

LM-79-08 TEST REPORT

for

IDEAL INDUSTRIES LIGHTING LLC, DBA CREE LIGHTING

4401 SILICON DRIVE, DURHAM, NC 27703, USA

LED Tube

Model: C-T824-A-17W-50K-B1

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Hangzhou, Zhejiang Province, China 311100

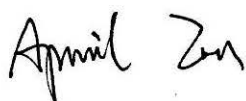
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Report No.: HZ22030014i

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

Review by:



Engineer: April Zou

Mar. 04, 2022

Approved by:



Manager: Jim Zhang

Mar. 04, 2022

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

TEST SUMMARY

Sample Tested: **C-T824-A-17W-50K-B1**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
138.7	1259.2	9.08	0.9775
CCT (K)	CRI	Stabilization Time (Light & Power)	
4927	82.2	60	

Table 1: Executive Data Summary

Note: The above results are recorded/ derived from measurements made using an Integrating Sphere.

Test specifications:

Date of Receipt : Nov. 30, 2021

Date of Test : Dec. 01, 2021

Test item : Total Luminous Flux, Luminous Distribution Intensity, 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
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)

Name	: LED Tube
Model	: C-T824-A-17W-50K-B1
Electrical Ratings	: 120-277V, 50/60Hz, 9W
Product Description	: 5000K Manufacturer of light source: Bridgelux Inc. Model of LED light source: BXVN-50E-11L-3DV-000-00-00-0

TEST RESULTS

Test ambient temperature was 26.0°C.

Base 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)	0.077	0.037
Power Factor	0.9775	0.9193
Test Power (W)	9.08	9.38
THD A%	20.05	21.29
Luminous Efficacy (lm/W)	138.7	135.7
Total Luminous Flux (lm)	1259.2	1273.0
Color Rendering Index (CRI)	82.2	
R9	8.4	
Correlated Color Temperature (CCT)(K)	4927	
Chromaticity Chroma x	0.3475	
Chromaticity Chroma y	0.3571	
Chromaticity Chroma u	0.2109	
Chromaticity Chroma v	0.3251	
Duv	0.0018	
Chromaticity Chroma u'	0.2109	
Chromaticity Chroma v'	0.4877	

Special Color Rendering Indices	
R1	80.5
R2	85.7
R3	90.3
R4	83.3
R5	81.3
R6	81
R7	87
R8	68.5
R9	8.4
R10	66.8
R11	83
R12	62.5
R13	81.4
R14	94.7

Table 2: Test data per Sphere-Spectroradiometer Method

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

Goniophotometer Method

Test ambient temperature was 25.8°C.

The photometric distance is 30 m.

Luminous data was taken at 0.5°vertical intervals and 10°horizontal intervals.

Parameter	Result
Test Voltage (V)	120.0
Voltage frequency (Hz)	60
Test Current (A)	0.078
Power Factor	0.9735
Power (W)	9.15
Luminous Efficacy (lm/W)	135.4
Total Luminous Flux (lm)	1238.9
Beam Angle (°)	110.7 (0°-180°) / 232.4 (90°-270°)
Center Beam Candle Power (cd)	200
Maximum Beam Candle Power (cd)	200.1 (At: C=280.0, Gamma=1.5)
Spacing Criteria	1.24 (0°-180°) / 1.45 (90°-270°)
Zonal Lumens in the 0°-60°Zone	41.53%
Zonal Lumens in the 60°-90°Zone	26.57%
Zonal Lumens in the 90°-120°Zone	17.97%
Zonal Lumens in the 120°-180°Zone	13.92%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

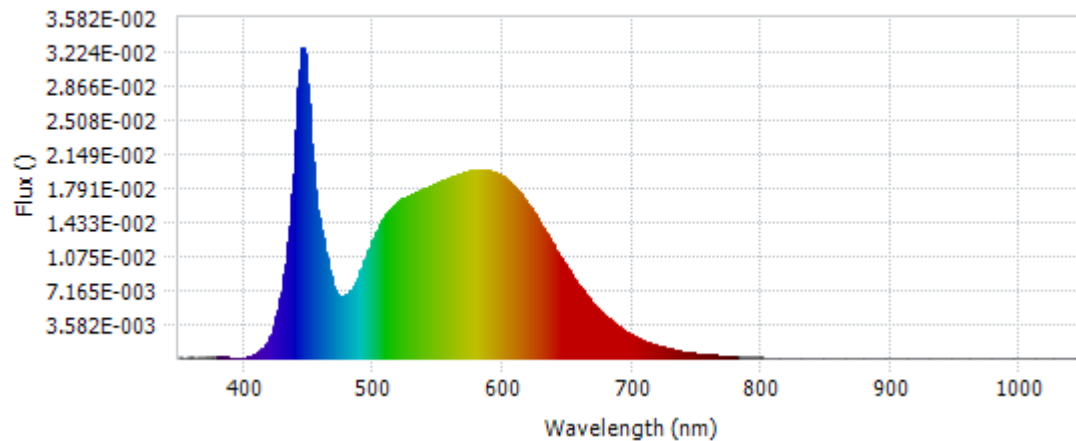
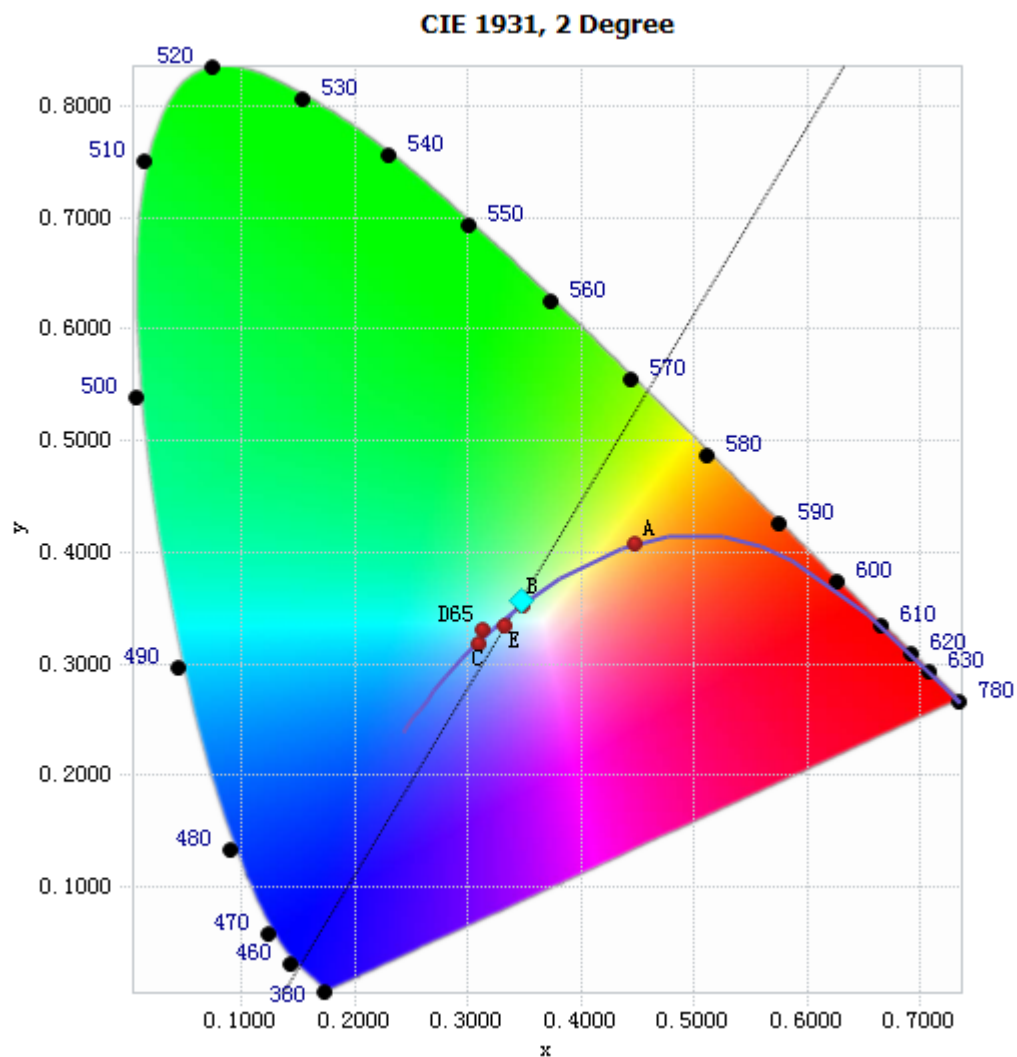


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.15E-04	485	7.65E-03	590	1.98E-02	695	2.85E-03
385	1.15E-04	490	9.19E-03	595	1.95E-02	700	2.45E-03
390	9.06E-05	495	1.09E-02	600	1.92E-02	705	2.09E-03
395	8.74E-05	500	1.27E-02	605	1.86E-02	710	1.79E-03
400	9.33E-05	505	1.40E-02	610	1.79E-02	715	1.54E-03
405	2.19E-04	510	1.51E-02	615	1.71E-02	720	1.32E-03
410	5.37E-04	515	1.60E-02	620	1.61E-02	725	1.13E-03
415	1.16E-03	520	1.65E-02	625	1.51E-02	730	9.67E-04
420	2.28E-03	525	1.70E-02	630	1.40E-02	735	8.18E-04
425	4.39E-03	530	1.73E-02	635	1.29E-02	740	6.95E-04
430	7.90E-03	535	1.76E-02	640	1.17E-02	745	5.99E-04
435	1.39E-02	540	1.79E-02	645	1.06E-02	750	5.19E-04
440	2.40E-02	545	1.82E-02	650	9.50E-03	755	4.38E-04
445	3.26E-02	550	1.85E-02	655	8.46E-03	760	3.73E-04
450	2.67E-02	555	1.88E-02	660	7.49E-03	765	3.21E-04
455	1.76E-02	560	1.90E-02	665	6.61E-03	770	2.74E-04
460	1.34E-02	565	1.93E-02	670	5.77E-03	775	2.37E-04
465	9.83E-03	570	1.96E-02	675	5.05E-03	780	2.06E-04
470	7.23E-03	575	1.97E-02	680	4.40E-03		
475	6.54E-03	580	1.98E-02	685	3.81E-03		
480	6.80E-03	585	1.99E-02	690	3.29E-03		

Table 4: Spectral Power Distribution Numerical Data per Sphere - Spectroradiometer Method

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3475, 0.3571)

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

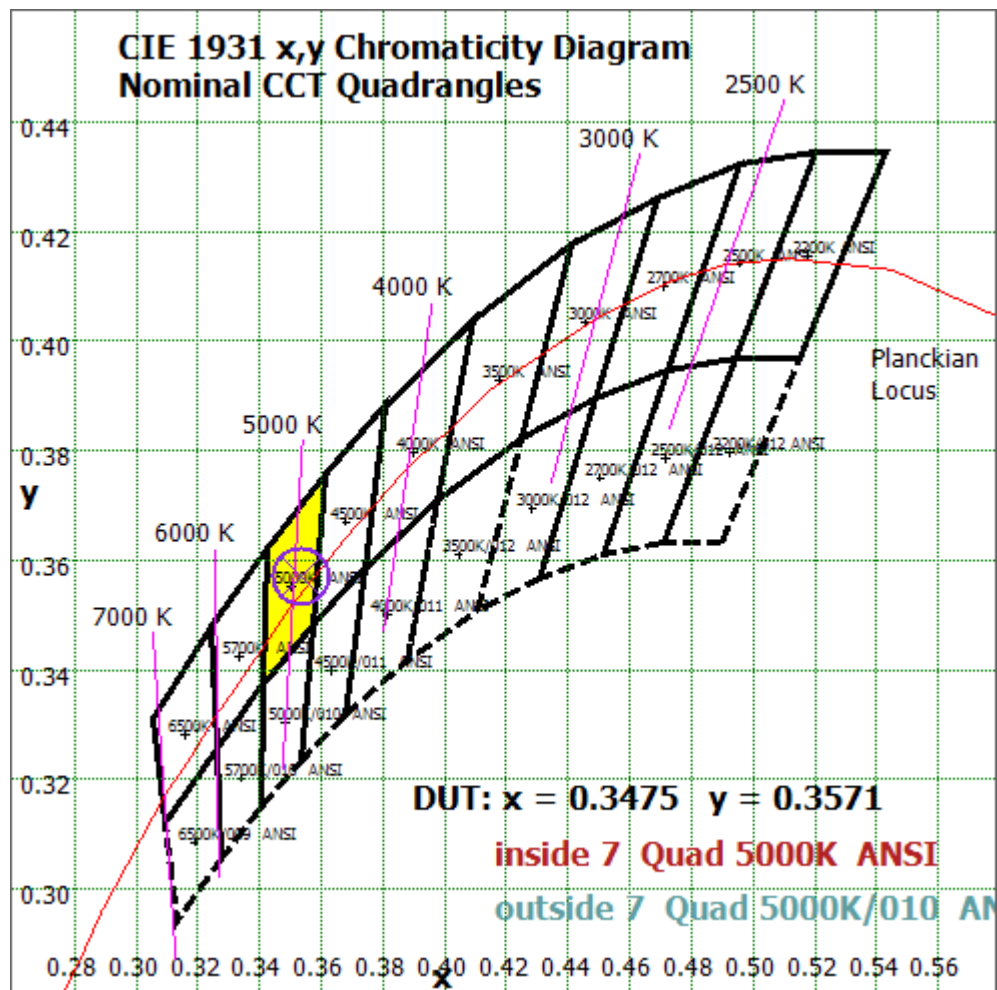


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

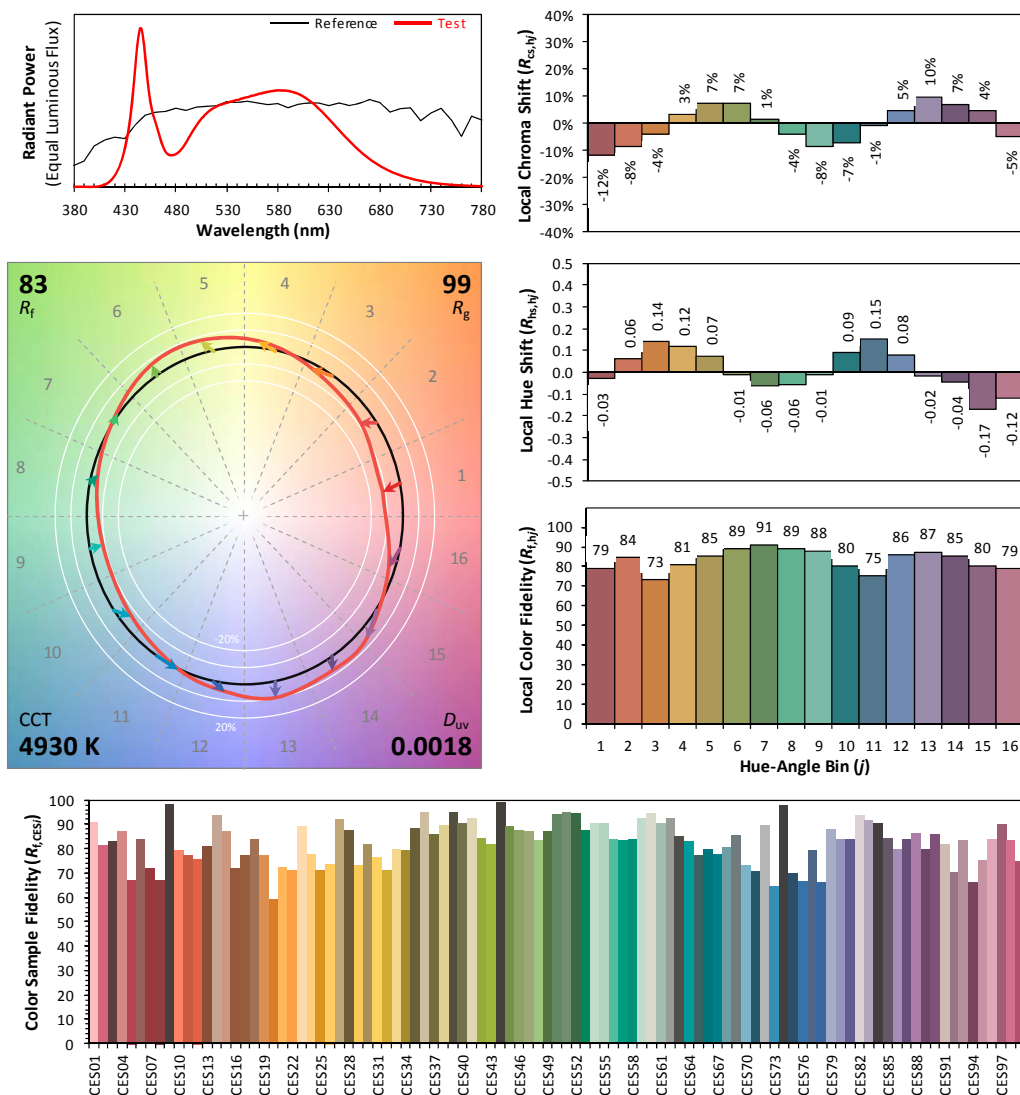
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: IDEAL INDUSTRIES LIGHTING LLC,
DBA CREE LIGHTING

Date: 2021/12/01

Model: C-T824-A-17W-50K-B1



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

x 0.3475
 y 0.3571
 u' 0.2109
 v' 0.4877

CIE 13.3-1995
(CRI)
 R_a 82
 R_g 8

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

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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Zonal Lumen Tabulation- Goniophotometer Method

$\gamma(^{\circ})$	Lumens	% Total
0- 10	18.953	1.53%
10- 20	54.951	4.44%
20- 30	85.546	6.91%
30- 40	108.22	8.74%
40- 50	121.535	9.81%
50- 60	125.279	10.11%
60- 70	120.797	9.75%
70- 80	110.567	8.92%
80- 90	97.839	7.90%
90-100	85.59	6.91%
100-110	74.052	5.98%
110-120	63.029	5.09%
120-130	52.978	4.28%
130-140	43.514	3.51%
140-150	34.099	2.75%
150-160	24.178	1.95%
160-170	13.18	1.06%
170-180	4.556	0.37%
Total	1238.9	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	514.484	41.53%
60- 90	329.203	26.57%
0-90	843.687	68.10%
90- 180	395.176	31.90%
0- 180	1238.9	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

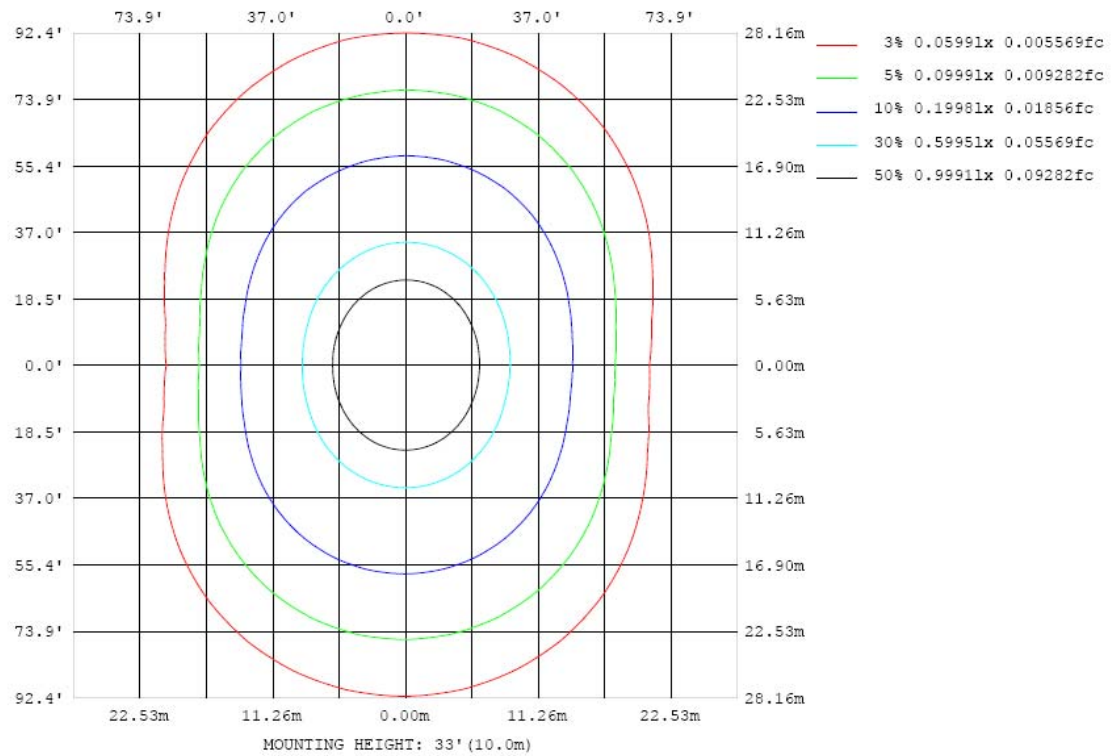


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

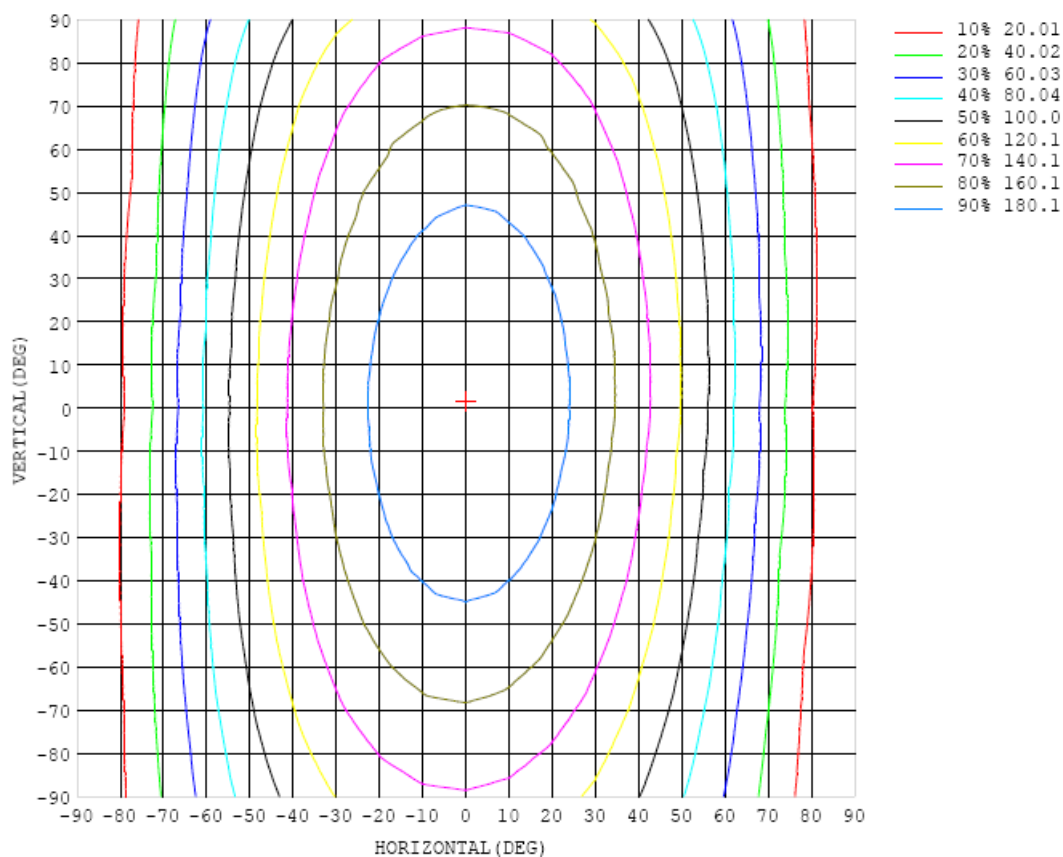


Chart 6: Isocandela Plot

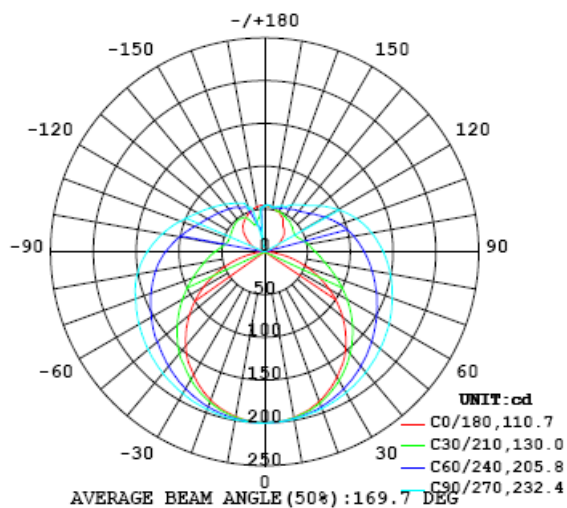


Chart 7: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1

UNIT: cd

C (DEG) γ (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
5	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199
10	196	196	196	197	197	198	198	198	198	198	198	198	197	197	197	197	196	195	195
15	192	192	192	193	194	195	196	196	197	197	197	196	195	194	193	192	191	191	191
20	186	186	187	188	189	191	193	194	195	195	195	194	192	190	188	187	185	184	184
25	178	179	180	181	184	187	189	191	192	193	192	191	188	186	183	180	178	176	176
30	169	169	171	174	178	182	185	188	189	190	189	187	184	180	177	172	169	167	166
35	159	159	161	165	170	175	180	184	186	187	186	184	180	175	169	164	160	157	156
40	147	147	150	155	162	168	175	179	183	184	183	180	175	168	162	154	149	145	143
45	134	133	138	145	153	161	169	175	179	180	179	175	170	162	153	144	137	132	130
50	119	119	125	134	144	154	163	170	174	176	175	171	164	155	145	134	124	118	115
55	103	104	111	123	135	147	157	165	170	172	171	166	159	148	136	123	111	103	99.0
60	86.6	88.5	97.7	111	126	139	151	160	165	168	166	161	153	141	128	113	97.8	87.1	82.5
65	70.0	72.6	84.1	100.0	117	132	145	155	161	163	162	156	147	135	120	102	85.2	71.4	65.4
70	53.0	57.4	71.2	89.4	108	125	139	149	156	159	157	152	142	128	112	92.8	73.2	56.7	48.2
75	36.3	42.0	59.3	79.9	100	118	133	144	151	154	152	147	137	122	105	84.2	62.7	42.4	31.9
80	20.8	28.2	48.6	71.4	92.9	112	127	139	146	149	147	141	131	117	98.1	76.7	53.3	30.1	17.0
85	8.26	17.5	40.0	64.9	86.6	106	122	133	141	144	142	136	126	111	92.5	70.4	46.2	21.2	5.24
90	1.46	11.3	34.4	59.3	81.1	101	116	128	135	139	137	131	121	106	87.2	66.2	41.4	16.8	0.84
95	1.73	9.25	31.2	55.0	76.3	95.4	111	122	130	133	131	125	116	101	82.6	62.2	38.4	15.1	1.98
100	4.17	9.15	28.5	51.6	72.6	90.6	106	117	124	127	126	120	110	96.2	78.5	58.7	36.0	14.8	4.20
105	7.50	11.2	26.1	47.8	68.2	85.4	100	111	118	121	120	114	104	90.9	74.2	55.3	34.2	16.6	7.49
110	11.0	14.8	25.6	44.3	63.3	79.9	94.0	104	111	114	113	107	98.4	85.5	70.3	52.5	33.8	20.0	11.7
115	15.4	19.4	27.5	41.7	59.2	74.6	87.5	97.5	104	107	105	100	91.9	80.0	66.1	50.2	34.3	23.0	15.8
120	19.5	23.4	30.0	40.5	55.3	69.5	81.1	90.2	96.3	98.9	97.9	93.2	85.5	75.1	62.5	49.0	34.2	24.5	20.2
125	23.8	27.9	33.0	41.1	52.3	64.6	74.9	83.3	89.0	91.1	90.3	86.2	79.2	70.2	59.7	48.5	37.4	30.2	24.9
130	28.8	29.9	36.6	42.8	51.1	60.8	69.5	76.5	81.5	83.7	82.9	79.3	73.6	66.6	57.8	48.2	38.6	32.7	30.3
135	32.4	34.1	39.2	43.9	50.8	58.1	65.5	71.2	74.6	76.4	75.9	72.8	69.1	63.5	56.5	48.7	41.7	35.4	35.5
140	35.4	39.9	41.9	46.1	50.9	56.9	62.2	66.9	70.2	71.5	71.3	69.4	65.9	61.3	54.8	48.3	42.2	39.4	39.5
145	37.6	42.1	43.0	45.9	50.9	55.5	60.3	64.0	66.2	67.3	67.2	65.7	62.8	57.7	51.7	44.4	42.2	42.4	42.4
150	42.7	44.9	44.7	47.8	51.7	54.6	57.4	60.5	62.5	63.3	63.0	61.3	57.6	53.6	47.4	45.6	45.0	45.0	45.0
155	46.2	46.8	46.1	49.0	51.3	54.4	56.8	57.2	57.6	57.9	57.2	56.2	56.6	57.3	55.9	52.4	49.2	48.4	47.6
160	49.2	49.2	48.5	50.1	51.9	53.4	54.2	56.0	57.4	57.8	57.6	56.6	55.7	56.0	54.7	52.7	51.9	50.7	49.4
165	51.1	51.3	50.9	50.7	51.9	52.4	53.0	54.5	54.9	54.9	55.0	55.3	55.3	54.5	54.4	53.6	53.1	53.0	52.3
170	52.3	52.6	52.8	52.9	53.0	53.0	52.7	52.6	52.8	53.0	53.1	53.1	53.4	53.9	54.2	54.3	54.3	54.0	53.3
175	53.2	53.4	53.7	54.3	54.6	54.7	54.9	54.9	54.9	54.9	54.9	55.0	55.0	55.1	55.3	55.5	55.2	54.7	54.9
180	54.2	54.2	54.2	54.2	54.2	54.2	54.2	54.2	54.2	54.2	54.2	54.2	54.2	54.2	54.2	54.2	54.2	54.2	54.2

Table 6: Luminous Intensity Data

Table--2

UNIT: cd

C (DEG) γ (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200		
5	199	199	199	199	199	199	200	200	200	200	200	199	199	199	199	199	199		
10	196	196	196	197	197	198	198	199	199	199	199	199	198	198	197	197	197		
15	191	192	193	194	195	196	197	197	198	198	197	197	196	195	194	193	192		
20	185	186	187	189	191	193	194	195	196	196	195	194	193	191	189	188	187		
25	177	178	180	183	186	189	191	193	194	194	193	191	189	186	183	181	179		
30	167	169	172	177	181	185	188	190	191	191	189	187	183	179	175	172	170		
35	157	160	163	169	175	180	184	187	188	188	186	182	178	172	167	163	160		
40	145	149	155	161	168	175	180	184	185	185	182	177	171	165	159	153	149		
45	131	137	144	154	162	169	175	180	181	181	177	172	165	157	149	142	136		
50	117	124	133	145	155	164	171	176	178	177	173	167	159	149	139	129	122		
55	102	110	122	135	148	159	166	171	173	172	168	162	152	140	128	116	107		
60	86.4	96.4	111	126	141	153	161	167	169	168	163	156	145	131	117	103	91.8		
65	69.6	82.6	99.9	117	134	147	157	162	165	164	159	150	138	123	106	89.7	76.2		
70	53.6	69.4	89.3	109	127	141	152	159	160	159	154	145	131	115	96.1	76.9	60.6		
75	38.3	57.4	79.9	101	120	135	147	154	156	155	149	139	125	107	86.8	65.2	45.8		
80	25.0	47.2	71.6	94.1	114	129	141	148	151	149	143	133	118	99.7	78.3	54.9	32.6		
85	15.4	39.4	64.7	87.6	107	123	135	142	145	143	137	126	111	92.9	71.1	46.6	22.5		
90	10.4	33.3	58.1	80.7	100	116	127	134	137	135	129	119	104	85.7	64.2	39.9	16.2		
95	8.76	28.8	52.2	74.1	93.1	108	120	127	129	128	122	111	96.9	78.7	57.5	34.1	12.5		
100	9.87	26.8	47.7	68.2	86.3	101	112	119	121	120	114	104	89.7	72.1	51.8	30.3	12.0		
105	12.9	27.4	45.0	63.2	79.9	93.8	104	111	113	111	106	96.1	82.7	66.2	47.5	29.0	14.0		
110	15.8	29.4	44.3	59.8	74.5	87.1	96.7	103	105	103	97.9	88.8	76.4	61.5	45.0	29.7	17.1		
115	18.5	31.6	44.3	57.8	70.7	81.5	89.9	95.2	97.2	95.8	90.8	82.7	71.6	58.4	44.1	31.2	20.1		
120	20.7	34.1	45.0	56.6	67.7	77.3	84.7	89.2	90.9	89.6	85.1	78.0	68.2	56.4	44.3	33.6	22.8		
125	22.4	36.7	45.9	55.9	65.4	73.7	80.0	84.1	85.5	84.3	80.4	74.0	65.4	55.4	45.3	36.4	25.3		
130	24.5	38.8	47.0	55.6	63.5	70.6	76.1	79.4	80.7	79.6	76.2	70.7	63.4	55.0	46.3	38.8	26.8		
135	27.6	40.1	48.0	55.3	61.8	67.8	72.4	75.4	76.3	75.5	72.5	67.9	61.6	54.8	47.3	40.3	28.7		
140	32.0	38.7	48.5	55.1	60.5	65.4	69.2	71.5	72.4	71.7	69.3	65.4	60.3	54.5	48.7	40.9	30.9		
145	36.2	35.6	47.7	55.0	59.2	63.1	66.2	68.2	68.8	68.4	66.4	63.2	59.0	54.8	48.8	39.4	32.0		
150	41.7	33.5	46.7	54.4	57.1	59.4	62.6	65.1	65.7	65.4	63.9	61.3	58.3	54.7	46.6	36.5	34.9		
155	44.3	35.2	40.0	49.7	54.9	57.5	58.9	59.6	62.7	62.6	61.7	60.0	57.8	53.7	44.3	32.8	35.9		
160	47.6	41.4	33.2	40.0	46.5	49.4	50.7	57.2	52.4	60.4	59.7	58.7	53.6	46.7	35.3	30.3	44.3		
165	50.4	45.2	34.4	30.1	31.8	33.3	32.3	31.5	36.9	47.0	35.4	29.4	30.0	27.9	27.1	40.7	49.9		
170	51.8	47.8	39.9	33.2	27.5	24.3	27.7	31.0	4.89	33.4	26.0	24.5	24.8	27.0	36.1	47.5	51.8		
175	54.5	53.4	51.7	49.2	46.3	44.4	43.2	48.6	49.8	48.7	47.5	48.3	49.8	51.9	51.7	52.0	52.8		
180	54.2	54.2	54.2	54.2	54.2	54.2	54.2	54.2	54.2	54.2	54.2	54.2	54.2	54.2	54.2	54.2	54.2		

Table 7: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 05, 2021	Aug. 04, 2022
Digital Power Meter	PF2010A	HZTE028-01	Aug. 05, 2021	Aug. 04, 2022
AC Power Supply	DPS1060	HZTE001-06	Aug. 05, 2021	Aug. 04, 2022
DC Power Supply	WY12010	HZTE004-03	Aug. 05, 2021	Aug. 04, 2022
Temperature recorder	JM624U	HZTE018-08	Aug. 05, 2021	Aug. 04, 2022
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 05, 2021	Aug. 04, 2022
Standard source	D908	HZTE012-01	Aug. 05, 2021	Aug. 04, 2022
Integrate Sphere system	3M	HZTE015-04	Aug. 05, 2021	Aug. 04, 2022
Digital Power Meter	WT210	HZTE008-01	Aug. 05, 2021	Aug. 04, 2022
AC Power Supply	PCR 500L	HZTE001-07	Aug. 05, 2021	Aug. 04, 2022
DC Power Supply	IT6154	HZTE004-04	Aug. 05, 2021	Aug. 04, 2022
Standard source	SCL-1400	HZTE012-02	Aug. 05, 2021	Aug. 04, 2022
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 05, 2021	Aug. 04, 2022
Temperature Meter	TES1310	HZTE017-01	Aug. 05, 2021	Aug. 04, 2022

Table 8: 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 expanded uncertainty is 2.1% with a coverage factor $k=2$.

Goniophotometer Method

Photometric and Electrical Measurements

An EVERFINE Type C Model GO-R5000 Goniophotometer was used to measure the intensity at each angle of distribution for each sample. The photometric distance is 2.475m for near-field measurement or 30m for far-field measurement. Bandwidth of spectroradiometer is 380nm-780nm.

Ambient temperature was measured at the same height of the sample mounted on the Goniophotometer equipment. 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 Everfine Digital Power Meter.

Some graphics were created with Photometric Plus software.

The standard reference of the Goniophotometer system is halogen incandescent lamp, the intensity distribution type is omni-directional, and is traceable to the National Institute of Metrology P.R. China.

The uncertainty of goniophotometer system reported in this document is expanded uncertainty is 2.3% with a coverage factor $k=2$.

Color Characteristics Measurements

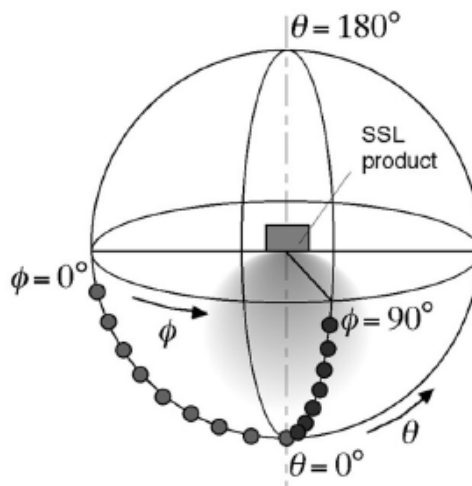
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as values that are spatially average, weighted to intensity, over the angular range where light is intentionally emitted from the SSL product. The color characteristics measurements are using gonio-spectroradiometer.

Color Spatial Uniformity

The characteristics of SSL products may be spatially non-uniform, the chromaticity coordinate shall be measured at two vertical planes ($C=0^\circ/180^\circ$ and $C=90^\circ/270^\circ$) and at 10° or less intervals for vertical angle until the light output dropped to below 10% of the peak intensity. The averaged weighted chromaticity coordinate

was calculated from these points. The data was then analyzed to check for delta color differences of the u' , v' chromaticity coordinates. The spatial non-uniformity of chromaticity, $\Delta u'v'$, is determined as the maximum deviation (distance on the CIE (u' , v') diagram) among all measured points from the spatially averaged chromaticity coordinate.

The geometry for the chromaticity measurement using gonio-spectroradiometer is shown as following.



*** End of Report ***

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