

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-MS04-0010-3-DN-XX-J

Representative (Tested) Model:

IK-MS04-0010-3-DN-30-J

IK-MS04-0010-3-DN-35-J

IK-MS04-0010-3-DN-40-J

IK-MS04-0010-3-DN-50-J

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

Test & Report By:

Jack Luo

Engineer: Jack Luo

Date: 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

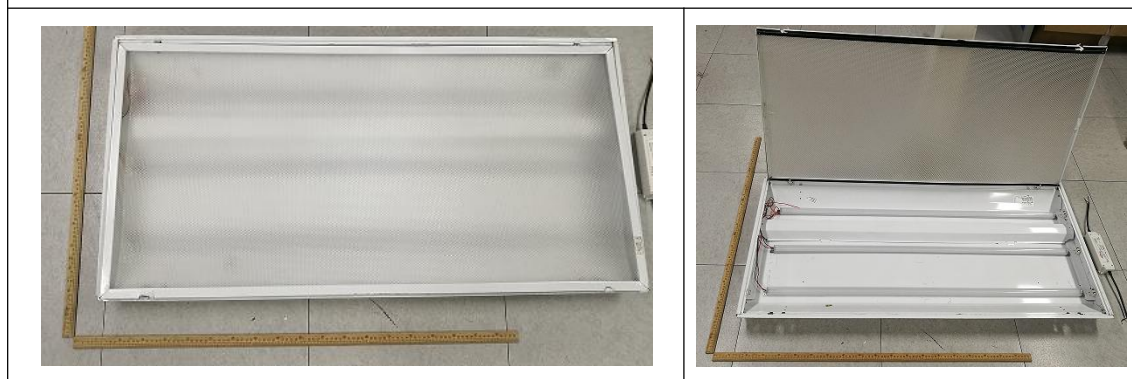
Report Format Number STD/QR4909-A/2

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-MS04-0010-3-DN-XX-J	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	Linear Retrofit Kits for 2x4 Luminaires	
Rated Voltage / Frequency	100~277 Vac, 50/60 Hz	
Nominal Power	30W	
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-T1(3000K),T2(3500K),T3(4000K), T4(5000K)	
Luminaire Aperture (for downlights)	--	in.
Luminaire Length	--	mm
Luminaires Width	--	mm
Number of Units (modular products)	N/A	s

Photo


1.2 Test Specifications:

Date of Receipt	Feb.16, 2017
Date of Test	Feb.18, 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	2017-02-18	Test Ambient:	25.2 °C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	IK-MS04-0010-3-DN-30-J		

Electrical Measurement in Lithonia 2GT8 lensed 2x4:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE171126-T1	120.0	60	0.2419	28.86	0.9942	4.98
	277.0	60	0.1062	28.55	0.9705	8.77
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	82	R9	7
Frequency (Hz)	60	R2	92	R10	80
CCT (K)	3073	R3	96	R11	78
Duv	-0.0011	R4	80	R12	67
Chromaticity (x, y)	x=0.4303 y=0.3990	R5	81	R13	84
Chromaticity (u', v')	u'=0.2485 v'=0.5184	R6	89	R14	99
Color Rendering Index (CRI)	82.6	R7	82	R15	74
R9	7	R8	59	--	--

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

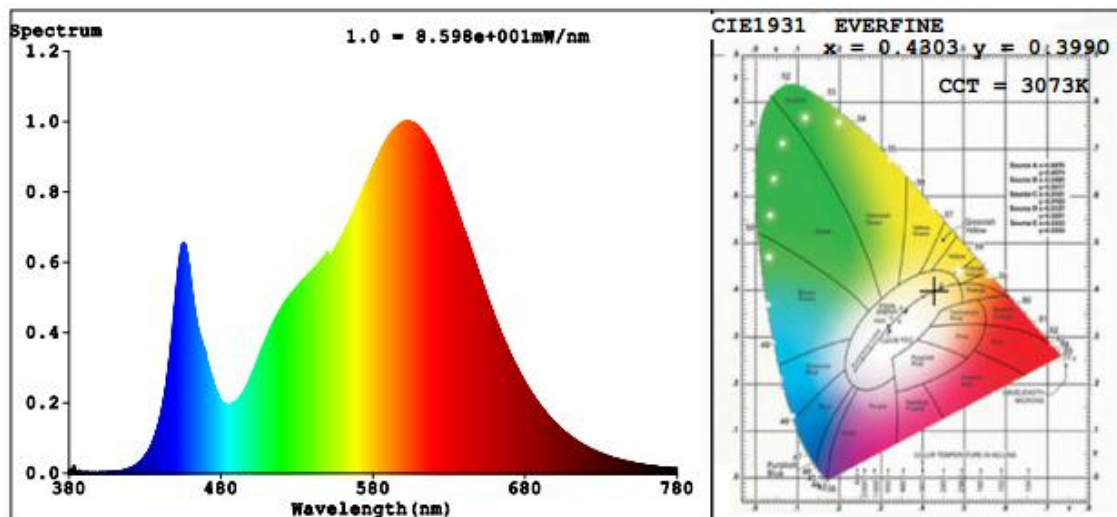
Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	3108.8	3152.4	$\geq 3000(-10\%)$	
Luminous Efficacy (lm/W)	107.72	110.42	Standard: $\geq 100(-3\%)$	Premium: $\geq 125(-3\%)$
Zonal lumens in the 0-60° zone (%)	85.6	--	$\geq 75(-3)$	
SC: 0-180° (if applicable)	1.20	--	1.0-2.0(± 0.1)	
SC: 90-270° (if applicable)	1.16	--	1.0-2.0(± 0.1)	
Beam Angle (°)	91.0	--	--	
Center Beam Candle Power (cd)	1421	--	--	

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Spectral Power Distribution & Chromaticity Diagram

Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,076.4	34.6%
0-40	1,705.6	54.9%
0-60	2,661.6	85.6%
60-90	446.8	14.4%
70-100	201.5	6.5%
90-120	0.0	0%
0-90	3,108.3	100%
90-180	0.0	0%
0-180	3,108.4	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	134.1	4.3%	90-100	0.0	0%
10-20	380.8	12.2%	100-110	0	0%
20-30	561.5	18.1%	110-120	0	0%
30-40	629.2	20.2%	120-130	0	0%
40-50	557.7	17.9%	130-140	0	0%
50-60	398.3	12.8%	140-150	0.0	0%
60-70	245.3	7.9%	150-160	0.0	0%
70-80	150.3	4.8%	160-170	0.0	0%
80-90	51.3	1.6%	170-180	0.0	0%

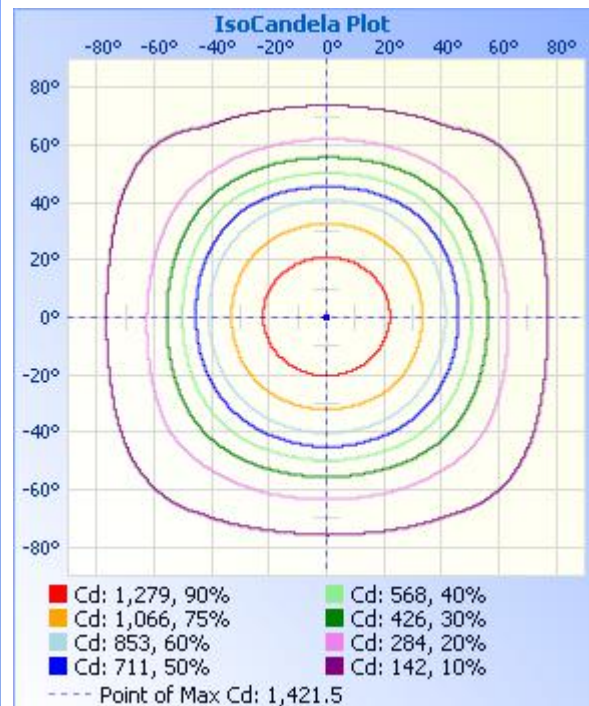
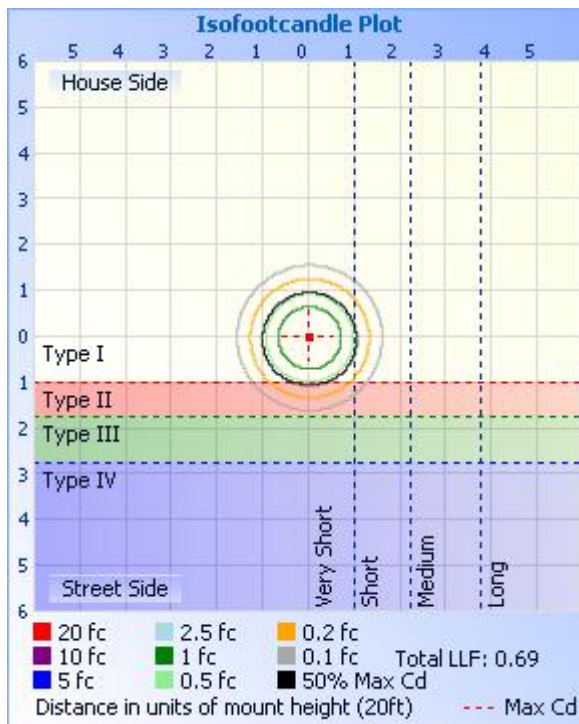
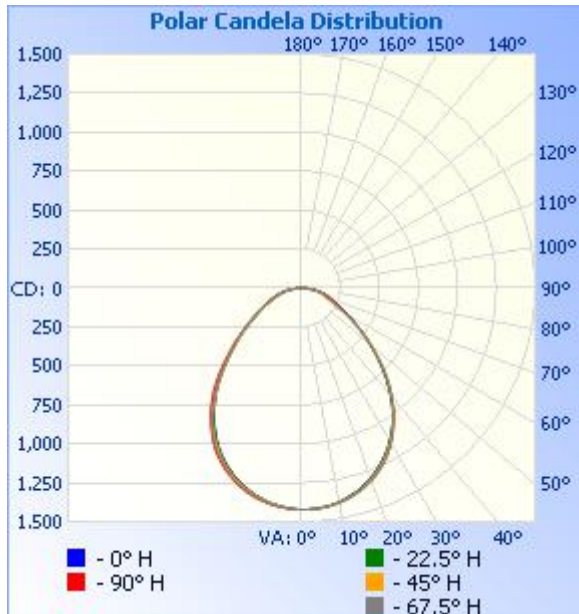
Photometric Data


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	1421	1421	1421	1421	1421	1421	1421	1421	1421	1421	1421	1421	1421	1421	1421	1421	
5	1413	1415	1416	1414	1415	1416	1417	1416	1414	1412	1411	1410	1409	1408	1409	1411	
10	1391	1394	1394	1393	1392	1394	1397	1398	1397	1390	1386	1382	1381	1380	1383	1387	
15	1356	1359	1356	1354	1353	1355	1360	1364	1363	1354	1346	1339	1335	1337	1342	1348	
20	1302	1303	1301	1297	1297	1299	1305	1313	1313	1302	1290	1280	1276	1277	1283	1293	
25	1230	1230	1225	1224	1223	1226	1233	1242	1241	1230	1215	1205	1198	1200	1208	1219	
30	1137	1136	1131	1130	1133	1133	1139	1147	1146	1136	1121	1108	1100	1103	1113	1126	
35	1017	1021	1018	1018	1022	1022	1027	1032	1030	1012	999	987	981	983	994	1001	
40	884	887	889	885	888	888	897	900	897	869	852	846	846	846	847	860	
45	728	741	748	741	739	743	754	752	740	719	698	690	699	692	697	710	
50	577	582	598	593	591	592	601	592	587	574	559	549	552	549	556	564	
55	443	444	450	457	454	452	450	450	450	447	435	429	430	426	431	440	
60	335	325	322	333	339	328	320	324	338	344	329	331	331	328	326	340	
65	254	234	219	232	244	229	216	235	256	263	245	253	255	251	243	261	
70	204	185	160	171	181	170	160	187	205	196	183	189	194	189	181	197	
75	160	149	132	133	137	133	133	150	161	145	137	140	146	142	136	146	
80	108	106	99.5	95.6	97.8	94.6	101	108	111	100	92.1	94.3	100	96.8	92.5	99.2	
85	49.0	52.9	47.6	49.8	51.7	49.8	46.1	49.4	46.1	47.5	41.1	46.4	49.0	49.0	42.0	50.9	
90	0.00	0.00	0.05	0.12	0.24	0.14	0.04	0.00	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	0.00	0.00	
105	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	
110	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	
115	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	
120	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	
125	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	
130	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	
135	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	
140	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	
145	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	
150	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	0.05	0.00	
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.00	0.00	
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.00	0.00	
165	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.25	0.00	0.00	
170	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.20	0.00	0.00	
175	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	
180	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	

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-MS04-0010-3-DN-35-J		

Electrical Measurement in Lithonia 2GT8 lensed 2x4:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE171126-T2	120.0	60	0.2445	29.12	0.9923	5.39
	277.0	60	0.1073	28.83	0.9702	8.63
DLC Pass Criteria					$\geq 0.9(-3\%)$	$\leq 20(+5)$

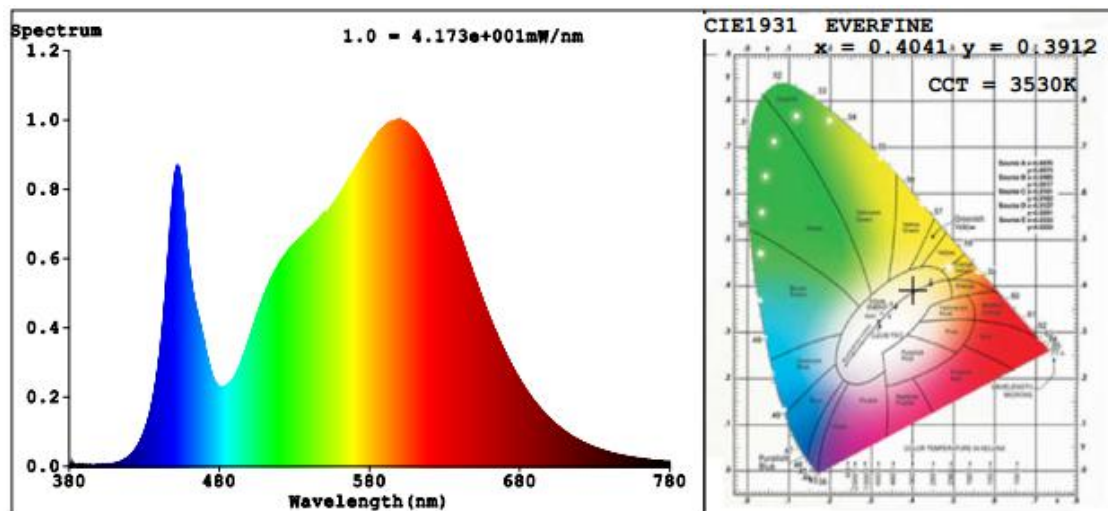
Chromaticity Measurement in Lithonia 2GT8 lensed 2x4 - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	9
Frequency (Hz)	60	R2	90	R10	75
CCT (K)	3530	R3	95	R11	80
Duv	0.0005	R4	81	R12	62
Chromaticity (x, y)	x=0.4041 y=0.3912	R5	81	R13	83
Chromaticity (u', v')	u'=0.2347 v'=0.5113	R6	86	R14	98
Color Rendering Index (CRI)	82.8	R7	85	R15	75
R9	9	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)	3178	3215	$\geq 3000(-10\%)$	
Luminous Efficacy (lm/W)	109.13	111.52	Standard: $\geq 100(-3\%)$	Premium: $\geq 125(-3\%)$

Spectral Power Distribution & Chromaticity Diagram



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2.3 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2017-02-18	Test Ambient:	25.2 °C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	IK-MS04-0010-3-DN-40-J		

Electrical Measurement in Lithonia 2GT8 lensed 2x4:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE171126-T3	120.0	60	0.2412	28.75	0.9935	5.29
	277.0	60	0.1062	28.51	0.9692	8.73
DLC Pass Criteria					$\geq 0.9(-3\%)$	$\leq 20(+5)$

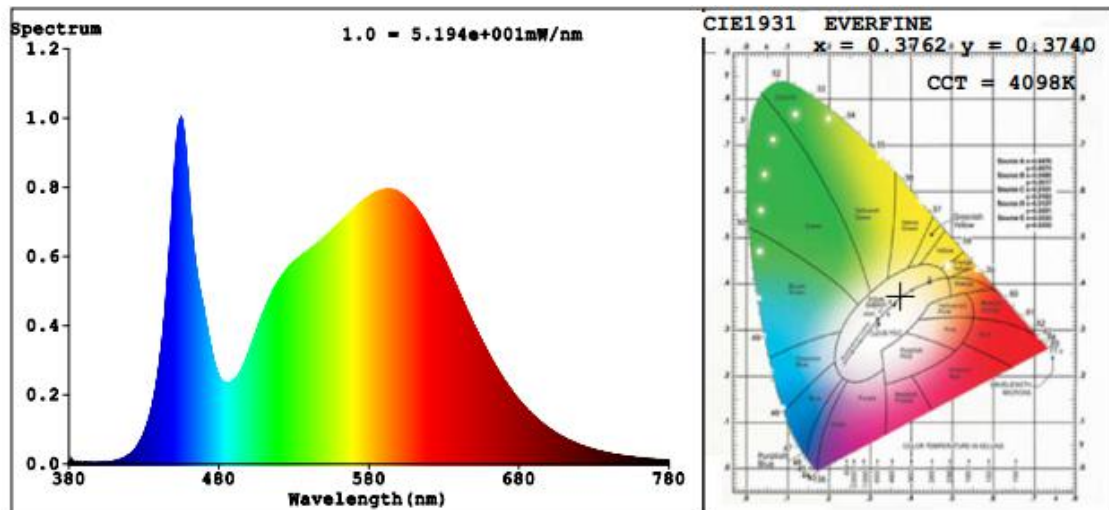
Chromaticity Measurement in Lithonia 2GT8 lensed 2x4 - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	81	R9	8
Frequency (Hz)	60	R2	90	R10	74
CCT (K)	4098	R3	94	R11	77
Duv	0.0000	R4	80	R12	56
Chromaticity (x, y)	x=0.3762 y=0.3740	R5	80	R13	83
Chromaticity (u', v')	u'=0.2234 v'=0.4997	R6	84	R14	97
Color Rendering Index (CRI)	82.4	R7	86	R15	76
R9	8	R8	64	--	--

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)	3205	3241	$\geq 3000(-10\%)$	
Luminous Efficacy (lm/W)	111.48	113.68	Standard: $\geq 100(-3\%)$	Premium: $\geq 125(-3\%)$

Spectral Power Distribution & Chromaticity Diagram



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

Test date	2017-02-18	Test Ambient:	25.2 ° C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	IK-MS04-0010-3-DN-50-J		

Electrical Measurement in Lithonia 2GT8 lensed 2x4:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE171126-T4	120.0	60	0.2392	28.54	0.9942	5.38
	277.0	60	0.1048	28.21	0.9722	9.09
DLC Pass Criteria					$\geq 0.9(-3\%)$	$\leq 20(+5)$

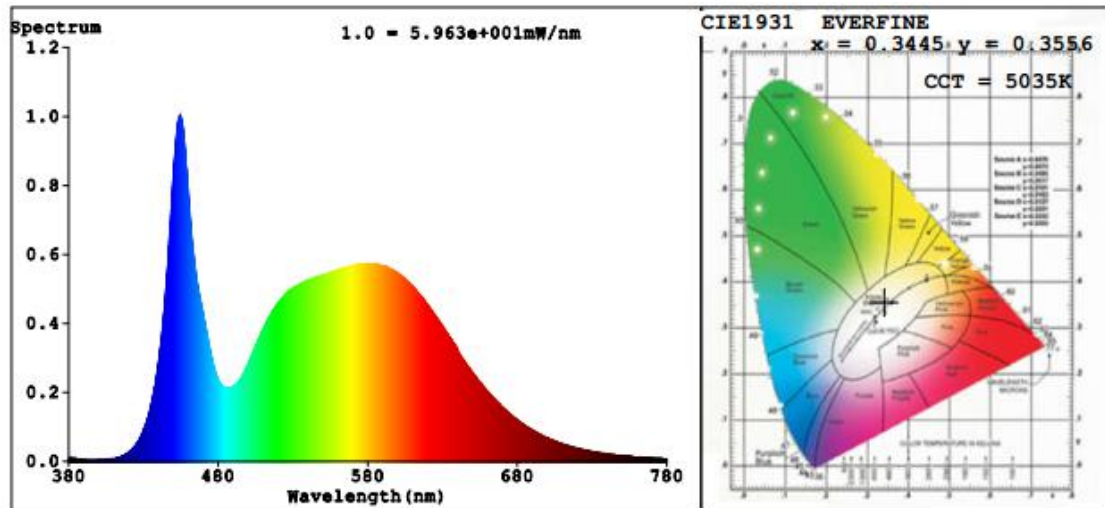
Chromaticity Measurement in Lithonia 2GT8 lensed 2x4 -
Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	80	R9	4
Frequency (Hz)	60	R2	88	R10	70
CCT (K)	5035	R3	92	R11	78
Duv	0.0022	R4	80	R12	55
Chromaticity (x, y)	x=0.3445 y=0.3556	R5	80	R13	82
Chromaticity (u', v')	u'=0.2095 v'=0.4865	R6	82	R14	96
Color Rendering Index (CRI)	81.8	R7	86	R15	75
R9	4	R8	65	--	--

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)	3218	3228	$\geq 3000(-10\%)$	
Luminous Efficacy (lm/W)	112.75	114.43	Standard: $\geq 100(-3\%)$	Premium: $\geq 125(-3\%)$

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 *******