



LM-79-08 Test Report

for

Hangzhou ZGSM Technology Co., Ltd

No.1188 Jinxi South Road., Linglong Industrial Zone, Lin'an, Hangzhou, Zhejiang 311301, China.

LED Street Light

Model: ZGSM-LD80H4

Laboratory: Leading Testing Laboratories

NVLAP CODE: 200960-0

Tel: +86-571-56680806

www.ledtestlab.com

Report No.: HZ17090007ae

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

Test specifications:

Date of Receipt : Sep. 11, 2017

Date of Test : Sep. 16, 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
Sep. 27, 2017

Approved by



Manager: Jim Zhang
Sep. 27, 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: **ZGSM-LD80H4**

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
165.8	13308.8	80.27	0.9909
CCT (K)	CRI	Stabilization Time (Light & Power)	
3939	71.6	60	
IES Classification		Longitudinal Classification	
Type II		Medium	

Table 1: Executive Data Summary

Sample Photo

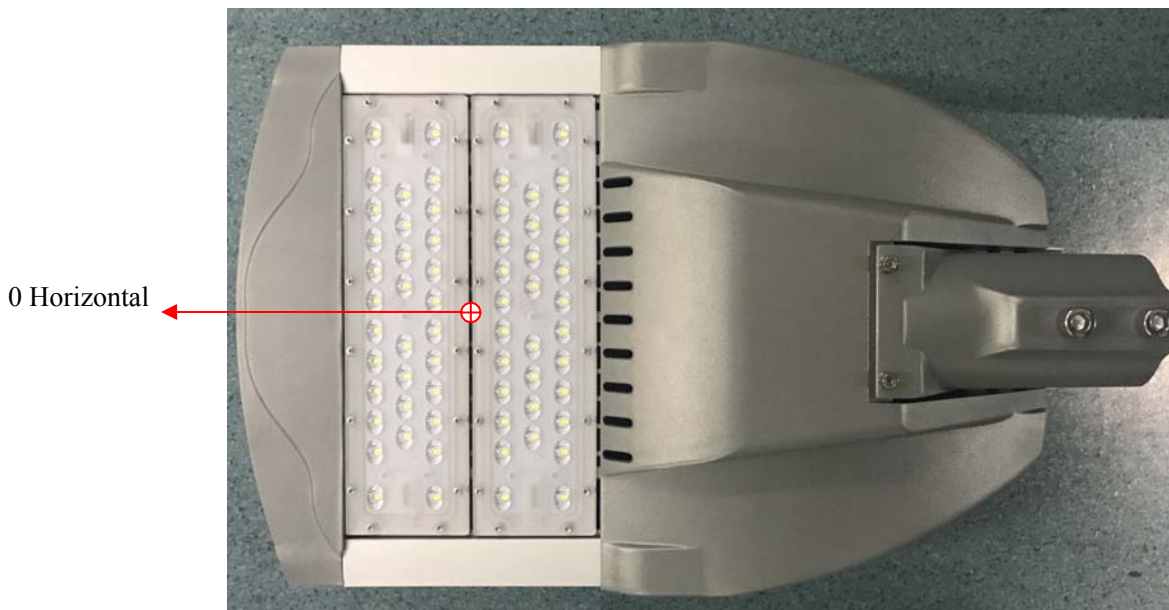


Figure 1- Overview of the sample

Equipment Under Test (EUT)

Name	: LED Street Light
Model	: ZGSM-LD80H4
Electrical Ratings	: 100-240V, 50/60Hz, 80W
Product Description	: 4000K
Manufacturer	: Hangzhou ZGSM Technology Co., Ltd
Address	: No.1188 Jinxi South Road., Linglong Industrial Zone, Lin'an, Hangzhou, Zhejiang 311301, China.

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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			Special Color Rendering Indices	
Test Voltage (V)	120.0	100.0	240.0	R1	68
Voltage frequency (Hz)	60	60	60	R2	78
Test Current (A)	0.675	0.819	0.343	R3	85
Power Factor	0.9909	0.9895	0.9686	R4	70
Test Power (W)	80.27	81.05	79.68	R5	67
THD A%	8.16	8.92	10.10	R6	68
Luminous Efficacy (lm/W)	165.8	161.4	165.2	R7	82
Total Luminous Flux (lm)	13308.8	13081.5	13163.1	R8	53
Color Rendering Index (CRI)	71.6			R9	-28
R9	-28			R10	47
Correlated Color Temperature (CCT) (K)	3939			R11	64
Chromaticity (Chroma x, Chroma y)	(0.3861, 0.3889)			R12	36
Chromaticity (Chroma u, Chroma v)	(0.2240, 0.3385)			R13	70
Chromaticity (Chroma u', Chroma v')	(0.2240, 0.5077)			R14	92
Duv	0.0040				
Average Beam Angle (°)	132.6				
Center Beam Candle Power (cd)	2879				
Spacing Criteria	1.26 (0°-180°) 1.73 (90°-270°)				
Zonal Lumens in the 0°-60°Zone	71.09%				
Zonal Lumens in the 60°-90°Zone	28.91%				
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

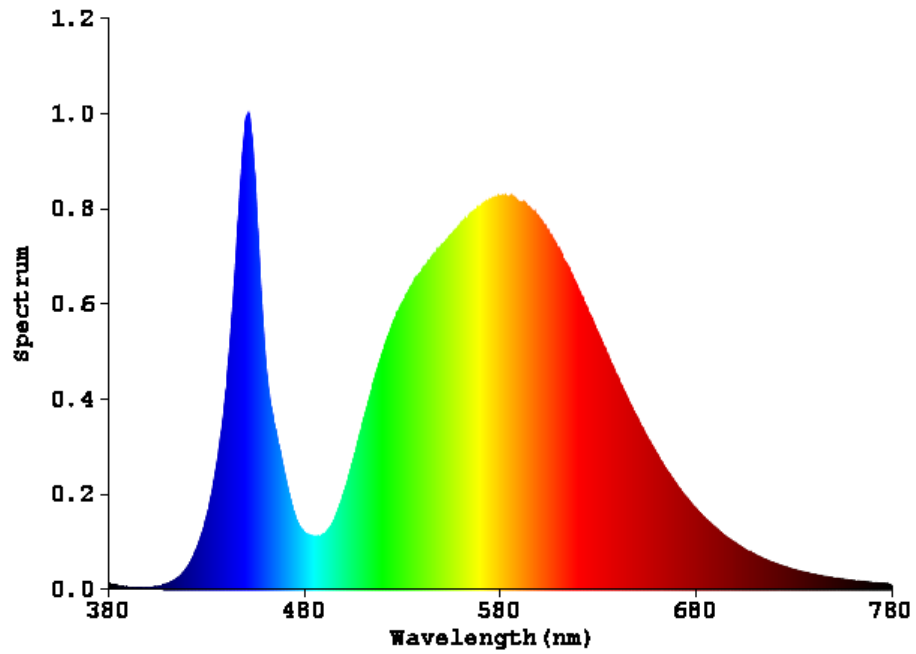


Chart 1: Spectral Power Distribution

IESNA Luminaire Flux Distribution Table

Zone	Lumens	Luminaire %
FL - Front-Low (0-30)	1370.8	10.3
FM - Front-Medium (30-60)	3899.5	29.3
FH - Front-High (60-80)	2222.6	16.7
FVH - Front-Very High (80-90)	146.4	1.1
Total Forward Light	7639.3	57.4

BL - Back-Low (0-30)	1211.1	9.1
BM - Back-Medium (30-60)	2981.2	22.4
BH - Back-High (60-80)	1424.0	10.7
BVH - Back-Very High (80-90)	53.2	0.4
Total Back Light	5669.5	42.6

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-G3
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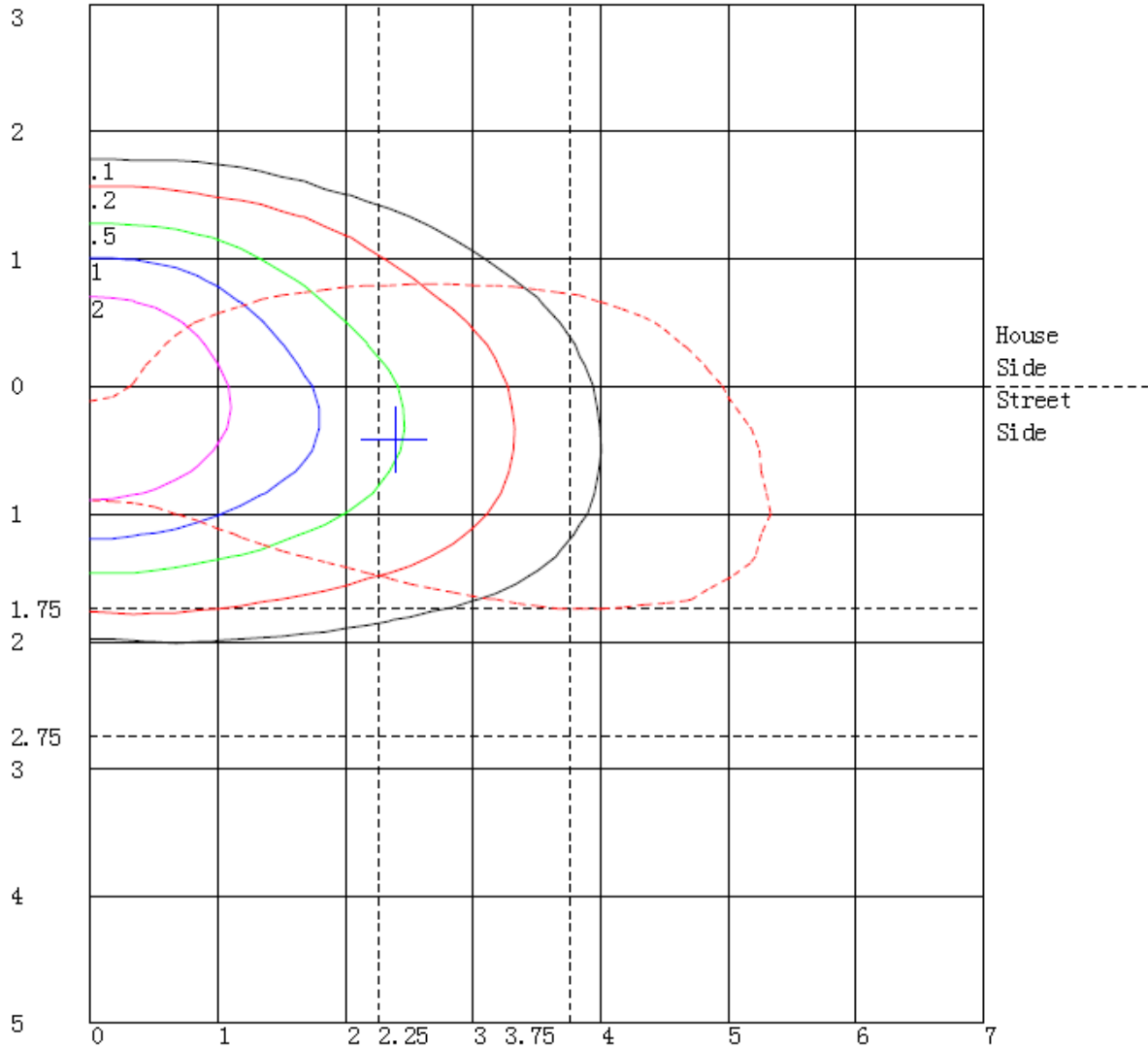
Table 3: Flux Distribution Data

Zone	Downward Lumens	Upward Lumens	Total Lumens
House Side	5669.5	0	5669.5
Street Side	7639.3	0	7639.3

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 rounding.

Isoillumiance Plots of Horizontal Illuminance



Distance In Units Of Mounting Height
 Values Based On 25 Foot Mounting Height
 1/2 Maximum Candela Trace Shown As Dashed Curve
 (+) = Maximum Candela Point

Chart 2: Illuminance Plot (Footcandles)

Luminous Intensity Distribution Plots

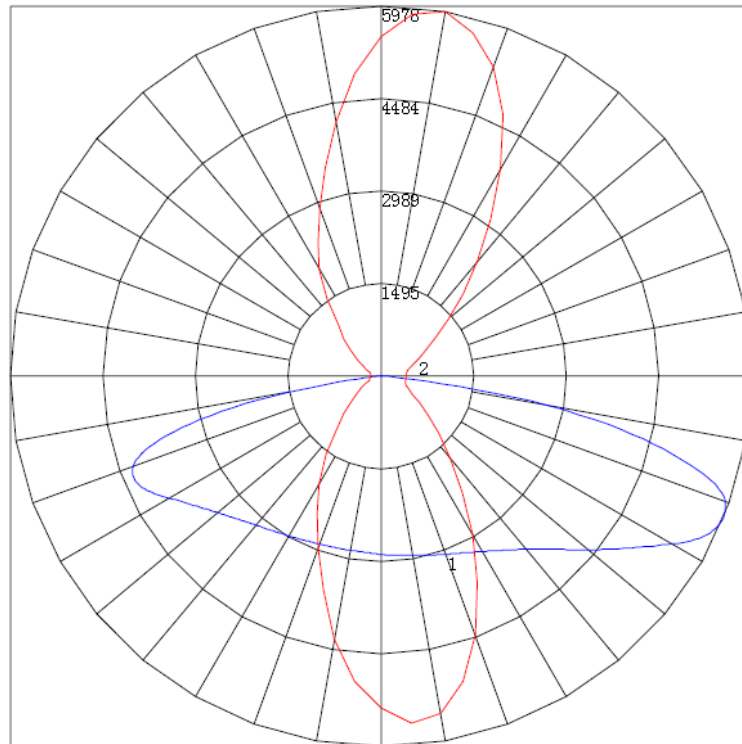


Chart 3: Maximum Plane and Cone Plots of Candela

Maximum Candela = 5978.1 Located At Horizontal Angle =80, Vertical Angle = 67.5

1 - Vertical Plane Through Horizontal Angles (80-260) (Through Max. Cd.)

2 - Horizontal Cone Through Vertical Angle (67.5) (Through Max. Cd.)

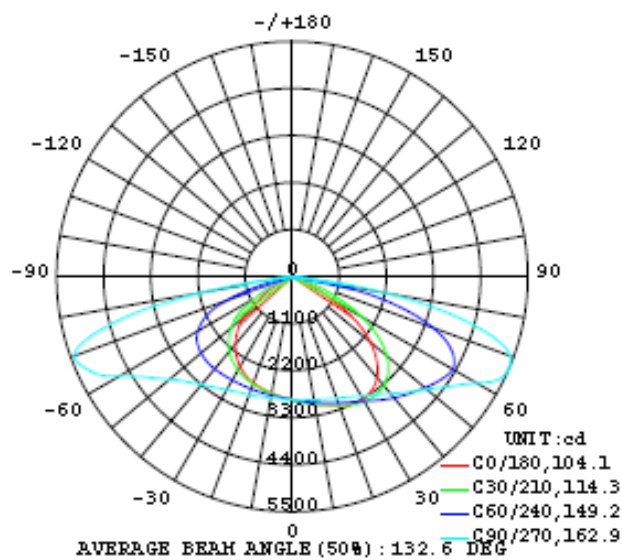


Chart 4: Polar Candela Distribution

Luminous Intensity Data

Table--1 UNIT: cd

C (DEG) \ γ (DEG)	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
0	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879
5	2958	2959	2960	2959	2958	2957	2955	2952	2949	2946	2941	2937	2931	2926	2920	2914	2908	2902	2895
10	3041	3041	3041	3040	3038	3035	3030	3024	3017	3010	3002	2994	2985	2976	2967	2956	2945	2934	2922
15	3114	3116	3116	3115	3113	3112	3112	3109	3102	3092	3080	3066	3052	3039	3025	3011	2995	2980	2964
20	3208	3212	3215	3215	3212	3207	3201	3195	3187	3177	3167	3155	3139	3119	3099	3080	3062	3043	3023
25	3284	3289	3294	3300	3306	3308	3306	3300	3292	3281	3268	3253	3237	3219	3196	3173	3150	3128	3105
30	3302	3310	3321	3334	3347	3361	3375	3386	3395	3398	3393	3380	3363	3344	3324	3299	3273	3248	3221
35	3242	3251	3265	3286	3313	3346	3384	3424	3459	3489	3513	3528	3526	3510	3484	3459	3435	3408	3372
40	3077	3090	3110	3142	3190	3252	3320	3394	3472	3545	3607	3659	3697	3714	3701	3669	3648	3622	3570
45	2790	2809	2839	2882	2947	3042	3159	3287	3419	3550	3673	3779	3867	3931	3966	3970	3951	3900	3810
50	2375	2400	2445	2508	2594	2716	2875	3062	3266	3478	3689	3881	4043	4184	4300	4375	4365	4248	4096
55	1821	1858	1920	2000	2100	2241	2443	2697	2982	3288	3607	3924	4218	4497	4740	4867	4844	4694	4469
60	1097	1147	1239	1352	1479	1644	1867	2154	2508	2913	3362	3841	4326	4814	5222	5423	5424	5277	4972
65	495	523	588	686	807	964	1173	1454	1821	2273	2814	3434	4111	4816	5396	5738	5909	5821	5454
70	367	370	373	375	394	448	551	731	1009	1419	1967	2655	3499	4389	5122	5651	5915	5800	5410
75	251	254	258	263	271	285	296	317	403	591	943	1524	2404	3407	4194	4721	4869	4750	4405
80	154	153	148	139	135	143	158	182	209	232	285	475	976	1711	2341	2714	2721	2526	2259
85	75.2	75.2	72.5	70.1	70.1	71.6	75.0	81.2	95.5	117	139	169	203	264	369	430	384	248	172
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) \ γ (DEG)	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185
0	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879
5	2890	2885	2879	2874	2869	2865	2861	2857	2853	2850	2846	2842	2839	2836	2834	2831	2828	2827	2826
10	2911	2901	2890	2882	2874	2865	2857	2847	2836	2825	2813	2803	2795	2788	2782	2776	2772	2769	2768
15	2949	2934	2919	2905	2889	2873	2855	2837	2820	2803	2787	2771	2757	2744	2733	2723	2716	2711	2708
20	3003	2984	2964	2942	2918	2892	2866	2839	2811	2784	2759	2736	2714	2694	2676	2662	2650	2643	2639
25	3081	3056	3027	2995	2959	2921	2881	2839	2799	2760	2724	2690	2659	2629	2604	2582	2566	2557	2554
30	3189	3152	3110	3063	3011	2956	2898	2841	2784	2728	2674	2622	2576	2535	2499	2469	2447	2435	2432
35	3327	3272	3209	3142	3071	2997	2920	2841	2758	2675	2597	2524	2459	2403	2355	2316	2289	2275	2273
40	3496	3412	3330	3238	3138	3035	2927	2813	2699	2589	2485	2388	2299	2223	2162	2115	2083	2069	2069
45	3699	3584	3463	3328	3186	3037	2884	2734	2589	2450	2317	2196	2088	1997	1922	1865	1829	1815	1818
50	3936	3766	3580	3384	3184	2983	2786	2597	2417	2247	2087	1940	1812	1708	1628	1565	1526	1513	1519
55	4218	3947	3675	3401	3132	2869	2617	2383	2164	1959	1775	1618	1447	1247	1095	1011	978	970	974
60	4564	4143	3731	3339	2973	2640	2335	2054	1810	1504	1172	1009	885	780	700	637	614	613	618
65	4877	4207	3622	3098	2642	2249	1903	1488	1089	892	715	546	422	366	318	290	276	275	280
70	4802	4011	3239	2609	2100	1558	1050	771	526	346	229	172	156	145	140	139	138	139	140
75	3894	3219	2429	1754	1119	634	354	200	141	117	101	87.2	81.5	82.5	86.8	88.0	88.1	89.1	88.1
80	1955	1571	1072	552	236	129	89.8	74.1	58.4	46.9	43.2	41.0	39.3	39.1	42.9	49.5	50.0	49.6	52.4
85	157	127	115	91.2	57.5	42.7	37.6	32.0	25.8	23.7	21.8	19.7	16.5	12.8	8.81	4.93	2.56	2.07	4.61
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 6: Luminous Intensity Data

Table--3 UNIT: cd

C (DEG) \ γ (DEG)	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280
0	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879
5	2826	2826	2826	2827	2828	2829	2831	2832	2834	2837	2840	2844	2848	2853	2858	2864	2870	2876	2883
10	2767	2768	2770	2773	2778	2785	2792	2799	2805	2812	2819	2826	2836	2846	2856	2868	2880	2893	2906
15	2708	2710	2715	2723	2730	2740	2752	2764	2777	2791	2805	2820	2836	2851	2867	2883	2900	2917	2935
20	2640	2643	2651	2662	2674	2690	2708	2729	2751	2773	2796	2819	2842	2866	2888	2910	2933	2955	2977
25	2556	2563	2576	2592	2611	2634	2661	2691	2724	2759	2793	2827	2860	2892	2924	2954	2982	3009	3037
30	2438	2451	2471	2499	2533	2571	2613	2656	2701	2749	2797	2843	2889	2935	2977	3017	3055	3090	3125
35	2284	2306	2337	2376	2425	2482	2547	2614	2679	2743	2808	2870	2930	2989	3048	3105	3157	3205	3247
40	2086	2116	2161	2220	2290	2368	2453	2544	2638	2729	2819	2907	2989	3066	3142	3219	3294	3360	3415
45	1842	1884	1945	2021	2109	2210	2322	2439	2561	2688	2815	2938	3056	3166	3267	3370	3473	3571	3654
50	1548	1598	1670	1761	1872	1999	2137	2286	2444	2608	2780	2952	3119	3281	3434	3581	3731	3869	3942
55	1010	1106	1267	1421	1552	1717	1886	2070	2266	2479	2709	2949	3187	3420	3654	3890	4101	4249	4305
60	647	693	763	866	979	1169	1480	1760	1991	2256	2545	2865	3209	3563	3942	4339	4648	4780	4770
65	295	324	370	426	547	717	876	1116	1494	1894	2234	2631	3093	3620	4254	4850	5212	5393	5275
70	142	143	153	167	183	250	371	537	791	1126	1629	2172	2731	3450	4259	4927	5424	5725	5614
75	87.3	84.3	79.9	80.3	88.7	104	123	157	236	395	700	1251	1951	2704	3449	4022	4481	4677	4662
80	45.8	38.9	37.0	37.9	39.5	41.9	48.3	62.2	78.9	96.3	150	299	669	1169	1557	1902	2182	2410	2525
85	7.67	9.93	11.6	14.2	17.3	19.8	21.3	24.1	29.0	31.9	37.5	58.5	93.0	117	139	169	205	230	238
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) \ γ (DEG)	285	290	295	300	305	310	315	320	325	330	335	340	345	350	355				
0	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879	2879				
5	2889	2896	2904	2910	2916	2923	2928	2933	2938	2943	2946	2950	2953	2955	2957				
10	2918	2930	2941	2951	2962	2972	2982	2992	3002	3011	3019	3026	3031	3035	3039				
15	2953	2971	2988	3005	3022	3038	3053	3065	3074	3082	3088	3094	3100	3105	3110				
20	2999	3024	3050	3073	3093	3110	3124	3138	3152	3165	3176	3186	3193	3198	3203				
25	3067	3097	3124	3146	3168	3191	3212	3231	3246	3256	3264	3269	3272	3275	3280				
30	3159	3191	3222	3250	3275	3295	3306	3310	3310	3307	3305	3302	3299	3297	3298				
35	3286	3328	3364	3384	3385	3376	3360	3340	3317	3292	3270	3254	3244	3239	3239				
40	3471	3512	3516	3498	3466	3422	3368	3308	3249	3194	3146	3109	3087	3078	3075				
45	3697	3697	3665	3603	3519	3417	3303	3188	3078	2977	2898	2846	2815	2798	2790				
50	3949	3910	3812	3672	3507	3322	3133	2952	2784	2641	2534	2465	2420	2389	2374				
55	4273	4140	3923	3670	3394	3108	2833	2579	2352	2168	2042	1960	1895	1851	1826				
60	4617	4325	3949	3543	3130	2736	2370	2042	1778	1577	1429	1318	1223	1152	1108				
65	4919	4428	3832	3230	2657	2140	1710	1363	1097	896	751	641	560	520	501				
70	5113	4336	3435	2566	1862	1323	925	651	477	393	364	360	363	366	368				
75	4292	3491	2489	1512	887	529	348	288	282	275	266	260	257	256	254				
80	2311	1746	1035	444	262	227	205	182	162	146	136	136	146	155	156				
85	266	259	227	175	129	109	95.0	79.5	71.9	68.0	66.3	66.8	69.6	75.1	77.6				
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				

Table 8: Luminous Intensity Data

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Goniophotometer system	GO-R5000	HZTE011-01	Aug. 23, 2017	Aug. 22, 2018
Digital Power Meter	PF2010A	HZTE028-01	Aug. 10, 2017	Aug. 09, 2018
AC Power Supply	DPS1060	HZTE001-06	Aug. 10, 2017	Aug. 09, 2018
DC Power Supply	WY12010	HZTE004-03	Aug. 10, 2017	Aug. 09, 2018
Standard Source	D908	HZTE012-01	Aug. 20, 2017	Aug. 19, 2018
Standard source	SCL-1400	HZTE012-02	Aug. 20, 2017	Aug. 19, 2018
Temperature and humidity recorder	JR900	HZTE018-01	Aug. 16, 2017	Aug. 15, 2018
Temperature recorder	JM624U	HZTE018-08	Aug. 17, 2017	Aug. 16, 2018

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 $k=2$.

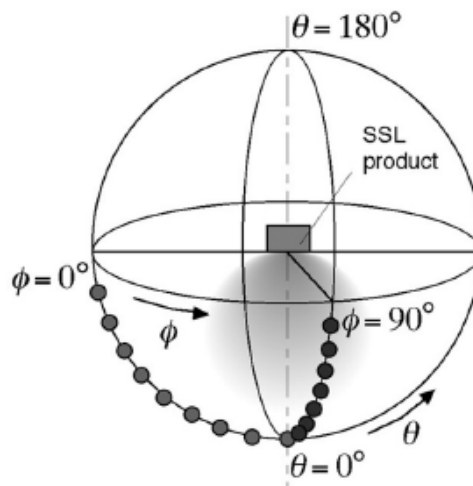
Color Characteristics Measurements

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° 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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