

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-T504-0018-DN-2630B

Representative (Tested) Model: IK-T504-0018-DN-2630B

IK-T504-0018-DN-2700B

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

Test & Report By:

Biao Zhong

Engineer: Biao Zhong

Date: Apr.12, 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

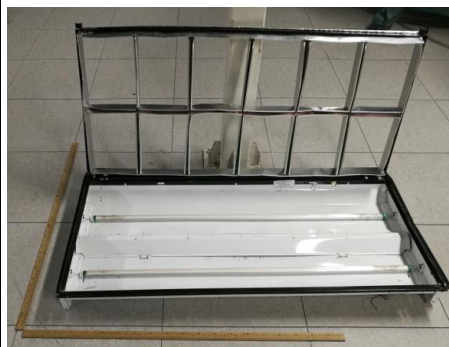
Tel: 8620-3229 0320

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1.1 Product Information:

Organization Name	IKIO LED LIGHTING	
Brand Name	IKIO	
Model Number	IK-T504-0018-DN-XXXXB	
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	18W	
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-F1, F2(2700K), F3(5000K)	
Lamp Length	1200	mm
Lamp Width	--	mm
Number of Units (modular products)	N/A	s

Photo

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1.2 Test Specifications:

Date of Receipt	Mar.28,2018
Date of Test	Apr.10,2018
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	2018-04-10	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-T504-0018-DN-2630B		

Electrical Measurement for Bare-lamp:

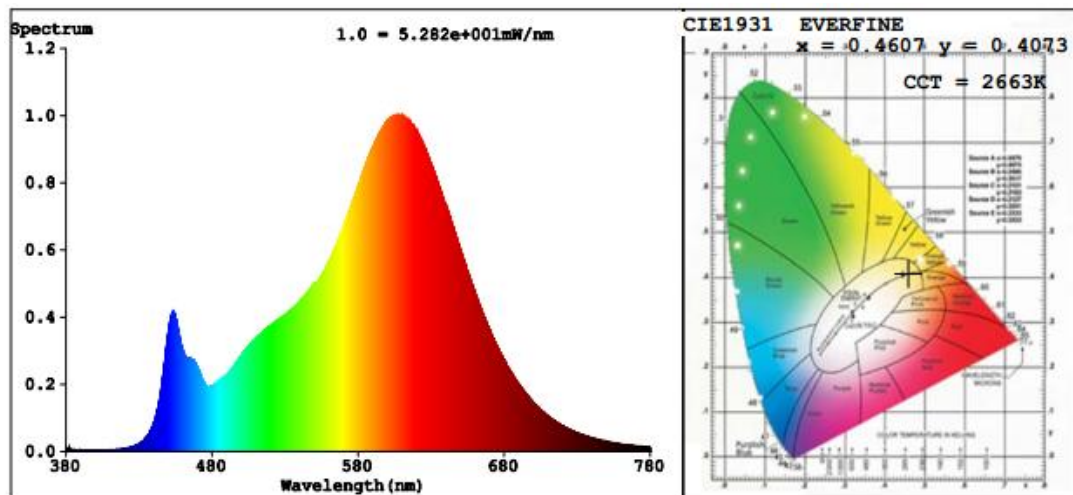
Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE171202 4-F1	120.0	60	0.1551	17.94	0.9637	23.32
	277.0	60	0.0756	18.89	0.9023	14.11
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

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

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	83	R9	10
Frequency (Hz)	60	R2	95	R10	90
CCT (K)	2663	R3	91	R11	82
Duv	-0.0013	R4	81	R12	81
Chromaticity (x, y)	x=0.4607 y=0.4073	R5	85	R13	87
Chromaticity (u', v')	u'=0.2645 v'=0.5262	R6	95	R14	96
Color Rendering Index (CRI)	83.3	R7	79	R15	75
R9	10	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)	2592	2671	Bare Lamp: 1600(-10%)
Luminous Efficacy (lm/W)	144.48	141.40	Bare lamp: >= 110(-3%)
Most Worst Luminous/Highest Watts	137.22		

Spectral Power Distribution & Chromaticity Diagram

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2.2 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2018-04-10	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-T504-0018-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	0.3069	35.55	0.9653	23.19
4-F1,F2	277.0	60	0.1467	36.68	0.9025	14.07
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	83	R9	10
Frequency (Hz)	60	R2	96	R10	91
CCT (K)	2640	R3	90	R11	82
Duv	-0.0020	R4	81	R12	82
Chromaticity (x, y)	x=0.4612 y=0.4054	R5	85	R13	87
Chromaticity (u', v')	u'=0.2658 v'=0.5256	R6	95	R14	95
Color Rendering Index (CRI)	83.1	R7	79	R15	75
R9	10	R8	56	--	--

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)	4397.9	4407.6	In luminaire (2 lamps): 3000(-10%)
Luminous Efficacy (lm/W)	123.71	120.16	In luminaire: >= 100(-3%)
Most Worst Luminous/Highest Watts	119.90		
Zonal lumens in the 0-60 ° zone (%)	91.8	--	>= 75(-3)
SC: 0-180 °(if applicable)	1.28	--	1.0-2.0(±0.1)
SC: 90-270 °(if applicable)	1.18	--	1.0-2.0(±0.1)
Beam Angle (°)	102.2	--	--
Center Beam Candle Power (cd)	1868	--	--

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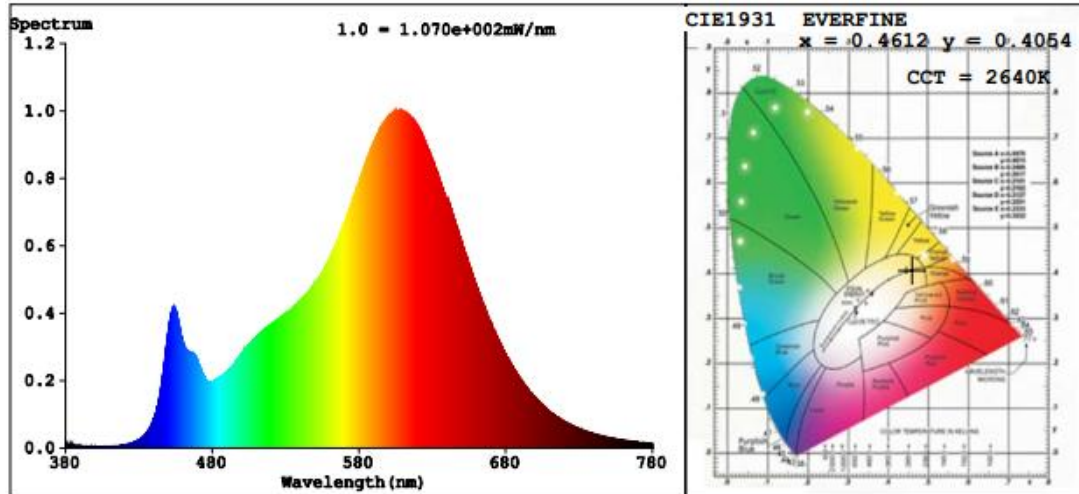
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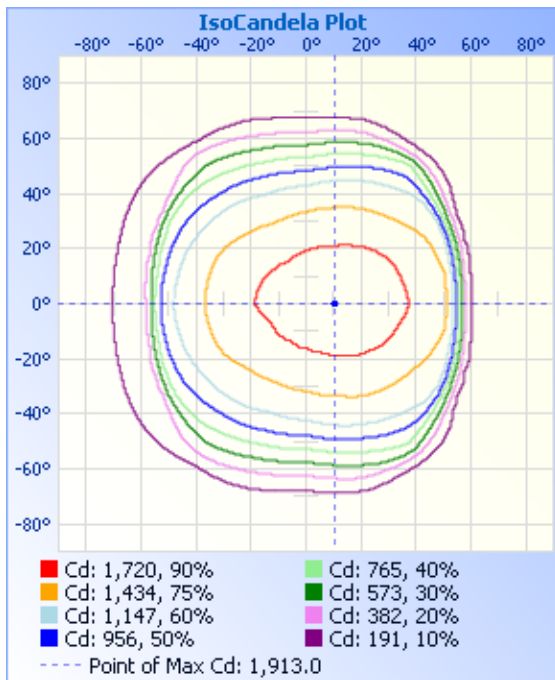
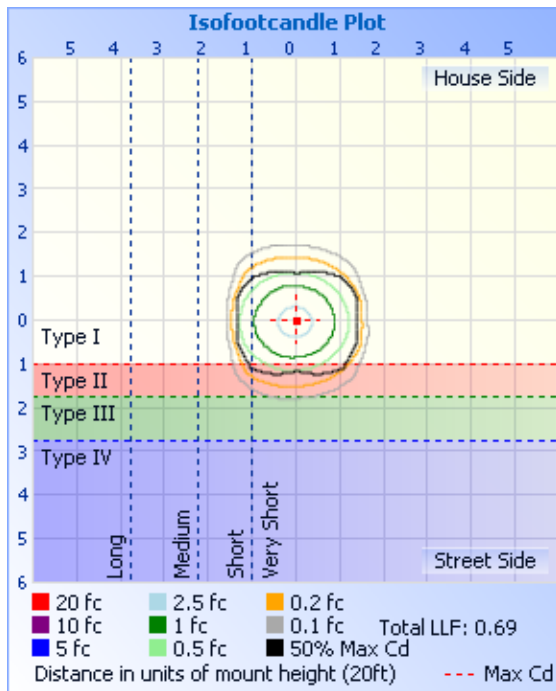
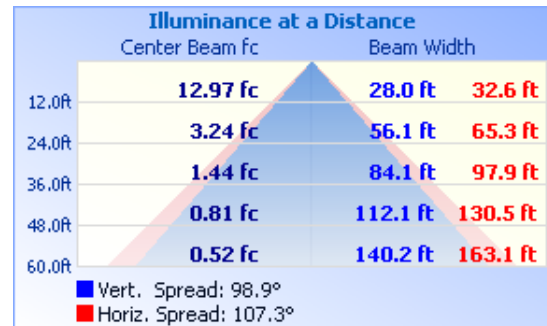
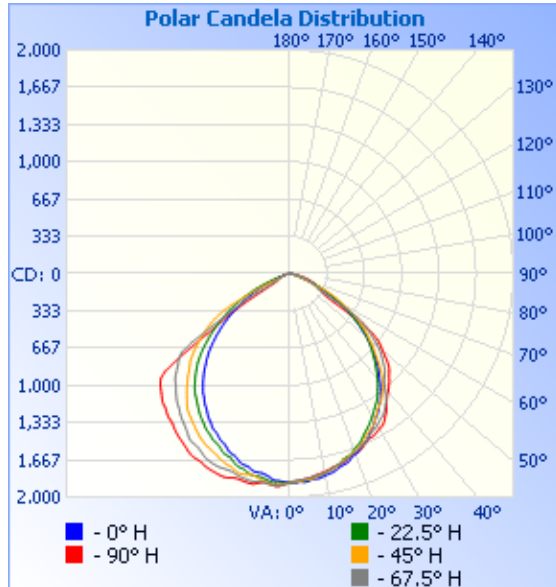
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Spectral Power Distribution & Chromaticity Diagram

Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,450.8	33%
0-40	2,380.5	54.1%
0-60	4,038.0	91.8%
60-90	353.3	8%
70-100	89.0	2%
90-120	2.2	0%
0-90	4,391.3	99.9%
90-180	5.7	0.1%
0-180	4,397.1	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	176.6	4.0%	90-100	0.3	0%
10-20	505.2	11.5%	100-110	0.8	0%
20-30	769.0	17.5%	110-120	1.1	0%
30-40	929.8	21.1%	120-130	1.0	0%
40-50	945.9	21.5%	130-140	0.9	0%
50-60	711.6	16.2%	140-150	0.7	0%
60-70	264.6	6.0%	150-160	0.5	0%
70-80	75.9	1.7%	160-170	0.3	0%
80-90	12.8	0.3%	170-180	0.1	0%

Photometric Data


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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	1868	1868	1868	1868	1868	1868	1868	1868	1868	1868	1868	1868	1868	1868	1868	1868	
5	1895	1904	1894	1893	1867	1853	1849	1838	1839	1831	1831	1839	1845	1871	1896	1897	
10	1911	1903	1860	1874	1832	1811	1807	1809	1798	1771	1764	1778	1800	1836	1835	1888	
15	1893	1886	1860	1816	1781	1747	1754	1757	1766	1720	1719	1717	1742	1788	1836	1860	
20	1905	1887	1810	1755	1717	1675	1691	1703	1710	1650	1657	1633	1656	1714	1779	1843	
25	1868	1849	1764	1681	1639	1577	1607	1637	1643	1581	1559	1525	1564	1637	1718	1807	
30	1829	1798	1701	1595	1515	1473	1520	1565	1602	1524	1461	1434	1469	1544	1646	1746	
35	1758	1709	1604	1492	1406	1361	1408	1480	1506	1440	1368	1311	1343	1439	1557	1649	
40	1685	1614	1479	1375	1248	1215	1297	1319	1372	1277	1256	1173	1204	1328	1438	1552	
45	1615	1512	1352	1233	1090	1061	1119	1201	1257	1162	1072	1026	1041	1179	1292	1442	
50	1514	1385	1203	1051	906	911	940	1041	1092	1013	907	878	857	997	1144	1319	
55	760	1020	1017	852	709	705	769	835	837	808	745	678	658	792	951	1069	
60	148	253	767	608	492	508	554	328	342	319	538	479	457	583	733	295	
65	118	115	229	362	293	315	320	246	279	244	239	297	276	367	286	111	
70	91.4	82.9	74.9	145	132	152	138	176	205	172	135	143	127	161	74.3	78.4	
75	65.9	55.0	41.0	52.8	59.7	64.9	73.9	108	133	105	70.6	60.1	55.5	54.5	39.3	51.7	
80	37.5	30.5	21.6	25.2	28.3	30.3	35.6	48.3	58.9	45.8	31.4	25.3	22.1	20.2	19.7	27.8	
85	15.3	12.6	7.87	9.50	9.16	9.07	10.5	12.8	14.5	11.5	8.70	7.10	6.23	5.95	6.61	9.91	
90	0.27	0.16	0.32	0.42	0.53	0.26	0.27	0.21	0.10	0.00	0.16	0.58	0.37	0.47	0.26	0.00	
95	0.11	0.16	0.16	0.31	0.31	0.26	0.05	0.16	0.05	0.00	0.32	0.94	0.58	0.63	0.42	0.11	
100	0.11	0.05	0.21	0.58	0.37	0.42	0.21	0.00	0.05	0.00	0.95	1.10	0.84	0.84	0.69	0.37	
105	0.11	0.21	1.26	0.63	0.73	0.78	0.79	0.42	0.53	0.58	1.59	0.94	0.79	0.78	1.00	0.75	
110	1.11	1.05	0.89	0.79	0.84	0.78	1.21	0.74	1.00	1.21	2.11	0.84	0.79	0.73	0.95	0.90	
115	0.90	0.89	0.89	0.89	0.84	0.84	1.21	1.53	1.58	1.58	2.42	0.63	0.79	0.57	0.89	1.11	
120	0.9988	1.05	0.89	0.47	0.63	0.57	1.21	1.53	1.53	1.52	2.53	0.73	0.79	0.52	0.84	1.11	
125	1.05	1.47	0.89	0.47	0.68	0.63	1.21	1.58	1.53	1.52	2.68	0.68	0.73	0.57	0.79	1.11	
130	1.05	1.52	0.89	0.58	0.73	0.63	1.21	1.58	1.58	1.68	2.42	0.89	0.89	0.68	0.79	0.95	
135	1.16	1.42	0.89	0.68	0.79	0.73	1.10	1.58	1.63	1.57	1.89	0.99	1.05	0.89	0.79	0.95	
140	1.37	1.37	0.74	0.79	0.84	0.84	0.95	1.58	1.58	1.37	1.42	0.95	1.21	0.99	0.74	0.95	
145	1.26	1.26	0.58	0.79	0.84	0.84	0.74	1.21	1.53	1.37	0.89	1.21	1.36	1.25	0.95	0.95	
150	1.26	1.16	0.74	0.79	0.94	0.99	0.84	1.11	1.47	1.26	0.89	1.31	1.52	1.51	1.16	0.95	
155	1.21	1.05	0.79	0.94	1.10	0.99	0.84	0.90	1.37	1.26	0.89	1.36	1.52	1.51	1.37	1.05	
160	1.21	0.9992	0.84	1.15	1.15	1.10	0.84	0.90	1.42	1.26	0.89	1.31	1.57	1.67	1.52	1.11	
165	1.31	0.89	0.84	1.20	1.15	1.10	0.89	0.90	1.42	1.31	1.05	1.31	1.68	1.77	1.52	1.27	
170	1.32	0.89	1.00	1.36	1.52	1.46	1.16	0.90	1.48	1.31	1.05	1.47	1.68	1.88	1.52	1.27	
175	1.47	0.89	1.16	1.52	1.62	1.51	1.31	1.05	1.37	1.31	1.00	1.31	1.62	1.62	1.47	1.21	
180	1.32	0.95	1.16	1.41	1.57	1.41	1.10	1.05	1.32	1.26	0.95	1.15	1.52	1.62	1.47	1.21	

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

Test date	2018-04-10	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-T504-0018-DN-2700B		

Electrical Measurement for Bare-lamp:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE171202 4-F3	120.0	60	0.1543	17.85	0.9641	23.08
	277.0	60	0.0749	18.72	0.9028	14.05
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

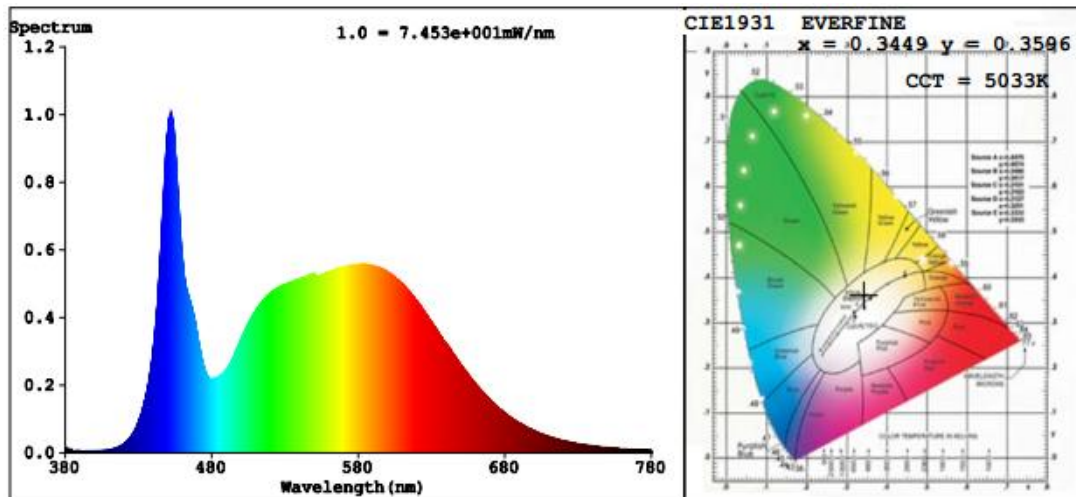
Chromaticity Measurement for Bare-lamp - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	6
Frequency (Hz)	60	R2	88	R10	71
CCT (K)	5033	R3	93	R11	81
Duv	0.0041	R4	82	R12	59
Chromaticity (x, y)	x=0.3449 y=0.3596	R5	81	R13	83
Chromaticity (u', v')	u'=0.2082 v'=0.4885	R6	83	R14	96
Color Rendering Index (CRI)	82.8	R7	87	R15	75
R9	6	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)	2902	2987	Bare Lamp: 1600(-10%)
Luminous Efficacy (lm/W)	162.58	159.56	Bare lamp: >= 110(-3%)
Most Worst Luminous/Highest Watts	155.02		

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-T504-0018-DN-2630B	2700K	2592	17.94	144.48
IK-T504-L160-0018-DN-30-B	3000K	2654 ^{*1}	17.90 ^{*2}	148.27 ^{*3}
IK-T504-L160-0018-DN-35-B	3500K	2716 ^{*1}	17.90 ^{*2}	151.73 ^{*3}
IK-T504-L160-0018-DN-40-B	4000K	2778 ^{*1}	17.90 ^{*2}	155.20 ^{*3}
IK-T504-L160-0018-DN-45-B	4500K	2840 ^{*1}	17.90 ^{*2}	158.66 ^{*3}
IK-T504-0018-DN-2700B	5000K	2902	17.85	162.58

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

$$2654 = (2902 - 2592) / 5 * 1 + 2592$$

$$2716 = (2902 - 2592) / 5 * 2 + 2592$$

$$2778 = (2902 - 2592) / 5 * 3 + 2592$$

$$2840 = (2902 - 2592) / 5 * 4 + 2592$$

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

$$17.90 = (17.94 + 17.85) / 2$$

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

$$148.27 = 2654 / 17.90$$

$$151.73 = 2716 / 17.90$$

$$155.20 = 2778 / 17.90$$

$$158.66 = 2840 / 17.90$$

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 *******