COMMUNICATION CERTIFICATION LABORATORY

1940 West Alexander Street
Salt Lake City, UT 84119
801-972-6146

Certification Test Report

TEST OF: LT-800B-072

FCC ID: OMD800-002

To FCC PART 15, Subpart C

Test Report Serial No: 73-8024

Applicant:

Listen Technologies
8535 South 700 West, Suite A
Sandy, UT 84070

Date of Test: May 10, 2005

Issue Date: May 18, 2005

Equipment Receipt Date: May 5, 2005

Accredited Testing Laboratory By:

NVLAP

NVLAP Lab Code 100272-0

CERTIFICATION OF ENGINEERING REPORT

This report has been prepared by Communication Certification Laboratory to document compliance of the device described below with the requirements of Federal Communications Commission (FCC) Part 15, Subpart C. This report may be reproduced in full, partial reproduction may only be made with the written consent of the laboratory. The results in this report apply only to the sample tested.

- Applicant: Listen Technologies
- Manufacturer: Listen Technologies
- Brand Name: Listen Technologies
- Model Number: LT-800B-072
- FCC ID Number: OMD800-002

On this 18th day of May 2005, I, individually, and for Communication Certification Laboratory, certify that the statements made in this engineering report are true, complete, and correct to the best of my knowledge, and are made in good faith.

Although NVLAP has recognized that the Communication Certification Laboratory EMC testing facilities are in good standing, this report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

COMMUNICATION CERTIFICATION LABORATORY

Tested by: Norman P. Hansen
EMC Technician

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SECTION 1.0 CLIENT INFORMATION

1.1 Applicant:

Company Name: Listen Technologies
8535 South 700 West, Suite A
Draper, UT 84020

Contact Name: Russell Gentner
Title: President

1.2 Manufacturer:

Company Name: Listen Technologies
8535 South 700 West, Suite A
Draper, UT 84020

Contact Name: Russell Gentner
Title: President

SECTION 2.0 EQUIPMENT UNDER TEST (EUT)

2.1 Identification of EUT:

Brand Name:	Listen Technologies
Model Name or Number:	LT-800B-072
Serial Number:	None
Options Fitted:	N/A
Country of Manufacture:	U.S.A.

2.2 Description of EUT:

The LT-800B-072 is a professionally installed transmitter used for auditory assistance. The LT-800B-072 operates in the ranges of 72.0 – 73.0 MHz, 74.6 – 74.8 MHz, and 75.2 – 76.0 MHz using a total of 57 channels, 17 designated as wide band and 40 designated as narrow band. A table of designated channels and frequencies is shown below.

The LT-800B-072 receives power from a Listen Technologies SCP48-151000A 120 VAC to 15 VAC power adapter.

The LT-800B-072 provides two inputs, one for connection to a microphone and the second for line level inputs. A monitor port using a stereo phono plug connector is available for headset connection. A mixed output port is provided using RCA-type connectors. Antenna connection is made using either a telescoping monopole screw mount located in the center of the PCB or using a BNC connection for a remote mount antenna on the rear panel of the EUT.

The LT-800B-072 was tested using all the antennas supplied by the manufacturer. They consist of a fully extended, one meter, telescoping, monopole antenna directly connected to the PCB and remote antennas connected by a 25 foot RG58U coax cable. The remote antennas consisted of a dipole antenna with the one meter elements, dipole antenna with 31 centimeter elements, dipole antenna using 1 meter flexible cable elements, monopole antenna using a one meter element, and monopole antenna using a 31 centimeter element. The worst-case emissions were exhibited when using a remote, dipole antenna using 1 meter elements.

The control circuitry of the LT-800-72 was tested under FCC Part 15, Subpart B and is covered in a separate report.

Wide Band		Narrow Band			
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
A	72.1	1	72.025	21	75.425
B	72.3	2	72.075	22	75.475
C	72.5	3	72.125	23	75.525
D	72.7	4	72.175	24	75.575
E	72.9	5	72.225	25	75.625
F	75.5	6	72.275	26	75.675
G	75.7	7	72.325	27	75.725
H	75.9	8	72.375	28	75.775
I	74.7	9	72.425	29	75.825
J	75.3	10	72.475	30	75.875
K	72.2	11	72.525	31	75.925
N	72.4	12	72.575	32	75.975
O	72.6	13	72.625	33	74.625
P	72.8	14	72.675	34	74.675
R	75.4	15	72.725	35	74.725
S	75.6	16	72.775	36	74.775
T	75.8	17	72.825	37	75.225
		18	72.825	38	75.725
		19	72.925	39	75.325
		20	72.975	40	75.375

2.3 EUT and Support Equipment:

The FCC ID numbers for all the EUT and support equipment used during the test (including inserted cards) are listed below:

Brand Name Model Number Serial No.	FCC ID Number	Description	Name of Interface Ports / Interface Cables
BN: Listen Technologies MN: LT-800B-072 (Note 1)	OMD800-002	Auditory Assistance Transceiver	See Section 2.4
BN: Digital MN: Stereo Headphones	N/A	Headphones	Unshielded cable with phono jack type connector (Note 2)

Note: (1) EUT
(2) Port connected to EUT

2.4 Interface Ports on EUT:

Name of Ports	No. of Ports Fitted to EUT	Cable Descriptions/Length
Monitor	1	Unshielded cable from headphones with phono jack type connector/2 meters
Antenna (Rear)	1	RG58U coax w/BNC connectors/25 feet (configurations w/remote mounted antennas only))
Antenna (Center)	1	Mounting stud for direct connection to screw-on monopole antenna (configuration using screw-on monopole antenna only)
Mix Output	1	Dual RCA cable/1.5 meters
Input 1	1	Cable with ¼" jack connector/2 meters
Input 2	1	Dual RCA cable/1.5 meters
15 VAC Input	1	Unshielded cable from power adapter/2 meters

2.5 Modification Incorporated/Special Accessories on EUT:

There were no modifications or special accessories required to comply with the specification.

Signature: _____

Typed Name: Russell Gentner

Title: President

SECTION 3.0 TEST SPECIFICATION, METHODS & PROCEDURES

3.1 Test Specification:

Title: FCC PART 15, Subpart C (47 CFR 15). 15.203, 15.207, and 15.237

Limits and methods of measurement of radio interference characteristics of radio frequency devices.

Purpose of Test: The tests were performed to demonstrate initial compliance.

3.2 Methods & Procedures:

3.2.1 §15.203 Antenna Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

3.2.2 §15.207 Conducted Limits

(a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHZ to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph

shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15 – 0.5*	66 to 56*	56 to 46*
0.5 – 5	56	46
5 - 30	60	50

*Decreases with the logarithm of the frequency.

3.2.3 §15.237 Operation in the bands 72.0 – 73.0 MHz, 74.6 – 74.8 MHz and 75.2 – 76.0 MHz

(a) The intentional radiator shall be restricted to use as an auditory assistance device.

(b) Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the above specified frequency ranges.

(c) The field strength of any emissions within the permitted 200 kHz band shall not exceed 80 millivolts/meter at 3 meters. The field strength of any emissions radiated on any frequency outside of the specified 200 kHz band shall not exceed 1500 microvolts/meter at 3 meters. The emission limits in this paragraph are based on measurement instrumentation employing an average detector. The provisions in Section 15.35 for limiting peak emissions apply.

3.2.3 Test Procedure

The line conducted and radiated emissions testing was performed according to the procedures in ANSI C63.4 (2003). Testing was performed at CCL's Wanship open area test site #2, located at 550 West Wanship Road, Wanship, UT. This site has been fully described in a report submitted to the FCC, and was accepted in a letter dated August 11, 2003 (90504).

CCL participates in the National Voluntary Laboratory Accreditation Program (NVLAP) and has been accepted under NVLAP Lab Code:100272-0, which is effective until September 30, 2005.

For radiated emissions testing at 30 MHz or above that is performed at distances closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

SECTION 4.0 OPERATION OF EUT DURING TESTING

4.1 Operating Environment:

Power Supply: 120 VAC

4.2 Operating Modes:

Each mode of operation was exercised to produce worst-case emissions. All configurations of antennas included by the manufacturer in the system were tested. The worst-case radiated emissions configuration was with the output power switch in the maximum output position and using a remote dipole antenna with 1 meter elements in a vertical orientation mounted to a plywood wall behind the table the EUT was placed on. The results shown in this report are the worst-case results from testing in this configuration. The conducted emissions at the AC mains ports did not change when the different antennas were connected.

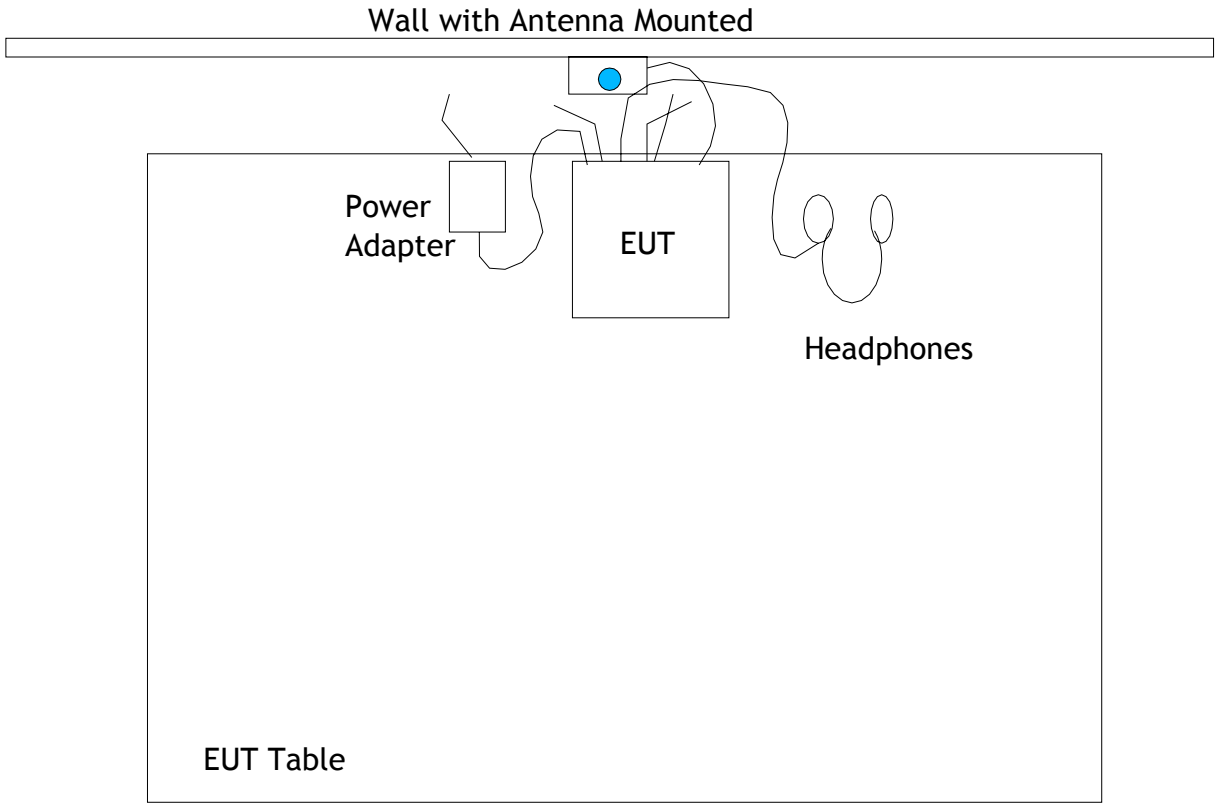
4.3 EUT Exercise Software:

Listen Technologies firmware was used to exercise the transmitter.

4.4 Configuration & Peripherals:

The LT-800B-072 was placed on the table and connected to the support equipment listed in Section 2.3 via each port listed in Section 2.4. Shown in Section 4.5 is a block diagram of the test configuration.

4.5 Block Diagram of Test Configuration:



SECTION 5.0 SUMMARY OF TEST RESULTS

5.1 FCC Part 15, Subpart C

5.1.1 Summary of Tests:

Section	Environmental Phenomena	Frequency Range (MHz)	Result
15.203	Antenna Requirements	Structural Requirement	Complied
15.207	Conducted Disturbance at Mains Ports	0.15 to 30	Complied
15.237(a)	Restricted Use as an Auditory Assistance Device	Design and Use Requirement	Complied
15.237(b)	Bandwidth Requirement	72.0 – 73.0 74.6 – 74.8 75.2 – 76.0	Complied
15.237(c)	Radiated Emissions	30 - 1000	Complied

5.2 Result

In the configuration tested, the EUT complied with the requirements of the specification.

SECTION 6.0 MEASUREMENTS, EXAMINATIONS AND DERIVED RESULTS

6.1 Test Results:

6.1.1 §15.203 Antenna Requirements

The LT-800B-072 is a professionally installed and maintained system. Either a direct connect screw-on antenna or antennas connected to the base unit via a coaxial cable with BNC connectors are provided by the manufacturer. This product was granted certification by the FCC on August 21, 2001 using FCC ID#OMD800-001 and the antenna configurations have not changed and the unit is professionally installed; therefore, the LT-800B-072 is deemed to still comply with this regulation.

6.1.2 §15.207 Conducted Disturbance at Mains Ports

The conducted emissions on the AC mains ports must not exceed the limits shown in the table of §15.207. The table below shows the test data. The EUT complies with the specification by a margin of 8.6 dB.

AC Lead	Frequency (MHz)	Detector	Measured Level ($dB\mu V$)	Limit ($dB\mu V$)	Margin (dB)
Hot	0.17	Peak (Note 1)	46.4	55.0	-8.6
Hot	0.18	Peak (Note 1)	43.7	54.5	-10.8
Hot	0.20	Peak (Note 1)	42.9	53.5	-10.6
Hot	0.24	Peak (Note 1)	37.7	52.0	-14.3
Hot	0.28	Peak (Note 1)	34.7	50.9	-16.2
Hot	0.33	Peak (Note 1)	30.2	49.3	-19.1
Neutral	0.16	Peak (Note 1)	41.8	55.7	-13.9
Neutral	0.17	Peak (Note 1)	36.7	55.2	-18.5
Neutral	0.21	Peak (Note 1)	35.0	53.3	-18.3
Neutral	0.24	Peak (Note 1)	31.4	52.2	-20.8
Neutral	0.92	Peak (Note 1)	24.5	46.0	-21.5
Neutral	4.40	Peak (Note 1)	24.4	46.0	-21.6

Note 1: The reference detector used for the measurements was Quasi-Peak or Peak and the data was compared to the average limit; therefore, the EUT was deemed to meet both the average and quasi-peak limits.

Measurement Uncertainty

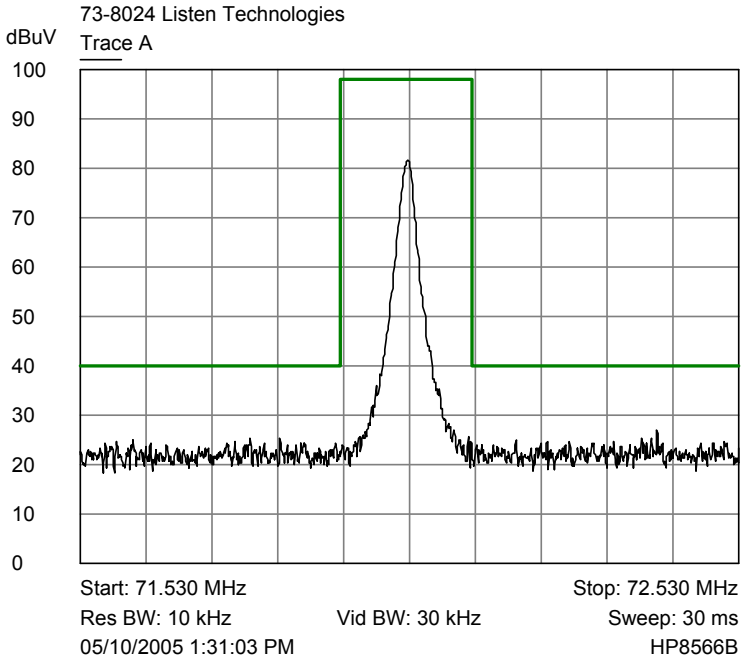
The measurement uncertainty (with a 95% confidence level) for this test was: ± 3.3 dB.

6.1.3 §15.237(a) Restriction of Device Usage

The LT-800B-072 is designed as an auditory assistance device; therefore it meets the requirements of this paragraph.

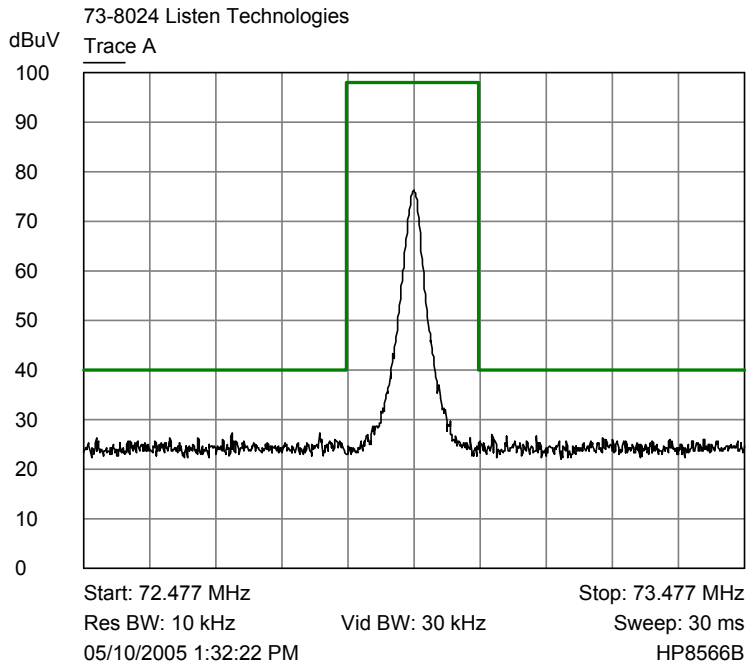
6.1.4 §15.237(b) Emission Bandwidth

In the configuration tested, the emissions are contained wholly within the allowed frequency ranges and the emission is contained within a 200 kHz wide band centered on the operating frequency; therefore, the EUT complied with the requirements of the specification (see spectrum analyzer plots below).



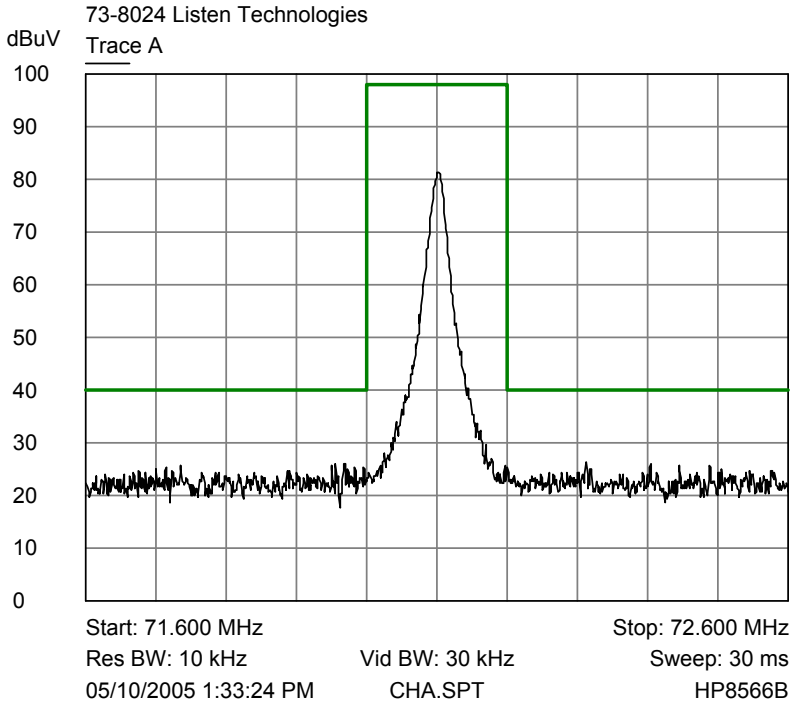
Lower band edge plot, Narrow band

Trace A Channel 1 Bandwidth plot



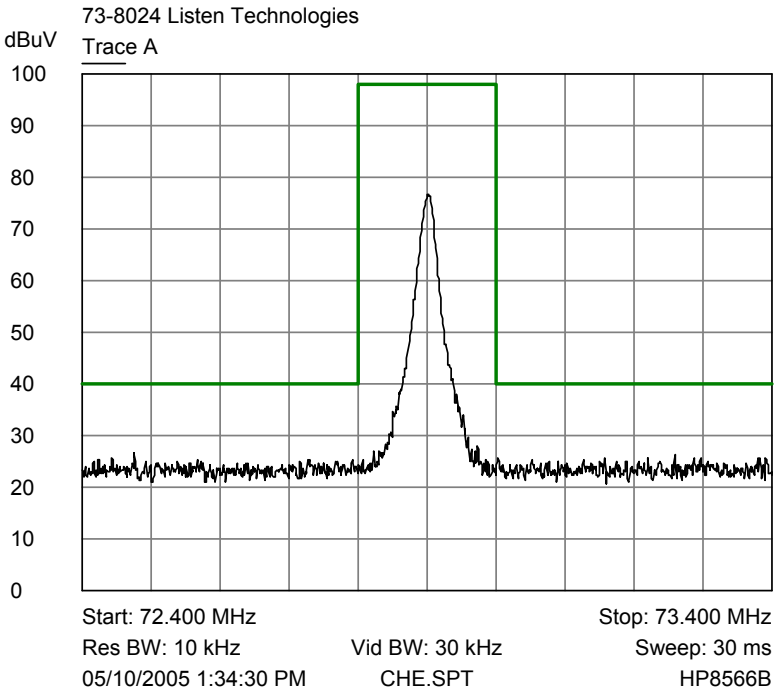
Upper band edge plot, Narrow band

Trace A Channel 20 Bandwidth plot



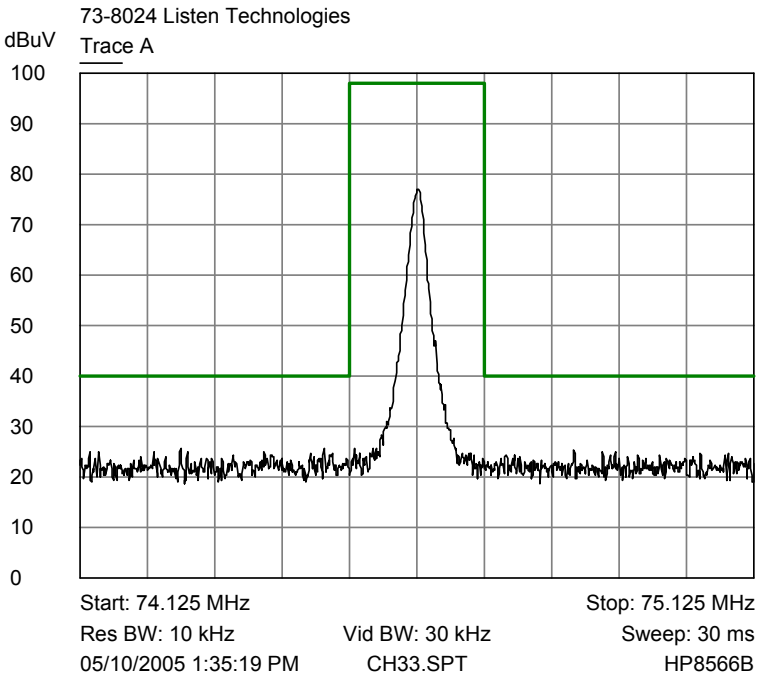
Lower band edge plot, Wide band

Trace A Channel A Bandwidth plot



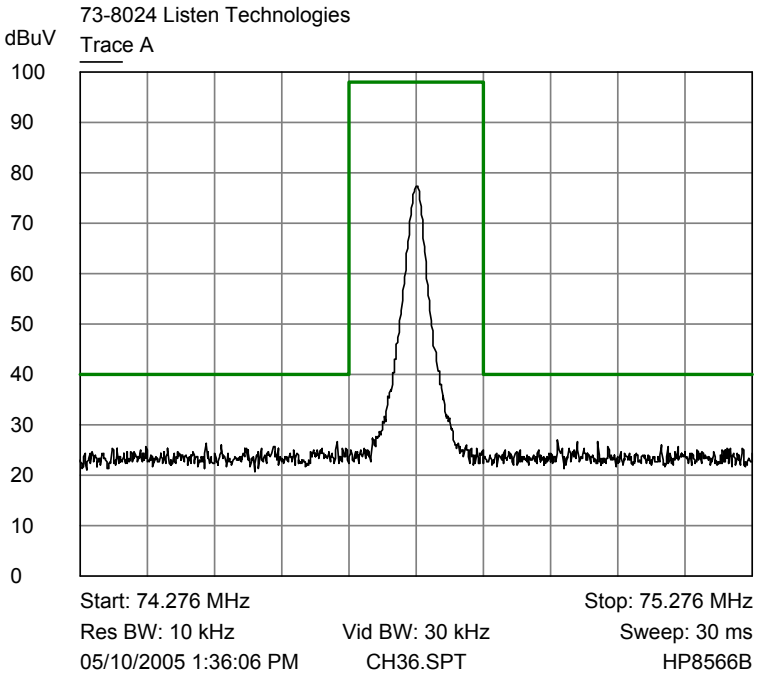
Upper band edge plot, Wide band

Trace A Channel E Bandwidth plot



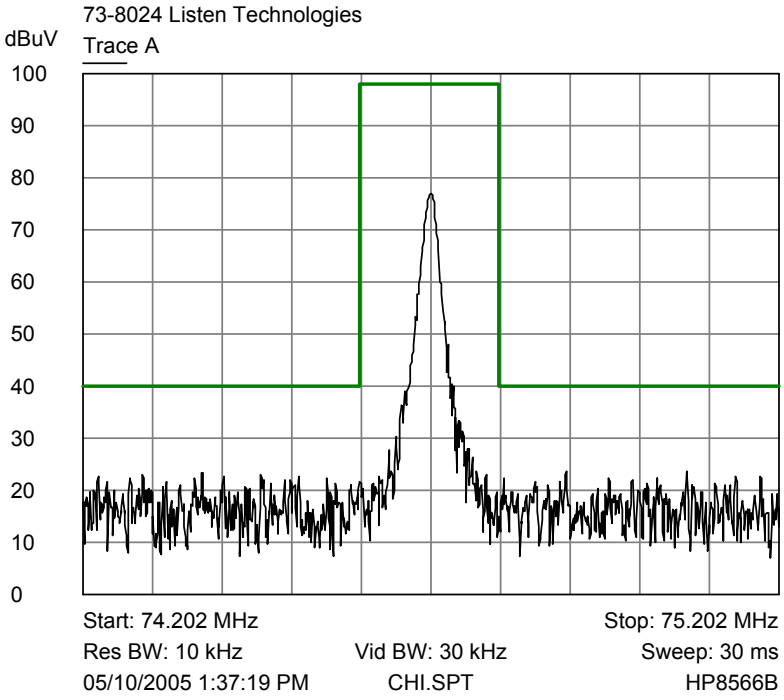
Lower band edge plot, Narrow band

Trace A Channel 33 Bandwidth plot



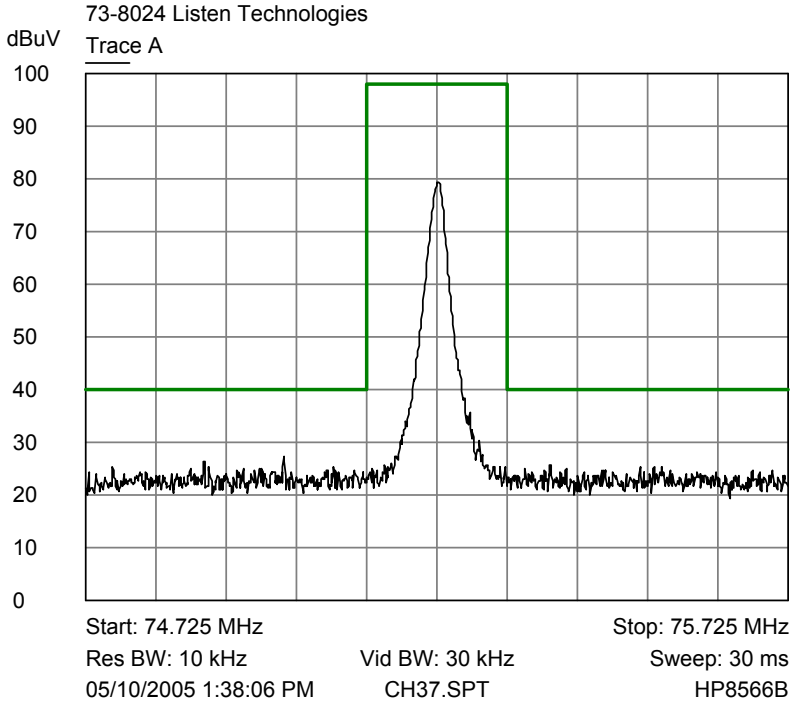
Upper band edge plot, Narrow band

Trace A Channel 36 Bandwidth plot



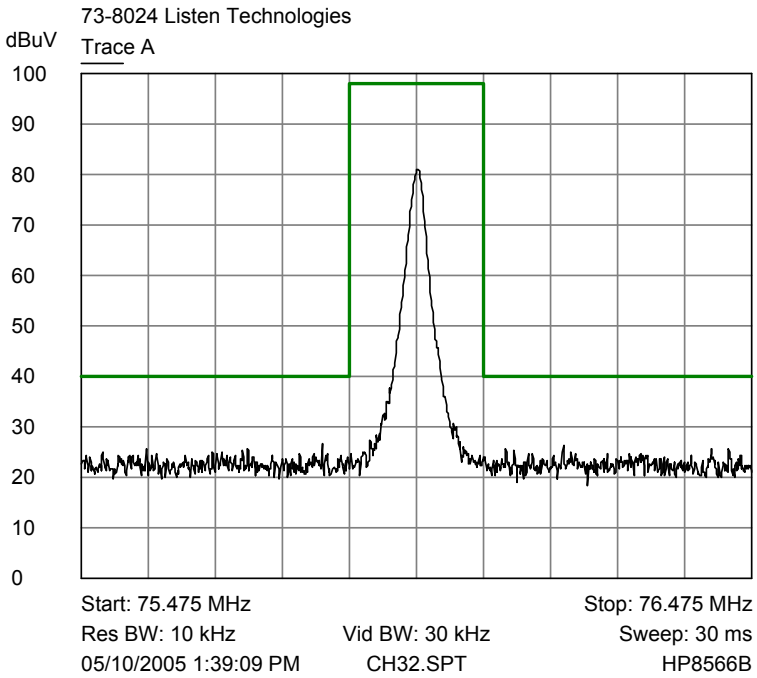
Band edge plot, Wide band

Trace A Channel I Bandwidth plot



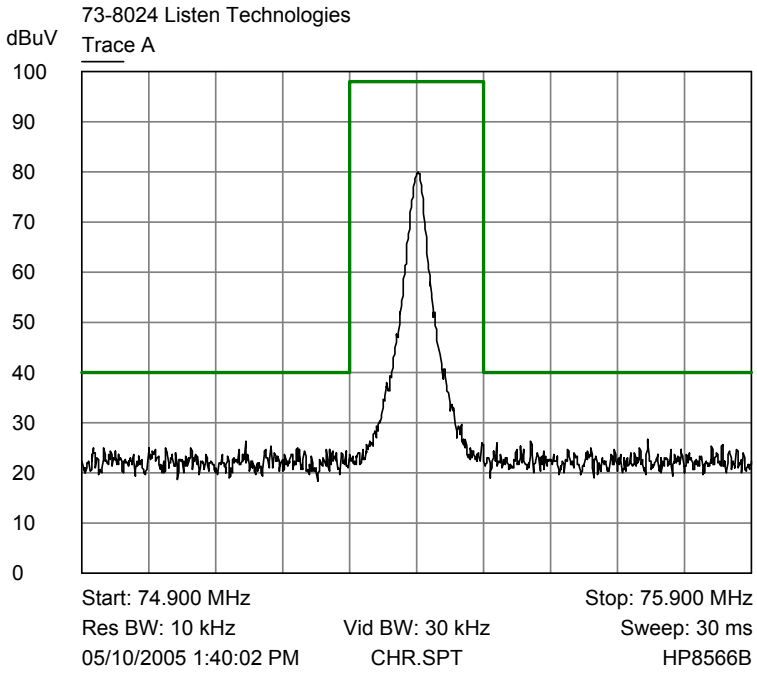
Lower band edge plot, Narrow band

Trace A Channel 37 Bandwidth plot



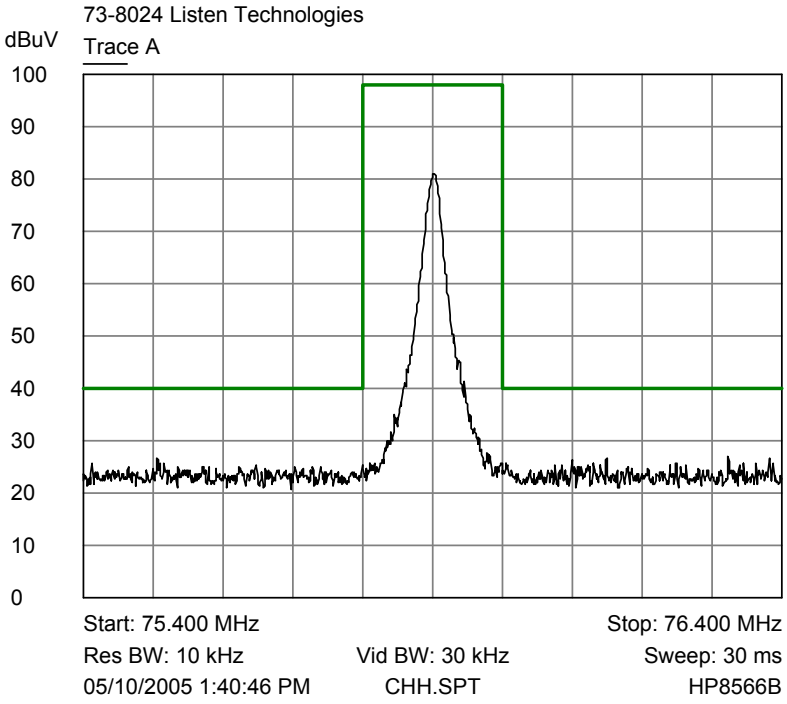
Upper band edge plot, Narrow band

Trace A Channel 32 Bandwidth plot



Lower band edge plot, Wide band

Trace A Channel R Bandwidth plot



Upper band edge plot, Wide band

Trace A Channel H Bandwidth plot

6.1.5 §15.237(c) Emission Strength

The frequency range from 30 MHz to 1000 MHz was investigated to measure the fundamental frequency radiated emission, and other spurious emissions. The fundamental frequency emission must not exceed 80 millivolts/meter when measured at a distance of 3 meters and all other emissions must not exceed 1500 microvolts/meter at a measuring distance of 3 meters. Using the formula dBµV/m = 20 log(µV/m) the fundamental emission limit is 98.1 dBµV/m and the spurious emission limit is 63.5 dBµV/m. The limits are specified using average detection. The provisions of Section 15.35 for limiting peak emissions apply.

The EUT complies with the specification by a margin of 7.2 dB. The following tables show the data from the measurement of radiated emissions. The emission was deemed to comply if the peak detection measurement met the average limit.

Channel C – 72.5 MHz - Wide Band

Frequency (MHz)	Antenna Polarity	Detector	Receiver Reading (dBμV)	Correction Factor (dB/m)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
72.5	V	Peak (1)	82.9	8.0	90.9	118.1	-27.2
72.5	V	Average (2)	82.9	8.0	90.9	98.1	-7.2
145.0	V	Peak (3)	27.4	10.0	37.4	63.5	-26.1
217.5	V	Peak (3)	22.9	13.2	36.1	63.5	-27.4
290.0	V	Peak (3)	12.6	15.5	28.1	63.5	-35.4
362.5	V	Peak (3)	10.9	18.6	29.5	63.5	-34.0
435.0	V	Peak (3)	10.1	20.2	30.3	63.5	-33.2
507.5	V	Peak (3)	12.2	21.9	34.1	63.5	-29.4
580.0	V	Peak (3)	9.8	23.2	33.0	63.5	-30.5
652.5	V	Peak (3)	9.3	24.7	34.0	63.5	-29.5
725.0	V	Peak (3)	9.9	26.1	36.0	63.5	-27.5
72.5	H	Peak (3)	63.8	8.0	71.8	98.1	-26.3
145.0	H	Peak (3)	10.6	10.0	20.6	63.5	-42.9
217.5	H	Peak (3)	20.3	13.2	33.5	63.5	-30.0
290.0	H	Peak (3)	9.1	15.5	24.6	63.5	-38.9
362.5	H	Peak (3)	9.6	18.6	28.2	63.5	-35.3
435.0	H	Peak (3)	9.1	20.2	29.3	63.5	-34.2
507.5	H	Peak (3)	9.3	21.9	31.2	63.5	-32.3
580.0	H	Peak (3)	9.2	23.2	32.4	63.5	-31.1
652.5	H	Peak (3)	9.5	24.7	34.2	63.5	-29.3
725.0	H	Peak (3)	9.1	26.1	35.2	63.5	-28.3

Note 1: Peak detection measurement compared to peak limit

Note 2: Average detection measurement compared to average limit

Note 3: Peak detection measurement compared to average limit

Channel I – 74.7 MHz - Wide Band

Frequency (MHz)	Antenna Polarity	Detector	Receiver Reading (dBμV)	Correction Factor (dB/m)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
74.7	V	Peak (1)	81.7	8.1	89.8	118.1	-28.3
74.7	V	Average (2)	81.7	8.1	89.8	98.1	-8.3
149.4	V	Peak (3)	26.0	10.4	36.4	63.5	-27.1
224.1	V	Peak (3)	25.7	13.4	39.1	63.5	-24.4
298.8	V	Peak (3)	12.2	15.9	28.1	63.5	-35.4
373.5	V	Peak (3)	9.9	18.7	28.6	63.5	-34.9
448.2	V	Peak (3)	9.9	19.8	29.7	63.5	-33.8
522.9	V	Peak (3)	10.3	22.4	32.7	63.5	-30.8
597.6	V	Peak (3)	10.1	24.0	34.1	63.5	-29.4
672.3	V	Peak (3)	9.2	25.4	34.6	63.5	-28.9
747.0	V	Peak (3)	9.5	26.1	35.6	63.5	-27.9
74.7	H	Peak (3)	62.8	8.1	70.9	98.1	-27.2
149.4	H	Peak (3)	10.2	10.4	20.6	63.5	-42.9
224.1	H	Peak (3)	24.0	13.4	37.4	63.5	-26.1
298.8	H	Peak (3)	10.3	15.9	26.2	63.5	-37.3
373.5	H	Peak (3)	9.4	18.7	28.1	63.5	-35.4
448.2	H	Peak (3)	9.6	19.8	29.4	63.5	-34.1
522.9	H	Peak (3)	9.2	22.4	31.6	63.5	-31.9
597.6	H	Peak (3)	9.2	24.0	33.2	63.5	-30.3
672.3	H	Peak (3)	9.3	25.4	34.7	63.5	-28.8
747.0	H	Peak (3)	9.7	26.1	35.8	63.5	-27.7

Note 1: Peak detection measurement compared to peak limit

Note 2: Average detection measurement compared to average limit

Note 3: Peak detection measurement compared to average limit

Channel S – 75.6 MHz - Wide Band

Frequency (MHz)	Antenna Polarity	Detector	Receiver Reading (dBμV)	Correction Factor (dB/m)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
75.6	V	Peak (1)	80.7	8.1	88.8	118.1	-29.3
75.6	V	Average (2)	80.6	8.1	88.7	98.1	-9.4
151.2	V	Peak (3)	23.4	10.5	33.9	63.5	-29.6
226.8	V	Peak (3)	19.7	13.6	33.3	63.5	-30.2
302.4	V	Peak (3)	11.5	16.0	27.5	63.5	-36.0
378.0	V	Peak (3)	10.1	18.8	28.9	63.5	-34.6
453.6	V	Peak (3)	9.2	20.9	30.1	63.5	-33.4
529.2	V	Peak (3)	10.5	22.6	33.1	63.5	-30.4
604.8	V	Peak (3)	9.4	24.1	33.5	63.5	-30.0
680.4	V	Peak (3)	9.6	25.8	35.4	63.5	-28.1
756.0	V	Peak (3)	9.9	26.1	36.0	63.5	-27.5
75.6	H	Peak (3)	61.6	8.1	69.7	98.1	-28.4
151.2	H	Peak (3)	11.3	10.5	21.8	63.5	-41.7
226.8	H	Peak (3)	23.2	13.6	36.8	63.5	-26.7
302.4	H	Peak (3)	10.0	16.0	26.0	63.5	-37.5
378.0	H	Peak (3)	9.3	18.8	28.1	63.5	-35.4
453.6	H	Peak (3)	9.4	20.9	30.3	63.5	-33.2
529.2	H	Peak (3)	9.2	22.6	31.8	63.5	-31.7
604.8	H	Peak (3)	9.4	24.1	33.5	63.5	-30.0
680.4	H	Peak (3)	9.3	25.8	35.1	63.5	-28.4
756.0	H	Peak (3)	9.6	26.1	35.7	63.5	-27.8

Note 1: Peak detection measurement compared to peak limit

Note 2: Average detection measurement compared to average limit

Note 3: Peak detection measurement compared to average limit

Channel 11 – 72.525 MHz - Narrow Band

Frequency (MHz)	Antenna Polarity	Detector	Receiver Reading (dBμV)	Correction Factor (dB/m)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
72.525	V	Peak (1)	82.4	8.0	90.4	118.1	-27.7
72.525	V	Average (2)	82.3	8.0	90.3	98.1	-7.8
145.050	V	Peak (3)	25.7	10.0	35.7	63.5	-27.8
217.575	V	Peak (3)	20.0	13.2	33.2	63.5	-30.3
290.100	V	Peak (3)	9.5	15.5	25.0	63.5	-38.5
362.625	V	Peak (3)	9.1	18.6	27.7	63.5	-35.8
435.150	V	Peak (3)	9.4	20.2	29.6	63.5	-33.9
507.675	V	Peak (3)	8.9	21.9	30.8	63.5	-32.7
580.200	V	Peak (3)	9.3	23.2	32.5	63.5	-31.0
652.725	V	Peak (3)	9.3	24.7	34.0	63.5	-29.5
725.250	V	Peak (3)	9.5	26.1	35.6	63.5	-27.9
72.525	H	Peak (3)	64.4	8.0	72.4	98.1	-25.7
145.050	H	Peak (3)	12.5	10.0	22.5	63.5	-41.0
217.575	H	Peak (3)	21.8	13.2	35.0	63.5	-28.5
290.100	H	Peak (3)	8.9	15.5	24.4	63.5	-39.1
362.625	H	Peak (3)	9.4	18.6	28.0	63.5	-35.5
435.150	H	Peak (3)	9.1	20.2	29.3	63.5	-34.2
507.675	H	Peak (3)	9.7	21.9	31.6	63.5	-31.9
580.200	H	Peak (3)	9.2	23.2	32.4	63.5	-31.1
652.725	H	Peak (3)	9.4	24.7	34.1	63.5	-29.4
725.250	H	Peak (3)	9.9	26.1	36.0	63.5	-27.5

Note 1: Peak detection measurement compared to peak limit

Note 2: Average detection measurement compared to average limit

Note 3: Peak detection measurement compared to average limit

Channel 35 – 74.725 MHz – Narrow Band

Frequency (MHz)	Antenna Polarity	Detector	Receiver Reading (dBμV)	Correction Factor (dB/m)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
74.725	V	Peak (1)	81.7	8.1	89.8	118.1	-28.3
74.725	V	Average (2)	81.7	8.1	89.8	98.1	-8.3
149.450	V	Peak (3)	24.7	10.4	35.1	63.5	-28.4
224.175	V	Peak (3)	25.9	13.4	39.3	63.5	-24.2
298.900	V	Peak (3)	9.6	15.9	25.5	63.5	-38.0
373.625	V	Peak (3)	9.1	18.7	27.8	63.5	-35.7
448.350	V	Peak (3)	9.0	19.8	28.8	63.5	-34.7
523.075	V	Peak (3)	9.1	22.4	31.5	63.5	-32.0
597.800	V	Peak (3)	9.4	24.0	33.4	63.5	-30.1
672.525	V	Peak (3)	9.3	25.4	34.7	63.5	-28.8
747.250	V	Peak (3)	9.8	26.1	35.9	63.5	-27.6
74.725	H	Peak (3)	62.7	8.1	70.8	98.1	-27.3
149.450	H	Peak (3)	10.1	10.4	20.5	63.5	-43.0
224.175	H	Peak (3)	24.0	13.4	37.4	63.5	-26.1
298.900	H	Peak (3)	10.7	15.9	26.6	63.5	-36.9
373.625	H	Peak (3)	9.2	18.7	27.9	63.5	-35.6
448.350	H	Peak (3)	9.6	19.8	29.4	63.5	-34.1
523.075	H	Peak (3)	9.1	22.4	31.5	63.5	-32.0
597.800	H	Peak (3)	9.2	24.0	33.2	63.5	-30.3
672.525	H	Peak (3)	9.2	25.4	34.6	63.5	-28.9
747.250	H	Peak (3)	9.3	26.1	35.4	63.5	-28.1

Note 1: Peak detection measurement compared to peak limit

Note 2: Average detection measurement compared to average limit

Note 3: Peak detection measurement compared to average limit

Channel 25 – 75.625 MHz – Narrow Band

Frequency (MHz)	Antenna Polarity	Detector	Receiver Reading (dBμV)	Correction Factor (dB/m)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
75.625	V	Peak (1)	80.8	8.1	88.9	118.1	-29.2
75.625	V	Average (2)	80.7	8.1	88.8	98.1	-9.3
151.250	V	Peak (3)	22.9	10.5	33.4	63.5	-30.1
226.875	V	Peak (3)	20.5	13.6	34.1	63.5	-29.4
302.500	V	Peak (3)	10.2	16.0	26.2	63.5	-37.3
378.125	V	Peak (3)	9.2	18.8	28.0	63.5	-35.5
453.750	V	Peak (3)	9.3	20.9	30.2	63.5	-33.3
529.375	V	Peak (3)	9.0	22.6	31.6	63.5	-31.9
605.000	V	Peak (3)	9.3	24.1	33.4	63.5	-30.1
680.625	V	Peak (3)	9.2	25.8	35.0	63.5	-28.5
756.250	V	Peak (3)	10.0	26.1	36.1	63.5	-27.4
75.625	H	Peak (3)	61.9	8.1	70.0	98.1	-28.1
151.250	H	Peak (3)	9.9	10.5	20.4	63.5	-43.1
226.875	H	Peak (3)	23.4	13.6	37.0	63.5	-26.5
302.500	H	Peak (3)	9.1	16.0	25.1	63.5	-38.4
378.125	H	Peak (3)	9.3	18.8	28.1	63.5	-35.4
453.750	H	Peak (3)	9.4	20.9	30.3	63.5	-33.2
529.375	H	Peak (3)	9.3	22.6	31.9	63.5	-31.6
605.000	H	Peak (3)	9.5	24.1	33.6	63.5	-29.9
680.625	H	Peak (3)	10.2	25.8	36.0	63.5	-27.5
756.250	H	Peak (3)	9.1	26.1	35.2	63.5	-28.3

Note 1: Peak detection measurement compared to peak limit

Note 2: Average detection measurement compared to average limit

Note 3: Peak detection measurement compared to average limit

APPENDIX 1 TEST PROCEDURES AND TEST EQUIPMENT

§15.207 Conducted Disturbance at Mains Ports

The conducted disturbance at mains ports from the EUT was measured using a spectrum analyzer with a quasi-peak adapter for peak, quasi-peak and average readings. The quasi-peak adapter uses a bandwidth of 9 kHz, with the spectrum analyzer's resolution bandwidth set at 100 kHz, for readings in the 150 kHz to 30 MHz frequency ranges.

The conducted disturbance at mains ports measurements are performed in a screen room using a (50 Ω/50 μH) Line Impedance Stabilization Network (LISN).

Where mains flexible power cords are longer than 1 m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4 m in length.

Where the EUT is a collection of equipment with each device having its own power cord, the point of connection for the LISN is determined from the following rules:

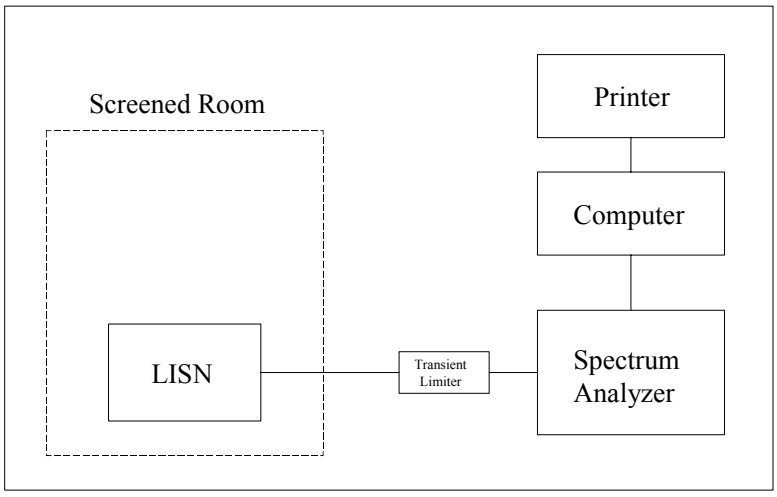
a) Each power cord, which is terminated in a mains supply plug, shall be tested separately.
b) Power cords, which are not specified by the manufacturer to be connected via a host unit, shall be tested separately.
c) Power cords which are specified by the manufacturer to be connected via a host unit or other power supplying equipment shall be connected to that host unit and the power cords of that host unit connected to the LISN and tested.
d) Where a special connection is specified, the necessary hardware to effect the connection is supplied by the manufacturer for the testing purpose.
e) When testing equipment with multiple mains cords, those cords not under test are connected to an artificial mains network (AMN) different than the AMN used for the mains cord under test.

Desktop EUT are placed on a non-conducting table at 0.8 meters from the metallic floor. The vertical coupling plane (wall of the screened room) is located 40 cm to the rear of the EUT. Floor standing equipment is placed directly on the earth grounded floor.

Type of Equipment	Manufacturer	Model Number	Serial Number	Date of Last Calibration
Wanship Open Area Test Site #2	CCL	N/A	N/A	10/25/2004
Test Software	CCL	Conducted Emissions	Revision 1.2	N/A
Spectrum Analyzer	Hewlett Packard	8566B	2230A01711	10/11/2004
Quasi-Peak Detector	Hewlett Packard	85650A	3107A01582	10/11/2004
LISN	EMCO	3825/2	9305-2099	03/18/2005
Conductance Cable Wanship Site #2	CCL	Cable J	N/A	12/09/2003
Transient Limiter	Hewlett Packard	11947A	3107A02266	12/09/2003

An independent calibration laboratory or CCL personnel calibrates all the equipment listed above at intervals defined in ANSI C63.4:2003 Section 4.4 following outlined calibration procedures. All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Supporting documentation relative to tractability is on file and is available for examination upon request.

Conducted Emissions Test Setup



§15.237 Radiated Emissions

The radiated emissions from the intentional radiator were measured using a spectrum analyzer with a quasi-peak adapter for peak and quasi-peak readings. An amplifier was used to increase the sensitivity of the measuring instrumentation. The quasi-peak adapter uses a bandwidth of 120 kHz, with the spectrum analyzer's resolution bandwidth set at 1 MHz, for readings in the 30 to 1000 MHz frequency ranges. For average emissions the quasi-peak adapter was by-passed and the spectrum analyzer's resolution bandwidth was set to 100 kHz and the video bandwidth was set to 10 Hz.

A biconilog antenna was used to measure the frequency range of 30 to 1000 MHz at a distance of 3 meters from the EUT. The readings obtained by these antennas are correlated to the levels obtained with a tuned dipole antenna by adding antenna factors.

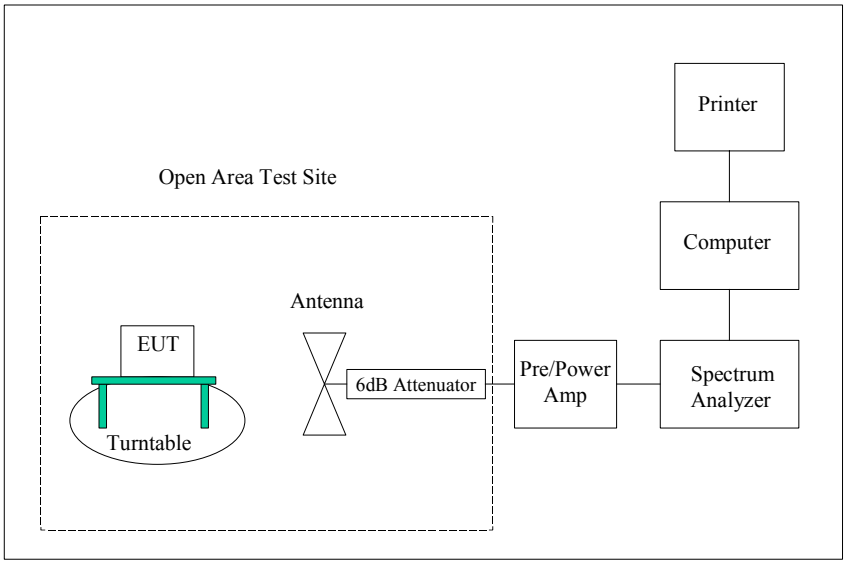
The configuration of the intentional radiator was varied to find the maximum radiated emission. The intentional radiator was connected to the peripherals listed in Section 2.4 via the interconnecting cables listed in Section 2.5. These interconnecting cables were manipulated manually by a technician to obtain worst case radiated emissions. The intentional radiator was rotated 360 degrees, and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission. Where there were multiple interface ports all of the same type, cables are either placed on all of the ports or cables added to these ports until the emissions do not increase by more than 2 dB.

Desktop intentional radiators are measured on a non-conducting table 80 centimeters above the ground plane. The table is placed on a turntable which is level with the ground plane. The turntable has slip rings, which supply AC power to the intentional radiator. For equipment normally placed on floors, the equipment shall be placed directly on the turntable.

Type of Equipment	Manufacturer	Model Number	Serial Number	Date of Last Calibration
Wanship Open Area Test Site #2	CCL	N/A	N/A	10/25/2004
Test Software	CCL	Radiated Emissions	Revision 1.3	N/A
Spectrum Analyzer	Hewlett Packard	8566B	2230A01711	10/11/2004
Quasi-Peak Detector	Hewlett Packard	85650A	3107A01582	10/11/2004
Biconilog Antenna	EMCO	3142	9601-1009	12/28/2004
3 Meter Radiated Emissions Cable Wanship Site #2	CCL	Cable K	N/A	12/09/2004
Pre/Power-Amplifier	Hewlett Packard	8447F	3113A05161	09/15/2004
6 dB Attenuator	Hewlett Packard	8491A	32835	12/09/2004

An independent calibration laboratory or CCL personnel calibrates all the equipment listed above at intervals defined in ANSI C63.4:2003 Section 4.4 following outlined calibration procedures. All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Supporting documentation relative to tractability is on file and is available for examination upon request.

Radiated Emissions Test Setup



APPENDIX 2 PHOTOGRAPHS

Photograph 1 – Front View Worst-Case Radiated Emission Configuration

Photograph 2 – Rear View Worst-Case Radiated Emission Configuration

Photograph 3 – Front View Conducted Emission Setup

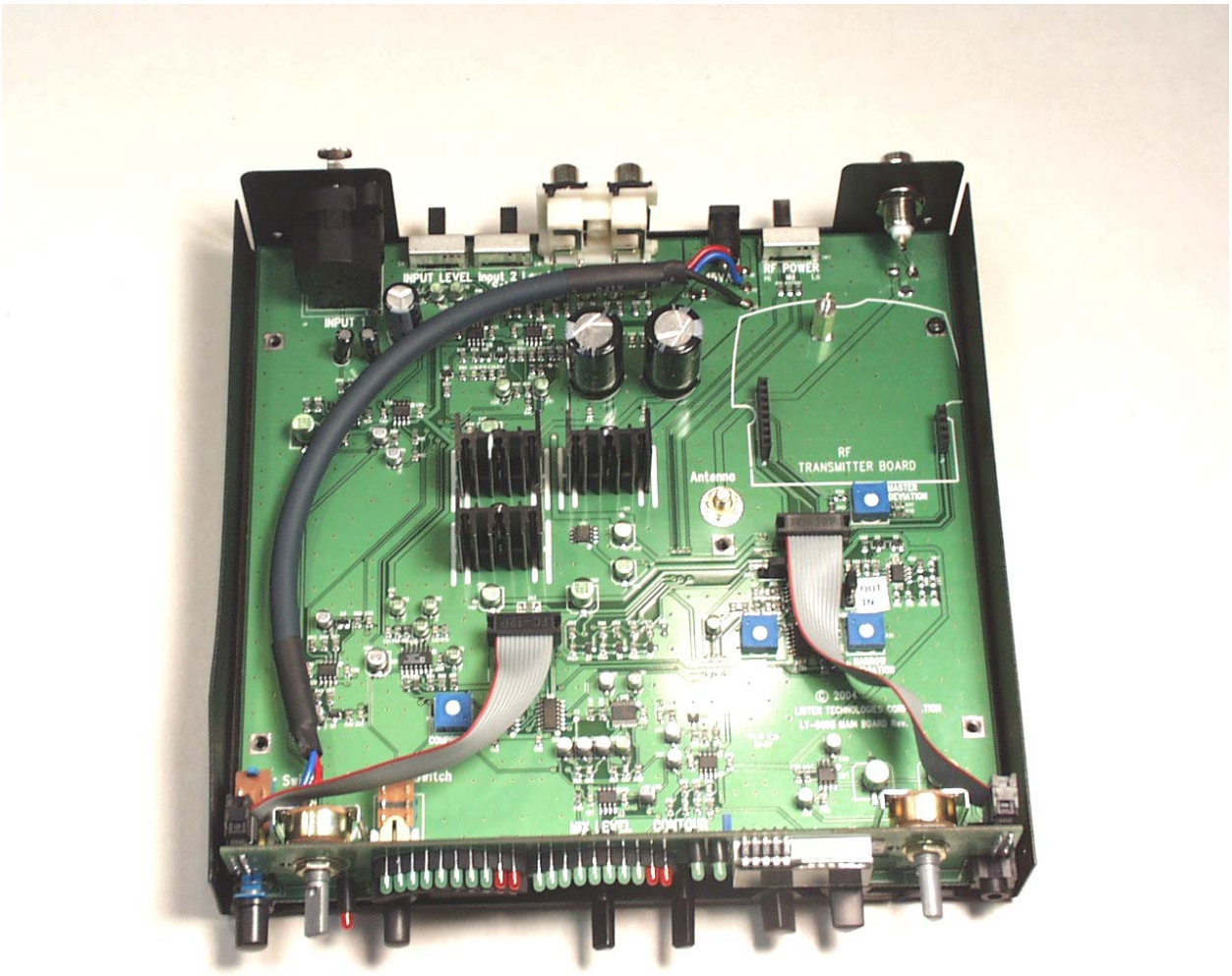
Photograph 4 – Rear View Conducted Emission Setup

Photograph 5 – Front View of the EUT

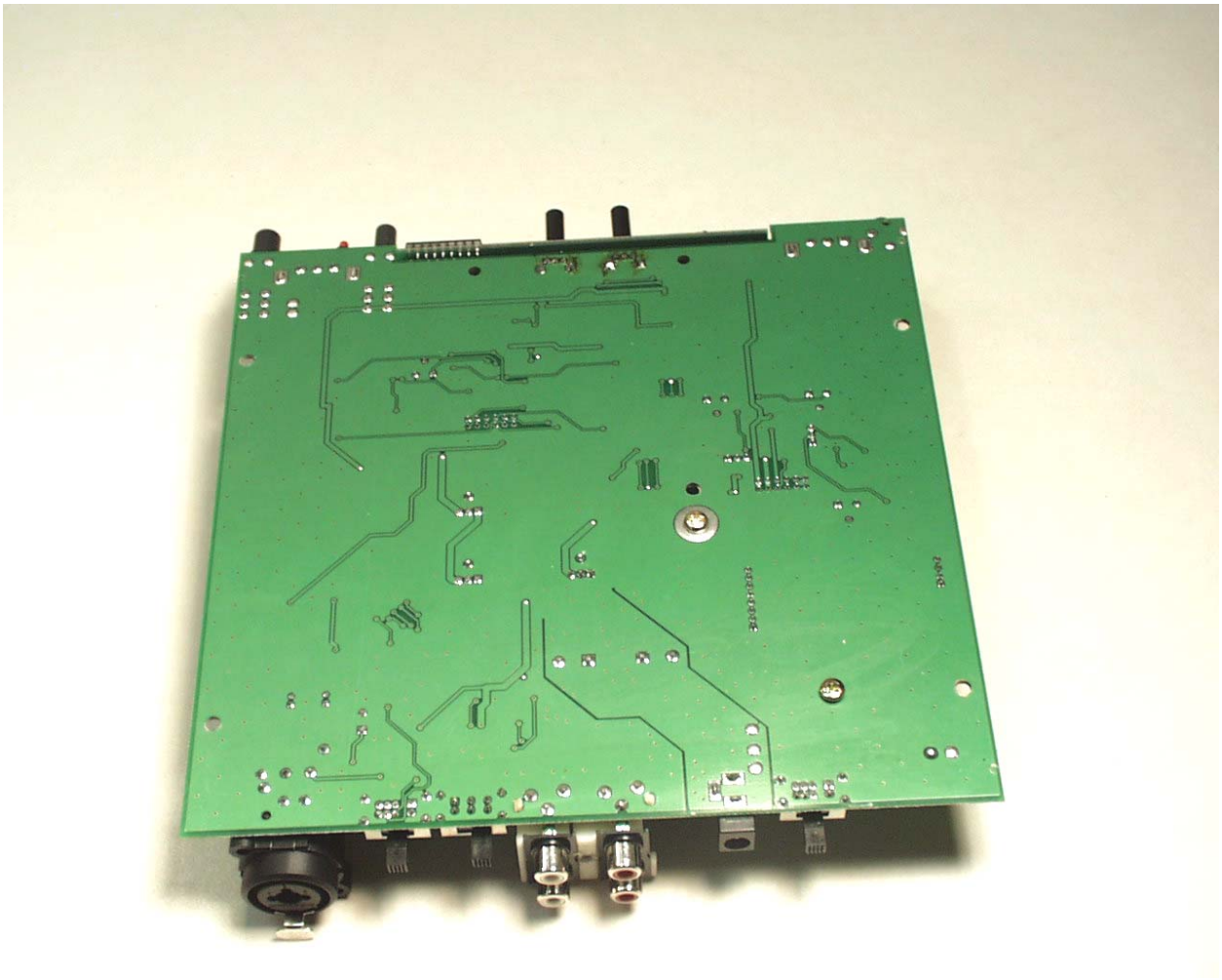
Photograph 6 – Rear View of the EUT

Photograph 7 – Internal View of the EUT with Transmitter PCB Installed

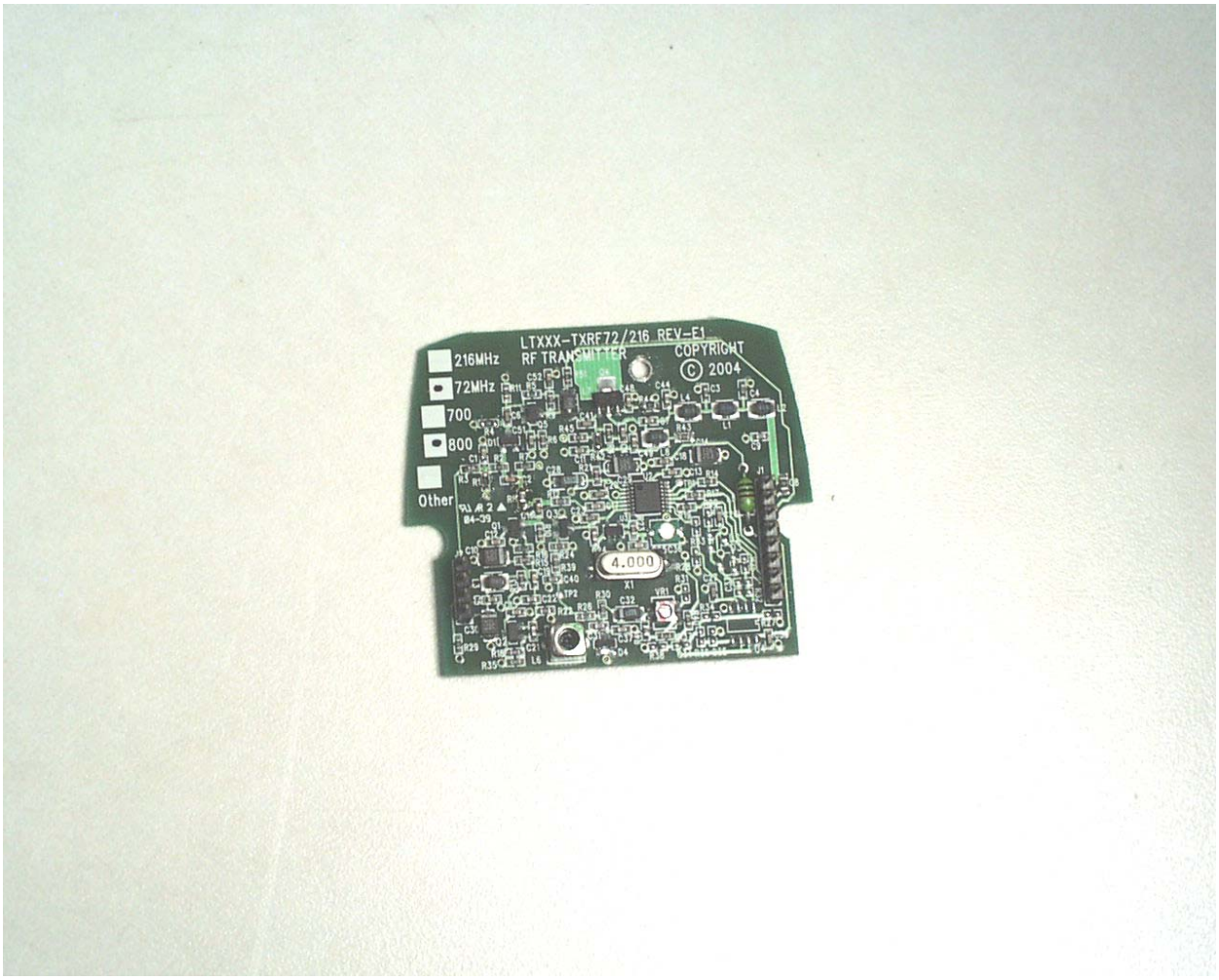
Photograph 8 – Internal View of the EUT with Transmitter PCB Removed



Photograph 9 – Trace Side of the Main PCB

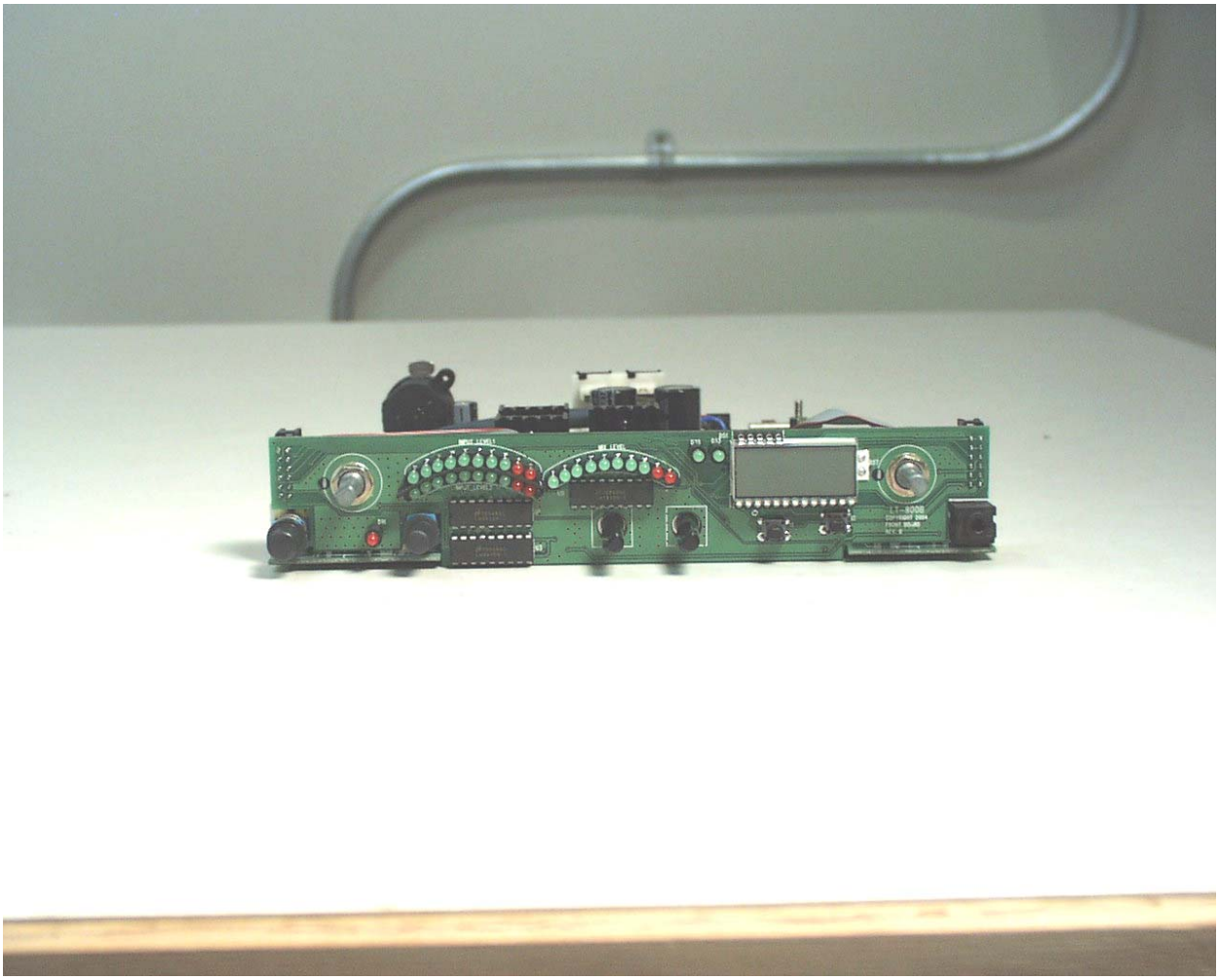


Photograph 10 – Component Side of the Transmitter PCB

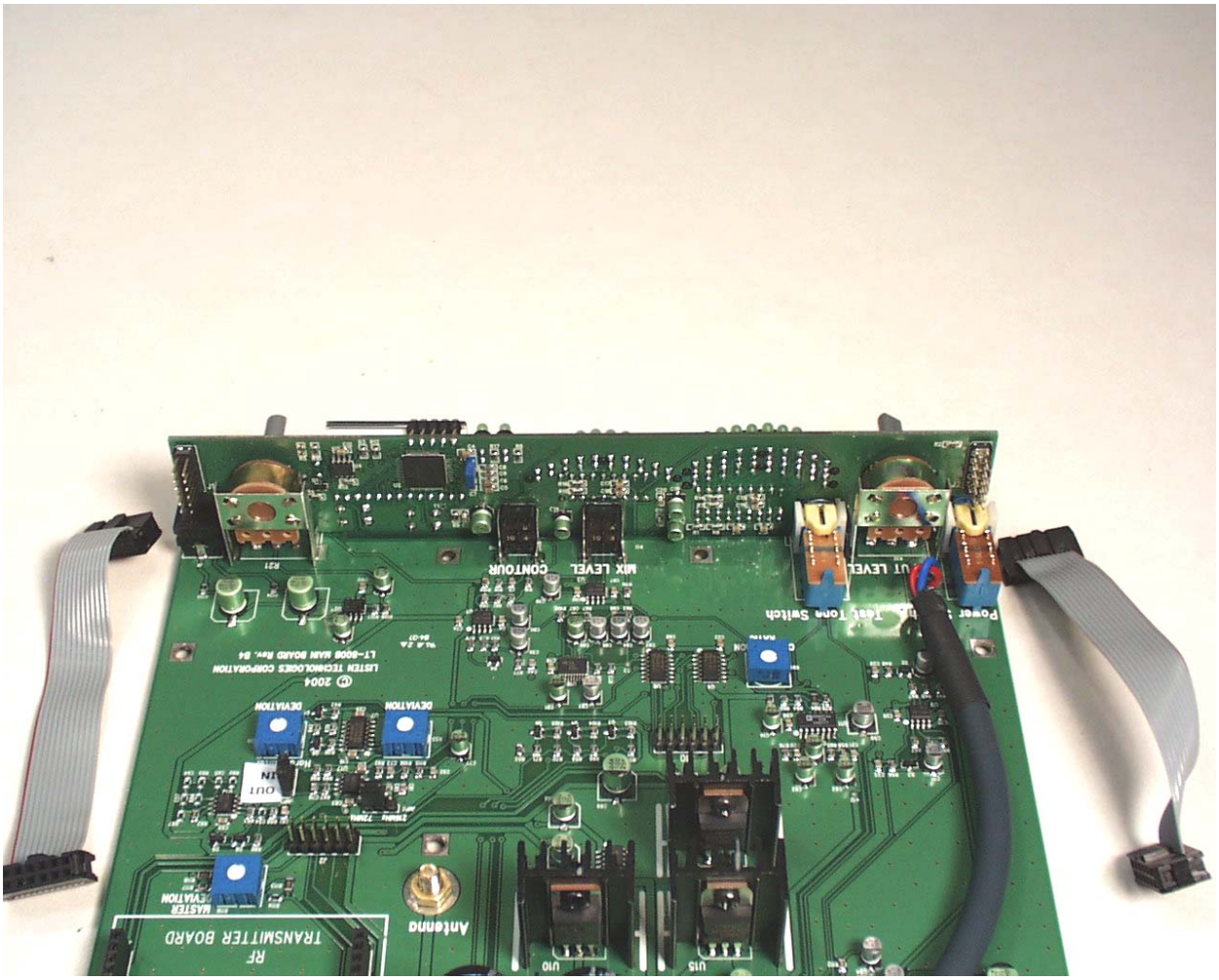


Photograph 11 – Trace Side of the Transmitter PCB While Connected to the Control Card

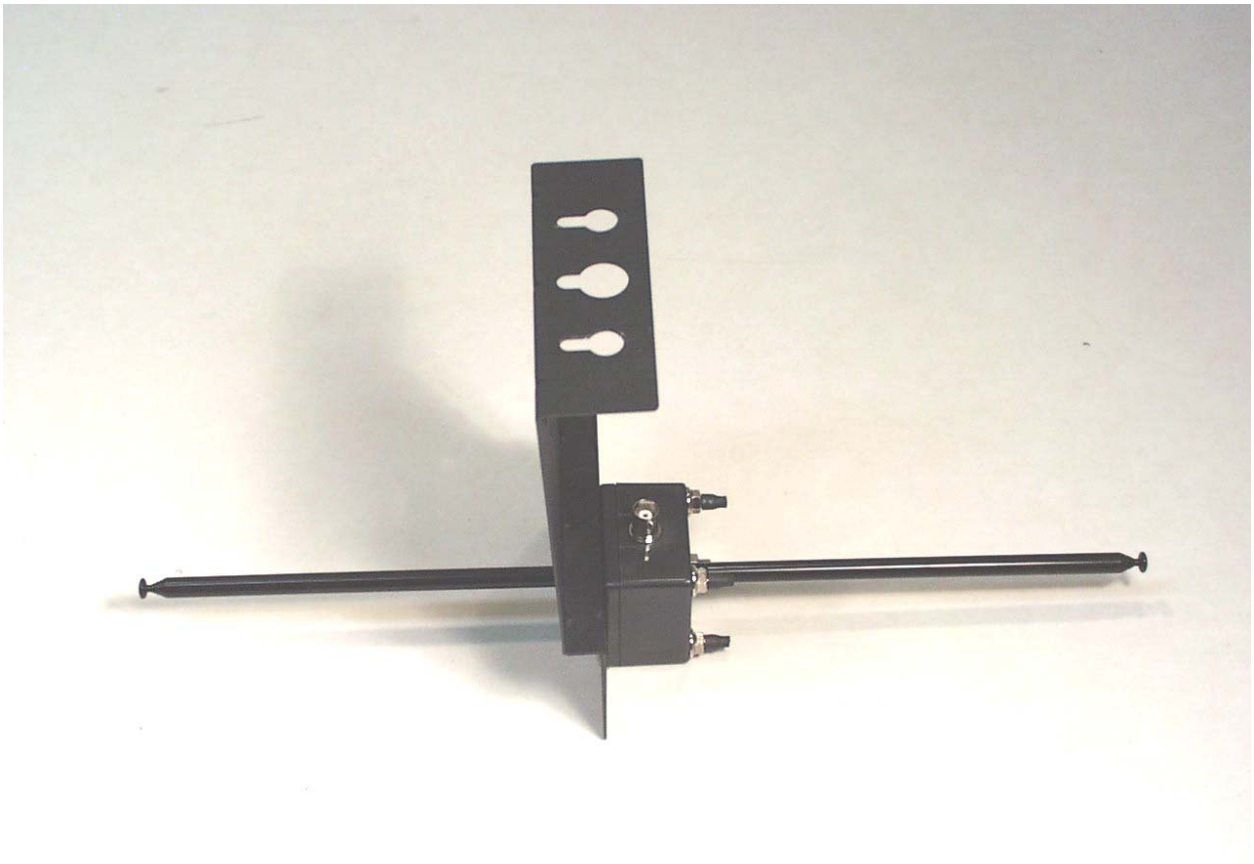
Photograph 12 – Front View of the Front Panel PCB



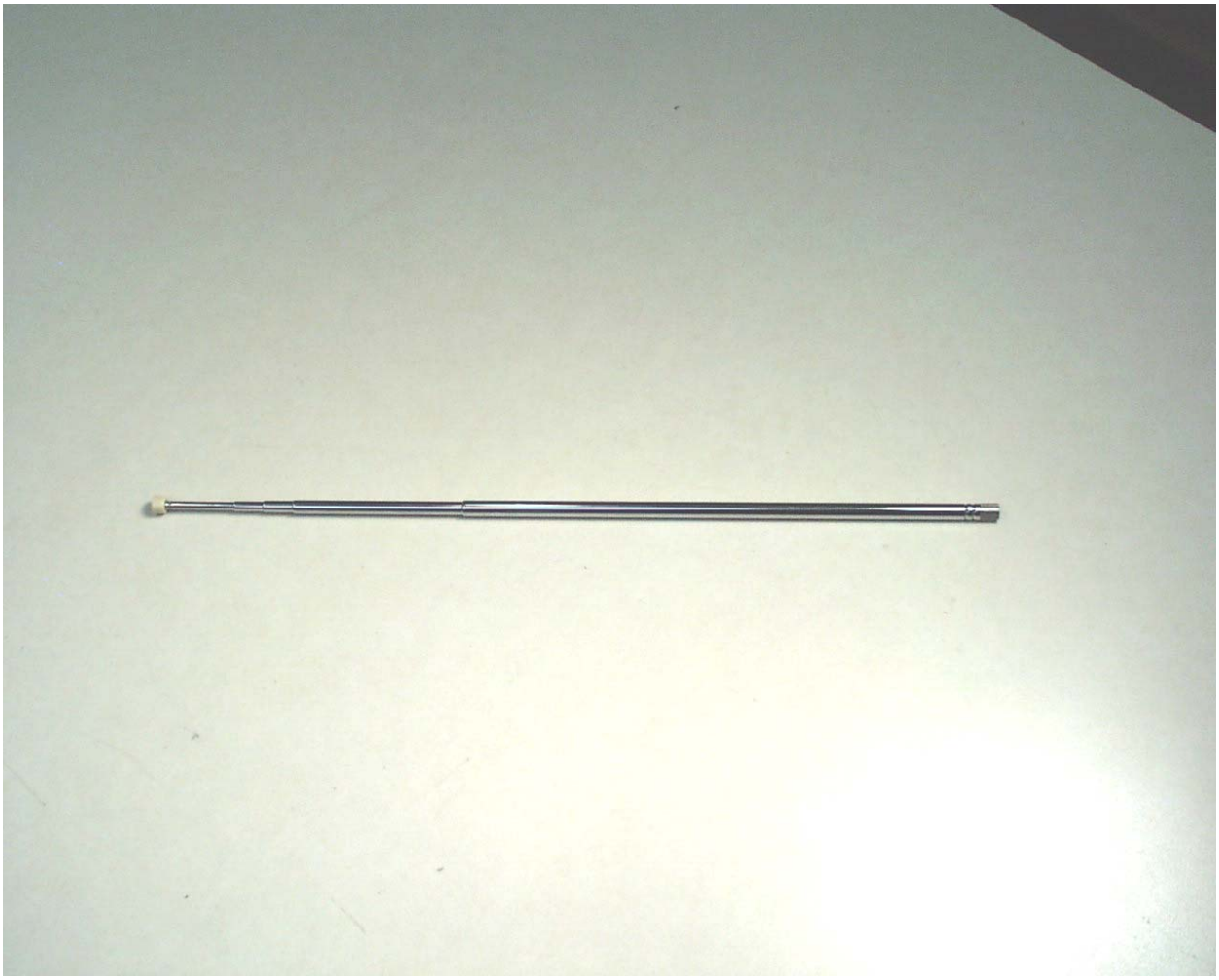
Photograph 13 – Rear View of the Front Panel PCB



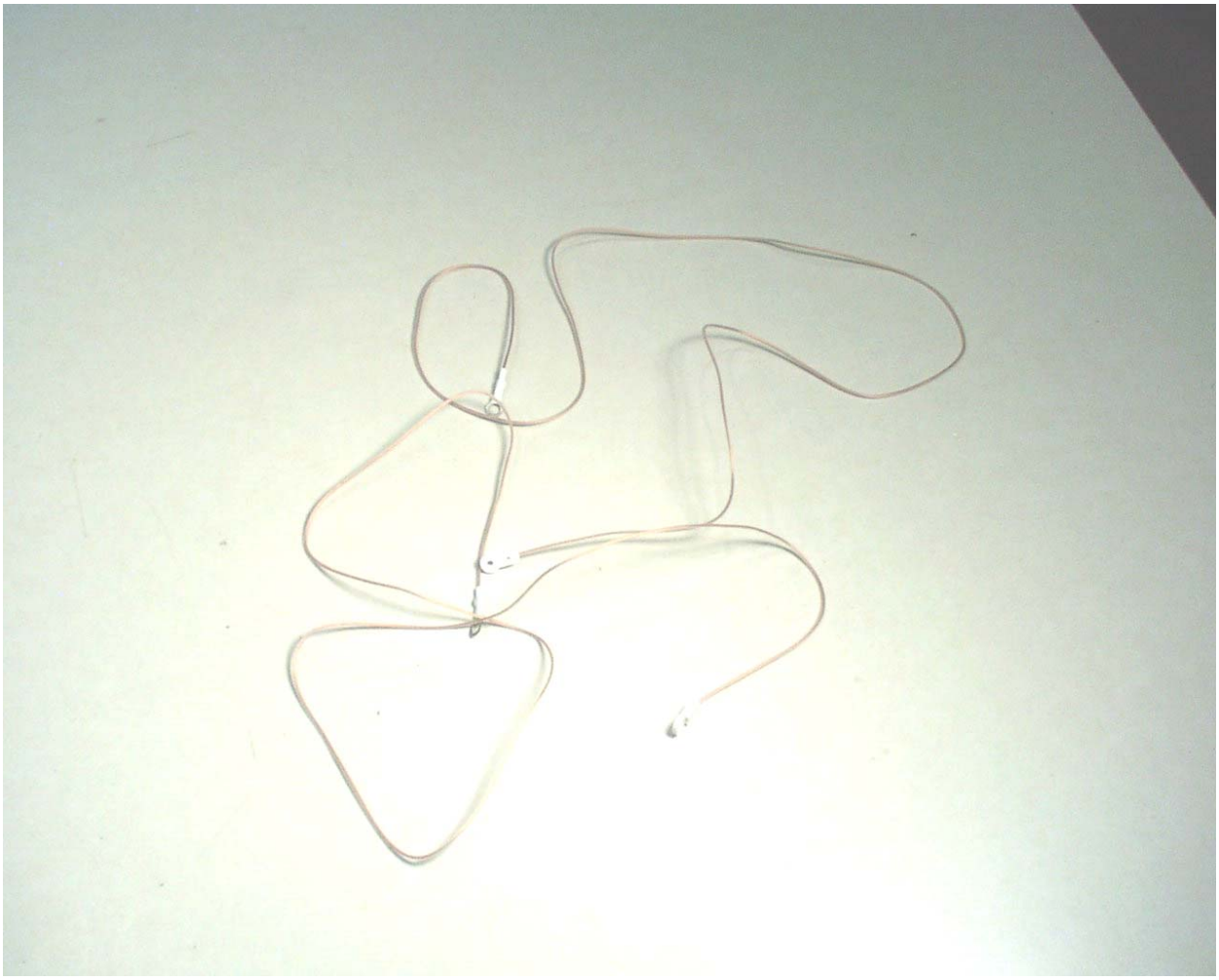
Photograph 14 – Dipole Antenna, Balun, and Mounting Bracket
(1 meter telescoping elements in collapsed position shown)



Photograph 15 – Telescoping Monopole Antenna for Direct Connection to the PCB



Photograph 16 – Flexible Antenna Elements



Photograph 17 – 120 VAC to 15 VAC Power Adapter