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-40K-B1

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ22030014h

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

Review by: April Zou

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-40K-B1**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
138.4	1244.6	8.99	0.9773

CCT (K)	CRI	Stabilization Time (Light & Power)
3999	82.4	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

TABLE OF CONTENT

SAMPLE PHOTO

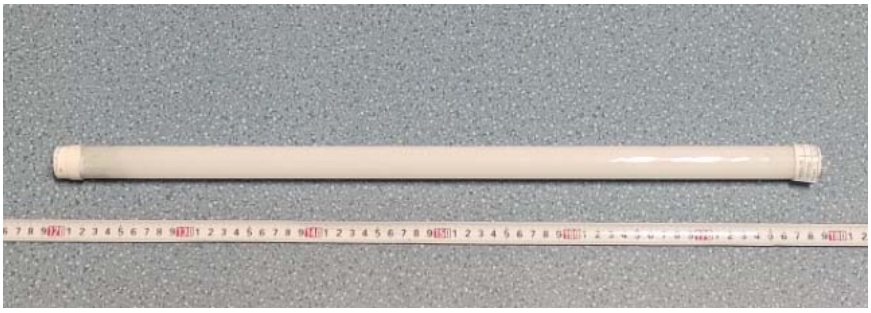


Figure 1- Overview of the sample

Equipment Under Test(EUT)	
Name	: LED Tube
Model	: C-T824-A-17W-40K-B1
Electrical Ratings	: 120-277V, 50/60Hz, 9W
Product Description	: 4000K Manufacturer of light source: Bridgelux Inc. Model of LED light source: BXVN-40E-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	0.9773	0.9181
Test Power (W)	8.99	9.38
THD A%	20.21	21.54
Luminous Efficacy (lm/W)	138.4	134.8
Total Luminous Flux (lm)	1244.6	1264.4
Color Rendering Index (CRI)	82.4	
R9	4.7	
Correlated Color Temperature (CCT)(K)	3999	
Chromaticity Chroma x	0.3810	
Chromaticity Chroma y	0.3791	
Chromaticity Chroma u	0.2246	
Chromaticity Chroma v	0.3351	
Duv	0.0009	
Chromaticity Chroma u ’	0.2246	
Chromaticity Chroma v’	0.5027	

Special Color Rendering Indices	
R1	80.4
R2	89.1
R3	95.2
R4	80.9
R5	80.6
R6	84.8
R7	85.5
R8	63
R9	4.7
R10	74.1
R11	79.7
R12	61.8
R13	82.6
R14	97.6

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 24.9°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	0.9732
Power (W)	9.08
Luminous Efficacy (lm/W)	135.7
Total Luminous Flux (lm)	1232.2
Beam Angle (°)	110.3 (0^o-180^o) / 231.4 (90^o-270^o)
Center Beam Candle Power (cd)	198
Maximum Beam Candle Power (cd)	199.5 (At: C=270.0, Gamma=7.5)
Spacing Criteria	1.27 (0^o-180^o) / 1.49 (90^o-270^o)
Zonal Lumens in the 0°-60°Zone	41.48%
Zonal Lumens in the 60°-90°Zone	26.63%
Zonal Lumens in the 90°-120°Zone	18.01%
Zonal Lumens in the 120°-180°Zone	13.88%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

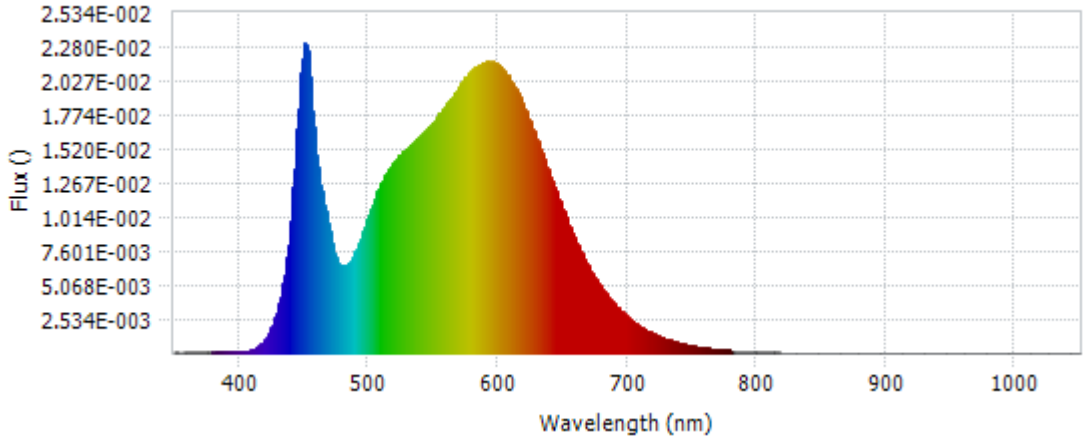
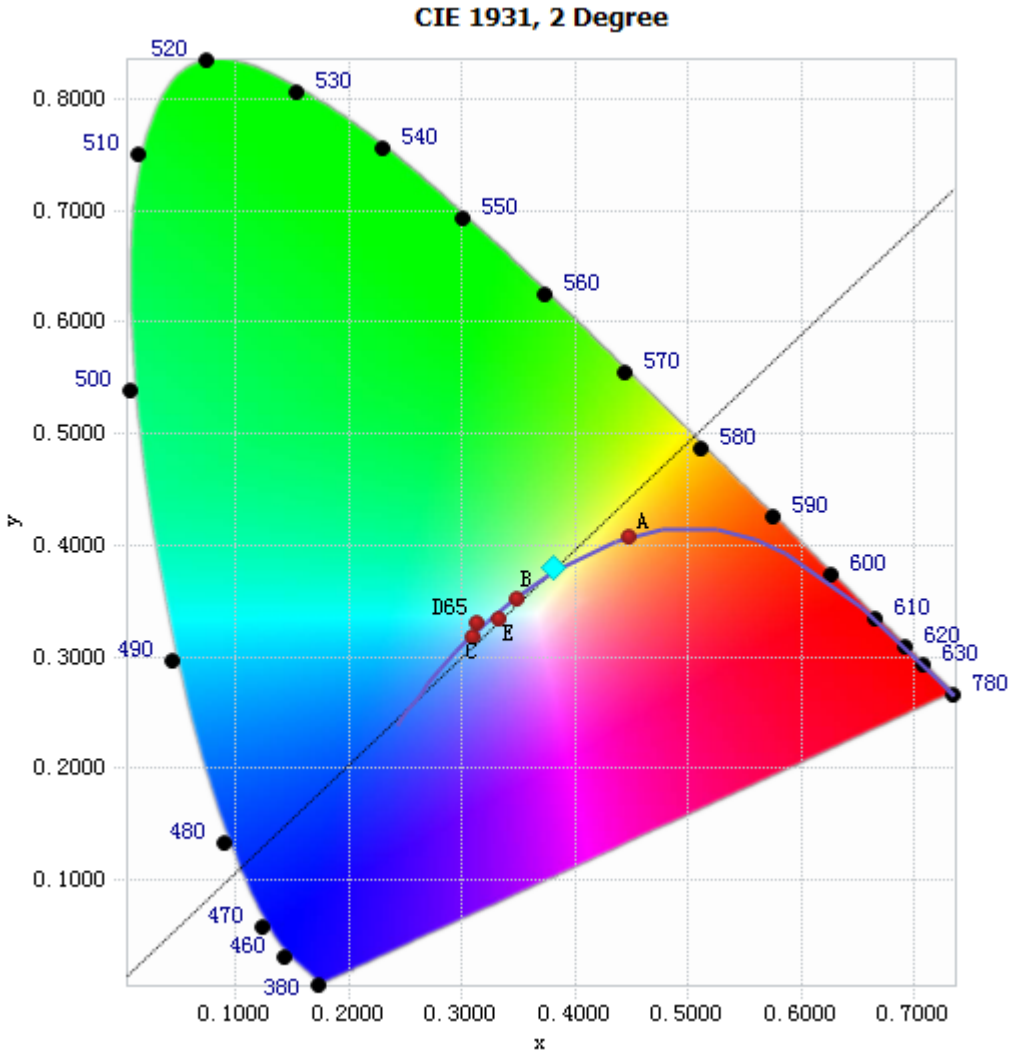


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	9.48E-05	485	6.78E-03	590	2.16E-02	695	3.21E-03
385	9.40E-05	490	7.58E-03	595	2.17E-02	700	2.75E-03
390	9.92E-05	495	8.76E-03	600	2.15E-02	705	2.36E-03
395	8.63E-05	500	1.02E-02	605	2.10E-02	710	2.01E-03
400	9.54E-05	505	1.16E-02	610	2.03E-02	715	1.71E-03
405	1.45E-04	510	1.27E-02	615	1.95E-02	720	1.48E-03
410	2.76E-04	515	1.36E-02	620	1.84E-02	725	1.27E-03
415	5.46E-04	520	1.43E-02	625	1.73E-02	730	1.09E-03
420	1.05E-03	525	1.48E-02	630	1.60E-02	735	9.07E-04
425	1.89E-03	530	1.53E-02	635	1.47E-02	740	7.79E-04
430	3.35E-03	535	1.57E-02	640	1.34E-02	745	6.65E-04
435	5.80E-03	540	1.61E-02	645	1.20E-02	750	5.70E-04
440	9.87E-03	545	1.67E-02	650	1.08E-02	755	4.91E-04
445	1.67E-02	550	1.72E-02	655	9.60E-03	760	4.19E-04
450	2.26E-02	555	1.78E-02	660	8.49E-03	765	3.58E-04
455	2.06E-02	560	1.84E-02	665	7.47E-03	770	3.07E-04
460	1.48E-02	565	1.91E-02	670	6.52E-03	775	2.65E-04
465	1.15E-02	570	1.99E-02	675	5.69E-03	780	2.28E-04
470	9.15E-03	575	2.05E-02	680	4.94E-03		
475	7.15E-03	580	2.10E-02	685	4.30E-03		
480	6.52E-03	585	2.15E-02	690	3.70E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3810, 0.3791)

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

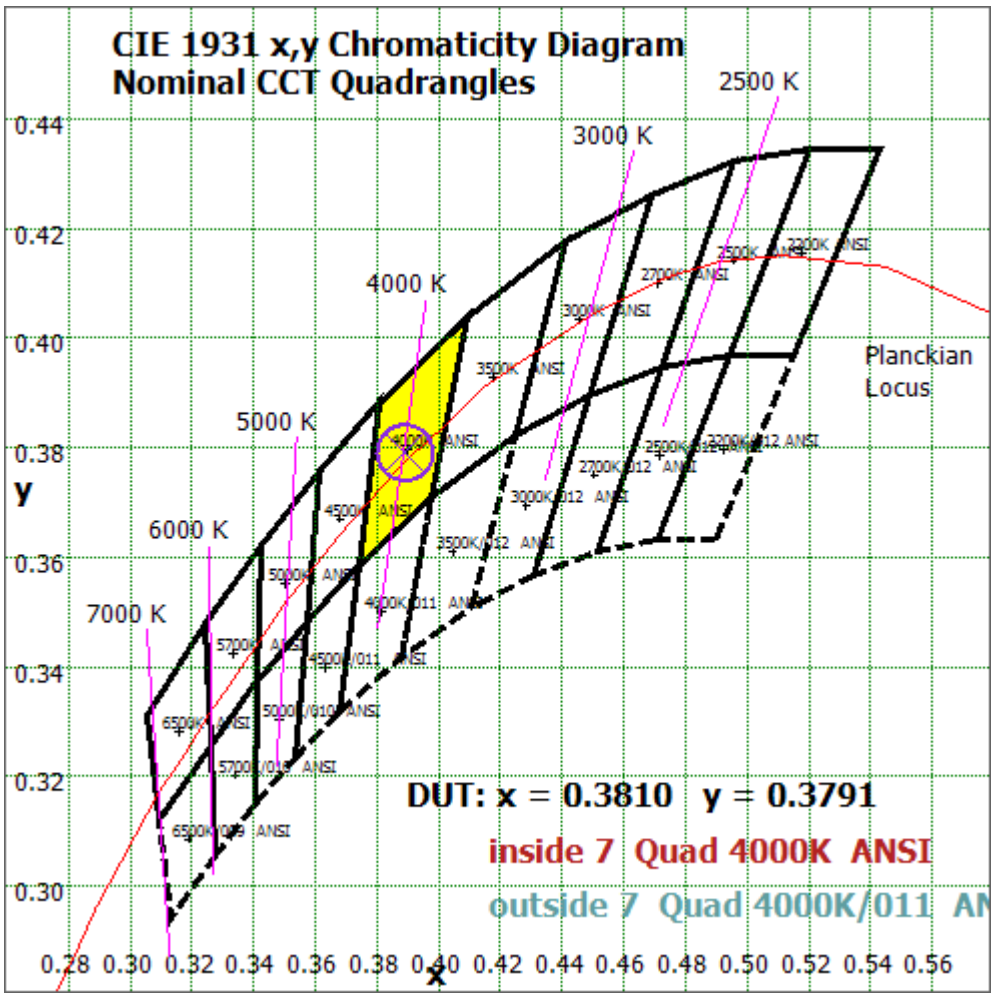


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Color Rendition Report – Sphere Spectroradiometer Method

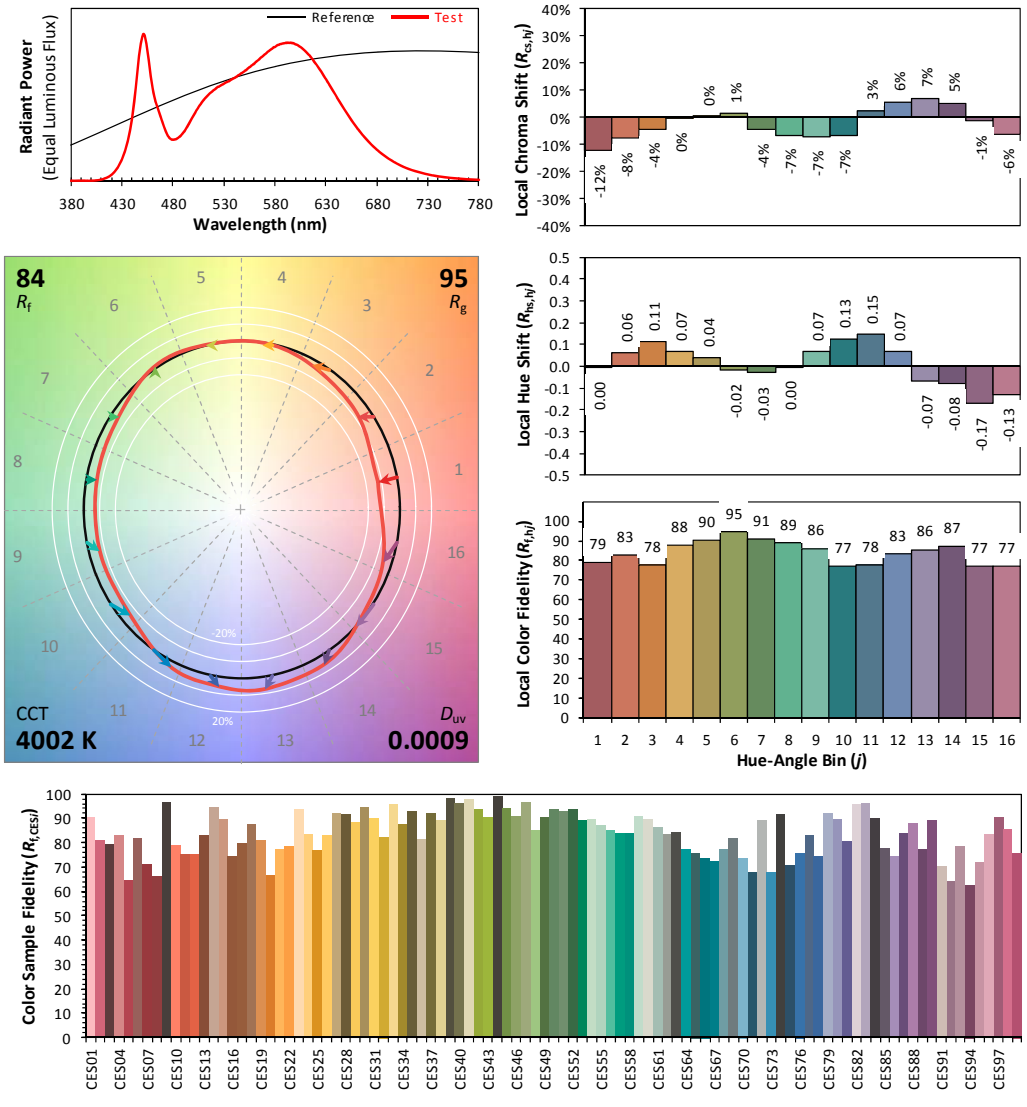
ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: IDEAL INDUSTRIES LIGHTING LLC, DBA CREE LIGHTING

Date: 2021/12/01

Model: C-T824-A-17W-40K-B1



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

x	0.3810
y	0.3791
u'	0.2246
v'	0.5027

CIE 13.3-1995 (CRI)

R_a	82
R_9	5

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.

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	18.804	1.53%
10- 20	54.54	4.43%
20- 30	84.947	6.89%
30- 40	107.493	8.72%
40- 50	120.754	9.80%
50- 60	124.607	10.11%
60- 70	120.272	9.76%
70- 80	110.112	8.94%
80- 90	97.758	7.93%
90-100	85.949	6.98%
100-110	73.78	5.99%
110-120	62.213	5.05%
120-130	52.022	4.22%
130-140	42.952	3.49%
140-150	33.892	2.75%
150-160	24.609	2.00%
160-170	13.99	1.14%
170-180	3.504	0.28%
Total	1232.2	100%

γ(°)	Lumens	% Total
0- 60	511.145	41.48%
60- 90	328.142	26.63%
0-90	839.287	68.11%
90- 180	392.911	31.89%
0- 180	1232.2	100%

Table 5: Zonal Lumen

Illuminance Plots- Goniophotometer Method

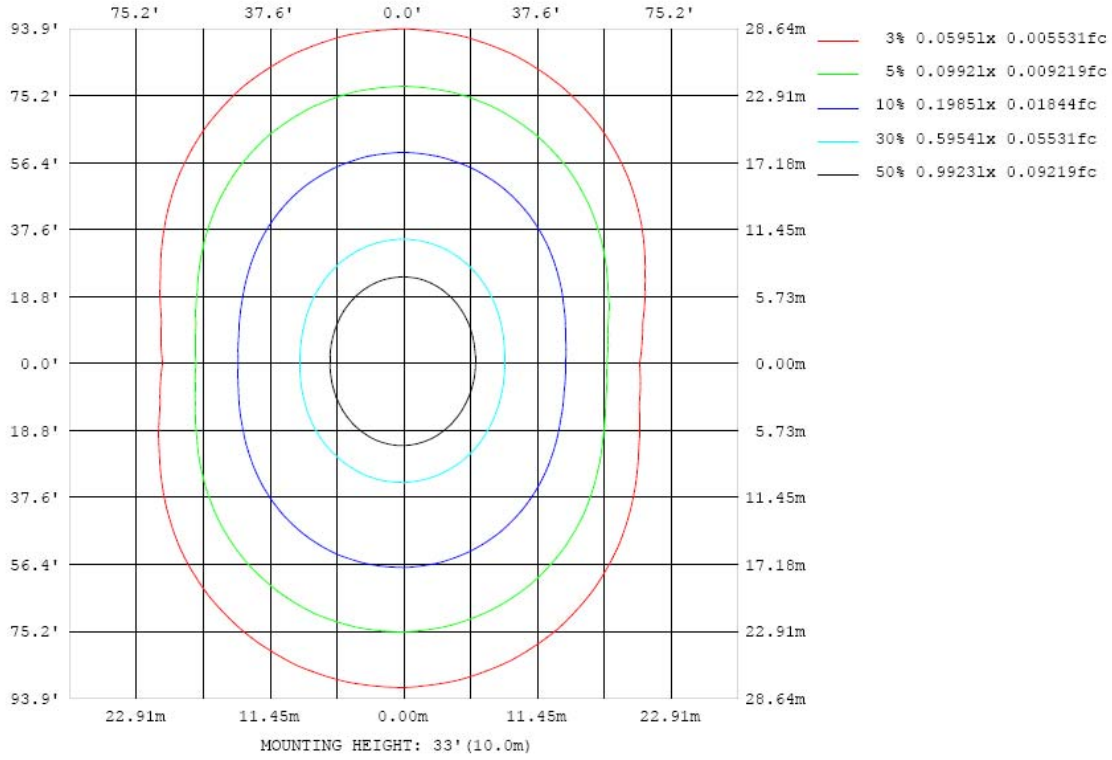


Chart 5: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

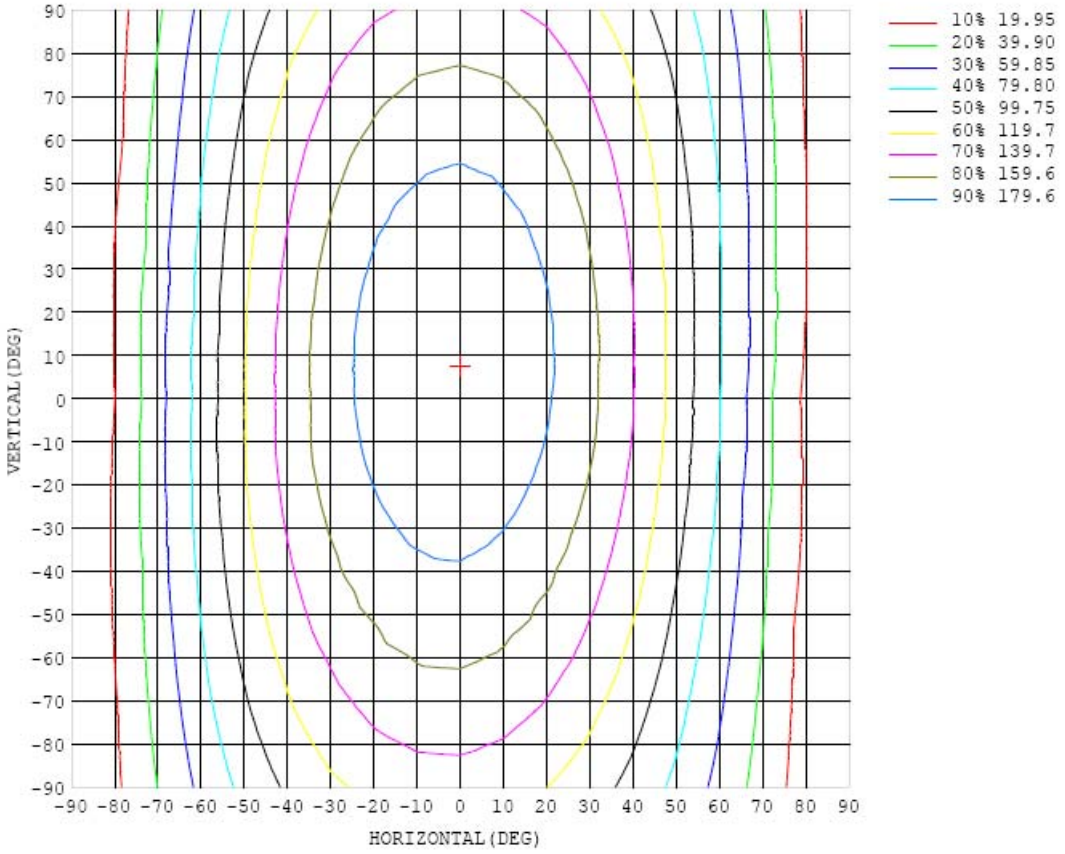


Chart 6: Isocandela Plot

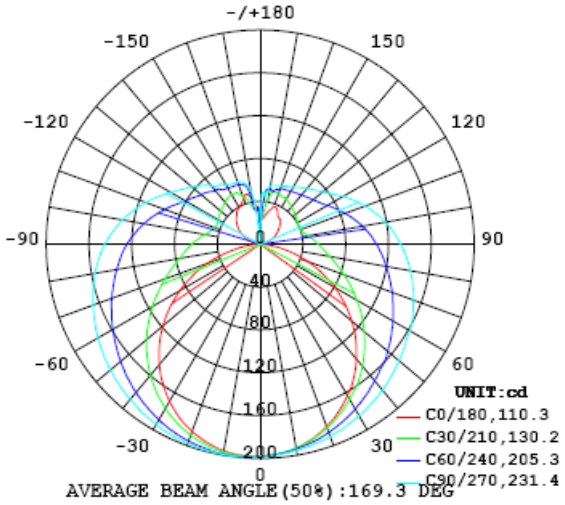


Chart 7: Polar Candela Distribution

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	198	198	198	198	198	198	198	198	198	198	198	198	198	198	198	198	198	198	198
5	197	196	197	196	197	196	197	197	197	197	197	197	197	197	198	198	198	198	198
10	193	193	193	193	194	194	194	194	195	196	195	195	195	195	196	195	196	196	196
15	188	188	188	189	189	190	191	192	193	194	194	193	193	193	192	192	192	192	192
20	181	181	181	183	184	185	187	189	190	191	191	191	190	189	188	187	186	186	186
25	173	173	174	175	177	180	183	185	187	188	188	188	186	185	183	181	179	179	179
30	163	163	165	167	170	174	178	181	183	185	185	184	182	179	176	174	171	170	169
35	152	153	155	159	163	167	172	177	179	181	181	180	177	174	169	165	162	160	159
40	140	141	144	149	155	161	166	172	175	178	178	176	172	167	162	158	153	148	147
45	126	127	131	138	146	154	161	167	171	174	174	171	167	161	155	147	141	136	133
50	112	113	118	127	137	147	156	162	167	169	169	166	161	155	146	137	128	122	119
55	96.3	98.1	105	116	127	139	149	158	162	165	165	162	156	148	137	126	115	107	103
60	80.3	82.8	91.7	104	118	132	143	152	159	162	161	158	151	141	129	115	102	91.5	86.7
65	63.8	67.1	78.4	93.5	110	124	137	147	154	157	157	153	145	134	120	105	88.9	75.9	69.6
70	47.3	51.7	65.6	83.3	101	117	131	142	149	152	152	148	139	127	112	94.6	76.1	60.2	52.8
75	31.2	37.2	54.1	74.1	93.6	111	125	136	144	148	147	142	133	121	105	85.3	64.4	45.4	35.5
80	16.7	24.5	44.2	66.1	86.7	105	120	131	139	142	142	137	127	115	97.3	77.1	54.2	32.3	19.7
85	5.58	15.3	36.7	59.6	80.7	99.0	114	126	133	137	136	131	122	109	91.1	69.9	46.0	22.1	7.19
90	0.80	10.4	31.6	54.3	75.3	93.6	109	120	128	131	130	125	116	103	85.0	64.0	40.1	16.1	0.94
95	1.80	8.41	28.1	49.9	70.5	88.2	103	114	122	125	125	120	110	97.1	79.8	59.0	36.0	13.2	1.55
100	3.97	9.31	25.4	45.7	65.3	82.7	97.0	108	115	119	118	113	104	90.9	74.1	54.2	32.3	12.5	3.79
105	6.66	12.1	24.7	42.3	60.6	77.0	90.8	101	108	112	111	106	97.2	84.8	68.8	49.9	30.1	14.3	7.51
110	9.45	16.0	25.8	40.0	56.3	71.5	84.4	94.5	101	104	104	99.0	90.4	78.6	63.6	46.5	30.0	18.0	11.9
115	12.6	20.1	28.1	39.6	52.7	66.5	78.3	87.6	93.9	96.9	96.1	91.9	83.8	72.8	59.2	44.7	31.1	22.0	16.4
120	16.6	24.1	30.7	40.1	51.1	62.1	72.5	81.0	86.7	89.4	88.7	84.8	77.3	67.6	56.1	44.2	33.1	26.0	20.6
125	19.7	28.2	33.4	41.3	50.3	59.6	68.0	74.7	79.8	82.2	81.5	78.0	71.8	63.9	54.5	44.5	36.1	29.7	24.7
130	23.0	32.1	36.2	42.7	50.1	57.6	64.7	70.4	74.3	76.2	75.8	72.9	67.9	61.5	53.7	45.5	39.2	33.0	28.3
135	26.3	34.9	39.1	44.2	50.3	56.5	62.1	66.8	70.1	71.7	71.2	69.0	64.9	59.5	53.3	47.1	42.2	36.4	31.5
140	29.3	38.2	41.8	45.8	50.7	55.6	60.1	63.9	66.6	67.9	67.5	65.7	62.4	58.2	53.3	48.6	44.8	39.5	34.5
145	30.4	39.9	44.6	47.2	51.0	54.9	58.5	61.5	63.6	64.7	64.5	63.1	60.4	57.2	53.6	50.3	46.9	42.5	37.7
150	33.0	43.1	47.1	48.8	51.6	54.5	57.2	59.5	61.0	61.9	61.8	60.8	58.8	56.5	54.0	51.6	48.8	44.7	39.7
155	36.5	45.3	47.8	49.0	51.5	54.2	56.2	57.8	59.0	59.8	59.7	59.0	57.7	56.1	54.6	52.6	50.1	46.5	41.7
160	37.6	45.2	48.3	50.1	51.0	52.6	55.1	56.6	57.4	58.0	58.0	57.7	56.9	56.0	54.8	53.1	51.4	49.0	45.6
165	32.5	43.8	48.7	50.7	51.5	52.0	52.2	53.9	56.4	56.8	56.8	56.7	56.2	55.4	54.5	53.4	52.0	50.8	48.4
170	27.9	33.9	38.2	42.0	47.4	52.0	51.9	49.1	49.4	55.3	55.6	55.2	54.9	54.4	53.9	53.1	52.8	50.2	43.2
175	23.4	24.4	25.5	27.5	30.3	34.6	42.6	50.5	51.1	48.3	46.6	47.7	52.8	54.5	53.5	53.5	49.9	41.8	35.3
180	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9

Table 6: Luminous Intensity Data

Table--2 UNIT: cd

γ (DEG) \ C (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	198	198	198	198	198	198	198	198	198	198	198	198	198	198	198	198	198		
5	198	198	198	198	199	199	199	199	199	199	199	198	198	197	197	197	197		
10	196	197	197	198	198	199	199	199	199	199	198	197	196	195	195	194	194		
15	192	193	194	195	197	197	198	199	199	198	197	196	194	193	191	190	189		
20	187	188	190	192	194	196	197	198	198	197	196	194	191	189	186	184	183		
25	180	181	184	187	190	193	195	196	196	196	193	190	187	183	180	177	174		
30	171	174	177	181	186	189	192	194	194	193	191	187	182	177	172	168	165		
35	160	164	169	175	180	185	189	191	192	191	187	182	177	170	164	158	154		
40	149	153	159	167	174	181	185	188	189	188	183	177	170	162	154	148	142		
45	136	141	149	159	168	176	181	185	186	184	180	172	164	154	145	136	129		
50	122	129	139	150	161	170	177	181	182	181	175	167	157	146	134	124	115		
55	106	115	128	141	154	165	173	178	179	177	171	162	151	138	124	111	101		
60	90.7	101	116	132	147	159	168	173	175	173	166	157	144	129	113	98.2	85.7		
65	74.0	87.8	105	123	140	153	163	169	171	168	162	151	137	121	103	85.4	71.1		
70	58.6	74.6	94.7	115	133	148	158	164	166	164	157	145	131	113	93.6	74.1	56.6		
75	42.8	62.6	85.0	107	126	142	153	160	162	159	152	140	125	106	85.2	63.4	42.7		
80	28.6	51.6	76.5	100	120	136	148	154	157	154	147	135	119	99.8	77.6	54.0	30.7		
85	17.7	43.1	70.0	93.6	114	131	142	149	151	149	141	129	113	93.9	72.0	46.8	21.8		
90	11.8	37.2	64.2	87.7	108	125	136	143	145	143	135	123	108	88.3	66.5	41.6	16.9		
95	9.06	32.1	58.3	81.3	102	118	129	136	138	136	128	117	101	82.4	61.2	37.1	14.2		
100	9.86	28.4	52.6	74.9	94.5	111	122	128	131	128	121	110	95.1	76.8	56.5	33.8	14.1		
105	13.1	27.7	48.0	69.5	87.5	103	114	120	123	120	113	103	88.6	71.5	52.5	32.3	14.5		
110	17.6	29.2	45.4	64.0	80.6	95.0	105	112	114	112	106	95.3	82.2	67.0	49.8	33.1	19.2		
115	21.9	31.7	44.4	59.9	74.3	87.5	97.3	103	105	103	97.6	88.3	76.2	63.1	47.8	30.7	22.9		
120	25.9	34.5	45.4	57.7	70.5	80.9	89.5	94.9	97.0	95.2	90.0	81.5	71.3	60.7	47.4	33.6	26.0		
125	29.3	37.4	46.8	56.5	67.0	76.0	83.2	87.7	89.3	88.0	83.7	77.0	69.0	58.5	45.8	35.7	28.6		
130	32.5	40.3	48.3	56.6	64.9	71.7	77.8	81.8	83.2	82.1	78.5	72.6	65.5	55.8	46.9	38.6	31.1		
135	35.2	42.8	49.4	56.7	62.8	69.0	73.3	76.4	77.6	76.6	73.3	67.6	60.4	54.7	46.4	42.0	33.3		
140	36.1	44.1	51.3	55.6	61.2	65.6	68.6	70.7	71.5	70.3	65.6	61.8	61.8	56.1	48.3	44.3	33.6		
145	34.7	42.8	52.8	55.8	58.3	61.9	66.6	68.0	67.8	66.9	66.1	64.9	61.8	55.6	50.1	44.3	32.2		
150	35.5	43.0	53.4	56.1	58.2	60.8	62.4	63.4	64.1	64.0	63.6	63.3	60.7	56.1	51.4	45.4	31.8		
155	37.8	43.8	53.2	56.2	58.1	59.7	61.2	61.9	62.4	63.0	62.9	62.0	59.7	56.2	50.5	42.2	29.4		
160	37.2	40.6	47.7	55.2	57.8	59.1	60.3	61.2	61.9	61.7	61.4	60.3	59.0	53.1	47.3	41.7	26.9		
165	40.4	34.5	41.8	48.8	55.0	56.8	58.4	59.2	59.5	59.3	58.9	57.4	47.7	41.4	34.4	29.3	25.7		
170	37.2	34.7	33.4	34.8	34.4	36.7	45.8	50.7	50.6	47.6	30.6	25.2	24.4	25.1	23.8	23.7	24.2		
175	33.9	33.9	33.8	32.9	32.3	32.7	31.4	28.2	6.33	19.8	29.6	29.0	27.9	26.9	24.3	23.1	23.2		
180	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9		

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 expended 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 expended uncertainty is 2.3% with a coverage factor k=2.

Color Characteristics Measurements

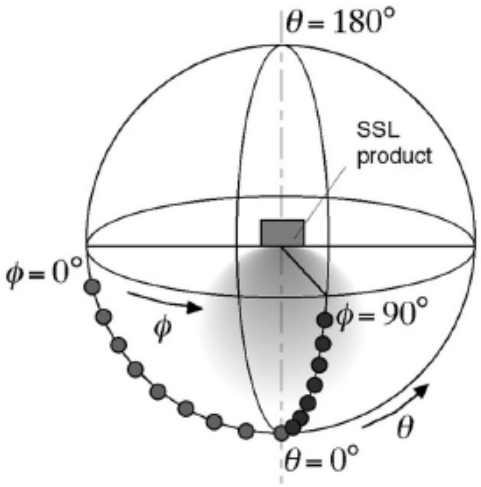
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as 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°/180° and C=90°/270°) 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, Δu'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 ***