

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-2630B

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.**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-T504-0015-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	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-A1, A2(2700K), A3(5000K)	
Lamp Length	1200	mm
Lamp Width	--	mm
Number of Units (modular products)	N/A	s

Photo**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>

1.2 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-T504-0015-DN-2630B		

Electrical Measurement for Bare-lamp:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE171202	120.0	60	0.1321	15.09	0.9521	12.73
4-A1	277.0	60	0.0642	15.54	0.8741	16.54
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

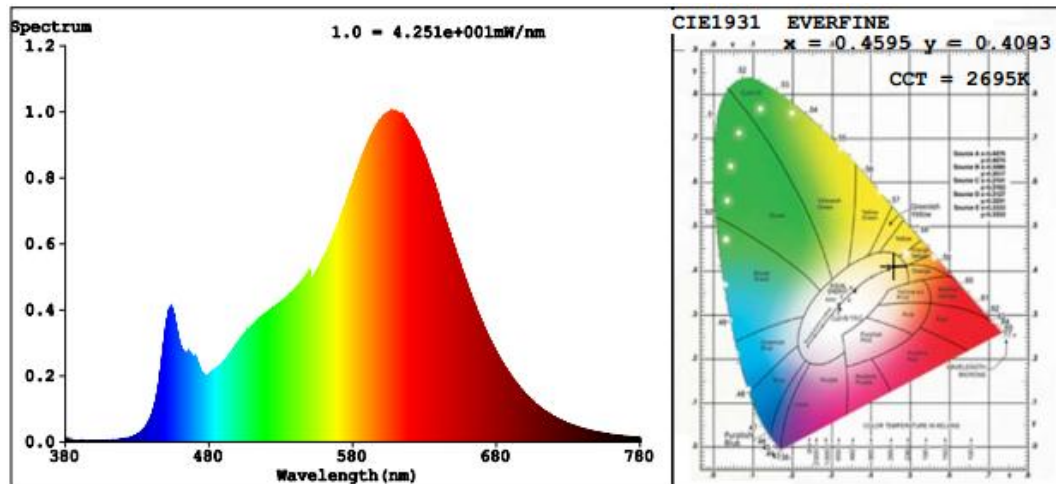
Chromaticity Measurement for Bare-lamp - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	85	R9	13
Frequency (Hz)	60	R2	96	R10	91
CCT (K)	2695	R3	92	R11	85
Duv	-0.0005	R4	83	R12	82
Chromaticity (x, y)	x=0.4595 y=0.4093	R5	86	R13	88
Chromaticity (u', v')	u'=0.2629 v'=0.5268	R6	96	R14	96
Color Rendering Index (CRI)	84.6	R7	80	R15	76
R9	13	R8	59	--	--

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)	2028	2035	Bare Lamp: 1600(-10%)
Luminous Efficacy (lm/W)	134.39	130.95	Bare lamp: >= 110(-3%)
Most Worst Luminous/Highest Watts	130.50		

Spectral Power Distribution & Chromaticity Diagram



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>

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-T504-0015-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	0.2586	29.56	0.9525	12.68
4-A1,A2	277.0	60	0.1278	30.95	0.8742	16.48
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	9
Frequency (Hz)	60	R2	96	R10	91
CCT (K)	2608	R3	90	R11	82
Duv	-0.0021	R4	81	R12	82
Chromaticity (x, y)	x=0.4638 y=0.4057	R5	85	R13	87
Chromaticity (u', v')	u'=0.2673 v'=0.5261	R6	95	R14	95
Color Rendering Index (CRI)	82.9	R7	78	R15	74
R9	9	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)	3522.2	3535.2	In luminaire (2 lamps): 3000(-10%)
Luminous Efficacy (lm/W)	119.15	114.22	In luminaire: >= 100(-3%)
Most Worst Luminous/Highest Watts	113.80		
Zonal lumens in the 0-60 °zone (%)	90.1	--	>= 75(-3)
SC: 0-180 °(if applicable)	1.37	--	1.0-2.0(±0.1)
SC: 90-270 °(if applicable)	1.15	--	1.0-2.0(±0.1)
Beam Angle (°)	102.3	--	--
Center Beam Candle Power (cd)	1470	--	--

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

Report Format Number STD/QR4909-A/2

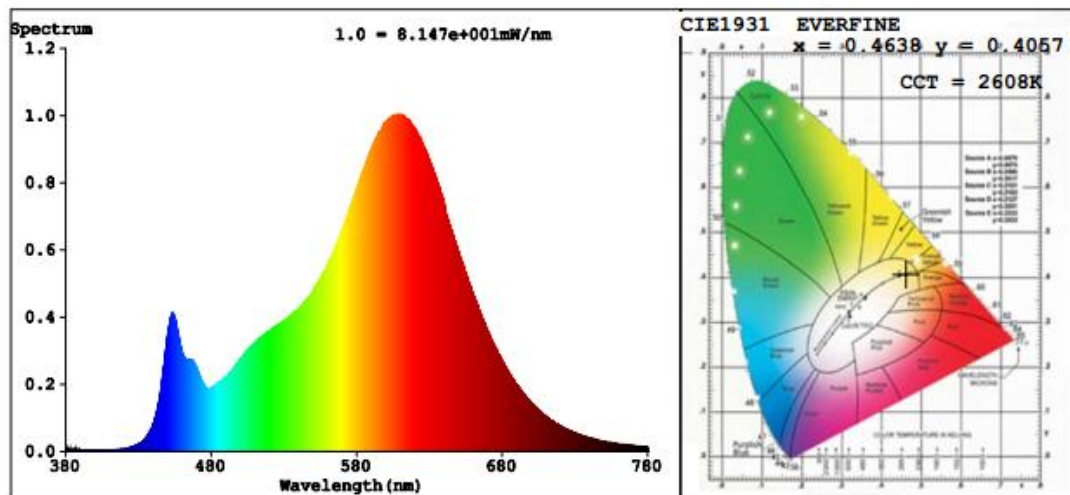
Address: Standard-Tech Building, No.6 Guanhong Road,Guangzhou Science City, Guangzhou 510663, China

Tel: 8620-3229 0320

Fax: 8620-32290422

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

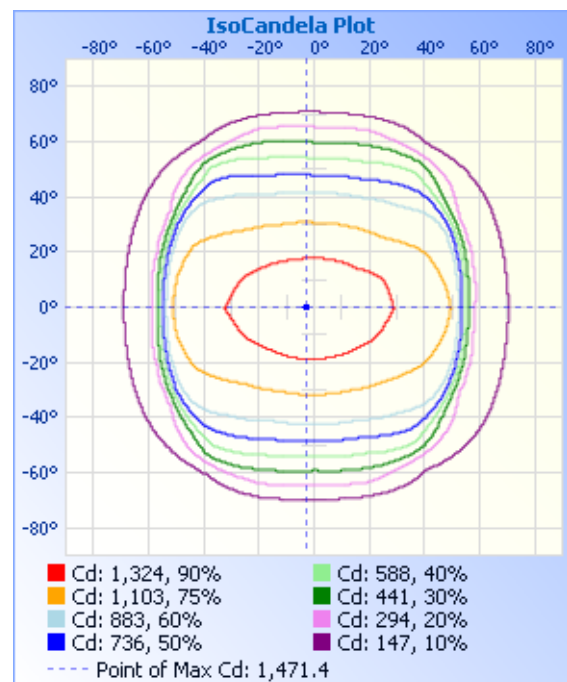
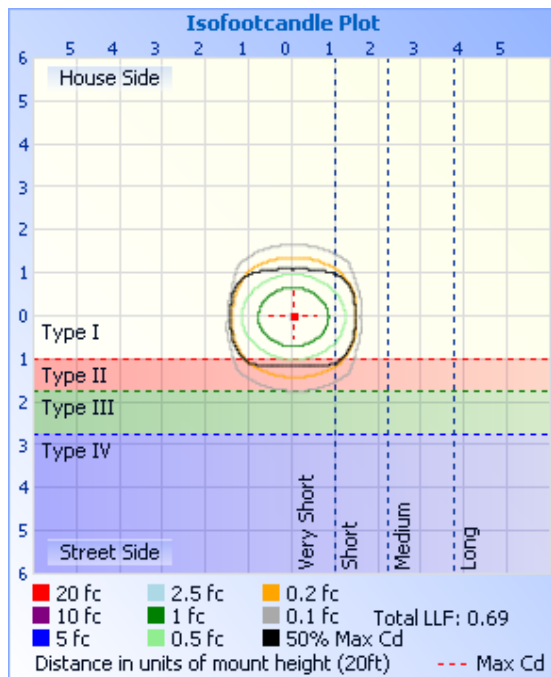
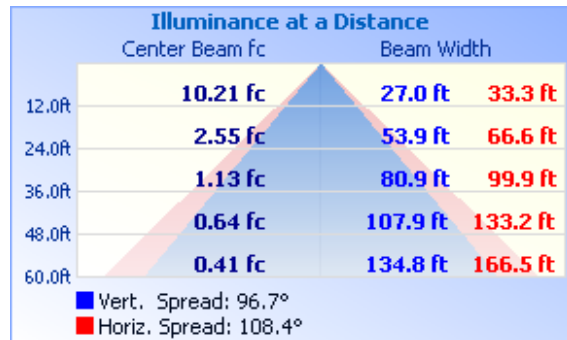
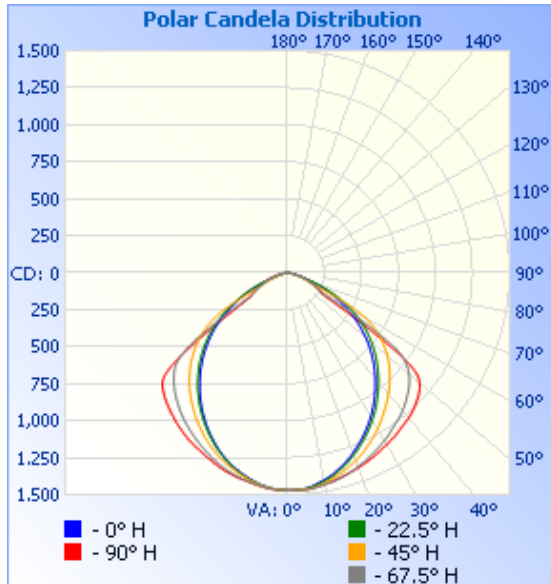
Spectral Power Distribution & Chromaticity Diagram



Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,123.4	31.9%
0-40	1,837.2	52.2%
0-60	3,173.4	90.1%
60-90	343.3	9.7%
70-100	93.0	2.6%
90-120	2.2	0.1%
0-90	3,516.8	99.9%
90-180	5.0	0.1%
0-180	3,521.7	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	138.7	3.9%	90-100	0.4	0%
10-20	393.5	11.2%	100-110	0.8	0%
20-30	591.1	16.8%	110-120	0.9	0%
30-40	713.8	20.3%	120-130	0.8	0%
40-50	751.5	21.3%	130-140	0.7	0%
50-60	584.8	16.6%	140-150	0.5	0%
60-70	250.7	7.1%	150-160	0.4	0%
70-80	79.4	2.3%	160-170	0.3	0%
80-90	13.2	0.4%	170-180	0.1	0%

Photometric Data


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>

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	1470	1470	1470	1470	1470	1470	1470	1470	1470	1470	1470	1470	1470	1470	1470	1470	
5	1464	1470	1464	1462	1462	1462	1467	1470	1470	1466	1465	1459	1456	1458	1458	1461	
10	1439	1450	1435	1428	1422	1429	1444	1453	1448	1446	1435	1425	1417	1424	1426	1437	
15	1417	1428	1389	1374	1365	1377	1400	1430	1426	1420	1390	1377	1365	1371	1381	1409	
20	1385	1392	1330	1305	1294	1308	1349	1394	1401	1383	1340	1312	1300	1304	1329	1368	
25	1348	1342	1261	1224	1213	1231	1287	1352	1372	1341	1280	1232	1219	1226	1266	1321	
30	1314	1289	1181	1136	1124	1147	1216	1309	1341	1298	1206	1143	1126	1139	1192	1269	
35	1272	1229	1096	1040	1026	1054	1140	1259	1308	1252	1127	1048	1027	1043	1112	1215	
40	1227	1159	1006	937	922	957	1061	1211	1276	1198	1042	947	919	942	1026	1151	
45	1175	1084	915	831	812	853	977	1150	1232	1132	952	840	806	832	931	1082	
50	1086	992	814	716	696	745	883	1072	1166	1049	849	727	684	711	824	990	
55	473	724	692	595	573	629	771	896	760	878	722	598	550	581	692	616	
60	266	249	531	465	444	501	605	277	262	289	555	452	406	436	476	250	
65	210	189	216	325	315	354	239	194	201	185	249	298	270	281	168	191	
70	149	130	110	169	176	188	123	132	141	125	107	142	132	131	105	130	
75	90.2	77.1	59.6	72.8	84.5	80.2	67.1	79.4	87.7	73.5	56.9	61.0	62.0	56.5	54.6	76.1	
80	41.2	35.3	28.4	31.0	35.3	34.3	31.6	37.5	42.1	34.5	26.9	27.0	27.0	24.9	25.7	34.5	
85	12.6	11.1	9.31	9.64	10.9	11.0	10.9	12.5	14.3	11.3	8.85	8.35	7.99	7.35	7.92	10.3	
90	0.32	0.48	0.37	0.37	0.63	0.64	0.58	0.64	0.26	0.21	0.37	0.36	0.26	0.42	0.26	0.21	
95	0.32	0.27	0.31	0.21	0.26	0.37	0.26	0.26	0.21	0.16	0.42	0.57	0.47	0.68	0.47	0.21	
100	0.11	0.21	0.47	0.26	0.37	0.63	0.26	0.16	0.32	0.37	0.85	0.83	0.63	0.78	0.74	0.43	
105	0.37	0.64	1.25	0.47	0.78	0.78	1.41	0.26	0.59	0.85	1.20	0.68	0.68	0.78	1.47	0.74	
110	1.53	1.76	1.15	0.57	0.78	0.84	1.00	1.53	1.58	0.96	1.41	0.47	0.57	0.73	0.89	1.58	
115	1.21	1.33	1.10	0.53	0.73	0.78	1.00	0.95	1.11	1.17	1.57	0.37	0.42	0.58	0.89	1.11	
120	1.21	1.39	1.05	0.37	0.57	0.47	1.00	0.95	1.05	1.01	1.68	0.37	0.42	0.47	0.84	1.11	
125	1.26	1.39	1.05	0.37	0.47	0.42	1.00	1.05	1.05	0.96	1.62	0.42	0.47	0.47	0.84	1.05	
130	1.32	1.39	0.94	0.37	0.47	0.42	1.00	1.05	1.05	0.96	1.47	0.52	0.52	0.58	0.84	1.05	
135	1.32	1.39	0.84	0.37	0.57	0.42	1.00	1.05	1.05	0.91	0.99	0.63	0.68	0.68	0.84	1.00	
140	1.32	1.39	0.58	0.37	0.57	0.52	0.79	1.05	1.05	0.91	0.79	0.73	0.73	0.89	0.58	0.90	
145	1.26	1.33	0.47	0.42	0.68	0.84	0.58	1.05	1.05	0.91	0.79	0.99	0.89	0.89	0.74	0.84	
150	1.16	1.17	0.47	0.57	0.73	0.84	0.58	1.11	1.05	1.01	0.94	0.99	0.94	1.10	0.94	0.84	
155	1.11	1.07	0.63	0.78	0.73	0.84	1.45	0.95	1.05	1.01	0.94	0.99	1.05	1.10	1.05	0.90	
160	1.11	0.96	0.73	0.83	0.84	0.84	0.84	0.90	1.05	1.01	0.89	0.99	1.05	1.20	1.05	0.95	
165	1.11	0.91	0.78	0.84	0.94	0.84	0.84	0.90	1.16	1.07	0.89	0.99	1.05	1.26	1.05	0.95	
170	1.11	0.85	0.79	0.94	0.99	1.04	0.89	0.90	1.11	1.07	0.89	1.04	1.05	1.26	1.05	0.95	
175	1.11	0.85	0.94	0.94	1.15	1.05	0.89	0.90	1.11	1.07	0.84	0.89	0.99	1.26	1.05	0.95	
180	1.11	0.85	0.89	0.94	1.15	1.05	0.89	0.90	1.05	1.12	0.84	0.89	0.94	1.15	1.05	0.90	

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-T504-0015-DN-5000B		

Electrical Measurement for Bare-lamp:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE171202	120.0	60	0.1316	15.03	0.9518	12.74
4-A3	277.0	60	0.0637	15.42	0.8738	16.73
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

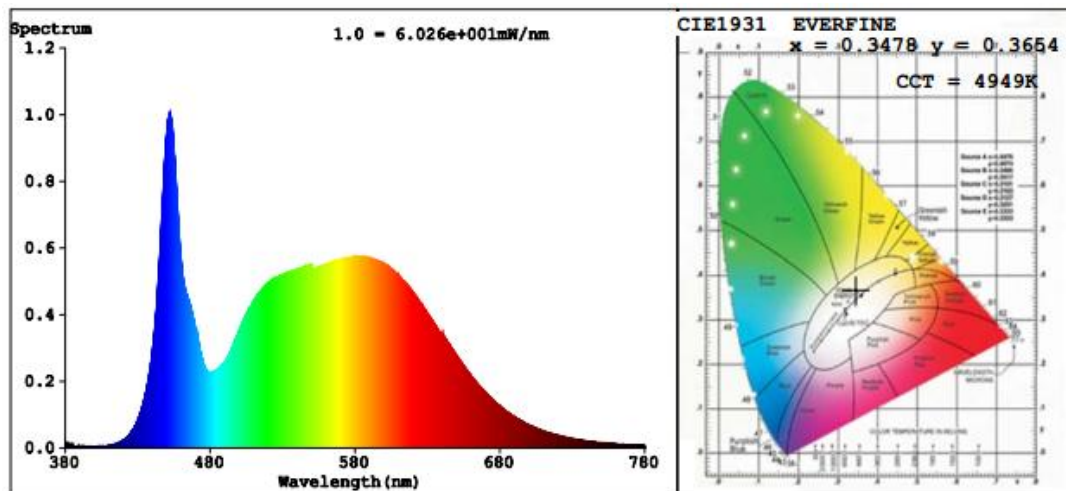
Chromaticity Measurement for Bare-lamp - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	80	R9	8
Frequency (Hz)	60	R2	88	R10	72
CCT (K)	4949	R3	94	R11	80
Duv	0.0057	R4	81	R12	53
Chromaticity (x, y)	x=0.3478 y=0.3654	R5	80	R13	83
Chromaticity (u', v')	u'=0.2080 v'=0.4916	R6	83	R14	97
Color Rendering Index (CRI)	82.8	R7	88	R15	74
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)	2303	2311	Bare Lamp: 1600(-10%)
Luminous Efficacy (lm/W)	153.23	149.87	Bare lamp: >= 110(-3%)
Most Worst Luminous/Highest Watts	149.35		

Spectral Power Distribution & Chromaticity Diagram



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>

2.3 Performance Assessment:

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
IK-T504-0015-DN-2630B	2700K	2028	15.09	134.39
IK-T504-L160-0015-DN-30-B	3000K	2083 ^{*1}	15.06 ^{*2}	138.31 ^{*3}
IK-T504-L160-0015-DN-35-B	3500K	2138 ^{*1}	15.06 ^{*2}	141.97 ^{*3}
IK-T504-L160-0015-DN-40-B	4000K	2193 ^{*1}	15.06 ^{*2}	145.62 ^{*3}
IK-T504-L160-0015-DN-45-B	4500K	2248 ^{*1}	15.06 ^{*2}	149.27 ^{*3}
IK-T504-0015-DN-5000B	5000K	2303	15.03	153.23

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

$$2083 = (2303 - 2028) / 5 * 1 + 2028$$

$$2138 = (2303 - 2028) / 5 * 2 + 2028$$

$$2193 = (2303 - 2028) / 5 * 3 + 2028$$

$$2248 = (2303 - 2028) / 5 * 4 + 2028$$

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

$$15.06 = (15.09 + 15.03) / 2$$

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

$$138.31 = 2083 / 15.06$$

$$141.97 = 2138 / 15.06$$

$$145.62 = 2193 / 15.06$$

$$149.27 = 2248 / 15.06$$

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 *******