

**Shanghai Afula Electronic Technology Co. Ltd.**

Application  
For  
Certification  
**(FCC ID: ODUSHAFLJKRLYER)**

RF Lighting Equipment

WO# 9810046  
CKL/at  
May 11, 1999

- The test results reported in this report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
- This report shall not be reproduced except in full without prior authorization from Intertek Testing Services Hong Kong Limited

FCC ID : ODUSHAFLJKRLYER

## **INTERTEK TESTING SERVICES**

---

---

### **LIST OF EXHIBITS**

#### *INTRODUCTION*

<i>EXHIBIT 1:</i>	General Description
<i>EXHIBIT 2:</i>	System Test Configuration
<i>EXHIBIT 3:</i>	Emission Results
<i>EXHIBIT 4:</i>	Equipment Photographs
<i>EXHIBIT 5:</i>	Product Labelling
<i>EXHIBIT 6:</i>	Technical Specifications
<i>EXHIBIT 7:</i>	Instruction Manual

# INTERTEK TESTING SERVICES

---

---

## MEASUREMENT/TECHNICAL REPORT

**Shanghai Afula Electronic Technology Co. Ltd.**

**MODEL: YER-2 20W, YER-2 23W, YER-2 26W, YER(SB) 20W, YER(SB) 23W, YER(SB) 26W**

**FCC ID: ODUSHAFLJKRLYER**

**May 11, 1999**

This report concerns (check one):      Original Grant       Class II Change \_\_\_\_\_

Equipment Type: RF Lighting equipment

---

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?      Yes       No

If yes, defer until: \_\_\_\_\_  
date \_\_\_\_\_

Company Name agrees to notify the Commission by: \_\_\_\_\_  
date \_\_\_\_\_

of the intended date of announcement of the product so that the grant can be issued on that date.

---

Report prepared by:

C. K. Lam  
Intertek Testing Services  
2/F., Garment Center,  
576, Castle Peak Road,  
HONG KONG  
Phone:      852-2746-8211  
Fax:      852-2785-5487

# INTERTEK TESTING SERVICES

---

---

## Table of Contents

<b>1.0 General Description</b> .....	2
1.1 Product Description .....	2
1.2 Related Submittal(s) Grants .....	2
1.3 Test Methodology .....	3
1.4 Test Facility .....	3
1.4 Equipment List .....	4
<b>2.0 System Test Configuration</b> .....	6
2.1 Justification.....	6
2.2 EUT Exercising Software .....	6
2.3 Special Accessories.....	6
2.4 Equipment Modification .....	7
2.5 Support Equipment List and Description .....	7
<b>3.0 Emission Results</b> .....	9
3.1 Field Strength Calculation.....	10
3.1 Field Strength Calculation (cont) .....	11
3.2 Radiated Emission Configuration Photograph .....	12
3.3 Radiated Emission Data.....	13
3.4 Line Conducted Configuration Photograph (cont).....	14
3.5 Line Conducted Emission Data .....	19
<b>4.0 Equipment Photographs</b> .....	20
<b>5.0 Product Labelling</b> .....	22
<b>6.0 Technical Specifications</b> .....	24
<b>7.0 Instruction Manual</b> .....	26

## INTERTEK TESTING SERVICES

---

---

### List of attached file

Exhibit type	File Description	filename
Cover Letter	Letter of Agency	letter.pdf
Test Report	Test Report	report.doc
Operation Description	Technical Description	descri.pdf
Test Setup Photo	Radiated Emission	radiated1.jpg to radiated4.jpg
Test Setup Photo	Conducted Emission	conduct1.jpg to conduct6.jpg
Test Report	Conducted Emission Test Result	conduct.pdf
External Photo	External Photo	ophoto1.jpg, ophoto3.jpg
Internal Photo	Internal Photo	iphoto1.jpg to iphoto4.jpg
Block Diagram	Block Diagram	block.pdf
Schematics	Circuit Diagram	circuit.pdf
ID Label/Location	Label Artwork and Location	label.pdf
User Manual	User Manual	manual.pdf

---

---

**INTERTEK TESTING SERVICES**

---

**EXHIBIT 1**

**GENERAL DESCRIPTION**

## INTERTEK TESTING SERVICES

---

---

### 1.0 **General Description**

#### 1.1 Product Description

The equipment Under Test (EUT) is a self-ballast lamp. It is powered by 120V, 60Hz and operated with 20kHz to activate the fluorescent lamp. The self-ballast lamp have two group which are different in the shape of lamp. The two group of lamp are screw tube series (YER(SB)) and 3U tube series (YER-2). Each group contains three power rating with 20W, 23W and 26W. The difference of each rating is on the size of lamp and a few of component (which is shown on the circuit diagram).

The brief circuit description is saved with filename: descri.pdf

#### 1.2 Related Submittal(s) Grants

This is a single application for certification of a RF Lighting Equipment.

## INTERTEK TESTING SERVICES

---

---

### 1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in MP-5. All measurements were performed in Open Area Test Sites. Preliminary scans were performed in the Open Area Test Sites only to determine worst case modes. For each scan, the procedure for maximizing emissions in Appendices D and E were followed. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the **"Justification Section"** of this Application.

### 1.4 Test Facility

The open area test site and conducted measurement facility used to collect the emission data is located at Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong. This test facility and site measurement data have been fully placed on file with the FCC.

## INTERTEK TESTING SERVICES

---

### 1.5 Equipment List

#### 1) Radiated Emission Test for FCC Part 18

Equipment	Registration No.	Manufacturer	Model No.	Serial No.	Calibration Due Date
EMI Test Receiver	EW-0014	R&S	ESVS30	842807/001	December 1999
Biconical Antenna	EI-088	CDI	B100 B200 B300	3098 3112 3118	June 1999
EMI Test Receiver	EW-0015	R&S	ESHS30	827128/009	December 1999

#### 2) Disturbance Voltage Tests for FCC Part 18

Equipment	Registration No.	Manufacturer	Model No.	Serial No.	Calibration Due Date
EMI Test Receiver	EW-0015	R&S	ESVS30	827128/009	June 1999
Absorbing Clamp	EI-128	R&S	MDS21	840031/001	November 1999
LISN	EI-130	R&S	RSH3-Z5	840731/013	April 1999

---

---

**INTERTEK TESTING SERVICES**

---

**EXHIBIT 2**

**SYSTEM TEST CONFIGURATION**

## INTERTEK TESTING SERVICES

---

---

### 2.0 **System Test Configuration**

#### 2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in MP-5

The EUT was powered from 120V, 60Hz.

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The unit was operated standalone and placed in the center of the turntable.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was mounted to a cardboard box, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

The worst case bit sequence was applied during test.

#### 2.2 EUT Exercising Software

There was no special software to exercise the device. Once the button is depressed, the unit transmits the typical signal. For simplicity of testing, the unit was wired to transmit continuously.

#### 2.3 Special Accessories

There are no special accessories necessary for compliance of this product.

## INTERTEK TESTING SERVICES

---

---

### 2.4 Equipment Modification

Any modifications installed previous to testing by Shanghai Afula Electronic Technology Co. Ltd. will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services.

### 2.5 Support Equipment List and Description

A standalone Lampholder is used for supporting the RUT.

All the items listed under section 2.0 of this report are

*Confirmed by:*

*C. K. Lam  
Technical Manager  
Intertek Testing Services  
Agent for Shanghai Afula Electronic Technology Co. Ltd.*



Signature

May 11, 1999 Date

---

---

**INTERTEK TESTING SERVICES**

---

**EXHIBIT 3**

**EMISSION RESULTS**

## INTERTEK TESTING SERVICES

---

---

### 3.0 Emission Results

Data is included worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

## INTERTEK TESTING SERVICES

---

---

### 3.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$FS = RA + AF + CF - AG + PD + AV$$

where FS = Field Strength in  $\text{dB}\mu\text{V}/\text{m}$

RA = Receiver Amplitude (including preamplifier) in  $\text{dB}\mu\text{V}$

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB

AG = Amplifier Gain in dB

PD = Pulse Desensitization in dB

AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + AF + CF - AG + PD + AV$$

## INTERTEK TESTING SERVICES

---

---

### 3.1 Field Strength Calculation (cont)

#### Example

Assume a receiver reading of 62.0 dB $\mu$ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

$$RA = 62.0 \text{ dB}\mu\text{V}$$

$$AF = 7.4 \text{ dB}$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$PD = 0 \text{ dB}$$

$$AV = -10 \text{ dB}$$

$$FS = 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32 \text{ dB}\mu\text{V/m}$$

$$\text{Level in mV/m} = \text{Common Antilogarithm} [(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

## **INTERTEK TESTING SERVICES**

---

---

### **3.2 Radiated Emission Configuration Photograph**

**Worst Case Radiated Emission**

**53.659 MHz**

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated1.jpg to radiated4.jpg

## INTERTEK TESTING SERVICES

---

---

### 3.3 Radiated Emission Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 13.1 dB

### **TEST PERSONNEL:**



*Signature*

Wilson S.K.Loke, Compliance Engineer  
*Typed/Printed Name*

May 11, 1999  
*Date*

## INTERTEK TESTING SERVICES

---

Company: Shanghai Afula Electronic Technology Co. Ltd.  
Model: YER-2 26W

Date of Test: January 12, 1999

Table 1

### Radiated Emissions

Polarity	Frequency (M H z)	Reading (dB $\mu$ V )	Antenna Factor (dB )	Pre-Amp Gain (dB )	Distance Factor (-dB )	Net at 30m (dB $\mu$ V /m )	Limit at 30m (dB $\mu$ V /m )	Margin (dB )
H	32.481	29.9	10	16	20	3.9	20	-16.1
H	36.716	30.1	10	16	20	4.1	20	-15.9
H	40.952	31.3	10	16	20	5.3	20	-14.7
H	45.187	31.8	10	16	20	5.8	20	-14.2
H	49.423	31.4	11	16	20	6.4	20	-13.6
H	53.659	31.9	11	16	20	6.9	20	-13.1

Notes: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.

Test Engineer: Wilson S.K.Loke

## INTERTEK TESTING SERVICES

---

Company: Shanghai Afula Electronic Technology Co. Ltd.  
Model: YER(SB) 26W

Date of Test: January 12, 1999

Table 2

### Radiated Emissions

Polarity	Frequency (M H z)	Reading (dB $\mu$ V )	Antenna Factor (dB )	Pre-Amp Gain (dB )	Distance Factor (-dB )	Net at 30m (dB $\mu$ V /m )	Limit at 30m (dB $\mu$ V /m )	Margin (dB )
H	32.468	29.9	10	16	20	3.9	20	-16.1
H	36.781	30.5	10	16	20	4.5	20	-15.5
H	40.962	30.8	10	16	20	4.8	20	-15.2
H	45.193	31.3	10	16	20	5.3	20	-14.7
H	49.438	30.9	11	16	20	5.9	20	-14.1
H	53.658	31.1	11	16	20	6.1	20	-13.9

Notes: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.

Test Engineer: Wilson S.K.Loke

## **INTERTEK TESTING SERVICES**

---

---

### **3.4 Line Conducted Configuration Photograph**

**Worst Case Line-Conducted Configuration**

**0.540 MHz**

For electronic filing, the worst case line-conducted configuration photograph are saved with filename: conduct1.jpg to conduct6.jpg

## **INTERTEK TESTING SERVICES**

---

---

Company: Shanghai Afula Electronic Technology Co. Ltd.

Date of Test: January 12, 1999

Model: YER(SB) 26W

YER-2 26W

### **Conducted Emissions Section 18.307 Requirements**

For electronic filing, the conducted emission test result is saved with filename: conduct.pdf

## INTERTEK TESTING SERVICES

---

---

### 3.5 Line Conducted Emission Configuration Data

The data on the following page lists the significant emission frequencies, the limit, and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 10.2 dB

\* All readings are peak unless stated otherwise.

### **TEST PERSONNEL:**



*Signature*

Wilson S.K. Loke, Compliance Engineer

*Typed/Printed Name*

May 11, 1999

*Date*

---

---

**INTERTEK TESTING SERVICES**

---

**EXHIBIT 4**

**EQUIPMENT PHOTOGRAPHS**

## **INTERTEK TESTING SERVICES**

---

---

### **4.0 Equipment Photographs**

For electronic filing, the photographs are saved with filename: ophoto1.jpg to ophoto3.jpg and iphoto1.jpg to iphoto4.jpg

---

---

**INTERTEK TESTING SERVICES**

---

**EXHIBIT 5**

**PRODUCT LABELLING**

## INTERTEK TESTING SERVICES

---

---

### 5.0 **Product Labelling**

For electronic filing, the FCC ID label artwork and the label location are saved with filename: label.pdf

**INTERTEK TESTING SERVICES**

---

---

**EXHIBIT 6**

**TECHNICAL SPECIFICATIONS**

## INTERTEK TESTING SERVICES

---

---

### 6.0 Technical Specifications

For electronic filing, the block diagram and schematics are saved with filename: block.pdf and circuit.pdf respectively.

---

---

**INTERTEK TESTING SERVICES**

---

**EXHIBIT 7**

**INSTRUCTION MANUAL**

## INTERTEK TESTING SERVICES

---

---

### 7.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf

This manual will be provided to the end-user with each unit sold/leased in the United States.