

## LM-79-08 Test Report

for

### ABOVE ALL LIGHTING INC

1501 Industrial Way N. Toms River, NJ 08755.

### MT LED Area Light

### Model: MT100401-III

#### Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

Tel: +86-571-56680806

www.ledtestlab.com

Report No.: HZ17080006h

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

#### Test specifications:

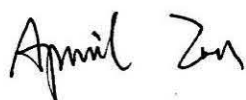
**Date of Receipt** : Jul. 24, 2017

**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: MT100401-III

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
100.6	12067.0	119.93	0.9947
CCT (K)	CRI	Stabilization Time (Light & Power)	
4055	73.4	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>	: MT100401-III
<b>Electrical Ratings</b>	: 120~277V, 50/60Hz, 100W
<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)	1.005	0.458
Power Factor	0.9947	0.9381
Test Power (W)	119.93	118.99
THD A%	6.58	10.98
Luminous Efficacy (lm/W)	100.6	101.3
Total Luminous Flux (lm)	12067.0	12060.0
Color Rendering Index (CRI)	73.4	
R9	-26	
Correlated Color Temperature (CCT) (K)	4055	
Chromaticity (Chroma x, Chroma y)	(0.3768, 0.3704)	
Chromaticity (Chroma u, Chroma v)	(0.2252, 0.3321)	
Chromaticity (Chroma u', Chroma v')	(0.2252, 0.4982)	
Duv	-0.0019	
Average Beam Angle (°)	105.2	
Center Beam Candle Power (cd)	3468	
Spacing Criteria	0.69 (0°-180°)/ 1.61 (90°-270°)	
Zonal Lumens in the 0°-60°Zone	71.69%	
Zonal Lumens in the 60°-90°Zone	28.31%	
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	-26
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

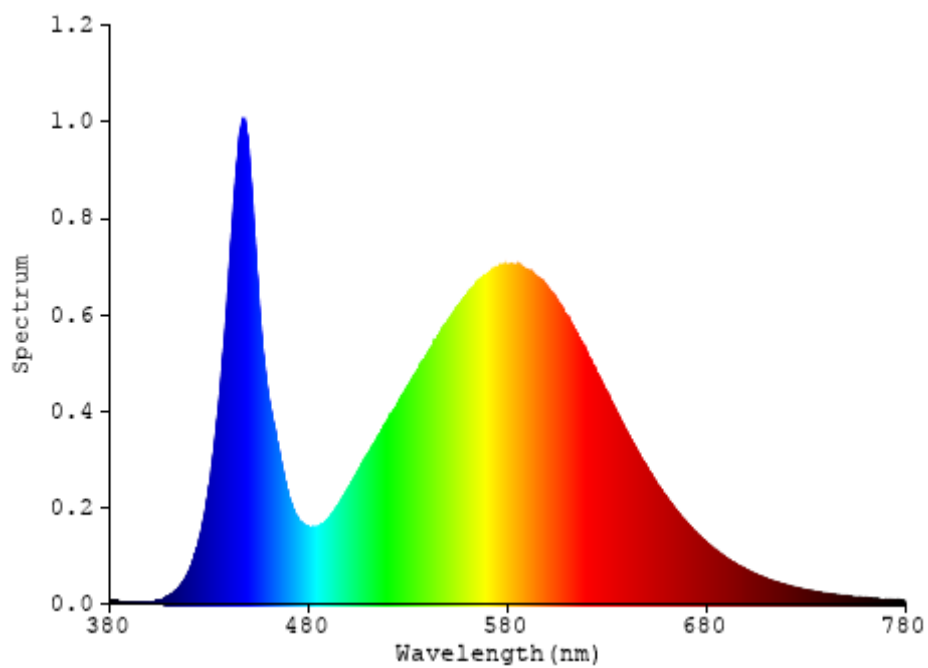


Chart 1: Spectral Power Distribution

### IESNA Luminaire Flux Distribution Table

Zone	Lumens	Luminaire %
FL - Front-Low (0-30)	1569.9	13.0
FM - Front-Medium (30-60)	4889.1	40.5
FH - Front-High (60-80)	2872.2	23.8
FVH - Front-Very High (80-90)	40.4	0.3
Total Forward Light	9371.6	77.6

BL - Back-Low (0-30)	977.8	8.1
BM - Back-Medium (30-60)	1214.4	10.1
BH - Back-High (60-80)	485.3	4.0
BVH - Back-Very High (80-90)	18.5	0.2
Total Back Light	2696.0	22.4

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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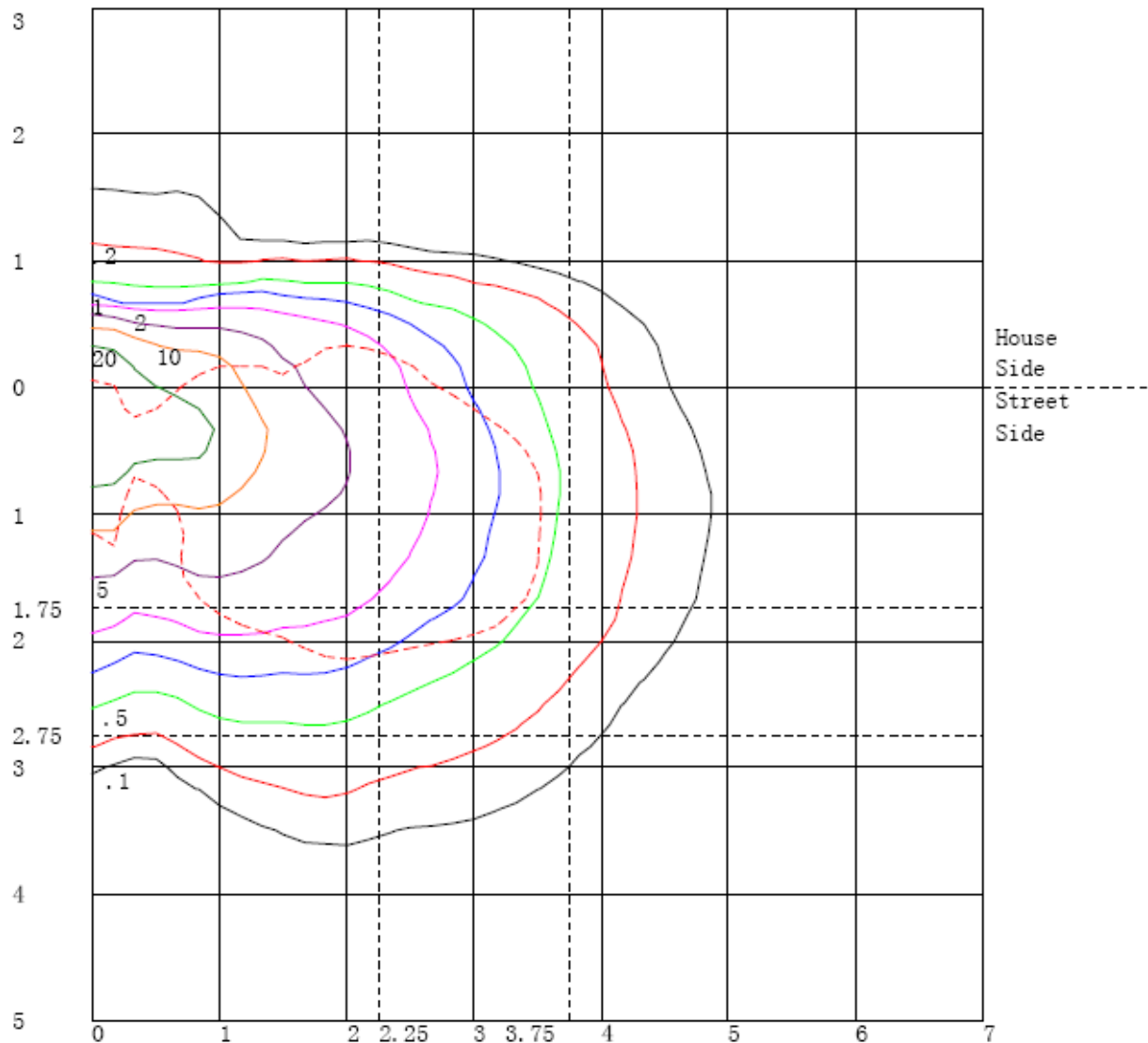
Table 3: Flux Distribution Data

Zone	Downward Lumens	Upward Lumens	Total Lumens
House Side	2696.0	0	2696.0
Street Side	9371.6	0	9371.6

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

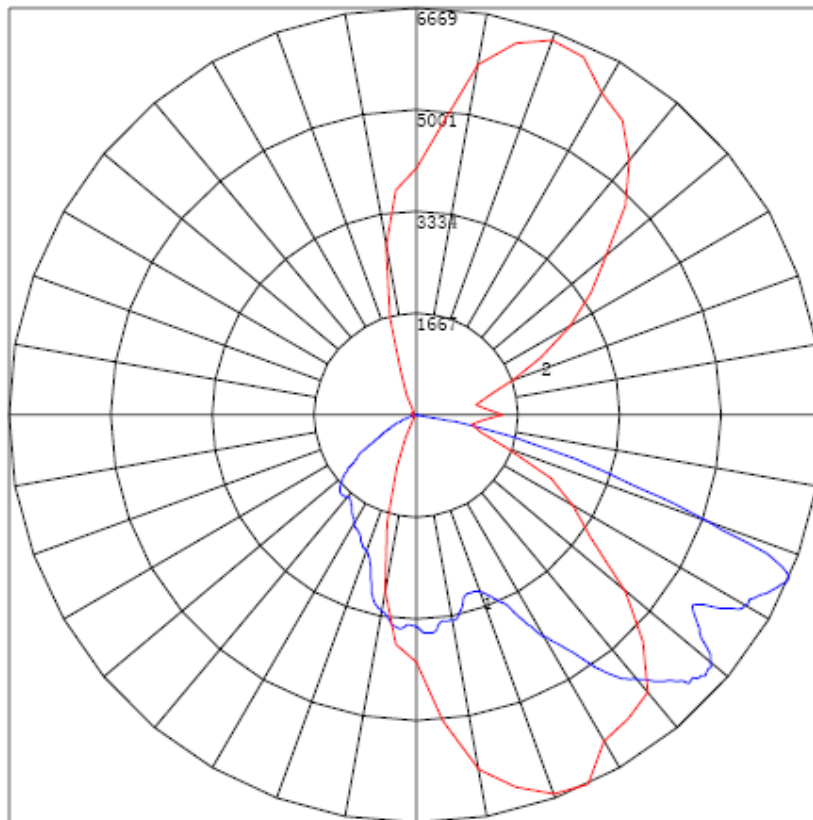


Chart 3: Maximum Plane and Cone Plots of Candela

Maximum Candela = 6668.5 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.)

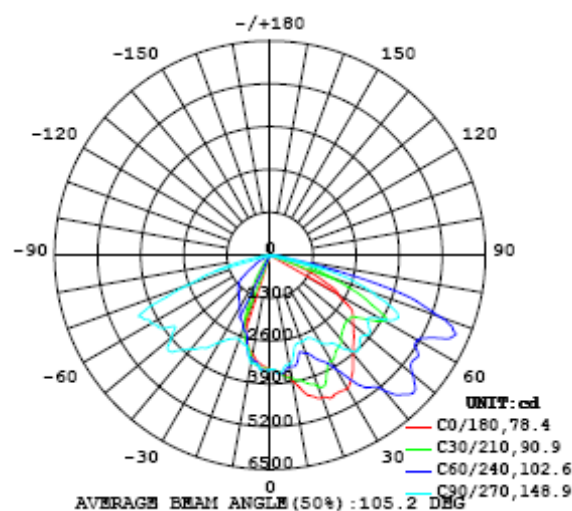


Chart 4: Polar Candela Distribution



## 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	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468
5	3567	3561	3559	3558	3560	3574	3594	3630	3646	3652	3644	3634	3617	3599	3587	3577	3572	3575	3567
10	3859	3853	3825	3843	3891	3845	3777	3705	3645	3567	3495	3454	3427	3425	3405	3388	3372	3352	3349
15	4398	4388	4387	4451	4306	4143	3975	3873	3761	3690	3579	3395	3268	3157	3041	2982	2918	2891	2868
20	4599	4560	4683	4575	4413	4324	4229	4052	3806	3540	3416	3246	3160	3040	2984	2912	2879	2831	2793
25	4646	4620	4776	4573	4461	4323	4021	3773	3736	3706	3658	3565	3516	3307	3157	3016	2901	2814	2763
30	4667	4760	4809	4554	4492	4029	3707	3715	3797	3897	4018	4042	3990	3885	3729	3481	3328	3178	3064
35	4344	4645	4427	4263	3864	3455	3504	3638	3850	4090	4365	4678	4840	4708	4457	4037	3679	3430	3247
40	3904	4442	3861	3798	3179	3200	3339	3561	3802	4270	4806	5101	5348	5497	5292	4876	4309	4016	3781
45	3576	4226	3504	3109	2885	2983	3144	3418	3769	4251	4969	5641	5957	6015	5967	5348	4654	4101	3829
50	3279	3774	3200	2598	2702	2859	3079	3320	3989	4520	5069	5469	5630	5684	5594	5270	4668	4090	3781
55	3040	3249	2775	2477	2713	3001	3315	3874	4362	4738	4906	5103	5411	5556	5443	5288	4755	4025	3627
60	2369	2235	1817	2000	2510	3247	3968	4423	4744	5001	5089	5038	5146	5382	5580	5499	4881	4252	3865
65	1684	1389	1183	1424	1977	2633	3232	3866	4498	4831	5378	5592	5970	6421	6612	6419	5795	4858	4260
70	641	488	499	816	1252	1660	1978	2463	3285	4146	4805	5263	5446	5550	5421	5390	4910	3960	3293
75	44.1	29.1	58.3	171	460	830	1164	1307	1528	1894	2284	2788	3291	3528	3317	3149	2892	2327	1853
80	4.23	4.49	5.31	13.4	54.9	68.6	119	210	334	506	560	643	695	858	963	887	843	692	615
85	0.54	0.48	0.42	0.41	0.40	0.40	10.3	2.32	6.75	3.84	22.3	40.5	46.9	60.0	34.8	31.8	57.7	42.5	56.5
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 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	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468
5	3549	3536	3520	3510	3498	3487	3481	3472	3467	3436	3395	3344	3324	3313	3304	3303	3300	3306	3310
10	3326	3294	3273	3280	3254	3200	3183	3188	3196	3221	3229	3202	3188	3164	3085	3062	3052	3059	3067
15	2811	2809	2816	2791	2848	2853	2858	2904	2889	2825	2785	2781	2865	2858	2817	2714	2674	2680	2722
20	2700	2659	2554	2513	2369	2332	2236	2203	2213	2293	2355	2295	2198	2196	2225	2176	2063	2067	2144
25	2657	2530	2459	2283	2174	2081	1942	1827	1686	1569	1524	1588	1568	1470	1470	1447	1350	1355	1440
30	2910	2699	2418	2226	2026	1827	1632	1435	1272	1116	982	868	813	739	659	659	618	602	648
35	3046	2752	2427	2124	1845	1569	1299	1067	844	625	458	337	250	203	164	163	171	185	188
40	3492	3089	2695	2187	1752	1323	1000	676	431	250	138	114	111	104	100	105	107	105	94.3
45	3573	3296	2877	2359	1764	1239	728	361	176	126	109	98.1	94.2	86.6	80.9	77.3	78.9	77.9	72.1
50	3503	3236	2775	2119	1539	901	434	203	128	103	91.1	80.1	75.1	70.4	65.4	63.1	66.8	65.9	57.6
55	3373	3113	2572	1846	1137	592	256	131	94.1	82.1	78.1	73.9	69.4	66.0	66.2	62.3	64.5	64.3	57.8
60	3614	3167	2238	1313	667	337	171	86.9	67.3	70.7	76.4	79.5	77.3	75.5	67.9	60.2	61.0	60.8	56.5
65	3919	3087	1916	958	425	173	82.2	61.1	56.7	65.5	73.2	85.1	82.0	74.3	68.2	56.9	53.0	50.5	48.7
70	2933	2057	960	394	188	89.1	53.6	48.9	49.3	59.5	68.5	75.3	73.6	61.7	54.2	50.6	47.5	43.1	42.0
75	1662	1053	457	216	85.2	44.3	43.9	42.6	43.1	51.7	59.1	61.6	57.0	52.0	47.9	46.5	45.0	41.3	40.7
80	486	228	103	58.4	35.8	37.5	36.3	36.8	39.8	43.0	46.4	47.5	47.0	46.3	46.4	44.3	43.3	42.0	42.7
85	48.8	47.0	16.4	14.9	17.0	19.4	22.9	26.5	30.3	34.1	35.7	38.8	40.6	42.1	43.5	42.9	42.5	43.4	45.6
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	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468
5	3325	3356	3393	3425	3429	3432	3441	3447	3445	3450	3460	3469	3473	3475	3473	3475	3477	3496	3515
10	3128	3157	3171	3193	3169	3097	3088	3122	3152	3168	3194	3234	3258	3265	3288	3294	3315	3355	3379
15	2801	2842	2828	2738	2768	2795	2824	2835	2767	2691	2694	2701	2699	2747	2791	2818	2833	2914	2934
20	2204	2190	2163	2239	2293	2205	2107	2096	2196	2240	2354	2367	2490	2563	2604	2695	2726	2851	2878
25	1472	1400	1464	1500	1462	1499	1620	1733	1839	1954	2121	2197	2332	2507	2600	2749	2797	2936	2987
30	643	678	737	789	891	1000	1141	1293	1482	1666	1835	2058	2214	2440	2676	2918	3045	3254	3394
35	203	213	245	284	359	476	659	876	1095	1330	1627	1881	2221	2554	2901	3258	3453	3671	3936
40	91.0	97.2	102	104	111	170	286	462	747	1076	1453	1927	2351	2860	3206	3457	3715	3897	4330
45	71.5	76.0	75.6	78.3	85.1	98.8	128	208	438	822	1336	1927	2592	3180	3559	3784	4156	4308	4830
50	58.0	58.7	60.7	61.7	65.9	76.3	92.2	130	268	596	1185	1901	2571	3173	3498	3643	3894	4189	4857
55	56.0	55.2	54.4	53.4	52.9	54.8	63.9	81.4	158	320	710	1233	1959	2821	3364	3600	3841	4240	4947
60	54.9	51.9	51.0	49.7	47.6	48.4	50.3	57.0	82.0	189	452	893	1615	2624	3515	3908	4138	4563	5305
65	48.3	47.6	49.3	48.6	47.8	46.7	46.9	47.8	55.2	93.9	185	463	1063	2076	3204	4018	4384	5073	5925
70	43.2	45.5	46.8	47.5	46.3	44.5	43.8	44.1	46.3	53.1	98.4	209	449	987	1835	2318	2607	3198	3949
75	41.7	43.5	45.4	46.1	45.3	43.6	43.1	42.4	43.6	48.1	54.9	90.5	168	327	800	1261	1425	1763	2155
80	44.5	44.9	45.1	44.7	43.2	41.9	40.5	38.5	38.0	41.3	44.1	42.8	46.4	85.1	225	383	465	630	746
85	45.9	44.8	42.8	40.7	33.8	30.5	26.6	22.9	20.3	18.4	15.9	13.0	9.00	7.30	5.91	4.44	2.83	1.00	0.61
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	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468	3468				
5	3533	3550	3565	3584	3594	3601	3613	3607	3612	3618	3636	3633	3624	3606	3586				
10	3387	3397	3410	3423	3449	3472	3493	3502	3566	3677	3761	3789	3819	3870	3862				
15	2943	2983	3078	3185	3296	3471	3670	3736	3788	3880	3965	4145	4317	4384	4389				
20	2919	3008	3077	3232	3294	3459	3587	3680	3942	4209	4325	4359	4439	4595	4629				
25	3124	3261	3404	3572	3627	3784	3878	3870	3799	3914	4333	4526	4544	4748	4786				
30	3630	3905	4180	4277	4343	4242	4032	3904	3820	3786	3871	4419	4558	4658	4875				
35	4344	4721	4984	5076	4879	4599	4307	3976	3774	3623	3572	3780	4308	4343	4804				
40	4897	5360	5659	5564	5338	4944	4394	3969	3635	3409	3256	3192	3705	3908	4496				
45	5553	6146	6157	5943	5645	5003	4472	3913	3502	3146	2999	2904	3007	3542	4127				
50	5618	6150	6302	6206	6026	5397	4810	4081	3435	3047	2872	2736	2609	3205	3678				
55	5389	5406	5529	5640	5594	5623	5457	4757	4014	3401	3080	2781	2531	2720	3170				
60	5979	6207	6243	5995	5646	5302	5178	5356	5014	4245	3313	2620	2084	1782	2177				
65	6400	6624	6591	6168	6087	6031	5605	4707	3845	3563	2850	1876	1347	1089	1325				
70	4417	4769	5117	5128	5300	4643	3912	3173	2660	2027	1592	1334	677	432	445				
75	2326	2460	2512	2210	1935	1726	1569	1339	1217	1094	779	423	216	33.2	35.2				
80	81.2	824	654	553	514	322	249	195	138	101	72.7	40.5	13.3	4.57	4.34				
85	0.53	0.56	13.6	12.2	12.7	1.88	0.81	0.51	0.50	0.42	0.43	0.50	0.54	0.55	0.57				
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 expanded uncertainty is 2.3% with a coverage factor  $k=2$ .

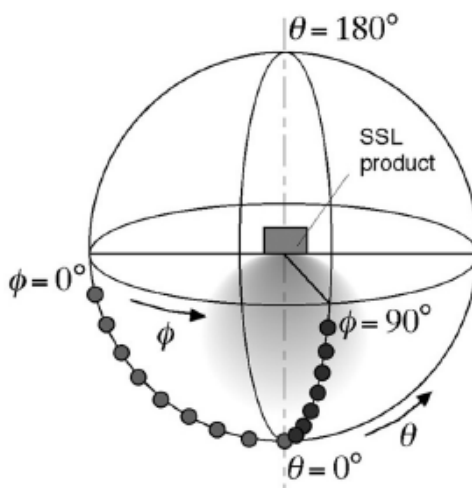
## Color Characteristics Measurements

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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