

FCC PART 18 MEASUREMENT AND TEST REPORT

For

Ningbo Sunbe Electric Lighting Co., Ltd.

RM 13-15, 19/F, Hualian
Bldg No. 238 Zhongshan East Rd
Ningbo, China

FCC ID: QHESB016

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This Report Concerns: ☒ Original Report	Equipment Type: CFL
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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Ningbo Sunbe Electric Lighting Co., Ltd.'s ET, ES, EG, and ETR Series or the "EUT" as referred to in this report is an CFL. For marketing purposes the applicant created the following family series: ES-13, ES-15, ES-20, EG-20, ES-23, ES-25, ETR-25. The EUT that were tested are: ET-13, ET-15, ET-20, ET-23, and ET-25, they were tested to represent the worst case results.

Note: The test data was only good for the test sample. It may have deviation for other test sample.

1.2 Objective

The following test report is prepared on behalf of *Ningbo Sunbe Electric Lighting Co., Ltd.* in accordance with Part 2, Subpart J, and Part 18, Subparts A, B, and C of the Federal Communication Commissions rules and regulations.

The objective of the manufacturer is to demonstrate compliance with FCC Part 18 limit requirements for Industrial, Scientific, and Medical Equipment.

1.3 Related Submittal(s)/Grant(s)

No Related Submittals.

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 –2000, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 Meters.

1.5 Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated and conducted emission measurement data is located in the back parking lot of the building at the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

Test site at Bay Area Compliance Laboratory Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2000.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratory Corporation is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (NVLAP). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, IEC/CISPR 22: 1998, and AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167-0.

1.6 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Last Cal. Date	Cal. Due Date
HP	Spectrum Analyzer	8568B	Panel 2408A00105 Display 2403A06544	5/1/2002	5/1/2003
HP	Spectrum Analyzer	8593A	29190A00242	5/1/2002	5/1/2003
HP	Amplifier	8447E	1937A01054	5/1/2002	5/1/2003
HP	Quasi-Peak Adapter	85650A	2521A00718	5/1/2002	5/1/2003
HP	Signal generator	8640B	1727A06741	5/1/2002	5/1/2003
HP	Signal generator	8685A	2214A03081	5/1/2002	5/1/2003
Com-Power	Biconical Antenna	AB-100	14012	5/1/2002	5/1/2003
SOLAR	LISN	9252-50-R-24-BNC	984412	5/1/2002	5/1/2003
SOLAR	LISN	9252-50-R-20-BNC	984413	5/1/2002	5/1/2003
Com-Power	Log Periodic Antenna	AL-100	16091	5/1/2002	5/1/2003
Com-Power	Log Periodic Antenna	AB-900	15049	5/1/2002	5/1/2003

*** Statement of Traceability:** Bay Area Compliance Laboratory Corp certifies that all calibration has been performed using suitable standards traceable to the NATIONAL INSTITUTE of STANDARDS and TECHNOLOGY (NIST).

2 - SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was tested under normal mode as used by a common (typical) user.

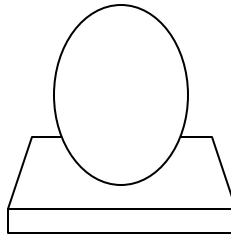
2.2 Schematics / Block Diagram

Appendix A contains a copy of the EUT's schematics diagram as reference.

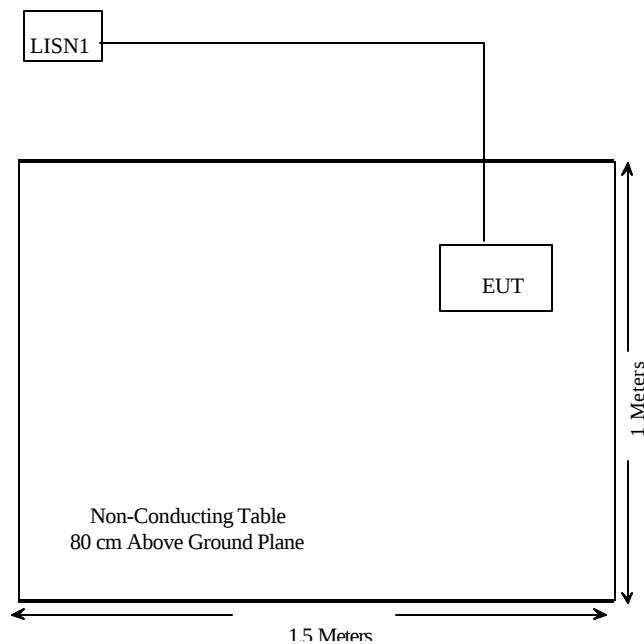
2.3 Equipment Modifications

No modifications were made by BACL Corporation to ensure the EUT to comply with the application limits and requirements.

2.4 Configuration of Test System



2.5 Test Setup Block Diagram



3 - CONDUCTED EMISSIONS TEST DATA

3.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is ± 2.4 dB.

3.2 EUT Setup

The measurement was performed at the **Open Area Test Site**, using the same setup per ANSI C63.4 - 2000 measurement procedure. The specification used was the FCC Part 18 limits.

The EUT was placed on the center of the back edge on the test table.

The power cord extension of the EUT was connected with 110 Vac/60 Hz power source.

3.3 Spectrum Analyzer Setup

The spectrum analyzer was set with the following configuration during the conduction test:

Start Frequency	450 kHz
Stop Frequency	30 MHz
Sweep Speed.....	Auto
IF Bandwidth.....	10 kHz
Video Bandwidth	10 kHz
Quasi-Peak Adapter Bandwidth.....	9 kHz
Quasi-Peak Adapter Mode.....	Normal

3.4 Test Procedure

During the conducted emission test, the power cord of the power cord extension was connected to the auxiliary outlet of the first LISN.

Maximizing procedure was performed on the six (6) highest emissions to ensure that the EUT is compliant with all installation combination.

All data was recorded in the peak detection mode. Quasi-peak readings were only performed when an emission was found to be marginal (within -4 dB μ V of specification limits). Quasi-peak readings are distinguished with a "Qp".

The EUT was tested under the normal modes during the final qualification test to represent the worst case results.

3.5 Summary of Test Results

According to the data in section 3.6, the EUT complied with the FCC 18 Conducted margin for industry, scientific and medical device, and with the worst margin reading of:

0.45-30MHz

- ET-13: -12.17 dBμV at 1.63 MHz at the **Line** mode.
 ET-15: -14.43 dBμV at 1.58 MHz at the **Neutral** mode.
 ET-20: -14.50 dBμV at 3.01 MHz at the **Neutral** mode.
 ET-23: -13.50 dBμV at 2.85 MHz at the **Line** mode.
 ET-25: -13.00 dBμV at 2.86 MHz at the **Neutral** mode.

3.6 Conducted Emissions Test Data

3.6.1 Test Data, 0.45-30MHz

ET-13 Test Data

LINE CONDUCTED EMISSIONS				FCC PART 18	
Frequency MHz	Amplitude dBμV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBμV	Margin dB
1.63	35.83	QP	Line	48	-12.17
21.63	26.50	QP	Line	48	-21.50
17.84	25.67	QP	Neutral	48	-22.33
27.49	23.17	QP	Line	48	-24.83
21.63	23.00	QP	Neutral	48	-25.00
18.62	21.50	QP	Neutral	48	-26.50

ET-15 Test Data

LINE CONDUCTED EMISSIONS				FCC PART 18	
Frequency MHz	Amplitude dBμV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBμV	Margin dB
1.58	33.57	QP	Neutral	48	-14.43
2.91	29.17	QP	Neutral	48	-18.83
5.13	27.83	QP	Neutral	48	-20.17
5.28	27.67	QP	Line	48	-20.33
7.25	26.33	QP	Line	48	-21.67
6.46	26.17	QP	Line	48	-21.83

ET-20 Test Data

LINE CONDUCTED EMISSIONS				FCC PART 18	
Frequency	Amplitude	Detector	Phase	Limit	Margin
MHz	dBμV	Qp/Ave/Peak	Line/Neutral	dBμV	dB
3.01	33.50	QP	Neutral	48	-14.50
2.67	32.33	QP	Neutral	48	-15.67
2.03	31.60	QP	Line	48	-16.40
8.63	31.50	QP	Neutral	48	-16.50
2.27	29.33	QP	Line	48	-18.67
2.67	28.83	QP	Line	48	-19.17

ET-23 Test Data

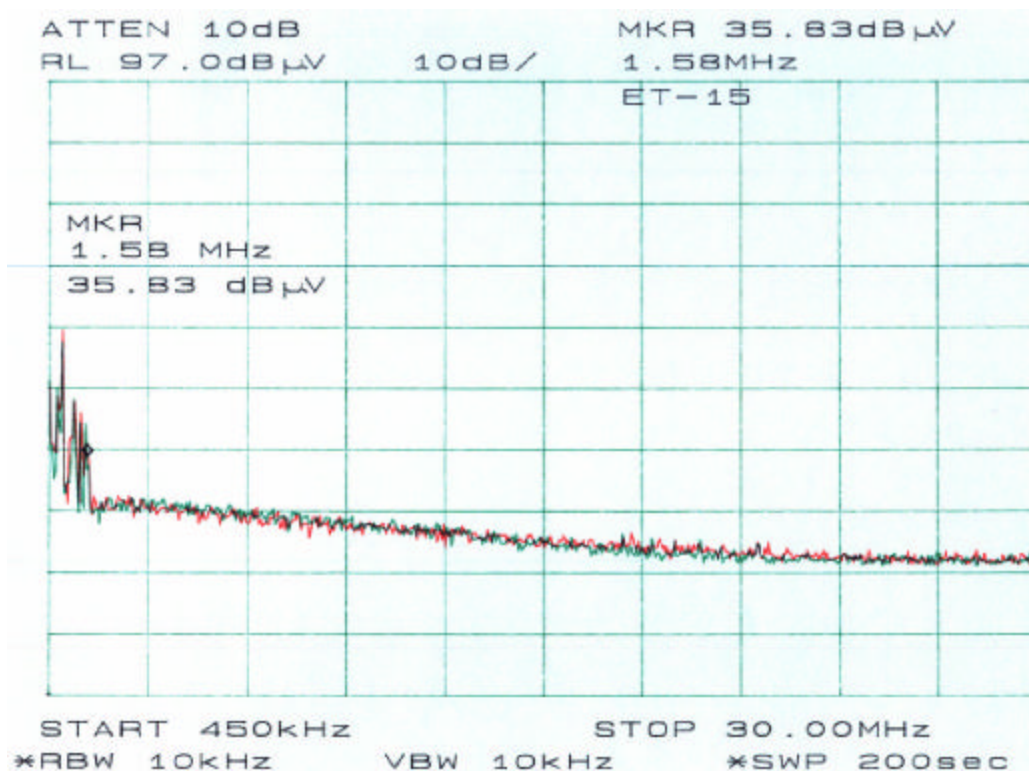
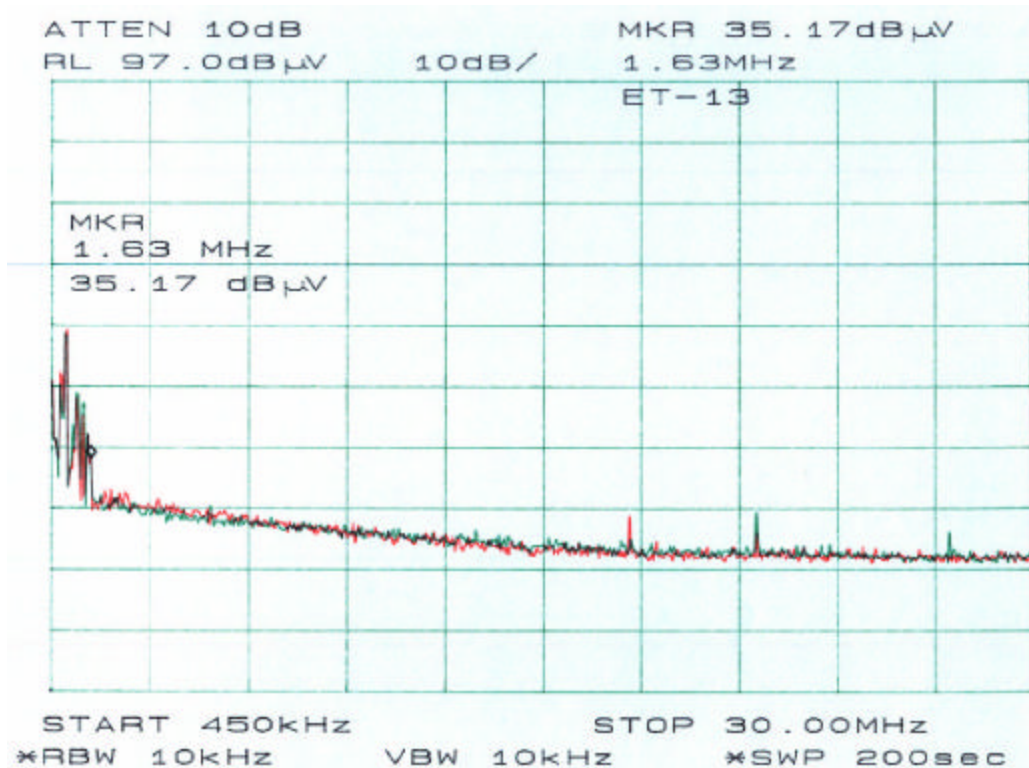
LINE CONDUCTED EMISSIONS				FCC PART 18	
Frequency	Amplitude	Detector	Phase	Limit	Margin
MHz	dBμV	Qp/Ave/Peak	Line/Neutral	dBμV	dB
2.85	34.50	QP	Line	48	-13.50
2.81	34.17	QP	Neutral	48	-13.83
2.67	33.83	QP	Line	48	-14.17
2.72	33.33	QP	Neutral	48	-14.67
2.52	33.00	QP	Neutral	48	-15.00
3.50	32.83	QP	Line	48	-15.17

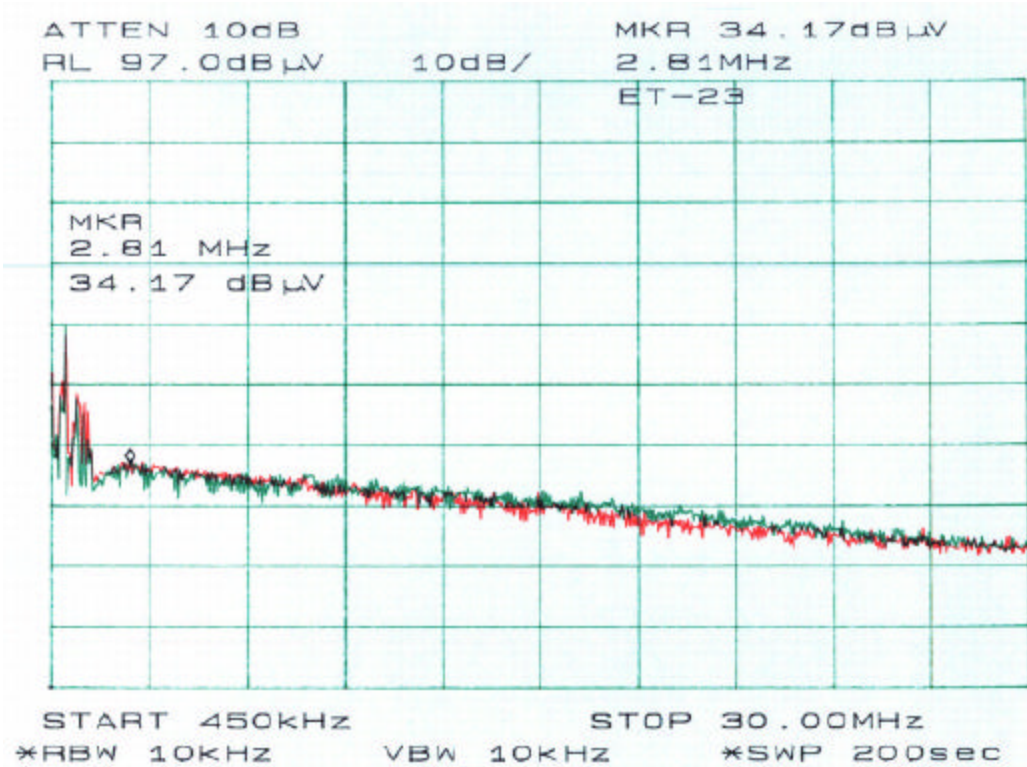
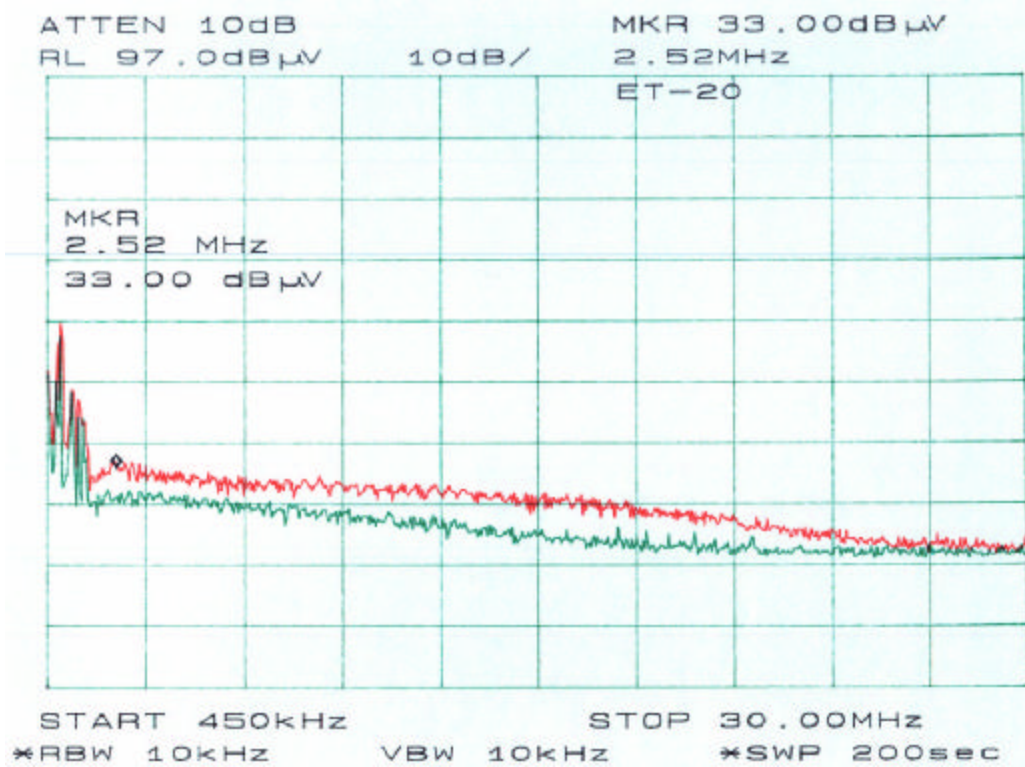
ET-25 Test Data

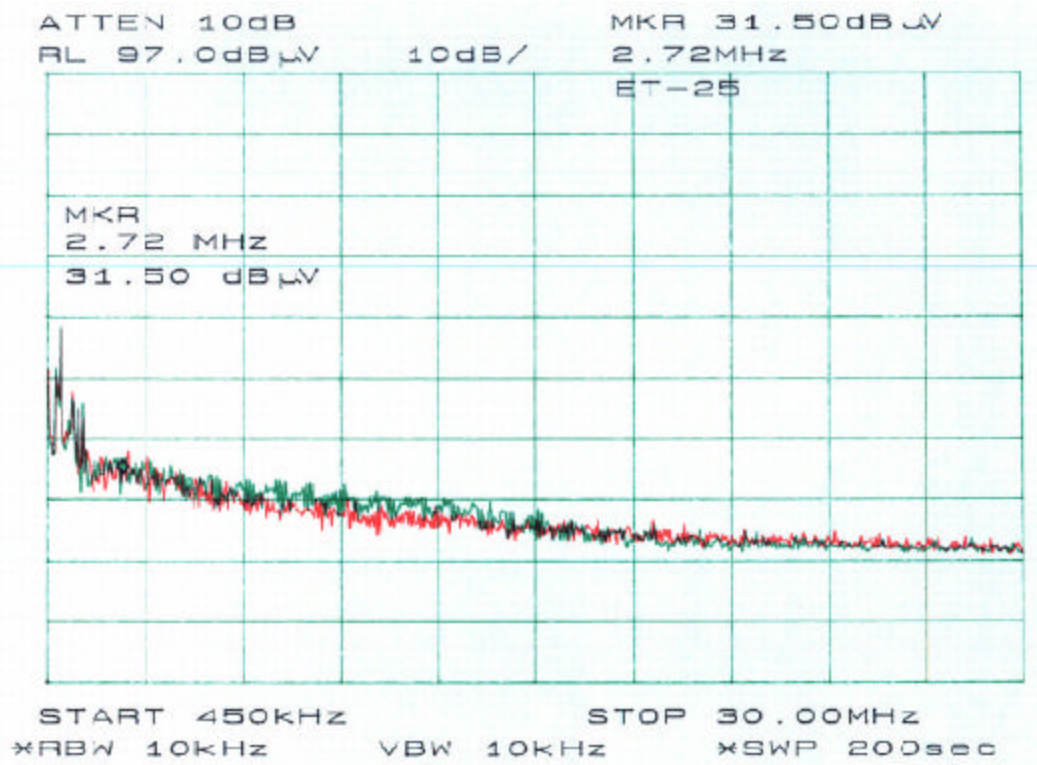
LINE CONDUCTED EMISSIONS				FCC PART 18	
Frequency	Amplitude	Detector	Phase	Limit	Margin
MHz	dBμV	Qp/Ave/Peak	Line/Neutral	dBμV	dB
2.86	35.00	QP	Neutral	48	-13.00
2.22	34.17	QP	Line	48	-13.83
3.50	33.83	QP	Neutral	48	-14.17
2.72	33.82	QP	Line	48	-14.18
2.52	33.67	QP	Line	48	-14.33
3.65	31.00	QP	Neutral	48	-17.00

3.7 Plot(s) of Conducted Emissions Test Data

The plot of conducted emission tested was presented hereinafter as reference.







4 - RADIATED EMISSION DATA

4.1 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 NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is ± 4.0 dB.

4.2 EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup accordance with the ANSI C63.4 - 2000. The specification used in this report was the FCC Part 18 limits.

The EUT was placed on the center of the back edge on the test table.

The power cord extension of the EUT was connected with 110 Vac/60 Hz power source.

4.3 Spectrum Analyzer Setup

According to FCC Rules, the system was tested to 1000 MHz.

Start Frequency	30 MHz
Stop Frequency	1000 MHz
Sweep Speed.....	Auto
IF Bandwidth.....	1 MHz
Video Bandwidth	1 MHz
Quasi-Peak Adapter Bandwidth.....	120 kHz
Quasi-Peak Adapter Mode.....	Normal
Resolution Bandwidth.....	1MHz

4.4 Test Procedure

For the radiated emissions test, the power cord of the power cord extension was connected to the AC floor outlet.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combinations.

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.

The EUT was under normal mode during the final qualification test and the configuration was used to represent the worst case results.

4.5 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 -7dBμV means the emission is 7dBμV below the maximum limit for FCC Part 18. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 18 Limit}$$

4.6 Summary of Test Results

According to the data in section 4.7, the EUT complied with the FCC Part 18 standards for a industry, scientific and medical device, and had the worst margin of:

30-1000MHz, 3 Meters

ET-13: -15.1 dBμV at 134.80 MHz at the **Vertical** polarization
 ET-15: -13.8 dBμV at 49.87 MHz at the **Vertical** polarization
 ET-20: -5.4 dBμV at 786.83 MHz at the **Horizontal** polarization
 ET-23: -3.1 dBμV at 960.00 MHz at the **Vertical** polarization
 ET-25: -14.5 dBμV at 170.24 MHz at the **Vertical** polarization

4.7 Radiated Emissions Test Data

4.7.1 Final Test Data, 30-1000MHz, 3 Meters

ET-13 Test Data

INDICATED		TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC PART 18	
Frequency MHz	Ampl. dBμV/m	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable dB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
134.80	39.8	90	1.2	V3	12.6	3.5	27.5	28.4	43.5	-15.1
323.99	38.2	120	2.0	H3	13.7	5.4	27.3	30.0	46.0	-16.0
76.30	38.6	200	1.2	V3	9.5	2.8	27.5	23.4	40.0	-16.6
154.41	37.2	160	1.2	V3	13.0	3.8	27.5	26.5	43.5	-17.0
170.67	35.9	180	1.8	H3	13.3	4.0	27.5	25.7	43.5	-17.8
80.00	37.2	45	1.2	V3	9.6	2.7	27.5	22.0	40.0	-18.0
122.89	37.4	270	1.2	V3	12.1	3.4	27.7	25.2	43.5	-18.3
334.11	34.9	45	2.0	H3	15.0	5.4	27.3	28.0	46.0	-18.0
54.24	35.8	180	1.2	V3	10.5	2.0	27.3	21.0	40.0	-19.0
111.92	36.9	90	1.2	V3	11.7	3.2	27.7	24.1	43.5	-19.4
334.12	33.8	270	1.2	V3	15.0	5.4	27.3	26.9	46.0	-19.1

ET-15 Test Data

INDICATED		TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC PART 18	
Frequency MHz	Ampl. dBmV/m	Angle Degree	Height Meter	Polar H/ V	Antenna dBmV/m	Cable dB	Amp. dB	Corr. Ampl. dBmV/m	Limit dBmV/m	Margin dB
49.87	39.6	0	1.0	v3	11.3	2.2	26.9	26.2	40.0	-13.8
68.34	38.5	270	1.0	v3	9.7	2.3	27.5	23.0	40.0	-17.0
47.49	33.1	180	1.0	h3	11.3	2.2	26.9	19.7	40.0	-20.3
240.04	35.0	270	1.0	h3	11.8	4.6	27.2	24.2	46.0	-21.8
215.78	33.9	180	1.0	h3	10.5	4.2	27.0	21.6	43.5	-21.9
110.37	32.7	0	1.0	h3	11.7	3.2	27.7	19.9	43.5	-23.6
240.04	33.2	135	1.2	v3	11.8	4.6	27.2	22.4	46.0	-23.6
232.37	33.3	225	1.2	v3	11.8	4.4	27.2	22.3	46.0	-23.7

ET-21 Test Data

INDICATED		TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC PART 18	
Frequency MHz	Ampl. dBmV/m	Angle Degree	Height Meter	Polar H/ V	Antenna dBmV/m	Cable dB	Amp. dB	Corr. Ampl. dBmV/m	Limit dBmV/m	Margin dB
786.83	37.7	45	1.5	h3	22.7	8.8	28.6	40.6	46.0	-5.4
47.49	42.4	180	1.0	v3	11.3	2.2	26.9	29.0	40.0	-11.0
420.03	33.0	90	1.0	h3	16.2	5.8	28.0	27.0	46.0	-19.0
414.25	32.1	270	1.0	h3	16.2	5.8	28.0	26.1	46.0	-19.9
143.21	33.3	0	1.0	v3	13.2	3.6	27.5	22.6	43.5	-20.9
85.94	33.9	270	1.0	h3	9.7	2.9	27.5	19.0	40.0	-21.0
143.21	32.5	90	1.0	h3	13.2	3.6	27.5	21.8	43.5	-21.7
267.21	34.9	0	1.2	v3	12.0	4.6	27.4	24.1	46.0	-21.9
233.87	34.8	90	1.0	v3	11.8	4.4	27.2	23.8	46.0	-22.2

ET-23 Test Data

INDICATED		TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC PART 18	
Frequency MHz	Ampl. dBmV/m	Angle Degree	Height Meter	Polar H/ V	Antenna dBmV/m	Cable dB	Amp. dB	Corr. Ampl. dBmV/m	Limit dBmV/m	Margin dB
960.00	35.3	180	1.5	V3	23.4	9.2	25	42.9	46.0	-3.1
893.12	31.6	180	1.2	H3	23.1	8.9	25	38.6	46.0	-7.4
47.49	41.6	135	1.0	V3	11.3	2.2	25	30.1	40.0	-9.9
47.49	39.6	135	1.2	H3	11.3	2.2	25	28.1	40.0	-11.9
83.27	40.4	225	1.0	V3	9.6	2.7	25	27.7	40.0	-12.3
145.31	32.8	90	1.0	H3	13.4	3.7	25	24.9	43.5	-18.6
85.94	33.0	225	1.5	H3	9.7	2.9	25	20.6	40.0	-19.4
114.45	32.7	90	1.0	V3	11.7	3.2	25	22.6	43.5	-20.9
240.03	33.4	90	1.0	H3	11.8	4.6	25	24.8	46.0	-21.2
211.27	31.8	135	1.0	H3	10.5	4.1	25	21.4	43.5	-22.1

ET-25 Test Data

INDICATED		TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC PART 18	
Frequency MHz	Ampl. dBmV/m	Angle Degree	Height Meter	Polar H/ V	Antenna dBmV/m	Cable dB	Amp. dB	Corr. Ampl. dBmV/m	Limit dBmV/m	Margin dB
170.24	39.2	270	1.2	V3	13.3	4.0	27.5	29.0	43.5	-14.5
44.35	38.5	90	1.2	V3	12.1	1.9	26.9	25.6	40.0	-14.4
196.20	37.1	45	1.2	V3	14.4	4.0	27.1	28.4	43.5	-15.1
323.99	37.4	120	2.0	H3	13.7	5.4	27.3	29.2	46.0	-16.8
122.04	38.3	180	1.5	H3	12.1	3.4	27.7	26.1	43.5	-17.4
365.56	35.7	180	2.0	H3	15.1	5.5	27.7	28.6	46.0	-17.4
334.11	34.9	45	2.0	H3	15.0	5.4	27.3	28.0	46.0	-18.0
166.83	35.3	90	2.0	H3	13.3	3.8	27.5	24.9	43.5	-18.6
72.04	36.2	45	1.2	V3	9.6	2.5	27.5	20.8	40.0	-19.2
334.12	33.8	270	1.2	V3	15.0	5.4	27.3	26.9	46.0	-19.1
122.02	35.9	180	2.0	H3	12.1	3.4	27.7	23.7	43.5	-19.8

5 – FCC PRODUCT LABELING AND WARNING STATEMENT

5.1 Proposed FCC Label Format

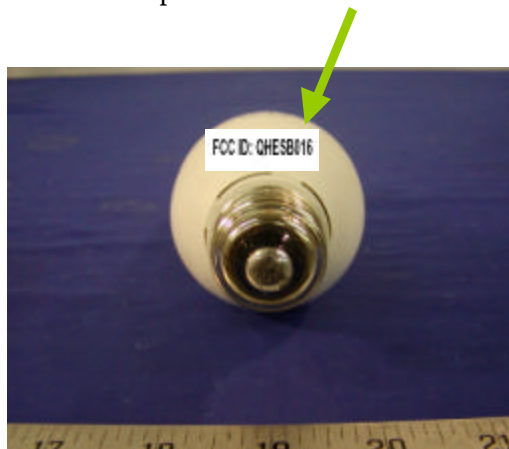
FCC ID: QHESB016

Specifications: Text is black or white in color and is left justified. Labels are silk-screened and shall be “permanently affixed” at a conspicuous location on the EUT.

5.2 Proposed Label Location on EUT

Rear View of EUT

Proposed FCC Label Location



5.3 FCC Warning Statement

This device complies with Part 18 of FCC rules.

Information on the following matters shall be provided to the user in the instruction manual or on the packaging if an instruction manual is not provided for any type of any ISM equipment:

- The interference potential of the device or system
- Maintenance of the system
- Simple measures that can be taken by the user to correct interference.

6 - Conducted and Radiated Setup Photographs

6.1 Conducted Emission Photograph – Front View



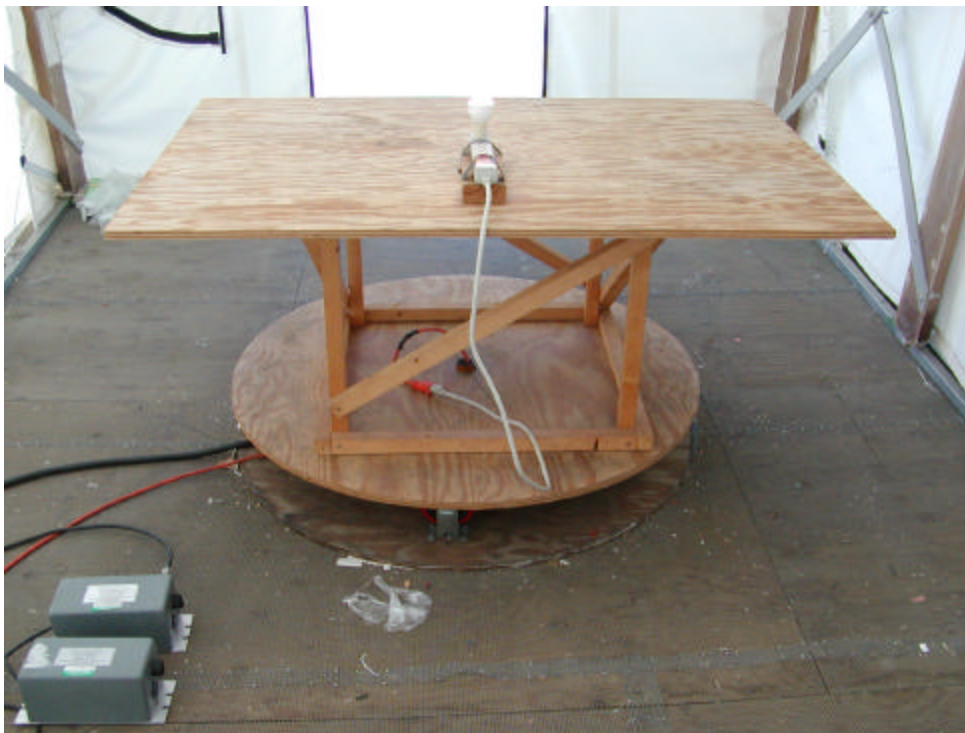
6.2 Conducted Emission Photograph – Rear View



6.3 Radiated Emission Photograph – Front View



6.4 Radiated Emission Photograph – Rear View



7 - PHOTOGRAPHS

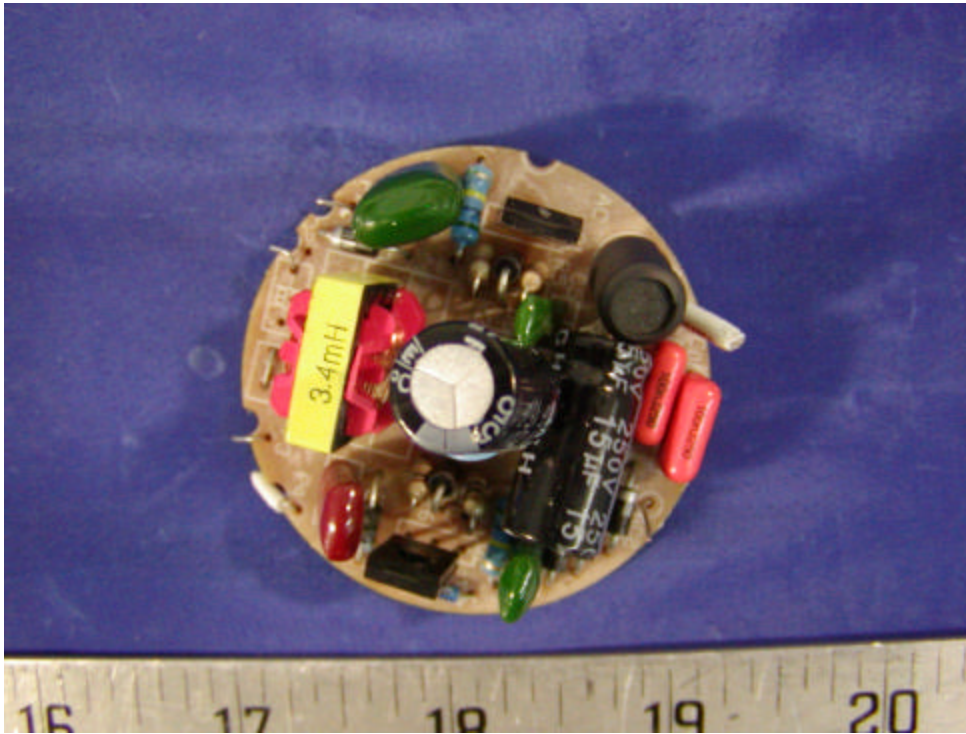
7.1 ET-13 – Front View



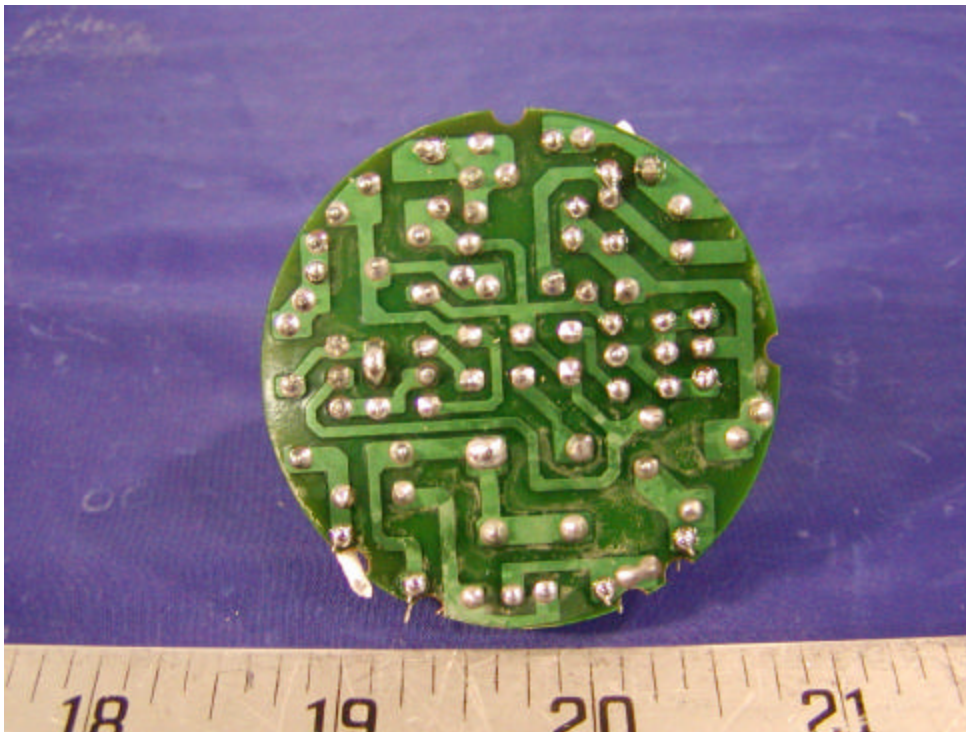
7.2 ET-13 – Top View



7.3 ET-13 – Component View



7.4 ET-13 – Solder View



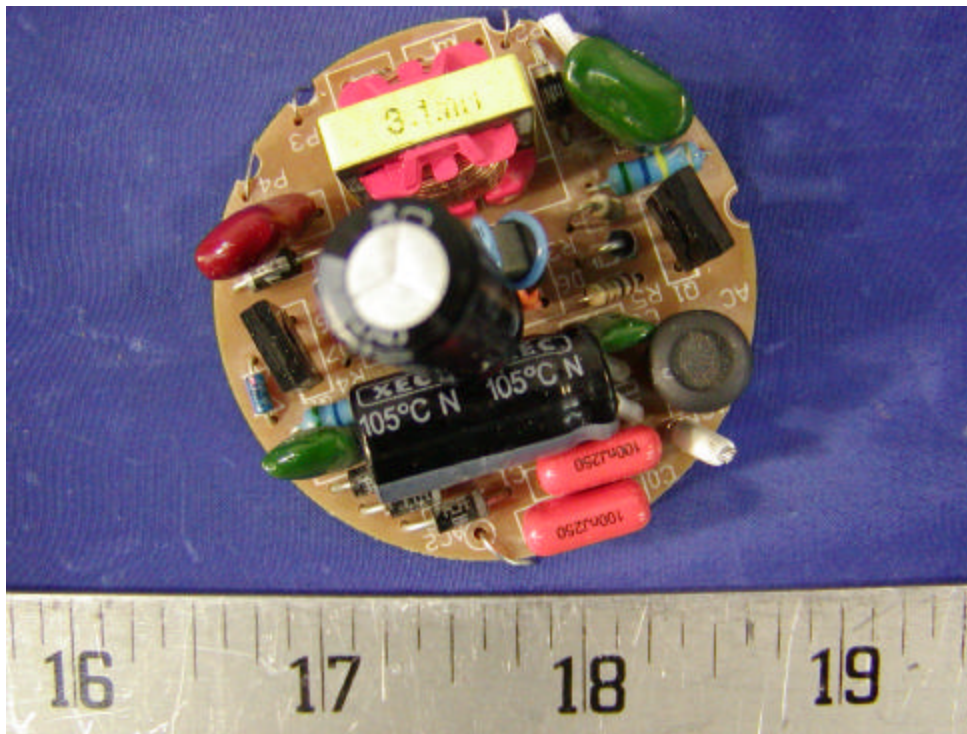
7.5 ET-15 – Front View



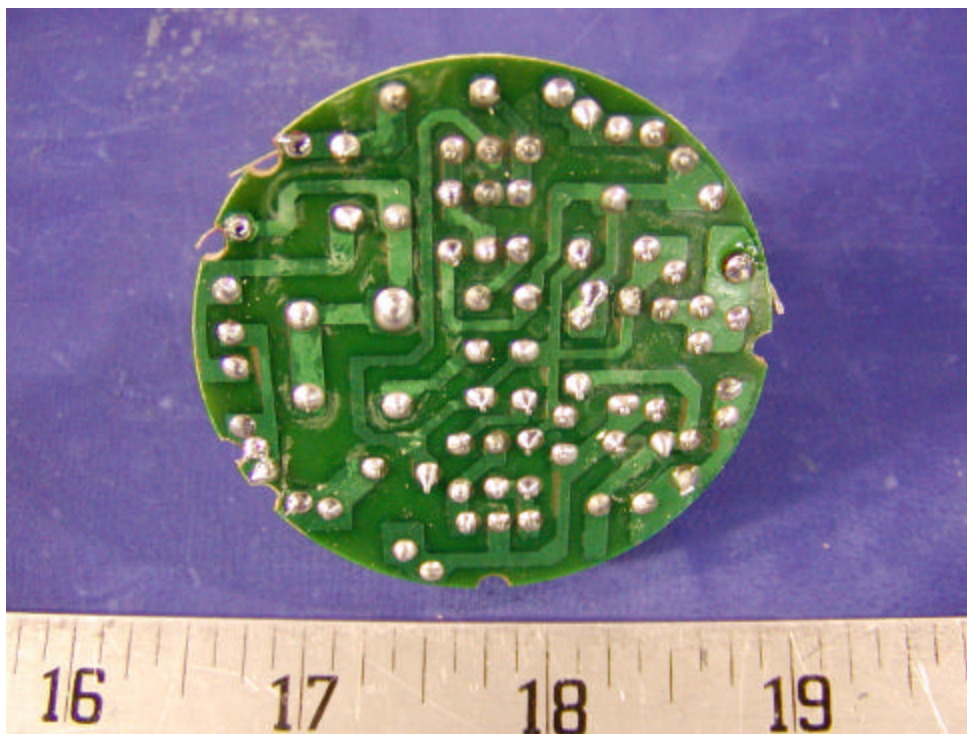
7.6 ET-15 – Top View



7.7 ET-15 – Component View



7.8 ET-15 – Solder View



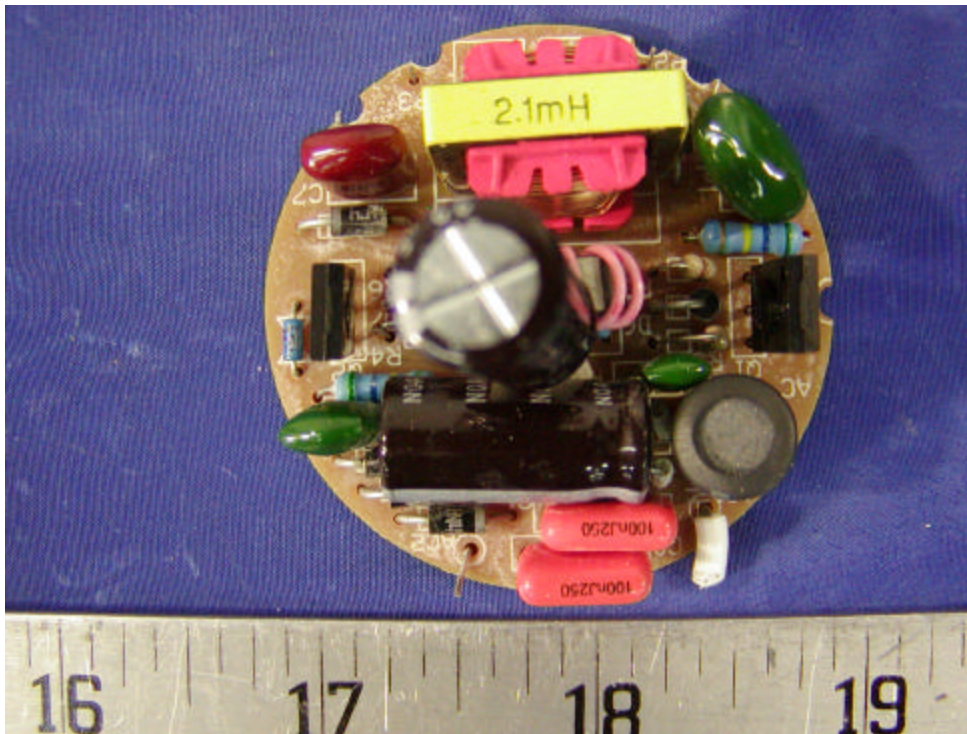
7.9 ET-20 – Front View



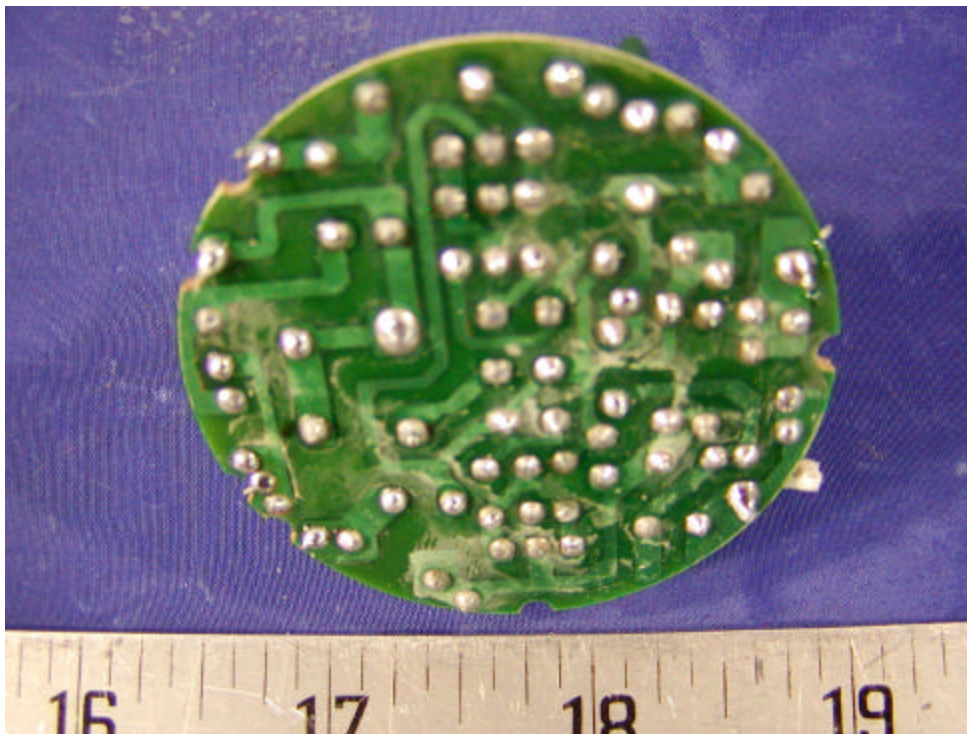
7.10 ET-20 – Top View



7.11 ET-20 – Component View



7.12 ET-20 – Solder View



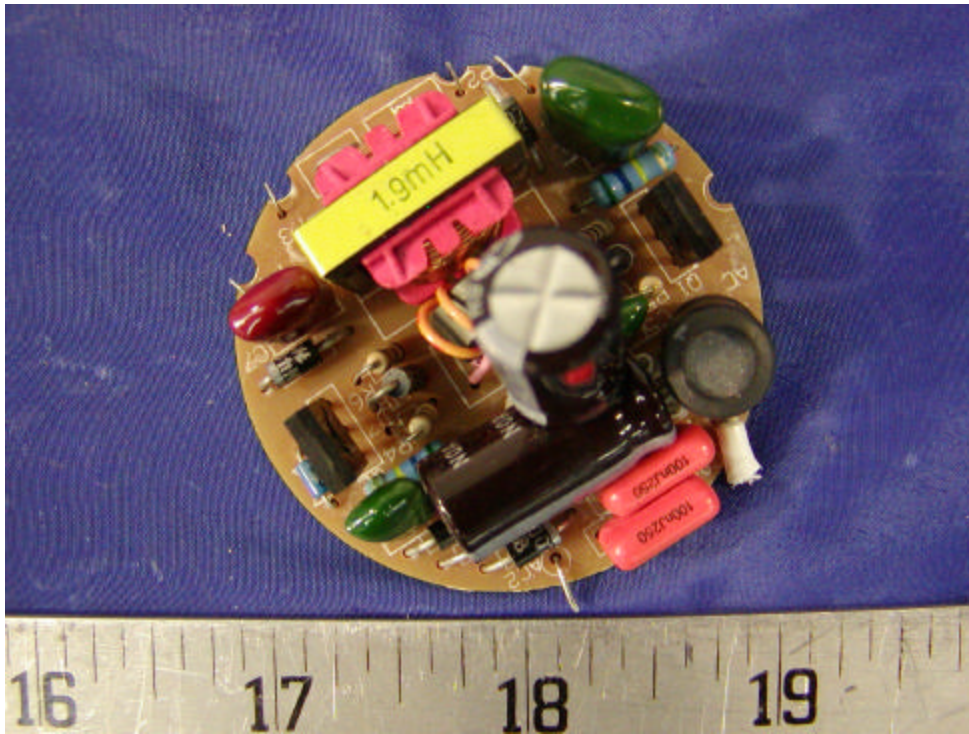
7.13 ET-23 – Front View



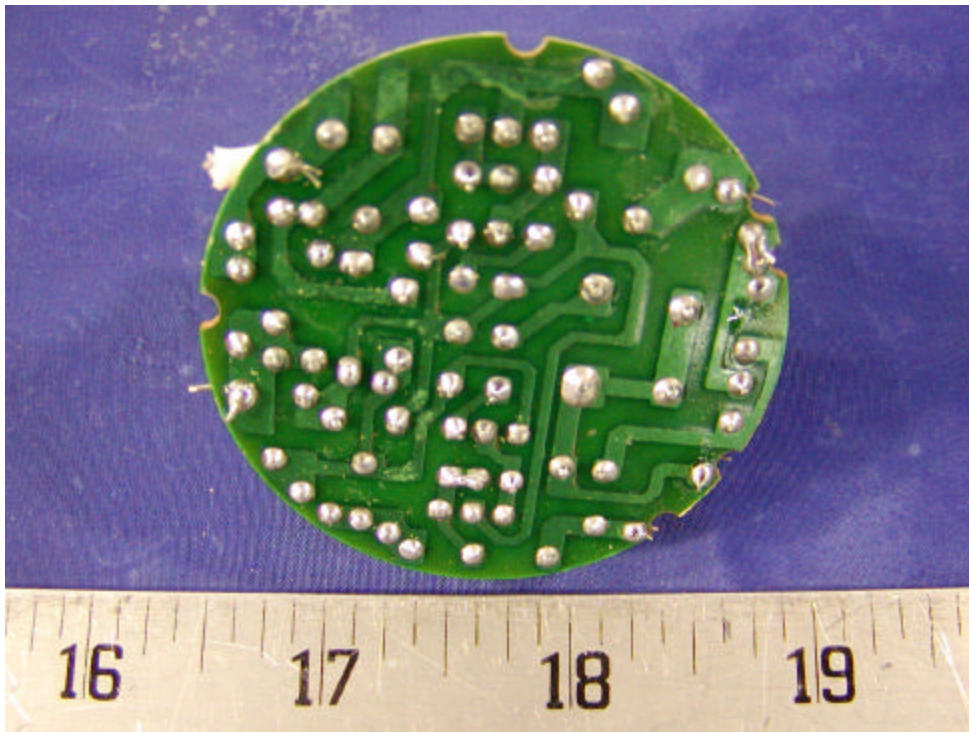
7.14 ET-23 – Top View



7.15 ET-23 – Component View



7.16 ET-23 – Solder View



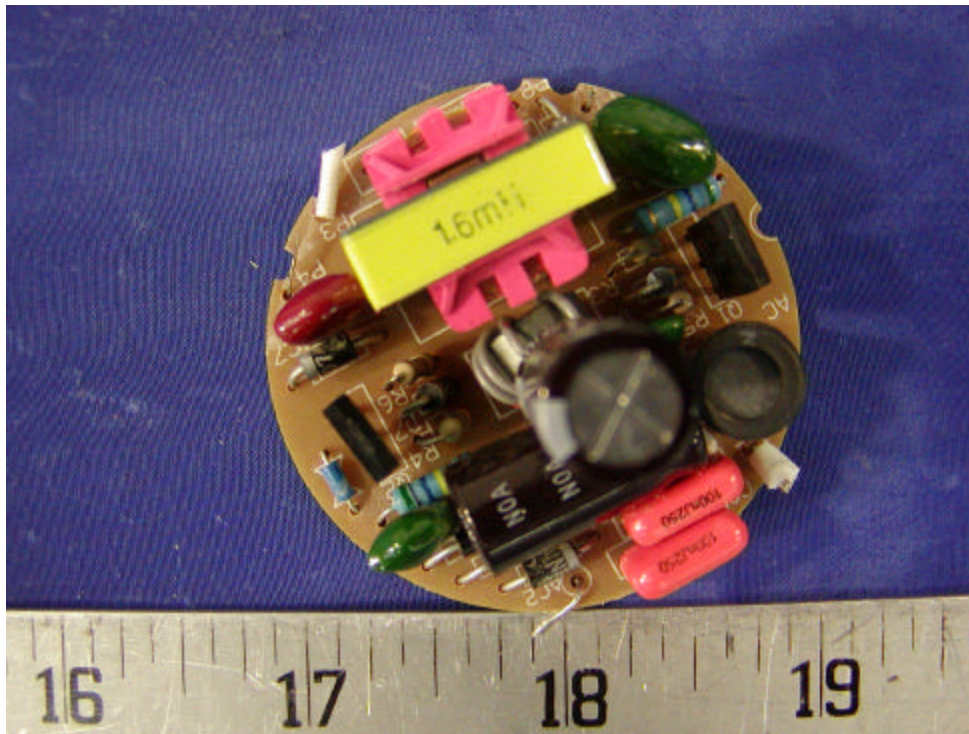
7.17 ET-25 – Front View



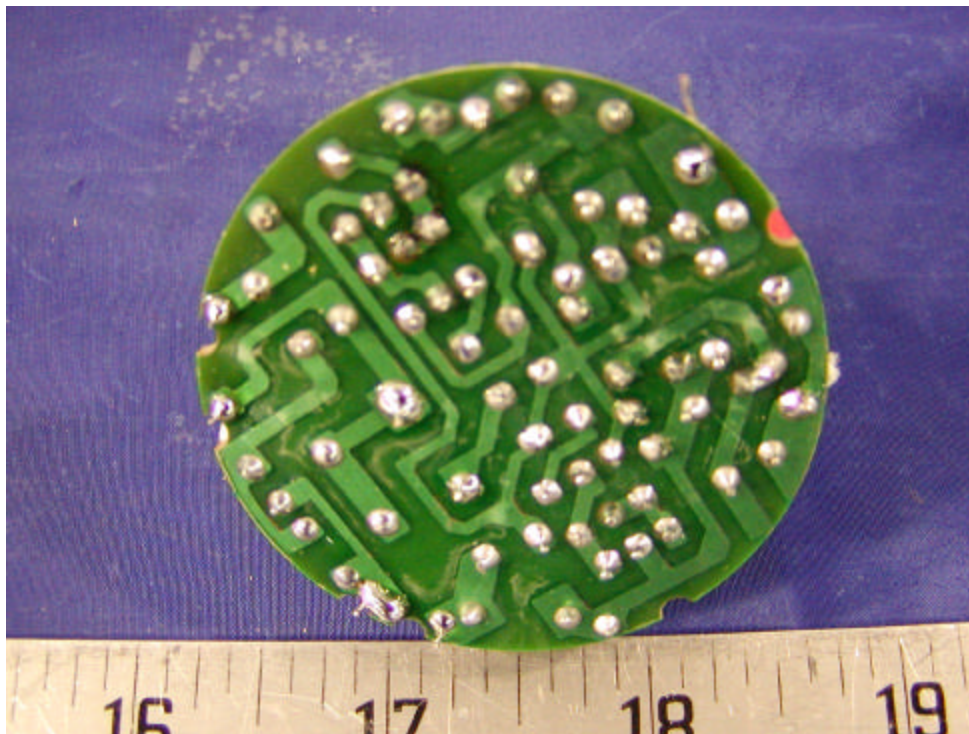
7.18 ET-25 – Top View



7.19 ET-25 – Component View



7.20 ET-25 – Solder View



APPENDIX A - BLOCK DIAGRAM/SCHEMATICS/PARTS LIST

(Not Available at Time of Testing)

APPENDIX B - USER MANUAL

(Not Available at Time of Testing)