

Report Number: PL13009-001A
Model: HXB-C-xx-70L-M-40K-8-UL-xx-xxx
Date: 8/9/2018

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

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Product Information

Manufacturer	Cree Inc
Model Number (SKU)	HXB-C-xx-70L-M-40K-8-UL-xx-xxx
Serial Number	PL13009-001
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	62369.0	62199.0	lm
Efficacy	127.75	127.83	lm/W
Correlated Color Temperature (CCT)	3852		
Color Rendering Index (CRI)	81		
R ₉	7		
Duv	0.001556		
S/P Ratio*	1.59		
CIE Type	Direct		
Color Angular Uniformity	N/A		

	Sphere		Goniophotometer		
Electrical Measurements	120V	277V	120V	277V	
Input Wattage	488.20	482.30	486.58	480.99	W
Input Current	4.08	1.80	4.07	1.79	A
Input Voltage	120.01	277.01	120.06	277.02	V
Power Factor	0.996	0.969	0.997	0.970	
Off-State Power	0	0	0	0	W
Total Harmonic Distortion (Voltage)	0.23	0.11	0.15	0.10	%
Total Harmonic Distortion (Amperage)	6.20	7.39	5.30	6.18	%

Note: All photometric measurements taken at 120VAC.

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	63	30	min
Total Operating Time (Stabilization + Test)	83	50	min
Ambient Temperature	25.4	24.5	°C

Spacing Criteria

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

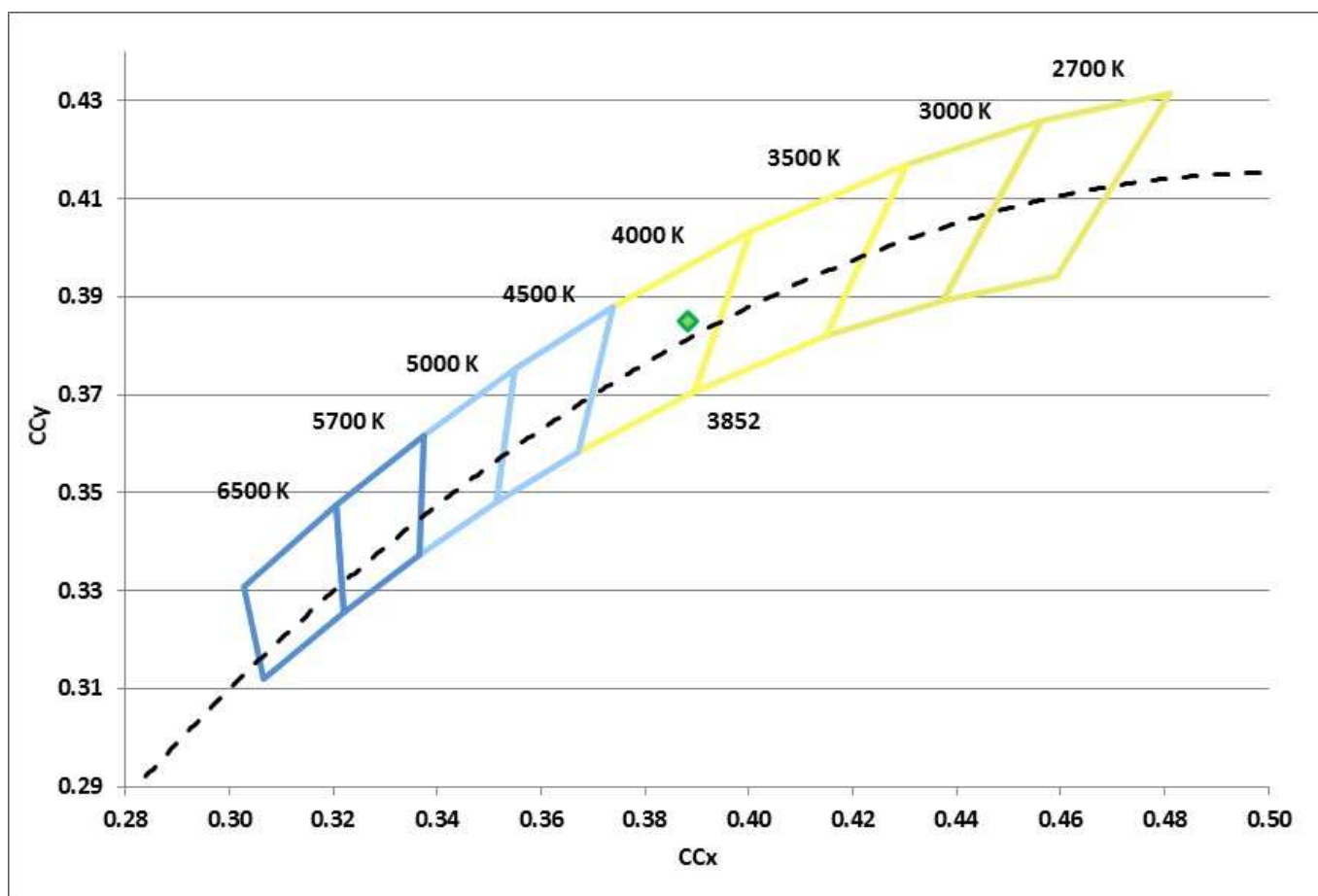
Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.3883	0.3849	0.2270	0.3376	0.2270	0.5063	0.001556

Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
81	79	86	92	81	79	81	87	65	7	67	79	58	81	95

Chromaticity Diagram



Spectral Distribution

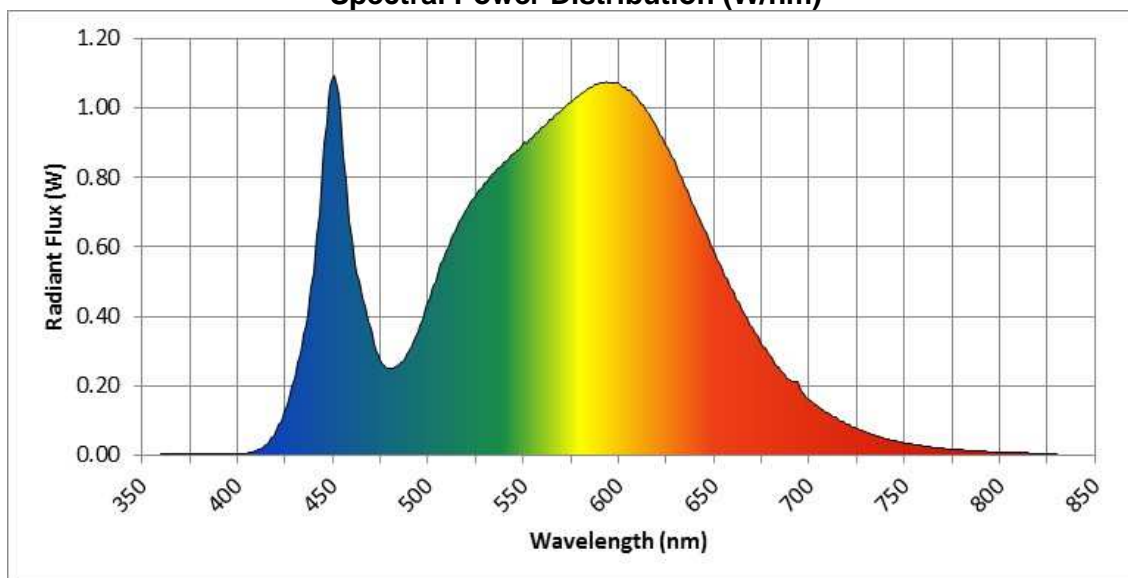
$\lambda(\text{nm})$	W/nm
360	0.003188
370	0.003124
380	0.002652
390	0.002282
400	0.003497
410	0.013008
420	0.065772
430	0.221104
440	0.525034
450	1.087986
460	0.623025
470	0.362750
480	0.249255
490	0.296858
500	0.437427
510	0.590199
520	0.702770

$\lambda(\text{nm})$	W/nm
530	0.781550
540	0.840713
550	0.892369
560	0.942811
570	0.991876
580	1.039237
590	1.071367
600	1.069672
610	1.026268
620	0.944297
630	0.836683
640	0.712617
650	0.587712
660	0.472265
670	0.369085
680	0.282741
690	0.215913

$\lambda(\text{nm})$	W/nm
700	0.161351
710	0.120704
720	0.089898
730	0.065843
740	0.048385
750	0.035664
760	0.026631
770	0.019696
780	0.015067
790	0.011593
800	0.008495
810	0.006825
820	0.005257
830	0.004375

Dominant Wavelength	578	nm
Peak Wavelength	451	nm

Spectral Power Distribution (W/nm)



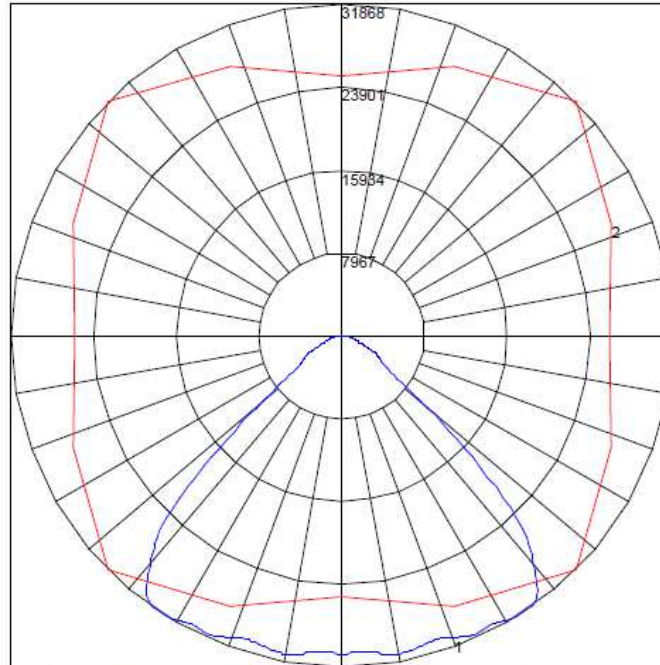
Zonal Lumen Summary

Zone	Lumens	% of Total	Zone	Lumens
0-20	11506.57	18.5	0-10	2927.66
0-30	25096.3	40.3	10-20	8578.91
0-40	42153.23	67.8	20-30	13589.72
0-60	57325.31	92.2	30-40	17056.93
0-80	61695.8	99.2	40-50	10762.34
0-90	62136.73	99.9	50-60	4409.74
10-90	59209.08	95.2	60-70	2868.01
20-40	30646.65	49.3	70-80	1502.47
20-50	41409	66.6	80-90	440.94
40-70	18040.1	29	90-100	1.01
60-80	4370.48	7	100-110	0
70-80	1502.47	2.4	110-120	0
80-90	440.94	0.7	120-130	0.11
90-110	1.01	0	130-140	6.03
90-120	1.01	0	140-150	14.73
90-130	1.12	0	150-160	18.67
90-150	21.88	0	160-170	15.72
90-180	62.68	0.1	170-180	6.41
110-180	61.67	0.1		
Total	62199.41 lm	100%		

Luminance Data (Cd./Sq.M)

Average in Degrees	Average 0-Deg	Average 45-Deg	Average 90-Deg
45	74165	191744	80188
55	50934	54796	51088
65	41049	41608	43744
75	42370	28151	41005
85	34239	23115	35374

Candela Plots



Maximum Candela = 31867.5 Located At Horizontal Angle = 45, Vertical Angle = 33.5
1 - Vertical Plane Through Horizontal Angles (45 - 225) (Through Max. Cd.)
2 - Horizontal Cone Through Vertical Angle (33.5) (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	30619.6	30619.6	30619.6	30619.6	30619.6
2.5	30312.4	30495.8	30522.9	30669	30721.2
5	30406.6	30621	30575.8	30555	30551.5
7.5	30863.5	31183	30882.9	30326	30246.8
10	30360.3	30975.9	31080.8	30491.5	30253.2
12.5	29450	30181.5	31036	30735.9	30128.2
15	29335.1	29845.3	30752.2	30804.8	29750
17.5	29346.5	30031.2	30637.3	30560.2	29300.2
20	28366.2	29947.3	30988.5	30497.3	29065.8
22.5	27296.7	29180.5	31335.2	30064.8	28017.7
25	27212	29086.2	31461.6	29502.2	27692
27.5	26696.5	29182.8	31343.4	29449.3	27111.8
30	26286.9	28480	31653.2	28807.7	26207.8
32.5	25975.9	28271.8	31858	28484.3	25782.3
35	25166.5	27621.8	31821.8	27083.8	24264.4
37.5	22693	26083.3	30983.5	25544.5	22621.8
40	18754.9	22666.1	28729.9	22427.2	18646.9
42.5	13623.5	17457.5	26447.5	17256.2	13764.1
45	8535.7	11534.8	22068	11990	9228.9
47.5	6231.1	7283.6	16081.2	7860.4	6606.3
50	5679.1	5601.9	10669.4	5690.6	5714.3
52.5	5257.4	5071	6766.1	5046.1	5271
55	4755.1	4578.5	5115.6	4598.5	4769.4
57.5	4265.9	4060.1	4454.7	4128.2	4269.4
60	3745.2	3680.6	4047.8	3804.9	3813.4
62.5	3251.4	3318.2	3534.7	3382.6	3385.1
65	2823.6	2860.2	2862.1	2884.5	3009
67.5	2475.5	2411.9	2224.3	2443.9	2652.7
70	2253.8	2012	1765.7	2058.1	2345.5
72.5	2039.1	1656.3	1443.1	1700.2	2048.9
75	1784.9	1353.5	1185.9	1364.1	1727.4
77.5	1466	1089	948.7	1065.8	1377
80	1108	845.3	723.6	806.7	1048
82.5	789.8	612.6	517.7	583	776.7
85	485.7	381.9	327.9	379.6	501.8
87.5	213.1	165.8	150.9	167.3	217
90	17.9	20.5	25.7	26.2	29

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	0.1	0	0
130	0	1.3	2.3	1.2	0.2
132.5	2.8	4.7	5.7	4.4	2.7
135	6.4	8.1	9.3	8	6.3
137.5	10	11.6	12.6	12	9.9
140	14	15.3	16.4	15.6	14
142.5	18.5	19.7	20.8	19.7	18.2
145	22.8	23.7	24.9	23.9	22.9
147.5	27.1	27.9	28.9	28.3	27.5
150	32	32.5	33.1	32.6	31.8
152.5	36.6	36.6	37.2	36.9	36.5
155	40.9	40.8	41.3	41.1	40.8
157.5	44.9	44.5	45.1	44.8	44.6
160	49.1	48.8	49	48.7	48.8
162.5	53	52.9	52.8	52.8	52.6
165	56.5	56.6	56.8	56.6	56.2
167.5	59.7	59.7	59.7	59.4	59.6
170	62.2	62.2	62.1	62.1	62.2
172.5	66.1	66	65.8	65.8	66.1
175	70.5	70.3	70.7	70.5	70.6
177.5	72.5	72.6	72.1	72.5	72.9
180	73.2	73.2	73.2	73.2	73.2

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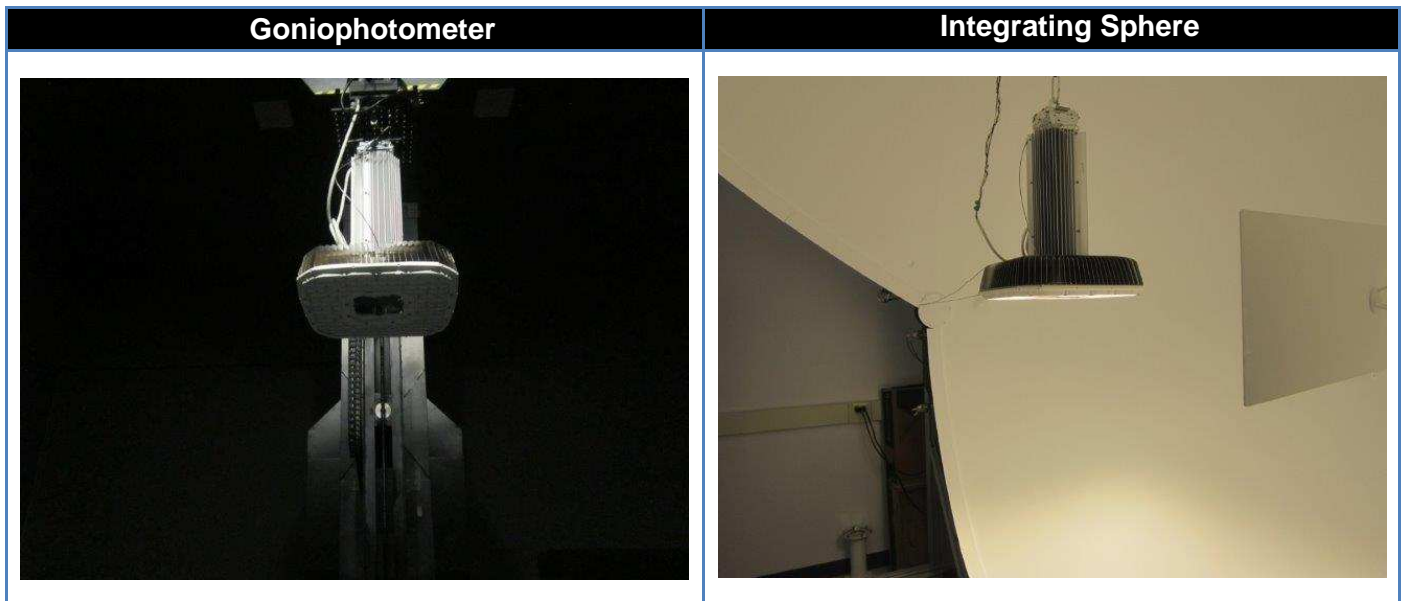
In the event that the recorded temperature is outside of $25 \pm 1^{\circ}\text{C}$, this is considered a non-standard condition.

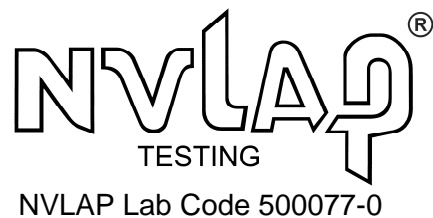
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Additional Comments:

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
8/9/2018	A	DMS	Origination	A. Gressel	B. Kuebler