

LM-79-08 Test Report

For

ATG ELECTRONICS CORP**(Brand Name: N/A)**

10700 7th Street Rancho Cucamonga, CA 91730

**2x4 Luminaires for Ambient Lighting of Interior
Commercial Spaces**

Model name(s): FPEL24-30W-ZZ

Remark: The suffix of the model name "ZZ" stands for different color
temperature as below: 30=3000K, 35=3500K, 40=4000K,
45=4500K, 50=5000K.

Representative (Tested) Model: FPEL24-30W-30
FPEL24-30W-50

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

Test & Report By:

Garman Mo

Engineer: Garman Mo

Date: Mar.29,2017

Review By:

Tommy Liang

Manager: Tommy Liang

Remark: This is a multiple listed report, the Project Number of the original report is GZE170352-H-D.

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

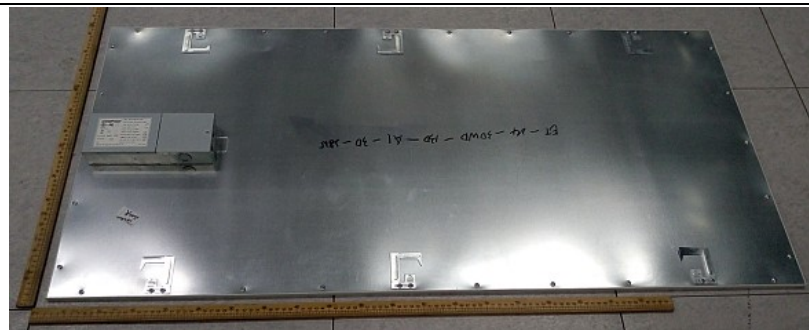
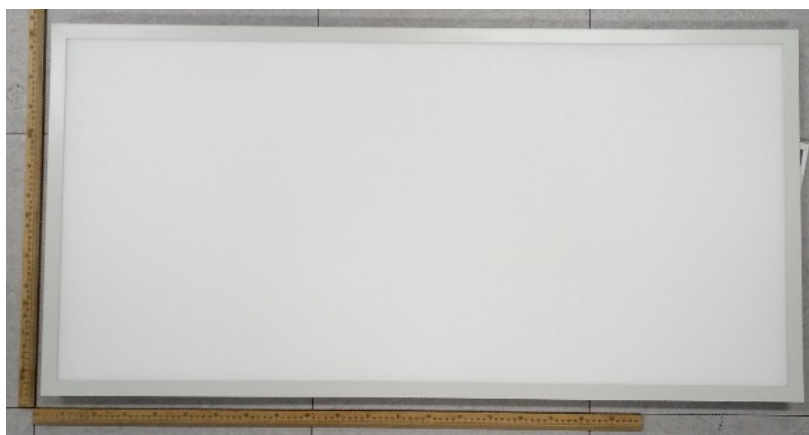
Tel: 8620-3229 0320

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

1.1 Product Information:

Organization Name	ATG ELECTRONICS CORP	
Brand Name	N/A	
Model Number	FPEL24-30W-ZZ	
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 -277Vac, 50/60 Hz	
Nominal Power	30W	
Rated Initial Lamp Lumen	--	
Declared CCT	3000K,3500K,4000K,4500K,5000K	
LED Manufacturer	EVERLIGHT ELECTRONICS CO., LTD	
LED Model	67-21S Series (3000K)	
Sample Number	GZE170352-H-D1(3000K),D2(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	Mar.26,2017
Date of Test	Mar.27,2017
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	2017-03-27	Test Ambient:	25.2 ° C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	FPEL24-30W-30		

Electrical Measurement:

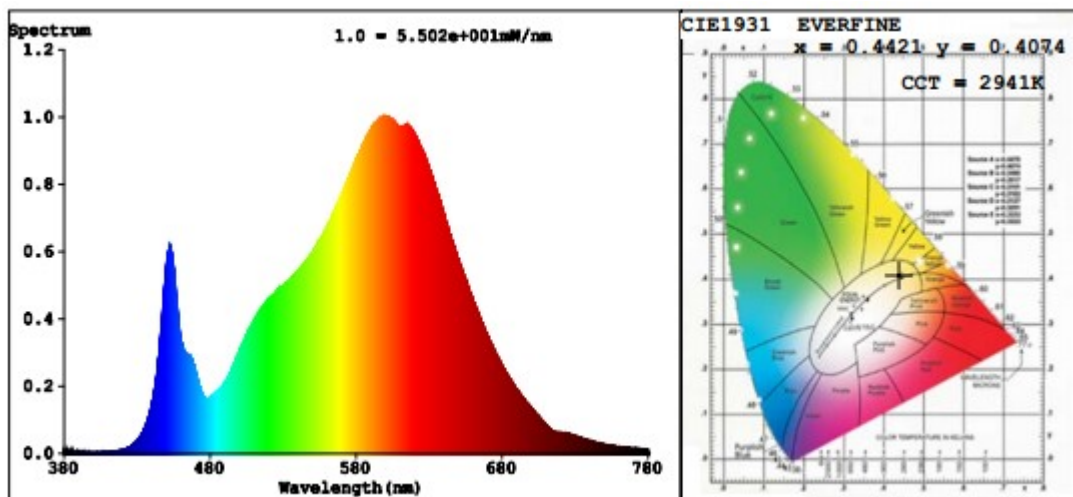
Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170352-H-D1	120.0	60	0.2494	29.55	0.9874	11.42
	277.0	60	0.1179	29.15	0.8922	14.38
DLC Pass Criteria					$\geq 0.9(-3\%)$	$\leq 20(+5)$

Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	80	R9	5
Frequency (Hz)	60	R2	91	R10	79
CCT (K)	2941	R3	96	R11	79
Duv	0.0006	R4	80	R12	68
Chromaticity (x, y)	x=0.4421 y=0.4074	R5	80	R13	83
Chromaticity (u', v')	u'=0.2525 v'=0.5235	R6	89	R14	99
Color Rendering Index (CRI)	82.1	R7	82	R15	73
R9	5	R8	58	--	--

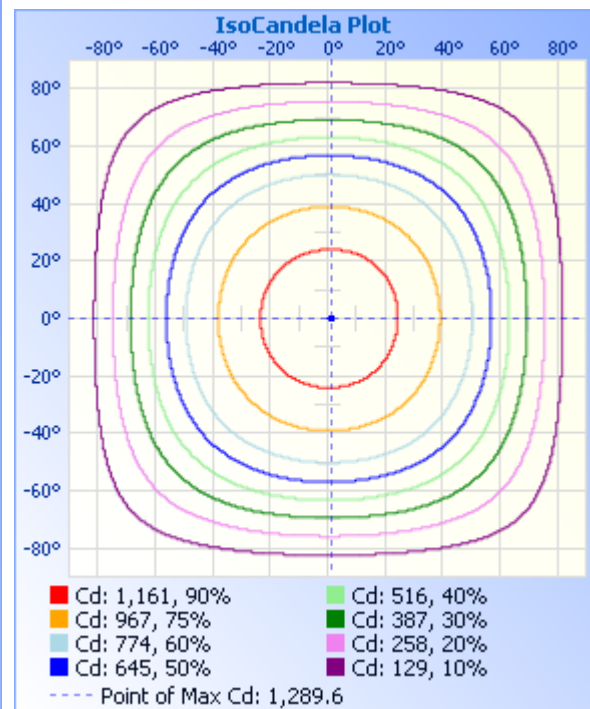
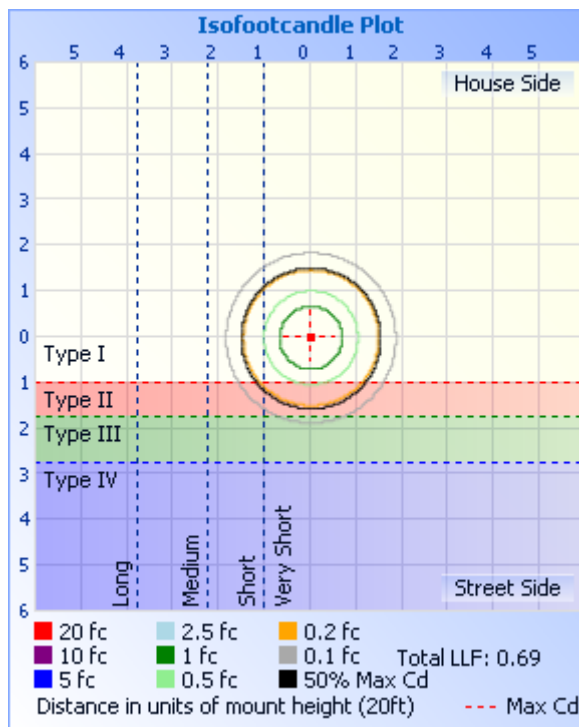
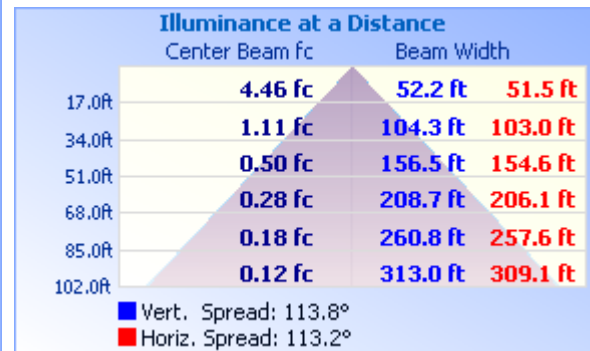
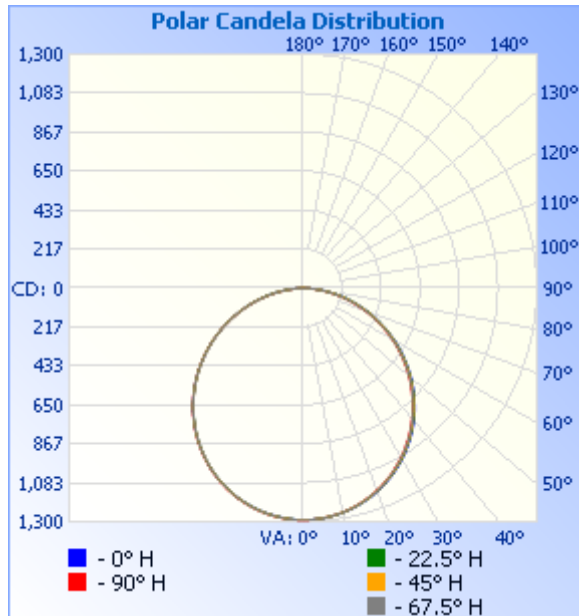
Photometric Measurement – Goniophotometer Method:

Parameter	Result		DLC V4.1 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	3753.0	3734.1	$\geq 3000 (-10\%)$	
Luminous Efficacy (lm/W)	127.01	128.10	Standard: $\geq 100(-3\%)$	Premium: $\geq 125(-3\%)$
Zonal lumens in the 0-60° zone (%)	77.7	--	$\geq 75(-3)$	
SC: 0-180° (if applicable)	1.25	--	1.0-2.0(± 0.1)	
SC: 90-270° (if applicable)	1.26	--	1.0-2.0(± 0.1)	
Beam Angle (°)	113.5	--	--	
Center Beam Candle Power (cd)	1288	--	--	

Spectral Power Distribution & Chromaticity Diagram

Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,002.1	26.7%
0-40	1,643.0	43.8%
0-60	2,917.2	77.7%
60-90	835.4	22.3%
70-100	364.4	9.7%
90-120	0.0	0%
0-90	3,752.6	100%
90-180	0.0	0%
0-180	3,752.6	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	122.0	3.2%	90-100	0.0	0%
10-20	349.6	9.3%	100-110	0.0	0%
20-30	530.5	14.1%	110-120	0.0	0%
30-40	641.0	17.1%	120-130	0	0%
40-50	667.2	17.8%	130-140	0	0%
50-60	607.0	16.2%	140-150	0.0	0%
60-70	471.0	12.6%	150-160	0	0%
70-80	283.3	7.5%	160-170	0	0%
80-90	81.0	2.2%	170-180	0	0%

Photometric Data


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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	1290	1289	1289	1289	1288	1288	1289	1289	1290	1289	1289	1289	1288	1288	1289	1289	
5	1284	1285	1285	1285	1284	1283	1283	1283	1283	1282	1282	1282	1282	1282	1283	1284	
10	1268	1270	1270	1269	1268	1267	1267	1266	1265	1264	1264	1264	1264	1265	1266	1266	
15	1240	1243	1244	1243	1241	1240	1239	1238	1237	1235	1235	1236	1236	1237	1237	1238	
20	1201	1205	1206	1206	1204	1202	1200	1199	1197	1196	1196	1197	1198	1198	1198	1199	
25	1152	1156	1158	1158	1156	1154	1151	1149	1147	1147	1146	1148	1149	1148	1149	1149	
30	1093	1097	1100	1100	1099	1096	1093	1090	1087	1087	1088	1089	1090	1090	1090	1090	
35	1025	1029	1032	1034	1032	1028	1026	1022	1019	1019	1019	1022	1022	1022	1023	1022	
40	949	953	957	958	957	953	950	946	942	942	943	945	947	946	946	945	
45	865	869	873	875	874	870	867	863	859	858	859	862	863	863	863	862	
50	775	779	783	785	784	781	777	773	769	768	769	771	773	773	773	771	
55	679	682	686	689	689	686	682	677	674	672	673	675	677	677	677	676	
60	578	582	586	588	589	586	583	578	574	572	573	575	576	577	577	575	
65	474	477	481	485	485	484	480	475	471	470	470	472	474	474	474	472	
70	368	372	376	380	381	380	376	370	365	365	367	369	370	371	370	368	
75	263	265	271	277	278	277	272	265	261	261	263	267	268	267	267	265	
80	158	163	171	176	178	177	171	164	162	161	163	168	168	168	166	163	
85	64.9	68.6	73.8	79.7	80.8	78.6	74.1	70.3	68.8	67.6	68.2	71.3	73.2	72.0	68.8	67.3	
90	0.02	0.01	0.16	0.07	0.37	0.46	0.24	0.01	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	2.39	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	0.00	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	0.00	0.00	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	0.00	0.00	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	0.00	0.00	0.00	0.00	
170	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	
175	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	
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	

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2.2 Electrical, Photometric and Chromaticity Measurements

(Refer to Work Instruction QD25)

Test date	2017-03-27	Test Ambient:	25.2 ° C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	FPEL24-30W-50		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170352-H-D2	120.0	60	0.2537	29.91	0.9826	11.86
	277.0	60	0.1200	29.50	0.8875	14.81
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

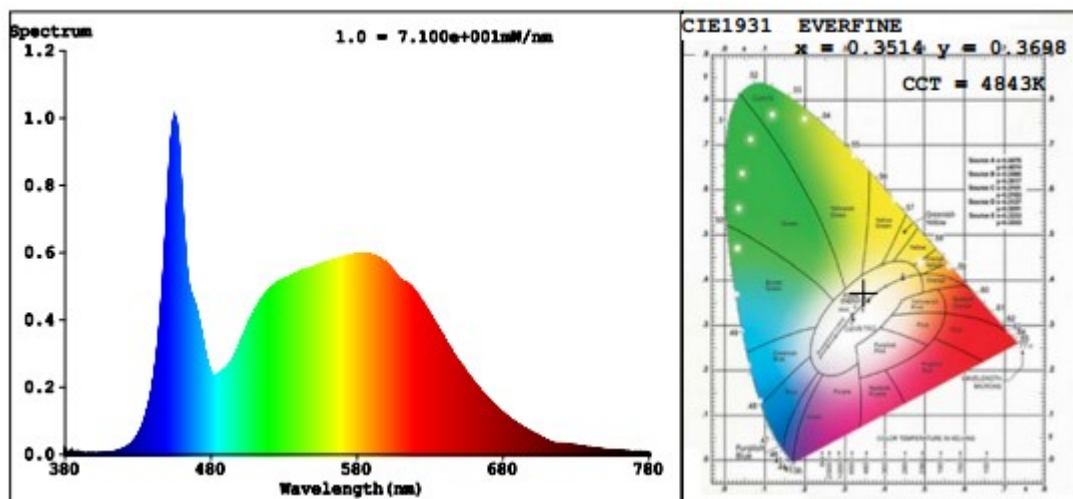
Chromaticity Measurement - Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	79	R9	3
Frequency (Hz)	60	R2	89	R10	72
CCT (K)	4843	R3	95	R11	76
Duv	0.0065	R4	78	R12	50
Chromaticity (x, y)	x=0.3514 y=0.3698	R5	78	R13	82
Chromaticity (u', v')	u'=0.2087 v'=0.4942	R6	83	R14	97
Color Rendering Index (CRI)	81.7	R7	87	R15	73
R9	3	R8	65	--	--

Photometric Measurement – Sphere-Spectroradiometer Method:

Parameter	Result		DLC V4.1 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	3894	3874	>=3000(-10%)	
Luminous Efficacy (lm/W)	130.19	131.31	Standard: >= 100(-3%)	Premium: >= 125(-3%)

Spectral Power Distribution & Chromaticity Diagram



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2.3 Performance Assessment:

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
FPEL24-30W-30	3000K	3753.0	29.55	127.01
FPEL24-30W-35	3500K	3788 ^{*1}	29.73 ^{*2}	127.41 ^{*3}
FPEL24-30W-40	4000K	3824 ^{*1}	29.73 ^{*2}	128.62 ^{*3}
FPEL24-30W-45	4500K	3859 ^{*1}	29.73 ^{*2}	129.80 ^{*3}
FPEL24-30W-50	5000K	3894	29.91	130.19

*1: This value is calculated and the calculation formula is as below:

$$3788 = (3894 - 3753.0) / 4 + 3753.0$$

$$3824 = (3894 - 3753.0) / 4 + 3788$$

$$3859 = (3894 - 3753.0) / 4 + 3824$$

*2: This value is calculated and the calculation formula is as below:

$$29.73 = (29.55 + 29.91) / 2$$

*3: This value is calculated and the calculation formula is as below:

$$127.41 = 3788 / 29.73$$

$$128.62 = 3824 / 29.73$$

$$129.80 = 3859 / 29.73$$

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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 *******