IESNA LM-79: 2008

Measurement and Test Report

for

Diogen Lighting,Inc

Diogen Lighting,Inc 14 Inverness Drive East,Ste.E-128 Englewood, CO 80112

Jun 15, 2011

Product Name:	T8 Tube
Model No:	T8L1200-18W-02-120-32
Test Engineer:	David Zhang
Report No.:	BTR66.180.10.209.02
Sample Received Date:	Jun 13, 2011
Test Performed Date:	Jun 14, 2011
Reviewed By:	Steven Hsu
Prepared By:	**BEST Test Service Shenzhen Co., Ltd.** 1st Floor, 1st Building, Weitai Industrial Park, Yingrenshi, Shiyan, Baoan, Shenzhen, China TEL: +86-755-28236006 FAX: +86-755-23467087-811 Email: certification@bestcert.cn

NVLAP LAB CODE 200770-0

Efficient Lighting Initiative

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1 - GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

Applicant	:	Diogen Lighting,Inc
Product Name	:	T8 Tube
Model No	:	T8L1200-18W-02-120-32
Brand	:	Diogen Lighting
SKU	:	T.B.D
12 NC Code	:	T.B.D
Nominal Operation Voltage	:	AC 120V/60Hz
Nominal Power	:	18W
Nominal Lumen Output	:	1300Lumens
Rated Lamp Life	;	50000Hours
Stabilization Time	:	1.5 hours
Lamp Cap	:	G13
Date of Receiving Sample	:	Jun 13, 2011
Quantity of samples	:	1 pcs
Test Requested	:	1. Electrical and Photometric Test 2. Luminous Intensity Distribution Test;

1.2 Objective

The following test report is prepared on behalf of Diogen Lighting,Inc in accordance with IESNA LM-79-08, used the following American National Standards or illumination Engineering Society of North America test guides:

ANSI C78.377-2008: Specifications for the Chromaticity of Solid State Lighting Products;
ANSI C79.1– 2002: American National Standard for Electric Lamps – Nomenclature for Glass Bulbs Intended for Use with Electric Lamps;
ANSI C78.20 – 2003: American National Standard for Electric Lamps – A, G, PS, and Similar Shapes with E26 Medium Screw Bases;
ANSI C78.21 – 2003: American National Standard for Electric Lamps – PAR and R Shapes;
ANSI C78.24 – 2001: American National Standard for Electric Lamps – Two-inch (51 mm);
Integral-reflector Lamps with Front Covers and GU5.3 or GX 5.3 Bases;
ANSI/IEC C81.61-2003: American National Standard for Electric Lamp Bases;
ANSI/IEEE C62.41 – 1991 (01-May-1991): Surge Voltages in Low-Voltage AC Power Circuits, Recommended Practice for;
CIE Publication No. 13.3 – 1995: Method of Measuring and Specifying Color Rendering of Light Sources;
CIE Publication No. 18.2 – 1983: The Basis of Physical Photometry;
IESNA LM-16-1993: Practical Guide to Colorimetry of Light Sources;
IESNA LM-28-89 – 1989: Guide for the Selection, Care, and Use of Electrical Instruments in the Photometric Laboratory;
IESNA LM-79-08 Electrical and Photometric Measurement of Solid State Lighting Products
UL 1993 – 1999: Standard for Self-Ballasted Lamps and Lamp Adapters;
UL 8750 – 2009: Light Emitting Diode (LED) Equipment for Use in Lighting Products.

1.3 Test Facility Description

The Energy Efficiency Lab used by BEST to collect energy efficiency measurement data is located in 1st Floor, 1st Building, Weitai Industrial Park, Yingrenshi, Shiyan, Baoan, Shenzhen, China. BEST Test Service Shenzhen Co., Ltd is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200770-0). BEST Test Service Shenzhen Co., Ltd is also an ELI accredited lab for lighting products (ELI Certificate No. ELI-L04-2010) and UL accredited lab for lighting products

1.4 Test Equipment List

Device	Manufacture	Model No	Serial No	Cal. Date	Cal Due Date
Integral Sphere	Everfine	1.5M SPEKTRON	608040T	Oct 20, 2010	Oct 20, 2011
Integral Sphere	Everfine	1.5M SPEKTRON	906025	Oct 20, 2010	Oct 20, 2011
Integral Sphere	Labsphere	LMS-650	6101002416	Mar 10, 2011	Mar 09, 2012
Spectro Meter Assy	Labsphere	CDS 2100	217101416	Mar 10, 2011	Mar 09, 2012
Plus UV-VIS-Near IR Spectrophotometer Colorimeter	Everfine	PMS-50 (380nm-800nm)	608033	Oct 20, 2010	Oct 20, 2011
Plus UV-VIS-Near IR Spectrophotometer Colorimeter	Everfine	PMS-700 (200nm-800nm)	908001	Oct 20, 2010	Oct 20, 2011
Goniophotometer	Everfine	GOR-5000	1009001	Nov 20, 2010	Nov 19, 2011
$6\ ^{1/2}$ Digital Multimeter	Agilent	34401A	MY4702386	Oct 18, 2010	Oct 17, 2011
AC Power Source	California Instrument	1501I	S13093	N/A	N/A
AC Power Source	California Instrument	1501L	L03572	N/A	N/A
Standard Light Source	OSRAM	24V/50W	NO.1	Sep 17, 2010	Sep 16, 2011
Standard Light Source	OSRAM	24V/50W	NO.2	Sep 17, 2010	Sep 16, 2011
Multi-Function AC standard Meter	Everfine	PF2010S	605010	Oct 18, 2010	Oct 17, 2011
Digital Power Meter	Everfine	PF9811	902029	Oct 18, 2010	Oct 17, 2011
Digital Power Meter	YOKOGAWA	WT210	91K310009	Oct 18, 2010	Oct 17, 2011
Digital Power Meter	YOKOGAWA	WT210	91K310017	Oct 18, 2010	Oct 17, 2011
Digital Power Meter	YOKOGAWA	WT210	91K310016	Oct 18, 2010	Oct 17, 2011
Ballast Parameter Analyzer	Everfine	PF9821	905050	Oct 18, 2010	Oct 17, 2011
Second Meter	TIANFU	PC 396	N/A	Oct 18, 2010	Oct 17, 2011
Digital Storage Oscilloscope	Tektronix	TDS2012B	C051911	Oct 18, 2010	Oct 17, 2011

Statement of Traceability: BEST Test Service Shenzhen Co., Ltd. certifies that all calibration has been performed using suitable standards traceable to the NIM China.

2 - Test Method

2.1 Photometric and Electrical Measurement (Integrated Sphere Method)

Total light output (luminous flux) for the 25℃ ±1℃ ambient temperature conditions is measured using a 1.6m 4∏ geometry integrating sphere. Temperature is measured at a position inside the sphere. Spectral radiant flux measurements are made using Labsphere LMS-650 to the detector port of the integrating sphere. Each lamp is operated at rated voltage in its designated orientation. Each lamp should be stable before measurements are made. The determining method of stable is as follows:

Step 1 Take 3 measurements of the lamp light output at 15 minute interval (total time=30mintues.)This time period is in addition to the recommended pre-burning time.

Step 2 Calculate the percent difference between the maximum measured value and the minimum measured value for the three consecutive measurements.

Step 3 if the value calculated in Step 2 does not exceed 0.5 percent, the lamp is considered stable.
Luminous flux, chromaticity coordinates, correlated color temperature and color rendering index for each lamp are calculated from the spectral radiant flux measurements taken at 2 nm intervals over the range 350 to 1050 nm. The calibration of the sphere photometer-spectrometer system is traceable to the NIST USA. Lamp efficacy (lumens per watts) for each lamp model is computed based on the revised luminous flux result. Electrical measurements including voltage, current, power and power factor are measured using the YOKOGAWA WT210 digital power Meter.

The total uncertainty of the light output measurements is estimated, at the 95% confidence level, not to exceed ±1.12% over the wavelength range 350-1050 nm.

2.2 Photometric and Electrical Measurement (GonioPhotometer Method)

Before each measurement, the method below should be used to determine the lamp is stable or not.

Step 1 Take 3 measurements of the lamp intensity at 15 minute interval (total time=30mintues.)This time period is in addition to the recommended pre-burning time.

Step 2 Calculate the percent difference between the maximum measured value and the minimum measured value for the three consecutive measurements.

Step 3 if the value calculated in Step 2 does not exceed 0.5 percent, the lamp is considered stable.

A Everfine GOR-5000 Goniometer was used to measure the intensity (candelas) at each angle of distribution for each sample; the photometric distance is 2.436m. Ambient temperature was measured equal to the height of the sample mounted on the Goniometer equipment. Each sample was operated at input rated voltage in its designated orientation. Each sample was allowed to be stable before measurement was made. Electrical measurements including voltage, current, power and power factor were measured using the YOKOGAWA WT210 Power Analyzer.

Some graphics were created with Photometric Plus software.

3 – Summary of Test Result

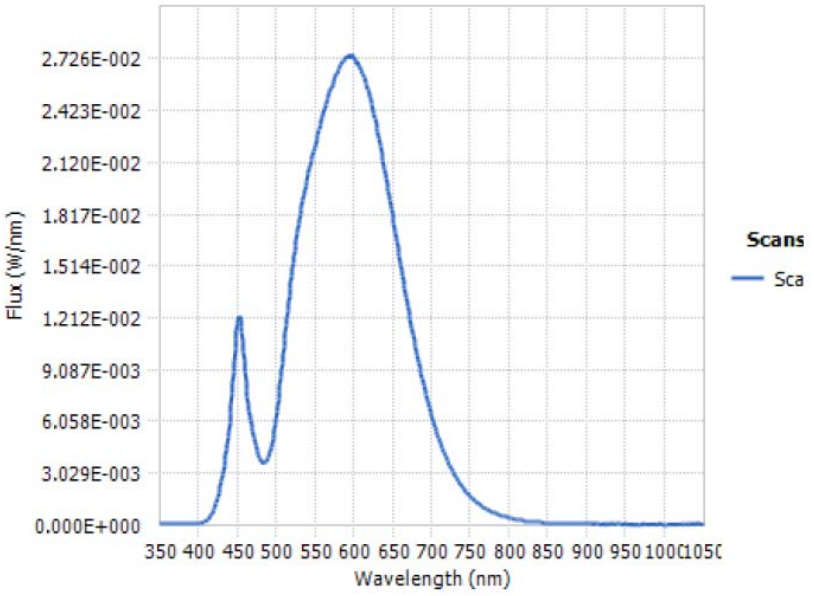
	Item	Test Result		Accreditation
Required Fields	Lumen Output (Lumens)	1521		NVLAP/EPA
	Luminous Efficacy (lm/w)	75.76		NVLAP/EPA
	Correlated Color Temperature (CCT)	3166		NVLAP/EPA
	Color Rendering Index– CRI	76.1		NVLAP/EPA
	Input Power (W)	18.50		NVLAP/EPA
Optional Fields	Power Type	☒AC	☐DC	/
	Input Voltage (V)	120		NVLAP/EPA
	Input Current (A)	0.1717		NVLAP/EPA
	Power Factor	0.8978		NVLAP/EPA
	x(CIE 1931)	0.4385		NVLAP/EPA
	y(CIE 1931)	0.4290		NVLAP/EPA
	u' (CIE 1976)	0.2412		NVLAP/EPA
	v' (CIE 1976)	0.5310		NVLAP/EPA
	Duv(CIE 1976)	0.0091		NVLAP/EPA
	R9	-2.4		NVLAP/EPA
	Beam Angle: (Degree)	125.1		NVLAP/EPA
	Center beam candlepower: (cd)	347.4		NVLAP/EPA
	Zonal lumen density (0-60°):	56.6%		NVLAP/EPA
	Zonal lumen density (60-90°):	27.1%		NVLAP/EPA
	Zonal lumen density (90-120°):	11.7%		NVLAP/EPA
	Zonal lumen density (120-180°):	4.6%		NVLAP/EPA

4 – Spectral Flux Plots

Spectral Results

Name	Value	Unit	Pass/Fail
Φ	4.549E00	Watts	N/A
Φ(v)	1.521E03	lumens	N/A
Φ(v')	1.896E03	lm'	N/A
Chrom x	0.4385		N/A
Chrom y	0.4290		N/A
Chrom u	0.2412		N/A
Chrom v	0.3540		N/A
Duv	0.0091		N/A
Chrom u'	0.2412		N/A
Chrom v'	0.5310		N/A
λ (peak)	596.3	nm	N/A
λ (center)	592.0	nm	N/A
λ (centroid)	589.4	nm	N/A
λ (dom)	579.2	nm	N/A
FWHM	148.5	nm	N/A
Purity	60.4	%	N/A
CCT	3165.9	°K	N/A
η	N/A	lm/W	N/A
Correlation	0.0054		N/A
Corr. Coef.	0.0095		N/A
RA	76.1		N/A
R1	72.8		N/A
R2	80.9		N/A
R3	88.6		N/A
R4	75.3		N/A
R5	70.5		N/A
R6	72.5		N/A
R7	88		N/A
R8	60.4		N/A
R9	-2.4		N/A
R10	54.8		N/A
R11	69.7		N/A
R12	41.7		N/A
R13	73.6		N/A
R14	93.1		N/A

Spectral Flux Graph



5 – EUT Photos

6 – Luminous Intensity Distribution Test Plots

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