



LM-79-08 Test Report

For

P.Q.L. INC

2285 Ward Avenue, Simi Valley, CA, USA 93065

LED TUBE

Model: 90457

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ16050011a

The laboratory that conducted the testing detailed in this report has been accredited for SSL by NVLAP.

Reviewed by:

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May. 09, 2016

Approved by:



Manager: Jim Zhang
May. 09, 2016

Note: This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Test Summary

Model	90457
Luminous Efficacy (Lumens /Watt)	112.1
Total Luminous Flux (Lumens)	1884.0
Power (Watts)/2	16.80
Power Factor	0.9963
CCT (K)	5130
CRI	84.2
Stabilization Time (Light & Power)	60 mins
Note	5000K, Opal Lens

Table 1: Executive Data Summary

Test specifications:

Date of Receipt	: May. 09, 2016
Date of Test	: May. 09, 2016
Test item	: Total Luminous Flux, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters
Reference Standard	: IESNA LM-79-2008 Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products

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Sample Photos



Sample view

Equipment Under Test (EUT)

Name	: LED TUBE
Model	: 90457
Electrical Ratings	: 120-277Vac, 60Hz, 17.5W
Product Description	: G13 base, fixed end caps, 5000K, 4 feet tube, Opal Lens Manufacturer of the LED light source: Everlight Electronics Co., LTD Model of the LED light source: 67-21S Series Quantity of the LED light source: 80 pcs LED Tubes supplied by a high frequency fluorescent lamp ballast: QTP 2x32T8/UNV ISN-SC
Manufacturer	: P.Q.L. INC
Address	: 2285 Ward Avenue, Simi Valley, CA, USA 93065

TEST RESULTS

Test ambient temperature was 25.1°C.

Test orientation was Horizontal. Test was conducted without a dimmer in the circuit.

The stabilization time of the sample was 60 minutes, and the total operating time including stabilization was 65 minutes.

Sphere-Spectroradiometer Method

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.281	0.124
Power Factor	0.9963	0.9770
Test Power (W)/2	16.80	16.73
THD A%	7.32	9.64
Luminous Efficacy (lm/W)	112.1	
Total Luminous Flux (lm)	1884.0	
Color Rendering Index (CRI)	84.2	
R9	12.3	
Correlated Color Temperature (CCT)(K)	5130	
Chromaticity Chroma x	0.3418	
Chromaticity Chroma y	0.3534	
Chromaticity Chroma u	0.2085	
Chromaticity Chroma v	0.3234	
Duv	0.0017	
Chromaticity Chroma u'	0.2085	
Chromaticity Chroma v'	0.4851	

Special Color Rendering Indices	
R1	82.7
R2	90.8
R3	94.4
R4	82.1
R5	82.8
R6	85.7
R7	86.9
R8	68
R9	12.3
R10	76.9
R11	81
R12	61.6
R13	85.2
R14	97.3

Table 2: Test data per Sphere-Spectroradiometer Method

Note: According to CIE 1976 (u',v') diagram, $u' = u = 4x/(-2x+12y+3)$, $v' = 3v/2 = 9y/(-2x+12y+3)$.

Spectral Power Distribution - Sphere Spectroradiometer Method

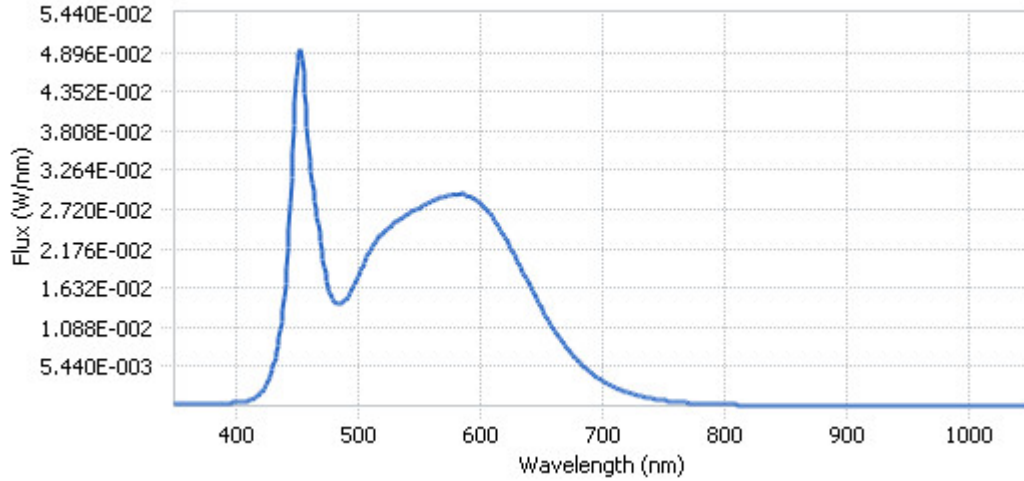
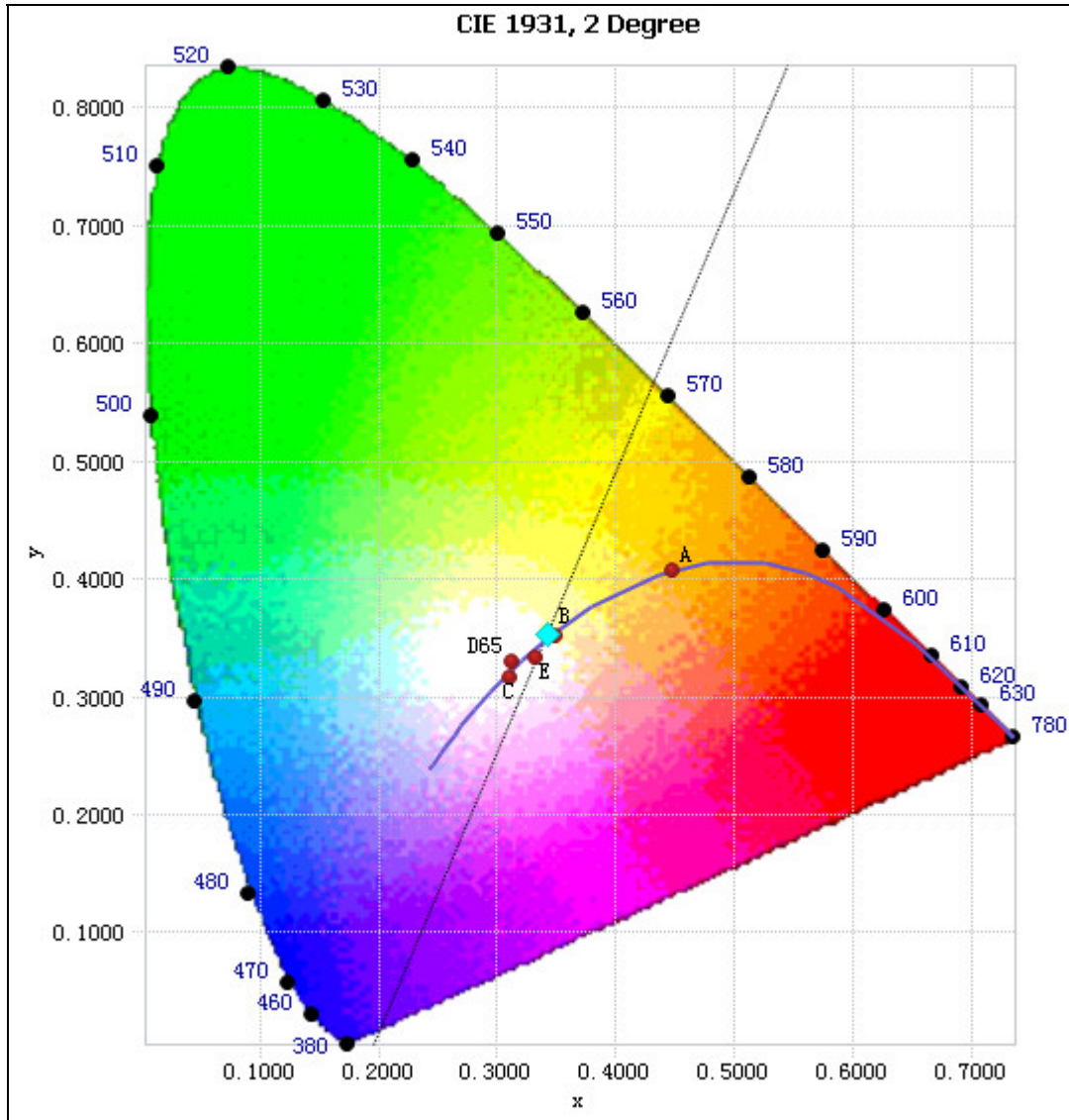


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	3.36E-04	485	1.41E-02	590	2.91E-02	695	4.16E-03
385	3.56E-04	490	1.46E-02	595	2.87E-02	700	3.54E-03
390	3.73E-04	495	1.58E-02	600	2.82E-02	705	3.06E-03
395	4.10E-04	500	1.78E-02	605	2.73E-02	710	2.62E-03
400	4.54E-04	505	1.98E-02	610	2.63E-02	715	2.24E-03
405	5.42E-04	510	2.14E-02	615	2.50E-02	720	1.94E-03
410	6.87E-04	515	2.27E-02	620	2.35E-02	725	1.67E-03
415	1.03E-03	520	2.37E-02	625	2.20E-02	730	1.43E-03
420	1.64E-03	525	2.45E-02	630	2.04E-02	735	1.22E-03
425	2.83E-03	530	2.52E-02	635	1.87E-02	740	1.05E-03
430	4.90E-03	535	2.58E-02	640	1.71E-02	745	9.06E-04
435	8.40E-03	540	2.65E-02	645	1.54E-02	750	7.79E-04
440	1.50E-02	545	2.70E-02	650	1.38E-02	755	6.74E-04
445	2.81E-02	550	2.73E-02	655	1.23E-02	760	5.83E-04
450	4.55E-02	555	2.78E-02	660	1.09E-02	765	5.03E-04
455	4.81E-02	560	2.82E-02	665	9.55E-03	770	4.30E-04
460	3.62E-02	565	2.87E-02	670	8.37E-03	775	3.75E-04
465	2.83E-02	570	2.89E-02	675	7.32E-03	780	3.33E-04
470	2.28E-02	575	2.92E-02	680	6.36E-03		
475	1.73E-02	580	2.93E-02	685	5.52E-03		
480	1.46E-02	585	2.93E-02	690	4.80E-03		

Table 3: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y) : (0.3418, 0.3534)

Chart 2: Chromaticity Diagram per Sphere - Spectroradiometer Method

Note: The location on the diagram of the tristimulus coordinates are indicated by the blue diamond.

Nominal CCT Quadrangles – Sphere Spectroradiometer Method

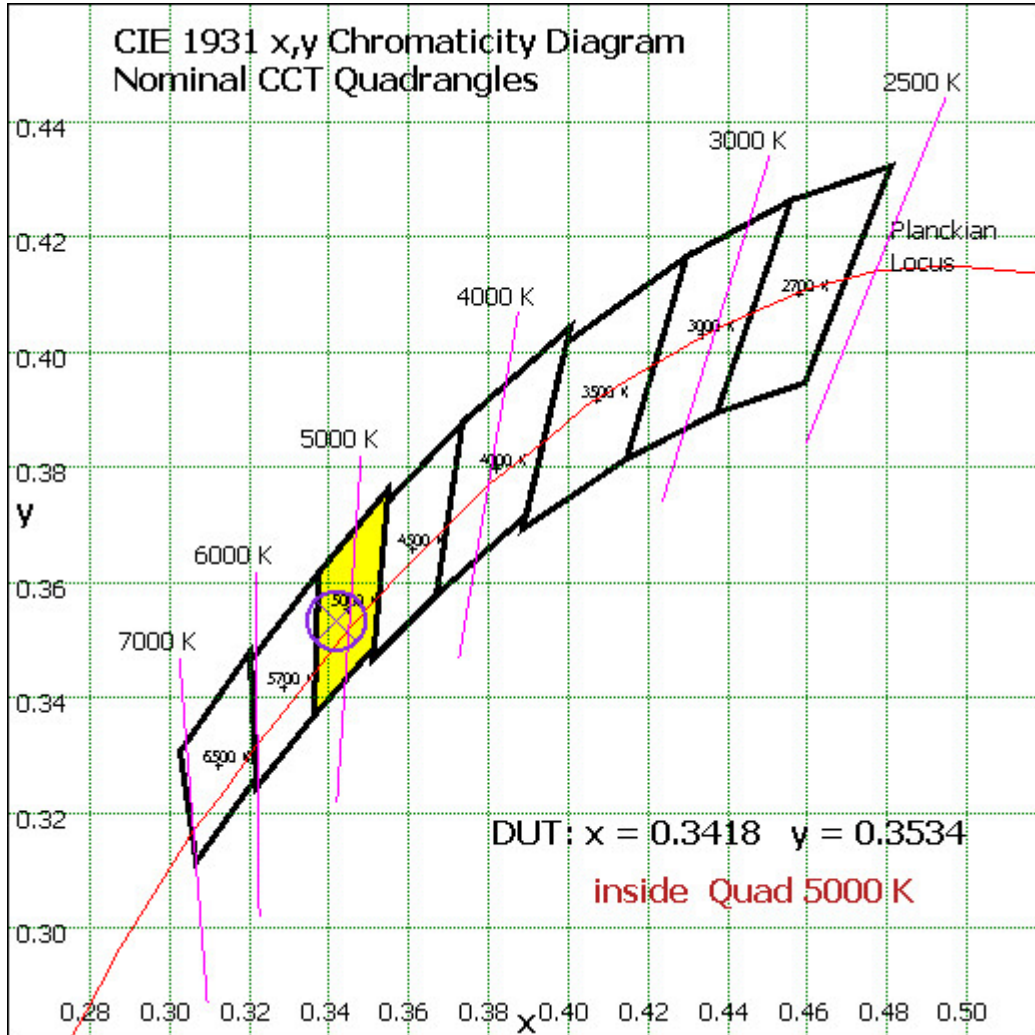


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Integrate Sphere system	2M	HZTE015-01	Jul. 16, 2015	Jul. 15, 2016
Digital Power Meter	WT210	HZTE008-01	Jul. 17, 2015	Jul. 16, 2016
AC Power Supply	PCR 500L	HZTE001-07	Jul. 17, 2015	Jul. 16, 2016
DC Power Supply	6154	HZTE004-04	Jul. 17, 2015	Jul. 16, 2016
Temperature and humidity recorder	JR900	HZTE018-01	Jul. 21, 2015	Jul. 20, 2016
Standard source	SCL-1400	HZTE012-02	Oct. 21, 2015	Oct. 20, 2016

Table 4: Test Equipment List

TEST METHODS

Seasoning of SSL Product

For the purpose of rating new SSL products, SSL products shall be tested with no seasoning. Therefore, no seasoning was performed.

Sphere-Spectroradiometer Method- Photometric and Electrical Measurements

A Labsphere Model CDS 2100 Spectroradiometer and Two Meter Sphere was used to measure correlated color temperature, chromaticity coordinates, and the color rendering index for each SSL unit. The coating reflectance of each sphere is 98%. The measure geometry is 4π . Self-absorption correction is conducted in testing. Bandwidth of spectroradiometer is 350nm-1050nm.

Ambient temperature was measured at a position inside the sphere. Each SSL unit was operated on the client provided driver at the rated input voltage in its designated orientation.

The stabilization time typically ranges from 30 min (small integrated LED TUBEs) to 2 or more hours for large SSL luminaires). It can be judged that stability is reached when the variation (maximum – minimum) of at least 3 readings of the light output and electrical power over a period of 30 min, taken 15 minutes apart, is less than 0.5 %.

Electrical measurements including voltage, current, and power were measured using the Yokogawa Power Analyzer.

The standard reference of the integrated sphere system is halogen incandescent lamp, the intensity distribution type is omni-directional, and is traceable to the National Institute of Standards and Technology.

The uncertainty of integrating sphere system reported in this document is expended uncertainty is 1.06% with a coverage factor $k=2$.

*** End of Report ***

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