

Report Number: PL09629-001A
Model: LS4-25L-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)	LS4-25L-35K-10V-FD
Serial Number	WK18Y20937
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
<p>The following sample was submitted for evaluation</p> 



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Key Photometric Data	Sphere Output	Goniophotometer	
Luminous Flux	2423.0	2369	lm
Efficacy	133.79	130.52	lm/W
Correlated Color Temperature (CCT)	3411	K	
Color Rendering Index (CRI)	84		
R ₉	18		
Duv	0.000247		
S/P Ratio*	1.48		

Electrical Measurements	Sphere		Goniophotometer		
	120V	277V	120V	277V	
Input Wattage	18.11	18.12	18.15	18.09	W
Input Current	0.15	0.07	0.15	0.07	A
Input Voltage	120.03	277.02	120.04	277.09	V
Power Factor	0.988	0.934	0.986	0.930	
Off-State Power	0	0	0	0	W
Total Harmonic Distortion (Voltage)	0.05	0.05	0.09	0.11	%
Total Harmonic Distortion (Amperage)	9.64	15.57	9.58	15.53	%

Note: All photometric measurements taken at 120VAC.

Luminous Intensity Distribution	Goniophotometer	
Maximum Candela	643.5	Cd
Horizontal Angle of Max Candela	67.5	°
Vertical Angle of Max Candela	2.5	°
Zonal Lumens (0° – 30°)	494.4 (20.9%)	lm (%)
Zonal Lumens (0° – 40°)	813.8 (34.4%)	lm (%)
Zonal Lumens (0° – 60°)	1474.6 (62.2%)	lm (%)
Zonal Lumens (60° – 90°)	648.3 (27.4%)	lm (%)
Color Angular Uniformity	NA	

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	45	36	min
Total Operating Time (Stabilization + Test)	45	56	min
Ambient Temperature	25.3	24.0	°C

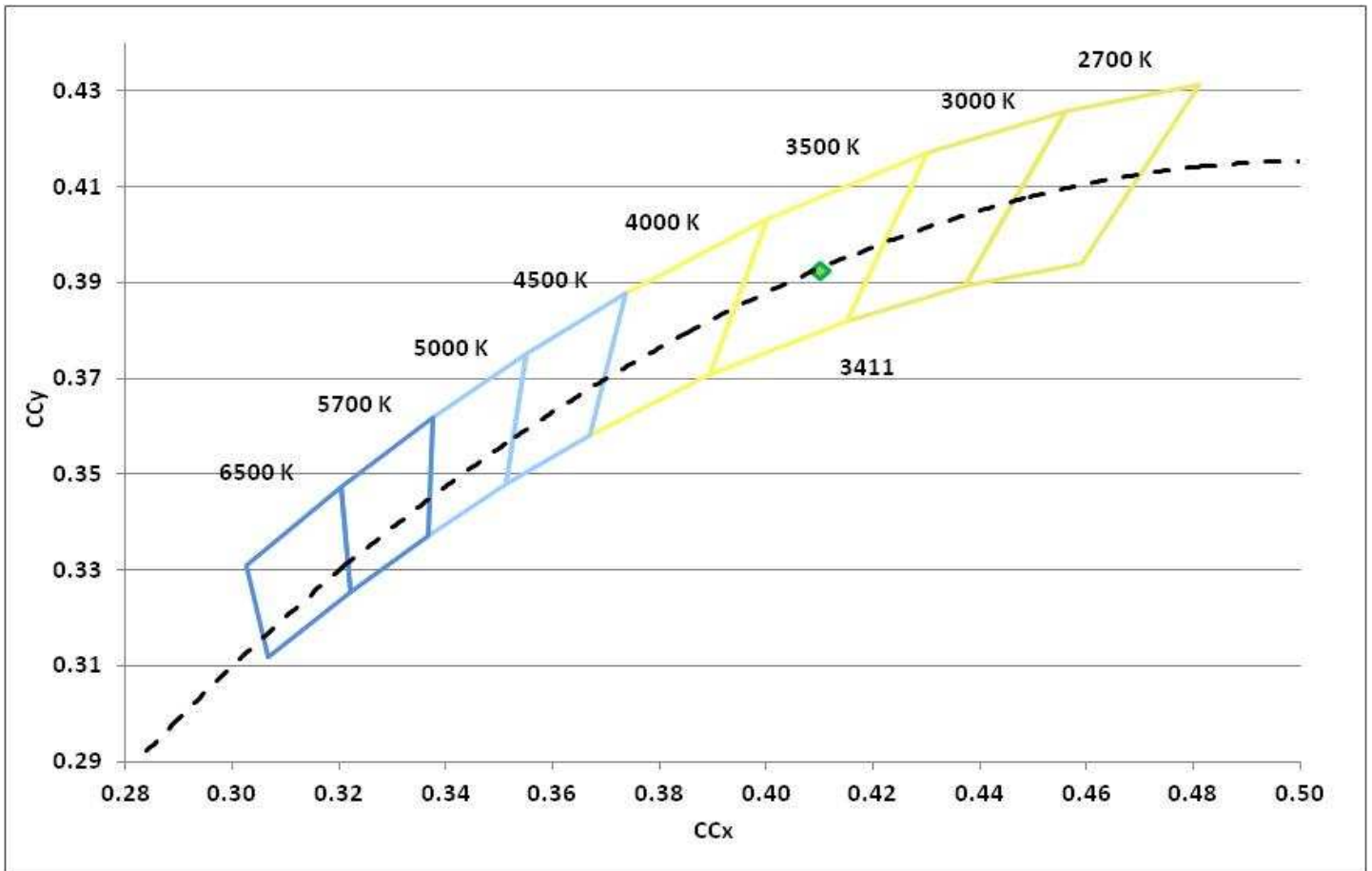
Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.4101	0.3926	0.2380	0.3418	0.2380	0.5127	0.000247

Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
84	82	90	95	82	82	86	86	66	18	75	80	63	84	97

Chromaticity Diagram



Spectral Distribution

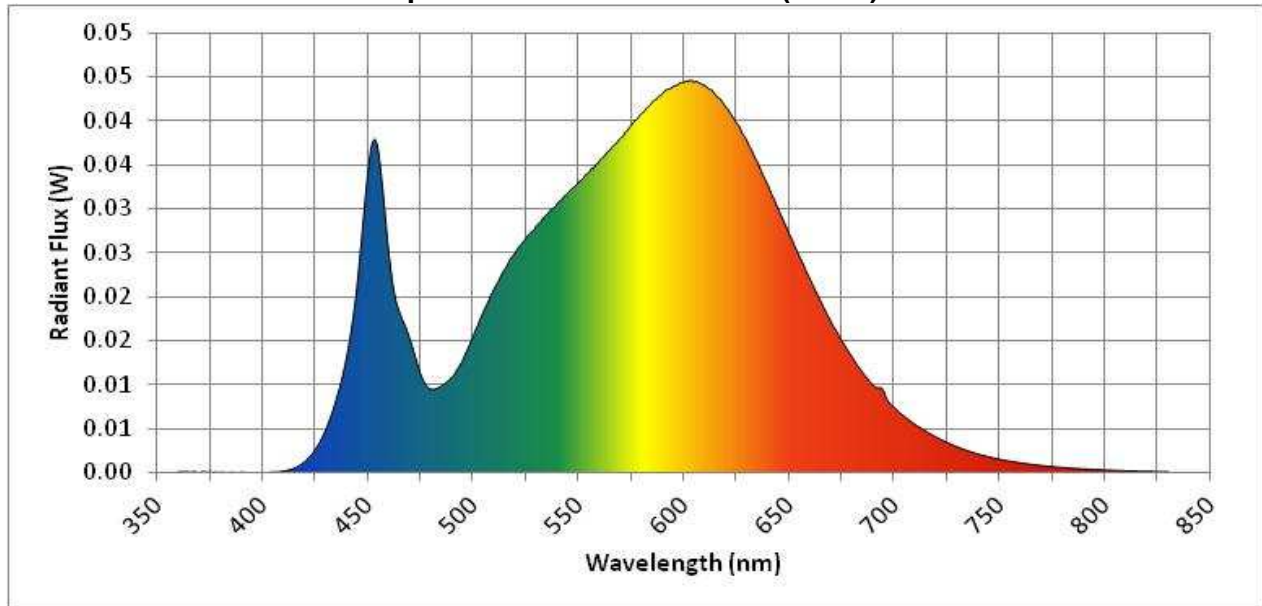
λ (nm)	W/nm
360	0.000114
370	0.000053
380	0.000080
390	0.000068
400	0.000012
410	0.000206
420	0.001308
430	0.005038
440	0.013610
450	0.034740
460	0.024215
470	0.014925
480	0.009500
490	0.010927
500	0.015612
510	0.021049
520	0.025109

λ (nm)	W/nm
530	0.028147
540	0.030704
550	0.033107
560	0.035570
570	0.038087
580	0.040897
590	0.043199
600	0.044415
610	0.044090
620	0.041533
630	0.037665
640	0.032627
650	0.027150
660	0.021968
670	0.017091
680	0.013096
690	0.009903

λ (nm)	W/nm
700	0.007363
710	0.005444
720	0.004026
730	0.002919
740	0.002095
750	0.001526
760	0.001116
770	0.000813
780	0.000587
790	0.000425
800	0.000301
810	0.000219
820	0.000135
830	0.000102

Dominant Wavelength	581	nm
Peak Wavelength:	603	nm

Spectral Power Distribution (W/nm)





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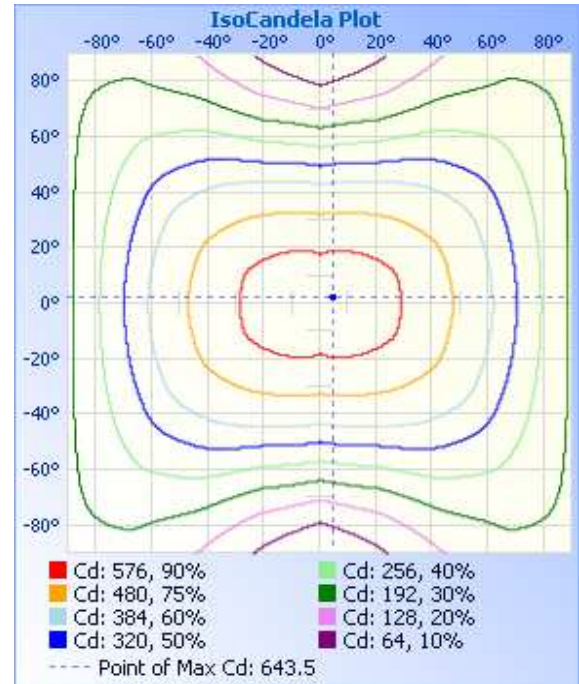
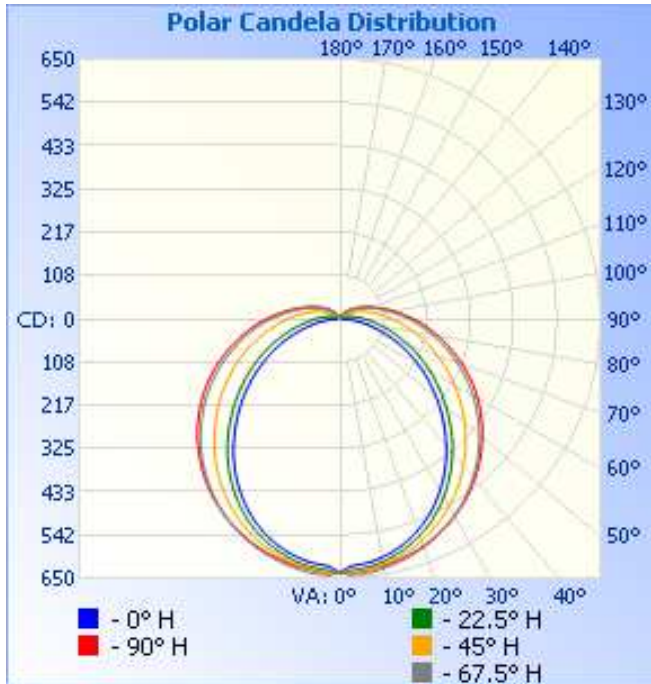
Zonal Lumen Summary **

Zone	Lumens	% of Total	Zone	Lumens	% of Total
0-5	15.2	0.6%	90-95	56.1	2.4%
5-10	44.9	1.9%	95-100	45.3	1.9%
10-15	73.1	3.1%	100-105	36.2	1.5%
15-20	99.0	4.2%	105-110	28.5	1.2%
20-25	121.7	5.1%	110-115	22.3	0.9%
25-30	140.5	5.9%	115-120	17.1	0.7%
30-35	154.9	6.5%	120-125	12.9	0.5%
35-40	164.5	6.9%	125-130	9.5	0.4%
40-45	169.2	7.1%	130-135	6.8	0.3%
45-50	169.3	7.1%	135-140	4.7	0.2%
50-55	165.1	7.0%	140-145	3.0	0.1%
55-60	157.2	6.6%	145-150	1.9	0.1%
60-65	146.2	6.2%	150-155	1.0	0%
65-70	132.3	5.6%	155-160	0.5	0%
70-75	116.6	4.9%	160-165	0.2	0%
75-80	100.2	4.2%	165-170	0.0	0%
80-85	84.1	3.5%	170-175	0.0	0%
85-90	69.1	2.9%	175-180	0	0%
Total			2369 lm		100%

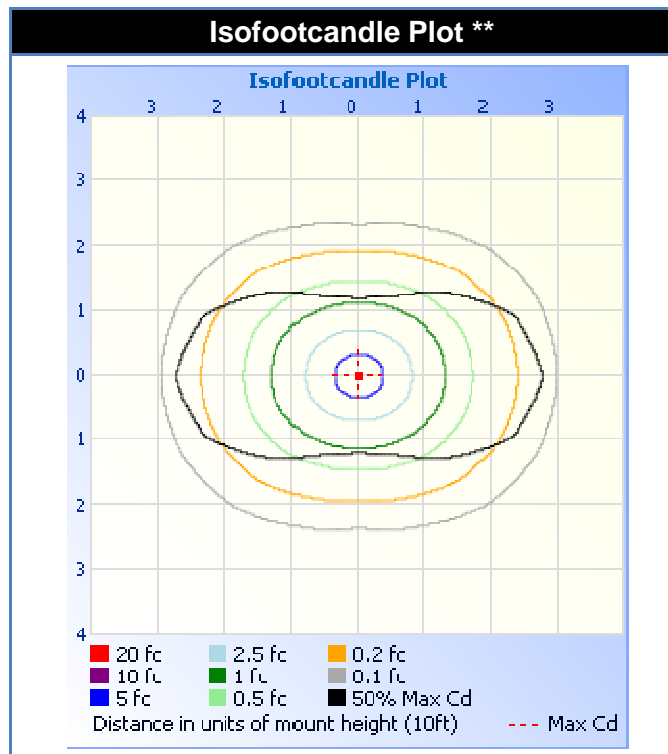
Spacing Criteria **

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	636	636	636	636	636
2.5	620	631	636	644	636
5	618	628	633	642	635
7.5	613	624	630	639	632
10	607	618	624	635	628
12.5	599	610	618	630	624
15	590	601	611	623	619
17.5	578	591	602	617	613
20	565	579	593	610	606
22.5	551	566	582	602	599
25	535	551	570	592	590
27.5	517	535	557	582	582
30	498	517	543	571	572
32.5	479	498	529	559	561
35	458	479	513	546	549
37.5	436	458	497	532	537
40	413	437	480	518	523
42.5	389	415	462	503	509
45	366	393	444	487	495
47.5	342	370	425	471	480
50	318	347	406	454	464
52.5	294	324	387	437	448
55	271	302	368	419	431
57.5	247	280	350	401	414
60	224	258	330	383	396
62.5	201	237	312	365	379
65	178	216	293	346	360
67.5	155	195	274	327	342
70	133	176	256	308	323
72.5	112	157	238	289	304
75	92	139	220	271	285
77.5	74	122	203	253	267
80	56	107	186	235	249
82.5	40	93	171	219	231
85	25	80	156	203	215
87.5	11	69	142	187	199
90	1	59	130	172	182



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Candela Tabulations (Continued) **

	0	22.5	45	67.5	90
92.5	0	51	118	157	167
95	0	43	106	143	152
97.5	0	37	95	131	138
100	0	32	86	119	126
102.5	0	27	77	108	115
105	0	24	69	97	104
107.5	0	20	62	88	94
110	0	18	55	80	86
112.5	0	15	49	72	78
115	0	13	44	65	70
117.5	0	11	39	58	64
120	0	10	34	52	57
122.5	0	8	30	47	52
125	0	7	27	42	46
127.5	0	6	23	37	41
130	0	5	20	33	37
132.5	0	4	18	29	33
135	0	3	15	26	29
137.5	0	2	13	22	25
140	0	2	11	19	22
142.5	0	1	9	16	19
145	0	1	7	14	16
147.5	0	1	6	12	14
150	0	0	5	10	12
152.5	0	0	3	8	10
155	0	0	3	6	8
157.5	0	0	2	4	6
160	0	0	1	3	4
162.5	0	0	1	2	3
165	0	0	0	1	2
167.5	0	0	0	0	1
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 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.

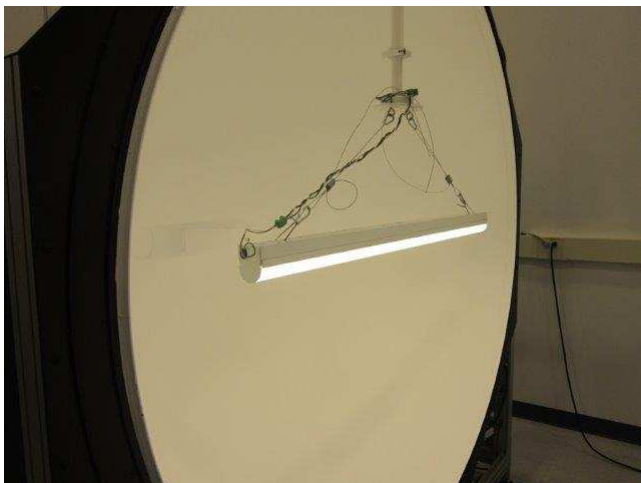
** In the event that testing is subcontracted, test results in this report marked with the symbol **, or noted as "Goniophotometer", were performed by the subcontracted laboratory identified in the footer on the first page of this report. Subcontracted testing is strictly goniophotometer based. All other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

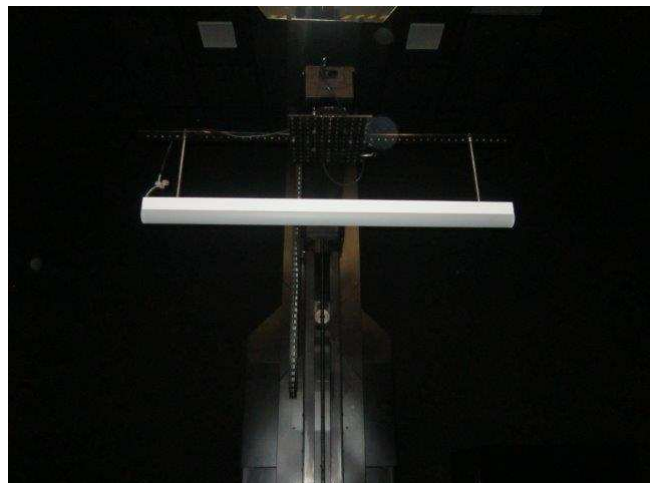
Additional Comments:

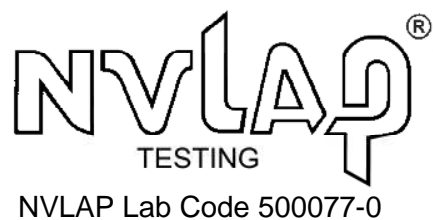
The photos below are intended to show the orientation and fixturing/set-up of the units under test. These are critical to understanding the results of the test given the sensitivity of many products and measurement systems to orientation and set-up considerations, and also for reproducing the conditions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