

VISUAL COMFORT AND COMPANY TEST REPORT

SCOPE OF WORK

LED Performance Testing

MODEL NUMBER

ESSF0604D473009W3018WW1

PROJECT NUMBER

G104349704

REPORT NUMBER

104349704CHI-074

ISSUE DATE

4/14/2021

REVISED DATE

None

TEST DATES

04/12/2021 through 04/13/2021.

DOCUMENT CONTROL NUMBER

RTTDS-R-AMER-Test-3407

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REPORT NUMBER

104349704CHI-074

MODEL NUMBER(s)

ESSF0604D473009W3018WW1

REPORT RENDERED TO:

VISUAL COMFORT AND COMPANY
7400 LINDER AVE
SKOKIE, IL 60077
USA

STATEMENT OF LIMITATION

NVLAP Lab Code 600186-0. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

AUTHORIZATION

The testing performed was authorized by signed quote number Qu-01080748-3.

TEST STANDARDS

IESNA LM-79 - 2008: Electrical and Photometric Measurements of Solid State Lighting

ANSI NEMA ANSLG C78.377: 2017: Specifications for the Chromaticity of Solid State Lighting (SSL) Products

IES TM-30-18: IES Method for Evaluating Light Source Color Rendition

In Charge of Testing:



Tim Quigley
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Reviewer:



Jeff Davis
N.A. Technical Lead
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SAMPLE INFORMATION

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ITEMS RECEIVED

Item No.	Control No.	Model No.	Description	Type	Received
1	AH04082021114642-002	ESSF0604D473009W301 8WW1	WARM DIM 350LM/FT 0604 WHITE	Production	4/8/2021

TESTED SAMPLE CONFIGURATIONS

Config No.	Tested Model No.	Item Nos. Utilized
1	ESSF0604D473009W3018WW1	1

SUMMARY

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PRODUCT INFORMATION AND SUMMARY OF DATA

Product Model No.:	ESSF0604D473009W3018WW1
Product Description:	WARM DIM 350LM/FT 0604 WHITE
LED Model No.:	U series
Driver Model No.:	NA
Light Source:	LED

Criteria	Results	
	Goniophotometer	Integrating Sphere
Light Output (lumens)	964.5	991.3
Input Power (W) @ 24 (Vdc)	13.79	13.80
Lumen Efficacy (lm/W)	69.9	71.8
Input Power Factor () @ 24 (Vdc)	--	--

Criteria	Results
Input ATHD (%) @ 24 (Vdc)	--
Correlated Color Temperature (K)	2947
Color Rendering Index - Ra ()	98.3
Color Rendering Index - R9 ()	97.8
Duv ()	0.0010
Chromaticity Coordinate (x)	0.439
Chromaticity Coordinate (y)	0.403
Chromaticity Coordinate (u')	0.253
Chromaticity Coordinate (v')	0.521

TEST METHODS

SEASONING IN SAMPLE ORIENTATION - LED PRODUCTS

No seasoning was performed in accordance with IESNA LM-79.

INTEGRATING SPHERE TESTING

A spectroradiometer and integrating sphere were used to measure the spectral distribution for each EUT resulting in photometric and colorimetric data. Electrical measurements of the unit were measured using a power analyzer. Each EUT was operated at the rated input voltage of the system in its designated orientation. The ambient temperature was measured at a position inside the sphere and stabilization procedures to LM-79 were followed.

TYPE C GONIOPHOTOMETER DISTRIBUTION TESTING

A Type C Mirror Goniophotometer system was used to measure the luminous intensity (candela) at each angle of distribution for the EUT. Electrical measurements of the unit were measured using a power analyzer. Each EUT was operated at the rated input voltage of the system in its designated orientation. The ambient temperature was measured at a position near the EUT at equal height and stabilization procedures to LM-79 were followed.

TYPE C GONIOPHOTOMETER DISTRIBUTION TESTING

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Test Configuration	Tested Model No.	Pass/Fail/NA
1	ESSF0604D473009W3018WW1	NA

PHOTOMETRIC AND ELECTRICAL MEASUREMENTS (25°C +/- 1°C)

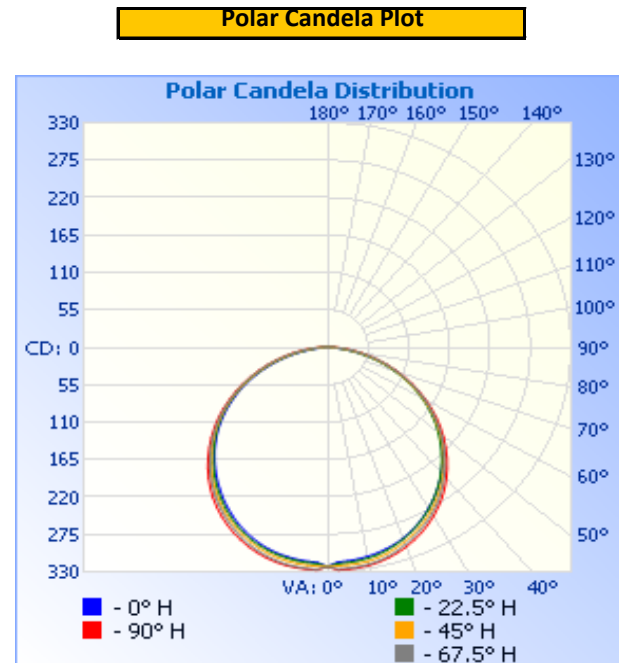
Base Orientation	Input Voltage (Vdc)	Input Current (mA)	Input Power (W)	Input Power Factor ()
Up	24.00	574.7	13.79	--

Light Output (lm)	Lumen Efficacy (lm/W)
964.5	69.9

INTENSITY SUMMARY - CANDELA

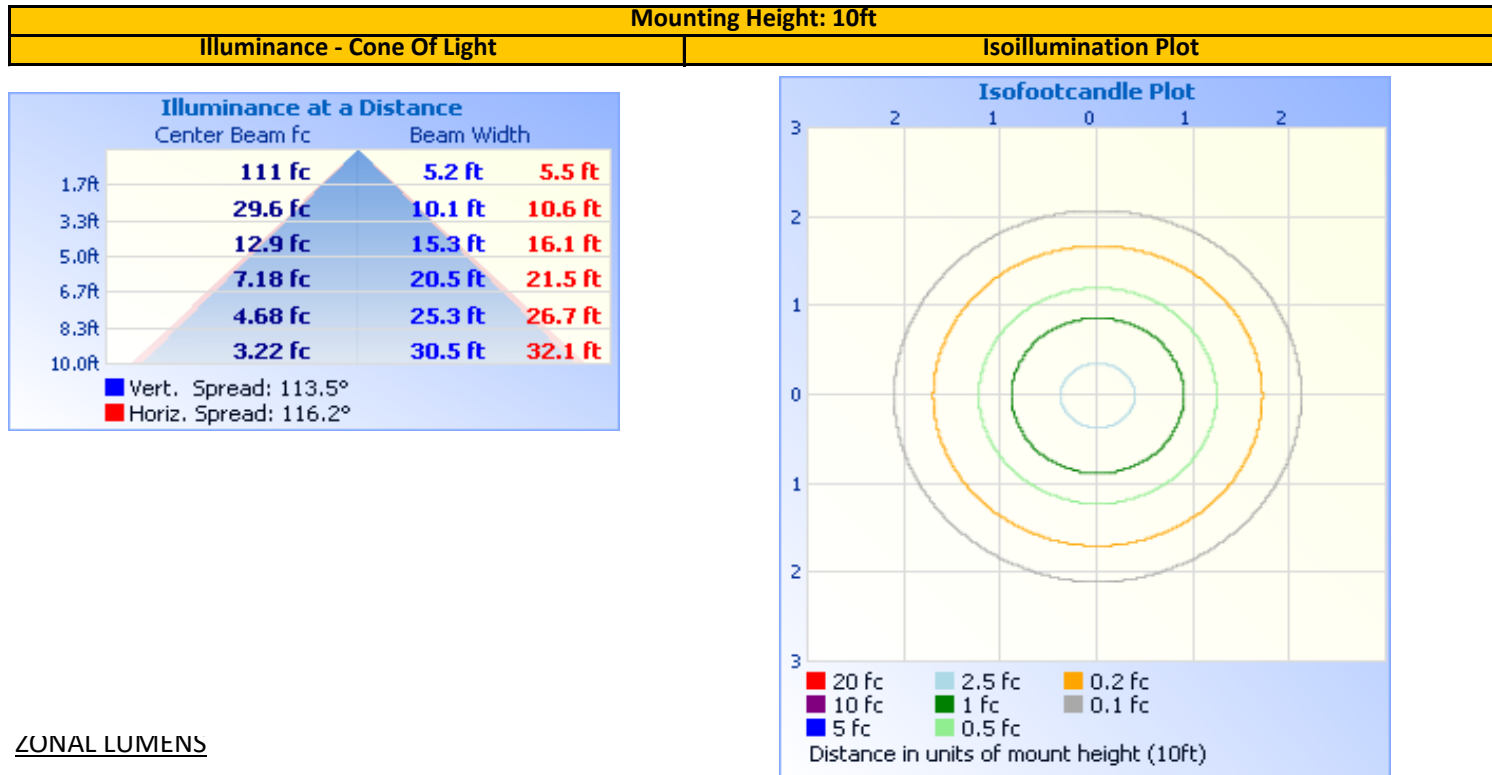
Angle	0	22.5	45	67.5	90
0	322	322	322	322	322
5	315	318	321	326	327
10	312	315	319	324	325
15	307	309	313	318	320
20	299	300	304	308	312
25	287	288	292	296	301
30	274	274	279	283	287
35	258	258	262	266	270
40	240	239	243	246	250
45	220	218	222	225	229
50	198	196	199	202	205
55	174	173	175	177	180
60	150	147	149	151	153
65	123	120	122	124	126
70	94	92	95	97	99
75	67	65	68	71	72
80	39	38	42	46	47
85	16	16	20	24	25
90	1	3	6	9	10
95	0	0	1	2	3
100	0	0	0	0	0
105	0	0	0	0	0
110	0	0	0	0	0
115	0	0	0	0	0
120	0	0	0	0	0
125	0	0	0	0	0
130	0	0	0	0	0
135	0	0	0	0	0
140	0	0	0	0	0
145	0	0	0	0	0
150	0	0	0	0	0
155	0	0	0	0	0
160	0	0	0	0	0
165	0	0	0	0	0
170	0	0	0	0	0
175	0	0	0	0	0
180	0	0	0	0	0

Entire luminous intensity matrix found in .IES file



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ILLUMINANCE SUMMARY



ZONAL LUMENS

Zonal Lumen Summary					
Zone	Lumens	Luminaire	Zone	Lumens	Total
0-30	254.0	26.3%	0-10	30.6	3.2%
0-40	417.9	43.3%	10-20	88.4	9.2%
0-60	746.0	77.4%	20-30	135.0	14.0%
60-90	216.4	22.4%	30-40	164.0	17.0%
70-100	97.1	10.1%	40-50	171.4	17.8%
90-120	2.0	0.2%	50-60	156.7	16.2%
0-90	962.4	99.8%	60-70	121.3	12.6%
90-180	2.0	0.2%	70-80	71.8	7.4%
0-180	964.5	100.0%	80-90	23.3	2.4%
			90-100	2.0	0.2%
			100-110	0.0	0.0%
			110-120	0.0	0.0%
			120-130	0.0	0.0%
			130-140	0.0	0.0%
			140-150	0.0	0.0%
			150-160	0.0	0.0%
			160-170	0.0	0.0%
			170-180	0.0	0.0%

INTEGRATING SPHERE TESTING

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Test Configuration	Tested Model No.	Pass/Fail/NA
1	ESSF0604D473009W3018WW1	NA

PHOTOMETRIC, COLORIMETRIC, AND ELECTRICAL MEASUREMENTS (25°C +/- 1°C)

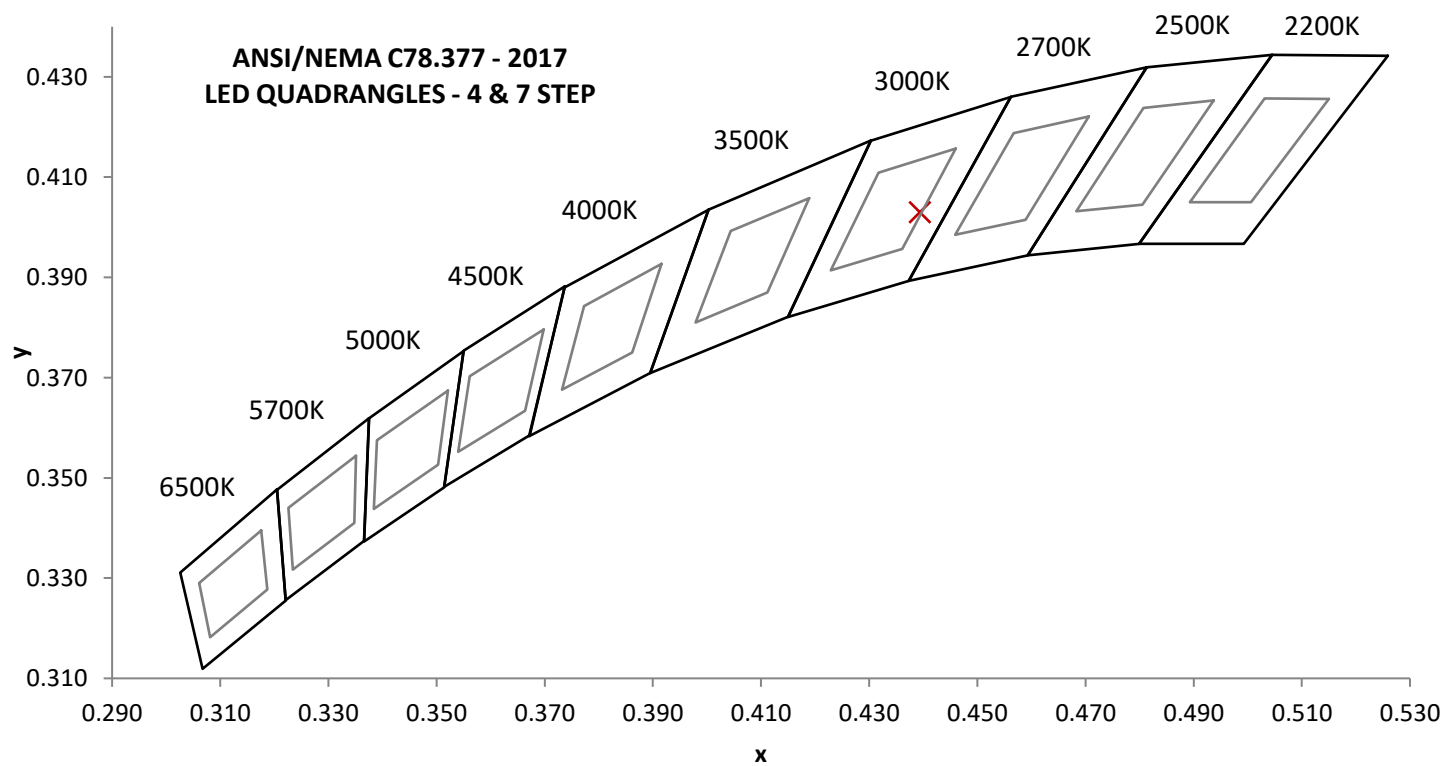
Base Orientation
Up

Input Voltage (Vdc)	Input Current (mA)	Input Power (W)	Input Power Factor (l)	Input ATHD (%)
24.00	575.1	13.80	--	--

Measured at 24(Vdc)

Light Output (lm)	Lumen Efficacy (lm/W)	CCT (K)	CRI - Ra (l)	CRI - R9 (l)
991.3	71.8	2947	98.3	97.8

Duv (l)	1931 Chrom (x)	1931 Chrom (y)	1976 Chrom (u')	1976 Chrom (v')
0.0010	0.439	0.403	0.253	0.521

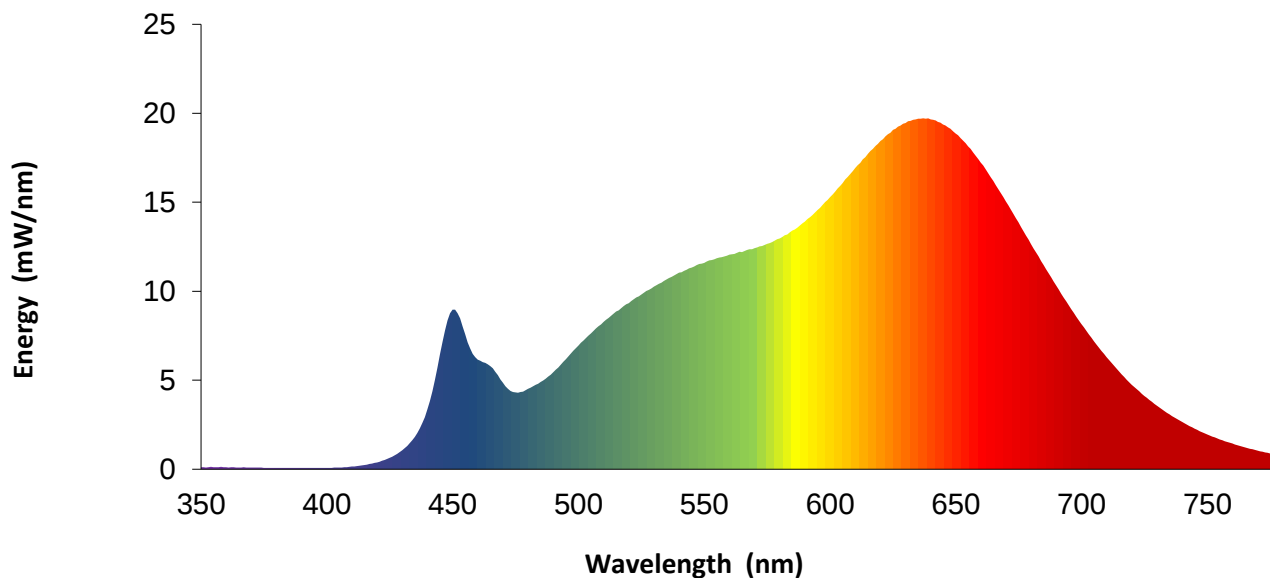


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SPECTRAL DISTRIBUTION OVER WAVELENGTHS

nm	mW/nm		nm	mW/nm		nm	mW/nm		nm	mW/nm
350	0.1		460	6.2		570	12.4		680	12.7
355	0.1		465	5.8		575	12.7		685	11.5
360	0.1		470	4.9		580	13.0		690	10.3
365	0.1		475	4.3		585	13.4		695	9.2
370	0.1		480	4.5		590	13.9		700	8.2
375	0.1		485	4.9		595	14.6		705	7.2
380	0.1		490	5.4		600	15.3		710	6.3
385	0.1		495	6.2		605	16.1		715	5.5
390	0.1		500	7.0		610	16.9		720	4.7
395	0.1		505	7.6		615	17.7		725	4.1
400	0.1		510	8.3		620	18.4		730	3.6
405	0.1		515	8.9		625	19.1		735	3.1
410	0.1		520	9.3		630	19.5		740	2.7
415	0.2		525	9.8		635	19.7		745	2.3
420	0.4		530	10.3		640	19.7		750	2.0
425	0.6		535	10.7		645	19.4		755	1.7
430	1.1		540	11.0		650	18.9		760	1.4
435	1.8		545	11.3		655	18.1		765	1.2
440	3.4		550	11.6		660	17.2		770	1.0
445	6.5		555	11.8		665	16.2		775	0.9
450	9.0		560	12.1		670	15.0		780	0.8
455	7.6		565	12.2		675	13.9		---	---

Without correction of sample absorption.



Portrayed color in graphic is estimated by wavelength (nm) and may not be exact - it is a visual representation only

EQUIPMENT LIST

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#	Equipment	Model No	Control No.	Last Cal	Cal Due
1	Yokogawa Power Meter	WT210	146919	7/1/2020	7/1/2021
2	Omega Thermometer	DPI8-C24	146920	10/1/2020	10/1/2021
3	LSI High Speed Mirror Goniometer	6440T	146928	VBU	VBU
4	Newport Thermohygrometer	iServer	146957	1/29/2021	1/29/2022
6	Sorenson DC Power Supply	XHR 150-7	146922	VBU	VBU
8	Newport Humidity Recorder	iServer	146961	9/3/2020	9/3/2021
21	Labsphere 2M Sphere & Spectroradiometer	CDS1100	146137	VBU	VBU
23	Sorenson DC Power Supply	XFR150-8	146847	VBU	VBU
24	Yokogawa Power Meter	WT1600	146768	10/2/2020	10/2/2021
25	Omega Thermometer	MDSi8	146873	7/1/2020	7/1/2021
26					
27					
28					
29					
30					

Note: Standard sources listed above are traceable to NIST: National Institute of Standards and Technology

REVISION HISTORY

#	Revision Date	Updated By	Reviewed By	Description of Change
---	None	---	---	---
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Test Configuration	Tested Model No.	Pass/Fail/NA
1	ESSF0604D473009W3018WW1	NA

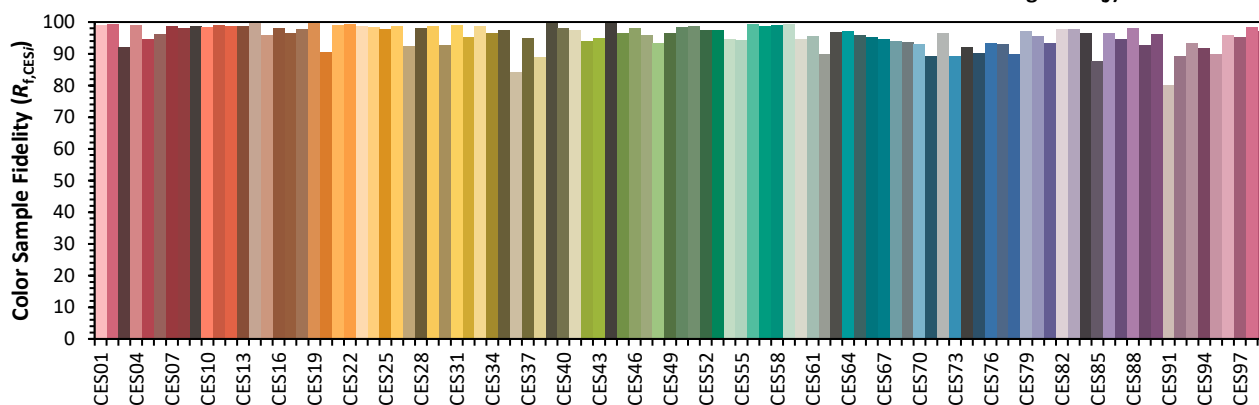
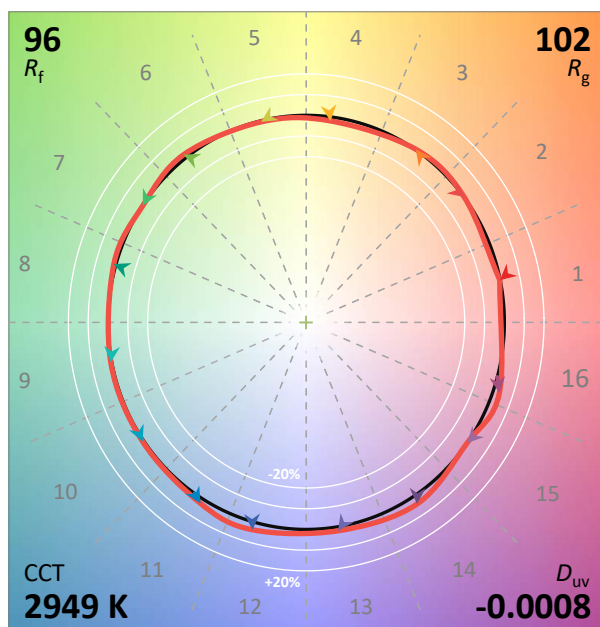
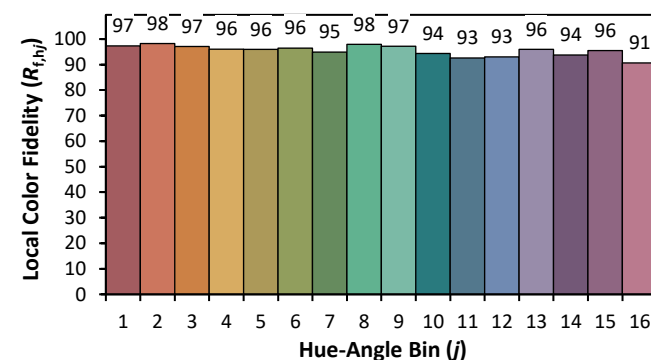
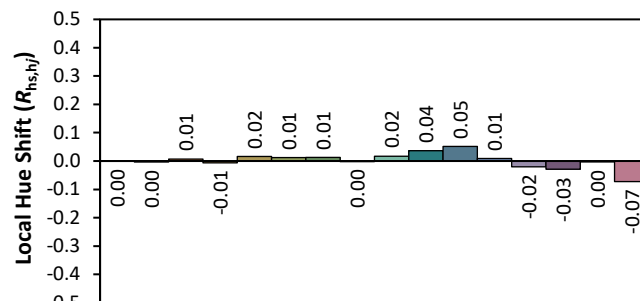
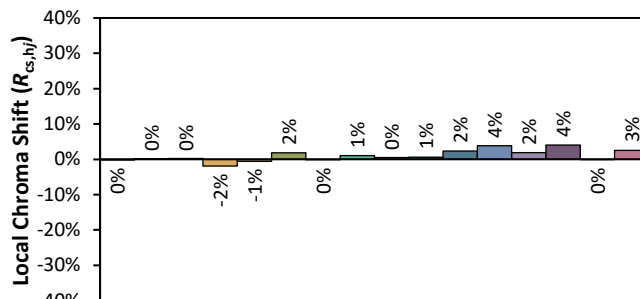
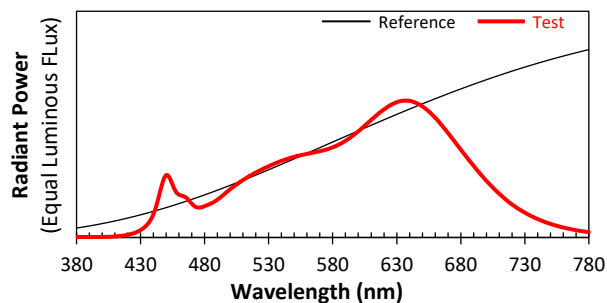
ANSI/IES TM-30-18 Color Rendition Report

Source: User SPD

Manufacturer: VISUAL COMFORT AND COMPANY

Date: 4/12/2021

Model: ESSF0604D473009W3018WW1



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

x 0.4394

y 0.4030

u' 0.2527

v' 0.5213