



NVLAP Lab Code 500077-0

Report Number: PL08596-001A
Model: ZR22M-32L-35K-10V-FD
Date: 6/21/2016

Cree Engineering Services Testing Laboratory (CESTL) Photometric Testing and Evaluation Report

Prepared For:

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Approved By:

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Product Information

Manufacturer	Cree Inc
Model Number (SKU)	ZR22M-32L-35K-10V-FD
Serial Number	WK191A02864
LED Type	XH-G2

Product Description

2 x 2 Troffer with a white painted aluminum reflector and body, and curved diffuse lens.

Driver Information (Where Applicable)

Integral

Length	Width
23.75"	24"

Sample

The following sample was submitted for evaluation





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Key Photometric Data	Sphere Output	Goniophotometer	
Luminous Flux	3253.0	3251.6	lm
Efficacy	129.19	128.93	lm/W
Correlated Color Temperature (CCT)	3413	K	
Color Rendering Index (CRI)	82		
R ₉	14		
Duv	0.000538		
S/P Ratio*	1.46		

Electrical Measurements	Sphere		Goniophotometer		
	120V	277V	120V	277V	
Input Wattage	25.18	24.97	25.22	24.99	W
Input Current	0.21	0.10	0.21	0.09	A
Input Voltage	120.04	277.04	120.03	277.07	V
Power Factor	0.994	0.939	0.991	0.936	
Off-State Power	0	0	0	0	W
Total Harmonic Distortion (Voltage)	0.05	0.05	0.13	0.06	%
Total Harmonic Distortion (Amperage)	5.86	14.49	6.45	14.17	%

Note: All photometric measurements taken at 120VAC.

Luminous Intensity Distribution	Goniophotometer	
Maximum Candela	1056.5	Cd
Horizontal Angle of Max Candela	0	°
Vertical Angle of Max Candela	2.5	°
Zonal Lumens (0° – 30°)	813.3 (25)	lm (%)
Zonal Lumens (0° – 40°)	1333.9 (41)	lm (%)
Zonal Lumens (0° – 60°)	2394.5 (73.6)	lm (%)
Zonal Lumens (60° – 90°)	857.1 (26.4)	lm (%)
Color Angular Uniformity	NA	

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	40	167	min
Total Operating Time (Stabilization + Test)	40	187	min
Ambient Temperature	25.1	24.9	°C



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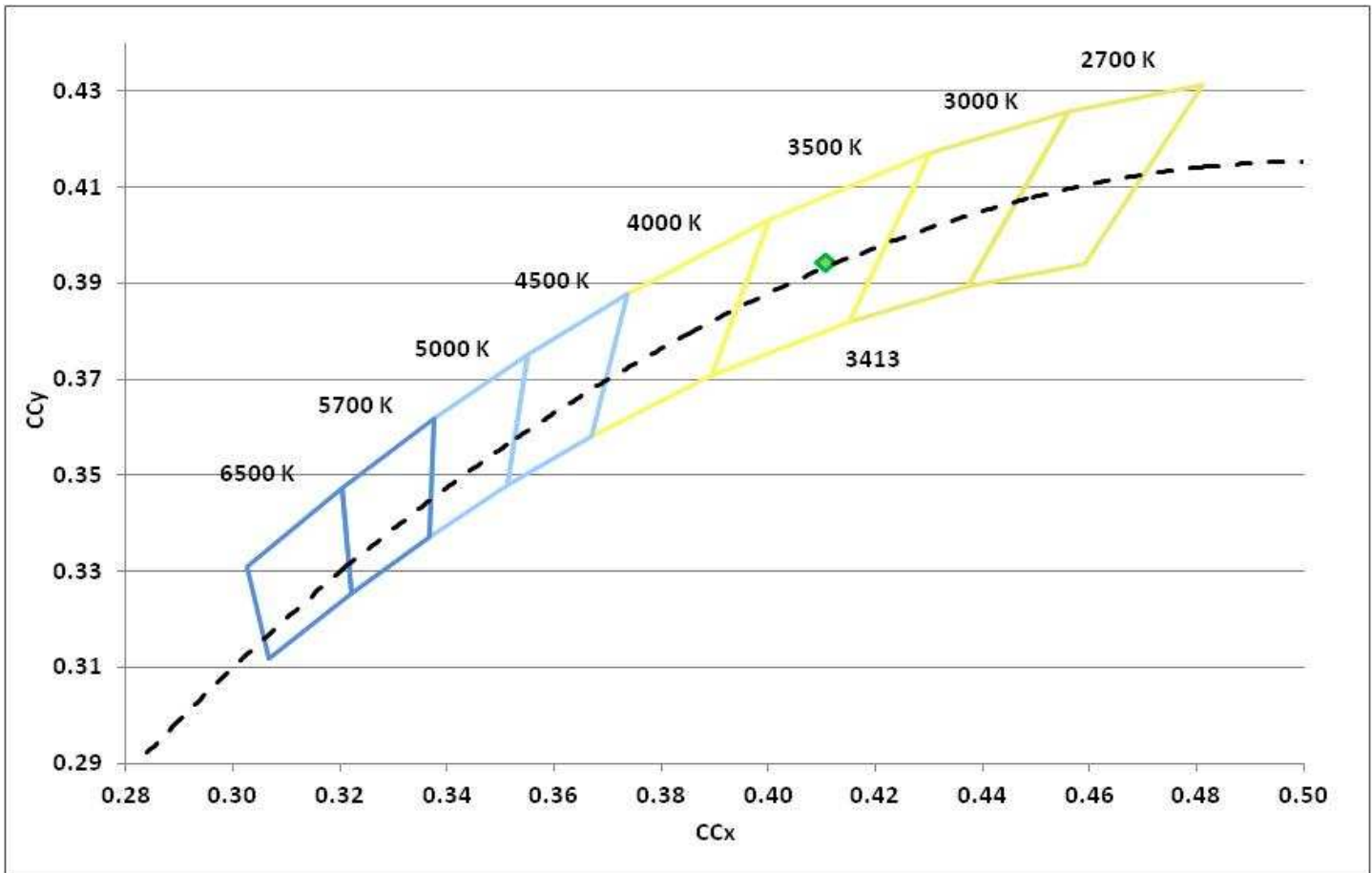
Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.4107	0.3945	0.2376	0.3424	0.2376	0.5136	0.000538

Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
82	81	88	93	82	80	83	86	65	14	70	81	62	82	96

Chromaticity Diagram



Spectral Distribution

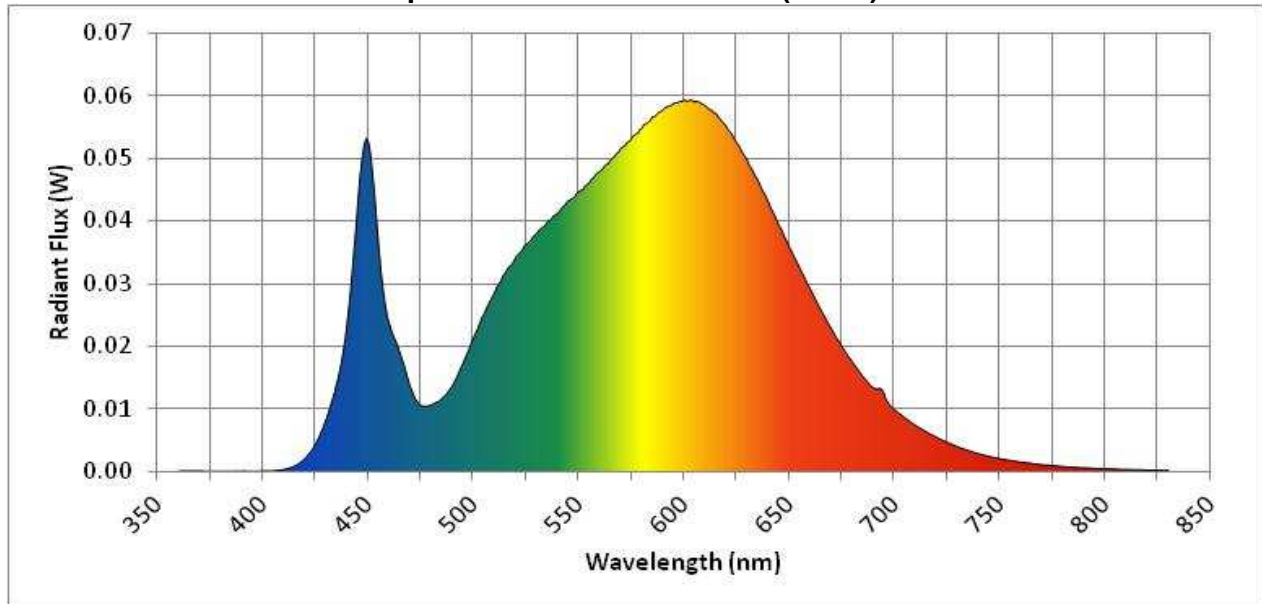
λ (nm)	W/nm
360	0.000129
370	0.000124
380	0.000121
390	0.000127
400	0.000138
410	0.000406
420	0.002194
430	0.008482
440	0.024126
450	0.052629
460	0.023556
470	0.013457
480	0.010720
490	0.013837
500	0.021471
510	0.028656
520	0.034304

λ (nm)	W/nm
530	0.038122
540	0.041423
550	0.044728
560	0.048055
570	0.051708
580	0.054901
590	0.057821
600	0.059421
610	0.058483
620	0.055188
630	0.049798
640	0.043145
650	0.035925
660	0.029244
670	0.022866
680	0.017528
690	0.013433

λ (nm)	W/nm
700	0.009970
710	0.007432
720	0.005527
730	0.004019
740	0.002909
750	0.002140
760	0.001572
770	0.001170
780	0.000847
790	0.000658
800	0.000488
810	0.000393
820	0.000320
830	0.000253

Dominant Wavelength	580	nm
Peak Wavelength:	603	nm

Spectral Power Distribution (W/nm)





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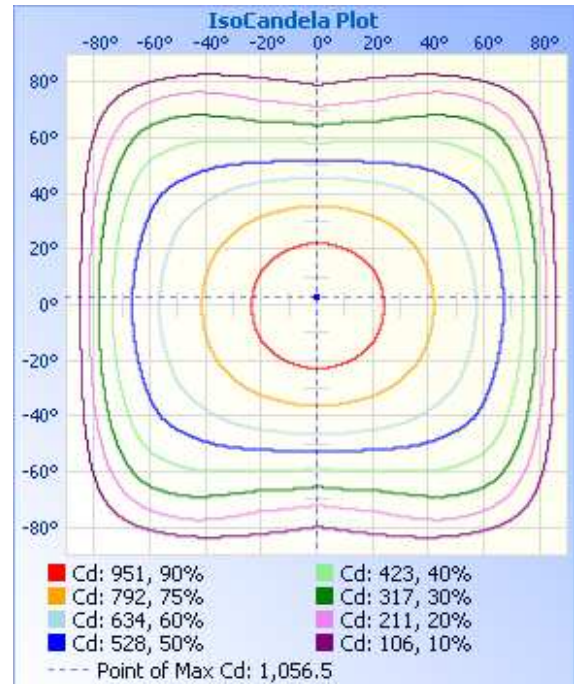
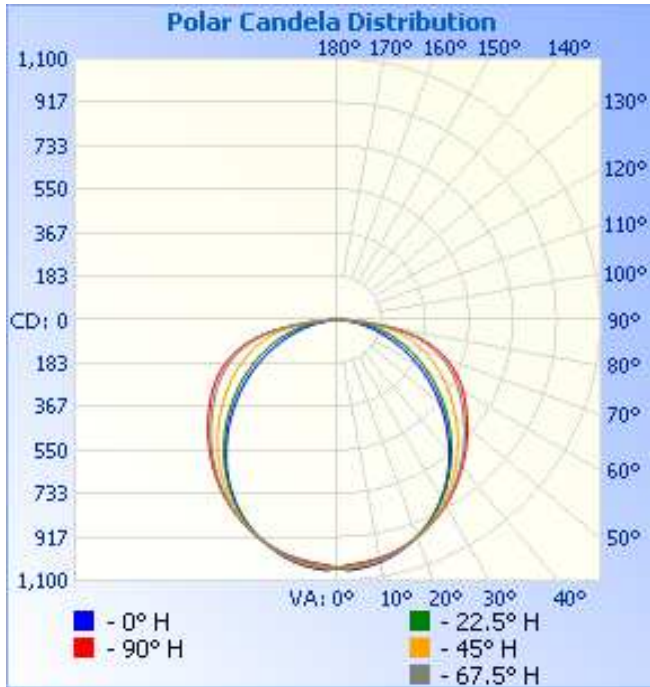
Zonal Lumen Summary **

Zone	Lumens	% of Total	Zone	Lumens	% of Total
0-5	25.0	0.8%	90-95	0	0%
5-10	74.0	2.3%	95-100	0	0%
10-15	120.6	3.7%	100-105	0	0%
15-20	163.1	5.0%	105-110	0	0%
20-25	200.2	6.2%	110-115	0	0%
25-30	230.5	7.1%	115-120	0	0%
30-35	253.1	7.8%	120-125	0	0%
35-40	267.5	8.2%	125-130	0	0%
40-45	273.7	8.4%	130-135	0	0%
45-50	272.4	8.4%	135-140	0	0%
50-55	264.1	8.1%	140-145	0	0%
55-60	250.4	7.7%	145-150	0	0%
60-65	231.7	7.1%	150-155	0	0%
65-70	206.9	6.4%	155-160	0	0%
70-75	175.8	5.4%	160-165	0	0%
75-80	136.6	4.2%	165-170	0	0%
80-85	82.8	2.5%	170-175	0	0%
85-90	23.3	0.7%	175-180	0	0%
Total			3251.6 lm	100%	

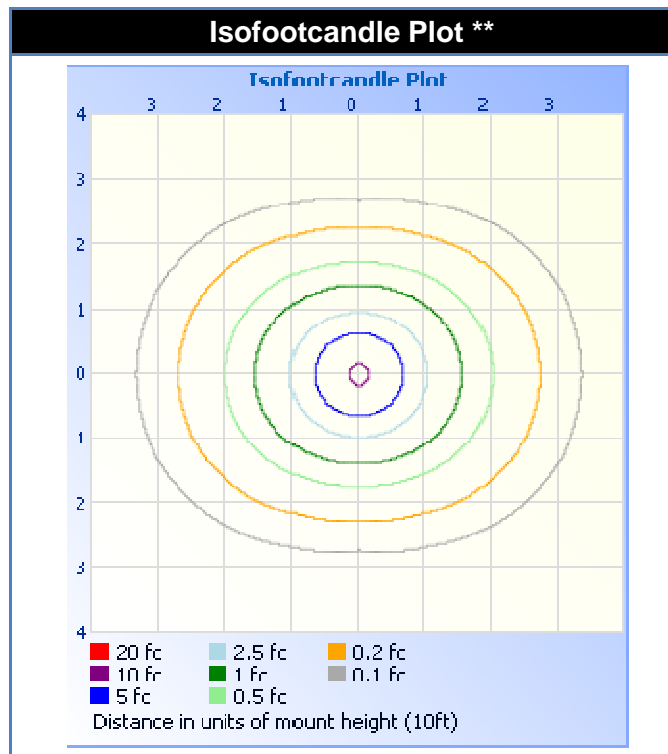
Spacing Criteria **

Spacing Criterion (0 - 180)	1.24
Spacing Criterion (90 - 270)	1.30
Spacing Criterion (Diagonal)	1.40

Candela Plots **



Isofootcandle Plot **





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Candela Tabulations **

	0	22.5	45	67.5	90
0	1047	1047	1047	1047	1047
2.5	1056	1051	1047	1040	1034
5	1052	1048	1044	1037	1031
7.5	1046	1041	1037	1031	1026
10	1036	1031	1029	1024	1019
12.5	1024	1020	1018	1015	1011
15	1010	1006	1006	1004	1000
17.5	993	990	992	991	988
20	973	971	975	977	975
22.5	951	950	957	960	959
25	926	927	936	942	942
27.5	899	901	913	922	924
30	869	873	888	900	903
32.5	838	842	862	877	882
35	803	810	834	854	860
37.5	767	776	805	828	836
40	728	741	774	802	811
42.5	688	704	743	775	786
45	647	666	711	748	760
47.5	606	628	679	721	734
50	564	589	646	693	709
52.5	522	550	613	665	682
55	480	511	580	638	656
57.5	438	473	548	612	632
60	397	435	517	586	607
62.5	355	397	485	558	580
65	314	359	452	529	552
67.5	274	322	419	498	520
70	235	285	385	464	485
72.5	198	249	349	427	446
75	162	214	312	386	401
77.5	128	178	272	338	351
80	97	144	227	278	282
82.5	68	109	172	200	198
85	42	71	107	119	115
87.5	18	32	44	46	43
90	0	0	0	0	0



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Candela Tabulations (Continued) **

	0	22.5	45	67.5	90
92.5	0	0	0	0	0
95	0	0	0	0	0
97.5	0	0	0	0	0
100	0	0	0	0	0
102.5	0	0	0	0	0
105	0	0	0	0	0
107.5	0	0	0	0	0
110	0	0	0	0	0
112.5	0	0	0	0	0
115	0	0	0	0	0
117.5	0	0	0	0	0
120	0	0	0	0	0
122.5	0	0	0	0	0
125	0	0	0	0	0
127.5	0	0	0	0	0
130	0	0	0	0	0
132.5	0	0	0	0	0
135	0	0	0	0	0
137.5	0	0	0	0	0
140	0	0	0	0	0
142.5	0	0	0	0	0
145	0	0	0	0	0
147.5	0	0	0	0	0
150	0	0	0	0	0
152.5	0	0	0	0	0
155	0	0	0	0	0
157.5	0	0	0	0	0
160	0	0	0	0	0
162.5	0	0	0	0	0
165	0	0	0	0	0
167.5	0	0	0	0	0
170	0	0	0	0	0
172.5	0	0	0	0	0
175	0	0	0	0	0
177.5	0	0	0	0	0
180	0	0	0	0	0



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Integrating Sphere Equipment List

Description	Manufacturer	Model	Serial Number
3M Sphere	Labsphere	CSTM-CSLMS-3M98-HDS	82456
CCD Array Spectrometer	Otsuka	MC-9801	98010165
Programmable AC Source	Chroma	61603	616030000761
Single Channel Power Analyzer	Xitron	2801	28011110008
Aux Lamp Power Supply	Labsphere	LPS-100-0833	1002104538

Goniophotometer Equipment List

Description	Manufacturer	Model	Serial Number
AC Power Source	Adaptive	FC210	2300229
AC Power Source	Elgar	CW1251	1126A06399
Type C Goniophotometer	LSI / UL	6440T	6440TE0192T
Spectroradiometer	Gooch & Housego	770VIS/NIR	11414155
Power Meter	Yokogawa	WT210	91L220953

Test Methods Used:

Title	Description
ANSI C82.77:2002	Harmonic Emission Limits- Related Power Quality Req't's for Lighting Equipment
CIE Pub. 13.3:1995	Method of Measuring and Specifying Color Rendering of Light Sources
CIE Pub. 15:2004	Colorimetry
IES LM-58:1994	Spectroradiometric Measurements
IES LM-65:2001	Single-Ended Compact Fluorescent Lamps – Life Test Performance
IES LM-79:2008	Electrical and Photometric Measurements of Solid-State Lighting Products

Reference Standard Used:

Equipment	Description
3m Sphere	Tungsten Halogen Omni-Directional 75W Calibration Lamp, Serial Number K142
Type C Goniophotometer	Tungsten Halogen Omni-Directional 500W Calibration Lamp, Serial Number 97A

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The results contained in this report pertain only to the tested sample.

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* Items marked with a single asterisk are not covered by the NVLAP accreditation.

In the event that the recorded temperature is outside of $25 \pm 1^{\circ}\text{C}$, this is considered a non-standard condition.

** In the event that testing is subcontracted, test results in this report marked with the symbol **, or noted as "Goniophotometer", were performed by the subcontracted laboratory identified in the footer on the first page of this report. Subcontracted testing is strictly goniophotometer based. All other tests are performed using an integrating sphere.

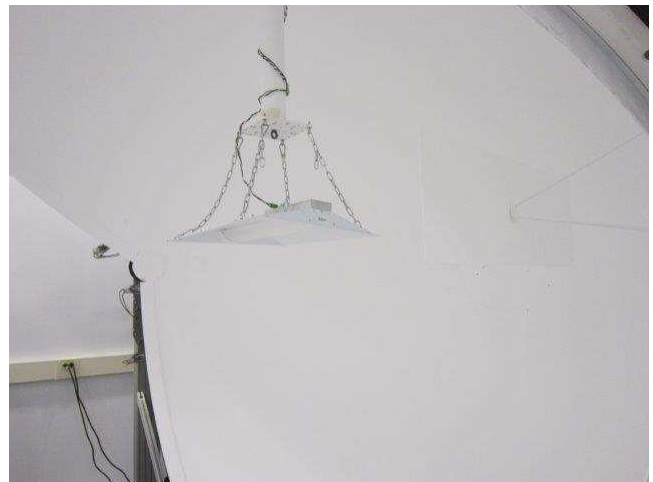
The goniophotometer information in the equipment list, report items marked with **, or results specifically identified as "Goniophotometer", are the actual equipment used, and test results produced, by the subcontracted laboratory.

Additional Comments: This luminaire was tested in the base up orientation.

Sphere picture



Goniophotometer Picture





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Document Revision History:

Each subsequent revision of this report replaces the preceding report.

Date	Rev	DCN #	Change at the time of this test	By	Approval
06/21/16	A	DMS	Origination	A. Gressel	C. McLaurin