LM-79-08 Test Report

For

IKIO LED LIGHTING

(Brand Name: IKIO)

8470 Allison Pointe Blvd, Suite 128
Indianapolis, IN 46250

2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces

Model name(s): IK-FP22-0040-DX-XX-J

Representative (Tested) Model: IK-FP22-0040-DX-30-J
IK-FP22-0040-DX-35-J
IK-FP22-0040-DX-40-J
IK-FP22-0040-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

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.

1.1 Product Information:

Organization Name	IKIO LED LIGHTING	
Brand Name	IKIO	
Model Number	IK-FP22-0040-DX-XX-J	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	2x2 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	Dongguan Sino-win Opto-Electronic Technology Co.,Ltd.	
LED Model	ZT2835WOM1	
Sample Number	GZE170221-D1(3000K),D2(3500K), D3(4000K),D4(5000K)	
Lamp Length	--	mm
Lamp Width	--	mm
Number of Units (modular products)	N/A	s

Photo

1.2 Test Specifications:

Date of Receipt	Mar.11, 2017
Date of Test	Mar.12, 2017
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	2017-03-12	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-FP22-0040-DX-30-J		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170221 -D1	120.0	60	0.3263	39.03	0.9967	6.45
	382.0	60	0.1147	39.43	0.9002	14.44
				DLC Pass Criteria	>= 0.9(-3%)	<= 20(+5)

Chromaticity Measurement - Sphere-Spectroradiometer Method:

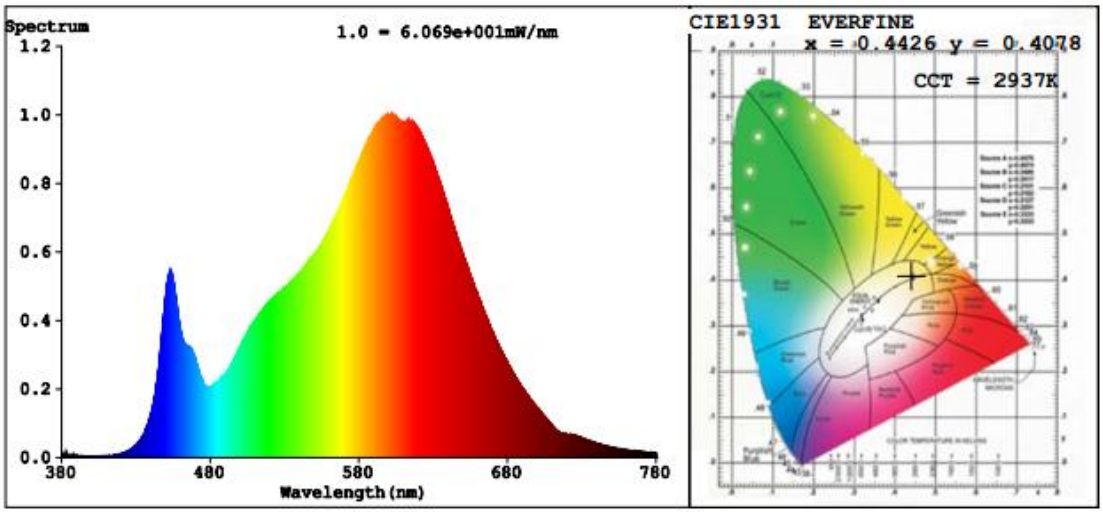
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	2937
Duv	0.0007
Chromaticity (x, y)	x=0.4426 y=0.4078
Chromaticity (u', v')	x=0.4426 y=0.4078
Color Rendering Index (CRI)	83.5
R9	11

Special Color Rendering Indices			
R1	82	R9	11
R2	93	R10	83
R3	95	R11	81
R4	81	R12	72
R5	83	R13	85
R6	92	R14	98
R7	83	R15	74
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)	4754.1	4847.6	>=2000(-10%)	
Luminous Efficacy (lm/W)	121.81	122.94	Standard: >= 105(-3%)	Premium: >= 125(-3%)
Zonal lumens in the 0-60 °zone (%)	78.8	--	>= 75(-3)	
SC: 0-180 °(if applicable)	1.24	--	--	
SC: 90-270 °(if applicable)	1.26	--	--	
Beam Angle (°)	111.1	--	--	
Center Beam Candle Power (cd)	1681	--	--	

Spectral Power Distribution & Chromaticity Diagram

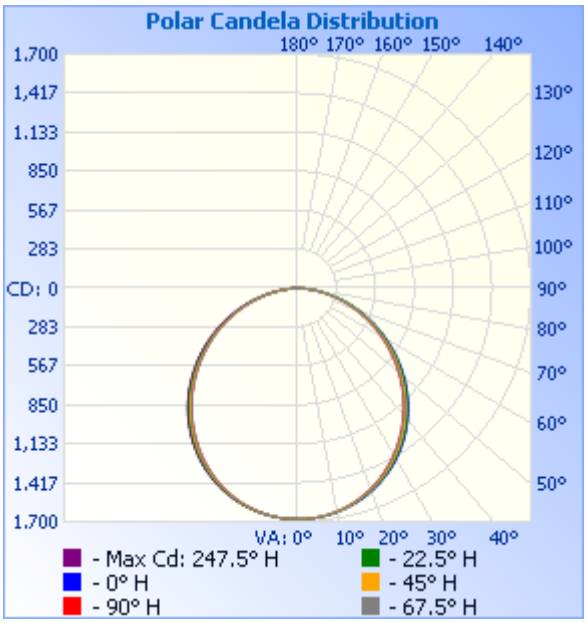


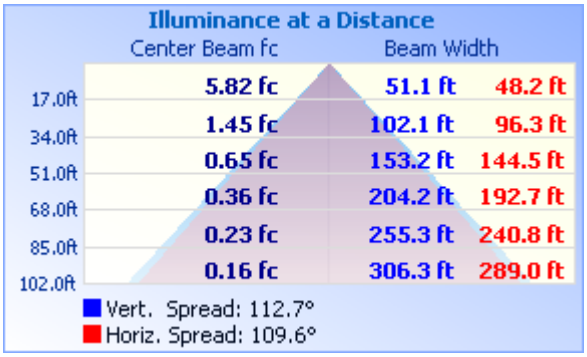
Zonal Lumen Tabulation

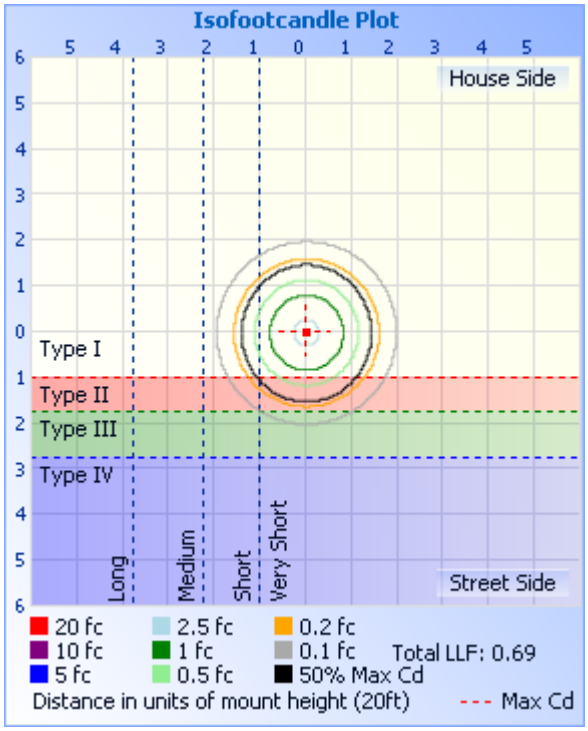
Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,302.7	27.4%
0-40	2,129.1	44.8%
0-60	3,744.1	78.8%
60-90	1,007.1	21.2%
70-100	427.2	9%
90-120	0.5	0%
0-90	4,751.2	99.9%
90-180	2.5	0.1%
0-180	4,753.7	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	159.0	3.3%	90-100	0.0	0%
10-20	455.1	9.6%	100-110	0.1	0%
20-30	688.5	14.5%	110-120	0.4	0%
30-40	826.5	17.4%	120-130	0.6	0%
40-50	851.6	17.9%	130-140	0.5	0%
50-60	763.3	16.1%	140-150	0.4	0%
60-70	579.9	12.2%	150-160	0.3	0%
70-80	337.5	7.1%	160-170	0.2	0%
80-90	89.7	1.9%	170-180	0.1	0%

Photometric Data







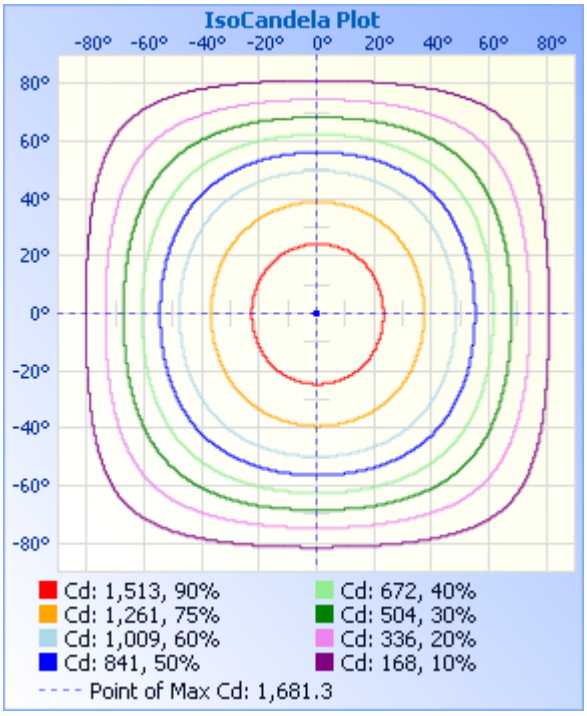


Table--1 UNIT: cd

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	1681	1681	1681	1681	1681	1681	1681	1681	1681	1681	1681	1681	1681	1681	1681	1681
5	1673	1674	1674	1674	1675	1674	1674	1673	1672	1673	1673	1675	1673	1673	1674	1673
10	1648	1649	1651	1653	1655	1653	1651	1649	1649	1648	1650	1651	1652	1651	1651	1649
15	1608	1609	1614	1618	1620	1617	1614	1610	1608	1608	1612	1615	1617	1615	1612	1609
20	1553	1556	1563	1569	1573	1568	1561	1556	1552	1552	1559	1565	1568	1565	1559	1554
25	1483	1486	1497	1507	1510	1505	1496	1486	1482	1484	1492	1500	1505	1501	1492	1485
30	1399	1404	1417	1429	1435	1428	1415	1404	1398	1401	1412	1423	1428	1422	1412	1401
35	1303	1309	1325	1340	1347	1338	1323	1309	1303	1306	1319	1332	1338	1331	1318	1307
40	1198	1205	1221	1239	1246	1237	1220	1205	1198	1201	1214	1229	1236	1228	1214	1201
45	1084	1091	1109	1127	1134	1125	1106	1090	1083	1087	1100	1115	1122	1115	1099	1086
50	962	970	988	1005	1014	1004	986	969	962	965	978	993	999	992	977	963
55	834	842	860	877	884	875	858	841	835	838	850	862	869	862	847	836
60	704	711	727	743	750	741	725	711	705	707	716	727	733	726	714	704
65	571	577	591	606	612	605	590	578	573	573	580	589	594	588	578	571
70	439	444	455	469	474	468	456	445	441	440	445	453	456	451	443	438
75	308	313	324	333	337	333	325	316	311	310	314	319	321	317	312	308
80	183	188	198	204	207	205	200	191	187	185	189	193	194	192	187	184
85	72.6	74.7	78.7	85.1	87.8	87.0	81.7	78.2	75.8	73.1	73.5	76.7	77.2	75.7	72.2	71.2
90	0.01	0.02	0.14	0.21	0.26	0.12	0.21	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.05	0.26	0.10	0.10	0.05	0.39	0.15
110	0.25	0.00	0.05	0.00	0.10	0.05	0.00	0.00	0.43	0.36	0.42	0.36	0.41	0.34	0.48	0.41
115	0.44	0.32	0.41	0.05	0.41	0.25	0.26	0.32	0.61	0.58	0.47	0.28	0.61	0.31	0.50	0.47
120	0.58	0.41	0.46	0.25	0.68	0.38	0.51	0.41	0.82	0.63	0.46	0.67	0.72	0.62	0.46	0.48
125	0.66	0.61	0.49	0.61	0.94	0.62	0.47	0.71	0.80	0.68	0.39	0.67	1.04	0.92	0.38	0.49
130	0.85	0.60	0.53	0.76	1.04	0.69	0.44	0.75	0.85	0.72	0.35	0.68	1.15	0.99	0.33	0.50
135	0.90	0.58	0.36	0.74	1.18	0.74	0.41	0.68	0.86	0.75	0.30	0.69	1.00	0.99	0.30	0.51
140	0.91	0.57	0.10	0.72	1.11	0.73	0.10	0.61	0.85	0.73	0.00	0.70	0.88	0.99	0.34	0.48
145	0.92	0.54	0.00	0.71	0.97	0.71	0.00	0.62	0.83	0.76	0.00	0.70	0.87	1.05	0.41	0.44
150	0.84	0.41	0.00	0.69	1.07	0.68	0.00	0.56	0.82	0.78	0.05	0.71	1.11	1.14	0.56	0.31
155	0.66	0.29	0.00	0.67	1.07	0.61	0.00	0.55	0.84	0.81	0.14	0.56	1.08	1.17	0.61	0.31
160	0.65	0.30	0.00	0.61	0.97	0.51	0.00	0.51	0.86	0.84	0.24	0.49	0.82	1.11	0.68	0.31
165	0.69	0.31	0.00	0.58	0.97	0.60	0.00	0.49	0.94	0.87	0.35	0.51	0.82	1.02	0.91	0.31
170	0.70	0.46	0.26	0.87	0.97	0.82	0.15	0.47	0.97	0.73	0.38	0.55	1.33	1.34	1.02	0.31
175	0.68	0.42	0.41	1.04	1.18	1.12	0.41	0.46	0.90	0.68	0.40	0.51	1.17	1.28	1.02	0.31
180	0.66	0.51	0.46	1.02	1.38	0.97	0.21	0.67	0.72	0.66	0.41	0.41	1.08	1.28	0.97	0.31

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

Test date	2017-03-12	Test Ambient:	25.2 ºC
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-FP22-0040-DX-35-J		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170221 -D2	120.0	60	0.3299	39.44	0.9962	6.27
	382.0	60	0.1158	39.76	0.8987	14.11
				DLC Pass Criteria	>= 0.9(-3%)	<= 20(+5)

Chromaticity Measurement - Sphere-Spectroradiometer Method:

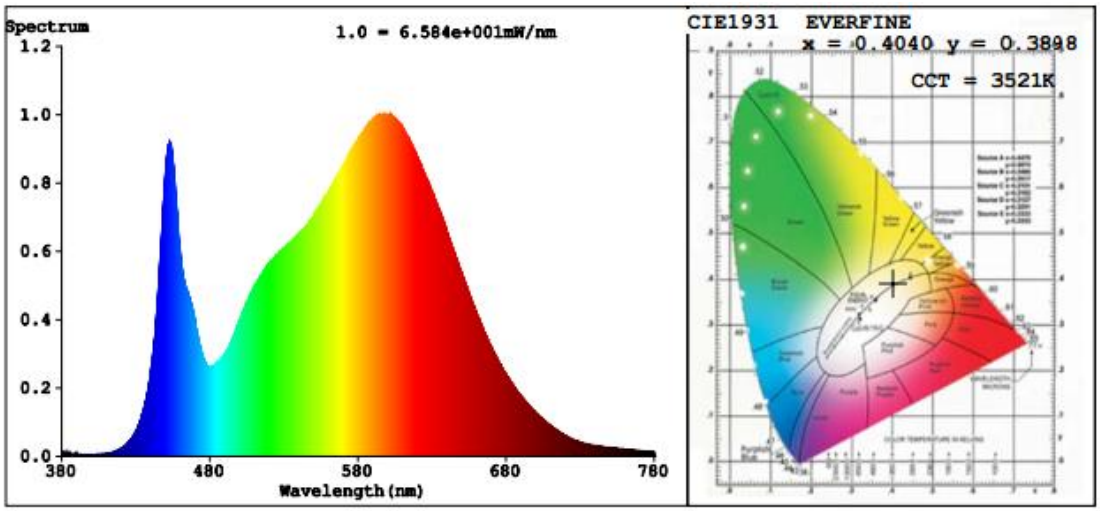
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	3521
Duv	-0.0001
Chromaticity (x, y)	x=0.4040 y=0.3898
Chromaticity (u', v')	u'=0.2353 v'=0.5107
Color Rendering Index (CRI)	82.9
R9	7

Special Color Rendering Indices			
R1	81	R9	7
R2	91	R10	79
R3	96	R11	79
R4	80	R12	64
R5	81	R13	84
R6	88	R14	98
R7	84	R15	75
R8	61	--	--

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)	4876	4960	>=2000(-10%)	
Luminous Efficacy (lm/W)	123.63	124.75	Standard: >= 105(-3%)	Premium: >= 125(-3%)

Spectral Power Distribution & Chromaticity Diagram



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

Test date	2017-03-12	Test Ambient:	25.2 ºC
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-FP22-0040-DX-40-J		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170221 -D3	120.0	60	0.3274	39.15	0.9965	6.12
	382.0	60	0.1148	39.51	0.9009	14.26
				DLC Pass Criteria	>= 0.9(-3%)	<= 20(+5)

Chromaticity Measurement - Sphere-Spectroradiometer Method:

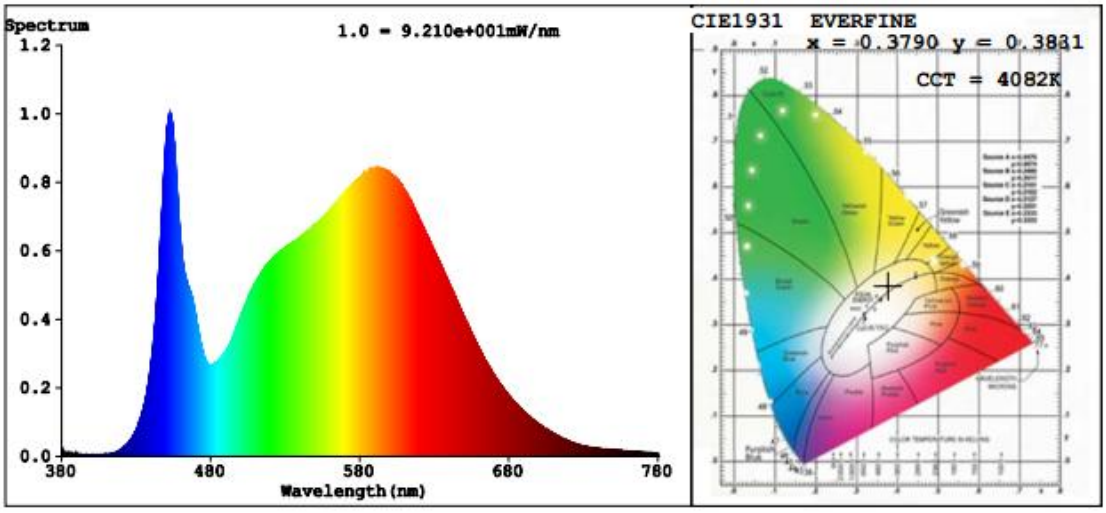
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	4082
Duv	0.0034
Chromaticity (x, y)	x=0.3790 y=0.3831
Chromaticity (u', v')	u'=0.2217 v'=0.5041
Color Rendering Index (CRI)	82.0
R9	1

Special Color Rendering Indices			
R1	80	R9	1
R2	89	R10	74
R3	96	R11	78
R4	80	R12	57
R5	80	R13	82
R6	85	R14	98
R7	85	R15	73
R8	62	--	--

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)	4913	5010	>=2000(-10%)	
Luminous Efficacy (lm/W)	125.49	126.80	Standard: >= 105(-3%)	Premium: >= 125(-3%)

Spectral Power Distribution & Chromaticity Diagram



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

Test date	2017-03-12	Test Ambient:	25.2 ºC
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-FP22-0040-DX-50-J		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170221 -D4	120.0	60	0.3258	38.92	0.9956	6.34
	382.0	60	0.1143	39.40	0.9020	14.41
				DLC Pass Criteria	>= 0.9(-3%)	<= 20(+5)

Chromaticity Measurement - Sphere-Spectroradiometer Method:

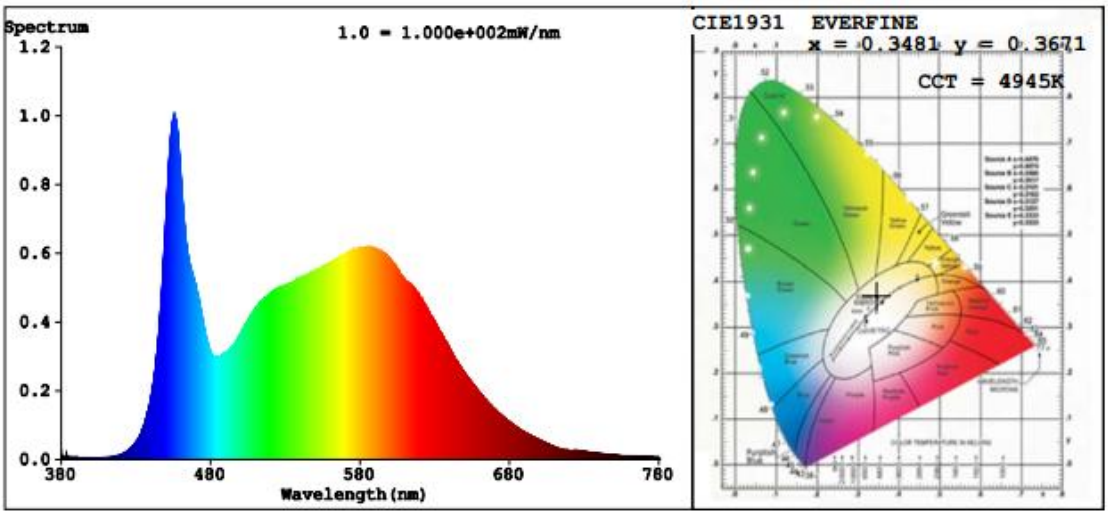
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
CCT (K)	4945
Duv	0.0064
Chromaticity (x, y)	x=0.3481 y=0.3671
Chromaticity (u', v')	u'=0.2075 v'=0.4925
Color Rendering Index (CRI)	81.1
R9	0

Special Color Rendering Indices			
R1	79	R9	0
R2	91	R10	78
R3	95	R11	74
R4	75	R12	53
R5	78	R13	83
R6	86	R14	97
R7	84	R15	71
R8	61	--	--

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)	4950	5054	>=2000(-10%)	
Luminous Efficacy (lm/W)	127.18	128.27	Standard: >= 105(-3%)	Premium: >= 125(-3%)

Spectral Power Distribution & Chromaticity Diagram



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 ********