

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

Soraa Inc.

6500 Kaiser Drive, Fremont, CA 94555

Test Model: SP38-18-25D-827-03

Report Type:	Electrical and Photometric tests including: Luminous Flux, Color, Luminous Intensity Distribution, Spatial Non-uniformity of Chromaticity
Test Engineer:	Daniel Duan <i>Daniel Duan</i>
Report Number:	R2DG160323051-10A2
Test Date:	2016-03-29 to 2016-03-30
Report Date:	2016-04-01
Reviewed By:	Jeanne Han/Safety Manager <i>Jeanne Han</i>
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.

1. Product Description

General Information:

Two samples were received on 2016-03-23 and used for testing. One was tested in integrating sphere and the other was tested in goniophotometer.

Model Tested: SP38-18-25D-827-03
 Manufacturer: Sora Inc.
 Brand Name: SORAA BRILLIANT
 Product Designation: Directional LED Lamp
 Burning Time Before Test: 0hour(For New Products)

Rated Values:

Rated Voltage/Frequency: 100-120 V AC 50/60Hz
 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	2016-03-10	2017-03-09
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°C0~90%	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	2016-03-04	2017-03-03
AC Power Supply	EVERFINE	VPS1030 PWM	1012017	0-150V, 0-300V	2016-03-04	2017-03-03
DC Power Supply	EVERFINE	WY12010	1009009	30V/5A	2016-03-04	2017-03-03
Power Meter	YOKOGAWA	WT-210	91KB35700	15/30/60/150/300/600 V	2016-03-04	2017-03-03
Goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	1600mm,3000W/10A	2016-03-10	2017-03-09
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.

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 $U=1.8\%$ ($K=2$), 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 $U=1.6\%$ ($K=2$), 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	0.1559	18.47	0.9876

Photometric Measurement

Luminous Flux (lm)	Radiant Flux (W)	Efficacy (lm/W)	CCT (K)	Duv
1412.6	4.785	76.480	2668	-0.0007

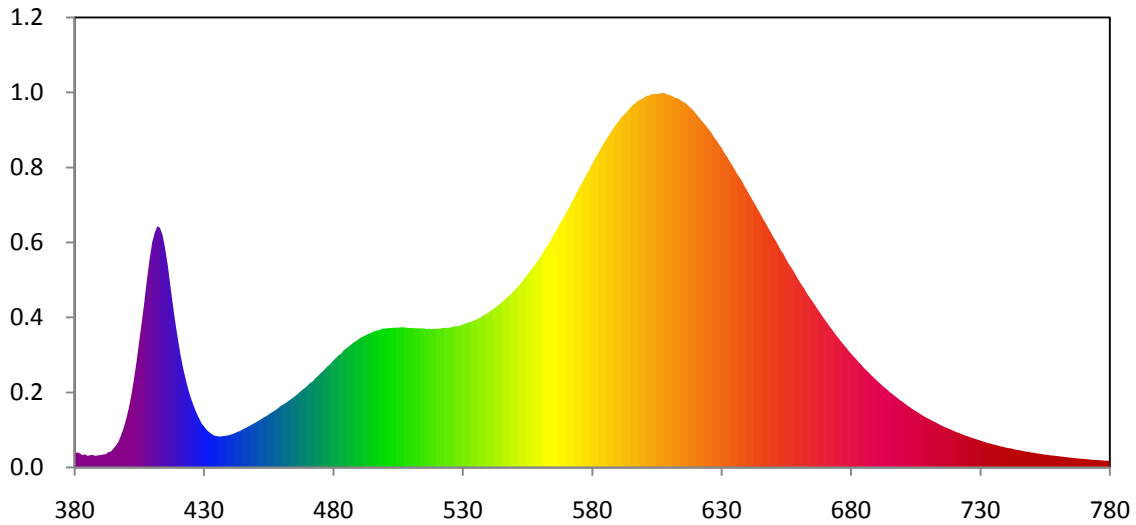
Chromaticity Coordinate

x	y	u	v	u'	v'
0.4613	0.4090	0.2641	0.3513	0.2641	0.5270

Color Rendering Index

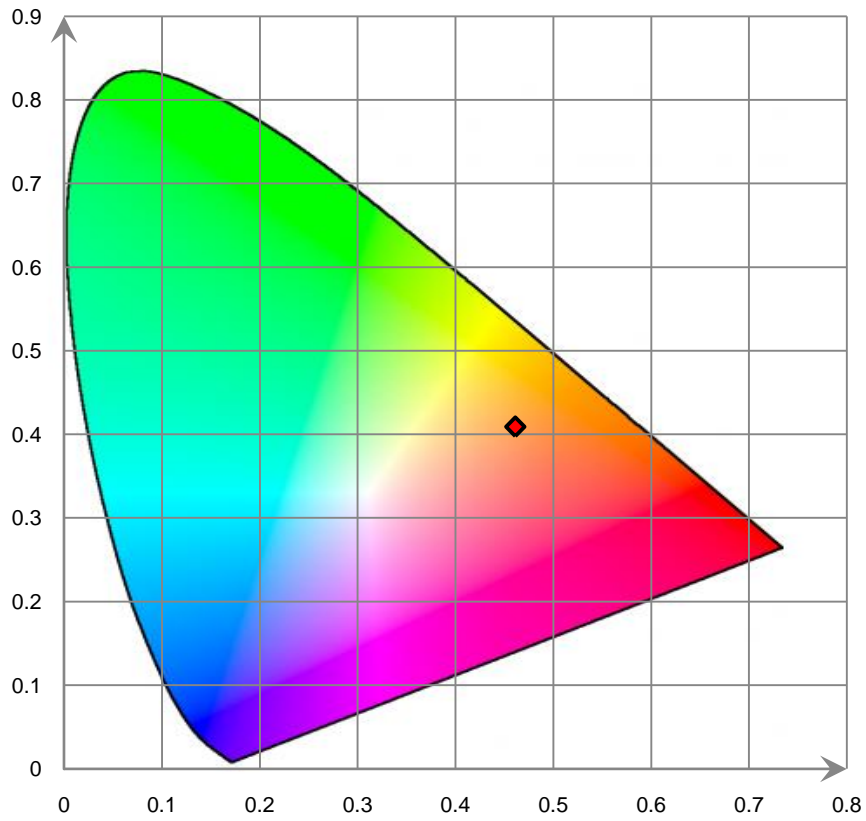
Ra 83.8			
R1 84	R2 97	R3 87	R4 83
R5 87	R6 97	R7 79	R8 57
R9 10	R10 96	R11 85	R12 88
R13 87	R14 93	R15 74	

Relative Spectral Power Distribution

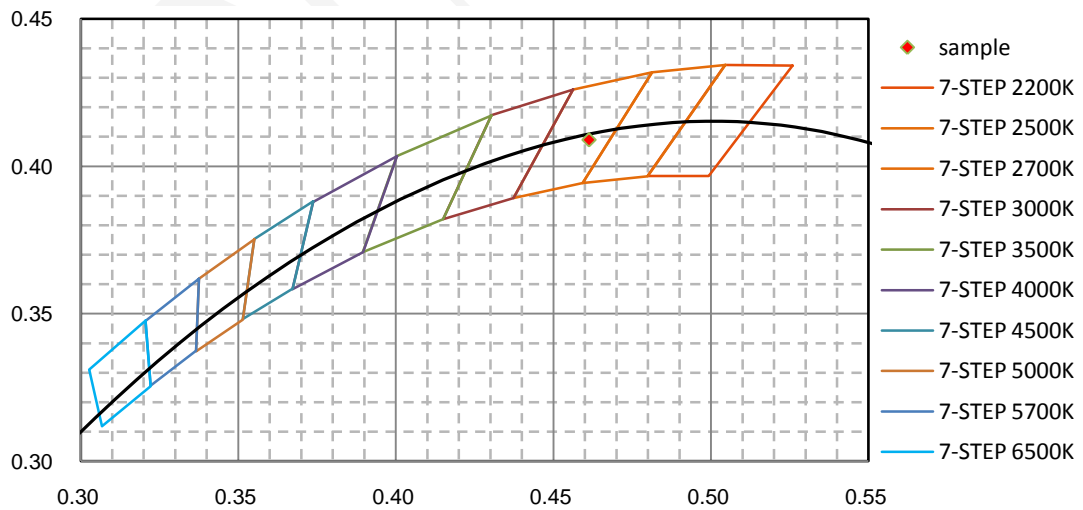


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	1.067E+00	465	5.589E+00	550	1.395E+01	635	2.354E+01	720	2.858E+00
385	9.214E-01	470	6.451E+00	555	1.522E+01	640	2.179E+01	725	2.465E+00
390	9.810E-01	475	7.408E+00	560	1.660E+01	645	2.002E+01	730	2.127E+00
395	1.477E+00	480	8.439E+00	565	1.831E+01	650	1.818E+01	735	1.820E+00
400	3.844E+00	485	9.395E+00	570	2.012E+01	655	1.641E+01	740	1.560E+00
405	9.962E+00	490	1.016E+01	575	2.205E+01	660	1.471E+01	745	1.362E+00
410	1.775E+01	495	1.066E+01	580	2.392E+01	665	1.314E+01	750	1.170E+00
415	1.728E+01	500	1.094E+01	585	2.575E+01	670	1.163E+01	755	1.009E+00
420	1.005E+01	505	1.103E+01	590	2.724E+01	675	1.025E+01	760	8.954E-01
425	5.457E+00	510	1.101E+01	595	2.843E+01	680	8.990E+00	765	7.706E-01
430	3.245E+00	515	1.096E+01	600	2.915E+01	685	7.847E+00	770	6.748E-01
435	2.482E+00	520	1.095E+01	605	2.946E+01	690	6.858E+00	775	5.930E-01
440	2.562E+00	525	1.102E+01	610	2.938E+01	695	5.947E+00	780	5.322E-01
445	3.005E+00	530	1.128E+01	615	2.885E+01	700	5.169E+00		
450	3.540E+00	535	1.165E+01	620	2.793E+01	705	4.451E+00		
455	4.168E+00	540	1.223E+01	625	2.669E+01	710	3.845E+00		
460	4.895E+00	545	1.302E+01	630	2.522E+01	715	3.311E+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**

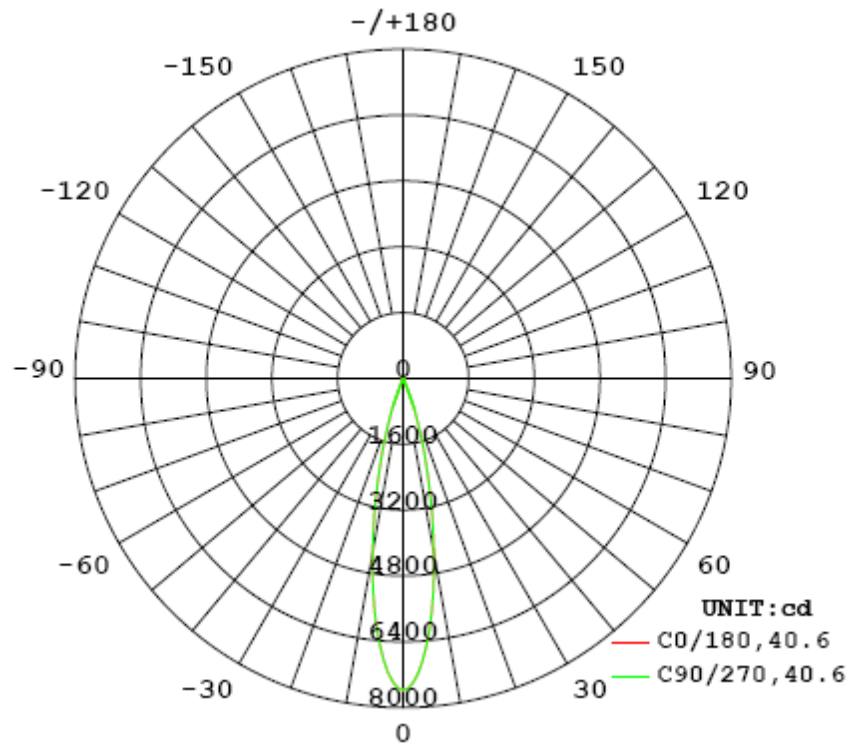
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
119.99	60	0.1549	18.36	0.9878

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
1411.19	76.86	7568	0.38	0.38

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	22.3	22.3	22.3	22.3	22.3
Field Angle (10% I _{max}):	40.6	40.6	40.6	40.6	40.6

Luminous Intensity (cd) Distribution Data

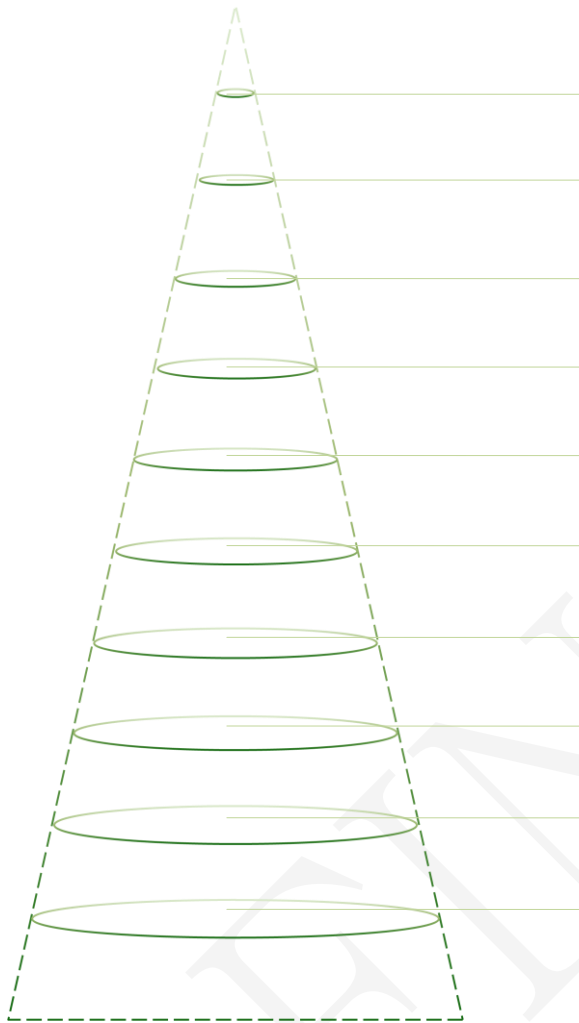
C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	7568	7568	7568	7568	7568	7568	7568	7568
5.0°	6524	6524	6524	6524	6524	6524	6524	6524
10.0°	4331	4331	4331	4331	4331	4331	4331	4331
15.0°	2191	2191	2191	2191	2191	2191	2191	2191
20.0°	808	808	808	808	808	808	808	808
25.0°	224	224	224	224	224	224	224	224
30.0°	85	85	85	85	85	85	85	85
35.0°	64	64	64	64	64	64	64	64
40.0°	51	51	51	51	51	51	51	51
45.0°	43	43	43	43	43	43	43	43
50.0°	36	36	36	36	36	36	36	36
55.0°	31	31	31	31	31	31	31	31
60.0°	25	25	25	25	25	25	25	25
65.0°	18	18	18	18	18	18	18	18
70.0°	11	11	11	11	11	11	11	11
75.0°	5	5	5	5	5	5	5	5
80.0°	1	1	1	1	1	1	1	1
85.0°	0	0	0	0	0	0	0	0
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°	1	1	1	1	1	1	1	1
150.0°	2	2	2	2	2	2	2	2
155.0°	3	3	3	3	3	3	3	3
160.0°	3	3	3	3	3	3	3	3
165.0°	3	3	3	3	3	3	3	3
170.0°	3	3	3	3	3	3	3	3
175.0°	2	2	2	2	2	2	2	2
180.0°	1	1	1	1	1	1	1	1

Luminous Intensity (cd) Distribution Data (cont.)

C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	7568	7568	7568	7568	7568	7568	7568	7568
5.0°	6524	6524	6524	6524	6524	6524	6524	6524
10.0°	4331	4331	4331	4331	4331	4331	4331	4331
15.0°	2191	2191	2191	2191	2191	2191	2191	2191
20.0°	808	808	808	808	808	808	808	808
25.0°	224	224	224	224	224	224	224	224
30.0°	85	85	85	85	85	85	85	85
35.0°	64	64	64	64	64	64	64	64
40.0°	51	51	51	51	51	51	51	51
45.0°	43	43	43	43	43	43	43	43
50.0°	36	36	36	36	36	36	36	36
55.0°	31	31	31	31	31	31	31	31
60.0°	25	25	25	25	25	25	25	25
65.0°	18	18	18	18	18	18	18	18
70.0°	11	11	11	11	11	11	11	11
75.0°	5	5	5	5	5	5	5	5
80.0°	1	1	1	1	1	1	1	1
85.0°	0	0	0	0	0	0	0	0
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°	1	1	1	1	1	1	1	1
150.0°	2	2	2	2	2	2	2	2
155.0°	3	3	3	3	3	3	3	3
160.0°	3	3	3	3	3	3	3	3
165.0°	3	3	3	3	3	3	3	3
170.0°	3	3	3	3	3	3	3	3
175.0°	2	2	2	2	2	2	2	2
180.0°	1	1	1	1	1	1	1	1

Average Area Illumination Figure

Angle:22.3°. Flux out:712.2lm



Height (m)	Diameter (cm)	E _{avg} (lx)	E _{max} (lx)
0.5	19.71	20071.0	30271.0
1.0	39.42	5018.0	7568.0
1.5	59.13	2230.0	3363.0
2.0	78.84	1254.0	1892.0
2.5	98.55	802.8	1211.0
3.0	118.26	557.5	840.9
3.5	137.97	409.6	617.8
4.0	157.68	313.6	473.0
4.5	177.39	247.8	373.7
5.0	197.10	200.7	302.7

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	167.9	11.90
5-10	383.1	27.15
10-15	373.1	26.44
15-20	229.8	16.29
20-25	95.9	6.79
25-30	33.8	2.40
30-35	21.4	1.52
35-40	19.0	1.34
40-45	17.2	1.22
45-50	15.8	1.12
50-55	14.5	1.03
55-60	13.1	0.92
60-65	10.5	0.75
65-70	7.2	0.50
70-75	4.1	0.30
75-80	1.3	0.09
80-85	0.2	0.01
85-90	0.0	0.00
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	0.01
125-130	0.0	0.00
130-135	0.0	0.00
135-140	0.1	0.01
140-145	0.3	0.01
145-150	0.5	0.04
150-155	0.6	0.04
155-160	0.6	0.04
160-165	0.5	0.04
165-170	0.4	0.02
170-175	0.2	0.02
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	167.9	11.90
0-10	551.1	39.05
0-15	924.2	65.49
0-20	1154.0	81.78
0-25	1249.9	88.57
0-30	1283.8	90.97
0-35	1305.2	92.49
0-40	1324.2	93.83
0-45	1341.4	95.05
0-50	1357.1	96.17
0-55	1371.6	97.20
0-60	1384.7	98.12
0-65	1395.2	98.87
0-70	1402.4	99.37
0-75	1406.5	99.67
0-80	1407.8	99.76
0-85	1408.0	99.77
0-90	1408.0	99.77
0-95	1408.0	99.77
0-100	1408.0	99.77
0-105	1408.0	99.77
0-110	1408.0	99.77
0-115	1408.0	99.77
0-120	1408.0	99.77
0-125	1408.0	99.78
0-130	1408.0	99.78
0-135	1408.1	99.78
0-140	1408.2	99.79
0-145	1408.4	99.80
0-150	1408.9	99.84
0-155	1409.5	99.88
0-160	1410.1	99.92
0-165	1410.6	99.96
0-170	1411.0	99.98
0-175	1411.2	100.00
0-180	1411.2	100.00

Color Spatial Uniformity

Average Weighted
u': 0.2629 v': 0.5288

$\gamma \setminus C0-180$	u'	v'	$Du'v'$
-15	0.2614	0.5273	0.0021
-10	0.2622	0.5278	0.0012
-5	0.2631	0.5285	0.0004
0	0.2637	0.5291	0.0009
5	0.2639	0.5295	0.0012
10	0.2640	0.5297	0.0014
15	0.2645	0.5300	0.0020

$\gamma \setminus C90-270$	u'	v'	$Du'v'$
-15	0.2634	0.5292	0.0006
-10	0.2620	0.5287	0.0009
-5	0.2632	0.5290	0.0004
0	0.2637	0.5291	0.0009
5	0.2634	0.5290	0.0005
10	0.2628	0.5288	0.0001
15	0.2613	0.5284	0.0016

FINAL

6. Product Photo



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