

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

P.Q.L., Inc.

2285 Ward Avenue / Simi Valley, CA 93065

Test Model: 83233

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Daniel Duan <i>Daniel Duan</i>
Report Number:	RSZ160316516-10A2
Test Date:	2016-06-07
Report Date:	2016-06-14
Reviewed By:	Jeanne Han/Safety Manager <i>Jeanne Han</i>
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008
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.

STATEMENT: This test may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Shenzhen). The test data was only valid for the test sample(s). This report **must not** be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Federal Government. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

1. Product Description

General Information:

One sample was received on 2016-03-16 and used for testing.

Model Tested: 83233
 Manufacturer: P.Q.L., Inc.
 Brand Name: Superior Life®
 Product Designation: Parking Garage Luminaires
 Dimmable: Continuous Dimming
 Dimming Range: 10% to 100%
 Burning Time Before Test: 0 hour (For New Products)

Rated Values:

Rated Voltage/Frequency: 120-277V AC 60Hz
 Rated Power: 65W
 Nominal CCT: 6700 lm
 Nominal Lumen Output: 5000K
 Nominal CRI: 70

2. Standards Used

IES 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
 IES TM-30-15: IES Method for Evaluating Light Source Color Rendition (This method is not in NVLAP accreditation scope)

3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
2.0m integrating sphere	EVERFINE	R98	11010018	R98	2015-11-09	2016-11-08
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	380-780nm	2016-03-10	2017-03-09
DC Power Supply	EVERFINE	WY305-V1	1101047	30V/5A	2015-07-27	2016-07-26
Thermal Meter	Anymetre	JR900A	N/A	25°C	2016-01-12	2017-01-11
Standard Light Source	SENSING	N/A	LSD090808	N/A	2015-09-25	2016-09-24
AC Power Supply	EVERFINE	DPS1010-YF	1011001T	30V/5A	2016-03-04	2017-03-03
Variable-Voltage Transformer	CHKO	TDGC2G-3	201102	0-600v	N/A	N/A

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 $25^{\circ}\text{C}\pm 1^{\circ}\text{C}$ during measurement. And relative humidity is less than 65%.

Integrating Sphere System

The system includes AC power source, digital power meter, DC power supply, Spectroradiometer, and integrating sphere. The integrating sphere system is calibrated by standard spectrum light source before measurement.

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 $U=32\text{K}$ ($K=2$), at the 95% confidence level. The uncertainty of the CRI is $U=2.1$ ($K=2$), at the 95% confidence level.

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.

Fidelity Index and Gamut Index Calculation

The R_f , R_g was calculated according to IES TM-30-15 by using calculation tools. The calculation was based on the measured SPD from 380nm to 780nm with 1nm intervals. All the colors in this report is for reference only.

5. Test Result

[Integrating Sphere System]

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

Test orientation: **Downward**

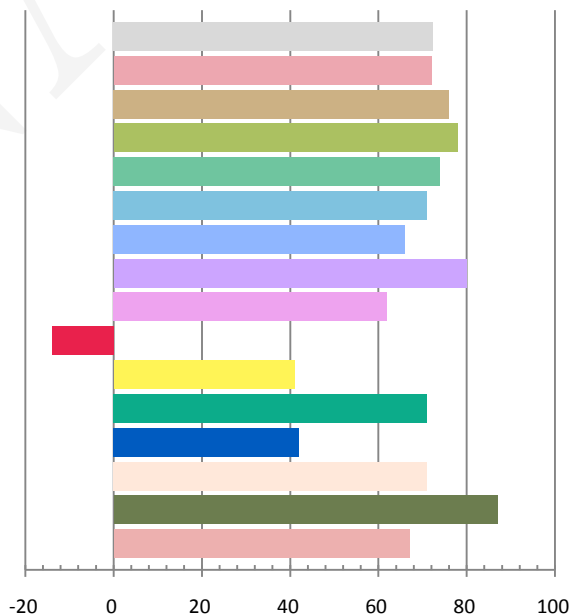
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
119.9	60	0.5415	64.58	0.9945	6713.7	103.96

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
20.507	4777	0.0000513	0.3517	0.3569	0.2138	0.4882

Color Rendering Index

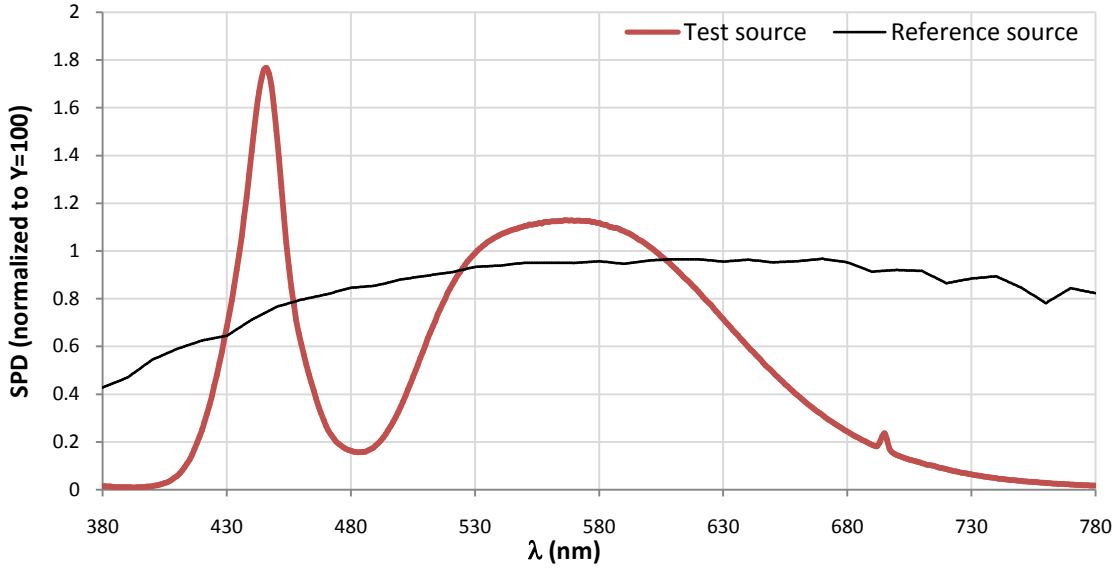
Ra			
72.3			
R1	R2	R3	R4
72	76	78	74
R5	R6	R7	R8
71	66	80	62
R9	R10	R11	R12
-14	41	71	42
R13	R14	R15	
71	87	67	
Ra			
72.3			



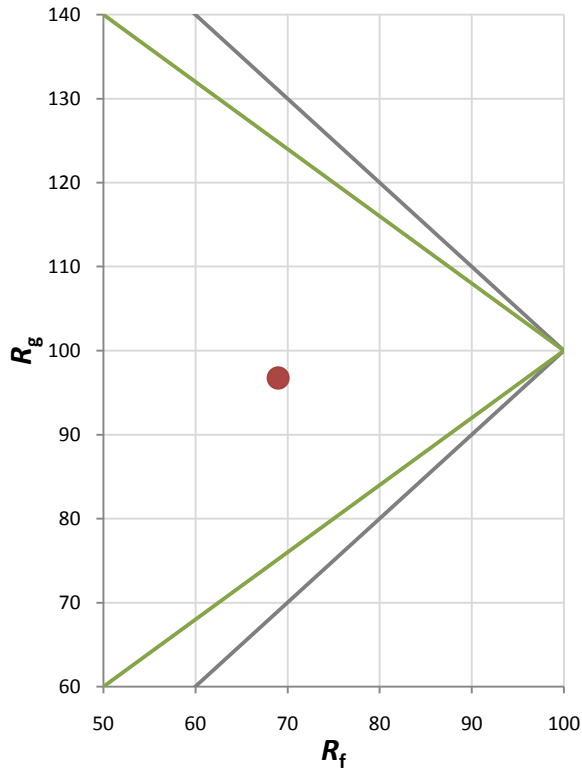
Fidelity Index and Gamut Index

Fidelity Index R_f	69
Gamut Index R_g	97

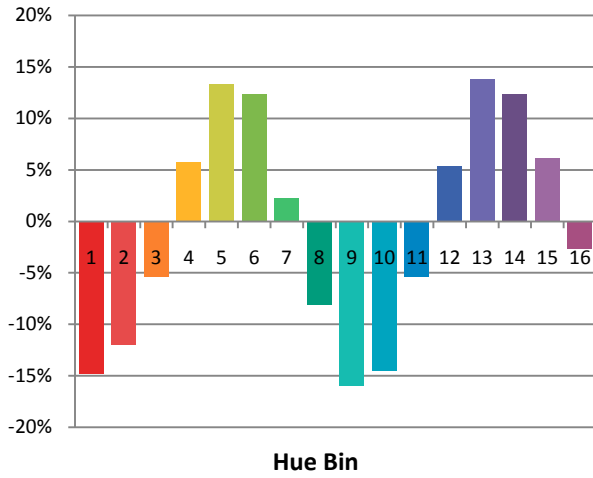
Spectral Power Distribution Comparison



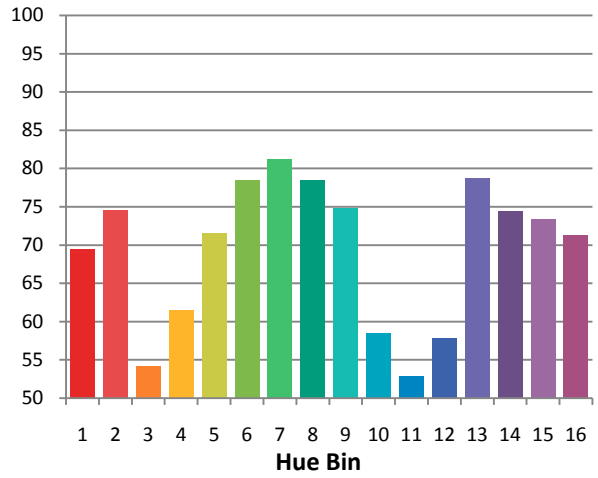
Plot of R_g versus R_f



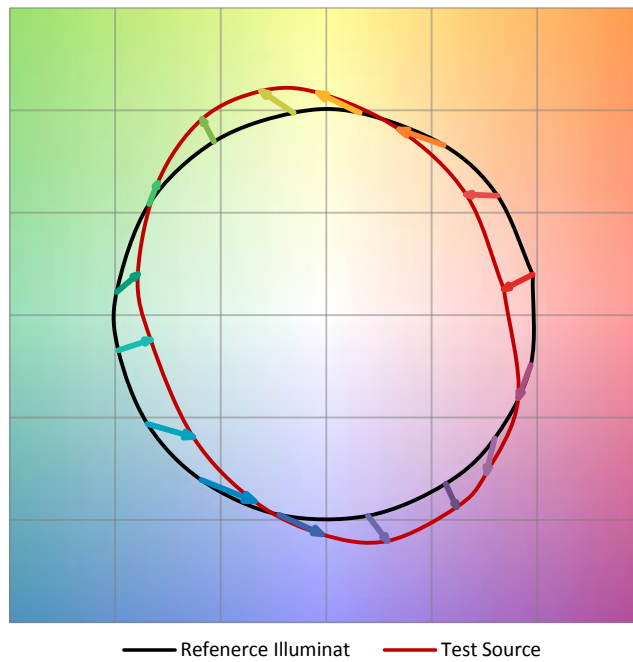
Chroma Shift by Hue



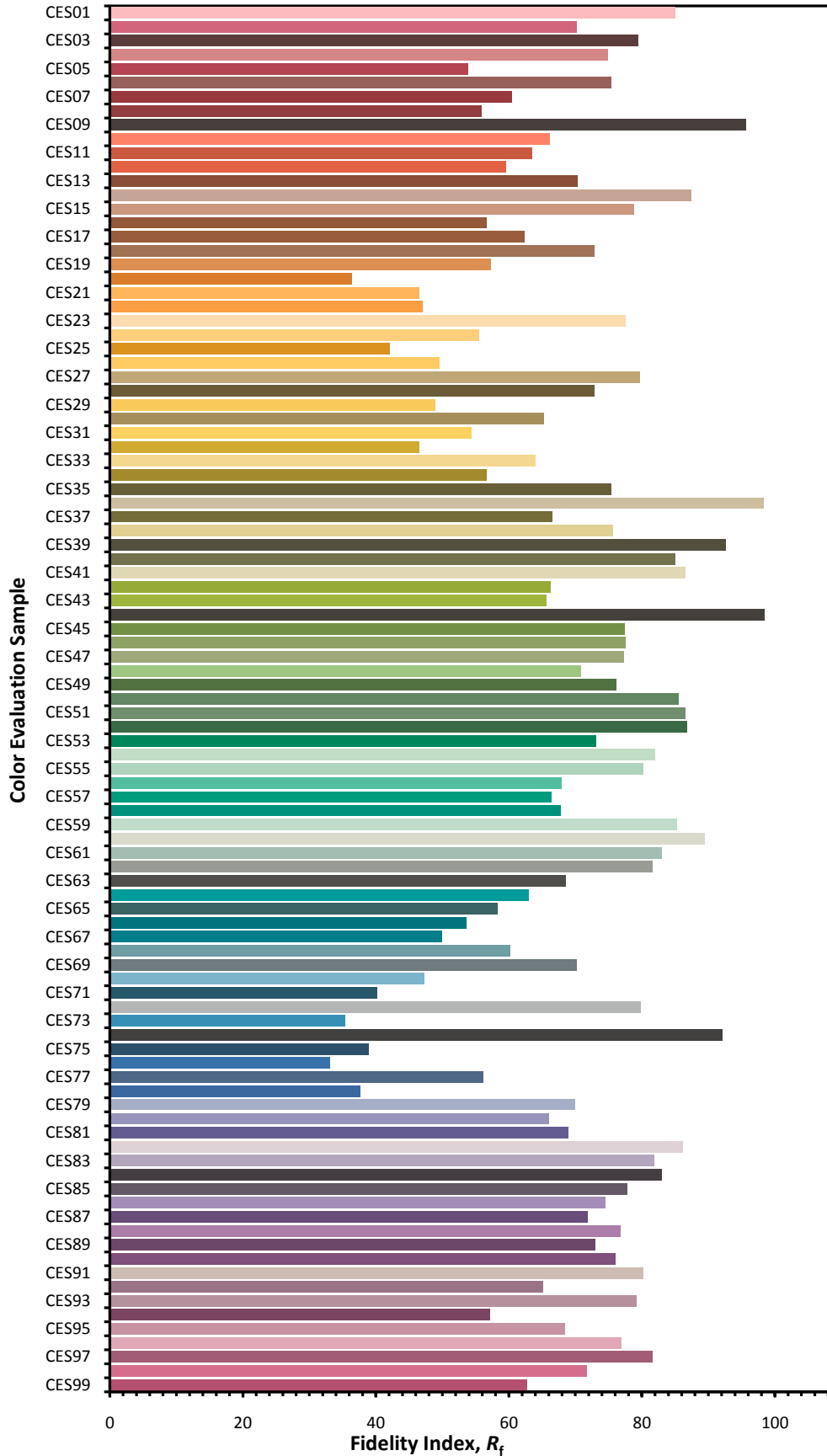
Rf by Hue



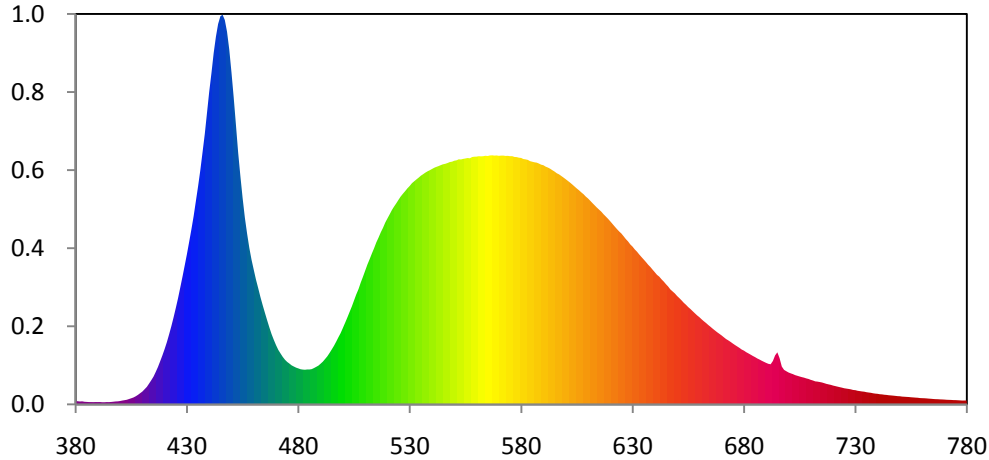
Color Vector Graphic



Color Fidelity by CES Sample



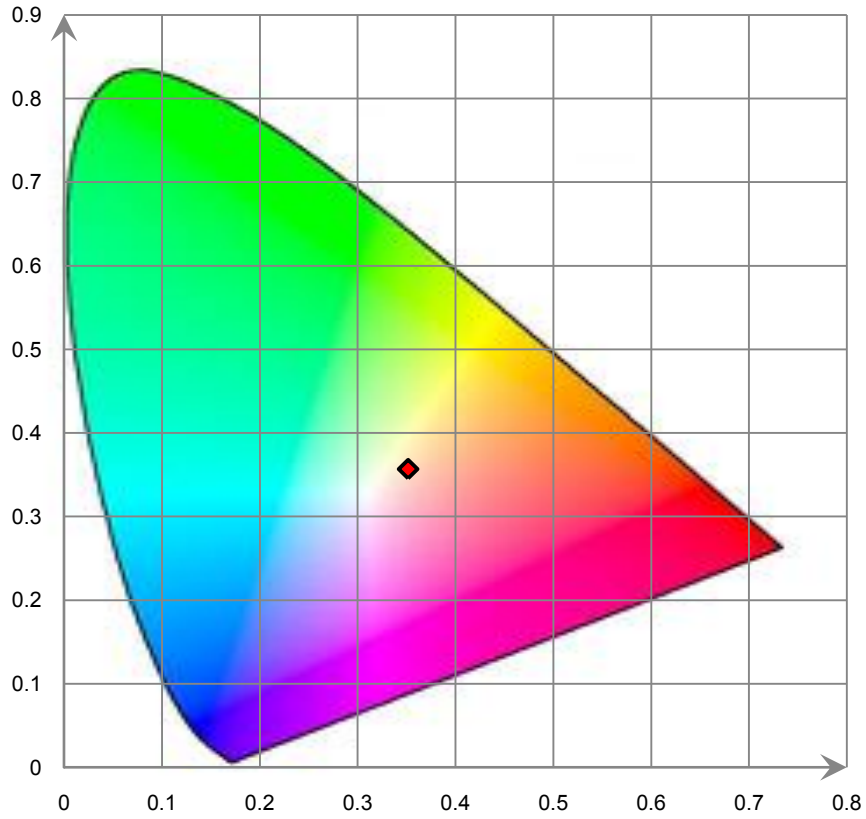
Relative Spectral Power Distribution



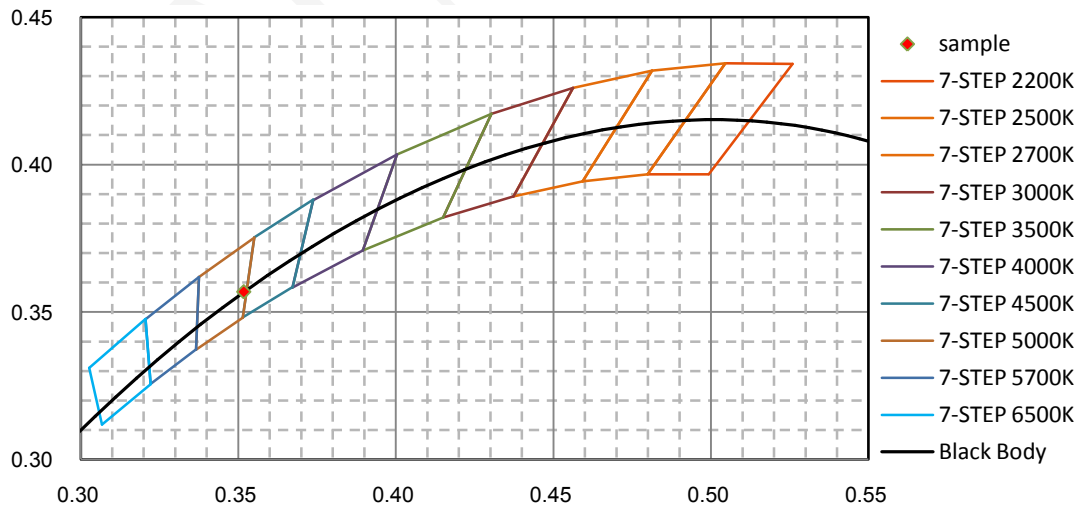
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.584E+00	421	2.773E+01	462	5.172E+01	503	4.117E+01	544	1.066E+02
381	1.393E+00	422	3.121E+01	463	4.775E+01	504	4.357E+01	545	1.070E+02
382	1.287E+00	423	3.482E+01	464	4.420E+01	505	4.630E+01	546	1.072E+02
383	1.360E+00	424	3.873E+01	465	4.079E+01	506	4.898E+01	547	1.075E+02
384	1.159E+00	425	4.292E+01	466	3.748E+01	507	5.131E+01	548	1.079E+02
385	1.100E+00	426	4.722E+01	467	3.426E+01	508	5.421E+01	549	1.081E+02
386	1.030E+00	427	5.201E+01	468	3.130E+01	509	5.682E+01	550	1.085E+02
387	1.030E+00	428	5.681E+01	469	2.872E+01	510	5.952E+01	551	1.087E+02
388	1.009E+00	429	6.186E+01	470	2.638E+01	511	6.228E+01	552	1.092E+02
389	1.035E+00	430	6.690E+01	471	2.428E+01	512	6.467E+01	553	1.091E+02
390	1.021E+00	431	7.237E+01	472	2.267E+01	513	6.718E+01	554	1.093E+02
391	1.043E+00	432	7.796E+01	473	2.116E+01	514	6.955E+01	555	1.095E+02
392	9.560E-01	433	8.378E+01	474	1.988E+01	515	7.214E+01	556	1.098E+02
393	9.514E-01	434	9.047E+01	475	1.890E+01	516	7.429E+01	557	1.096E+02
394	1.028E+00	435	9.708E+01	476	1.818E+01	517	7.661E+01	558	1.102E+02
395	1.015E+00	436	1.043E+02	477	1.737E+01	518	7.864E+01	559	1.103E+02
396	1.070E+00	437	1.122E+02	478	1.686E+01	519	8.095E+01	560	1.103E+02
397	1.189E+00	438	1.203E+02	479	1.637E+01	520	8.285E+01	561	1.105E+02
398	1.309E+00	439	1.297E+02	480	1.601E+01	521	8.466E+01	562	1.105E+02
399	1.356E+00	440	1.392E+02	481	1.565E+01	522	8.657E+01	563	1.105E+02
400	1.499E+00	441	1.475E+02	482	1.550E+01	523	8.815E+01	564	1.107E+02
401	1.698E+00	442	1.564E+02	483	1.542E+01	524	8.962E+01	565	1.106E+02
402	1.886E+00	443	1.637E+02	484	1.555E+01	525	9.119E+01	566	1.109E+02
403	2.057E+00	444	1.694E+02	485	1.554E+01	526	9.266E+01	567	1.109E+02
404	2.383E+00	445	1.729E+02	486	1.570E+01	527	9.390E+01	568	1.108E+02
405	2.709E+00	446	1.736E+02	487	1.616E+01	528	9.505E+01	569	1.109E+02
406	3.077E+00	447	1.712E+02	488	1.669E+01	529	9.626E+01	570	1.107E+02
407	3.603E+00	448	1.660E+02	489	1.726E+01	530	9.731E+01	571	1.108E+02
408	4.225E+00	449	1.581E+02	490	1.811E+01	531	9.852E+01	572	1.108E+02
409	4.973E+00	450	1.479E+02	491	1.903E+01	532	9.936E+01	573	1.107E+02
410	5.700E+00	451	1.367E+02	492	2.019E+01	533	1.002E+02	574	1.107E+02
411	6.745E+00	452	1.244E+02	493	2.140E+01	534	1.010E+02	575	1.106E+02
412	7.800E+00	453	1.121E+02	494	2.288E+01	535	1.019E+02	576	1.106E+02
413	9.250E+00	454	1.016E+02	495	2.448E+01	536	1.025E+02	577	1.102E+02
414	1.077E+01	455	9.190E+01	496	2.611E+01	537	1.032E+02	578	1.102E+02
415	1.237E+01	456	8.317E+01	497	2.795E+01	538	1.038E+02	579	1.099E+02
416	1.448E+01	457	7.612E+01	498	2.992E+01	539	1.043E+02	580	1.098E+02
417	1.666E+01	458	6.972E+01	499	3.178E+01	540	1.049E+02	581	1.093E+02
418	1.923E+01	459	6.443E+01	500	3.404E+01	541	1.054E+02	582	1.091E+02
419	2.185E+01	460	5.993E+01	501	3.634E+01	542	1.058E+02	583	1.089E+02
420	2.468E+01	461	5.557E+01	502	3.870E+01	543	1.062E+02	584	1.083E+02

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.081E+02	626	7.489E+01	667	3.290E+01	708	1.156E+01	749	3.678E+00
586	1.078E+02	627	7.361E+01	668	3.213E+01	709	1.132E+01	750	3.623E+00
587	1.077E+02	628	7.258E+01	669	3.142E+01	710	1.092E+01	751	3.464E+00
588	1.073E+02	629	7.124E+01	670	3.069E+01	711	1.063E+01	752	3.414E+00
589	1.068E+02	630	7.029E+01	671	2.989E+01	712	1.025E+01	753	3.332E+00
590	1.065E+02	631	6.903E+01	672	2.909E+01	713	1.014E+01	754	3.266E+00
591	1.059E+02	632	6.802E+01	673	2.850E+01	714	9.971E+00	755	3.171E+00
592	1.055E+02	633	6.679E+01	674	2.785E+01	715	9.748E+00	756	3.104E+00
593	1.050E+02	634	6.565E+01	675	2.711E+01	716	9.466E+00	757	3.017E+00
594	1.043E+02	635	6.456E+01	676	2.644E+01	717	9.140E+00	758	2.954E+00
595	1.037E+02	636	6.343E+01	677	2.579E+01	718	8.906E+00	759	2.824E+00
596	1.029E+02	637	6.221E+01	678	2.515E+01	719	8.693E+00	760	2.763E+00
597	1.025E+02	638	6.120E+01	679	2.443E+01	720	8.392E+00	761	2.728E+00
598	1.018E+02	639	6.001E+01	680	2.394E+01	721	8.145E+00	762	2.658E+00
599	1.010E+02	640	5.885E+01	681	2.328E+01	722	7.920E+00	763	2.556E+00
600	1.003E+02	641	5.770E+01	682	2.271E+01	723	7.676E+00	764	2.495E+00
601	9.954E+01	642	5.688E+01	683	2.215E+01	724	7.446E+00	765	2.394E+00
602	9.875E+01	643	5.573E+01	684	2.157E+01	725	7.191E+00	766	2.330E+00
603	9.791E+01	644	5.471E+01	685	2.106E+01	726	7.021E+00	767	2.304E+00
604	9.702E+01	645	5.356E+01	686	2.046E+01	727	6.871E+00	768	2.228E+00
605	9.614E+01	646	5.247E+01	687	1.996E+01	728	6.693E+00	769	2.193E+00
606	9.535E+01	647	5.119E+01	688	1.943E+01	729	6.417E+00	770	2.136E+00
607	9.444E+01	648	5.030E+01	689	1.893E+01	730	6.330E+00	771	2.052E+00
608	9.362E+01	649	4.941E+01	690	1.847E+01	731	6.071E+00	772	2.015E+00
609	9.257E+01	650	4.828E+01	691	1.805E+01	732	5.914E+00	773	1.979E+00
610	9.174E+01	651	4.734E+01	692	1.789E+01	733	5.750E+00	774	1.921E+00
611	9.072E+01	652	4.635E+01	693	1.934E+01	734	5.657E+00	775	1.887E+00
612	8.968E+01	653	4.526E+01	694	2.183E+01	735	5.418E+00	776	1.838E+00
613	8.866E+01	654	4.438E+01	695	2.319E+01	736	5.281E+00	777	1.781E+00
614	8.766E+01	655	4.332E+01	696	2.061E+01	737	5.142E+00	778	1.711E+00
615	8.674E+01	656	4.248E+01	697	1.685E+01	738	4.946E+00	779	1.730E+00
616	8.581E+01	657	4.151E+01	698	1.538E+01	739	4.802E+00	780	1.733E+00
617	8.468E+01	658	4.056E+01	699	1.478E+01	740	4.699E+00		
618	8.367E+01	659	3.964E+01	700	1.420E+01	741	4.527E+00		
619	8.267E+01	660	3.884E+01	701	1.383E+01	742	4.454E+00		
620	8.156E+01	661	3.791E+01	702	1.345E+01	743	4.301E+00		
621	8.038E+01	662	3.703E+01	703	1.303E+01	744	4.216E+00		
622	7.923E+01	663	3.624E+01	704	1.273E+01	745	4.070E+00		
623	7.810E+01	664	3.536E+01	705	1.243E+01	746	3.991E+00		
624	7.703E+01	665	3.456E+01	706	1.214E+01	747	3.896E+00		
625	7.611E+01	666	3.371E+01	707	1.190E+01	748	3.788E+00		

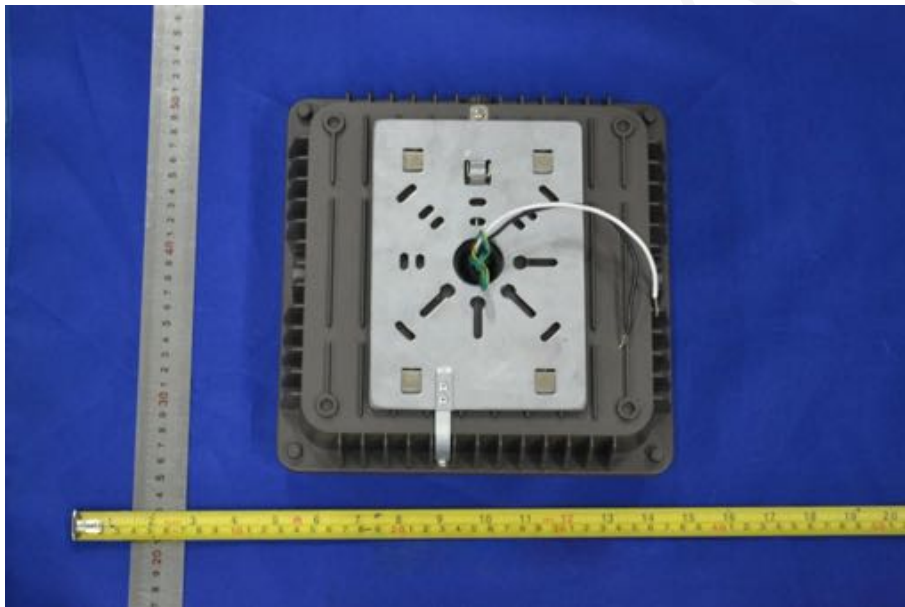
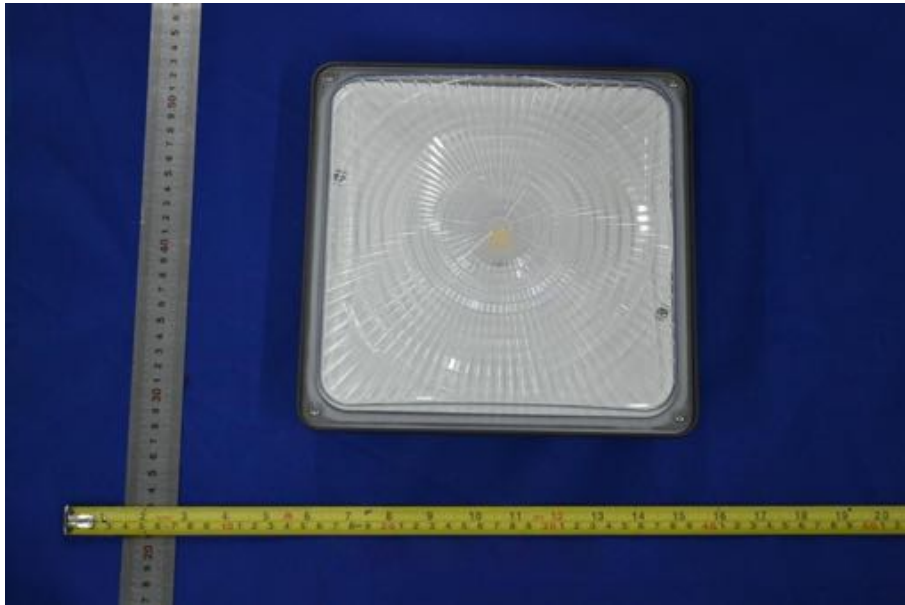
CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



6. Product Photo



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