

IES LM-79-08

MEASUREMENT AND TEST REPORT

Test Model: P30B02-D 3000K

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:	R2XM140901065-10A1
Test Date:	2014-09-02 to 2014-09-10
Report Date:	2014-10-08
Reviewed By:	Jeanne Han/Safety Manager <i>Jeanne Han</i>
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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.

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1. Product Description

General Information:

Two samples were received on 2014-09-01. One was tested in integrating sphere and the other was tested in goniophotometer.

Model Tested: P30B02-D 3000K
 Manufacturer: Xiamen Bymea Lighting Co.,Ltd.
 Brand Name: BYMEA
 Product Designation: Integral LED Lamp
 Burning Time Before Test: 0 hour(For New Products)

Rated Values:

Rated Voltage/Frequency: 120 VAC 60Hz
 Rated Power: 13W
 Nominal CCT: 3000K
 Nominal Lumen Output: 800 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	2014-03-16	2015-03-16
Power Meter	SENSING	UI2008	908735	10.0-600.0V	2014-03-12	2015-03-12
Spectral photometer	SENSING	SPR3000	s0902024	350nm~800nm	2014-03-16	2015-03-16
AC Power Supply	ALL Power	APW-105N	970663	0V-300V 50-400Hz	2014-03-12	2015-03-12
Standard Light Source	EVERFINE	D204	01331191	N/A	2013-12-04	2014-12-04
Thermal Meter	SENSING	N/A	N/A	20~30°C	2014-03-13	2015-03-13
DC Power Supply	ITECH	IT6154	0061 0417 6471 0010 19	0~32V	2014-03-12	2015-03-12
AC Power Supply	EVERFINE	VPS1060 PWM	1101006	0-150V, 0-300V	2014-03-12	2015-03-12
DC Power Supply	EVERFINE	WY12010	1009009	30V/5A	2014-03-12	2015-03-12
Power Meter	YOKOGAWA	WT-210	91KB35700	15/30/60/150/300/600 V	2014-03-12	2015-03-12
Goniophotometer	EVERFINE	GO- R5000	YG108492N10120001	1600mm,3000W/10A	2014-03-04	2015-03-04
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.

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 $U=1.60\%$ ($K=2$), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is $U=21\text{K}$ ($K=2$), at the 95% confidence level. The uncertainty of the CRI is $U=1.3(K=2)$, 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	0.121	13.0	0.896

Photometric Measurement

Luminous Flux (lm)	Radiant Flux (W)	Efficacy (lm/W)	CCT (K)	Duv
823.363	2.172	63.336	2976	4.60E-04

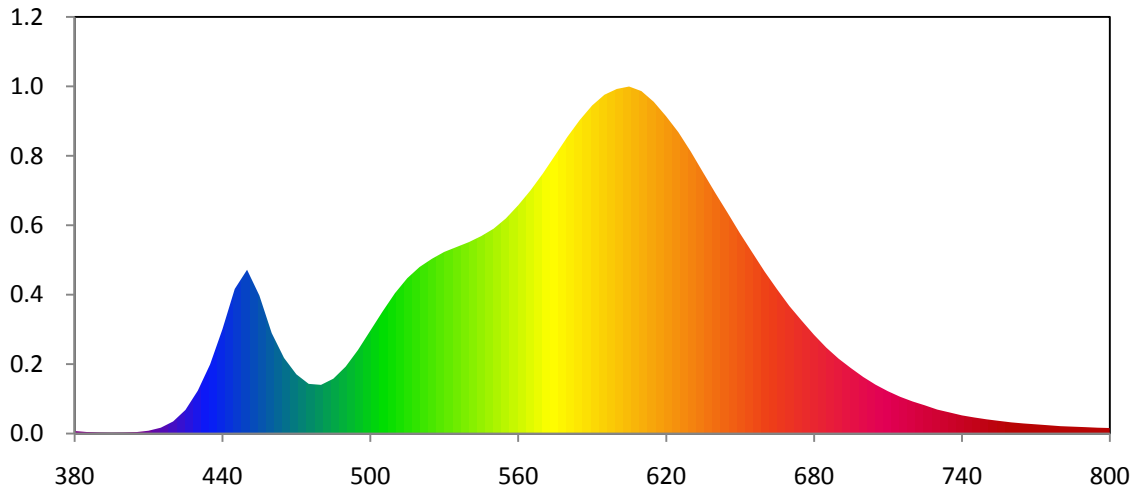
Chromaticity Coordinate

x	y	u	v	u'	v'
0.4394	0.4061	0.2513	0.3484	0.2513	0.5225

Color Rendering Index

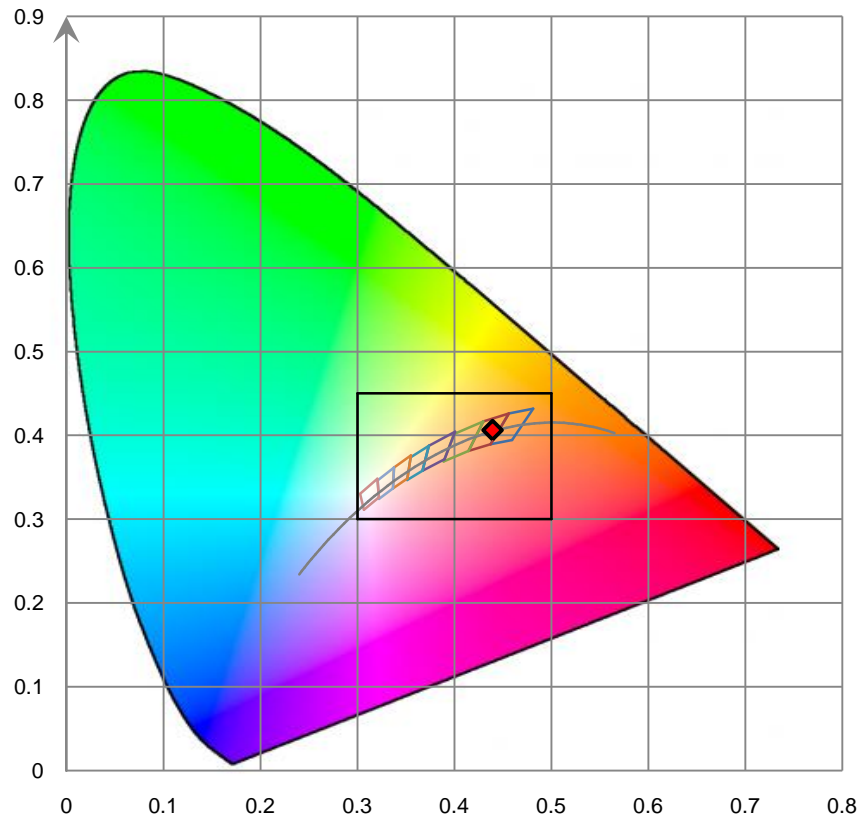
Ra			
82.5			
R1 81	R2 89	R3 97	R4 82
R5 81	R6 87	R7 83	R8 59
R9 5	R10 76	R11 82	R12 71
R13 84	R14 98	R15 73	

Relative Spectral Power Distribution

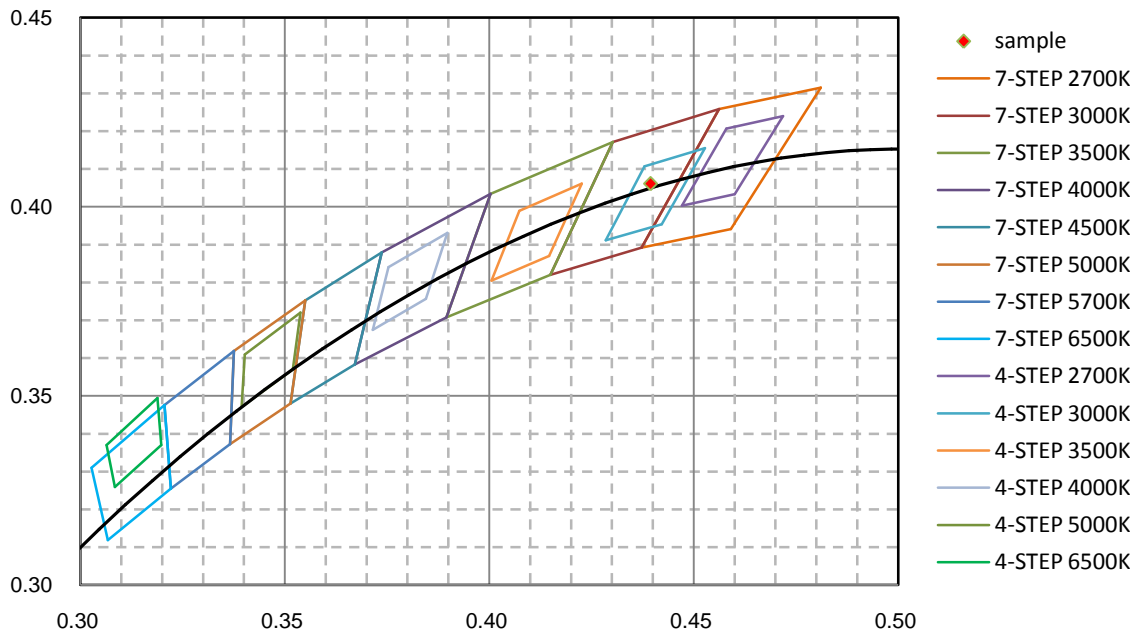


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	5.457E-04	465	1.596E-02	550	4.321E-02	635	5.509E-02	720	6.772E-03
385	3.290E-04	470	1.249E-02	555	4.538E-02	640	5.074E-02	725	5.955E-03
390	2.171E-04	475	1.048E-02	560	4.816E-02	645	4.653E-02	730	5.066E-03
395	1.739E-04	480	1.027E-02	565	5.129E-02	650	4.223E-02	735	4.456E-03
400	2.031E-04	485	1.157E-02	570	5.484E-02	655	3.818E-02	740	3.837E-03
405	3.091E-04	490	1.412E-02	575	5.872E-02	660	3.416E-02	745	3.401E-03
410	5.973E-04	495	1.763E-02	580	6.261E-02	665	3.046E-02	750	3.009E-03
415	1.240E-03	500	2.170E-02	585	6.615E-02	670	2.692E-02	755	2.682E-03
420	2.554E-03	505	2.577E-02	590	6.921E-02	675	2.383E-02	760	2.363E-03
425	4.988E-03	510	2.961E-02	595	7.147E-02	680	2.085E-02	765	2.132E-03
430	9.034E-03	515	3.278E-02	600	7.269E-02	685	1.814E-02	770	1.948E-03
435	1.460E-02	520	3.514E-02	605	7.320E-02	690	1.580E-02	775	1.756E-03
440	2.200E-02	525	3.687E-02	610	7.224E-02	695	1.381E-02	780	1.558E-03
445	3.051E-02	530	3.832E-02	615	6.998E-02	700	1.193E-02	785	1.462E-03
450	3.455E-02	535	3.935E-02	620	6.693E-02	705	1.031E-02	790	1.356E-03
455	2.912E-02	540	4.038E-02	625	6.356E-02	710	8.933E-03	795	1.242E-03
460	2.120E-02	545	4.166E-02	630	5.950E-02	715	7.755E-03	800	1.175E-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**

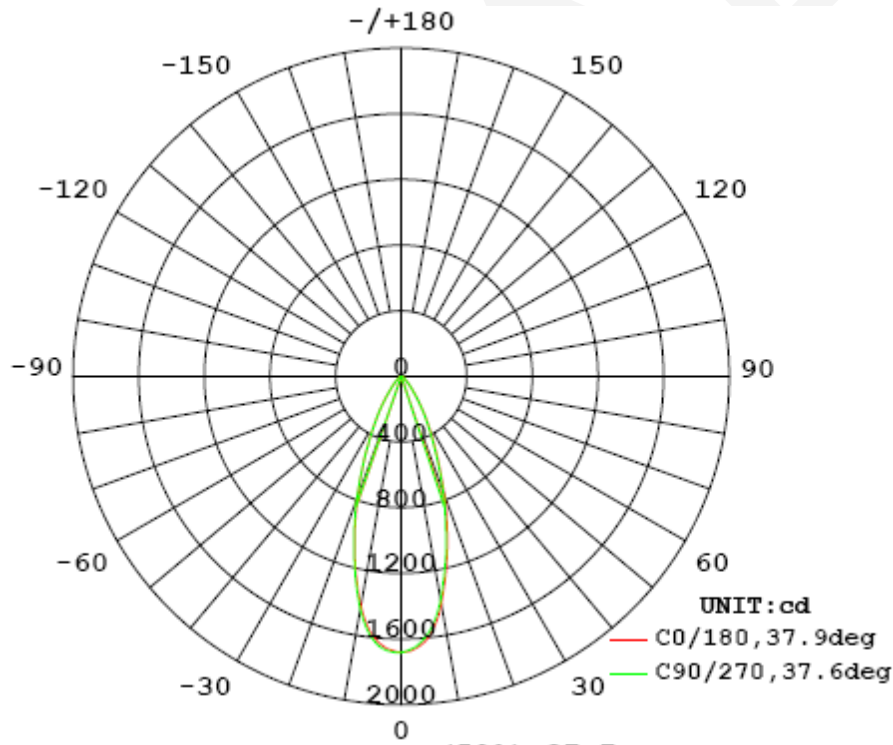
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60.0	0.1188	12.95	0.9082

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	CBCP (cd)	S/MH (C0/180)	S/MH (C90/270)
885.252	68.36	1680	0.62	0.62

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	37.9	37.5	37.6	38.0	37.9
Field Angle (10% I _{max}):	71.6	71.1	71.2	71.5	71.6

Luminous Intensity (cd) Distribution Data

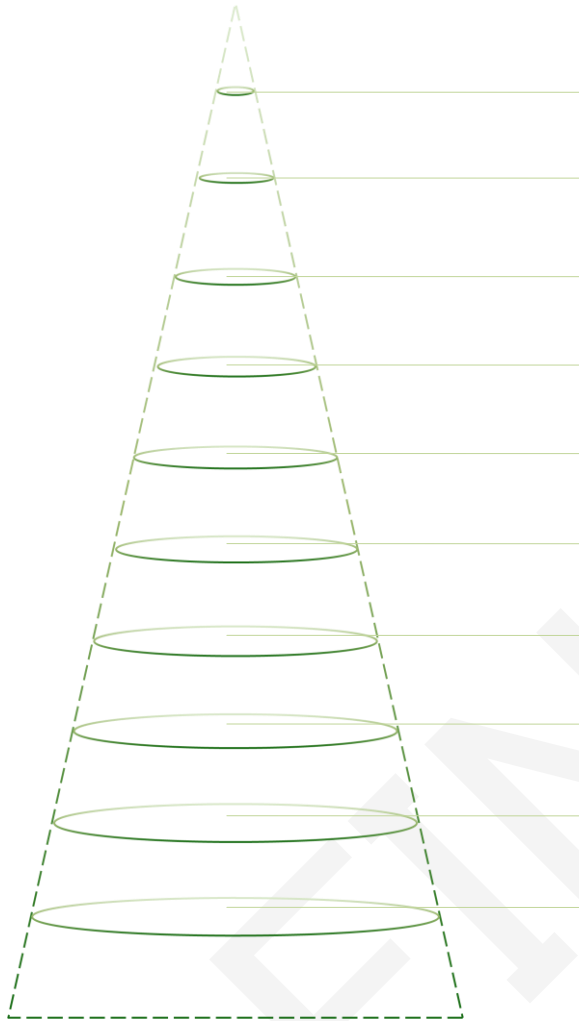
C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1680	1680	1680	1680	1680	1680	1680	1680
5.0°	1624	1628	1634	1638	1642	1643	1642	1642
10.0°	1422	1421	1433	1432	1442	1451	1444	1443
15.0°	1104	1097	1119	1112	1114	1139	1127	1129
20.0°	784	787	781	788	793	797	810	802
25.0°	512	512	511	510	511	518	531	529
30.0°	317	319	314	318	317	319	330	330
35.0°	183	183	176	182	182	183	191	193
40.0°	104	102	100	102	105	107	108	111
45.0°	60	59	59	62	62	64	65	66
50.0°	36	35	35	36	38	39	40	41
55.0°	23	23	23	23	24	26	26	26
60.0°	16	16	16	16	17	18	18	18
65.0°	11	11	11	11	11	12	12	12
70.0°	7	7	7	7	7	8	8	8
75.0°	4	4	4	4	4	4	4	4
80.0°	2	2	2	2	2	2	2	2
85.0°	0	1	0	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 y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	1680	1680	1680	1680	1680	1680	1680	1680
5.0°	1624	1616	1610	1606	1604	1603	1604	1608
10.0°	1407	1393	1390	1378	1381	1388	1382	1386
15.0°	1088	1065	1067	1051	1055	1070	1060	1077
20.0°	769	768	747	748	748	743	757	754
25.0°	499	495	484	479	480	475	483	489
30.0°	317	318	310	308	305	292	301	305
35.0°	186	187	181	182	178	168	176	176
40.0°	107	106	106	105	103	98	99	100
45.0°	63	63	61	61	60	58	59	58
50.0°	39	37	36	36	37	36	37	36
55.0°	25	24	23	23	23	24	24	23
60.0°	17	16	16	15	16	16	16	16
65.0°	11	11	11	11	11	11	11	11
70.0°	7	7	7	7	7	7	7	7
75.0°	4	4	4	4	4	4	4	4
80.0°	2	2	2	2	2	2	2	2
85.0°	1	1	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°	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: 37.75°. Flux out: 418.6 lm.



Height (m)	Diameter (cm)	E _{avg} (lx)	E _{max} (lx)
0.5	34.2	4495.0	6847.0
1.0	68.4	1124.0	1712.0
1.5	102.6	499.5	760.5
2.0	136.8	281.0	428.0
2.5	170.9	179.8	273.9
3.0	205.1	124.9	190.2
3.5	239.3	91.7	139.7
4.0	273.5	70.2	107.0
4.5	307.7	55.5	84.5
5.0	341.9	45.0	68.5

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	39.5	4.46
5-10	108.9	12.30
10-15	147.5	16.66
15-20	152.2	17.19
20-25	131.3	14.84
25-30	100.8	11.39
30-35	71.4	8.06
35-40	46.3	5.23
40-45	29.7	3.36
45-50	19.4	2.19
50-55	13.0	1.47
55-60	9.2	1.03
60-65	6.6	0.74
65-70	4.5	0.51
70-75	2.8	0.32
75-80	1.5	0.17
80-85	0.6	0.07
85-90	0.1	0.01
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	39.5	4.46
0-10	148.4	16.76
0-15	295.9	33.42
0-20	448.0	50.61
0-25	579.4	65.45
0-30	680.2	76.84
0-35	751.6	84.90
0-40	797.9	90.13
0-45	827.6	93.49
0-50	847.0	95.68
0-55	860.0	97.15
0-60	869.2	98.18
0-65	875.7	98.92
0-70	880.2	99.43
0-75	883.1	99.75
0-80	884.6	99.92
0-85	885.2	99.99
0-90	885.2	100.00
0-95	885.2	100.00
0-100	885.2	100.00
0-105	885.2	100.00
0-110	885.2	100.00
0-115	885.2	100.00
0-120	885.2	100.00
0-125	885.2	100.00
0-130	885.2	100.00
0-135	885.2	100.00
0-140	885.2	100.00
0-145	885.2	100.00
0-150	885.2	100.00
0-155	885.2	100.00
0-160	885.2	100.00
0-165	885.2	100.00
0-170	885.3	100.00
0-175	885.3	100.00
0-180	885.3	100.00

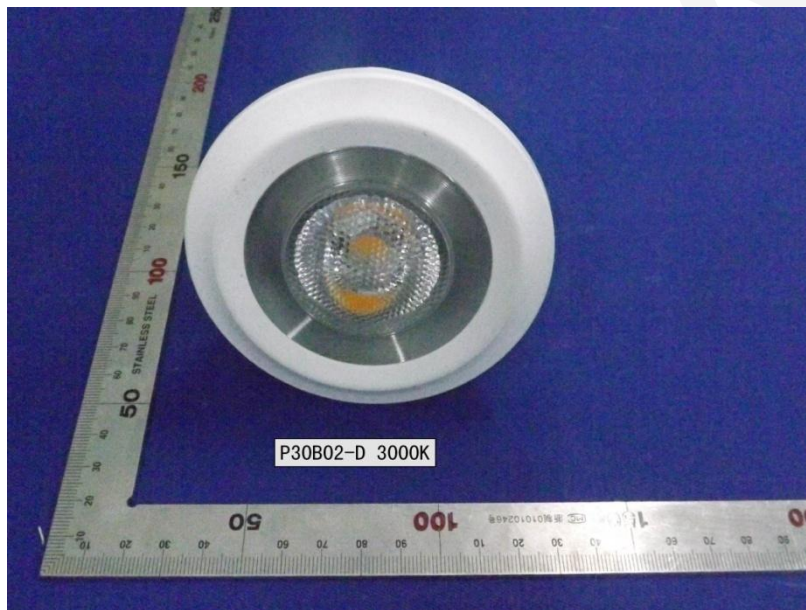
Color Spatial Uniformity

Average Weighted
u': 0.2492, v': 0.5213

$\gamma \setminus C0-180$	u'	v'	$Du'v'$	$\gamma \setminus C90-270$	u'	v'	$Du'v'$
-20	0.2502	0.5223	0.0014	-20	0.2496	0.5217	0.0005
-15	0.2498	0.5220	0.0009	-15	0.2495	0.5217	0.0004
-10	0.2496	0.5218	0.0006	-10	0.2492	0.5216	0.0002
-5	0.2493	0.5217	0.0003	-5	0.2490	0.5213	0.0002
0	0.2492	0.5216	0.0002	0	0.2492	0.5215	0.0001
5	0.2489	0.5211	0.0004	5	0.2491	0.5211	0.0003
10	0.2486	0.5208	0.0008	10	0.2489	0.5208	0.0006
15	0.2487	0.5209	0.0007	15	0.2493	0.5210	0.0004
20	0.2488	0.5209	0.0006	20	0.2490	0.5210	0.0004

FINAL

6. Product Photo



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