

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): 83934, 83935

Representative (Tested) Model: 83934 (3000K) 83935 (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	83934, 83935	
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	180-528Vac, 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-I1(3000K);I2(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"> 1. Total Luminous Flux 2. Luminous Distribution Intensity 3. Luminous Efficacy 4. Correlated Color Temperature 5. Color Rendering Index 6. Chromaticity Coordinate 7. Electrical Parameters
Reference Standard	<ol style="list-style-type: none"> 1. IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products 2. ANSI C78.377-2008 Specifications for the Chromaticity of Solid State Lighting Products 3. CIE 13.3-1995 Method of Measuring and Specifying Colour Rendering Properties of Light Sources 4. CIE 15-2004 Technical Report Colorimetry 5. IESNA LM-16-93 Practical Guide to Colorimetry of Light Source 6. IESNA TM-16-05 Technical Memorandum on Light Emitting Diode (LED) Sources and Systems
Reference Work Instruction	QD25

1.3 Test Methods

<p>1) Photometric and Light Distribution Measurement – Goniophotometer Method:</p> <p>Photometric parameters were measured using the goniophotometer and software. The ambient temperature shall be maintained at 25° C ± 1° 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 277 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° vertical intervals and 22.5° horizontal intervals.</p>
<p>2) Chromaticity Measurement – Sphere-Spectroradiometer Method:</p> <p>Chromaticity parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25° C ± 1° 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 277 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.</p>
<p>3) Electrical Measurements:</p> <p>Electrical parameters were measured using power meters incorporated in goniophotometer or sphere-spectroradiometer system. The ambient temperature surrounding the sample was maintained at 25° C ± 1° C. The sample was operated at 277 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.</p>

2.1 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2016-12-30	Test Ambient:	25.2 ° C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	83934 (3000K)		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE161210	277.0	60	0.4034	110.2	0.9863	10.29
2-II	480.0	60	0.2525	111.6	0.9207	13.42
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

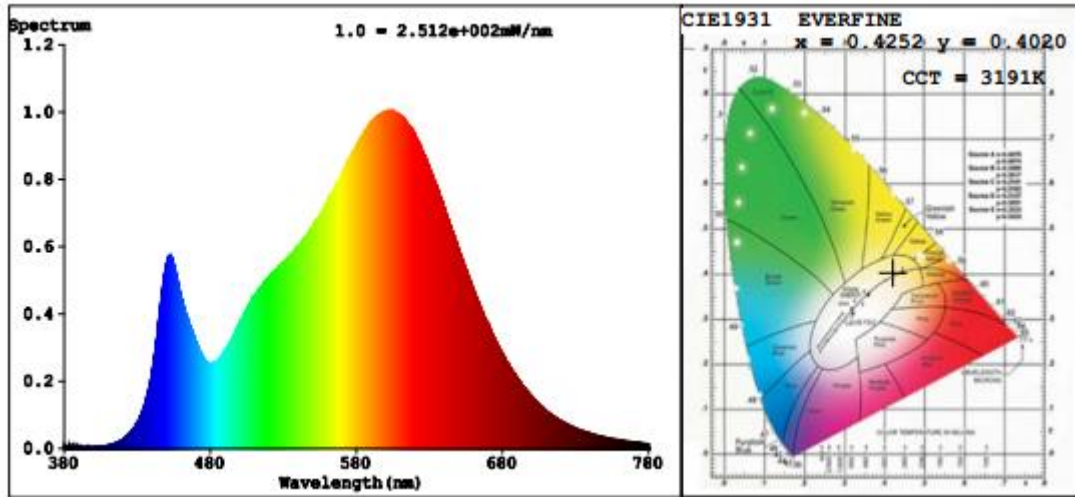
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	277.0	R1	82	R9	12
Frequency (Hz)	60	R2	92	R10	81
CCT (K)	3191	R3	97	R11	81
Duv	0.0010	R4	82	R12	71
Chromaticity (x, y)	x=0.4252 y=0.4020	R5	82	R13	85
Chromaticity (u', v')	u'=0.2439 v'=0.5188	R6	90	R14	99
Color Rendering Index (CRI)	83.8	R7	84	R15	75
R9	12	R8	62	--	--

Photometric Measurement – Goniophotometer Method:

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	277.0	480.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	11175	11197	>=1000 (±10%)	
Luminous Efficacy (lm/W)	101.41	100.33	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 (°)	74.0	--	--	
Center Beam Candle Power (cd)	2019	--	--	

Spectral Power Distribution & Chromaticity Diagram



Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	3,432.7	30.7%
0-40	5,917.4	52.9%
0-60	10,256.1	91.8%
60-90	899.6	8%
70-100	294.6	2.6%
90-120	2.5	0%
0-90	11,155.7	99.8%
90-180	20.7	0.2%
0-180	11,176.4	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	212.2	1.9%	90-100	0.0	0%
10-20	951.0	8.5%	100-110	0.5	0%
20-30	2,269.5	20.3%	110-120	2.1	0%
30-40	2,484.7	22.2%	120-130	3.8	0%
40-50	2,503.8	22.4%	130-140	4.7	0%
50-60	1,834.9	16.4%	140-150	4.3	0%
60-70	605.0	5.4%	150-160	3.0	0%
70-80	235.9	2.1%	160-170	1.7	0%
80-90	58.7	0.5%	170-180	0.7	0%

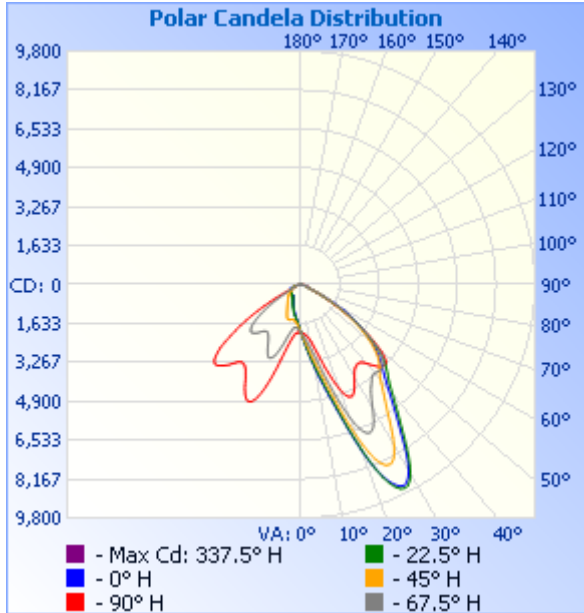
Laboratory: Standard-Tech Co. Ltd Testing Center
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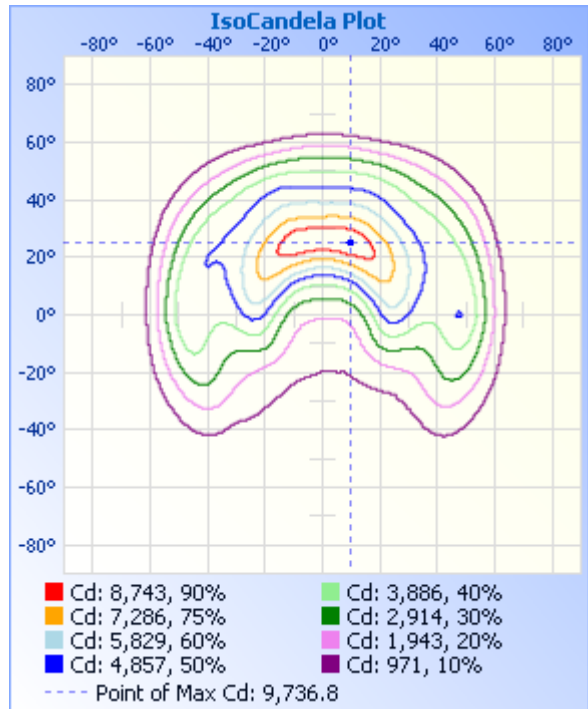
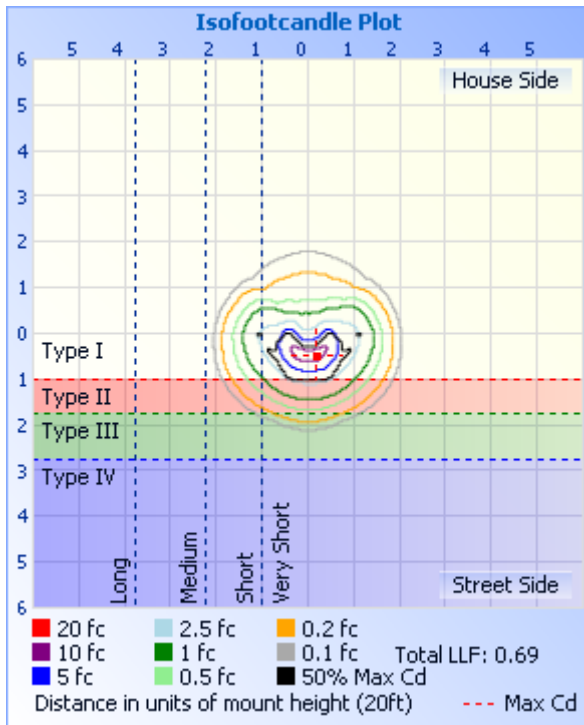
Photometric Data



Illuminance at a Distance

	Center Beam fc	Beam Width	
17.0ft	6.99 fc	9.9 ft	23.9 ft
34.0ft	1.75 fc	19.7 ft	47.8 ft
51.0ft	0.78 fc	29.6 ft	71.8 ft
68.0ft	0.44 fc	39.5 ft	95.7 ft
85.0ft	0.28 fc	49.4 ft	119.6 ft
102.0ft	0.19 fc	59.2 ft	143.5 ft

■ Vert. Spread: 32.4°
■ Horiz. Spread: 70.3°



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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	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	
5	2026	2245	2451	2627	2697	2676	2537	2352	2120	1913	1744	1637	1592	1610	1696	1840	
10	2329	2822	3242	3575	3697	3604	3317	2931	2445	2019	1651	1417	1333	1370	1539	1863	
15	3253	4022	4579	4982	5102	4977	4583	4115	3337	2478	1708	1257	1128	1183	1520	2336	
20	4794	5973	6823	7414	7409	7326	6749	5908	4634	3126	1758	1093	929	995	1557	3129	
25	5360	7034	8540	9491	9264	9377	8355	6851	5122	3242	1637	922	757	825	1415	3293	
30	4683	6362	8130	9353	9004	9163	7788	5993	4457	2845	1439	777	641	697	1172	2760	
35	4133	5358	6568	7468	7118	7360	6224	5128	4086	2757	1298	672	582	615	993	2452	
40	4275	4754	5198	5868	5667	5941	5159	4834	4336	3001	1180	607	567	578	870	2572	
45	4808	4589	4463	4951	4761	5084	4629	4856	4855	3210	1023	574	567	569	769	2863	
50	4693	4088	3713	4097	3959	4179	3852	4232	4409	2772	827	555	566	561	676	2692	
55	3360	3088	2769	2946	2989	2908	2731	2938	2904	1739	629	532	549	543	571	1899	
60	1802	1971	1757	1639	1819	1531	1578	1654	1373	850	488	489	525	503	486	991	
65	600	742	698	499	640	468	611	609	486	438	397	444	495	455	402	445	
70	307	276	245	250	289	254	254	284	308	321	304	383	446	390	306	320	
75	211	192	180	159	166	164	187	190	205	228	263	306	360	310	257	224	
80	117	111	91.2	63.6	54.0	67.2	99.7	118	121	140	212	202	200	204	203	137	
85	45.4	36.5	13.1	3.99	3.02	4.92	17.3	46.3	52.1	60.8	95.8	79.5	83.2	78.5	92.9	58.8	
90	0.02	0.07	0.07	0.01	0.00	0.01	0.05	0.10	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	0.84	0.39	0.00	0.00	0.00	0.00	0.00	0.43	0.64	0.79	0.79	0.45	0.50	0.25	0.50	0.75	
110	2.51	1.33	0.05	0.00	0.00	0.00	0.05	1.24	2.12	2.28	1.83	1.50	1.50	1.20	1.59	1.94	
115	4.47	2.76	0.40	0.00	0.00	0.00	0.45	2.68	3.94	3.86	3.07	1.90	2.31	1.85	2.54	3.28	
120	6.05	3.51	0.69	0.00	0.00	0.00	0.45	3.63	5.12	5.20	4.80	3.95	3.35	3.71	4.18	4.28	
125	7.53	4.55	1.09	0.20	0.15	0.40	0.70	4.47	5.96	6.83	6.44	6.49	6.10	6.06	5.27	5.68	
130	8.42	5.15	1.29	0.35	0.20	0.40	0.94	5.17	7.34	8.56	8.03	8.94	8.65	8.07	6.97	7.17	
135	8.46	5.14	1.43	0.45	0.20	0.45	1.19	5.17	8.07	9.75	10.2	10.2	10.6	9.86	8.46	8.35	
140	8.91	5.19	1.88	0.60	0.20	0.45	1.34	5.22	8.32	10.6	10.4	10.4	11.8	10.5	9.35	9.79	
145	8.71	4.36	2.03	0.70	0.35	0.50	1.49	4.87	8.36	10.4	10.8	12.2	12.2	11.2	11.2	10.0	
150	7.78	4.11	2.72	1.10	0.55	0.9987	2.09	4.77	7.48	9.74	10.7	12.6	12.6	12.4	12.7	9.94	
155	5.96	4.06	2.97	1.50	1.20	1.35	2.73	4.67	5.84	8.45	12.5	11.4	11.8	12.0	11.9	9.34	
160	5.02	4.11	3.31	1.99	1.54	2.00	3.03	4.62	5.17	6.67	8.45	9.92	10.4	10.3	10.1	8.49	
165	5.61	4.40	3.81	2.59	2.10	2.75	3.58	4.32	5.46	5.34	7.17	8.73	8.89	9.15	8.40	8.10	
170	5.85	5.09	5.14	3.79	3.35	4.00	5.07	5.12	6.20	6.53	8.26	10.7	11.0	11.1	10.3	10.7	
175	6.00	5.88	6.13	5.09	5.04	5.15	7.14	5.17	5.96	6.13	7.47	9.11	8.84	9.35	8.75	9.23	
180	4.53	6.03	6.73	5.98	6.10	5.85	6.61	5.42	4.82	4.90	6.03	6.58	5.83	6.30	5.90	6.70	

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2.2 Electrical, Photometric and Chromaticity Measurements
(Refer to Work Instruction QD25)

Test date	2016-12-30	Test Ambient:	25.2 ° C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	83935 (5000K)		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE161210	277.0	60	0.4086	111.0	0.9807	10.83
2-12	480.0	60	0.2554	112.3	0.9161	14.08
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

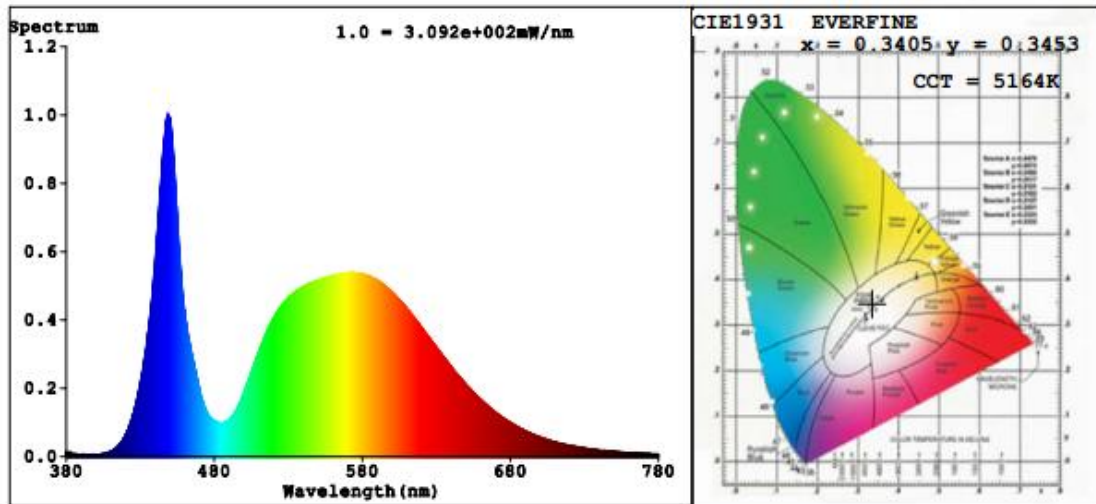
Chromaticity Measurement - Sphere-Spectroradiometer Method :

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	277.0	R1	73	R9	0
Frequency (Hz)	60	R2	78	R10	47
CCT (K)	5164	R3	81	R11	73
Duv	-0.0013	R4	76	R12	46
Chromaticity (x, y)	x=0.3405 y=0.3453	R5	74	R13	74
Chromaticity (u', v')	u'=0.2107 v'=0.4809	R6	70	R14	89
Color Rendering Index (CRI)	74.3	R7	81	R15	69
R9	0	R8	61	--	--

Photometric Measurement– Sphere-Spectroradiometer Method :

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	277.0	480.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	11658	11665	>=1000 (±10%)	
Luminous Efficacy (lm/W)	105.03	103.87	Standard: >= 100(-3%)	Premium: >= 120(-3%)

Spectral Power Distribution & Chromaticity Diagram



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2.3 Performance Assessment:

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
83934 (3000K)	3000K	11175	110.2	101.41
839XX (3500K)	3500K	11296 ^{*1}	110.6 ^{*2}	102.13 ^{*3}
839XX (4000K)	4000K	11417 ^{*1}	110.6 ^{*2}	103.23 ^{*3}
839XX (4500K)	4500K	11537 ^{*1}	110.6 ^{*2}	104.31 ^{*3}
83935 (5000K)	5000K	11658	111.0	105.03

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

$$11296 = (11658 - 11175) / 4 + 11175$$

$$11417 = (11658 - 11175) / 4 + 11296$$

$$11537 = (11658 - 11175) / 4 + 11417$$

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

$$110.6 = (110.2 + 111.0) / 2$$

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

$$102.13 = 11296 / 110.6$$

$$103.23 = 11417 / 110.6$$

$$104.31 = 11537 / 110.6$$

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 *******

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