



Project:	04ME10395
File:	NC2219
Date:	9/30/04
Model:	886 HR-REP
FCC ID	JPZ0034

Test Report

On

Electromagnetic Compatibility Testing

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Quality service for over 100 years**

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04

Test Report Details

Tests Performed By:	Underwriters Laboratories Inc. 1285 Walt Whitman Rd. Melville, NY 11747
Tests Performed For:	Lutron Electronics Co. Inc. 7200 Suter Road Coopersburg, PA 18036
Applicant Contact:	Mark Clouser
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Test Report Date:	9/30/04
Product Type:	Repeater
Model Number:	886 HR-REP
Sample Serial Number:	Not Provided
Sample Tag Number:	0613366001
Sample Receive Date:	8/12/04
EUT Category:	Radio Transmitter
Testing Start Date:	12 August 2004
Date Testing Complete:	9/7/04

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, 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 certificates provided at the end of this report.

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Report Revision History

Revision Date	Description	Revised By	Revision Reviewed By
9/30/04	Original	--	--

1.0 G E N E R A L - Product Description

Device Function: The HR-REP-120 acts as a signal repeater in an integrated lighting control system. It contains a FM transceiver and an integral antenna. The purpose of the RF communication is to transmit and receive command signals. Transmitted commands allow the triggering of the system events and the updating of the control indicator status.

Analog Function: The HR-REP-120 obtains power through a 120Vac to 9VDC Class 2 transformer. The voltage is then linearly regulated down to 5Vdc output, which is used to power all analog and micro controller activities.

Device is exempt from routine RF exposure testing per FCC Part 2.1091.

Device contains an integrated antenna. It is not detachable or replaceable by the user

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 and was powered with 120VAC, 60Hz.

1.1.1 Equipment Used During Test:

Use*	Product Type	Manufacturer	Model	Comments
EUT	Repeater	Lutron	886 –HR-REP	--
ACC	Class 2 transformer	Lutron	280903000C0	--

* Use = EUT - Equipment Under Test, ACC - Accessory (Not Subjected to Test), or SIM - Simulator (Not Subjected to Test)

1.1.2 Input/Output Ports:

Port #	Name	Type*	Cable Max. >3m	Cable Shielded	Comments
0	Enclosure	N/E	-	-	None
1	Mains	AC	No	No	--

*AC = AC Power Port

DC = DC Power Port

N/E = Non-Electrical

I/O = Signal Input or Output Port (Not Involved in Process Control)

PMC = Process Measurement and Control Port

1.1.3 EUT Internal Operating Frequencies:

Frequency (MHz)	Description	Frequency (MHz)	Description
431	Operating Frequency	--	--
437	Operating Frequency	--	--

1.1.4 Power Interface:

Mode #	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
Rated						
1	120	--	--	60	1	--

1.2 EUT Operation Modes:

Mode #	Description
1	Transmit 431MHz
2	Receive 431MHz
3	Transmit 437MHz
4	Receive 437MHz

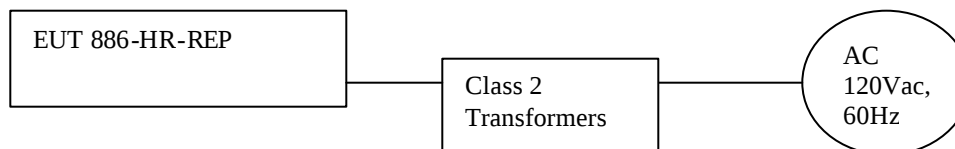
1.3 EUT Configuration Modes:

Mode #	Description
1	Constant (Continuous) Wave Transmit and Receive modes for all other tests

"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"

1.4 Block Diagram:

The diagram below illustrates the configuration of the equipment above.



1.5 Deviations from standard test methods.

Not Applicable

1.6 Device Modifications Necessary for Compliance

Not Applicable.

1.7 Test Summary

Test Name	Comply	Does Not	See
Test Requirement/Specification		Comply	Remark
Radiated Disturbance Emissions - 30 to 5000MHz Electric Field	Y	-	1
FCC Part 15 Subpart C, Intentional Radiators, Paragraph 15.209			
FCC Part 15 Subpart B, Class B, Un-Intentional Radiators, Paragraph 15.109	Y	-	1
FCC Part 15, Subpart C, Cease Operation < 5seconds	Y	-	1
FCC Part 15 Subpart C, Paragraph 15.231, Occupied Bandwidth	Y	-	1
FCC Part 15 Subpart C, Paragraph 15.231, Pulse Train Measurements	Y	-	1

Remarks:

- 1) No Modifications required for compliance.
- 2) Modifications required to comply as described in Section 1.6

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2.0 Conclusion:

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 as being applicable to the Equipment Under Test determined the test list. 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.

The equipment under test has

Met the technical requirements as defined under section(s) 5.0

Test Start Date:	12 August 2004
Test Completion Date:	10 September 2004



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3.0 FCC Labeling Information

3.1 Identification.

Devices Subject to Verification

In 47 CFR, Part 2, § 2.954:

“Devices subject only to verification shall be uniquely identified by the person responsible for marketing or importing the equipment within the United States. However, the identification shall not be of a format which could be confused with the FCC Identifier required on certified, notified or type accepted equipment. The importer or manufacturer shall maintain adequate identification records to facilitate positive identification for each verified device.”

Devices Subject to Declaration of Conformity

In 47 CFR, Part 2, § 2.1074:

“Devices subject only to a Declaration of Conformity shall be uniquely identified by the responsible party. This identification shall not be of a format which could be confused with the FCC Identifier required on certified, notified, type accepted or type approved equipment. The responsible party shall maintain adequate identification records to facilitate positive identification for each device.”

3.2 Compliance information

§ 2.1077 Compliance information.

(a) If a product must be tested and authorized under a Declaration of Conformity, a compliance information statement shall be supplied with the product at the time of marketing or importation, containing the following information:

- (1) Identification of the product, e.g., name and model number;
- (2) A statement, similar to that contained in § 15.19(a)(3) of this chapter, that the product complies with part 15 of this chapters; and
- (3) The identification, by name, address and telephone number, of the responsible party, as defined in §

2.909.

The responsible party for a Declaration of Conformity must be located within the United States.

(c) The compliance information statement shall be included in the user’s manual or as a separate sheet.

§ 15.19(a)(3):

“ All other devices shall bear the following statement in a conspicuous location on the device:

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.”

3.3 Labeling.

Labeling Certification or Verification

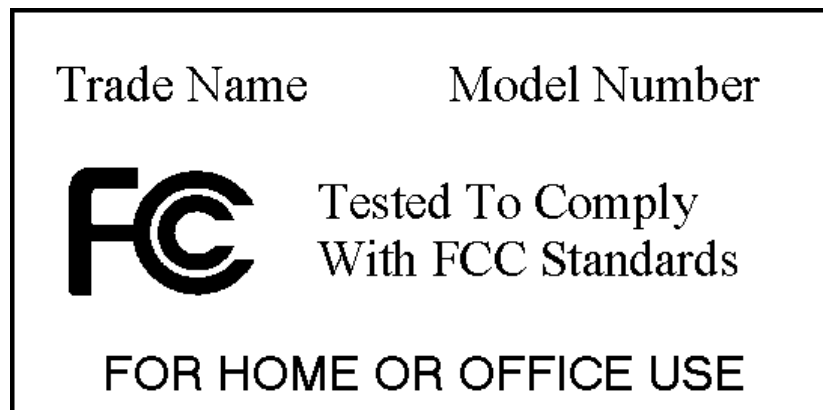
In addition to the requirements in Part 2 of this CFR 47 (See **1.6.1 Identification** above), a device subject to certification or verification shall be labeled as follows:

- (1) Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under Part 73, land mobile operation under Part 90, etc., shall bear the following statement in a conspicuous location on the device:
This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.
- (2) A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:
This device is verified to comply with Part 15 of the FCC Rules for use with cable television service.
- (3) All other devices shall bear the following statement in a conspicuous location on the device:
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
- (4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.
- (5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

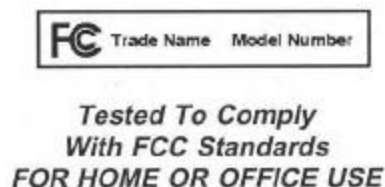
Declaration of Conformity Labeling

In addition to the requirements in Part 2 of CFR 47 (See **1.6.1 Identification** above), a device subject to authorization under a Declaration of Conformity shall be labeled as follows:

- (1) The label shall be located in a conspicuous location on the device and shall contain the unique identification described in Section 2.1074 of this chapter and the following logo:
 - (i) If the product is authorized based on testing of the product or system:



Alternate label format for small devices:



The text shown in ***bold-face italics*** may be placed in a prominent location in the instruction manual or pamphlet supplied to the user.

- (2) Label text and information should be in a size of type large enough to be readily legible, consistent with the dimensions of the equipment and the label. However, the type size for the text is not required to be larger than eight point.
- (3) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (b)(1) of this section on it, such as for a CPU board or a plug-in circuit board peripheral device, the text associated with the logo may be placed in a prominent location in the instruction manual or pamphlet supplied to the user. However, the unique identification (trade name and model number) and the logo must be displayed on the device.
- (4) The label shall not be a stick-on, paper label. The label on these products shall be permanently affixed to the product and shall be readily visible to the purchaser at the time of purchase, as described in Section 2.925(d) of this chapter. "Permanently affixed" means that the label is etched, engraved, stamped, silk-screened, indelibly printed, or otherwise permanently marked on a permanently attached part of the equipment or on a nameplate of metal, plastic, or other material fastened to the equipment by welding, riveting, or a permanent adhesive. The label must be designed to last the expected lifetime of the equipment in the environment in which the equipment may be operated and must not be readily detachable.

3.4 User information.

In 47 CFR, Part 15, § 15.21 Information to user:

“The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.”

In 47 CFR, Part 15, § 15.105 Information to the user:

Class A Devices

“(a) For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.”

Class B Devices

“(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help*

“(d) For systems incorporating several digital devices, the statement shown in paragraph (a) or (b) of this section needs to be contained only in the instruction manual for the main control unit.”

4.0 Calibration of Equipment Used for Measurement

All test equipment and test accessories are calibrated on a regular basis. The maximum time between calibrations is the manufacturer recommends one year or what 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.

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5.0 EMISSIONS TEST REGULATIONS

The emissions tests were performed according to following regulations:

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

FCC Part 15, Subpart C Code of Federal Regulations, Part 15, Radio Frequency Devices

FCC Part 15, Subpart B, Paragraph 15.107 & 15.109

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

5.1.1 Conducted Emissions Tests

Test Applicable

Measurements were made on a ground plane that extends 1-meter minimum beyond all sides of the system under test. All power was connected to the system through Line Impedance Stabilization Networks (LISN). Conducted voltage measurements on mains lines were made at the output of the LISN.

Results

The system met the requirements for conducted emissions. Data Pages follow.

Temperature:	20.5 °C
Humidity:	70.0 %RH
Pressure:	1008 mbar
Date test performed:	13 August 2004

1 fully configured sample was scanned over the following frequency range

Frequency range on each side of line	Measurement Point		Mode*	
			Power	Operation
150kHz to 30MHz	Voltage	Mains	<u>1</u>	<u>1, 2, 3, 4</u>

*See Power Interface and EUT Operating Modes for details

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Test equipment used for conducted emissions

HP 8574A	Hewlett-Packard	EMI Receiver Consisting of: HP - 8566B	Equipment No.: ME5A-461
		HP - 85662A HP - 85650A	Hewlett-Packard Spectrum Analyzer, Resolution BW: 1MHz Video BW: 1MHz Hewlett-Packard Analyzer Display Hewlett-Packard Quasi-Peak Adapter, BW: 120kHz Hewlett-Packard Preselector Calibration Due Date: 26 March 2005 Quasi Peak BW: 200Hz 9kHz to 150kHz RBW 10 KHz Quasi Peak BW: 9kHz 150kHz to 30MHz RBW 100 KHz Quasi Peak BW: 120 kHz 30 to 1000MHz RBW 1.0 MHz
Range: 150K – 30M	Last Calibration Date: 26 March 2004	HP - 85685A	

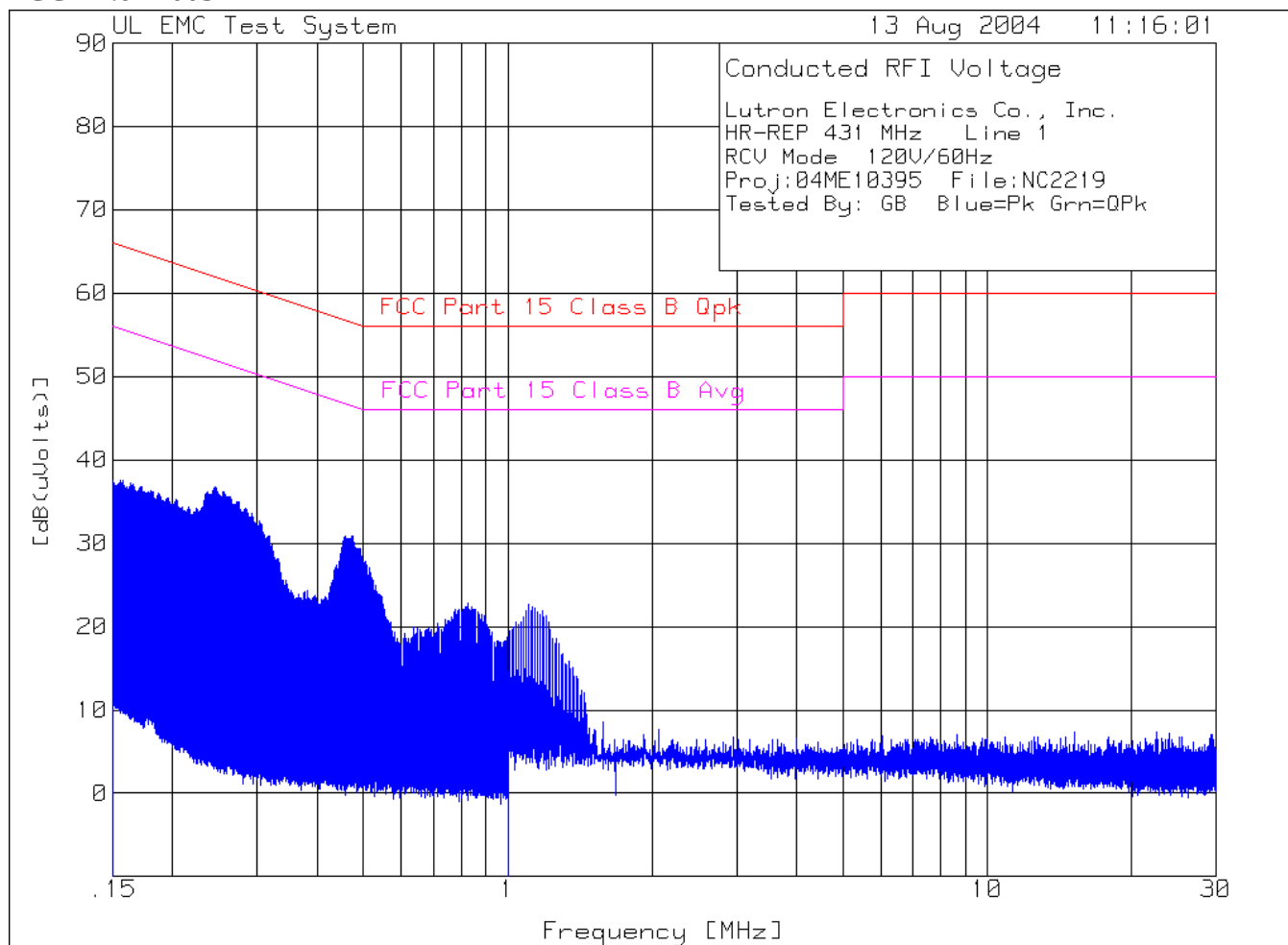
Test Accessories for Conducted Emissions

EC - 3825/2	EMCO	50W LISN	Equipment No.: ME5-629
Range: 150K-30M	Last Calibration Date: 26 March 2004		Calibration Due Date: 26 March 2005
11947A	Hewlett Packard	Transient Limiter	Equipment No.: ME5A-443
Range: 150K-30M	Last Calibration Date: 24 March 2004		Calibration Due Date: 24 March 2005
11947A	Hewlett Packard	Transient Limiter	Equipment No.: ME5A-444
Range: 150K-30M	Last Calibration Date: 24 March 2004		Calibration Due Date: 24 March 2005
99760-00	Cole –Parmer	Hygrometer/Temp/Barometer	Equipment No.: ME4-268
		Ranges	Temp: 0°C-55°C Humidity: 25% to 95 %RH Pressure: 795 to 1050 mbar Calibration Due Date: 185 January 2005
	Last Calibration Date: 18 January 2004		

5.1.2 Conducted Click Emissions Tests

Test Not Applicable

The EUT does not contain devices that produce transient emissions as defined by the standard.



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FCC-ID: JPZ0034

Lutron Electronics Co., Inc.

HR-REP 431 MHz Line 1

RCV Mode 120V/60Hz

Proj:04ME10395 File:NC2219

Tested By: GB Blue=Pk Grn=QPk

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2
=====							
Range 1 .15 - 1MHz -----							
1	.15717	27.4 pk	10.1	0	37.5	65.6	55.6
				Margin [dB]		-28.1	-18.1
2	.20346	25.1 pk	10.1	0	35.2	63.5	53.5
				Margin [dB]		-28.3	-18.3
3	.24557	26.7 pk	10.1	0	36.8	61.9	51.9
				Margin [dB]		-25.1	-15.1
4	.46418	20.5 pk	10.1	0	30.6	56.6	46.6
				Margin [dB]		-26	-16
5	.82478	12.7 pk	10.1	0	22.8	56	46
				Margin [dB]		-33.2	-23.2
Range:2 1 - 30MHz -----							
6	1.1038	12.6 pk	10.1	0	22.7	56	46
				Margin [dB]		-33.3	-23.3

LIMIT 1: FCC Part 15 Class B Qpk

LIMIT 2: FCC Part 15 Class B Avg

pk - Peak detector

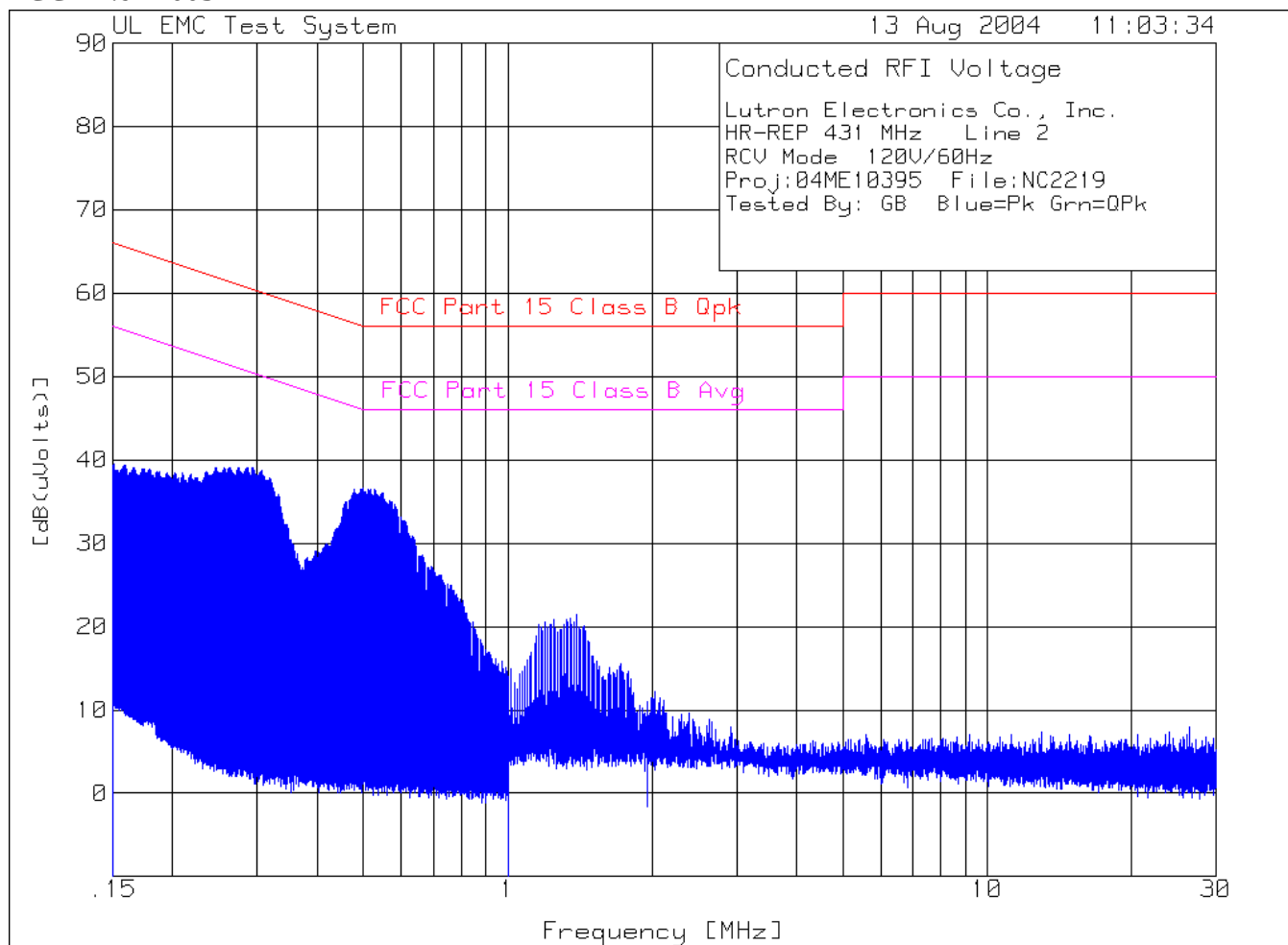
qp - Quasi-Peak detector

av - Average detector

avlg - denotes average log detection

avem - denotes EMI average detection

tm - Trace Math Result



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Project Number: 04ME10395

Model Number: 886 HR-REP

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Lutron Electronics Co., Inc.

HR-REP 431 MHz Line 2

RCV Mode 120V/60Hz

Proj:04ME10395 File:NC2219

Tested By: GB Blue=Pk Grn=QPk

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2
=====							
Range 1 .15 - 1MHz -----							
1	.15131	29.4 pk	10.1	0	39.5	65.9	55.9
				Margin [dB]		-26.4	-16.4
2	.21007	28.3 pk	10.1	0	38.4	63.2	53.2
				Margin [dB]		-24.8	-14.8
3	.29314	29 pk	10.1	0	39.1	60.4	50.4
				Margin [dB]		-21.3	-11.3
4	.50117	26 pk	10.1	0	36.1	56	46
				Margin [dB]		-19.9	-9.9
Range:2 1 - 30MHz -----							
5	1.24623	10.8 pk	10.1	0	20.9	56	46
				Margin [dB]		-35.1	-25.1
6	1.39348	11.3 pk	10.1	0	21.4	56	46
				Margin [dB]		-34.6	-24.6

LIMIT 1: FCC Part 15 Class B Qpk

LIMIT 2: FCC Part 15 Class B Avg

pk - Peak detector

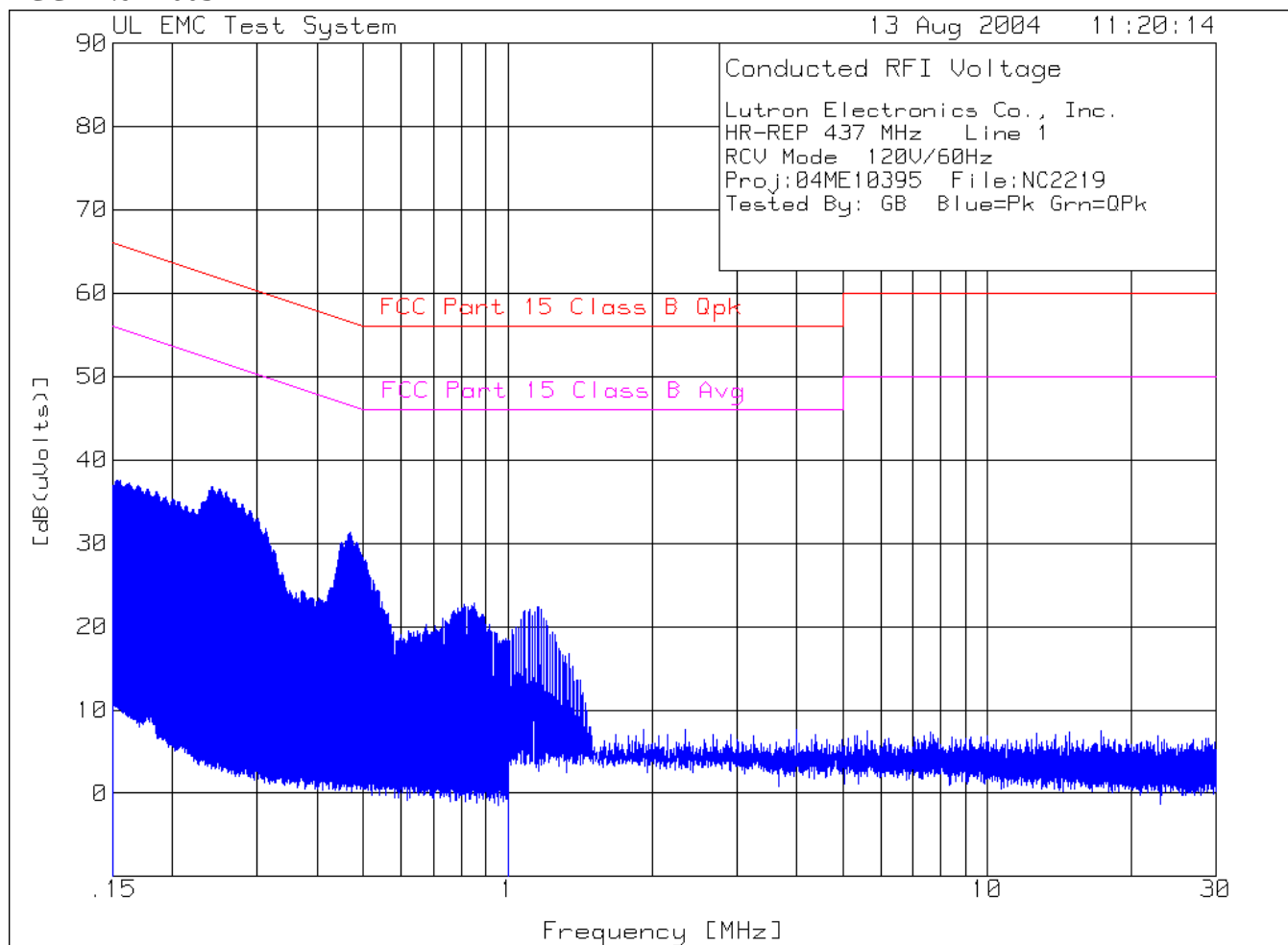
qp - Quasi-Peak detector

av - Average detector

avlg - denotes average log detection

avem - denotes EMI average detection

tm - Trace Math Result



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Lutron Electronics Co., Inc.

HR-REP 437 MHz Line 1

RCV Mode 120V/60Hz

Proj:04ME10395 File:NC2219

Tested By: GB Blue=Pk Grn=QPk

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2
=====							
Range 1 .15 - 1MHz -----							
1	.15511	27.5 pk	10.1	0	37.6	65.7	55.7
				Margin [dB]		-28.1	-18.1
2	.20084	25.2 pk	10.1	0	35.3	63.6	53.6
				Margin [dB]		-28.3	-18.3
3	.2418	26.6 pk	10.1	0	36.7	62	52
				Margin [dB]		-25.3	-15.3
4	.46588	21 pk	10.1	0	31.1	56.6	46.6
				Margin [dB]		-25.5	-15.5
5	.81236	12.5 pk	10.1	0	22.6	56	46
				Margin [dB]		-33.4	-23.4
Range:2 1 - 30MHz -----							
6	1.14967	12.3 pk	10.1	0	22.4	56	46
				Margin [dB]		-33.6	-23.6

LIMIT 1: FCC Part 15 Class B Qpk

LIMIT 2: FCC Part 15 Class B Avg

pk - Peak detector

qp - Quasi-Peak detector

av - Average detector

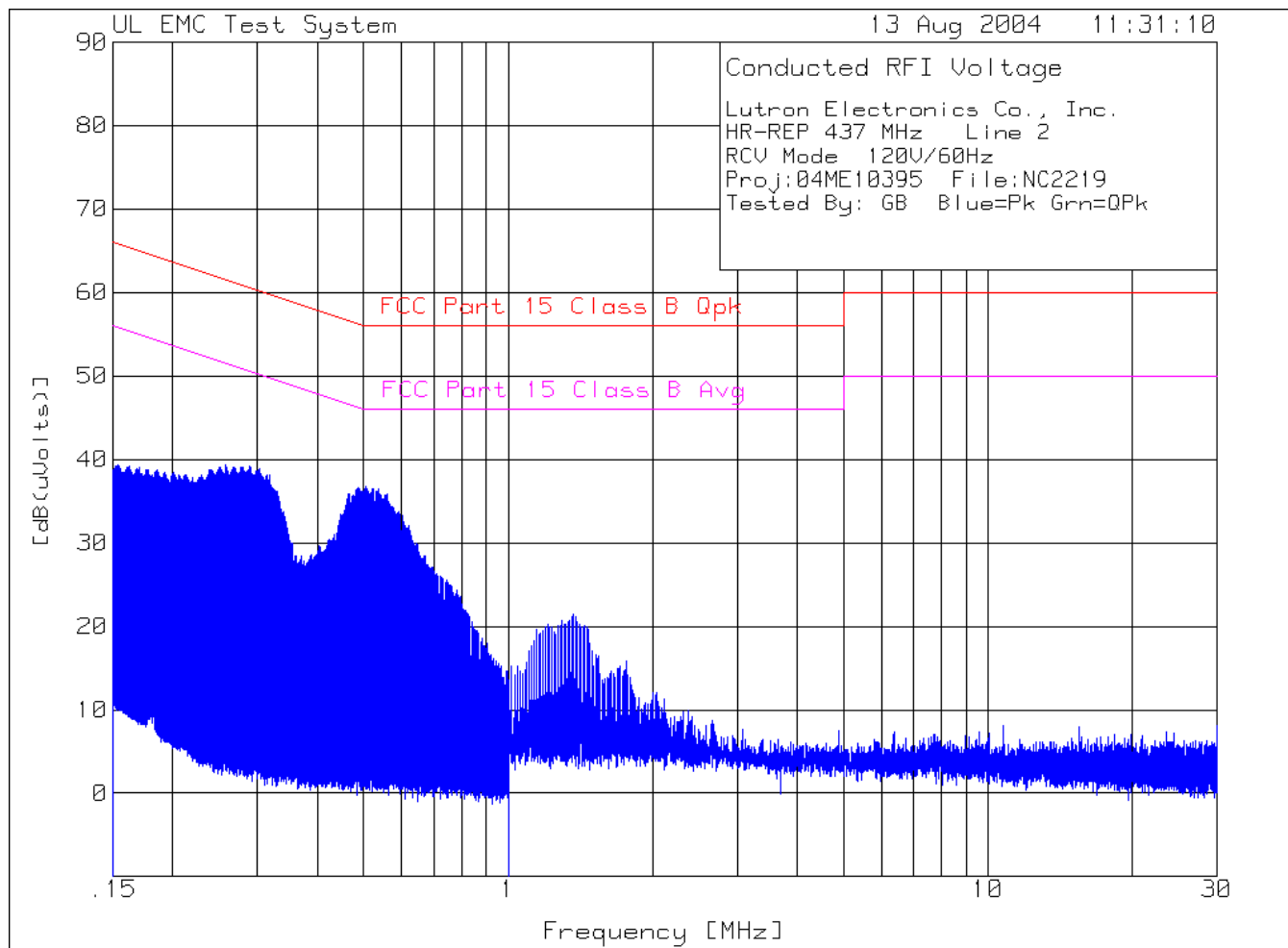
avlg - denotes average log detection

avem - denotes EMI average detection

tm - Trace Math Result

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Project Number: 04ME10395

Model Number: 886 HR-REP

FCC-ID: JPZ0034

Lutron Electronics Co., Inc.

HR-REP 437 MHz Line 2

RCV Mode 120V/60Hz

Proj:04ME10395 File:NC2219

Tested By: GB Blue=Pk Grn=QPk

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2
=====							
Range 1 .15 - 1MHz -----							
1	.15412	29.2 pk	10.1	0	39.3	65.8	55.8
				Margin [dB]		-26.5	-16.5
2	.21347	27.9 pk	10.1	0	38	63.1	53.1
				Margin [dB]		-25.1	-15.1
3	.29867	28.5 pk	10.1	0	38.6	60.3	50.3
				Margin [dB]		-21.7	-11.7
4	.50081	26.4 pk	10.1	0	36.5	56	46
				Margin [dB]		-19.5	-9.5
5	.64728	19.7 pk	10.1	0	29.8	56	46
				Margin [dB]		-26.2	-16.2
Range:2 1 - 30MHz -----							
6	1.36934	11.3 pk	10.1	0	21.4	56	46
				Margin [dB]		-34.6	-24.6

LIMIT 1: FCC Part 15 Class B Qpk

LIMIT 2: FCC Part 15 Class B Avg

pk - Peak detector

qp - Quasi-Peak detector

av - Average detector

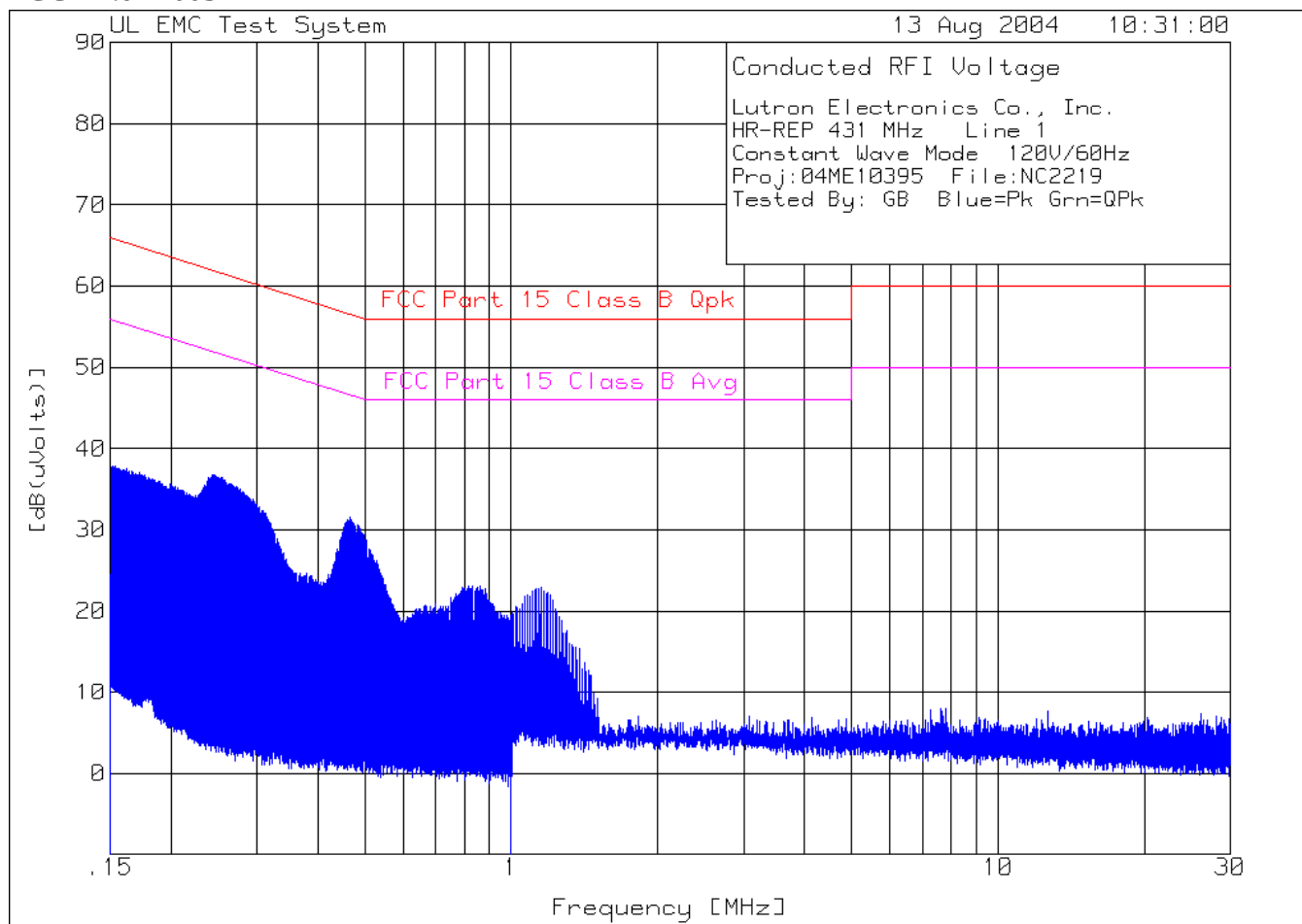
avlg - denotes average log detection

avem - denotes EMI average detection

tm - Trace Math Result

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04



File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04

Lutron Electronics Co., Inc.
HR-REP 431 MHz Line 1
Constant Wave Mode 120V/60Hz
Proj:04ME10395 File:NC2219
Tested By: GB Blue=Pk Grn=QPk

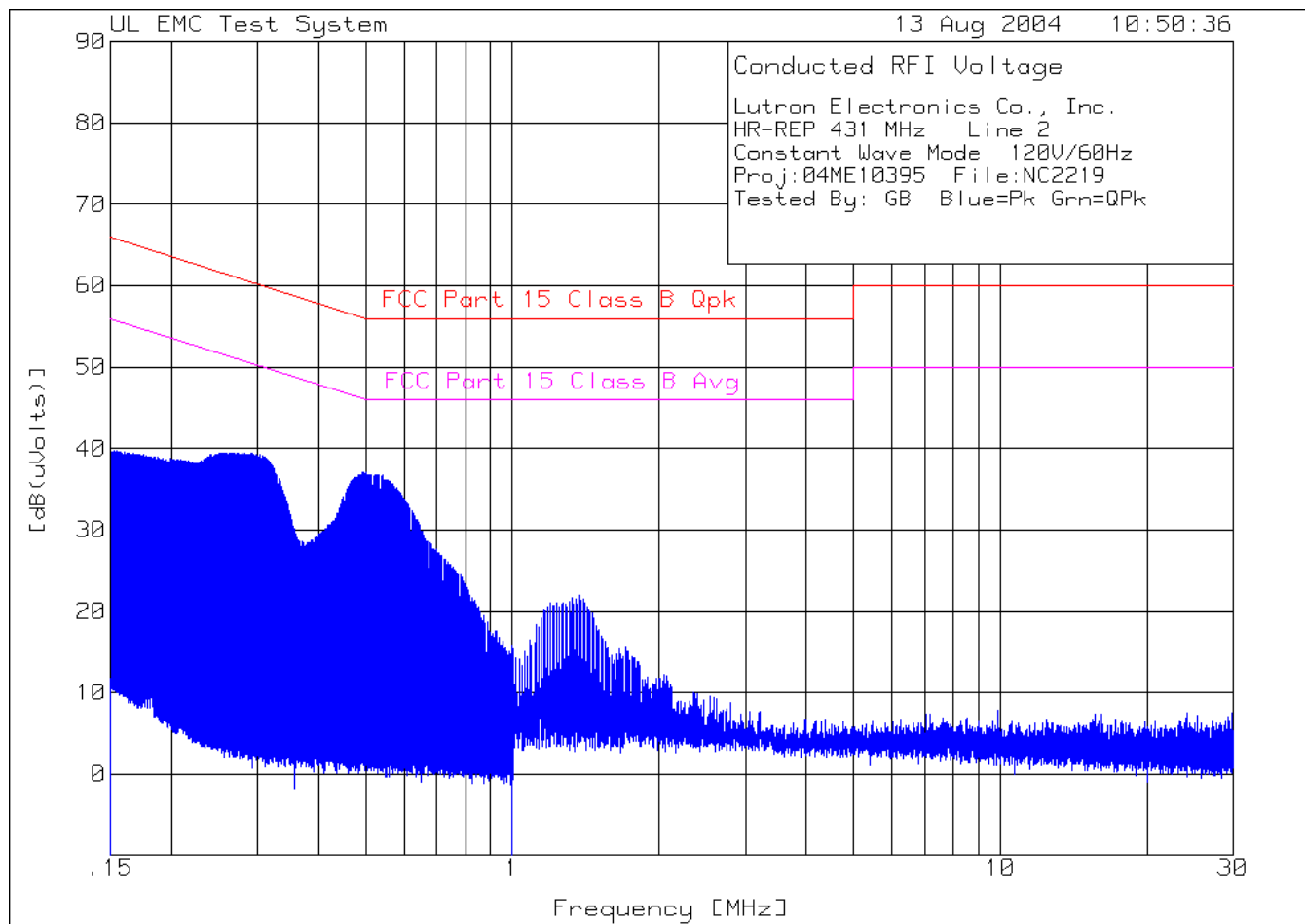
No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2
=====							
Range 1 .15 - 1MHz -----							
1	.15391	27.8 pk	10.1	0	37.9	65.8	55.8
				Margin [dB]		-27.9	-17.9
2	.20353	25.2 pk	10.1	0	35.3	63.5	53.5
				Margin [dB]		-28.2	-18.2
3	.24621	26.6 pk	10.1	0	36.7	61.9	51.9
				Margin [dB]		-25.2	-15.2
4	.46098	21.1 pk	10.1	0	31.2	56.7	46.7
				Margin [dB]		-25.5	-15.5
5	.81335	12.6 pk	10.1	0	22.7	56	46
				Margin [dB]		-33.3	-23.3
Range:2 1 - 30MHz -----							
6	1.1545	12.8 pk	10.1	0	22.9	56	46
				Margin [dB]		-33.1	-23.1

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

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

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04



File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

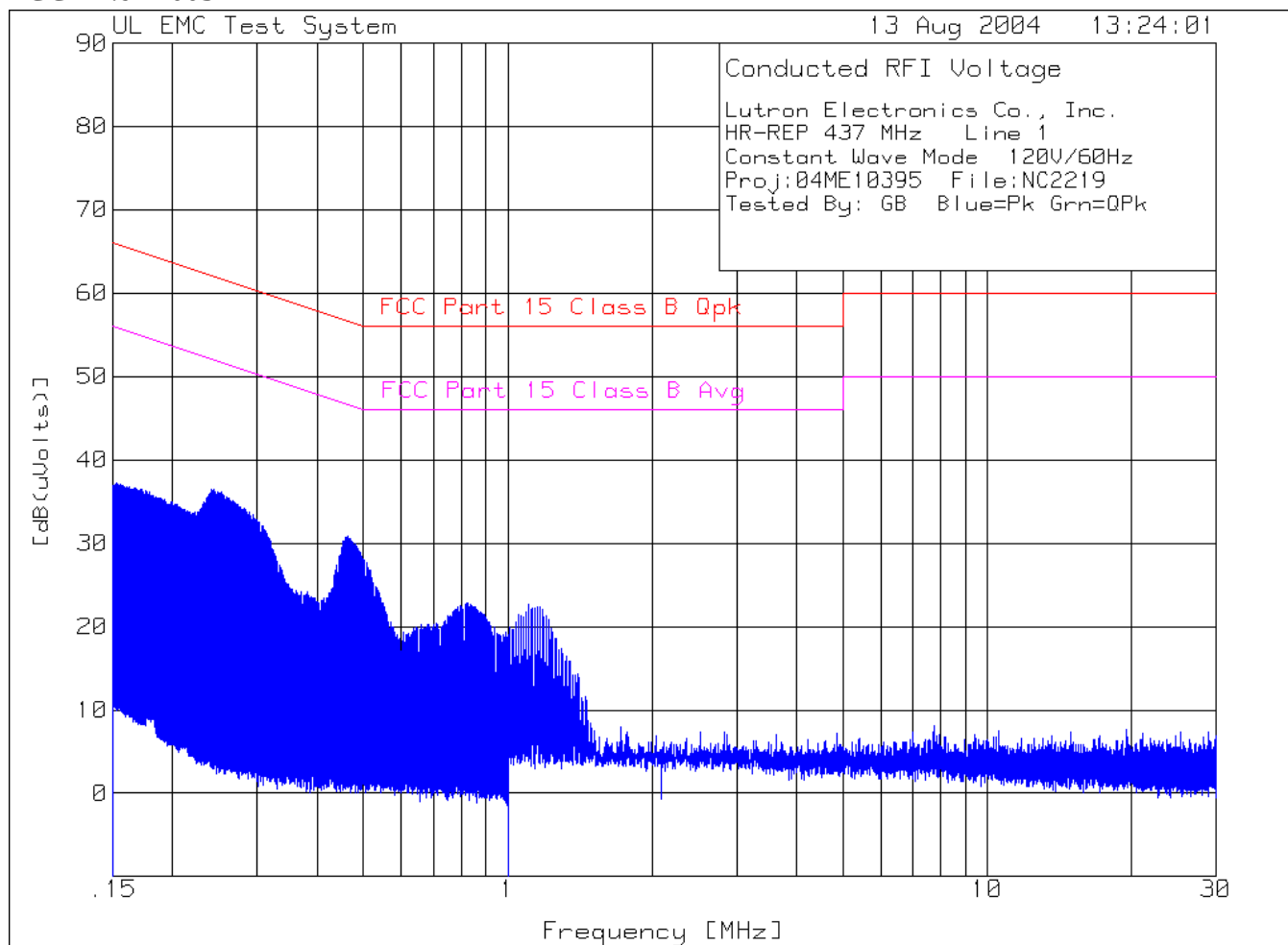
Issued: 9/30/04

Lutron Electronics Co., Inc.
HR-REP 431 MHz Line 2
Constant Wave Mode 120V/60Hz
Proj:04ME10395 File:NC2219
Tested By: GB Blue=Pk Grn=QPk

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2
=====							
Range 1 .15 - 1MHz -----							
1	.15462	29.7 pk	10.1	0	39.8	65.7	55.7
				Margin [dB]		-25.9	-15.9
2	.22043	28.2 pk	10.1	0	38.3	62.8	52.8
				Margin [dB]		-24.5	-14.5
3	.27737	29.2 pk	10.1	0	39.3	60.9	50.9
				Margin [dB]		-21.6	-11.6
4	.48966	26.6 pk	10.1	0	36.7	56.2	46.2
				Margin [dB]		-19.5	-9.5
Range:2 1 - 30MHz -----							
5	1.23174	11 pk	10.1	0	21.1	56	46
				Margin [dB]		-34.9	-24.9
6	1.36934	11.8 pk	10.1	0	21.9	56	46
				Margin [dB]		-34.1	-24.1

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

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



File Number: NC2219

Issued: 9/30/04

Project Number: 04ME10395

Model Number: 886 HR-REP

FCC-ID: JPZ0034

Lutron Electronics Co., Inc.

HR-REP 437 MHz Line 1

Constant Wave Mode 120V/60Hz

Proj:04ME10395 File:NC2219

Tested By: GB Blue=Pk Grn=QPk

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2
=====							
Range 1 .15 - 1MHz -----							
1	.15582	27 pk	10.1	0	37.1	65.7	55.7
				Margin [dB]		-28.6	-18.6
2	.18884	25.3 pk	10.1	0	35.4	64.1	54.1
				Margin [dB]		-28.7	-18.7
3	.24429	26.4 pk	10.1	0	36.5	61.9	51.9
				Margin [dB]		-25.4	-15.4
4	.46425	20.7 pk	10.1	0	30.8	56.6	46.6
				Margin [dB]		-25.8	-15.8
5	.82365	12.7 pk	10.1	0	22.8	56	46
				Margin [dB]		-33.2	-23.2
Range:2 1 - 30MHz -----							
6	1.1038	12.5 pk	10.1	0	22.6	56	46
				Margin [dB]		-33.4	-23.4

LIMIT 1: FCC Part 15 Class B Qpk

LIMIT 2: FCC Part 15 Class B Avg

pk - Peak detector

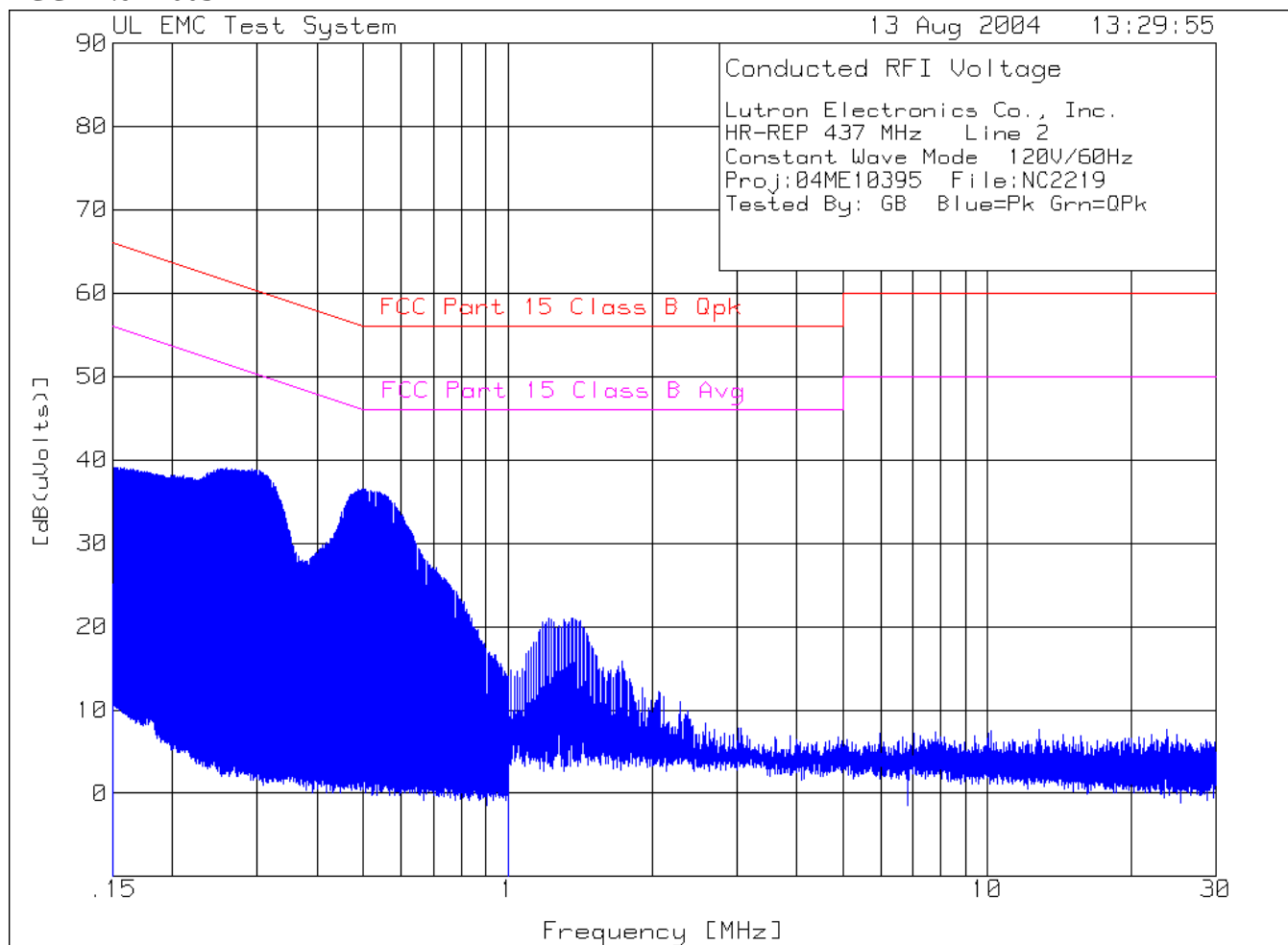
qp - Quasi-Peak detector

av - Average detector

avlg - denotes average log detection

avem - denotes EMI average detection

tm - Trace Math Result



File Number: NC2219
 Project Number: 04ME10395
 Model Number: 886 HR-REP
 FCC-ID: JPZ0034

Issued: 9/30/04

Lutron Electronics Co., Inc.
 HR-REP 437 MHz Line 2
 Constant Wave Mode 120V/60Hz
 Proj:04ME10395 File:NC2219
 Tested By: GB Blue=Pk Grn=QPk

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2
=====							
Range 1 .15 - 1MHz -----							
1	.15575	29 pk	10.1	0	39.1	65.7	55.7
				Margin [dB]		-26.6	-16.6
2	.25934	28.9 pk	10.1	0	39	61.5	51.5
				Margin [dB]		-22.5	-12.5
3	.3045	28.5 pk	10.1	0	38.6	60.1	50.1
				Margin [dB]		-21.5	-11.5
4	.50571	26.4 pk	10.1	0	36.5	56	46
				Margin [dB]		-19.5	-9.5
Range:2 1 - 30MHz -----							
5	1.21967	10.9 pk	10.1	0	21	56	46
				Margin [dB]		-35	-25
6	1.36934	10.9 pk	10.1	0	21	56	46
				Margin [dB]		-35	-25

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

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

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04



Conducted Emissions Test Set-Up

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04



Conducted Emissions Test Set-Up

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

Test Applicable

Measurements were made in a 10-meter semi-anechoic chamber that complies to ANSI C63.4. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.

Results

The system met/does not meet the requirements for radiated emissions. Data Pages follow.

Temperature:	20.5 °C	Mode*	
Humidity:	70%RH	Power	Operation
Pressure:	1011mbar	<u>1</u>	<u>1</u>
Date test performed:	12 August 2004	<u>1</u>	<u>2</u>

1 fully configured sample was scanned over the following frequency range:

Electric fields:	30MHz - 5GHz	(3 meter measurement distance) Intentional Transmit at 431 MHz and 437 MHz
Electric fields:	30MHz - 2GHz	(3 meter measurement distance) Unintentional Receive at 431 MHz and 437 MHz

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04

Test equipment used for radiated emissions

ESI26	Rhode & Schwartz	EMI Receiver	Equipment No.: ME5B-081
			Quasi Peak BW: 200Hz
			RBW 10 KHz
			Quasi Peak BW: 9kHz
			RBW 100 KHz
			Quasi Peak BW: 120 kHz
			RBW 1.0 MHz
Range: 30-1000m	Last Calibration Date: 28 August 2003		Calibration Due Date: 31 August 2004

Test equipment used for radiated emissions above 1GHz

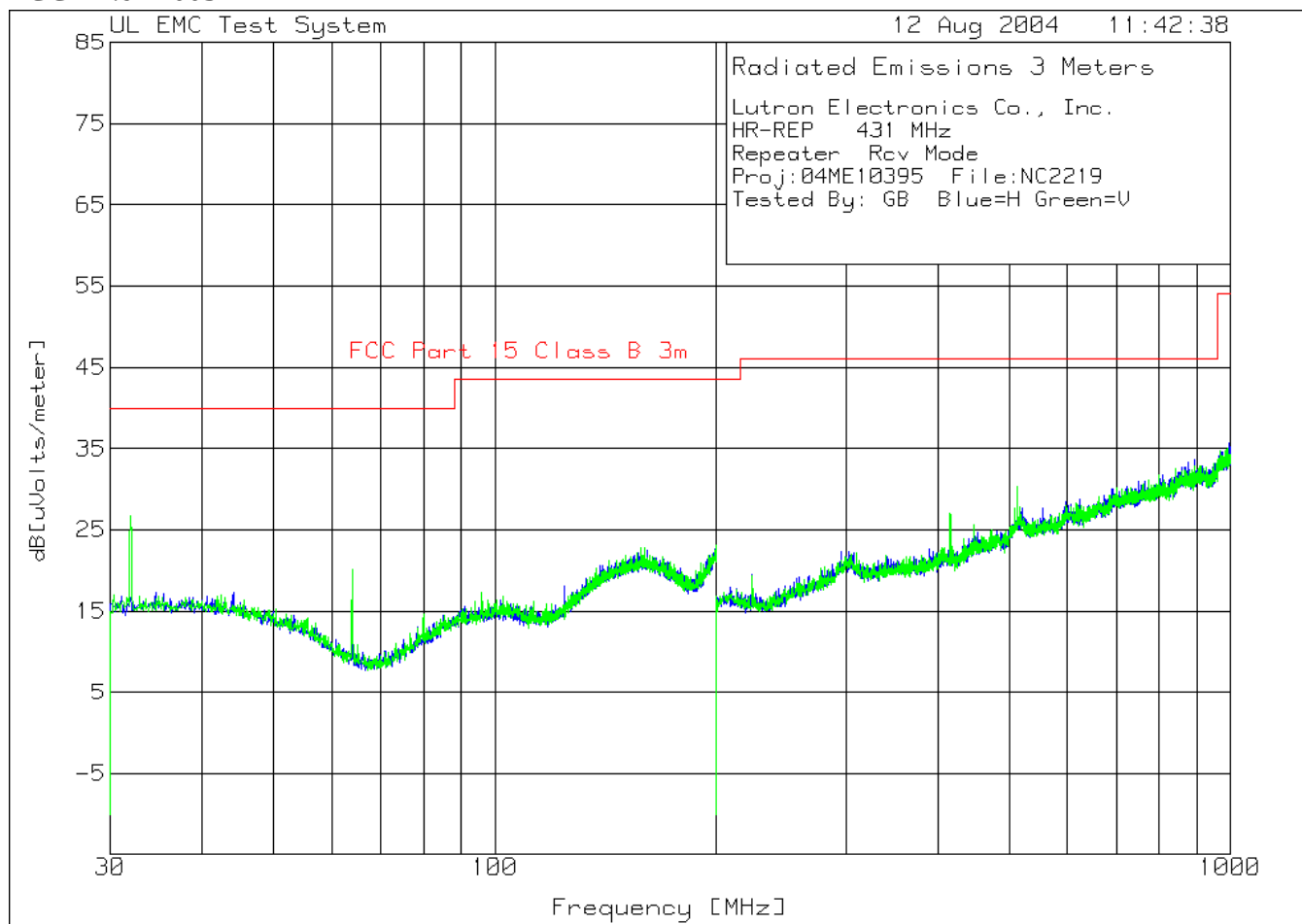
ESI26	Rhode & Schwartz	EMI Receiver	Equipment No.: ME5B-081
			Resolution BW: 1MHz
			Video BW: 1MHz
Range: 1-5GHz	Last Calibration Date: 28 August 2003		Calibration Due Date: 31 August 2004

Test Accessories for Radiated Emissions

94455-1	Ailtech	Biconnical Antenna	Equipment No.: ME5-439
Range: 30-200M	Last Calibration Date: 2 December 2003		Calibration Due Date: 2 December 2004
3146	EMCO	Log Periodic Antenna	Equipment No.: ME5-451
Range: 200-1000M	Last Calibration Date: 4 December 2003		Calibration Due Date: 4 December 2004
RGA-180	EMCO	Horn Antenna	Equipment No.: ME5-565
Range: 1-5GHz	Last Calibration Date: 7 July 2004		Calibration Due Date: 7 July 2005
8449B	Hewlett Packard	1-26GHz Pre-Amp	Equipment No.: ME5-914
Range: 1-5GHz	Last Calibration Date: 21 January 2004		Calibration Due Date: 21 January 2005
99760-00	Cole -Parmer	Hygrometer/Temp/Baro meter	Equipment No.: ME4-268
		Ranges	Temp: 0°C-55°C
			Humidity: 25% to 95 %RH
			Pressure: 795 to 1050 mbar
	Last Calibration Date: 18 June 2004		Calibration Due Date: 18 June 2005

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04



File Number: NC2219

Issued: 9/30/04

Project Number: 04ME10395

Model Number: 886 HR-REP

FCC-ID: JPZ0034

Lutron Electronics Co., Inc.

HR-REP 431 MHz

Repeater Rcv Mode

Proj:04ME10395 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
=====						
Horizontal 30 - 200MHz -----						
3	124.4828	5.33 pk	1.6	11.2	18.13	43.5
	Azimuth:322	Height:248	Horz	Margin [dB]		-25.37
Vertical 30 - 200MHz -----						
1	31.956	12.28 pk	.8	13.7	26.78	40
	Azimuth:280	Height:101	Vert	Margin [dB]		-13.22
2	64.0172	12.96 pk	1.1	6.1	20.16	40
	Azimuth:343	Height:101	Vert	Margin [dB]		-19.84
4	157.9047	4.55 pk	1.8	16.4	22.75	43.5
	Azimuth:196	Height:249	Vert	Margin [dB]		-20.75
Vertical 200 - 1000MHz -----						
5	415.8056	7.89 pk	2.9	16.2	26.99	46
	Azimuth:89	Height:100	Vert	Margin [dB]		-19.01
6	513.1715	7.65 pk	3.3	19.4	30.35	46
	Azimuth:229	Height:399	Vert	Margin [dB]		-15.65

LIMIT 1: FCC Part 15 Class B 3m

pk - Peak detector

qp - Quasi-Peak detector

av - Average detector

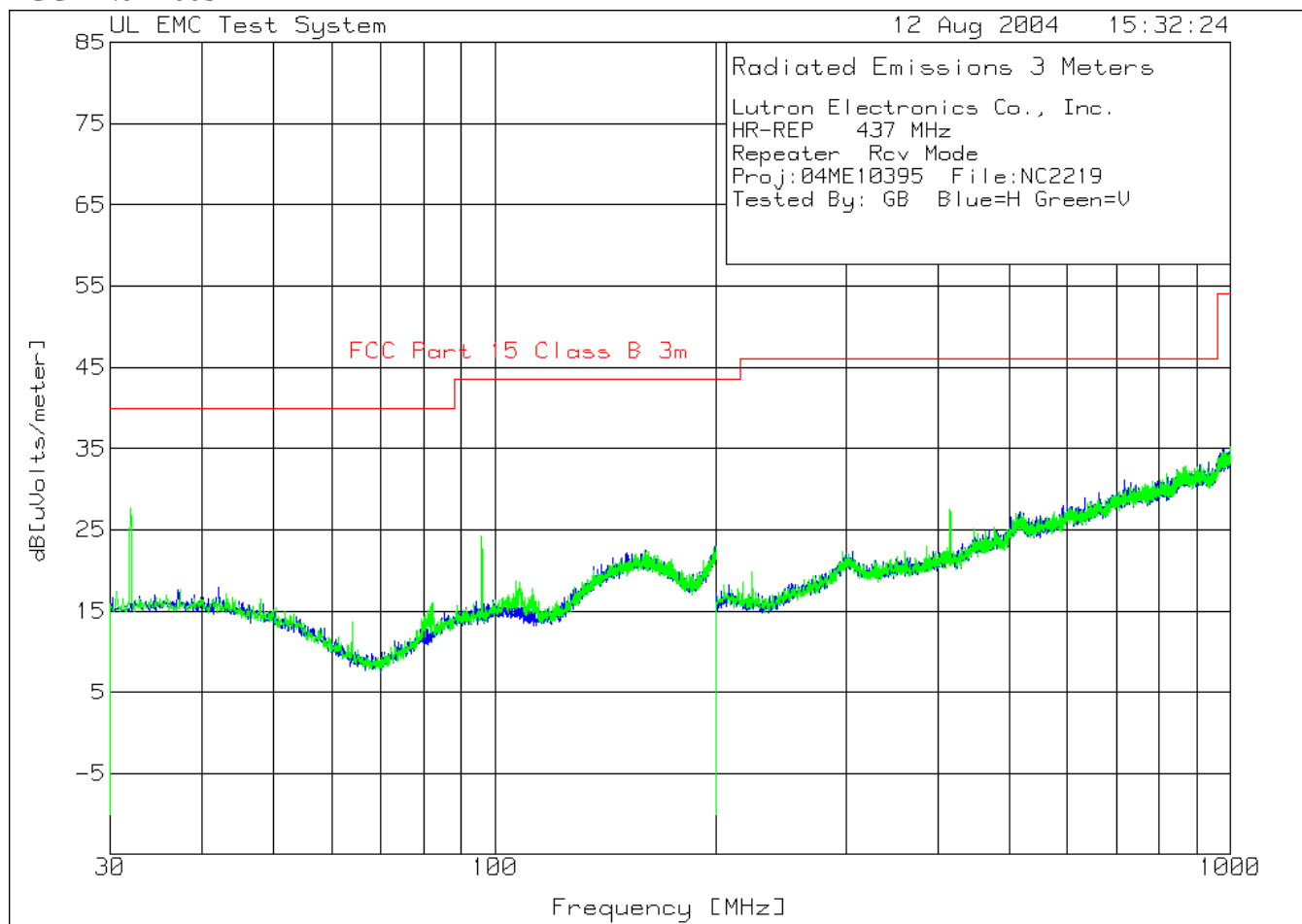
avlg - denotes average log detection

ave - denotes average detection

tm - Trace Math Result

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04



File Number: NC2219

Issued: 9/30/04

Project Number: 04ME10395

Model Number: 886 HR-REP

FCC-ID: JPZ0034

Lutron Electronics Co., Inc.

HR-REP 437 MHz

Repeater Rcv Mode

Proj:04ME10395 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
=====						
Horizontal 30 - 200MHz -----						
1	42.1611	3.72 pk	.9	13.3	17.92	40
	Azimuth:343	Height:101	Horz	Margin [dB]		-22.08
2	160.0307	3.87 pk	1.8	16.4	22.07	43.5
	Azimuth:120	Height:101	Horz	Margin [dB]		-21.43
Vertical 30 - 200MHz -----						
3	31.956	13.17 pk	.8	13.7	27.67	40
	Azimuth:41	Height:101	Vert	Margin [dB]		-12.33
4	95.9934	12.21 pk	1.4	10.6	24.21	43.5
	Azimuth:198	Height:101	Vert	Margin [dB]		-19.29
Vertical 200 - 1000MHz -----						
5	223.7413	5.93 pk	2.2	11.7	19.83	46
	Azimuth:104	Height:100	Vert	Margin [dB]		-26.17
6	415.8056	8.48 pk	2.9	16.2	27.58	46
	Azimuth:21	Height:100	Vert	Margin [dB]		-18.42

LIMIT 1: FCC Part 15 Class B 3m

pk - Peak detector

qp - Quasi-Peak detector

av - Average detector

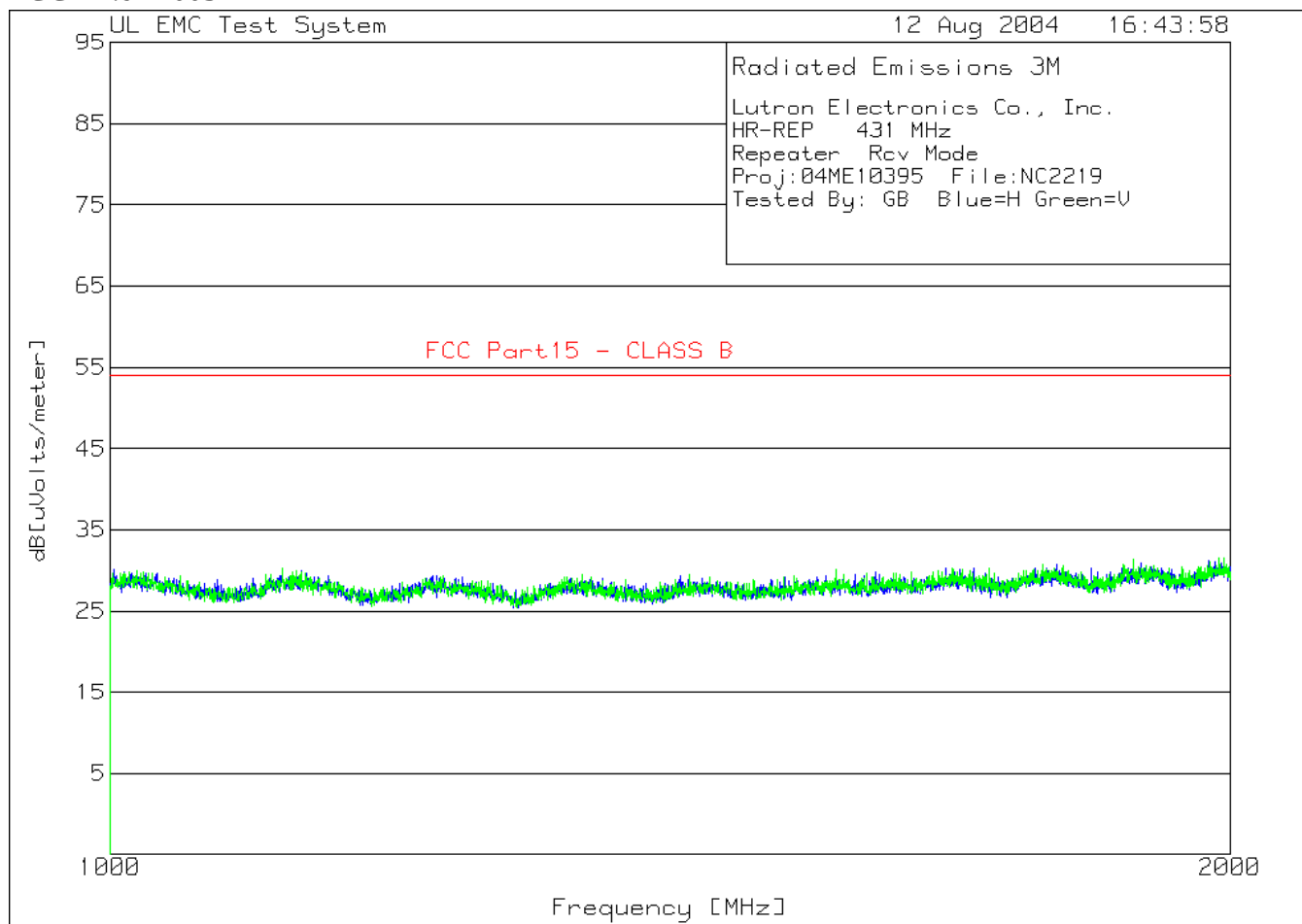
avlg - denotes average log detection

ave - denotes average detection

tm - Trace Math Result

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04



File Number: NC2219

Issued: 9/30/04

Project Number: 04ME10395

Model Number: 886 HR-REP

FCC-ID: JPZ0034

Lutron Electronics Co., Inc.

HR-REP 431 MHz

Repeater Rcv Mode

Proj:04ME10395 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
=====						
Horizontal 1000 - 2000MHz -----						
1	1029.343	37.32 pk	-31.9	24.3	29.72	54
	Azimuth:358	Height:101	Horz	Margin [dB]		-24.28
2	1144.381	36.46 pk	-31.6	24.5	29.36	54
	Azimuth:157	Height:101	Horz	Margin [dB]		-24.64
3	1243.748	36.05 pk	-31.4	24.6	29.25	54
	Azimuth:23	Height:101	Horz	Margin [dB]		-24.75
Vertical 1000 - 2000MHz -----						
4	1431.477	35.27 pk	-30.8	25	29.47	54
	Azimuth:158	Height:101	Vert	Margin [dB]		-24.53
5	1566.855	35.19 pk	-30.4	25.4	30.19	54
	Azimuth:10	Height:101	Vert	Margin [dB]		-23.81
6	1883.627	33.91 pk	-29.5	26.9	31.31	54
	Azimuth:14	Height:101	Vert	Margin [dB]		-22.69

LIMIT 1: FCC Part15 - CLASS B

pk - Peak detector

qp - Quasi-Peak detector

av - Average detector

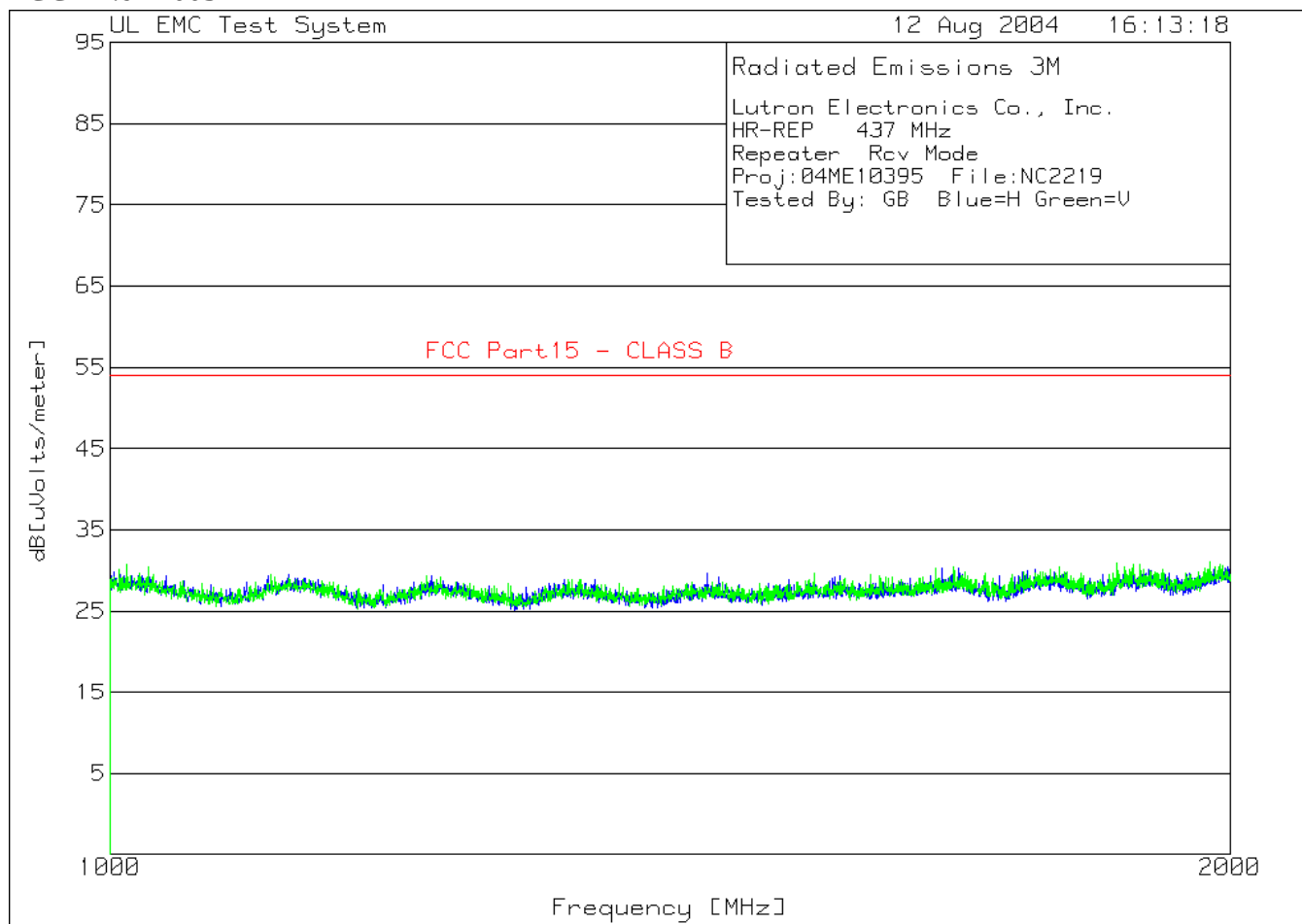
avlg - denotes average log detection

ave - denotes average detection

tm - Trace Math Result

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04



File Number: NC2219

Issued: 9/30/04

Project Number: 04ME10395

Model Number: 886 HR-REP

FCC-ID: JPZ0034

Lutron Electronics Co., Inc.

HR-REP 437 MHz

Repeater Rcv Mode

Proj:04ME10395 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
=====						
Horizontal 1000 - 2000MHz -----						
1	1002.668	37.68 pk	-32	24.2	29.88	54
	Azimuth:17	Height:101	Horz	Margin [dB]		-24.12
Vertical 1000 - 2000MHz -----						
2	1005.669	37.89 pk	-32	24.2	30.09	54
	Azimuth:212	Height:101	Vert	Margin [dB]		-23.91
3	1010.337	38.5 pk	-32	24.2	30.7	54
	Azimuth:18	Height:101	Vert	Margin [dB]		-23.3
4	1023.675	38.08 pk	-31.9	24.2	30.38	54
	Azimuth:212	Height:101	Vert	Margin [dB]		-23.62
5	1601.2	34.21 pk	-30.3	25.6	29.51	54
	Azimuth:166	Height:101	Vert	Margin [dB]		-24.49
6	1666.555	34.53 pk	-30.1	25.9	30.33	54
	Azimuth:358	Height:101	Vert	Margin [dB]		-23.67

LIMIT 1: FCC Part15 - CLASS B

pk - Peak detector

qp - Quasi-Peak detector

av - Average detector

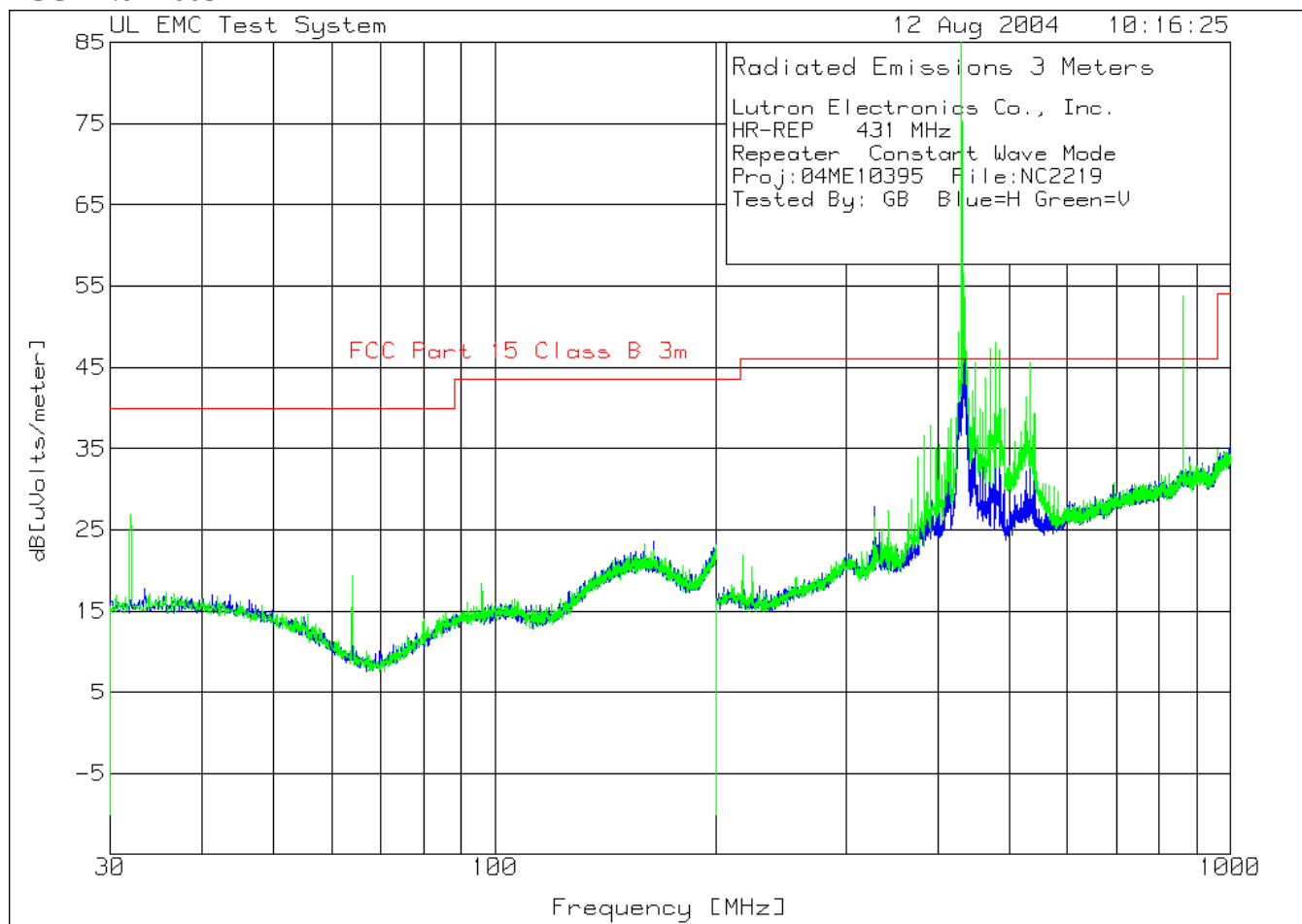
avlg - denotes average log detection

ave - denotes average detection

tm - Trace Math Result

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04



File Number: NC2219

Issued: 9/30/04

Project Number: 04ME10395

Model Number: 886 HR-REP

FCC-ID: JPZ0034

Lutron Electronics Co., Inc.

HR-REP 431 MHz

Repeater Constant Wave Mode

Proj:04ME10395 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]	Limit 2
=====							
Horizontal 200 - 1000MHz -----							
1	427.0094	26.49 pk	2.9	16.1	45.49	46	60.7
	Azimuth:68	Height:248	Horz	Margin [dB]		-.51	-15.11
2	431.0107	*54.38 pk	3	16.3	*73.98	46	80.7
	Azimuth:68	Height:248	Horz	Margin [dB]		48.68	-6.72
3	434.2118	32.84 pk	3	16.4	52.24	46	60.7
	Azimuth:68	Height:248	Horz	Margin [dB]		6.24	-8.46
4	437.6796	23.97 pk	3	16.6	43.57	46	60.7
	Azimuth:68	Height:248	Horz	Margin [dB]		-2.43	-17.13
5	449.1501	20.71 pk	3	17.4	41.11	46	60.7
	Azimuth:264	Height:248	Horz	Margin [dB]		-4.89	-19.59
6	471.2909	19.67 pk	3.1	17.7	40.47	46	60.7
	Azimuth:344	Height:101	Horz	Margin [dB]		-5.53	-20.23
7	478.4933	18.64 pk	3.1	17.9	39.64	46	60.7
	Azimuth:295	Height:248	Horz	Margin [dB]		-6.36	-21.06
8	862.0884	15.42 pk	4.2	23.6	43.22	46	60.7
	Azimuth:166	Height:101	Horz	Margin [dB]		-2.78	-17.48
Vertical 200 - 1000MHz -----							
9	427.0094	30.31 pk	2.9	16.1	49.31	46	60.7
	Azimuth:31	Height:101	Vert	Margin [dB]		3.31	-11.39
10	431.0107	*58.62 pk	3	16.3	*77.92	46	80.7
	Azimuth:31	Height:101	Vert	Margin [dB]		52.92	-2.78
11	434.2118	37.16 pk	3	16.4	56.56	46	60.7
	Azimuth:161	Height:101	Vert	Margin [dB]		10.56	-4.14
12	435.012	34.12 pk	3	16.5	53.62	46	60.7
	Azimuth:161	Height:101	Vert	Margin [dB]		7.62	-7.44
13	437.6796	27.28 pk	3	16.6	46.88	46	60.7
	Azimuth:31	Height:101	Vert	Margin [dB]		.88	-13.82
14	439.8136	20.24 pk	3	16.8	40.04	46	60.7
	Azimuth:161	Height:101	Vert	Margin [dB]		-5.96	-20.66
15	441.6809	21.25 pk	3	17	41.25	46	60.7
	Azimuth:359	Height:101	Vert	Margin [dB]		-4.75	-19.45
16	445.6823	21.76 pk	3	17.3	42.06	46	60.7
	Azimuth:359	Height:101	Vert	Margin [dB]		-3.94	-18.64
17	449.1501	25.19 pk	3	17.4	45.59	46	60.7
	Azimuth:359	Height:101	Vert	Margin [dB]		-.41	-15.11

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04

Lutron Electronics Co., Inc.

HR-REP 431 MHz

Repeater Constant Wave Mode

Proj:04ME10395 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]	Limit 2
-----	----------------------------	------------------------------	-----------------------------	------------------------------	-------	-----------------------------	---------

Horizontal 200 - 1000MHz -----							
2	437.6796	23.97 qp	3	16.6	43.57	46	60.7
	Azimuth:68	Height:248	Horz	Margin [dB]		-2.43	-17.13
3	449.1501	20.71 qp	3	17.4	41.11	46	60.7
	Azimuth:264	Height:248	Horz	Margin [dB]		-4.89	-19.59
4	471.2909	19.67 qp	3.1	17.7	40.47	46	60.7
	Azimuth:344	Height:101	Horz	Margin [dB]		-5.53	-20.23
5	478.4933	18.64 qp	3.1	17.9	39.64	46	60.7
	Azimuth:295	Height:248	Horz	Margin [dB]		-6.36	-21.06
6	862.0884	15.42 qp	4.2	23.6	43.22	46	60.7
	Azimuth:166	Height:101	Horz	Margin [dB]		-2.78	-17.48

Vertical 200 - 1000MHz -----							
7	439.8136	20.24 qp	3	16.8	40.04	46	60.7
	Azimuth:161	Height:101	Vert	Margin [dB]		-5.96	-20.66
8	441.6809	21.25 qp	3	17	41.25	46	60.7
	Azimuth:359	Height:101	Vert	Margin [dB]		-4.75	-19.45
9	445.6823	21.76 qp	3	17.3	42.06	46	60.7
	Azimuth:359	Height:101	Vert	Margin [dB]		-3.94	-18.64
10	449.1501	25.19 qp	3	17.4	45.59	46	60.7
	Azimuth:359	Height:101	Vert	Margin [dB]		-.41	-15.11

LIMIT 1: FCC Part 15 Class B 3m

LIMIT 2: FCC Part 15 Subpart C-Section 15.231

*** Duty Cycle correction factor of -21db added to Average level.**

pk - Peak detector

qp - Quasi-Peak detector

av - Average detector

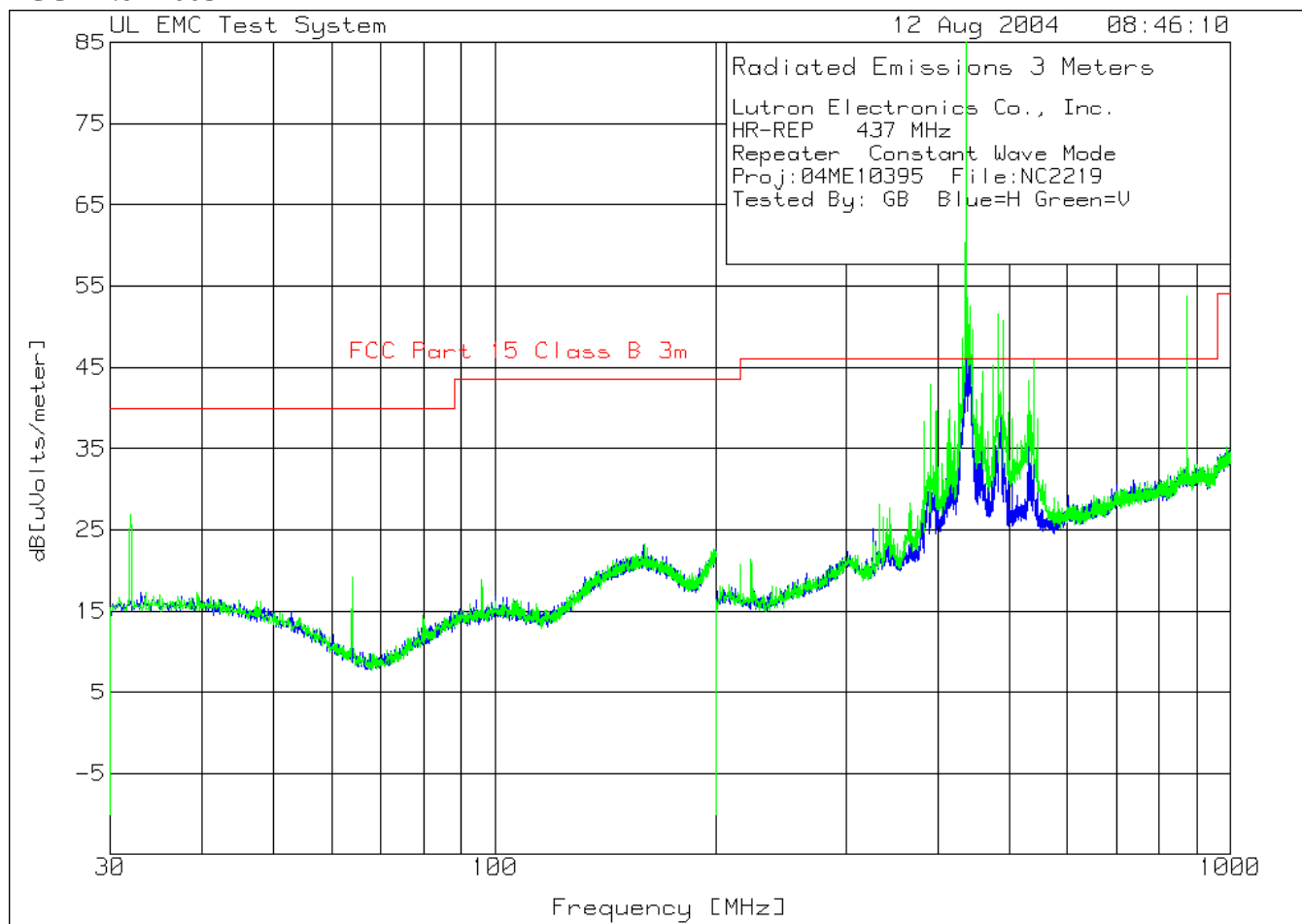
avlg - denotes average log detection

ave - denotes average detection

tm - Trace Math Result

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04



File Number: NC2219

Issued: 9/30/04

Project Number: 04ME10395

Model Number: 886 HR-REP

FCC-ID: JPZ0034

Lutron Electronics Co., Inc.

HR-REP 437 MHz

Repeater Constant Wave Mode

Proj:04ME10395 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]	Limit 2
-----	----------------------------	------------------------------	-----------------------------	------------------------------	-------	-----------------------------	---------

Horizontal 200 - 1000MHz -----							
1	390.7305	21.61 pk	2.8	15.8	40.21	46	60.8
	Azimuth:227	Height:198	Horz	Margin [dB]		-5.79	-20.59
2	427.5429	22.73 pk	2.9	16.1	41.73	46	60.8
	Azimuth:96	Height:198	Horz	Margin [dB]		-4.27	-19.07
3	431.5442	25.58 pk	3	16.3	44.88	46	60.8
	Azimuth:96	Height:198	Horz	Margin [dB]		-1.12	-15.92
4	436.8793	*56.06 pk	3	16.5	*75.56	46	80.8
	Azimuth:96	Height:198	Horz	Margin [dB]		50.56	-5.24
5	437.4128	31.06 pk	3	16.6	50.66	46	60.8
	Azimuth:96	Height:198	Horz	Margin [dB]		4.66	-10.14
6	439.0134	29.7 pk	3	16.7	49.4	46	60.8
	Azimuth:96	Height:198	Horz	Margin [dB]		3.4	-11.4
7	442.2144	28.73 pk	3	17	48.73	46	60.8
	Azimuth:96	Height:198	Horz	Margin [dB]		2.73	-12.07
8	446.2158	24.98 pk	3	17.3	45.28	46	60.8
	Azimuth:96	Height:198	Horz	Margin [dB]		-.72	-15.52
9	461.1541	19.81 pk	3.1	17.4	40.31	46	60.8
	Azimuth:292	Height:198	Horz	Margin [dB]		-5.69	-20.49
10	483.2949	26.94 pk	3.1	17.9	47.94	46	60.8
	Azimuth:295	Height:198	Horz	Margin [dB]		1.94	-12.86
11	490.4973	25.11 pk	3.2	17.6	45.91	46	60.8
	Azimuth:295	Height:198	Horz	Margin [dB]		-.09	-14.89
32	874.0924	15.92 pk	4.2	23.5	43.62	46	60.8
	Azimuth:343	Height:100	Horz	Margin [dB]		-2.38	-17.28

Vertical 200 - 1000MHz -----							
12	390.7305	24.38 pk	2.8	15.8	42.98	46	60.8
	Azimuth:357	Height:199	Vert	Margin [dB]		-3.02	-17.82
13	427.5429	25.81 pk	2.9	16.1	44.81	46	60.8
	Azimuth:31	Height:101	Vert	Margin [dB]		-1.19	-15.99
14	431.5442	29.24 pk	3	16.3	48.54	46	60.8
	Azimuth:31	Height:101	Vert	Margin [dB]		2.54	-12.26
15	432.878	25.97 pk	3	16.3	45.27	46	60.8
	Azimuth:31	Height:101	Vert	Margin [dB]		-.73	-15.53
16	435.012	26.25 pk	3	16.5	45.75	46	60.8
	Azimuth:96	Height:101	Vert	Margin [dB]		-.25	-15.05
17	439.0134	33.95 pk	3	16.7	53.65	46	60.8
	Azimuth:358	Height:101	Vert	Margin [dB]		7.65	-7.15
18	440.3472	30.44 pk	3	16.8	50.24	46	60.8
	Azimuth:358	Height:101	Vert	Margin [dB]		4.24	-10.56

File Number: NC2219

Issued: 9/30/04

Project Number: 04ME10395

Model Number: 886 HR-REP

FCC-ID: JPZ0034

Lutron Electronics Co., Inc.

HR-REP 437 MHz

Repeater Constant Wave Mode

Proj:04ME10395 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]	Limit 2
19	442.2144	32.54 pk	3	17	52.54	46	60.8
	Azimuth:358	Height:101	Vert	Margin [dB]		6.54	-8.26
20	444.3485	26.37 pk	3	17.1	46.47	46	60.8
	Azimuth:358	Height:101	Vert	Margin [dB]		.47	-14.33
21	446.2158	29.39 pk	3	17.3	49.69	46	60.8
	Azimuth:358	Height:101	Vert	Margin [dB]		3.69	-11.11
22	451.8177	20.77 pk	3	17.3	41.07	46	60.8
	Azimuth:358	Height:101	Vert	Margin [dB]		-4.93	-19.73
23	459.0201	21.37 pk	3.1	17.4	41.87	46	60.8
	Azimuth:358	Height:101	Vert	Margin [dB]		-4.13	-18.93
24	461.1541	23.99 pk	3.1	17.4	44.49	46	60.8
	Azimuth:358	Height:101	Vert	Margin [dB]		-1.51	-16.31
25	475.8257	24.36 pk	3.1	17.8	45.26	46	60.8
	Azimuth:17	Height:101	Vert	Margin [dB]		-.74	-15.54
26	483.2949	30.49 pk	3.1	17.9	51.49	46	60.8
	Azimuth:17	Height:101	Vert	Margin [dB]		5.49	-9.31
27	490.4973	30.04 pk	3.2	17.6	50.84	46	60.8
	Azimuth:358	Height:101	Vert	Margin [dB]		4.84	-9.96
28	532.9115	21.38 pk	3.3	18.7	43.38	46	60.8
	Azimuth:100	Height:101	Vert	Margin [dB]		-2.62	-17.42
29	536.9128	17.11 pk	3.4	18.6	39.11	46	60.8
	Azimuth:36	Height:101	Vert	Margin [dB]		-6.89	-21.69
30	540.1139	23.86 pk	3.4	18.6	45.86	46	60.8
	Azimuth:344	Height:101	Vert	Margin [dB]		-.14	-14.94
31	874.0924	26.08 pk	4.2	23.5	53.78	46	60.8
	Azimuth:129	Height:101	Vert	Margin [dB]		7.78	-7.02
33	436.8793	*58.74 pk	3	16.5	*78.24	46	80.8
	Azimuth:358	Height:101	Vert	Margin [dB]		53.24	-2.56

LIMIT 1: FCC Part 15 Class B 3m

LIMIT 2: FCC Part 15 Subpart C-Section 15.231

*** Duty Cycle correction factor of -21db added to Average level.**

pk - Peak detector

qp - Quasi-Peak detector

av - Average detector

avlg - denotes average log detection

ave - denotes average detection

tm - Trace Math Result

File Number: NC2219
 Project Number: 04ME10395
 Model Number: 886 HR-REP
 FCC-ID: JPZ0034

Issued: 9/30/04

Lutron Electronics Co., Inc.
 HR-REP 437 MHz
 Repeater Constant Wave Mode
 Proj:04ME10395 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]	Limit 2
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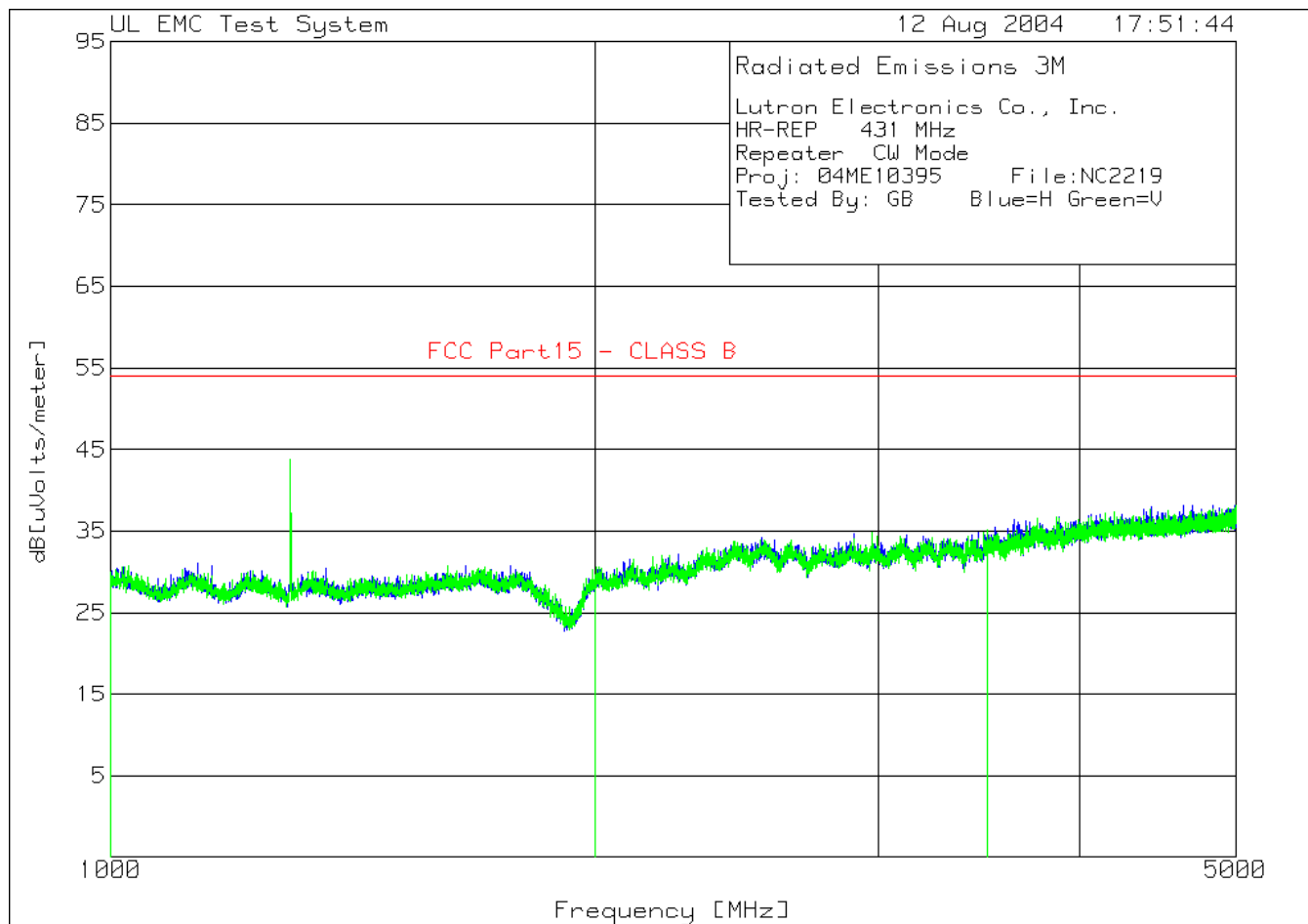
=====
Horizontal 200 - 1000MHz -----
1  390.7305    21.61 qp    2.8      15.8      40.21    46      60.8
   Azimuth:227 Height:198 Horz    Margin [dB]    -5.79
2  427.5429    22.73 qp    2.9      16.1      41.73    46      60.8
   Azimuth:96  Height:198 Horz    Margin [dB]    -4.27
3  431.5442    25.58 qp    3        16.3      44.88    46      60.8
   Azimuth:96  Height:198 Horz    Margin [dB]    -1.12
8  446.2158    24.98 qp    3        17.3      45.28    46      60.8
   Azimuth:96  Height:198 Horz    Margin [dB]    -.72
9  461.1541    19.81 qp    3.1      17.4      40.31    46      60.8
   Azimuth:292 Height:198 Horz    Margin [dB]    -5.69
11 490.4973    25.11 qp    3.2      17.6      45.91    46      60.8
    Azimuth:295 Height:198 Horz    Margin [dB]    -.09
32 874.0924    15.92 qp    4.2      23.5      43.62    46      60.8
    Azimuth:343 Height:100 Horz    Margin [dB]    -2.38
  
```

```

Vertical 200 - 1000MHz -----
12 390.7305    24.38 qp    2.8      15.8      42.98    46      60.8
    Azimuth:357 Height:199 Vert    Margin [dB]    -3.02
13 427.5429    25.81 qp    2.9      16.1      44.81    46      60.8
    Azimuth:31  Height:101 Vert    Margin [dB]    -1.19
15 432.878     25.97 qp    3        16.3      45.27    46      60.8
    Azimuth:31  Height:101 Vert    Margin [dB]    -.73
22 451.8177    20.77 qp    3        17.3      41.07    46      60.8
    Azimuth:358 Height:101 Vert    Margin [dB]    -4.93
23 459.0201    21.37 qp    3.1      17.4      41.87    46      60.8
    Azimuth:358 Height:101 Vert    Margin [dB]    -4.13
24 461.1541    23.99 qp    3.1      17.4      44.49    46      60.8
    Azimuth:358 Height:101 Vert    Margin [dB]    -1.51
25 475.8257    24.36 qp    3.1      17.8      45.26    46      60.8
    Azimuth:17  Height:101 Vert    Margin [dB]    -.74
28 532.9115    21.38 qp    3.3      18.7      43.38    46      60.8
    Azimuth:100 Height:101 Vert    Margin [dB]    -2.62
29 536.9128    17.11 qp    3.4      18.6      39.11    46      60.8
    Azimuth:36  Height:101 Vert    Margin [dB]    -6.89
30 540.1139    23.86 qp    3.4      18.6      45.86    46      60.8
    Azimuth:344 Height:101 Vert    Margin [dB]    -.14
  
```

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04



File Number: NC2219

Issued: 9/30/04

Project Number: 04ME10395

Model Number: 886 HR-REP

FCC-ID: JPZ0034

Lutron Electronics Co., Inc.

HR-REP 431 MHz

Repeater CW Mode

Proj: 04ME10395 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
=====						
Horizontal 1000 - 2000MHz -----						
1	1132.044	38.38 pk	-31.7	24.4	31.08	54
	Azimuth:207	Height:101	Horz	Margin [dB]		-22.92
3	1662.22	35.07 pk	-30.1	25.8	30.77	54
	Azimuth:106	Height:101	Horz	Margin [dB]		-23.23
Horizontal 2000 - 3500MHz -----						
4	2250.084	32.8 pk	-28.7	28	32.1	54
	Azimuth:130	Height:101	Horz	Margin [dB]		-21.9
Horizontal 3500 - 5000MHz -----						
5	3641.547	30.35 pk	-25.6	31.6	36.35	54
	Azimuth:190	Height:101	Horz	Margin [dB]		-17.65
6	4640.381	29.32 pk	-23.8	32.6	38.12	54
	Azimuth:115	Height:101	Horz	Margin [dB]		-15.88
Vertical 1000 - 2000MHz -----						
2	1293.097	50.31 pk	-31.2	24.7	43.81	54
	Azimuth:208	Height:101	Vert	Margin [dB]		-10.19

LIMIT 1: FCC Part15 - CLASS B

pk - Peak detector

qp - Quasi-Peak detector

av - Average detector

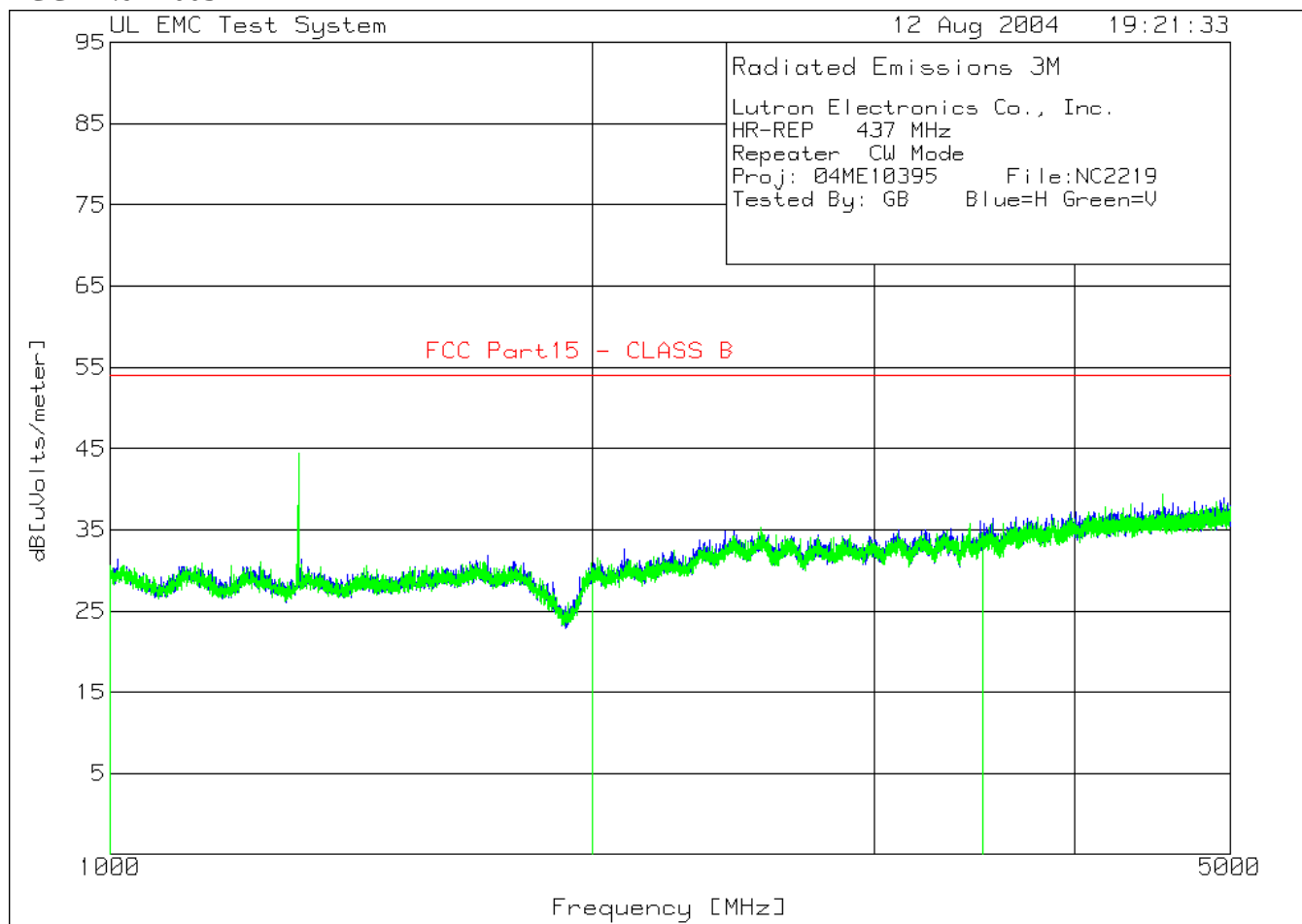
avlg - denotes average log detection

ave - denotes average detection

tm - Trace Math Result

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04



File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04

Lutron Electronics Co., Inc.

HR-REP 437 MHz

Repeater CW Mode

Proj: 04ME10395 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
-----	----------------------------	------------------------------	-----------------------------	------------------------------	---------------------------	---------

Horizontal 1000 - 2000MHz -----						
3	1719.239	35.78 pk	-30	26.1	31.88	54
	Azimuth:344	Height:101	Horz	Margin [dB]		-22.12

Horizontal 3500 - 5000MHz -----						
5	3555.519	30.81 pk	-25.8	31.4	36.41	54
	Azimuth:358	Height:101	Horz	Margin [dB]		-17.59

Vertical 1000 - 2000MHz -----						
1	1189.396	37.53 pk	-31.5	24.5	30.53	54
	Azimuth:208	Height:101	Vert	Margin [dB]		-23.47
2	1311.103	50.85 pk	-31.2	24.8	44.45	54
	Azimuth:208	Height:101	Vert	Margin [dB]		-9.55

Vertical 2000 - 3500MHz -----						
4	2547.183	33.4 pk	-26.8	28.7	35.3	54
	Azimuth:47	Height:101	Vert	Margin [dB]		-18.7

Vertical 3500 - 5000MHz -----						
6	4532.345	30.93 pk	-23.9	32.4	39.43	54
	Azimuth:80	Height:101	Vert	Margin [dB]		-14.57

LIMIT 1: FCC Part15 - CLASS B

pk - Peak detector

qp - Quasi-Peak detector

av - Average detector

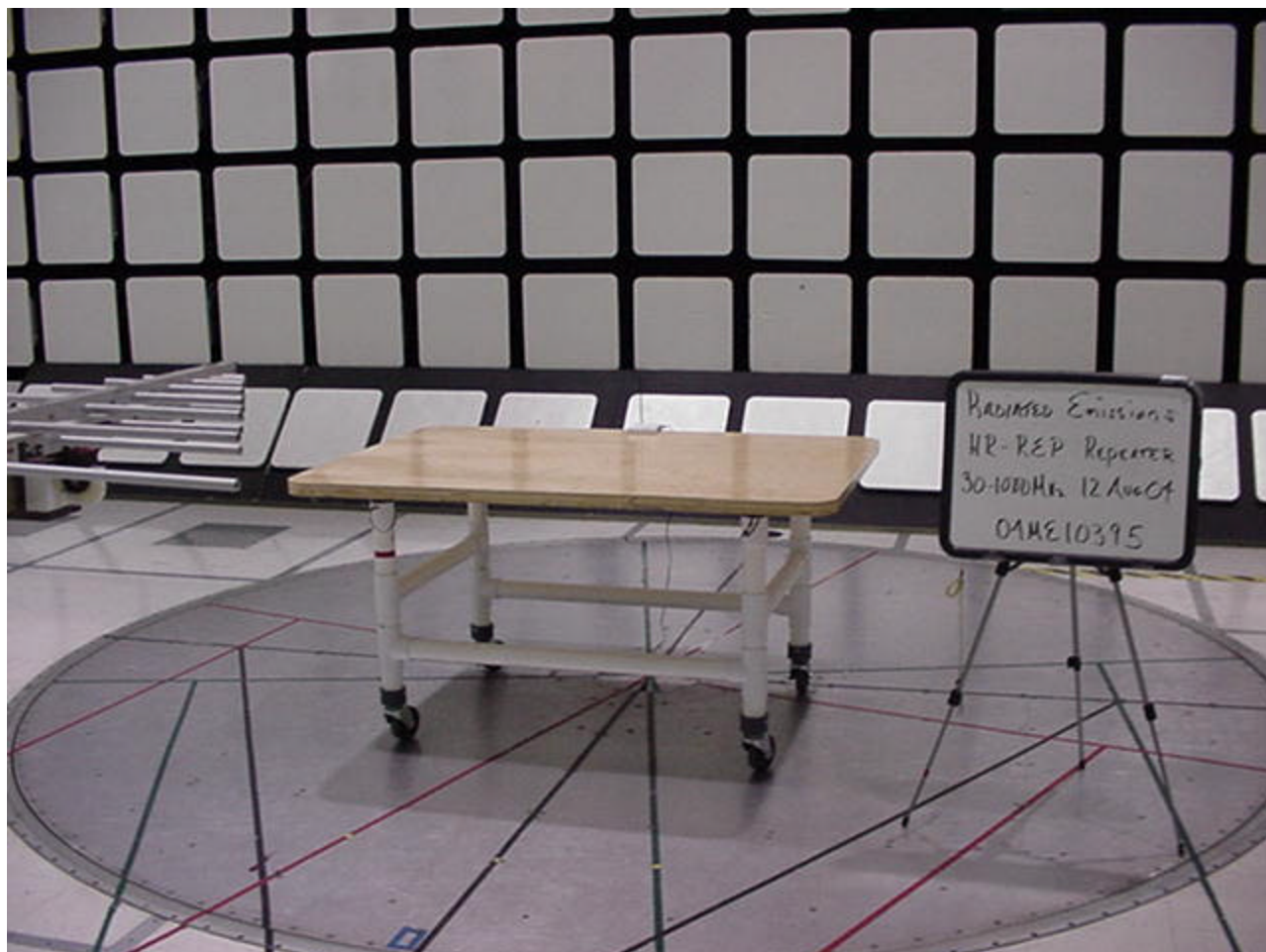
avlg - denotes average log detection

ave - denotes average detection

tm - Trace Math Result

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04



Radiated Emissions Test Set Up Front View 30-1000MHz

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

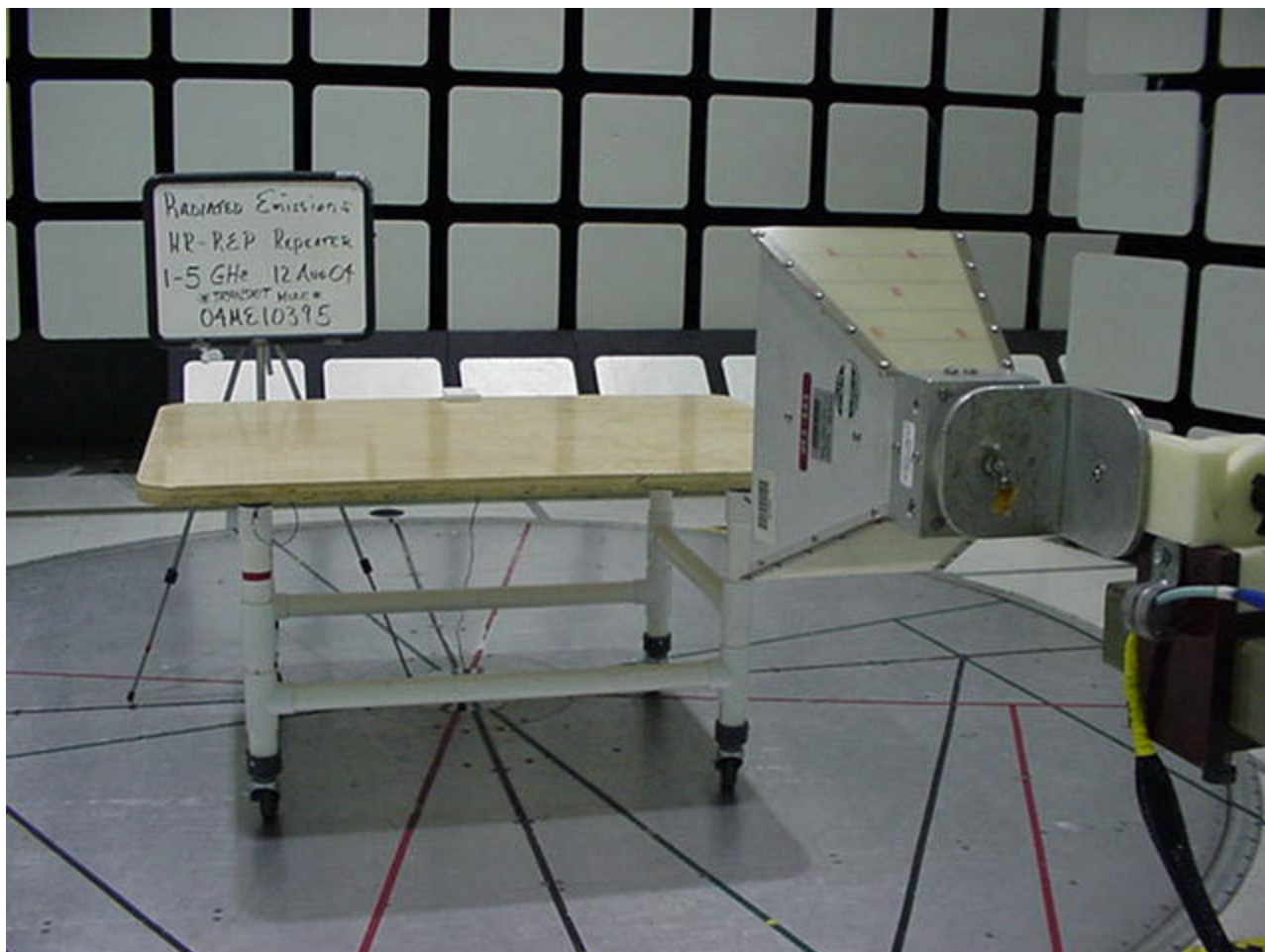
Issued: 9/30/04



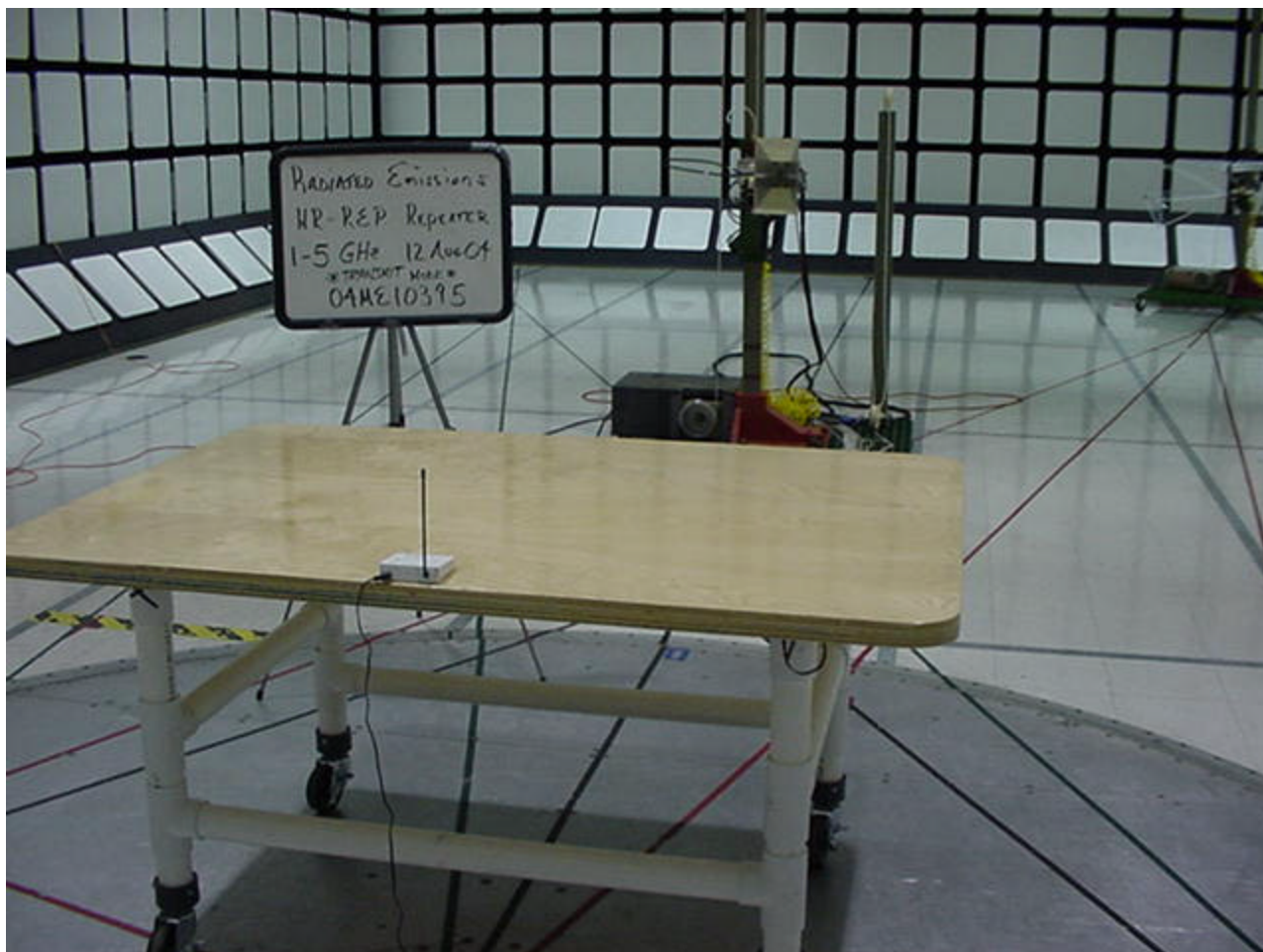
Radiated Emissions Test Set Up Rear View 30-1000MHz

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04



Radiated Emissions Test Set Up Front View 1-5GHz



Radiated Emissions Test Set Up Rear View 1-5GHz

5.1.3 Cease Operation Within 5 Seconds

Test Applicable

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

Results

The system met the requirements for conducted emissions. Data Pages follow.

Temperature:	20.5°C
Humidity:	68.0%RH
Pressure:	1008 mbar
Date test performed:	16 September 2004

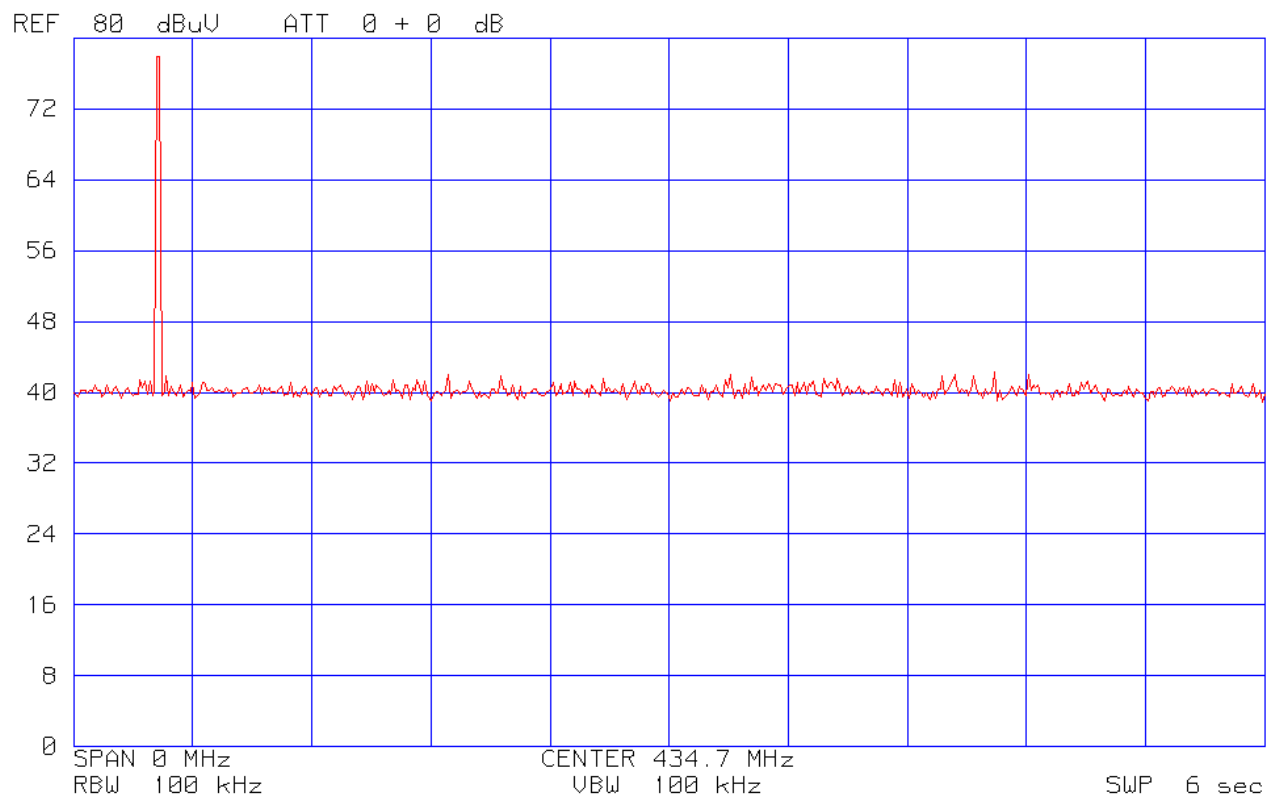
1 fully configured sample was scanned over the following frequency range

Test equipment used for Cease Operation measurements:

ESI26	Rhode & Schwartz	EMI Receiver	Equipment No.: ME5B-081
			Quasi Peak BW: 200Hz 9kHz to 150kHz
			RBW 10 KHz
			Quasi Peak BW: 9kHz 150kHz to 30MHz
			RBW 100 KHz
			Quasi Peak BW: 120 kHz 30 to 1000MHz
			RBW 1.0 MHz
Range: 431-437MHz	Last Calibration Date: 7 September 2004		Calibration Due Date: 7 September 2005
3121C-DB4	EMCO Dipole Antenna		Equipment No.: ME5-751
Last Calibration Date: 26 July 2004			Calibration Due Date: 26 July 2005
99760-00	Cole –Parmer	Hydrometer/Temp/Barometer	Equipment No.: ME4-268
Ranges: Temp:0°C-55°C			
Humidity 25% to 95 %RH			
Pressure 795 to 1050 mbar			
Last Calibration Date: 18 July 2004			Calibration Due Date: 18 July 2005

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04



Cease Operation < 5 Seconds

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04



Cease Operation Test Set Up

5.1.5 Pulse Train

Test Applicable

Test Procedure: 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.

Results

The system met the requirements for conducted emissions. Data Pages follow.

Temperature:	21.0°C
Humidity:	68.0%RH
Pressure:	1008mbar
Date test performed:	16 September 2004

ESI26

Rhode & Schwartz

EMI Receiver

Equipment No.: ME5B-081

Quasi Peak BW: 200Hz 9kHz to 150kHz
 RBW 10 KHz

Quasi Peak BW: 9kHz 150kHz to 30MHz
 RBW 100 KHz

Quasi Peak BW: 120 30 to 1000MHz
 kHz

RBW 1.0 MHz

Range: 30MHz-1000MHz Last Calibration Date: 7 September 2004

Calibration Due Date: 7 September 2005

3121C-DB4 EMCO Dipole Antenna
 Last Calibration Date: 26 July 2004

Equipment No.: ME5-751
 Calibration Due Date: 26 July 2005

TDS 3054 Tektronix Oscilloscope
 Last Calibration: 23 January 2004

Equipment No. 5B173
 Calibration Due: 23 January 2005

99760-00 Cole -Parmer Hydrometer/Temp/Barometer

Equipment No.: ME4-268

Ranges: 0°C-55°C

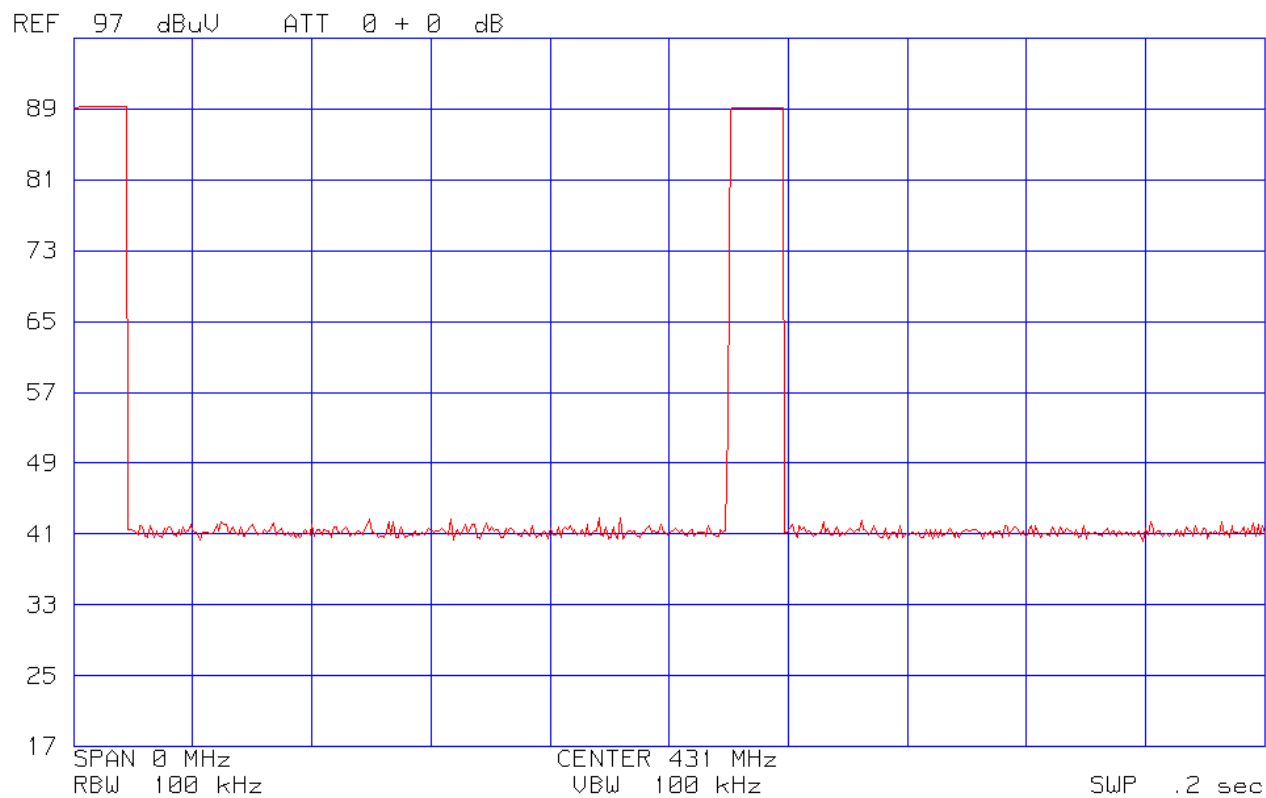
Temp:0°C-55°C

Humidity 25% to 95 %RH

Pressure 795 to 1050 mbar

Last Calibration Date: 18 July 2004

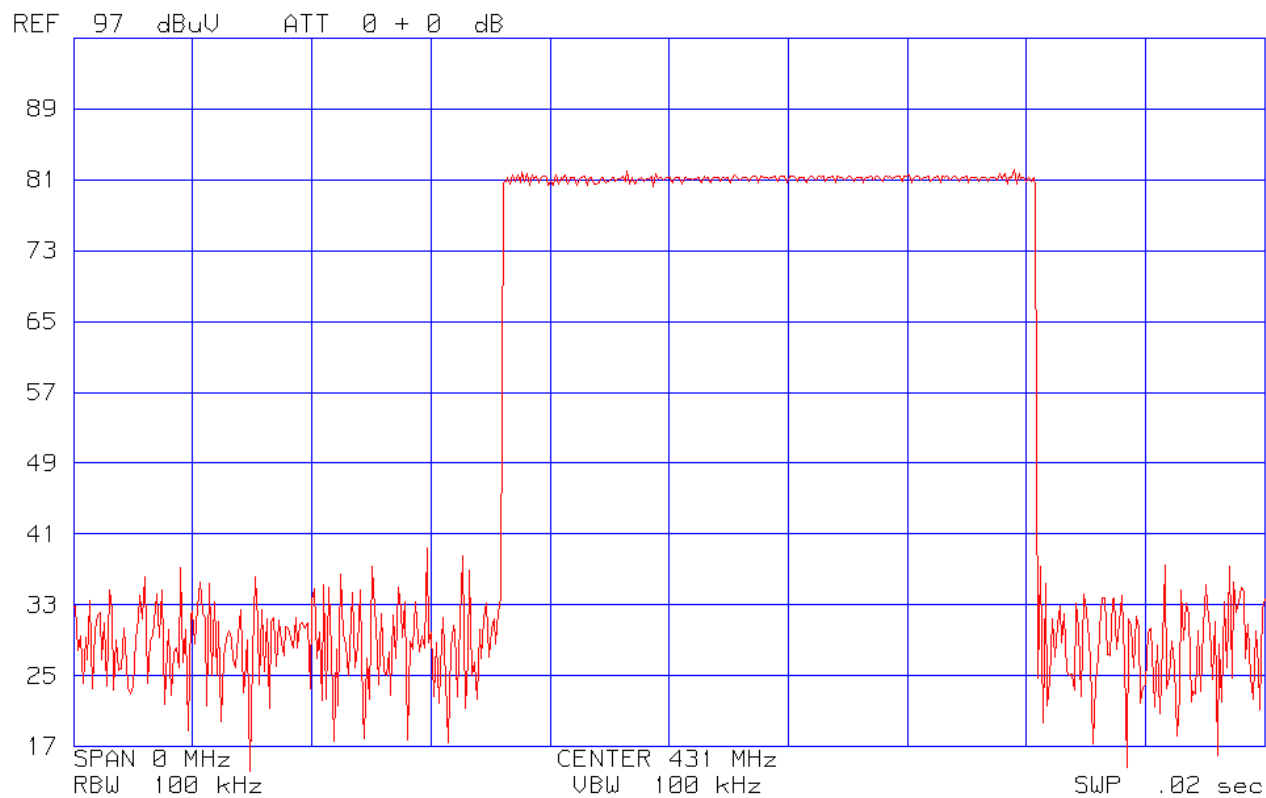
Calibration Due Date: 18 July 2005



Depicting two pulse trains
Blanking Interval =109ms

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

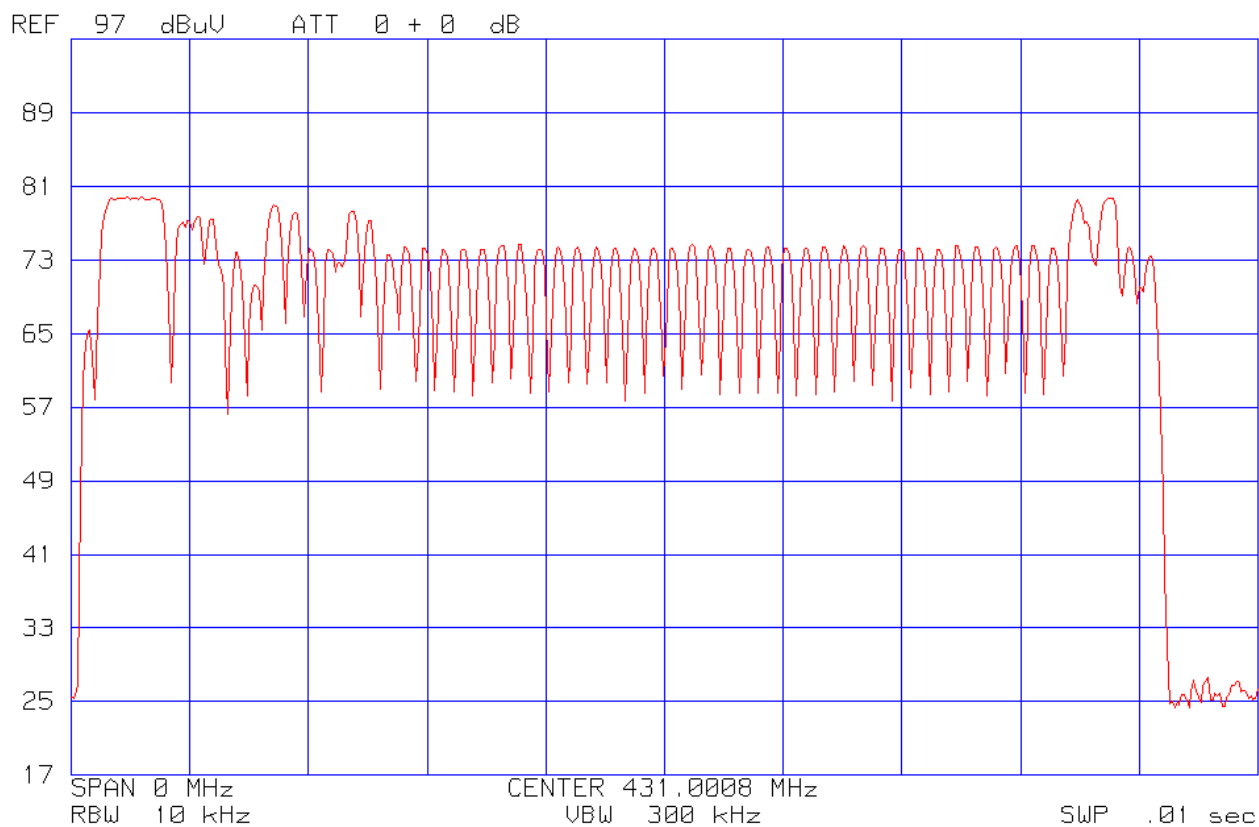
Issued: 9/30/04



One Complete Pulse Train » 9.1ms

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04



One Complete Pulse Train (profile)

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04



Pulse Train Test Set-up

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04

5.1.6 Occupied Bandwidth:

Test Applicable

Temperature:	20.5°C
Humidity:	67.0%RH
Pressure:	1014mbar
Date test performed:	7 September 2004

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 at a distance of 100cm.

Mode: “ Constant (Continuous) Transmit”

Frequency range:

431MHz and 437MHz

Bandwidth = 0.25% of 431MHz = 1.0775MHz

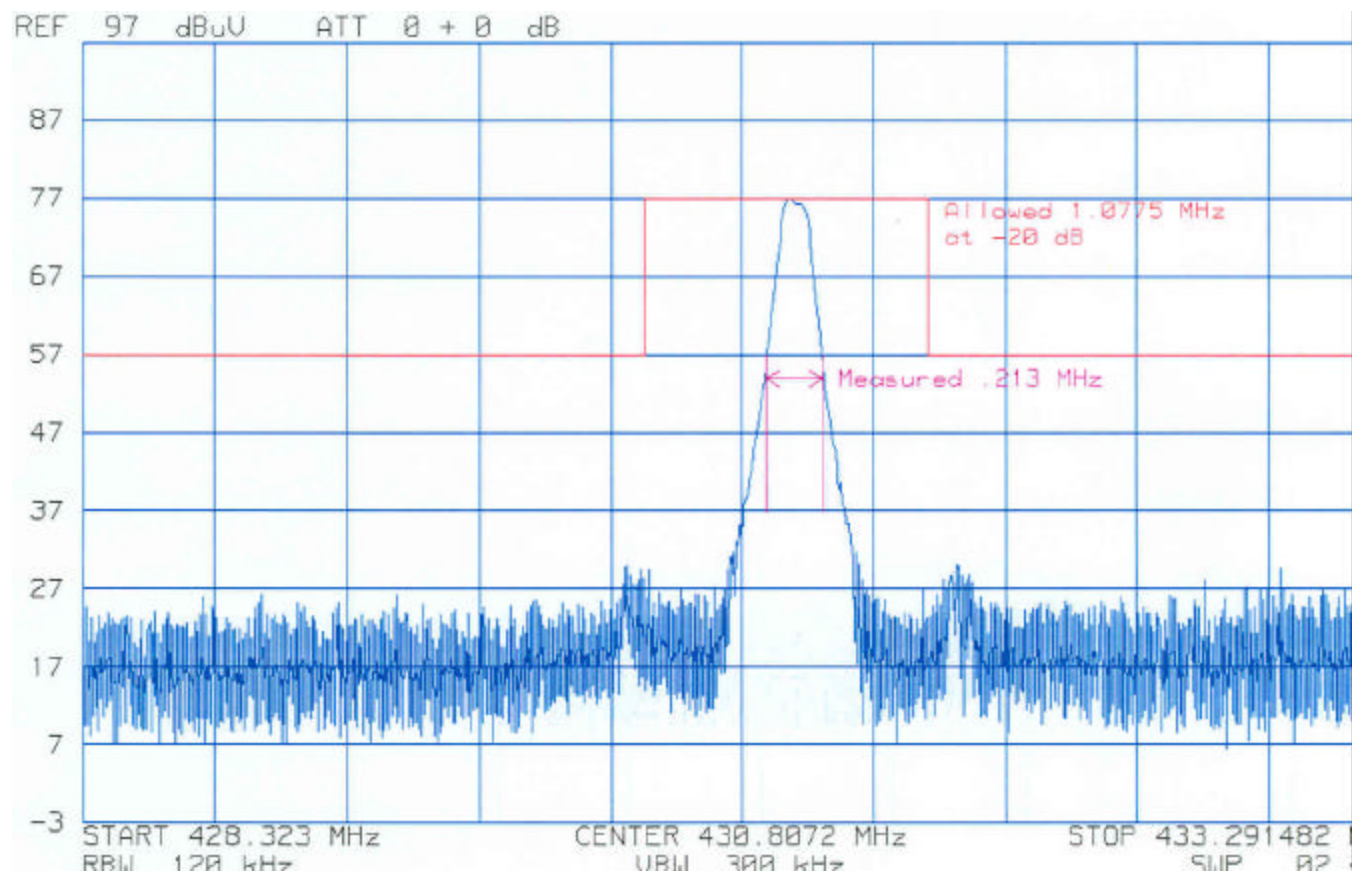
Bandwidth = 0.25% of 437MHz = 1.0925MHz

Test equipment used for Occupied Bandwidth Measurements:

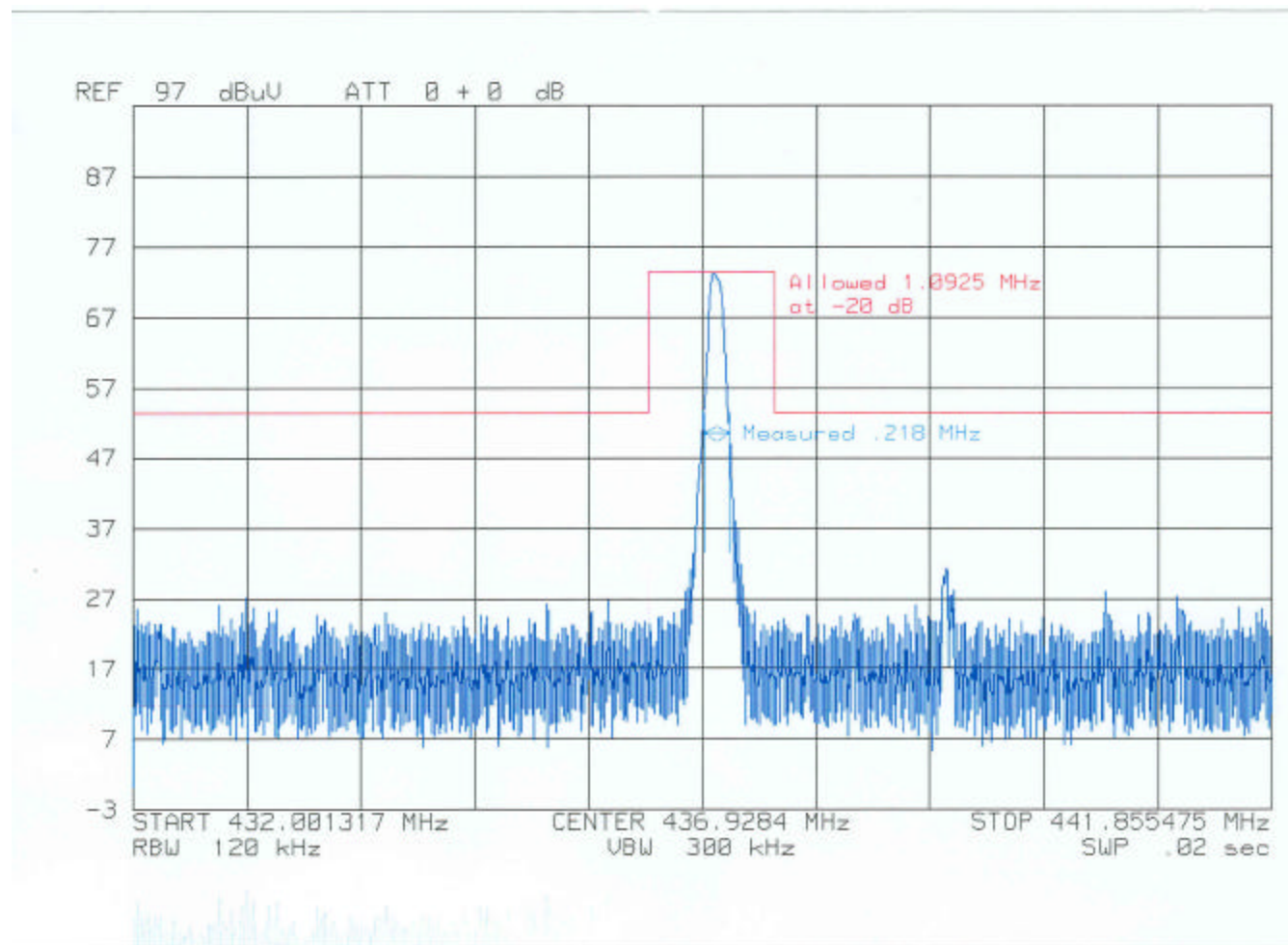
E7402A	Agilent Technologies	EMI Spectrum Analyzer	Equipment No.: ME5B-123
Range:	Last Calibration Date:		Calibration Due Date:
3121C	EMCO	Dipole Antenna	Equipment No.: ME5-751
	Last Calibration Date: 26 July 2004		Calibration Due Date: 26 July 2005
99760-00	Cole –Parmer	Hygrometer/Temp/Barometer	Equipment No.: ME4-268
		Ranges	Temp: 0°C-55°C
			Humidity: 25% to 95 %RH
			Pressure: 795 to 1050 mbar
	Last Calibration Date: 18 July 2004		Calibration Due Date: 18 July 2005

File Number: NC2219
Project Number: 04ME10395
Model Number: 886 HR-REP
FCC-ID: JPZ0034

Issued: 9/30/04



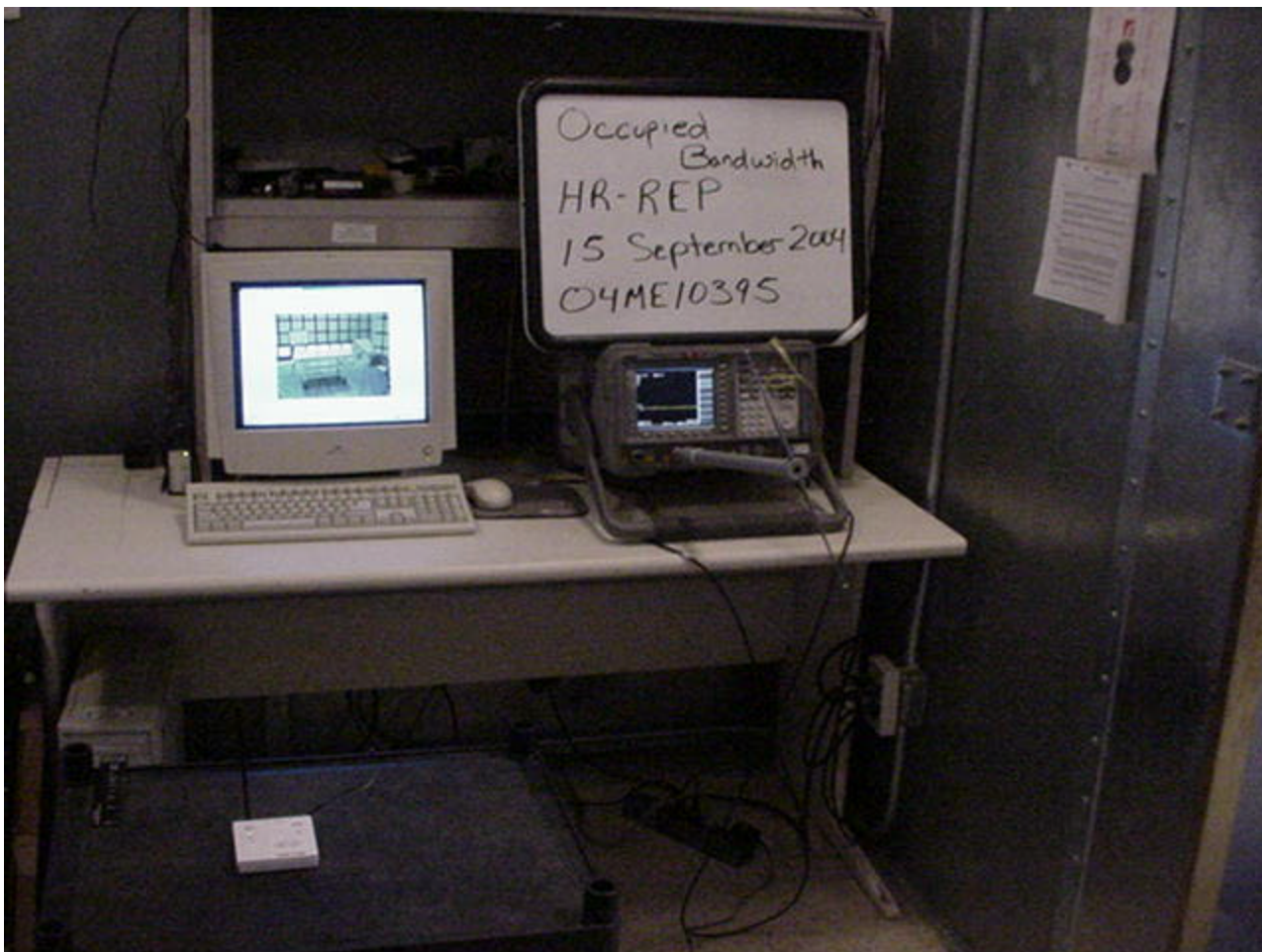
Occupied Bandwidth 431 MHz



Occupied Bandwidth 437 MHz

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Occupied Bandwidth Test Set Up

5.1.7 Fundamental Frequency and Spurious Emissions Measurement Limit Calculations:

Fundamental Frequency is 437MHz

From table in section 15.231

Limit = $41.6667(437) - 7083.3333$

Limit = 11125.018uV

Limit = $\text{Log } 11125.018 (20)$

Limit = 80.9dBuV

Limit for Spurious Emissions = 20dB lower then fundamental = 60.9dBuV/m

Radiated Emissions Limit conversion from mV/m to dBmV/m (accordance with paragraph 15.109)

Radiated Emissions Limit (dBuV/m) = $20 \cdot \log (\mu\text{V/m})$

Radiated Emissions Limit (dBuV/m) = $20 \cdot \log (90)$

Radiated Emissions Limit (dBuV/m) = 39.1

Radiated Emissions test data obtained during measurements.

Field Strength (dBuV/m) = Measured field strength (dBuV/m) + Antenna Factor (dB) + Cable Factor (dB)

Field Strength (dBuV/m) = 19.7dBuV/m + 12.5dB + 0.3dB

Field Strength (dBuV/m) = 32.5

Duty Cycle factor calculation.

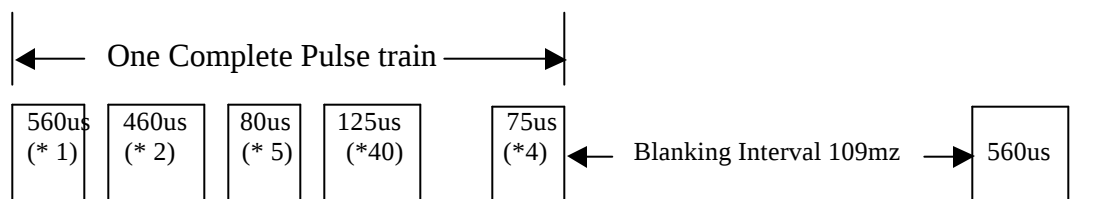
Total number of pulses counted in 50ms.

P1=560us * 1, P2=460us *2, P3= 125us *40, P4=80 *5, P5=75us *4

Blanking interval = 109ms

Pulse width= 560us+ 920us + 125us + 75us + 200us = Total time on

Total time on = 7.1ms



Duty cycle correction factor = $20 \log (7.1 / 100\text{ms})$
= $20 \log 0.071$
= - 21dB

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

Appendix A

Accreditations and Authorizations



NVLAP Lab code: 100255-0

NVLAP: Recognized under the National Voluntary Laboratory Accreditation Program (NVLAP) for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC EN17025 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of calibration or test results. The specific scope includes IEC/CISPR 22:1997, Amendment 1:1995, Amendment 2:1997, EN 55022:1998, AS/NZS 1044, CNS 13438:1997, ANSI C63.4, FCC Method - 47 CFR Part 15, FCC Method - 47 CFR Part 68, AS/NZS 3548, IEC 61000-3-2, EN 61000-3-2, CISPR 14-1, EN 55014-1, AS/NZS 1044, CNS 13783-1, CISPR 22, IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, and IEC 61000-4-11 testing.



FCC: Details of the measurement facilities used for these tests have been filed with the Federal Communications Commission's Laboratory in Columbia, Maryland and accepted in a letter dated September 24, 1997 (Ref. No. 91040).



Industry Canada Industrie Canada

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



VCCI: Accepted as an Associate Member to the VCCI. The measurement facilities detailed in this test report have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. Registration Nos.: (Radiated Emissions) R-797, (Conducted Emissions) C-832, C-833, C-834 and (Conducted Emissions - Telecommunications Ports) T-160.



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 89/336/EEC, Article 10 (2). 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. U.S. Identifier Number: US0113