

## LM-79-08 TEST REPORT

for

**IDEAL INDUSTRIES LIGHTING LLC, DBA CREE LIGHTING**

4401 SILICON DRIVE, DURHAM, NC 27703, USA

**LED Tube**

**Model: C-T848-B-32W-40K-B1**

**Laboratory: Leading Testing Laboratories**

**NVLAP CODE: 200960-0**

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Hangzhou, Zhejiang Province, China 311100

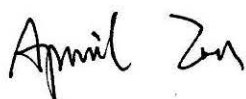
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www.ledtestlab.com

Report No.: HZ22030014b

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-T848-B-32W-40K-B1**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
158.3	1926.4	12.17	0.9839
CCT (K)	CRI	Stabilization Time (Light & Power)	
3976	82.5	60	

Table 1: Executive Data Summary

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

### Test specifications:

<b>Date of Receipt</b>	: Nov. 30, 2021
<b>Date of Test</b>	: Dec. 02, 2021
<b>Test item</b>	: Total Luminous Flux, Luminous Distribution Intensity, 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

## TABLE OF CONTENT

LM-79-08 TEST REPORT .....	1
TEST SUMMARY .....	2
SAMPLE PHOTO .....	4
TEST RESULTS .....	5
Sphere-Spectroradiometer Method.....	5
Goniophotometer Method .....	6
Spectral Power Distribution - Sphere Spectroradiometer Method .....	7
Chromaticity Diagram - Sphere Spectroradiometer Method.....	8
Nominal CCT Quadrangles – Sphere Spectroradiometer Method .....	9
Color Rendition Report – Sphere Spectroradiometer Method .....	10
Zonal Lumen Tabulation- Goniophotometer Method .....	11
Illuminance Plots- Goniophotometer Method .....	12
Luminous Intensity Distribution Plots- Goniophotometer Method.....	13
Luminous Intensity Data- Goniophotometer Method .....	14
EQUIPMENT LIST .....	16
TEST METHODS .....	16
Seasoning of SSL Product.....	16
Sphere-Spectroradiometer Method- Photometric and Electrical Measurements.....	16
Goniophotometer Method .....	17
Photometric and Electrical Measurements .....	17
Color Characteristics Measurements.....	17
Color Spatial Uniformity .....	17

## SAMPLE PHOTO

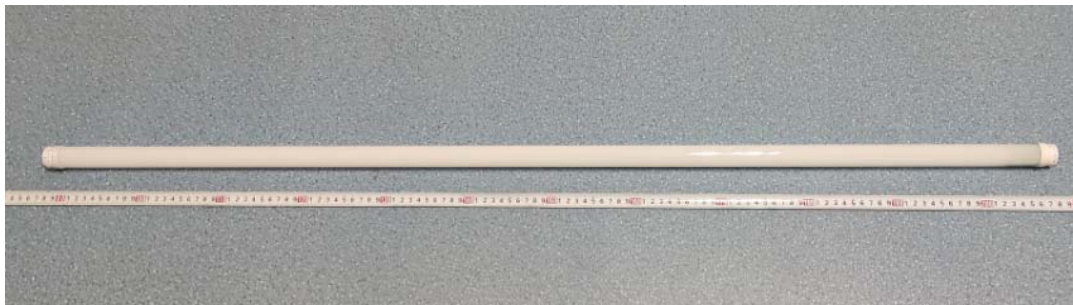


Figure 1- Overview of the sample

### Equipment Under Test(EUT)

<b>Name</b>	: LED Tube
<b>Model</b>	: C-T848-B-32W-40K-B1
<b>Electrical Ratings</b>	: 120-277V, 50/60Hz, 12W
<b>Product Description</b>	: 4000K
	: Manufacturer of light source: Bridgelux Inc.
	: Model of LED light source: BXVN-40E-11L-3EJ-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)	0.103	0.047
Power Factor	0.9839	0.9421
Test Power (W)	12.17	12.34
THD A%	17.16	18.58
Luminous Efficacy (lm/W)	158.3	156.9
Total Luminous Flux (lm)	1926.4	1936.5
Color Rendering Index (CRI)	82.5	
R9	5.7	
Correlated Color Temperature (CCT)(K)	3976	
Chromaticity Chroma x	0.3821	
Chromaticity Chroma y	0.3798	
Chromaticity Chroma u	0.2249	
Chromaticity Chroma v	0.3354	
Duv	0.0010	
Chromaticity Chroma u'	0.2249	
Chromaticity Chroma v'	0.5032	

Special Color Rendering Indices	
R1	80.6
R2	89.1
R3	95.1
R4	81
R5	80.6
R6	84.7
R7	85.6
R8	63.3
R9	5.7
R10	74.1
R11	79.9
R12	59.9
R13	82.8
R14	97.5

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)	0.104
Power Factor	0.9798
Power (W)	12.26
Luminous Efficacy (lm/W)	154.8
Total Luminous Flux (lm)	1898.1
Beam Angle (°)	116.3 (0°-180°) / 251.4 (90°-270°)
Center Beam Candle Power (cd)	281
Maximum Beam Candle Power (cd)	281.6 (At: C=50.0, Gamma=4.0)
Spacing Criteria	1.28 (0°-180°) / 1.46 (90°-270°)
Zonal Lumens in the 0°-60°Zone	39.39%
Zonal Lumens in the 60°-90°Zone	26.21%
Zonal Lumens in the 90°-120°Zone	18.81%
Zonal Lumens in the 120°-180°Zone	15.60%

Table 3: Test data per Goniophotometer Method

## Spectral Power Distribution - Sphere Spectroradiometer Method

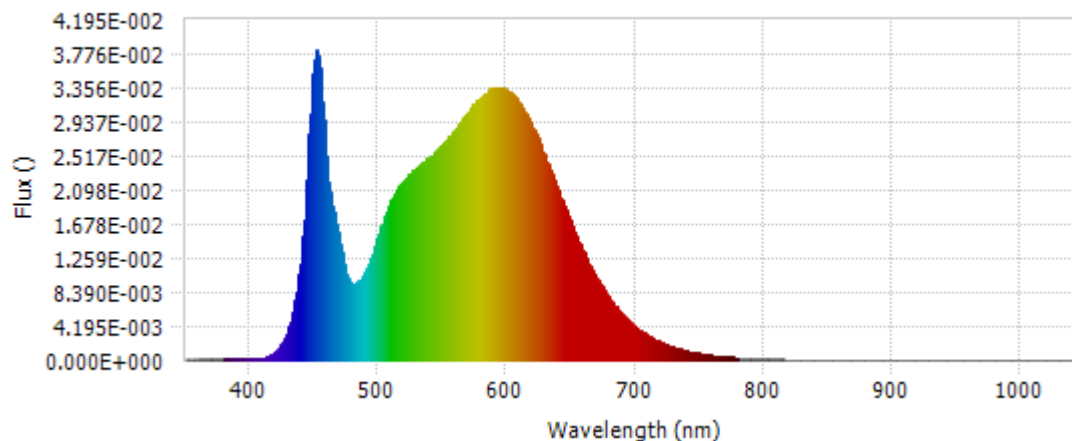
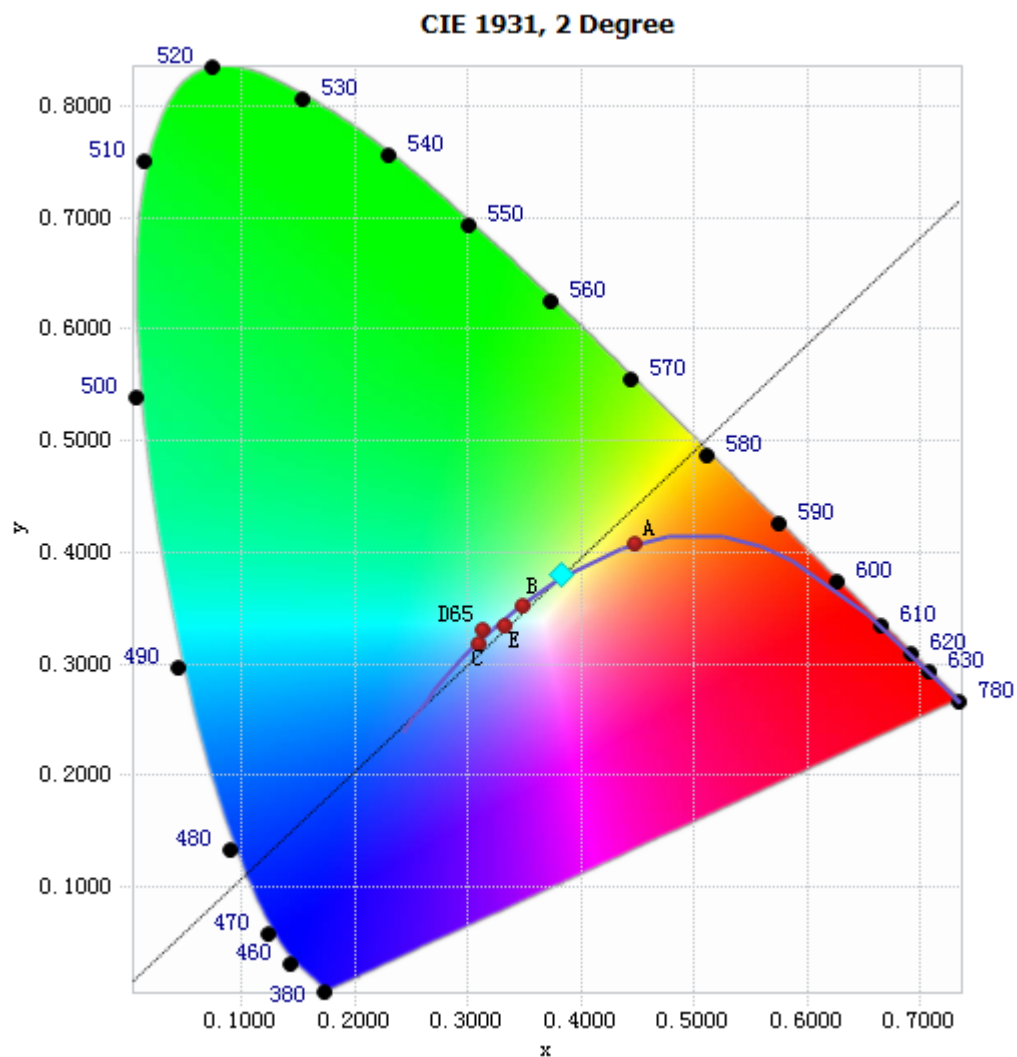


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	1.92E-04	485	9.77E-03	590	3.36E-02	695	4.86E-03
385	1.62E-04	490	1.10E-02	595	3.36E-02	700	4.17E-03
390	1.65E-04	495	1.31E-02	600	3.32E-02	705	3.56E-03
395	1.48E-04	500	1.55E-02	605	3.26E-02	710	3.03E-03
400	1.44E-04	505	1.78E-02	610	3.16E-02	715	2.58E-03
405	1.58E-04	510	1.96E-02	615	3.03E-02	720	2.25E-03
410	2.82E-04	515	2.12E-02	620	2.87E-02	725	1.89E-03
415	5.67E-04	520	2.22E-02	625	2.69E-02	730	1.61E-03
420	1.10E-03	525	2.30E-02	630	2.50E-02	735	1.37E-03
425	2.17E-03	530	2.37E-02	635	2.30E-02	740	1.16E-03
430	4.07E-03	535	2.44E-02	640	2.10E-02	745	9.85E-04
435	7.47E-03	540	2.50E-02	645	1.89E-02	750	8.48E-04
440	1.35E-02	545	2.58E-02	650	1.69E-02	755	7.14E-04
445	2.50E-02	550	2.66E-02	655	1.50E-02	760	6.14E-04
450	3.70E-02	555	2.76E-02	660	1.32E-02	765	5.27E-04
455	3.42E-02	560	2.85E-02	665	1.16E-02	770	4.56E-04
460	2.34E-02	565	2.95E-02	670	1.01E-02	775	3.90E-04
465	1.82E-02	570	3.06E-02	675	8.80E-03	780	3.30E-04
470	1.42E-02	575	3.16E-02	680	7.61E-03		
475	1.06E-02	580	3.24E-02	685	6.59E-03		
480	9.37E-03	585	3.32E-02	690	5.66E-03		

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

# Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.3821, 0.3798)

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

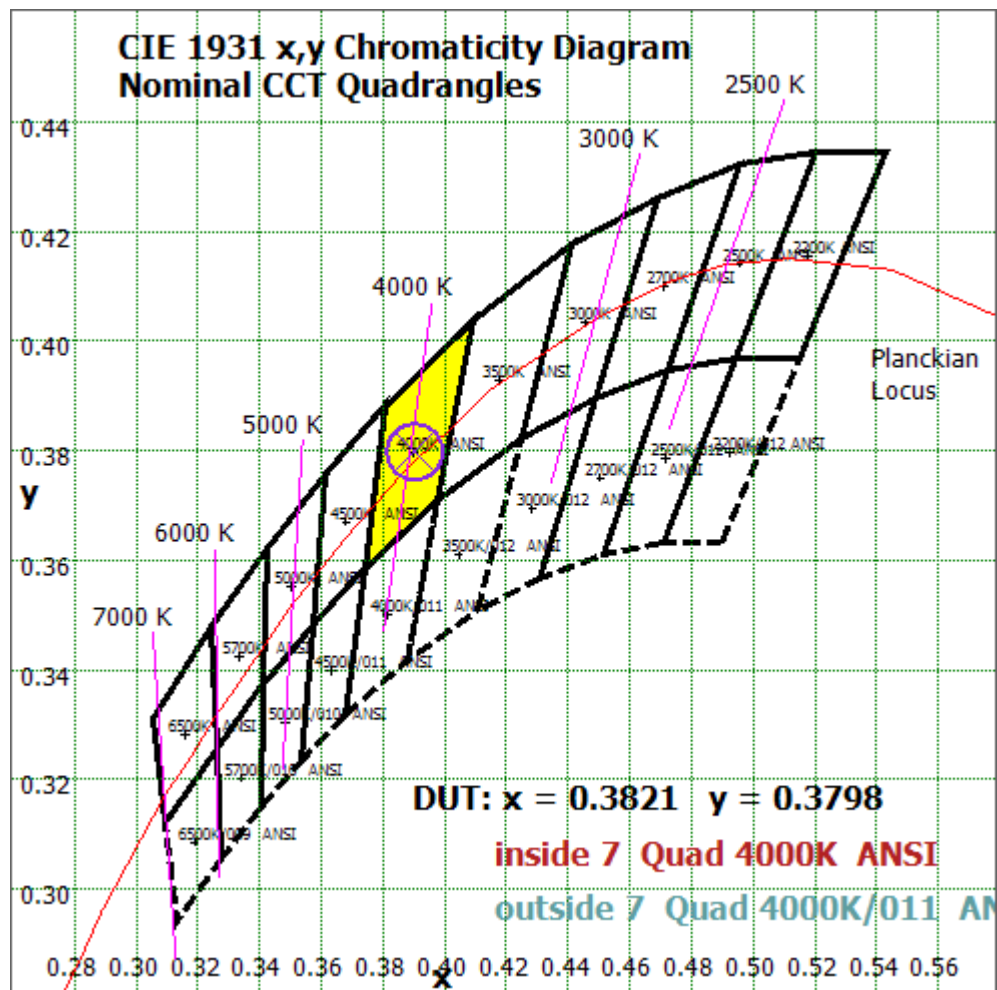


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

# Color Rendition Report – Sphere Spectroradiometer Method

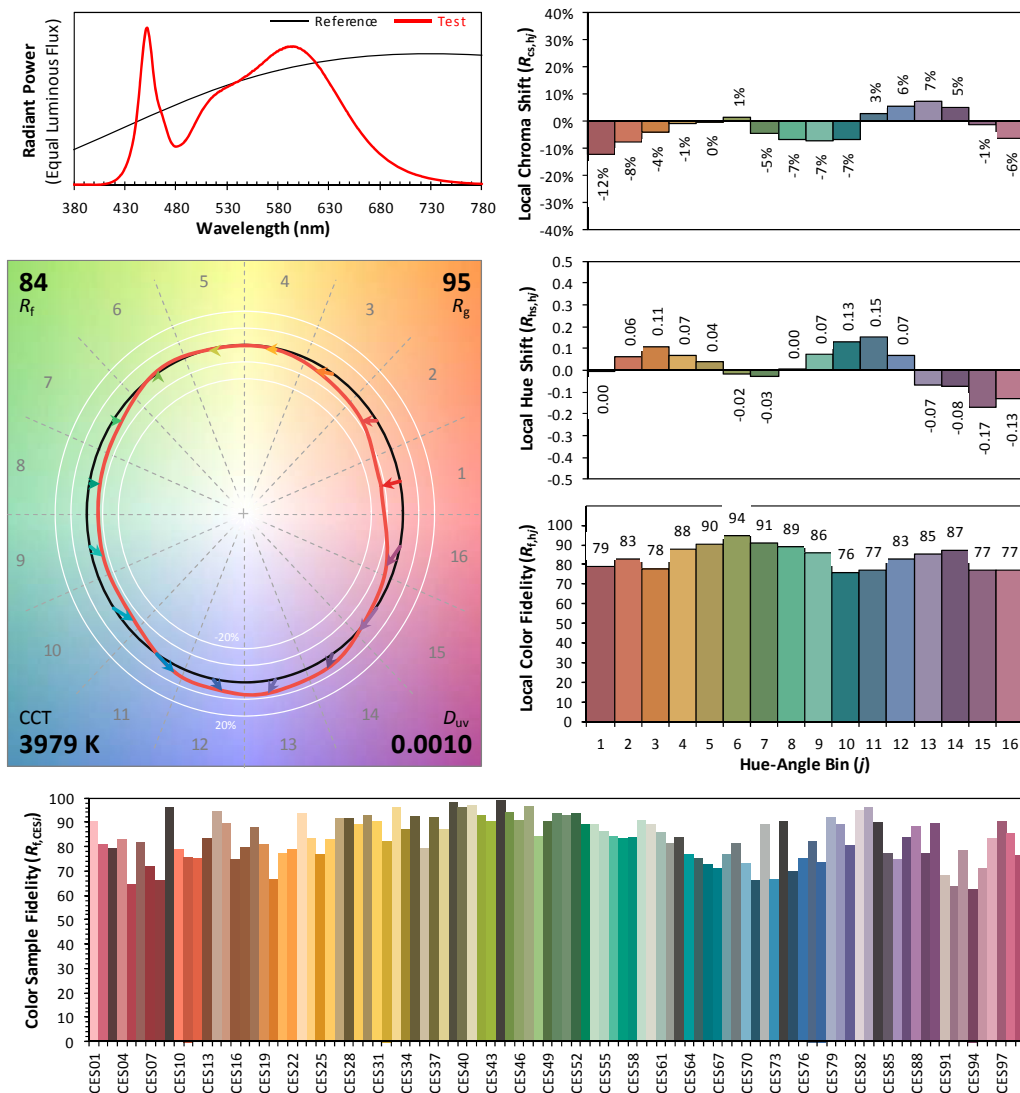
## ANSI/IES TM-30-18 Color Rendition Report

Source: LED

Manufacturer: IDEAL INDUSTRIES LIGHTING LLC,  
DBA CREE LIGHTING

Date: 2021/12/02

Model: C-T848-B-32W-40K-B1



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

$x$  0.3821  
 $y$  0.3798  
 $u'$  0.2249  
 $v'$  0.5032

CIE 13.3-1995  
(CRI)

$R_a$  83  
 $R_g$  6

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	26.697	1.41%
10- 20	77.821	4.10%
20- 30	122.294	6.44%
30- 40	156.54	8.25%
40- 50	178.127	9.38%
50- 60	186.104	9.80%
60- 70	181.325	9.55%
70- 80	167.004	8.80%
80- 90	149.102	7.86%
90-100	133.555	7.04%
100-110	118.929	6.27%
110-120	104.526	5.51%
120-130	89.919	4.74%
130-140	75.059	3.95%
140-150	59.136	3.12%
150-160	42.059	2.22%
160-170	23.198	1.22%
170-180	6.671	0.35%
Total	1898.1	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	747.583	39.39%
60- 90	497.431	26.21%
0-90	1245.01	65.59%
90- 180	653.052	34.41%
0- 180	1898.1	100%

Table 5: Zonal Lumen

## Illuminance Plots- Goniophotometer Method

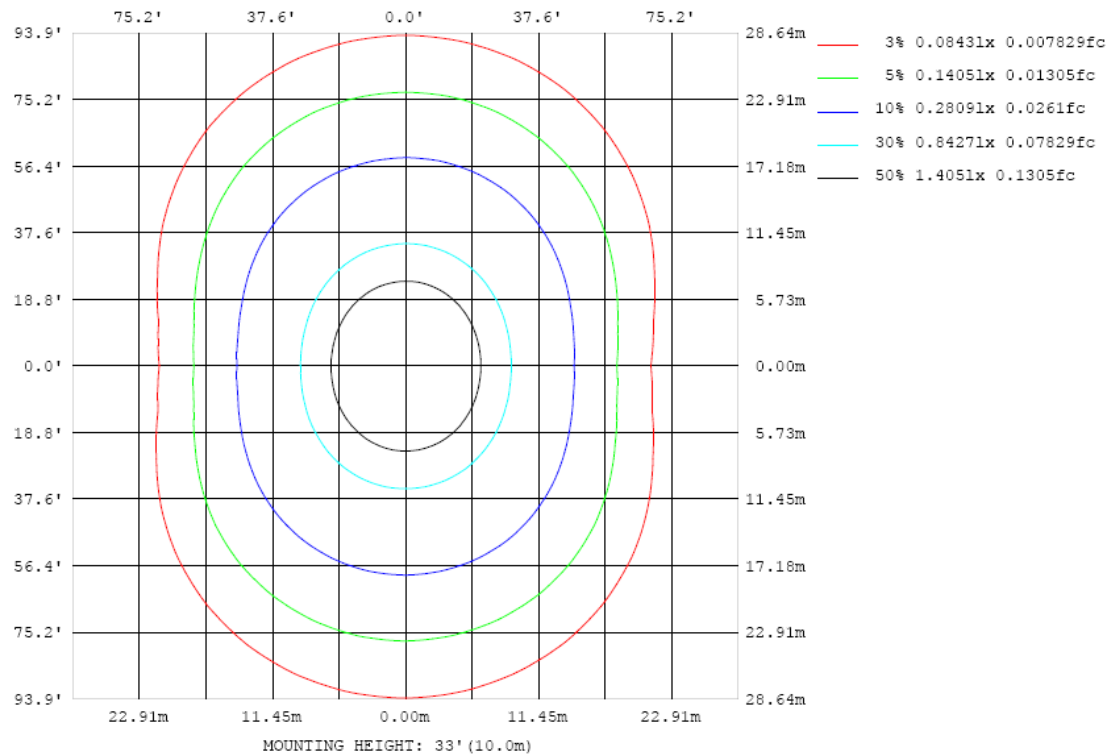


Chart 5: Illuminance Plot (Footcandles)

## Luminous Intensity Distribution Plots- Goniophotometer Method

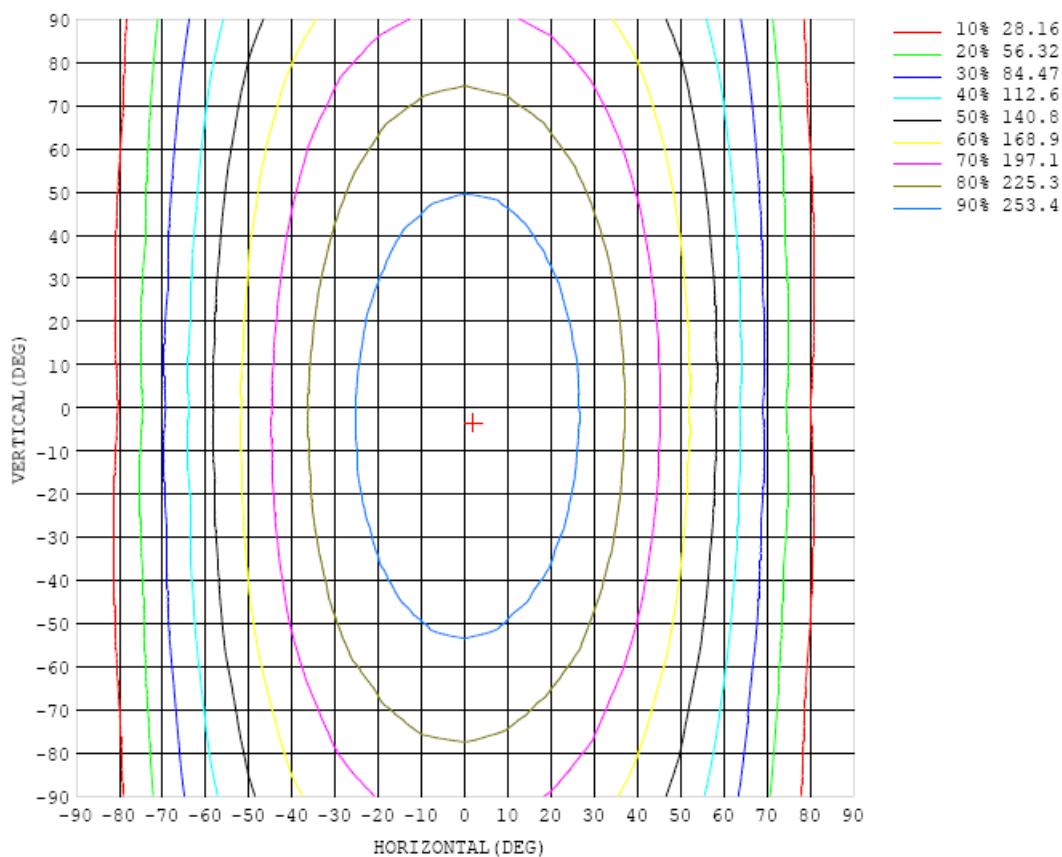


Chart 6: Isocandela Plot

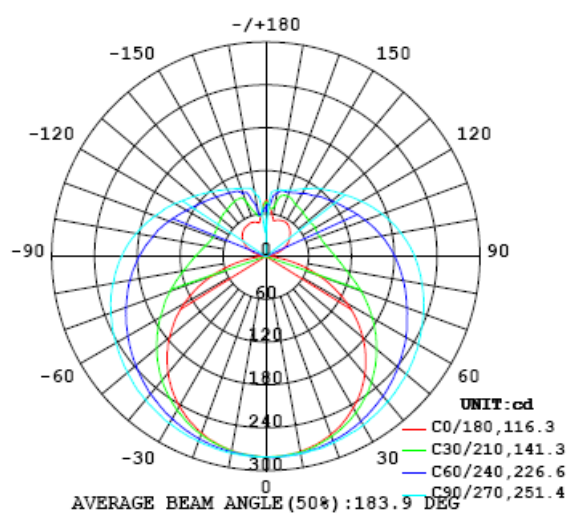


Chart 7: Polar Candela Distribution

## 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	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281
5	280	280	280	280	281	281	281	281	281	281	281	281	281	280	281	280	280	280	279
10	278	278	278	278	279	280	280	280	280	281	281	280	279	278	278	277	277	276	276
15	273	273	274	274	276	277	278	279	279	280	280	278	277	276	274	273	272	271	271
20	266	266	267	268	272	273	275	276	277	278	277	275	274	272	270	267	266	264	263
25	256	257	259	262	265	268	271	273	275	275	275	273	271	267	263	260	257	255	254
30	245	246	249	253	257	263	267	269	272	273	272	269	266	261	256	251	247	243	242
35	232	233	237	242	249	256	261	265	267	269	269	265	260	254	247	241	235	231	229
40	216	217	223	230	239	248	256	260	264	265	265	260	255	247	238	229	221	216	213
45	198	200	208	217	229	239	249	255	259	261	260	255	249	239	228	217	207	199	196
50	177	181	190	203	217	230	242	249	255	257	255	250	242	230	217	203	190	180	176
55	155	160	172	188	205	221	234	244	250	252	251	244	235	222	206	189	172	159	155
60	131	137	153	172	193	212	227	237	243	246	245	238	228	213	195	174	154	137	132
65	106	113	133	157	181	202	218	230	237	241	239	231	220	204	184	160	135	115	107
70	79.2	89.1	113	142	169	192	210	223	231	235	233	225	213	195	172	146	117	91.7	80.8
75	53.5	65.6	95.5	127	158	183	203	216	225	229	227	219	206	186	162	132	99.6	68.7	54.2
80	28.4	44.8	78.4	115	148	175	196	210	218	222	220	212	199	179	153	120	83.6	48.9	30.2
85	8.84	28.7	67.1	105	139	167	188	202	212	215	214	206	192	171	144	111	71.7	33.3	9.36
90	0.76	20.2	59.3	97.3	131	160	181	195	205	209	207	198	185	164	137	103	65.0	24.7	0.54
95	2.66	18.6	54.6	91.0	125	152	173	188	197	200	198	191	177	156	130	97.4	60.5	22.9	2.63
100	7.76	21.5	52.2	86.0	118	144	165	179	188	192	190	182	169	149	123	92.4	58.1	25.5	7.67
105	14.3	26.0	52.5	82.4	112	137	156	170	179	183	181	173	161	141	117	88.4	58.0	30.5	14.7
110	21.5	31.7	54.5	80.2	107	130	148	161	170	173	172	164	152	134	112	85.9	60.0	37.0	21.1
115	28.6	37.7	56.7	79.4	102	124	140	153	161	164	162	155	144	127	107	85.1	63.1	43.9	28.3
120	35.0	44.6	58.6	79.7	99.5	118	133	144	152	154	153	147	136	121	104	85.1	65.5	50.5	34.4
125	40.1	52.5	61.8	79.1	97.4	113	126	136	142	146	144	138	129	117	102	85.4	68.4	56.4	39.6
130	44.2	58.9	66.0	78.6	95.4	109	121	129	135	137	136	131	123	113	100	84.4	72.6	63.3	43.4
135	48.1	64.4	69.9	79.2	91.9	106	116	123	128	130	129	125	118	109	97.0	85.0	76.8	68.5	46.3
140	51.6	69.1	73.8	80.8	90.6	101	110	117	121	123	123	119	113	104	95.3	86.4	79.8	72.2	48.4
145	53.9	73.0	79.6	82.4	89.3	98.2	106	111	115	116	115	112	107	101	93.6	88.1	82.4	75.7	50.0
150	55.5	77.0	84.3	84.0	90.2	95.3	102	106	109	109	108	106	102	97.6	93.9	86.8	85.5	78.7	50.6
155	54.8	71.8	86.3	87.7	89.6	94.7	98.3	101	103	103	103	101	99.1	96.7	93.1	86.9	84.6	76.8	51.5
160	54.0	61.7	87.5	89.5	91.4	93.2	95.4	97.6	98.5	99.2	99.0	98.1	96.8	94.8	85.2	83.3	75.7	67.4	50.9
165	52.0	53.8	71.7	88.3	90.4	93.8	94.7	95.1	95.4	95.9	95.9	95.4	94.3	81.9	76.0	68.9	64.2	56.8	49.4
170	55.7	54.8	57.6	71.4	85.2	88.2	89.1	93.1	93.7	93.9	94.1	86.5	72.2	65.6	65.6	64.1	61.4	52.5	49.8
175	68.7	68.7	67.6	67.1	72.3	71.2	73.5	78.5	87.1	89.8	67.0	48.8	58.2	66.5	65.4	68.5	64.1	64.8	64.8
180	78.3	77.8	77.3	75.1	71.8	65.3	63.4	57.3	59.5	4.79	48.1	59.3	62.9	67.7	70.5	74.4	76.4	77.6	77.9

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	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281		
5	279	280	279	280	280	280	281	280	281	281	281	281	280	280	281	281	280		
10	276	276	277	277	278	278	278	279	280	279	279	279	279	278	278	278	277		
15	271	272	272	274	275	275	276	277	278	278	277	277	276	275	274	274	273		
20	264	264	266	268	270	272	274	274	276	275	274	274	272	270	269	267	266		
25	254	256	258	262	265	268	270	272	273	273	271	270	267	264	261	259	257		
30	243	246	249	254	259	263	266	268	270	269	267	265	260	257	252	249	246		
35	230	234	238	245	252	257	262	264	266	266	263	259	254	248	241	237	233		
40	215	220	226	236	244	252	257	261	262	262	258	253	246	238	230	222	218		
45	198	204	213	225	236	245	251	256	258	258	253	246	237	227	217	208	200		
50	179	188	200	214	227	238	246	251	253	252	247	239	229	216	203	190	181		
55	159	170	185	203	218	231	240	245	248	247	241	232	220	204	188	172	161		
60	137	153	171	191	210	223	234	240	242	241	234	225	210	193	173	154	139		
65	114	134	157	180	200	216	227	234	237	235	228	217	201	181	158	135	115		
70	91.0	115	143	169	192	209	221	228	231	228	221	209	191	170	144	116	91.1		
75	66.9	96.8	129	158	182	201	214	222	225	222	214	201	183	159	131	98.1	67.7		
80	46.1	81.3	117	150	174	193	207	214	217	215	207	194	174	150	119	82.5	47.0		
85	30.3	69.1	107	140	166	186	199	207	210	208	199	185	166	141	108	70.1	31.2		
90	21.8	60.7	98.9	132	158	178	191	199	202	199	191	177	158	132	99.5	61.5	22.8		
95	19.2	55.1	91.9	124	151	169	183	191	194	191	183	169	150	124	92.3	55.8	20.0		
100	21.6	52.0	85.9	117	142	161	174	181	184	182	174	160	142	117	86.1	52.3	22.0		
105	26.9	51.9	81.5	110	134	153	165	172	175	173	164	153	134	110	81.6	51.8	27.1		
110	34.1	54.1	79.2	105	127	144	156	162	165	163	156	144	126	104	78.7	53.5	34.0		
115	41.5	57.8	78.8	101	120	136	148	154	157	155	147	136	119	99.6	77.7	56.4	41.2		
120	48.9	62.2	79.4	97.6	115	128	139	145	147	145	139	128	113	96.5	77.9	60.7	48.1		
125	56.1	66.7	80.7	95.9	110	122	131	136	138	137	131	122	109	94.7	79.0	65.4	54.4		
130	62.6	71.1	82.3	95.0	107	117	125	129	131	129	124	116	106	93.5	80.8	70.2	60.3		
135	68.6	74.9	84.2	94.3	104	112	119	123	124	123	118	112	103	93.2	83.2	74.7	65.9		
140	72.2	78.6	85.0	94.3	102	108	114	117	118	117	113	108	101	93.3	85.5	78.5	70.7		
145	73.4	82.1	87.1	93.2	100	105	109	112	113	112	109	105	99.4	93.6	87.6	81.9	74.1		
150	77.0	85.1	88.7	91.1	98.9	102	105	107	108	107	105	102	98.2	94.0	89.5	84.8	77.3		
155	74.0	84.2	88.8	90.5	93.0	100	102	104	104	104	103	100	97.6	94.4	90.9	87.3	73.2		
160	59.3	72.3	80.7	86.1	92.6	93.3	99.7	101	101	101	100	98.9	96.9	94.6	92.1	88.0	66.2		
165	49.5	60.4	64.8	71.0	79.5	86.5	93.3	96.9	98.6	98.4	97.9	97.3	96.1	93.4	90.4	85.3	58.7		
170	49.3	49.0	57.7	62.6	61.3	62.2	73.7	87.2	91.2	95.8	95.4	93.7	88.6	86.7	83.8	68.7	56.7		
175	64.7	62.6	60.3	63.9	61.7	63.7	55.8	45.7	58.2	84.2	79.6	76.8	73.9	70.9	70.7	66.6	66.6		
180	77.7	77.5	76.7	75.0	72.0	70.0	60.3	59.0	52.6	6.03	49.4	59.5	64.2	67.6	71.4	74.6	76.3		

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  $4\pi$ . 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  $k=2$ .

## **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**

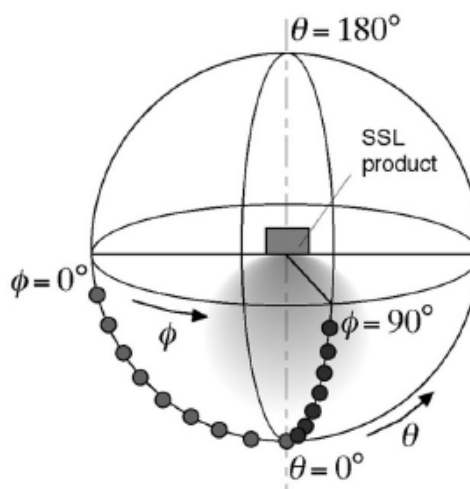
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as 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  $10^\circ$  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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