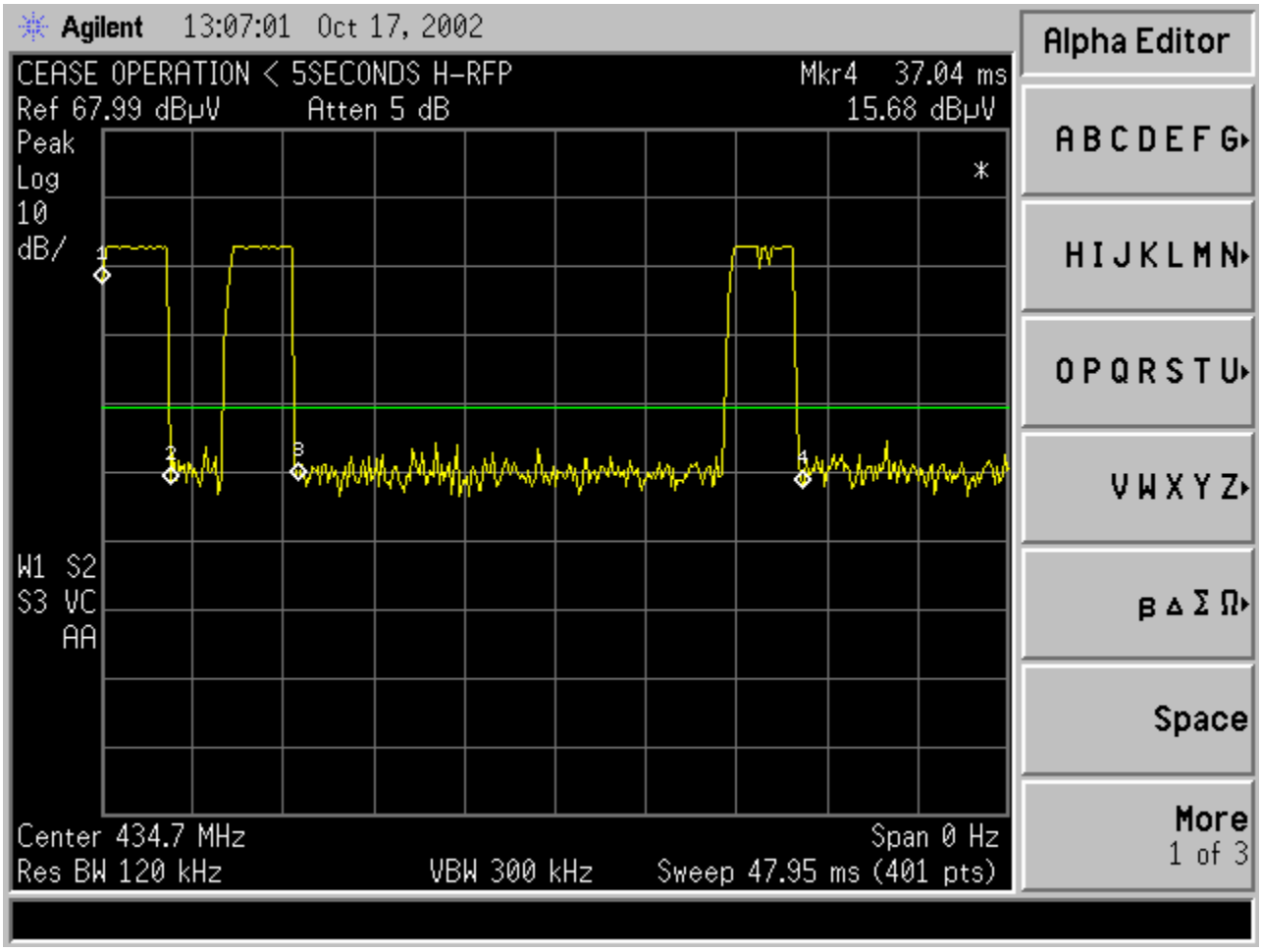
Test Procedure:

☒ This test is performed one time at any frequency band. A manual operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

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

Test equipment used for conducted Click measurements:

☒ **E7402A** **Agilent** **EMC Analyzer** **Equipment No.: 5B-123**
Last Calibration Date: 17 Sept. 2002 Calibration Due Date: 17 September 2003
☒ **Temp/Pressure** **Oakton** **Barometer** **Equipment No.: ME4-263**
Range:950-1045 Last Calibration Date: 2 April 02 Calibration Due Date:2 April 03
☒ **453320** **Ex-Tech** **Hydro-Thermometer Equipment No.: ME4-264**
Range:0-80% Last Calibration Date:2 April 02 Calibration Due Date:2 April 03



H-RFP-1P < 5 Seconds the plot depicts Multiple transmit turn on
(Model number in title block H-RFP = H-RFP-1P)

Test Set-Up Cease Operation < 5 seconds

2.1.3 Radiated Emissions Test (10 Meter Semi-Anechoic Chamber)

☒ **Test Applicable** ☐ **Test Not Applicable**

Temperature:	22.1°C
Humidity:	44%RH
Pressure:	1030milbar
Date test performed:	16 Oct. 2002

The EUT (equipment under test) was tested in 3 orthogonal axes and the orientation depicted in the Radiated Emission test set-up was deemed worst case.

Mode: "Constant Wave Transmit"

Measurement distance: ☒ 3 intentional Radiator ☐ 10 meters un-intentional radiator

Frequency Range:

☒ 30MHz - 5000MHz	☒ Electric Intentional @ low band 431MHz & High band 437MHz
☒ 30MHz - 2000MHz	☒ Electric Unintentional @ low band 431MHz & High band 437MHz

Paragraph 15.35:

☒ When the Radiated Limits are expressed in terms of the average value of the emissions, and pulse operation is employed, the pulse measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds (100ms) or in cases where the pulse train exceeds 0.1seconds the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

Note: The model number H-RFP depicted in some graphs and photo's is the same as H-RFP-1P

Test equipment used for final radiated emissions tests:

☒ **HP 8574A** **Hewlett-Packard** **EMI Reciever,** **Equipment No.: ME5A-461**
Range:30-1000MHz Last Calibration Date:25 Jan 02 Calibration Due Date: 25 Jan 03

Consisting of:

HP - 8566B **Hewlett-Packard** **Spectrum Analyzer,**
Resolution BW: **100kHz** **9kHz to 30 MHz**
1MHz **30MHz to 1000 MHz**
Video BW: **100kHz** **9kHz to 30 MHz**
1MHz **30MHz TO 1000**MHz
HP - 85662A **Hewlett-Packard** **Analyzer Display**
HP - 85650A **Hewlett-Packard** **Quasi-Peak Adapter,**
Quasi Peak BW: **200Hz** **9kHz to 150kHz**
9kHz **150kHz to 30MHz**
120kHz **30 to 1000 MHz**
HP - 85685A **Hewlett-Packard** **Preselector**

For Measurements above 1GHz:

☒ **HP - 8566B** **Hewlett-Packard** **Spectrum Analyzer,** **Equipment No.: ME5A-461**
Resolution BW: 1MHz
Video BW: 1MHz
Range: 1- 2 GHz Last Calibration Date:30 April 02 Calibration Due Date: 30 April 03

☒ **HP - 85662A** **Hewlett-Packard** **Analyzer Display** **Equipment No. ME5A-461**
Last Calibration Date:30 April 02 Calibration Due Date: 30 April 03

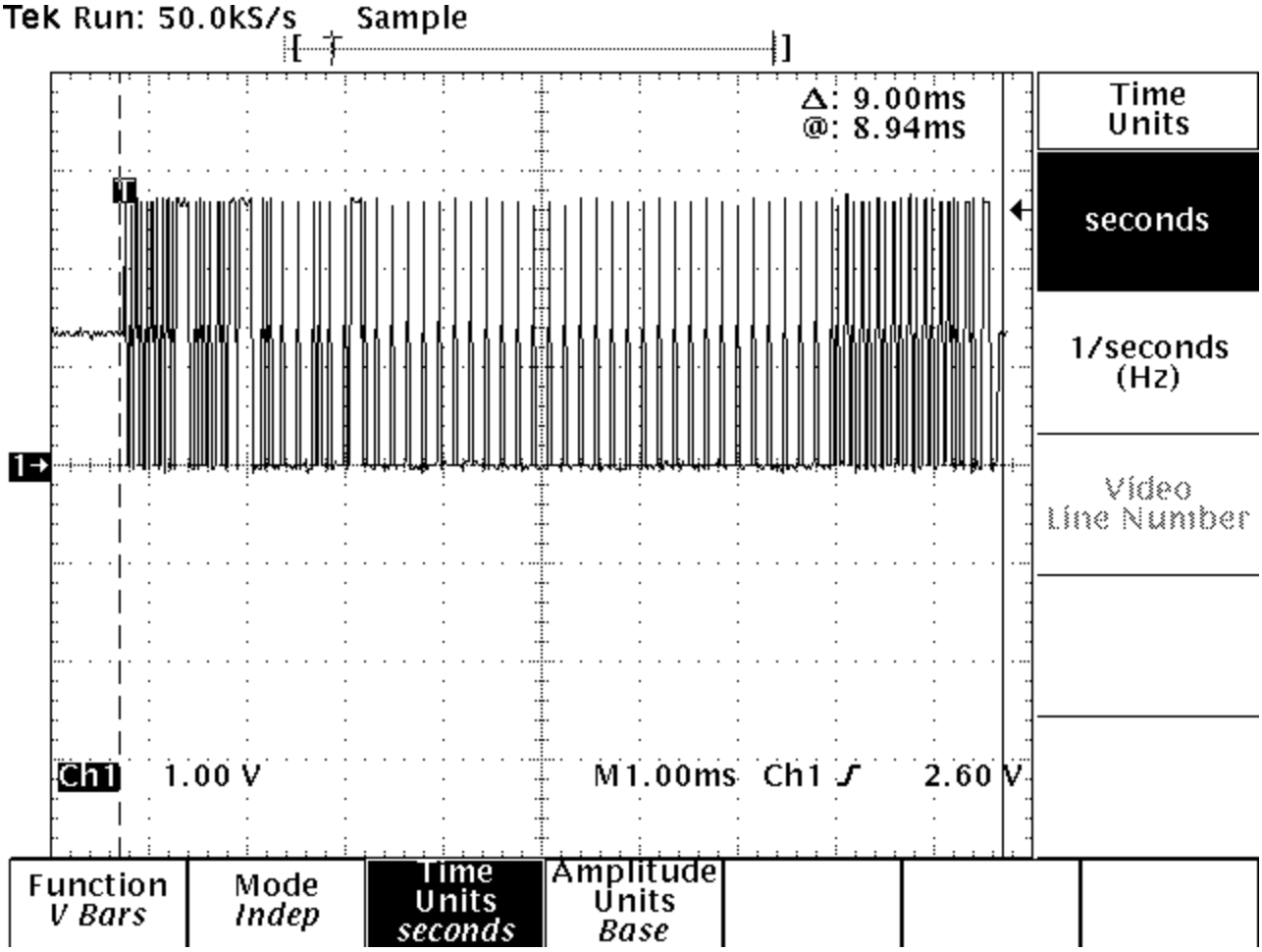
Test Accessories for Radiated Emissions:

☒ **94455-1** **Ailtech** **Biconnical Antenna** **Equipment No.: ME5-439**
Last Calibration Date:16 Oct 02 Calibration Due Date: 16 Oct 03

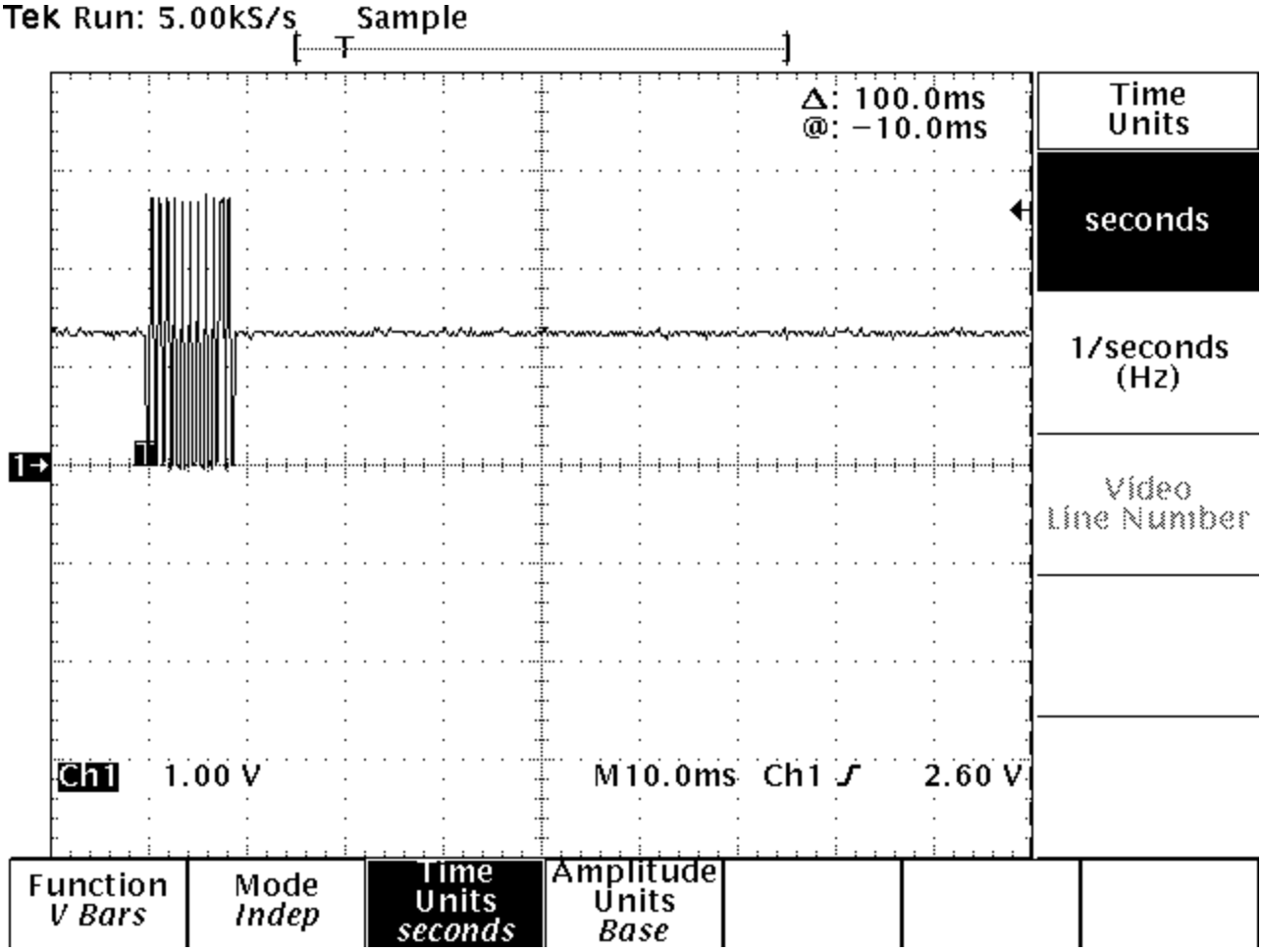
☒ **3146** **EMCO** **Log Periodic Antenna** **Equipment No.: ME5-451**
Last Calibration Date:15 Oct 02 Calibration Due Date: 15 Oct 03

☒ **Temp/Pressure** **Oakton** **Barometer** **Equipment No.: ME4-263**
Range:950-1045 Last Calibration Date: 2 April 02 Calibration Due Date:2 April 03

☒ **453320** **Ex-Tech** **Hydro-Thermometer Equipment No.: ME4-264**
Range:0-80% Last Calibration Date:2 April 02 Calibration Due Date:2 April 03

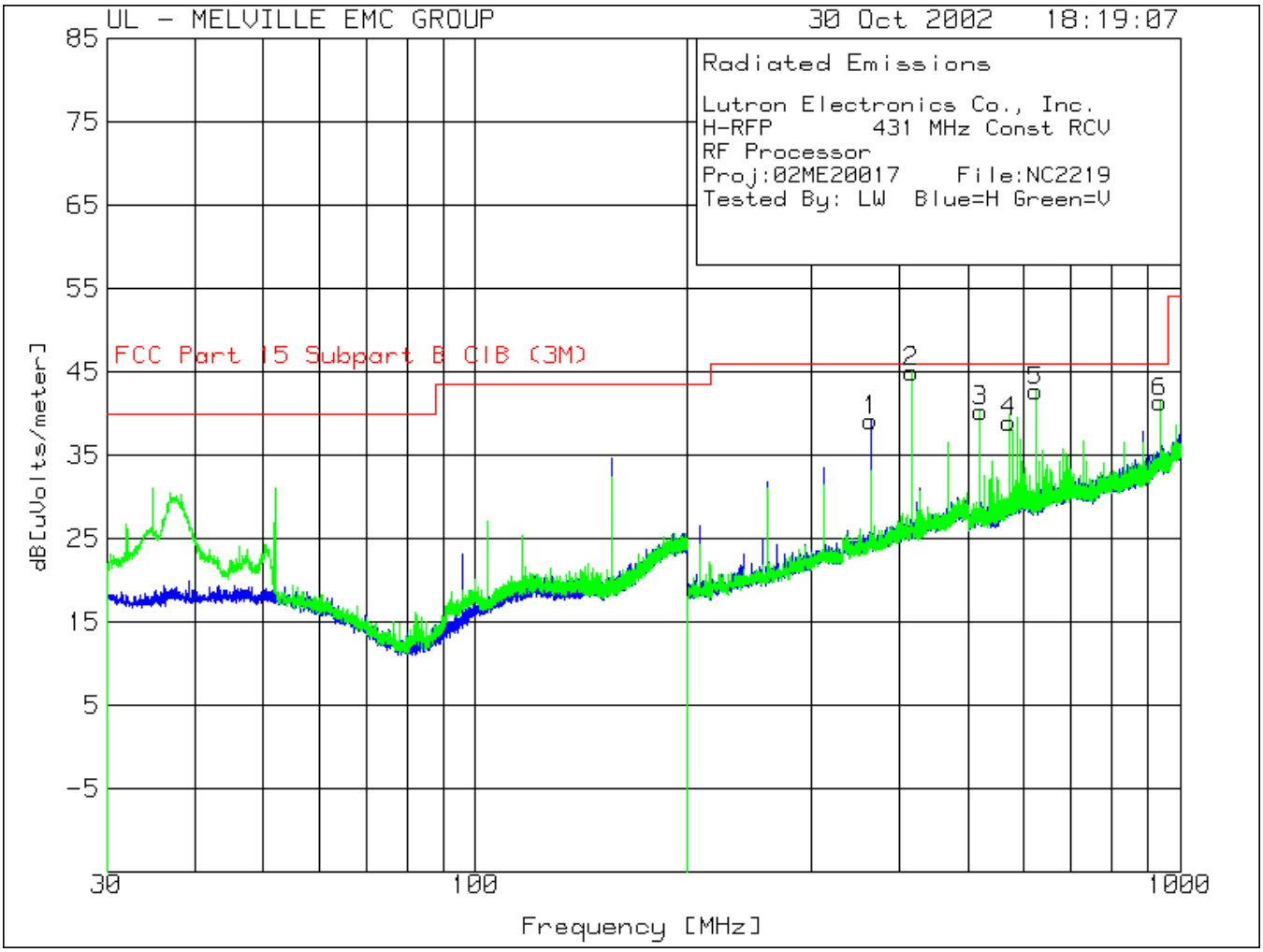


H–RFP-1P One Complete Pulse Train 8.94ms expanded view profile



H–RFP-1P One Complete Pulse Train > 100ms wide profile

Pulse Train Test Set-Up



431MHz Receive Mode (Model number in title block H-RFP = H-RFP-1P)

Lutron Electronics Co., Inc.
H-RFP 431 MHz Const RCV
RF Processor
Proj:02ME20017 File:NC2219
Tested By: LW Blue=H Green=V

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
Range: 3 200 - 1000MHz						
1	363.8634	21 pk	2.71	15.49	39.2	46
	Azimuth:221	Height:100 Horz		Margin [dB]		-6.8
Range: 4 200 - 1000MHz						
2	415.9534	25.64 pk	3.06	16.3	45	46
	Azimuth:340	Height:199 Vert		Margin [dB]		-1
3	520	17.84 pk	3.56	18.9	40.3	46
	Azimuth:166	Height:100 Vert		Margin [dB]		-5.7
4	572.0899	16.04 pk	3.66	19.3	39	46
	Azimuth:358	Height:100 Vert		Margin [dB]		-7
5	624.0466	19.52 pk	3.68	19.5	42.7	46
	Azimuth:168	Height:100 Vert		Margin [dB]		-3.3
6	935.6536	12.78 pk	4.54	24.08	41.4	46
	Azimuth:206	Height:100 Vert		Margin [dB]		-4.6

LIMIT 1: FCC Part 15 Subpart B ClB (3M)
LIMIT 2: NONE
LIMIT 3: NONE
LIMIT 4: NONE
LIMIT 5: NONE
LIMIT 6: NONE

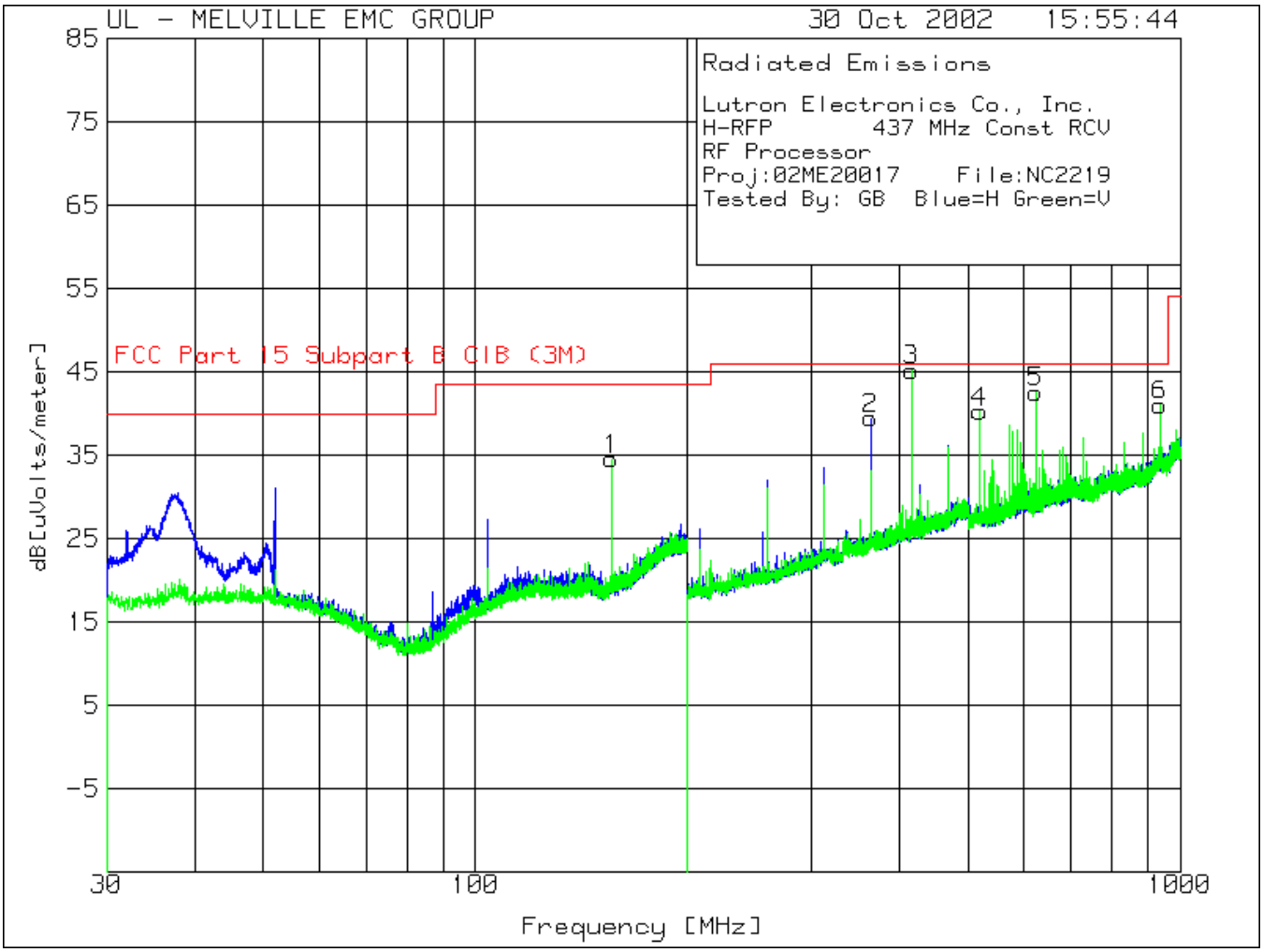
pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - denotes average log detection
tm - Trace Math Result

Lutron Electronics Co., Inc.
H-RFP-1P 431 MHz Const RCV
RF Processor
Proj:02ME20017 File:NC2219
Tested By: LW Blue=H Green=V

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
Range: 3 200 - 1000MHz					
363.9941	17.2 qp	2.71	15.5	35.41	46
Azimuth: 22	Height:103 Horz		Margin [dB]:	-10.59	
Range: 4 200 - 1000MHz					
416.058	23.66 qp	3.06	16.3	43.02	46
Azimuth: 360	Height:145 Vert		Margin [dB]:	-2.98	
520	13.58 qp	3.56	18.9	36.04	46
Azimuth: 341	Height:121 Vert		Margin [dB]:	-9.96	
572.02	11.67 qp	3.66	19.3	34.63	46
Azimuth: 0	Height:113 Vert		Margin [dB]:	-11.37	
624.0359	14.16 qp	3.68	19.5	37.34	46
Azimuth: 8	Height:110 Vert		Margin [dB]:	-8.66	
936.0995	5.68 qp	4.54	24.1	34.32	46
Azimuth: 197	Height:104 Vert		Margin [dB]:	-11.68	

LIMIT 1: FCC Part 15 Subpart B ClB (3M)
LIMIT 2: NONE
LIMIT 3: NONE
LIMIT 4: NONE
LIMIT 5: NONE
LIMIT 6: NONE

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - Average log detector



437MHz Receive Mode (Model number in title block H-RFP = H-RFP-1P)

Lutron Electronics Co., Inc.
H-RFP-1P 437 MHz Const RCV
RF Processor
Proj:02ME20017 File:NC2219
Tested By: GB Blue=H Green=V

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
Range: 2 30 - 200MHz						
1	155.9605	20.23 pk	1.78	12.49	34.5	43.5
	Azimuth:207	Height:199 Vert		Margin [dB]		-9
Range: 3 200 - 1000MHz						
2	363.8634	21.2 pk	2.71	15.49	39.4	46
	Azimuth:77	Height:101 Horz		Margin [dB]		-6.6
Range: 4 200 - 1000MHz						
3	415.8202	25.84 pk	3.06	16.3	45.2	46
	Azimuth:350	Height:200 Vert		Margin [dB]		-.8
4	519.8668	17.74 pk	3.56	18.9	40.2	46
	Azimuth:163	Height:101 Vert		Margin [dB]		-5.8
5	624.0466	19.42 pk	3.68	19.5	42.6	46
	Azimuth:340	Height:101 Vert		Margin [dB]		-3.4
6	935.9201	12.36 pk	4.54	24.1	41	46
	Azimuth:213	Height:101 Vert		Margin [dB]		-5

LIMIT 1: FCC Part 15 Subpart B ClB (3M)
LIMIT 2: NONE
LIMIT 3: NONE
LIMIT 4: NONE
LIMIT 5: NONE
LIMIT 6: NONE

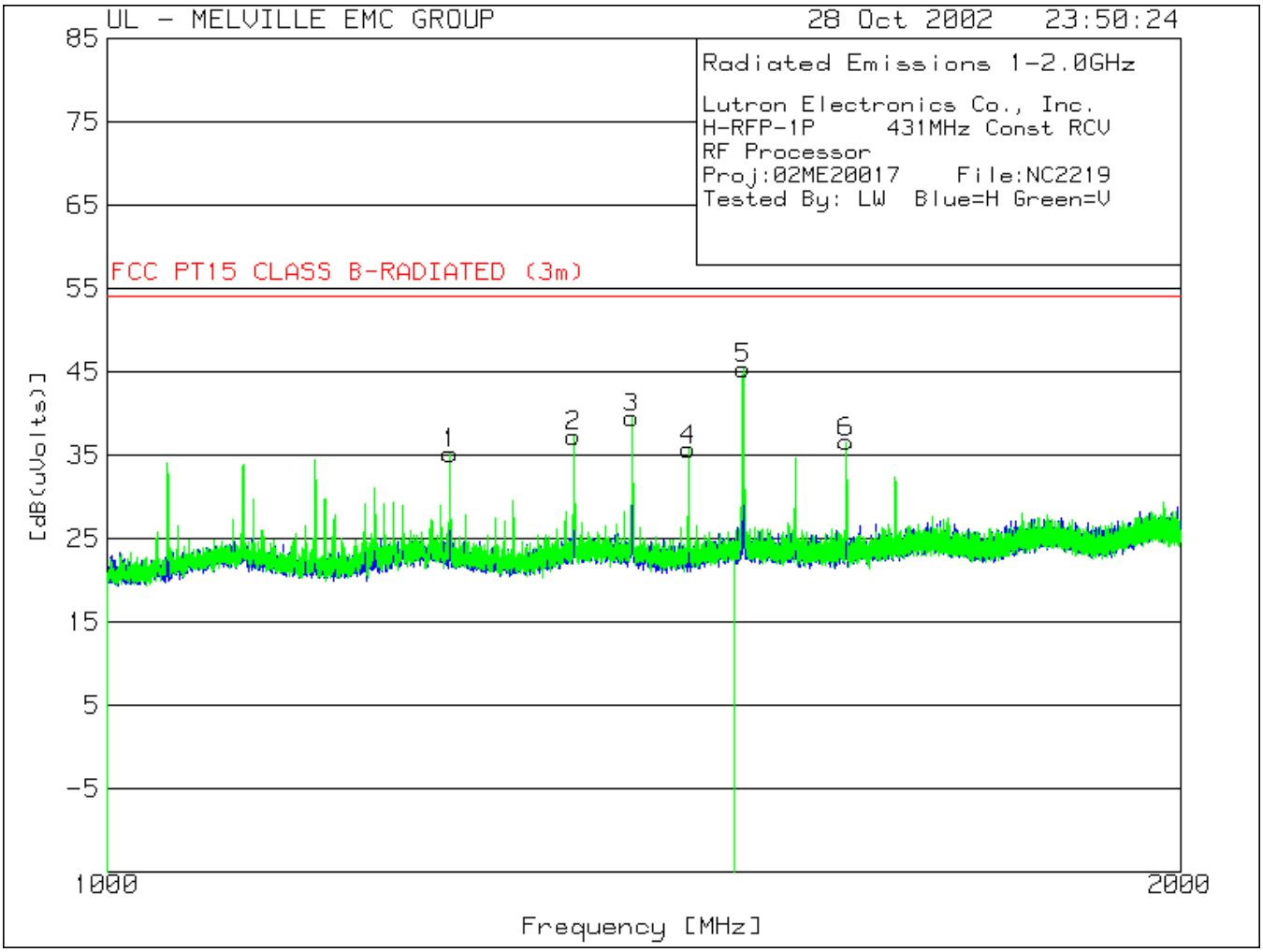
pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - denotes average log detection
tm - Trace Math Result

Lutron Electronics Co., Inc.
H-RFP-1P 437 MHz Const RCV
RF Processor
Proj:02ME20017 File:NC2219
Tested By: GB Blue=H Green=V

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
Range: 2 30 - 200MHz					
156.0055	16.14 qp	1.78	12.5	30.42	43.5
Azimuth: 240	Height:101 Vert		Margin [dB]:		-13.08
Range: 3 200 - 1000MHz					
364.0079	18.36 qp	2.71	15.5	36.57	46
Azimuth: 30	Height:102 Horz		Margin [dB]:		-9.43
Range: 4 200 - 1000MHz					
416.04	24.77 qp	3.06	16.3	44.13	46
Azimuth: 337	Height:151 Vert		Margin [dB]:		-1.87
519.98	13.14 qp	3.56	18.9	35.6	46
Azimuth: 323	Height:109 Vert		Margin [dB]:		-10.4
623.982	13.43 qp	3.68	19.5	36.61	46
Azimuth: 11	Height:102 Vert		Margin [dB]:		-9.39
936	5.8 qp	4.54	24.1	34.44	46
Azimuth: 199	Height:100 Vert		Margin [dB]:		-11.56

LIMIT 1: FCC Part 15 Subpart B ClB (3M)
LIMIT 2: NONE
LIMIT 3: NONE
LIMIT 4: NONE
LIMIT 5: NONE
LIMIT 6: NONE

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - Average log detector



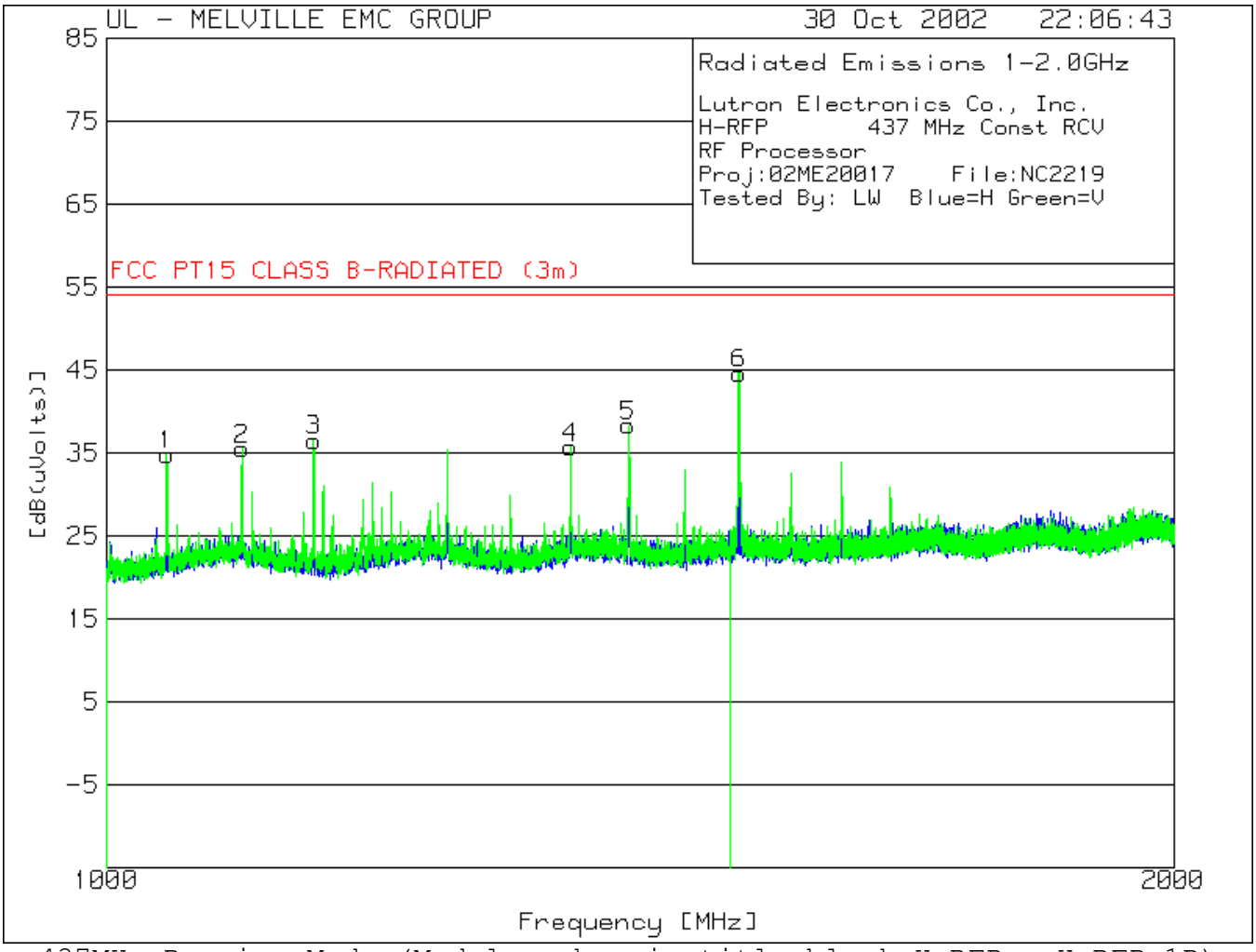
431MHz Receive mode

Lutron Electronics Co., Inc.
H-RFP-1P 431MHz Const RCV
RF Processor
Proj:02ME20017 File:NC2219
Tested By: LW Blue=H Green=V

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1
Range: 3 1000 - 1500MHz						
1	1248.043	42.44 pk	-33.03	25.79	35.2	54
	Azimuth:168	Height:101 Vert		Margin [dB]		-18.8
2	1352.04	43.88 pk	-32.75	26.17	37.3	54
	Azimuth:326	Height:101 Vert		Margin [dB]		-16.7
3	1403.913	45.76 pk	-32.61	26.35	39.5	54
	Azimuth:342	Height:101 Vert		Margin [dB]		-14.5
4	1455.787	41.63 pk	-32.47	26.54	35.7	54
	Azimuth:212	Height:101 Vert		Margin [dB]		-18.3
Range: 4 1500 - 2000MHz						
5	1508.118	50.98 pk	-32.32	26.74	45.4	54
	Azimuth:105	Height:101 Vert		Margin [dB]		-8.6
6	1611.965	41.4 pk	-31.99	27.19	36.6	54
	Azimuth:38	Height:101 Vert		Margin [dB]		-17.4

LIMIT 1: FCC PT15 CLASS B-RADIATED (3m)
LIMIT 2: NONE
LIMIT 3: NONE
LIMIT 4: NONE
LIMIT 5: NONE
LIMIT 6: NONE

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - denotes average log detection
tm - Trace Math Result



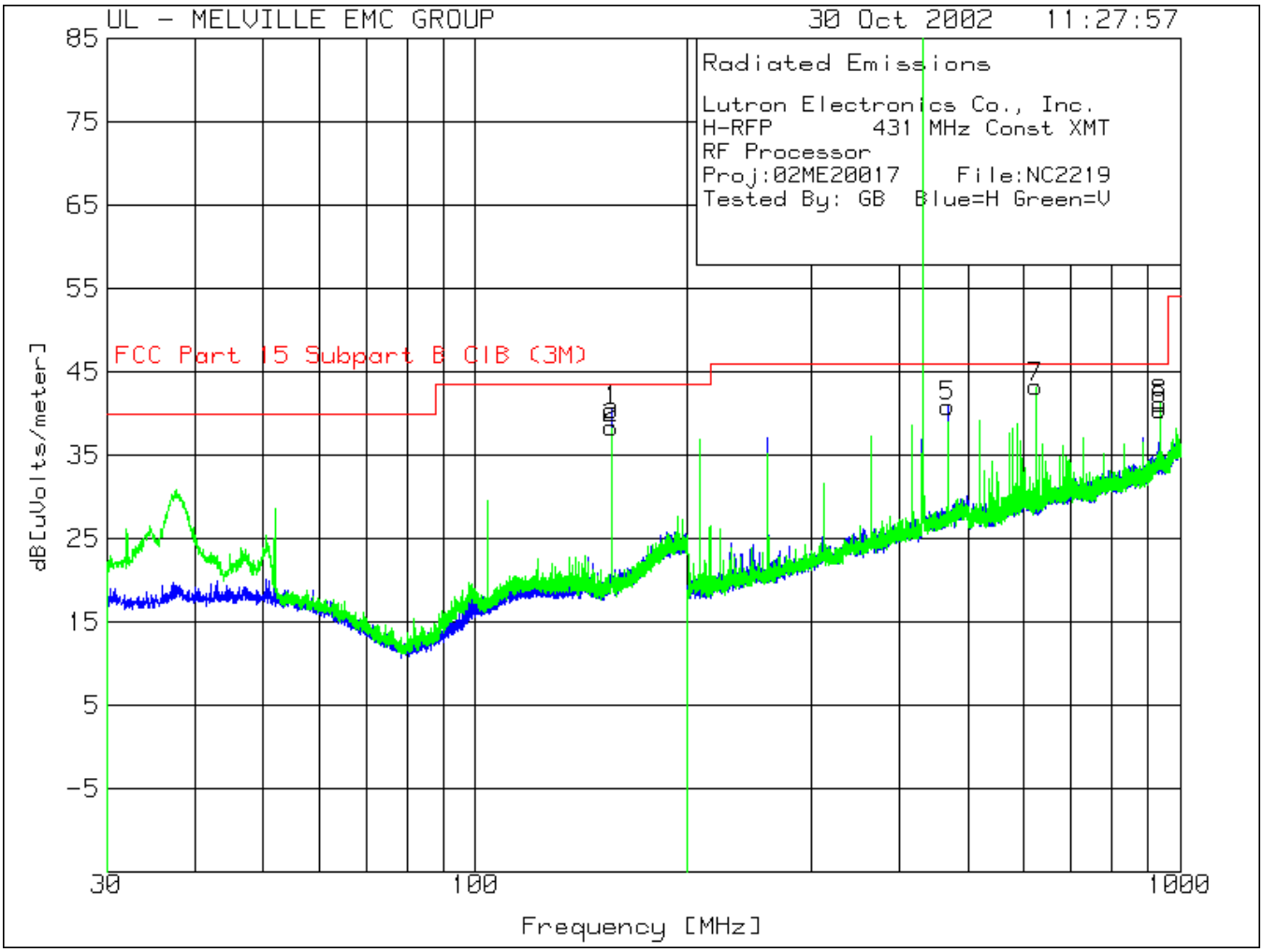
437MHz Receive Mode (Model number in title block H-RFP = H-RFP-1P)

```
 Lutron Electronics Co., Inc.
 H-RFP-1P       437 MHz Const RCV
 RF Processor
 Proj:02ME20017    File:NC2219
 Tested By: LW  Blue=H Green=V
```

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1
Range: 3 1000 - 1500MHz						
1	1039.883	43.35 pk	-33.59	25.04	34.8	54
	Azimuth:228	Height:198 Vert		Margin [dB]		-19.2
2	1092.09	43.72 pk	-33.45	25.23	35.5	54
	Azimuth:273	Height:100 Vert		Margin [dB]		-18.5
3	1143.88	44.39 pk	-33.31	25.42	36.5	54
	Azimuth:65	Height:100 Vert		Margin [dB]		-17.5
4	1352.04	42.28 pk	-32.75	26.17	35.7	54
	Azimuth:325	Height:100 Vert		Margin [dB]		-18.3
5	1403.58	44.56 pk	-32.61	26.35	38.3	54
	Azimuth:325	Height:100 Vert		Margin [dB]		-15.7
Range: 4 1500 - 2000MHz						
6	1508.118	50.18 pk	-32.32	26.74	44.6	54
	Azimuth:133	Height:101 Vert		Margin [dB]		-9.4

```
LIMIT 1: FCC PT15 CLASS B-RADIATED (3m)
LIMIT 2: NONE
LIMIT 3: NONE
LIMIT 4: NONE
LIMIT 5: NONE
LIMIT 6: NONE

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - denotes average log detection
tm - Trace Math Result
```



431MHz Transmit (Model number in title block H-RFP = H-RFP-1P)

Lutron Electronics Co., Inc.
H-RFP-1P 431 MHz Const XMT
RF Processor
Proj:02ME20017 File:NC2219
Tested By: GB Blue=H Green=V

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level	Limit:1 dB[uVolts/meter]	Limit2
Range: 1 30 - 200MHz							
1	156.003	26.12 pk	1.78	12.5	40.4	N/A	43.5
	Azimuth:237	Height:199 Horz	Margin [dB]				-3.1
Range: 2 30 - 200MHz							
2	156.0455	24.02 pk	1.78	12.5	38.3	N/A	43.5
	Azimuth:341	Height:100 Vert	Margin [dB]				-5.2
Range: 3 200 - 1000MHz							
3	430.8743	74.69 pk	3.17	16.54	94.4	80.7	
	Azimuth:347	Height:199 Horz	Margin [dB]			13.7	
5	467.9101	20.25 pk	3.35	17.3	40.9	60.7	
	Azimuth:86	Height:100 Horz	Margin [dB]			-19.8	
6	935.9201	11.86 pk	4.54	24.1	40.5	60.7	
	Azimuth:227	Height:100 Horz	Margin [dB]			-20.2	
Range: 4 200 - 1000MHz							
4	430.8743	71.99 pk	3.17	16.54	91.7	80.7	
	Azimuth:341	Height:100 Vert	Margin [dB]			11.0	
7	623.9134	20.02 pk	3.68	19.5	43.2	60.7	
	Azimuth:144	Height:100 Vert	Margin [dB]			-17.5	
8	935.7868	12.57 pk	4.54	24.09	41.2	60.7	
	Azimuth:103	Height:100 Vert	Margin [dB]			-19.5	

LIMIT 1: FCC Part 15 Subpart C-Section 15.231
LIMIT 2: FCC Part 15 Subpart B ClB (3M)
LIMIT 3: NONE

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - denotes average log detection
tm - Trace Math Result

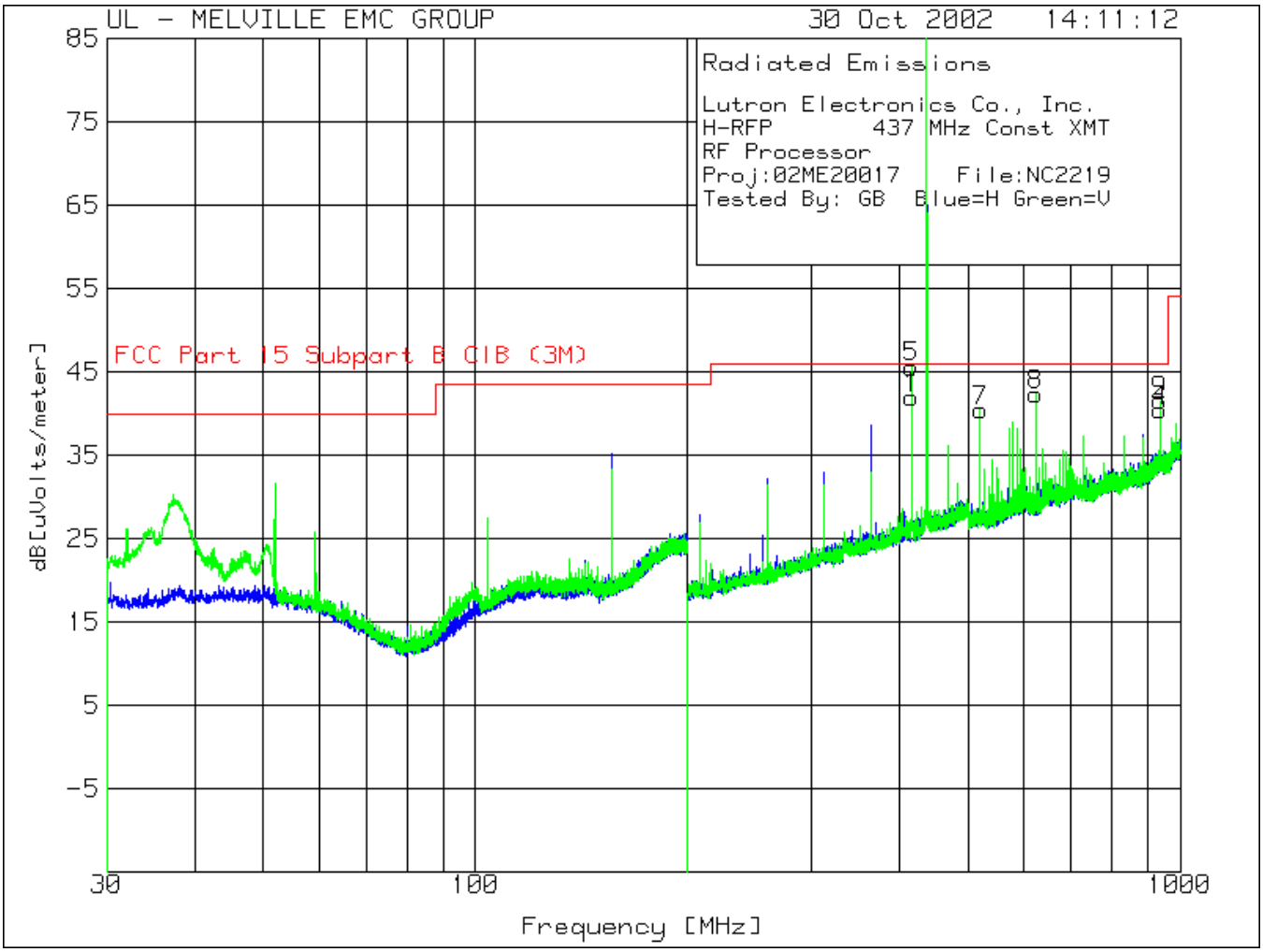
Lutron Electronics Co., Inc.
H-RFP-1P 431 MHz Const XMT
RF Processor
Proj:02ME20017 File:NC2219
Tested By: GB Blue=H Green=V

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level	Limit:1 dB[uVolts/meter]	Limit2
Range: 1 30 - 200MHz						
155.998	23.11 qp	1.78	12.5	37.39	N/A	43.5
Azimuth: 216	Height:202 Horz		Margin [dB]:			-6.11
Range: 2 30 - 200MHz						
156.009	17.45 qp	1.78	12.5	31.73	N/A	43.5
Azimuth: 293	Height:105 Vert		Margin [dB]:			-11.77
Range: 3 200 - 1000MHz						
431.0478	*52.67 av	3.17	16.55	*72.39	80.7	
Azimuth: 258	Height:101 Horz		Margin [dB]:		-8.31	
468.012	15.55 av	3.35	17.3	36.2	60.7	
Azimuth: 253	Height:101 Horz		Margin [dB]:		-24.5	
935.94	3.28 av	4.54	24.1	31.92	60.7	
Azimuth: 265	Height:117 Horz		Margin [dB]:		-28.78	
Range: 4 200 - 1000MHz						
430.9884	*51.88 av	3.17	16.55	*71.6	80.7	
Azimuth: 192	Height:118 Vert		Margin [dB]:		-9.1	
623.98	13.5 av	3.68	19.5	36.68	60.7	
Azimuth: 12	Height:109 Vert		Margin [dB]:		-24.02	
935.9895	5.5 av	4.54	24.1	34.14	60.7	
Azimuth: 196	Height:105 Vert		Margin [dB]:		-26.56	

LIMIT 1: FCC Part 15 Subpart C-Section 15.231
LIMIT 2: FCC Part 15 Subpart B ClB (3M)
LIMIT 3: NONE
LIMIT 4: NONE
LIMIT 5: NONE
LIMIT 6: NONE

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - Average log detector

***Duty Cycle correction factor of –20.9dB added to Average level.**



437MHz Transmit (Model number in title block H-RFP = H-RFP-1P)

Lutron Electronics Co., Inc.
H-RFP-1P 437 MHz Const XMT
RF Processor
Proj:02ME20017 File:NC2219
Tested By: GB Blue=H Green=V

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level	Limit:1 dB[uVolts/meter]	Limit2
Range: 3 200 - 1000MHz							
1	415.8202	22.54 pk	3.06	16.3	41.9	N/A	46
	Azimuth:107	Height:400 Horz	Margin [dB]				-4.1
2	436.8693	75.36 pk	3.2	16.94	95.5	80.9	
	Azimuth:358	Height:200 Horz	Margin [dB]			14.6	
4	935.7868	11.77 pk	4.54	24.09	40.4	60.9	
	Azimuth:216	Height:100 Horz	Margin [dB]			-20.5	
Range: 4 200 - 1000MHz							
5	415.8202	26.24 pk	3.06	16.3	45.6	N/A	46
	Azimuth:170	Height:200 Vert	Margin [dB]				-.4
6	436.8693	72.16 pk	3.2	16.94	92.3	80.9	
	Azimuth:14	Height:100 Vert	Margin [dB]			11.4	
7	520	17.94 pk	3.56	18.9	40.4	60.9	
	Azimuth:188	Height:100 Vert	Margin [dB]			-20.5	
8	624.0466	19.12 pk	3.68	19.5	42.3	60.9	
	Azimuth:334	Height:100 Vert	Margin [dB]			-18.6	
9	935.7868	12.87 pk	4.54	24.09	41.5	60.9	
	Azimuth:214	Height:100 Vert	Margin [dB]			-19.4	

LIMIT 1: FCC Part 15 Subpart C-Section 15.231
LIMIT 2: FCC Part 15 Subpart B ClB (3M)

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - denotes average log detection
tm - Trace Math Result

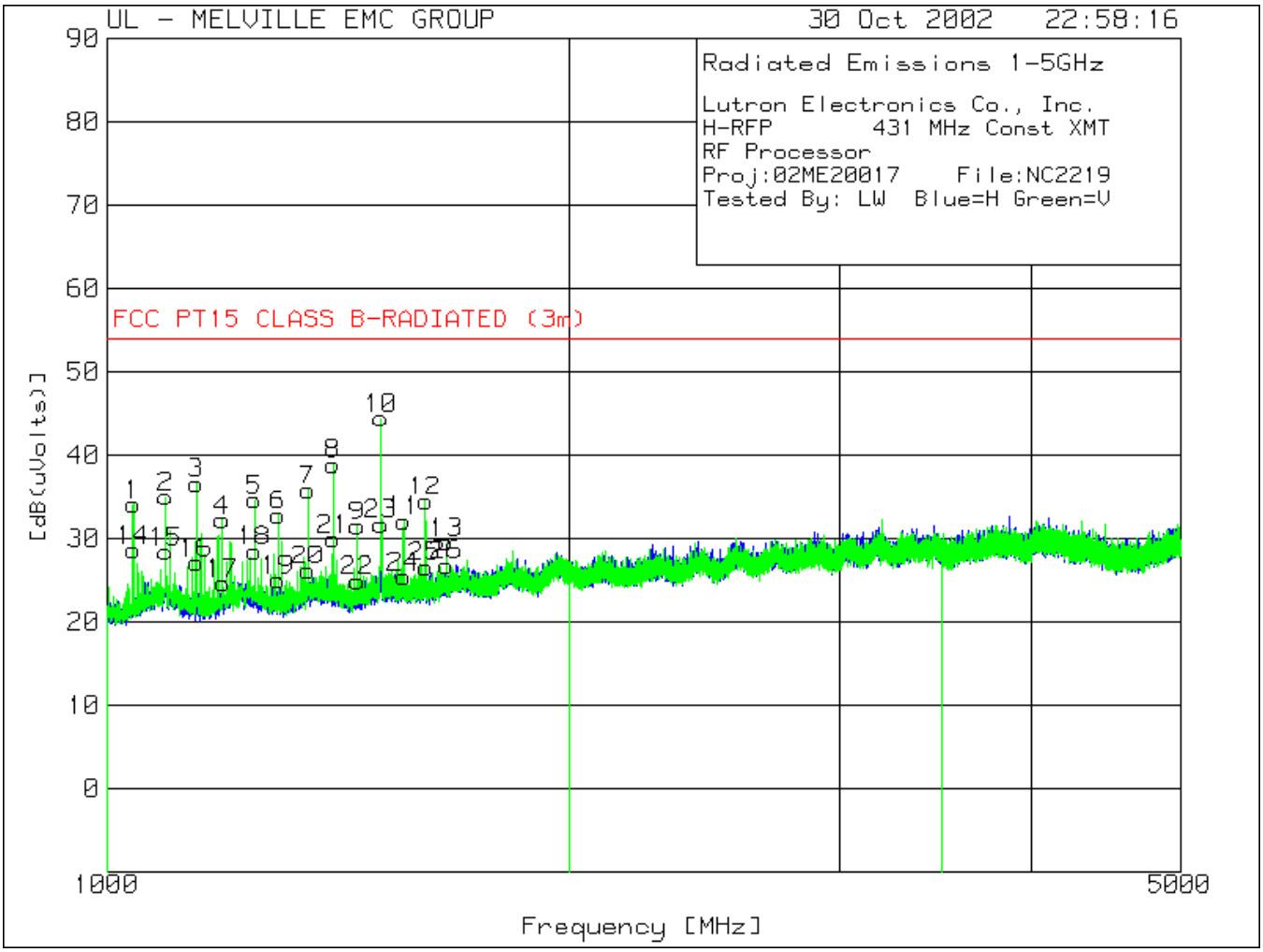
Lutron Electronics Co., Inc.
H-RFP-1P 437 MHz Const XMT
RF Processor
Proj:02ME20017 File:NC2219
Tested By: GB Blue=H Green=V

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	Limit2
Range: 3 200 - 1000MHz						
415.9879	18.45 qp	3.06	16.3	37.81	N/A	46
Azimuth: 92	Height:378 Horz			Margin [dB]:		-8.19
437	*52.48 av	3.2	16.95	*72.63	80.9	
Azimuth: 7	Height:99 Horz			Margin [dB]:	-8.27	
936.052	4.49 av	4.54	24.1	33.13	60.9	
Azimuth: 261	Height:105 Horz			Margin [dB]:	-27.77	
Range: 4 200 - 1000MHz						
416	24.32 av	3.06	16.3	43.68	60.9	
Azimuth: 0	Height:144 Vert			Margin [dB]:	-17.22	
436.9948	*51.45 av	3.2	16.95	*71.6	80.9	
Azimuth: 236	Height:143 Vert			Margin [dB]:	-9.3	
520.0139	13.61 av	3.56	18.9	36.07	60.9	
Azimuth: 341	Height:122 Vert			Margin [dB]:	-24.83	
623.99	12.35 av	3.68	19.5	35.53	60.9	
Azimuth: 0	Height:105 Vert			Margin [dB]:	-25.37	
936.0498	5.66 av	4.54	24.1	34.3	60.9	
Azimuth: 183	Height:108 Vert			Margin [dB]:	-26.6	

LIMIT 1: FCC Part 15 Subpart C-Section 15.231
LIMIT 2: FCC Part 15 Subpart B ClB (3M)

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - Average log detector

*** Duty Cycle correction factor of –20.9dB added to Average level.**



431MHz Transmit (Model number in title block H-RFP = H-RFP-1P)

Lutron Electronics Co., Inc.
H-RFP-1P 431 MHz Const XMT
RF Processor
Proj:02ME20017 File:NC2219
Tested By: LW Blue=H Green=V

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1
Range: 1 1000 - 2000MHz						
14	1039.8	37.15 pk	-33.59	25.04	28.6	60.7
	Azimuth:252	Height:100 Horz		Margin [dB]		-32.1
15	1091.757	36.62 pk	-33.45	25.23	28.4	60.7
	Azimuth:305	Height:199 Horz		Margin [dB]		-32.3
16	1143.714	34.99 pk	-33.31	25.42	27.1	60.7
	Azimuth:40	Height:100 Horz		Margin [dB]		-33.6
17	1189.342	32.21 pk	-33.19	25.58	24.6	60.7
	Azimuth:76	Height:199 Horz		Margin [dB]		-36.1
18	1247.794	35.74 pk	-33.03	25.79	28.5	60.7
	Azimuth:56	Height:199 Horz		Margin [dB]		-32.2
19	1292.756	31.96 pk	-32.91	25.95	25	60.7
	Azimuth:76	Height:199 Horz		Margin [dB]		-35.7
20	1351.873	32.78 pk	-32.75	26.17	26.2	60.7
	Azimuth:294	Height:199 Horz		Margin [dB]		-34.5
21	1403.997	36.16 pk	-32.61	26.35	29.9	60.7
	Azimuth:43	Height:100 Horz		Margin [dB]		-30.8
22	1455.62	30.83 pk	-32.47	26.54	24.9	60.7
	Azimuth:332	Height:100 Horz		Margin [dB]		-35.8
23	1507.91	37.29 pk	-32.32	26.73	31.7	60.7
	Azimuth:230	Height:199 Horz		Margin [dB]		-29
24	1559.867	30.6 pk	-32.16	26.96	25.4	60.7
	Azimuth:304	Height:199 Horz		Margin [dB]		-35.3
25	1611.823	31.4 pk	-31.99	27.19	26.6	60.7
	Azimuth:323	Height:100 Horz		Margin [dB]		-34.1
26	1663.78	31.21 pk	-31.83	27.42	26.8	60.7
	Azimuth:80	Height:199 Horz		Margin [dB]		-33.9
Range: 5 1000 - 2000MHz						
1	1039.967	42.65 pk	-33.59	25.04	34.1	60.7
	Azimuth:95	Height:100 Vert		Margin [dB]		-26.6
2	1091.757	43.22 pk	-33.45	25.23	35	60.7
	Azimuth:201	Height:100 Vert		Margin [dB]		-25.7
3	1143.547	44.49 pk	-33.31	25.42	36.6	60.7
	Azimuth:24	Height:100 Vert		Margin [dB]		-24.1
4	1188.51	39.81 pk	-33.19	25.58	32.2	60.7
	Azimuth:21	Height:100 Vert		Margin [dB]		-28.5
5	1247.96	41.84 pk	-33.03	25.79	34.6	60.7
	Azimuth:175	Height:100 Vert		Margin [dB]		-26.1
6	1292.756	39.76 pk	-32.91	25.95	32.8	60.7
	Azimuth:216	Height:198 Vert		Margin [dB]		-27.9
7	1351.873	42.38 pk	-32.75	26.17	35.8	60.7
	Azimuth:324	Height:100 Vert		Margin [dB]		-24.9
8	1403.83	45.16 pk	-32.61	26.35	38.9	60.7
	Azimuth:324	Height:100 Vert		Margin [dB]		-21.8
9	1455.62	37.43 pk	-32.47	26.54	31.5	60.7
	Azimuth:171	Height:100 Vert		Margin [dB]		-29.2
10	1508.077	49.98 pk	-32.32	26.74	44.4	60.7

	Azimuth:21	Height:100 Vert	Margin [dB]			-16.3
11	1559.867	37.3 pk	-32.16	26.96	32.1	60.7
	Azimuth:21	Height:100 Vert	Margin [dB]			-28.6
12	1611.823	39.3 pk	-31.99	27.19	34.5	60.7
	Azimuth:21	Height:100 Vert	Margin [dB]			-26.2
13	1663.947	33.91 pk	-31.83	27.42	29.5	60.7
	Azimuth:40	Height:100 Vert	Margin [dB]			-31.2

LIMIT 1: FCC Part 15 Subpart C-Section 15.231
LIMIT 2: NONE

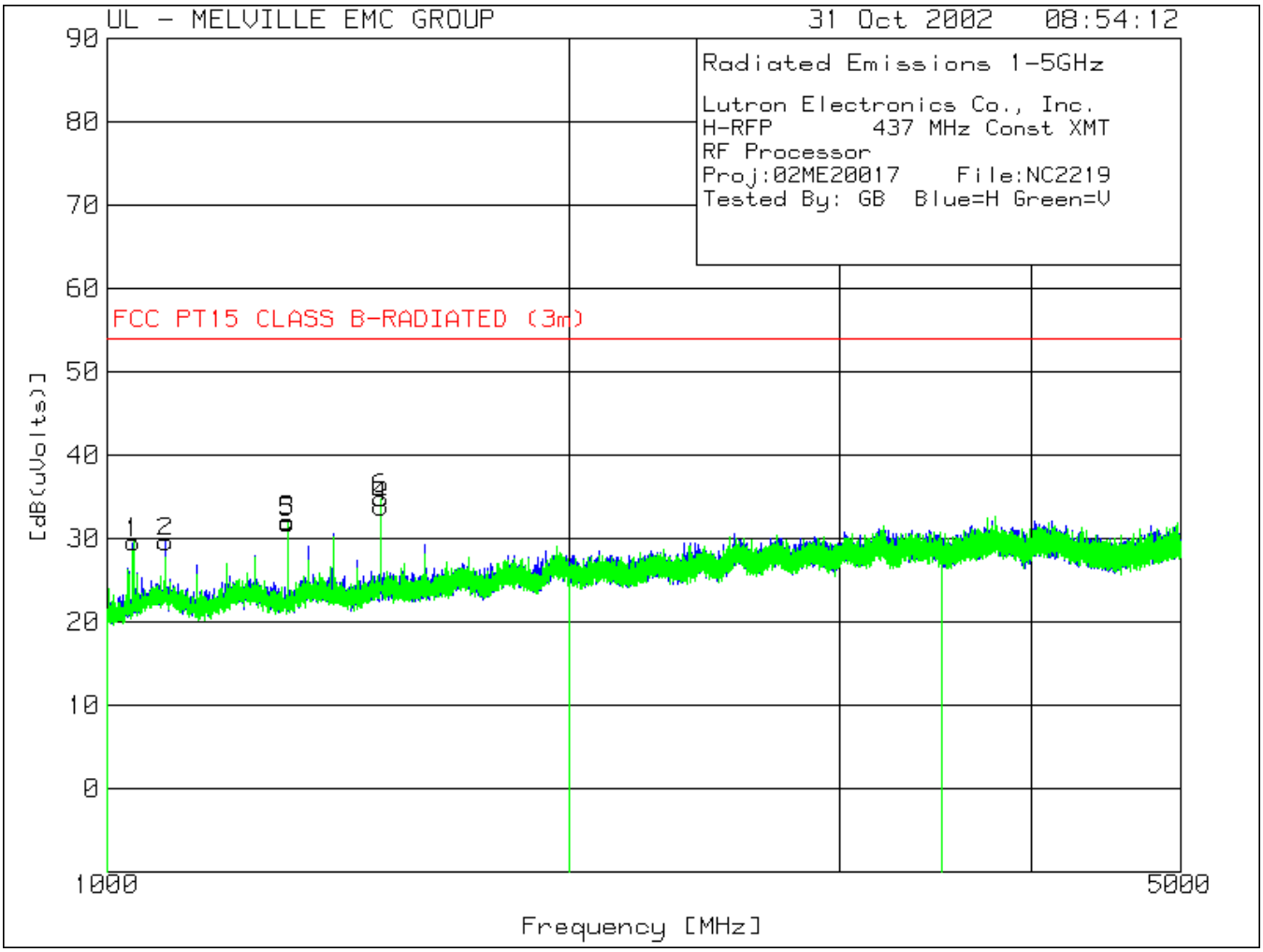
pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - denotes average log detection
tm - Trace Math Result

Lutron Electronics Co., Inc.
H-RFP-1P 431 MHz Const XMT
RF Processor
Proj:02ME20017 File:NC2219
Tested By: LW Blue=H Green=V

Frequency [MHz]	Test Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1 [dB(uVolts)]	
Range: 1 1000 - 2000MHz						
1039.992	36.79 av	-33.59	25.04	28.24	60.7	
Azimuth: 53	Height:117 Horz		Margin [dB]:		-32.46	
1091.978	36.99 av	-33.45	25.23	28.77	60.7	
Azimuth: 253	Height:132 Horz		Margin [dB]:		-31.93	
1143.978	34.43 av	-33.31	25.42	26.54	60.7	
Azimuth: 144	Height:106 Horz		Margin [dB]:		-34.16	
1188.68	31.71 av	-33.19	25.58	24.1	60.7	
Azimuth: 359	Height:109 Horz		Margin [dB]:		-36.6	
1247.7	33.55 av	-33.03	25.79	26.31	60.7	
Azimuth: 226	Height:108 Horz		Margin [dB]:		-34.39	
1292.97	35.9 av	-32.91	25.95	28.94	60.7	
Azimuth: 128	Height:107 Horz		Margin [dB]:		-31.76	
1351	30.95 av	-32.75	26.16	24.36	60.7	
Azimuth: 320	Height:144 Horz		Margin [dB]:		-36.34	
Range: 5 1000 - 2000MHz						
1039.955	44.25 av	-33.59	25.04	35.7	60.7	
Azimuth: 13	Height:131 Vert		Margin [dB]:		-25	
1091.975	42.71 av	-33.45	25.23	34.49	60.7	
Azimuth: 358	Height:123 Vert		Margin [dB]:		-26.21	
1143.99	46.8 av	-33.31	25.42	38.91	60.7	
Azimuth: 73	Height:117 Vert		Margin [dB]:		-21.79	
1188.828	39.37 av	-33.19	25.58	31.76	60.7	
Azimuth: 88	Height:104 Vert		Margin [dB]:		-28.94	
1247.952	43.63 av	-33.03	25.79	36.39	60.7	
Azimuth: 0	Height:99 Vert		Margin [dB]:		-24.31	
1292.976	43.56 av	-32.91	25.95	36.6	60.7	
Azimuth: 319	Height:110 Vert		Margin [dB]:		-24.1	
1351.98	43.62 av	-32.75	26.17	37.04	60.7	
Azimuth: 329	Height:109 Vert		Margin [dB]:		-23.66	

LIMIT 1: FCC Part 15 Subpart C-Section 15.231
pk - Peak detector

qp - Quasi-Peak detector
av - Average detector
avlg - Average log detector



437MHz Transmit (Model number in title block H-RFP = H-RFP-1P)

Lutron Electronics Co., Inc.
H-RFP-1P 437 MHz Const XMT
RF Processor
Proj:02ME20017 File:NC2219
Tested By: GB Blue=H Green=V

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1
Range: 1 1000 - 2000MHz						
1	1039.883	38.05 pk	-33.59	25.04	29.5	60.9
	Azimuth:317	Height:100 Horz		Margin [dB]		-31.4
2	1091.757	37.82 pk	-33.45	25.23	29.6	60.9
	Azimuth:299	Height:100 Horz		Margin [dB]		-31.3
3	1310.741	38.94 pk	-32.86	26.02	32.1	60.9
	Azimuth:243	Height:199 Horz		Margin [dB]		-28.8
4	1508.41	39.38 pk	-32.32	26.74	33.8	60.9
	Azimuth:61	Height:199 Horz		Margin [dB]		-27.1
Range: 5 1000 - 2000MHz						
5	1310.741	38.74 pk	-32.86	26.02	31.9	60.9
	Azimuth:257	Height:199 Vert		Margin [dB]		-29
6	1508.077	40.38 pk	-32.32	26.74	34.8	60.9
	Azimuth:278	Height:199 Vert		Margin [dB]		-26.1

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

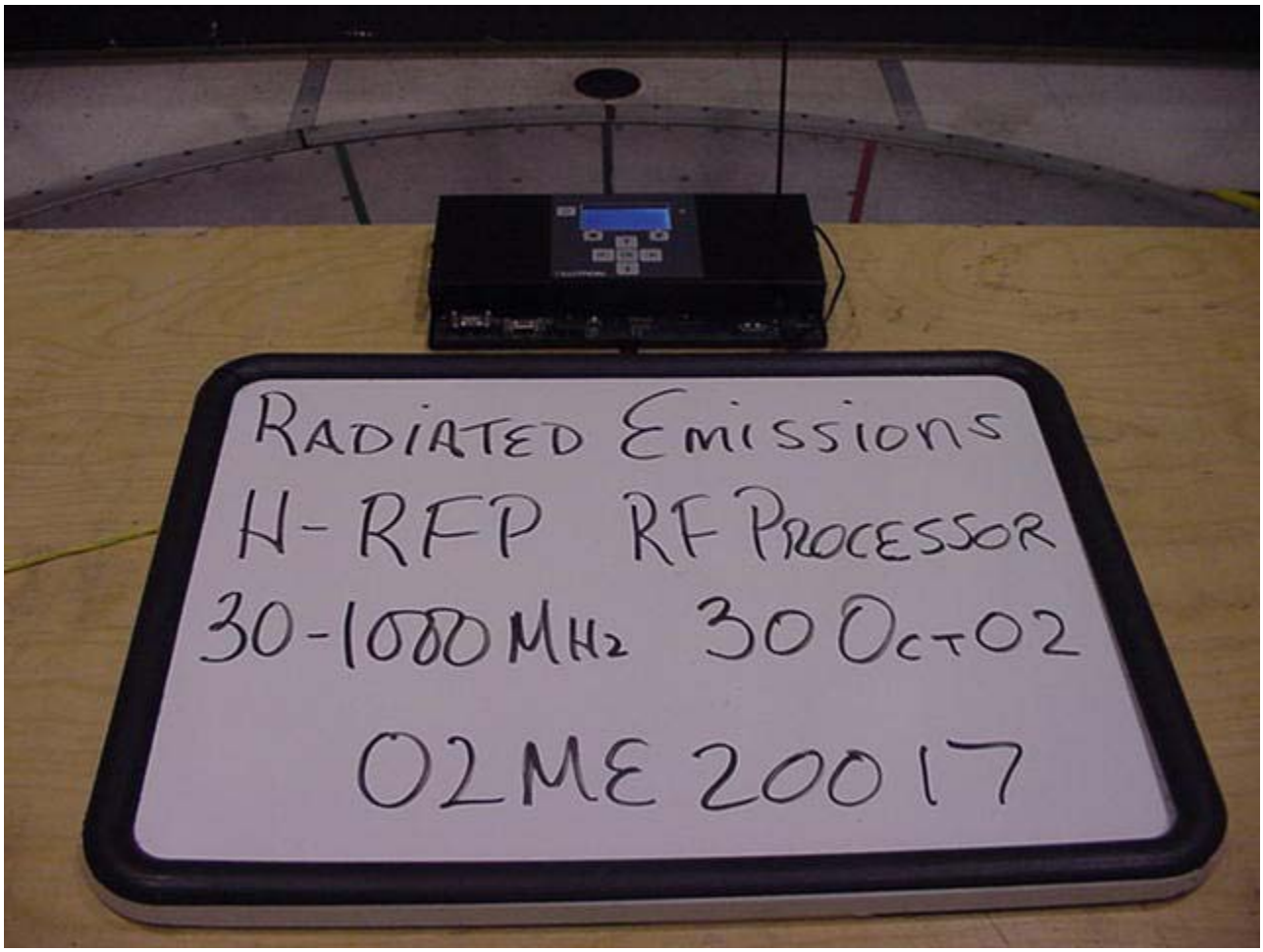
pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - denotes average log detection
tm - Trace Math Result

Lutron Electronics Co., Inc.
H-RFP-1P 437 MHz Const XMT
RF Processor
Proj:02ME20017 File:NC2219
Tested By: GB Blue=H Green=V

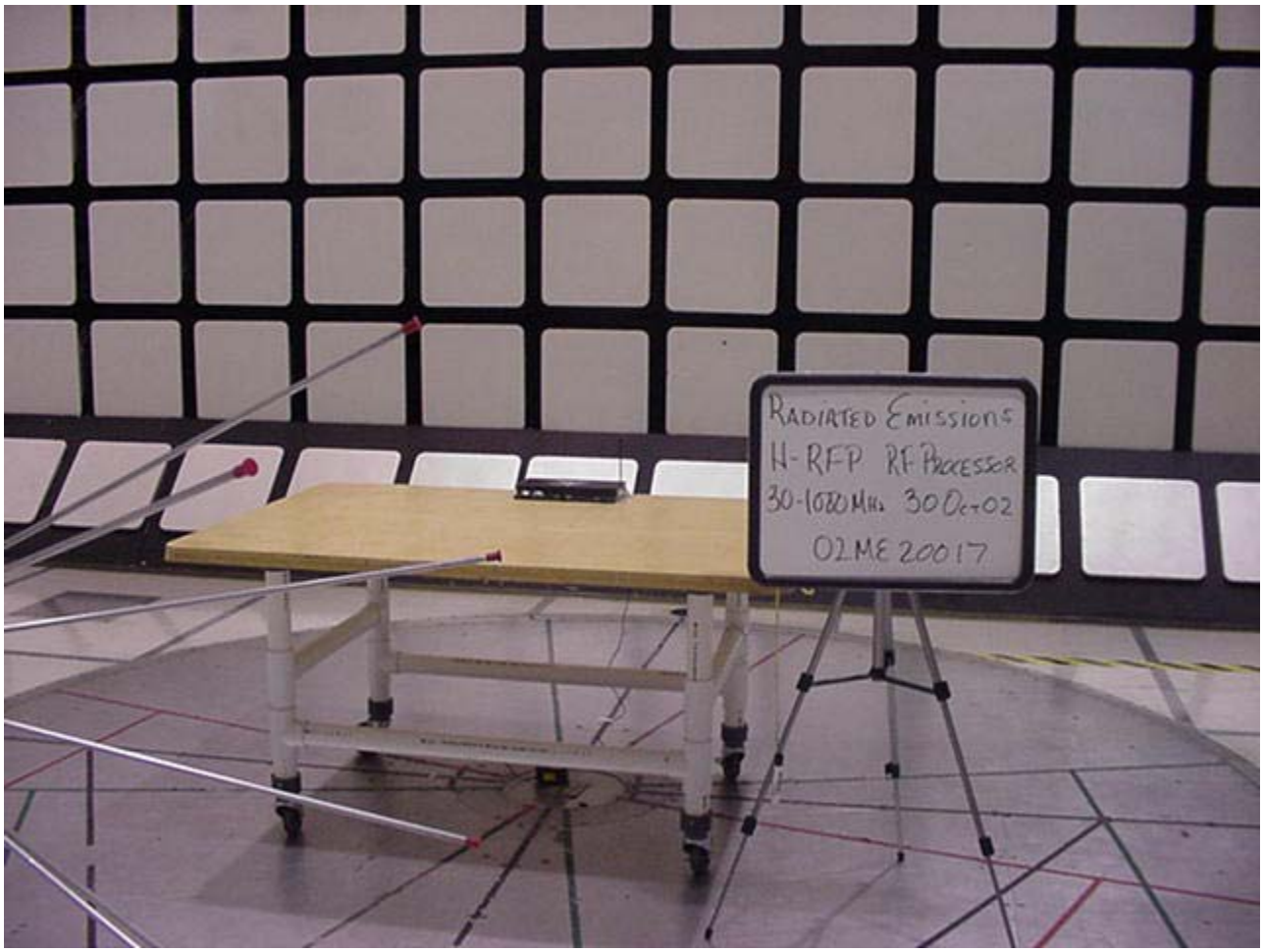
Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1
Range: 1 1000 - 2000MHz					
1040.12	24.66 av	-33.59	25.04	16.11	60.9
Azimuth: 18	Height:176 Horz		Margin [dB]:		-44.79
1092	29.34 av	-33.45	25.23	21.12	60.9
Azimuth: 244	Height:174 Horz		Margin [dB]:		-39.78
1310.98	38.58 av	-32.86	26.02	31.74	60.9
Azimuth: 263	Height:194 Horz		Margin [dB]:		-29.16
1507.99	32.55 av	-32.32	26.74	26.97	60.9
Azimuth: 286	Height:190 Horz		Margin [dB]:		-33.93
Range: 5 1000 - 2000MHz					
1310.96	38.42 av	-32.86	26.02	31.58	60.9
Azimuth: 262	Height:194 Vert		Margin [dB]:		-29.32
1508.02	32.52 av	-32.32	26.74	26.94	60.9
Azimuth: 286	Height:198 Vert		Margin [dB]:		-33.96

LIMIT 1: FCC Part 15 Subpart C-Section 15.231
LIMIT 2: NONE

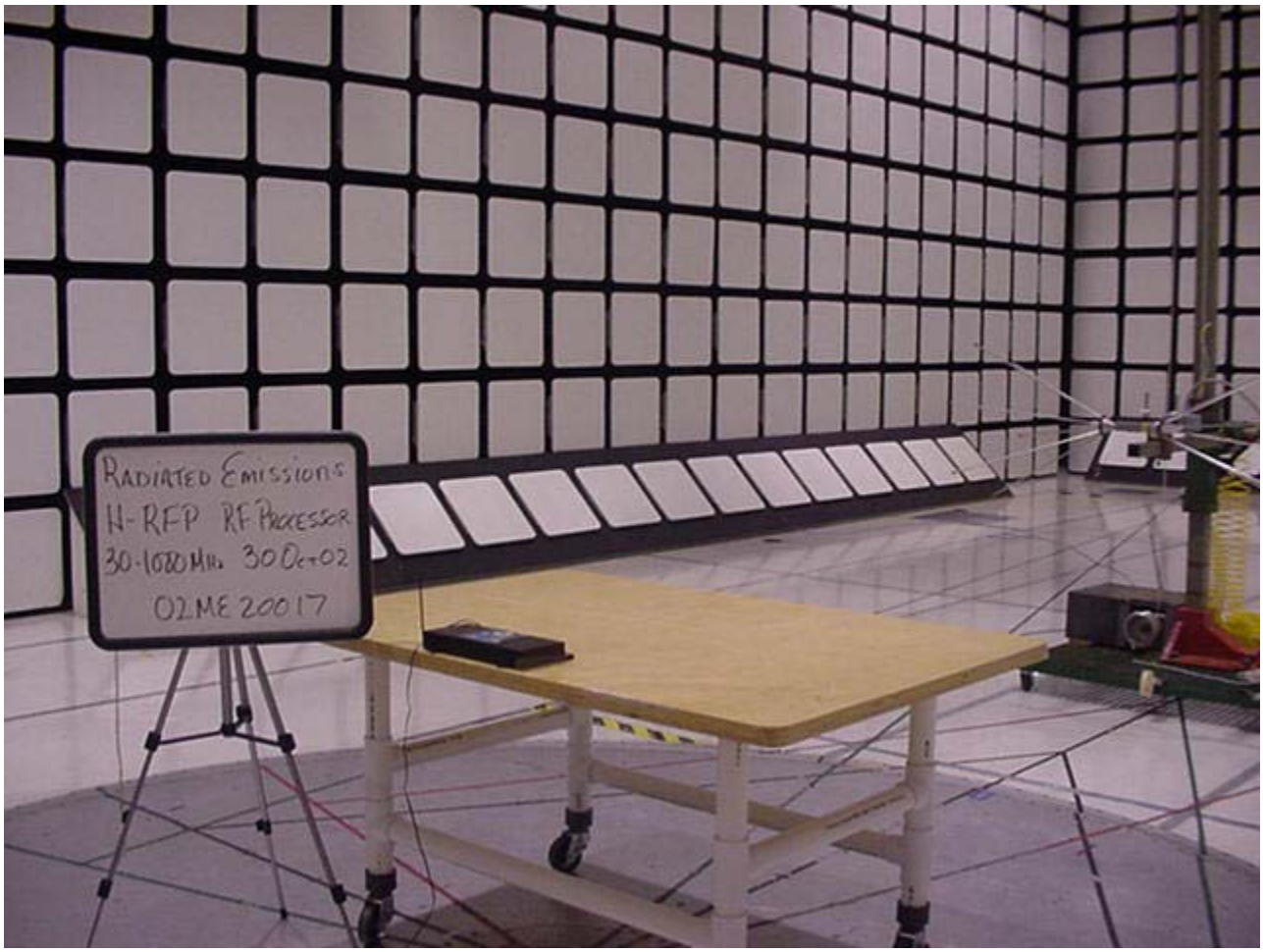
pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - Average log detector



Radiated Emissions Test Set-Up 30-1000MHz
(Model number in title block H-RFP = H-RFP-1P)



Radiated Emissions Test Set-Up 30-1000MHz Front View
(Model number in title block H-RFP = H-RFP-1P)



Radiated Emissions Test Set-Up 30-1000MHz Rear View
(Model number in title block H-RFP = H-RFP-1P)

Radiated Emissions Test Set-Up 1-5GHz Front View
(Model number in title block H-RFP = H-RFP-1P)

2.1.4 Occupied Bandwidth

☒ **Test Applicable** ☐ **Test Not Applicable**

Temperature: 20.8 °C
Humidity: 69%RH
Pressure: 1040mbar
Date test performed: 24 Oct 2002

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

☒431MHz and 437MHz
Bandwidth = 0.25% of 431MHz = 1.0775MHz
Bandwidth = 0.25% of 437MHz = 1.0925MHz

Test equipment used for Occupied Bandwidth Measurements:

☒ **ESI** **Rhode &Swharz** **EMI Test Receiver,** **Equipment No.: 5B-081**
Range: 20Hz -26.5GHz Last Calibration Date:20 August 02 Calibration Due Date: 20 August 03

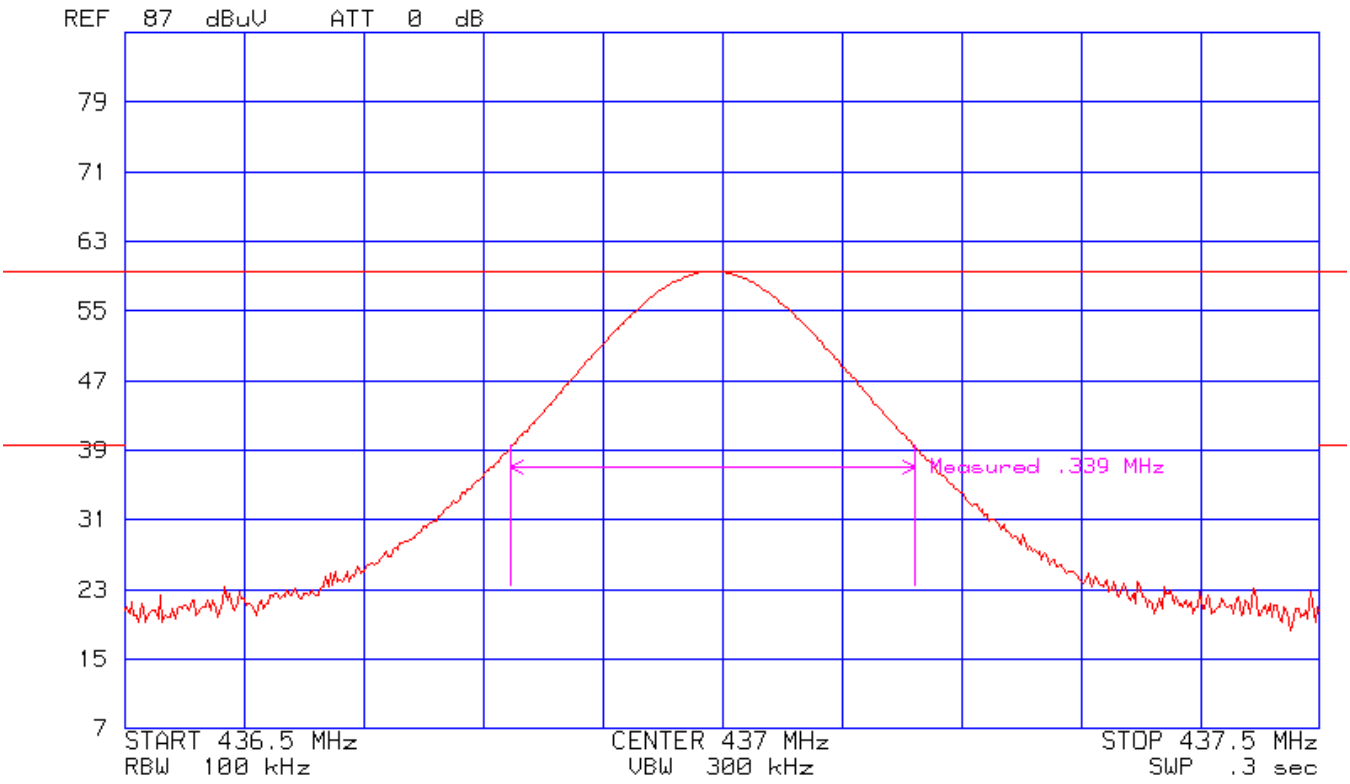
Consisting of:

HP - 8566B	**Hewlett-Packard**	**Spectrum Analyzer,**
	Resolution BW: 1MHz	
	Video BW: 1MHz	
HP - 85662A	**Hewlett-Packard**	**Analyzer Display**
HP - 85650A	**Hewlett-Packard**	**Quasi-Peak Adapter,**
	BW: 120kHz	
HP - 85685A	**Hewlett-Packard**	**Preselector**

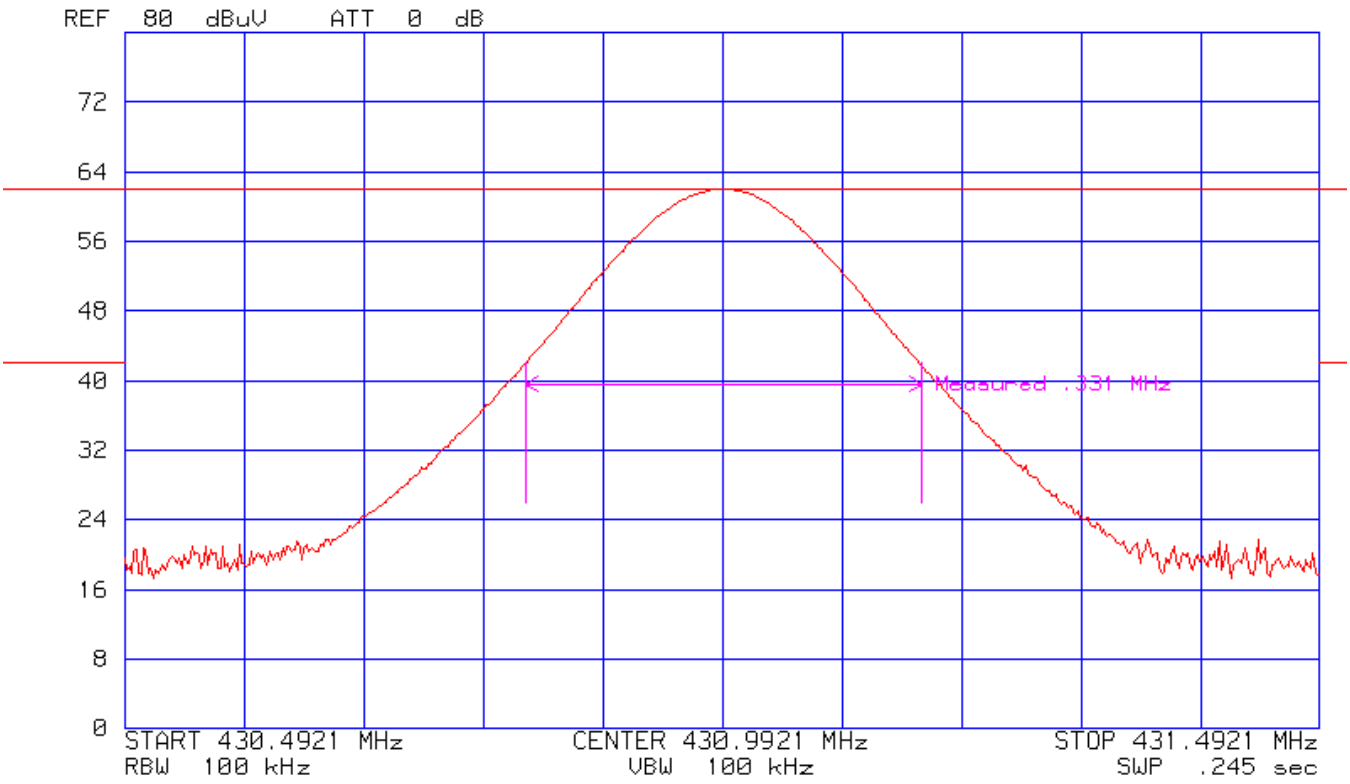
☒ **3121C** **The Electro Mechanics** **Dipole ANtenna** **Equipment No.:**
Last Calibration Date:10 Dec.01 Calibration Due Date: 10 DEC 02

☒ **Temp/Pressure** **Oakton** **Barometer** **Equipment No.: ME4-263**
Range:950-1045 Last Calibration Date: 2 April 02 Calibration Due Date:2 April 03

☒ **453320** **Ex-Tech** **Hydro-Thermometer Equipment No.: ME4-264**
Range:0-80% Last Calibration Date:2 April 02 Calibration Due Date:2 April 03



437MHz Occupied Bandwidth @ 20 db = 0.339MHz



431MHz Occupied Bandwidth @ 20 db = 0.331MHz

Occupied Bandwidth Test Set-up H-RFP-1P

2.1.5 Fundamental Frequency and Spurious Emissions Measurement Limit Calculations

Limit Calculation

Fundamental Frequency is 431MHz
From table in section 15.231
Limit = 41.6667(431) – 7083.3333
Limit = 10846.3uV
Limit = Log 10846.3(20)
Limit = 80.7dBuV
Limit for Spurious Emissions = 20dB lower then fundamental = 60.7dBuV/m

Fundamental Frequency is 437MHz
From table in section 15.231
Limit = 41.6667(437) – 7083.3333
Limit = 11125.018uV
Limit = Log 11125.018 (20)
Limit = 80.9dBuV
Limit for Spurious Emissions = 20dB lower then fundamental = 60.9dBuV/m

Radiated Emissions Limit conversion from µV/m to dBµV/m (accordance with paragraph 15.109)

Radiated Emissions Limit (dBµV/m) = 20*log (µV/m)
Radiated Emissions Limit (dBµV/m) = 20 * log (90)
Radiated Emissions Limit (dBµV/m) = 39.1

Radiated Emissions test data obtained during measurements.

Field Strength (dBµV/m) = Measured field strength(dBµV/m) + Antenna Factor(dB) + Cable Factor(dB)
Field Strength (dBµV/m) = 19.7dBµV/m + 12.5dB + 0.3dB
Field Strength (dBµV/m) = 32.5

Duty Cycle factor calculation.

Total number of pulses counted in 100ms.
Total time on = 8.94ms
Duty cycle correction factor = 20 log (8.94ms / 100ms)
= 20 log (0.0894)
= - 20.9dB

The correction factor is added to the measured field strength in dBuV/m

3.0 SUMMARY:

The equipment under test has

☒ met the technical requirements as defined under section(s) ☒ 2.0 and ☐ 3.0

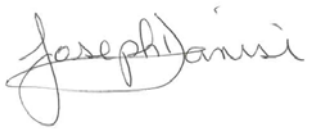
☐ not met the technical requirements as defined under section(s) ☐ 2.0 and ☐ 3.0

Test Start Date: 16 October 2002

Test Completion Date: 28 October 2002

- UNDERWRITERS LABORATORIES, INC. -

Project Engineer



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Conformity Assessment Services-3014AMEL

Reviewer

Corey Hyatt (Ext.22452)
Associate Manager
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