

VISUAL COMFORT AND COMPANY TEST REPORT

SCOPE OF WORK

LED Performance Testing

MODEL NUMBER

700CLM4B-LED930

PROJECT NUMBER

G104941221

REPORT NUMBER

104941221CRT-003

ISSUE DATE

7/13/2022

REVISED DATE

None

TEST DATES

7/11/2022 through 7/12/2022

DOCUMENT CONTROL NUMBER

RTTDS-R-AMER-Test-3407

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REPORT NUMBER

104941221CRT-003

MODEL NUMBER(s)

700CLM4B-LED930

REPORT RENDERED TO:

VISUAL COMFORT AND COMPANY
7400 LINDER AVE
SKOKIE, IL 60077

STATEMENT OF LIMITATION

NVLAP Lab Code 100402-0. 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-01236637-1.

TEST STANDARDS

ANSI/IES LM-79-19: Optical and Electrical Measurements of Solid State Lighting Products

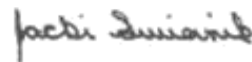
ANSI NEMA ANSLG C78.377: 2017: Specifications for the Chromaticity of Solid State Lighting (SSL) Products

In Charge of Testing:

Reviewer:



Melanie Brittain
Senior Associate Engineer
Lighting Division



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SAMPLE INFORMATION

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ITEMS RECEIVED

Item No.	Control No.	Model No.	Description	Type	Received
1	CRT2206301053-003	700CLM4B-LED930	Calumn 4-Light Chandelier	Production	6/30/2022

SAMPLE PHOTOS - TESTED CONFIGURATIONS



SUMMARY

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PRODUCT INFORMATION AND SUMMARY OF DATA

Product Model No.:	700CLM4B-LED930
Product Description:	Calumn 4-Light Chandelier
LED Model No.:	BRIDGELUX Bridgelux DS412 V10 Gen 8
Driver Model No.:	LTF DA35W900C2839T31-301
Light Source:	LED

Criteria	Results	
	Goniophotometer	Integrating Sphere
Light Output (lumens)	2359.5	2328.3
Input Power (W) @ 120 (Vac)	34.52	34.53
Luminous Efficacy (lm/W)	68.35	67.43
Input Power Factor (I) @ 120 (Vac)	0.996	0.995

Criteria	Results
Input ATHD (%) @ 120 (Vac)	7.03
Correlated Color Temperature (K)	2950
Color Rendering Index - Ra (I)	91.6
Color Rendering Index - R9 (I)	56.0
Duv (I)	0.0007
Chromaticity Coordinate (x)	0.442
Chromaticity Coordinate (y)	0.407
Chromaticity Coordinate (u')	0.252
Chromaticity Coordinate (v')	0.523

TEST METHODS

SEASONING IN SAMPLE ORIENTATION - LED PRODUCTS

No seasoning was performed in accordance with ANSI/IES LM-79-19

INTEGRATING SPHERE TESTING

A spectroradiometer and integrating sphere were used to measure the spectral power distribution for photometric and colorimetric data of 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 and relative humidity was measured at $25^{\circ}\text{C} \pm 1.2^{\circ}\text{C}$ and 10-65% respectively at a position inside of the sphere within 1.5m and at equal height of the EUT. Stabilization procedures to LM-79-19 were followed. The EUT was mounted in a 4π configuration.

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 and relative humidity was measured at $25^{\circ}\text{C} \pm 1.2^{\circ}\text{C}$ and 10-65% respectively at a position within 1.5m and at equal height of the EUT. Stabilization procedures to LM-79-19 were followed. The test distance was $\geq 5x$ the longest luminous dimension of the EUT.

TYPE C GONIOPHOTOMETER DISTRIBUTION TESTING

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PHOTOMETRIC AND ELECTRICAL MEASUREMENTS

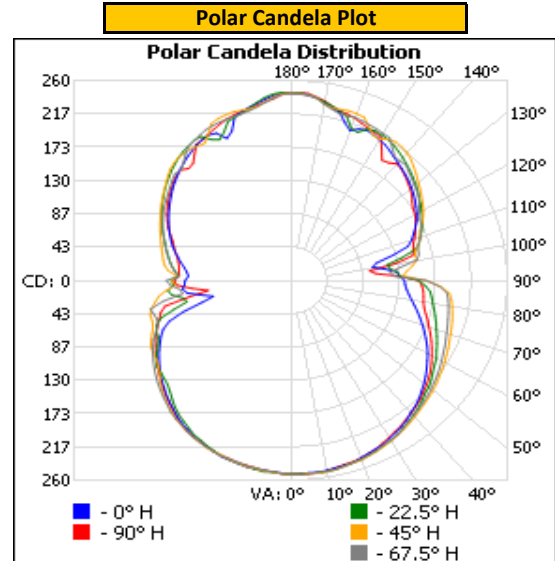
Base Orientation	Input Voltage (Vac)	Input Current (mA)	Input Power (W)	Input Power Factor ()
Up	120.09	288.6	34.52	0.996

Light Output (lm)	Efficacy (lm/W)
2359.5	68.3

LUMINOUS INTENSITY SUMMARY (candela)

Angle (°)	0	22.5	45	67.5	90
0	252	252	252	252	252
5	251	252	252	252	252
10	251	252	253	252	251
15	249	250	250	250	248
20	246	248	248	247	246
25	242	245	245	244	242
30	238	240	241	240	236
35	232	235	237	235	231
40	224	229	232	230	225
45	218	222	227	225	220
50	209	216	223	220	212
55	199	208	218	215	205
60	190	202	213	209	195
65	179	194	209	204	186
70	168	186	204	199	176
75	158	179	201	195	168
80	147	173	197	192	162
85	140	168	191	188	160
90	137	153	162	163	154
95	128	128	140	120	102
100	100	118	154	154	128
105	127	154	156	158	152
110	154	166	165	165	158
115	165	174	173	173	165
120	174	181	184	178	172
125	182	188	192	188	178
130	189	195	200	194	187
135	194	202	209	200	194
140	200	209	217	203	198
145	207	215	220	212	191
150	212	219	212	221	216
155	216	217	221	223	219
160	208	211	231	226	225
165	227	229	230	224	228
170	234	236	233	233	237
175	242	242	242	243	244
180	244	244	244	244	244

Entire luminous intensity matrix found in .IES file



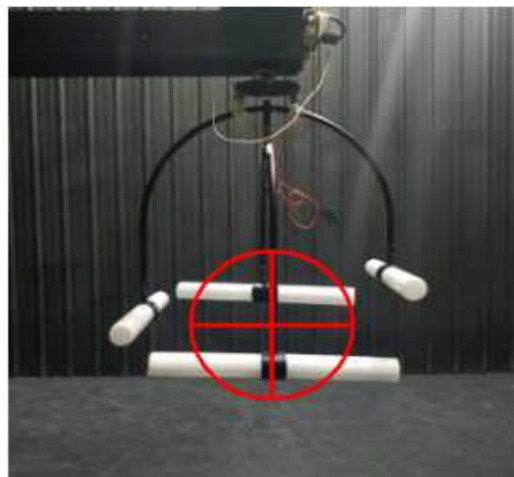
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ORIENTATION AND ALIGNMENT OF EUT

Luminous Opening		
Length (ft)	Width (ft)	Height (ft)
1.90	2.42	0.79
0°-180° H	90°-270° H	0°-180° V

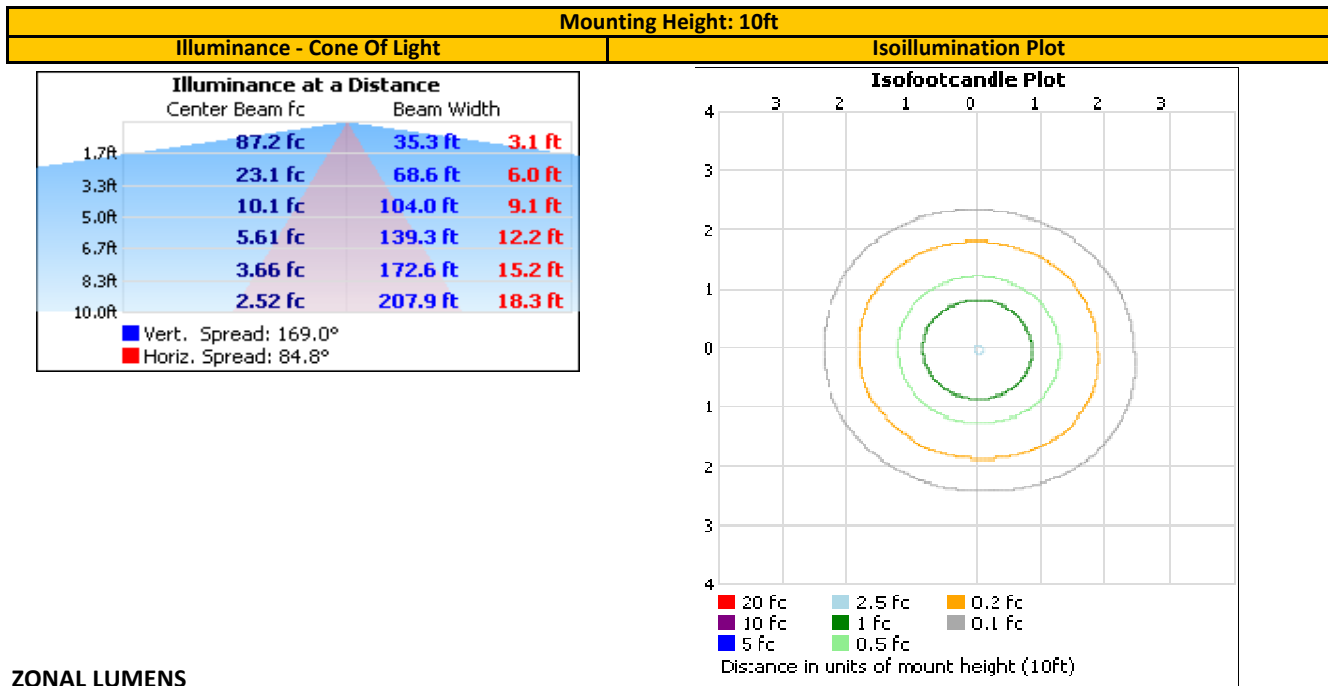
Test Distance (ft)
29.6

PHOTOMETRIC CENTER OF EUT



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ILLUMINANCE SUMMARY



ZONAL LUMENS

Zonal Lumen Summary					
Zone	Lumens	Luminaire	Zone	Lumens	Total
0-30	205.3	8.7%	90-100	157.0	6.7%
0-40	349.7	14.8%	100-110	165.7	7.0%
0-60	695.8	29.5%	110-120	173.8	7.4%
60-90	519.7	22.0%	120-130	169.5	7.2%
70-100	495.1	21.0%	130-140	155.9	6.6%
90-120	496.6	21.0%	140-150	133.1	5.6%
0-90	1,215.6	51.5%	150-160	101.5	4.3%
90-180	1,143.9	48.5%	160-170	64.6	2.7%
0-180	2,359.5	100.0%	170-180	22.8	1.0%

INTEGRATING SPHERE TESTING

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PHOTOMETRIC, RADIOMETRIC, COLORIMETRIC, AND ELECTRICAL MEASUREMENTS

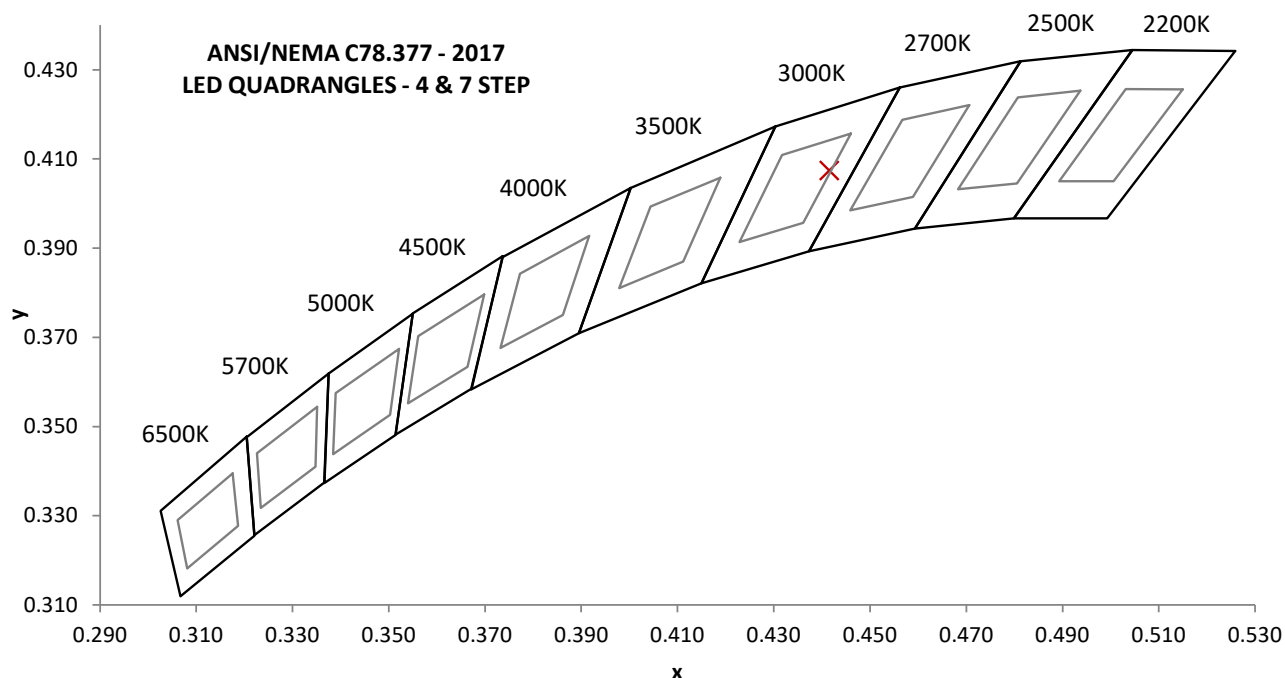
Base Orientation
Up

Input Voltage (Vac)	Input Current (mA)	Input Power (W)	Input Power Factor (l)	Input ATHD (%)
120.08	289.0	34.53	0.995	7.03

Measured at 120.08(Vac)

Light Output (lm)	Efficacy (lm/W)	CCT (K)	CRI - Ra (l)	CRI - R9 (l)
2328.3	67.4	2950	91.6	56.0

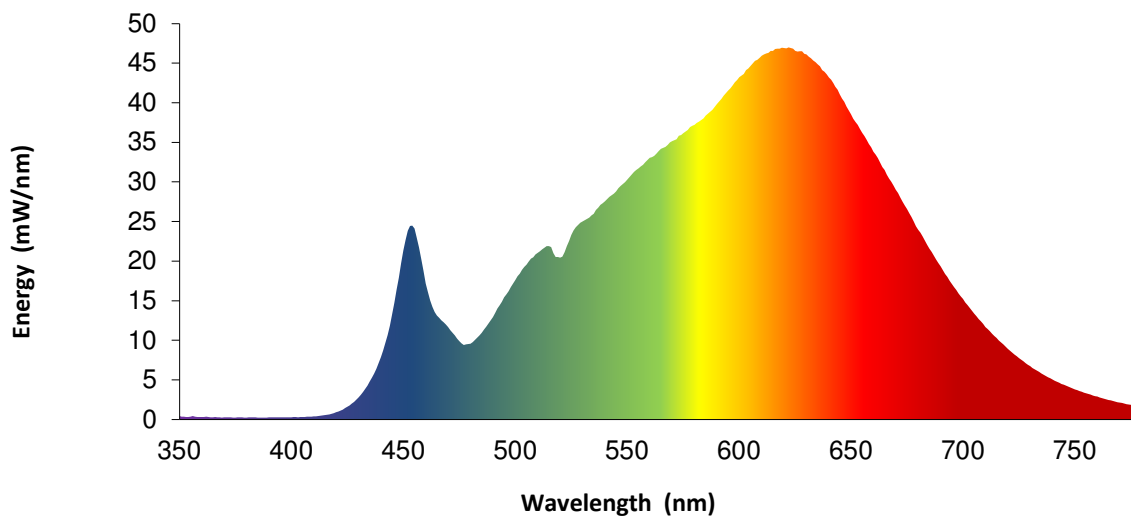
Duv (l)	1931 Chrom (x)	1931 Chrom (y)	1976 Chrom (u')	1976 Chrom (v')
0.0007	0.442	0.407	0.252	0.523



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SPECTRAL POWER DISTRIBUTION

nm	mW/nm		nm	mW/nm		nm	mW/nm		nm	mW/nm
350	0.4		460	17.2		570	35.1		680	24.0
355	0.4		465	13.1		575	36.1		685	21.6
360	0.3		470	11.7		580	37.2		690	19.3
365	0.3		475	9.9		585	38.4		695	17.1
370	0.3		480	9.6		590	39.9		700	15.2
375	0.2		485	10.9		595	41.5		705	13.4
380	0.2		490	12.9		600	43.2		710	11.7
385	0.3		495	15.4		605	44.7		715	10.3
390	0.3		500	17.6		610	45.9		720	8.9
395	0.3		505	19.5		615	46.5		725	7.8
400	0.3		510	21.1		620	46.9		730	6.7
405	0.3		515	21.9		625	46.6		735	5.8
410	0.4		520	20.5		630	46.1		740	5.0
415	0.6		525	23.3		635	44.9		745	4.4
420	0.9		530	25.0		640	43.2		750	3.8
425	1.6		535	26.0		645	41.0		755	3.3
430	2.8		540	27.5		650	38.5		760	2.9
435	4.8		545	28.8		655	36.2		765	2.5
440	7.9		550	30.3		660	33.8		770	2.1
445	13.3		555	31.7		665	31.5		775	1.8
450	21.3		560	33.1		670	29.0		780	1.6
455	24.1		565	34.2		675	26.6		---	---



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	Elgar AC Power Supply	CW1251	---	VBU	VBU
2	Sorenson DC Power Supply	XFR 150-8	---	VBU	VBU
3	Traceable Hygrothermometer	200110913	L206	2/21/2022	2/21/2023
4	Yokogawa Power Analyzer	WT1600	E462	5/21/2022	5/21/2023
5	Fluke Thermometer	53 II	D588	6/13/2022	6/13/2023
6	Fluke Multimeter	87V	M145	3/25/2022	3/25/2023
7	Current Monitor	411	A197	8/26/2021	8/26/2024
8	3M Integrating Sphere Spectrometer System	CDS 2600	L231	7/1/2022	10/1/2022
9	Fisher Scientific Stopwatch	14-649-9	N1132	3/24/2022	3/24/2023
10	LSI High Speed Mirror Goniophotometer	6440	---	6/30/2022	9/30/2022
11	Elgar AC Power Supply	CW1251	---	VBU	VBU
12	Yokogawa Power Analyzer	WT210	307-E464	6/21/2022	6/21/2023
13	Traceable Hygrothermometer	4800	L204	2/21/2022	2/21/2023
14	Sorenson DC Power Supply	XG 150-10	---	VBU	VBU
15	Omega Thermometer	DPi8-C24	M263	3/1/2022	3/1/2023
16	Bosch Distance Laser	Pro GLM 20	L210	3/21/2022	3/15/2023
17	Tape Measure	Crescent	---	9/21/2021	9/21/2024

The AC power supplies used for testing have a crest factor capable of 0-3.5

REVISION HISTORY

#	Revision Date	Updated By	Reviewed By	Description of Change
---	None	---	---	---
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ANNEX A - TM-30 CALCULATIONS

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TM-30 REPORT

