

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

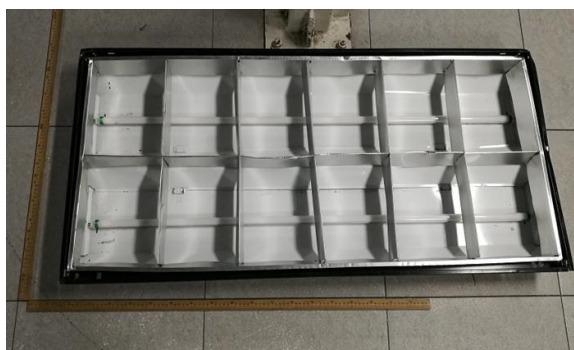
Tel: 8620-3229 0320

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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-C1, C2(2700K), C3(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 4-C1	120.0	60	0.2006	23.40	0.9723	22.79
	277.0	60	0.0985	24.02	0.8801	16.82
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

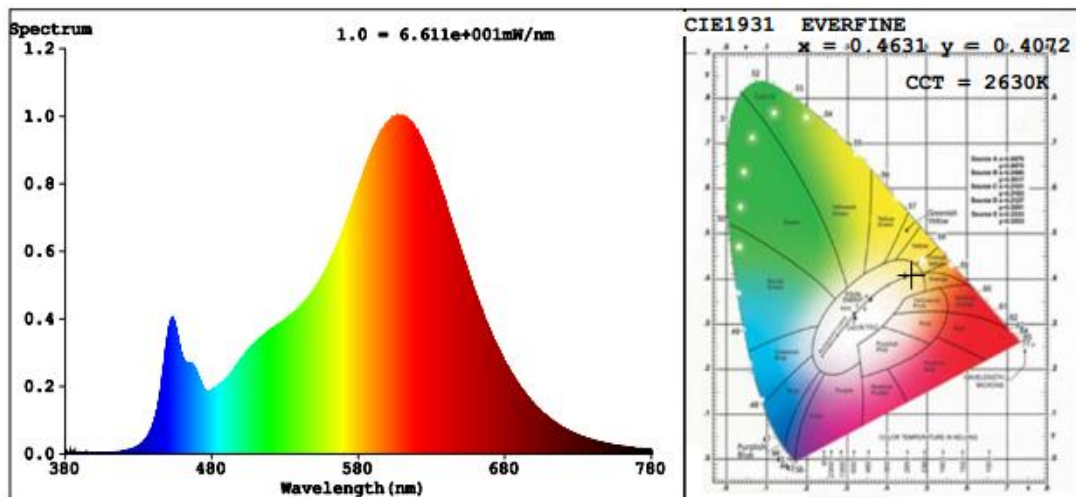
Chromaticity Measurement for Bare-lamp - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	83	R9	9
Frequency (Hz)	60	R2	95	R10	90
CCT (K)	2630	R3	91	R11	82
Duv	-0.0015	R4	81	R12	82
Chromaticity (x, y)	x=0.4631 y=0.4072	R5	84	R13	86
Chromaticity (u', v')	u'=0.2661 v'=0.5265	R6	95	R14	96
Color Rendering Index (CRI)	83.0	R7	79	R15	74
R9	9	R8	56	--	--

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)	3057	3063	Bare Lamp: 1600(-10%)
Luminous Efficacy (lm/W)	130.64	127.52	Bare lamp: >= 110(-3%)
Most Worst Luminous/Highest Watts	127.27		

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	0.4008	46.71	0.9711	22.79
4-C1,C2	277.0	60	0.1962	47.67	0.8770	16.82
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	84	R9	10
Frequency (Hz)	60	R2	96	R10	91
CCT (K)	2635	R3	90	R11	82
Duv	-0.0020	R4	81	R12	82
Chromaticity (x, y)	x=0.4617 y=0.4055	R5	85	R13	87
Chromaticity (u', v')	u'=0.2660 v'=0.5257	R6	95	R14	95
Color Rendering Index (CRI)	83.3	R7	79	R15	75
R9	10	R8	57	--	--

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)	5256.0	5265.5	In luminaire (2 lamps): 3000(-10%)
Luminous Efficacy (lm/W)	112.52	110.46	In luminaire: >= 100(-3%)
Most Worst Luminous/Highest Watts	110.26		
Zonal lumens in the 0-60 °zone (%)	90.1	--	>= 75(-3)
SC: 0-180 °(if applicable)	1.38	--	1.0-2.0(±0.1)
SC: 90-270 °(if applicable)	1.13	--	1.0-2.0(±0.1)
Beam Angle (°)	101.5	--	--
Center Beam Candle Power (cd)	2209	--	--

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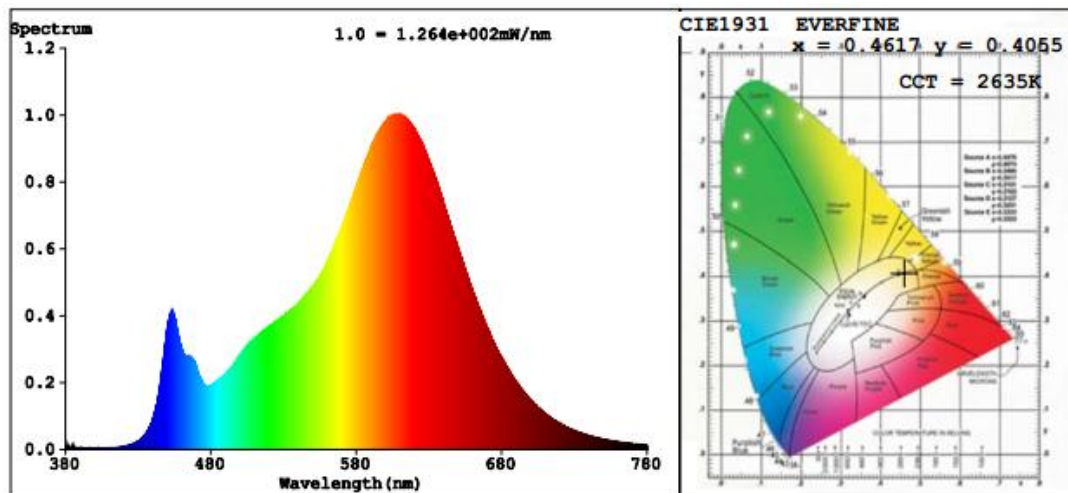
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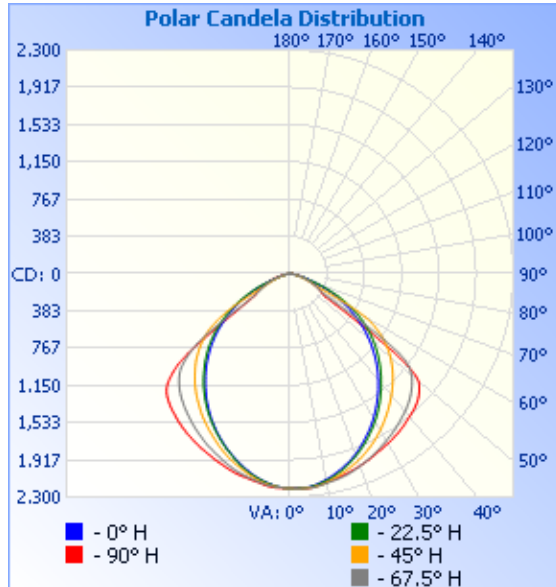
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Spectral Power Distribution & Chromaticity Diagram

Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,683.2	32%
0-40	2,754.4	52.4%
0-60	4,732.9	90.1%
60-90	514.2	9.8%
70-100	142.9	2.7%
90-120	3.3	0.1%
0-90	5,247.2	99.9%
90-180	7.7	0.1%
0-180	5,254.8	100%

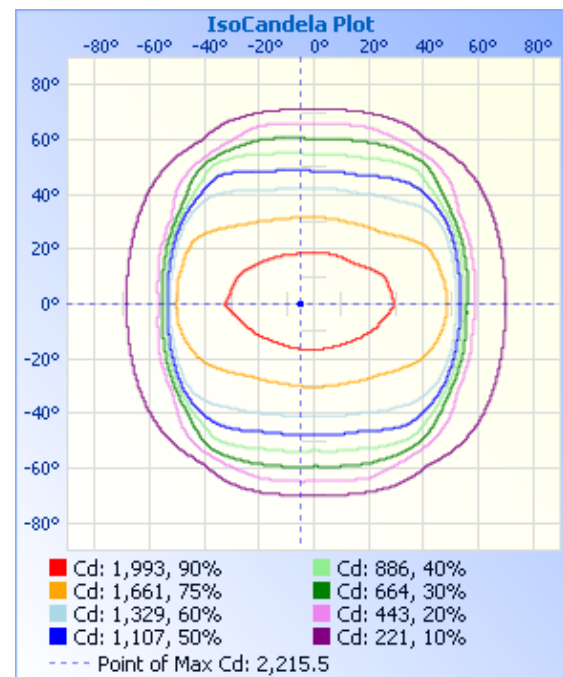
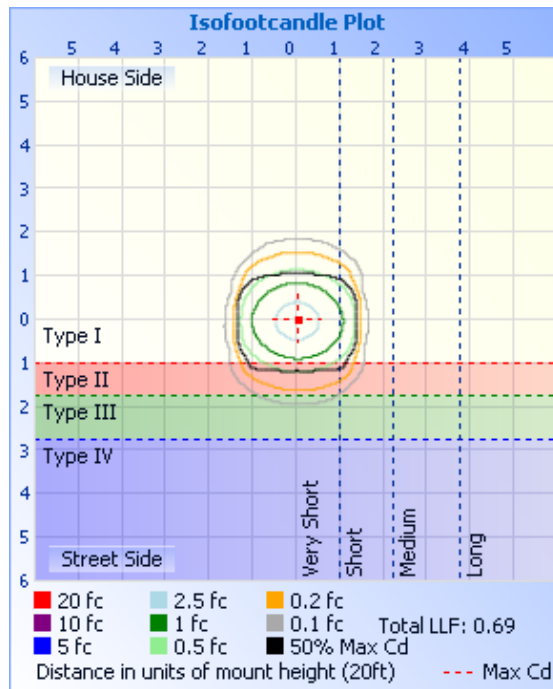
Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	%Total
0-10	208.5	4.0%	90-100	0.6	0%
10-20	589.6	11.2%	100-110	1.3	0%
20-30	885.1	16.8%	110-120	1.4	0%
30-40	1,071.2	20.4%	120-130	1.3	0%
40-50	1,128.8	21.5%	130-140	1.0	0%
50-60	849.8	16.2%	140-150	0.8	0%
60-70	372.0	7.1%	150-160	0.6	0%
70-80	121.7	2.3%	160-170	0.4	0%
80-90	20.6	0.4%	170-180	0.2	0%

Photometric Data


Illuminance at a Distance

	Center Beam fc	Beam Width
12.0ft	15.34 fc	27.1 ft 32.3 ft
24.0ft	3.84 fc	54.1 ft 64.6 ft
36.0ft	1.70 fc	81.2 ft 96.9 ft
48.0ft	0.96 fc	108.2 ft 129.2 ft
60.0ft	0.61 fc	135.3 ft 161.5 ft

■ Vert. Spread: 96.8°
 ■ Horiz. Spread: 106.8°



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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	2209	2209	2209	2209	2209	2209	2209	2209	2209	2209	2209	2209	2209	2209	2209	2209	
5	2203	2213	2205	2205	2205	2207	2212	2215	2215	2198	2195	2184	2179	2180	2189	2193	
10	2161	2186	2169	2158	2151	2162	2181	2189	2178	2162	2141	2121	2110	2116	2132	2152	
15	2130	2151	2094	2086	2072	2090	2119	2157	2144	2115	2065	2033	2015	2024	2053	2104	
20	2080	2097	2006	1985	1974	1993	2048	2108	2105	2054	1979	1927	1909	1914	1963	2037	
25	2031	2025	1911	1863	1853	1879	1962	2048	2059	1986	1877	1806	1788	1797	1860	1967	
30	1983	1952	1796	1728	1718	1752	1859	1984	2017	1915	1770	1676	1655	1670	1754	1890	
35	1930	1867	1670	1582	1569	1612	1747	1919	1972	1841	1651	1535	1507	1533	1639	1807	
40	1866	1777	1540	1426	1413	1462	1627	1847	1917	1759	1526	1387	1352	1384	1517	1719	
45	1787	1667	1404	1267	1247	1306	1497	1759	1856	1655	1390	1229	1186	1225	1381	1614	
50	1570	1519	1253	1095	1071	1142	1354	1635	1730	1522	1237	1060	1009	1052	1225	1432	
55	694	1082	1071	917	885	967	1176	1186	757	1136	1044	875	815	863	1028	842	
60	401	401	824	722	688	771	903	375	375	348	781	669	618	658	665	374	
65	310	292	347	512	493	544	295	284	292	261	268	439	415	434	256	281	
70	216	199	178	280	285	295	182	195	205	177	152	209	210	204	163	190	
75	131	117	97.5	123	141	126	101	119	130	106	82.3	90.0	97.2	89.0	86.5	111	
80	59.2	52.7	45.0	51.7	58.4	53.8	49.0	58.4	64.2	51.3	40.0	39.5	41.6	38.9	40.2	50.0	
85	18.3	16.4	14.7	15.6	17.8	17.5	17.8	20.8	23.5	18.3	13.9	11.9	11.5	11.0	12.5	15.6	
90	0.65	0.55	0.50	0.71	0.84	1.25	1.26	1.42	0.93	2.07	0.42	0.57	0.52	0.63	0.32	2.42	
95	0.37	0.43	0.33	0.60	0.58	1.02	0.46	0.35	0.51	1.01	0.58	0.76	0.68	0.99	0.53	1.14	
100	0.45	0.46	0.67	0.78	0.75	1.02	0.69	0.37	0.48	0.43	1.06	0.90	0.87	1.26	0.95	0.43	
105	0.67	0.89	1.54	0.96	1.10	1.13	2.05	0.73	0.85	1.66	1.68	0.94	0.92	1.36	2.21	1.07	
110	2.95	2.20	1.47	0.89	1.09	1.14	1.51	1.29	2.14	1.44	2.01	0.90	0.95	1.04	1.65	1.43	
115	1.53	1.99	1.56	0.71	1.02	0.97	1.59	1.37	1.68	1.60	2.31	0.79	0.98	0.73	1.73	1.66	
120	1.67	1.81	1.65	0.60	0.73	0.68	1.63	1.64	1.68	1.70	2.67	0.81	0.97	0.84	1.63	1.71	
125	1.76	1.98	1.47	0.78	0.89	0.77	1.66	1.72	1.70	1.70	2.72	0.68	0.95	0.75	1.49	1.68	
130	1.77	1.97	1.08	0.77	0.90	0.85	1.52	1.71	1.72	1.69	2.10	0.89	0.94	0.93	1.35	1.65	
135	1.77	1.90	0.99	0.81	0.92	0.89	1.42	1.70	1.68	1.66	1.73	1.02	1.15	1.10	1.26	1.66	
140	1.78	1.84	0.89	0.84	0.93	0.92	1.16	1.70	1.65	1.65	1.10	1.18	1.20	1.26	1.18	1.68	
145	1.78	1.77	0.84	0.87	1.06	1.10	0.94	1.65	1.61	1.65	1.15	1.36	1.36	1.37	1.20	1.48	
150	1.78	1.49	0.85	0.94	1.13	1.13	0.92	1.53	1.61	1.65	1.27	1.47	1.58	1.55	1.37	1.33	
155	1.74	1.44	0.95	1.04	1.41	1.20	0.90	1.37	1.66	1.65	1.29	1.51	1.67	1.71	1.58	1.38	
160	1.71	1.33	1.03	1.31	1.46	1.62	1.06	1.37	1.68	1.64	1.31	1.55	1.85	1.78	1.74	1.49	
165	1.69	1.31	1.15	1.56	1.74	1.68	1.16	1.37	1.69	1.63	1.43	1.58	1.80	1.88	1.74	1.58	
170	1.66	1.30	1.36	1.88	1.83	1.75	1.63	1.37	1.71	1.61	1.51	1.60	1.76	1.85	1.73	1.65	
175	1.64	1.28	1.49	1.84	1.87	1.82	1.66	1.37	1.73	1.60	1.44	1.57	1.72	1.80	1.73	1.58	
180	1.47	1.28	1.47	1.72	1.88	1.93	1.42	1.37	1.58	1.60	1.31	1.46	1.83	1.73	1.73	1.53	

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	0.2023	23.59	0.9719	22.81
4-C3	277.0	60	0.1003	24.42	0.8793	16.87
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

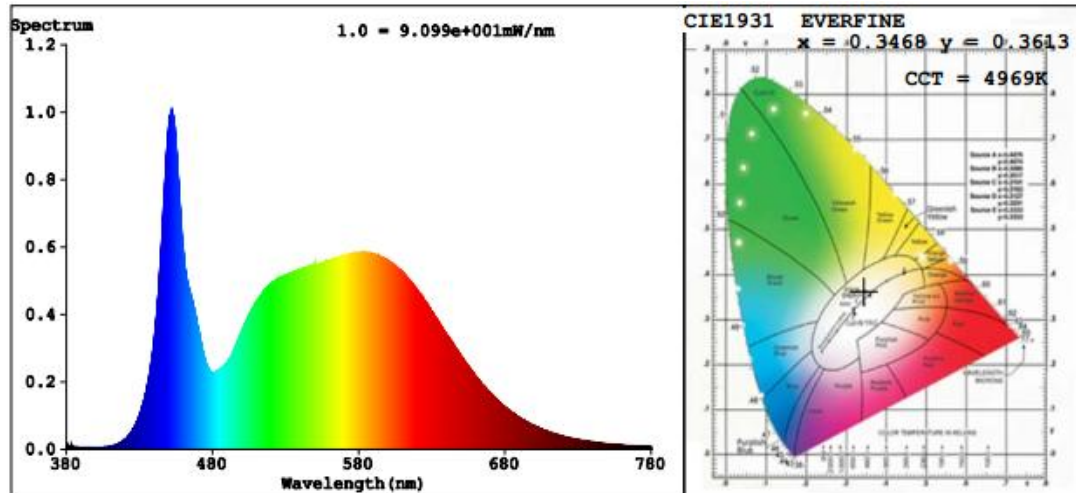
Chromaticity Measurement for Bare-lamp - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	8
Frequency (Hz)	60	R2	88	R10	72
CCT (K)	4969	R3	93	R11	80
Duv	0.0041	R4	81	R12	54
Chromaticity (x, y)	x=0.3468 y=0.3613	R5	80	R13	83
Chromaticity (u', v')	u'=0.2089 v'=0.4896	R6	83	R14	97
Color Rendering Index (CRI)	82.8	R7	88	R15	75
R9	8	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)	3584	3590	Bare Lamp: 1600(-10%)
Luminous Efficacy (lm/W)	151.93	147.01	Bare lamp: >= 110(-3%)
Most Worst Luminous/Highest Watts	146.76		

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	3057	23.4	130.64
IK-T504-L160-0024-DN-30-B	3000K	3162 ^{*1}	23.50 ^{*2}	134.55 ^{*3}
IK-T504-L160-0024-DN-35-B	3500K	3268 ^{*1}	23.50 ^{*2}	139.06 ^{*3}
IK-T504-L160-0024-DN-40-B	4000K	3373 ^{*1}	23.50 ^{*2}	143.53 ^{*3}
IK-T504-L160-0024-DN-45-B	4500K	3479 ^{*1}	23.50 ^{*2}	148.04 ^{*3}
IK-T504-0024-DN-5000B	5000K	3584	23.59	151.93

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

$$3162 = (3584 - 3057) / 5 * 1 + 3057$$

$$3268 = (3584 - 3057) / 5 * 2 + 3057$$

$$3373 = (3584 - 3057) / 5 * 3 + 3057$$

$$3479 = (3584 - 3057) / 5 * 4 + 3057$$

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

$$23.50 = (23.40 + 23.59) / 2$$

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

$$134.55 = 3162 / 23.50$$

$$139.06 = 3268 / 23.50$$

$$143.53 = 3373 / 23.50$$

$$148.04 = 3479 / 23.50$$

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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 *******