Engineering and Testing for EMC and Safety Compliance

EMI Test Report

Product Tested:
Model: ET3-33
Compact Fluorescent Lamp

Prepared for:
Technical Consumer Products, Inc
300 Lena Drive
Aurora, OH 44022

Prepared by:
Rhein Tech Laboratories, Inc.
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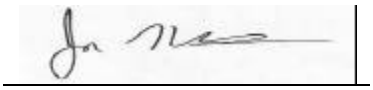
Report Number:	2001176
Gateway Project Number:	QRTL01-165
Issue Date:	10/09/2001

Radiated and Conducted Emissions Conformance Statement

We, the undersigned, hereby state that the proper standards and procedures were followed as detailed in this test record. Furthermore, we attest that the data contained within this report is accurate and concise within the bounds of the standards and our company procedures.

Signature: 

Full Name: Jon Wilson
Title: EMC Lab Coordinator

Report Prepared By:
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360 Herndon Parkway, Suite 1400
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For:
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Aurora, OH 44022

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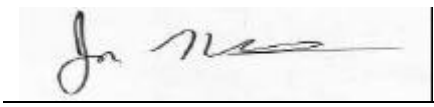
Paul Fisher
800-324-1496

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this attached test record. There were no modifications made to the equipment in order to achieve compliance with these standards.

Signature: 

Date: 10/09/2001 Full Name: Jon Wilson

Location: Herndon, VA Title: EMC Lab Coordinator

Accredited by the National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under laboratory code 200061-0

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1. General Information

1.1 Executive Summary

The following report for EMI compliance of a Class B Industrial, Scientific, and Medical Equpment (ISM) is prepared on behalf of Technical Consumer Products, Inc. in accordance with the rules of the Federal Communications Commission CFR 47, Part 18 for sub Part B equipment.

This report covers testing for the ET3-33 Compact Fluorescent Lamp. All testing was performed on October 9, 2001.

All equipment configurations and measurements contained in this report were performed in accordance with the revision of the standards listed in this report. Also, the instrumentation and facilities utilized for the measurements conform with all appropriate standards. Calibration checks are performed regularaly on all test equipment by a local calibration lab, with traceability to the National Institute of Standards and Technology (NIST).

All emission measurements were performed manually at Rhein Tech Laboratories, Inc. The radiated emissions measurements (if applicable) were performed on an open area test site (OATS) maintained by Rhein Tech Laboratories, Inc., 360 Herndon Parkway, Suite 1400, Herndon, VA, USA. Complete site descriptions and site attenuation measurement data have been placed on file with the Federal Communications Commission (FCC) and can be made available upon request. The Power Line Conducted Emissions Measurements were performed in a shielded enclosure also located at the same facility.

1.2 Test Facility Information

The open area test site used to collect the radiated emissions data, and the shielded room used to collect the conducted emissions data have been listed by the FCC, per ANSI C63.4.

1.3 Client Responsibilities

It is the responsibility of Technical Consumer Products, Inc. to supply Rhein Tech Laboratories, Inc. with the information necessary to complete the documentation. This information includes, but is not limited to, the user's manual, EUT schematics, etc.

1.4 Accreditation Statements

- **FCC**

Rhein Tech Laboratories, Inc. is accepted by the Federal Communications Commission as a facility available to do measurement work for others on a contract basis. 31040/SIT (Registration # 90902)

- **ACA**

Rhein Tech Laboratories, Inc. is an AUSTEL listed test house having satisfied NATA's (or its Associates with which it has an MoU or MRA for mutual recognition of test houses) requirements for testing to the following standards: AS/NZS 3548: Limits and methods of measurement of radio disturbance characteristics of information technology equipment. Certification number: A97/TH/0107.

- **Industry Canada**

Certification numbers: IC 2956-1 and IC 2956-2

- **CE**

Rhein Tech Laboratories, Inc. has been assessed by TNO Certification B.V.(formerly NMi) based upon EN45001 and complies with the TNO requirements and has therefore been approved as an EMC Test Laboratory providing Test Reports, Technical Construction Files, to TNO Certification B.V. Certification number: 10118957

Rhein Tech Laboratories, Inc. was designated a U.S. Conformity Assessment Bodies (CAB) operating under the European Union (EU) EMC Directive 89/336/EEC Article 10.2. The CAB designation is considered equivalent to an EU competent body. Rhein Tech Laboratories, Inc.'s CAB is responsible to evaluate and endorse a Technical Construction File (TCF) and issue a certificate or technical report that is included in the TCF.

- **NVLAP**

Rhein Tech Laboratories, Inc., is recognized under the National Voluntary Laboratory Accreditation Program for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC Guide 25 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of calibration or test results. Accreditation is awarded for specific services, listed on the Scope of Accreditation for: Electromagnetic Compatibility And Telecommunications. NVLAP Lab Code: 200061-0

2. System Test Configuration

2.1 Technical Description

The Equipment Under Test (EUT) is a fluorescent lamp assembly designed to be screwed into a standard light socket. It has a plastic case containing electronic ballast that is constructed on a PC board which is identical to those in the original University of Michigan testing. The lamp is configured into three looped tubes. The ballast is a switching power supply operating at 45kHz. The ET3-33 is a 3-way switchable lamp, at its highest setting it uses 33 watts. The unit is designed by Technical Consumer Products, Inc. and is manufactured by Shanghai Jensing Electron Electrical Equipment Co. 23 Kai Jiange Rd. E, Si Jing, Song Jiang, 201601 Shanghai, China.

The EUT is identified as: TCP Fluorescent Lamp, Model: ET3-33

2.2 Photographs of EUT

2.3 Tested Configuration

2.3.1 Tested Configuration Details

PART	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID	CABLE DESCRIPTION	RTL BAR CODE
LAMP ADAPTER	TECHNICAL CONSUMER PRODUCTS, INC	3 WAY LAMP SOCKET	N/A	N/A	UNSHIELDED 6 FT.	013421
COMPACT FLOURESCENT LAMP (EUT)	**TECHNICAL CONSUMER PRODUCTS, INC**	**ET3-33**	**19833/27**	**SAMPLE**	**N/A**	**013420**

2.3.2 Test Configuration Description

The EUT was configured as it would be normally used. It was installed in a typical 3-way switchable table lamp socket with a 6 foot, two wire, unshielded power cable.

2.4 Special Accessories

The end user is advised to use the same type cables as mentioned in Sections 2.3.1 and 2.3.2.

2.5 Modifications to EUT

There were no modifications made to the EUT before or during testing.

3. Test Results

3.1 Emissions Test Methodology

3.1.1 Test Methodology for ANSI C63.4

There was no deviation from, additions to, or exclusions from, ANSI C63.4 1992 test methodology.

3.1.1.1 Measurement Uncertainty

Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Other errors have been defined and calculated within the Rhein Tech quality manual, section 6.1. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as well as daily calibration methods, technician training, and emphasis to employees on avoiding error.

3.2 Conducted Emissions Measurements

3.2.1 Site and Test Description

The power line conducted emissions measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 0.8 meters high. Power was fed to the EUT through a 50 Ω/50 µH Line Impedance Stabilization Network (LISN). The EUT LISN was fed power through an AC filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed AC power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

The spectrum analyzer was connected to the AC line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 7 kHz high-pass filter. The filter was used to prevent overload of the spectrum analyzer from noise below 7 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or average mode if applicable). The analyzer's 6 dB bandwidth was set to 9 kHz. No video filter less than 10 times the resolution bandwidth was used. Average measurements were performed in a linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The range of the frequency spectrum to be investigated is specified in FCC Part 15. The highest emissions amplitudes relative to the appropriate limits were measured and have been recorded in this report.

3.2.2 Test Limits

Class A Line-Conducted Emissions		
Frequency (MHz)	Quasi-Peak (dBµV)	Average (dBµV)
0.450 to 1.705	60.0	60.0
1.705 to 30.000	69.5	69.5

Class B Line-Conducted Emissions		
Frequency (MHz)	Quasi-Peak (dBµV)	Average (dBµV)
0.450 to 30.000	48	48

3.2.3 Conducted Emissions Data: Highest Wattage

NEUTRAL SIDE (Line 1)

Temperature: 73°F Humidity: 43%										
Emission Frequency (MHz)	**Test Detector**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB)**	**Emission Level (dBuV)**	**FCC B QP Limit (dBuV)**	**FCC B QP Margin (dBuV)**	**FCC B AV Limit (dBuV)**	**FCC B AV Margin (dBuV)**	**Pass/ Fail**	**Comments**
0.980	Pk	35.2	0.6	35.8	48.0	-12.2	48.0	-12.2	Pass	
3.520	Pk	31.6	1.5	33.1	48.0	-14.9	48.0	-14.9	Pass	
7.870	Pk	27.1	2.2	29.3	48.0	-18.7	48.0	-18.7	Pass	
19.270	Pk	24.5	3.4	27.9	48.0	-20.1	48.0	-20.1	Pass	
23.440	Pk	24.0	3.7	27.7	48.0	-20.3	48.0	-20.3	Pass	
29.590	Pk	32.3	4.0	36.3	48.0	-11.7	48.0	-11.7	Pass	

HOT SIDE (Line 2)

Temperature: 73°F Humidity: 43%										
Emission Frequency (MHz)	**Test Detector**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB)**	**Emission Level (dBuV)**	**FCC B QP Limit (dBuV)**	**FCC B QP Margin (dBuV)**	**FCC B AV Limit (dBuV)**	**FCC B AV Margin (dBuV)**	**Pass/ Fail**	**Comments**
0.480	Pk	35.2	0.7	35.9	48.0	-12.1	48.0	-12.1	Pass	
6.540	Pk	27.4	2.0	29.4	48.0	-18.6	48.0	-18.6	Pass	
12.920	Pk	22.7	2.7	25.4	48.0	-22.6	48.0	-22.6	Pass	
22.460	Pk	24.9	3.5	28.4	48.0	-19.6	48.0	-19.6	Pass	
27.670	Pk	25.1	4.1	29.2	48.0	-18.8	48.0	-18.8	Pass	
29.620	Pk	30.6	4.0	34.6	48.0	-13.4	48.0	-13.4	Pass	

3.2.4 Conducted Emissions Data: Middle Wattage

HOT SIDE (Line 2)

Temperature: 73°F Humidity: 43%										
Emission Frequency (MHz)	**Test Detector**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB)**	**Emission Level (dBuV)**	**FCC B QP Limit (dBuV)**	**FCC B QP Margin (dBuV)**	**FCC B AV Limit (dBuV)**	**FCC B AV Margin (dBuV)**	**Pass/ Fail**	**Comments**
0.600	Pk	36.3	0.7	37.0	48.0	-11.0	48.0	-11.0	Pass	
1.540	Pk	35.9	1.0	36.9	48.0	-11.1	48.0	-11.1	Pass	
6.540	Pk	28.5	2.0	30.5	48.0	-17.5	48.0	-17.5	Pass	
11.240	Pk	24.1	2.5	26.6	48.0	-21.4	48.0	-21.4	Pass	
23.230	Pk	25.6	3.6	29.2	48.0	-18.8	48.0	-18.8	Pass	
29.170	Pk	31.4	4.1	35.5	48.0	-12.5	48.0	-12.5	Pass	

NEUTRAL SIDE (Line 1)

Temperature: 73°F Humidity: 43%										
Emission Frequency (MHz)	**Test Detector**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB)**	**Emission Level (dBuV)**	**FCC B QP Limit (dBuV)**	**FCC B QP Margin (dBuV)**	**FCC B AV Limit (dBuV)**	**FCC B AV Margin (dBuV)**	**Pass/ Fail**	**Comments**
1.130	Pk	36.1	0.9	37.0	48.0	-11.0	48.0	-11.0	Pass	
1.750	Pk	35.8	1.1	36.9	48.0	-11.1	48.0	-11.1	Pass	
11.180	Pk	23.8	2.5	26.3	48.0	-21.7	48.0	-21.7	Pass	
21.140	Pk	22.2	3.4	25.6	48.0	-22.4	48.0	-22.4	Pass	
24.180	Pk	23.6	3.8	27.4	48.0	-20.6	48.0	-20.6	Pass	
29.470	Pk	32.3	4.1	36.4	48.0	-11.6	48.0	-11.6	Pass	

3.2.5 Conducted Emissions Data: Lowest Wattage

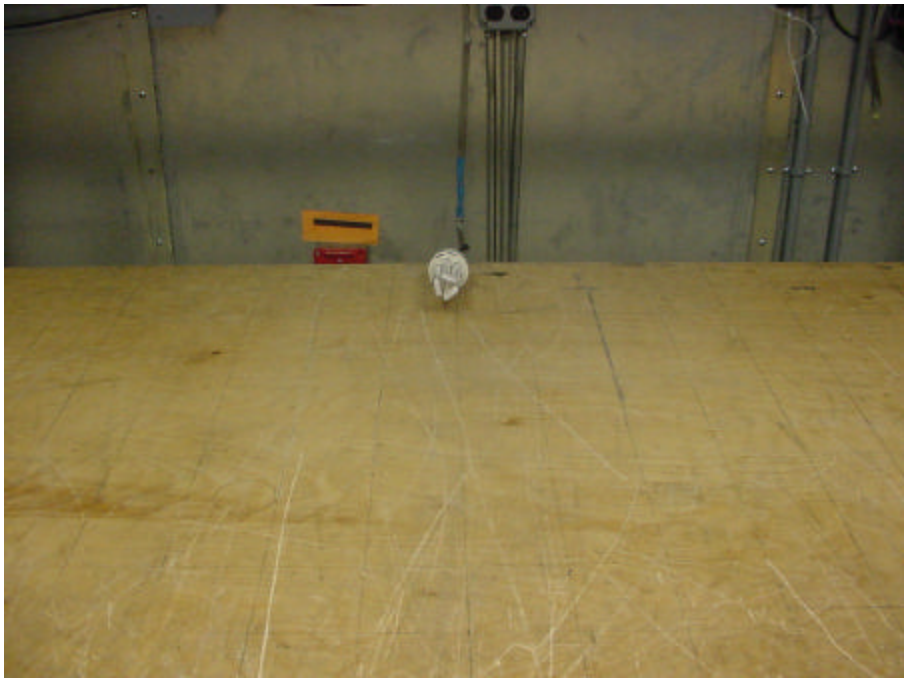
NEUTRAL SIDE (Line 1)

Temperature: 73°F Humidity: 43%										
Emission Frequency (MHz)	**Test Detector**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB)**	**Emission Level (dBuV)**	**FCC B QP Limit (dBuV)**	**FCC B QP Margin (dBuV)**	**FCC B AV Limit (dBuV)**	**FCC B AV Margin (dBuV)**	**Pass/ Fail**	**Comments**
1.130	Pk	36.2	0.9	37.1	48.0	-10.9	48.0	-10.9	Pass	
4.820	Pk	32.7	1.8	34.5	48.0	-13.5	48.0	-13.5	Pass	
8.660	Pk	25.2	2.3	27.5	48.0	-20.5	48.0	-20.5	Pass	
20.280	Pk	24.5	3.3	27.8	48.0	-20.2	48.0	-20.2	Pass	
24.500	Pk	26.2	3.8	30.0	48.0	-18.0	48.0	-18.0	Pass	
28.730	Pk	34.7	4.1	38.8	48.0	-9.2	48.0	-9.2	Pass	

HOT SIDE (Line 2)

Temperature: 73°F Humidity: 43%										
Emission Frequency (MHz)	**Test Detector**	**Analyzer Reading (dBuV)**	**Site Correction Factor (dB)**	**Emission Level (dBuV)**	**FCC B QP Limit (dBuV)**	**FCC B QP Margin (dBuV)**	**FCC B AV Limit (dBuV)**	**FCC B AV Margin (dBuV)**	**Pass/ Fail**	**Comments**
0.750	Pk	38.3	0.8	39.1	48.0	-8.9	48.0	-8.9	Pass	
3.610	Pk	33.1	1.5	34.6	48.0	-13.4	48.0	-13.4	Pass	
7.190	Pk	28.7	2.1	30.8	48.0	-17.2	48.0	-17.2	Pass	
14.100	Pk	22.8	2.8	25.6	48.0	-22.4	48.0	-22.4	Pass	
28.290	Pk	28.4	4.2	32.6	48.0	-15.4	48.0	-15.4	Pass	
29.700	Pk	30.0	4.0	34.0	48.0	-14.0	48.0	-14.0	Pass	

3.2.6 Conducted Emissions Photographs



4. Test Equipment

RTL equipment for emission testing					
RTL Asset Number	**Manufacturer**	**Model**	**Part Type**	**Serial Number**	**Calibration due date**
900339	Hewlett Packard	85650A	Quasi-Peak Adapter (30 Hz – 40 GHz)	2521A00743	03/21/02
900897	Hewlett Packard	8567A	Spectrum Analyzer (10 kHz - 1.5 GHz)	2727A00535	11/08/01
900970	Hewlett Packard	85662A	Spectrum Analyzer Display	254211239	03/21/02
900896	Hewlett Packard	85662A	Spectrum Analyzer Display	2816A16471	11/08/01
900726	Solar	7225-1	LISN	-	03/27/02
900727	Solar	7225-1	LISN	-	03/27/02