



LM-79-08 Test Report

for

DONGGUAN THAILIGHT SEMICONDUCTOR LIGHTING CO., LTD

Sanhui Ind. Area, Cunwei, Hengli, Dongguan, China.

LED HIGH BAY

Model: TLHBH120P3YYZZ

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ17060045c

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

Review by:

Engineer: April Zou
Jul. 10, 2017

Approved by

Manager: Jim Zhang
Jul. 10, 2017



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: **TLHBH120P3YYZZ**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
130.9	15354.0	117.26	0.9975
CCT (K)	CRI	Stabilization Time (Light & Power)	
3015	73.2	60	
IES Classification		B-U-G	
Type VS		B4-U0-G1	

Table 1: Executive Data Summary

Note: The above results are recorded/ derived from measurements made using an Integrating Sphere.

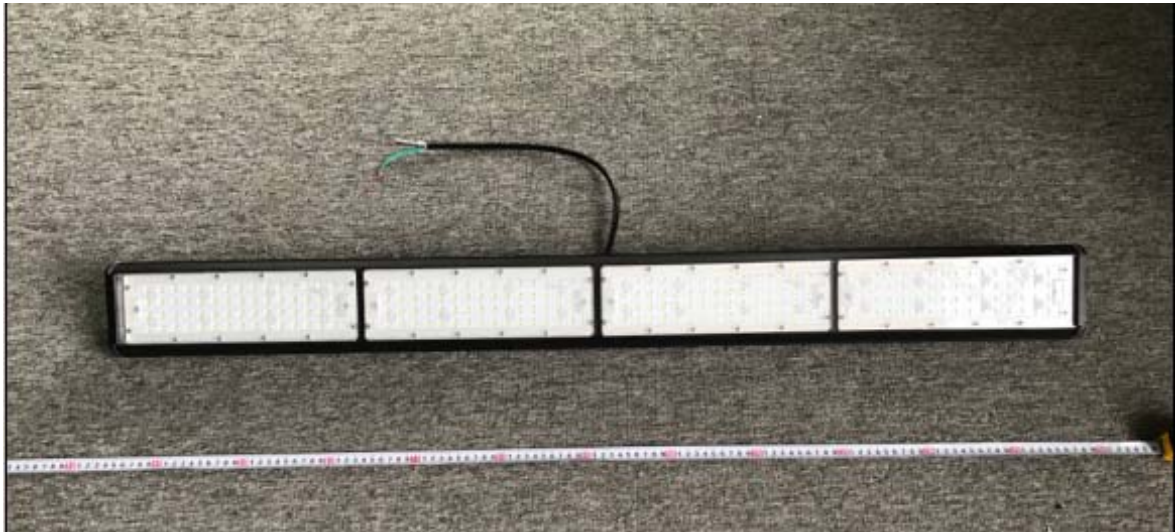
Test specifications:

Date of Receipt	: Jun. 22, 2017
Date of Test	: Jun. 28, 2017
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 Photos



Overview of the sample

Equipment Under Test (EUT)

Name	: LED HIGH BAY
Model	: TLHBH120P3YYZZ
Electrical Ratings	: 100-277V, 50/60Hz
Product Description	: 3000K
Manufacturer	: DONGGUAN THAILIGHT SEMICONDUCTOR LIGHTING CO., LTD
Address	: Sanhui Ind. Area, Cunwei, Hengli, Dongguan, China.

TEST RESULTS

Test ambient temperature was 24.7°C.

Base orientation was base up. 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 95 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	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.980	0.447
Power Factor	0.9975	0.9467
Test Power (W)	117.26	117.18
THD A%	5.59	13.90
Luminous Efficacy (lm/W)	130.9	128.7
Total Luminous Flux (lm)	15354.0	15081.1
Color Rendering Index (CRI)	73.2	
R9	-25	
Correlated Color Temperature (CCT) (K)	3015	
Chromaticity (Chroma x, Chroma y)	(0.4348, 0.4014)	
Chromaticity (Chroma u, Chroma v)	(0.2503, 0.3467)	
Chromaticity (Chroma u', Chroma v')	(0.2503, 0.5200)	
Duv	-0.0008	
Average Beam Angle (°)	96.4	
Center Beam Candle Power (cd)	7108	
Spacing Criteria	1.40 (0°-180°)/ 1.34 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	98.01%	
Zonal Lumens in the 60°-90°Zone	1.99%	
Zonal Lumens in the 90°-120°Zone	0.00%	
Zonal Lumens in the 120°-180°Zone	0.00%	

Special Color Rendering Indices	
R1	70
R2	85
R3	95
R4	67
R5	69
R6	78
R7	78
R8	46
R9	-25
R10	64
R11	60
R12	52
R13	73
R14	97

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

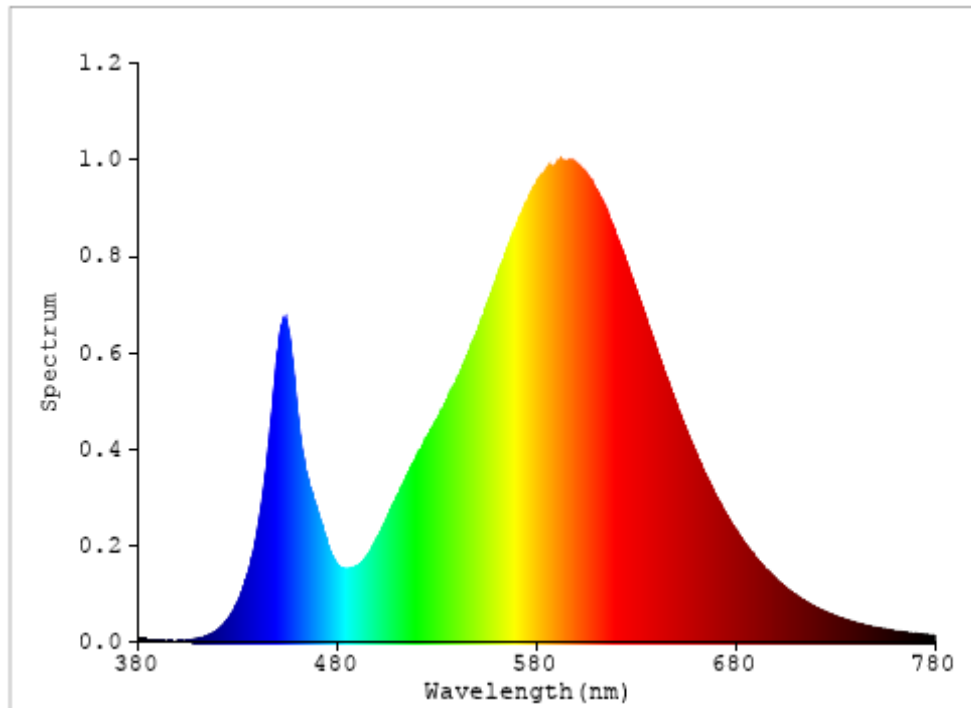


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	681.168	4.44%
10- 20	2052.392	13.37%
20- 30	3376.164	21.99%
30- 40	4243.869	27.64%
40- 50	3528.023	22.98%
50- 60	1166.802	7.60%
60- 70	183.33	1.19%
70- 80	95.98	0.63%
80- 90	26.456	0.17%
90-100	0	0.00%
100-110	0	0.00%
110-120	0	0.00%
120-130	0	0.00%
130-140	0	0.00%
140-150	0	0.00%
150-160	0	0.00%
160-170	0	0.00%
170-180	0	0.00%
Total	15354.2	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	15048.42	98.01%
60- 90	305.766	1.99%
0-90	15354.18	100.00%
90- 180	0	0.00%
0- 180	15354.2	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.

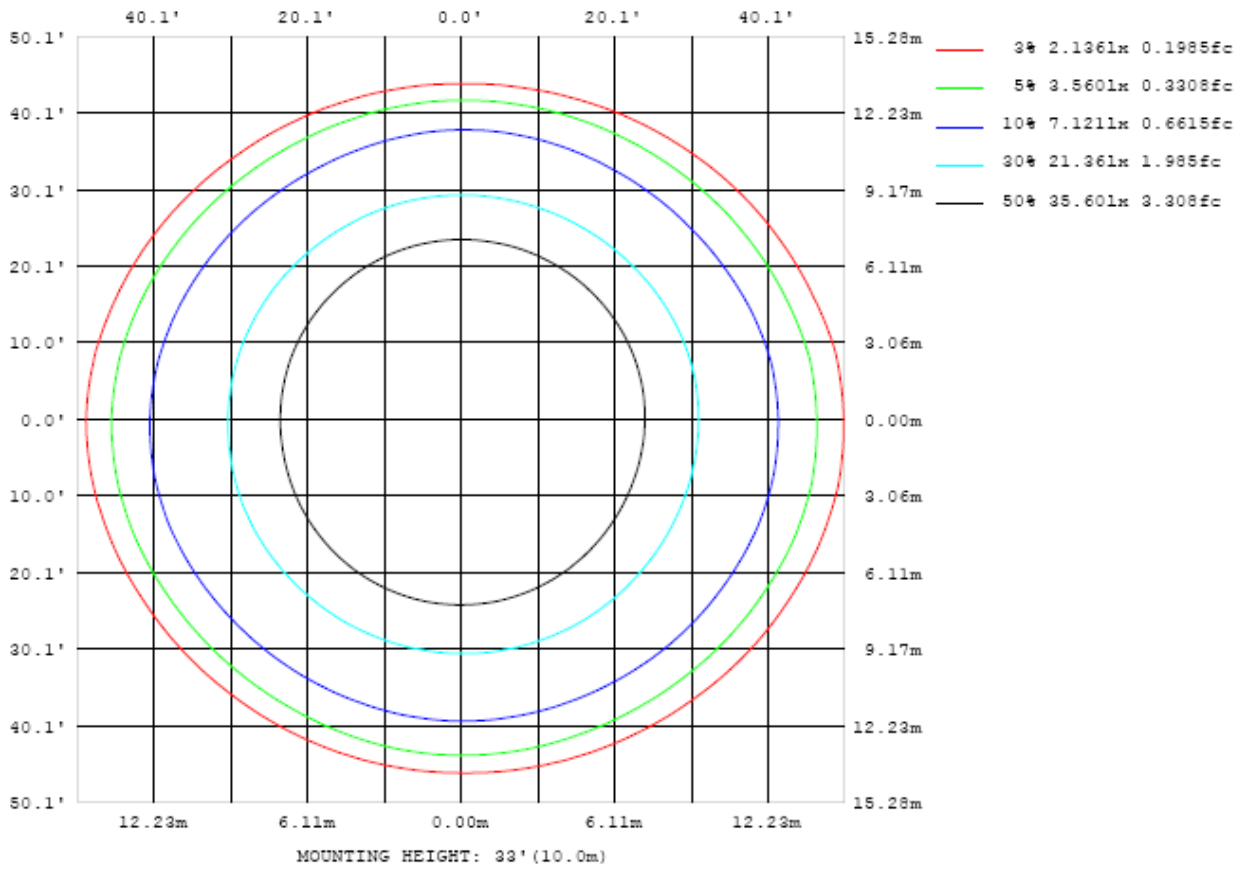


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

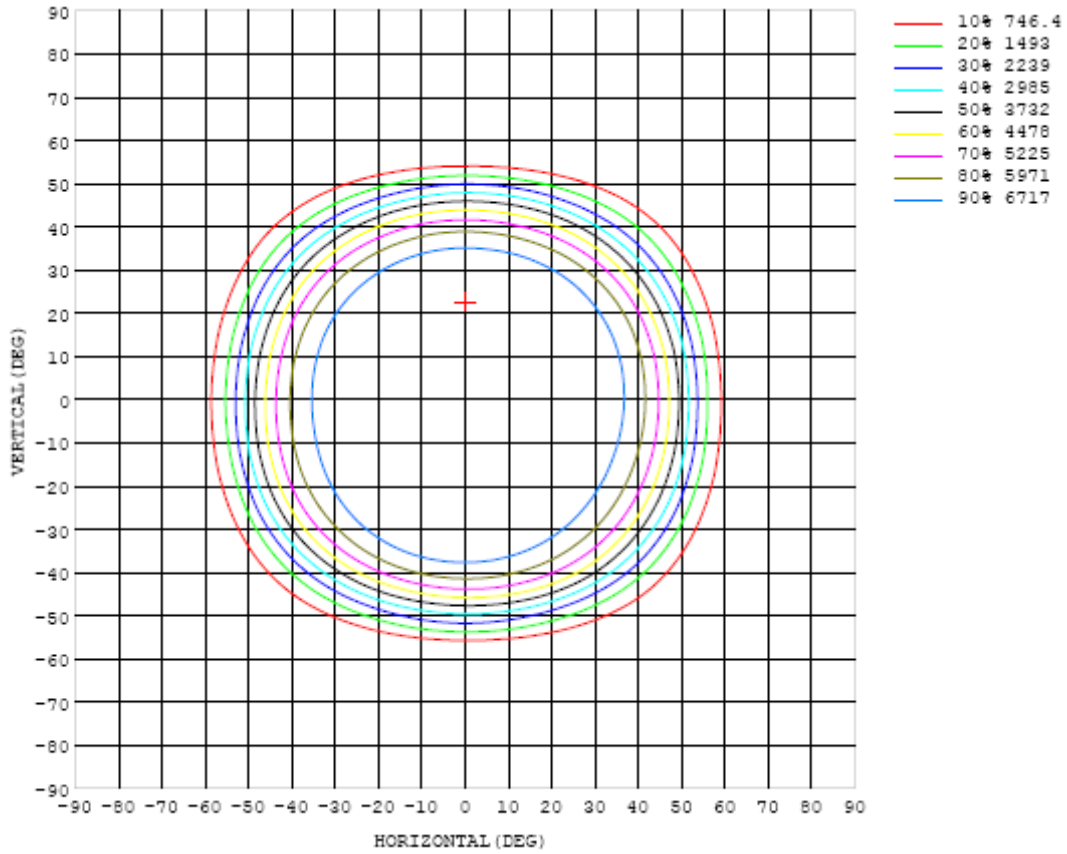


Chart 3: Isocandela Plot

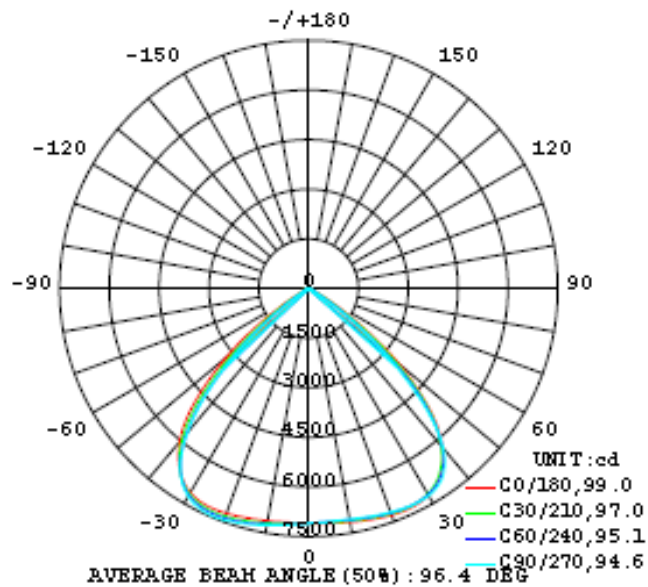


Chart 4: Polar Candela Distribution

Luminous Intensity Data

Table--1 UNIT: cd

C (DEG) y (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	7108	7108	7108	7108	7108	7108	7108	7108	7108	7108	7108	7108	7108	7108	7108	7108	7108	7108	7108
5	7130	7122	7113	7104	7099	7093	7081	7075	7074	7072	7065	7065	7068	7068	7069	7075	7088	7094	7105
10	7175	7160	7147	7134	7127	7114	7105	7096	7093	7088	7078	7075	7077	7076	7077	7086	7103	7116	7136
15	7237	7219	7202	7189	7183	7172	7160	7148	7144	7137	7126	7122	7122	7120	7119	7126	7142	7160	7187
20	7298	7277	7263	7248	7244	7233	7224	7210	7206	7201	7194	7187	7189	7184	7180	7180	7194	7210	7241
25	7318	7297	7282	7273	7271	7261	7256	7252	7255	7255	7249	7247	7245	7239	7228	7220	7221	7228	7253
30	7223	7200	7182	7180	7189	7193	7202	7216	7231	7238	7235	7231	7225	7208	7183	7156	7136	7121	7131
35	6904	6881	6862	6863	6883	6913	6943	6974	7000	7010	7012	6999	6975	6940	6894	6847	6803	6765	6761
40	6265	6234	6203	6205	6210	6225	6268	6292	6309	6308	6298	6276	6245	6203	6166	6147	6118	6076	6048
45	5142	5134	5108	5051	5009	4987	4943	4878	4836	4791	4754	4740	4770	4808	4860	4912	4940	4904	4841
50	3542	3549	3468	3316	3182	3057	2946	2878	2846	2838	2805	2788	2813	2868	2963	3105	3248	3294	3242
55	1790	1814	1711	1548	1415	1286	1184	1100	1019	973	984	1027	1079	1141	1230	1328	1463	1563	1604
60	609	614	553	490	411	315	268	236	210	204	206	225	251	287	339	408	465	529	535
65	202	206	201	198	193	181	160	147	143	141	140	143	154	169	176	177	177	183	189
70	139	141	138	141	142	131	117	111	108	107	107	109	115	126	133	131	127	129	132
75	102	101	101	105	105	96.0	85.7	79.0	76.8	76.5	76.9	78.9	85.0	93.8	100	98.5	93.9	94.2	96.8
80	57.6	62.3	67.6	68.6	68.5	63.6	56.5	50.3	43.7	41.4	44.6	51.2	56.2	62.6	66.2	65.6	63.1	58.8	56.5
85	26.0	26.5	30.3	32.5	28.5	25.9	23.0	19.0	15.3	14.4	15.7	19.7	23.4	26.6	28.7	32.0	30.2	26.1	26.0
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
135	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
165	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
175	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 4: Luminous Intensity Data

Table--2 UNIT: cd

C (DEG) \ y (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	7108	7108	7108	7108	7108	7108	7108	7108	7108	7108	7108	7108	7108	7108	7108	7108	7108		
5	7118	7129	7137	7150	7160	7164	7167	7177	7181	7176	7175	7176	7168	7158	7152	7147	7136		
10	7159	7182	7200	7221	7239	7246	7255	7268	7275	7270	7268	7264	7253	7237	7222	7209	7190		
15	7220	7251	7276	7303	7323	7335	7346	7366	7371	7368	7366	7360	7344	7322	7302	7283	7256		
20	7277	7308	7334	7362	7385	7399	7414	7434	7447	7443	7440	7431	7416	7396	7375	7351	7320		
25	7285	7310	7331	7352	7375	7392	7410	7432	7448	7442	7438	7428	7420	7403	7387	7368	7340		
30	7151	7172	7181	7193	7209	7222	7235	7255	7266	7259	7264	7263	7263	7261	7261	7258	7244		
35	6763	6769	6756	6740	6728	6725	6724	6736	6738	6741	6771	6795	6827	6861	6895	6916	6919		
40	6026	5989	5918	5842	5773	5718	5698	5695	5694	5701	5740	5813	5913	6017	6130	6218	6267		
45	4760	4655	4502	4345	4207	4132	4097	4084	4090	4116	4181	4275	4399	4569	4769	4972	5108		
50	3140	2948	2716	2509	2329	2197	2151	2174	2200	2228	2268	2335	2474	2660	2914	3214	3461		
55	1507	1329	1146	986	843	727	615	541	530	569	660	791	953	1135	1317	1513	1729		
60	476	391	335	282	244	220	197	188	186	191	209	241	270	308	358	428	532		
65	188	183	182	177	166	149	139	137	137	140	145	158	177	188	191	191	197		
70	132	132	136	136	124	113	105	102	102	105	111	120	132	145	143	137	139		
75	95.4	96.9	102	99.5	90.2	79.5	73.5	72.0	72.3	74.2	77.8	86.0	98.1	107	108	102	101		
80	60.4	64.2	63.6	62.6	56.6	49.5	42.1	36.5	34.7	37.8	45.0	53.8	62.2	68.7	67.9	66.9	62.6		
85	26.8	28.5	27.9	22.8	19.2	15.4	11.5	9.49	8.92	9.96	12.9	17.2	21.5	24.5	29.9	30.0	26.7		
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
135	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
165	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
175	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		

Table 5: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Jul. 26, 2016	Jul. 25, 2017
Digital Power Meter	PF2010A	HZTE028-01	Jul. 26, 2016	Jul. 25, 2017
AC Power Supply	DPS1060	HZTE001-06	Dec. 25, 2016	Dec. 24, 2017
DC Power Supply	WY12010	HZTE004-03	Dec. 25, 2016	Dec. 24, 2017
Temperature Meter	TES1310	HZTE017-01	Aug. 08, 2016	Aug. 07, 2017
Standard Source	D908	HZTE012-01	Jul. 28, 2016	Jul. 27, 2017
Standard source	SCL-1400	HZTE012-02	Jul. 28, 2016	Jul. 27, 2017

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 2.3% with a coverage factor $k=2$.

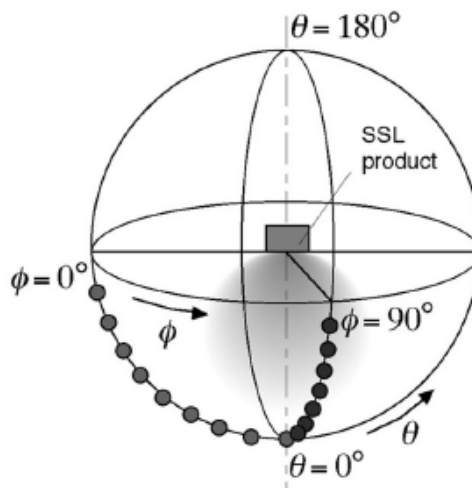
Color Characteristics Measurements

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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