



LM-79-08 Test Report

for

ABOVE ALL LIGHTING INC.

1501 Industrial Way N. Toms River, NJ 08755.

Troffer Retrofit kit

Model: TRK22D25LED35-DL

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

3rd Floor, Bld. 2, NO. 96 Longchuanwu Rd Qianjiang Economy Dev. Zone, Yuhang Dist,
Hangzhou, Zhejiang Province, China 311100

Tel: +86 571 86376106

www.ledtestlab.com

Report No.: HZ16100019a

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

Reviewed by:

Engineer: April Zou

Oct. 21, 2016

Approved by:

Manager: Jim Zhang

Oct. 21, 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: **TRK22D25LED35-DL**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
130.8	3348.2	25.60	0.9886
CCT (K)	CRI	Stabilization Time (Light & Power)	
3490	82.5	60	

Table 1: Executive Data Summary

Test specifications:

Date of Receipt	: Oct. 19, 2016
Date of Test	: Oct. 20, 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 in Lithonia 2GT8 Lensed 2x2

Equipment Under Test (EUT)

Name	: Troffer Retrofit kit
Model	: TRK22D25LED35-DL
Electrical Ratings	: 120~277Vac, 50/60Hz, 25W
Product Description	: 3500K, Aluminum frame, Frosted Lens, SPCC with powder paint Manufacturer of light source: LG Innotek Co., Ltd Model of light source: LGIT 5630HE Package
Manufacturer	: ABOVE ALL LIGHTING INC.
Address	: Room 1012, North Minch Fortune 108 Plaza,# 1839 Qixin road, Shanghai

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	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.216	0.100
Power Factor	0.9886	0.9380
Test Power (W)	25.60	25.90
THD A%	7.19	10.84
Luminous Efficacy (lm/W)	130.8	129.4
Total Luminous Flux (lm)	3348.2	3350.9
Color Rendering Index (CRI)	82.5	
R9	4	
Correlated Color Temperature (CCT) (K)	3490	
Chromaticity (Chroma x, Chroma y)	(0.4080, 0.3966)	
Chromaticity (Chroma u, Chroma v)	(0.2350, 0.3427)	
Chromaticity (Chroma u', Chroma v')	(0.2350, 0.5141)	
Duv	0.0020	
Average Beam Angle (°)	112.4	
Center Beam Candle Power (cd)	1163	
Spacing Criteria	1.22 (0°-180°)/ 1.27 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	77.33%	
Zonal Lumens in the 60°-90°Zone	22.51%	
Zonal Lumens in the 90°-120°Zone	0.06%	
Zonal Lumens in the 120°-180°Zone	0.09%	

Special Color Rendering Indices	
R1	80
R2	89
R3	97
R4	81
R5	81
R6	87
R7	85
R8	61
R9	4
R10	76
R11	80
R12	69
R13	82
R14	98

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

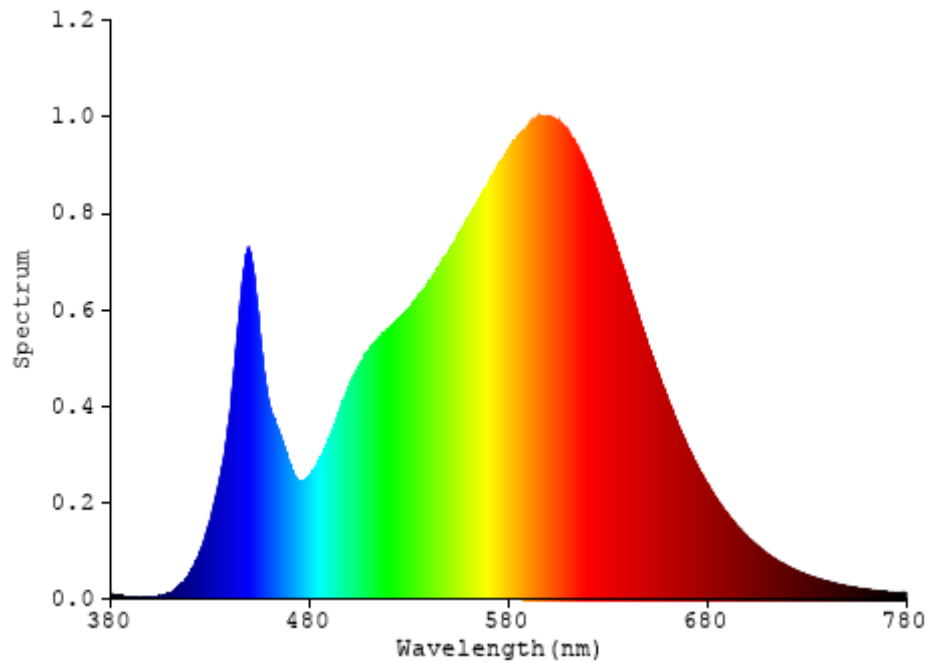


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

$\gamma(^{\circ})$	Lumens	% Total
0- 10	110.015	3.29%
10- 20	314.995	9.41%
20- 30	476.326	14.23%
30- 40	570.804	17.05%
40- 50	586.833	17.53%
50- 60	530.342	15.84%
60- 70	422.517	12.62%
70- 80	267.325	7.98%
80- 90	63.956	1.91%
90-100	0.625	0.02%
100-110	0.718	0.02%
110-120	0.807	0.02%
120-130	0.784	0.02%
130-140	0.739	0.02%
140-150	0.632	0.02%
150-160	0.459	0.01%
160-170	0.269	0.01%
170-180	0.092	0.00%
Total	3348.2	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	2589.315	77.33%
60- 90	753.798	22.51%
0-90	3343.113	99.85%
90- 180	5.125	0.15%
0- 180	3348.2	100%

Table 3: Zonal Lumen Data

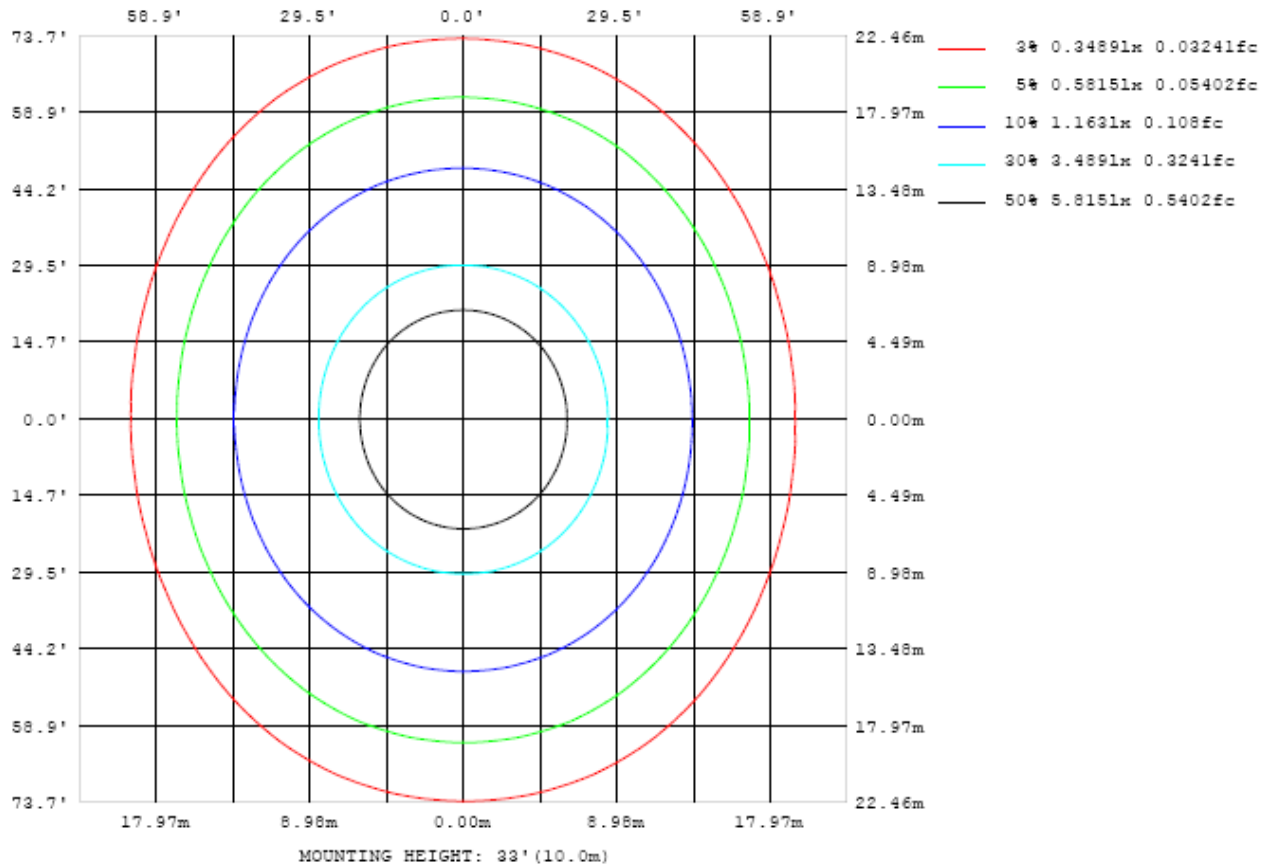


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

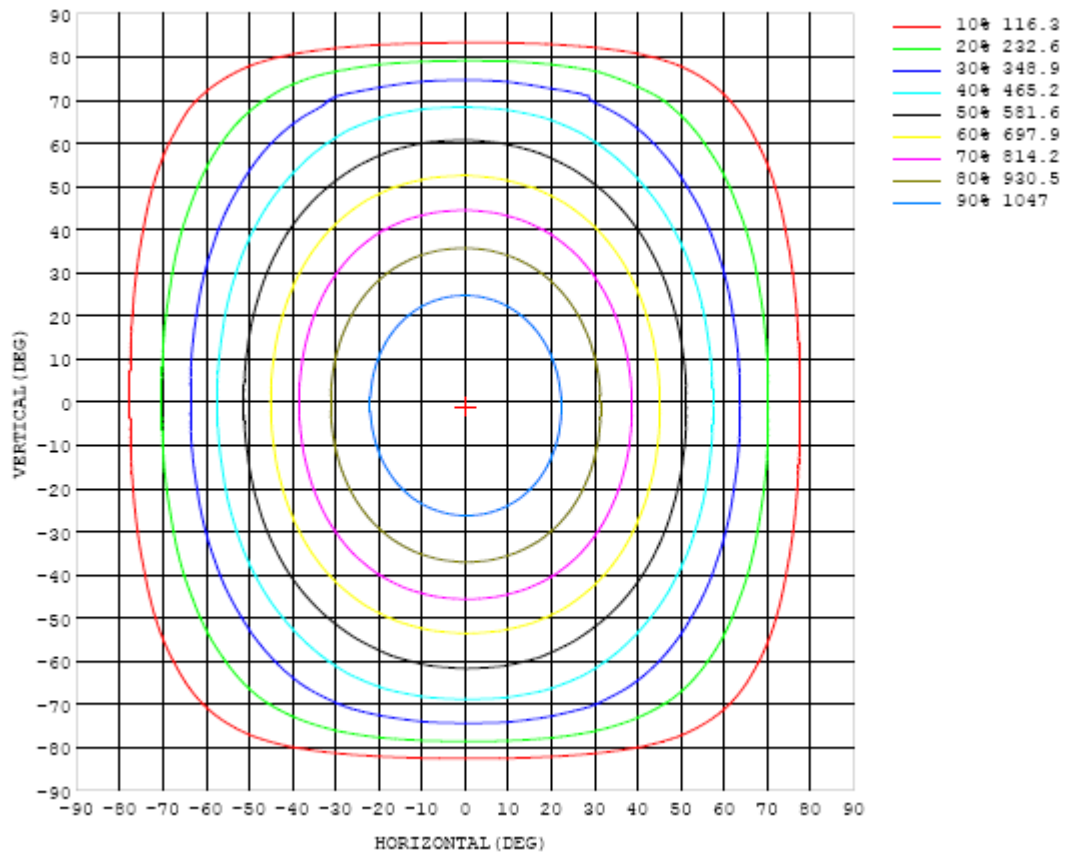


Chart 3: Isocandela Plot

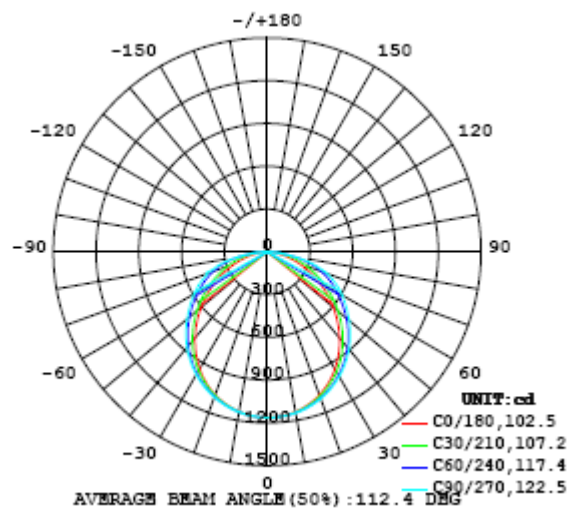


Chart 4: Polar Candela Distribution

Luminous Intensity Data

Table--1

UNIT: cd

C (DEG) γ (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	1163	1163	1163	1163	1163	1163	1163	1163	1163	1163	1163	1163	1163	1163	1163	1163	1163	1163	1163
5	1157	1158	1158	1158	1159	1159	1160	1160	1160	1160	1160	1160	1159	1159	1158	1158	1157	1157	1157
10	1140	1141	1142	1143	1144	1146	1147	1147	1148	1148	1148	1147	1146	1144	1143	1142	1140	1140	1139
15	1111	1112	1114	1116	1119	1122	1124	1126	1127	1127	1126	1125	1123	1120	1117	1114	1112	1110	1109
20	1069	1071	1075	1079	1084	1089	1092	1095	1097	1097	1096	1094	1090	1086	1081	1076	1072	1069	1067
25	1016	1019	1024	1031	1038	1045	1051	1055	1058	1058	1057	1053	1048	1042	1034	1026	1020	1015	1013
30	950	954	962	972	983	993	1001	1006	1010	1011	1009	1004	997	988	977	966	957	950	948
35	874	879	889	903	918	931	942	950	954	955	953	947	938	925	911	896	884	875	872
40	790	796	808	825	843	861	876	886	891	893	890	882	871	854	836	818	802	792	788
45	699	706	720	740	762	785	803	815	822	824	820	812	797	777	755	733	715	703	699
50	605	612	628	650	676	702	725	740	748	750	746	736	718	695	669	644	623	610	606
55	510	518	534	558	587	618	645	664	675	677	672	659	638	610	580	552	530	515	511
60	416	423	441	467	499	534	566	591	603	606	601	585	559	526	492	461	436	421	417
65	324	332	350	378	414	453	489	516	529	532	526	510	482	446	406	372	346	330	326
70	236	244	263	294	333	372	405	429	443	449	440	424	399	365	325	287	259	242	238
75	154	162	182	214	249	281	304	324	333	334	331	321	300	277	243	208	178	160	157
80	82.0	88.7	107	131	154	173	184	189	191	189	189	187	182	170	151	128	103	87.3	84.0
85	27.7	29.4	35.5	46.7	53.3	55.5	52.8	49.1	46.2	45.0	46.4	49.0	52.7	54.3	52.4	44.5	34.5	28.6	28.0
90	0.20	0.10	0.69	0.59	0.62	0.48	0.17	0.13	0.12	0.13	0.13	0.14	0.18	0.59	0.60	0.51	0.16	0.05	0.11
95	0.15	0.18	0.47	0.50	0.41	0.25	0.21	0.19	0.17	0.16	0.16	0.20	0.21	0.30	0.52	0.51	0.37	0.18	0.16
100	0.22	0.25	0.61	0.55	0.34	0.28	0.25	0.24	0.22	0.20	0.20	0.24	0.26	0.28	0.39	0.58	0.57	0.35	0.27
105	0.31	0.31	0.55	0.46	0.40	0.34	0.31	0.28	0.27	0.26	0.25	0.28	0.31	0.36	0.42	0.50	0.60	0.44	0.41
110	0.43	0.36	0.45	0.44	0.47	0.47	0.45	0.43	0.41	0.40	0.40	0.43	0.45	0.48	0.49	0.46	0.50	0.45	0.56
115	0.43	0.39	0.45	0.46	0.51	0.52	0.51	0.52	0.52	0.51	0.51	0.52	0.52	0.53	0.52	0.49	0.46	0.42	0.55
120	0.54	0.47	0.50	0.44	0.54	0.55	0.56	0.55	0.57	0.56	0.56	0.56	0.55	0.55	0.55	0.44	0.51	0.50	0.66
125	0.46	0.50	0.51	0.56	0.48	0.59	0.61	0.60	0.62	0.62	0.61	0.60	0.59	0.59	0.46	0.56	0.48	0.50	0.58
130	0.68	0.64	0.55	0.61	0.59	0.49	0.64	0.66	0.65	0.65	0.64	0.65	0.62	0.50	0.64	0.63	0.63	0.60	0.84
135	0.67	0.61	0.69	0.58	0.62	0.64	0.55	0.53	0.55	0.58	0.54	0.52	0.58	0.64	0.66	0.59	0.73	0.66	0.90
140	0.84	0.69	0.72	0.64	0.62	0.70	0.73	0.71	0.69	0.69	0.72	0.73	0.70	0.68	0.62	0.70	0.76	0.75	1.01
145	0.79	0.68	0.74	0.79	0.68	0.63	0.71	0.71	0.73	0.75	0.74	0.74	0.71	0.66	0.72	0.78	0.72	0.71	0.85
150	0.91	0.80	0.74	0.81	0.78	0.70	0.59	0.61	0.61	0.64	0.64	0.63	0.62	0.75	0.78	0.77	0.71	0.81	1.05
155	0.99	0.84	0.76	0.77	0.77	0.75	0.67	0.65	0.63	0.64	0.66	0.69	0.75	0.82	0.80	0.76	0.72	0.78	1.09
160	0.99	0.76	0.75	0.77	0.77	0.76	0.72	0.74	0.74	0.74	0.78	0.79	0.84	0.84	0.80	0.79	0.83	0.88	1.21
165	0.96	0.87	0.84	0.82	0.80	0.75	0.70	0.72	0.71	0.74	0.77	0.79	0.75	0.78	0.82	0.82	0.84	0.97	1.15
170	0.98	0.91	0.89	0.85	0.82	0.74	0.68	0.65	0.68	0.69	0.72	0.78	0.78	0.82	0.84	0.82	0.83	0.98	1.07
175	0.94	0.86	0.88	0.87	0.84	0.82	0.77	0.76	0.81	0.81	0.82	0.82	0.84	0.87	0.89	0.92	0.96	1.01	1.01
180	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95

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	1163	1163	1163	1163	1163	1163	1163	1163	1163	1163	1163	1163	1163	1163	1163	1163	1163		
5	1156	1157	1157	1157	1157	1157	1157	1157	1157	1157	1157	1157	1157	1157	1157	1157	1157		
10	1139	1139	1139	1140	1140	1141	1141	1142	1142	1142	1141	1141	1140	1140	1140	1139	1139		
15	1109	1110	1111	1112	1114	1116	1117	1118	1118	1118	1117	1116	1114	1112	1111	1110	1110		
20	1067	1069	1072	1075	1078	1081	1084	1085	1086	1085	1083	1081	1078	1075	1072	1070	1069		
25	1014	1017	1022	1028	1033	1038	1042	1044	1045	1044	1041	1037	1032	1026	1021	1017	1015		
30	949	954	962	971	980	987	992	995	996	994	991	985	977	969	961	954	950		
35	874	882	893	905	917	927	934	938	939	937	932	924	914	902	890	880	875		
40	792	801	815	832	848	861	870	875	876	873	867	856	843	827	811	798	791		
45	703	715	732	752	772	789	800	806	807	804	796	783	765	745	726	710	701		
50	611	624	644	668	691	712	726	733	735	731	721	705	683	659	636	618	608		
55	517	532	554	581	609	634	651	660	662	657	645	625	599	571	545	525	513		
60	424	440	465	495	528	557	579	590	592	586	572	547	516	483	455	432	420		
65	333	350	378	413	450	483	507	518	520	515	499	472	437	400	367	343	328		
70	246	265	296	334	371	402	425	440	448	435	419	393	360	321	284	257	241		
75	165	186	218	252	297	309	330	340	343	342	326	302	278	243	207	177	160		
80	92.1	112	138	162	181	196	205	208	208	209	206	197	180	159	132	105	87.5		
85	31.5	40.0	51.8	61.7	66.6	65.8	64.6	63.8	64.1	67.5	69.9	72.5	70.7	63.8	52.3	39.1	30.6		
90	0.16	0.43	0.72	0.98	1.18	1.31	1.28	1.40	1.32	1.40	1.29	1.26	1.10	0.89	0.45	0.24	0.17		
95	0.24	0.54	0.77	1.00	1.18	1.22	0.91	0.92	0.92	0.92	0.96	1.08	1.00	0.87	0.69	0.49	0.33		
100	0.31	0.69	0.91	1.12	1.29	1.28	0.91	0.87	0.87	0.87	0.93	1.14	1.11	1.02	0.85	0.68	0.39		
105	0.42	0.81	1.05	1.27	1.41	1.32	1.00	0.97	0.98	0.98	1.03	1.28	1.29	1.21	1.00	0.79	0.50		
110	0.52	0.88	1.12	1.38	1.53	1.29	1.15	1.14	1.16	1.16	1.19	1.35	1.45	1.31	1.07	0.84	0.56		
115	0.56	0.91	1.15	1.38	1.40	1.30	1.27	1.30	1.33	1.33	1.33	1.36	1.42	1.33	1.08	0.86	0.62		
120	0.53	0.94	1.08	1.24	1.30	1.34	1.36	1.40	1.44	1.44	1.42	1.41	1.37	1.27	1.05	0.90	0.76		
125	0.52	0.95	1.09	1.21	1.33	1.38	1.43	1.47	1.51	1.49	1.47	1.43	1.37	1.21	1.04	0.88	0.66		
130	0.91	1.02	1.15	1.25	1.32	1.43	1.49	1.55	1.57	1.55	1.52	1.47	1.34	1.24	1.16	0.93	0.88		
135	0.99	1.15	1.24	1.29	1.37	1.41	1.48	1.58	1.60	1.56	1.49	1.45	1.40	1.33	1.19	0.76	0.87		
140	1.04	0.84	1.26	1.33	1.40	1.49	1.55	1.58	1.58	1.56	1.54	1.49	1.39	1.30	1.24	0.93	1.02		
145	0.85	0.91	1.30	1.34	1.45	1.51	1.56	1.57	1.59	1.56	1.51	1.48	1.42	1.32	0.87	0.98	0.97		
150	1.01	1.08	0.95	1.36	1.37	1.45	1.51	1.51	1.51	1.50	1.48	1.38	1.35	1.27	0.93	1.15	1.11		
155	1.14	1.24	1.13	0.98	1.39	1.38	1.41	1.39	1.39	1.41	1.40	1.36	1.22	0.90	1.19	1.27	1.18		
160	1.20	1.26	1.30	1.18	0.91	1.00	1.28	1.37	1.38	1.40	1.23	0.93	0.87	1.18	1.26	1.22	1.20		
165	1.17	1.20	1.24	1.25	1.26	1.17	0.86	0.86	0.84	0.87	0.87	0.95	1.02	1.05	1.08	1.08	1.07		
170	1.08	1.09	1.10	1.14	1.22	1.24	1.24	1.21	1.19	1.12	1.05	1.09	1.13	1.14	1.11	1.06	1.05		
175	1.02	1.02	1.04	1.06	1.08	1.13	1.15	1.14	1.11	1.06	1.04	0.99	0.95	0.95	1.00	1.04	0.94		
180	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95		

Table 5: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Jul. 27, 2016	Jul. 26, 2017
Digital Power Meter	PF2010A	HZTE028-01	Jul. 27, 2016	Jul. 26, 2017
AC Power Supply	PCR 500L	HZTE001-08	Jul. 27, 2016	Jul. 26, 2017
DC Power Supply	WY12010	HZTE004-03	Jul. 27, 2016	Jul. 26, 2017
Temperature Meter	TES1310	HZTE017-01	Jul. 27, 2016	Jul. 26, 2017
Standard Source	D908	HZTE012-01	Jul. 27, 2016	Jul. 26, 2017
Standard source	SCL-1400	HZTE012-02	Jul. 27, 2016	Jul. 26, 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 1.94% with a coverage factor k=2.

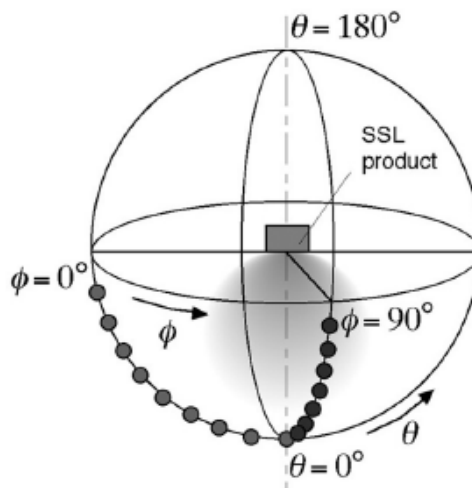
Color Characteristics Measurements

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 ***

This report is considered invalidated without the Special Seal for Inspection of the LTL. This report shall not be altered, increased or deleted. The results shown in this test report refer only to the sample(s) tested. Without written approval of LTL, this test report shall not be copied except in full and published as advertisement.