TEST REPORT

For

Espen Technology Inc.

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

Model Number:	VEKL8F/90-8T (65W/75W/90W)	
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:	IES LM-79-08: Approved Method: Electrical & Photometric Measurement 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 IES TM-30-18: IES Method for Evaluating Light Source Color Rendition	
Project Engineer:	Bay Wang	Bay Wang
Report Number:	PKS210904060-10	
Sample Size:	One sample were received on 2020-09-15 and used for testing.	
Test Date:	2020-09-23	
Report Date:	2021-09-10	
Reviewed By:	Seven Xia/ EE Engineer	Seven Xia
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan). No. 248 Chenghu Road, Kunshan, Jiangsu Province, 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:	SIL 80-I2000 120-277 W D1+D3 M
Luminaire length:	8ft
Auxiliary Ballast Model:	NA
Auxiliary Housing Model:	Lithonia TC2 32 MVOLT GEB10IS
White Tunable:	Yes
Field-Adjustable Light Output:	Yes

Note:

1. The applicant Espen Technology Inc. declared that their products are the same to the product in report# RKSB200915002-10-3 and is authorized by original applicant to use their test data.
2. All the data in previous report (RKSB200915002-10-3) is shared in report.

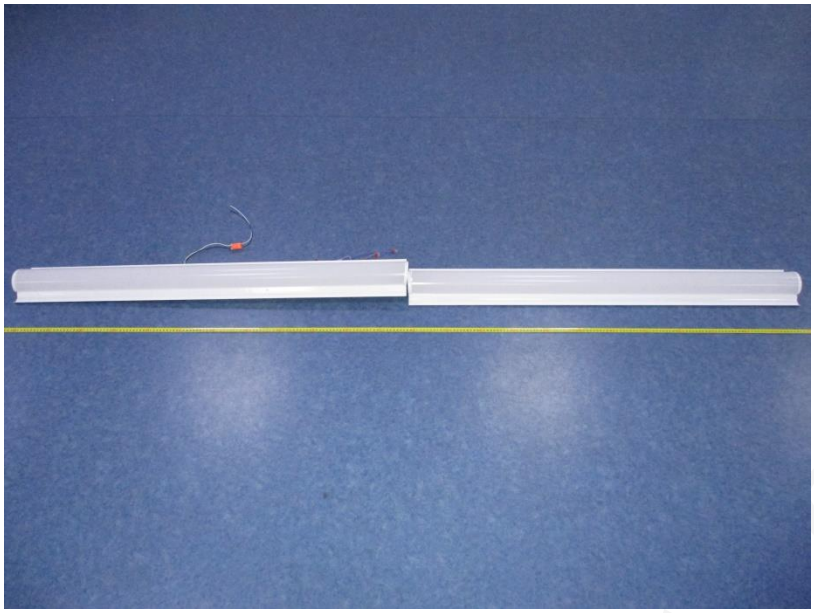
2. Product Rated Values#

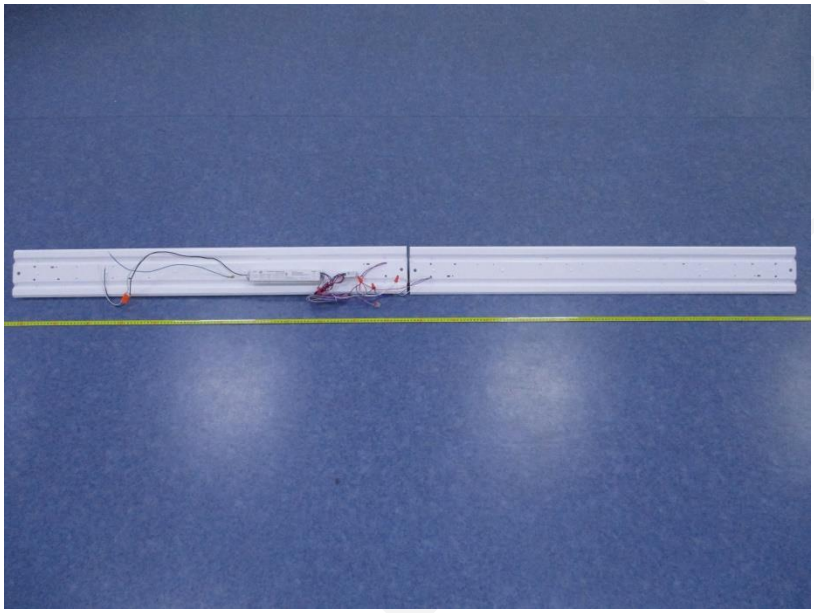
Test Model	CCT(K)	Light Output (lm)	Power(W)	Luminous Efficacy (lm/W)
VEKL8F/90-8T (65W/75W/90W)	3500	11700	90	130
		9975	75	133
		8840	65	136
	4000	11790	90	131
		10050	75	134
		8905	65	137
	5000	11880	90	132
		10125	75	135
		8970	65	138

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
VEKL8F/90-8T (65W/75W/90W)	3500	90	NA	Yes	Yes	Yes
		75	NA	Yes	Yes	NA
		65	NA	Yes	Yes	NA
	4000	90	NA	NA	Yes	NA
	5000	90	NA	NA	Yes	NA

4. Product Photo





LED Driver Photo

5. Test Result

Test Model: VEKL8F/90-8T (65W/75W/90W)
Control setting: 3500K/ 90W

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

Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances only)	Conclusion
Light Output(lm)	11739.5	≥3000	≥2700	Pass
Power(W)	88.59	None.	None.	N/A
Total Efficacy(lm/W)	132.51	≥115	≥111.55	Pass
CCT(K)	3411	None [i]	None.	N/A
Duv	-0.00081	None [i]	None.	N/A
IES R_f	83	70	69	Pass
IES R_g	97	89	88	
IES Rcs,h1	-12%	-12%~23%	-13%~24%	
R_a	81.7	≥80	≥79	
R_9	6	≥0	≥-1	

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

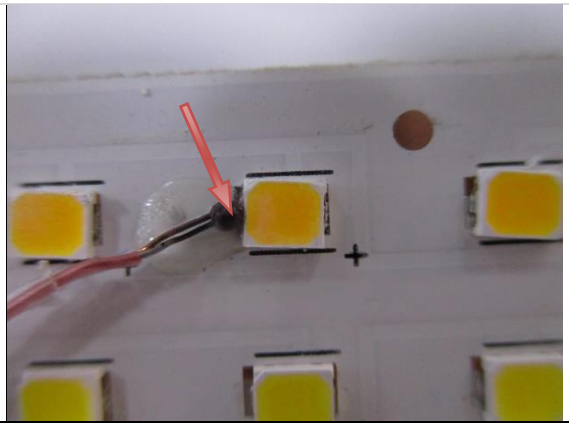
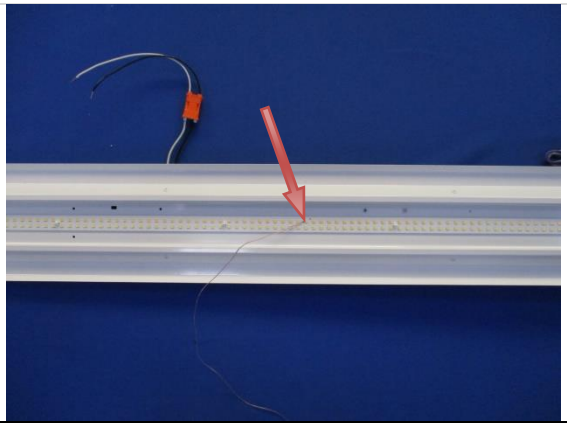
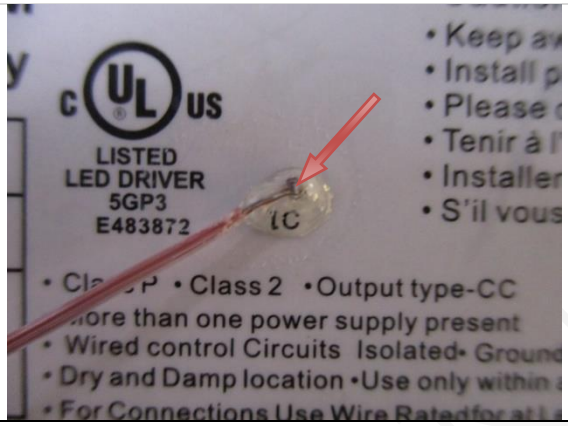
Integrating Sphere THDi、PF Test; Orientation: Downward;

Test Voltage	Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances and/or allowances)	Conclusion
120	Power Factor	0.997	≥0.9	≥0.87	Pass
120	THDi	3.79%	≤20%	≤25%	Pass
277	Power Factor	0.982	≥0.9	≥0.87	Pass
277	THDi	4.28%	≤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)	47.8	≤105	With tolerance of ≤ 1.1°C or 0.4%, whichever is greater due to thermocouple tolerance	Pass
TMP_c(°C)	50.7	≤90	With tolerance of ≤ 1.1°C or 0.4%, whichever is greater due to thermocouple tolerance	Pass
Drive Current/Individual LED source(mA)	123.6	≤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.

TMP_{LED}(Zoomed-in View)	TMP_{LED}(Bird's-eye View)
	
TMP_c(Zoomed-in View)	TMP_c (Bird's-eye View)
	

Test Data

[Integrating Sphere System]

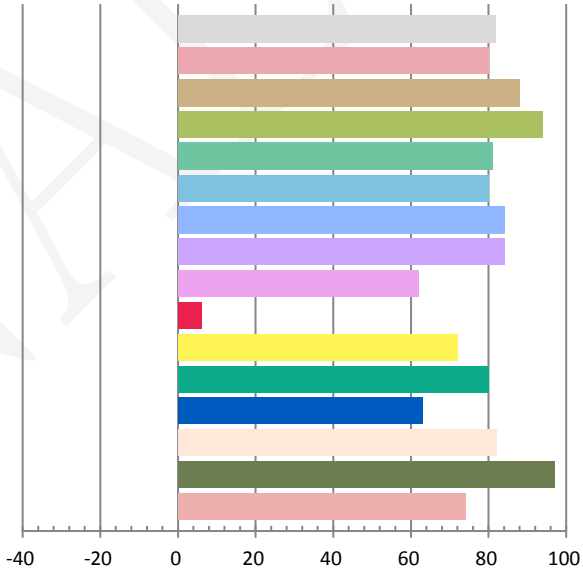
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.7404	88.59	0.997	11739.5	132.51

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
35.122	3411	-0.00081	0.4095	0.3909	0.2384	0.5120

Color Rendering Index

Ra			
81.7			
R1	R2	R3	R4
80	88	94	81
R5	R6	R7	R8
80	84	84	62
R9	R10	R11	R12
6	72	80	63
R13	R14	R15	
82	97	74	



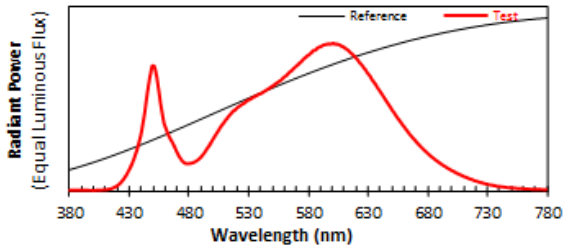
ANSI/IES TM-30-18 Color Rendition Report

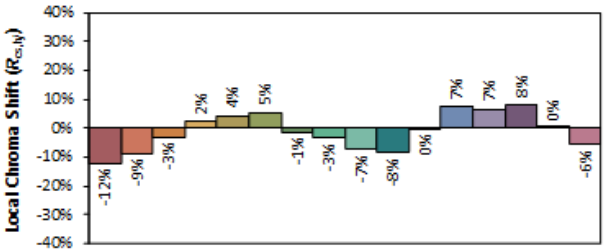
Source: User SPD

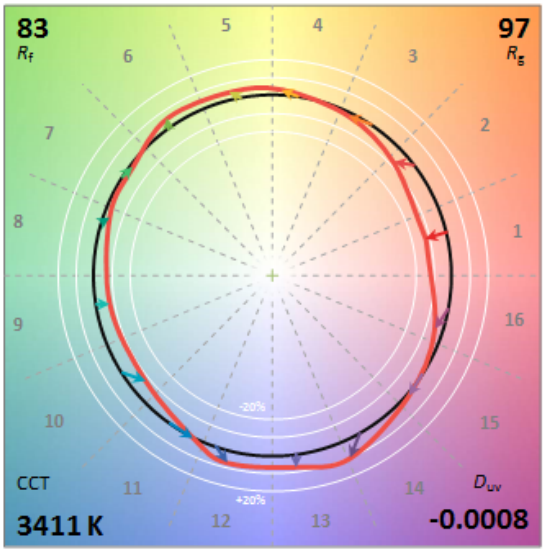
Manufacturer: Espen Technology Inc.

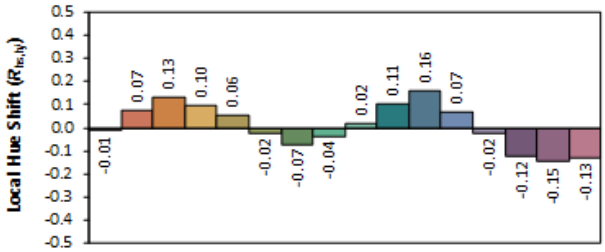
Date: 2020/9/23

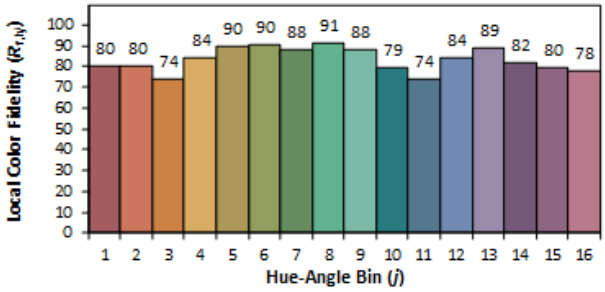
Model: VEKL8F/90-8T (65W/75W/90W)

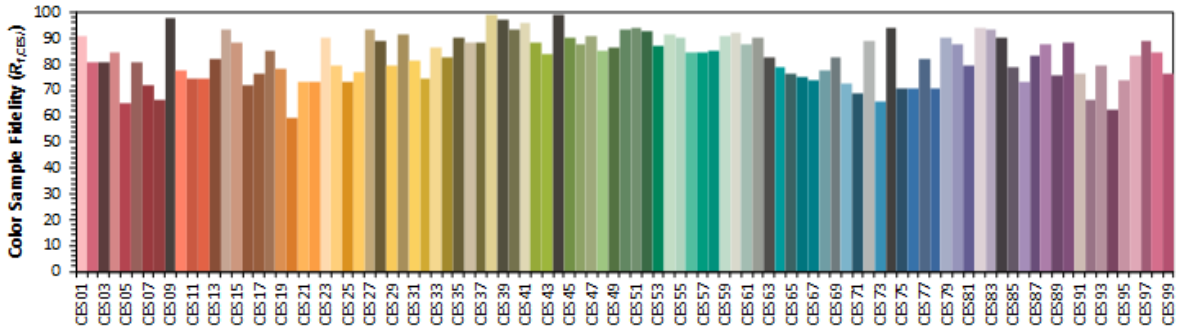












Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

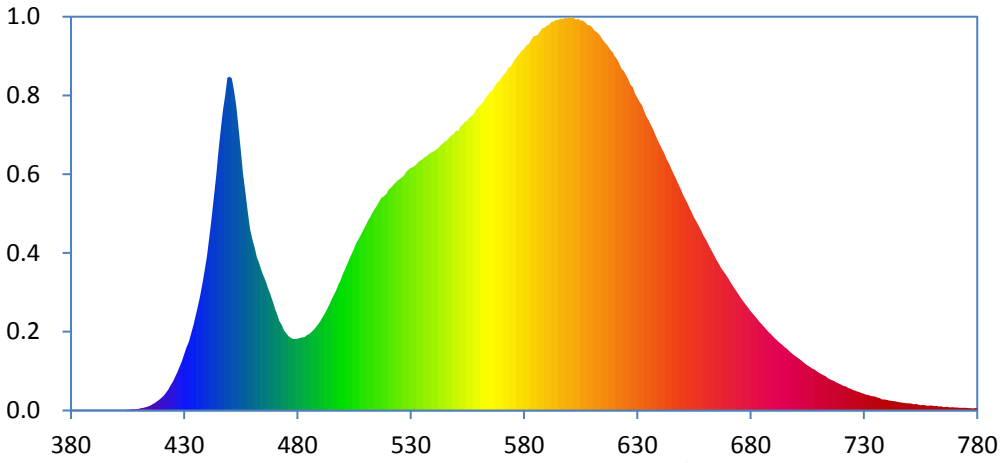
x	**0.4095**
y	**0.3909**
u'	**0.2384**
v'	**0.5120**

CIE 13.3-1995 (CRI)

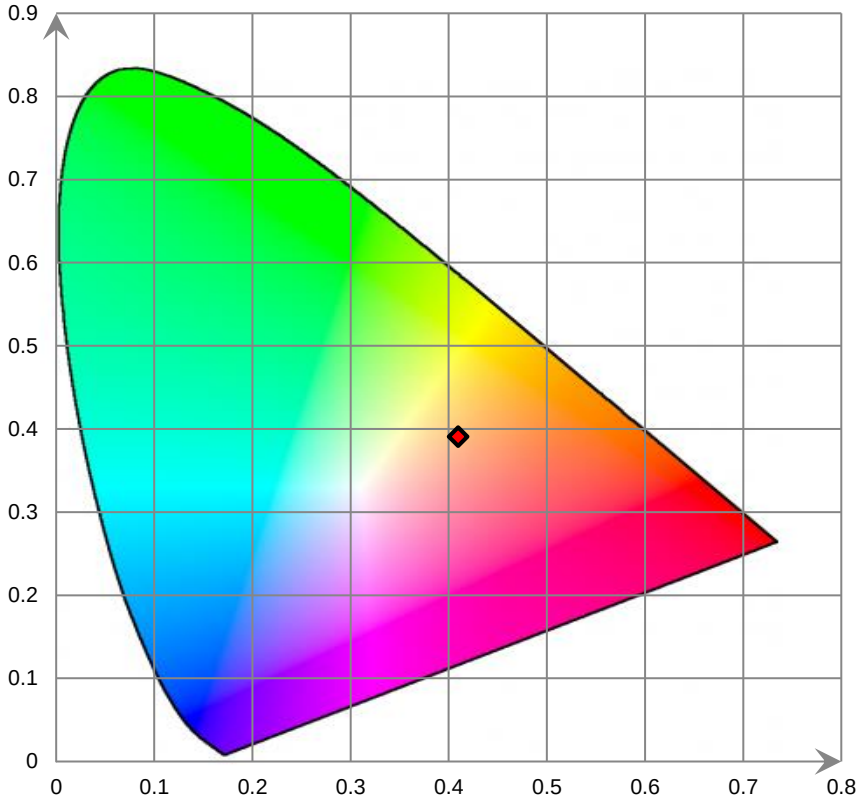
R_a	82
R_9	6

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

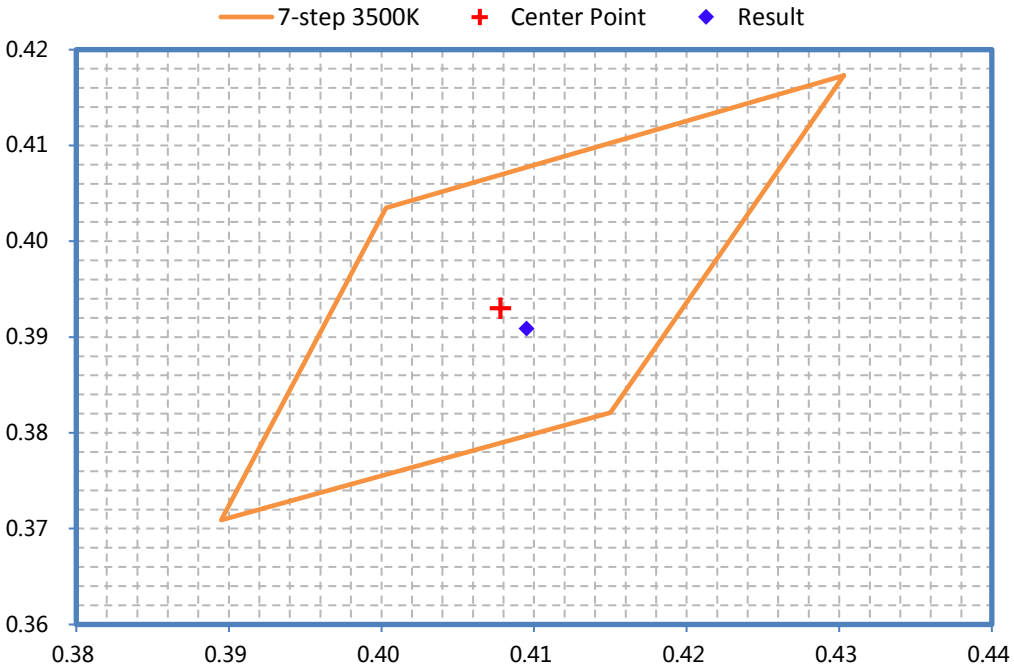
Relative Spectral Power Distribution



CIE 1931 x y Chromaticity Diagram



ANSI C78.377-2017 Chromaticity Quadrangles



Test Model: VEKL8F/90-8T (65W/75W/90W)
Control setting: 3500K/ 75W

THDi、PF Test; Orientation: Downward;

Test Voltage	Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances and/or allowances)	Conclusion
120	Power Factor	0.997	≥0.9	≥0.87	Pass
120	THDi	3.99%	≤20%	≤25%	Pass
277	Power Factor	0.9781	≥0.9	≥0.87	Pass
277	THDi	4.77%	≤20%	≤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]

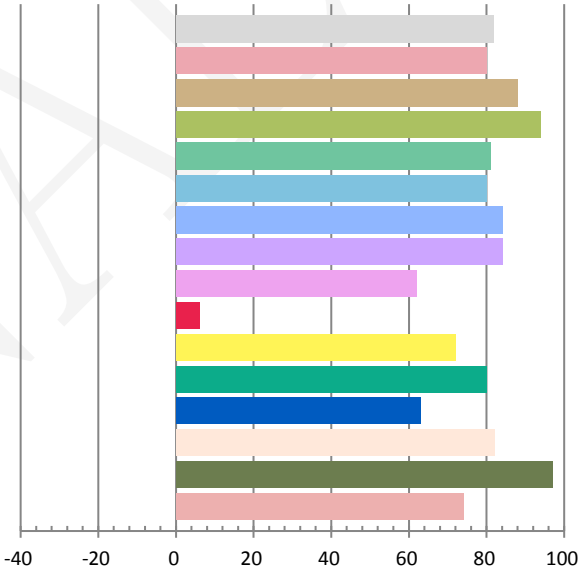
Photometric and Electrical Measurement Result

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.0	60	0.6241	74.67	0.997	10349.35	138.6

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
30.899	3412	-0.00058	0.4097	0.3915	0.2382	0.5122

Color Rendering Index

Ra			
81.7			
R1	R2	R3	R4
80	88	94	81
R5	R6	R7	R8
80	84	84	62
R9	R10	R11	R12
6	72	80	63
R13	R14	R15	
82	97	74	



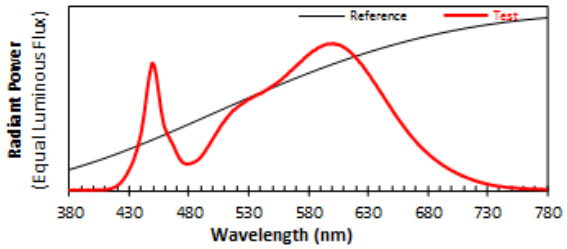
ANSI/IES TM-30-18 Color Rendition Report

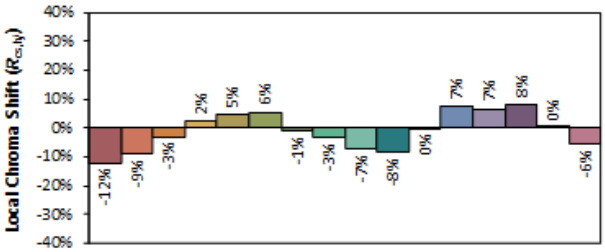
Source: User SPD

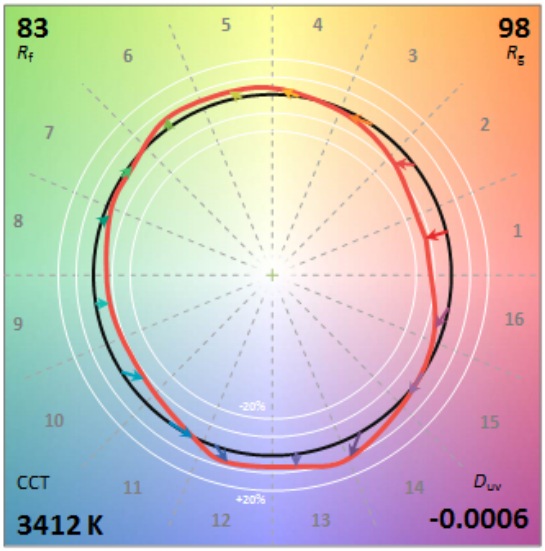
Manufacturer: Espen Technology Inc.

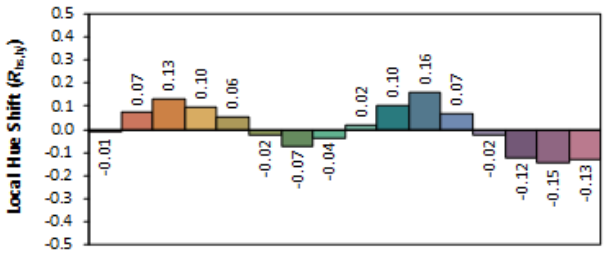
Date: 2020/9/23

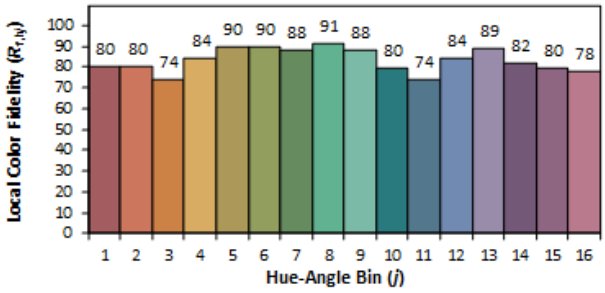
Model: VEKL8F/90-8T (65W/75W/90W)

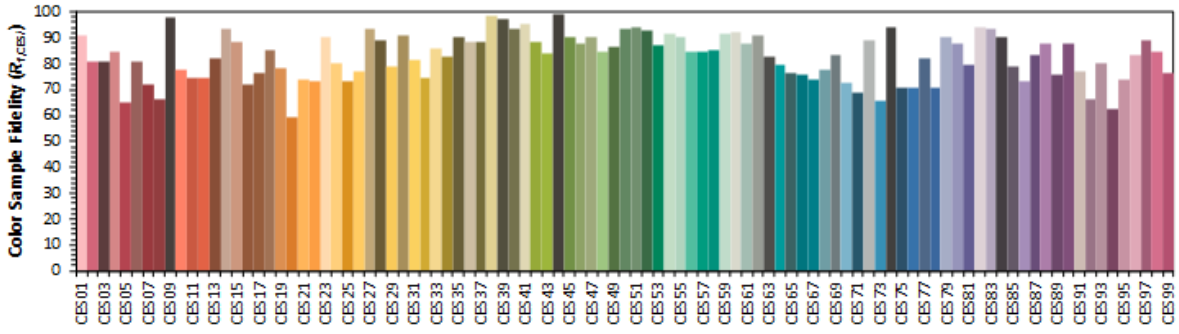












Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

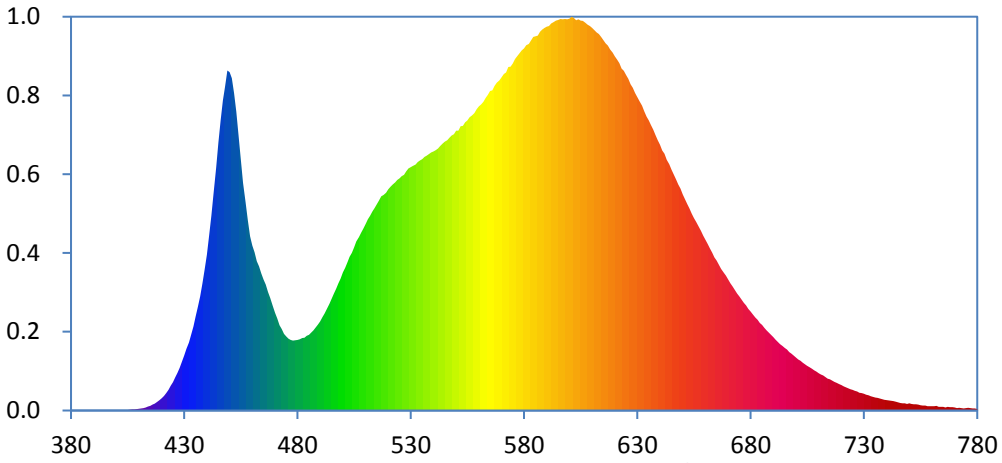
x	**0.4097**
y	**0.3915**
u'	**0.2382**
v'	**0.5122**

CIE 13.3-1995 (CRI)

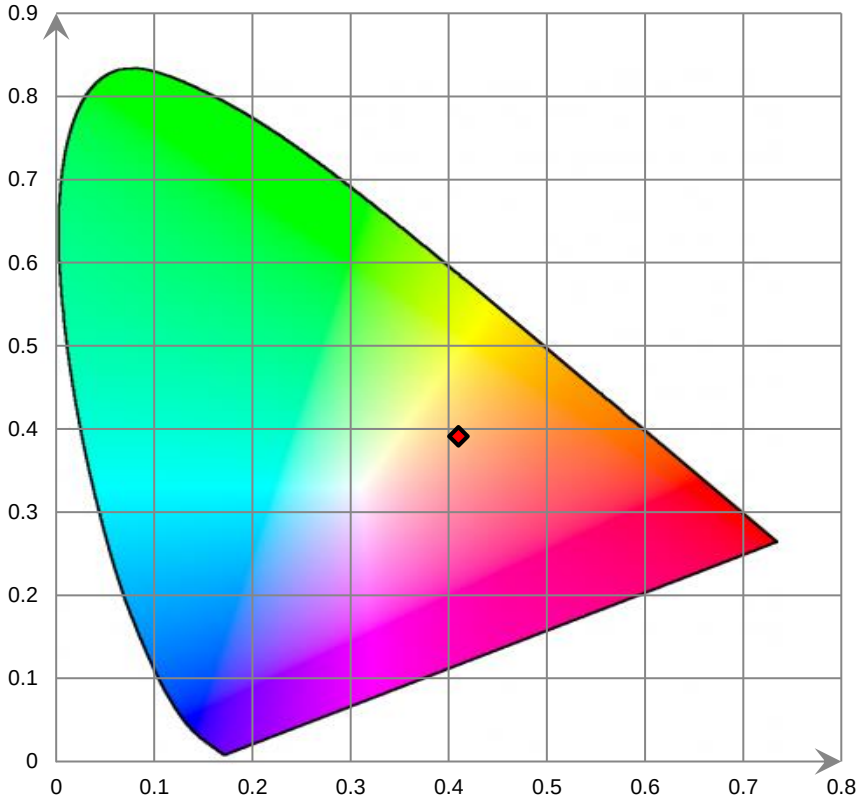
R_a	82
R_9	6

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

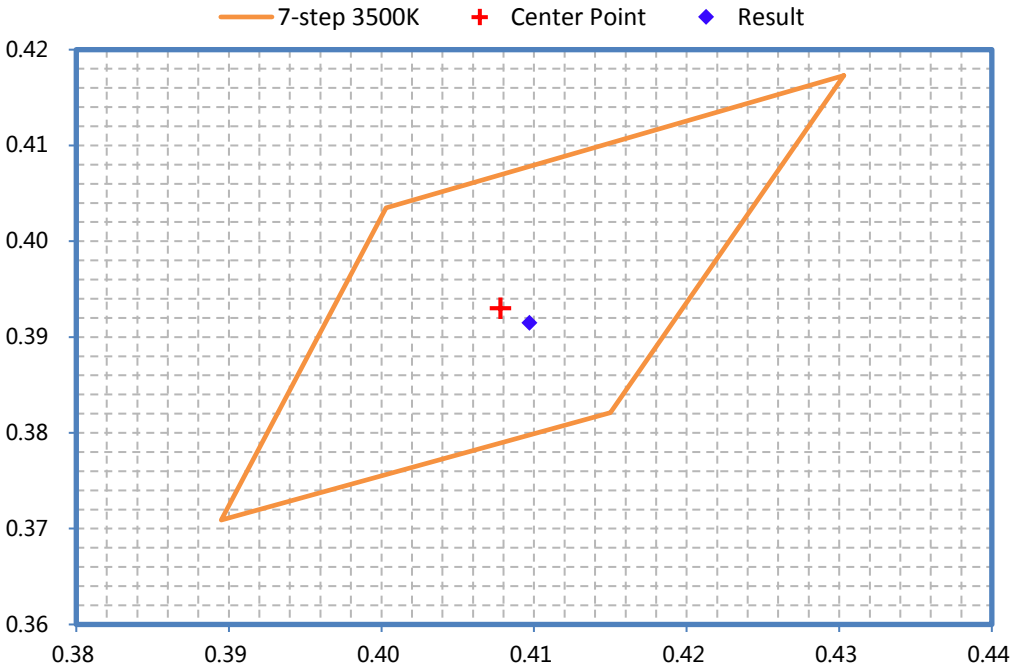
Relative Spectral Power Distribution



CIE 1931 x y Chromaticity Diagram



ANSI C78.377-2017 Chromaticity Quadrangles



Test Model: VEKL8F/90-8T (65W/75W/90W)
Control setting: 3500K/ 65W

THDi、PF Test; Orientation: Downward;

Test Voltage	Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances and/or allowances)	Conclusion
120	Power Factor	0.9962	≥0.9	≥0.87	Pass
120	THDi	3.79%	≤20%	≤25%	Pass
277	Power Factor	0.9725	≥0.9	≥0.87	Pass
277	THDi	4.47%	≤20%	≤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	0.5203	62.19	0.9962	8753.19	140.76

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
26.137	3399	-0.00053	0.4105	0.3921	0.2386	0.5126

Color Rendering Index

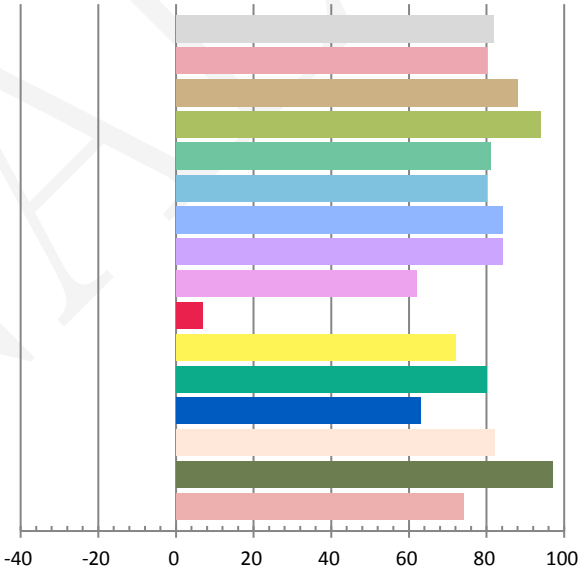
Ra
81.8

R1	R2	R3	R4
80	88	94	81

R5	R6	R7	R8
80	84	84	62

R9	R10	R11	R12
7	72	80	63

R13	R14	R15
82	97	74



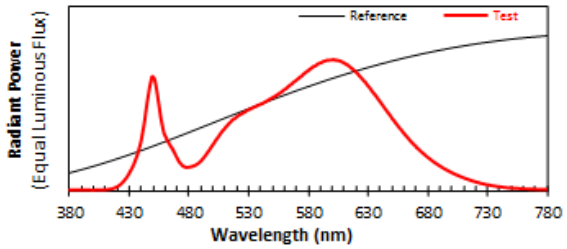
ANSI/IES TM-30-18 Color Rendition Report

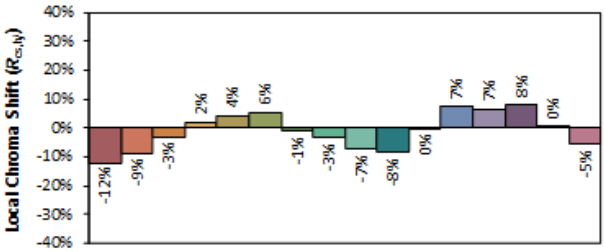
Source: User SPD

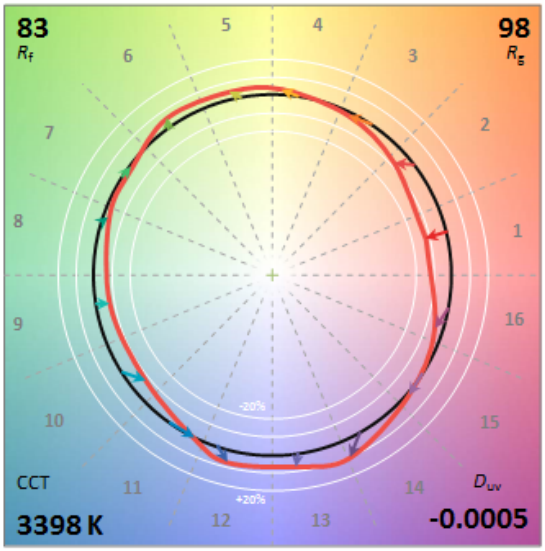
Manufacturer: Espen Technology Inc.

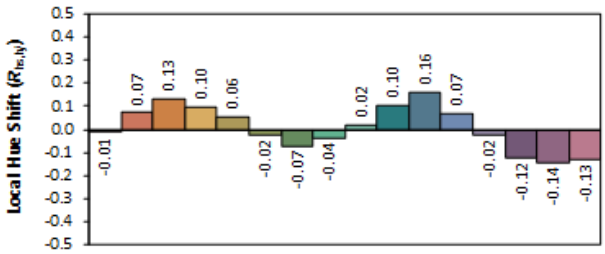
Date: 2020/9/23

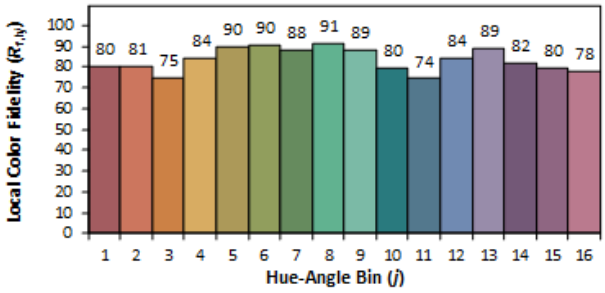
Model: VEKL8F/90-8T (65W/75W/90W)

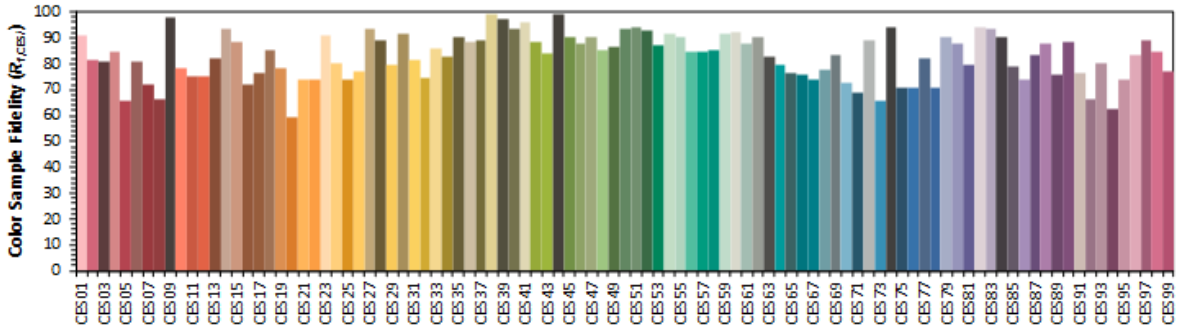












Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

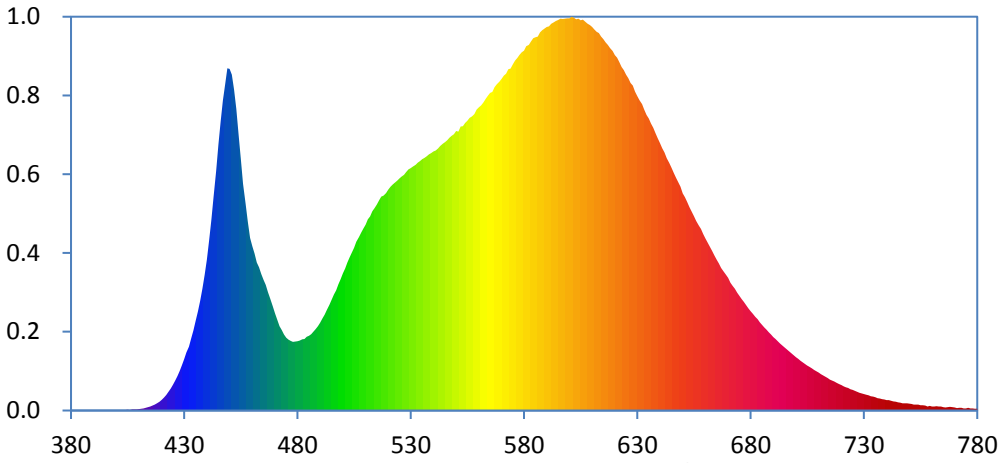
x	0.4105
y	0.3921
u'	0.2386
v'	0.5126

CIE 13.3-1995 (CRI)

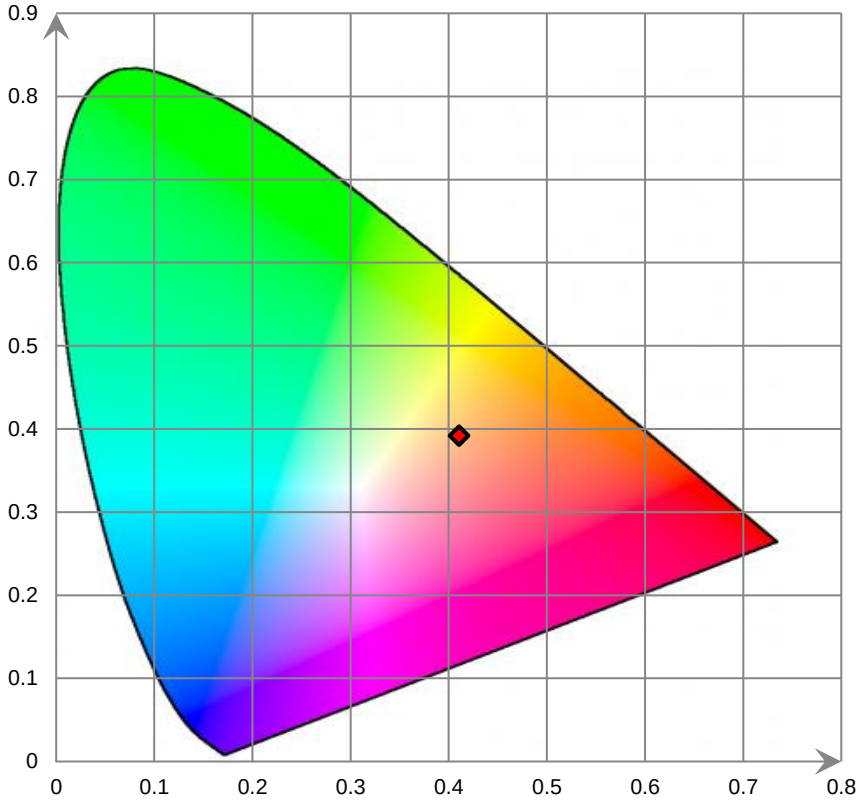
R_a	82
R_9	7

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

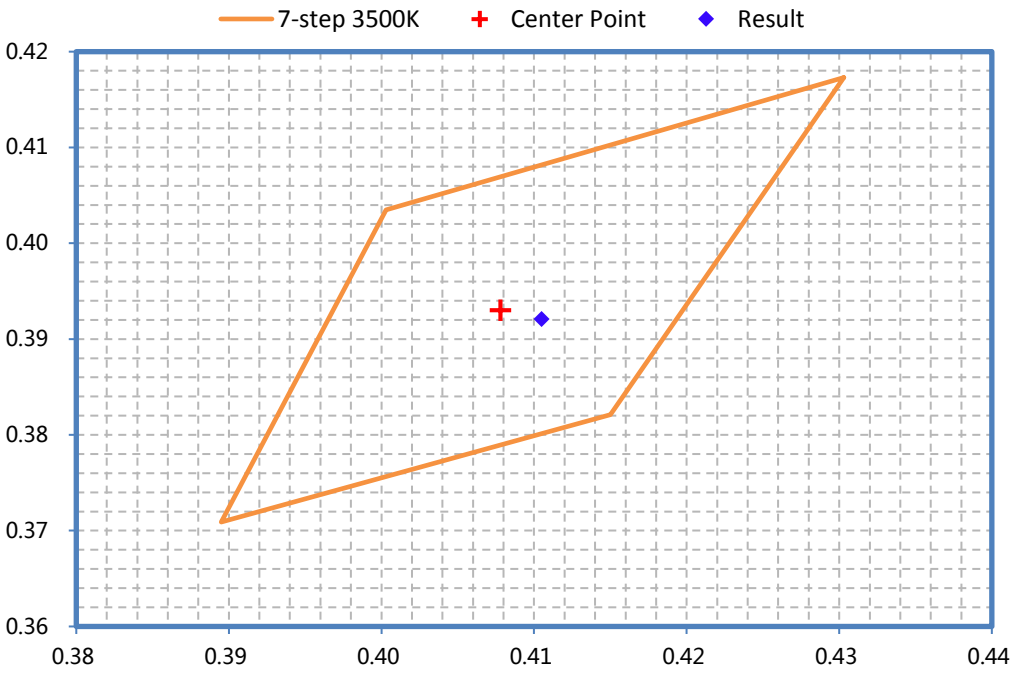
Relative Spectral Power Distribution



CIE 1931 x y Chromaticity Diagram



ANSI C78.377-2017 Chromaticity Quadrangles



Test Model: VEKL8F/90-8T (65W/75W/90W)
Control setting: 4000K/ 90W

THDi、PF Test; Orientation: Downward;

Test Voltage	Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances and/or allowances)	Conclusion
120	Power Factor	0.9971	≥0.9	≥0.87	Pass
120	THDi	3.82%	≤20%	≤25%	Pass
277	Power Factor	0.9824	≥0.9	≥0.87	Pass
277	THDi	3.99%	≤20%	≤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 V5.0.
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 Model: VEKL8F/90-8T (65W/75W/90W)
Control setting: 5000K/ 90W

THDi、PF Test; Orientation: Downward;

Test Voltage	Test Item	Test Result	DLC Requirements	DLC Requirements(With tolerances and/or allowances)	Conclusion
120	Power Factor	0.9972	≥0.9	≥0.87	Pass
120	THDi	3.77%	≤20%	≤25%	Pass
277	Power Factor	0.9834	≥0.9	≥0.87	Pass
277	THDi	3.70%	≤20%	≤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 V5.0.
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.

6. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
Integrating Sphere	INVENTFINE	Dia 1.5m	JWWCV090112	2020-01-22	2021-01-21
Power Meter	INVENTFINE	WT500	GSJWQ20009	2020-04-02	2021-04-01
Spectral photometer	INVENTFINE	CMS-3S	GSGSE100017	2020-01-22	2021-01-21
AC Power Supply	INVENTFINE	CHP500	JWJSD010071	2020-04-02	2021-04-01
Standard Light Source	INVENTFINE	N/A	JWWCR020104	2019-11-19	2020-11-18
Thermal Meter	KEJIAN	TA298	N/A	2019-12-02	2020-12-01
DC Power Supply	INVENTFINE	WL3005	JWWCP020069	2019-12-20	2020-12-19
Digital Multimeter	FLUKE	115C	37840512WS	2019-10-08	2020-10-07
Hybrid Recorder	YOKOGAWA	DR230	4TJH0903	2020-04-02	2021-04-01
Power Supply	SC	SC/BP-11003	1608110030553	2019-12-14	2020-12-13

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-79-08. 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.

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. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
3. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.
5. This report cannot be reproduced except in full, without prior written approval of the Company.
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**********END OF REPORT**********