

LM-79-08 Test Report

For

IKIO LED LIGHTING**(Brand Name: IKIO)**8470 Allison Pointe Blvd, Suite 128
Indianapolis, IN 46250**2x4 Luminaires for Ambient Lighting of Interior
Commercial Spaces**

Model name(s): IK-FP24-0050-DX-XX-J

Representative (Tested) Model: IK-FP24-0050-DX-30-J
IK-FP24-0050-DX-35-J
IK-FP24-0050-DX-40-J
IK-FP24-0050-DX-50-J

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

Test & Report By:

*Jack Luo*Engineer: Jack Luo
Date: Mar.13,2017

Review By:

Tommy Liang

Manager: Tommy Liang

Note: 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-FP24-0050-DX-XX-J	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	2x4 Luminaires for Ambient Lighting of Interior Commercial Spaces	
Rated Voltage / Frequency	100~277 Vac, 50/60 Hz	
Nominal Power	50W	
Rated Initial Lamp Lumen	--	
Declared CCT	3000K,3500K,4000K,5000K	
LED Manufacturer	Dongguan Sino-win Opto-Electronic Technology Co.,Ltd.	
LED Model	ZT2835WOM1	
Sample Number	GZE170321-F1(3000K),F2(3500K), F3(4000K),F4(5000K)	
Lamp Length	--	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.11, 2017
Date of Test	Mar.12, 2017
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	2017-03-12	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-FP24-0050-DX-30-J		

Electrical Measurement:

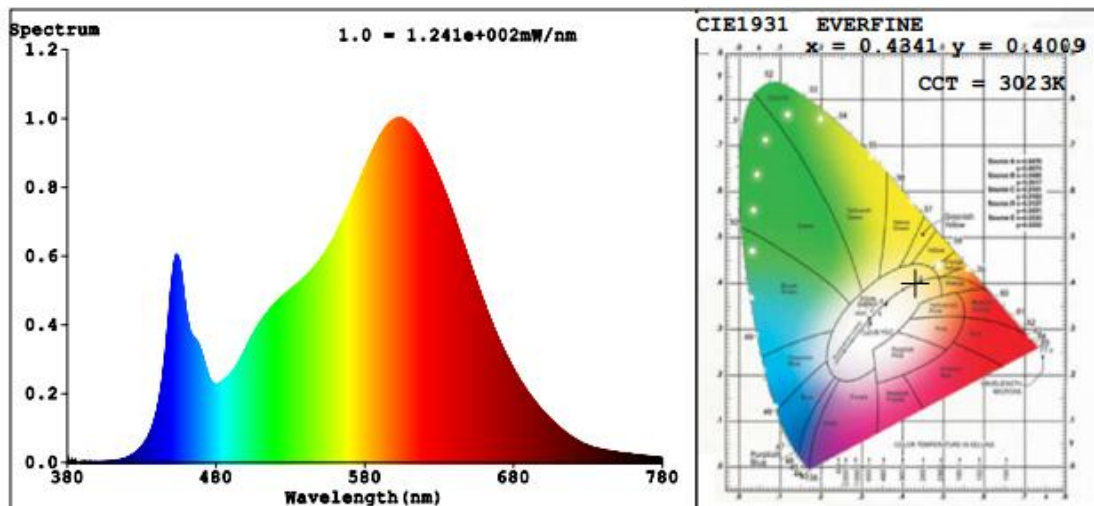
Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170321	120.0	60	0.4159	48.77	0.9771	6.90
-F1	277.0	60	0.1944	48.42	0.8994	15.03
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	83	R9	12
Frequency (Hz)	60	R2	94	R10	85
CCT (K)	3023	R3	94	R11	82
Duv	-0.0009	R4	82	R12	74
Chromaticity (x, y)	x=0.4341 y=0.4009	R5	84	R13	86
Chromaticity (u', v')	u'=0.2501 v'=0.5197	R6	93	R14	98
Color Rendering Index (CRI)	83.9	R7	82	R15	76
R9	12	R8	60	--	--

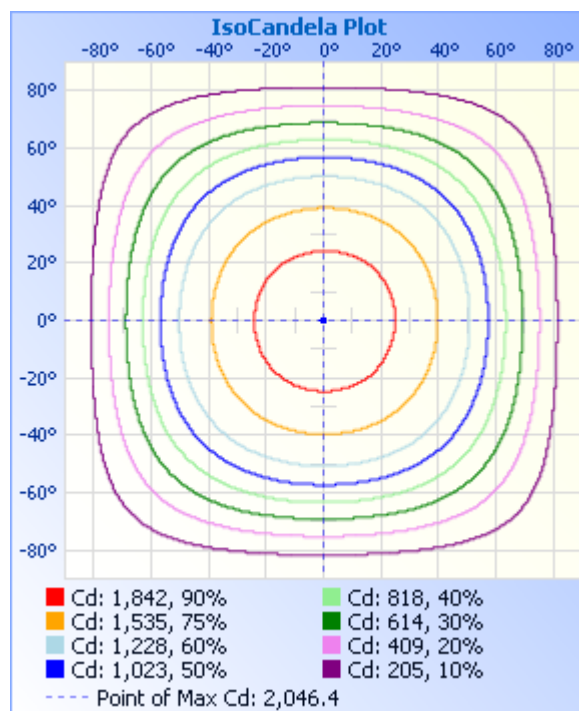
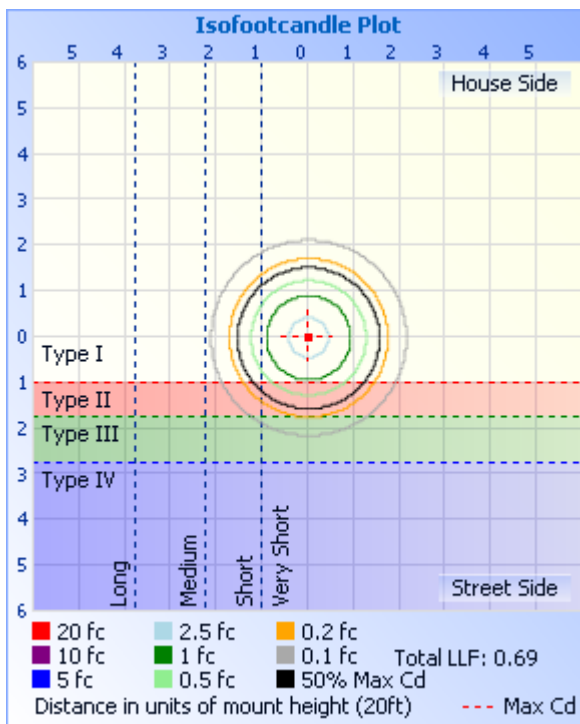
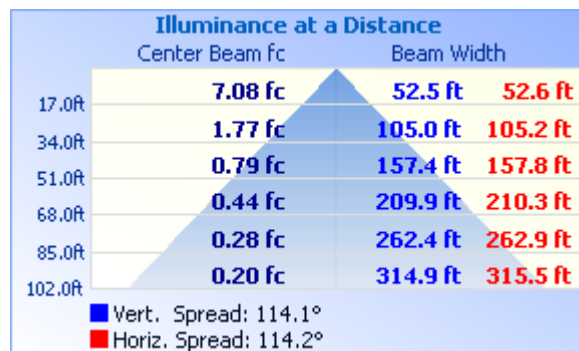
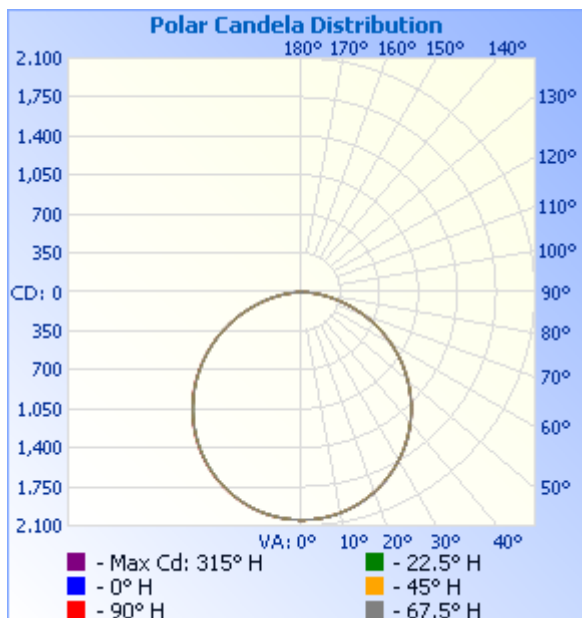
Photometric Measurement –Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	5966.3	5961.8	>=3000(-10%)	
Luminous Efficacy (lm/W)	122.34	123.13	Standard: >= 105(-3%)	Premium: >= 125(-3%)
Zonal lumens in the 0-60 °zone (%)	78.2	--	>= 75(-3)	
SC: 0-180 °(if applicable)	1.27	--	--	
SC: 90-270 °(if applicable)	1.26	--	--	
Beam Angle (°)	114.2	--	--	
Center Beam Candle Power (cd)	2046	--	--	

Spectral Power Distribution & Chromaticity Diagram

Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,595.2	26.7%
0-40	2,620.2	43.9%
0-60	4,663.9	78.2%
60-90	1,299.8	21.8%
70-100	553.0	9.3%
90-120	1.7	0%
0-90	5,963.7	100%
90-180	2.0	0%
0-180	5,965.7	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	193.7	3.2%	90-100	1.3	0%
10-20	555.9	9.3%	100-110	0.2	0%
20-30	845.6	14.2%	110-120	0.2	0%
30-40	1,025.0	17.2%	120-130	0.1	0%
40-50	1,070.1	17.9%	130-140	0.0	0%
50-60	973.7	16.3%	140-150	0.0	0%
60-70	748.2	12.5%	150-160	0.0	0%
70-80	433.7	7.3%	160-170	0.0	0%
80-90	117.9	2.0%	170-180	0.0	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

γ (DEG) \ C (DEG)	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	
0	2046	2046	2046	2046	2046	2046	2046	2046	2046	2046	2046	2046	2046	2046	2046	2046	
5	2038	2039	2039	2039	2039	2038	2038	2038	2038	2037	2036	2037	2037	2037	2037	2037	
10	2013	2015	2015	2014	2014	2013	2013	2012	2012	2010	2010	2010	2010	2010	2011	2011	
15	1970	1973	1973	1973	1972	1970	1970	1970	1969	1967	1967	1967	1967	1967	1967	1967	
20	1911	1914	1915	1914	1913	1911	1911	1911	1910	1908	1907	1907	1908	1907	1908	1907	
25	1836	1839	1840	1840	1838	1836	1836	1836	1834	1834	1831	1832	1832	1831	1832	1831	
30	1744	1748	1749	1749	1748	1745	1746	1746	1745	1743	1741	1741	1741	1739	1741	1740	
35	1639	1642	1644	1644	1643	1641	1642	1641	1640	1638	1635	1636	1635	1633	1635	1634	
40	1520	1523	1525	1525	1524	1522	1524	1523	1522	1519	1516	1516	1515	1514	1516	1514	
45	1383	1391	1393	1393	1393	1391	1393	1392	1391	1388	1385	1383	1382	1382	1383	1382	
50	1244	1246	1249	1249	1249	1249	1251	1250	1248	1244	1241	1240	1238	1238	1239	1238	
55	1088	1091	1094	1095	1096	1096	1097	1096	1095	1091	1087	1085	1083	1083	1084	1083	
60	923	927	930	932	933	934	935	934	932	928	924	922	920	920	920	920	
65	752	755	759	762	764	765	766	764	762	758	754	752	749	749	749	749	
70	576	579	584	590	590	591	591	590	588	583	580	579	576	576	575	574	
75	403	404	410	415	417	419	418	413	413	410	408	407	405	404	403	401	
80	237	241	248	253	255	256	254	248	246	246	247	246	245	244	242	240	
85	96.2	100	105	110	112	112	108	102	101	101	101	104	103	101	99.2	98.0	
90	0.10	0.29	0.56	0.78	0.97	0.90	0.57	0.57	0.00	0.00	0.00	22.9	7.01	0.42	0.00	0.00	
95	0.00	0.00	0.05	0.25	0.38	0.23	0.00	0.00	0.00	0.00	0.10	13.5	4.35	0.37	0.00	0.00	
100	0.00	0.00	0.00	0.22	0.41	0.29	0.00	0.00	0.00	0.00	0.18	4.16	1.69	0.29	0.06	0.00	
105	0.00	0.00	0.25	0.31	0.41	0.38	0.00	0.00	0.00	0.00	0.38	0.35	0.47	0.21	0.13	0.00	
110	0.00	0.00	0.47	0.44	0.48	0.40	0.00	0.00	0.05	0.00	0.44	0.16	0.42	0.10	0.10	0.00	
115	0.00	0.32	0.40	0.16	0.38	0.16	0.31	0.20	0.05	0.00	0.47	0.00	0.00	0.00	0.05	0.00	
120	0.00	0.35	0.39	0.00	0.16	0.00	0.35	0.31	0.05	0.00	0.16	0.00	0.00	0.00	0.05	0.00	
125	0.20	0.38	0.37	0.00	0.05	0.00	0.47	0.41	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
130	0.18	0.42	0.21	0.00	0.00	0.00	0.21	0.38	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
135	0.15	0.18	0.00	0.00	0.00	0.00	0.10	0.26	0.10	0.00	0.00	0.05	0.10	0.00	0.00	0.00	
140	0.13	0.05	0.00	0.00	0.00	0.00	0.00	0.19	0.10	0.05	0.00	0.13	0.21	0.00	0.00	0.00	
145	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.00	0.26	0.26	0.16	0.00	0.00	
150	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.00	0.36	0.32	0.33	0.00	0.00	
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.05	0.00	0.34	0.33	0.42	0.21	0.00	
160	0.00	0.00	0.00	0.10	0.16	0.00	0.00	0.00	0.24	0.05	0.00	0.33	0.34	0.44	0.31	0.05	
165	0.00	0.00	0.00	0.40	0.20	0.05	0.00	0.00	0.27	0.07	0.00	0.32	0.34	0.47	0.33	0.10	
170	0.00	0.00	0.05	0.39	0.36	0.42	0.00	0.00	0.23	0.18	0.00	0.32	0.35	0.49	0.31	0.05	
175	0.00	0.00	0.10	0.37	0.40	0.49	0.00	0.00	0.17	0.05	0.00	0.16	0.36	0.51	0.23	0.00	
180	0.00	0.00	0.10	0.36	0.42	0.26	0.00	0.00	0.16	0.00	0.00	0.10	0.36	0.47	0.21	0.00	

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	2017-03-12	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-FP24-0050-DX-35-J		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170321	120.0	60	0.4193	49.09	0.9756	6.92
-F2	277.0	60	0.1964	48.89	0.8986	14.85
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

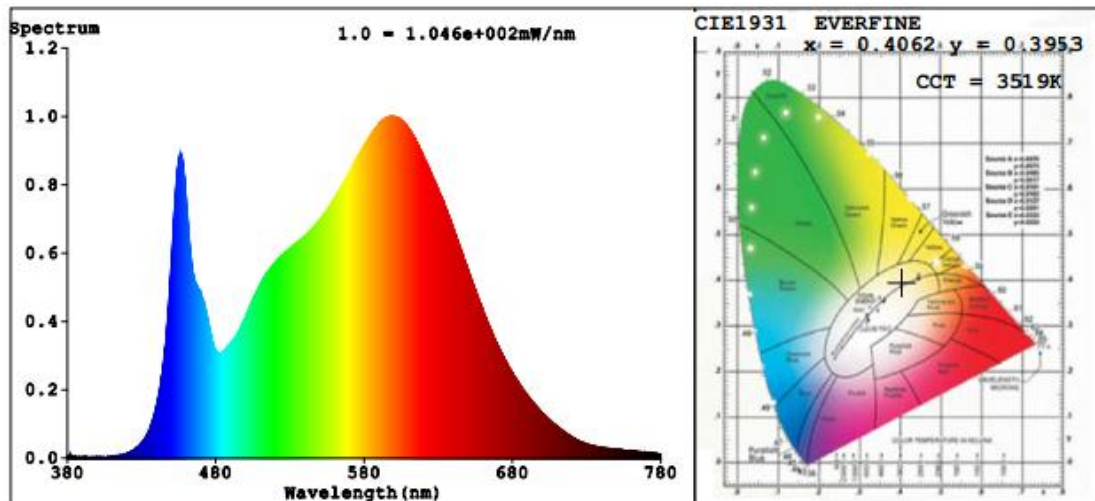
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	83	R9	12
Frequency (Hz)	60	R2	93	R10	84
CCT (K)	3519	R3	95	R11	80
Duv	0.0018	R4	81	R12	65
Chromaticity (x, y)	x=0.4062 y=0.3953	R5	83	R13	86
Chromaticity (u', v')	u'=0.2344 v'=0.5133	R6	91	R14	98
Color Rendering Index (CRI)	84.1	R7	84	R15	76
R9	12	R8	63	--	--

Photometric Measurement –Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	6114	6131	>=3000(-10%)	
Luminous Efficacy (lm/W)	124.55	125.40	Standard: >= 105(-3%)	Premium: >= 125(-3%)

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

Test date	2017-03-12	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-FP24-0050-DX-40-J		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170321	120.0	60	0.4191	49.11	0.9765	6.81
-F3	277.0	60	0.1962	48.78	0.8974	14.87
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

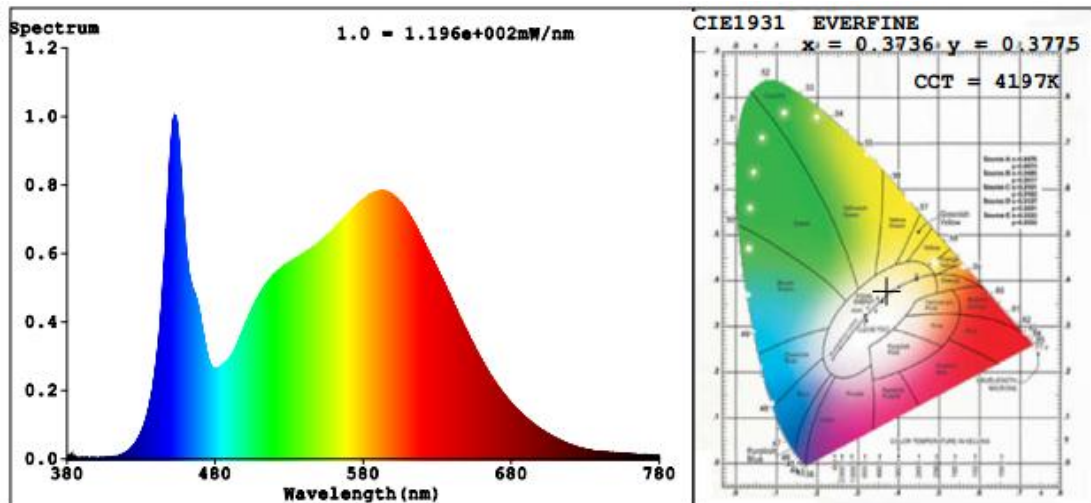
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	3
Frequency (Hz)	60	R2	90	R10	76
CCT (K)	4197	R3	96	R11	79
Duv	0.0024	R4	80	R12	58
Chromaticity (x, y)	x=0.3736 y=0.3775	R5	80	R13	83
Chromaticity (u', v')	u'=0.2203 v'=0.5009	R6	86	R14	98
Color Rendering Index (CRI)	82.6	R7	85	R15	74
R9	3	R8	63	--	--

Photometric Measurement –Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	6197	6187	>=3000(-10%)	
Luminous Efficacy (lm/W)	126.19	126.83	Standard: >= 105(-3%)	Premium: >= 125(-3%)

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>

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

Test date	2017-03-12	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-FP24-0050-DX-50-J		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170321	120.0	60	0.4185	49.01	0.9759	7.22
-F4	277.0	60	0.1961	48.75	0.8976	15.14
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

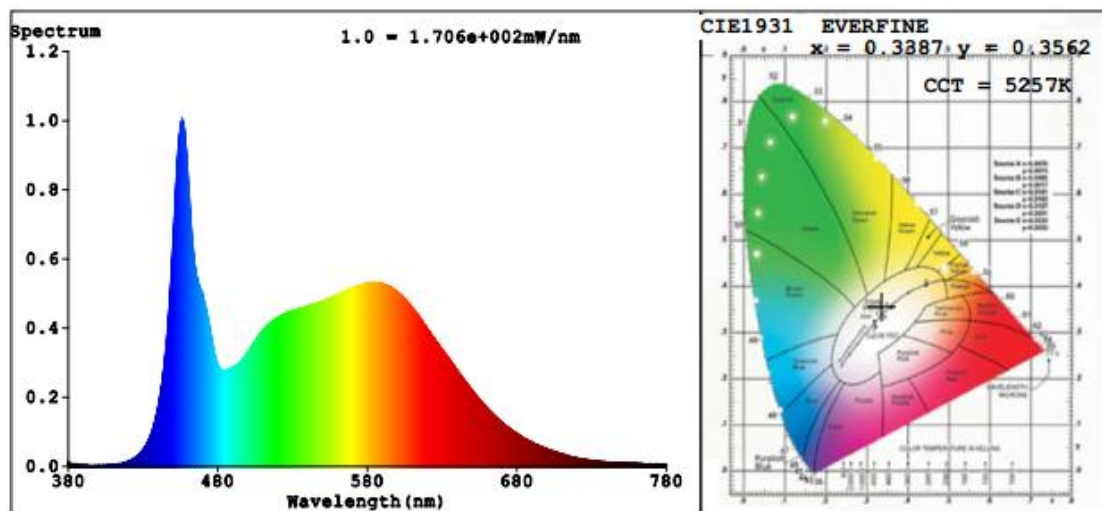
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	1
Frequency (Hz)	60	R2	92	R10	81
CCT (K)	5257	R3	94	R11	78
Duv	0.0049	R4	78	R12	59
Chromaticity (x, y)	x=0.3387 y=0.3562	R5	81	R13	85
Chromaticity (u', v')	u'=0.2054 v'=0.4860	R6	88	R14	97
Color Rendering Index (CRI)	82.8	R7	84	R15	75
R9	1	R8	63	--	--

Photometric Measurement –Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	6248	6243	>=3000(-10%)	
Luminous Efficacy (lm/W)	127.48	128.06	Standard: >= 105(-3%)	Premium: >= 125(-3%)

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>

3. Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-331	2 meter Integrating Sphere	2016-07-01	2017-06-30
ST-R-327	Spectral analysis system HAAS-2000	2016-07-01	2017-06-30
D204	Standard Lamp	2016-07-12	2017-07-11
PF2010	Power Meter for Integrating Sphere	2016-07-01	2017-06-30
GO-R5000	Goniophotometer system	2016-07-01	2017-06-30
D908S	Standard Lamp	2016-07-12	2017-07-11
PF210	Power Meter for Goniophotometer	2016-07-07	2017-07-06
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 *******