Quality Assured

NVLAP LAB CODE 200960-0

LM-79-08 Test Report

for

IGT LIGHTING INC.

3755 Lincoln St. Suite B, Riverside, CA 92503

200W LED LINEAR HIGH BAY WITH PIR SENSOR

Model: IGTLHB-1620050-PIR

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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

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Report No.: HZ16060019c

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

Reviewed by:

Engineer: April Zou

Jul. 01, 2016

Approved by:

LEADING TESTING LABORATORIES

Manager: Jim Zhang

Jul. 01, 2016

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: **IGTLHB-1620050-PIR**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
136.3	26505.0	194.40	0.9946

CCT (K)	CRI	Stabilization Time (Light & Power)
4956	77.3	60

Table 1: Executive Data Summary

Test specifications:

Date of Receipt : Jun. 20, 2016

Date of Test : Jun. 30, 2016

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 IGTLHB-1620050-PIR

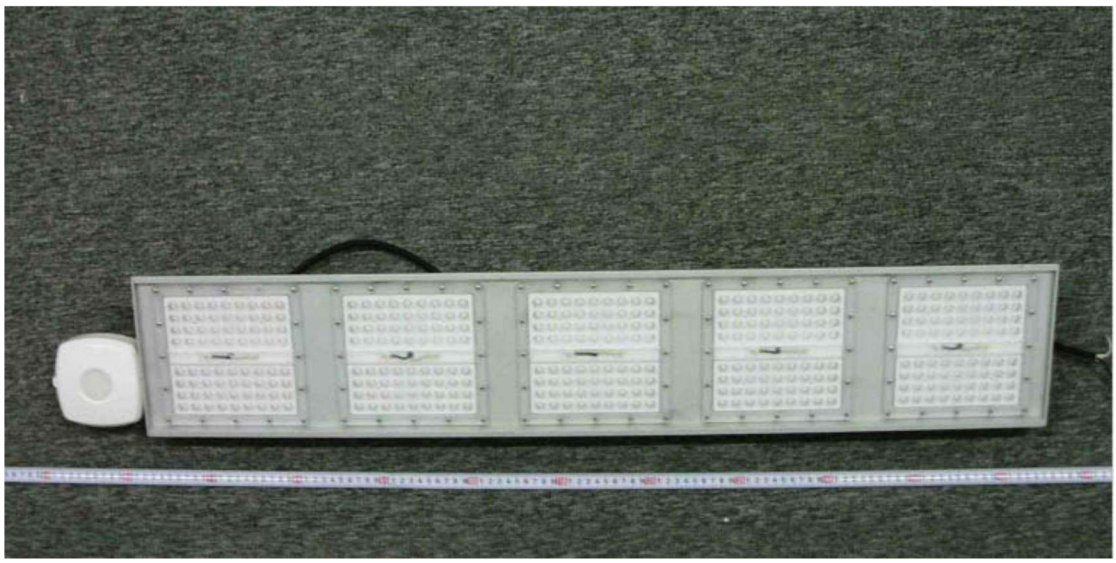


Figure 1- Overview of the sample

Equipment Under Test (EUT)	
Name	: 200W LED LINEAR HIGH BAY WITH PIR SENSOR
Model	: IGTLHB-1620050-PIR
Electrical Ratings	: 100~277Vac, 50/60Hz, 200W
Product Description	: 5000K, Plastic Lens, Aluminum Enclosure
Manufacturer	: Jiangsu Liangfeng Lighting Co., Ltd
Address	: No. 245 Gangcheng Dadao, Zhangjiagang, Jiangsu, China

TEST RESULTS

Test ambient temperature was 24.5℃.

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.

The photometric distance of Goniophotometer is 30 m.

Luminous data was taken at 0.5° vertical intervals and 10.0°horizontal intervals.

Parameter	Result		
Test Voltage (V)	120.0	100.0	277.0
Voltage frequency (Hz)	60	60	60
Test Current (A)	1.629	1.981	0.740
Power Factor	0.9946	0.9970	0.9127
Test Power (W)	194.40	197.42	187.0
THD A%	4.97	4.54	13.21
Luminous Efficacy (lm/W)	136.3		
Total Luminous Flux (lm)	26505.0		
Color Rendering Index (CRI)	77.3		
R9	-11		
Correlated Color Temperature (CCT) (K)	4956		
Chromaticity (Chroma x, Chroma y)	(0.3466, 0.3552)		
Chromaticity (Chroma u, Chroma v)	(0.2110, 0.3244)		
Chromaticity (Chroma u', Chroma v')	(0.2110, 0.4866)		
Duv	0.0012		
Average Beam Angle (°)	44.7		
Center Beam Candle Power (cd)	28090		
Spacing Criteria	0.95 (0°-180°)/ 0.45 (90°-270°)		
Zonal Lumens in the 0°-60°Zone	93.20%		
Zonal Lumens in the 60°-90°Zone	6.68%		
Zonal Lumens in the 90°-120°Zone	0.06%		
Zonal Lumens in the 120°-180°Zone	0.06%		

Special Color Rendering Indices	
R1	75
R2	85
R3	89
R4	74
R5	74
R6	76
R7	85
R8	61
R9	-11
R10	61
R11	69
R12	46
R13	77
R14	94

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

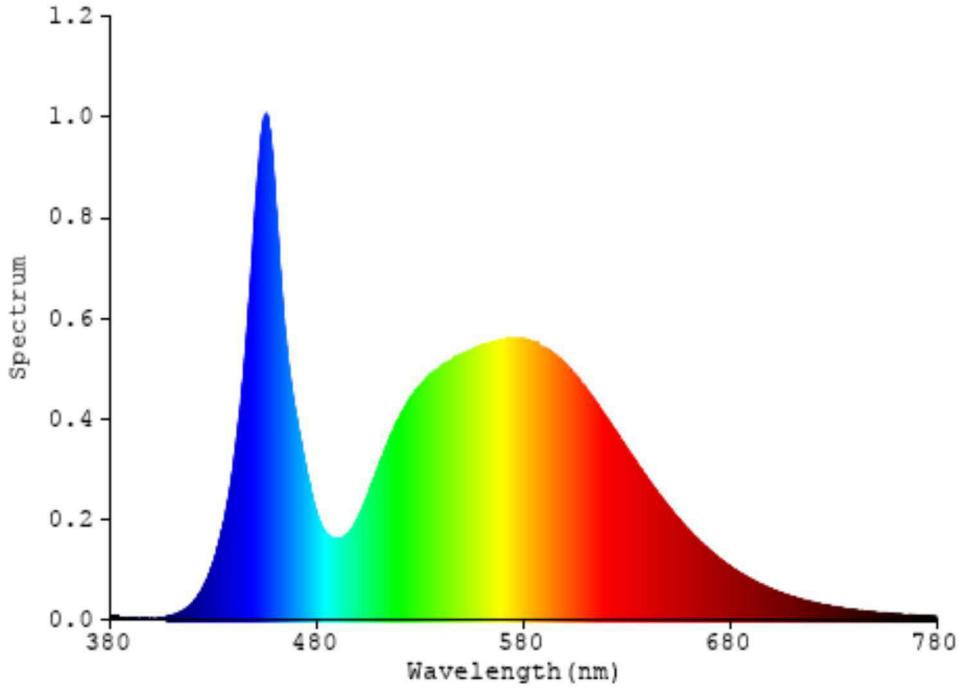


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

γ(°)	Lumens	% Total
0- 10	2353.141	8.88%
10- 20	4956.925	18.70%
20- 30	5408.101	20.40%
30- 40	5195.089	19.60%
40- 50	4278.452	16.14%
50- 60	2512.432	9.48%
60- 70	1058.542	3.99%
70- 80	580.312	2.19%
80- 90	131.244	0.50%
90-100	8.036	0.03%
100-110	4.217	0.02%
110-120	3.101	0.01%
120-130	2.959	0.01%
130-140	3.398	0.01%
140-150	3.68	0.01%
150-160	3.136	0.01%
160-170	1.931	0.01%
170-180	0.651	0.00%
Total	26505.3	100%

γ(°)	Lumens	% Total
0- 60	24704.14	93.20%
60- 90	1770.098	6.68%
0-90	26474.238	99.88%
90- 180	31.109	0.12%
0- 180	26505.3	100%

Table 3: Zonal Lumen Data

Note: The Flux in this table might be a little different from the total flux in Table 2 due to rounding.

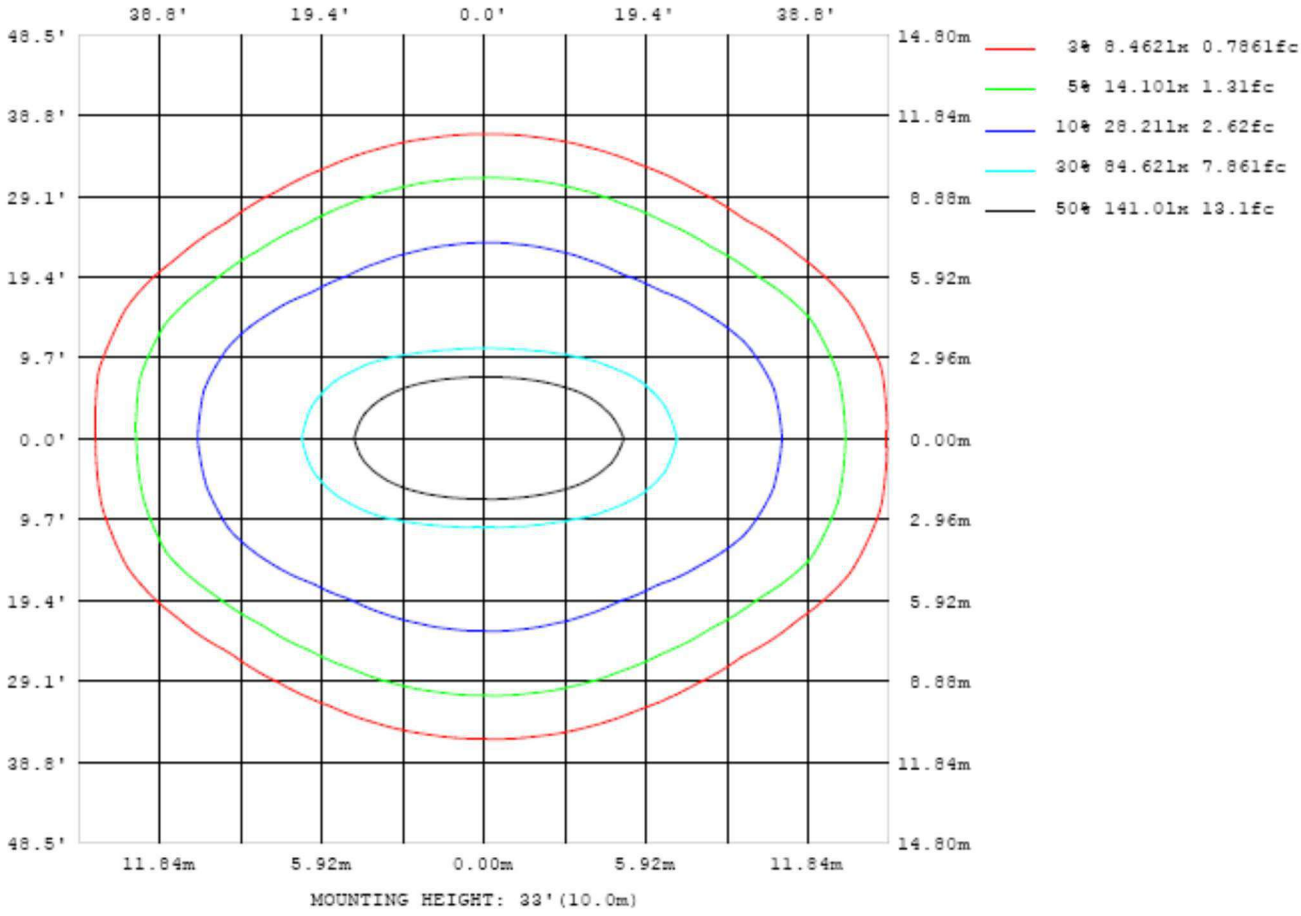


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

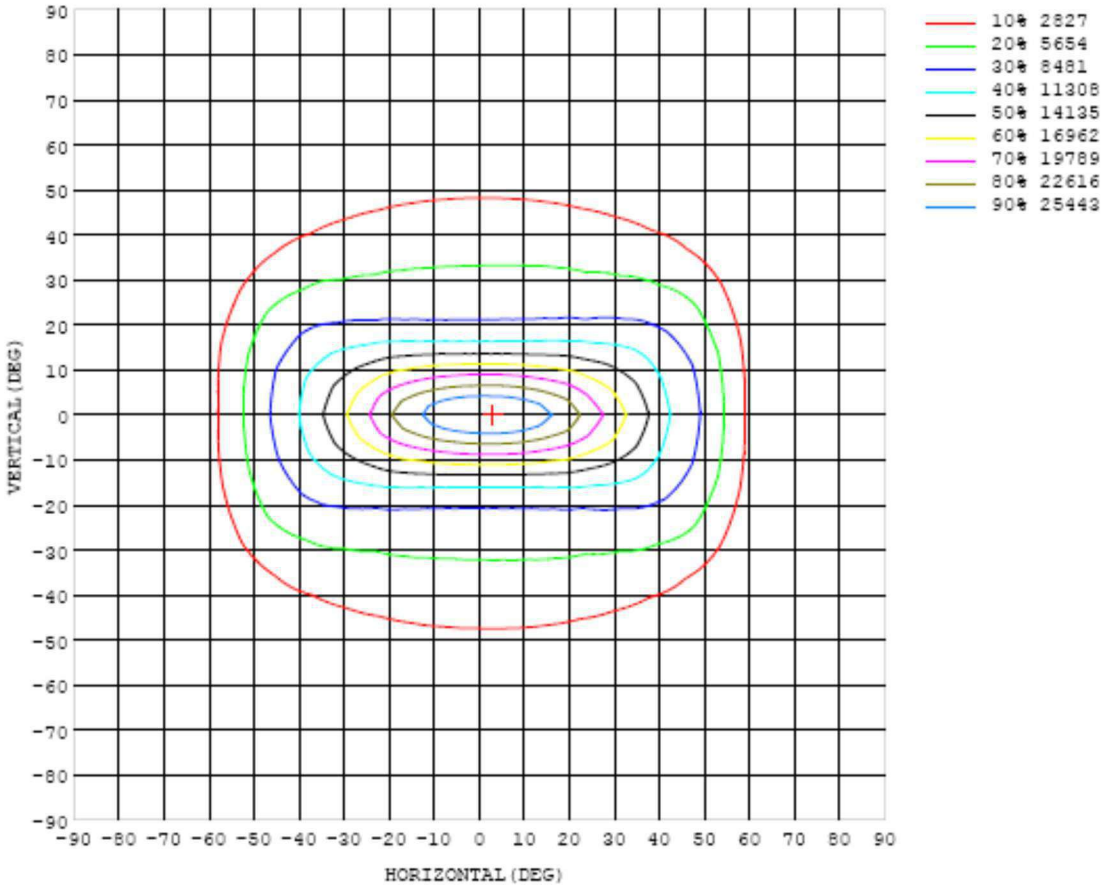


Chart 3: Isocandela Plot

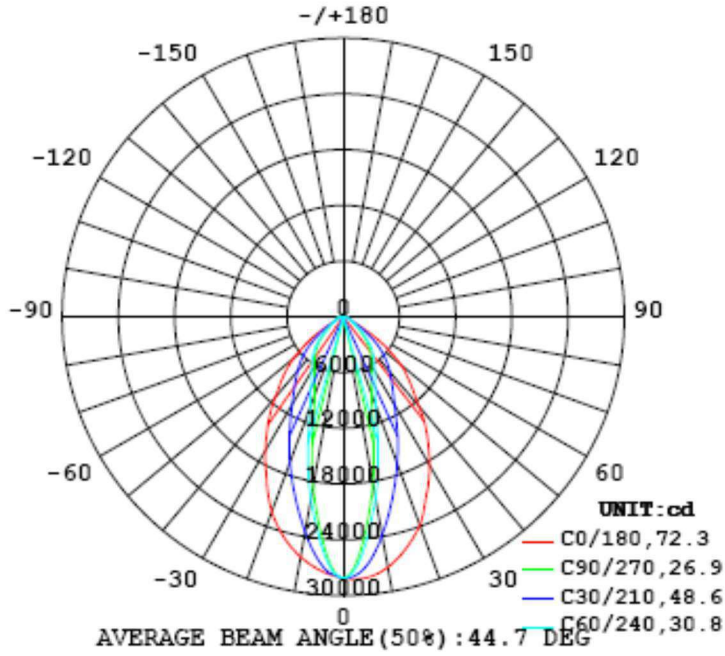


Chart 4: Polar Candela Distribution

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	2809	2809	2809	2809	2809	2809	2809	2809	2809	2809	2809	2809	2809	2809	2809	2809	2809	2809	2809
5	2819	2801	2761	2705	2638	2573	2516	2472	2443	2428	2434	2456	2494	2543	2597	2653	2702	2734	2743
10	2737	2682	2552	2388	2229	2093	1983	1899	1844	1823	1838	1884	1959	2057	2178	2321	2470	2581	2625
15	2584	2482	2262	2026	1807	1603	1433	1314	1246	1224	1245	1313	1429	1588	1770	1964	2176	2367	2455
20	2388	2249	1969	1681	1398	1165	1018	935	891	877	891	934	1020	1168	1389	1636	1882	2117	2234
25	2105	1956	1663	1364	1081	898	797	740	716	706	714	738	797	901	1082	1335	1580	1815	1938
30	1841	1693	1409	1099	861	736	669	630	609	601	606	626	665	737	862	1084	1331	1547	1664
35	1561	1435	1196	913	722	625	576	544	526	518	522	537	568	614	712	900	1127	1302	1400
40	1255	1177	1014	771	612	528	487	455	436	428	431	446	470	512	597	749	949	1068	1133
45	1014	964	835	635	505	427	381	355	337	329	331	345	364	406	482	605	770	863	907
50	803	776	672	488	369	309	271	253	239	233	235	246	260	292	345	452	600	672	697
55	527	522	448	314	232	195	176	173	176	176	174	169	174	192	225	290	390	435	436
60	224	248	227	166	140	129	128	128	125	122	127	129	128	130	143	166	206	211	193
65	99.0	106	115	107	102	101	101	93.2	85.7	82.8	86.6	93.8	98.8	98.1	101	106	109	96.7	89.4
70	69.9	73.0	81.7	81.6	76.1	77.5	78.7	70.7	64.9	62.7	64.1	70.1	76.5	72.4	71.5	78.1	76.2	66.6	64.2
75	48.3	51.2	59.5	57.3	53.0	55.4	57.0	54.0	55.7	53.3	52.6	52.2	54.1	51.4	49.6	53.8	54.4	46.6	44.4
80	31.1	33.3	35.4	33.6	32.2	32.4	34.5	33.6	31.3	30.9	41.2	33.3	32.9	30.4	30.7	31.6	32.9	31.0	29.5
85	14.6	12.8	11.8	8.94	4.73	2.55	1.14	0.63	0.40	0.37	0.47	0.70	4.11	3.43	5.50	9.78	10.8	11.6	12.6
90	0.24	0.07	0.54	0.48	0.31	0.20	0.14	0.08	0.06	0.08	0.12	0.17	0.23	0.32	0.46	0.48	0.18	0.16	0.03
95	0.12	0.22	0.58	0.84	1.01	1.05	0.97	0.81	0.63	0.72	0.85	1.13	1.29	1.31	1.16	0.90	0.65	0.26	0.11
100	0.15	0.17	0.26	0.39	0.50	0.55	0.55	0.50	0.44	0.49	0.52	0.61	0.66	0.66	0.62	0.54	0.35	0.19	0.17
105	0.18	0.18	0.20	0.27	0.32	0.37	0.38	0.36	0.34	0.39	0.42	0.46	0.50	0.52	0.48	0.38	0.26	0.20	0.23
110	0.20	0.20	0.21	0.23	0.27	0.31	0.32	0.29	0.31	0.35	0.39	0.41	0.45	0.45	0.38	0.31	0.25	0.22	0.27
115	0.22	0.22	0.22	0.24	0.25	0.28	0.28	0.27	0.31	0.34	0.37	0.37	0.38	0.37	0.34	0.29	0.26	0.23	0.30
120	0.24	0.24	0.24	0.24	0.26	0.26	0.26	0.26	0.29	0.31	0.33	0.32	0.34	0.34	0.31	0.32	0.27	0.23	0.35
125	0.27	0.24	0.25	0.27	0.26	0.26	0.26	0.26	0.27	0.29	0.31	0.31	0.33	0.32	0.35	0.33	0.31	0.25	0.42
130	0.35	0.27	0.32	0.30	0.30	0.29	0.25	0.26	0.27	0.29	0.30	0.31	0.33	0.37	0.38	0.37	0.36	0.29	0.45
135	0.42	0.33	0.37	0.37	0.33	0.33	0.32	0.31	0.31	0.32	0.34	0.37	0.40	0.42	0.43	0.45	0.41	0.36	0.52
140	0.47	0.39	0.40	0.42	0.40	0.37	0.37	0.37	0.37	0.38	0.40	0.43	0.45	0.47	0.50	0.49	0.46	0.45	0.62
145	0.49	0.41	0.42	0.46	0.47	0.45	0.43	0.41	0.41	0.42	0.43	0.47	0.51	0.53	0.53	0.50	0.46	0.50	0.66
150	0.54	0.46	0.43	0.47	0.49	0.49	0.48	0.48	0.49	0.48	0.52	0.54	0.56	0.56	0.54	0.49	0.43	0.49	0.67
155	0.56	0.47	0.46	0.47	0.50	0.51	0.52	0.53	0.54	0.53	0.58	0.59	0.59	0.57	0.54	0.49	0.44	0.52	0.68
160	0.59	0.49	0.49	0.48	0.49	0.50	0.52	0.54	0.56	0.55	0.60	0.62	0.60	0.56	0.52	0.47	0.44	0.52	0.66
165	0.64	0.50	0.52	0.52	0.52	0.52	0.52	0.54	0.57	0.56	0.62	0.63	0.60	0.57	0.53	0.50	0.47	0.56	0.65
170	0.69	0.53	0.55	0.55	0.55	0.55	0.53	0.53	0.56	0.57	0.56	0.61	0.57	0.54	0.53	0.53	0.52	0.64	0.66
175	0.73	0.69	0.61	0.62	0.62	0.62	0.61	0.60	0.63	0.61	0.63	0.65	0.62	0.60	0.61	0.61	0.65	0.67	0.67
180	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67

Table 4: Luminous Intensity Data

Quality Assured

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	2809	2809	2809	2809	2809	2809	2809	2809	2809	2809	2809	2809	2809	2809	2809	2809	2809		
5	2738	2726	2678	2622	2568	2516	2477	2455	2446	2460	2487	2527	2583	2645	2702	2775	2814		
10	2603	2496	2352	2210	2089	1992	1919	1873	1857	1878	1930	2008	2112	2243	2398	2552	2697		
15	2388	2201	1995	1806	1626	1463	1343	1274	1253	1277	1348	1469	1634	1830	2037	2265	2483		
20	2133	1908	1669	1417	1191	1039	953	910	897	912	957	1045	1197	1428	1702	1977	2241		
25	1830	1617	1361	1097	913	813	758	731	723	733	763	820	923	1111	1386	1677	1939		
30	1562	1357	1094	878	750	679	641	623	618	626	647	687	760	889	1124	1427	1682		
35	1321	1145	906	723	633	582	554	539	536	543	561	593	643	742	938	1211	1432		
40	1094	965	760	610	529	492	466	451	447	454	473	503	544	630	791	1021	1178		
45	886	781	620	496	424	388	364	349	346	352	369	393	439	517	648	839	970		
50	695	609	462	363	307	274	259	251	249	254	264	282	320	380	498	671	783		
55	452	395	297	228	197	179	173	177	183	183	181	190	211	248	328	449	526		
60	223	208	163	139	128	128	133	135	136	138	140	139	143	159	186	238	257		
65	100	107	104	100	99.9	102	98.7	93.3	90.8	94.2	101	108	109	112	120	125	113		
70	68.6	78.1	79.8	74.8	76.8	80.0	73.9	67.2	65.7	68.4	75.0	83.6	82.4	82.1	87.5	86.3	75.3		
75	48.8	57.8	56.7	53.1	56.4	59.5	55.8	53.8	55.5	57.3	57.0	61.6	59.7	56.3	61.2	62.4	52.6		
80	32.7	34.9	33.9	33.7	35.0	36.9	39.2	52.6	64.0	60.9	40.4	38.3	36.9	35.4	36.6	39.0	34.9		
85	12.4	13.3	14.5	10.2	7.14	7.48	5.47	5.13	5.02	4.85	7.35	8.36	11.0	15.0	15.4	14.8	14.4		
90	0.03	0.49	0.41	0.25	0.16	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.15	0.03		
95	0.31	0.99	1.53	1.76	1.79	1.48	1.31	0.95	0.76	0.71	0.94	1.15	1.25	1.21	0.98	0.62	0.11		
100	0.19	0.37	0.66	0.91	1.04	1.04	0.93	0.80	0.67	0.57	0.63	0.64	0.62	0.56	0.43	0.28	0.14		
105	0.21	0.28	0.39	0.52	0.63	0.67	0.64	0.60	0.52	0.45	0.50	0.42	0.41	0.37	0.30	0.26	0.19		
110	0.25	0.27	0.33	0.39	0.44	0.48	0.47	0.46	0.42	0.38	0.42	0.38	0.33	0.31	0.29	0.27	0.24		
115	0.28	0.28	0.31	0.35	0.38	0.38	0.37	0.38	0.36	0.34	0.36	0.36	0.33	0.31	0.30	0.29	0.27		
120	0.34	0.32	0.31	0.34	0.35	0.35	0.35	0.36	0.36	0.35	0.36	0.36	0.35	0.33	0.33	0.33	0.31		
125	0.39	0.36	0.36	0.33	0.35	0.34	0.34	0.36	0.35	0.36	0.36	0.37	0.36	0.39	0.39	0.38	0.37		
130	0.44	0.47	0.45	0.43	0.39	0.36	0.37	0.38	0.38	0.39	0.39	0.39	0.45	0.47	0.47	0.49	0.45		
135	0.54	0.57	0.58	0.56	0.52	0.48	0.44	0.42	0.41	0.42	0.46	0.50	0.54	0.55	0.59	0.57	0.57		
140	0.60	0.67	0.72	0.69	0.66	0.61	0.58	0.56	0.55	0.55	0.58	0.61	0.63	0.67	0.69	0.61	0.64		
145	0.65	0.71	0.80	0.81	0.80	0.75	0.73	0.70	0.68	0.68	0.69	0.70	0.75	0.77	0.73	0.66	0.66		
150	0.68	0.72	0.83	0.91	0.92	0.88	0.84	0.82	0.78	0.79	0.82	0.84	0.86	0.84	0.76	0.72	0.73		
155	0.68	0.74	0.82	0.91	0.95	0.95	0.93	0.92	0.91	0.92	0.91	0.90	0.89	0.86	0.79	0.76	0.74		
160	0.67	0.71	0.76	0.84	0.90	0.92	0.95	0.97	0.96	0.96	0.95	0.91	0.87	0.84	0.81	0.78	0.75		
165	0.65	0.68	0.72	0.77	0.83	0.85	0.88	0.91	0.91	0.90	0.91	0.89	0.85	0.84	0.83	0.78	0.75		
170	0.67	0.69	0.72	0.75	0.78	0.81	0.84	0.84	0.84	0.85	0.85	0.86	0.85	0.83	0.81	0.78	0.75		
175	0.68	0.70	0.71	0.73	0.75	0.76	0.77	0.78	0.76	0.78	0.78	0.78	0.77	0.76	0.75	0.75	0.74		
180	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67		

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

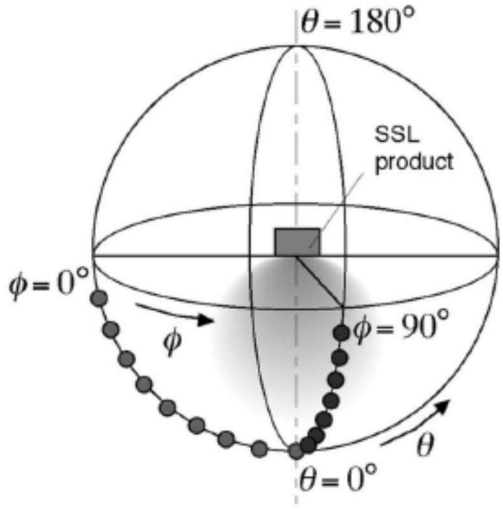
An EVERFINE Type C Model GO-R5000 Goniophotometer was used to measure the intensity at each angle of distribution for each sample. The photometric distance is 2.475m for near-field measurement or 30m for far-field measurement. Bandwidth of spectroradiometer is 380nm-780nm.
Ambient temperature was measured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