



**FCC CFR47 PART 15 SUBPART C  
ISED CANADA RSS-210 ISSUE 9**

**CERTIFICATION TEST REPORT**

**FOR**

**SIGNAL REPEATER**

**Model: Radio RA2  
PMN: L-REPPRO  
HVIN: NHR1**

**FCC ID: JPZ0117  
IC: 2851A-JPZ0117**

**REPORT NUMBER: R11854880-E1 V4**

**ISSUE DATE: 2017-08-31**

**Prepared for  
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Revision History

| Ver. | Issue Date | Revisions                                                                                                                                                | Revised By   |
|------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| 1    | 2017-08-15 | Initial Issue                                                                                                                                            | Brian Kiewra |
| 2    | 2017-08-21 | Corrected RSS-GEN reference in Section 9.<br>Removed Transmission Time Section, this would be covered by associated transmitters compliant to 15.231(a). | Brian Kiewra |
| 3    | 2017-08-30 | Added low channel and high channel data.<br>Added PMN (Product Marketing Name) and HVIN (Hardware Version Identification Number).                        | Jeff Moser   |
| 4    | 2017-08-31 | Editorial revisions and added Low/High Channel for OBW tests.                                                                                            | Jeff Moser   |

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## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** Lutron Electronics Co. Inc.  
7200 Suter Road  
Coopersburg, PA, 18036-1249 USA

**EUT DESCRIPTION:** Signal Repeater

**MODEL:** Radio RA2 (PMN: L-REPPRO, HVIN: NHR1)

**SERIAL NUMBER:** 0250002B

**DATE TESTED:** 2017-07-25 to 2017-08-31

| APPLICABLE STANDARDS        |              |
|-----------------------------|--------------|
| STANDARD                    | TEST RESULTS |
| FCC PART 15 SUBPART C       | Pass         |
| ISED CANADA RSS-210 Issue 9 | Pass         |
| ISED CANADA RSS-GEN Issue 4 | Pass         |

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL LLC based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

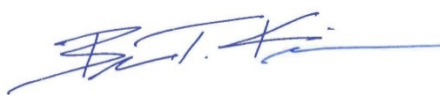
**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

Approved & Released  
For UL LLC By:



Jeffrey Moser  
Operations Leader  
UL – Consumer Technology Division

Prepared By:



Brian Kiewra  
Project Engineer  
UL – Consumer Technology Division

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 4, and RSS-210 Issue 9.

## 3. FACILITIES

The test sites and measurement facilities used to collect data are located at 12 Laboratory Dr., Research Triangle Park, NC 27709, USA.

|                                    |
|------------------------------------|
| 12 Laboratory Dr., RTP, NC 27709   |
| <input type="checkbox"/> Chamber A |
| <input type="checkbox"/> Chamber C |

|                                                           |
|-----------------------------------------------------------|
| 2800 Suite B Perimeter Park Dr.,<br>Morrisville, NC 27560 |
| <input checked="" type="checkbox"/> Chamber NORTH         |
| <input type="checkbox"/> Chamber SOUTH                    |

The onsite chambers are covered under Industry Canada company address code 2180C with site numbers 2180C -1 through 2180C-4, respectively.

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) +

Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

### 4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| PARAMETER                         | UNCERTAINTY | Required by standard |
|-----------------------------------|-------------|----------------------|
| Occupied Channel Bandwidth        | 2.00%       | ±5 %                 |
| RF output power, conducted        | 1.3 dB      | ±1,5 dB              |
| Power Spectral Density, conducted | 2.47 dB     | ±3 dB                |
| Unwanted Emissions, conducted     | 2.94 dB     | ±3 dB                |
| All emissions, radiated           | 5.36 dB     | ±6 dB                |
| Temperature                       | 2.26 °C     | ±3 °C                |
| Supply voltages                   | 2.40%       | ±3 %                 |
| Time                              | 3.39%       | ±5 %                 |

Uncertainty figures are valid to a confidence level of 95%.

## **5. EQUIPMENT UNDER TEST**

### **5.1. DESCRIPTION OF EUT**

The EUT is a signal repeater in an integrated lighting control system intended for transmitting and receiving command signals to trigger system events and to update control indicator status. The EUT operates over the 431-437 MHz band.

### **5.2. DESCRIPTION OF AVAILABLE ANTENNAS**

The radio utilizes a helical antenna.

### **5.3. SOFTWARE AND FIRMWARE**

The firmware installed in the EUT during testing was 0797251, 0.02, App image 0790000 Rev 250.14.

The EUT driver software installed during testing was RAIL 1.6.0.

The test utility software used during testing was 0790000 rev 250.15 +6dBm Tx power

### **5.4. WORST-CASE CONFIGURATION AND MODE**

Three orientations of the EUT were investigated for the worst-case emissions at its fundamental operating frequency. The worst-case orientation was with the unit lying flat on the test table.

### **5.5. MODIFICATIONS**

The power was reduced for compliance. The sample used for final testing was marked as S/N 00B010A9.

## 5.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

| Support Equipment List |              |              |               |        |
|------------------------|--------------|--------------|---------------|--------|
| Description            | Manufacturer | Model        | Serial Number | FCC ID |
| Power Supply           | Lutron       | T-5DC-USB-WH | NA            | NA     |

### I/O CABLES

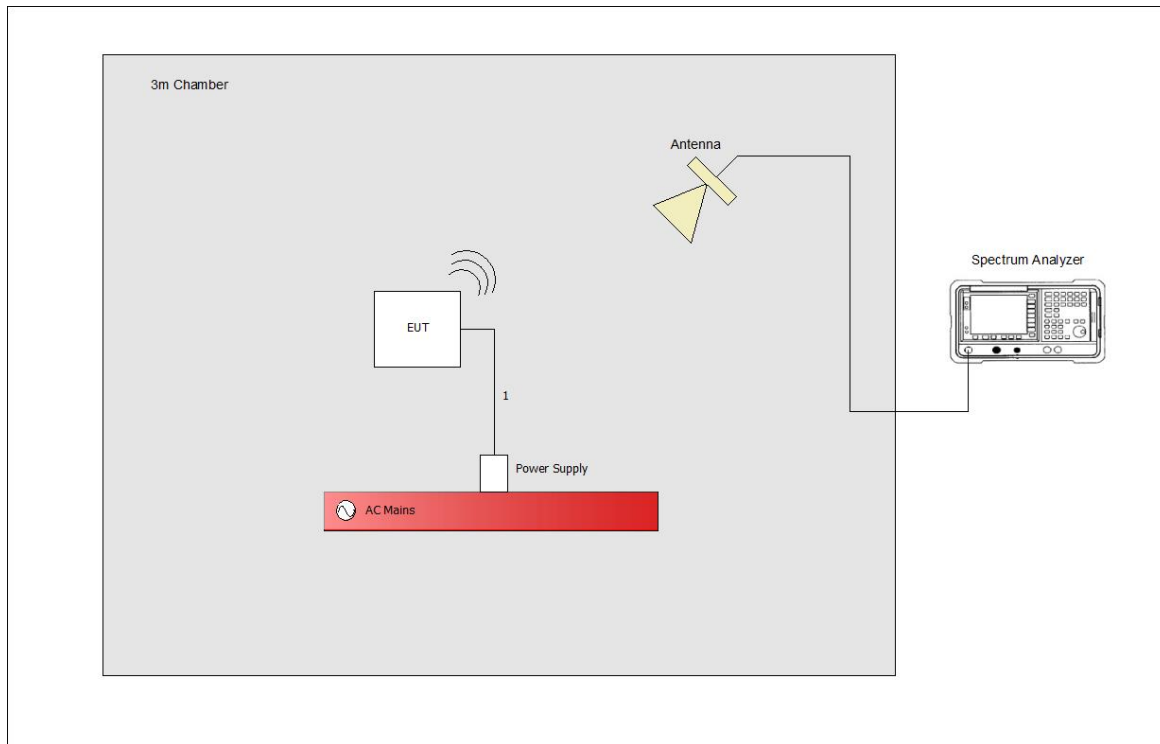
| I/O Cable List |      |                      |                |            |                  |          |
|----------------|------|----------------------|----------------|------------|------------------|----------|
| Cable No.      | Port | # of Identical Ports | Connector Type | Cable Type | Cable Length (m) | Remarks  |
| 1              | USB  | 1                    | μUSB           | USB        | <3m              | DC Power |

### TEST SETUP

The EUT is setup as a standalone device.



**SETUP DIAGRAM FOR TESTS**



## 6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville - North Chamber)  
Includes Occupied Bandwidth testing.

| Equip. ID     | Description                                       | Manufacturer         | Model Number | Last Cal.                 | Next Cal.                 |
|---------------|---------------------------------------------------|----------------------|--------------|---------------------------|---------------------------|
|               | <b>0.009-30MHz</b>                                | <b>(Loop Ant.)</b>   |              |                           |                           |
| AT0079        | Active Loop Antenna                               | ETS-Lindgren         | 6502         | 2016-12-28                | 2017-12-31                |
|               | <b>30-1000 MHz</b>                                |                      |              |                           |                           |
| AT0074        | Hybrid Broadband Antenna                          | Sunol Sciences Corp. | JB3          | 2017-06-15                | 2018-06-15                |
|               | <b>1-18 GHz</b>                                   |                      |              |                           |                           |
| AT0072        | Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz | ETS Lindgren         | 3117         | 2017-04-05                | 2018-04-05                |
|               | <b>Gain-Loss Chains</b>                           |                      |              |                           |                           |
| N-SAC01       | Gain-loss string: 0.009-30MHz                     | Various              | Various      | 2016-10-04                | 2017-10-04                |
| N-SAC02       | Gain-loss string: 30-1000MHz                      | Various              | Various      | 2017-06-11                | 2018-06-11                |
| N-SAC03       | Gain-loss string: 1-18GHz                         | Various              | Various      | 2016-08-28,<br>2017-08-18 | 2017-08-28,<br>2018-08-18 |
|               | <b>Receiver &amp; Software</b>                    |                      |              |                           |                           |
| SA0027        | Spectrum Analyzer                                 | Agilent              | N9030A       | 2017-03-16                | 2018-03-16                |
| SOFTEMI       | EMI Software                                      | UL                   | Version 9.5  | NA                        | NA                        |
|               | <b>Additional Equipment used</b>                  |                      |              |                           |                           |
| s/n 161024690 | Environmental Meter                               | Fisher Scientific    | 15-077-963   | 2016-12-21                | 2018-12-21                |
| HPF009        | 1GHz High-Pass Filter                             | Micro-Tronics        | HPM17672     | 2017-03-20                | 2018-03-20                |
| ATA174        | 10dB Pad                                          | Mini-Circuits        | BW-N10W5     | 2017-03-20                | 2018-03-20                |

Test Equipment Used - Line-Conducted Emissions – Voltage (Morrisville – Conducted 1)

| Equipment ID       | Description                                   | Manufacturer        | Model Number              | Last Cal.              | Next Cal.              |
|--------------------|-----------------------------------------------|---------------------|---------------------------|------------------------|------------------------|
| CBL076             | Coax cable, RG223, N-male to BNC-male, 20-ft. | Pasternack          | PE3476-240                | 2017-06-12             | 2018-06-12             |
| s/n 160938893      | Environmental Meter                           | Fisher Scientific   | 14-650-118                | 2016-11-02             | 2018-11-02             |
| LISN003            | LISN, 50-ohm/50-uH, 2-conductor, 25A          | Fischer Custom Com. | FCC-LISN-50-25-2-01-550V  | 2016-08-24, 2017-08-22 | 2017-08-24, 2018-08-22 |
| PRE0101521 (75141) | EMI Test Receiver 9kHz-7GHz                   | Rohde & Schwarz     | ESCI 7                    | 2016-08-23, 2017-08-23 | 2017-08-23, 2018-08-23 |
| TL001              | Transient Limiter, 0.009-30MHz                | Com-Power           | LIT-930A                  | 2017-06-12             | 2018-06-12             |
| PS214              | AC Power Source                               | Elgar               | CW2501M (s/n 1523A02396)  | NA                     | NA                     |
| PS215              | AC Power Source                               | Elgar               | CW2501M (s/n 1523A02397)  | NA                     | NA                     |
| SOFTEMI            | EMI Software                                  | UL                  | Version 9.5               | NA                     | NA                     |
|                    | <b>Miscellaneous (if needed)</b>              |                     |                           |                        |                        |
| CDECABLE001        | ANSI C63.4 1m extension cable.                | UL                  | Per Annex B of ANSI C63.4 | 2017-07-03             | 2018-07-03             |

## 7. ANTENNA PORT TEST RESULTS

### 7.1. 20 dB AND 99% BW

#### LIMITS

FCC §15.231 (c)

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

RSS-210 A.1.3

For the purpose of Section A1.1, the 99% Bandwidth shall be less than or equal to 0.25% of the centre frequency for devices operating between 70 and 900MHz. For devices operating above 900 MHz, the emission shall be less or equal to 0.5% of the centre frequency.

#### TEST PROCEDURE

ANSI C63.10

The transmitter output is connected to the spectrum analyzer.

20dB Bandwidth: The RBW is set to 1% to 5% of the OBW. The VBW is set to 3 times the RBW. The sweep time is coupled. Bandwidth is determined at the points 20 dB down from the modulated carrier.

99% Bandwidth: The RBW is set to 1% to 5% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

## **RESULTS**

No non-compliance noted.

### **20dB Bandwidth**

| <b>Frequency<br/>(MHz)</b> | <b>20dB Bandwidth<br/>(kHz)</b> | <b>Limit<br/>(kHz)</b> | <b>Margin<br/>(kHz)</b> |
|----------------------------|---------------------------------|------------------------|-------------------------|
| 431.5                      | 139.5                           | 1078.75                | -939.25                 |
| 436.6                      | 139.2                           | 1091.5                 | -952.3                  |

### **99% Bandwidth**

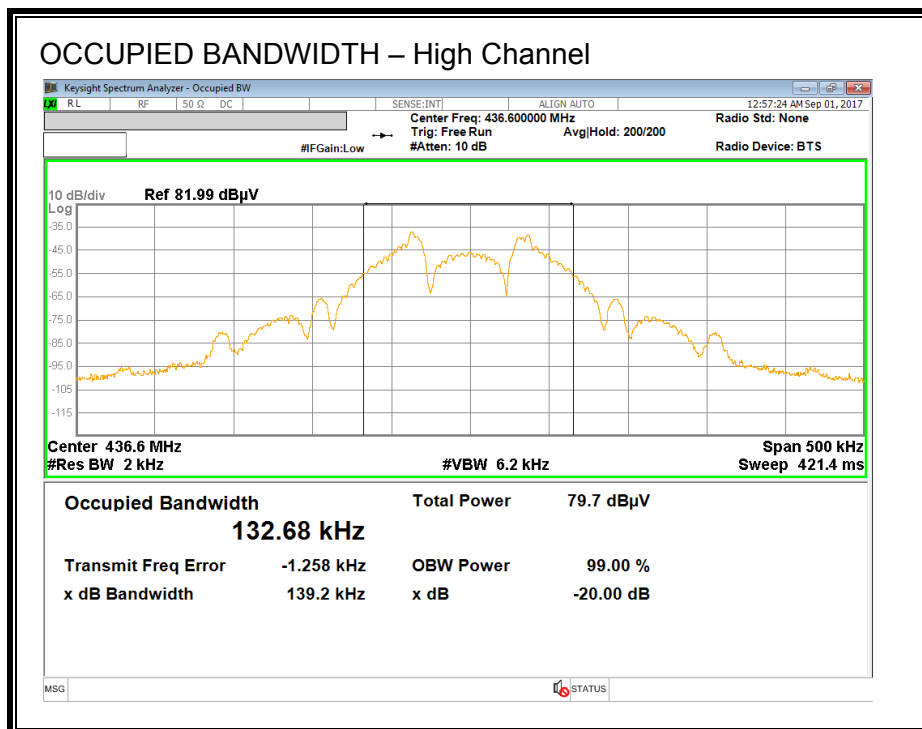
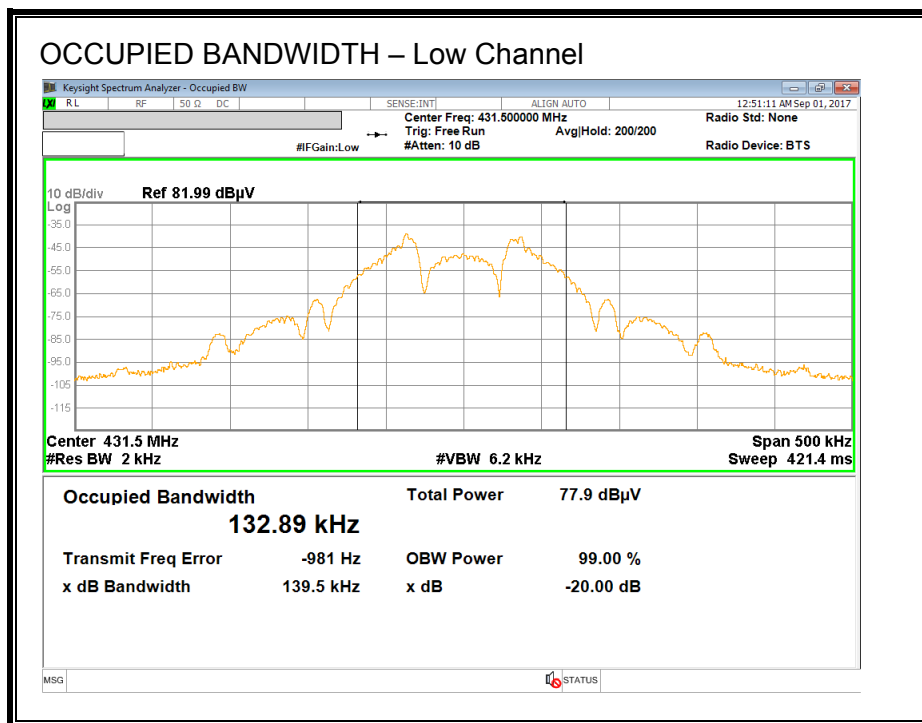
| <b>Frequency<br/>(MHz)</b> | <b>99% Bandwidth<br/>(kHz)</b> | <b>Limit<br/>(kHz)</b> | <b>Margin<br/>(kHz)</b> |
|----------------------------|--------------------------------|------------------------|-------------------------|
| 431.5                      | 132.89                         | 1078.75                | -945.86                 |
| 436.6                      | 132.68                         | 1091.5                 | -958.82                 |

## **Test Information**

Tester: Mark Nolting

Date: 2017-08-31

## 20dB AND 99% BANDWIDTH



## **7.2. DUTY CYCLE**

### **LIMITS**

FCC §15.35 (c)

The 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. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, 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. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

### **TEST PROCEDURE**

The transmitter output is connected to a spectrum analyzer or radiated field strength. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is coupled and the span is set to 0 Hz. The number of pulses is measured and calculated in a 100 ms scan.

### **CALCULATION**

Average Reading = Peak Reading (dBuV/m) + 20log (Duty Cycle), Where Duty Cycle is (# of long pulses \* long pulse width) + (# of short pulses \* short pulse width) / 100 or T

### **RESULTS**

Lutron has declared a worst-case duty cycle of 10%.

## 8. RADIATED EMISSION TEST RESULTS

### 8.1. TX RADIATED SPURIOUS EMISSION

#### LIMITS

FCC §15.231 (b)

IC A1.2

In addition to the provisions of § 15.205, the field strength of emissions from Intentional radiators operated under this section shall not exceed the following:

| Fundamental Frequency (MHz) | Field Strength of Fundamental Frequency (microvolts/meter) | Field Strength of Spurious Emissions (microvolts/meter) |
|-----------------------------|------------------------------------------------------------|---------------------------------------------------------|
| 40.66 - 40.70               | 2,250                                                      | 225                                                     |
| 70 - 130                    | 1,250                                                      | 125                                                     |
| 130 - 174                   | 1,250 to 3,750 <sup>1</sup>                                | 125 to 375 <sup>1</sup>                                 |
| 174 - 260                   | 3,750                                                      | 375                                                     |
| 260 - 470                   | 3,750 to 12,500 <sup>1</sup>                               | 375 to 1,250 <sup>1</sup>                               |
| Above 470                   | 12,500                                                     | 1,250                                                   |

<sup>1</sup> Linear interpolation

§15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

| MHz                        | MHz                   | MHz             | GHz              |
|----------------------------|-----------------------|-----------------|------------------|
| 0.090 - 0.110              | 16.42 - 16.423        | 399.9 - 410     | 4.5 - 5.15       |
| <sup>1</sup> 0.495 - 0.505 | 16.69475 - 16.69525   | 608 - 614       | 5.35 - 5.46      |
| 2.1735 - 2.1905            | 16.80425 - 16.80475   | 960 - 1240      | 7.25 - 7.75      |
| 4.125 - 4.128              | 25.5 - 25.67          | 1300 - 1427     | 8.025 - 8.5      |
| 4.17725 - 4.17775          | 37.5 - 38.25          | 1435 - 1626.5   | 9.0 - 9.2        |
| 4.20725 - 4.20775          | 73 - 74.6             | 1645.5 - 1646.5 | 9.3 - 9.5        |
| 6.215 - 6.218              | 74.8 - 75.2           | 1660 - 1710     | 10.6 - 12.7      |
| 6.26775 - 6.26825          | 108 - 121.94          | 1718.8 - 1722.2 | 13.25 - 13.4     |
| 6.31175 - 6.31225          | 123 - 138             | 2200 - 2300     | 14.47 - 14.5     |
| 8.291 - 8.294              | 149.9 - 150.05        | 2310 - 2390     | 15.35 - 16.2     |
| 8.362 - 8.366              | 156.52475 - 156.52525 | 2483.5 - 2500   | 17.7 - 21.4      |
| 8.37625 - 8.38675          | 156.7 - 156.9         | 2655 - 2900     | 22.01 - 23.12    |
| 8.41425 - 8.41475          | 162.0125 - 167.17     | 3260 - 3267     | 23.6 - 24.0      |
| 12.29 - 12.293             | 167.72 - 173.2        | 3332 - 3339     | 31.2 - 31.8      |
| 12.51975 - 12.52025        | 240 - 285             | 3345.8 - 3358   | 36.43 - 36.5     |
| 12.57675 - 12.57725        | 322 - 335.4           | 3600 - 4400     | ( <sup>2</sup> ) |
| 13.36 - 13.41              |                       |                 |                  |



1 Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.  
2 Above 38.6

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency<br>(MHz) | Field Strength<br>(microvolts/meter) | Measurement Distance<br>(meters) |
|--------------------|--------------------------------------|----------------------------------|
| 30 88              | 100 **                               | 3                                |
| 88 216             | 150 **                               | 3                                |
| 216 960            | 200 **                               | 3                                |
| Above 960          | 500                                  | 3                                |

\*\* Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 72 MHz, 76 88 MHz, 174 216 MHz or 470 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

## **TEST PROCEDURE**

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz measurements and 1.5 meters above the ground plane for above 1 GHz measurements. The antenna to EUT distance is 3 meters.

For measurements below 1 GHz the resolution bandwidth is set to 120 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For peak measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz. For average measurements, the resolution and video bandwidths are set as described in ANSI 63.10:2013 for the applicable average measurement. For this test program, Average measurements were performed using a Peak detector and duty cycle correction by  $20\log(x)$  where 'x' is the duty cycle of 10%.

The spectrum from 9 kHz to 5 GHz is investigated with the transmitter on.

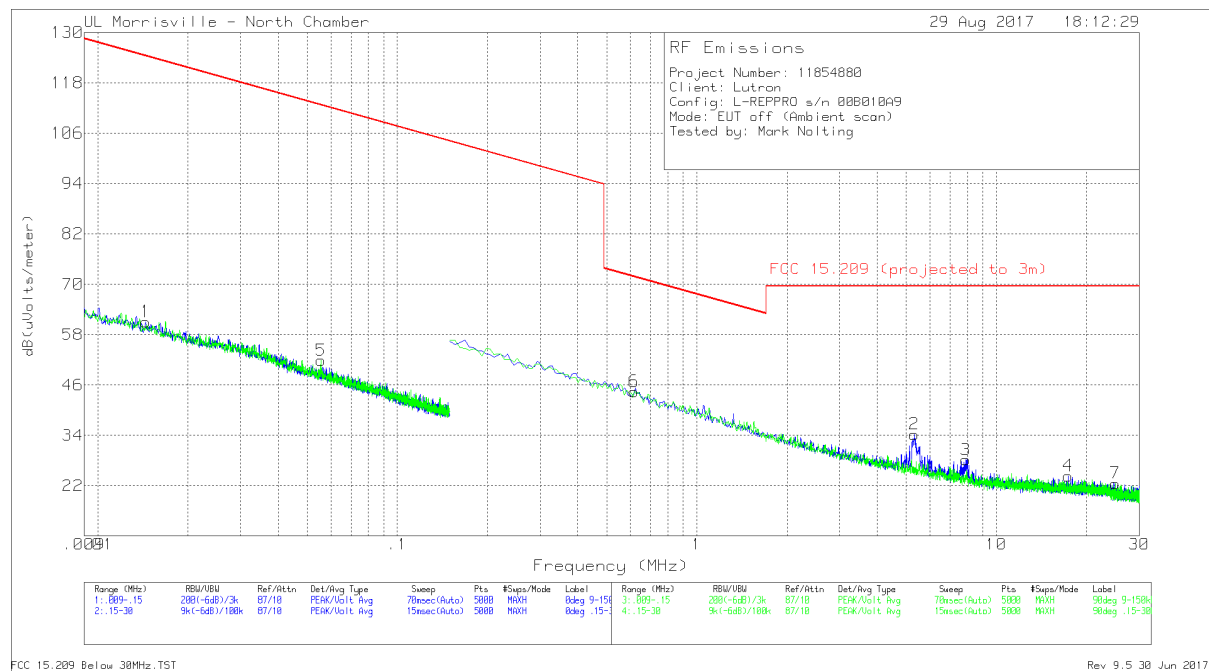
The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

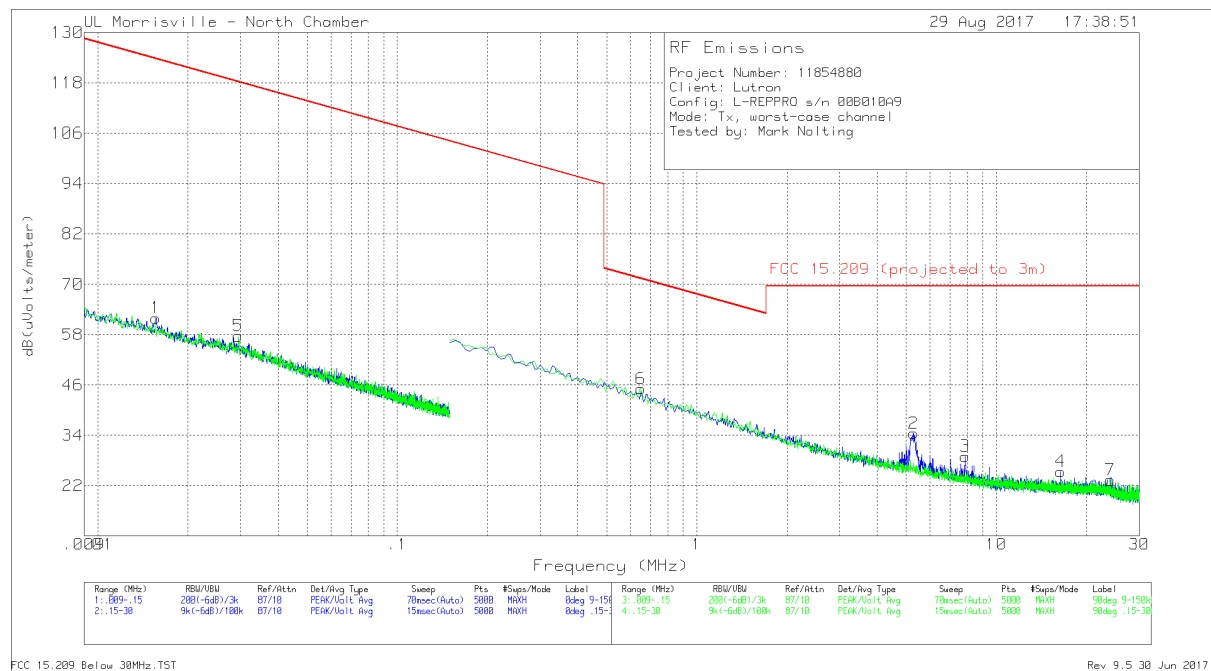
## RESULTS

### TX SPURIOUS EMISSIONS (0.009-30MHz)

**Note:** All measurements were made at a test distance of 3 m. The limits in the plots and tabular data are the FCC/IC limits extrapolated from the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to the measurement distance to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the intentionally transmitted signal. The extrapolation factor for the limits were  $40 \cdot \log(\text{specification distance} / \text{test distance})$  per FCC 15.31 (f) (2).

Although these tests were performed at a test site other than an open area test site, adequate comparison measurements were confirmed against an open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.





| Marker                                                                       | Frequency (MHz) | Meter Reading (dBuV) | Det | AT0079 AF (dB/m) | Cbl (dB) | Corrected Reading dB(uVolts/meter) | FCC 15.209 (projected to 3m) | Margin (dB) | Azimuth (Degs) |
|------------------------------------------------------------------------------|-----------------|----------------------|-----|------------------|----------|------------------------------------|------------------------------|-------------|----------------|
| The following emissions are with the loop antenna at 0-degrees. (Face on.)   |                 |                      |     |                  |          |                                    |                              |             |                |
| 1                                                                            | .01564          | 46                   | Pk  | 15.9             | .1       | 62                                 | 123.72                       | -61.72      | 0-360          |
| 2                                                                            | 5.28506         | 23.09                | Pk  | 11               | .4       | 34.49                              | 69.54                        | -35.05      | 0-360          |
| 3                                                                            | 7.85259         | 17.8                 | Pk  | 10.7             | .5       | 29                                 | 69.54                        | -40.54      | 0-360          |
| 4                                                                            | 16.39709        | 14.5                 | Pk  | 10.2             | .7       | 25.4                               | 69.54                        | -44.14      | 0-360          |
| The following emissions are with the loop antenna at 90-degrees. (Face off.) |                 |                      |     |                  |          |                                    |                              |             |                |
| 5                                                                            | .02944          | 44.08                | Pk  | 13.5             | .1       | 57.68                              | 118.23                       | -60.55      | 0-360          |
| 6                                                                            | .65156          | 34.32                | Pk  | 10.7             | .1       | 45.12                              | 71.32                        | -26.2       | 0-360          |
| 7                                                                            | 24.034          | 13.35                | Pk  | 9.2              | .8       | 23.35                              | 69.54                        | -46.19      | 0-360          |

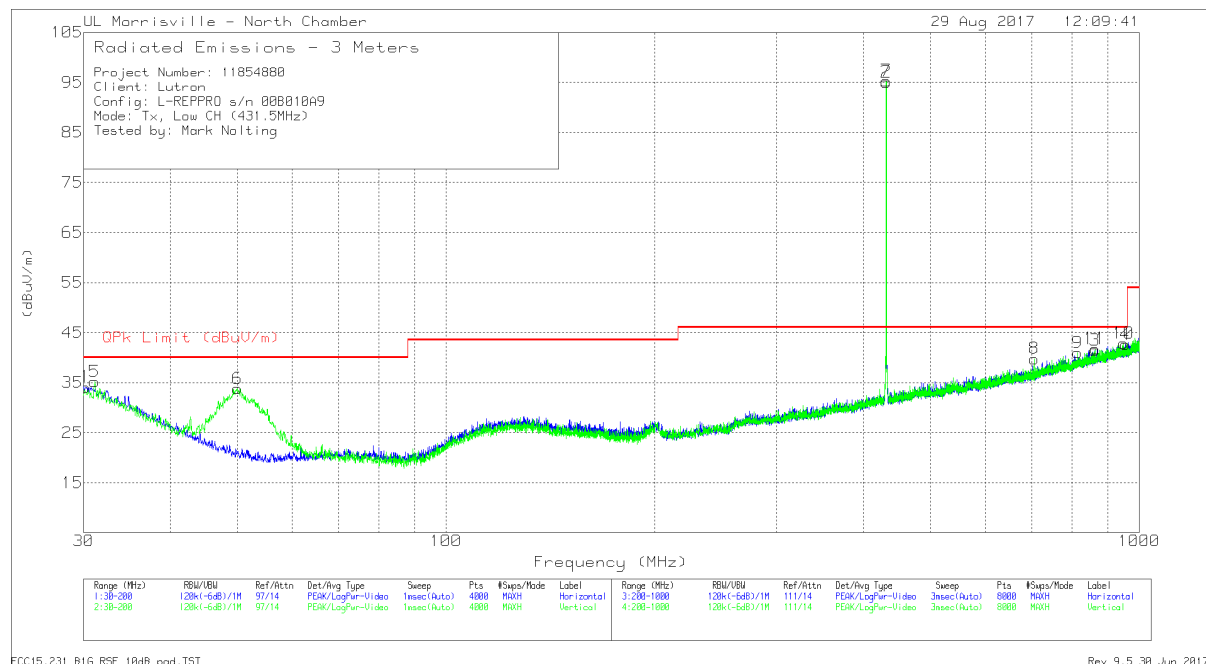
Pk - Peak detector

FCC 15.209 Below 30MHz.TST

Rev 9.5 30 Jun 2017

# **FUNDAMENTAL, HARMONICS AND TX SPURIOUS EMISSION (30 – 1000 MHz)**

## **LOW CHANNEL**

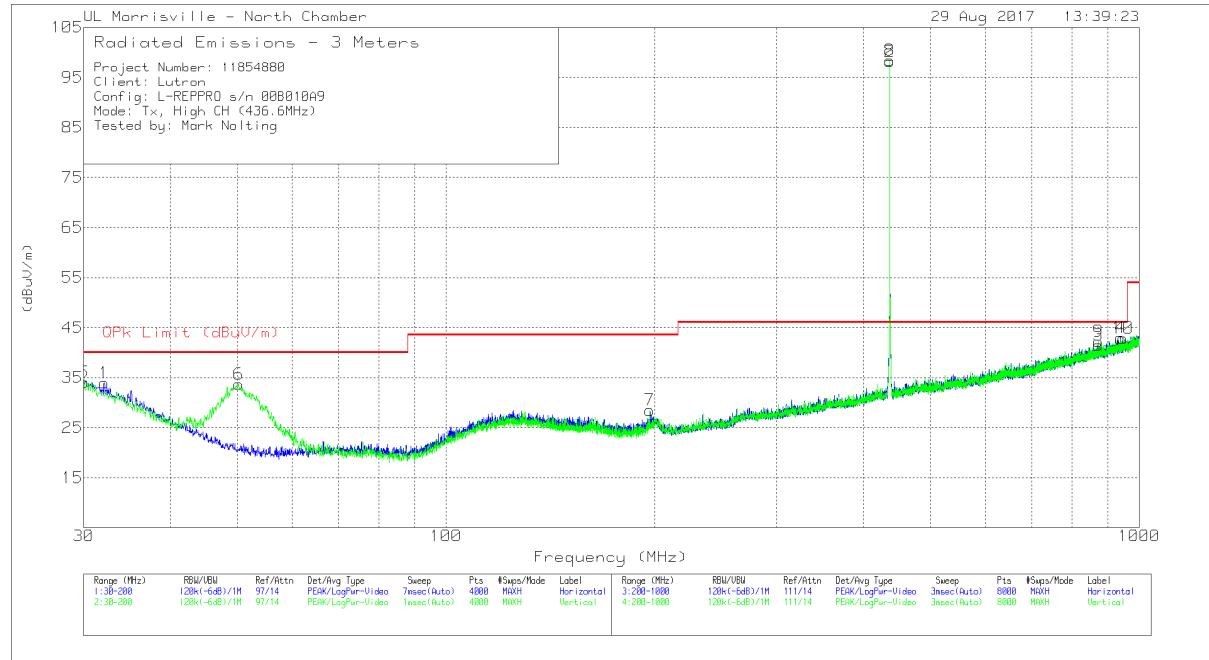


| Marker | Freq. (MHz) | Meter Reading (dBuV) | Det | AT0074 AF (dB/m) | Amp/Cbl (dB) | Pad (dB) | DCCF (dB) | Corrected Reading (dBuV/m) | Pk Limit (dBuV/m) *Qp Limit | Margin (dB) | Avg Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-------------|----------------------|-----|------------------|--------------|----------|-----------|----------------------------|-----------------------------|-------------|--------------------|-------------|----------------|-------------|----------|
| 1      | 30.205      | 25.25                | Qp  | 26.1             | -31.7        | 9.9      | 0         | 29.55                      | *40                         | -10.45      | -                  | -           | 279            | 398         | H        |
| 2      | 431.537     | 93.27                | Pk  | 21               | -28.7        | 9.9      | 0         | 95.47                      | 100.75                      | -5.28       | -                  | -           | 102            | 231         | H        |
|        | 431.537     | 93.27                | Pk  | 21               | -28.7        | 9.9      | -20       | 75.47                      | -                           | -           | 80.75              | -5.28       | 102            | 231         | H        |
| 3      | 863.0728    | 32.4                 | Pk  | 26.6             | -26.8        | 9.9      | 0         | 42.1                       | 80.75                       | -38.65      | -                  | -           | 107            | 227         | H        |
|        | 863.0728    | 32.4                 | Pk  | 26.6             | -26.8        | 9.9      | -20       | 22.1                       | -                           | -           | 60.75              | -38.65      | 107            | 227         | H        |
| 4      | 954.9981    | 24.19                | Qp  | 27.7             | -25.8        | 9.9      | 0         | 35.99                      | *46.02                      | -10.03      | -                  | -           | 96             | 101         | H        |
| 5      | 31.1053     | 25.26                | Qp  | 25.4             | -31.7        | 9.9      | 0         | 28.86                      | *40                         | -11.14      | -                  | -           | 258            | 101         | V        |
| 6      | 49.9802     | 42.74                | Pk  | 12.7             | -31.5        | 9.9      | 0         | 33.84                      | *40                         | -6.16       | -                  | -           | 0-360          | 102         | V        |
| 7      | 431.5397    | 93.14                | Pk  | 21               | -28.7        | 9.9      | 0         | 95.34                      | 100.75                      | -5.41       | -                  | -           | 88             | 226         | V        |
|        | 431.5301    | 93.11                | Pk  | 21               | -28.7        | 9.9      | -20       | 75.34                      | -                           | -           | 80.75              | -5.41       | 88             | 226         | V        |
| 8      | 705.7657    | 24.75                | Qp  | 24.7             | -27.9        | 9.9      | 0         | 31.45                      | *46.02                      | -14.57      | -                  | -           | 50             | 201         | V        |
| 9      | 815.08      | 24.58                | Qp  | 26.4             | -27.2        | 9.9      | 0         | 33.68                      | *46.02                      | -12.34      | -                  | -           | 50             | 201         | V        |
| 11     | 863.0732    | 32.8                 | Pk  | 26.6             | -26.8        | 9.9      | 0         | 42.5                       | 80.75                       | -38.25      | -                  | -           | 332            | 100         | V        |
|        | 863.0862    | 32.08                | Pk  | 26.6             | -26.8        | 9.9      | -20       | 22.5                       | -                           | -           | 60.75              | -38.25      | 332            | 100         | V        |
| 10     | 948.3973    | 24.19                | Qp  | 27.5             | -25.8        | 9.9      | 0         | 35.79                      | *46.02                      | -10.23      | -                  | -           | 174            | 398         | V        |

Pk - Peak detector

Qp - Quasi-Peak detector

# HIGH CHANNEL



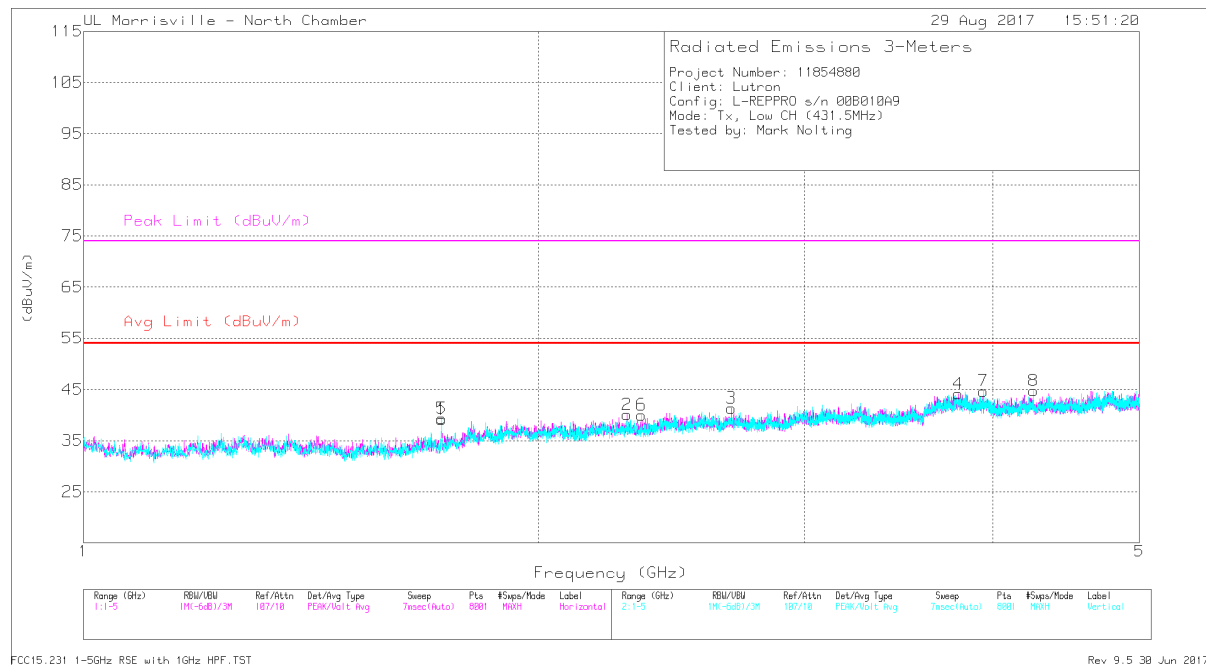
| Marker | Freq. (MHz) | Meter Reading (dBuV) | Det | AT0074 AF (dB/m) | Amp/Cbl (dB) | Pad (dB) | DCCF (dB) | Corrected Reading (dBuV/m) | Pk Limit (dBuV/m) *Qp Limit | Margin (dB) | Avg Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-------------|----------------------|-----|------------------|--------------|----------|-----------|----------------------------|-----------------------------|-------------|--------------------|-------------|----------------|-------------|----------|
| 1      | 32.1256     | 25.24                | Qp  | 24.6             | -31.7        | 9.9      | 0         | 28.04                      | *40                         | -11.96      | -                  | -           | 160            | 100         | H        |
| 2      | 436.6383    | 96.13                | Pk  | 20.9             | -28.7        | 9.9      | 0         | 98.23                      | 100.91                      | -2.68       | -                  | -           | 110            | 229         | H        |
|        | 436.6383    | 96.13                | Pk  | 20.9             | -28.7        | 9.9      | -20       | 78.23                      | -                           | -           | 80.91              | -2.68       | 110            | 229         | H        |
| 3      | 873.1174    | 33.85                | Pk  | 26.7             | -26.6        | 9.9      | 0         | 43.85                      | 80.91                       | -37.06      | -                  | -           | 103            | 233         | H        |
|        | 873.1174    | 33.85                | Pk  | 26.7             | -26.6        | 9.9      | -20       | 23.85                      | -                           | -           | 60.91              | -37.06      | 103            | 233         | H        |
| 4      | 939.0961    | 24.31                | Qp  | 27.3             | -25.9        | 9.9      | 0         | 35.61                      | *46.02                      | -10.41      | -                  | -           | 0-360          | 299         | H        |
| 5      | 30.1413     | 25.22                | Qp  | 26.2             | -31.8        | 9.9      | 0         | 29.52                      | *40                         | -10.48      | -                  | -           | 109            | 100         | V        |
| 6      | 50.1927     | 42.67                | Pk  | 12.6             | -31.5        | 9.9      | 0         | 33.67                      | *40                         | -6.33       | -                  | -           | 0-360          | 102         | V        |
| 7      | 196.5581    | 31.69                | Pk  | 17               | -30.1        | 9.9      | 0         | 28.49                      | *43.52                      | -15.03      | -                  | -           | 0-360          | 102         | V        |
| 8      | 436.6354    | 96.24                | Pk  | 20.9             | -28.7        | 9.9      | 0         | 98.34                      | 100.91                      | -2.57       | -                  | -           | 96             | 212         | V        |
|        | 436.6354    | 96.24                | Pk  | 20.9             | -28.7        | 9.9      | -20       | 78.34                      | -                           | -           | 80.91              | -2.57       | 96             | 212         | V        |
| 9      | 873.1191    | 34.13                | Pk  | 26.7             | -26.6        | 9.9      | 0         | 44.13                      | 80.91                       | -36.78      | -                  | -           | 83             | 204         | V        |
|        | 873.1191    | 34.13                | Pk  | 26.7             | -26.6        | 9.9      | -20       | 24.13                      | -                           | -           | 60.91              | -36.78      | 83             | 204         | V        |
| 10     | 946.9971    | 24.23                | Qp  | 27.5             | -25.8        | 9.9      | 0         | 35.83                      | *46.02                      | -10.19      | -                  | -           | 262            | 201         | V        |

Pk - Peak detector

Qp - Quasi-Peak detector

# **HARMONICS AND TX SPURIOUS EMISSIONS ABOVE 1GHz**

## **LOW CHANNEL**

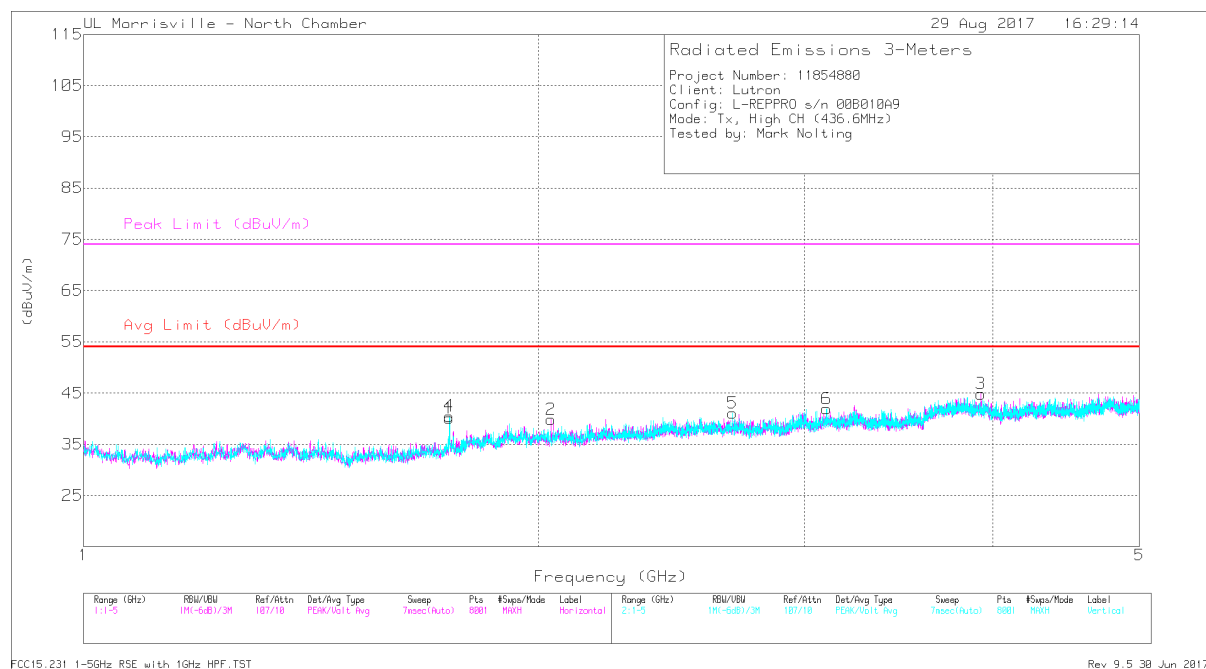


| Marker | Freq. (MHz) | Meter Reading (dBuV) | Det | AT0074 AF (dB/m) | Amp/ Cbl (dB) | HPF009 (dB) | DCCF (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Pk Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-------------|----------------------|-----|------------------|---------------|-------------|-----------|----------------------------|--------------------|-------------|-------------------|-------------|----------------|-------------|----------|
| 1      | 1.726       | 47.2                 | Pk  | 29.2             | -35.3         | .5          | 0         | 41.6                       | -                  | -           | 80.75             | -39.15      | 161            | 253         | H        |
|        | 1.726       | 47.2                 | Pk  | 29.2             | -35.3         | .5          | -20       | 21.6                       | 60.75              | -39.15      | -                 | -           | 161            | 253         | H        |
| 2      | * 2.29      | 42.47                | Pk  | 31.5             | -34.2         | .3          | 0         | 40.07                      | 54                 | -13.93      | 74                | -33.93      | 0-360          | 103         | H        |
| 3      | * 2.684     | 42.17                | Pk  | 32.4             | -33.6         | .4          | 0         | 41.37                      | 54                 | -12.63      | 74                | -32.63      | 0-360          | 399         | H        |
| 4      | * 3.793     | 42.53                | Pk  | 33.5             | -32.4         | .5          | 0         | 44.13                      | 54                 | -9.87       | 74                | -29.87      | 0-360          | 399         | H        |
|        |             |                      |     |                  |               |             |           |                            |                    |             |                   |             |                |             |          |
| 5      | 1.726       | 47.24                | Pk  | 29.2             | -35.3         | .5          | 0         | 41.64                      | -                  | -           | 80.75             | -39.11      | 76             | 390         | V        |
|        | 1.726       | 47.24                | Pk  | 29.2             | -35.3         | .5          | -20       | 21.64                      | 60.75              | -39.11      | -                 | -           | 76             | 390         | V        |
| 6      | * 2.34      | 42.12                | Pk  | 31.6             | -34.1         | .4          | 0         | 40.02                      | 54                 | -13.98      | 74                | -33.98      | 0-360          | 302         | V        |
| 7      | * 3.941     | 43.41                | Pk  | 33.4             | -32.5         | .4          | 0         | 44.71                      | 54                 | -9.29       | 74                | -29.29      | 0-360          | 400         | V        |
| 8      | * 4.257     | 42.94                | Pk  | 33.5             | -32.1         | .4          | 0         | 44.74                      | 54                 | -9.26       | 74                | -29.26      | 0-360          | 102         | V        |

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

# HIGH CHANNEL



| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AT0074 AF (dB/m) | Amp/Cbl (dB) | HPF009 (dB) | DCCF (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Pk Limit (dBuV/m) | Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-----------------|----------------------|-----|------------------|--------------|-------------|-----------|----------------------------|--------------------|-------------|-------------------|-------------|----------------|-------------|----------|
| 1      | 1.746           | 47.97                | Pk  | 29.5             | -35.2        | .5          | 0         | 42.77                      | -                  | -           | 80.91             | -38.14      | 349            | 252         | H        |
|        | 1.746           | 47.97                | Pk  | 29.5             | -35.2        | .5          | -20       | 22.77                      | 60.91              | -38.14      | -                 | -           | 349            | 252         | H        |
| 2      | 2.039           | 42.82                | Pk  | 31.4             | -34.7        | .3          | 0         | 39.82                      | 54                 | -14.18      | 74                | -34.18      | 0-360          | 399         | H        |
| 3      | * 3.929         | 43.44                | Pk  | 33.4             | -32.5        | .5          | 0         | 44.84                      | 54                 | -9.16       | 74                | -29.16      | 0-360          | 399         | H        |
|        |                 |                      |     |                  |              |             |           |                            |                    |             |                   |             |                |             |          |
| 4      | 1.747           | 48.21                | Pk  | 29.5             | -35.2        | .5          | 0         | 43.01                      | -                  | -           | 80.91             | -37.90      | 75             | 394         | V        |
|        | 1.747           | 48.21                | Pk  | 29.5             | -35.2        | .5          | -20       | 23.01                      | 60.91              | -37.90      | -                 | -           | 75             | 394         | V        |
| 5      | * 2.69          | 41.77                | Pk  | 32.4             | -33.5        | .4          | 0         | 41.07                      | 54                 | -12.93      | 74                | -32.93      | 0-360          | 400         | V        |
| 6      | 3.104           | 41.8                 | Pk  | 32.8             | -33.2        | .5          | 0         | 41.9                       | 54                 | -12.1       | 74                | -32.1       | 0-360          | 102         | V        |

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector



## 9. AC MAINS LINE CONDUCTED EMISSIONS

### LIMITS

§15.207 (a)  
IC RSS-GEN, Section 8.8

| Frequency of emission<br>(MHz)                   | Conducted Limit (dBμV) |           |
|--------------------------------------------------|------------------------|-----------|
|                                                  | Quasi-peak             | Average   |
| 0.15 to 0.50                                     | 66 to 56*              | 56 to 46* |
| 0.50 to 5                                        | 56                     | 46        |
| 5 to 30                                          | 60                     | 50        |
| * Decreases with the logarithm of the frequency. |                        |           |

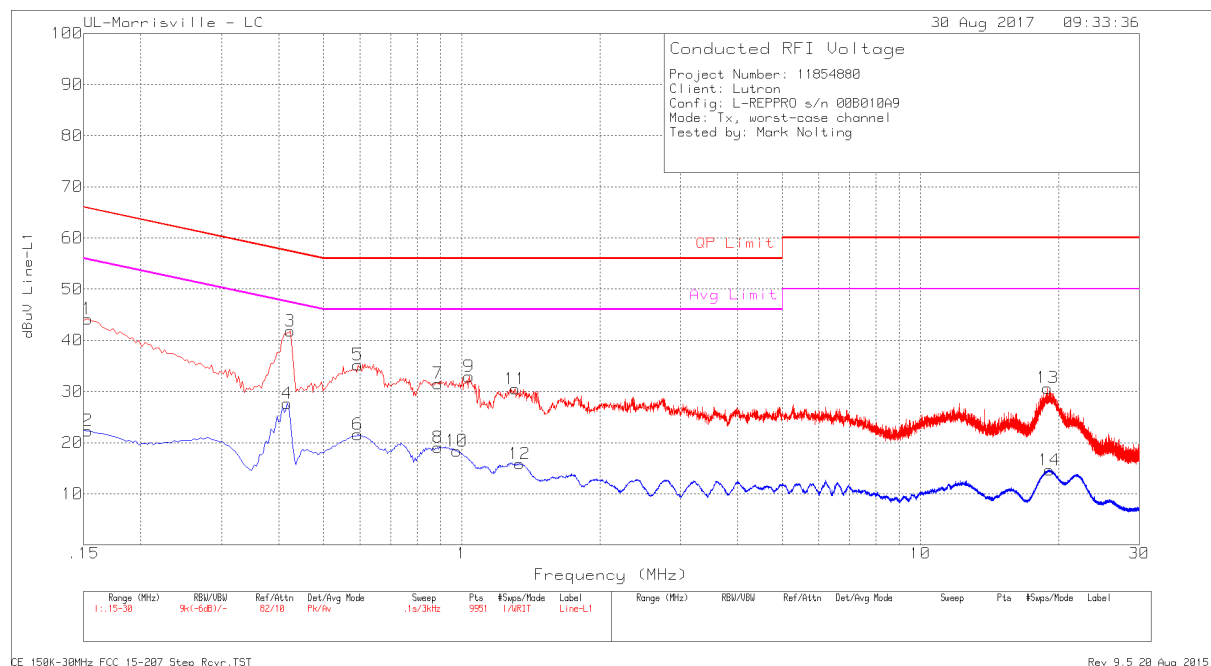
### TEST PROCEDURE

ANSI C63.10

### RESULTS

No non-compliance noted.

## LINE 1 RESULTS

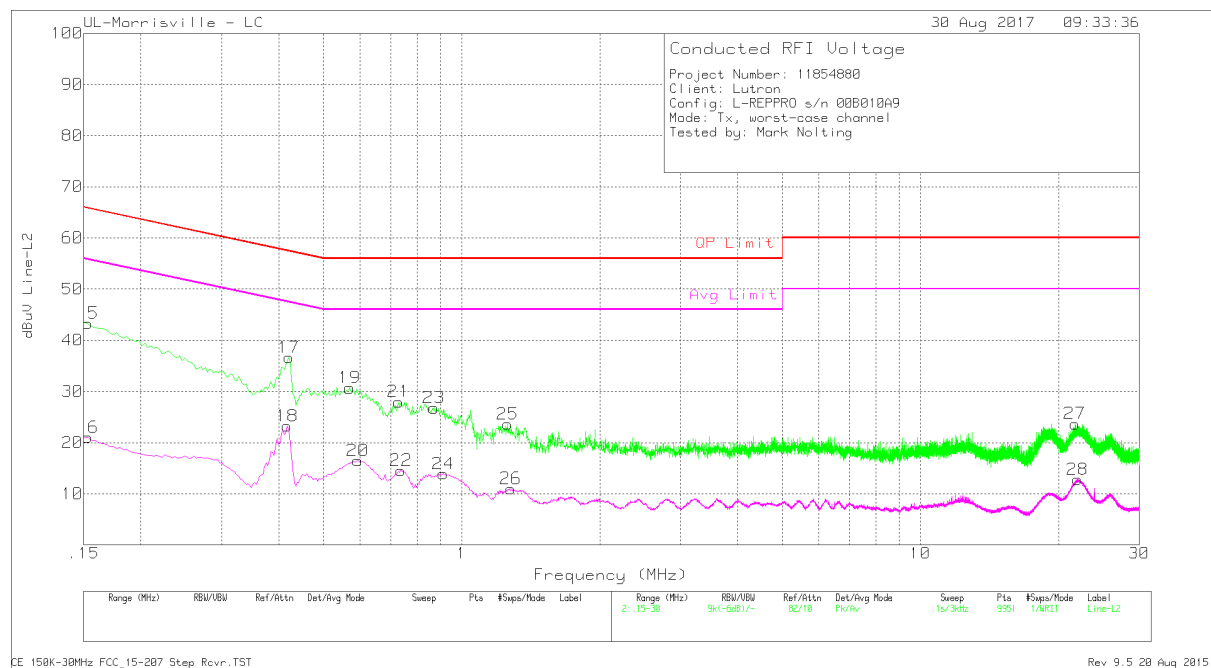


| Range 1: Line-L1 .15 - 30MHz |                 |                      |     |               |                  |                        |          |             |           |             |
|------------------------------|-----------------|----------------------|-----|---------------|------------------|------------------------|----------|-------------|-----------|-------------|
| Marker                       | Frequency (MHz) | Meter Reading (dBuV) | Det | LISN VCF (dB) | Cbl/Limiter (dB) | Corrected Reading dBuV | QP Limit | Margin (dB) | Avg Limit | Margin (dB) |
| 1                            | .153            | 33.99                | Pk  | .2            | 10               | 44.19                  | 65.84    | -21.65      | -         | -           |
| 2                            | .153            | 12.13                | Av  | .2            | 10               | 22.33                  | -        | -           | 55.84     | -33.51      |
| 3                            | .423            | 31.79                | Pk  | .1            | 9.9              | 41.79                  | 57.39    | -15.6       | -         | -           |
| 4                            | .417            | 17.6                 | Av  | .1            | 10               | 27.7                   | -        | -           | 47.51     | -19.81      |
| 5                            | .594            | 25.32                | Pk  | 0             | 9.9              | 35.22                  | 56       | -20.78      | -         | -           |
| 6                            | .594            | 11.71                | Av  | 0             | 9.9              | 21.61                  | -        | -           | 46        | -24.39      |
| 7                            | .888            | 21.65                | Pk  | 0             | 9.9              | 31.55                  | 56       | -24.45      | -         | -           |
| 8                            | .888            | 9.18                 | Av  | 0             | 9.9              | 19.08                  | -        | -           | 46        | -26.92      |
| 9                            | 1.038           | 23.01                | Pk  | 0             | 9.9              | 32.91                  | 56       | -23.09      | -         | -           |
| 10                           | .975            | 8.49                 | Av  | 0             | 9.9              | 18.39                  | -        | -           | 46        | -27.61      |
| 11                           | 1.308           | 20.48                | Pk  | 0             | 10               | 30.48                  | 56       | -25.52      | -         | -           |
| 12                           | 1.338           | 5.9                  | Av  | 0             | 10               | 15.9                   | -        | -           | 46        | -30.1       |
| 13                           | 18.942          | 20.29                | Pk  | .2            | 10.2             | 30.69                  | 60       | -29.31      | -         | -           |
| 14                           | 19.098          | 4.28                 | Av  | .2            | 10.2             | 14.68                  | -        | -           | 50        | -35.32      |

Pk - Peak detector

Av - Average detection

## LINE 2 RESULTS



| Range 2: Line-L2 .15 - 30MHz |                 |                      |     |               |                  |                        |          |             |           |             |
|------------------------------|-----------------|----------------------|-----|---------------|------------------|------------------------|----------|-------------|-----------|-------------|
| Marker                       | Frequency (MHz) | Meter Reading (dBuV) | Det | LISN VCF (dB) | Cbl/Limiter (dB) | Corrected Reading dBuV | QP Limit | Margin (dB) | Avg Limit | Margin (dB) |
| 15                           | .153            | 33.12                | Pk  | .2            | 10               | 43.32                  | 65.84    | -22.52      | -         | -           |
| 16                           | .153            | 10.8                 | Av  | .2            | 10               | 21                     | -        | -           | 55.84     | -34.84      |
| 17                           | .42             | 26.62                | Pk  | .1            | 9.9              | 36.62                  | 57.45    | -20.83      | -         | -           |
| 18                           | .417            | 13.14                | Av  | .1            | 10               | 23.24                  | -        | -           | 47.51     | -24.27      |
| 19                           | .57             | 20.8                 | Pk  | 0             | 9.9              | 30.7                   | 56       | -25.3       | -         | -           |
| 20                           | .594            | 6.56                 | Av  | 0             | 9.9              | 16.46                  | -        | -           | 46        | -29.54      |
| 21                           | .729            | 18.09                | Pk  | 0             | 9.9              | 27.99                  | 56       | -28.01      | -         | -           |
| 22                           | .738            | 4.66                 | Av  | 0             | 9.9              | 14.56                  | -        | -           | 46        | -31.44      |
| 23                           | .87             | 16.87                | Pk  | 0             | 9.9              | 26.77                  | 56       | -29.23      | -         | -           |
| 24                           | .912            | 3.98                 | Av  | 0             | 9.9              | 13.88                  | -        | -           | 46        | -32.12      |
| 25                           | 1.26            | 13.65                | Pk  | 0             | 10               | 23.65                  | 56       | -32.35      | -         | -           |
| 26                           | 1.2795          | 1                    | Av  | 0             | 10               | 11                     | -        | -           | 46        | -35         |
| 27                           | 21.714          | 13.28                | Pk  | .2            | 10.2             | 23.68                  | 60       | -36.32      | -         | -           |
| 28                           | 22.011          | 2.41                 | Av  | .2            | 10.2             | 12.81                  | -        | -           | 50        | -37.19      |

Pk - Peak detector

Av - Average detection