

# COMMUNICATION CERTIFICATION LABORATORY

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

## Certification Test Report

TEST OF: LT-700-216

FCC ID: OMD700-003

To FCC PART 95, Subparts E, and G

Test Report Serial No: 73-8025

Applicant:

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

Date of Test: December 22, 2004 – March 30, 2005

Issue Date: April 11, 2005

Equipment Receipt Date: December 22, 2004

Accredited Testing Laboratory By:



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 95, Subpart E and G. 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 Corporation
- Manufacturer: Listen Technologies Corporation
- Brand Name: Listen Technologies Corporation
- Model Number: LT-700-216
- FCC ID Number: OMD700-003

On this 11<sup>th</sup> day of April 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: Jeffrey L. Draney  
EMC Technician

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**SECTION 1.0 CLIENT INFORMATION**

**1.1 Applicant:**

Company Name: Listen Technologies Corporation  
8535 South 700 West, Suite A  
Sandy, UT 84070

Contact Name: Russell Gentner  
Title: President

**1.2 Manufacturer:**

Company Name: Listen Technologies Corporation  
8535 South 700 West, Suite A  
Sandy, UT 84070

Contact Name: Russell Gentner  
Title: President

**SECTION 2.0 EQUIPMENT UNDER TEST (EUT)****2.1 Identification of EUT:**

Brand Name: Listen Technologies Corporation  
Model Name or Number: LT-700-216  
Serial Number: None  
Options Fitted: N/A  
Country of Manufacture: U.S.A.

**2.2 Description of EUT:**

The LT-700-216 is a 57 channel (38 standard band, 19 extra band); FM transmitter used in the Low Power Radio Service (LPRS) for auditory assistance, language translation or education. It operates in the frequency range of 216.0125 to 216.9875 MHz. The LT-700-216 receives 7.5 VDC power from a Listen AC adapter model CH-75301-N or from two AA Alkaline or NiMH Batteries.

The LT-700-216 provides two inputs, one for connection to a microphone, the second for line input. The LT-700-216 provides a phono connector on the top of the unit for connecting to the antenna (microphone cable).

The Control circuitry was tested under part 15 subpart B, and is covered in a separate verification report.

**2.3 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 95, Subpart E and G (47 CFR 95).  
Low Power Radio Services (LPRS)

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

**3.2 Methods & Procedures (Applicable to the LT-700-216):****3.2.1 § 95.605 Certification Procedures**

Any entity may request certification for its transmitter when the transmitter is used in the GMRS, FRS, R/C, CB, IVDS, LPRS, MURS, or MICS following the procedures in part 2 of this chapter.

**3.2.2 § 95.629 LPRS Transmitter Frequencies**

(a) LPRS transmitters may operate on any frequency listed in paragraphs (b), (c), and (d) of this section. Channels 19, 20, 50, and 151-160 are available exclusively for law enforcement tracking purposes. AMTS transmissions are limited to the 216.750-217.000 MHz band for low power point-to-point network control communications by AMTS coast stations. Other AMTS transmissions in the 216-217 MHz band are prohibited.

(b) Standard band channels. (1) The following table indicates standard band frequencies. The channel bandwidth is 25 kHz.

Channel No.	Center frequency (MHz)
1.....	216.0125
2.....	216.0375
3.....	216.0625
4.....	216.0875
5.....	216.1125
6.....	216.1375
7.....	216.1625
8.....	216.1875
9.....	216.2125
10.....	216.2375
11.....	216.2625
12.....	216.2875

13.....	216.3125
14.....	216.3375
15.....	216.3625
16.....	216.3875
17.....	216.4125
18.....	216.4375
19.....	216.4625
20.....	216.4875
21.....	216.5125
22.....	216.5375
23.....	216.5625
24.....	216.5875
25.....	216.6125
26.....	216.6375
27.....	216.6625
28.....	216.6875
29.....	216.7125
30.....	216.7375
31.....	216.7625
32.....	216.7875
33.....	216.8125
34.....	216.8375
35.....	216.8625
36.....	216.8875
37.....	216.9125
38.....	216.9375
39.....	216.9625
40.....	216.9875

(2) LPRS transmitters operating on standard band channels must be maintained within a frequency stability of 50 parts per million.

(c) Extra band channels. (1) The following table indicates extra band frequencies. The channel bandwidth is 50 kHz.

Channel No.	Center frequency (MHz)
41.....	216.025
42.....	216.075
43.....	216.125
44.....	216.175
45.....	216.225
46.....	216.275
47.....	216.325
48.....	216.375
49.....	216.425
50.....	216.475
51.....	216.525
52.....	216.575
53.....	216.625
54.....	216.675
55.....	216.725
56.....	216.775
57.....	216.825
58.....	216.875

59.....	216.925
60.....	216.975

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(2) LPRS transmitters operating on extra band channels must be maintained within a frequency stability of 50 parts per million.

### **3.2.3 § 95.631 Emissions Type**

(g) An LPRS station may transmit any emission type appropriate for communications in this service. Two-way voice communications, however, are prohibited.

### **3.2.4 § 95.633 Emissions Bandwidth**

(d) For transmitters in the LPRS:

(2) The channel bandwidth for standard band frequencies is 25 kHz.

(3) The channel bandwidth for extra band frequencies is 50 kHz.

### **3.2.5 § 95.635 Unwanted Radiation**

(c) For transmitters designed to operate in the LPRS, emissions shall be attenuated in accordance with the following:

(1) Emissions for LPRS transmitters operating on standard band channels (25 kHz) shall be attenuated below the unmodulated carrier in accordance with the following:

(i) Emissions 12.5 kHz to 22.5 kHz away from the channel center frequency: at least 30 dB; and

(ii) Emissions more than 22.5 kHz away from the channel center frequency: at least  $43 + 10\log(\text{carrier power in watts})$  dB.

(2) Emissions for LPRS transmitters operating on extra band channels (50 kHz) shall be attenuated below the unmodulated carrier in accordance with the following:

(i) Emissions 25 kHz to 35 kHz from the channel center frequency: at least 30 dB; and

(ii) Emissions more than 35 kHz away from the channel center frequency: at least  $43 + 10\log(\text{carrier power in watts})$  dB.

### **3.2.6 § 95.639 Maximum Transmitter Power**

(e) The maximum transmitter output power authorized for LPRS stations is 100 mW.



**3.2.7 § 95.649 Power Capability**

No CB, R/C, LPRS, FRS, MICS, MURS or WMTS unit shall incorporate provisions for increasing its transmitter power to any level in excess of the limits specified in Sec. 95.639.

**3.2.8 § 95.1001 Eligibility**

An entity is authorized by rule to operate a LPRS transmitter and is not required to be individually licensed by the FCC if it is not a representative of a foreign government and if it uses the transmitter only in accordance with Sec. 95.1009. Each entity operating a LPRS transmitter for AMTS purposes must hold an AMTS license under part 80 of this chapter.

**3.2.9 § 95.1003 Authorized Locations**

LPRS operation is authorized:

(a) Anywhere CB station operation is permitted under Sec. 95.405(a); and

(b) Aboard any vessel or aircraft of the United States, with the permission of the captain, while the vessel or aircraft is either traveling domestically or in international waters or airspace.

**3.2.10 § 95.1005 Station Identification**

An LPRS station is not required to transmit a station identification announcement.

**3.2.11 § 95.1007 Station Inspection**

All LPRS system apparatus must be made available for inspection upon request by an authorized FCC representative.

**3.2.12 § 95.1009 Permissible Communications**

LPRS stations may transmit voice, data, or tracking signals as permitted in this section. Two-way voice communications are prohibited.

(a) Auditory assistance communications (including but not limited to applications such as assistive listening devices, audio description for the blind, and simultaneous language translation) for:

(1) Persons with disabilities. In the context of the LPRS, the term ``disability'' has the meaning given to it by section 3(2)(A) of the Americans with Disabilities Act of 1990 (42 U.S.C.

12102(2)(A)), i.e, persons with a physical or mental impairment that substantially limits one or more of the major life activities of such individuals;

(2) Persons who require language translation; or

(3) Persons who may otherwise benefit from auditory assistance communications in educational settings.

### **3.2.13 § 95.1011 Channel Use Policy**

(a) The channels authorized to LPRS systems by this part are available on a shared basis only and will not be assigned for the exclusive use of any entity.

(b) Those using LPRS transmitters must cooperate in the selection and use of channels in order to reduce interference and make the most effective use of the authorized facilities. Channels must be selected in an effort to avoid interference to other LPRS transmissions.

(c) Operation is subject to the conditions that no harmful interference is caused to the United States Navy's SPASUR radar system (216.88-217.08 MHz) or to TV reception within the Grade B contour of any TV channel 13 station or within the 68 dBu predicted contour of any low power TV or TV translator station operating on channel 13.

### **3.2.14 § 95.1013 Antennas**

(a) The maximum allowable ERP for a station in the LPRS other than an AMTS station is 100 mW. The maximum allowable ERP for an AMTS station in the LPRS is 1 W, so long as emissions are attenuated, in accordance with Sec. 80.211 of this chapter, at the band edges.

(b) AMTS stations must employ directional antennas.

(c) Antennas used with LPRS units must comply with the following:

(1) For LPRS units operating entirely within an enclosed structure, e.g., a building, there is no limit on antenna height;

(2) For LPRS units not operating entirely within an enclosed structure, the tip of the antenna shall not exceed 30.5 meters (100 feet) above ground. In cases where harmful interference occurs the FCC may require that the antenna height be reduced; and

(3) The height limitation in paragraph (c)(2) of this section does not apply to LPRS units in which the antenna is an integral part of the unit.

**3.2.15 § 2.202 Bandwidths**

(a) Occupied bandwidth. The frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission. In some cases, for example multichannel frequency-division systems, the percentage of 0.5 percent may lead to certain difficulties in the practical application of the definitions of occupied and necessary bandwidth; in such cases a different percentage may prove useful.

(b) Necessary bandwidth. For a given class of emission, the minimum value of the occupied bandwidth sufficient to ensure the transmission of information at the rate and with the quality required for the system employed, under specified conditions. Emissions useful for the good functioning of the receiving equipment as, for example, the emission corresponding to the carrier of reduced carrier systems, shall be included in the necessary bandwidth.

**3.2.16 Test Procedure**

The 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
Mains Frequency	60 Hz

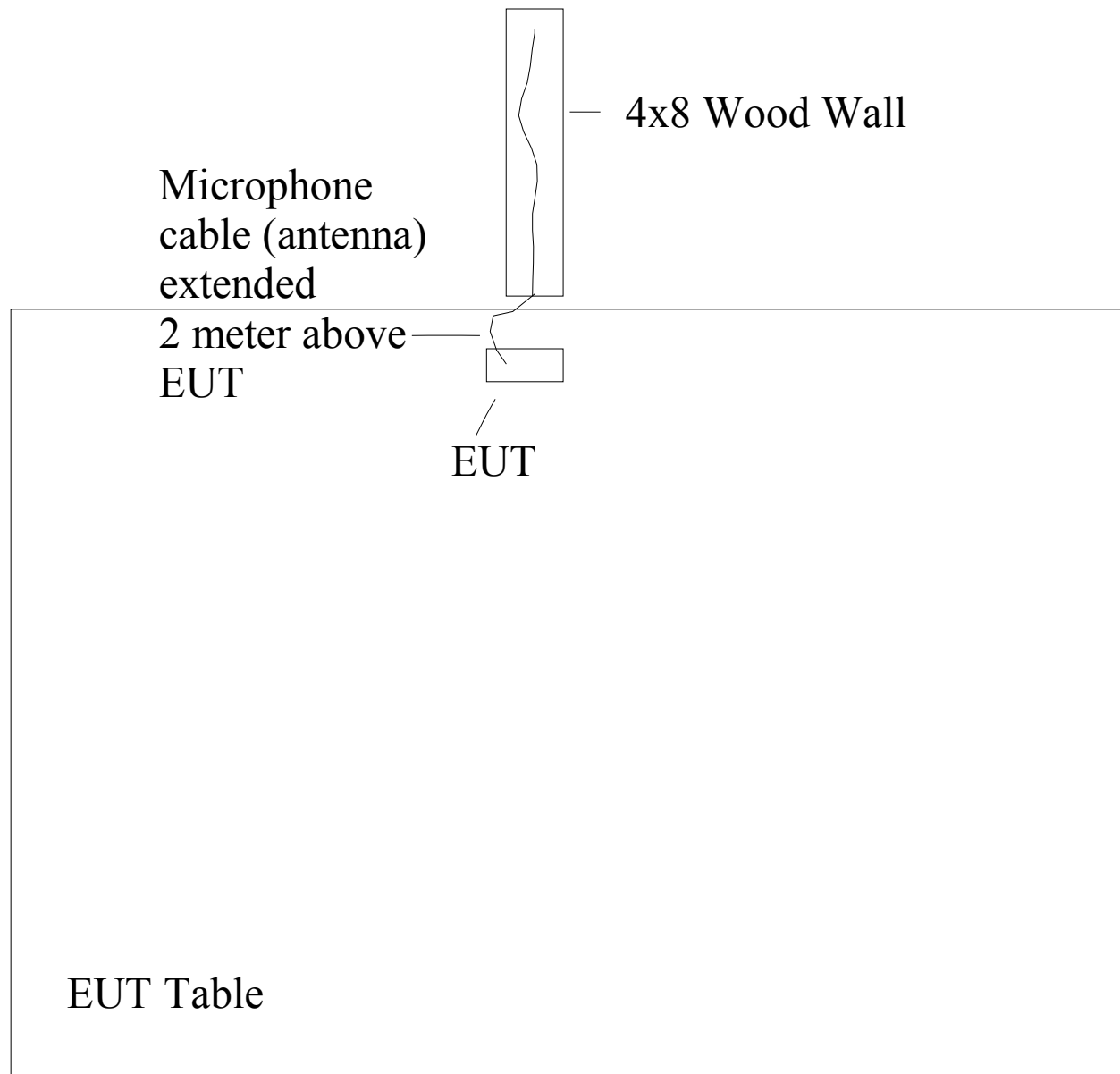
**4.2 Operating Modes:**

The transmitter was in a constant transmit mode at the desired frequency.

**4.3 EUT Exercise Software:**

N/A.

**4.4 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	Test Performed	Frequency Range (MHz)	Result
95.629	Frequency of Operation	216.0125 - 216.9875	Complied
95.629 / 2.1055	Frequency Stability	216.0125 - 216.9875	Complied
95.631	Emission Type	216.0125 - 216.9875	Complied
95.633 / 2.1049	Emission Bandwidth	216.0125 - 216.9875	Complied
95.635 / 2.1051	Unwanted Radiation (Antenna Conducted Spurious Emissions)	30 - 2169.875	Complied
95.636 / 2.1053	Unwanted Radiation (Radiated Spurious)	30 - 2169.875	Complied
95.639 /2.1046	Maximum Transmitter Power	216.0125 - 216.9875	Complied
2.1047	Modulation Characteristics	216.0125 - 216.9875	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 General Comments:**

This section contains the test results only. Details of the test methods used and a list of the test equipment used during the measurements can be found in Appendix 1 of this report.

**6.2 Test Results:****6.2.1 § 95.629/2.1049(c) 95.633(d) /2.1049 /2.202(a) Frequency of Operation / Emission Bandwidth / Occupied Bandwidth**

The LT-700-216 antenna connects through the microphone and line input cable connector located on the top of the unit. The direct connect tests were performed using this port.

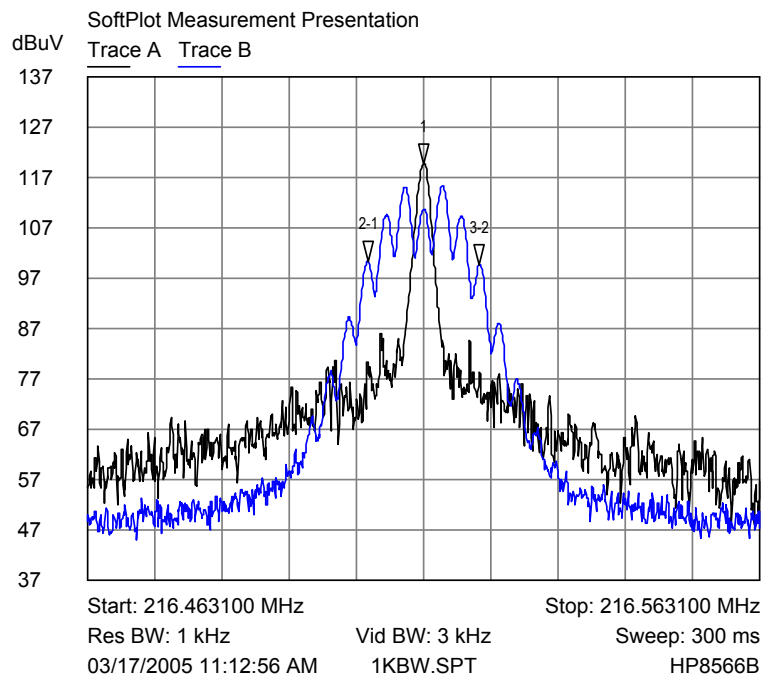
2.202(a) Occupied bandwidth. The frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

**Demonstration of Compliance:**

The LT-700-216 operates on channels 1 - 60 as specified in § 95.629 (b) (c). The bandwidth measurements are shown below:

Channel / Frequency	Bandwidth (kHz) / Limit (kHz)
1K / 216.5125	16.5 kHz / 25 kHz
2K / 216.5250	33.5 kHz / 50 kHz

The peak deviation was measured with a modulation frequency of .5 kHz. 50% modulation was reached with an audio input level of 200 mV. The bandwidth was run with a 2500 Hz audio signal 16 dB higher than the level needed to produce 50% modulation (1262 mV).



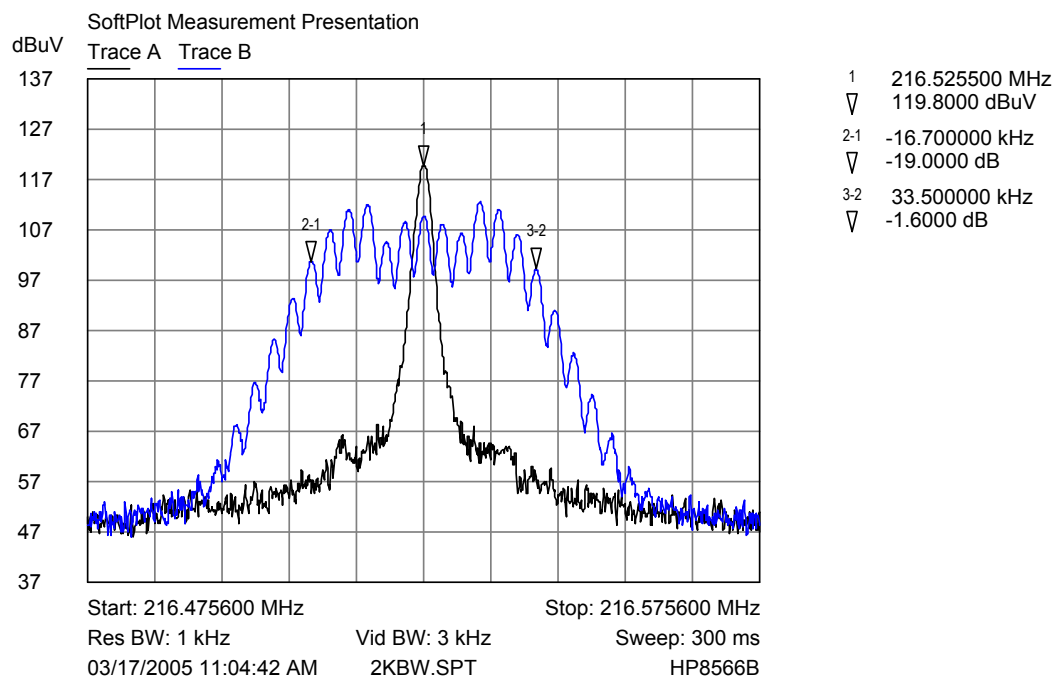
LT-700-216 Channel 1K

Trace A Unmodulated Carrier

Trace B 2500 Hz Modulated Carrier

1 216.513100 MHz  
▽ 119.8000 dBuV  
2-1 -8.300000 kHz  
▽ -19.4000 dB  
3-2 16.500000 kHz  
▽ -0.7000 dB





LT-700-216

Trace A Unmodulated Carrier

Trace B 2500 Hz Modulated Carrier

**RESULT**

In the configuration tested, the EUT complied with the requirements of this section.

**6.2.2 § 95.629 / 2.1055 Frequency Stability**

Channel 1K (216.5125)

Ambient Temperature (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Deviation (PPM)	Criteria (PPM)
-30	216.5125	216.5112	-6.0	50
-20	216.5125	216.5120	-2.3	50
-10	216.5125	216.5126	0.5	50
0	216.5125	216.5129	1.8	50
10	216.5125	216.5129	1.8	50
20	216.5125	216.5128	1.4	50
30	216.5125	216.5128	1.4	50
40	216.5125	216.5129	1.8	50
50	216.5125	216.5134	4.2	50

Channel 1K

Voltage AC	Assigned Frequency (MHz)	Measured Frequency (MHz)	Deviation (PPM)	Criteria (PPM)
102	216.5125	216.5128	1.4	50
120	216.5125	216.5128	1.4	50
138	216.5125	216.5128	1.4	50

Channel 1K

Voltage DC	Assigned Frequency (MHz)	Measured Frequency (MHz)	Deviation (PPM)	Criteria (PPM)
3.0	216.5125	216.5128	1.4	50
2.2	216.5125	216.5128	1.4	50

Channel 2K (216.5250)

Ambient Temperature (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Deviation (PPM)	Criteria (PPM)
-30	216.5250	216.5240	-4.6	50
-20	216.5250	216.5245	-2.3	50
-10	216.5250	216.5251	0.5	50
0	216.5250	216.5254	1.8	50
10	216.5250	216.5254	1.8	50
20	216.5250	216.5253	1.4	50
30	216.5250	216.5253	1.4	50
40	216.5250	216.5254	1.8	50
50	216.5250	216.5259	4.2	50

Channel 2K

Voltage AC	Assigned Frequency (MHz)	Measured Frequency (MHz)	Deviation (PPM)	Criteria (PPM)
102	216.5250	216.5253	1.4	50
120	216.5250	216.5253	1.4	50

138	216.5250	216.5253	1.4	50
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Channel 2K

Voltage DC	Assigned Frequency (MHz)	Measured Frequency (MHz)	Deviation (PPM)	Criteria (PPM)
3.0	216.5250	216.5253	1.4	50
2.2	216.5250	216.5253	1.4	50

**Sample Calculation**

$$\text{Deviation (PPM)} = \frac{\text{FM} - \text{TF}}{\text{TF}} * 10^6$$

FM = Frequency Measured

TF = Intended Transmit Frequency

**RESULT**

In the configuration tested, the EUT complied with the requirements of this section.

**6.2.3 § 95.631 Emissions Type****Demonstration of Compliance:**

The LT-700-216 transmits voice only, and is not used for two-way communications; therefore, it complies with this section.

**6.2.4 § 95.635 / 2.1051 Spurious Emissions at Antenna Terminals**

(c) For transmitters designed to operate in the LPRS, emissions shall be attenuated in accordance with the following:

(1) Emissions for LPRS transmitters operating on standard band channels (25 kHz) shall be attenuated below the unmodulated carrier in accordance with the following:

(i) Emissions 12.5 kHz to 22.5 kHz away from the channel center frequency: at least 30 dB; and

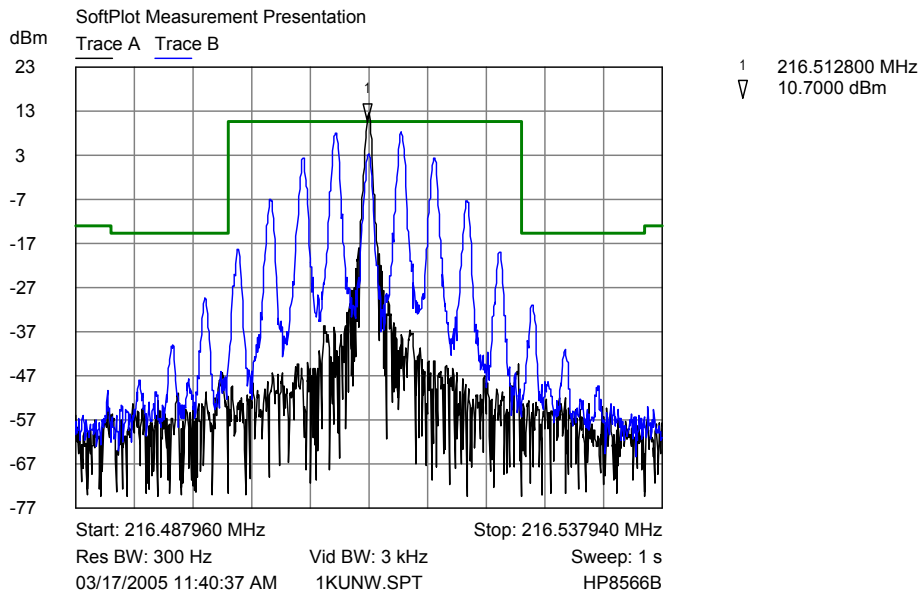
(ii) Emissions more than 22.5 kHz away from the channel center frequency: at least  $43 + 10\log(\text{carrier power in watts})$  dB.

(2) Emissions for LPRS transmitters operating on extra band channels (50 kHz) shall be attenuated below the unmodulated carrier in accordance with the following:

(i) Emissions 25 kHz to 35 kHz from the channel center frequency: at least 30 dB; and

(ii) Emissions more than 35 kHz away from the channel center

frequency: at least  $43 + 10\log(\text{carrier power in watts})$  dB.

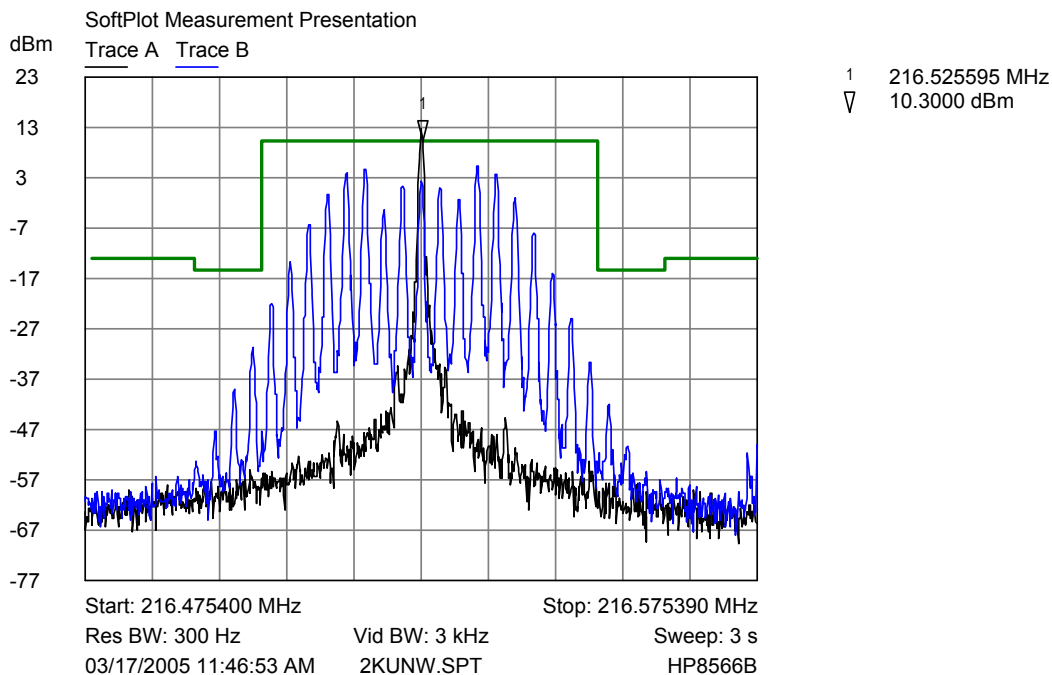


LT-700-216 Channel 1K

Trace A Unmodulated Carrier

Trace B 2500 Hz Modulated Carrier

### Channel 1K



LT-700-216 Channel 2K

Trace A Unmodulated Carrier Ch 2K

Trace B 2500 Hz Modulated Carrier Ch 2K

### Channel 2K

**Demonstration of Compliance:**

The Emissions that are more than 22.5 kHz (standard band) or 35 kHz (extra band) away from the center frequency must be attenuated  $43 + 10 \log P$  dB.

where  $P$  = Mean Power of the unmodulated carrier.

Channel 1K = 12.5 dBm = 17.8 mW

Attenuation =  $43 + (-19.3) = 25.5$  dB

Level = 12.5 dBm - 25.5 dB = 13.0 dBm

Channel 2K = 12.5 dBm = 17.8 mW

Attenuation =  $43 + (-19.3) = 25.5$  dB

Level = 12.5 dBm - 25.5 dB = 13.0 dBm

**Channel 1K**

Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
1 - 30	6.5	-57.9	-13.0
30 - 200	196.9	-56.8	-13.0
200 - 216.49	204.55	-53.9	-13.0
216.535 - 400	228.6	-53.9	-13.0
400 - 600	433.2	-51.8	-13.0
600 - 800	678.6	-52.9	-13.0
800 - 1000	866.0	-51.3	-13.0
1000 - 1200	1082.4	-45.3	-13.0
1200 - 1400	1299.2	-48.4	-13.0
1400 - 1600	1515.8	-46.8	-13.0
1600 - 1800	1766.9	-55.9	-13.0
1800 - 2000	1801.8	-56.4	-13.0
2000 - 2200	2165.2	-51.9	-13.0

**Channel 2K**

Frequency Range MHz	Frequency MHz	Corrected Level dBm	Criteria dBm
1 - 30	6.67	-57.0	-13.0
30 - 200	196.9	-56.4	-13.0
200 - 216.49	204.55	-54.5	-13.0
216.560 - 400	220.6	-54.9	-13.0
400 - 600	433.2	-51.5	-13.0
600 - 800	604.8	-57.3	-13.0
800 - 1000	866.2	-53.1	-13.0
1000 - 1200	1082.6	-45.8	-13.0
1200 - 1400	1299.2	-49.2	-13.0
1400 - 1600	1515.8	-46.5	-13.0
1600 - 1800	1708.0	-56.1	-13.0
1800 - 2000	1969.2	-56.9	-13.0
2000 - 2200	2165.2	-50.6	-13.0

RBW = 10 kHz VBW = 30 kHz

**RESULT**

Spurious emissions must be attenuated below -13.0 dBm. The highest emission noted was at -45.3 dBm; therefore, the EUT complies with the specification.

**6.2.5 § 95.635 / 2.1053 Radiated Spurious Emissions****Demonstration of Compliance:**

The reference level for spurious radiation was taken at an ideal dipole excited by the rated output power according to the following relationship:

$$E = \frac{\sqrt{(49.2)(Pt)}}{R}$$

Note: Reference Data for Radio Engineers, Pg. 676.  
International Telephone and Telephone Corporation,  
Fourth Edition.

Where E = electric Field Intensity in Volts/Meter  
Pt = Transmitter Power in Watts  
R = Measurements distance in Meters

At a maximum power of 0.0178 Watts

$$E = \frac{\sqrt{(49.2)(0.0178)}}{3} = 0.312 \text{ Volts/Meter} = 109.9 \text{ dB}\mu\text{V/m}$$

Paragraph 95.635 requires that spurious radiated emission be attenuated at least  $43 + 10 \log$  (mean output power in watts) below the unmodulated carrier. In this case, the rated power of 0.0178 watts requires a minimum attenuation of  $43 + 10 \log 0.0178 = 25.5$  dB below the reference level of 109.8 dB $\mu$ V/m calculated above; therefore, the criteria is 84.4 dB $\mu$ V/m (109.9 - 25.5).

Radiated spurious emissions were performed with the antenna port (microphone cable) connected and extended 1 meter above the EUT, the results are shown below:

Transmitting on Channel 1K (216.5125 MHz)					
Antenna Polarity	Frequency (MHz)	Uncorr. Level (dB $\mu$ V)	Correction Factor (dB)	Field Strength (dB $\mu$ V/m)	Criteria (dB $\mu$ V/m)
V	216.5	81.8	12.9	94.7	109.9
V	433.0	35.9	19.7	55.6	84.4
V	649.5	34.5	24.1	58.6	84.4
V	866.1	28.2	27.3	55.5	84.4
H	216.5	73.9	12.9	86.8	109.9
H	433.0	33.3	19.7	53.0	84.4
H	649.5	32.3	24.1	56.4	84.4
H	866.1	28.2	27.3	55.5	84.4
All emissions above 1 GHz were more than 20 dB below the limit.					

Transmitting on Channel 2K (216.5250 MHz)					
Antenna Polarity	Frequency (MHz)	Uncorr. Level (dB $\mu$ V)	Correction Factor (dB)	Field Strength (dB $\mu$ V/m)	Criteria (dB $\mu$ V/m)
V	216.5	82.0	12.9	94.9	109.9
V	433.0	36.0	19.7	55.7	84.4
V	649.5	34.6	24.1	58.7	84.4
V	866.1	27.0	27.3	54.3	84.4
H	216.5	73.7	12.9	86.6	109.9
H	433.0	32.5	19.7	52.2	84.4
H	649.5	31.9	24.1	56.0	84.4
H	866.1	28.5	27.3	55.8	84.4
All emissions above 1 GHz were more than 20 dB below the limit.					

A diagram of the test configuration and the test equipment used is enclosed in Appendix 1. For frequencies below 1000 MHz RBW = 100 kHz and VBW = 300 kHz, For frequencies above 1000 MHz RBW = 1 MHz and VBW = 3 MHz.

## RESULT

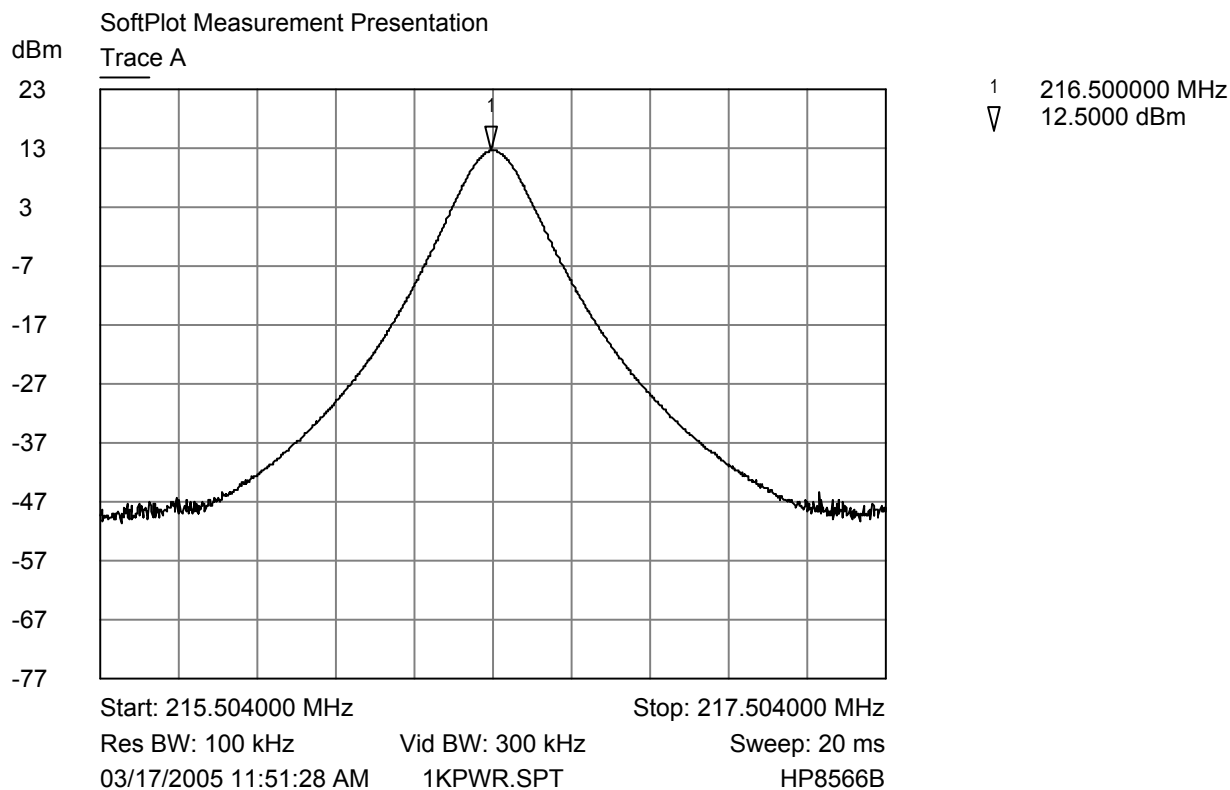
In the configuration tested, the EUT complied with the requirements of this section.



**6.2.6 § 95.639 / 2.1046 RF Output Power****Demonstration of Compliance:**

(e) The maximum transmitter output power authorized for LPRS stations is 100 mW.

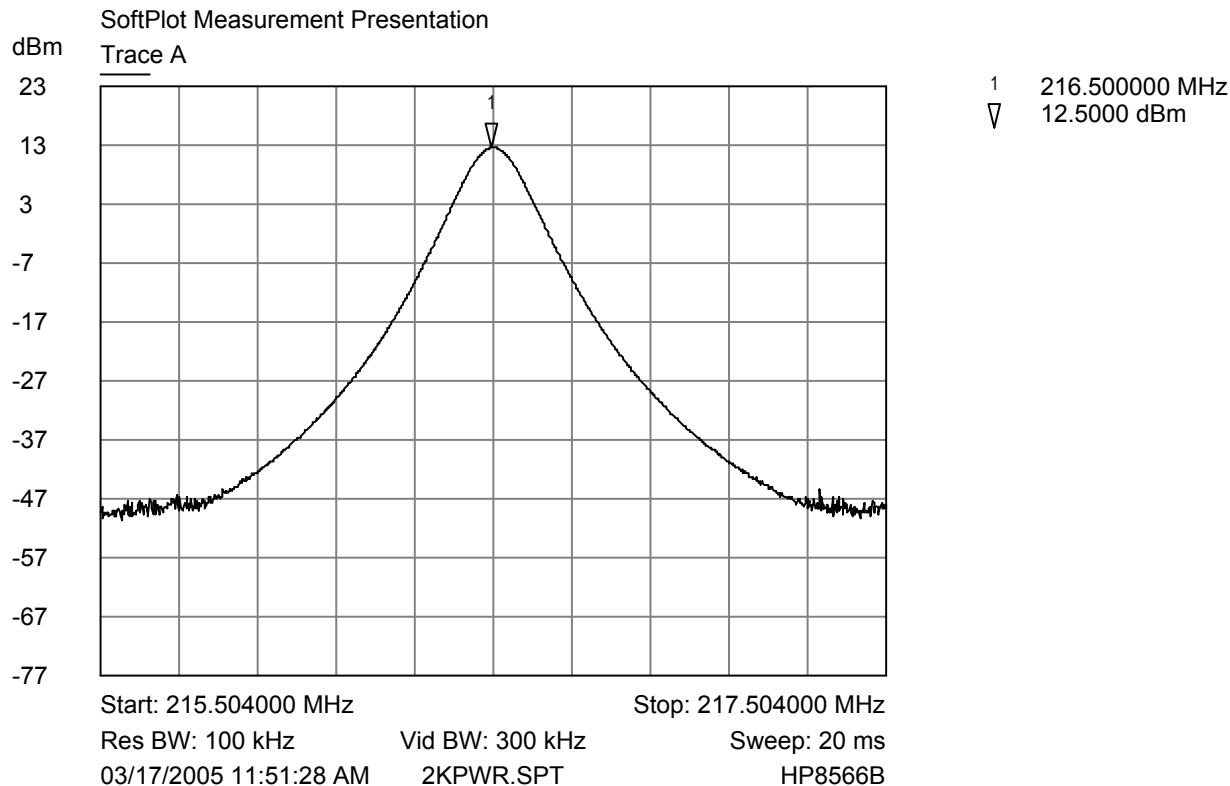
Shown below are the results with the LT-700-216 tuned to two different channels.

**Channel 1K**

LT-700-216

Trace A Ch 1K power

$$\text{Power} = 12.5 \text{ dBm} = 17.8 \text{ mW}$$

**Channel 2K**

LT-700-216

Trace A Ch 2K power

Power = 12.5 dBm = 17.8 mW

**RESULT**

In the configuration tested, the EUT complied with the requirements of this section.

**6.2.7 § 2.1047 Modulation Characteristics****Demonstration of Compliance:**

The modulation characteristics of the LT-700-216 were measured as described in the test procedures (Appendix 1). The table enclosed below show the results. Testing was performed with the modulation connected to the line input. The microphone input was tested and produced the same modulation characteristics.

F Mod (kHz)	Audio Voltage (mV)	Ch 1K Peak Deviation (kHz)	Ch 2K Peak Deviation (kHz)
0.5	800	7.0	18.4
	1000	7.0	18.5
	1500	7.0	18.5
	2000	7.0	18.5
	3000	7.0	18.5
1	800	7.0	17.5
	1000	7.0	17.5
	1500	7.0	17.7
	2000	7.0	17.7
	3000	7.0	17.7
2	800	6.0	15.3
	1000	6.1	16.0
	1500	6.4	16.5
	2000	6.4	16.8
	3000	6.4	16.8
<b>3</b>	<b>800</b>	<b>4.0</b>	<b>10.0</b>
	<b>1000</b>	<b>4.2</b>	<b>10.2</b>
	<b>1500</b>	<b>4.3</b>	<b>10.9</b>
	<b>2000</b>	<b>4.3</b>	<b>11.1</b>
	<b>3000</b>	<b>4.3</b>	<b>11.1</b>
4	800	2.6	6.4
	1000	2.7	6.6
	1500	2.8	7.0
	2000	2.8	7.0
	3000	2.8	7.0
5	800	1.8	4.4
	1000	1.9	4.5
	1500	2.0	4.8
	2000	2.0	4.8
	3000	2.0	4.8

F Mod (kHz)	Audio Voltage (mV)	Ch 1K Peak Deviation (kHz)	Ch 2K Peak Deviation (kHz)
6	800	1.3	3.2
	1000	1.3	3.3
	1500	1.4	3.5
	2000	1.4	3.5
	3000	1.4	3.5
7	800	1.0	2.3
	1000	1.0	2.5
	1500	1.1	2.5
	2000	1.1	2.6
	3000	1.1	2.6

**RESULT**

In the configuration tested, the EUT complied with the requirements of this section.

**6.2.8 § 2.202(b) Necessary Bandwidth**

(b) Necessary bandwidth. For a given class of emission, the minimum value of the occupied bandwidth sufficient to ensure the transmission of information at the rate and with the quality required for the system employed, under specified conditions. Emissions useful for the good functioning of the receiving equipment as, for example, the emission corresponding to the carrier of reduced carrier systems, shall be included in the necessary bandwidth.

$$B_n = 2M + 2DK$$

Where

B<sub>n</sub> - Necessary bandwidth in hertz;

M - Maximum modulation frequency in hertz;

D - Peak frequency deviation;

K - Numerical factor that equals 1 for FM sound broadcasting;

**Demonstration of Compliance:****Channel 1K (standard band)**

$$M = 3000 \text{ Hz}$$

$$D = 7000 \text{ Hz}$$

$$B_n = 2 \times 3000 + 2 \times 7000 \times 1 = 20000 \text{ Hz}$$

Emissions designation is **20K0F3E**

**Channel 2K (extra band)**

$$M = 3000 \text{ Hz}$$

$$D = 18500 \text{ Hz}$$

$$B_n = 2 \times 3000 + 2 \times 18500 \times 1 = 43000 \text{ Hz}$$

Emissions designation is **43K0F3E**

**APPENDIX 1 TEST PROCEDURES AND TEST EQUIPMENT****§ 2.202(a) Emission Bandwidth**

The EUT was directly connected to the spectrum analyzer via the antenna output port as shown in the block diagram below.

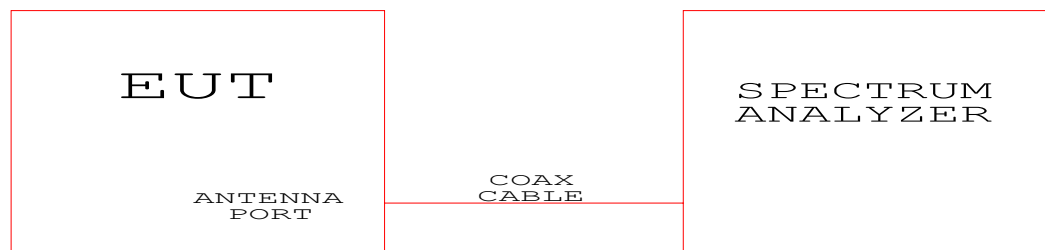
The spectrum analyzer's resolution bandwidth and video bandwidth were set as follows:

RBW = 1 kHz

VBW = 3 kHz

Type of Equipment	Manufacturer	Model Number	Serial Number
Spectrum Analyzer	Hewlett Packard	8566B	2230A01711
Quasi-Peak Detector	Hewlett Packard	85650A	3107A01582
Low Loss Cable (1 dB)	N/A	N/A	N/A

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.

**Test Configuration Block Diagram**

**§ 95.639/2.1046 RF Output Power**

The EUT was directly connected to the spectrum analyzer via the antenna output port as shown in the block diagram below.

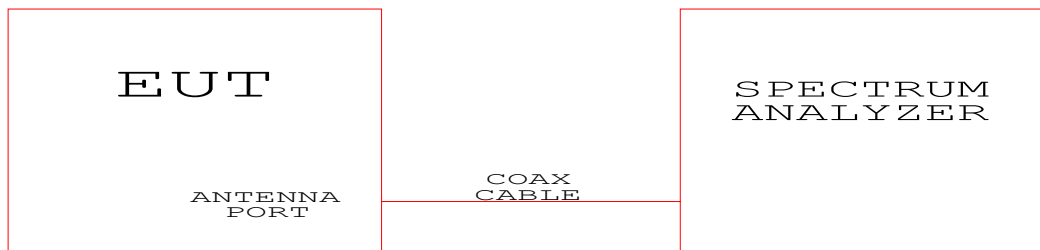
The spectrum analyzer's resolution bandwidth and video bandwidth were set as follows:

RBW = 100 kHz

VBW = 300 kHz

Type of Equipment	Manufacturer	Model Number	Serial Number
Spectrum Analyzer	Hewlett Packard	8566B	2230A01711
Quasi-Peak Detector	Hewlett Packard	85650A	3107A01582
Low Loss Cable (1 dB)	N/A	N/A	N/A

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.

**Test Configuration Block Diagram**

**§ 95.635 / 2.1051 Spurious Emissions at Antenna Terminals**

The EUT was directly connected to the spectrum analyzer via the antenna output port as shown in the block diagram below.

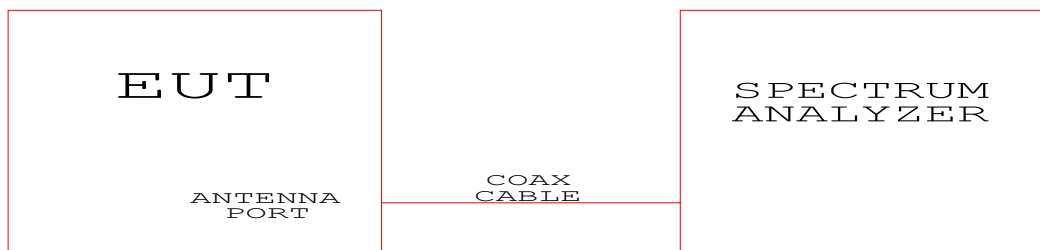
The spectrum analyzer's resolution bandwidth and video bandwidth were set as follows:

RBW = 10 kHz

VBW = 30 kHz

Type of Equipment	Manufacturer	Model Number	Serial Number
Spectrum Analyzer	Hewlett Packard	8566B	2230A01711
Quasi-Peak Detector	Hewlett Packard	85650A	3107A01582
Low Loss Cable (1 dB)	N/A	N/A	N/A

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.

**Test Configuration Block Diagram**

**§ 95.635 / 2.1053 Radiated Spurious 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 and preamplifier were 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 peak emissions above 1000 MHz the spectrum analyzer's resolution bandwidth was set to 1 MHz and the video bandwidth was set to 3 MHz. For average emissions above 1000 MHz the spectrum analyzer's resolution bandwidth was set to 1 MHz and the video bandwidth was set to 10 Hz.

A biconilog antenna was used to measure the frequency range of 30 to 1000 MHz and a Double Ridge Guide Horn antenna was used to measure the frequency range of 1 GHz to 18 GHz, and a Pyramidal Horn antenna was used to measure the frequency range of 18 GHz to 25 GHz, 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.

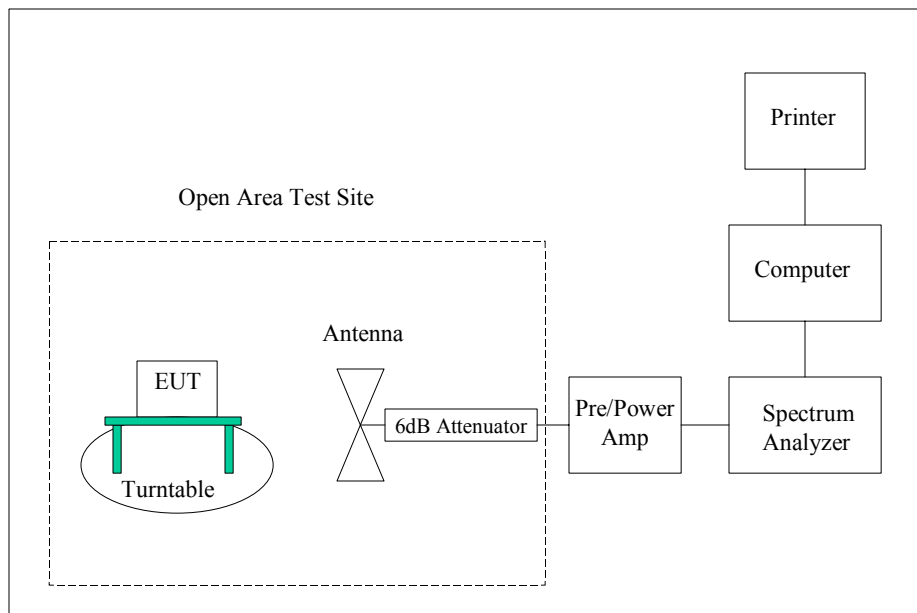
Desktop intentional radiators are measured on a non-conducting table 80 centimeters above the ground plane. The table is placed on a turntable which is level with the ground plane. The turntable has slip rings, which supply AC power to the intentional radiator. For equipment normally placed on floors, 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
Double Ridged Guide Antenna	EMCO	3115	2129	06/10/2003
High Frequency Amplifier	Hewlett Packard	8449B	3008A00990	09/21/2004
Pyramidal Horn Antenna	EMCO	3160-09	0003-1197	03/07/2003
Harmonic Mixer	Hewlett Packard	11970K	3003A05756	03/07/2003
3 Meter Radiated Emissions Cable Wanship Site #2	CCL	Cable K	N/A	12/09/2004
10 Meter Radiated Emissions Cable Wanship Site #2	CCL	Cable L	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

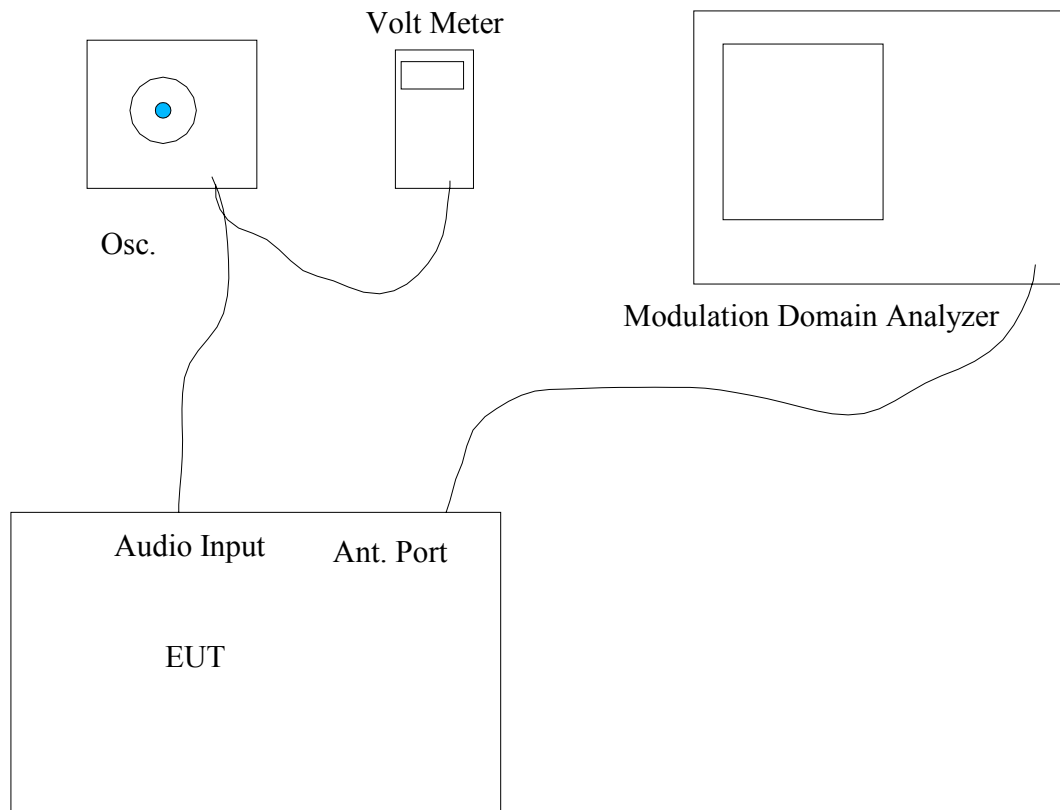


### Modulation Deviation Limiting

Vary the audio input voltage Over the frequency range 100 to 10000 Hz and record the peak deviation.

Type of Equipment	Manufacturer	Model Number	Serial Number
Audio Oscillator	Hewlett Packard	204D	None
Modulation Domain Analyzer	Hewlett Packard	53310A	000726
Multimeter	Fluke	87	000646

All the equipment listed above is calibrated every 12 months by an independent calibration laboratory or by CCL personal following outlined calibration procedures.

**Test Configuration Block Diagram****Carrier Frequency Stability**

The EUT was placed inside of a temperature chamber and directly connected to the spectrum analyzer via the antenna output port as shown in the block diagram below. The measurements were performed from  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  in  $10^{\circ}$  increments.

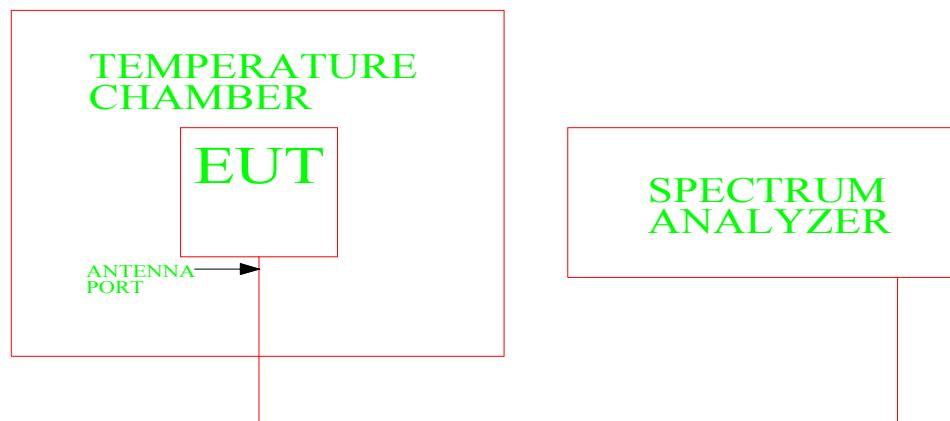
The spectrum analyzer's was configured as follows:

RBW = 1 kHz  
VBW = 3 kHz  
Span = 20 kHz  
Sweep = Auto

Type of Equipment	Manufacturer	Model Number	Serial Number
Spectrum Analyzer	Hewlett Packard	8566B	2230A01711
Quasi-Peak Detector	Hewlett Packard	8565A	3107A01582
Low Loss Cable (1 dB)	N/A	N/A	N/A
Temperature Chamber	Tenney Engineering, Inc.	Tenney Jr.	11184-83

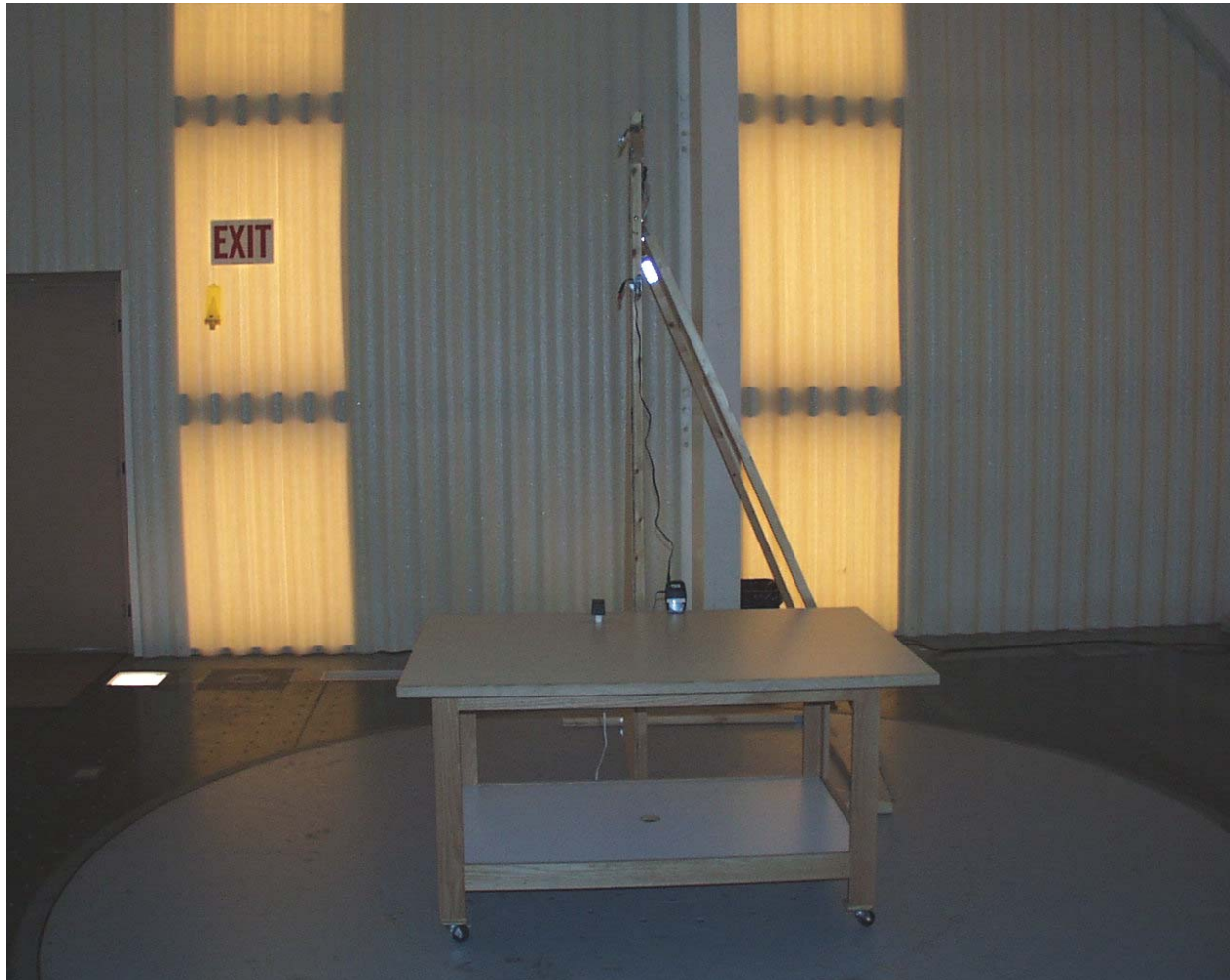
All the equipment listed above is calibrated every 12 months by an independent calibration laboratory or by CCL personal following outlined calibration procedures.

#### Test Configuration Block Diagram



**APPENDIX 2 PHOTOGRAPHS**

Photograph 1 - Front View Radiated Spurious Emission  
Configuration

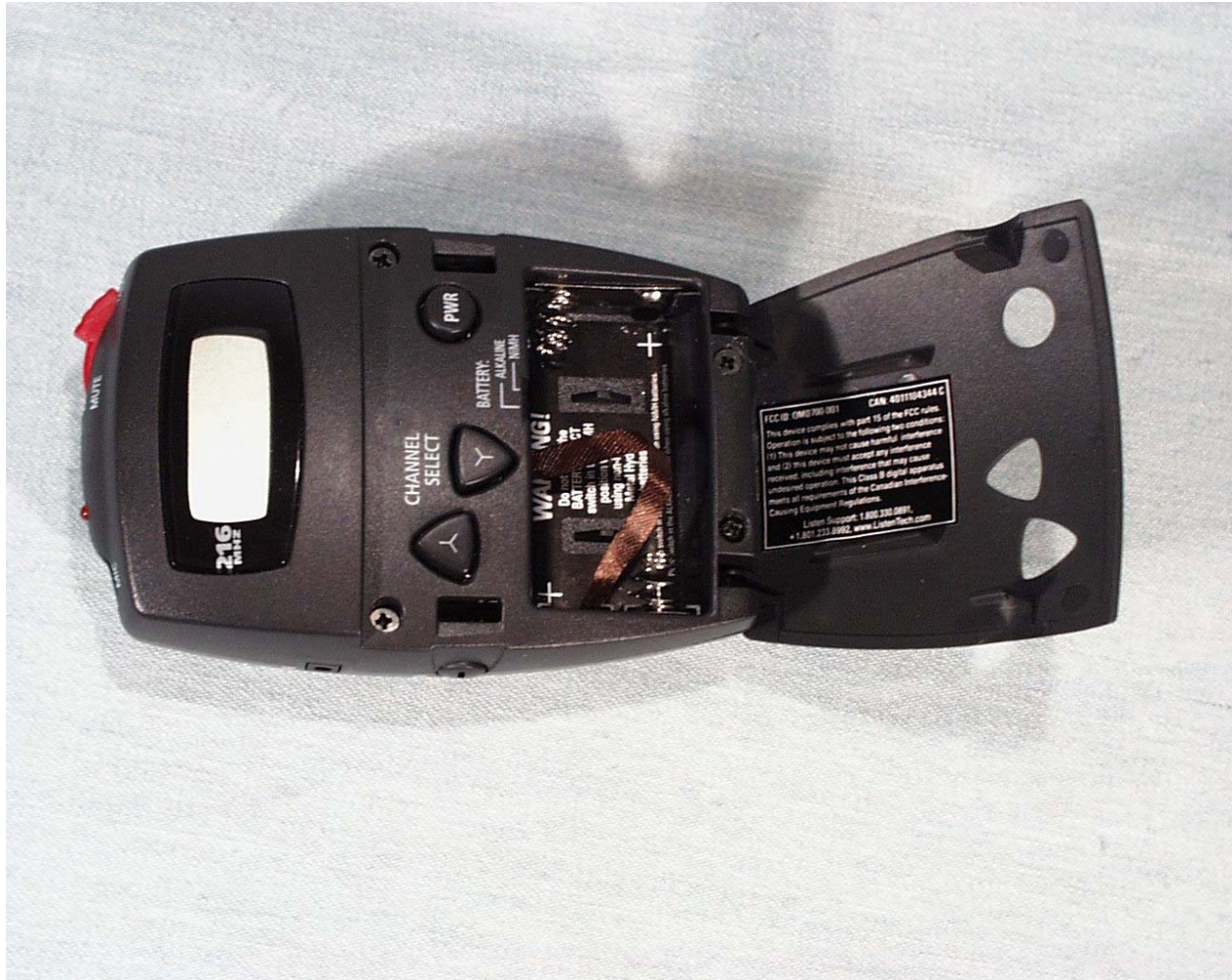


Photograph 2 - Front View of the EUT





Photograph 3 - Front View of the EUT with Battery Case Open

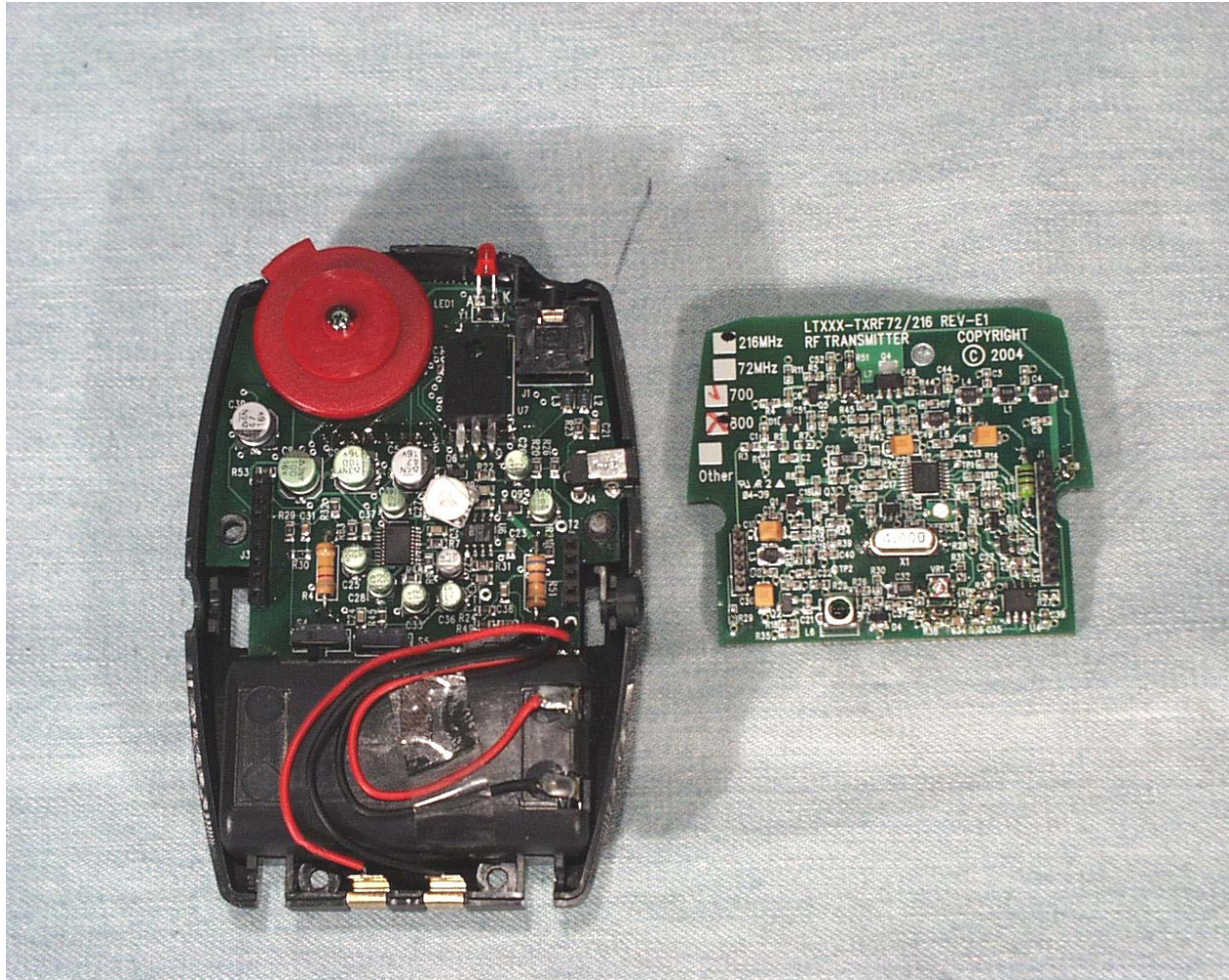


Photograph 4 - Back View of the EUT





Photograph 5 - Inside View of the EUT





Photograph 6 - View of Side B of the PCB

