

# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### Soraa Inc.

6500 Kaiser Drive, Fremont, CA 94555

**Test Model: SP38-18-60D-827-03**

<b>Report Type:</b>	Electrical and Photometric tests including: Luminous Flux, Color, Luminous Intensity Distribution, Spatial Non-uniformity of Chromaticity
<b>Test Engineer:</b>	Daniel Duan <i>Daniel Duan</i>
<b>Report Number:</b>	R2DG160322050-10A2-M1
<b>Test Date:</b>	2016-03-29 to 2016-03-30
<b>Report Date:</b>	2016-04-11
<b>Note:</b>	The previous report R2DG160322050-10A2 is replaced by this report on 2016-04-11
<b>Reviewed By:</b>	Jeanne Han/Safety Manager <i>Jeanne Han</i>
<b>Prepared By:</b>	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
<b>Test Facility:</b>	Test facility was located at Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.China.

## 1. Product Description

### General Information:

Two samples were received on 2016-03-22 and used for testing. One was tested in integrating sphere and the other was tested in goniophotometer.

Model Tested: SP38-18-60D-827-03  
 Manufacturer: Sora Inc.  
 Brand Name: SORAA BRILLIANT  
 Product Designation: Directional LED Lamp  
 Burning Time Before Test: 0hour(For New Products)

### Rated Values:

Rated Voltage/Frequency: 100-120 V AC 50/60Hz  
 Rated Power: 18.5 W  
 Nominal CCT: 2700K  
 Nominal Lumen Output: 1190 lm

## 2. Standards Used

- IESNA 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

## 3. Description of Test Equipment

Device	Manufacturer	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	2015-07-24	2016-07-23
Digital CC&CV DC Power Supply	EVERFINE	WY305-V1	1101047	30V/5A	2015-07-27	2016-07-26
Temperature/humidity/clock	Victor	VC230	EE209	0~40°C0~90%	2015-03-24	2016-03-23
Standard Light Source	SENSING	N/A	LSD090808	N/A	2015-09-25	2016-09-24
Special zero-voltage synchronous switching AC	EVERFINE	DPS1010-YF	1011001T	30V/5A	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
Wireless Remote Sensor	N/A	433MHz	N/A	0°C~50°C;-20°C~60°C	2015-03-24	2016-03-23
Standard Light Source	EVERFINE	D908	1012003	N/A	2015-09-08	2016-09-07

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, spectrophotometer, and integrating sphere. The integrating sphere system is calibrated by standard light source before measurement.

$4\pi$  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  $U=20\text{K}$  ( $K=2$ ), 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 uncertainty of the luminous intensity is  $U=1.6\%$  ( $K=2$ ), at the 95% confidence level.

## 5. Test Result

### [Integrating Sphere System]

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

Test orientation: **Base up**

#### Electrical Measurement

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
120.0	60	0.1556	18.44	0.9881

#### Photometric Measurement

Luminous Flux (lm)	Radiant Flux (W)	Efficacy (lm/W)	CCT (K)	Duv
1446.8	4.991	78.440	2688	-0.0023

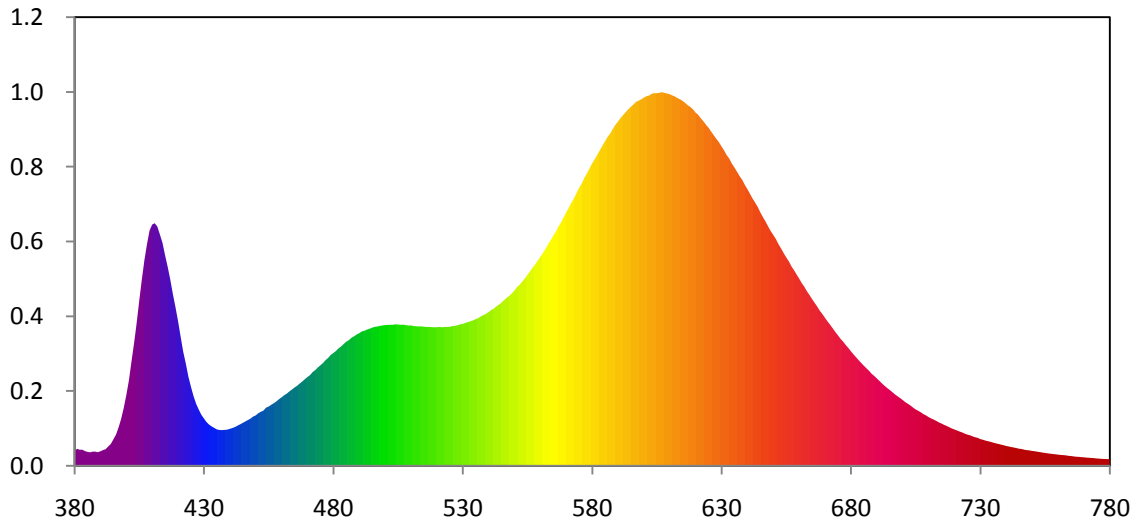
#### Chromaticity Coordinate

x	y	u	v	u'	v'
0.4569	0.4037	0.2637	0.3495	0.2637	0.5242

#### Color Rendering Index

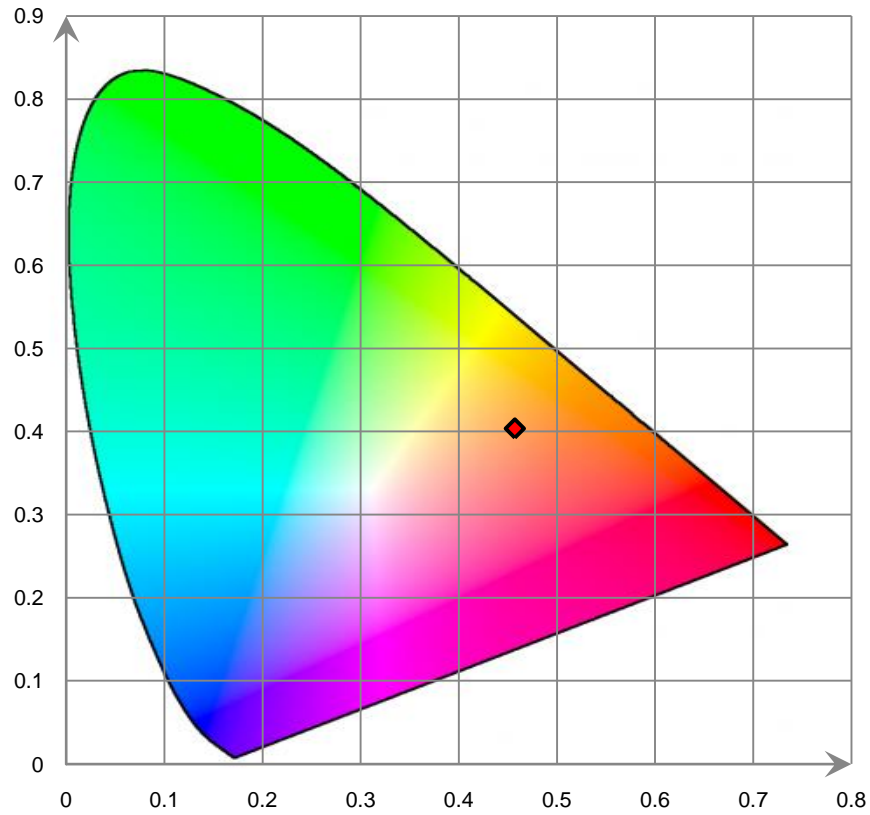
<b>Ra</b>			
84.0			
R1	R2	R3	R4
85	98	86	84
R5	R6	R7	R8
88	96	79	57
R9	R10	R11	R12
13	98	86	85
R13	R14	R15	
88	92	75	

Relative Spectral Power Distribution

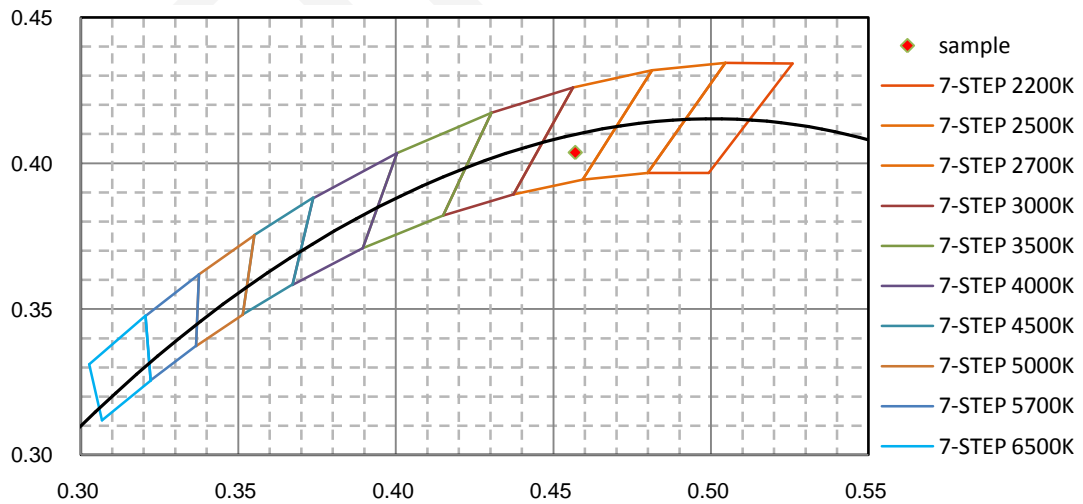


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.236E+00	465	6.352E+00	550	1.420E+01	635	2.416E+01	720	2.955E+00
385	1.145E+00	470	7.201E+00	555	1.548E+01	640	2.241E+01	725	2.543E+00
390	1.188E+00	475	8.149E+00	560	1.693E+01	645	2.053E+01	730	2.178E+00
395	2.156E+00	480	9.146E+00	565	1.865E+01	650	1.870E+01	735	1.889E+00
400	5.731E+00	485	1.006E+01	570	2.054E+01	655	1.689E+01	740	1.620E+00
405	1.337E+01	490	1.075E+01	575	2.252E+01	660	1.517E+01	745	1.399E+00
410	1.954E+01	495	1.120E+01	580	2.449E+01	665	1.351E+01	750	1.220E+00
415	1.704E+01	500	1.141E+01	585	2.630E+01	670	1.199E+01	755	1.055E+00
420	1.173E+01	505	1.145E+01	590	2.788E+01	675	1.057E+01	760	9.195E-01
425	6.404E+00	510	1.138E+01	595	2.909E+01	680	9.280E+00	765	8.072E-01
430	3.839E+00	515	1.127E+01	600	2.982E+01	685	8.117E+00	770	7.011E-01
435	2.958E+00	520	1.124E+01	605	3.018E+01	690	7.088E+00	775	6.104E-01
440	3.006E+00	525	1.127E+01	610	3.010E+01	695	6.154E+00	780	5.624E-01
445	3.490E+00	530	1.150E+01	615	2.954E+01	700	5.340E+00		
450	4.096E+00	535	1.189E+01	620	2.860E+01	705	4.579E+00		
455	4.813E+00	540	1.246E+01	625	2.738E+01	710	3.963E+00		
460	5.557E+00	545	1.323E+01	630	2.586E+01	715	3.438E+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**

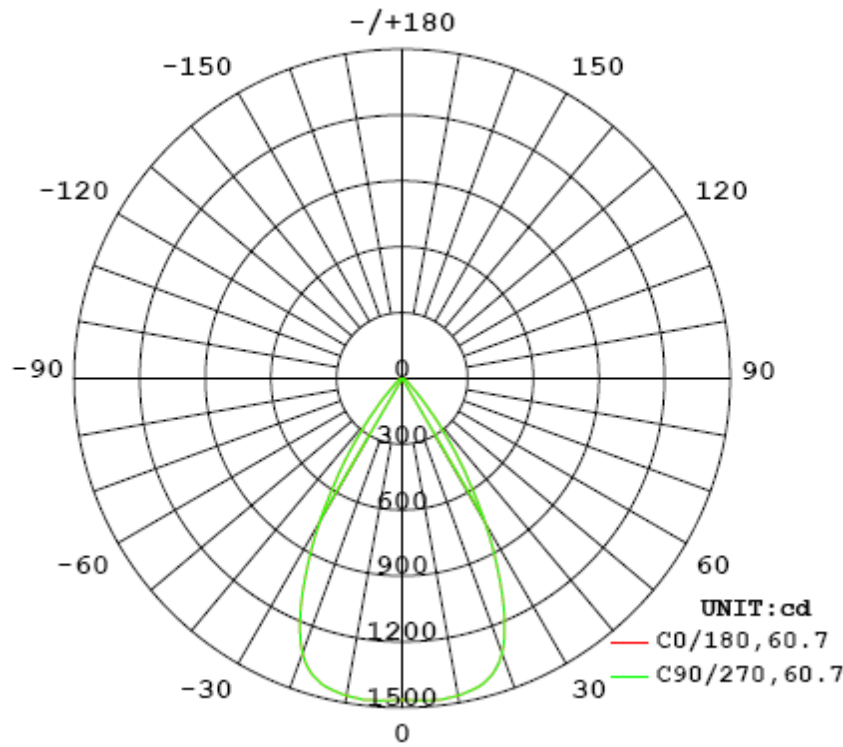
**Electrical Measurement**

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.01	60	0.1558	18.48	0.9884

**Photometric Measurement**

Luminous Flux (lm)	Efficacy (lm/W)	I <sub>max</sub> (cd)	S/MH (C0/180)	S/MH (C90/270)
1457.63	78.88	1474	0.90	0.90

**Luminous Intensity Distribution**



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I <sub>max</sub> ):	60.7	60.7	60.7	60.7	60.7
Field Angle (10% I <sub>max</sub> ):	85.3	85.3	85.3	85.3	85.3

Luminous Intensity (cd) Distribution Data

C \ y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1464	1464	1464	1464	1464	1464	1464	1464
5.0°	1471	1471	1471	1471	1471	1471	1471	1471
10.0°	1467	1467	1467	1467	1467	1467	1467	1467
15.0°	1438	1438	1438	1438	1438	1438	1438	1438
20.0°	1334	1334	1334	1334	1334	1334	1334	1334
25.0°	1080	1080	1080	1080	1080	1080	1080	1080
30.0°	759	759	759	759	759	759	759	759
35.0°	458	458	458	458	458	458	458	458
40.0°	229	229	229	229	229	229	229	229
45.0°	98	98	98	98	98	98	98	98
50.0°	52	52	52	52	52	52	52	52
55.0°	35	35	35	35	35	35	35	35
60.0°	24	24	24	24	24	24	24	24
65.0°	17	17	17	17	17	17	17	17
70.0°	11	11	11	11	11	11	11	11
75.0°	3	3	3	3	3	3	3	3
80.0°	1	1	1	1	1	1	1	1
85.0°	0	0	0	0	0	0	0	0
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°	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°	2	2	2	2	2	2	2	2
170.0°	1	1	1	1	1	1	1	1
175.0°	1	1	1	1	1	1	1	1
180.0°	1	1	1	1	1	1	1	1

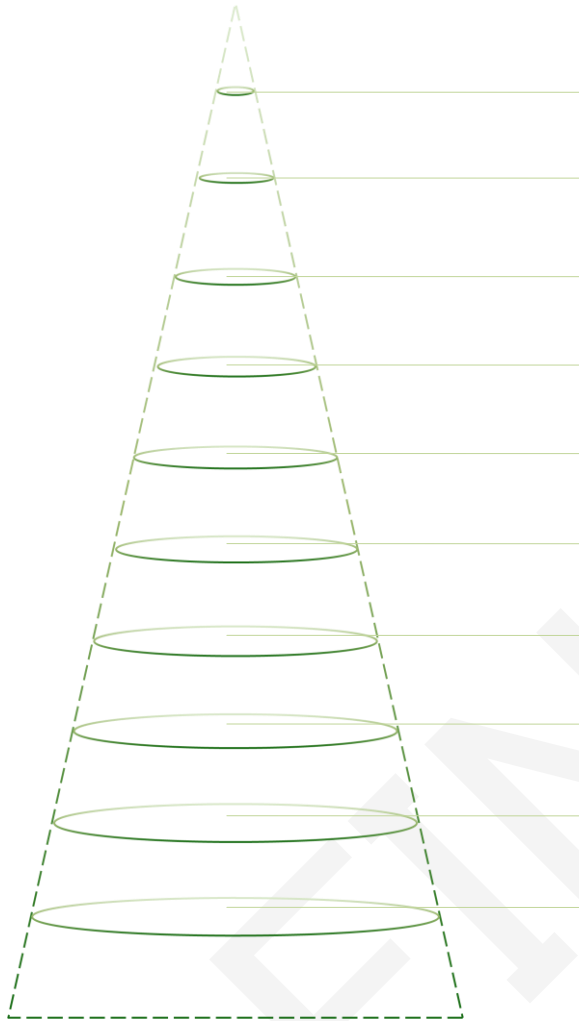


Luminous Intensity (cd) Distribution Data (cont.)

C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	1464	1464	1464	1464	1464	1464	1464	1464
5.0°	1471	1471	1471	1471	1471	1471	1471	1471
10.0°	1467	1467	1467	1467	1467	1467	1467	1467
15.0°	1438	1438	1438	1438	1438	1438	1438	1438
20.0°	1334	1334	1334	1334	1334	1334	1334	1334
25.0°	1080	1080	1080	1080	1080	1080	1080	1080
30.0°	759	759	759	759	759	759	759	759
35.0°	458	458	458	458	458	458	458	458
40.0°	229	229	229	229	229	229	229	229
45.0°	98	98	98	98	98	98	98	98
50.0°	52	52	52	52	52	52	52	52
55.0°	35	35	35	35	35	35	35	35
60.0°	24	24	24	24	24	24	24	24
65.0°	17	17	17	17	17	17	17	17
70.0°	11	11	11	11	11	11	11	11
75.0°	3	3	3	3	3	3	3	3
80.0°	1	1	1	1	1	1	1	1
85.0°	0	0	0	0	0	0	0	0
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°	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°	2	2	2	2	2	2	2	2
170.0°	1	1	1	1	1	1	1	1
175.0°	1	1	1	1	1	1	1	1
180.0°	1	1	1	1	1	1	1	1

Average Area Illumination Figure

**Angle:60.7°. Flux out:1069.0lm**



Height (m)	Diameter (cm)	E <sub>avg</sub> (lx)	E <sub>max</sub> (lx)
0.5	58.55	3771.0	5858.0
1.0	117.10	942.7	1464.0
1.5	175.66	419.0	650.8
2.0	234.21	235.7	366.1
2.5	292.76	150.8	234.3
3.0	351.31	104.7	162.7
3.5	409.87	77.0	119.5
4.0	468.42	58.9	91.5
4.5	526.97	46.6	72.3
5.0	585.52	37.7	58.6

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	35.1	2.41
5-10	105.3	7.22
10-15	172.5	11.84
15-20	229.6	15.75
20-25	254.7	17.47
25-30	231.7	15.89
30-35	176.3	12.10
35-40	111.3	7.64
40-45	57.4	3.93
45-50	28.4	1.95
50-55	18.4	1.26
55-60	13.6	0.93
60-65	9.8	0.68
65-70	7.1	0.48
70-75	3.3	0.23
75-80	1.0	0.07
80-85	0.2	0.01
85-90	0.0	0.00
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	0.01
115-120	0.0	0.00
120-125	0.0	0.00
125-130	0.1	0.00
130-135	0.1	0.01
135-140	0.1	0.01
140-145	0.2	0.01
145-150	0.3	0.02
150-155	0.3	0.02
155-160	0.3	0.02
160-165	0.3	0.02
165-170	0.2	0.01
170-175	0.1	0.01
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	35.1	2.41
0-10	140.4	9.63
0-15	312.9	21.47
0-20	542.5	37.22
0-25	797.1	54.69
0-30	1028.9	70.58
0-35	1205.2	82.68
0-40	1316.5	90.32
0-45	1373.9	94.25
0-50	1402.3	96.20
0-55	1420.7	97.46
0-60	1434.2	98.39
0-65	1444.0	99.07
0-70	1451.1	99.55
0-75	1454.4	99.78
0-80	1455.4	99.85
0-85	1455.6	99.86
0-90	1455.6	99.86
0-95	1455.6	99.86
0-100	1455.6	99.86
0-105	1455.6	99.86
0-110	1455.7	99.86
0-115	1455.7	99.87
0-120	1455.7	99.87
0-125	1455.7	99.87
0-130	1455.8	99.87
0-135	1455.9	99.88
0-140	1456.0	99.89
0-145	1456.2	99.90
0-150	1456.5	99.92
0-155	1456.8	99.94
0-160	1457.1	99.96
0-165	1457.3	99.98
0-170	1457.5	99.99
0-175	1457.6	100.00
0-180	1457.6	100.00

Color Spatial Uniformity

**Average Weighted**  
**u': 0.2629 v': 0.5262**

$\gamma \setminus C0-180$	$u'$	$v'$	$Du'v'$	$\gamma \setminus C90-270$	$u'$	$v'$	$Du'v'$
-30	0.2637	0.5270	0.0011	-30	0.2647	0.5275	0.0022
-25	0.2632	0.5267	0.0006	-25	0.2644	0.5272	0.0018
-20	0.2622	0.5260	0.0007	-20	0.2632	0.5265	0.0004
-15	0.2613	0.5254	0.0018	-15	0.2625	0.5258	0.0006
-10	0.2612	0.5248	0.0022	-10	0.2622	0.5253	0.0011
-5	0.2613	0.5245	0.0023	-5	0.2618	0.5248	0.0018
0	0.2615	0.5245	0.0022	0	0.2615	0.5245	0.0022
5	0.2615	0.5248	0.0020	5	0.2614	0.5246	0.0022
10	0.2617	0.5253	0.0015	10	0.2617	0.5248	0.0018
15	0.2621	0.5259	0.0009	15	0.2623	0.5254	0.0010
20	0.2633	0.5267	0.0006	20	0.2629	0.5260	0.0002
25	0.2640	0.5271	0.0014	25	0.2638	0.5267	0.0010
30	0.2643	0.5275	0.0019	30	0.2641	0.5269	0.0014

FINAL

6. Product Photo



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