

# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

**Soraa, Inc**

6500 Kaiser Dr. Fremont, California 94555, USA

**Test Model: SP30S-18-36D-830-03**

<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>	R2DG150317053-10
<b>Test Date:</b>	2015-03-18
<b>Report Date:</b>	2015-03-20
<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 2015-03-17. And used for testing.

Model Tested: SP30S-18-36D-830-03  
 Manufacturer: Soraa, Inc  
 Product Designation: LED Lamp  
 Burning Time Before Test: 0 hour (For New Products)

### Rated Values:

Rated Voltage/Frequency: AC100-120V 50Hz/60Hz  
 Rated Power: 18.5W  
 Nominal CCT: 3000K  
 Nominal Lumen Output: 1240 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	N/A	N/A	1.5meter	2015-03-16	2016-03-16
Power Meter	SENSING	UI2008	908735	10.0-600.0V	2015-03-12	2016-03-12
Spectral photometer	SENSING	SPR3000	s0902024	350nm~800nm	2015-03-16	2016-03-16
AC Power Supply	ALL Power	APW-105N	970663	0V-300V 50-400Hz	2015-03-12	2016-03-12
Standard Light Source	EVERFINE	D204	LSD090808	N/A	2014-08-05	2015-08-05
Thermal Meter	SENSING	N/A	N/A	20~30°C	2015-03-13	2016-03-13
DC Power Supply	ITECH	IT6154	0061 0417 6471 0010 19	0~32V	2015-03-12	2016-03-12
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°C 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  $25^{\circ}\text{C}\pm 1^{\circ}\text{C}$  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  $U=2.3\%$  ( $K=2$ ), 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.

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  $U=2.82\%$  ( $K=2$ ), at the 95% confidence level.

## 5. Test Result

### [Integrating Sphere System]

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

Test orientation: **Base up**

#### Electrical Measurement

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
120.00	60.0	0.1589	18.718	0.981

#### Photometric Measurement

Luminous Flux (lm)	Radiant Flux (W)	Efficacy (lm/W)	CCT (K)	Duv
1374.237	4.184	73.418	3031	1.18E-03

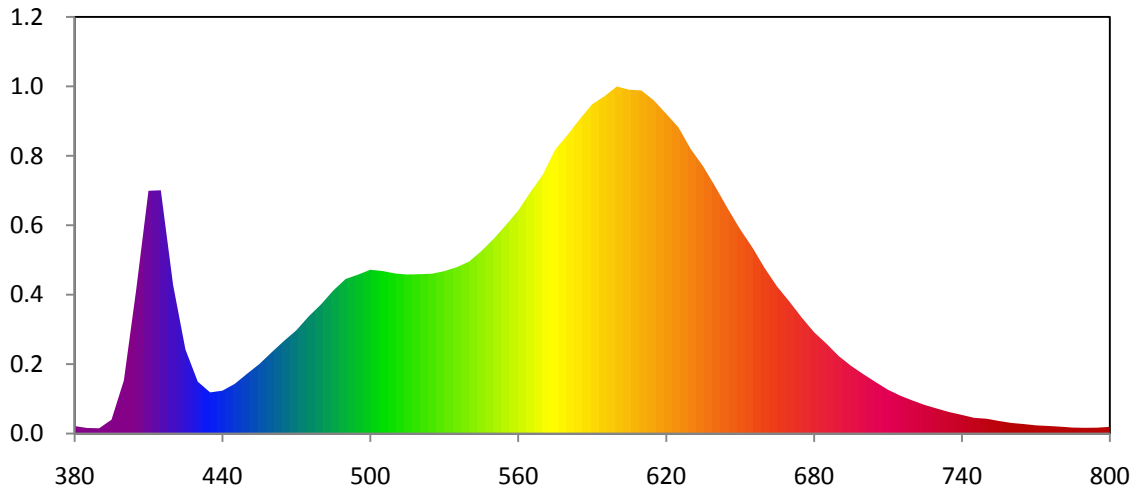
#### Chromaticity Coordinate

x	y	u	v	u'	v'
0.4364	0.4069	0.2490	0.3483	0.2490	0.5224

#### Color Rendering Index

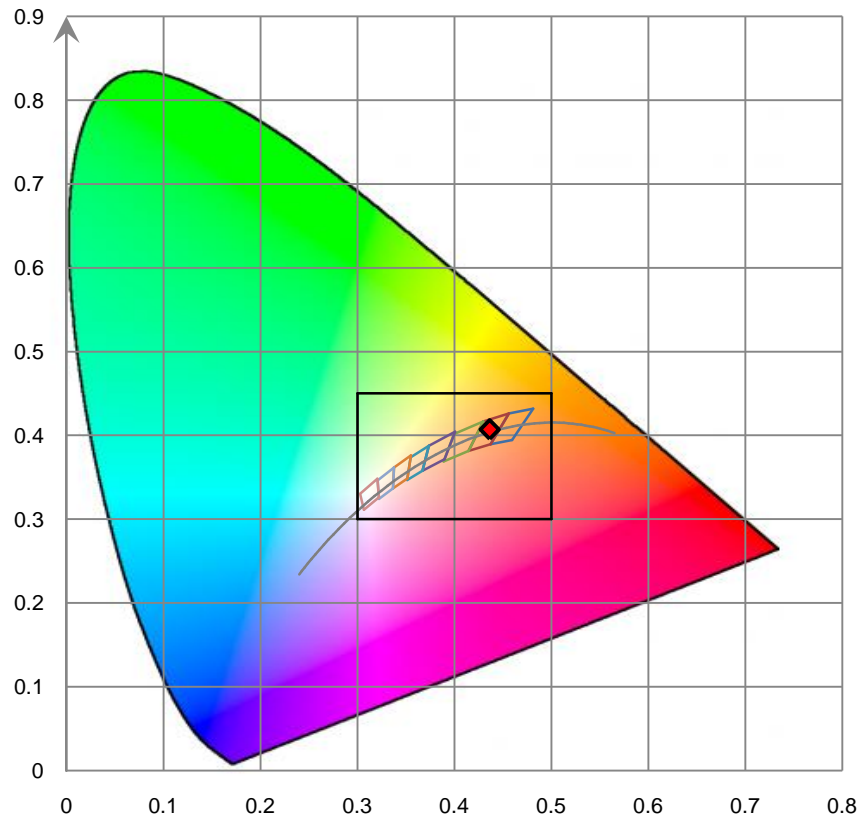
<b>Ra</b>			
85.6			
R1 85	R2 97	R3 89	R4 85
R5 88	R6 98	R7 82	R8 61
R9 15	R10 95	R11 86	R12 91
R13 89	R14 94	R15 76	

### Relative Spectral Power Distribution

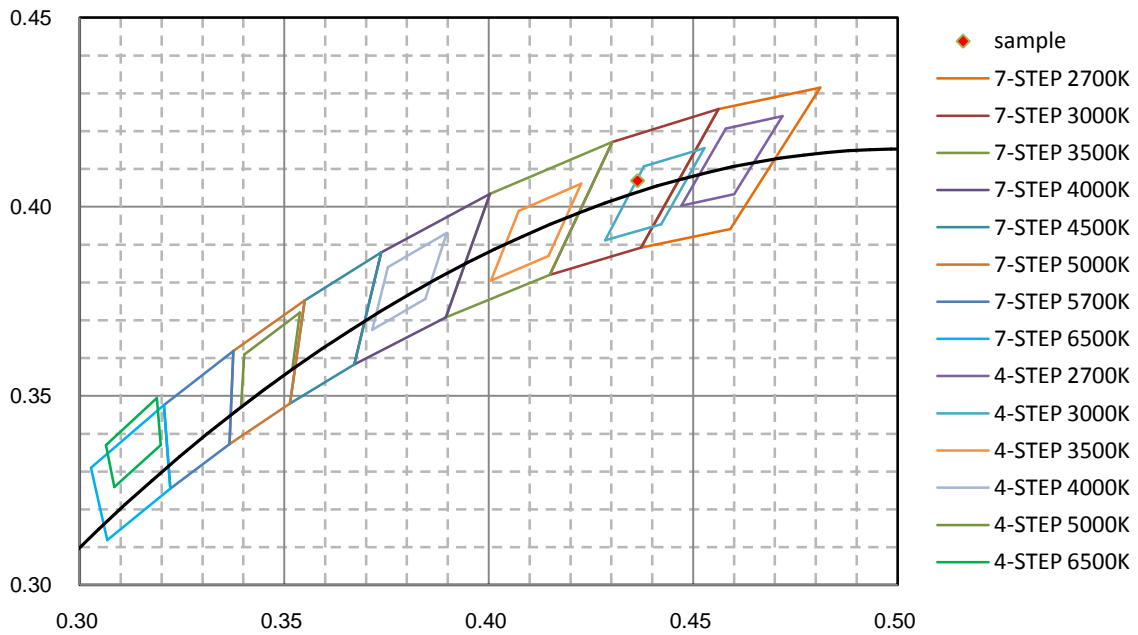


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.784E-03	465	3.427E-02	550	7.195E-02	635	9.884E-02	720	1.222E-02
385	2.071E-03	470	3.820E-02	555	7.708E-02	640	9.126E-02	725	1.056E-02
390	1.957E-03	475	4.333E-02	560	8.244E-02	645	8.324E-02	730	9.214E-03
395	5.134E-03	480	4.776E-02	565	8.929E-02	650	7.562E-02	735	7.925E-03
400	1.960E-02	485	5.292E-02	570	9.573E-02	655	6.883E-02	740	6.899E-03
405	5.310E-02	490	5.717E-02	575	1.050E-01	660	6.118E-02	745	5.812E-03
410	8.977E-02	495	5.876E-02	580	1.104E-01	665	5.442E-02	750	5.486E-03
415	8.996E-02	500	6.058E-02	585	1.163E-01	670	4.885E-02	755	4.668E-03
420	5.492E-02	505	6.010E-02	590	1.217E-01	675	4.295E-02	760	3.939E-03
425	3.109E-02	510	5.920E-02	595	1.247E-01	680	3.753E-02	765	3.523E-03
430	1.919E-02	515	5.881E-02	600	1.283E-01	685	3.330E-02	770	3.045E-03
435	1.522E-02	520	5.894E-02	605	1.271E-01	690	2.870E-02	775	2.819E-03
440	1.586E-02	525	5.910E-02	610	1.269E-01	695	2.507E-02	780	2.550E-03
445	1.838E-02	530	6.005E-02	615	1.232E-01	700	2.198E-02	785	2.218E-03
450	2.211E-02	535	6.149E-02	620	1.183E-01	705	1.906E-02	790	2.137E-03
455	2.572E-02	540	6.355E-02	625	1.132E-01	710	1.622E-02	795	2.184E-03
460	3.007E-02	545	6.741E-02	630	1.052E-01	715	1.403E-02	800	2.496E-03

CIE 1931 x y Chromaticity Diagram



7-Step & 4-Step Chromaticity Quadrangles



**[Goniophotometer System]**

Total operating time for luminous intensity distribution: **2.0 hours**

Test orientation: **Base up**

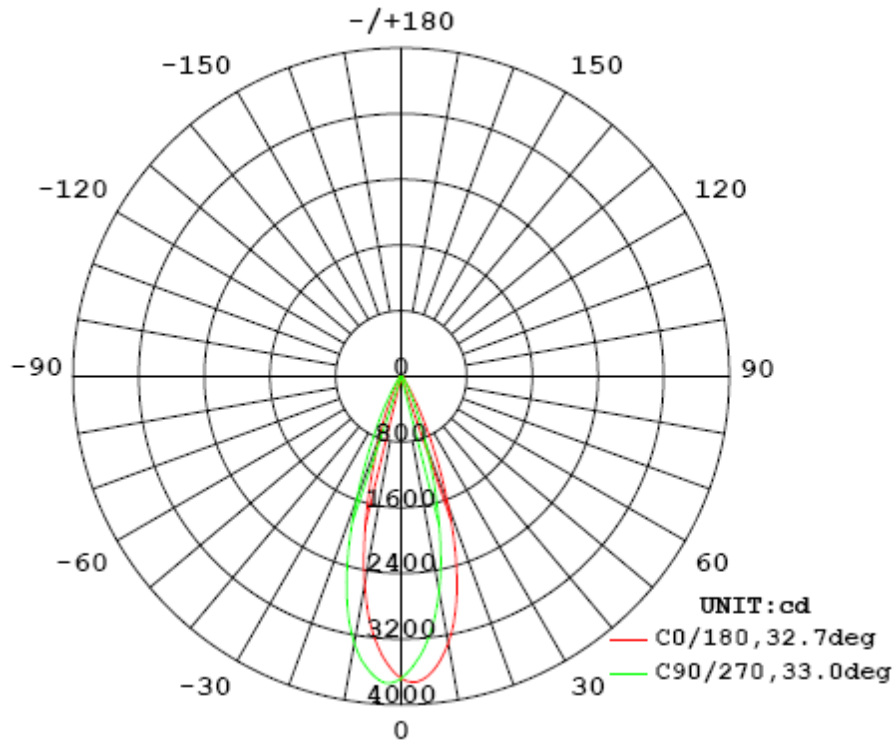
**Electrical Measurement**

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.1	60.0	0.1585	18.63	0.9789

**Photometric Measurement**

Luminous Flux (lm)	Efficacy (lm/W)	CBCP (cd)	S/MH (C0/180)	S/MH (C90/270)
1375.44	73.85	3678	0.46	0.58

**Luminous Intensity Distribution**



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I <sub>max</sub> ):	32.7	32.5	33.0	32.9	32.8
Field Angle (10% I <sub>max</sub> ):	53.9	54.4	55.1	54.6	54.5

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	3678	3678	3678	3678	3678	3678	3678	3678
5.0°	3300	3383	3490	3597	3677	3750	3770	3717
10.0°	2585	2739	2937	3127	3304	3416	3428	3368
15.0°	1591	1773	2018	2302	2585	2744	2783	2729
20.0°	771	907	1097	1316	1594	1774	1853	1804
25.0°	323	419	530	610	800	891	948	923
30.0°	140	179	224	252	353	377	427	418
35.0°	77	97	116	116	165	157	178	183
40.0°	55	63	71	69	94	85	95	101
45.0°	44	48	51	51	62	58	62	66
50.0°	39	40	42	43	48	46	48	49
55.0°	34	35	37	38	40	41	41	41
60.0°	28	29	31	33	35	36	36	36
65.0°	22	24	25	27	29	29	30	29
70.0°	16	18	20	22	24	24	25	24
75.0°	9	11	13	15	17	18	18	17
80.0°	4	6	7	8	11	11	11	11
85.0°	0	1	2	3	5	5	6	5
90.0°	0	0	0	0	0	1	1	1
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

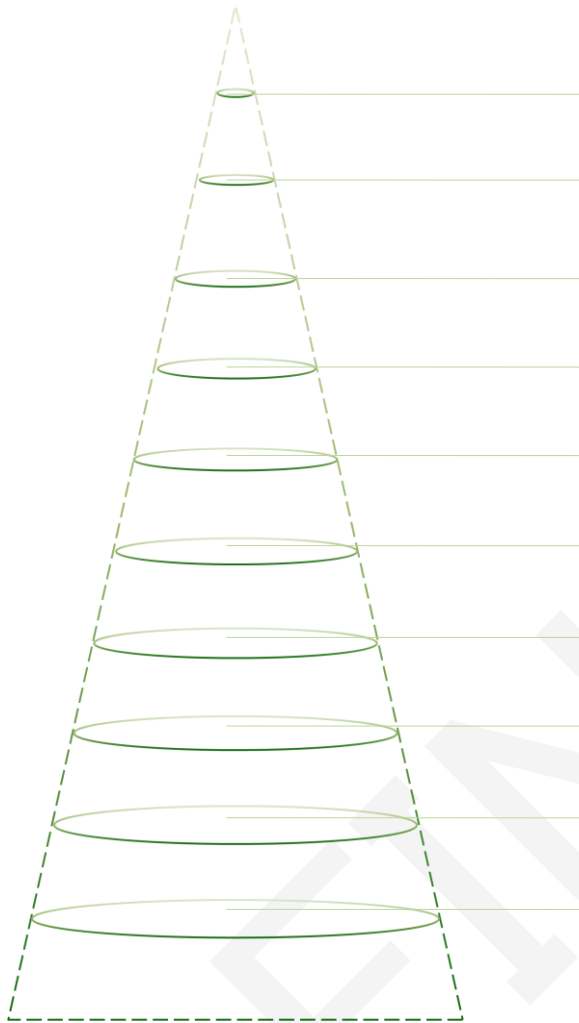


Luminous Intensity (cd) Distribution Data (cont.)

C γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	3678	3678	3678	3678	3678	3678	3678	3678
5.0°	3668	3570	3464	3377	3306	3268	3252	3272
10.0°	3301	3145	2972	2820	2657	2529	2515	2559
15.0°	2631	2415	2154	1949	1741	1568	1550	1587
20.0°	1681	1451	1219	1029	891	759	759	792
25.0°	844	723	548	453	399	320	324	347
30.0°	354	318	232	198	185	147	152	163
35.0°	158	156	116	103	104	81	85	91
40.0°	83	90	72	66	68	57	58	60
45.0°	57	61	52	49	50	45	45	46
50.0°	46	47	43	41	40	39	38	39
55.0°	40	39	37	36	35	33	33	33
60.0°	35	33	31	29	28	27	27	27
65.0°	28	27	25	23	23	22	21	22
70.0°	23	22	19	17	16	15	15	15
75.0°	17	15	13	11	10	9	9	10
80.0°	10	9	7	6	5	4	3	4
85.0°	4	3	2	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: 32.80°. Flux out: 735.3 lm.



Height (m)	Diameter (cm)	E <sub>avg</sub> (lx)	E <sub>max</sub> (lx)
0.5	29.4	10017.0	15205.0
1.0	58.9	2504.0	3801.0
1.5	88.3	1113.0	1689.0
2.0	117.7	626.0	950.3
2.5	147.2	400.7	608.2
3.0	176.6	278.2	422.4
3.5	206.0	204.4	310.3
4.0	235.5	156.5	237.6
4.5	264.9	123.7	187.7
5.0	294.3	100.2	152.0

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	85.7	6.23
5-10	230.6	16.77
10-15	301.5	21.92
15-20	272.3	19.80
20-25	182.7	13.29
25-30	100.6	7.31
30-35	52.4	3.82
35-40	31.8	2.30
40-45	23.0	1.68
45-50	19.2	1.39
50-55	17.4	1.26
55-60	15.8	1.15
60-65	13.7	1.00
65-70	11.4	0.83
70-75	8.6	0.62
75-80	5.5	0.40
80-85	2.6	0.19
85-90	0.6	0.04
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	85.7	6.23
0-10	316.4	23.00
0-15	617.9	44.92
0-20	890.2	64.72
0-25	1073.0	78.01
0-30	1173.6	85.32
0-35	1226.0	89.14
0-40	1257.8	91.44
0-45	1280.8	93.12
0-50	1299.9	94.51
0-55	1317.3	95.77
0-60	1333.1	96.92
0-65	1346.8	97.92
0-70	1358.2	98.75
0-75	1366.8	99.37
0-80	1372.3	99.77
0-85	1374.8	99.96
0-90	1375.4	100.00
0-95	1375.4	100.00
0-100	1375.4	100.00
0-105	1375.4	100.00
0-110	1375.4	100.00
0-115	1375.4	100.00
0-120	1375.4	100.00
0-125	1375.4	100.00
0-130	1375.4	100.00
0-135	1375.4	100.00
0-140	1375.4	100.00
0-145	1375.4	100.00
0-150	1375.4	100.00
0-155	1375.4	100.00
0-160	1375.4	100.00
0-165	1375.4	100.00
0-170	1375.4	100.00
0-175	1375.4	100.00
0-180	1375.4	100.00

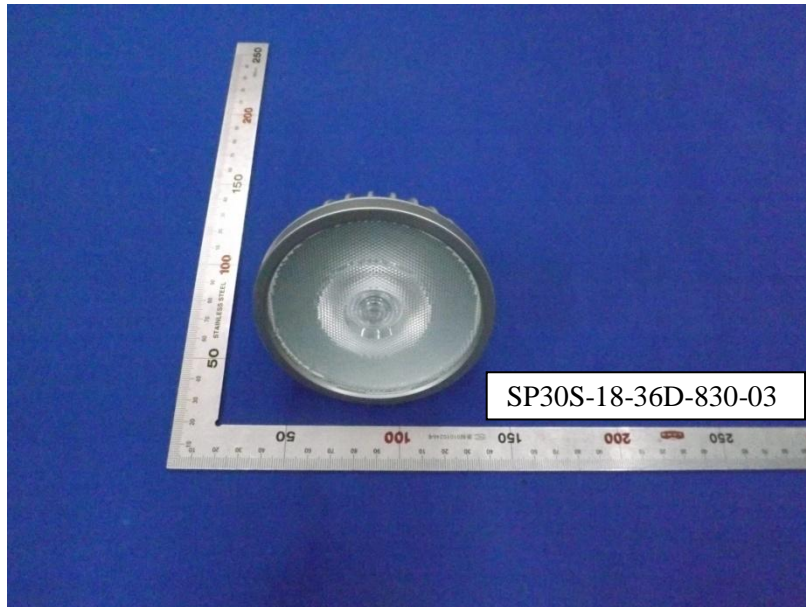
Color Spatial Uniformity

**Average Weighted**  
**u': 0.2503, v': 0.5217**

$\gamma \setminus C0-180$	$u'$	$v'$	$Du'v'$	$\gamma \setminus C90-270$	$u'$	$v'$	$Du'v'$
-30	0.2487	0.5200	0.0024	-30	0.2471	0.5201	0.0035
-25	0.2504	0.5213	0.0004	-25	0.2486	0.5211	0.0018
-20	0.2511	0.5215	0.0008	-20	0.2499	0.5216	0.0003
-15	0.2516	0.5219	0.0013	-15	0.2510	0.5223	0.0009
-10	0.2514	0.5220	0.0012	-10	0.2510	0.5224	0.0010
-5	0.2518	0.5222	0.0016	-5	0.2510	0.5225	0.0011
0	0.2517	0.5221	0.0015	0	0.2509	0.5223	0.0009
5	0.2512	0.5219	0.0010	5	0.2512	0.5226	0.0013
10	0.2501	0.5212	0.0005	10	0.2499	0.5221	0.0005
15	0.2493	0.5206	0.0015	15	0.2493	0.5219	0.0010
20	0.2496	0.5210	0.0010	20	0.2492	0.5217	0.0011
25	0.2490	0.5206	0.0017	25	0.2493	0.5215	0.0010
30	0.2482	0.5202	0.0026	30	0.2478	0.5206	0.0027

FINAL

6. Product Photo



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