TEST REPORT FROM:

COMMUNICATION CERTIFICATION LABORATORY
1940 W. Alexander Street
Salt Lake City, Utah
84119-2039

Type of Report: Certification

TEST OF: CCF3101B

FCC ID: SU7CCF31B

To FCC PART 15, Subpart C
Section 15.231

Test Report Serial No: 73-8045

Applicant:

Controlled Entry Distributors, Inc.
DBA Community Controls
2500 South 3850 West, Suite A
Salt Lake City, UT 84120

Date of Test: January 5, 2005

Issue Date: January 10, 2005

CERTIFICATION OF ENGINEERING REPORT

This report has been prepared by Communication Certification Laboratory to determine compliance of the device described below with the certification requirements of FCC Part 15, Subpart C Section 15.231. 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: Controlled Entry Distributors, Inc.
  DBA Community Controls
- Manufacturer: Lighting Tech Co., LTD
- Trade Name: Community Controls
- Model Number: CCF3101B
- FCC ID: SU7CCF31B

On this 10th day of January 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, NVLAP does not endorse the product described in this report.

COMMUNICATION CERTIFICATION LABORATORY

Norman P Hansen

Tested by: Norman P. Hansen
EMC Technician

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SECTION 1.0 CLIENT INFORMATION

1.1 Client Information:

Company Name: Controlled Entry Distributors, Inc.
DBA Community Controls
2500 South 3850 West, Suite A
Salt Lake City, UT 84120

Contact Name: Brad Kofford
Title: President

1.2 Manufacturer:

Company Name: Lighting Tech Co., LTD
4F, No. 124 Hua Chen Rd.
Hsing Chuang City, Taipei Hsien
Taiwan, R.O.C.

Contact Name: N. J. Duan
Title: Sales Manager

SECTION 2.0 EQUIPMENT UNDER TEST (EUT)

2.1 Identification of EUT:

Trade Name:	Community Controls
Model Name or Number:	CCF3101B
Serial Number:	LT08077
Options Fitted:	N/A
Country of Manufacture:	Taiwan

2.2 Description of EUT:

The CCF3101B is a one or two button transmitter operating at 310 MHz. Encoding is performed by toggling the 8 DIP switches to either the on or off position. The CCF3101B is for use with automated gates, access control panels, or garage door openers that operate at 310 MHz.

SECTION 3.0 TEST SPECIFICATION, METHODS & PROCEDURES

3.1 Test Specification:

Title: FCC PART 15, Subpart C (47 CFR 15).
Section 15.231

Periodic operation in the band 40.66-40.70 MHz and above 70 MHz.

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

3.2 Methods & Procedures:

3.2.1 §15.231

(a) The provision of this section are restricted to periodic operation within the band 40.66-40.70 MHz and above 70 MHz. Except as Shown in paragraph (e) of this section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Radio control of toys in not permitted. Continuous transmissions, such as voice or video, and data transmissions are not permitted. The prohibition against data transmissions does not preclude the use of recognition codes. Those codes are used to identify the sensor that is activated or to identify the particular component as being part of the system. The following conditions shall be met to comply with the provisions for this periodic operation:

(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

(3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmission to determine system integrity of transmitters used in security or safety applications are allowed if the periodic rate of transmission does not exceed one transmission of not more than one second duration per hour for each transmitter.

(4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and

safety of life, when activated to signal an alarm, may operated during the pendency of the alarm condition.

(b) In addition to the provisions of 15.205, the field strength of emission from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66 - 40.70	2,250	225
70 -130	1,250	125
130 - 174	1,250 to 3,750 **	125 to 375 **
174 - 260	3,750	375
260 - 470	3,750 to 12,500 **	375 to 1,250 **
Above 470	12,500	1,250

** Linear interpolations

(1) the above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.

(2) Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provision in 15.35 for averaging pulsed emission and for limiting peak emissions apply. Further, compliance with the provisions of 15.205 shall be demonstrated using the measurement instrumentation specified in that section.

(3) The limits on the field strength of the spurious emission in the above table are based on the fundamental frequency of the intentional radiator. Spurious emission shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in 15.209, whichever limit permits a higher field strength.

(c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall

be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

(d) For devices operation within the frequency band 40.66-40.70 MHz, the bandwidth of the emission shall be confined within the band edges and the frequency tolerance of the carrier shall be ±0.01%. This frequency tolerance shall be maintained for a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation on the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

(e) Intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) of this section and may be employed for any type of operation, including operation prohibited in paragraph (a) of this section, provided that intentional radiator complies with the provisions of paragraphs (b) through (d) of this section except the field strength table in paragraph (b) of this section is replaced by the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66 - 40.70	1,00	100
70 -130	500	50
130 - 174	500 to 1,500 **	50 to 150 **
174 - 260	1,500	150
260 - 470	1,500 to 5,000 **	150 to 500 **
Above 470	5,000	500

** Linear interpolations

In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent periods between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

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.

3.3 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: 12 volt alkaline battery

4.2 Operating Modes:

The worst-case emissions were with the CCF3101B powered up with the button held down so the EUT would constantly transmit.

4.3 EUT Exercise Software:

No software was required.

SECTION 5.0 SUMMARY OF TEST RESULTS

5.1 FCC PART 15, Subpart C Section 15.231

5.1.1 Summary of Tests:

Section	Test Performed	Frequency Range (MHz)	Result
15.231 (a)	Periodic Operation	310	Complied
15.231 (b)	Radiated Emissions	30 to 3100	Complied
15.231 (c)	Bandwidth	310	Complied
15.231 (d)	Frequency Stability	40.66 to 40.70	Not Applicable
15.231 (e)	Radiated Emissions	30 to 3100	Not Applicable
15.207	Line Conducted Emissions (Hot Lead to Ground)	0.15 to 30	Not Applicable
15.207	Line Conducted Emissions (Neutral Lead to Ground)	0.15 to 30	Not Applicable

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:

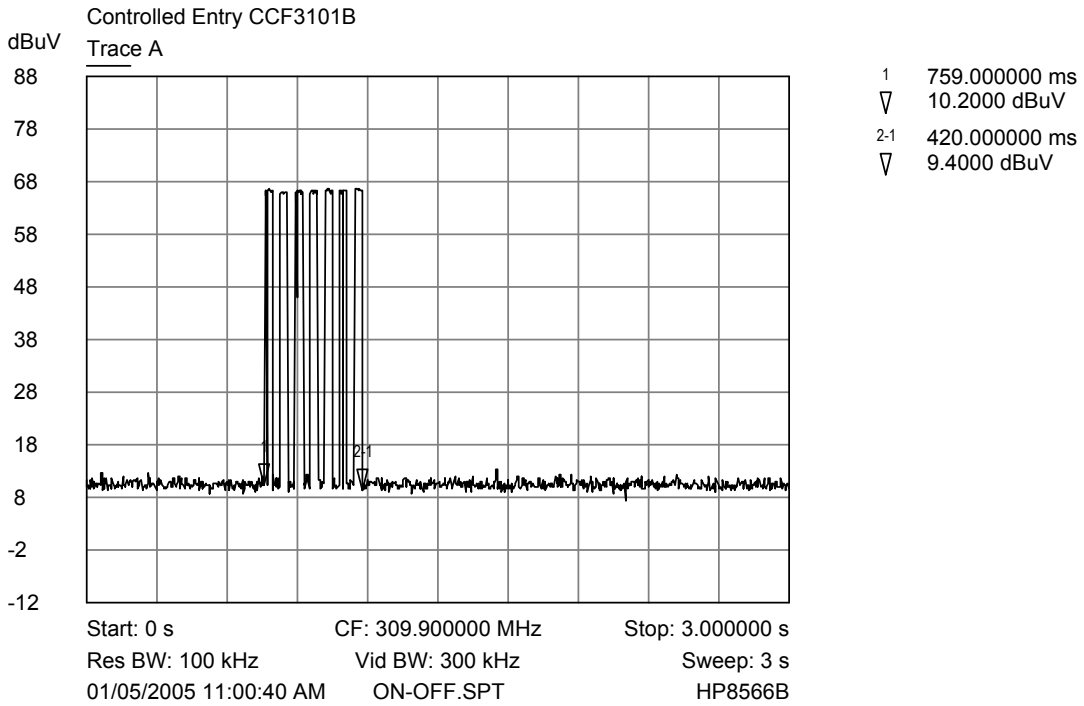
This section contains the test results only. Details of the test methods used and a list of the test equipment used during the measurements can be found in Appendix 1 of this report.

6.2 Test Results:

6.2.1 §15.231 (a)

Demonstration of Compliance:

1. A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released. The plot below shows the transmitter button depressed to activate the transmitter and then immediately released.



Button depressed and released

2. The CCF3101B cannot be automatically activated. The CCF3101B only transmits if manually activated.

3. The CCF3101B does not transmit at regular predetermined intervals. The CCF3101B only transmits if manually activated.

RESULT

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

6.2.2 §15.231 (b) Radiated Emissions

Demonstration of Compliance:

The CCF3101B operates at 310.0 MHz, therefore; the field strength of the fundamental must be less than 5833.3437 μV/m (75.3 dBμV/m) at 3 meters and the field strength of the harmonics must be less than 583.3 μV/m (55.3 dBμV/m) at 3 meters.

The limits for a distance of 3 meters are determined using the formula:

Limit in the 260 – 470 MHz band = 41.6667(F) – 7083.3333

Where F is the frequency in MHz

Emissions in the restricted bands of §15.205 must meet the limits specified in §15.209.

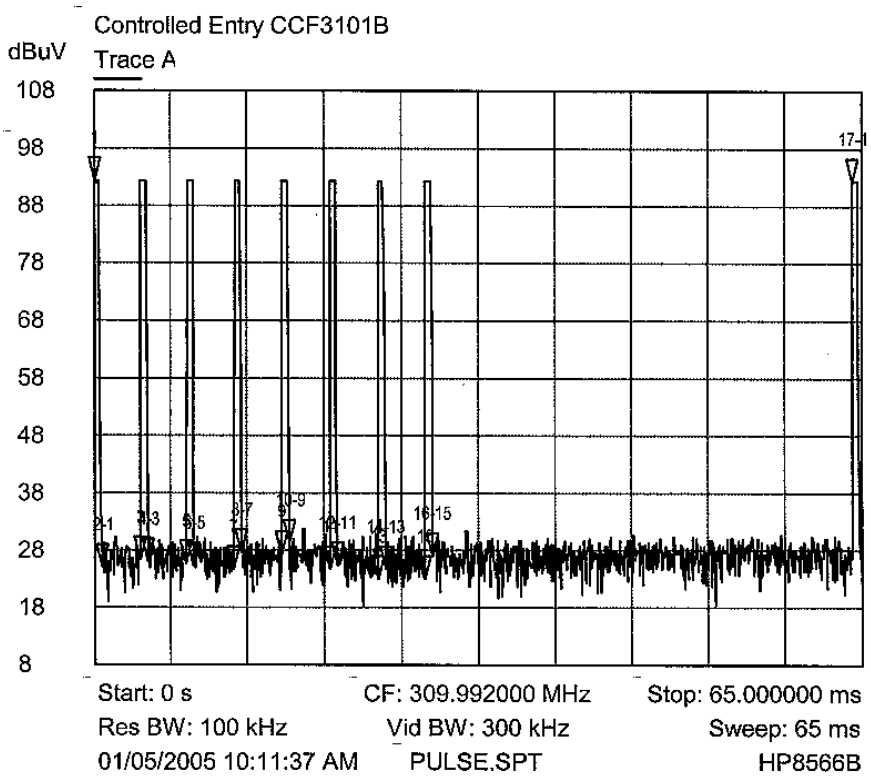
Measurement Data Fundamental and Harmonic Emissions:

The frequency range from 30 MHz to the tenth harmonic of the highest fundamental frequency was investigated to measure any radiated emissions.

A diagram of the test configuration and test equipment used is enclosed in Appendix 1.

Pulsed Emission Averaging Factor

The CCF3101B transmitter is a pulsed emission device; therefore, the method of §15.35 for averaging a pulsed emission may be used. The plot of the pulse train and the average factor calculations are shown below:



Pulse train

1	0 s
∇	92.2000 dBuV
2-1	585.000000 us
∇	24.9000 dBuV
3	3.835000 ms
∇	26.5000 dBuV
4-3	780.000000 us
∇	25.9000 dBuV
5	7.865000 ms
∇	25.7000 dBuV
6-5	650.000000 us
∇	25.4000 dBuV
7	11.895000 ms
∇	24.6000 dBuV
8-7	650.000000 us
∇	27.5000 dBuV
9	15.860000 ms
∇	27.2000 dBuV
10-9	650.000000 us
∇	29.4000 dBuV
11	19.955000 ms
∇	24.8000 dBuV
12-11	650.000000 us
∇	25.4000 dBuV
13	23.985000 ms
∇	23.1000 dBuV
14-13	650.000000 us
∇	24.8000 dBuV
15	27.885000 ms
∇	23.1000 dBuV
16-15	715.000000 us
∇	27.0000 dBuV
17-1	64.220000 ms
∇	92.4000 dBuV

Average factor calculation

From the plot, the total on time for the pulse train is 5.33 msec and the complete pulse train is 64.22 msec.

A measurement of 58.8 dBμV, the receiver measurement of the fundamental frequency in the vertical polarity, is equivalent to 871 μV/m.

$$\frac{871\ \mu V/m \times 5.33\ msec}{64.22\ msec} = 72.3\ \mu V/m \text{ or } 37.2\ dB\mu V$$

The difference from 58.8 dBμV peak measurement to 37.2 dBμV from averaging is 21.6, which exceeds the maximum averaging factor allowed by §15.35(b) which specifies a 20 dB maximum between the peak and average measurements; therefore, a 20 dB averaging factor was applied to the peak measurements.

Radiated Interference Level Data - (Vertical Polarity)

Frequency MHz	Detector	Receiver Reading dBμV	Average Factor dB	Correction Factor dB	Field Strength dBμV/m	Limit dBμV/m	Delta dB
310.0	Peak	58.8	20.0	17.9	56.7	75.3	-18.6
620.0	Peak	49.9	20.0	24.5	54.4	55.3	-0.9
930.0	Peak	45.2	20.0	28.9	54.1	55.3	-1.2
1240.0 *	Peak	43.1	20.0	28.4	51.5	54.0	-2.5
1550.0 *	Peak	32.9	20.0	30.0	42.9	54.0	-11.1
1860.0	Peak	29.9	20.0	31.2	41.1	55.3	-14.2
2170.0	Peak	23.0	20.0	32.3	35.3	55.3	-20.0
2480.0	Peak	16.9	20.0	33.3	30.2	55.3	-25.1
2790.0 *	Peak	7.6	20.0	34.2	21.8	54.0	-32.2
3100.0	Peak	12.2	20.0	34.9	27.1	55.3	-28.2
* Emissions within restricted bands							

Radiated Interference Level Data - (Horizontal Polarity)

Frequency MHz	Detector	Receiver Reading dBμV	Average Factor dB	Correction Factor dB	Field Strength dBμV/m	Limit dBμV/m	Delta dB
310.0	Peak	69.4	20.0	17.9	67.3	75.3	-8.0
620.0	Peak	45.9	20.0	24.5	50.4	55.3	-4.9
930.0	Peak	44.2	20.0	28.9	53.1	55.3	-2.2
1240.0 *	Peak	22.6	20.0	28.4	31.0	54.0	-23.0
1550.0 *	Peak	26.0	20.0	30.0	36.0	54.0	-18.0
1860.0	Peak	30.9	20.0	31.2	42.1	55.3	-13.2
2170.0	Peak	8.4	20.0	32.3	20.7	55.3	-34.6
2480.0	Peak	13.2	20.0	33.3	26.5	55.3	-28.8
2790.0 *	Peak	18.6	20.0	34.2	32.8	54.0	-21.2
3100.0	Peak	8.8	20.0	34.9	23.7	55.3	-31.6
* Emissions within restricted bands							

Sample Field Strength Calculation:

The field strength is calculated by adding the Correction Factor (Antenna Factor + Cable Factor) and subtracting the Average Factor from the measured level of the receiver. The receiver amplitude reading is compensated for any amplifier gain.

The basic equation with a sample calculation is shown below:

FS = RA + CF - AV Where

FS = Field Strength
RA = Receiver Amplitude Reading
CF = Correction Factor (Antenna Factor + Cable Factor)
AV = Averaging Factor

Assume a receiver reading of 58.8 dBμV is obtained from the receiver, with an average factor of 20 dB and a correction factor of 17.9 dB. The field strength is calculated by adding the correction factor and subtracting the average factor, giving a field strength of 56.7 dBμV/m, FS = (58.8 + 17.9) – 20.0 = 56.7 dBμV/m

RESULT

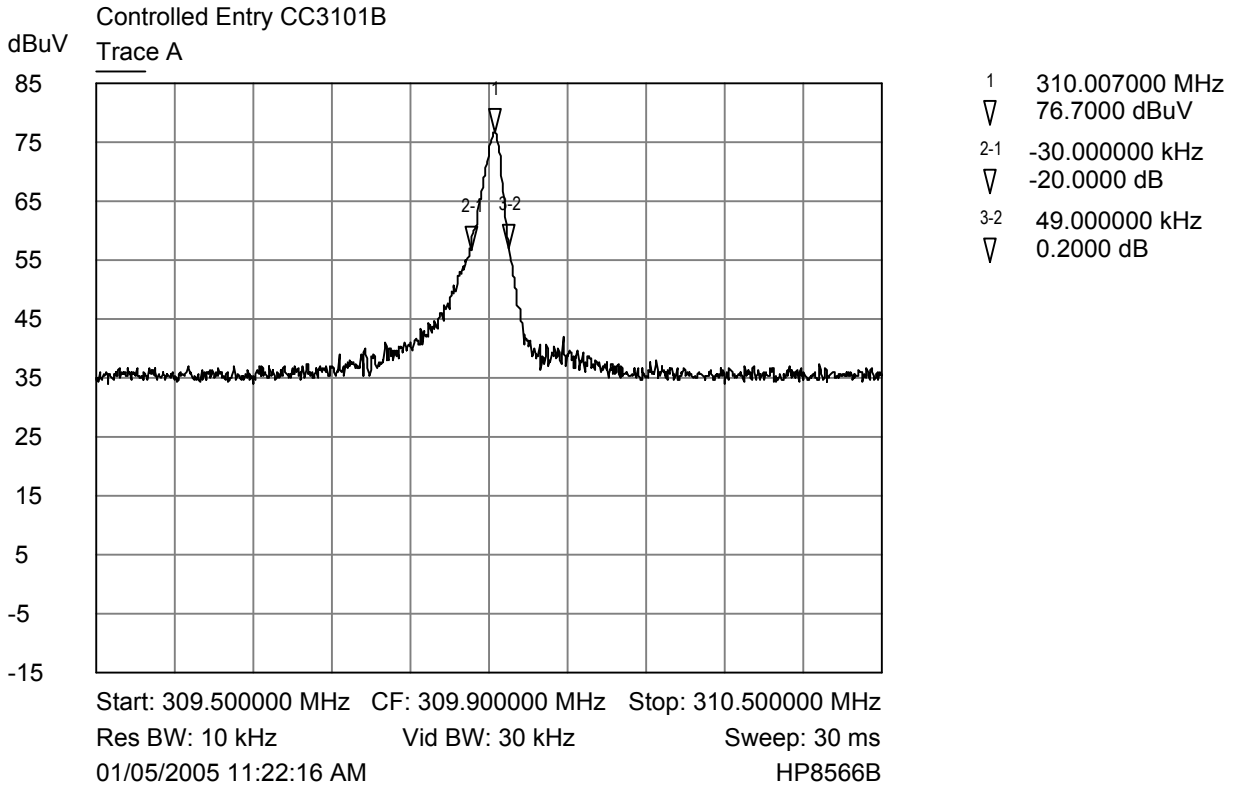
In the configuration tested, the EUT complied with the requirements of this section.

6.2.3 §15.231 (c) Bandwidth

Demonstration of Compliance:

The bandwidth of the emission must not be wider than 0.25% of the center frequency. The center frequency is 310 MHz, therefore the bandwidth must not be wider than 775 kHz. The CCF3101B bandwidth was 49 kHz, therefore it meets the bandwidth requirements. See spectrum analyzer plot below.

CCF3101B Bandwidth Plot



Bandwidth plot

6.2.4 §15.207 Line Conducted Emissions

The CCF3101B is powered from a 12 VDC battery, therefore the line conducted emission tests are not applicable.

APPENDIX 1 TEST PROCEDURES AND TEST EQUIPMENT

Radiated Interference Emissions:

The radiated emission from the intentional radiator was measured using a spectrum analyzer. The resolution bandwidth was set at 100 kHz and the video bandwidth was set at 300 kHz. 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.

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 1 GHz to 3.1 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 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.

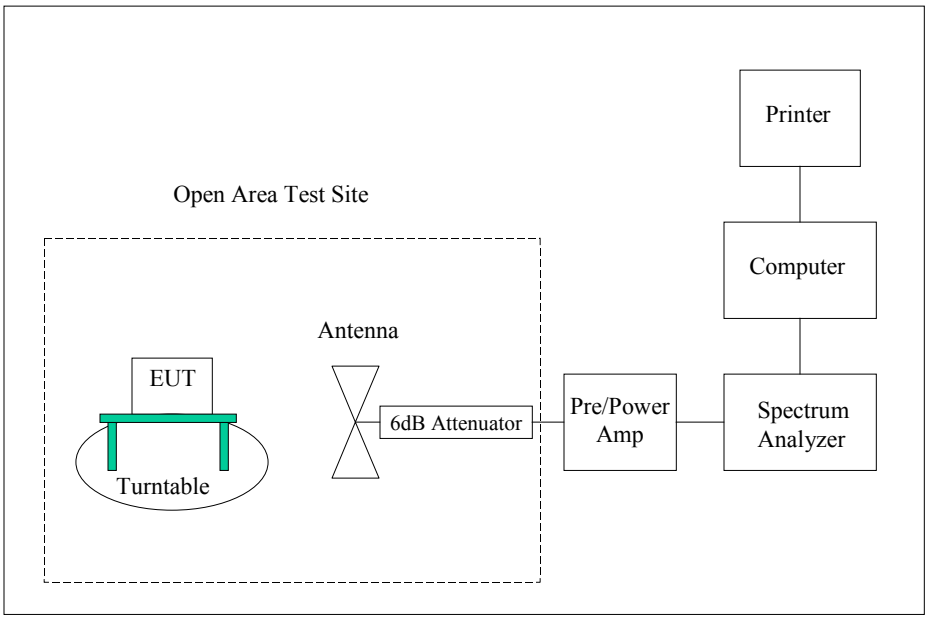
Desktop intentional radiator is measured on a non-conducting table one meter above the ground plane. The table is placed on a turntable which is level with the ground plane. The turntable has slip rings, which supply AC power to the intentional radiator. For equipment normally placed on floors, the equipment 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

Type of Equipment	Manufacturer	Model Number	Serial Number	Date of Last Calibration
Double Ridged Guide Antenna	EMCO	3115	2129	06/10/2003
High Frequency Amplifier	Hewlett Packard	8449B	3008A00990	04/25/2003
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
Pre/Power-Amplifier	Hewlett Packard	8447F	3113A05161	09/15/2004
6 dB Attenuator	Hewlett Packard	8491A	32835	12/09/2004

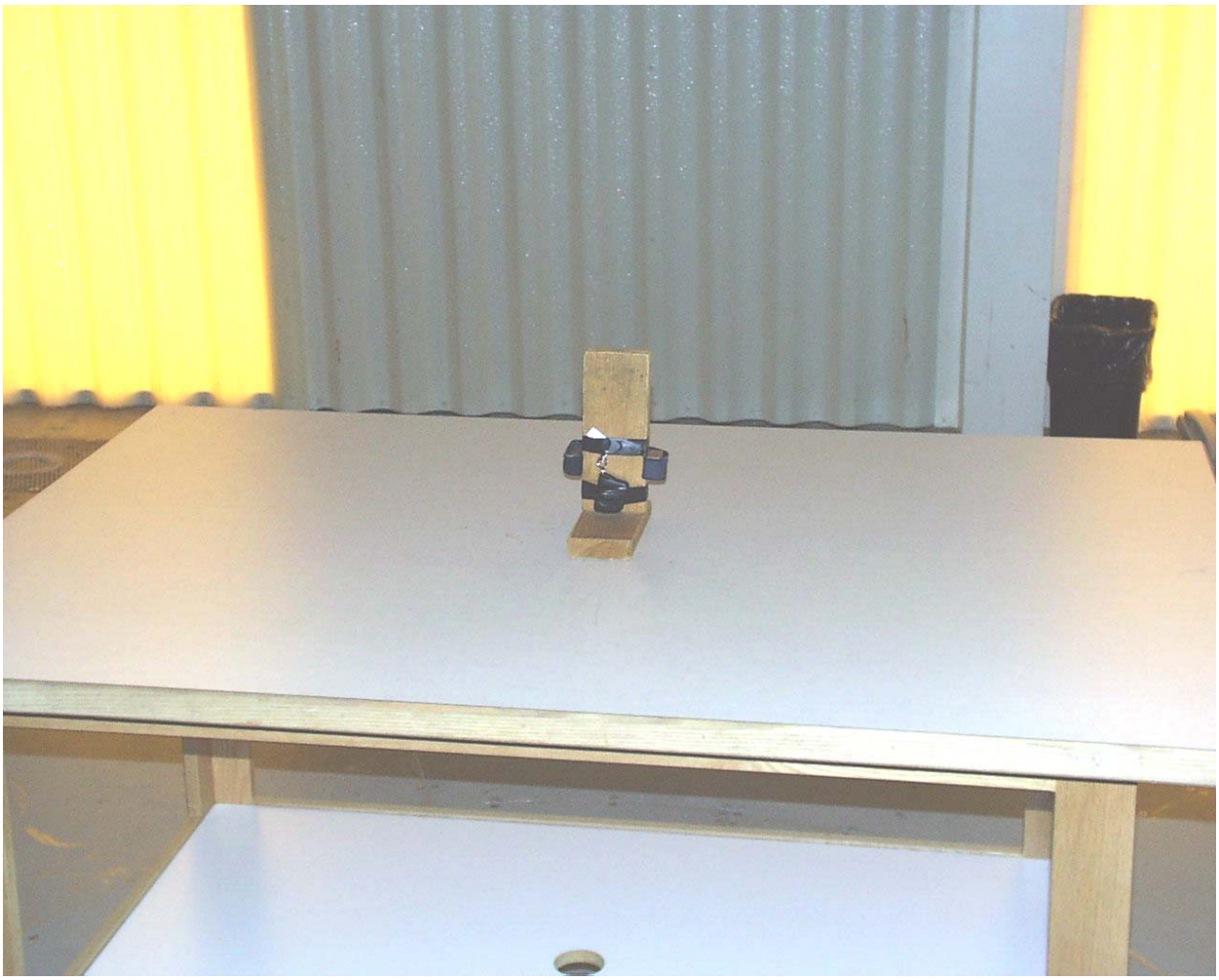
An independent calibration laboratory or CCL personnel calibrates all the equipment listed above at intervals defined in ANSI C63.4:2003 Section 4.4 following outlined calibration procedures. All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Supporting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

Radiated Emissions Test Setup



APPENDIX 2 PHOTOGRAPHS

Front View of the Radiated Test Setup

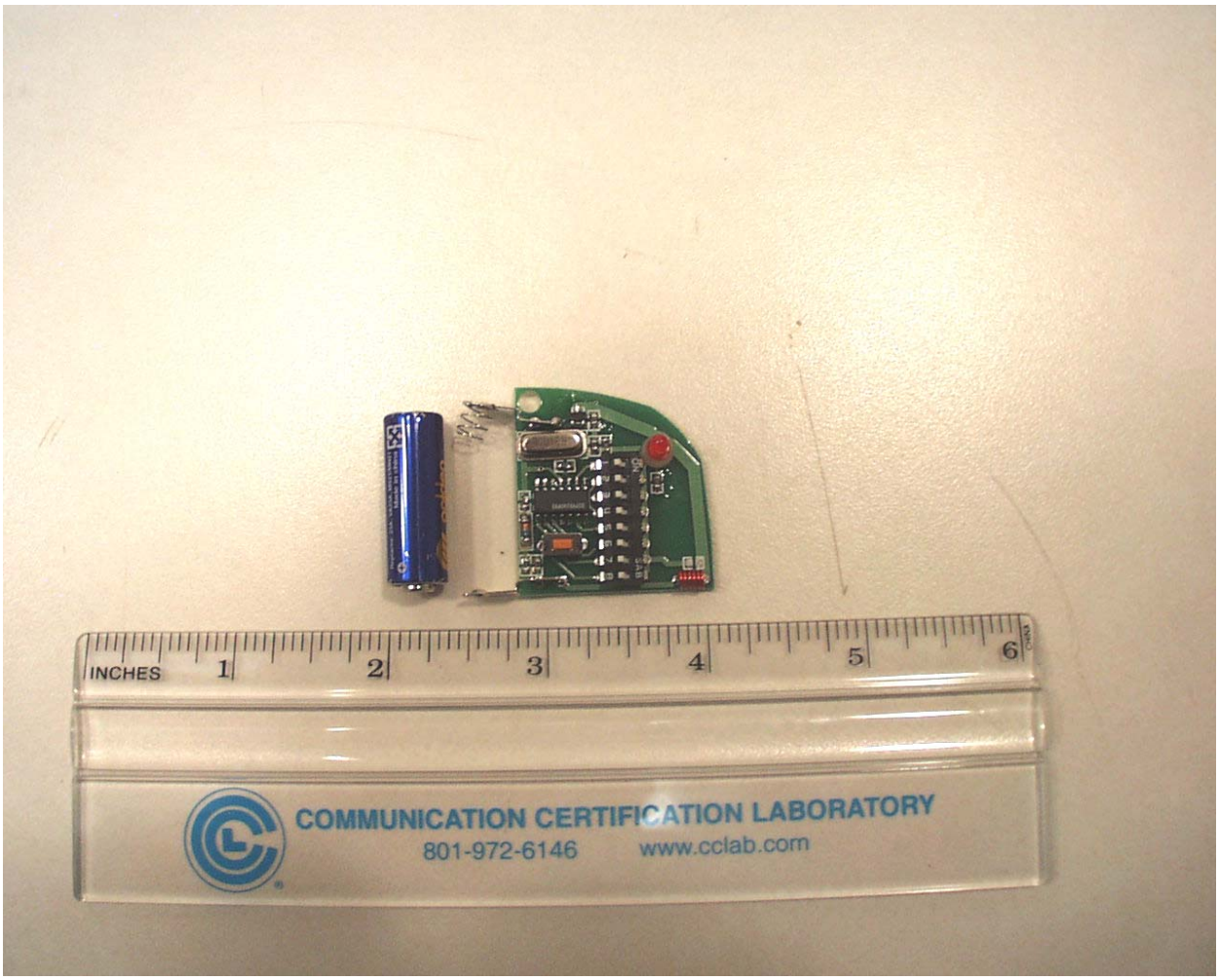
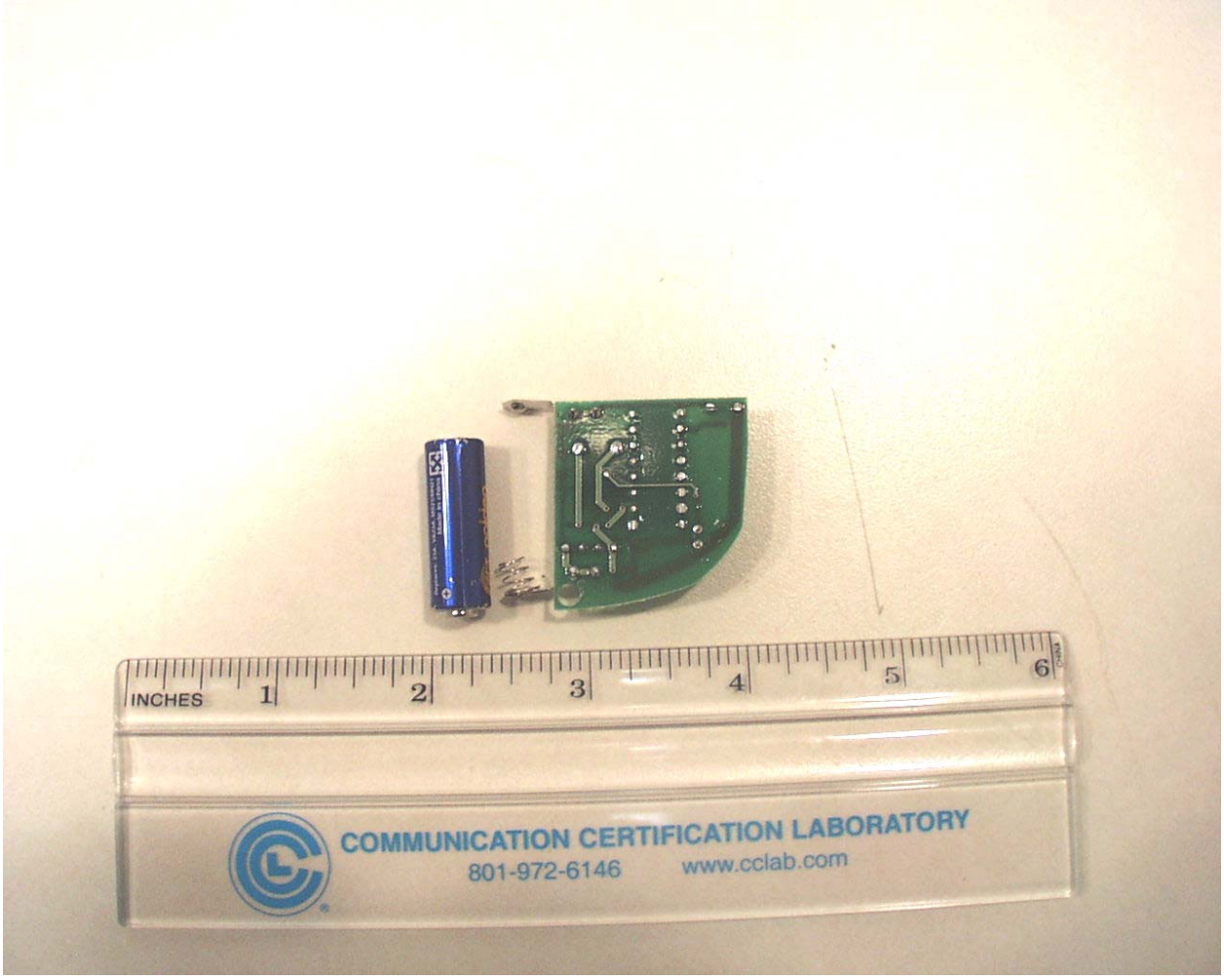


Front View of the EUT

Back View of the EUT

View of the Inside of the Case

View of the Component Side of the PCB



View of the Trace Side of the PCB