

## LM-79-08 Test Report

for

### ABOVE ALL LIGHTING INC

1501 Industrial Way N. Toms River, NJ 08755.

### MT LED Area Light

### Model: MT150401-III

#### Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

Tel: +86-571-56680806

www.ledtestlab.com

Report No.: HZ17080006m

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

#### Test specifications:

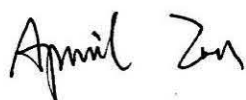
**Date of Receipt** : Jul. 24, 2017

**Date of Test** : Jul. 25, 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

Reviewed by:



Engineer: April Zou

Jul. 25, 2017

Approved by



Manager: Jim Zhang

Jul. 25, 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: MT150401-III

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
101.3	15894.0	156.97	0.9942
CCT (K)	CRI	Stabilization Time (Light & Power)	
4035	73.1	60	
IES Classification		Longitudinal Classification	
Type III		Short	

Table 1: Executive Data Summary

## Sample Photo

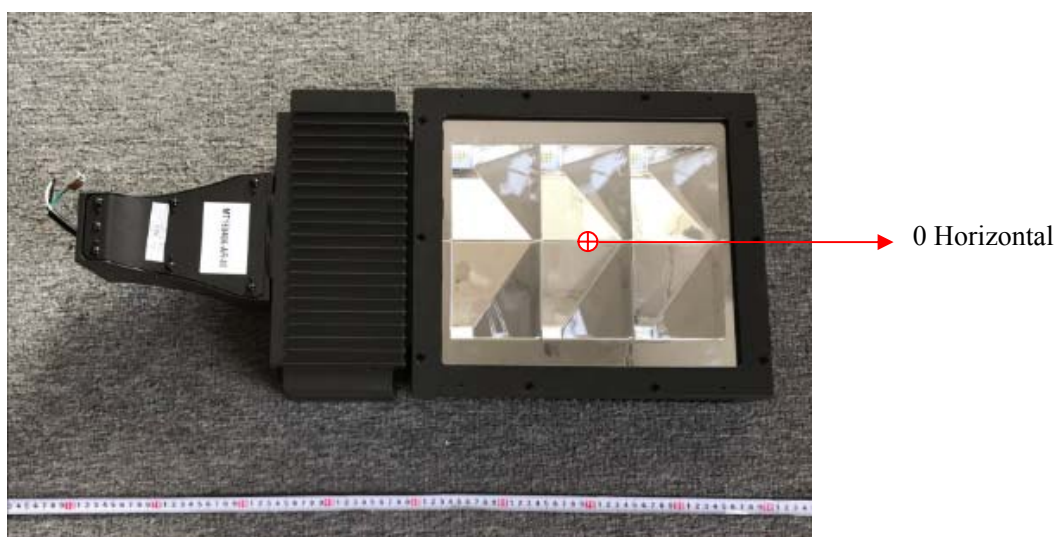


Figure 1- Overview of the sample

## Equipment Under Test (EUT)

<b>Name</b>	: MT LED Area Light
<b>Model</b>	: MT150401-III
<b>Electrical Ratings</b>	: 120~277V, 50/60Hz, 150W
<b>Product Description</b>	: 4000K Manufacturer of light source: SAMSUNG Model of light source: LH351B
<b>Manufacturer</b>	: ABOVE ALL LIGHTING (SHANGHAI) Co., Ltd.
<b>Address</b>	: Room 1012, North Minch Fortune 108 Plaza, # 1839 Qixin road, Shanghai

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## TEST RESULTS

Test ambient temperature was 24.7°C.

Sample 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.

### Goniophotometer Method

The photometric distance is 2.47m.

Luminous data was taken at 0.5°vertical intervals and 5°horizontal intervals.

Parameter	Result	
Test Voltage (V)	120.0	277.0
Voltage frequency (Hz)	60	60
Test Current (A)	1.315	0.598
Power Factor	0.9942	0.9345
Test Power (W)	156.97	154.94
THD A%	6.69	11.93
Luminous Efficacy (lm/W)	101.3	102.2
Total Luminous Flux (lm)	15894.0	15836.0
Color Rendering Index (CRI)	73.1	
R9	-27	
Correlated Color Temperature (CCT) (K)	4035	
Chromaticity (Chroma x, Chroma y)	(0.3778, 0.3717)	
Chromaticity (Chroma u, Chroma v)	(0.2253, 0.3327)	
Chromaticity (Chroma u', Chroma v')	(0.2253, 0.4990)	
Duv	-0.0015	
Average Beam Angle (°)	97.8	
Center Beam Candle Power (cd)	4535	
Spacing Criteria	0.57 (0°-180°)/ 1.59 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	70.88%	
Zonal Lumens in the 60°-90°Zone	29.12%	
Zonal Lumens in the 90°-120°Zone	0.00%	
Zonal Lumens in the 120°-180°Zone	0.00%	

Special Rendering Indices	Color
R1	70
R2	81
R3	89
R4	71
R5	70
R6	72
R7	81
R8	53
R9	-27
R10	54
R11	65
R12	48
R13	72
R14	93

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

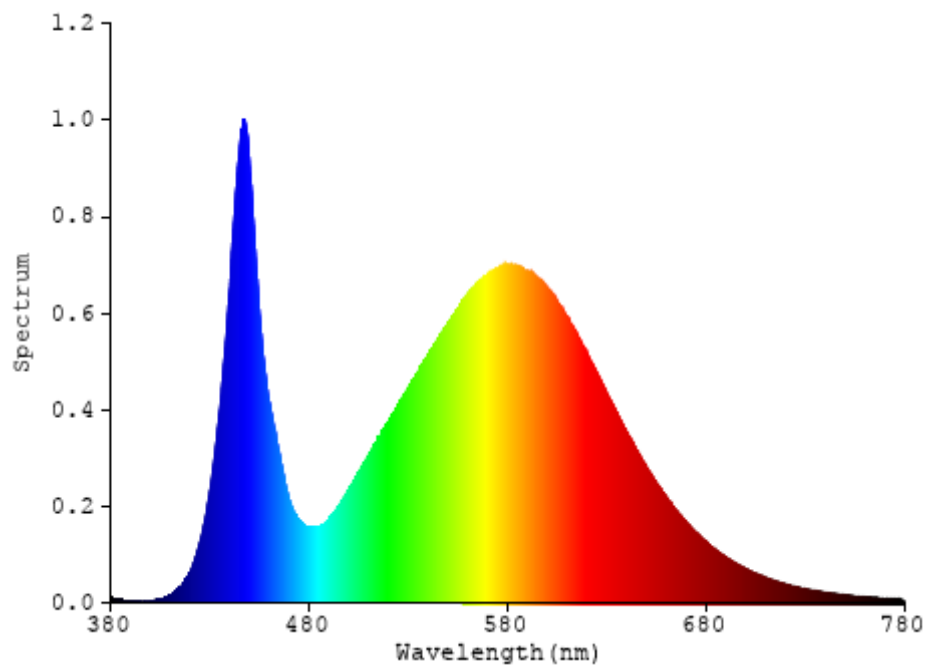


Chart 1: Spectral Power Distribution

### IESNA Luminaire Flux Distribution Table

Zone	Lumens	Luminaire %
FL - Front-Low (0-30)	2233.7	14.1
FM - Front-Medium (30-60)	6587.4	41.4
FH - Front-High (60-80)	3966.8	25.0
FVH - Front-Very High (80-90)	65.4	0.4
Total Forward Light	12853.3	80.9

BL - Back-Low (0-30)	1091.4	6.9
BM - Back-Medium (30-60)	1353.9	8.5
BH - Back-High (60-80)	570.8	3.6
BVH - Back-Very High (80-90)	24.9	0.2
Total Back Light	3041.0	19.2

UL - Uplight-Low (90-100)	0	0
UH - Uplight-High (100-180)	0	0
Total Up Light	0	0

BUG (Back, Up, Glare) Rating	B3-U0-G2
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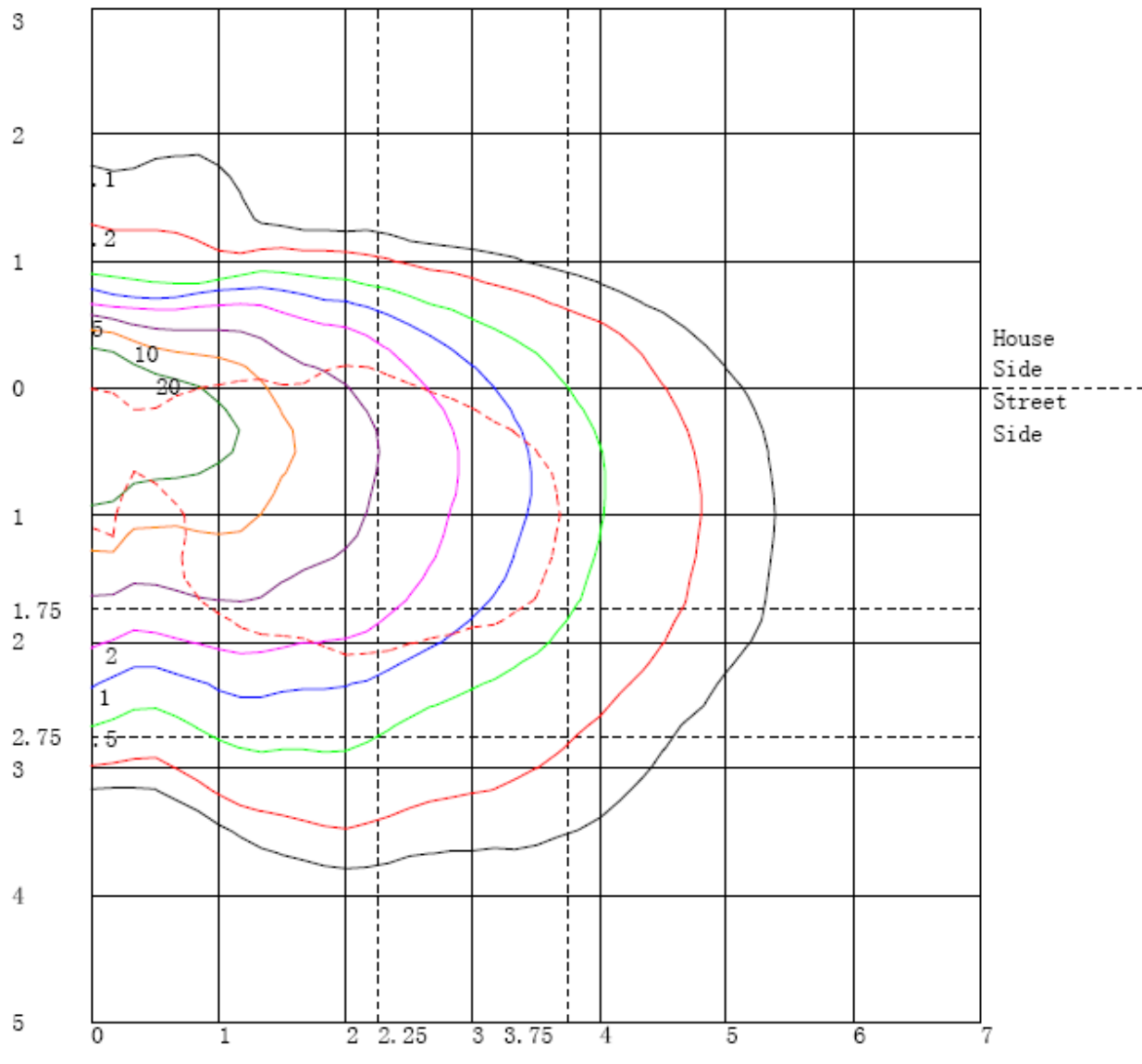
Table 3: Flux Distribution Data

Zone	Downward Lumens	Upward Lumens	Total Lumens
House Side	3041.0	0	3041.0
Street Side	12853.3	0	12853.3

Table 4: Flux Distribution Table

Note: The Flux in this table might be a little different from the total flux in Table 2 due to software calculation deviation.

## Isoilluminance Plots of Horizontal Illuminance



Distance In Units Of Mounting Height

Values Based On 10 Foot Mounting Height

1/2 Maximum Candela Trace Shown As Dashed Curve

(+) = Maximum Candela Point

Chart 2: Illuminance Plot (Footcandles)

## Luminous Intensity Distribution Plots

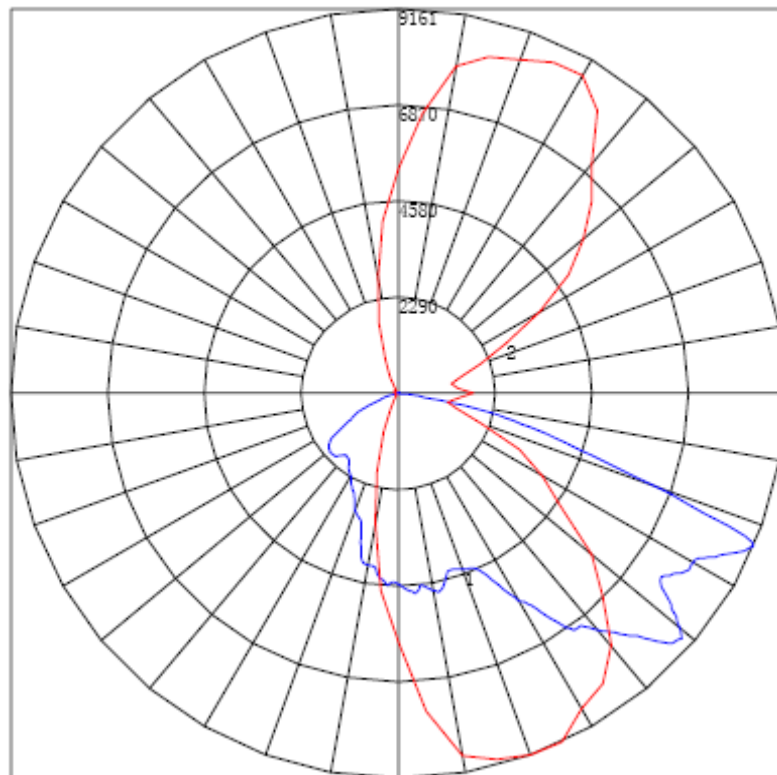


Chart 3: Maximum Plane and Cone Plots of Candela

Maximum Candela = 9160.56 Located At Horizontal Angle = 290, Vertical Angle = 66.5

# 1 - Vertical Plane Through Horizontal Angles (290 - 110) (Through Max. Cd.)

# 2 - Horizontal Cone Through Vertical Angle (66.5) (Through Max. Cd.)

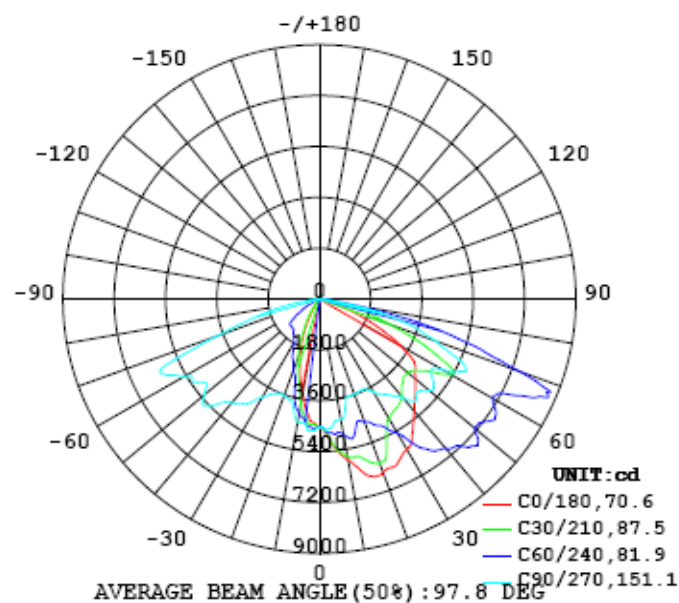


Chart 4: Polar Candela Distribution



## Luminous Intensity Data

Table--1

UNIT: 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	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535
5	5166	5145	5126	5106	5090	5077	5080	5073	5035	4971	4901	4820	4743	4683	4644	4605	4582	4572	4576
10	5787	5779	5797	5856	5860	5752	5643	5526	5362	5204	5098	4996	4868	4734	4641	4516	4385	4320	4325
15	6444	6482	6491	6467	6245	6022	5815	5732	5602	5511	5398	5122	4861	4561	4273	4033	3845	3646	3622
20	6522	6519	6726	6563	6277	6207	6196	6042	5585	5095	4826	4712	4625	4508	4337	4127	3916	3656	3576
25	6446	6454	6505	6214	6190	6118	5568	5102	5182	5241	5237	5136	4949	4704	4566	4293	4025	3768	3548
30	6147	6231	6267	5964	5952	5336	4870	4967	5137	5309	5502	5562	5479	5279	5036	4884	4563	4195	3816
35	5702	6119	5719	5620	5196	4618	4704	4853	5103	5433	5859	6299	6458	6394	6010	5569	5121	4598	4110
40	5178	5819	5090	5056	4133	4247	4507	4762	5094	5682	6286	6626	6904	7071	6740	6211	5769	5161	4585
45	4762	5523	4651	4124	3763	3895	4146	4574	5127	5566	6184	6834	7434	7873	7906	7150	6306	5477	4767
50	4399	5010	4295	3424	3577	3811	4048	4378	4971	5644	6620	6923	7107	7530	7917	7487	6728	5856	5036
55	4107	4354	3807	3373	3760	4096	4428	5016	5582	6032	6667	7101	7469	7785	7840	7491	6656	5682	4837
60	3245	3086	2599	2921	3586	4378	5330	5931	6484	7179	7355	7182	7024	7138	7352	7440	6743	5912	5002
65	2112	1767	1560	1791	2400	3283	4348	5586	6555	6632	7033	7777	8263	8600	8687	8683	8126	6922	5654
70	1000	826	831	1135	1654	2272	2639	3063	4013	5412	6593	7163	7411	7168	6672	6734	6516	5668	4410
75	35.2	54.9	76.1	255	711	1137	1723	2072	2234	2492	2964	3740	4535	4865	4821	4737	4471	3800	2931
80	7.45	9.33	8.95	23.3	95.2	120	170	340	486	730	1108	1241	1314	1447	1744	1589	1415	1239	941
85	1.93	1.70	1.53	1.00	0.87	0.85	2.32	3.69	5.02	7.26	39.9	63.1	74.0	68.4	43.9	15.8	15.6	58.1	73.3
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

Table 5: Luminous Intensity Data

Table--2

UNIT: 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	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535
5	4552	4515	4476	4448	4425	4411	4420	4428	4439	4443	4408	4331	4267	4225	4199	4193	4185	4215	4220
10	4284	4180	4138	4150	4113	3985	3870	3803	3745	3713	3679	3616	3563	3559	3490	3424	3408	3418	3420
15	3539	3477	3512	3396	3377	3334	3223	3178	3043	2915	2835	2753	2766	2785	2764	2726	2662	2669	2686
20	3381	3364	3106	2974	2656	2478	2293	2170	2161	2181	2172	2108	2010	1950	2022	2027	1953	1961	2026
25	3304	3116	2910	2547	2253	2063	1908	1725	1587	1473	1410	1422	1381	1269	1240	1271	1240	1238	1319
30	3523	3109	2643	2252	1940	1694	1498	1344	1188	1028	908	789	730	659	592	619	624	599	651
35	3754	3118	2501	2035	1708	1445	1205	990	783	624	488	383	302	248	207	201	229	235	245
40	3941	3133	2479	1931	1578	1250	980	719	482	313	196	145	137	132	127	129	135	131	128
45	4101	3413	2628	2118	1624	1180	776	466	252	167	145	128	119	110	103	99.0	101	99.8	98.3
50	4426	3597	2750	2126	1574	1005	575	286	169	129	117	105	97.4	91.6	86.6	82.8	83.2	85.0	81.0
55	4184	3363	2635	1949	1291	764	353	175	118	107	106	103	95.5	91.7	89.1	80.5	79.9	86.6	84.0
60	4185	3003	2088	1351	830	448	237	127	95.5	99.4	108	109	106	101	92.5	79.3	78.5	83.1	82.2
65	4501	3040	1946	1026	489	244	122	81.2	76.8	90.9	106	114	116	103	95.0	81.1	74.0	70.1	67.4
70	3196	2036	1063	473	246	129	75.6	63.9	66.0	77.9	91.5	99.8	105	92.4	79.6	72.0	67.4	61.6	57.8
75	2109	1133	512	256	108	65.9	63.4	60.4	58.2	66.1	82.1	89.3	88.9	83.0	71.9	67.8	65.4	59.1	55.2
80	676	238	116	69.1	55.2	57.1	54.2	53.3	53.7	57.3	67.5	71.2	69.8	68.2	64.5	62.7	60.2	56.4	57.3
85	58.6	46.3	19.7	21.1	24.8	28.3	33.4	37.4	41.6	45.2	50.4	54.1	56.5	58.0	57.6	56.4	57.2	55.3	58.5
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

Table 6: Luminous Intensity Data

Table--3

UNIT: 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	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535
5	4237	4277	4340	4404	4443	4456	4470	4482	4493	4515	4540	4558	4572	4604	4638	4658	4660	4668	4694
10	3481	3552	3608	3690	3737	3740	3763	3840	3926	3995	4111	4218	4256	4294	4336	4386	4401	4457	4536
15	2788	2850	2895	2820	2893	2952	3054	3213	3233	3239	3352	3417	3478	3577	3639	3693	3744	3864	3980
20	2086	2112	2052	2113	2185	2192	2173	2179	2330	2457	2685	2805	3091	3274	3458	3553	3635	3839	4033
25	1360	1292	1350	1430	1446	1496	1602	1707	1813	1968	2245	2467	2747	3097	3338	3572	3707	3959	4387
30	656	675	749	824	896	980	1091	1249	1455	1616	1788	2121	2451	2813	3317	3735	4002	4350	4895
35	283	307	334	362	429	526	724	883	1063	1322	1585	1796	2236	2826	3498	4170	4541	5148	5711
40	123	135	140	140	185	264	380	546	873	1104	1407	1843	2251	2888	3599	4389	4802	5569	6180
45	98.8	102	100	107	118	140	181	356	565	944	1368	1870	2487	3208	4014	4804	5347	6124	6974
50	77.5	77.1	78.6	81.8	86.4	94.1	124	191	376	786	1353	2027	2678	3306	4103	4736	5253	6110	7302
55	73.9	71.6	70.6	70.6	70.9	73.4	81.6	106	209	461	947	1467	2092	2840	3763	4532	5139	5955	7130
60	74.1	71.4	68.9	70.0	67.0	69.0	70.9	76.9	114	257	572	1065	1695	2528	3606	4740	5508	6443	7496
65	66.1	65.5	69.1	69.0	67.3	69.3	67.3	65.2	75.8	123	243	563	1176	2168	3408	5056	6162	7640	8969
70	57.6	60.8	66.6	66.8	65.6	62.1	61.4	61.5	62.7	69.6	115	261	498	1004	1858	2844	3813	5070	5672
75	56.6	59.4	64.8	64.8	63.0	59.8	58.6	59.1	59.5	62.5	72.4	114	188	308	731	1496	2078	2701	3125
80	60.2	61.3	63.3	63.1	60.9	58.5	56.7	56.2	54.4	57.2	61.9	61.4	56.2	76.7	215	539	842	1087	1157
85	60.1	58.8	56.4	54.3	46.6	41.8	37.7	32.8	27.6	23.9	20.8	19.2	14.1	10.2	9.01	7.95	6.08	3.42	1.13
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

Table 7: Luminous Intensity Data

Table--4

UNIT: cd

C (DEG) y (DEG)	285	290	295	300	305	310	315	320	325	330	335	340	345	350	355				
0	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535	4535				
5	4734	4778	4826	4868	4920	4958	4999	5039	5082	5135	5184	5202	5198	5192	5176				
10	4637	4759	4918	5072	5164	5222	5303	5393	5543	5740	5833	5852	5884	5898	5845				
15	4218	4453	4632	4886	5143	5421	5666	5777	5854	5956	6035	6319	6479	6524	6508				
20	4314	4465	4588	4827	4979	5128	5345	5631	5998	6284	6328	6313	6575	6691	6676				
25	4519	4688	5013	5193	5366	5401	5418	5377	5366	5738	6223	6372	6312	6622	6619				
30	5203	5706	5953	5954	5978	5915	5726	5443	5221	5083	5316	6026	6063	6259	6515				
35	6340	6697	6819	6853	6747	6299	5789	5392	5075	4840	4730	5149	5722	5794	6336				
40	6942	7375	7577	7542	7226	6639	5918	5338	4868	4611	4383	4255	5049	5219	5966				
45	7815	8267	8244	7731	7303	6531	5933	5208	4675	4239	4005	3886	4124	4771	5519				
50	8070	8705	8587	8192	7671	7052	6122	5282	4531	4076	3860	3688	3541	4351	4921				
55	7639	7605	7490	7490	7542	7677	7204	6159	5337	4545	4171	3831	3436	3763	4286				
60	8075	8058	8036	7846	7599	7154	7102	7358	6771	5663	4459	3636	2968	2574	3083				
65	8955	8947	8888	8442	8151	7891	7259	6399	5431	4823	3565	2352	1762	1476	1688				
70	6083	6368	7072	7565	7465	6577	5350	4096	3331	2697	2183	1840	939	654	753				
75	3288	3408	3534	3211	2676	2438	2210	1985	1808	1472	1043	602	330	52.4	30.9				
80	1245	1297	1035	939	795	515	350	303	214	171	108	67.3	22.0	8.57	9.03				
85	1.00	1.08	16.5	20.9	17.8	10.0	1.45	0.86	0.91	0.75	0.78	0.99	1.21	1.49	2.57				
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				

Table 8: 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 9: 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 2.3% with a coverage factor k=2.

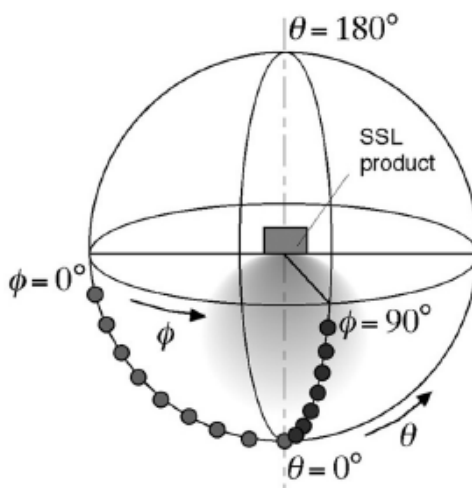
## Color Characteristics Measurements

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  $10^\circ$  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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