

## LM-79-08 Test Report

For

**P.Q.L., Inc.**

**(Brand Name: Superior Life®)**

2285 Ward Avenue / Simi Valley, CA 93065

## Outdoor Pole/Arm-Mounted Area and Roadway Luminaires

Model name(s): 83926, 83927

Representative (Tested) Model: 83926 (3000K), 83927 (5000K)

Model Different: All construction and rating are the same, except CCT

Test & Report By:

*Garman Mo*

Engineer: Garman Mo

Date: Jan.04,2017

Review By:

*Tommy Liang*

Manager: Tommy Liang

Note: This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

**Laboratory: Standard-Tech Co. Ltd Testing Center**  
**NVLAP CODE: 201011-0**

Report Format Number STD/QR4909-A/2

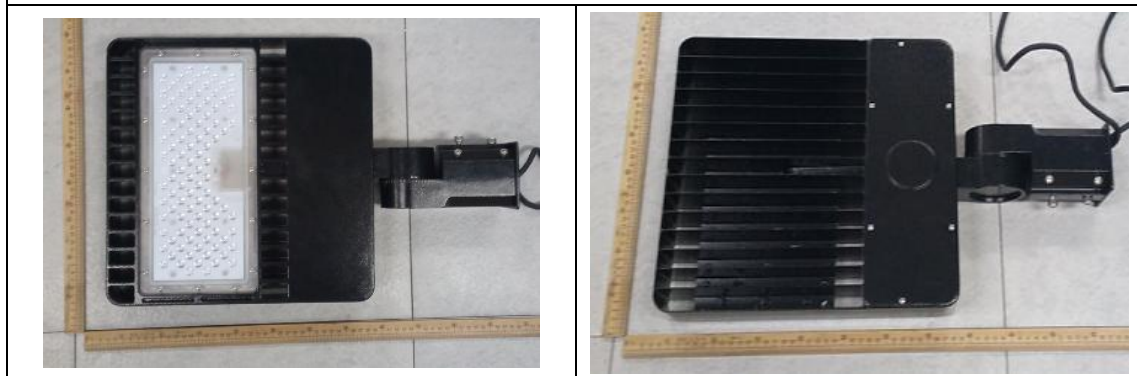
Address: Standard-Tech Building, No.6 Guanhong Road,Guangzhou Science City, Guangzhou 510663, China

Tel: 8620-3229 0320 Fax: 8620-32290422 <http://www.standard-tech.com>

**1.1 Product Information:**

Organization Name	P.Q.L., Inc.	
Brand Name	Superior Life®	
Model Number	83926, 83927	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	Outdoor Pole/Arm-Mounted Area and Roadway Luminaires	
Rated Voltage / Frequency	120-277Vac, 50/60 Hz	
Nominal Power	100W	
Rated Initial Lamp Lumen	--	
Declared CCT	3000K,3500K,4000K,4500K,5000K	
LED Manufacturer	Philips Lumileds	
LED Model	LUXEON 3030 2D	
Sample Number	GZE1612102-H1(3000K);H2(5000K)	
Luminaire Aperture (for downlights)	--	in.
Luminaire Length	--	mm
Luminaires Width	--	mm
Number of Units (modular products)	N/A	s

**Photo**



**1.2 Test Specifications:**

Date of Receipt	Dec.29,2016
Date of Test	Dec.30,2016
Test item	<ol style="list-style-type: none"> <li>1. Total Luminous Flux</li> <li>2. Luminous Distribution Intensity</li> <li>3. Luminous Efficacy</li> <li>4. Correlated Color Temperature</li> <li>5. Color Rendering Index</li> <li>6. Chromaticity Coordinate</li> <li>7. Electrical Parameters</li> </ol>
Reference Standard	<ol style="list-style-type: none"> <li>1. IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products</li> <li>2. ANSI C78.377-2008 Specifications for the Chromaticity of Solid State Lighting Products</li> <li>3. CIE 13.3-1995 Method of Measuring and Specifying Colour Rendering Properties of Light Sources</li> <li>4. CIE 15-2004 Technical Report Colorimetry</li> <li>5. IESNA LM-16-93 Practical Guide to Colorimetry of Light Source</li> <li>6. IESNA TM-16-05 Technical Memorandum on Light Emitting Diode (LED) Sources and Systems</li> </ol>
Reference Work Instruction	QD25

**1.3 Test Methods****1) Photometric and Light Distribution Measurement – Goniophotometer Method:**

Photometric parameters were measured using the goniophotometer and software. The ambient temperature shall be maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ , measured at a point not more than 1 m from the sample and at the same height as the sample. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at  $1^{\circ}$  vertical intervals and  $22.5^{\circ}$  horizontal intervals.

**2) Chromaticity Measurement – Sphere-Spectroradiometer Method:**

Chromaticity parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ . The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral power distribution taken at 5 nm intervals over the range of 380 to 780 nm.

**3) Electrical Measurements:**

Electrical parameters were measured using power meters incorporated in goniophotometer or sphere-spectroradiometer system. The ambient temperature surrounding the sample was maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ . The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Voltage, frequency, current, power, power factor and total harmonic distortion were measured by and read from the power meter.

**2.1 Electrical, Photometric and Chromaticity Measurements**

*(Refer to Work Instruction QD25)*

<b>Test date</b>	2016-12-30	<b>Test Ambient:</b>	25.2 °C
<b>Test Orientation</b>	As intended	<b>Stabilization Time (min)</b>	90
<b>Model Number</b>	83926 (3000K)		

**Electrical Measurement:**

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE161210	120.0	60	0.8432	100.4	0.9923	8.12
2-H1	277.0	60	0.3937	99.47	0.9122	15.59
<b>DLC Pass Criteria</b>					>= 0.9(-3%)	<= 20(+5)

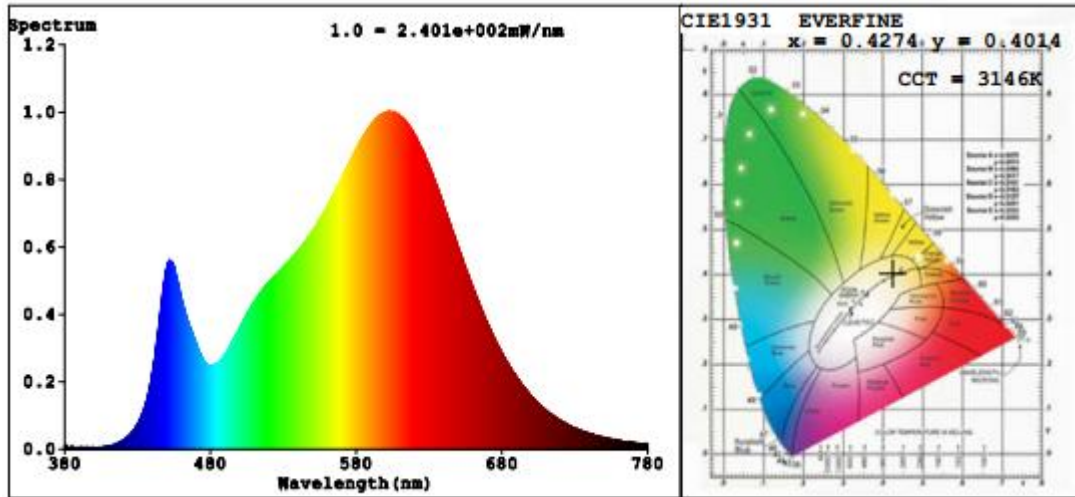
**Chromaticity Measurement - Sphere-Spectroradiometer Method:**

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	83	R9	13
Frequency (Hz)	60	R2	92	R10	82
CCT (K)	3146	R3	96	R11	81
Duv	0.0003	R4	81	R12	72
Chromaticity (x, y)	x=0.4274 y=0.4014	R5	83	R13	85
Chromaticity (u', v')	u'=0.2455 v'=0.5189	R6	90	R14	99
Color Rendering Index (CRI)	83.9	R7	84	R15	76
R9	13	R8	62	--	--

**Photometric Measurement – Goniophotometer Method:**

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	10608	10543	>=1000 (±10%)	
Luminous Efficacy (lm/W)	105.66	105.99	Standard: >= 100(-3%)	Premium: >= 120(-3%)
Zonal lumens in the 0-90° zone (%)	99.8	--	>=100(-1)	
Zonal lumens in the 80-90° zone (%)	0.5	--	<=10(+3)	
Beam Angle (°)	74.9	--	--	
Center Beam Candle Power (cd)	1900	--	--	

**Spectral Power Distribution & Chromaticity Diagram**

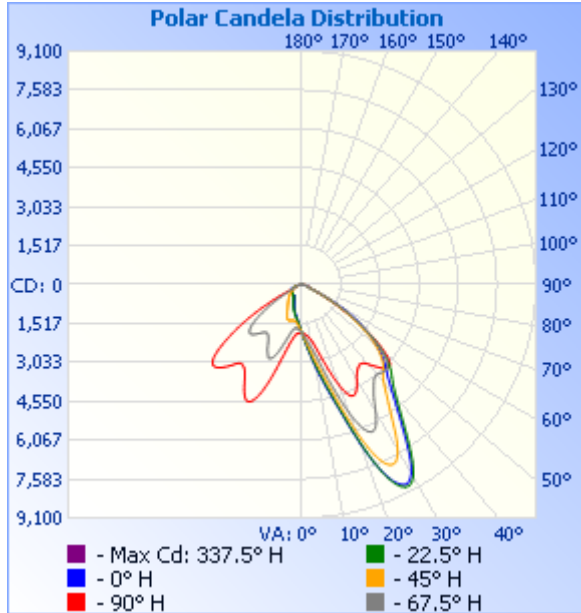


**Zonal Lumen Tabulation**

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	3,160.2	29.8%
0-40	5,532.2	52.1%
0-60	9,735.9	91.8%
60-90	853.5	8%
70-100	272.5	2.6%
90-120	2.4	0%
0-90	10,589.4	99.8%
90-180	19.2	0.2%
0-180	10,608.6	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	198.0	1.9%	90-100	0.0	0%
10-20	859.7	8.1%	100-110	0.4	0%
20-30	2,102.5	19.8%	110-120	2.0	0%
30-40	2,372.0	22.4%	120-130	3.6	0%
40-50	2,402.4	22.6%	130-140	4.4	0%
50-60	1,801.3	17.0%	140-150	4.0	0%
60-70	580.9	5.5%	150-160	2.8	0%
70-80	218.3	2.1%	160-170	1.5	0%
80-90	54.2	0.5%	170-180	0.6	0%

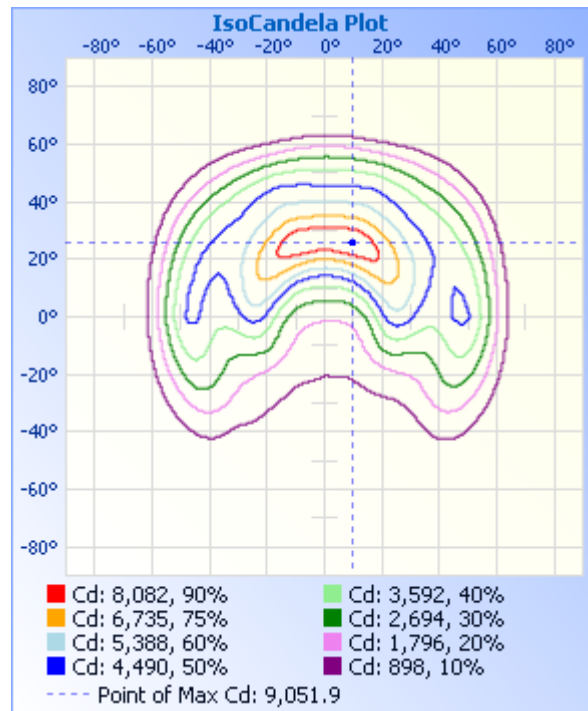
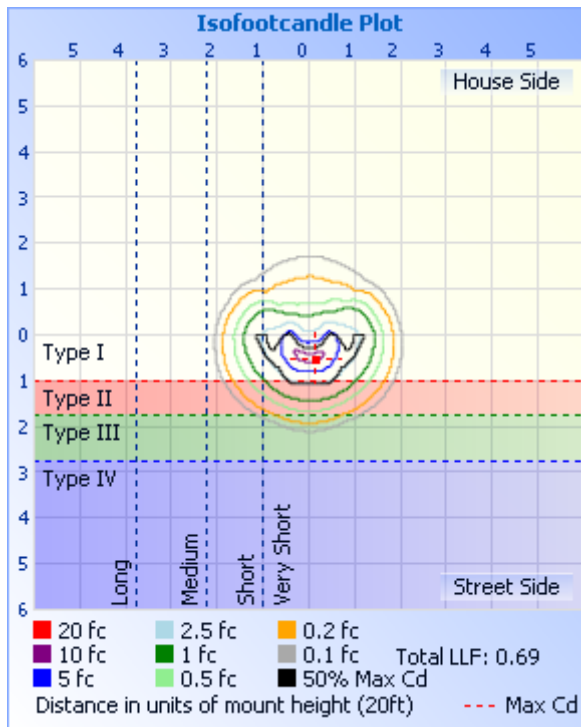
**Photometric Data**



**Illuminance at a Distance**

	Center Beam fc	Beam Width	
17.0ft	<b>6.57 fc</b>	<b>10.2 ft</b>	<b>27.2 ft</b>
34.0ft	<b>1.64 fc</b>	<b>20.5 ft</b>	<b>54.4 ft</b>
51.0ft	<b>0.73 fc</b>	<b>30.7 ft</b>	<b>81.6 ft</b>
68.0ft	<b>0.41 fc</b>	<b>40.9 ft</b>	<b>108.8 ft</b>
85.0ft	<b>0.26 fc</b>	<b>51.2 ft</b>	<b>136.0 ft</b>
102.0ft	<b>0.18 fc</b>	<b>61.4 ft</b>	<b>163.3 ft</b>

■ Vert. Spread: 33.5°  
■ Horiz. Spread: 77.3°



Laboratory: Standard-Tech Co. Ltd Testing Center  
NVLAP CODE: 201011-0

Report Format Number STD/QR4909-A/2

Address: Standard-Tech Building, No.6 Guan hong Road, Guangzhou Science City, Guangzhou 510663, China

Tel: 8620-3229 0320 Fax: 8620-32290422 <http://www.standard-tech.com>

Table--1 UNIT: cd

C (DEG) γ (DEG)	0	23	45	68	90	113	135	158	180	203	225	248	270	293	315	338
0	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
5	1907	2105	2290	2436	2501	2475	2360	2194	1989	1801	1648	1553	1514	1528	1611	1735
10	2153	2597	2995	3276	3387	3300	3062	2689	2258	1876	1552	1348	1273	1303	1462	1739
15	2907	3609	4122	4483	4595	4480	4138	3695	2984	2259	1589	1197	1082	1132	1438	2120
20	4305	5313	6049	6541	6570	6496	6027	5290	4144	2841	1646	1047	892	957	1488	2858
25	5015	6513	7830	8659	8480	8561	7705	6335	4763	3024	1562	882	723	791	1383	3122
30	4499	6098	7756	8838	8491	8649	7437	5720	4254	2703	1378	737	605	661	1146	2664
35	3943	5145	6334	7171	6831	7054	5972	4859	3859	2586	1236	629	542	576	970	2342
40	4033	4519	5004	5641	5446	5688	4925	4555	4065	2799	1118	561	522	533	842	2447
45	4567	4398	4346	4800	4609	4922	4462	4646	4601	3012	966	525	518	519	735	2744
50	4528	3973	3664	4035	3884	4120	3797	4114	4313	2678	773	504	514	510	637	2638
55	3334	3040	2763	2924	2928	2888	2721	2923	2912	1696	579	482	497	492	530	1890
60	1810	1964	1752	1637	1789	1534	1565	1626	1366	811	447	445	475	456	448	985
65	593	736	684	482	608	443	594	581	459	406	367	405	450	414	373	423
70	285	257	228	234	270	235	236	262	285	298	282	350	408	356	284	298
75	196	177	168	148	154	150	173	175	190	211	244	282	332	284	239	209
80	108	103	84.5	58.8	49.5	61.7	91.9	109	113	130	195	188	185	188	190	128
85	42.3	33.6	11.9	3.52	2.78	4.01	15.3	42.2	48.2	56.4	87.6	72.8	77.4	72.8	86.9	54.8
90	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	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
100	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
105	0.83	0.39	0.00	0.00	0.00	0.00	0.00	0.10	0.69	0.69	0.40	0.35	0.30	0.25	0.45	0.55
110	2.55	1.13	0.00	0.00	0.00	0.00	0.00	1.24	2.13	2.08	1.59	1.40	1.60	1.35	1.35	1.74
115	4.48	2.37	0.10	0.00	0.00	0.00	0.00	2.63	3.94	3.61	2.73	1.74	2.40	1.84	2.45	3.08
120	5.91	3.31	0.49	0.43	0.00	0.00	0.20	3.52	5.03	4.94	4.51	3.70	3.26	3.65	3.80	4.13
125	7.43	4.44	0.64	0.35	0.30	0.00	0.40	4.32	5.82	6.49	6.09	6.13	6.20	5.94	5.09	5.33
130	8.22	4.79	0.89	0.45	0.30	0.00	0.65	4.57	7.14	8.06	7.58	8.47	8.35	7.84	6.68	6.72
135	8.22	4.74	1.29	0.40	0.25	0.00	1.20	4.62	7.64	9.10	9.40	9.66	10.3	9.58	8.08	8.01
140	8.47	4.94	1.53	0.45	0.25	0.35	1.20	4.82	7.68	9.98	9.55	9.86	11.4	10.0	8.73	9.20
145	8.08	4.15	1.83	0.65	0.25	0.40	1.25	4.48	7.68	9.64	9.65	11.1	11.8	10.6	10.4	9.20
150	7.20	3.81	2.47	1.09	0.65	0.65	1.84	4.28	6.80	8.70	9.70	11.5	11.9	11.5	11.7	9.09
155	5.38	3.71	2.82	1.49	1.20	1.15	2.44	4.23	5.31	7.61	8.96	10.4	11.0	11.1	10.9	8.50
160	4.53	3.71	2.97	1.89	1.44	1.59	2.74	4.13	4.68	6.03	7.57	8.96	9.64	9.47	9.07	7.75
165	5.17	3.76	3.51	2.49	2.00	2.34	3.04	3.93	5.12	4.80	6.33	7.72	7.99	8.28	7.57	7.11
170	5.22	4.54	4.70	3.63	3.04	3.54	4.38	4.52	5.96	5.83	7.37	9.56	9.99	10.0	9.17	9.25
175	5.27	5.14	5.59	4.68	4.64	4.39	5.18	4.72	5.47	5.38	6.68	8.06	8.23	8.37	7.57	7.99
180	4.28	5.39	6.04	5.28	5.49	5.24	5.63	4.72	4.43	4.45	5.39	5.97	5.39	5.78	5.12	5.86

**2.2 Electrical, Photometric and Chromaticity Measurements**

*(Refer to Work Instruction QD25)*

<b>Test date</b>	2016-12-30	<b>Test Ambient:</b>	25.2 °C
<b>Test Orientation</b>	As intended	<b>Stabilization Time (min)</b>	90
<b>Model Number</b>	83927 (5000K)		

**Electrical Measurement:**

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE161210	120.0	60	0.8573	101.3	0.9847	8.69
2-H2	277.0	60	0.4009	100.4	0.9042	16.17
<b>DLC Pass Criteria</b>					<b>&gt;= 0.9(-3%)</b>	<b>&lt;= 20(+5)</b>

**Chromaticity Measurement - Sphere-Spectroradiometer Method :**

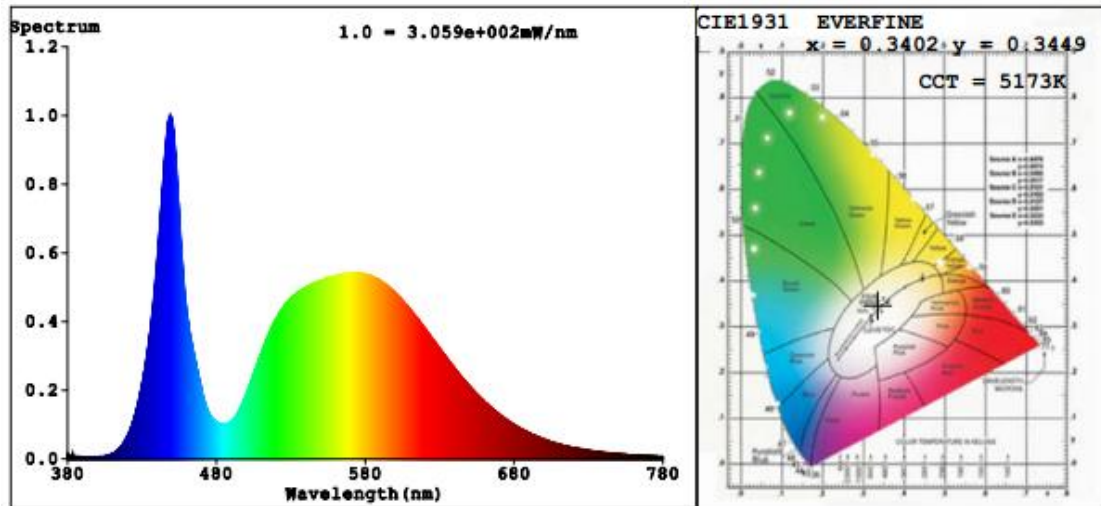
Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	73	R9	0
Frequency (Hz)	60	R2	79	R10	48
CCT (K)	5173	R3	81	R11	73
Duv	-0.0014	R4	76	R12	46
Chromaticity (x, y)	x=0.3402 y=0.3449	R5	74	R13	74
Chromaticity (u', v')	u'=0.2107 v'=0.4806	R6	70	R14	89
Color Rendering Index (CRI)	74.4	R7	82	R15	69
R9	0	R8	61	--	--

**Photometric Measurement– Sphere-Spectroradiometer Method :**

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	11022	10962	>=1000 (±10%)	
Luminous Efficacy (lm/W)	108.81	109.18	Standard: >= 100(-3%)	Premium: >= 120(-3%)



**Spectral Power Distribution & Chromaticity Diagram**



Laboratory: Standard-Tech Co. Ltd Testing Center  
NVLAP CODE: 201011-0

Report Format Number STD/QR4909-A/2

Address: Standard-Tech Building, No.6 Guanhong Road,Guangzhou Science City, Guangzhou 510663, China

Tel: 8620-3229 0320 Fax: 8620-32290422 <http://www.standard-tech.com>

**2.3 Performance Assessment:**

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
83926 ( 3000K)	3000K	10608	100.4	105.66
839XX ( 3500K)	3500K	10712	100.9	106.16
839XX ( 4000K)	4000K	10815	100.9	107.19
839XX ( 4500K)	4500K	10919	100.9	108.22
83927 ( 5000K)	5000K	11022	101.3	108.81

\*1: This value is calculated and the calculation formula is as below:

$$10712 = (11022 - 10608) / 4 + 10608$$

$$10815 = (11022 - 10608) / 4 + 10712$$

$$10919 = (11022 - 10608) / 4 + 10815$$

\*2: This value is calculated and the calculation formula is as below:

$$100.9 = (100.4 + 101.3) / 2$$

\*3: This value is calculated and the calculation formula is as below:

$$106.16 = 10712 / 100.9$$

$$107.19 = 10815 / 100.9$$

$$108.22 = 10919 / 100.9$$

**3. Test Equipment**

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-336	2 meter Integrating Sphere	2016-07-01	2017-06-30
ST-R-331	Spectral analysis system HAAS-2000	2016-07-01	2017-06-30
D204	Standard Lamp	2016-07-01	2017-06-30
PF2010	Power Meter for Integrating Sphere	2016-07-01	2017-06-30
EE-09	Goniophotometer system	2016-07-01	2017-06-30
D908S	Standard Lamp	2016-07-01	2017-06-30
PF210	Power Meter for Goniophotometer	2016-07-01	2017-06-30
ST-R-181A	Temperature Tester	2016-07-01	2017-06-30
Uncertainty: Photometric Measurement (Sphere):1.74% Chromaticity Measurement(Sphere):14.3K Photometric Measurement(Goniophotometer):1.62%			

**\*\*\*\*\* END OF REPORT \*\*\*\*\***

**Laboratory: Standard-Tech Co. Ltd Testing Center**  
**NVLAP CODE: 201011-0**

Report Format Number STD/QR4909-A/2

Address: Standard-Tech Building, No.6 Guanhong Road,Guangzhou Science City, Guangzhou 510663, China

Tel: 8620-3229 0320 Fax: 8620-32290422 <http://www.standard-tech.com>