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-T504-0015-DN-XXXXB

Representative (Tested) Model: IK-T504-0015-DN-2630B
IK-T504-0015-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 rested samples.

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

1.1 Product Information:

Organization Name	IKIO LED LIGHTING	
Brand Name	IKIO	
Model Number	IK-T504-0015-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	15W	
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-B1, B2(2700K), B3(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	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	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 °C ±1 °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 ºC ±1 ºC. 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 ºC ±1 ºC. 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 ºC
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-T504-0015-DN-2630B		

Electrical Measurement for Bare-lamp:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE171202 4-B1	120.0	60	0.1316	15.02	0.9513	12.57
	277.0	60	0.0629	15.39	0.8834	16.45
				DLC Pass Criteria	>= 0.9(-3%)	<= 20(+5)

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

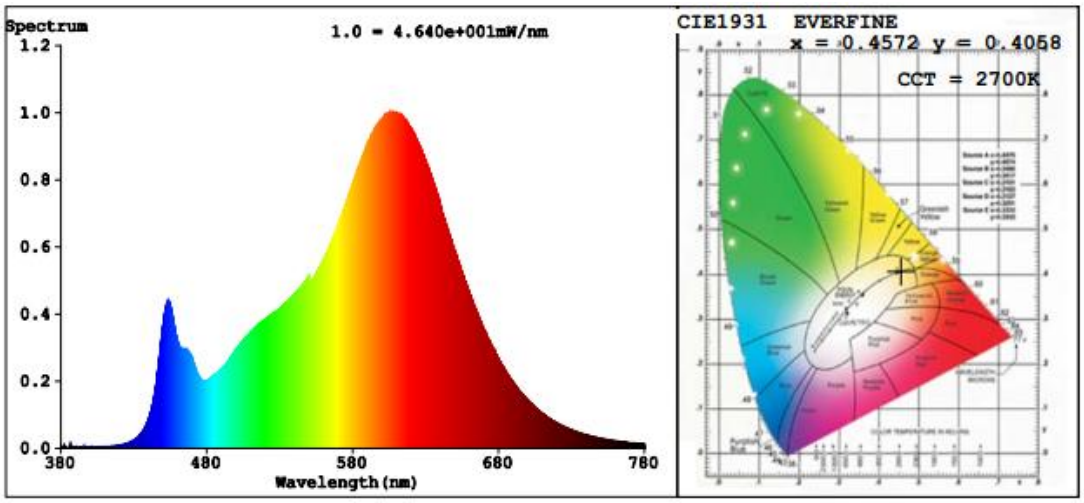
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	2700
Duv	-0.0016
Chromaticity (x, y)	x=0.4572 y=0.4058
Chromaticity (u', v')	u'=0.2629 v'=0.5251
Color Rendering Index (CRI)	83.9
R9	11

Special Color Rendering Indices			
R1	85	R9	11
R2	96	R10	91
R3	91	R11	84
R4	82	R12	81
R5	86	R13	88
R6	96	R14	96
R7	79	R15	76
R8	57	--	--

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)	2192	2202	Bare Lamp: 1600(-10%)
Luminous Efficacy (lm/W)	145.94	143.08	Bare lamp: >= 110(-3%)
Most Worst Luminous/Highest Watts	142.43		

Spectral Power Distribution & Chromaticity Diagram



2.2 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2018-03-24	Test Ambient:	25.2 ºC
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-T504-0015-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	0.2587	29.55	0.9518	12.12
4-B1,B2	277.0	60	0.1278	30.94	0.8738	16.28
				DLC Pass Criteria	>= 0.9(-3%)	<= 20(+5)

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

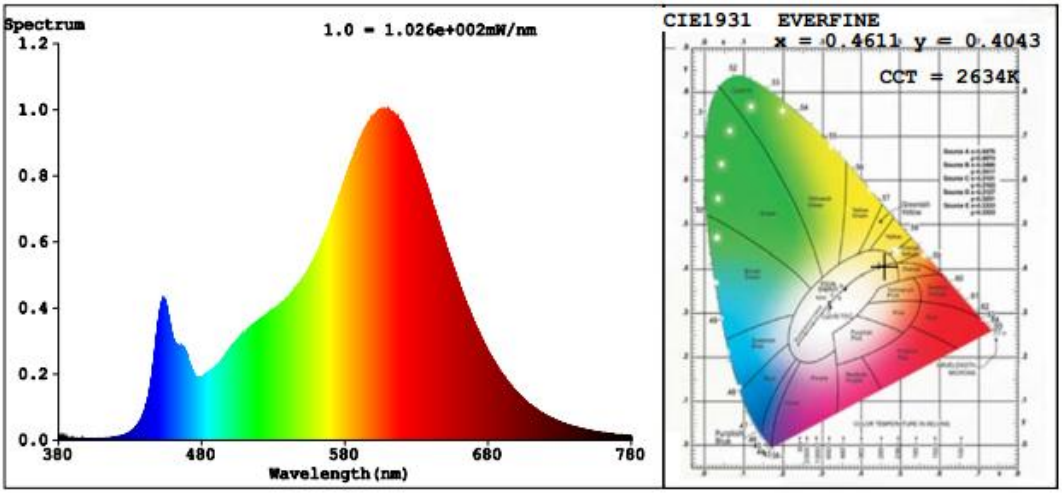
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	2634
Duv	-0.0024
Chromaticity (x, y)	x=0.4611 y=0.4043
Chromaticity (u', v')	u'=0.2662 v'=0.5251
Color Rendering Index (CRI)	82.9
R9	9

Special Color Rendering Indices			
R1	83	R9	9
R2	96	R10	91
R3	90	R11	81
R4	80	R12	82
R5	85	R13	87
R6	95	R14	95
R7	78	R15	74
R8	55	--	--

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)	3835.2	3853	In luminaire (2 lamps): 3000(-10%)
Luminous Efficacy (lm/W)	129.79	124.53	In luminaire: >= 100(-3%)
Most Worst Luminous/Highest Watts	123.96		
Zonal lumens in the 0-60 °zone (%)	91.5	--	>= 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 ( )	102.2	--	--
Center Beam Candle Power (cd)	1647	--	--

Spectral Power Distribution & Chromaticity Diagram

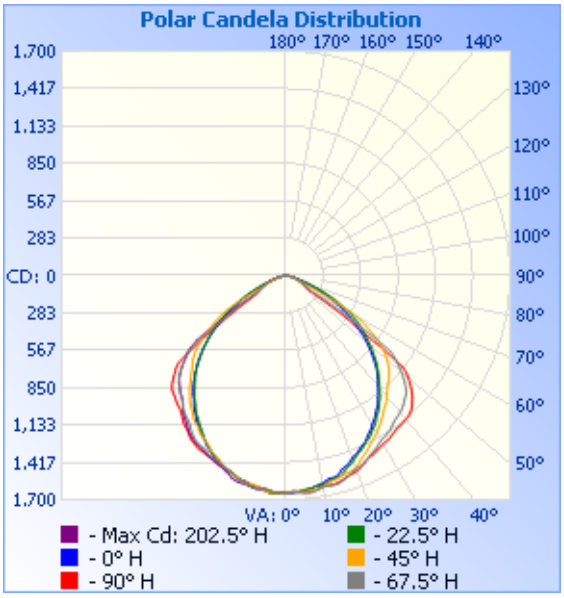


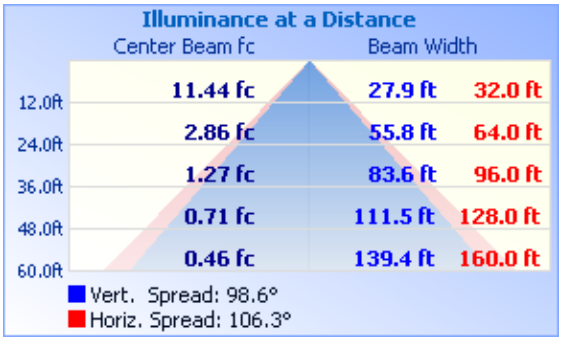
Zonal Lumen Tabulation

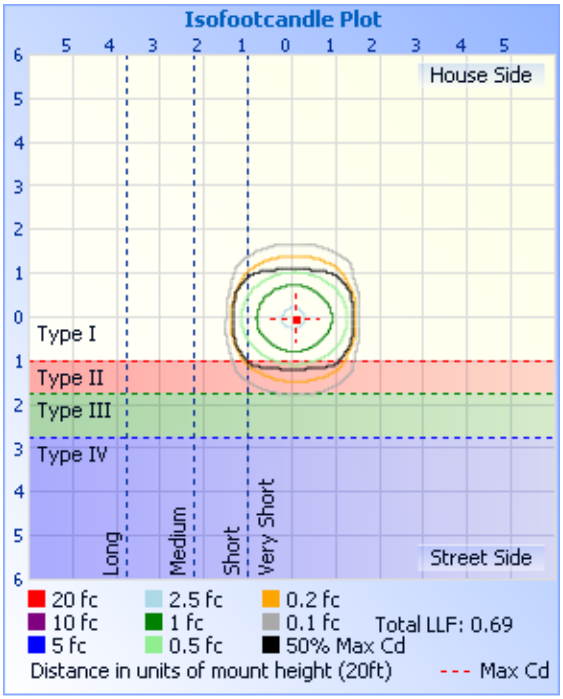
Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,265.8	33%
0-40	2,068.4	53.9%
0-60	3,507.4	91.5%
60-90	322.0	8.4%
70-100	86.6	2.3%
90-120	2.0	0.1%
0-90	3,829.4	99.9%
90-180	5.2	0.1%
0-180	3,834.6	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	%Total
0-10	155.7	4.1%	90-100	0.4	0%
10-20	443.4	11.6%	100-110	0.7	0%
20-30	666.7	17.4%	110-120	0.9	0%
30-40	802.6	20.9%	120-130	0.9	0%
40-50	833.3	21.7%	130-140	0.8	0%
50-60	605.7	15.8%	140-150	0.6	0%
60-70	235.8	6.1%	150-160	0.5	0%
70-80	73.4	1.9%	160-170	0.3	0%
80-90	12.8	0.3%	170-180	0.1	0%

Photometric Data







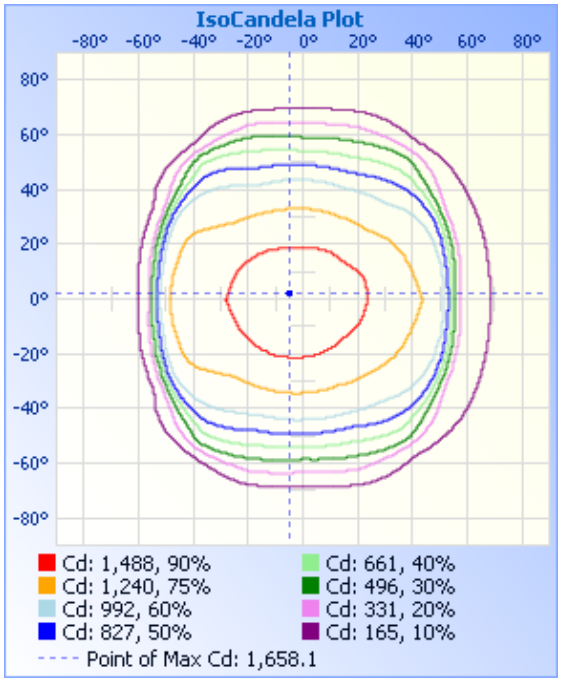


Table--1 UNIT: cd

γ (DEG) \ C (DEG)	0	23	45	68	90	113	135	158	180	203	225	248	270	293	315	338	
0	1647	1647	1647	1647	1647	1647	1647	1647	1647	1647	1647	1647	1647	1647	1647	1647	
5	1627	1642	1639	1647	1637	1628	1643	1654	1650	1641	1646	1631	1634	1646	1646	1628	
10	1600	1618	1597	1609	1599	1610	1625	1627	1622	1629	1626	1618	1603	1612	1601	1611	
15	1559	1587	1544	1564	1555	1577	1580	1620	1611	1606	1579	1575	1552	1551	1556	1563	
20	1513	1520	1491	1485	1470	1493	1546	1558	1576	1568	1531	1512	1500	1487	1485	1502	
25	1477	1469	1397	1394	1406	1411	1460	1506	1513	1495	1462	1436	1419	1409	1406	1452	
30	1436	1419	1306	1308	1307	1329	1375	1443	1476	1440	1377	1344	1321	1309	1328	1404	
35	1356	1330	1219	1193	1211	1228	1285	1398	1441	1386	1272	1233	1216	1197	1244	1313	
40	1277	1224	1110	1071	1085	1104	1187	1349	1418	1341	1187	1108	1094	1074	1136	1219	
45	1222	1144	990	948	962	978	1105	1285	1354	1287	1081	975	951	947	1009	1152	
50	1088	1008	886	793	812	841	1002	1143	1213	1136	974	823	787	787	897	1006	
55	512	718	720	643	645	704	841	829	561	833	798	664	610	627	713	614	
60	254	243	540	491	478	546	614	185	172	180	571	488	425	455	513	240	
65	202	184	226	328	313	361	170	132	131	127	198	302	261	285	171	186	
70	147	131	113	172	169	177	94.8	91.3	93.1	86.2	81.5	130	125	136	107	132	
75	94.2	81.7	64.8	76.8	82.5	72.9	52.2	56.6	58.4	52.3	44.9	55.7	61.2	60.2	60.3	81.9	
80	45.5	39.2	31.4	34.1	35.5	31.1	25.5	27.7	29.6	25.6	22.1	24.8	27.4	27.2	28.5	39.5	
85	14.9	13.0	10.8	10.9	11.1	10.1	8.74	9.52	10.4	8.39	7.11	7.68	8.35	8.16	9.37	13.1	
90	0.32	0.48	0.48	0.58	0.48	0.48	0.32	0.42	0.16	0.21	0.31	0.63	0.36	0.42	0.16	0.16	
95	0.00	0.06	0.31	0.37	0.31	0.37	0.21	0.26	0.11	0.21	0.52	0.68	0.47	0.68	0.32	0.11	
100	0.00	0.05	0.37	0.47	0.42	0.47	0.21	0.16	0.21	0.27	0.74	0.94	0.78	0.84	0.53	0.27	
105	0.05	0.43	1.10	0.79	0.84	0.73	0.68	0.21	0.42	0.54	1.10	0.94	0.78	0.84	1.00	0.69	
110	0.94	1.01	1.10	0.79	0.84	0.79	0.84	0.74	0.84	0.80	1.42	0.79	0.78	0.73	1.00	1.16	
115	0.90	1.17	1.10	0.79	0.84	0.73	1.10	0.89	0.90	1.01	1.68	0.52	0.68	0.52	1.00	1.21	
120	1.05	1.44	1.10	0.47	0.63	0.42	1.10	1.11	0.90	1.07	1.68	0.52	0.68	0.47	1.00	1.21	
125	1.32	1.55	1.10	0.47	0.63	0.42	1.10	1.16	0.79	1.07	1.63	0.58	0.68	0.52	1.00	1.21	
130	1.37	1.55	1.10	0.52	0.68	0.26	1.00	1.16	1.16	1.07	1.36	0.73	0.79	0.68	0.95	1.16	
135	1.37	1.65	1.00	0.79	0.84	0.63	0.95	1.32	1.11	1.07	0.94	0.84	0.84	0.73	0.84	1.05	
140	1.37	1.55	0.89	0.79	0.84	0.78	0.79	1.32	1.11	1.07	0.84	0.94	1.04	0.94	0.68	1.00	
145	1.32	1.33	0.79	0.79	0.84	0.73	0.63	1.32	1.11	1.07	0.84	1.05	1.10	1.00	0.79	0.95	
150	1.26	1.23	0.84	0.79	0.84	0.79	0.63	1.21	1.11	1.07	0.94	1.20	1.25	1.20	1.05	0.90	
155	1.16	1.12	0.94	0.79	0.84	0.84	0.68	1.11	1.11	1.07	0.94	1.26	1.31	1.31	1.16	1.00	
160	1.11	1.07	0.94	0.99	0.94	0.84	0.74	1.11	1.16	1.12	0.94	1.26	1.41	1.36	1.21	1.05	
165	1.16	0.96	1.05	1.05	1.05	0.99	0.84	1.11	1.21	1.12	0.94	1.26	1.46	1.41	1.21	1.05	
170	1.21	0.96	1.05	1.15	1.31	1.10	0.94	1.00	1.16	1.12	0.94	1.26	1.57	1.41	1.21	1.05	
175	1.21	0.96	1.26	1.20	1.46	1.47	1.00	1.05	1.05	1.12	0.94	1.26	1.31	1.41	1.21	1.05	
180	1.16	0.96	1.26	1.20	1.36	1.31	1.00	1.05	1.05	1.17	0.94	1.26	1.20	1.47	1.21	1.05	

2.3 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2018-03-24	Test Ambient:	25.2 ºC
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-T504-0015-DN-5000B		

Electrical Measurement for Bare-lamp:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE171202 4-B3	120.0	60	0.1314	15.01	0.9517	12.16
	277.0	60	0.0630	15.36	0.8801	16.31
				DLC Pass Criteria	>= 0.9(-3%)	<= 20(+5)

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

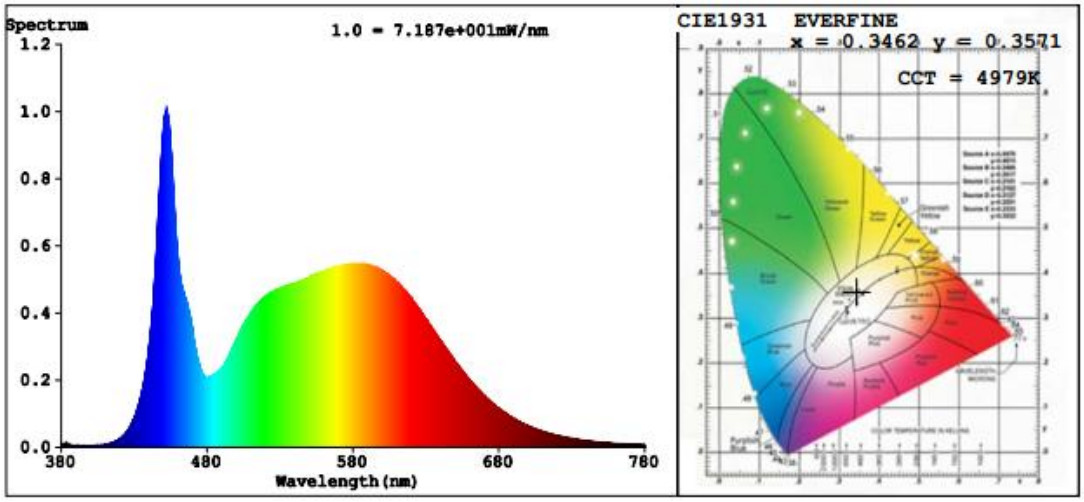
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	4979
Duv	0.0023
Chromaticity (x, y)	x=0.3462 y=0.3571
Chromaticity (u', v')	u'=0.2100 v'=0.4875
Color Rendering Index (CRI)	83.0
R9	9

Special Color Rendering Indices			
R1	81	R9	9
R2	89	R10	72
R3	93	R11	80
R4	81	R12	54
R5	81	R13	83
R6	83	R14	97
R7	88	R15	76
R8	68	--	--

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)	2500	2511	Bare Lamp: 1600(-10%)
Luminous Efficacy (lm/W)	166.56	163.48	Bare lamp: >= 110(-3%)
Most Worst Luminous/Highest Watts	162.76		

Spectral Power Distribution & Chromaticity Diagram



2.3 Performance Assessment:

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
IK-T504-0015-DN-2630B	2700K	2192	15.02	145.94
IK-T504-L160-0015-DN-30-B	3000K	2254*1	15.02*2	150.07*3
IK-T504-L160-0015-DN-35-B	3500K	2315*1	15.02*2	154.13*3
IK-T504-L160-0015-DN-40-B	4000K	2377*1	15.02*2	158.26*3
IK-T504-L160-0015-DN-45-B	4500K	2438*1	15.02*2	162.32 *3
IK-T504-0015-DN-5000B	5000K	2500	15.01	166.56

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

2254= (2500-2192)/5*1+2192

2315= (2500-2192)/5*2+2192

2377= (2500-2192)/5*3+2192

2438= (2500-2192)/5*4+2192

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

15.02= (15.02+15.01)/2

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

150.07=2254/15.02

154.13=2315/15.02

158.26=2377/15.02

162.32=2438/15.02

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 ********