

VISUAL COMFORT AND COMPANY TEST REPORT

SCOPE OF WORK

LED Performance Testing

MODEL NUMBER

700TDCLMB-LED930

PROJECT NUMBER

G104349704

REPORT NUMBER

104349704CHI-060

ISSUE DATE

1/18/2021

REVISED DATE

None

TEST DATES

01/11/2021 through 01/13/2021.

DOCUMENT CONTROL NUMBER

RTTDS-R-AMER-Test-3407

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REPORT NUMBER

104349704CHI-060

MODEL NUMBER

700TDCLMB-LED930

REPORT RENDERED TO:

VISUAL COMFORT AND COMPANY
7400 LINDER AVE
SKOKIE, IL 60077
UNITED STATES

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-01080748-1.

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
Project Engineer
Lighting Division

Reviewer:



Jeff Davis
N.A. Technical Lead
Lighting Division

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SAMPLE INFORMATION

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ITEMS RECEIVED

Item No.	Control No.	Model No.	Description	Type	Received
1	AH01072021112227-002	700TDCLMB-LED930	CALUMN PENDANT	Production	1/7/2021

TESTED SAMPLE CONFIGURATIONS

Config No.	Tested Model No.	Item Nos. Utilized
1	700TDCLMB-LED930	1

SAMPLE PHOTOS - TESTED CONFIGURATIONS



SUMMARY

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PRODUCT INFORMATION AND SUMMARY OF DATA

Product Model No.:	700TDCLMB-LED930
Product Description:	CALUMN PENDANT
LED Model No.:	CITIZEN CLU028-1203C4-303H5M3-F1
Driver Model No.:	LTF DA12W300C2038-3001
Light Source:	LED

Criteria	Results	
	Goniophotometer	Integrating Sphere
Light Output (lumens)	904.6	946.2
Input Power (W) @ 120VAC (Vac)	12.37	12.43
Lumen Efficacy (lm/W)	73.1	76.1
Input Power Factor () @ 120VAC (Vac)	0.996	0.995

Criteria	Results
Input ATHD (%) @ 120VAC (Vac)	8.85
Correlated Color Temperature (K)	2989
Color Rendering Index - Ra ()	92.4
Color Rendering Index - R9 ()	57.3
Duv ()	0.0011
Chromaticity Coordinate (x)	0.439
Chromaticity Coordinate (y)	0.408
Chromaticity Coordinate (u')	0.251
Chromaticity Coordinate (v')	0.523

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	700TDCLMB-LED930	NA

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

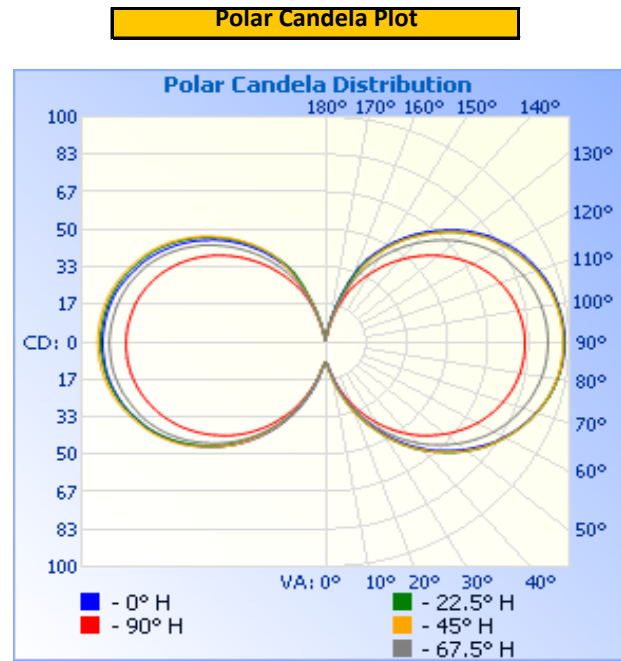
Base Orientation	Input Voltage (Vac)	Input Current (mA)	Input Power (W)	Input Power Factor (I)
Horizontal	120.1	103.4	12.37	0.996

Light Output (lm)	Lumen Efficacy (lm/W)
904.6	73.1

INTENSITY SUMMARY - CANDELA

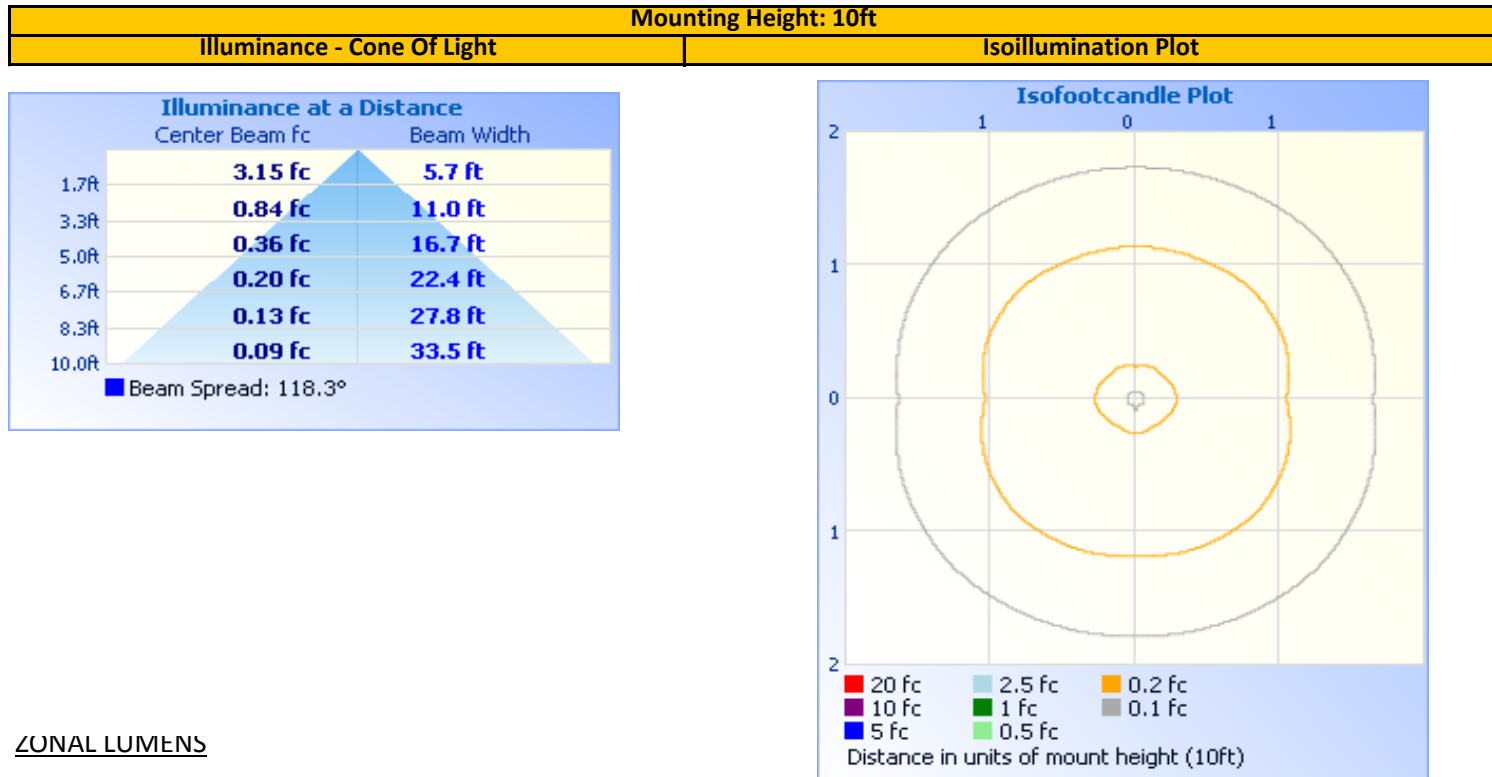
Angle	0	22.5	45	67.5	90
0	9	9	9	9	9
5	10	11	11	11	11
10	15	17	16	16	15
15	23	24	24	22	21
20	30	32	32	30	28
25	39	40	40	37	35
30	47	48	48	45	41
35	55	56	56	52	48
40	62	63	63	59	54
45	68	70	69	65	59
50	74	76	75	70	64
55	80	81	81	76	68
60	85	85	85	80	72
65	89	89	89	83	75
70	92	92	92	86	78
75	95	95	95	88	80
80	97	97	96	90	81
85	98	98	97	91	82
90	98	98	98	91	82
95	98	97	97	91	81
100	97	96	96	90	80
105	95	95	95	89	79
110	93	92	92	86	76
115	90	89	89	84	73
120	86	85	85	80	70
125	82	81	81	75	65
130	77	75	75	70	60
135	70	69	69	64	54
140	64	62	62	57	48
145	56	55	55	50	41
150	49	47	47	42	34
155	41	39	37	34	27
160	29	28	24	24	19
165	16	15	12	13	10
170	5	4	2	3	3
175	1	1	1	1	1
180	1	1	1	1	1

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	25.6	2.8%	0-10	1.2	0.1%
0-40	58.9	6.5%	10-20	6.7	0.7%
0-60	178.3	19.7%	20-30	17.7	2.0%
60-90	278.3	30.8%	30-40	33.3	3.7%
70-100	294.8	32.6%	40-50	50.9	5.6%
90-120	277.6	30.7%	50-60	68.5	7.6%
0-90	456.6	50.5%	60-70	83.5	9.2%
90-180	448.0	49.5%	70-80	94.5	10.4%
0-180	904.6	100.0%	80-90	100.2	11.1%
			90-100	100.1	11.1%
			100-110	94.3	10.4%
			110-120	83.2	9.2%
			120-130	67.9	7.5%
			130-140	50.0	5.5%
			140-150	32.1	3.5%
			150-160	16.3	1.8%
			160-170	4.0	0.4%
			170-180	0.1	0.0%

INTEGRATING SPHERE TESTING

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Test Configuration	Tested Model No.	Pass/Fail/NA
1	700TDCLMB-LED930	NA

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

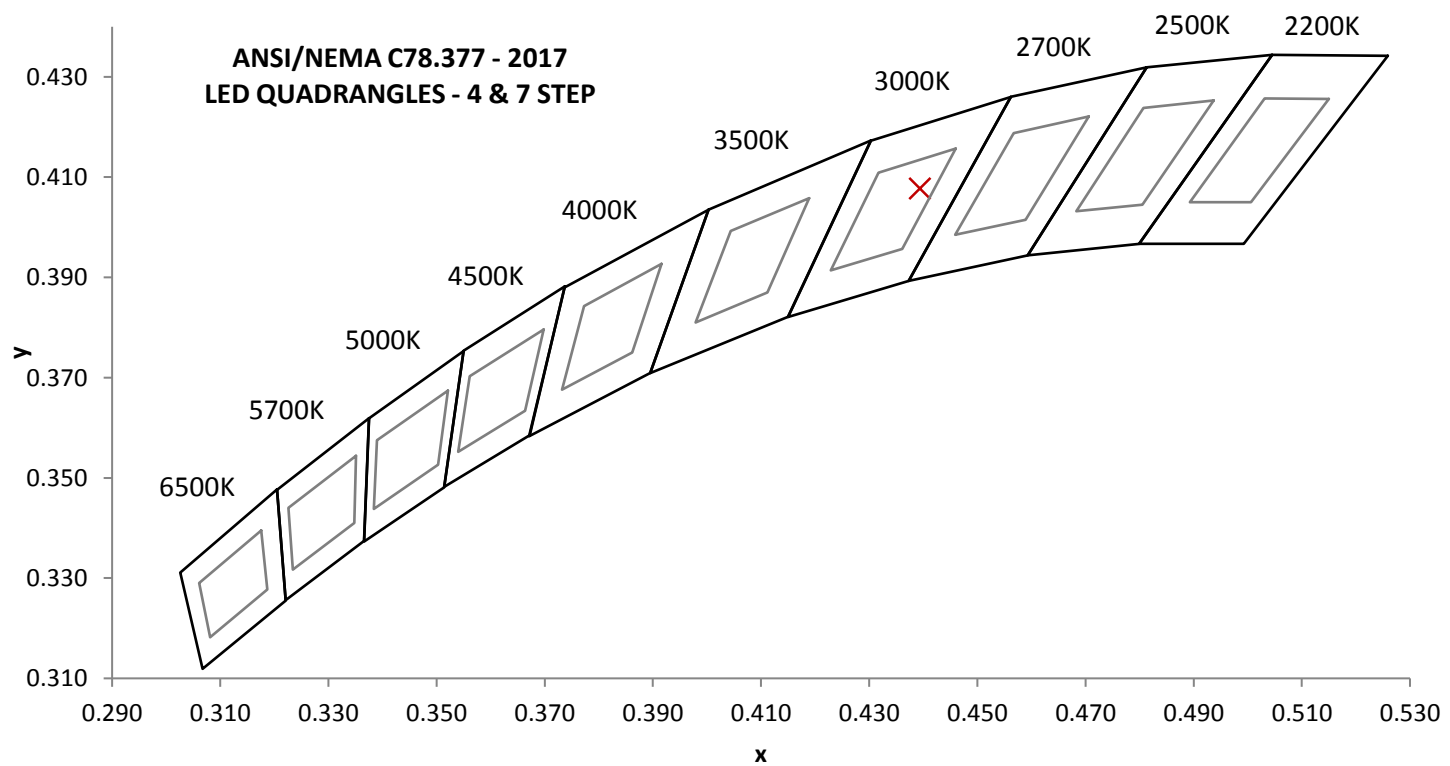
Base Orientation
Horizontal

Input Voltage (Vac)	Input Current (mA)	Input Power (W)	Input Power Factor (I)	Input ATHD (%)
119.98	104.1	12.43	0.995	8.85

Measured at 119.98(Vac)

Light Output (lm)	Lumen Efficacy (lm/W)	CCT (K)	CRI - Ra (I)	CRI - R9 (I)
946.2	76.1	2989	92.4	57.3

Duv (I)	1931 Chrom (x)	1931 Chrom (y)	1976 Chrom (u')	1976 Chrom (v')
0.0011	0.439	0.408	0.251	0.523

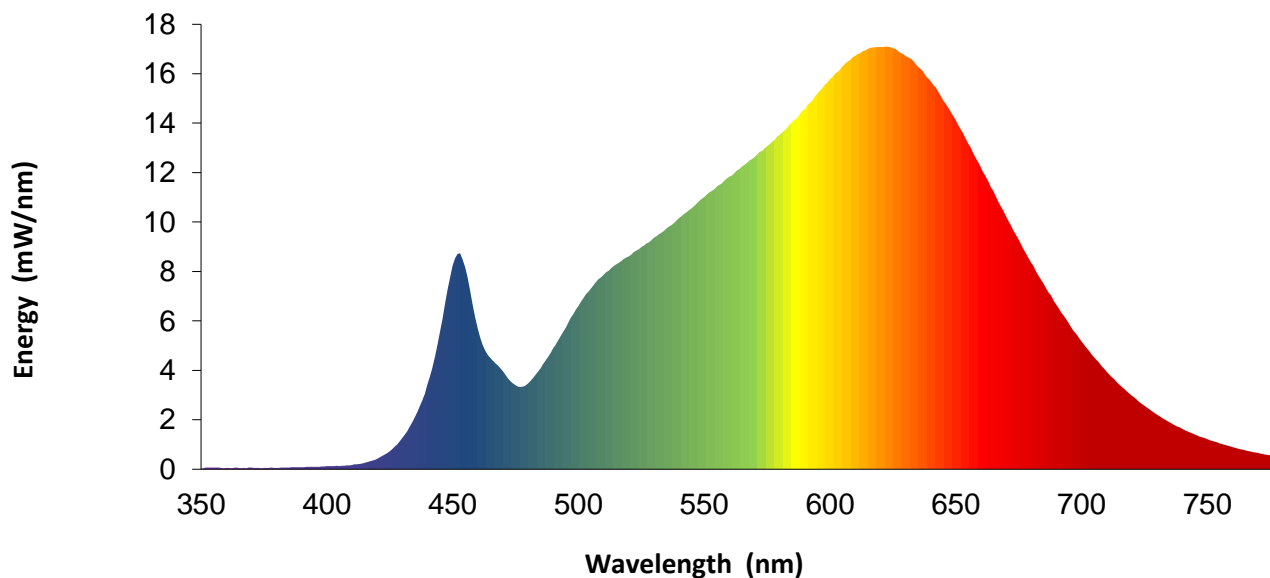


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SPECTRAL DISTRIBUTION OVER WAVELENGTHS

nm	mW/nm		nm	mW/nm		nm	mW/nm		nm	mW/nm
350	0.0		460	5.7		570	12.6		680	8.4
355	0.1		465	4.5		575	13.1		685	7.5
360	0.1		470	4.0		580	13.5		690	6.7
365	0.1		475	3.4		585	14.1		695	5.9
370	0.1		480	3.5		590	14.6		700	5.2
375	0.1		485	4.1		595	15.2		705	4.5
380	0.1		490	4.9		600	15.8		710	4.0
385	0.1		495	5.7		605	16.3		715	3.4
390	0.1		500	6.6		610	16.7		720	3.0
395	0.1		505	7.3		615	17.0		725	2.6
400	0.1		510	7.9		620	17.1		730	2.2
405	0.1		515	8.3		625	17.0		735	1.9
410	0.2		520	8.6		630	16.7		740	1.6
415	0.3		525	9.0		635	16.3		745	1.4
420	0.4		530	9.4		640	15.7		750	1.2
425	0.7		535	9.7		645	14.9		755	1.0
430	1.3		540	10.2		650	14.1		760	0.9
435	2.1		545	10.6		655	13.2		765	0.8
440	3.4		550	11.0		660	12.2		770	0.7
445	5.6		555	11.4		665	11.3		775	0.6
450	8.2		560	11.8		670	10.2		780	0.5
455	8.2		565	12.2		675	9.3		---	---

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	VBV	VBV
4	Newport Thermohygrometer	iServer	146958	9/30/2020	9/30/2021
5	Pacific AC Power Supply	118-ACX	CHI0153	VBV	VBV
6	Sorenson DC Power Supply	XHR 150-7	146922	VBV	VBV
8	Newport Humidity Recorder	iServer	146961	9/3/2020	9/3/2021
9	Labsphere Spectroradiometer	CDS2600	CHI0539	VBV	VBV
10	3 Meter Sphere	SPR600	CHI0088	VBV	VBV
11	Elgar AC Power Supply	CW1251	146112	VBV	VBV
12	Sorenson DC Power Supply	XFR150-8	146846	VBV	VBV
13	Yokogawa Power Meter	WT1600	146769	4/6/2020	4/6/2021
14	Extech K Temperature Meter	421502	CHI0476	10/1/2020	10/1/2021

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	700TDCLMB-LED930	NA

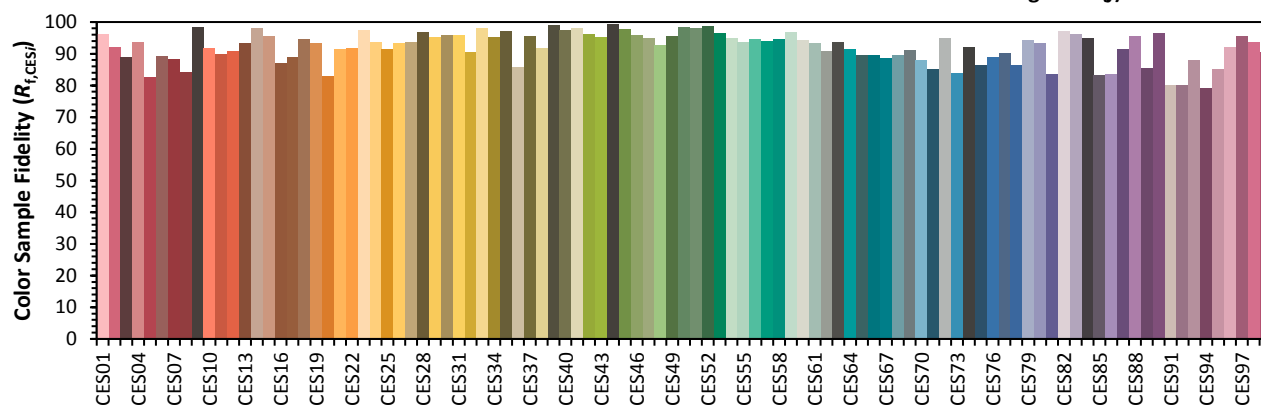
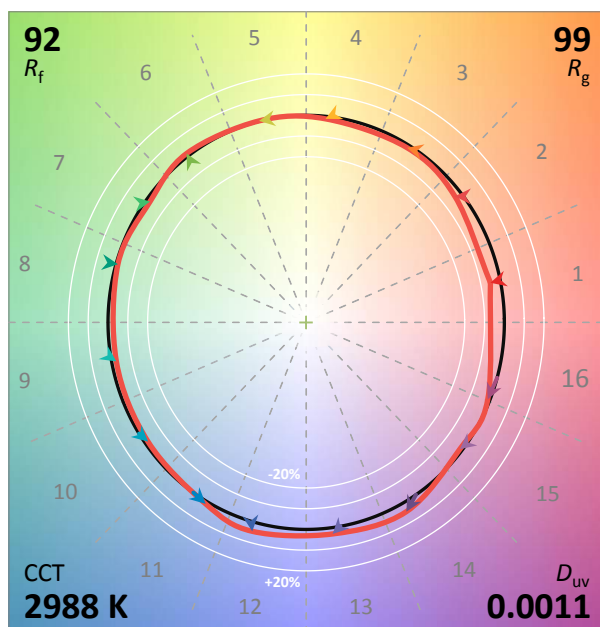
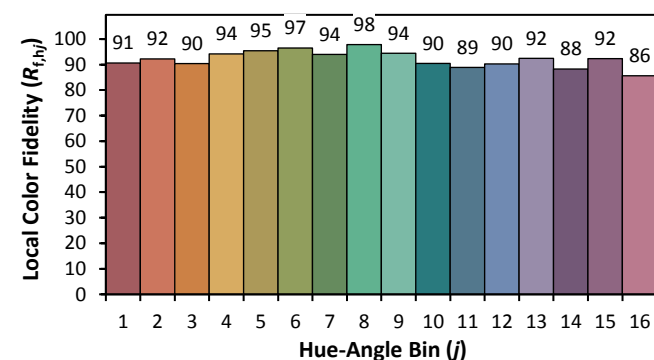
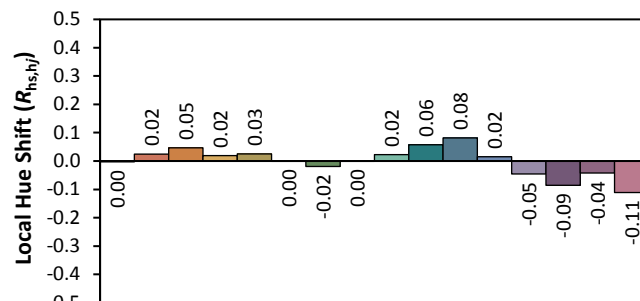
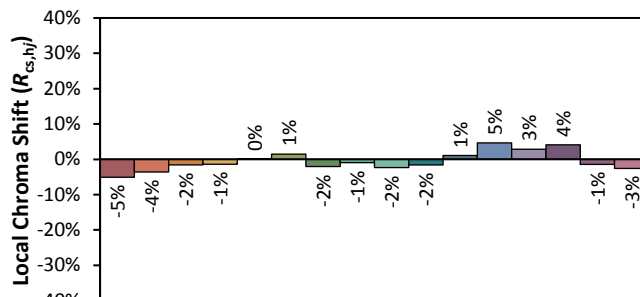
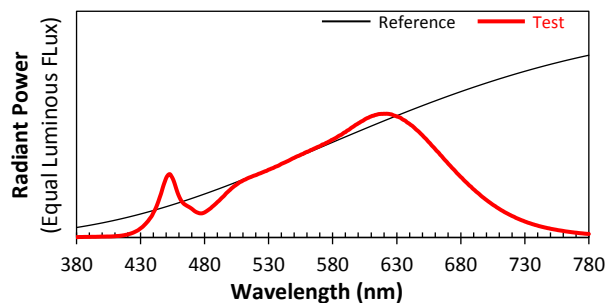
ANSI/IES TM-30-18 Color Rendition Report

Source: User SPD

Manufacturer: VISUAL COMFORT AND COMPANY

Date: 1/11/2021

Model: 700TDCLMB-LED930



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

x 0.4394

y 0.4077

u' 0.2506

v' 0.5232