

# IES LM-79-08

## MEASUREMENT AND TEST REPORT

For

**Soraa, Inc**

6500 Kaiser Dr. Fremont, California 94555, USA

**Test Model: SP30S-18-25D-827-03**

<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>	R2DG150916063-10
<b>Test Date:</b>	2015-09-15 to 2015-09-18
<b>Report Date:</b>	2016-02-26
<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:

Two samples were received on 2015-09-16. One was tested in integrating sphere and the other was tested in goniophotometer.

Model Tested: SP30S-18-25D-827-03  
 Manufacturer: Soraa, Inc  
 Brand Name: SORAA BRILLIANT  
 Product Designation: Directional LED Lamp  
 Burning Time Before Test: 0hour(For New Products)

### Rated Values:

Rated Voltage/Frequency: 120 V AC 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	Manufacturer	Model No	Serial No	Test Range	Calibration date	Calibration due date
2.0m integrating sphere	EVERFINE	R98	11010018	R98	2015-11-09	2016-11-08
High accuracy array spectroradiometer	EVERFINE	HAAS-2000	1012016T	380-780nm	2015-03-25	2016-03-24
Digital Power Meter	EVERFINE	PF2010A	1011004	600V/20A	2015-07-24	2016-07-23
Digital CC&CV DC Power Supply	EVERFINE	WY305-V1	1101047	30V/5A	2015-07-27	2016-07-26
Temperature/humidity/clock	Victor	VC230	EE209	0~40°C 0~90%	2015-03-24	2016-03-23
Standard Light Source	SENSING	N/A	LSD090808	N/A	2015-09-25	2016-09-24
Special zero-voltage synchronous switching AC	EVERFINE	DPS1010-YF	1011001T	30V/5A	2015-03-05	2016-03-04
AC Power Supply	EVERFINE	VPS1030 PWM	1012017	0-150V, 0-300V	2015-03-05	2016-03-04
DC Power Supply	EVERFINE	WY12010	1009009	30V/5A	2015-03-05	2016-03-04
Power Meter	YOKOGAWA	WT-210	91KB35700	15/30/60/150/300/600 V	2015-03-05	2016-03-04
Goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	1600mm,3000W/10A	2015-03-20	2016-03-19
Wireless Remote Sensor	N/A	433MHz	N/A	0°C~50°C;-20°C~60°C	2015-03-24	2016-03-23
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.

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  $U=1.8\%$  ( $K=2$ ), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is  $U=20\text{K}$  ( $K=2$ ), at the 95% confidence level. The uncertainty of the CRI is  $U=1.8(K=2)$ , 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 hour**

Test orientation: **Base up**

#### Electrical Measurement

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
120.1	60	0.1559	18.33	0.9794

#### Photometric Measurement

Luminous Flux (lm)	Radiant Flux (W)	Efficacy (lm/W)	CCT (K)	Duv
1318.5	4.390	71.92	2709	5.05E-04

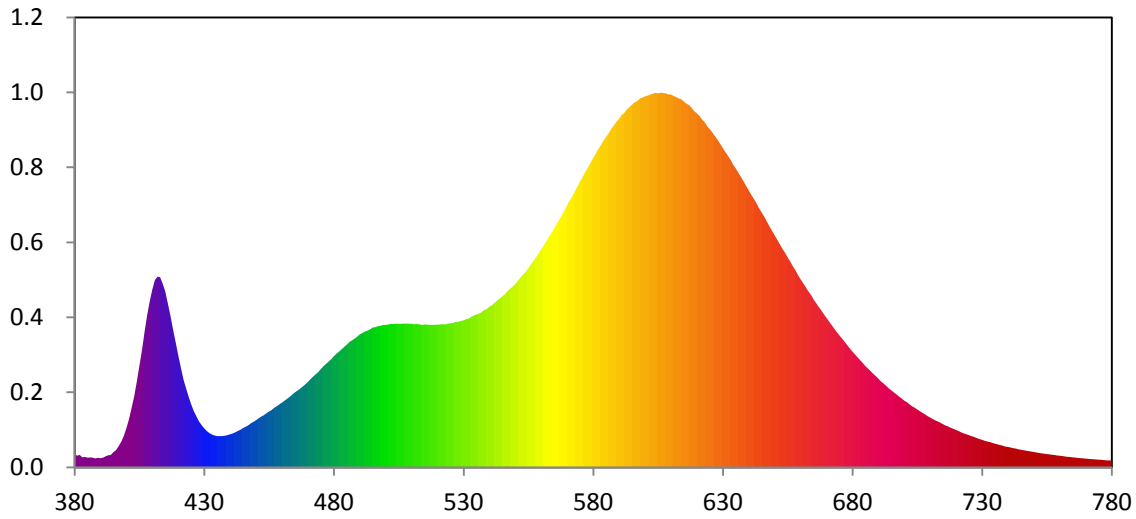
#### Chromaticity Coordinate

x	y	u	v	u'	v'
0.4600	0.4120	0.2620	0.3519	0.2620	0.5279

#### Color Rendering Index

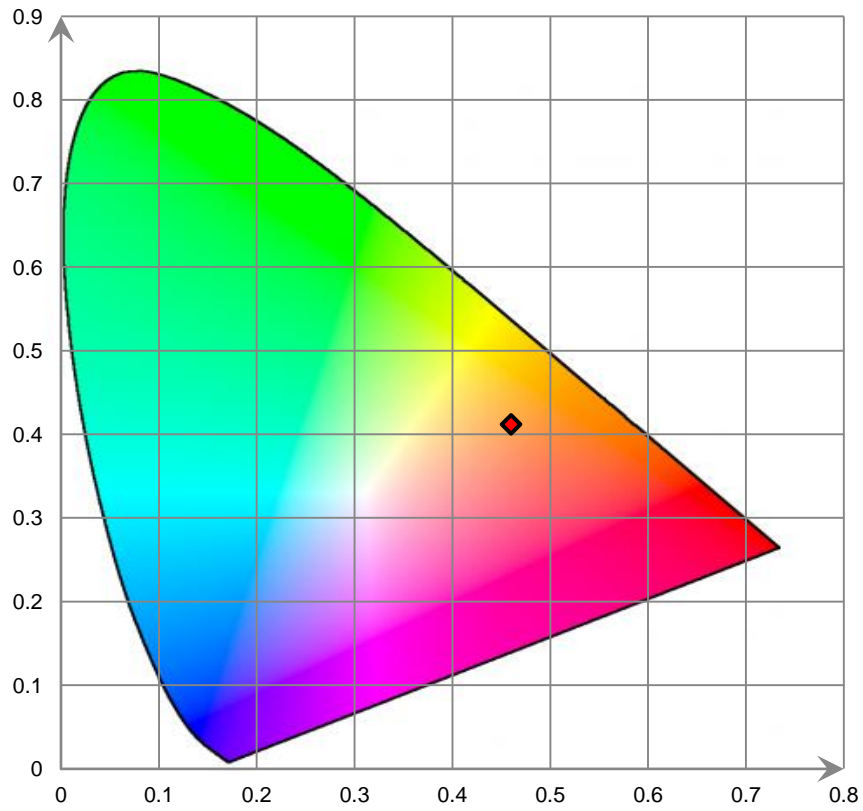
<b>Ra</b>			
83.8			
R1 83	R2 96	R3 88	R4 82
R5 87	R6 98	R7 80	R8 57
R9 11	R10 95	R11 84	R12 92
R13 87	R14 93	R15 74	

Relative Spectral Power Distribution

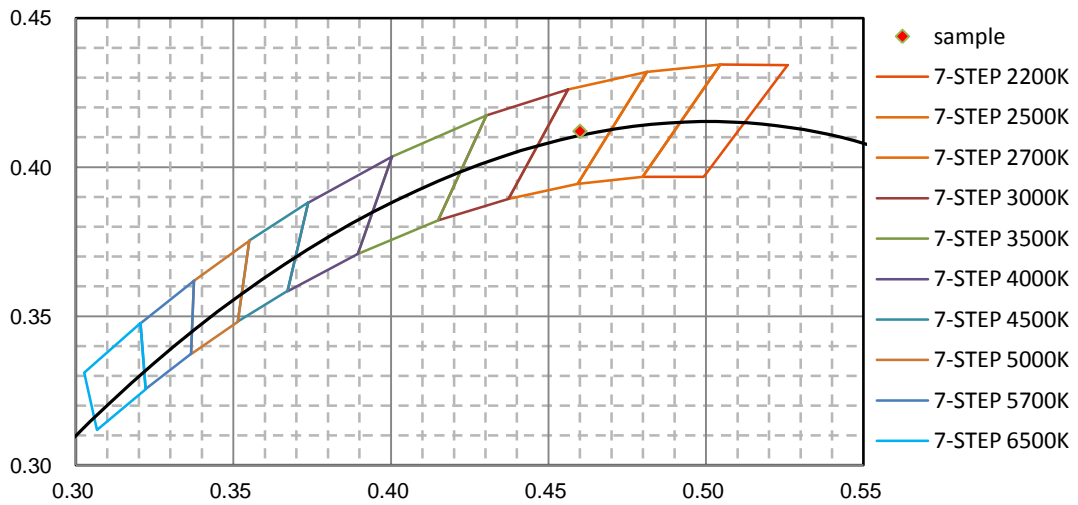


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	9.976E-01	465	1.583E+00	550	1.365E+01	635	2.709E+00	720	3.280E+00
385	8.752E-01	470	1.901E+00	555	1.307E+01	640	2.555E+00	725	3.386E+00
390	9.362E-01	475	2.343E+00	560	1.217E+01	645	2.448E+00	730	3.513E+00
395	7.544E-01	480	2.915E+00	565	1.126E+01	650	2.370E+00	735	3.653E+00
400	7.850E-01	485	3.586E+00	570	1.024E+01	655	2.330E+00	740	3.778E+00
405	7.257E-01	490	4.410E+00	575	9.302E+00	660	2.334E+00	745	3.883E+00
410	7.505E-01	495	5.280E+00	580	8.324E+00	665	2.335E+00	750	4.031E+00
415	7.261E-01	500	6.363E+00	585	7.419E+00	670	2.360E+00	755	4.152E+00
420	6.712E-01	505	7.538E+00	590	6.550E+00	675	2.404E+00	760	4.266E+00
425	7.194E-01	510	8.705E+00	595	5.884E+00	680	2.467E+00	765	4.431E+00
430	6.889E-01	515	1.006E+01	600	5.259E+00	685	2.525E+00	770	4.550E+00
435	7.266E-01	520	1.130E+01	605	4.678E+00	690	2.616E+00	775	4.690E+00
440	8.293E-01	525	1.234E+01	610	4.184E+00	695	2.716E+00	780	4.819E+00
445	9.088E-01	530	1.322E+01	615	3.797E+00	700	2.801E+00		
450	9.315E-01	535	1.392E+01	620	3.425E+00	705	2.929E+00		
455	1.138E+00	540	1.417E+01	625	3.144E+00	710	3.024E+00		
460	1.290E+00	545	1.413E+01	630	2.905E+00	715	3.129E+00		

CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



**[Goniophotometer System]**

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

Test orientation: **Base up**

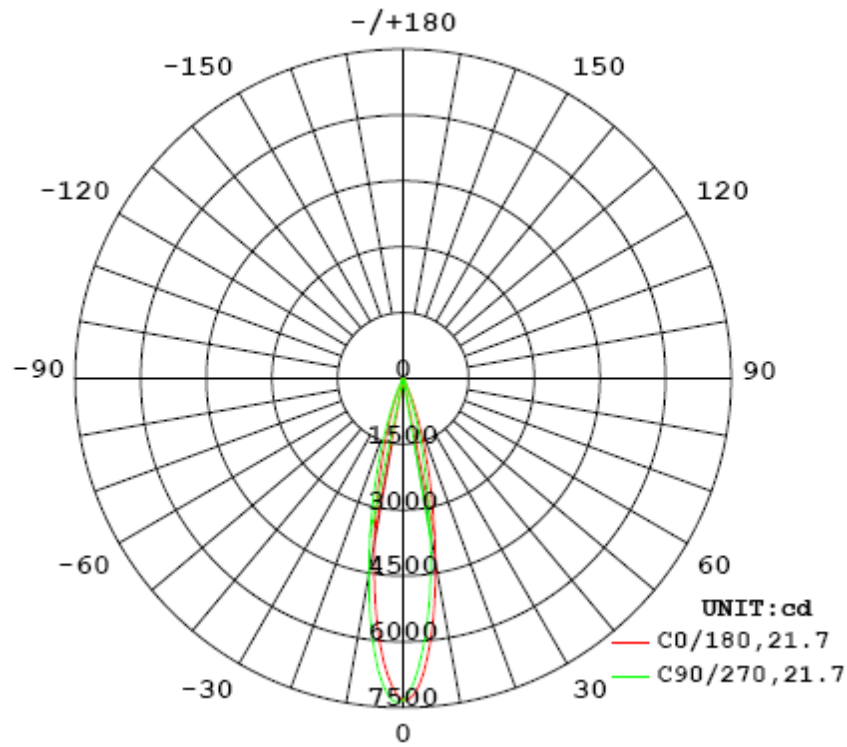
**Electrical Measurement**

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.04	60	0.153	18.05	0.9828

**Photometric Measurement**

Luminous Flux (lm)	Efficacy (lm/W)	I <sub>max</sub> (cd)	S/MH (C0/180)	S/MH (C90/270)
1359.04	75.29	7414	0.39	0.33

**Luminous Intensity Distribution**



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I <sub>max</sub> ):	21.7	21.8	21.7	21.8	21.8
Field Angle (10% I <sub>max</sub> ):	41.1	41.1	40.6	41.1	41.0

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	7334	7334	7334	7334	7334	7334	7334	7334
5.0°	6075	6212	6371	6529	6648	6725	6714	6648
10.0°	3820	3997	4211	4395	4557	4660	4670	4575
15.0°	1841	2014	2195	2332	2478	2582	2633	2549
20.0°	677	767	863	938	1011	1114	1173	1165
25.0°	193	221	247	271	296	359	384	378
30.0°	73	76	81	86	91	98	102	102
35.0°	50	52	54	56	59	61	61	62
40.0°	39	41	42	43	45	45	47	47
45.0°	34	35	36	37	37	38	39	38
50.0°	29	29	30	31	32	32	32	32
55.0°	25	26	27	27	27	28	28	28
60.0°	21	22	23	23	23	23	24	24
65.0°	17	18	18	18	19	19	19	19
70.0°	13	13	14	14	15	15	15	15
75.0°	8	9	9	9	10	10	10	9
80.0°	4	4	5	5	5	5	5	5
85.0°	1	1	1	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

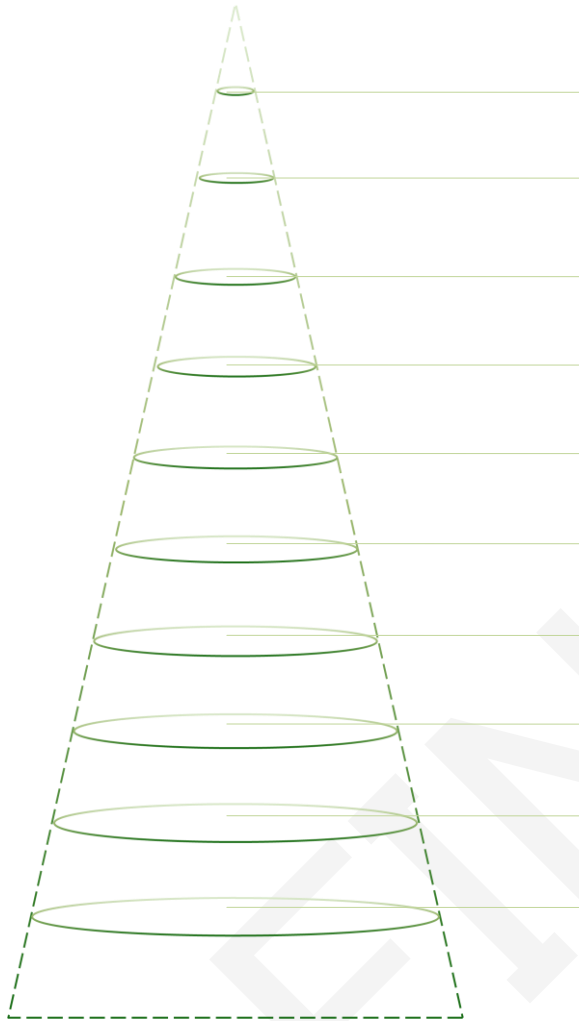


Luminous Intensity (cd) Distribution Data (cont.)

C γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	7334	7334	7334	7334	7334	7334	7334	7334
5.0°	6380	6250	6124	5980	5874	5827	5821	5869
10.0°	4252	4074	3907	3733	3579	3516	3532	3599
15.0°	2307	2180	2012	1813	1675	1629	1642	1677
20.0°	1012	921	791	676	599	575	582	602
25.0°	293	261	217	187	178	171	175	183
30.0°	91	83	75	70	68	67	67	68
35.0°	59	55	52	50	49	49	48	49
40.0°	44	43	42	41	40	39	39	39
45.0°	37	36	36	35	34	33	33	33
50.0°	31	31	30	29	29	28	28	28
55.0°	27	27	26	26	25	25	25	25
60.0°	23	22	22	22	21	21	21	21
65.0°	18	18	17	17	17	16	16	16
70.0°	14	14	13	13	12	12	12	12
75.0°	9	8	8	8	7	7	7	8
80.0°	5	4	4	4	3	3	3	3
85.0°	2	1	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

Average Area Illumination Figure

**Angle:21.8°. Flux out:601.6lm**



Height (m)	Diameter (cm)	E <sub>avg</sub> (lx)	E <sub>max</sub> (lx)
0.5	19.26	20274.0	29589.0
1.0	38.51	5068.0	7397.0
1.5	57.77	2253.0	3288.0
2.0	77.03	1267.0	1849.0
2.5	96.28	810.9	1184.0
3.0	115.54	563.2	821.9
3.5	134.80	413.7	603.8
4.0	154.06	316.8	462.3
4.5	173.31	250.3	365.3
5.0	192.57	202.7	295.9

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	161.7	11.90
5-10	363.0	26.71
10-15	352.3	25.92
15-20	228.8	16.83
20-25	103.0	7.58
25-30	36.0	2.65
30-35	19.0	1.40
35-40	15.8	1.16
40-45	14.3	1.05
45-50	13.2	0.98
50-55	12.3	0.90
55-60	11.2	0.82
60-65	9.7	0.72
65-70	7.9	0.58
70-75	5.8	0.42
75-80	3.4	0.25
80-85	1.5	0.11
85-90	0.3	0.02
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	161.7	11.90
0-10	524.7	38.61
0-15	877.0	64.53
0-20	1105.7	81.36
0-25	1208.7	88.94
0-30	1244.7	91.59
0-35	1263.7	92.99
0-40	1279.5	94.15
0-45	1293.9	95.20
0-50	1307.1	96.18
0-55	1319.3	97.08
0-60	1330.6	97.90
0-65	1340.2	98.62
0-70	1348.1	99.20
0-75	1353.9	99.62
0-80	1357.3	99.87
0-85	1358.7	99.98
0-90	1359.0	100.00
0-95	1359.0	100.00
0-100	1359.0	100.00
0-105	1359.0	100.00
0-110	1359.0	100.00
0-115	1359.0	100.00
0-120	1359.0	100.00
0-125	1359.0	100.00
0-130	1359.0	100.00
0-135	1359.0	100.00
0-140	1359.0	100.00
0-145	1359.0	100.00
0-150	1359.0	100.00
0-155	1359.0	100.00
0-160	1359.0	100.00
0-165	1359.0	100.00
0-170	1359.0	100.00
0-175	1359.0	100.00
0-180	1359.0	100.00

Color Spatial Uniformity

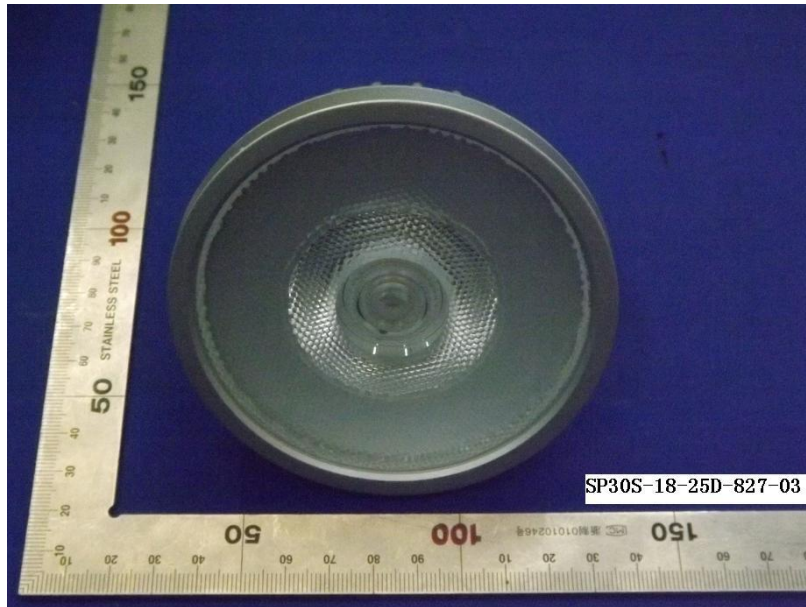
**Average Weighted**  
**u': 0.2608 v': 0.5281**

$\gamma \setminus C0-180$	$u'$	$v'$	$Du'v'$
-20	0.2623	0.5287	0.0016
-15	0.2609	0.5279	0.0002
-10	0.2604	0.5277	0.0006
-5	0.2608	0.5281	0.0000
0	0.2607	0.5282	0.0001
5	0.2609	0.5282	0.0001
10	0.2608	0.5282	0.0001
15	0.2606	0.5282	0.0002
20	0.2619	0.5294	0.0017

$\gamma \setminus C90-270$	$u'$	$v'$	$Du'v'$
-20	0.2623	0.5286	0.0016
-15	0.2603	0.5274	0.0009
-10	0.2598	0.5274	0.0012
-5	0.2605	0.5278	0.0004
0	0.2607	0.5282	0.0001
5	0.2610	0.5284	0.0004
10	0.2607	0.5282	0.0001
15	0.2610	0.5282	0.0002
20	0.2641	0.5297	0.0037

FINAL

## 6. Product Photo



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