

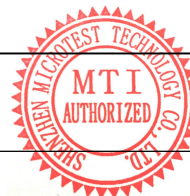
EN 55015: 2006+A1:2007+A2:2009  
EN 61547: 2009  
EN 61000-3-2: 2006+A1:2009+A2: 2009  
EN 61000-3-3: 2008  
MEASUREMENT AND TEST REPORT  
For  
**FUZHOU WAER POWER-SAVING ELECTRIC APPLIANCES CO., LTD.**

Qiaotou Industry area Hongwei Minhou, Fuzhou, Fujian, China

**Model: 8U 250W, 2U, 3U,  
4U, 5U, 6U, 1W---250W**

**November 25, 2013**

<b>This Report Concerns:</b> <input checked="" type="checkbox"/> Original Report	<b>Equipment Type:</b> ENERGY SAVING LAMP
<b>Report Number:</b>	MTI131119004RE
<b>Test Engineer:</b>	Bill Chen
<b>Reviewed By:</b>	Jason zheng
<b>Approved &amp; Authorized By:</b>	Hebe Lee
<b>Test Date:</b>	Nov 19, 2013–Nov 25, 2013
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**Note:** This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of MTI Technology Laboratory Ltd.

## TABLE OF CONTENTS

<b>1. GENERAL INFORMATION.....</b>	<b>4</b>
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....	4
1.2 TEST STANDARDS.....	4
1.3 TEST SUMMARY.....	5
1.4 TEST METHODOLOGY.....	5
1.5 TEST FACILITY.....	6
1.6 TEST EQUIPMENT LIST AND DETAILS.....	6
<b>2. SYSTEM TEST CONFIGURATION.....</b>	<b>8</b>
2.1 JUSTIFICATION.....	8
2.2 EUT EXERCISE SOFTWARE.....	8
2.3 SPECIAL ACCESSORIES.....	8
2.4 EQUIPMENT MODIFICATIONS.....	8
2.5 CONFIGURATION OF TEST SYSTEM.....	8
2.6 TEST SETUP DIAGRAM.....	8
<b>3. RADIATED DISTURBANCES.....</b>	<b>9</b>
3.1 MEASUREMENT UNCERTAINTY.....	9
3.2 LIMIT OF RADIATED DISTURBANCES.....	9
3.3 EUT SETUP.....	9
3.4 TEST RECEIVER SETUP.....	9
3.5 TEST PROCEDURE.....	10
3.6 CORRECTED AMPLITUDE & MARGIN CALCULATION.....	10
3.7 RADIATED EMISSIONS TEST RESULT.....	10
3.8 TEST RESULT.....	10
<b>4. CONDUCTED DISTURBANCES.....</b>	<b>13</b>
4.1. MEASUREMENT UNCERTAINTY.....	13
4.2. LIMIT OF CONDUCTED DISTURBANCES.....	14
4.3. EUT SETUP.....	14
4.4. INSTRUMENT SETUP.....	14
4.5. TEST PROCEDURE.....	14
4.6. SUMMARY OF TEST RESULTS.....	15
4.7. TEST RESULT.....	15
<b>5. RADIATED ELECTROMAGNETIC DISTURBANCES (FREQUENCY RANGE 9KHZ TO 30MHZ).....</b>	<b>17</b>
5.1. MEASUREMENT UNCERTAINTY.....	17
5.2. LIMIT OF RADIATED ELECTROMAGNETIC DISTURBANCES.....	18
5.3. EUT SETUP.....	18
5.4. SUMMARY OF TEST RESULTS.....	18
5.5. TEST RESULT.....	19
<b>6. HARMONIC CURRENT TEST.....</b>	<b>22</b>
6.1 APPLICATION OF HARMONIC CURRENT EMISSION.....	22
6.2 MEASUREMENT DATA.....	22
6.3 TEST RESULTS.....	22
<b>7. VOLTAGE FLUCTUATIONS AND FLICKER TEST.....</b>	<b>24</b>
7.1 APPLICATION OF VOLTAGE FLUCTUATIONS AND FLICKER TEST.....	24
7.2 MEASUREMENT DATA.....	24
7.3 TEST RESULTS.....	24
<b>8. IMMUNITY MEASUREMENT INSTRUMENTATION.....</b>	<b>25</b>
8.1 ELECTROSTATIC DISCHARGE TEST SYSTEM.....	25
8.2 RADIATED SUSCEPTIBILITY TEST SYSTEM.....	25

8.3 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST SYSTEM.....	25
8.4 VOLTAGE DIPS, SHORT INTERRUPTIONS IMMUNITY TESTS SYSTEM.....	25
8.5 SURGE IMMUNITY TEST SYSTEM.....	25
8.6 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST SYSTEM.....	25
8.7 CONDUCTED SUSCEPTIBILITY TEST SYSTEM.....	25
8.8 EQUIPMENT TEST TABLE.....	26
8.9 INSTRUMENT CALIBRATION.....	26
<b>9. IMMUNITY TEST PROCEDURES.....</b>	<b>27</b>
9.1 EUT AND CABLE PLACEMENT.....	27
9.2 APPLICATION OF ELECTROSTATIC DISCHARGE IMMUNITY TEST.....	27
9.3 APPLICATION OF RADIATED SUSCEPTIBILITY TEST.....	27
9.4 APPLICATION OF POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST.....	27
9.5 APPLICATION OF VOLTAGE DIPS, SHORT INTERRUPTIONS IMMUNITY TESTS.....	27
9.6 SURGE IMMUNITY TEST SYSTEM.....	27
9.7 APPLICATION OF ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST.....	28
9.8 APPLICATION OF CONDUCTED SUSCEPTIBILITY TEST.....	28
9.9 DEVIATIONS FROM THE STANDARD.....	28
<b>10. TEST DATA.....</b>	<b>29</b>
10.1 ELECTROSTATIC DISCHARGE IMMUNITY TEST (IEC 61000-4-2).....	29
10.2 RADIATED SUSCEPTIBILITY TEST (IEC 61000-4-3).....	30
10.3 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST (IEC 61000-4-8).....	30
10.4 VOLTAGE DIPS, SHORT INTERRUPTIONS IMMUNITY TESTS (IEC 61000-4-11).....	30
10.5 SURGE IMMUNITY TEST (IEC 61000-4-5).....	31
10.6 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST (IEC 61000-4-4).....	31
10.7 CONDUCTED SUSCEPTIBILITY TEST (IEC 61000-4-6).....	32
<b>11. TEST RESULTS.....</b>	<b>33</b>
11.1 IEC 61000-4-2 ELECTROSTATIC DISCHARGE IMMUNITY TEST CONFIGURATION.....	33
11.2 IEC 61000-4-3 RADIATED SUSCEPTIBILITY TEST CONFIGURATION.....	33
11.3 IEC 61000-4-8 FREQUENCY MAGNETIC FIELD IMMUNITY TEST CONFIGURATION.....	33
11.4 IEC 61000-4-11 VOLTAGE DIPS, SHORT INTERRUPTIONS IMMUNITY TESTS CONFIGURATION.....	33
11.5 IEC 61000-4-5 OF SURGE IMMUNITY TEST CONFIGURATION.....	33
11.6 IEC 61000-4-4 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST CONFIGURATION.....	34
11.7 IEC 61000-4-6 CONDUCTED SUSCEPTIBILITY TEST CONFIGURATION.....	34
<b>APPENDIX I - PRODUCT LABELING.....</b>	<b>35</b>
CE MARKING LABEL SPECIFICATION.....	35
PROPOSED LABEL LOCATION ON EUT.....	35
<b>APPENDIX II - EUT PHOTOGRAPHS.....</b>	<b>36</b>
EUT – EXTERNAL VIEW 1.....	36
EUT –EXTERNAL VIEW 2.....	36
EUT –EXTERNAL VIEW 3.....	37
EUT –EXTERNAL VIEW 4.....	37
<b>APPENDIX III – TEST SETUP PHOTOGRAPHS.....</b>	<b>38</b>

# 1. GENERAL INFORMATION

## 1.1 Product Description for Equipment Under Test (EUT)

### Client Information

Applicant: FUZHOU WAER POWER-SAVING ELECTRIC APPLIANCES CO., LTD.

Address of applicant: Qiaotou Industry area Hongwei Minhou, Fuzhou, Fujian, China

Manufacturer: FUZHOU WAER POWER-SAVING ELECTRIC APPLIANCES CO., LTD.

Address of manufacturer: Qiaotou Industry area Hongwei Minhou, Fuzhou, Fujian, China

Equipment Under Test: ENERGY SAVING LAMP

Trade Name: N/A

Model No.: 8U 250W

Supplementary 2U, 3U, 4U, 5U, 6U 1W---250W

Models No.: Remark: Power ,Current, Lumen, Color Temperature And Luminous Flux Are All Different

Power Supply: AC 230V, 50Hz

## 1.2 Test Standards

The following Declaration of Conformity report of EUT is prepared in accordance with

EN 55015: 2006+A1:2007+A2:2009

EN 61547: 2009

EN 61000-3-2: 2006+A1:2009+A2: 2009

EN 61000-3-3: 2008

The objective of the manufacturer is to demonstrate compliance with the described standards above.

### 1.3 Test Summary

For the EUT described above.

Table 1: Tests Carried Out Under EN 55015: 2006+A1:2007+A2:2009

Standard	Test Items	Status
EN 55015: 2006+A1:2007+A2:2009	Disturbance Voltage at The Mains Terminals (150KHz To 30MHz)	√
	Radiated Disturbances (30MHz To 1000MHz)	√

- √ Indicates that the test is applicable  
× Indicates that the test is not applicable

Table 2: Tests Carried Out Under EN 61547: 2009

Standard	Test Items	Status
EN61000-4-2:2009	Electrostatic discharge Immunity	√
EN61000-4-3:2010	Radiated Susceptibility (80MHz to 1GHz)	√
EN61000-4-8:2010	Power Frequency Magnetic Field Immunity (50/60Hz)	√
EN61000-4-4:2010	Electrostatic Fast Transient/Burst Immunity	√
EN61000-4-5:2006	Surge Immunity	√
EN61000-4-6:2009	Conducted Susceptibility (150KHz to 80MHz)	√
EN61000-4-11: 2004	Voltage Dips Short Interruptions Immunity Tests	√

- √ Indicates that the test is applicable  
× Indicates that the test is not applicable

Table 3: Tests Carried Out Under EN 61000-3-2: 2006+A1:2009+A2: 2009 & EN 61000-3-3: 2008

Standard	Test Items	Status
EN 61000-3-2: 2006+A1:2009+A2: 2009	Harmonic Current	√
EN 61000-3-3: 2008	Voltage Fluctuations	√

- √ Indicates that the test is applicable  
× Indicates that the test is not applicable

### 1.4 Test Methodology

All measurements contained in this report were conducted with CISPR 16-1: 2002, radio disturbance and immunity measuring apparatus, and CISPR16-2: 2002, Method of measurement of disturbances and immunity.

All measurement required was performed at laboratory of MTI Technology Laboratory Ltd., at 10F, Yinxing Business hotel, Xixiang Road, Bao'an District, Shenzhen, P.R. China.

## 1.5 Test Facility

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

### FCC – Registration No.: 167003

MTI Technology Laboratory 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 167003, May 04, 2009.

The facility also complies with the radiated and AC line conducted test site criteria set forth in CISPR 16-1: 2002, CISPR16-2: 2002.

## 1.6 Test Equipment List and Details

Table 1: Test Equipment for Emission Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal	Calibration Period
Spectrum Analyzer	ANRITSU	MS2651B	6200238856	2011/11/18	1 year
EMI Test Receiver	ROHDE&SCHWARZ	ESCS30	100307	2011/11/18	1 year
LISN	ROHDE&SCHWARZ	ESH3-Z5	100305	2011/11/18	1 year
Pulse Limiter	ROHDE&SCHWARZ	ESH3-Z2	100305	2011/11/18	1 year
Bilog Antenna	SCHWARZBECK	VULB 9163	9163-194	2011/11/18	1 year
50 $\Omega$ Coaxial Switch	ANRITSU CORP	MP59B	6200283933	2011/11/18	1 year
Power Clamp	ROHDE&SCHWARZ	MDS21	100142	2011/11/18	1 year
Loop Antenna	Laplace Instrument Ltd	RF300	8006	2011/11/18	1 year
Cable	Resenberger	N/A	NO.1	N/A	N/A
Cable	SCHWARZBECK	N/A	NO.2	N/A	N/A
Cable	SCHWARZBECK	N/A	NO.3	N/A	N/A
DC Power Filter	DuoJi	DL2 $\times$ 30B	N/A	N/A	N/A
Single Phase Power Line Filter	DuoJi	FNF 202B30	N/A	N/A	N/A
3 Phase Power Line Filter	DuoJi	FNF 402B30	N/A	N/A	N/A
AC Power Source	California Instruments	5001iX-400	55689	2011/11/18	1 year
Test analyzer	California Instruments	PACS-1	72254	2011/11/18	1 year

Table 2: Test Equipment for Immunity Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal	Calibration Period
ESD Tester	HAEFELY	PESD 1610	H4001552	2011/11/18	1 year
EMC PRO System	Thermo	PRO-BASE	0403271	2011/11/18	1 year
Capacitive Clamp	Thermo	PRO-CCL	0403272	2011/11/18	1 year
Coupler decoupler for telecom lines	Thermo	CM-TEL-CD	0403273	2011/11/18	1 year
Magnetic field Tester	HAEFELY	MAG 100	150577	2011/11/18	1 year
AC Transformer	CHOKUN	TDGC2J-5	N/A	2011/11/18	1 year
Signal Generator	IFR	2032	203002/100	2011/11/18	1 year
Amplifier	AR	150W1000	301584	2011/11/18	1 year
Dual Directional Coupler	AR	DC6080	301508	2011/11/18	1 year
Power Head	AR	PH2000	301193	2011/11/18	1 year
Power Meter	AR	PM2002	302799	2011/11/18	1 year
Transmitting Antenna	AR	AT1080	28570	2011/11/18	1 year
Simulator	EMTEST	CWS 500C	0900-12	2011/11/18	1 year
CDN	EMTEST	CDN-M2	510010010010	2011/11/18	1 year
CDN	EMTEST	CDN-M3	0900-11	2011/11/18	1 year
Injection Clamp	EMTEST	F-2031-23MM	368	2011/11/18	1 year
Attenuator	EMTEST	ATT 6	0010222A	2011/11/18	1 year

2. SYSTEM TEST CONFIGURATION

2.1 Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

2.2 EUT Exercise Software

The EUT exercising program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The software offered by manufacture, can let the EUT being normal operation.

2.3 Special Accessories

As shown in section 2.5, interface cable used for compliance testing is shielded as normally supplied by Fuzhou Waer Power-Saving Electric Appliances Co.,Ltd. its respective support equipment manufacturers.

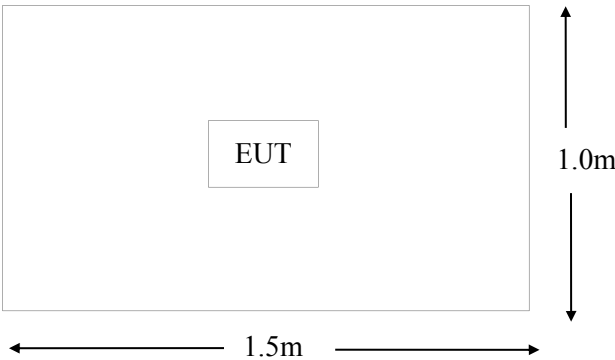
2.4 Equipment Modifications

The EUT tested was not modified by MTI.

2.5 Configuration of Test System



2.6 Test Setup Diagram



All setup please see the section 2.5.

### 3. RADIATED DISTURBANCES

#### 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, 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.

The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is  $\pm 4.0$  dB.

#### 3.2 Limit of Radiated Disturbances

Frequency (MHz)	Distance (Meters)	Field Strengths Limits (dB $\mu$ V/m)
30 ~ 230	3	40
230 ~ 300	3	47

Note: (1) The tighter limit shall apply at the edge between two frequency bands.  
(2) Distance refers to the distance in meters between the test instrument antenna and the closest point of any part of the E.U.T.

#### 3.3 EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup accordance with the CISPR 16-1: 2002, CISPR16-2: 2002. The specification used was EN 55015 limits.

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

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

#### 3.4 Test Receiver Setup

According to EN 55022 rules, the frequency was investigated from 30 to 300 MHz. During the radiated emission test, the test receiver was set with the following configurations:

Test Receiver Setting:

Detector.....Peak & Quasi-Peak  
IF Band Width.....120 KHz  
Frequency Range.....30MHz to 1000MHz  
Turntable Rotated.....0 to 360 degrees

Antenna Position:

Height.....1m to 4m  
Polarity.....Horizontal and Vertical

### 3.5 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings performed only when an emission was found to be marginal (within  $-10 \text{ dB } \mu\text{V}$  of specification limits), and are distinguished with a "QP" in the data table.

### 3.6 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  $7\text{dB } \mu\text{V}$  means the emission is  $7\text{dB } \mu\text{V}$  below the maximum limit for Class B. The equation for margin calculation is as follows:

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

### 3.7 Radiated Emissions Test Result

Temperature ( °C )	22~23
Humidity ( %RH )	50~54
Barometric Pressure ( mbar )	950~1000
EUT	ENERGY SAVING LAMP
M/N	8U 250W
Operating Mode	On

Test data see following pages

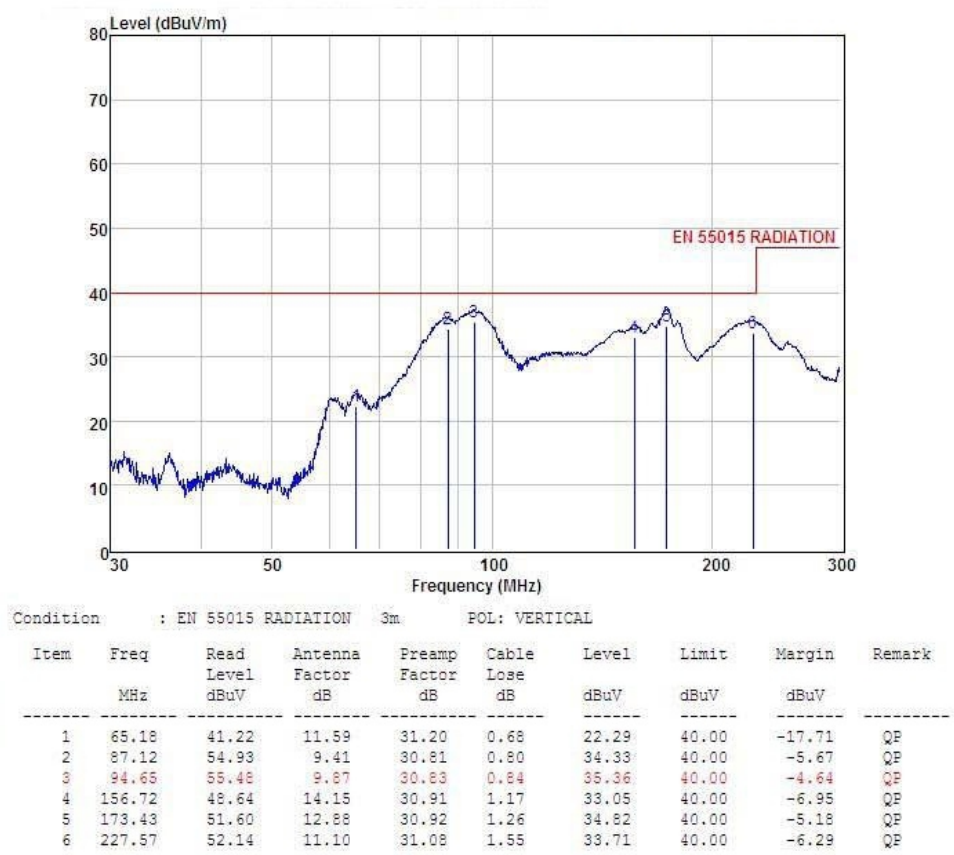
**Remark:** (1) When PK reading is less than relevant limit 20dB, the QP reading and AV reading will not be recorded.  
(2) Where QP reading is less than relevant AV limit, the AV reading will not be measured

### 3.8 Test Result

Pass  
Please refer to the following pages.

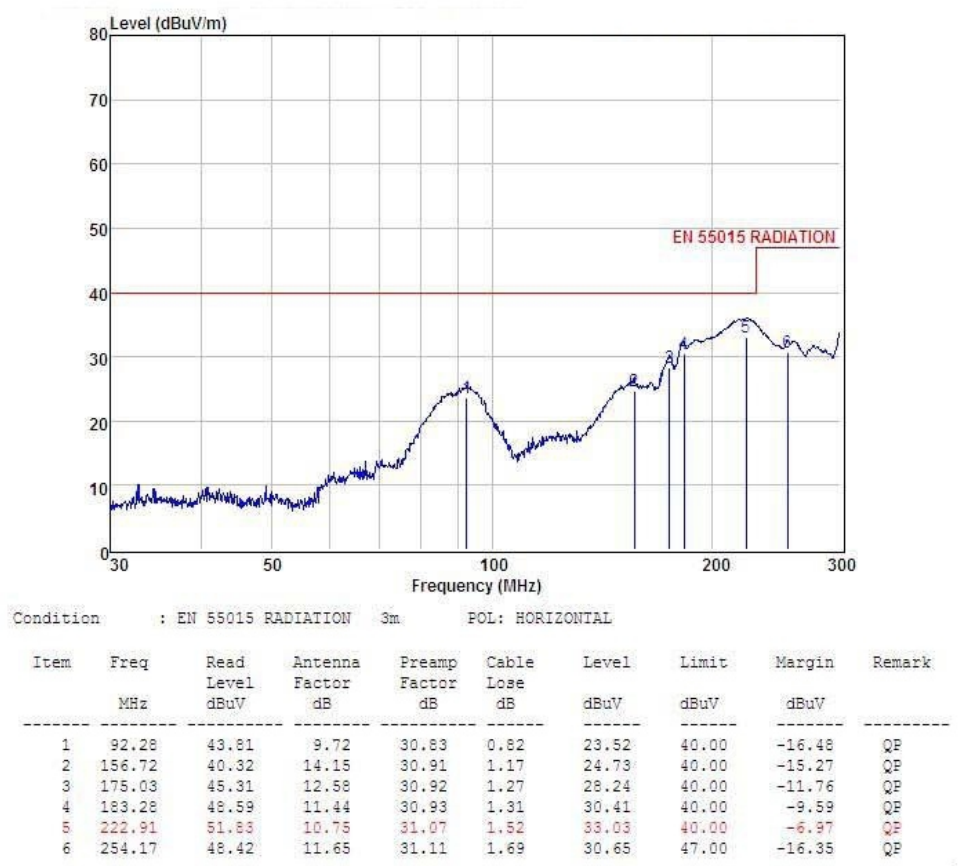
Radiated Emission Test Data

EUT: ENERGY SAVING LAMP  
M/N: 8U 250W  
Operating Condition: On  
Test Site: 3m CHAMBER  
Operator: Shine  
Comment: Polarization: Vertical



Radiated Emission Test Data

EUT: ENERGY SAVING LAMP  
M/N: 8U 250W  
Operating Condition: On  
Test Site: 3m CHAMBER  
Operator: Shine  
Comment: Polarization: Horizontal



## 4. CONDUCTED DISTURBANCES

### 4.1. 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.

The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is +2.4 dB.

### 4.2. Limit of Conducted Disturbances

Frequency Range (MHz)	Limits ( dBuV)	
	Quasi-Peak	Average
0.009~0.050	110	/
0.050~0.150	90 ~80*	/
0.150~0.500	66~56*	56~46
0.500~5.000	56	46
5.000~30.00	60	50

Note: \* Decreasing linearly with logarithm of frequency.

### 4.3. EUT Setup

The setup of EUT is according with CISPR 16-1: 2002, CISPR16-2: 2002 measurement procedure. The specification used was the EN 55015 limits.

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

The cables were draped along the test table and bundled to 30-40cm in the middle.

The spacing between the peripherals was 10 cm.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

### 4.4. Instrument Setup

The test receiver was set with the following configurations:

Test Receiver Setting:

Frequency Range.....9 KHz to 30 MHz  
Detector.....Peak & Quasi-Peak & Average  
Sweep Speed.....Auto  
IF Band Width.....3 KHz with 9 KHz – 150 KHz  
IF Band Width.....9 KHz with 150 KHz – 30 MHz

#### 4.5. Test Procedure

During the conducted emission test, the EUT power cord was connected to the auxiliary outlet of the first Artificial Mains.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance using all installation combination.

All data was recorded in the peak detection mode. Quasi-peak and Average readings were only performed when an emission was found to be marginal (within -10 dB $\mu$ V of specification limits). Quasi-peak readings are distinguished with a "**QP**". Average readings are distinguished with a "**AV**".

#### 4.6. Summary of Test Results

According to the data in section 3.6, the EUT complied with the EN 55022 Conducted margin, with the worst margin reading of:

##### EUT Configuration on Test

The EN 55015 regulations test method must be used to find the maximum emission during radiated emission test.

##### ENERGY SAVING LAMP

Model Number : 8U 250W

Serial Number : N/A

Applicant : FUZHOU WAER POWER-SAVING ELECTRIC  
APPLIANCES CO., LTD.

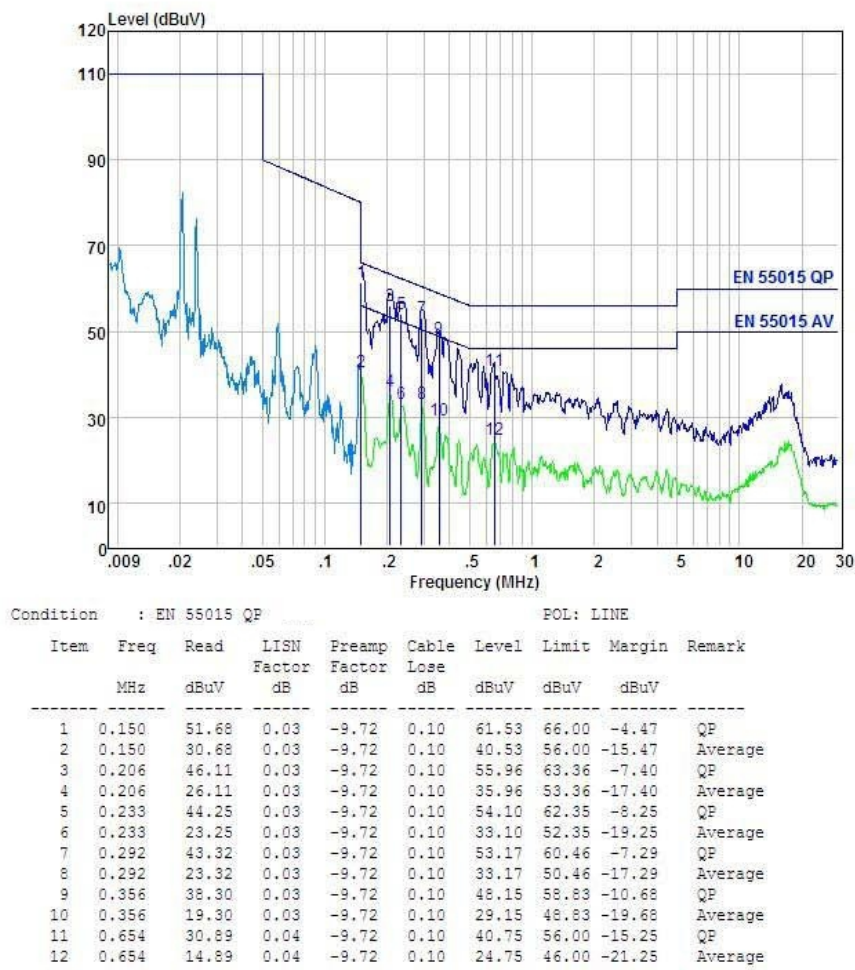
#### 4.7. Test Result

PASS

Please refer to the following pages.

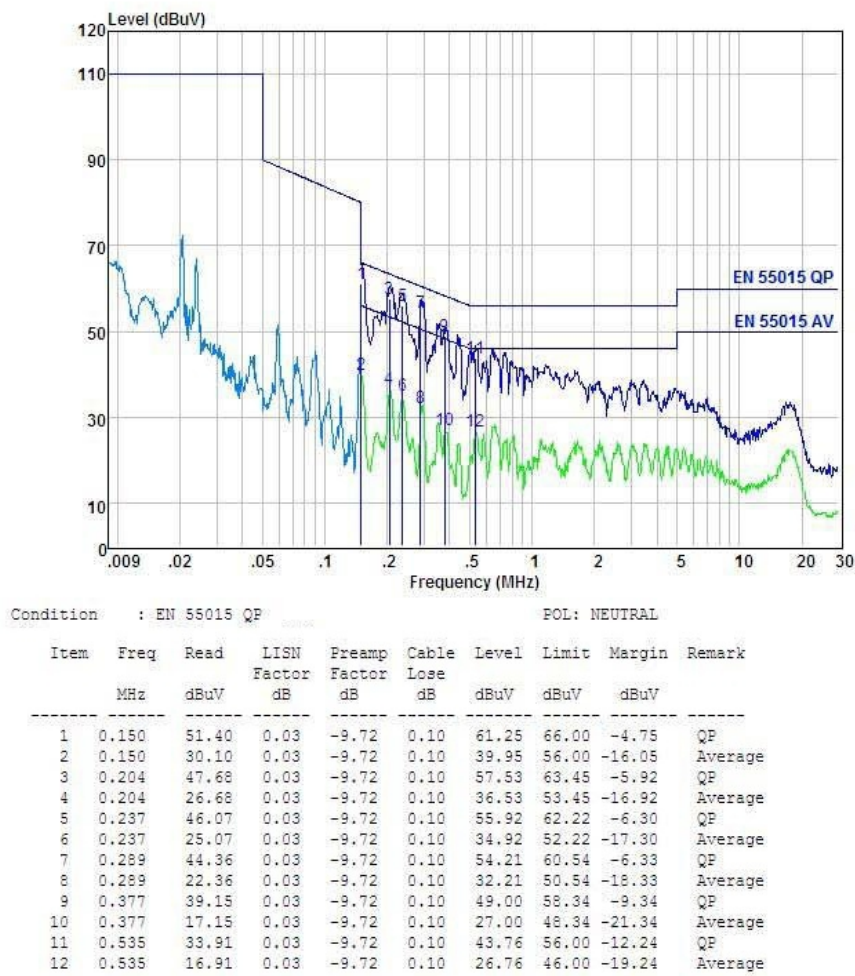
Conduction Emission Test Data

EUT: ENERGY SAVING LAMP  
M/N: 8U 250W  
Operating Condition: On  
Test Site: 3m Shield  
Operator: Amy  
POL: LINE



Conduction Emission Test Data

EUT: ENERGY SAVING LAMP  
M/N: 8U 250W  
Operating Condition: On  
Test Site: 3m Shield  
Operator: Amy  
POL: NEUTRAL



## 5. Radiated Electromagnetic Disturbances (Frequency range 9kHz to 30MHz)

### 5.1. 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.

The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is  $\pm 2.4$  dB.

### 5.2. Limit of Radiated Electromagnetic Disturbances

Frequency Range (MHz)	Limits for loop diameter (dB $\mu$ A)
	2m
0.009~0.070	88
0.070~0.150	88~58
0.150~3.00	58~22
3.000~30.000	22

### 5.3. EUT Setup

The setup of EUT is according with EN 55015 Limits and Methods of Measurement.

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

The cables were draped along the test table and bundled to 30-40cm in the middle.

The spacing between the peripherals was 10 cm.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

### 5.4. Summary of Test Results

According to the data in section 4.5, the worst margin reading of:

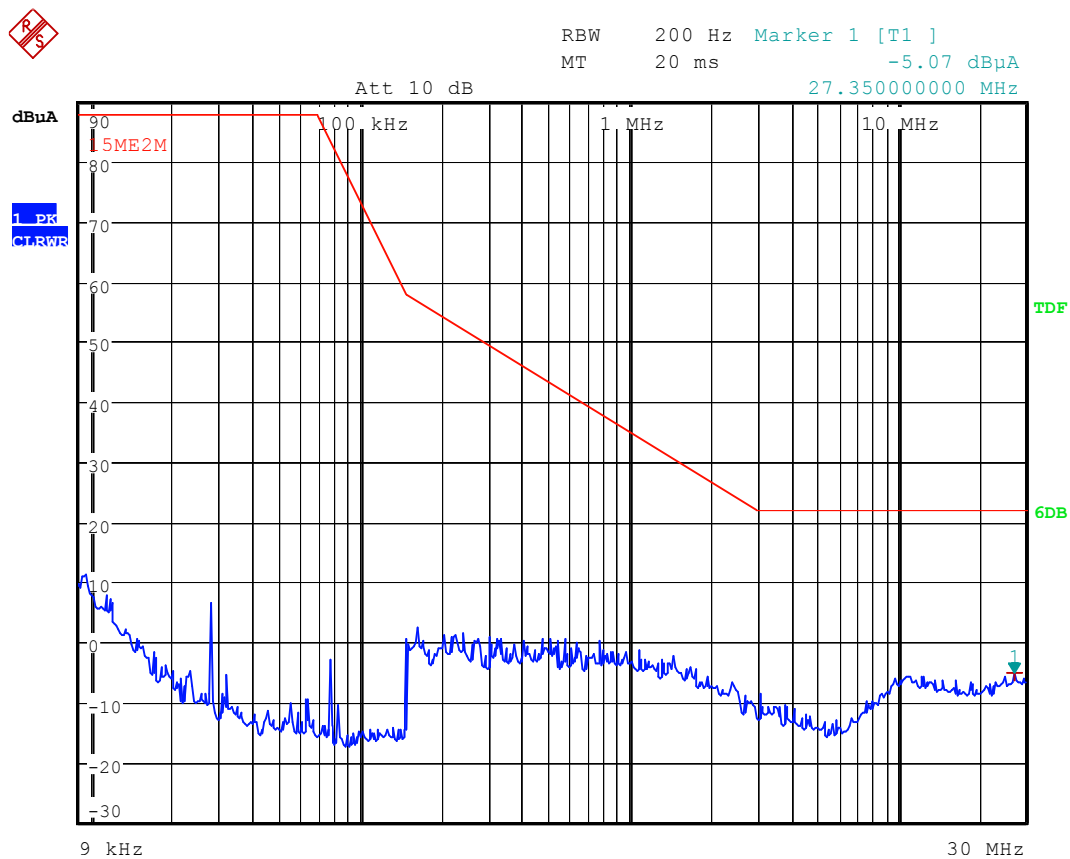
EUT Configuration on Test

EUT : ENERGY SAVING LAMP  
Model Number : 8U 250W  
Serial Number : N/A  
Applicant : FUZHOU WAER POWER-SAVING ELECTRIC APPLIANCES CO., LTD.

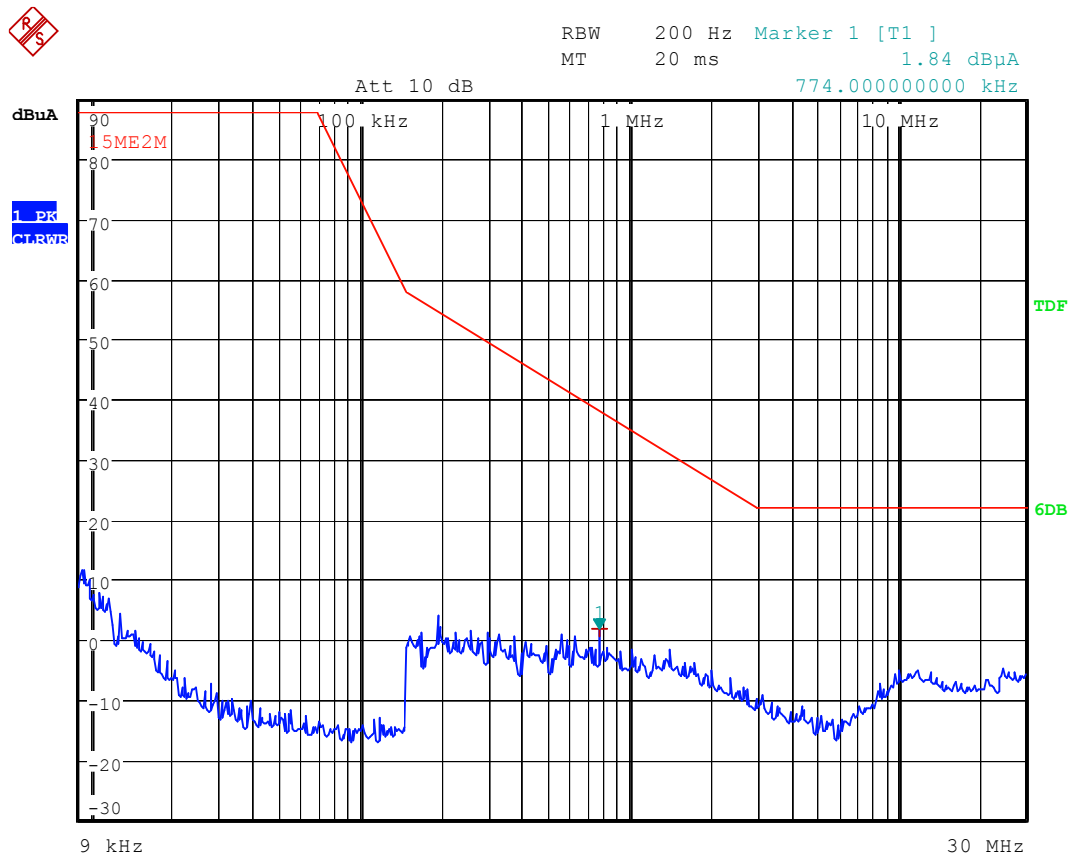
5.5. Test Result

Testing according to limit table 3b and the emissions below 10dB are not report.  
Detailed information, Please refer to the following pages.  
Test Result: Pass

Plot of Radiated Electromagnetic Disturbances Test Data  
Radiated Electromagnetic Disturbances  
EUT: ENERGY SAVING LAMP  
M/N: 8U 250W  
Operating Specification: X  
Comment: AC 230V/50Hz



**Plot of Radiated Electromagnetic Disturbances Test Data**  
Radiated Electromagnetic Disturbances  
EUT: ENERGY SAVING LAMP  
M/N: 8U 250W  
Operating Specification: Y  
Comment: AC 230V/50Hz



Plot of Radiated Electromagnetic Disturbances Test Data

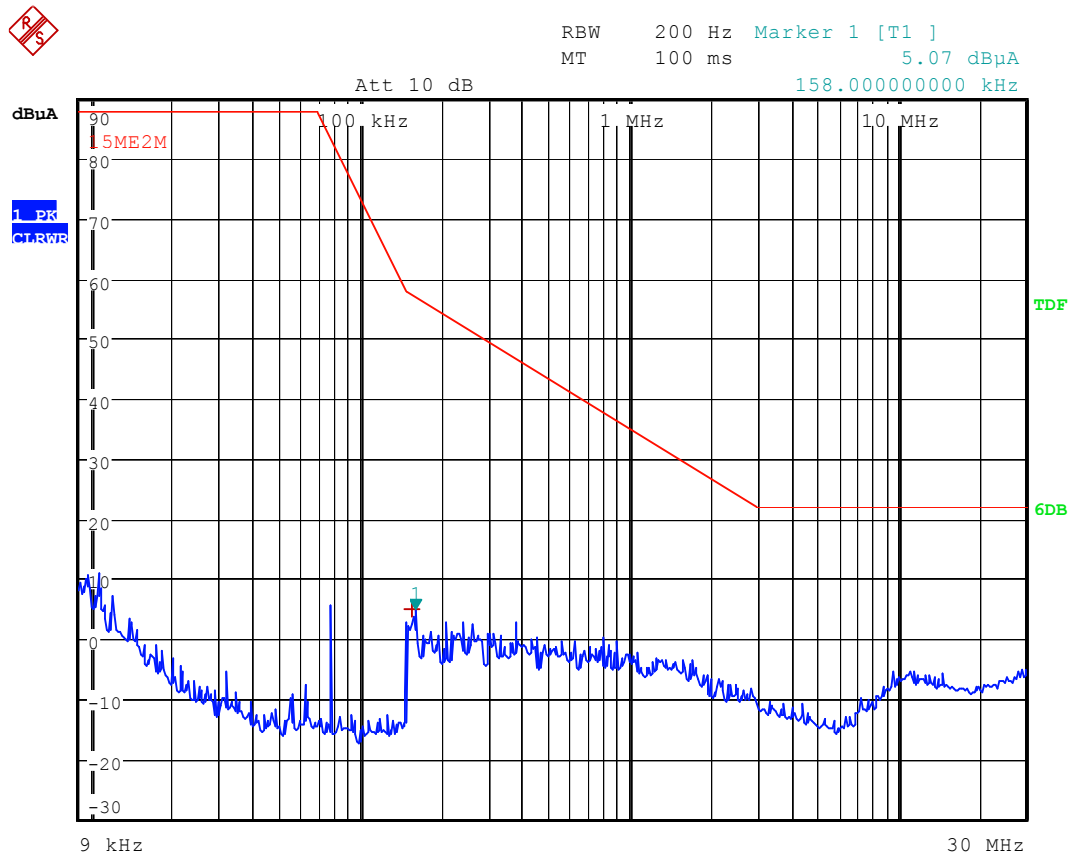
Radiated Electromagnetic Disturbances

EUT: ENERGY SAVING LAMP

M/N: 8U 250W

Operating Specification: Z

Comment: AC 230V/50Hz



## 6. HARMONIC CURRENT TEST

### 6.1 Application of Harmonic Current Emission

Compliance to these standards ensures that tested equipment will not generate harmonic currents at levels that cause unacceptable degradation of the main environment. This directly contributes to meeting compatibility levels established in other EMC standards, which defines compatibility levels for low-frequency conducted disturbances in low-voltage supply systems.

### 6.2 Measurement Data

Note: For detailed test data, refer to the following pages:

Standard used:	EN/IEC 61000-3-2 Quasi-stationary - Equipment class C
Observation time:	150s
E. U. T.:	ENERGY SAVING LAMP
M/N:	8U 250W
Power Supply:	AC 230V 50Hz
Operation Mode:	On

### 6.3 Test Results

The EUT was subjected to the Harmonic Current test required by EN 61000-3-2.

The EUT measured values of the Harmonic Current test of the input current, shall be compared with the limits given in section 7.0.

Voltech IEC61000-3 Windows Software 1.14.06RC1		Test Date: 2012 Aug 6 21:06
Type of Test:	Fluctuating Harmonics Test - Worst Case Table (2006)	
Power Analyzer:	Voltech PM6000 SN: 200006700495 Firmware version: v1.21.07RC2	
Channel(s):	1. SN: 090015501951, 28 Adjusted Date: 23 MAR 2011. 2. SN:None Adjusted Date:None 3. SN:None Adjusted Date:None 4. SN:None Adjusted Date:None 5. SN:None Adjusted Date:None 6. SN:None Adjusted Date:None	
Shunt(s):	1. SN: 091024301771, 4 Adjusted Date: 25 MAR 2011. 2. SN:None Adjusted Date:None 3. SN:None Adjusted Date:None 4. SN:None Adjusted Date:None 5. SN:None Adjusted Date:None 6. SN:None Adjusted Date:None	
AC Source:	Mains / Manual Source	
Overall Result:	Notes: Supplied fundamental current not equal to measured  <div style="color: green; font-weight: bold; font-size: 1.2em;">PASS</div>	

Class	Class C
Class Multiplier	1

Harmonics	Limit 1	Limit 2	Average Reading	<L1 <L2	Max Reading	<L2	Pass FAIL	Harmonics	Limit 1	Limit 2	Average Reading	<L1 <L2	Max Reading	<L2	Pass FAIL
2	None	None	0.718mA		1.005mA		N/A	3	13.760A	20.639A	65.33mA	✓✓	65.55mA	✓	Pass
4	None	None	0.800mA		1.111mA		N/A	5	9.7600A	14.640A	62.50mA	✓✓	62.65mA	✓	Pass
6	None	None	0.909mA		1.217mA		N/A	7	None	None	58.49mA		58.60mA		N/A
8	None	None	1.001mA		1.320mA		N/A	9	None	None	53.53mA		53.66mA		N/A
10	None	None	1.073mA		1.407mA		N/A	11	None	None	47.93mA		48.05mA		N/A
12	None	None	1.124mA		1.465mA		N/A	13	None	None	42.02mA		42.14mA		N/A
14	None	None	1.133mA		1.430mA		N/A	15	None	None	36.18mA		36.30mA		N/A
16	None	None	1.126mA		1.400mA		N/A	17	None	None	30.78mA		30.89mA		N/A
18	None	None	1.099mA		1.338mA		N/A	19	None	None	26.15mA		26.26mA		N/A
20	None	None	1.067mA		1.289mA		N/A	21	None	None	22.54mA		22.63mA		N/A
22	None	None	1.038mA		1.252mA		N/A	23	None	None	20.01mA		20.09mA		N/A
24	None	None	1.027mA		1.242mA		N/A	25	None	None	18.41mA		18.48mA		N/A
26	None	None	1.014mA		1.262mA		N/A	27	None	None	17.40mA		17.47mA		N/A
28	None	None	1.015mA		1.297mA		N/A	29	None	None	16.62mA		16.69mA		N/A
30	None	None	1.012mA		1.312mA		N/A	31	None	None	15.81mA		15.87mA		N/A
32	None	None	1.001mA		1.311mA		N/A	33	None	None	14.85mA		14.93mA		N/A
34	None	None	0.976mA		1.301mA		N/A	35	None	None	13.75mA		13.82mA		N/A
36	None	None	0.941mA		1.260mA		N/A	37	None	None	12.58mA		12.64mA		N/A
38	None	None	0.896mA		1.205mA		N/A	39	None	None	11.43mA		11.51mA		N/A
40	None	None	0.847mA		1.138mA		N/A								

<L1 : Reading is below limit 1.

<L2 : Reading is below limit 2.

N/A : Harmonic current below 0.6% of rated current or 5mA, whichever is greater, are disregarded.

## 7. VOLTAGE FLUCTUATIONS AND FLICKER TEST

### 7.1 Application of Voltage Fluctuations and Flicker Test

Compliance to these standards ensures that tested equipment will not generate flickers and voltage change at levels that cause unacceptable degradation of the main environment. This directly contributes to meeting compatibility levels established in other EMC standards, which defines compatibility levels for low-frequency conducted disturbances in low-voltage supply systems.

### 7.2 Measurement Data

Note: For detailed test data, refer to the following pages:

Standard used	EN/IEC 61000-3-3 Flicker
Short time (Pst)	12 min
Observation time	12 min (1 Flicker measurement)
Flicker meter	AC 230V / 50Hz
E. U. T.	ENERGY SAVING LAMP
M/N:	8U 250W
Power Supply	AC 230V 50Hz
Operation Mode	On

Test Result	PASS
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#### Maximum Flicker results

	EUT values	Limit	Result
Pst	0.260	1.00	PASS
dc [%]	0.015	3.30	PASS
dmax [%]	0.171	4.00	PASS
dt [s]	0.000	0.50	PASS

### 7.3 Test Results

The EUT was subjected to the voltage fluctuations and flicker test required by EN 61000-3-3.

The EUT measured values of the Flicker test of the input current, including live current and neutral current, shall be compared with the limits given in section 6.2.

## **8. IMMUNITY MEASUREMENT INSTRUMENTATION**

### **8.1 Electrostatic Discharge Test System**

An EM TEST DITOC0103Z ESD simulator is used for all testing. It is capable of applying Electrostatic discharges in both contact discharge modes to 4 kV and air discharge modes to 8 kV in both positive and negative polarities. This is in accordance with the IEC 61000-4-2 basic EMC publication.

### **8.2 Radiated Susceptibility Test System**

An IFR 2032 signal generator and an Amplifier Research power amplifier are used to provide a signal at the appropriate power and frequency to a transmitting antenna to obtain the required electromagnetic field at the position of the EUT in accordance with the IEC 61000-4-3 basic EMC publication. The field was monitored by Amplifier Research field probe and Amplifier Research PM2002 power meter according the IEC 61000-4-3 standards. In order to judge the performance of the EUT, a set of monitor system is used.

### **8.3 Power Frequency Magnetic Field Immunity Test System**

An HAEFELY MAG 100 Immunity test system is used for all testing. Test level as described in IEC 61000-4-8 titled "Table 1 – Test Levels for continuous field" was chosen. Single turn induction coil in 1m x 1m size was used to generate the magnetic field.

### **8.4 Voltage Dips, Short Interruptions Immunity Tests System**

An EM Test UCS 500-M6 Immunity test system is used for all testing. Test level as described in IEC 61000-4-11, section 5, titled "Test Levels".

### **8.5 Surge Immunity Test System**

An EM Test UCS 500-M6 Immunity test system is used for all testing. Both positive and negative polarities of voltage up to 2kV were applied to the AC input lines. The coupling network defined in the standard was used.

### **8.6 Electrical Fast Transient/Burst Immunity Test System**

An EM Test UCS 500-M6 Immunity test system is used for all testing. It is capable of applying fast transients to the AC line at any phase angle with respect to the AC line voltage wave form and to attached cables via a capacitive coupling clamp in accordance with the IEC 61000-4-4 basic EMC publication.

### **8.7 Conducted Susceptibility Test System**

An IFR 2032A signal generator and a set of Amplifier Research test system are used for the testing. EUT was tested from 0.15 MHz to 80 MHz with 1kHz sine wave, 80% modulation with 3Vr.m.s. CDN coupling and de-coupling networks was tested. During the tests, injected was applied to power line by using CDNs-6.2.2 method, and I/O lines was injected by using clamp injection-6.2.3.method.

## 8.8 Equipment Test Table

IEC 61000-4-2 specifies that a tabletop EUT shall be placed on a non-conducting table which is 80 centimeters above a ground reference plane and that floor mounted equipment shall be placed on a insulating support approximately 10 centimeters above a ground plane. During the tests, the EUT is positioned over a ground reference plane in conformance with this requirement.

For tabletop equipment, a 1.6 by 0.8-meter metal sheet (HCP) is placed on the table and connected to the ground plane via a metal strap with two 470 k Ohms resistors in series. The EUT and attached cables are isolated from this metal sheet by *0.5-millimeter* thick insulating material. A Vertical Coupling Plane (VCP) grounded on the ground plane through the same configuration as in the HCP is used.

IEC 61000-4-3 and IEC 61000-4-4 specify that a tabletop EUT be placed on a non-conducting table 80 centimeters above a ground reference plane and that floor-mounted equipment shall be placed on an insulating support approximately 10 centimeters above a ground plane. During the IEC 61000-4-3 tests, the EUT is positioned on a table in a shielded semi-anechoic test chamber to reduce reflections from the internal surfaces of the chamber. During the IEC 61000-4-4 tests, the EUT is positioned on a table over a ground reference plane in conformance with this requirement.

## 8.9 Instrument Calibration

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications.

Extensive engineering efforts have been made to ensure test data reliability through Quality Control and regular equipment calibration schedules. However, the application of radio frequency fields and voltages are not without an unavoidable level of uncertainty. These include inaccuracies in antenna factors, chamber imperfections and possible test generator output uncertainties.

## **9. IMMUNITY TEST PROCEDURES**

### **9.1 EUT and Cable Placement**

The EUT and any peripherals are located at the center of the table for tabletop devices and in the center of the ground plane with the insulating support for floor-standing devices. The standards require that interconnecting cables to be connected to available ports of the unit and that the placement of the unit and the attached cables simulate a typical installation so far as to be practical.

### **9.2 Application of Electrostatic Discharge Immunity Test**

The test is conducted in the following order according to the basic standard IEC 61000-4-2: Air Discharge, Direct Contact Discharge, Indirect Contact Horizontal Coupling Plane Discharge, and Indirect Contact Vertical Coupling Plane Discharge. The Electrostatic Discharge test levels are set and discharges for the different test modes are set appropriately. The Electrostatic Discharge is applied to the conductive surface of the computer in which the EUT is enclosed, and along all seams and control surfaces on the computer. When a discharge occurs and an error is caused, the type of error, discharge level and location is recorded.

### **9.3 Application of Radiated Susceptibility Test**

The electromagnetic field is established at the front edge of the EUT. The frequency range is swept from 80 to 1000 MHz using a power level necessary to obtain a 3 volt/meter and 80% amplitude of a 1 kHz sine wave modulated field Strength is directed at the EUT. The test is performed with each of four sides of EUT facing the transmitting antenna. If an error is detected when the susceptible side of the EUT facing the transmitting antenna, the field is reduced until the error is not repeatable, the field is then manually increased until the error begins to occur. This threshold level, the frequency and the error created are noted before continuing. Both horizontal and vertical polarization of the antenna are set on test and measured individually

### **9.4 Application of Power Frequency Magnetic Field Immunity Test**

It is deemed that according to the standard of EN 55024, this test is not applicable to the EUT which does not contain devices susceptible to magnetic fields, such as CRT monitors, Hall elements, electro-dynamic microphone, magnetic field sensor, etc.

### **9.5 Application of Voltage Dips, Short Interruptions Immunity Tests**

The EUT was setup according to the IEC 61000-4-11 and the test shall be done as the procedure described in the standard.

### **9.6 Surge Immunity Test System**

An EM Test UCS 500-M6 Immunity test system is used for all testing. Both positive and negative polarities of voltage up to 2kV were applied to the AC input lines. The coupling network defined in the standard was used.

## **9.7 Application of Electrical Fast Transient/Burst Immunity Test**

The EUT was arranged for Power Line Coupling and for I/O Line Coupling through a capacitive clamp, where applicable. (Note: The I/O coupling test using a capacitive clamp is performed on the I/O interface cables that are longer in length than 3 meters.) A metal ground plane 2.4 meter by 2.0 meter was placed between the floor and the table and is connected to the earth by a 2.0 meter ground rod. The ground rod is connected to the test facility's electrical earth.

## **9.8 Application of Conducted Susceptibility Test**

The EUT was setup according to the IEC 61000-4-6 and the test shall be performed with the test generator connected to each of the coupling and Decoupling devices in turn while the other non-excited RF input ports of the coupling devices are terminated by a 50 W load resistor. The frequency range is 150kHz to 80 MHz.

## **9.9 Deviations from the Standard**

No deviations from EN 55024 were made when performing the tests described in this report.

## 10. TEST DATA

### 10.1 Electrostatic Discharge Immunity Test (IEC 61000-4-2)

Temperature ( °C )	22~23
Humidity ( %RH )	50~54
Barometric Pressure ( mbar )	950~1000
EUT	ENERGY SAVING LAMP
M/N	8U 250W
Operating Mode	On

Table 1: Electrostatic Discharge Immunity (Air Discharge)

IEC 61000-4-2 Test Points	Test Levels									
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV	-15 kV	+15 kV
Screen 20 points	A	A	A	A	A	A	A	A	/	/
Slot 20 points	A	A	A	A	A	A	A	A	/	/
Other 20 points	A	A	A	A	A	A	B	B	/	/

Table 2: Electrostatic Discharge Immunity (Direct Contact)

IEC 61000-4-2 Test Points	Test Levels									
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV	-15 kV	+15 kV
Screws 50 points	A	A	B	B	/	/	/	/	/	/
USB Port 50 points	A	A	B	B	/	/	/	/	/	/

Table 3: Electrostatic Discharge Immunity (Indirect Contact HCP)

IEC 61000-4-2 Test Points	Test Levels									
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV	-15 kV	+15 kV
Front Side	A	A	A	A	/	/	/	/	/	/
Back Side	A	A	A	A	/	/	/	/	/	/
Left Side	A	A	A	A	/	/	/	/	/	/
Right Side	A	A	A	A	/	/	/	/	/	/

Table 4: Electrostatic Discharge Immunity (Indirect Contact VCP)

IEC 61000-4-2 Test Points	Test Levels									
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV	-15 kV	+15 kV
Front Side	A	A	A	A	/	/	/	/	/	/
Back Side	A	A	A	A	/	/	/	/	/	/
Left Side	A	A	A	A	/	/	/	/	/	/
Right Side	A	A	A	A	/	/	/	/	/	/

## 10.2 Radiated Susceptibility Test (IEC 61000-4-3)

**Frequency Range (MHz):** 80~1000MHz

**Modulation:** Amplitude 80%, 1 kHz sinewave

**Severity Level:** 3V/m

Temperature ( °C )	22~23
Humidity ( %RH )	50~54
Barometric Pressure ( mbar )	950~1000
EUT	ENERGY SAVING LAMP
M/N	8U 250W
Operating Mode	On

Frequency Range (MHz)	Front (3 V/m)		Rear (3 V/m)		Left Side (3 V/m)		Right Side (3 V/m)	
	VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI
80-1000	A	A	A	A	A	A	A	A

## 10.3 Power Frequency Magnetic Field Immunity Test (IEC 61000-4-8)

Temperature ( °C )	22~23
Humidity ( %RH )	50~54
Barometric Pressure ( mbar )	950~1000
EUT	ENERGY SAVING LAMP
M/N	8U 250W
Operating Mode	On

Level	Magnetic Field Strength A/M	X (Horizontal)	Y (Vertical)	Z (Special)
1	1	/	/	/
2	3	A	A	A
3	10	/	/	/
4	30	/	/	/
5	100	/	/	/
X	Special	/	/	/

## 10.4 Voltage Dips, Short Interruptions Immunity Tests (IEC 61000-4-11)

Temperature ( °C )	22~23
Humidity ( %RH )	50~54
Barometric Pressure ( mbar )	950~1000
EUT	ENERGY SAVING LAMP
M/N	8U 250W
Operating Mode	On

Level	U2	td	Phase Angle	N	Pass	Fail
1	100%	250ms	0/90/180/270	3	C	/
2	30%	10ms	0/90/180/270	3	B	/
3	60%	100ms	0/90/180/270	3	C	/

## 10.5 Surge Immunity Test (IEC 61000-4-5)

Temperature ( °C )	22~23
Humidity ( %RH )	50~54
Barometric Pressure ( mbar )	950~1000
EUT	ENERGY SAVING LAMP
M/N	8U 250W
Operating Mode	On

**Table 1: Surge Power Supply**

Level	Voltage	Poll	Path	Pass	Fail
1	0.5kV	±	/	/	/
2	1kV	±	L-N	A	/
3	2kV	±	/	/	/
4	4kV	±	/	/	/

## 10.6 Electrical Fast Transient/Burst Immunity Test (IEC 61000-4-4)

Temperature ( °C )	22~23
Humidity ( %RH )	50~54
Barometric Pressure ( mbar )	950~1000
EUT	ENERGY SAVING LAMP
M/N	8U 250W
Operating Mode	On

IEC 61000-4-4 Test Points		Test Levels (kV)							
		+0.5	-0.5	+1.0	-1.0	+2.0	-2.0	+4.0	-4.0
Power Supply Power Line of EUT	L1	/	/	A	A	/	/	/	/
	L2	/	/	A	A	/	/	/	/
	Earth	/	/	/	/	/	/	/	/
	L1+L2	/	/	A	A	/	/	/	/
	L1 + Earth	/	/	/	/	/	/	/	/
	L2 + Earth	/	/	/	/	/	/	/	/
	L1+L2+Earth	/	/	/	/	/	/	/	/

## 10.7 Conducted Susceptibility Test (IEC 61000-4-6)

**Frequency Range (MHz):** 0.15~80MHz

**Modulation:** Amplitude 80%, 1kHz sinewave

**Severity Level:** 3Vr.m.s.

Temperature ( °C )	22~23
Humidity ( %RH )	50~54
Barometric Pressure ( mbar )	950~1000
EUT	ENERGY SAVING LAMP
M/N	8U 250W
Operating Mode	On

Level	Voltage Level (e.m.f.) $U_0$	Pass	Fail
1	1	/	/
2	3	A	/
3	10	/	/
X	Special	/	/

Note:

- A. The apparatus shall continue to operate as intended during and after the test. The manufacturer specifies some minimum performance level. The performance level may be specified by the manufacturer as a permissible loss of performance.
- B. The apparatus shall continue to operate as intended after the test. This indicates that the EUT does not need to function at normal performance levels during the test, but must recover. Again some minimal performance is defined by the manufacture. No change in operating state or loss or data is permitted.
- C. Temporary loss of function is allowed. Operation of the EUT may stop as long as it is either automatically reset or can be manually restored by operation of the controls.

## 11. TEST RESULTS

The following tests were performed on the ENERGY SAVING LAMP, model: 8U 250W; the actual test results are contained within the Test Data section of this report.

### 11.1 IEC 61000-4-2 Electrostatic Discharge Immunity Test Configuration

The EUT was subjected to the electrostatic discharge tests required by EN 61547 and all lower levels specified in IEC 61000-4-2.

*The EUT continued to perform as intended during and after the application of the ESD.*

### 11.2 IEC 61000-4-3 Radiated Susceptibility Test Configuration

The EUT was subjected to a 3-volt/meter, 80% Amplitude, 1 kHz Sine wave field as required by EN 61547 and all lower levels specified in IEC 61000-4-3.

*The EUT continued to perform as intended during and after the application of the electromagnetic field.*

### 11.3 IEC 61000-4-8 Frequency Magnetic Field Immunity Test Configuration

The EUT was subjected to the Frequency Magnetic Field Immunity tests required by EN 61547 and all lower levels specified in IEC 61000-4-8.

*The EUT continued to perform as intended during and after the application of the Frequency Magnetic Field Immunity Test.*

### 11.4 IEC 61000-4-11 Voltage Dips, Short Interruptions Immunity Tests Configuration

The EUT was subjected to the Voltage Dips/Interruptions tests required by EN 61547 and all lower levels specified in IEC 61000-4-11.

*The EUT continued to perform as intended during and after the application of the Voltage Dips/Interruptions Test.*

### 11.5 IEC 61000-4-5 of Surge Immunity Test Configuration

The EUT was subjected to the Surge Immunity tests required by EN 61547 and all lower levels specified in IEC 61000-4-5.

*The EUT continued to perform as intended during and after the application of the Surge Immunity Test.*

## **11.6 IEC 61000-4-4 Electrical Fast Transient/Burst Immunity Test Configuration**

The EUT was subjected to the electrical fast transient tests required by EN 61547 and all lower levels specified in IEC 61000-4-4.

*The EUT continued to perform as intended during and after the application of the EFT/B.*

## **11.7 IEC 61000-4-6 Conducted Susceptibility Test Configuration**

The EUT was subjected to the Conducted Susceptibility tests required by EN 61547 and all lower levels specified in IEC 61000-4-6.

*The EUT continued to perform as intended during and after the application of the Conducted Susceptibility Test.*

## APPENDIX I - PRODUCT LABELING

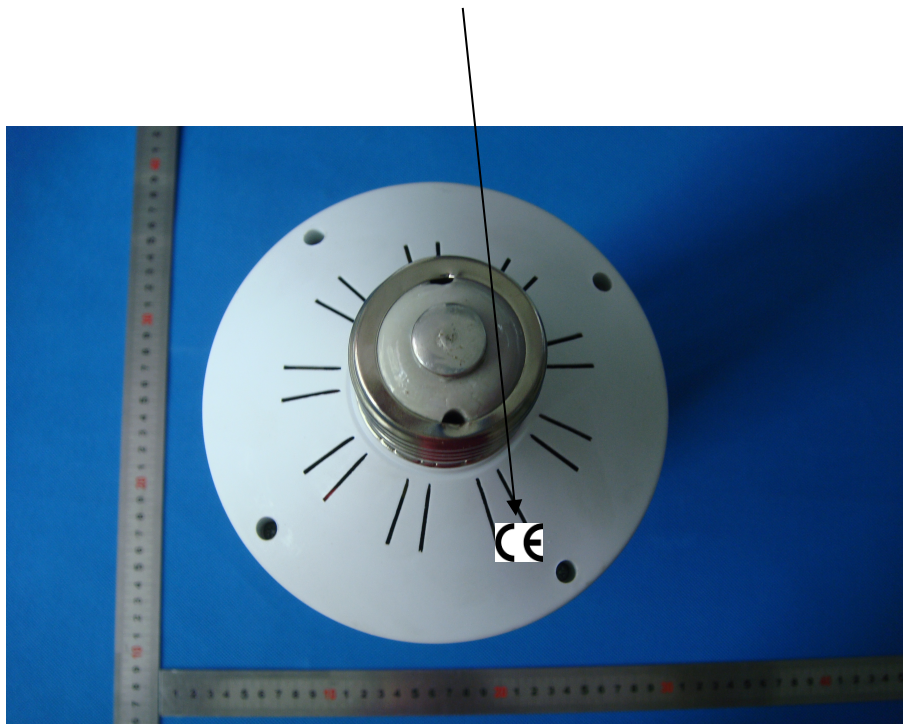
### CE Marking Label Specification



Specification: Text is Black or white in color and is left justified. Labels are printed in indelible ink on permanent adhesive backing and shall be affixed at a conspicuous location on the EUT or silk-screened onto the EUT.

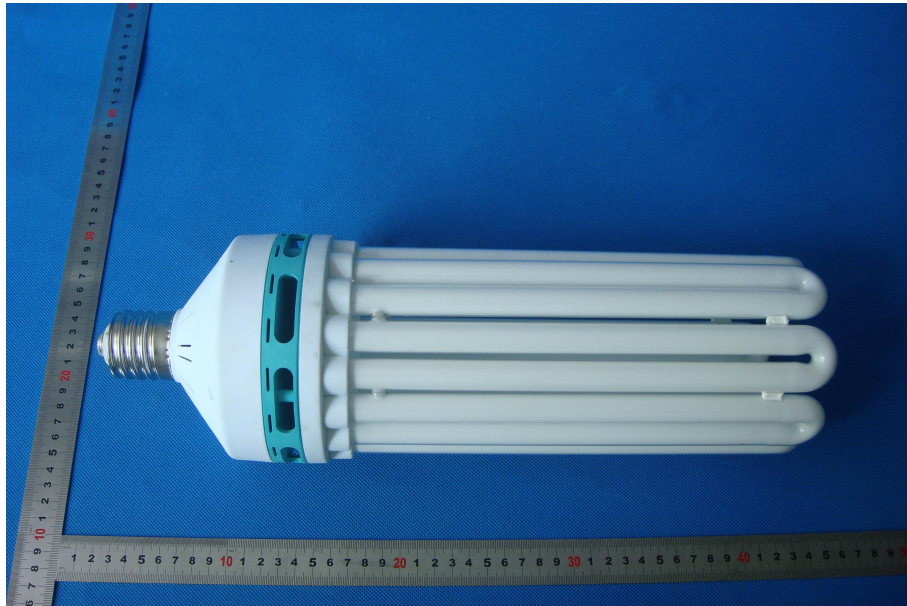
### Proposed Label Location on EUT

EUT Rear View/Proposed CE marking Location



## APPENDIX II - EUT PHOTOGRAPHS

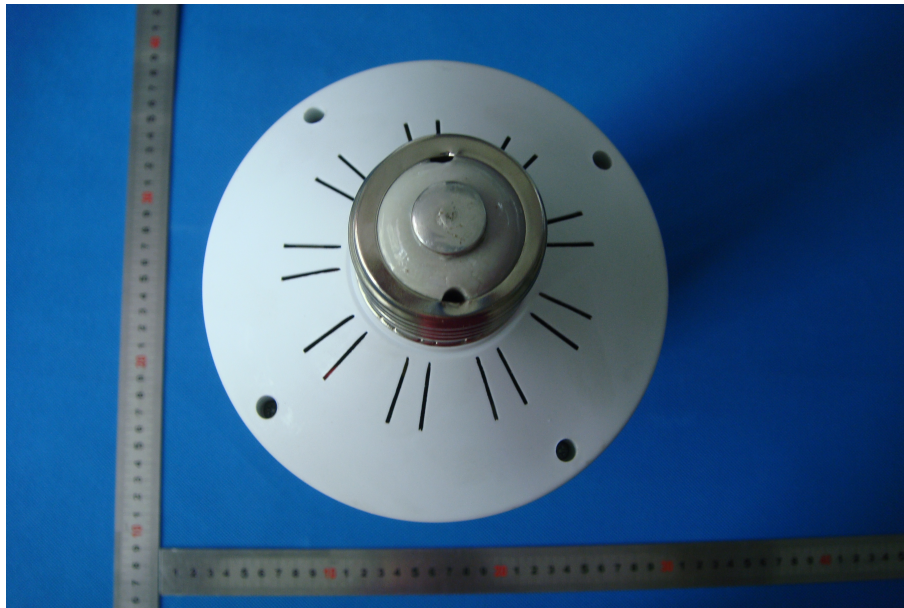
### EUT – External View 1



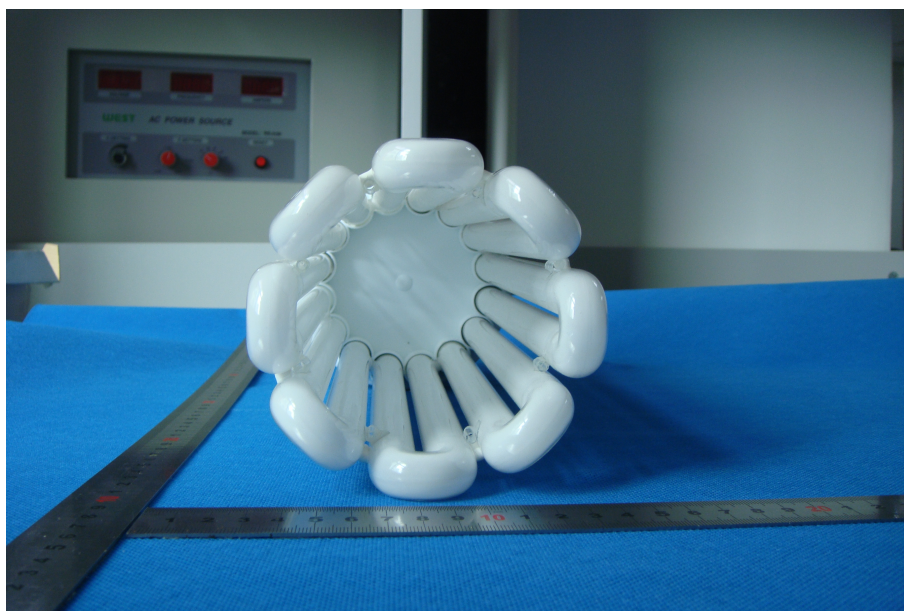
### EUT –External View 2



**EUT –External View 3**



**EUT –External View 4**



## APPENDIX III – TEST SETUP PHOTOGRAPHS

### Radiated emission test setup photographs



**Radiated Electromagnetic Disturbances test setup photographs**



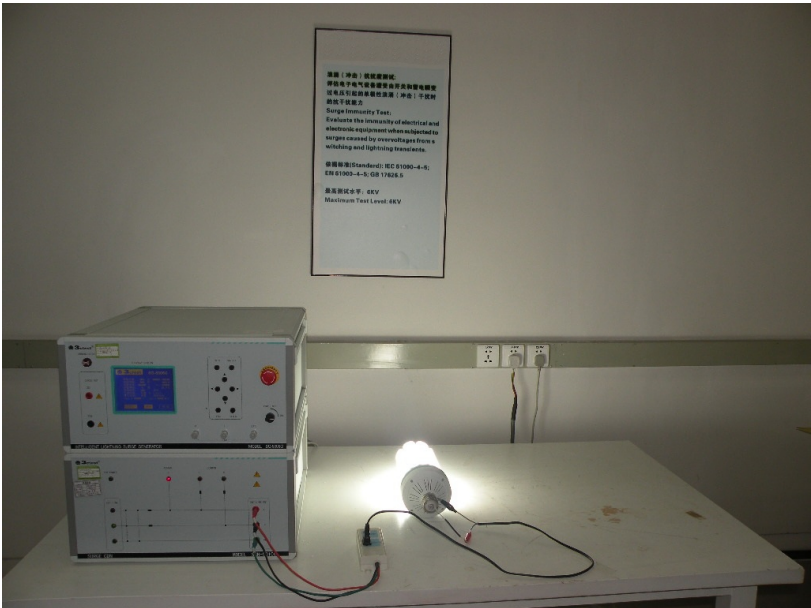
**Conducted emission test setup photographs**



H-F test setup photographs



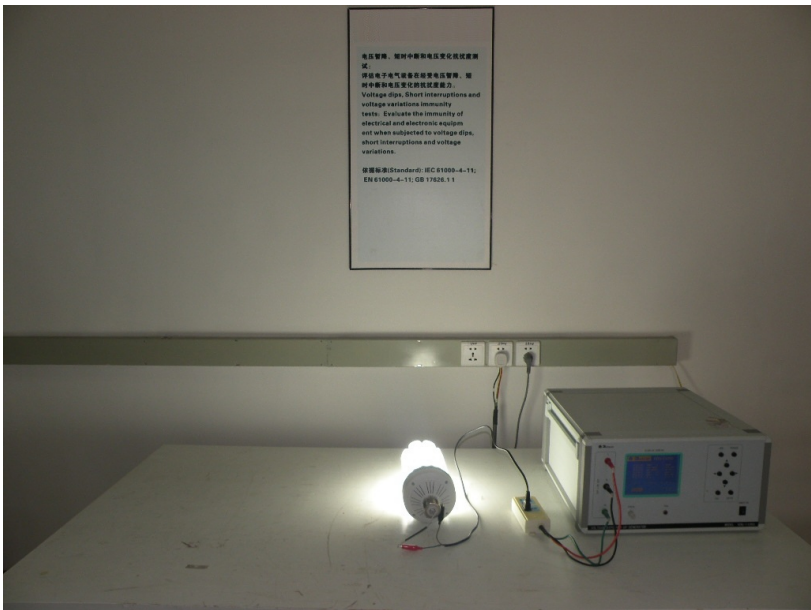
Surge test setup photographs



EFT test setup photographs



Dips test setup photographs



ESD test setup photographs



-----END OF THE REPORT-----