



TEST REPORT

For

Espen Technology Inc.

12257 Florence Ave., Santa Fe Springs, CA, 90650, United States

Model Number:	VEKL4F/30-8T (18W/25W/30W)	
Report Type:	Electrical, Photometric and ISTMT tests according to the following standards and show the compliance to DLC Program SSL Technical Requirements V5.1	
Standards:	ANSI/IES LM-79-19: Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products ANSI C82.77-10-2014: Harmonic Emission Limits – Related Power Quality Requirements for Lighting ANSI/UL 1598-2008: Standard for Safety of Luminaires CIE 190:2010 Calculation and presentation of unified glare rating tables for indoor lighting luminaires IES TM-30-18*: IES Method for Evaluating Light Source Color Rendition	
Project Engineer:	Bay Wang	
Report Number:	RKSB230316010-10	
Sample Size:	One sample was received on 2023-03-16 and used for testing.	
Test Date:	2023-03-28 to 2023-03-30	
Report Date:	2023-03-30	
Reviewed By:	Seven Xia/ EE Engineer	
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan). No. 248 Chenghu Road, Kunshan, Jiangsu, People's Republic of China Tel: +86-0512-86175000 Fax: +86-0512-88934268	

1. Product Information and Description

Product Primary Use:	Retrofit Kits for Direct Linear Ambient Luminaires
Voltage and Frequency:	120-277VAC, 50/60Hz
LED Source Manufacturer:	Seoul Semiconductor Co., LTD
LED Source Model:	STW8A2PD-XX
Driver Model:	SIF30-I0650 120-277 W D1 F-S1S2
Luminaire length:	4ft
Auxiliary Ballast Model:	NA
Auxiliary Housing Model:	Lithonia C2 32 MVOLT GEB10IS
White Tunable:	Yes
Field-Adjustable Light Output:	Yes

2. Product Rated Values#

Test Model	CCT(K)	Light Output (lm)	Power(W)	Luminous Efficacy (lm/W)
VEKL4F/30-8T (18W/25W/30W)	3500	3900	30	130
		3375	25	135
		2502	18	139
	4000	4200	30	140
		3625	25	145
		2682	18	149
	5000	3960	30	132
		3425	25	137
		2538	18	141

3. Test List

Test Model	CCT(K)	Power(W)	Test Item			
			Goniophotometer Test	Integrating Sphere Test	THDi and PF Test	In-Situ Temperature Measurement Test
VEKL4F/30-8T (18W/25W/30W)	3500	30	Yes	Yes	Yes	Yes
		25	NA	Yes	Yes	NA
		18	NA	Yes	Yes	NA
	4000	30	NA	Yes	Yes	NA
	5000	30	Yes	Yes	Yes	NA

4. Product Photo

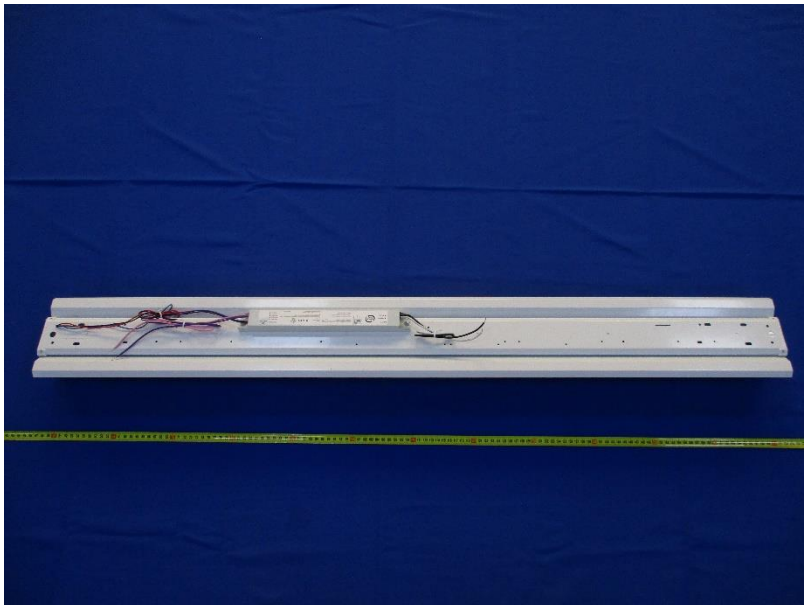
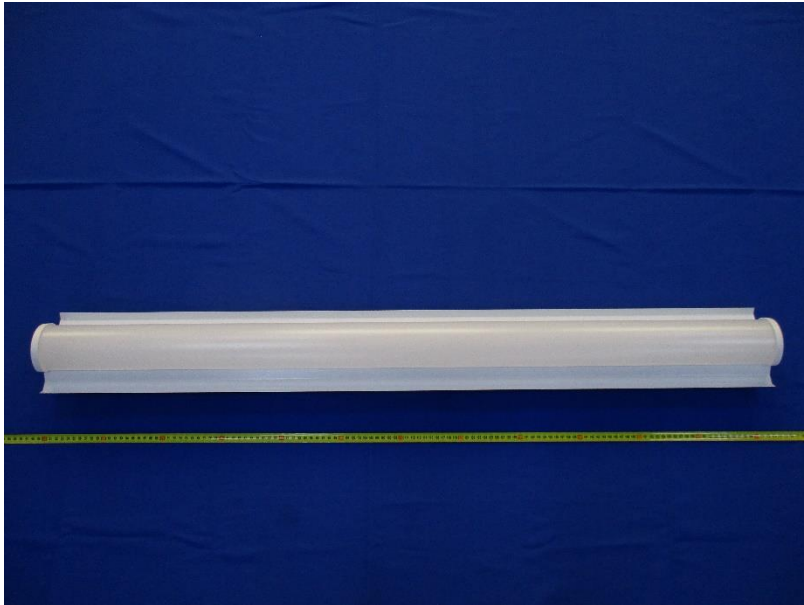
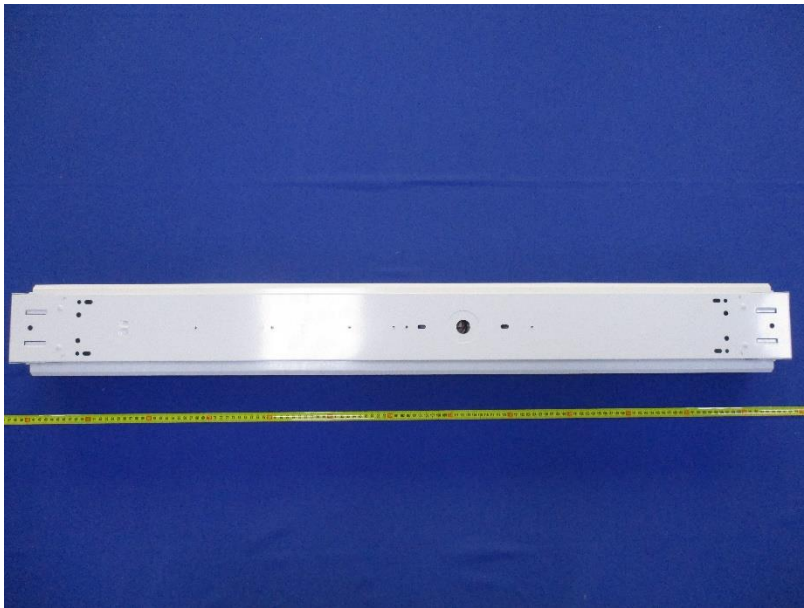
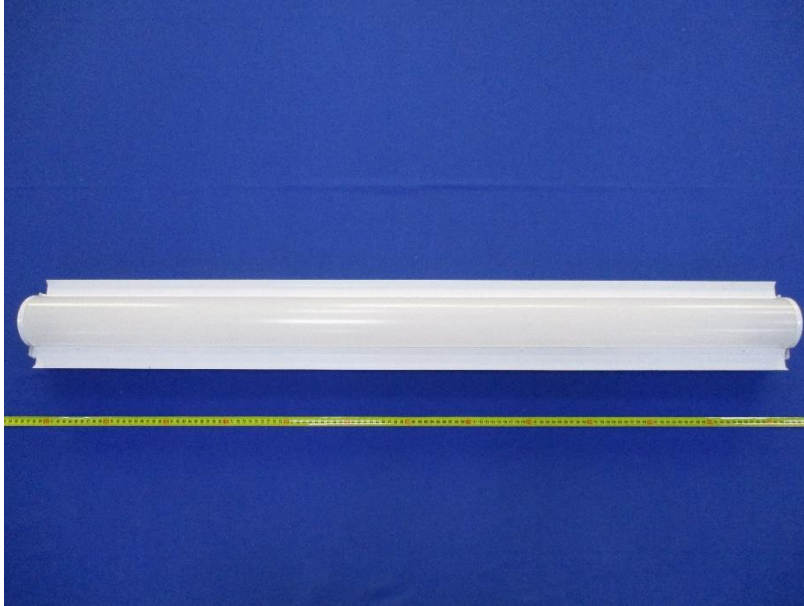


Photo of Product Installed in the Fixture



LED Driver Photo



5. Test Result

Test Model: VEKL4F/30-8T (18W/25W/30W)

Control setting: 3500K/ 30W

Integrating Sphere Test; Orientation: Downward; Test Voltage: 120V 60Hz;				
Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances only)	Conclusion
Light Output(lm)	4052.3	≥1500	≥1350	Pass
Power(W)	31.29	None.	None.	N/A
Total Efficacy(lm/W)	129.52	≥115	≥111.55	Pass
CCT(K)	3462	None ⁱ	None.	N/A
Duv	0.000214	None ⁱ	None.	N/A
IES R _f	84	70	69	Pass
IES R _g	96	89	88	
IES Rcs,h1	-12%	-12%~23%	-13%~24%	
R _a	82.7	≥80	≥79	
R ₉	6	≥0	≥-1	

Note:

- i. White-tunable products are not required to meet the chromaticity requirements in DLC V5.1.

Goniophotometer Test; Orientation: Downward; Test Voltage: 120V 60Hz;				
Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances only)	Conclusion
Light Output(lm)	4055	≥1500	≥1350	Pass
Power(W)	31.42	None.	None.	N/A
Total Efficacy(lm/W)	129.11	≥115	≥111.55	Pass
Zonal Lumen Distribution(0-60°)	64.65%	0-60°≥40%	0-60°≥37%	Pass

Goniophotometer THDi 、 PF Test; Orientation: Downward;					
Test Voltage	Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances and/or allowances)	Conclusion
120	Power Factor	0.9974	≥0.9	≥0.87	Pass
120	THDi	6.09%	≤20%	≤25%	Pass
277	Power Factor	0.9679	≥0.9	≥0.87	Pass
277	THDi	12.39%	≤20%	≤25%	Pass

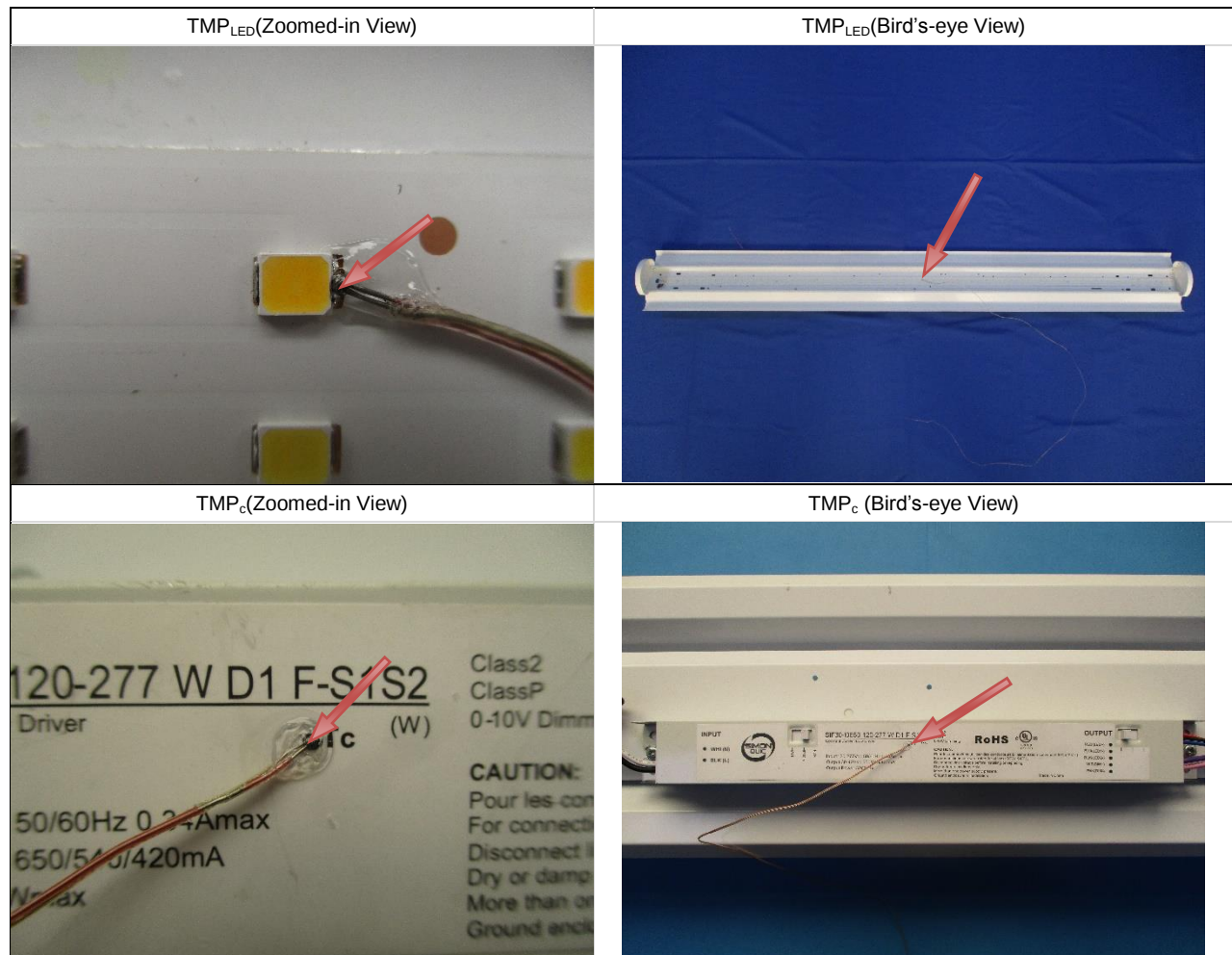
Integrating Sphere THDi 、 PF Test; Orientation: Downward;					
Test Voltage	Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances and/or allowances)	Conclusion
120	Power Factor	0.9913	≥0.9	≥0.87	Pass
120	THDi	5.89%	≤20%	≤25%	Pass
277	Power Factor	0.9667	≥0.9	≥0.87	Pass
277	THDi	12.46%	≤20%	≤25%	Pass

In-Situ Temperature Measurement Test: Test Voltage: 120V 60Hz;

Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances and/or allowances)	Conclusion
TMP _{LED} (°C)	40.2	≤105	With tolerance of ≤ 1.1°C or 0.4%, whichever is greater due to thermocouple tolerance	Pass
TMP _c (°C)	45.4	≤90	With tolerance of ≤ 1.1°C or 0.4%, whichever is greater due to thermocouple tolerance	Pass
Drive Current/Individual LED source(mA)	109.5	≤200	With +5% tolerance	Pass
L70 Lumen Maintenance Life (Hours)	>54000	≥50000	None.	Pass
Color Maintenance	0.0018	≤0.004	≤0.0044	Pass

Note:

1. The test results were measured directly from the test equipment.
2. The DLC requirements were listed according to DLC Technical Requirements V5.1.
3. The conclusion is for reference only. Test report that indicate product performance meets DLC Technical Requirements do not represent official DLC product qualification. All decisions regarding product qualification are made by the DLC.



Test Data

[Integrating Sphere System]

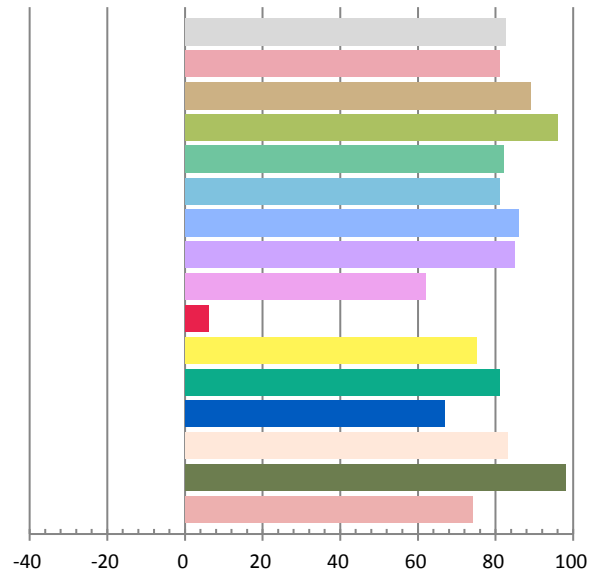
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.263	31.29	0.9913	4052.3	129.52

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
12.201	3462	0.000214	0.4077	0.3924	0.2366	0.5123

Color Rendering Index

Ra			
82.7			
R1	R2	R3	R4
81	89	96	82
R5	R6	R7	R8
81	86	85	62
R9	R10	R11	R12
6	75	81	67
R13	R14	R15	
83	98	74	



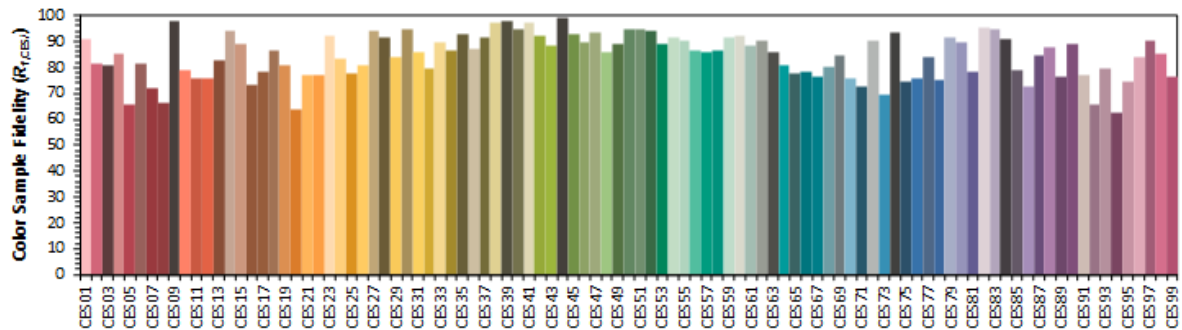
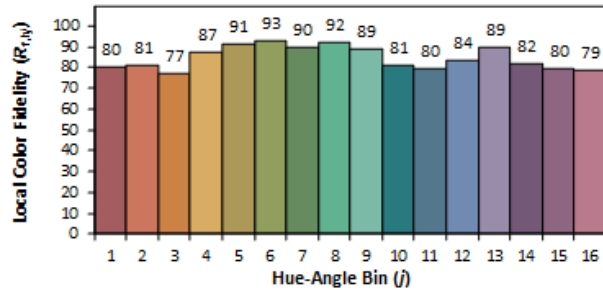
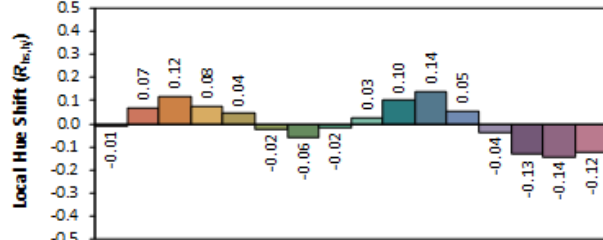
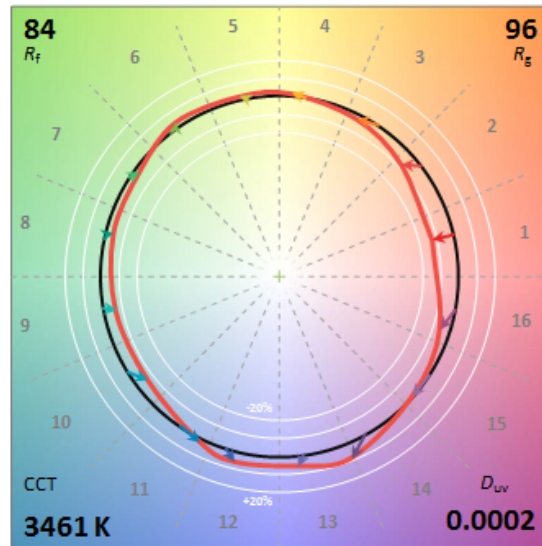
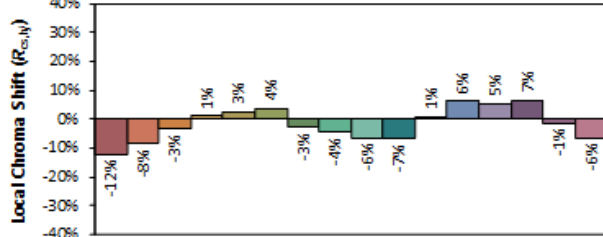
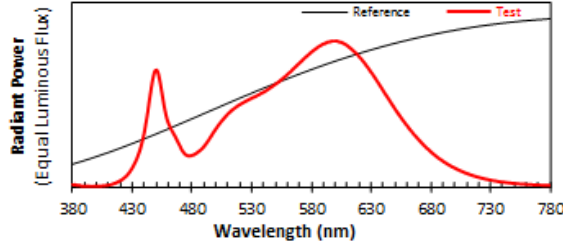
ANSI/IES TM-30-18 Color Rendition Report

Source: User SPD

Manufacturer: Espen Technology Inc.

Date: 2023/3/29

Model: VEKL4F/30-8T (18W/25W/30W)



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

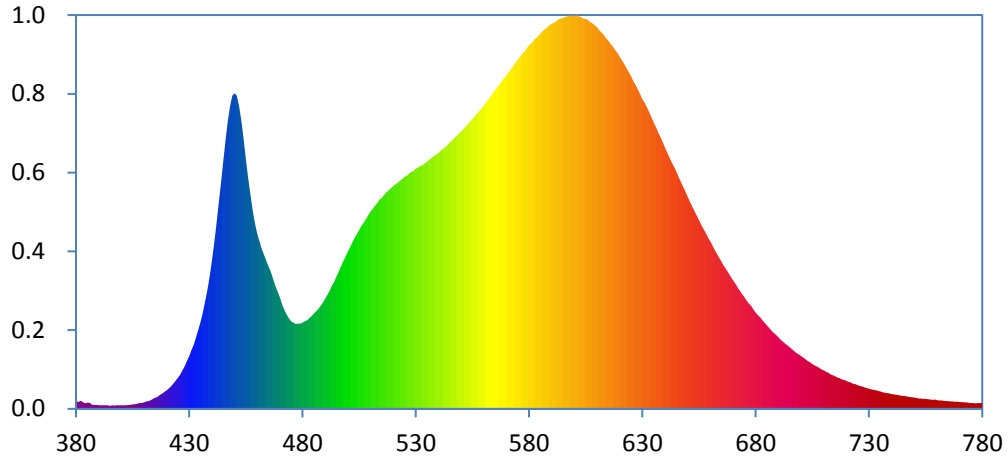
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 y 0.3923
 u' 0.2366
 v' 0.5123

CIE 13.3-1995
(CRI)

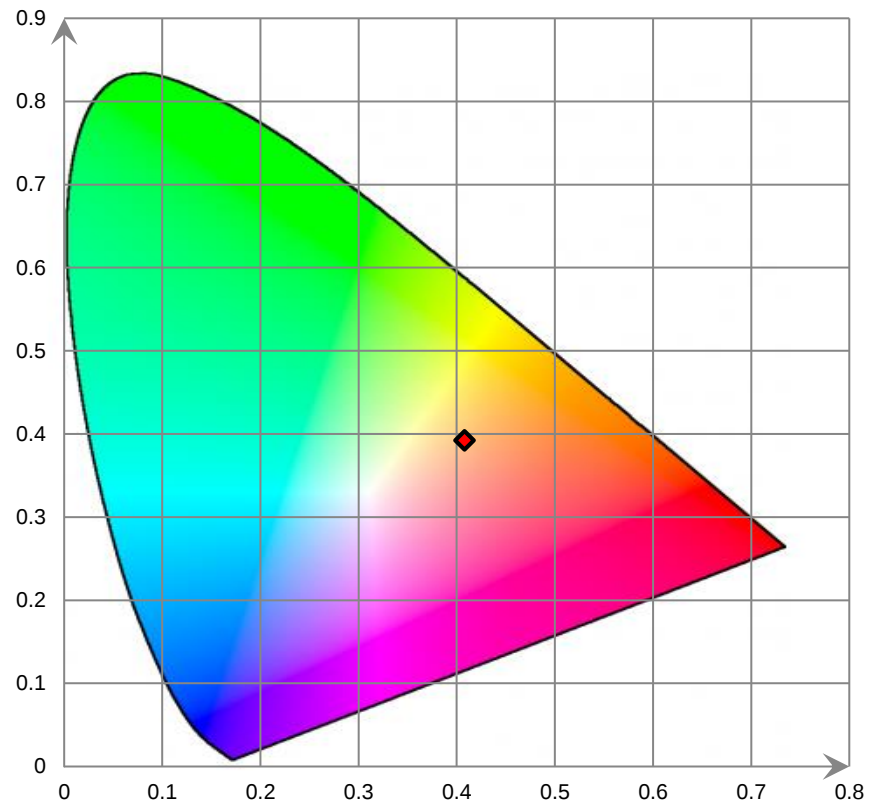
R_a 83
 R_g 6

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

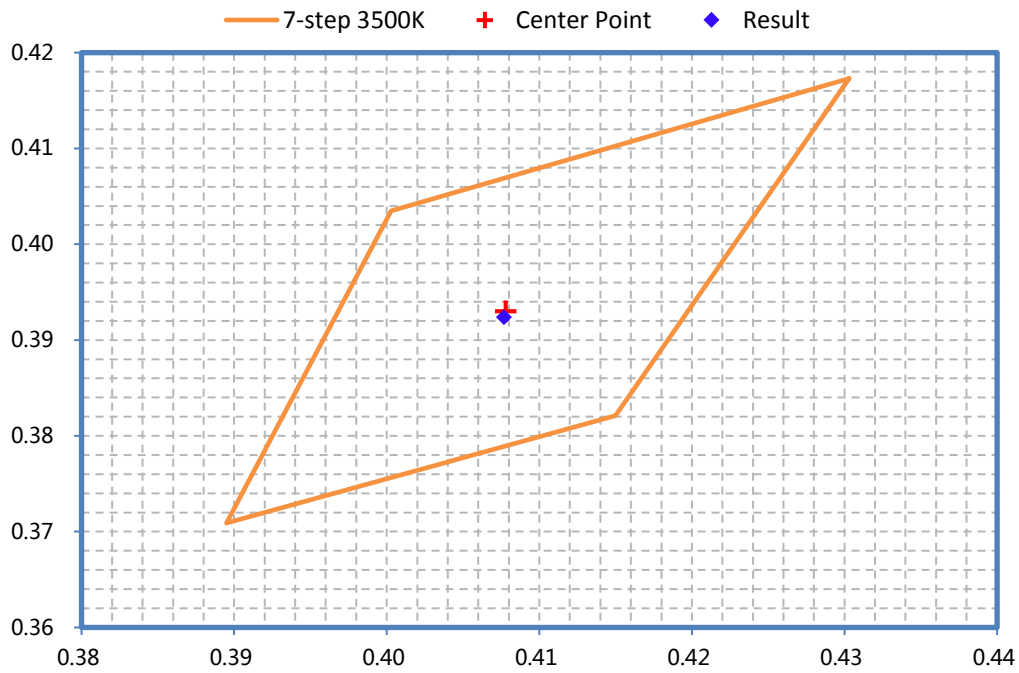
Relative Spectral Power Distribution



CIE 1931 x y Chromaticity Diagram



ANSI C78.377-2017 Chromaticity Quadrangles



[Goniophotometer System]

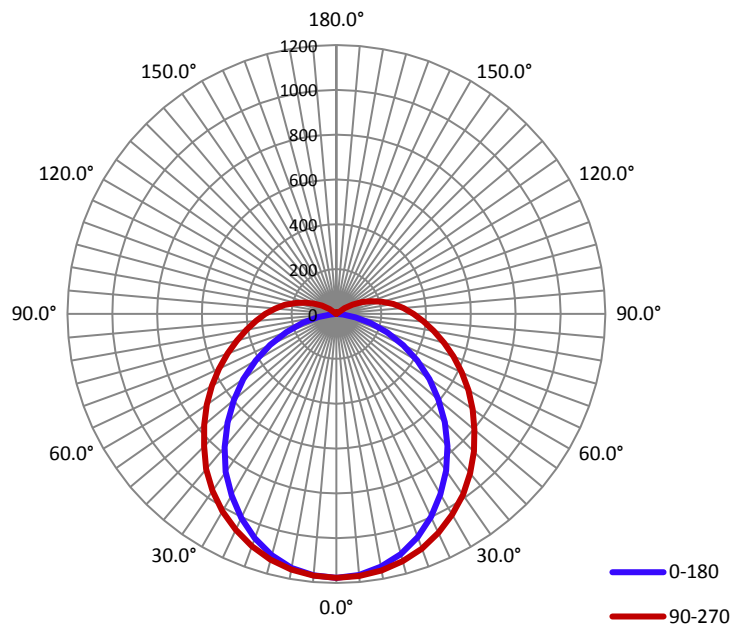
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.262	31.42	0.997

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	$I_{\max}$ (cd)	S/MH (C0/180)	S/MH (C90/270)
4055	129.11	1177.7	1.18	1.30

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% $I_{\max}$):	100.9	113.0	131.5	114.1	114.9
Field Angle (10% $I_{\max}$):	155.2	206.6	229.9	208.1	200.0

Luminous Intensity (cd) Distribution Data

$\begin{matrix} C \\ \backslash \\ Y \end{matrix}$	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1177.2	1177.2	1177.2	1177.2	1177.2	1177.2	1177.2	1177.2
5.0°	1168.5	1170.1	1170.3	1171.8	1173.7	1174.2	1173.6	1173.0
10.0°	1145.3	1149.0	1152.0	1157.4	1161.7	1161.7	1158.2	1155.1
15.0°	1109.5	1114.9	1121.5	1133.1	1141.5	1139.2	1129.8	1124.1
20.0°	1059.5	1068.7	1081.4	1100.6	1114.0	1109.1	1091.8	1079.9
25.0°	998.1	1010.0	1032.3	1058.4	1077.1	1068.5	1043.9	1024.5
30.0°	928.8	944.5	974.3	1009.5	1033.7	1021.4	987.4	960.7
35.0°	853.4	873.2	910.3	955.2	984.5	968.3	924.4	886.2
40.0°	771.0	791.9	841.7	893.8	928.0	910.5	857.6	807.6
45.0°	684.7	710.3	767.5	829.8	867.4	845.3	785.6	726.0
50.0°	595.1	628.3	692.7	761.2	803.6	776.3	710.4	641.6
55.0°	506.9	545.4	616.1	698.1	742.4	712.5	634.1	557.6
60.0°	417.0	461.2	542.9	634.1	680.1	648.5	562.8	474.8
65.0°	328.7	382.2	475.5	570.3	617.8	584.7	495.7	395.1
70.0°	241.3	304.4	412.8	508.7	555.6	522.2	432.3	316.9
75.0°	159.6	238.1	354.9	449.4	497.3	462.1	372.5	250.4
80.0°	87.5	180.4	302.5	394.1	442.6	406.4	318.3	191.2
85.0°	30.4	131.1	256.5	344.4	391.6	353.6	268.9	141.8
90.0°	0.0	97.6	217.0	301.4	344.2	306.8	227.1	106.3
95.0°	0.0	69.6	183.3	262.4	300.2	265.6	191.3	76.9
100.0°	0.0	43.4	147.4	226.6	257.8	228.4	154.1	48.8
105.0°	0.0	16.7	112.1	183.0	209.7	184.2	116.7	20.2
110.0°	0.0	1.0	77.8	143.3	166.2	144.3	81.8	1.7
115.0°	0.0	0.0	41.9	103.7	126.0	104.3	44.8	1.4
120.0°	0.0	0.7	11.9	64.4	84.2	64.8	13.5	1.1
125.0°	0.0	0.8	1.8	28.0	44.8	28.8	1.7	1.4
130.0°	1.2	1.2	1.8	1.9	10.7	1.6	2.0	1.9
135.0°	1.1	1.6	2.5	2.3	2.6	2.1	1.7	2.1
140.0°	1.9	2.1	2.4	2.7	2.8	2.6	2.8	2.0
145.0°	2.8	2.8	3.0	3.1	3.7	3.2	3.2	2.7
150.0°	3.2	3.6	3.7	3.6	4.2	4.0	3.3	3.6
155.0°	4.0	4.2	3.7	4.4	5.0	4.0	4.2	4.3
160.0°	4.8	4.6	4.2	4.9	5.1	4.8	4.6	4.3
165.0°	5.2	4.3	4.9	5.0	5.1	4.9	5.0	5.3
170.0°	4.9	5.5	5.3	5.1	5.0	5.5	6.1	5.5
175.0°	5.5	5.9	5.9	6.0	6.4	6.5	5.6	5.5
180.0°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Luminous Intensity (cd) Distribution Data (cont.)

$\begin{matrix} C \\ \backslash \\ Y \end{matrix}$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	1177.2	1177.2	1177.2	1177.2	1177.2	1177.2	1177.2	1177.2
5.0°	1170.5	1171.5	1171.4	1171.1	1172.1	1170.7	1169.0	1168.4
10.0°	1150.3	1151.7	1154.5	1156.2	1157.2	1153.6	1147.9	1145.2
15.0°	1113.8	1118.0	1125.1	1131.3	1134.5	1127.2	1116.2	1110.0
20.0°	1065.0	1073.2	1084.4	1097.2	1102.5	1091.9	1074.5	1063.0
25.0°	1004.9	1017.1	1032.8	1052.8	1062.5	1047.4	1021.9	1004.1
30.0°	935.0	950.9	974.8	1002.2	1015.8	996.0	962.7	936.5
35.0°	860.3	875.0	908.5	944.2	962.7	938.5	895.1	865.6
40.0°	775.7	797.5	838.8	883.0	903.5	879.2	825.5	784.6
45.0°	686.5	713.8	764.6	812.5	834.6	806.2	753.5	703.5
50.0°	597.0	631.0	687.5	741.6	769.2	736.4	678.8	620.6
55.0°	506.9	547.3	609.6	674.1	705.3	671.2	602.0	536.2
60.0°	416.2	464.0	535.8	609.3	641.6	607.1	532.6	456.2
65.0°	326.1	383.4	468.3	545.0	578.3	542.7	467.4	378.2
70.0°	237.6	303.5	403.3	483.9	516.9	479.6	405.3	303.5
75.0°	155.1	236.0	344.8	426.5	460.1	421.2	348.2	238.7
80.0°	82.3	176.4	292.7	372.2	408.2	369.7	295.7	181.8
85.0°	26.2	129.1	246.0	323.5	360.2	323.4	249.5	135.3
90.0°	0.0	93.3	207.5	281.7	316.4	282.4	211.5	102.0
95.0°	0.0	64.2	173.5	243.2	274.7	244.5	177.5	73.8
100.0°	0.0	37.3	135.8	203.9	234.3	207.1	140.7	46.2
105.0°	0.0	11.3	100.5	163.6	188.2	166.0	106.0	19.7
110.0°	0.0	0.8	68.8	126.6	147.0	128.4	75.4	2.0
115.0°	0.0	0.0	34.7	91.9	110.6	94.4	41.3	1.4
120.0°	0.0	0.0	5.3	55.5	75.1	58.9	11.2	1.1
125.0°	0.0	0.7	1.3	20.6	37.5	24.1	1.7	1.1
130.0°	0.0	1.5	1.1	0.7	6.3	1.6	2.1	1.9
135.0°	0.0	1.7	1.5	1.5	1.6	1.8	1.9	1.9
140.0°	1.1	1.6	1.9	2.1	2.1	2.2	2.4	2.8
145.0°	1.5	2.4	1.8	2.4	2.5	3.2	3.2	3.2
150.0°	2.1	2.7	2.5	3.4	3.4	3.7	4.1	4.1
155.0°	2.7	3.6	4.0	3.3	4.7	4.8	4.7	4.8
160.0°	3.7	4.1	3.9	4.0	4.6	5.2	5.1	4.5
165.0°	3.6	4.7	4.7	4.0	5.1	5.7	5.6	5.4
170.0°	5.3	5.4	5.1	5.1	5.9	5.9	5.7	5.6
175.0°	5.3	5.4	5.3	5.7	5.8	5.8	6.3	6.0
180.0°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Test Model: VEKL4F/30-8T (18W/25W/30W)
Control setting: 3500K/ 25W

THDi 、 PF Test; Orientation: <u>Downward</u> ;					
Test Voltage	Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances and/or allowances)	Conclusion
120	Power Factor	0.9902	≥ 0.9	≥ 0.87	Pass
120	THDi	5.72%	$\leq 20\%$	$\leq 25\%$	Pass
277	Power Factor	0.9649	≥ 0.9	≥ 0.87	Pass
277	THDi	12.28%	$\leq 20\%$	$\leq 25\%$	Pass

Note:

1. The test results were measured directly from the test equipment.
2. The DLC requirements were listed according to DLC Technical Requirements V5.1.
3. The conclusion is for reference only. Test report that indicate product performance meets DLC Technical Requirements do not represent official DLC product qualification. All decisions regarding product qualification are made by the DLC.

Test Data

[Integrating Sphere System]

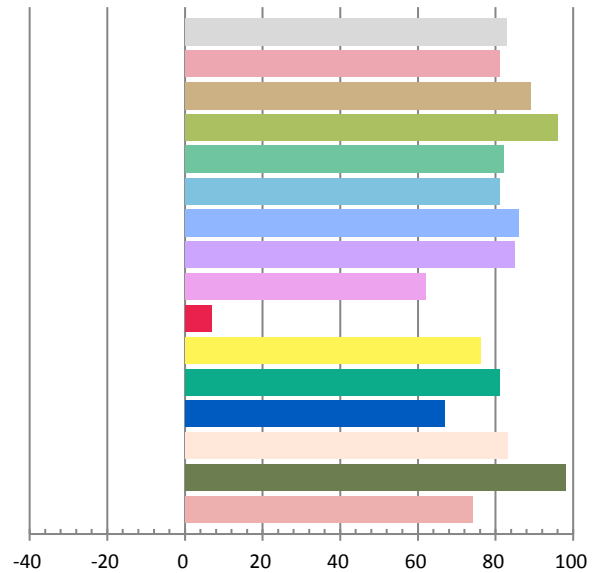
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.2193	26.06	0.9902	3519.9	135.05

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
10.595	3458	0.000245	0.4080	0.3926	0.2367	0.5124

Color Rendering Index

Ra			
82.8			
R1	R2	R3	R4
81	89	96	82
R5	R6	R7	R8
81	86	85	62
R9	R10	R11	R12
7	76	81	67
R13	R14	R15	
83	98	74	



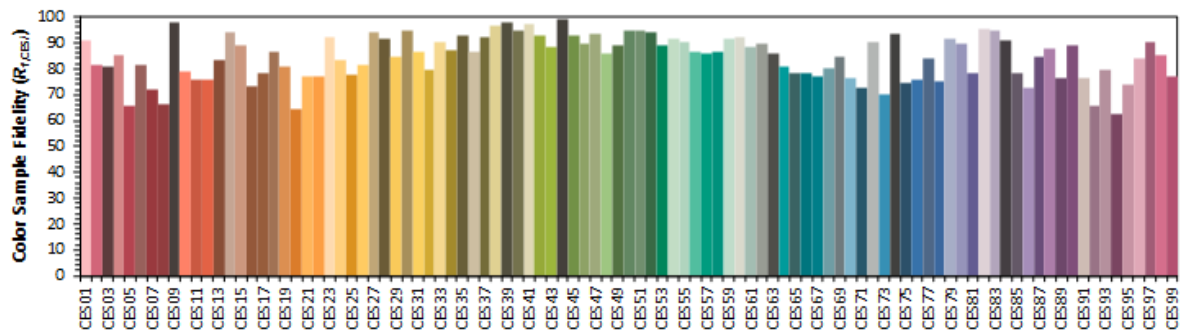
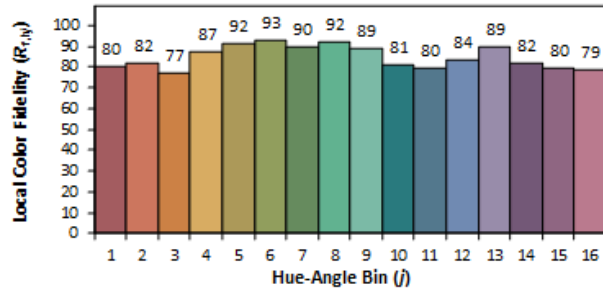
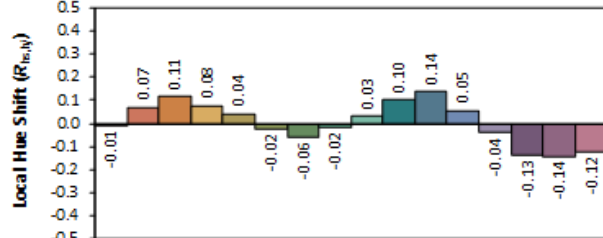
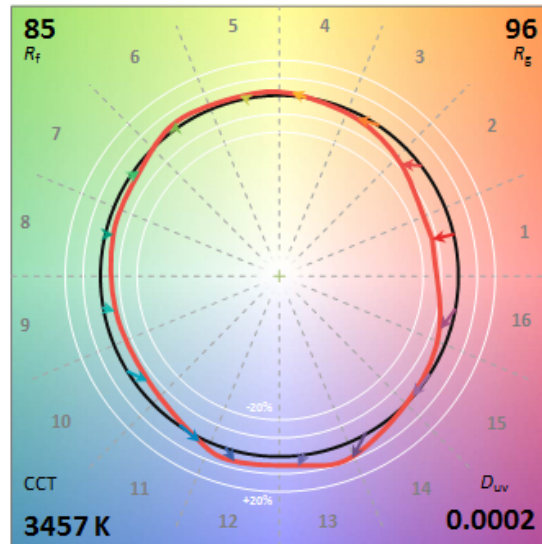
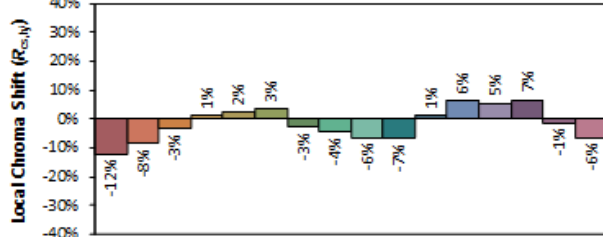
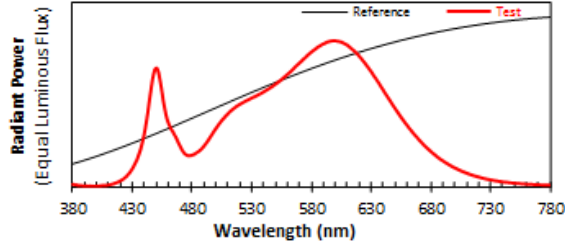
ANSI/IES TM-30-18 Color Rendition Report

Source: User SPD

Manufacturer: Espen Technology Inc.

Date: 2023/3/29

Model: VEKL4F/30-8T (18W/25W/30W)



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

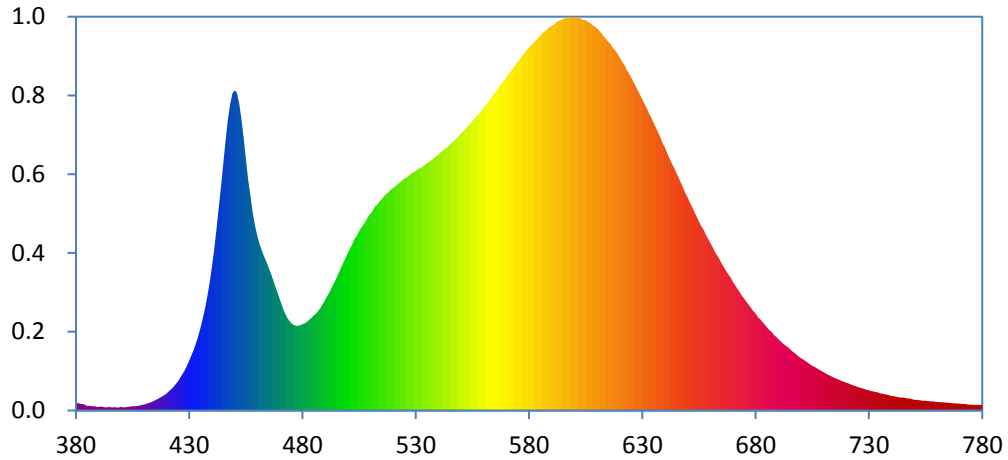
x 0.4080
 y 0.3925
 u' 0.2367
 v' 0.5124

CIE 13.3-1995
(CRI)

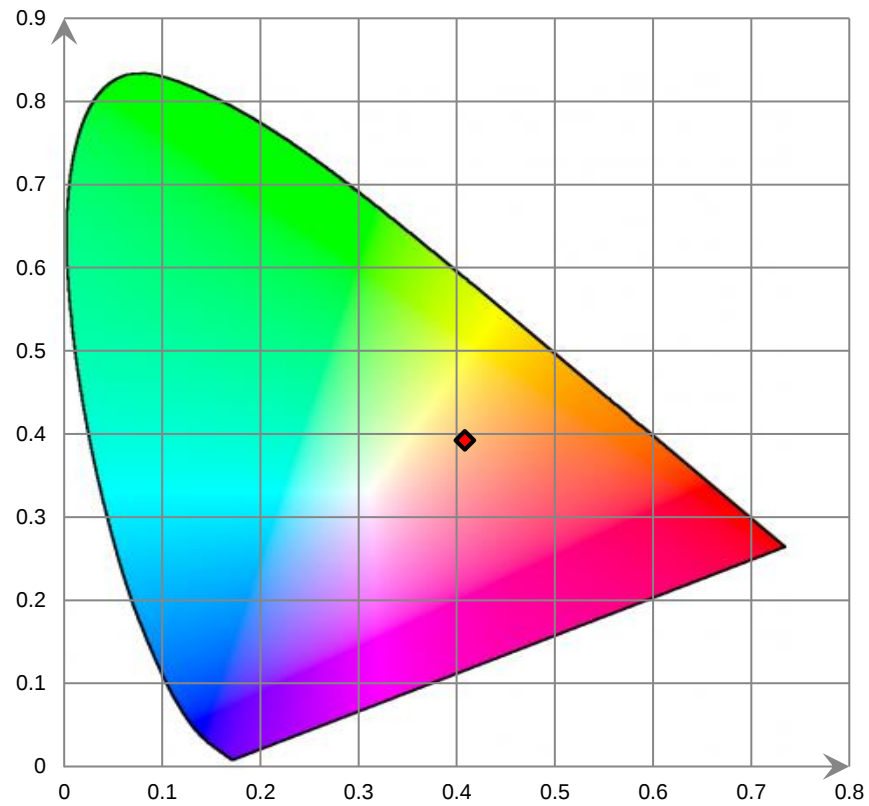
R_a 83
 R_g 7

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

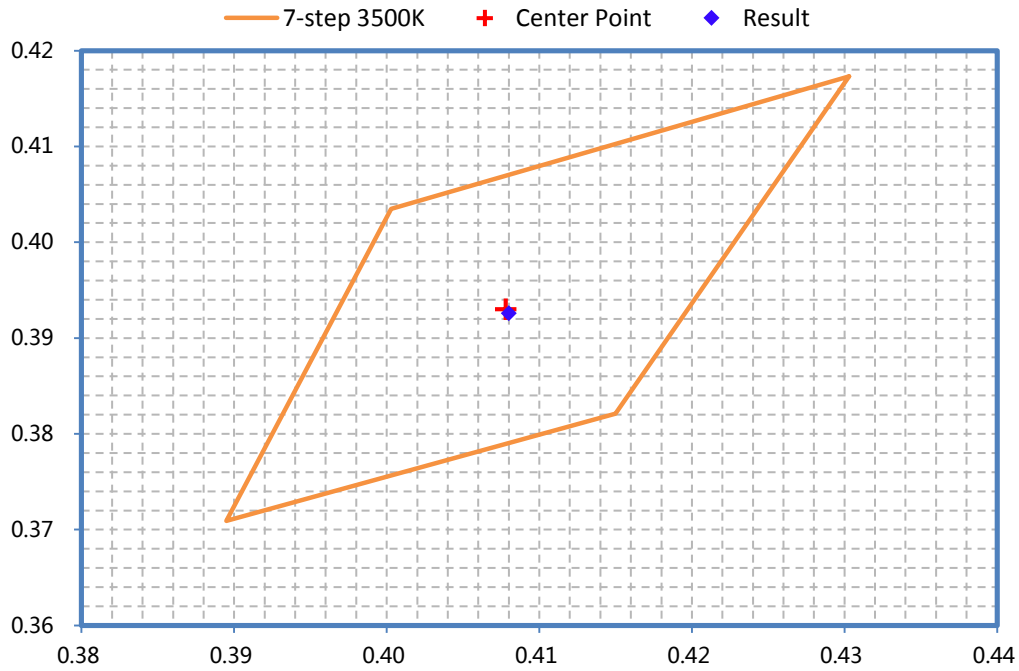
Relative Spectral Power Distribution



CIE 1931 x y Chromaticity Diagram



ANSI C78.377-2017 Chromaticity Quadrangles



Test Model: VEKL4F/30-8T (18W/25W/30W)
Control setting: 3500K/ 18W

THDi 、 PF Test; Orientation: <u>Downward</u> ;					
Test Voltage	Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances and/or allowances)	Conclusion
120	Power Factor	0.9807	≥ 0.9	≥ 0.87	Pass
120	THDi	5.12%	$\leq 20\%$	$\leq 25\%$	Pass
277	Power Factor	0.9387	≥ 0.9	≥ 0.87	Pass
277	THDi	12.52%	$\leq 20\%$	$\leq 25\%$	Pass

Note:

1. The test results were measured directly from the test equipment.
2. The DLC requirements were listed according to DLC Technical Requirements V5.1.
3. The conclusion is for reference only. Test report that indicate product performance meets DLC Technical Requirements do not represent official DLC product qualification. All decisions regarding product qualification are made by the DLC.

Test Data

[Integrating Sphere System]

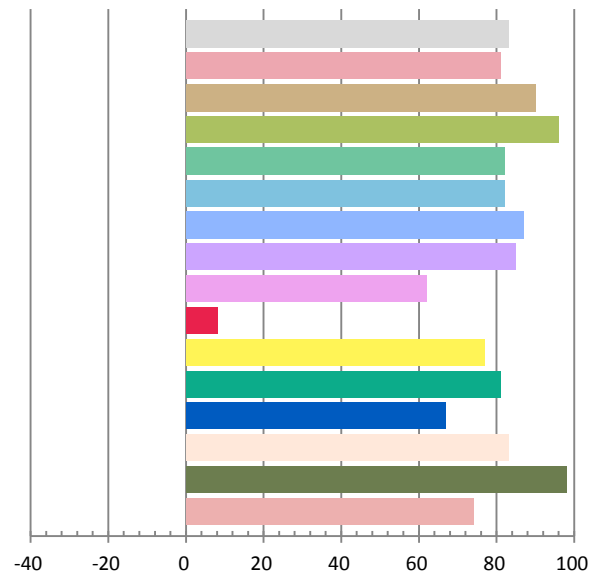
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.1524	17.93	0.9807	2565.9	143.1

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
7.730	3456	0.00015	0.4080	0.3924	0.2368	0.5124

Color Rendering Index

Ra			
83.0			
R1	R2	R3	R4
81	90	96	82
R5	R6	R7	R8
82	87	85	62
R9	R10	R11	R12
8	77	81	67
R13	R14	R15	
83	98	74	



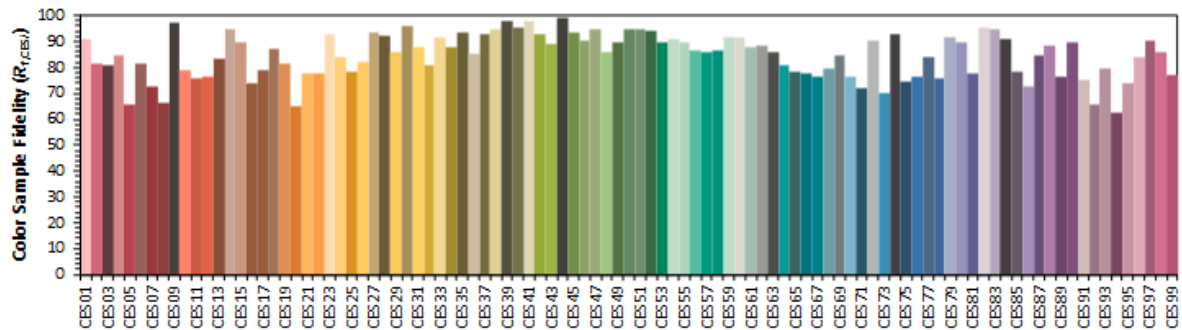
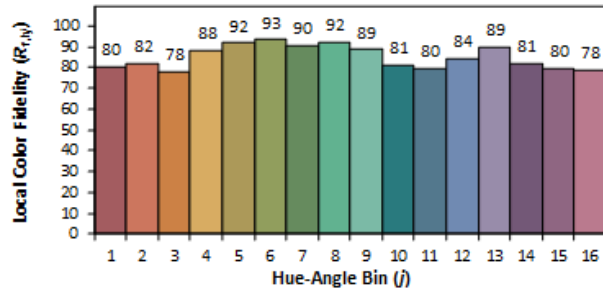
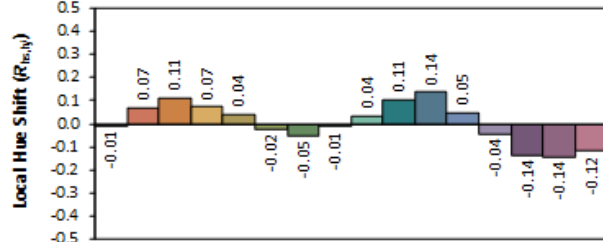
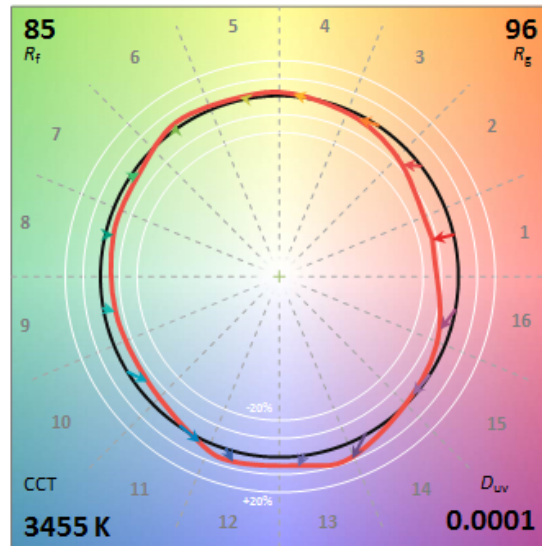
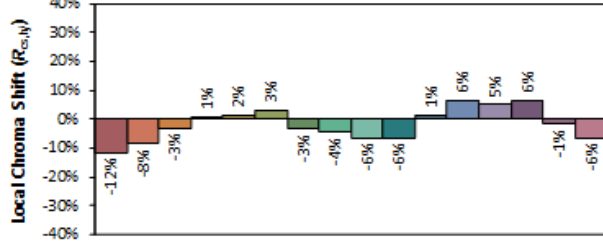
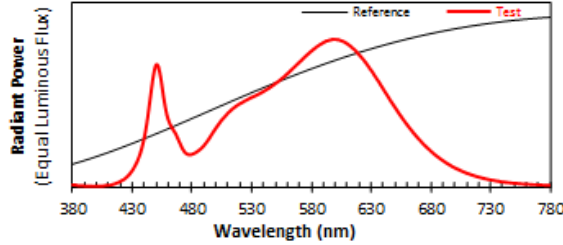
ANSI/IES TM-30-18 Color Rendition Report

Source: User SPD

Manufacturer: Espen Technology Inc.

Date: 2023/3/29

Model: VEKL4F/30-8T (18W/25W/30W)



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

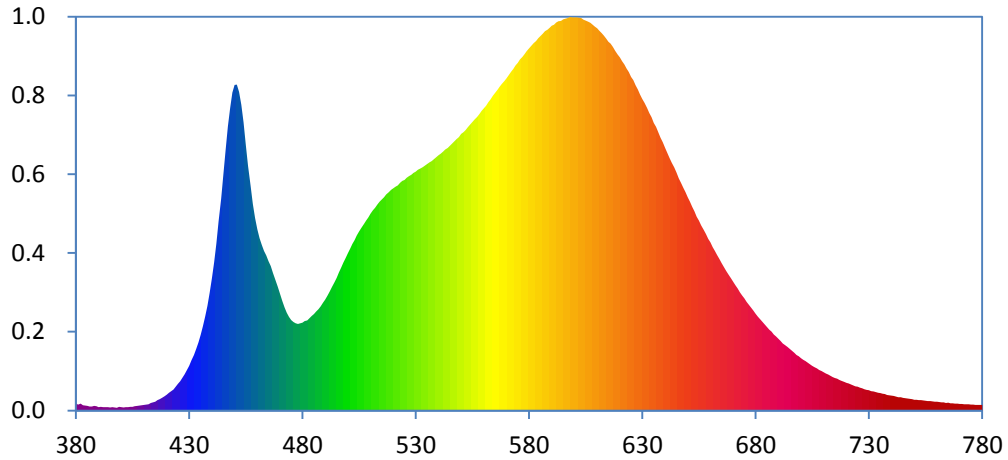
x 0.4080
 y 0.3923
 u' 0.2368
 v' 0.5123

CIE 13.3-1995
(CRI)

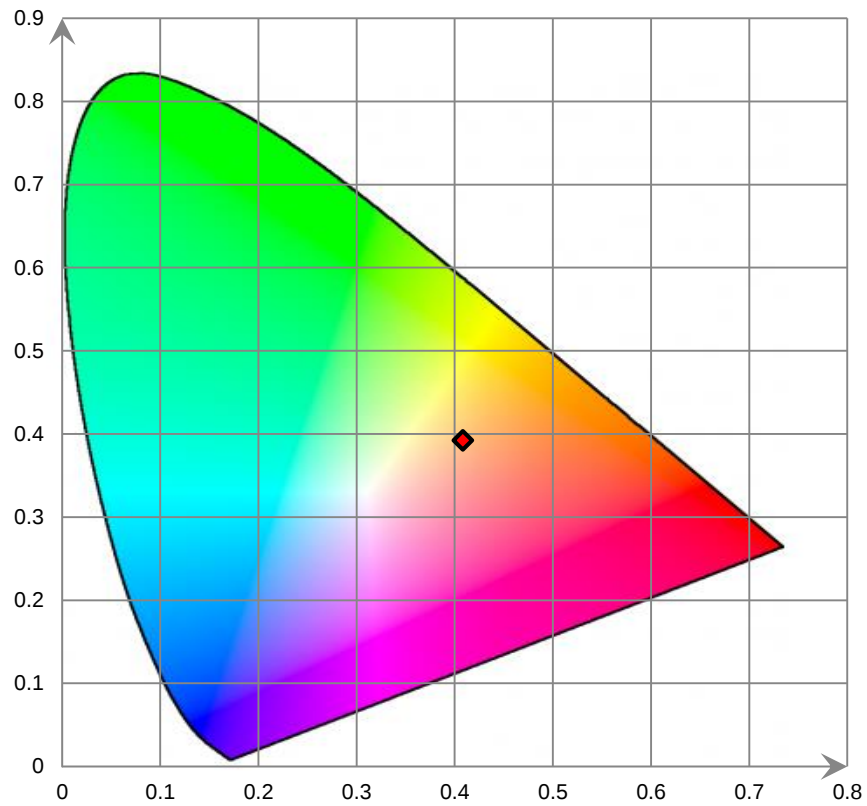
R_a 83
 R_g 8

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

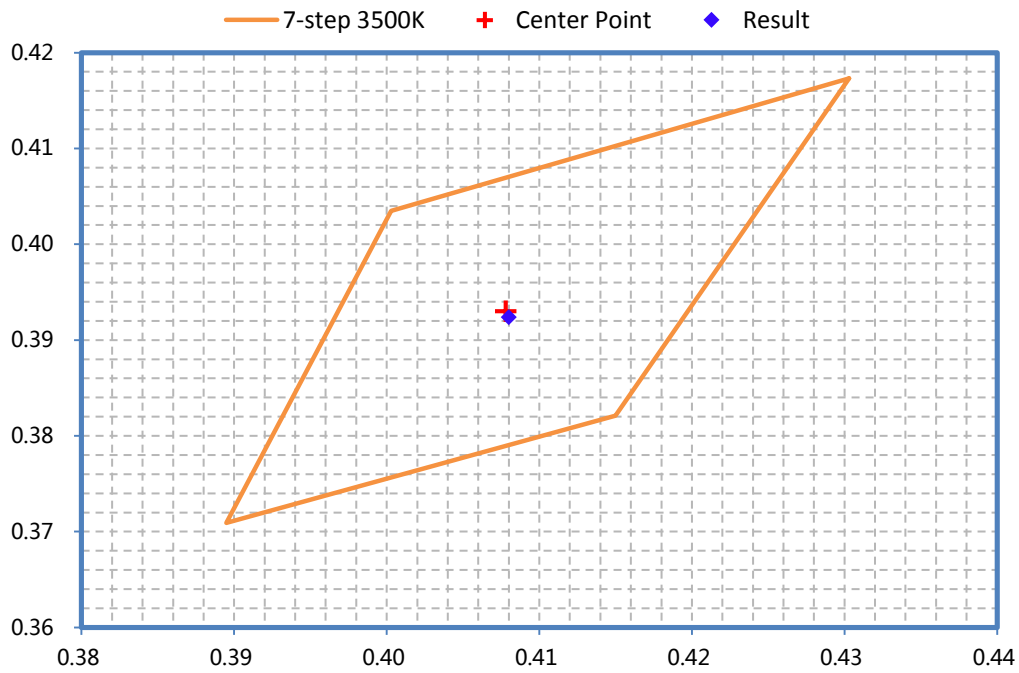
Relative Spectral Power Distribution



CIE 1931 x y Chromaticity Diagram



ANSI C78.377-2017 Chromaticity Quadrangles



Test Model: VEKL4F/30-8T (18W/25W/30W)
Control setting: 4000K/ 30W

Integrating Sphere Test; Orientation: Downward; Test Voltage: 120V 60Hz;				
Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances only)	Conclusion
Light Output(lm)	4383.7	≥1500	≥1350	Pass
Power(W)	29.96	None.	None.	N/A
Total Efficacy(lm/W)	146.34	≥115	≥111.55	Pass
CCT(K)	4107	None ⁱ	None.	N/A
Duv	-0.0000568	None ⁱ	None.	N/A
IES R _f	84	70	69	Pass
IES R _g	97	89	88	
IES Rcs,h1	-11%	-12%~23%	-13%~24%	
R _a	83.4	≥80	≥79	
R ₉	12	≥0	≥-1	

Note:

- i. White-tunable products are not required to meet the chromaticity requirements in DLC V5.1.

THDi · PF Test; Orientation: Downward;					
Test Voltage	Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances and/or allowances)	Conclusion
120	Power Factor	0.9912	≥0.9	≥0.87	Pass
120	THDi	6.02%	≤20%	≤25%	Pass
277	Power Factor	0.9658	≥0.9	≥0.87	Pass
277	THDi	11.98%	≤20%	≤25%	Pass

Note:

- The test results were measured directly from the test equipment.
- The DLC requirements were listed according to DLC Technical Requirements V5.1.
- The conclusion is for reference only. Test report that indicate product performance meets DLC Technical Requirements do not represent official DLC product qualification. All decisions regarding product qualification are made by the DLC.

Test Data

[Integrating Sphere System]

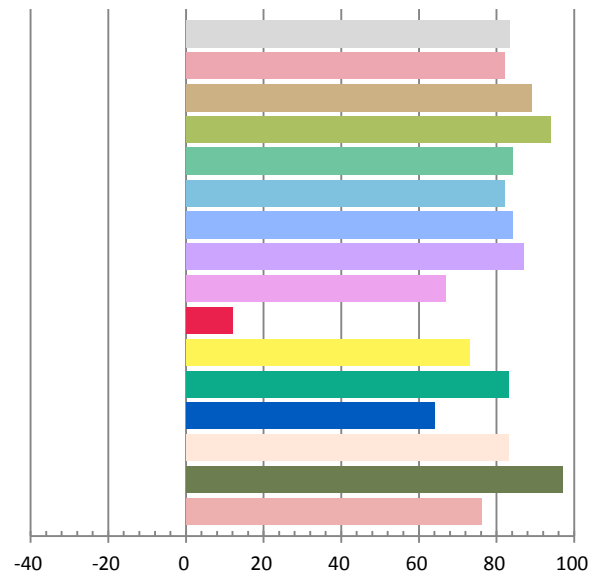
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.2519	29.96	0.9909	4383.7	146.34

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
13.418	4107	-0.0000568	0.3758	0.3737	0.2232	0.4995

Color Rendering Index

Ra			
83.4			
R1	R2	R3	R4
82	89	94	84
R5	R6	R7	R8
82	84	87	67
R9	R10	R11	R12
12	73	83	64
R13	R14	R15	
83	97	76	



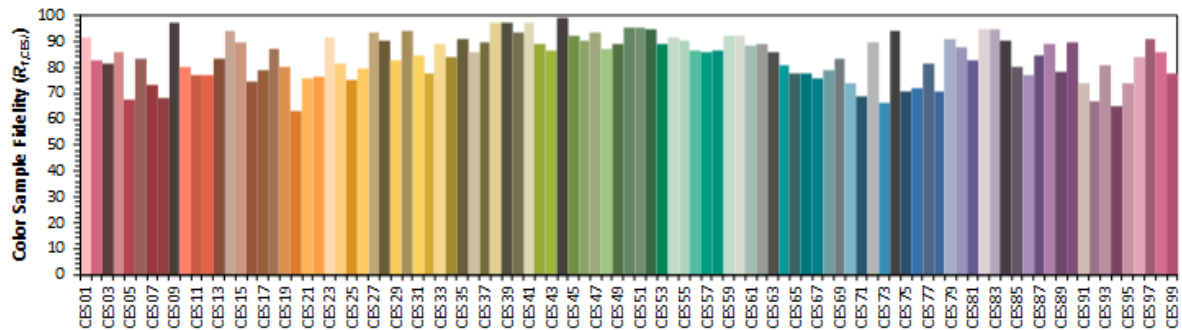
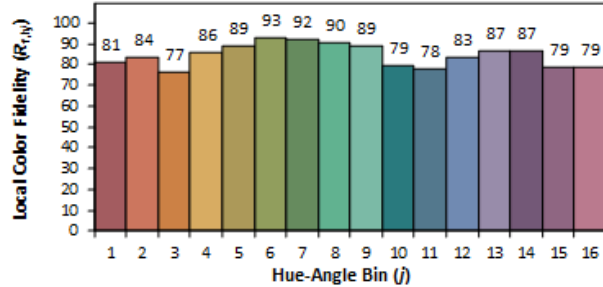
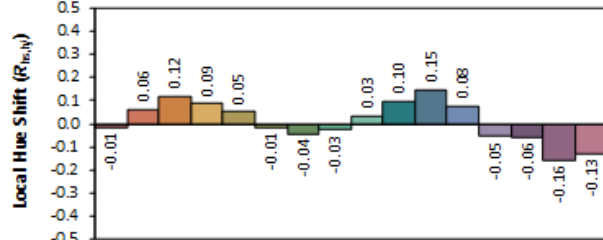
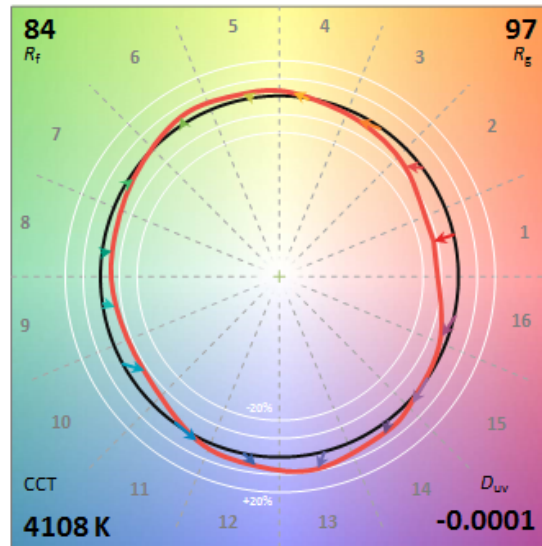
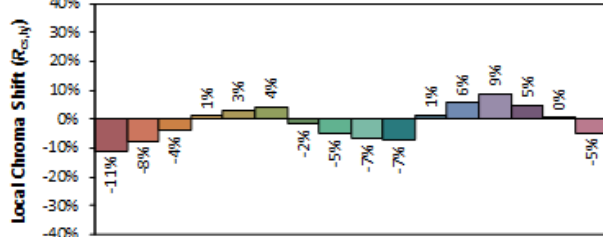
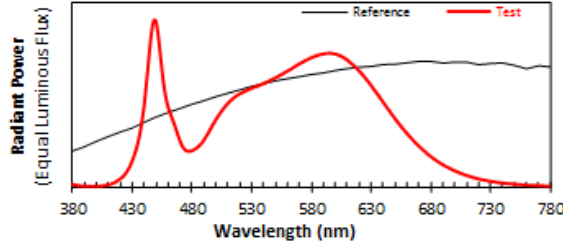
ANSI/IES TM-30-18 Color Rendition Report

Source: User SPD

Manufacturer: Espen Technology Inc.

Date: 2023/3/29

Model: VEKL4F/30-8T (18W/25W/30W)



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

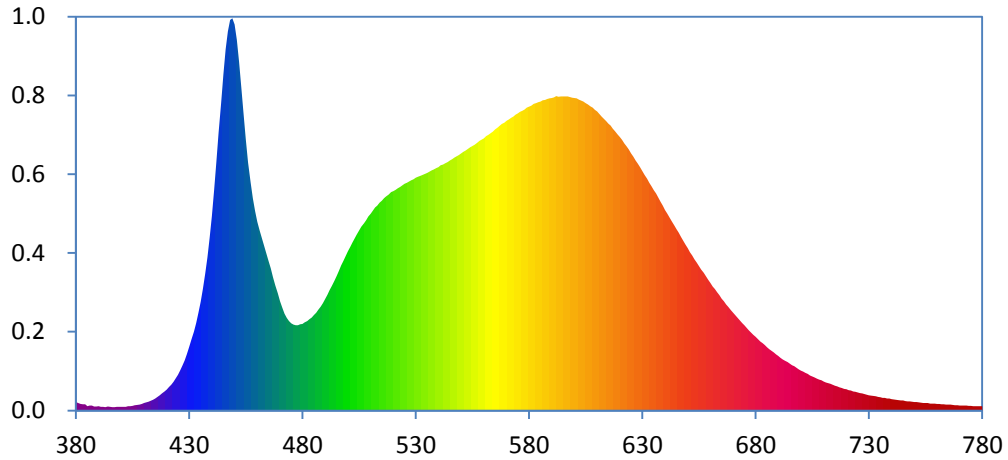
x 0.3757
 y 0.3735
 u' 0.2233
 v' 0.4995

CIE 13.3-1995
(CRI)

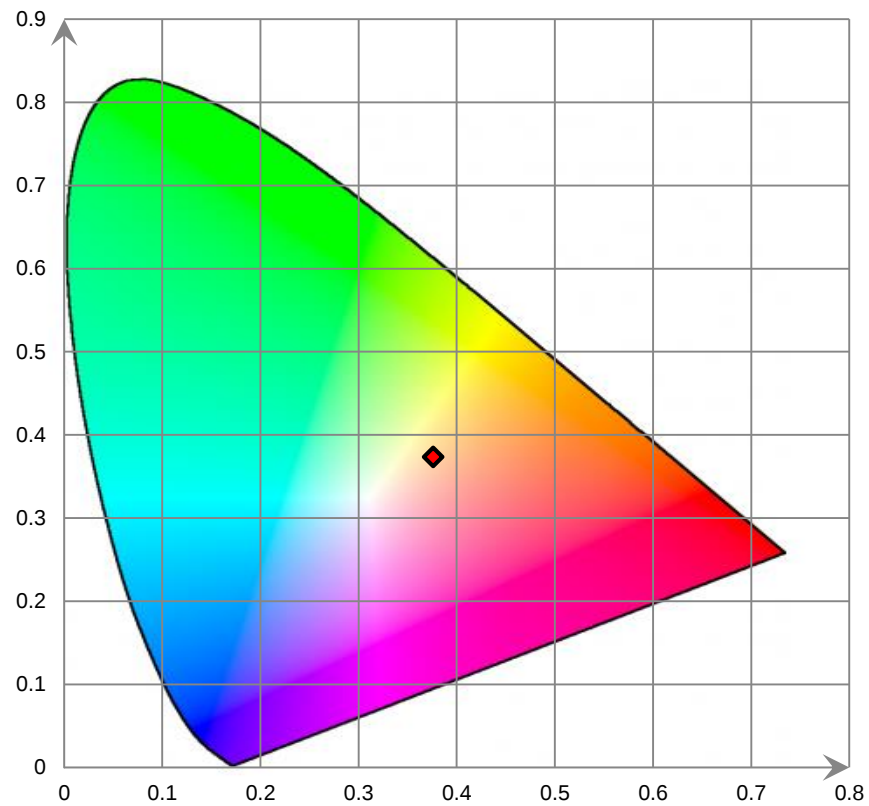
R_a 83
 R_g 11

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

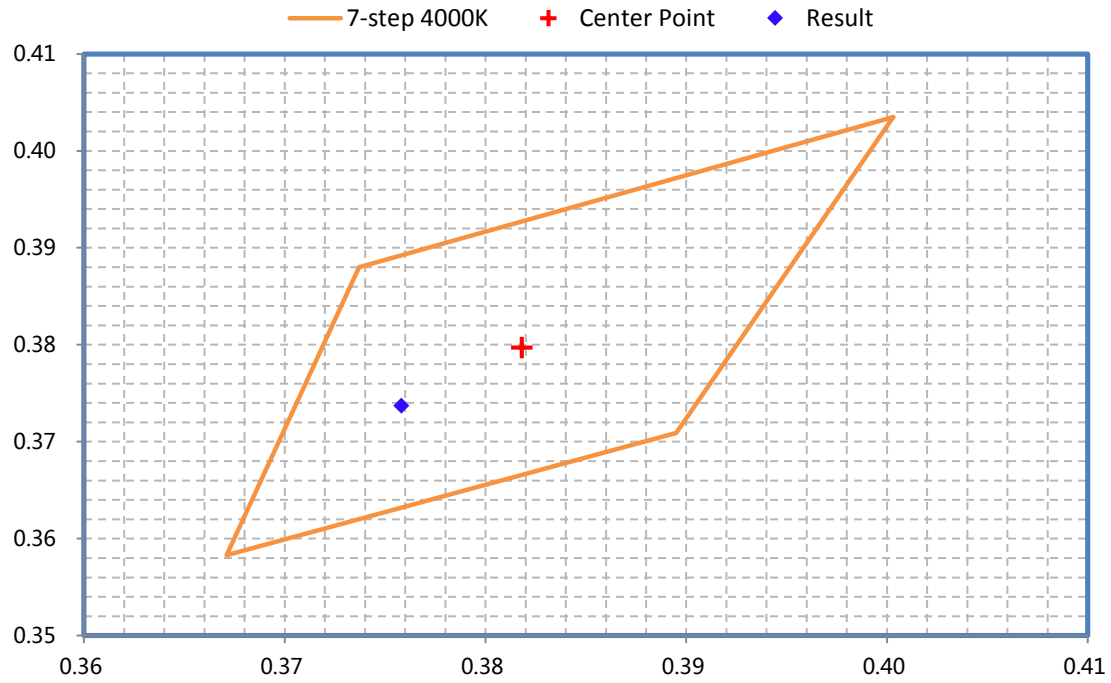
Relative Spectral Power Distribution



CIE 1931 x y Chromaticity Diagram



ANSI C78.377-2017 Chromaticity Quadrangles



Test Model: VEKL4F/30-8T (18W/25W/30W)
Control setting: 5000K/ 30W

Integrating Sphere Test; Orientation: Downward; Test Voltage: 120V 60Hz;

Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances only)	Conclusion
Light Output(lm)	4179	≥1500	≥1350	Pass
Power(W)	31.39	None.	None.	N/A
Total Efficacy(lm/W)	133.13	≥115	≥111.55	Pass
CCT(K)	5016	None ⁱ	None.	N/A
Duv	0.00204	None ⁱ	None.	N/A
IES R _f	82	70	69	Pass
IES R _g	98	89	88	
IES Rcs,h1	-12%	-12%~23%	-13%~24%	
R _a	81.4	≥80	≥79	
R ₉	5	≥0	≥-1	

Note:

i. White-tunable products are not required to meet the chromaticity requirements in DLC V5.1.

Goniophotometer Test; Orientation: Downward; Test Voltage: 120V 60Hz;

Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances only)	Conclusion
Light Output(lm)	4183.5	≥1500	≥1350	Pass
Power(W)	31.51	None.	None.	N/A
Total Efficacy(lm/W)	132.82	≥115	≥111.55	Pass
Zonal Lumen Distribution(0-60°)	64.49%	0-60°≥40%	0-60°≥37%	Pass

Goniophotometer THDi 、PF Test; Orientation: Downward;

Test Voltage	Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances and/or allowances)	Conclusion
120	Power Factor	0.9974	≥0.9	≥0.87	Pass
120	THDi	6.09%	≤20%	≤25%	Pass
277	Power Factor	0.9681	≥0.9	≥0.87	Pass
277	THDi	12.42%	≤20%	≤25%	Pass

Integrating Sphere THDi 、PF Test; Orientation: Downward;

Test Voltage	Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances and/or allowances)	Conclusion
120	Power Factor	0.9911	≥0.9	≥0.87	Pass
120	THDi	5.76%	≤20%	≤25%	Pass
277	Power Factor	0.9658	≥0.9	≥0.87	Pass
277	THDi	12.73%	≤20%	≤25%	Pass

Note:

- The test results were measured directly from the test equipment.
- The DLC requirements were listed according to DLC Technical Requirements V5.1.
- The conclusion is for reference only. Test report that indicate product performance meets DLC Technical Requirements do not represent official DLC product qualification. All decisions regarding product qualification are made by the DLC.

Test Data

[Integrating Sphere System]

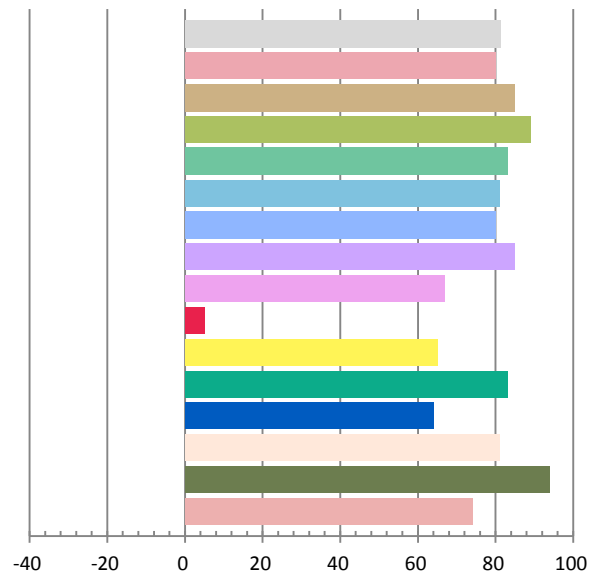
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.2639	31.39	0.9911	4179	133.13

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
13.019	5016	0.00204	0.3450	0.3556	0.2098	0.4866

Color Rendering Index

Ra			
81.4			
R1	R2	R3	R4
80	85	89	83
R5	R6	R7	R8
81	80	85	67
R9	R10	R11	R12
5	65	83	64
R13	R14	R15	
81	94	74	



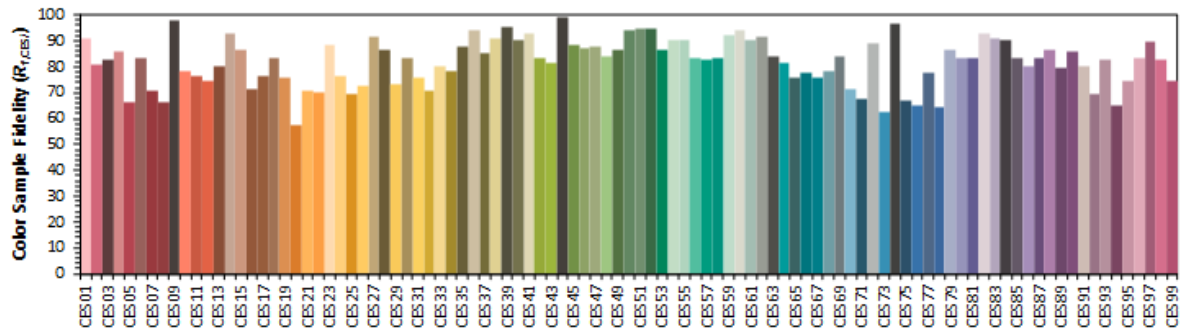
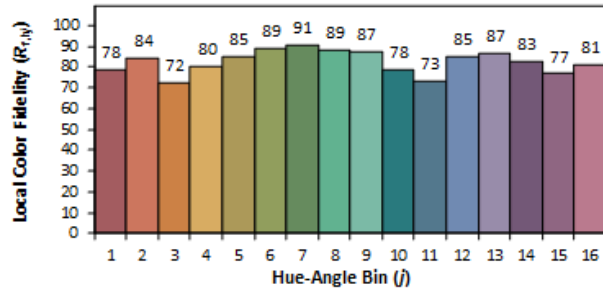
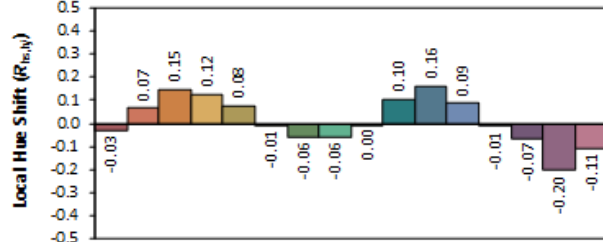
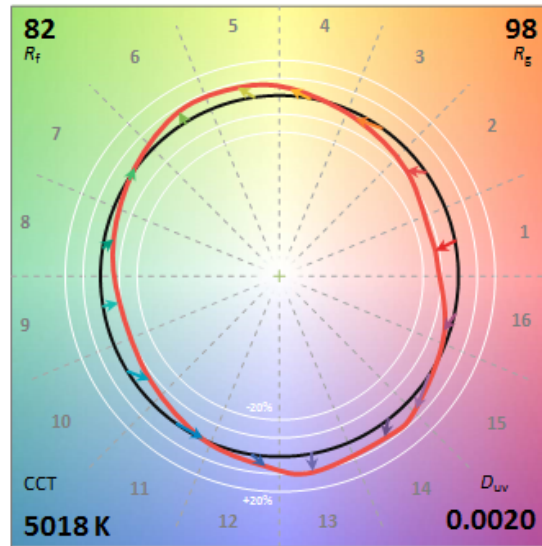
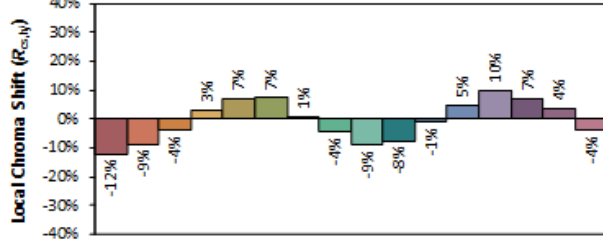
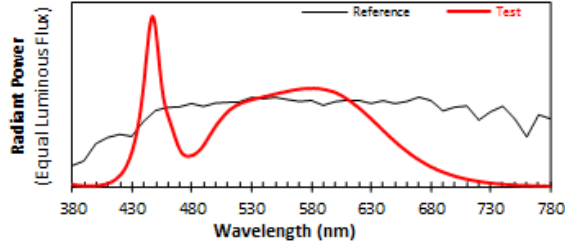
ANSI/IES TM-30-18 Color Rendition Report

Source: User SPD

Manufacturer: Espen Technology Inc.

Date: 2023/3/29

Model: VEKL4F/30-8T (18W/25W/30W)



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

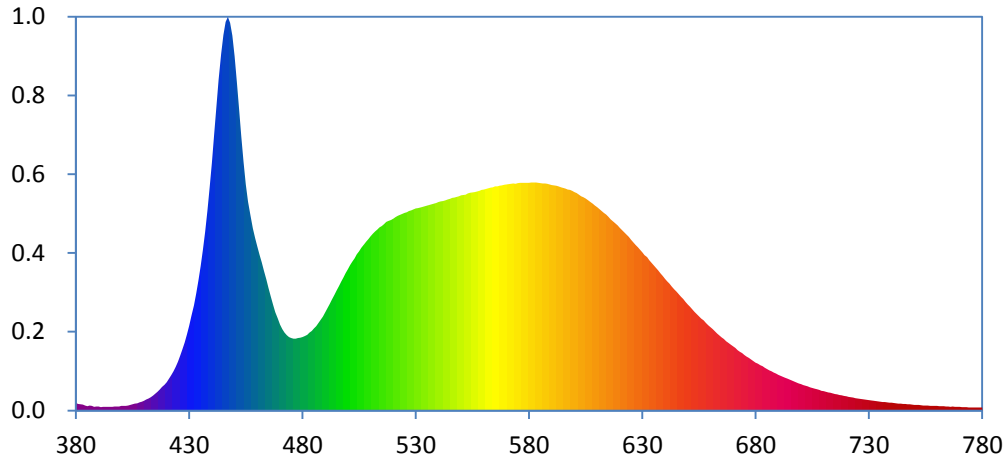
x 0.3450
 y 0.3555
 u' 0.2098
 v' 0.4865

CIE 13.3-1995
(CRI)

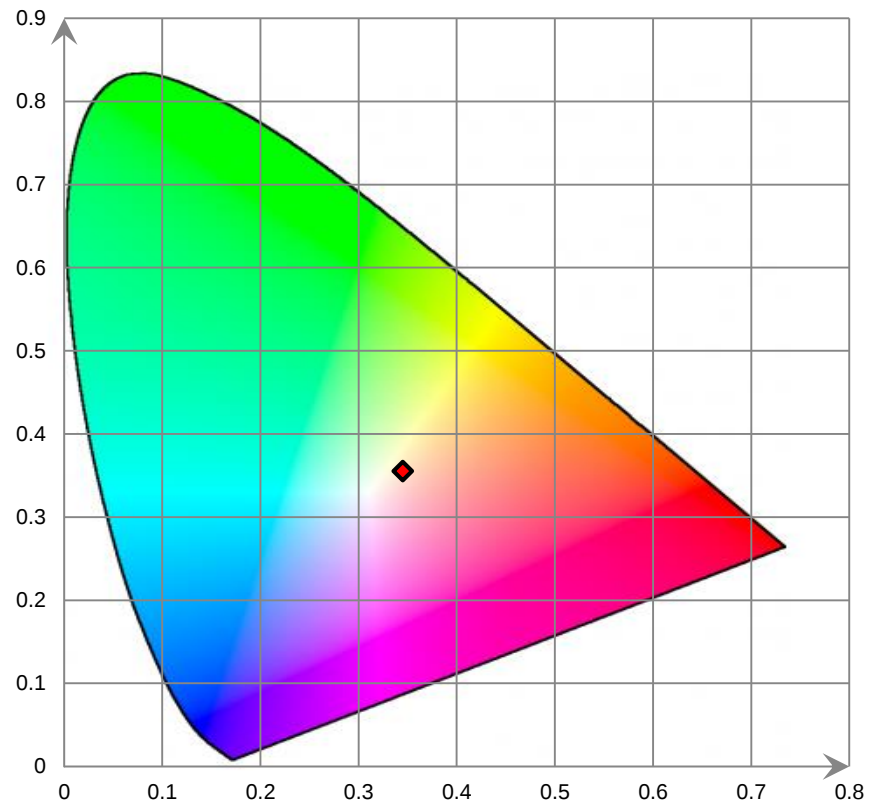
R_a 81
 R_g 5

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

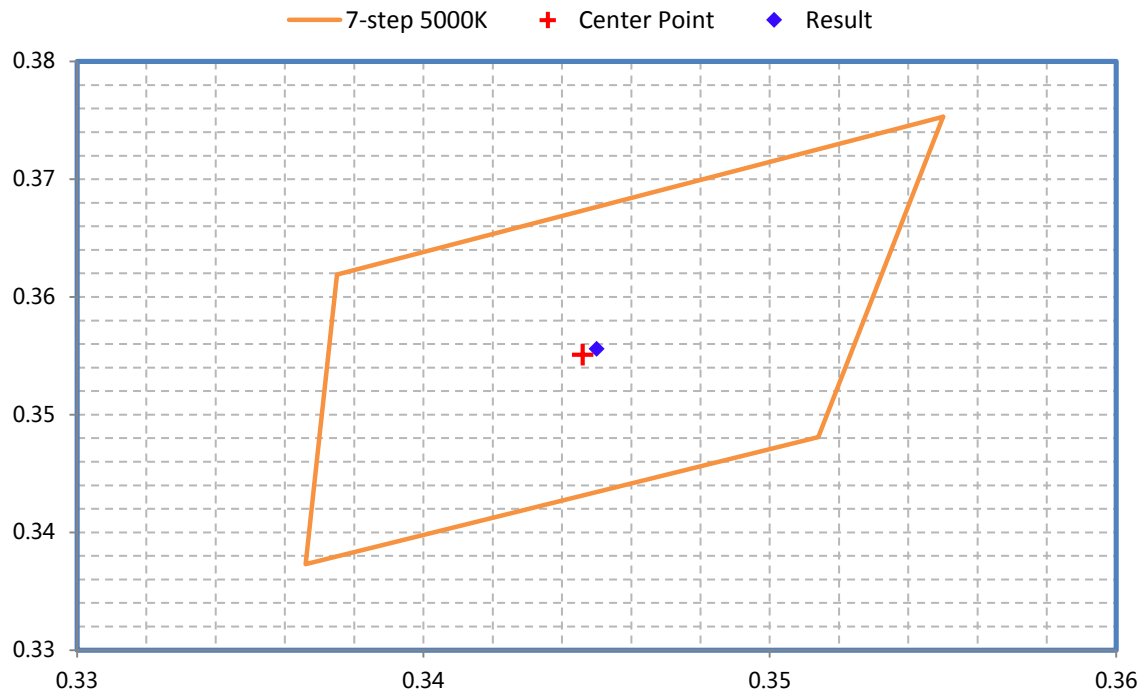
Relative Spectral Power Distribution



CIE 1931 x y Chromaticity Diagram



ANSI C78.377-2017 Chromaticity Quadrangles



[Goniophotometer System]

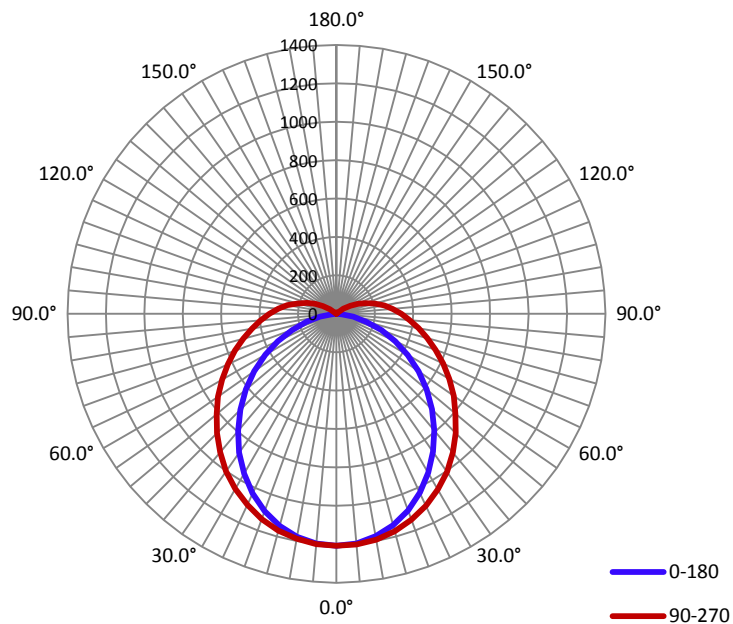
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.263	31.51	0.997

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
4183.5	132.82	1209.7	1.18	1.30

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	101.1	113.5	132.1	114.5	115.3
Field Angle (10% I _{max}):	155.3	207.0	230.5	208.6	200.4

Luminous Intensity (cd) Distribution Data

$\begin{matrix} C \\ \backslash \\ Y \end{matrix}$	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	1208.2	1208.2	1208.2	1208.2	1208.2	1208.2	1208.2	1208.2
5.0°	1199.7	1200.7	1199.7	1203.4	1206.0	1206.5	1205.5	1203.0
10.0°	1175.8	1178.2	1179.8	1187.3	1193.8	1191.1	1189.2	1186.1
15.0°	1138.9	1143.0	1148.7	1162.3	1171.6	1167.6	1159.5	1153.8
20.0°	1090.0	1096.8	1109.5	1127.0	1141.1	1136.0	1120.1	1109.1
25.0°	1026.9	1038.4	1058.7	1083.1	1102.7	1093.6	1071.7	1052.7
30.0°	955.1	971.1	1000.7	1032.0	1055.9	1044.3	1012.8	987.6
35.0°	875.8	896.8	933.0	973.6	1003.5	988.5	948.8	913.0
40.0°	792.6	817.9	865.1	910.8	943.2	926.0	876.2	833.1
45.0°	704.2	734.8	787.5	843.7	877.3	857.9	805.0	750.3
50.0°	612.2	651.4	710.8	770.4	809.5	785.6	728.6	664.6
55.0°	521.5	567.0	631.2	704.1	745.3	718.3	650.8	579.5
60.0°	429.1	480.6	556.5	637.9	679.4	651.2	576.7	494.5
65.0°	338.4	400.4	488.7	572.6	612.8	583.9	508.3	412.9
70.0°	249.9	321.5	423.2	507.7	549.6	520.6	442.1	332.7
75.0°	164.3	251.5	363.9	447.3	489.9	459.8	380.9	264.1
80.0°	89.5	191.4	310.1	392.2	435.0	402.6	325.2	202.5
85.0°	30.5	140.1	262.4	342.5	383.5	349.9	276.0	150.7
90.0°	0.0	103.7	222.1	298.6	337.5	303.8	231.8	112.7
95.0°	0.0	74.0	188.4	260.8	294.0	264.1	195.1	81.2
100.0°	0.0	46.3	150.3	224.5	253.3	226.3	157.1	52.2
105.0°	0.0	18.8	113.3	180.4	205.1	181.4	118.4	22.1
110.0°	0.0	2.4	80.6	141.3	161.8	142.0	84.8	2.1
115.0°	0.0	1.7	43.8	104.7	123.7	105.8	46.7	1.3
120.0°	0.0	1.2	12.2	65.4	84.6	65.7	13.6	1.5
125.0°	0.8	1.7	1.8	28.6	45.3	28.9	2.0	1.4
130.0°	1.1	1.8	2.0	1.8	10.7	1.8	2.2	1.6
135.0°	1.8	2.2	2.3	2.3	1.7	2.3	2.5	1.7
140.0°	2.6	3.1	2.8	2.5	2.3	2.7	2.8	2.2
145.0°	2.9	3.5	3.2	3.5	3.3	3.2	3.3	2.8
150.0°	3.7	4.3	3.4	3.8	3.9	3.8	3.8	3.8
155.0°	4.1	5.0	4.2	4.5	4.4	4.2	4.6	4.2
160.0°	4.9	5.3	5.2	5.3	5.1	4.0	4.6	5.0
165.0°	5.6	5.4	5.3	5.3	5.0	5.5	5.3	5.4
170.0°	5.8	5.9	5.6	5.2	5.2	5.6	5.9	5.7
175.0°	5.4	6.0	6.4	5.7	6.1	6.1	6.1	6.2
180.0°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Luminous Intensity (cd) Distribution Data (cont.)

$\begin{matrix} C \\ \backslash \\ Y \end{matrix}$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	1208.2	1208.2	1208.2	1208.2	1208.2	1208.2	1208.2	1208.2
5.0°	1201.0	1201.8	1202.2	1203.5	1204.1	1201.5	1200.9	1198.2
10.0°	1178.6	1181.6	1185.8	1189.0	1188.6	1184.7	1180.0	1177.1
15.0°	1142.6	1148.1	1155.9	1163.5	1168.5	1160.6	1148.2	1139.3
20.0°	1093.5	1103.0	1114.7	1130.5	1137.2	1125.3	1104.1	1091.7
25.0°	1031.7	1045.0	1064.0	1087.0	1097.4	1080.4	1053.3	1032.6
30.0°	961.3	977.2	1004.0	1036.7	1051.5	1030.8	991.8	963.0
35.0°	882.7	899.6	937.3	980.7	1000.9	973.7	923.5	887.2
40.0°	796.2	817.5	867.1	918.8	941.1	911.8	854.1	806.3
45.0°	706.6	732.4	791.1	849.8	878.7	844.7	778.5	720.9
50.0°	615.1	646.9	711.0	779.8	813.9	775.1	702.8	634.3
55.0°	522.8	560.2	631.8	713.2	751.6	709.5	625.6	549.7
60.0°	427.6	472.1	556.9	647.8	687.0	644.1	554.7	465.9
65.0°	336.8	389.2	488.0	582.0	623.0	578.9	487.4	385.8
70.0°	245.5	308.8	421.4	518.3	561.8	515.7	422.4	307.4
75.0°	160.5	239.1	360.6	458.1	502.7	454.7	363.6	242.3
80.0°	85.7	178.6	306.6	402.4	446.5	399.6	310.8	184.4
85.0°	27.4	130.0	258.6	351.3	396.3	350.2	262.9	137.3
90.0°	0.0	94.7	218.2	305.8	347.5	306.0	223.0	103.7
95.0°	0.0	65.6	183.1	263.3	302.7	265.9	188.1	74.4
100.0°	0.0	38.9	144.8	223.0	258.7	226.2	149.4	47.2
105.0°	0.0	11.8	107.7	179.8	209.5	182.3	113.4	19.9
110.0°	0.0	0.9	72.4	139.8	163.9	142.0	78.9	2.1
115.0°	0.0	0.7	36.7	99.7	122.2	102.4	43.7	1.5
120.0°	0.0	0.7	5.7	59.1	80.7	62.3	12.0	1.6
125.0°	0.0	0.8	1.8	22.8	40.3	25.9	1.6	2.2
130.0°	0.0	1.7	1.9	0.9	6.1	1.6	1.7	2.0
135.0°	0.0	2.4	1.8	1.5	1.5	1.7	1.3	2.7
140.0°	0.8	1.9	1.8	2.0	1.9	2.2	2.2	3.1
145.0°	1.6	2.3	2.5	2.6	2.6	2.7	3.6	4.0
150.0°	2.3	3.4	3.2	3.2	3.0	3.7	3.4	4.1
155.0°	3.0	4.1	4.6	4.2	4.4	5.0	4.6	4.9
160.0°	4.0	4.5	5.4	4.3	4.9	5.4	4.8	5.6
165.0°	4.6	4.9	5.3	4.6	5.6	6.0	5.4	5.3
170.0°	5.0	5.5	5.8	5.0	5.8	6.2	5.5	6.7
175.0°	4.7	6.1	6.4	6.3	5.5	6.0	6.0	6.0
180.0°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

6. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
2.0m integrating sphere	EVERFINE	R98	G121960CS1361154D	2022-06-21	2023-06-20
spectroradiometer	EVERFINE	HAAS-2000	M12048CS1361148	2022-06-21	2023-06-20
Digital CC&CV DC Power Supply	EVERFINE	WY305	G115986CN1361134	2022-06-21	2023-06-20
Thermal Meter	ANYMETRE	TH-20E	N/A	2022-11-11	2023-11-10
Standard Light Source	Osram	24V/50W	JWWCR020106	2021-09-15	2023-09-14
Digital Power Meter	YOKOGAWA	WT210	91KB35700	2022-11-03	2023-11-02
Intelligence ac power supply	EVERFINE	DPS1005	G119890CS1361121	2022-06-21	2023-06-20
AC Power Supply	INVENTFINE	CHP-5KVA	900511765	2022-06-21	2023-06-20
DC Power Supply	INVENTFINE	WL3010	JWDMP030001	2022-06-21	2023-06-20
Power Meter	INVENTFINE	WT500	GSQSQ200007	2022-11-03	2023-11-02
Goniophotometer	INVENTFINE	GPM-1900	YWGCF120001	2022-11-14	2023-11-13
Wireless Weather Station	ZHONGXING	KG218	N/A	2022-06-21	2023-06-20
Standard Light Source	INVENTFINE	N/A	JWBYR040008	2021-12-23	2023-12-22
Digital Multimeter	FLUKE	115C	37840512WS	2022-06-22	2023-06-21
Hybrid Recorder	YOKOGAWA	DR230	47JH0903	2022-06-22	2023-06-21
Power Supply	SC	SC/BP-11003	1608110030553	2022-06-21	2023-06-20

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Kunshan) attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).

7. Test Method

Product was tested with no seasoning. All stabilization and measurements were made in compliance with IES LM-79-19. The ambient temperature of the sample was maintained at 25°C±1°C during measurement. And relative humidity is less than 65%. The product was operated in its intended orientation in application during all testing.

Integrating Sphere System

The system includes AC power source, digital power meter, DC power supply, Spectroradiometer, and integrating sphere. The integrating sphere system is calibrated by standard spectrum light source before measurement. 4π geometry was used during measurement.

Goniophotometer System

Type C goniophotometer was used for measuring luminous intensity distribution. The vertical angle (γ) test intervals were set no more than 1 degree while data for 5 degree intervals is reported. The horizontal angle (C plane) test intervals were set no more than 22.5 degree.

ISTMT Test

The LED which has the highest temperature was measured at the location of LED case which is specified by LED source manufacturer and detailed by LM-80 report. The drive current of LED package/module/ array was calculated as the total output current of the driver measured by multimeter, divided by the number of branches in parallel of LEDs.

Directions

1. The information marked "superscript #" is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report.
2. This report may contain data that are not covered by the accreditation scope and shall be marked with an asterisk "★".
3. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
4. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
5. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.
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*****END OF REPORT*****