*FCC PART 15, SUBPART B and C*
*TEST REPORT*

*for*

# REMORA REMOTE TRANSMITTER

# MODEL: 22R

Prepared for

MANLEY LABORATORIES, INC.
13880 MAGNOLIA AVENUE
CHINO, CALIFORNIA 91710

Prepared by:_____

KYLE FUJIMOTO

Approved by:_____

MICHAEL CHRISTENSEN

COMPATIBLE ELECTRONICS INC.
114 OLINDA DRIVE
BREA, CALIFORNIA 92823
(714) 579-0500

DATE: JANUARY 28, 2009

| | REPORT BODY | APPENDICES | | | | | TOTAL |
|---|---|---|---|---|---|---|---|
| | | ***A*** | ***B*** | ***C*** | ***D*** | ***E*** | |
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# GENERAL REPORT SUMMARY

This electromagnetic emission test report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced without the written permission of Compatible Electronics, unless done so in full.

This report must not be used to claim product endorsement by NVLAP, NIST or any other agency of the U.S. Government.

| | |
|---|---|
| Device Tested: | Remora Remote Transmitter<br>Model: 22R<br>S/N: N/A |
| Product Description: | See Expository Statement |
| Modifications: | The EUT was not modified in order to meet the specifications. |
| Manufacturer: | Manley Laboratories, Inc.<br>13880 Magnolia Avenue<br>Chino, California 91710 |
| Test Date: | December 23, 2008 |
| Test Specifications: | EMI requirements<br>CFR Title 47, Part 15 Subpart B; and Subpart C, Sections 15.205, 15.209 and 15.231 |
| Test Procedure: | ANSI C63.4 |
| Test Deviations: | The test procedure was not deviated from during the testing. |

# SUMMARY OF TEST RESULTS

| TEST | DESCRIPTION | RESULTS |
|---|---|---|
| 1 | Conducted RF Emissions, 150 kHz – 30 MHz | This test was not performed because the EUT cannot be plugged into the AC public mains. |
| 2 | Radiated RF Emissions, 10 kHz – 4340 MHz (Transmitter Portion) | Complies with the limits of CFR Title 47, Part 15, Subpart C, section 15.205, 15.209, and 15.231. |
| 3 | Radiated RF Emissions, 10 kHz – 4340 MHz (Digital Portion) | Complies with the **Class B** limits of CFR Title 47, Part 15, Subpart B. |

# 1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the Remora Remote Transmitter, Model: 22R. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the **Class B** specification limits defined by CFR Title 47, Part 15, Subpart B for the digital and receiver portion; and the limits defined in Subpart C, sections 15.205, 15.209, and 15.231 for the transmitter portion.

# 2. ADMINISTRATIVE DATA

## 2.1 Location of Testing

The EMI tests described herein were performed at the test facility of Compatible Electronics, 114 Olinda Drive, Brea, California 92823.

## 2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST)**.**

## 2.3 Cognizant Personnel

Manley Laboraties, Inc.

Mitch Margolis

Compatible Electronics, Inc.

| | |
|---|---|
| Kyle Fujimoto | Test Engineer |
| Michael Christensen | Lab Manager, Brea Division |

## 2.4 Date Test Sample was Received

The test sample was received prior to testing.

## 2.5 Disposition of the Test Sample

The sample was returned prior to the date of this test report.

## 2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

| | |
|---|---|
| RF | Radio Frequency |
| EMI | Electromagnetic Interference |
| EUT | Equipment Under Test |
| P/N | Part Number |
| S/N | Serial Number |
| HP | Hewlett Packard |
| ITE | Information Technology Equipment |
| CML | Corrected Meter Limit |
| LISN | Line Impedance Stabilization Network |

## 3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this EMI Test Report.

| SPEC | TITLE |
|---|---|
| CFR Title 47, Part 15 | FCC Rules – Radio frequency devices (including digital devices) |
| ANSI C63.4 2003 | American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz |

# 4. DESCRIPTION OF TEST CONFIGURATION

## 4.1 Description Of Test Configuration - EMI

Setup and operation of the equipment under test.

Specifics of the EUT and Peripherals Tested

The Remora Remote Transmitter, Model: 22R (EUT) was tested as a stand alone unit and continuously transmitting. The EUT's antenna is a wire style antenna and is inside the enclosure. The EUT was tested in three orthogonal axis.

The transmitter shuts off immediately after the button is released during normal operation.

The final radiated data was taken the mode described above. Please see Appendix E for the data sheets.

### 4.1.1 Cable Construction and Termination

There were no cables connected to the EUT.

# 5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

## 5.1 EUT and Accessory List

| EQUIPMENT | MANUFACTURER | MODEL NUMBER | SERIALNUMBER | FCC ID |
|---|---|---|---|---|
| REMORA REMOTE TRANSMITTER (EUT) | MANLEY LABORATORIES, INC. | 22R | N/A | **WYM22R** |

## 5.2 EMI Test Equipment

| EQUIPMENT TYPE | MANU-FACTURER | MODEL NUMBER | SERIAL NUMBER | CALIBRATION DATE | CALIBRATION DUE DATE |
|---|---|---|---|---|---|
| **GENERAL TEST EQUIPMENT USED FOR ALL RF EMISSIONS TESTS** | | | | | |
| Computer | Hewlett Packard | 4530 | US91912319 | N/A | N/A |
| EMI Receiver | Rohde & Schwarz | ESIB40 | 100194 | September 17, 2008 | Sept. 17, 2010 |
| Monitor | Hewlett Packard | D5258A | TW74500641 | N/A | N/A |
| **RF RADIATED EMISSIONS TEST EQUIPMENT** | | | | | |
| Radiated Emissions Data Capture Program | Compatible Electronics | 2.0 | N/A | N/A | N/A |
| Biconical Antenna | Com Power | AB-900 | 15226 | February 28, 2008 | Feb. 28, 2009 |
| Log Periodic Antenna | Com Power | AL-100 | 16060 | June 27, 2008 | June 27, 2009 |
| Preamplifier | Com-Power | PA-102 | 1017 | January 11, 2008 | Jan. 11, 2009 |
| Loop Antenna | Com Power | AL-130 | 17089 | September 29, 2008 | Sept. 29, 2009 |
| Horn Antenna | Com Power | AH-118 | 071175 | June 27, 2008 | June 27, 2010 |
| Microwave Preamplifier | Com Power | PA-122 | 181921 | March 3, 2008 | March 3, 2009 |
| Antenna Mast | Com Power | AM-100 | N/A | N/A | N/A |

# 6. TEST SITE DESCRIPTION

## 6.1 Test Facility Description

Please refer to section 2.1 and 7.1 of this report for EMI test location.

## 6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 1.0 by 1.5 meter non-conductive table 0.8 meters above the ground plane.

The EUT was not grounded.

# 7. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

## 7.1 RF Emissions

### 7.1.1 Radiated Emissions (Spurious and Harmonics) Test

The EMI Receiver was used as a measuring meter along with the quasi-peak adapter. Amplifiers were used to increase the sensitivity of the instrument. The Com Power Preamplifier Model: PA-102 was used for frequencies from 30 MHz to 1 GHz, and the Com-Power Microwave Preamplifier Model: PA-122 was used for frequencies above 1 GHz. The EMI Receiver was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the EMI Receiver records the highest measured reading over all the sweeps.

The readings were averaged by a “duty cycle correction factor”, derived from 20 log (dwell time / one pulse train with blanking interval).

The measurement bandwidths and transducers used for the radiated emissions test were:

| FREQUENCY RANGE | EFFECTIVE MEASUREMENT BANDWIDTH | TRANSDUCER |
|---|---|---|
| 9 kHz to 150 kHz | 200 Hz | Active Loop Antenna |
| 150 kHz to 30 MHz | 9 kHz | Active Loop Antenna |
| 30 MHz to 300 MHz | 120 kHz | Biconical Antenna |
| 300 MHz to 1 GHz | 120 kHz | Log Periodic Antenna |
| 1 GHz to 4.34 GHz | 1 MHz | Horn Antenna |

The open field test site of Compatible Electronics, Inc. was used for radiated emission testing. This test site is set up according to ANSI C63.4. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength). The gunsight method was used when measuring with the horn antenna in order to ensure accurate results. The loop antenna was also rotated in the horizontal and vertical axis in order to ensure accurate results.

### 7.1.2 Radiated Emissions (Spurious and Harmonics) Test (Continued)

The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT. The EUT was tested at a 3 meter test distance to obtain the final test data. The final qualification data sheets are located in Appendix E.

**Test Results:**

The EUT complies with the **Class B** limits of CFR Title 47, Part 15, Subpart B; and CFR Title 47, Part 15, Subpart C, sections 15.205, 15.209, and 15.231.

## 7.2 Bandwidth of the Fundamental

The -20 dB bandwidth was checked to see that it was within 0.25% of the fundamental frequency for the EUT. Plots of the -20 dB bandwidth are located in Appendix E.

**Test Results:**

Complies with the limits of CFR Title 47, Part 15, Subpart C, section 15.231(c).

## 8. CONCLUSIONS

The Remora Remote Transmitter, Model: 22R meets all of the **Class B** specification limits defined in CFR Title 47, Part 15, Subpart B for the digital portion; and the limits defined in Subpart C, sections 15.205, 15.209, and 15.231 for the transmitter portion.

# APPENDIX A

# *LABORATORY RECOGNITIONS*

# *LABORATORY RECOGNITIONS*

**Compatible Electronics has the following agency accreditations:**

National Voluntary Laboratory Accreditation Program - Lab Code: 200528-0

Voluntary Control Council for Interference - Registration Numbers: R-983, C-1026, R-984 and C-1027

Bureau of Standards and Metrology Inspection - Reference Number: SL2-IN-E-1031

Conformity Assessment Body for the EMC Directive Under the US/EU MRA Appointed by NIST

**Compatible Electronics is recognized or on file with the following agencies:**

Federal Communications Commission

Industry Canada

# APPENDIX B

# *MODIFICATIONS TO THE EUT*

# MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC 15.231 or FCC Class B specifications.

All the rework described below was implemented during the test in a method that could be reproduced in all the units by the manufacturer.

No modifications were made to the EUT.

# APPENDIX C

# *ADDITIONAL MODELS COVERED UNDER THIS REPORT*

# ADDITIONAL MODELS COVERED UNDER THIS REPORT

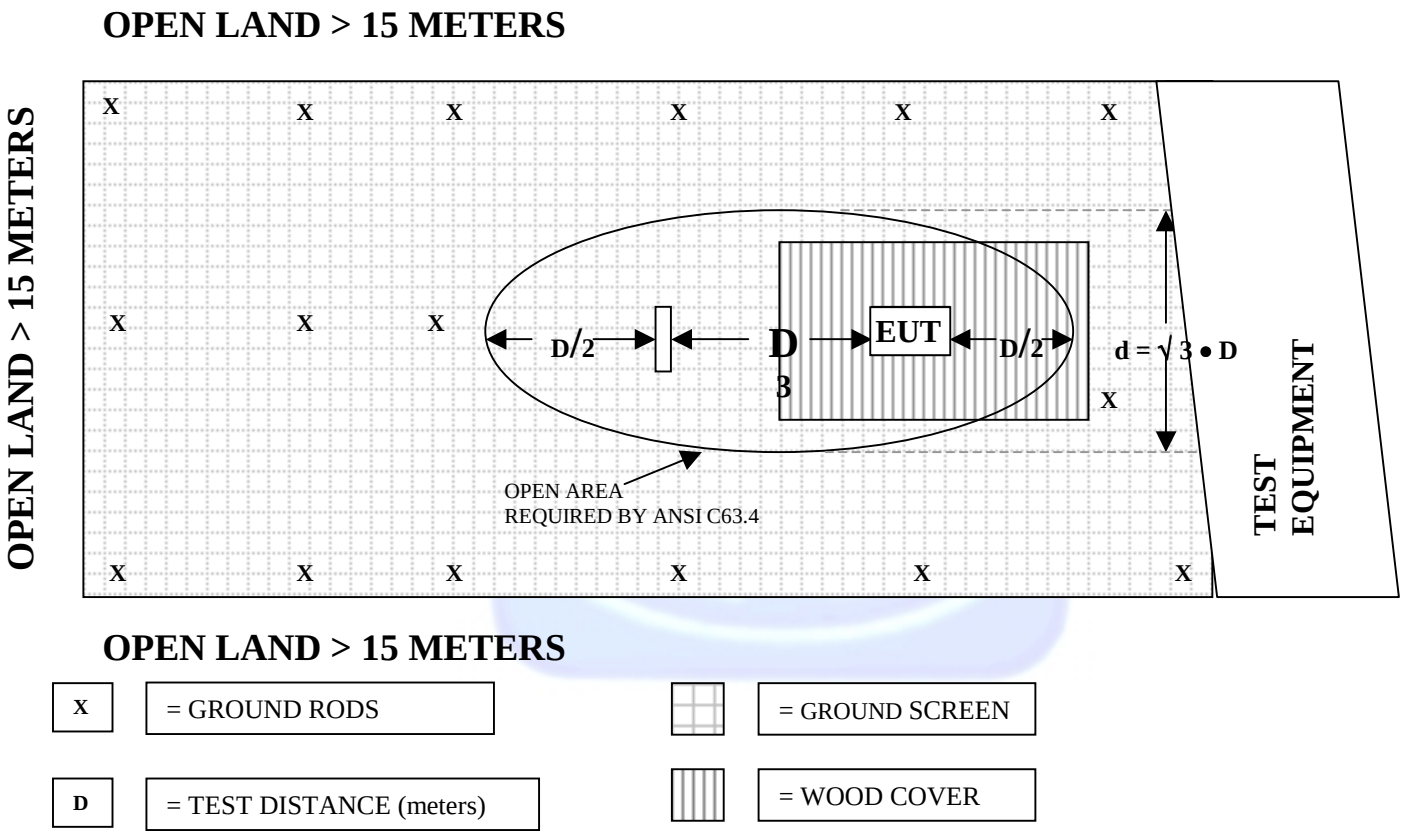
| | |
|---|---|
| USED FOR THE PRIMARY TEST | Remora Remote Transmitter<br>Model: 22R<br>S/N: N/A |

There were no additional models covered under this report.

# APPENDIX D

# *DIAGRAMS, CHARTS, AND PHOTOS*

# *FIGURE 1: PLOT MAP AND LAYOUT OF RADIATED TEST SITE – 3 METERS*



# COM-POWER AB-900

# BICONICAL ANTENNA

# S/N: 15226

# CALIBRATION DATE: FEBRUARY 28, 2008

| FREQUENCY (MHz) | FACTOR (dB) | FREQUENCY (MHz) | FACTOR (dB) |
|---|---|---|---|
| 30 | 12.1 | 100 | 10.7 |
| 35 | 12.2 | 120 | 13.6 |
| 40 | 11.7 | 140 | 12.1 |
| 45 | 9.9 | 160 | 12.2 |
| 50 | 11.3 | 180 | 15.2 |
| 60 | 9.4 | 200 | 16.5 |
| 70 | 7.6 | 250 | 16.5 |
| 80 | 6.0 | 275 | 18.1 |
| 90 | 6.8 | 300 | 21.5 |

# COM-POWER AL-100

# LOG PERIODIC ANTENNA

# S/N: 16060

# CALIBRATION DATE: JUNE 27, 2008

| FREQUENCY (MHz) | FACTOR (dB) | FREQUENCY (MHz) | FACTOR (dB) |
|---|---|---|---|
| 300 | 12.7 | 700 | 21.2 |
| 400 | 15.3 | 800 | 21.7 |
| 500 | 17.4 | 900 | 21.8 |
| 600 | 19.0 | 1000 | 22.8 |

# COM POWER AH-118

# HORN ANTENNA

# S/N: 071175

# CALIBRATION DATE: JUNE 27, 2008

| FREQUENCY (GHz) | FACTOR (dB) | FREQUENCY (GHz) | FACTOR (dB) |
|---|---|---|---|
| 1.0 | 24.5 | 10.0 | 39.4 |
| 1.5 | 25.4 | 10.5 | 39.7 |
| 2.0 | 28.3 | 11.0 | 39.0 |
| 2.5 | 28.9 | 11.5 | 40.0 |
| 3.0 | 29.7 | 12.0 | 39.7 |
| 3.5 | 30.8 | 12.5 | 41.7 |
| 4.0 | 31.4 | 13.0 | 42.7 |
| 4.5 | 32.6 | 13.5 | 41.2 |
| 5.0 | 33.7 | 14.0 | 41.6 |
| 5.5 | 34.4 | 14.5 | 43.2 |
| 6.0 | 34.7 | 15.0 | 42.3 |
| 6.5 | 35.4 | 15.5 | 39.3 |
| 7.0 | 37.0 | 16.0 | 41.7 |
| 7.5 | 37.4 | 16.5 | 39.6 |
| 8.0 | 37.6 | 17.0 | 43.0 |
| 8.5 | 37.6 | 17.5 | 47.1 |
| 9.0 | 38.5 | 18.0 | 46.2 |
| 9.5 | 38.6 | | |

# COM-POWER PA-102

# PREAMPLIFIER

# S/N: 1017

# CALIBRATION DATE: JANUARY 11, 2008

| FREQUENCY (MHz) | FACTOR (dB) | FREQUENCY (MHz) | FACTOR (dB) |
|---|---|---|---|
| 30 | 38.2 | 300 | 38.0 |
| 40 | 38.0 | 350 | 38.3 |
| 50 | 38.3 | 400 | 38.0 |
| 60 | 38.6 | 450 | 37.5 |
| 70 | 38.4 | 500 | 37.9 |
| 80 | 38.4 | 550 | 37.9 |
| 90 | 38.3 | 600 | 37.8 |
| 100 | 38.1 | 650 | 37.5 |
| 125 | 38.5 | 700 | 38.0 |
| 150 | 38.2 | 750 | 37.7 |
| 175 | 38.1 | 800 | 37.1 |
| 200 | 38.4 | 850 | 37.1 |
| 225 | 38.2 | 900 | 37.1 |
| 250 | 38.2 | 950 | 37.0 |
| 275 | 38.2 | 1000 | 36.5 |

# COM-POWER PA-122

# PREAMPLIFIER

# S/N: 181921

# CALIBRATION DATE: MARCH 3, 2008

| FREQUENCY (GHz) | FACTOR (dB) | FREQUENCY (GHz) | FACTOR (dB) |
|---|---|---|---|
| 1.0 | 36.32 | 10.0 | 35.47 |
| 1.5 | 35.40 | 10.5 | 35.05 |
| 2.0 | 34.77 | 11.0 | 34.16 |
| 2.5 | 35.07 | 11.5 | 33.75 |
| 3.0 | 34.86 | 12.0 | 34.65 |
| 3.5 | 34.48 | 12.5 | 34.41 |
| 4.0 | 34.30 | 13.0 | 35.36 |
| 4.5 | 33.96 | 13.5 | 35.30 |
| 5.0 | 34.06 | 14.0 | 35.87 |
| 5.5 | 34.54 | 14.5 | 36.44 |
| 6.0 | 35.90 | 15.0 | 36.24 |
| 6.5 | 36.85 | 15.5 | 35.92 |
| 7.0 | 36.55 | 16.0 | 35.53 |
| 7.5 | 35.31 | 16.5 | 35.29 |
| 8.0 | 33.57 | 17.0 | 34.96 |
| 8.5 | 33.36 | 17.5 | 34.02 |
| 9.0 | 35.01 | 18.0 | 33.39 |
| 9.5 | 35.97 | | |

# COM-POWER AL-130

# LOOP ANTENNA

# S/N: 17089

# CALIBRATION DATE: SEPTEMBER 29, 2008

| FREQUENCY (MHz) | MAGNETIC (dB/m) | ELECTRIC (dB/m) |
|---|---|---|
| 0.009 | -41.57 | 9.93 |
| 0.01 | -42.06 | 9.44 |
| 0.02 | -42.43 | 9.07 |
| 0.05 | -42.50 | 9.00 |
| 0.07 | -42.10 | 9.40 |
| 0.1 | -42.03 | 9.47 |
| 0.2 | -44.50 | 7.00 |
| 0.3 | -41.93 | 9.57 |
| 0.5 | -41.90 | 9.60 |
| 0.7 | -41.73 | 9.77 |
| 1 | -41.23 | 10.27 |
| 2 | -40.90 | 10.60 |
| 3 | -41.20 | 10.30 |
| 4 | -41.30 | 10.20 |
| 5 | -40.70 | 10.80 |
| 10 | -41.10 | 10.40 |
| 15 | -42.17 | 9.33 |
| 20 | -42.00 | 9.50 |
| 25 | -42.20 | 9.30 |
| 30 | -43.10 | 8.40 |

**FRONT VIEW**

MANLEY LABORATORIES, INC.
REMORA REMOTE TRANSMITTER
MODEL: 22R
FCC SUBPART B AND C – RADIATED EMISSIONS

## PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

**REAR VIEW**

MANLEY LABORATORIES, INC.
REMORA REMOTE TRANSMITTER
MODEL: 22R
FCC SUBPART B AND C – RADIATED EMISSIONS

## PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

# APPENDIX E

# *DATA SHEETS*

# *RADIATED EMISSIONS*

# *DATA SHEETS*

**FCC 15.231**

Manley Laboratories, Inc.
Remora Remote Transmitter
Model: 22R

Date: 12/23/08
Labs: B and D
Tested By: Kyle Fujimoto

**X-Axis**
**Duty Cycle: 48.61%**

| Freq. (MHz) | Level (dBuV) | Pol (v/h) | Limit | Margin | Peak / QP / Avg | Ant. Height (m) | Table Angle (deg) | Comments |
|---|---|---|---|---|---|---|---|---|
| 433.92 | 83.31 | V | 100.8 | -17.49 | Peak | 1.25 | 135 | |
| 433.92 | 77.02 | V | 80.8 | -3.78 | Avg | 1.25 | 135 | |
| | | | | | | | | |
| 867.84 | 26.87 | V | 80.8 | -53.93 | Peak | 1.08 | 125 | |
| 867.84 | 20.58 | V | 60.8 | -40.22 | Avg | 1.08 | 125 | |
| | | | | | | | | |
| 1301.76 | 33.63 | V | 74 | -40.37 | Peak | 1.25 | 135 | |
| 1301.76 | 27.34 | V | 54 | -26.66 | Avg | 1.25 | 135 | |
| | | | | | | | | |
| 1735.68 | 38.76 | V | 80.8 | -42.04 | Peak | 1.35 | 150 | |
| 1735.68 | 32.47 | V | 60.8 | -28.33 | Avg | 1.35 | 150 | |
| | | | | | | | | |
| 2169.6 | 41.08 | V | 80.8 | -39.72 | Peak | 1.26 | 135 | |
| 2169.6 | 34.79 | V | 60.8 | -26.01 | Avg | 1.26 | 135 | |
| | | | | | | | | |
| 2603.5 | 39.58 | V | 80.8 | -41.22 | Peak | 1.23 | 150 | |
| 2603.5 | 33.29 | V | 60.8 | -27.51 | Avg | 1.23 | 150 | |
| | | | | | | | | |
| 3037.4 | 41.44 | V | 80.8 | -39.36 | Peak | 1.27 | 180 | |
| 3037.4 | 35.15 | V | 60.8 | -25.65 | Avg | 1.27 | 180 | |
| | | | | | | | | |
| 3471.3 | 42.37 | V | 80.8 | -38.43 | Peak | 1.25 | 90 | |
| 3471.3 | 36.08 | V | 60.8 | -24.72 | Avg | 1.25 | 90 | |
| | | | | | | | | |
| 3905.3 | 41.18 | V | 74 | -32.82 | Peak | 1.34 | 135 | |
| 3905.3 | 34.89 | V | 54 | -19.11 | Avg | 1.34 | 135 | |
| | | | | | | | | |
| 4339.2 | 41.32 | V | 74 | -32.68 | Peak | 1.38 | 125 | |
| 4339.2 | 35.03 | V | 54 | -18.97 | Avg | 1.38 | 125 | |
| | | | | | | | | |

**FCC 15.231**

Manley Laboratories, Inc.
Remora Remote Transmitter
Model: 22R

Date: 12/23/08
Labs: B and D
Tested By: Kyle Fujimoto

**X-Axis**
**Duty Cycle: 48.61%**

| Freq. (MHz) | Level (dBuV) | Pol (v/h) | Limit | Margin | Peak / QP / Avg | Ant. Height (m) | Table Angle (deg) | Comments |
|---|---|---|---|---|---|---|---|---|
| 433.92 | 86.85 | H | 100.8 | -13.95 | Peak | 1 | 135 | |
| 433.92 | 80.56 | H | 80.8 | -0.24 | Avg | 1 | 135 | |
| | | | | | | | | |
| 867.84 | 46.47 | H | 80.8 | -34.33 | Peak | 1 | 45 | |
| 867.84 | 40.18 | H | 60.8 | -20.62 | Avg | 1 | 45 | |
| | | | | | | | | |
| 1301.76 | 35.86 | H | 74 | -38.14 | Peak | 1.25 | 135 | |
| 1301.76 | 29.57 | H | 54 | -24.43 | Avg | 1.25 | 135 | |
| | | | | | | | | |
| 1735.68 | 37.81 | H | 80.8 | -42.99 | Peak | 1.45 | 150 | |
| 1735.68 | 31.52 | H | 60.8 | -29.28 | Avg | 1.45 | 150 | |
| | | | | | | | | |
| 2169.6 | 40.08 | H | 80.8 | -40.72 | Peak | 1.55 | 155 | |
| 2169.6 | 33.79 | H | 60.8 | -27.01 | Avg | 1.55 | 155 | |
| | | | | | | | | |
| 2603.5 | 41.66 | H | 80.8 | -39.14 | Peak | 1.52 | 135 | |
| 2603.5 | 35.37 | H | 60.8 | -25.43 | Avg | 1.52 | 135 | |
| | | | | | | | | |
| 3037.4 | 40.02 | H | 80.8 | -40.78 | Peak | 1.56 | 150 | |
| 3037.4 | 33.73 | H | 60.8 | -27.07 | Avg | 1.56 | 150 | |
| | | | | | | | | |
| 3471.3 | 40.96 | H | 80.8 | -39.84 | Peak | 1.35 | 150 | |
| 3471.3 | 34.67 | H | 60.8 | -26.13 | Avg | 1.35 | 150 | |
| | | | | | | | | |
| 3905.3 | 40.83 | H | 74 | -33.17 | Peak | 1.55 | 175 | |
| 3905.3 | 34.54 | H | 54 | -19.46 | Avg | 1.55 | 175 | |
| | | | | | | | | |
| 4339.2 | 42.51 | H | 74 | -31.49 | Peak | 1.35 | 150 | |
| 4339.2 | 36.22 | H | 54 | -17.78 | Avg | 1.35 | 150 | |
| | | | | | | | | |

**FCC 15.231**

Manley Laboratories, Inc.
Remora Remote Transmitter
Model: 22R

Date: 12/23/08
Labs: B and D
Tested By: Kyle Fujimoto

**Y-Axis**
**Duty Cycle: 48.61%**

| Freq. (MHz) | Level (dBuV) | Pol (v/h) | Limit | Margin | Peak / QP / Avg | Ant. Height (m) | Table Angle (deg) | Comments |
|---|---|---|---|---|---|---|---|---|
| 433.92 | 84.41 | V | 100.8 | -16.39 | Peak | 1 | 135 | |
| 433.92 | 78.12 | V | 80.8 | -2.68 | Avg | 1 | 135 | |
| | | | | | | | | |
| 867.84 | 44.67 | V | 80.8 | -36.13 | Peak | 1 | 45 | |
| 867.84 | 38.38 | V | 60.8 | -22.42 | Avg | 1 | 45 | |
| | | | | | | | | |
| 1301.76 | 38.12 | V | 74 | -35.88 | Peak | 2.05 | 135 | |
| 1301.76 | 31.83 | V | 54 | -22.17 | Avg | 2.05 | 135 | |
| | | | | | | | | |
| 1735.68 | 38.88 | V | 80.8 | -41.92 | Peak | 1.57 | 45 | |
| 1735.68 | 32.59 | V | 60.8 | -28.21 | Avg | 1.57 | 45 | |
| | | | | | | | | |
| 2169.6 | 42.96 | V | 80.8 | -37.84 | Peak | 2.25 | 135 | |
| 2169.6 | 36.67 | V | 60.8 | -24.13 | Avg | 2.25 | 135 | |
| | | | | | | | | |
| 2603.5 | 43.11 | V | 80.8 | -37.69 | Peak | 1.56 | 135 | |
| 2603.5 | 36.82 | V | 60.8 | -23.98 | Avg | 1.56 | 135 | |
| | | | | | | | | |
| 3037.4 | 41.88 | V | 80.8 | -38.92 | Peak | 1.35 | 150 | |
| 3037.4 | 35.59 | V | 60.8 | -25.21 | Avg | 1.35 | 150 | |
| | | | | | | | | |
| 3471.3 | 41.47 | V | 80.8 | -39.33 | Peak | 1.31 | 135 | |
| 3471.3 | 35.18 | V | 60.8 | -25.62 | Avg | 1.31 | 135 | |
| | | | | | | | | |
| 3905.3 | 40.96 | V | 74 | -33.04 | Peak | 1.14 | 135 | |
| 3905.3 | 34.67 | V | 54 | -19.33 | Avg | 1.14 | 135 | |
| | | | | | | | | |
| 4339.2 | 43.56 | V | 74 | -30.44 | Peak | 1.96 | 135 | |
| 4339.2 | 37.27 | V | 54 | -16.73 | Avg | 1.96 | 135 | |
| | | | | | | | | |

**FCC 15.231**

Manley Laboratories, Inc.
Remora Remote Transmitter
Model: 22R

Date: 12/23/08
Labs: B and D
Tested By: Kyle Fujimoto

**Y-Axis**
**Duty Cycle: 48.61%**

| Freq. (MHz) | Level (dBuV) | Pol (v/h) | Limit | Margin | Peak / QP / Avg | Ant. Height (m) | Table Angle (deg) | Comments |
|---|---|---|---|---|---|---|---|---|
| 433.92 | 76.61 | H | 100.8 | -24.19 | Peak | 1 | 180 | |
| 433.92 | 70.32 | H | 80.8 | -10.48 | Avg | 1 | 180 | |
| | | | | | | | | |
| 867.84 | 44.27 | H | 80.8 | -36.53 | Peak | 1 | 315 | |
| 867.84 | 37.98 | H | 60.8 | -22.82 | Avg | 1 | 315 | |
| | | | | | | | | |
| 1301.76 | 35.83 | H | 74 | -38.17 | Peak | 1.22 | 135 | |
| 1301.76 | 29.54 | H | 54 | -24.46 | Avg | 1.22 | 135 | |
| | | | | | | | | |
| 1735.68 | 39.11 | H | 80.8 | -41.69 | Peak | 2.15 | 135 | |
| 1735.68 | 32.82 | H | 60.8 | -27.98 | Avg | 2.15 | 135 | |
| | | | | | | | | |
| 2169.6 | 40.23 | H | 80.8 | -40.57 | Peak | 1.53 | 150 | |
| 2169.6 | 33.94 | H | 60.8 | -26.86 | Avg | 1.53 | 150 | |
| | | | | | | | | |
| 2603.5 | 45.27 | H | 80.8 | -35.53 | Peak | 2.19 | 135 | |
| 2603.5 | 38.98 | H | 60.8 | -21.82 | Avg | 2.19 | 135 | |
| | | | | | | | | |
| 3037.4 | 42.61 | H | 80.8 | -38.19 | Peak | 1.87 | 135 | |
| 3037.4 | 36.32 | H | 60.8 | -24.48 | Avg | 1.87 | 135 | |
| | | | | | | | | |
| 3471.3 | 40.89 | H | 80.8 | -39.91 | Peak | 1.87 | 225 | |
| 3471.3 | 34.6 | H | 60.8 | -26.2 | Avg | 1.87 | 225 | |
| | | | | | | | | |
| 3905.3 | 40.84 | H | 74 | -33.16 | Peak | 1.59 | 180 | |
| 3905.3 | 34.55 | H | 54 | -19.45 | Avg | 1.59 | 180 | |
| | | | | | | | | |
| 4339.2 | 42.65 | H | 74 | -31.35 | Peak | 2.23 | 135 | |
| 4339.2 | 36.36 | H | 54 | -17.64 | Avg | 2.23 | 135 | |
| | | | | | | | | |

**FCC 15.231**

Manley Laboratories, Inc.
Remora Remote Transmitter
Model: 22R

Date: 12/23/08
Labs: B and D
Tested By: Kyle Fujimoto

**Z-Axis**
**Duty Cycle: 48.61%**

| Freq. (MHz) | Level (dBuV) | Pol (v/h) | Limit | Margin | Peak / QP / Avg | Ant. Height (m) | Table Angle (deg) | Comments |
|---|---|---|---|---|---|---|---|---|
| 433.92 | 71.41 | V | 100.8 | -29.39 | Peak | 1 | 135 | |
| 433.92 | 65.12 | V | 80.8 | -15.68 | Avg | 1 | 135 | |
| | | | | | | | | |
| 867.84 | 40.27 | V | 80.8 | -40.53 | Peak | 2 | 225 | |
| 867.84 | 33.98 | V | 60.8 | -26.82 | Avg | 2 | 225 | |
| | | | | | | | | |
| 1301.76 | 37.76 | V | 74 | -36.24 | Peak | 1.81 | 180 | |
| 1301.76 | 31.47 | V | 54 | -22.53 | Avg | 1.81 | 180 | |
| | | | | | | | | |
| 1735.68 | 40.01 | V | 80.8 | -40.79 | Peak | 1.59 | 135 | |
| 1735.68 | 33.72 | V | 60.8 | -27.08 | Avg | 1.59 | 135 | |
| | | | | | | | | |
| 2169.6 | 40.36 | V | 80.8 | -40.44 | Peak | 1.89 | 155 | |
| 2169.6 | 34.07 | V | 60.8 | -26.73 | Avg | 1.89 | 155 | |
| | | | | | | | | |
| 2603.5 | 41.95 | V | 80.8 | -38.85 | Peak | 1.69 | 135 | |
| 2603.5 | 35.66 | V | 60.8 | -25.14 | Avg | 1.69 | 135 | |
| | | | | | | | | |
| 3037.4 | 40.22 | V | 80.8 | -40.58 | Peak | 1.59 | 135 | |
| 3037.4 | 33.93 | V | 60.8 | -26.87 | Avg | 1.59 | 135 | |
| | | | | | | | | |
| 3471.3 | 41.51 | V | 80.8 | -39.29 | Peak | 1.22 | 135 | |
| 3471.3 | 35.22 | V | 60.8 | -25.58 | Avg | 1.22 | 135 | |
| | | | | | | | | |
| 3905.3 | 39.76 | V | 74 | -34.24 | Peak | 1.98 | 225 | |
| 3905.3 | 33.47 | V | 54 | -20.53 | Avg | 1.98 | 225 | |
| | | | | | | | | |
| 4339.2 | 42.05 | V | 74 | -31.95 | Peak | 1.61 | 135 | |
| 4339.2 | 35.76 | V | 54 | -18.24 | Avg | 1.61 | 135 | |
| | | | | | | | | |

**FCC 15.231**

Manley Laboratories, Inc.
Remora Remote Transmitter
Model: 22R

Date: 12/23/08
Labs: B and D
Tested By: Kyle Fujimoto

**Z-Axis**
**Duty Cycle: 48.61%**

| Freq. (MHz) | Level (dBuV) | Pol (v/h) | Limit | Margin | Peak / QP / Avg | Ant. Height (m) | Table Angle (deg) | Comments |
|---|---|---|---|---|---|---|---|---|
| 433.92 | 83.51 | H | 100.8 | -17.29 | Peak | 1 | 135 | |
| 433.92 | 77.22 | H | 80.8 | -3.58 | Avg | 1 | 135 | |
| | | | | | | | | |
| 867.84 | 29.07 | H | 80.8 | -51.73 | Peak | 1 | 45 | |
| 867.84 | 22.78 | H | 60.8 | -38.02 | Avg | 1 | 45 | |
| | | | | | | | | |
| 1301.76 | 32.89 | H | 74 | -41.11 | Peak | 1.45 | 135 | |
| 1301.76 | 26.6 | H | 54 | -27.4 | Avg | 1.45 | 135 | |
| | | | | | | | | |
| 1735.68 | 34.96 | H | 80.8 | -45.84 | Peak | 2.15 | 45 | |
| 1735.68 | 28.67 | H | 60.8 | -32.13 | Avg | 2.15 | 45 | |
| | | | | | | | | |
| 2169.6 | 38.67 | H | 80.8 | -42.13 | Peak | 1.44 | 135 | |
| 2169.6 | 32.38 | H | 60.8 | -28.42 | Avg | 1.44 | 135 | |
| | | | | | | | | |
| 2603.5 | 42.26 | H | 80.8 | -38.54 | Peak | 1.65 | 135 | |
| 2603.5 | 35.97 | H | 60.8 | -24.83 | Avg | 1.65 | 135 | |
| | | | | | | | | |
| 3037.4 | 42.43 | H | 80.8 | -38.37 | Peak | 1.65 | 135 | |
| 3037.4 | 36.14 | H | 60.8 | -24.66 | Avg | 1.65 | 135 | |
| | | | | | | | | |
| 3471.3 | 41.13 | H | 80.8 | -39.67 | Peak | 1.98 | 135 | |
| 3471.3 | 34.84 | H | 60.8 | -25.96 | Avg | 1.98 | 135 | |
| | | | | | | | | |
| 3905.3 | 42.44 | H | 74 | -31.56 | Peak | 2.51 | 135 | |
| 3905.3 | 36.15 | H | 54 | -17.85 | Avg | 2.51 | 135 | |
| | | | | | | | | |
| 4339.2 | 42.57 | H | 74 | -31.43 | Peak | 1.36 | 125 | |
| 4339.2 | 36.28 | H | 54 | -17.72 | Avg | 1.36 | 125 | |
| | | | | | | | | |

**FCC 15.231 and FCC Class B**

Manley Laboratories, Inc.
Remora Remote Transmitter
Model: 22R

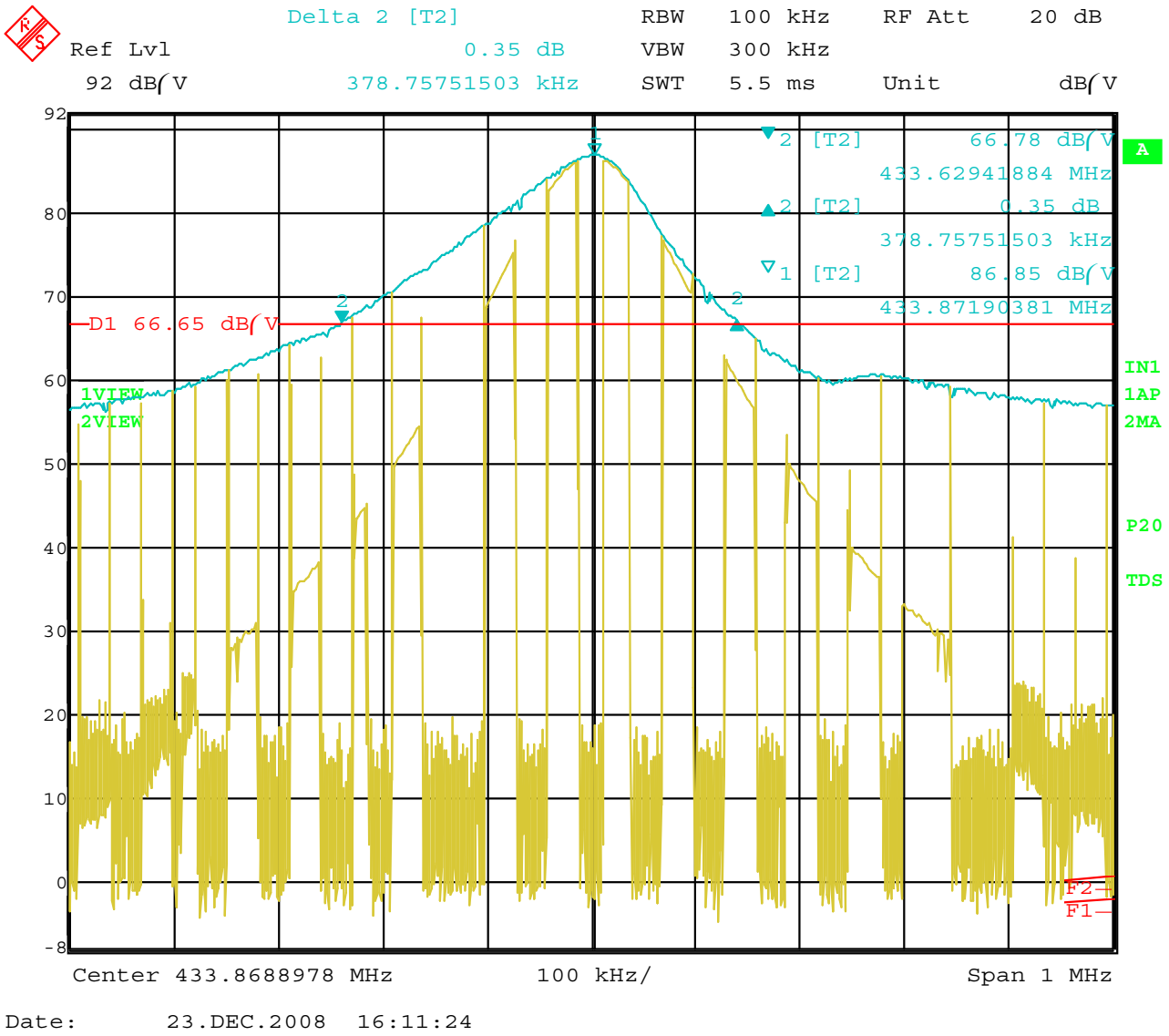
Date: 12/23/08
Labs: B and D
Tested By: Kyle Fujimoto

**X-Axis (Worst Case)**
**Digital Portion and Non-Harmonic Emissions of the Transmitter**

| Freq. (MHz) | Level (dBuV) | Pol (v/h) | Limit | Margin | Peak / QP / Avg | Ant. Height (m) | Table Angle (deg) | Comments |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | No Emissions Detected |
| | | | | | | | | from10 kHz to 4340 MHz |
| | | | | | | | | for the Digital Portion |
| | | | | | | | | for both the Vertical and |
| | | | | | | | | Horizontal Polarizations. |
| | | | | | | | | |
| | | | | | | | | No Emissions Detected |
| | | | | | | | | from 10 kHz to 4340 MHz |
| | | | | | | | | for the Non-Harmonic |
| | | | | | | | | Emissions from the Tx for the |
| | | | | | | | | EUT for both the Vertical and |
| | | | | | | | | Horizontal Polarizations. |

# *-20 dB BANDWIDTH*

# *DATA SHEET*




Date: 23.DEC.2008 16:11:24

-20 dB Bandwidth of the Fundamental