

IES LM-79-08

MEASUREMENT AND TEST REPORT For

P.Q.L., Inc.

2285 Ward Avenue / Simi Valley, CA 93065

Test Model: 83632

Report Type:	Electrical and Photometric tests including: Luminous Flux, Color, Luminous Intensity Distribution, THD, Power Factor
Test Engineer:	Daniel Duan <i>Daniel Duan</i>
Report Number:	RSZ160311516-10
Test Date:	2016-03-17 to 2016-03-20
Report Date:	2016-04-02
Reviewed By:	Jeanne Han/Safety Manager <i>Jeanne Han</i>
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Test Facility:	Test facility was located at Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.China.
Accreditation:	The NVLAP Lab Code is 200707-0.



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1. Product Description

General Information:

One sample was received on 2016-03-11 and used for testing.

Model Tested: 83632

Manufacturer: P.Q.L., Inc.

Brand Name: Superior Life®

Product Designation: Outdoor Pole/Arm-mounted Area and Roadway Luminaires
Architectural Flood and Spot Luminaires

Dimmable: Non-Dimmable

Burning Time Before Test: 0 hour(For New Products)

Rated Values:

Rated Voltage/Frequency: 120-277 V AC 60Hz

Rated Power: 150 W

Nominal Light Output: 18000 lm

Nominal CCT: 5000K

Nominal CRI: 80

2. Standards Used

- IESNA LM-79-08: Approved Method: Electrical & Photometric Measurement of Solid-state Lighting Products
- ANSI C82.77-2002: Harmonic Emission Limits – Related Power Quality Requirements for Lighting

3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Integrating Sphere	SENSING	SPR-600	S09008	25~50℃	2016-03-10	2017-03-09
Spectral photometer	SENSING	SPR3000	90902027	350nm~800nm	2016-03-10	2017-03-09
Power Meter	YOKOGAWA	WT-210	91j926132	15/30/60/150/300/600 V	2016-03-04	2017-03-03
AC Power Supply	ALL Power	APW-105N	970663	220V±10% 50HZ	2016-03-04	2017-03-03
Standard Light Source	EVERFINE	D204	01331191	24V/100W	2015-08-27	2016-08-26
Thermal Meter	SENSING	N/A	N/A	25、50℃	2016-03-10	2017-03-09
DC Power Supply	ITECH	IT6154	0061 0417 6471 0010 19	0~32V	2016-03-04	2017-03-03
AC Power Supply	EVERFINE	VPS1030 PWM	1012017	0-150V, 0-300V	2016-03-04	2017-03-03
DC Power Supply	EVERFINE	WY12010	1009009	30V/5A	2016-03-04	2017-03-03
Power Meter	YOKOGAWA	WT-210	91KB35700	15/30/60/150/300/600 V	2016-03-04	2017-03-03
Goniophotometer	EVERFINE	GO-R5000	YG108492N101 20001	1600mm,3000W /10A	2016-03-10	2017-03-09

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Wireless Remote Sensor	N/A	433MHz	N/A	0°C~50°C;-20°C~60°C	2015-03-24	2016-03-23
Standard Light Source	EVERFINE	D908	1012003	N/A	2015-09-08	2016-09-07

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Shenzhen) attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).

4. Test Method

Product was tested with no seasoning. All stabilization and measurements were made in compliance with IES LM-79-08. The product was operated at rated voltage or at voltage required by manufacturer. The ambient temperature of the sample was maintained at 25°C±1°C during measurement. And relative humidity is less than 65%.

Integrating Sphere System

The system includes AC power source, digital power meter, DC power supply, spectrophotometer, and integrating sphere. The integrating sphere system is calibrated by standard light source before measurement. The system and standard light source has been calibrated regularly and traceable to the National Primary Standards.

4π geometry was used during measurement. The product was operated in its intended orientation in application and was recorded in this report.

The uncertainty of the light output (luminous flux) measurements is U=2.1% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=32K (K=2), at the 95% confidence level. The uncertainty of the CRI is U=2.1 (K=2), at the 95% confidence level.

Goniophotometer System

The goniophotometer system is calibrated by standard light source before measurement. The standard light source has been calibrated regularly and traceable to the National Primary Standards.

Type C goniophotometer was used for measuring total luminous flux, luminous intensity distribution, and color spatial uniformity. The product was operated in its intended orientation in application and was recorded in this report.

The uncertainty of the luminous intensity is U=2.82% (K=2), at the 95% confidence level.

Additional Test

The Additional Test item may not be covered by IESNA LM-79-2008. Additional test including power factor, off-state power and THD, was measured by Digital Power Meter after stabilized at 25°C±1°C. Test voltage for THD and power factor test would be equal to rated voltage or, in case of a voltage range, maximum value of that range.

The uncertainty of power meter AC current U=0.19 % of rdg, AC Voltage U=0.15% of rdg, Power U=0.20% (K=2), at the 95% confidence level.

5. Test Result

[Integrating Sphere System]

Total operating time for integrating sphere test: **1.0 hour**

Test orientation: **Downward**

Electrical Measurement

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
120.02	60	1.2175	146.0	0.999

Photometric Measurement

Luminous Flux (lm)	Radiant Flux (W)	Efficacy (lm/W)	CCT (K)	Duv
16632.2	51.541	113.919	4897	0.0024

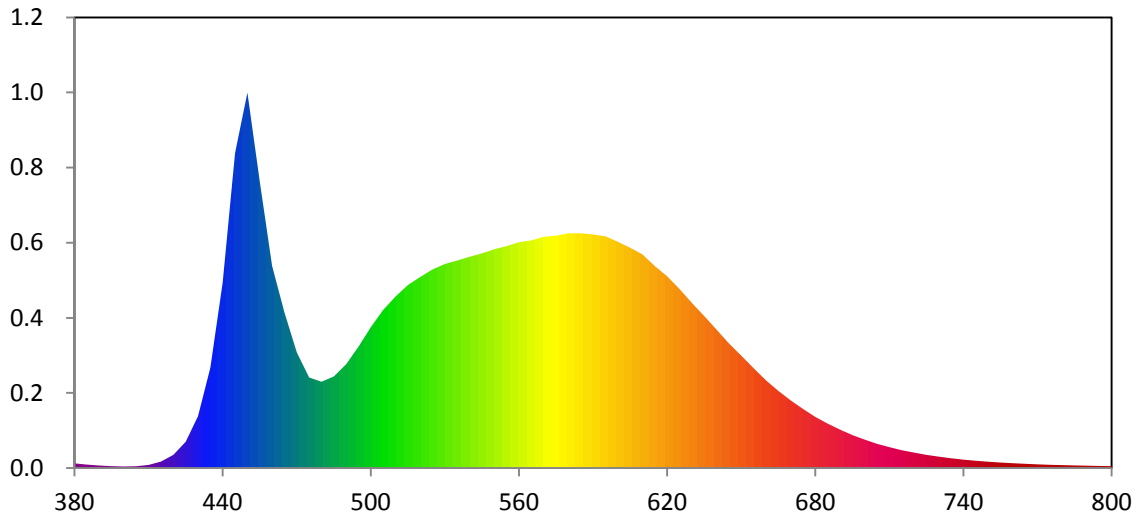
Chromaticity Coordinate

x	y	u	v	u'	v'
0.3486	0.3592	0.2109	0.3259	0.2109	0.4889

Color Rendering Index

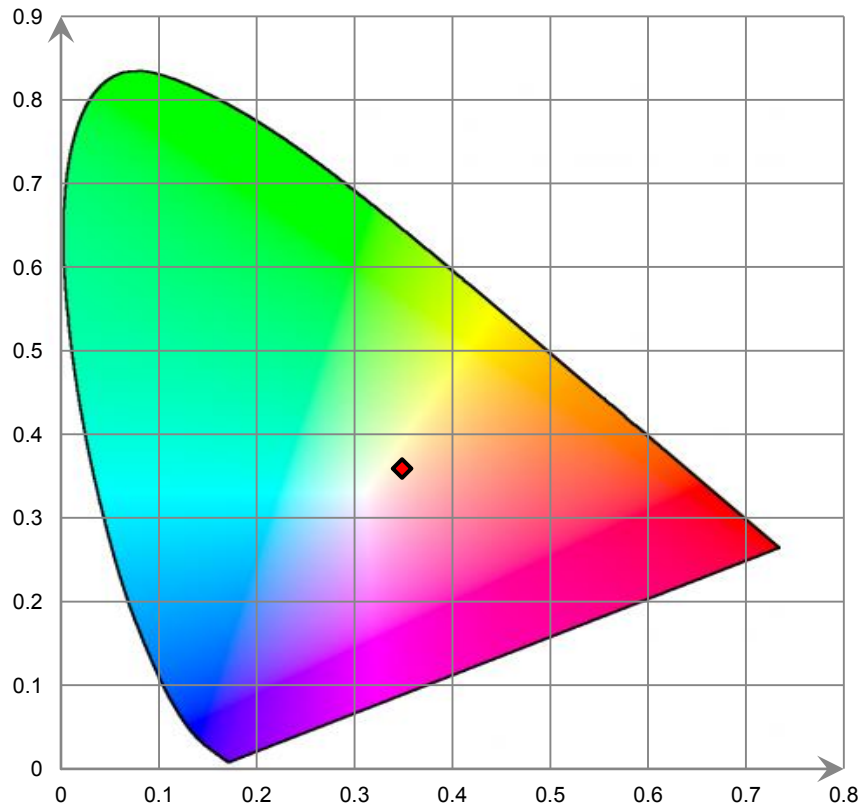
Ra			
82.6			
R1 81	R2 87	R3 92	R4 82
R5 81	R6 82	R7 88	R8 68
R9 9	R10 69	R11 81	R12 57
R13 83	R14 95	R15 75	

Relative Spectral Power Distribution

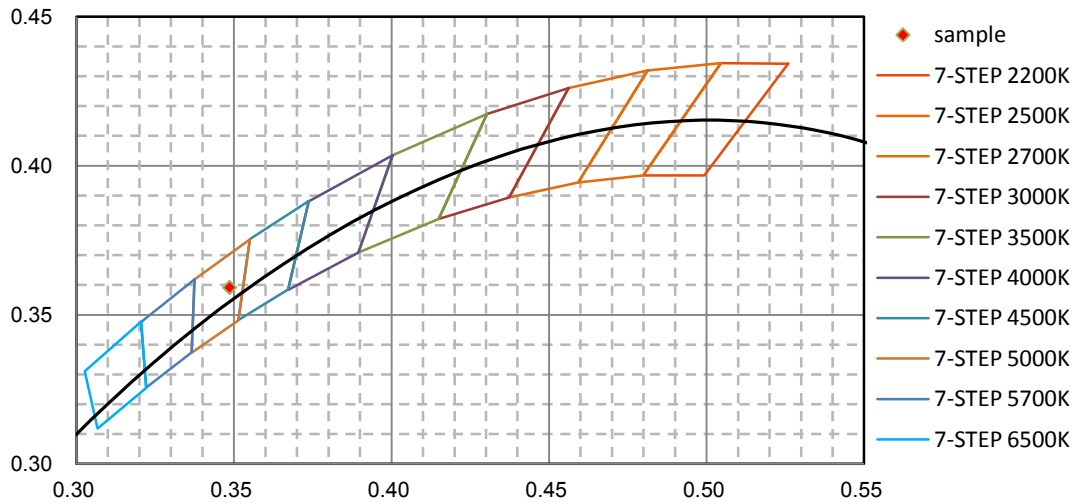


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.162E-02	465	7.025E-01	550	9.881E-01	635	6.862E-01	720	7.028E-02
385	1.607E-02	470	5.225E-01	555	1.002E+00	640	6.249E-01	725	5.992E-02
390	1.192E-02	475	4.093E-01	560	1.020E+00	645	5.628E-01	730	5.191E-02
395	9.017E-03	480	3.901E-01	565	1.028E+00	650	5.075E-01	735	4.461E-02
400	7.523E-03	485	4.140E-01	570	1.044E+00	655	4.509E-01	740	3.833E-02
405	8.741E-03	490	4.694E-01	575	1.049E+00	660	3.961E-01	745	3.338E-02
410	1.470E-02	495	5.487E-01	580	1.060E+00	665	3.487E-01	750	2.897E-02
415	2.972E-02	500	6.365E-01	585	1.060E+00	670	3.057E-01	755	2.531E-02
420	5.992E-02	505	7.144E-01	590	1.055E+00	675	2.673E-01	760	2.230E-02
425	1.187E-01	510	7.748E-01	595	1.046E+00	680	2.310E-01	765	1.972E-02
430	2.346E-01	515	8.263E-01	600	1.022E+00	685	2.009E-01	770	1.715E-02
435	4.531E-01	520	8.630E-01	605	9.948E-01	690	1.739E-01	775	1.511E-02
440	8.382E-01	525	8.970E-01	610	9.644E-01	695	1.493E-01	780	1.380E-02
445	1.421E+00	530	9.215E-01	615	9.119E-01	700	1.286E-01		
450	1.695E+00	535	9.372E-01	620	8.655E-01	705	1.098E-01		
455	1.294E+00	540	9.539E-01	625	8.084E-01	710	9.485E-02		
460	9.127E-01	545	9.693E-01	630	7.456E-01	715	8.085E-02		

CIE 1931 x y Chromaticity Diagram



7-Step & 4-Step Chromaticity Quadrangles



[Goniophotometer System]

Total operating time for luminous intensity distribution: **1.0 hour**

Test orientation: **Downward**

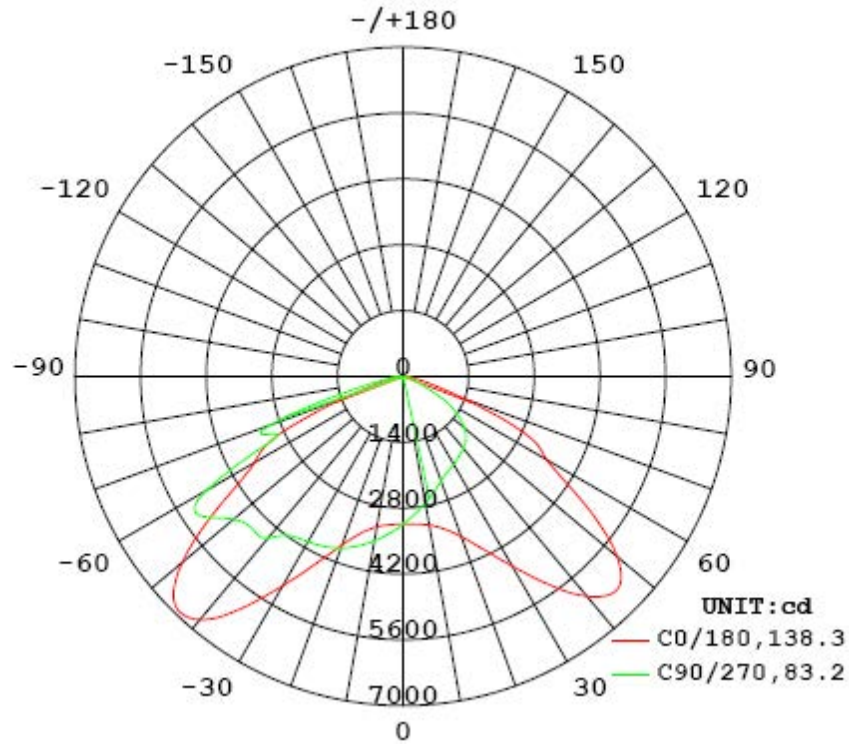
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.05	60	1.2211	146.48	0.9992

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
16709.2	114.07	7593	2.10	1.01

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	138.3	58.3	83.2	59.9	84.9
Field Angle (10% I _{max}):	155.8	152.1	143.5	152.5	151.0

Luminous Intensity (cd) Distribution Data

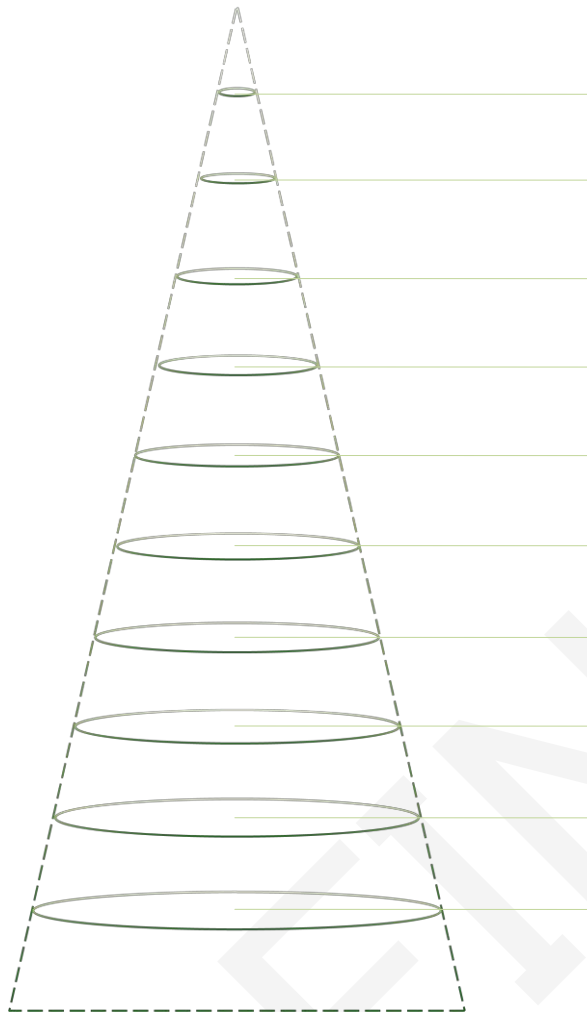
C \ y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	3141	3141	3141	3141	3141	3141	3141	3141
5.0°	3165	3247	3308	3339	3348	3335	3299	3237
10.0°	3248	3424	3519	3551	3550	3537	3494	3393
15.0°	3445	3720	3791	3764	3733	3740	3741	3654
20.0°	3811	4157	4128	3970	3885	3931	4047	4038
25.0°	4380	4714	4519	4158	3988	4102	4406	4526
30.0°	5138	5420	4992	4334	4059	4264	4836	5124
35.0°	6025	6342	5578	4526	4146	4451	5374	5919
40.0°	6749	7238	6266	4957	4488	4843	5983	6685
45.0°	6879	7584	6892	5216	4567	5092	6545	7092
50.0°	6160	7341	7044	5329	4727	5201	6678	7007
55.0°	4761	6169	7177	5734	5197	5636	6935	5982
60.0°	3670	4313	6847	5967	4856	5916	6731	4232
65.0°	2934	3140	5520	4302	2943	4248	5447	3158
70.0°	1326	2518	3468	3751	3009	3810	3337	2279
75.0°	531	1044	1989	2284	1200	2297	2017	948
80.0°	226	306	1560	772	418	780	1497	290
85.0°	71	84	490	248	137	245	460	79
90.0°	4	3	2	1	1	37	2	4
95.0°	1	1	1	0	0	0	1	1
100.0°	2	1	1	1	0	1	1	1
105.0°	2	1	1	1	1	1	1	2
110.0°	2	2	1	1	1	1	1	2
115.0°	2	2	1	1	1	1	1	2
120.0°	2	2	1	1	1	1	1	2
125.0°	2	2	1	1	1	1	1	2
130.0°	3	2	1	1	1	1	2	2
135.0°	3	2	2	1	1	2	2	3
140.0°	3	3	2	2	2	2	3	3
145.0°	3	3	3	2	2	3	3	4
150.0°	4	3	3	3	3	3	4	4
155.0°	4	4	4	3	3	4	4	5
160.0°	4	4	4	4	4	4	5	5
165.0°	4	4	4	4	4	4	5	4
170.0°	4	4	4	4	4	4	4	4
175.0°	4	4	4	4	4	4	4	4
180.0°	3	3	3	3	3	3	4	4

Luminous Intensity (cd) Distribution Data (cont.)

C \ Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	3141	3141	3141	3141	3141	3141	3141	3141
5.0°	3152	3068	2997	2951	2935	2952	3000	3074
10.0°	3209	3007	2845	2760	2737	2762	2854	3027
15.0°	3355	2965	2668	2554	2542	2557	2693	3018
20.0°	3625	2964	2478	2351	2369	2356	2526	3084
25.0°	4057	3091	2339	2179	2242	2189	2418	3296
30.0°	4656	3366	2290	2044	2156	2062	2415	3674
35.0°	5396	3701	2286	1930	2076	1951	2452	4117
40.0°	6103	3969	2260	1820	1995	1842	2438	4469
45.0°	6435	4142	2180	1695	1895	1717	2352	4636
50.0°	5960	4058	2035	1520	1711	1541	2178	4429
55.0°	4721	3507	1795	1281	1414	1301	1895	3731
60.0°	3534	2657	1456	1005	1036	1030	1519	2755
65.0°	2879	1788	1038	674	496	707	1082	1812
70.0°	1391	927	597	330	281	349	612	977
75.0°	561	436	288	199	174	203	292	458
80.0°	242	210	147	132	121	137	154	221
85.0°	76	63	54	57	63	59	64	73
90.0°	0	1	1	1	1	1	1	1
95.0°	1	1	1	1	1	1	1	1
100.0°	1	1	2	1	2	2	1	1
105.0°	1	2	2	2	2	2	2	2
110.0°	1	2	2	2	2	2	2	2
115.0°	2	2	2	2	2	3	2	2
120.0°	2	2	3	3	3	3	3	3
125.0°	2	3	3	3	3	3	3	3
130.0°	2	3	4	4	3	4	3	3
135.0°	3	3	4	4	3	4	4	4
140.0°	3	3	4	4	3	3	4	3
145.0°	3	3	3	4	4	4	3	3
150.0°	3	3	3	3	3	3	3	3
155.0°	3	3	3	3	3	3	3	3
160.0°	3	3	3	3	3	3	3	3
165.0°	3	3	3	3	3	3	3	3
170.0°	3	3	3	3	3	3	3	3
175.0°	3	3	3	3	3	3	3	4
180.0°	3	3	3	3	3	3	4	4

Average Area Illumination Figure

Angle: 84.9°. Flux out: 6493.0lm.



Height (m)	Diameter (cm)	E _{avg} (lx)	E _{max} (lx)
0.5	91.47	9507.0	14138.0
1.0	182.95	2377.0	3534.0
1.5	274.42	1056.0	1571.0
2.0	365.89	594.2	883.6
2.5	457.36	380.3	565.5
3.0	548.84	264.1	392.7
3.5	640.31	194.0	288.5
4.0	731.78	148.5	220.9
4.5	823.25	117.4	174.5
5.0	914.73	95.1	141.4

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	75.2	0.45
5-10	226.5	1.36
10-15	381.2	2.28
15-20	543.9	3.25
20-25	722.5	4.33
25-30	928.1	5.55
30-35	1169.8	7.00
35-40	1444.7	8.65
40-45	1712.9	10.25
45-50	1875.0	11.22
50-55	1911.6	11.44
55-60	1812.8	10.85
60-65	1522.1	9.11
65-70	1117.2	6.69
70-75	709.1	4.24
75-80	356.3	2.13
80-85	154.6	0.93
85-90	32.0	0.19
90-95	0.7	0.00
95-100	0.6	0.01
100-105	0.7	0.00
105-110	0.8	0.01
110-115	0.9	0.00
115-120	0.9	0.01
120-125	1.0	0.00
125-130	1.0	0.01
130-135	1.1	0.00
135-140	1.0	0.01
140-145	1.0	0.01
145-150	0.9	0.00
150-155	0.8	0.01
155-160	0.7	0.00
160-165	0.6	0.01
165-170	0.4	0.00
170-175	0.2	0.00
175-180	0.1	0.00

Deg	Flux (lm)	%
0-5	75.2	0.45
0-10	301.7	1.81
0-15	682.9	4.09
0-20	1226.9	7.34
0-25	1949.4	11.67
0-30	2877.5	17.22
0-35	4047.4	24.22
0-40	5492.1	32.87
0-45	7205.0	43.12
0-50	9080.0	54.34
0-55	10991.6	65.78
0-60	12804.4	76.63
0-65	14326.5	85.74
0-70	15443.7	92.43
0-75	16152.8	96.67
0-80	16509.0	98.80
0-85	16663.6	99.73
0-90	16695.6	99.92
0-95	16696.4	99.92
0-100	16696.9	99.93
0-105	16697.6	99.93
0-110	16698.4	99.94
0-115	16699.3	99.94
0-120	16700.3	99.95
0-125	16701.2	99.95
0-130	16702.2	99.96
0-135	16703.3	99.96
0-140	16704.3	99.97
0-145	16705.3	99.98
0-150	16706.3	99.98
0-155	16707.1	99.99
0-160	16707.9	99.99
0-165	16708.4	100.00
0-170	16708.8	100.00
0-175	16709.1	100.00
0-180	16709.2	100.00

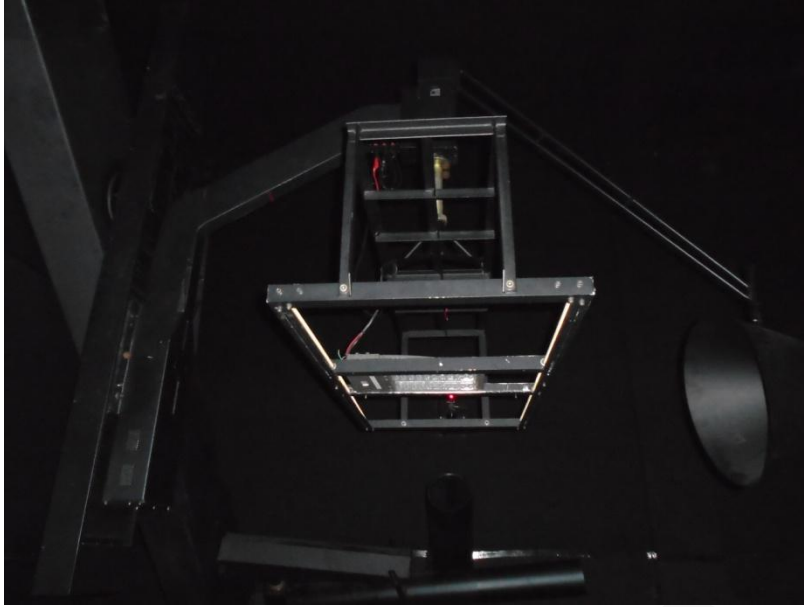
[Additional Test]

Test Item	Test Voltage (V)	Frequency (Hz)	Test Result
Power Factor:	277.0	60	0.9233
Total Harmonic Distortion:	277.0	60	12.16%
Total Harmonic Distortion:	120.0	60	9.81%

6. Product Photo



7. Product Test orientation in the Goniophotometer



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