

FCC PART 15, SUBPART C
TEST REPORT

for

REMOTE COMMAND UNIT
P/N: CMD-HHLR

Prepared for

LINX TECHNOLOGIES
575 SE ASHLEY PLACE
GRANTS PASS, OREGON 97526

Prepared by:_____

KYLE FUJIMOTO

Approved by:_____

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DATE: JUNE 12, 2002

REPORT BODY	APPENDICES					TOTAL	
	A	B	C	D	E		
PAGES	16	2	2	10	13	2	45

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TABLE OF CONTENTS

Section / Title	PAGE
GENERAL REPORT SUMMARY	4
SUMMARY OF TEST RESULTS	4
1. PURPOSE	5
2. ADMINISTRATIVE DATA	6
2.1 Location of Testing	6
2.2 Traceability Statement	6
2.3 Cognizant Personnel	6
2.4 Date Test Sample was Received	6
2.5 Disposition of the Test Sample	6
2.6 Abbreviations and Acronyms	6
3. APPLICABLE DOCUMENTS	7
4. Description of Test Configuration	8
4.1 Description of Test Configuration - EMI	8
4.1.1 Cable Construction and Termination	9
5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT	10
5.1 EUT and Accessory List	10
5.2 EMI Test Equipment	11
6. TEST SITE DESCRIPTION	12
6.1 Test Facility Description	12
6.2 EUT Mounting, Bonding and Grounding	12
7. Test Procedures	13
7.1 Radiated Emissions (Spurious and Harmonics) Test	13
7.2 Bandwidth of the Fundamental	15
8. CONCLUSIONS	16



LIST OF APPENDICES

APPENDIX	TITLE
A	Modifications to the EUT
B	Additional Models Covered Under This Report
C	Diagrams, Charts and Photos <ul style="list-style-type: none">• Test Setup Diagrams• Radiated Emissions Photos• Antenna and Effective Gain Factors
D	Data Sheets
E	Laboratory Recognitions

LIST OF FIGURES

FIGURE	TITLE
1	Plot Map And Layout of Test Site



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 or any other agency of the U.S. Government.

Device Tested: Remote Command Unit
 P/N: CMD-HHLR
 S/N: N/A

Product Description: See Expository Statement.

Modifications: The EUT was not modified during the testing.

Manufacturer: Linx Technologies
 575 SE Ashley Place
 Grants Pass, Oregon 97526

Test Date: May 21, 2002

Test Specifications: EMI requirements
 CFR Title 47, Part 15 Subpart C, Sections 15.205, 15.209, and 15.231

Test Procedure: ANSI C63.4: 1992

Test Deviations: The test procedure was not deviated from during the testing.

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 450 kHz - 30 MHz	This test was not performed because the EUT can only operate on battery power and cannot be connected to the AC public mains.
2	Radiated RF Emissions, 10 kHz - 4300 MHz	Complies with the limits of CFR Title 47, Part 15, 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 Remote Command Unit Model: CMD-HHLR. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4: 1992. 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 specification limits defined by CFR Title 47, Part 15, Subpart C, sections 15.205, 15.209, and 15.231.



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

Linx Technologies

Paul True	President
Ammon Gomez	Engineer

Compatible Electronics, Inc.

Kyle Fujimoto	Test Engineer
Michael Christensen	Test Engineer

2.4 Date Test Sample was Received

The test sample was received on May 21, 2002.

2.5 Disposition of the Test Sample

The test sample has not been returned to Linx Technologies as of June 12, 2002.

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, Subpart C.	FCC Rules – Radio frequency devices – Intentional Radiators
ANSI C63.4 1992	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 Remote Command Unit P/N: CMD-HHLR (EUT) was tested as a stand alone unit and tested in three different orthogonal axis. The EUT was continuously transmitting during the test. The antenna is a PCB trace. The EUT turns immediately off after the button is released.

Note: The EUT has 3 different frequencies (315 MHz, 418 MHz, and 433.92 MHz). All three frequencies were completely investigated during the testing.

The final radiated data was taken in the mode above. Please see Appendix D for the data sheets.



4.1.1 **Cable Construction and Termination**

There are no external cables connected to the EUT.



5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT**5.1 EUT and Accessory List**

EQUIPMENT	MANUFACTURER	PART NUMBER	SERIAL NUMBER	FCC ID
REMOTE COMMAND UNIT (EUT)	LINX TECHNOLOGIES	CMD-HHLR	N/A	OJM-CMD-HHLR-XXX



5.2 EMI Test Equipment

EQUIPMENT TYPE	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
Radiated Emissions Manual Test – Radiated	Compatible Electronics	N/A	N/A	N/A	N/A
Conducted Emissions Program	Compatible Electronics	N/A	N/A	N/A	N/A
Spectrum Analyzer – Main Section	Hewlett Packard	8566B	3638A08768	June 15, 2001	June 15, 2002
Spectrum Analyzer – Display Section	Hewlett Packard	85662A	3701A22262	June 15, 2001	June 15, 2002
Spectrum Analyzer – Quasi-Peak Adapter	Hewlett Packard	85662A	2811A01363	June 15, 2001	June 15, 2002
Preamplifier	Com Power	PA-102	1017	Dec. 31, 2001	Dec. 31, 2002
Biconical Antenna	Com Power	AB-100	1548	Oct. 11, 2001	Oct. 11, 2002
Log Periodic Antenna	Com Power	AL-100	16089	Oct. 11, 2001	Oct. 11, 2002
Computer	Hewlett Packard	D5251A 888	US74458128	N/A	N/A
Printer	Hewlett Packard	C5886A	SG7CM1P090	N/A	N/A
Monitor	Hewlett Packard	D5258A	DK74889705	N/A	N/A
Loop Antenna	Com-Power	AL-130	17070	May 21, 2001	May 21, 2002
Horn Antenna	Antenna Research	DRG-118/A	1053	Jan. 13, 2002	Jan. 13, 2003
Microwave Preamplifier	Com-Power	PA-122	25195	Jan. 7, 2002	Jan. 7, 2003



6. TEST SITE DESCRIPTION

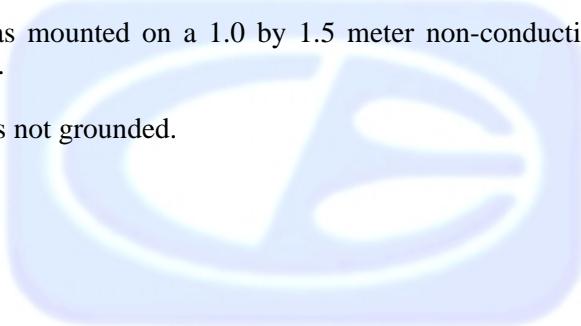
6.1 Test Facility Description

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

Radiated Emissions (Spurious and Harmonics) Test

The spectrum analyzer 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 spectrum analyzer was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the spectrum analyzer records the highest measured reading over all 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.

For the peak readings above 1000 MHz that were within 3dB of the spec limit or higher, the readings were averaged manually by narrowing the video filter down to 10 Hz and slowing the sweep time to keep the amplitude reading calibrated.

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 4.3 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: 1992. 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.



Radiated Emissions (Spurious and Harmonics) Test (con't)

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 final test data. The final qualification data sheets are located in Appendix D.



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. A plot of the -20 dB bandwidth is located in Appendix D.



8. CONCLUSIONS

The Remote Command Unit P/N: CMD-HHLR meets all of the specification limits defined in CFR Title 47, Part 15, Subpart C, sections 15.205, 15.209, and 15.231.



APPENDIX A

MODIFICATIONS TO THE EUT



MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC 15.231 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 during the testing.



APPENDIX B

***ADDITIONAL MODELS COVERED
UNDER THIS REPORT***



ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

Remote Command Unit
P/N: CMD-HHLR
S/N: N/A

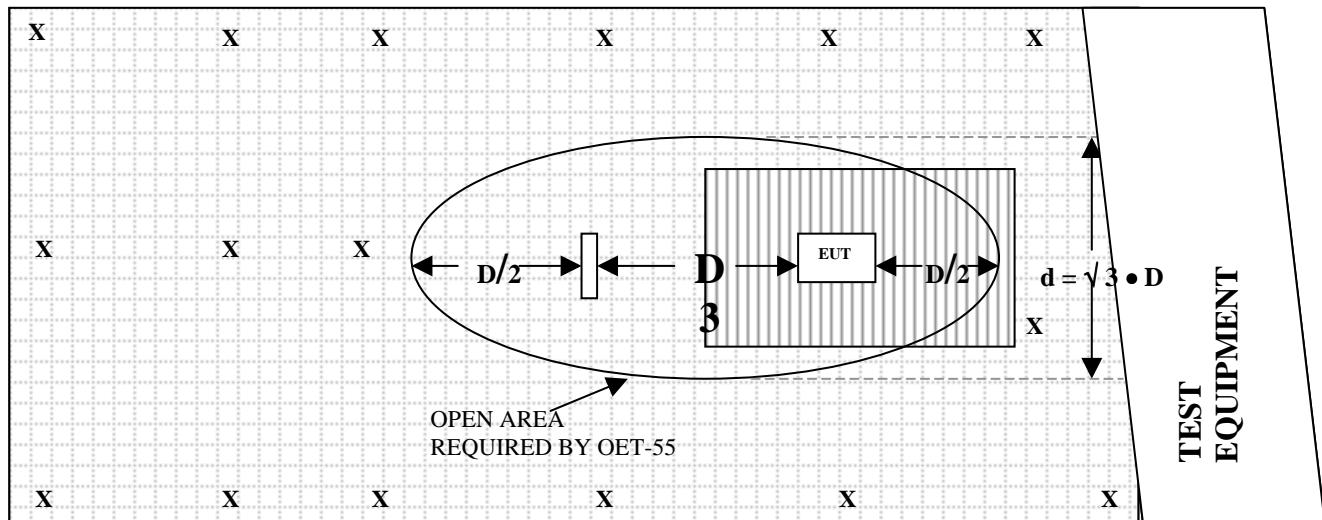
There were no additional models covered under this report.



APPENDIX C

DIAGRAMS, CHARTS AND PHOTOS



FIGURE 1: PLOT MAP AND LAYOUT OF RADIATED SITE**OPEN LAND > 15 METERS****OPEN LAND > 15 METERS****OPEN LAND > 15 METERS**

**FRONT VIEW**

LINX TECHNOLOGIES
REMOTE COMMAND UNIT
P/N: CMD-HHLR
FCC SUBPART C - RADIATED EMISSIONS – 05-21-02

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



**REAR VIEW**

LINX TECHNOLOGIES
REMOTE COMMAND UNIT
P/N: CMD-HHLR
FCC SUBPART C - RADIATED EMISSIONS – 05-21-02

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



COM-POWER AB-100

BICONICAL ANTENNA

S/N: 01548

CALIBRATION DATE: OCTOBER 11, 2001

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	13.70	120	11.00
35	13.70	125	11.20
40	11.80	140	12.50
45	12.30	150	13.20
50	11.00	160	13.50
60	10.40	175	14.60
70	8.60	180	14.40
80	8.30	200	15.90
90	8.30	250	17.60
100	8.80	300	19.90



COM-POWER AL-100

LOG PERIODIC ANTENNA

S/N: 16089

CALIBRATION DATE: OCTOBER 11, 2001

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
300	14.10	700	20.60
400	15.10	800	22.40
500	16.60	900	22.70
600	19.90	1000	26.50



COM-POWER PA-102

PREAMPLIFIER

S/N: 1017

CALIBRATION DATE: DECEMBER 31, 2001

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	38.5	300	38.5
40	38.5	350	38.4
50	38.5	400	38.2
60	38.5	450	37.8
70	38.5	500	38.0
80	38.5	550	38.2
90	38.3	600	38.2
100	38.3	650	38.0
125	38.6	700	38.1
150	38.5	750	37.7
175	38.4	800	37.4
200	38.5	850	37.9
225	38.5	900	37.2
250	38.4	950	36.8
275	38.4	1000	37.3



COM-POWER PA-122

MICROWAVE PREAMPLIFIER

S/N: 25195

CALIBRATION DATE: JANUARY 7, 2002

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	33.7	9.5	31.8
1.1	33.4	10.0	32.2
1.2	33.1	11.0	31.4
1.3	33.1	12.0	30.2
1.4	33.2	13.0	32.9
1.5	32.5	14.0	33.9
1.6	32.7	15.0	32.4
1.7	32.3	16.0	32.2
1.8	32.3	17.0	31.5
1.9	31.4	18.0	32.2
2.0	32.8	19.0	31.2
2.5	33.3	20.0	31.3
3.0	31.7	21.0	31.7
3.5	31.6	22.0	29.7
4.0	31.2		
4.5	31.2		
5.0	31.0		
5.5	31.3		
6.0	32.1		
6.5	32.1		
7.0	31.8		
7.5	32.0		
8.0	33.1		
8.5	32.0		
9.0	30.8		



ANTENNA RESEARCH DRG-118/A

HORN ANTENNA

S/N: 1053

CALIBRATION DATE: JANUARY 13, 2002

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	25.5	9.5	39.1
1.5	26.6	10.0	39.7
2.0	29.4	10.5	40.9
2.5	30.4	11.0	40.7
3.0	31.2	11.5	42.4
3.5	32.3	12.0	42.6
4.0	32.9	12.5	42.4
4.5	33.0	13.0	41.5
5.0	34.8	13.5	41.0
5.5	35.2	14.0	40.5
6.0	36.4	14.5	43.6
6.5	36.6	15.0	43.7
7.0	38.8	15.5	43.3
7.5	38.8	16.0	42.8
8.0	38.0	16.5	43.0
8.5	38.1	17.0	42.7
9.0	39.9	17.5	44.0
		18.0	41.8



Com-Power Corporation

(949) 587-9800

Antenna Calibration

Frequency MHz	Magnetic (dB/m)	Electric (dB/m)
0.009	-40.5	11.0
0.01	-40.4	11.1
0.02	-41.4	10.1
0.03	-40.0	11.5
0.04	-40.4	11.1
0.05	-41.7	9.8
0.06	-41.2	10.3
0.07	-41.5	10.0
0.08	-41.8	9.7
0.09	-41.8	9.7
0.1	-41.8	9.7
0.2	-44.0	7.5
0.3	-41.6	9.9
0.4	-41.6	9.9
0.5	-41.6	9.9
0.6	-41.5	10.0
0.7	-41.4	10.1
0.8	-41.3	10.2
0.9	-41.3	10.2
1	-40.9	10.6
2	-40.3	11.2
3	-40.5	11.0
4	-40.8	10.7
5	-40.2	11.3
6	-40.0	11.5
7	-40.4	11.1
8	-40.5	11.0
9	-40.0	11.5
10	-40.7	10.8
12	-41.2	10.3
14	-41.3	10.2
15	-41.3	10.2
16	-41.4	10.1
18	-41.4	10.1
20	-41.4	10.1
25	-41.7	9.8
30	-43.1	8.4

Separation Distance

1100

APPENDIX D

DATA SHEETS



RADIATED EMISSIONS

DATA SHEETS



RADIATED EMISSIONS (FCC SECTION 15.205 AND 15.231)

COMPANY	LINX TECHNOLOGIES												DATE	5/20/02
EUT	REMOTE COMMAND UNIT												DUTY CYCLE	48 %
MODEL	CMD-HHLR												PEAK TO AVG	-6.37517525 dB
S/N	N/A												TEST DIST.	3 Meters
TEST ENGINEER	KYLE FUJIMOTO												LAB	D

Frequency MHz	Peak Reading (dBuV)	Average (A) or Quasi- Peak (QP)	Antenna Polar. (V or H)	Antenna Height (meters)	EUT Azimuth (degrees)	EUT Axis (X,Y,Z)	EUT Tx Channel	Antenna Factor (dB)	Cable Loss (dB)	Amplifier Gain (dB)	Distance Factor (dB)	Mixer Factor (dB)	*Corrected Reading (dBuV/m)	Delta ** (dB)	Spec Limit (dBuV/m)	Comments
315.0000	102.8	96.5 A	H	1.0	90	X	LOW	14.3	2.9	38.5	0.0	0.0	75.1	-0.5	75.6	
315.0000	97.6	91.3 A	H	1.0	0	Y	LOW	14.3	2.9	38.5	0.0	0.0	69.9	-5.7	75.6	
315.0000	98.3	92.0 A	H	1.0	90	Z	LOW	14.3	2.9	38.5	0.0	0.0	70.6	-5.0	75.6	
315.0000	86.3	80.0 A	V	1.0	0	X	LOW	14.3	2.9	38.5	0.0	0.0	58.6	-17.0	75.6	
315.0000	102.7	96.4 A	V	1.5	180	Y	LOW	14.3	2.9	38.5	0.0	0.0	75.0	-0.6	75.6	
315.0000	91.9	85.6 A	V	1.5	180	Z	LOW	14.3	2.9	38.5	0.0	0.0	64.2	-11.4	75.6	
418.0000	105.4	99.1 A	H	1.0	90	X	MED.	15.4	3.3	38.1	0.0	0.0	79.7	-0.5	80.2	
418.0000	90.3	84.0 A	H	1.0	0	Y	MED.	15.4	3.3	38.1	0.0	0.0	64.6	-15.6	80.2	
418.0000	104.7	98.4 A	H	1.0	90	Z	MED.	15.4	3.3	38.1	0.0	0.0	79.0	-1.2	80.2	
418.0000	89.9	83.6 A	V	1.0	90	X	MED.	15.4	3.3	38.1	0.0	0.0	64.2	-16.0	80.2	
418.0000	100.2	93.9 A	V	1.0	0	Y	MED.	15.4	3.3	38.1	0.0	0.0	74.5	-5.7	80.2	
418.0000	91.7	85.4 A	V	1.0	180	Z	MED.	15.4	3.3	38.1	0.0	0.0	66.0	-14.2	80.2	
433.9200	102.4	96.1 A	H	1.0	270	X	HIGH	15.6	3.2	37.9	0.0	0.0	77.0	-3.8	80.8	
433.9200	92.8	86.5 A	H	1.0	0	Y	HIGH	15.6	3.2	37.9	0.0	0.0	67.4	-13.4	80.8	
433.9200	104.8	98.5 A	H	1.0	90	Z	HIGH	15.6	3.2	37.9	0.0	0.0	79.4	-1.4	80.8	
433.9200	94.3	88.0 A	V	1.0	0	X	HIGH	15.6	3.2	37.9	0.0	0.0	68.9	-11.9	80.8	
433.9200	104.0	97.7 A	V	1.0	90	Y	HIGH	15.6	3.2	37.9	0.0	0.0	78.6	-2.2	80.8	
433.9200	99.8	93.5 A	V	1.0	90	Z	HIGH	15.6	3.2	37.9	0.0	0.0	74.4	-6.4	80.8	

* CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

** DELTA = SPEC LIMIT - CORRECTED READING

PAGE 1 of PAGE 6

RADIATED EMISSIONS (FCC SECTION 15.205 AND 15.231)

COMPANY	LINX TECHNOLOGIES												DATE	5/20/02
EUT	REMOTE COMMAND UNIT												DUTY CYCLE	48 %
MODEL	CMD-HHLR												PEAK TO AVG	-6.37517525 dB
S/N	N/A												TEST DIST.	3 Meters
TEST ENGINEER	KYLE FUJIMOTO												LAB	D

Frequency MHz	Peak Reading (dBuV)	Average (A) or Quasi- Peak (QP)	Antenna Polar. (V or H)	Antenna Height (meters)	EUT Azimuth (degrees)	EUT Axis (X,Y,Z)	EUT Tx Channel	Antenna Factor (dB)	Cable Loss (dB)	Amplifier Gain (dB)	Distance Factor (dB)	Mixer Factor (dB)	*Corrected Reading (dBuV/m)	Delta ** (dB)	Spec Limit (dBuV/m)	Comments
630.0000	52.8	46.5 A	H	1.0	180	X	LOW	20.1	4.0	38.1	0.0	0.0	32.6	-21.4	54.0	
630.0000	38.2	31.9 A	H	1.0	0	Y	LOW	20.1	4.0	38.1	0.0	0.0	18.0	-36.0	54.0	
630.0000	55.0	48.7 A	H	1.0	0	Z	LOW	20.1	4.0	38.1	0.0	0.0	34.8	-19.2	54.0	
630.0000	38.0	31.7 A	V	1.0	0	X	LOW	20.1	4.0	38.1	0.0	0.0	17.8	-36.2	54.0	
630.0000	52.1	45.8 A	V	1.0	0	Y	LOW	20.1	4.0	38.1	0.0	0.0	31.9	-22.1	54.0	
630.0000	52.5	46.2 A	V	1.5	90	Z	LOW	20.1	4.0	38.1	0.0	0.0	32.3	-21.7	54.0	
836.0000	58.3	52.0 A	H	1.0	90	X	MED.	22.5	4.8	37.8	0.0	0.0	41.5	-18.7	60.2	
836.0000	41.6	35.3 A	H	1.0	90	Y	MED.	22.5	4.8	37.8	0.0	0.0	24.8	-35.4	60.2	
836.0000	53.4	47.1 A	H	1.0	90	Z	MED.	22.5	4.8	37.8	0.0	0.0	36.6	-23.6	60.2	
836.0000	41.7	35.4 A	V	1.0	90	X	MED.	22.5	4.8	37.8	0.0	0.0	24.9	-35.3	60.2	
836.0000	49.4	43.1 A	V	1.0	90	Y	MED.	22.5	4.8	37.8	0.0	0.0	32.6	-27.6	60.2	
836.0000	34.3	28.0 A	V	1.0	0	Z	MED.	22.5	4.8	37.8	0.0	0.0	17.5	-42.7	60.2	
867.8400	48.7	42.4 A	H	1.0	0	X	HIGH	22.6	4.8	37.7	0.0	0.0	32.2	-21.8	54.0	
867.8400	49.0	42.7 A	H	1.0	0	Y	HIGH	22.6	4.8	37.7	0.0	0.0	32.5	-21.5	54.0	
867.8400	38.5	32.2 A	H	1.0	0	Z	HIGH	22.6	4.8	37.7	0.0	0.0	22.0	-32.0	54.0	
867.8400	42.3	36.0 A	V	1.0	0	X	HIGH	22.6	4.8	37.7	0.0	0.0	25.8	-28.2	54.0	
867.8400	59.5	53.2 A	V	1.0	0	Y	HIGH	22.6	4.8	37.7	0.0	0.0	43.0	-11.0	54.0	
867.8400	60.1	53.8 A	V	1.5	90	Z	HIGH	22.6	4.8	37.7	0.0	0.0	43.6	-10.4	54.0	

* CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

** DELTA = SPEC LIMIT - CORRECTED READING

PAGE 2 of PAGE 6

RADIATED EMISSIONS (FCC SECTION 15.205 AND 15.231)

COMPANY	LINX TECHNOLOGIES												DATE	5/20/02
EUT	REMOTE COMMAND UNIT												DUTY CYCLE	48 %
MODEL	CMD-HHLR												PEAK TO AVG	-6.37517525 dB
S/N	N/A												TEST DIST.	3 Meters
TEST ENGINEER	KYLE FUJIMOTO												LAB	D

Frequency MHz	Peak Reading (dBuV)	Average (A) or Quasi- Peak (QP)	Antenna Polar. (V or H)	Antenna Height (meters)	EUT Azimuth (degrees)	EUT Axis (X,Y,Z)	EUT Tx Channel	Antenna Factor (dB)	Cable Loss (dB)	Amplifier Gain (dB)	Distance Factor (dB)	Mixer Factor (dB)	*Corrected Reading (dBuV/m)	Delta ** (dB)	Spec Limit (dBuV/m)	Comments
945.0000	60.7	54.4 A	H	1.0	90	X	LOW	24.4	5.3	36.8	0.0	0.0	47.2	-6.8	54.0	
945.0000	39.2	32.9 A	H	1.0	90	Y	LOW	24.4	5.3	36.8	0.0	0.0	25.7	-28.3	54.0	
945.0000	64.6	58.3 A	H	1.0	270	Z	LOW	24.4	5.3	36.8	0.0	0.0	51.1	-2.9	54.0	
945.0000	35.2	28.9 A	V	1.0	90	X	LOW	24.4	5.3	36.8	0.0	0.0	21.7	-32.3	54.0	
945.0000	43.0	36.7 A	V	1.0	0	Y	LOW	24.4	5.3	36.8	0.0	0.0	29.5	-24.5	54.0	
945.0000	38.2	31.9 A	V	1.0	0	Z	LOW	24.4	5.3	36.8	0.0	0.0	24.7	-29.3	54.0	
1254.0000	39.4	33.1 A	H	1.0	90	X	MED.	26.1	2.6	33.1	0.0	0.0	28.6	-31.6	60.2	
1254.0000	40.1	33.8 A	H	1.0	180	Y	MED.	26.1	2.6	33.1	0.0	0.0	29.3	-30.9	60.2	
1254.0000	39.0	32.7 A	H	1.0	90	Z	MED.	26.1	2.6	33.1	0.0	0.0	28.2	-32.0	60.2	
1254.0000	36.7	30.4 A	V	1.0	180	X	MED.	26.1	2.6	33.1	0.0	0.0	25.9	-34.3	60.2	
1254.0000	39.2	32.9 A	V	1.0	0	Y	MED.	26.1	2.6	33.1	0.0	0.0	28.4	-31.8	60.2	
1254.0000	40.2	33.9 A	V	1.0	0	Z	MED.	26.1	2.6	33.1	0.0	0.0	29.4	-30.8	60.2	
1301.7600	44.4	38.1 A	H	1.0	0	X	HIGH	26.2	2.6	33.1	0.0	0.0	33.8	-20.2	54.0	
1301.7600	42.8	36.5 A	H	1.0	0	Y	HIGH	26.2	2.6	33.1	0.0	0.0	32.2	-21.8	54.0	
1301.7600	43.1	36.8 A	H	1.0	90	Z	HIGH	26.2	2.6	33.1	0.0	0.0	32.5	-21.5	54.0	
1301.7600	45.3	39.0 A	V	1.0	0	X	HIGH	26.2	2.6	33.1	0.0	0.0	34.7	-19.3	54.0	
1301.7600	45.6	39.3 A	V	1.0	0	Y	HIGH	26.2	2.6	33.1	0.0	0.0	35.0	-19.0	54.0	
1301.7600	42.2	35.9 A	V	1.0	90	Z	HIGH	26.2	2.6	33.1	0.0	0.0	31.6	-22.4	54.0	

* CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

** DELTA = SPEC LIMIT - CORRECTED READING

PAGE 3 of PAGE 6

RADIATED EMISSIONS (FCC SECTION 15.205 AND 15.231)

COMPANY	LINX TECHNOLOGIES												DATE	5/20/02
EUT	REMOTE COMMAND UNIT												DUTY CYCLE	48 %
MODEL	CMD-HHLR												PEAK TO AVG	-6.37517525 dB
S/N	N/A												TEST DIST.	3 Meters
TEST ENGINEER	KYLE FUJIMOTO												LAB	D

Frequency MHz	Peak Reading (dBuV)	Average (A) or Quasi- Peak (QP)	Antenna Polar. (V or H)	Antenna Height (meters)	EUT Azimuth (degrees)	EUT Axis (X,Y,Z)	EUT Tx Channel	Antenna Factor (dB)	Cable Loss (dB)	Amplifier Gain (dB)	Distance Factor (dB)	Mixer Factor (dB)	*Corrected Reading (dBuV/m)	Delta ** (dB)	Spec Limit (dBuV/m)	Comments
1260.0000	40.3	34.0	A	H	1.0	0	X	LOW	26.1	2.6	33.1	0.0	0.0	29.5	-24.5	54.0
1260.0000	40.6	34.3	A	H	1.0	0	Y	LOW	26.1	2.6	33.1	0.0	0.0	29.8	-24.2	54.0
1260.0000	39.8	33.5	A	H	1.0	0	Z	LOW	26.1	2.6	33.1	0.0	0.0	29.0	-25.0	54.0
1260.0000	40.6	34.3	A	V	1.0	0	X	LOW	26.1	2.6	33.1	0.0	0.0	29.8	-24.2	54.0
1260.0000	40.0	33.7	A	V	1.0	180	Y	LOW	26.1	2.6	33.1	0.0	0.0	29.2	-24.8	54.0
1260.0000	37.0	30.7	A	V	1.0	0	Z	LOW	26.1	2.6	33.1	0.0	0.0	26.2	-27.8	54.0
1672.0000	39.4	33.1	A	H	1.0	90	X	MED.	27.6	3.3	32.4	0.0	0.0	31.5	-22.5	54.0
1672.0000	38.6	32.3	A	H	1.0	90	Y	MED.	27.6	3.3	32.4	0.0	0.0	30.7	-23.3	54.0
1672.0000	39.2	32.9	A	H	1.0	90	Z	MED.	27.6	3.3	32.4	0.0	0.0	31.3	-22.7	54.0
1672.0000	39.2	32.9	A	V	1.0	180	X	MED.	27.6	3.3	32.4	0.0	0.0	31.3	-22.7	54.0
1672.0000	39.8	33.5	A	V	1.0	0	Y	MED.	27.6	3.3	32.4	0.0	0.0	31.9	-22.1	54.0
1672.0000	40.2	33.9	A	V	1.0	0	Z	MED.	27.6	3.3	32.4	0.0	0.0	32.3	-21.7	54.0
1735.6800	43.5	37.2	A	H	1.0	180	X	HIGH	27.9	3.3	32.3	0.0	0.0	36.2	-17.8	54.0
1735.6800	41.1	34.8	A	H	1.0	0	Y	HIGH	27.9	3.3	32.3	0.0	0.0	33.8	-20.2	54.0
1735.6800	42.8	36.5	A	H	1.0	180	Z	HIGH	27.9	3.3	32.3	0.0	0.0	35.5	-18.5	54.0
1735.6800	41.9	35.6	A	V	1.0	270	X	HIGH	27.9	3.3	32.3	0.0	0.0	34.6	-19.4	54.0
1735.6800	45.0	38.7	A	V	1.0	270	Y	HIGH	27.9	3.3	32.3	0.0	0.0	37.7	-16.3	54.0
1735.6800	41.1	34.8	A	V	1.0	270	Z	HIGH	27.9	3.3	32.3	0.0	0.0	33.8	-20.2	54.0

* CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

** DELTA = SPEC LIMIT - CORRECTED READING

PAGE 4 of PAGE 6

RADIATED EMISSIONS (FCC SECTION 15.205 AND 15.231)

COMPANY	LINX TECHNOLOGIES												DATE	5/20/02
EUT	REMOTE COMMAND UNIT												DUTY CYCLE	48 %
MODEL	CMD-HHLR												PEAK TO AVG	-6.37517525 dB
S/N	N/A												TEST DIST.	3 Meters
TEST ENGINEER	KYLE FUJIMOTO												LAB	D

Frequency MHz	Peak Reading (dBuV)	Average (A) or Quasi- Peak (QP)	Antenna Polar. (V or H)	Antenna Height (meters)	EUT Azimuth (degrees)	EUT Axis (X,Y,Z)	EUT Tx Channel	Antenna Factor (dB)	Cable Loss (dB)	Amplifier Gain (dB)	Distance Factor (dB)	Mixer Factor (dB)	*Corrected Reading (dBuV/m)	Delta ** (dB)	Spec Limit (dBuV/m)	Comments
1575.0000	43.0	36.7	A	H	1.0	0	X	LOW	27.0	3.1	32.7	0.0	0.0	34.2	-19.8	54.0
1575.0000	40.0	33.7	A	H	1.0	90	Y	LOW	27.0	3.1	32.7	0.0	0.0	31.2	-22.8	54.0
1575.0000	45.7	39.4	A	H	1.0	270	Z	LOW	27.0	3.1	32.7	0.0	0.0	36.9	-17.1	54.0
1575.0000	41.1	34.8	A	V	1.0	0	X	LOW	27.0	3.1	32.7	0.0	0.0	32.3	-21.7	54.0
1575.0000	46.1	39.8	A	V	1.0	0	Y	LOW	27.0	3.1	32.7	0.0	0.0	37.3	-16.7	54.0
1575.0000	44.0	37.7	A	V	1.0	270	Z	LOW	27.0	3.1	32.7	0.0	0.0	35.2	-18.8	54.0
2090.0000	"--"	--	A	H	1.5	90	X	MED.	29.6	3.6	32.2	0.0	0.0	--	--	60.2
2090.0000	--	--	A	H	1.5	90	Y	MED.	29.6	3.6	32.2	0.0	0.0	--	--	60.2
2090.0000	--	--	A	H	1.5	90	Z	MED.	29.6	3.6	32.2	0.0	0.0	--	--	60.2
2090.0000	--	--	A	V	1.5	90	X	MED.	29.6	3.6	32.2	0.0	0.0	--	--	60.2
2090.0000	--	--	A	V	1.5	90	Y	MED.	29.6	3.6	32.2	0.0	0.0	--	--	60.2
2090.0000	--	--	A	V	1.5	90	Z	MED.	29.6	3.6	32.2	0.0	0.0	--	--	60.2
2169.6000	--	--	A	H	1.5	90	X	HIGH	29.7	3.6	32.4	0.0	0.0	--	--	54.0
2169.6000	--	--	A	H	1.5	90	Y	HIGH	29.7	3.6	32.4	0.0	0.0	--	--	54.0
2169.6000	--	--	A	H	1.5	90	Z	HIGH	29.7	3.6	32.4	0.0	0.0	--	--	54.0
2169.6000	--	--	A	V	1.5	90	X	HIGH	29.7	3.6	32.4	0.0	0.0	--	--	54.0
2169.6000	--	--	A	V	1.5	90	Y	HIGH	29.7	3.6	32.4	0.0	0.0	--	--	54.0
2169.6000	--	--	A	V	1.5	90	Z	HIGH	29.7	3.6	32.4	0.0	0.0	--	--	54.0

* CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

** DELTA = SPEC LIMIT - CORRECTED READING

-- No Emission Found

At this Frequency

PAGE 5 of PAGE 6

RADIATED EMISSIONS (FCC SECTION 15.205 AND 15.231)

COMPANY	LINX TECHNOLOGIES												DATE	5/20/02
EUT	REMOTE COMMAND UNIT												DUTY CYCLE	48 %
MODEL	CMD-HHLR												PEAK TO AVG	-6.37517525 dB
S/N	N/A												TEST DIST.	3 Meters
TEST ENGINEER	KYLE FUJIMOTO												LAB	D

Frequency MHz	Peak Reading (dBuV)	Average (A) or Quasi- Peak (QP)	Antenna Polar. (V or H)	Antenna Height (meters)	EUT Azimuth (degrees)	EUT Axis (X,Y,Z)	EUT Tx Channel	Antenna Factor (dB)	Cable Loss (dB)	Amplifier Gain (dB)	Distance Factor (dB)	Mixer Factor (dB)	*Corrected Reading (dBuV/m)	Delta ** (dB)	Spec Limit (dBuV/m)	Comments	
1890.0000	39.8	33.5	A	H	1.0	0	X	LOW	28.8	3.4	31.5	0.0	0.0	34.2	-19.8	54.0	NO
1890.0000	40.0	33.7	A	H	1.0	90	Y	LOW	28.8	3.4	31.5	0.0	0.0	34.4	-19.6	54.0	HARMONICS
1890.0000	37.3	31.0	A	H	1.0	0	Z	LOW	28.8	3.4	31.5	0.0	0.0	31.7	-22.3	54.0	NOR
1890.0000	39.6	33.3	A	V	1.0	0	X	LOW	28.8	3.4	31.5	0.0	0.0	34.0	-20.0	54.0	EMISSIONS
1890.0000	39.6	33.3	A	V	1.0	0	Y	LOW	28.8	3.4	31.5	0.0	0.0	34.0	-20.0	54.0	FOUND
1890.0000	39.0	32.7	A	V	1.0	0	Z	LOW	28.8	3.4	31.5	0.0	0.0	33.4	-20.6	54.0	AFTER
2508.0000	"--"	--	A	H	1.5	90	X	MED.	30.4	3.5	33.3	0.0	0.0	--	--	60.2	THE
2508.0000	--	--	A	H	1.5	90	Y	MED.	30.4	3.5	33.3	0.0	0.0	--	--	60.2	6TH
2508.0000	--	--	A	H	1.5	90	Z	MED.	30.4	3.5	33.3	0.0	0.0	--	--	60.2	HARMONICS
2508.0000	--	--	A	V	1.5	90	X	MED.	30.4	3.5	33.3	0.0	0.0	--	--	60.2	FOR
2508.0000	--	--	A	V	1.5	90	Y	MED.	30.4	3.5	33.3	0.0	0.0	--	--	60.2	THE
2508.0000	--	--	A	V	1.5	90	Z	MED.	30.4	3.5	33.3	0.0	0.0	--	--	60.2	EUT
2603.5200	--	--	A	H	1.5	90	X	HIGH	30.6	3.8	33.0	0.0	0.0	--	--	54.0	
2603.5200	--	--	A	H	1.5	90	Y	HIGH	30.6	3.8	33.0	0.0	0.0	--	--	54.0	
2603.5200	--	--	A	H	1.5	90	Z	HIGH	30.6	3.8	33.0	0.0	0.0	--	--	54.0	
2603.5200	--	--	A	V	1.5	90	X	HIGH	30.6	3.8	33.0	0.0	0.0	--	--	54.0	
2603.5200	--	--	A	V	1.5	90	Y	HIGH	30.6	3.8	33.0	0.0	0.0	--	--	54.0	
2603.5200	--	--	A	V	1.5	90	Z	HIGH	30.6	3.8	33.0	0.0	0.0	--	--	54.0	

* CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

** DELTA = SPEC LIMIT - CORRECTED READING

-- No Emission Found

At this Frequency

PAGE 6 of PAGE 6

Test location: Compatible Electronics
Customer : LINX TECHNOLOGIES Date : 5/21/2002
Manufacturer : LINX TECHNOLOGIES Time : 14.26
EUT name : REMOTE COMMAND UNIT P/N: CMD-HHLR
Specification: Fcc_B Test distance: 3.0 mtrs Lab: D
Distance correction factor($20 \log(\text{test}/\text{spec})$) : 0.00
Test Mode :
SPURIOUS EMISSIONS - VERTICAL AND HORIZONTAL POLAR.
TEMPERATURE 66 DEGREES F.
RELATIVE HUMIDITY 74%
315 MHz, 418 MHz, and 433.92 MHz
TESTED BY: KYLE FUJIMOTO

NO SPURIOUS EMISSIONS FOUND FROM 10 kHz - 4400 MHz
IN EITHER POLARIZATION FOR THE EUT

ALL 3 CHANNELS (315 MHz, 418 MHz, AND 433.92 MHz) WERE
INVESTIGATED FOR SPURIOUS EMISSIONS

-20 dB BANDWIDTH

DATA SHEETS



315 MHz

HHLR

-20 dB BANDWIDTH OF FUNDAMENTAL
REF 110.0 dB μ V ATTEN 20 dB

MKR Δ 340 kHz
-0.10 dB

hp

10 dB/

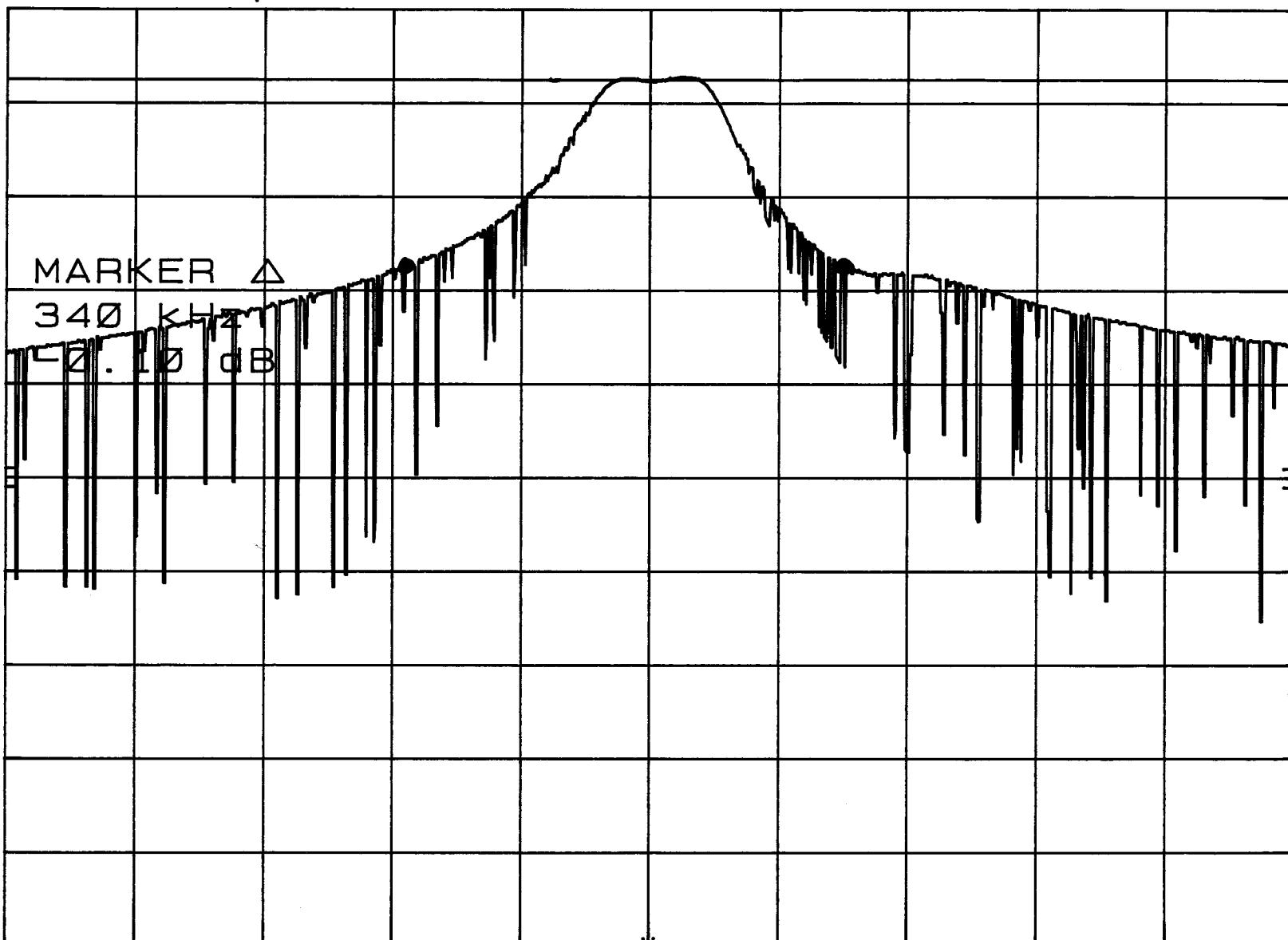
DL
102.5
dB μ V

CORR'D

CENTER 315.00 MHz
RES BW 1 MHz

VBW 1 MHz

SPAN 1.00 MHz
SWP 20.0 msec



418 MHz

HHLR

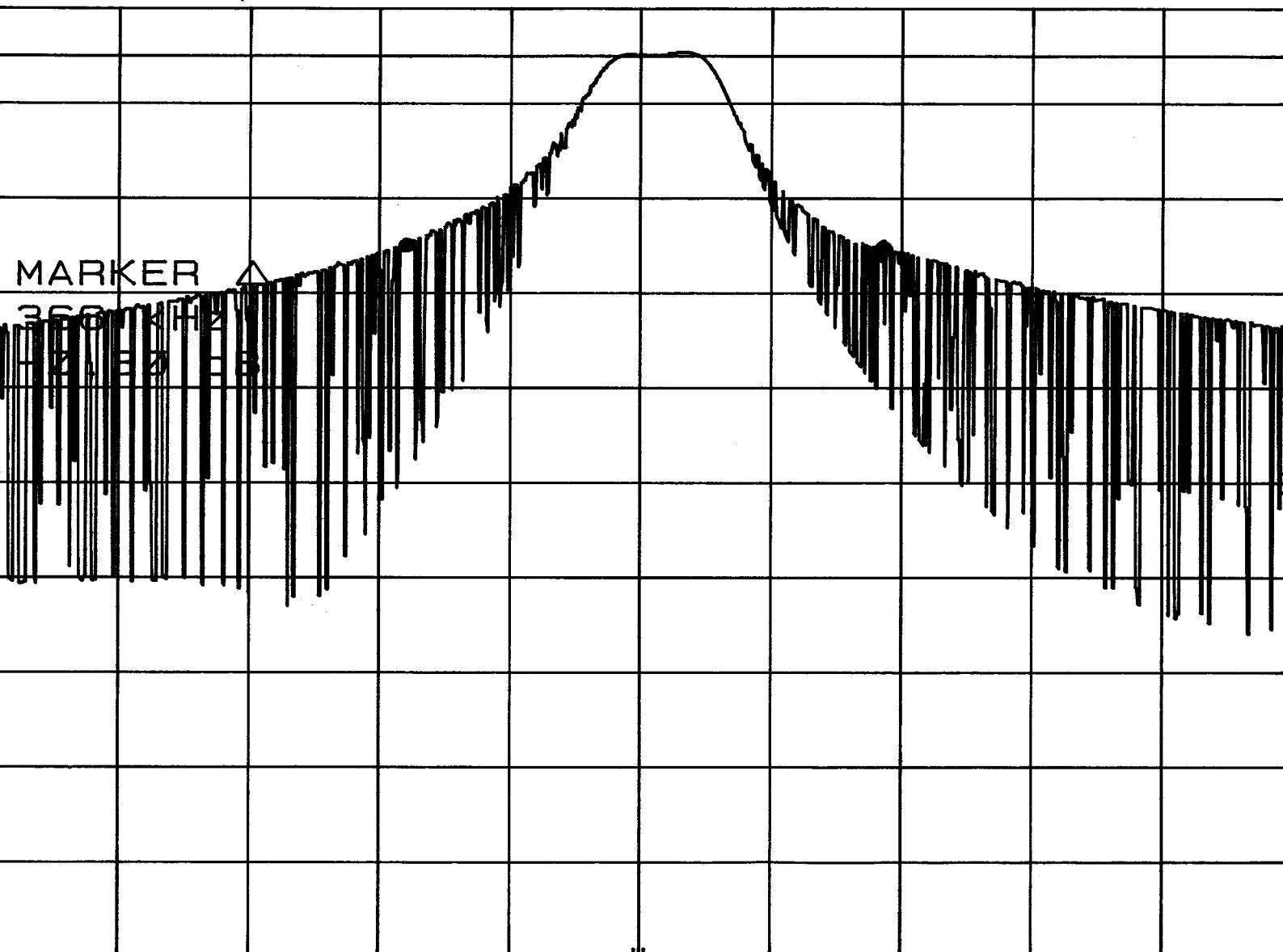
MKR Δ 366 kHz
-0.30 dB

HP

10 dB/

-20 dB BANDWIDTH OF FUNDAMENTAL
REF 110.0 dB μ V ATTEN 20 dB

DL
105.0
dB μ V



CORR'D

CENTER 418.04 MHz
RES BW 1 MHz

VBW 1 MHz

SPAN 1.00 MHz
SWP 20.0 msec

433.92 MHz

HHLR

MKR Δ 363 kHz
0.00 dB

BANDWIDTH OF FUNDAMENTAL
REF 110.0 dB μ V ATTN 20 dB

hp

10 dB/

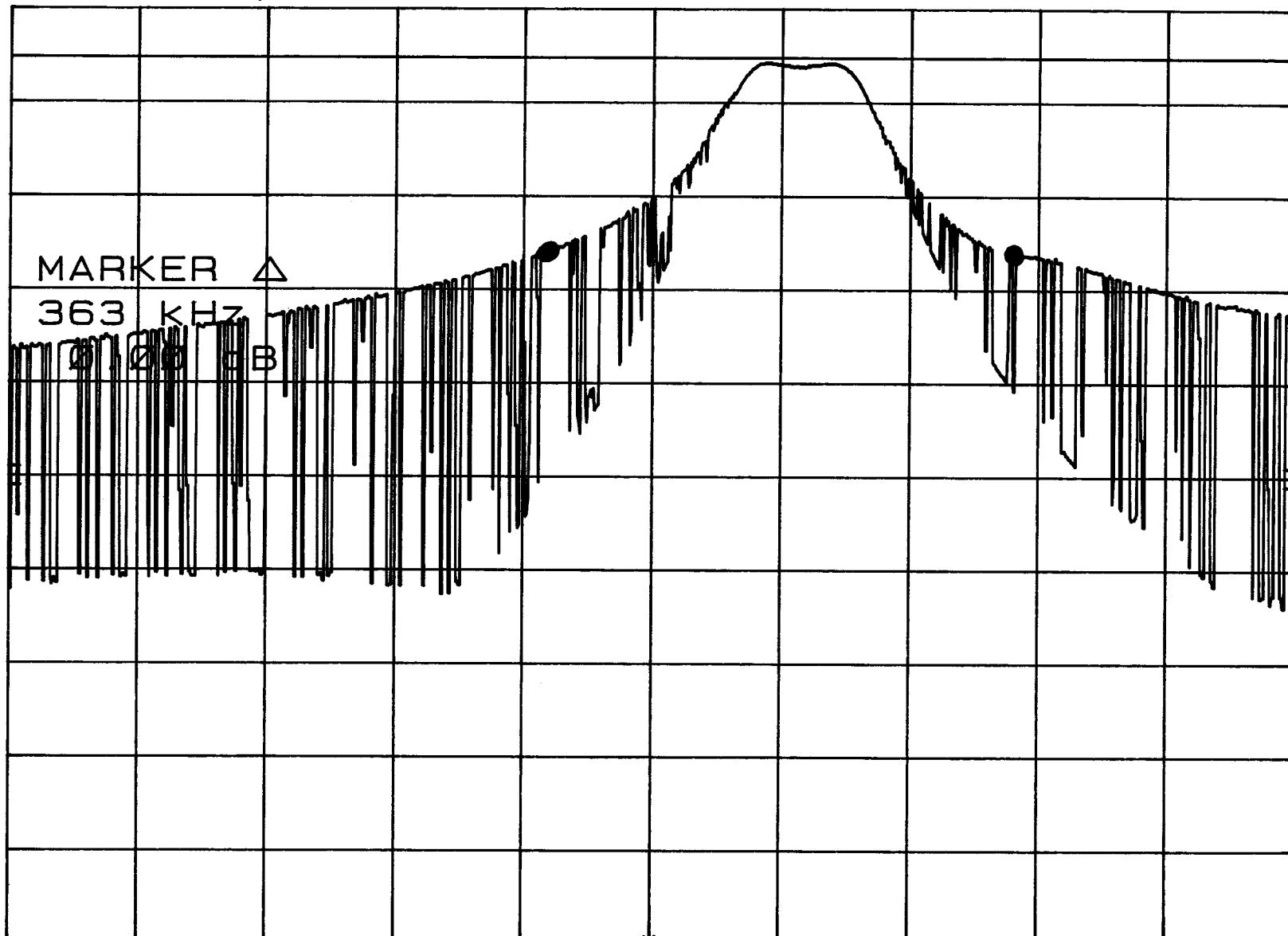
DL
104.8
dB μ V

CORR'D

CENTER 433.92 MHz
RES BW 1 MHz

VBW 3 MHz

SPAN 1.00 MHz
SWP 20.0 msec



APPENDIX E

LABORATORY RECOGNITIONS



LABORATORY RECOGNITIONS

Compatible Electronics has the following agency accreditations:

National Voluntary Laboratory Accreditation Program - Lab Code: 200063-0

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

Radio-Frequency Technologies (Competent Body)

