



IES LM-79-08

MEASUREMENT AND TEST REPORT

For

MaxLite Inc.

12 York Ave West Caldwell NJ US 07006

Test Model: ML4LE109SPLBK2

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Hexy He <i>Hexy He</i>
Report Number:	R1KS180822001-10-1-M1
Test Date:	2018-08-28
Report Date:	2018-09-25
Reviewed By:	Blake Zhang / EE Engineer <i>Blake Zhang</i>
Revised Note:	The previous report R1KS180822001-10-1 is replaced by this report on 2018-07-12
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.69, Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax: +86-0769-86858588
Test Facility:	Test facility was located at No.69, Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.
Accreditation:	The IAS Accreditation Number TL-460.

Note: The test data was only valid for the test sample(s). This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan). 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:

Two samples were received on 2018-08-22.

Model Tested: ML4LE109SPLBK2

Manufacturer: MaxLite Inc.

Brand Name: MaxLite

Product Designation: Non-directional Wall Sconces

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

Rated Values:

Rated Voltage/Frequency: 120VAC 60Hz

Rated Power: 9W

Nominal CCT: 2700K

Nominal Lumen Output: 550lm

Family Declaration:

MaxLite Inc. declare that there are some differences between Multiple Models and testing products. Details as below:

Testing Products	Multiple Models	Differences Items	Details	Additional Test
ML4LE109S PLBK2	ML4LE109SPL## 2	Finishing Color	## is the Finishing Color, it can be BK、 WH: BK=Black, WH=White	None

2. Standards Used

- IES LM-79-08: Approved Method: Electrical & Photometric Measurement of Solid-state Lighting Products
- ANSI C82.77-10-2014: Harmonic Emission Limits – Related Power Quality Requirements for Lighting Equipment
- IES TM-30-15: IES Method for Evaluating Light Source Color Rendition (This method is not in IAS accreditation scope)

3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
2.0m integrating sphere	EVERFINE	R98	11010018	2017-12-14	2018-12-14
spectroradiometer	EVERFINE	HAAS-2000	20140912	2017-12-14	2018-12-14
Digital Power Meter	EVERFINE	PF2010A	1011004	2018-07-28	2019-07-28
Digital CC&CV DC Power Supply	EVERFINE	WY305-V1	1101047	2018-06-15	2019-06-15
Rapid Recording Photometer	EVERFINE	PHOTO-2000F	1007010	2017-12-14	2018-12-14
Standard Light Source	EVERFINE	D204	G100283CA8351158	2018-01-08	2019-01-08
Special zero-voltage synchronous switching AC	EVERFINE	DPS1010-YF	1011001T	2018-03-19	2019-03-19
AC POWER SUPPLY	EVERFINE	VPS1030	1012017	2018-03-19	2019-03-19

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
		PWM			
Digital CC&CV DC Power Supply	EVERFINE	WY12010	1009009	2018-03-26	2019-03-26
Digital power meter	YOKOGAWA	WT-210	91j926132	2018-03-26	2019-03-26
full-field speed goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	2018-03-18	2019-03-18
Wireless Remote Sensor	N/A	433MHz	N/A	2018-03-17	2019-03-17
Standard Light Source	EVERFINE	D908	1012003	2018-01-05	2019-01-05

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) 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 $U=31\text{K}$ ($K=2$), 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 $U=0.18\%$ of rdg, Power $U=0.46\%$ ($K=2$), at the 95% confidence level.

Goniophotometer System

The goniophotometer system is calibrated by standard light source before measurement.

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 vertical angle (γ) test intervals were set no more than 1 degree while data for 5 degree intervals is reported. The horizontal angle (C plane) test intervals were set no more than 22.5 degree.

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

Fidelity Index and Gamut Index Calculation

The R_i , 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**

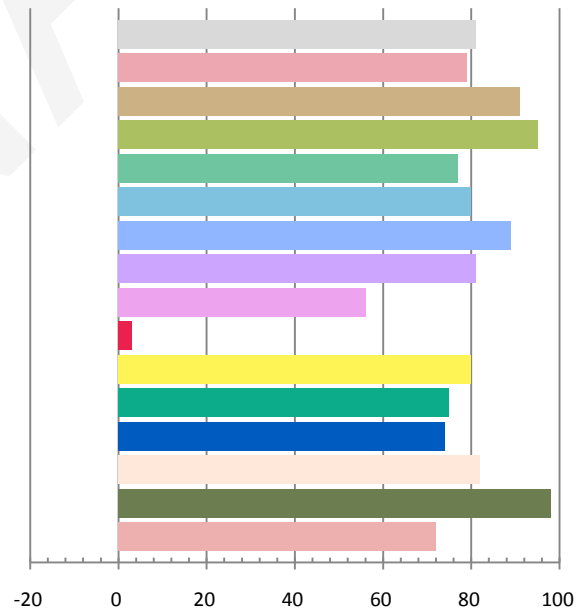
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120	60	0.1067	9.502	0.742	551.14	58

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
1.7044	2842	-0.00169	0.4459	0.4026	0.2570	0.5221

Color Rendering Index

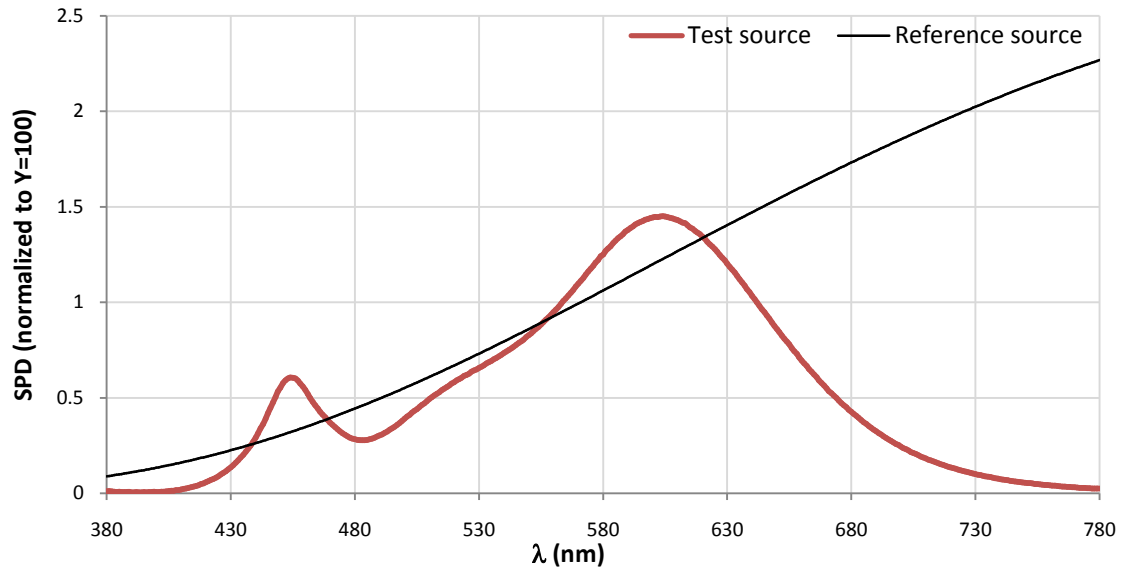
Ra			
80.9			
R1	R2	R3	R4
79	91	95	77
R5	R6	R7	R8
80	89	81	56
R9	R10	R11	R12
3	80	75	74
R13	R14	R15	
82	98	72	



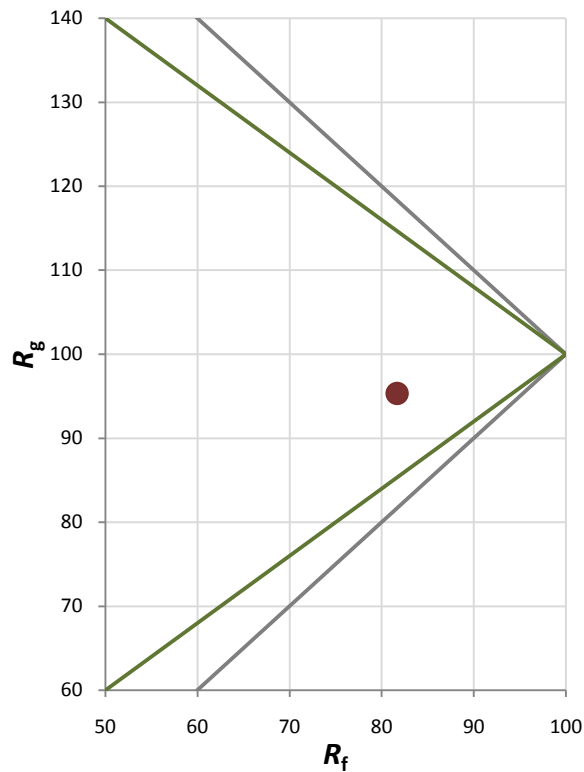
Fidelity Index and Gamut Index

Fidelity Index R_f	82
Gamut Index R_g	95

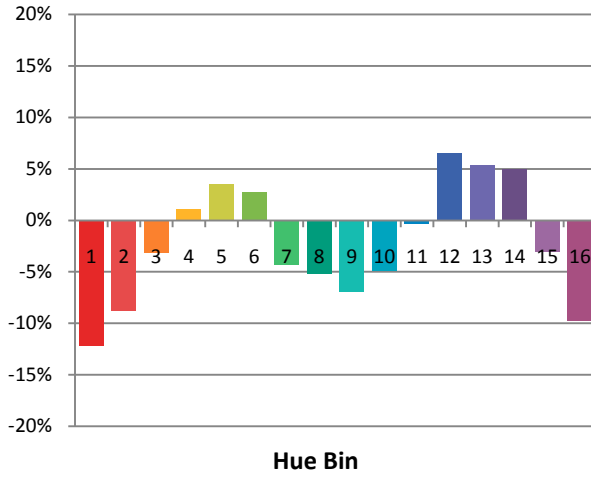
Spectral Power Distribution Comparison



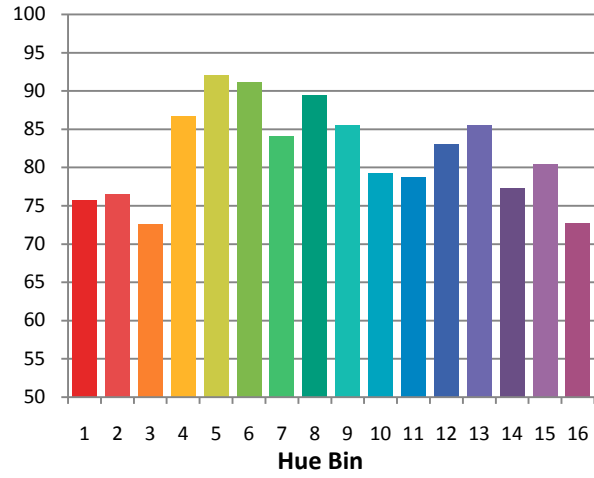
Plot of R_g versus R_f



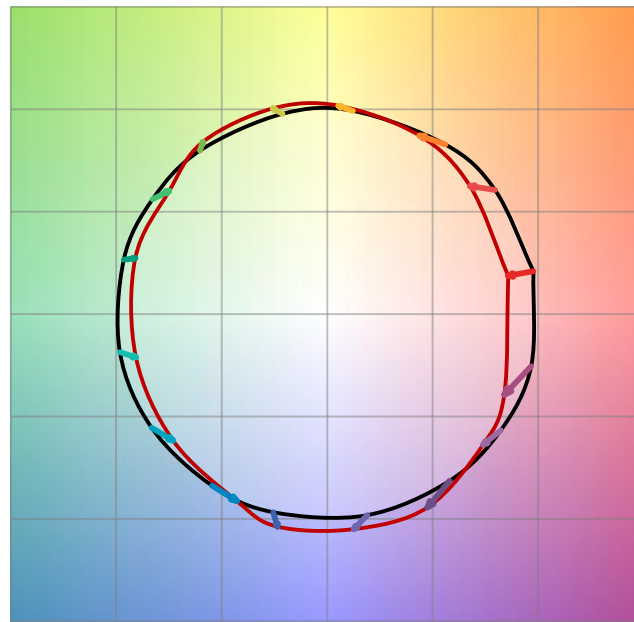
Chroma Shift by Hue



R_f by Hue

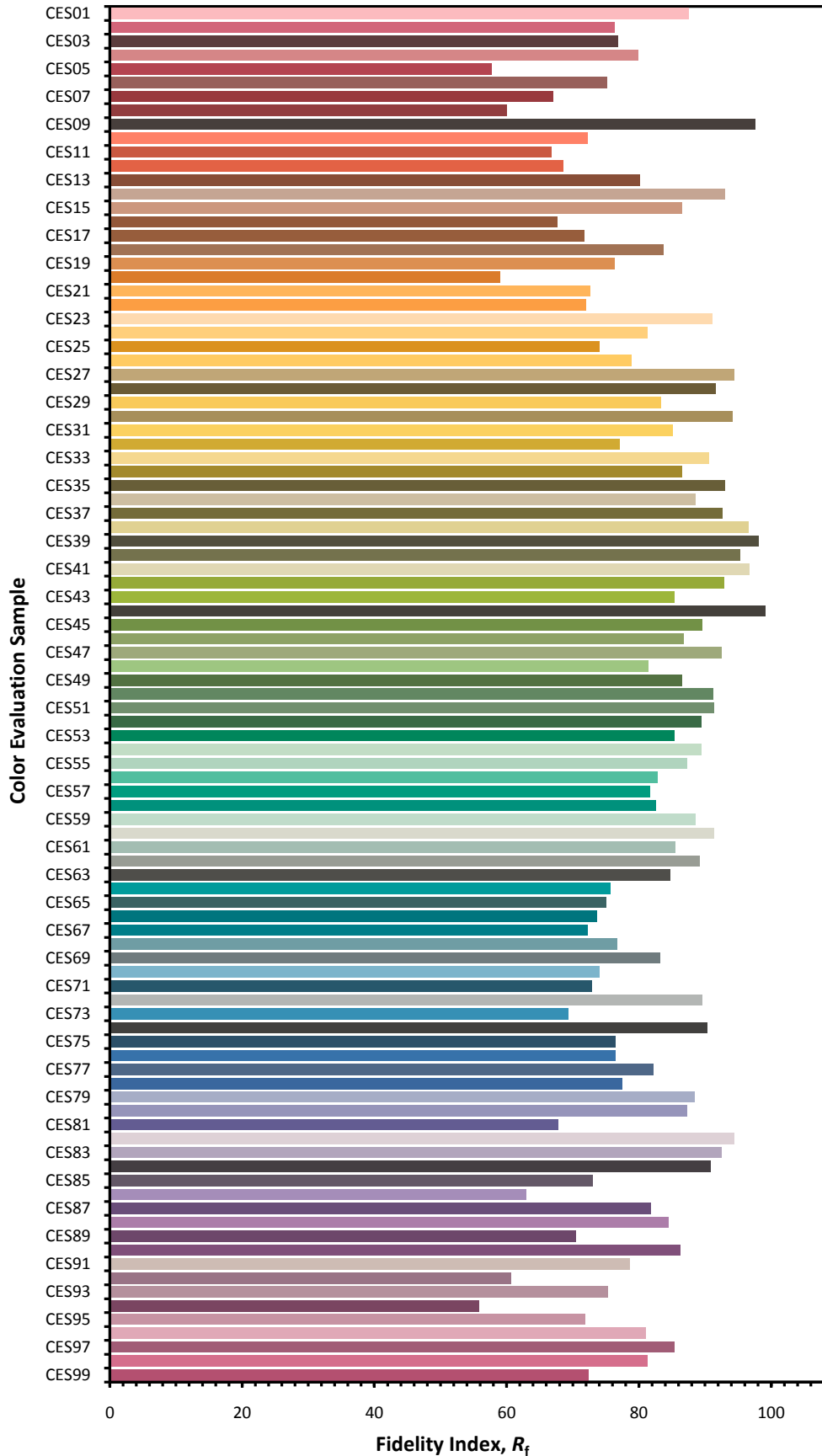


Color Vector Graphic

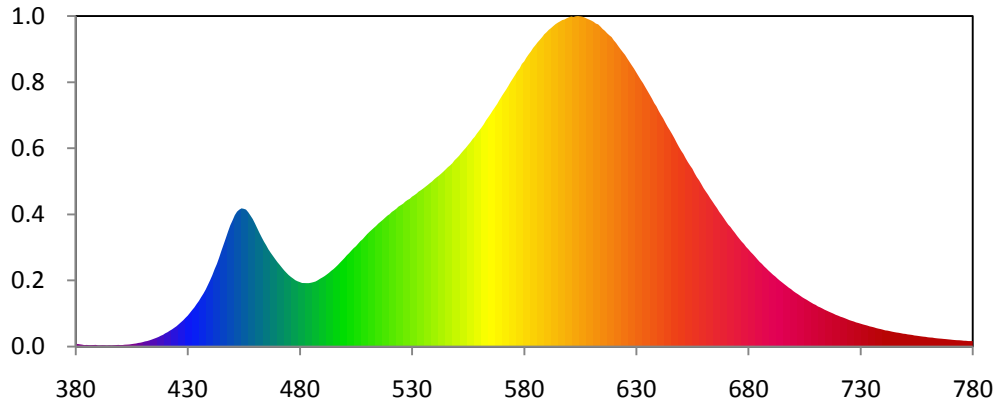


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



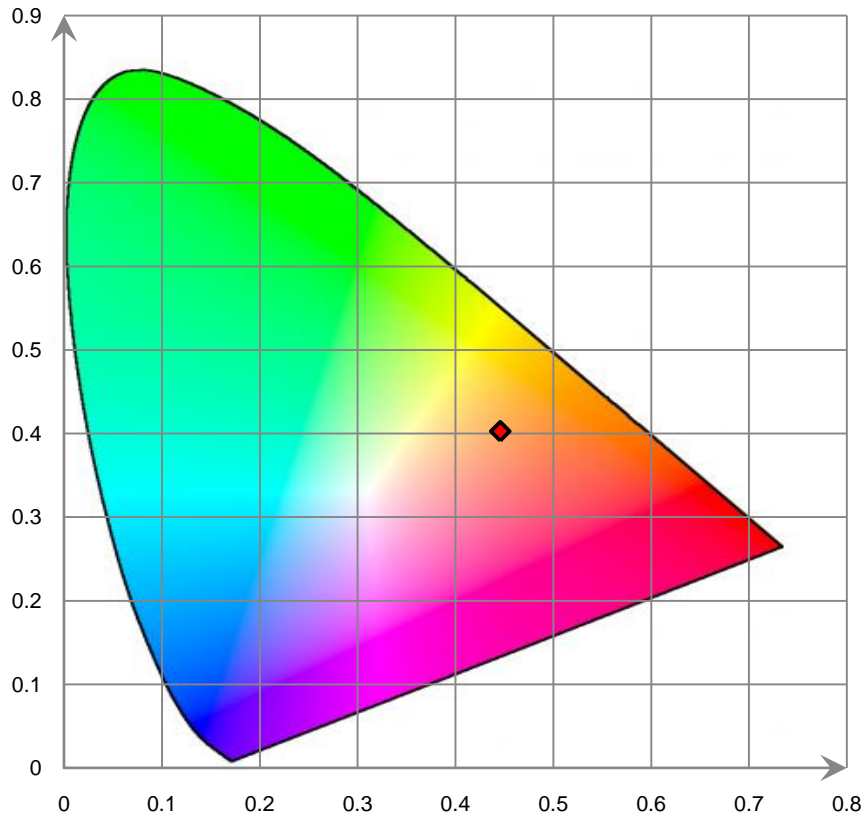
Relative Spectral Power Distribution



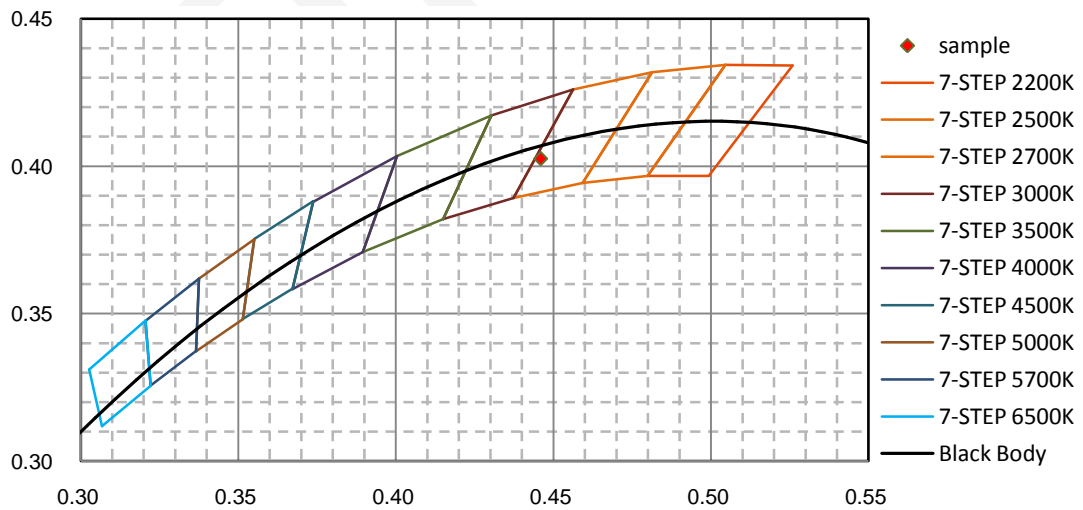
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	9.323E-02	421	5.103E-01	462	4.024E+00	503	3.400E+00	544	6.192E+00
381	9.433E-02	422	5.630E-01	463	3.869E+00	504	3.485E+00	545	6.271E+00
382	8.194E-02	423	6.100E-01	464	3.718E+00	505	3.553E+00	546	6.350E+00
383	6.984E-02	424	6.659E-01	465	3.588E+00	506	3.645E+00	547	6.415E+00
384	5.357E-02	425	7.218E-01	466	3.441E+00	507	3.735E+00	548	6.491E+00
385	6.110E-02	426	7.911E-01	467	3.323E+00	508	3.802E+00	549	6.597E+00
386	5.240E-02	427	8.620E-01	468	3.213E+00	509	3.892E+00	550	6.672E+00
387	5.207E-02	428	9.331E-01	469	3.101E+00	510	3.981E+00	551	6.754E+00
388	5.749E-02	429	1.017E+00	470	2.991E+00	511	4.059E+00	552	6.855E+00
389	6.153E-02	430	1.095E+00	471	2.897E+00	512	4.130E+00	553	6.947E+00
390	4.290E-02	431	1.194E+00	472	2.797E+00	513	4.203E+00	554	7.034E+00
391	4.388E-02	432	1.294E+00	473	2.701E+00	514	4.274E+00	555	7.134E+00
392	4.770E-02	433	1.390E+00	474	2.616E+00	515	4.357E+00	556	7.229E+00
393	4.534E-02	434	1.508E+00	475	2.534E+00	516	4.421E+00	557	7.340E+00
394	3.982E-02	435	1.617E+00	476	2.469E+00	517	4.487E+00	558	7.429E+00
395	4.697E-02	436	1.750E+00	477	2.411E+00	518	4.561E+00	559	7.547E+00
396	4.067E-02	437	1.875E+00	478	2.351E+00	519	4.632E+00	560	7.649E+00
397	4.891E-02	438	2.015E+00	479	2.312E+00	520	4.687E+00	561	7.755E+00
398	5.400E-02	439	2.181E+00	480	2.284E+00	521	4.766E+00	562	7.869E+00
399	6.196E-02	440	2.350E+00	481	2.253E+00	522	4.820E+00	563	8.006E+00
400	5.527E-02	441	2.529E+00	482	2.250E+00	523	4.880E+00	564	8.118E+00
401	5.825E-02	442	2.738E+00	483	2.248E+00	524	4.958E+00	565	8.231E+00
402	6.861E-02	443	2.923E+00	484	2.248E+00	525	5.006E+00	566	8.357E+00
403	7.215E-02	444	3.144E+00	485	2.262E+00	526	5.056E+00	567	8.472E+00
404	7.874E-02	445	3.384E+00	486	2.282E+00	527	5.132E+00	568	8.589E+00
405	8.992E-02	446	3.610E+00	487	2.305E+00	528	5.188E+00	569	8.729E+00
406	1.023E-01	447	3.838E+00	488	2.350E+00	529	5.232E+00	570	8.859E+00
407	1.127E-01	448	4.073E+00	489	2.401E+00	530	5.305E+00	571	8.982E+00
408	1.309E-01	449	4.294E+00	490	2.446E+00	531	5.357E+00	572	9.099E+00
409	1.410E-01	450	4.467E+00	491	2.493E+00	532	5.413E+00	573	9.230E+00
410	1.613E-01	451	4.650E+00	492	2.553E+00	533	5.489E+00	574	9.369E+00
411	1.848E-01	452	4.777E+00	493	2.613E+00	534	5.538E+00	575	9.491E+00
412	1.992E-01	453	4.847E+00	494	2.683E+00	535	5.597E+00	576	9.616E+00
413	2.239E-01	454	4.893E+00	495	2.743E+00	536	5.659E+00	577	9.745E+00
414	2.507E-01	455	4.877E+00	496	2.815E+00	537	5.721E+00	578	9.848E+00
415	2.814E-01	456	4.851E+00	497	2.894E+00	538	5.788E+00	579	1.001E+01
416	3.109E-01	457	4.757E+00	498	2.979E+00	539	5.849E+00	580	1.009E+01
417	3.426E-01	458	4.638E+00	499	3.060E+00	540	5.927E+00	581	1.023E+01
418	3.854E-01	459	4.517E+00	500	3.143E+00	541	5.992E+00	582	1.034E+01
419	4.188E-01	460	4.360E+00	501	3.237E+00	542	6.052E+00	583	1.044E+01
420	4.716E-01	461	4.190E+00	502	3.311E+00	543	6.121E+00	584	1.057E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.066E+01	626	1.020E+01	667	4.771E+00	708	1.558E+00	749	4.587E-01
586	1.077E+01	627	1.007E+01	668	4.665E+00	709	1.512E+00	750	4.501E-01
587	1.086E+01	628	9.955E+00	669	4.549E+00	710	1.476E+00	751	4.346E-01
588	1.095E+01	629	9.837E+00	670	4.431E+00	711	1.423E+00	752	4.253E-01
589	1.106E+01	630	9.706E+00	671	4.318E+00	712	1.390E+00	753	4.141E-01
590	1.113E+01	631	9.574E+00	672	4.234E+00	713	1.349E+00	754	3.956E-01
591	1.121E+01	632	9.443E+00	673	4.125E+00	714	1.306E+00	755	3.860E-01
592	1.127E+01	633	9.325E+00	674	4.024E+00	715	1.269E+00	756	3.759E-01
593	1.135E+01	634	9.186E+00	675	3.915E+00	716	1.233E+00	757	3.636E-01
594	1.141E+01	635	9.050E+00	676	3.816E+00	717	1.200E+00	758	3.539E-01
595	1.146E+01	636	8.914E+00	677	3.716E+00	718	1.165E+00	759	3.460E-01
596	1.151E+01	637	8.776E+00	678	3.633E+00	719	1.125E+00	760	3.316E-01
597	1.156E+01	638	8.620E+00	679	3.527E+00	720	1.096E+00	761	3.226E-01
598	1.158E+01	639	8.504E+00	680	3.444E+00	721	1.062E+00	762	3.191E-01
599	1.162E+01	640	8.343E+00	681	3.350E+00	722	1.035E+00	763	3.037E-01
600	1.165E+01	641	8.203E+00	682	3.272E+00	723	1.005E+00	764	2.954E-01
601	1.168E+01	642	8.075E+00	683	3.184E+00	724	9.720E-01	765	2.874E-01
602	1.167E+01	643	7.922E+00	684	3.090E+00	725	9.389E-01	766	2.819E-01
603	1.169E+01	644	7.777E+00	685	3.000E+00	726	9.130E-01	767	2.739E-01
604	1.170E+01	645	7.652E+00	686	2.930E+00	727	8.897E-01	768	2.666E-01
605	1.169E+01	646	7.517E+00	687	2.843E+00	728	8.578E-01	769	2.583E-01
606	1.167E+01	647	7.374E+00	688	2.769E+00	729	8.383E-01	770	2.509E-01
607	1.164E+01	648	7.220E+00	689	2.687E+00	730	8.133E-01	771	2.410E-01
608	1.161E+01	649	7.072E+00	690	2.617E+00	731	7.880E-01	772	2.337E-01
609	1.157E+01	650	6.935E+00	691	2.542E+00	732	7.667E-01	773	2.277E-01
610	1.154E+01	651	6.817E+00	692	2.480E+00	733	7.462E-01	774	2.260E-01
611	1.149E+01	652	6.667E+00	693	2.404E+00	734	7.187E-01	775	2.201E-01
612	1.143E+01	653	6.531E+00	694	2.337E+00	735	7.016E-01	776	2.095E-01
613	1.141E+01	654	6.409E+00	695	2.275E+00	736	6.826E-01	777	2.066E-01
614	1.133E+01	655	6.296E+00	696	2.211E+00	737	6.555E-01	778	1.977E-01
615	1.124E+01	656	6.140E+00	697	2.151E+00	738	6.367E-01	779	1.961E-01
616	1.118E+01	657	6.000E+00	698	2.086E+00	739	6.202E-01	780	1.965E-01
617	1.109E+01	658	5.888E+00	699	2.034E+00	740	5.987E-01		
618	1.102E+01	659	5.751E+00	700	1.967E+00	741	5.761E-01		
619	1.095E+01	660	5.609E+00	701	1.911E+00	742	5.659E-01		
620	1.084E+01	661	5.491E+00	702	1.860E+00	743	5.498E-01		
621	1.075E+01	662	5.377E+00	703	1.806E+00	744	5.309E-01		
622	1.063E+01	663	5.248E+00	704	1.749E+00	745	5.146E-01		
623	1.052E+01	664	5.134E+00	705	1.701E+00	746	5.007E-01		
624	1.042E+01	665	5.013E+00	706	1.658E+00	747	4.901E-01		
625	1.032E+01	666	4.902E+00	707	1.607E+00	748	4.752E-01		

CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



[Goniophotometer System]

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

Test orientation: **Downward**

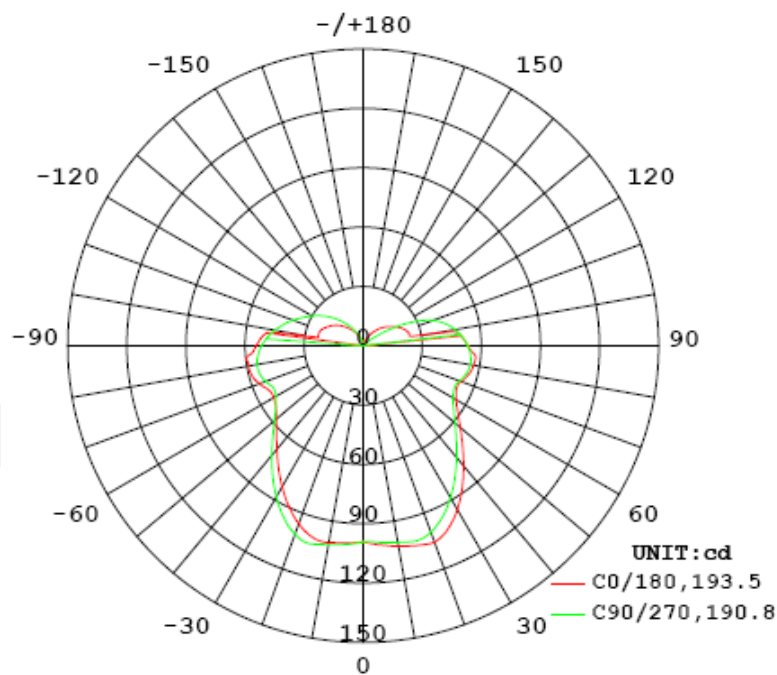
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1066	9.520	0.7444

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
552.584	58.04	109.0	1.37	1.30

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	193.5	114.1	190.8	113.0	152.9
Field Angle (10% I _{max}):	285.1	292.5	273.6	295.7	286.7

Luminous Intensity (cd) Distribution Data

$\begin{matrix} C \\ \backslash \\ \gamma \end{matrix}$	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	99	99	99	99	99	99	99	99
5.0°	100	100	101	101	101	101	102	102
10.0°	101	102	102	102	102	103	104	104
15.0°	100	102	104	104	104	105	106	106
20.0°	96	99	104	103	101	105	108	107
25.0°	90	94	98	97	96	102	108	105
30.0°	82	86	89	89	88	95	100	98
35.0°	75	78	79	80	80	86	90	89
40.0°	68	70	70	72	72	77	80	80
45.0°	62	63	62	64	65	68	70	71
50.0°	58	56	55	57	59	61	61	64
55.0°	54	52	49	52	54	54	53	57
60.0°	53	49	44	49	51	50	47	53
65.0°	53	47	42	47	50	47	43	50
70.0°	56	49	42	48	53	47	41	49
75.0°	59	50	43	49	54	48	42	51
80.0°	59	50	43	49	55	48	43	52
85.0°	59	49	42	48	54	48	42	51
90.0°	54	48	41	47	52	46	41	50
95.0°	52	46	40	45	49	44	40	48
100.0°	26	44	38	42	46	42	38	45
105.0°	23	41	36	39	42	39	35	41
110.0°	23	38	33	36	38	36	33	38
115.0°	22	35	31	33	34	32	30	34
120.0°	20	32	29	29	30	29	28	30
125.0°	18	29	26	26	27	26	25	27
130.0°	16	25	23	23	23	23	22	23
135.0°	14	22	20	20	19	19	18	20
140.0°	12	18	17	16	15	16	15	16
145.0°	10	14	14	13	12	12	12	12
150.0°	8	10	11	9	9	9	9	9
155.0°	6	7	8	7	6	6	7	6
160.0°	4	4	5	4	4	4	4	3
165.0°	2	2	3	2	2	2	2	2
170.0°	1	1	1	1	1	1	1	0
175.0°	0	0	0	0	0	0	0	0
180.0°	0	0	0	0	0	0	0	0

Luminous Intensity (cd) Distribution Data (cont.)

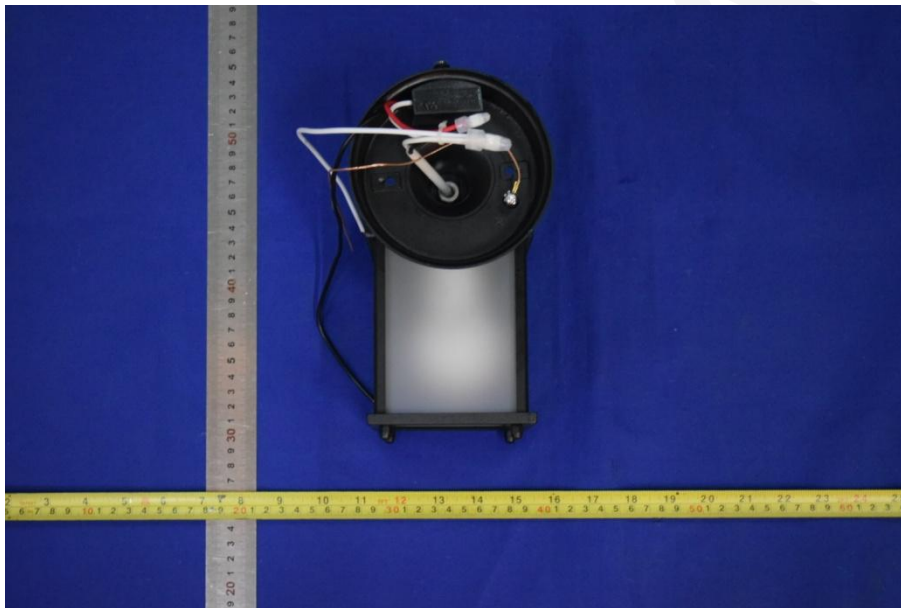
C γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	99	99	99	99	99	99	99	99
5.0°	101	101	101	100	100	100	100	100
10.0°	103	103	103	102	101	101	101	101
15.0°	105	105	105	104	102	103	102	101
20.0°	106	107	107	103	100	102	102	98
25.0°	102	106	106	99	95	98	97	92
30.0°	96	100	100	94	89	90	89	85
35.0°	88	91	91	86	81	82	80	77
40.0°	79	82	81	78	74	73	71	70
45.0°	71	73	72	70	67	65	64	63
50.0°	64	65	63	63	61	59	56	58
55.0°	59	57	56	58	56	53	50	54
60.0°	54	51	50	54	53	48	45	51
65.0°	52	48	45	51	51	46	42	49
70.0°	53	46	42	50	52	45	41	50
75.0°	55	47	43	52	54	46	42	52
80.0°	57	47	43	53	55	47	42	52
85.0°	57	47	43	53	55	46	42	51
90.0°	53	46	42	51	53	45	41	50
95.0°	51	44	41	49	51	44	40	48
100.0°	35	42	39	47	47	41	38	45
105.0°	24	39	37	43	43	39	36	43
110.0°	23	36	34	38	38	35	34	39
115.0°	21	33	30	31	29	31	31	36
120.0°	19	29	27	23	19	25	29	33
125.0°	17	26	23	14	10	19	26	30
130.0°	15	23	19	8	5	13	22	26
135.0°	13	19	15	5	2	9	19	22
140.0°	10	15	11	3	2	6	15	18
145.0°	8	11	8	3	1	4	11	14
150.0°	6	7	5	2	0	2	8	11
155.0°	4	5	4	2	0	1	5	8
160.0°	3	3	3	1	0	0	3	5
165.0°	2	2	2	1	0	0	1	3
170.0°	1	1	1	1	1	1	1	1
175.0°	0	0	0	0	0	0	0	0
180.0°	0	0	0	0	0	0	0	0

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	2.4	0.43
5-10	7.3	1.32
10-15	12.2	2.21
15-20	17.1	3.09
20-25	21.3	3.84
25-30	24.2	4.38
30-35	25.8	4.66
35-40	26.4	4.77
40-45	26.2	4.75
45-50	25.6	4.63
50-55	24.8	4.48
55-60	24.1	4.36
60-65	23.7	4.29
65-70	24.0	4.34
70-75	25.4	4.60
75-80	26.6	4.81
80-85	27.0	4.87
85-90	26.5	4.80
90-95	25.6	4.62
95-100	23.9	4.33
100-105	20.8	3.77
105-110	18.8	3.41
110-115	16.6	3.00
115-120	14.1	2.55
120-125	11.5	2.08
125-130	9.2	1.67
130-135	7.1	1.28
135-140	5.3	0.97
140-145	3.8	0.68
145-150	2.5	0.46
150-155	1.5	0.28
155-160	0.9	0.16
160-165	0.4	0.07
165-170	0.2	0.03
170-175	0.0	0.01
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	2.4	0.43
0-10	9.6	1.75
0-15	21.9	3.96
0-20	38.9	7.05
0-25	60.2	10.89
0-30	84.4	15.27
0-35	110.2	19.93
0-40	136.5	24.70
0-45	162.7	29.45
0-50	188.3	34.08
0-55	213.1	38.56
0-60	237.2	42.92
0-65	260.9	47.21
0-70	284.9	51.55
0-75	310.3	56.15
0-80	336.8	60.96
0-85	363.8	65.83
0-90	390.3	70.63
0-95	415.8	75.25
0-100	439.7	79.58
0-105	460.6	83.35
0-110	479.4	86.76
0-115	496.0	89.76
0-120	510.1	92.31
0-125	521.6	94.39
0-130	530.8	96.06
0-135	537.9	97.34
0-140	543.2	98.31
0-145	547.0	98.99
0-150	549.6	99.45
0-155	551.1	99.73
0-160	552.0	99.89
0-165	552.4	99.96
0-170	552.5	99.99
0-175	552.6	100.00
0-180	552.6	100.00

6. Product Photo



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