

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-3000B
IK-T504-0018-DN-5000B

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

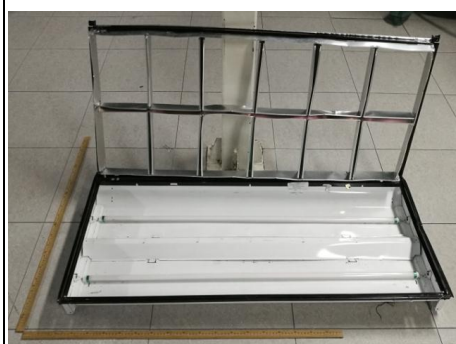
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1.1 Product Information:

Organization Name	IKIO LED LIGHTING	
Brand Name	IKIO LED LIGHTING	
Model Number	IK-T504-0018-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	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-E1, E2(2700K), E3(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.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-E1	120.0	60	0.1564	18.07	0.9627	22.86
	277.0	60	0.0761	19.02	0.9018	13.69
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

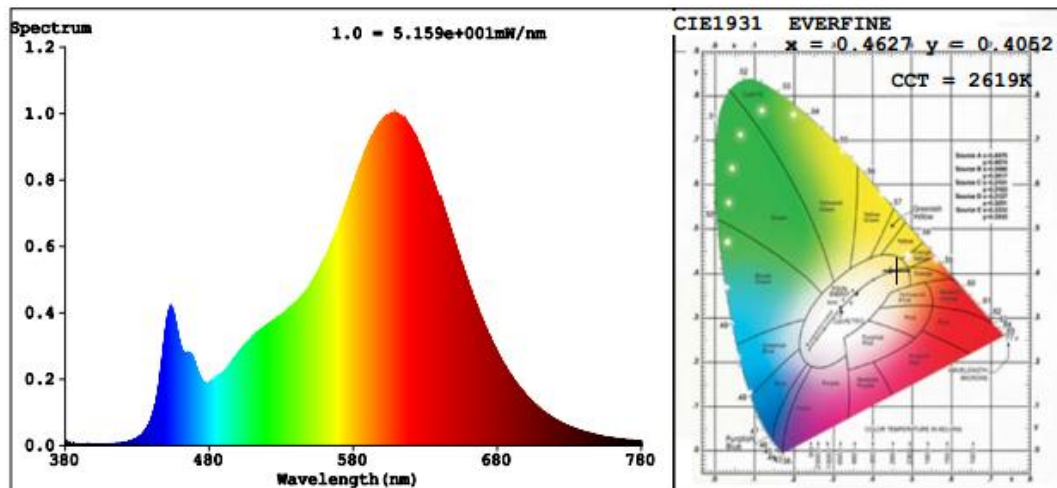
Chromaticity Measurement for Bare-lamp - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	84	R9	11
Frequency (Hz)	60	R2	96	R10	91
CCT (K)	2619	R3	90	R11	82
Duv	-0.0022	R4	81	R12	82
Chromaticity (x, y)	x=0.4627 y=0.4052	R5	85	R13	87
Chromaticity (u', v')	u'=0.2668 v'=0.5257	R6	95	R14	95
Color Rendering Index (CRI)	83.2	R7	79	R15	75
R9	11	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)	2402	2442	Bare Lamp: 1600(-10%)
Luminous Efficacy (lm/W)	132.93	128.39	Bare lamp: >= 110(-3%)
Most Worst Luminous/Highest Watts	126.19		

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	0.3070	35.56	0.9654	23.11
4-E1,E2	277.0	60	0.1465	36.65	0.9029	13.97
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	11
Frequency (Hz)	60	R2	96	R10	91
CCT (K)	2621	R3	90	R11	82
Duv	-0.0021	R4	81	R12	82
Chromaticity (x, y)	x=0.4628 y=0.4056	R5	85	R13	87
Chromaticity (u', v')	u'=0.2667 v'=0.5259	R6	95	R14	95
Color Rendering Index (CRI)	83.2	R7	79	R15	75
R9	11	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)	4100.9	4110.5	In luminaire (2 lamps): 3000(-10%)
Luminous Efficacy (lm/W)	115.32	112.16	In luminaire: >= 100(-3%)
Most Worst Luminous/Highest Watts	111.89		
Zonal lumens in the 0-60 ° zone (%)	90	--	>= 75(-3)
SC: 0-180 °(if applicable)	1.36	--	1.0-2.0(±0.1)
SC: 90-270 °(if applicable)	1.14	--	1.0-2.0(±0.1)
Beam Angle (°)	103.9	--	--
Center Beam Candle Power (cd)	1702	--	--

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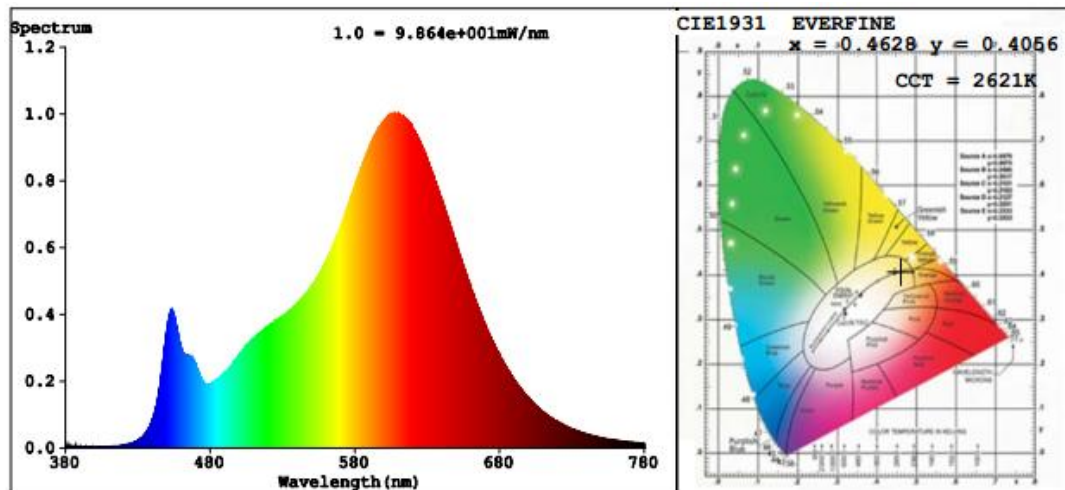
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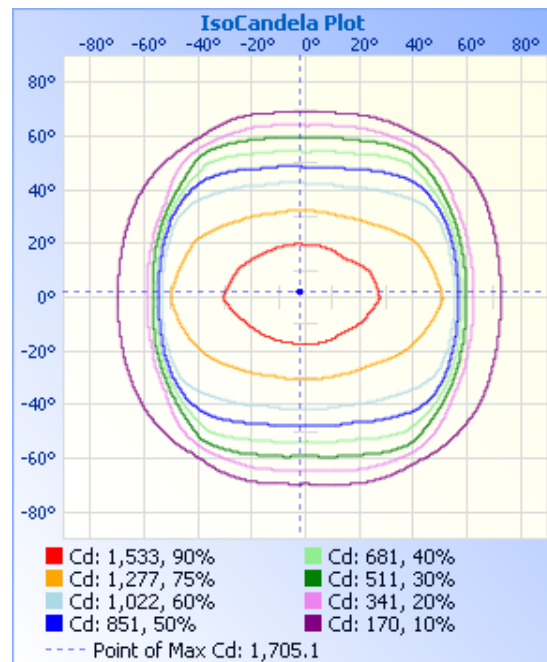
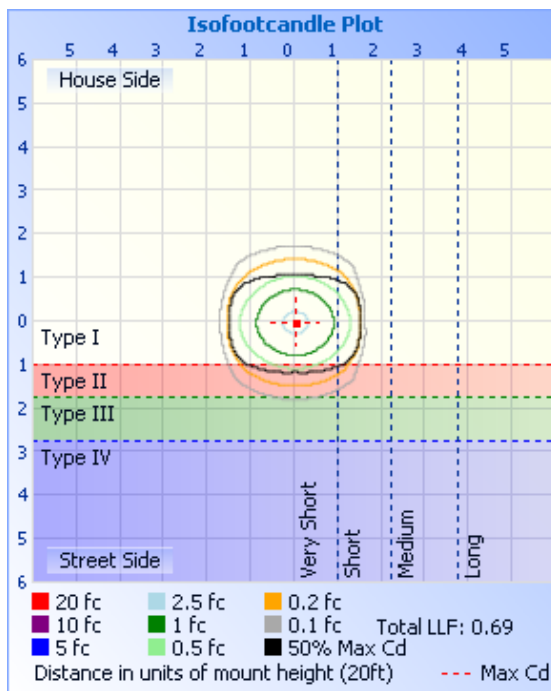
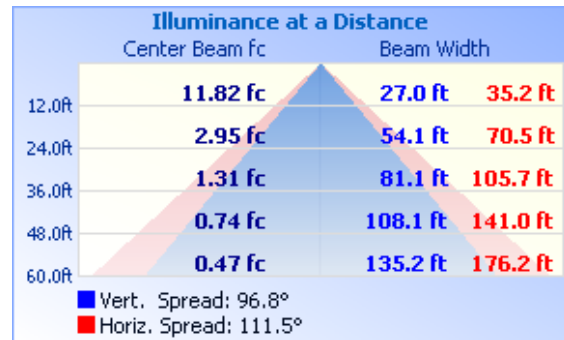
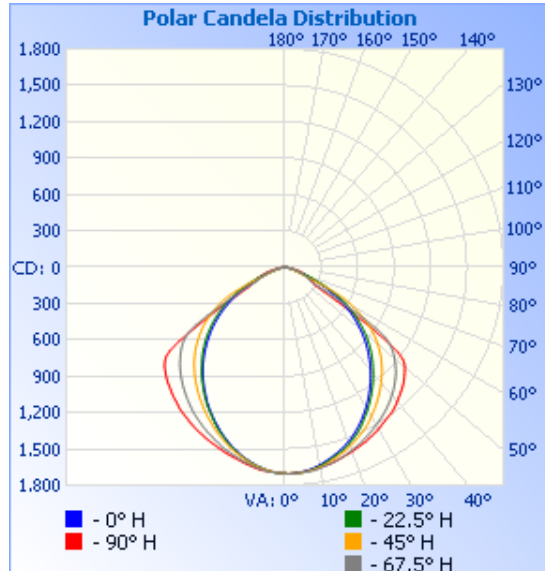
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Spectral Power Distribution & Chromaticity Diagram

Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,294.5	31.6%
0-40	2,116.0	51.6%
0-60	3,688.5	90%
60-90	406.1	9.9%
70-100	106.1	2.6%
90-120	2.5	0.1%
0-90	4,094.6	99.9%
90-180	5.7	0.1%
0-180	4,100.3	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	160.3	3.9%	90-100	0.4	0%
10-20	453.4	11.1%	100-110	1.1	0%
20-30	680.8	16.6%	110-120	1.0	0%
30-40	821.4	20.0%	120-130	0.9	0%
40-50	861.8	21.0%	130-140	0.8	0%
50-60	710.8	17.3%	140-150	0.6	0%
60-70	300.3	7.3%	150-160	0.5	0%
70-80	90.6	2.2%	160-170	0.3	0%
80-90	15.2	0.4%	170-180	0.1	0%

Photometric Data

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Table--1

UNIT: cd

γ (DEG) \ C (DEG)	0	23	45	68	90	113	135	158	180	203	225	248	270	293	315	338	
0	1702	1702	1702	1702	1702	1702	1702	1702	1702	1702	1702	1702	1702	1702	1702	1702	
5	1689	1699	1692	1692	1694	1698	1700	1700	1694	1685	1691	1684	1680	1681	1681	1688	
10	1661	1672	1662	1658	1656	1664	1673	1682	1675	1658	1656	1637	1631	1635	1640	1651	
15	1624	1636	1606	1601	1599	1610	1627	1651	1650	1617	1599	1571	1562	1568	1578	1609	
20	1588	1591	1539	1534	1531	1549	1571	1608	1618	1573	1533	1491	1479	1486	1506	1559	
25	1550	1538	1466	1444	1441	1464	1503	1558	1584	1518	1459	1399	1384	1390	1424	1503	
30	1511	1481	1389	1340	1336	1360	1422	1503	1543	1465	1374	1297	1281	1290	1340	1441	
35	1467	1420	1302	1226	1221	1249	1333	1443	1496	1405	1284	1189	1168	1180	1250	1373	
40	1414	1352	1209	1103	1096	1131	1234	1373	1442	1331	1184	1076	1048	1065	1154	1298	
45	1359	1274	1107	983	965	1008	1127	1289	1376	1243	1078	952	918	946	1053	1218	
50	1291	1180	993	858	822	870	1003	1181	1291	1143	955	823	780	813	936	1123	
55	1063	1044	852	714	668	718	851	1009	860	950	810	677	628	673	803	998	
60	426	514	674	543	497	551	651	340	281	318	627	511	464	518	639	515	
65	281	255	335	347	318	357	293	205	234	203	249	332	298	352	368	239	
70	206	177	135	161	150	166	116	148	176	144	114	158	148	178	131	166	
75	136	108	70.6	65.5	64.5	64.2	63.9	93.0	119	88.7	59.9	66.5	66.7	72.5	67.9	101	
80	67.2	54.3	36.3	31.4	28.6	29.0	30.7	41.4	52.6	38.8	27.1	26.0	26.0	27.7	33.2	49.6	
85	25.8	21.5	13.2	11.8	8.91	8.87	9.02	10.9	12.9	9.71	7.24	6.40	6.63	7.68	10.8	17.2	
90	0.53	0.54	0.43	0.43	0.38	0.27	0.43	0.43	0.21	0.26	0.26	0.52	0.36	0.42	0.37	0.32	
95	0.21	0.27	0.26	0.26	0.10	0.16	0.26	0.21	0.16	0.26	0.32	0.68	0.52	0.47	0.37	0.37	
100	0.21	0.21	0.26	0.63	0.26	0.47	0.47	0.21	0.37	0.42	0.84	0.84	0.89	0.84	0.73	0.53	
105	0.26	0.53	1.58	0.73	0.68	0.68	1.47	1.21	1.00	1.32	1.63	0.84	0.89	0.84	1.52	0.90	
110	2.52	2.12	1.10	0.73	0.84	0.78	1.05	1.38	2.26	1.11	1.42	0.84	0.73	0.73	1.00	1.58	
115	1.21	1.27	1.10	0.73	0.89	0.58	1.05	1.37	1.16	1.11	1.53	0.63	0.63	0.42	1.00	1.32	
120	1.32	1.59	1.10	0.47	0.63	0.42	1.05	1.37	1.16	1.11	1.68	0.68	0.68	0.42	0.99	1.32	
125	1.32	1.69	1.10	0.47	0.47	0.37	1.05	1.48	1.16	1.11	1.68	0.73	0.68	0.52	0.84	1.32	
130	1.32	1.64	1.10	0.47	0.63	0.42	1.05	1.63	1.16	1.11	1.37	0.68	0.79	0.68	0.84	1.05	
135	1.37	1.53	0.95	0.52	0.73	0.52	1.00	1.58	1.16	1.06	1.16	0.84	0.84	0.68	0.78	1.00	
140	1.42	1.53	0.79	0.57	0.79	0.68	0.73	1.32	1.16	1.06	0.95	0.99	0.94	0.84	0.58	1.00	
145	1.32	1.32	0.68	0.68	0.79	0.73	0.73	1.21	1.16	1.06	0.89	1.10	1.10	0.89	0.79	1.05	
150	1.21	1.17	0.79	0.78	0.84	0.79	0.79	1.16	1.16	1.06	0.95	1.25	1.31	1.15	1.00	0.95	
155	1.26	1.16	0.95	0.84	0.84	0.84	0.89	1.05	1.16	1.06	0.95	1.25	1.31	1.20	1.20	1.00	
160	1.11	1.06	0.95	0.94	0.84	0.89	0.94	1.00	1.16	1.06	0.95	1.25	1.36	1.26	1.20	1.00	
165	1.11	1.01	0.95	1.10	1.04	0.94	1.00	0.95	1.16	1.22	0.95	1.25	1.36	1.36	1.20	1.16	
170	1.21	0.95	0.95	1.15	1.20	1.05	1.10	0.95	1.16	1.22	0.95	1.25	1.41	1.57	1.20	1.16	
175	1.21	0.95	0.95	1.20	1.31	1.15	1.10	1.00	1.11	1.22	0.95	1.09	1.36	1.57	1.15	1.16	
180	1.21	0.95	0.95	1.20	1.31	1.15	1.10	1.05	1.11	1.22	0.95	0.94	1.20	1.31	1.15	1.11	

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-2630B		

Electrical Measurement for Bare-lamp:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE171202 4-E3	120.0	60	0.1554	17.93	0.9618	23.07
	277.0	60	0.0754	18.81	0.9012	13.82
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

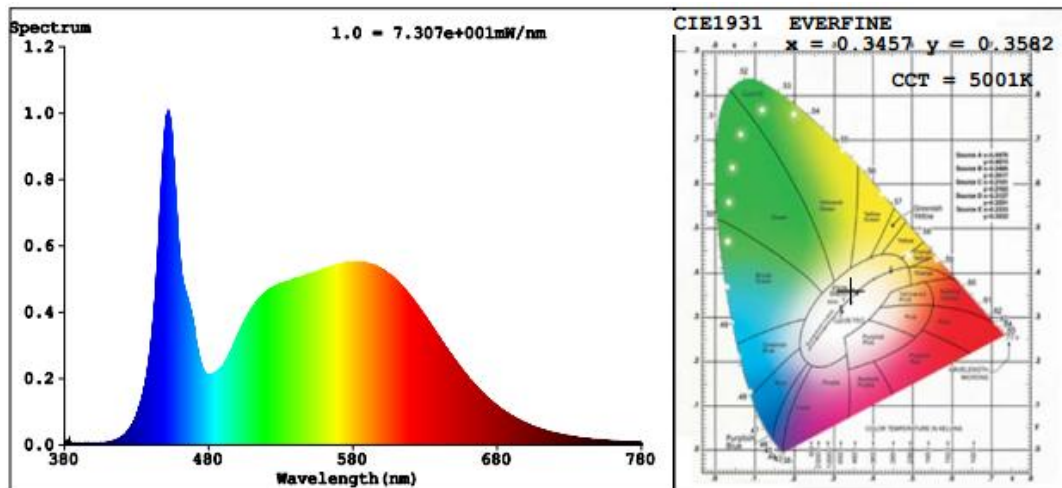
Chromaticity Measurement for Bare-lamp - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	8
Frequency (Hz)	60	R2	88	R10	72
CCT (K)	5001	R3	93	R11	82
Duv	0.0030	R4	83	R12	59
Chromaticity (x, y)	x=0.3457 y=0.3582	R5	82	R13	83
Chromaticity (u', v')	u'=0.2093 v'=0.4879	R6	84	R14	96
Color Rendering Index (CRI)	83.0	R7	87	R15	76
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)	2718	2763	Bare Lamp: 1600(-10%)
Luminous Efficacy (lm/W)	151.59	146.89	Bare lamp: >= 110(-3%)
Most Worst Luminous/Highest Watts	144.50		

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	2402	18.07	132.93
IK-T504-0018-DN-3000B	3000K	2465 ^{*1}	18.00 ^{*2}	136.94 ^{*3}
IK-T504-L160-0018-DN-35-B	3500K	2528 ^{*1}	18.00 ^{*2}	140.44 ^{*3}
IK-T504-L160-0018-DN-40-B	4000K	2592 ^{*1}	18.00 ^{*2}	144.00 ^{*3}
IK-T504-L160-0018-DN-45-B	4500K	2655 ^{*1}	18.00 ^{*2}	147.50 ^{*3}
IK-T504-0018-DN-5000B	5000K	2718	17.93	151.59

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

$$2465 = (2718 - 2402) / 5 * 1 + 2402$$

$$2528 = (2718 - 2402) / 5 * 2 + 2402$$

$$2592 = (2718 - 2402) / 5 * 3 + 2402$$

$$2655 = (2718 - 2402) / 5 * 4 + 2402$$

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

$$18.00 = (18.07 + 17.93) / 2$$

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

$$136.94 = 2465 / 18.00$$

$$140.44 = 2528 / 18.00$$

$$144.00 = 2592 / 18.00$$

$$147.50 = 2655 / 18.00$$

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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 *****