NVLAP Lab Code 500089-0

Report Number:	PL16737-001A
Model:	CDR8-B-ALS-9ACK-10V5-xx-UNV (4000K-LOW)
Date:	03/24/2022

Cree Racine Engineering Services Testing Laboratory (RESTL) Photometric Testing and Evaluation Report

Prepared For:

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Cree Lighting

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Prepared By:

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Approved By:

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This report contains data that are not covered by the NVLAP accreditation.

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Product Information	
Manufacturer	Cree Lighting
Model Number (SKU)	CDR8-B-ALS-9ACK-10V5-xx-UNV (4000K-LOW)
Serial Number	16737-001
LED Type	Smalite SL-ID2835FTA-31KAG

Product Description
CDR 8" Downlight luminare, white painted reflector, selectable CCT (4000K) and lumens (Low – 1000lm)

Driver Information (Where Applicable)
Integral

Length	Width	Height
8.25”	8.25”	5.50”

Sample

The following sample was submitted for evaluation

CREE LIGHTING
A COMPANY OF IDEAL INDUSTRIES, INC.

NVLAP TESTING
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Key Photometric Data	Sphere Output	Goniophotometer	
Luminous Flux	1110.7	1127	lm
Efficacy	109.53	115.0	lm/W
Correlated Color Temperature (CCT)	4045	K	
Color Rendering Index (CRI)	94		
R_9	70		
Duv	0.0029		
S/P Ratio**	1.81		
CIE Type	Direct		

	Sphere		Goniophotometer		
Electrical Measurements	**120V**	**277V**	**120V**	**277V**	
Input Wattage	10.14	-	9.80	10.46	W
Input Current	0.085	-	0.082	0.414	A
Input Voltage	120.18	-	120.22	277.21	V
Power Factor	0.992	-	0.991	0.911	
Off-State Power	0	-	0	0	W
Total Harmonic Distortion (Voltage)	0.07	-	0.08	0.10	%
Total Harmonic Distortion (Amperage)	7.57	-	7.77	22.56	%

Note: All photometric measurements taken at 120VAC.

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	41	30	min
Total Operating Time (Stabilization + Test)	51	50	min
Ambient Temperature	24.46	24.7	˚C

Spacing Criteria

Spacing Criterion (0 - 180)	1.18
Spacing Criterion (90 - 270)	1.20
Spacing Criterion (Diagonal)	1.24

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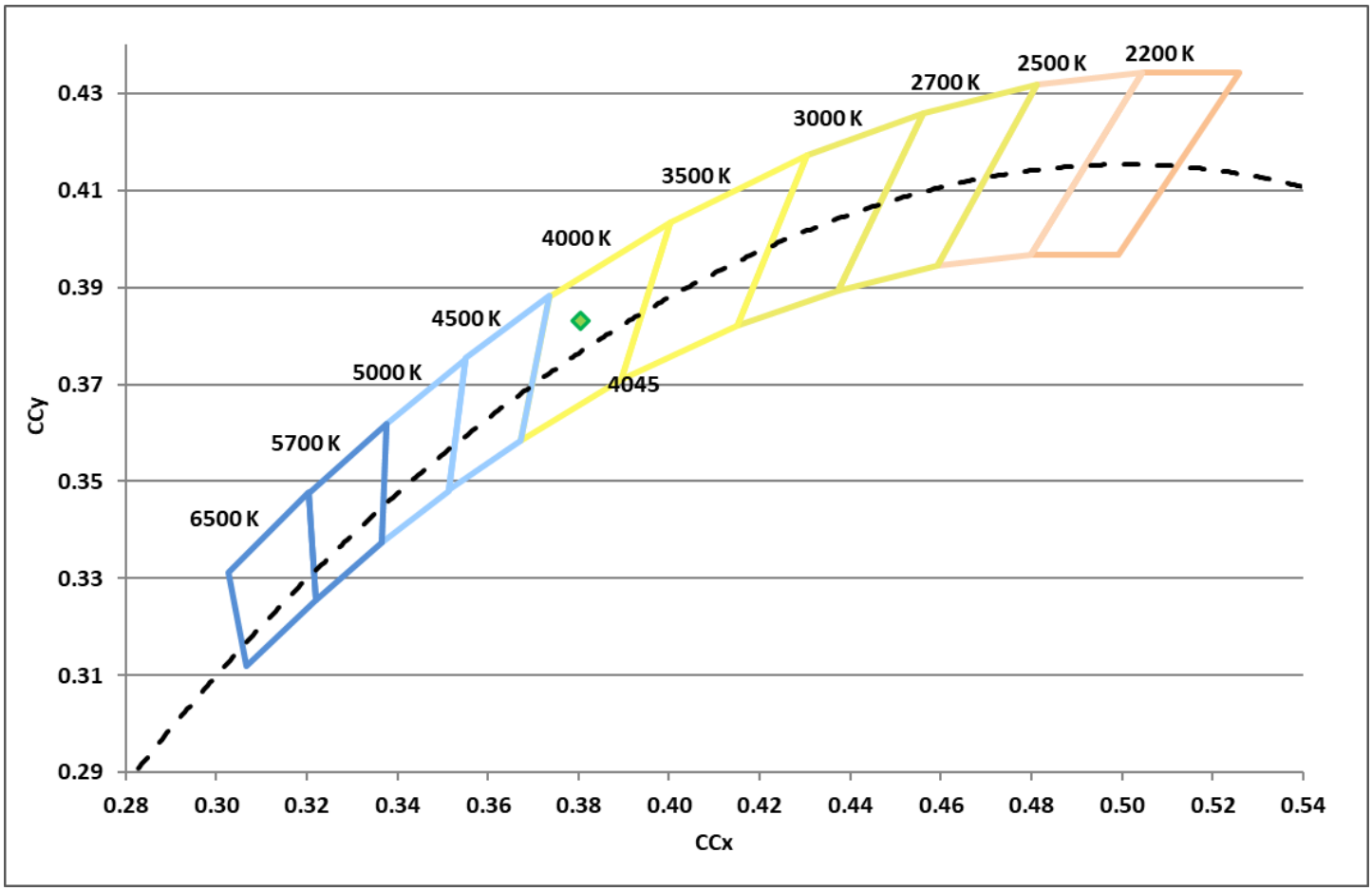
Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.3805	0.3830	0.2226	0.3362	0.2226	0.5043	0.0029

Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
94	94	96	97	93	92	93	95	88	70	89	93	68	94	98

Chromaticity Diagram



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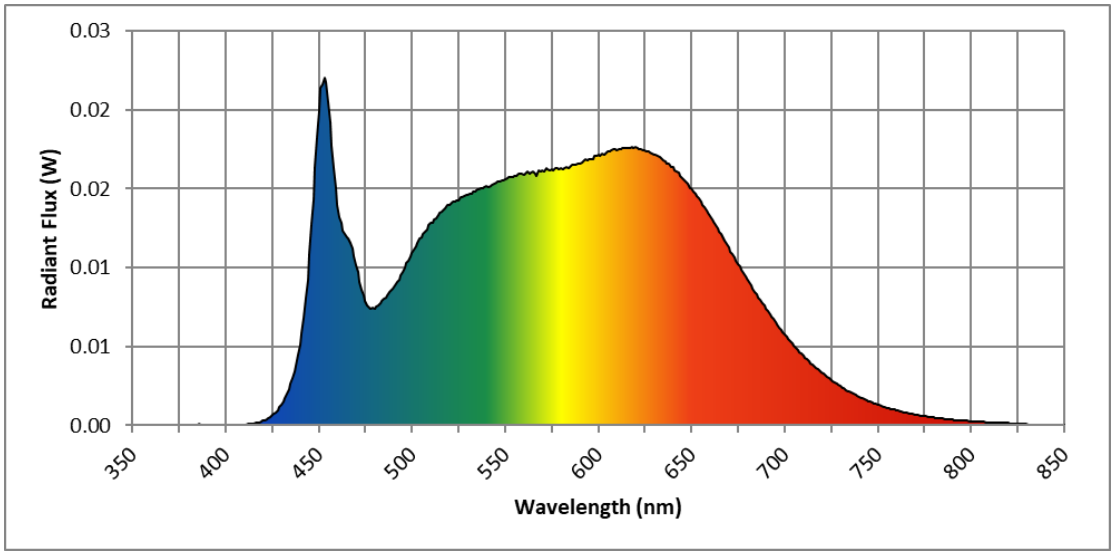
Spectral Distribution

λ(nm)	W/nm	λ(nm)	W/nm	λ(nm)	W/nm
360	0.000021	530	0.014631	700	0.005762
370	0.000006	540	0.015182	710	0.004398
380	0.000018	550	0.015612	720	0.003356
390	0.000003	560	0.015911	730	0.002474
400	0.000006	570	0.016154	740	0.001796
410	0.000047	580	0.016273	750	0.001308
420	0.000284	590	0.016578	760	0.000947
430	0.001309	600	0.017125	770	0.000681
440	0.005143	610	0.017441	780	0.000494
450	0.019963	620	0.017626	790	0.000352
460	0.013971	630	0.017171	800	0.000258
470	0.010151	640	0.016364	810	0.000185
480	0.007413	650	0.014992	820	0.000133
490	0.008624	660	0.013280	830	0.000096
500	0.010951	670	0.011267		
510	0.012812	680	0.009262		
520	0.013970	690	0.007365		

Dominant Wavelength	577	nm
Peak Wavelength	453	nm

Spectral Power Distribution (W/nm)



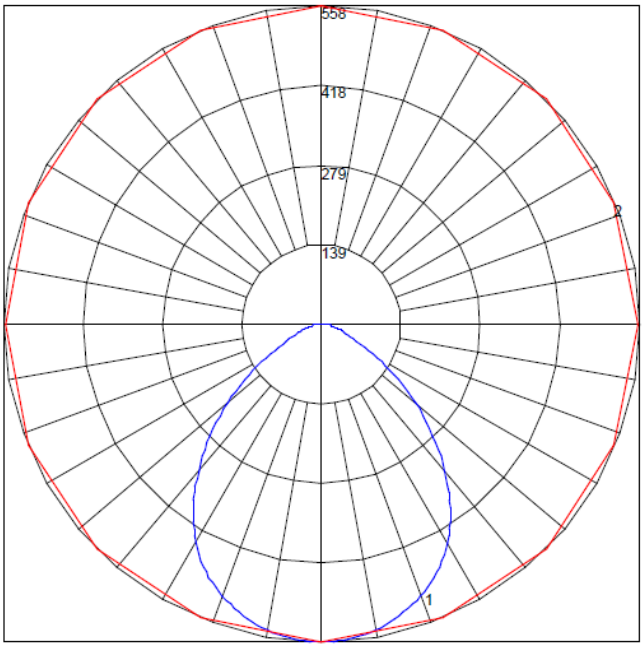
Zonal Lumen Summary

Zone	Lumens	% of Total	Zone	Lumens
0-20	201.44	17.9	0-10	52.53
0-30	421.16	37.4	10-20	148.91
0-40	665.34	59	20-30	219.71
0-60	1018.93	90.4	30-40	244.18
0-80	1116.78	99.1	40-50	212.7
0-90	1126.99	100	50-60	140.89
10-90	1074.46	95.3	60-70	65.84
20-40	463.9	41.2	70-80	32.01
20-50	676.6	60	80-90	10.22
40-70	419.43	37.2	90-100	0.0
60-80	97.84	8.7	100-110	0.0
70-80	32.01	2.8	110-120	0.0
80-90	10.22	0.9	120-130	0.0
90-110	0.0	0.0	130-140	0.0
90-120	0.0	0.0	140-150	0.0
90-130	0.0	0.0	150-160	0.0
90-150	0.0	0.0	160-170	0.0
90-180	0.0	0.0	170-180	0.0
110-180	0.0	0.0		
Total	**1126.9**	**100**		

Luminance Data (Cd./Sq.M)

Average in Degrees	Average 0-Deg	Average 45-Deg	Average 90-Deg
45	10745	10788	10777
55	7560	7562	7501
65	4212	4140	4011
75	3228	3230	3211
85	2883	2888	2852

Candela Plots



Maximum Candela = 557.587 Located At Horizontal Angle = 90, Vertical Angle = 1
1 - Vertical Plane Through Horizontal Angles (90 - 270) (Through Max. Cd.)
2 - Horizontal Cone Through Vertical Angle (1) (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	107	103	100	108	105	101	98	100	98	95	97	94	92	93	91	90	88
2	102	95	90	85	100	94	88	84	90	86	82	87	83	80	84	81	78	76
3	95	86	79	73	92	84	78	72	81	76	71	79	74	70	76	72	69	67
4	88	77	69	64	85	76	69	63	73	67	62	71	66	62	69	65	61	59
5	81	70	62	56	79	69	61	56	67	60	55	65	59	55	63	58	54	52
6	76	64	56	50	74	63	55	50	61	54	49	59	53	49	58	53	48	46
7	70	58	50	45	69	57	50	44	56	49	44	55	48	44	53	48	44	42
8	66	53	46	40	64	53	45	40	51	45	40	50	44	40	49	44	39	38
9	62	49	42	37	60	49	41	37	48	41	36	47	41	36	46	40	36	34
10	58	46	38	33	57	45	38	33	44	38	33	43	37	33	43	37	33	31

Candela Tabulations

	0	22.5	45	67.5	90
0	556.8	556.8	556.8	556.8	556.8
1	556.1	556.1	557.2	557.1	557.6
2	555.8	555.3	556.0	556.5	557.0
3	555.2	554.7	555.9	556.1	556.1
4	553.6	553.8	554.3	554.8	555.5
5	553.3	552.4	554.1	554.1	553.8
6	551.7	551.2	552.0	552.5	553.0
7	549.8	549.4	550.8	550.7	551.1
8	548.1	548.0	548.7	549.3	549.3
9	545.5	545.4	546.9	546.9	547.2
10	543.6	543.0	544.2	544.4	544.4
11	540.5	540.9	541.5	542.0	542.6
12	538.3	537.4	538.5	538.9	538.9
13	534.5	534.8	536.0	536.1	536.2
14	531.4	531.0	531.9	532.4	532.5
15	527.9	527.9	528.6	529.2	529.0
16	524.1	523.9	524.7	525.3	525.6
17	519.9	519.6	520.5	520.9	521.2
18	514.9	515.2	516.2	516.7	516.6
19	510.7	510.6	511.5	512.0	512.7
20	506.3	505.7	506.5	507.0	507.4
21	500.3	500.1	501.4	501.7	501.8
22	494.8	494.8	495.8	496.5	496.8
23	489.8	489.4	491.1	490.8	491.1
24	482.9	483.3	484.5	485.4	486.0
25	477.0	476.9	478.5	479.1	479.6
26	470.1	470.6	472.2	472.9	473.4
27	463.6	463.6	465.2	466.3	466.4
28	455.7	456.2	457.7	458.0	458.5
29	447.9	448.1	449.0	450.3	450.3
30	440.0	440.3	441.3	441.6	441.6
31	430.8	431.2	432.1	433.1	433.3
32	421.3	421.4	422.8	423.1	423.0
33	411.9	412.0	412.5	413.5	413.7
34	402.0	402.2	403.4	403.5	403.8
35	391.3	391.4	392.4	393.0	392.8
36	380.1	380.1	381.5	381.4	382.0

Candela Tabulations (Continued)

	0	22.5	45	67.5	90
37	369.5	369.7	370.7	371.2	371.2
38	358.5	358.5	359.5	359.6	360.2
39	346.6	346.6	347.8	348.0	347.9
40	334.8	334.9	336.1	336.3	336.1
41	323.9	324.0	324.6	324.9	324.6
42	311.6	311.8	313.0	312.7	312.7
43	299.6	299.8	300.2	300.6	300.3
44	287.7	288.7	289.0	288.7	288.6
45	276.0	276.8	277.1	277.4	276.8
46	263.9	264.4	264.5	264.5	264.2
47	252.2	252.7	252.4	252.3	252.1
48	240.4	240.8	240.8	240.4	240.3
49	228.2	228.3	228.6	228.0	227.8
50	216.0	215.7	215.8	215.6	215.1
51	204.4	203.8	204.0	203.6	203.2
52	192.4	192.1	192.5	191.8	191.4
53	180.1	179.7	180.0	179.5	179.0
54	168.4	168.4	168.6	168.0	167.5
55	157.5	157.5	157.5	156.8	156.3
56	146.1	146.4	146.3	145.7	145.0
57	135.0	135.5	135.1	134.5	134.0
58	125.1	125.5	124.9	124.4	123.8
59	114.9	115.5	114.9	114.2	113.8
60	105.1	105.5	104.7	104.2	103.5
61	96.0	96.2	95.5	94.9	94.2
62	87.5	87.6	86.9	85.9	85.5
63	78.9	78.9	78.2	77.2	76.5
64	71.3	71.2	70.5	69.2	68.6
65	64.7	64.4	63.6	62.3	61.6
66	58.3	58.3	57.4	56.0	55.2
67	53.1	53.1	52.1	50.7	50.0
68	48.8	48.9	47.9	46.8	46.0
69	44.8	45.0	44.3	43.6	43.3
70	41.4	41.7	41.2	41.0	40.9
71	39.0	39.1	38.9	38.8	38.7
72	36.7	36.9	36.7	36.6	36.5
73	34.5	34.6	34.5	34.5	34.4

Candela Tabulations (Continued)

	0	22.5	45	67.5	90
74	32.4	32.5	32.4	32.3	32.3
75	30.3	30.4	30.4	30.3	30.2
76	28.2	28.2	28.2	28.1	28.0
77	26.1	26.1	26.1	26.0	26.0
78	24.1	24.0	24.0	23.9	23.9
79	21.9	21.8	21.9	21.8	21.8
80	19.8	19.7	19.7	19.7	19.6
81	17.7	17.7	17.6	17.6	17.6
82	15.6	15.5	15.5	15.5	15.4
83	13.4	13.4	13.3	13.3	13.3
84	11.3	11.3	11.3	11.3	11.2
85	9.1	9.2	9.1	9.1	9.0
86	7.0	7.1	7.0	7.0	6.9
87	5.0	5.2	5.0	4.8	4.7
88	3.6	3.8	3.3	2.8	2.5
89	2.5	2.7	2.2	1.3	0.7
90	0.0	0.0	0.0	0.0	0.0

Integrating Sphere Equipment List

Description	Manufacturer	Model	Serial Number
2M Sphere	Labsphere	ILLUMIA PLUS 3020-300 4PI	1109184535
CCD Array Spectrometer	Labsphere	MC-9801:3683L	98011077
Programmable AC Source	Chroma	61602	616020003699
Power Analyzer	Xitron	XT2640	264AD2006001

Goniophotometer Equipment List

Description	Manufacturer	Model	Serial Number
AC Power Source	Chroma	61602	616020002300
Type C Goniophotometer	LSI / UL	6440T	6440PN2028
Spectroradiometer	Gooch & Housego	770VIS/NIR	12415189
Spectrometer	Inphora, Inc	PDET 31	130627
Power Meter	Xitron	XT2640	M20140823

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 35W Calibration Lamp, Serial Number E4
Type C Goniophotometer and Spectrometer	Tungsten Halogen Omni-Directional 500W Calibration Lamp, Serial Numbers 16C293. 16C294, 16C295. For color calibration of spectrometer, 13C074.

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In the event that the recorded temperature is outside of 25 ± 1˚C, this is considered a non-standard condition.

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In the event that testing is subcontracted, or subcontracted equipment was used, test results in this report marked with the symbol *, or noted as “Sphere” or “Integrating Sphere” or “Goniophotometer,” were performed by the subcontracted laboratory identified in the equipment list of this report.

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.

Goniophotometer	Integrating Sphere

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
03/24/2022	A	DMS	Origination	M. Hubbard	J. Vollers