



NVLAP LAB CODE 201011-0

Report No.: GZE161906-L

## 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 2x2 Luminaires

Model name(s):

IK-MS02-0010-3-DN-XX-J

Representative (Tested) Model:

IK-MS02-0010-3-DN-30-J

IK-MS02-0010-3-DN-35-J

IK-MS02-0010-3-DN-40-J

IK-MS02-0010-3-DN-50-J

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

Test & Report By:

*Jack Luo*

Engineer: Jack Luo

Date: Aug.10,2016

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-MS02-0010-3-DN-XX-J	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	Linear Retrofit Kits for 2x2 Luminaires	
Rated Voltage / Frequency	100 -277Vac, 50/60 Hz	
Nominal Power	30W	
Rated Initial Lamp Lumen	--	
Declared CCT	3000K,3500K,4000K,5000K,	
LED Manufacturer	EVERLIGHT ELECTRONICS CO., LTD	
LED Model	67-21S Series (3000K)	
Sample Number	GZE161906-L1(3000K), L2(3500K), L3(4000K), L4(5000K)	
Luminaire Aperture (for downlights)	--	in.
Luminaire Length	--	mm
Luminaires 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	Aug.05, 2016
Date of Test	Aug.06, 2016
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.

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>

## 2.1 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2016-08-06	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-MS02-0010-3-DN-30-J		

### Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE161906-L1	120.0	60	0.2543	30.06	0.9850	6.13
	277.0	60	0.1163	29.02	0.9007	7.37
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

### Chromaticity Measurement - Sphere-Spectroradiometer Method in Lithonia

#### 2GT8 lensed 2x2:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	80	R9	0
Frequency (Hz)	60	R2	93	R10	84
CCT (K)	2890	R3	92	R11	75
Duv	-0.0022	R4	76	R12	72
Chromaticity (x, y)	x=0.4415 y=0.4000	R5	80	R13	83
Chromaticity (u', v')	u'=0.2554 v'=0.5204	R6	91	R14	97
Color Rendering Index (CRI)	80.6	R7	78	R15	72
R9	0	R8	54	--	--

### Photometric Measurement – Goniophotometer Method in Lithonia 2GT8 lensed

#### 2x2:

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	3142.5	3110.1	>= 2000(-10%)	
Luminous Efficacy (lm/W)	104.54	107.17	Standard: >= 100(-3%)	Premium: >= 125(-3%)
Zonal lumens in the 0-60 °zone (%)	85.2	--	>= 75(-3)	
SC: 0-180 °(if applicable)	1.21	--	1.0-2.0(±0.1)	
SC: 90-270 °(if applicable)	1.12	--	1.0-2.0(±0.1)	
Beam Angle (°)	89.3	--	--	
Center Beam Candle Power (cd)	1466	--	--	

Laboratory: Standard-Tech Co. Ltd Testing Center

NVLAP CODE: 201011-0

Report Format Number STD/QR4909-A/2

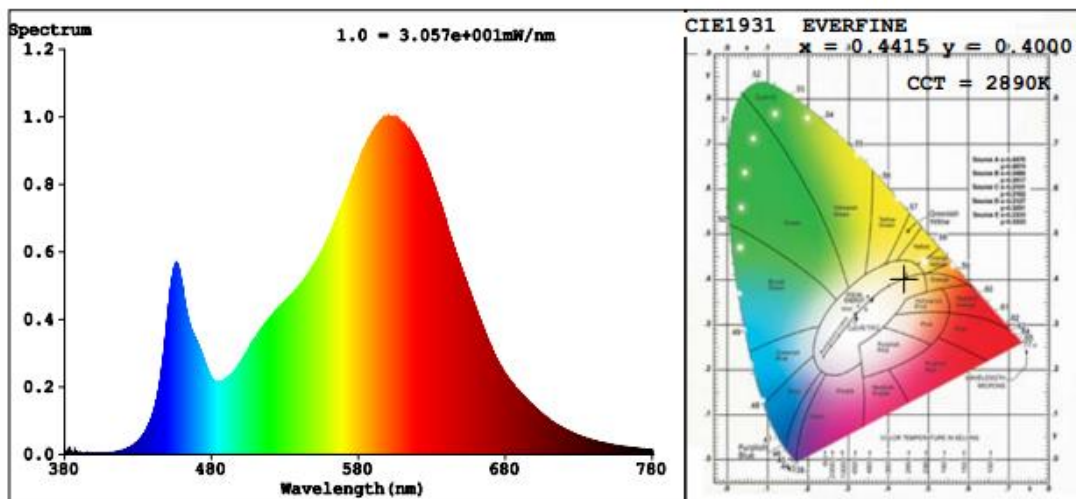
Address: Standard-Tech Building, No.6 Guanhong Road, Guangzhou Science City, Guangzhou 510663, China

Tel: 8620-3229 0320

Fax: 8620-32290422

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

## Spectral Power Distribution & Chromaticity Diagram

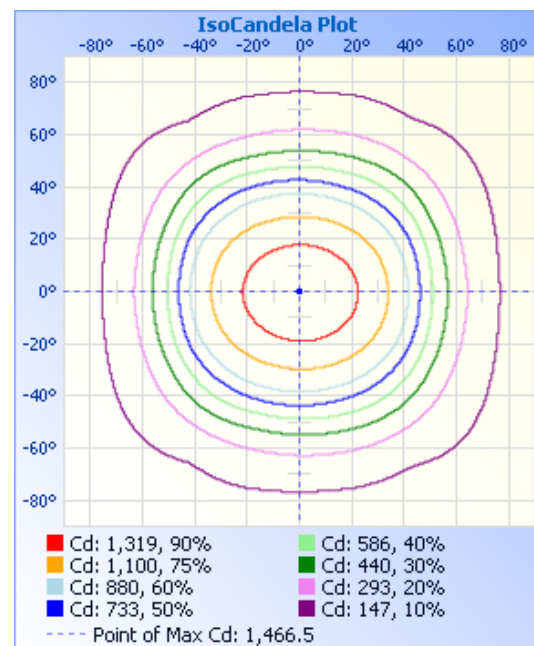
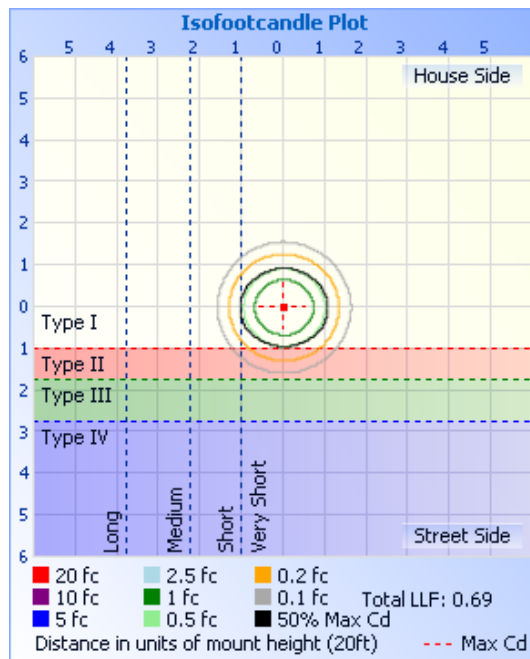
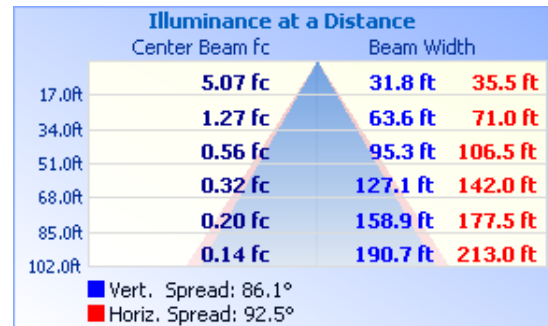
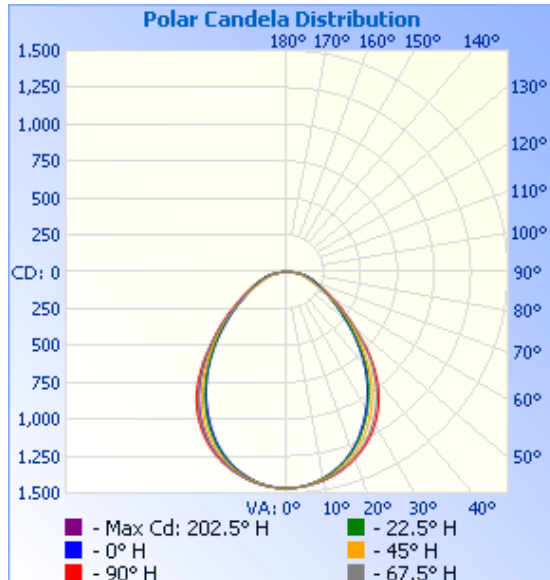


## Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,094.1	34.8%
0-40	1,722.4	54.8%
0-60	2,678.6	85.2%
60-90	459.8	14.6%
70-100	207.4	6.6%
90-120	1.0	0%
0-90	3,138.3	99.9%
90-180	3.7	0.1%
0-180	3,142.0	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	138.2	4.4%	90-100	0.1	0%
10-20	389.3	12.4%	100-110	0.3	0%
20-30	566.6	18.0%	110-120	0.6	0%
30-40	628.2	20.0%	120-130	0.8	0%
40-50	555.7	17.7%	130-140	0.7	0%
50-60	400.5	12.7%	140-150	0.5	0%
60-70	252.5	8.0%	150-160	0.4	0%
70-80	155.5	4.9%	160-170	0.2	0%
80-90	51.8	1.6%	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	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466	
5	1459	1459	1457	1455	1454	1454	1456	1456	1458	1456	1456	1455	1456	1458	1458	1460	
10	1437	1434	1429	1423	1420	1421	1427	1432	1436	1432	1428	1424	1424	1427	1431	1436	
15	1399	1394	1381	1370	1365	1368	1382	1393	1400	1393	1381	1371	1370	1376	1385	1396	
20	1348	1337	1314	1296	1289	1295	1317	1337	1348	1335	1316	1297	1294	1303	1320	1341	
25	1277	1261	1229	1200	1190	1201	1233	1265	1281	1261	1230	1202	1195	1208	1237	1266	
30	1184	1161	1120	1086	1076	1090	1129	1173	1194	1166	1124	1089	1081	1095	1129	1168	
35	1071	1040	994	960	952	968	1011	1061	1087	1052	1004	966	955	967	1002	1047	
40	926	899	850	818	818	835	873	928	951	918	866	834	822	826	857	903	
45	760	746	707	677	675	687	724	774	793	762	714	686	681	686	714	751	
50	605	593	575	549	537	549	586	614	616	604	578	544	544	557	579	600	
55	474	450	444	429	421	427	452	466	478	458	445	422	425	435	448	458	
60	360	333	329	330	330	324	329	341	363	332	322	320	330	332	333	338	
65	279	250	239	259	260	250	232	248	273	242	226	248	258	258	241	254	
70	214	192	174	208	208	200	167	189	208	183	163	199	204	204	175	196	
75	158	143	132	161	165	156	128	144	155	138	126	155	160	154	131	146	
80	109	97.9	97.6	112	117	110	95.9	97.1	105	92.2	93.1	108	112	105	95.3	97.7	
85	45.5	43.1	43.9	58.3	57.1	57.8	45.8	45.1	46.2	41.1	42.6	54.6	52.7	52.1	41.6	42.0	
90	0.00	0.12	0.19	0.12	0.10	0.22	0.38	0.24	0.00	0.00	0.10	0.00	0.00	0.21	0.32	0.00	
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.05	0.00	0.37	0.00	
100	0.31	0.42	0.32	0.00	0.00	0.21	0.42	0.16	0.32	0.21	0.37	0.00	0.05	0.00	0.37	0.37	
105	0.37	0.47	0.32	0.00	0.00	0.32	0.48	0.32	0.48	0.32	0.48	0.11	0.05	0.05	0.42	0.53	
110	0.42	0.42	0.48	0.05	0.00	0.32	0.63	0.42	0.74	0.64	0.69	0.32	0.27	0.26	0.32	0.85	
115	0.58	0.69	0.48	0.32	0.05	0.48	0.90	0.95	1.06	1.01	0.95	0.26	0.27	0.21	0.64	1.01	
120	0.79	0.80	0.53	0.26	0.16	0.37	0.74	1.27	1.22	0.95	1.11	0.58	0.53	0.64	0.64	0.96	
125	0.95	1.01	0.53	0.63	0.58	0.58	0.74	1.17	1.11	1.01	1.22	0.79	0.95	0.95	0.64	0.96	
130	1.11	1.32	0.53	0.69	0.58	0.74	0.74	1.27	1.32	1.01	0.90	0.85	1.11	1.01	0.64	0.96	
135	1.11	1.22	0.53	0.74	1.01	0.79	0.69	1.33	1.32	1.01	0.58	0.85	1.17	0.90	0.48	0.96	
140	1.22	1.27	0.48	0.74	1.06	0.96	0.48	1.17	1.32	1.01	0.53	0.85	1.01	0.90	0.53	0.96	
145	1.22	1.06	0.32	0.74	0.90	0.69	0.11	0.96	1.32	1.01	0.53	0.85	1.06	1.06	0.74	1.01	
150	1.27	0.95	0.26	0.69	1.01	0.64	0.16	0.90	1.16	1.01	0.48	0.85	1.22	1.16	0.74	0.58	
155	1.06	0.85	0.26	0.69	1.06	0.64	0.32	0.90	0.90	1.01	0.58	0.85	1.22	1.17	0.80	0.48	
160	0.90	0.69	0.26	0.69	1.06	0.64	0.37	0.90	0.85	0.85	0.64	0.69	1.16	1.22	0.85	0.53	
165	0.90	0.64	0.26	0.69	0.95	0.58	0.32	0.58	1.01	0.95	0.64	0.53	0.90	1.11	1.01	0.58	
170	0.95	0.64	0.37	1.05	1.01	0.85	0.42	0.58	1.06	1.06	0.74	0.53	1.33	1.48	1.17	0.58	
175	1.06	0.69	0.42	1.27	1.38	1.06	0.53	0.74	1.01	0.90	0.69	0.48	1.27	1.38	1.06	0.53	
180	1.06	0.69	0.48	1.11	1.33	1.21	0.53	0.64	1.01	1.11	0.69	0.48	1.22	1.32	1.11	0.53	

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	2016-08-06	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-MS02-0010-3-DN-35-J		

### Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE161906-L2	120.0	60	0.2546	30.15	0.9867	6.14
	277.0	60	0.1179	29.43	0.9011	7.16
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

### Chromaticity Measurement - Sphere-Spectroradiometer Method in Lithonia

#### 2GT8 lensed 2x2:

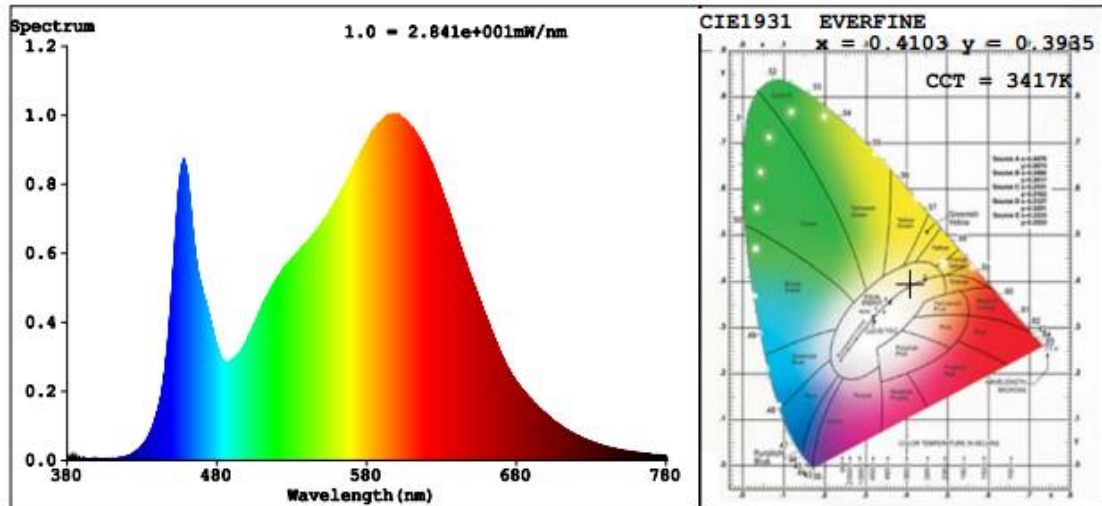
Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	6
Frequency (Hz)	60	R2	93	R10	82
CCT (K)	3417	R3	95	R11	76
Duv	0.0002	R4	78	R12	63
Chromaticity (x, y)	x=0.4103 y=0.3935	R5	81	R13	85
Chromaticity (u', v')	u'=0.2378 v'=0.5132	R6	90	R14	98
Color Rendering Index (CRI)	82.2	R7	82	R15	74
R9	6	R8	59	--	--

### Photometric Measurement – Sphere-Spectroradiometer Method in Lithonia

#### 2GT8 lensed 2x2:

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	3552	3516	>= 2000(-10%)	
Luminous Efficacy (lm/W)	117.81	119.47	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	2016-08-06	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-MS02-0010-3-DN-40-J		

### Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE161906-L3	120.0	60	0.2573	30.51	0.9882	6.53
	277.0	60	0.1199	29.96	0.9018	7.74
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

### Chromaticity Measurement - Sphere-Spectroradiometer Method in Lithonia

#### 2GT8 lensed 2x2:

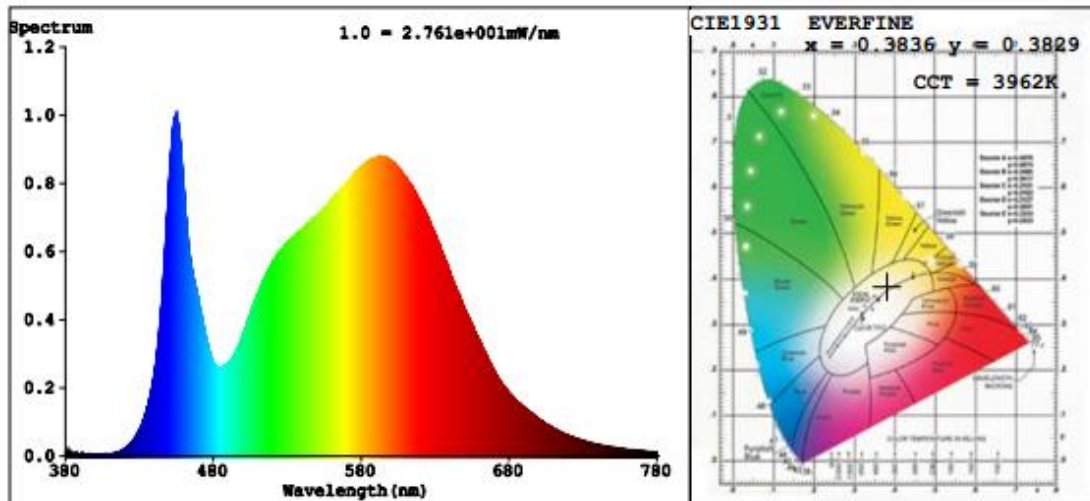
Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	80	R9	5
Frequency (Hz)	60	R2	89	R10	73
CCT (K)	3962	R3	95	R11	76
Duv	0.0020	R4	78	R12	55
Chromaticity (x, y)	x=0.3836 y=0.3829	R5	79	R13	82
Chromaticity (u', v')	u'=0.2247 v'=0.5047	R6	84	R14	98
Color Rendering Index (CRI)	81.6	R7	85	R15	73
R9	3	R8	62	--	--

### Photometric Measurement – Sphere-Spectroradiometer Method in Lithonia

#### 2GT8 lensed 2x2:

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	3701	3695	>= 2000(-10%)	
Luminous Efficacy (lm/W)	121.30	123.33	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>

## 2.4 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2016-08-06	Test Ambient:	25.2 °C
Test Orientation	Horizontal	Stabilization Time (min)	90
Model Number	IK-MS02-0010-3-DN-50-J		

### Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE161906-L4	120.0	60	0.2578	30.38	0.9819	6.86
	277.0	60	0.1183	29.50	0.9006	7.24
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

### Chromaticity Measurement - Sphere-Spectroradiometer Method in Lithonia

#### 2GT8 lensed 2x2:

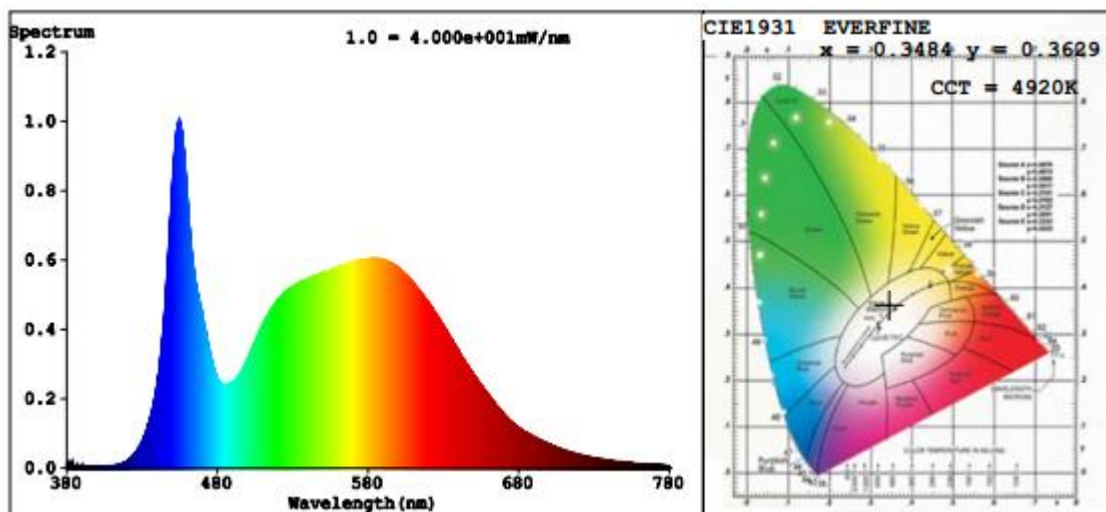
Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	79	R9	2
Frequency (Hz)	60	R2	89	R10	72
CCT (K)	4920	R3	94	R11	76
Duv	0.0043	R4	78	R12	50
Chromaticity (x, y)	x=0.3484 y=0.3629	R5	78	R13	82
Chromaticity (u', v')	u'=0.2093 v'=0.4905	R6	83	R14	97
Color Rendering Index (CRI)	81.4	R7	86	R15	73
R9	2	R8	64	--	--

### Photometric Measurement – Sphere-Spectroradiometer Method in Lithonia

#### 2GT8 lensed 2x2:

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	3780	3714	>= 2000(-10%)	
Luminous Efficacy (lm/W)	124.42	125.90	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>

### 3. Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-336	2 meter Integrating Sphere	2016-07-01	2017-06-30
ST-R-331	Spectral analysis system HAAS-2000	2016-07-01	2017-06-30
D204	Standard Lamp	2016-07-01	2017-06-30
PF2010	Power Meter for Integrating Sphere	2016-07-01	2017-06-30
EE-09	Goniophotometer system	2016-07-01	2017-06-30
D908S	Standard Lamp	2016-07-01	2017-06-30
PF210	Power Meter for Goniophotometer	2016-07-01	2017-06-30
ST-R-181A	Temperature Tester	2016-07-01	2017-06-30
Uncertainty: Photometric Measurement (Sphere):1.74% Chromaticity Measurement(Sphere):14.3K Photometric Measurement(Goniophotometer):1.62%			

\*\*\*\*\* END OF REPORT \*\*\*\*\*

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>