

## LM-79-08 Test Report

for

### ABOVE ALL LIGHTING INC

1501 Industrial Way N. Toms River, NJ 08755.

### MT LED Area Light

### Model: MT100501-III

#### Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

Tel: +86-571-56680806

www.ledtestlab.com

Report No.: HZ17080006k

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

#### Test specifications:

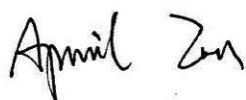
**Date of Receipt** : Jul. 24, 2017

**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: MT100501-III

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
109.0	12748.0	116.95	0.9946
CCT (K)	CRI	Stabilization Time (Light & Power)	
5236	69.2	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>	: MT100501-III
<b>Electrical Ratings</b>	: 120~277V, 50/60Hz, 100W
<b>Product Description</b>	: 5000K 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 24.9°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)	0.980	0.447
Power Factor	0.9946	0.9368
Test Power (W)	116.95	115.92
THD A%	6.82	11.58
Luminous Efficacy (lm/W)	109.0	109.9
Total Luminous Flux (lm)	12748.0	12734.0
Color Rendering Index (CRI)	69.2	
R9	-30	
Correlated Color Temperature (CCT) (K)	5236	
Chromaticity (Chroma x, Chroma y)	(0.3387, 0.3450)	
Chromaticity (Chroma u, Chroma v)	(0.2097, 0.3203)	
Chromaticity (Chroma u', Chroma v')	(0.2097, 0.4804)	
Duv	-0.0008	
Average Beam Angle (°)	96.3	
Center Beam Candle Power (cd)	3365	
Spacing Criteria	0.72 (0°-180°)/ 1.65 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	70.69%	
Zonal Lumens in the 60°-90°Zone	29.31%	
Zonal Lumens in the 90°-120°Zone	0.00%	
Zonal Lumens in the 120°-180°Zone	0.00%	

Special Rendering Indices	Color
R1	68
R2	73
R3	75
R4	71
R5	69
R6	63
R7	78
R8	58
R9	-30
R10	34
R11	68
R12	39
R13	68
R14	85

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

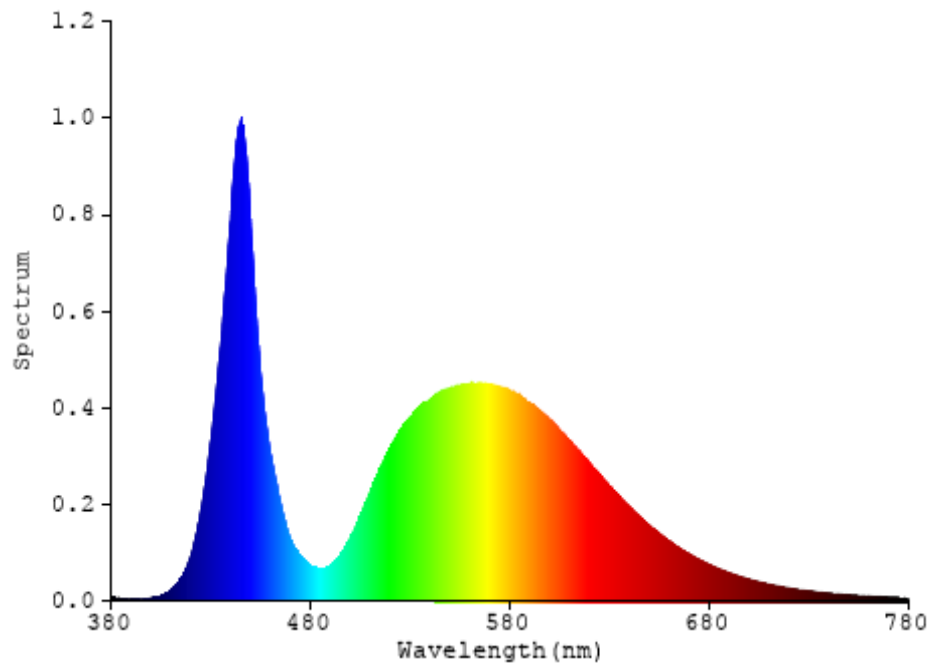


Chart 1: Spectral Power Distribution

### IESNA Luminaire Flux Distribution Table

Zone	Lumens	Luminaire %
FL - Front-Low (0-30)	1562.7	12.3
FM - Front-Medium (30-60)	5149.9	40.4
FH - Front-High (60-80)	3132.7	24.6
FVH - Front-Very High (80-90)	48.1	0.4
Total Forward Light	9893.4	77.7

BL - Back-Low (0-30)	988.0	7.8
BM - Back-Medium (30-60)	1311.4	10.3
BH - Back-High (60-80)	533.4	4.2
BVH - Back-Very High (80-90)	21.7	0.2
Total Back Light	2854.5	22.5

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

BUG (Back, Up, Glare) Rating	B2-U0-G2
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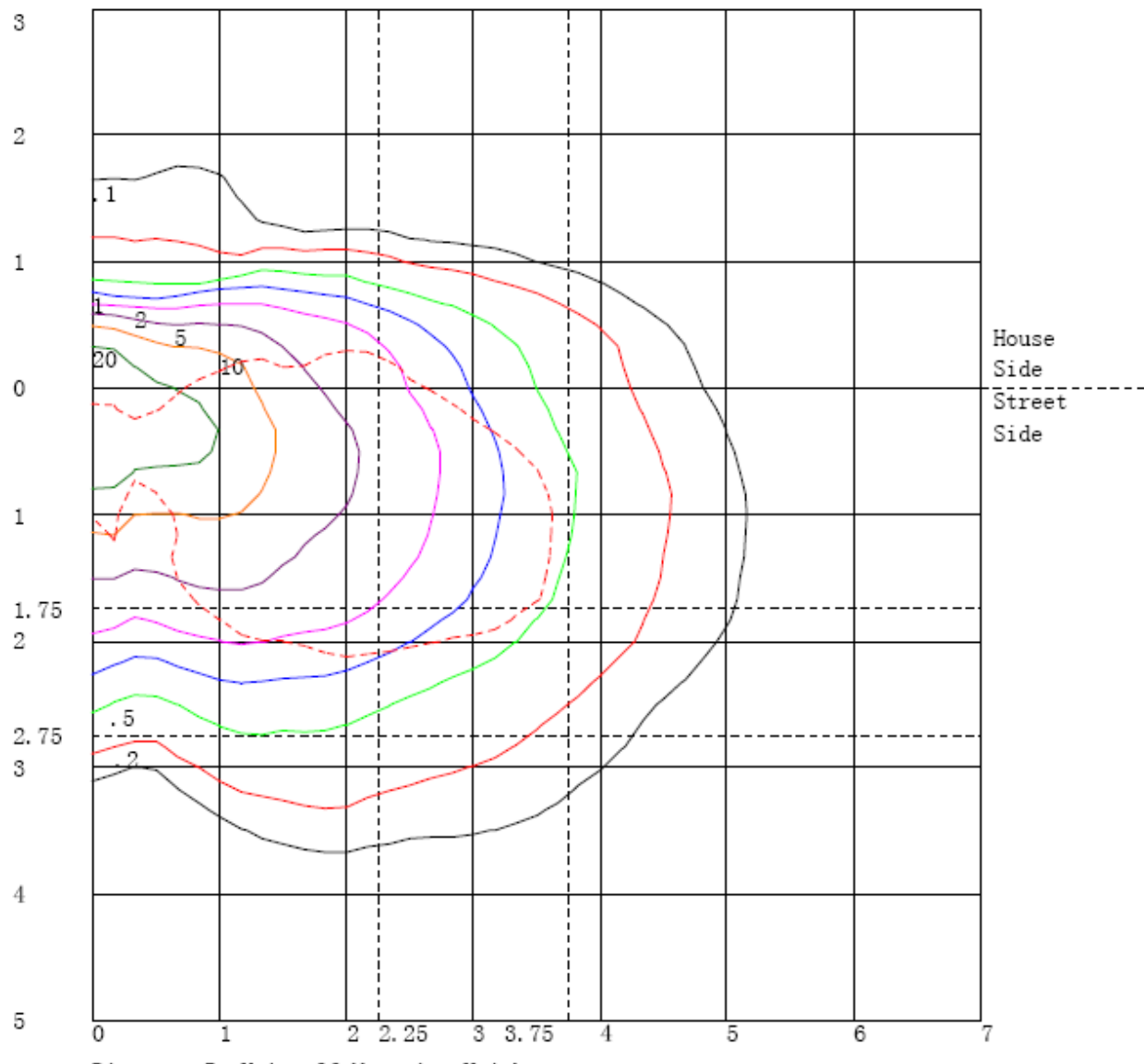
Table 3: Flux Distribution Data

Zone	Downward Lumens	Upward Lumens	Total Lumens
House Side	2854.5	0	2854.5
Street Side	9893.4	0	9893.4

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

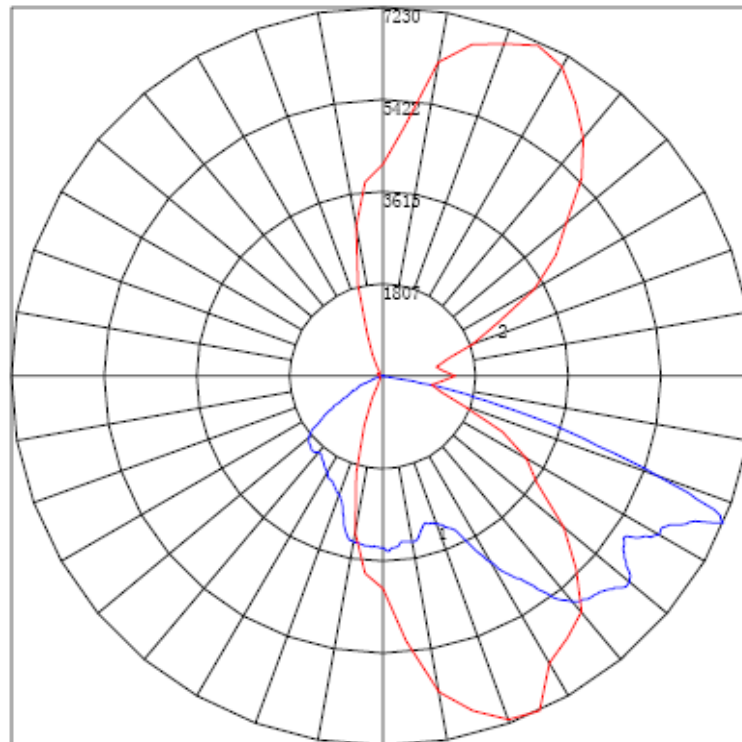


Chart 3: Maximum Plane and Cone Plots of Candela

Maximum Candela = 7229.97 Located At Horizontal Angle = 295, Vertical Angle = 66.5

# 1 - Vertical Plane Through Horizontal Angles (295 - 115) (Through Max. Cd.)

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

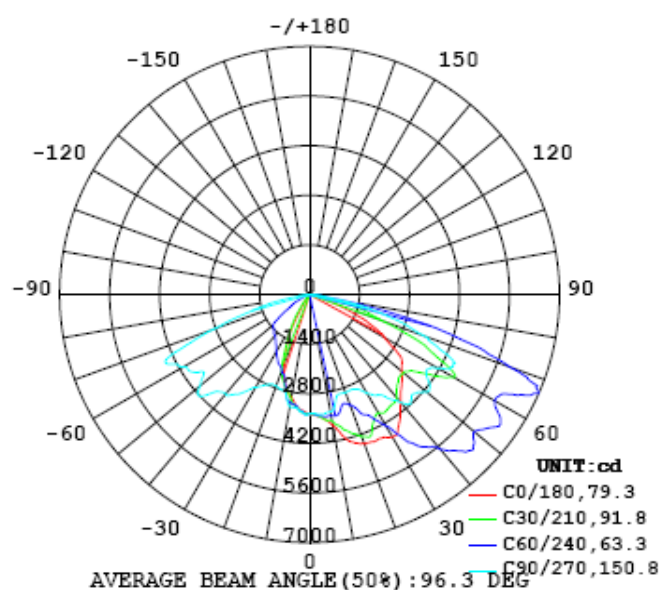


Chart 4: Polar Candela Distribution



## 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	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365
5	3469	3461	3454	3454	3457	3463	3461	3469	3473	3467	3455	3441	3428	3414	3414	3411	3400	3392	3391
10	3742	3719	3726	3732	3746	3679	3624	3606	3587	3560	3512	3481	3467	3455	3427	3397	3383	3365	3362
15	4273	4262	4257	4238	4111	4049	3964	3927	3807	3713	3623	3479	3361	3254	3150	3083	3006	2970	2960
20	4469	4426	4464	4403	4357	4329	4264	4082	3882	3704	3588	3445	3319	3228	3162	3086	3028	2955	2941
25	4520	4521	4555	4524	4498	4378	4157	3966	3945	3960	3892	3859	3744	3510	3361	3212	3096	2996	2949
30	4639	4581	4690	4704	4652	4139	3853	3937	4072	4250	4343	4368	4279	4140	3928	3696	3498	3300	3208
35	4389	4557	4602	4509	4082	3776	3882	3999	4185	4385	4735	5047	5169	5027	4748	4267	3905	3599	3451
40	3970	4369	4117	4004	3467	3570	3810	4023	4220	4659	5151	5395	5700	5773	5546	5098	4579	4212	3965
45	3645	4223	3739	3326	3144	3283	3506	3889	4353	4684	5325	5908	6251	6518	6289	5603	4823	4312	4027
50	3370	3966	3449	2875	2997	3198	3439	3824	4502	5056	5660	5888	6020	6319	6323	5929	5199	4627	4277
55	3145	3449	3037	2837	3168	3456	3859	4458	4937	5392	5840	6219	6477	6548	6199	5906	5181	4394	4004
60	2426	2384	2012	2279	2937	3774	4672	5142	5762	6364	6407	6075	5988	6004	6156	6046	5338	4619	4176
65	1711	1477	1298	1566	2161	2850	3708	4700	5471	5697	6026	6302	6731	7096	7115	6922	6375	5156	4442
70	715	599	614	971	1409	1916	2168	2639	3456	4443	5394	5745	5946	6018	5660	5625	5240	4239	3437
75	49.5	59.7	77.3	229	613	946	1333	1513	1726	2040	2370	3113	3666	3934	3793	3638	3368	2672	2104
80	11.8	15.2	17.4	31.9	83.6	101	153	254	405	578	753	884	951	1140	1290	1147	1064	867	671
85	0.68	0.91	0.50	0.47	0.46	0.50	1.91	3.57	5.74	8.81	38.2	49.0	72.2	61.0	30.4	21.4	45.3	39.5	52.0
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

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	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365
5	3400	3400	3383	3357	3338	3311	3296	3293	3292	3285	3269	3262	3253	3246	3241	3236	3235	3246	3253
10	3360	3328	3300	3284	3291	3256	3217	3202	3189	3152	3115	3065	3027	3005	2966	2957	2953	2956	2969
15	2923	2881	2922	2905	2931	2920	2904	2928	2905	2868	2847	2831	2817	2759	2724	2657	2644	2648	2678
20	2820	2810	2696	2640	2482	2406	2324	2306	2316	2383	2428	2390	2296	2278	2215	2161	2101	2108	2161
25	2794	2702	2613	2417	2297	2222	2075	1944	1812	1695	1674	1726	1696	1593	1573	1506	1440	1451	1503
30	3038	2861	2561	2364	2168	1971	1772	1580	1419	1256	1126	1009	981	896	806	780	723	733	768
35	3213	2906	2558	2301	2016	1744	1473	1233	1001	787	602	447	334	252	198	184	191	212	222
40	3628	3226	2858	2386	1942	1536	1206	872	579	346	187	137	130	124	117	120	123	117	112
45	3753	3461	3071	2554	1981	1478	951	523	239	158	137	122	112	102	94.5	91.3	92.8	85.8	83.7
50	3980	3735	3221	2506	1872	1139	596	279	168	131	115	96.6	89.0	81.3	76.5	75.6	77.3	74.9	69.2
55	3761	3561	3050	2248	1433	804	372	179	117	103	98.8	90.9	86.4	81.6	79.5	73.9	76.8	73.6	66.8
60	3832	3301	2442	1551	873	483	244	131	96.5	99.8	97.4	99.2	94.3	91.1	80.2	71.3	70.4	69.1	65.4
65	4130	3267	2143	1144	556	257	120	85.6	79.4	89.4	97.5	108	102	92.3	83.9	67.1	62.5	58.3	57.4
70	3052	2201	1166	510	265	130	74.7	67.5	66.5	77.2	87.4	93.6	86.5	72.5	62.5	58.8	56.0	50.5	49.2
75	1893	1206	552	279	127	69.7	65.2	59.0	58.2	64.5	71.8	72.5	67.2	60.0	56.1	54.5	52.7	48.3	47.8
80	579	263	135	79.2	59.5	57.4	53.0	51.2	51.3	53.4	55.7	55.4	54.4	54.0	53.9	51.6	51.2	49.3	49.3
85	49.6	43.7	24.3	24.4	26.1	28.5	31.9	35.0	38.6	41.4	41.7	43.7	45.4	46.9	48.5	48.2	47.2	47.9	49.7
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	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	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365
5	3265	3296	3311	3307	3278	3255	3246	3252	3263	3270	3280	3277	3281	3282	3281	3290	3296	3306	3316
10	3007	2988	2981	3009	3001	2970	2969	3011	3048	3066	3095	3124	3148	3155	3159	3179	3210	3227	3231
15	2699	2708	2694	2661	2694	2703	2714	2733	2686	2637	2634	2668	2660	2702	2742	2739	2802	2821	2844
20	2176	2186	2177	2240	2281	2213	2141	2087	2170	2203	2292	2341	2466	2557	2621	2653	2748	2790	2844
25	1510	1474	1532	1565	1534	1544	1650	1758	1857	1980	2104	2167	2333	2491	2589	2723	2812	2893	2977
30	765	805	863	886	960	1073	1205	1358	1532	1696	1872	2060	2204	2436	2727	2898	3023	3160	3358
35	231	250	286	340	433	581	770	951	1164	1407	1651	1895	2186	2483	2887	3199	3420	3641	3967
40	111	114	118	121	135	225	350	572	891	1170	1518	1916	2337	2722	3197	3454	3669	3912	4347
45	87.7	93.2	92.4	96.1	107	124	158	293	540	966	1416	1946	2514	3073	3434	3678	3960	4227	4700
50	69.5	68.5	70.6	74.0	78.6	89.0	116	171	339	695	1339	2040	2754	3314	3574	3737	4010	4334	4967
55	65.3	65.0	64.9	64.9	65.2	67.0	76.2	100	214	434	858	1437	2096	2861	3350	3548	3832	4248	4955
60	64.3	62.0	60.8	60.4	60.7	63.8	65.0	75.2	118	238	537	1042	1798	2719	3454	3802	4072	4437	5191
65	57.6	56.3	59.2	59.3	61.1	61.3	60.0	58.7	69.4	126	259	544	1170	2178	3333	4155	4467	5287	6482
70	50.5	52.8	54.9	55.5	55.2	55.4	54.3	54.9	59.1	67.3	137	285	590	1188	2091	2584	2864	3581	4292
75	49.0	51.1	53.2	54.4	53.8	51.7	51.1	50.9	55.2	62.0	66.2	118	208	398	867	1374	1521	1910	2418
80	51.0	51.4	52.1	51.7	50.5	49.7	48.2	46.7	47.5	53.6	56.4	52.1	56.4	99.8	247	453	529	700	873
85	50.6	49.2	47.6	44.7	37.8	34.3	30.6	26.6	24.3	21.6	18.3	14.1	9.35	7.91	6.56	4.82	3.03	1.12	0.72
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	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365	3365				
5	3332	3342	3352	3365	3373	3385	3389	3393	3406	3435	3476	3506	3513	3503	3488				
10	3248	3263	3290	3320	3337	3359	3385	3392	3421	3505	3586	3623	3665	3759	3769				
15	2885	2939	3032	3125	3236	3376	3506	3616	3721	3804	3850	3925	4068	4170	4288				
20	2907	3012	3069	3177	3290	3474	3560	3681	3863	4050	4132	4159	4215	4333	4464				
25	3110	3208	3333	3601	3739	3790	3795	3797	3785	3891	4183	4338	4346	4454	4553				
30	3594	3858	4204	4345	4349	4279	4100	3920	3791	3696	3815	4310	4413	4413	4660				
35	4322	4763	4953	5048	4893	4585	4245	4001	3839	3720	3650	3847	4317	4325	4647				
40	4923	5445	5761	5598	5372	4903	4380	4072	3798	3572	3378	3288	3755	3910	4328				
45	5416	5909	5970	5769	5495	4990	4532	4061	3663	3285	3094	2994	3120	3584	4086				
50	5864	6325	6277	6069	5771	5163	4726	4101	3542	3161	3003	2873	2735	3276	3710				
55	5446	5476	5748	5810	5910	5894	5526	4738	4150	3562	3309	3010	2739	2872	3276				
60	5864	6119	6211	6055	5772	5601	5724	5792	5363	4411	3539	2799	2255	1922	2303				
65	6753	6926	6736	6294	6143	6210	5747	4945	4188	3870	2817	1946	1441	1199	1439				
70	4873	5275	5632	5754	5655	4932	3909	3159	2681	2093	1806	1418	751	508	554				
75	2617	2795	2863	2478	2136	2023	1841	1644	1417	1227	862	481	276	48.6	34.9				
80	935	896	721	623	597	406	286	221	160	125	86.7	52.1	21.0	10.4	11.1				
85	0.60	0.68	18.9	14.5	15.4	1.83	0.93	0.60	0.59	0.47	0.49	0.57	0.61	0.62	0.66				
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 expanded uncertainty is 2.3% with a coverage factor  $k=2$ .

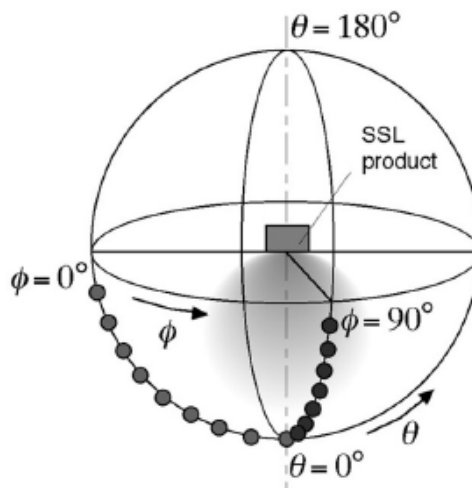
## Color Characteristics Measurements

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  $10^\circ$  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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