NVLAP LAB CODE 200960-0

LM-79-08 Test Report

for

Maxlite Inc.

12 York Ave West Caldwell NJ 07006

LED Wall Pack

Model: WPL40AU50B

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ15040014a/R2

This report is replaced the old report No. HZ15040014a/R1 dated Aug. 27, 2015

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

Reviewed by: April Zou

Engineer: April Zou

Sep. 09, 2015

Approved by: Jim Zhang

Manager: Jim Zhang

Sep. 09, 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: **WPL40AU50B**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
91.6	3480.4	37.99	0.9907

CCT (K)	CRI	Stabilization Time (Light & Power)
5257	84.0	60

Table 1: Executive Data Summary

Test specifications:

Date of Receipt	: Apr. 20, 2015
Date of Test	: Apr. 22, 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

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Photos

Figure 1- Overview of the sample

Equipment Under Test (EUT)	
Name	: LED Wall Pack
Model	: WPL40AU50B
Electrical Ratings	: 120~277Vac, 50/60Hz, 40W
Product Description	: 5000K, Outdoor Wall-Mounted Area Luminaires Manufacturer of light source: SAMSUNG Model of light source: LM561B Quantity of LED light source: 100pcs Driver model: XEL-A048B-042-C1X10-PA01
Manufacturer	: MaxLite Inc.
Address	: 12 York Ave West Caldwell, NJ 07006

TEST RESULTS

Test ambient temperature was 25.2℃.

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	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.319	0.145
Power Factor	0.9907	0.9421
Test Power (W)	37.99	37.92
THD A%	10.39	15.69
Luminous Efficacy (lm/W)	91.6	92.4
Total Luminous Flux (lm)	3480.4	3504.2
Color Rendering Index (CRI)	84.0	
R9	16	
Correlated Color Temperature (CCT) (K)	5257	
Chromaticity (Chroma x, Chroma y)	(0.3383, 0.3465)	
Chromaticity (Chroma u, Chroma v)	(0.2088, 0.3207)	
Chromaticity (Chroma u', Chroma v')	(0.2088, 0.4811)	
Duv	0.0002	
Average Beam Angle (°)	82.5	
Center Beam Candle Power (cd)	1293	
Spacing Criteria	0.33 (0°-180°)/ 1.16 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	69.35%	
Zonal Lumens in the 60°-90°Zone	27.44%	
Zonal Lumens in the 90°-120°Zone	2.50%	
Zonal Lumens in the 120°-180°Zone	0.71%	

Special Color Rendering Indices	
R1	83
R2	87
R3	91
R4	85
R5	85
R6	83
R7	87
R8	71
R9	16
R10	70
R11	86
R12	69
R13	84
R14	95

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

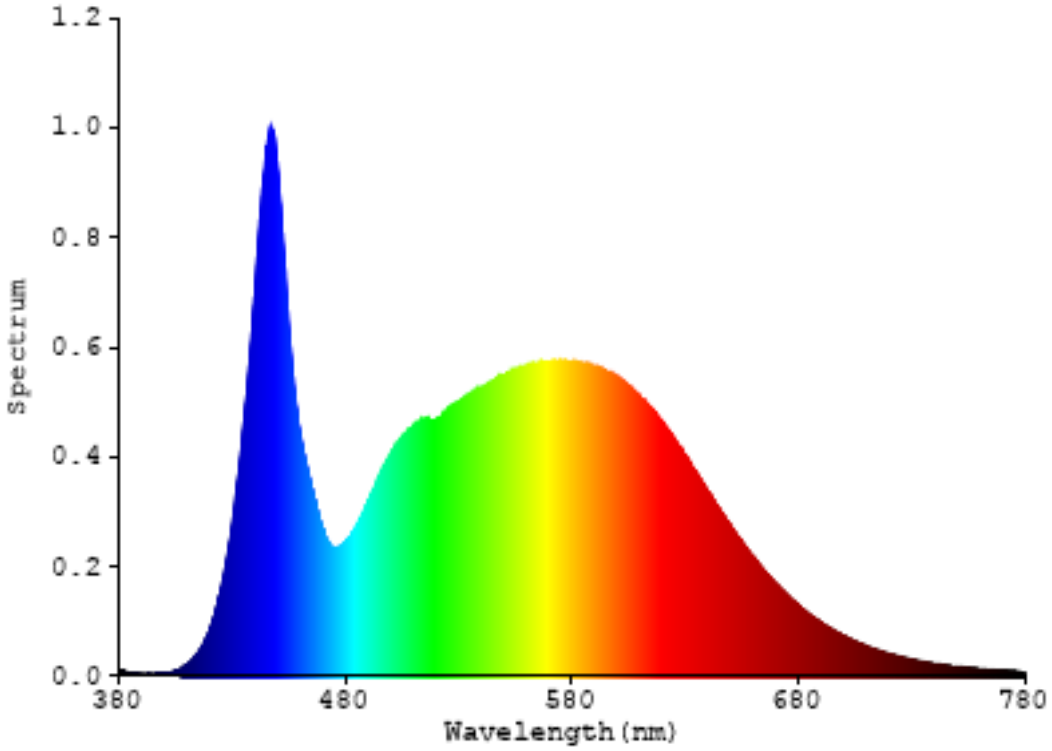


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

γ(°)	Lumens	% Total
0- 10	120.765	3.47%
10- 20	318.348	9.15%
20- 30	434.734	12.49%
30- 40	492.293	14.14%
40- 50	527.816	15.17%
50- 60	519.819	14.94%
60- 70	451.268	12.97%
70- 80	325.719	9.36%
80- 90	177.91	5.11%
90-100	39.473	1.13%
100-110	30.514	0.88%
110-120	17.097	0.49%
120-130	12.475	0.36%
130-140	7.245	0.21%
140-150	3.304	0.09%
150-160	1.227	0.04%
160-170	0.292	0.01%
170-180	0.078	0.00%
Total	3480.4	100%

γ(°)	Lumens	% Total
0- 60	2413.775	69.35%
60- 90	954.897	27.44%
0-90	3368.672	96.79%
90- 180	111.705	3.21%
0- 180	3480.4	100%

Table 3: Zonal Lumen Data

Illuminance Plots

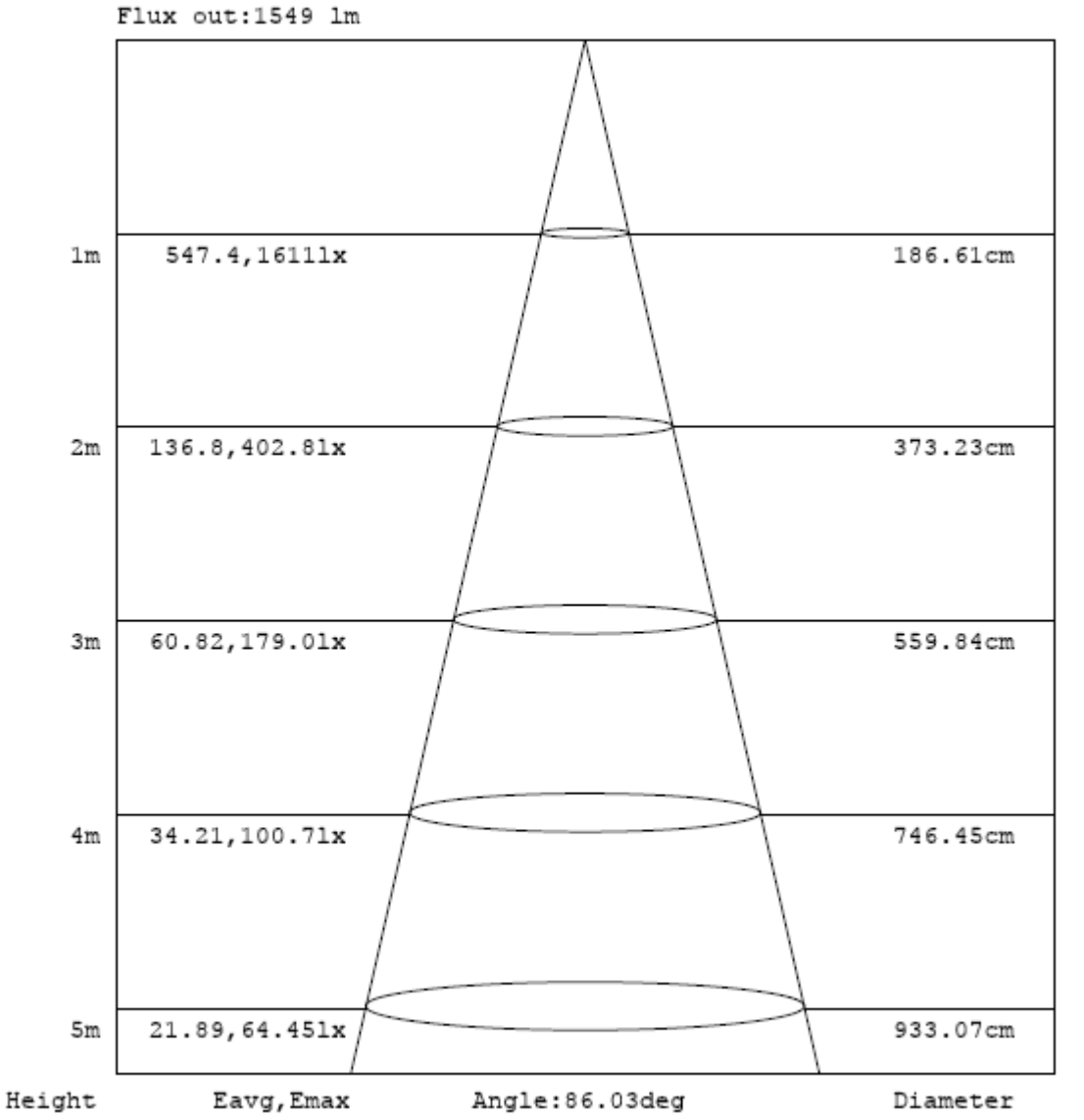


Chart 2: Beam Angle

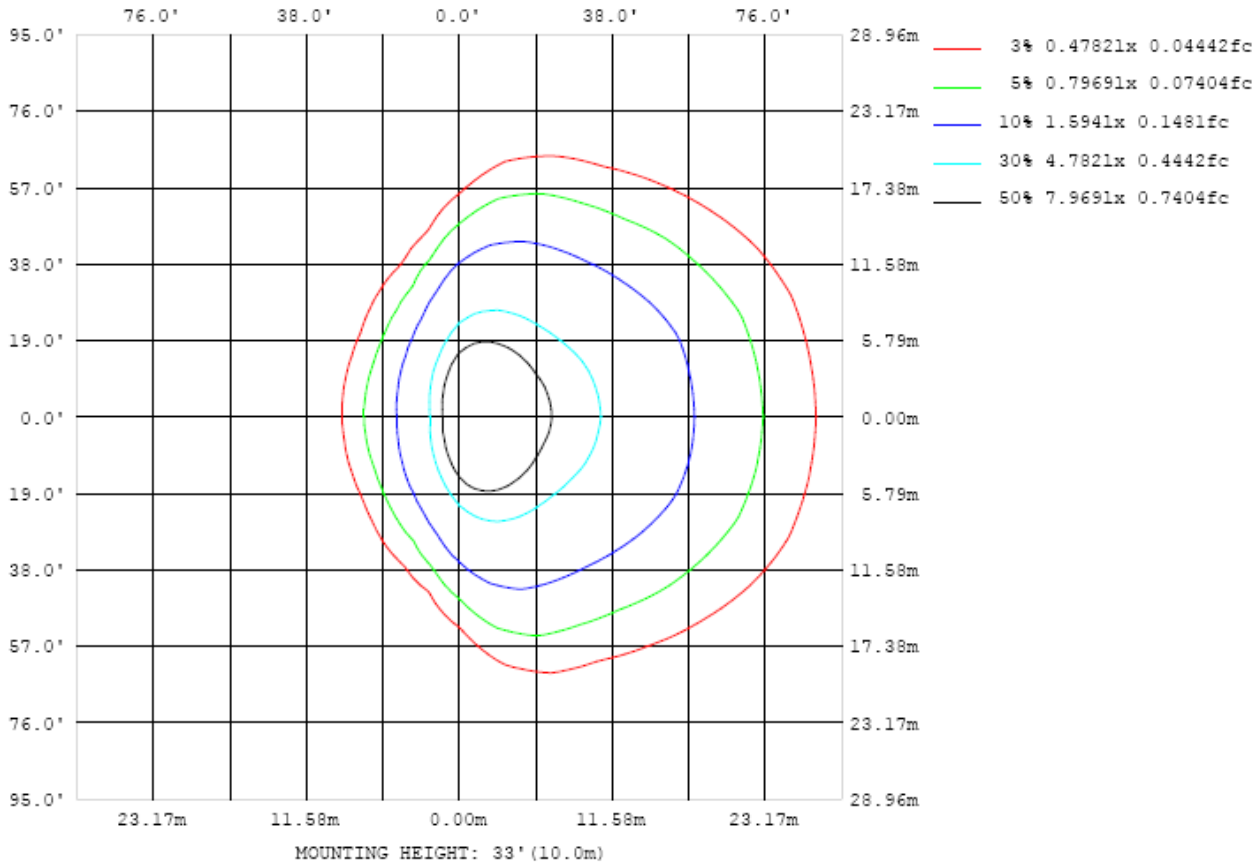


Chart 3: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

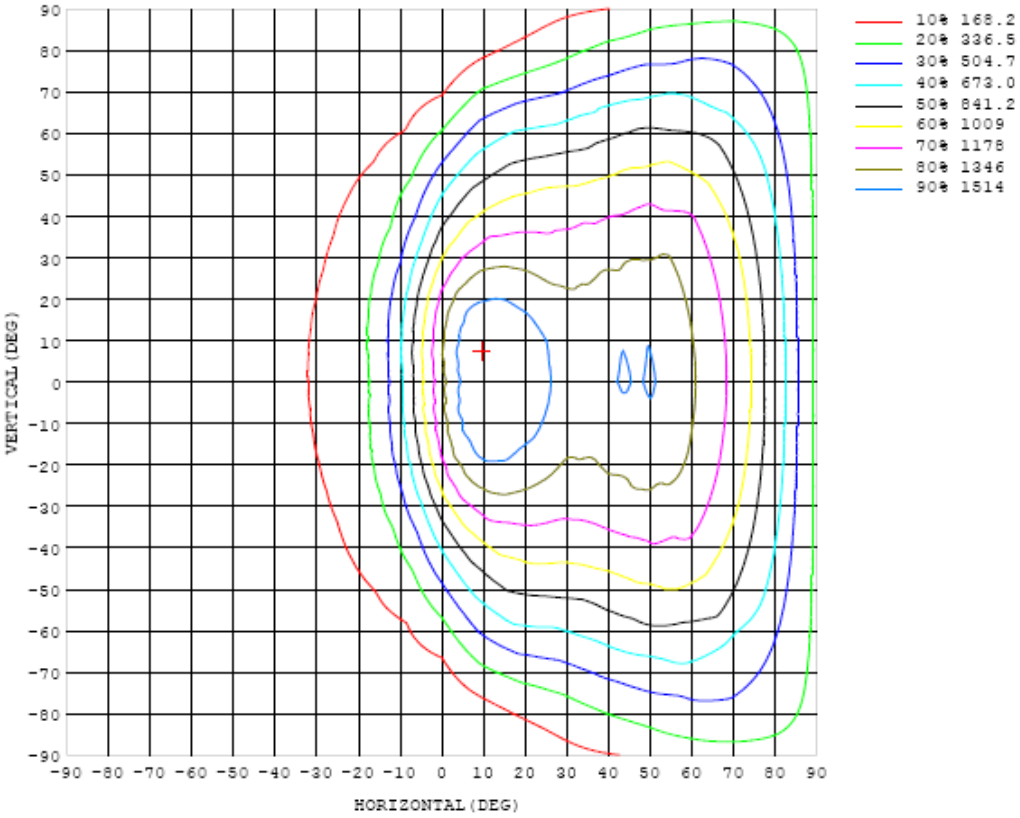


Chart 4: Isocandela Plot

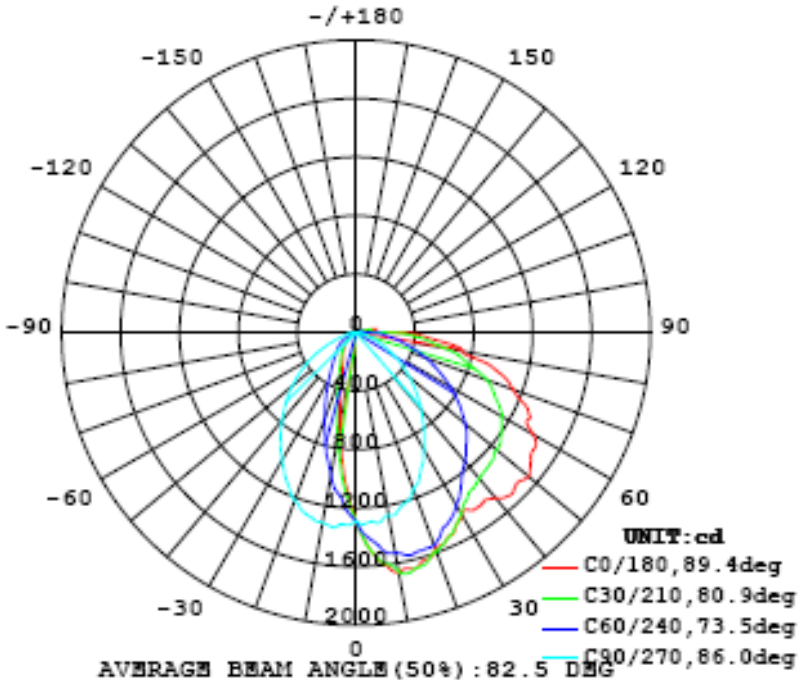


Chart 5: Polar Candela Distribution

Luminous Intensity Data

Table--1 UNIT: cd

γ (DEG) \ C (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293
5	1540	1547	1548	1531	1507	1472	1437	1405	1351	1294	1240	1180	1123	1077	1050	1021	994	974	965
10	1660	1677	1667	1654	1633	1589	1528	1446	1370	1267	1154	1045	950	866	786	714	672	649	641
15	1649	1669	1667	1657	1627	1637	1557	1470	1364	1221	1054	896	757	645	552	495	444	421	413
20	1574	1588	1610	1591	1602	1564	1546	1447	1315	1139	934	736	591	472	399	338	308	286	279
25	1526	1520	1532	1525	1503	1498	1450	1387	1243	1039	798	591	452	354	293	253	234	220	218
30	1437	1441	1425	1428	1415	1390	1361	1286	1137	921	663	471	345	276	228	203	192	185	183
35	1453	1428	1388	1337	1321	1289	1248	1178	1024	802	539	368	269	217	185	166	156	154	153
40	1476	1442	1368	1304	1231	1209	1151	1073	919	687	437	286	218	177	150	136	129	124	123
45	1519	1474	1394	1278	1186	1106	1059	978	814	580	347	225	182	145	119	107	99.5	93.5	92.8
50	1530	1484	1377	1246	1130	1029	966	882	716	475	270	185	152	114	92.1	81.4	72.6	69.6	69.7
55	1451	1422	1343	1205	1059	934	856	784	617	373	203	154	121	84.7	68.7	57.8	52.3	53.3	54.2
60	1389	1366	1293	1144	975	831	739	674	517	278	157	125	89.1	60.7	48.7	39.0	37.8	39.1	39.1
65	1291	1259	1198	1044	888	738	619	555	413	192	122	92.9	60.5	41.4	30.9	24.5	24.0	23.7	23.5
70	1133	1112	1071	948	783	630	503	426	302	124	89.5	62.4	38.7	25.5	16.9	11.8	10.2	9.17	8.94
75	979	956	907	775	640	514	384	302	195	77.9	58.3	38.5	22.9	13.0	5.68	1.05	0.54	0.51	0.49
80	732	710	685	613	503	387	285	200	109	46.4	34.1	23.6	13.2	6.88	3.23	0.97	0.74	0.70	0.69
85	524	521	515	450	354	279	197	124	60.2	27.5	21.8	16.4	9.78	5.29	2.55	0.91	0.90	0.88	0.87
90	269	267	251	229	192	160	120	78.0	40.2	22.9	17.9	13.3	7.84	4.22	1.94	0.89	0.95	0.99	0.99
95	45.6	44.6	43.8	45.7	46.8	37.5	28.2	26.5	24.2	19.6	14.0	9.98	5.60	3.60	1.86	1.22	1.31	1.35	1.32
100	145	141	130	105	74.9	49.6	25.4	22.3	14.7	11.6	7.66	3.22	2.53	2.37	1.77	1.57	1.68	1.74	1.73
105	84.4	84.1	80.1	70.2	55.0	39.5	45.9	33.5	25.9	15.6	12.5	7.36	4.59	2.25	1.46	1.61	1.73	1.78	1.79
110	44.6	43.9	40.6	35.3	35.1	40.5	36.4	28.9	23.6	15.9	10.4	5.93	3.76	2.35	1.46	1.50	1.60	1.64	1.64
115	35.9	35.9	36.0	37.3	36.7	32.8	29.0	23.8	18.7	12.2	7.96	4.73	3.03	1.88	1.28	1.37	1.43	1.45	1.45
120	40.4	41.0	39.3	36.4	33.0	28.6	24.8	19.1	13.8	9.09	6.07	3.82	2.32	1.49	1.13	1.23	1.26	1.27	1.26
125	38.1	38.1	36.2	33.0	29.5	25.3	20.2	14.4	9.73	6.53	4.43	2.88	1.97	1.03	0.96	1.14	1.15	1.15	1.15
130	35.0	34.9	33.3	29.3	25.4	20.9	15.4	10.3	2.77	2.87	1.57	1.78	1.53	1.04	0.93	0.79	0.98	1.05	1.07
135	30.1	29.8	28.5	24.8	20.2	15.5	10.9	4.63	4.32	1.54	2.34	1.02	1.26	0.92	1.02	1.05	1.01	0.92	0.89
140	23.4	23.0	22.1	19.1	15.0	10.8	7.05	1.27	2.61	1.23	1.62	1.33	1.04	0.85	0.96	1.05	1.04	1.09	1.05
145	18.1	17.6	16.6	14.4	11.1	7.38	3.99	1.04	1.26	0.93	1.04	0.84	0.96	0.99	1.00	0.92	0.98	1.02	1.03
150	12.9	12.5	11.6	10.2	7.82	5.16	1.64	0.74	0.72	0.86	0.89	0.78	0.92	0.98	0.99	0.97	0.99	0.93	0.89
155	8.75	8.52	7.84	6.73	5.28	3.28	0.71	0.76	0.77	0.89	0.91	0.81	0.89	0.95	0.91	0.90	0.95	0.95	0.95
160	5.26	5.14	4.67	3.85	1.26	0.73	0.78	0.81	0.81	0.95	0.95	0.95	0.82	0.83	0.86	0.86	0.87	0.91	0.88
165	0.64	0.67	0.71	0.74	0.76	0.79	0.83	0.85	0.86	0.99	0.98	0.97	0.95	0.86	0.78	0.74	0.72	0.72	0.72
170	0.65	0.67	0.73	0.76	0.80	0.83	0.85	0.87	0.87	1.03	1.02	1.00	0.97	0.92	0.86	0.79	0.69	0.63	0.63
175	0.70	0.75	0.78	0.82	0.85	0.88	0.91	0.92	0.91	1.02	1.02	0.99	0.96	0.91	0.83	0.77	0.70	0.70	0.66
180	0.75	0.75	0.75	0.78	0.81	0.82	0.80	0.82	0.83	1.04	1.03	1.02	0.98	0.95	0.91	0.87	0.82	0.78	0.76

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	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293		
5	972	1000	1029	1057	1089	1139	1200	1259	1317	1367	1413	1448	1482	1515	1538	1545	1540		
10	652	678	731	810	895	987	1086	1207	1319	1413	1493	1557	1620	1645	1661	1674	1669		
15	424	454	510	579	670	801	950	1119	1288	1413	1513	1598	1643	1646	1680	1665	1670		
20	288	314	352	416	506	626	795	1009	1219	1374	1488	1575	1605	1618	1615	1611	1588		
25	223	238	262	305	376	489	646	876	1120	1282	1420	1484	1511	1526	1540	1536	1522		
30	187	197	211	236	285	374	513	742	1005	1187	1313	1374	1410	1440	1451	1450	1441		
35	155	160	173	192	227	290	406	617	896	1080	1215	1264	1314	1342	1367	1422	1441		
40	127	132	142	159	187	233	319	507	782	984	1113	1180	1237	1284	1354	1410	1460		
45	95.9	103	113	127	157	194	252	412	676	886	1013	1095	1162	1237	1342	1451	1503		
50	70.4	75.8	86.4	100	127	164	203	324	568	784	918	1013	1094	1193	1295	1440	1509		
55	53.2	53.8	62.5	75.7	96.6	136	168	244	459	680	825	915	1001	1130	1254	1390	1434		
60	39.0	38.3	42.1	53.9	69.4	103	136	181	351	578	718	801	906	1041	1202	1345	1372		
65	23.7	24.4	26.3	34.9	47.7	72.3	105	134	247	468	597	680	808	955	1094	1236	1262		
70	9.34	10.6	13.2	19.5	30.2	47.0	72.6	96.6	154	355	469	560	686	844	994	1099	1119		
75	0.51	0.54	1.89	7.51	16.4	29.0	46.4	64.3	89.0	239	341	435	571	693	819	938	969		
80	0.70	0.73	1.56	4.36	8.97	17.1	29.0	38.4	49.8	138	229	324	432	547	637	700	713		
85	0.86	0.86	1.30	3.44	7.03	12.8	20.3	24.6	28.7	74.3	147	226	308	379	470	524	524		
90	0.96	0.89	0.99	2.71	5.60	10.4	16.6	20.4	24.0	48.0	87.7	130	168	192	227	253	265		
95	1.31	1.23	1.17	2.45	4.61	7.60	12.4	16.4	20.9	23.8	30.7	29.6	37.8	39.0	39.6	42.5	44.4		
100	1.69	1.59	1.43	2.03	2.64	2.75	2.86	9.47	12.6	11.7	21.9	27.9	52.8	79.6	107	134	141		
105	1.74	1.64	1.44	1.40	2.76	5.81	2.95	14.8	20.3	23.6	38.4	47.4	39.3	56.4	70.1	78.7	81.9		
110	1.61	1.52	1.34	1.65	2.88	4.63	2.22	12.6	18.3	22.3	32.9	39.0	40.1	32.9	34.1	40.1	43.6		
115	1.42	1.35	1.21	1.35	2.33	3.67	1.63	9.66	14.5	18.8	27.3	30.8	33.4	35.9	35.5	35.2	35.8		
120	1.25	1.19	1.08	1.11	1.78	2.92	1.17	7.22	10.8	14.6	21.8	26.3	29.2	32.6	36.0	39.2	40.9		
125	1.11	1.08	0.98	0.74	1.39	2.36	0.88	5.19	7.71	10.6	16.4	21.7	25.9	29.5	32.8	36.3	38.2		
130	1.01	0.88	0.70	0.83	1.13	1.76	1.06	2.70	4.04	4.12	11.6	16.6	21.6	25.5	29.3	33.4	35.1		
135	0.91	0.98	0.97	0.89	0.95	1.46	1.97	2.76	3.28	5.04	6.32	11.7	16.1	20.4	24.9	28.6	29.9		
140	1.05	1.01	0.97	0.85	0.85	0.83	1.50	2.05	2.22	3.15	1.98	7.67	11.1	15.1	19.2	22.2	23.1		
145	0.99	0.95	0.85	0.94	0.94	0.88	0.95	1.29	1.36	1.71	1.37	4.24	7.50	11.2	14.4	16.6	17.6		
150	0.89	0.94	0.97	1.00	0.96	0.91	0.80	0.86	0.86	0.83	0.81	1.84	5.14	7.76	10.2	11.6	12.5		
155	0.98	0.99	0.98	0.97	0.96	0.85	0.90	0.90	0.88	0.85	0.81	0.74	3.10	5.14	6.61	7.73	8.46		
160	0.94	0.93	0.93	0.88	0.88	0.87	0.98	0.96	0.91	0.88	0.84	0.79	0.72	0.86	3.68	4.51	5.06		
165	0.70	0.71	0.71	0.72	0.77	0.92	0.94	0.94	0.93	0.91	0.88	0.84	0.77	0.72	0.67	0.64	0.63		
170	0.61	0.62	0.62	0.64	0.75	0.84	0.90	0.93	0.96	0.94	0.91	0.87	0.82	0.77	0.71	0.66	0.67		
175	0.64	0.71	0.71	0.67	0.72	0.78	0.83	0.89	1.00	0.98	0.95	0.91	0.86	0.81	0.77	0.74	0.74		
180	0.74	0.74	0.75	0.78	0.81	0.81	0.80	0.83	1.04	1.02	0.98	0.95	0.91	0.87	0.82	0.78	0.76		

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
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.

Goniophotometer Method

Photometric and Electrical Measurements

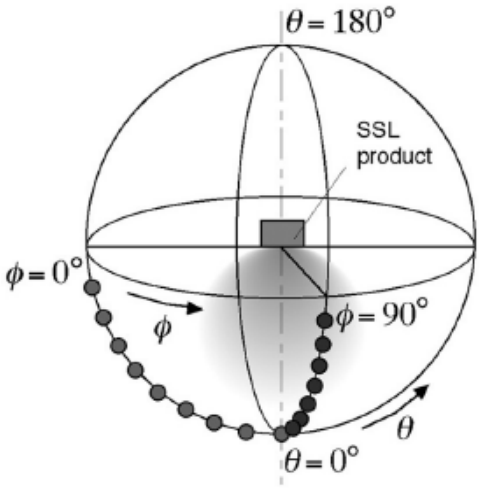
An EVERFINE Type C Model GO-R5000 Goniophotometer was used to measure the intensity at each angle of distribution for each sample. The photometric distance is 2.475m for near-field measurement or 30m for far-field measurement. Bandwidth of spectroradiometer is 380nm-780nm.
Ambient temperature was measured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