



## LM-79-08-TEST REPORT

for

### IKIO LED LIGHTING

8470 Allison Pointe Blvd, Suite 128 Indianapolis, IN 46250

### Internal Driver Line Voltage (UL Type B) Emergency Tube

### Model : IK-T804-0015(EM)[1;2]-50B

Where 50B represent CCT, may be 3000K, 3500K, 4000K, 4100K, 4500K, 5000K

### Laboratory : Leading Testing Laboratories

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

Review by:

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Jul. 05, 2019

Approved by



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Jul. 05, 2019

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

## TEST SUMMARY

Tested Model	IK-T804-0015(EM)[1;2]-30B	IK-T804-0015(EM)[1;2]-50B
Luminous Efficacy (Lumens /Watt)	128.0	143.6
Total Luminous Flux (Lumens)	1845.0	2055.0
Power (Watts)/2	14.41	14.31
Power Factor	0.9911	0.9910
CCT (K)	2911	4888
CRI	81.9	81.5
Stabilization Time (Light & Power)	60 mins	60 mins
Note	3000K	5000K

### Scaled data for family models based on tested models' data

Model	Flux(lm)	Power(W)	Efficacy(lm/W)
IK-T804-0015(EM)[1;2]-30B	1845	14.41	128.0
IK-T804-0015(EM)[1;2]-35B	1898	14.36	132.2
IK-T804-0015(EM)[1;2]-40B	1950	14.36	135.8
IK-T804-0015(EM)[1;2]-41B	1950	14.36	135.8
IK-T804-0015(EM)[1;2]-45B	2003	14.36	139.5
IK-T804-0015(EM)[1;2]-50B	2055	14.31	143.6

Table 1: Executive Data Summary

### Test specifications:

<b>Date of Receipt</b>	: May 15, 2019
<b>Date of Test</b>	: May 21, 2019
<b>Test item</b>	: Total Luminous Flux, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters
<b>Reference Standard</b>	: IESNA LM-79-2008 Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products ANSI/IES TM-30-18 IES Method for Evaluating Light Source Color Rendition

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## SAMPLE PHOTO

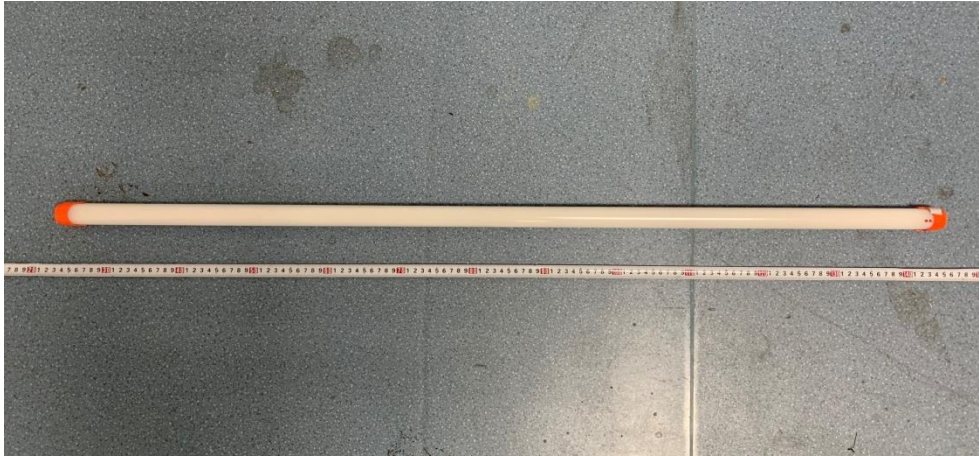


Figure 1- Overview of the sample

### Equipment Under Test(EUT)

<b>Name</b>	: Internal Driver/Line Voltage (UL Type B) Emergency Tube
<b>Model</b>	: IK-T804-0015(EM)[1;2]-30B IK-T804-0015(EM)[1;2]-50B
<b>Electrical Ratings</b>	: 120-277V, 50/60Hz, 15W
<b>Product Description</b>	: /
<b>Manufacturer</b>	IKIO LED LIGHTING
<b>Address</b>	8470 Allison Pointe Blvd, Suite 128 Indianapolis, IN 46250

## TEST RESULTS of Model PV-4FT-15W(EM)[2;5] 3000K

Test ambient temperature was 26.0 °C.

Base orientation was horizontal. Test was conducted without a dimmer in the circuit. The emergency function has been shorted.

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
Voltage frequency (Hz)	60	60
Test Current (A)	0.121	0.062
Power Factor	0.9911	0.9014
Test Power (W)	14.41	15.49
THD A%	8.54	14.05
Luminous Efficacy (lm/W)	128.0	128.0
Total Luminous Flux (lm)	1845.0	1982.0
Color Rendering Index (CRI)	81.9	
R9	5	
Correlated Color Temperature (CCT)(K)	2911	
Chromaticity Chroma x	0.4419	
Chromaticity Chroma y	0.4035	
Chromaticity Chroma u	0.2540	
Chromaticity Chroma v	0.3479	
Duv	0.0012	
Chromaticity Chroma u'	0.2540	
Chromaticity Chroma v'	0.5219	

Special Color Rendering Indices	
R1	80.7
R2	92.1
R3	94.6
R4	78.9
R5	81
R6	90.6
R7	80.9
R8	56.8
R9	5
R10	82
R11	78.1
R12	72.1
R13	83.6
R14	97.8

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**

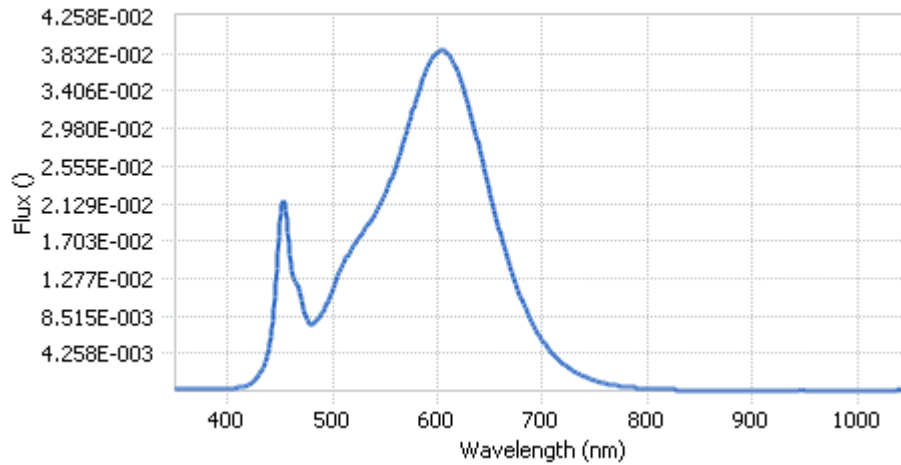
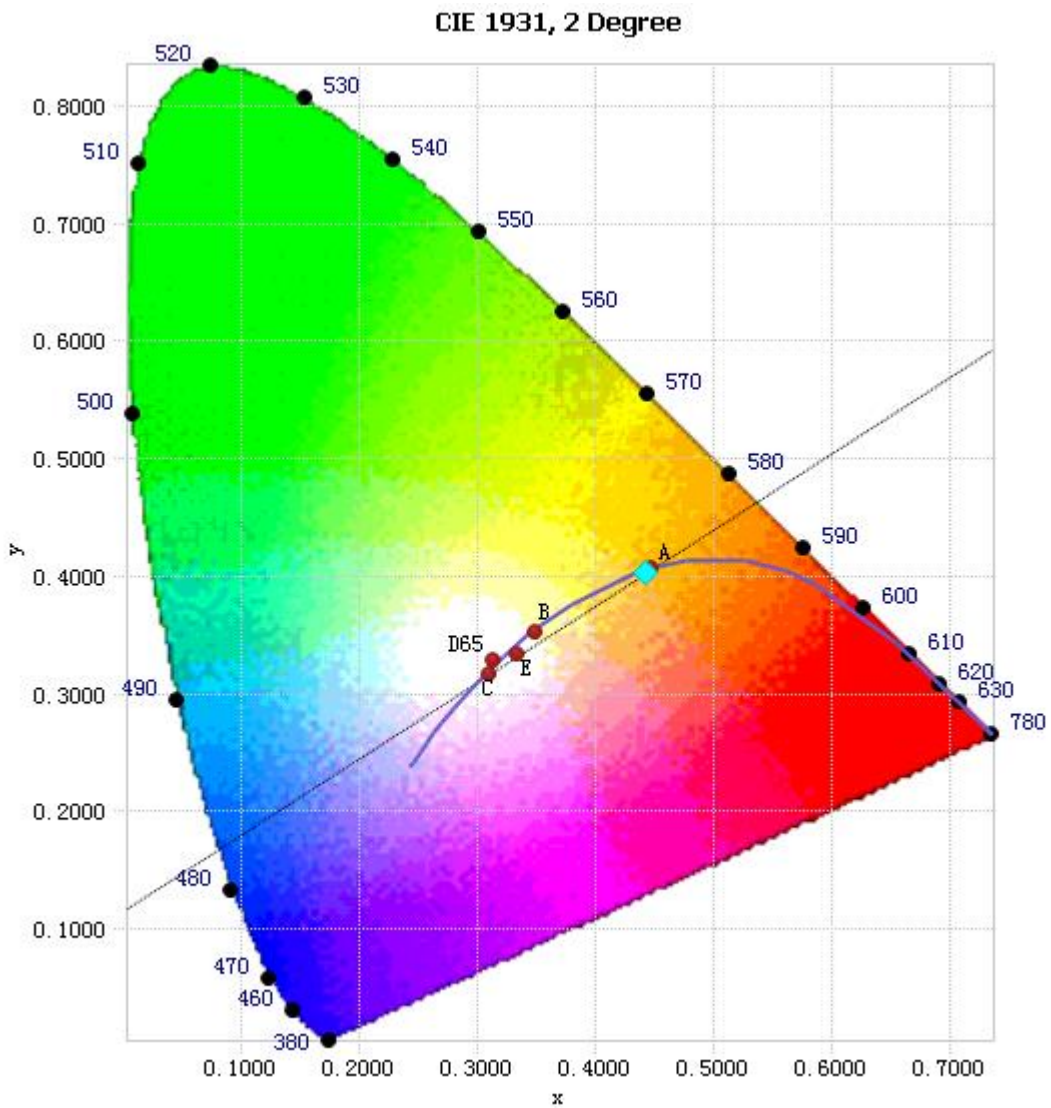


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	2.35E-04	485	7.99E-03	590	3.66E-02	695	6.69E-03
385	2.13E-04	490	8.79E-03	595	3.78E-02	700	5.73E-03
390	2.41E-04	495	9.97E-03	600	3.84E-02	705	4.88E-03
395	2.56E-04	500	1.16E-02	605	3.87E-02	710	4.19E-03
400	2.68E-04	505	1.31E-02	610	3.83E-02	715	3.58E-03
405	3.07E-04	510	1.44E-02	615	3.74E-02	720	3.06E-03
410	3.70E-04	515	1.56E-02	620	3.59E-02	725	2.61E-03
415	4.93E-04	520	1.66E-02	625	3.42E-02	730	2.22E-03
420	7.00E-04	525	1.74E-02	630	3.22E-02	735	1.90E-03
425	1.12E-03	530	1.83E-02	635	2.98E-02	740	1.61E-03
430	1.83E-03	535	1.91E-02	640	2.74E-02	745	1.37E-03
435	3.13E-03	540	2.00E-02	645	2.49E-02	750	1.17E-03
440	5.49E-03	545	2.11E-02	650	2.24E-02	755	1.00E-03
445	1.07E-02	550	2.23E-02	655	2.00E-02	760	8.65E-04
450	1.92E-02	555	2.38E-02	660	1.78E-02	765	7.37E-04
455	2.05E-02	560	2.54E-02	665	1.57E-02	770	6.35E-04
460	1.45E-02	565	2.72E-02	670	1.38E-02	775	5.40E-04
465	1.23E-02	570	2.92E-02	675	1.20E-02	780	4.57E-04
470	1.07E-02	575	3.13E-02	680	1.04E-02		
475	8.20E-03	580	3.33E-02	685	9.03E-03		
480	7.54E-03	585	3.52E-02	690	7.78E-03		

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

**Chromaticity Diagram - Sphere Spectroradiometer Method**



Tristimulus values(x, y): (0.4419, 0.4035)

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

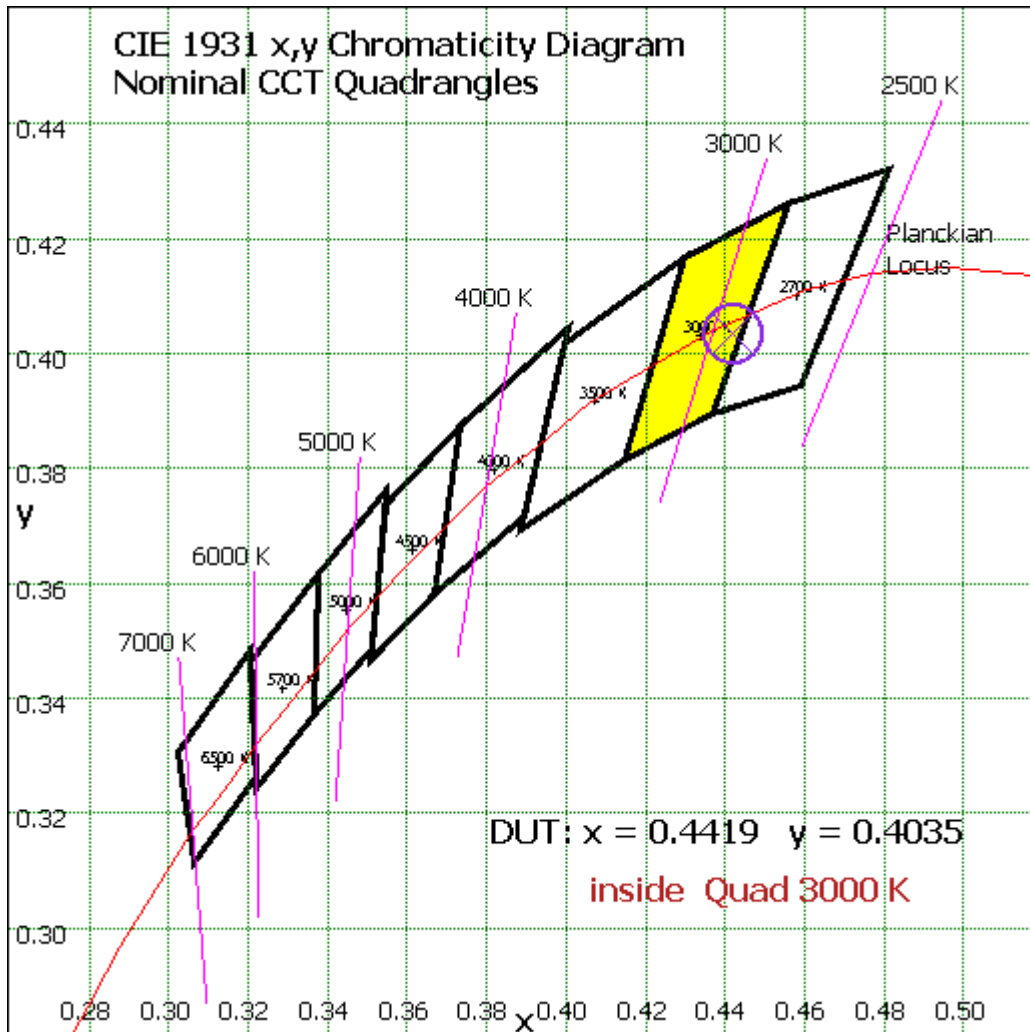
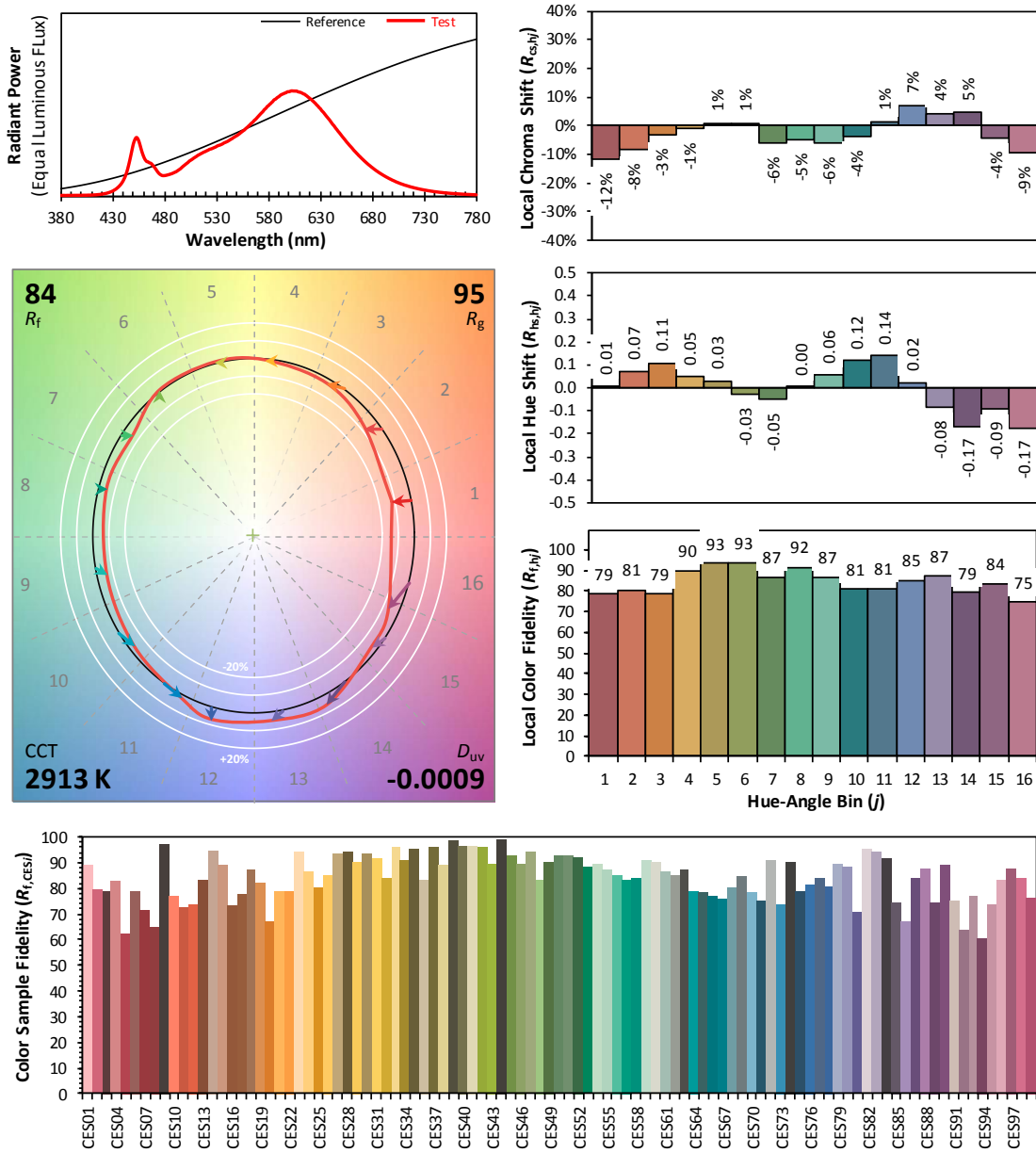


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram



**Color Rendition Report – Sphere Spectroradiometer Method**



**Notes:** This is a recommended method for displaying ANSI/IES TM-30-18 information.

$x$  0.4419  
 $y$  0.4035  
 $u'$  0.2540  
 $v'$  0.5219

Chart 4: Full Report Created with the IES TM-30 Calculator

Note: The values in this diagram might be a little different from the values in Table 2 due to rounding.



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**Spectral Power Distribution - Sphere Spectroradiometer Method**

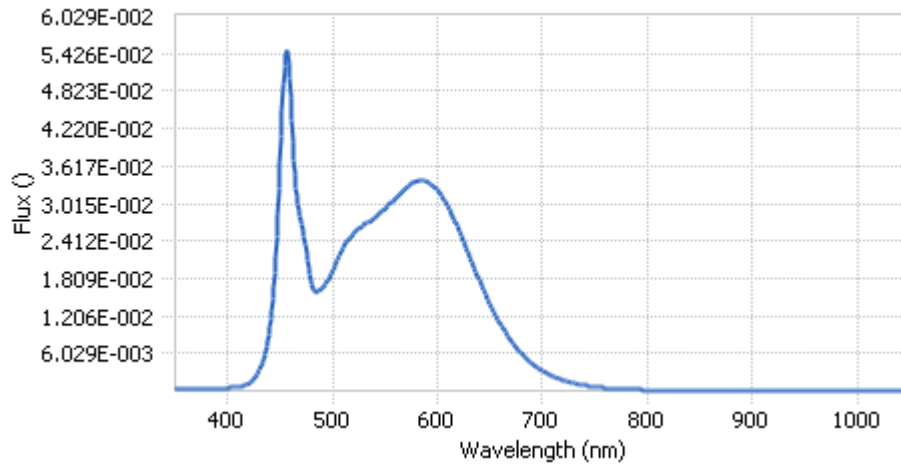
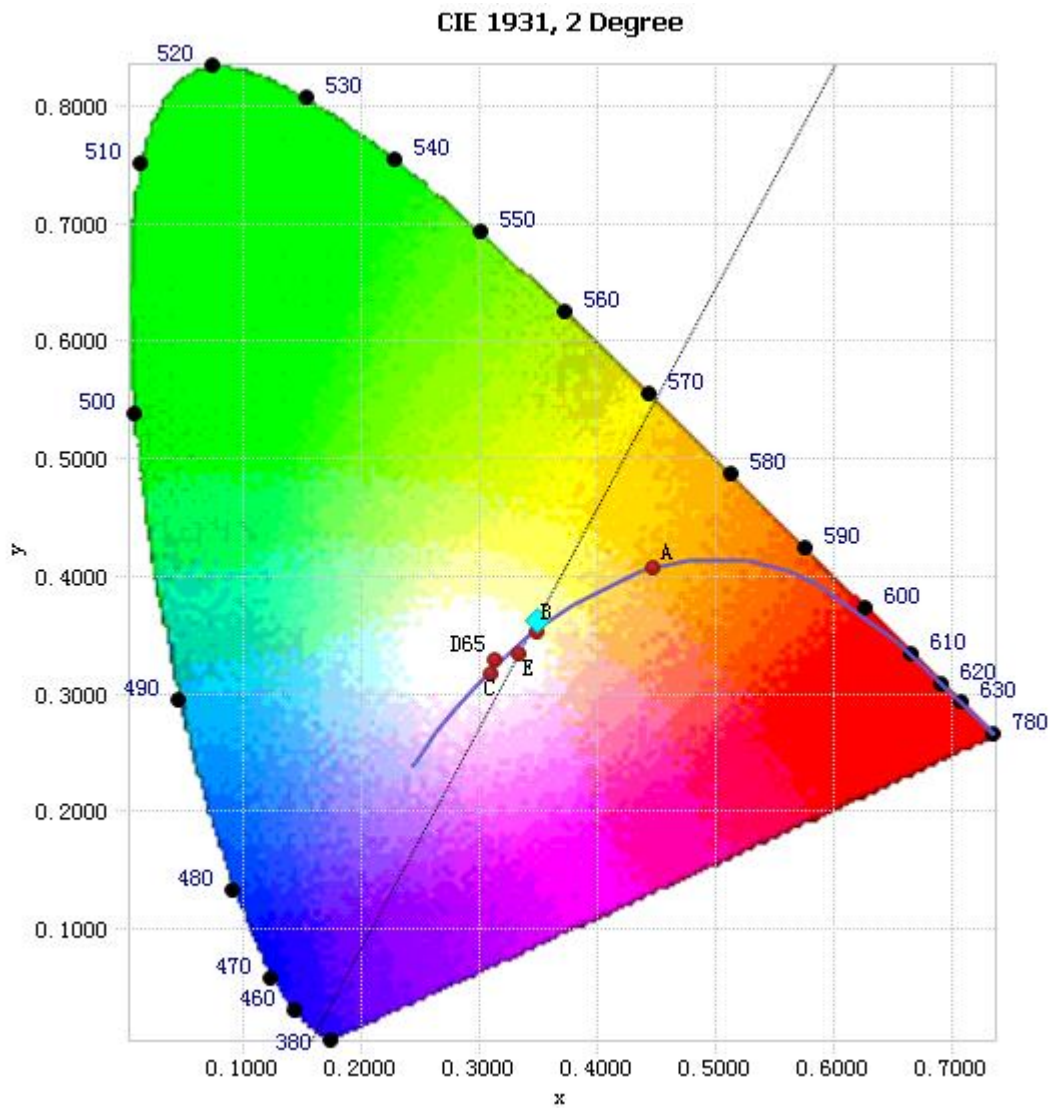


Chart 5: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	3.93E-04	485	1.58E-02	590	3.36E-02	695	3.75E-03
385	3.88E-04	490	1.66E-02	595	3.31E-02	700	3.21E-03
390	4.21E-04	495	1.76E-02	600	3.22E-02	705	2.74E-03
395	4.50E-04	500	1.94E-02	605	3.11E-02	710	2.33E-03
400	4.86E-04	505	2.14E-02	610	2.96E-02	715	1.99E-03
405	5.48E-04	510	2.30E-02	615	2.79E-02	720	1.70E-03
410	6.53E-04	515	2.44E-02	620	2.59E-02	725	1.46E-03
415	8.44E-04	520	2.53E-02	625	2.40E-02	730	1.24E-03
420	1.23E-03	525	2.61E-02	630	2.19E-02	735	1.06E-03
425	1.97E-03	530	2.68E-02	635	1.97E-02	740	9.01E-04
430	3.32E-03	535	2.73E-02	640	1.77E-02	745	7.72E-04
435	5.81E-03	540	2.79E-02	645	1.58E-02	750	6.62E-04
440	1.03E-02	545	2.86E-02	650	1.40E-02	755	5.71E-04
445	1.90E-02	550	2.93E-02	655	1.23E-02	760	4.91E-04
450	3.68E-02	555	3.02E-02	660	1.07E-02	765	4.27E-04
455	5.40E-02	560	3.10E-02	665	9.31E-03	770	3.67E-04
460	4.71E-02	565	3.18E-02	670	8.05E-03	775	3.17E-04
465	3.26E-02	570	3.26E-02	675	6.96E-03	780	2.70E-04
470	2.75E-02	575	3.33E-02	680	6.00E-03		
475	2.21E-02	580	3.37E-02	685	5.13E-03		
480	1.70E-02	585	3.39E-02	690	4.40E-03		

Table 5: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

**Chromaticity Diagram - Sphere Spectroradiometer Method**



Tristimulus values(x, y): (0.3492, 0.3631)

Chart 6: 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

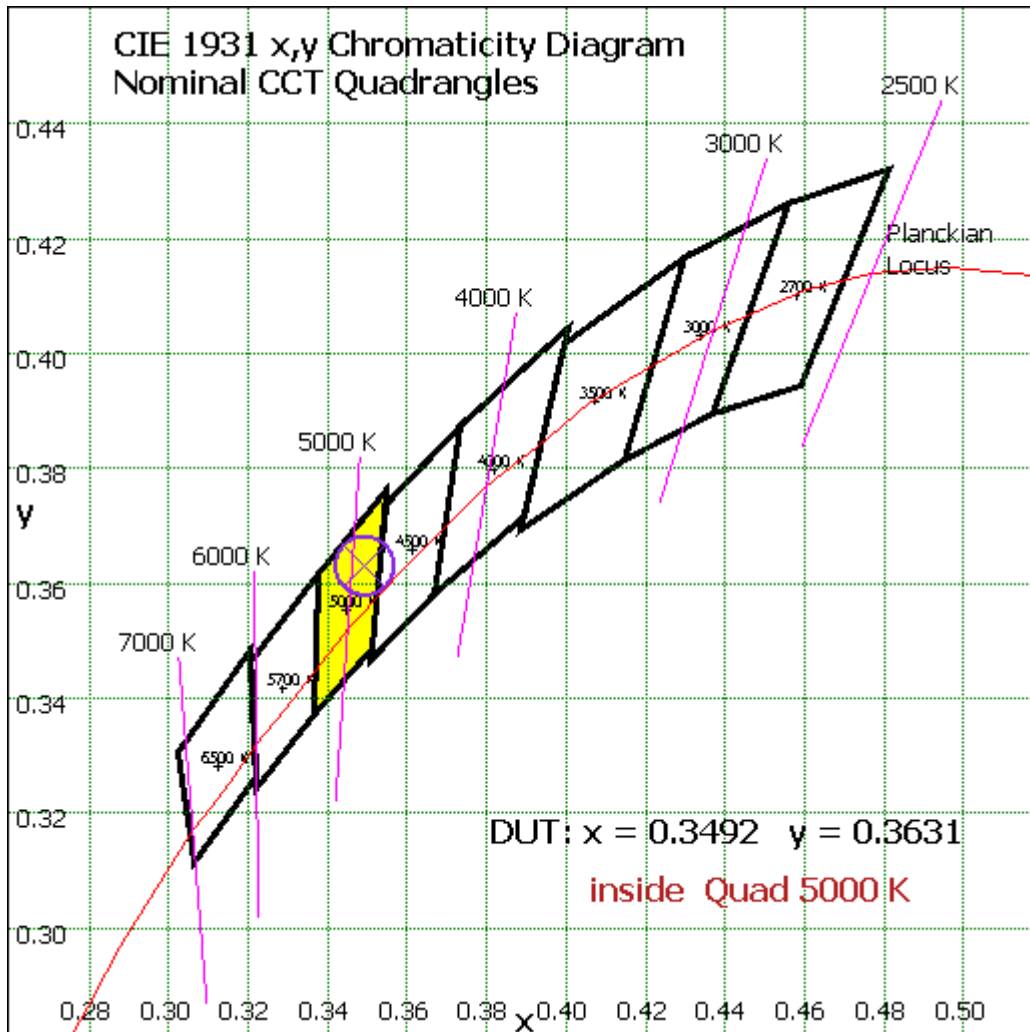
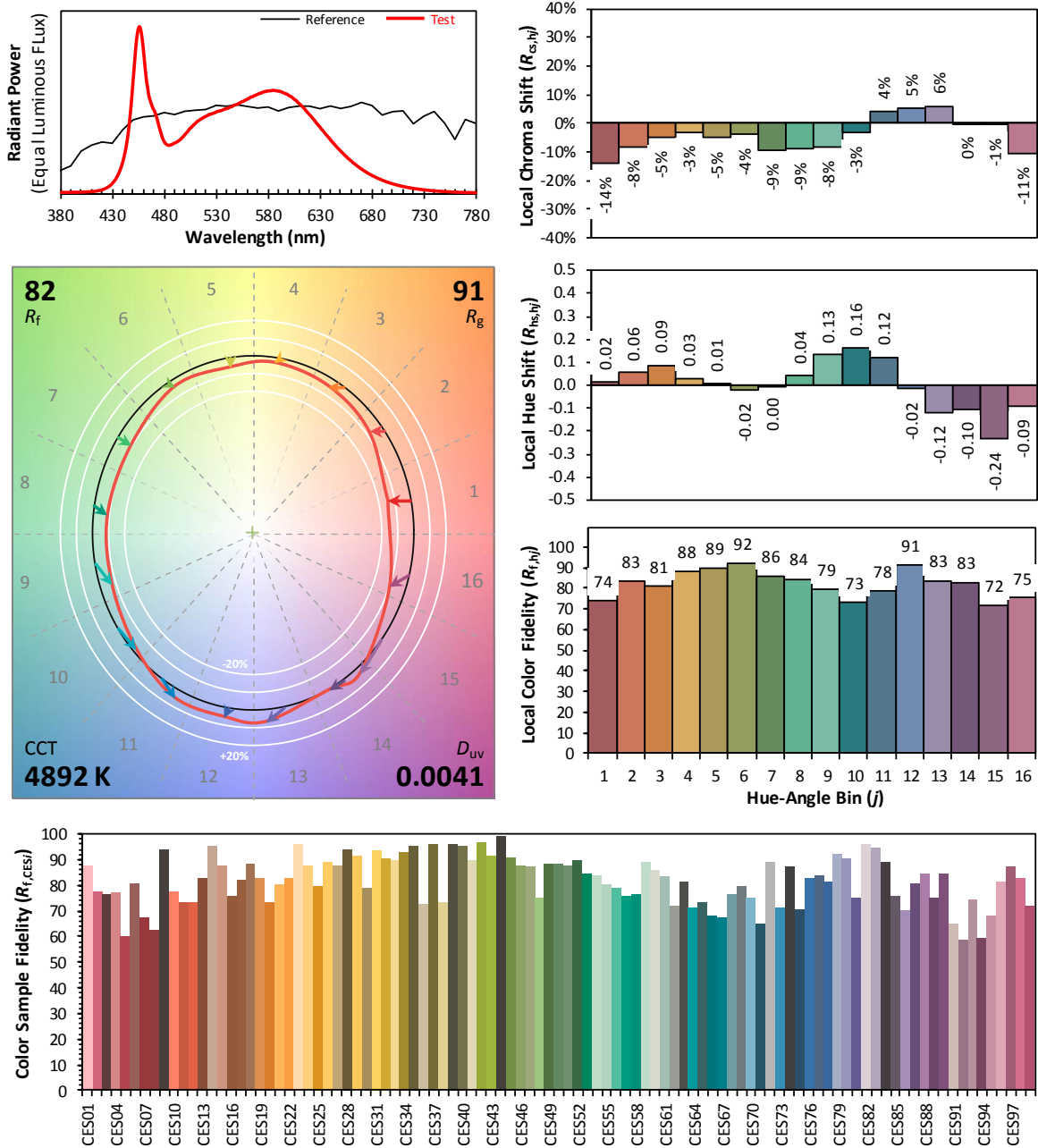


Chart 7: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

**Color Rendition Report – Sphere Spectroradiometer Method**



**Notes:** This is a recommended method for displaying ANSI/IES TM-30-18 information.

$x$  0.3492  
 $y$  0.3631  
 $u'$  0.2098  
 $v'$  0.4908

Chart 8: Full Report Created with the IES TM-30 Calculator

Note: The values in this diagram might be a little different from the values in Table 2 due to rounding.

## EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Integrate Sphere system	3M	HZTE015-04	Aug. 16, 2018	Aug. 15, 2019
Digital Power Meter	WT210	HZTE008-01	Aug. 02, 2018	Aug. 01, 2019
AC Power Supply	PCR 500L	HZTE001-07	Aug. 09, 2018	Aug. 08, 2019
DC Power Supply	IT6154	HZTE004-04	Aug. 09, 2018	Aug. 08, 2019
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 09, 2018	Aug. 08, 2019
Standard source	SCL-1400	HZTE012-02	Aug. 16, 2018	Aug. 15, 2019
Temperature Meter	TES1310	HZTE017-01	Aug. 09, 2018	Aug. 08, 2019

Table 6: 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  $4\pi$ . 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 expanded uncertainty is 2.1% with a coverage factor  $k=2$ .

\*\*\* End of Report \*\*\*

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