

Report Number: PL09630-001A
Model: LS4-25L-40K-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-40K-10V-FD
Serial Number	WK10Y14291
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





NVLAP Lab Code 500077-0

Key Photometric Data	Sphere Output	Goniophotometer	
Luminous Flux	2481.0	2425	lm
Efficacy	133.24	130.10	lm/W
Correlated Color Temperature (CCT)	3991	K	
Color Rendering Index (CRI)	82		
R ₉	14		
Duv	0.000813		
S/P Ratio*	1.64		

Electrical Measurements	Sphere		Goniophotometer		
	120V	277V	120V	277V	
Input Wattage	18.62	18.61	18.64	18.57	W
Input Current	0.16	0.07	0.16	0.07	A
Input Voltage	120.04	277.02	120.04	277.01	V
Power Factor	0.988	0.935	0.986	0.931	
Off-State Power	0	0	0	0	W
Total Harmonic Distortion (Voltage)	0.05	0.06	0.09	0.11	%
Total Harmonic Distortion (Amperage)	9.48	15.34	9.43	15.780	%

Note: All photometric measurements taken at 120VAC.

Luminous Intensity Distribution	Goniophotometer	
Maximum Candela	652.2	Cd
Horizontal Angle of Max Candela	67.5	°
Vertical Angle of Max Candela	2.5	°
Zonal Lumens (0° – 30°)	503.4 (20.8%)	lm (%)
Zonal Lumens (0° – 40°)	831.1 (34.3%)	lm (%)
Zonal Lumens (0° – 60°)	1514.5 (62.5%)	lm (%)
Zonal Lumens (60° – 90°)	669.8 (27.6%)	lm (%)
Color Angular Uniformity	NA	

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	43	30	min
Total Operating Time (Stabilization + Test)	43	50	min
Ambient Temperature	25.2	25.6	°C

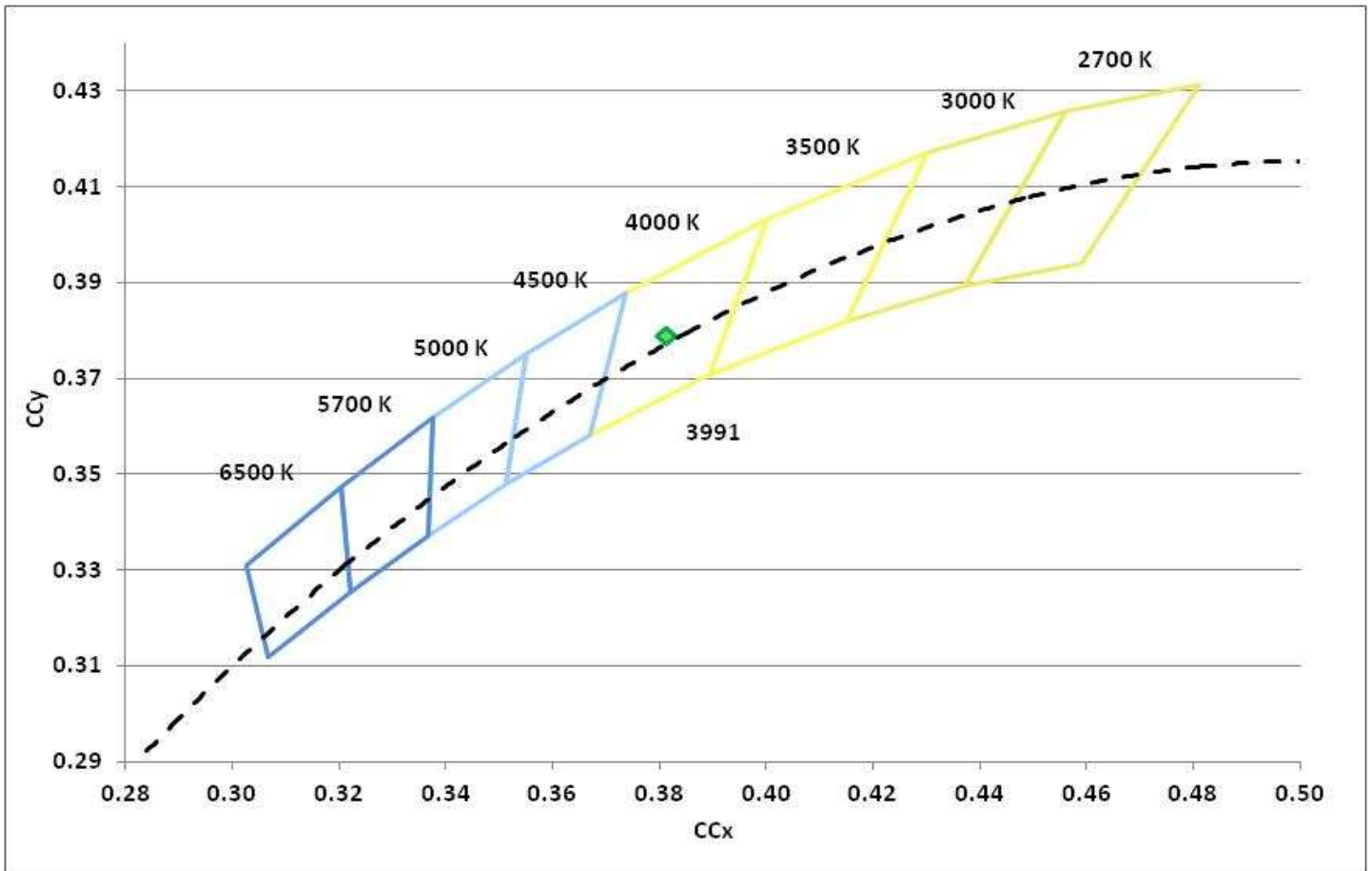
Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.3813	0.3790	0.2248	0.3352	0.2248	0.5027	0.000813

Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
82	81	87	90	82	80	81	87	68	14	67	80	57	82	94

Chromaticity Diagram



Spectral Distribution

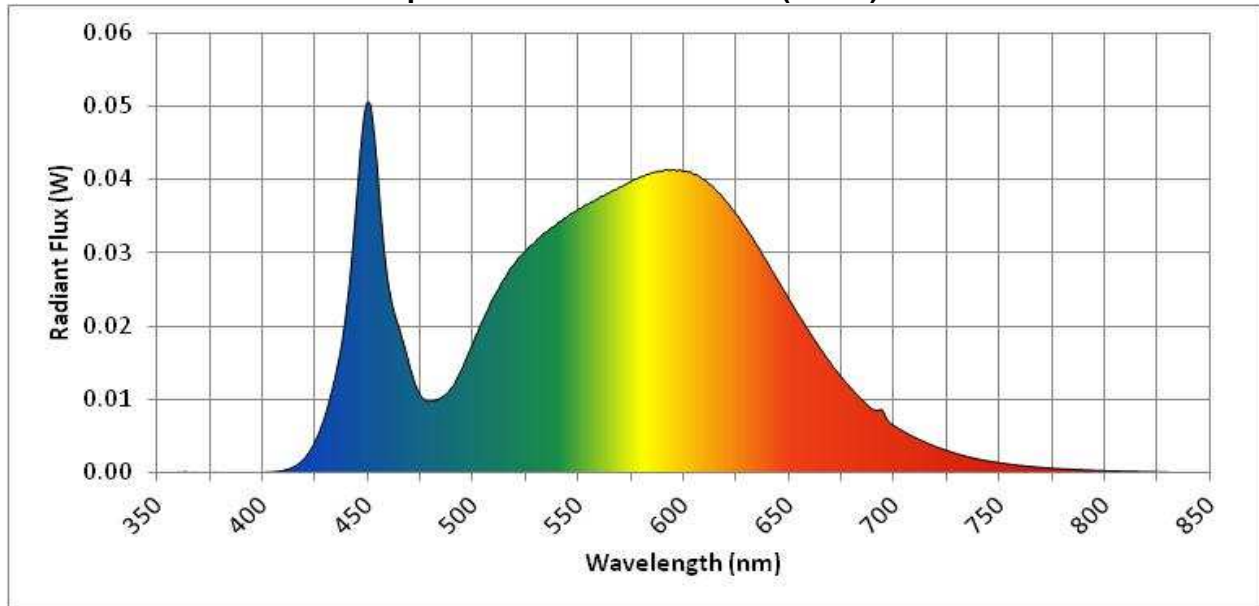
λ (nm)	W/nm
360	0.000101
370	0.000028
380	0.000026
390	0.000007
400	0.000034
410	0.000352
420	0.002106
430	0.008366
440	0.023330
450	0.050734
460	0.024829
470	0.014125
480	0.009779
490	0.011771
500	0.017936
510	0.024231
520	0.028778

λ (nm)	W/nm
530	0.031832
540	0.034183
550	0.036069
560	0.037706
570	0.039094
580	0.040530
590	0.041265
600	0.041164
610	0.040014
620	0.037084
630	0.033189
640	0.028557
650	0.023655
660	0.019046
670	0.014843
680	0.011385
690	0.008639

λ (nm)	W/nm
700	0.006414
710	0.004764
720	0.003522
730	0.002565
740	0.001855
750	0.001348
760	0.000987
770	0.000723
780	0.000514
790	0.000379
800	0.000274
810	0.000195
820	0.000126
830	0.000089

Dominant Wavelength	578	nm
Peak Wavelength:	450	nm

Spectral Power Distribution (W/nm)





NVLAP Lab Code 500077-0

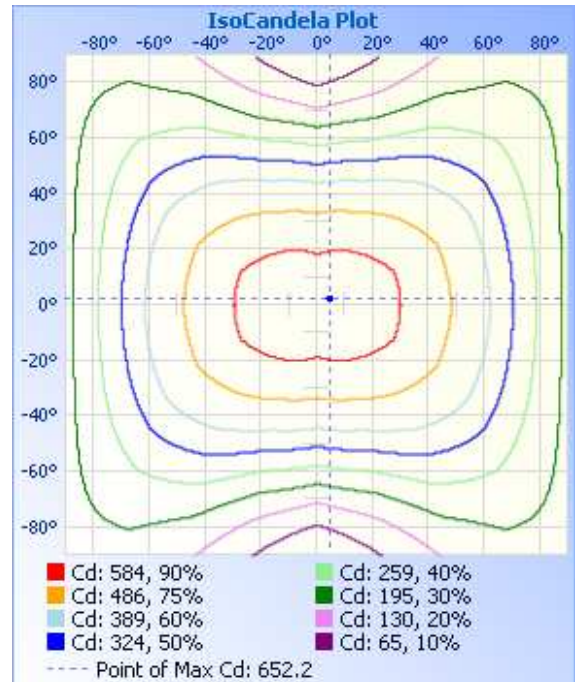
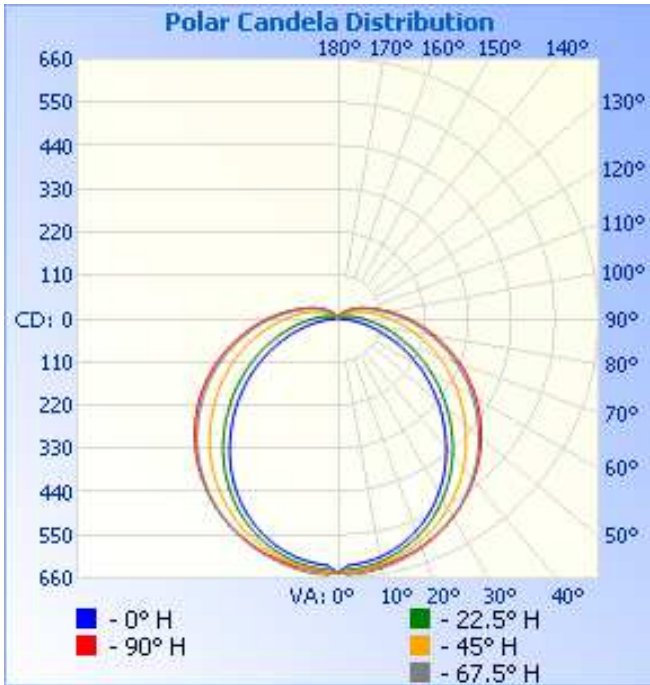
Zonal Lumen Summary **

Zone	Lumens	% of Total	Zone	Lumens	% of Total
0-5	15.4	0.6%	90-95	56.3	2.3%
5-10	45.5	1.9%	95-100	44.9	1.8%
10-15	74.3	3.1%	100-105	35.4	1.5%
15-20	100.7	4.2%	105-110	27.7	1.1%
20-25	124.0	5.1%	110-115	21.5	0.9%
25-30	143.6	5.9%	115-120	16.4	0.7%
30-35	158.7	6.5%	120-125	12.3	0.5%
35-40	169.0	7.0%	125-130	9.1	0.4%
40-45	174.4	7.2%	130-135	6.5	0.3%
45-50	174.9	7.2%	135-140	4.4	0.2%
50-55	170.9	7.0%	140-145	2.9	0.1%
55-60	163.2	6.7%	145-150	1.8	0.1%
60-65	151.8	6.3%	150-155	1.0	0%
65-70	137.3	5.7%	155-160	0.5	0%
70-75	120.8	5.0%	160-165	0.2	0%
75-80	103.4	4.3%	165-170	0.0	0%
80-85	86.2	3.6%	170-175	0.0	0%
85-90	70.2	2.9%	175-180	0	0%
			Total	2425 lm	100%

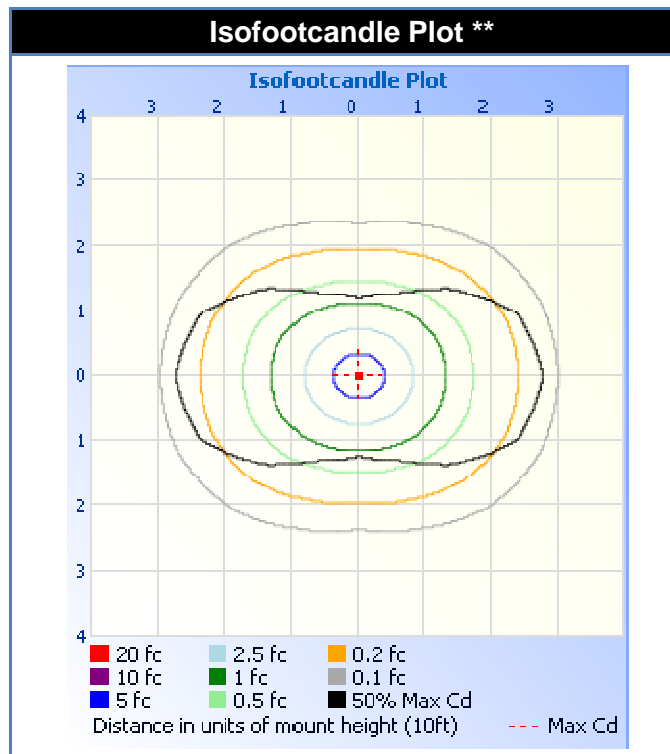
Spacing Criteria **

Spacing Criterion (0 - 180)	1.20
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	644	644	644	644	644
2.5	628	639	644	652	645
5	625	636	642	651	644
7.5	621	632	638	648	641
10	615	627	633	644	638
12.5	608	619	628	639	634
15	598	611	621	633	629
17.5	588	601	612	627	623
20	575	590	604	620	617
22.5	562	577	594	612	609
25	546	563	582	603	601
27.5	530	548	570	593	592
30	511	530	556	583	583
32.5	492	512	542	571	572
35	472	493	527	558	560
37.5	450	473	511	545	547
40	427	452	495	530	534
42.5	404	431	477	515	520
45	380	408	459	500	505
47.5	356	386	441	483	490
50	332	363	422	466	474
52.5	308	340	402	448	457
55	283	318	384	430	440
57.5	259	295	365	412	422
60	234	273	346	394	404
62.5	210	251	326	375	386
65	186	229	307	355	366
67.5	162	207	287	336	347
70	139	187	268	316	327
72.5	117	167	249	296	307
75	96	148	230	276	288
77.5	76	131	212	258	268
80	57	114	194	239	249
82.5	40	99	178	221	230
85	25	86	162	204	213
87.5	12	74	147	187	195
90	1	64	133	171	178



NVLAP Lab Code 500077-0

Candela Tabulations (Continued) **

	0	22.5	45	67.5	90
92.5	0	54	120	155	162
95	0	46	108	140	146
97.5	0	40	97	126	133
100	0	34	86	114	120
102.5	0	29	77	103	108
105	0	25	69	93	98
107.5	0	22	61	84	89
110	0	18	54	76	80
112.5	0	16	48	68	73
115	0	14	43	61	66
117.5	0	12	38	55	59
120	0	10	33	49	54
122.5	0	9	29	44	48
125	0	7	26	39	43
127.5	0	6	22	35	38
130	0	5	20	31	34
132.5	0	4	17	28	30
135	0	3	14	24	27
137.5	0	3	12	21	24
140	0	2	10	18	20
142.5	0	2	9	16	18
145	0	1	7	13	15
147.5	0	1	6	11	13
150	0	0	5	9	11
152.5	0	0	3	7	9
155	0	0	2	6	7
157.5	0	0	2	4	5
160	0	0	1	3	4
162.5	0	0	1	2	3
165	0	0	0	1	1
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



NVLAP Lab Code 500077-0

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.

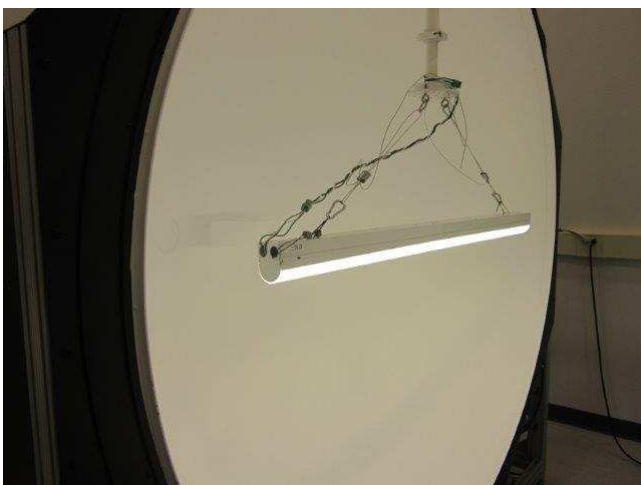
** In the event that testing is subcontracted, test results in this report marked with the symbol **, or noted as "Goniophotometer", were performed by the subcontracted laboratory identified in the footer on the first page of this report. Subcontracted testing is strictly goniophotometer based. All other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

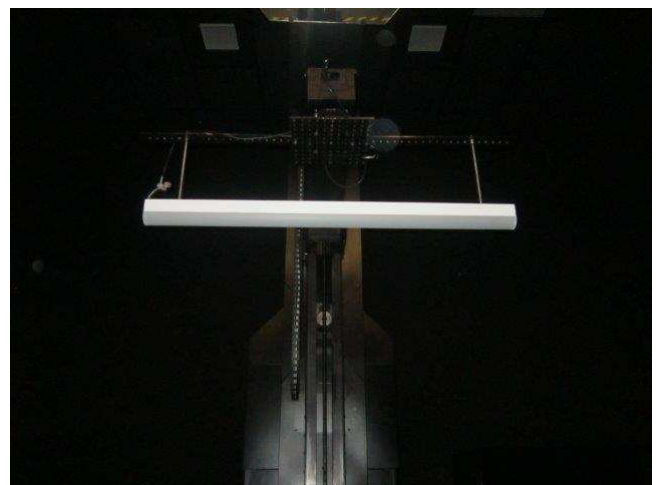
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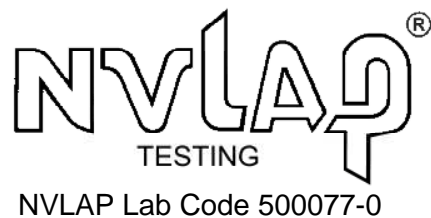
The photos below are intended to show the orientation and fixturing/set-up of the units under test. These are critical to understanding the results of the test given the sensitivity of many products and measurement systems to orientation and set-up considerations, and also for reproducing the conditions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