



## LM-79-08 Test Report

for

**IGT Lighting, Inc.**

3755 Lincoln St. Suite B, Riverside, CA 92503

**100W LED LINEAR HIGH BAY WITH PIR SENSOR**

**Model: IGTLHB-1610050-PIR**

**Laboratory: Leading Testing Laboratories**

**NVLAP CODE: 200960-0**

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Report No.: HZ16060019a

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:

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-1610050-PIR

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
131.5	12600.0	95.79	0.9938
CCT (K)	CRI	Stabilization Time (Light & Power)	
5008	77.5	60	

Table 1: Executive Data Summary

### Test specifications:

**Date of Receipt** : Jun. 20, 2016

**Date of Test** : Jul. 01, 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

LM-79-08 Test Report.....	1
Test Summary.....	2
Sample Photo.....	4
TEST RESULTS .....	5
Spectral Power Distribution .....	6
Zonal Lumen Tabulation.....	7
Luminous Intensity Distribution Plots.....	9
Luminous Intensity Data .....	10
EQUIPMENT LIST .....	12
TEST METHODS .....	12
Seasoning of SSL Product.....	12
Goniophotometer Method .....	12
Photometric and Electrical Measurements.....	12
Color Characteristics Measurements.....	13
Color Spatial Uniformity .....	13

## Sample Photo

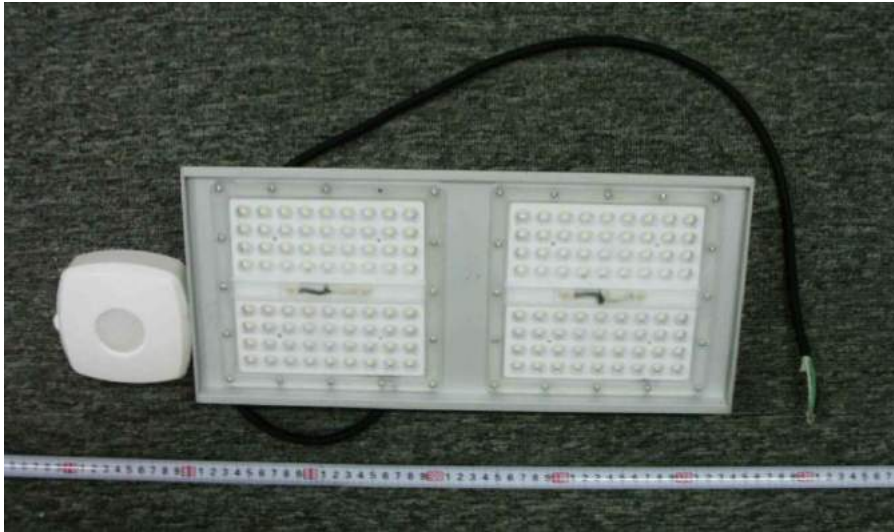


Figure 1- Overview of the sample

### Equipment Under Test (EUT)

<b>Name</b>	: 100W LED LINEAR HIGH BAY WITH PIR SENSOR
<b>Model</b>	: IGTLHB-1610050-PIR
<b>Electrical Ratings</b>	: 100~277Vac, 50/60Hz, 100W
<b>Product Description</b>	: 5000K, Plastic Lens, Aluminum Enclosure
<b>Manufacturer</b>	: IGT Lighting, Inc.
<b>Address</b>	: 1900 Compton Ave., Building 101, Corona, CA 92881, USA

## TEST RESULTS

Test ambient temperature was 24.4°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.

The photometric distance of Goniophotometer is 30 m.

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

Parameter	Result			Special Color Rendering Indices	
Test Voltage (V)	120.0	100.0	277.0	R1	75
Voltage frequency (Hz)	60	60	60	R2	85
Test Current (A)	0.803	0.970	0.371	R3	89
Power Factor	0.9938	0.9959	0.9278	R4	75
Test Power (W)	95.79	96.52	95.48	R5	75
THD A%	7.68	7.29	15.36	R6	76
Luminous Efficacy (lm/W)	131.5			R7	85
Total Luminous Flux (lm)	12600.0			R8	61
Color Rendering Index (CRI)	77.5			R9	-10
R9	-10			R10	60
Correlated Color Temperature (CCT) (K)	5008			R11	70
Chromaticity (Chroma x, Chroma y)	(0.3449, 0.3517)			R12	47
Chromaticity (Chroma u, Chroma v)	(0.2112, 0.3231)			R13	78
Chromaticity (Chroma u', Chroma v')	(0.2112, 0.4847)			R14	93
Duv	0.0002				
Average Beam Angle (°)	45.9				
Center Beam Candle Power (cd)	11930				
Spacing Criteria	0.96 (0°-180°)/ 0.48 (90°-270°)				
Zonal Lumens in the 0°-60°Zone	93.54%				
Zonal Lumens in the 60°-90°Zone	6.29%				
Zonal Lumens in the 90°-120°Zone	0.10%				
Zonal Lumens in the 120°-180°Zone	0.07%				

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

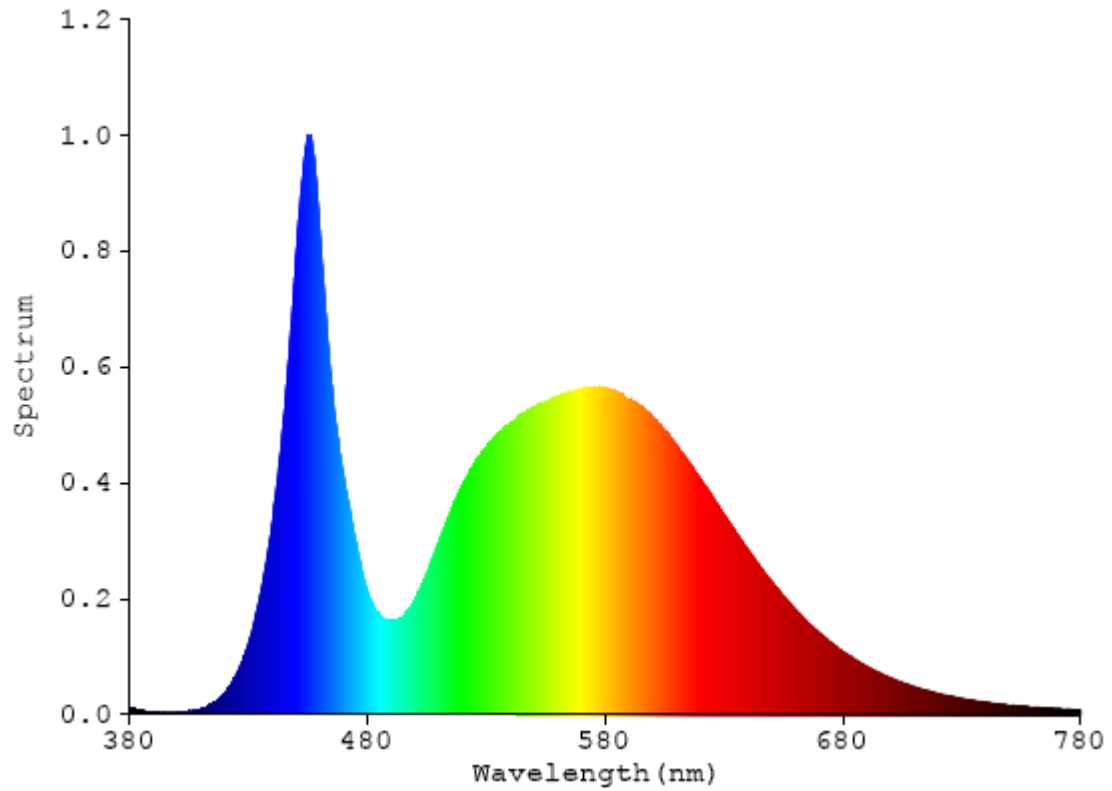


Chart 1: Spectral Power Distribution

### Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	1089.588	8.65%
10- 20	2343.917	18.60%
20- 30	2595.178	20.60%
30- 40	2473.742	19.63%
40- 50	2064.684	16.39%
50- 60	1218.48	9.67%
60- 70	495.654	3.93%
70- 80	250.828	1.99%
80- 90	46.076	0.37%
90-100	6.5	0.05%
100-110	3.49	0.03%
110-120	2.317	0.02%
120-130	2.092	0.02%
130-140	2.174	0.02%
140-150	2.07	0.02%
150-160	1.653	0.01%
160-170	0.989	0.01%
170-180	0.318	0.00%
Total	12599.8	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	11785.589	93.54%
60- 90	792.558	6.29%
0-90	12578.147	99.83%
90- 180	21.603	0.17%
0- 180	12599.8	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.

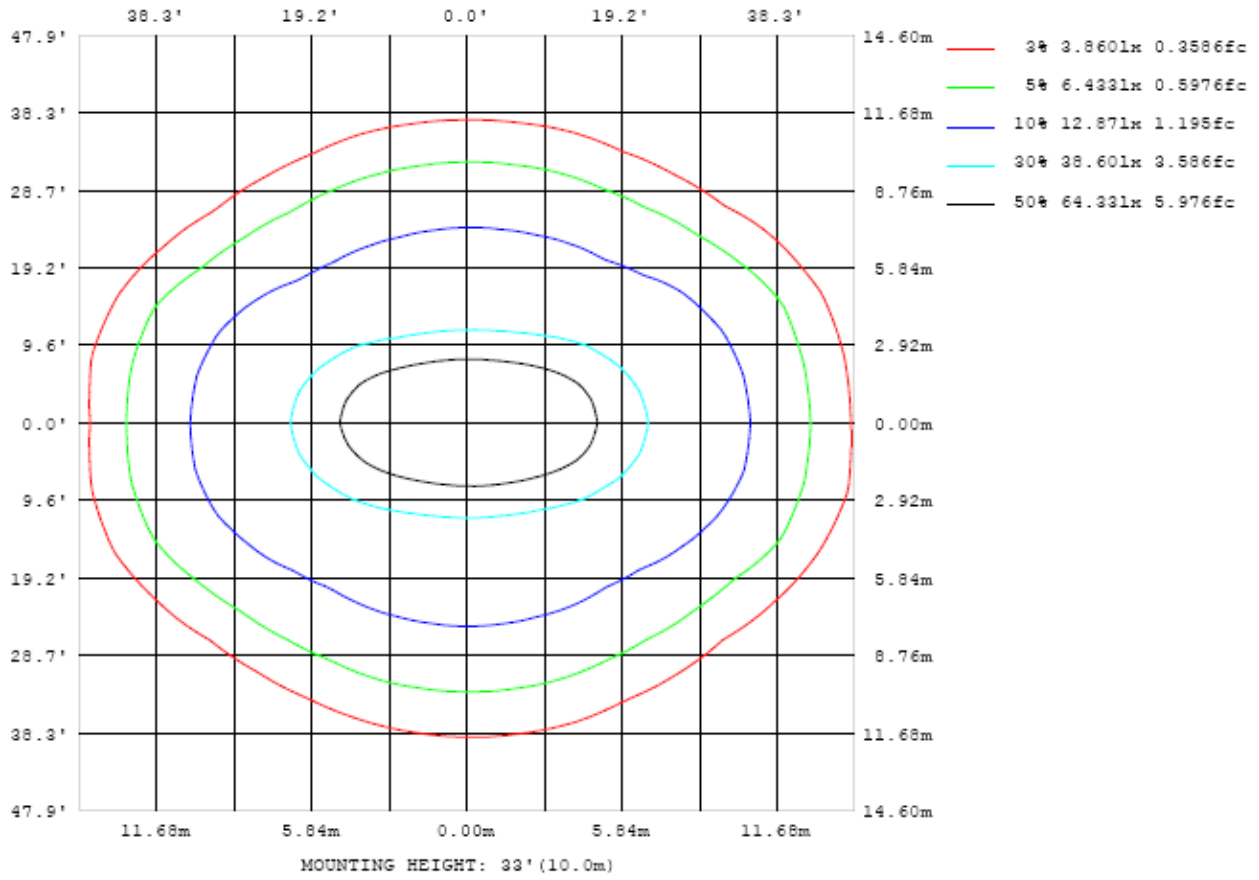


Chart 2: Illuminance Plot (Footcandles)



### Luminous Intensity Distribution Plots

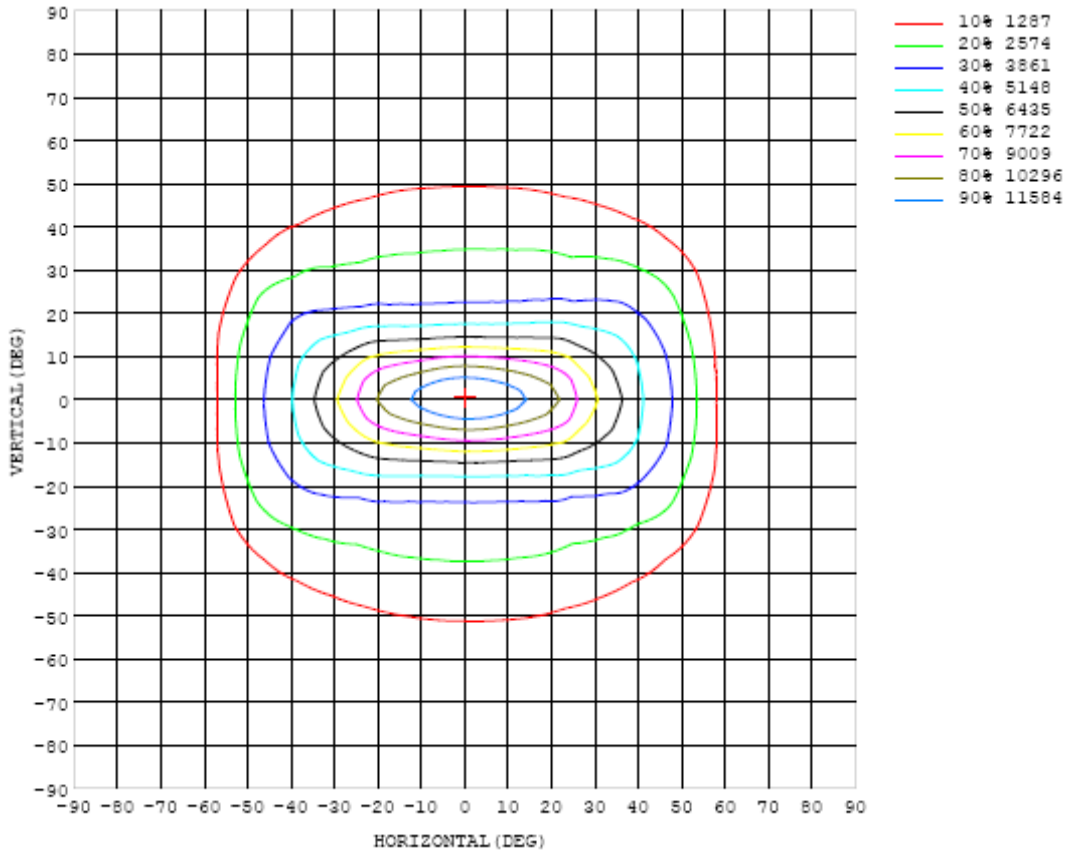


Chart 3: Isocandela Plot

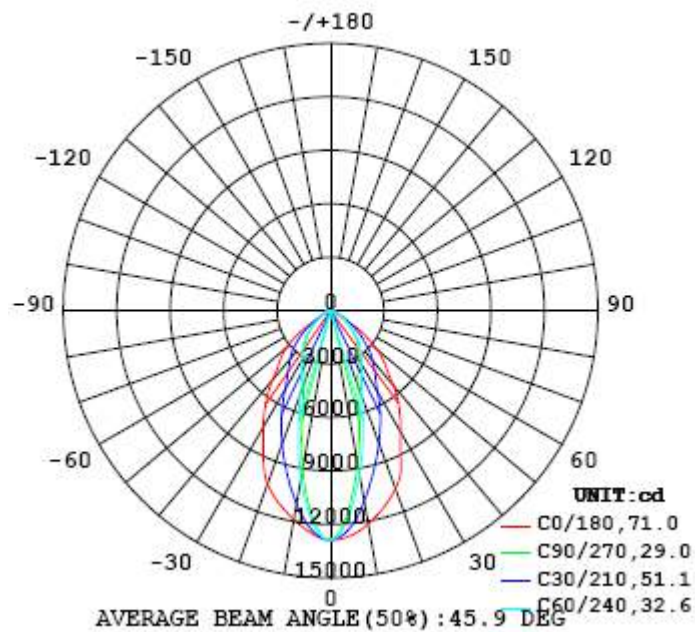


Chart 4: Polar Candela Distribution

**Luminous Intensity Data**

Table--1 UNIT: ×10cd

C (DEG) γ (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	1287	1287	1287	1287	1287	1287	1287	1287	1287	1287	1287	1287	1287	1287	1287	1287	1287	1287	1287
5	1269	1263	1248	1227	1204	1181	1160	1143	1133	1129	1130	1137	1151	1169	1189	1210	1229	1244	1254
10	1216	1195	1148	1086	1027	976	933	902	882	874	877	893	921	960	1008	1064	1121	1166	1190
15	1145	1107	1025	933	848	770	705	658	630	620	626	650	695	757	831	914	1004	1081	1120
20	1064	1011	906	793	678	581	517	479	460	454	459	478	517	582	672	776	883	983	1036
25	935	884	787	662	538	455	410	384	372	368	371	384	411	460	541	647	751	845	897
30	788	739	646	527	437	379	345	327	318	316	317	326	346	381	437	525	628	712	758
35	672	635	554	436	353	322	298	284	278	276	276	283	297	317	358	440	536	604	637
40	551	534	473	368	298	263	255	243	238	236	237	242	251	265	303	372	452	494	509
45	436	425	373	298	247	216	204	197	191	189	190	195	200	217	250	303	368	401	406
50	341	339	297	227	183	165	151	148	144	142	141	144	148	162	185	235	298	324	325
55	219	225	195	152	124	110	104	102	102	103	100	96.2	99.8	105	122	154	196	211	197
60	79.0	108	105	87.2	74.9	72.0	71.9	75.7	77.9	82.8	80.1	72.4	67.7	68.6	73.4	83.8	97.9	82.2	60.3
65	40.1	46.2	52.4	51.9	50.5	51.4	54.7	57.2	57.0	61.2	58.2	56.3	51.6	48.0	47.3	48.3	46.6	38.9	36.4
70	27.8	30.4	35.6	37.0	35.4	39.1	42.7	40.8	37.6	38.5	37.0	40.0	39.1	34.4	31.7	32.9	31.2	26.1	25.3
75	18.7	20.8	25.0	25.6	24.6	26.6	31.3	29.1	28.0	28.9	26.9	28.0	27.9	22.6	21.1	22.2	20.7	17.4	16.9
80	10.8	12.7	14.7	15.5	15.5	16.0	17.4	18.4	20.1	24.0	19.1	17.0	15.2	13.7	13.2	12.5	12.3	10.3	9.50
85	2.57	2.83	3.08	3.52	4.37	4.77	3.47	2.05	1.02	0.64	1.14	2.20	3.71	4.33	3.59	3.27	3.16	3.06	3.03
90	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.01	0.01	0.01	0.02
95	0.11	0.34	0.86	1.18	1.35	1.29	1.06	0.70	0.34	0.12	0.51	1.04	1.52	1.84	1.69	1.39	0.69	0.10	0.08
100	0.14	0.20	0.36	0.51	0.72	0.74	0.68	0.52	0.31	0.19	0.39	0.66	0.82	0.83	0.72	0.46	0.35	0.12	0.15
105	0.16	0.19	0.25	0.36	0.45	0.48	0.44	0.35	0.24	0.17	0.24	0.36	0.42	0.41	0.35	0.33	0.31	0.13	0.18
110	0.17	0.18	0.22	0.27	0.32	0.34	0.32	0.28	0.20	0.16	0.18	0.24	0.27	0.30	0.31	0.32	0.29	0.14	0.21
115	0.11	0.17	0.21	0.23	0.26	0.27	0.26	0.23	0.18	0.16	0.16	0.21	0.25	0.29	0.31	0.31	0.26	0.14	0.13
120	0.19	0.20	0.19	0.21	0.23	0.23	0.23	0.20	0.18	0.17	0.17	0.21	0.25	0.28	0.30	0.29	0.25	0.12	0.25
125	0.10	0.15	0.19	0.21	0.21	0.22	0.21	0.19	0.18	0.17	0.18	0.22	0.25	0.28	0.29	0.28	0.26	0.12	0.21
130	0.22	0.15	0.23	0.22	0.22	0.21	0.20	0.19	0.18	0.18	0.20	0.22	0.25	0.28	0.29	0.28	0.27	0.19	0.32
135	0.27	0.19	0.26	0.23	0.23	0.23	0.22	0.19	0.19	0.19	0.21	0.24	0.27	0.29	0.30	0.30	0.29	0.24	0.36
140	0.24	0.21	0.27	0.27	0.25	0.24	0.24	0.23	0.23	0.23	0.24	0.26	0.28	0.30	0.31	0.31	0.27	0.25	0.39
145	0.27	0.26	0.23	0.29	0.28	0.26	0.25	0.25	0.25	0.25	0.26	0.28	0.30	0.31	0.32	0.31	0.24	0.25	0.40
150	0.30	0.26	0.23	0.29	0.29	0.29	0.27	0.27	0.26	0.27	0.28	0.30	0.31	0.32	0.31	0.30	0.22	0.21	0.35
155	0.27	0.27	0.24	0.25	0.29	0.29	0.29	0.29	0.29	0.28	0.30	0.31	0.31	0.31	0.30	0.25	0.24	0.22	0.34
160	0.29	0.28	0.27	0.25	0.26	0.29	0.29	0.30	0.30	0.28	0.31	0.32	0.31	0.30	0.26	0.24	0.26	0.26	0.39
165	0.28	0.28	0.28	0.27	0.26	0.25	0.26	0.28	0.28	0.28	0.30	0.31	0.28	0.27	0.26	0.26	0.27	0.27	0.38
170	0.27	0.27	0.28	0.27	0.27	0.26	0.26	0.27	0.28	0.28	0.28	0.29	0.29	0.28	0.28	0.28	0.27	0.24	0.33
175	0.31	0.30	0.30	0.31	0.30	0.30	0.30	0.31	0.31	0.30	0.32	0.33	0.32	0.32	0.31	0.30	0.30	0.29	0.32
180	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35

Table 4: Luminous Intensity Data

Table--2 UNIT: ×10cd

C (DEG) y (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	1287	1287	1287	1287	1287	1287	1287	1287	1287	1287	1287	1287	1287	1287	1287	1287	1287		
5	1255	1248	1235	1220	1202	1186	1174	1167	1164	1166	1174	1187	1204	1222	1241	1256	1266		
10	1183	1150	1102	1052	1004	963	931	911	904	911	933	968	1012	1062	1115	1166	1203		
15	1100	1033	947	857	771	702	655	628	620	629	659	712	787	877	969	1054	1122		
20	1005	913	796	672	569	501	463	445	440	447	470	516	591	696	821	935	1028		
25	861	772	653	523	436	387	361	349	347	352	368	400	457	554	683	808	898		
30	717	626	512	415	355	320	302	294	293	297	308	331	373	448	545	658	747		
35	604	530	417	332	298	275	261	256	256	259	267	285	314	360	455	560	634		
40	492	448	353	281	247	236	223	218	217	220	229	245	260	306	388	478	528		
45	395	360	291	235	202	189	180	173	172	175	184	194	213	256	319	384	421		
50	323	293	221	174	150	134	130	123	122	124	133	139	159	186	245	310	337		
55	211	186	140	108	94.6	87.3	88.5	88.4	85.7	89.7	90.7	93.0	103	123	158	201	216		
60	84.4	88.1	70.9	61.2	58.6	60.5	63.5	61.5	63.9	64.2	66.6	65.7	67.0	73.9	88.3	103	94.3		
65	39.3	43.4	43.1	41.7	42.5	45.5	45.1	41.5	42.7	42.9	48.2	48.5	46.9	47.5	50.8	50.0	43.8		
70	26.8	30.6	30.2	27.4	31.1	35.5	34.5	32.4	32.8	31.7	35.6	36.3	32.6	31.0	33.8	32.7	28.8		
75	18.0	20.3	20.1	19.2	21.2	25.2	25.1	26.7	27.3	25.8	25.9	26.2	22.5	21.2	22.5	21.4	19.3		
80	10.3	10.5	10.6	11.1	11.0	12.7	14.8	15.3	18.3	15.4	16.0	14.2	12.8	12.9	12.3	12.5	11.4		
85	2.89	2.54	2.47	2.33	1.84	1.15	0.71	0.37	0.18	0.32	0.48	1.19	2.51	2.59	2.59	2.65	2.72		
90	0.02	0.02	0.09	0.46	0.47	0.14	0.10	0.06	0.05	0.08	0.10	0.15	0.19	0.05	0.02	0.02	0.02		
95	0.14	0.73	1.25	1.59	1.61	1.43	1.09	0.66	0.44	0.57	0.82	1.03	1.15	1.13	0.92	0.61	0.07		
100	0.10	0.20	0.45	0.68	0.80	0.80	0.69	0.49	0.41	0.47	0.50	0.59	0.62	0.57	0.42	0.25	0.07		
105	0.12	0.15	0.22	0.34	0.43	0.47	0.45	0.37	0.35	0.39	0.40	0.39	0.40	0.36	0.28	0.20	0.10		
110	0.16	0.15	0.19	0.23	0.28	0.31	0.32	0.31	0.32	0.34	0.37	0.29	0.29	0.27	0.23	0.20	0.15		
115	0.14	0.16	0.18	0.21	0.23	0.25	0.26	0.27	0.30	0.30	0.32	0.31	0.25	0.24	0.21	0.19	0.13		
120	0.24	0.18	0.18	0.20	0.22	0.23	0.24	0.26	0.29	0.31	0.32	0.33	0.26	0.22	0.21	0.22	0.19		
125	0.18	0.23	0.20	0.20	0.21	0.22	0.23	0.26	0.28	0.30	0.31	0.32	0.32	0.27	0.23	0.22	0.17		
130	0.26	0.30	0.26	0.23	0.23	0.23	0.23	0.26	0.27	0.28	0.30	0.32	0.34	0.36	0.32	0.29	0.29		
135	0.30	0.35	0.33	0.30	0.28	0.27	0.27	0.28	0.29	0.29	0.32	0.33	0.36	0.37	0.39	0.33	0.38		
140	0.37	0.39	0.38	0.35	0.34	0.33	0.31	0.32	0.32	0.32	0.35	0.36	0.38	0.41	0.41	0.37	0.38		
145	0.37	0.36	0.39	0.41	0.42	0.39	0.38	0.37	0.37	0.37	0.38	0.41	0.42	0.44	0.41	0.34	0.39		
150	0.38	0.39	0.44	0.43	0.46	0.45	0.44	0.42	0.40	0.42	0.43	0.45	0.47	0.44	0.42	0.43	0.44		
155	0.38	0.40	0.41	0.44	0.48	0.47	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.43	0.42	0.44	0.42		
160	0.39	0.39	0.40	0.41	0.44	0.47	0.48	0.48	0.47	0.46	0.46	0.45	0.43	0.43	0.44	0.44	0.42		
165	0.40	0.40	0.39	0.40	0.42	0.43	0.44	0.44	0.44	0.43	0.43	0.43	0.43	0.44	0.44	0.43	0.40		
170	0.36	0.36	0.37	0.38	0.40	0.41	0.43	0.43	0.42	0.43	0.43	0.41	0.41	0.41	0.42	0.41	0.37		
175	0.34	0.34	0.35	0.35	0.36	0.37	0.38	0.39	0.38	0.38	0.38	0.38	0.37	0.38	0.38	0.38	0.35		
180	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35		

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

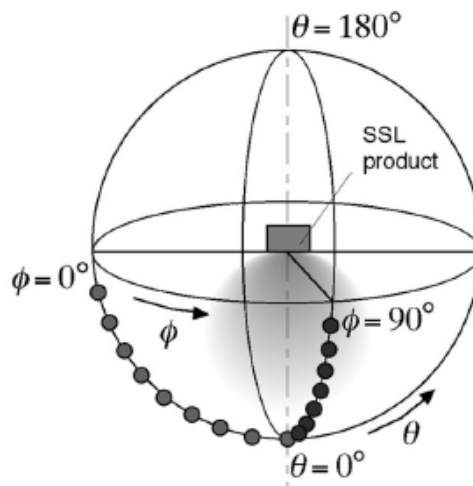
## Color Characteristics Measurements

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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