LM-79-08 Test Report

for

Philips Lighting (China) Investment Co., Ltd.

Building 9 #, Lane 888, Tianlin Road, Minhang District, Shanghai City.

LED Tube

Model: 9290018769

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

3rd Floor, Bld. 2, NO. 96 Longchuanwu Rd Qianjiang Economy Dev. Zone, Yuhang Dist,
Hangzhou, Zhejiang Province, China 311100
Tel: +86 571 86376106
www.ledtestlab.com

Report No.: HZ18030033b

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. 22, 2018

Approved by: Jim Zhang

Manager: Jim Zhang
Mar. 22, 2018

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: **9290018769**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
156.4	1855.0	11.86	0.9811

CCT (K)	CRI	Stabilization Time (Light & Power)
3472	82.2	60

Table 1: Executive Data Summary

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

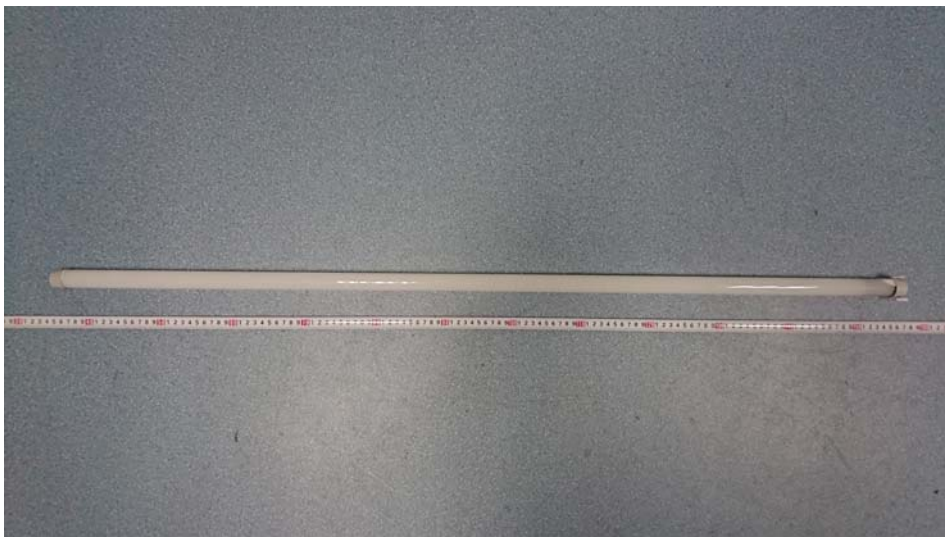
Test specifications:

Date of Receipt	: Mar. 20, 2018
Date of Test	: Mar. 20, 2018
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

TABLE OF CONTENT

LM-79-08 Test Report 1
Test Summary 2
Sample Photo 4
TEST RESULTS 5
Goniophotometer Method 6
Spectral Power Distribution - Sphere Spectroradiometer Method 7
Chromaticity Diagram - Sphere Spectroradiometer Method 8
Nominal CCT Quadrangles – Sphere Spectroradiometer Method 9
Zonal Lumen Tabulation- Goniophotometer Method 10
Luminous Intensity Distribution Plots- Goniophotometer Method 12
Luminous Intensity Data- Goniophotometer Method 13
EQUIPMENT LIST 15
TEST METHODS 15
Seasoning of SSL Product 15
Sphere-Spectroradiometer Method- Photometric and Electrical Measurements 15
Goniophotometer Method 16
Photometric and Electrical Measurements 16
Color Characteristics Measurements 16
Color Spatial Uniformity 16

Sample Photo



Sample view

Equipment Under Test (EUT)	
Name	: LED Tube
Model	: 9290018769
Electrical Ratings	: 120-277V, 60HZ
Product Description	: 12T8/PRO/48-835/BB17/G 10/1 FB
Manufacturer	: Philips Lighting (China) Investment Co., Ltd.
Address	: Building 9 #, Lane 888, Tianlin Road, Minhang District, Shanghai City

TEST RESULTS

Test ambient temperature was 24.9℃.

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)	0.101	0.046
Power Factor	0.9811	0.9622
Test Power (W)	11.86	12.14
THD A%	17.68	13.46
Luminous Efficacy (lm/W)	156.4	152.7
Total Luminous Flux (lm)	1855.0	1854.0
Color Rendering Index (CRI)	82.2	
R9	6	
Correlated Color Temperature (CCT)(K)	3472	
Chromaticity Chroma x	0.4083	
Chromaticity Chroma y	0.3956	
Chromaticity Chroma u	0.2357	
Chromaticity Chroma v	0.3425	
Duv	0.0012	
Chromaticity Chroma u ’	0.2357	
Chromaticity Chroma v’	0.5137	

Special Color Rendering Indices	
R1	80.2
R2	88.7
R3	95.6
R4	81
R5	80.1
R6	84.9
R7	85.2
R8	61.8
R9	6
R10	73.5
R11	79.7
R12	62.8
R13	82.1
R14	97.6
Rf	82
Rg	96

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 25.2℃.

The photometric distance is 2.47m.

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)	0.101
Power Factor	0.9806
Power (W)	11.86
Luminous Efficacy (lm/W)	155.4
Total Luminous Flux (lm)	1842.9
Beam Angle (°)	111.7（0^o-180^o）/ 196.9 (90^o-270^o)
Center Beam Candle Power (cd)	332
Maximum Beam Candle Power (cd)	332.2 (At: C=110.0, Gamma=1.0)
Spacing Criteria	1.26（0^o-180^o）/1.41 (90^o-270^o)
Zonal Lumens in the 0°-60°Zone	45.55%
Zonal Lumens in the 60°-90°Zone	26.75%
Zonal Lumens in the 90°-120°Zone	16.24%
Zonal Lumens in the 120°-180°Zone	11.46%

Table 3: Test data per Goniophotometer Method

Spectral Power Distribution - Sphere Spectroradiometer Method

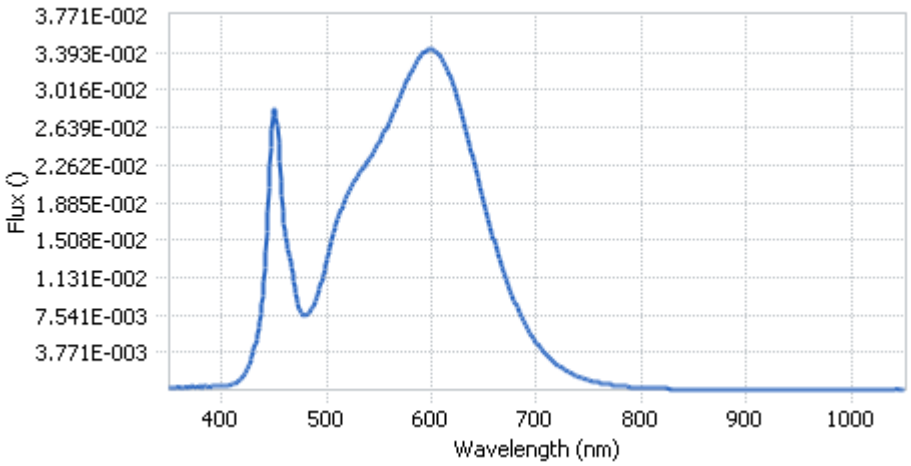
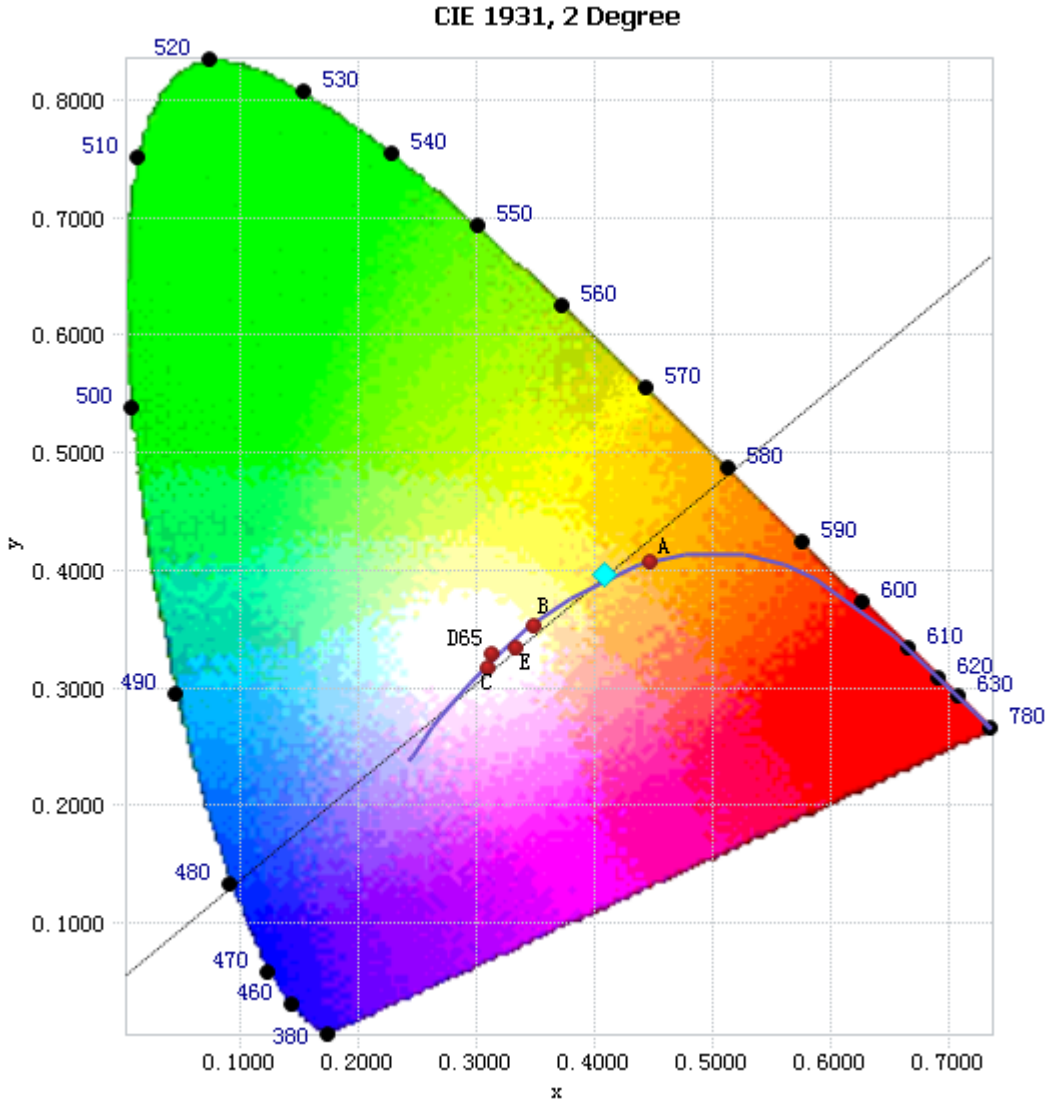


Chart 1: Spectral Power Distribution

Spectral Distribution over Visible Wavelength							
WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)	WL(nm)	Radiant(Watts)
380	3.20E-04	485	8.03E-03	590	3.36E-02	695	5.52E-03
385	3.29E-04	490	9.05E-03	595	3.40E-02	700	4.74E-03
390	3.29E-04	495	1.09E-02	600	3.42E-02	705	4.05E-03
395	3.51E-04	500	1.31E-02	605	3.40E-02	710	3.45E-03
400	3.89E-04	505	1.52E-02	610	3.34E-02	715	2.95E-03
405	4.55E-04	510	1.71E-02	615	3.22E-02	720	2.52E-03
410	5.94E-04	515	1.86E-02	620	3.08E-02	725	2.16E-03
415	8.48E-04	520	1.98E-02	625	2.91E-02	730	1.85E-03
420	1.35E-03	525	2.07E-02	630	2.73E-02	735	1.57E-03
425	2.26E-03	530	2.16E-02	635	2.52E-02	740	1.33E-03
430	3.82E-03	535	2.24E-02	640	2.30E-02	745	1.14E-03
435	6.22E-03	540	2.32E-02	645	2.09E-02	750	9.75E-04
440	1.09E-02	545	2.40E-02	650	1.88E-02	755	8.39E-04
445	2.03E-02	550	2.49E-02	655	1.68E-02	760	7.18E-04
450	2.83E-02	555	2.59E-02	660	1.48E-02	765	6.13E-04
455	2.31E-02	560	2.70E-02	665	1.30E-02	770	5.21E-04
460	1.60E-02	565	2.83E-02	670	1.14E-02	775	4.51E-04
465	1.33E-02	570	2.95E-02	675	9.95E-03	780	3.92E-04
470	1.03E-02	575	3.07E-02	680	8.66E-03		
475	7.88E-03	580	3.19E-02	685	7.46E-03		
480	7.49E-03	585	3.30E-02	690	6.43E-03		

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

Chromaticity Diagram - Sphere Spectroradiometer Method



Tristimulus values(x, y): (0.4083, 0.3956)

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

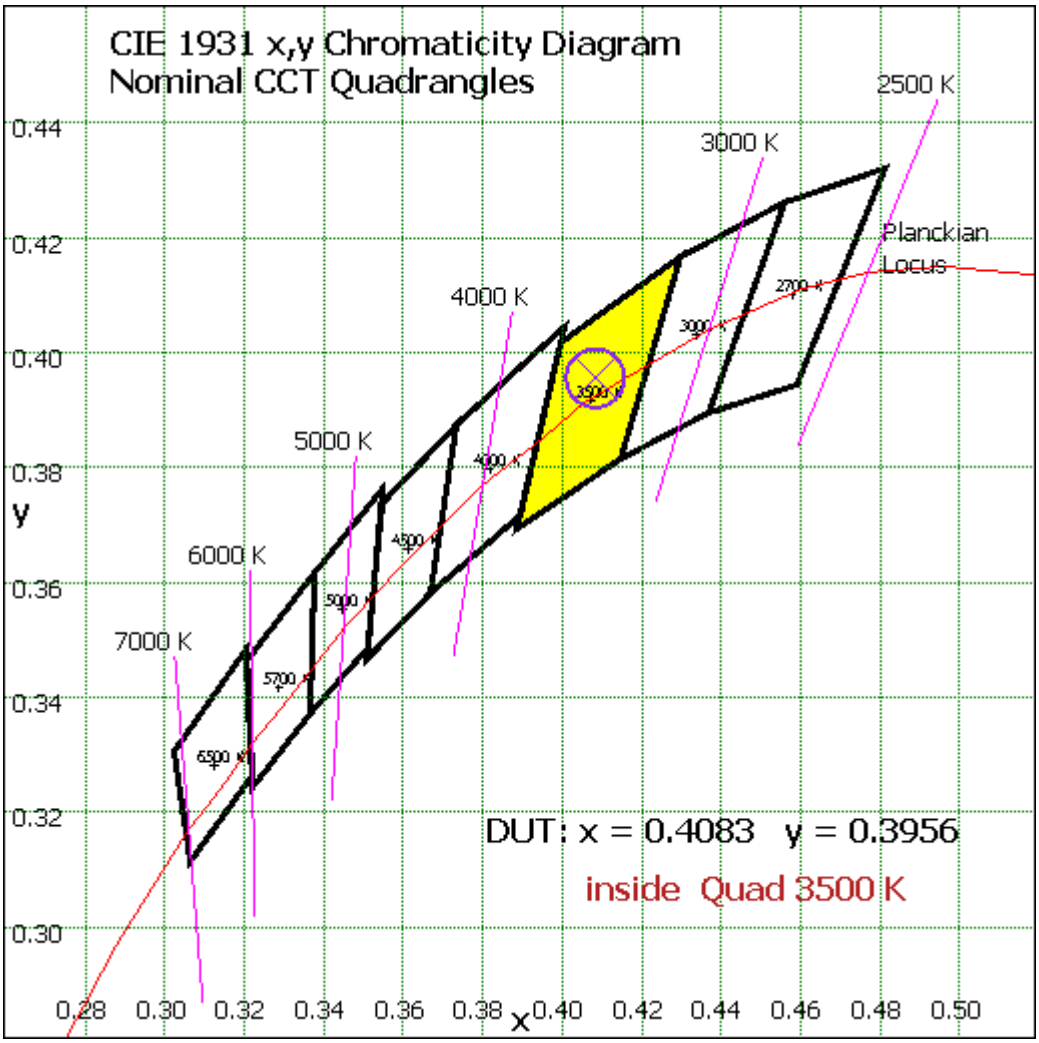


Chart 3: Plot of Lamp x/y coordinates on CIE 1931 Chromaticity Diagram

Zonal Lumen Tabulation- Goniophotometer Method

γ(°)	Lumens	% Total
0- 10	31.491	1.71%
10- 20	91.201	4.95%
20- 30	141.541	7.68%
30- 40	177.813	9.65%
40- 50	197.389	10.71%
50- 60	199.995	10.85%
60- 70	187.84	10.19%
70- 80	165.402	8.98%
80- 90	139.778	7.58%
90-100	117.908	6.40%
100-110	99.122	5.38%
110-120	82.314	4.47%
120-130	67.443	3.66%
130-140	54.021	2.93%
140-150	41.342	2.24%
150-160	28.496	1.55%
160-170	15.309	0.83%
170-180	4.505	0.24%
Total	1842.9	100%

γ(°)	Lumens	% Total
0- 60	839.43	45.55%
60- 90	493.02	26.75%
0-90	1332.45	72.30%
90- 180	510.46	27.70%
0- 180	1842.9	100%

Table 5: Zonal Lumen Data

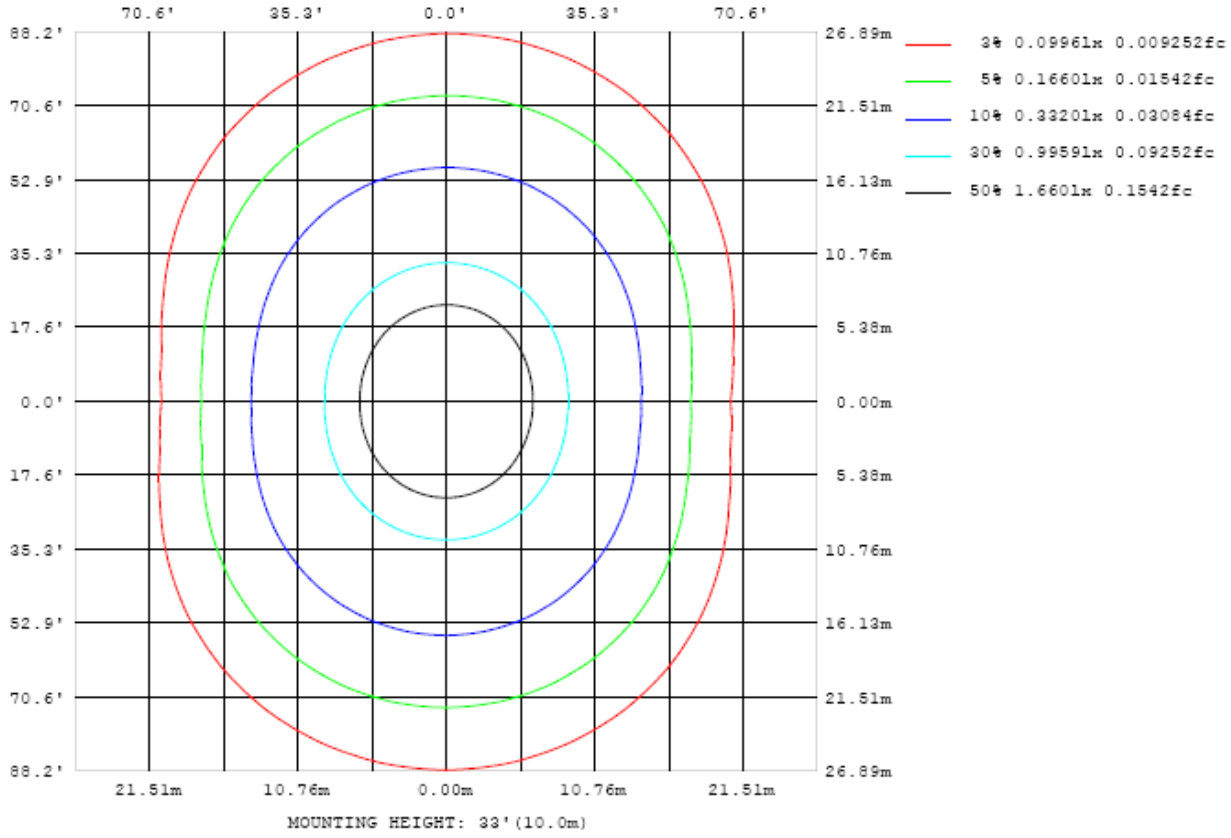


Chart 4: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots- Goniophotometer Method

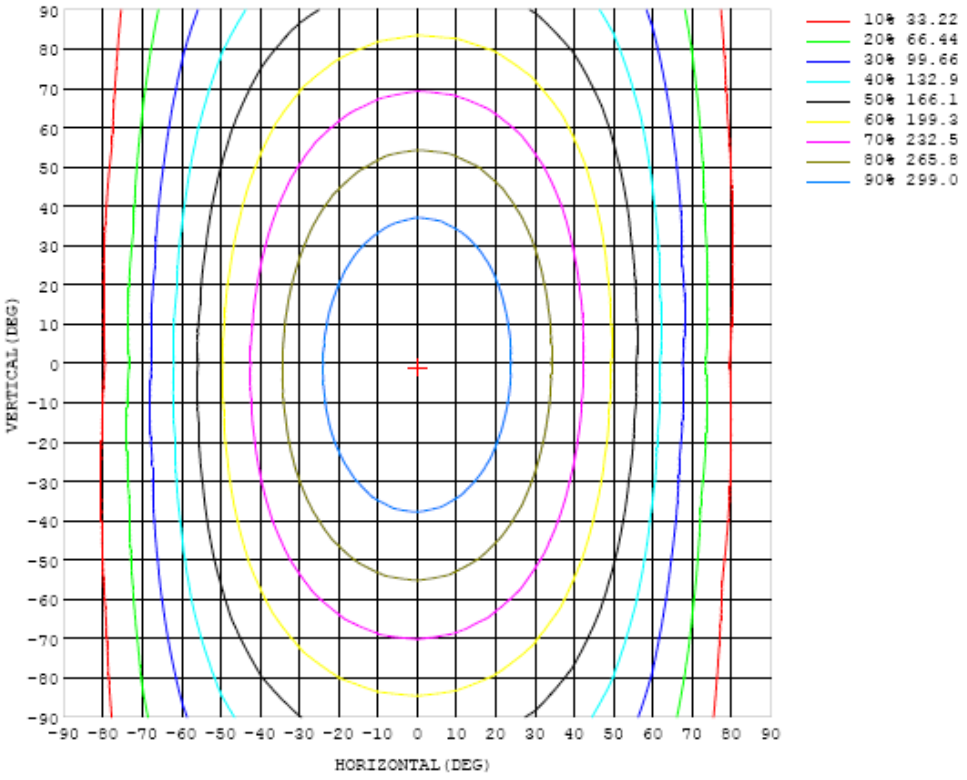


Chart 5: Isocandela Plot

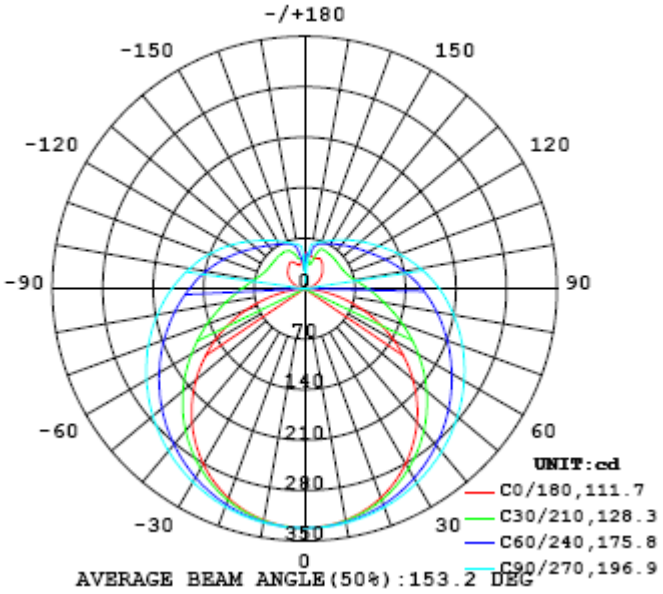


Chart 6: Polar Candela Distribution

Luminous Intensity Data- Goniophotometer Method

Table--1 UNIT: cd

γ (DEG) \ C (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	332	332	332	332	332	332	332	332	332	332	332	332	332	332	332	332	332	332	332
5	330	330	331	331	331	331	331	331	332	332	332	332	331	331	331	331	331	331	331
10	326	326	326	327	328	328	329	329	330	330	330	330	329	329	328	327	327	326	326
15	319	319	320	321	322	323	325	326	326	327	327	326	325	324	323	321	320	319	319
20	309	309	310	312	315	317	319	321	322	323	322	322	320	318	315	313	311	310	309
25	296	297	298	301	305	309	312	315	317	318	317	316	313	310	306	303	299	297	296
30	280	281	284	288	293	299	304	307	310	311	310	308	305	300	295	290	285	282	281
35	262	264	268	274	281	288	294	299	302	304	303	300	295	289	283	276	269	265	263
40	242	244	249	257	266	276	284	290	294	295	294	291	285	278	269	260	251	246	243
45	220	222	229	240	251	263	272	280	285	286	285	281	274	265	254	243	232	224	221
50	196	199	208	221	235	249	260	269	274	276	275	270	262	252	239	224	211	201	197
55	170	174	186	202	219	235	248	258	264	266	265	259	250	238	223	206	189	176	171
60	143	148	163	182	203	221	236	246	253	255	254	248	238	224	207	187	167	151	144
65	114	121	139	163	187	207	223	235	242	244	242	236	225	210	191	169	145	124	115
70	85.6	93.5	117	145	171	193	210	223	230	233	231	224	213	197	176	151	123	98.2	86.2
75	57.5	68.3	95.9	128	156	180	198	211	219	222	220	213	201	184	162	134	103	73.4	57.5
80	30.9	44.4	77.5	112	142	167	186	199	207	210	208	201	189	171	148	120	86.0	52.0	31.0
85	9.86	26.5	63.1	98.9	130	155	174	188	196	198	196	189	177	160	136	107	71.9	35.4	9.95
90	0.74	16.9	52.6	88.1	119	144	163	176	184	187	185	178	166	148	125	95.7	61.8	25.6	0.72
95	1.97	13.5	45.2	78.7	109	133	151	164	172	175	173	166	154	137	115	86.2	53.9	20.8	1.89
100	5.13	14.8	40.5	70.9	98.9	122	140	153	160	163	161	154	143	126	105	78.2	48.5	20.6	4.95
105	9.28	18.2	39.3	65.4	90.5	112	129	141	149	151	149	143	132	116	96.0	71.5	45.9	22.4	9.05
110	13.8	22.3	39.6	61.7	83.5	103	119	130	137	140	138	132	122	107	88.4	67.0	45.3	25.5	13.5
115	18.5	26.7	40.9	59.6	78.2	95.5	110	120	126	129	127	122	112	98.9	82.7	64.5	45.7	29.0	18.2
120	23.1	30.7	43.1	58.4	74.3	89.4	102	111	116	119	117	112	104	92.3	78.2	62.6	46.8	32.4	22.7
125	27.5	34.3	45.4	58.0	71.3	84.2	94.9	103	108	110	108	104	96.7	86.7	74.6	61.4	48.4	35.3	26.7
130	31.4	37.5	47.7	58.1	68.9	79.8	89.0	96.0	100	102	101	96.9	90.6	82.0	71.7	60.8	50.3	37.8	30.3
135	35.3	40.4	49.7	58.4	67.3	76.1	83.9	89.7	93.4	94.8	93.8	90.6	85.1	77.8	69.5	60.6	51.7	39.0	33.3
140	38.9	42.4	51.8	58.7	66.3	73.2	79.4	84.2	87.2	88.4	87.6	84.9	80.3	74.4	67.8	60.2	52.5	40.2	35.9
145	42.7	43.7	53.3	58.8	65.0	70.6	75.4	79.3	81.8	82.7	82.0	79.8	76.3	71.8	66.6	60.2	54.6	40.4	38.6
150	45.4	42.8	54.2	59.5	63.7	67.9	72.0	75.0	76.9	77.7	77.2	75.6	72.9	69.5	63.2	58.2	55.8	39.8	41.4
155	46.5	38.9	50.3	60.1	63.0	66.2	68.6	71.0	72.6	73.3	73.0	71.7	69.8	66.0	59.7	54.4	50.9	36.9	41.1
160	44.5	36.2	41.3	55.8	62.6	64.2	66.5	68.2	69.0	68.9	68.8	68.9	64.6	56.0	51.0	47.9	43.9	33.8	37.6
165	44.8	35.0	34.8	37.6	54.0	61.3	62.9	64.9	65.5	65.8	65.6	57.4	48.4	44.6	44.8	40.1	36.3	32.5	34.4
170	46.6	36.3	36.1	36.5	37.7	44.4	50.4	56.4	60.6	63.3	48.1	39.5	44.8	43.6	42.8	38.8	36.7	35.3	33.8
175	46.8	44.7	43.9	43.6	45.8	48.1	49.1	48.6	47.1	21.8	45.7	49.5	49.6	48.2	46.7	45.3	43.1	40.8	40.5
180	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5

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	332	332	332	332	332	332	332	332	332	332	332	332	332	332	332	332	332		
5	330	330	331	331	331	331	331	331	331	331	331	331	331	331	331	331	330		
10	326	326	327	327	328	329	329	329	329	329	329	329	328	327	327	327	326		
15	319	320	321	322	323	324	325	326	326	326	325	325	323	322	321	320	319		
20	309	310	312	314	316	318	320	321	322	321	320	319	317	314	312	310	309		
25	297	298	301	304	308	311	314	315	316	316	314	312	309	305	301	299	296		
30	282	284	288	293	298	303	306	309	310	309	307	304	299	294	289	285	282		
35	264	268	273	280	287	293	298	301	302	301	299	294	289	282	275	269	264		
40	245	250	257	266	274	282	288	292	294	293	290	284	277	268	259	251	245		
45	223	230	239	250	261	271	278	283	285	284	280	273	264	253	242	231	223		
50	199	208	220	234	247	259	267	273	275	274	269	262	251	238	224	210	201		
55	174	186	201	218	233	246	255	262	264	263	258	250	238	222	205	189	176		
60	149	163	181	201	219	233	244	251	254	252	247	237	224	207	186	167	151		
65	122	140	162	185	204	220	232	239	242	241	235	225	210	191	168	145	125		
70	94.3	117	144	169	190	207	220	227	231	229	223	212	196	176	151	123	98.5		
75	68.2	95.9	127	154	177	195	208	216	219	218	211	200	183	161	134	103	73.5		
80	44.8	77.5	111	141	164	183	196	204	208	206	199	188	171	148	119	85.2	51.0		
85	27.0	62.7	98.1	129	153	171	184	192	196	194	188	176	159	136	106	70.6	33.7		
90	17.3	52.2	87.3	118	142	160	173	181	184	183	176	164	148	124	94.8	59.9	23.5		
95	14.2	45.5	78.5	108	132	150	162	170	173	171	165	154	137	114	85.7	52.5	19.4		
100	15.2	41.4	71.4	98.8	122	139	152	159	162	160	155	144	127	105	78.0	47.5	19.0		
105	18.0	39.4	65.9	91.0	112	129	141	149	152	150	144	133	117	96.7	71.8	44.7	21.2		
110	21.9	39.6	61.8	84.2	104	119	131	138	141	139	133	123	108	89.4	67.0	43.6	23.9		
115	26.6	40.9	59.2	78.5	96.2	110	121	127	130	129	123	114	100	83.2	63.4	43.9	28.1		
120	31.3	42.4	57.9	74.0	89.4	102	112	118	120	119	114	105	93.0	77.8	61.1	44.9	32.0		
125	35.8	44.2	57.4	70.8	83.6	94.5	103	109	111	109	105	97.2	86.5	73.7	60.0	45.9	35.8		
130	40.0	47.2	57.3	68.3	79.0	88.1	95.2	99.9	102	101	96.8	90.2	81.3	70.8	59.4	48.2	39.9		
135	43.7	49.5	57.1	66.6	75.3	82.8	88.7	92.5	94.1	93.2	89.9	84.5	77.2	68.6	58.6	49.8	43.6		
140	46.8	51.9	58.1	65.2	72.2	78.3	83.1	86.2	87.5	86.7	84.0	79.6	73.7	66.6	58.7	51.7	46.7		
145	49.8	52.9	57.7	64.2	69.7	74.5	78.3	80.8	81.9	81.2	79.1	75.5	70.7	64.6	58.8	53.4	49.4		
150	51.6	54.7	58.7	63.5	67.6	71.2	74.1	76.0	76.8	76.2	74.6	71.7	67.7	63.4	59.0	54.9	51.6		
155	50.0	54.1	57.3	62.1	65.9	68.4	70.5	71.7	72.2	71.7	70.3	68.3	65.6	62.5	59.3	56.2	53.3		
160	45.4	51.2	54.2	60.3	64.0	65.9	67.2	68.0	68.3	68.0	67.1	65.7	63.9	61.8	59.6	57.5	54.9		
165	40.1	43.9	48.4	52.6	59.7	63.5	64.4	65.0	65.2	64.9	64.4	63.7	62.6	61.2	59.7	58.1	57.6		
170	38.0	41.7	42.1	42.8	47.0	54.1	59.9	62.6	62.5	62.3	62.0	61.6	61.0	60.2	58.4	56.6	54.0		
175	40.6	41.9	42.3	40.1	38.0	39.2	43.9	51.8	59.0	59.7	58.9	58.7	58.4	57.3	55.5	53.2	50.7		
180	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5		

Table 7: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 23, 2017	Aug. 22, 2018
Digital Power Meter	PF2010A	HZTE028-01	Aug. 10, 2017	Aug. 09, 2018
AC Power Supply	DPS1060	HZTE001-06	Aug. 10, 2017	Aug. 09, 2018
DC Power Supply	WY12010	HZTE004-03	Aug. 10, 2017	Aug. 09, 2018
Temperature recorder	JM624U	HZTE018-08	Aug. 17, 2017	Aug. 16, 2018
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 16, 2017	Aug. 15, 2018
Standard source	D908	HZTE012-01	Aug. 20, 2017	Aug. 19, 2018
Integrate Sphere system	2M	HZTE015-01	Aug. 23, 2017	Aug. 22, 2018
Digital Power Meter	WT210	HZTE008-01	Aug. 10, 2017	Aug. 09, 2018
AC Power Supply	PCR 500L	HZTE001-07	Aug. 10, 2017	Aug. 09, 2018
DC Power Supply	IT6154	HZTE004-04	Aug. 10, 2017	Aug. 09, 2018
Standard source	SCL-1400	HZTE012-02	Aug. 20, 2017	Aug. 19, 2018
Temperature and humidity recorder	JR900	HZTE018-02	Aug. 16, 2017	Aug. 15, 2018
Temperature Meter	TES1310	HZTE017-01	Aug. 17, 2017	Aug. 16, 2018

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

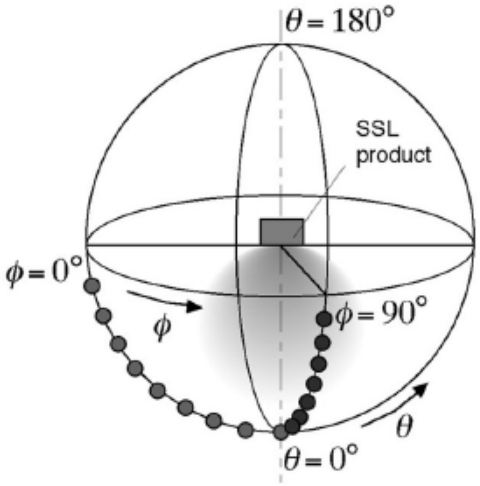
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as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