NVLAP LAB CODE 200707-0

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

Soraa,Inc

6500 Kaiser Dr.Fremont, California 94555, USA

Test Model: SR111-18-36D-930-03

Report Type:	Electrical and Photometric tests including: Luminous Flux, Color, Luminous Intensity Distribution
Test Engineer:	Daniel Duan
Report Number:	R2DG150317051-10-M1
Test Date:	2015-03-27 to 2015-03-29
Report Date:	2015-05-08
Reviewed By:	Jeanne Han/Safety Manager
Note:	The previous report R2DG150317051-10 is replaced by this report on 2015-05-08
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.
Accreditation:	The NVLAP Lab Code is 200707-0.

1. Product Description

General Information:

One sample was received on 2015-03-17. And used for testing.

Model Tested:	SR111-18-36D-930-03
Manufacturer:	Soraa,Inc
Product Designation:	LED Lamp
Burning Time Before Test:	0 hour(For New Products)

Rated Values:

Rated Voltage/Frequency:	AC 12 V 50Hz/60Hz
Rated Power:	18.5W
Nominal CCT:	3000K
Nominal Lumen Output:	1000 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	350nm～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℃,45℃,55℃	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	2015-03-12	2016-03-12
Power Meter	YOKOGAWA	WT-210	91KB35700	15/30/60/150/300/600 V	2015-03-12	2016-03-12
Goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	1600mm,3000W/10A	2015-03-04	2016-03-04
Thermal Meter	Victor	VC230	EE091	0~40℃0~90%	2013-04-01	2016-03-31
Standard Light Source	EVERFINE	D908	1012001	N/A	2014-05-06	2015-05-06

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°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, 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=1.64% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=21K (K=2), at the 95% confidence level. The uncertainty of the CRI is U=1.6(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
12.01	60.0	1.672	18.555	0.924

Photometric Measurement

Luminous Flux (lm)	Radiant Flux (W)	Efficacy (lm/W)	CCT (K)	Duv
1131.826	3.920	60.998	2944	6.10E-04

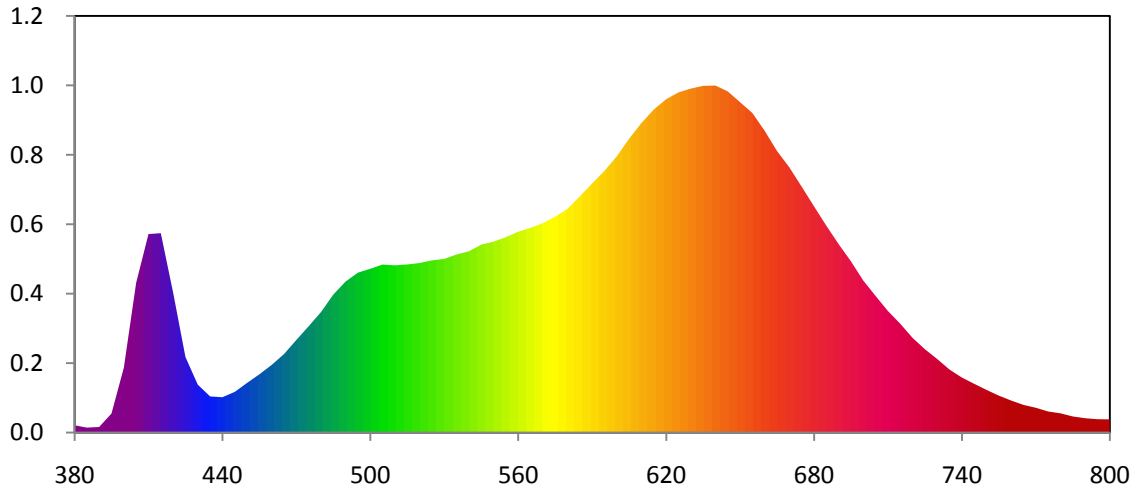
Chromaticity Coordinate

x	y	u	v	u'	v'
0.4419	0.4073	0.2524	0.3489	0.2524	0.5234

Color Rendering Index

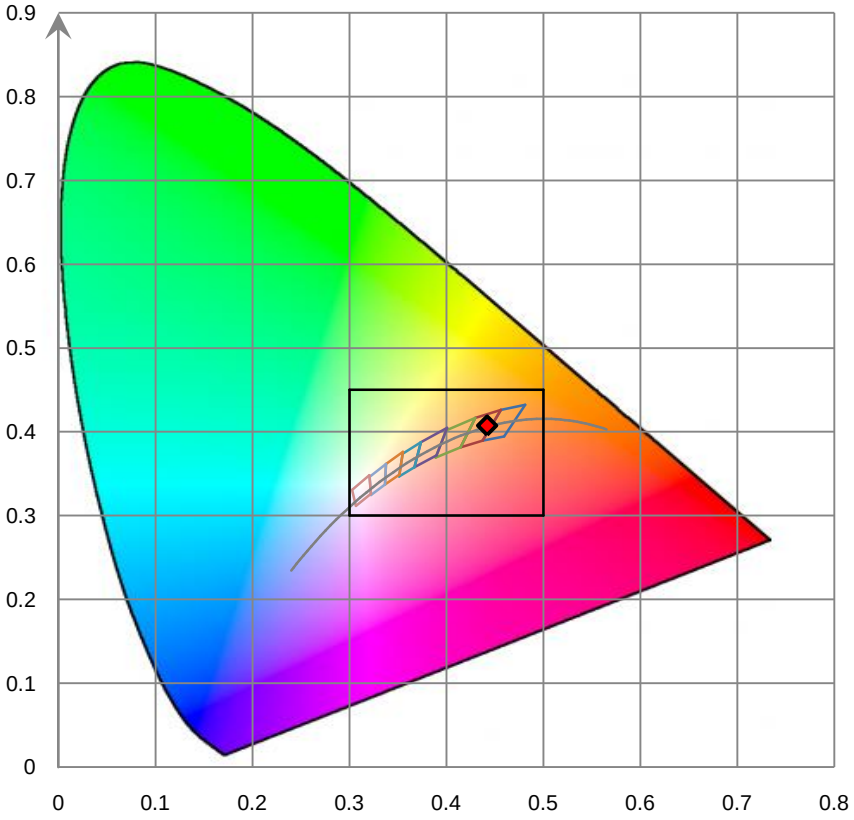
Ra			
94.5			
R1	R2	R3	R4
94	95	97	92
R5	R6	R7	R8
92	90	98	98
R9	R10	R11	R12
97	89	88	76
R13	R14	R15	
94	99	97	

Relative Spectral Power Distribution

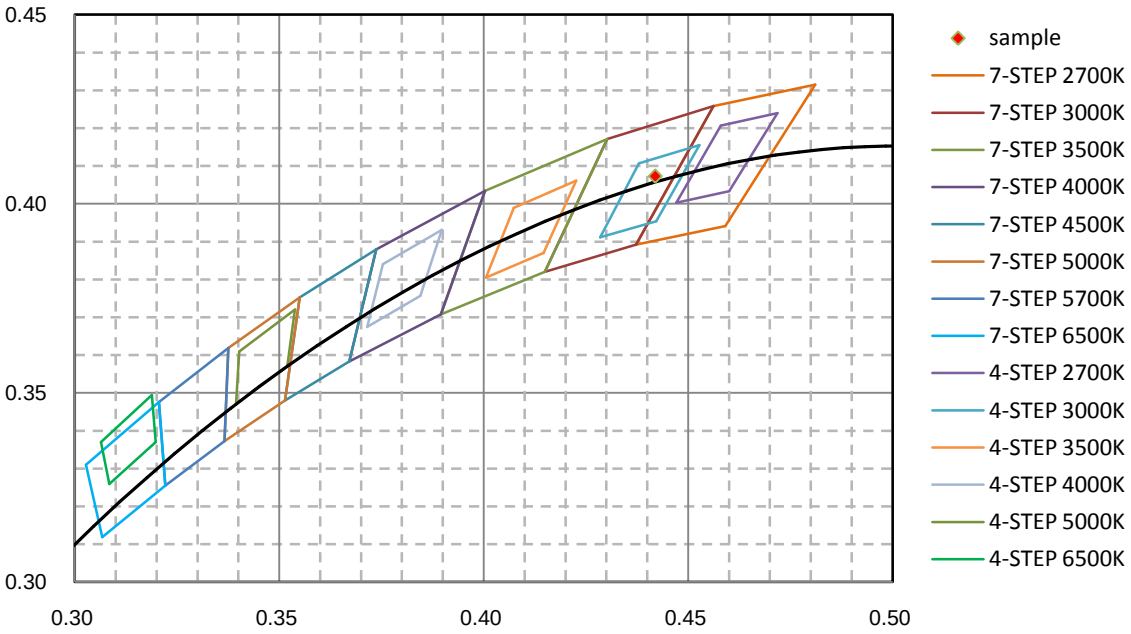


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.210E-03	465	2.376E-02	550	5.777E-02	635	1.049E-01	720	2.866E-02
385	1.498E-03	470	2.802E-02	555	5.911E-02	640	1.050E-01	725	2.523E-02
390	1.695E-03	475	3.218E-02	560	6.076E-02	645	1.032E-01	730	2.224E-02
395	5.763E-03	480	3.647E-02	565	6.193E-02	650	9.998E-02	735	1.906E-02
400	1.964E-02	485	4.177E-02	570	6.336E-02	655	9.669E-02	740	1.665E-02
405	4.531E-02	490	4.571E-02	575	6.531E-02	660	9.129E-02	745	1.476E-02
410	6.005E-02	495	4.838E-02	580	6.768E-02	665	8.520E-02	750	1.292E-02
415	6.033E-02	500	4.956E-02	585	7.147E-02	670	8.026E-02	755	1.118E-02
420	4.237E-02	505	5.084E-02	590	7.537E-02	675	7.442E-02	760	9.693E-03
425	2.287E-02	510	5.060E-02	595	7.919E-02	680	6.849E-02	765	8.372E-03
430	1.450E-02	515	5.087E-02	600	8.356E-02	685	6.262E-02	770	7.505E-03
435	1.093E-02	520	5.130E-02	605	8.891E-02	690	5.702E-02	775	6.374E-03
440	1.069E-02	525	5.210E-02	610	9.366E-02	695	5.182E-02	780	5.823E-03
445	1.231E-02	530	5.255E-02	615	9.773E-02	700	4.600E-02	785	4.876E-03
450	1.502E-02	535	5.388E-02	620	1.008E-01	705	4.135E-02	790	4.337E-03
455	1.763E-02	540	5.484E-02	625	1.029E-01	710	3.678E-02	795	4.047E-03
460	2.047E-02	545	5.685E-02	630	1.041E-01	715	3.294E-02	800	3.986E-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**

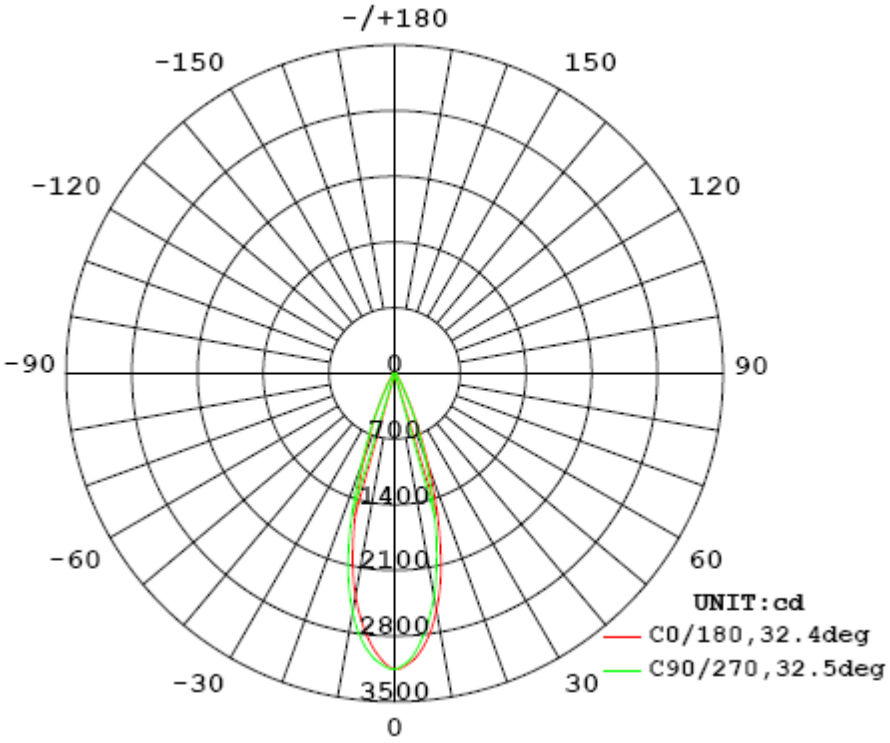
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
12.0	60.0	1.674	18.54	0.9230

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	CBCP (cd)	S/MH (C0/180)	S/MH (C90/270)
1132.43	61.08	3153	0.51	0.53

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% Imax):	32.4	32.7	32.5	31.8	32.4
Field Angle (10% Imax):	55.0	54.9	54.1	54.0	54.5

Luminous Intensity (cd) Distribution Data

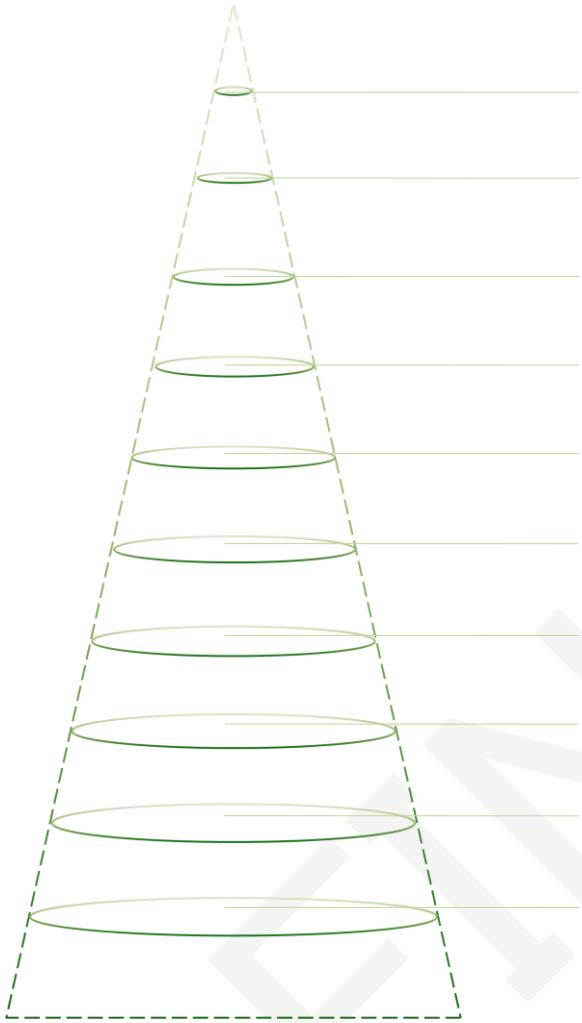
C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	3153	3153	3153	3153	3153	3153	3153	3153
5.0°	2899	2933	2969	2998	3005	2994	2983	2972
10.0°	2409	2478	2538	2573	2586	2562	2527	2517
15.0°	1680	1762	1845	1880	1902	1877	1814	1809
20.0°	948	978	1036	1056	1046	1033	979	972
25.0°	474	463	506	500	484	491	442	441
30.0°	217	192	216	207	192	204	172	174
35.0°	114	95	110	103	92	105	86	87
40.0°	68	57	66	62	57	64	55	55
45.0°	46	41	45	43	42	45	41	41
50.0°	36	34	35	35	35	36	35	34
55.0°	30	30	30	30	31	31	31	30
60.0°	25	25	25	25	25	26	25	25
65.0°	20	20	20	21	21	21	21	21
70.0°	16	16	16	16	16	16	15	15
75.0°	11	10	11	10	10	10	10	10
80.0°	7	6	6	6	5	5	5	5
85.0°	2	2	1	1	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 / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	3153	3153	3153	3153	3153	3153	3153	3153
5.0°	2996	2977	2953	2932	2918	2898	2898	2916
10.0°	2565	2531	2475	2445	2416	2391	2390	2420
15.0°	1883	1834	1753	1737	1682	1656	1650	1692
20.0°	1053	1012	986	972	937	948	943	974
25.0°	489	453	460	461	438	471	461	478
30.0°	205	181	199	201	187	223	207	215
35.0°	103	86	101	102	93	118	105	109
40.0°	63	54	61	61	57	70	62	63
45.0°	45	41	44	44	42	48	43	44
50.0°	36	34	35	35	35	37	35	35
55.0°	31	30	30	30	30	31	30	30
60.0°	26	26	26	26	26	26	26	26
65.0°	21	21	21	21	21	21	21	21
70.0°	16	16	16	16	17	17	16	16
75.0°	11	11	11	11	11	12	11	11
80.0°	6	6	7	7	6	8	7	7
85.0°	1	2	2	2	2	2	2	2
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

Average Area Illumination Figure

Angle: 32.40°. Flux out: 617.1 lm.



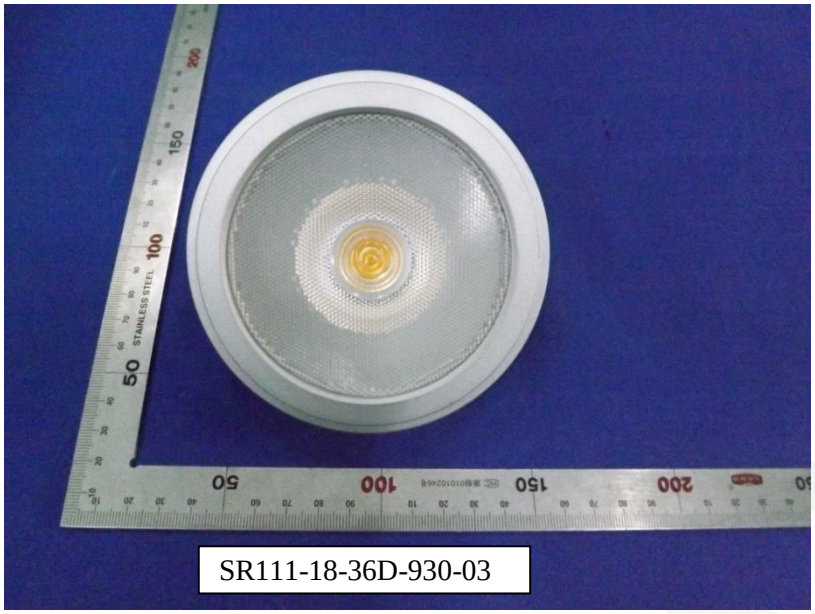
Height (m)	Diameter (cm)	E_{avg}(lx)	E_{max}(lx)
0.5	29.1	8406.0	12643.0
1.0	58.1	2102.0	3161.0
1.5	87.2	934.0	1405.0
2.0	116.2	525.4	790.2
2.5	145.3	336.3	505.7
3.0	174.3	233.5	351.2
3.5	203.4	171.6	258.0
4.0	232.4	131.3	197.5
4.5	261.5	103.8	156.1
5.0	290.5	84.1	126.4

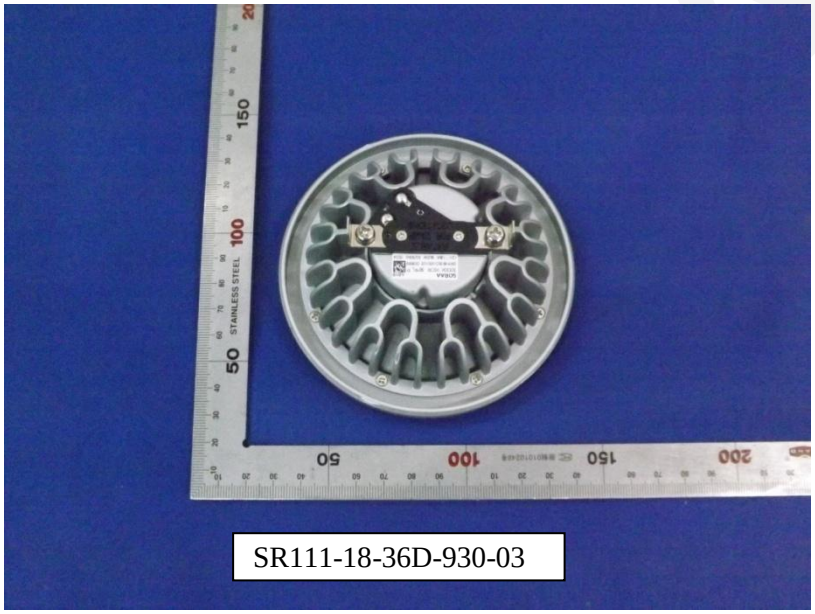
Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	72.8	6.43
5-10	194.3	17.15
10-15	252.7	22.31
15-20	224.0	19.78
20-25	146.3	12.92
25-30	78.6	6.95
30-35	41.8	3.69
35-40	25.9	2.29
40-45	18.9	1.67
45-50	15.7	1.38
50-55	14.1	1.25
55-60	12.9	1.14
60-65	11.2	1.00
65-70	9.4	0.83
70-75	6.9	0.61
75-80	4.4	0.39
80-85	2.0	0.18
85-90	0.3	0.03
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	72.8	6.43
0-10	267.0	23.58
0-15	519.7	45.89
0-20	743.7	65.67
0-25	890.0	78.59
0-30	968.6	85.54
0-35	1010.5	89.23
0-40	1036.4	91.52
0-45	1055.3	93.19
0-50	1071.0	94.57
0-55	1085.1	95.82
0-60	1098.0	96.96
0-65	1109.3	97.96
0-70	1118.7	98.79
0-75	1125.6	99.40
0-80	1130.1	99.79
0-85	1132.1	99.97
0-90	1132.4	100.00
0-95	1132.4	100.00
0-100	1132.4	100.00
0-105	1132.4	100.00
0-110	1132.4	100.00
0-115	1132.4	100.00
0-120	1132.4	100.00
0-125	1132.4	100.00
0-130	1132.4	100.00
0-135	1132.4	100.00
0-140	1132.4	100.00
0-145	1132.4	100.00
0-150	1132.4	100.00
0-155	1132.4	100.00
0-160	1132.4	100.00
0-165	1132.4	100.00
0-170	1132.4	100.00
0-175	1132.4	100.00
0-180	1132.4	100.00

6. Product Photo





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