

FCC TEST REPORT

FCC ID : S4XML-21

Applicant : **Shenzhen C&D Electronics Co.,Ltd.**
Building 2, Xia You Song Mountaintop Industrial District, YouSong
Village, LongHua Town, BaoAn District, ShenZhen China

Equipment Under Test (EUT) :

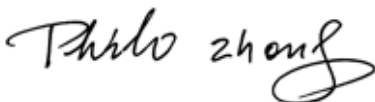
Product description : REMOTE ACCESS FOR POWERVISORS

Model No. : ML-21

Standards : FCC 15 Paragraph 15.205, Paragraph 15.209, Paragraph 15.231,
Paragraph 15.31, Paragraph 15.33, Paragraph 15.35.

Date of Test : May 26, 2005

Test Engineer : Jimmy Lee

Reviewed By : 

PERPARED BY:
Shenzhen Huatongwei International Inspection Co., Ltd
Keji S,12th,Road, Hi-tech Industrial Park, Shenzhen, Guangdong, China

FCC Registration Number: 662850

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3 **Test Summary**

Test	Test Requirement	Test Method	Class / Severity	Result
Radiated Emission (30MHz to 5GHz)	FCC PART 15: 2003	ANSI C63.4: 1992	Class B	PASS
Conducted Emission (150KHz to 30MHz)	FCC PART 15: 2003	ANSI C63.4: 1992	Class B	N/A

4 General Information

4.1 Client Information

Applicant: **Shenzhen C&D Electronics Co.,Ltd.**
Address of Applicant: Building 2, Xia You Song Mountaintop Industrial District,
YouSong Village, LongHua Town, BaoAn District, ShenZhen
China

4.2 General Description of E.U.T.

Product description: REMOTE ACCESS FOR POWERVISORS
Model No.: ML-21

4.3 Details of E.U.T.

Power Supply: 12VDC Battery

4.4 Description of Support Units

The EUT has been tested as an independent device unit.

4.5 Standards Applicable for Testing

The customer requested FCC tests for a REMOTE ACCESS FOR POWERVISORS. The standards used were FCC 15 Paragraph 15.205, Paragraph 15.209, Paragraph 15.231, Paragraph 15.31, Paragraph 15.33, Paragraph 15.35.

4.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC – Registration No.: 662850**

Shenzhen Huatongwei International Inspection Co., Ltd, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 662850, November 17, 2003.

4.7 Test Location

All Emissions tests were performed at:-Shenzhen Huatongwei International Inspection Co., Ltd. at Keji S,12th,Road, Hi-tech Industrial Park, Shenzhen, Guangdong, China.

5 Equipment Used during Test

Conducted Emission Test						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due date
1	Shielding Room	ETS	8 x 4 x 4 m ³	N0.2	N/A	N/A
2	LISN	Rohde & Schwarz	ESH2-Z5	100028	06-11-2004	05-11-2005
3	EMI Test Receiver	Rohde & Schwarz	ESCS30	100038	18-11-2004	17-11-2005
Radiated Emission Test						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due date
1	3m Semi- Anechoic Chamber	ETS	N/A	N/A	05-11-2004	04-11-2005
2	EMI Test Receiver	ROHDE & SCHWARZ	ESI 26	100009	05-11.2004	04-11-2005
3	EMI Test Receiver	ROHDE & SCHWARZ	ESCS30	100038	05-11.2004	04-11-2005
4	EMI Test Software	ROHDE & SCHWARZ	ES-K1	N/A	N/A	N/A
5	Bilog Type Antenna	ETS	2075	2346	02-12-2004	01-12-2005
6	Horn Antenna	ROHDE & SCHWARZ	HF906	1000029	05-11.2004	04-11-2005
7	Ultra-Broadband Antenna	ROHDE & SCHWARZ	HL562	100015	02-12-2004	01-12-2005
Common Used Equipment						
Item	Test Equipment	Manufacturer	Model No.	Series No.	Cal. Date	Due date
1	Temperature, Humidity & Barometer	OREGON SCIENTIFIC	BA-888	EMC0001 to EMC0004	25-07-2004	25-07-2005
2	DMM	FLUKE	73	70681569 or 70671122	23-07-2004	23-07-2005

6 **Conducted Emission Test**

Product:	REMOTE ACCESS FOR POWERSVISORS
Test Requirement:	FCC Part15 Paragraph 15.207
Test Method:	Based on FCC Part15 Paragraph 15.207
Test Date:
Frequency Range:	150kHz to 30MHz
Class:	Class B
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth) Quasi-Peak & Average if maximised peak within 6dB of Average Limit

6.1 **Test Equipment**

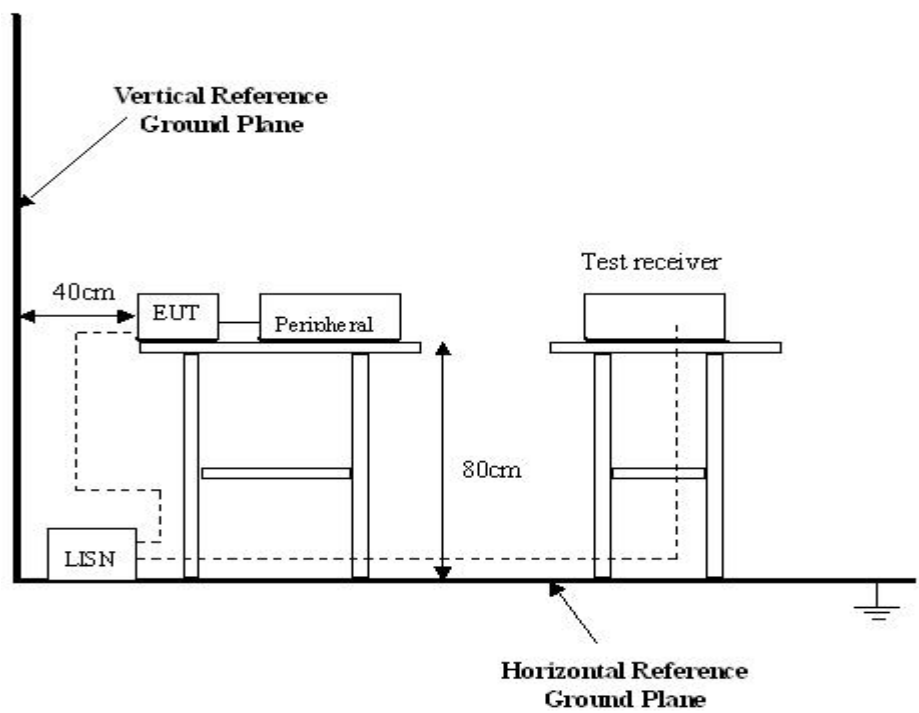
Please refer to Section 5 this report.

6.2 **Test Procedure**

1. The EUT was tested according to ANSI C63.4. The frequency spectrum from 150kHz to 30MHz was investigated.
2. The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

6.3 Conducted Test Setup

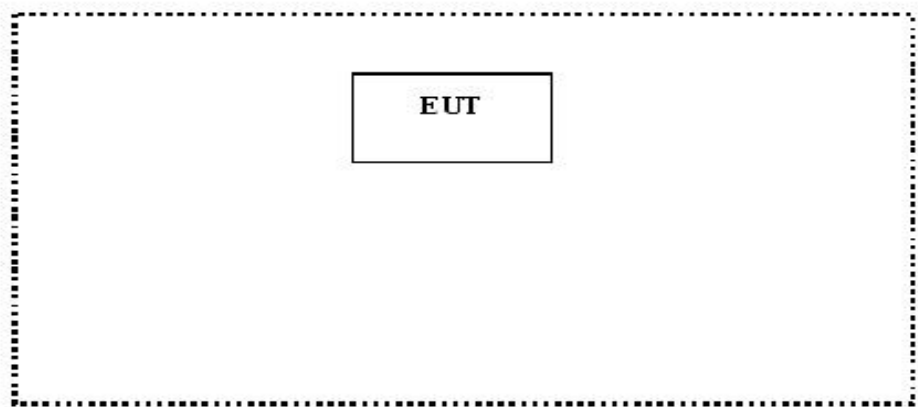
The conducted emission tests were performed using the setup accordance with the ANSI C63.4, The specification used in this report was the FCC Part15 Paragraph 15.207 limits.



6.4 EUT Operating Condition

Operating condition is according to ANSI C63.4.

- A. Setup the EUT and simulators as shown on follow.
- B. Enable RF signal and confirm EUT active.
- C. Modulate output capacity of EUT up to specification.



6.5 Conducted Emission Limits

66-56 dB μ V/m between 0.15MHz & 0.5MHz

56 dB μ V/m between 0.5MHz & 5MHz

60 dB μ V/m between 5MHz & 30MHz

Note: In the above limits, the tighter limit applies at the band edges.

6.6 Conducted Emission Test Result

Owing to the DC operation of EUT, this test is not performed.

7 Radiation Emission Test

Product:	REMOTE ACCESS FOR POWERVISORS
Test Requirement:	FCC Part15 Paragraph 15.209, Paragraph 15.231
Test Method:	Based on FCC Part15 Paragraph 15.33
Test Date:	May 26, 2005
Frequency Range:	30MHz to 5GHz
Measurement Distance:	3m
Detector:	Peak for pre-scan (120kHz resolution bandwidth) Quasi-Peak if maximised peak within 6dB of limit

7.1 Test Equipment

Please refer to Section 5 this report.

7.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

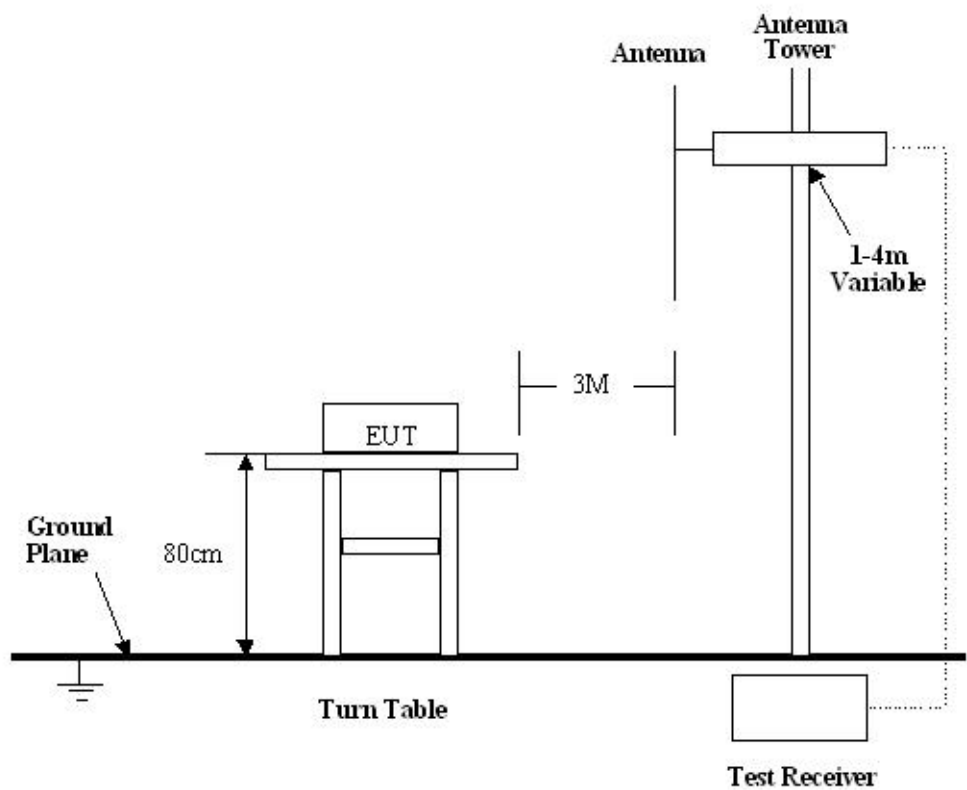
Based on ANSI C63.4, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at SZHTW is +4.0 dB.

7.3 Test Procedure

1. For the radiated emissions test, since the EUT does not have a power source, there was no connection to AC outlets.
2. Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combinations.
3. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB μ V of specification limits), and are distinguished with a "Qp" in the data table.
4. The EUT was under normal mode during the final qualification test and the configuration was used to represent the worst case results.

7.4 Radiated Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4, The specification used in this report was the FCC Part15 Paragraph 15.209, Paragraph 15.231 limits.



7.5 Spectrum Analyzer Setup

According to FCC Part15 Paragraph 15.209, Paragraph 15.231 Rules, the system was tested to 5000 MHz.

Start Frequency	30 MHz
Stop Frequency	5000 MHz
Sweep Speed	Auto
IF Bandwidth	100 kHz
Video Bandwidth	1 MHz
Quasi-Peak Adapter Bandwidth	120 kHz
Quasi-Peak Adapter Mode.....	Normal
Resolution Bandwidth	1MHz

7.6 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB μ V means the emission is 7dB μ V below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Class B Limit}$$

7.7 Summary of Test Results

According to the data in section 7.10, the EUT complied with the FCC Part15 Paragraph 15.209 and Paragraph 15.231 standards.

7.8 EUT Operating Condition

Same as section 6.4 of this report.

7.9 Radiated Emissions Limit

A. FCC Part 15 subpart C Paragraph 15.231 Limit

Fundamental Frequency(MHZ)	Field Strength of Fundamental	
	uV/m	dBuV/m
315.0	6041.68	75.62

Note: (1) $RF\ Voltage(dBuV) = 20 \log RF\ Voltage(uV)$

(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

(3) The emission limit in this paragraph is based on measurement instrumentation employing an average detector. Measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.

B. Frequencies in restricted band are complied to limit on Paragraph 15.209

Frequency(MHZ)	Distance(m)	Field strength(dBuV/m)
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

Note: (1) $\text{RF Voltage(dBuV)} = 20 \log \text{RF Voltage(uV)}$
(2) In the Above Table, the tighter limit applies at the band edges.
(3) Distance refers to the distance in meters between the measuring instrument antenna.

7.10 Radiated Emissions Test Result

Formula of conversion factors:the field strength at 3m was established by adding
The meter reading of the spectrum analyzer (which is set to read in units of dBuV)
To the antenna correction factor supplied by the antenna manufacturer. The antenna
Correction factors are stated in terms of dB.The gain of the pressletor was accounted
For in the spectrum analyser meter reading.

Example:

Freq(MHz) Meter Reading +ACF=FS

33 20dBuV+10.36dB=30.36dBuV/m @3m

A. Fundamental Radiated Emission Data for 315MHz

Test Item: Fundamental Radiated Emission Data
Test Voltage: 12VDC Battery
Test Mode: On
Temperature: 24 °C
Humidity: 52%RH
Test Result: PASS

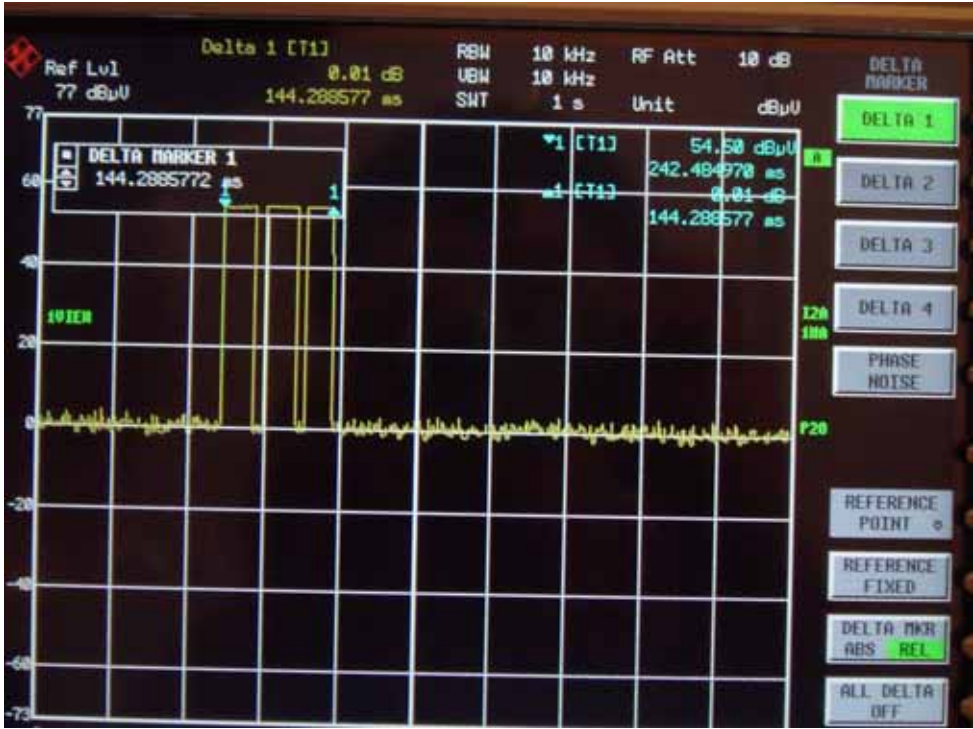
Frequency (MHz)	Antenna Polarization	Emission Level (dBuV/m)	FCC 15 Subpart C Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Turntable Angle (°)
315.151503	Vertical	71.37	75.62	4.25	1.5	60
315.151503	Horizontal	72.53	75.62	3.09	1.5	60

B. General Radiated Emission Data

Test Item: General Radiated Emission Data
 Test Voltage: 12VDC Battery
 Test Mode: On
 Temperature: 24 °C
 Humidity: 52%RH
 Test Result: PASS

Frequency (MHz)	Antenna Polarization	Emission Level (dBuV/m)	FCC 15 Subpart C Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Turntable Angle (°)
30.551642	Vertical	27.80	40.0	12.2	1.2	45
296.884675	Vertical	28.50	46.0	17.5	2.0	180
564.145251	Vertical	30.50	46.0	15.5	1.8	60
630.661323	Vertical	38.21	46.0	7.79	1.6	60
945.571142	Vertical	39.09	46.0	6.91	2.0	180
30.796576	Horizontal	28.20	40.0	11.8	1.2	45
213.493459	Horizontal	31.53	43.5	11.97	1.6	60
571.249431	Horizontal	30.80	46.0	15.2	2.0	180
630.661323	Horizontal	37.88	46.0	8.12	1.6	60
945.571142	Horizontal	38.66	46.0	7.34	1.5	180

8 Periodic Operation



9 Band Edge

Test Requirement:	FCC Part15 C
Test Method:	Based on FCC Part15 Paragraph 15.231
Test Date:	May 26, 2005
Test mode:	On
Temperature:	24 °C
Humidity:	52%RH

9.1 Test Procedure

1. The EUT, peripherals were put on the turntable which table size is 1mX1.5m, table high 0.8m. All set up is according to ANSI C63.4.
2. With the EUT's antenna attached, The EUT's radiated emission power was received by the test antenna which was connected to the spectrum analyser with the START and STOP frequencies set to the EUT's operation band. Measurements were made at 3 meters.
3. The antenna high were varied from 1m to 4m high to find the maximum emission for each frequency.
4. The bandwidth of the fundamental frequency was measure by spectrum analyser with 20KHz RBW and 200KHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power 20dB.

9.2 Band Edge

Requirements: Paragraph 15.231, The emission power at the START and STOP frequencies shall be at least 50dB below the level of the fundamental or to the general radiated emission limits in FCC 15.209.

9.3 Band Edge Test Result

315MHz TX

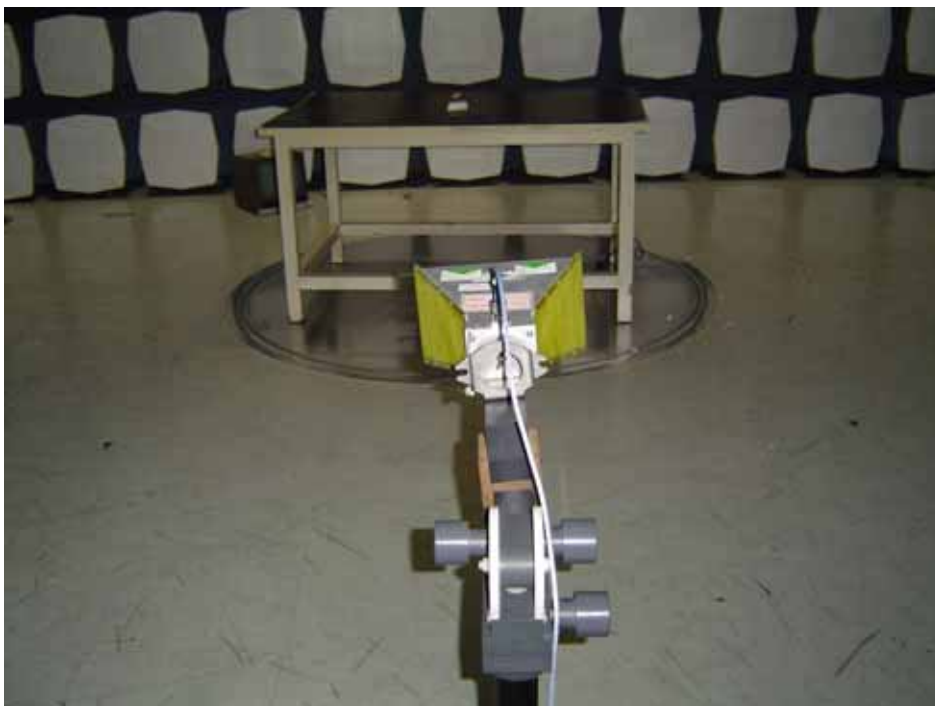


10 Photographs of Testing

10.1 Radiation Emission Test View For 30MHz-1000MHz



10.2 Radiation Emission Test View For 1GHz-5GHz



11 Photographs - Constructional Details

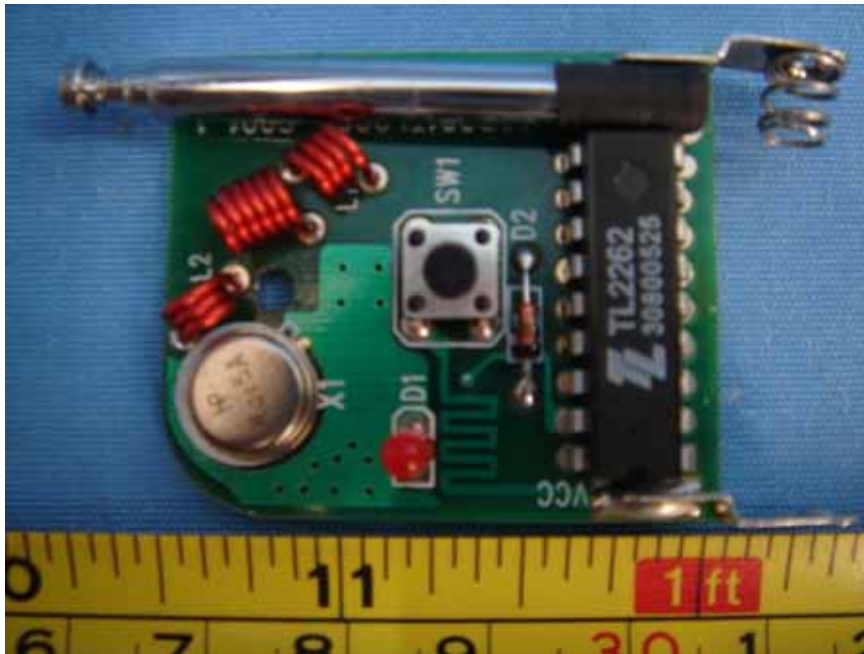
11.1 EUT - Front View



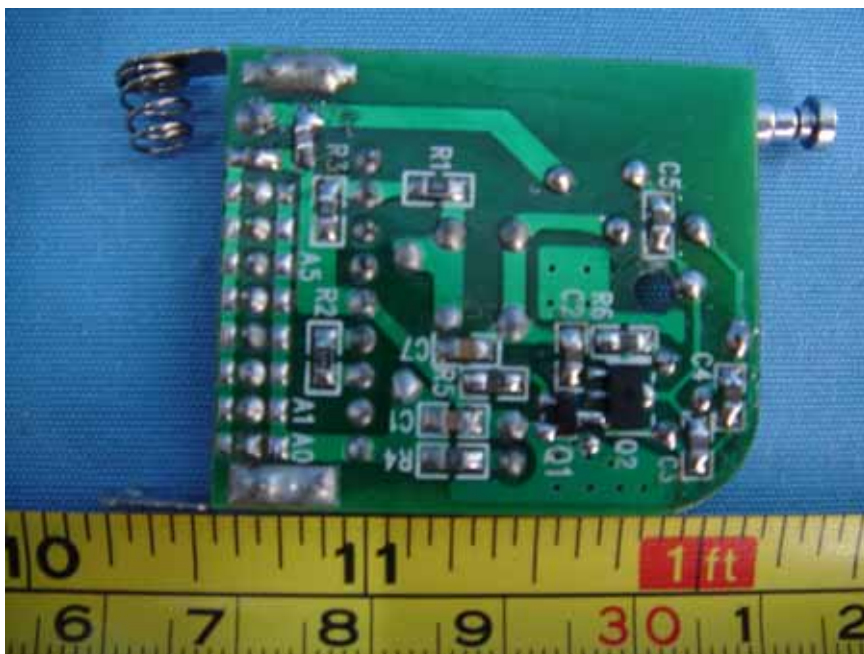
11.2 EUT - Back View



11.3 PCB - Component View



11.4 PCB - Solder View



12 FCC ID Label

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:(1)this device may not cause harmful interference,and (2) this device must accept any interference received, including interference that may cause undesired operation

The Label must not be a stick-on paper. The Label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

Proposed Label Location on EUT
EUT Bottom View/proposed FCC Mark Location

