



LM-79-08 Test Report

for

Maxlite Inc.

10 York Ave West Caldwell, NJ 07006 United States

Outdoor Pole/Arm-mounted Area and Roadway Luminaires

Model: AR-MAL100UT5-50X

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

Tel: +86-571-56680806

www.ledtestlab.com

Report No.: HZ17010004z

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

Test specifications:

Date of Receipt : Jan. 04, 2017

Date of Test : Jan. 10, 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
Jan. 19, 2017

Approved by



Manager: Jim Zhang
Jan. 19, 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: **AR-MAL100UT5-50X**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
130.9	12541.0	95.81	0.9967
CCT (K)	CRI	Stabilization Time (Light & Power)	
4791	76.6	60	
IES Classification		Longitudinal Classification	
Type VS		Short	

Table 1: Executive Data Summary

Sample Photo

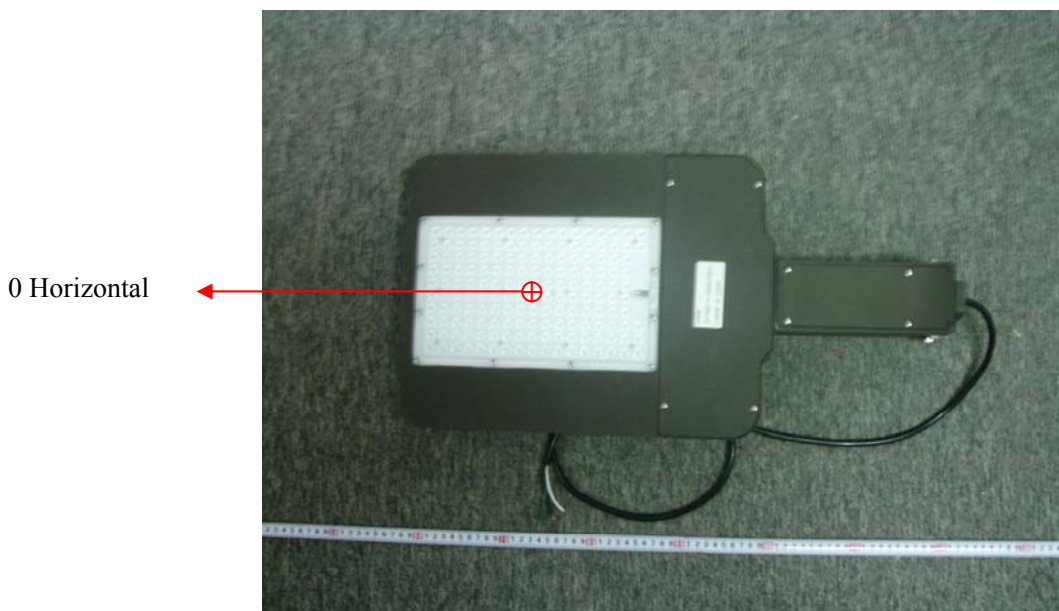


Figure 1- Overview of the sample

Equipment Under Test (EUT)

Name	: Outdoor Pole/Arm-mounted Area and Roadway Luminaires
Model	: AR-MAL100UT5-50X
Electrical Ratings	: 100~277Vac, 60Hz, 100W
Product Description	: 5000K, Outdoor Pole/Arm- Mounted Area and Roadway Luminaires Manufacturer of light source: Nichia Corporation Model of light source: NF2L757GRT-V1
Manufacturer	: Maxlite Inc.
Address	: 10 York Ave West Caldwell, NJ 07006 United States

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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 30m.

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

Parameter	Result			Special Color Rendering Indices	
Test Voltage (V)	120.0	100.0	277.0	R1	73
Voltage frequency (Hz)	60	60	60	R2	83
Test Current (A)	0.801	0.974	0.356	R3	90
Power Factor	0.9967	0.9979	0.9509	R4	76
Test Power (W)	95.81	97.20	93.90	R5	74
THD A%	5.46	5.23	14.60	R6	76
Luminous Efficacy (lm/W)	130.9	129.3	133.9	R7	84
Total Luminous Flux (lm)	12541.0	12568.0	12574.0	R8	58
Color Rendering Index (CRI)	76.6			R9	-22
R9	-22			R10	59
Correlated Color Temperature (CCT) (K)	4791			R11	73
Chromaticity (Chroma x, Chroma y)	(0.3523, 0.3651)			R12	47
Chromaticity (Chroma u, Chroma v)	(0.2111, 0.3281)			R13	75
Chromaticity (Chroma u', Chroma v')	(0.2111, 0.4921)			R14	95
Duv	0.0038				
Average Beam Angle (°)	132.5				
Center Beam Candle Power (cd)	2254				
Spacing Criteria	2.29 (0°-180°)/ 2.25 (90°-270°)				
Zonal Lumens in the 0°-60°Zone	83.94%				
Zonal Lumens in the 60°-90°Zone	16.06%				
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

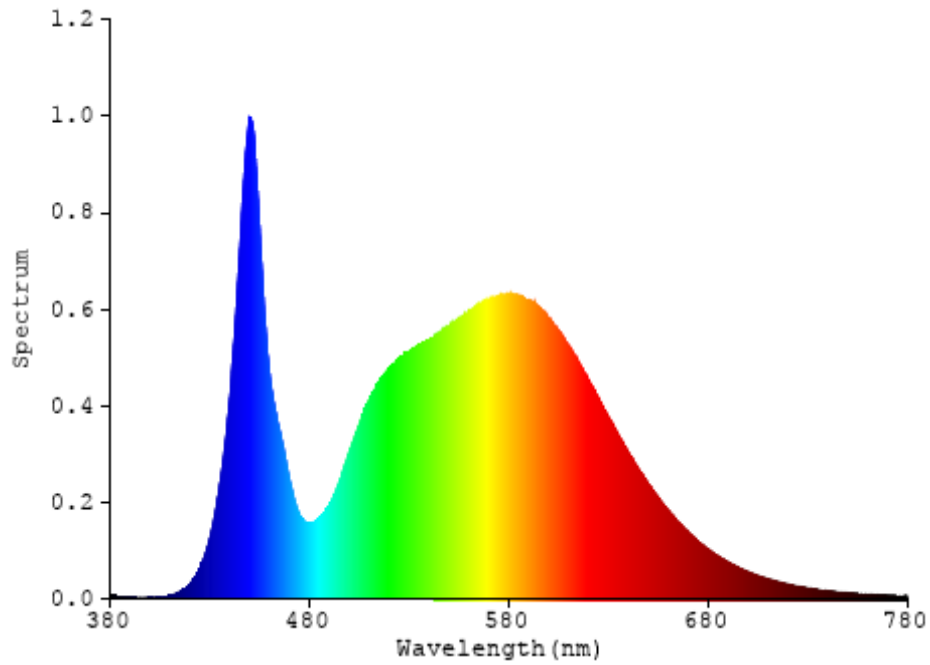


Chart 1: Spectral Power Distribution

IESNA Luminaire Flux Distribution Table

Zone	Lumens	Luminaire %
FL - Front-Low (0-30)	1058.9	8.4
FM - Front-Medium (30-60)	4220.1	33.7
FH - Front-High (60-80)	814.0	6.5
FVH - Front-Very High (80-90)	31.1	0.2
Total Forward Light	6124.1	48.8

BL - Back-Low (0-30)	1023.4	8.2
BM - Back-Medium (30-60)	4224.5	33.7
BH - Back-High (60-80)	1108.8	8.8
BVH - Back-Very High (80-90)	60.7	0.5
Total Back Light	6417.4	51.2

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-G1
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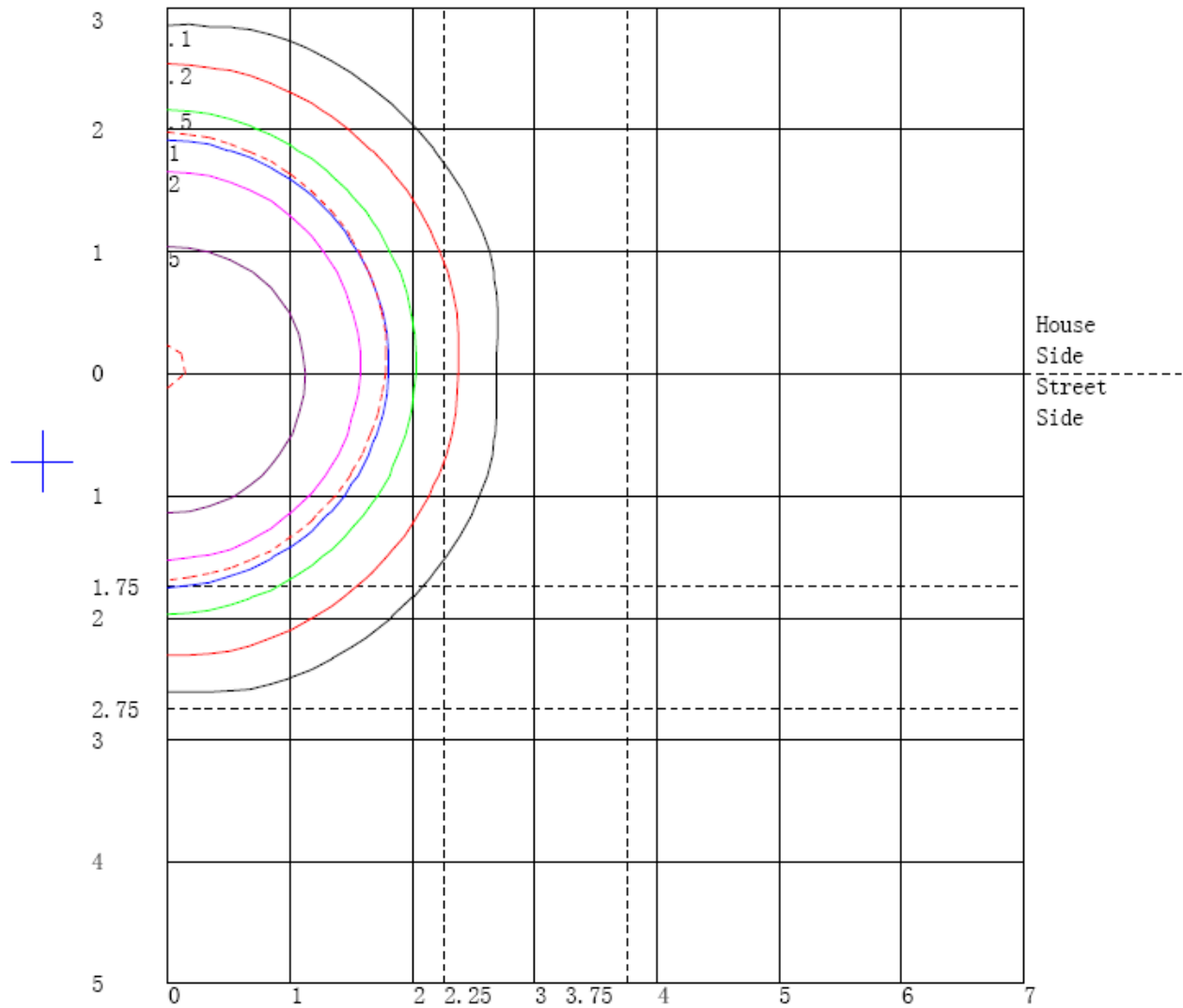
Table 3: Flux Distribution Data

Zone	Downward Lumens	Upward Lumens	Total Lumens
House Side	6417.4	0	6417.4
Street Side	6124.1	0	6124.1

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 rounding.

Isoilluminance Plots of Horizontal Illuminance



Distance In Units Of Mounting Height
 Values Based On 16 Foot Mounting Height
 1/2 Maximum Candela Trace Shown As Dashed Curve
 (+) = Maximum Candela Point

Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

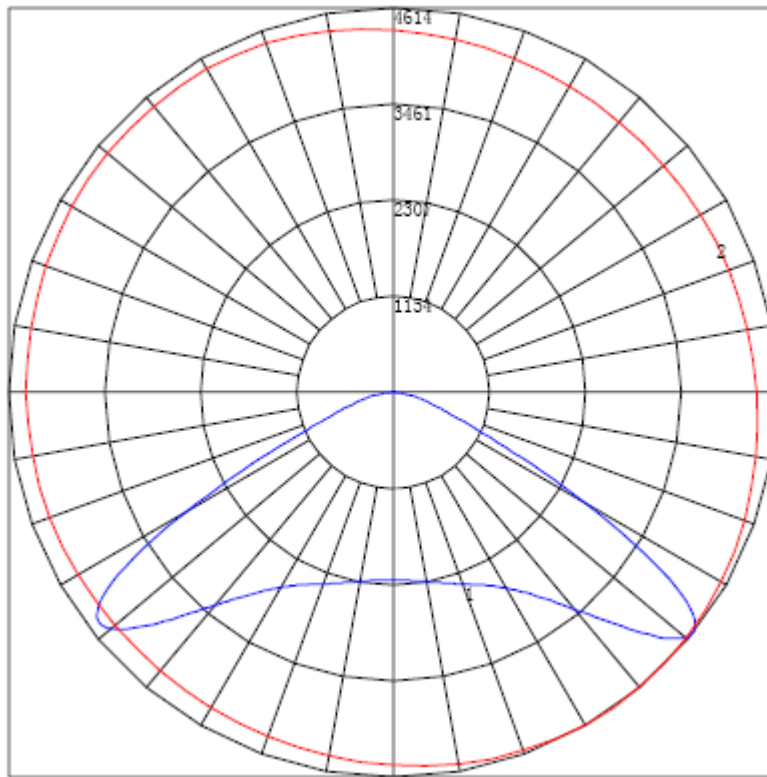


Chart 3: Maximum Plane and Cone Plots of Candela

Maximum Candela = 4614.19 Located At Horizontal Angle = 305, Vertical Angle = 51.5

1 - Vertical Plane Through Horizontal Angles (305 - 125) (Through Max. Cd.)

2 - Horizontal Cone Through Vertical Angle (51.5) (Through Max. Cd.)

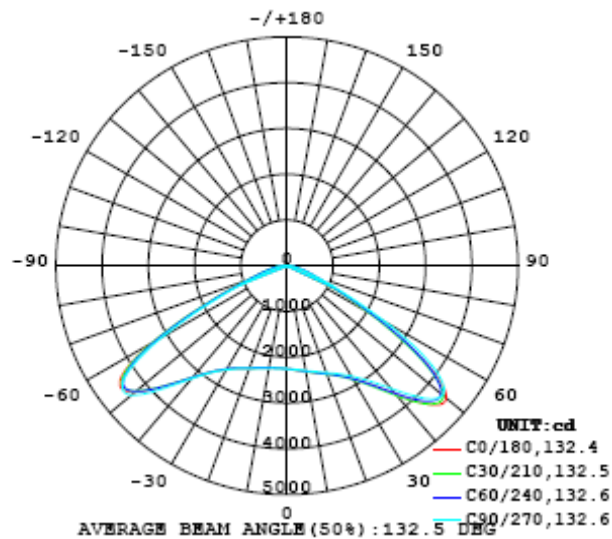


Chart 4: Polar Candela Distribution

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	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254
5	2286	2287	2288	2289	2288	2288	2288	2288	2289	2287	2287	2286	2285	2285	2284	2283	2282	2280	2278
10	2338	2341	2342	2344	2345	2345	2345	2346	2345	2344	2343	2343	2341	2340	2338	2335	2333	2330	2327
15	2412	2414	2418	2420	2422	2422	2423	2424	2423	2422	2421	2420	2418	2416	2413	2410	2406	2402	2397
20	2509	2511	2515	2517	2520	2522	2523	2524	2524	2522	2521	2519	2515	2512	2509	2504	2499	2492	2486
25	2637	2641	2646	2651	2656	2659	2660	2661	2661	2659	2657	2653	2649	2644	2639	2631	2624	2615	2607
30	2839	2846	2853	2861	2867	2872	2873	2873	2872	2869	2866	2861	2854	2846	2838	2827	2814	2801	2789
35	3165	3175	3186	3196	3205	3210	3210	3209	3206	3200	3192	3181	3170	3158	3144	3127	3108	3089	3068
40	3664	3676	3688	3698	3706	3710	3706	3701	3693	3682	3670	3654	3638	3619	3600	3579	3553	3526	3501
45	4267	4270	4277	4283	4283	4277	4264	4249	4233	4217	4204	4189	4175	4156	4143	4127	4109	4088	4068
50	4498	4476	4463	4455	4444	4429	4408	4386	4372	4362	4356	4352	4350	4351	4357	4363	4370	4380	4392
55	3613	3582	3563	3557	3547	3538	3527	3524	3527	3542	3564	3587	3614	3644	3680	3722	3763	3813	3867
60	2087	2068	2056	2047	2040	2033	2031	2038	2051	2072	2096	2125	2158	2198	2240	2289	2340	2391	2457
65	1040	1032	1027	1020	1017	1014	1012	1015	1022	1031	1039	1050	1066	1082	1100	1120	1143	1165	1191
70	472	480	512	551	571	576	579	588	593	596	604	611	612	622	625	629	602	577	568
75	245	247	259	283	313	334	344	349	354	360	370	377	381	379	366	338	312	301	298
80	102	104	112	126	145	163	169	160	148	146	154	173	198	205	193	171	154	145	143
85	10.1	9.98	11.3	14.4	19.0	20.5	21.5	24.5	22.9	24.7	28.2	35.2	43.1	46.0	49.0	50.2	46.2	42.6	41.8
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

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	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254
5	2276	2274	2272	2271	2269	2267	2265	2263	2261	2259	2258	2256	2254	2252	2251	2249	2249	2246	2246
10	2324	2321	2317	2313	2310	2307	2304	2300	2296	2294	2290	2286	2284	2281	2279	2276	2273	2271	2269
15	2393	2388	2384	2379	2374	2369	2364	2360	2355	2352	2346	2342	2337	2334	2330	2325	2323	2320	2318
20	2481	2474	2468	2462	2456	2451	2445	2439	2434	2428	2422	2417	2413	2407	2402	2398	2395	2391	2389
25	2598	2589	2581	2572	2564	2555	2547	2539	2531	2524	2517	2511	2506	2501	2496	2490	2487	2482	2480
30	2777	2764	2751	2740	2729	2716	2703	2691	2681	2671	2661	2653	2646	2639	2631	2625	2621	2618	2615
35	3050	3032	3016	3000	2984	2967	2950	2935	2921	2906	2893	2882	2872	2863	2852	2845	2841	2838	2834
40	3477	3452	3429	3404	3380	3356	3336	3316	3298	3280	3262	3247	3235	3222	3210	3201	3194	3192	3189
45	4048	4023	4000	3970	3941	3911	3883	3859	3837	3815	3795	3778	3762	3747	3732	3724	3715	3711	3707
50	4411	4424	4435	4438	4434	4426	4413	4399	4388	4374	4362	4349	4336	4323	4309	4301	4295	4289	4280
55	3929	3988	4053	4110	4161	4208	4251	4288	4322	4347	4365	4383	4393	4400	4404	4412	4418	4419	4414
60	2520	2591	2654	2712	2772	2832	2888	2943	3000	3051	3098	3146	3191	3231	3271	3312	3343	3361	3373
65	1221	1252	1284	1313	1341	1372	1401	1433	1465	1496	1528	1561	1593	1629	1661	1696	1725	1751	1768
70	580	618	669	697	711	722	734	745	756	769	781	795	809	822	832	822	793	784	815
75	308	328	360	401	430	443	453	457	463	469	478	484	486	481	457	428	409	407	418
80	150	164	187	216	242	256	256	244	244	256	282	296	295	280	253	231	220	218	226
85	43.8	54.9	68.8	78.4	85.0	89.7	89.6	86.8	86.4	92.9	106	120	127	129	117	106	95.4	93.2	100
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	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254
5	2246	2245	2245	2243	2243	2243	2243	2244	2244	2245	2245	2246	2248	2249	2251	2253	2254	2256	2258
10	2268	2265	2263	2263	2262	2261	2261	2261	2261	2262	2263	2265	2267	2270	2273	2276	2279	2284	2286
15	2315	2312	2311	2309	2309	2307	2307	2306	2305	2306	2307	2309	2311	2315	2319	2322	2327	2332	2336
20	2385	2382	2382	2380	2379	2377	2376	2377	2375	2375	2377	2378	2380	2383	2387	2391	2396	2403	2410
25	2477	2475	2474	2472	2470	2469	2468	2466	2466	2466	2466	2466	2468	2471	2474	2478	2485	2494	2503
30	2611	2610	2609	2608	2607	2605	2604	2603	2602	2602	2603	2604	2605	2608	2611	2617	2625	2636	2648
35	2830	2830	2831	2831	2829	2828	2828	2828	2827	2826	2827	2828	2828	2829	2835	2840	2851	2866	2883
40	3185	3185	3186	3187	3184	3184	3183	3184	3184	3183	3184	3183	3185	3191	3196	3206	3220	3243	3267
45	3702	3702	3699	3699	3698	3696	3697	3699	3700	3703	3711	3713	3723	3739	3753	3770	3798	3827	3854
50	4273	4273	4266	4263	4258	4250	4248	4246	4251	4258	4268	4281	4295	4315	4337	4364	4396	4426	4462
55	4411	4409	4399	4384	4363	4351	4337	4330	4319	4311	4316	4304	4299	4294	4297	4293	4303	4307	4314
60	3390	3398	3396	3383	3367	3352	3341	3328	3319	3304	3294	3269	3247	3227	3195	3164	3128	3097	3051
65	1784	1794	1804	1799	1796	1791	1786	1775	1759	1747	1740	1714	1700	1668	1658	1624	1589	1570	1524
70	866	896	901	904	902	899	896	889	881	874	864	852	839	821	776	720	691	699	722
75	446	490	525	537	543	543	539	535	532	527	517	505	484	443	406	380	368	369	382
80	242	269	307	331	338	338	329	317	322	320	312	298	269	235	210	194	187	187	195
85	114	130	149	161	159	143	127	121	124	134	143	136	124	106	92.3	80.5	74.6	76.1	82.8
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

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	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254	2254				
5	2259	2262	2264	2266	2268	2270	2272	2275	2276	2278	2281	2281	2282	2282	2285				
10	2291	2294	2298	2303	2306	2311	2313	2318	2321	2325	2327	2331	2334	2336	2337				
15	2343	2348	2354	2361	2366	2373	2377	2382	2387	2392	2395	2399	2405	2407	2411				
20	2417	2425	2434	2442	2448	2456	2463	2469	2476	2482	2487	2492	2498	2502	2506				
25	2514	2523	2533	2543	2553	2562	2571	2580	2591	2599	2606	2612	2621	2627	2632				
30	2663	2675	2687	2700	2713	2726	2740	2752	2766	2780	2791	2801	2812	2823	2831				
35	2901	2919	2937	2955	2977	2996	3016	3034	3054	3074	3090	3108	3124	3139	3152				
40	3291	3315	3343	3373	3400	3428	3456	3484	3513	3535	3562	3587	3609	3630	3647				
45	3886	3912	3948	3981	4015	4048	4082	4109	4142	4168	4191	4213	4233	4247	4256				
50	4491	4514	4538	4561	4576	4587	4597	4598	4602	4599	4592	4579	4563	4538	4515				
55	4314	4302	4286	4267	4232	4182	4124	4066	4000	3938	3869	3809	3747	3697	3649				
60	2990	2920	2850	2773	2691	2605	2525	2451	2386	2322	2269	2223	2180	2149	2117				
65	1480	1436	1389	1341	1284	1246	1210	1176	1149	1126	1108	1093	1077	1065	1054				
70	730	718	702	688	676	662	649	639	631	621	607	595	569	527	490				
75	404	421	425	422	415	406	394	384	376	368	355	331	298	271	254				
80	211	232	243	239	219	196	187	185	191	192	180	160	137	119	109				
85	89.0	91.3	85.2	76.8	65.2	53.9	46.6	43.4	42.2	39.5	35.6	31.5	25.8	21.0	16.9				
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. 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 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 1.8% with a coverage factor $k=2$.

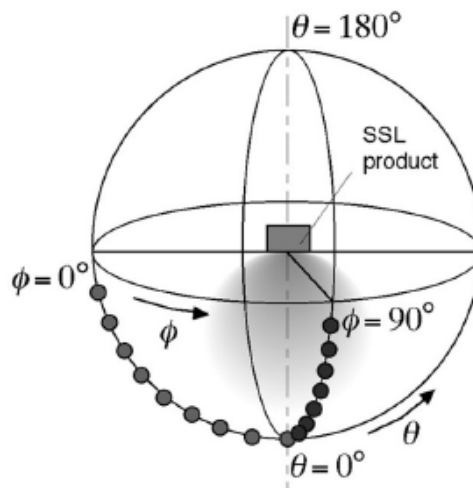
Color Characteristics Measurements

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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