

# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

### Soraa Inc.

6500 Kaiser Drive, Fremont, CA 94555

**Test Model: SP30S-18-25D-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>	R2DG150423050-10A1
<b>Test Date:</b>	2015-04-25 to 2015-04-27
<b>Report Date:</b>	2015-05-05
<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.

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## 1. Product Description

### General Information:

Two samples were received on 2015-04-23. One was tested in integrating sphere and the other was tested in goniophotometer.

Model Tested: SP30S-18-25D-830-03  
 Manufacturer: Soraa Inc.  
 Brand Name: Soraa  
 Product Designation: LED Lamp  
 Burning Time Before Test: 0 hour(For New Products)

### Rated Values:

Rated Voltage/Frequency: AC 100-120V 50/ 60Hz  
 Rated Power: 18.5 W  
 Nominal CCT: 3000K  
 Nominal Lumen Output: 1280 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
2.0m integrating sphere	EVERFINE	R98	11010018	N/A	2014-12-27	2015-12-27
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	380-780nm	2015-03-04	2016-03-04
Digital CC&CV DC Power Supply	EVERFINE	WY305	1101047	30V/5A	2015-03-05	2016-03-05
Temperature/humidity/clock	Victor	VC230	EE209	0~40℃0~90%	2013-04-01	2016-03-31
Standard Light Source	EVERFINE	D204	LSD090808	N/A	2014-08-05	2015-08-05
Special zero-voltage synchronous switching AC	EVERFINE	DPS1010	1011001T	N/A	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℃0~90%	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  $U=2.0(K=2)$ , 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
120.0	60	0.1537	18.1	0.9814

#### Photometric Measurement

Luminous Flux (lm)	Radiant Flux (W)	Efficacy (lm/W)	CCT (K)	Duv
1288.6	4.4094	71.2	2996	-7.12E-04

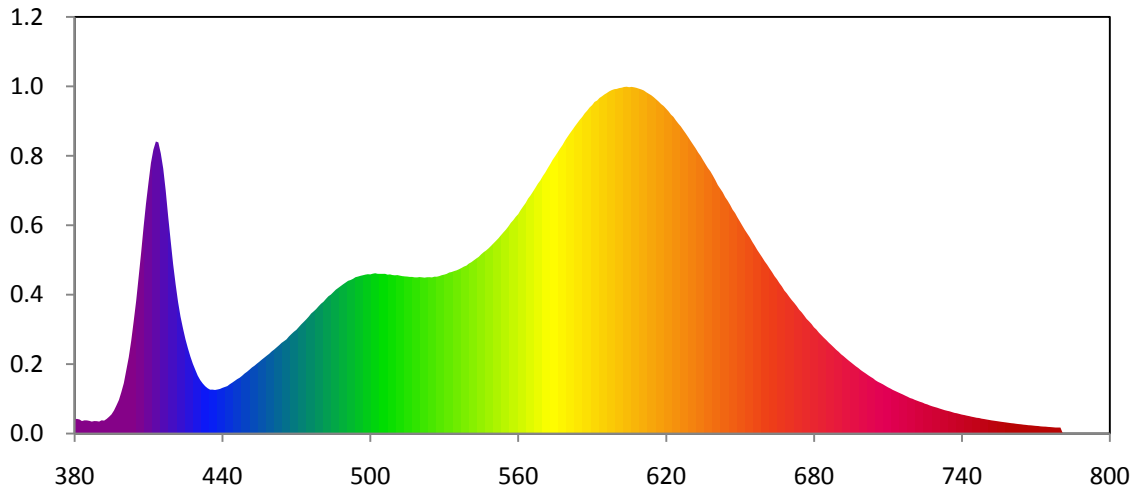
#### Chromaticity Coordinate

x	y	u	v	u'	v'
0.4362	0.4020	0.2510	0.3470	0.2510	0.5205

#### Color Rendering Index

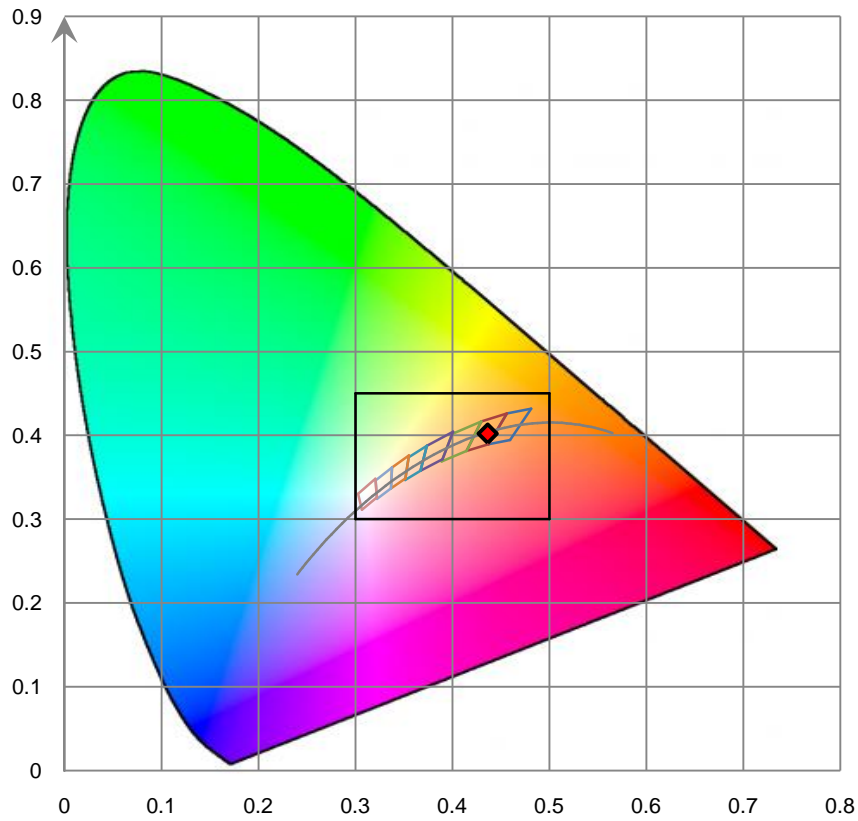
<b>Ra</b>			
86.2			
R1 86	R2 97	R3 89	R4 86
R5 90	R6 97	R7 82	R8 62
R9 19	R10 97	R11 87	R12 87
R13 89	R14 94	R15 77	

Relative Spectral Power Distribution

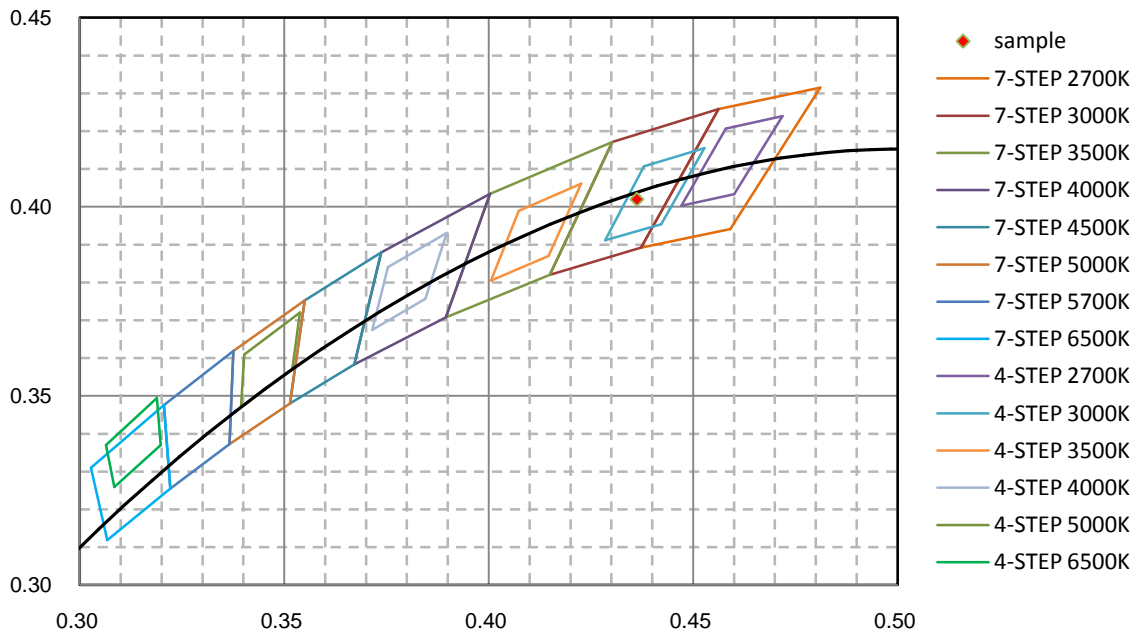


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.043E+00	465	6.658E+00	550	1.371E+01	635	1.971E+01	720	2.507E+00
385	9.472E-01	470	7.474E+00	555	1.469E+01	640	1.826E+01	725	2.154E+00
390	8.644E-01	475	8.424E+00	560	1.581E+01	645	1.677E+01	730	1.863E+00
395	1.384E+00	480	9.357E+00	565	1.716E+01	650	1.527E+01	735	1.603E+00
400	3.637E+00	485	1.019E+01	570	1.856E+01	655	1.381E+01	740	1.368E+00
405	9.550E+00	490	1.088E+01	575	1.999E+01	660	1.241E+01	745	1.177E+00
410	1.807E+01	495	1.131E+01	580	2.138E+01	665	1.111E+01	750	1.015E+00
415	2.019E+01	500	1.147E+01	585	2.261E+01	670	9.849E+00	755	8.763E-01
420	1.222E+01	505	1.151E+01	590	2.367E+01	675	8.740E+00	760	7.497E-01
425	6.805E+00	510	1.140E+01	595	2.444E+01	680	7.657E+00	765	6.437E-01
430	4.171E+00	515	1.131E+01	600	2.484E+01	685	6.742E+00	770	5.551E-01
435	3.163E+00	520	1.128E+01	605	2.496E+01	690	5.894E+00	775	4.807E-01
440	3.293E+00	525	1.125E+01	610	2.479E+01	695	5.134E+00	780	4.363E-01
445	3.796E+00	530	1.145E+01	615	2.424E+01	700	4.449E+00	785	0.000E+00
450	4.457E+00	535	1.176E+01	620	2.341E+01	705	3.835E+00	790	0.000E+00
455	5.179E+00	540	1.225E+01	625	2.233E+01	710	3.335E+00	795	0.000E+00
460	5.923E+00	545	1.292E+01	630	2.108E+01	715	2.900E+00	800	0.000E+00

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**

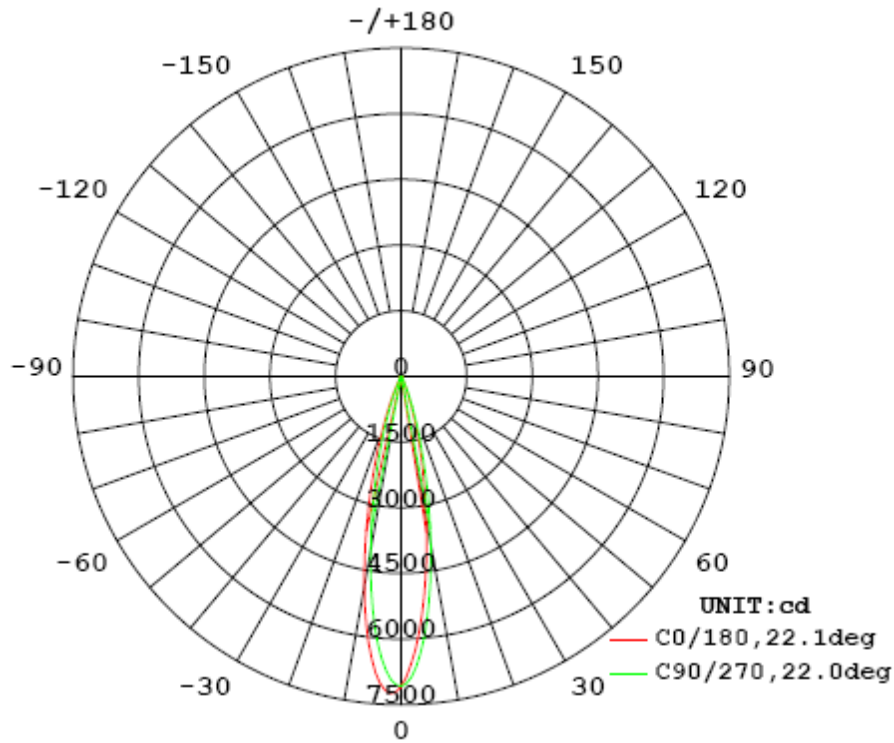
**Electrical Measurement**

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.1565	18.46	0.9827

**Photometric Measurement**

Luminous Flux (lm)	Efficacy (lm/W)	CBCP (cd)	S/MH (C0/180)	S/MH (C90/270)
1343.66	72.80	7073	0.43	0.38

**Luminous Intensity Distribution**



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I <sub>max</sub> ):	22.1	22.0	22.0	22.0	22.03
Field Angle (10% I <sub>max</sub> ):	41.1	41.0	40.5	40.6	40.80

Luminous Intensity (cd) Distribution Data

C \ y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	7073	7073	7073	7073	7073	7073	7073	7073
5.0°	6786	6718	6562	6352	6131	5921	5757	5638
10.0°	4881	4767	4578	4341	4038	3782	3609	3505
15.0°	2728	2614	2497	2306	2088	1878	1763	1724
20.0°	1162	1099	1031	917	772	668	613	593
25.0°	378	324	299	256	212	183	168	162
30.0°	108	104	99	92	84	80	78	77
35.0°	68	67	65	63	60	59	59	57
40.0°	51	52	50	50	47	47	46	46
45.0°	42	42	42	42	41	39	39	39
50.0°	35	36	36	35	34	34	33	33
55.0°	30	31	31	30	30	29	28	28
60.0°	26	25	25	25	24	24	23	23
65.0°	21	21	20	20	19	19	18	18
70.0°	16	16	15	15	14	14	13	13
75.0°	11	11	10	10	9	9	8	8
80.0°	6	6	5	5	4	4	4	4
85.0°	3	3	2	2	2	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	1	1
165.0°	1	1	1	1	1	1	1	1
170.0°	1	1	1	1	1	1	1	1
175.0°	1	1	1	1	1	1	1	1
180.0°	0	0	0	0	0	0	0	0

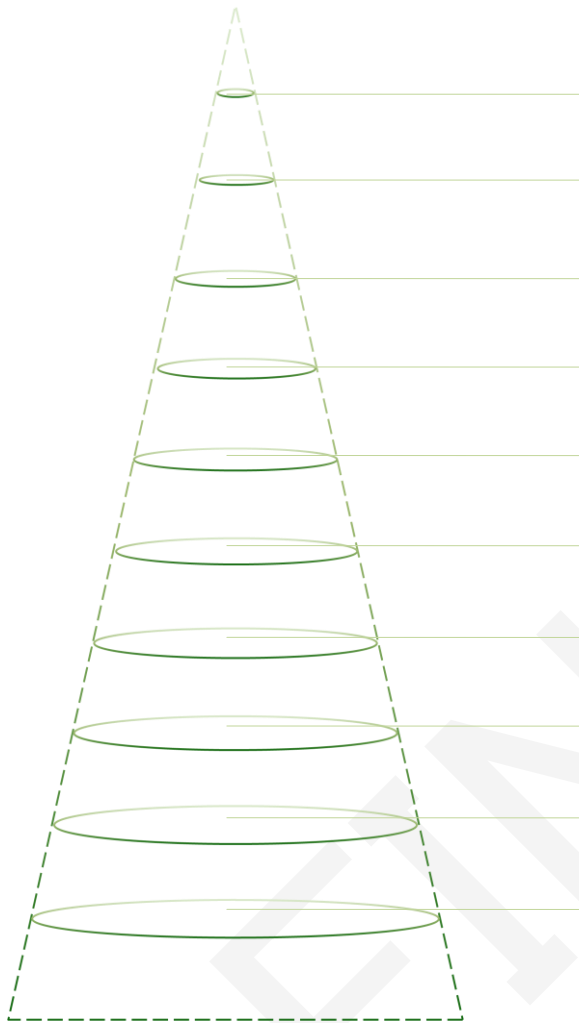


Luminous Intensity (cd) Distribution Data (cont.)

C \ Y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	7073	7073	7073	7073	7073	7073	7073	7073
5.0°	5470	5487	5605	5785	5997	6207	6420	6547
10.0°	3311	3330	3461	3672	3901	4147	4434	4610
15.0°	1592	1605	1707	1841	1950	2085	2328	2513
20.0°	558	568	619	693	728	786	932	1028
25.0°	166	171	178	198	211	230	273	303
30.0°	75	75	77	80	82	86	93	99
35.0°	55	55	56	57	58	61	63	64
40.0°	44	45	44	46	46	48	48	50
45.0°	38	38	38	39	39	40	41	42
50.0°	32	32	32	33	33	34	34	35
55.0°	27	27	28	28	29	29	30	30
60.0°	22	22	23	23	24	24	25	26
65.0°	17	18	18	18	19	19	20	20
70.0°	13	13	13	14	14	15	15	15
75.0°	8	8	8	9	9	10	10	10
80.0°	3	4	4	4	5	5	5	6
85.0°	1	1	1	1	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: 22.00°. Flux out: 589.2 lm.



Height (m)	Diameter (cm)	E <sub>avg</sub> (lx)	E <sub>max</sub> (lx)
0.5	19.4	19856.0	28812.0
1.0	38.9	4964.0	7203.0
1.5	58.3	2206.0	3201.0
2.0	77.8	1241.0	1801.0
2.5	97.2	794.2	1152.0
3.0	116.6	551.6	800.3
3.5	136.1	405.2	588.0
4.0	155.5	310.3	450.2
4.5	174.9	245.1	355.7
5.0	194.4	198.6	288.1

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	156.9	11.68
5-10	356.2	26.51
10-15	349.4	26.00
15-20	222.9	16.59
20-25	96.4	7.18
25-30	35.2	2.61
30-35	21.0	1.56
35-40	17.8	1.33
40-45	16.1	1.20
45-50	14.8	1.10
50-55	13.7	1.02
55-60	12.3	0.91
60-65	10.5	0.78
65-70	8.4	0.63
70-75	6.2	0.46
75-80	3.6	0.27
80-85	1.7	0.12
85-90	0.4	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	0.01
155-160	0.0	0.00
160-165	0.1	0.00
165-170	0.1	0.01
170-175	0.0	0.00
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	156.9	11.68
0-10	513.1	38.19
0-15	862.5	64.19
0-20	1085.4	80.78
0-25	1181.8	87.96
0-30	1217.0	90.57
0-35	1238.0	92.13
0-40	1255.8	93.46
0-45	1271.9	94.66
0-50	1286.7	95.76
0-55	1300.4	96.78
0-60	1312.7	97.69
0-65	1323.1	98.47
0-70	1331.6	99.10
0-75	1337.7	99.56
0-80	1341.4	99.83
0-85	1343.1	99.95
0-90	1343.4	99.98
0-95	1343.4	99.98
0-100	1343.4	99.98
0-105	1343.4	99.98
0-110	1343.4	99.98
0-115	1343.4	99.98
0-120	1343.4	99.98
0-125	1343.4	99.98
0-130	1343.4	99.98
0-135	1343.4	99.98
0-140	1343.4	99.98
0-145	1343.4	99.98
0-150	1343.4	99.98
0-155	1343.5	99.99
0-160	1343.5	99.99
0-165	1343.6	99.99
0-170	1343.6	100.00
0-175	1343.7	100.00
0-180	1343.7	100.00

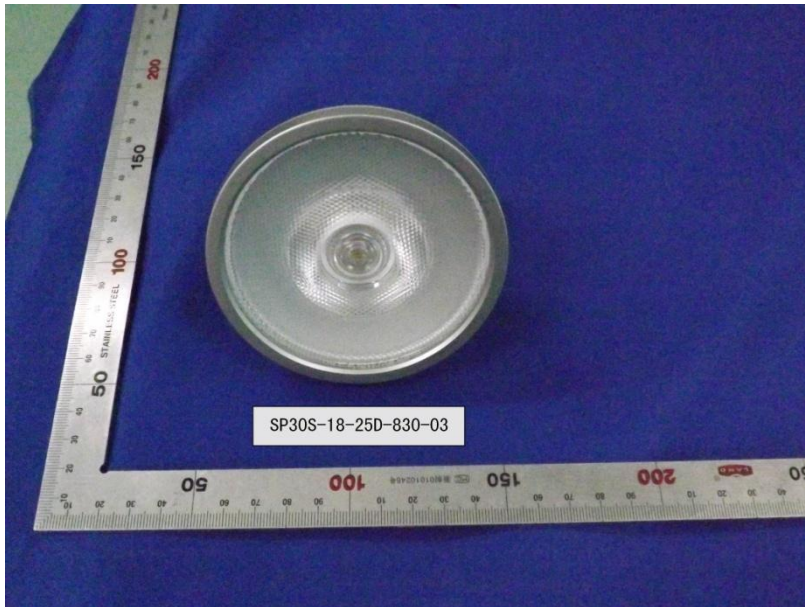
Color Spatial Uniformity

**Average Weighted**  
**u': 0.2494, v': 0.5238**

$\gamma \setminus C0-180$	$u'$	$v'$	$Du'v'$	$\gamma \setminus C90-270$	$u'$	$v'$	$Du'v'$
-20	0.2489	0.5229	0.0009	-20	0.2513	0.5236	0.0019
-15	0.2476	0.5220	0.0025	-15	0.2494	0.5224	0.0014
-10	0.2488	0.5236	0.0006	-10	0.2492	0.5230	0.0008
-5	0.2496	0.5244	0.0007	-5	0.2499	0.5243	0.0007
0	0.2496	0.5245	0.0008	0	0.2498	0.5245	0.0009
5	0.2502	0.5246	0.0011	5	0.2501	0.5248	0.0012
10	0.2497	0.5239	0.0003	10	0.2499	0.5244	0.0009
15	0.2491	0.5229	0.0010	15	0.2487	0.5233	0.0008
20	0.2500	0.5234	0.0007	20	0.2500	0.5244	0.0009

FINAL

6. Product Photo



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