

Report Number: PL13011-001A
Model: HXB-C-xx-70L-M-40K-7-UL-xx-xxx
Date: 8/14/2018

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-7-UL-xx-xxx
Serial Number	PL13011-001
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	69400.0	69581.0	lm
Efficacy	140.57	140.97	lm/W
Correlated Color Temperature (CCT)	3817		
Color Rendering Index (CRI)	73		
R ₉	-21		
Duv	0.002264		
S/P Ratio*	1.46		
CIE Type	Direct		
Color Angular Uniformity	N/A		

	Sphere		Goniophotometer		
Electrical Measurements	120V	277V	120V	277V	
Input Wattage	493.70	487.40	493.59	487.40	W
Input Current	4.13	1.81	4.12	1.81	A
Input Voltage	120.00	277.02	120.03	277.00	V
Power Factor	0.996	0.970	0.997	0.971	
Off-State Power	0	0	0	0	W
Total Harmonic Distortion (Voltage)	0.23	0.11	0.14	0.10	%
Total Harmonic Distortion (Amperage)	5.99	7.29	5.00	5.91	%

Note: All photometric measurements taken at 120VAC.

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	120	48	min
Total Operating Time (Stabilization + Test)	120	68	min
Ambient Temperature	25.5	24.6	°C

Spacing Criteria

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

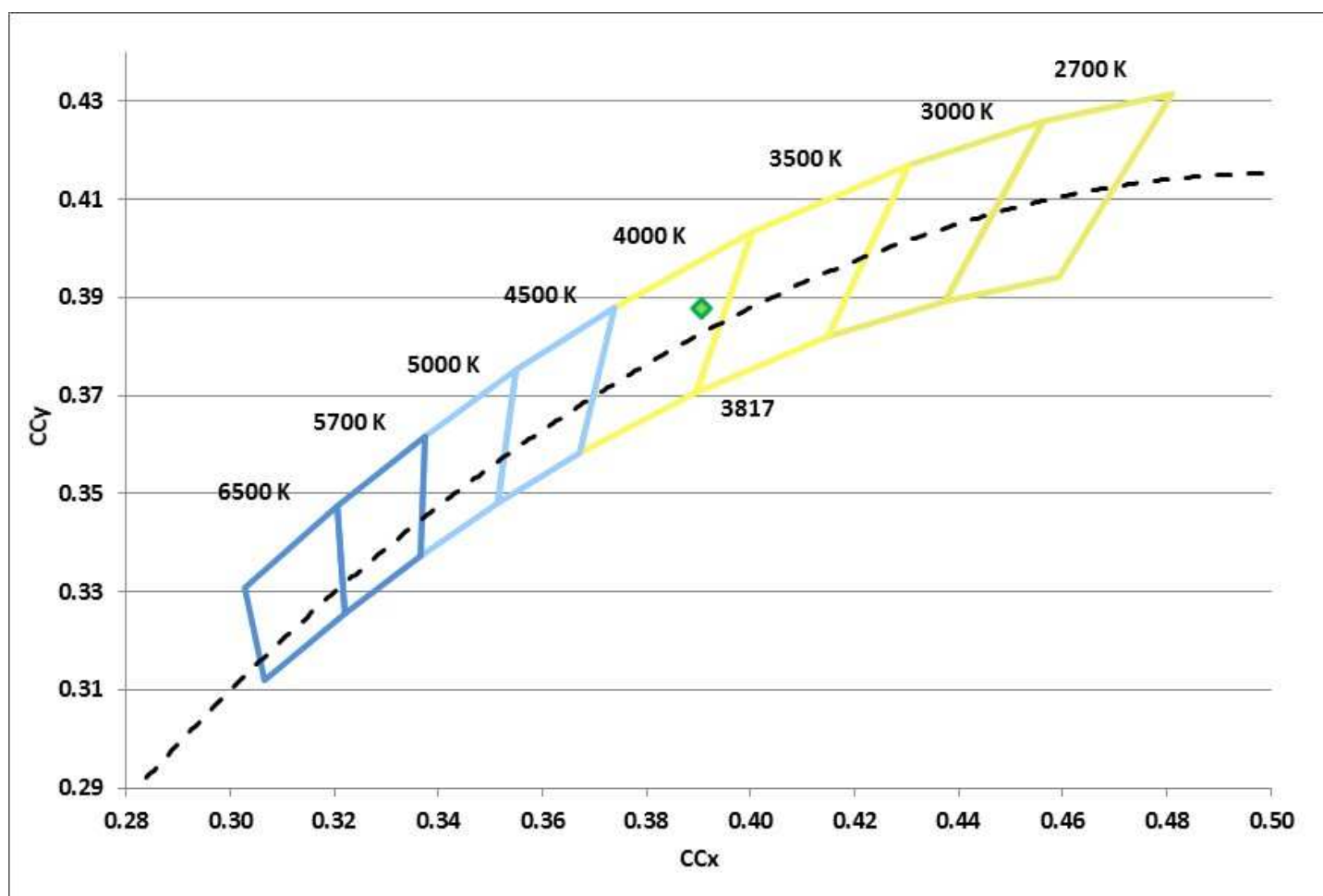
Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.3906	0.3878	0.2273	0.3386	0.2273	0.5079	0.002264

Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
73	70	79	85	72	69	69	82	55	-21	49	67	40	71	91

Chromaticity Diagram



Spectral Distribution

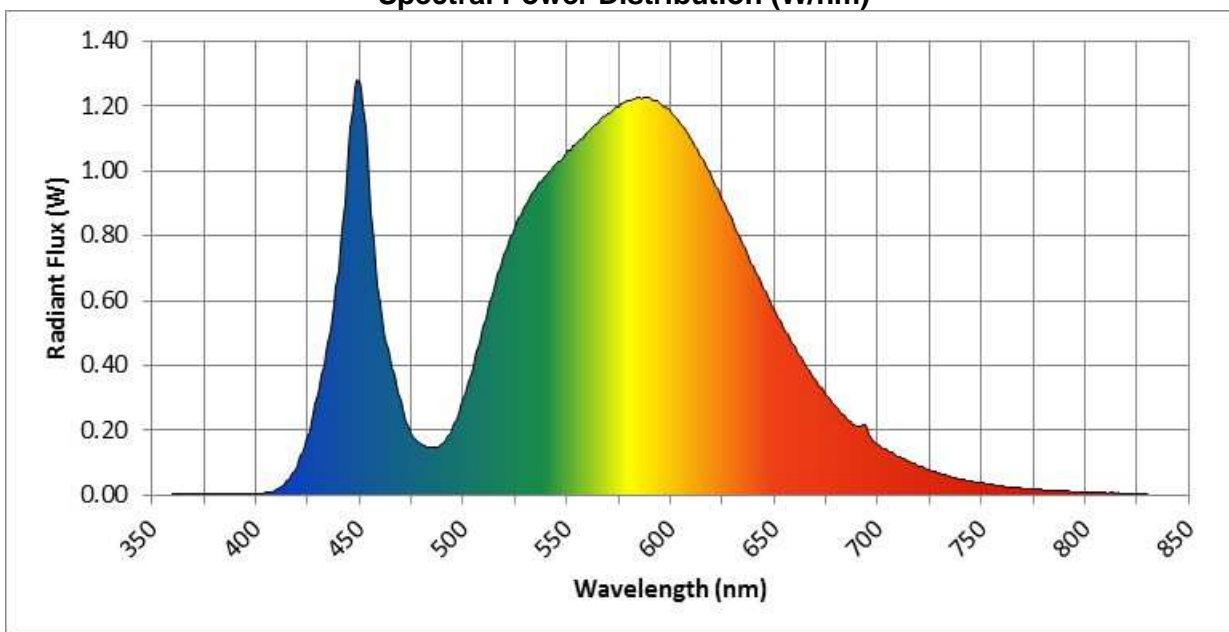
$\lambda(\text{nm})$	W/nm
360	0.003402
370	0.003215
380	0.003784
390	0.002867
400	0.004134
410	0.017129
420	0.090657
430	0.309620
440	0.690293
450	1.275683
460	0.589555
470	0.289113
480	0.156621
490	0.158673
500	0.289368
510	0.517806
520	0.738693

$\lambda(\text{nm})$	W/nm
530	0.890729
540	0.984270
550	1.053801
560	1.116917
570	1.175409
580	1.215973
590	1.224387
600	1.184855
610	1.098942
620	0.980233
630	0.846061
640	0.706341
650	0.573902
660	0.457470
670	0.355766
680	0.272713
690	0.211296

$\lambda(\text{nm})$	W/nm
700	0.157813
710	0.120024
720	0.091053
730	0.067698
740	0.049772
750	0.037612
760	0.028646
770	0.021478
780	0.016497
790	0.012953
800	0.010021
810	0.008191
820	0.006343
830	0.005078

Dominant Wavelength	578	nm
Peak Wavelength	449	nm

Spectral Power Distribution (W/nm)



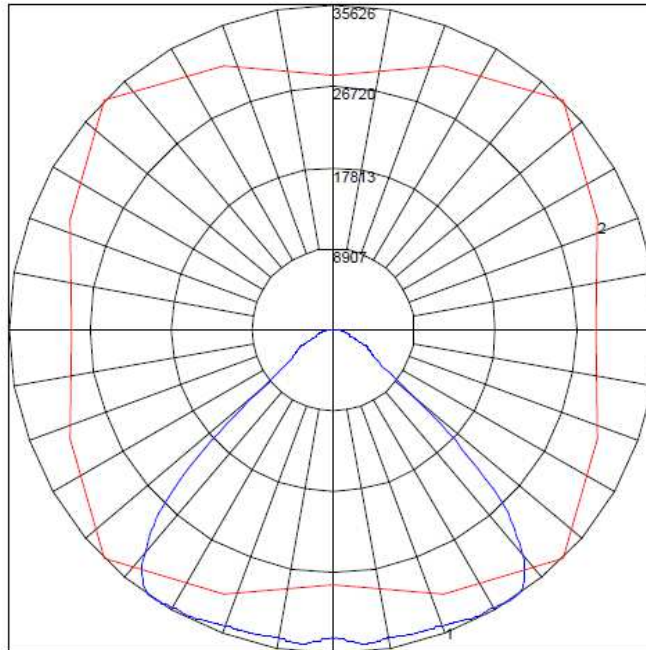
Zonal Lumen Summary

Zone	Lumens	% of Total	Zone	Lumens
0-20	12894.67	18.5	0-10	3281.34
0-30	28123.26	40.4	10-20	9613.33
0-40	47202.57	67.8	20-30	15228.6
0-60	64151.38	92.2	30-40	19079.31
0-80	69022.2	99.2	40-50	12028.44
0-90	69512.56	99.9	50-60	4920.37
10-90	66231.22	95.2	60-70	3197.7
20-40	34307.91	49.3	70-80	1673.12
20-50	46336.35	66.6	80-90	490.37
40-70	20146.51	29	90-100	0.98
60-80	4870.81	7	100-110	0
70-80	1673.11	2.4	110-120	0
80-90	490.37	0.7	120-130	0.06
90-110	0.98	0	130-140	6.18
90-120	0.98	0	140-150	16.07
90-130	1.04	0	150-160	20.61
90-150	23.29	0	160-170	17.51
90-180	68.57	0.1	170-180	7.15
110-180	67.59	0.1		
Total	69581.13 lm	100%		

Luminance Data (Cd./Sq.M)

Average in Degrees	Average 0-Deg	Average 45-Deg	Average 90-Deg
45	83265	215756	88539
55	56825	61117	56924
65	45821	46278	49065
75	47389	31370	45772
85	38109	25956	39286

Candela Plots



Maximum Candela = 35626.2 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	92	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	75	71	69
4	89	79	72	67	87	78	71	66	76	70	65	74	69	65	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	59	53	76	65	58	53	64	57	52	62	56	52	61	55	52	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	48	41	36	47	40	36	46	40	36	45	39	36	34

Candela Tabulations

	0	22.5	45	67.5	90
0	34011.5	34011.5	34011.5	34011.5	34011.5
2.5	34083.2	34263.7	34206.8	34232.9	34183
5	34278.2	34619.4	34652.2	34358.6	34147.8
7.5	34240.4	34660.5	34652.4	34245.5	33898.1
10	33973.2	34542.9	34480.7	34376	33874.1
12.5	33399.8	34191.8	34548.2	34392.8	33707.6
15	32967.6	33717.8	34601.9	34345	33445.3
17.5	32504.8	33500.8	34594.9	34100	32985.9
20	31748.2	33237.2	34745.5	34068.4	32623.8
22.5	30901.2	32982.3	34913.1	33783.9	31520.8
25	30321.7	32582.2	35175.7	33191.2	31044.2
27.5	29905.2	32317.9	35290.7	32999.3	30301.1
30	29441	32139.6	35322.6	32309.7	29450
32.5	28983	31491.2	35579.4	31820	28756.9
35	28069.1	31107.3	35527	30328	27234.2
37.5	25534.8	28958.2	34480.2	28555.8	25400
40	20991.9	25457.7	32392.4	25081.7	20869.8
42.5	15168.1	19702.1	29265.4	19238.5	15245.9
45	9583	13040.9	24831.6	13274.5	10190
47.5	6969.7	8182.2	18142.9	8683.9	7269.3
50	6305.5	6244.9	12037.8	6236.5	6315.8
52.5	5878.5	5607	7692.4	5583.1	5850.6
55	5305	5101.5	5705.7	5107.4	5314.3
57.5	4756.9	4514.8	4986.8	4614.9	4757.7
60	4184.2	4099.5	4510.6	4239.7	4262.8
62.5	3628.2	3695.3	3935.7	3771.1	3782
65	3151.9	3185.9	3183.3	3210.7	3375
67.5	2763.7	2690.9	2487.4	2710.6	2979.2
70	2517.4	2247.8	1972.3	2278.3	2624.2
72.5	2276.7	1848.9	1607.9	1876.6	2291.6
75	1996.3	1510.9	1321.5	1503.9	1928.2
77.5	1637.1	1217.7	1058.6	1178.4	1533.9
80	1237.4	944.2	810.6	891.5	1168.2
82.5	877.8	683	581.8	646.9	869.7
85	540.6	422.5	368.2	422	557.3
87.5	233	182.3	167.2	186.4	235.4
90	12.2	18.6	27.6	29.8	28.3

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	1	2.4	0.8	0
132.5	2.3	4.3	5.6	4.1	2.5
135	6.2	8.1	9.7	8.3	6.3
137.5	10.6	12.1	13.4	12.4	10.4
140	14.8	16.6	17.7	16.4	14.9
142.5	19.9	21.4	22.1	21.3	20.1
145	24.9	26	27	26.1	25.1
147.5	29.9	30.8	31.5	30.6	30.3
150	35	35.3	36.2	35.5	35.3
152.5	40.3	40.3	41.1	40.8	40.2
155	45.2	45.2	45.6	45.4	45.1
157.5	49.7	49.4	49.7	49.4	49.5
160	54.4	54.4	54.2	54.2	54.3
162.5	58.8	58.9	59	59.1	58.7
165	63	63.1	63.3	62.9	62.8
167.5	66.6	66.8	66.7	66.5	66.1
170	69.4	69.3	69.6	69.2	69.1
172.5	74	73.4	73.5	73.5	73.8
175	78.9	78.8	78.7	78.9	79.1
177.5	81.1	81.1	80.6	80.9	80.8
180	81.8	81.8	81.8	81.8	81.8

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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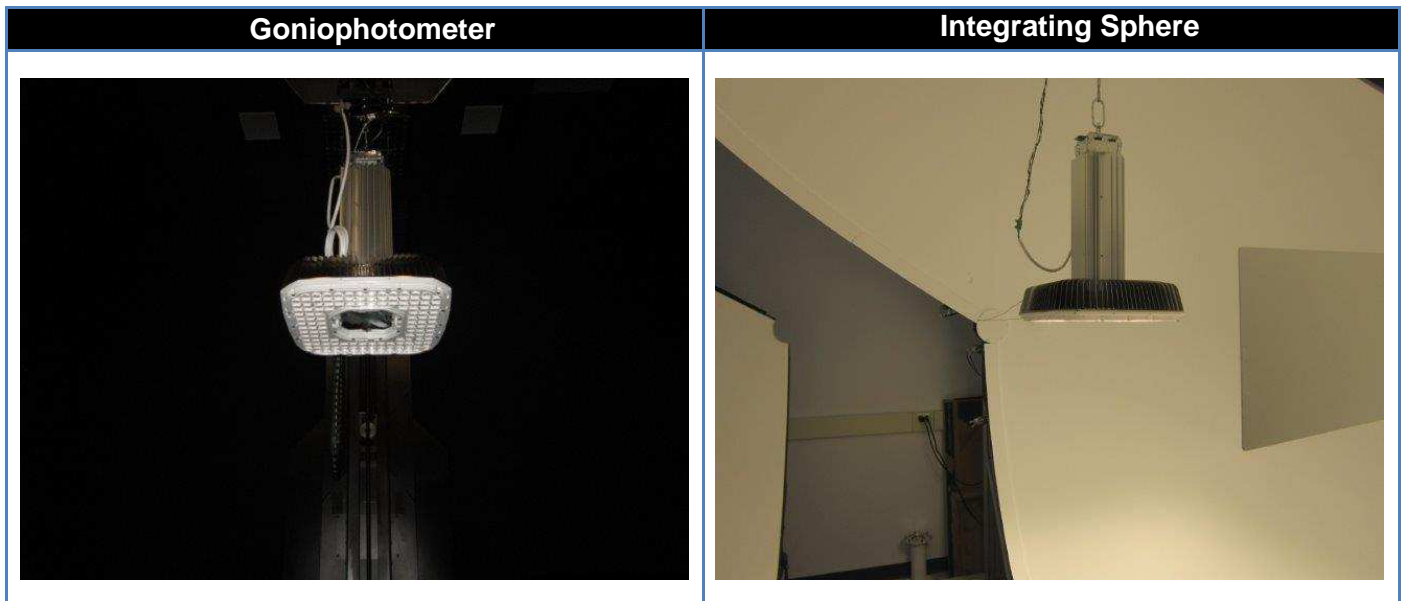
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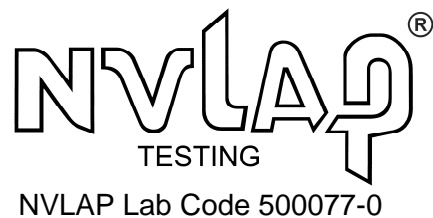
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Additional Comments:

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