

VISUAL COMFORT AND COMPANY TEST REPORT

SCOPE OF WORK

LED Performance Testing

MODEL NUMBER

700FMLMOBG-LED930

PROJECT NUMBER

G104941221

REPORT NUMBER

104941221CRT-013

ISSUE DATE

7/28/2022

REVISED DATE

None

TEST DATES

7/13/2022 through 7/23/2022

DOCUMENT CONTROL NUMBER

RTTDS-R-AMER-Test-3407

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REPORT NUMBER

104941221CRT-013

MODEL NUMBER(s)

700FMLMOBG-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.

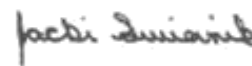
TEST STANDARDS

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

Jacki Swiernik
Staff 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	CRT2206301053-013	700FMLMOBG-LED930	Loom 14 Flush Square	Production	6/30/2022

SAMPLE PHOTOS - TESTED CONFIGURATIONS



SUMMARY

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PRODUCT INFORMATION AND SUMMARY OF DATA

Product Model No.:	700FMLMOBG-LED930
Product Description:	Loom 14 Flush Square
LED Model No.:	Luminus MP-3030-1100-30-90
Driver Model No.:	LTF DA22W600C2036BF1-00HE
Light Source:	LED

Criteria	Results	
	Goniophotometer	Integrating Sphere
Light Output (lumens)	1019.9	1011.8
Input Power (W) @ 120 (Vac)	22.18	22.14
Luminous Efficacy (lm/W)	45.99	45.70
Input Power Factor (I) @ 120 (Vac)	0.988	0.985

Criteria	Results
Input ATHD (%) @ 120 (Vac)	7.21
Correlated Color Temperature (K)	2897
Color Rendering Index - Ra (I)	92.4
Color Rendering Index - R9 (I)	58.9
Duv (I)	-0.0011
Chromaticity Coordinate (x)	0.443
Chromaticity Coordinate (y)	0.403
Chromaticity Coordinate (u')	0.255
Chromaticity Coordinate (v')	0.522

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

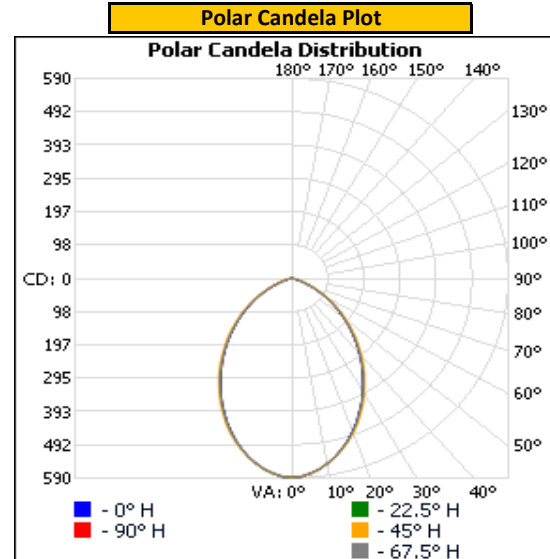
Base Orientation	Input Voltage (Vac)	Input Current (mA)	Input Power (W)	Input Power Factor ()
Up	120.16	186.9	22.18	0.988

Light Output (lm)	Efficacy (lm/W)
1019.9	46.0

LUMINOUS INTENSITY SUMMARY (candela)

Angle (°)	0	22.5	45	67.5	90
0	588	588	588	588	588
5	578	578	579	578	578
10	556	555	556	555	555
15	523	523	525	523	523
20	482	483	488	483	483
25	436	438	443	437	436
30	387	389	395	388	388
35	338	339	345	339	337
40	287	289	295	288	287
45	237	239	246	238	238
50	190	191	197	191	190
55	145	146	152	146	146
60	103	104	109	103	103
65	65	65	71	65	65
70	35	36	40	35	35
75	15	16	18	16	16
80	7	6	6	6	7
85	2	1	1	1	2
90	0	0	0	0	0
95	0	0	0	0	0
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



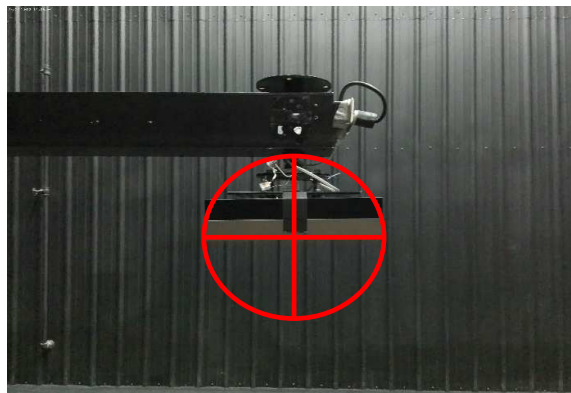
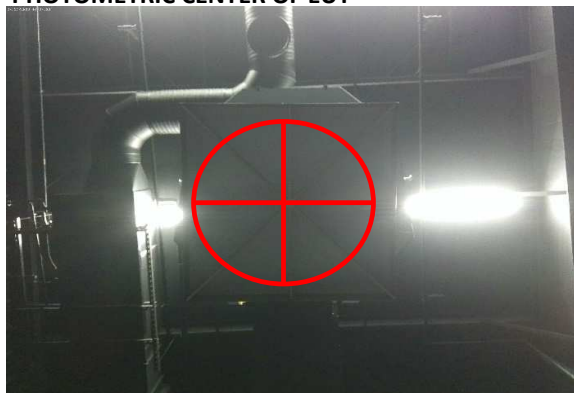
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ORIENTATION AND ALIGNMENT OF EUT

Luminous Opening		
Length (ft)	Width (ft)	Height (ft)
1.16	1.16	0.00
0°-180° H	90°-270° H	0°-180° V

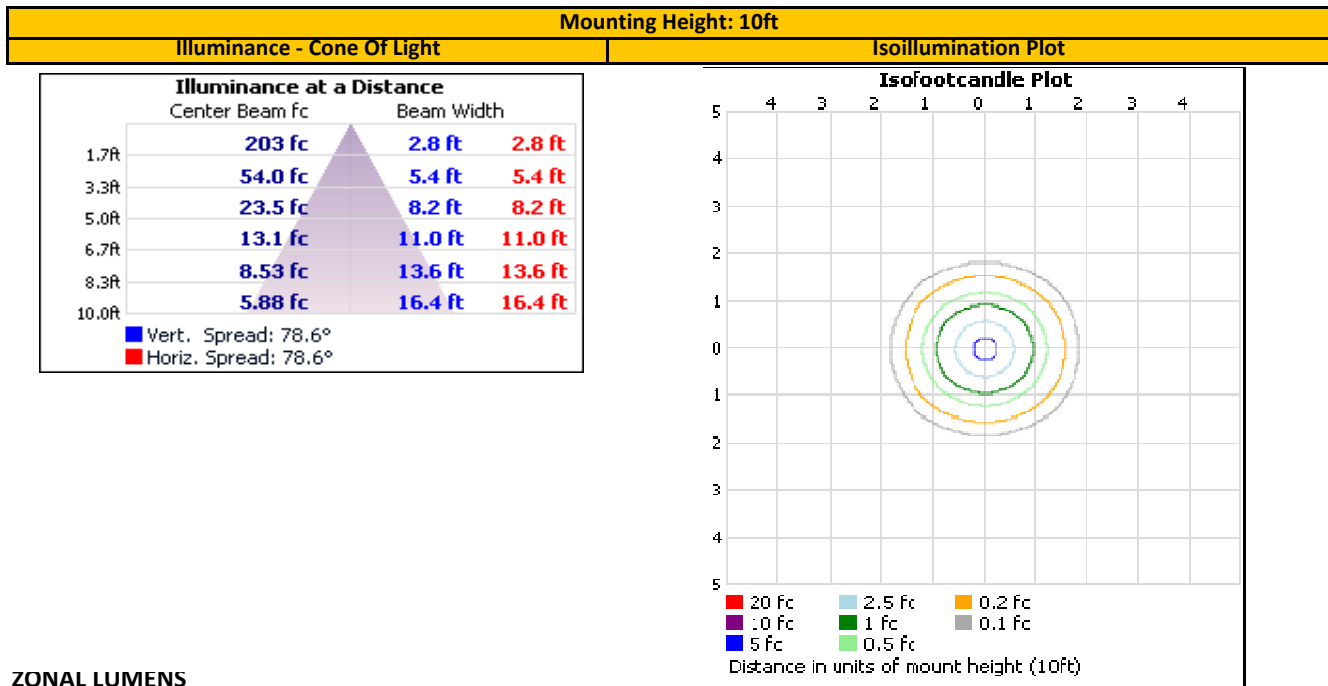
Test Distance (ft)
29.6

PHOTOMETRIC CENTER OF EUT



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ILLUMINANCE SUMMARY



ZONAL LUMENS

Zonal Lumen Summary																																																																																																			
<table><tr><th>Zone</th><th>Lumens</th><th>Luminaire</th></tr><tr><td>0-30</td><td>402.7</td><td>39.5%</td></tr><tr><td>0-40</td><td>614.9</td><td>60.3%</td></tr><tr><td>0-60</td><td>931.5</td><td>91.3%</td></tr><tr><td>60-90</td><td>88.3</td><td>8.7%</td></tr><tr><td>70-100</td><td>21.2</td><td>2.1%</td></tr><tr><td>90-120</td><td>0.0</td><td>0.0%</td></tr><tr><td>0-90</td><td>1,019.9</td><td>100.0%</td></tr><tr><td>90-180</td><td>0.0</td><td>0.0%</td></tr><tr><td>0-180</td><td>1,019.9</td><td>100.0%</td></tr></table>			Zone	Lumens	Luminaire	0-30	402.7	39.5%	0-40	614.9	60.3%	0-60	931.5	91.3%	60-90	88.3	8.7%	70-100	21.2	2.1%	90-120	0.0	0.0%	0-90	1,019.9	100.0%	90-180	0.0	0.0%	0-180	1,019.9	100.0%	<table><tr><th>Zone</th><th>Lumens</th><th>Total</th><th>Zone</th><th>Lumens</th><th>Total</th></tr><tr><td>0-10</td><td>54.4</td><td>5.3%</td><td>90-100</td><td>0.0</td><td>0.0%</td></tr><tr><td>10-20</td><td>146.9</td><td>14.4%</td><td>100-110</td><td>0.0</td><td>0.0%</td></tr><tr><td>20-30</td><td>201.4</td><td>19.7%</td><td>110-120</td><td>0.0</td><td>0.0%</td></tr><tr><td>30-40</td><td>212.2</td><td>20.8%</td><td>120-130</td><td>0.0</td><td>0.0%</td></tr><tr><td>40-50</td><td>185.0</td><td>18.1%</td><td>130-140</td><td>0.0</td><td>0.0%</td></tr><tr><td>50-60</td><td>131.6</td><td>12.9%</td><td>140-150</td><td>0.0</td><td>0.0%</td></tr><tr><td>60-70</td><td>67.1</td><td>6.6%</td><td>150-160</td><td>0.0</td><td>0.0%</td></tr><tr><td>70-80</td><td>19.1</td><td>1.9%</td><td>160-170</td><td>0.0</td><td>0.0%</td></tr><tr><td>80-90</td><td>2.1</td><td>0.2%</td><td>170-180</td><td>0.0</td><td>0.0%</td></tr></table>							Zone	Lumens	Total	Zone	Lumens	Total	0-10	54.4	5.3%	90-100	0.0	0.0%	10-20	146.9	14.4%	100-110	0.0	0.0%	20-30	201.4	19.7%	110-120	0.0	0.0%	30-40	212.2	20.8%	120-130	0.0	0.0%	40-50	185.0	18.1%	130-140	0.0	0.0%	50-60	131.6	12.9%	140-150	0.0	0.0%	60-70	67.1	6.6%	150-160	0.0	0.0%	70-80	19.1	1.9%	160-170	0.0	0.0%	80-90	2.1	0.2%	170-180	0.0	0.0%
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INTEGRATING SPHERE TESTING

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PHOTOMETRIC, RADIOMETRIC, COLORIMETRIC, AND ELECTRICAL MEASUREMENTS

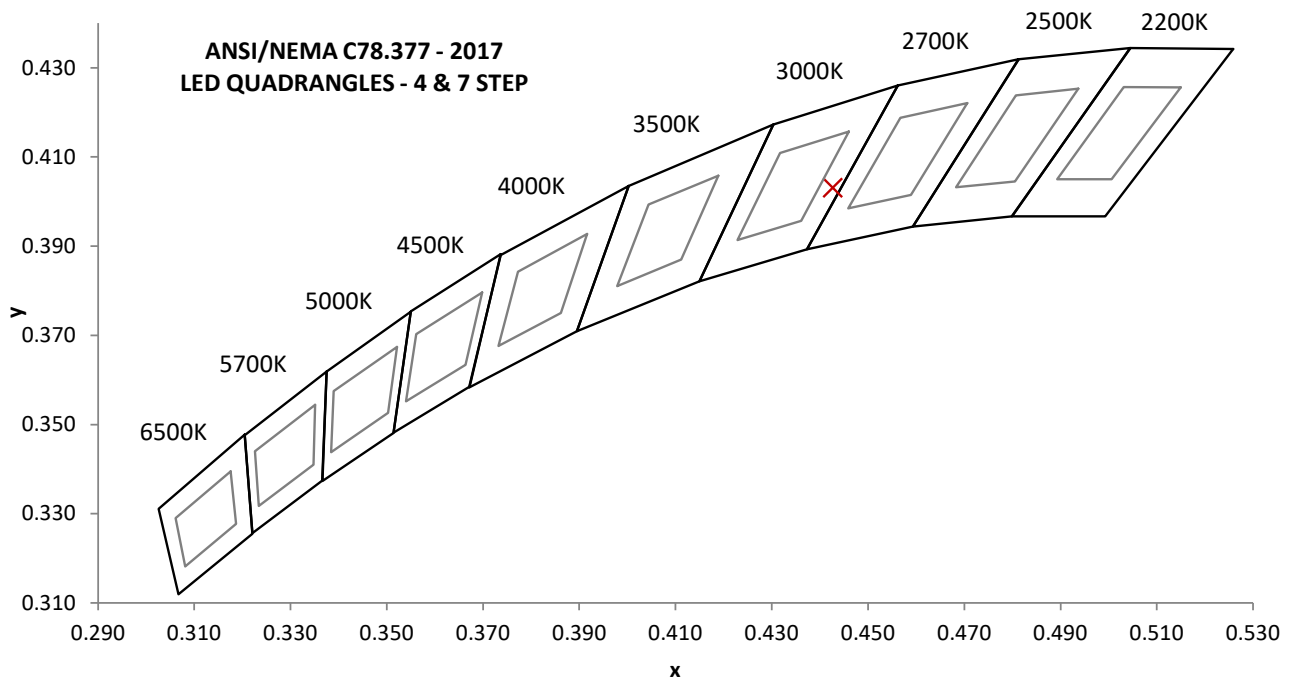
Base Orientation
Up

Input Voltage (Vac)	Input Current (mA)	Input Power (W)	Input Power Factor (l)	Input ATHD (%)
120.04	187.2	22.14	0.985	7.21

Measured at 120.04(Vac)

Light Output (lm)	Efficacy (lm/W)	CCT (K)	CRI - Ra (l)	CRI - R9 (l)
1011.8	45.7	2897	92.4	58.9

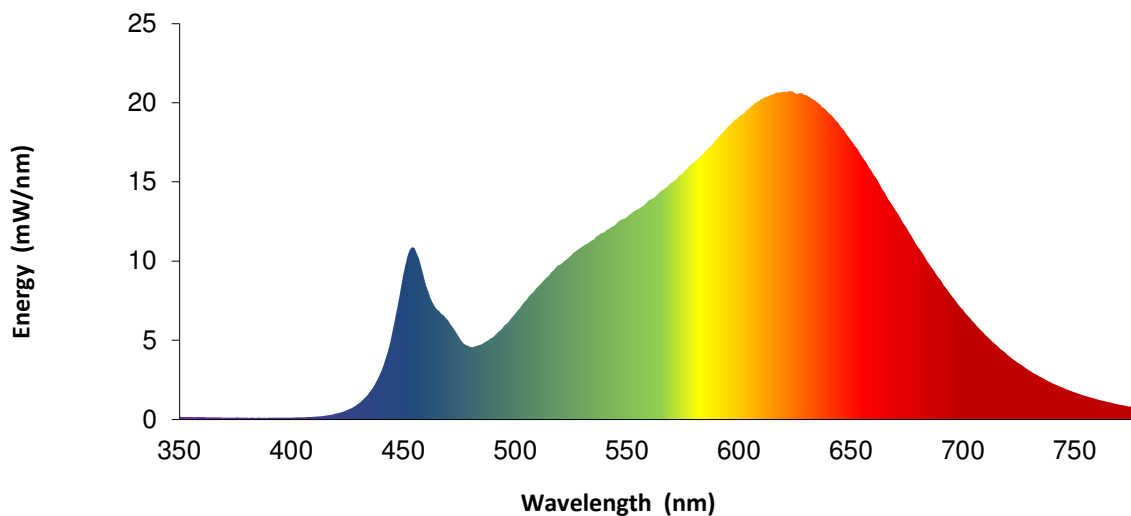
Duv (l)	1931 Chrom (x)	1931 Chrom (y)	1976 Chrom (u')	1976 Chrom (v')
-0.0011	0.443	0.403	0.255	0.522



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SPECTRAL POWER DISTRIBUTION

nm	mW/nm		nm	mW/nm		nm	mW/nm		nm	mW/nm
350	0.2		460	8.5		570	15.0		680	10.9
355	0.2		465	7.0		575	15.6		685	9.8
360	0.2		470	6.3		580	16.3		690	8.8
365	0.1		475	5.2		585	17.0		695	7.8
370	0.1		480	4.6		590	17.7		700	6.9
375	0.1		485	4.7		595	18.5		705	6.1
380	0.1		490	5.2		600	19.1		710	5.3
385	0.1		495	5.9		605	19.7		715	4.7
390	0.1		500	6.7		610	20.2		720	4.1
395	0.1		505	7.6		615	20.5		725	3.5
400	0.1		510	8.4		620	20.7		730	3.1
405	0.1		515	9.1		625	20.6		735	2.7
410	0.2		520	9.8		630	20.5		740	2.3
415	0.2		525	10.4		635	20.0		745	2.0
420	0.4		530	10.9		640	19.3		750	1.7
425	0.6		535	11.4		645	18.6		755	1.5
430	1.0		540	11.9		650	17.6		760	1.3
435	1.7		545	12.3		655	16.6		765	1.1
440	3.0		550	12.8		660	15.5		770	0.9
445	5.4		555	13.3		665	14.3		775	0.8
450	9.1		560	13.9		670	13.2		780	0.7
455	10.8		565	14.4		675	12.0		---	---



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

