



## LM-79-08 Test Report

for

**Generpower(Shanghai)Co., Ltd.**

1501 Industrial Way N. Toms River, NJ 08755

**25W TROFFER**

**Model: ABBRT22D2541**

**Laboratory: Leading Testing Laboratories**

**NVLAP CODE: 200960-0**

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Report No.: HZ14100006a

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

Reviewed by:

*April Zou*

Engineer: April Zou  
Oct. 15, 2014



Approved by

*Jim Zhang*

Manager: Jim Zhang  
Oct. 15, 2014

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: ABBRT22D2541

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
98.5	2152.4	21.86	0.9861
CCT (K)	CRI	Stabilization Time (Light & Power)	
4044	82.3	60	

Table 1: Executive Data Summary

### Test specifications:

**Date of Receipt** : Oct. 14, 2014

**Date of Test** : Oct. 14, 2014

**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

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## Photos

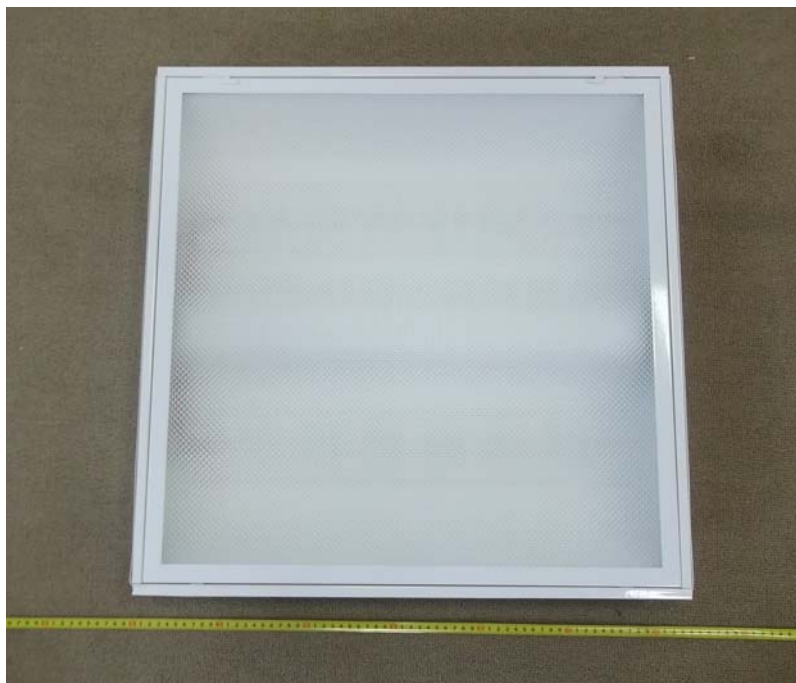


Figure 1- Overview of the sample

### Equipment Under Test (EUT)

<b>Name</b>	: 25W TROFFER
<b>Model</b>	: ABBRT22D2541
<b>Electrical Ratings</b>	: 100~277V AC, 50/60Hz, 25W
<b>Product Description</b>	: 4100K, 2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces Manufacturer of light source: EVERLIGHT Model of light source: EVERLIGHT (67-21 S/KK2C-HXXXXXXXXX2934Z6/2T) Quantity of LED light source: 144pcs
<b>Manufacturer</b>	: ABB Lighting (Shanghai) Co., Ltd.
<b>Address</b>	: Room 1012, North Minch Fortune 108 Plaza, # 1839 Qixin road, Shanghai

## TEST RESULTS

Test ambient temperature was 24.7°C.

Base orientation was Light down. 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 85 minutes.

Parameter	Result			Special Color Rendering Indices	
Test Voltage (V)	120.0	100.0	277.0	R1	80
Voltage frequency (Hz)	60	60	60	R2	86
Test Current (A)	0.185	0.225	0.088	R3	91
Power Factor	0.9861	0.9798	0.9191	R4	82
Test Power (W)	21.86	22.09	22.46	R5	80
THD A%	9.53	8.75	16.26	R6	81
Luminous Efficacy (lm/W)	98.5			R7	88
Total Luminous Flux (lm)	2152.4			R8	69
Color Rendering Index (CRI)	82.3			R9	17
R9	17			R10	68
Correlated Color Temperature (CCT) (K)	4044			R11	80
Chromaticity (Chroma x, Chroma y)	(0.3811, 0.3856)			R12	60
Chromaticity (Chroma u, Chroma v)	(0.2221, 0.3270)			R13	81
Chromaticity (Chroma u', Chroma v')	(0.2221, 0.5055)			R14	95
Duv	0.0039				
Average Beam Angle (°)	92.3				
Center Beam Candle Power (cd)	971				
Spacing Criteria	1.20 (0°-180°)/ 1.22 (90°-270°)				
Zonal Lumens in the 0°-60°Zone	86.81%				
Zonal Lumens in the 60°-90°Zone	13.06%				
Zonal Lumens in the 90°-120°Zone	0.06%				
Zonal Lumens in the 120°-180°Zone	0.07%				

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

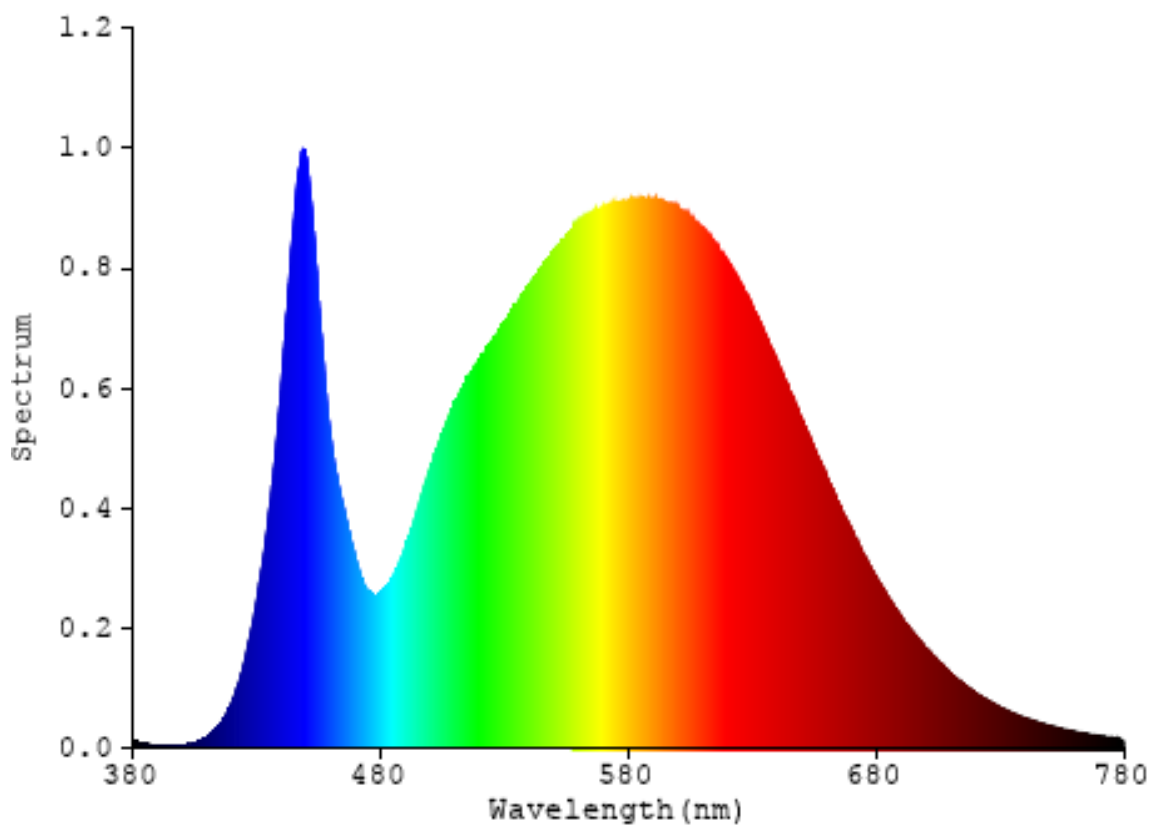


Chart 1: Spectral Power Distribution

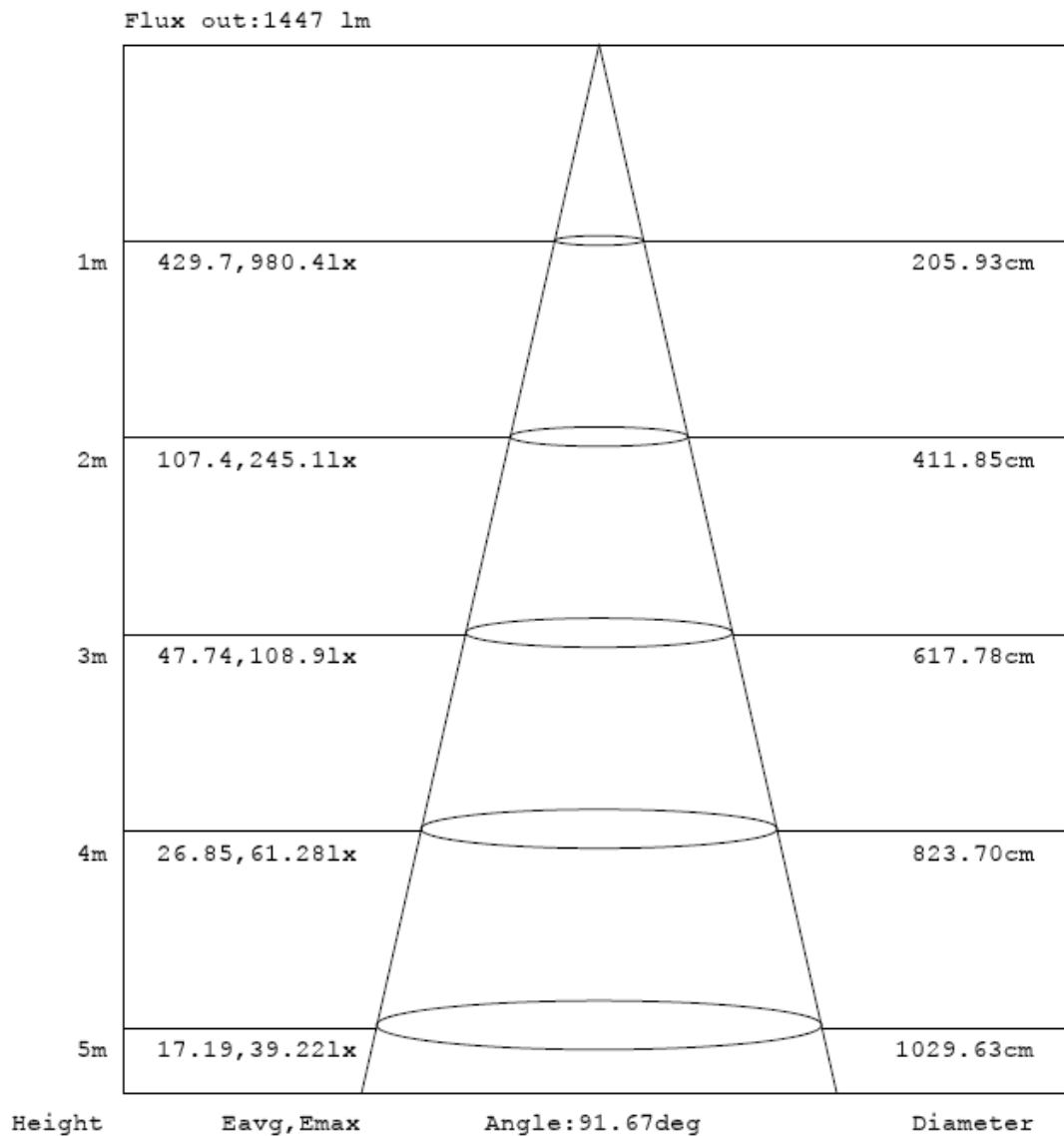
## Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	92.552	4.30%
10- 20	264.602	12.29%
20- 30	394.906	18.35%
30- 40	445.902	20.72%
40- 50	396.677	18.43%
50- 60	273.82	12.72%
60- 70	152.413	7.08%
70- 80	93.518	4.34%
80- 90	35.078	1.63%
90-100	0.486	0.02%
100-110	0.463	0.02%
110-120	0.449	0.02%
120-130	0.39	0.02%
130-140	0.367	0.02%
140-150	0.318	0.01%
150-160	0.246	0.01%
160-170	0.162	0.01%
170-180	0.056	0.00%
Total	2152.4	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	1868.459	86.81%
60- 90	281.009	13.06%
0-90	2149.468	99.86%
90- 180	2.937	0.14%
0- 180	2152.4	100%

Table 3: Zonal Lumen Data

## Illuminance Plots



**Note:** The Curves indicate the illuminated area and the average illumination when the luminaire is at different distance.

Chart 2: Beam Angle



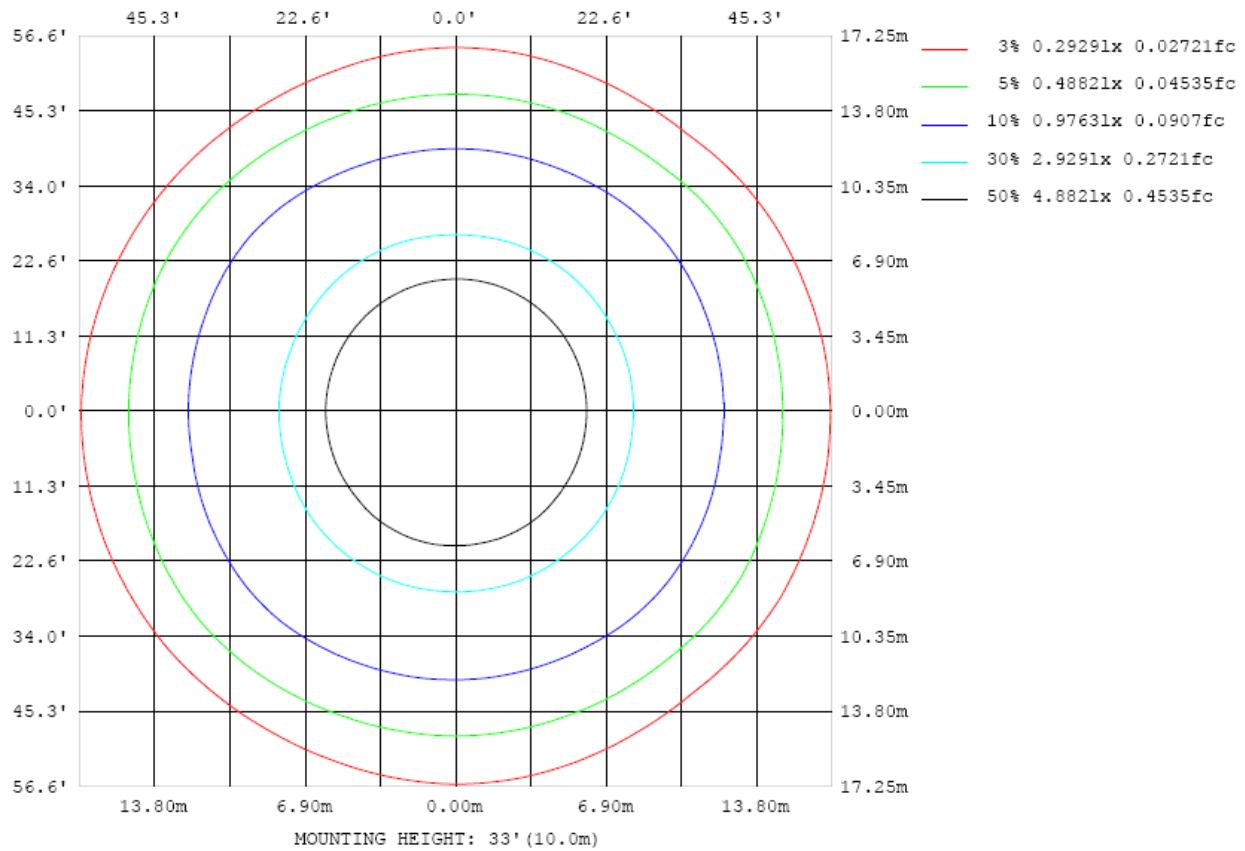


Chart 3: Illuminance Plot (Footcandles)

## Luminous Intensity Distribution Plots

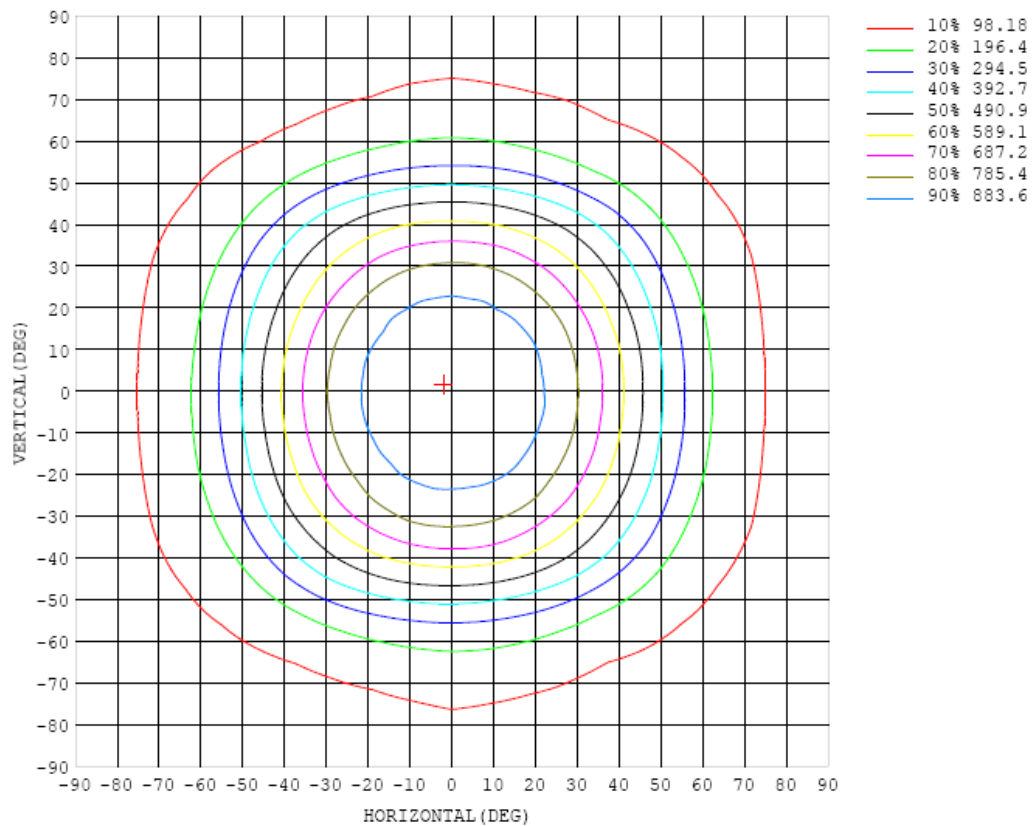


Chart 4: Isocandela Plot

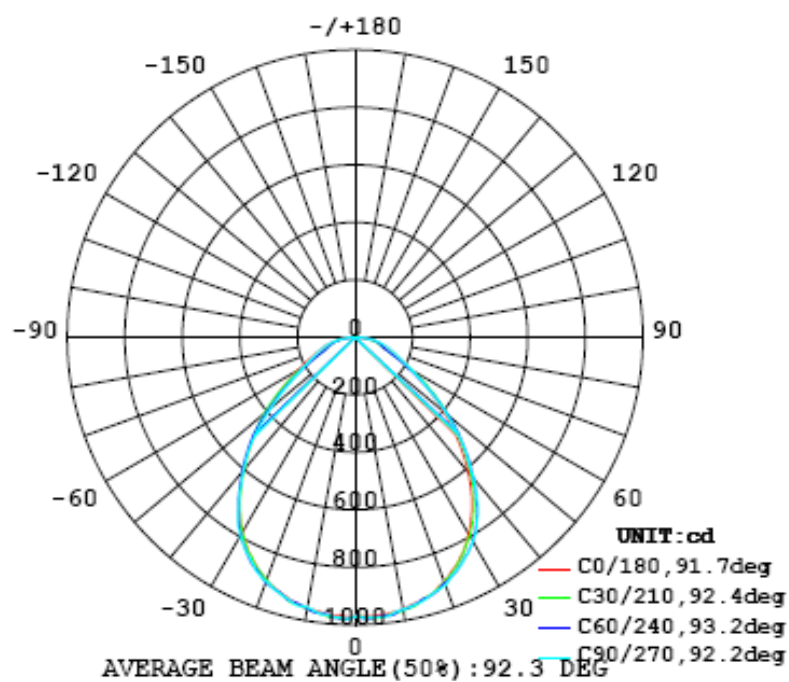


Chart 5: Polar Candela Distribution

## Luminous Intensity Data

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	971	971	971	971	971	971	971	971	971	971	971	971	971	971	971	971	971	971	971
5	968	970	977	979	977	975	975	977	978	978	979	978	976	973	976	977	976	969	969
10	959	963	965	965	969	962	961	959	960	959	960	959	959	963	962	964	959	961	956
15	940	943	944	939	939	940	939	943	942	944	943	944	941	937	937	941	937	936	932
20	904	907	906	906	907	911	910	915	914	917	911	909	908	907	904	905	904	900	899
25	855	858	856	858	863	869	871	872	873	873	874	870	867	865	857	854	850	848	848
30	789	791	794	796	805	815	819	819	818	819	818	816	813	807	798	788	785	781	783
35	708	709	714	720	731	737	740	741	742	744	742	742	740	731	722	711	703	701	701
40	611	613	620	628	632	635	641	642	641	640	641	643	640	636	629	620	610	605	605
45	507	509	517	524	530	536	534	533	532	531	533	535	537	537	531	522	510	502	501
50	404	406	415	421	429	431	422	415	415	415	418	422	430	437	431	422	412	401	401
55	309	311	316	323	322	314	309	306	306	306	307	310	317	326	329	322	316	309	308
60	227	228	227	227	220	212	214	220	225	226	223	219	217	219	224	224	226	227	226
65	170	166	153	148	145	140	145	156	168	172	165	154	146	142	143	145	154	166	169
70	130	123	111	104	103	100	106	117	129	137	128	114	105	101	103	105	112	125	132
75	98.3	96.3	84.1	82.6	84.6	84.7	89.3	91.4	98.8	107	95.1	85.8	86.1	83.7	84.6	83.9	87.2	95.8	100
80	67.4	72.1	63.8	61.6	62.8	63.7	69.5	67.8	75.0	75.2	70.0	62.4	65.4	59.7	63.6	62.9	67.0	70.1	67.0
85	38.2	41.5	36.9	30.1	33.4	36.1	34.7	37.1	43.6	39.6	41.7	33.0	33.4	35.2	33.9	30.6	37.3	39.6	36.5
90	2.25	2.72	2.97	2.11	2.13	2.15	1.81	3.76	5.35	3.72	5.26	2.16	1.75	2.23	1.87	2.06	4.06	4.01	0.41
95	0.44	0.69	0.53	0.43	0.41	0.31	0.21	0.13	0.10	0.10	0.12	0.17	0.26	0.37	0.49	0.59	0.61	0.69	0.54
100	0.40	0.70	0.51	0.37	0.46	0.35	0.23	0.16	0.11	0.11	0.13	0.19	0.29	0.43	0.56	0.55	0.70	0.71	0.58
105	0.41	0.64	0.57	0.35	0.39	0.33	0.25	0.18	0.14	0.14	0.16	0.22	0.31	0.40	0.48	0.61	0.81	0.80	0.69
110	0.42	0.63	0.56	0.38	0.39	0.31	0.26	0.21	0.17	0.18	0.19	0.25	0.31	0.39	0.50	0.67	0.88	0.94	0.82
115	0.45	0.62	0.59	0.41	0.40	0.33	0.28	0.24	0.21	0.21	0.22	0.28	0.35	0.42	0.54	0.67	0.88	0.73	0.50
120	0.48	0.59	0.58	0.43	0.41	0.37	0.32	0.27	0.25	0.25	0.27	0.32	0.38	0.46	0.56	0.65	0.79	0.83	0.55
125	0.51	0.59	0.51	0.45	0.42	0.40	0.37	0.31	0.29	0.30	0.31	0.35	0.42	0.49	0.56	0.63	0.54	0.69	0.50
130	0.46	0.58	0.48	0.53	0.42	0.43	0.41	0.36	0.33	0.35	0.36	0.40	0.45	0.50	0.55	0.67	0.55	0.73	0.48
135	0.52	0.56	0.46	0.47	0.50	0.46	0.42	0.41	0.38	0.40	0.41	0.43	0.46	0.53	0.60	0.49	0.62	0.70	0.51
140	0.53	0.53	0.56	0.46	0.51	0.49	0.46	0.43	0.42	0.44	0.45	0.46	0.50	0.55	0.56	0.48	0.65	0.68	0.52
145	0.57	0.61	0.62	0.54	0.44	0.46	0.49	0.47	0.47	0.48	0.48	0.48	0.51	0.50	0.45	0.46	0.55	0.57	0.55
150	0.61	0.62	0.63	0.55	0.50	0.44	0.43	0.48	0.49	0.50	0.50	0.49	0.42	0.45	0.56	0.51	0.59	0.61	0.58
155	0.53	0.56	0.57	0.58	0.57	0.52	0.43	0.42	0.42	0.42	0.42	0.43	0.46	0.57	0.62	0.62	0.53	0.54	0.52
160	0.58	0.61	0.62	0.61	0.57	0.52	0.46	0.46	0.50	0.51	0.54	0.55	0.57	0.60	0.63	0.64	0.61	0.54	0.57
165	0.57	0.61	0.60	0.58	0.55	0.50	0.49	0.51	0.54	0.55	0.58	0.59	0.61	0.63	0.64	0.65	0.65	0.62	0.55
170	0.56	0.57	0.56	0.56	0.55	0.53	0.54	0.54	0.57	0.58	0.58	0.61	0.62	0.64	0.63	0.58	0.55	0.55	0.57
175	0.61	0.63	0.64	0.66	0.66	0.66	0.65	0.65	0.64	0.63	0.65	0.57	0.57	0.58	0.60	0.60	0.61	0.61	0.61
180	0.61	0.62	0.61	0.61	0.61	0.60	0.59	0.55	0.55	0.57	0.54	0.55	0.57	0.60	0.61	0.63	0.65	0.65	0.61

Table 4: 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	971	971	971	971	971	971	971	971	971	971	971	971	971	971	971	971	971		
5	977	979	978	977	976	974	973	972	972	973	972	970	973	977	978	977	973		
10	961	961	958	958	960	958	955	956	953	958	957	955	960	961	958	962	964		
15	935	936	937	932	936	938	937	934	936	936	938	941	934	938	936	938	941		
20	898	901	898	900	905	907	901	900	904	902	901	906	904	905	903	903	900		
25	847	848	847	855	858	860	859	856	857	859	860	862	857	858	855	853	853		
30	781	783	784	790	791	793	797	796	796	798	799	799	796	794	794	792	790		
35	699	700	699	700	702	707	706	705	706	709	712	712	712	709	708	707	707		
40	601	598	600	605	611	610	611	606	604	606	610	611	612	612	609	611	614		
45	500	501	508	513	516	514	509	502	499	501	505	510	515	513	510	507	508		
50	402	404	411	416	411	396	386	382	381	382	384	393	405	412	409	405	406		
55	308	308	310	306	295	285	280	278	278	279	280	281	289	304	308	307	308		
60	223	216	209	203	197	194	197	202	205	203	197	194	194	205	212	217	224		
65	159	143	135	131	129	131	141	154	160	152	141	135	132	136	140	149	163		
70	120	107	101	96.0	96.4	101	108	122	128	119	110	105	99.7	102	104	110	123		
75	95.0	83.9	82.3	78.6	79.9	81.5	82.2	92.3	98.6	93.1	88.3	88.3	83.3	83.9	83.1	86.5	96.5		
80	72.1	62.1	59.8	55.3	53.8	56.9	57.2	64.7	65.9	68.3	62.9	64.2	57.8	59.4	59.6	66.5	72.5		
85	39.2	32.3	25.2	27.8	26.0	22.1	24.2	29.0	28.6	30.8	25.2	26.3	27.9	27.1	27.9	36.6	40.6		
90	0.57	0.73	0.42	0.41	0.32	0.23	0.17	0.13	0.13	0.14	0.19	0.25	0.35	0.40	0.54	0.50	0.64		
95	0.76	0.66	0.50	0.49	0.39	0.29	0.22	0.18	0.18	0.18	0.23	0.30	0.39	0.48	0.58	0.63	0.74		
100	0.87	0.69	0.47	0.54	0.42	0.32	0.24	0.20	0.19	0.21	0.25	0.34	0.44	0.53	0.52	0.64	0.69		
105	0.82	0.76	0.50	0.49	0.41	0.33	0.27	0.23	0.23	0.24	0.28	0.34	0.42	0.48	0.57	0.70	0.75		
110	0.84	0.78	0.53	0.51	0.39	0.33	0.27	0.24	0.24	0.25	0.29	0.34	0.41	0.49	0.58	0.71	0.76		
115	0.77	0.76	0.54	0.49	0.39	0.33	0.28	0.24	0.24	0.25	0.30	0.34	0.40	0.48	0.55	0.65	0.71		
120	0.79	0.72	0.54	0.47	0.37	0.33	0.27	0.24	0.24	0.24	0.29	0.33	0.38	0.45	0.53	0.56	0.64		
125	0.68	0.47	0.56	0.44	0.38	0.34	0.28	0.26	0.25	0.25	0.29	0.33	0.38	0.40	0.44	0.55	0.59		
130	0.70	0.61	0.55	0.43	0.39	0.36	0.31	0.30	0.30	0.29	0.33	0.37	0.39	0.45	0.46	0.49	0.54		
135	0.68	0.58	0.46	0.51	0.46	0.40	0.37	0.36	0.35	0.35	0.37	0.39	0.46	0.48	0.44	0.51	0.53		
140	0.66	0.61	0.54	0.47	0.47	0.46	0.42	0.42	0.41	0.40	0.41	0.42	0.47	0.47	0.50	0.54	0.48		
145	0.59	0.57	0.51	0.49	0.44	0.45	0.47	0.48	0.47	0.45	0.45	0.43	0.44	0.54	0.59	0.62	0.52		
150	0.63	0.61	0.50	0.54	0.54	0.45	0.45	0.45	0.43	0.42	0.43	0.48	0.54	0.54	0.60	0.64	0.55		
155	0.55	0.54	0.55	0.59	0.56	0.52	0.53	0.53	0.52	0.49	0.47	0.52	0.56	0.60	0.59	0.58	0.51		
160	0.55	0.56	0.58	0.59	0.58	0.57	0.54	0.57	0.56	0.54	0.49	0.51	0.55	0.60	0.63	0.64	0.57		
165	0.55	0.55	0.60	0.59	0.60	0.58	0.58	0.55	0.58	0.56	0.53	0.51	0.52	0.55	0.59	0.60	0.55		
170	0.57	0.58	0.59	0.59	0.59	0.61	0.62	0.60	0.61	0.60	0.57	0.55	0.53	0.55	0.57	0.56	0.56		
175	0.61	0.61	0.61	0.61	0.60	0.60	0.59	0.58	0.57	0.58	0.59	0.58	0.56	0.58	0.60	0.60	0.60		
180	0.61	0.61	0.61	0.61	0.60	0.60	0.60	0.57	0.55	0.56	0.54	0.54	0.56	0.60	0.61	0.62	0.64		

Table 5: Luminous Intensity Data

## EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Sep. 18, 2014	Sep. 17, 2015
Digital Power Meter	PF2010A	HZTE028-01	Sep. 18, 2014	Sep. 17, 2015
AC Power Supply	PCR 500L	HZTE001-08	Sep. 18, 2014	Sep. 17, 2015
DC Power Supply	WY12010	HZTE004-03	Sep. 18, 2014	Sep. 17, 2015
Temperature Meter	TES1310	HZTE017-01	Sep. 18, 2014	Sep. 17, 2015
Standard source	D908	HZTE012-01	Sep. 18, 2014	Sep. 17, 2015
Integrate Sphere system	2M	HZTE015-01	Sep. 18, 2014	Sep. 17, 2015
Digital Power Meter	WT210	HZTE008-01	Sep. 18, 2014	Sep. 17, 2015
AC Power Supply	PCR 500L	HZTE001-07	Sep. 18, 2014	Sep. 17, 2015
DC Power Supply	6154	HZTE004-04	Sep. 18, 2014	Sep. 17, 2015
Temperature and humidity recorder	JR900	HZTE018-01	Sep. 18, 2014	Sep. 17, 2015
Standard source	SCL-1400	HZTE012-02	Sep. 18, 2014	Sep. 17, 2015

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 expended uncertainty is 1.06% 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 1.94% with a coverage factor  $k=2$ .

### **Color Characteristics Measurements**

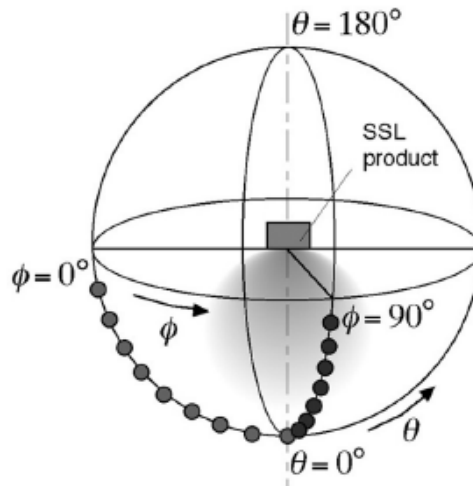
The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as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