NVLAP LAB CODE 200960-0

LM-79-08 Test Report

for

P.Q.L., Inc.

2285 Ward Avenue / Simi Valley, CA 93065

LED tube lamps

Model: 91297

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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www.ledtestlab.com

Report No.: HZ16030023b

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

Review by: April Zou

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Mar. 15, 2016

Approved by: Jim Zhang

Manager: Jim Zhang

Mar. 15, 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	91297
Luminous Efficacy (Lumens /Watt)	139.8
Total Luminous Flux (Lumens)	1887.0
Power (Watts)	13.50
Power Factor	0.9750
CCT (K)	4976
CRI	82.7
Stabilization Time (Light & Power)	60 mins
Note	5000K, frosted lens

Table 1: Executive Data Summary

Test specifications:	
Date of Receipt	: Mar. 09, 2016
Date of Test	: Mar. 10, 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

TABLE OF CONTENT

LM-79-08 Test Report 1
Test Summary 2
Sample Photo 4
TEST RESULTS 5
Spectral Power Distribution - Sphere Spectroradiometer Method 6
Chromaticity Diagram - Sphere Spectroradiometer Method 7
Nominal CCT Quadrangles – Sphere Spectroradiometer Method 8
EQUIPMENT LIST 9
TEST METHODS 9
Seasoning of SSL Product 9
Sphere-Spectroradiometer Method- Photometric and Electrical Measurements 9

Sample Photo

Sample view

Equipment Under Test (EUT)	
Name	: LED tube lamps
Model	: 91297
Electrical Ratings	: AC120-277V, 50/60Hz
Product Description	: G13 base, 5000K, frosted lens, 4 feet tube, fixed ends, No dimmable Manufacturer of light source: Everlight Electronics Co., LTD Model of LED light source: 67-21S Series
Manufacturer	: P.Q.L., Inc.
Address	: 2285 Ward Avenue Simi Valley, CA 93065

TEST RESULTS

Test ambient temperature was 24.5℃.

Test orientation was Light down. 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)	0.115	0.054
Power Factor	0.9750	0.9018
Test Power (W)	13.50	13.59
THD A%	19.81	16.34
Luminous Efficacy (lm/W)	139.8	140.1
Total Luminous Flux (lm)	1887.0	1904.0
Color Rendering Index (CRI)	82.7	
R9	6.4	
Correlated Color Temperature (CCT)(K)	4976	
Chromaticity Chroma x	0.3463	
Chromaticity Chroma y	0.3591	
Chromaticity Chroma u	0.2094	
Chromaticity Chroma v	0.3256	
Duv	0.0032	
Chromaticity Chroma u ’	0.2094	
Chromaticity Chroma v’	0.4885	

Special Color Rendering Indices	
R1	80.4
R2	88.3
R3	93.7
R4	81.4
R5	80.6
R6	83.1
R7	87.7
R8	66.8
R9	6.4
R10	72
R11	80.1
R12	57.1
R13	82.5
R14	96.7

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

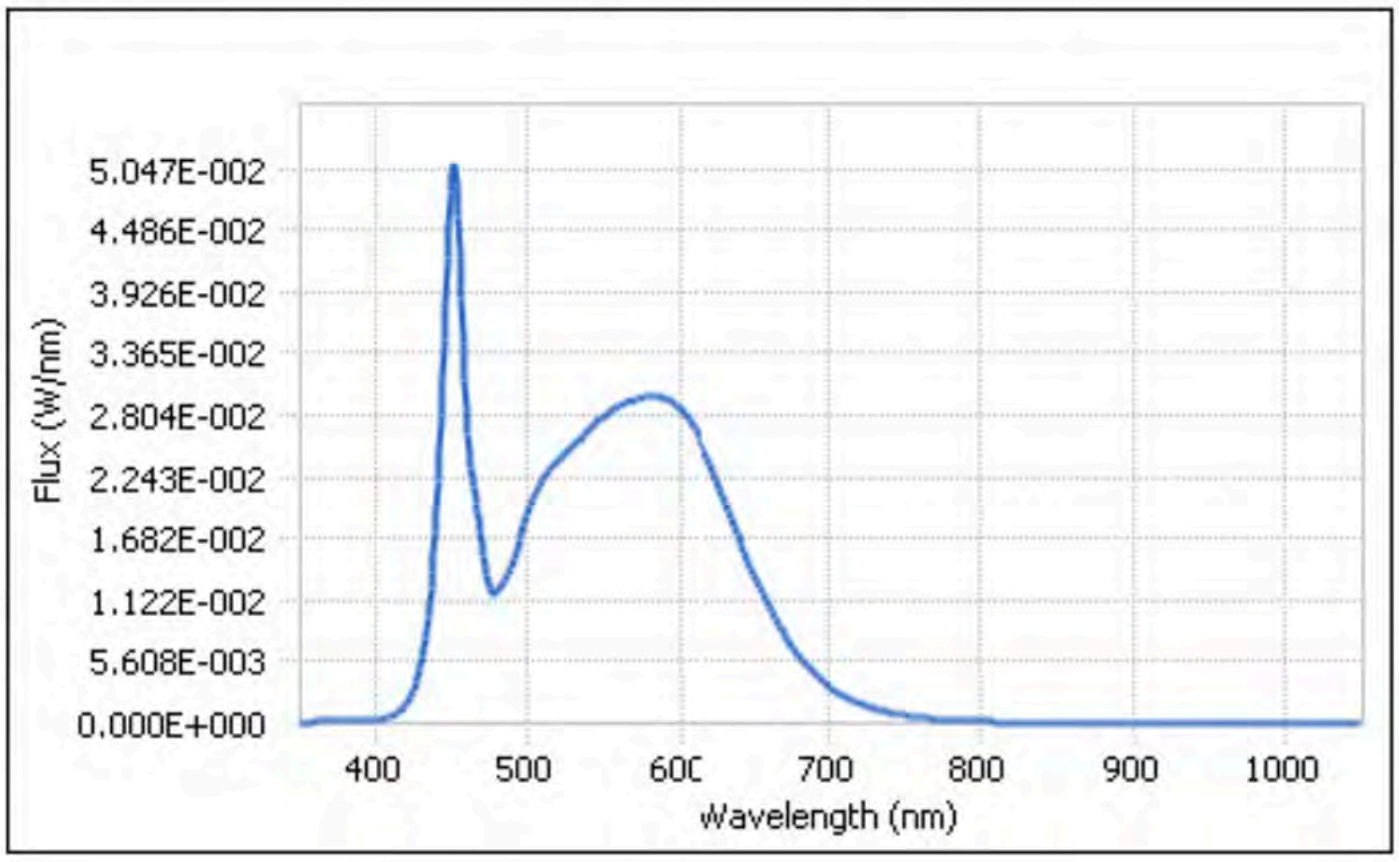
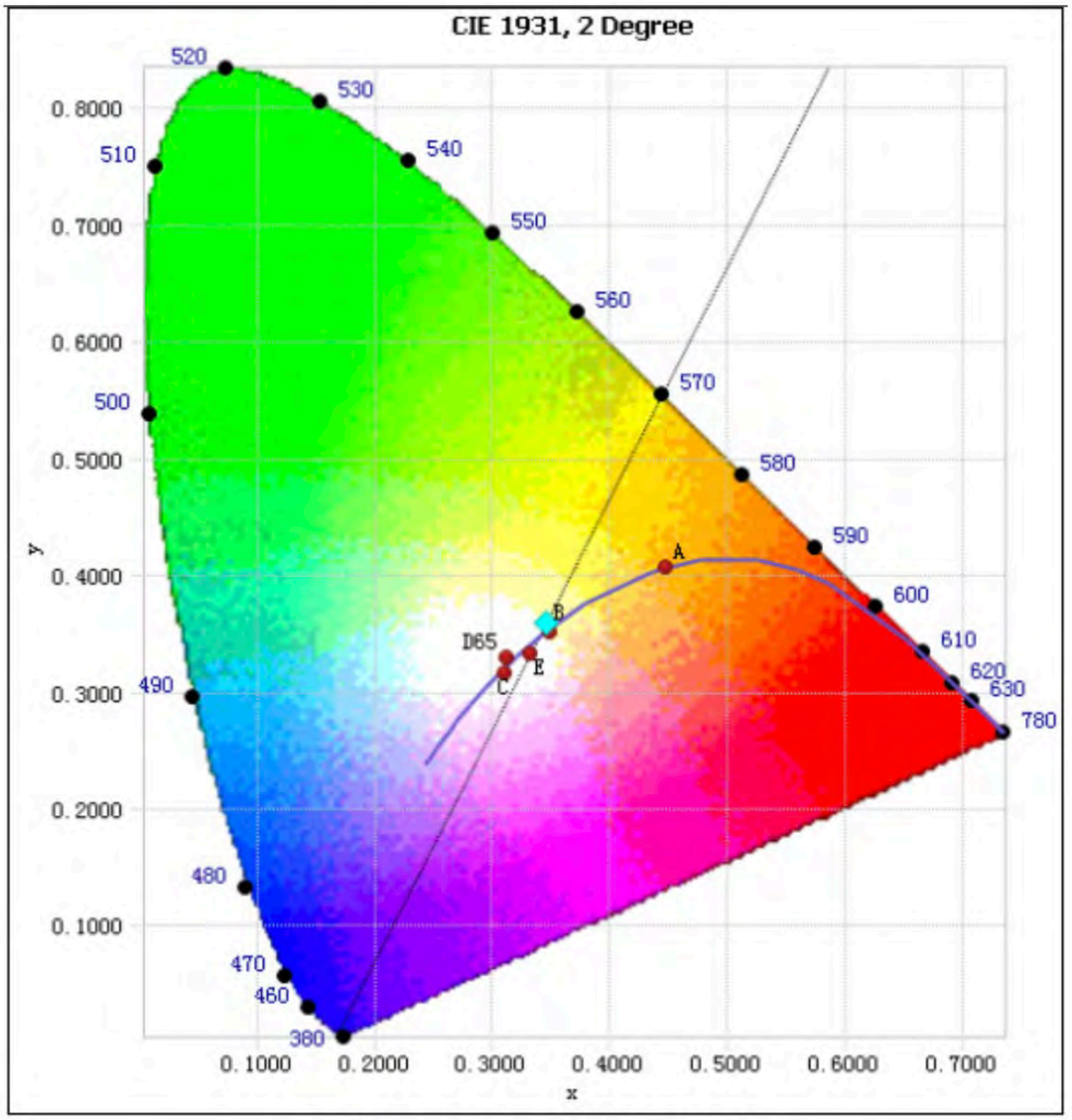


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.13E-04	485	1.31E-02	590	2.96E-02	695	3.95E-03
385	2.25E-04	490	1.49E-02	595	2.92E-02	700	3.38E-03
390	2.67E-04	495	1.70E-02	600	2.86E-02	705	2.89E-03
395	2.92E-04	500	1.92E-02	605	2.78E-02	710	2.47E-03
400	3.43E-04	505	2.10E-02	610	2.68E-02	715	2.11E-03
405	4.26E-04	510	2.24E-02	615	2.55E-02	720	1.82E-03
410	6.03E-04	515	2.33E-02	620	2.39E-02	725	1.55E-03
415	1.00E-03	520	2.39E-02	625	2.23E-02	730	1.32E-03
420	1.78E-03	525	2.45E-02	630	2.06E-02	735	1.13E-03
425	3.24E-03	530	2.52E-02	635	1.89E-02	740	9.71E-04
430	6.05E-03	535	2.58E-02	640	1.71E-02	745	8.29E-04
435	1.09E-02	540	2.67E-02	645	1.54E-02	750	7.12E-04
440	1.96E-02	545	2.74E-02	650	1.38E-02	755	6.10E-04
445	3.48E-02	550	2.79E-02	655	1.22E-02	760	5.23E-04
450	5.02E-02	555	2.85E-02	660	1.07E-02	765	4.51E-04
455	4.24E-02	560	2.88E-02	665	9.43E-03	770	3.88E-04
460	2.62E-02	565	2.92E-02	670	8.23E-03	775	3.38E-04
465	2.06E-02	570	2.94E-02	675	7.16E-03	780	2.91E-04
470	1.63E-02	575	2.97E-02	680	6.20E-03		
475	1.23E-02	580	2.97E-02	685	5.35E-03		
480	1.19E-02	585	2.97E-02	690	4.61E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y) : (0.3463, 0.3591)

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

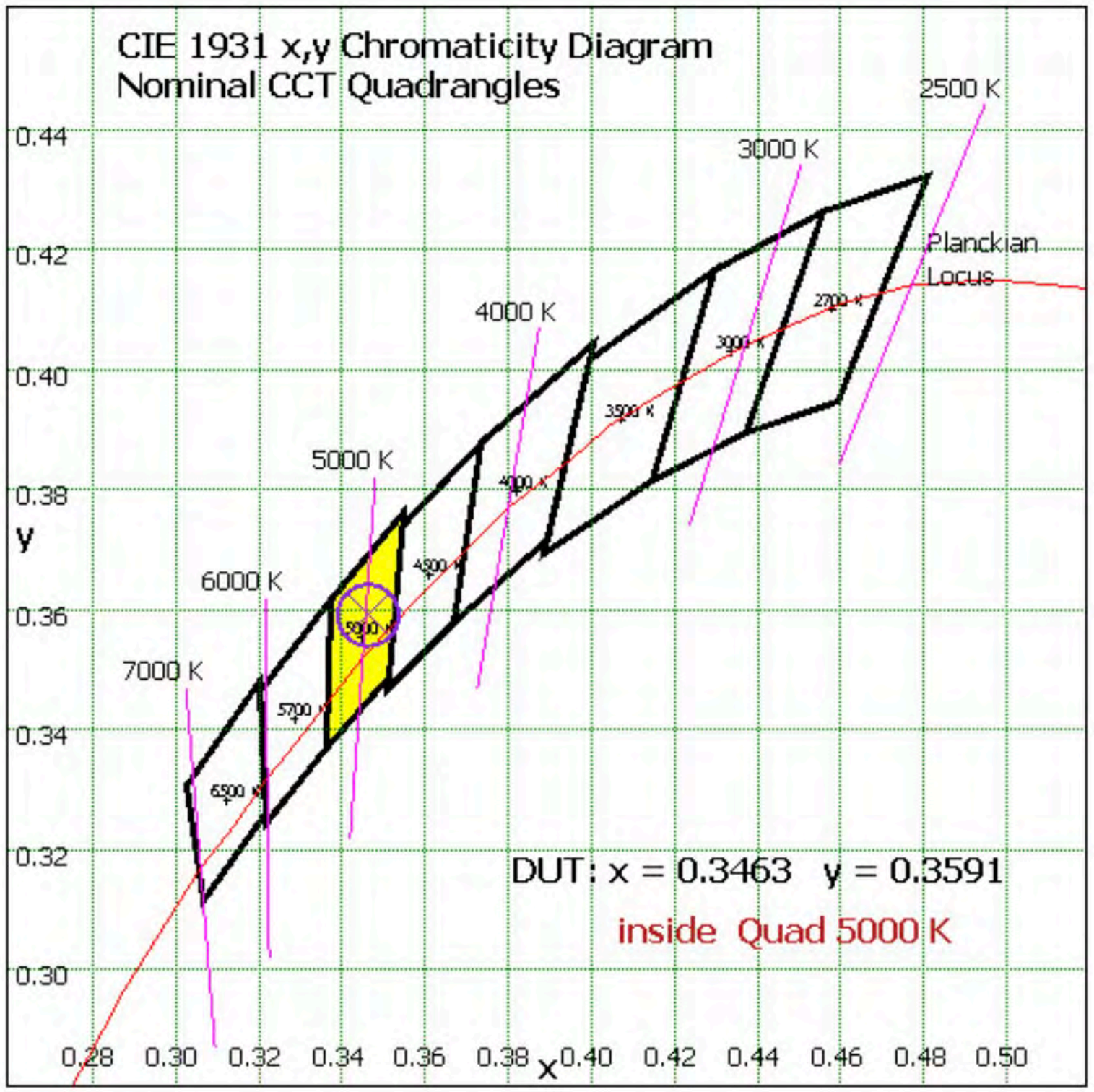


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

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 lamps) 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 ***