NVLAP LAB CODE 200960-0

LM-79-08 Test Report

for

ABOVE ALL LIGHTING INC.

1501 Industrial Way N. Toms River, NJ 08755.

Troffer Retrofit kit

Model: TRK24D25LED35-DL

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

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Report No.: HZ16100019c

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

Reviewed by:

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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: **TRK24D25LED35-DL**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
132.8	3344.8	25.18	0.9890

CCT (K)	CRI	Stabilization Time (Light & Power)
3486	82.6	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

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Sample Photo

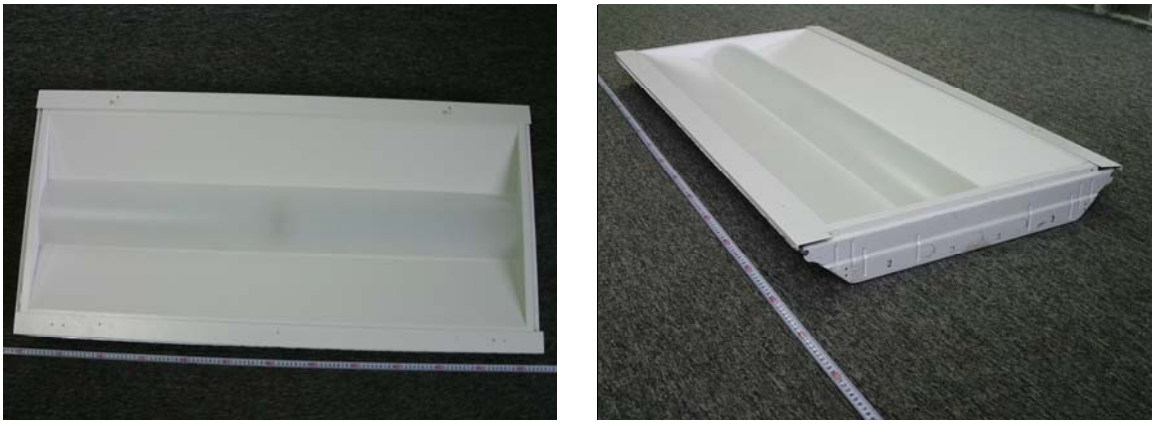


Figure 1- Overview of the sample in Lithonia 2GT8 Lensed 2x4

Equipment Under Test (EUT)	
Name	: Troffer Retrofit kit
Model	: TRK24D25LED35-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 24.5℃.

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	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	0.212	0.099
Power Factor	0.9890	0.9334
Test Power (W)	25.18	25.53
THD A%	7.36	11.42
Luminous Efficacy (lm/W)	132.8	131.1
Total Luminous Flux (lm)	3344.8	3347.0
Color Rendering Index (CRI)	82.6	
R9	4	
Correlated Color Temperature (CCT) (K)	3486	
Chromaticity (Chroma x, Chroma y)	(0.4083, 0.3969)	
Chromaticity (Chroma u, Chroma v)	(0.2351, 0.3428)	
Chromaticity (Chroma u', Chroma v')	(0.2351, 0.5142)	
Duv	0.0020	
Average Beam Angle (°)	117.0	
Center Beam Candle Power (cd)	1102	
Spacing Criteria	1.25 (0°-180°)/ 1.28 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	75.83%	
Zonal Lumens in the 60°-90°Zone	24.00%	
Zonal Lumens in the 90°-120°Zone	0.07%	
Zonal Lumens in the 120°-180°Zone	0.10%	

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

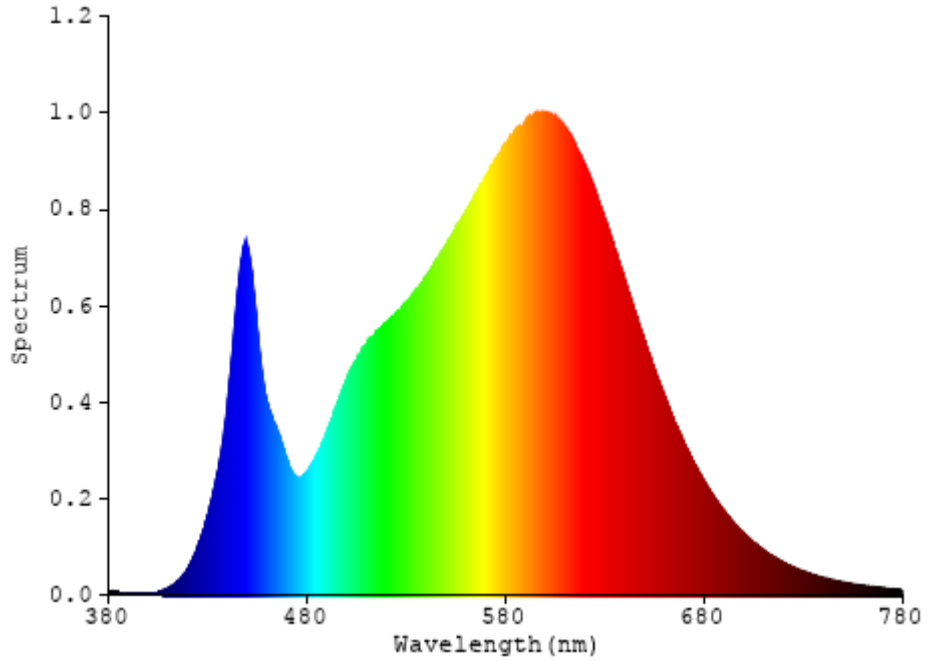


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

γ(°)	Lumens	% Total
0- 10	104.336	3.12%
10- 20	299.836	8.96%
20- 30	457.163	13.67%
30- 40	555.489	16.61%
40- 50	581.956	17.40%
50- 60	537.508	16.07%
60- 70	439.3	13.13%
70- 80	288.106	8.61%
80- 90	75.391	2.25%
90-100	0.722	0.02%
100-110	0.823	0.02%
110-120	0.941	0.03%
120-130	0.904	0.03%
130-140	0.81	0.02%
140-150	0.67	0.02%
150-160	0.461	0.01%
160-170	0.262	0.01%
170-180	0.09	0.00%
Total	3344.8	100%

γ(°)	Lumens	% Total
0- 60	2536.288	75.83%
60- 90	802.797	24.00%
0-90	3339.085	99.83%
90- 180	5.683	0.17%
0- 180	3344.8	100%

Table 3: Zonal Lumen Data

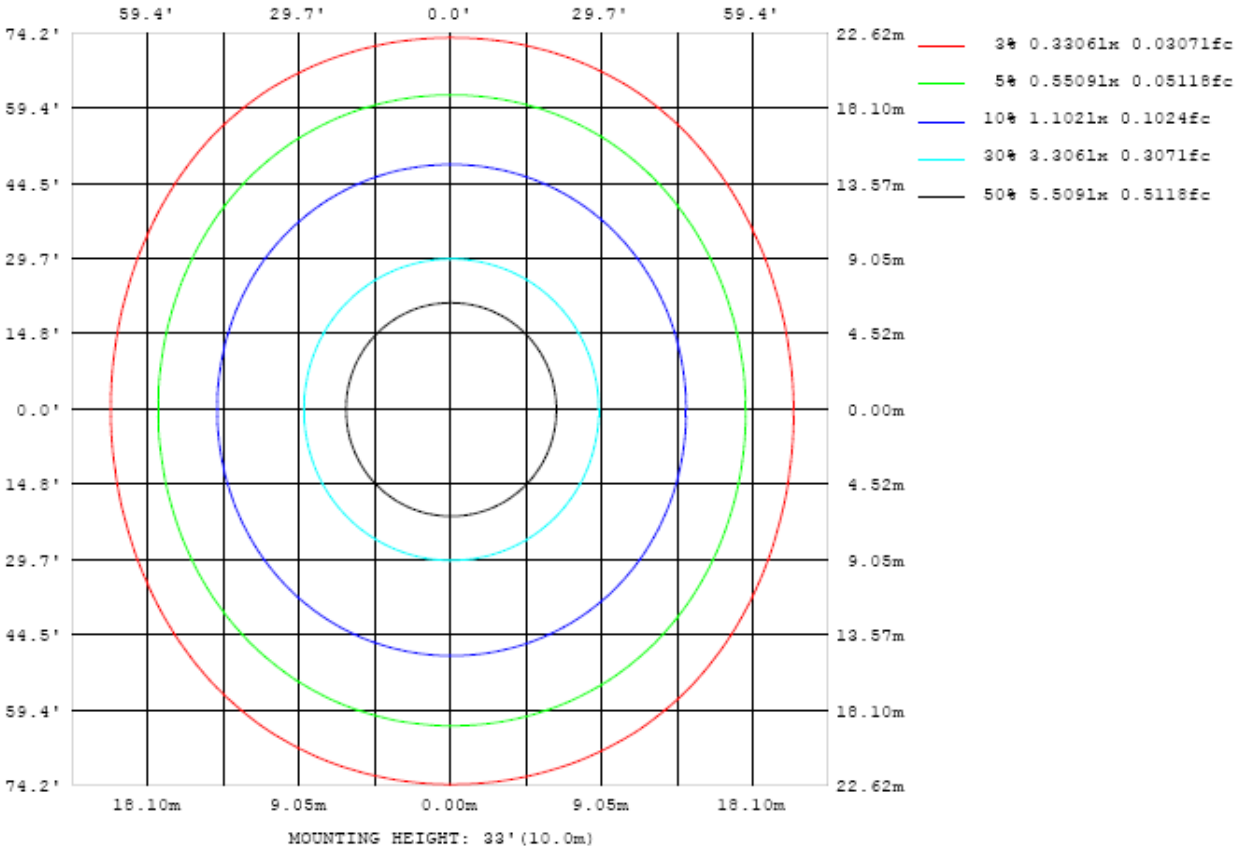


Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

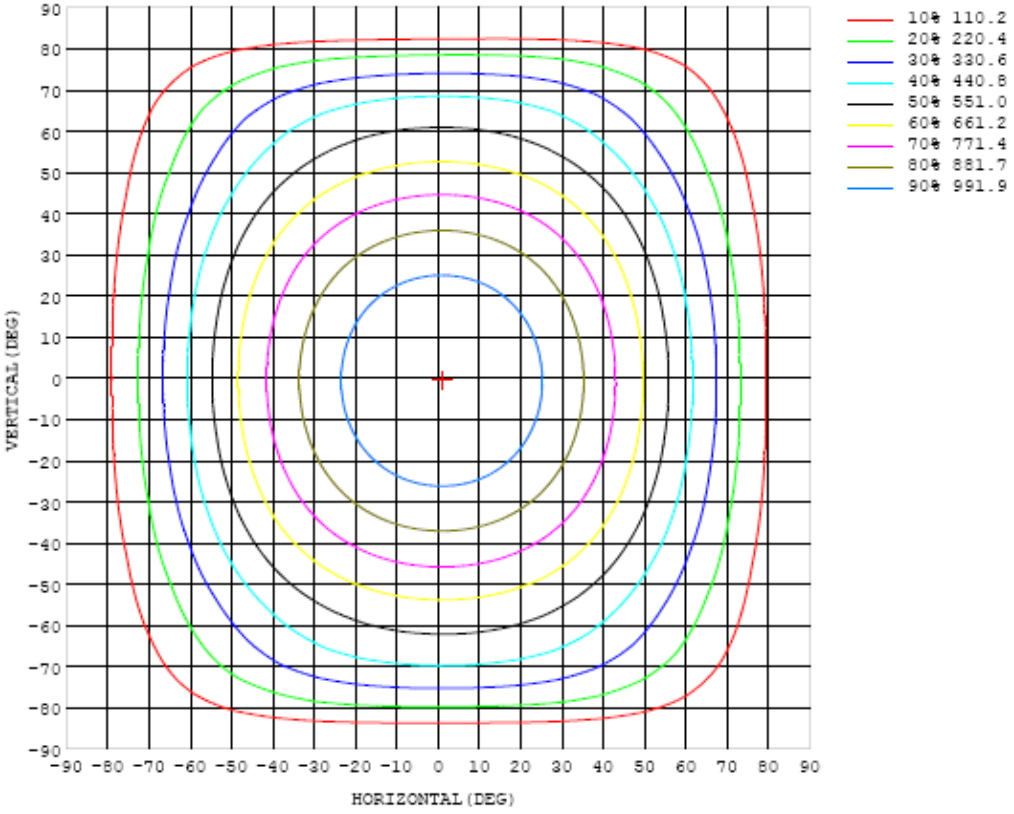


Chart 3: Isocandela Plot

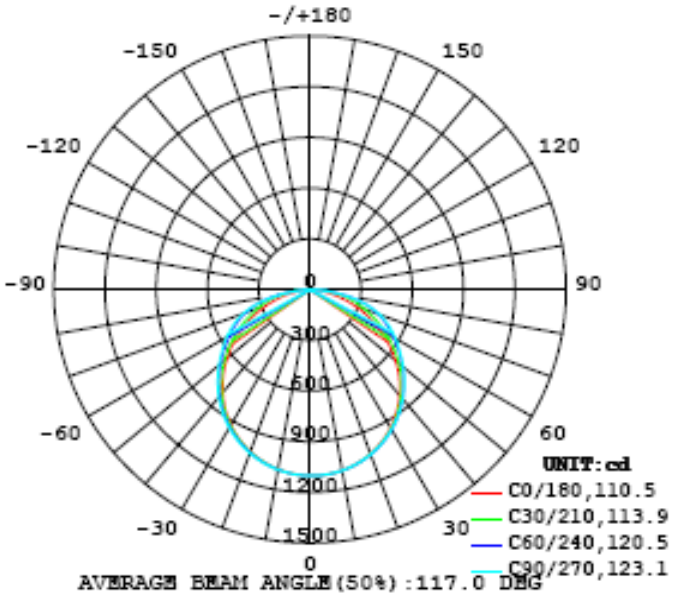


Chart 4: Polar Candela Distribution

Luminous Intensity Data

Table--1 UNIT: cd

γ (DEG) \ C (DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	1102	1102	1102	1102	1102	1102	1102	1102	1102	1102	1102	1102	1102	1102	1102	1102	1102	1102	1102
5	1099	1099	1099	1099	1099	1099	1099	1099	1099	1098	1098	1098	1098	1097	1097	1096	1096	1096	1096
10	1087	1087	1087	1088	1088	1088	1088	1088	1087	1087	1086	1085	1085	1084	1083	1082	1081	1080	1080
15	1065	1066	1066	1067	1067	1068	1068	1068	1067	1066	1066	1064	1063	1062	1060	1058	1057	1056	1055
20	1034	1035	1036	1037	1038	1039	1039	1039	1039	1038	1037	1035	1033	1031	1028	1026	1024	1022	1021
25	994	995	997	998	1000	1002	1002	1003	1002	1001	1000	998	995	992	988	985	982	979	978
30	944	945	948	951	954	956	957	958	958	957	955	952	949	945	940	935	930	927	926
35	884	886	890	895	899	902	905	906	906	905	903	899	895	890	883	877	871	866	864
40	816	818	824	830	836	842	845	847	847	846	844	840	835	828	820	811	803	797	795
45	739	742	749	758	767	774	779	782	783	782	779	775	768	760	749	738	728	721	718
50	655	659	668	680	692	702	709	713	714	714	711	705	697	687	674	659	647	638	634
55	565	570	582	596	612	626	636	642	645	645	641	635	624	611	594	576	561	550	546
60	471	477	491	510	531	551	565	574	578	578	575	566	553	535	513	490	471	458	454
65	375	383	399	424	452	479	498	508	513	513	509	501	485	462	433	405	381	366	361
70	279	288	309	341	377	408	426	434	436	436	433	428	416	393	358	321	291	273	268
75	186	197	224	263	300	324	337	339	337	336	336	336	329	313	284	244	206	184	178
80	100	113	145	181	203	220	225	220	214	212	214	218	220	211	193	167	129	102	95.2
85	33.3	45.1	65.9	82.9	91.0	90.3	83.4	75.7	70.3	69.2	71.7	77.5	84.5	87.9	86.0	76.2	58.4	37.3	30.9
90	0.14	1.76	4.05	2.42	0.96	0.87	0.94	0.93	0.89	0.86	0.85	0.84	0.81	0.76	1.13	2.22	2.10	1.85	0.10
95	0.16	0.24	0.27	0.50	0.63	0.66	0.70	0.72	0.68	0.60	0.65	0.64	0.62	0.59	0.42	0.38	0.20	0.23	0.19
100	0.25	0.32	0.37	0.64	0.68	0.69	0.72	0.73	0.68	0.61	0.68	0.68	0.66	0.64	0.59	0.41	0.30	0.26	0.28
105	0.35	0.44	0.45	0.79	0.81	0.79	0.79	0.79	0.71	0.65	0.72	0.76	0.75	0.76	0.76	0.60	0.34	0.32	0.36
110	0.43	0.50	0.48	0.86	0.94	0.97	0.97	0.93	0.81	0.77	0.84	0.92	0.93	0.92	0.87	0.72	0.43	0.37	0.42
115	0.53	0.53	0.49	0.88	0.99	1.04	1.06	1.04	0.94	0.91	0.95	1.04	1.02	0.99	0.90	0.74	0.46	0.40	0.45
120	0.65	0.58	0.55	0.86	0.99	1.06	1.09	1.05	0.98	0.97	0.99	1.05	1.04	0.99	0.89	0.71	0.50	0.49	0.60
125	0.67	0.65	0.61	0.91	0.95	1.07	1.07	1.05	1.02	1.01	1.02	1.04	1.03	0.98	0.84	0.81	0.51	0.54	0.61
130	0.78	0.80	0.67	0.94	0.98	0.96	1.07	1.07	1.03	1.04	1.04	1.05	1.03	0.89	0.93	0.85	0.60	0.62	0.74
135	0.77	0.79	0.71	0.90	1.01	1.02	0.97	0.97	1.01	1.05	1.02	0.95	0.95	0.98	0.94	0.85	0.60	0.71	0.84
140	0.77	0.81	0.60	0.96	1.01	1.08	1.10	1.08	1.04	1.05	1.06	1.08	1.07	1.02	0.92	0.87	0.68	0.77	0.80
145	0.91	0.86	0.78	0.98	0.99	1.02	1.09	1.10	1.09	1.11	1.09	1.09	1.07	0.97	0.97	0.83	0.85	0.87	0.92
150	1.02	0.97	0.94	0.78	0.94	1.01	0.99	0.98	1.00	1.01	0.99	0.98	0.98	1.00	0.94	0.77	0.80	0.85	0.92
155	0.98	0.98	0.94	0.89	0.71	0.99	0.92	0.95	0.93	0.90	0.95	0.97	0.95	0.97	0.75	0.87	0.71	0.73	0.95
160	0.99	0.98	0.94	0.97	0.93	0.72	0.60	0.83	0.90	0.90	0.93	0.85	0.73	0.82	0.91	0.85	0.82	0.78	0.90
165	1.05	1.03	1.01	0.97	0.84	0.73	0.75	0.72	0.68	0.70	0.74	0.76	0.95	0.94	0.88	0.87	0.89	0.89	1.03
170	0.84	0.84	0.80	0.82	0.86	0.88	0.86	0.80	0.82	0.85	0.89	0.87	0.85	0.84	0.93	0.95	0.93	0.94	0.99
175	1.07	1.06	1.04	1.03	0.99	0.93	0.89	0.89	0.88	0.85	0.89	0.80	0.87	0.87	0.88	0.90	0.92	0.94	0.99
180	0.93	0.94	0.94	0.94	0.95	0.96	0.96	0.97	0.97	0.98	0.95	0.93	0.90	0.88	0.86	0.84	0.83	0.82	0.82

Table 4: Luminous Intensity Data

Table--2 UNIT: cd

γ (DEG) \ C (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350
0	1102	1102	1102	1102	1102	1102	1102	1102	1102	1102	1102	1102	1102	1102	1102	1102	1102
5	1096	1095	1096	1096	1096	1096	1096	1096	1097	1097	1097	1098	1098	1098	1098	1099	1099
10	1080	1080	1080	1080	1081	1081	1082	1083	1083	1084	1084	1085	1085	1085	1086	1086	1086
15	1055	1055	1056	1056	1057	1058	1059	1060	1061	1062	1062	1063	1063	1064	1064	1064	1064
20	1021	1022	1023	1024	1026	1027	1028	1030	1031	1032	1032	1033	1033	1033	1033	1033	1034
25	978	979	981	983	985	987	989	991	992	993	994	994	994	994	993	993	993
30	926	928	931	934	937	940	942	944	946	947	948	948	948	946	945	944	943
35	865	868	872	877	881	885	888	891	892	894	894	894	893	890	888	885	884
40	796	801	806	813	819	823	827	830	832	833	833	833	830	827	822	818	815
45	720	726	734	742	750	756	761	764	766	767	767	765	762	756	750	743	739
50	637	645	655	667	677	685	691	695	697	698	697	693	688	680	670	661	656
55	550	559	573	588	602	613	621	626	629	629	626	620	611	599	586	574	566
60	458	470	488	508	528	543	554	561	564	563	558	549	534	516	498	483	473
65	366	381	404	432	458	477	488	494	496	496	492	481	461	435	410	390	378
70	274	294	324	359	387	403	410	413	415	416	415	408	390	359	325	298	283
75	187	212	249	280	299	308	309	310	311	313	315	316	305	282	245	211	191
80	106	137	164	182	192	191	184	179	179	184	192	200	200	187	166	132	107
85	41.0	57.1	66.3	64.4	54.1	47.3	40.7	40.7	36.8	40.1	47.1	54.4	67.1	75.1	72.0	58.2	38.8
90	0.21	0.34	0.74	0.94	1.10	1.21	1.26	1.19	1.13	1.21	1.23	1.17	1.05	0.90	0.64	0.27	0.15
95	0.34	0.38	0.68	0.79	0.87	0.93	0.97	0.95	0.87	0.94	0.93	0.90	0.85	0.77	0.64	0.49	0.29
100	0.42	0.51	0.82	0.88	0.92	0.97	1.00	0.95	0.89	0.98	0.97	0.95	0.92	0.88	0.78	0.69	0.41
105	0.47	0.59	0.97	1.05	1.08	1.10	1.10	1.03	0.98	1.07	1.10	1.10	1.10	1.09	0.93	0.78	0.48
110	0.51	0.63	1.03	1.15	1.23	1.28	1.27	1.17	1.14	1.22	1.29	1.30	1.28	1.20	0.98	0.81	0.54
115	0.54	0.61	1.05	1.19	1.28	1.36	1.35	1.28	1.27	1.31	1.40	1.38	1.35	1.23	0.96	0.82	0.59
120	0.52	0.67	1.02	1.19	1.31	1.38	1.37	1.34	1.34	1.37	1.41	1.41	1.36	1.23	0.95	0.84	0.73
125	0.58	0.74	1.04	1.15	1.32	1.37	1.39	1.38	1.39	1.40	1.42	1.39	1.32	1.18	1.00	0.89	0.75
130	0.80	0.79	1.05	1.20	1.28	1.40	1.42	1.43	1.44	1.44	1.44	1.39	1.26	1.23	1.05	0.82	0.87
135	0.94	0.89	1.12	1.22	1.34	1.38	1.40	1.42	1.43	1.42	1.38	1.37	1.30	1.20	1.11	0.80	0.87
140	0.80	0.69	1.13	1.21	1.34	1.42	1.45	1.46	1.47	1.45	1.44	1.37	1.28	1.21	1.15	0.82	0.73
145	0.95	0.78	1.19	1.26	1.32	1.37	1.41	1.42	1.46	1.40	1.38	1.30	1.25	1.23	0.81	1.08	0.89
150	0.93	1.02	0.83	1.23	1.30	1.28	1.36	1.34	1.34	1.31	1.26	1.22	1.25	0.94	0.84	1.09	1.07
155	0.89	0.97	1.12	0.81	1.24	1.29	1.27	1.27	1.26	1.26	1.21	1.28	0.92	0.86	1.19	1.07	1.08
160	0.94	1.03	1.04	1.14	0.88	0.85	0.87	1.10	1.24	1.11	0.85	0.77	0.88	1.25	1.18	1.09	1.12
165	1.00	0.97	1.05	1.07	1.09	1.13	1.06	0.81	0.84	0.85	0.94	1.12	0.98	1.06	1.14	1.15	1.15
170	0.97	1.01	1.05	1.09	1.05	1.05	1.03	1.08	1.05	0.98	0.96	0.93	0.93	0.94	0.91	0.88	0.89
175	0.99	0.98	0.98	0.98	0.99	1.00	1.03	0.92	0.91	0.89	0.93	0.96	0.95	1.00	1.07	1.05	1.06
180	0.82	0.83	0.84	0.86	0.88	0.90	0.93	0.95	0.98	0.97	0.97	0.96	0.96	0.95	0.94	0.94	0.94

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

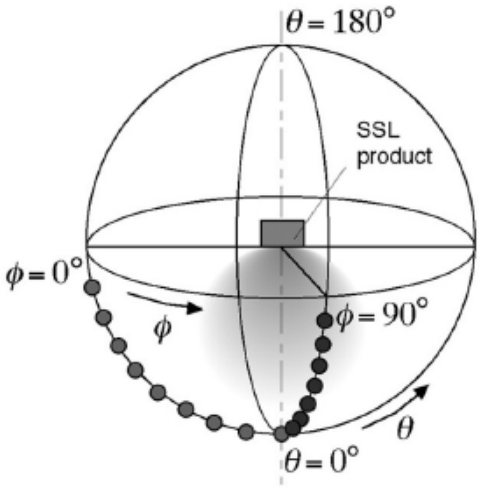
An EVERFINE Type C Model GO-R5000 Goniophotometer was used to measure the intensity at each angle of distribution for each sample. The photometric distance is 2.475m for near-field measurement or 30m for far-field measurement. Bandwidth of spectroradiometer is 380nm-780nm.
Ambient temperature was measured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

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