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**Report of Measurements
of Electromagnetic Compatibility Testing**

Test Report File No. : **MC2219** Date of issue: January 28, 2002
Applicant : Lutron Electronics Co. Inc.
Model / Serial No. : RA-GRX-3 /
Product Type : Light Dimmer
Power Supply : 120Vac, 60Hz
Manufacturer : Same As Applicant
License holder : Same As Applicant
Address : 7200 Suter Road
: Coopersburg, PA 18036
Test Type : **Compliance Investigation**
 Manufacturer's Specification
Test Project Number : 01ME23499
References(s) : FCC ID: JPZ0018

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1.0 G E N E R A L - Product Description

Device Function: The RA-GRX-3 is a wall mounted 3-zone dimmer. It contains a super-heterodyne receiver, a saw 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-GRX-3 to turn zones of light ON or OFF in response to commands from the Lutron RAMC-XX master control keypads and the Lutron RA-REP. Transmitted command signals acknowledge the state of the RA-GRX-3 to the rest of the RadioRA system in response to manual button presses on a master control keypad.

RF Function: The receiver down converts a 418.00MHz carrier frequency using a 407.30MHz local oscillator producing a 10.7MHz IF signal. The signal is further processed to decode data. The transmitter uses a SAW oscillator and power amplifier, which is keyed ON/OFF to produce the modulated carrier. The RA-GRX-3 contains a micro controller running at 4MHz to ensure that all transmissions stop within 5 seconds of the button release or within 5 seconds on the beginning of the transmission. A transmission actuated automatically shall cease transmission within 5 seconds after activation. Modulation is AM, specifically ON/OFF Keyed (OOK) or sometimes called Amplitude Shift Keyed (ASK) data at 15.625kbps. The antenna cannot be modified or easily replaced by the user.

Analog Function: The RA-GRX-3 obtains power through standard household wiring. The power supply and voltage regulator produce a 5V DC output, which is used to power all analog and micro controller activities.

1.1 Device Configuration During Test

The device under test was tested in normal orientation that represents the worst case orientation. The device is normally mounted in a vertical wall.

The device was tested in two modes of operation:

Continuously transmitting an intentional radio frequency in continuous wave (CW).

Standby mode. Device waiting to receive a signal source.

The manufacturer configured the device.

The device was powered with 120VAC, 60Hz.

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

1.2 Deviations from ANSI C63.4

Not Applicable

As described below:

1.3 Device Modifications Necessary for Compliance

- N/A
- As described below:

To comply with the conducted emissions requirements, the device needed the following modification implemented.

In the power section of the device, a 0.1uF, 400V capacitor was added between Pin #1 of Tran1 and Pin #5 (common) on U8.

1.4 Test Summary

Test	Basic Standard	Considered	Tested	In Compliance
Conducted Voltage Emissions	FCC Part 15	✓	✓	✓
Radiated Emissions	FCC Part 15	✓	✓	✓

Environmental conditions in the lab:

Temperature:	<u>Range</u> 20-25°C
Relative Humidity	30 - 60 %
Atmospheric pressure	680 - 1060 mbar

2.0 EMISSIONS TEST REGULATIONS

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

2.1 EUT OPERATION MODE - EMISSIONS TESTS

- Standby
- Test program (H-Pattern)
- Test program (color bar)
- Test program (customer specific)
- Practice operation
- Normal operation Mode:
- As per manufacturer's instructions: Continuous wave (CW) at 418MHz and standby mode.

2.1.1 Conducted Emissions Tests

Test Applicable Test Not Applicable

Frequency range on each side of line.

Measurement Point

- | | | | |
|------------------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------|------------------------------------|
| <input type="checkbox"/> 9kHz to 30MHz | <input type="checkbox"/> Voltage <input type="checkbox"/> Current | <input type="checkbox"/> Mains | <input type="checkbox"/> I/O Lines |
| <input type="checkbox"/> 10kHz to 30MHz | <input type="checkbox"/> Voltage <input type="checkbox"/> Current | <input type="checkbox"/> Mains | <input type="checkbox"/> I/O Lines |
| <input type="checkbox"/> 20kHz to 30MHz | <input type="checkbox"/> Voltage <input type="checkbox"/> Current | <input type="checkbox"/> Mains | <input type="checkbox"/> I/O Lines |
| <input type="checkbox"/> 150kHz to 30MHz | <input type="checkbox"/> Voltage <input type="checkbox"/> Current | <input type="checkbox"/> Mains | <input type="checkbox"/> I/O Lines |
| <input checked="" type="checkbox"/> 450kHz to 30 MHz | <input checked="" type="checkbox"/> Voltage <input type="checkbox"/> Current | <input checked="" type="checkbox"/> Mains | <input type="checkbox"/> I/O Lines |
| <input type="checkbox"/> 500kHz to 30MHz | <input type="checkbox"/> Voltage <input type="checkbox"/> Current | <input type="checkbox"/> Mains | <input type="checkbox"/> I/O Lines |

Line Description:

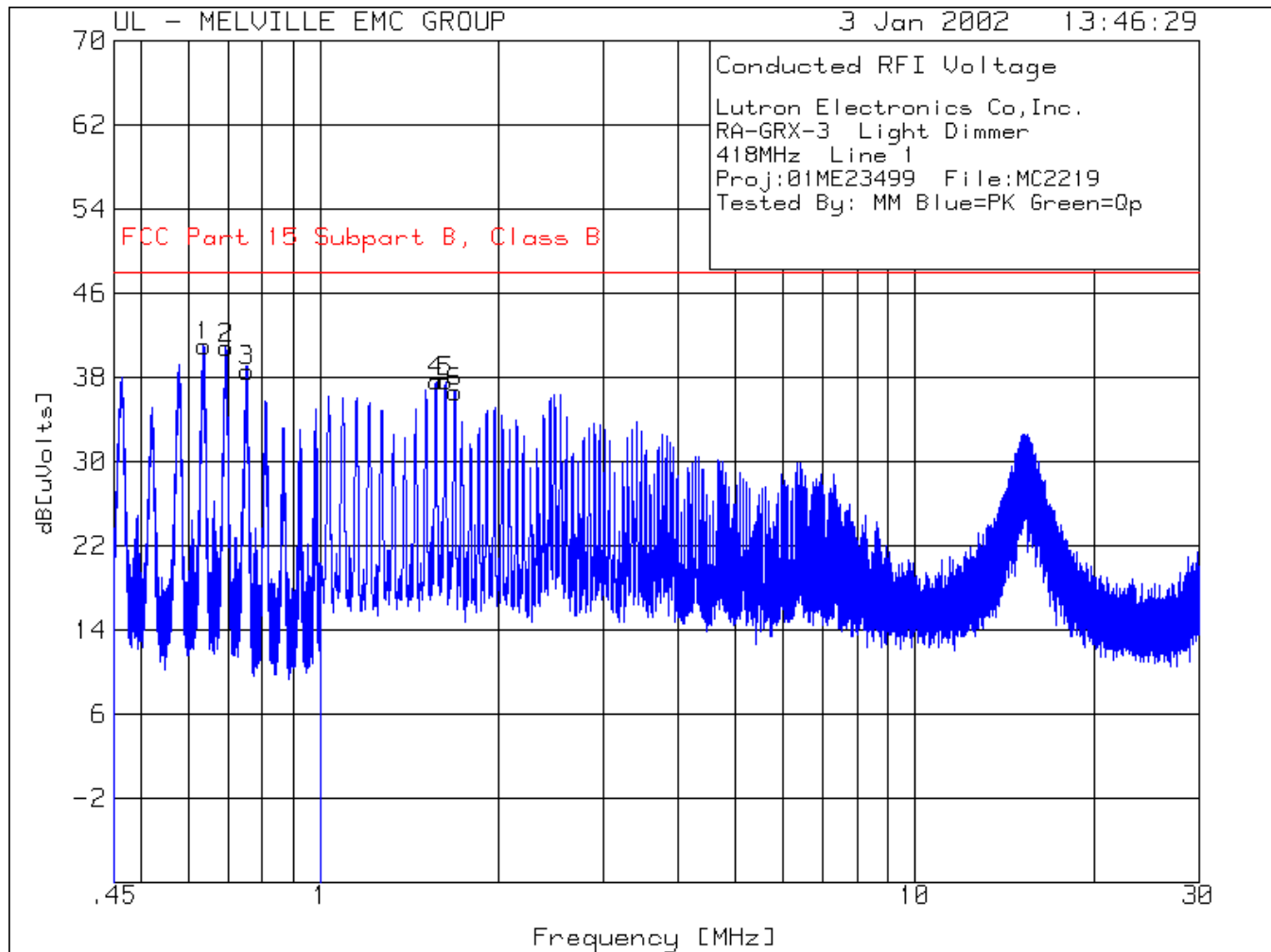
Line Number	Type/Designation
1	Hot side of line / receive mode
2	Neutral side of line / receive mode
3	Hot side of line / transmit mode
4	Neutral side of line / transmit mode

Test equipment used for conducted emissions:

- R3261C** **Advantest** **Spectrum Analyzer** **Equipment No.: ME5A-229**
 Resolution BW: 100kHz
 Video BW: 100kHz
 QP BW: 10kHz
 Range: .450 –30MHz Last Calibration Date: 22 June 01 Calibration Due Date: 22 June 02
- R3551** **Advantest** **Pre-Selector** **Equipment No.: ME5A-228**
 Range: .450 –30MHz Last Calibration Date: 31 July 01 Calibration Due Date: 31 July 02

Test Accessories for Conducted Emissions:

- 11947A** **Hewlett Packard** **Transient Limiter** **Equipment No.: ME5A-443**
 Last Calibration Date: 25 January 01 Calibration Due Date: 21 January 02
- 9252-50-R-24-BNC** **Solar Electronics** **LISN** **Equipment No.: ME5A-636**
 Last Calibration Date: 14 August 01 Calibration Due Date: 14 August 02



EUT in Receive (standby) mode

File Number: MC2219
 Project Number: 01ME23499
 Model Number: RA-GRX-3

Issued: January 28, 2002

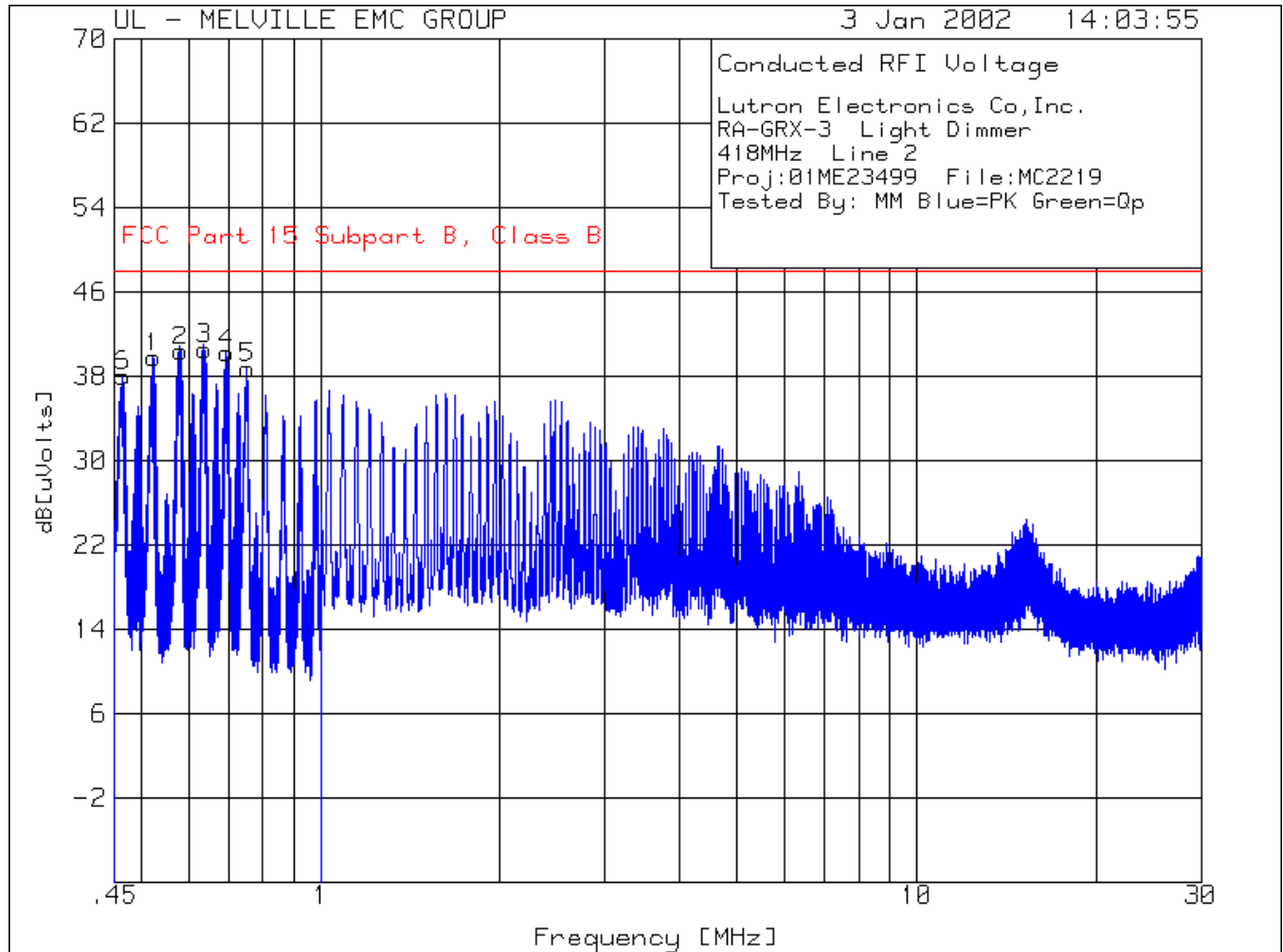
FCC ID: JPZ0018

Lutron Electronics Co, Inc.
 RA-GRX-3 Light Dimmer
 418MHz Line 1
 Proj:01ME23499 File:MC2219
 Tested By: MM Blue=PK Green=Qp

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level Limit:1 [dB]	2	3	4
1	.63671	30.9 pk	10.1	0	41	47.9	N/A	N/A
	Azimuth: N/A	Height: N/A		Margin [dB]	-6.9		N/A	N/A
2	.69435	30.7 pk	10.1	0	40.8	47.9	N/A	N/A
	Azimuth: N/A	Height: N/A		Margin [dB]	-7.1		N/A	N/A
3	.75194	28.5 pk	10.1	0	38.6	47.9	N/A	N/A
	Azimuth: N/A	Height: N/A		Margin [dB]	-9.3		N/A	N/A
4	1.56575	27.5 pk	10.1	0	37.6	47.9	N/A	N/A
	Azimuth: N/A	Height: N/A		Margin [dB]	-10.3		N/A	N/A
5	1.62625	27.5 pk	10.1	0	37.6	47.9	N/A	N/A
	Azimuth: N/A	Height: N/A		Margin [dB]	-10.3		N/A	N/A
6	1.68262	26.5 pk	10.1	0	36.6	47.9	N/A	N/A
	Azimuth: N/A	Height: N/A		Margin [dB]	-11.3		N/A	N/A

LIMIT 1: FCC Part 15 Subpart B, Class B
 LIMIT 2: NONE
 LIMIT 3: NONE
 LIMIT 4: NONE

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 tm - Trace Math Result



EUT in Receive (standby) mode

File Number: MC2219
 Project Number: 01ME23499
 Model Number: RA-GRX-3

Issued: January 28, 2002

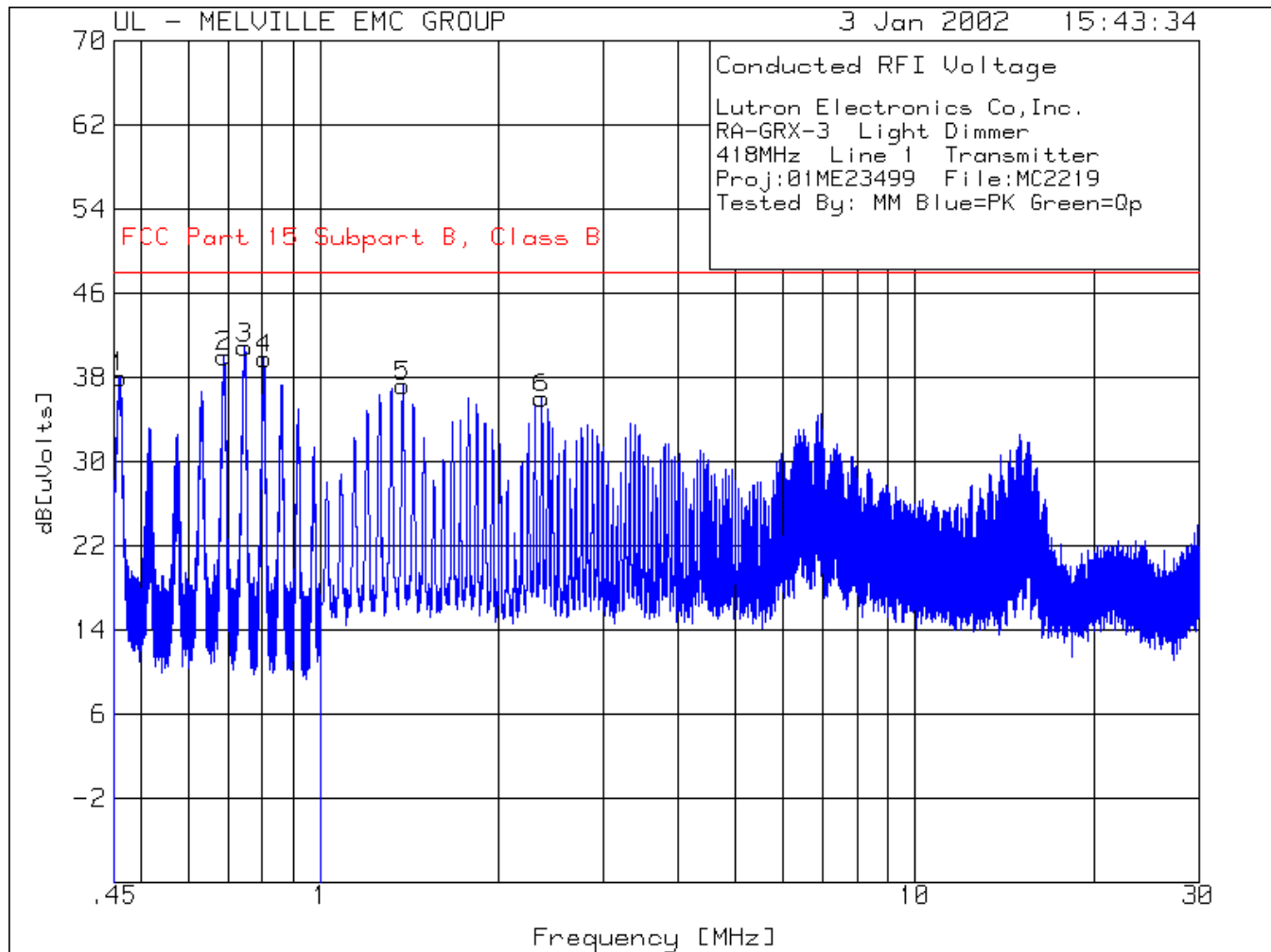
FCC ID: JPZ0018

Lutron Electronics Co, Inc.
 RA-GRX-3 Light Dimmer
 418MHz Line 2
 Proj:01ME23499 File:MC2219
 Tested By: MM Blue=PK Green=Qp

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level Limit:1 [dB]	2	3	4
1	.52321	29.7 pk	10.1	0	39.8	47.9	N/A	N/A
	Azimuth: N/A	Height: N/A		Margin [dB]	-8.1		N/A	N/A
2	.58068	30.3 pk	10.1	0	40.4	47.9	N/A	N/A
	Azimuth: N/A	Height: N/A		Margin [dB]	-7.5		N/A	N/A
3	.6367	30.5 pk	10.1	0	40.6	47.9	N/A	N/A
	Azimuth: N/A	Height: N/A		Margin [dB]	-7.3		N/A	N/A
4	.69395	30.1 pk	10.1	0	40.2	47.9	N/A	N/A
	Azimuth: N/A	Height: N/A		Margin [dB]	-7.7		N/A	N/A
5	.75174	28.7 pk	10.1	0	38.8	47.9	N/A	N/A
	Azimuth: N/A	Height: N/A		Margin [dB]	-9.1		N/A	N/A
6	.46505	27.9 pk	10.1	0	38	47.9	N/A	N/A
	Azimuth: N/A	Height: N/A		Margin [dB]	-9.9		N/A	N/A

LIMIT 1: FCC Part 15 Subpart B, Class B
 LIMIT 2: NONE
 LIMIT 3: NONE
 LIMIT 4: NONE

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 tm - Trace Math Result



EUT in CW transmit mode

File Number: MC2219
 Project Number: 01ME23499
 Model Number: RA-GRX-3

Issued: January 28, 2002

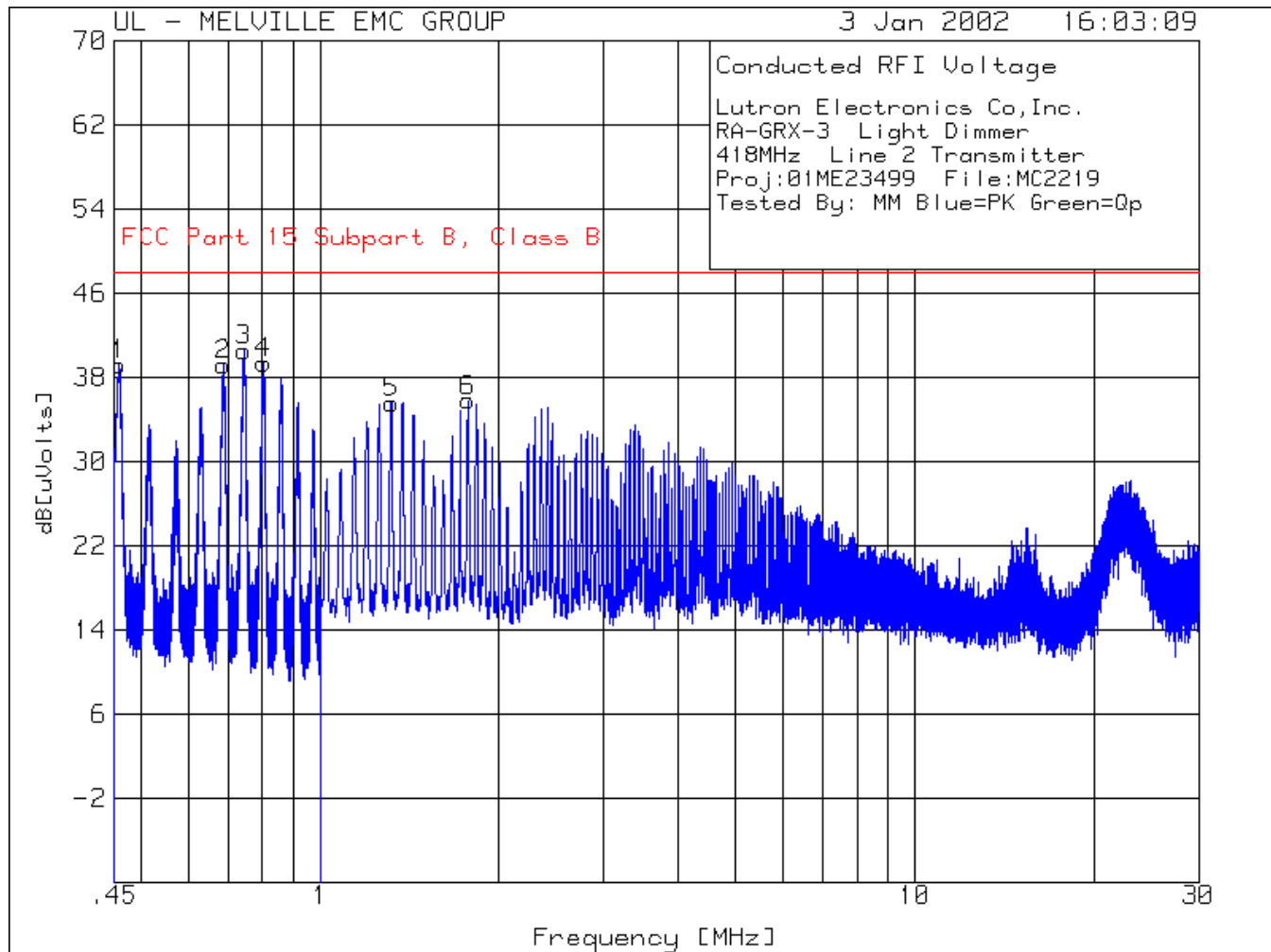
FCC ID: JPZ0018

Lutron Electronics Co, Inc.
 RA-GRX-3 Light Dimmer
 418MHz Line 1 Transmitter
 Proj:01ME23499 File:MC2219
 Tested By: MM Blue=PK Green=Qp

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level Limit:1 [dB]	2	3	4
1	.46034	27.9 pk	10.1	0	38	47.9	N/A	N/A
	Azimuth: N/A	Height: N/A		Margin [dB]	-9.9		N/A	N/A
2	.68906	29.9 pk	10.1	0	40	47.9	N/A	N/A
	Azimuth: N/A	Height: N/A		Margin [dB]	-7.9		N/A	N/A
3	.74698	30.7 pk	10.1	0	40.8	47.9	N/A	N/A
	Azimuth: N/A	Height: N/A		Margin [dB]	-7.1		N/A	N/A
4	.80506	29.7 pk	10.1	0	39.8	47.9	N/A	N/A
	Azimuth: N/A	Height: N/A		Margin [dB]	-8.1		N/A	N/A
5	1.37854	27.1 pk	10.1	0	37.2	47.9	N/A	N/A
	Azimuth: N/A	Height: N/A		Margin [dB]	-10.7		N/A	N/A
6	2.35852	25.9 pk	10.1	0	36	47.9	N/A	N/A
	Azimuth: N/A	Height: N/A		Margin [dB]	-11.9		N/A	N/A

LIMIT 1: FCC Part 15 Subpart B, Class B
 LIMIT 2: NONE
 LIMIT 3: NONE
 LIMIT 4: NONE

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 tm - Trace Math Result



EUT in CW transmit mode

File Number: MC2219
 Project Number: 01ME23499
 Model Number: RA-GRX-3

Issued: January 28, 2002

FCC ID: JPZ0018

Lutron Electronics Co, Inc.
 RA-GRX-3 Light Dimmer
 418MHz Line 2 Transmitter
 Proj:01ME23499 File:MC2219
 Tested By: MM Blue=PK Green=Qp

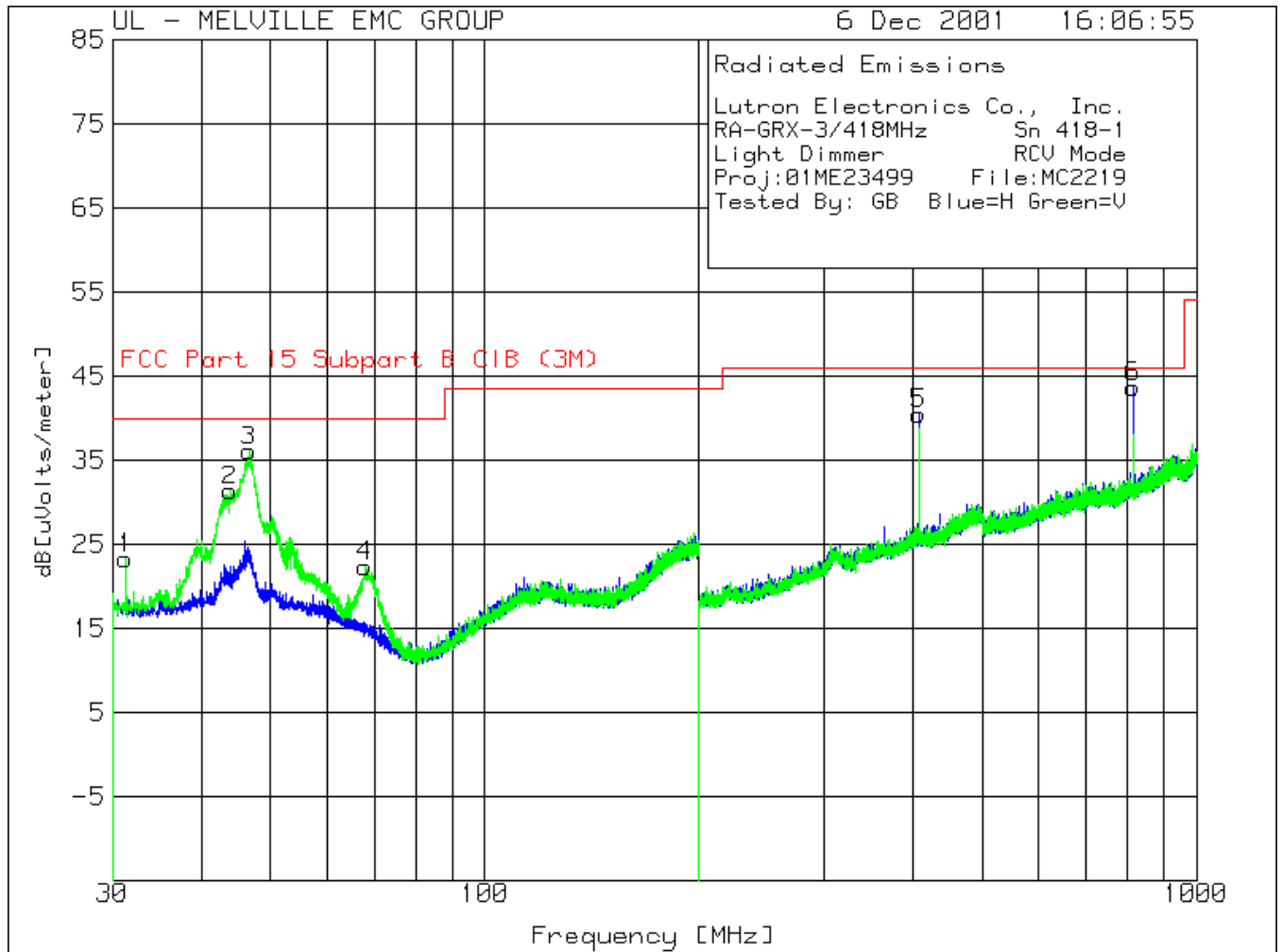
No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Level [dB]	Limit:1 dB[uVolts]	2	3	4
1	.45881	29.1 pk	10.1	0	39.2	47.9	N/A	N/A
	Azimuth: N/A	Height: N/A		Margin [dB]	-8.7		N/A	N/A
2	.68835	29.1 pk	10.1	0	39.2	47.9	N/A	N/A
	Azimuth: N/A	Height: N/A		Margin [dB]	-8.7		N/A	N/A
3	.74555	30.5 pk	10.1	0	40.6	47.9	N/A	N/A
	Azimuth: N/A	Height: N/A		Margin [dB]	-7.3		N/A	N/A
4	.80379	29.3 pk	10.1	0	39.4	47.9	N/A	N/A
	Azimuth: N/A	Height: N/A		Margin [dB]	-8.5		N/A	N/A
5	1.317	25.5 pk	10.1	0	35.6	47.9	N/A	N/A
	Azimuth: N/A	Height: N/A		Margin [dB]	-12.3		N/A	N/A
6	1.77312	25.7 pk	10.1	0	35.8	47.9	N/A	N/A
	Azimuth: N/A	Height: N/A		Margin [dB]	-12.1		N/A	N/A

LIMIT 1: FCC Part 15 Subpart B, Class B
 LIMIT 2: NONE
 LIMIT 3: NONE
 LIMIT 4: NONE

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 tm - Trace Math Result



Conducted Emissions test set-up



EUT in Receive (standby) mode

File Number: MC2219
 Project Number: 01ME23499
 Model Number: RA-GRX-3

Issued: January 28, 2002

FCC ID: JPZ0018

Lutron Electronics Co., Inc.
 RA-GRX-3/418MHz Sn 418-1
 Light Dimmer RCV Mode
 Proj:01ME23499 File:MC2219
 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	2	3	4
1	31.274	10.1 pk	.9	12.3	23.3	40	N/A	N/A	N/A
	Azimuth: 253	Height:99	Vert	Margin	[dB]	-16.7	N/A	N/A	N/A
2	43.8021	17.6 pk	1	12.8	31.4	40	N/A	N/A	N/A
	Azimuth: 44	Height:99	Vert	Margin	[dB]	-8.6	N/A	N/A	N/A
3	46.69	22.2 pk	1	12.9	36.1	40	N/A	N/A	N/A
	Azimuth: 21	Height:99	Vert	Margin	[dB]	-3.9	N/A	N/A	N/A
4	67.8391	12 pk	1.2	9.2	22.4	40	N/A	N/A	N/A
	Azimuth: 128	Height:99	Vert	Margin	[dB]	-17.6	N/A	N/A	N/A
5	407.1607	21 pk	3	16.5	40.5	46	N/A	N/A	N/A
	Azimuth: 39	Height:202	Horz	Margin	[dB]	-5.5	N/A	N/A	N/A
6	814.4213	17.4 pk	4.2	22.1	43.7	46	N/A	N/A	N/A
	Azimuth: 151	Height:202	Horz	Margin	[dB]	-2.3	N/A	N/A	N/A

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

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 tm - Trace Math Result

File Number: MC2219
Project Number: 01ME23499
Model Number: RA-GRX-3

Issued: January 28, 2002

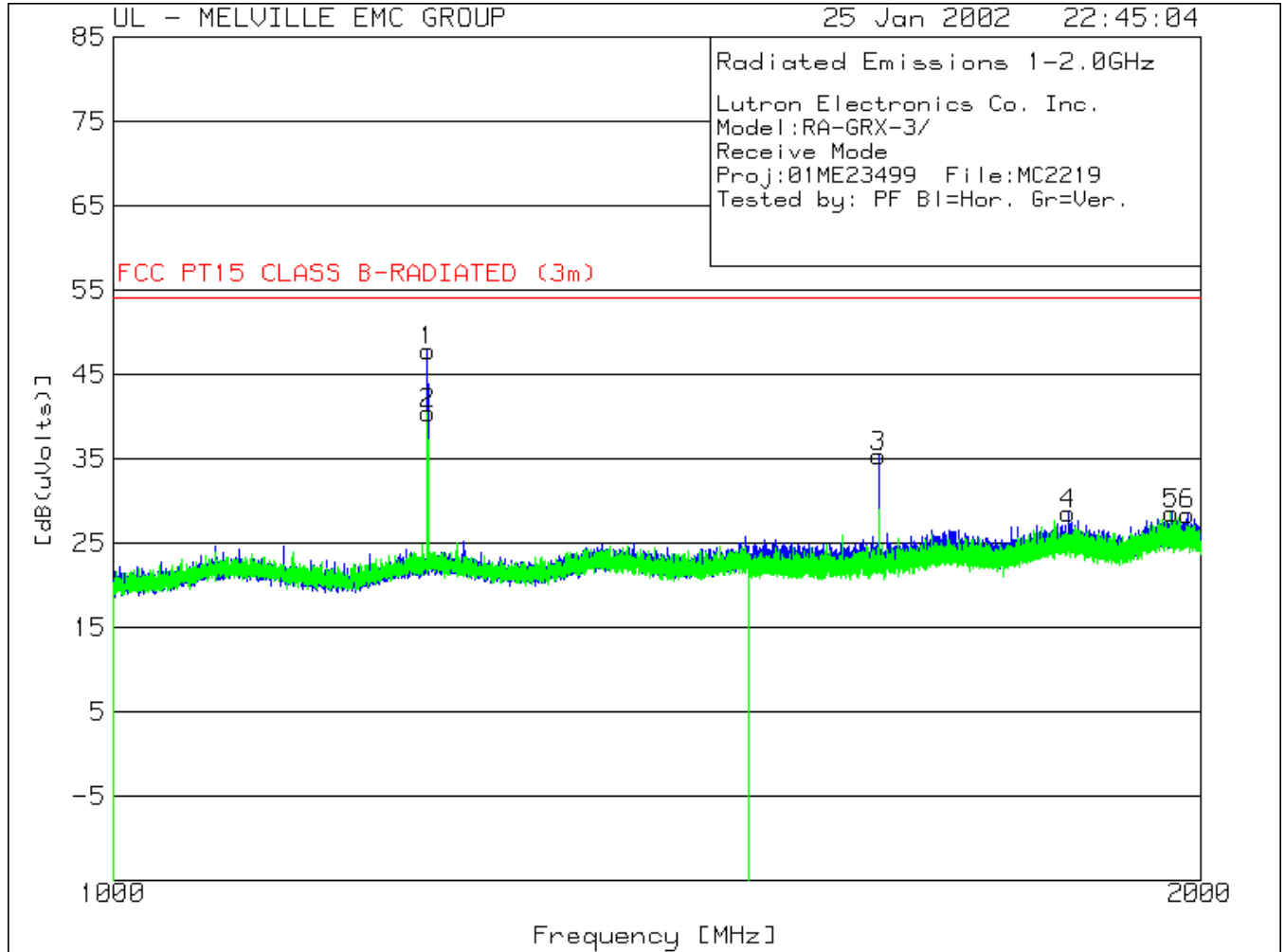
FCC ID: JPZ0018

Lutron Electronics Co., Inc.
RA-GRX-3/418MHz Sn 418-1
Light Dimmer RCV Mode
Proj:01ME23499 File:MC2219
Tested By: GB Blue=H Green=V

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3	4
Frequency	Reading	Factor	Factor	dB[uVolts/meter]				
[MHz]	[dB(uV)]	[dB]	[dB]					
814.78	16.6 qp	4.2	22.1	42.9	46	N/A	N/A	N/A
Azimuth: 39	Height:196	Horz	Margin	[dB]	-3.1	N/A	N/A	N/A
46.966	17.84 qp	1	12.9	31.74	40	N/A	N/A	N/A
Azimuth: 239	Height:109	Vert	Margin	[dB]	-8.26	N/A	N/A	N/A

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

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



EUT in Receive (standby) mode

File Number: MC2219
 Project Number: 01ME23499
 Model Number: RA-GRX-3

Issued: January 28, 2002

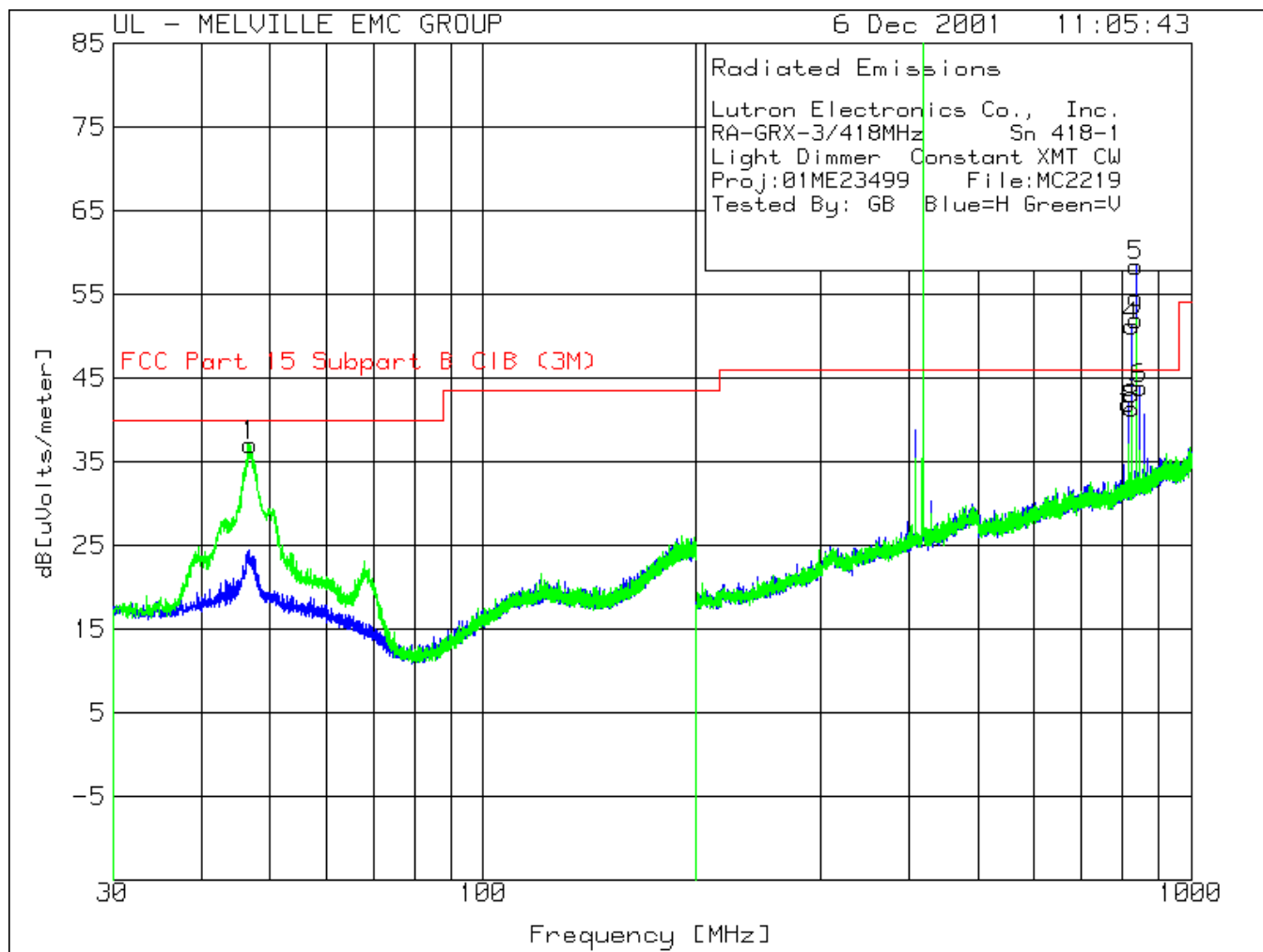
FCC ID: JPZ0018

Lutron Electronics Co. Inc.
 Model:RA-GRX-3/
 Receive Mode
 Proj:01ME23499 File:MC2219
 Tested by: PF Bl=Hor. Gr=Ver.

Test No.	Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4
1	1222.065	55.2 pk	-33.1	25.7	47.8	54	N/A	N/A	N/A
Azimuth: 0		Height:198	Horz	Margin	[dB]	-6.2	N/A	N/A	N/A
2	1221.982	47.8 pk	-33.1	25.7	40.4	54	N/A	N/A	N/A
Azimuth: 346		Height:100	Vert	Margin	[dB]	-13.6	N/A	N/A	N/A
3	1629.512	40 pk	-31.9	27.2	35.3	54	N/A	N/A	N/A
Azimuth: 299		Height:100	Horz	Margin	[dB]	-18.7	N/A	N/A	N/A
4	1838.704	31.6 pk	-31.3	28.2	28.5	54	N/A	N/A	N/A
Azimuth: 287		Height:100	Horz	Margin	[dB]	-25.5	N/A	N/A	N/A
5	1964.156	30.7 pk	-30.9	28.7	28.5	54	N/A	N/A	N/A
Azimuth: 202		Height:100	Horz	Margin	[dB]	-25.5	N/A	N/A	N/A
6	1984.264	30.4 pk	-30.8	28.8	28.4	54	N/A	N/A	N/A
Azimuth: 0		Height:199	Horz	Margin	[dB]	-25.6	N/A	N/A	N/A

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

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



EUT in CW transmit mode

File Number: MC2219
 Project Number: 01ME23499
 Model Number: RA-GRX-3

Issued: January 28, 2002

FCC ID: JPZ0018

Lutron Electronics Co., Inc.
 RA-GRX-3/418MHz Sn 418-1
 Light Dimmer Constant XMT CW
 Proj:01ME23499 File:MC2219
 Tested By: GB Blue=H Green=V

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level Limit:1 [dB]	2	3	4
1	46.7749	23.1 pk	1	12.9	37	N/A	40	N/A
	Azimuth: 127	Height:98	Vert	Margin	[dB]	N/A	-3	N/A
2	417.8185	69.2 pk	3.1	16.4	88.7	80.3	N/A	N/A
	Azimuth: 91	Height:98	Vert	Margin	[dB]	8.4	N/A	N/A
3	814.2881	15.7 pk	4.2	22.1	42	60.3	N/A	N/A
	Azimuth: 14	Height:201	Horz	Margin	[dB]	-18.3	N/A	N/A
4	824.9459	24.9 pk	4.2	22.1	51.2	60.3	N/A	N/A
	Azimuth: 1	Height:201	Horz	Margin	[dB]	-9.1	N/A	N/A
5	835.4704	31.5 pk	4.3	22.6	58.4	60.3	N/A	N/A
	Azimuth: 151	Height:201	Horz	Margin	[dB]	-1.9	N/A	N/A
6	846.1282	16.9 pk	4.3	22.6	43.8	60.3	N/A	N/A
	Azimuth: 290	Height:201	Horz	Margin	[dB]	-16.5	N/A	N/A
7	417.8185	71.1 pk	3.1	16.4	90.6	80.3	N/A	N/A
	Azimuth: 12	Height:201	Horz	Margin	[dB]	10.3	N/A	N/A
8	824.9459	15 pk	4.2	22.1	41.3	60.3	N/A	N/A
	Azimuth: 202	Height:202	Vert	Margin	[dB]	-19.0	N/A	N/A
9	835.4704	25 pk	4.3	22.6	51.9	60.3	N/A	N/A
	Azimuth: 168	Height:98	Vert	Margin	[dB]	-8.4	N/A	N/A

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

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 tm - Trace Math Result

File Number: MC2219
 Project Number: 01ME23499
 Model Number: RA-GRX-3

Issued: January 28, 2002

FCC ID: JPZ0018

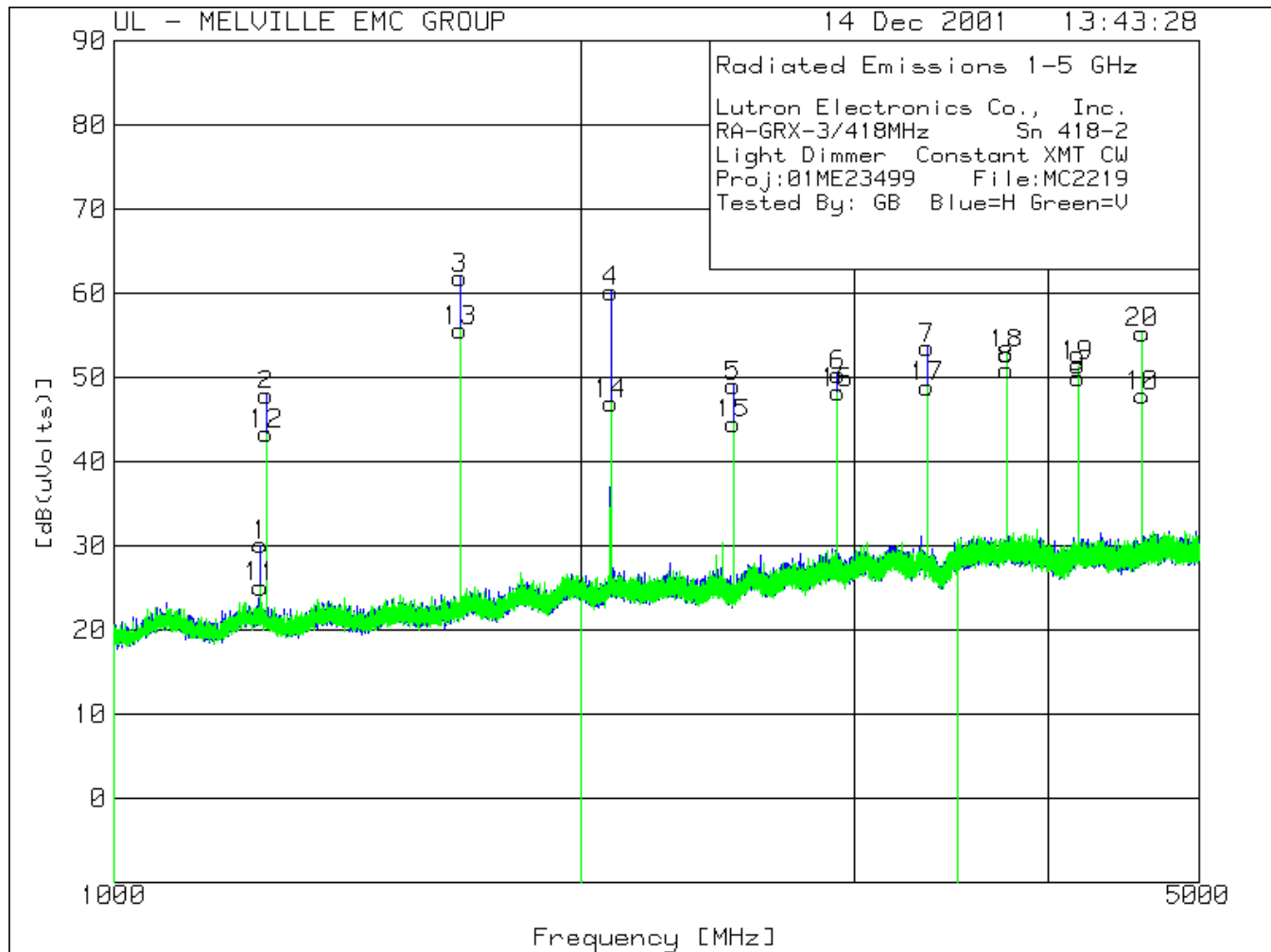
Lutron Electronics Co., Inc.
 RA-GRX-3/418MHz Sn 418-1
 Light Dimmer Constant XMT CW
 Proj:01ME23499 File:MC2219
 Tested By: GB Blue=H Green=V

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
46.747	9.72 av	1	12.9	23.62	N/A	40	N/A	N/A
Azimuth: 215		Height:102	Vert	Margin [dB]	N/A	-16.38	N/A	N/A
417.963	69.03 av	3.1	16.4	*66.23	80.3	N/A	N/A	N/A
Azimuth: 77		Height:136	Vert	Margin [dB]	-14.07	N/A	N/A	N/A
418.01	73.93 av	3.1	16.4	*71.13	80.3	N/A	N/A	N/A
Azimuth: 8		Height:163	Horz	Margin [dB]	-9.17	N/A	N/A	N/A
814.788	13.2 av	4.2	22.1	39.5	60.3	N/A	N/A	N/A
Azimuth: 23		Height:208	Horz	Margin [dB]	-20.8	N/A	N/A	N/A
825.33	22.87 av	4.2	22.1	49.17	60.3	N/A	N/A	N/A
Azimuth: 36		Height:206	Horz	Margin [dB]	-11.13	N/A	N/A	N/A
825.3518	13.84 av	4.2	22.1	40.14	60.3	N/A	N/A	N/A
Azimuth: 86		Height:208	Vert	Margin [dB]	-20.16	N/A	N/A	N/A
835.964	29.94 av	4.3	22.6	56.84	60.3	N/A	N/A	N/A
Azimuth: 144		Height:206	Horz	Margin [dB]	-3.46	N/A	N/A	N/A
835.964	21.6 av	4.3	22.6	48.5	60.3	N/A	N/A	N/A
Azimuth: 94		Height:210	Vert	Margin [dB]	-11.8	N/A	N/A	N/A
846.5764	16.96 av	4.3	22.6	43.86	60.3	N/A	N/A	N/A
Azimuth: 37		Height:195	Horz	Margin [dB]	-16.4	N/A	N/A	N/A

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

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

* Duty Cycle correction factor of -22.3dB added to Average level.



EUT in CW transmit mode

File Number: MC2219
 Project Number: 01ME23499
 Model Number: RA-GRX-3

Issued: January 28, 2002

FCC ID: JPZ0018

Lutron Electronics Co., Inc.
 RA-GRX-3/418MHz Sn 418-2
 Light Dimmer Constant XMT CW
 Proj:01ME23499 File:MC2219
 Tested By: GB Blue=H Green=V

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB]	Limit:1 [dB(uVolts)]	2	3	4
1	1243.297	39.3 pk	-33	23.8	30.1	60.3	N/A	N/A	N/A
	Azimuth: 0	Height:200	Horz	Margin	[dB]	-30.2	N/A	N/A	N/A
2	1254.122	57.1 pk	-33	23.8	47.9	60.3	N/A	N/A	N/A
	Azimuth: 258	Height:100	Horz	Margin	[dB]	-12.4	N/A	N/A	N/A
3	1672.273	68.2 pk	-31.8	25.4	61.8	N/A	53.97	N/A	N/A
	Azimuth: 19	Height:100	Horz	Margin	[dB]	N/A	7.83	N/A	N/A
4	2089.921	63.7 pk	-30.7	27.2	60.2	60.3	N/A	N/A	N/A
	Azimuth: 134	Height:99	Horz	Margin	[dB]	-0.1	N/A	N/A	N/A
5	2507.868	51.4 pk	-30.4	28	49	60.3	N/A	N/A	N/A
	Azimuth: 308	Height:99	Horz	Margin	[dB]	-11.3	N/A	N/A	N/A
6	2925.815	49.9 pk	-29.4	29.8	50.3	60.3	N/A	N/A	N/A
	Azimuth: 301	Height:99	Horz	Margin	[dB]	-10.0	N/A	N/A	N/A
7	3344.417	50.3 pk	-27.8	31	53.5	60.3	N/A	N/A	N/A
	Azimuth: 47	Height:99	Horz	Margin	[dB]	-6.8	N/A	N/A	N/A
8	3762.458	46.1 pk	-27.3	32.1	50.9	N/A	53.97	N/A	N/A
	Azimuth: 308	Height:99	Horz	Margin	[dB]	N/A	-3.07	N/A	N/A
9	4180.03	45 pk	-27.4	32.4	50	N/A	53.97	N/A	N/A
	Azimuth: 309	Height:99	Horz	Margin	[dB]	N/A	-3.97	N/A	N/A
10	4598.164	42.7 pk	-27.2	32.3	47.8	60.3	N/A	N/A	N/A
	Azimuth: 326	Height:99	Horz	Margin	[dB]	-12.5	N/A	N/A	N/A
11	1243.297	34.3 pk	-33	23.8	25.1	60.3	N/A	N/A	N/A
	Azimuth: 336	Height:99	Vert	Margin	[dB]	-35.2	N/A	N/A	N/A
12	1254.122	52.5 pk	-33	23.8	43.3	60.3	N/A	N/A	N/A
	Azimuth: 268	Height:99	Vert	Margin	[dB]	-17.0	N/A	N/A	N/A
13	1672.273	62 pk	-31.8	25.4	55.6	N/A	53.97	N/A	N/A
	Azimuth: 232	Height:99	Vert	Margin	[dB]	N/A	1.63	N/A	N/A
14	2090.015	50.4 pk	-30.7	27.2	46.9	60.3	N/A	N/A	N/A
	Azimuth: 0	Height:200	Vert	Margin	[dB]	-13.4	N/A	N/A	N/A
15	2507.868	46.9 pk	-30.4	28	44.5	60.3	N/A	N/A	N/A
	Azimuth: 0	Height:200	Vert	Margin	[dB]	-15.8	N/A	N/A	N/A
16	2925.815	47.8 pk	-29.4	29.8	48.2	60.3	N/A	N/A	N/A
	Azimuth: 329	Height:99	Vert	Margin	[dB]	-12.1	N/A	N/A	N/A

File Number: MC2219
Project Number: 01ME23499
Model Number: RA-GRX-3

Issued: January 28, 2002

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No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level Limit:1 [dB(uVolts)]	2	3	4	
17	3344.324	45.7 pk	-27.8	31	48.9	60.3	N/A	N/A	N/A
Azimuth: 0		Height:200 Vert		Margin [dB]		-11.4	N/A	N/A	N/A
18	3762.458	48 pk	-27.3	32.1	52.8	N/A	53.97	N/A	N/A
Azimuth: 350		Height:98 Vert		Margin [dB]		N/A	-1.17	N/A	N/A
19	4180.03	46.4 pk	-27.4	32.4	51.4	N/A	53.97	N/A	N/A
Azimuth: 60		Height:98 Vert		Margin [dB]		N/A	-2.57	N/A	N/A
20	4598.164	50.2 pk	-27.2	32.3	55.3	60.3	N/A	N/A	N/A
Azimuth: 357		Height:98 Vert		Margin [dB]		-5.0	N/A	N/A	N/A

LIMIT 1: FCC Part 15 Subpart C-Section 15.231
LIMIT 2: FCC Part 15 Subpart C-Section 15.209, 15.205
LIMIT 3: NONE
LIMIT 4: NONE

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
tm - Trace Math Result

File Number: MC2219
 Project Number: 01ME23499
 Model Number: RA-GRX-3

Issued: January 28, 2002

FCC ID: JPZ0018

Lutron Electronics Co., Inc.
 RA-GRX-3/418MHz Sn 418-2
 Light Dimmer Constant XMT CW
 Proj:01ME23499 File:MC2219
 Tested By: GB Blue=H Green=V

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB]	Limit:1 [dB(uVolts)]	2	3	4
1243.4	40.27 av	-33	23.8	31.07	60.3	N/A	N/A	N/A
Azimuth: 320		Height:188	Horz	Margin [dB]	-29.23	N/A	N/A	N/A
1243.4	31.8 av	-33	23.8	22.6	60.3	N/A	N/A	N/A
Azimuth: 340		Height:188	Vert	Margin [dB]	-37.7	N/A	N/A	N/A
1254.1402	57.63 av	-33	23.8	48.43	60.3	N/A	N/A	N/A
Azimuth: 353		Height:185	Horz	Margin [dB]	-11.87	N/A	N/A	N/A
1254.15	55.28 av	-33	23.8	46.08	60.3	N/A	N/A	N/A
Azimuth: 118		Height:130	Vert	Margin [dB]	-14.22	N/A	N/A	N/A
1672.2	61.27 av	-31.8	25.4	*32.59	N/A	53.97	N/A	N/A
Azimuth: 117		Height:136	Vert	Margin [dB]	N/A	-21.30	N/A	N/A
1672.204	71.03 av	-31.8	25.4	*42.35	N/A	53.97	N/A	N/A
Azimuth: 345		Height:130	Horz	Margin [dB]	N/A	-11.6	N/A	N/A
2090.24	65.04 av	-30.7	27.2	*39.26	60.3	N/A	N/A	N/A
Azimuth: 31		Height:124	Horz	Margin [dB]	-21.04	N/A	N/A	N/A
2090.246	51.22 av	-30.7	27.2	47.72	60.3	N/A	N/A	N/A
Azimuth: 326		Height:163	Vert	Margin [dB]	-12.58	N/A	N/A	N/A
2508.305	47.46 av	-30.4	28	45.06	60.3	N/A	N/A	N/A
Azimuth: 342		Height:126	Vert	Margin [dB]	-15.24	N/A	N/A	N/A
2508.306	51.34 av	-30.4	28	48.94	60.3	N/A	N/A	N/A
Azimuth: 42		Height:119	Horz	Margin [dB]	-11.36	N/A	N/A	N/A
2926.35	48.65 av	-29.4	29.8	49.05	60.3	N/A	N/A	N/A
Azimuth: 40		Height:102	Horz	Margin [dB]	-11.25	N/A	N/A	N/A
2926.36	46.98 av	-29.4	29.8	47.38	60.3	N/A	N/A	N/A
Azimuth: 43		Height:129	Vert	Margin [dB]	-12.92	N/A	N/A	N/A
3344.39	48.35 av	-27.8	31	51.55	60.3	N/A	N/A	N/A
Azimuth: 29		Height:103	Horz	Margin [dB]	-8.75	N/A	N/A	N/A
3344.416	47.95 av	-27.8	31	51.15	60.3	N/A	N/A	N/A
Azimuth: 32		Height:134	Vert	Margin [dB]	-9.15	N/A	N/A	N/A
3762.46	51.73 av	-27.3	32.1	*34.25	N/A	53.97	N/A	N/A
Azimuth: 1		Height:122	Vert	Margin [dB]	N/A	-19.72	N/A	N/A
3762.464	45.47 av	-27.3	32.1	*27.99	N/A	53.97	N/A	N/A
Azimuth: 36		Height:103	Horz	Margin [dB]	N/A	-25.98	N/A	N/A

File Number: MC2219
Project Number: 01ME23499
Model Number: RA-GRX-3

Issued: January 28, 2002

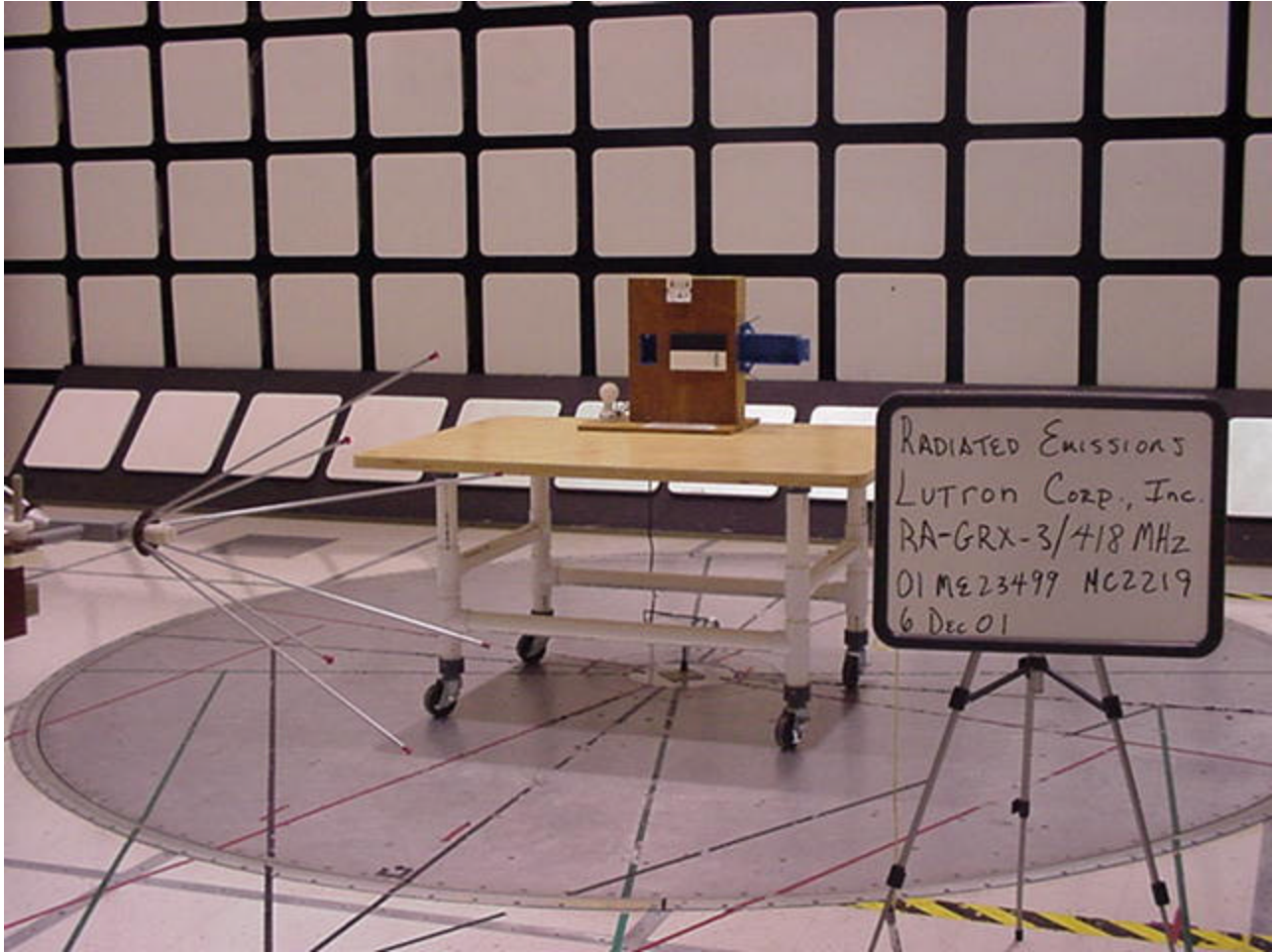
FCC ID: JPZ0018

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3	4
Frequency	Reading	Factor	Factor	[dB(uVolts)]				
[MHz]	[dB(uV)]	[dB]	[dB]					
4180.49	45.72 av	-27.4	32.4	*28.44	N/A	53.97	N/A	N/A
Azimuth: 5	Height:111	Vert	Margin [dB]	N/A	-25.53	N/A	N/A	N/A
4180.504	44.22 av	-27.4	32.4	*26.94	N/A	53.97	N/A	N/A
Azimuth: 307	Height:101	Horz	Margin [dB]	N/A	-27.03	N/A	N/A	N/A
4598.552	49.81 av	-27.2	32.3	54.91	60.3	N/A	N/A	N/A
Azimuth: 7	Height:100	Vert	Margin [dB]	-5.39	N/A	N/A	N/A	N/A
4598.562	43.7 av	-27.2	32.3	48.8	60.3	N/A	N/A	N/A
Azimuth: 315	Height:151	Horz	Margin [dB]	-11.5	N/A	N/A	N/A	N/A

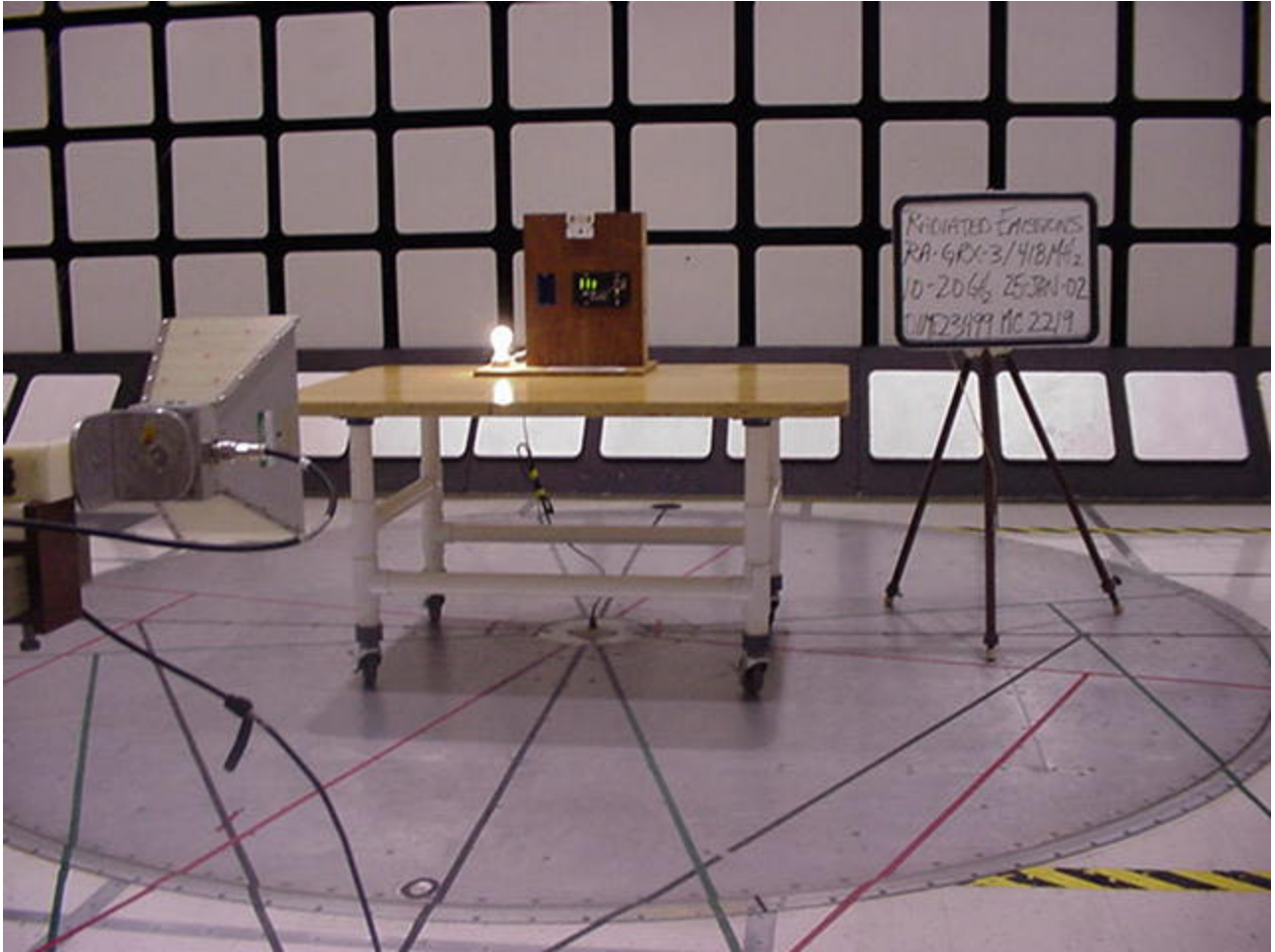
LIMIT 1: FCC Part 15 Subpart C-Section 15.231
LIMIT 2: FCC Part 15 Subpart C-Section 15.209, 15.205
LIMIT 3: NONE
LIMIT 4: NONE

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

* Duty Cycle correction factor of -22.3dB added to Average level.



Radiated emissions test 30 - 1000MHz set-up



Radiated emissions test 1 - 2GHz set-up



Radiated Emissions test 1 - 5GHz set-up

2.1.3 Fundamental Frequency and Spurious Emissions Measurement Limit Calculations

Limit Calculation

Fundamental Frequency is 418MHz

From table in section 15.231

Limit = 41.6667(418) – 7083.3333

Limit = 10333.3473uV

Limit = Log 10333.3473(20)

Limit = 80.3dBuV

Limit for Spurious Emissions = 20dB lower then fundamental = 60.3dBuV/m

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

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

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

Radiated Emissions Limit (dBμV/m) = 39.1

Radiated Emissions test data obtained during measurements.

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

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

Field Strength (dBμV/m) = 32.5

Duty Cycle factor calculation.

Total number of pulses counted in 100ms.

576us * 2 = 1.152ms

64us * 65 = 4.16ms

132us * 18 = 2.376ms

Total time on = 1.152ms + 4.16ms + 2.376ms = 7.688ms

Duty cycle correction factor = 20 log (7.688ms / 100ms)

= 20 log (76.88ms)

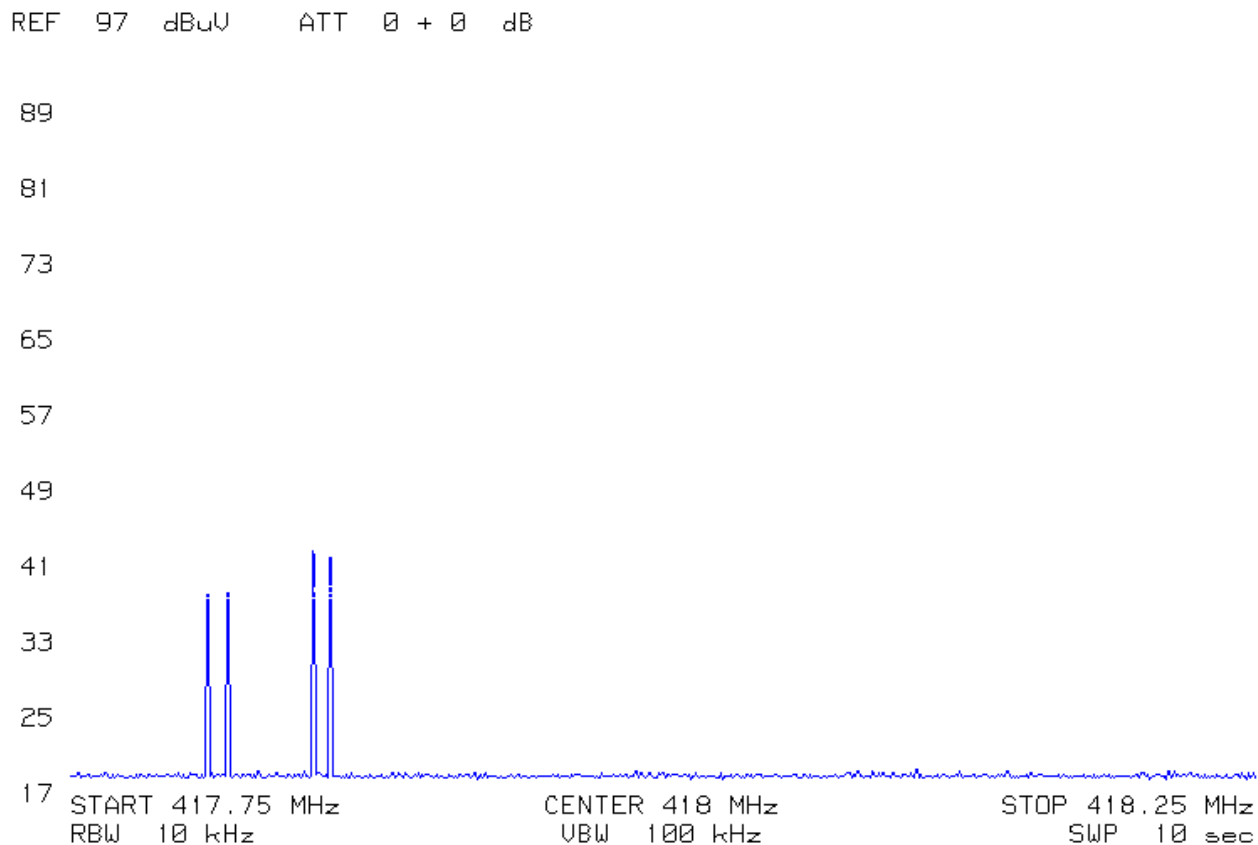
= - 22.3dB

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

2.1.4 Automatic Cease Operation

1. Set analyzer sweep time for 10 seconds
2. Key transmitter and release button
3. Ensure transmission stops before signal passes 5 second (5 divisions)

Complies (Y/N) YES

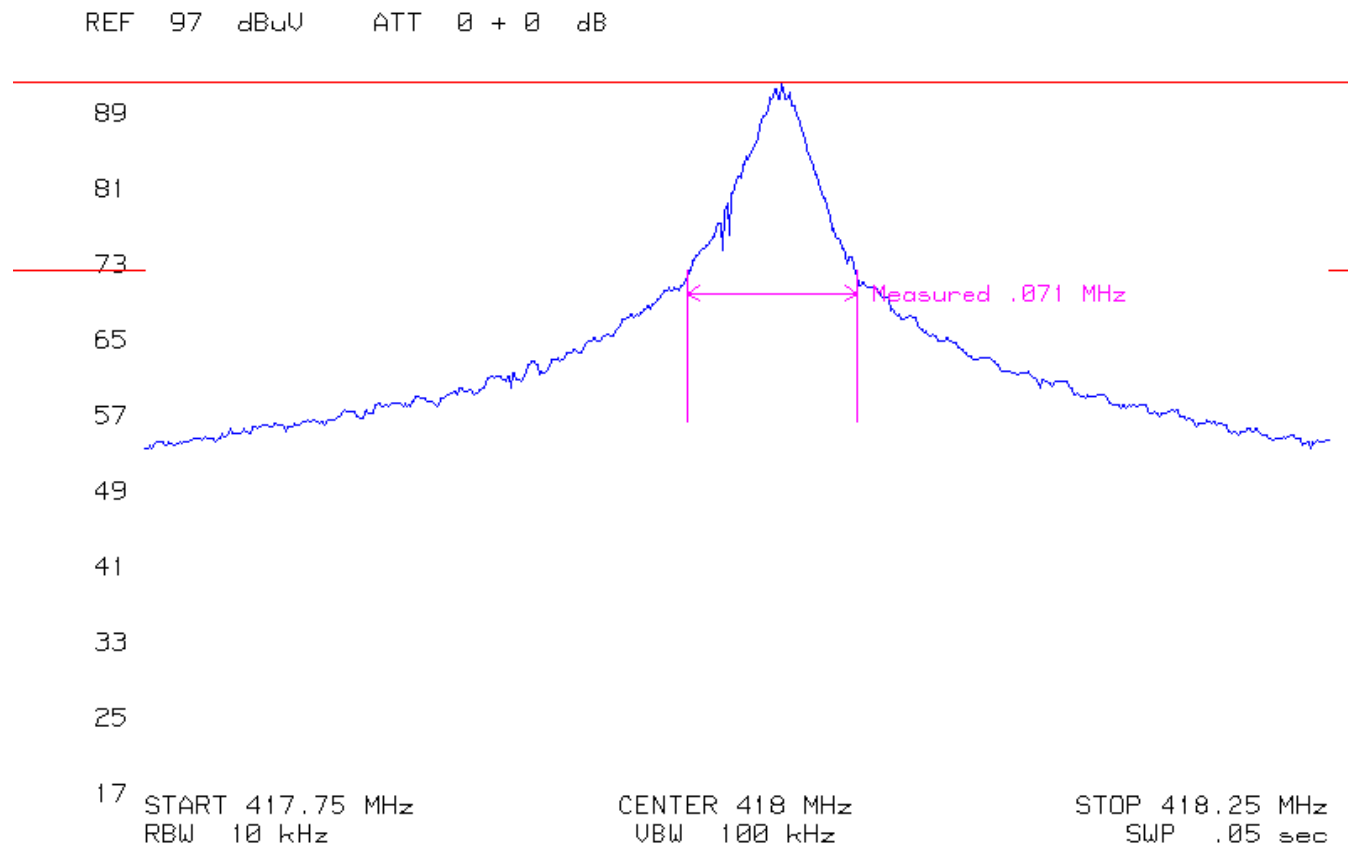


The data shown above illustrates the amount of time the device transmits by depressing the data transmit button and releasing it. The amount of total time transmitting is approximately 100ms.

2.1.5 Bandwidth Determination

Max bandwidth (0.25% of Fundamental Frequency) = 418MHz * .0025 = 1.045MHz

Complies (Y/N) YES



The data shown above illustrates the occupied bandwidth determination. The maximum bandwidth for a transmitter at 418MHz is 1.045MHz. The occupied bandwidth for the device under test is 71KHz.

The bandwidth was determined by setting the left and right markers -20dB from the peak reading.

File Number: MC2219
Project Number: 01ME23499
Model Number: RA-GRX-3

Issued: January 28, 2002

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3.0 SUMMARY:

The equipment under test has

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

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

Test Start Date: 12/6/2001

Test Completion Date: 01/25/2002

- UNDERWRITERS LABORATORIES, INC. -



Project Engineer

Donald Lerner (Ext.22765)
Project Engineer
International EMC Services
Conformity Assessment Services-3014AMEL



Reviewer

Robert DeLisi (Ext.22452)
Engineering Group Leader
International EMC Services
Conformity Assessment Services -3014AMEL