



Project: 03ME13330
File: NC2219
Date: 11/19/03
Model: RALB-5W

Test Report

On

Electromagnetic Compatibility Testing

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to public safety and committed to
quality service for over 100 years**

File Number: NC2219
Project Number: 03ME13330
Model Number: RALB-5W
FCCID: JPZ0028

Issued: 11/19/03

Test Report Details

Tests Performed By: **Underwriters Laboratories Inc.
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Melville, NY 11747**

Tests Performed For: **Lutron Electronics Co. Inc.
7200 Suter Road.
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Test Report Date: **11/19/03**

Product Type: **Keypad**

Model Number: **RALB-5W**

Sample Serial Number: **Not Provided**

Sample Tag Number: **0534332001**

Sample Receive Date: **11/04/03**

EUT Category: **Radio Transmitter**

Testing Start Date: **11/04/03**

Date Testing Complete: **11/18/03**

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.

Report Directory

1.0	<i>GENERAL - Product Description</i>	4
1.1	Device Configuration During Test	5
1.1.1	Equipment Used During Test:	5
1.1.2	Input/Output Ports:	5
1.1.3	EUT Internal Operating Frequencies:	5
1.1.4	Power Interface:	6
1.2	EUT Operation Modes:	6
1.3	EUT Configuration Modes:	6
1.4	Block Diagram:	7
1.5	Deviations from standard test methods.	7
1.6	Device Modifications Necessary for Compliance	7
1.7	Test Summary.....	7
2.0	Conclusion:	8
3.0	FCC Labeling Information	9
3.1	Identification.	9
3.2	Compliance information.....	9
3.3	Labeling.....	10
3.4	User information.....	12
4.0	Calibration of Equipment Used for Measurement	12
5.0	EMISSIONS TEST REGULATIONS.....	13
5.1.1	Conducted Emissions Tests.....	14
5.1.2	Cease Operation Within 5 Seconds.....	28
5.1.3	Radiated Emissions Test (10 Meter Semi-Anechoic Chamber).....	31
5.1.4	Occupied Bandwidth.....	49
5.1.5	Fundamental Frequency and Spurious Emissions Measurement Limit Calculations	50
	Accreditations and Authorizations	54

Report Revision History

Revision Date	Description	Revised By	Revision Reviewed By
Not Applicable	Not Applicable	Not Applicable	Not Applicable

1.0 G E N E R A L - Product Description

Device Function: The RALB-5W is a wall mounted master control station. It contains an AM transceiver and an antenna, which are not accessible to the user. It is used as part of acts as a central hub and programming interface of an integrated lighting control system. It contains an AM transceiver and an antenna. It is used as part of an integrated lighting control system. The purpose of RF communication is to transmit and receive command signals. Transmitted commands allow the triggering of system events. Received commands allow for updating of control indicator status.

Analog Function: The RALB-5W obtains power through standard household wiring. The power supply and voltage regulator produces a 5VDC output, which is used to power all analog and micro controller activities.

1.1 Device Configuration During Test

The device was tested in two modes of operation:

1. Continuously transmitting an intentional radio frequency in Continuous Wave (CW).
2. Standby mode (Receive). The device is waiting to receive a signal source.

The manufacturer configured the device. The antenna is an Integral part of the EUT (equipment under test) and cannot be changed or removed.

1.1.1 Equipment Used During Test:

Use*	Product Type	Manufacturer	Model	Comments
EUT	Keypad	Lutron	RALB-5W	There was no support equipment necessary except for the keypad.

* 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	< 3m	None	None

*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
418	Operating Frequency	-----	-----

1.1.4 Power Interface:

Mode #	Voltage (V)	Frequency (DC/AC-Hz)	Phases (#)	Comments
1	120	60	1	None

1.2 EUT Operation Modes:

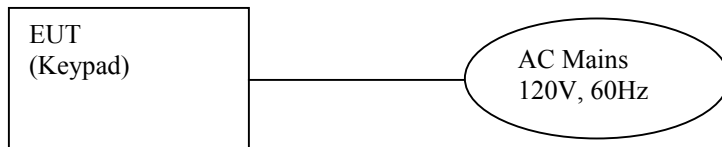
Mode #	Description
1	The EUT was configured to continuously transmit at its operating frequency 418MHz.
2	The EUT was configured to be in Standby, which is receive mode

1.3 EUT Configuration Modes: See section 1.1

"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 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 1.5

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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: 11/4/03
Test Completion Date: 11/19/03



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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

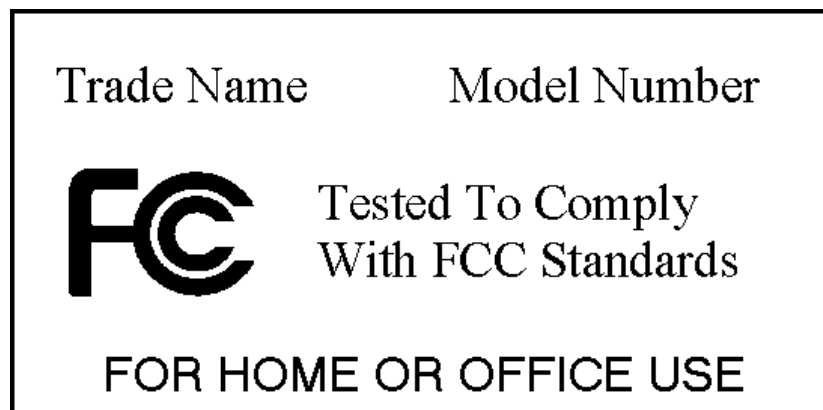
In addition to the requirements in Part 2 of this CFR 47 (See **1.6.1 Identification** above), a device subject to certification or verification shall be labeled as follows:

- (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.

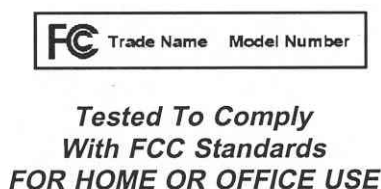
Declaration of Conformity Labeling

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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FCCID: JPZ0028

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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	Code of Federal Regulations, Part 15,
FCC Part 15 Subpart C, Paragraph 15.205, 15.207,	Subpart C, Radio Frequency Devices
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:	21.5 °C
Humidity:	55%RH
Pressure:	1013mbar
Date test performed:	6 November 2003

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
150kHz to 30 MHz	Voltage	Mains	1	2

*See Power Interface and EUT Operating Modes for details

Test equipment used for conducted emissions

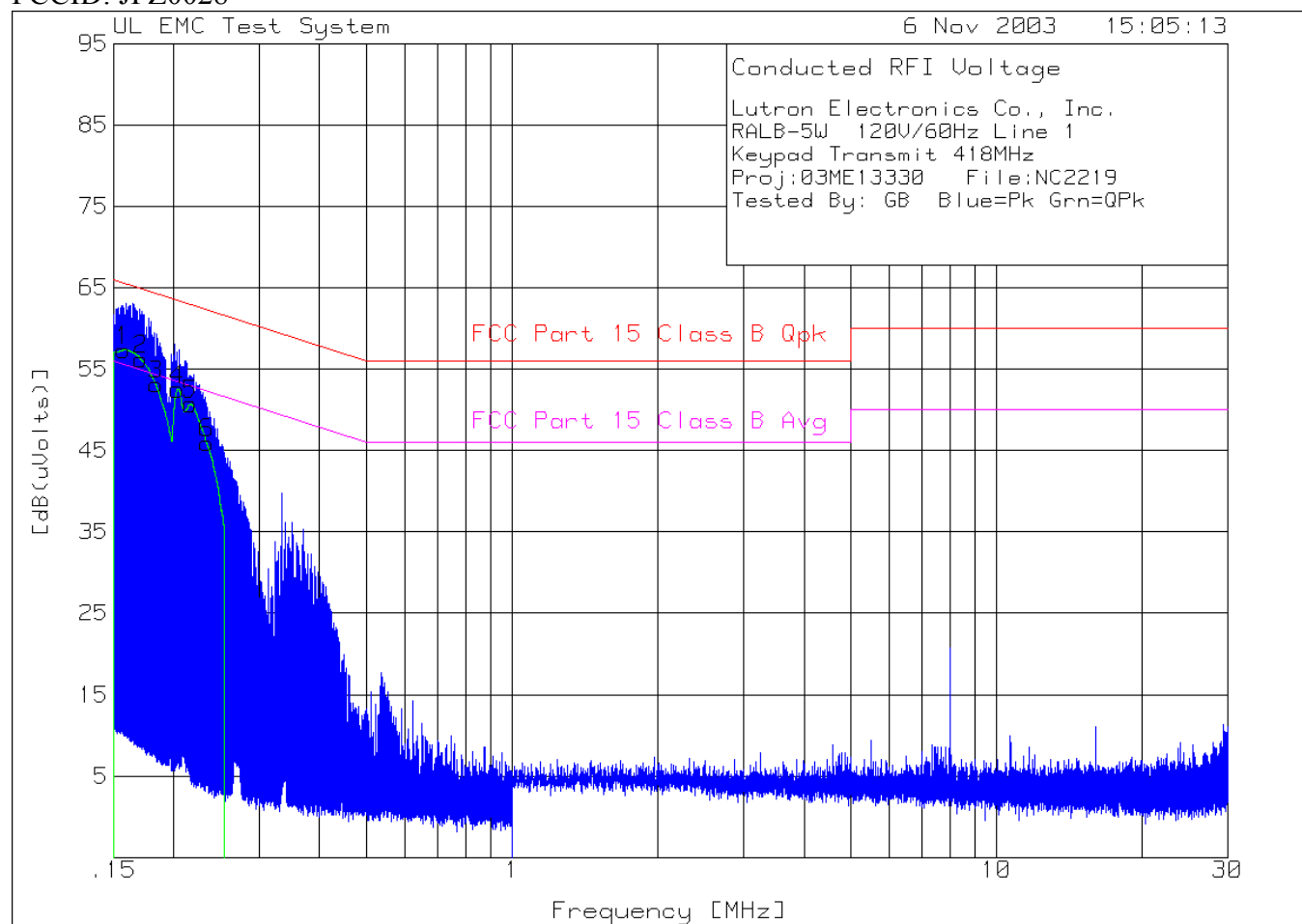
E7402A	Agilent Technologies	EMI Spectrum Analyzer	Equipment No.: ME5B-123
Range: 150KHz to 30MHz	Last Calibration Date: 25 January 2003	Calibration Due Date: 25 January 2004	

Test Accessories for Conducted Emissions

11947A	Hewlett Packard	Transient Limiter	Equipment No.: ME5A-444
Range: 150KHz to 30MHz	Last Calibration Date: 17 October 2003	Calibration Due Date: 17 October 2004	
9252-50-R-24-BNC	Solar Electronics	50Ω LISN	Equipment No.: ME5A-636
Range: 150KHz to 30 MHz	Last Calibration Date: 16 September 2003	Calibration Due Date: 16 September 2004	
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
Range: 0°C-55°C	Last Calibration Date: 27 May 2003	Calibration Due Date: 27 May 2004	

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Lutron Electronics Co., Inc.
 RALB-5W 120V/60Hz Line 1
 Keypad Transmit 418MHz
 Proj:03ME13330 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	.15732	47 qp	10.3	0	57.3	65.6	55.6
				Margin [dB]		-8.3	1.7
2	.17096	45.9 qp	10.3	0	56.2	64.9	54.9
				Margin [dB]		-8.7	1.3
3	.18371	42.8 qp	10.3	0	53.1	64.3	54.3
				Margin [dB]		-11.2	-1.2
4	.20323	42.2 qp	10.3	0	52.5	63.5	53.5
				Margin [dB]		-11	-1
5	.21666	40.4 qp	10.3	0	50.7	62.9	52.9
				Margin [dB]		-12.2	-2.2
6	.23389	35.6 qp	10.3	0	45.9	62.3	52.3
				Margin [dB]		-16.4	-6.4

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

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Keypad Transmit 418MHz
Proj:03ME13330 File:NC2219
Tested By: GB Blue=Pk Grn=QPk

Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB (uVolts)]	Limit:1	2
=====						
Range: 1 .15 - 1MHz						
.15732	9.89 av	10.3	0	20.19	65.6	55.6
			Margin [dB]:		-45.41	-35.41
.17096	9.27 av	10.3	0	19.57	64.9	54.9
			Margin [dB]:		-45.33	-35.33
.18371	6.64 av	10.3	0	16.94	64.3	54.3
			Margin [dB]:		-47.36	-37.36
.20323	5.78 av	10.3	0	16.08	63.5	53.5
			Margin [dB]:		-47.42	-37.42
.21666	3.67 av	10.3	0	13.97	62.9	52.9
			Margin [dB]:		-48.93	-38.93
.23389	-.13 av	10.3	0	10.17	62.3	52.3
			Margin [dB]:		-52.13	-42.13

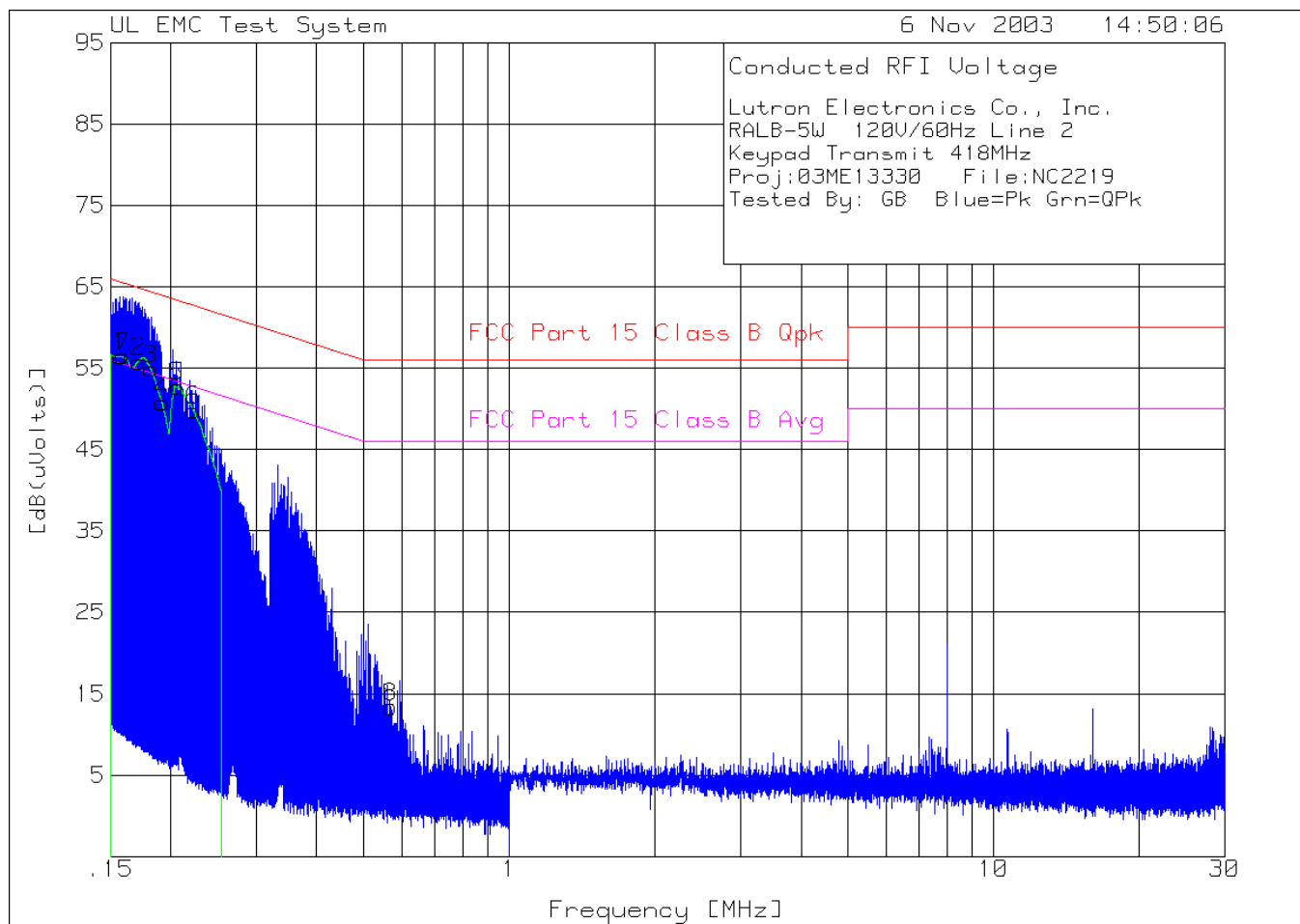
NOTE: "+" - Indicates an emission level in excess of the
applicable limit (s).

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
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 Model Number: RALB-5W
 FCCID: JPZ0028

Issued: 11/19/03

Lutron Electronics Co., Inc.
 RALB-5W 120V/60Hz Line 2
 Keypad Transmit 418MHz
 Proj:03ME13330 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	.15732	46.1 qp	10.3	0	56.4	65.6	55.6
				Margin [dB]		-9.2	.8
2	.17132	45.5 qp	10.3	0	55.8	64.9	54.9
				Margin [dB]		-9.1	.9
3	.18173	44.6 qp	10.3	0	54.9	64.4	54.4
				Margin [dB]		-9.5	.5
4	.19157	40.5 qp	10.3	0	50.8	64	54
				Margin [dB]		-13.2	-3.2
5	.20641	42.4 qp	10.3	0	52.7	63.3	53.3
				Margin [dB]		-10.6	-.6
6	.22301	39.5 qp	10.3	0	49.8	62.7	52.7
				Margin [dB]		-12.9	-2.9
7	.15941	46.1 qp	10.3	0	56.4	65.5	55.5
				Margin [dB]		-9.1	.9
8	.56899	3.1 pk	10.3	0	13.4	56	46
				Margin [dB]		-42.6	-32.6

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Keypad Transmit 418MHz
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Tested By: GB Blue=Pk Grn=QPk

Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB (uVolts)]	Limit:1	2
=====						
Range: 1 .15 - 1MHz						
.15732	10.76 av	10.3	0	21.06	65.6	55.6
			Margin [dB]:		-44.54	-34.54
.17132	9.68 av	10.3	0	19.98	64.9	54.9
			Margin [dB]:		-44.92	-34.92
.18173	8.48 av	10.3	0	18.78	64.4	54.4
			Margin [dB]:		-45.62	-35.62
.19157	5.88 av	10.3	0	16.18	64	54
			Margin [dB]:		-47.82	-37.82
.20641	3.49 av	10.3	0	13.79	63.3	53.3
			Margin [dB]:		-49.51	-39.51
.22301	1.84 av	10.3	0	12.14	62.7	52.7
			Margin [dB]:		-50.56	-40.56
.15941	10.3 av	10.3	0	20.6	65.5	55.5
			Margin [dB]:		-44.9	-34.9

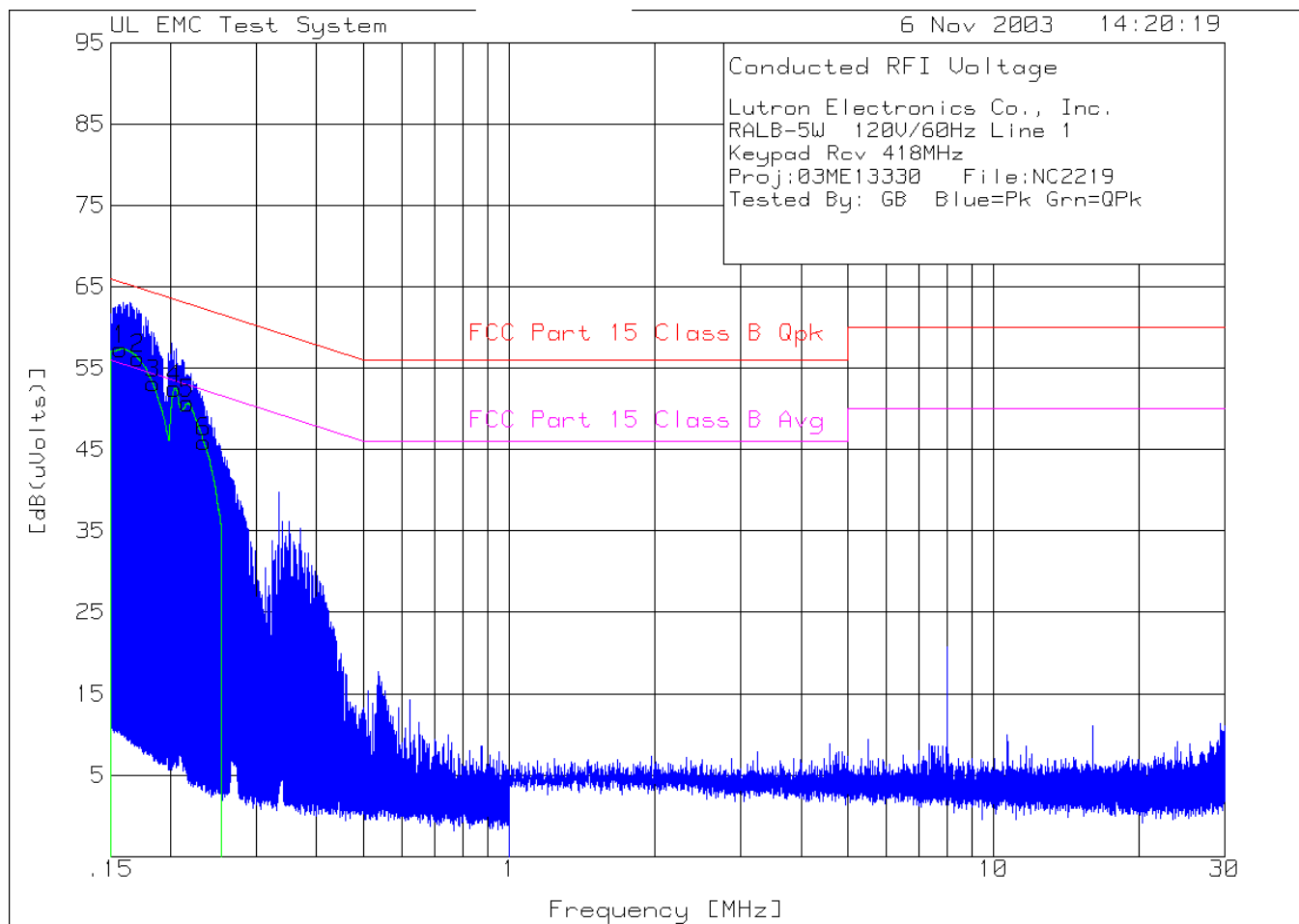
NOTE: "+" - Indicates an emission level in excess of the
applicable limit (s).

pk - Peak detector
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avem - denotes EMI average detection

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 Keypad Rcv 418MHz
 Proj:03ME13330 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	.16093	43.4 qp	10.3	0	53.7	65.4	55.4
				Margin [dB]		-11.7	-1.7
2	.17748	39.9 qp	10.3	0	50.2	64.6	54.6
				Margin [dB]		-14.4	-4.4
3	.18641	34.5 qp	10.3	0	44.8	64.2	54.2
				Margin [dB]		-19.4	-9.4
4	.20323	42.2 qp	10.3	0	52.5	63.5	53.5
				Margin [dB]		-11	-1.0
5	.21666	40.4 qp	10.3	0	50.7	62.9	52.9
				Margin [dB]		-12.2	-2.2
6	.23389	35.6 qp	10.3	0	45.9	62.3	52.3
				Margin [dB]		-16.4	-6.0
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: 03ME13330
Model Number: RALB-5W
FCCID: JPZ0028

Issued: 11/19/03

Lutron Electronics Co., Inc.
RALB-5W 120V/60Hz Line 1
Keypad Rcv 418MHz
Proj:03ME13330 File:NC2219
Tested By: GB Blue=Pk Grn=QPk

Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB (uVolts)]	Limit:1	2
=====						
Range: 1 .15 - 1MHz						
.16093	7.44 av	10.3	0	17.74	65.4	55.4
			Margin [dB]:		-47.66	-37.66
.17748	6.75 av	10.3	0	17.05	64.6	54.6
			Margin [dB]:		-47.55	-37.55
.18641	5.34 av	10.3	0	15.64	64.2	54.2
			Margin [dB]:		-48.56	-38.56
.20323	5.78 av	10.3	0	16.08	63.5	53.5
			Margin [dB]:		-47.42	-37.42
.21666	3.67 av	10.3	0	13.97	62.9	52.9
			Margin [dB]:		-48.93	-38.93
.23389	-.13 av	10.3	0	10.17	62.3	52.3
			Margin [dB]:		-52.13	-42.13

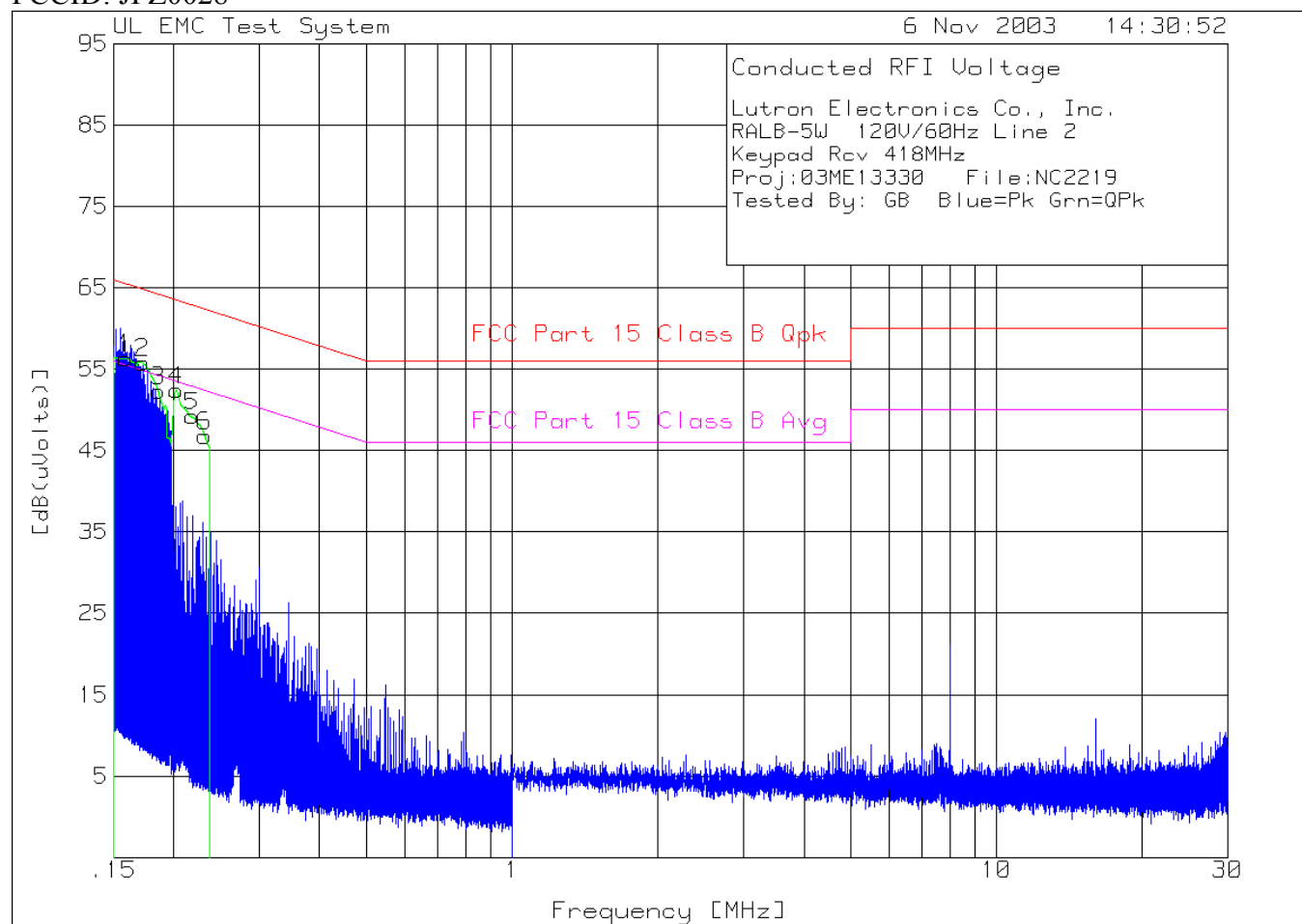
NOTE: "+" - Indicates an emission level in excess of the
applicable limit (s).

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: 03ME13330
Model Number: RALB-5W
FCCID: JPZ0028

Issued: 11/19/03



File Number: NC2219
 Project Number: 03ME13330
 Model Number: RALB-5W
 FCCID: JPZ0028

Issued: 11/19/03

Lutron Electronics Co., Inc.
 RALB-5W 120V/60Hz Line 2
 Keypad Rcv 418MHz
 Proj:03ME13330 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	.15883	46 qp	10.3	0	56.3	65.5	55.5
				Margin [dB]		-9.2	.8
2	.17227	45.5 qp	10.3	0	55.8	64.9	54.9
				Margin [dB]		-9.1	.9
3	.18571	42 qp	10.3	0	52.3	64.2	54.2
				Margin [dB]		-11.9	-1.9
4	.20277	42.1 qp	10.3	0	52.4	63.5	53.5
				Margin [dB]		-11.1	-1.1
5	.21812	38.9 qp	10.3	0	49.2	62.9	52.9
				Margin [dB]		-13.7	-3.7
6	.23174	36.5 qp	10.3	0	46.8	62.4	52.4
				Margin [dB]		-15.6	-5.6

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: 03ME13330
Model Number: RALB-5W
FCCID: JPZ0028

Issued: 11/19/03

Lutron Electronics Co., Inc.
RALB-5W 120V/60Hz Line 2
Keypad Rcv 418MHz
Proj:03ME13330 File:NC2219
Tested By: GB Blue=Pk Grn=QPk

Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB (uVolts)]	Limit:1	2
=====						
Range: 1 .15 - 1MHz						
.15883	13.99 av	10.3	0	24.29	65.5	55.5
			Margin [dB]:		-41.21	-31.21
.17227	13.05 av	10.3	0	23.35	64.9	54.9
			Margin [dB]:		-41.55	-31.55
.18571	2.93 av	10.3	0	13.23	64.2	54.2
			Margin [dB]:		-50.97	-40.97
.20277	-2.65 av	10.3	0	7.65	63.5	53.5
			Margin [dB]:		-55.85	-45.85
.21812	-5.01 av	10.3	0	5.29	62.9	52.9
			Margin [dB]:		-57.61	-47.61
.23174	-5.18 av	10.3	0	5.12	62.4	52.4
			Margin [dB]:		-57.28	-47.28

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: 03ME13330
Model Number: RALB-5W
FCCID: JPZ0028

Issued: 11/19/03



Conducted Emission Test Set-Up

5.1.2 Cease Operation Within 5 Seconds

Test Applicable

Results

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

Temperature:	21.5 °C
Humidity:	51 %RH
Pressure:	1013mbar
Date test performed:	5 November 2003

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:

E7402A Agilent EMC Analyzer
Last Calibration Date: 25 January 2003

Equipment No.: 5B-123
Calibration Due Date: 25 January 2004

3121C-DB4 EMCO Dipole Antenna
Last Calibration Date: 6 March 2003

Equipment No.: ME-751
Calibration Due Date: 6 March 2004

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

File Number: NC2219
 Project Number: 03ME13330
 Model Number: RALB-5W
 FCCID: JPZ0028

Issued: 11/19/03



CEASE OPERATION < 5 SECONDS RALB-5W 418MHZ

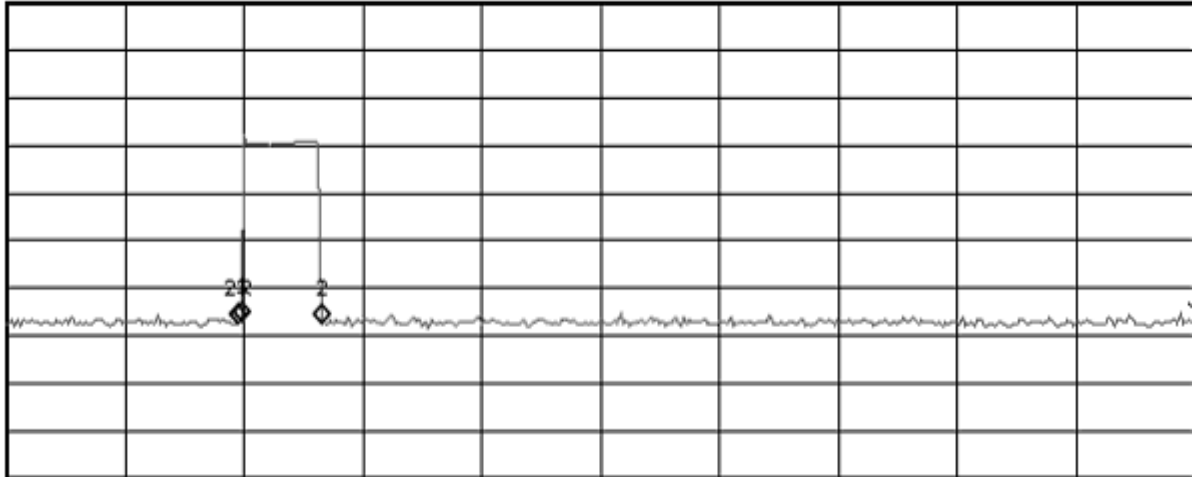
Mkr2 Δ 350 ms

Ref 107 dBμV

#Atten 20 dB

-0.004 dB

Peak
Log
10
dB/



Center 418 MHz

Span 0 Hz

Res BW 120 kHz

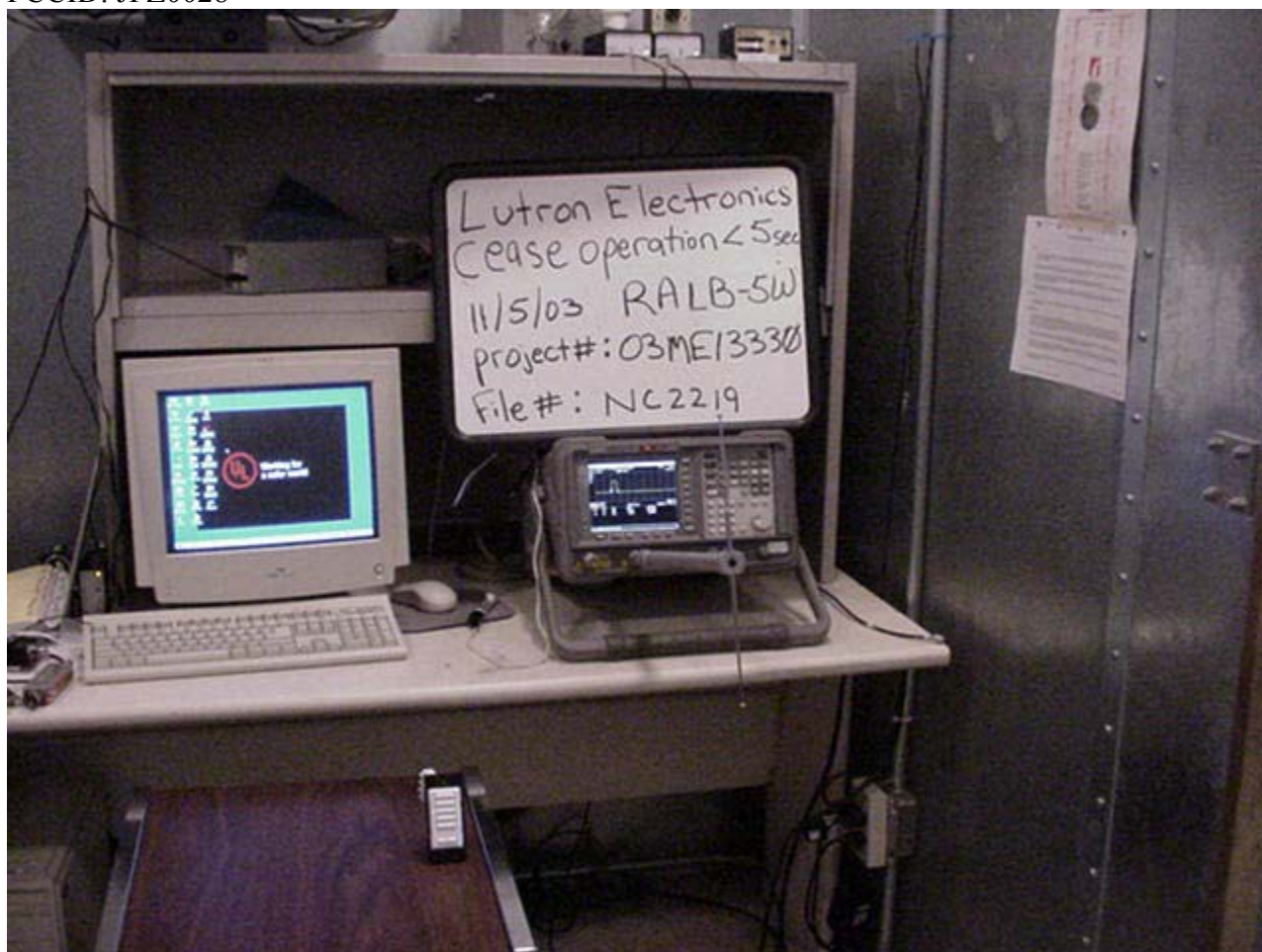
VBW 300 kHz

Sweep 5 s (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Time	987.5 ms	40.18 dBμV
2R	(1)	Time	975 ms	39.7 dBμV
2Δ	(1)	Time	350 ms	-0.004 dB

File Number: NC2219
Project Number: 03ME13330
Model Number: RALB-5W
FCCID: JPZ0028

Issued: 11/19/03



Cease Operation in Less Than 5 seconds 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.

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

Results

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

Temperature:	21.5 °C	Mode*	
Humidity:	51%RH	Power	Operation
Pressure:	1007mbar	1	1
Date test performed:	4 November 2003	1	2

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

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

File Number: NC2219
Project Number: 03ME13330
Model Number: RALB-5W
FCCID: JPZ0028

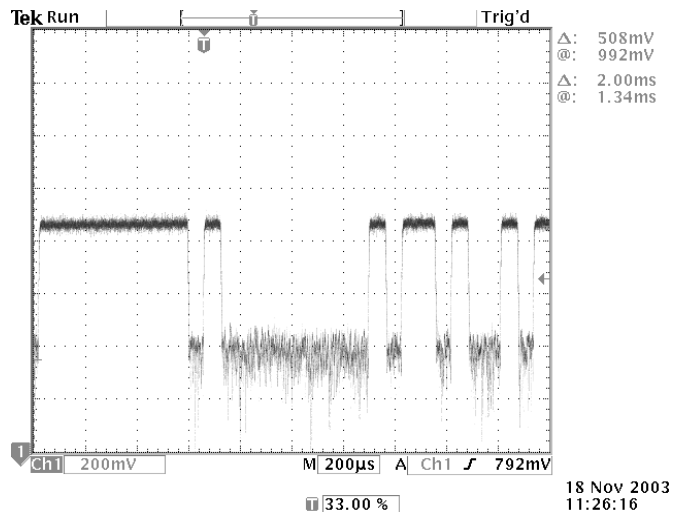
Issued: 11/19/03

Test equipment used for final radiated emissions tests:

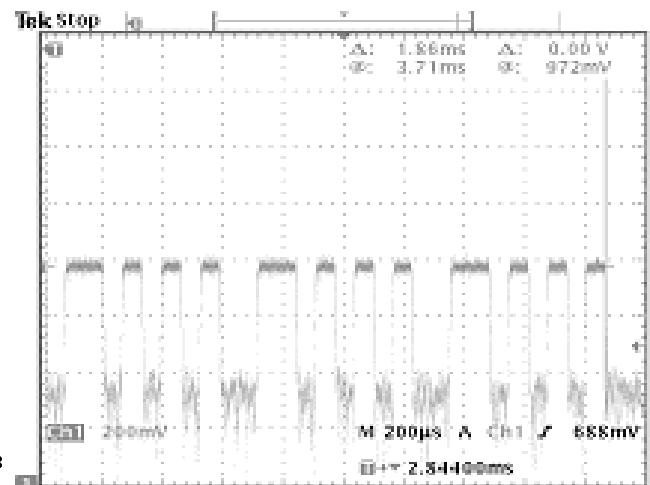
ESI26	Rhode & Schwartz	EMI Receiver	Equipment No.: ME5B-081
			Quasi Peak BW: 200Hz 9kHz to 150kHz
			RBW 10 KHz
			Quasi Peak BW: 9kHz 150kHz to 30MHz
			RBW 100 KHz
			Quasi Peak BW: 120 30 to 1000MHz
			kHz
			RBW 1.0 MHz
Range: 30 TO 5GHz	Last Calibration Date: 28 August 2003		Calibration Due Date: 28 August 2004
Test Accessories for Radiated Emissions			
94455-1	Ailtech	Biconnical Antenna	Equipment No.: ME5-439
Range: 30 to 200MHz	Last Calibration Date: 15 November 2002		Calibration Due Date: 15 November 2003
3146	EMCO	Log Periodic Antenna	Equipment No.: ME5-451
Range: 200 to 1000MHz	Last Calibration Date: 21 November 2002		Calibration Due Date: 21 November 2003
RGA-180	EMCO	Horn Antenna	Equipment No.: ME5-565
Range: 1 to 5GHz	Last Calibration Date: 24 June 2003		Calibration Due Date: 24 June 2004
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
Range: 0 -55	Last Calibration Date: 27 May 2003		Calibration Due Date: 27 May 2004

Paragraph 15.35:

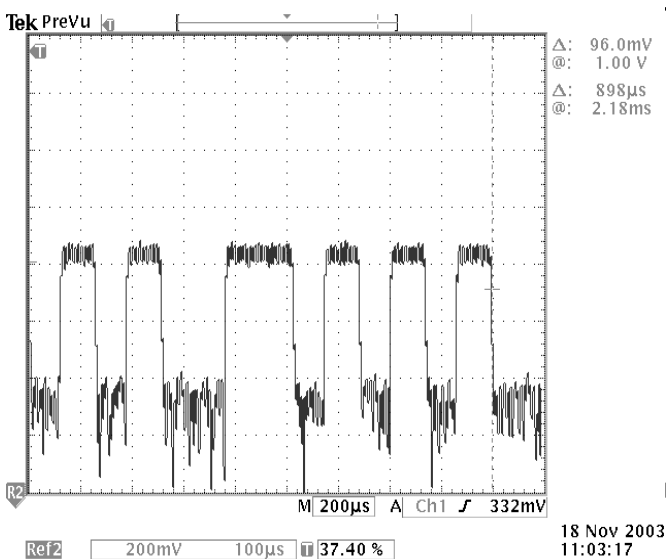
When the Radiated Limits are expressed in terms of the average value of the emissions, and pulse operation is employed, the pulse measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds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



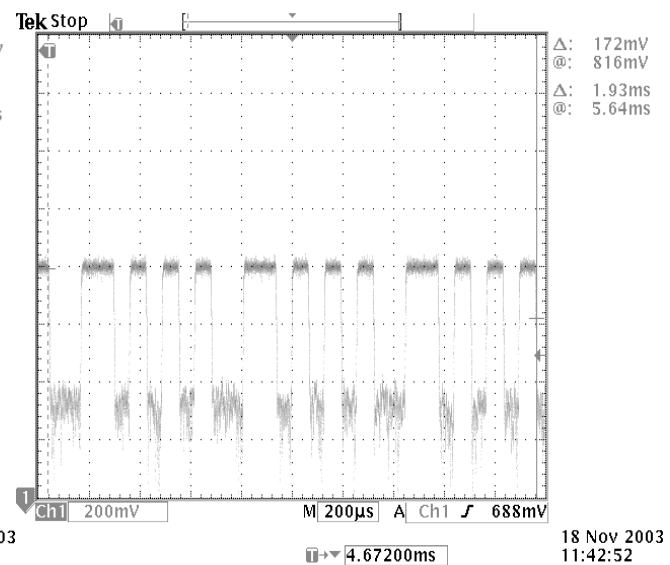
T= TØ to T1 = Individual Pulses



T= T1 to T2 = Individual Pulses



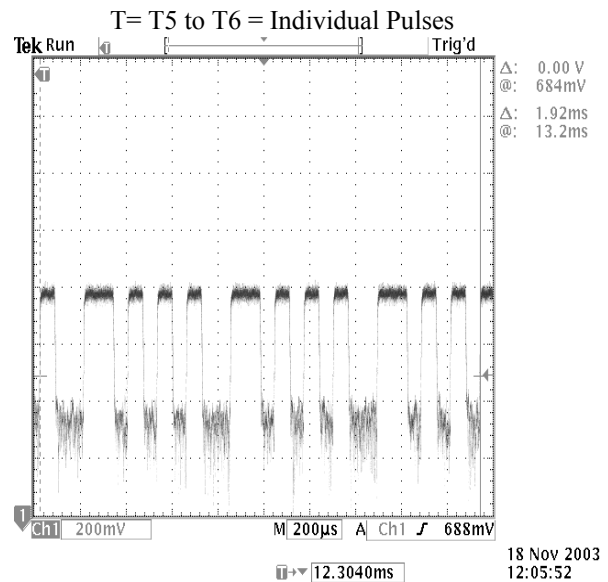
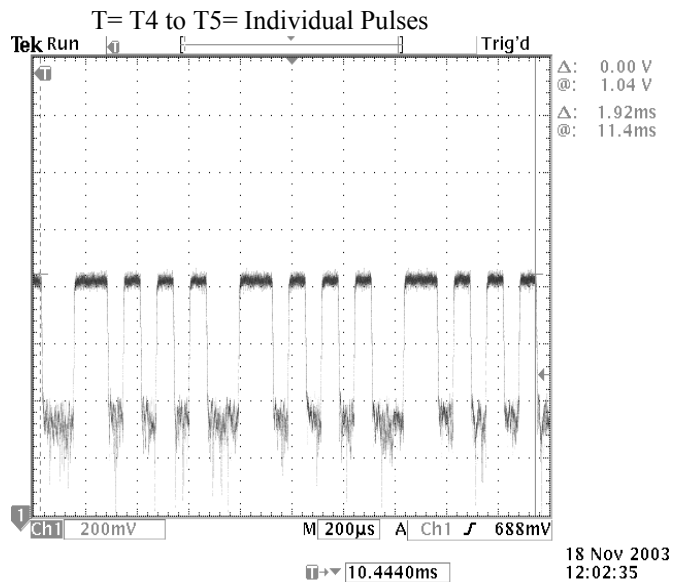
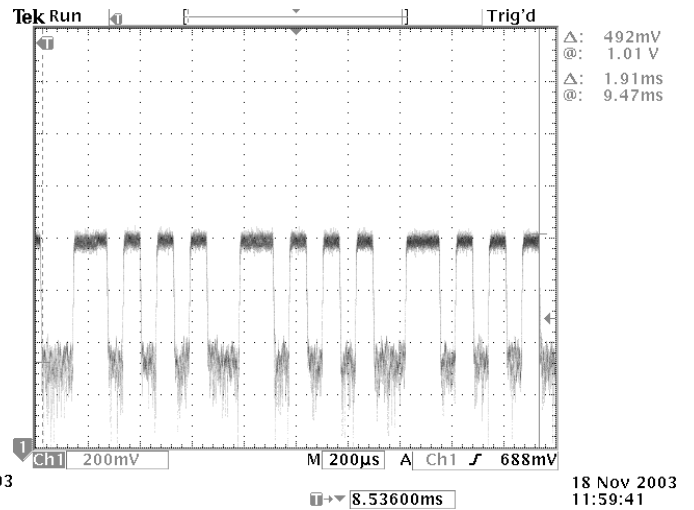
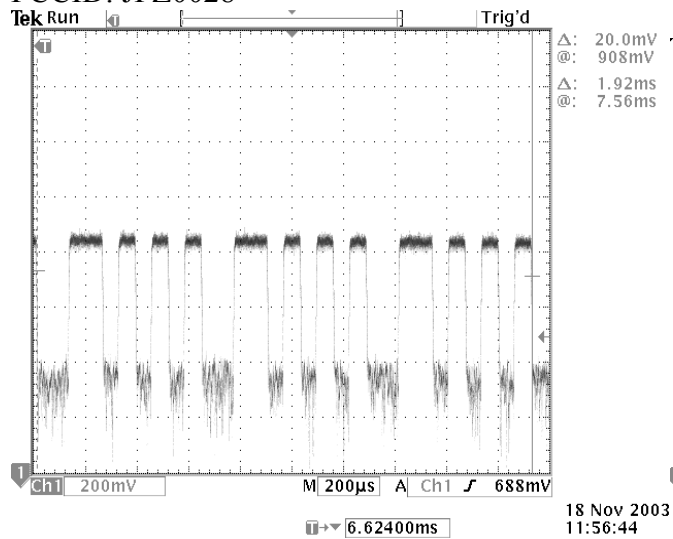
T= T2 to T3 = Individual Pulses



T= T3 to T4= Individual Pulses

File Number: NC2219
Project Number: 03ME13330
Model Number: RALB-5W
FCCID: JPZ0028

Issued: 11/19/03

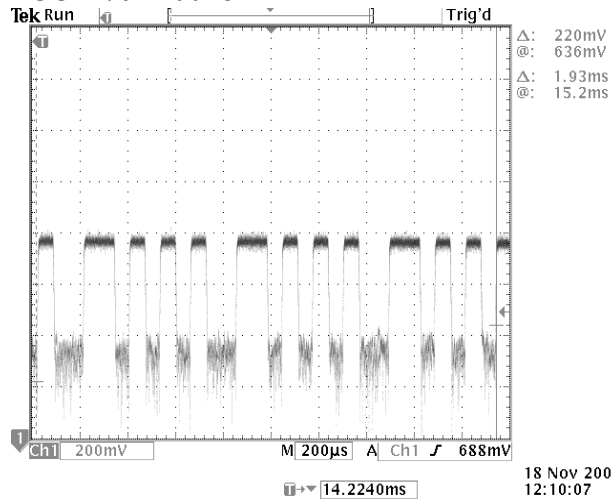


T= T6 to T7= Individual Pulses

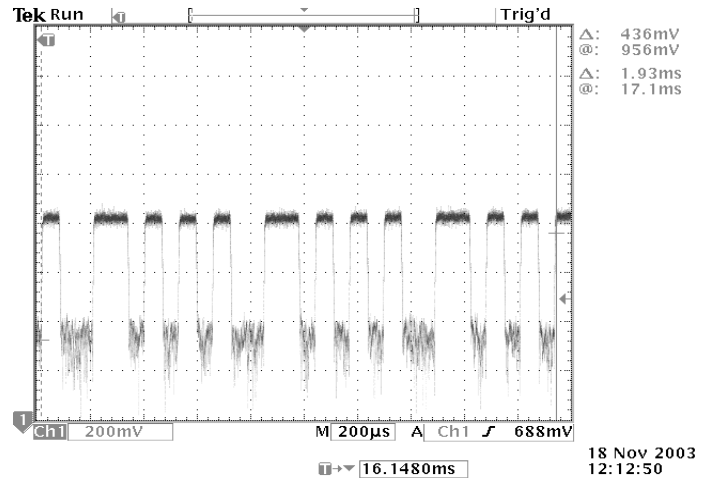
T= T7 to T8 = Individual Pulses

File Number: NC2219
 Project Number: 03ME13330
 Model Number: RALB-5W
 FCCID: JPZ0028

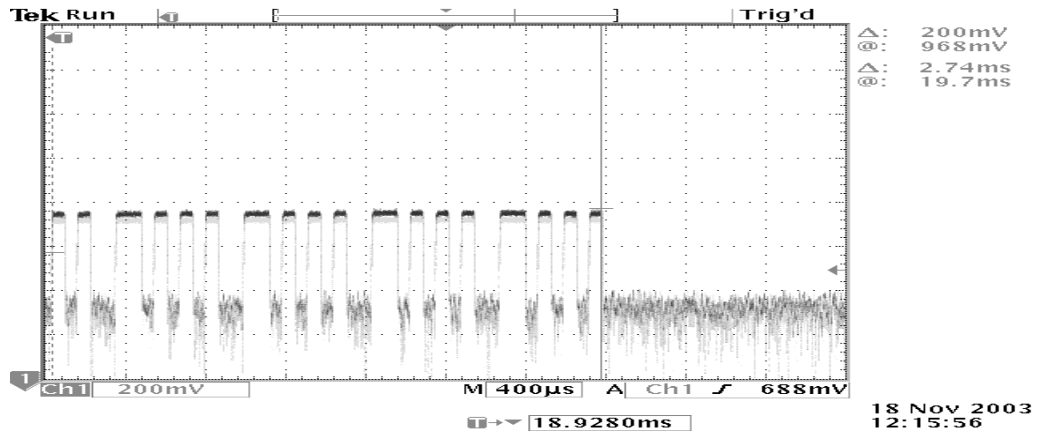
Issued: 11/19/03



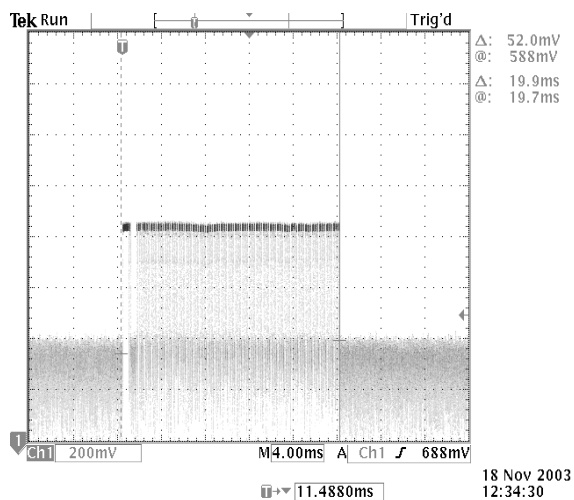
T= T8 to T9= Individual Pulses



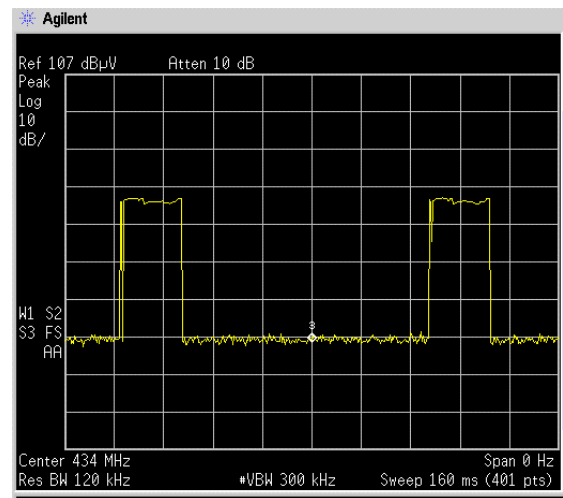
T= T9 to T10 = Individual Pulses



T= T10 to T11 = Individual Pulses



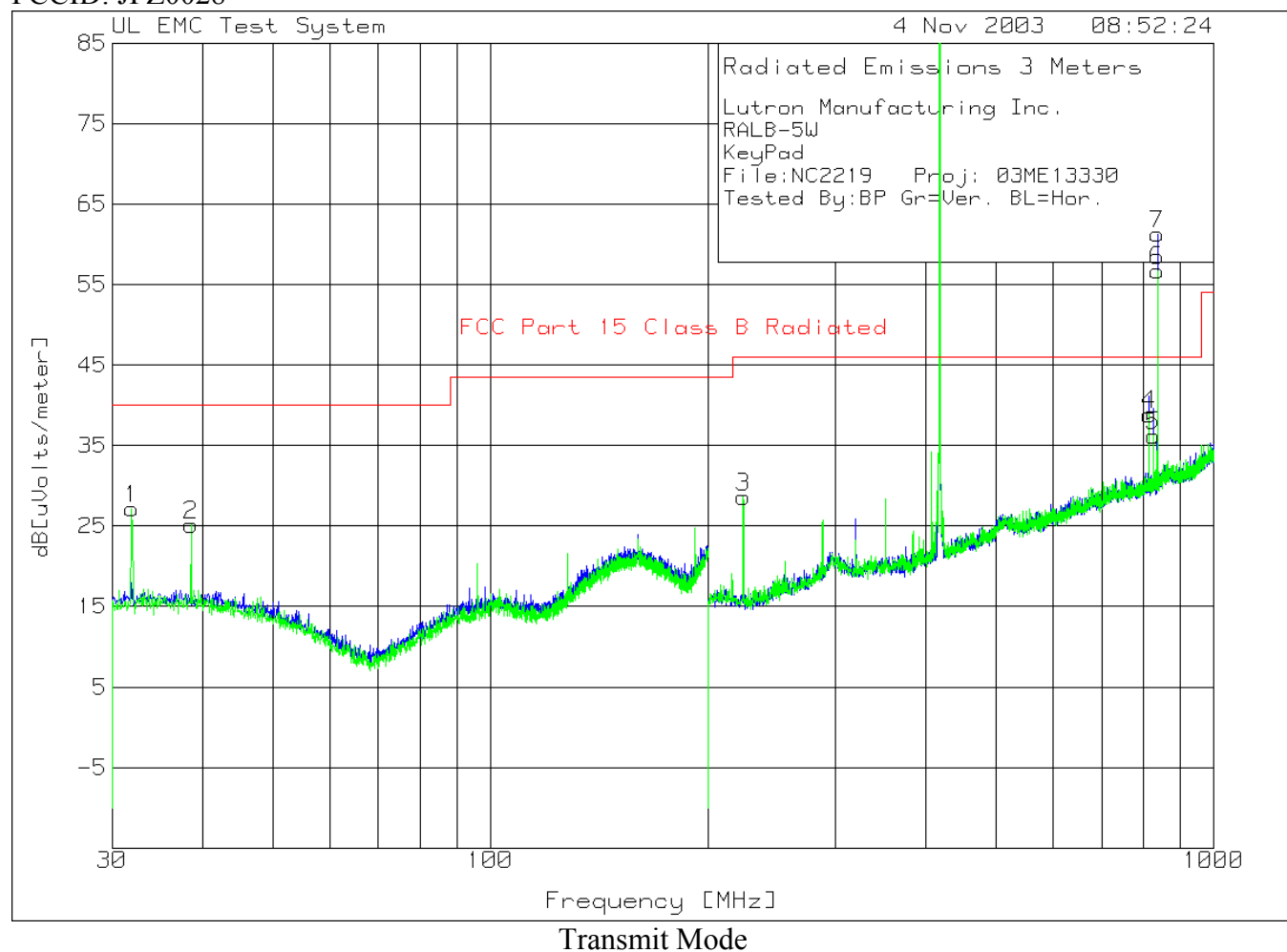
One complete pulse train



One complete pulse train

File Number: NC2219
Project Number: 03ME13330
Model Number: RALB-5W
FCCID: JPZ0028

Issued: 11/19/03



File Number: NC2219
 Project Number: 03ME13330
 Model Number: RALB-5W
 FCCID: JPZ0028

Issued: 11/19/03

Lutron Manufacturing Inc.
 RALB-5W
 KeyPad
 File:NC2219 Proj: 03ME13330
 Tested By:BP Gr=Ver. BL=Hor.

No.	Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level	Limit:1 dB[uVolts/meter]	Limit:2
=====							
Vertical 30 - 200MHz -----							
1	31.956	12.35 pk	.8	14	27.15	40	60.3
	Azimuth:1	Height:101 Vert		Margin [dB]		-12.85	
2	38.5893	10.35 pk	.9	13.9	25.15	40	60.3
	Azimuth:63	Height:199 Vert		Margin [dB]		-14.85	
Horizontal 200 - 1000MHz -----							
7	836.2121	*14.23 pk	4.2	22.8	*41.23	46	60.3
	Azimuth:105	Height:102 Horz		Margin [dB]			-19.07
8	417.9393	*59.69 pk	2.9	16.3	*78.89	46	80.3
	Azimuth:300	Height:102 Horz		Margin [dB]			-1.41
Vertical 200 - 1000MHz -----							
3	223.7412	14.89 pk	2.2	11.5	28.59	46	60.3
	Azimuth:17	Height:101 Vert		Margin [dB]		-17.41	
4	814.8716	12.26 pk	4.2	22.4	38.86	46	60.3
	Azimuth:106	Height:198 Vert		Margin [dB]		-7.14	
5	825.5418	9.41 pk	4.2	22.6	36.21	46	60.3
	Azimuth:162	Height:198 Vert		Margin [dB]		-9.79	
6	836.2121	*9.7 pk	4.2	22.8	*36.7	46	60.3
	Azimuth:49	Height:101 Vert		Margin [dB]			-23.6
9	417.9393	*59.7 pk	2.9	16.3	*78.9	46	80.3
	Azimuth:241	Height:101 Vert		Margin [dB]			-1.4

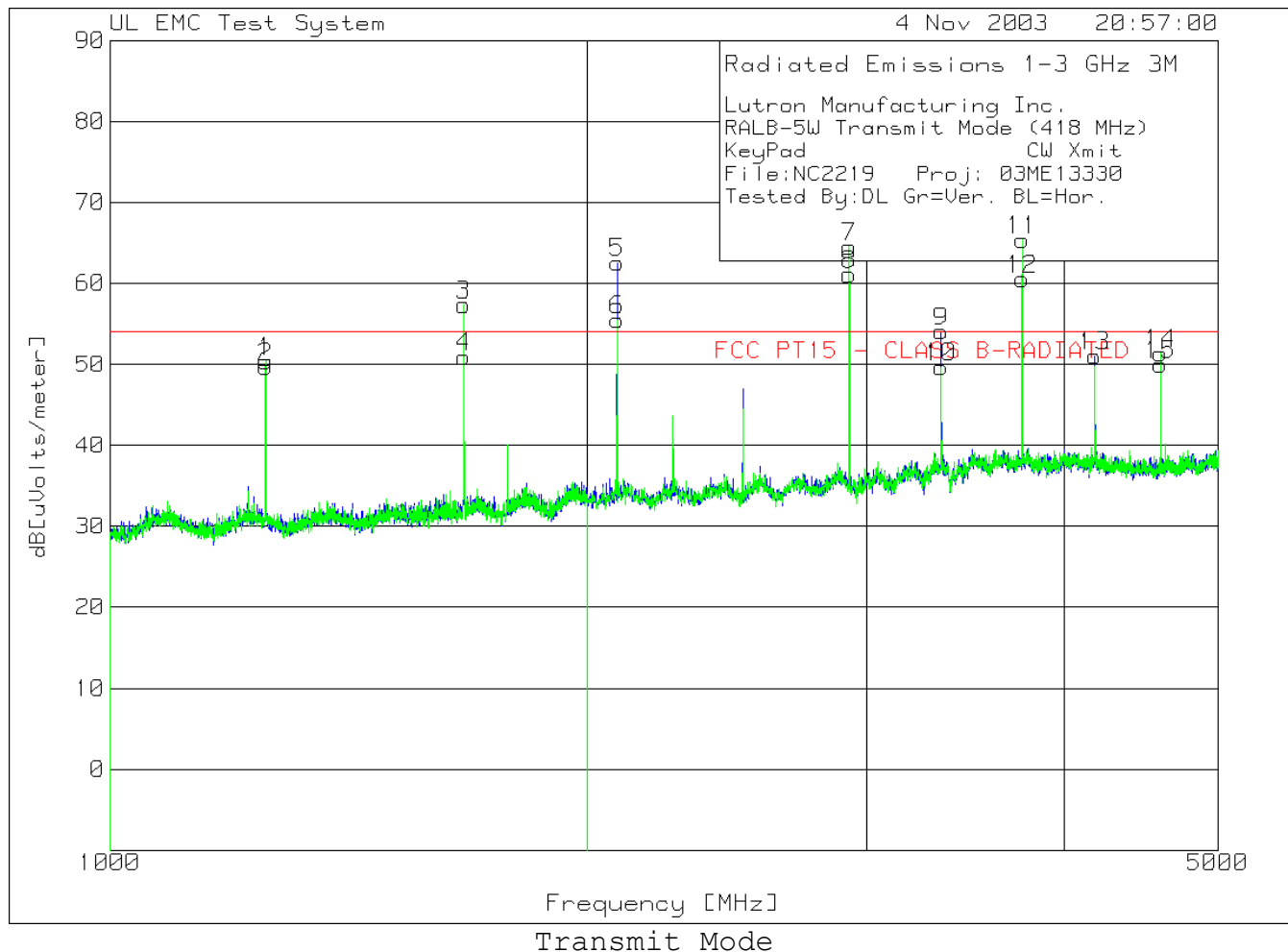
LIMIT 1: FCC Part 15 Subpart B ClB (3M)
 LIMIT 2: FCC Part 15 Subpart C-Section 15.231

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 -20.0 dB added to Average level.**

File Number: NC2219
Project Number: 03ME13330
Model Number: RALB-5W
FCCID: JPZ0028

Issued: 11/19/03



File Number: NC2219
Project Number: 03ME13330
Model Number: RALB-5W
FCCID: JPZ0028

Issued: 11/19/03

Lutron Manufacturing Inc.
RALB-5W Transmit Mode (418 MHz)
KeyPad CW Xmit
File:NC2219 Proj: 03ME13330
Tested By:DL Gr=Ver. BL=Hor.

Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level	Limit:1 dB[uVolts/meter]	Limit:2
=====						
Horizontal 1000 - 2000MHz						
1254.1562	56.71	avem -33	25.8	49.51	54	60.3
Azimuth: 237 Height:111 Horz			Margin [dB]: -4.49			
1672.2705	56.61	avem -31.8	27.5	52.31	54	60.3
Azimuth: 234 Height:119 Horz			Margin [dB]: -1.69			
Horizontal 2000 - 5000MHz						
2090.3257	*44.3	avem -30.7	29.2	*42.8	54	60.3
Azimuth: 332 Height:191 Horz			Margin [dB]: -17.5			
2926.4709	*40.35	avem -29.4	31.4	*42.35	54	60.3
Azimuth: 99 Height:152 Horz			Margin [dB]: -17.95			
3344.5511	*31.29	avem -27.8	32.4	*35.89	54	60.3
Azimuth: 57 Height:149 Horz			Margin [dB]: -24.41			
3762.5511	*36.74	avem -27.3	33.6	*33.04	54	60.3
Azimuth: 342 Height:149 Horz			Margin [dB]: -27.26			
4180.5929	42.34	avem -27.4	34.1	49.04	54	60.3
Azimuth: 255 Height:116 Horz			Margin [dB]: -4.96			
4598.626	45.57	avem -27.2	34	52.37	54	60.3
Azimuth: 52 Height:146 Horz			Margin [dB]: -1.63			
Vertical 1000 - 2000MHz						
1254.1002	57.45	avem -33	25.8	50.25	54	60.3
Azimuth: 138 Height:146 Vert			Margin [dB]: -3.75			
1672.263	*43.48	avem -31.8	27.5	*39.18	54	60.3
Azimuth: 160 Height:149 Vert			Margin [dB]: -21.12			
Vertical 2000 - 5000MHz						
2090.3282	*40.58	avem -30.7	29.2	*39.08	54	60.3
Azimuth: 356 Height:148 Vert			Margin [dB]: -21.22			

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

***Duty Cycle correction factor of -20.0 dB added to Average level.**

File Number: NC2219
Project Number: 03ME13330
Model Number: RALB-5W
FCCID: JPZ0028

Issued: 11/19/03

Lutron Manufacturing Inc.
RALB-5W Transmit Mode (418 MHz)
KeyPad CW Xmit
File:NC2219 Proj: 03ME13330
Tested By:DL Gr=Ver. BL=Hor.

Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	Limit:2
----------------------------	-------------------------------	-----------------------------	------------------------------	---------------------------	---------	---------

2926.4108	*35.67 avem	-29.4	31.4	*37.67	54	60.3
Azimuth: 360 Height:122 Vert				Margin [dB]:	3.67	-22.63
3344.5511	47.76 avem	-27.8	32.4	52.36	54	60.3
Azimuth: 36 Height:148 Vert				Margin [dB]:	-1.64	
3762.5912	*37.39 avem	-27.3	33.6	*43.69	54	60.3
Azimuth: 172 Height:102 Vert				Margin [dB]:	9.69	-16.61
4180.6713	42.14 avem	-27.4	34.1	48.84	54	60.3
Azimuth: 193 Height:102 Vert				Margin [dB]:	-5.16	
4598.7477	*36.82 avem	-27.2	34	*33.62	54	60.3
Azimuth: 193 Height:108 Vert				Margin [dB]:	-.38	-26.68

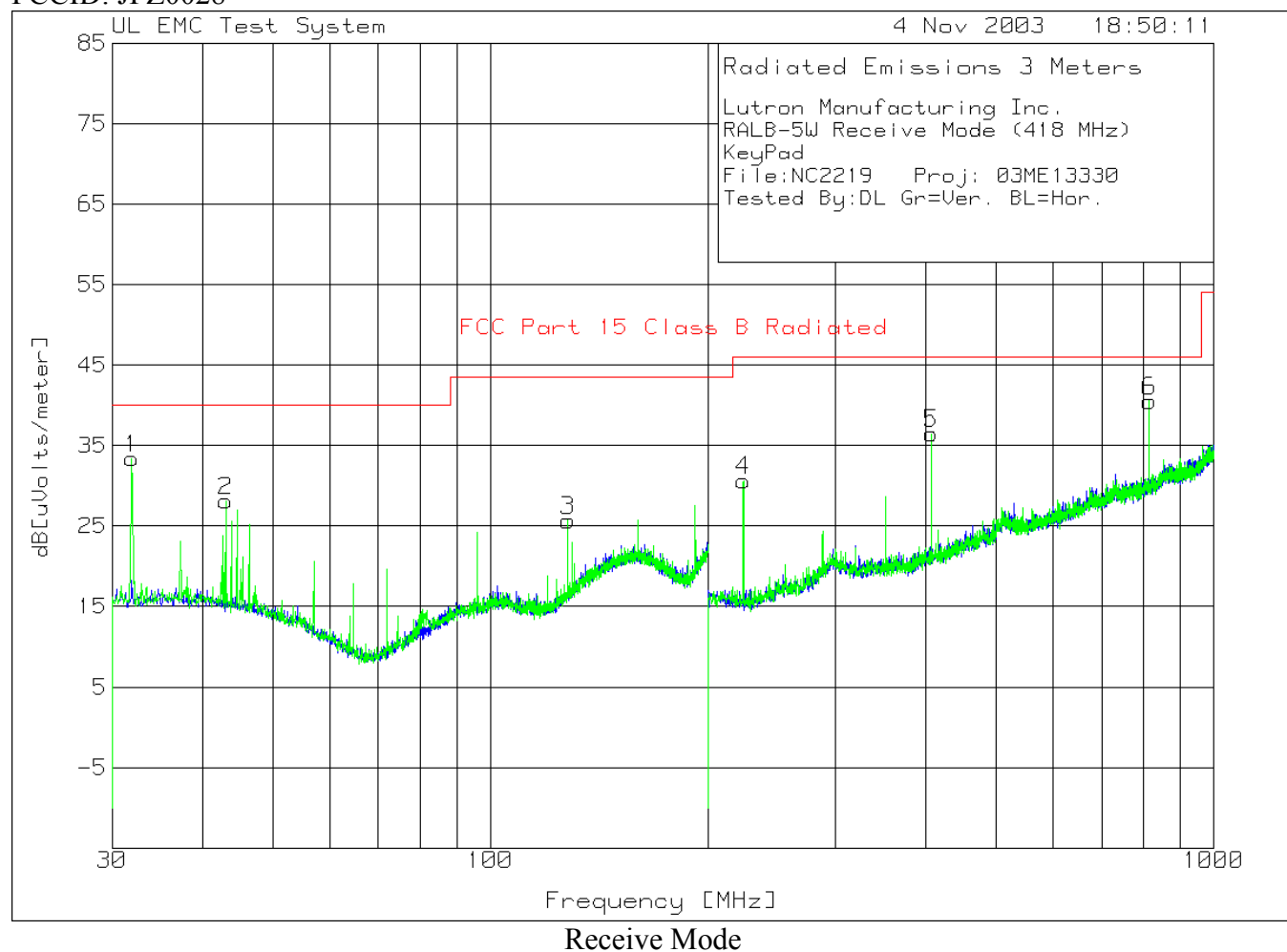
LIMIT 1: FCC Part 15 Subpart B ClB (3M)
LIMIT 2: FCC Part 15 Subpart C-Section 15.231

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

***Duty Cycle correction factor of -20.0 dB added to Average level.**

File Number: NC2219
Project Number: 03ME13330
Model Number: RALB-5W
FCCID: JPZ0028

Issued: 11/19/03



File Number: NC2219
Project Number: 03ME13330
Model Number: RALB-5W
FCCID: JPZ0028

Issued: 11/19/03

Lutron Manufacturing Inc.
RALB-5W Receive Mode (418 MHz)
KeyPad

File:NC2219 Proj: 03ME13330

Tested By:DL Gr=Ver. BL=Hor.

No.	Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
-----	----------------------------	-------------------------------	-----------------------------	------------------------------	---------------------------	---------

=====						
Vertical 30 - 200MHz -----						
1	31.956	18.59 pk	.8	14	33.39	40
	Azimuth:355	Height:100	Vert	Margin [dB]		-6.61
2	43.0965	13.91 pk	.9	13.3	28.11	40
	Azimuth:355	Height:100	Vert	Margin [dB]		-11.89
3	128.054	11.71 pk	1.6	12.4	25.71	43.5
	Azimuth:83	Height:100	Vert	Margin [dB]		-17.79
Vertical 200 - 1000MHz -----						
4	224.008	16.93 pk	2.2	11.5	30.63	46
	Azimuth:214	Height:100	Vert	Margin [dB]		-15.37
5	407.2691	17.37 pk	2.9	16.2	36.47	46
	Azimuth:179	Height:100	Vert	Margin [dB]		-9.53
6	814.8716	13.9 pk	4.2	22.4	40.5	46
	Azimuth:302	Height:100	Vert	Margin [dB]		-5.5

LIMIT 1: FCC Part 15 Class B Radiated

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: 03ME13330
Model Number: RALB-5W
FCCID: JPZ0028

Issued: 11/19/03

Lutron Manufacturing Inc.
RALB-5W Receive Mode (418 MHz)
KeyPad
File:NC2219 Proj: 03ME13330
Tested By:DL Gr=Ver. BL=Hor.

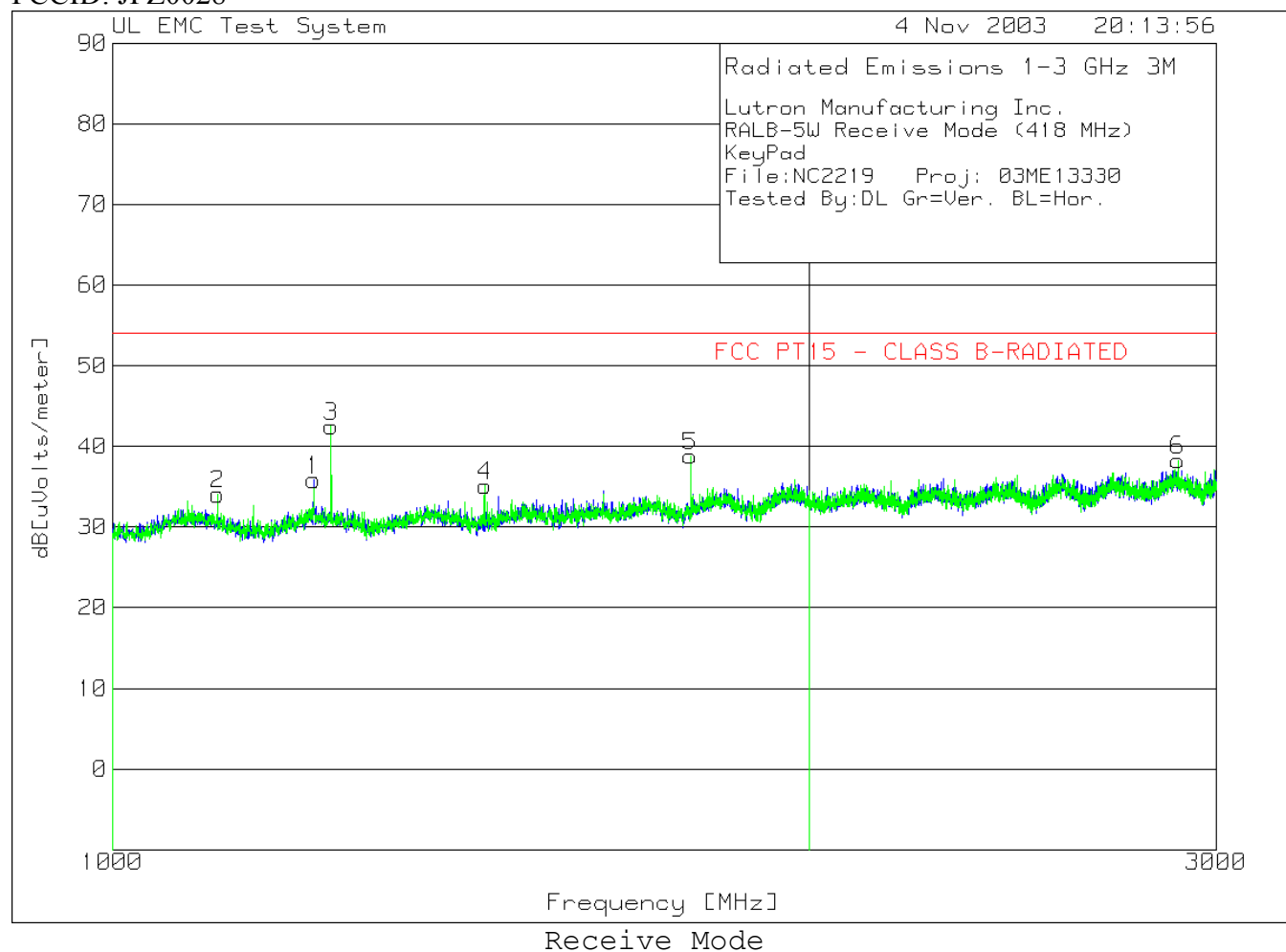
Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
=====					
Vertical 30 - 200MHz					
127.9995	13.62 qp	1.6	12.3	27.52	43.5
Azimuth: 59	Height:101	Vert	Margin	[dB]:	-15.98
31.9946	18.84 qp	.8	14	33.64	40
Azimuth: 108	Height:101	Vert	Margin	[dB]:	-6.36
43.3965	6.37 qp	.9	13.2	20.47	40
Azimuth: 125	Height:283	Vert	Margin	[dB]:	-19.53
Vertical 200 - 1000MHz					
814.7866	15.96 qp	4.2	22.4	42.56	46
Azimuth: 353	Height:102	Vert	Margin	[dB]:	-3.44
407.3968	19.15 qp	2.9	16.2	38.25	46
Azimuth: 249	Height:115	Vert	Margin	[dB]:	-7.75
224.004	18.47 qp	2.2	11.5	32.17	46
Azimuth: 335	Height:100	Vert	Margin	[dB]:	-13.83

LIMIT 1: FCC Part 15 Class B Radiated

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

File Number: NC2219
Project Number: 03ME13330
Model Number: RALB-5W
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File Number: NC2219
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Issued: 11/19/03

Lutron Manufacturing Inc.
RALB-5W Receive Mode (418 MHz)
KeyPad
File:NC2219 Proj: 03ME13330
Tested By:DL Gr=Ver. BL=Hor.

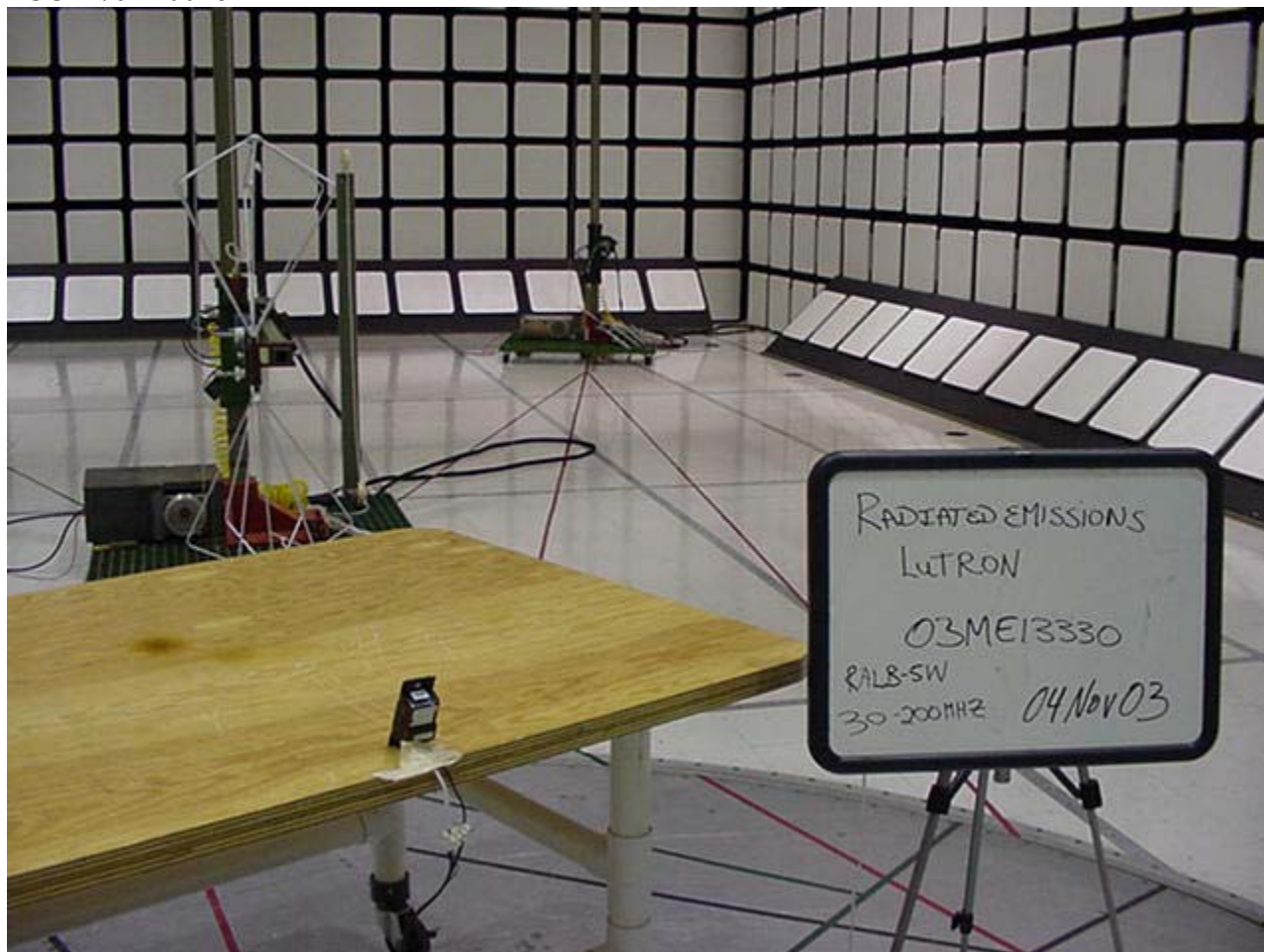
No.	Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
=====						
Horizontal 1000 - 2000MHz -----						
1	1222.074	43.26 pk	-33.1	25.7	35.86	54
	Azimuth:29	Height:99	Horz	Margin [dB]		-18.14
Vertical 1000 - 2000MHz -----						
2	1110.704	42.16 pk	-33.4	25.3	34.06	54
	Azimuth:358	Height:199	Vert	Margin [dB]		-19.94
3	1243.414	49.68 pk	-33	25.8	42.48	54
	Azimuth:304	Height:100	Vert	Margin [dB]		-11.52
4	1449.15	41.12 pk	-32.5	26.5	35.12	54
	Azimuth:111	Height:100	Vert	Margin [dB]		-18.88
5	1777.926	42.39 pk	-31.5	27.9	38.79	54
	Azimuth:56	Height:100	Vert	Margin [dB]		-15.21
Vertical 2000 - 3000MHz -----						
6	2887.296	36.47 pk	-29.5	31.3	38.27	54
	Azimuth:258	Height:199	Vert	Margin [dB]		-15.73

LIMIT 1: FCC PT15 - CLASS B-RADIATED

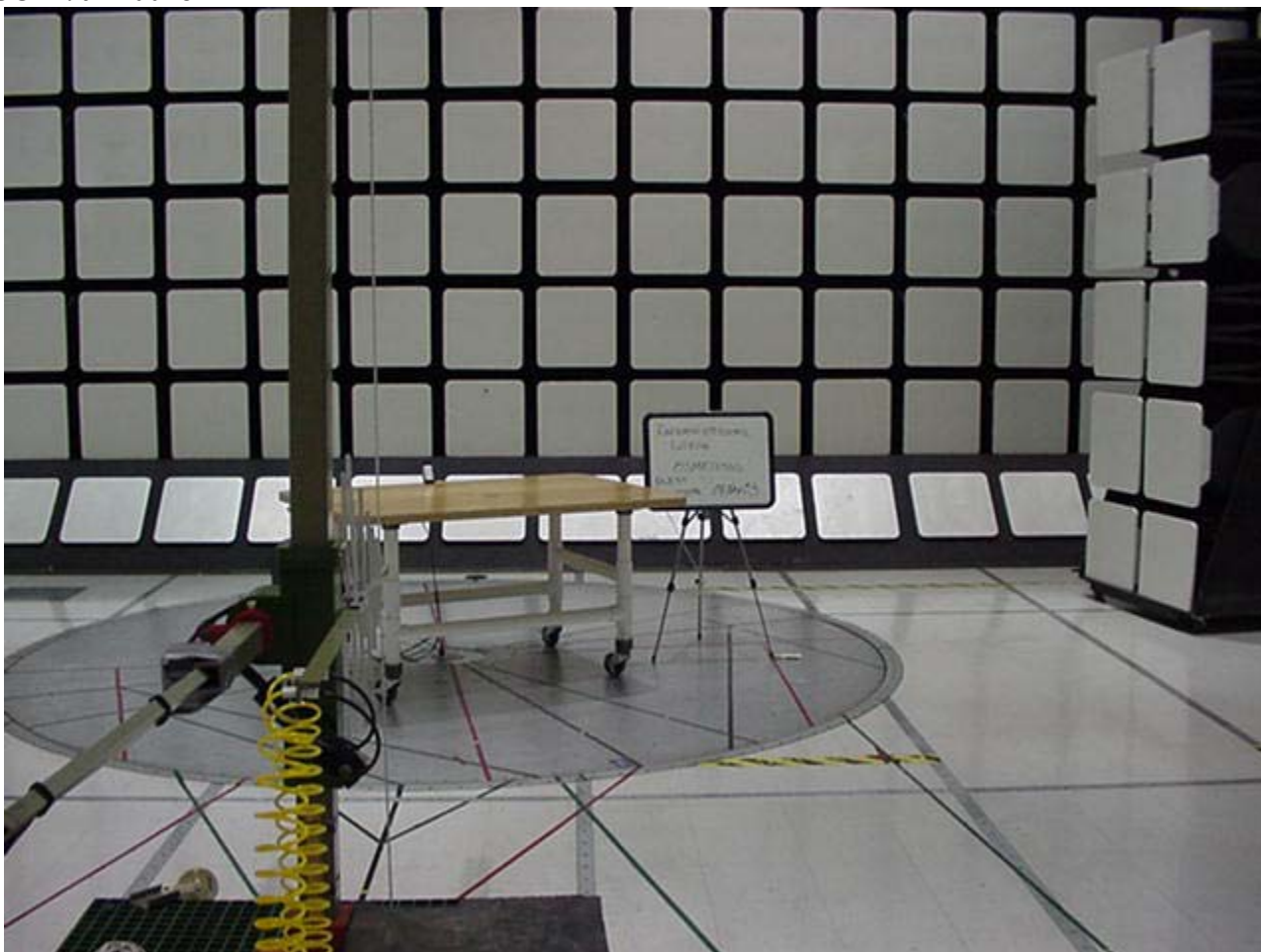
pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - denotes average log detection
avem - denotes EMI average detection
tm - Trace Math Result

File Number: NC2219
Project Number: 03ME13330
Model Number: RALB-5W
FCCID: JPZ0028

Issued: 11/19/03



Radiated Emission Test Set-Up 30-200 MHz Rear View



Radiated Emission Test Set-Up 200 to 1000 MHz Front View

File Number: NC2219
Project Number: 03ME13330
Model Number: RALB-5W
FCCID: JPZ0028

Issued: 11/19/03



Radiated Emission Test Set-Up 1-5GHz Rear View

File Number: NC2219
Project Number: 03ME13330
Model Number: RALB-5W
FCCID: JPZ0028

Issued: 11/19/03

5.1.4 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

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:	49%RH
Pressure:	1012mbar
Date test performed:	November 5, 2003

Test equipment used for Occupied Bandwidth Measurements:

ESI 126	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: 30MHz – 5GHz Last Calibration Date: 28 August 2003 Calibration Due Date: 28 August 04

Test Accessories for Radiated Emissions:

3121C-DB4	EMCO	Dipole Antenna	Equipment No.: ME-751
Last Calibration Date: 6 March 2003		Calibration Due Date: 6 March 2004	

8449BHewlett Packard	1-26GHz Pre-Amp	Equipment No.: ME5-914
99760-00	Hydrometer/Temp/Barometer	Equipment No.: ME4-268
Cole –Parmer		

Ranges:: Temp:0°C-55°C

Humidity 25% to 95 %RH

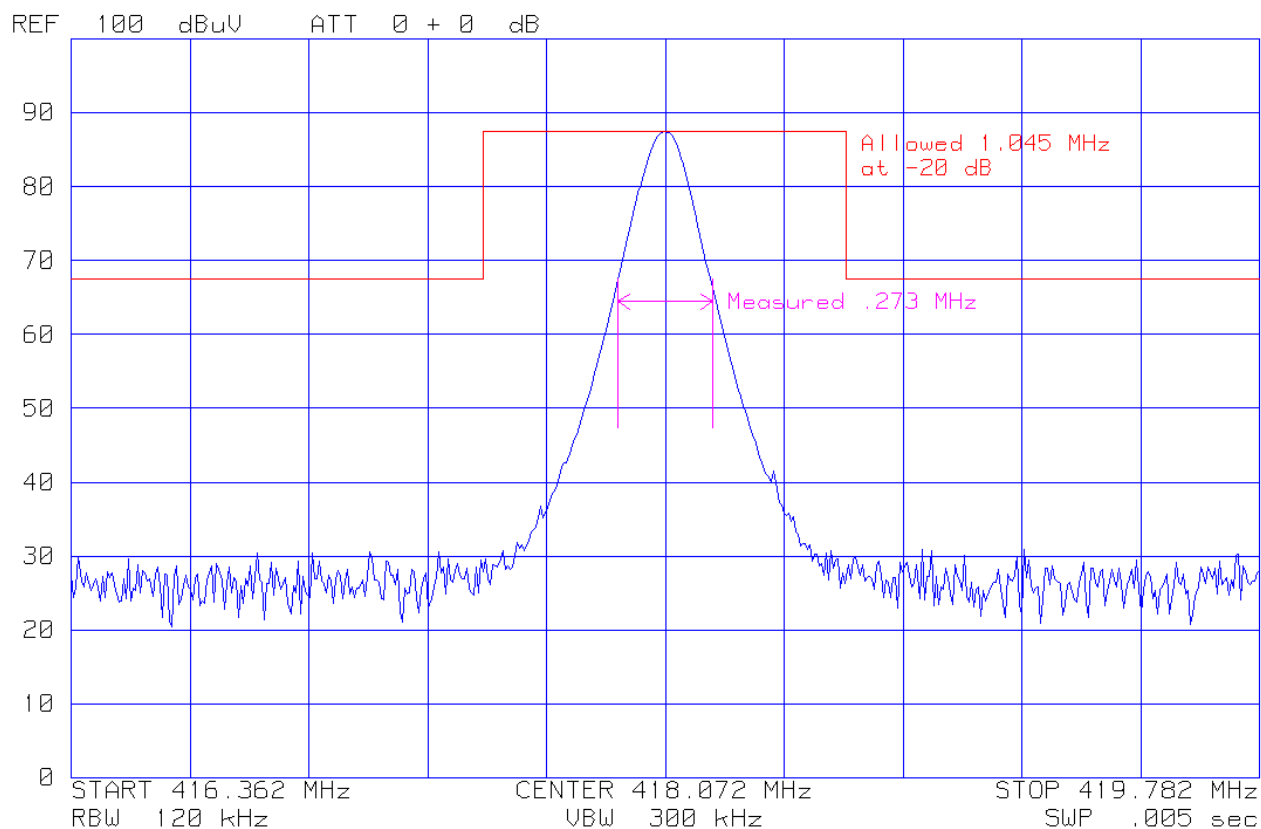
Pressure 795 to 1050 mbar

Last Calibration Date: 27 May 03

Calibration Due Date: 27 May 04

File Number: NC2219
Project Number: 03ME13330
Model Number: RALB-5W
FCCID: JPZ0028

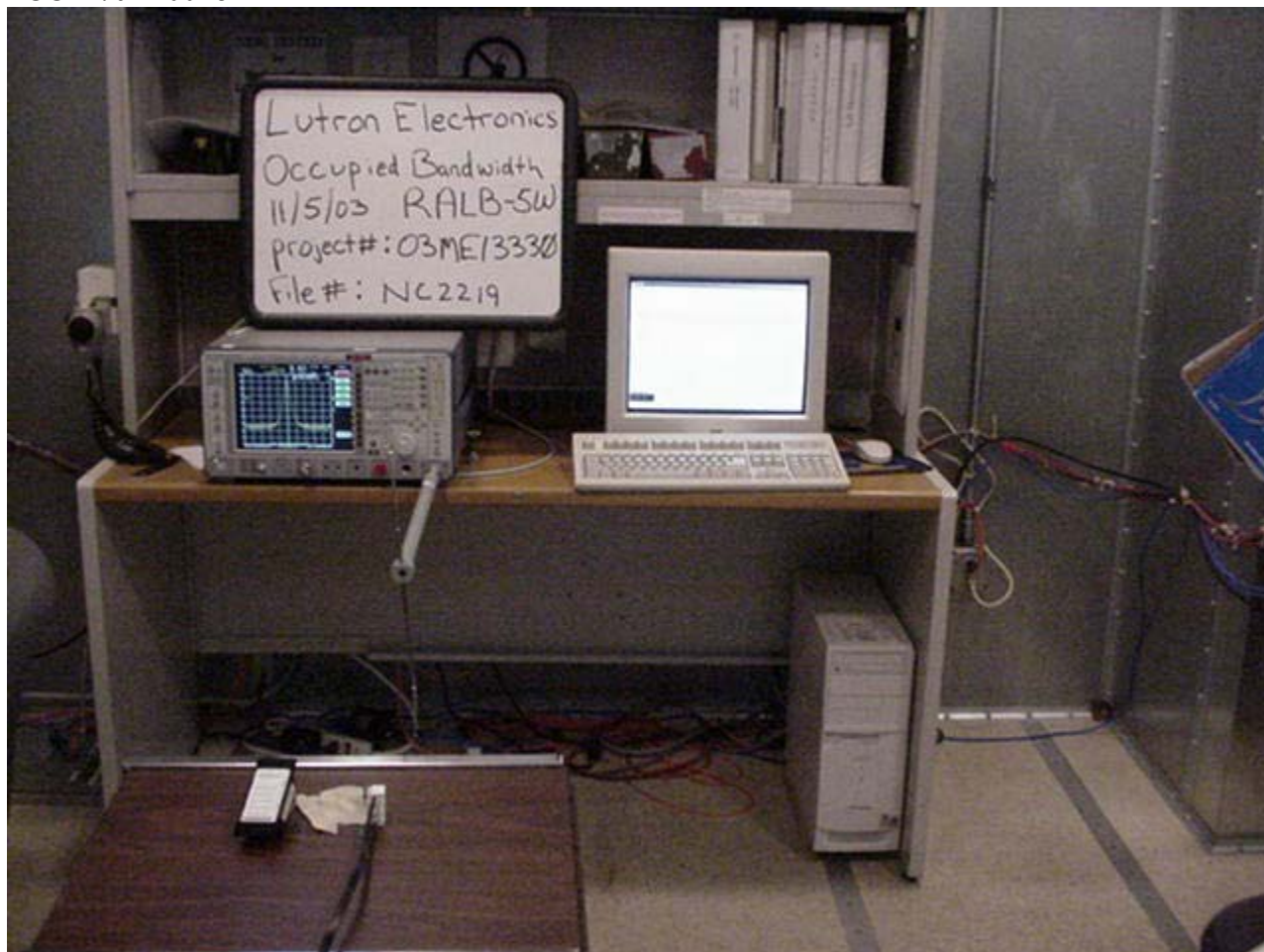
Issued: 11/19/03



Occupied Bandwidth 0.273 MHz

File Number: NC2219
Project Number: 03ME13330
Model Number: RALB-5W
FCCID: JPZ0028

Issued: 11/19/03



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

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

$$\text{Limit} = 10333.348\mu\text{V}$$

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

$$\text{Limit} = 80.3\text{dB}\mu\text{V}$$

$$\text{Limit for Spurious Emissions} = 20\text{dB lower than fundamental} = 60.3\text{dB}\mu\text{V/m}$$

Radiated Emissions Limit conversion from $\mu\text{V/m}$ to $\text{dB}\mu\text{V/m}$ (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 Correction factor calculation.

Total number of pulses counted in 100ms

Total time on = 10.08ms

$$\begin{aligned}\text{Duty cycle correction factor} &= 20 \log (10.08 / 100\text{ms}) \\ &= 20 \log (0.1008) \\ &= -20\text{Db}\end{aligned}$$

The correction factor is added to the measured field strength in $\text{dB}\mu\text{V/m}$

Appendix A

Accreditations and Authorizations



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. NVLAP Lab code: 100255-0.



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.

File Number: NC2219
Project Number: 03ME13330
Model Number: RALB-5W
FCCID: JPZ0028

Issued: 11/19/03



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