



Project: 04ME04421  
File: NC2219  
Date: 6/2/04  
Model: RA-6D  
FCC ID: JPZ0031

# Test Report

## On

# Electromagnetic Compatibility Testing

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Underwriters Laboratories Inc.  
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A not-for-profit organization dedicated  
To public safety and committed to  
Quality service for over 100 years

File Number: NC2219  
Project Number: 04ME04421  
Model Number: RA-6D  
FCC ID: JPZ0031

Issued: 6/02/04

## Test Report Details

Tests Performed By: **Underwriters Laboratories Inc.**  
**1285 Walt Whitman Rd.**  
**Melville, NY 11747**

Tests Performed For: **Lutron Electronics Inc.**  
**7200 Suter Road**  
**Coopersburg, PA 18036**

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Test Report Date: **5/26/04**

Product Type: **Radio Frequency Controlled Dimmer**

Model Number: **RA-6D**

Sample Serial Number: **Not Provided**

Sample Tag Number: **0584944001**

Sample Receive Date: **06 May 2004**

EUT Category: **Transceiver**

Testing Start Date: **14 May 2004**

Date Testing Complete: **24 May 2004**

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
6/01/04	Original	-	-

### 1.0 GENERAL - Product Description

The RA-6D is a wall mounted dimmer. It contains a super-heterodyne receiver, a crystal oscillator stabilized transmitter, and an antenna. It is used as part of an integrated lighting control system. The purpose of the RF communication is to transmit and receive command signals. Received command signals allow the RA-6D to dim ON or OFF in response to commands from the lighting control system. The Transmitted command signals acknowledge the state of the RA-6D to the rest of the lighting control System. The RA-6D obtains power through standard household wiring. The power supply produces a 5V DC output, which is used to power all analog and micro controller activities.

## 1.1 Device Configuration During Test

The EUT was configured by the manufacturer to be in a continuous wave, which is constantly transmitting for Emission tests and in constant packet for all other tests (works as intended).

The unit defaults to operate like a normal dimmer on power up, which is in receive mode. The dimmer transmit mode configuration per the manufacturer instructions is as follows:

### Continuous Packet:

- 1) Pullout the air gap button (bottom center switch).
- 2) Press the lower button.
- 3) While holding the lower button push in the air gap button.
- 4) Observe LED's ramp upward from the bottom then releases lower button.
- 5) 2<sup>nd</sup> LED from the bottom will go on (all other LED's will function displaying normal load light levels).

### Continuous Wave:

- 1) Pullout the air gap button (bottom center switch).
- 2) Press the raise button.
- 3) While holding the raise button push in the air gap button.
- 4) Observe LED's ramp upward from the bottom then releases raise button.
- 5) The bottom LED will go on (all other LED's will function displaying normal load light levels).

### 1.1.1 Equipment Used During Test:

Use*	Product Type	Manufacturer	Model	Comments
EUT	Wireless Lighting Control	Lutron	RA-6D	-
ACC	Mounting Fixture	Lutron	-	-

\* 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	-	-	Standard power cord

\*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
407.3	Local Oscillator	-	-
2	Micro Internal	-	-
4	Micro External	-	-
418	Operating Frequency	-	-

### 1.1.4 Power Interface:

Mode #	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
1	120	5	600	60 Hz	1	-

### 1.2 EUT Operation Modes:

Mode #	Description
1	The EUT was configured to continuously transmit at its operating frequency 418MHz.
2	The EUT was configured to be in Standby, which is receive mode

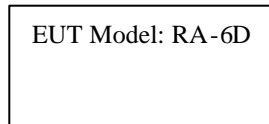
### 1.3 EUT Configuration Modes:

Mode #	Description
1	The EUT was configured by the manufacturer to be in a continuous wave, which is constantly transmitting for Emission tests and in constant packet for all other tests (works as intended).

"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

As described below:

## 1.6 Device Modifications Necessary for Compliance

Not Applicable.

## 1.7 Test Summary

Test Name Test Requirement/Specification	Comply	Does Not Comply	See Remark
Conducted Voltage Emissions (Continuous Data Transmit Mode): FCC Part 15 Subpart B, Class B. Paragraph 15.205	Yes	-	1
Radiated Emissions: FCC Part 15 Subpart C, Class B, Intentional Radiators, Paragraph 15.209, 15.231	Yes	-	1
FCC Part 15 Subpart B, Class B, Un-Intentional Radiators, Paragraph 15.109	Yes	-	1
Cease Operation < 5 seconds: FCC Part 15 Subpart C, Paragraph 15.231	Yes	-	1
Occupied Bandwidth: FCC Part 15 Subpart C, Paragraph 15.231	Yes	-	1

### Remarks:

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

## 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: 6 May 2004  
Test Completion Date: 24 May 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**

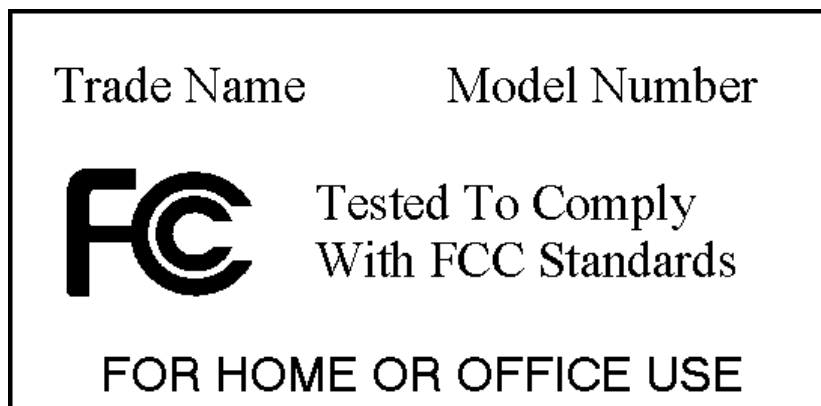
In addition to the requirements in Part 2 of this CFR 47 (See **1.6.1 Identification** above), a device subject to certification or verification shall be labeled as follows:

- (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.

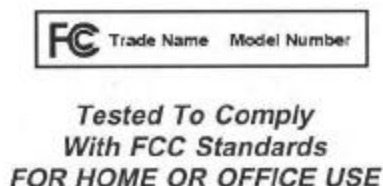
#### **Declaration of Conformity Labeling**

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.

#### 5.0 EMISSIONS TEST REGULATIONS

The emissions tests were performed according to following regulations:

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

FCC Part 15, Subpart B, Paragraph 15.107 & 15.109 FCC Part 15 Subpart C, Paragraph 15.205, 15.207, 15.209 & 15.231	Code of Federal Regulations, Part 15, Subpart B and C, Radio Frequency Devices
--------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------

## 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:	21.5 °C
Humidity:	44 %RH
Pressure:	1011 mbar
Date test performed:	10 May 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	1	1, 2

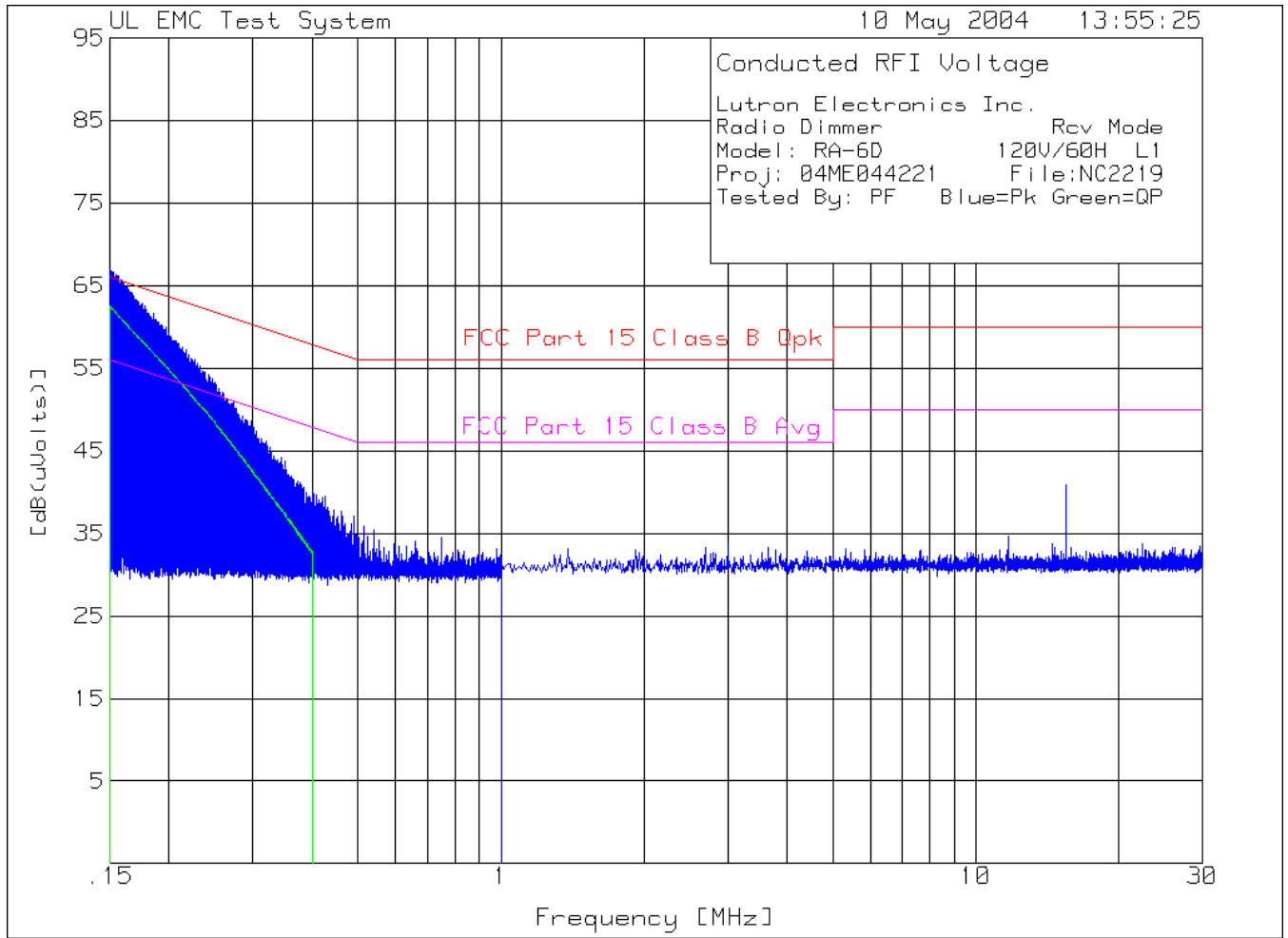
\*See Power Interface and EUT Operating Modes for details

#### Test equipment used for conducted emissions

<b>E7402A</b>	<b>Agilent Technologies</b>	<b>EMI Spectrum Analyzer</b>	<b>Equipment No.: ME5B-123</b>
Range: 150K-30M	Last Calibration Date: 22 January 2004		Calibration Due Date: 22 January 2005

#### Test Accessories for Conducted Emissions

<b>11947A</b>	<b>Hewlett Packard</b>	<b>Transient Limiter</b>	<b>Equipment No.: ME5A-444</b>
Range: 150K-30M	Last Calibration Date: 17 October 2003		Calibration Due Date: 17 October 2004
<b>9252-50-R-24-BNC</b>	<b>Solar Electronics</b>	<b>50W LISN</b>	<b>Equipment No.: ME5A-636</b>
Range: 150K-30M	Last Calibration Date: 16 September 2003		Calibration Due Date: 16 September 2004
<b>99760-00</b>	<b>Cole -Parmer</b>	<b>Hygrometer/Temp/Baro meter</b>	<b>Equipment No.: ME4-268</b>
		Ranges	Temp: 0°C-55°C Humidity: 25% to 95 %RH Pressure: 795 to 1050 mbar
Range: 0°C-55°C	Last Calibration Date: 27 May 2003		Calibration Due Date: 27 May 2004



File Number: NC2219  
 Project Number: 04ME04421  
 Model Number: RA-6D  
 FCC ID: JPZ0031

Issued: 6/02/04

Lutron Electronics Inc.  
 Radio Dimmer Rcv Mode  
 Model: RA-6D 120V/60H L1  
 Proj: 04ME044221 File:NC2219  
 Tested By: PF Blue=Pk Green=QP

No.	Frequency [MHz]	Test	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2
=====								
Range: 1 .15 - 1MHz -----								
1	.15		52.45 qp	10.1	0	62.55	66	56
					Margin [dB]		-3.45	6.55
2	.17386		48.44 qp	10.1	0	58.54	64.8	54.8
					Margin [dB]		-6.26	3.74
3	.20118		44.51 qp	10.1	0	54.61	63.6	53.6
					Margin [dB]		-8.99	1.01
4	.23164		40.44 qp	10.1	0	50.54	62.4	52.4
					Margin [dB]		-11.86	-1.86
5	.25613		37.47 qp	10.1	0	47.57	61.6	51.6
					Margin [dB]		-14.03	-4.03
6	.28157		34.48 qp	10.1	0	44.58	60.8	50.8
					Margin [dB]		-16.22	-6.22

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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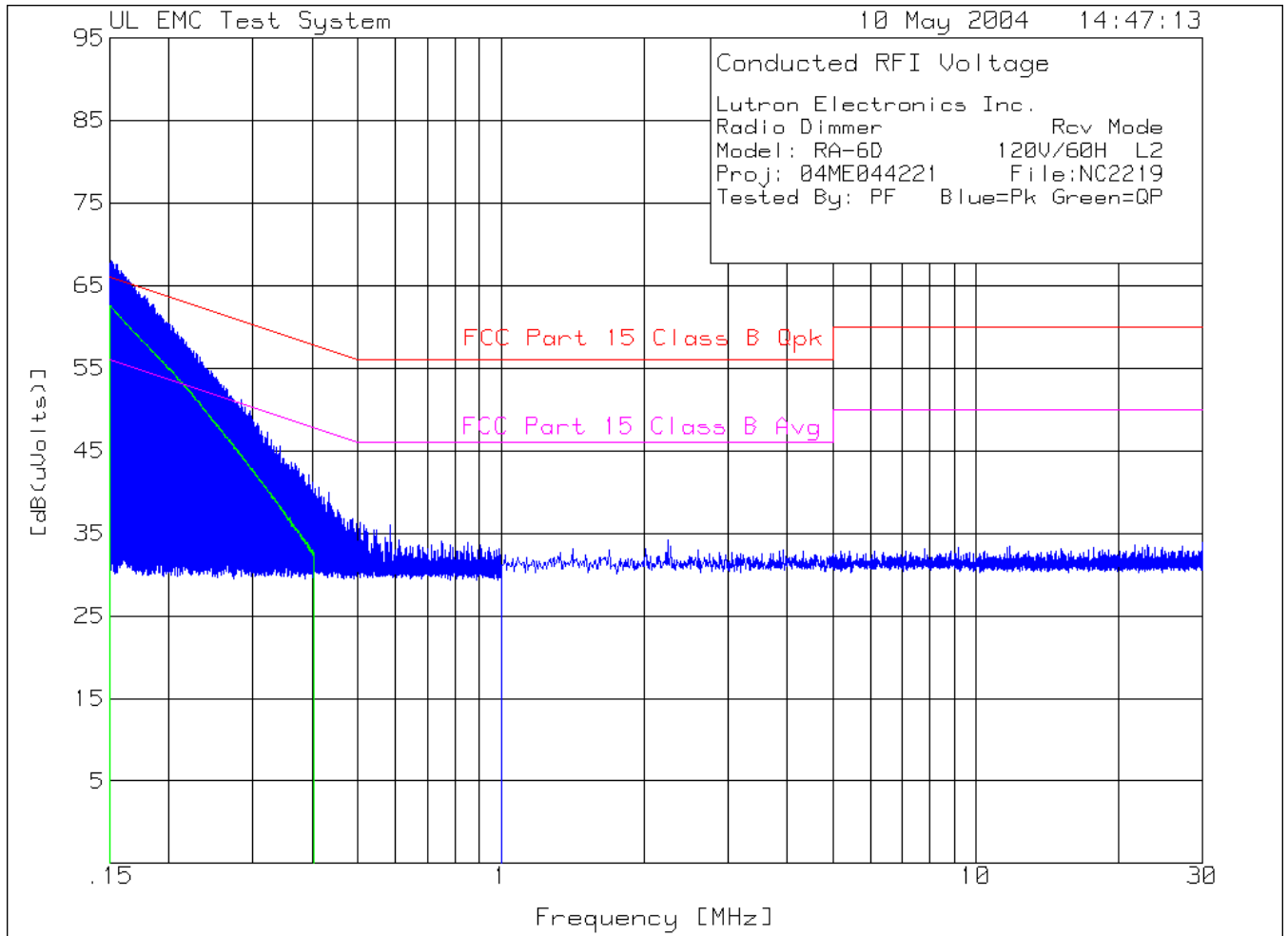
Lutron Electronics Inc.  
 Radio Dimmer Rcv Mode  
 Model: RA-6D 120V/60H L1  
 Proj: 04ME044221 File:NC2219  
 Tested By: PF Blue=Pk Green=QP

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2
=====						
Range: 1 .15 - 1MHz						
.15175	12.26 avem	10.1	0	22.36	65.9	55.9
			Margin [dB]:		-43.54	-33.54
.17386	9.28 avem	10.1	0	19.38	64.8	54.8
			Margin [dB]:		-45.42	-35.42
.20118	6.65 avem	10.1	0	16.75	63.6	53.6
			Margin [dB]:		-46.85	-36.85
.23164	4.51 avem	10.1	0	14.61	62.4	52.4
			Margin [dB]:		-47.79	-37.79
.25613	2.72 avem	10.1	0	12.82	61.6	51.6
			Margin [dB]:		-48.78	-38.78
.28157	1.92 avem	10.1	0	12.02	60.8	50.8
			Margin [dB]:		-48.78	-38.78

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



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 Project Number: 04ME04421  
 Model Number: RA-6D  
 FCC ID: JPZ0031

Issued: 6/02/04

Lutron Electronics Inc.  
 Radio Dimmer Rcv Mode  
 Model: RA-6D 120V/60H L2  
 Proj: 04ME044221 File:NC2219  
 Tested By: PF Blue=Pk Green=QP

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	.15	52.47 qp	10.1	0	62.57	66	56
				Margin [dB]		-3.43	6.57
2	.17253	48.71 qp	10.1	0	58.81	64.8	54.8
				Margin [dB]		-5.99	4.01
3	.19568	45.4 qp	10.1	0	55.5	63.8	53.8
				Margin [dB]		-8.3	1.7
4	.22614	41.31 qp	10.1	0	51.41	62.6	52.6
				Margin [dB]		-11.19	-1.19
5	.25311	37.94 qp	10.1	0	48.04	61.7	51.7
				Margin [dB]		-13.66	-3.66
6	.28451	34.25 qp	10.1	0	44.35	60.7	50.7
				Margin [dB]		-16.35	-6.35

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  
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 tm - Trace Math Result

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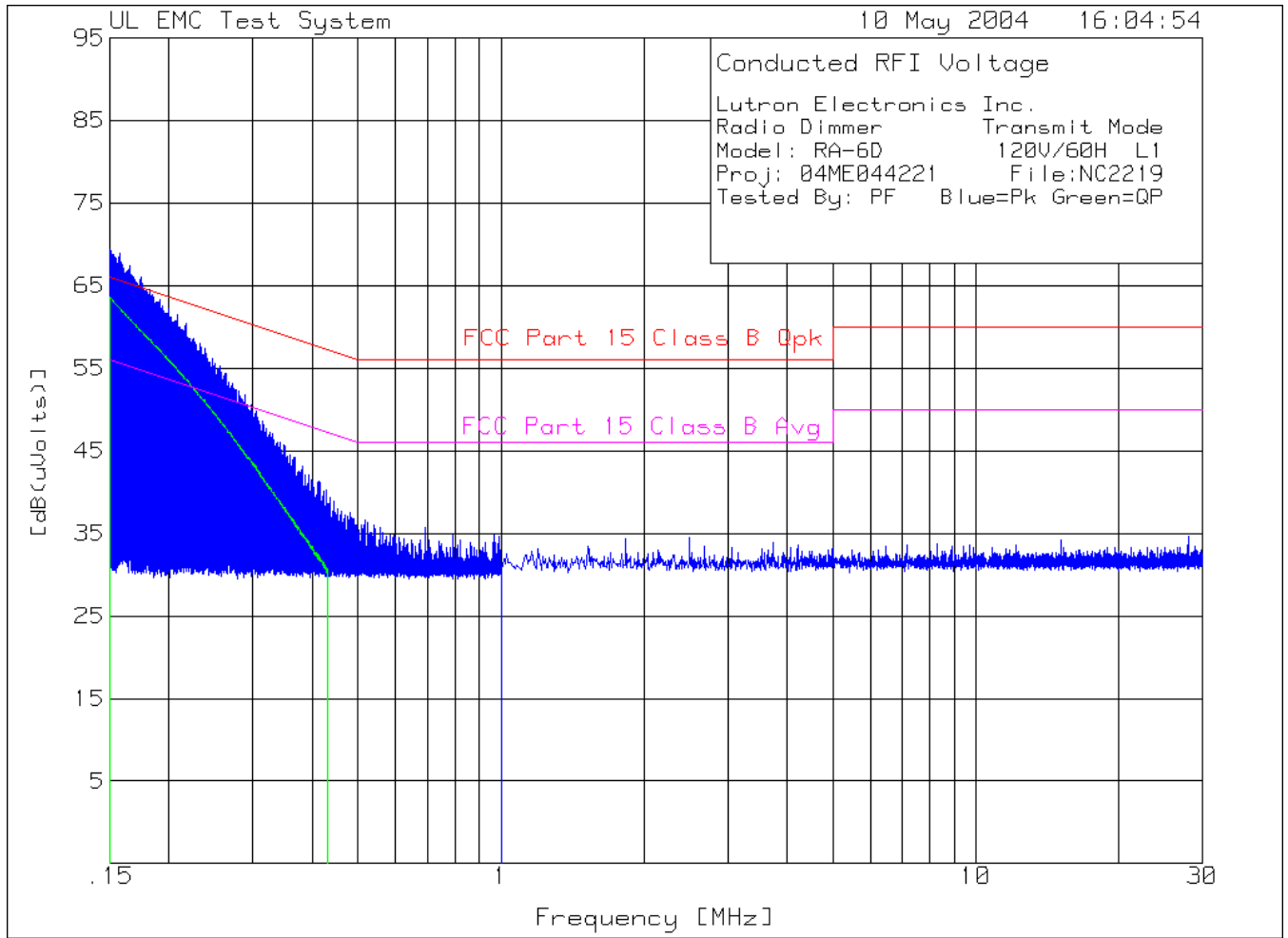
Lutron Electronics Inc.  
 Radio Dimmer Rcv Mode  
 Model: RA-6D 120V/60H L2  
 Proj: 04ME044221 File:NC2219  
 Tested By: PF Blue=Pk Green=QP

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2
Frequency [MHz]	Reading [dB(uV)]	Factor [dB]	Factor [dB]	[dB(uVolts)]		
=====						
Range: 1 .15 - 1MHz						
.15175	13.16 avem	10.1	0	23.26	65.9	55.9
			Margin [dB]:		-42.64	-32.64
.17253	10.4 avem	10.1	0	20.5	64.8	54.8
			Margin [dB]:		-44.3	-34.3
.19568	7.41 avem	10.1	0	17.51	63.8	53.8
			Margin [dB]:		-46.29	-36.29
.22614	4.79 avem	10.1	0	14.89	62.6	52.6
			Margin [dB]:		-47.71	-37.71
.25311	3.45 avem	10.1	0	13.55	61.7	51.7
			Margin [dB]:		-48.15	-38.15
.28451	1.59 avem	10.1	0	11.69	60.7	50.7
			Margin [dB]:		-49.01	-39.01

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



File Number: NC2219  
 Project Number: 04ME04421  
 Model Number: RA-6D  
 FCC ID: JPZ0031

Issued: 6/02/04

Lutron Electronics Inc.  
 Radio Dimmer Transmit Mode  
 Model: RA-6D 120V/60H L1  
 Proj: 04ME044221 File:NC2219  
 Tested By: PF Blue=Pk Green=QP

No.	Frequency [MHz]	Test	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2
=====								
Range: 1 .15 - 1MHz -----								
1	.15		53.45 qp	10.1	0	63.55	66	56
					Margin [dB]		-2.45	7.55
2	.16865		50.27 qp	10.1	0	60.37	65	55
					Margin [dB]		-4.63	5.37
3	.19363		46.66 qp	10.1	0	56.76	63.9	53.9
					Margin [dB]		-7.14	2.86
4	.22389		42.57 qp	10.1	0	52.67	62.7	52.7
					Margin [dB]		-10.03	-.03
5	.2524		38.99 qp	10.1	0	49.09	61.7	51.7
					Margin [dB]		-12.61	-2.61
6	.27492		36.24 qp	10.1	0	46.34	61	51
					Margin [dB]		-14.66	-4.66
7	.29638		33.86 qp	10.1	0	43.96	60.3	50.3
					Margin [dB]		-16.34	-6.34

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: 04ME04421  
 Model Number: RA-6D  
 FCC ID: JPZ0031

Issued: 6/02/04

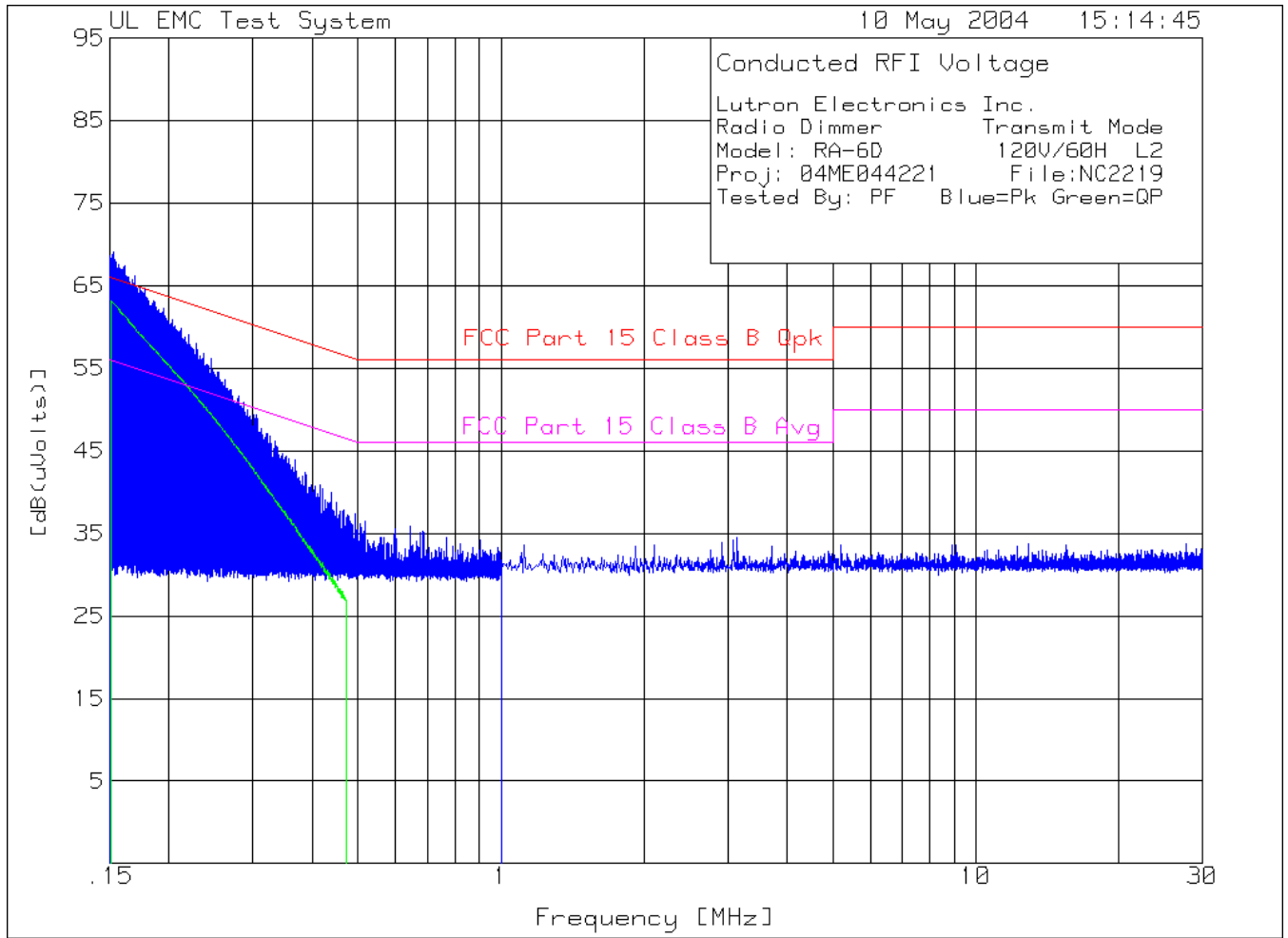
Lutron Electronics Inc.  
 Radio Dimmer Transmit Mode  
 Model: RA-6D 120V/60H L1  
 Proj: 04ME044221 File:NC2219  
 Tested By: PF Blue=Pk Green=QP

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2
Frequency [MHz]	Reading [dB(uV)]	Factor [dB]	Factor [dB]	[dB(uVolts)]		
=====						
Range: 1 .15 - 1MHz						
.15175	10.33 avem	10.1	0	20.43	65.9	55.9
			Margin [dB]:		-45.47	-35.47
.16865	9.46 avem	10.1	0	19.56	65	55
			Margin [dB]:		-45.44	-35.44
.19363	6.84 avem	10.1	0	16.94	63.9	53.9
			Margin [dB]:		-46.96	-36.96
.22389	3.89 avem	10.1	0	13.99	62.7	52.7
			Margin [dB]:		-48.71	-38.71
.2524	3.79 avem	10.1	0	13.89	61.7	51.7
			Margin [dB]:		-47.81	-37.81
.27492	1.47 avem	10.1	0	11.57	61	51
			Margin [dB]:		-49.43	-39.43
.29638	2.13 avem	10.1	0	12.23	60.3	50.3
			Margin [dB]:		-48.07	-38.07

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





File Number: NC2219  
 Project Number: 04ME04421  
 Model Number: RA-6D  
 FCC ID: JPZ0031

Issued: 6/02/04

Lutron Electronics Inc.  
 Radio Dimmer Transmit Mode  
 Model: RA-6D 120V/60H L2  
 Proj: 04ME044221 File:NC2219  
 Tested By: PF Blue=Pk Green=QP

No.	Frequency [MHz]	Test Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2
=====							
Range: 1 .15 - 1MHz -----							
1	.1511	53.05 qp	10.1	0	63.15	65.9	55.9
				Margin [dB]		-2.75	7.25
2	.16557	50.33 qp	10.1	0	60.43	65.2	55.2
				Margin [dB]		-4.77	5.23
3	.18447	47.37 qp	10.1	0	57.47	64.3	54.3
				Margin [dB]		-6.83	3.17
4	.20818	44.12 qp	10.1	0	54.22	63.3	53.3
				Margin [dB]		-9.08	.92
5	.2315	41.02 qp	10.1	0	51.12	62.4	52.4
				Margin [dB]		-11.28	-1.28
6	.25763	37.76 qp	10.1	0	47.86	61.5	51.5
				Margin [dB]		-13.64	-3.64
7	.27733	35.33 qp	10.1	0	45.43	60.9	50.9
				Margin [dB]		-15.47	-5.47

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: 04ME04421  
 Model Number: RA-6D  
 FCC ID: JPZ0031

Issued: 6/02/04

Lutron Electronics Inc.  
 Radio Dimmer Transmit Mode  
 Model: RA-6D 120V/60H L2  
 Proj: 04ME044221 File:NC2219  
 Tested By: PF Blue=Pk Green=QP

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2
Frequency [MHz]	Reading [dB(uV)]	Factor [dB]	Factor [dB]	[dB(uVolts)]		
=====						
Range: 1 .15 - 1MHz						
.15175	11.07 avem	10.1	0	21.17	65.9	55.9
			Margin [dB]:		-44.73	-34.73
.16557	11.1 avem	10.1	0	21.2	65.2	55.2
			Margin [dB]:		-44	-34
.18447	8.13 avem	10.1	0	18.23	64.3	54.3
			Margin [dB]:		-46.07	-36.07
.20818	5.52 avem	10.1	0	15.62	63.3	53.3
			Margin [dB]:		-47.68	-37.68
.2315	3.99 avem	10.1	0	14.09	62.4	52.4
			Margin [dB]:		-48.31	-38.31
.25763	2.3 avem	10.1	0	12.4	61.5	51.5
			Margin [dB]:		-49.1	-39.1
.27733	1.79 avem	10.1	0	11.89	60.9	50.9
			Margin [dB]:		-49.01	-39.01

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



**Conducted Emission Test Set-Up**

## 5.1.2 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

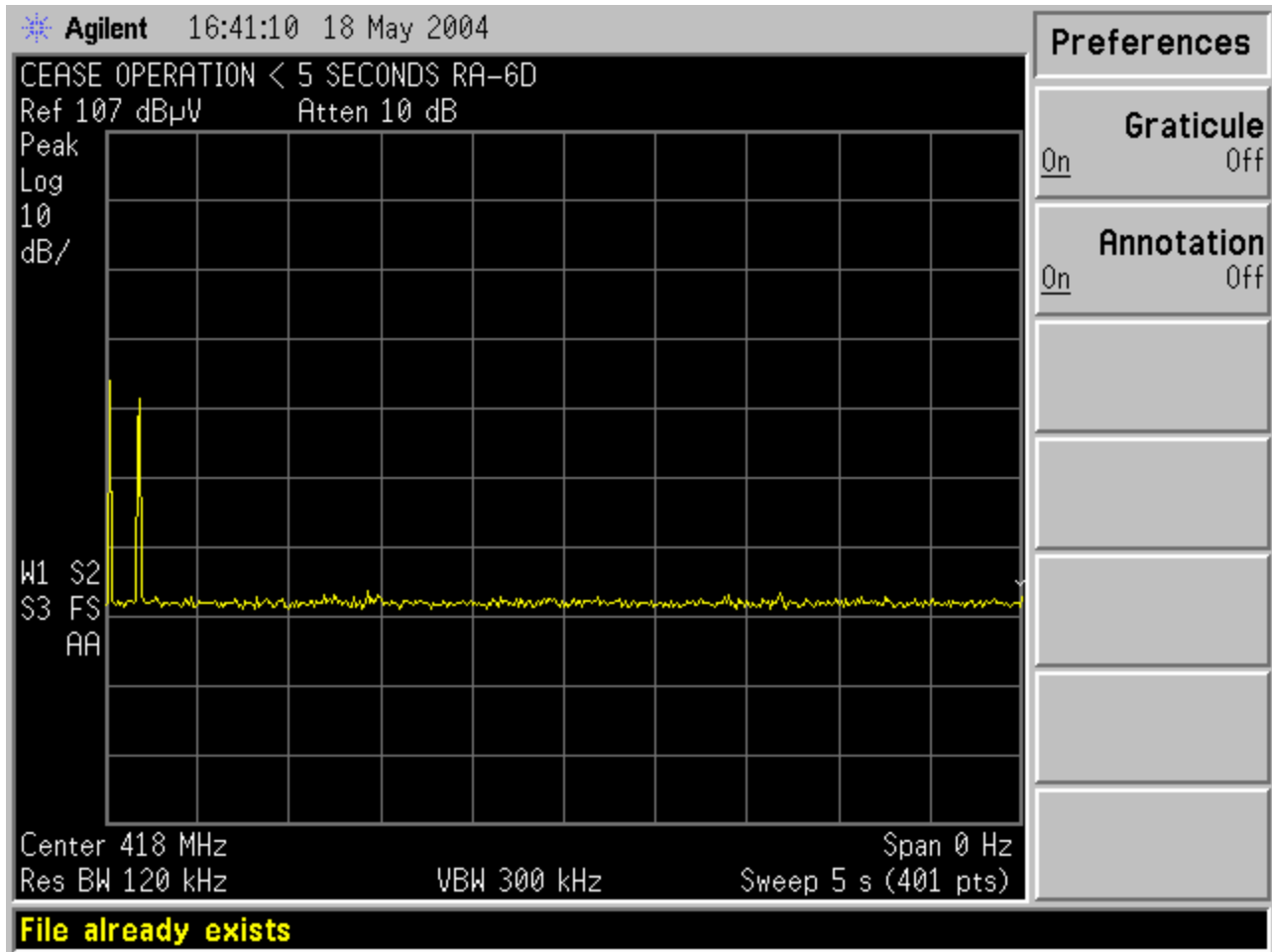
The system met the requirements for conducted emissions. Data Pages follow.

Temperature:	21.5 °C
Humidity:	42 %RH
Pressure:	1011 mbar
Date test performed:	18 May 2004

1 fully configured sample was scanned over the following frequency range

### Test equipment used for Cease Operation measurements:

<b>ESI26</b>	<b>Rhode &amp; Schwartz</b>	<b>EMI Receiver</b>	<b>Equipment No.: ME5B-081</b>
			<b>Quasi Peak BW: 200Hz      9kHz to 150kHz</b>
			<b>RBW 10 KHz</b>
			<b>Quasi Peak BW: 9kHz      150kHz to 30MHz</b>
			<b>RBW 100 KHz</b>
			<b>Quasi Peak BW: 120      30 to 1000MHz</b>
			<b>kHz</b>
			<b>RBW 1.0 MHz</b>
Range: 30MHz-1000MHz	Last Calibration Date: 28 August 2003		Calibration Due Date: 31 August 2004
3121C-DB4	EMCO Log-Periodic Antenna		Equipment No.: ME5-811
Last Calibration Date: 1 April 2004			Calibration Due Date: 1 April 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: 27 May 2003			Calibration Due Date: 27 May 2004



Cease operation in < 5 seconds



**Test Set-up Cease Operation < 5 Seconds**

### 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 the requirements for radiated emissions. Data Pages follow.

Temperature:	21.5 °C	<b>Mode*</b>	
Humidity:	39%RH	<b>Power</b>	<b>Operation</b>
Pressure:	1008mbar	<u>1</u>	<u>1</u>
Date test performed:	6 May and 14 May 2004	<u>1</u>	<u>2</u>

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

Electric fields:	30MHz – 1GHz	(3 meter measurement distance) Unintentional
	1GHz – 3 GHz	(3 meter measurement distance) Unintentional
	30MHz - 1GHz	(3 meter measurement distance) Intentional
	1GHz - 5GHz	(3 meter measurement distance) Intentional

File Number: NC2219  
Project Number: 04ME04421  
Model Number: RA-6D  
FCC ID: JPZ0031

Issued: 6/02/04

**Test equipment used for radiated emissions**

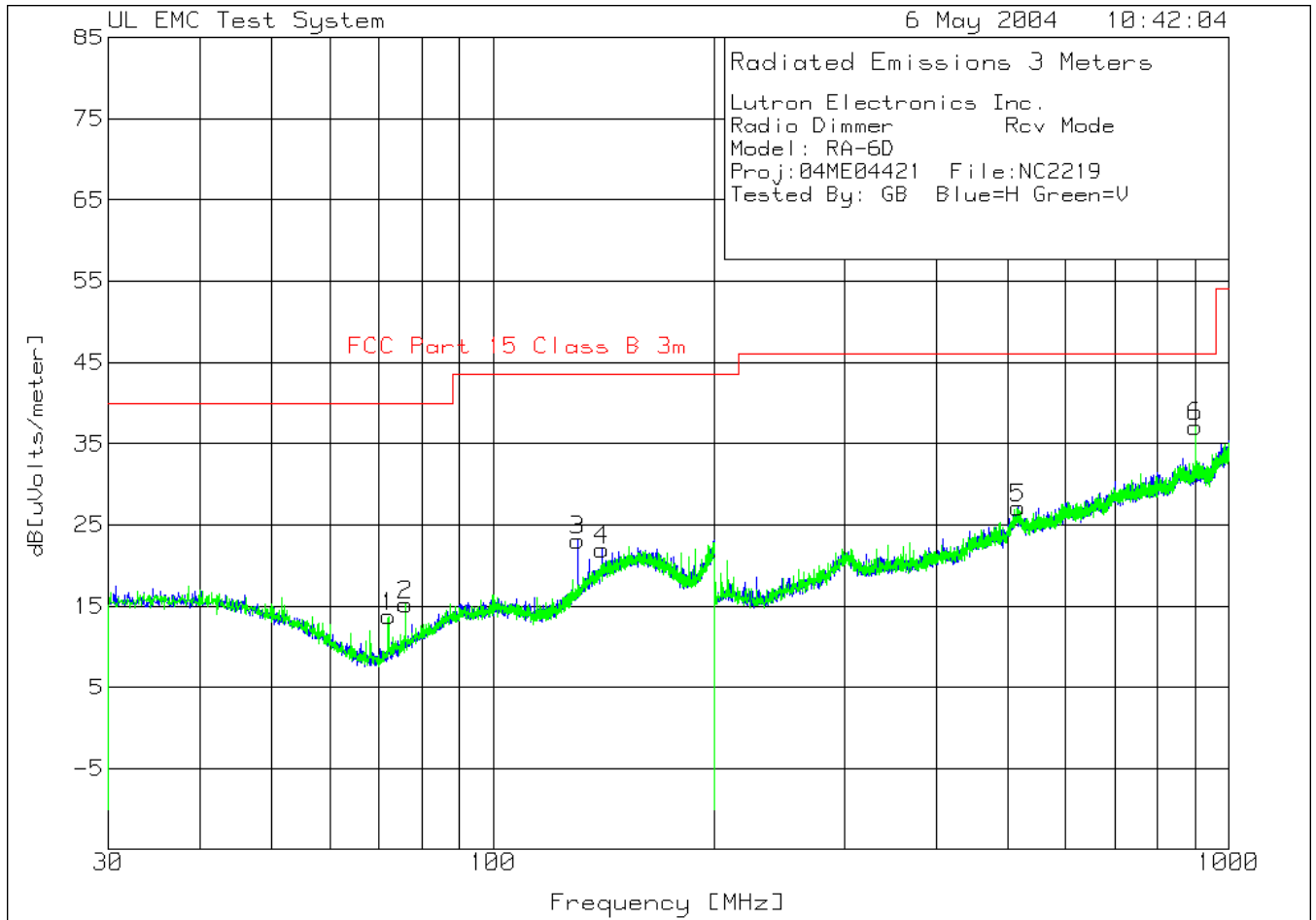
<b>ESI26</b>	<b>Rhode &amp; Schwartz</b>	<b>EMI Receiver</b>	<b>Equipment No.: ME5B-081</b>
			<b>Quasi Peak BW: 200Hz</b> <b>9kHz to 150kHz</b>
			<b>RBW 10 KHz</b>
			<b>Quasi Peak BW: 9kHz</b> <b>150kHz to 30MHz</b>
			<b>RBW 100 KHz</b>
			<b>Quasi Peak BW: 120</b> <b>30 to 1000MHz</b>
			<b>kHz</b>
			<b>RBW 1.0 MHz</b>
Range: 30MHz -5GHz	Last Calibration Date: 28 August 2003		Calibration Due Date: 31 August 2004

**Test equipment used for radiated emissions above 1GHz**

**Test Accessories for Radiated Emissions**

<b>94455-1</b>	<b>Ailtech</b>	<b>Biconnical Antenna</b>	<b>Equipment No.: ME5-439</b>
Range: 30MHz – 200MHz	Last Calibration Date: 2 December 2003		Calibration Due Date: 2 December 2004
<b>3146</b>	<b>EMCO</b>	<b>Log Periodic Antenna</b>	<b>Equipment No.: ME5-451</b>
Range: 200MHz–1000MHz	Last Calibration Date: 4 December 2003		Calibration Due Date: 4 December 2004
Range:	Last Calibration Date:		Calibration Due Date:
<b>RGA-180</b>	<b>EMCO</b>	<b>Horn Antenna</b>	<b>Equipment No.: ME5-565</b>
Range: 1GHz –5GHz	Last Calibration Date: 24 June 2003		Calibration Due Date: 24 June 2004
<b>8449B</b>	<b>Hewlett Packard</b>	<b>1-26GHz Pre-Amp</b>	<b>Equipment No.: ME5-914</b>
Range: 1GHz –5GHz	Last Calibration Date: 21 January 2004		Calibration Due Date: 21 January 2005
<b>99760-00</b>	<b>Cole –Parmer</b>	<b>Hygrometer/Temp/Baro</b>	<b>Equipment No.: ME4-268</b>
		<b>meter</b>	
		Ranges	Temp: 0°C-55°C
			Humidity: 25% to 95 %RH
			Pressure: 795 to 1050 mbar
Range: 0°C-55°C	Last Calibration Date: 27 May 2003		Calibration Due Date: 27 May 2004





File Number: NC2219  
 Project Number: 04ME04421  
 Model Number: RA-6D  
 FCC ID: JPZ0031

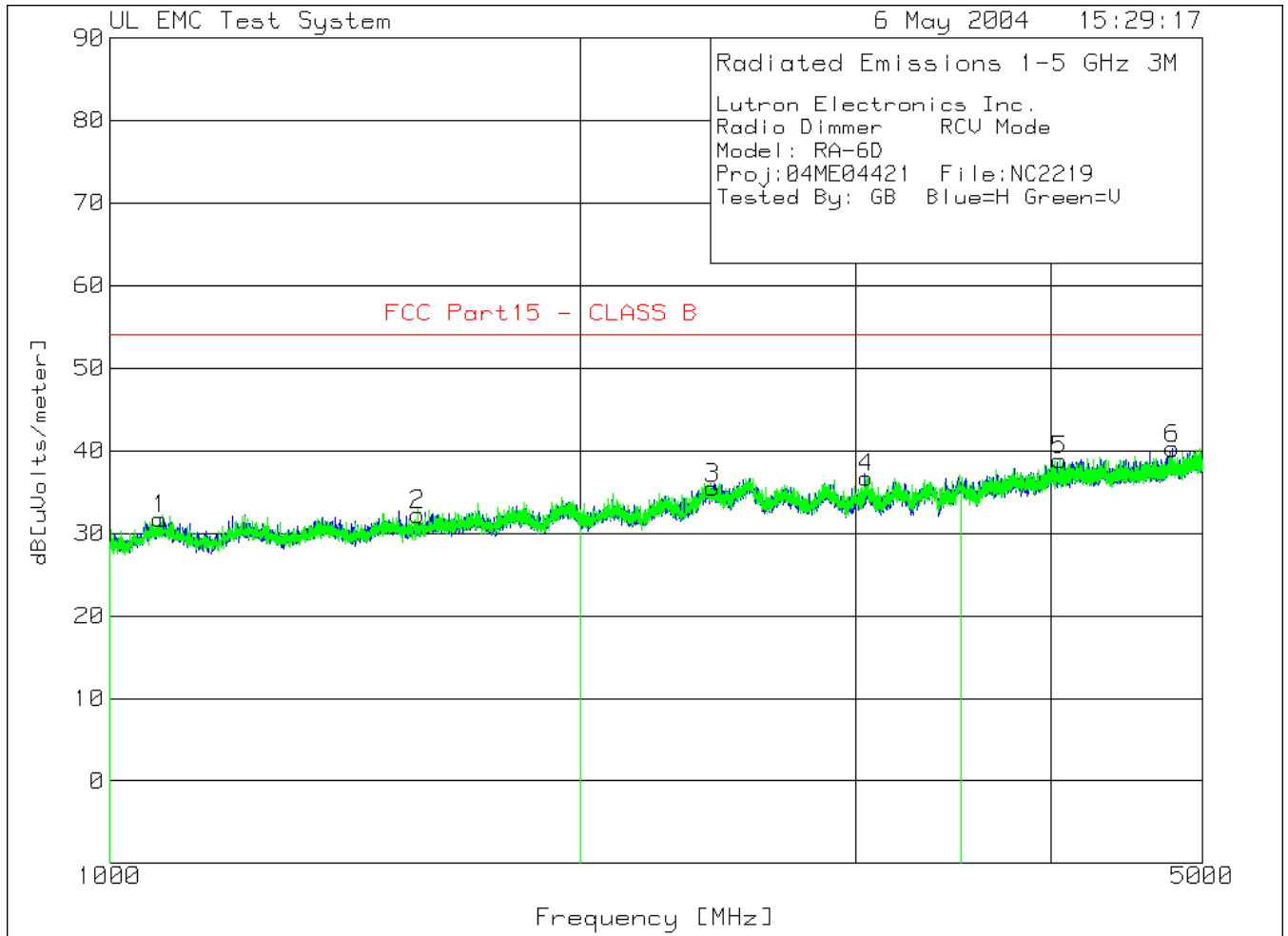
Issued: 6/02/04

Lutron Electronics Inc.  
 Radio Dimmer Rcv Mode  
 Model: RA-6D  
 Proj:04ME04421 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	130.2657	8.81 pk	1.6	12.7	23.11	43.5
	Azimuth:325	Height:299	Horz	Margin [dB]		-20.39
4	140.5559	5.35 pk	1.7	14.9	21.95	43.5
	Azimuth:163	Height:299	Horz	Margin [dB]		-21.55
-----						
Vertical 30 - 200MHz -----						
1	72.0963	6.84 pk	1.2	5.7	13.74	40
	Azimuth:118	Height:101	Vert	Margin [dB]		-26.26
2	76.0933	7.09 pk	1.2	6.9	15.19	40
	Azimuth:196	Height:101	Vert	Margin [dB]		-24.81
-----						
Horizontal 200 - 1000MHz -----						
5	516.6394	4.32 pk	3.3	19.5	27.12	46
	Azimuth:60	Height:398	Horz	Margin [dB]		-18.88
-----						
Vertical 200 - 1000MHz -----						
6	900.2345	9.2 pk	4.4	23.5	37.1	46
	Azimuth:18	Height:100	Vert	Margin [dB]		-8.9

LIMIT 1: FCC Part 15 Class B 3m

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: 04ME04421  
 Model Number: RA-6D  
 FCC ID: JPZ0031

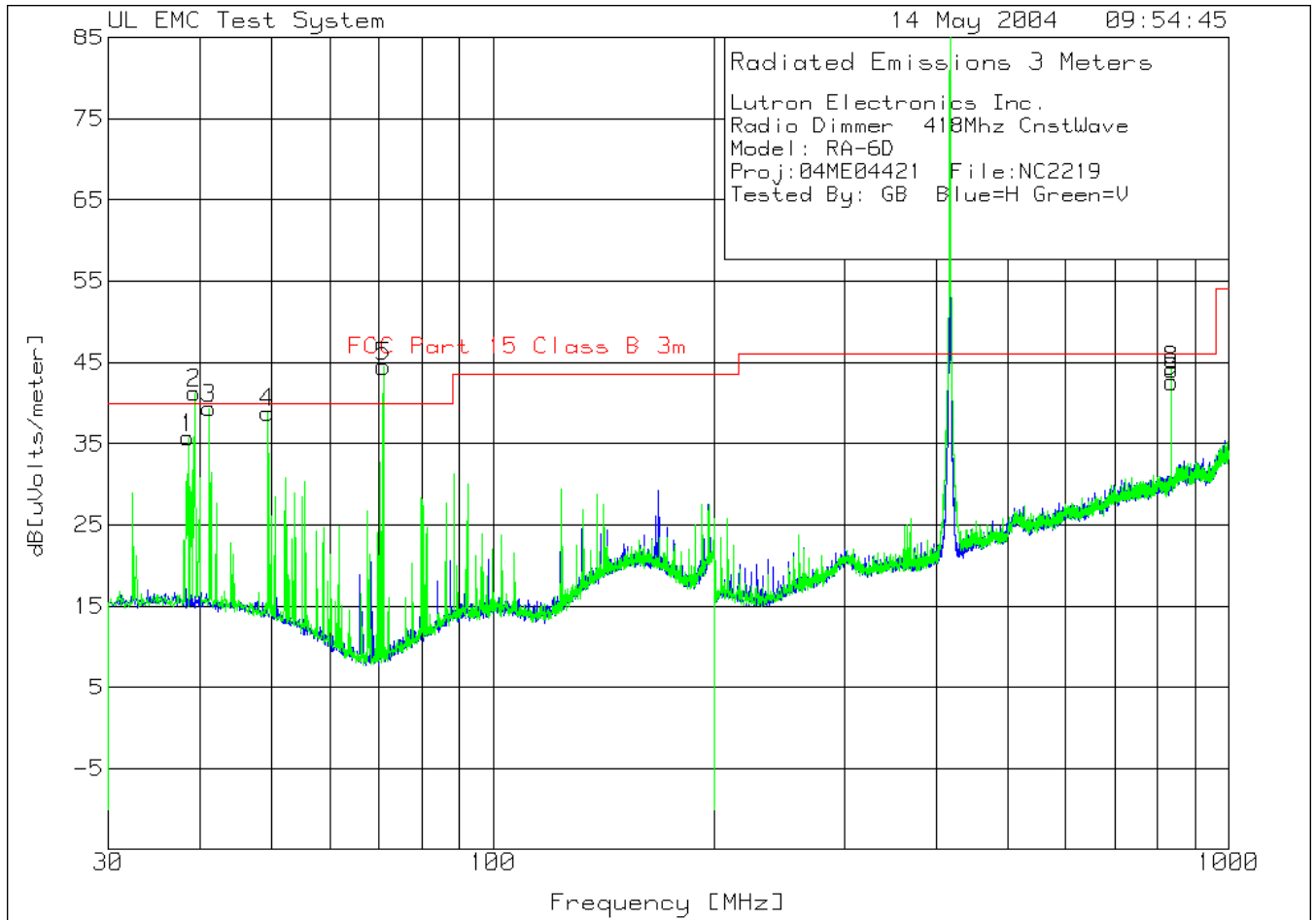
Issued: 6/02/04

Lutron Electronics Inc.  
 Radio Dimmer RCV Mode  
 Model: RA-6D  
 Proj:04ME04421 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	1077.026	38.35 pk	-31.8	25.2	31.75	54
	Azimuth:193	Height:197	Horz	Margin [dB]		-22.25
2	1574.191	35.69 pk	-30.4	27	32.29	54
	Azimuth:342	Height:100	Horz	Margin [dB]		-21.71
-----						
Horizontal 3500 - 5000MHz -----						
6	4784.929	29.48 pk	-23.7	34.5	40.28	54
	Azimuth:355	Height:197	Horz	Margin [dB]		-13.72
-----						
Vertical 2000 - 3500MHz -----						
3	2430.644	32.28 pk	-27.2	30.4	35.48	54
	Azimuth:321	Height:197	Vert	Margin [dB]		-18.52
4	3047.35	32.25 pk	-27.1	31.6	36.75	54
	Azimuth:18	Height:197	Vert	Margin [dB]		-17.25
-----						
Vertical 3500 - 5000MHz -----						
5	4053.685	29.54 pk	-25	34.3	38.84	54
	Azimuth:226	Height:198	Vert	Margin [dB]		-15.16

LIMIT 1: FCC Part15 - CLASS B

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: 04ME04421  
 Model Number: RA-6D  
 FCC ID: JPZ0031

Issued: 6/02/04

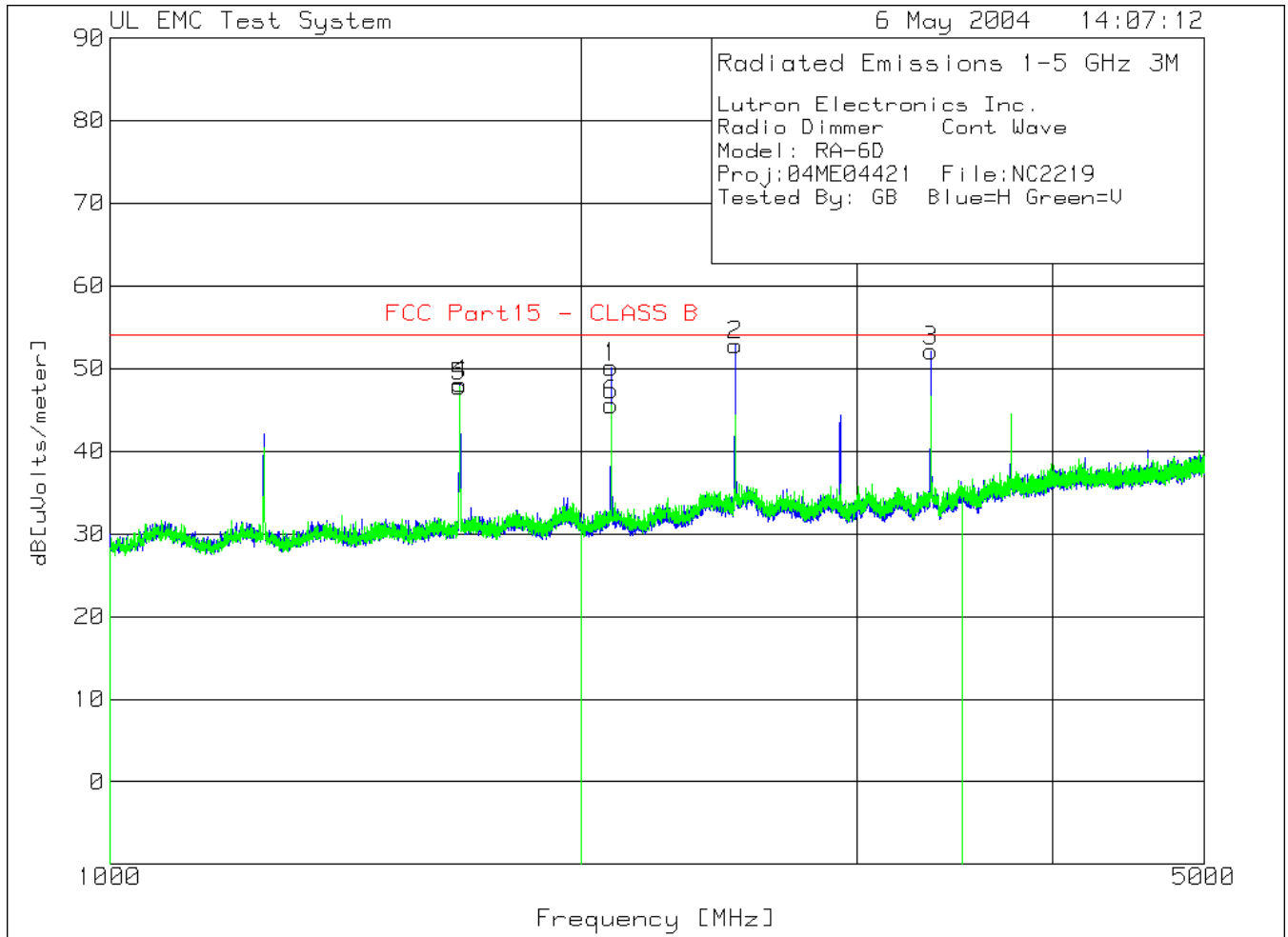
Lutron Electronics Inc.  
 Radio Dimmer 418Mhz CnstWave  
 Model: RA-6D Transmit  
 Proj:04ME04421 File:NC2219  
 Tested By: GB Blue=H Green=V

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	Limit:2
=====							
Vertical 30 - 200MHz -----							
1	38.5043	21.24 pk	.9	13.6	35.74	40	60.2
	Azimuth:199	Height:197	Vert	Margin [dB]		-4.26	-24.46
2	39.2697	26.82 pk	.9	13.5	41.22	40	60.2
	Azimuth:17	Height:197	Vert	Margin [dB]		1.22	-18.98
3	41.1406	25.17 pk	.9	13.3	39.37	40	60.2
	Azimuth:39	Height:395	Vert	Margin [dB]		-.63	-20.83
4	49.3898	26.12 pk	1	11.7	38.82	40	60.2
	Azimuth:199	Height:197	Vert	Margin [dB]		-1.18	-21.38
5	70.9907	37.81 pk	1.1	5.6	44.51	40	60.2
	Azimuth:358	Height:197	Vert	Margin [dB]		4.51	-15.69
-----							
Horizontal 200 - 1000MHz -----							
6	417.9397	*41.6 pk	2.9	16.1	60.6	*46	80.2
	Azimuth:88	Height:297	Horz	Margin [dB]		40.2	-19.6
9	836.2131	15.92 pk	4.2	22.5	42.62	46	60.2
	Azimuth:343	Height:197	Horz	Margin [dB]		-3.38	-17.58
-----							
Vertical 200 - 1000MHz -----							
7	417.9397	*49.5 pk	2.9	16.1	68.5	*46	80.2
	Azimuth:223	Height:101	Vert	Margin [dB]		48.1	-11.7
8	836.2131	17.42 pk	4.2	22.5	44.12	46	60.2
	Azimuth:325	Height:101	Vert	Margin [dB]		-1.88	-16.08

LIMIT 1: FCC Part 15 Class B 3m  
 LIMIT 2: FCC Part 15 Subpart C-Section 15.231

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

**\*Duty Cycle correction factor of -25.6 dB added to Average level.**



File Number: NC2219  
 Project Number: 04ME04421  
 Model Number: RA-6D  
 FCC ID: JPZ0031

Issued: 6/02/04

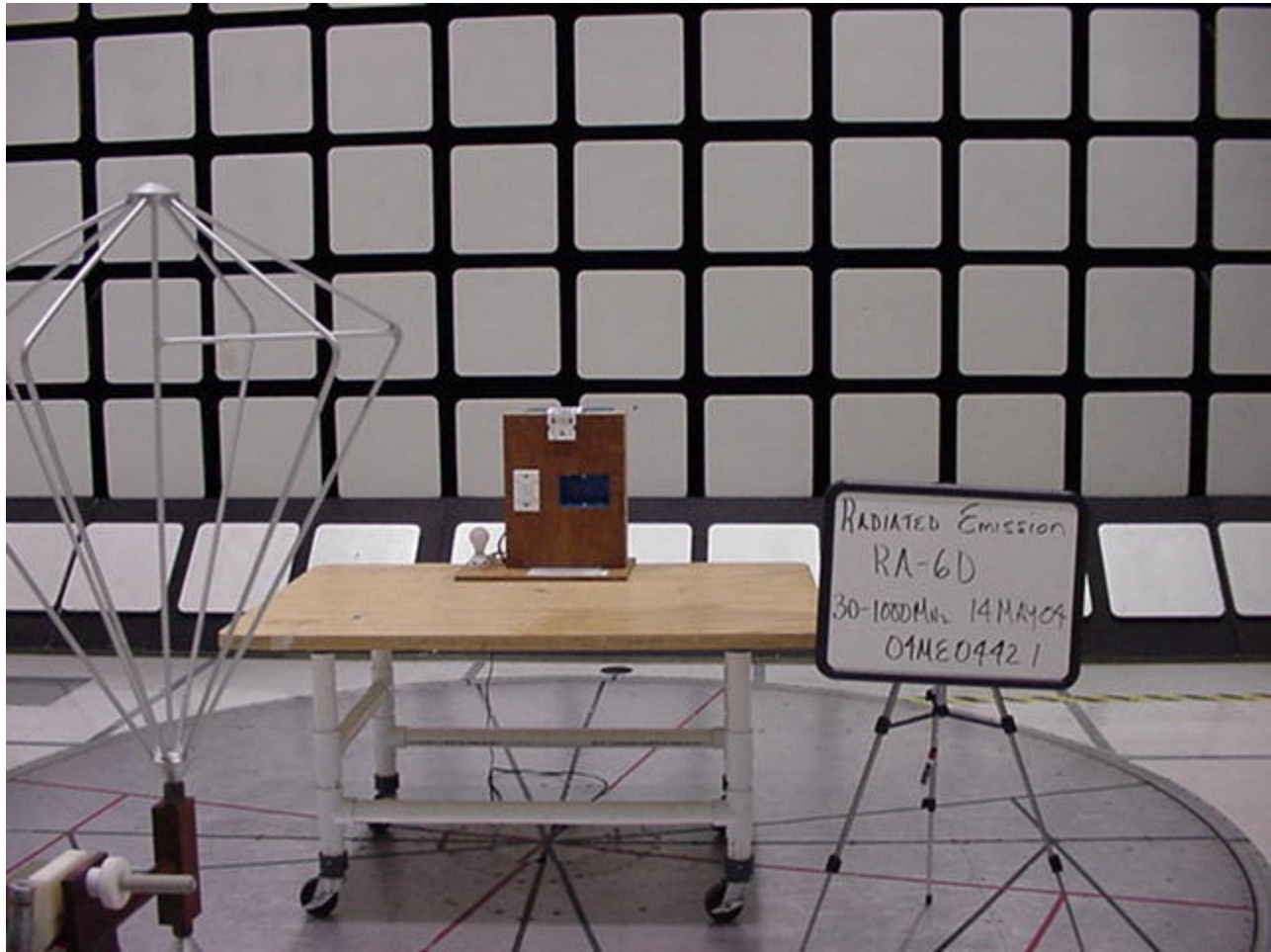
Lutron Electronics Inc.  
 Radio Dimmer Cont Wave  
 Model: RA-6D Transmit  
 Proj:04ME04421 File:NC2219  
 Tested By: GB Blue=H Green=V

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	Limit:2
-----							
Horizontal 1000 - 2000MHz -----							
4	1672.557	50.69 pk	-30.1	27.5	48.09	54	60.2
	Azimuth:211	Height:98	Horz	Margin [dB]		-5.91	-12.11
-----							
Horizontal 2000 - 3500MHz -----							
1	2090.03	49.96 pk	-29	29.2	50.16	54	60.2
	Azimuth:222	Height:100	Horz	Margin [dB]		-3.84	-10.04
2	2508.17	48.81 pk	-26.6	30.6	52.81	54	60.2
	Azimuth:229	Height:100	Horz	Margin [dB]		-1.19	-7.39
3	3344.449	46.23 pk	-26.5	32.4	52.13	54	60.2
	Azimuth:222	Height:100	Horz	Margin [dB]		-1.87	-8.07
-----							
Vertical 1000 - 2000MHz -----							
5	1672.223	50.46 pk	-30.1	27.5	47.86	54	60.2
	Azimuth:95	Height:100	Vert	Margin [dB]		-6.14	-12.34
-----							
Vertical 2000 - 3500MHz -----							
6	2090.03	45.4 pk	-29	29.2	45.6	54	60.2
	Azimuth:342	Height:100	Vert	Margin [dB]		-8.4	-14.6

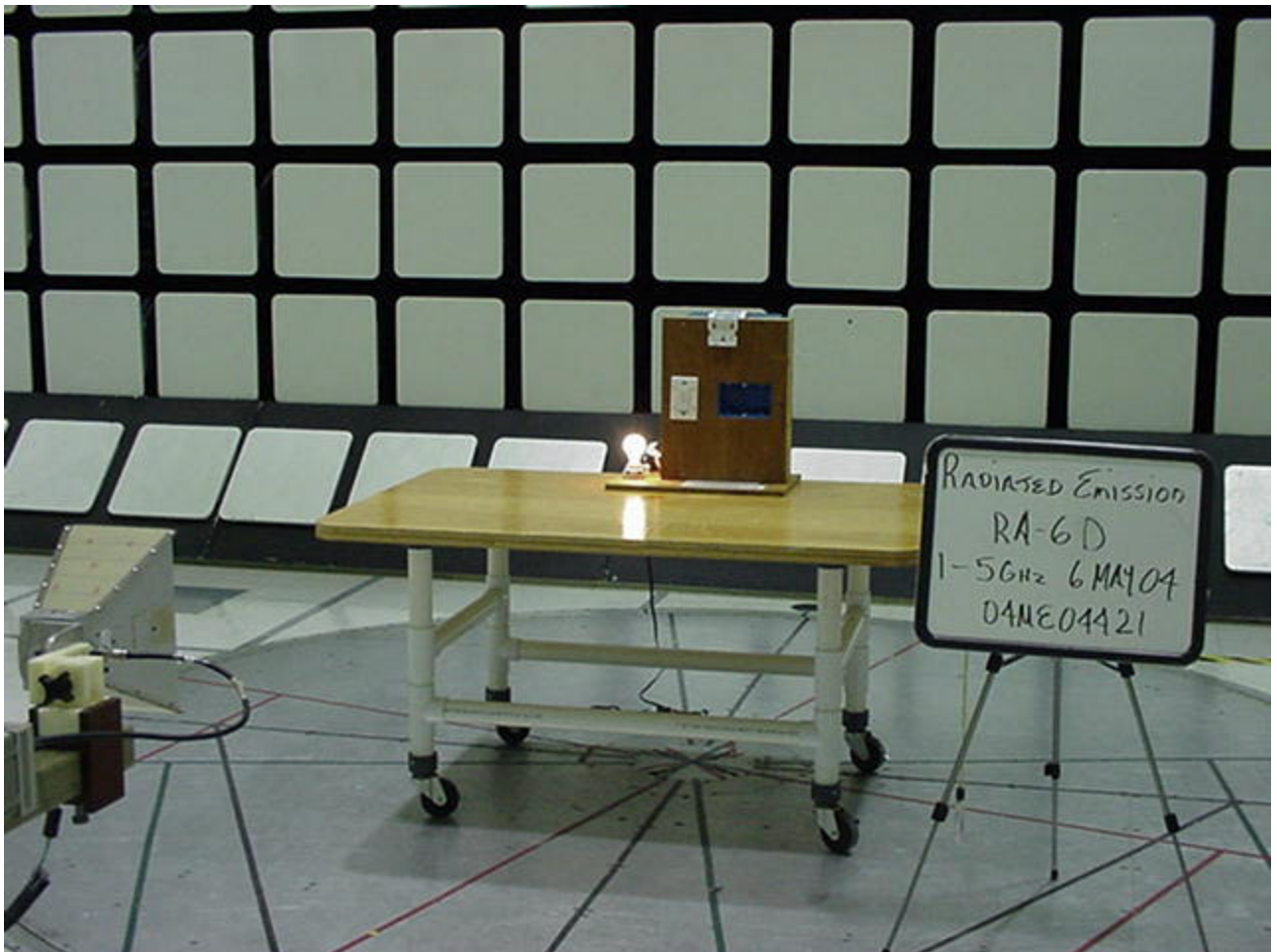
LIMIT 1: FCC Part15 - CLASS B  
 LIMIT 2: FCC Part 15 Subpart C-Section 15.231

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





**Radiated Emission Test Set-up Front View 30 –1000MHz**



**Radiated Emission Test Set-up Front View 1-5GHz**



**Radiated Emission Test Set-up Rear View 1-5GHz**

## 5.1.2 Pulse Train

### Test Applicable

#### Results

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

Temperature:	21.5°C
Humidity:	46%RH
Pressure:	1011mbar
Date test performed:	24 May 2004

### Test Procedure:

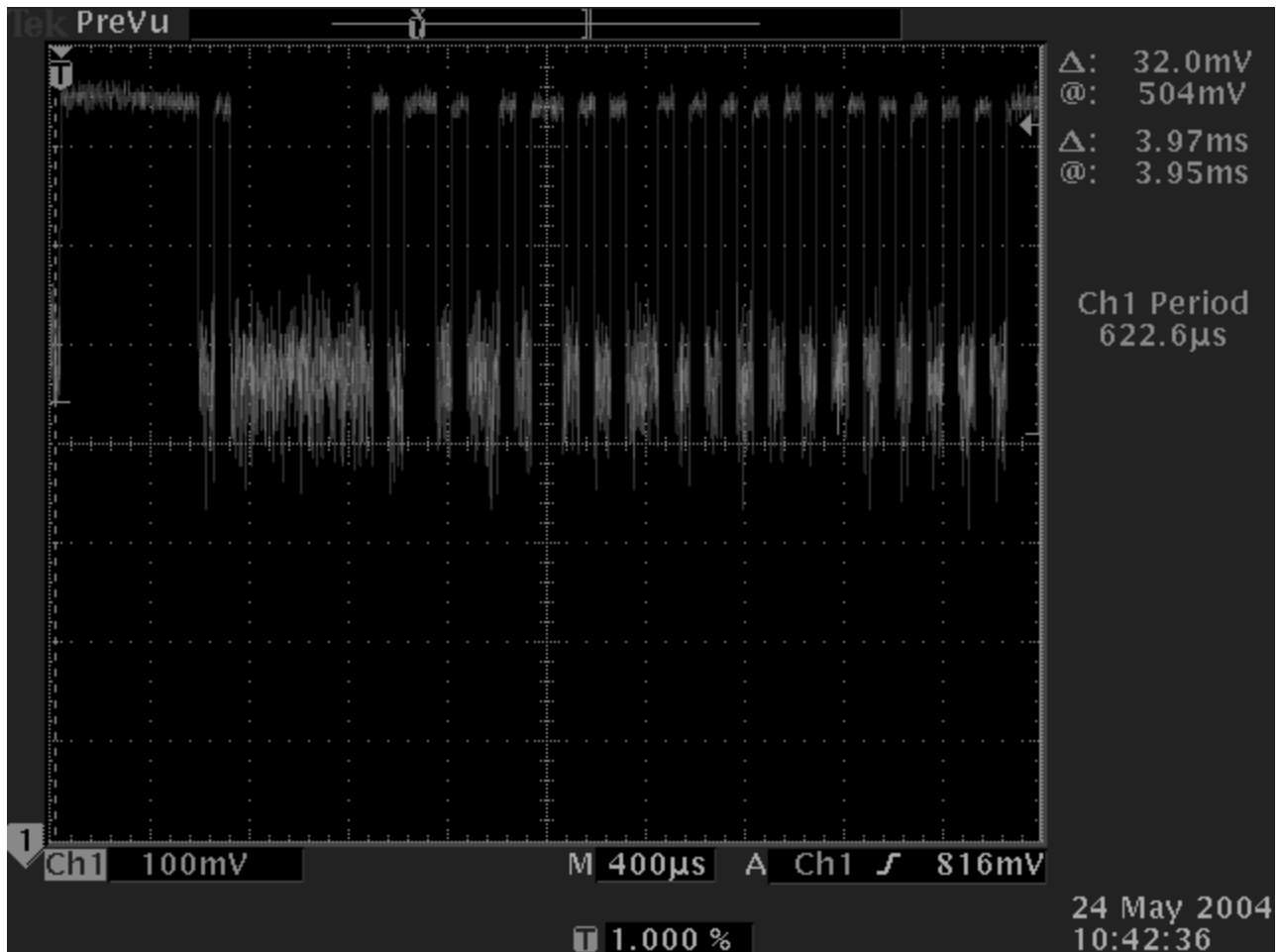
This test is performed one time at any frequency band. A manual operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released

### Test equipment used for Cease Operation measurements:

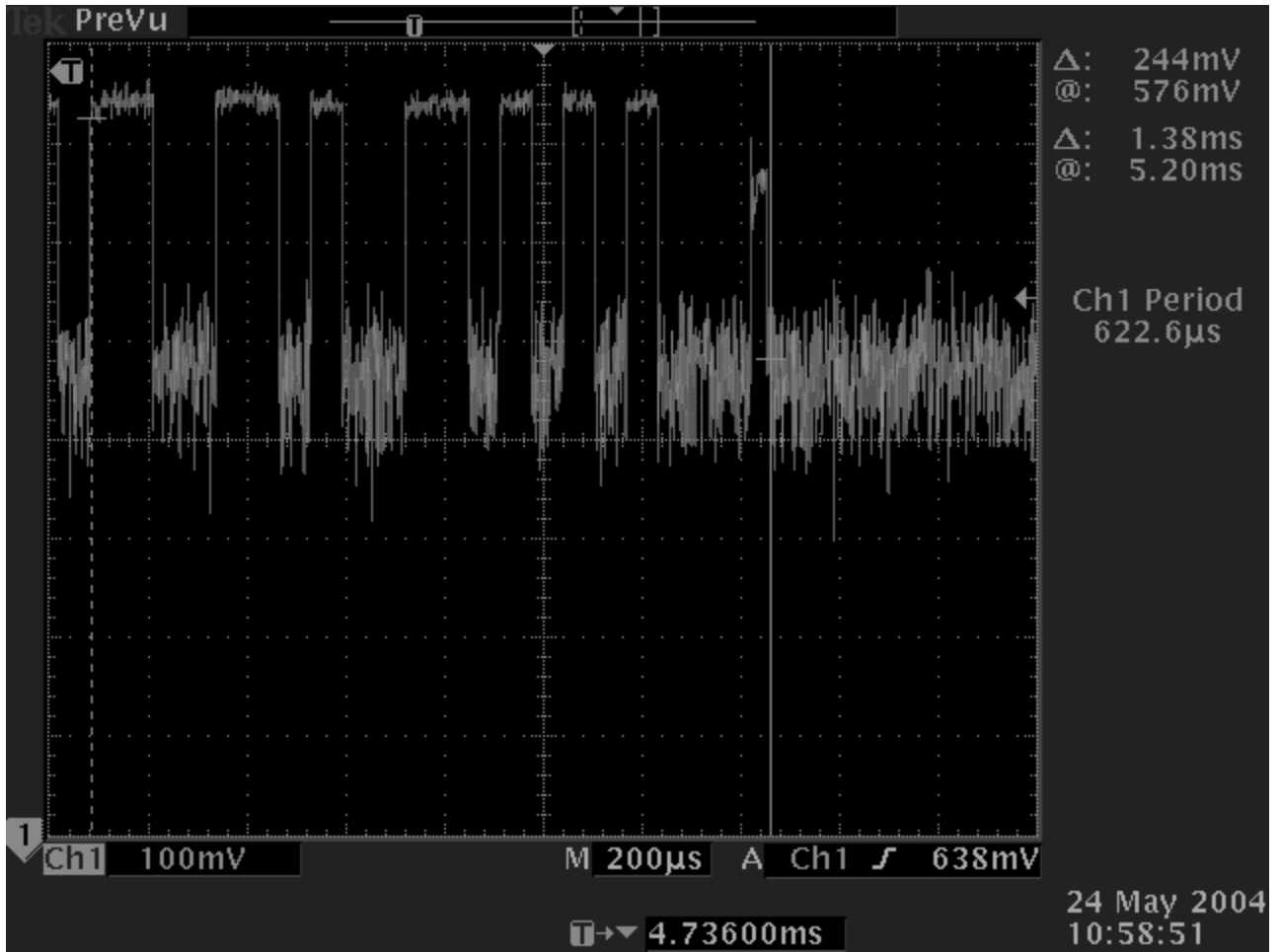
<b>ESI26</b>	<b>Rhode &amp; Schwartz</b>	<b>EMI Receiver</b>	<b>Equipment No.: ME5B-081</b>
			<b>Quasi Peak BW: 200Hz 9kHz to 150kHz</b>
			<b>RBW 10 KHz</b>
			<b>Quasi Peak BW: 9kHz 150kHz to 30MHz</b>
			<b>RBW 100 KHz</b>
			<b>Quasi Peak BW: 120 kHz 30 to 1000MHz</b>
			<b>RBW 1.0 MHz</b>
Range: 30MHz-1000MHz	Last Calibration Date: 28 August 2003		Calibration Due Date: 31 August 2004
3121C-DB4	EMCO Log-Periodic Antenna		Equipment No.: ME5-811
	Last Calibration Date: 1 April 2004		Calibration Due Date: 1 April 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: 27 May 2003			Calibration Due Date: 27 May 2004

**Paragraph 15.35:**

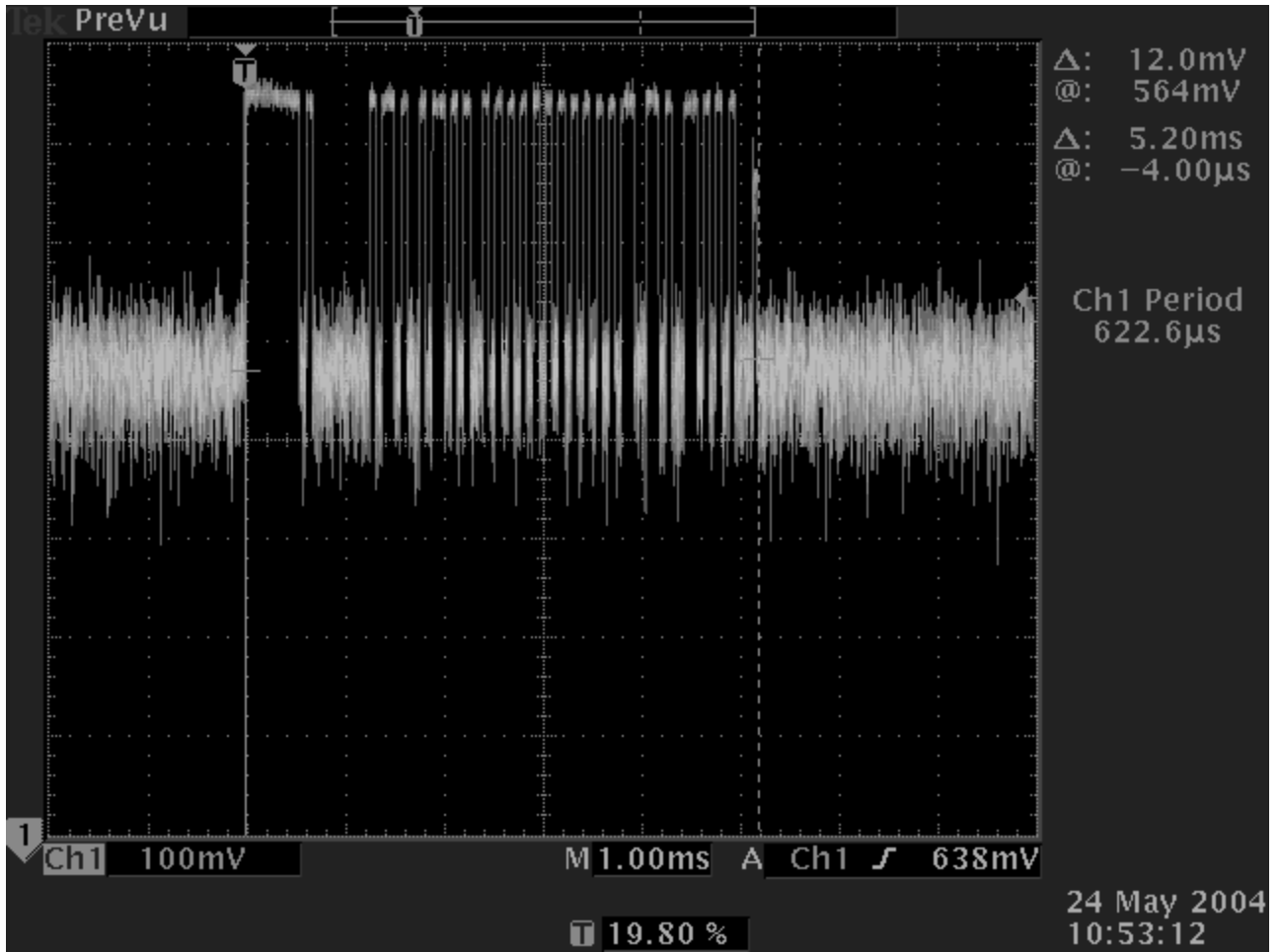
When the Radiated Limits are expressed in terms of the average value of the emissions, and pulse operation is employed, the pulse measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds (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.



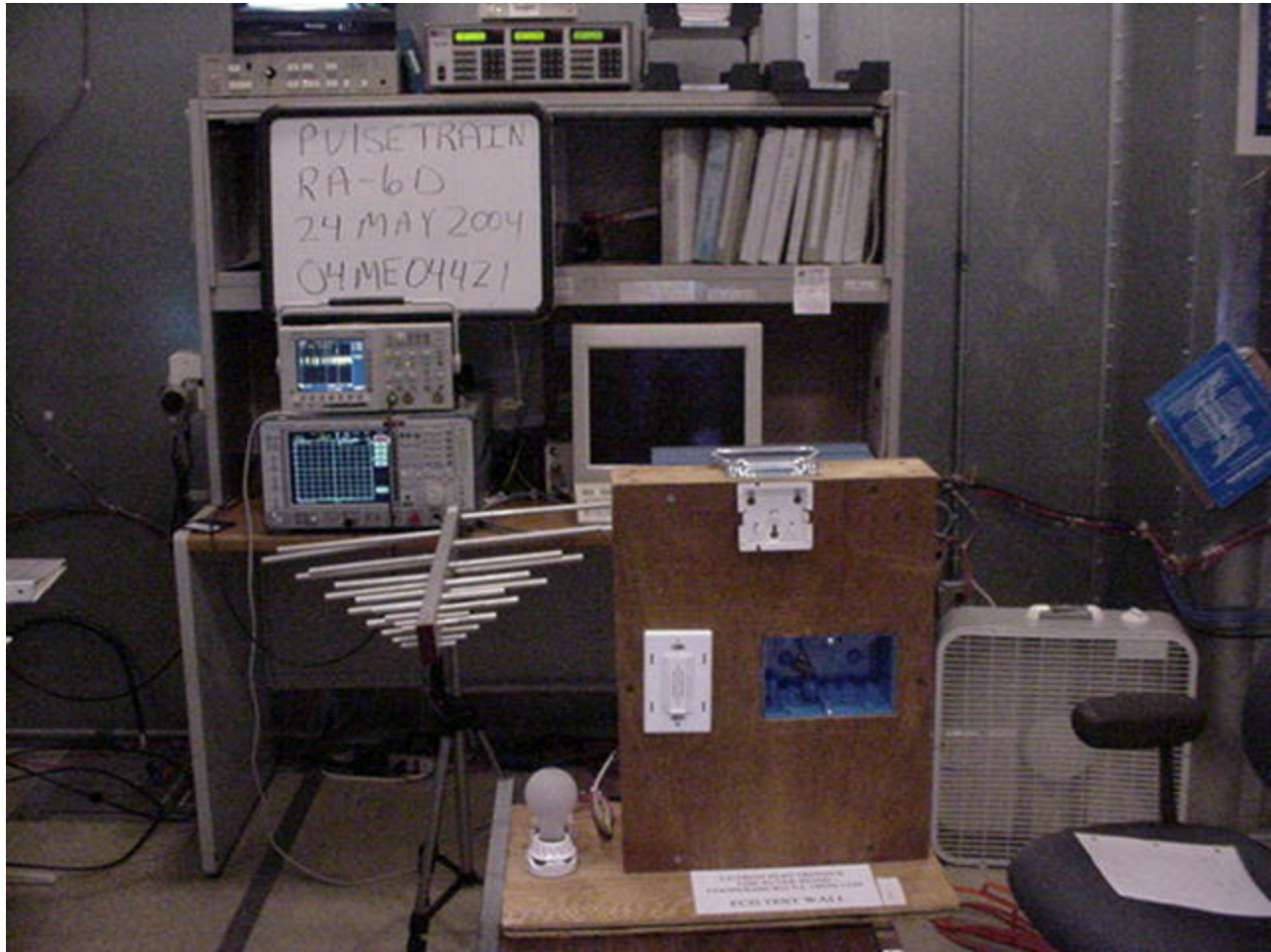
**Pulse train T0 -T1**



Pulse train T1 -T2



**Complete Pulse Train = 5.20ms**



**Pulse Train Test Set-Up**



### 5.1.3 Occupied Bandwidth

#### Test Applicable

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.

418MHz = Fundamental Operating Frequency

Bandwidth = 0.25% of 418MHz = 1.045MHz

#### Results

The system met the requirements for fluctuating harmonic emissions and flicker. Data Pages follow.

Temperature:	21.5°C
Humidity:	48%RH
Pressure:	1011mbar
Date test performed:	20 May 2004

#### Test equipment used for Occupied Bandwidth Measurements:

<b>E7402A</b>	<b>Agilent</b>	<b>EMI Receiver</b>	<b>Equipment No.: ME5B-123</b>
		<b>Quasi Peak BW:</b>	<b>200Hz</b>
		<b>RBW</b>	<b>10 KHz</b>
		<b>Quasi Peak BW:</b>	<b>9kHz</b>
		<b>RBW</b>	<b>100 KHz</b>
		<b>Quasi Peak BW:</b>	<b>120 kHz</b>
		<b>RBW</b>	<b>1.0 MHz</b>

Range: 30MHz – 5GHz    Last Calibration Date: 22 January 2004    Calibration Due Date: 22 January 2005

#### Test Accessories for Radiated Emissions:

<b>3121C-DB4</b>	<b>EMCO Log-Periodic Antenna</b>	<b>Equipment No.: ME5-811</b>
	<b>Last Calibration Date: 1 April 2004</b>	<b>Calibration Due Date: 1 April 2005</b>
<b>8449BHewlett Packard</b>	<b>1-26GHz Pre-Amp</b>	<b>Equipment No.: ME5-914</b>
<b>99760-00</b>	<b>Cole –Parmer Hydrometer/Temp/Barometer</b>	<b>Equipment No.: ME4-268</b>

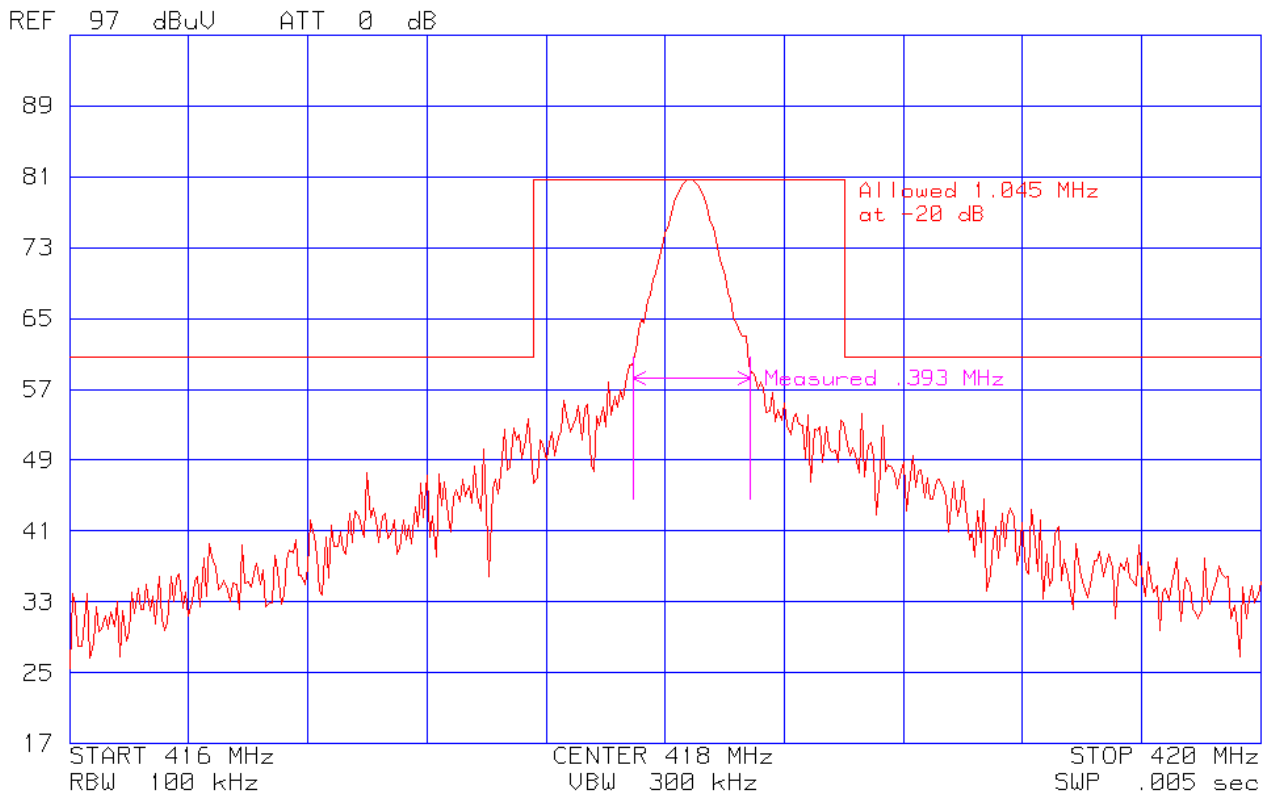
Ranges:: Temp:0°C-55°C

Humidity 25% to 95 %RH

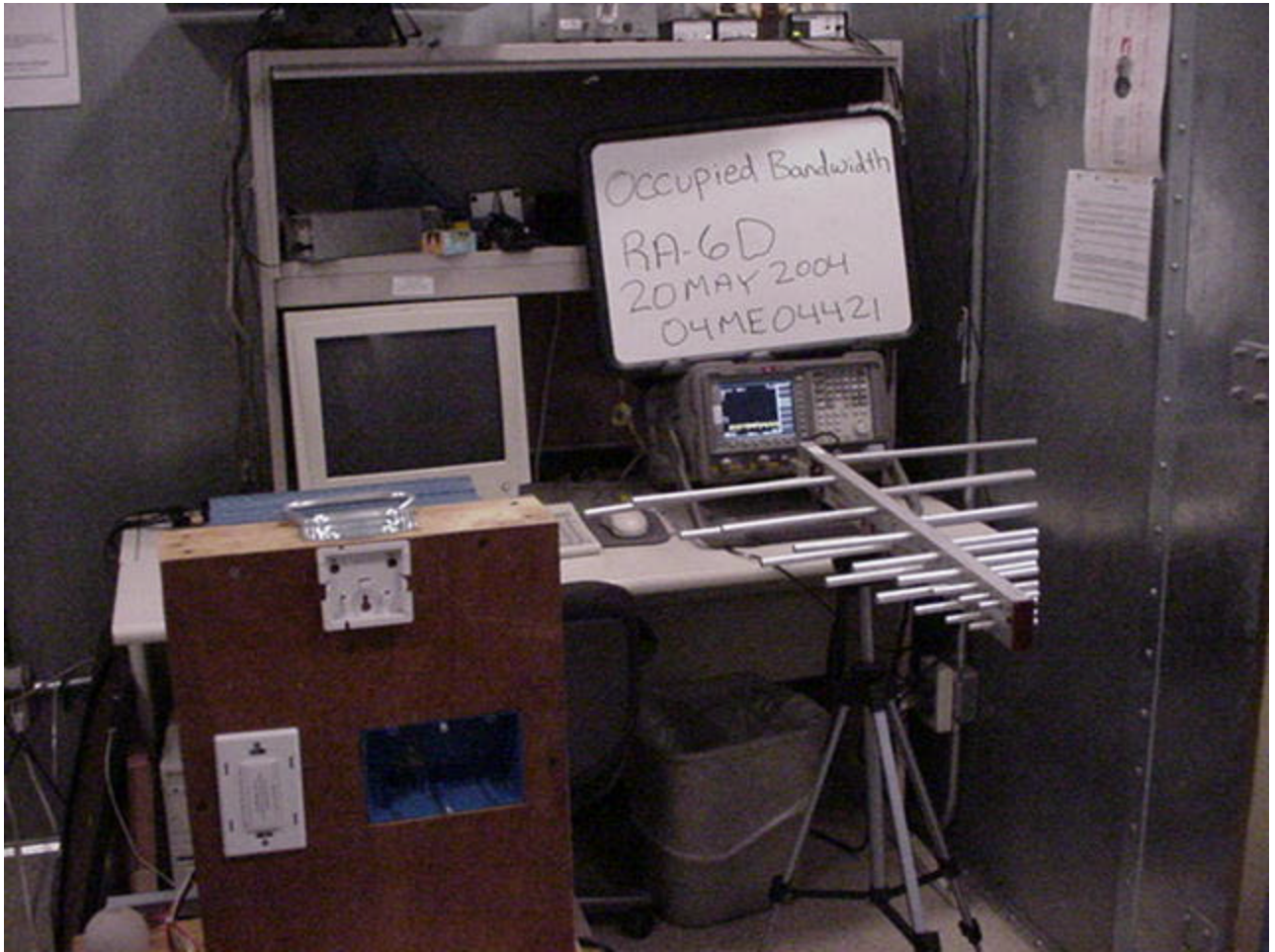
Pressure 795 to 1050 mbar

Last Calibration Date: 27 May 2003

Calibration Due Date: 27 May 2004



### Occupied Bandwidth @ 418MHz



**Occupied Bandwidth Test Set-Up**

## 5.1.5 Fundamental Frequency and Spurious Emissions Measurement Limit Calculations

### Limit Calculation

#### **Fundamental Frequency is 418MHz**

From table in section 15.231

$$\text{Limit} = 41.6667(418) - 7083.3333$$

$$\text{Limit} = 10333.348\text{uV}$$

$$\text{Limit} = \text{Log } 10333.348 (20)$$

$$\text{Limit} = 80.2\text{dBuV}$$

$$\text{Limit for Spurious Emissions} = 20\text{dB lower then fundamental} = 60.2\text{dBuV/m}$$

Fundamental Frequency is 418MHz

From table in section 15.231

$$\text{Limit} = 41.6667(418) - 7083.3333$$

$$\text{Limit} = 10333.348\text{uV}$$

$$\text{Limit} = \text{Log } 10333.348(20)$$

$$\text{Limit} = 80.2\text{dBuV}$$

$$\text{Limit for Spurious Emissions} = 20\text{dB lower then fundamental} = 60.2\text{dBuV/m}$$

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

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

$$\text{Radiated Emissions Limit (dB}\mu\text{V/m)} = 20 * \log (90)$$

$$\text{Radiated Emissions Limit (dB}\mu\text{V/m)} = 39.1$$

***Radiated Emissions test data obtained during measurements.***

$$\text{Field Strength (dB}\mu\text{V/m)} = \text{Measured field strength (dB}\mu\text{V/m)} + \text{Antenna Factor (dB)} + \text{Cable Factor(dB)}$$

$$\text{Field Strength (dB}\mu\text{V/m)} = 19.7\text{dB}\mu\text{V/m} + 12.5\text{dB} + 0.3\text{dB}$$

$$\text{Field Strength (dB}\mu\text{V/m)} = 32.5$$

#### **Duty Cycle factor calculation:**

Total number of pulses counted in 100ms

Total time on = 5.20ms

$$\text{Duty cycle correction factor} = 20 \log (5.20 / 100\text{ms})$$

$$= 20 \log (0.052)$$

$$= - 25.6\text{dB}$$

**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