LM-79-08 Test Report

for

ABBlighting,Inc.

1501 Industrial Way N. Toms River, NJ 08755

240W Linear Highbay

Model: LHB240501-82

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ14110022a

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

Reviewed by:

Engineer: April Zou

Dec. 11, 2014

Approved by:

Manager: Jim Zhang

Dec. 11, 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: **LHB240501-82**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
105.3	25527.7	242.53	0.9961

CCT (K)	CRI	Stabilization Time (Light & Power)
5453	85.1	65

Table 1: Executive Data Summary

Test specifications:

Date of Receipt	: Nov. 28, 2014
Date of Test	: Nov. 28, 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)	
Name	: 240W Linear Highbay
Model	: LHB240501-82
Electrical Ratings	: 100~277V AC, 50/60Hz, 240W
Product Description	: 5300K, High-Bay Luminaires for Commercial and Industrial buildings Manufacturer of light source: LG Model of light source: LGIT 5630 Quantity of LED light source: 560pcs
Manufacturer	: ABB Lighting (Shanghai) Co., Ltd.
Address	: Room 1012, North Minch Fortune 108 Plaza,# 1839 Qixin road, Shanghai

TEST RESULTS

Test ambient temperature was 25.0℃.

Base orientation was Light down. Test was conducted without a dimmer in the circuit.

The stabilization time of the sample was 65 minutes, and the total operating time including stabilization was 95 minutes.

Parameter	Result			Special Color Rendering Indices	
Test Voltage (V)	120.0	100.0	277.0	R1	86
Voltage frequency (Hz)	60	60	60	R2	88
Test Current (A)	2.028	2.464	0.899	R3	88
Power Factor	0.9961	0.9965	0.9436	R4	87
Test Power (W)	242.53	245.50	234.93	R5	87
THD A%	4.42	6.08	9.50	R6	83
Luminous Efficacy (lm/W)	105.3	106.4	105.8	R7	87
Total Luminous Flux (lm)	25527.7	26121.2	24858.8	R8	76
Color Rendering Index (CRI)	85.1			R9	29
R9	29			R10	70
Correlated Color Temperature (CCT) (K)	5453			R11	87
Chromaticity (Chroma x, Chroma y)	(0.3335, 0.3372)			R12	68
Chromaticity (Chroma u, Chroma v)	(0.2091, 0.3171)			R13	86
Chromaticity (Chroma u', Chroma v')	(0.2091, 0.4757)			R14	93
Duv	0.0025				
Average Beam Angle (°)	99.3				
Center Beam Candle Power (cd)	10810				
Spacing Criteria	1.33 (0°-180°)/ 1.16 (90°-270°)				
Zonal Lumens in the 0°-60°Zone	91.79%				
Zonal Lumens in the 60°-90°Zone	8.16%				
Zonal Lumens in the 90°-120°Zone	0.02%				
Zonal Lumens in the 120°-180°Zone	0.04%				

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

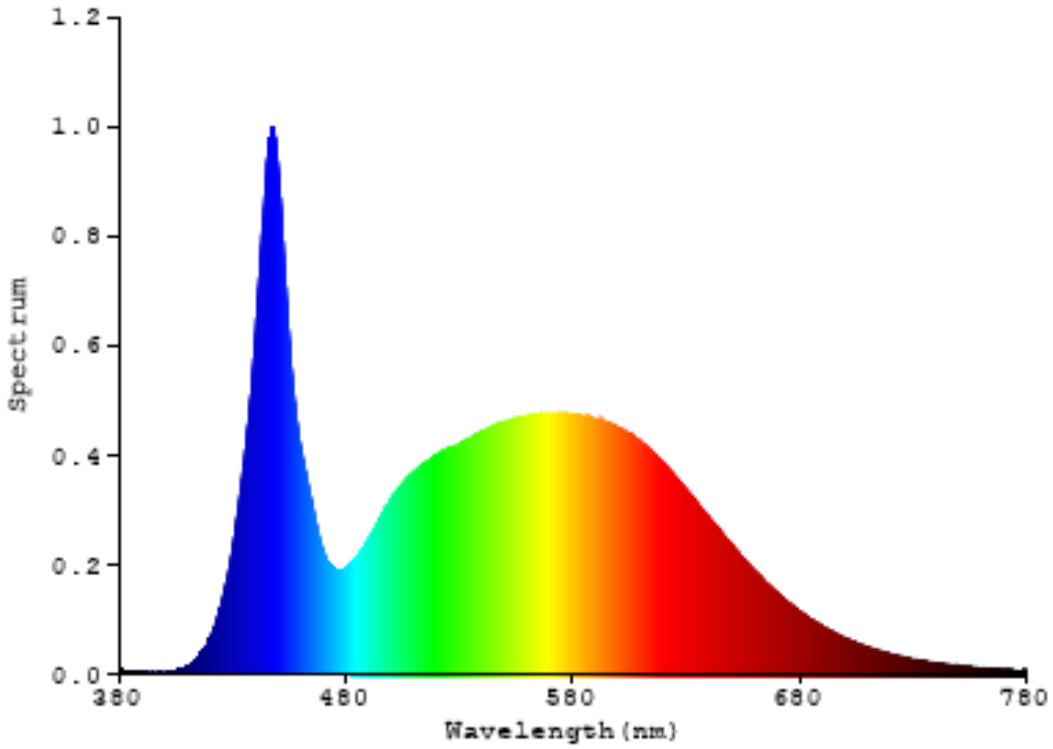


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

γ(°)	Lumens	% Total
0- 10	1017.805	3.99%
10- 20	3057.092	11.98%
20- 30	4896.304	19.18%
30- 40	5821.939	22.81%
40- 50	5152.164	20.18%
50- 60	3485.543	13.65%
60- 70	1572.763	6.16%
70- 80	463.252	1.81%
80- 90	46.028	0.18%
90-100	0.875	0.00%
100-110	1.458	0.01%
110-120	1.763	0.01%
120-130	2.031	0.01%
130-140	2.397	0.01%
140-150	2.379	0.01%
150-160	1.987	0.01%
160-170	1.371	0.01%
170-180	0.534	0.00%
Total	25527.7	100%

γ(°)	Lumens	% Total
0- 60	23430.847	91.79%
60- 90	2082.043	8.16%
0-90	25512.89	99.94%
90- 180	14.795	0.06%
0- 180	25527.7	100%

Table 3: Zonal Lumen Data

Illuminance Plots

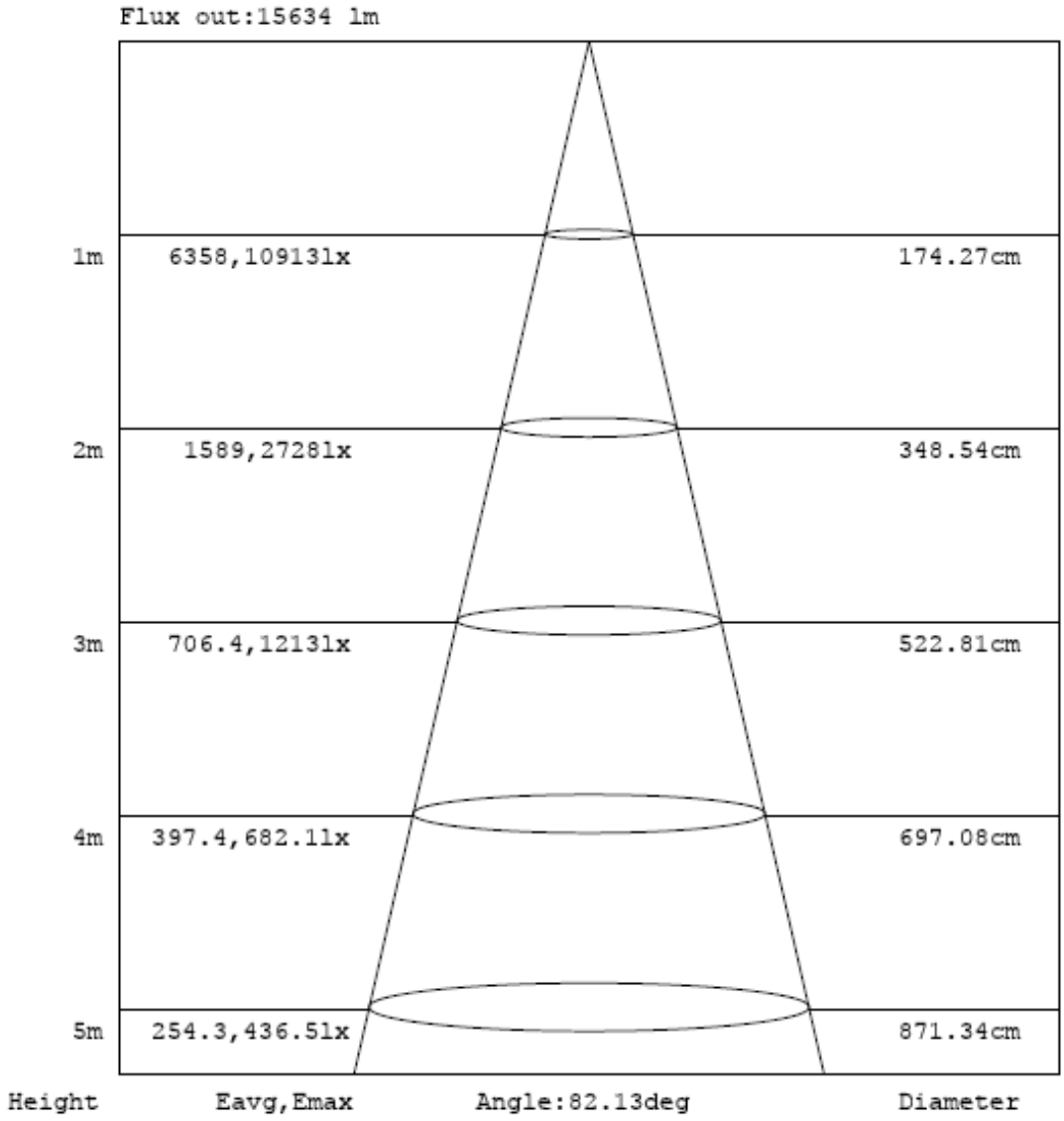


Chart 2: Beam Angle

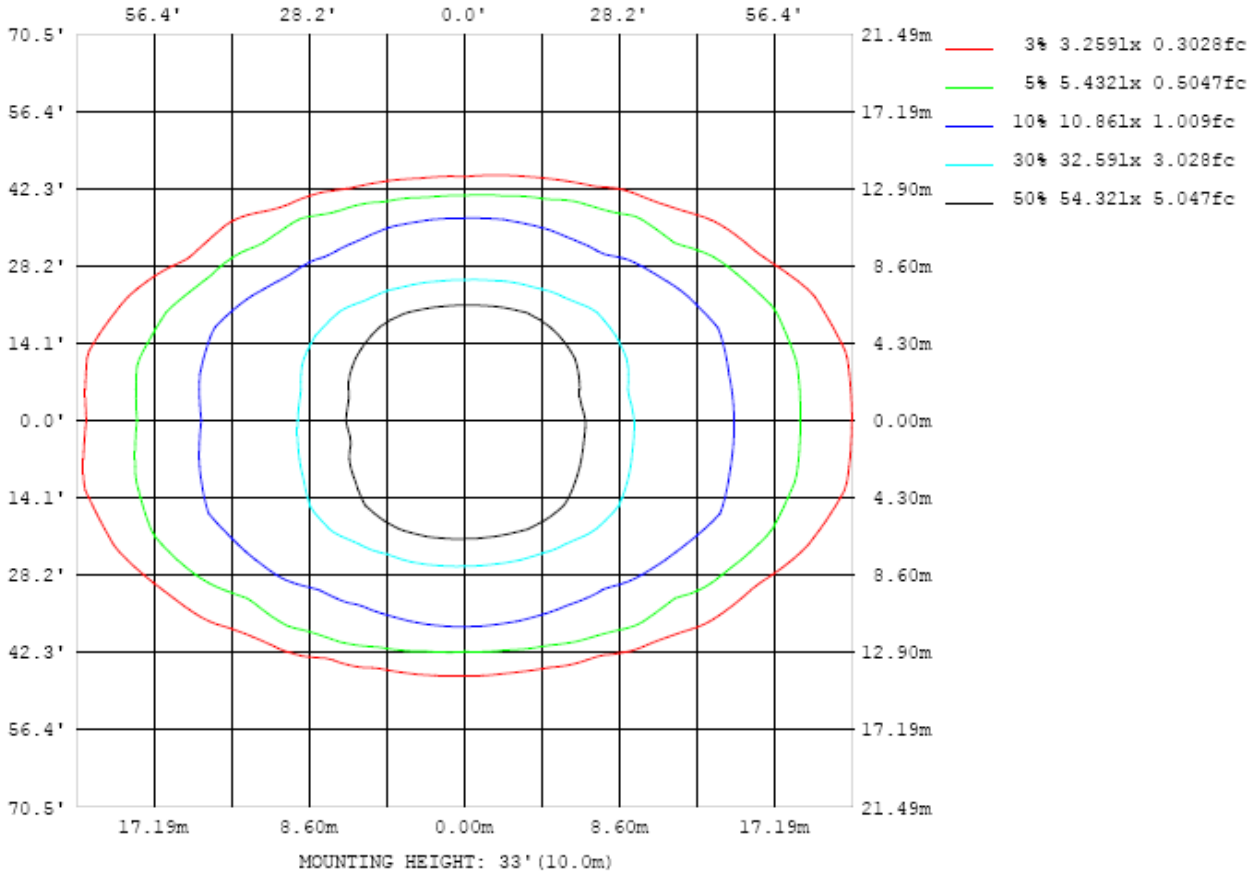


Chart 3: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

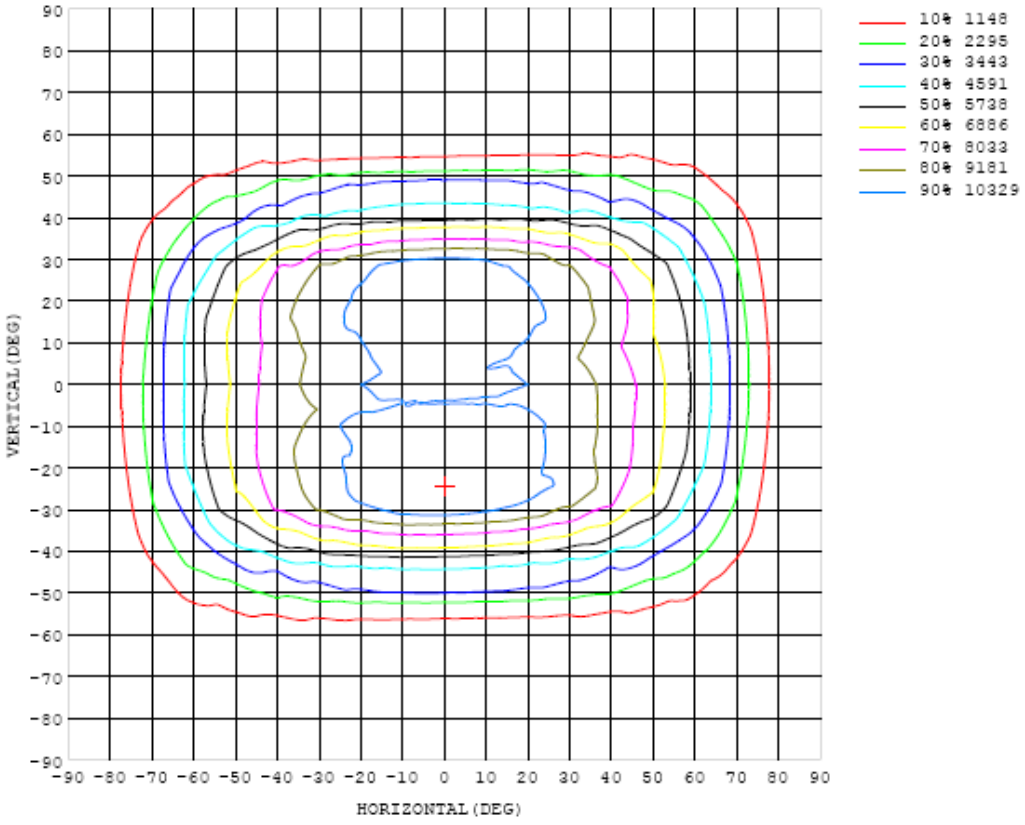


Chart 4: Isocandela Plot

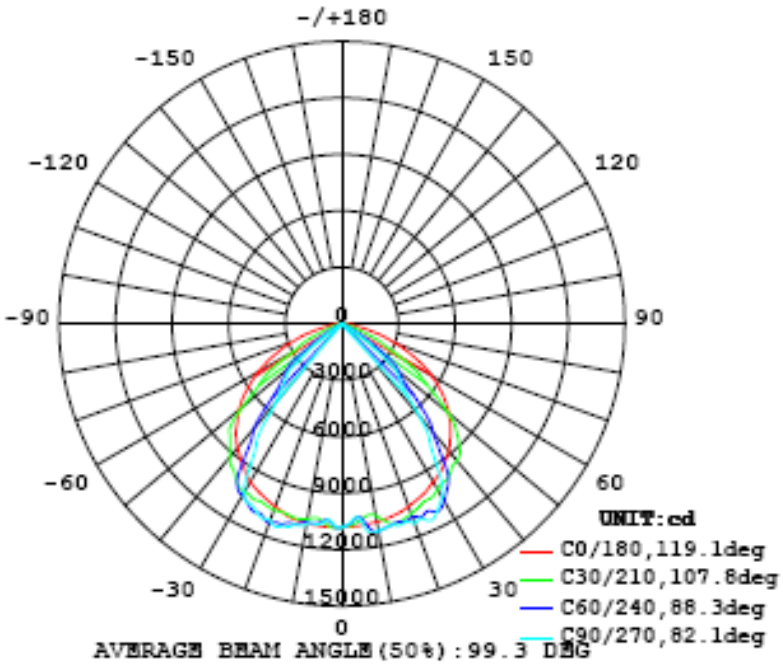


Chart 5: Polar Candela Distribution

Luminous Intensity Data

Table--1 UNIT: ×10cd

γ (DEG) \ C(DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	1081	1081	1081	1081	1081	1081	1081	1081	1081	1081	1081	1081	1081	1081	1081	1081	1081	1081	1081
5	1077	1072	1065	1053	1039	1031	1029	1033	1036	1038	1035	1031	1030	1034	1045	1059	1069	1075	1082
10	1068	1055	1025	1036	1087	1116	1120	1117	1117	1117	1118	1120	1124	1114	1074	1027	1038	1065	1077
15	1056	1025	1030	1099	1099	1097	1096	1099	1108	1110	1106	1101	1102	1105	1108	1096	1016	1045	1065
20	1033	987	1068	1075	1073	1093	1093	1111	1124	1127	1125	1108	1100	1098	1083	1078	1039	1001	1034
25	1006	963	1040	1040	1060	1091	1097	1133	1143	1146	1146	1132	1098	1089	1060	1040	1045	959	1004
30	970	952	994	1016	1045	1091	1087	1070	1063	1063	1069	1082	1102	1073	1047	1021	1010	924	971
35	933	937	960	989	1035	1012	983	896	854	843	864	926	1001	1024	1024	983	954	888	916
40	880	890	901	949	941	849	752	705	652	639	669	730	765	898	964	927	908	864	861
45	815	818	849	874	770	666	543	466	448	445	452	482	581	688	822	895	841	819	793
50	739	754	776	734	600	438	393	377	356	343	366	378	398	486	615	778	765	743	710
55	652	656	679	533	381	337	244	187	174	166	178	192	272	340	441	570	683	653	616
60	548	555	511	371	277	164	91.4	39.6	18.7	17.7	18.6	48.3	123	176	282	422	557	551	513
65	430	430	342	224	125	33.4	14.7	12.2	10.8	10.3	10.3	12.0	15.6	53.1	131	227	358	430	397
70	303	298	193	91.0	16.8	12.6	11.2	10.8	9.75	9.42	9.41	10.4	10.2	11.1	27.7	98.3	228	291	279
75	183	147	67.9	13.6	11.0	9.53	7.78	6.57	5.65	5.20	5.38	6.50	7.40	8.37	9.09	16.9	74.3	152	170
80	78.1	53.2	10.0	7.50	6.00	4.91	4.28	3.73	3.39	3.20	3.21	3.53	3.88	4.27	5.27	6.31	16.1	53.4	68.4
85	11.6	6.57	3.64	2.81	2.36	2.09	1.86	1.67	1.45	1.37	1.40	1.53	1.70	1.81	2.04	2.35	2.93	6.46	9.56
90	0.55	0.39	0.54	0.33	0.22	0.07	0.07	0.13	0.06	0.05	0.04	0.03	0.04	0.05	0.06	0.21	0.25	0.38	0.18
95	0.05	0.05	0.04	0.03	0.03	0.03	0.04	0.04	0.03	0.03	0.02	0.02	0.03	0.03	0.04	0.05	0.06	0.06	0.23
100	0.07	0.07	0.06	0.05	0.04	0.04	0.05	0.05	0.04	0.04	0.03	0.03	0.04	0.05	0.07	0.08	0.08	0.08	0.30
105	0.09	0.10	0.08	0.08	0.07	0.06	0.07	0.06	0.06	0.05	0.05	0.05	0.06	0.08	0.10	0.11	0.11	0.10	0.33
110	0.11	0.12	0.10	0.10	0.10	0.09	0.12	0.09	0.08	0.07	0.08	0.08	0.10	0.12	0.13	0.15	0.16	0.14	0.30
115	0.15	0.14	0.12	0.12	0.12	0.13	0.13	0.13	0.12	0.11	0.12	0.13	0.14	0.16	0.17	0.18	0.18	0.19	0.25
120	0.20	0.18	0.15	0.14	0.15	0.17	0.18	0.17	0.16	0.16	0.17	0.18	0.19	0.20	0.27	0.22	0.22	0.23	0.23
125	0.24	0.22	0.22	0.18	0.18	0.21	0.23	0.22	0.21	0.22	0.23	0.23	0.24	0.25	0.25	0.25	0.27	0.28	0.25
130	0.31	0.28	0.23	0.22	0.22	0.24	0.27	0.28	0.27	0.28	0.28	0.28	0.28	0.28	0.28	0.30	0.31	0.34	0.28
135	0.36	0.33	0.30	0.26	0.25	0.28	0.30	0.32	0.31	0.33	0.32	0.32	0.31	0.31	0.33	0.34	0.35	0.38	0.33
140	0.38	0.35	0.35	0.30	0.30	0.31	0.32	0.35	0.33	0.36	0.35	0.34	0.33	0.35	0.36	0.37	0.38	0.40	0.37
145	0.42	0.39	0.37	0.34	0.42	0.35	0.37	0.36	0.36	0.37	0.35	0.36	0.37	0.37	0.37	0.39	0.41	0.44	0.47
150	0.44	0.41	0.40	0.38	0.36	0.37	0.40	0.40	0.40	0.39	0.39	0.38	0.39	0.39	0.40	0.40	0.44	0.45	0.41
155	0.46	0.44	0.42	0.40	0.38	0.40	0.42	0.40	0.41	0.40	0.41	0.39	0.43	0.42	0.42	0.45	0.46	0.48	0.42
160	0.48	0.47	0.44	0.44	0.42	0.40	0.41	0.42	0.43	0.41	0.43	0.44	0.44	0.44	0.47	0.48	0.49	0.50	0.45
165	0.53	0.52	0.49	0.47	0.46	0.44	0.42	0.42	0.42	0.42	0.42	0.46	0.49	0.50	0.52	0.53	0.55	0.54	0.46
170	0.56	0.55	0.54	0.51	0.49	0.46	0.46	0.46	0.49	0.49	0.48	0.50	0.55	0.56	0.56	0.57	0.58	0.57	0.51
175	0.59	0.59	0.59	0.59	0.58	0.58	0.55	0.57	0.59	0.57	0.57	0.56	0.60	0.59	0.58	0.58	0.59	0.60	0.55
180	0.55	0.56	0.55	0.55	0.56	0.57	0.58	0.59	0.60	0.62	0.61	0.60	0.57	0.57	0.54	0.53	0.54	0.54	0.55

Table 4: Luminous Intensity Data

Table--2 UNIT: ×10cd

γ (DEG) \ C (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	1081	1081	1081	1081	1081	1081	1081	1081	1081	1081	1081	1081	1081	1081	1081	1081	1081		
5	1086	1078	1062	1048	1043	1046	1051	1055	1055	1054	1050	1044	1041	1047	1061	1076	1081		
10	1069	1038	1053	1068	1070	1070	1074	1078	1079	1076	1070	1065	1065	1061	1042	1037	1069		
15	1035	1047	1057	1068	1089	1094	1109	1116	1118	1114	1102	1088	1081	1055	1050	1029	1043		
20	994	1026	1051	1078	1103	1126	1125	1117	1114	1116	1123	1113	1095	1066	1036	1024	1005		
25	979	997	1039	1077	1087	1104	1098	1092	1089	1091	1095	1092	1086	1066	1029	991	969		
30	954	989	1032	1033	1046	1053	1058	1045	1040	1045	1055	1044	1050	1035	1019	963	933		
35	902	964	985	991	994	940	845	805	797	811	864	965	990	992	987	945	897		
40	846	917	925	932	794	723	621	554	544	565	656	734	843	920	922	905	843		
45	799	844	840	715	608	475	451	433	429	435	454	497	657	777	843	850	779		
50	745	758	691	542	407	378	361	297	279	311	371	383	419	593	752	755	703		
55	654	648	510	350	320	200	153	108	98.8	125	172	227	326	374	545	662	641		
60	542	469	298	239	138	33.6	26.0	20.2	18.5	21.6	29.2	75.0	163	271	387	532	552		
65	417	324	191	99.4	22.8	13.3	12.1	11.3	11.3	11.7	13.7	17.3	26.8	126	220	354	432		
70	260	153	77.3	15.3	11.5	9.97	9.05	8.32	8.29	8.60	10.3	11.2	13.0	21.2	96.3	216	298		
75	133	52.9	11.2	8.68	7.38	6.20	5.07	4.44	4.28	4.78	5.73	7.32	8.56	10.4	24.3	76.4	161		
80	34.7	7.65	5.48	4.14	3.43	2.92	2.59	2.35	2.27	2.49	2.88	3.39	4.08	5.50	7.14	20.8	59.9		
85	3.69	2.37	1.85	1.50	1.26	1.07	0.94	0.86	0.83	0.89	1.04	1.25	1.52	1.89	2.43	3.58	8.19		
90	0.16	0.13	0.09	0.05	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.06	0.10	0.14	0.22		
95	0.22	0.19	0.14	0.09	0.06	0.04	0.04	0.04	0.04	0.05	0.05	0.06	0.07	0.10	0.15	0.19	0.22		
100	0.28	0.25	0.20	0.15	0.10	0.07	0.06	0.06	0.06	0.07	0.08	0.09	0.11	0.16	0.22	0.26	0.28		
105	0.32	0.30	0.26	0.21	0.15	0.12	0.10	0.09	0.10	0.11	0.12	0.14	0.17	0.23	0.28	0.31	0.32		
110	0.30	0.28	0.27	0.23	0.19	0.15	0.14	0.12	0.12	0.14	0.16	0.18	0.21	0.25	0.29	0.30	0.30		
115	0.25	0.23	0.24	0.23	0.20	0.17	0.16	0.15	0.15	0.17	0.19	0.20	0.22	0.25	0.26	0.26	0.26		
120	0.27	0.21	0.21	0.21	0.19	0.18	0.17	0.17	0.17	0.19	0.20	0.21	0.22	0.23	0.23	0.24	0.25		
125	0.25	0.22	0.21	0.21	0.21	0.20	0.19	0.20	0.19	0.21	0.22	0.22	0.22	0.22	0.23	0.25	0.26		
130	0.28	0.25	0.25	0.24	0.24	0.24	0.24	0.26	0.25	0.26	0.26	0.25	0.24	0.24	0.25	0.26	0.29		
135	0.32	0.31	0.30	0.29	0.29	0.29	0.30	0.32	0.32	0.32	0.32	0.31	0.28	0.28	0.28	0.29	0.32		
140	0.35	0.34	0.33	0.34	0.34	0.33	0.35	0.37	0.37	0.37	0.38	0.34	0.36	0.31	0.46	0.31	0.32		
145	0.39	0.38	0.38	0.39	0.38	0.37	0.39	0.41	0.43	0.42	0.42	0.38	0.36	0.33	0.33	0.33	0.35		
150	0.41	0.40	0.42	0.41	0.41	0.42	0.43	0.46	0.46	0.45	0.45	0.41	0.38	0.36	0.39	0.36	0.38		
155	0.43	0.42	0.43	0.43	0.44	0.43	0.46	0.47	0.47	0.46	0.46	0.47	0.41	0.40	0.40	0.39	0.41		
160	0.45	0.44	0.44	0.45	0.47	0.46	0.49	0.48	0.48	0.50	0.48	0.48	0.48	0.45	0.45	0.44	0.45		
165	0.47	0.48	0.48	0.49	0.49	0.48	0.50	0.51	0.51	0.51	0.52	0.50	0.49	0.48	0.50	0.49	0.48		
170	0.51	0.53	0.55	0.56	0.57	0.57	0.56	0.55	0.57	0.56	0.54	0.55	0.53	0.53	0.53	0.53	0.51		
175	0.56	0.57	0.57	0.57	0.58	0.60	0.59	0.59	0.61	0.63	0.64	0.59	0.58	0.58	0.57	0.56	0.54		
180	0.55	0.55	0.55	0.55	0.55	0.57	0.58	0.60	0.60	0.62	0.61	0.60	0.57	0.57	0.54	0.54	0.54		

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

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

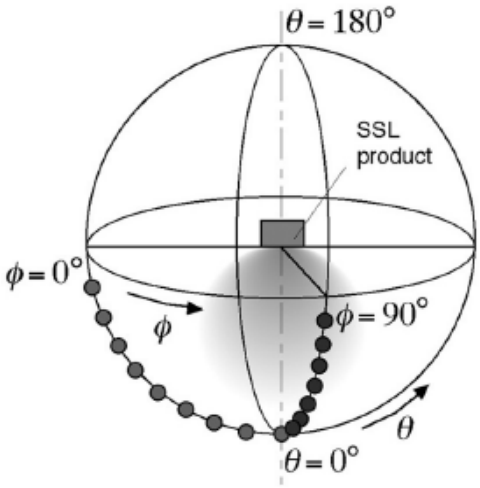
An EVERFINE Type C Model GO-R5000 Goniophotometer was used to measure the intensity at each angle of distribution for each sample. The photometric distance is 2.475m for near-field measurement or 30m for far-field measurement. Bandwidth of spectroradiometer is 380nm-780nm.
Ambient temperature was measured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