

**Report Number:** PL13012-001A  
**Model:** HXB-C-xx-70L-M-50K-7-UL-xx-xxx  
**Date:** 8/14/2018

## 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)	HXB-C-xx-70L-M-50K-7-UL-xx-xxx
Serial Number	PL13012-001
LED Type	MHD-E

### Product Description

Extruded aluminum enclosure with finned aluminum heat sink, gray polymeric housing, white polymeric reflector, and clear polymeric optical lens covering LEDs

### Driver Information (Where Applicable)

Philips XI300C150V300BSR1

Length	Width	Height
18.5"	18.5"	26"

### Sample

The following sample was submitted for evaluation



Key Photometric Data	Sphere Output	Goniophotometer	
Luminous Flux	69591.0	69686.0	lm
Efficacy	143.93	144.45	lm/W
Correlated Color Temperature (CCT)	4789		
Color Rendering Index (CRI)	72		
R <sub>9</sub>	-24		
Duv	0.003307		
S/P Ratio*	1.71		
CIE Type	Direct		
Color Angular Uniformity	N/A		

	Sphere		Goniophotometer		
Electrical Measurements	120V	277V	120V	277V	
Input Wattage	483.50	479.00	482.41	478.10	W
Input Current	4.04	1.78	4.03	1.78	A
Input Voltage	120.06	277.07	120.03	277.10	V
Power Factor	0.996	0.969	0.997	0.970	
Off-State Power	0	0	0	0	W
Total Harmonic Distortion (Voltage)	0.22	0.11	0.14	0.10	%
Total Harmonic Distortion (Amperage)	6.20	7.41	5.28	6.06	%

**Note:** All photometric measurements taken at 120VAC.

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	60	50	min
Total Operating Time (Stabilization + Test)	80	70	min
Ambient Temperature	25.1	24.6	°C

#### Spacing Criteria

Spacing Criterion (0 - 180)	1.32
Spacing Criterion (90 - 270)	1.30
Spacing Criterion (Diagonal)	1.44

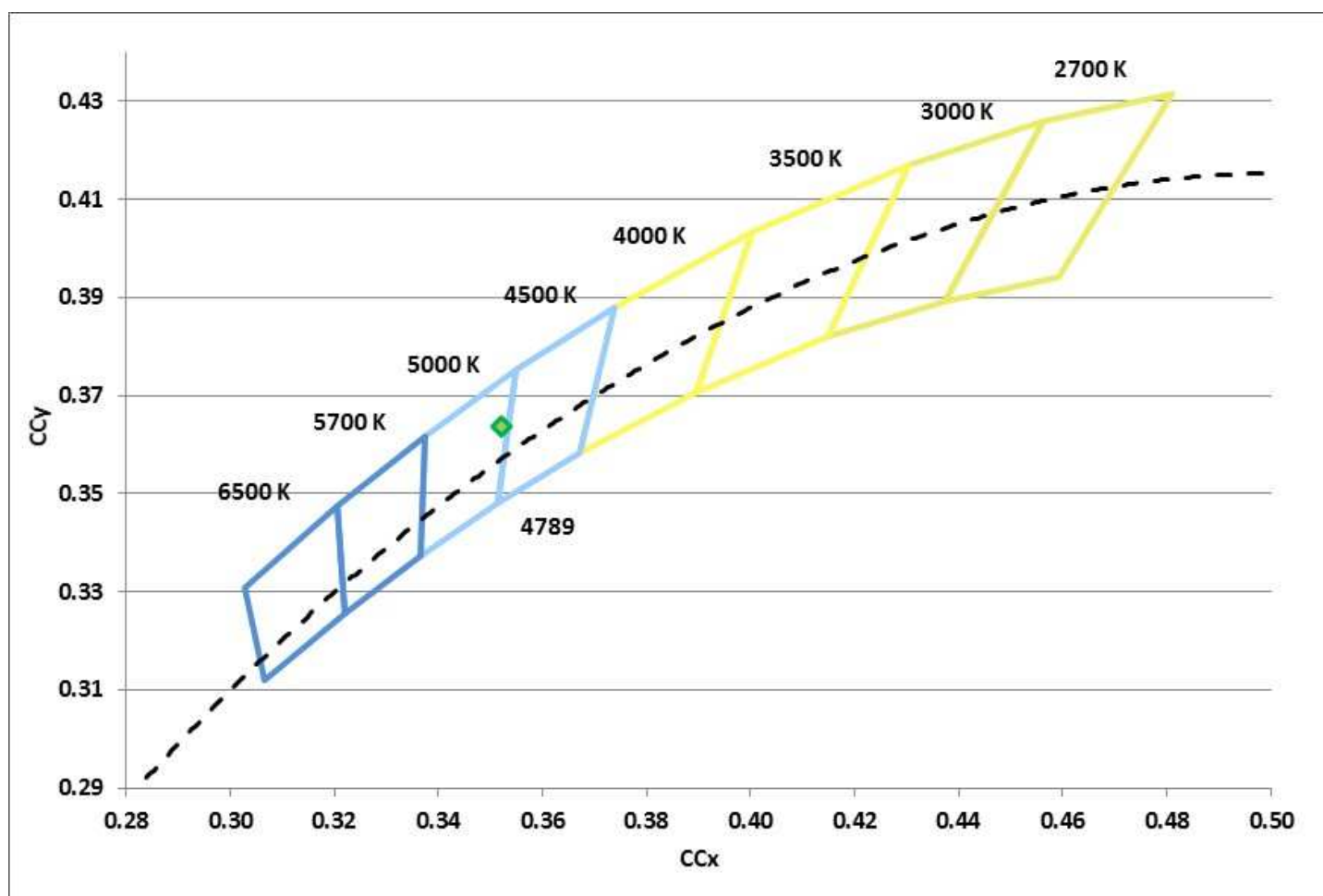
### Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.3521	0.3638	0.2114	0.3277	0.2114	0.4915	0.003307

### Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
72	70	77	81	72	69	67	83	58	-24	44	67	35	71	89

### Chromaticity Diagram



## **Spectral Distribution**

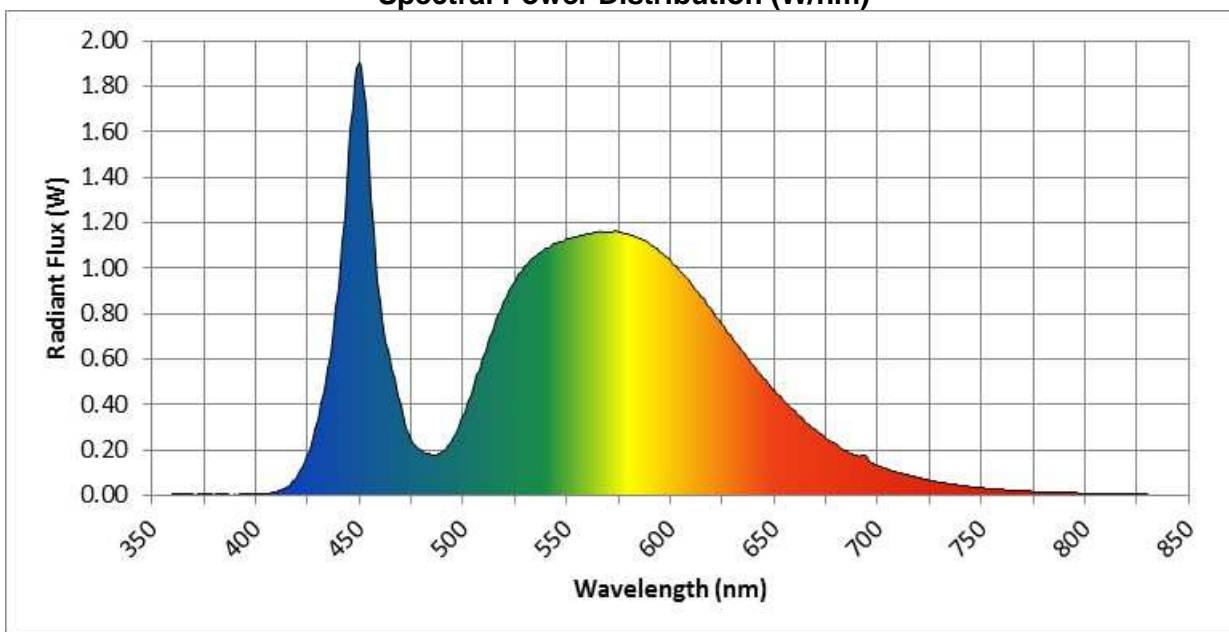
$\lambda(\text{nm})$	W/nm
360	0.003232
370	0.003847
380	0.002684
390	0.003726
400	0.004537
410	0.015284
420	0.083267
430	0.328856
440	0.908762
450	1.903457
460	0.845926
470	0.393181
480	0.194584
490	0.189394
500	0.344698
510	0.607408
520	0.852356

$\lambda(\text{nm})$	W/nm
530	1.006546
540	1.084589
550	1.125886
560	1.150857
570	1.158878
580	1.148310
590	1.110777
600	1.034270
610	0.933385
620	0.814955
630	0.693201
640	0.572720
650	0.465115
660	0.370336
670	0.288955
680	0.222400
690	0.173000

$\lambda(\text{nm})$	W/nm
700	0.131436
710	0.099975
720	0.076702
730	0.057800
740	0.043086
750	0.032935
760	0.024801
770	0.019277
780	0.014870
790	0.011926
800	0.008954
810	0.007280
820	0.005640
830	0.004950

<b>Dominant Wavelength</b>	572	nm
<b>Peak Wavelength</b>	450	nm

## **Spectral Power Distribution (W/nm)**



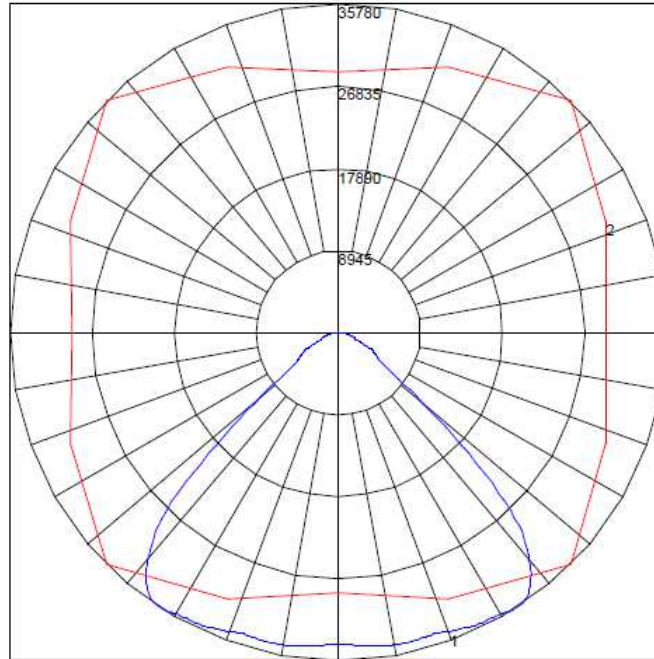
### Zonal Lumen Summary

Zone	Lumens	% of Total	Zone	Lumens
0-20	12886.29	18.5	0-10	3273.6
0-30	28144.57	40.4	10-20	9612.69
0-40	47222.05	67.8	20-30	15258.29
0-60	64230.12	92.2	30-40	19077.47
0-80	69130.36	99.2	40-50	12050.16
0-90	69619.96	99.9	50-60	4957.91
10-90	66346.36	95.2	60-70	3218.35
20-40	34335.75	49.3	70-80	1681.89
20-50	46385.91	66.6	80-90	489.6
40-70	20226.42	29	90-100	0.81
60-80	4900.25	7	100-110	0
70-80	1681.89	2.4	110-120	0
80-90	489.6	0.7	120-130	0.02
90-110	0.81	0	130-140	5.49
90-120	0.81	0	140-150	15.53
90-130	0.84	0	150-160	20.21
90-150	21.85	0	160-170	17.3
90-180	66.46	0.1	170-180	7.1
110-180	65.64	0.1		
<b>Total</b>	<b>69686.42 lm</b>	<b>100%</b>		

### Luminance Data (Cd./Sq.M)

Average in Degrees	Average 0-Deg	Average 45-Deg	Average 90-Deg
45	80871	214960	91427
55	57010	61754	57157
65	45948	46500	49579
75	47360	31486	46228
85	37404	25850	40005

### Candela Plots



Maximum Candela = 35779.8 Located At Horizontal Angle = 45, Vertical Angle = 33  
# 1 - Vertical Plane Through Horizontal Angles (45 - 225) (Through Max. Cd.)  
# 2 - Horizontal Cone Through Vertical Angle (33) (Through Max. Cd.)

### Coefficients of Utilization

RC	80				70				50			30			10			0
RW	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
0	119	119	119	119	116	116	116	116	111	111	111	106	106	106	102	102	102	100
1	111	108	104	101	109	105	102	100	101	99	96	97	95	94	94	92	91	89
2	103	97	91	87	101	95	90	86	92	88	84	89	85	82	86	83	80	78
3	96	88	81	76	94	86	80	75	83	78	74	81	76	73	78	74	71	69
4	89	79	72	67	87	78	71	66	76	70	65	74	69	64	72	67	64	62
5	83	72	65	59	81	71	64	59	69	63	58	67	62	58	66	61	57	55
6	78	66	58	53	76	65	58	53	64	57	52	62	56	52	61	55	51	50
7	73	61	53	48	71	60	53	48	59	52	47	57	51	47	56	51	47	45
8	68	56	48	43	66	55	48	43	54	48	43	53	47	43	52	46	42	41
9	64	52	44	39	62	51	44	39	50	44	39	49	43	39	48	43	39	37
10	60	48	41	36	59	47	41	36	47	40	36	46	40	36	45	39	36	34

### Candela Tabulations

	0	22.5	45	67.5	90
0	34052.9	34052.9	34052.9	34052.9	34052.9
2.5	33917.4	34197.9	34151.6	34123.3	33986.9
5	34094.8	34421.1	34376.1	34191.7	33943.6
7.5	34320.2	34633.8	34560	34177.6	33855.9
10	33979.6	34565	34638.8	34202.5	33725.8
12.5	33216.4	34066.5	34632.6	34289.2	33623.6
15	32961.3	33662.6	34544	34322.9	33393.1
17.5	32728.5	33624.6	34529.6	34187.2	33031.8
20	31812	33405.6	34765.9	34009.6	32407.7
22.5	30827.2	32955.3	35004.3	33733.5	31748.7
25	30501.2	32681	35226.3	33306.2	31063.8
27.5	30034.8	32561	35350	32882.6	30382.1
30	29567.2	32229.1	35450.8	32398.3	29593.4
32.5	29175	31686.2	35756.4	31585.2	28640.8
35	28115.5	31162.5	35597.3	30353.6	27331
37.5	25503.8	29173.7	34387.8	28319.6	25117.3
40	20987.2	25382.4	32361.3	24877.8	20811
42.5	15084.1	19580.5	29531	19355.8	15425.6
45	9307.5	13041	24740	13390	10522.4
47.5	6899.2	8186.8	18010.5	8789.3	7526.1
50	6334.9	6272.6	12002.1	6387.9	6391.5
52.5	5873.1	5682.1	7739.1	5615.8	5879
55	5322.3	5140.6	5765.2	5122	5336
57.5	4783.8	4586.7	5026.9	4647.7	4779.9
60	4202.7	4171.6	4532.7	4241.7	4294.6
62.5	3636	3744.9	3942.9	3771.9	3822.4
65	3160.6	3220.3	3198.6	3223.2	3410.4
67.5	2784.2	2715	2504.6	2727.9	3018
70	2530.3	2265.3	1982.9	2295	2658.6
72.5	2284.7	1862.4	1617.5	1888.3	2315.1
75	1995.1	1518.3	1326.4	1513.8	1947.4
77.5	1631.8	1218.5	1061.1	1186.1	1549
80	1226.8	944.2	810.4	897.4	1177.5
82.5	870.3	681.4	580.4	647.3	877.4
85	530.6	424.9	366.7	420.7	567.5
87.5	224	183.2	166.9	182.1	239.4
90	8	16.2	24.1	25.9	30.2



### 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	0.3	1.1	0.2	0
132.5	1.3	3.4	4.6	3.2	1.2
135	5.3	7.4	8.7	7.1	5.1
137.5	9.5	11.4	12.3	11.7	9.7
140	14	15.7	16.7	15.9	14
142.5	19	20.4	21.3	20.4	19.1
145	24	25.1	26.2	25	23.9
147.5	29.1	29.8	30.6	30	29.1
150	34.4	34.5	35.3	34.8	34.4
152.5	39.3	39.4	40.1	39.7	39.3
155	44.3	44.4	44.6	44.4	44.5
157.5	48.8	48.6	49	48.9	48.6
160	53.7	53.3	53.6	53.2	53
162.5	58.1	58.2	58.3	57.9	57.7
165	62.2	62.4	62.4	62.3	62
167.5	65.9	65.9	65.8	65.8	65.5
170	68.8	68.7	68.6	68.5	68.5
172.5	73.1	73.3	73.1	72.8	73
175	78.3	78.2	78.2	78.2	78.2
177.5	80.6	80.4	80.4	80.4	80.6
180	81.3	81.3	81.3	81.3	81.3

### 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	1027119144

### \*Goniophotometer Equipment List (Cree Durham Technology Center, NVLAP Lab Code 500070-0)

Description	Manufacturer	Model	Serial Number
AC Power Source	Adaptive	FC200	2300230
DC Power Source	Sorensen	XHR 150-7	1424A01504
DC Power Source	GW	GPR-30H 10D	EF810483
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 Reqt'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-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 F132
*Type C Goniophotometer and Spectrometer (Cree Durham Technology Center, NVLAP Lab Code 500070-0)	Tungsten Halogen Omni-Directional 500W Calibration Flux Lamp, Serial Number 97A. For color calibration of spectroradiometer, Serial Numbers 12C066, 12C067, 12C068.

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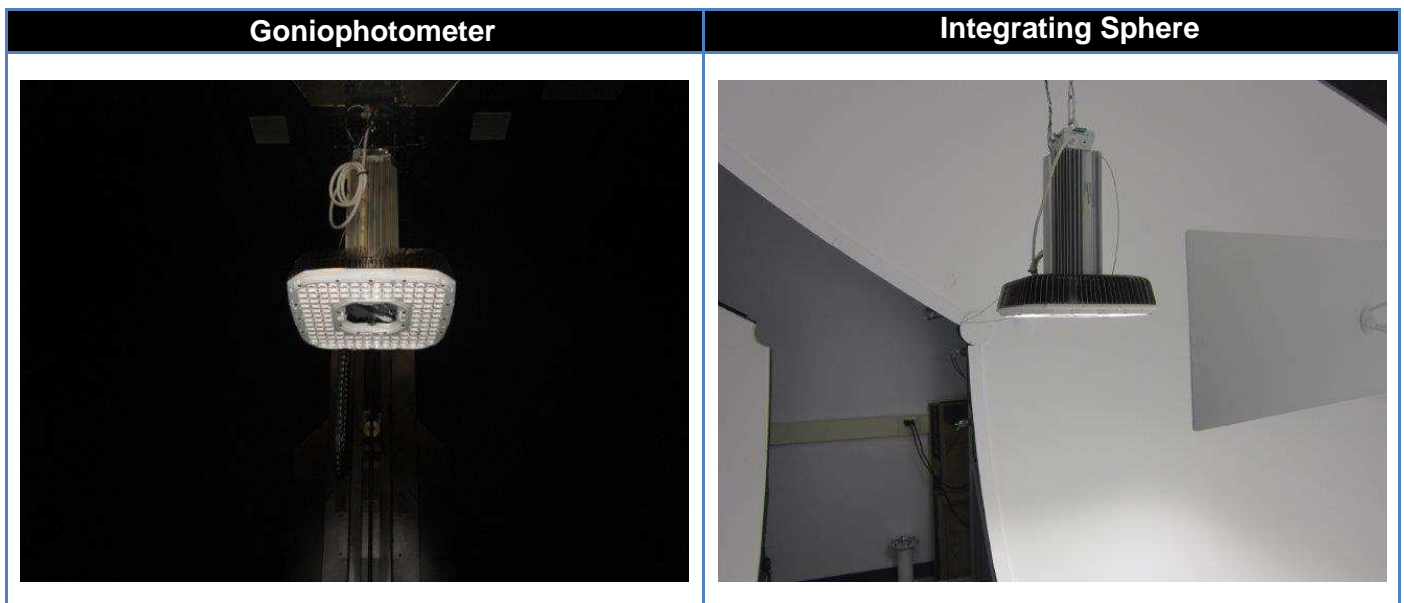
In the event that the recorded temperature is outside of  $25 \pm 1^{\circ}\text{C}$ , this is considered a non-standard condition.

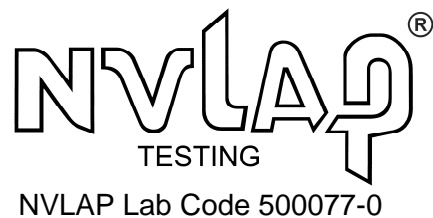
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### Additional Comments:

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.





**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
8/14/2018	A	DMS	Origination	A. Gressel	B. Kuebler