



LM-79-08 Test Report

for

IGT Lighting, Inc.

3755 Lincoln St. Suite B, Riverside, CA 92503

150W LED LINEAR HIGH BAY WITH PIR & PHOTECCELL SENSOR

Model: IGTLHB-1615050-PIRP

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ16060019g

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

Reviewed by:

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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-1615050-PIRP**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
139.4	20508.0	147.11	0.9946
CCT (K)	CRI	Stabilization Time (Light & Power)	
4979	77.5	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

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Sample Photo

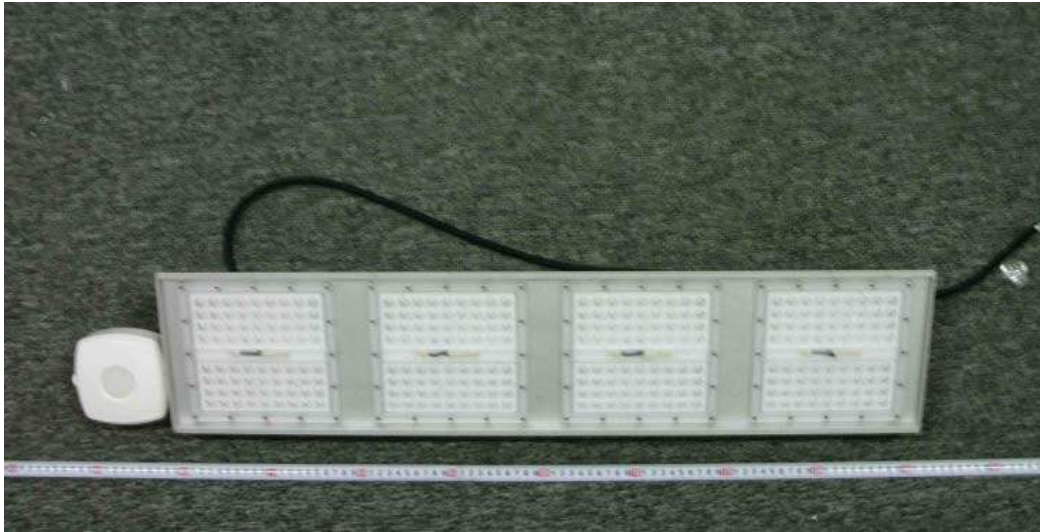


Figure 1- Overview of the sample

Equipment Under Test (EUT)

Name	: 150W LED LINEAR HIGH BAY WITH PIR & PHOTECCELL SENSOR
Model	: IGTLHB-1615050-PIRP
Electrical Ratings	: 100~277Vac, 50/60Hz, 150W
Product Description	: 5000K, Plastic Lens, Aluminum Enclosure
Manufacturer	: IGT Lighting, Inc.
Address	: 1900 Compton Ave., Building 101, Corona, CA 92881, USA

TEST RESULTS

Test ambient temperature was 24.5°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)	1.233	1.494	0.562	R3	89
Power Factor	0.9946	0.9965	0.9302	R4	74
Test Power (W)	147.11	148.89	144.79	R5	74
THD A%	6.94	6.40	14.07	R6	77
Luminous Efficacy (lm/W)	139.4			R7	85
Total Luminous Flux (lm)	20508.0			R8	61
Color Rendering Index (CRI)	77.5			R9	-10
R9	-10			R10	61
Correlated Color Temperature (CCT) (K)	4979			R11	69
Chromaticity (Chroma x, Chroma y)	(0.3459, 0.3544)			R12	46
Chromaticity (Chroma u, Chroma v)	(0.2109, 0.3241)			R13	78
Chromaticity (Chroma u', Chroma v')	(0.2109, 0.4861)			R14	94
Duv	0.0011				
Average Beam Angle (°)	44.0				
Center Beam Candle Power (cd)	21830				
Spacing Criteria	0.98 (0°-180°)/ 0.44 (90°-270°)				
Zonal Lumens in the 0°-60°Zone	93.11%				
Zonal Lumens in the 60°-90°Zone	6.75%				
Zonal Lumens in the 90°-120°Zone	0.07%				
Zonal Lumens in the 120°-180°Zone	0.06%				

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

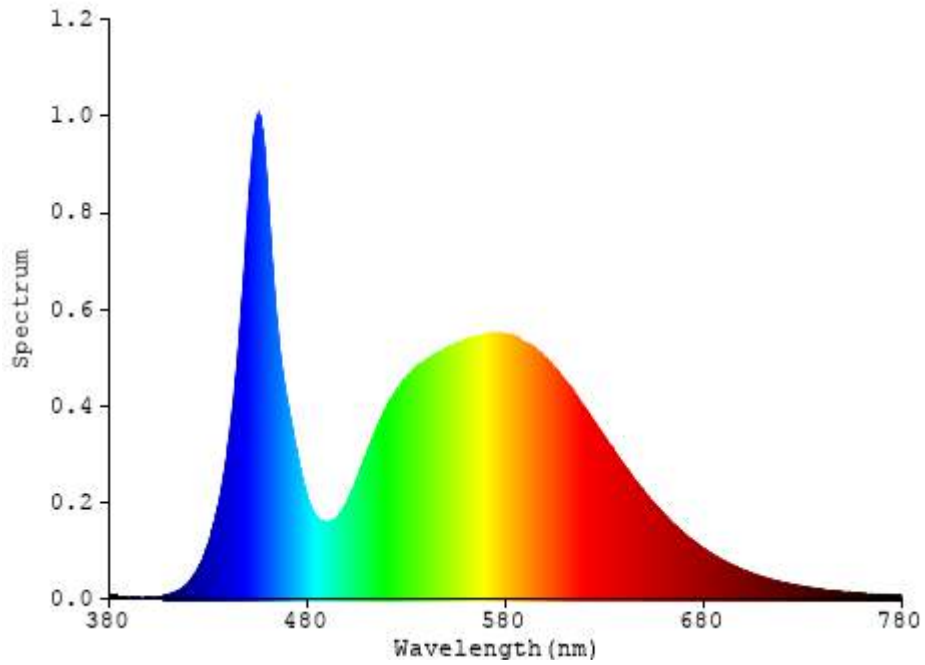


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	1821.099	8.88%
10- 20	3831.501	18.68%
20- 30	4187.722	20.42%
30- 40	4020.964	19.61%
40- 50	3321.469	16.20%
50- 60	1912.326	9.33%
60- 70	825.656	4.03%
70- 80	458.853	2.24%
80- 90	100.183	0.49%
90-100	8.027	0.04%
100-110	3.806	0.02%
110-120	2.781	0.01%
120-130	2.66	0.01%
130-140	2.917	0.01%
140-150	3.02	0.01%
150-160	2.501	0.01%
160-170	1.509	0.01%
170-180	0.507	0.00%
Total	20507.5	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	19095.081	93.11%
60- 90	1384.692	6.75%
0-90	20479.773	99.86%
90- 180	27.728	0.14%
0- 180	20507.5	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.

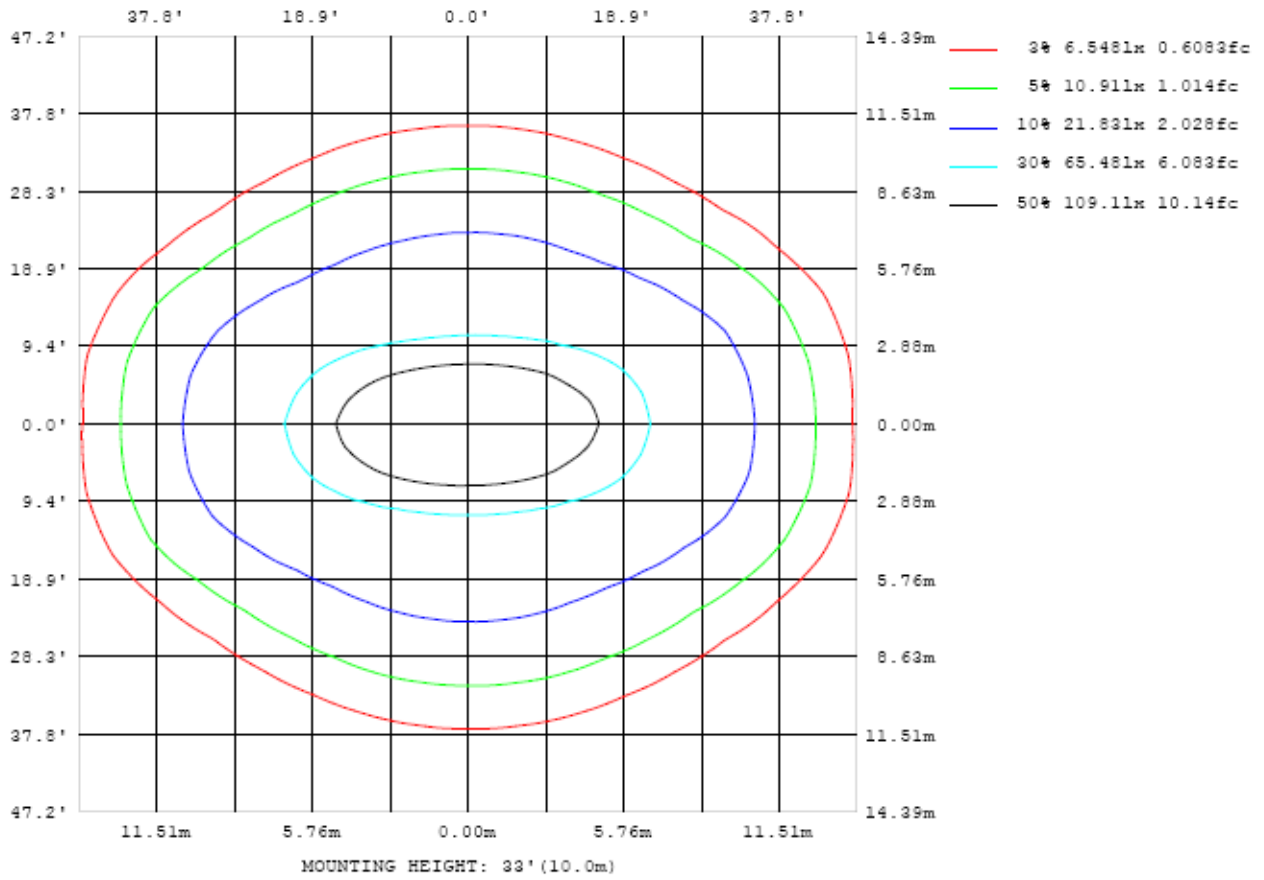


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

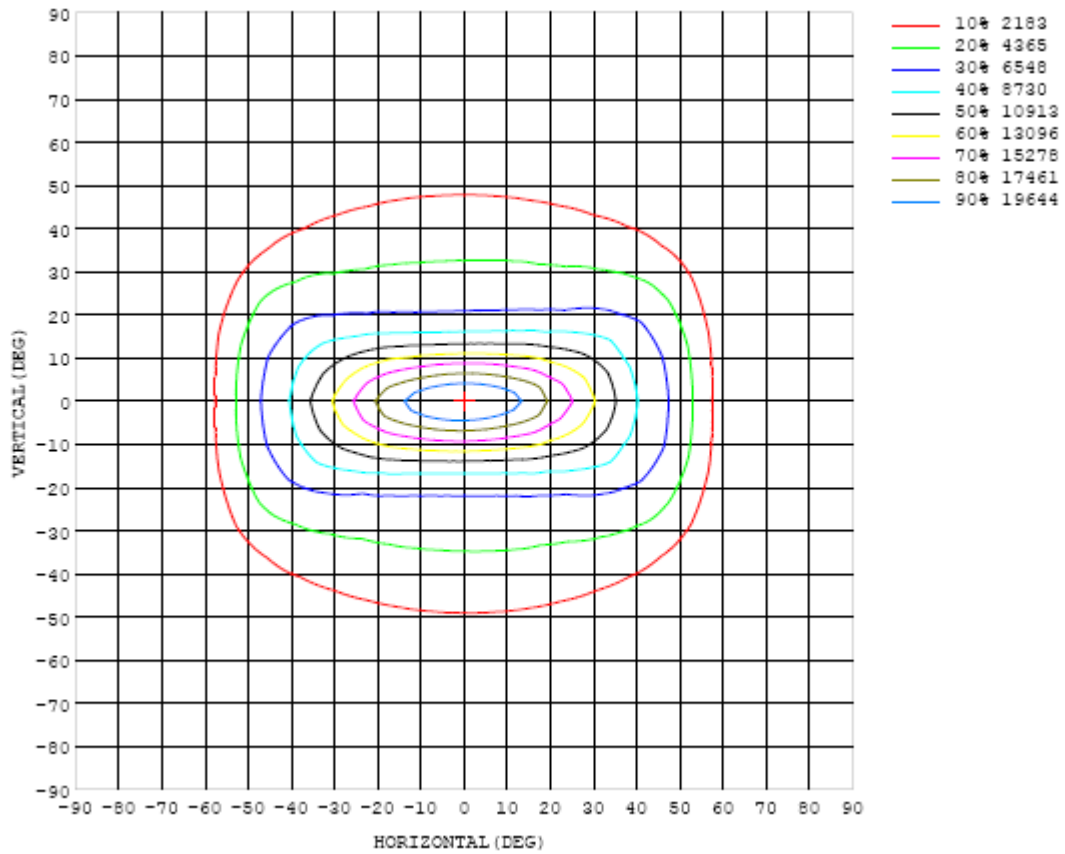


Chart 3: Isocandela Plot

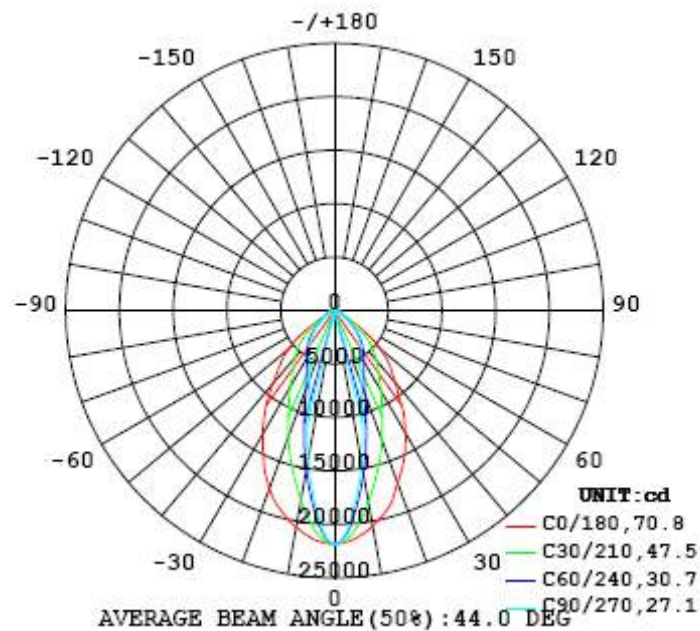


Chart 4: Polar Candela Distribution

Luminous Intensity Data

Table--1 UNIT: *10cd

C (DEG) y (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	2183	2183	2183	2183	2183	2183	2183	2183	2183	2183	2183	2183	2183	2183	2183	2183	2183	2183	2183
5	2143	2134	2110	2075	2034	1994	1959	1932	1916	1913	1920	1940	1971	2008	2051	2093	2125	2145	2149
10	2045	2011	1926	1820	1716	1627	1557	1503	1469	1459	1474	1510	1567	1642	1737	1847	1956	2035	2057
15	1917	1850	1706	1550	1404	1264	1144	1058	1008	994	1011	1065	1157	1283	1426	1575	1740	1885	1933
20	1715	1626	1460	1296	1108	937	823	762	730	716	729	762	825	944	1125	1328	1515	1698	1772
25	1533	1427	1251	1050	852	732	652	609	587	579	585	606	649	731	869	1084	1284	1470	1559
30	1322	1225	1070	865	692	593	548	518	502	496	500	513	543	594	692	875	1087	1252	1338
35	1099	1036	912	726	583	506	472	450	438	433	435	445	466	499	573	726	922	1054	1122
40	882	846	757	613	498	432	395	381	368	363	366	376	392	421	483	605	766	857	896
45	727	713	638	501	404	349	314	299	287	282	284	294	307	338	391	487	628	699	718
50	556	551	499	381	294	252	225	213	207	204	205	210	221	245	286	371	495	550	559
55	340	355	314	231	183	157	147	142	148	151	147	142	149	160	186	237	321	357	346
60	129	156	150	126	112	106	106	112	116	117	117	113	109	111	120	135	162	159	132
65	71.6	77.8	85.0	85.2	83.1	83.6	86.0	83.9	79.6	78.6	80.1	85.2	86.6	84.8	85.8	89.0	89.2	78.0	71.3
70	51.7	54.9	63.3	65.3	62.2	64.4	67.6	61.9	56.2	55.3	56.1	62.3	67.3	63.3	61.7	65.4	63.7	54.7	52.7
75	35.6	38.3	45.9	46.0	43.2	46.3	49.9	46.1	45.3	45.9	44.5	46.2	49.3	45.1	42.8	46.2	45.9	38.7	37.0
80	22.5	24.9	27.5	27.2	26.6	27.7	29.6	31.2	41.9	52.5	37.2	31.5	29.9	28.2	27.6	27.9	28.3	25.3	24.2
85	9.02	8.86	9.61	10.6	6.85	5.31	4.07	2.70	0.64	0.50	0.86	3.70	5.50	6.73	8.35	10.5	9.55	8.97	9.54
90	0.02	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.03	0.03
95	0.12	0.28	0.71	1.09	1.29	1.29	1.13	0.86	0.54	0.49	0.77	1.18	1.48	1.62	1.49	1.08	0.64	0.21	0.10
100	0.14	0.18	0.31	0.49	0.62	0.68	0.66	0.57	0.42	0.40	0.47	0.62	0.69	0.67	0.55	0.43	0.37	0.21	0.17
105	0.16	0.18	0.23	0.31	0.39	0.43	0.43	0.39	0.31	0.30	0.29	0.36	0.39	0.39	0.38	0.37	0.31	0.22	0.19
110	0.17	0.19	0.21	0.25	0.30	0.33	0.34	0.31	0.27	0.27	0.26	0.30	0.34	0.37	0.37	0.34	0.28	0.22	0.23
115	0.18	0.20	0.21	0.23	0.26	0.29	0.29	0.27	0.25	0.26	0.27	0.29	0.34	0.36	0.35	0.31	0.27	0.20	0.24
120	0.14	0.19	0.22	0.23	0.25	0.26	0.26	0.24	0.25	0.27	0.28	0.30	0.33	0.34	0.33	0.31	0.27	0.17	0.24
125	0.24	0.20	0.23	0.24	0.23	0.25	0.24	0.23	0.25	0.27	0.28	0.29	0.32	0.32	0.33	0.32	0.30	0.19	0.37
130	0.22	0.21	0.28	0.26	0.26	0.25	0.23	0.24	0.25	0.28	0.29	0.29	0.30	0.34	0.35	0.33	0.33	0.24	0.43
135	0.32	0.27	0.32	0.31	0.29	0.28	0.27	0.27	0.26	0.27	0.29	0.33	0.35	0.37	0.37	0.39	0.37	0.26	0.43
140	0.36	0.32	0.34	0.36	0.34	0.31	0.31	0.31	0.32	0.33	0.34	0.37	0.38	0.39	0.42	0.41	0.39	0.32	0.51
145	0.38	0.35	0.34	0.38	0.38	0.36	0.35	0.35	0.36	0.37	0.38	0.39	0.41	0.44	0.44	0.43	0.36	0.39	0.53
150	0.35	0.36	0.33	0.39	0.40	0.40	0.39	0.40	0.39	0.40	0.42	0.44	0.44	0.45	0.45	0.42	0.34	0.39	0.59
155	0.37	0.37	0.36	0.37	0.42	0.42	0.42	0.43	0.44	0.43	0.46	0.47	0.47	0.47	0.45	0.39	0.36	0.39	0.59
160	0.38	0.39	0.40	0.38	0.38	0.40	0.42	0.44	0.46	0.44	0.49	0.49	0.48	0.46	0.42	0.37	0.38	0.40	0.56
165	0.37	0.40	0.41	0.41	0.41	0.38	0.40	0.43	0.44	0.44	0.48	0.50	0.46	0.44	0.42	0.41	0.38	0.37	0.53
170	0.42	0.42	0.44	0.44	0.44	0.42	0.42	0.42	0.44	0.44	0.44	0.47	0.46	0.45	0.42	0.41	0.41	0.40	0.53
175	0.49	0.50	0.49	0.49	0.49	0.47	0.49	0.50	0.50	0.48	0.51	0.53	0.50	0.49	0.49	0.49	0.48	0.49	0.56
180	0.52	0.53	0.52	0.53	0.53	0.53	0.54	0.53	0.54	0.56	0.53	0.52	0.52	0.55	0.53	0.53	0.54	0.51	0.52

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	2183	2183	2183	2183	2183	2183	2183	2183	2183	2183	2183	2183	2183	2183	2183	2183	2183		
5	2137	2109	2068	2023	1976	1936	1907	1890	1884	1891	1911	1941	1981	2025	2069	2107	2134		
10	2013	1918	1799	1691	1596	1519	1461	1425	1413	1428	1467	1528	1609	1703	1814	1928	2014		
15	1852	1688	1524	1364	1214	1092	1008	962	951	971	1023	1113	1239	1388	1543	1710	1861		
20	1661	1468	1264	1053	888	781	721	692	685	697	733	801	917	1092	1287	1462	1640		
25	1433	1240	1018	817	686	614	574	555	551	560	583	629	710	837	1048	1258	1448		
30	1215	1036	817	655	565	513	486	472	470	476	493	525	572	679	867	1076	1243		
35	1024	875	678	542	477	442	420	409	407	412	425	446	486	569	725	916	1043		
40	841	734	572	459	400	373	352	340	336	341	355	371	411	481	604	754	843		
45	689	605	470	376	321	292	274	263	259	263	275	291	327	383	493	635	702		
50	550	480	354	273	230	206	196	186	184	187	194	208	233	280	375	491	539		
55	353	303	219	169	146	134	135	139	140	140	137	142	157	183	233	317	350		
60	164	151	119	105	98.4	99.0	101	99.3	98.2	100	104	104	107	118	137	162	157		
65	77.2	83.8	80.5	77.4	77.1	78.1	73.7	67.7	66.4	68.6	75.6	80.1	80.0	81.6	87.2	87.9	77.3		
70	55.2	61.4	61.0	55.8	58.9	61.5	55.7	51.0	50.9	51.3	56.5	61.6	58.6	57.1	62.3	61.9	54.2		
75	39.2	44.6	42.6	40.3	42.4	45.0	42.4	42.7	44.0	42.4	42.3	44.6	41.6	40.1	43.4	43.4	37.6		
80	25.8	26.2	25.9	25.5	25.7	28.2	30.2	32.1	43.0	32.4	29.0	26.6	24.2	24.4	25.2	26.2	24.4		
85	8.73	8.43	7.70	5.14	3.73	2.62	0.95	0.59	0.40	0.41	0.64	2.74	6.06	7.38	8.86	8.69	8.99		
90	0.03	0.52	0.59	0.64	0.58	0.41	0.06	0.05	0.06	0.07	0.08	0.09	0.09	0.12	0.57	0.03	0.03		
95	0.20	0.84	1.42	1.70	1.72	1.55	1.28	0.92	0.71	0.69	0.86	1.02	1.09	1.04	0.85	0.55	0.09		
100	0.13	0.27	0.54	0.78	0.91	0.93	0.84	0.70	0.57	0.53	0.51	0.56	0.56	0.50	0.39	0.25	0.12		
105	0.16	0.19	0.29	0.42	0.52	0.57	0.54	0.51	0.45	0.44	0.47	0.38	0.37	0.32	0.27	0.22	0.16		
110	0.21	0.20	0.23	0.30	0.36	0.40	0.39	0.40	0.38	0.39	0.42	0.33	0.30	0.28	0.25	0.23	0.20		
115	0.26	0.22	0.24	0.26	0.29	0.32	0.32	0.34	0.34	0.36	0.39	0.35	0.27	0.27	0.25	0.25	0.22		
120	0.25	0.26	0.25	0.27	0.27	0.28	0.29	0.32	0.34	0.36	0.37	0.35	0.33	0.26	0.27	0.27	0.24		
125	0.34	0.31	0.30	0.28	0.29	0.29	0.30	0.32	0.33	0.35	0.37	0.37	0.35	0.35	0.32	0.33	0.31		
130	0.36	0.41	0.36	0.35	0.34	0.31	0.32	0.35	0.36	0.37	0.38	0.40	0.43	0.41	0.40	0.38	0.34		
135	0.41	0.46	0.46	0.46	0.43	0.41	0.41	0.40	0.40	0.42	0.44	0.47	0.49	0.48	0.49	0.47	0.47		
140	0.53	0.54	0.57	0.56	0.54	0.51	0.49	0.48	0.48	0.48	0.51	0.53	0.54	0.57	0.56	0.49	0.52		
145	0.53	0.56	0.65	0.66	0.64	0.60	0.59	0.57	0.57	0.57	0.58	0.60	0.62	0.62	0.59	0.53	0.56		
150	0.59	0.58	0.67	0.71	0.72	0.69	0.68	0.66	0.63	0.66	0.67	0.68	0.69	0.68	0.61	0.57	0.55		
155	0.60	0.60	0.64	0.71	0.72	0.75	0.74	0.73	0.72	0.73	0.72	0.72	0.72	0.69	0.62	0.60	0.59		
160	0.55	0.57	0.60	0.64	0.69	0.73	0.76	0.76	0.75	0.74	0.74	0.72	0.69	0.65	0.64	0.62	0.59		
165	0.54	0.55	0.58	0.61	0.64	0.66	0.69	0.71	0.71	0.70	0.70	0.68	0.67	0.66	0.64	0.60	0.57		
170	0.54	0.55	0.56	0.58	0.60	0.63	0.66	0.66	0.66	0.68	0.68	0.68	0.66	0.65	0.63	0.61	0.57		
175	0.56	0.56	0.57	0.58	0.58	0.59	0.60	0.62	0.60	0.61	0.63	0.63	0.60	0.61	0.61	0.60	0.58		
180	0.52	0.53	0.52	0.53	0.53	0.53	0.54	0.54	0.54	0.56	0.53	0.53	0.54	0.55	0.54	0.53	0.53		

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 $k=2$.

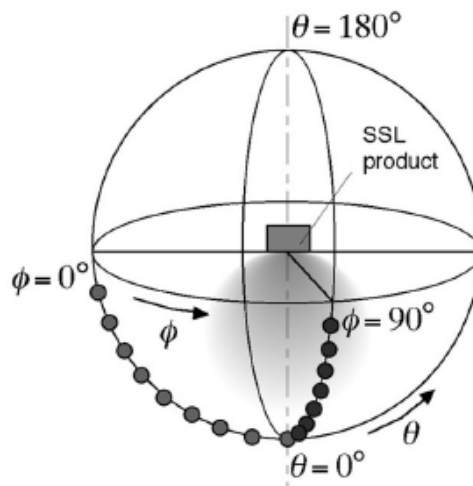
Color Characteristics Measurements

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° 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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