



LM-79-08 Test Report

for

ABB Lighting, Inc.

1501 Industrial Way N. Toms River, NJ 08755

Model T Led Light

Model: MT150501-III

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

No.1805, DongLiu road, BinJiang District, Hangzhou, China

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www.ledtestlab.com

Report No.: HZ16050033b

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

Reviewed by:

April Zou

Engineer: April Zou
May 23, 2016

Jim Zhang

Manager: Jim Zhang
May 23, 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: **MT150501-III**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
115.6	17823.0	154.21	0.9950
CCT (K)	CRI	Stabilization Time (Light & Power)	
5239	68.6	60	

Table 1: Executive Data Summary

Test specifications:

Date of Receipt	: May 18, 2016
Date of Test	: May 18, 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	: Model T Led Light
Model	: MT150501-III
Electrical Ratings	: 100~277Vac, 50/60Hz, 150W
Product Description	: 5000K, Aluminum Enclosure, Black Coating, Silver reflector Manufacturer of light source: Samsung Model of light source: 351B Quantity of LED light source: 66 (11S6P)
Manufacturer	: ABB Lighting (shanghai) Co., Ltd.
Address	: Room 1012, North Minch Fortune 108 Plaza,# 1839 Qixin road, Shanghai

TEST RESULTS

Test ambient temperature was 24.2°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 2.47 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	67.5
Voltage frequency (Hz)	60	60	60	R2	72.7
Test Current (A)	1.292	1.559	0.589	R3	75
Power Factor	0.9950	0.9968	0.9342	R4	70.2
Test Power (W)	154.21	155.47	152.35	R5	67.9
THD A%	6.35	5.87	13.18	R6	61.9
Luminous Efficacy (lm/W)	115.6	114.8	117.1	R7	77.1
Total Luminous Flux (lm)	17823.0	17841.0	17847.0	R8	56.6
Color Rendering Index (CRI)	68.6			R9	-33.6
R9	-33.6			R10	33.8
Correlated Color Temperature (CCT) (K)	5239			R11	67.3
Chromaticity (Chroma x, Chroma y)	(0.3387, 0.3467)			R12	37
Chromaticity (Chroma u, Chroma v)	(0.2090, 0.3209)			R13	67.3
Chromaticity (Chroma u', Chroma v')	(0.2090, 0.4814)			R14	85.6
Duv	0.0002				
Average Beam Angle (°)	102.6				
Center Beam Candle Power (cd)	496				
Spacing Criteria	0.53 (0°-180°)/ 1.60 (90°-270°)				
Zonal Lumens in the 0°-60°Zone	70.26%				
Zonal Lumens in the 60°-90°Zone	29.74%				
Zonal Lumens in the 90°-120°Zone	0.00%				
Zonal Lumens in the 120°-180°Zone	0.00%				

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

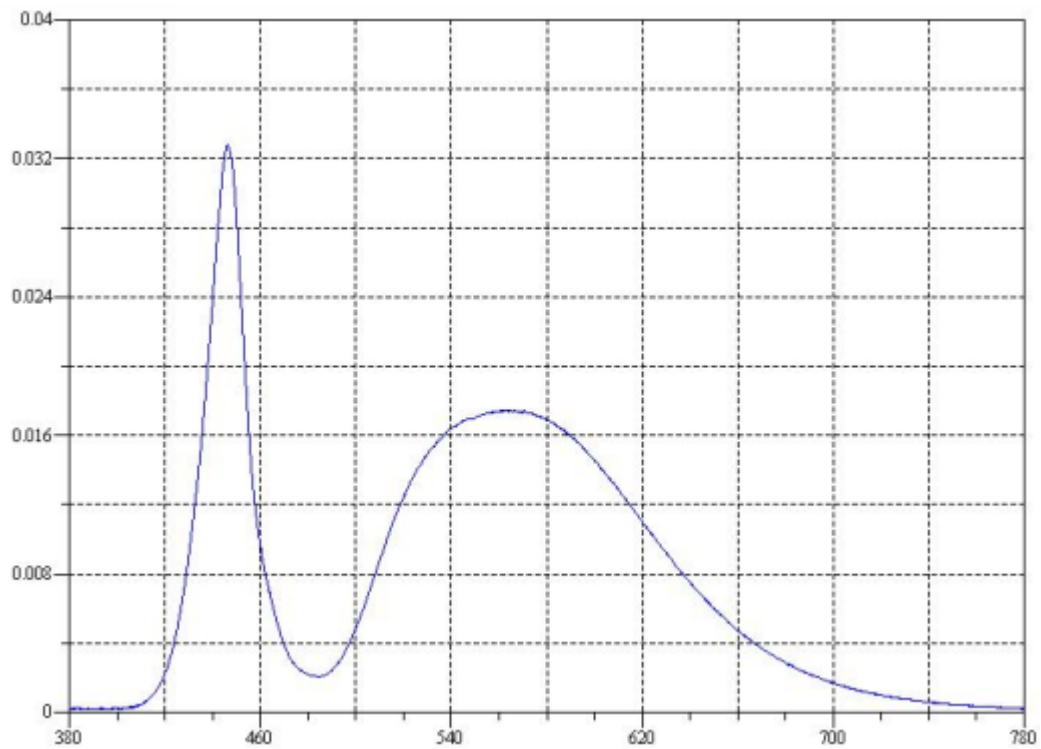


Chart 1: Spectral Power Distribution

Zonal Lumen Tabulation

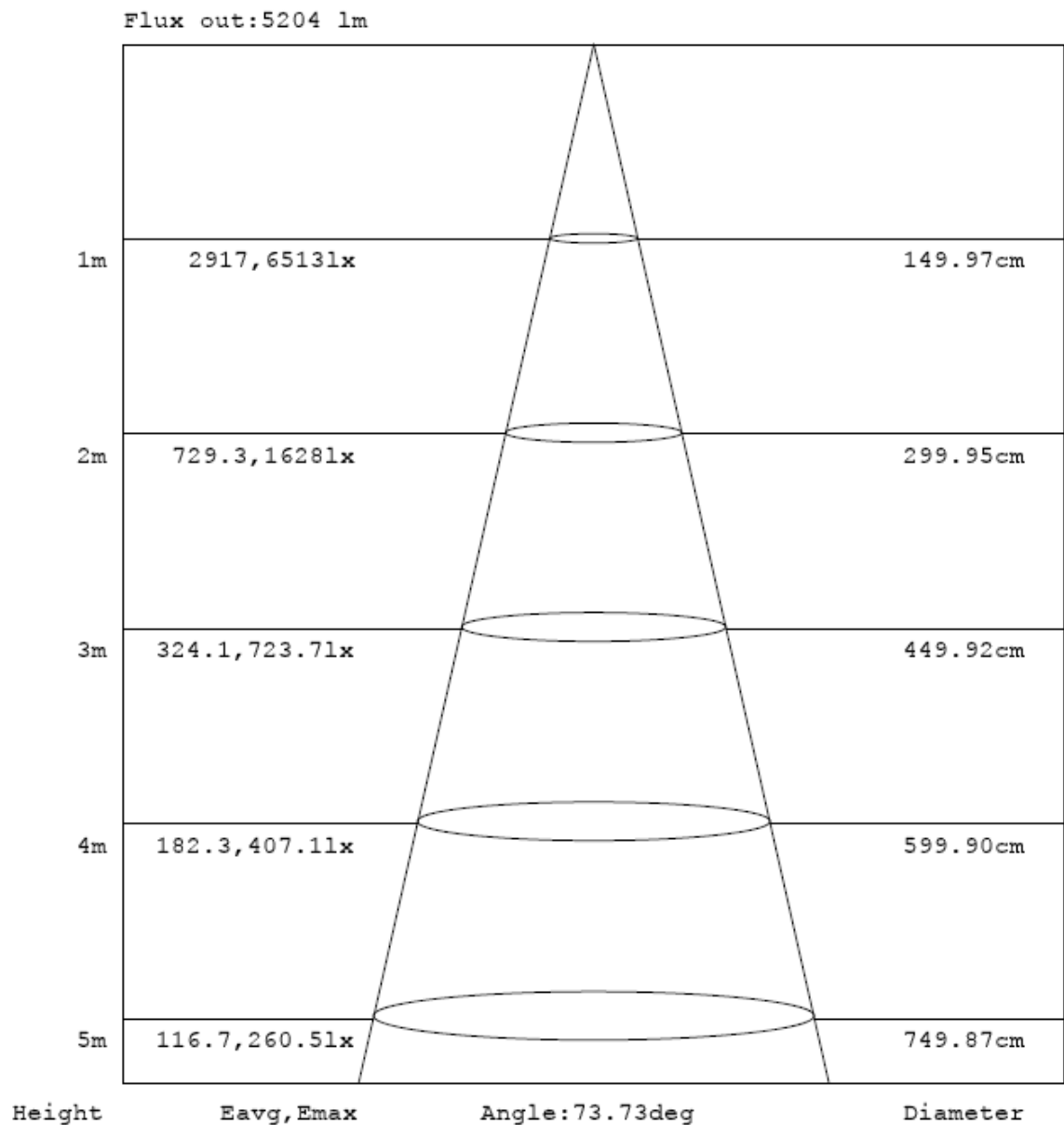
$\gamma(^{\circ})$	Lumens	% Total
0- 10	465.953	2.61%
10- 20	1268.26	7.12%
20- 30	1836.312	10.30%
30- 40	2428.891	13.63%
40- 50	3040.633	17.06%
50- 60	3482.709	19.54%
60- 70	3712.717	20.83%
70- 80	1497.6	8.40%
80- 90	89.453	0.50%
90-100	0	0.00%
100-110	0	0.00%
110-120	0	0.00%
120-130	0	0.00%
130-140	0	0.00%
140-150	0	0.00%
150-160	0	0.00%
160-170	0	0.00%
170-180	0	0.00%
Total	17822.5	100%

$\gamma(^{\circ})$	Lumens	% Total
0- 60	12522.758	70.26%
60- 90	5299.77	29.74%
0-90	17822.528	100.00%
90- 180	0	0.00%
0- 180	17822.5	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.

Illuminance Plots



Note: The Curves indicate the illuminated area and the average illumination when the luminaire is at different distance.

Chart 2: Beam Angle

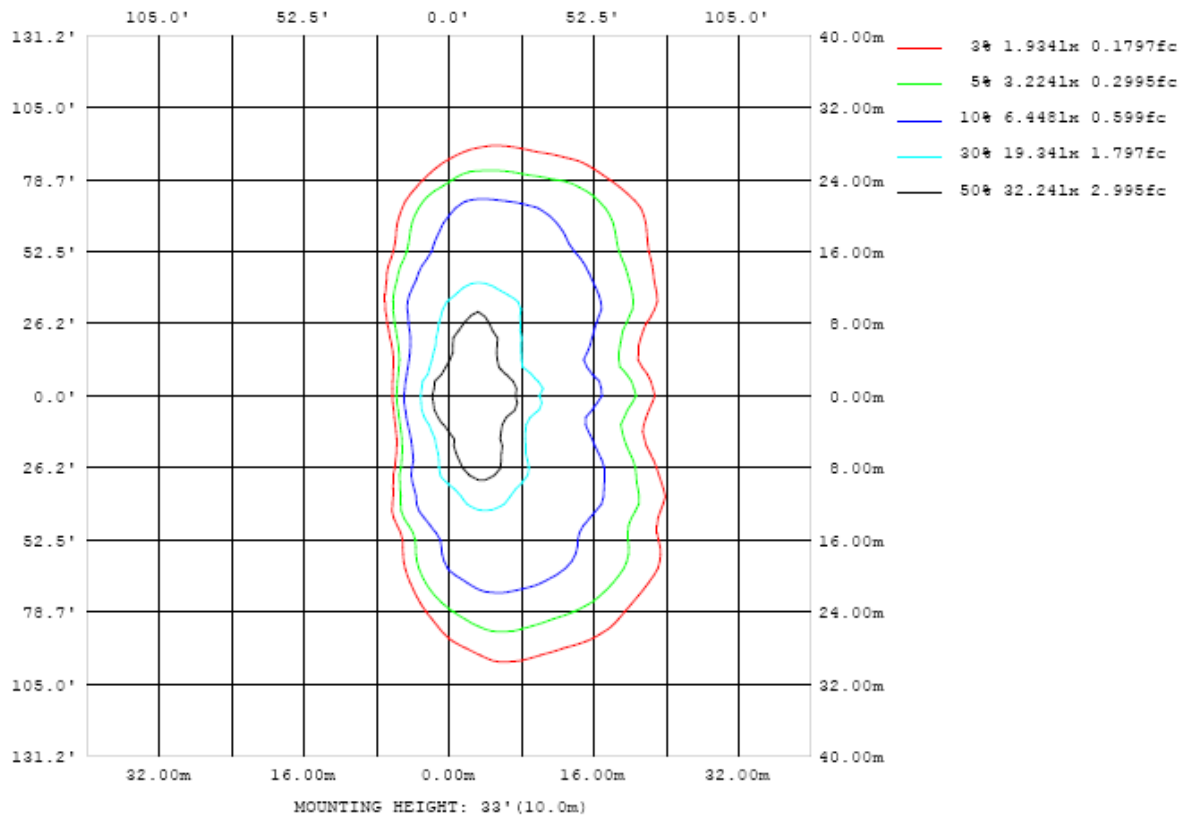


Chart 3: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

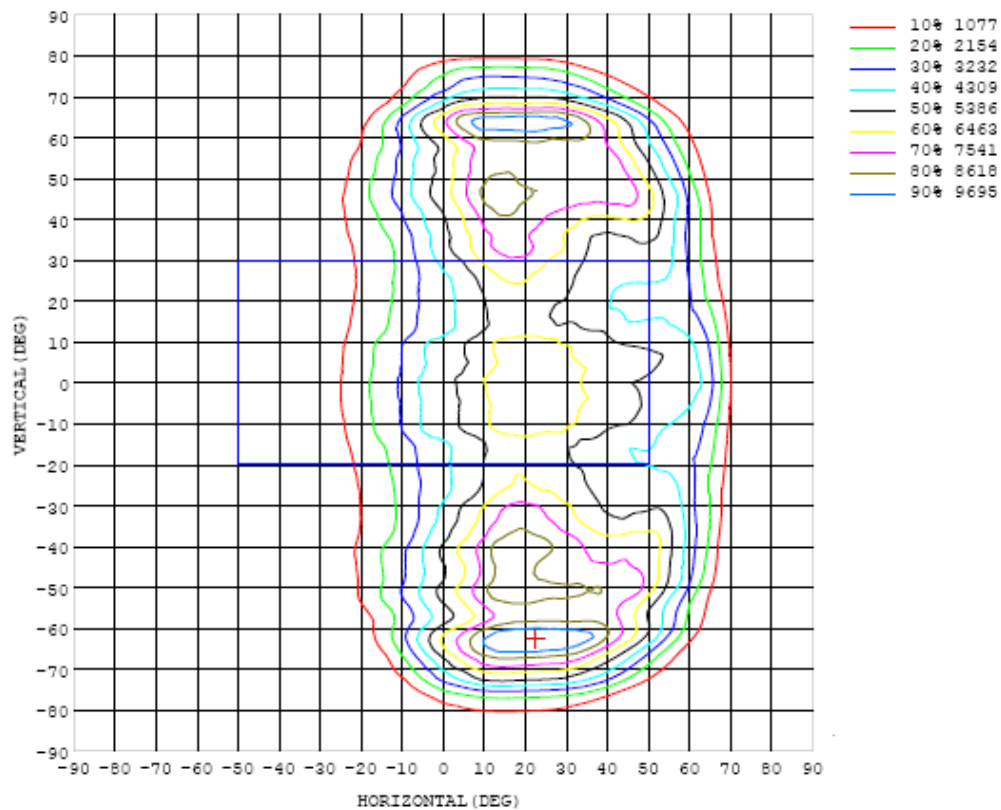


Chart 4: Isocandela Plot

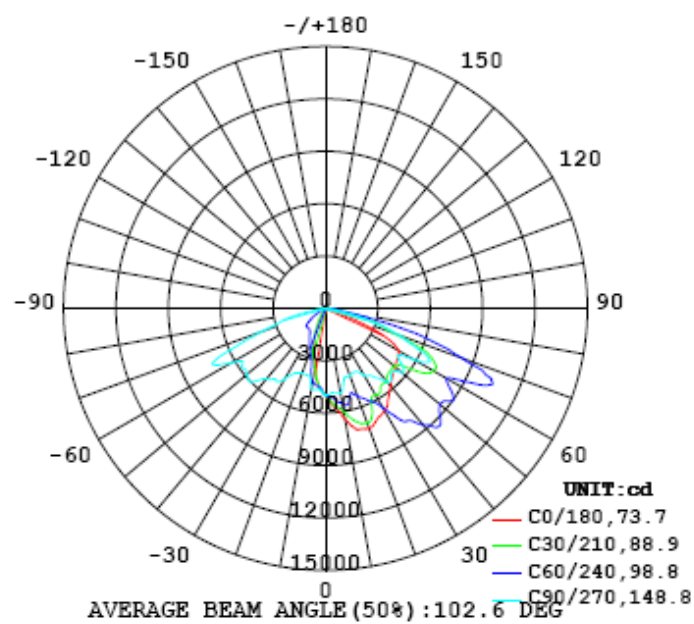


Chart 5: Polar Candela Distribution

Luminous Intensity Data

Table--1

UNIT: $\times 10\text{cd}$

C (DEG) y (DEG)	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
0	496	496	496	496	496	496	496	496	496	496	496	496	496	496	496	496	496	496	496
5	567	565	563	561	559	557	555	549	544	537	530	521	513	507	503	498	494	491	486
10	644	642	637	631	621	610	596	585	582	577	571	562	552	545	536	520	508	499	490
15	719	712	711	694	684	674	672	662	649	633	600	562	533	510	485	466	443	428	414
20	731	724	712	706	709	704	697	672	628	588	570	551	532	506	491	474	457	431	410
25	700	699	688	691	699	691	633	601	608	610	612	600	584	548	512	487	459	431	399
30	678	680	691	696	675	593	570	582	602	636	653	651	657	642	614	571	541	494	441
35	628	649	634	636	554	530	550	587	616	652	719	775	792	764	718	660	602	545	475
40	582	626	588	544	487	512	545	575	634	708	766	825	874	872	845	778	704	637	552
45	544	586	545	448	461	482	516	578	639	722	813	906	933	955	914	819	690	606	530
50	521	518	483	421	444	482	515	578	686	781	828	821	858	897	920	862	763	661	573
55	503	463	399	421	484	530	616	706	741	772	822	873	896	907	877	820	708	592	516
60	483	408	362	429	512	646	710	759	823	869	834	817	802	824	863	858	787	685	589
65	358	292	268	324	448	550	669	756	738	784	886	973	1034	1078	1050	1023	939	771	634
70	111	94.1	116	200	282	400	416	519	686	776	824	854	833	784	774	757	699	567	446
75	6.61	9.40	19.9	54.5	91.0	163	245	283	343	408	461	489	487	448	413	393	355	290	223
80	3.14	3.31	4.11	10.1	18.5	29.1	46.2	55.3	62.4	73.2	96.2	120	133	129	127	125	116	96.2	70.3
85	0.89	0.97	1.13	1.42	1.83	2.82	4.24	5.88	8.75	11.2	13.7	17.6	19.5	23.0	22.4	22.3	21.4	18.5	13.8
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: $\times 10\text{cd}$

C (DEG) y (DEG)	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185
0	496	496	496	496	496	496	496	496	496	496	496	496	496	496	496	496	496	496	496
5	480	474	470	468	466	465	464	462	460	459	457	455	452	451	450	449	449	450	451
10	478	474	472	463	453	441	431	415	398	385	371	358	352	350	348	345	344	344	345
15	401	400	390	384	371	355	345	333	318	309	303	296	290	277	273	271	268	268	266
20	395	373	354	317	288	261	249	239	234	231	226	213	204	201	192	192	190	190	186
25	384	353	308	271	243	224	201	179	164	154	150	144	132	121	117	113	109	108	106
30	405	350	289	245	211	178	154	138	116	98.2	83.6	72.4	64.0	56.7	53.0	51.6	48.2	49.0	49.1
35	423	339	270	220	180	151	121	92.7	69.8	52.6	38.6	28.2	20.5	16.2	15.4	15.4	15.9	16.9	14.0
40	482	374	292	226	174	128	92.3	60.1	38.1	19.9	14.8	12.6	11.3	10.7	9.85	10.5	10.2	10.1	9.11
45	465	371	296	237	177	122	67.6	31.5	18.0	13.6	10.6	9.20	8.15	7.23	6.65	6.64	6.63	6.82	6.14
50	486	374	288	204	144	82.0	40.1	20.9	11.2	8.31	6.72	5.74	5.15	4.82	4.66	4.60	4.99	4.91	4.45
55	429	326	247	186	115	59.4	22.3	10.4	7.10	5.60	4.63	4.03	3.69	3.63	3.50	3.37	3.42	3.33	3.20
60	454	315	195	104	58.3	28.7	13.9	7.83	5.46	4.44	3.74	3.38	3.20	3.07	2.78	2.58	2.47	2.38	2.52
65	463	290	154	69.7	33.9	15.5	7.76	4.87	3.96	3.77	3.43	3.12	2.76	2.47	2.30	2.23	2.16	2.11	2.23
70	300	165	72.9	32.4	14.7	7.06	4.84	3.84	3.44	3.13	2.80	2.56	2.35	2.19	2.08	2.04	2.16	2.13	2.13
75	135	60.7	30.4	15.3	6.39	4.42	3.89	3.31	2.91	2.69	2.51	2.38	2.19	2.01	1.87	1.79	1.79	1.78	1.83
80	36.5	12.7	6.40	3.95	3.74	3.50	2.84	2.44	2.26	2.20	2.08	1.99	1.83	1.76	1.66	1.52	1.48	1.52	1.66
85	7.50	3.11	2.28	2.13	2.08	1.94	1.78	1.68	1.59	1.49	1.43	1.36	1.31	1.26	1.20	1.16	1.15	1.16	1.19
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 5: Luminous Intensity Data

Table--3

UNIT: $\times 10\text{cd}$

C (DEG) y (DEG)	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280
0	496	496	496	496	496	496	496	496	496	496	496	496	496	496	496	496	496	496	496
5	453	451	445	440	439	441	444	448	450	450	449	449	449	451	453	456	461	468	472
10	338	337	343	346	351	363	374	388	404	417	426	435	445	449	450	453	464	478	487
15	261	265	268	276	283	292	295	296	298	303	310	331	347	360	375	378	397	412	426
20	187	186	192	199	201	198	197	210	224	240	258	285	308	340	358	371	394	414	441
25	108	113	120	123	128	135	147	160	176	195	217	243	286	319	350	379	407	433	467
30	50.7	55.1	59.6	66.0	76.2	86.8	99.9	118	136	155	180	210	246	298	361	415	466	504	542
35	16.1	18.8	22.9	28.6	36.7	47.4	63.4	83.9	106	130	157	187	232	297	371	437	500	568	622
40	9.64	10.3	10.9	12.9	14.7	21.1	37.8	60.1	86.6	116	151	198	247	315	389	466	528	599	688
45	6.54	7.02	7.36	8.22	10.0	13.2	19.5	36.5	66.6	106	150	202	270	345	434	521	594	673	783
50	4.47	4.56	4.69	5.12	5.69	7.00	10.4	20.8	42.5	84.5	138	202	266	339	437	518	593	688	809
55	3.37	3.46	3.46	3.70	4.34	5.29	6.33	8.11	18.7	42.8	91.3	152	220	307	409	500	585	685	793
60	2.78	3.06	3.17	3.25	3.97	4.75	4.98	6.28	10.2	23.9	49.0	93.8	163	256	383	518	623	755	858
65	2.27	2.43	2.62	2.88	3.27	3.87	4.06	4.15	5.26	10.1	23.6	56.2	120	228	371	546	692	903	989
70	2.13	2.24	2.39	2.64	2.91	3.05	3.37	3.66	4.30	5.19	10.4	23.7	42.2	83.5	171	284	394	480	539
75	1.89	2.04	2.21	2.46	2.67	2.82	2.91	3.07	3.47	4.02	4.39	7.74	13.8	27.2	77.9	161	224	293	330
80	1.72	1.84	1.94	2.05	2.08	2.24	2.41	2.49	2.66	3.12	3.41	3.19	3.53	6.23	17.5	42.0	55.7	74.8	84.8
85	1.22	1.31	1.37	1.44	1.48	1.51	1.58	1.61	1.60	1.62	1.77	1.62	1.64	1.85	2.10	2.69	3.39	3.99	4.47
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 6: Luminous Intensity Data

Table--4

UNIT: $\times 10\text{cd}$

C (DEG) y (DEG)	285	290	295	300	305	310	315	320	325	330	335	340	345	350	355				
0	496	496	496	496	496	496	496	496	496	496	496	496	496	496	496				
5	477	482	488	497	506	513	520	526	530	535	544	556	567	570	569				
10	502	518	529	537	545	554	563	568	568	573	589	601	613	637	647				
15	445	456	470	494	529	566	605	637	649	658	658	653	672	689	714				
20	458	481	505	528	547	562	566	585	628	668	681	680	672	691	723				
25	492	530	559	583	589	593	590	584	573	593	659	681	674	669	691				
30	598	636	653	659	660	640	613	581	556	538	553	638	651	648	674				
35	700	749	777	766	728	676	613	568	550	533	516	551	620	620	646				
40	754	807	821	777	752	713	638	590	540	496	470	452	553	573	616				
45	876	907	867	799	754	685	634	587	514	469	437	425	460	532	594				
50	884	897	884	857	824	746	665	561	505	465	446	417	395	493	571				
55	845	856	833	832	828	839	790	695	616	534	498	443	395	446	528				
60	854	827	830	841	835	821	826	820	797	651	546	459	390	370	468				
65	1016	1035	1032	938	897	831	798	735	655	618	479	338	271	243	318				
70	574	600	682	752	785	750	674	545	448	396	320	230	121	84.7	98.4				
75	345	354	360	352	346	304	267	239	233	170	116	62.1	32.1	10.4	7.55				
80	94.8	105	118	109	82.9	59.5	42.6	36.9	34.0	30.5	24.4	13.5	5.41	3.24	3.20				
85	4.70	4.71	4.36	3.86	3.64	3.23	3.25	2.94	3.05	2.31	1.50	1.14	0.94	0.88	0.89				
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				
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				
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				
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				
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				
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				
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				
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				
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				
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				
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				
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				
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				
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				
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				
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				
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				
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				
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				

Table 7: 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 8: 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.

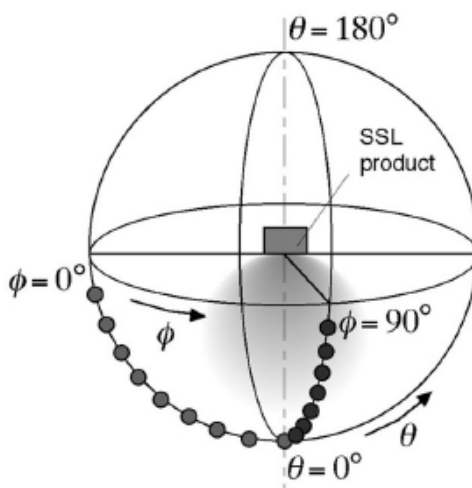
Color Characteristics Measurements

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 ($C=0^\circ/180^\circ$ 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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