FCC PART 15 SUBPART B and C
TEST REPORT

for

LONG-RANGE HANDHELD TRANSMITTER

MODEL: CMD-HHLR-433-MD

Prepared for

LINX TECHNOLOGIES
159 ORT LANE
MERLIN, OREGON 97532

Prepared by: Kyle Fujimoto

KYLE FUJIMOTO

Approved by: James Ross

JAMES ROSS

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DATE: JUNE 10, 2013

	REPORT BODY	APPENDICES					TOTAL
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GENERAL REPORT SUMMARY

Compatible Electronics Inc. generates this electromagnetic emission test report, 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: Long-Range Handheld Transmitter
Model: CMD-HHLR-433-MD

Product Description: See Expository Statement

Modifications: The EUT was modified during the testing. Please see the list located in Appendix B.

Customer: Linx Technologies
159 Ort Lane
Merlin, Oregon 97532

Test Date(s): June 4 and 5, 2013

Test Specifications: Emissions requirements
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 to 30 MHz	This test was not performed because the EUT cannot directly or indirectly connect to the AC public mains.
2	Radiated RF Emissions 10 kHz to 4400 MHz (Transmitter and Digital Portion)	Complies with the **Class B** limits of CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.209, and 15.231.

1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the Long-Range Handheld Transmitter, Model: CMD-HHLR-433-MD. The Emissions 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 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 Emissions tests described herein were performed at the test facility of Compatible Electronics, 114 Olinda Drive, Brea, California.

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

Linx Technologies

Shawn Hogan Director of Engineering

Compatible Electronics Inc.

Kyle Fujimoto Test Engineer
James Ross Test Engineer

2.4 Date Test Sample was Received

The test sample was received prior to the date of testing.

2.5 Disposition of the Test Sample

The test sample has not yet been returned as of the date of this report.

2.6 Abbreviations and Acronyms

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

FCC	Federal Communications Commission
RF	Radio Frequency
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
ITE	Information Technology Equipment
LISN	Line Impedance Stabilization Network
NVLAP	National Voluntary Laboratory Accreditation Program
CFR	Code of Federal Regulations
N/A	Not Applicable
Ltd.	Limited
Inc.	Incorporated
NCR	No Calibration Required
R&D	Research and Development
Rx	Receive / Receiver
Tx	Transmit / Transmitter

3. APPLICABLE DOCUMENTS

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

SPEC	TITLE
CFR Title 47, Part 15	FCC Rules – Radio frequency devices (including digital devices)
ANSI C63.4: 2009	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 – Emissions

The Long-Range Handheld Transmitter, Model: CMD-HHLR-433-MD (EUT) was tested as a stand alone unit and tested in three orthogonal axis. The EUT was continuously transmitting.

The EUT was investigated for duty cycle correction factor using both the Holtek and serial encoding. The serial encoding was used because this produces the worst case duty cycle.

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

The antenna is connected directly to the PCB of the EUT via a phillips screw.

It was determined that the emissions were at their highest level when the EUT was operating in the above configuration. The final emissions data was taken in this mode of operation and any cables were maximized. All initial investigations were performed with the measurement receiver in manual mode scanning the frequency range continuously. Photographs of the test setup are in Appendix D of this report.

4.1.1 Cable Construction and Termination

The EUT has no external cables.

5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

5.1 EUT and Accessory List

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID
LONG-RANGE HANDHELD TRANSMITTER (EUT)	LINX TECHNOLOGIES	CMD-HHLR-433-MD	N/A	OJM-CMD-HHLR-XXXB

5.2 Emissions Test Equipment

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CALIBRATION DATE	CALIBRATION CYCLE
GENERAL TEST EQUIPMENT USED FOR ALL RF EMISSIONS TESTS					
Radiated Emissions Data Capture Program	Compatible Electronics	2.0	N/A	N/A	N/A
EMI Receiver	Rohde & Schwarz	ESIB40	100194	November 19, 2012	2 Year
Loop Antenna	Com-Power	AL-130	17089	January 29, 2013	2 Year
CombiLog Antenna	Com-Power	AC-220	61060	May 29, 2013	1 Year
Horn Antenna	Com-Power	AH-118	10085	February 29, 2012	2 Year
Preamplifier	Com-Power	PA-103	1582	December 28, 2012	1 Year
HF Preamplifier	Com-Power	PAM-6000	461017	December 27, 2012	1 Year
Turntable	Com-Power	TT-100	N/A	N/A	N/A
Antenna-Mast	Com-Power	AM-100	N/A	N/A	N/A
Monitor	Hewlett Packard	D5258A	TW74500641	N/A	N/A
Computer	Hewlett Packard	4530	US91912319	N/A	N/A

6. TEST SITE DESCRIPTION

6.1 Test Facility Description

Please refer to section 2.1 and 7.1.2 of this report for Emissions 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.

6.3 Facility Environmental Characteristics

When applicable refer to the data sheets in Appendix E for the relative humidity, air temperature, and barometric pressure.

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 Conducted Emissions Test

The measurement receiver was used as a measuring meter. The data was collected with the measurement receiver in the peak detect mode with the "Max Hold" feature activated. The quasi-peak was used only where indicated in the data sheets. A transient limiter was used for the protection of the measurement receiver's input stage, and the offset was adjusted accordingly to read the actual data measured. The LISN output was measured using the measurement receiver. The output of the second LISN was terminated by a 50-ohm termination. The effective measurement bandwidth used for this test was 9 kHz.

Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The EUT was powered through the LISN, which was bonded to the ground plane. The LISN power was filtered and the filter was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in ANSI C63.4. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The conducted emissions from the EUT were maximized for operating mode as well as cable placement. The final data was collected under program control by the Compatible Electronics conducted emissions software in several overlapping sweeps by running the spectrum analyzer at a minimum scan rate of 10 seconds per octave. The final qualification data is located in Appendix E.

Test Results:

This test was not performed because the EUT cannot directly or indirectly connect to the AC public mains.

7.1.2 Radiated Emissions (Spurious and Harmonics) Test

The spectrum analyzer, along with the quasi-peak adapter, and EMI Receiver were used as a measuring meter. Amplifiers were used to increase the sensitivity of the instrument. The Com-Power Preamplifier Model: PA-103 was used for frequencies from 30 MHz to 1 GHz and the Com-Power Microwave Preamplifier Model: PAM-6000 was used for frequencies above 1 GHz. The spectrum analyzer and EMI Receiver were used in the peak detect mode with the "Max Hold" feature activated. In this mode, the spectrum analyzer and EMI receiver records the highest measured reading over the sweeps.

For the peak readings below 1000 MHz that were within 3 dB of the spec limit or higher, the quasi-peak adapter was used to quasi-peak the readings.

The fundamental, 2nd harmonic, and frequencies above 1 GHz were adjusted by a "duty cycle correction factor", derived from 20 log (dwell time / pulse train).

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

FREQUENCY RANGE	EFFECTIVE MEASUREMENT BANDWIDTH	TRANSDUCER
10 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	Combilog Antenna
1 GHz to 4.40 GHz	1 MHz	Horn Antennas

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 by the Radiated Emission Manual Test software. 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 gun sight 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.

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 to obtain the final test data.

Test Results:

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

7.1.3 RF Emissions Test Results

Table 1.0 RADIATED EMISSION RESULTS
Long-Range Handheld Transmitter, Model: CMD-HHLR-433-MD

Frequency MHz	Corrected Reading* dBuV	Specification Limit dBuV	Delta (Cor. Reading – Spec. Limit) dB
433.92 (H) (X-Axis)	80.3 (A)	80.82	-0.52
433.92 (H) (Z-Axis)	78.7 (A)	80.82	-2.12
433.92 (V) (Y-Axis)	71.5 (A)	80.82	-9.32
433.92 (H) (Y-Axis)	69.5 (A)	80.82	-11.32
433.92 (V) (Z-Axis)	66.4 (A)	80.82	-14.42
4339.2 (V) (X-Axis)	39.53 (A)	54.00	-14.47

Notes:
* The complete emissions data is given in Appendix E of this report.
A Average Reading
V Vertical
H Horizontal

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:

The EUT complies with the requirements of CFR Title 47, Part 15, Subpart C, section 15.231 (c) for the -20 dB bandwidth of the fundamental. The EUT has a -20 dB bandwidth that is less than 0.25% of frequency of the fundamental.

8. CONCLUSIONS

The Long-Range Handheld Transmitter, Model: CMD-HHLR-433-MD (EUT), as tested, 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 ACCREDITATIONS AND RECOGNITIONS

LABORATORY ACCREDITATIONS AND RECOGNITIONS

NVLAP LAB CODES 200063-0, 200528-0, 200527-0

For US, Canada, Australia/New Zealand, Japan, Taiwan, Korea, and the European Union, Compatible Electronics is currently accredited by NVLAP to ISO/IEC 17025. Please follow the link to the NIST/NVLAP site for each of our facilities' NVLAP certificate and scope of accreditation

NVLAP listing links

Agoura Division / **Brea Division** / **Silverado/Lake Forest Division**

.Quote from ISO-ILAC-IAF Communiqué on 17025:

"A laboratory's fulfillment of the requirements of ISO/IEC 17025:2005 means the laboratory meets both the technical competence requirements and management system requirements that are necessary for it to consistently deliver technically valid test results and calibrations. The management system requirements in ISO/IEC 17025:2005 (Section 4) are written in language relevant to laboratory operations and meet the principles of ISO 9001:2008 Quality Management Systems — Requirements."

ANSI listing CETCB

Compatible Electronics has been nominated as a Conformity Assessment Body (CAB) for EMC under the US/EU Mutual Recognition Agreement (MRA).
US/EU MRA list NIST MRA site

Compatible Electronics has been nominated as a Conformity Assessment Body (CAB) for Taiwan/BSMI under the US/APEC (Asia-Pacific Economic Cooperation) Mutual Recognition Agreement (MRA).
APEC MRA list NIST MRA site

We are also listed for IT products by the following country/agency:

VCCI Support member: Please visit http://www.vcci.jp/vcci_e/

FCC Listing, from FCC OET site
FCC test lab search https://fjallfoss.fcc.gov/oetcf/eas/reports/TestFirmSearch.cfm

Compatible Electronics IC listing can be found at:
http://www.ic.gc.ca/eic/site/ic1.nsf/eng/home

APPENDIX B

MODIFICATIONS TO THE EUT

MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC 15.231 and/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.

1. Change R3 to 1500 ohms.

APPENDIX C

ADDITIONAL MODELS COVERED UNDER THIS REPORT

ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST	Long-Range Handheld Transmitter Model: CMD-HHLR-433-MD

The EUT had no additional models.

APPENDIX D

DIAGRAMS, CHARTS, AND PHOTOS

FIGURE 1: CONDUCTED EMISSIONS TEST SETUP

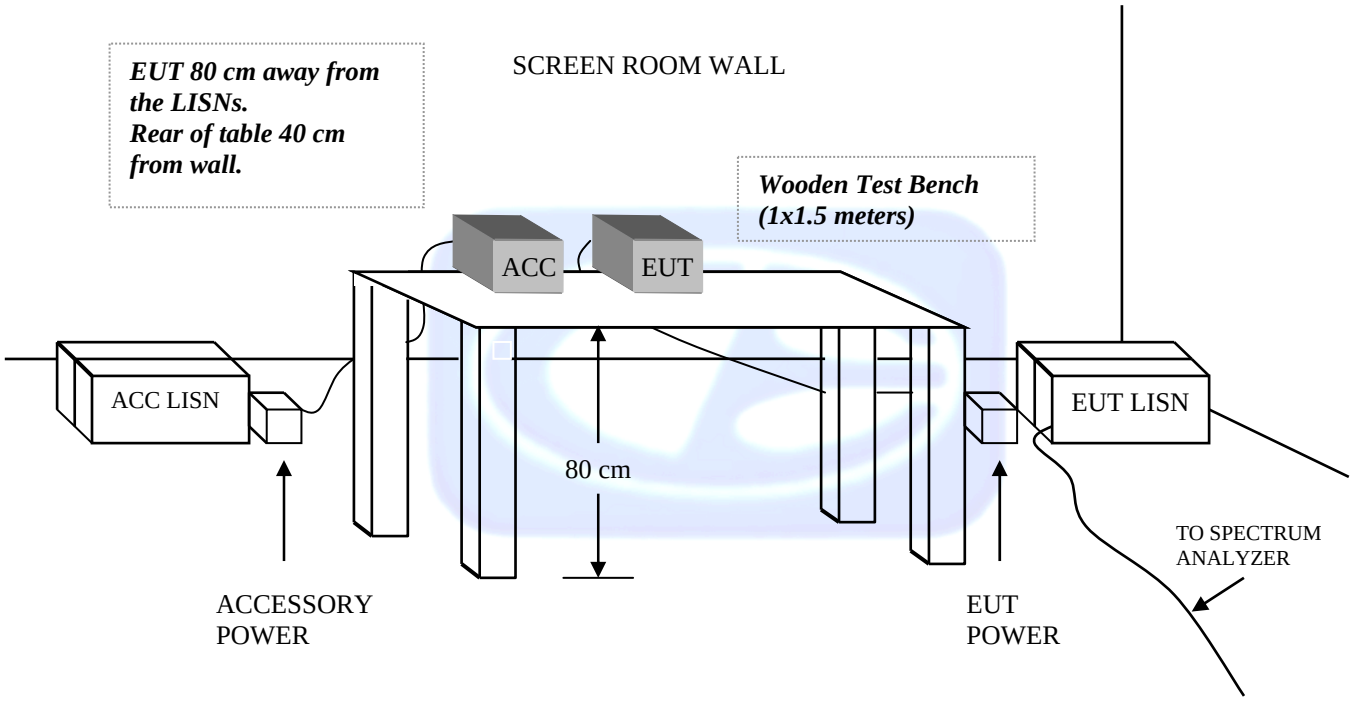
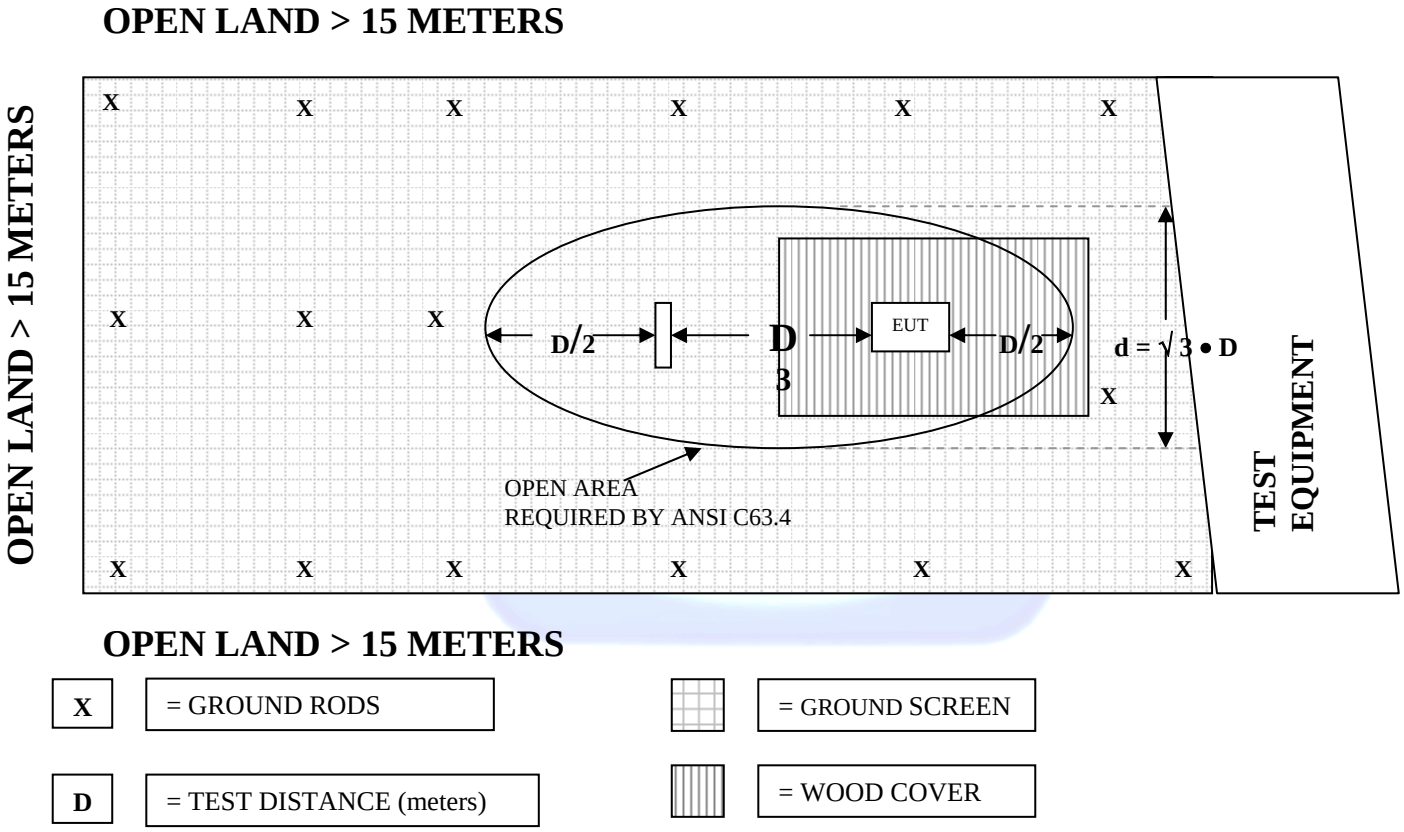


FIGURE 2: PLOT MAP AND LAYOUT OF RADIATED SITE – 3 METERS



COM-POWER AL-130

LOOP ANTENNA

S/N: 17089

CALIBRATION DATE: JANUARY 29, 2013

FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)
0.009	-42.5	9
0.01	-42.3	9.2
0.02	-42.1	9.4
0.03	-41.4	10.1
0.04	-41.8	9.7
0.05	-42.4	9.1
0.06	-42.3	9.2
0.07	-42.5	9
0.08	-42.4	9.1
0.09	-42.5	9
0.1	-42.5	9
0.2	-42.7	8.8
0.3	-42.6	8.9
0.4	-42.5	9
0.5	-42.7	8.8
0.6	-42.7	8.8
0.7	-42.5	9
0.8	-42.3	9.2
0.9	-42.2	9.3
1	-42.2	9.3
2	-41.8	9.7
3	-41.7	9.8
4	-41.7	9.8
5	-41.5	10
6	-41.6	9.9
7	-41.4	10.1
8	-41	10.5
9	-40.8	10.7
10	-41.3	10.2
15	-41.4	10.1
20	-41.2	10.3
25	-42.6	8.9
30	-41.7	9.8

COM-POWER AC-220

COMBILOG ANTENNA

S/N: 61060

CALIBRATION DATE: MAY 29, 2013

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	19.40	200	9.10
35	19.10	250	11.40
40	19.70	300	11.90
45	18.00	350	14.20
50	16.80	400	15.20
60	12.50	450	16.50
70	7.30	500	17.10
80	4.40	550	16.20
90	8.00	600	17.70
100	8.80	650	19.10
120	10.50	700	20.00
125	10.60	750	21.50
140	8.60	800	21.50
150	11.20	850	21.70
160	8.90	900	22.70
175	9.60	950	22.10
180	8.50	1000	22.90

COM-POWER PA-103

PREAMPLIFIER

S/N: 1582

CALIBRATION DATE: DECEMBER 28, 2012

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	32.80	300	32.26
40	33.10	350	32.23
50	33.10	400	32.17
60	33.10	450	32.16
70	33.00	500	32.11
80	33.00	550	32.07
90	33.10	600	32.02
100	33.00	650	31.97
125	33.00	700	31.87
150	33.00	750	31.81
175	32.90	800	31.73
200	32.80	850	31.57
225	32.34	900	31.43
250	32.32	950	31.29
275	32.28	1000	31.14

COM-POWER AH-118

HORN ANTENNA

S/N: 10085

CALIBRATION DATE: FEBRUARY 29, 2012

FREQUENCY (GHz)	FACTOR (dB)
1.0	25.0
1.5	25.4
2.0	31.4
2.5	31.2
3.0	31.4
3.5	30.6
4.0	31.8
4.5	33.4
5.0	34.3
5.5	35.3
6.0	35.0
6.5	39.2
7.5	40.9
8.0	38.5
8.5	41.2
9.0	41.4
9.5	38.8
10.0	39.3

COM-POWER PAM-6000

PREAMPLIFIER (1 – 6 GHz)

S/N: 461017

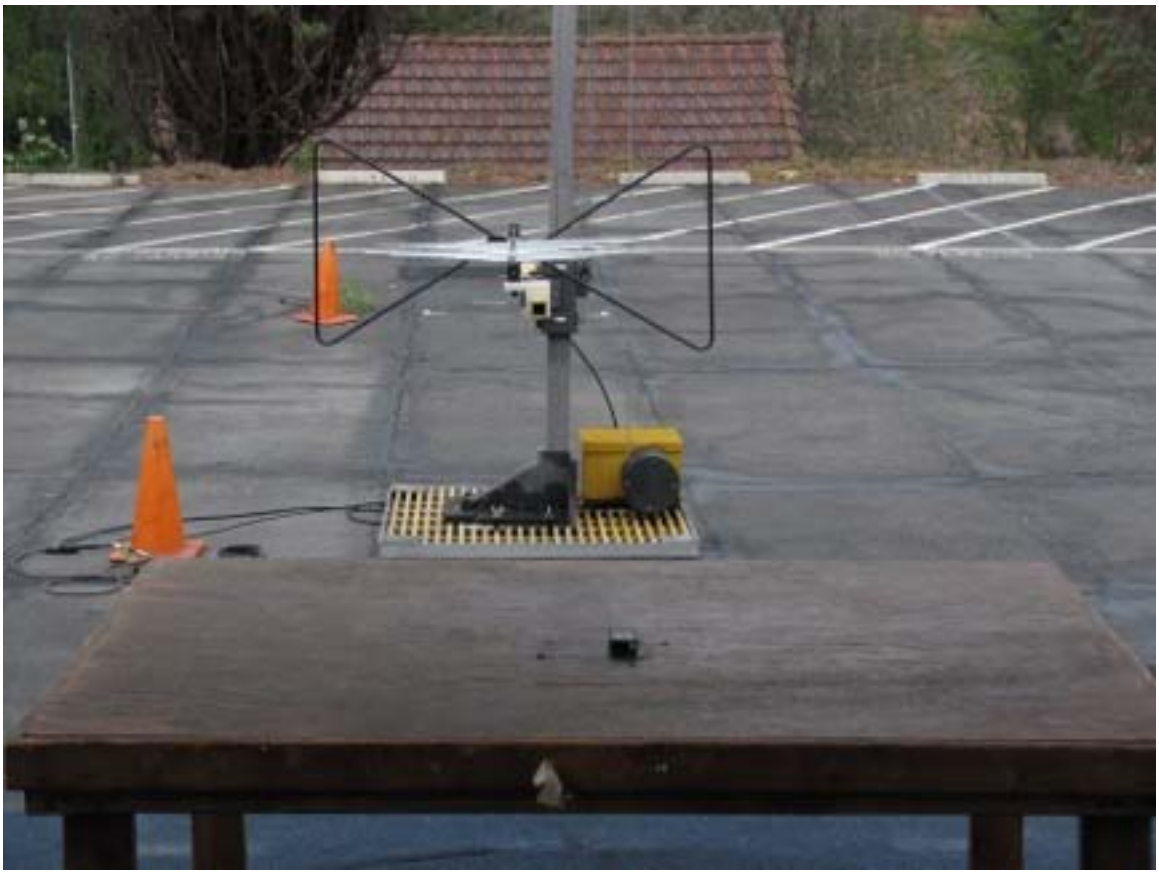
CALIBRATION DATE: DECEMBER 27, 2012

FREQUENCY (GHz)	FACTOR (dB)
1000	30.82
1100	30.97
1200	31.01
1300	30.94
1400	30.76
1500	30.43
1600	29.91
1700	29.38
1800	28.85
1900	28.55
2000	28.52
2500	29.32
3000	30.70
3500	30.13
4000	31.08
4500	30.81
5000	31.12
5500	28.79
6000	30.20

FRONT VIEW

LINX TECHNOLOGIES
LONG-RANGE HANDHELD TRANSMITTER
MODEL: CMD-HHLR-433-MD
FCC SUBPART B AND C – RADIATED EMISSIONS – BELOW 1 GHz

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



REAR VIEW

LINX TECHNOLOGIES
LONG-RANGE HANDHELD TRANSMITTER
MODEL: CMD-HHLR-433-MD
FCC SUBPART B AND C – RADIATED EMISSIONS – BELOW 1 GHz

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

FRONT VIEW

LINX TECHNOLOGIES
LONG-RANGE HANDHELD TRANSMITTER
MODEL: CMD-HHLR-433-MD
FCC SUBPART B AND C – RADIATED EMISSIONS – ABOVE 1 GHz

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

REAR VIEW

LINX TECHNOLOGIES
LONG-RANGE HANDHELD TRANSMITTER
MODEL: CMD-HHLR-433-MD
FCC SUBPART B AND C – RADIATED EMISSIONS – ABOVE 1 GHz

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

APPENDIX E

DATA SHEETS

RADIATED EMISSIONS

DATA SHEETS

FCC 15.231
Linx Technologies
Long-Range Handheld Transmitter
Model: CMD-HHLR-433-MD

Date: 06/04/2013
Lab: A
Tested By: Kyle Fujimoto

X-Axis
Duty Cycle: 44.17%

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
433.92	72.09	V	100.82	-28.73	Peak	1	135	
433.92	65	V	80.82	-15.82	Avg	1	135	
867.84	37.44	V	80.82	-43.38	Peak	1.25	135	
867.84	30.35	V	60.82	-30.47	Avg	1.25	135	
1301.76	35.93	V	74	-38.07	Peak	1.25	155	
1301.76	28.84	V	54	-25.16	Avg	1.25	155	
1735.68	36.87	V	80.82	-43.95	Peak	1.35	145	
1735.68	29.78	V	60.82	-31.04	Avg	1.35	145	
2169.6	42.93	V	80.82	-37.89	Peak	1.25	155	
2169.6	35.84	V	60.82	-24.98	Avg	1.25	155	
2603.5	41.73	V	80.82	-39.09	Peak	1.25	155	
2603.5	34.64	V	60.82	-26.18	Avg	1.25	155	
3037.44	45.91	V	80.82	-34.91	Peak	1.35	165	
3037.4	38.82	V	60.82	-22	Avg	1.35	165	
3471.3	44.99	V	80.82	-35.83	Peak	1.25	175	
3471.3	37.9	V	60.82	-22.92	Avg	1.25	175	
3905.28	42.91	V	74	-31.09	Peak	1.15	185	
3905.28	35.82	V	54	-18.18	Avg	1.15	185	
4339.2	46.62	V	74	-27.38	Peak	1.25	175	
4339.2	39.53	V	54	-14.47	Avg	1.25	175	

FCC 15.231
Linx Technologies
Long-Range Handheld Transmitter
Model: CMD-HHLR-433-MD

Date: 06/04/2013
Lab: A
Tested By: Kyle Fujimoto

X-Axis
Duty Cycle: 44.17%

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
433.92	87.39	H	100.82	-13.43	Peak	1	90	
433.92	80.3	H	80.82	-0.52	Avg	1	90	
867.84	44.24	H	80.82	-36.58	Peak	1	135	
867.84	37.15	H	60.82	-23.67	Avg	1	135	
1301.76	37.67	H	80.82	-43.15	Peak	1.25	155	
1301.76	30.58	H	54	-23.42	Avg	1.25	155	
1735.68	41.78	H	80.82	-39.04	Peak	1.35	165	
1735.68	34.69	H	60.82	-26.13	Avg	1.35	165	
2169.6	43.04	H	80.82	-37.78	Peak	1.25	135	
2169.6	35.95	H	60.82	-24.87	Avg	1.25	135	
2603.5	41.08	H	80.82	-39.74	Peak	1.35	145	
2603.5	33.99	H	60.82	-26.83	Avg	1.35	145	
3037.44	47.04	H	80.82	-33.78	Peak	1.25	165	
3037.4	39.95	H	60.82	-20.87	Avg	1.25	165	
3471.3	45.17	H	80.82	-35.65	Peak	1.35	175	
3471.3	38.08	H	60.82	-22.74	Avg	1.35	175	
3905.28	42.48	H	74	-31.52	Peak	1.45	185	
3905.28	35.39	H	54	-18.61	Avg	1.45	185	
4339.2	43.93	H	74	-30.07	Peak	1.25	155	
4339.2	36.84	H	54	-17.16	Avg	1.25	155	

FCC 15.231
Linx Technologies
Long-Range Handheld Transmitter
Model: CMD-HHLR-433-MD

Date: 06/04/2013
Lab: A
Tested By: Kyle Fujimoto

Y-Axis
Duty Cycle: 44.17%

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
433.92	78.59	V	100.82	-22.23	Peak	1	90	
433.92	71.5	V	80.82	-9.32	Avg	1	90	
867.84	42.54	V	80.82	-38.28	Peak	1	90	
867.84	35.45	V	60.82	-25.37	Avg	1	90	
1301.76	41.67	V	74	-32.33	Peak	1.25	155	
1301.76	34.58	V	54	-19.42	Avg	1.25	155	
1735.68	43.43	V	80.82	-37.39	Peak	1.25	165	
1735.68	36.34	V	60.82	-24.48	Avg	1.25	165	
2169.6	42.57	V	80.82	-38.25	Peak	1.35	175	
2169.6	35.48	V	60.82	-25.34	Avg	1.35	175	
2603.5	41.27	V	80.82	-39.55	Peak	1.25	185	
2603.5	34.18	V	60.82	-26.64	Avg	1.25	185	
3037.44	47.08	V	80.82	-33.74	Peak	1.55	195	
3037.4	39.99	V	60.82	-20.83	Avg	1.55	195	
3471.3	44.96	V	80.82	-35.86	Peak	1.25	175	
3471.3	37.87	V	60.82	-22.95	Avg	1.25	175	
3905.28	43.18	V	74	-30.82	Peak	1.35	185	
3905.28	36.09	V	54	-17.91	Avg	1.35	185	
4339.2	42.57	V	74	-31.43	Peak	1.25	175	
4339.2	35.48	V	54	-18.52	Avg	1.25	175	

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433.92	76.59	H	100.82	-24.23	Peak	1.25	135	
433.92	69.5	H	80.82	-11.32	Avg	1.25	135	
867.84	34.44	H	80.82	-46.38	Peak	1.25	135	
867.84	27.35	H	60.82	-33.47	Avg	1.25	135	
1301.76	34.49	H	74	-39.51	Peak	1.35	145	
1301.76	27.4	H	54	-26.6	Avg	1.35	145	
1735.68	38.33	H	80.82	-42.49	Peak	1.25	155	
1735.68	31.24	H	60.82	-29.58	Avg	1.25	155	
2169.6	41.57	H	80.82	-39.25	Peak	1.35	155	
2169.6	34.48	H	60.82	-26.34	Avg	1.35	155	
2603.5	43.11	H	80.82	-37.71	Peak	1.25	155	
2603.5	36.02	H	60.82	-24.8	Avg	1.25	155	
3037.44	45.51	H	80.82	-35.31	Peak	1.35	165	
3037.4	38.42	H	60.82	-22.4	Avg	1.35	165	
3471.3	46.11	H	80.82	-34.71	Peak	1.25	155	
3471.3	39.02	H	60.82	-21.8	Avg	1.25	155	
3905.28	42.78	H	74	-31.22	Peak	1.35	165	
3905.28	35.69	H	54	-18.31	Avg	1.35	165	
4339.2	45.96	H	74	-28.04	Peak	1.25	175	
4339.2	38.87	H	54	-15.13	Avg	1.25	175	

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Z-Axis
Duty Cycle: 44.17%

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
433.92	73.49	V	100.82	-27.33	Peak	1	225	
433.92	66.4	V	80.82	-14.42	Avg	1	225	
867.84	34.14	V	80.82	-46.68	Peak	1	225	
867.84	27.05	V	60.82	-33.77	Avg	1	225	
1301.76	35.61	V	74	-38.39	Peak	1.25	155	
1301.76	28.52	V	54	-25.48	Avg	1.25	155	
1735.68	38.31	V	80.82	-42.51	Peak	1.35	165	
1735.68	31.22	V	60.82	-29.6	Avg	1.35	165	
2169.6	43.89	V	80.82	-36.93	Peak	1.25	175	
2169.6	36.8	V	60.82	-24.02	Avg	1.25	175	
2603.5	40.58	V	80.82	-40.24	Peak	1.35	185	
2603.5	33.49	V	60.82	-27.33	Avg	1.35	185	
3037.44	46.56	V	80.82	-34.26	Peak	1.25	175	
3037.4	39.47	V	60.82	-21.35	Avg	1.25	175	
3471.3	46.84	V	80.82	-33.98	Peak	1.35	185	
3471.3	39.75	V	60.82	-21.07	Avg	1.35	185	
3905.28	42.87	V	74	-31.13	Peak	1.25	175	
3905.28	35.78	V	54	-18.22	Avg	1.25	175	
4339.2	43.98	V	74	-30.02	Peak	1.55	185	
4339.2	36.89	V	54	-17.11	Avg	1.55	185	

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Z-Axis
Duty Cycle: 44.17%

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
433.92	85.79	H	100.82	-15.03	Peak	1	90	
433.92	78.7	H	80.82	-2.12	Avg	1	90	
867.84	43.64	H	80.82	-37.18	Peak	1	90	
867.84	36.55	H	60.82	-24.27	Avg	1	90	
1301.76	39.48	H	74	-34.52	Peak	1.25	155	
1301.76	32.39	H	54	-21.61	Avg	1.25	155	
1735.68	43.23	H	80.82	-37.59	Peak	1.55	165	
1735.68	36.14	H	60.82	-24.68	Avg	1.55	165	
2169.6	44.35	H	80.82	-36.47	Peak	1.25	175	
2169.6	37.26	H	60.82	-23.56	Avg	1.25	175	
2603.5	41.32	H	80.82	-39.5	Peak	1.25	185	
2603.5	34.23	H	60.82	-26.59	Avg	1.25	185	
3037.44	46.12	H	80.82	-34.7	Peak	1.55	175	
3037.4	39.03	H	60.82	-21.79	Avg	1.55	175	
3471.3	44.77	H	80.82	-36.05	Peak	1.25	185	
3471.3	37.68	H	60.82	-23.14	Avg	1.25	185	
3905.28	41.94	H	74	-32.06	Peak	1.55	165	
3905.28	34.85	H	54	-19.15	Avg	1.55	165	
4339.2	43.08	H	74	-30.92	Peak	1.25	175	
4339.2	35.99	H	54	-18.01	Avg	1.25	175	

FCC Class B and FCC 15.231

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Model: CMD-HHLR-433-MD

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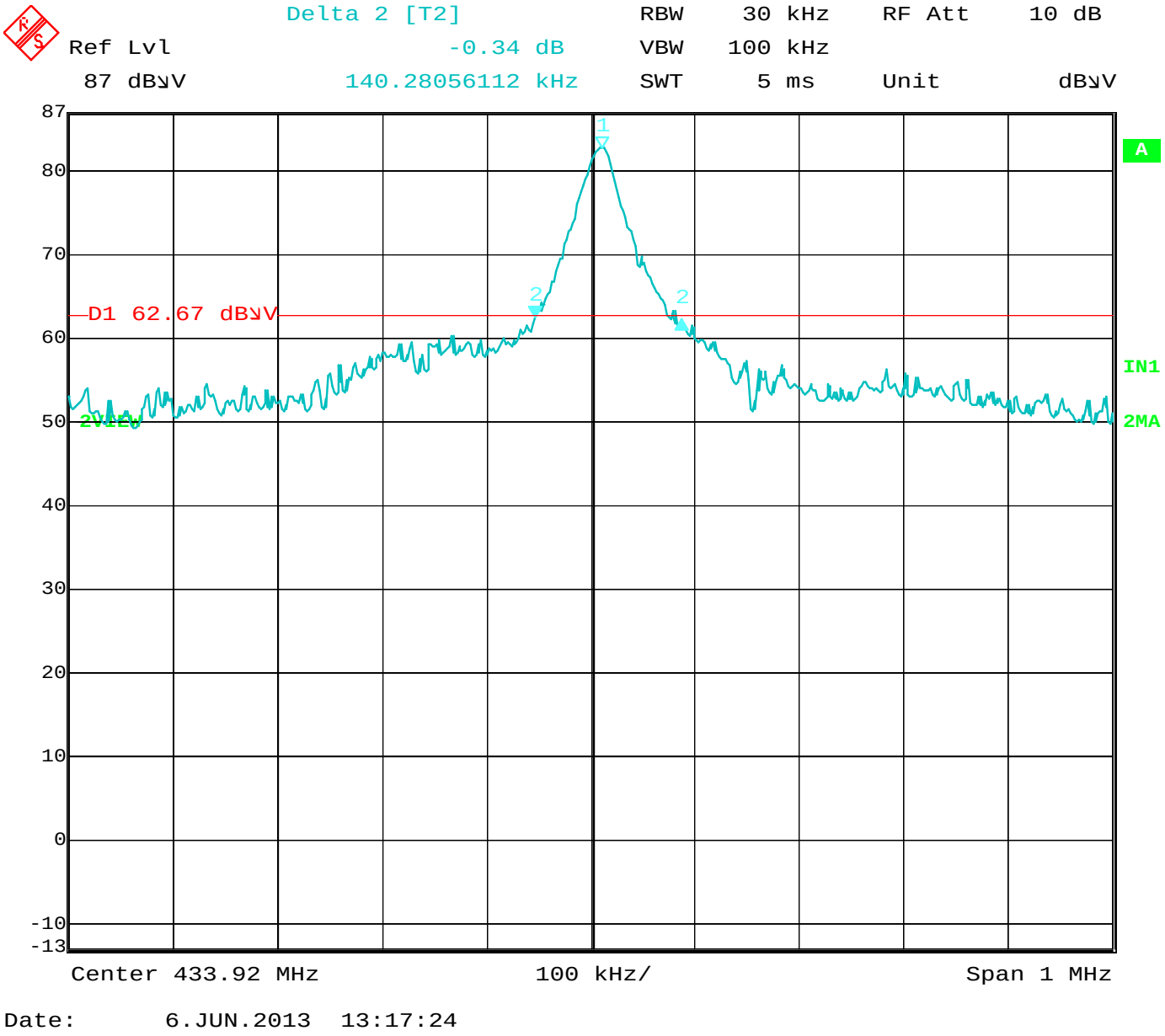
X-Axis (Worst Case)
Digital Portion and Non-Harmonic Emissions from the Transmitter
Vertical and Horizontal Polarizations

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
								No Emissions Detected
								from 10 kHz to 4400 MHz
								for the Digital Portion
								for both the Vertical and
								Horizontal Polarizations.
								No Emissions Detected
								from 10 kHz to 4400 MHz
								for the Non-Harmonic
								Emissions from the Tx for the
								EUT for both the Vertical and
								Horizontal Polarizations.
								No Emissions Detected at the
								Band Edges

-20 dB BANDWIDTH

DATA SHEETS



-20 dB Bandwidth Plot