

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-FP24-0040-DX-XX-J

Representative (Tested) Model: IK-FP24-0040-DX-30-J
IK-FP24-0040-DX-35-J
IK-FP24-0040-DX-40-J
IK-FP24-0040-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

Update: 2017-04-18

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

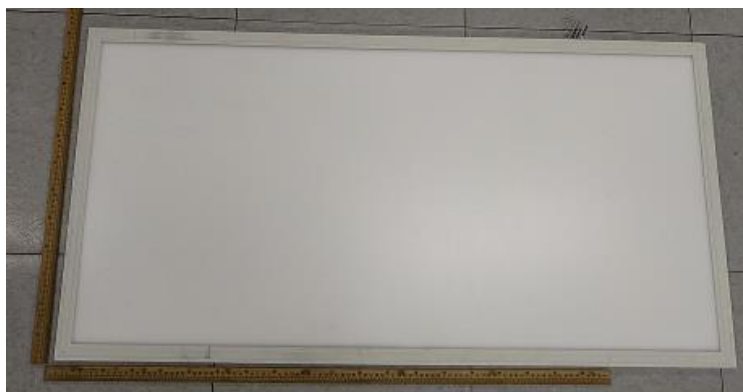
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1.1 Product Information:

Organization Name	IKIO LED LIGHTING	
Brand Name	IKIO	
Model Number	IK-FP24-0040-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	100~382 Vac, 50/60 Hz	
Nominal Power	40W	
Rated Initial Lamp Lumen	--	
Declared CCT	3000K,3500K,4000K,5000K	
LED Manufacturer	EVERLIGHT ELECTRONICS CO., LTD	
LED Model	67-21S Series	
Sample Number	GZE170221-E1(3000K),E2(3500K), E3(4000K),E4(5000K)	
Lamp Length	--	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.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-FP24-0040-DX-30-J		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170221	120.0	60	0.3457	41.36	0.9971	9.52
-E1	382.0	60	0.1182	40.20	0.8905	13.41
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)	3019	R3	95	R11	82
Duv	-0.0007	R4	82	R12	74
Chromaticity (x, y)	x=0.4346 y=0.4017	R5	84	R13	86
Chromaticity (u', v')	u'=0.2501 v'=0.5201	R6	92	R14	98
Color Rendering Index (CRI)	84.0	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	382.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	5075.6	4959.6	>=3000(-10%)	
Luminous Efficacy (lm/W)	124.01	124.36	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 (°)	114.1	--	--	
Center Beam Candle Power (cd)	1742	--	--	

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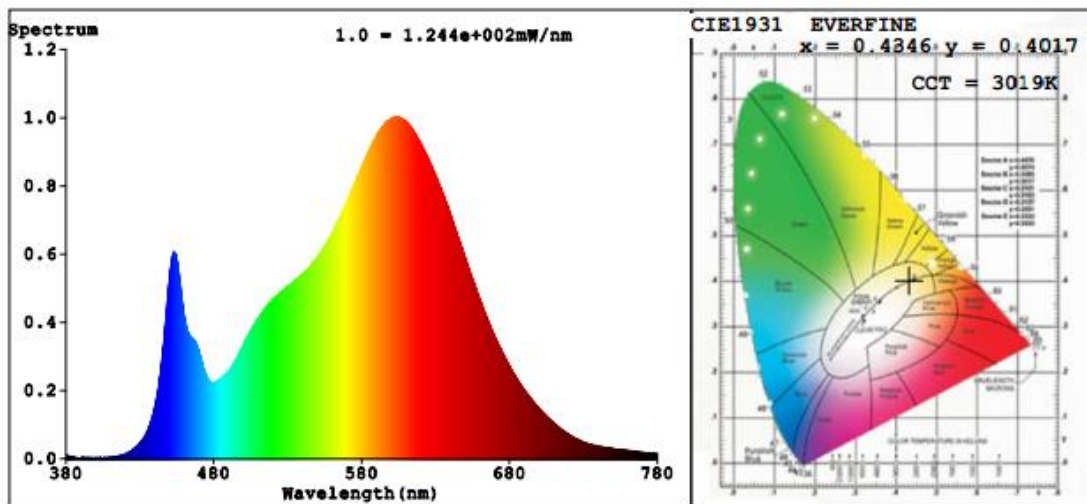
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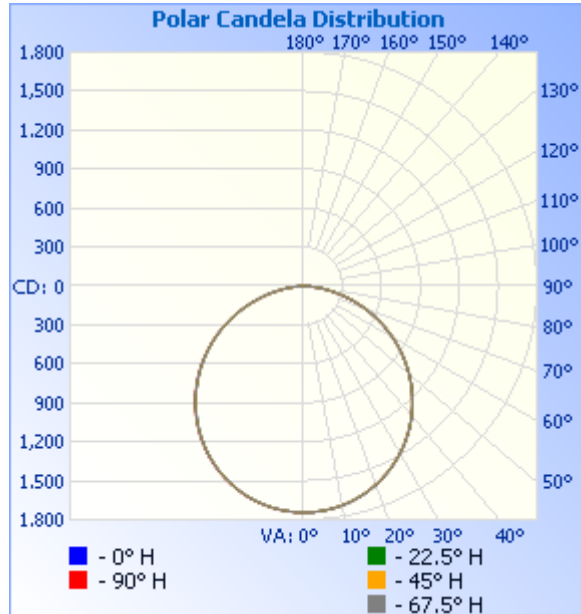
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Spectral Power Distribution & Chromaticity Diagram

Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,357.5	26.7%
0-40	2,229.6	43.9%
0-60	3,968.4	78.2%
60-90	1,106.4	21.8%
70-100	470.1	9.3%
90-120	0.3	0%
0-90	5,074.8	100%
90-180	0.4	0%
0-180	5,075.2	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	164.9	3.2%	90-100	0.1	0%
10-20	473.1	9.3%	100-110	0.1	0%
20-30	719.6	14.2%	110-120	0.0	0%
30-40	872.1	17.2%	120-130	0.0	0%
40-50	910.5	17.9%	130-140	0.0	0%
50-60	828.3	16.3%	140-150	0.0	0%
60-70	636.4	12.5%	150-160	0.0	0%
70-80	368.7	7.3%	160-170	0.0	0%
80-90	101.3	2.0%	170-180	0.0	0%

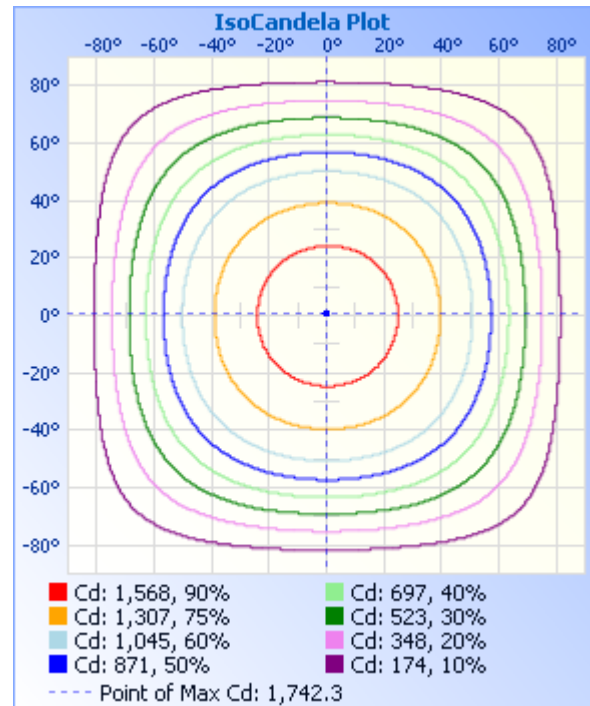
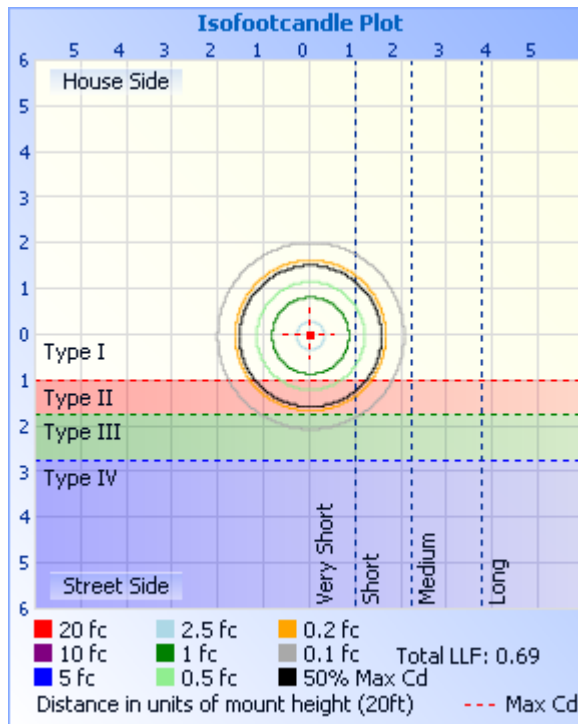
Photometric Data



Illuminance at a Distance

Center Beam fc	Beam Width	
17.0ft	6.03 fc	52.5 ft 52.5 ft
34.0ft	1.51 fc	104.9 ft 105.0 ft
51.0ft	0.67 fc	157.4 ft 157.6 ft
68.0ft	0.38 fc	209.9 ft 210.1 ft
85.0ft	0.24 fc	262.3 ft 262.6 ft
102.0ft	0.17 fc	314.8 ft 315.1 ft

■ Vert. Spread: 114.1°
 ■ Horiz. Spread: 114.2°



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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	1742	1742	1742	1742	1742	1742	1742	1742	1742	1742	1742	1742	1742	1742	1742	1742	
5	1735	1736	1735	1736	1735	1735	1735	1735	1734	1733	1733	1733	1735	1734	1734	1734	
10	1713	1715	1714	1715	1714	1713	1712	1713	1713	1711	1710	1711	1712	1711	1711	1712	
15	1677	1679	1678	1679	1678	1677	1677	1677	1677	1674	1673	1674	1675	1674	1674	1675	
20	1626	1628	1628	1629	1628	1627	1626	1627	1626	1624	1622	1623	1623	1623	1623	1624	
25	1563	1564	1564	1565	1565	1563	1562	1563	1562	1560	1557	1559	1559	1558	1558	1559	
30	1485	1487	1487	1489	1487	1486	1486	1486	1485	1483	1480	1481	1481	1480	1481	1481	
35	1395	1397	1398	1399	1398	1397	1397	1397	1396	1393	1390	1391	1391	1390	1391	1391	
40	1293	1295	1296	1298	1298	1296	1296	1296	1295	1292	1289	1289	1289	1288	1289	1290	
45	1181	1183	1183	1185	1186	1184	1185	1185	1184	1180	1176	1176	1177	1175	1177	1177	
50	1058	1060	1061	1063	1064	1063	1063	1064	1062	1058	1054	1054	1053	1053	1054	1055	
55	926	928	929	932	933	933	934	933	931	927	923	923	922	922	923	922	
60	786	788	790	793	794	795	795	795	793	789	785	784	783	783	783	783	
65	640	642	645	648	650	651	651	650	648	644	640	639	637	637	638	638	
70	491	493	496	500	503	504	503	502	500	496	493	491	489	489	489	489	
75	341	343	348	354	356	357	355	352	352	348	346	345	343	343	342	342	
80	201	204	211	216	217	218	216	212	211	209	208	208	207	207	205	205	
85	83.0	86.4	90.2	93.9	95.4	96.2	94.1	91.0	89.9	88.4	87.6	87.9	86.7	85.9	84.3	84.5	
90	0.05	0.05	0.32	0.87	1.58	1.66	1.28	0.78	0.24	0.00	0.00	0.33	0.38	0.43	0.00	0.00	
95	0.00	0.00	0.00	0.10	0.24	0.05	0.00	0.00	0.00	0.00	0.00	0.37	0.35	0.45	0.00	0.00	
100	0.00	0.00	0.00	0.10	0.24	0.05	0.00	0.00	0.00	0.00	0.00	0.29	0.32	0.43	0.00	0.00	
105	0.00	0.00	0.00	0.19	0.33	0.10	0.00	0.00	0.00	0.00	0.00	0.19	0.30	0.33	0.05	0.00	
110	0.00	0.00	0.24	0.43	0.33	0.10	0.00	0.00	0.00	0.00	0.00	0.09	0.10	0.00	0.05	0.00	
115	0.00	0.00	0.24	0.14	0.33	0.05	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
120	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.07	0.00	0.00	0.00	
125	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
130	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.10	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
135	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.05	0.00	0.00	0.00	
145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.15	0.05	0.00	0.00	
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.21	0.19	0.00	0.00	
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.31	0.29	0.05	0.00	
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.34	0.38	0.21	0.00	
165	0.00	0.00	0.00	0.24	0.05	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.35	0.33	0.27	0.00	
170	0.00	0.00	0.00	0.28	0.32	0.05	0.00	0.00	0.22	0.00	0.00	0.00	0.37	0.35	0.28	0.00	
175	0.00	0.00	0.00	0.29	0.30	0.10	0.00	0.00	0.10	0.00	0.00	0.00	0.38	0.37	0.10	0.00	
180	0.00	0.00	0.00	0.29	0.38	0.10	0.00	0.00	0.10	0.00	0.00	0.00	0.29	0.24	0.15	0.00	

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-FP24-0040-DX-35-J		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170221	120.0	60	0.3446	41.16	0.9955	9.93
-E2	382.0	60	0.1178	40.11	0.8916	12.97
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

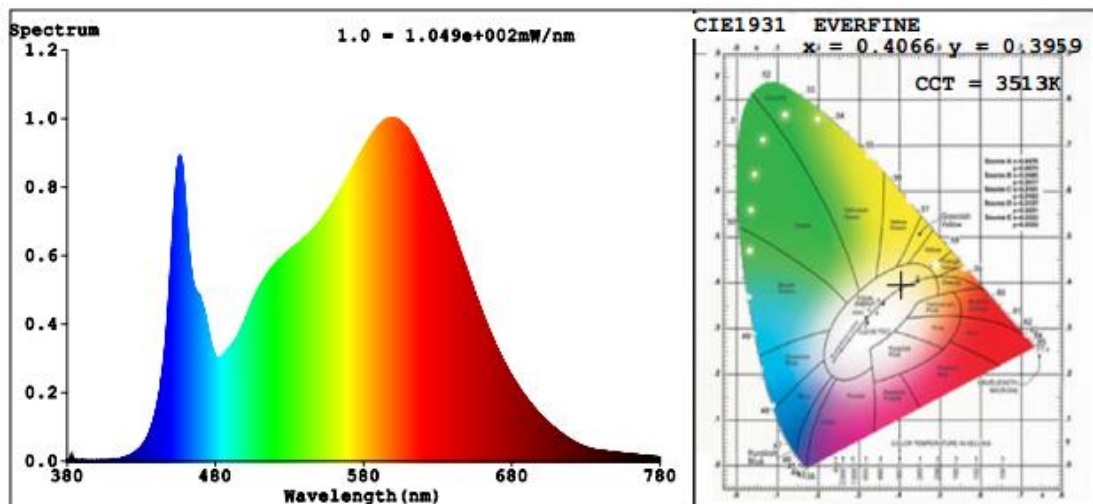
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	83	R9	12
Frequency (Hz)	60	R2	93	R10	84
CCT (K)	3513	R3	96	R11	81
Duv	0.0020	R4	81	R12	65
Chromaticity (x, y)	x=0.4066 y=0.3959	R5	83	R13	86
Chromaticity (u', v')	u'=0.2345 v'=0.5136	R6	91	R14	98
Color Rendering Index (CRI)	84.2	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	382.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	5176	5051	>=3000(-10%)	
Luminous Efficacy (lm/W)	125.75	125.93	Standard: >= 105(-3%)	Premium: >= 125(-3%)

Spectral Power Distribution & Chromaticity Diagram



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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-FP24-0040-DX-40-J		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170221	120.0	60	0.3468	41.47	0.9965	9.34
-E3	382.0	60	0.1183	40.28	0.8912	13.02
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

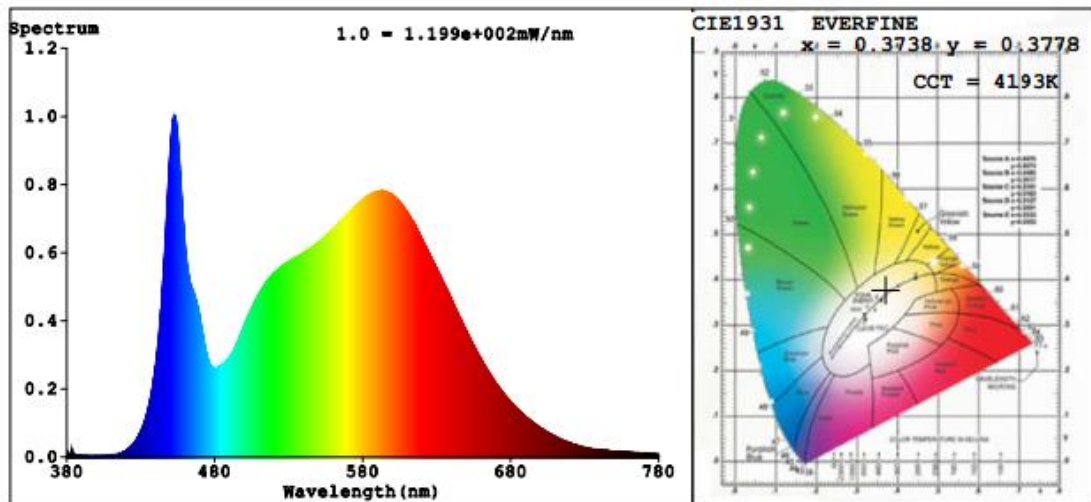
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	3
Frequency (Hz)	60	R2	90	R10	76
CCT (K)	4193	R3	96	R11	79
Duv	0.0025	R4	80	R12	58
Chromaticity (x, y)	x=0.3738 y=0.3778	R5	80	R13	83
Chromaticity (u', v')	u'=0.2203 v'=0.5011	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	382.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	5277	5145	>=3000(-10%)	
Luminous Efficacy (lm/W)	127.25	127.73	Standard: >= 105(-3%)	Premium: >= 125(-3%)

Spectral Power Distribution & Chromaticity Diagram



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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-FP24-0040-DX-50-J		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170221	120.0	60	0.3426	40.93	0.9957	9.18
-E4	382.0	60	0.1172	39.88	0.8909	13.08
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

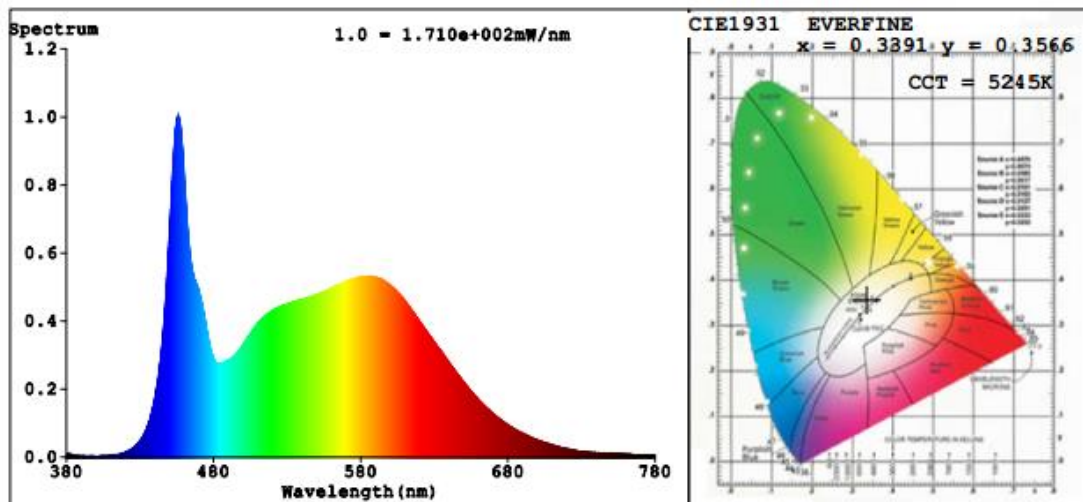
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	1
Frequency (Hz)	60	R2	92	R10	81
CCT (K)	5245	R3	94	R11	78
Duv	0.0050	R4	78	R12	59
Chromaticity (x, y)	x=0.3391 y=0.3566	R5	81	R13	85
Chromaticity (u', v')	u'=0.2054 v'=0.4862	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	382.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	5255	5139	>=3000(-10%)	
Luminous Efficacy (lm/W)	128.39	128.86	Standard: >= 105(-3%)	Premium: >= 125(-3%)

Spectral Power Distribution & Chromaticity Diagram



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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 *******