IES LM-79-08

MEASUREMENT AND TEST REPORT

For

GREEN CREATIVE LTD

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

Test Model: 11SMDL6DIM/940

Report Type:	Electrical and Photometric tests including: Luminous Flux, Chromaticity, Luminous Intensity Distribution
Test Engineer:	Carl Du
Report Number:	RKS170309004-10
Test Date:	2017-03-10
Report Date:	2017-03-11
Reviewed By:	Blake Zhang
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.

1. Product Description

General Information:

One sample was received on 2017-03-09 and used for testing.

Model Tested:	11SMDL6DIM/940
Manufacturer:	GREEN CREATIVE LTD
Brand Name:	GREEN CREATIVE
Product Designation:	6" New Construction Downlight
Burning Time Before Test:	0hour(For New Products)

Rated Values:

Rated Voltage/Frequency:	120 VAC 60Hz
Rated Power:	11W
Nominal CCT:	4000K
Nominal Lumen Output:	750 lm
Nominal CRI:	90

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
Integrating Sphere	SENSING	N/A	N/A	25°C	2017-03-09	2018-03-08
Power Meter	SENSING	UI2008	908735	10.0-600.0V	2017-03-03	2018-03-02
Spectral photometer	SENSING	SPR3000	s0902024	350nm～800nm	2017-03-09	2018-03-08
AC Power Supply	ALL Power	APW-105N	970663	220V±10% 50Hz	2017-03-03	2018-03-02
Standard Light Source	EVERFINE	D204	G100283CA8351158	24V/100W	2016-08-26	2017-08-25
Thermal Meter	SENSING	N/A	N/A	25°C	2016-03-21	2017-03-20
DC Power Supply	ITECH	IT6154	0061 0417 6471 0010 19	0~32V	2017-03-03	2018-03-02
AC Power Supply	EVERFINE	VPS1030 PWM	1012017	0-150V，0-300V	2017-03-03	2018-03-02
DC Power Supply	EVERFINE	WY12010	1009009	30V/5A	2017-03-03	2018-03-02
Power Meter	YOKOGAWA	WT-210	91KB35700	15/30/60/150/300/600 V	2017-03-03	2018-03-02
Goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	1600mm,3000W/10A	2017-03-09	2018-03-08
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=2.3% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=23K (K=2), at the 95% confidence level. The uncertainty of the CRI is U=2.3(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: **0.5hour**

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	0.09913	10.97	0.9224	807.7	73.62

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
2.761	4075	0.00064	0.3775	0.3763	0.2234	0.5009

Color Rendering Index

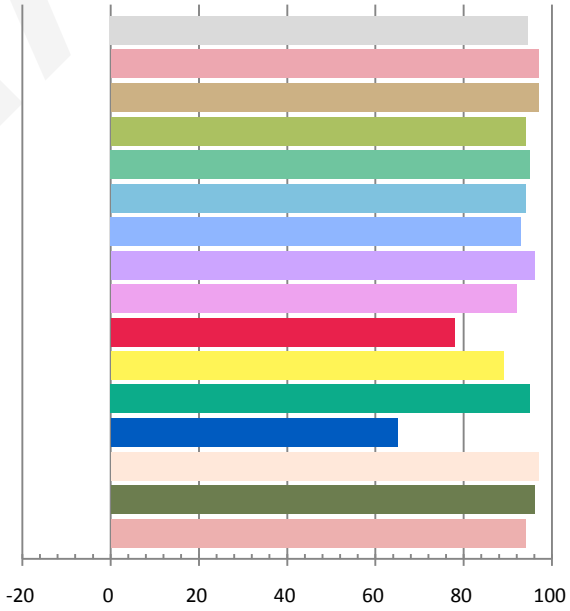
Ra
94.6

R1	R2	R3	R4
97	97	94	95

R5	R6	R7	R8
94	93	96	92

R9	R10	R11	R12
78	89	95	65

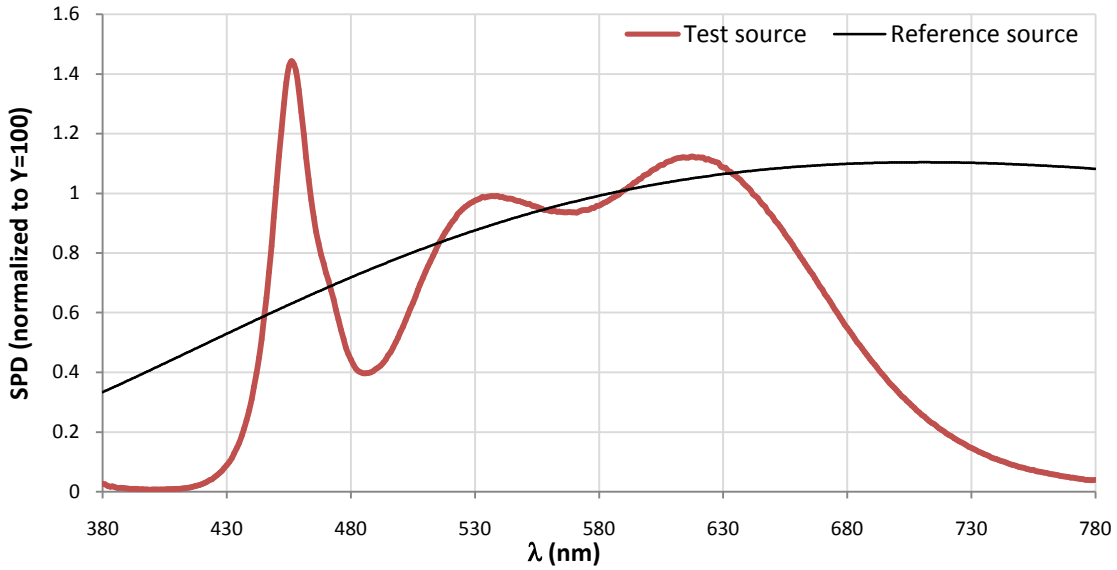
R13	R14	R15
97	96	94



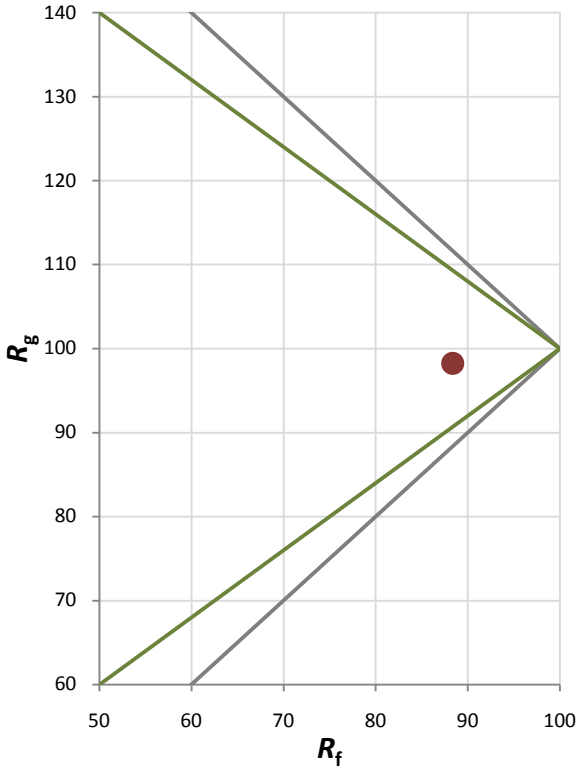
Fidelity Index and Gamut Index

Fidelity Index R_f	88
Gamut Index R_g	98

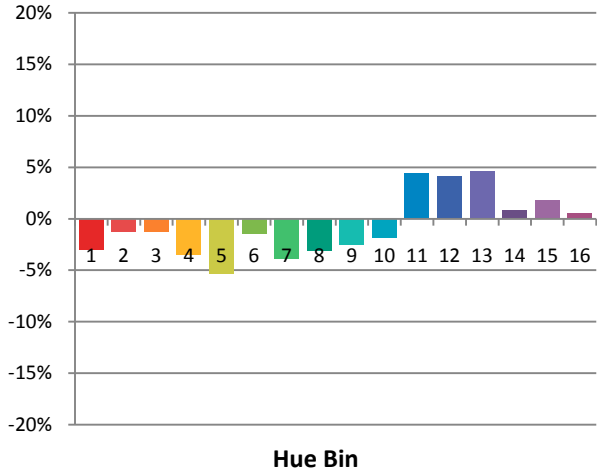
Spectral Power Distribution Comparison



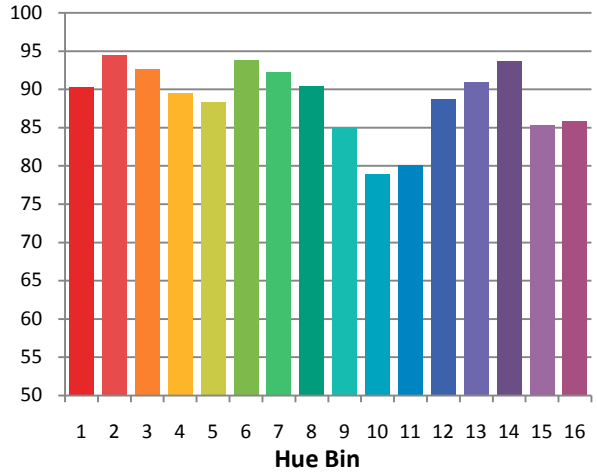
Plot of R_g versus R_f



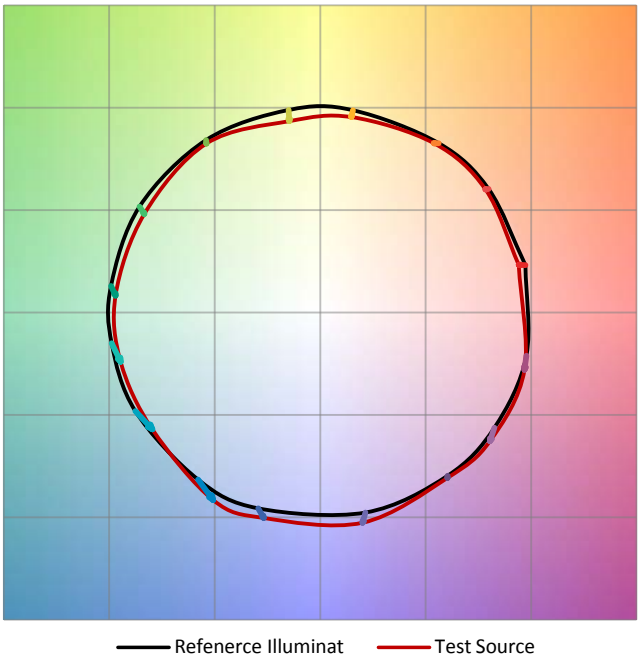
Chroma Shift by Hue



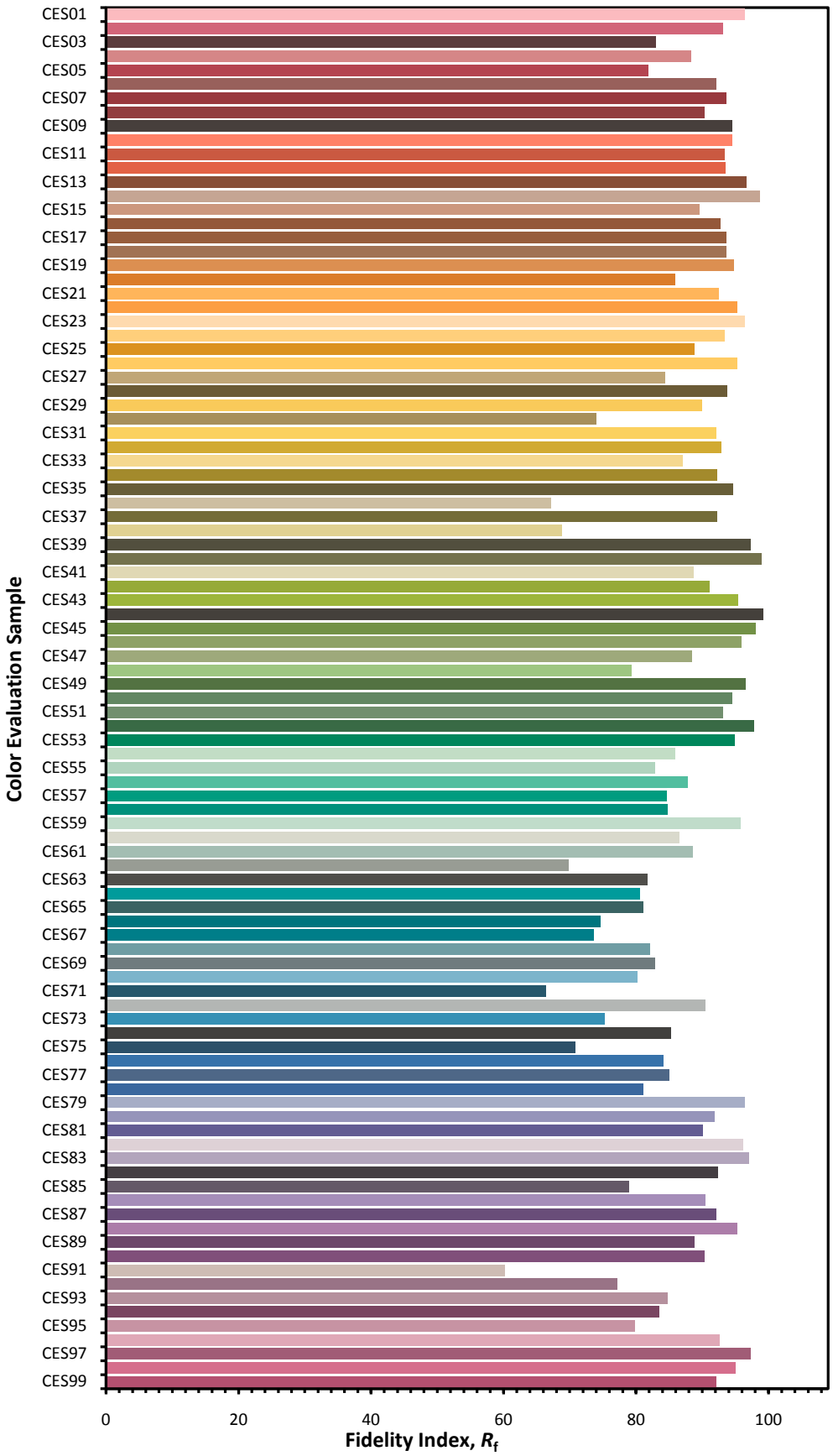
R_f by Hue



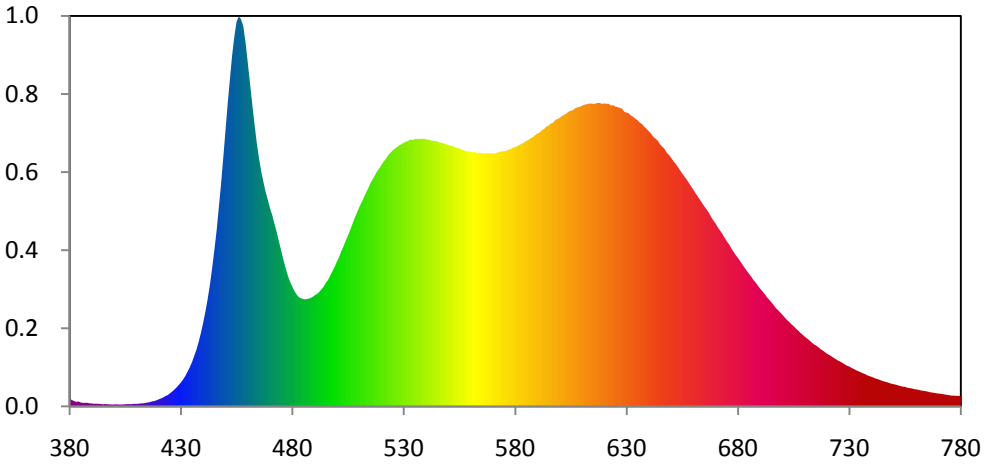
Color Vector Graphic



Color Fidelity by CES Sample



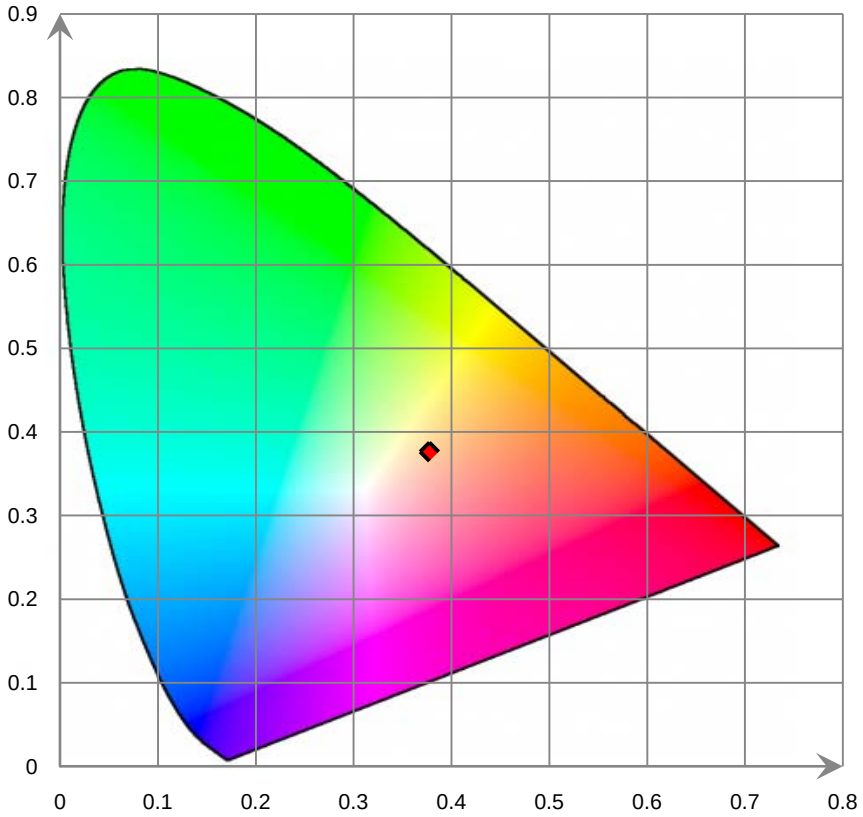
Relative Spectral Power Distribution



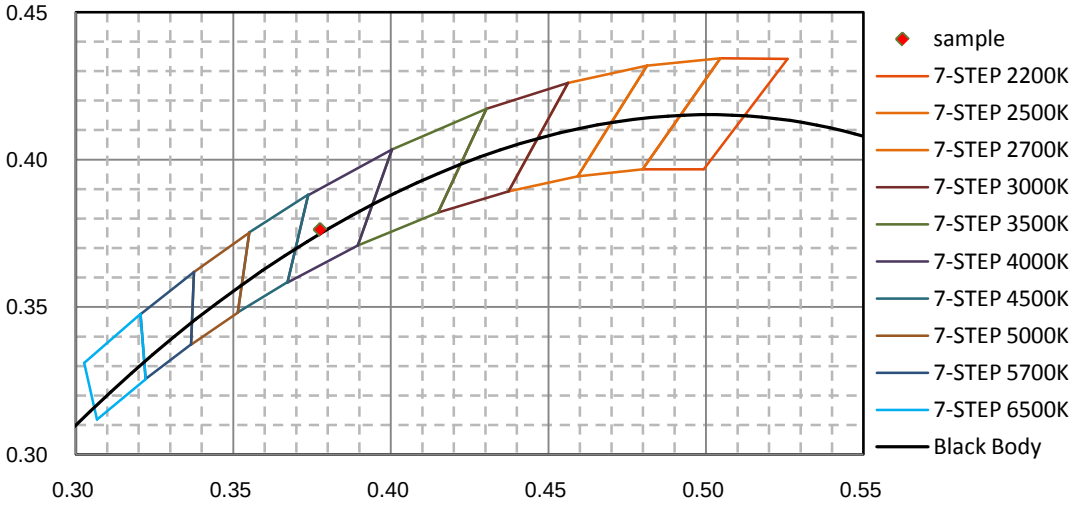
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.178E-01	421	3.459E-01	462	1.324E+01	503	7.008E+00	544	1.161E+01
381	2.853E-01	422	3.873E-01	463	1.238E+01	504	7.259E+00	545	1.160E+01
382	2.323E-01	423	4.501E-01	464	1.156E+01	505	7.482E+00	546	1.155E+01
383	1.977E-01	424	4.907E-01	465	1.088E+01	506	7.734E+00	547	1.153E+01
384	2.153E-01	425	5.649E-01	466	1.031E+01	507	7.987E+00	548	1.151E+01
385	1.726E-01	426	6.416E-01	467	9.835E+00	508	8.245E+00	549	1.147E+01
386	1.517E-01	427	7.296E-01	468	9.386E+00	509	8.472E+00	550	1.144E+01
387	1.552E-01	428	8.257E-01	469	9.041E+00	510	8.709E+00	551	1.140E+01
388	1.552E-01	429	9.354E-01	470	8.668E+00	511	8.909E+00	552	1.140E+01
389	1.327E-01	430	1.048E+00	471	8.364E+00	512	9.118E+00	553	1.133E+01
390	1.273E-01	431	1.177E+00	472	7.981E+00	513	9.328E+00	554	1.131E+01
391	1.152E-01	432	1.336E+00	473	7.622E+00	514	9.534E+00	555	1.129E+01
392	1.183E-01	433	1.519E+00	474	7.208E+00	515	9.754E+00	556	1.124E+01
393	1.109E-01	434	1.719E+00	475	6.819E+00	516	9.927E+00	557	1.121E+01
394	1.077E-01	435	1.943E+00	476	6.411E+00	517	1.010E+01	558	1.116E+01
395	9.019E-02	436	2.219E+00	477	6.057E+00	518	1.028E+01	559	1.117E+01
396	1.032E-01	437	2.492E+00	478	5.717E+00	519	1.041E+01	560	1.113E+01
397	9.201E-02	438	2.837E+00	479	5.447E+00	520	1.057E+01	561	1.111E+01
398	8.971E-02	439	3.225E+00	480	5.233E+00	521	1.071E+01	562	1.113E+01
399	8.060E-02	440	3.667E+00	481	5.038E+00	522	1.083E+01	563	1.109E+01
400	8.413E-02	441	4.154E+00	482	4.883E+00	523	1.099E+01	564	1.110E+01
401	8.973E-02	442	4.697E+00	483	4.776E+00	524	1.109E+01	565	1.108E+01
402	8.216E-02	443	5.315E+00	484	4.723E+00	525	1.120E+01	566	1.107E+01
403	8.190E-02	444	6.039E+00	485	4.695E+00	526	1.128E+01	567	1.107E+01
404	8.626E-02	445	6.842E+00	486	4.687E+00	527	1.135E+01	568	1.108E+01
405	9.091E-02	446	7.676E+00	487	4.704E+00	528	1.142E+01	569	1.107E+01
406	9.929E-02	447	8.692E+00	488	4.735E+00	529	1.148E+01	570	1.107E+01
407	9.694E-02	448	9.728E+00	489	4.784E+00	530	1.154E+01	571	1.106E+01
408	9.810E-02	449	1.087E+01	490	4.859E+00	531	1.158E+01	572	1.111E+01
409	1.142E-01	450	1.207E+01	491	4.914E+00	532	1.162E+01	573	1.114E+01
410	1.095E-01	451	1.327E+01	492	4.998E+00	533	1.168E+01	574	1.116E+01
411	1.166E-01	452	1.432E+01	493	5.114E+00	534	1.166E+01	575	1.116E+01
412	1.310E-01	453	1.538E+01	494	5.230E+00	535	1.169E+01	576	1.118E+01
413	1.334E-01	454	1.621E+01	495	5.401E+00	536	1.170E+01	577	1.123E+01
414	1.504E-01	455	1.684E+01	496	5.526E+00	537	1.171E+01	578	1.125E+01
415	1.696E-01	456	1.706E+01	497	5.718E+00	538	1.170E+01	579	1.132E+01
416	1.845E-01	457	1.693E+01	498	5.915E+00	539	1.172E+01	580	1.134E+01
417	2.152E-01	458	1.663E+01	499	6.104E+00	540	1.168E+01	581	1.139E+01
418	2.359E-01	459	1.593E+01	500	6.334E+00	541	1.168E+01	582	1.145E+01
419	2.649E-01	460	1.504E+01	501	6.537E+00	542	1.164E+01	583	1.149E+01
420	3.083E-01	461	1.415E+01	502	6.794E+00	543	1.162E+01	584	1.155E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	1.162E+01	626	1.310E+01	667	8.463E+00	708	3.222E+00	749	9.874E-01
586	1.167E+01	627	1.306E+01	668	8.290E+00	709	3.139E+00	750	9.689E-01
587	1.173E+01	628	1.303E+01	669	8.131E+00	710	3.047E+00	751	9.480E-01
588	1.178E+01	629	1.289E+01	670	7.997E+00	711	2.974E+00	752	9.141E-01
589	1.187E+01	630	1.285E+01	671	7.827E+00	712	2.896E+00	753	8.908E-01
590	1.194E+01	631	1.283E+01	672	7.696E+00	713	2.803E+00	754	8.625E-01
591	1.199E+01	632	1.272E+01	673	7.549E+00	714	2.724E+00	755	8.551E-01
592	1.208E+01	633	1.267E+01	674	7.382E+00	715	2.669E+00	756	8.161E-01
593	1.214E+01	634	1.258E+01	675	7.223E+00	716	2.599E+00	757	8.008E-01
594	1.224E+01	635	1.252E+01	676	7.090E+00	717	2.512E+00	758	7.861E-01
595	1.228E+01	636	1.242E+01	677	6.924E+00	718	2.448E+00	759	7.595E-01
596	1.238E+01	637	1.235E+01	678	6.767E+00	719	2.377E+00	760	7.429E-01
597	1.241E+01	638	1.223E+01	679	6.622E+00	720	2.303E+00	761	7.281E-01
598	1.253E+01	639	1.214E+01	680	6.496E+00	721	2.248E+00	762	6.992E-01
599	1.257E+01	640	1.204E+01	681	6.357E+00	722	2.190E+00	763	6.858E-01
600	1.262E+01	641	1.194E+01	682	6.211E+00	723	2.120E+00	764	6.702E-01
601	1.270E+01	642	1.179E+01	683	6.067E+00	724	2.064E+00	765	6.490E-01
602	1.277E+01	643	1.171E+01	684	5.927E+00	725	2.000E+00	766	6.257E-01
603	1.281E+01	644	1.163E+01	685	5.801E+00	726	1.956E+00	767	6.058E-01
604	1.290E+01	645	1.147E+01	686	5.670E+00	727	1.896E+00	768	5.930E-01
605	1.294E+01	646	1.137E+01	687	5.524E+00	728	1.835E+00	769	5.783E-01
606	1.296E+01	647	1.128E+01	688	5.415E+00	729	1.779E+00	770	5.608E-01
607	1.305E+01	648	1.110E+01	689	5.276E+00	730	1.742E+00	771	5.517E-01
608	1.309E+01	649	1.101E+01	690	5.149E+00	731	1.683E+00	772	5.361E-01
609	1.311E+01	650	1.088E+01	691	5.034E+00	732	1.636E+00	773	5.169E-01
610	1.316E+01	651	1.073E+01	692	4.918E+00	733	1.585E+00	774	5.019E-01
611	1.320E+01	652	1.062E+01	693	4.779E+00	734	1.541E+00	775	4.875E-01
612	1.322E+01	653	1.048E+01	694	4.671E+00	735	1.500E+00	776	4.695E-01
613	1.324E+01	654	1.034E+01	695	4.556E+00	736	1.452E+00	777	4.694E-01
614	1.325E+01	655	1.019E+01	696	4.438E+00	737	1.414E+00	778	4.610E-01
615	1.324E+01	656	1.006E+01	697	4.305E+00	738	1.362E+00	779	4.616E-01
616	1.324E+01	657	9.925E+00	698	4.214E+00	739	1.324E+00	780	4.621E-01
617	1.328E+01	658	9.774E+00	699	4.108E+00	740	1.291E+00		
618	1.328E+01	659	9.623E+00	700	4.007E+00	741	1.253E+00		
619	1.324E+01	660	9.484E+00	701	3.890E+00	742	1.211E+00		
620	1.325E+01	661	9.324E+00	702	3.784E+00	743	1.187E+00		
621	1.324E+01	662	9.182E+00	703	3.697E+00	744	1.147E+00		
622	1.324E+01	663	9.034E+00	704	3.595E+00	745	1.109E+00		
623	1.316E+01	664	8.886E+00	705	3.511E+00	746	1.080E+00		
624	1.318E+01	665	8.742E+00	706	3.409E+00	747	1.052E+00		
625	1.312E+01	666	8.610E+00	707	3.322E+00	748	1.021E+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**

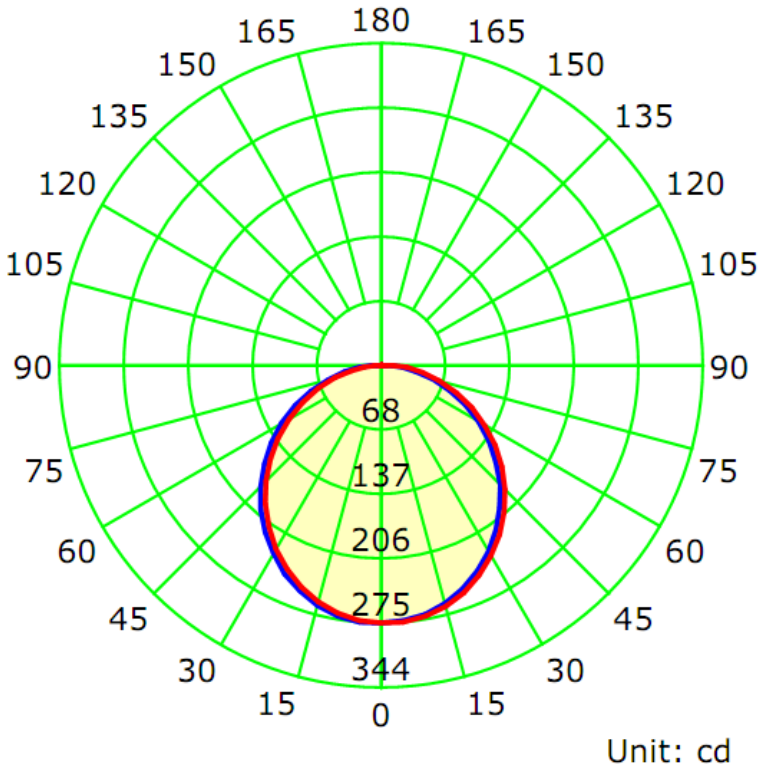
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.0980	10.87	0.9240

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I_{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
812.1	74.71	275.9	1.25	1.24

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I_{max}):	112.3	112.1	112.2	112.1	112.2
Field Angle (10% I_{max}):	167.4	167.2	166.9	167.0	167.1

Luminous Intensity (cd) Distribution Data

C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	276	276	276	276	276	276	276	276
5.0°	274	274	273	275	276	276	276	276
10.0°	271	271	271	272	273	273	273	272
15.0°	264	265	266	266	267	267	267	267
20.0°	255	255	257	258	259	259	259	259
25.0°	243	244	245	247	248	249	249	248
30.0°	230	231	232	234	236	236	236	235
35.0°	215	216	218	220	221	222	222	221
40.0°	198	200	201	203	205	206	205	204
45.0°	181	182	184	186	187	188	188	187
50.0°	161	163	165	167	169	169	169	168
55.0°	141	143	146	147	149	149	149	148
60.0°	121	123	125	127	129	129	129	127
65.0°	99	102	104	106	108	108	108	106
70.0°	78	80	82	84	86	86	86	85
75.0°	58	59	62	63	65	65	65	64
80.0°	38	40	42	44	45	45	45	44
85.0°	23	24	26	27	28	28	27	27
90.0°	11	12	13	14	14	15	14	14
95.0°	4	5	5	6	6	6	6	6
100.0°	1	1	1	1	2	2	1	2
105.0°	0	0	0	0	1	1	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°	1	1	1	1	1	1	1	0
135.0°	1	1	1	1	1	1	1	1
140.0°	1	1	1	1	1	1	1	1
145.0°	1	1	1	1	1	1	1	1
150.0°	1	1	1	1	1	1	1	1
155.0°	1	1	1	1	1	1	1	1
160.0°	1	1	1	1	1	1	1	1
165.0°	1	1	1	1	1	1	1	1
170.0°	1	1	1	1	1	1	1	1
175.0°	1	1	1	1	1	1	1	1
180.0°	0	0	0	0	0	0	0	0

Luminous Intensity (cd) Distribution Data (cont.)

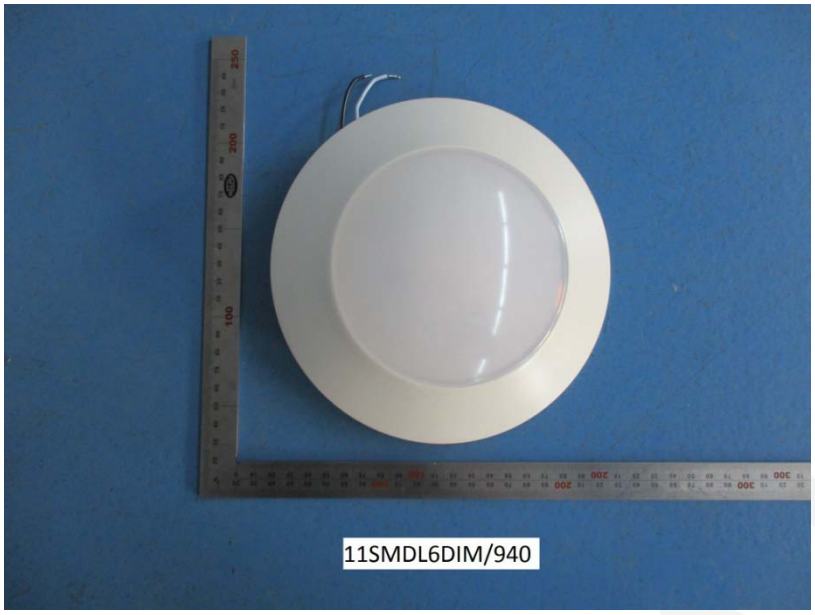
C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	276	276	276	276	276	276	276	276
5.0°	276	274	274	274	274	274	274	274
10.0°	272	271	270	269	269	269	269	269
15.0°	266	264	263	262	262	261	262	262
20.0°	257	256	254	253	252	252	252	252
25.0°	246	243	242	241	240	239	240	240
30.0°	232	230	229	227	227	226	226	227
35.0°	218	216	213	212	211	210	210	212
40.0°	201	199	196	195	194	193	193	195
45.0°	183	181	179	177	175	175	175	176
50.0°	164	161	159	157	156	155	156	157
55.0°	144	141	139	137	136	135	135	137
60.0°	123	121	118	116	114	114	115	116
65.0°	102	99	97	95	93	93	93	95
70.0°	80	78	75	73	72	72	72	73
75.0°	60	57	55	53	52	51	52	53
80.0°	41	38	36	35	33	33	34	35
85.0°	24	23	21	20	19	18	19	20
90.0°	12	11	10	9	9	8	9	7
95.0°	5	4	4	3	3	3	3	2
100.0°	2	1	0	0	1	1	0	1
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°	1	0	0	0	1	1	0	0
135.0°	1	1	1	1	1	1	1	1
140.0°	1	1	1	1	1	1	1	1
145.0°	1	1	1	1	1	1	1	1
150.0°	1	1	1	1	1	1	1	1
155.0°	1	1	1	1	1	1	1	1
160.0°	1	1	1	1	1	1	1	1
165.0°	1	1	1	1	1	1	1	1
170.0°	1	1	1	1	1	1	1	1
175.0°	1	1	1	1	1	1	1	1
180.0°	0	0	0	0	0	0	0	0

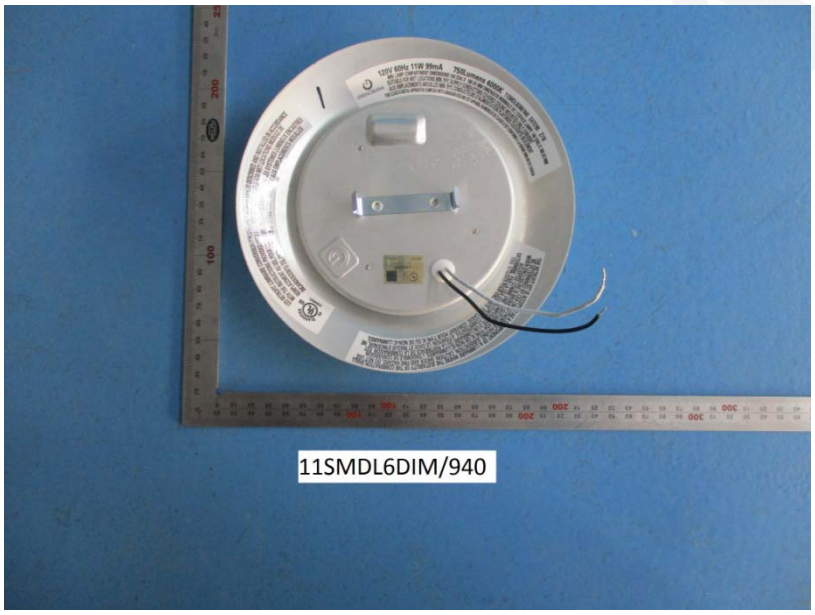
Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	6.6	0.81
5-10	19.5	2.40
10-15	31.7	3.91
15-20	42.8	5.27
20-25	52.4	6.45
25-30	60.1	7.40
30-35	65.8	8.10
35-40	69.3	8.53
40-45	70.5	8.68
45-50	69.5	8.55
50-55	66.2	8.16
55-60	61.0	7.51
60-65	54.0	6.65
65-70	45.4	5.59
70-75	35.9	4.42
75-80	26.1	3.21
80-85	17.0	2.09
85-90	9.5	1.17
90-95	4.4	0.54
95-100	1.5	0.19
100-105	0.4	0.04
105-110	0.1	0.02
110-115	0.1	0.02
115-120	0.1	0.02
120-125	0.2	0.02
125-130	0.2	0.02
130-135	0.2	0.03
135-140	0.2	0.03
140-145	0.2	0.03
145-150	0.3	0.03
150-155	0.2	0.03
155-160	0.2	0.03
160-165	0.2	0.02
165-170	0.1	0.02
170-175	0.1	0.01
175-180	0.0	0.00

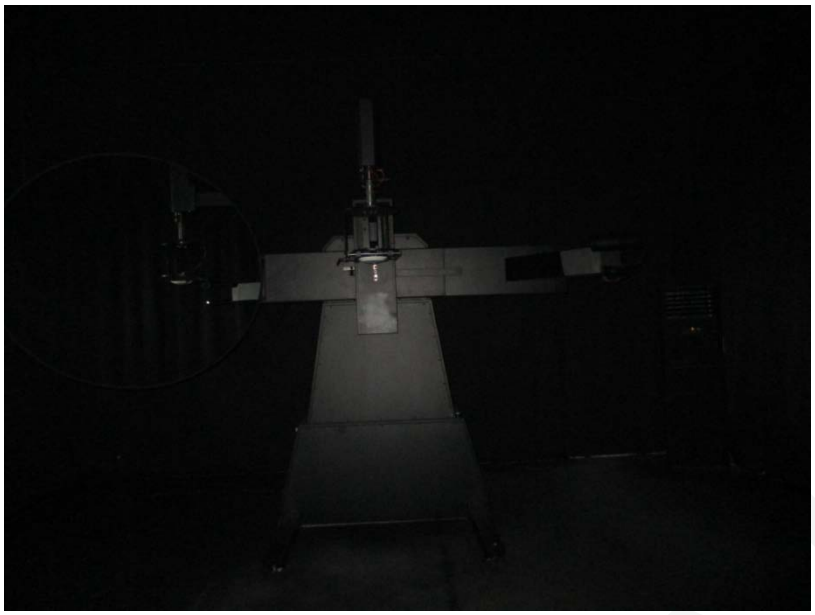
Deg	Flux (lm)	%
0-5	6.6	0.81
0-10	26.1	3.21
0-15	57.8	7.12
0-20	100.7	12.40
0-25	153.0	18.85
0-30	213.1	26.25
0-35	278.9	34.35
0-40	348.2	42.88
0-45	418.7	51.56
0-50	488.2	60.11
0-55	554.4	68.27
0-60	615.4	75.78
0-65	669.4	82.43
0-70	714.8	88.02
0-75	750.7	92.44
0-80	776.8	95.65
0-85	793.7	97.74
0-90	803.2	98.91
0-95	807.6	99.45
0-100	809.1	99.63
0-105	809.5	99.68
0-110	809.6	99.70
0-115	809.8	99.71
0-120	809.9	99.73
0-125	810.1	99.75
0-130	810.3	99.77
0-135	810.5	99.80
0-140	810.7	99.83
0-145	810.9	99.86
0-150	811.2	99.89
0-155	811.4	99.92
0-160	811.7	99.94
0-165	811.9	99.97
0-170	812.0	99.99
0-175	812.1	100.00
0-180	812.1	100.00

6. Product Photo





7. Product Test orientation in the Goniophotometer



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