

IES LM-79-08


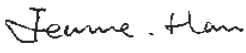
MEASUREMENT AND TEST REPORT

For

Soraa Inc.

6500 Kaiser Drive, Fremont, CA 94555

Test Model: SP38-18-36D-827-03

Report Type:	Electrical and Photometric tests including: Luminous Flux, Color, Luminous Intensity Distribution, Spatial Non-uniformity of Chromaticity
Test Engineer:	Daniel Duan 
Report Number:	R2DG160323050-10A1
Test Date:	2016-03-24 to 2016-03-25
Report Date:	2016-03-25
Reviewed By:	Jeanne Han/Safety Manager 
Prepared By:	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
Test Facility:	Test facility was located at Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.China.

1. Product Description

General Information:

One sample was received on 2016-03-23 and used for testing.

Model Tested: SP38-18-36D-827-03
 Manufacturer: Soraa Inc.
 Brand Name: Soraa, BRILLIANT
 Product Designation: LED PAR38
 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	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Integrating Sphere	SENSING	SPR-600	S09008	25~50℃	2016-03-10	2017-03-09
Spectral photometer	SENSING	SPR3000	90902027	350nm~800nm	2016-03-10	2017-03-09
Power Meter	YOKOGAWA	WT-210	91j926132	15/30/60/150/300/600 V	2016-03-04	2017-03-03
AC Power Supply	ALL Power	APW-105N	970663	220V±10% 50HZ	2016-03-04	2017-03-03
Standard Light Source	EVERFINE	D204	01331191	24V/100W	2015-08-27	2016-08-26
Thermal Meter	SENSING	N/A	N/A	25、50℃	2016-03-10	2017-03-09
DC Power Supply	ITECH	IT6154	0061 0417 6471 0010 19	0~32V	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	YG108492N101 20001	1600mm,3000W/10A	2016-03-10	2017-03-09
Wireless Remote Sensor	N/A	433MHz	N/A	0℃~50℃;-20℃~60℃	2016-03-23	2017-03-22
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.

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 $U=32\text{K}$ ($K=2$), at the 95% confidence level. The uncertainty of the CRI is $U=2.1$ ($K=2$), at the 95% confidence level.

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 $U=2.82\%$ ($K=2$), 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
120.1	60	0.1558	18.47	0.987

Photometric Measurement

Luminous Flux (lm)	Radiant Flux (W)	Efficacy (lm/W)	CCT (K)	Duv
1402.969	4.828	75.959	2642	-0.0022

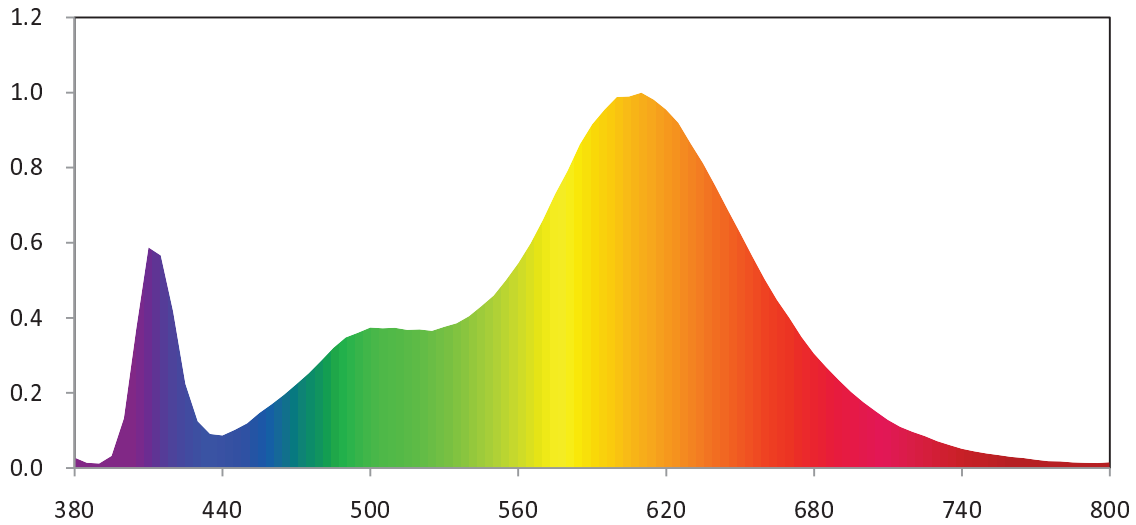
Chromaticity Coordinate

x	y	u	v	u'	v'
0.4608	0.4048	0.2657	0.3502	0.2657	0.5253

Color Rendering Index

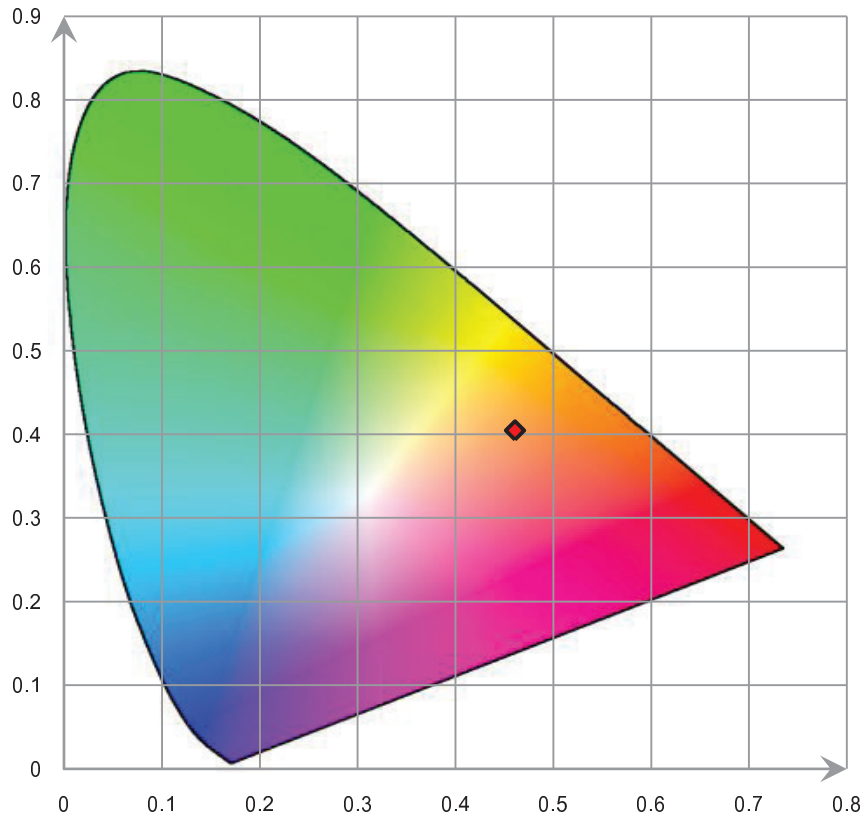
Ra			
84.3			
R1	R2	R3	R4
85	98	86	84
R5	R6	R7	R8
89	95	79	58
R9	R10	R11	R12
15	99	87	83
R13	R14	R15	
90	92	76	

Relative Spectral Power Distribution

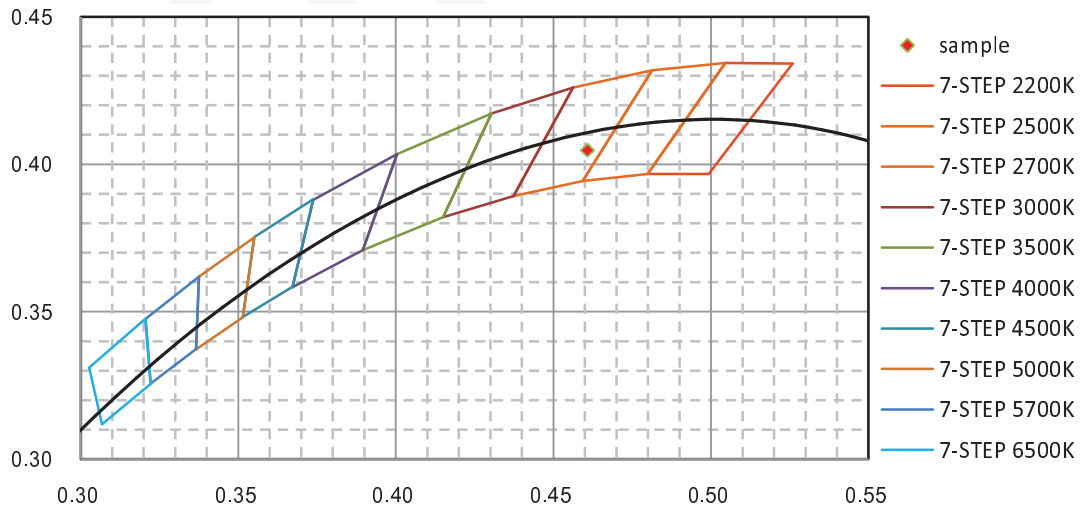


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	3.955E-03	465	2.726E-02	550	6.400E-02	635	1.131E-01	720	1.348E-02
385	2.004E-03	470	3.117E-02	555	6.971E-02	640	1.047E-01	725	1.191E-02
390	1.743E-03	475	3.520E-02	560	7.599E-02	645	9.593E-02	730	1.002E-02
395	4.549E-03	480	3.980E-02	565	8.336E-02	650	8.737E-02	735	8.583E-03
400	1.850E-02	485	4.461E-02	570	9.207E-02	655	7.858E-02	740	7.203E-03
405	5.152E-02	490	4.848E-02	575	1.017E-01	660	7.011E-02	745	6.258E-03
410	8.188E-02	495	5.024E-02	580	1.103E-01	665	6.241E-02	750	5.463E-03
415	7.889E-02	500	5.216E-02	585	1.201E-01	670	5.579E-02	755	4.850E-03
420	5.818E-02	505	5.189E-02	590	1.275E-01	675	4.864E-02	760	4.176E-03
425	3.128E-02	510	5.207E-02	595	1.330E-01	680	4.253E-02	765	3.779E-03
430	1.738E-02	515	5.129E-02	600	1.376E-01	685	3.747E-02	770	3.137E-03
435	1.269E-02	520	5.145E-02	605	1.378E-01	690	3.278E-02	775	2.605E-03
440	1.215E-02	525	5.093E-02	610	1.393E-01	695	2.835E-02	780	2.512E-03
445	1.421E-02	530	5.242E-02	615	1.367E-01	700	2.453E-02		
450	1.663E-02	535	5.374E-02	620	1.330E-01	705	2.117E-02		
455	2.049E-02	540	5.634E-02	625	1.281E-01	710	1.792E-02		
460	2.374E-02	545	6.007E-02	630	1.204E-01	715	1.534E-02		

CIE 1931 x y Chromaticity Diagram



7-Step & 4-Step Chromaticity Quadrangles



[Goniophotometer System]

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

Test orientation: **Base up**

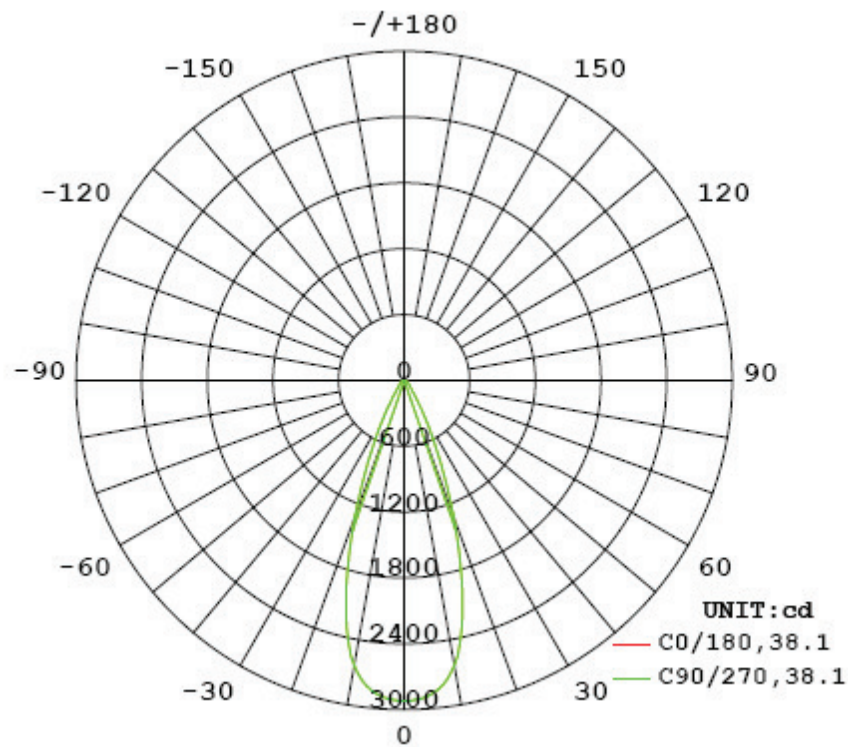
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.01	60	0.156	18.48	0.9871

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1423.91	77.05	2920	0.60	0.60

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	38.1	38.1	38.1	38.1	38.1
Field Angle (10% I _{max}):	62.6	62.6	62.6	62.6	62.6

Luminous Intensity (cd) Distribution Data

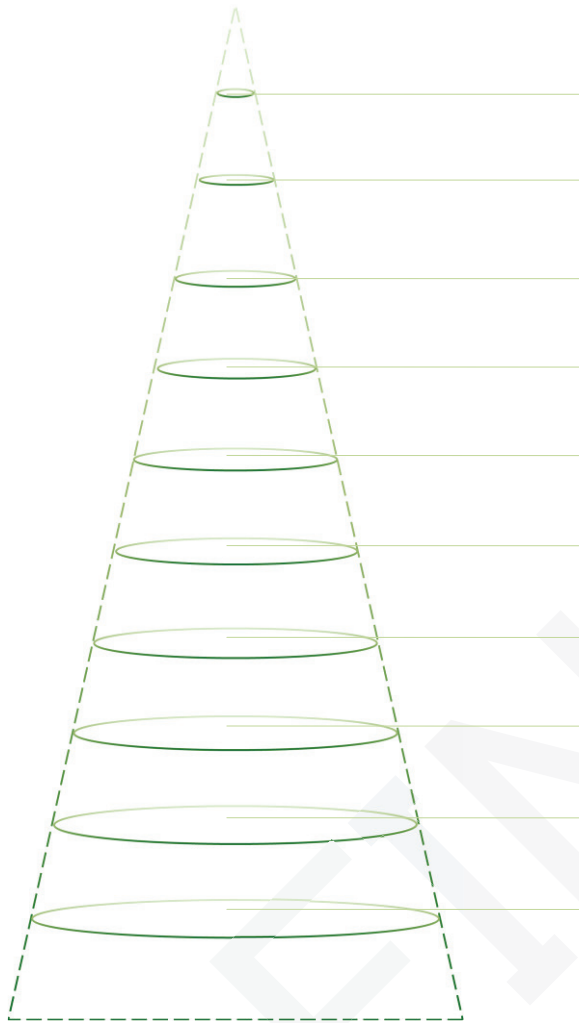
C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	2917	2917	2917	2917	2917	2917	2917	2917
5.0°	2868	2868	2868	2868	2868	2868	2868	2868
10.0°	2639	2639	2639	2639	2639	2639	2639	2639
15.0°	2066	2066	2066	2066	2066	2066	2066	2066
20.0°	1322	1322	1322	1322	1322	1322	1322	1322
25.0°	718	718	718	718	718	718	718	718
30.0°	351	351	351	351	351	351	351	351
35.0°	172	172	172	172	172	172	172	172
40.0°	102	102	102	102	102	102	102	102
45.0°	73	73	73	73	73	73	73	73
50.0°	59	59	59	59	59	59	59	59
55.0°	49	49	49	49	49	49	49	49
60.0°	41	41	41	41	41	41	41	41
65.0°	31	31	31	31	31	31	31	31
70.0°	20	20	20	20	20	20	20	20
75.0°	9	9	9	9	9	9	9	9
80.0°	2	2	2	2	2	2	2	2
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°	2	2	2	2	2	2	2	2
160.0°	2	2	2	2	2	2	2	2
165.0°	2	2	2	2	2	2	2	2
170.0°	2	2	2	2	2	2	2	2
175.0°	2	2	2	2	2	2	2	2
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°	2917	2917	2917	2917	2917	2917	2917	2917
5.0°	2868	2868	2868	2868	2868	2868	2868	2868
10.0°	2639	2639	2639	2639	2639	2639	2639	2639
15.0°	2066	2066	2066	2066	2066	2066	2066	2066
20.0°	1322	1322	1322	1322	1322	1322	1322	1322
25.0°	718	718	718	718	718	718	718	718
30.0°	351	351	351	351	351	351	351	351
35.0°	172	172	172	172	172	172	172	172
40.0°	102	102	102	102	102	102	102	102
45.0°	73	73	73	73	73	73	73	73
50.0°	59	59	59	59	59	59	59	59
55.0°	49	49	49	49	49	49	49	49
60.0°	41	41	41	41	41	41	41	41
65.0°	31	31	31	31	31	31	31	31
70.0°	20	20	20	20	20	20	20	20
75.0°	9	9	9	9	9	9	9	9
80.0°	2	2	2	2	2	2	2	2
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°	2	2	2	2	2	2	2	2
160.0°	2	2	2	2	2	2	2	2
165.0°	2	2	2	2	2	2	2	2
170.0°	2	2	2	2	2	2	2	2
175.0°	2	2	2	2	2	2	2	2
180.0°	1	1	1	1	1	1	1	1

Average Area Illumination Figure

Angle: 38.1°. Flux out: 823.4 lm.



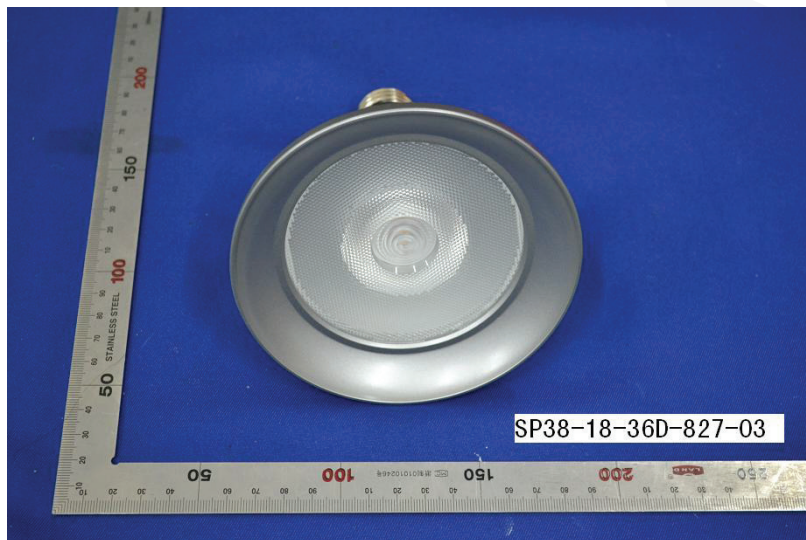
Height (m)	Diameter (cm)	E _{avg} (lx)	E _{max} (lx)
0.5	34.53	7914.0	11673.0
1.0	69.06	1979.0	2918.0
1.5	103.59	879.4	1297.0
2.0	138.12	494.6	729.6
2.5	172.65	316.6	466.9
3.0	207.18	219.8	324.3
3.5	241.71	161.5	238.2
4.0	276.24	123.7	182.4
4.5	310.77	97.7	144.1
5.0	345.30	79.1	116.7

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	69.2	4.86
5-10	197.6	13.88
10-15	280.2	19.67
15-20	276.5	19.42
20-25	207.9	14.60
25-30	130.4	9.16
30-35	73.1	5.13
35-40	43.9	3.09
40-45	31.6	2.22
45-50	26.3	1.84
50-55	23.5	1.65
55-60	20.8	1.46
60-65	17.4	1.22
65-70	12.8	0.90
70-75	7.4	0.53
75-80	2.6	0.18
80-85	0.3	0.02
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	0.00
115-120	0.0	0.01
120-125	0.0	0.00
125-130	0.0	0.00
130-135	0.1	0.00
135-140	0.1	0.01
140-145	0.2	0.02
145-150	0.3	0.02
150-155	0.4	0.03
155-160	0.4	0.03
160-165	0.3	0.02
165-170	0.2	0.02
170-175	0.1	0.01
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	69.2	4.86
0-10	266.8	18.74
0-15	547.0	38.41
0-20	823.4	57.83
0-25	1031.3	72.43
0-30	1161.7	81.59
0-35	1234.9	86.72
0-40	1278.8	89.81
0-45	1310.4	92.03
0-50	1336.7	93.87
0-55	1360.1	95.52
0-60	1380.9	96.98
0-65	1398.3	98.20
0-70	1411.1	99.10
0-75	1418.6	99.63
0-80	1421.2	99.81
0-85	1421.5	99.83
0-90	1421.5	99.83
0-95	1421.5	99.83
0-100	1421.5	99.83
0-105	1421.5	99.83
0-110	1421.5	99.83
0-115	1421.6	99.83
0-120	1421.6	99.84
0-125	1421.6	99.84
0-130	1421.6	99.84
0-135	1421.7	99.84
0-140	1421.8	99.85
0-145	1422.0	99.87
0-150	1422.4	99.89
0-155	1422.8	99.92
0-160	1423.2	99.95
0-165	1423.5	99.97
0-170	1423.7	99.99
0-175	1423.9	100.00
0-180	1423.9	100.00

6. Product Photo



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