

Application for FCC Certification
On Behalf of
Twin Growth Electronics (Suzhou) Co., Ltd.
Energy Saving Lamp
Model No.: TME15W, TME20W, TME25W
FCC ID : O9OTGESC20001

Prepared For : Twin Growth Electronics (Suzhou) Co., Ltd.
Mudu Town, Suzhou, Jiangsu, China

Prepared By : AUDIX Technology (Shanghai) Co., Ltd.
3 F., 34 Bldg., 680 Guiping Rd.,
Caohejing Hi-Tech Park,
Shanghai, China

Tel : (+8621) 64955500

Report No. : ACI-F00033
Date of Test : Dec 13 ~ Dec 14, 1999
Date of Report : Oct 30, 2000

TABLE OF CONTENTS

	Page
1 GENERAL INFORMATION	18
1.1 Description of Equipment Under Test	18
1.2 Description of Test Facility	19
1.3 Measurement Uncertainty.....	19
2 CONDUCTED EMISSION TEST	20
2.1 Test Equipment.....	20
2.2 Block Diagram of Test Setup	20
2.3 Conducted Emission Limit	20
2.4 Test Configuration.....	21
2.5 Operating Condition of EUT	21
2.6 Test Procedures.....	21
2.7 Test Results.....	22
3 RADIATED EMISSION TEST	25
3.1 Test Equipment.....	25
3.2 Block Diagram of Test Setup	25
3.3 Radiated Emission Limit	26
3.4 Test Configuration.....	26
3.5 Operating Condition of EUT	26
3.6 Test Procedures.....	26
3.7 Test Results.....	27
4 PHOTOGRAPHS	30
4.1 Conducted Emission Test	30
4.2 Radiated Emission Test	33

TEST REPORT FOR FCC CERTIFICATION

Applicant : Twin Growth Electronics (Suzhou) Co., Ltd.
Manufacturer : Twin Growth Electronics (Suzhou) Co., Ltd.
EUT Description : Energy Saving Lamp
(A) Model No. : TME15W, TME20W, TME25W
(B) Serial No. : TG99002, TG99003, TG99004
(C) Power Supply : AC 120V/60Hz

Test Procedure Used:

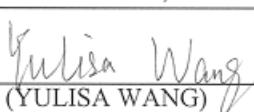
*FCC RULES AND REGULATIONS PART 18 CONSUMER DEVICES (1998)
AND MP-5/1986*

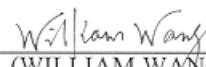
The device described above is tested by AUDIX Technology (Shanghai) Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 18 RF Lighting Device limits both radiated and conducted emissions.

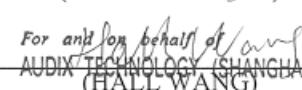
The test results are contained in this test report and AUDIX Technology (Shanghai) Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliant with the FCC official limits.

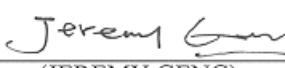
This report applies to above tested sample only. This report shall not be reproduced in part without written approval of AUDIX Technology (Shanghai) Co., Ltd.

Date of Test : Dec 13 ~ Dec 14, 1999

Prepared by : 
(YULISA WANG)

Test Engineer : 
(WILLIAM WANG)

Reviewer : 
For and on behalf of and
AUDIX TECHNOLOGY (SHANGHAI) CO., LTD.
(HALL WANG)

Approved Signatory : 
(JEREMY.GENG)
Authorized Signature(s)

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test

Description : Energy Saving Lamp

Type of EUT : Production Pre-product Pro-type

Model Number : TME15W, TME20W, TME25W
(The above models have two kinds of lamp tubes, both types of lamp were tested. Since the appearance of lamp did not affect the test result, only the test data for spiral appearance is shown in this report.)

Serial No. : TG99002, TG99003, TG99004

Applicant : Twin Growth Electronics (Suzhou) Co., Ltd.
Mudu Town, Suzhou, Jiangsu, China

Manufacturer : Twin Growth Electronics (Suzhou) Co., Ltd.
Mudu Town, Suzhou, Jiangsu, China

M/N	Input Power (w)	Output Power (w)
TME15W	25.2	14.0
TME20W	26.6	15.4
TME25W	37.6	23.5

1.2 Description of Test Facility

Site Description : Sept. 17, 1998 file on
(Semi-Anechoic Chamber) Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046, USA

Name of Firm : AUDIX Technology (Shanghai) Co., Ltd.

Site Location : 3 F., 34 Bldg., 680 Guiping Rd.,
Caohejing Hi-Tech Park,
Shanghai, China

NVLAP Lab Code : 200371-0

1.3 Measurement Uncertainty

Conducted Emission Uncertainty : U=2.60dB

Radiated Emission Uncertainty : U=3.90dB

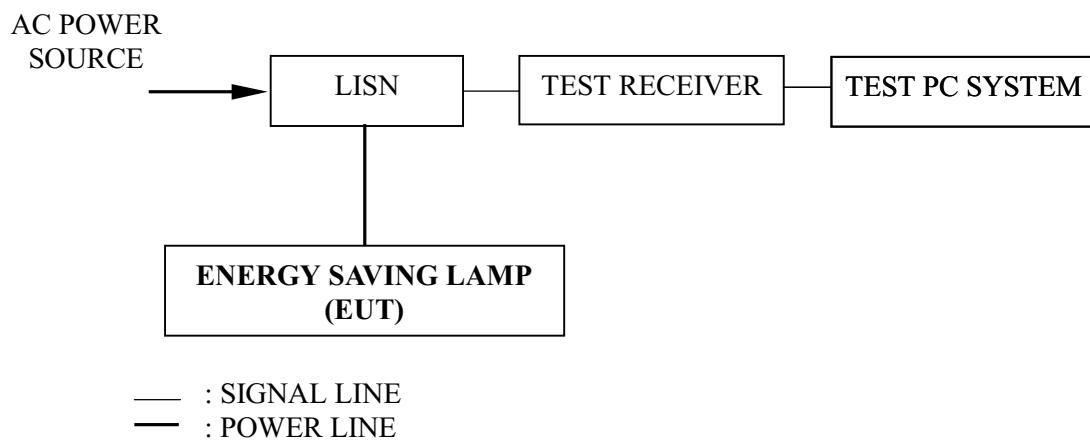
2 CONDUCTED EMISSION TEST

2.1 Test Equipment

The following test equipment are used during the conducted emission test in a shielded room:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESHS10	844077/020	May. 24, 2000	1 Year
2.	Line Impedance Stabilization Network (LISN)	Kyoritsu	KNW-407	8-1280-4	Jun. 04, 2000	1 Year

2.2 Block Diagram of Test Setup



2.3 Conducted Emission Limit

Frequency (MHz)	Maximum RF Line Voltage	
	(μ V)	dB(μ V)
0.45 ~ 30	250	48
NOTE 1 – RF Line Voltage dB(μ V) = 20 log RF Line Voltage (μ V)		

2.4 Test Configuration

The EUT (listed in Sec. 1.1) was installed as shown on Sec. 2.2 to meet FCC requirement and operating in a manner which tends to maximize its emission level in a normal application.

2.5 Operating Condition of EUT

- 2.5.1 Setup the EUT as shown in Sec. 2.2.
- 2.5.2 Turn on the power of all equipment.
- 2.5.3 The EUT will be operated normally.

2.6 Test Procedures

The EUT was connected to the power mains through a Line Impedance Stabilization Network (LISN). This provided a 50 ohm coupling impedance for the measuring equipment.

Both sides of AC line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables were changed or manipulated according to MP-5/1986 during conducted emission test.

The bandwidth of Test Receiver ESHS10 was set at 10 kHz.

The frequency range from 450 kHz to 30 MHz was checked. The test mode (ON) was done on conducted emission test and all the test results are listed in Sec. 2.7.

2.7 Test Results

< PASS >

The frequency and amplitude of the highest conducted emission relative to the limit is reported. All emissions not reported below are too low against the prescribed limits.

EUT : Energy Saving Lamp Temperature : 20°C
 Model No. : TME15W Humidity : 50%
 Test Mode : ON Date of Test : Dec 14, 1999

Test Line	Frequency (MHz)	Factor (dB)	Meter Reading dB(μV)	Emission Level dB(μV)	Limits dB(μV)	Margin (dB)
VA	0.468	0.45	36.10	36.55	48.00	11.45
	0.525	0.42	34.50	34.92	48.00	13.08
	0.551	0.40	33.50	33.90	48.00	14.10
	0.632	0.40	36.30	36.70	48.00	11.30
	0.688	0.40	34.30	34.70	48.00	13.30
	0.791	0.40	34.20	34.60	48.00	13.40
VB	0.465	0.53	31.60	32.13	48.00	15.87
	0.519	0.51	31.60	32.11	48.00	15.89
	0.549	0.50	29.90	30.40	48.00	17.60
	0.629	0.45	30.10	30.55	48.00	17.45
	0.713	0.40	28.10	28.50	48.00	19.50
	0.793	0.40	28.20	28.60	48.00	19.40
NOTE 1 – Emission Level = Meter Reading + Factor NOTE 2 – Factor = Insertion Loss + Cable Loss NOTE 3 – All reading are Quasi-Peak Values. NOTE 4 – The worst emission is detected at 0.468 MHz with corrected signal level of 36.55 dB(μV) (limit is 48.00 dB(μV)), when the VA of the EUT is connected to LISN.						

TEST ENGINEER: 
 (WILLIAM WANG)

EUT : Energy Saving Lamp Temperature : 20°C
 Model No. : TME20W Humidity : 50%
 Test Mode : ON Date of Test : Dec 14, 1999

Test Line	Frequency (MHz)	Factor (dB)	Meter Reading dB(μV)	Emission Level dB(μV)	Limits dB(μV)	Margin (dB)
VA	0.460	0.46	37.60	38.06	48.00	9.94
	0.541	0.41	35.60	36.01	48.00	11.99
	0.745	0.40	28.30	28.70	48.00	19.30
	0.813	0.40	29.80	30.20	48.00	17.80
	0.890	0.40	28.00	28.40	48.00	19.60
	2.000	0.40	17.80	18.20	48.00	29.80
VB	0.456	0.53	36.60	37.13	48.00	10.87
	0.517	0.51	38.20	38.71	48.00	9.29
	0.567	0.49	34.30	34.79	48.00	13.21
	0.605	0.46	39.80	40.26	48.00	7.74
	0.774	0.40	35.30	35.70	48.00	12.30
	1.010	0.40	28.00	28.40	48.00	19.60

NOTE 1 – Emission Level = Meter Reading + Factor

NOTE 2 – Factor = Insertion Loss + Cable Loss

NOTE 3 – All reading are Quasi-Peak Values.

NOTE 4 – The worst emission is detected at 0.605 MHz with corrected signal level of 40.26 dB(μV) (limit is 48.00 dB(μV)), when the VB of the EUT is connected to LISN.

TEST ENGINEER: William Wang
 (WILLIAM WANG)

EUT : Energy Saving Lamp Temperature : 20°C
 Model No. : TME25W Humidity : 50%
 Test Mode : ON Date of Test : Dec 14, 1999

Test Line	Frequency (MHz)	Factor (dB)	Meter Reading dB(μV)	Emission Level dB(μV)	Limits dB(μV)	Margin (dB)
VA	0.468	0.45	45.30	45.75	48.00	2.25
	0.594	0.40	41.00	41.40	48.00	6.60
	0.630	0.40	41.80	42.20	48.00	5.80
	0.716	0.40	38.40	38.80	48.00	9.20
	0.807	0.40	37.30	37.70	48.00	10.30
	0.903	0.40	36.90	37.30	48.00	10.70
VB	0.478	0.52	36.60	37.12	48.00	10.88
	0.528	0.51	37.20	37.71	48.00	10.29
	0.623	0.45	35.70	36.15	48.00	11.85
	0.716	0.40	34.40	34.80	48.00	13.20
	0.902	0.40	31.40	31.80	48.00	16.20
	1.020	0.40	27.60	28.00	48.00	20.00

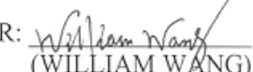
NOTE 1 – Emission Level = Meter Reading + Factor

NOTE 2 – Factor = Insertion Loss + Cable Loss

NOTE 3 – All reading are Quasi-Peak Values.

NOTE 4 – The worst emission is detected at 0.468 MHz with corrected signal level of 45.75 dB(μV) (limit is 48.00 dB(μV)), when the VA of the EUT is connected to LISN.

NOTE 5 - At the frequency 0.468MHz , the measured result is below the specification limit by a margin less than the measurement uncertainty. It is not therefore possible to determine compliance at a level of confidence of 95%. However, the measured result indicates a higher probability that the product tested complies with the specification limit.

TEST ENGINEER: 
(WILLIAM WANG)

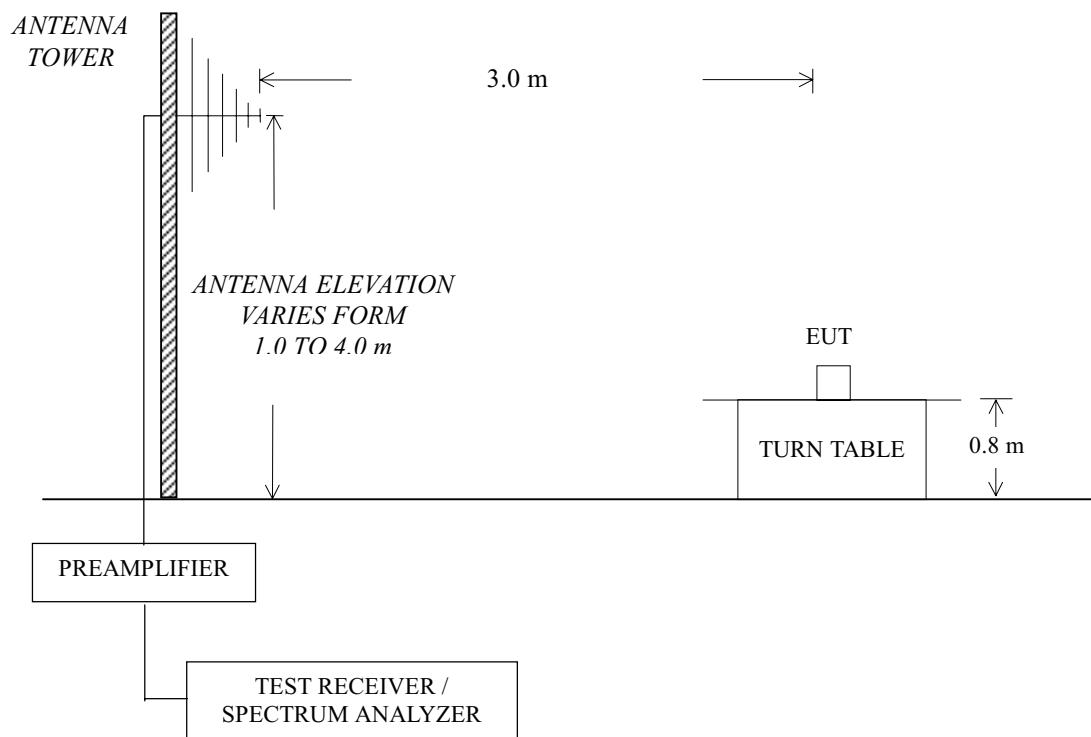
3 RADIATED EMISSION TEST

3.1 Test Equipment

The following test equipment are used during the radiated emission test in a semi-anechoic chamber:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	HP	8593EM	3628A00167	May 28,2000	1 Year
2.	Preamplifier	HP	8447D	2944A06849	Jun 10, 2000	1/2 Year
3.	Bilog Antenna	Chase	CBL6111	1146	Jun 10, 2000	1/2 Year
4.	Test Receiver	Rohde & Schwarz	ESVS10	844594/001	May 24,2000	1 Year

3.2 Block Diagram of Test Setup



3.3 Radiated Emission Limit

Frequency (MHz)	Distance (m)	Field strength limits (μ V/m)	Converted Field Strengths Limits By 3 meters Measuring Distance	
			(μ V/m)	dB(μ V/m)
30 ~ 88	30	10	100	40.0
88 ~ 216	30	15	150	43.5
216 ~ 1000	30	20	200	46.0

NOTE 1 - Emission Level dB(μ V/m) = 20 log Emission Level (μ V/m)
 NOTE 2 - The tighter limit applies at the band edges.
 NOTE 3 - Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
 NOTE 4 - The measurements are made at 3 meters distance, then the permissible field strength limits be adjusted using 1/d as an attenuation factor.

3.4 Test Configuration

The configuration of the EUT is same as those used in conducted emission test.

Please refer to Sec. 2.4.

3.5 Operating Condition of EUT

Same as conducted emission test which is listed in Sec. 2.5, except the test set up replaced by Sec. 3.2.

3.6 Test Procedures

The EUT was placed on a turn table which is 0.8 meter above ground. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna, which was mounted on an antenna tower. The antenna moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (Calibrated Bilog Antenna) or dipole antenna were used as receiving antenna. Both horizontal and vertical polarization of the antenna were set on measurement. In order to find the maximum emission, all of the interference cables were manipulated according to MP-5/1986 requirements during radiated emission test.

The bandwidth setting on Test Receiver ESVS10 was 120 kHz.

The frequency range from 30 MHz to 1000 MHz was checked. The test mode (ON) was done on radiated emission test and all the test results are listed in Sec. 3.7.

3.7 Test Results

<PASS>

The frequency and amplitude of the highest radiated emission relative the limit is reported. All the emissions not reported below are too low against the prescribed limits.

EUT	:	Energy Saving Lamp	Temperature :	20.8°C
Model No.	:	TME15W	Humidity :	53%
Test Mode	:	ON	Date of Test :	Dec 14, 1999

Polarization	Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Meter Reading dB(μV)	Emission Level dB(μV/m)	Limits dB(μV/m)	Margin (dB)
Horizontal	35.13	16.01	2.30	25.51	27.11	19.91	40.00	20.09
	109.65	11.79	3.53	25.10	25.42	15.64	43.50	27.86
	220.62	10.85	5.00	25.10	25.60	16.35	46.00	29.65
	406.40	16.85	6.84	26.05	23.21	20.85	46.00	25.15
	573.00	20.40	8.58	26.70	22.96	25.24	46.00	20.76
	752.20	22.14	9.96	26.62	22.38	27.86	46.00	18.14
Vertical	39.18	14.29	2.30	25.46	34.87	26.00	40.00	14.00
	64.29	6.17	2.66	25.27	32.88	16.44	40.00	23.56
	99.93	10.34	3.40	25.10	38.88	27.52	43.50	15.98
	398.70	16.62	6.75	26.00	23.05	20.42	46.00	25.58
	528.90	20.01	8.24	26.70	24.71	26.26	46.00	19.74
	665.40	21.09	9.20	26.70	23.27	26.86	46.00	19.14

NOTE 1 – Emission Level = Meter Reading + Antenna Factor + Cable Loss – Preamp Factor
 NOTE 2 – All reading are Quasi-Peak values.

NOTE 3 – The worst emission at horizontal polarization was detected at 752.20 MHz with corrected signal level of 27.86 dB(μV/m) (limit is 46.00 dB(μV/m)), when the antenna was 1.60m height and the turn table was at 190°.

NOTE 4 – The worst emission at vertical polarization was detected at 39.18 MHz with corrected signal level of 26.00 dB(μV/m) (limit is 40.00 dB(μV/m)), when the antenna was 1.00m height and the turn table was at 180°.

NOTE 5 – 0° was the table front facing the antenna. Degree is calculated from 0° clockwise facing the antenna.

TEST ENGINEER: 
 (WILLIAM WANG)

EUT : Energy Saving Lamp Temperature : 20.8°C

Model No. : TME20W Humidity : 53%

Test Mode : ON Date of Test : Dec 14, 1999

Polarization	Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Meter Reading dB(µV)	Emission Level dB(µV/m)	Limits dB(µV/m)	Margin (dB)
Horizontal	30.97	17.73	2.06	25.56	27.30	21.53	40.00	18.47
	101.78	10.62	3.42	25.10	29.20	18.14	43.50	25.36
	140.58	11.53	4.01	25.10	28.59	19.03	43.50	24.47
	153.19	10.81	4.16	25.10	30.68	20.55	43.50	22.95
	159.98	10.84	4.20	25.10	31.79	21.73	43.50	21.77
	501.42	19.76	8.01	26.70	28.36	29.43	46.00	16.57
Vertical	39.70	14.12	2.30	25.46	37.52	28.48	40.00	11.52
	101.78	10.62	3.42	25.10	39.71	28.65	43.50	14.85
	121.18	12.85	3.69	25.10	28.67	20.11	43.50	23.39
	150.28	10.79	4.14	25.10	30.45	20.28	43.50	23.22
	213.33	10.33	4.90	25.10	30.52	20.65	43.50	22.85
	327.79	15.02	6.04	25.38	28.71	24.39	46.00	21.61

NOTE 1 – Emission Level = Meter Reading + Antenna Factor + Cable Loss – Preamp Factor
 NOTE 2 – All reading are Quasi-Peak values.

NOTE 3 – The worst emission at horizontal polarization was detected at 501.42 MHz with corrected signal level of 29.43 dB(µV/m) (limit is 46.00 dB(µV/m)), when the antenna was 1.90m height and the turn table was at 179°.

NOTE 4 – The worst emission at vertical polarization was detected at 39.70 MHz with corrected signal level of 28.48 dB(µV/m) (limit is 40.00 dB(µV/m)), when the antenna was 1.00m height and the turn table was at 180°.

NOTE 5 – 0° was the table front facing the antenna. Degree is calculated from 0° clockwise facing the antenna.

TEST ENGINEER: 
 (WILLIAM WANG)

EUT : Energy Saving Lamp Temperature : 20.8°C

Model No. : TME25W Humidity : 53%

Test Mode : ON Date of Test : Dec 14, 1999

Polarization	Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Meter Reading dB(μV)	Emission Level dB(μV/m)	Limits dB(μV/m)	Margin (dB)
Horizontal	34.86	16.12	2.29	25.51	26.13	19.03	40.00	20.97
	99.93	10.34	3.40	25.10	28.74	17.38	43.50	26.12
	244.38	12.37	5.27	25.10	25.75	18.29	46.00	27.71
	363.00	15.86	6.41	25.69	24.91	21.49	46.00	24.51
	526.10	19.99	8.22	26.70	23.91	25.42	46.00	20.58
	744.50	22.03	9.88	26.64	23.68	28.95	46.00	17.05
Vertical	38.98	14.40	2.30	25.47	37.65	28.88	40.00	11.12
	51.83	7.84	2.43	25.36	29.81	14.72	40.00	25.28
	99.75	10.25	3.40	25.10	39.02	27.57	43.50	15.93
	397.30	16.59	6.74	25.97	24.56	21.92	46.00	24.08
	552.70	20.23	8.43	26.70	24.64	26.60	46.00	19.40
	731.20	21.79	9.72	26.66	24.49	29.34	46.00	16.66

NOTE 1 – Emission Level = Meter Reading + Antenna Factor + Cable Loss – Preamp Factor
 NOTE 2 – All reading are Quasi-Peak values.

NOTE 3 – The worst emission at horizontal polarization was detected at 744.50 MHz with corrected signal level of 28.95 dB(μV/m) (limit is 46.00 dB(μV/m)), when the antenna was 1.70m height and the turn table was at 178°.

NOTE 4 – The worst emission at vertical polarization was detected at 38.98 MHz with corrected signal level of 28.88 dB(μV/m) (limit is 40.00 dB(μV/m)), when the antenna was 1.00m height and the turn table was at 180°.

NOTE 5 – 0° was the table front facing the antenna. Degree is calculated from 0° clockwise facing the antenna.

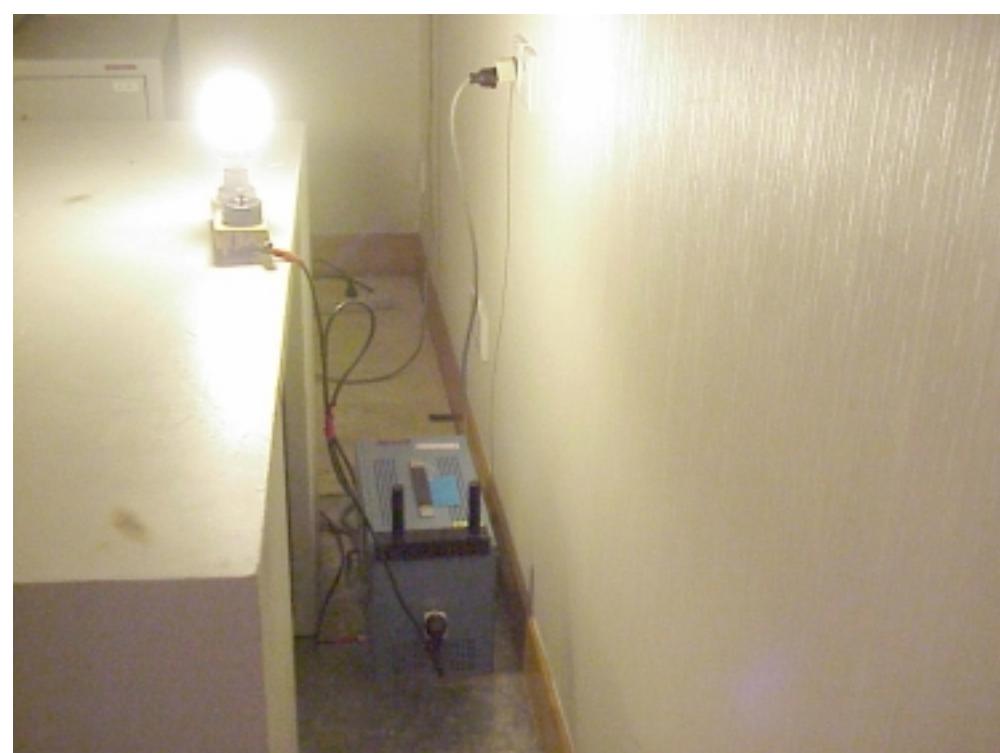
TEST ENGINEER: 
 (WILLIAM WANG)

4 PHOTOGRAHPS

4.1 Conducted Emission Test



FRONT VIEW (M/N: TME15W)



SIDE VIEW (M/N: TME15W)



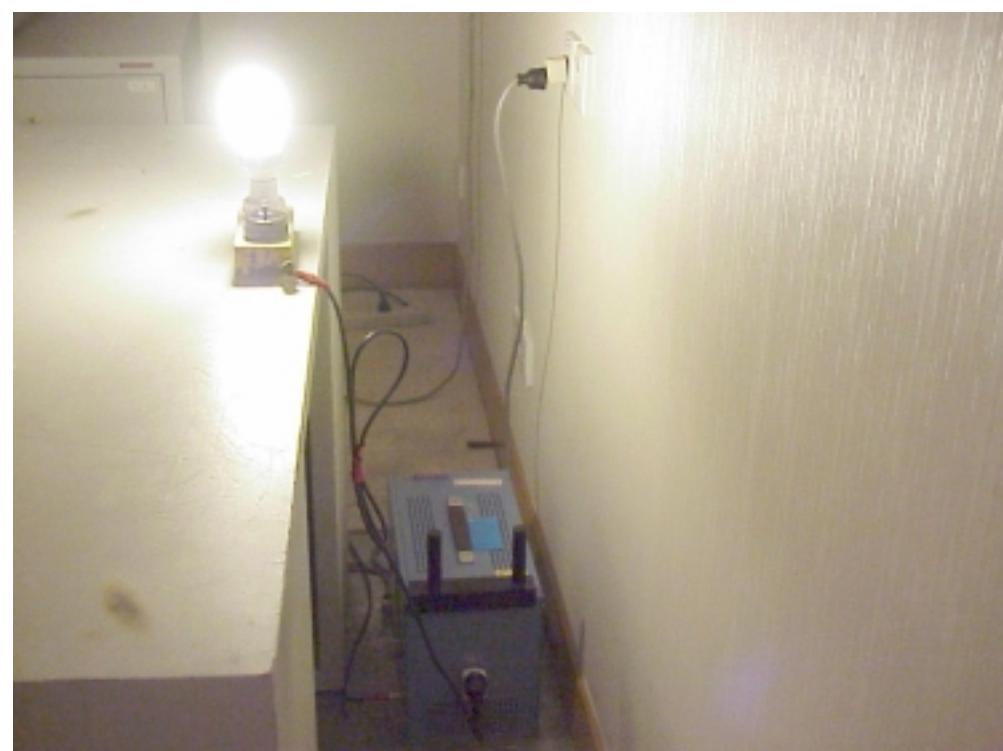
FRONT VIEW (M/N: TME20W)



SIDE VIEW (M/N: TME20W)

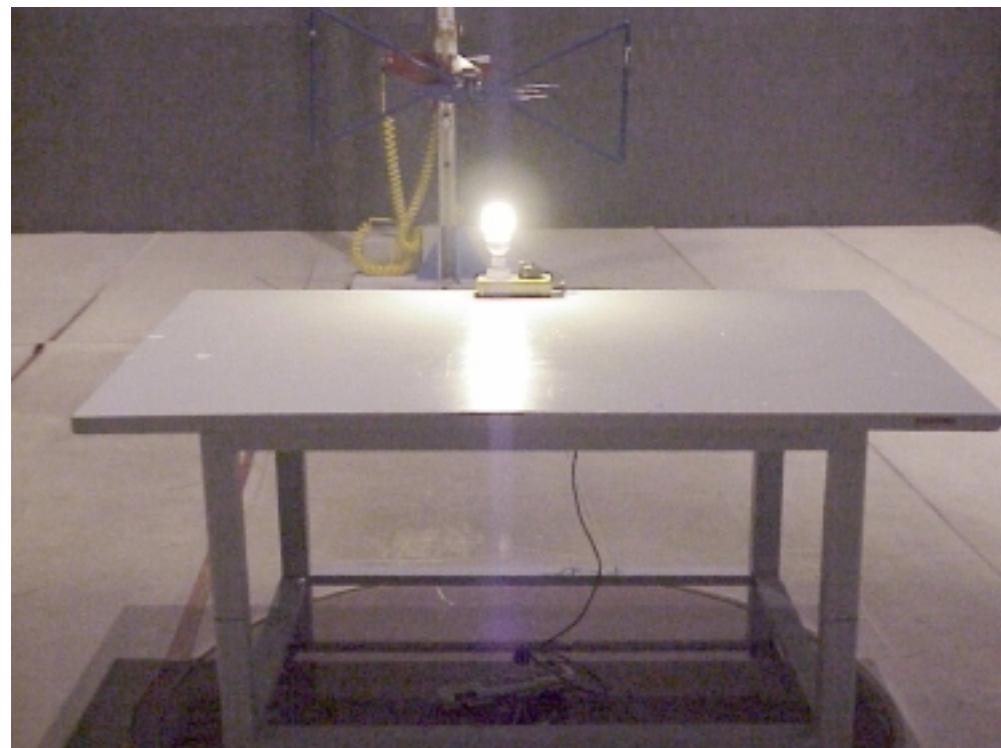


FRONT SIDE (M/N: TME25W)

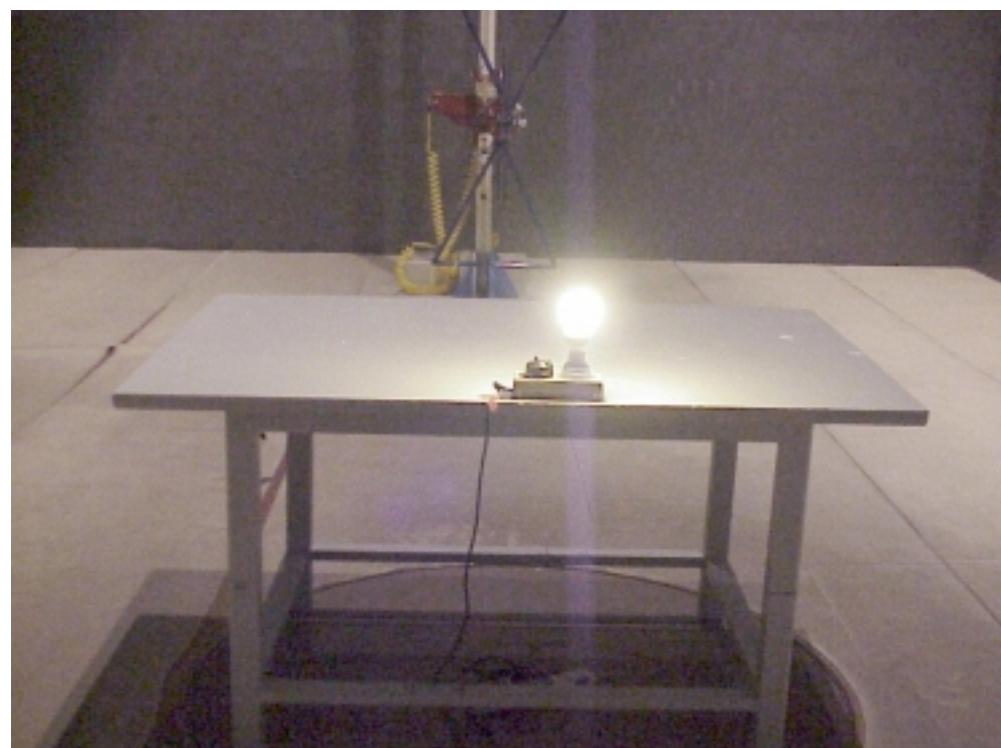


SIDE VIEW (M/N: TME25W)

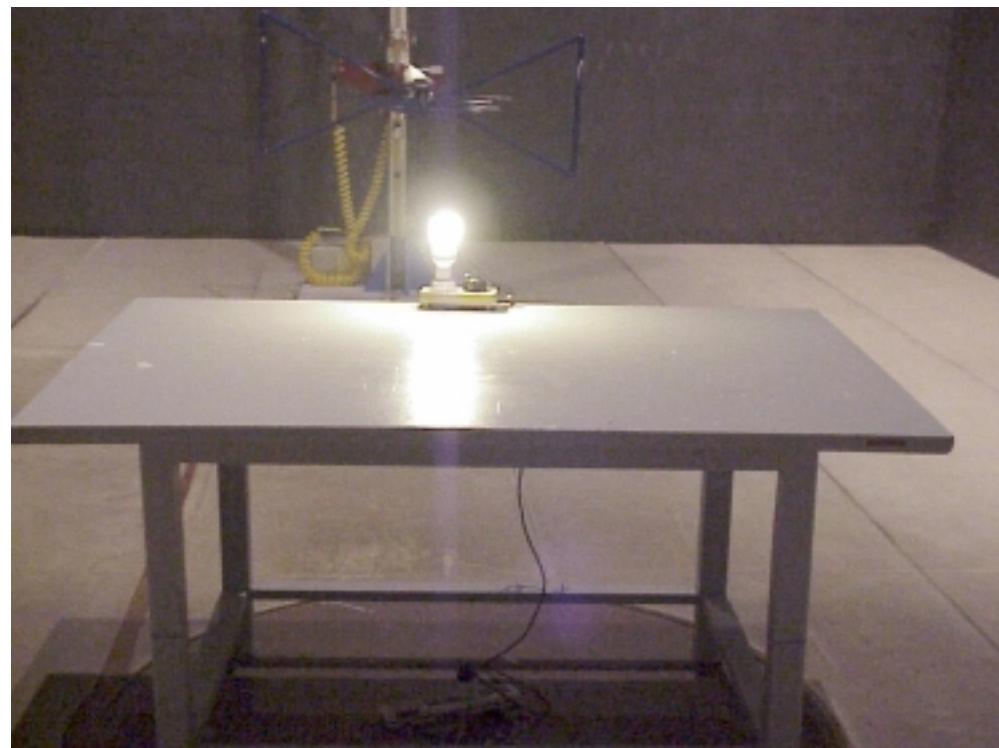
4.2 Radiated Emission Test



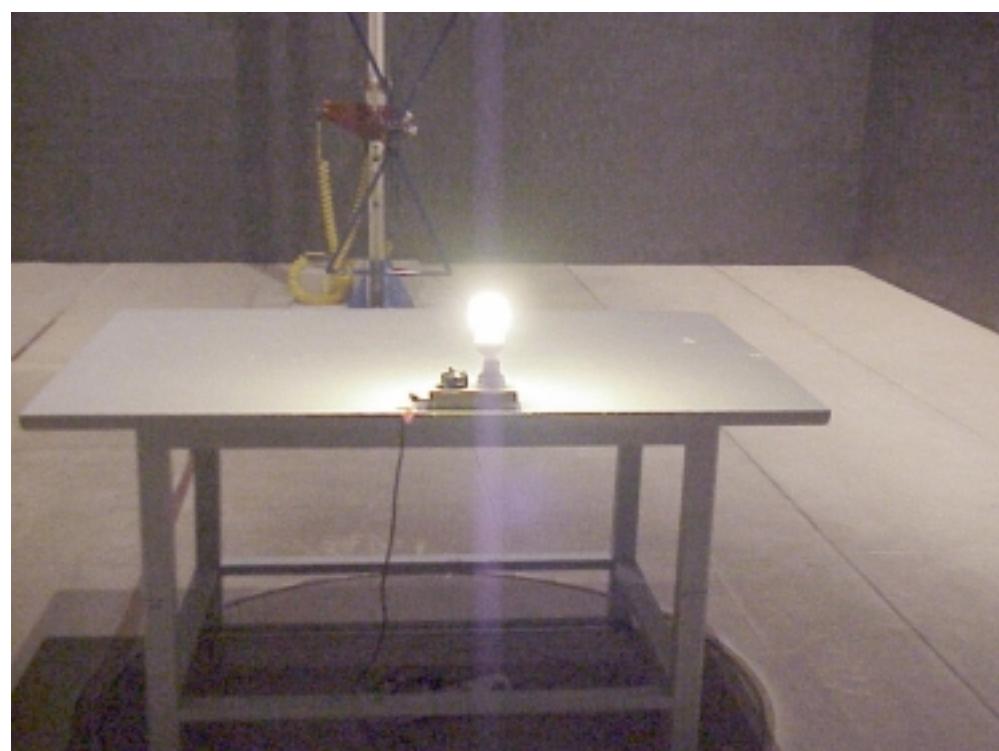
HORIZONTAL (M/N: TME15W)



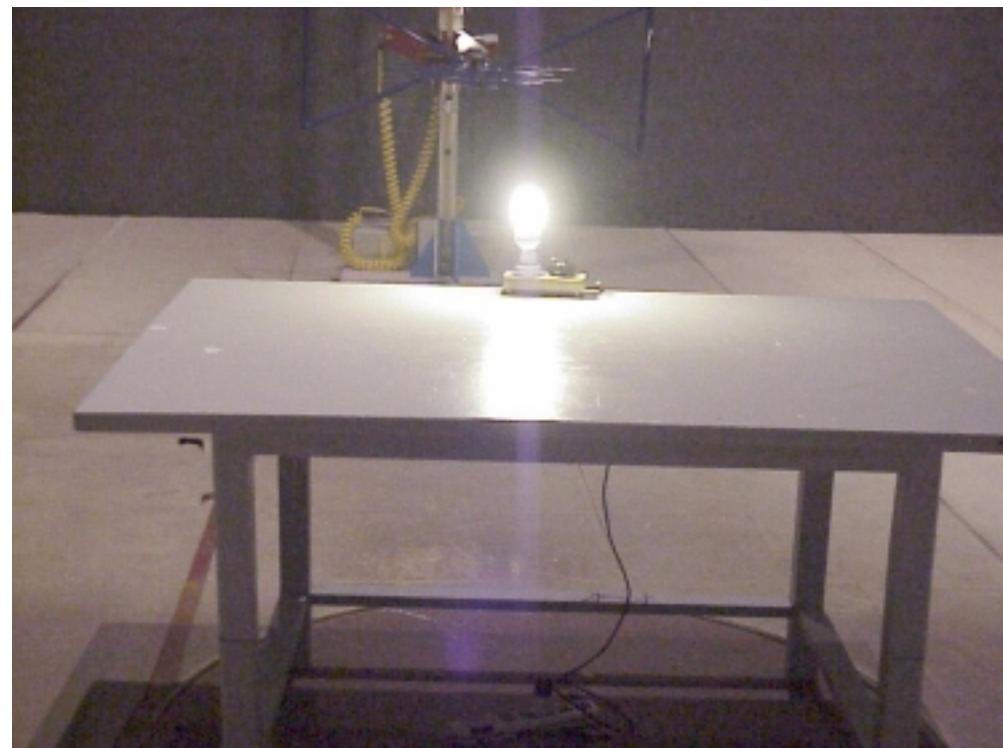
VERTICAL (M/N: TME15W)



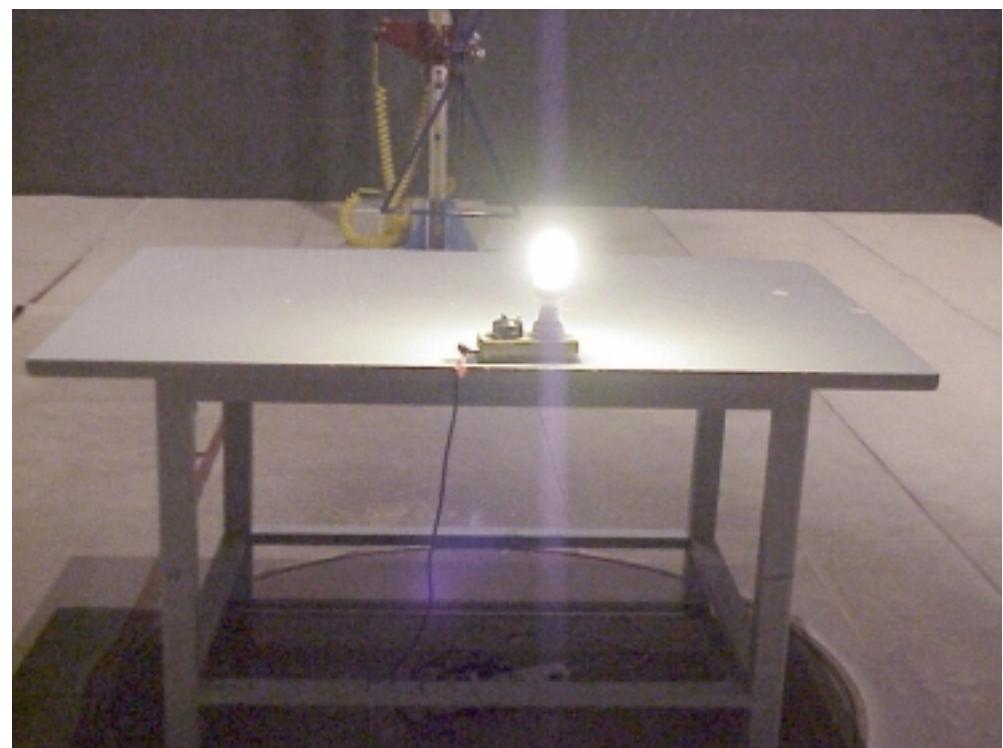
HORIZONTAL (M/N: TME20W)



VERTICAL (M/N: TME20W)



HORIZONTAL (M/N: TME25W)



VERTICAL (M/N: TME25W)