

VISUAL COMFORT AND COMPANY TEST REPORT

SCOPE OF WORK

LED Performance Testing

MODEL NUMBER

700BCKMD4S-LED930

PROJECT NUMBER

G104941221

REPORT NUMBER

104941221CRT-012

ISSUE DATE

7/28/2022

REVISED DATE

None

TEST DATES

7/12/2022 through 7/22/2022

DOCUMENT CONTROL NUMBER

RTTDS-R-AMER-Test-3407

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REPORT NUMBER

104941221CRT-012

MODEL NUMBER(s)

700BCKMD4S-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.

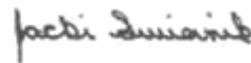
TEST STANDARDS

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
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Jacki Swiernik
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SAMPLE INFORMATION

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ITEMS RECEIVED

Item No.	Control No.	Model No.	Description	Type	Received
1	CRT2206301053-012	700BCKMD4S-LED930	Kamden 4-Light Bath	Production	6/30/2022

SAMPLE PHOTOS - TESTED CONFIGURATIONS



SUMMARY

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PRODUCT INFORMATION AND SUMMARY OF DATA

Product Model No.:	700BCKMD4S-LED930
Product Description:	Kamden 4-Light Bath
LED Model No.:	Everlight62-217D/HK2C-3H3030PBR22835Z15/2T/EU
Driver Model No.:	EPT/D43-1200RC
Light Source:	LED

Criteria	Results	
	Goniophotometer	Integrating Sphere
Light Output (lumens)	3673.4	3549.8
Input Power (W) @ 120 (Vac)	41.43	41.37
Luminous Efficacy (lm/W)	88.66	85.81
Input Power Factor (I) @ 120 (Vac)	0.966	0.996

Criteria	Results
Input ATHD (%) @ 120 (Vac)	8.18
Correlated Color Temperature (K)	2971
Color Rendering Index - Ra (I)	92.4
Color Rendering Index - R9 (I)	55.1
Duv (I)	-0.0008
Chromaticity Coordinate (x)	0.438
Chromaticity Coordinate (y)	0.402
Chromaticity Coordinate (u')	0.252
Chromaticity Coordinate (v')	0.521

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°C ± 1.2°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°C ± 1.2°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 ≥ 5x the longest luminous dimension of the EUT.

TYPE C GONIOPHOTOMETER DISTRIBUTION TESTING

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PHOTOMETRIC AND ELECTRICAL MEASUREMENTS

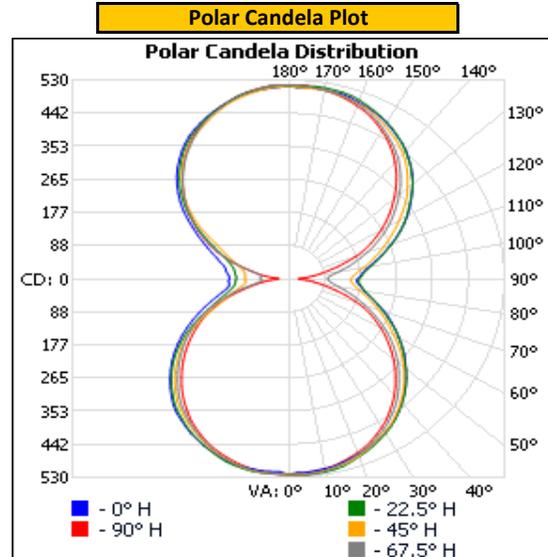
Base Orientation	Input Voltage (Vac)	Input Current (mA)	Input Power (W)	Input Power Factor ()
Wall Mount	120.17	346.0	41.43	0.966

Light Output (lm)	Efficacy (lm/W)
3673.4	88.7

LUMINOUS INTENSITY SUMMARY (candela)

Angle (°)	0	22.5	45	67.5	90
0	522	522	522	522	522
5	518	525	523	524	521
10	514	523	519	519	515
15	508	518	513	511	506
20	499	505	504	498	494
25	488	493	488	483	478
30	473	476	472	465	458
35	456	457	453	442	432
40	432	434	428	415	404
45	406	407	400	384	372
50	376	376	369	351	337
55	347	344	335	315	300
60	312	312	298	276	261
65	281	278	264	236	221
70	248	245	233	195	173
75	214	216	203	159	122
80	189	190	176	125	80
85	173	176	160	104	44
90	169	173	153	96	24
95	183	186	167	105	47
100	204	209	192	133	83
105	235	236	218	168	126
110	268	269	248	205	178
115	303	303	280	244	223
120	337	335	314	283	263
125	367	366	350	319	303
130	398	398	381	356	339
135	424	424	411	389	374
140	447	447	437	418	406
145	464	466	456	442	434
150	480	483	472	463	457
155	492	496	488	482	477
160	502	508	498	496	491
165	510	515	505	506	502
170	511	517	511	512	511
175	512	516	511	516	517
180	515	515	515	515	515

Entire luminous intensity matrix found in .IES file



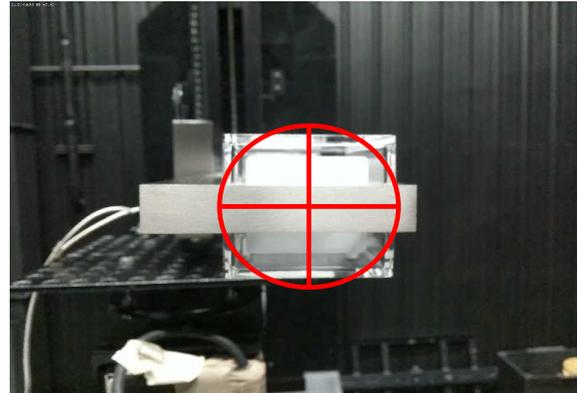
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ORIENTATION AND ALIGNMENT OF EUT

Luminous Opening		
Length (ft)	Width (ft)	Height (ft)
0.23	2.56	0.21
0°-180° H	90°-270° H	0°-180° V

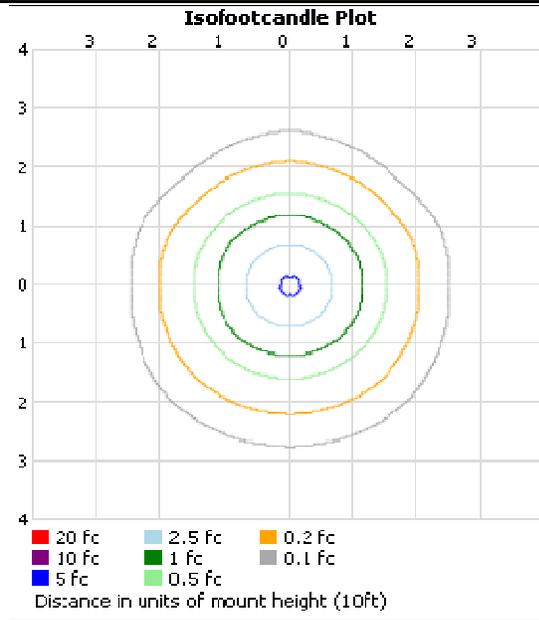
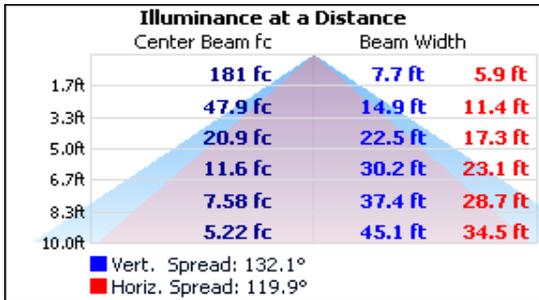
Test Distance (ft)
29.6

PHOTOMETRIC CENTER OF EUT



ILLUMINANCE SUMMARY

Mounting Height: 10ft



ZONAL LUMENS

Zonal Lumen Summary

Zone	Lumens	Luminaire
0-30	418.5	11.4%
0-40	699.2	19.0%
0-60	1,294.8	35.2%
60-90	552.3	15.0%
70-100	444.9	12.1%
90-120	550.2	15.0%
0-90	1,847.2	50.3%
90-180	1,826.2	49.7%
0-180	3,673.4	100.0%

Zone	Lumens	Total	Zone	Lumens	Total
0-10	49.7	1.4%	90-100	135.4	3.7%
10-20	144.5	3.9%	100-110	177.9	4.8%
20-30	224.3	6.1%	110-120	236.9	6.4%
30-40	280.7	7.6%	120-130	285.4	7.8%
40-50	304.4	8.3%	130-140	300.6	8.2%
50-60	291.2	7.9%	140-150	277.2	7.5%
60-70	242.8	6.6%	150-160	221.4	6.0%
70-80	177.7	4.8%	160-170	142.4	3.9%
80-90	131.8	3.6%	170-180	49.0	1.3%

INTEGRATING SPHERE TESTING

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PHOTOMETRIC, RADIOMETRIC, COLORIMETRIC, AND ELECTRICAL MEASUREMENTS

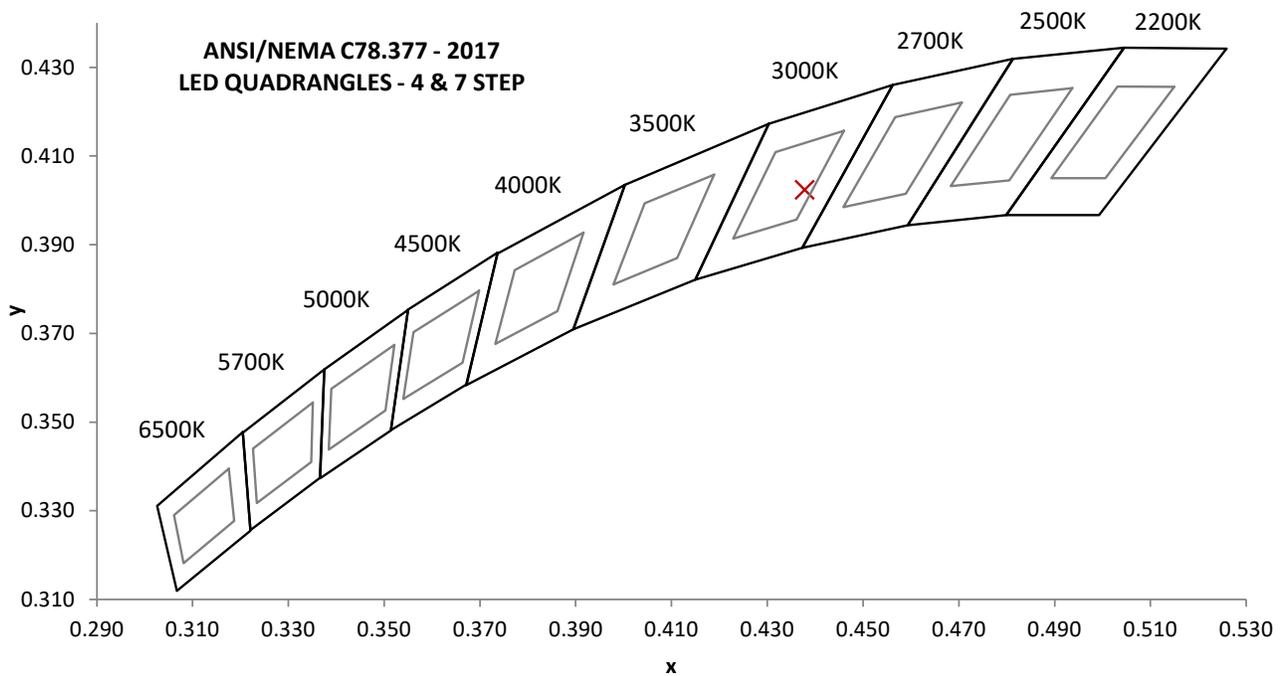
Base Orientation
Wall Mount

Input Voltage (Vac)	Input Current (mA)	Input Power (W)	Input Power Factor (l)	Input ATHD (%)
120.04	346.0	41.37	0.996	8.18

Measured at 120.04(Vac)

Light Output (lm)	Efficacy (lm/W)	CCT (K)	CRI - Ra (l)	CRI - R9 (l)
3549.8	85.8	2971	92.4	55.1

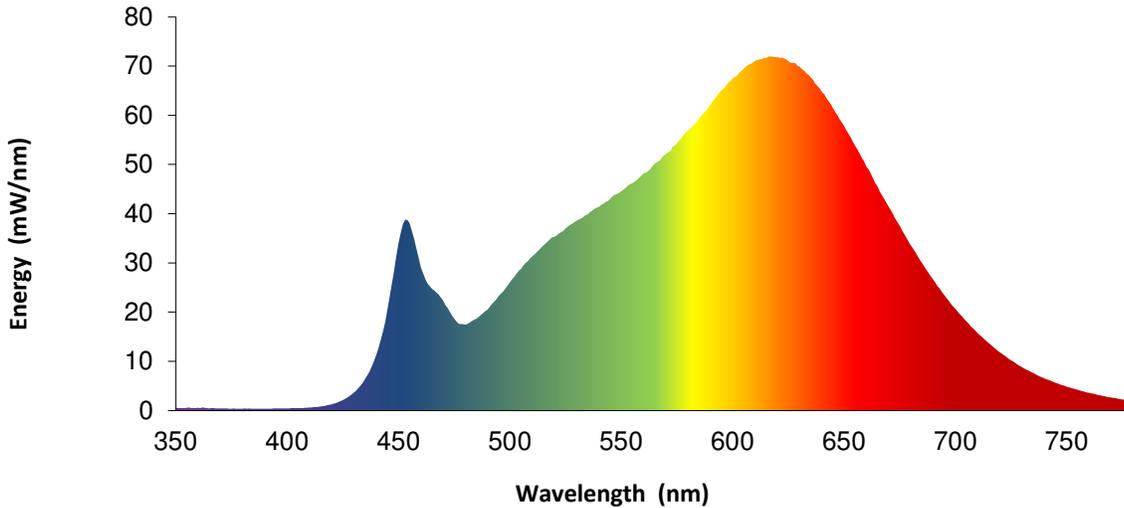
Duv (l)	1931 Chrom (x)	1931 Chrom (y)	1976 Chrom (u')	1976 Chrom (v')
-0.0008	0.438	0.402	0.252	0.521



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SPECTRAL POWER DISTRIBUTION

nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm
350	0.5	460	29.2	570	52.2	680	33.5
355	0.6	465	24.8	575	54.5	685	30.0
360	0.5	470	22.3	580	56.9	690	26.6
365	0.5	475	18.6	585	59.5	695	23.4
370	0.4	480	17.4	590	62.2	700	20.7
375	0.4	485	18.7	595	65.1	705	18.1
380	0.4	490	20.6	600	67.5	710	15.7
385	0.4	495	23.4	605	69.6	715	13.7
390	0.4	500	26.1	610	71.1	720	11.8
395	0.4	505	28.8	615	71.6	725	10.2
400	0.4	510	31.3	620	71.8	730	8.8
405	0.5	515	33.5	625	70.9	735	7.6
410	0.6	520	35.3	630	69.9	740	6.5
415	0.8	525	37.0	635	67.7	745	5.6
420	1.3	530	38.6	640	64.7	750	4.8
425	2.1	535	39.9	645	61.5	755	4.2
430	3.6	540	41.5	650	57.8	760	3.6
435	6.4	545	43.0	655	53.7	765	3.1
440	11.3	550	44.6	660	49.6	770	2.6
445	20.5	555	46.2	665	45.5	775	2.3
450	34.0	560	48.2	670	41.4	780	1.9
455	38.1	565	50.2	675	37.6	---	---



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	Current Monitor	411	A197	8/26/2021	8/26/2024
7	3M Integrating Sphere Spectrometer System	CDS 2600	L231	7/1/2022	10/1/2022
8	LSI High Speed Mirror Goniophotometer	6440	---	6/30/2022	9/30/2022
9	Elgar AC Power Supply	CW1251	---	VBU	VBU
10	Yokogawa Power Analyzer	WT210	307-E464	6/21/2022	6/21/2023
11	Traceable Hygrothermometer	4800	L204	2/21/2022	2/21/2023
12	Sorenson DC Power Supply	XG 150-10	---	VBU	VBU
13	Omega Thermometer	DPI8-C24	M263	3/1/2022	3/1/2023
14	Bosch Distance Laser	Pro GLM 20	L210	3/21/2022	3/15/2023
15	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

