



NVLAP Lab Code 500077-0

Report Number: PL08598-001A
Model: ZR14M-40L-35K-10V-FD
Date: 6/22/2016

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

Prepared For:

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Product Information

Manufacturer	Cree Inc
Model Number (SKU)	ZR14M-40L-35K-10V-FD
Serial Number	WK191A02839
LED Type	XH-G2

Product Description

1 x 4 Troffer with a white painted aluminum reflector and body, and curved diffuse lens.

Driver Information (Where Applicable)

Integral

Length	Width
48"	12"

Sample

The following sample was submitted for evaluation





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Key Photometric Data	Sphere Output	Goniophotometer	
Luminous Flux	4018.0	3976.0	lm
Efficacy	131.39	130.10	lm/W
Correlated Color Temperature (CCT)	3429	K	
Color Rendering Index (CRI)	83		
R ₉	15		
Duv	0.000245		
S/P Ratio*	1.46		

Electrical Measurements	Sphere		Goniophotometer		
	120V	277V	120V	277V	
Input Wattage	30.58	30.31	30.56	30.23	W
Input Current	0.26	0.12	0.26	0.12	A
Input Voltage	119.98	277.01	119.99	277.06	V
Power Factor	0.990	0.927	0.989	0.923	
Off-State Power	0	0	0	0	W
Total Harmonic Distortion (Voltage)	0.06	0.06	0.07	0.07	%
Total Harmonic Distortion (Amperage)	7.73	16.91	7.46	16.77	%

Note: All photometric measurements taken at 120VAC.

Luminous Intensity Distribution	Goniophotometer	
Maximum Candela	1373.3	Cd
Horizontal Angle of Max Candela	67.5	°
Vertical Angle of Max Candela	2.5	°
Zonal Lumens (0° – 30°)	1056.5 (26.6)	lm (%)
Zonal Lumens (0° – 40°)	1735.4 (43.6)	lm (%)
Zonal Lumens (0° – 60°)	3099.2 (77.9)	lm (%)
Zonal Lumens (60° – 90°)	876.7 (22.1)	lm (%)
Color Angular Uniformity	NA	

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	32	60	min
Total Operating Time (Stabilization + Test)	32	80	min
Ambient Temperature	25.0	24.9	°C



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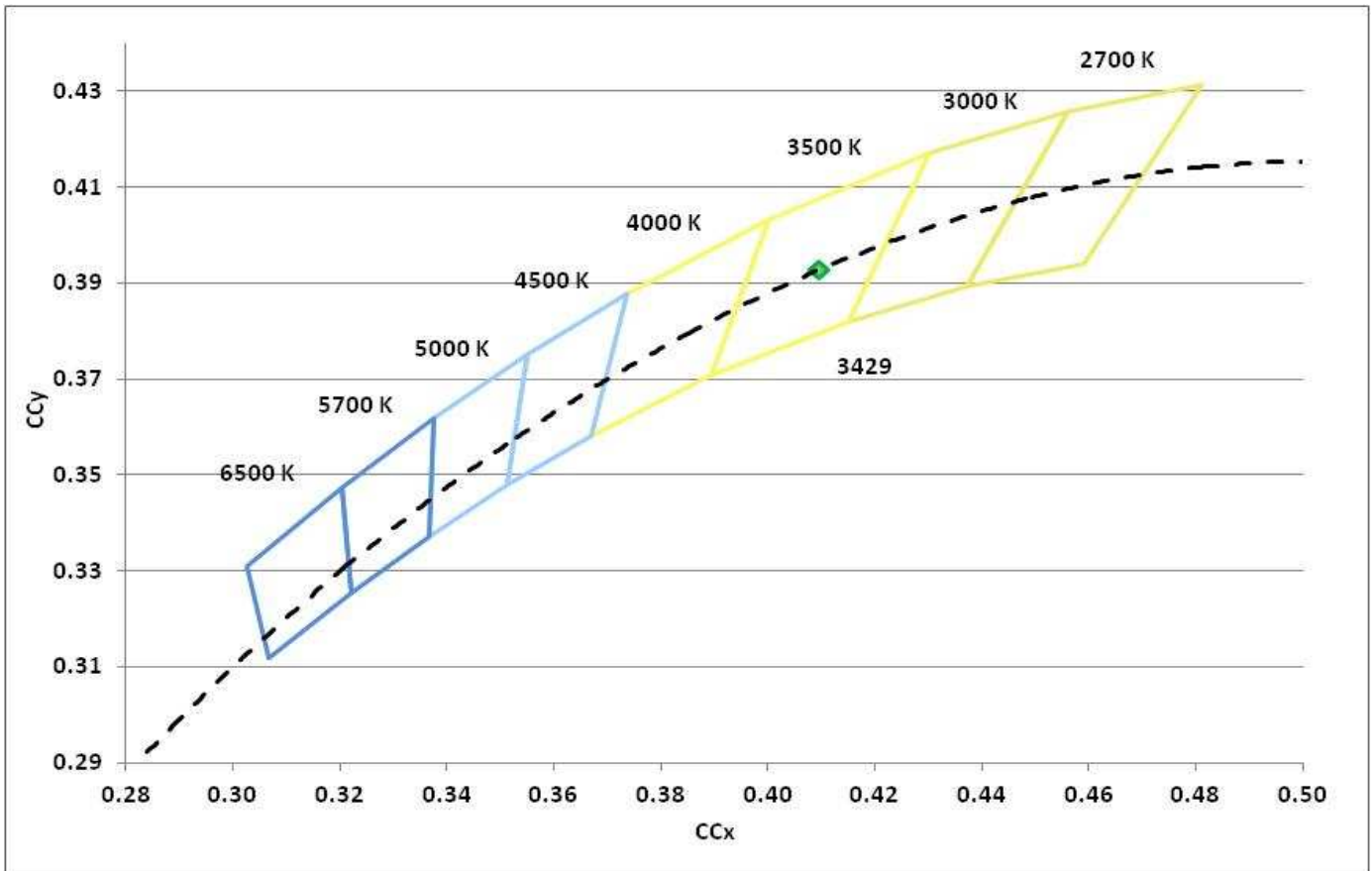
Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.4094	0.3931	0.2374	0.3420	0.2374	0.5129	0.000245

Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
83	81	88	93	82	81	83	86	66	15	71	81	62	83	96

Chromaticity Diagram



Spectral Distribution

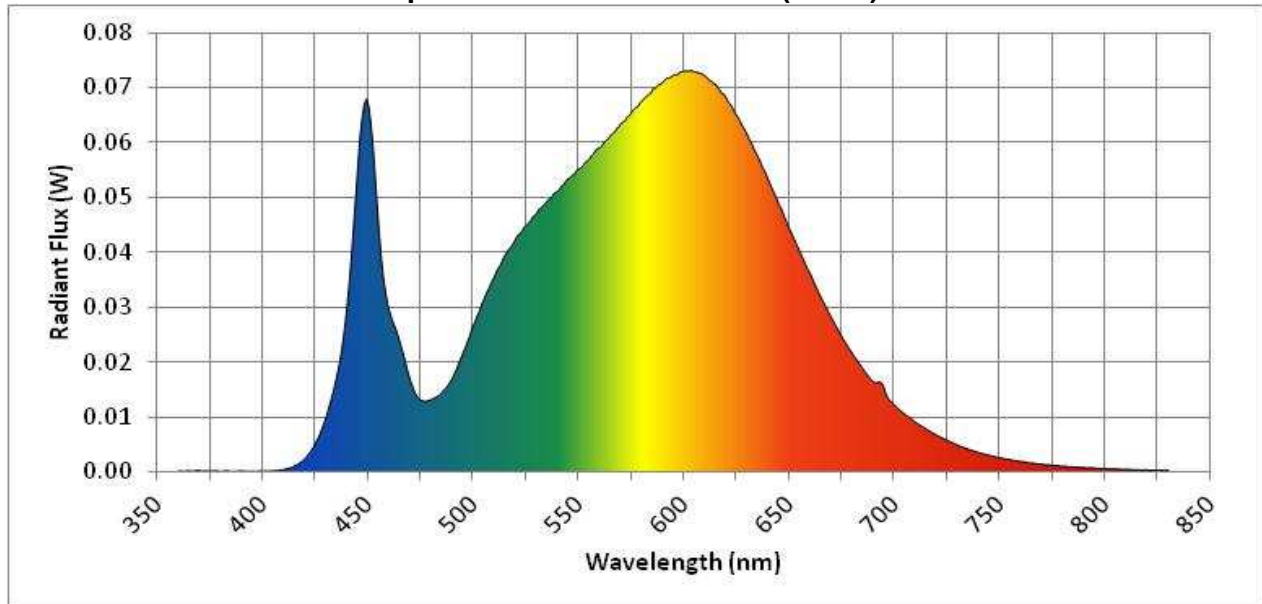
λ (nm)	W/nm
360	0.000164
370	0.000220
380	0.000042
390	0.000151
400	0.000129
410	0.000450
420	0.002531
430	0.010152
440	0.030837
450	0.066871
460	0.029224
470	0.016548
480	0.013214
490	0.017212
500	0.026826
510	0.035684
520	0.042562

λ (nm)	W/nm
530	0.047184
540	0.051263
550	0.055284
560	0.059173
570	0.063602
580	0.067655
590	0.071118
600	0.073163
610	0.072181
620	0.068216
630	0.061524
640	0.053315
650	0.044417
660	0.036135
670	0.028177
680	0.021578
690	0.016498

λ (nm)	W/nm
700	0.012182
710	0.009079
720	0.006715
730	0.004889
740	0.003549
750	0.002588
760	0.001871
770	0.001432
780	0.001058
790	0.000837
800	0.000610
810	0.000462
820	0.000366
830	0.000371

Dominant Wavelength	581	nm
Peak Wavelength:	603	nm

Spectral Power Distribution (W/nm)





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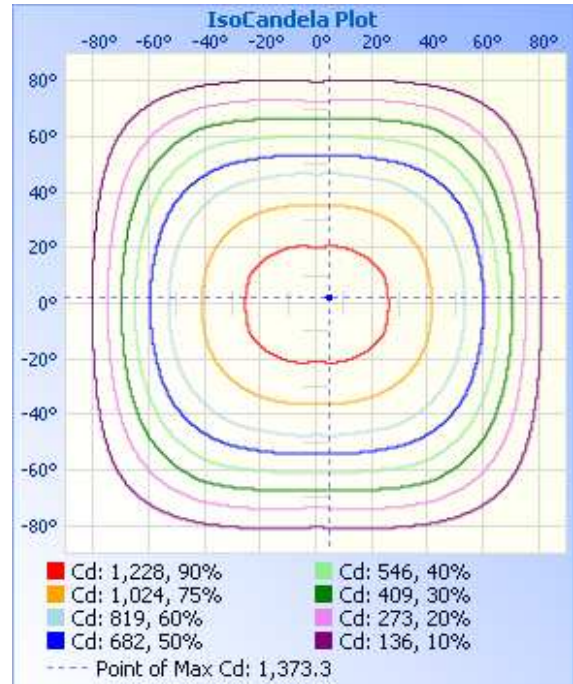
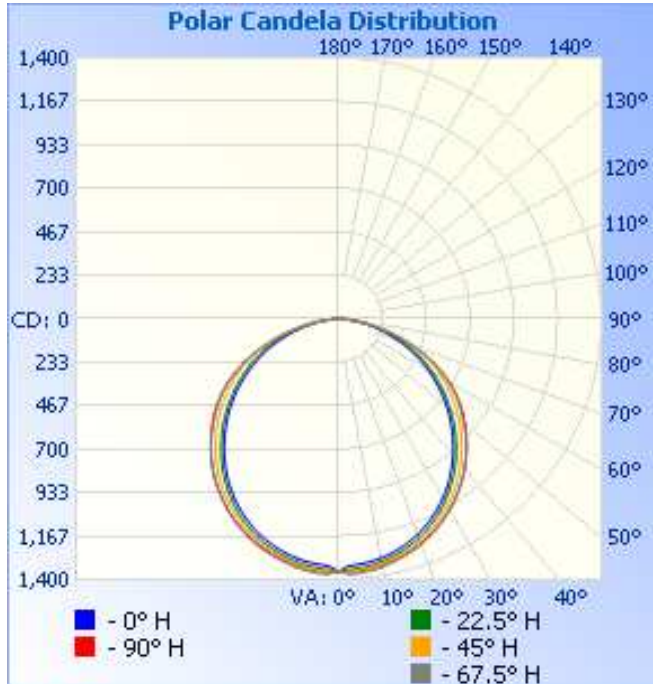
Zonal Lumen Summary **

Zone	Lumens	% of Total	Zone	Lumens	% of Total
0-5	32.4	0.8%	90-95	0	0%
5-10	96.0	2.4%	95-100	0	0%
10-15	156.3	3.9%	100-105	0	0%
15-20	211.7	5.3%	105-110	0	0%
20-25	260.2	6.5%	110-115	0	0%
25-30	300.0	7.5%	115-120	0	0%
30-35	329.9	8.3%	120-125	0	0%
35-40	349.0	8.8%	125-130	0	0%
40-45	356.7	9.0%	130-135	0	0%
45-50	353.2	8.9%	135-140	0	0%
50-55	339.1	8.5%	140-145	0	0%
55-60	314.9	7.9%	145-150	0	0%
60-65	279.4	7.0%	150-155	0	0%
65-70	232.1	5.8%	155-160	0	0%
70-75	175.7	4.4%	160-165	0	0%
75-80	115.9	2.9%	165-170	0	0%
80-85	59.3	1.5%	170-175	0	0%
85-90	14.3	0.4%	175-180	0	0%
			Total	3976 lm	100%

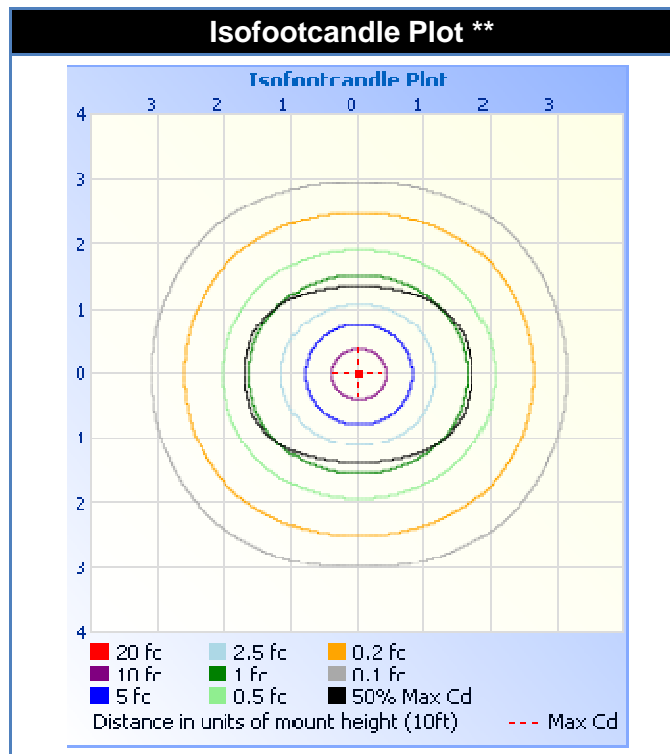
Spacing Criteria **

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	1354	1354	1354	1354	1354
2.5	1326	1347	1358	1373	1361
5	1322	1342	1353	1370	1358
7.5	1314	1334	1345	1362	1350
10	1304	1322	1335	1352	1340
12.5	1290	1309	1322	1338	1328
15	1273	1292	1306	1323	1314
17.5	1254	1273	1288	1307	1298
20	1231	1251	1267	1288	1280
22.5	1205	1226	1245	1266	1258
25	1177	1198	1219	1241	1235
27.5	1146	1167	1190	1214	1209
30	1111	1133	1158	1184	1181
32.5	1074	1096	1125	1153	1150
35	1035	1057	1090	1119	1118
37.5	993	1016	1052	1082	1082
40	949	973	1012	1044	1045
42.5	904	928	971	1004	1006
45	857	881	928	962	965
47.5	809	833	883	918	922
50	760	784	837	872	878
52.5	710	735	789	826	834
55	658	684	742	780	788
57.5	606	633	692	732	737
60	553	582	642	678	682
62.5	500	530	592	620	622
65	447	477	538	558	558
67.5	393	423	480	492	489
70	339	370	419	424	417
72.5	285	319	357	354	345
75	234	268	294	284	275
77.5	185	216	232	219	211
80	139	164	172	158	150
82.5	96	115	117	103	97
85	58	69	66	55	52
87.5	24	27	22	17	16
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.

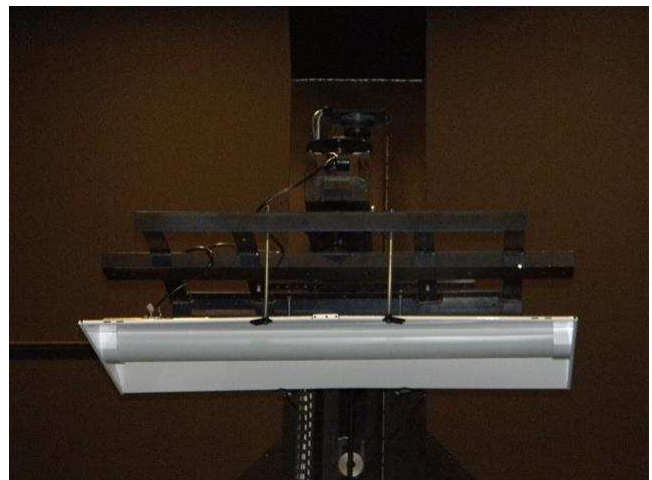
The goniophotometer information in the equipment list, report items marked with **, or results specifically identified as "Goniophotometer", are the actual equipment used, and test results produced, by the subcontracted laboratory.

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
06/22/16	A	DMS	Origination	A. Gressel	C. McLaurin