

*FCC PART 15, SUBPART B and C
TEST REPORT**for***WIRELESS TRANSMITTER****MODEL: LeakfinderRT**

Prepared for

ECHOLOGICS ENGINEERING, INC.
50 RONSON DRIVE, UNIT 165
TORONTO, CANADA M9W 1B3

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DATE: SEPTEMBER 22, 2004

	REPORT BODY	APPENDICES					TOTAL
		<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	
PAGES	15	2	2	2	15	17	53

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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: Wireless Transmitter
Model: LeakfinderRT
S/N: N/A

Product Description: See Expository Statement

Modifications: The EUT was modified in order to meet the specifications. Please see the list located in Appendix B.

Manufacturer: Echologics Engineering, Inc.
50 Ronson Drive, Unit 165
Toronto, Canada M9W 1B3

Test Date: September 17, 2004

Test Specifications: EMI requirements
CFR Title 47, Part 15 Subpart B; and Subpart C, Sections 15.205, 15.207, 15.209 and 15.249

Test Procedure: ANSI C63.4: 2003

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	Complies with the Class B limits of CFR Title 47, Part 15, Subpart B; and Subpart C, section 15.207.
2	Radiated RF Emissions, 10 kHz - 9300 MHz	Complies with the Class B limits of CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.209, and 15.249.

1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the Wireless Transmitter Model: LeakfinderRT . The EMI measurements were performed according to the measurement procedure described in ANSI C63.4: 2003. 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; and Subpart C, sections 15.205, 15.207, 15.209, and 15.249.



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

Echologics Engineering, Inc.

Tony Gambino	Engineer
Shabbir Yusuf	Sales Manager

Compatible Electronics, Inc.

Kyle Fujimoto	Test Engineer
Michael Christensen	Lab Manager

2.4 Date Test Sample was Received

The test sample was received on September 16, 2004.

2.5 Disposition of the Test Sample

The sample was returned to Echologics Engineering, Inc. as of September 22, 2004.

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	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

For Radiated Emissions: The Wireless Transmitter Model: LeakfinderRT (EUT) was connected to the Leak Finder Sensor via its charging/sensor port. The EUT was continuously transmitting. The antenna is hard wired to the PCB inside the EUT.

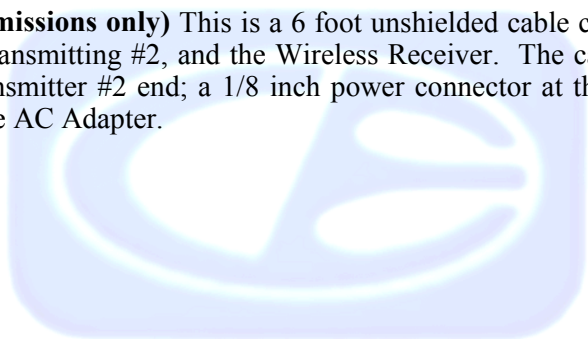
For Conducted Emissions: The Wireless Transmitter Model: LeakfinderRT (EUT) was connected to an AC Adapter via its charging/sensor port. The AC Adapter was also connected to a second Wireless Transmitter and also a Wireless Receiver. The AC Adapter was continuously charging the internal battery of the EUT. The antenna is hard wired to the PCB inside the EUT. The AC Adapter is only used to charge the internal battery and is not meant for normal operation of the EUT.

The final radiated as well as the conducted data were taken in the mode above. Please see Appendix E for the data sheets.

4.1.1 Cable Construction and Termination

Cable 1 (for radiated emissions only) This is a 3 meter foil shielded cable connecting the EUT to the sensor. It has a 4 pin DIN connector at the EUT end and is hard wired into the sensor. The cable was bundled to a length of 1 meter. The shield of the cable was grounded to the chassis via the connector.

Cable 2 (for conducted emissions only) This is a 6 foot unshielded cable connecting the AC Adapter to the EUT, Wireless Transmitting #2, and the Wireless Receiver. The cable has a 4 pin DIN at the EUT and Wireless Transmitter #2 end; a 1/8 inch power connector at the Wireless Receiver end; and is hard wired into the AC Adapter.



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

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID
WIRELESS TRANSMITTER (EUT)	ECHOLOGICS ENGINEERING, INC.	LeakfinderRT	N/A	SJH-LEAKFINDERRT
WIRELESS TRANSMITTER*	ECHOLOGICS ENGINEERING, INC.	LeakfinderRT	N/A	SJH-LEAKFINDERRT
WIRELESS RECEIVER*	ECHOLOGICS ENGINEERING, INC.	LeakfinderRT	N/A	DoC
AC ADAPTER (EUT)	MODE ELECTRONICS	DV-1250	N/A	N/A
SENSOR**	ECHOLOGICS ENGINEERING, INC.	N/A	N/A	N/A

* For Conducted Emissions Only

** For Radiated Emissions Only

5.2 EMI Test Equipment

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. CYCLE
Radiate Emissions Data Capture Program	Compatible Electronics	2.0	N/A	N/A	N/A
Emissions Program	Compatible Electronics	2.3 (SR19)	N/A	N/A	N/A
Spectrum Analyzer – Main Section	Hewlett Packard	8566B	3638A08768	June 24, 2004	1 Year
Spectrum Analyzer – Display Section	Hewlett Packard	85662A	3701A22262	June 24, 2004	1 Year
Quasi-Peak Adapter	Hewlett Packard	85650A	2811A01363	June 24, 2004	1 Year
EMI Receiver	Rhode & Schwarz	ESIB40	100172	July 22, 2003	2 Year
Preamplifier	Com-Power	PA-102	1017	January 6, 2004	1 Year
Biconical Antenna	Com Power	AB-900	15227	April 21, 2004	1 Year
Log Periodic Antenna	Com Power	AL-100	16203	February 18, 2004	1 Year
Antenna Mast	Com-Power	AM-100	N/A	N/A	N/A
Turntable	Com-Power	TT-100	N/A	N/A	N/A
Computer	Hewlett Packard	4530	US91912319	N/A	N/A
Monitor	Hewlett Packard	D5258A	TW74500641	N/A	N/A
Loop Antenna	Com-Power	AL-130	17089	September 4, 2004	1 Year
Horn Antenna	Antenna Research	DRG-118/A	1053	January 16, 2004	1 Year
Microwave Preamplifier	Com-Power	PA-122	25195	August 19, 2004	1 Year
LISN	Com Power	LI-215	12078	November 22,2003	1 Year
LISN	Com Power	LI-215	12082	November 22,2003	1 Year
RF Attenuator	Weinschel Corporation	2	BJ6396	August 12, 2004	1 Year

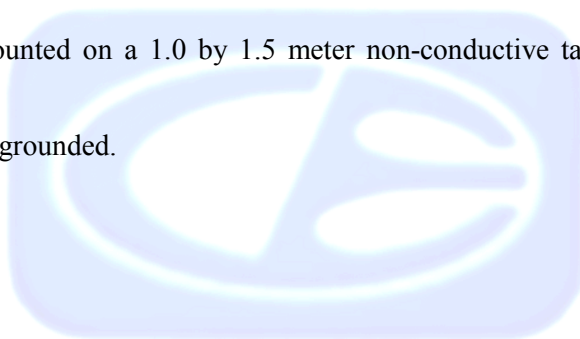
6. TEST SITE DESCRIPTION**6.1 Test Facility Description**

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 Conducted Emissions Test

The spectrum analyzer was used as a measuring meter. The data was collected with the spectrum analyzer in the peak detect mode with the “Max Hold” feature activated. The quasi-peak was used only where indicated in the data sheets. A 10 dB attenuation pad was used for the protection of the spectrum analyzer input stage, and the offset was adjusted accordingly to read the actual data measured. The LISN output was measured using the spectrum analyzer. 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: 2003. 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:

The EUT complies with the **Class B** limits of CFR Title 47, Part 15, Subpart B; and Subpart C, section 15.207 for conducted emissions.

7.2 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 from 1 GHz to 18 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.

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 9.3 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: 2003. 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.

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 E.

8. CONCLUSIONS

The Wireless Transmitter Model: LeakfinderRT meets all of the **Class B** specification limits defined in CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.209, and 15.249.



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

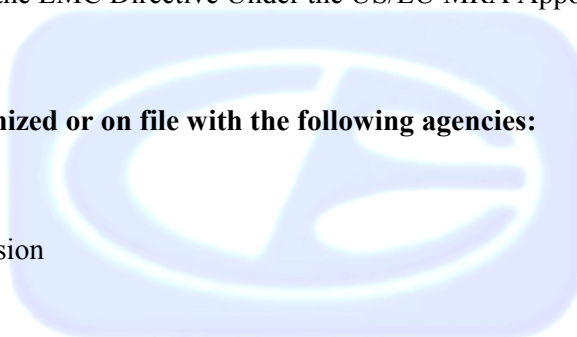
Conformity Assessment Body for the EMC Directive Under the US/EU MRA Appointed by NIST

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

Federal Communications Commission

Industry Canada

Radio-Frequency Technologies (Competent Body)



APPENDIX B

MODIFICATIONS TO THE EUT

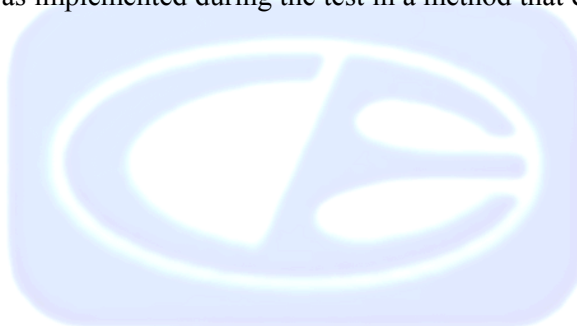
MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC 15.249 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.

Modifications:

- 1) R10 and R12 now 33 ohms
- 2) R11 now 22 ohms



APPENDIX C

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

ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

Wireless Transmitter
Model: LeakfinderRT
S/N: N/A

There are no additional models covered under this report.



APPENDIX D***DIAGRAMS, CHARTS, AND PHOTOS***

FIGURE 1: CONDUCTED EMISSIONS TEST SETUP

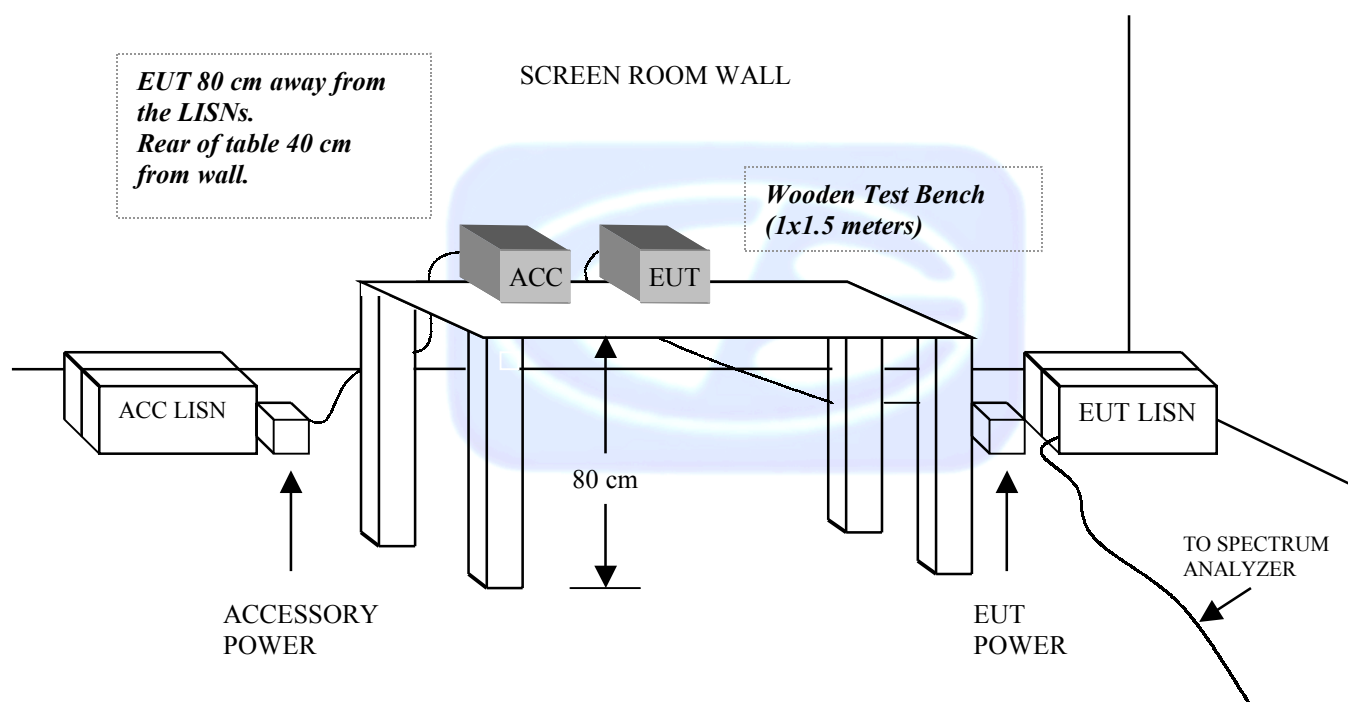
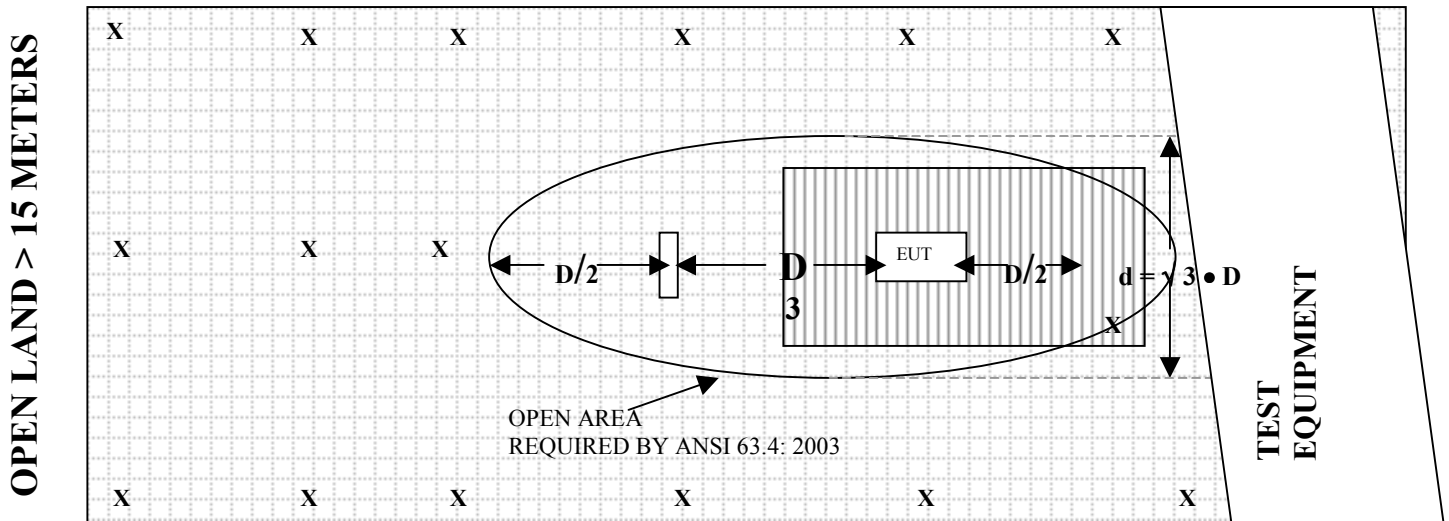


FIGURE 2: PLOT MAP AND LAYOUT OF RADIATED SITE

OPEN LAND > 15 METERS



OPEN LAND > 15 METERS

X	= GROUND RODS		= GROUND SCREEN
D	= TEST DISTANCE (meters)		= WOOD COVER

COM-POWER AB-900**BICONICAL ANTENNA****S/N: 15227****CALIBRATION DATE: APRIL 21, 2004**

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	11.20	120	12.50
35	10.90	125	12.90
40	11.40	140	12.40
45	8.90	150	12.10
50	11.40	160	12.40
60	10.30	175	15.80
70	8.20	180	15.70
80	6.00	200	17.40
90	7.60	250	14.60
100	10.50	300	19.50

COM-POWER AL-100

LOG PERIODIC ANTENNA

S/N: 16203

CALIBRATION DATE: FEBRUARY 18, 2004

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
300	13.00	700	19.40
400	15.10	800	21.30
500	16.70	900	20.70
600	18.70	1000	22.60

COM-POWER PA-102**PREAMPLIFIER**

S/N: 1017

CALIBRATION DATE: JANUARY 6, 2004

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	37.8	300	37.6
40	37.5	350	37.5
50	37.7	400	37.5
60	37.5	450	37.0
70	37.5	500	37.1
80	37.5	550	37.3
90	37.5	600	37.1
100	37.5	650	37.4
125	37.8	700	37.1
150	37.5	750	37.1
175	37.5	800	36.8
200	37.6	850	36.2
225	37.6	900	36.7
250	37.5	950	36.2
275	37.6	1000	35.3

COM-POWER PA-122**MICROWAVE PREAMPLIFIER**

S/N: 25195

CALIBRATION DATE: AUGUST 19, 2004

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	30.50	6.0	30.57
1.1	30.24	6.5	30.39
1.2	30.44	7.0	30.08
1.3	30.38	7.5	29.92
1.4	30.11	8.0	28.88
1.5	29.91	8.5	28.08
1.6	29.74	9.0	28.08
1.7	30.26	9.5	29.11
1.8	30.41	10.0	30.21
1.9	30.19	11.0	29.00
2.0	30.37	12.0	29.10
2.5	30.69	13.0	29.77
3.0	31.63	14.0	28.67
3.5	31.61	15.0	29.72
4.0	31.46	16.0	30.54
4.5	31.45	17.0	30.05
5.0	31.33	18.0	28.47
5.5	31.15		

ANTENNA RESEARCH DRG-118/A**HORN ANTENNA**

S/N: 1053

CALIBRATION DATE: JANUARY 16, 2004

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	24.4	10.0	38.7
1.5	25.2	10.5	39.0
2.0	28.2	11.0	38.9
2.5	28.5	11.5	41.3
3.0	30.1	12.0	40.5
3.5	31.0	12.5	40.0
4.0	31.2	13.0	40.2
4.5	31.9	13.5	40.5
5.0	33.2	14.0	41.6
5.5	33.7	14.5	44.8
6.0	34.3	15.0	41.4
6.5	35.0	15.5	39.2
7.0	36.7	16.0	39.4
7.5	37.3	16.5	40.9
8.0	37.1	17.0	42.6
8.5	37.3	17.5	45.1
9.0	37.7	18.0	41.7
9.5	38.6		

COM-POWER AL-130**LOOP ANTENNA**

S/N: 17089

CALIBRATION DATE: SEPTEMBER 3, 2004

FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)
0.009	-40.8	10.7
0.01	-40.9	10.6
0.02	-41.8	9.7
0.05	-42.0	9.5
0.07	-41.5	10.0
0.1	-41.7	9.8
0.2	-44.1	7.4
0.3	-41.6	9.9
0.5	-41.5	10.0
0.7	-41.4	10.1
1	-41.0	10.5
2	-40.6	10.9
3	-40.8	10.7
4	-41.0	10.5
5	-40.4	11.1
10	-40.7	10.8
15	-41.6	9.9
20	-41.3	10.2
25	-43.0	8.5
30	-42.6	8.9



FRONT VIEW

ECHOLOGICS ENGINEERING, INC.

WIRELESS TRANSMITTER

MODEL: LeakfinderRT

FCC SUBPART B AND FCC SUBPART C - RADIATED EMISSIONS – 09-17-04

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

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114 Olinda Drive
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REAR VIEW

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WIRELESS TRANSMITTER
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FRONT VIEW

ECHOLOGICS ENGINEERING, INC.

WIRELESS TRANSMITTER

MODEL: LeakfinderRT

FCC SUBPART B AND FCC SUBPART C - RADIATED EMISSIONS – 09-17-04

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REAR VIEW

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WIRELESS TRANSMITTER
MODEL: LeakfinderRT
FCC SUBPART B AND FCC SUBPART C - RADIATED EMISSIONS – 09-17-04

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FRONT VIEW

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WIRELESS TRANSMITTER

MODEL: LeakfinderRT

FCC SUBPART B AND FCC SUBPART C - CONDUCTED EMISSIONS – 09-17-04

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APPENDIX E

DATA SHEETS

CONDUCTED EMISSIONS

DATA SHEETS

FCC 15.249

Echologics Engineering, inc.

Date: 09/17/04

Wireless Transmitter

Lab: B

Model: LeakfinderRT

Tested By: Kyle Fujimoto

Configuration: Continuous Transmit Mode

Low Channel

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
1806.6	49.67	V	74	-24.33	Peak	1	315	
1806.6	48.24	V	54	-5.76	Avg	1	315	
2709.9	47.7	V	74	-26.3	Peak	1.81	315	
2709.9	44.56	V	54	-9.44	Avg	1.81	315	
3613.2	53.71	V	74	-20.29	Peak	2.08	225	
3613.2	51.84	V	54	-2.16	Avg	2.08	225	
4516.5	42.94	V	74	-31.06	Peak	1.58	225	
4516.5	30.94	V	54	-23.06	Avg	1.58	225	
5419.8	43.04	V	74	-30.96	Peak	1.83	180	
5419.8	30.45	V	54	-23.55	Avg	1.83	180	
6323.1	46.62	V	74	-27.38	Peak	1.83	180	
6323.1	32.82	V	54	-21.18	Avg	1.83	180	
7226.4	47.62	V	74	-26.38	Peak	1.83	225	
7226.4	34.96	V	54	-19.04	Avg	1.83	225	
8129.7	48.1	V	74	-25.9	Peak	1.83	315	
8129.7	35.45	V	54	-18.55	Avg	1.83	315	
9033	48.97	V	74	-25.03	Peak	1.83	180	
9033	35.81	V	54	-18.19	Avg	1.83	180	



**COMPATIBLE
ELECTRONICS**

9/17/2004

14:56:27

FCC Class B Conducted Emissions

Echologics Engineering, Inc.

Wireless Transmitter

Model: LeakfinderRT

FCC Class B - Black Lead

Black Lead LI-215 12078 11-22-03

TEST ENGINEER : Kyle Fujimoto

45 highest peaks above -50.00 dB of FCC Class B Avg. limit line

Peak criteria : 1.00 dB, Curve : Peak

Peak#	Freq(MHz)	Amp(dBuV)	Limit(dB)	Delta(dB)
1	0.256	53.05	51.55	1.50**
2	0.240	53.36	52.08	1.28**
3	0.270	52.14	51.11	1.03**
4	0.338	48.61	49.26	-0.66**
5	0.304	49.41	50.14	-0.73**
6	0.313	48.91	49.88	-0.97**
7	0.322	48.51	49.66	-1.16**
8	0.350	47.41	48.95	-1.55**
9	0.358	46.61	48.78	-2.17**
10	0.363	46.31	48.65	-2.34**
11	0.375	44.91	48.38	-3.47**
12	0.398	42.71	47.90	-5.19**
13	0.510	40.21	46.00	-5.79
14	0.679	40.12	46.00	-5.88
15	0.502	40.11	46.00	-5.89
16	0.759	39.92	46.00	-6.08
17	0.705	39.82	46.00	-6.18
18	0.724	39.72	46.00	-6.28
19	0.492	39.81	46.14	-6.33
20	0.637	39.62	46.00	-6.38
21	0.532	39.61	46.00	-6.39
22	0.747	39.52	46.00	-6.48
23	0.469	40.01	46.53	-6.52
24	0.694	39.42	46.00	-6.58
25	0.411	41.01	47.63	-6.63**
26	0.486	39.51	46.23	-6.72
27	0.826	39.02	46.00	-6.98
28	0.538	38.91	46.00	-7.09
29	0.805	38.82	46.00	-7.18
30	0.779	38.72	46.00	-7.28
31	0.890	38.63	46.00	-7.37
32	0.862	38.62	46.00	-7.38
33	0.792	38.62	46.00	-7.38
34	0.550	38.61	46.00	-7.39
35	0.844	38.32	46.00	-7.68
36	0.618	38.22	46.00	-7.78
37	0.627	37.92	46.00	-8.08
38	0.958	37.83	46.00	-8.17
39	0.909	37.83	46.00	-8.17
40	0.433	39.01	47.19	-8.18
41	0.567	37.61	46.00	-8.39
42	0.440	38.61	47.06	-8.45
43	0.419	39.01	47.46	-8.45
44	1.043	37.23	46.00	-8.77
45	0.598	37.22	46.00	-8.78

**COMPATIBLE
ELECTRONICS**

9/17/2004

14:56:27

FCC Class B Conducted Emissions
Echologics Engineering, Inc.
Wireless Transmitter
Model: LeakfinderRT
FCC Class B - Black Lead
Black Lead LI-215 12078 11-22-03
TEST ENGINEER : Kyle Fujimoto

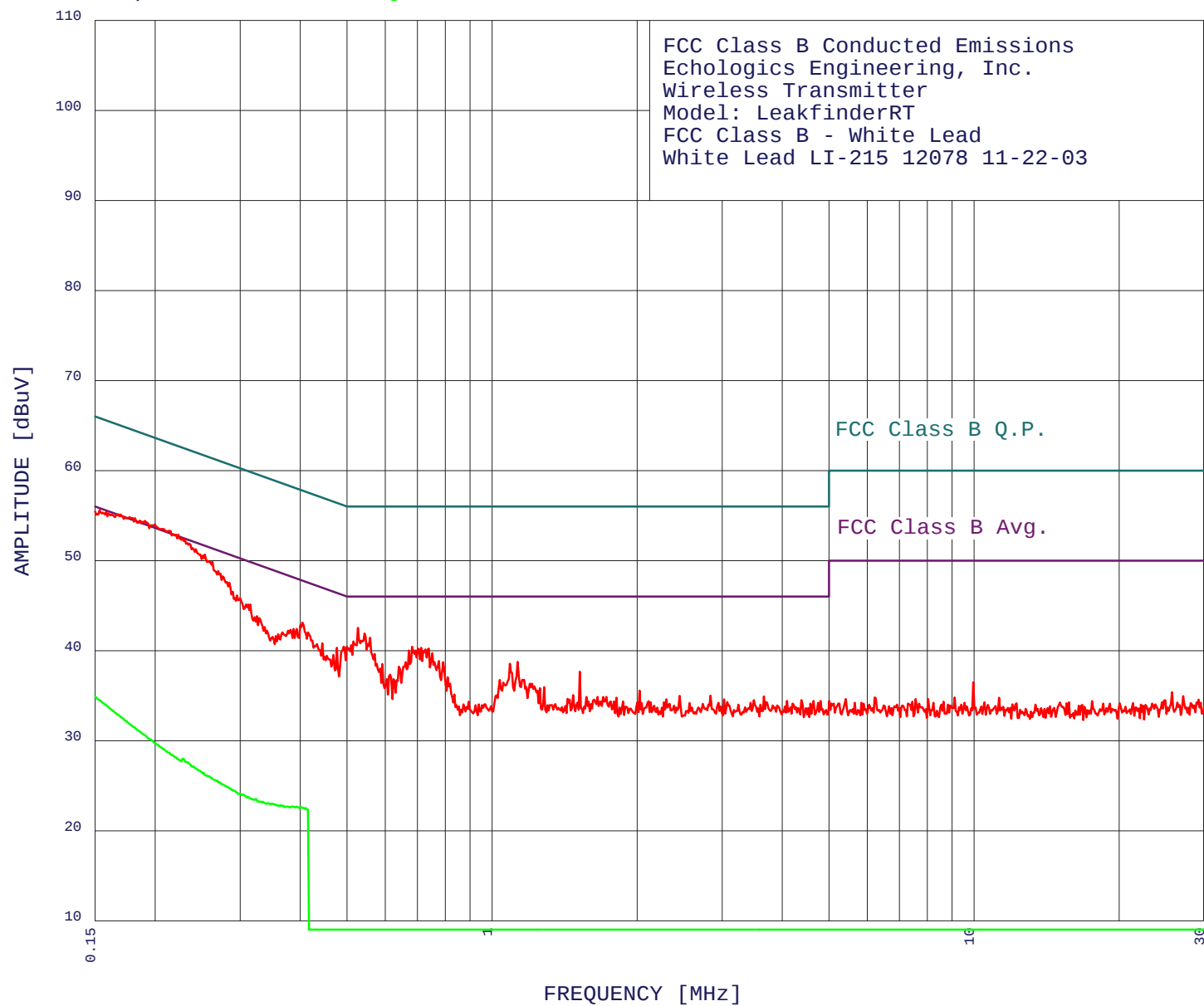
4 highest peaks above -50.00 dB of FCC Class B Avg. limit line

Peak criteria : 0.00 dB, Curve : Average

Peak#	Freq(MHz)	Amp(dBuV)	Limit(dB)	Delta(dB)
1	0.168	48.63	55.07	-6.44
2	0.282	36.06	50.76	-14.70
3	0.336	31.87	49.31	-17.44
4	0.409	27.99	47.68	-19.69

EMISSION LEVEL [dBuV] PEAK
Graph for Peak & Average

9/17/2004 15:01:55




**COMPATIBLE
ELECTRONICS**

9/17/2004

15:01:55

FCC Class B Conducted Emissions

Echologics Engineering, Inc.

Wireless Transmitter

Model: LeakfinderRT

FCC Class B - White Lead

White Lead LI-215 12078 11-22-03

TEST ENGINEER : Kyle Fujimoto

45 highest peaks above -50.00 dB of FCC Class B Avg. limit line

Peak criteria : 0.10 dB, Curve : Peak

Peak#	Freq(MHz)	Amp(dBuV)	Limit(dB)	Delta(dB)
1	0.190	54.40	54.01	0.39**
2	0.200	53.99	53.62	0.37**
3	0.182	54.71	54.41	0.29**
4	0.223	52.88	52.70	0.18**
5	0.185	54.40	54.24	0.17**
6	0.170	55.12	54.98	0.13**
7	0.173	54.81	54.81	0.00**
8	0.166	55.12	55.16	-0.04**
9	0.228	52.47	52.52	-0.05**
10	0.230	52.37	52.43	-0.06**
11	0.158	55.42	55.56	-0.13**
12	0.153	55.63	55.82	-0.19**
13	0.160	55.22	55.47	-0.25**
14	0.243	51.26	52.00	-0.73**
15	0.254	50.65	51.64	-0.99**
16	0.251	50.55	51.73	-1.17**
17	0.263	49.85	51.33	-1.49**
18	0.270	48.84	51.11	-2.27**
19	0.276	48.24	50.94	-2.70**
20	0.285	47.53	50.67	-3.14**
21	0.527	42.52	46.00	-3.48
22	0.290	46.53	50.54	-4.01**
23	0.544	41.92	46.00	-4.08
24	0.296	46.12	50.36	-4.24**
25	0.300	45.82	50.23	-4.42**
26	0.558	41.42	46.00	-4.58
27	0.404	43.11	47.77	-4.65**
28	0.315	45.11	49.84	-4.73**
29	0.312	45.11	49.92	-4.81**
30	0.309	45.11	50.01	-4.90**
31	0.516	41.02	46.00	-4.98
32	0.400	42.81	47.86	-5.04**
33	0.552	40.72	46.00	-5.28
34	0.510	40.62	46.00	-5.38
35	0.415	42.01	47.55	-5.53**
36	0.393	42.41	47.99	-5.58**
37	0.683	40.42	46.00	-5.58
38	0.500	40.42	46.01	-5.59
39	0.713	40.32	46.00	-5.68
40	0.387	42.41	48.12	-5.71**
41	0.492	40.42	46.14	-5.72
42	0.325	43.81	49.57	-5.76**
43	0.739	40.22	46.00	-5.78
44	0.701	40.22	46.00	-5.78
45	0.329	43.61	49.48	-5.87**



**COMPATIBLE
ELECTRONICS**

9/17/2004

15:01:55

FCC Class B Conducted Emissions
 Echologics Engineering, Inc.
 Wireless Transmitter
 Model: LeakfinderRT
 FCC Class B - White Lead
 White Lead LI-215 12078 11-22-03
 TEST ENGINEER : Kyle Fujimoto

 21 highest peaks above -50.00 dB of FCC Class B Avg. limit line

Peak criteria : 0.00 dB, Curve : Average

Peak#	Freq(MHz)	Amp(dBuV)	Limit(dB)	Delta(dB)
1	0.228	28.00	52.52	-24.52
2	0.411	22.51	47.63	-25.12
3	0.415	22.35	47.55	-25.19
4	0.402	22.60	47.81	-25.21
5	0.406	22.51	47.72	-25.21
6	0.252	26.40	51.68	-25.28
7	0.393	22.68	47.99	-25.31
8	0.387	22.68	48.12	-25.44
9	0.377	22.68	48.34	-25.66
10	0.369	22.76	48.52	-25.76
11	0.363	22.84	48.65	-25.81
12	0.358	22.84	48.78	-25.94
13	0.354	22.92	48.87	-25.94
14	0.350	22.99	48.95	-25.96
15	0.343	23.07	49.13	-26.06
16	0.324	23.52	49.62	-26.10
17	0.304	24.02	50.14	-26.12
18	0.334	23.22	49.35	-26.13
19	0.312	23.74	49.92	-26.18
20	0.331	23.22	49.44	-26.22
21	0.318	23.52	49.75	-26.23

RADIATED EMISSIONS

DATA SHEETS



Test Location : Compatible Electronics
Customer : Echologics Engineering, Inc.
Manufacturer : Echologics Engineering, Inc.
Eut name : Wireless Transmitter
Model : LeakfinderRT
Serial # : N/A
Specification : FCC 15.249
Distance correction factor (20 * log(test/spec)) : 0.00
Test Mode : Scan Type: Qualification - Fundamental of Transmitter
Readings 1 and 4 = Low Channel, Readings 2 and 5 = Mid Channel
Readings 3 and 6 = High Channel - All Readings Used Peak Detector
Test Engineer: Kyle Fujimoto

Page : 1/1
Date : 9/17/2004
Time : 13:10:28
Lab : D
Test Distance : 3.0 Meters

Pol	Freq MHz	Rdng dBuV	Cable loss dB	Ant factor dB	Amp gain dB	Cor'd rdg = R dBuV	Limit = L dBuV/m	Delta R-L dB
1V	903.393	58.70	3.10	20.77	0.00	82.57	94.00	-11.43
2V	912.500	58.60	3.10	20.95	0.00	82.65	94.00	-11.35
3V	921.456	57.50	3.10	21.12	0.00	81.72	94.00	-12.28
4H	903.422	48.60	3.10	20.77	0.00	72.47	94.00	-21.53
5H	912.359	49.30	3.10	20.95	0.00	73.35	94.00	-20.65
6H	921.458	48.60	3.10	21.12	0.00	72.82	94.00	-21.18

FCC 15.249

Echologics Engineering, inc.

Date: 09/17/04

Wireless Transmitter

Lab: B

Model: LeakfinderRT

Tested By: Kyle Fujimoto

Configuration: Continuous Transmit Mode

Low Channel

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
1806.6	49.67	V	74	-24.33	Peak	1	315	
1806.6	48.24	V	54	-5.76	Avg	1	315	
2709.9	47.7	V	74	-26.3	Peak	1.81	315	
2709.9	44.56	V	54	-9.44	Avg	1.81	315	
3613.2	53.71	V	74	-20.29	Peak	2.08	225	
3613.2	51.84	V	54	-2.16	Avg	2.08	225	
4516.5	42.94	V	74	-31.06	Peak	1.58	225	
4516.5	30.94	V	54	-23.06	Avg	1.58	225	
5419.8	43.04	V	74	-30.96	Peak	1.83	180	
5419.8	30.45	V	54	-23.55	Avg	1.83	180	
6323.1	46.62	V	74	-27.38	Peak	1.83	180	
6323.1	32.82	V	54	-21.18	Avg	1.83	180	
7226.4	47.62	V	74	-26.38	Peak	1.83	225	
7226.4	34.96	V	54	-19.04	Avg	1.83	225	
8129.7	48.1	V	74	-25.9	Peak	1.83	315	
8129.7	35.45	V	54	-18.55	Avg	1.83	315	
9033	48.97	V	74	-25.03	Peak	1.83	180	
9033	35.81	V	54	-18.19	Avg	1.83	180	

FCC 15.249

Echologics Engineering, inc.

Date: 09/17/04

Wireless Transmitter

Lab: B

Model: LeakfinderRT

Tested By: Kyle Fujimoto

Configuration: Continuous Transmit Mode

Low Channel

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
1806.6	49.37	H	74	-24.63	Peak	2.26	225	
1806.6	47.44	H	54	-6.56	Avg	2.26	225	
2709.9	46.7	H	74	-27.3	Peak	2.75	225	
2709.9	43.35	H	54	-10.65	Avg	2.75	225	
3613.2	53.65	H	74	-20.35	Peak	2.62	225	
3613.2	51.81	H	54	-2.19	Avg	2.62	225	
4516.5	42.96	H	74	-31.04	Peak	1.65	270	
4516.5	29.38	H	54	-24.62	Avg	1.65	270	
5419.8	43.61	H	74	-30.39	Peak	1.8	225	
5419.8	30.77	H	54	-23.23	Avg	1.8	225	
6323.1	46.71	H	74	-27.29	Peak	1.8	270	
6323.1	32.9	H	54	-21.1	Avg	1.8	270	
7226.4	47.33	H	74	-26.67	Peak	1.8	180	
7226.4	34.99	H	54	-19.01	Avg	1.8	180	
8129.7	47.76	H	74	-26.24	Peak	1.8	180	
8129.7	35.41	H	54	-18.59	Avg	1.8	180	
9033	48.05	H	74	-25.95	Peak	1.8	180	
9033	35.87	H	54	-18.13	Avg	1.8	180	

FCC 15.249

Echologics Engineering, inc.

Date: 09/17/04

Wireless Transmitter

Lab: B

Model: LeakfinderRT

Tested By: Kyle Fujimoto

Configuration: Continuous Transmit Mode

Middle Channel

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
1824.6	44.48	V	74	-29.52	Peak	1.49	180	
1824.6	40.79	V	54	-13.21	Avg	1.49	180	
2736.9	44.46	V	74	-29.54	Peak	1	180	
2736.9	39.79	V	54	-14.21	Avg	1	180	
3649.2	51.46	V	74	-22.54	Peak	1.05	180	
3649.2	48.86	V	54	-5.14	Avg	1.05	180	
4561.5	41.72	V	74	-32.28	Peak	1.97	270	
4561.5	28.76	V	54	-25.24	Avg	1.97	270	
5473.8	42.93	V	74	-31.07	Peak	1.97	135	
5473.8	30.4	V	54	-23.6	Avg	1.97	135	
6386.1	46.04	V	74	-27.96	Peak	1.97	180	
6386.1	32.54	V	54	-21.46	Avg	1.97	180	
7298.4	46.53	V	74	-27.47	Peak	1.97	180	
7298.4	34.46	V	54	-19.54	Avg	1.97	180	
8210.7	50.26	V	74	-23.74	Peak	1.6	180	
8210.7	35.81	V	54	-18.19	Avg	1.6	180	
9123	48.62	V	74	-25.38	Peak	1.6	315	
9123	36.43	V	54	-17.57	Avg	1.6	315	

FCC 15.249

Echologics Engineering, inc.

Date: 09/17/04

Wireless Transmitter

Lab: B

Model: LeakfinderRT

Tested By: Kyle Fujimoto

Configuration: Continuous Transmit Mode

Middle Channel

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
1824.6	43.08	H	74	-30.92	Peak	2.49	270	
1824.6	39.89	H	54	-14.11	Avg	2.49	270	
2736.9	42.8	H	74	-31.2	Peak	2.46	225	
2736.9	37.53	H	54	-16.47	Avg	2.46	225	
3649.2	52.93	H	74	-21.07	Peak	2.59	180	
3649.2	50.13	H	54	-3.87	Avg	2.59	180	
4561.5	44.5	H	74	-29.5	Peak	2.18	180	
4561.5	28.6	H	54	-25.4	Avg	2.18	180	
5473.8	42.97	H	74	-31.03	Peak	1.41	180	
5473.8	30.62	H	54	-23.38	Avg	1.41	180	
6386.1	44.72	H	74	-29.28	Peak	1.56	225	
6386.1	32.69	H	54	-21.31	Avg	1.56	225	
7298.4	47.26	H	74	-26.74	Peak	1.56	315	
7298.4	34.7	H	54	-19.3	Avg	1.56	315	
8210.7	48.74	H	74	-25.26	Peak	1.56	270	
8210.7	35.81	H	54	-18.19	Avg	1.56	270	
9123	48.88	H	74	-25.12	Peak	1.56	180	
9123	36.59	H	54	-17.41	Avg	1.56	180	

FCC 15.249

Echologics Engineering, inc.

Date: 09/17/04

Wireless Transmitter

Lab: B

Model: LeakfinderRT

Tested By: Kyle Fujimoto

Configuration: Continuous Transmit Mode

High Channel

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
1842.6	53.65	V	74	-20.35	Peak	1.42	180	
1842.6	52.26	V	54	-1.74	Avg	1.42	180	
2763.9	44.47	V	74	-29.53	Peak	2.28	225	
2763.9	41.48	V	54	-12.52	Avg	2.28	225	
3685.2	53.06	V	74	-20.94	Peak	2.04	225	
3685.2	51.26	V	54	-2.74	Avg	2.04	225	
4606.5	43.4	V	74	-30.6	Peak	2.04	225	
4606.5	28.55	V	54	-25.45	Avg	2.04	225	
5527.8	43.58	V	74	-30.42	Peak	2.48	315	
5527.8	31.35	V	54	-22.65	Avg	2.48	315	
6449.1	44.71	V	74	-29.29	Peak	2.48	315	
6449.1	32.17	V	54	-21.83	Avg	2.48	315	
7370.4	47.77	V	74	-26.23	Peak	2.48	45	
7370.4	34.46	V	54	-19.54	Avg	2.48	45	
8291.7	48.2	V	74	-25.8	Peak	2.15	135	
8291.7	35.1	V	54	-18.9	Avg	2.15	135	
9213	49.61	V	74	-24.39	Peak	2.15	270	
9213	36.44	V	54	-17.56	Avg	2.15	270	

FCC 15.249

Echologics Engineering, inc.

Date: 09/17/04

Wireless Transmitter

Lab: B

Model: LeakfinderRT

Tested By: Kyle Fujimoto

Configuration: Continuous Transmit Mode

High Channel

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
1842.6	46.73	H	74	-27.27	Peak	2.28	180	
1842.6	44.68	H	54	-9.32	Avg	2.28	180	
2763.9	48.73	H	74	-25.27	Peak	2.34	225	
2763.9	41.59	H	54	-12.41	Avg	2.34	225	
3685.2	50.16	H	74	-23.84	Peak	2.34	135	
3685.2	47.04	H	54	-6.96	Avg	2.34	135	
4606.5	42.51	H	74	-31.49	Peak	2.04	225	
4606.5	30.97	H	54	-23.03	Avg	2.04	225	
5527.8	43.58	H	74	-30.42	Peak	2.33	225	
5527.8	31.19	H	54	-22.81	Avg	2.33	225	
6449.1	44.91	H	74	-29.09	Peak	1.25	180	
6449.1	32.27	H	54	-21.73	Avg	1.25	180	
7370.4	49.09	H	74	-24.91	Peak	1.25	180	
7370.4	34.67	H	54	-19.33	Avg	1.25	180	
8291.7	47.26	H	74	-26.74	Peak	1.41	180	
8291.7	35.23	H	54	-18.77	Avg	1.41	180	
9213	49.03	H	74	-24.97	Peak	1.41	270	
9213	36.68	H	54	-17.32	Avg	1.41	270	



Test Location	: Compatible Electronics	Page	: 1/1
Customer	: Echologics Engineering, Inc.	Date	: 9/17/2004
Manufacturer	: Echologics Engineering, Inc.	Time	: 13:26:34
Eut name	: Wireless Transmitter	Lab	: D
Model	: LeakfinderRT	Test Distance	: 3.0 meters
Serial #	: N/A		
Specification	: FCC Class B		
Distance correction factor (20 * log(test/spec))			: 0.00
Test Mode	: Scan Type: Qualification		
	Scan Range: 10 kHz to 9.3 GHz (Vertical & Horizontal)		
	Spurious Radiated Emissions from the Transmitter		
	Test Engineer: Kyle Fujimoto		

Pol	Freq MHz	Rdng dBuV	Cable loss dB	Ant factor dB	Amp gain dB	Cor'd rdg = R dBuV	Limit = L dBuV/m	Delta R-L dB
1V	32.000	47.00	0.52	11.07	37.73	20.86	40.00	-19.14
2V	36.000	47.00	0.56	11.01	37.61	20.96	40.00	-19.04
3V	40.000	45.30	0.60	11.40	37.50	19.80	40.00	-20.20
4V	44.000	45.20	0.56	9.38	37.59	17.55	40.00	-22.45
5V	48.000	48.50	0.52	10.43	37.66	21.79	40.00	-18.21
6V	52.000	52.20	0.54	11.16	37.66	26.25	40.00	-13.75
7V	56.000	52.90	0.62	10.72	37.58	26.66	40.00	-13.34
8V	110.462	48.50	0.99	11.59	37.63	23.45	43.50	-20.05
9V	117.456	49.10	1.04	12.26	37.72	24.69	43.50	-18.81
10V	200.656	38.40	1.40	17.36	37.60	19.56	43.50	-23.94
11V	250.256	37.60	1.60	14.64	37.50	16.34	46.00	-29.66
12H	31.964	39.90	0.52	11.08	37.73	13.76	40.00	-26.24
13H	35.964	39.60	0.56	11.00	37.61	13.55	40.00	-26.45
14H	83.164	43.20	0.87	6.53	37.50	13.09	40.00	-26.91
15H	134.616	38.80	1.14	12.57	37.68	14.84	43.50	-28.66
16H	141.816	43.10	1.17	12.34	37.59	19.02	43.50	-24.48
17H	184.216	35.40	1.28	16.07	37.54	15.21	43.50	-28.29
18H	224.016	37.00	1.50	15.98	37.60	16.87	46.00	-29.13
19H	300.016	36.90	1.70	13.00	37.60	14.00	46.00	-32.00
20H	304.016	38.20	1.70	13.10	37.59	15.41	46.00	-30.59