

IES LM-79-08

MEASUREMENT AND TEST REPORT

Test Model: P30A02-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:	R2XM140901061-10A1
Test Date:	2014-09-02 to 2014-09-10
Report Date:	2014-09-26
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.
Accreditation:	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 2014-09-01. One was tested in integrating sphere and the other was tested in goniophotometer.

Model Tested: P30A02-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: 120V AC 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	201311	N/A	2013-09-26	2014-09-26
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	0.116	12.9	0.930

Photometric Measurement

Luminous Flux (lm)	Radiant Flux (W)	Efficacy (lm/W)	CCT (K)	Duv
845.469	2.344	65.54	2979	8.10E-04

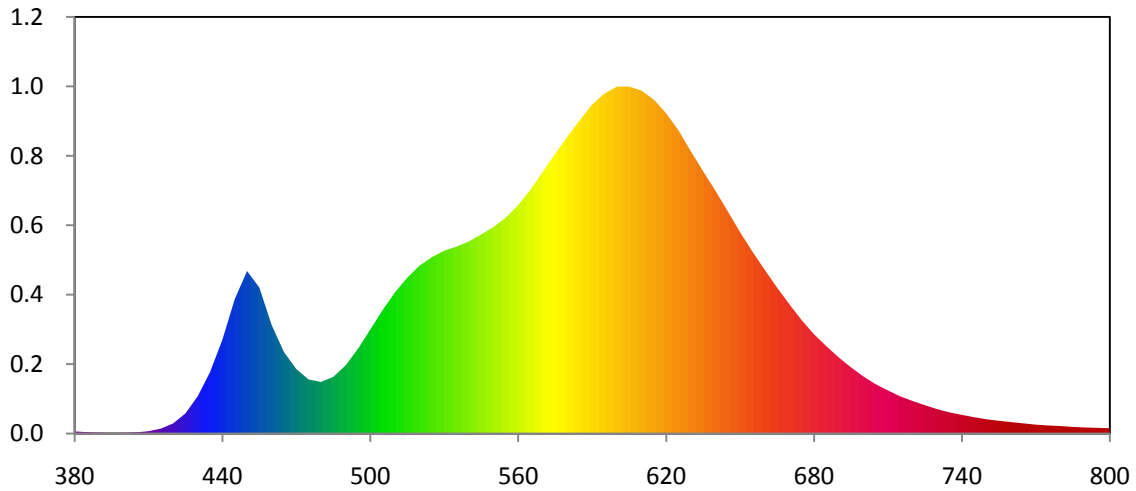
Chromaticity Coordinate

x	y	u	v	u'	v'
0.4397	0.4071	0.2510	0.3487	0.251	0.523

Color Rendering Index

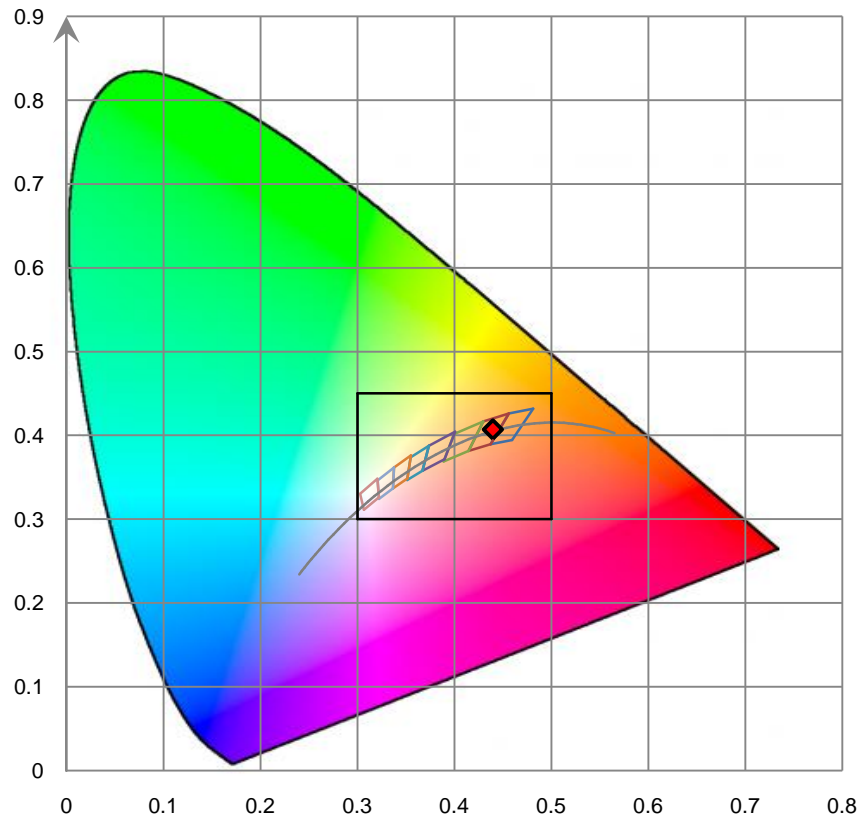
Ra			
82.8			
R1 81	R2 90	R3 97	R4 82
R5 81	R6 88	R7 84	R8 59
R9 6	R10 77	R11 83	R12 71
R13 84	R14 99	R15 73	

Relative Spectral Power Distribution

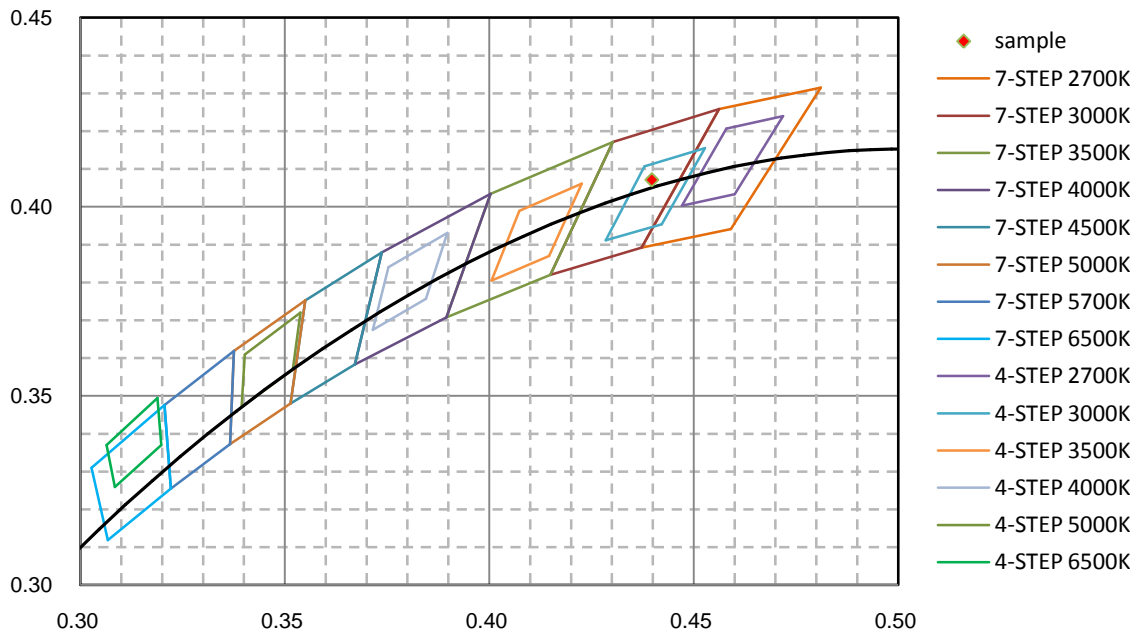


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	5.000E-04	465	1.846E-02	550	4.684E-02	635	5.951E-02	720	7.391E-03
385	3.153E-04	470	1.461E-02	555	4.898E-02	640	5.509E-02	725	6.435E-03
390	1.996E-04	475	1.225E-02	560	5.182E-02	645	5.043E-02	730	5.539E-03
395	1.545E-04	480	1.172E-02	565	5.531E-02	650	4.570E-02	735	4.806E-03
400	1.770E-04	485	1.287E-02	570	5.934E-02	655	4.128E-02	740	4.240E-03
405	2.742E-04	490	1.548E-02	575	6.346E-02	660	3.714E-02	745	3.711E-03
410	5.326E-04	495	1.923E-02	580	6.735E-02	665	3.313E-02	750	3.243E-03
415	1.124E-03	500	2.360E-02	585	7.108E-02	670	2.935E-02	755	2.899E-03
420	2.304E-03	505	2.799E-02	590	7.461E-02	675	2.573E-02	760	2.605E-03
425	4.575E-03	510	3.201E-02	595	7.709E-02	680	2.254E-02	765	2.310E-03
430	8.475E-03	515	3.536E-02	600	7.865E-02	685	1.984E-02	770	2.025E-03
435	1.397E-02	520	3.809E-02	605	7.870E-02	690	1.729E-02	775	1.836E-03
440	2.131E-02	525	4.002E-02	610	7.778E-02	695	1.503E-02	780	1.708E-03
445	3.049E-02	530	4.146E-02	615	7.574E-02	700	1.298E-02	785	1.513E-03
450	3.685E-02	535	4.240E-02	620	7.266E-02	705	1.121E-02	790	1.374E-03
455	3.310E-02	540	4.355E-02	625	6.879E-02	710	9.781E-03	795	1.298E-03
460	2.459E-02	545	4.515E-02	630	6.407E-02	715	8.430E-03	800	1.213E-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**

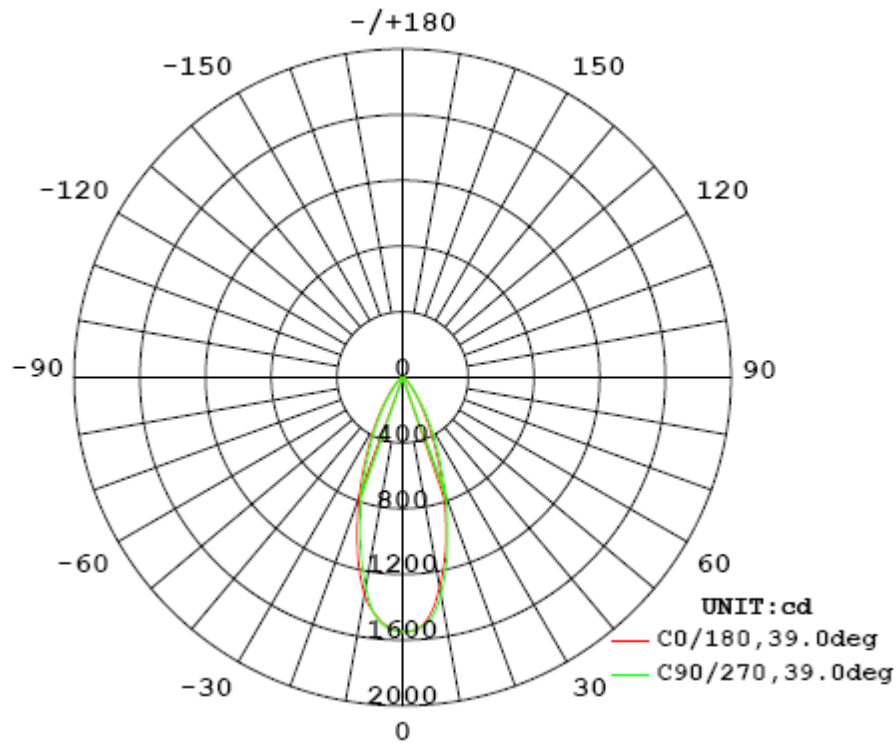
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.1	60.0	0.1122	12.62	0.9368

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	CBCP (cd)	S/MH (C0/180)	S/MH (C90/270)
861.887	68.30	1548	0.65	0.62

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	39.0	39.2	39.0	38.7	38.98
Field Angle (10% I _{max}):	73.2	73.7	73.4	73.4	73.43

Luminous Intensity (cd) Distribution Data

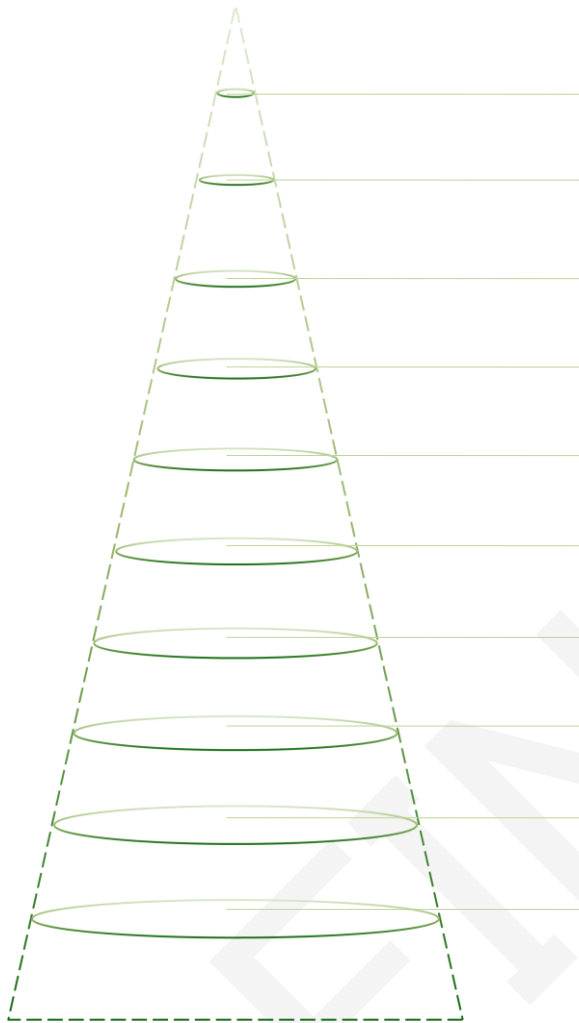
C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1548	1548	1548	1548	1548	1548	1548	1548
5.0°	1495	1494	1499	1500	1503	1509	1513	1517
10.0°	1342	1321	1312	1315	1299	1308	1310	1306
15.0°	1071	1045	1031	1026	1003	1014	1016	1010
20.0°	777	766	754	735	726	715	715	725
25.0°	524	524	509	488	477	473	475	475
30.0°	337	333	324	311	306	298	300	301
35.0°	205	202	195	182	178	170	171	175
40.0°	120	116	111	106	99	96	96	97
45.0°	71	68	64	60	58	56	57	58
50.0°	42	41	38	35	34	33	33	34
55.0°	26	26	25	23	22	22	22	22
60.0°	18	18	17	16	15	15	15	15
65.0°	12	12	12	11	11	10	10	11
70.0°	8	8	8	7	7	7	7	7
75.0°	5	5	4	4	4	4	4	4
80.0°	2	2	2	2	2	2	2	2
85.0°	1	1	1	1	1	1	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

Luminous Intensity (cd) Distribution Data (cont.)

C y	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	1548	1548	1548	1548	1548	1548	1548	1548
5.0°	1506	1506	1510	1516	1516	1510	1499	1487
10.0°	1299	1308	1316	1342	1344	1339	1327	1317
15.0°	1023	1041	1037	1066	1054	1057	1046	1032
20.0°	717	741	752	757	771	763	759	756
25.0°	467	490	499	506	512	515	519	505
30.0°	291	307	319	324	339	334	332	330
35.0°	167	180	187	189	200	203	206	202
40.0°	97	101	105	110	113	118	119	114
45.0°	56	59	63	64	66	68	69	67
50.0°	34	36	39	38	40	40	39	41
55.0°	23	24	25	24	25	25	24	25
60.0°	16	16	17	17	17	17	16	17
65.0°	11	11	11	11	12	11	12	12
70.0°	7	7	7	7	7	8	8	8
75.0°	4	4	4	4	4	5	5	5
80.0°	2	2	2	2	2	2	2	2
85.0°	0	0	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: 38.98°. Flux out: 422.1 lm.



Height (m)	Diameter (cm)	E _{avg} (lx)	E _{max} (lx)
0.5	35.4	4057.0	6323.0
1.0	70.8	1014.0	1581.0
1.5	106.2	450.8	702.6
2.0	141.6	253.6	395.2
2.5	177.0	162.3	252.9
3.0	212.4	112.7	175.6
3.5	247.7	82.8	129.0
4.0	283.1	63.4	98.8
4.5	318.5	50.1	78.1
5.0	353.9	40.6	63.2

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	36.5	4.24
5-10	101.2	11.74
10-15	139.0	16.13
15-20	145.4	16.87
20-25	128.6	14.91
25-30	101.2	11.74
30-35	73.1	8.48
35-40	47.9	5.55
40-45	30.6	3.55
45-50	19.7	2.28
50-55	13.0	1.51
55-60	9.2	1.06
60-65	6.6	0.77
65-70	4.6	0.54
70-75	3.0	0.34
75-80	1.6	0.19
80-85	0.7	0.08
85-90	0.1	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	36.5	4.24
0-10	137.8	15.98
0-15	276.7	32.11
0-20	422.1	48.98
0-25	550.7	63.89
0-30	651.9	75.63
0-35	724.9	84.11
0-40	772.8	89.66
0-45	803.3	93.21
0-50	823.0	95.49
0-55	836.0	97.00
0-60	845.2	98.06
0-65	851.8	98.83
0-70	856.4	99.37
0-75	859.4	99.71
0-80	861.1	99.90
0-85	861.8	99.98
0-90	861.9	100.00
0-95	861.9	100.00
0-100	861.9	100.00
0-105	861.9	100.00
0-110	861.9	100.00
0-115	861.9	100.00
0-120	861.9	100.00
0-125	861.9	100.00
0-130	861.9	100.00
0-135	861.9	100.00
0-140	861.9	100.00
0-145	861.9	100.00
0-150	861.9	100.00
0-155	861.9	100.00
0-160	861.9	100.00
0-165	861.9	100.00
0-170	861.9	100.00
0-175	861.9	100.00
0-180	861.9	100.00

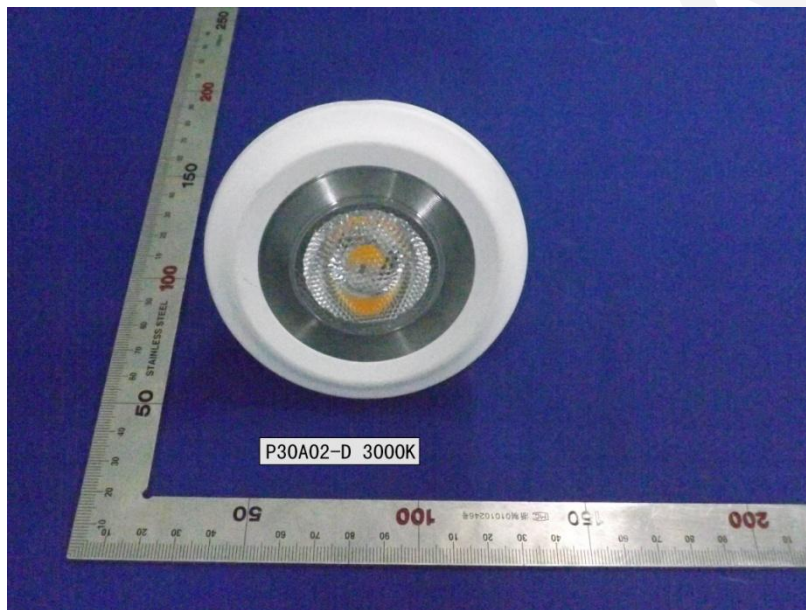
Color Spatial Uniformity

Average Weighted
u': 0.2494, v': 0.5213

$\gamma \setminus C0-180$	u'	v'	$Du'v'$	$\gamma \setminus C90-270$	u'	v'	$Du'v'$
-20	0.249	0.5205	0.0009	-20	0.2502	0.5223	0.0013
-15	0.2489	0.5205	0.0009	-15	0.2498	0.5215	0.0004
-10	0.2486	0.5204	0.0012	-10	0.2496	0.5215	0.0003
-5	0.2488	0.5206	0.0009	-5	0.2493	0.5213	0.0001
0	0.2493	0.5215	0.0002	0	0.2494	0.5214	0.0001
5	0.2494	0.5213	0.0001	5	0.2493	0.5213	0.0001
10	0.2496	0.5213	0.0002	10	0.2491	0.5211	0.0003
15	0.2500	0.5219	0.0009	15	0.2493	0.5214	0.0002
20	0.2502	0.5220	0.0011	20	0.2488	0.5211	0.0006

FINAL

6. Product Photo



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