



IES LM-79-08

MEASUREMENT AND TEST REPORT

For

Overdrive Electronics Pvt. Ltd

C-121, Hosiery Complex, Phase 2 Extn. Noida 201305 UP India

Test Model: L20H80/50K

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Hill Liu <i>Hill Liu</i>
Report Number:	PSZ2Q161028002-10
Test Date:	2016-11-01
Report Date:	2016-11-04
Reviewed By:	Bill Xiong / EE Engineer <i>Bill Xiong</i>
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.China. Tel: +86-0769-86858888 Fax: +86-0769-86858588
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:

One sample was received on 2016-10-28 and use for test.

Model Tested: L20H80/50K
 Manufacturer: Overdrive Electronics Pvt. Ltd
 Brand Name: OVERDRIVE
 Product Designation: LED H80 LAMP
 Burning Time Before Test: 0hour(For New Products)

Rated Values:

Rated Voltage/Frequency: 120/277V AC 60Hz
 Rated Power: 20 W
 Nominal CCT: 5000K
 Nominal Lumen Output: 2700 lm

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 IAS 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
Digital Power Meter	EVERFINE	PF2010A	1011004	600V/20A	2016-07-11	2017-07-10
Digital CC&CV DC Power Supply	EVERFINE	WY305-V1	1101047	30V/5A	2016-07-07	2017-07-06
Temperature/humidity/clock	Victor	VC230	EE023	0~40°C0~90%	2016-03-21	2017-03-20
Standard Light Source	SENSING	N/A	LSD090808	N/A	2016-09-24	2017-09-23
Special zero-voltage synchronous switching AC	EVERFINE	DPS1010-YF	1011001T	0-150V, 0-300V	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	YG108492N10120001	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	2016-03-21	2017-03-20
Standard Light Source	EVERFINE	D908	1012003	N/A	2016-09-07	2017-09-06

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°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, 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=1.8% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=20K (K=2), at the 95% confidence level. The uncertainty of the CRI is U=1.8(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.

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=1.6% (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: **Base up**

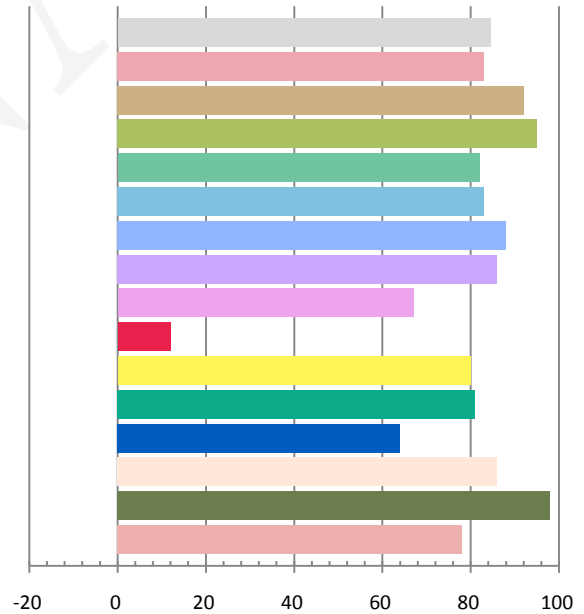
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1702	19.81	0.9703	2683.5	135.44

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
8.4161	5046	0.00233	0.3443	0.3556	0.2093	0.4865

Color Rendering Index

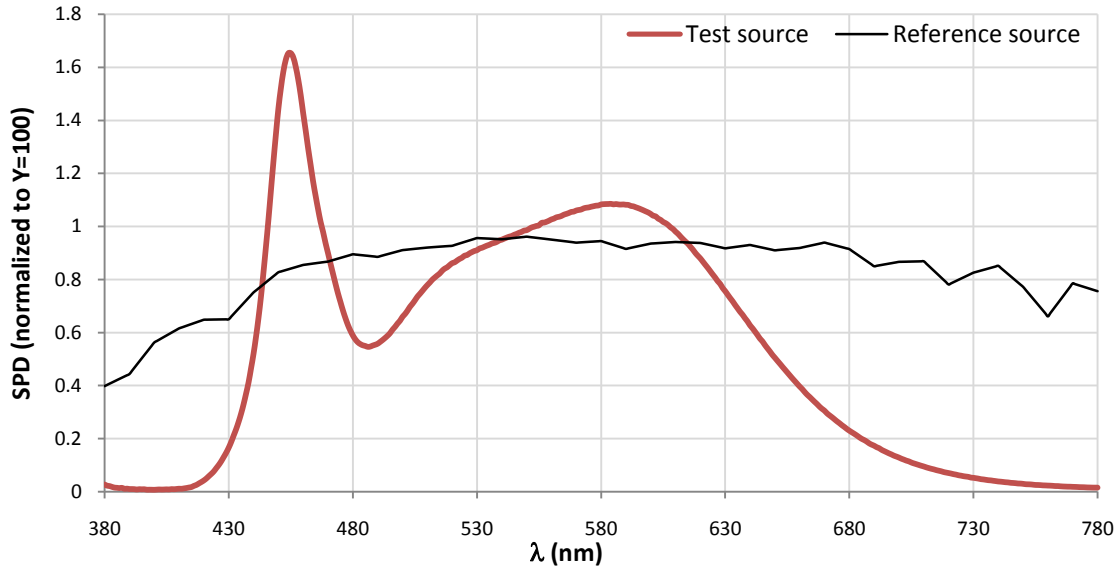
Ra			
84.5			
R1	R2	R3	R4
83	92	95	82
R5	R6	R7	R8
83	88	86	67
R9	R10	R11	R12
12	80	81	64
R13	R14	R15	
86	98	78	



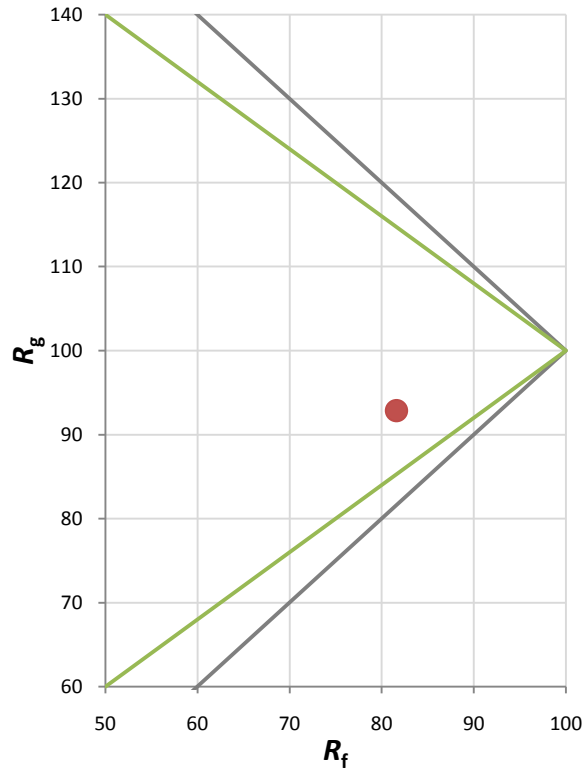
Fidelity Index and Gamut Index

Fidelity Index R_f	82
Gamut Index R_g	93

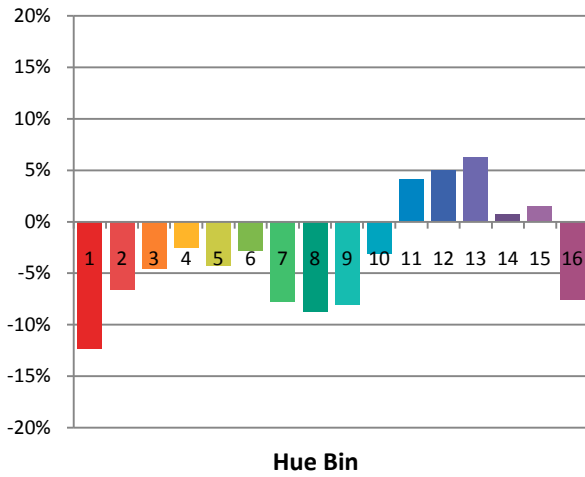
Spectral Power Distribution Comparison



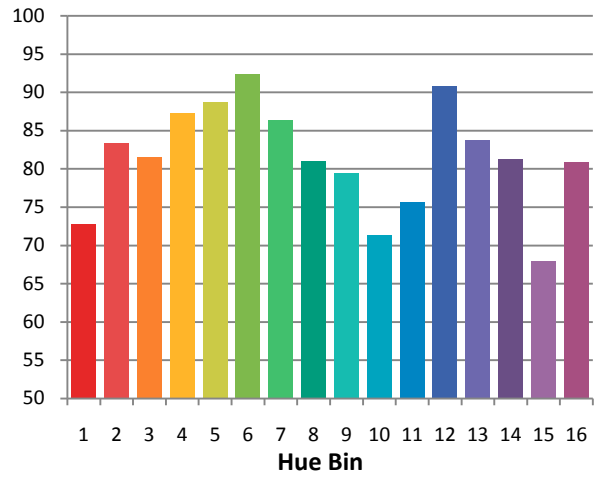
Plot of R_g versus R_f



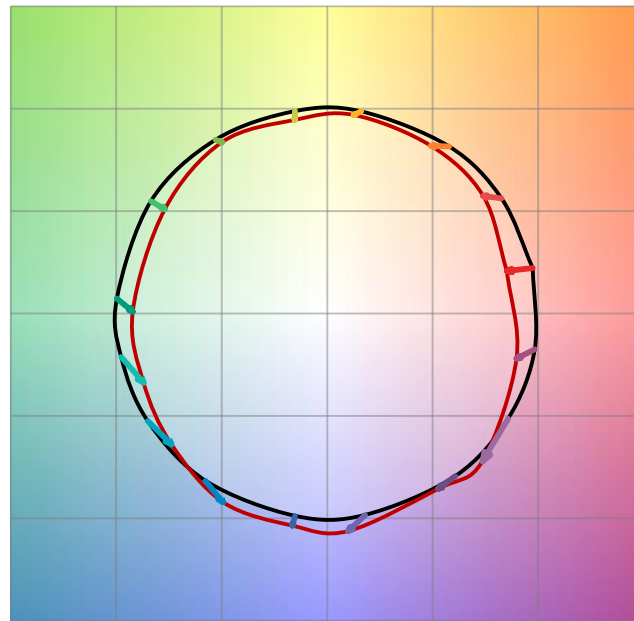
Chroma Shift by Hue



R_f by Hue

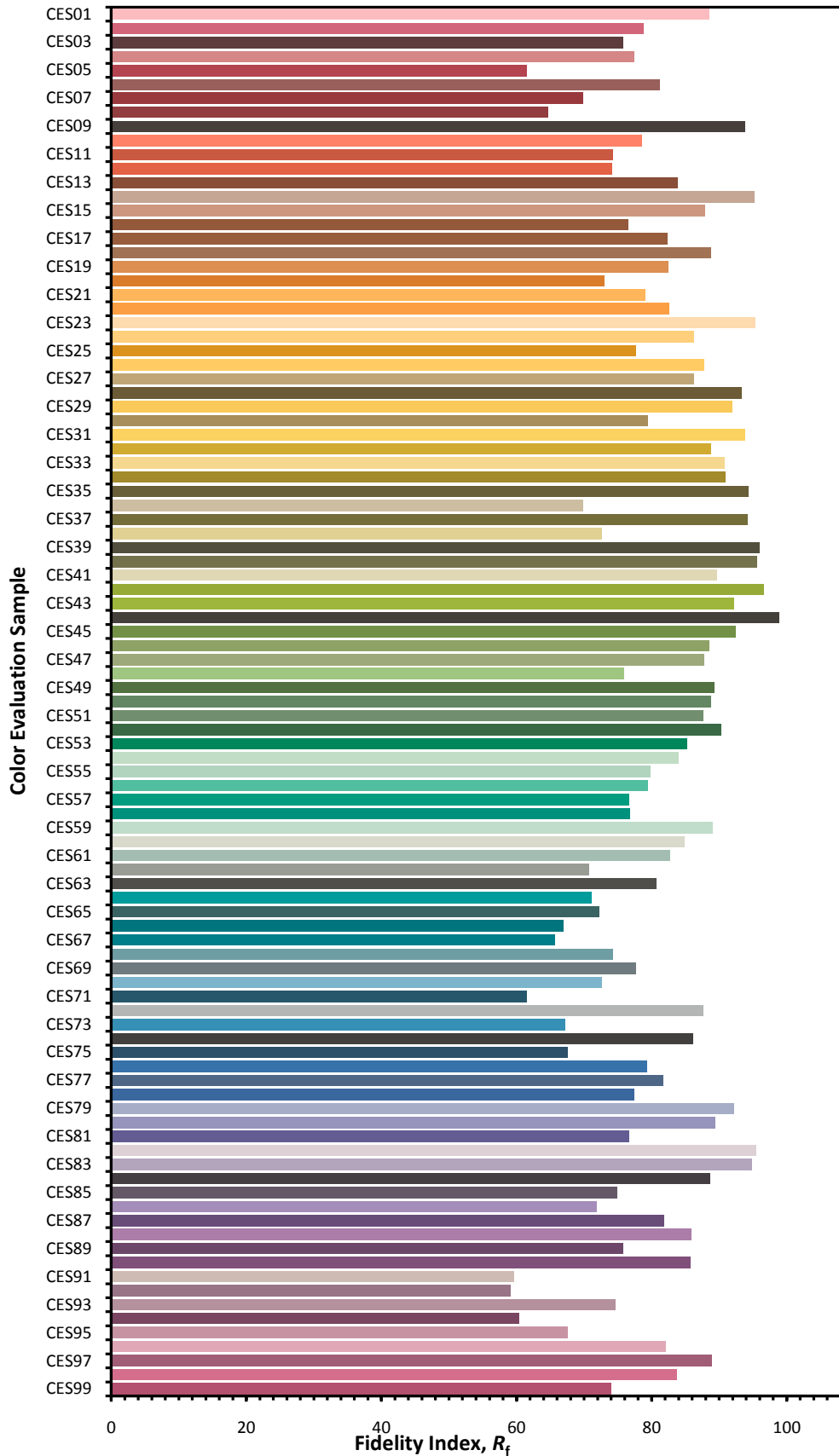


Color Vector Graphic

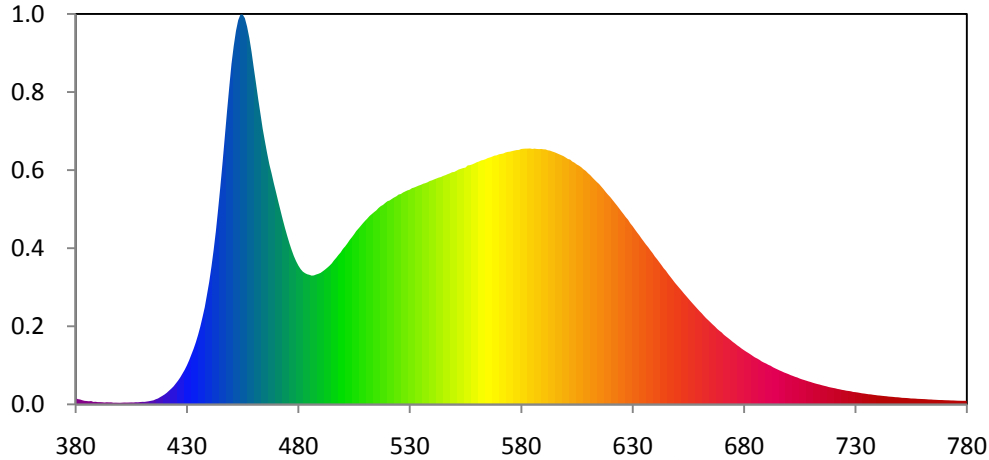


— Reference Illuminat — Test Source

Color Fidelity by CES Sample



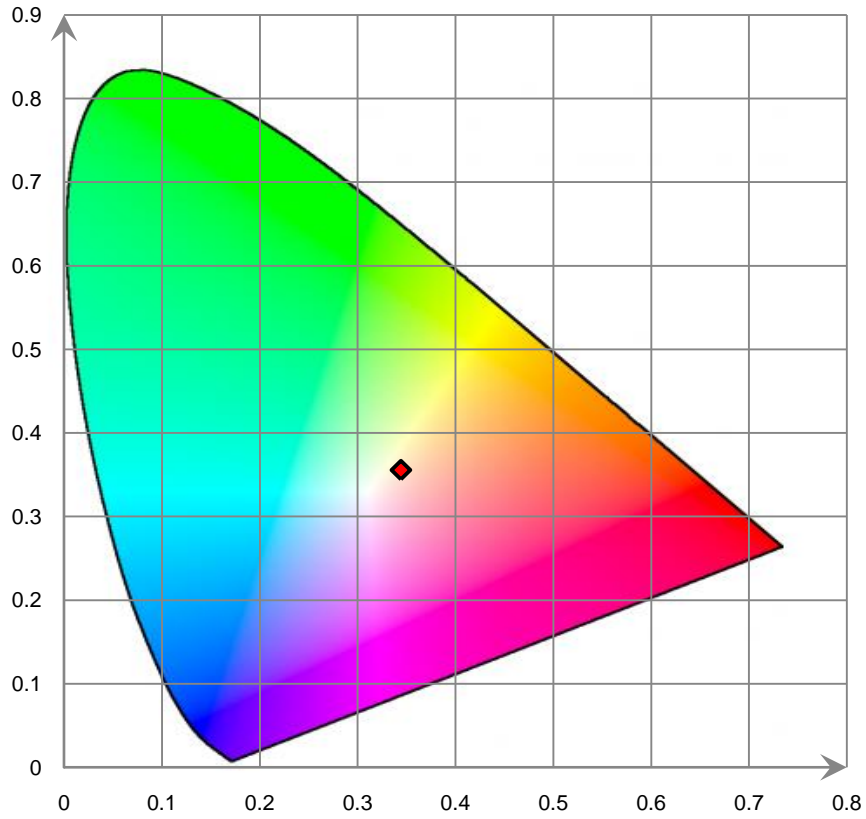
Relative Spectral Power Distribution



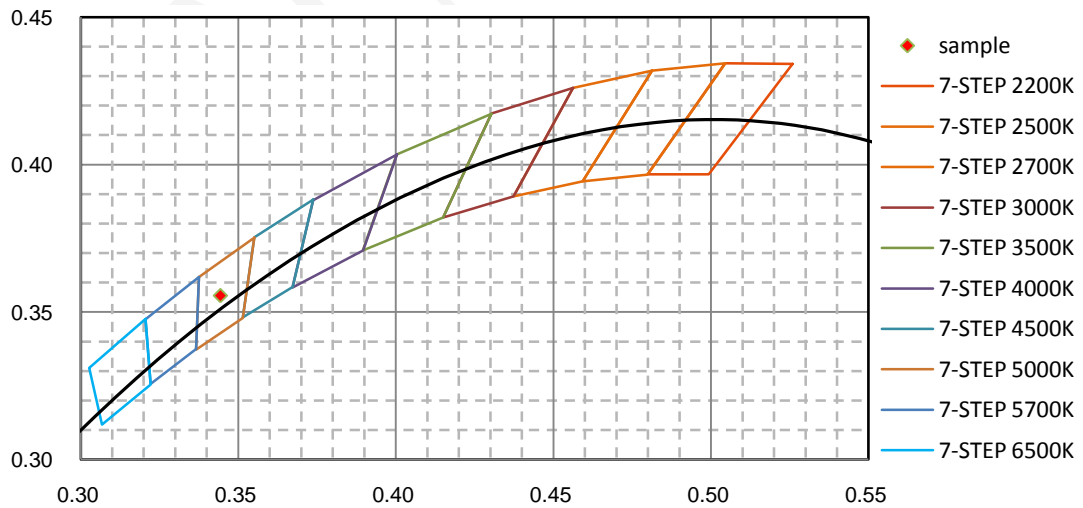
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.053E+00	421	1.942E+00	462	5.083E+01	503	2.736E+01	544	3.786E+01
381	8.764E-01	422	2.288E+00	463	4.839E+01	504	2.781E+01	545	3.804E+01
382	8.162E-01	423	2.624E+00	464	4.591E+01	505	2.832E+01	546	3.817E+01
383	6.950E-01	424	2.995E+00	465	4.381E+01	506	2.886E+01	547	3.834E+01
384	5.926E-01	425	3.475E+00	466	4.182E+01	507	2.928E+01	548	3.847E+01
385	5.605E-01	426	3.949E+00	467	3.996E+01	508	2.972E+01	549	3.866E+01
386	5.177E-01	427	4.495E+00	468	3.848E+01	509	3.017E+01	550	3.871E+01
387	5.568E-01	428	5.123E+00	469	3.681E+01	510	3.058E+01	551	3.891E+01
388	4.091E-01	429	5.763E+00	470	3.532E+01	511	3.096E+01	552	3.912E+01
389	4.384E-01	430	6.503E+00	471	3.377E+01	512	3.138E+01	553	3.923E+01
390	3.804E-01	431	7.351E+00	472	3.228E+01	513	3.170E+01	554	3.935E+01
391	3.760E-01	432	8.309E+00	473	3.080E+01	514	3.201E+01	555	3.943E+01
392	3.577E-01	433	9.258E+00	474	2.938E+01	515	3.230E+01	556	3.980E+01
393	3.121E-01	434	1.035E+01	475	2.809E+01	516	3.271E+01	557	3.984E+01
394	3.553E-01	435	1.156E+01	476	2.683E+01	517	3.302E+01	558	3.996E+01
395	3.369E-01	436	1.295E+01	477	2.571E+01	518	3.322E+01	559	4.012E+01
396	3.453E-01	437	1.452E+01	478	2.469E+01	519	3.354E+01	560	4.031E+01
397	2.794E-01	438	1.618E+01	479	2.385E+01	520	3.383E+01	561	4.043E+01
398	2.830E-01	439	1.826E+01	480	2.313E+01	521	3.396E+01	562	4.062E+01
399	2.745E-01	440	2.040E+01	481	2.255E+01	522	3.422E+01	563	4.070E+01
400	2.673E-01	441	2.292E+01	482	2.212E+01	523	3.446E+01	564	4.082E+01
401	2.928E-01	442	2.575E+01	483	2.185E+01	524	3.465E+01	565	4.101E+01
402	3.148E-01	443	2.890E+01	484	2.167E+01	525	3.494E+01	566	4.113E+01
403	2.991E-01	444	3.248E+01	485	2.157E+01	526	3.503E+01	567	4.126E+01
404	3.119E-01	445	3.629E+01	486	2.144E+01	527	3.528E+01	568	4.142E+01
405	3.308E-01	446	4.027E+01	487	2.148E+01	528	3.547E+01	569	4.147E+01
406	3.185E-01	447	4.456E+01	488	2.163E+01	529	3.564E+01	570	4.163E+01
407	3.658E-01	448	4.881E+01	489	2.175E+01	530	3.575E+01	571	4.171E+01
408	3.502E-01	449	5.286E+01	490	2.190E+01	531	3.600E+01	572	4.178E+01
409	3.882E-01	450	5.667E+01	491	2.217E+01	532	3.611E+01	573	4.195E+01
410	4.244E-01	451	5.968E+01	492	2.245E+01	533	3.627E+01	574	4.204E+01
411	4.151E-01	452	6.218E+01	493	2.276E+01	534	3.643E+01	575	4.209E+01
412	4.744E-01	453	6.397E+01	494	2.309E+01	535	3.656E+01	576	4.219E+01
413	5.303E-01	454	6.491E+01	495	2.347E+01	536	3.674E+01	577	4.227E+01
414	6.041E-01	455	6.494E+01	496	2.398E+01	537	3.684E+01	578	4.235E+01
415	6.748E-01	456	6.432E+01	497	2.440E+01	538	3.698E+01	579	4.238E+01
416	8.504E-01	457	6.292E+01	498	2.489E+01	539	3.720E+01	580	4.253E+01
417	9.851E-01	458	6.104E+01	499	2.531E+01	540	3.731E+01	581	4.257E+01
418	1.209E+00	459	5.873E+01	500	2.588E+01	541	3.747E+01	582	4.259E+01
419	1.421E+00	460	5.604E+01	501	2.629E+01	542	3.762E+01	583	4.260E+01
420	1.660E+00	461	5.349E+01	502	2.679E+01	543	3.776E+01	584	4.262E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	4.254E+01	626	3.168E+01	667	1.296E+01	708	3.941E+00	749	1.186E+00
586	4.259E+01	627	3.116E+01	668	1.258E+01	709	3.823E+00	750	1.146E+00
587	4.253E+01	628	3.075E+01	669	1.226E+01	710	3.718E+00	751	1.093E+00
588	4.251E+01	629	3.015E+01	670	1.198E+01	711	3.591E+00	752	1.078E+00
589	4.253E+01	630	2.969E+01	671	1.160E+01	712	3.484E+00	753	1.062E+00
590	4.248E+01	631	2.917E+01	672	1.130E+01	713	3.381E+00	754	1.024E+00
591	4.246E+01	632	2.866E+01	673	1.102E+01	714	3.294E+00	755	9.841E-01
592	4.231E+01	633	2.818E+01	674	1.072E+01	715	3.185E+00	756	9.736E-01
593	4.225E+01	634	2.764E+01	675	1.041E+01	716	3.096E+00	757	9.544E-01
594	4.211E+01	635	2.714E+01	676	1.014E+01	717	3.008E+00	758	9.217E-01
595	4.198E+01	636	2.663E+01	677	9.834E+00	718	2.894E+00	759	9.094E-01
596	4.183E+01	637	2.619E+01	678	9.571E+00	719	2.815E+00	760	8.894E-01
597	4.167E+01	638	2.567E+01	679	9.283E+00	720	2.746E+00	761	8.767E-01
598	4.150E+01	639	2.520E+01	680	9.023E+00	721	2.671E+00	762	8.512E-01
599	4.134E+01	640	2.463E+01	681	8.787E+00	722	2.577E+00	763	8.205E-01
600	4.112E+01	641	2.419E+01	682	8.559E+00	723	2.512E+00	764	8.154E-01
601	4.086E+01	642	2.369E+01	683	8.315E+00	724	2.417E+00	765	7.822E-01
602	4.076E+01	643	2.319E+01	684	8.055E+00	725	2.357E+00	766	7.576E-01
603	4.043E+01	644	2.266E+01	685	7.812E+00	726	2.278E+00	767	7.428E-01
604	4.024E+01	645	2.225E+01	686	7.627E+00	727	2.229E+00	768	7.274E-01
605	3.994E+01	646	2.171E+01	687	7.407E+00	728	2.175E+00	769	7.213E-01
606	3.976E+01	647	2.123E+01	688	7.146E+00	729	2.072E+00	770	7.025E-01
607	3.949E+01	648	2.076E+01	689	6.953E+00	730	2.037E+00	771	6.916E-01
608	3.914E+01	649	2.026E+01	690	6.795E+00	731	1.980E+00	772	6.749E-01
609	3.888E+01	650	1.983E+01	691	6.579E+00	732	1.921E+00	773	6.537E-01
610	3.850E+01	651	1.939E+01	692	6.428E+00	733	1.840E+00	774	6.493E-01
611	3.818E+01	652	1.896E+01	693	6.189E+00	734	1.801E+00	775	6.334E-01
612	3.777E+01	653	1.851E+01	694	6.008E+00	735	1.743E+00	776	6.122E-01
613	3.739E+01	654	1.808E+01	695	5.835E+00	736	1.687E+00	777	6.031E-01
614	3.703E+01	655	1.765E+01	696	5.655E+00	737	1.657E+00	778	5.909E-01
615	3.670E+01	656	1.722E+01	697	5.496E+00	738	1.600E+00	779	5.888E-01
616	3.626E+01	657	1.679E+01	698	5.317E+00	739	1.553E+00	780	5.899E-01
617	3.583E+01	658	1.638E+01	699	5.182E+00	740	1.498E+00		
618	3.534E+01	659	1.597E+01	700	5.035E+00	741	1.470E+00		
619	3.492E+01	660	1.556E+01	701	4.865E+00	742	1.424E+00		
620	3.453E+01	661	1.519E+01	702	4.733E+00	743	1.382E+00		
621	3.406E+01	662	1.476E+01	703	4.582E+00	744	1.355E+00		
622	3.359E+01	663	1.436E+01	704	4.471E+00	745	1.299E+00		
623	3.313E+01	664	1.402E+01	705	4.303E+00	746	1.274E+00		
624	3.264E+01	665	1.366E+01	706	4.174E+00	747	1.242E+00		
625	3.215E+01	666	1.330E+01	707	4.061E+00	748	1.198E+00		

CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



[Goniophotometer System]

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

Test orientation: **Base up**

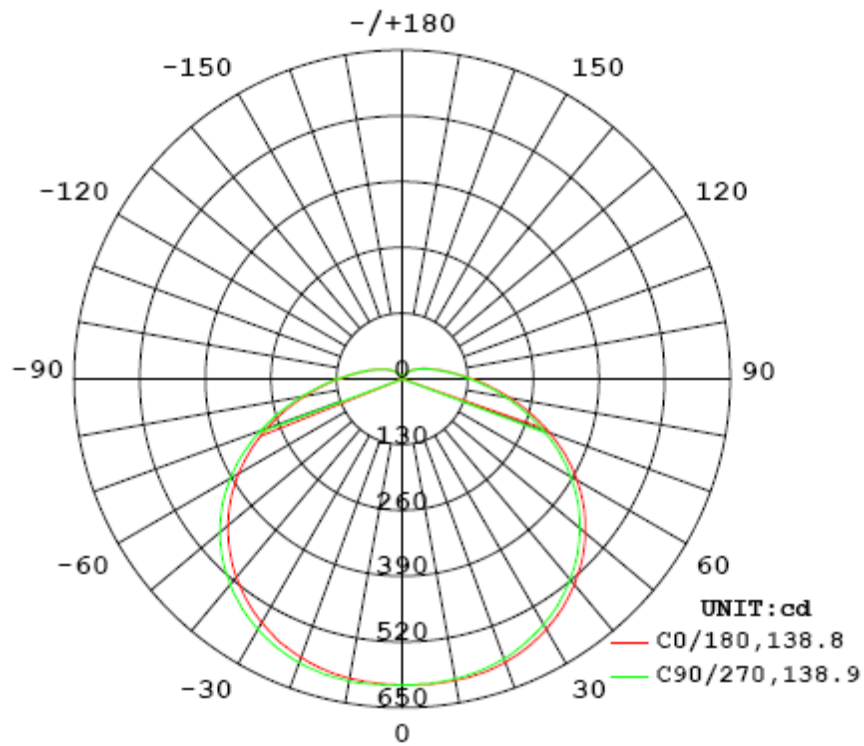
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.1	60	0.1692	19.8	0.9748

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
2689.61	135.83	607.3	1.41	1.38

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	138.8	139.1	138.9	138.9	138.9
Field Angle (10% I _{max}):	216.6	216.4	216.2	216.6	216.5

Luminous Intensity (cd) Distribution Data

C γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	605	605	605	605	605	605	605	605
5.0°	603	605	605	605	606	606	607	606
10.0°	601	602	604	605	607	607	607	607
15.0°	595	598	600	601	604	604	604	603
20.0°	586	589	592	595	597	598	598	598
25.0°	574	576	581	584	587	588	587	586
30.0°	557	560	565	570	572	573	573	572
35.0°	536	541	546	550	554	555	554	553
40.0°	511	516	524	527	530	532	531	531
45.0°	483	489	495	500	504	505	505	504
50.0°	451	456	463	468	472	474	474	473
55.0°	415	420	426	431	435	438	438	437
60.0°	375	379	385	389	393	398	398	398
65.0°	331	335	340	343	348	353	354	354
70.0°	285	288	292	295	299	305	307	308
75.0°	239	242	244	245	250	256	259	260
80.0°	196	197	198	199	203	209	212	213
85.0°	158	158	158	158	162	167	170	171
90.0°	126	126	126	125	128	133	135	137
95.0°	101	101	100	100	102	105	108	108
100.0°	81	81	81	80	82	84	86	87
105.0°	66	66	66	66	67	69	70	71
110.0°	55	55	54	54	55	56	57	59
115.0°	45	45	45	45	46	47	47	48
120.0°	38	38	38	38	38	39	39	40
125.0°	31	31	31	31	32	32	33	33
130.0°	26	26	26	26	26	27	27	27
135.0°	21	21	21	21	22	22	22	22
140.0°	17	17	17	17	18	18	18	18
145.0°	14	14	14	14	14	14	14	15
150.0°	11	11	11	11	11	11	11	11
155.0°	8	8	8	8	8	8	9	9
160.0°	6	6	6	6	6	6	6	6
165.0°	4	4	4	4	4	4	4	4
170.0°	2	2	2	2	2	2	2	2
175.0°	1	1	1	1	1	1	1	1
180.0°	1	1	1	1	1	1	1	1

Luminous Intensity (cd) Distribution Data (cont.)

C Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	605	605	605	605	605	605	605	605
5.0°	606	605	605	604	605	604	603	603
10.0°	606	605	604	602	602	602	601	601
15.0°	602	601	600	598	597	596	595	594
20.0°	597	596	593	590	589	587	586	586
25.0°	586	584	582	579	576	574	573	572
30.0°	572	570	566	563	560	558	556	556
35.0°	553	550	547	544	541	538	536	534
40.0°	531	528	525	521	518	515	512	511
45.0°	505	501	498	494	491	487	484	483
50.0°	474	472	467	463	459	456	453	451
55.0°	439	436	432	429	425	421	417	415
60.0°	400	398	393	390	386	382	378	376
65.0°	357	354	351	347	343	340	335	333
70.0°	310	309	306	302	298	295	291	288
75.0°	263	261	259	256	252	249	245	243
80.0°	217	216	214	211	208	205	202	200
85.0°	175	174	173	171	169	166	163	161
90.0°	139	139	138	137	135	133	130	129
95.0°	110	110	110	109	107	106	104	102
100.0°	88	89	88	87	86	85	84	83
105.0°	72	72	72	71	70	69	68	67
110.0°	59	59	59	58	58	57	56	56
115.0°	49	49	49	48	48	47	47	46
120.0°	40	41	41	40	40	40	39	39
125.0°	34	34	34	34	33	33	32	32
130.0°	28	28	28	28	28	27	27	27
135.0°	23	23	23	23	23	22	22	22
140.0°	19	19	19	18	18	18	18	18
145.0°	15	15	15	15	15	14	14	14
150.0°	11	11	11	11	11	11	11	11
155.0°	9	9	9	9	8	8	8	8
160.0°	6	6	6	6	6	6	6	6
165.0°	4	4	4	4	4	4	4	4
170.0°	2	2	2	2	2	2	2	2
175.0°	1	1	1	1	1	1	1	1
180.0°	1	1	1	1	1	1	1	1

Zonal Lumen Density Measurement

Deg	Flux (lm)	%	Deg	Flux (lm)	%
0-5	14.5	0.54	0-5	14.5	0.54
5-10	43.2	1.61	0-10	57.7	2.15
10-15	71.4	2.65	0-15	129.1	4.80
15-20	98.2	3.65	0-20	227.3	8.45
20-25	123.0	4.57	0-25	350.3	13.02
25-30	145.0	5.39	0-30	495.3	18.41
30-35	163.6	6.09	0-35	658.9	24.50
35-40	178.2	6.62	0-40	837.1	31.12
40-45	188.5	7.01	0-45	1025.6	38.13
45-50	193.9	7.21	0-50	1219.5	45.34
50-55	194.1	7.22	0-55	1413.6	52.56
55-60	188.9	7.02	0-60	1602.5	59.58
60-65	178.4	6.63	0-65	1780.9	66.21
65-70	162.9	6.06	0-70	1943.7	72.27
70-75	143.6	5.34	0-75	2087.3	77.61
75-80	122.2	4.54	0-80	2209.5	82.15
80-85	100.8	3.75	0-85	2310.4	85.90
85-90	81.3	3.02	0-90	2391.7	88.92
90-95	64.7	2.41	0-95	2456.4	91.33
95-100	51.4	1.91	0-100	2507.8	93.24
100-105	40.9	1.52	0-105	2548.7	94.76
105-110	32.7	1.22	0-110	2581.4	95.98
110-115	26.1	0.97	0-115	2607.6	96.95
115-120	20.9	0.78	0-120	2628.4	97.73
120-125	16.5	0.61	0-125	2645.0	98.34
125-130	12.9	0.48	0-130	2657.9	98.82
130-135	9.9	0.37	0-135	2667.8	99.19
135-140	7.4	0.27	0-140	2675.2	99.46
140-145	5.4	0.20	0-145	2680.6	99.66
145-150	3.8	0.14	0-150	2684.3	99.80
150-155	2.5	0.10	0-155	2686.8	99.90
155-160	1.5	0.05	0-160	2688.3	99.95
160-165	0.8	0.03	0-165	2689.1	99.98
165-170	0.4	0.01	0-170	2689.5	99.99
170-175	0.1	0.01	0-175	2689.6	100.00
175-180	0.0	0.00	0-180	2689.6	100.00

6. Product Photo



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