IESNA LM-79: 2008

Measurement and Test Report

For

P.Q.L., Inc.

2285 Ward Avenue / Simi Valley, CA 93065

Aug 13, 2015

Product Name:	LED
Model No:	90764
Test Engineer:	David Zhang
Report No.:	BTR66.181.14.0047.19-1
Sample Received Date:	Nov 02, 2014
Test Performed Date:	Nov 02, 2014 to Nov 08, 2014
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	:	P.Q.L., Inc.
Product Name	:	LED
Model No	:	90764
Brand	:	Superior Life®
Nominal Operation Voltage	:	AC 120V
Nominal Power	:	7W
Nominal CCT	:	2700K
Nominal CRI	:	80
Nominal Lumen Output	:	500Lumens
Nominal Life Time	:	25000Hours
Number of hours operated prior to measurement for new sample	:	0 Hours
Stabilization Time	:	1.0Hours
Total operating time for measurement include stabilization time	:	1.5 Hours
Nominal Shape of Bulb(Designation)	:	☒Standard ☐Non Standard ☐Omnidirectional A, BT, P, PS, S, T ☒Decorative G25 with E26 base ☐Directional PAR, MR, R, BR
Date of Receiving Sample	:	Nov 02, 2014
Date of Measurement performed	:	Nov 02, 2014 to Nov 08, 2014
Measurement quantities measured	:	1 pcs
Orientation During Testing	:	Base Up
Test Requested	:	1. Electrical and Photometric Test 2. Luminous Intensity Distribution Test

1.2 Objective

The following test report is prepared on behalf of Hengdian Group Tospo Lighting Co.,Ltd 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 – 2011: American National Standard for Incandescent 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: 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

Apparatus List	Device	Cal. Date	Cal Due Date
1	Integral Sphere+ Spectrophotometer System	Mar 10, 2015	Mar 09, 2016
2	Digital Power Meter	Oct 18, 2014	Oct 17, 2015
3	Goniophotometer+ Spectrophotometer System	Nov 20, 2014	Nov 19, 2015
4	Standard Light Source	Sep 17, 2014	Sep 16, 2015
5	Standard Light Source	Sep 17, 2014	Sep 16, 2015
6	Digital Storage Oscilloscope	Oct 18, 2014	Oct 17, 2015
7	Ultra Compact Simulator	Oct 20, 2014	Oct 19, 2015
8	Temperature Chamber	Oct 20, 2014	Oct 19, 2015
9	Digital Caliper	Nov 20, 2014	Nov 19, 2015
10	Digital CC&CV DC Power Supply(30V 5A)	N/A	N/A
11	5 1/2 Digital Multimeter	Oct 18, 2014	Oct 17, 2015
12	Digital CC&CV DC Power Supply(120V 10A)	N/A	N/A
13	6 1/2 Digital Multimeter	Oct 18, 2014	Oct 17, 2015
14	Digital Multimeter	Oct 18, 2014	Oct 17, 2015
15	Temperature Recorder+Thermocouple	Nov 20, 2014	Nov 19, 2015
16	Timer Controller	Nov 20, 2014	Nov 19, 2015

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 4Π geometry integrating sphere. Temperature is measured at a position inside the sphere. Spectral radiant flux measurements are made using Lab sphere 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 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)

A Goniometer was used to measure the intensity (candelas) at each angle of distribution for each sample; the photometric distance is 24m. 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 Power Analyzer

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.

Some graphics were created with Photometric Plus software.

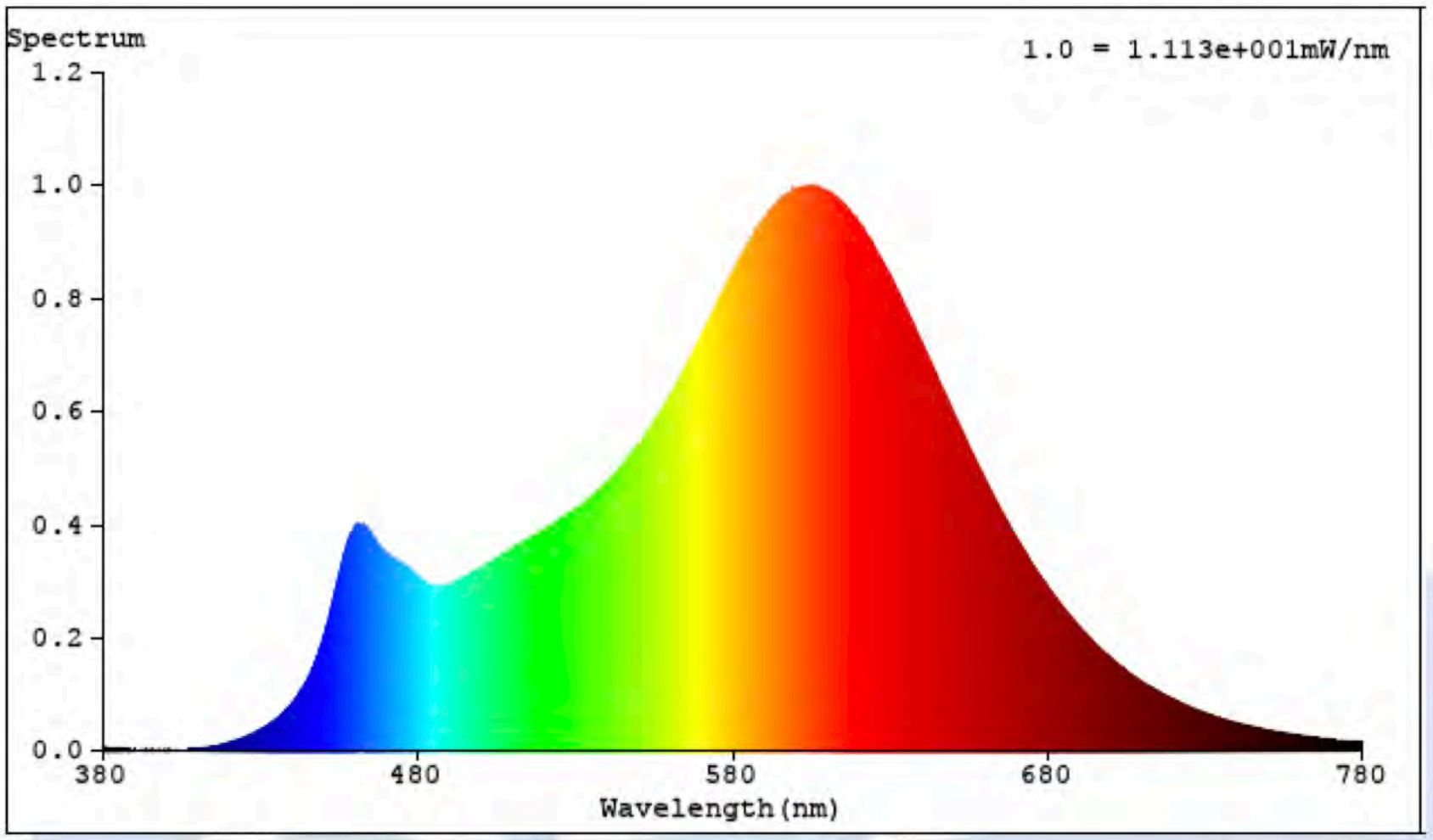
2.3 Deviation from standard operating procedure

None.

3 – Summary of Test Result

	Item	Test Result		Accreditation
Required Fields	Lumen Output (Lumens)	529.85		NVLAP/EPA
	Luminous Efficacy (lm/w)	77.36		NVLAP/EPA
	Correlated Color Temperature (CCT)	2812		NVLAP/EPA
	Color Rendering Index– CRI	82.2		NVLAP/EPA
	Input Power (W)	6.85		NVLAP/EPA
Optional Fields	Power Type	☒AC	☐DC	/
	Input Voltage (V)	120.0		NVLAP/EPA
	Input Current (A)	0.0674		NVLAP/EPA
	Power Factor	0.8460		NVLAP/EPA
	x(CIE 1931)	0.4524		NVLAP/EPA
	y(CIE 1931)	0.4111		NVLAP/EPA
	u' (CIE 1976)	0.2574		NVLAP/EPA
	v' (CIE 1976)	0.5264		NVLAP/EPA
	Duv(CIE 1976)	0.0009		NVLAP/EPA
	R9	8		NVLAP/EPA
	Beam Angle: (Degree)	232.0		NVLAP/EPA
	Center beam candlepower: (cd)	62.7		NVLAP/EPA
	Zonal lumen density (0-60°):	36.0%		NVLAP/EPA
	Zonal lumen density (60-90°):	30.3%		NVLAP/EPA
	Zonal lumen density (90-120°):	21.6%		NVLAP/EPA
	Zonal lumen density (120-180°):	12.1%		NVLAP/EPA

4 – Spectral Flux Plots



5 – EUT Photos