

LM-79-08 Test Report

For

IKIO LED LIGHTING**(Brand Name: IKIO)**

8470 Allison Pointe Blvd, Suite 128 Indianapolis, IN 46250

Internal Driver/Line Voltage Lamp-Style Retrofit Kits**(UL Type B)**

Model name(s): IK-T504-0024-DN-2630B

Representative (Tested) Model: IK-T504-0024-DN-2630B

IK-T504-0024-DN-5000B

Model Difference: All construction and rating are the same, except CCT

Test & Report By:

Biao Zhong

Engineer: Biao Zhong

Date: Apr. 04, 2018

Review By:

Univ Xie

Manager: Univ Xie

Note: 1. The results contained in this report pertain only to the tested samples.

2. This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Laboratory: Standard-Tech Co., Ltd Testing Center**NVLAP CODE: 201011-0**

Report Format Number STD/QR4909-A/2

Address: Standard-Tech Building, No.6 Guanhong Road, Guangzhou Science City, Guangzhou 510663, China

Tel: 8620-3229 0320

Fax: 8620-32290422

<http://www.standard-tech.com>

1.1 Product Information:

Organization Name	IKIO LED LIGHTING	
Brand Name	IKIO	
Model Number	IK-T504-0024-DN-2630B	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	Internal Driver/Line Voltage Lamp-Style Retrofit Kits (UL Type B)	
Rated Voltage / Frequency	100 ~ 277 Vac, 50/60 Hz	
Nominal Power	24W	
Rated Initial Lamp Lumen	--	
Declared CCT	2700K, 3000K, 3500K, 4000K, 4500K, 5000K	
LED Manufacturer	IKIO LED LIGHTING	
LED Model	LC-2835AWW1-S-R80-A-34D LC-2835AAW1-S-R80-A-34D	
Sample Number	GZE1712024-D1, D2(2700K), D3(5000K)	
Lamp Length	1200	mm
Lamp Width	--	mm
Number of Units (modular products)	N/A	s

Photo

1.2 Test Specifications:

Date of Receipt	Mar.20,2018
Date of Test	Mar.24,2018
Test item	<ol style="list-style-type: none"> 1. Total Luminous Flux 2. Luminous Distribution Intensity 3. Luminous Efficacy 4. Correlated Color Temperature 5. Color Rendering Index 6. Chromaticity Coordinate 7. Electrical Parameters
Reference Standard	<ol style="list-style-type: none"> 1. IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products 2. ANSI C78.377-2008 Specifications for the Chromaticity of Solid State Lighting Products 3. CIE 13.3-1995 Method of Measuring and Specifying Colour Rendering Properties of Light Sources 4. CIE 15-2004 Technical Report Colorimetry 5. IESNA LM-16-93 Practical Guide to Colorimetry of Light Source 6. IESNA TM-16-05 Technical Memorandum on Light Emitting Diode (LED) Sources and Systems
Reference Work Instruction	QD25

1.3 Test Methods**1) Photometric and Light Distribution Measurement – Goniophotometer Method:**

Photometric parameters were measured using the goniophotometer and software. The ambient temperature shall be maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$, measured at a point not more than 1 m from the sample and at the same height as the sample. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 1° vertical intervals and 22.5° horizontal intervals.

2) Chromaticity Measurement – Sphere-Spectroradiometer Method:

Chromaticity parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral power distribution taken at 5 nm intervals over the range of 380 to 780 nm.

3) Electrical Measurements:

Electrical parameters were measured using power meters incorporated in goniophotometer or sphere-spectroradiometer system. The ambient temperature surrounding the sample was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Voltage, frequency, current, power, power factor and total harmonic distortion were measured by and read from the power meter.

2.1 Electrical, Photometric and Chromaticity Measurements
(Refer to Work Instruction QD25)

Test date	2018-03-24	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-T504-0024-DN-2630B		

Electrical Measurement for Bare-lamp:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE171202	120.0	60	0.1999	23.29	0.9709	22.45
4-D1	277.0	60	0.0997	24.25	0.8783	15.48
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

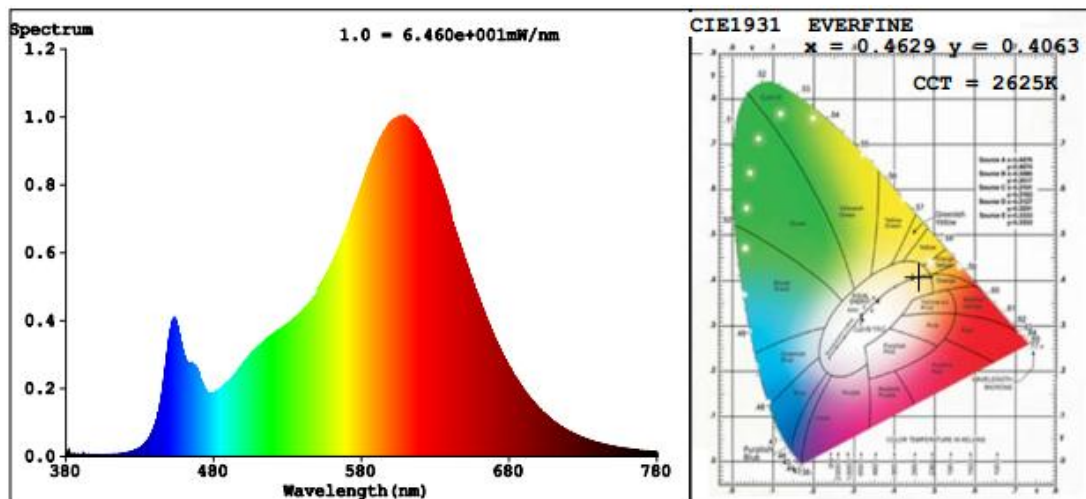
Chromaticity Measurement for Bare-lamp - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	82	R9	5
Frequency (Hz)	60	R2	95	R10	89
CCT (K)	2625	R3	90	R11	80
Duv	-0.0018	R4	79	R12	81
Chromaticity (x, y)	x=0.4629 y=0.4063	R5	83	R13	86
Chromaticity (u', v')	u'=0.2664 v'=0.5261	R6	95	R14	95
Color Rendering Index (CRI)	82.0	R7	78	R15	73
R9	5	R8	54	--	--

Photometric Measurement for Bare-lamp –Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.3 Pass Criteria
Test Voltage (V)	120.0	277.0	--
Frequency (Hz)	60	60	
Total Luminous (lm)	3306	3382	Bare Lamp: 1600(-10%)
Luminous Efficacy (lm/W)	141.95	139.46	Bare lamp: >= 110(-3%)
Most Worst Luminous/Highest Watts	136.33		

Spectral Power Distribution & Chromaticity Diagram



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2.2 Electrical, Photometric and Chromaticity Measurements
(Refer to Work Instruction QD25)

Test date	2018-03-24	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-T504-0024-DN-2630B		

Electrical Measurement for 2-lamp in Lithonia 2PM3N 12 cell 2x4 parabolic:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE171202	120.0	60	0.4006	46.69	0.9712	22.84
4-D1,D2	277.0	60	0.1960	47.71	0.8787	15.74
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

**Chromaticity Measurement for 2-lamp in Lithonia 2PM3N 12 cell 2x4 parabolic
- Sphere-Spectroradiometer Method:**

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	3
Frequency (Hz)	60	R2	95	R10	89
CCT (K)	2598	R3	90	R11	79
Duv	-0.0023	R4	78	R12	81
Chromaticity (x, y)	x=0.4643 y=0.4052	R5	83	R13	85
Chromaticity (u', v')	u'=0.2678 v'=0.5259	R6	95	R14	95
Color Rendering Index (CRI)	81.4	R7	77	R15	73
R9	3	R8	53	--	--

**Photometric Measurement 2-lamp in Lithonia 2PM3N 12 cell 2x4 parabolic –
Goniophotometer Method:**

Parameter	Result		DLC V4.3 Pass Criteria
Test Voltage (V)	120.0	277.0	--
Frequency (Hz)	60	60	
Total Luminous (lm)	5761.8	5788.7	In luminaire (2 lamps): 3000(-10%)
Luminous Efficacy (lm/W)	123.41	121.33	In luminaire: >= 100(-3%)
Most Worst Luminous/Highest Watts	120.77		
Zonal lumens in the 0-60 °zone (%)	91.4	--	>= 75(-3)
SC: 0-180 °(if applicable)	1.35	--	1.0-2.0(±0.1)
SC: 90-270 °(if applicable)	1.20	--	1.0-2.0(±0.1)
Beam Angle (°)	102.5	--	--
Center Beam Candle Power (cd)	2448	--	--

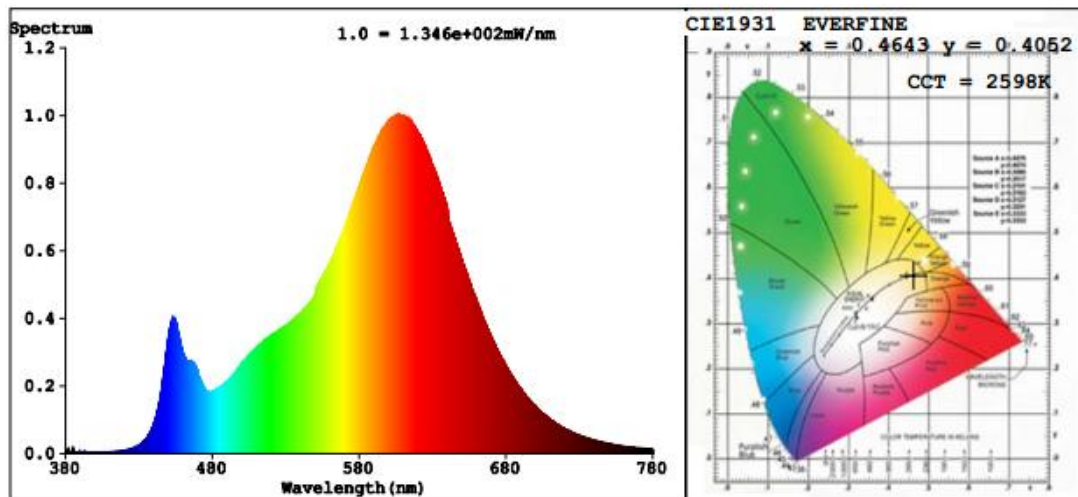
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Spectral Power Distribution & Chromaticity Diagram



Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,896.3	32.9%
0-40	3,105.3	53.9%
0-60	5,264.6	91.4%
60-90	487.0	8.5%
70-100	132.1	2.3%
90-120	3.9	0.1%
0-90	5,751.6	99.8%
90-180	9.4	0.2%
0-180	5,761.0	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	232.4	4.0%	90-100	0.8	0%
10-20	662.8	11.5%	100-110	1.4	0%
20-30	1,001.1	17.4%	110-120	1.7	0%
30-40	1,209.1	21.0%	120-130	1.5	0%
40-50	1,247.1	21.6%	130-140	1.3	0%
50-60	912.2	15.8%	140-150	1.0	0%
60-70	355.7	6.2%	150-160	0.8	0%
70-80	111.7	1.9%	160-170	0.5	0%
80-90	19.6	0.3%	170-180	0.2	0%

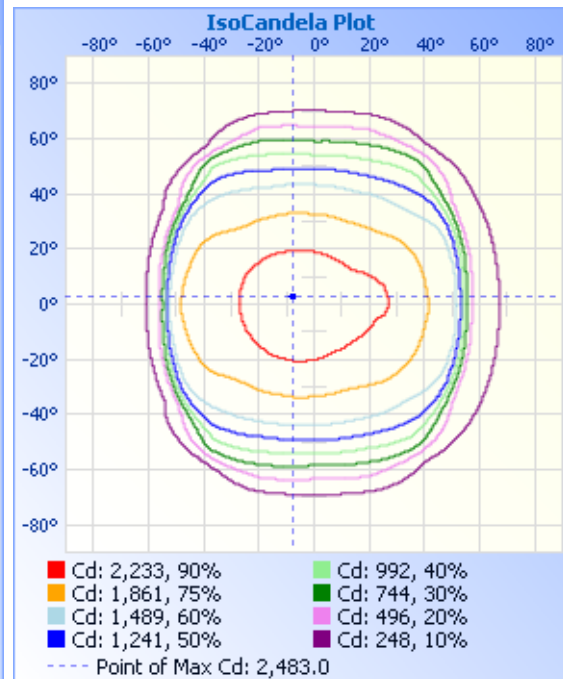
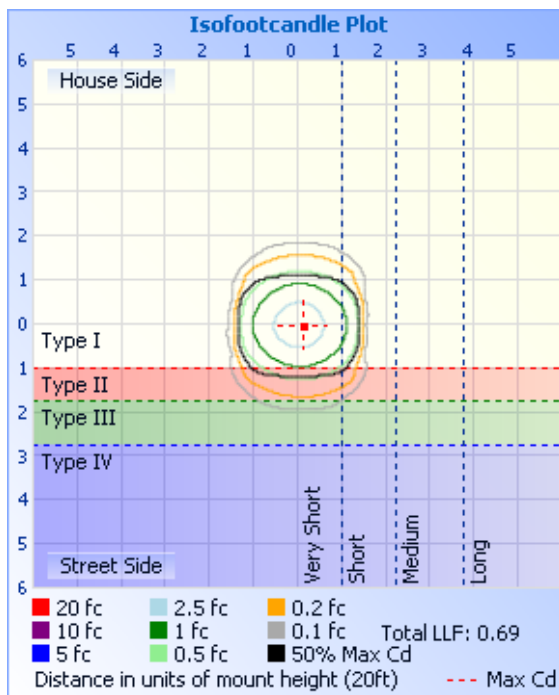
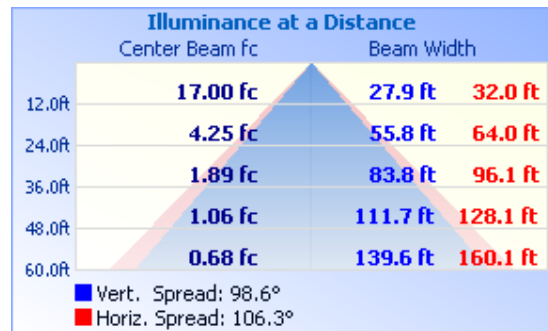
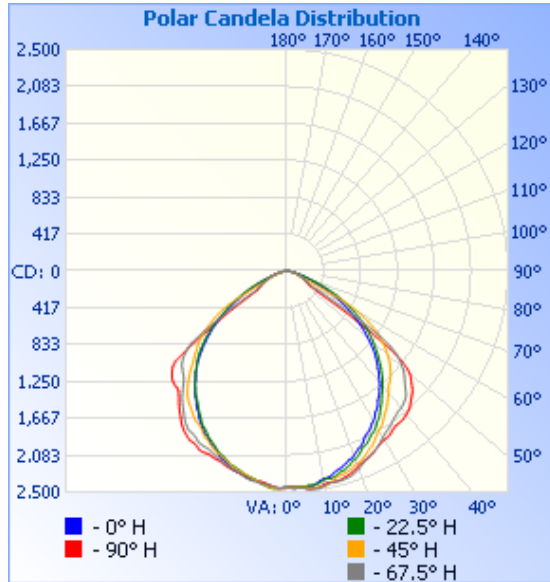
Photometric Data


Table--1

UNIT: cd

C (DEG) γ (DEG)	0	23	45	68	90	113	135	158	180	203	225	248	270	293	315	338	
0	2448	2448	2448	2448	2448	2448	2448	2448	2448	2448	2448	2448	2448	2448	2448	2448	
5	2420	2444	2442	2450	2447	2441	2453	2468	2466	2461	2455	2435	2439	2451	2447	2428	
10	2387	2414	2392	2381	2385	2398	2469	2465	2445	2454	2433	2382	2386	2366	2369	2399	
15	2331	2356	2309	2289	2312	2349	2384	2444	2430	2418	2365	2345	2327	2291	2305	2323	
20	2276	2299	2191	2192	2217	2262	2318	2380	2352	2345	2327	2266	2225	2199	2209	2251	
25	2258	2223	2092	2081	2078	2148	2213	2276	2284	2249	2208	2145	2088	2087	2116	2193	
30	2204	2160	1975	1929	1957	2020	2079	2169	2204	2146	2067	2020	1964	1941	1998	2126	
35	2084	2056	1852	1761	1789	1859	1943	2080	2140	2078	1940	1848	1788	1774	1892	2023	
40	1900	1857	1732	1599	1634	1682	1791	2017	2106	2002	1765	1677	1608	1613	1750	1842	
45	1805	1674	1510	1421	1436	1495	1660	1900	1999	1864	1615	1476	1411	1432	1523	1657	
50	1686	1559	1306	1229	1213	1286	1491	1712	1821	1684	1429	1248	1182	1212	1320	1533	
55	750	1094	1106	1001	969	1079	1272	1286	803	1264	1191	1008	914	944	1088	913	
60	351	346	831	756	718	823	953	284	265	268	865	731	636	692	763	340	
65	279	261	335	512	483	564	253	205	203	196	239	455	397	431	244	259	
70	201	185	167	271	270	289	148	142	147	135	126	205	197	206	156	182	
75	128	114	94.7	119	134	122	83.6	89.8	94.2	83.6	70.5	87.8	97.9	92.4	87.0	111	
80	61.6	54.8	45.7	51.7	56.7	50.9	41.3	44.6	48.7	41.5	34.8	39.1	43.3	41.7	41.6	53.4	
85	20.8	18.2	15.3	15.6	16.7	15.7	14.5	15.6	17.7	14.4	11.8	12.2	13.0	12.4	13.7	17.8	
90	0.74	0.75	0.69	0.95	0.95	1.05	0.69	0.85	0.89	0.73	0.52	0.89	0.73	0.94	0.53	0.72	
95	0.37	0.32	0.63	0.73	0.73	0.84	0.42	0.42	0.53	0.37	0.84	1.10	0.84	1.26	0.68	0.16	
100	0.37	0.32	0.89	0.94	0.94	1.15	0.63	0.42	0.53	0.54	1.37	1.56	1.31	1.72	1.21	0.38	
105	0.68	0.96	1.52	1.41	1.78	1.36	1.84	0.69	0.96	1.22	2.15	1.51	1.46	1.62	1.73	1.06	
110	1.37	1.70	1.89	1.56	1.67	1.62	1.73	1.64	1.74	1.65	2.62	1.30	1.46	1.57	1.73	1.58	
115	1.79	1.97	1.94	1.36	1.52	1.36	1.79	1.64	2.00	1.86	3.04	0.94	1.41	1.15	1.73	1.90	
120	2.05	2.29	1.94	0.94	1.15	0.78	1.79	2.11	2.00	2.07	3.41	0.94	1.20	0.99	1.68	1.80	
125	2.16	2.39	1.94	0.94	1.10	0.89	1.79	2.27	2.00	2.08	3.36	0.94	1.20	1.05	1.63	1.80	
130	2.27	2.45	1.83	0.94	1.15	0.84	1.79	2.16	2.06	2.18	2.83	1.20	1.31	1.31	1.58	1.80	
135	2.16	2.55	1.68	1.15	1.46	0.94	1.73	2.32	2.06	2.07	2.62	1.36	1.47	1.36	1.36	1.80	
140	2.16	2.40	1.36	1.30	1.52	1.20	1.37	2.17	2.06	1.81	1.73	1.46	1.67	1.62	1.21	1.69	
145	2.16	2.13	1.26	1.36	1.57	1.31	1.10	2.11	2.00	1.81	1.36	1.77	1.83	1.83	1.37	1.58	
150	2.11	1.92	1.31	1.62	1.67	1.41	1.10	1.80	1.95	1.81	1.47	1.88	1.99	2.04	1.74	1.48	
155	2.06	1.86	1.57	1.67	1.67	1.67	1.10	1.79	1.95	1.81	1.52	1.93	2.14	2.14	1.94	1.48	
160	2.06	1.60	1.62	1.77	1.78	1.72	1.21	1.79	2.00	1.91	1.57	1.93	2.20	2.35	2.15	1.64	
165	2.06	1.49	1.68	1.88	1.94	1.78	1.57	1.64	2.06	2.02	1.68	1.93	2.41	2.56	2.26	1.74	
170	1.90	1.54	1.78	2.08	2.40	2.19	1.84	1.74	2.11	1.97	1.62	2.09	2.51	2.51	2.21	1.85	
175	1.90	1.60	1.89	2.24	2.40	2.40	1.84	1.80	1.90	1.92	1.62	1.93	2.30	2.30	2.00	1.74	
180	1.90	1.60	1.89	2.14	2.35	2.19	1.94	1.58	1.95	1.92	1.57	1.93	2.25	2.30	2.10	1.85	

2.3 Electrical, Photometric and Chromaticity Measurements*(Refer to Work Instruction QD25)*

Test date	2018-03-24	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-T504-0024-DN-5000B		

Electrical Measurement for Bare-lamp:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE171202	120.0	60	0.2045	23.81	0.9701	22.87
4-D3	277.0	60	0.1026	24.93	0.8774	15.78
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

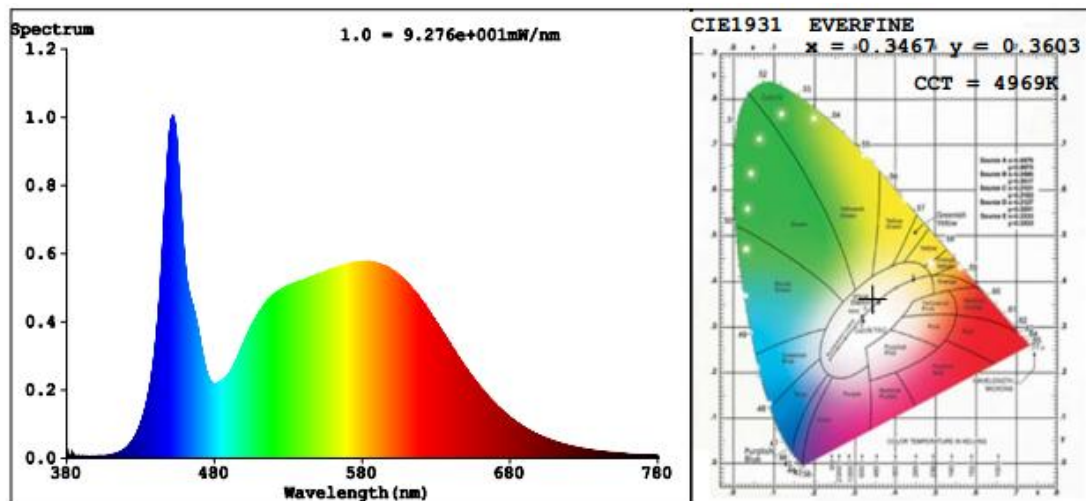
Chromaticity Measurement for Bare-lamp - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	80	R9	5
Frequency (Hz)	60	R2	88	R10	71
CCT (K)	4969	R3	93	R11	79
Duv	0.0037	R4	81	R12	53
Chromaticity (x, y)	x=0.3467 y=0.3603	R5	80	R13	82
Chromaticity (u', v')	u'=0.2092 v'=0.4891	R6	82	R14	96
Color Rendering Index (CRI)	82.3	R7	88	R15	74
R9	5	R8	67	--	--

Photometric Measurement for Bare-lamp –Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.3Pass Criteria
Test Voltage (V)	120.0	277.0	--
Frequency (Hz)	60	60	
Total Luminous (lm)	3876	3965	Bare Lamp: 1600(-10%)
Luminous Efficacy (lm/W)	162.79	159.05	Bare lamp: >= 110(-3%)
Most Worst Luminous/Highest Watts	155.48		

Spectral Power Distribution & Chromaticity Diagram



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2.3 Performance Assessment:

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
IK-T504-0024-DN-2630B	2700K	3306	23.29	141.95
IK-T504-L160-0024-DN-30-B	3000K	3420 ^{*1}	23.55 ^{*2}	145.22 ^{*3}
IK-T504-L160-0024-DN-35-B	3500K	3534 ^{*1}	23.55 ^{*2}	150.06 ^{*3}
IK-T504-L160-0024-DN-40-B	4000K	3648 ^{*1}	23.55 ^{*2}	154.90 ^{*3}
IK-T504-L160-0024-DN-45-B	4500K	3762 ^{*1}	23.55 ^{*2}	159.75 ^{*3}
IK-T504-0024-DN-5000B	5000K	3876	23.81	162.79

*1: This value is calculated and the calculation formula is as below:

$$3420 = (3876 - 3306) / 5 * 1 + 3306$$

$$3534 = (3876 - 3306) / 5 * 2 + 3306$$

$$3648 = (3876 - 3306) / 5 * 3 + 3306$$

$$3762 = (3876 - 3306) / 5 * 4 + 3306$$

*2: This value is calculated and the calculation formula is as below:

$$23.55 = (23.29 + 23.81) / 2$$

*3: This value is calculated and the calculation formula is as below:

$$145.22 = 3420 / 23.55$$

$$150.06 = 3534 / 23.55$$

$$154.90 = 3648 / 23.55$$

$$159.75 = 3762 / 23.55$$

3. Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-331	2 meter Integrating Sphere	2017-07-01	2018-06-30
ST-R-327	Spectral analysis system HAAS-2000	2017-07-01	2018-06-30
D204	Standard Lamp	2017-07-12	2018-07-11
PF2010	Power Meter for Integrating Sphere	2017-07-01	2018-06-30
GO-R5000	Goniophotometer system	2017-07-01	2018-06-30
D908S	Standard Lamp	2017-07-12	2018-07-11
PF210	Power Meter for Goniophotometer	2017-07-07	2018-07-06
Expand Uncertainty: Photometric Measurement (Sphere):2.04%, k=2 Chromaticity Measurement(Sphere):28.8K, k=2 Photometric Measurement(Goniophotometer):2.36%, k=2			

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