

# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### Soraa, Inc

6500 Kaiser Dr. Fremont, California 94555, USA

**Test Model: SM16GW-07-36D-927-03-S3**

<b>Report Type:</b>	Electrical and Photometric tests including: Luminous Flux, Color, Luminous Intensity Distribution
<b>Test Engineer:</b>	Daniel Duan <i>Daniel Duan</i>
<b>Report Number:</b>	R2DG150507054-10
<b>Test Date:</b>	2015-05-16 to 2015-05-19
<b>Report Date:</b>	2015-06-08
<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.
<b>Accreditation:</b>	The NVLAP Lab Code is 200707-0.

**STATEMENT:** This test may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Shenzhen). The test data was only valid for the test sample(s). This report **must not** be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Federal Government. 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 2015-05-07 and used for testing. Sample No.: R2DG150507054-S01 Model: SM16GW-07-36D-927-03-S3

Model Tested: SM16GW-07-36D-927-03-S3  
 Manufacturer: Soraa, Inc  
 Brand Name: Soraa Vivid  
 Product Designation: LED MR16  
 Burning Time Before Test: 0hour(For New Products)

### Rated Values:

Rated Voltage/Frequency: 220-240 V AC 50/60Hz  
 Rated Power: 7.5 W  
 Nominal CCT: 2700K  
 Nominal Lumen Output: 410 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	1.5 meter	2015-03-16	2016-03-16
Spectral photometer	SENSING	SPR3000	90902027	380nm~800nm	2015-03-16	2016-03-16
Power Meter	YOKOGAWA	WT-210	91j926132	15/30/60/150/300/600 V	2015-03-05	2016-03-05
AC Power Supply	ALL Power	APW-105N	970613	0V-300V 50-400Hz	2015-03-05	2016-03-05
Standard Light Source	EVERFINE	D204	LSD090808	N/A	2014-08-05	2015-08-05
Thermal Meter	SENSING	N/A	N/A	25°C,45°C,55°C	2015-03-05	2016-03-05
DC Power Supply	ITECH	IT6154	0061 0417 6471 0010 19	0~60V	2015-03-05	2016-03-05
AC Power Supply	EVERFINE	VPS1060 PWM	1101006	0-150V, 0-300V	2015-03-12	2016-03-12
DC Power Supply	EVERFINE	WY12010	1009009	30V/5A	2015-03-05	2016-03-05
Power Meter	YOKOGAWA	WT-210	91KB35700	15/30/60/150/300/600 V	2015-03-05	2016-03-05
Goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	1600mm,3000W/10A	2015-03-04	2016-03-04
Thermal Meter	Victor	VC230	EE091	0~40°C0~90%	2013-04-01	2016-03-31
Standard Light Source	EVERFINE	D908	1012004	N/A	2014-07-31	2015-07-31

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  $U=2.1\%$  ( $K=2$ ), 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
230.03	50.0	0.0413	7.56	0.796

#### Photometric Measurement

Luminous Flux (lm)	Radiant Flux (W)	Efficacy (lm/W)	CCT (K)	Duv
434.753	1.864	57.507	2667	-1.59E-03

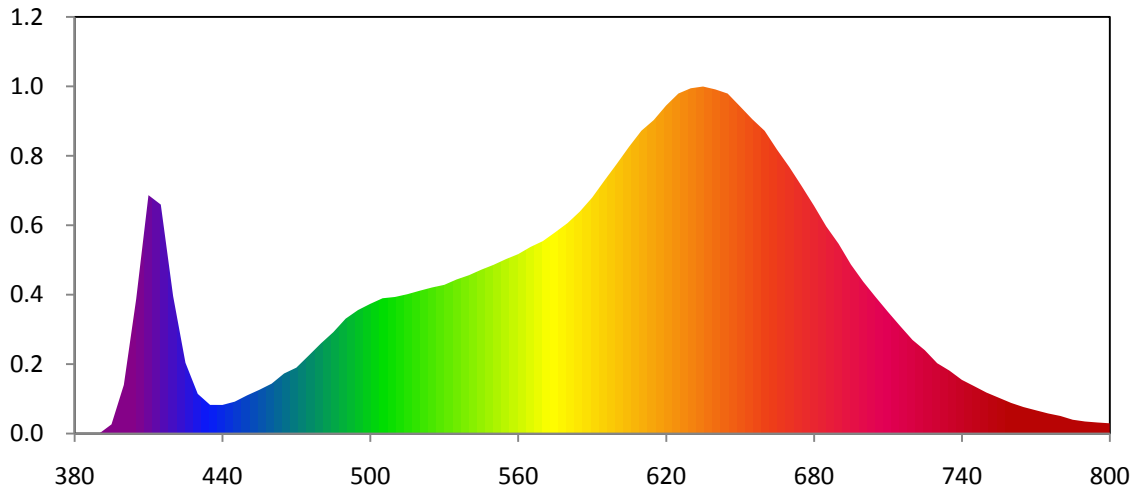
#### Chromaticity Coordinate

x	y	u	v	u'	v'
0.4598	0.4063	0.2644	0.3505	0.2644	0.5257

#### Color Rendering Index

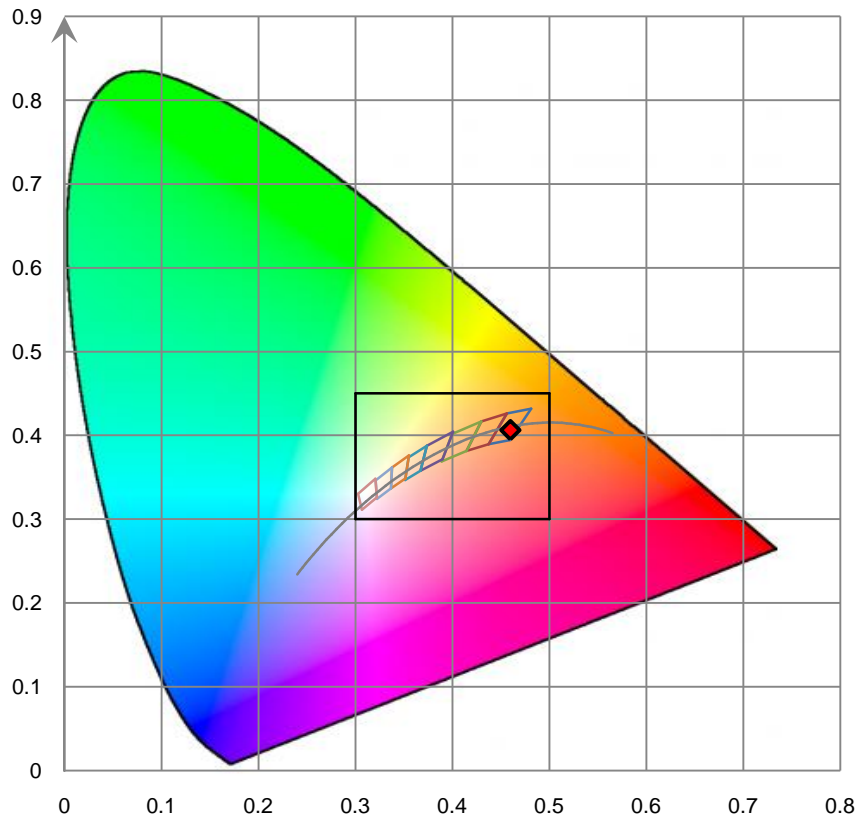
Ra			
95.0			
R1 95	R2 96	R3 98	R4 93
R5 93	R6 90	R7 97	R8 98
R9 96	R10 91	R11 88	R12 73
R13 95	R14 99	R15 98	

Relative Spectral Power Distribution

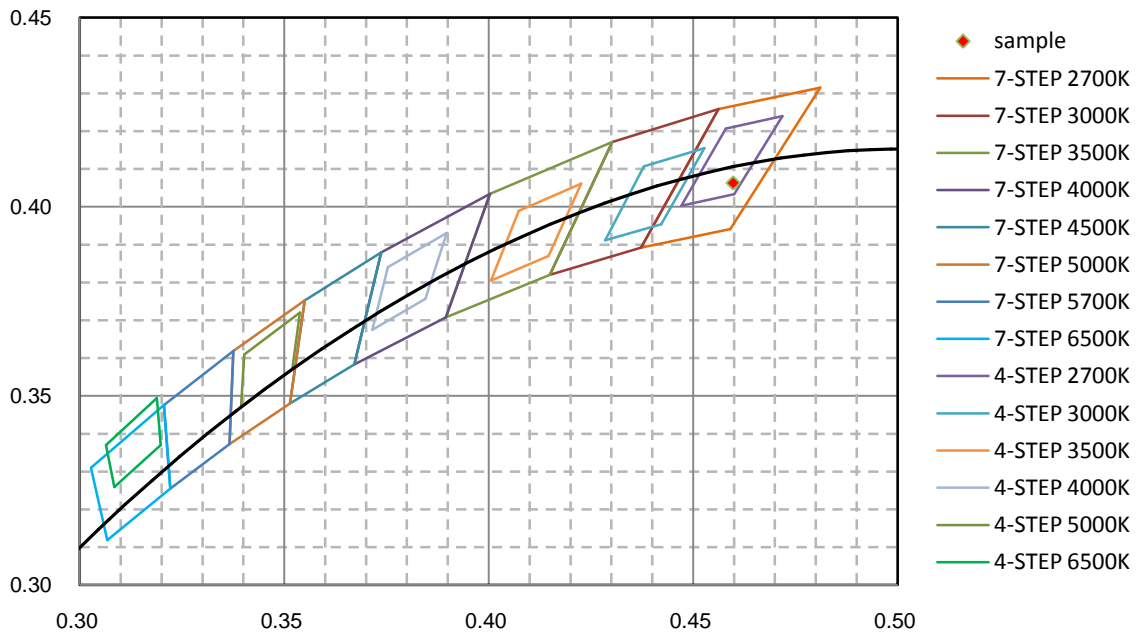


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	0.000E+00	465	7.998E-03	550	2.248E-02	635	4.624E-02	720	1.247E-02
385	0.000E+00	470	8.786E-03	555	2.324E-02	640	4.585E-02	725	1.110E-02
390	0.000E+00	475	1.039E-02	560	2.391E-02	645	4.530E-02	730	9.375E-03
395	1.226E-03	480	1.202E-02	565	2.486E-02	650	4.360E-02	735	8.378E-03
400	6.486E-03	485	1.351E-02	570	2.564E-02	655	4.188E-02	740	7.159E-03
405	1.789E-02	490	1.531E-02	575	2.682E-02	660	4.033E-02	745	6.315E-03
410	3.177E-02	495	1.645E-02	580	2.804E-02	665	3.784E-02	750	5.464E-03
415	3.051E-02	500	1.728E-02	585	2.957E-02	670	3.552E-02	755	4.772E-03
420	1.832E-02	505	1.803E-02	590	3.144E-02	675	3.298E-02	760	4.083E-03
425	9.436E-03	510	1.820E-02	595	3.371E-02	680	3.036E-02	765	3.533E-03
430	5.288E-03	515	1.857E-02	600	3.593E-02	685	2.760E-02	770	3.102E-03
435	3.823E-03	520	1.903E-02	605	3.822E-02	690	2.528E-02	775	2.679E-03
440	3.813E-03	525	1.946E-02	610	4.035E-02	695	2.252E-02	780	2.343E-03
445	4.251E-03	530	1.981E-02	615	4.177E-02	700	2.023E-02	785	1.843E-03
450	5.089E-03	535	2.053E-02	620	4.370E-02	705	1.820E-02	790	1.606E-03
455	5.830E-03	540	2.109E-02	625	4.531E-02	710	1.622E-02	795	1.475E-03
460	6.656E-03	545	2.183E-02	630	4.600E-02	715	1.432E-02	800	1.370E-03

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**

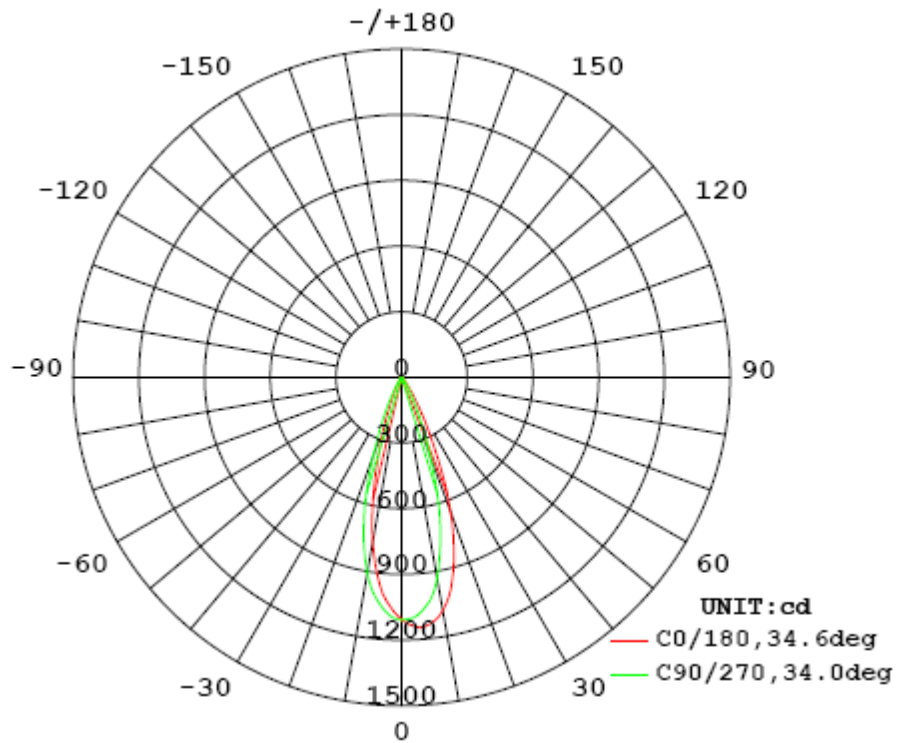
**Electrical Measurement**

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
230.0	50.0	0.0416	7.551	0.7896

**Photometric Measurement**

Luminous Flux (lm)	Efficacy (lm/W)	CBCP (cd)	S/MH (C0/180)	S/MH (C90/270)
435.154	57.63	1107	0.45	0.54

**Luminous Intensity Distribution**



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I <sub>max</sub> ):	34.6	34.4	34.0	34.2	34.30
Field Angle (10% I <sub>max</sub> ):	56.0	22.4	55.1	55.9	47.35

Luminous Intensity (cd) Distribution Data

C \ y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1107	1107	1107	1107	1107	1107	1107	1107
5.0°	993	994	1008	1027	1052	1084	1113	1133
10.0°	764	772	802	846	908	969	1022	1072
15.0°	465	479	517	584	668	748	831	899
20.0°	229	239	259	313	382	464	555	630
25.0°	98	103	108	141	177	222	288	336
30.0°	47	49	48	61	74	89	126	145
35.0°	25	26	25	32	35	40	58	59
40.0°	16	16	15	19	19	22	31	29
45.0°	12	11	11	13	13	14	19	18
50.0°	9	9	9	10	11	11	13	13
55.0°	7	7	7	8	9	10	11	11
60.0°	6	6	6	7	7	8	8	9
65.0°	5	5	5	6	7	6	7	8
70.0°	3	3	3	4	5	5	6	7
75.0°	2	2	2	3	3	3	4	4
80.0°	1	1	1	1	2	2	2	3
85.0°	0	0	0	0	1	1	1	1
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

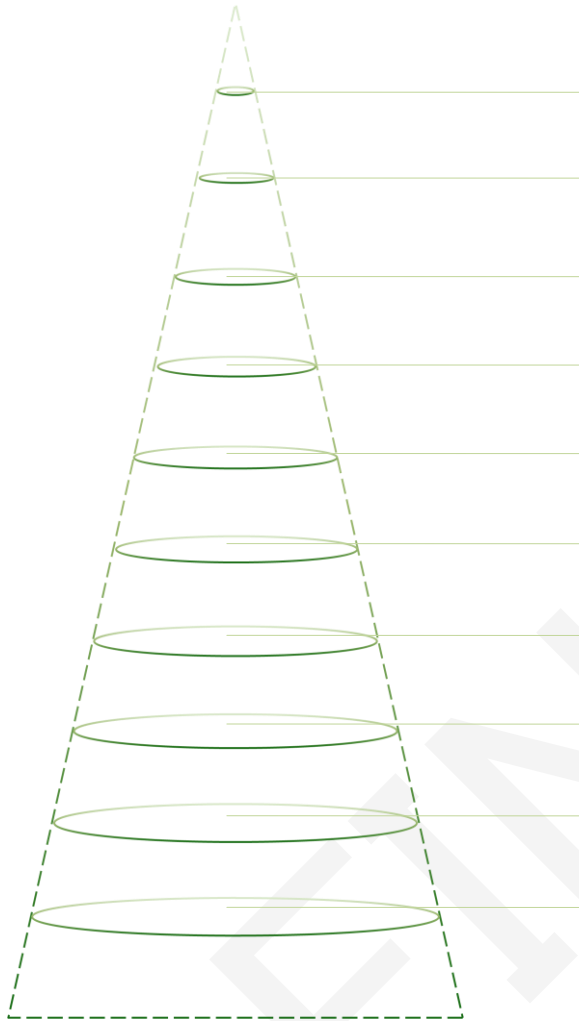


Luminous Intensity (cd) Distribution Data (cont.)

C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	1107	1107	1107	1107	1107	1107	1107	1107
5.0°	1144	1141	1125	1100	1071	1044	1016	994
10.0°	1083	1077	1050	1001	932	868	810	765
15.0°	913	900	850	776	679	591	517	466
20.0°	655	635	573	486	380	308	260	225
25.0°	359	340	294	241	173	138	117	91
30.0°	162	155	129	104	68	57	51	41
35.0°	67	61	51	48	32	29	28	22
40.0°	34	31	26	27	18	17	17	14
45.0°	21	18	16	17	13	12	12	11
50.0°	15	13	12	12	10	10	10	9
55.0°	13	11	10	10	9	8	8	7
60.0°	10	9	8	8	7	7	6	6
65.0°	8	8	7	7	7	6	6	5
70.0°	7	7	6	6	5	4	3	3
75.0°	5	4	4	3	3	2	2	2
80.0°	3	3	2	2	2	1	1	1
85.0°	2	2	1	1	1	0	0	0
90.0°	1	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

Average Area Illumination Figure

Angle: 34.30°. Flux out: 247.6 lm.



Height (m)	Diameter (cm)	E <sub>avg</sub> (lx)	E <sub>max</sub> (lx)
0.5	30.9	2987.0	4547.0
1.0	61.7	746.7	1137.0
1.5	92.6	331.9	505.2
2.0	123.4	186.7	284.2
2.5	154.3	119.5	181.9
3.0	185.2	83.0	126.3
3.5	216.0	61.0	92.8
4.0	246.9	46.7	71.0
4.5	277.7	36.9	56.1
5.0	308.6	29.9	45.5

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	26.0	5.97
5-10	71.2	16.35
10-15	94.9	21.80
15-20	88.7	20.39
20-25	62.1	14.26
25-30	34.4	7.92
30-35	17.5	4.02
35-40	9.8	2.26
40-45	6.5	1.51
45-50	5.1	1.17
50-55	4.4	1.00
55-60	3.8	0.87
60-65	3.3	0.77
65-70	2.9	0.65
70-75	2.1	0.48
75-80	1.3	0.30
80-85	0.7	0.16
85-90	0.2	0.05
90-95	0.0	0.00
95-100	0.0	0.00
100-105	0.0	0.00
105-110	0.0	0.01
110-115	0.0	0.00
115-120	0.0	0.00
120-125	0.0	0.00
125-130	0.0	0.01
130-135	0.0	0.00
135-140	0.0	0.01
140-145	0.0	0.01
145-150	0.0	0.01
150-155	0.0	0.01
155-160	0.0	0.00
160-165	0.0	0.01
165-170	0.0	0.00
170-175	0.0	0.00
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	26.0	5.97
0-10	97.1	22.32
0-15	192.0	44.12
0-20	280.7	64.51
0-25	342.8	78.77
0-30	377.2	86.69
0-35	394.7	90.71
0-40	404.6	92.97
0-45	411.1	94.48
0-50	416.2	95.65
0-55	420.6	96.65
0-60	424.4	97.52
0-65	427.7	98.29
0-70	430.6	98.94
0-75	432.6	99.42
0-80	433.9	99.72
0-85	434.6	99.88
0-90	434.8	99.93
0-95	434.9	99.93
0-100	434.9	99.93
0-105	434.9	99.93
0-110	434.9	99.94
0-115	434.9	99.94
0-120	434.9	99.94
0-125	434.9	99.94
0-130	434.9	99.95
0-135	434.9	99.95
0-140	435.0	99.96
0-145	435.0	99.97
0-150	435.1	99.98
0-155	435.1	99.99
0-160	435.1	99.99
0-165	435.1	100.00
0-170	435.2	100.00
0-175	435.2	100.00
0-180	435.2	100.00

6. Product Photo



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