Quality Assured

NVLAP LAB CODE 200960-0

LM-79-08 Test Report

for

ABBlighting, Inc.

3 Adams St Belvidere, NJ 07823.

WALLPACK

Model: ABBWP20501

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

No.1805, DongLiu road, BinJiang District, Hangzhou, China

Tel: +86-571-56680806

www.ledtestlab.com

Report No.: HZ15110008a

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

Reviewed by: April Zou

Engineer: April Zou

Nov. 13, 2015

Approved by: Jim Zhang

LEADING TESTING LABORATORIES

Manager: Jim Zhang

Nov. 13, 2015

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: **ABBWP20501**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
89.3	1725.7	19.33	0.9866

CCT (K)	CRI	Stabilization Time (Light & Power)
4858	75.2	60

Table 1: Executive Data Summary

Test specifications:

Date of Receipt	: Nov. 09, 2015
Date of Test	: Nov. 10, 2015
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

Sample Photo

Figure 1- Overview of the sample

Equipment Under Test (EUT)	
Name	: WALLPACK
Model	: ABBWP20501
Electrical Ratings	: 100~277Vac, 50/60Hz, 20W
Product Description	: 5000K, Outdoor Wall-Mounted Area Luminaires Manufacturer of light source: Philips Lumileds Model of light source: LUXEON 3030 2D Quantity of LED light source: 24pcs
Manufacturer	: ABB Lighting (shanghai) Co., Ltd.
Address	: Room 1012, North Minch Fortune 108 Plaza,# 1839 Qixin road, Shanghai

TEST RESULTS

Test ambient temperature was 25.3℃.

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		
Test Voltage (V)	120.0	100.0	277.0
Voltage frequency (Hz)	60	60	60
Test Current (A)	0.163	0.199	0.081
Power Factor	0.9866	0.9794	0.8957
Test Power (W)	19.33	19.50	20.16
THD A%	8.91	9.46	18.01
Luminous Efficacy (lm/W)	89.3	88.3	85.4
Total Luminous Flux (lm)	1725.7	1721.3	1721.8
Color Rendering Index (CRI)	75.2		
R9	-16		
Correlated Color Temperature (CCT) (K)	4858		
Chromaticity (Chroma x, Chroma y)	(0.3496, 0.3586)		
Chromaticity (Chroma u, Chroma v)	(0.2118, 0.3258)		
Chromaticity (Chroma u', Chroma v')	(0.2118, 0.4887)		
Duv	0.0017		
Average Beam Angle (°)	106.2		
Center Beam Candle Power (cd)	347		
Spacing Criteria	0.46 (0°-180°)/ 1.15 (90°-270°)		
Zonal Lumens in the 0°-60°Zone	50.46%		
Zonal Lumens in the 60°-90°Zone	32.76%		
Zonal Lumens in the 90°-120°Zone	14.19%		
Zonal Lumens in the 120°-180°Zone	2.59%		

Special Color Rendering Indices	
R1	73
R2	82
R3	86
R4	73
R5	72
R6	72
R7	85
R8	60
R9	-16
R10	54
R11	67
R12	40
R13	75
R14	92

Table 2: Test data per Goniophotometer 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

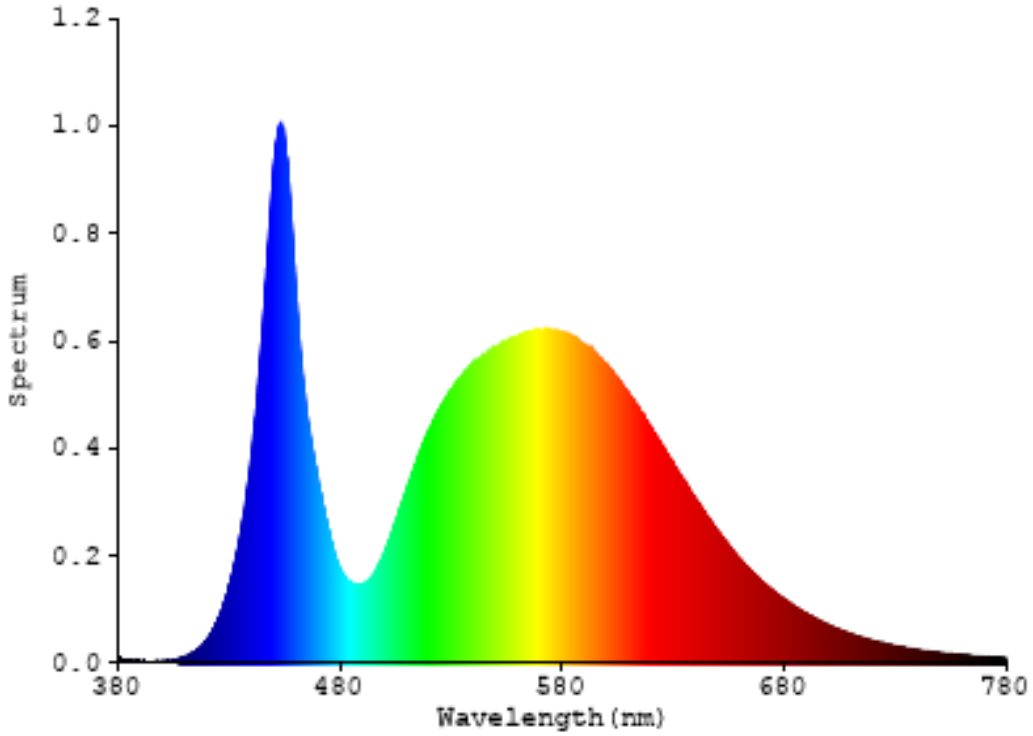


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

γ(°)	Lumens	% Total
0- 10	32.135	1.86%
10- 20	99.188	5.75%
20- 30	156.775	9.08%
30- 40	178.856	10.36%
40- 50	188.001	10.89%
50- 60	215.723	12.50%
60- 70	207.856	12.04%
70- 80	196.649	11.40%
80- 90	160.91	9.32%
90-100	118.769	6.88%
100-110	77.728	4.50%
110-120	48.419	2.81%
120-130	25.621	1.48%
130-140	11.645	0.67%
140-150	5.323	0.31%
150-160	1.831	0.11%
160-170	0.236	0.01%
170-180	0.035	0.00%
Total	1725.7	100%

γ(°)	Lumens	% Total
0- 60	870.678	50.46%
60- 90	565.415	32.76%
0-90	1436.093	83.22%
90- 180	289.607	16.78%
0- 180	1725.7	100%

Table 3: Zonal Lumen Data

Illuminance Plots

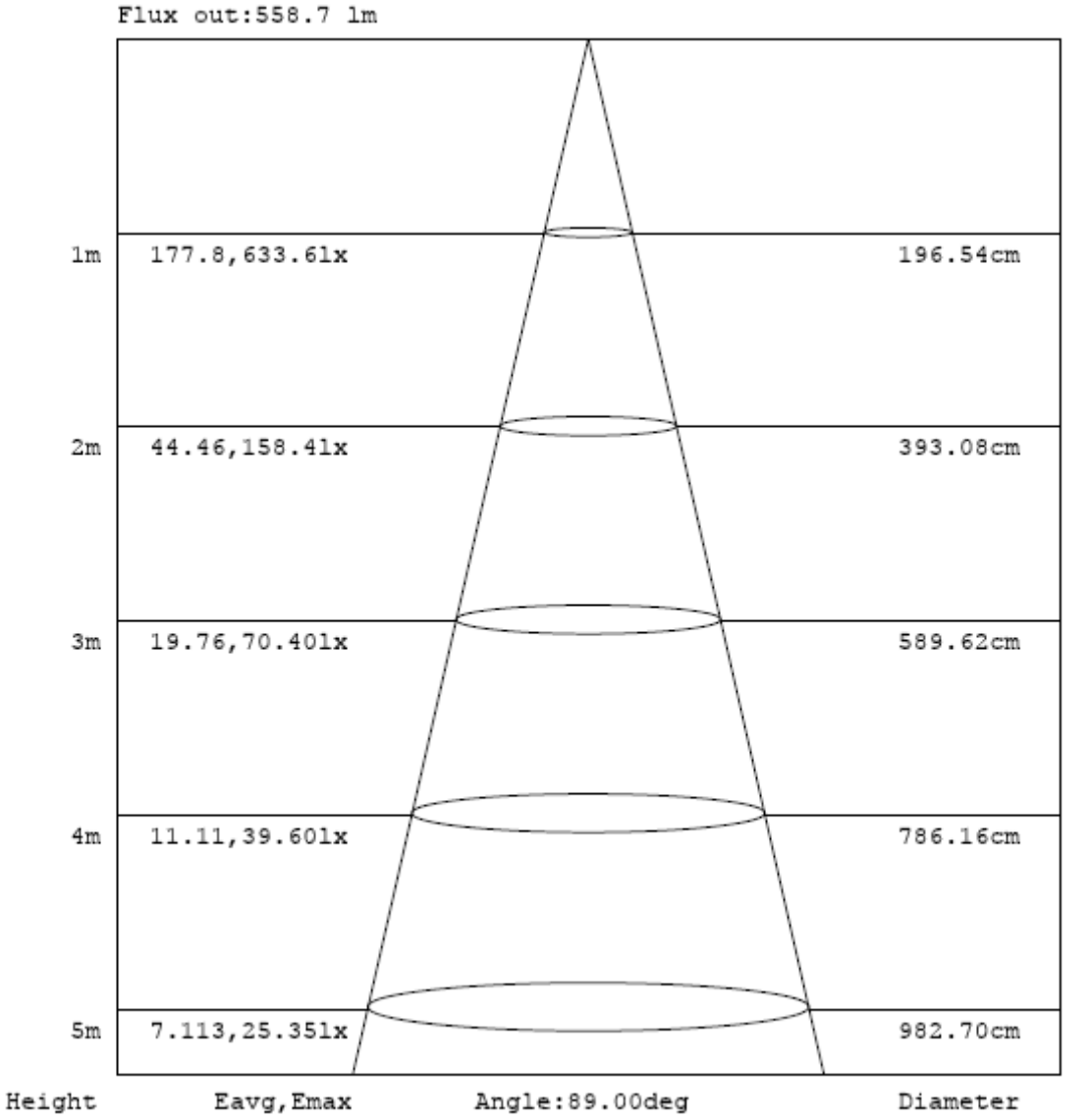


Chart 2: Beam Angle

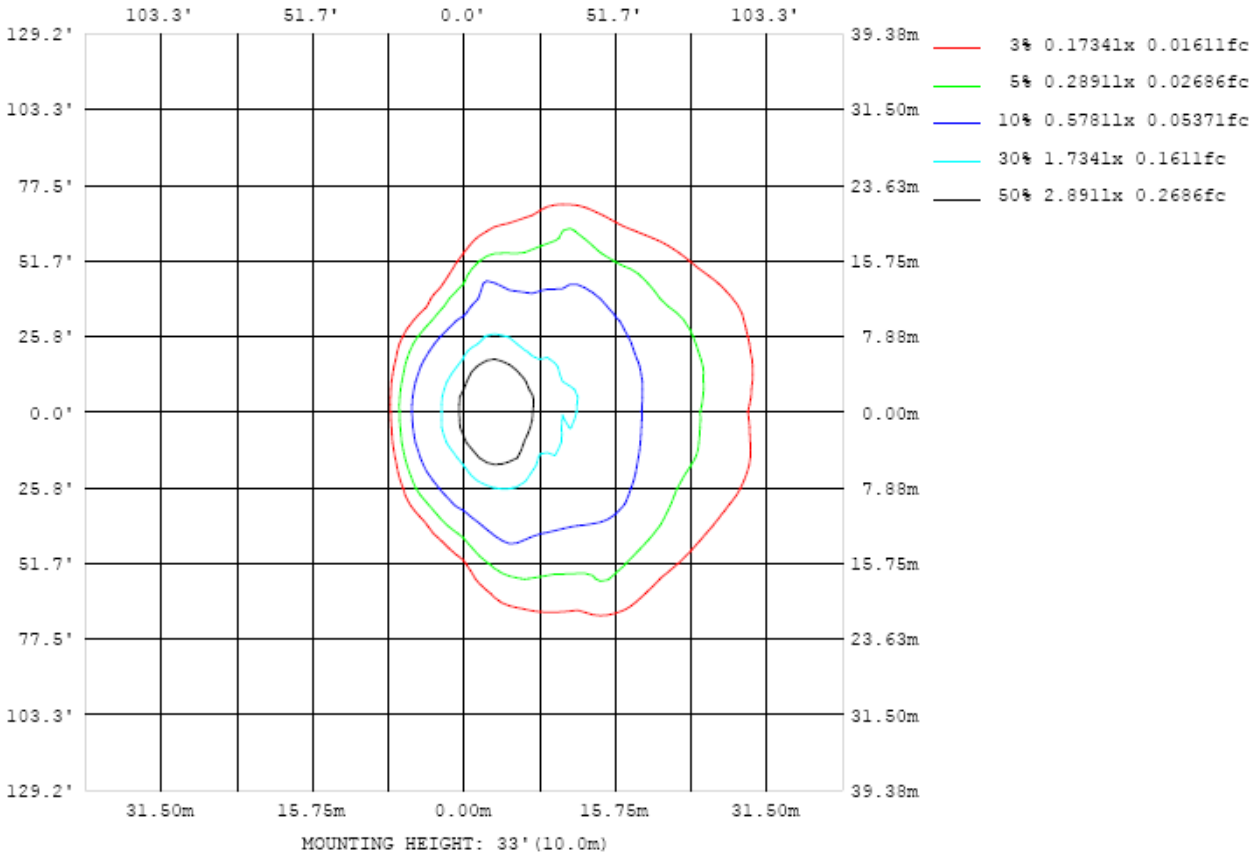


Chart 3: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

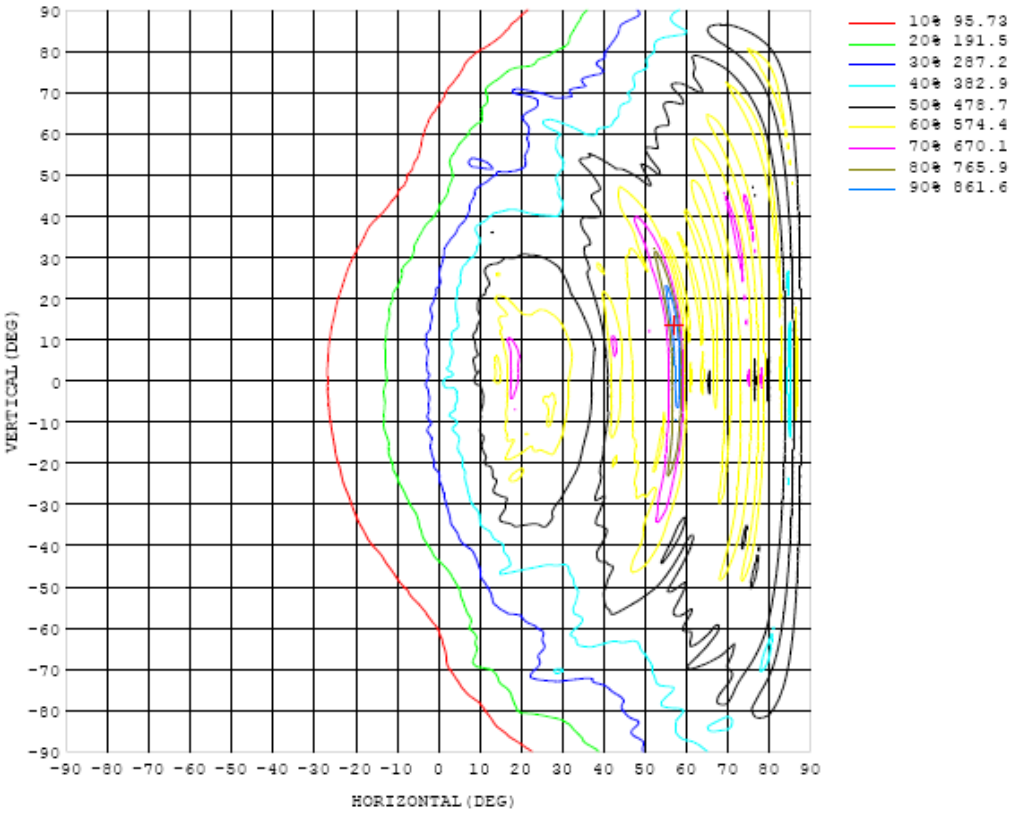


Chart 4: Isocandela Plot

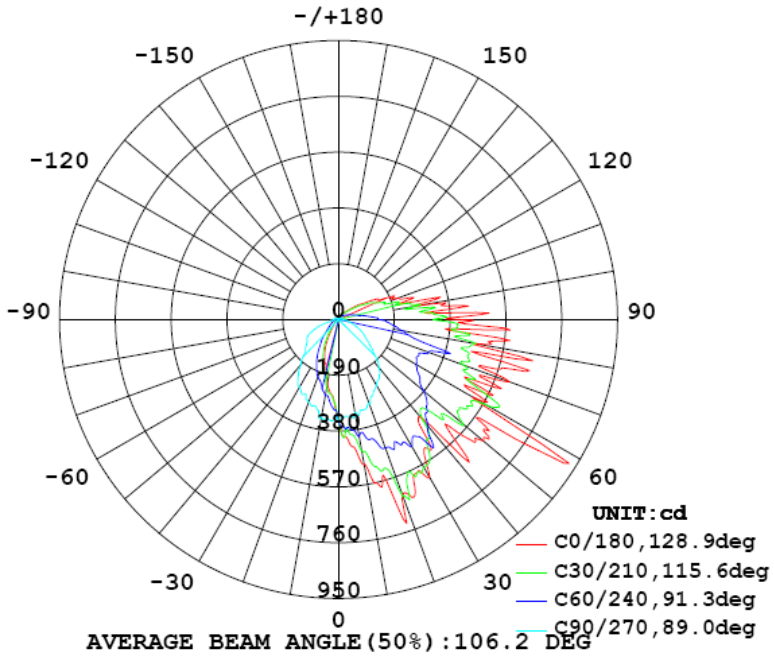


Chart 5: Polar Candela Distribution

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	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347
5	421	421	398	384	376	368	368	370	357	331	313	298	280	273	271	263	256	262	258
10	500	466	442	454	435	407	404	378	359	321	291	274	270	258	247	230	227	219	219
15	578	518	534	525	506	469	422	384	358	321	273	249	243	220	206	194	178	174	167
20	639	606	665	641	527	511	465	394	349	304	249	229	211	187	167	157	148	142	141
25	606	594	618	571	639	560	458	414	347	279	233	202	181	158	140	125	116	110	109
30	619	605	590	582	539	595	499	418	340	258	206	175	150	124	107	92.5	80.7	74.1	73.5
35	543	527	510	529	565	508	493	402	326	242	181	146	120	95.7	77.3	62.8	50.7	44.4	43.8
40	433	427	446	450	483	489	474	375	293	215	157	118	93.8	69.6	51.0	37.6	29.4	26.3	26.1
45	523	524	531	447	422	453	423	358	250	178	131	91.2	71.0	48.6	32.6	24.9	23.1	22.0	20.8
50	644	625	546	556	427	395	379	358	225	142	102	67.9	51.8	34.1	24.0	20.1	18.7	17.2	16.6
55	584	558	580	532	487	377	337	332	216	116	77.2	50.6	39.4	26.8	18.8	15.7	13.2	11.9	12.4
60	527	617	718	587	488	388	305	277	207	97.4	57.9	40.9	30.6	23.6	15.0	10.3	9.19	8.54	8.79
65	480	528	462	482	514	401	297	246	190	78.2	43.2	34.1	24.8	17.8	11.1	6.59	5.53	4.37	4.70
70	618	565	522	451	394	384	325	226	187	59.8	35.4	29.0	19.0	11.7	5.76	2.35	0.42	0.22	0.51
75	673	613	529	460	360	304	295	222	128	42.4	29.9	24.0	15.3	7.23	1.99	0.22	0.21	0.25	0.60
80	472	516	517	473	327	260	222	203	80.4	30.9	25.4	20.1	11.8	5.10	1.49	0.21	0.25	0.28	0.67
85	364	439	501	385	298	233	179	135	51.2	21.3	20.2	16.6	10.4	3.95	1.00	0.25	0.29	0.32	0.70
90	415	425	443	322	292	199	139	80.7	33.3	14.6	16.4	14.4	8.65	3.05	0.72	0.29	0.33	0.35	0.73
95	326	295	420	288	245	167	112	57.4	21.5	12.6	13.6	11.9	6.86	2.31	0.56	0.32	0.36	0.39	0.74
100	274	342	302	272	213	134	82.0	38.5	18.7	12.1	11.7	10.4	4.98	1.70	0.47	0.35	0.40	0.42	0.74
105	222	214	267	201	167	95.8	61.4	33.1	18.2	13.2	11.0	8.97	3.79	1.26	0.42	0.38	0.42	0.45	0.74
110	212	210	196	168	130	80.6	47.1	29.3	18.5	14.5	11.3	7.22	2.85	0.96	0.39	0.40	0.44	0.47	0.70
115	160	174	163	135	97.6	63.3	39.3	26.7	17.6	14.9	11.4	5.16	2.07	0.73	0.37	0.40	0.44	0.47	0.63
120	131	132	121	105	78.0	49.8	31.0	24.2	16.2	14.1	9.23	3.81	1.45	0.55	0.37	0.41	0.44	0.47	0.55
125	92.7	90.6	84.8	76.1	57.0	38.6	26.1	20.7	14.2	12.0	6.63	2.82	1.12	0.45	0.37	0.41	0.44	0.45	0.49
130	64.2	63.3	58.2	53.3	44.0	30.5	21.9	16.4	10.9	8.52	4.41	1.91	0.78	0.39	0.37	0.40	0.42	0.43	0.47
135	44.3	45.1	41.2	37.3	31.9	23.8	18.5	11.9	7.55	5.44	2.84	1.29	0.55	0.34	0.36	0.38	0.40	0.41	0.46
140	32.2	32.9	30.2	26.7	23.3	19.2	14.7	7.93	5.22	3.36	1.80	0.81	0.39	0.33	0.36	0.38	0.39	0.41	0.46
145	25.8	26.3	23.8	21.3	18.6	15.0	9.84	4.57	3.38	2.11	1.10	0.53	0.33	0.33	0.36	0.38	0.40	0.41	0.46
150	19.3	20.4	19.0	16.8	14.0	10.0	5.09	2.48	1.92	1.14	0.62	0.36	0.32	0.34	0.36	0.38	0.39	0.40	0.44
155	13.0	13.6	12.9	11.1	8.38	4.46	1.20	1.14	0.88	0.52	0.35	0.31	0.33	0.34	0.36	0.37	0.38	0.40	0.42
160	7.89	8.04	7.15	5.07	2.23	0.10	0.38	0.36	0.34	0.30	0.31	0.33	0.35	0.37	0.38	0.38	0.39	0.40	0.40
165	0.96	0.69	0.35	0.18	0.26	0.27	0.28	0.30	0.31	0.32	0.33	0.34	0.35	0.36	0.39	0.42	0.43	0.39	0.39
170	0.26	0.26	0.27	0.28	0.29	0.30	0.32	0.33	0.34	0.35	0.36	0.37	0.37	0.38	0.38	0.39	0.40	0.40	0.40
175	0.30	0.30	0.31	0.32	0.33	0.34	0.36	0.37	0.38	0.39	0.40	0.41	0.42	0.43	0.43	0.44	0.44	0.45	0.44
180	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38

Table 4: 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	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347		
5	252	255	261	269	280	294	305	322	345	365	376	381	386	394	400	401	410		
10	223	228	234	238	245	262	281	303	336	354	393	410	419	449	488	482	477		
15	174	180	191	210	222	228	246	277	305	352	389	440	493	529	566	580	583		
20	142	148	154	164	184	208	227	260	299	361	445	485	514	577	673	711	646		
25	109	115	123	134	154	179	198	232	282	365	435	489	627	602	594	638	639		
30	76.4	82.9	92.2	107	123	146	175	202	265	357	417	570	528	556	580	600	626		
35	45.9	51.8	61.4	76.7	95.0	112	147	183	242	320	402	460	503	514	547	562	566		
40	27.8	32.1	39.7	51.4	69.4	89.0	115	147	200	282	417	438	448	465	443	458	465		
45	21.0	22.8	26.9	36.3	50.0	63.4	81.1	115	164	265	375	384	390	439	504	594	580		
50	16.9	17.6	19.9	27.7	36.5	46.8	58.8	96.2	147	245	312	325	376	513	505	576	660		
55	13.1	14.8	17.2	22.3	27.5	37.1	46.5	72.2	131	273	268	300	450	489	561	579	600		
60	8.37	9.09	12.6	17.4	22.9	30.6	37.5	55.4	124	205	241	325	472	551	635	624	580		
65	4.71	4.92	6.94	11.5	18.4	25.8	32.1	39.2	106	183	239	411	407	441	478	559	584		
70	0.49	0.63	2.48	6.51	12.9	20.7	27.6	29.3	79.3	169	264	305	332	423	507	571	606		
75	0.57	0.53	1.09	3.63	8.94	16.8	23.4	23.1	41.3	140	221	258	299	397	489	630	672		
80	0.64	0.58	0.82	2.73	7.38	14.1	20.2	18.0	25.8	99.0	161	206	299	391	509	575	496		
85	0.67	0.61	0.66	1.96	5.76	11.5	16.7	14.9	17.3	56.0	120	173	259	353	473	484	420		
90	0.70	0.64	0.60	1.48	4.28	9.64	13.4	12.9	13.3	33.9	87.3	141	226	302	401	435	474		
95	0.72	0.66	0.59	1.08	3.16	7.53	11.5	12.0	12.5	26.3	61.9	108	185	257	365	313	314		
100	0.73	0.67	0.60	0.87	2.23	6.03	9.79	11.5	13.5	25.2	46.6	87.9	146	237	289	336	345		
105	0.72	0.66	0.59	0.70	1.68	4.44	9.27	11.6	14.6	24.5	39.4	70.1	120	182	219	227	229		
110	0.68	0.62	0.55	0.59	1.29	3.46	7.45	11.9	14.9	22.8	33.7	57.9	93.8	153	178	208	226		
115	0.61	0.55	0.50	0.47	0.95	2.40	5.63	11.1	14.3	21.0	29.1	46.1	77.5	121	154	170	180		
120	0.53	0.48	0.44	0.39	0.65	1.60	4.09	8.74	12.5	18.2	25.6	37.4	61.7	93.7	112	133	143		
125	0.47	0.44	0.40	0.36	0.47	1.15	2.81	6.07	9.76	14.0	21.5	30.8	47.8	68.3	78.8	98.1	101		
130	0.45	0.43	0.40	0.37	0.40	0.79	1.94	4.12	6.73	9.83	17.7	25.2	37.4	48.2	55.0	65.4	70.9		
135	0.46	0.44	0.42	0.39	0.36	0.58	1.27	2.73	4.59	6.83	13.8	21.0	27.6	33.8	40.5	46.5	49.1		
140	0.46	0.45	0.43	0.41	0.38	0.43	0.81	1.71	2.98	4.64	9.83	17.0	22.3	26.4	30.8	34.6	34.3		
145	0.46	0.46	0.44	0.42	0.40	0.37	0.51	1.00	1.78	2.75	5.09	12.6	18.2	22.1	25.0	27.7	26.9		
150	0.44	0.43	0.42	0.41	0.40	0.37	0.37	0.53	0.90	1.41	2.37	7.05	12.7	16.9	19.5	20.9	19.9		
155	0.42	0.41	0.40	0.39	0.39	0.39	0.36	0.35	0.41	0.56	0.64	1.64	6.45	10.4	12.7	13.8	13.5		
160	0.38	0.38	0.38	0.37	0.44	0.39	0.36	0.36	0.36	0.35	0.34	0.27	0.81	4.07	6.96	8.45	8.35		
165	0.36	0.36	0.38	0.42	0.41	0.36	0.37	0.38	0.39	0.39	0.38	0.37	0.36	0.35	0.29	1.30	1.33		
170	0.39	0.37	0.35	0.35	0.36	0.36	0.37	0.39	0.40	0.41	0.42	0.42	0.41	0.40	0.39	0.37	0.26		
175	0.46	0.37	0.33	0.33	0.33	0.33	0.34	0.36	0.38	0.40	0.42	0.42	0.42	0.43	0.39	0.30	0.30		
180	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38		

Table 5: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Jul. 17, 2015	Jul. 16, 2016
Digital Power Meter	PF2010A	HZTE028-01	Jul. 17, 2015	Jul. 16, 2016
AC Power Supply	PCR 500L	HZTE001-08	Jul. 17, 2015	Jul. 16, 2016
DC Power Supply	WY12010	HZTE004-03	Jul. 17, 2015	Jul. 16, 2016
Temperature Meter	TES1310	HZTE017-01	Jul. 17, 2015	Jul. 16, 2016
Standard source	D908	HZTE012-01	Jul. 23, 2015	Jul. 22, 2016
Standard source	SCL-1400	HZTE012-02	Oct. 21, 2015	Oct. 20, 2016

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.

Goniophotometer Method

Photometric and Electrical Measurements

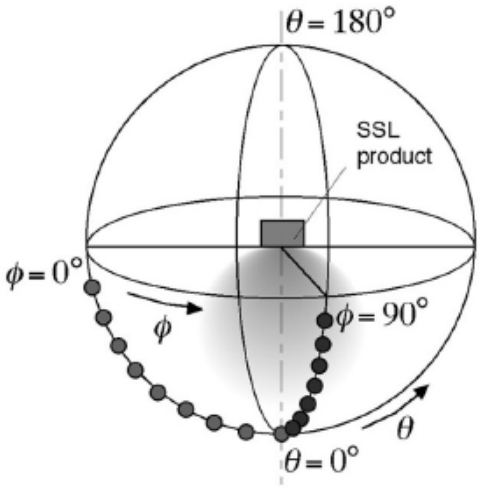
An EVERFINE Type C Model GO-R5000 Goniophotometer was used to measure the intensity at each angle of distribution for each sample. The photometric distance is 2.475m for near-field measurement or 30m for far-field measurement. Bandwidth of spectroradiometer is 380nm-780nm.
Ambient temperature was measured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