



TEST REPORT

For

Espen Technology Inc.

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

Model Number:	VEKL4F/45-8T (34W/38W/45W)	
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:	PKS230328059-10	
Sample Size:	One sample was received on 2022-12-08 and used for testing.	
Test Date:	2022-12-10 to 2022-12-16	
Report Date:	2023-03-28	
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:	SIF40-I1000 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

Note:

- The applicant Espen Technology Inc. declared that their products are the same to the product in report# RKS221208005-10 and is authorized by original applicant to use their test data.
- All the data in previous report (RKS221208005-10) is shared in report.

2. Product Rated Values#

Test Model	CCT(K)	Light Output (lm)	Power(W)	Luminous Efficacy (lm/W)
VEKL4F/45-8T (34W/38W/45W)	3500	5805	45	129
		5130	38	135
		4828	34	142
	4000	6255	45	139
		5510	38	145
		5168	34	152
	5000	5895	45	131
		5206	38	137
		4896	34	144

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/45-8T (34W/38W/45W)	3500	45	Yes	Yes	Yes	Yes
		38	NA	Yes	Yes	NA
		34	NA	Yes	Yes	NA
	4000	45	NA	Yes	Yes	NA
	5000	45	NA	Yes	Yes	NA

4. Product Photo

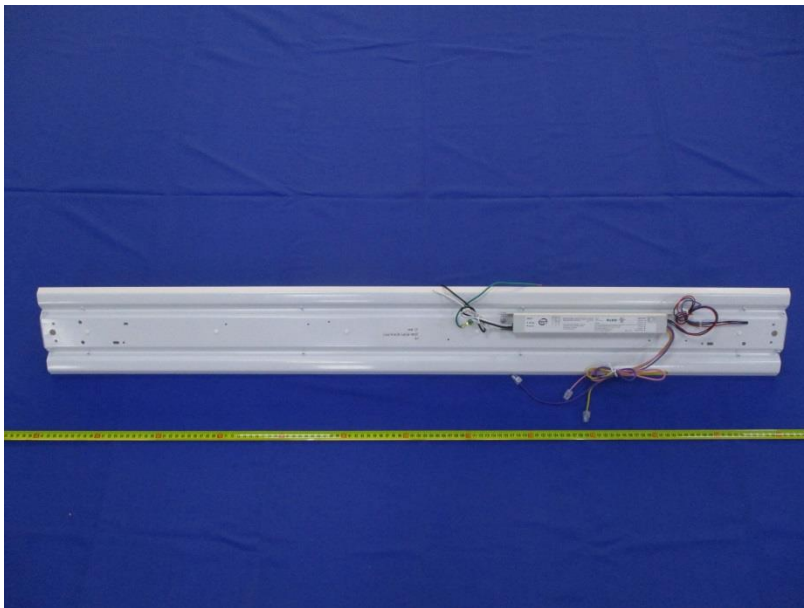
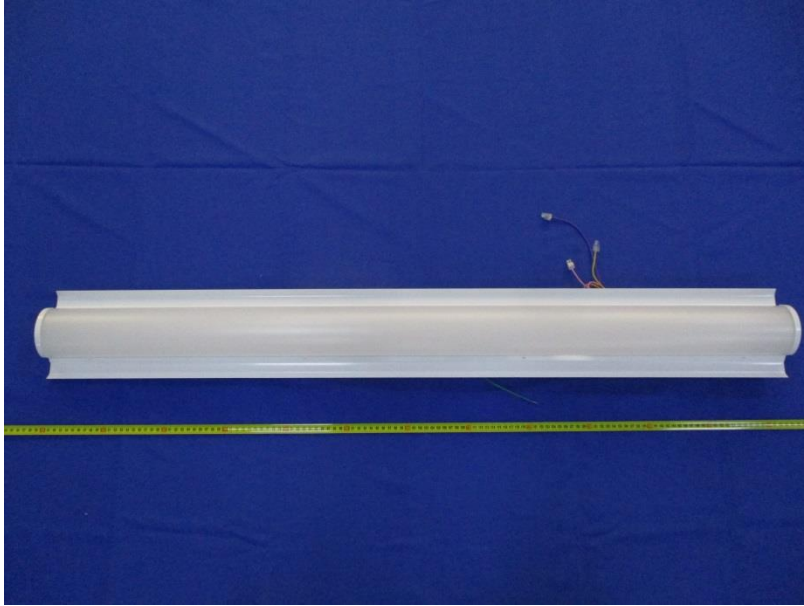
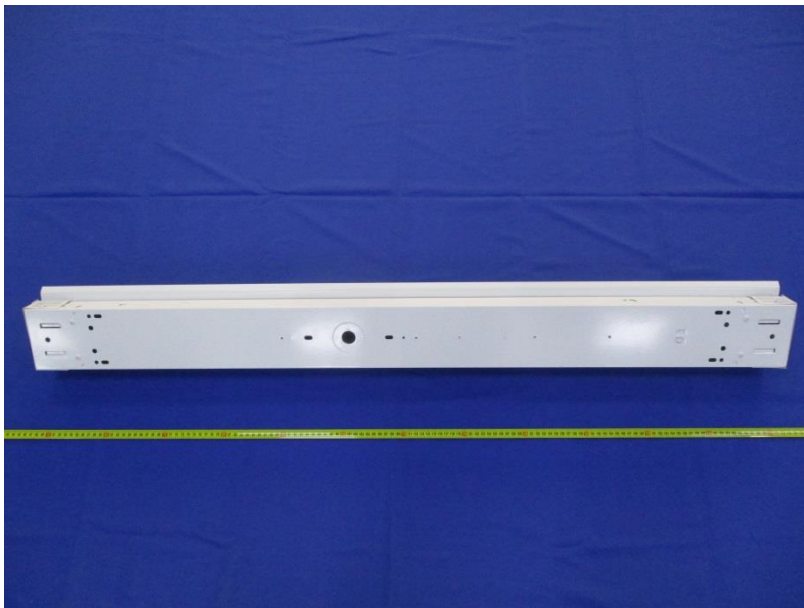
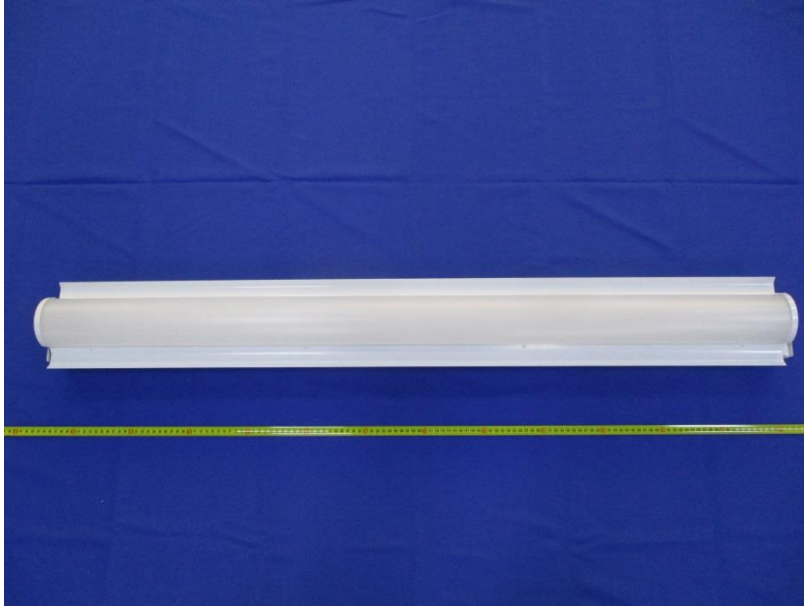


Photo of Product Installed in the Fixture



LED Driver Photo



5. Test Result

Test Model: VEKL4F/45-8T (34W/38W/45W)

Control Setting: 3500K/ 45W

Integrating Sphere Test; Orientation: Downward; Test Voltage: 120V 60Hz;				
Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances only)	Conclusion
Light Output(lm)	5800.6	≥1500	≥1350	Pass
Power(W)	44.85	None.	None.	N/A
Total Efficacy(lm/W)	129.33	≥115	≥111.55	Pass
CCT(K)	3384	None ⁱ	None.	N/A
Duv	0.00079	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	82.6	≥80	≥79	
R ₉	8	≥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)	5829.2	≥1500	≥1350	Pass
Power(W)	45.04	None.	None.	N/A
Total Efficacy(lm/W)	129.47	≥115	≥111.55	Pass
Zonal Lumen Distribution(0-60°)	66.57%	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	0.9939	≥0.9	≥0.87	Pass
120	THDi	9.68%	≤20%	≤25%	Pass
277	Power Factor	0.9735	≥0.9	≥0.87	Pass
277	THDi	8.59%	≤20%	≤25%	Pass

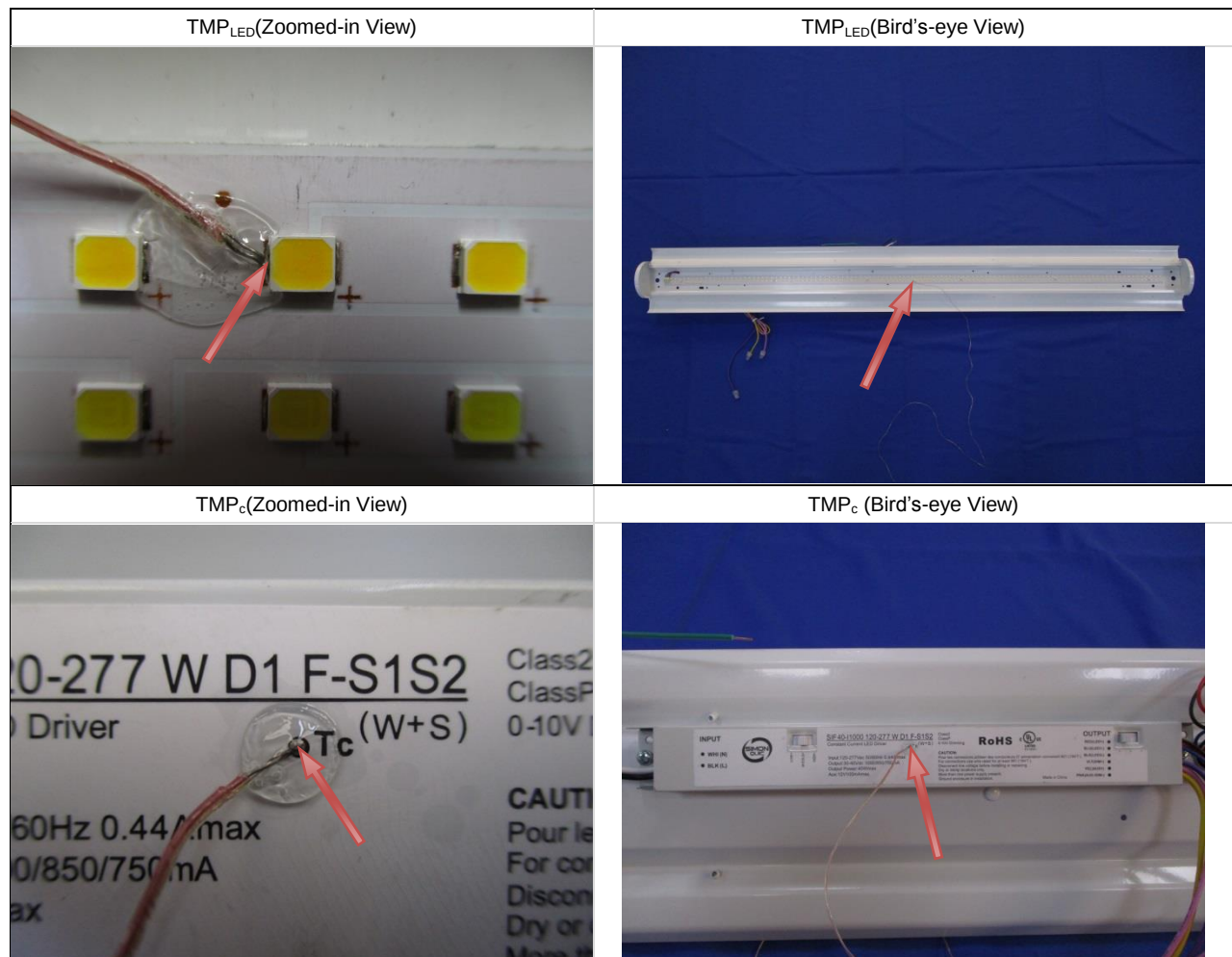
Integrating Sphere THDi、PF Test; Orientation: Downward;					
Test Voltage	Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances and/or allowances)	Conclusion
120	Power Factor	0.991	≥0.9	≥0.87	Pass
120	THDi	9.72%	≤20%	≤25%	Pass
277	Power Factor	0.9663	≥0.9	≥0.87	Pass
277	THDi	8.74%	≤20%	≤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)	40.5	≤105	With tolerance of ≤ 1.1°C or 0.4%, whichever is greater due to thermocouple tolerance	Pass
TMP _c (°C)	46.6	≤90	With tolerance of ≤ 1.1°C or 0.4%, whichever is greater due to thermocouple tolerance	Pass
Drive Current/Individual LED source(mA)	122.9	≤200	With +5% tolerance	Pass
L ₇₀ 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]

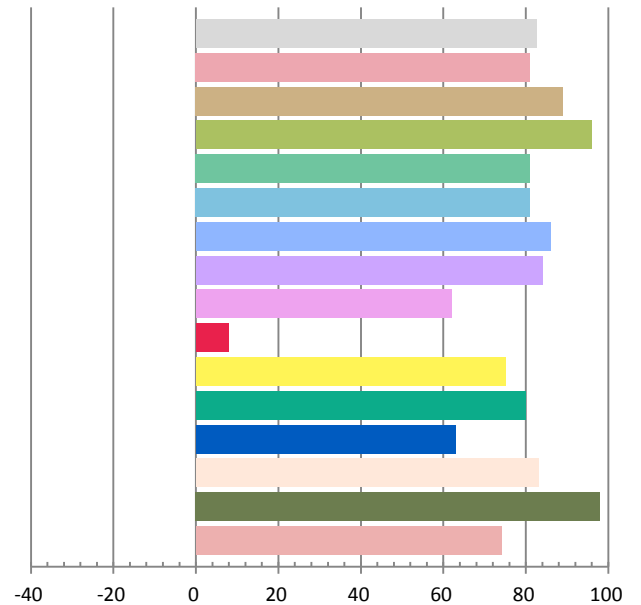
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.3772	44.85	0.991	5800.6	129.33

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
17.308	3384	0.00079	0.4129	0.3962	0.2383	0.5147

Color Rendering Index

Ra			
82.6			
R1	R2	R3	R4
81	89	96	81
R5	R6	R7	R8
81	86	84	62
R9	R10	R11	R12
8	75	80	63
R13	R14	R15	
83	98	74	



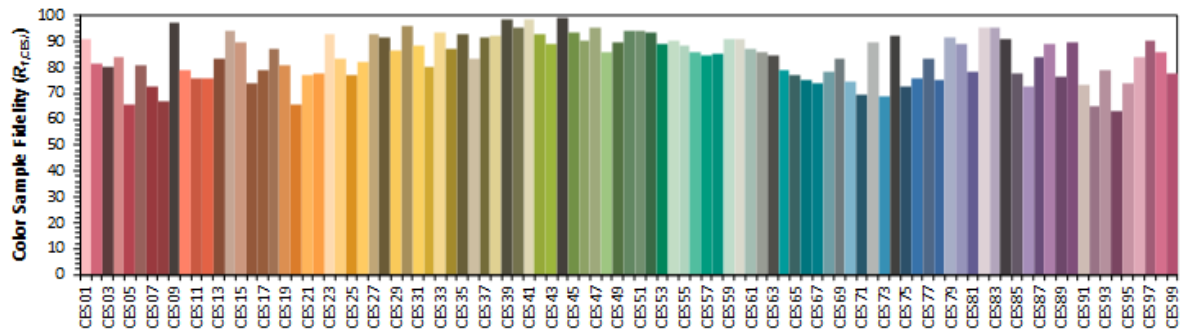
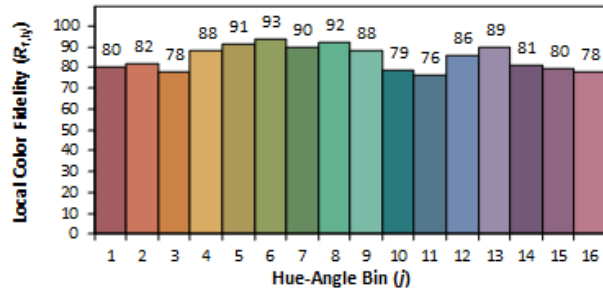
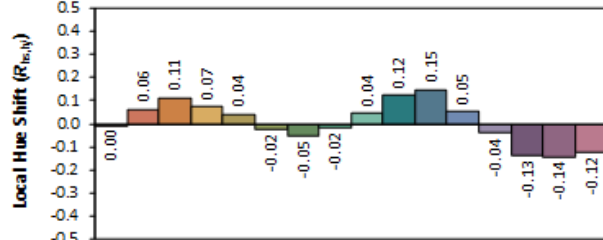
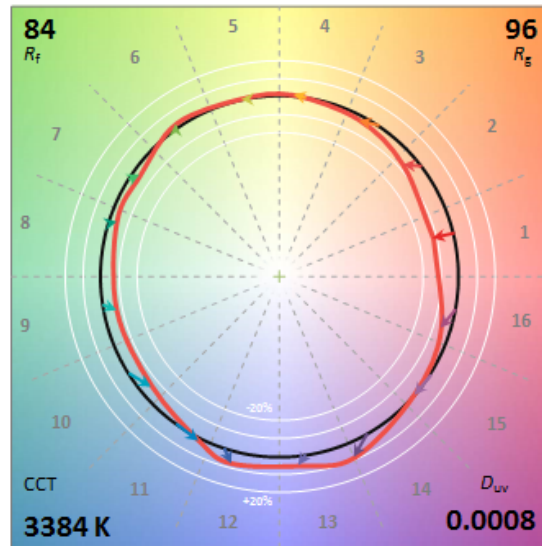
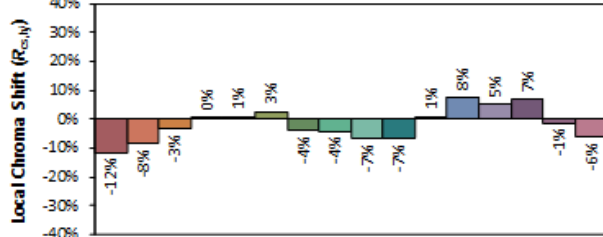
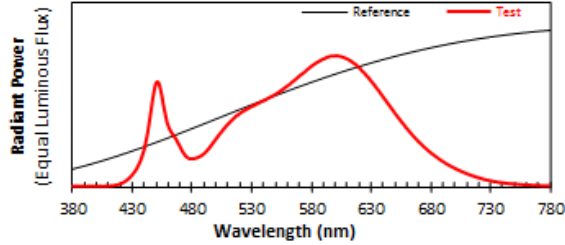
ANSI/IES TM-30-18 Color Rendition Report

Source: User SPD

Manufacturer: Espen Technology Inc.

Date: 2022/12/14

Model: VEKL4F/45-8T (34W/38W/45W)



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

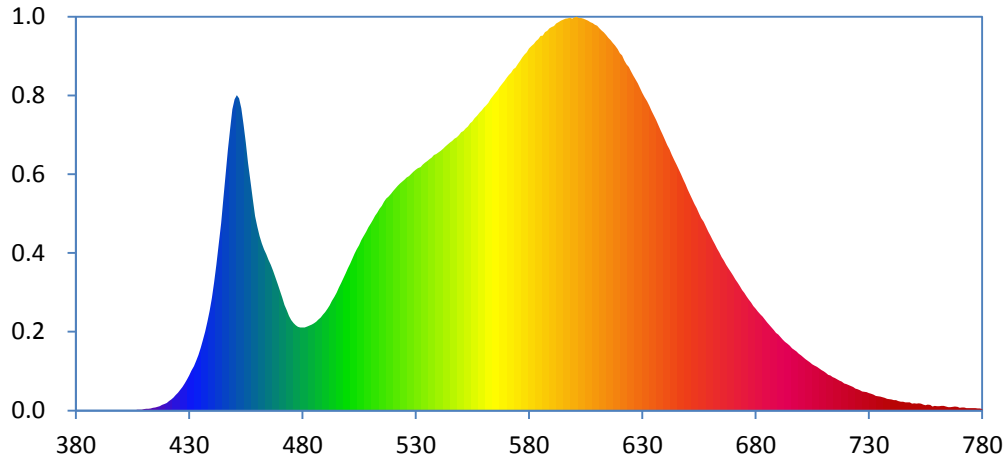
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 y 0.3962
 u' 0.2384
 v' 0.5147

CIE 13.3-1995
(CRI)

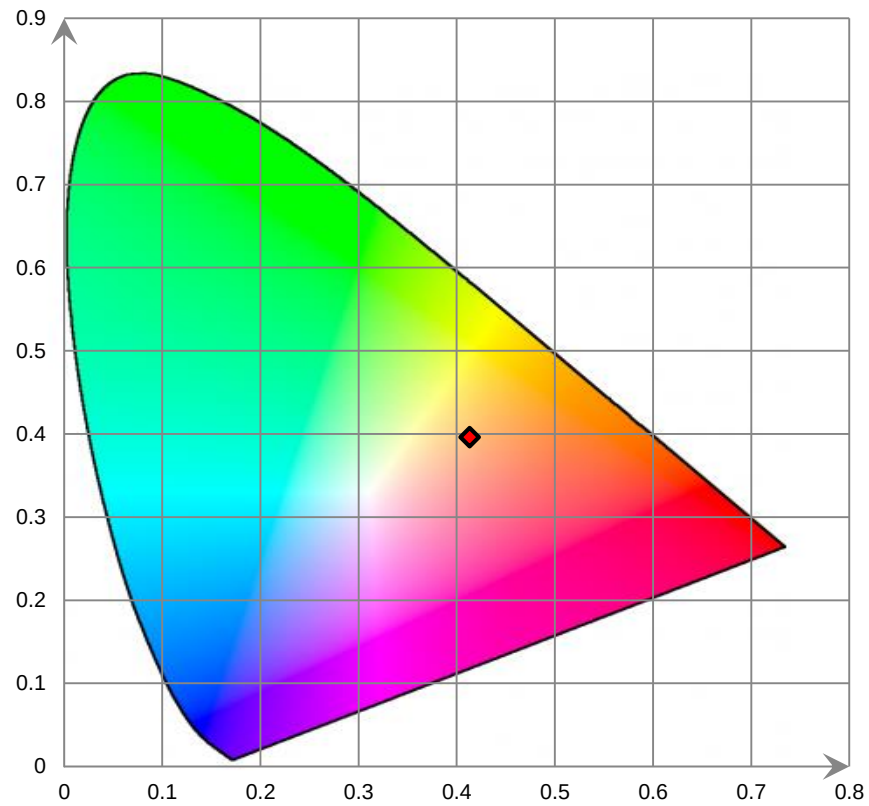
R_a 83
 R_g 9

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

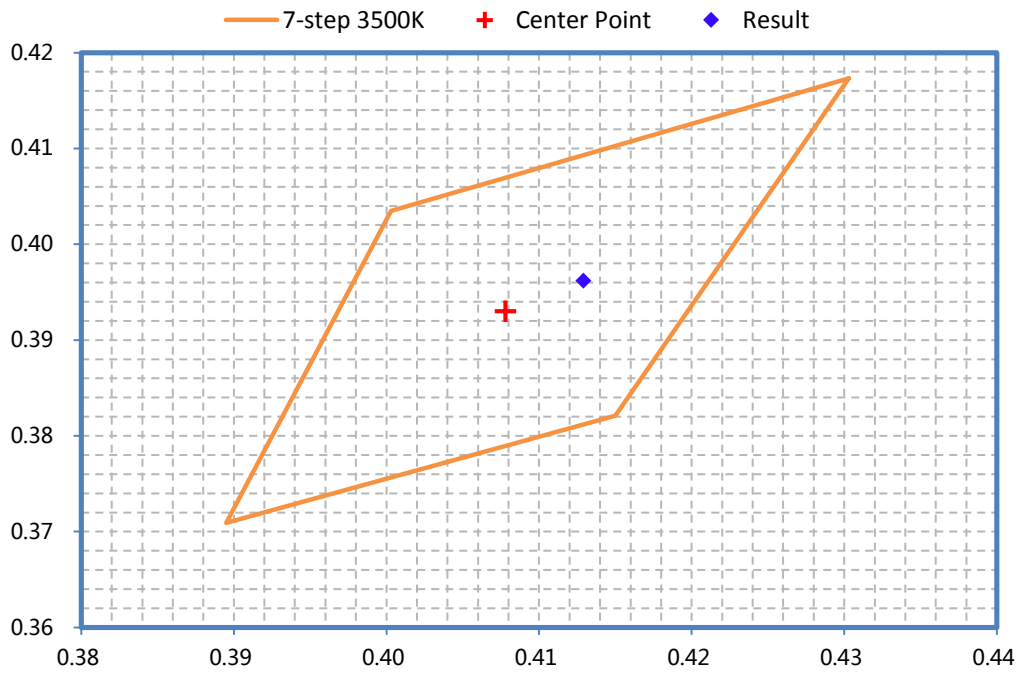
Relative Spectral Power Distribution



CIE 1931 x y Chromaticity Diagram



ANSI C78.377-2017 Chromaticity Quadrangles



[Goniophotometer System]

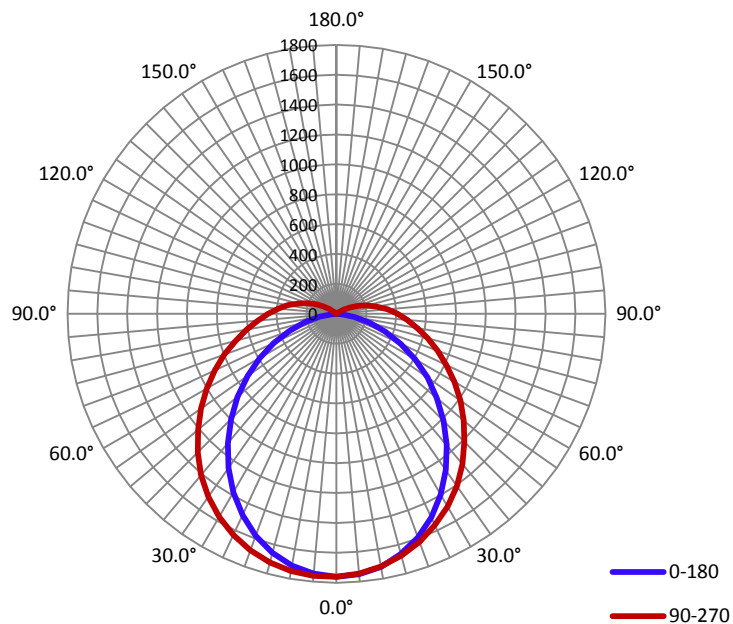
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60	0.378	45.04	0.994

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
5829.2	129.47	1761.1	1.18	1.29

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	99.3	111.6	127.5	112.1	112.6
Field Angle (10% I _{max}):	154.3	201.2	221.1	201.5	194.5

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°	1759.0	1759.0	1759.0	1759.0	1759.0	1759.0	1759.0	1759.0
5.0°	1749.8	1746.9	1744.6	1743.5	1744.5	1744.5	1745.6	1747.8
10.0°	1718.8	1714.1	1712.7	1714.7	1717.8	1715.2	1713.3	1712.5
15.0°	1664.7	1661.4	1663.5	1669.6	1676.2	1672.2	1664.2	1658.2
20.0°	1593.4	1589.5	1598.0	1611.3	1624.0	1614.2	1598.1	1589.0
25.0°	1503.3	1501.4	1515.7	1540.7	1559.6	1545.5	1517.7	1499.0
30.0°	1396.1	1396.1	1425.2	1462.5	1489.5	1467.7	1425.4	1394.5
35.0°	1276.4	1280.6	1322.4	1374.9	1405.3	1380.0	1321.9	1280.2
40.0°	1148.4	1159.0	1214.1	1276.8	1313.0	1282.6	1216.4	1156.9
45.0°	1014.7	1030.4	1097.5	1172.8	1212.4	1179.2	1102.4	1026.9
50.0°	878.5	899.8	978.3	1065.9	1113.4	1072.8	983.5	896.7
55.0°	743.6	772.8	862.4	966.4	1014.5	970.4	869.6	770.2
60.0°	608.0	647.3	751.7	863.6	911.6	869.8	758.9	645.5
65.0°	474.0	526.5	650.2	764.3	813.4	769.6	657.5	523.1
70.0°	347.9	413.3	553.1	670.3	719.1	674.4	560.6	413.5
75.0°	229.3	319.7	467.4	582.0	630.8	586.9	473.2	319.7
80.0°	122.0	237.2	392.5	501.9	550.1	506.8	397.1	236.8
85.0°	39.6	171.3	327.3	430.6	475.4	433.5	330.5	169.8
90.0°	0.0	123.6	270.2	367.5	407.8	366.7	271.1	122.6
95.0°	0.0	80.6	217.2	307.6	343.4	307.0	216.2	79.2
100.0°	0.0	41.3	163.4	246.3	275.8	243.9	162.5	40.1
105.0°	0.0	7.3	112.2	190.1	216.3	187.6	110.4	5.9
110.0°	0.0	1.1	64.3	134.4	156.5	132.0	62.4	0.0
115.0°	0.0	0.7	22.4	83.3	103.7	80.9	20.8	0.0
120.0°	0.0	0.0	1.8	38.4	56.4	36.5	0.8	0.0
125.0°	0.0	1.0	1.7	1.3	14.8	0.9	1.4	0.0
130.0°	1.2	1.5	1.6	1.4	1.2	1.6	1.3	1.0
135.0°	1.7	1.5	2.5	2.3	1.7	2.0	1.7	1.6
140.0°	2.1	2.3	2.9	3.1	2.7	2.6	2.4	2.1
145.0°	3.3	3.0	4.0	3.7	3.5	3.1	3.0	3.2
150.0°	3.9	4.1	4.5	4.3	4.2	4.3	4.2	3.9
155.0°	4.8	4.5	4.8	5.5	4.6	5.6	4.4	5.0
160.0°	5.7	4.6	5.6	5.8	5.7	5.8	5.7	5.0
165.0°	6.4	5.9	5.9	5.8	6.3	5.7	5.7	5.6
170.0°	6.9	5.5	6.9	6.2	7.1	6.7	6.7	6.4
175.0°	6.6	6.7	8.0	7.0	7.7	7.2	6.9	7.0
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°	1759.0	1759.0	1759.0	1759.0	1759.0	1759.0	1759.0	1759.0
5.0°	1746.1	1750.7	1755.8	1758.4	1760.4	1758.7	1755.0	1750.2
10.0°	1711.8	1722.4	1734.8	1743.1	1748.3	1743.1	1733.5	1723.2
15.0°	1656.4	1672.8	1694.2	1712.8	1722.4	1712.1	1693.1	1674.5
20.0°	1580.9	1605.4	1638.2	1668.7	1684.4	1668.1	1636.0	1607.4
25.0°	1486.0	1520.7	1567.7	1610.5	1633.2	1610.2	1566.6	1522.6
30.0°	1380.6	1420.1	1481.7	1539.5	1569.1	1539.9	1479.6	1423.2
35.0°	1259.5	1309.1	1385.9	1458.7	1494.5	1459.5	1384.5	1309.8
40.0°	1131.3	1189.6	1281.2	1366.6	1409.7	1369.3	1279.9	1190.2
45.0°	998.1	1064.0	1169.8	1266.1	1312.8	1267.4	1169.9	1065.2
50.0°	864.8	937.9	1055.5	1157.7	1209.2	1160.0	1056.9	937.3
55.0°	724.5	811.3	937.7	1049.1	1105.6	1052.2	940.7	810.8
60.0°	590.8	687.2	822.9	944.4	1001.3	949.8	827.5	686.0
65.0°	460.2	569.6	717.0	841.7	898.4	847.0	723.6	568.0
70.0°	335.8	451.9	616.1	742.1	796.9	744.1	622.6	454.0
75.0°	218.2	351.3	524.0	648.2	698.8	648.5	531.6	354.6
80.0°	113.8	266.2	441.8	559.9	610.3	562.1	449.3	268.0
85.0°	34.8	194.5	369.7	480.8	528.9	484.2	376.3	197.4
90.0°	0.0	142.5	308.1	412.5	456.0	413.9	312.8	146.7
95.0°	0.0	100.4	255.4	350.9	390.4	352.5	259.5	105.0
100.0°	0.0	60.7	202.0	295.2	330.0	297.0	205.3	65.6
105.0°	0.0	22.1	151.0	233.7	262.7	235.0	154.8	26.9
110.0°	0.0	1.6	102.5	181.4	205.4	181.9	106.3	1.9
115.0°	0.0	0.0	55.2	127.8	152.1	129.7	59.0	1.1
120.0°	0.0	0.7	14.7	77.7	100.7	80.2	18.4	1.1
125.0°	0.0	0.0	1.3	33.8	53.5	35.9	1.3	0.8
130.0°	1.0	1.1	1.3	1.1	14.2	2.1	1.5	1.3
135.0°	1.5	1.8	1.7	1.6	1.8	2.1	1.9	1.6
140.0°	2.3	2.0	2.3	2.5	2.4	2.7	2.2	2.3
145.0°	2.7	3.3	2.6	2.9	3.2	3.2	3.0	3.5
150.0°	3.1	4.1	3.7	4.4	4.0	3.8	4.0	4.4
155.0°	4.5	4.8	4.6	4.9	4.7	5.3	4.3	4.7
160.0°	5.2	5.2	5.0	5.1	5.4	5.6	5.6	5.4
165.0°	5.7	6.1	5.4	6.1	6.3	5.9	6.3	5.6
170.0°	6.0	7.0	6.2	6.5	6.6	7.0	6.2	6.2
175.0°	6.7	7.5	7.2	7.1	7.7	7.2	7.1	6.6
180.0°	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Test Model: VEKL4F/45-8T (34W/38W/45W)
Control Setting: 3500K/ 38W

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	0.9876	≥ 0.9	≥ 0.87	Pass
120	THDi	11.36%	$\leq 20\%$	$\leq 25\%$	Pass
277	Power Factor	0.9548	≥ 0.9	≥ 0.87	Pass
277	THDi	9.63%	$\leq 20\%$	$\leq 25\%$	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]

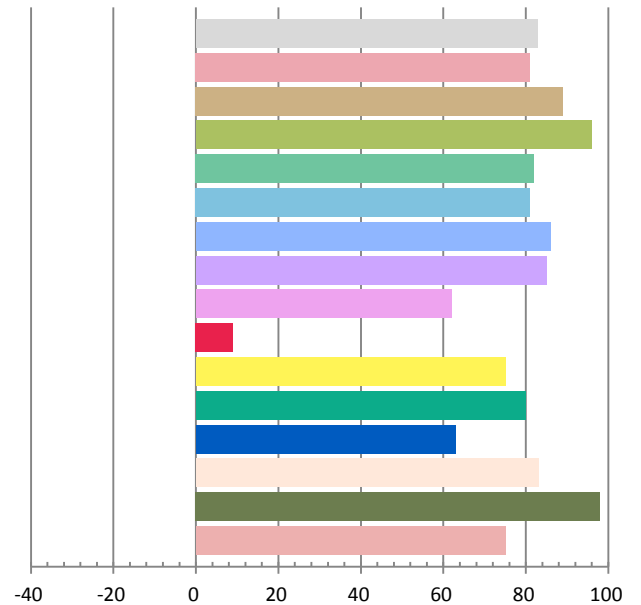
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.3128	37.07	0.9876	5016.9	135.33

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
14.980	3373	0.00084	0.4136	0.3967	0.2386	0.5149

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
9	75	80	63
R13	R14	R15	
83	98	75	



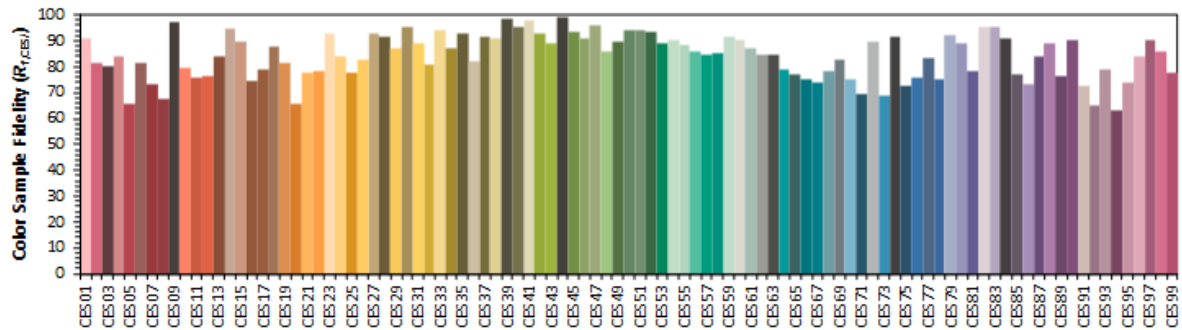
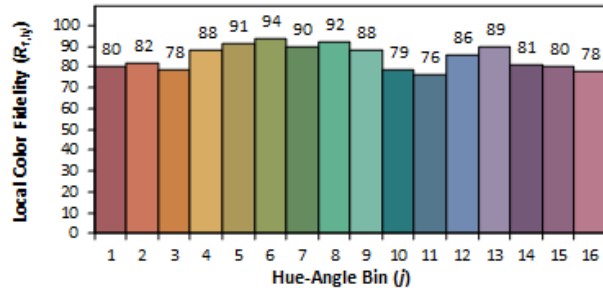
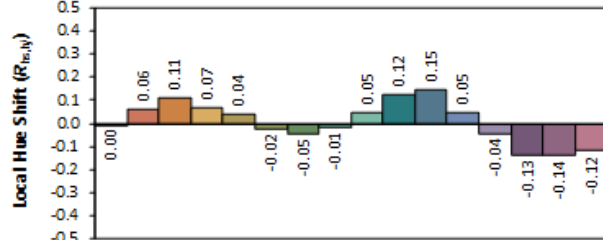
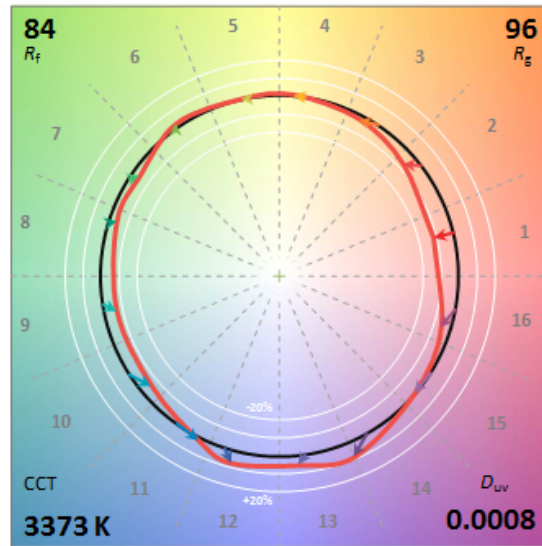
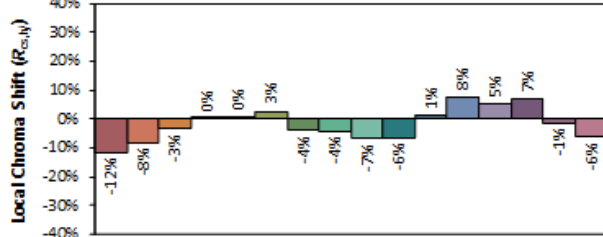
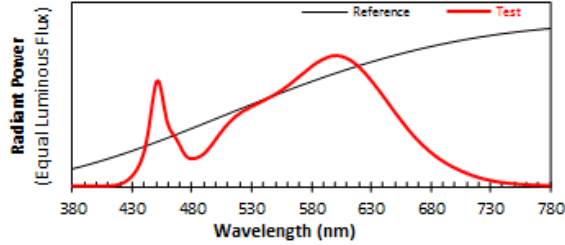
ANSI/IES TM-30-18 Color Rendition Report

Source: User SPD

Manufacturer: Espen Technology Inc.

Date: 2022/12/14

Model: VEKL4F/45-8T (34W/38W/45W)



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

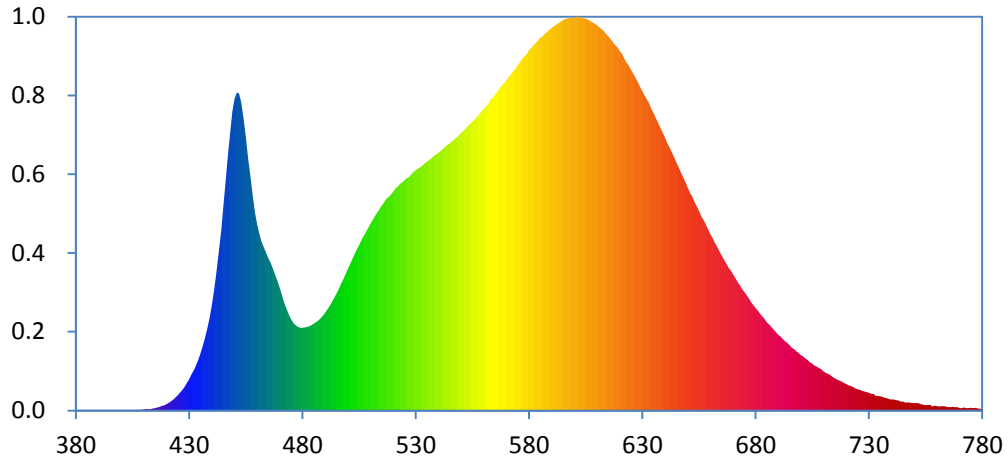
x 0.4136
 y 0.3967
 u' 0.2386
 v' 0.5149

CIE 13.3-1995
(CRI)

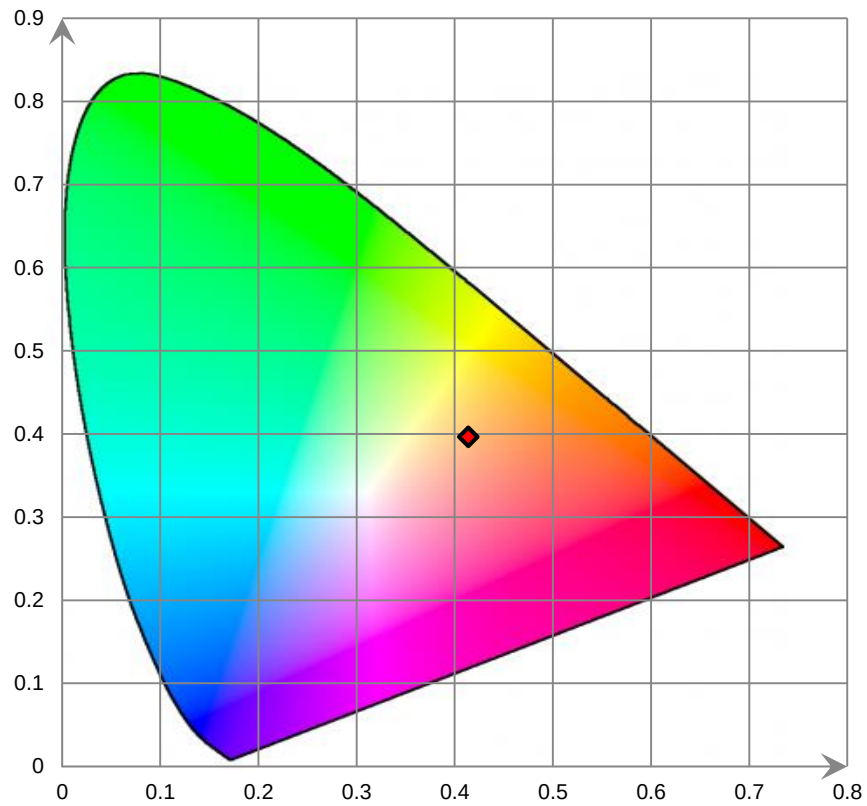
R_a 83
 R_g 10

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

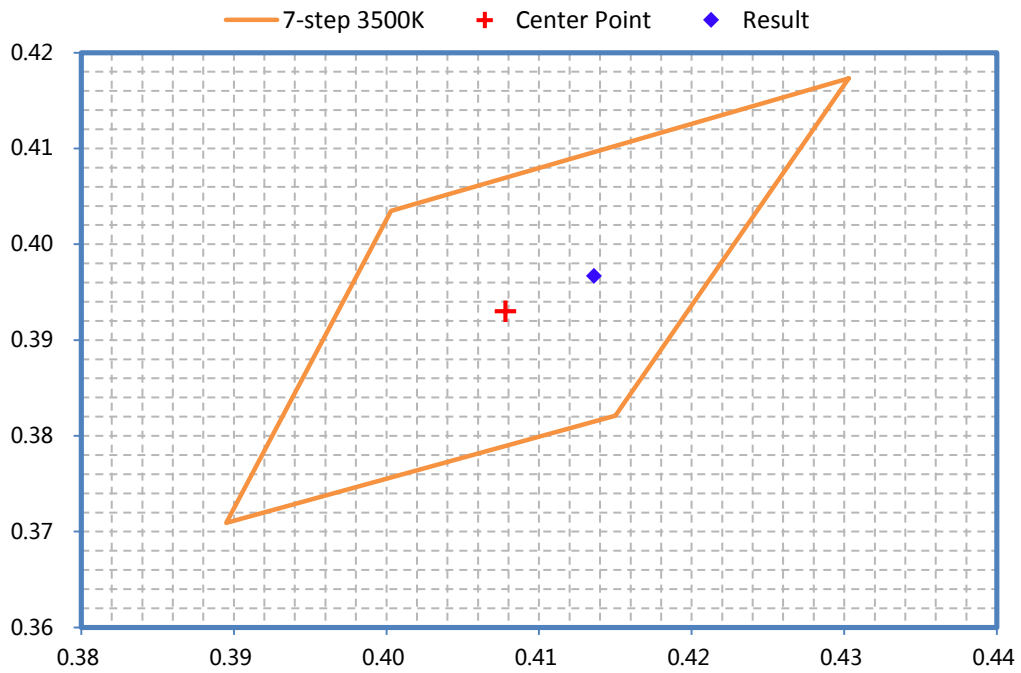
Relative Spectral Power Distribution



CIE 1931 x y Chromaticity Diagram



ANSI C78.377-2017 Chromaticity Quadrangles



Test Model: VEKL4F/45-8T (34W/38W/45W)
Control Setting: 3500K/ 34W

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	0.9853	≥ 0.9	≥ 0.87	Pass
120	THDi	12.41%	$\leq 20\%$	$\leq 25\%$	Pass
277	Power Factor	0.9481	≥ 0.9	≥ 0.87	Pass
277	THDi	10.39%	$\leq 20\%$	$\leq 25\%$	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]

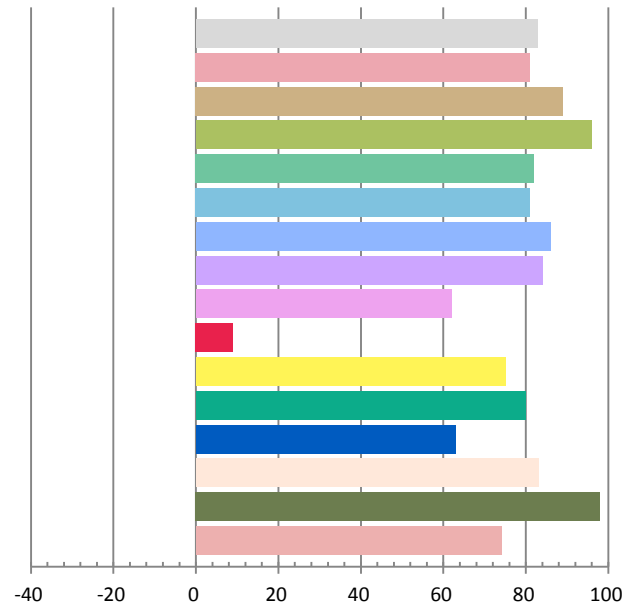
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.2784	32.92	0.9854	4713.1	143.16

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
14.056	3364	0.00091	0.4143	0.3972	0.2389	0.5152

Color Rendering Index

Ra			
82.8			
R1	R2	R3	R4
81	89	96	82
R5	R6	R7	R8
81	86	84	62
R9	R10	R11	R12
9	75	80	63
R13	R14	R15	
83	98	74	



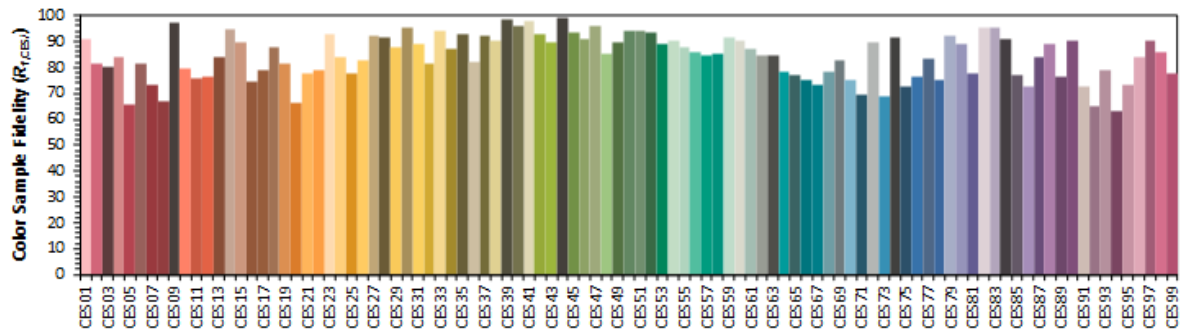
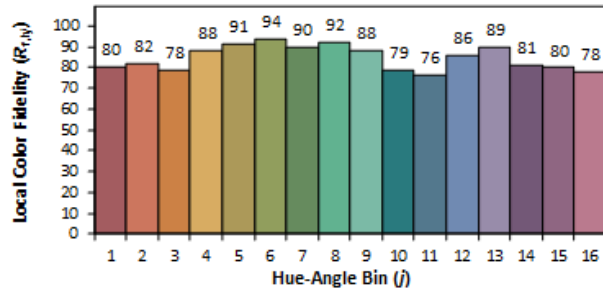
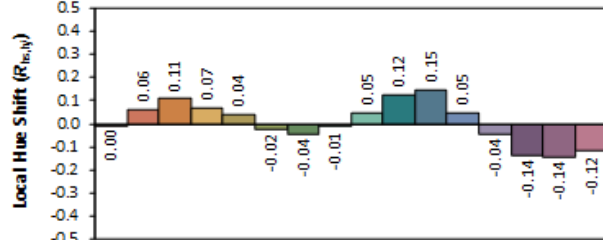
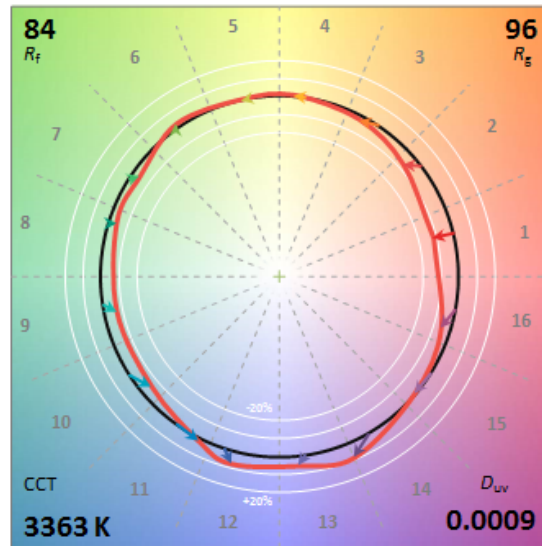
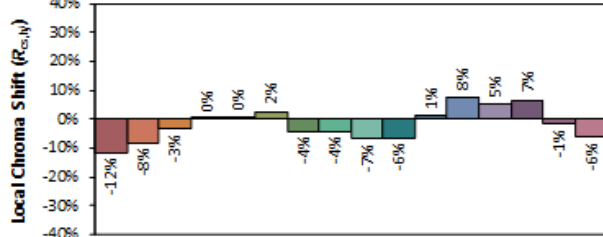
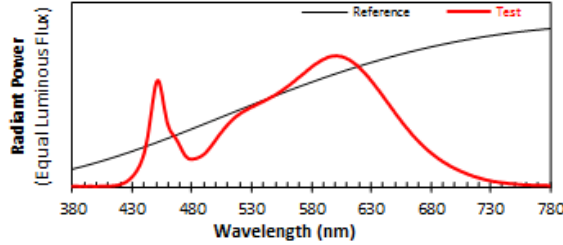
ANSI/IES TM-30-18 Color Rendition Report

Source: User SPD

Manufacturer: Espen Technology Inc.

Date: 2022/12/14

Model: VEKL4F/45-8T (34W/38W/45W)



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

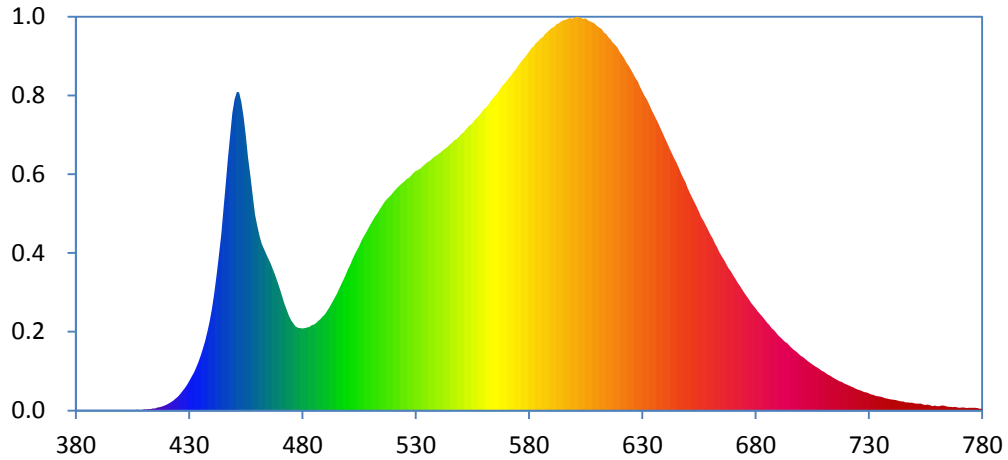
x 0.4143
 y 0.3971
 u' 0.2389
 v' 0.5152

CIE 13.3-1995
(CRI)

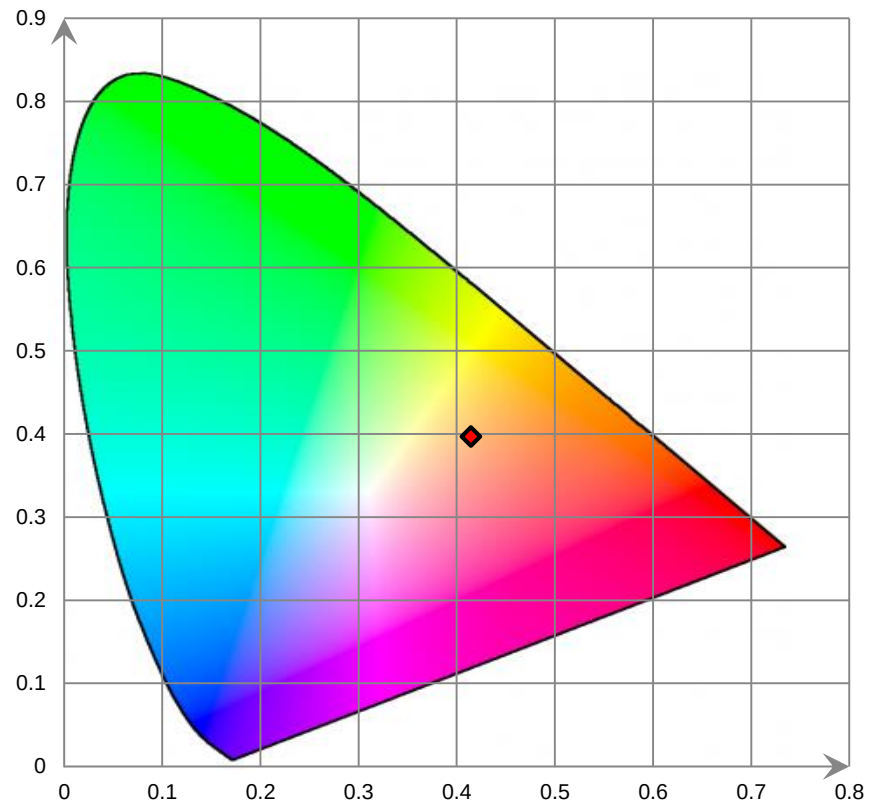
R_a 83
 R_g 9

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

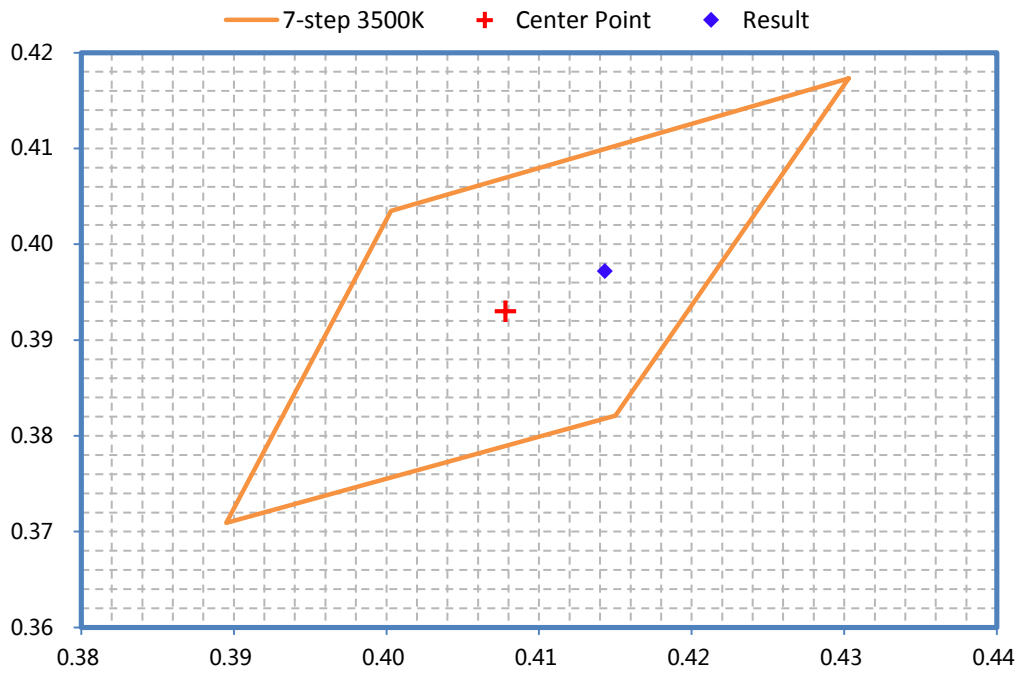
Relative Spectral Power Distribution



CIE 1931 x y Chromaticity Diagram



ANSI C78.377-2017 Chromaticity Quadrangles



Test Model: VEKL4F/45-8T (34W/38W/45W)
Control Setting: 4000K/ 45W

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

Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances only)	Conclusion
Light Output(lm)	6434.3	≥1500	≥1350	Pass
Power(W)	42.92	None.	None.	N/A
Total Efficacy(lm/W)	149.93	≥115	≥111.55	Pass
CCT(K)	4092	None ⁱ	None.	N/A
Duv	-0.00027	None ⁱ	None.	N/A
IES R _f	82	70	69	Pass
IES R _g	94	89	88	
IES Rcs,h1	-12%	-12%~23%	-13%~24%	
R _a	83	≥80	≥79	
R ₉	13	≥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	0.9911	≥0.9	≥0.87	Pass
120	THDi	9.28%	≤20%	≤25%	Pass
277	Power Factor	0.9634	≥0.9	≥0.87	Pass
277	THDi	8.97%	≤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]

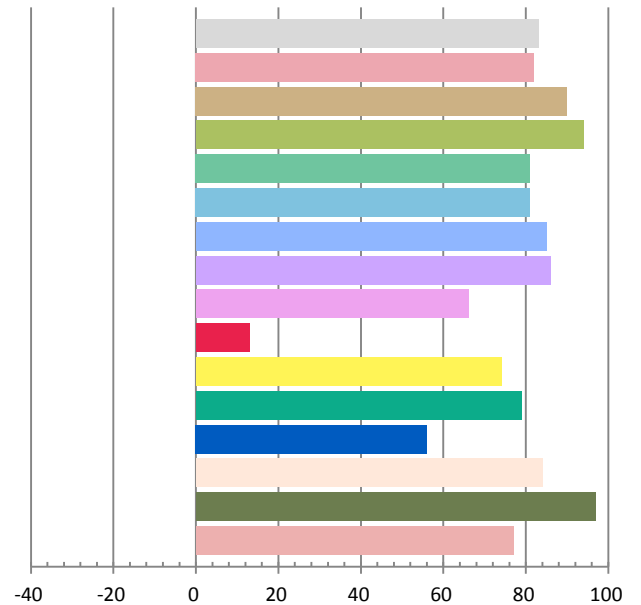
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.3609	42.92	0.991	6434.3	149.93

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
19.501	4092	-0.00027	0.3763	0.3736	0.2236	0.4996

Color Rendering Index

Ra			
83.0			
R1	R2	R3	R4
82	90	94	81
R5	R6	R7	R8
81	85	86	66
R9	R10	R11	R12
13	74	79	56
R13	R14	R15	
84	97	77	



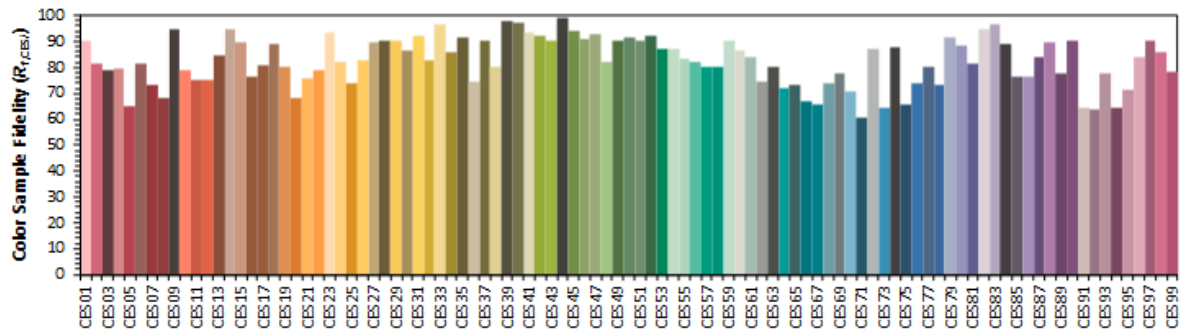
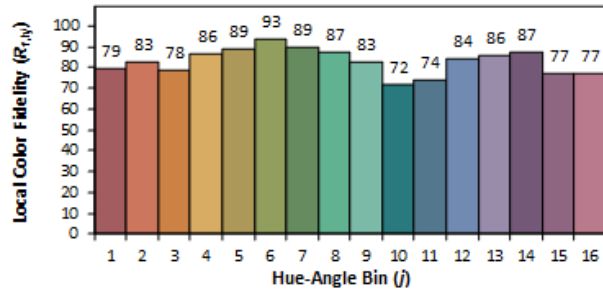
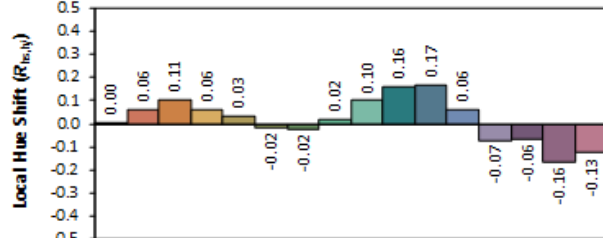
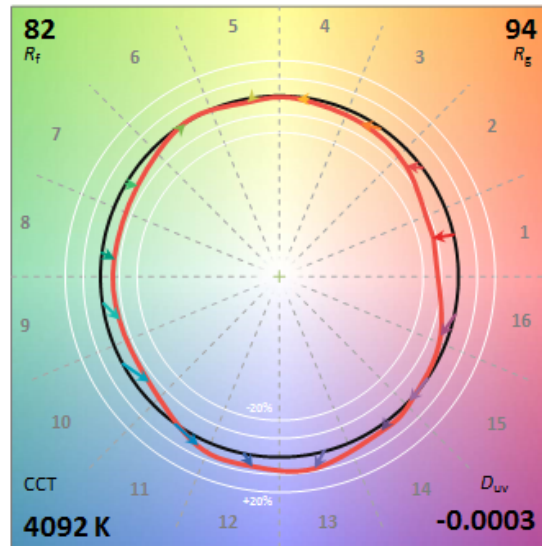
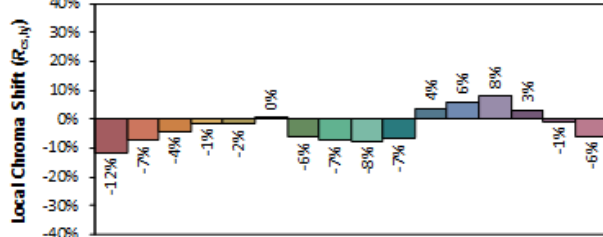
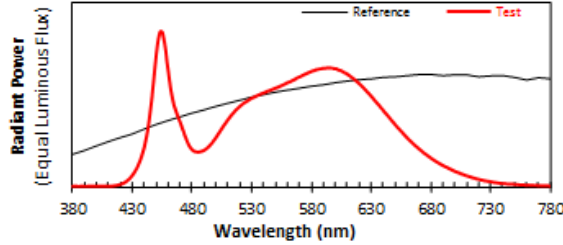
ANSI/IES TM-30-18 Color Rendition Report

Source: User SPD

Manufacturer: Espen Technology Inc.

Date: 2022/12/14

Model: VEKL4F/45-8T (34W/38W/45W)



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

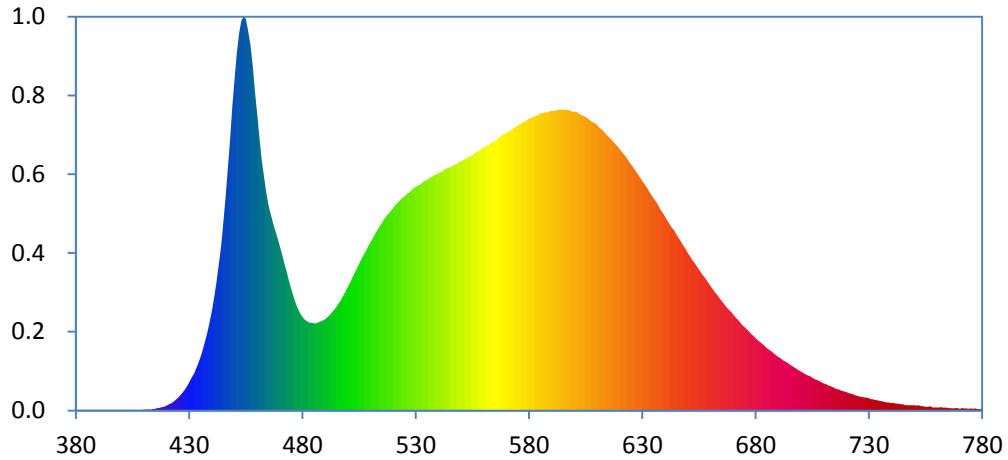
x 0.3763
 y 0.3736
 u' 0.2237
 v' 0.4996

CIE 13.3-1995
(CRI)

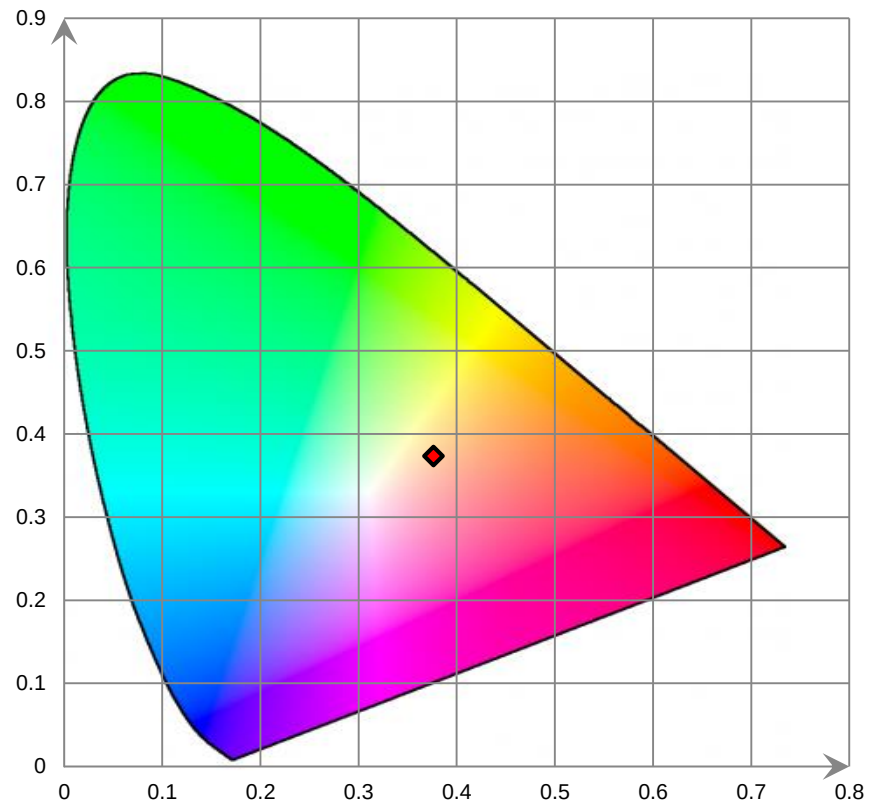
R_a 83
 R_g 12

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

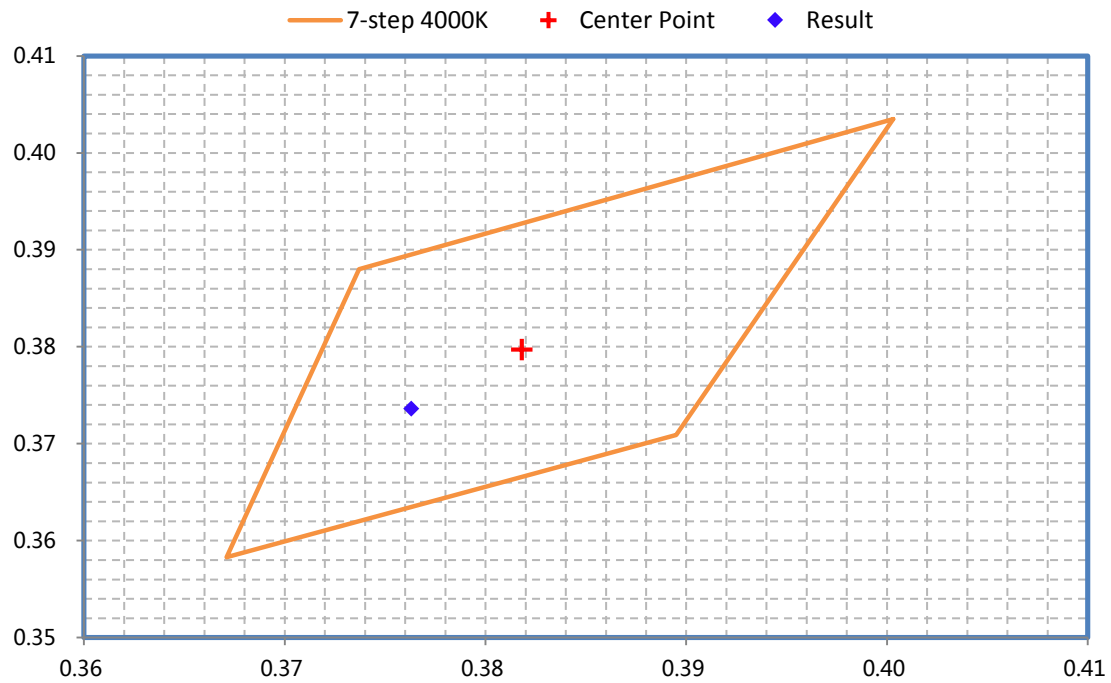
Relative Spectral Power Distribution



CIE 1931 x y Chromaticity Diagram



ANSI C78.377-2017 Chromaticity Quadrangles



Test Model: VEKL4F/45-8T (34W/38W/45W)
Control Setting: 5000K/ 45W

Integrating Sphere Test; Orientation: Downward; Test Voltage: 120V 60Hz;				
Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances only)	Conclusion
Light Output(lm)	5862.9	≥1500	≥1350	Pass
Power(W)	44.87	None.	None.	N/A
Total Efficacy(lm/W)	130.66	≥115	≥111.55	Pass
CCT(K)	5042	None ⁱ	None.	N/A
Duv	0.00082	None ⁱ	None.	N/A
IES R _f	81	70	69	Pass
IES R _g	95	89	88	
IES Rcs,h1	-13%	-12%~23%	-13%~24%	
R _a	81.1	≥80	≥79	
R ₉	4	≥0	≥-1	

Note:

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

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	0.9909	≥0.9	≥0.87	Pass
120	THDi	9.72%	≤20%	≤25%	Pass
277	Power Factor	0.9658	≥0.9	≥0.87	Pass
277	THDi	8.79%	≤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]

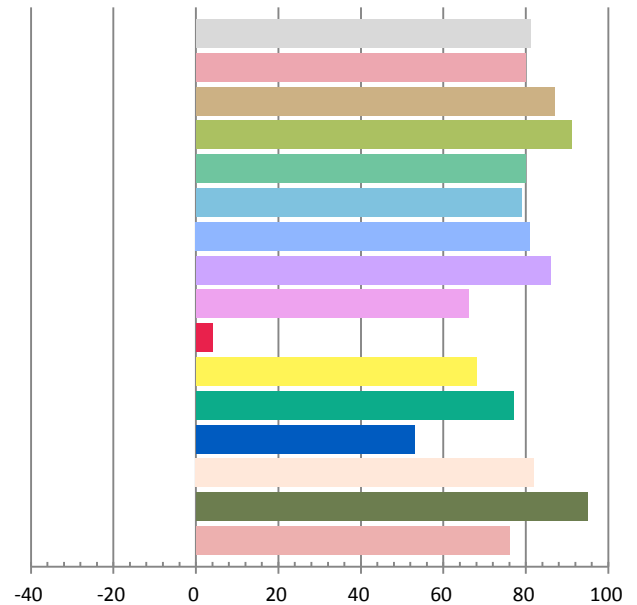
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.3773	44.87	0.991	5862.9	130.66

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
17.988	5042	0.00082	0.3441	0.3524	0.2104	0.4849

Color Rendering Index

Ra			
81.1			
R1	R2	R3	R4
80	87	91	80
R5	R6	R7	R8
79	81	86	66
R9	R10	R11	R12
4	68	77	53
R13	R14	R15	
82	95	76	



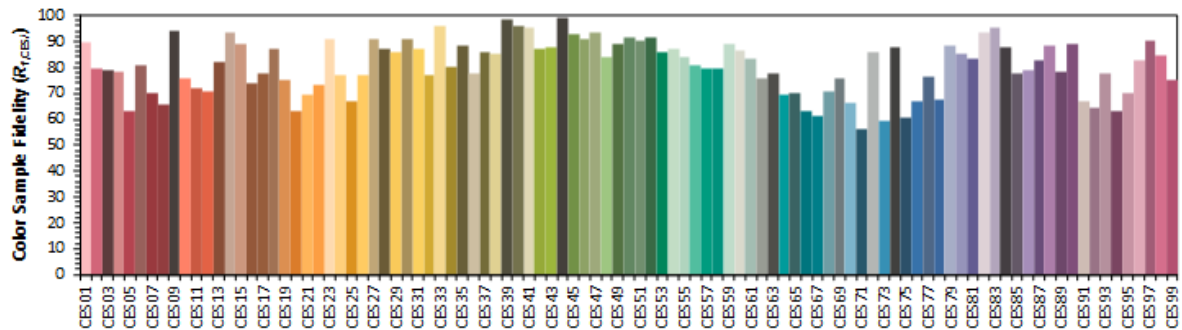
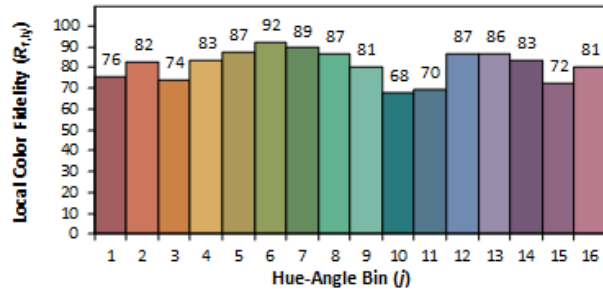
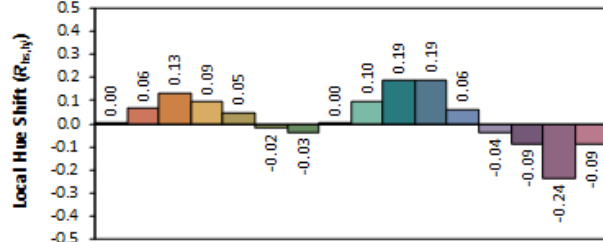
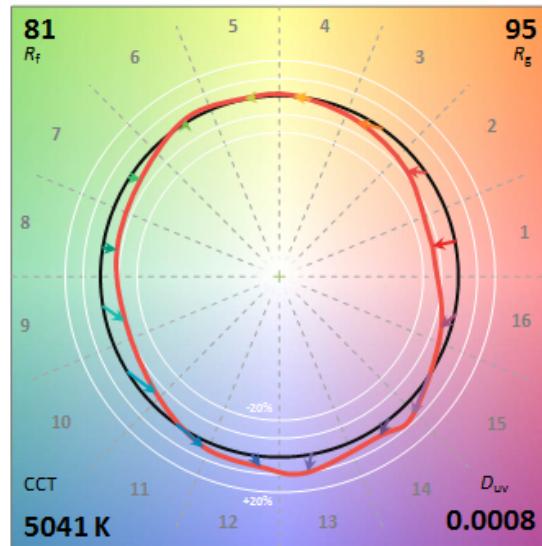
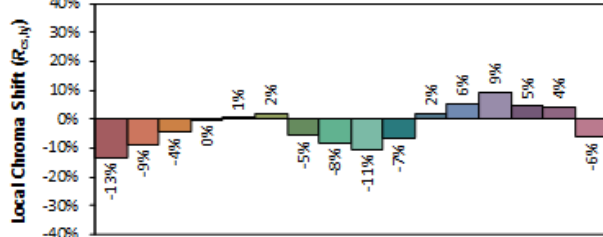
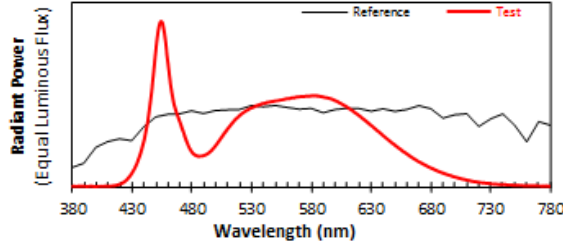
ANSI/IES TM-30-18 Color Rendition Report

Source: User SPD

Manufacturer: Espen Technology Inc.

Date: 2022/12/15

Model: VEKL4F/45-8T (34W/38W/45W)



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

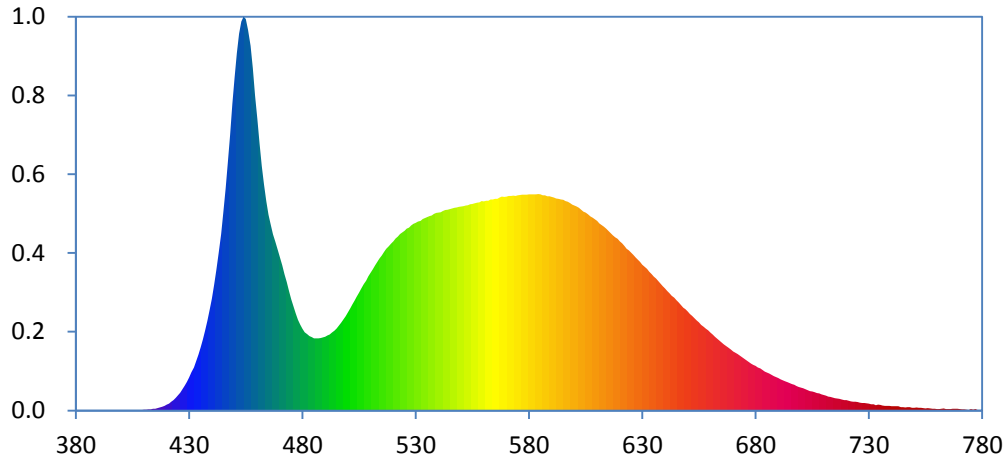
x 0.3441
 y 0.3524
 u' 0.2104
 v' 0.4849

CIE 13.3-1995
(CRI)

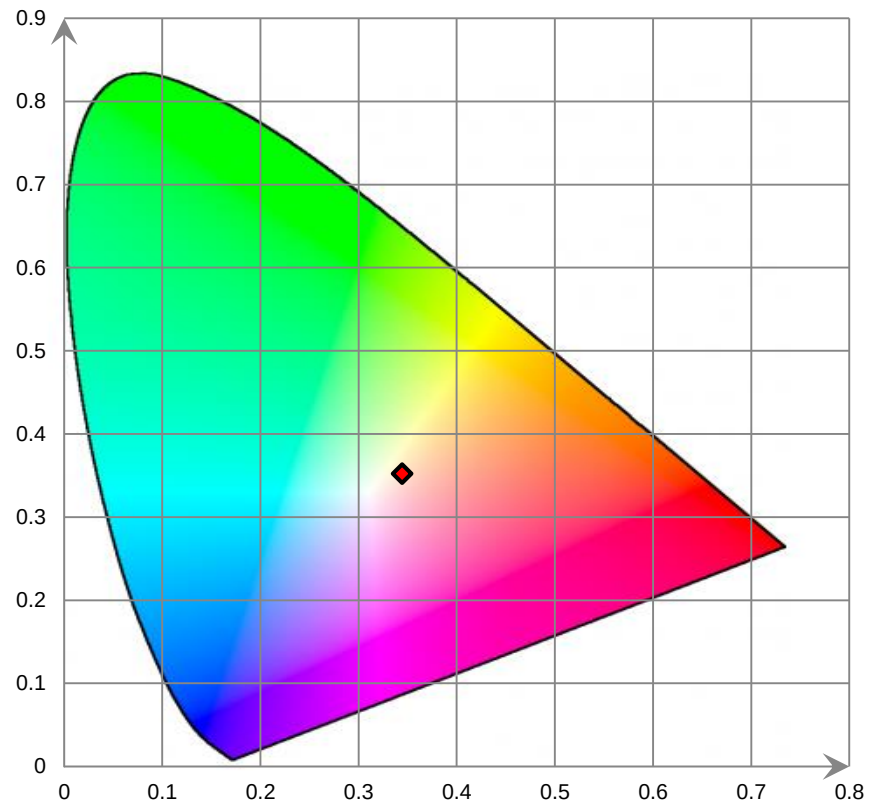
R_a 81
 R_g 4

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

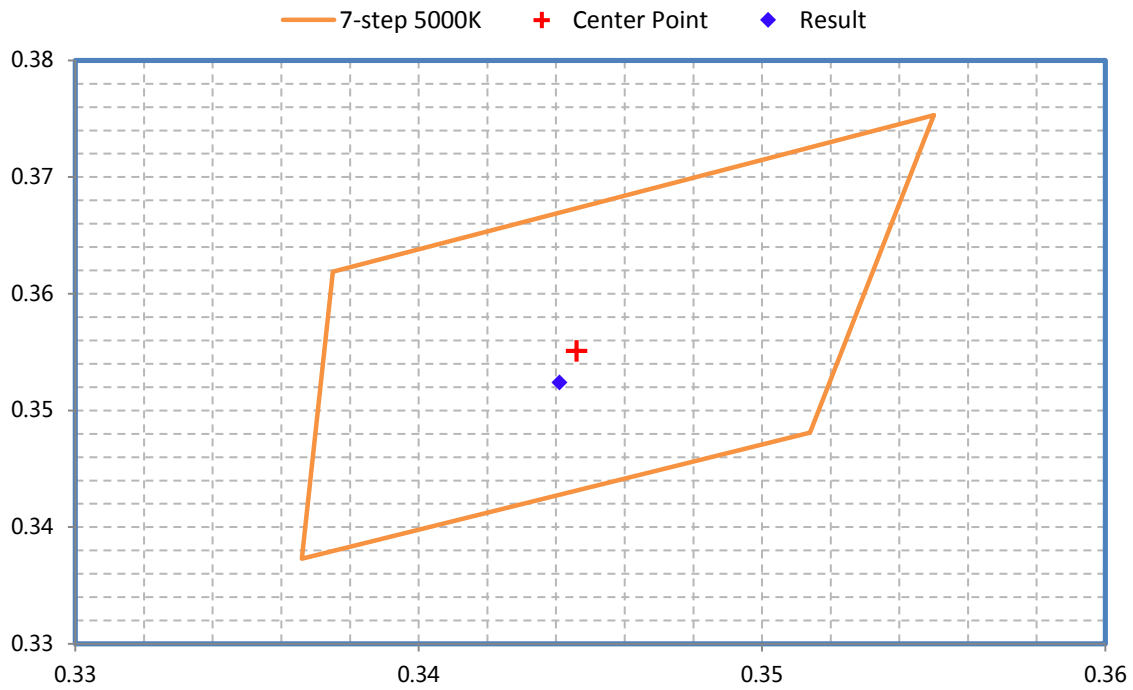
Relative Spectral Power Distribution



CIE 1931 x y Chromaticity Diagram



ANSI C78.377-2017 Chromaticity Quadrangles



6. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
Integrating Sphere	INVENTFINE	Dia 1.5m	JWWCV090112	2022-06-21	2023-06-20
Power Meter	INVENTFINE	WT500	GSJWQ20009	2022-11-03	2023-11-02
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2022-06-21	2023-06-20
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2022-06-21	2023-06-20
Standard Light Source	Osram	24V/50W	JWWCR020104	2021-09-15	2023-09-14
Thermal Meter	ANYMETRE	TH-20E	N/A	2022-11-11	2023-11-10
DC Power Supply	INVENTFINE	WL3005	JWWCP020069	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	GSDSQ200007	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.
6. This report cannot be reproduced except in full, without prior written approval of the Company.
7. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

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