



Report Number: PL09633-001A
Model: LS4-50L-35K-10V-FD
Date: 11/02/2016

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)	LS4-50L-35K-10V-FD
Serial Number	WK10Y14290
LED Type	XHG2


Product Description
 Four foot linear luminaire with a white, formed aluminum body and a diffuse cylindrical lens.

Driver Information (Where Applicable)
 Integral

Length	Width	Height
48"	2.5"	3"

Sample

The following sample was submitted for evaluation





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Key Photometric Data	Sphere Output	Goniophotometer	
Luminous Flux	5178.0	5056	lm
Efficacy	134.46	131.02	lm/W
Correlated Color Temperature (CCT)	3475	K	
Color Rendering Index (CRI)	83		
R _g	16		
Duv	0.000192		
S/P Ratio*	1.51		

Electrical Measurements	Sphere		Goniophotometer		
	120V	277V	120V	277V	
Input Wattage	38.51	38.16	38.59	38.18	W
Input Current	0.32	0.15	0.33	0.15	A
Input Voltage	120.03	277.03	120.05	277.00	V
Power Factor	0.989	0.909	0.989	0.906	
Off-State Power	0	0	0	0	W
Total Harmonic Distortion (Voltage)	0.06	0.06	0.07	0.07	%
Total Harmonic Distortion (Amperage)	8.63	21.30	8.41	21.01	%

Note: All photometric measurements taken at 120VAC.

Luminous Intensity Distribution	Goniophotometer	
Maximum Candela	1362.9	Cd
Horizontal Angle of Max Candela	67.5	°
Vertical Angle of Max Candela	2.5	°
Zonal Lumens (0° – 30°)	1047.7 (20.7%)	lm (%)
Zonal Lumens (0° – 40°)	1725.8 (34.1%)	lm (%)
Zonal Lumens (0° – 60°)	3133.5 (62%)	lm (%)
Zonal Lumens (60° – 90°)	1390.2 (27.5%)	lm (%)
Color Angular Uniformity	NA	

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	40	37	min
Total Operating Time (Stabilization + Test)	40	57	min
Ambient Temperature	25.9	25.8	°C

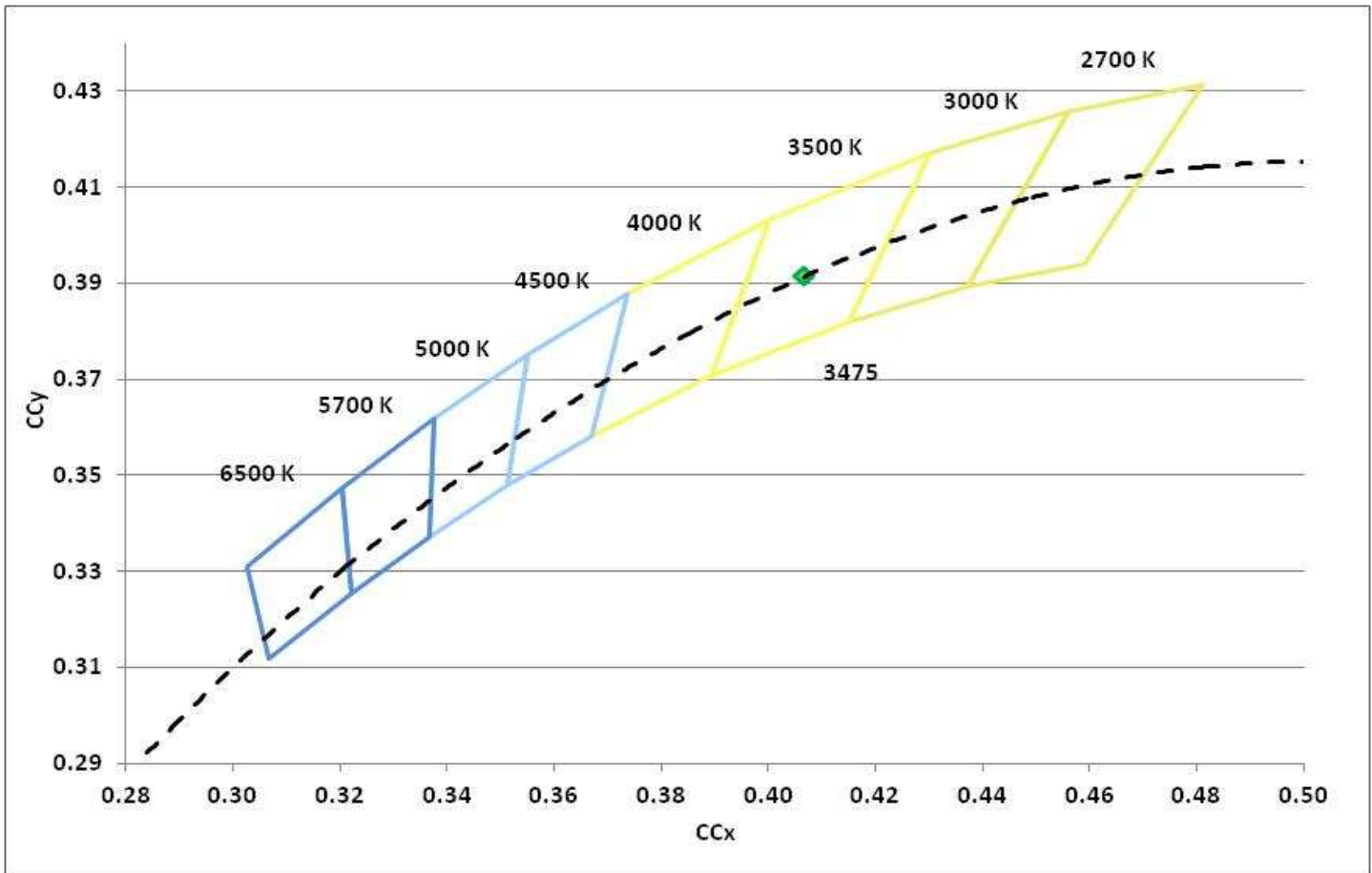
Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.4067	0.3917	0.2362	0.3413	0.2362	0.5119	0.000192

Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
83	82	89	95	82	81	85	86	66	16	74	80	62	84	97

Chromaticity Diagram



Spectral Distribution

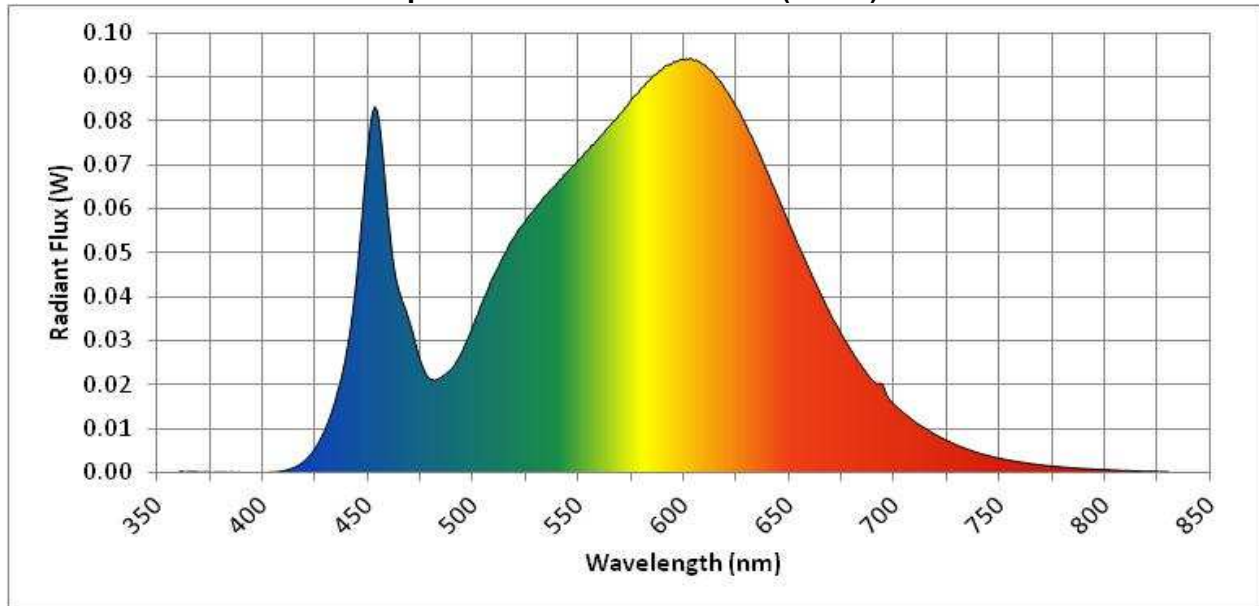
λ (nm)	W/nm
360	0.000242
370	0.000186
380	0.000110
390	0.000001
400	0.000021
410	0.000508
420	0.002890
430	0.010525
440	0.028459
450	0.074871
460	0.055126
470	0.033523
480	0.021185
490	0.023895
500	0.033651
510	0.045177
520	0.054010

λ (nm)	W/nm
530	0.060637
540	0.066096
550	0.071235
560	0.076406
570	0.081781
580	0.087515
590	0.091894
600	0.093815
610	0.092691
620	0.086887
630	0.078522
640	0.067952
650	0.056520
660	0.045748
670	0.035658
680	0.027381
690	0.020864

λ (nm)	W/nm
700	0.015475
710	0.011512
720	0.008543
730	0.006202
740	0.004495
750	0.003297
760	0.002396
770	0.001738
780	0.001271
790	0.000919
800	0.000642
810	0.000468
820	0.000332
830	0.000213

Dominant Wavelength	580	nm
Peak Wavelength:	603	nm

Spectral Power Distribution (W/nm)





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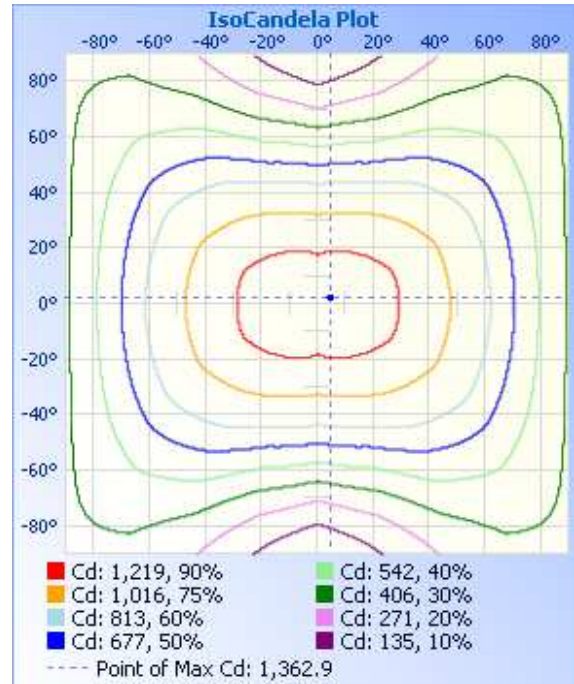
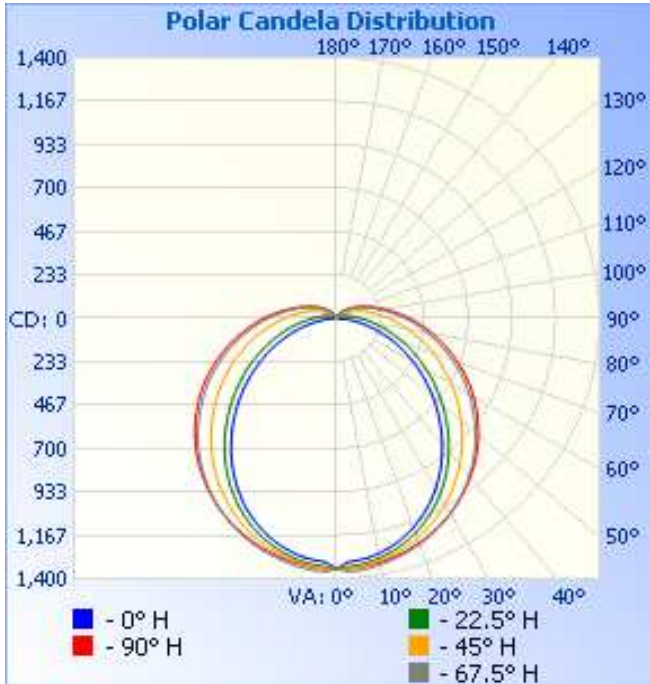
Zonal Lumen Summary **

Zone	Lumens	% of Total	Zone	Lumens	% of Total
0-5	32.1	0.6%	90-95	121.0	2.4%
5-10	95.1	1.9%	95-100	97.8	1.9%
10-15	154.9	3.1%	100-105	78.3	1.5%
15-20	209.7	4.1%	105-110	61.8	1.2%
20-25	258.0	5.1%	110-115	48.2	1%
25-30	298.0	5.9%	115-120	37.1	0.7%
30-35	328.7	6.5%	120-125	28.0	0.6%
35-40	349.4	6.9%	125-130	20.7	0.4%
40-45	359.9	7.1%	130-135	14.8	0.3%
45-50	360.4	7.1%	135-140	10.1	0.2%
50-55	351.9	7.0%	140-145	6.6	0.1%
55-60	335.5	6.6%	145-150	4.1	0.1%
60-65	312.3	6.2%	150-155	2.2	0%
65-70	283.1	5.6%	155-160	1.0	0%
70-75	249.9	4.9%	160-165	0.4	0%
75-80	215.1	4.3%	165-170	0.1	0%
80-85	180.8	3.6%	170-175	0.0	0%
85-90	148.9	2.9%	175-180	0.0	0%
			Total	5056 lm	100%

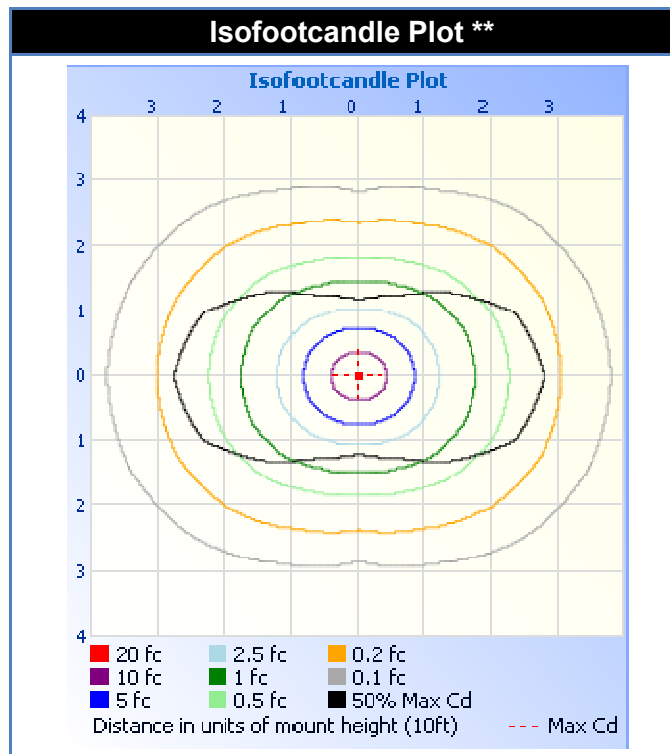
Spacing Criteria **

Spacing Criterion (0 - 180)	1.18
Spacing Criterion (90 - 270)	1.36
Spacing Criterion (Diagonal)	1.42

Candela Plots **



Isofootcandle Plot **





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Candela Tabulations **

	0	22.5	45	67.5	90
0	1346	1346	1346	1346	1346
2.5	1311	1336	1345	1363	1346
5	1306	1330	1340	1360	1343
7.5	1297	1321	1332	1354	1338
10	1284	1308	1322	1345	1330
12.5	1267	1292	1309	1334	1321
15	1247	1274	1294	1321	1310
17.5	1223	1252	1276	1308	1298
20	1196	1227	1256	1293	1284
22.5	1165	1200	1234	1275	1268
25	1132	1168	1210	1255	1250
27.5	1096	1135	1183	1234	1232
30	1056	1098	1154	1211	1211
32.5	1014	1059	1123	1186	1189
35	970	1018	1091	1159	1164
37.5	923	975	1057	1131	1138
40	875	930	1021	1100	1110
42.5	826	885	984	1069	1081
45	777	837	946	1036	1051
47.5	727	789	907	1002	1019
50	677	741	868	966	985
52.5	627	693	827	929	951
55	576	646	788	892	916
57.5	525	600	748	855	879
60	475	554	708	817	843
62.5	427	509	668	778	806
65	378	465	628	738	767
67.5	331	421	589	698	726
70	284	379	550	658	686
72.5	240	340	511	618	647
75	198	302	473	579	608
77.5	158	266	436	541	568
80	120	233	401	504	530
82.5	86	203	368	468	493
85	54	176	337	434	458
87.5	26	152	308	401	424
90	4	131	280	368	390



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Candela Tabulations (Continued) **

	0	22.5	45	67.5	90
92.5	0	113	254	337	357
95	0	97	230	307	325
97.5	0	83	207	279	296
100	0	72	186	254	270
102.5	0	62	168	231	246
105	0	53	150	210	223
107.5	0	46	135	190	203
110	0	40	120	171	184
112.5	0	35	107	155	166
115	0	30	95	140	151
117.5	0	26	84	125	136
120	0	22	75	112	123
122.5	0	20	66	101	111
125	0	16	58	90	99
127.5	0	14	51	80	88
130	0	12	45	71	79
132.5	0	9	39	63	70
135	0	8	33	55	62
137.5	0	6	28	48	54
140	0	4	23	41	47
142.5	0	3	20	36	40
145	0	2	16	30	35
147.5	0	2	13	26	30
150	0	1	10	21	25
152.5	0	1	7	17	20
155	0	0	6	13	17
157.5	0	0	4	8	13
160	0	0	3	6	9
162.5	0	0	2	3	6
165	0	0	1	2	4
167.5	0	0	0	1	2
170	0	0	0	0	1
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 G141
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.

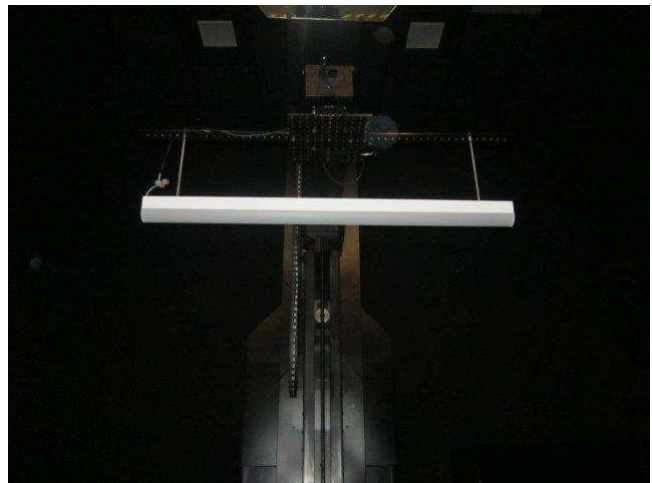
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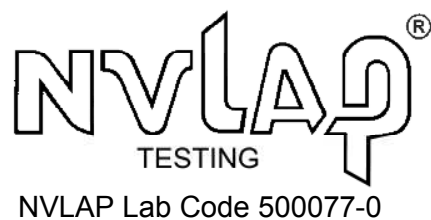
The photos below are intended to show the orientation and fixturing/set-up of the units under test. These are critical to understanding the results of the test given the sensitivity of many products and measurement systems to orientation and set-up considerations, and also for reproducing the conditions of the test.

Sphere Picture



Goniophotometer Picture





Document Revision History:

Each subsequent revision of this report replaces the preceding report.

Date	Rev	DCN #	Change Details	By	Approval
11/2/16	A	DMS	Origination	A. Gressel	C. McLaurin