

**LM-79-08 Test Report**

For

**IKIO LED LIGHTING****(Brand Name: IKIO)**8470 Allison Pointe Blvd, Suite 128  
Indianapolis, IN 46250**Linear Retrofit Kits for 2x4 Luminaires**Model name(s):  
IK-MS04-0015-3-DY-XX-J

Representative (Tested) Model:

IK-MS04-0015-3-DY-30-J

IK-MS04-0015-3-DY-35-J

IK-MS04-0015-3-DY-40-J

IK-MS04-0015-3-DY-50-J

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

Test &amp; Report By:

*Jack Luo*

Engineer: Jack Luo

Date: Feb.07,2017

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-MS04-0015-3-DY-XX-J	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	Linear Retrofit Kits for 2x4 Luminaires	
Rated Voltage / Frequency	100~277 Vac, 50/60 Hz	
Nominal Power	45W	
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	GZE171126-P1(3000K),P2(3500K),P3(4000K), P4(5000K)	
Luminaire Aperture (for downlights)	--	in.
Luminaire Length	--	mm
Luminaires Width	--	mm
Number of Units (modular products)	N/A	s
<b>Photo</b>		
		

**1.2 Test Specifications:**

Date of Receipt	Feb.16, 2017
Date of Test	Feb.18, 2017
Test item	<ol style="list-style-type: none"> <li>1. Total Luminous Flux</li> <li>2. Luminous Distribution Intensity</li> <li>3. Luminous Efficacy</li> <li>4. Correlated Color Temperature</li> <li>5. Color Rendering Index</li> <li>6. Chromaticity Coordinate</li> <li>7. Electrical Parameters</li> </ol>
Reference Standard	<ol style="list-style-type: none"> <li>1. IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products</li> <li>2. ANSI C78.377-2008 Specifications for the Chromaticity of Solid State Lighting Products</li> <li>3. CIE 13.3-1995 Method of Measuring and Specifying Colour Rendering Properties of Light Sources</li> <li>4. CIE 15-2004 Technical Report Colorimetry</li> <li>5. IESNA LM-16-93 Practical Guide to Colorimetry of Light Source</li> <li>6. IESNA TM-16-05 Technical Memorandum on Light Emitting Diode (LED) Sources and Systems</li> </ol>
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  $1^{\circ}$  vertical intervals and  $22.5^{\circ}$  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)*

<b>Test date</b>	2017-02-18	<b>Test Ambient:</b>	25.2 ° C
<b>Test Orientation</b>	As intended	<b>Stabilization Time (min)</b>	90
<b>Model Number</b>	IK-MS04-0015-3-DY-30-J		

**Electrical Measurement in Lithonia 2GT8 lensed 2x4:**

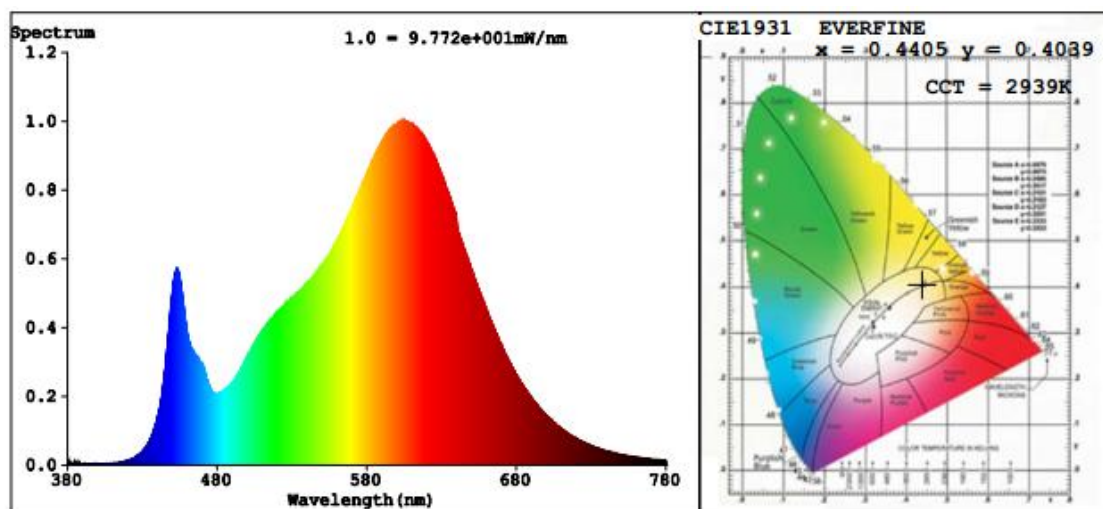
Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE171126-P1	120.0	60	0.3584	42.76	0.9943	4.55
	277.0	60	0.1720	43.97	0.9227	12.07
<b>DLC Pass Criteria</b>					$\geq 0.9(-3\%)$	$\leq 20(+5)$

**Chromaticity Measurement in Lithonia 2GT8 lensed 2x4 -**  
**Sphere-Spectroradiometer Method:**

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	82	R9	9
Frequency (Hz)	60	R2	93	R10	84
CCT (K)	2939	R3	95	R11	81
Duv	-0.0006	R4	81	R12	73
Chromaticity (x, y)	x=0.4405 y=0.4039	R5	83	R13	85
Chromaticity (u', v')	u'=0.2530 v'=0.5218	R6	92	R14	98
Color Rendering Index (CRI)	83.3	R7	82	R15	75
R9	9	R8	59	--	--

**Photometric Measurement in Lithonia 2GT8 lensed 2x4– Goniophotometer**  
**Method:**

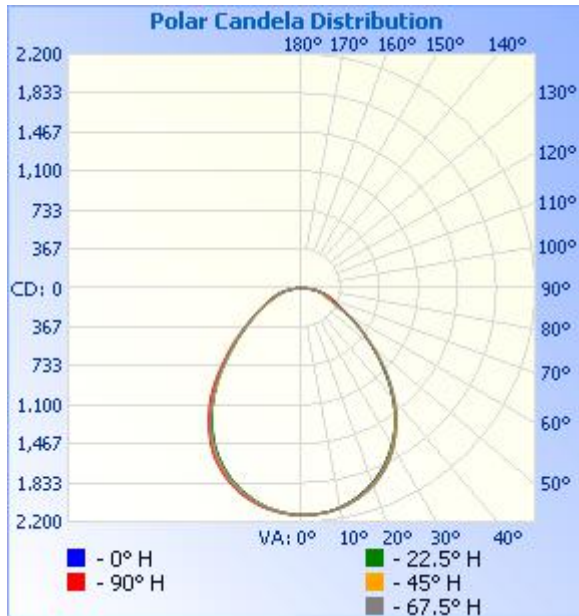
Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	4677.8	4828.4	$\geq 3000(-10\%)$	
Luminous Efficacy (lm/W)	109.40	109.81	Standard: $\geq 100(-3\%)$	Premium: $\geq 125(-3\%)$
Zonal lumens in the 0-60° zone (%)	85.6	--	$\geq 75(-3)$	
SC: 0-180° (if applicable)	1.20	--	1.0-2.0( $\pm 0.1$ )	
SC: 90-270° (if applicable)	1.16	--	1.0-2.0( $\pm 0.1$ )	
Beam Angle (°)	91.0	--	--	
Center Beam Candle Power (cd)	2137	--	--	

**Spectral Power Distribution & Chromaticity Diagram**

**Zonal Lumen Tabulation**

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,618.3	34.6%
0-40	2,564.2	54.8%
0-60	4,002.3	85.6%
60-90	673.8	14.4%
70-100	304.3	6.5%
90-120	0.3	0%
0-90	4,676.1	100%
90-180	1.2	0%
0-180	4,677.3	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	201.7	4.3%	90-100	0.1	0%
10-20	572.4	12.2%	100-110	0.1	0%
20-30	844.2	18.0%	110-120	0.2	0%
30-40	945.9	20.2%	120-130	0.2	0%
40-50	838.6	17.9%	130-140	0.2	0%
50-60	599.5	12.8%	140-150	0.2	0%
60-70	369.5	7.9%	150-160	0.2	0%
70-80	226.6	4.8%	160-170	0.1	0%
80-90	77.7	1.7%	170-180	0.1	0%

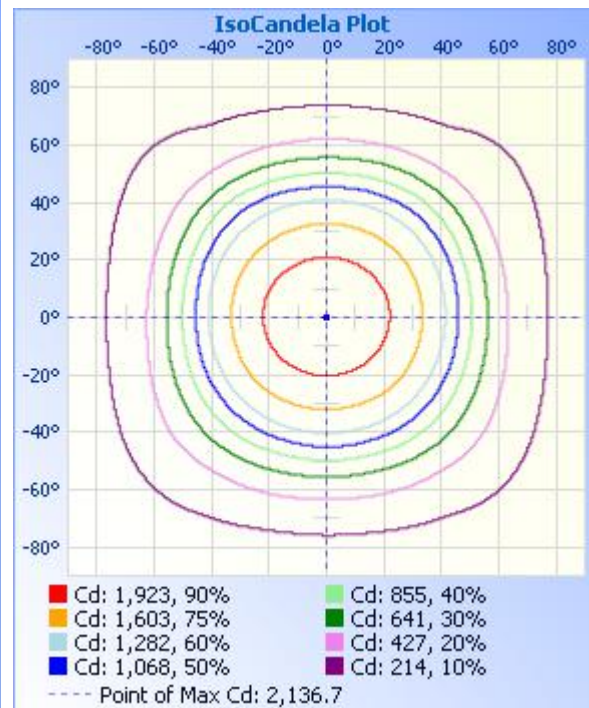
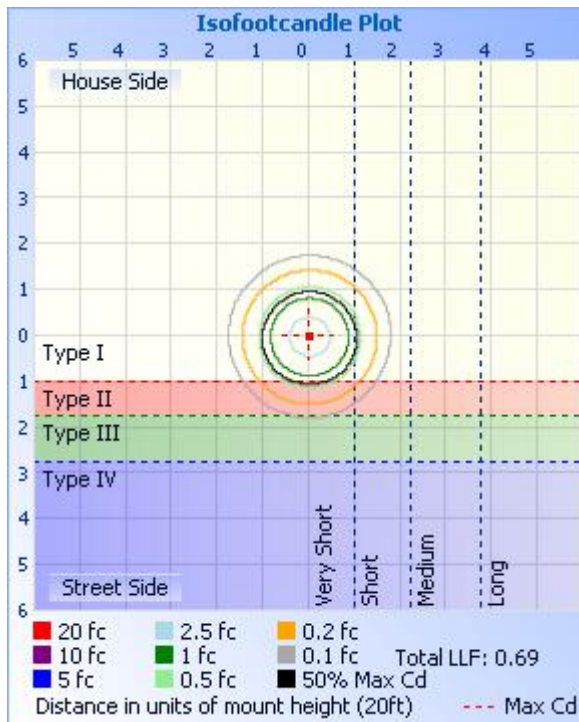


**Photometric Data**


**Illuminance at a Distance**

	Center Beam fc	Beam Width	
17.0ft	<b>7.39 fc</b>	<b>34.4 ft</b>	<b>34.9 ft</b>
34.0ft	<b>1.85 fc</b>	<b>68.7 ft</b>	<b>69.8 ft</b>
51.0ft	<b>0.82 fc</b>	<b>103.1 ft</b>	<b>104.7 ft</b>
68.0ft	<b>0.46 fc</b>	<b>137.4 ft</b>	<b>139.7 ft</b>
85.0ft	<b>0.30 fc</b>	<b>171.8 ft</b>	<b>174.6 ft</b>
102.0ft	<b>0.21 fc</b>	<b>206.2 ft</b>	<b>209.5 ft</b>

■ Vert. Spread: 90.6°  
 ■ Horiz. Spread: 91.5°



**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) y (DEG)	0	23	45	68	90	113	135	158	180	203	225	248	270	293	315	338	
0	2137	2137	2137	2137	2137	2137	2137	2137	2137	2137	2137	2137	2137	2137	2137	2137	
5	2124	2126	2129	2127	2127	2129	2130	2128	2127	2122	2122	2119	2117	2117	2119	2121	
10	2092	2095	2096	2093	2093	2095	2100	2102	2100	2090	2085	2078	2076	2075	2079	2086	
15	2038	2043	2039	2034	2034	2037	2043	2051	2050	2035	2024	2014	2008	2009	2017	2028	
20	1957	1959	1954	1949	1949	1953	1962	1975	1974	1958	1941	1925	1919	1920	1929	1944	
25	1849	1849	1841	1838	1839	1843	1854	1868	1867	1849	1828	1812	1801	1804	1816	1832	
30	1708	1708	1699	1698	1702	1703	1713	1726	1725	1709	1686	1666	1655	1658	1673	1693	
35	1528	1534	1528	1530	1537	1536	1544	1553	1549	1523	1503	1483	1475	1478	1493	1503	
40	1328	1332	1334	1331	1336	1335	1350	1355	1351	1309	1282	1272	1272	1270	1273	1292	
45	1093	1113	1123	1113	1112	1117	1134	1133	1116	1082	1051	1039	1052	1040	1047	1065	
50	867	875	898	892	889	891	904	893	884	864	840	826	830	826	835	848	
55	667	668	675	687	682	682	678	679	679	673	654	646	647	641	648	662	
60	504	489	485	500	510	495	482	490	509	519	495	499	498	493	490	511	
65	383	353	329	350	368	346	326	355	385	396	369	380	384	378	365	392	
70	306	278	241	257	273	256	241	282	308	296	275	284	293	284	272	297	
75	240	224	199	200	207	201	200	227	244	219	207	211	221	213	205	220	
80	164	159	150	144	148	143	152	163	168	151	139	143	152	146	140	149	
85	74.4	80.1	71.9	75.8	78.4	75.6	70.1	75.2	70.0	72.3	62.1	70.6	74.4	74.5	63.6	76.8	
90	0.10	0.09	0.16	0.43	0.46	0.41	0.06	0.00	0.00	0.00	0.00	0.15	0.30	0.35	0.00	0.00	
95	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.25	0.20	0.00	0.00	
100	0.00	0.00	0.00	0.00	0.10	0.05	0.00	0.00	0.00	0.00	0.15	0.05	0.45	0.20	0.05	0.00	
105	0.00	0.00	0.00	0.00	0.30	0.05	0.00	0.00	0.00	0.00	0.25	0.00	0.30	0.20	0.20	0.00	
110	0.00	0.00	0.00	0.00	0.30	0.05	0.00	0.00	0.15	0.10	0.40	0.00	0.00	0.05	0.35	0.05	
115	0.34	0.10	0.00	0.00	0.25	0.05	0.10	0.00	0.40	0.35	0.40	0.00	0.00	0.00	0.35	0.15	
120	0.35	0.25	0.35	0.00	0.00	0.00	0.45	0.10	0.50	0.50	0.35	0.00	0.00	0.00	0.30	0.40	
125	0.50	0.50	0.35	0.00	0.00	0.00	0.40	0.30	0.60	0.50	0.35	0.00	0.00	0.00	0.25	0.35	
130	0.55	0.50	0.20	0.00	0.00	0.00	0.35	0.40	0.60	0.55	0.20	0.00	0.00	0.00	0.29	0.40	
135	0.55	0.50	0.15	0.00	0.00	0.00	0.20	0.35	0.60	0.55	0.10	0.00	0.10	0.05	0.15	0.40	
140	0.55	0.50	0.00	0.00	0.00	0.00	0.10	0.30	0.60	0.55	0.05	0.10	0.35	0.25	0.05	0.50	
145	0.55	0.30	0.00	0.00	0.00	0.00	0.00	0.15	0.60	0.55	0.10	0.30	0.45	0.30	0.15	0.44	
150	0.55	0.25	0.00	0.00	0.24	0.00	0.00	0.10	0.60	0.55	0.25	0.40	0.59	0.55	0.40	0.20	
155	0.55	0.30	0.00	0.15	0.40	0.10	0.00	0.00	0.60	0.55	0.25	0.45	0.74	0.74	0.55	0.20	
160	0.45	0.15	0.00	0.35	0.50	0.40	0.00	0.00	0.65	0.55	0.30	0.50	0.69	0.89	0.70	0.35	
165	0.40	0.10	0.00	0.40	0.59	0.50	0.10	0.00	0.65	0.55	0.35	0.55	0.74	0.94	0.70	0.45	
170	0.40	0.10	0.20	0.50	0.94	0.64	0.45	0.05	0.65	0.55	0.50	0.45	0.74	0.94	0.70	0.50	
175	0.45	0.15	0.35	0.59	0.99	0.74	0.50	0.20	0.60	0.45	0.30	0.40	0.69	0.79	0.70	0.45	
180	0.45	0.20	0.35	0.59	0.70	0.74	0.59	0.15	0.65	0.45	0.20	0.35	0.59	0.69	0.80	0.45	

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	2017-02-18	Test Ambient:	25.2 °C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	IK-MS04-0015-3-DY-35-J		

### Electrical Measurement in Lithonia 2GT8 lensed 2x4:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE171126-P2	120.0	60	0.3590	42.82	0.9939	4.55
	277.0	60	0.1709	43.76	0.9243	12.07
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

### Chromaticity Measurement in Lithonia 2GT8 lensed 2x4 - Sphere-Spectroradiometer Method:

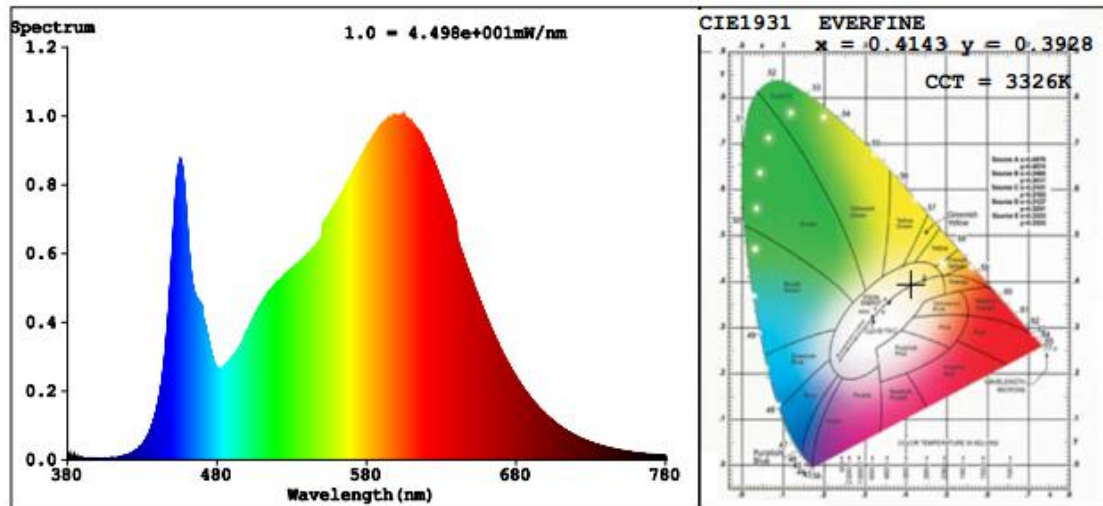
Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	82	R9	8
Frequency (Hz)	60	R2	93	R10	83
CCT (K)	3326	R3	94	R11	78
Duv	-0.0010	R4	79	R12	67
Chromaticity (x, y)	x=0.4143 y=0.3928	R5	82	R13	85
Chromaticity (u', v')	u'=0.2407 v'=0.5134	R6	91	R14	98
Color Rendering Index (CRI)	82.9	R7	82	R15	75
R9	8	R8	60	--	--

### Photometric Measurement in Lithonia 2GT8 lensed 2x4-- Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	4760	4892	>=3000(-10%)	
Luminous Efficacy (lm/W)	111.16	111.79	Standard: >= 100(-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	2017-02-18	Test Ambient:	25.2 °C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	IK-MS04-0015-3-DY-40-J		

**Electrical Measurement in Lithonia 2GT8 lensed 2x4:**

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE171126-P3	120.0	60	0.3593	42.84	0.9937	4.98
	277.0	60	0.1747	44.65	0.9225	12.35
DLC Pass Criteria					$\geq 0.9(-3\%)$	$\leq 20(+5)$

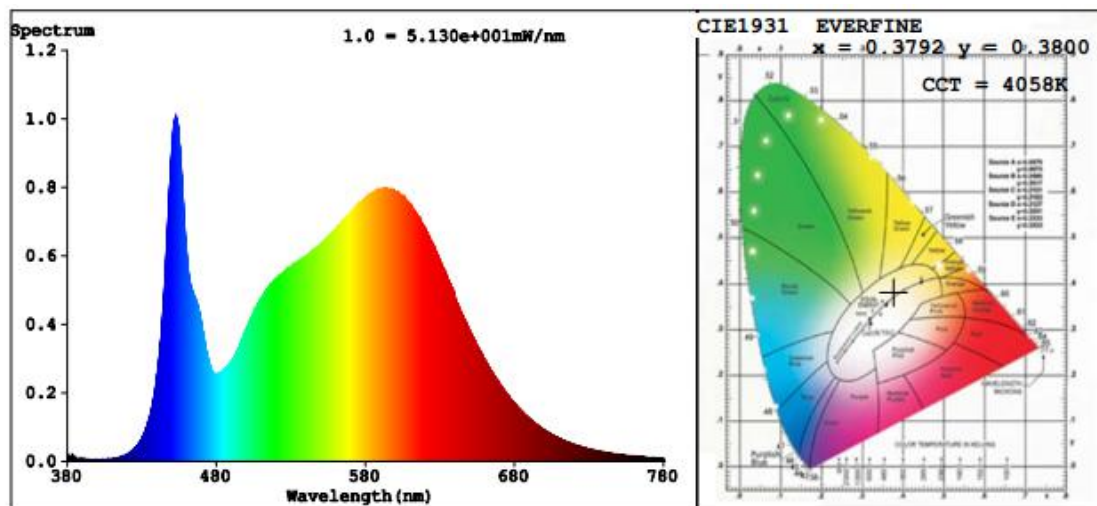
**Chromaticity Measurement in Lithonia 2GT8 lensed 2x4 -**  
**Sphere-Spectroradiometer Method:**

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	5
Frequency (Hz)	60	R2	90	R10	77
CCT (K)	4058	R3	94	R11	79
Duv	0.0019	R4	80	R12	59
Chromaticity (x, y)	x=0.3792 y=0.3800	R5	81	R13	84
Chromaticity (u', v')	u'=0.2230 v'=0.5028	R6	86	R14	98
Color Rendering Index (CRI)	82.8	R7	85	R15	74
R9	5	R8	63	--	--

**Photometric Measurement in Lithonia 2GT8 lensed 2x4—**  
**Sphere-Spectroradiometer Method:**

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	4839	5058	$\geq 3000(-10\%)$	
Luminous Efficacy (lm/W)	112.96	113.28	Standard: $\geq 100(-3\%)$	Premium: $\geq 125(-3\%)$

## Spectral Power Distribution &amp; 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)*

<b>Test date</b>	2017-02-18	<b>Test Ambient:</b>	25.2 ° C
<b>Test Orientation</b>	As intended	<b>Stabilization Time (min)</b>	90
<b>Model Number</b>	IK-MS04-0015-3-DY-50-J		

**Electrical Measurement in Lithonia 2GT8 lensed 2x4:**

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE171126-P4	120.0	60	0.3563	42.50	0.9941	4.52
	277.0	60	0.1748	44.60	0.9211	12.63
<b>DLC Pass Criteria</b>					$\geq 0.9(-3\%)$	$\leq 20(+5)$

**Chromaticity Measurement in Lithonia 2GT8 lensed 2x4 -**  
**Sphere-Spectroradiometer Method:**

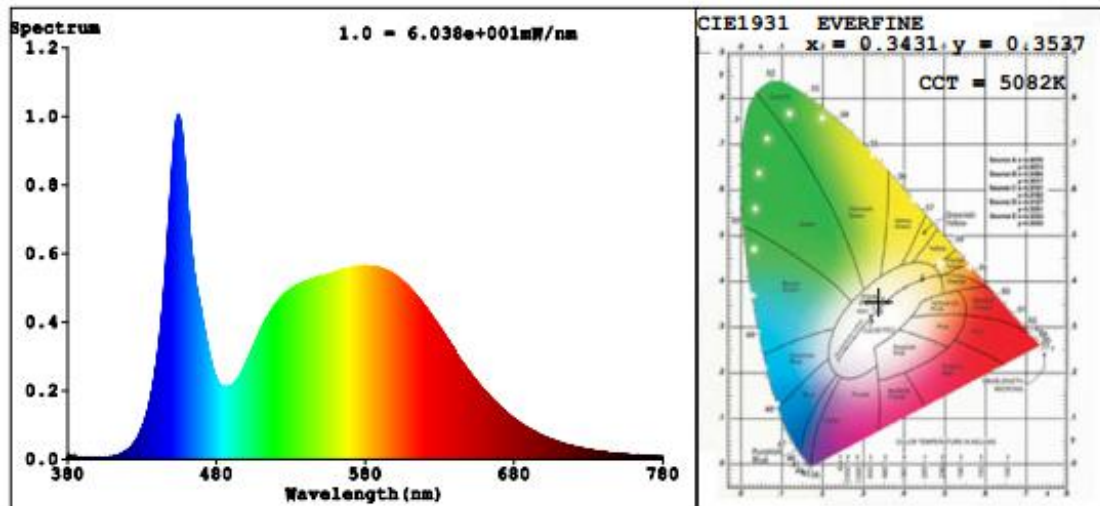
Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	80	R9	6
Frequency (Hz)	60	R2	88	R10	70
CCT (K)	5082	R3	92	R11	78
Duv	0.0019	R4	80	R12	56
Chromaticity (x, y)	x=0.3431 y=0.3537	R5	80	R13	83
Chromaticity (u', v')	u'=0.2093 v'=0.4854	R6	82	R14	96
Color Rendering Index (CRI)	82.0	R7	86	R15	76
R9	6	R8	66	--	--

**Photometric Measurement in Lithonia 2GT8 lensed 2x4—**  
**Sphere-Spectroradiometer Method:**

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	5279	5563	$\geq 3000(-10\%)$	
Luminous Efficacy (lm/W)	124.21	124.73	Standard: $\geq 100(-3\%)$	Premium: $\geq 125(-3\%)$



**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 \*\*\*\*\***