IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

756 North Zhongshan Rd., Unit B301 Zhabei District, Shanghai, China

Test Model: 20SMPR9DIM/940/277V

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	George Yang
Report Number:	PKS171229083-10
Test Date:	2018-01-03
Report Date:	2018-01-04
Reviewed By:	Ray Gao/EE Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan). No.248 Chenghu Road, Kunshan, Jiangsu province, China. Tel: +86-0512-86175000 Fax:+86-0512-88934268
Test Facility:	Test facility was located at No.248 Chenghu Road, Kunshan, Jiangsu province, China.
Accreditation:	The IAS Accreditation Number TL-749.

1. Product Description

General Information:

One sample was received on 2018-01-02 and used for testing.

Model Tested:	20SMPR9DIM/940/277V
Manufacturer:	GREEN CREATIVE LTD
Brand Name:	GREEN CREATIVE
Product Designation:	LED Downlight
Aging Time Before Test:	0hour(For New Products)

Rated Values:

Rated Voltage/Frequency:	120-277 VAC 60Hz
Rated Power:	20W
Nominal CCT:	4000K
Nominal Lumen Output:	1250lm

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

3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Integrating Sphere	INVENTFINE	Dia 1.5m	JWWCV090112	Dia 1.5m	2017-01-25	2018-01-25
Power Meter	INVENTFINE	WT500	GSJWQ20009	20/40/80/150/300/600V	2017-03-23	2018-03-22
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	380nm～780nm	2017-01-25	2018-01-25
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	0~150V 4.2A/0~300V 2.1A	2017-03-23	2018-03-22
Standard Light Source	INVENTFINE	N/A	JWWCR020106	24V/50W	2017-01-26	2018-01-26
Thermal Meter	KEJIAN	TA298	N/A	0~60℃	2017-10-17	2018-10-17
DC Power Supply	INVENTFINE	WL3005	JWWCP020069	30V/5A	2017-03-23	2018-03-22
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	0-150V，0-300V，5KVA	2017-03-23	2018-03-22
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	30V/10A	2017-03-23	2018-03-22
Power Meter	INVENTFINE	WT500	GSDSQ200007	20/40/80/150/300/600V	2017-03-23	2018-03-22
Goniophotometer	INVENTFINE	GPM-1900	YWGCF120001	0.001lx-99999lx	2017-01-25	2018-01-25
Wireless Weather Station	ZHONGXING	KG218	N/A	-40~65℃，20%~99%RH	2017-10-17	2018-10-17
Standard Light Source	INVENTFINE	N/A	JWBYR040007	24V/150W	2017-01-25	2018-01-25

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Kunshan) 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=2.6% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=24K (K=2), at the 95% confidence level. The uncertainty of the CRI is U=2.5(K=2), at the 95% confidence level.

The uncertainty of power meter AC current U=0.16 % of rdg, AC Voltage U=0.18% of rdg, Power U=0.14%) (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 flux is U=2.6% (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: **Downward**

Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1611	19.2	0.9931	1572.3	81.9

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
5.401	3938	0.00013	0.3833	0.3788	0.2262	0.5029

Color Rendering Index

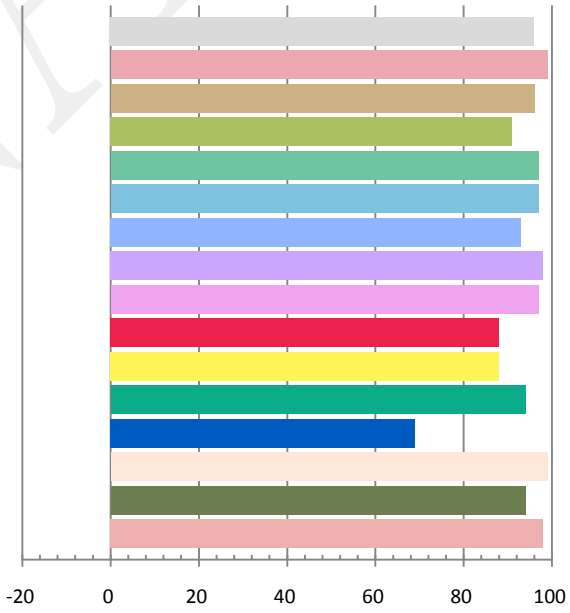
Ra
95.9

R1	R2	R3	R4
99	96	91	97

R5	R6	R7	R8
97	93	98	97

R9	R10	R11	R12
88	88	94	69

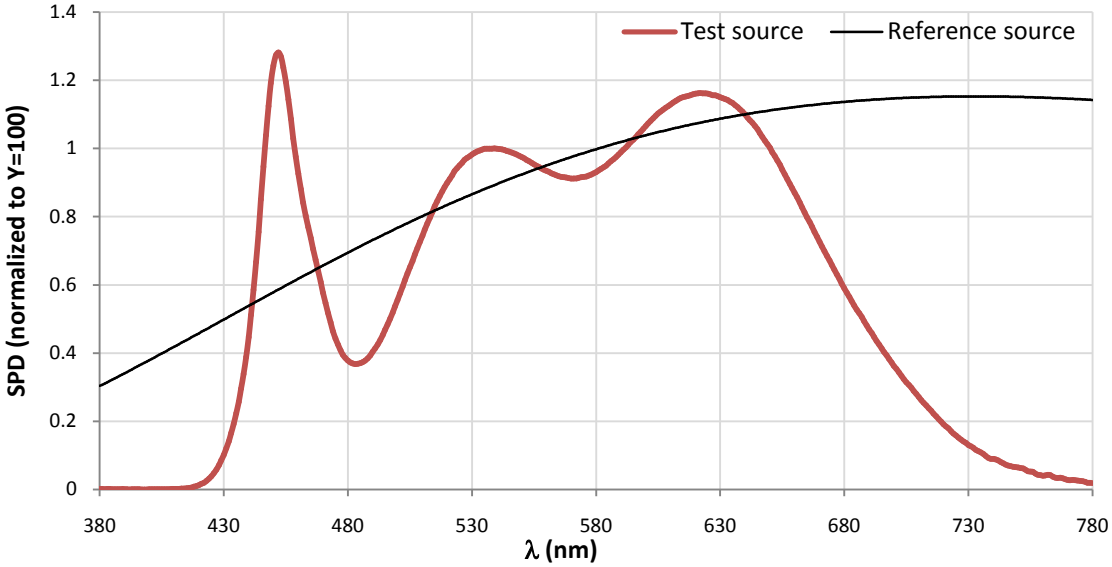
R13	R14	R15
99	94	98



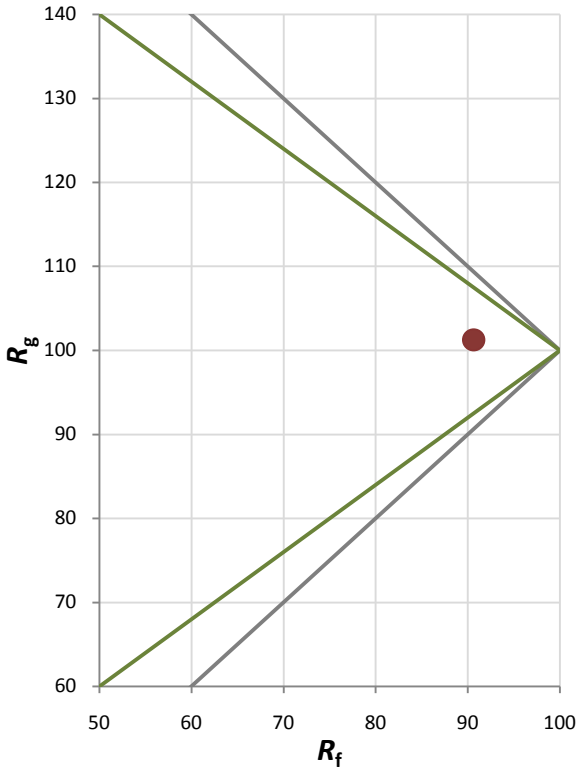
Fidelity Index and Gamut Index

Fidelity Index R_f	91
Gamut Index R_g	101

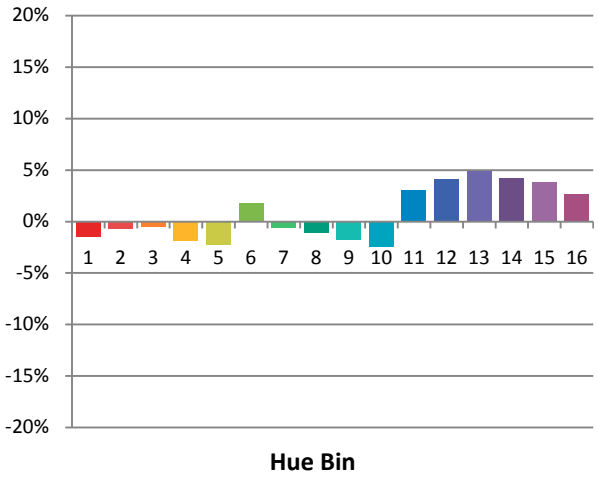
Spectral Power Distribution Comparison



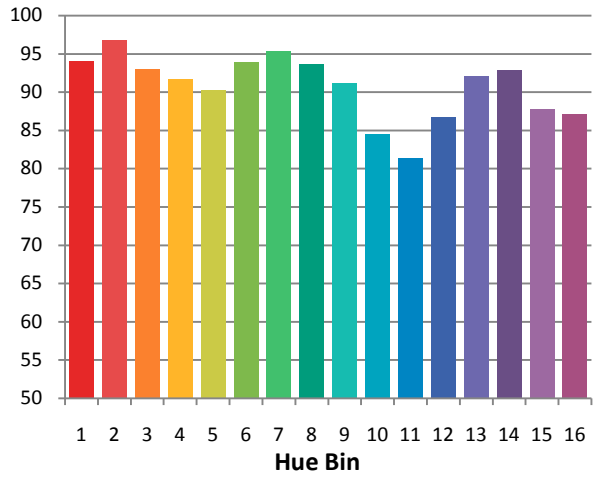
Plot of R_g versus R_f



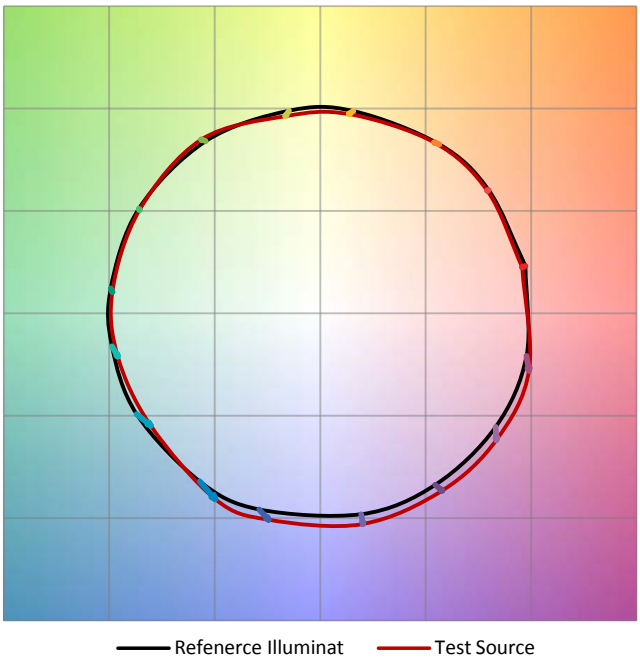
Chroma Shift by Hue

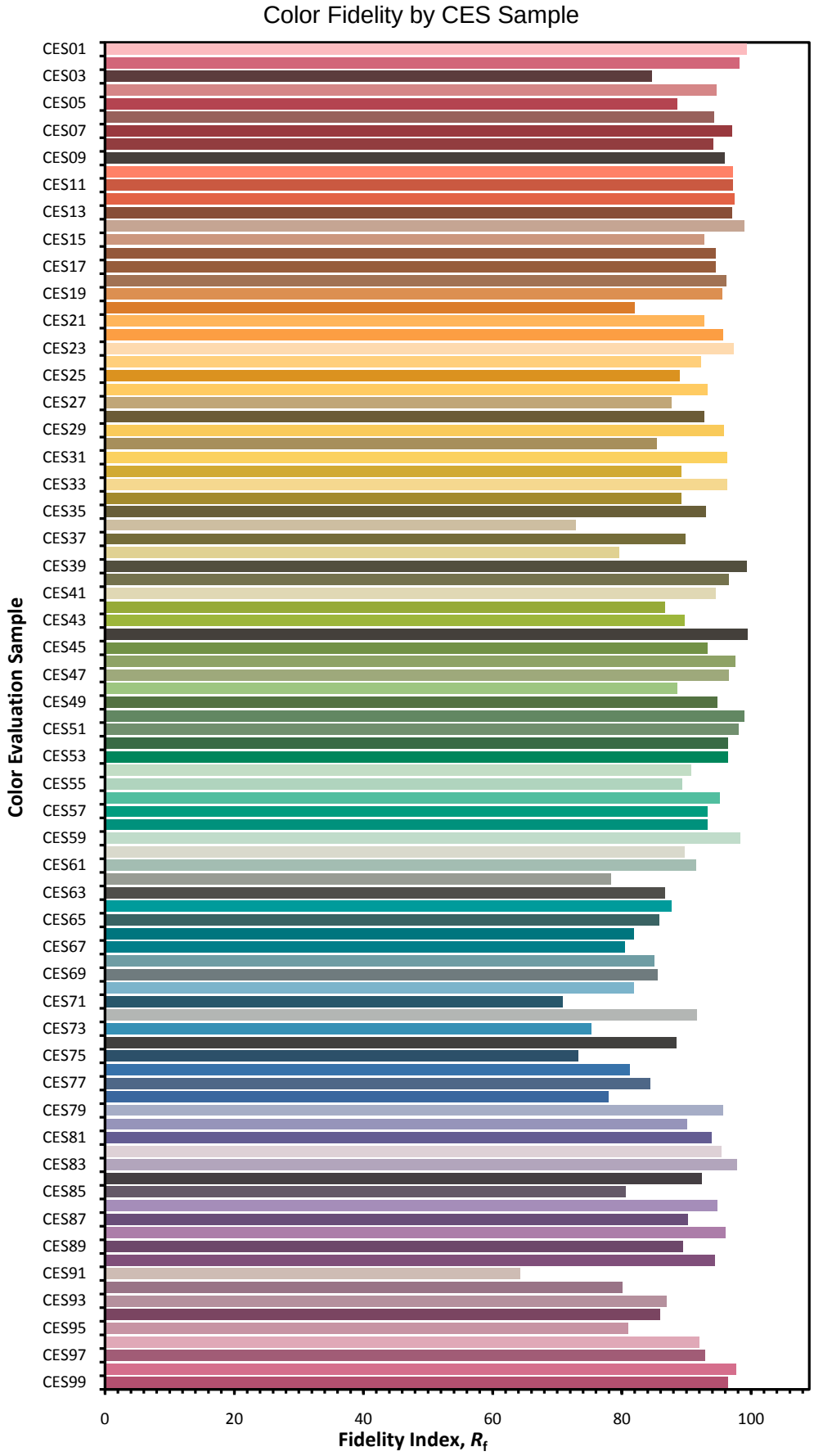


R_f by Hue



Color Vector Graphic




Color Fidelity by CES Sample
Color Evaluation Sample
CES01
CES03
CES05
CES07
CES09
CES11
CES13
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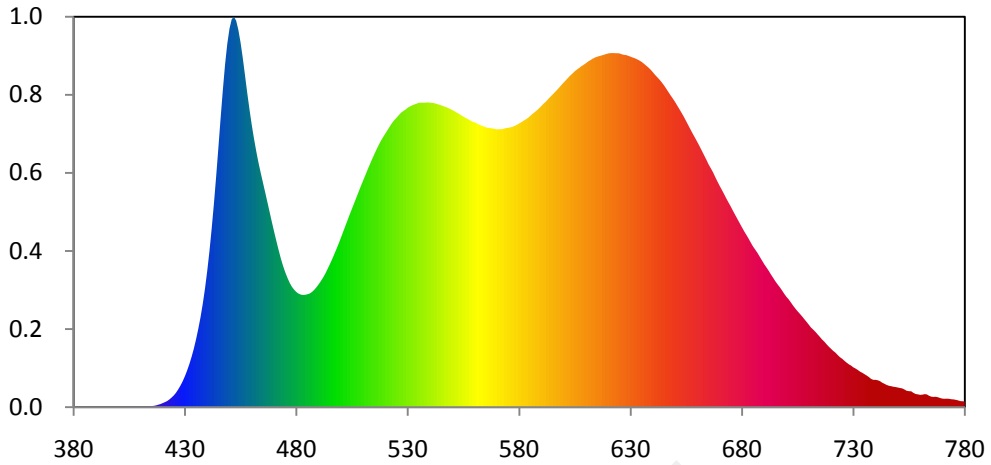
CES97
CES99
0
20
40
60
80
100
Fidelity Index, R_f

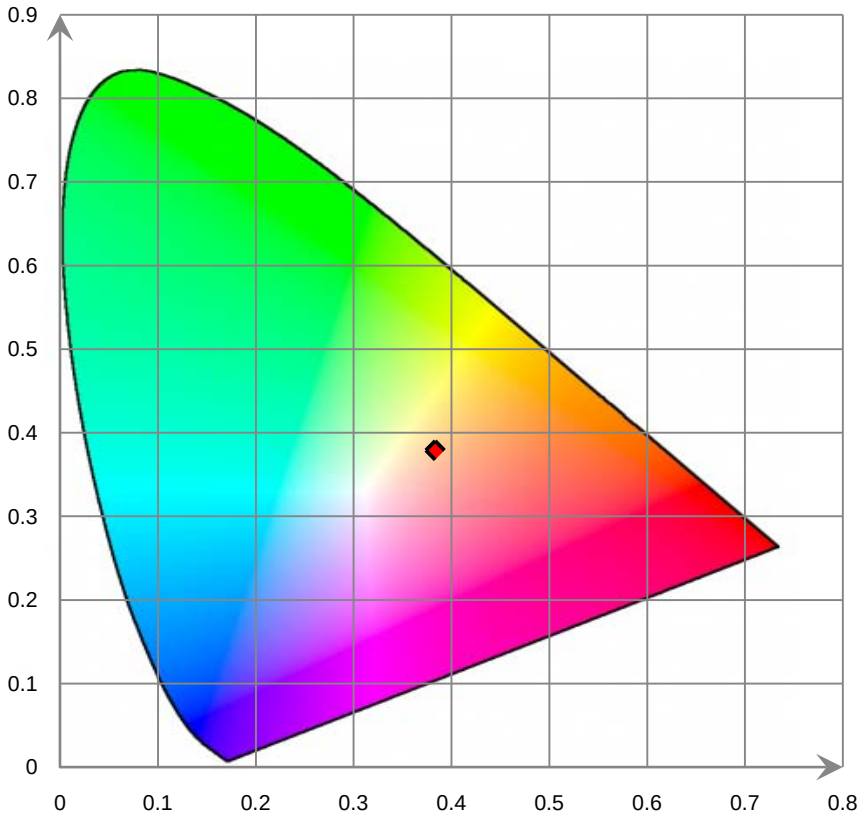
Relative Spectral Power Distribution



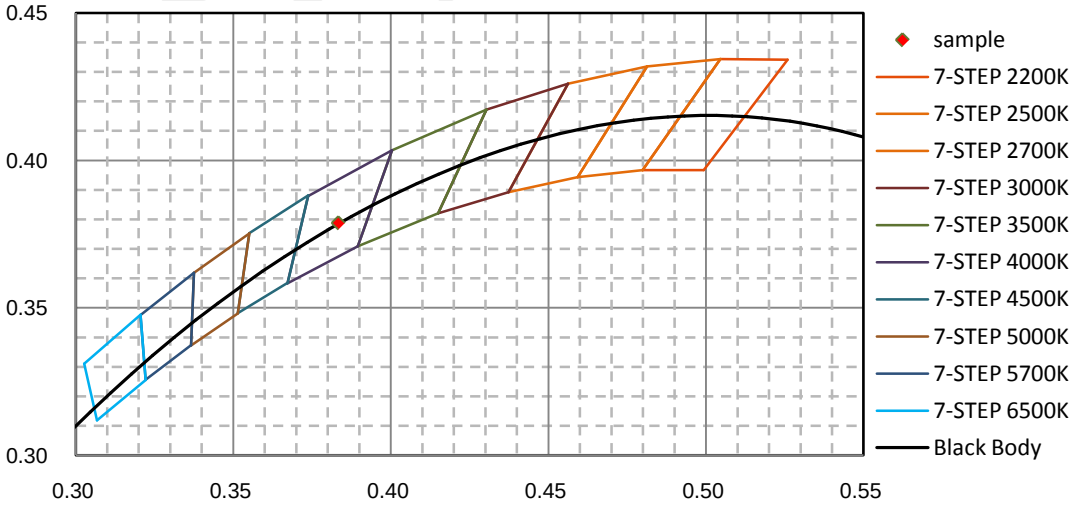
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.970E-02	421	3.809E-01	462	1.934E+01	503	1.413E+01	544	2.286E+01
381	3.440E-02	422	4.590E-01	463	1.848E+01	504	1.458E+01	545	2.280E+01
382	2.440E-02	423	5.820E-01	464	1.771E+01	505	1.500E+01	546	2.274E+01
383	3.520E-02	424	7.258E-01	465	1.698E+01	506	1.543E+01	547	2.268E+01
384	4.270E-02	425	8.884E-01	466	1.625E+01	507	1.586E+01	548	2.261E+01
385	2.900E-02	426	1.092E+00	467	1.550E+01	508	1.629E+01	549	2.253E+01
386	2.660E-02	427	1.348E+00	468	1.475E+01	509	1.671E+01	550	2.245E+01
387	2.490E-02	428	1.635E+00	469	1.401E+01	510	1.712E+01	551	2.236E+01
388	2.390E-02	429	1.961E+00	470	1.328E+01	511	1.753E+01	552	2.225E+01
389	3.080E-02	430	2.340E+00	471	1.258E+01	512	1.795E+01	553	2.216E+01
390	2.620E-02	431	2.776E+00	472	1.190E+01	513	1.834E+01	554	2.205E+01
391	1.230E-02	432	3.262E+00	473	1.126E+01	514	1.873E+01	555	2.194E+01
392	7.700E-03	433	3.806E+00	474	1.069E+01	515	1.911E+01	556	2.185E+01
393	1.310E-02	434	4.425E+00	475	1.020E+01	516	1.946E+01	557	2.176E+01
394	1.620E-02	435	5.132E+00	476	9.778E+00	517	1.981E+01	558	2.166E+01
395	2.000E-02	436	5.918E+00	477	9.398E+00	518	2.013E+01	559	2.157E+01
396	1.330E-02	437	6.795E+00	478	9.100E+00	519	2.041E+01	560	2.151E+01
397	7.000E-03	438	7.799E+00	479	8.877E+00	520	2.068E+01	561	2.144E+01
398	4.100E-03	439	8.951E+00	480	8.702E+00	521	2.095E+01	562	2.134E+01
399	2.100E-03	440	1.027E+01	481	8.576E+00	522	2.121E+01	563	2.127E+01
400	1.240E-02	441	1.178E+01	482	8.505E+00	523	2.148E+01	564	2.121E+01
401	1.810E-02	442	1.348E+01	483	8.472E+00	524	2.169E+01	565	2.114E+01
402	1.760E-02	443	1.535E+01	484	8.490E+00	525	2.187E+01	566	2.110E+01
403	1.980E-02	444	1.739E+01	485	8.532E+00	526	2.206E+01	567	2.108E+01
404	2.220E-02	445	1.957E+01	486	8.586E+00	527	2.224E+01	568	2.106E+01
405	2.340E-02	446	2.179E+01	487	8.699E+00	528	2.236E+01	569	2.102E+01
406	2.660E-02	447	2.391E+01	488	8.855E+00	529	2.248E+01	570	2.098E+01
407	2.720E-02	448	2.586E+01	489	9.051E+00	530	2.262E+01	571	2.099E+01
408	2.080E-02	449	2.743E+01	490	9.280E+00	531	2.272E+01	572	2.100E+01
409	3.750E-02	450	2.859E+01	491	9.517E+00	532	2.280E+01	573	2.103E+01
410	5.070E-02	451	2.930E+01	492	9.785E+00	533	2.287E+01	574	2.108E+01
411	4.500E-02	452	2.949E+01	493	1.009E+01	534	2.293E+01	575	2.110E+01
412	4.810E-02	453	2.919E+01	494	1.043E+01	535	2.299E+01	576	2.113E+01
413	5.810E-02	454	2.848E+01	495	1.078E+01	536	2.300E+01	577	2.118E+01
414	6.660E-02	455	2.751E+01	496	1.115E+01	537	2.300E+01	578	2.125E+01
415	8.240E-02	456	2.633E+01	497	1.154E+01	538	2.300E+01	579	2.133E+01
416	1.012E-01	457	2.502E+01	498	1.194E+01	539	2.302E+01	580	2.143E+01
417	1.330E-01	458	2.370E+01	499	1.235E+01	540	2.300E+01	581	2.153E+01
418	1.865E-01	459	2.246E+01	500	1.279E+01	541	2.298E+01	582	2.164E+01
419	2.366E-01	460	2.131E+01	501	1.324E+01	542	2.296E+01	583	2.174E+01
420	3.076E-01	461	2.028E+01	502	1.368E+01	543	2.290E+01	584	2.186E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	2.200E+01	626	2.666E+01	667	1.775E+01	708	6.652E+00	749	1.519E+00
586	2.215E+01	627	2.661E+01	668	1.740E+01	709	6.449E+00	750	1.485E+00
587	2.228E+01	628	2.660E+01	669	1.705E+01	710	6.235E+00	751	1.447E+00
588	2.243E+01	629	2.654E+01	670	1.672E+01	711	6.018E+00	752	1.414E+00
589	2.259E+01	630	2.647E+01	671	1.641E+01	712	5.856E+00	753	1.330E+00
590	2.275E+01	631	2.641E+01	672	1.609E+01	713	5.687E+00	754	1.236E+00
591	2.293E+01	632	2.635E+01	673	1.577E+01	714	5.493E+00	755	1.210E+00
592	2.308E+01	633	2.627E+01	674	1.546E+01	715	5.307E+00	756	1.197E+00
593	2.326E+01	634	2.618E+01	675	1.515E+01	716	5.108E+00	757	1.077E+00
594	2.344E+01	635	2.608E+01	676	1.483E+01	717	4.946E+00	758	9.929E-01
595	2.361E+01	636	2.595E+01	677	1.452E+01	718	4.751E+00	759	9.673E-01
596	2.379E+01	637	2.580E+01	678	1.420E+01	719	4.572E+00	760	9.276E-01
597	2.396E+01	638	2.566E+01	679	1.390E+01	720	4.410E+00	761	9.457E-01
598	2.415E+01	639	2.550E+01	680	1.359E+01	721	4.248E+00	762	9.837E-01
599	2.434E+01	640	2.530E+01	681	1.329E+01	722	4.117E+00	763	9.643E-01
600	2.452E+01	641	2.510E+01	682	1.301E+01	723	3.937E+00	764	8.616E-01
601	2.470E+01	642	2.493E+01	683	1.273E+01	724	3.774E+00	765	7.925E-01
602	2.489E+01	643	2.474E+01	684	1.242E+01	725	3.656E+00	766	7.746E-01
603	2.506E+01	644	2.454E+01	685	1.213E+01	726	3.505E+00	767	7.884E-01
604	2.521E+01	645	2.432E+01	686	1.189E+01	727	3.365E+00	768	7.490E-01
605	2.538E+01	646	2.406E+01	687	1.165E+01	728	3.236E+00	769	6.911E-01
606	2.551E+01	647	2.381E+01	688	1.136E+01	729	3.142E+00	770	6.447E-01
607	2.563E+01	648	2.355E+01	689	1.108E+01	730	3.009E+00	771	6.335E-01
608	2.576E+01	649	2.330E+01	690	1.080E+01	731	2.921E+00	772	6.436E-01
609	2.586E+01	650	2.306E+01	691	1.056E+01	732	2.811E+00	773	6.318E-01
610	2.598E+01	651	2.277E+01	692	1.031E+01	733	2.686E+00	774	5.991E-01
611	2.611E+01	652	2.249E+01	693	1.003E+01	734	2.600E+00	775	5.858E-01
612	2.621E+01	653	2.221E+01	694	9.774E+00	735	2.496E+00	776	5.554E-01
613	2.632E+01	654	2.191E+01	695	9.513E+00	736	2.390E+00	777	5.146E-01
614	2.641E+01	655	2.159E+01	696	9.278E+00	737	2.273E+00	778	4.589E-01
615	2.647E+01	656	2.127E+01	697	9.063E+00	738	2.133E+00	779	4.469E-01
616	2.652E+01	657	2.095E+01	698	8.817E+00	739	2.063E+00	780	4.315E-01
617	2.657E+01	658	2.064E+01	699	8.563E+00	740	2.065E+00		
618	2.662E+01	659	2.034E+01	700	8.333E+00	741	2.031E+00		
619	2.667E+01	660	2.002E+01	701	8.139E+00	742	1.962E+00		
620	2.672E+01	661	1.971E+01	702	7.906E+00	743	1.846E+00		
621	2.675E+01	662	1.937E+01	703	7.664E+00	744	1.765E+00		
622	2.675E+01	663	1.904E+01	704	7.443E+00	745	1.675E+00		
623	2.674E+01	664	1.871E+01	705	7.239E+00	746	1.615E+00		
624	2.674E+01	665	1.835E+01	706	7.056E+00	747	1.583E+00		
625	2.672E+01	666	1.806E+01	707	6.861E+00	748	1.542E+00		

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**

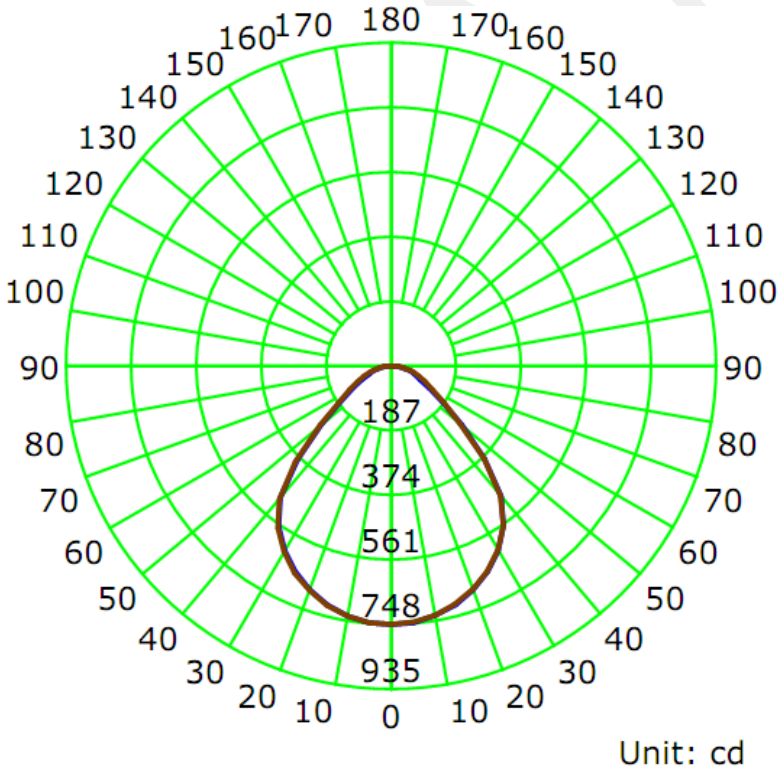
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1610	19.23	0.9950

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1575	81.95	748.4	1.22	1.22

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	90.6	90.5	90.7	90.6	90.6
Field Angle (10% I_{max}):	138.4	139.7	144.3	143.7	141.5

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	748	748	748	748	748	748	748	748
5.0°	745	744	743	744	744	745	744	746
10.0°	733	732	732	731	732	732	732	734
15.0°	715	713	713	712	714	715	715	716
20.0°	688	687	687	687	687	688	689	691
25.0°	656	655	655	654	655	656	657	660
30.0°	616	614	613	613	615	616	616	619
35.0°	565	562	561	562	563	565	566	570
40.0°	492	488	486	486	491	493	496	501
45.0°	380	376	373	371	376	377	382	387
50.0°	265	263	260	259	261	264	267	270
55.0°	183	186	180	180	183	181	185	188
60.0°	127	141	126	127	138	126	136	136
65.0°	93	110	94	96	107	92	104	104
70.0°	73	86	74	77	84	71	83	82
75.0°	57	64	58	60	64	55	63	63
80.0°	40	42	40	41	41	39	42	43
85.0°	19	20	19	19	20	19	21	22
90.0°	0	0	0	0	0	0	0	0
95.0°	0	0	0	0	0	0	0	0
100.0°	0	0	0	0	0	0	0	0
105.0°	0	0	0	0	0	0	0	0
110.0°	0	0	0	0	0	0	0	0
115.0°	0	0	0	0	0	0	0	0
120.0°	0	0	0	0	0	0	0	0
125.0°	0	0	0	0	0	0	0	0
130.0°	0	0	0	0	0	0	0	0
135.0°	0	0	0	0	0	0	0	0
140.0°	0	0	0	0	0	0	0	0
145.0°	0	0	0	0	0	0	0	0
150.0°	0	0	0	0	0	0	0	0
155.0°	0	0	0	0	0	0	0	0
160.0°	0	0	0	0	0	0	0	0
165.0°	0	0	0	0	0	0	0	0
170.0°	0	0	0	0	0	0	0	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.)

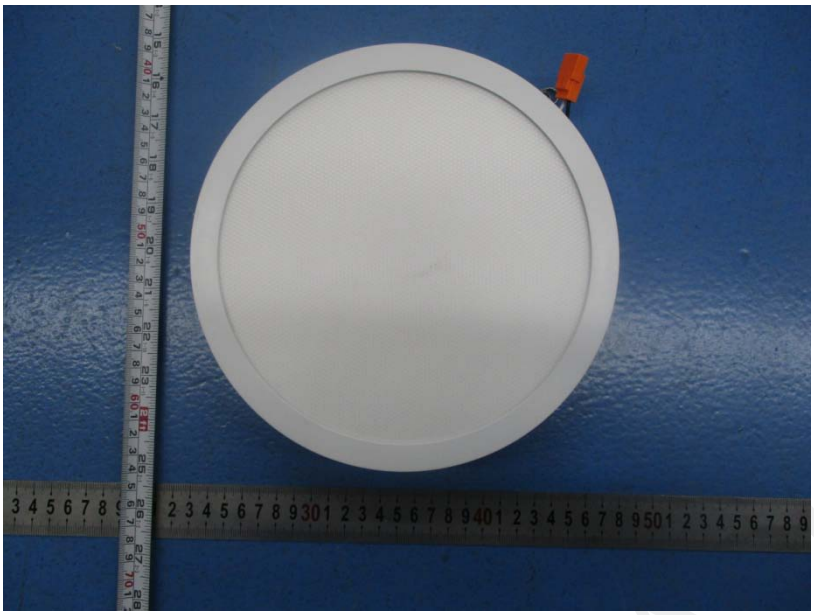
C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	748	748	748	748	748	748	748	748
5.0°	745	744	745	744	746	746	744	745
10.0°	734	733	734	734	734	734	733	733
15.0°	715	716	717	716	717	716	714	714
20.0°	690	690	691	692	691	691	689	688
25.0°	657	658	659	661	661	659	656	655
30.0°	617	619	620	621	620	619	617	614
35.0°	567	569	570	572	571	569	566	562
40.0°	498	501	503	504	504	502	494	489
45.0°	382	385	388	390	391	385	380	374
50.0°	265	268	267	267	267	266	263	260
55.0°	182	188	186	186	188	183	184	181
60.0°	126	141	130	130	138	126	135	130
65.0°	91	110	94	96	107	90	103	99
70.0°	70	86	74	75	84	69	82	79
75.0°	55	64	58	59	62	53	61	60
80.0°	39	42	40	40	41	38	41	40
85.0°	19	21	21	21	20	19	19	18
90.0°	0	0	0	0	0	0	0	0
95.0°	0	0	0	0	0	0	0	0
100.0°	0	0	0	0	0	0	0	0
105.0°	0	0	0	0	0	0	0	0
110.0°	0	0	0	0	0	0	0	0
115.0°	0	0	0	0	0	0	0	0
120.0°	0	0	0	0	0	0	0	0
125.0°	0	0	0	0	0	0	0	0
130.0°	0	0	0	0	0	0	0	0
135.0°	0	0	0	0	0	0	0	0
140.0°	0	0	0	0	0	0	0	0
145.0°	0	0	0	0	0	0	0	0
150.0°	0	0	0	0	0	0	0	0
155.0°	0	0	0	0	0	0	0	0
160.0°	0	0	0	0	0	0	0	0
165.0°	0	0	0	0	0	0	0	0
170.0°	0	0	0	0	0	0	0	0
175.0°	0	0	0	0	0	0	0	0
180.0°	0	0	0	0	0	0	0	0

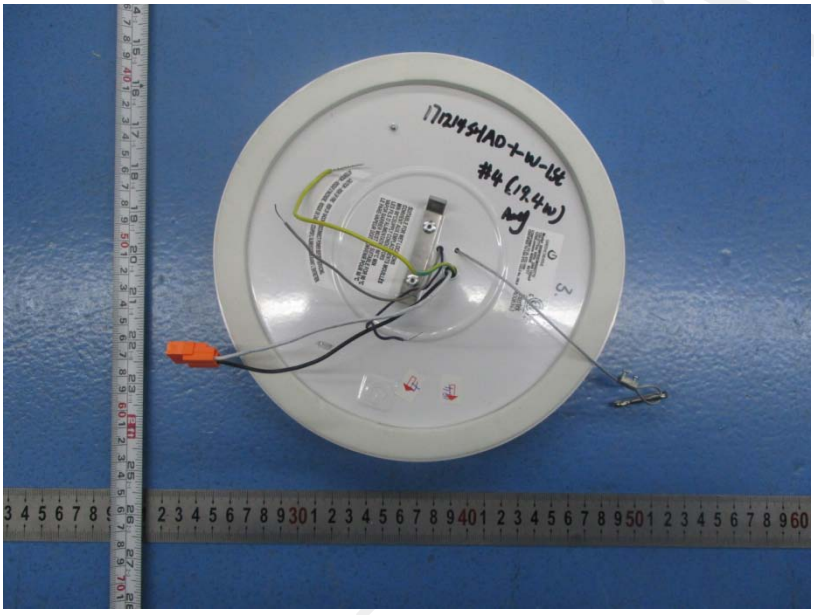
Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	17.8	1.13
5-10	52.9	3.36
10-15	85.9	5.45
15-20	115.7	7.35
20-25	141.2	8.97
25-30	161.2	10.23
30-35	174.2	11.06
35-40	177.1	11.25
40-45	162.3	10.30
45-50	130.4	8.28
50-55	97.5	6.19
55-60	73.1	4.64
60-65	56.2	3.57
65-70	44.9	2.85
70-75	36.0	2.28
75-80	26.8	1.70
80-85	16.4	1.04
85-90	5.4	0.34
90-95	0.0	0.00
95-100	0.0	0.00
100-105	0.0	0.00
105-110	0.0	0.00
110-115	0.0	0.00
115-120	0.0	0.00
120-125	0.0	0.00
125-130	0.0	0.00
130-135	0.0	0.00
135-140	0.0	0.00
140-145	0.0	0.00
145-150	0.0	0.00
150-155	0.0	0.00
155-160	0.0	0.00
160-165	0.0	0.00
165-170	0.0	0.00
170-175	0.0	0.00
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	17.8	1.13
0-10	70.7	4.49
0-15	156.6	9.94
0-20	272.3	17.29
0-25	413.5	26.25
0-30	574.7	36.49
0-35	748.9	47.55
0-40	926.0	58.79
0-45	1088.3	69.10
0-50	1218.7	77.38
0-55	1316.2	83.57
0-60	1389.3	88.21
0-65	1445.5	91.78
0-70	1490.4	94.63
0-75	1526.4	96.91
0-80	1553.2	98.61
0-85	1569.6	99.66
0-90	1575.0	100.00
0-95	1575.0	100.00
0-100	1575.0	100.00
0-105	1575.0	100.00
0-110	1575.0	100.00
0-115	1575.0	100.00
0-120	1575.0	100.00
0-125	1575.0	100.00
0-130	1575.0	100.00
0-135	1575.0	100.00
0-140	1575.0	100.00
0-145	1575.0	100.00
0-150	1575.0	100.00
0-155	1575.0	100.00
0-160	1575.0	100.00
0-165	1575.0	100.00
0-170	1575.0	100.00
0-175	1575.0	100.00
0-180	1575.0	100.00

6. Product Photo





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