NVLAP Lab Code 500089-0

Report Number:	PL16737-005A
Model:	CDR8-B-ALS-9ACK-10V5-xx-UNV (3000K-HIGH)
Date:	03/25/2022

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 (3000K-HIGH)
Serial Number	16737-005
LED Type	Smalite SL-ID2835FTA-31KAG

Product Description
CDR 8" Downlight luminare, white painted reflector, selectable CCT (3000K) and lumens (HIGH – 2500lm)

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
NVLAP Lab Code 500089-0

Key Photometric Data	Sphere Output	Goniophotometer	
Luminous Flux	2497.4	2534	lm
Efficacy	101.09	103.90	lm/W
Correlated Color Temperature (CCT)	3107	K	
Color Rendering Index (CRI)	93		
R_9	60		
Duv	0.0002		
S/P Ratio**	1.48		
CIE Type	Direct		

	Sphere		Goniophotometer		
Electrical Measurements	**120V**	**277V**	**120V**	**277V**	
Input Wattage	24.70	-	24.39	24.38	W
Input Current	0.209	-	0.206	0.090	A
Input Voltage	120.15	-	120.17	277.25	V
Power Factor	0.984	-	0.985	0.985	
Off-State Power	0	-	0	0	W
Total Harmonic Distortion (Voltage)	0.07	-	0.08	0.09	%
Total Harmonic Distortion (Amperage)	4.55	-	4.63	7.61	%

Note: All photometric measurements taken at 120VAC.

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	43	30	min
Total Operating Time (Stabilization + Test)	53	50	min
Ambient Temperature	24.82	24.6	˚C

Spacing Criteria

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

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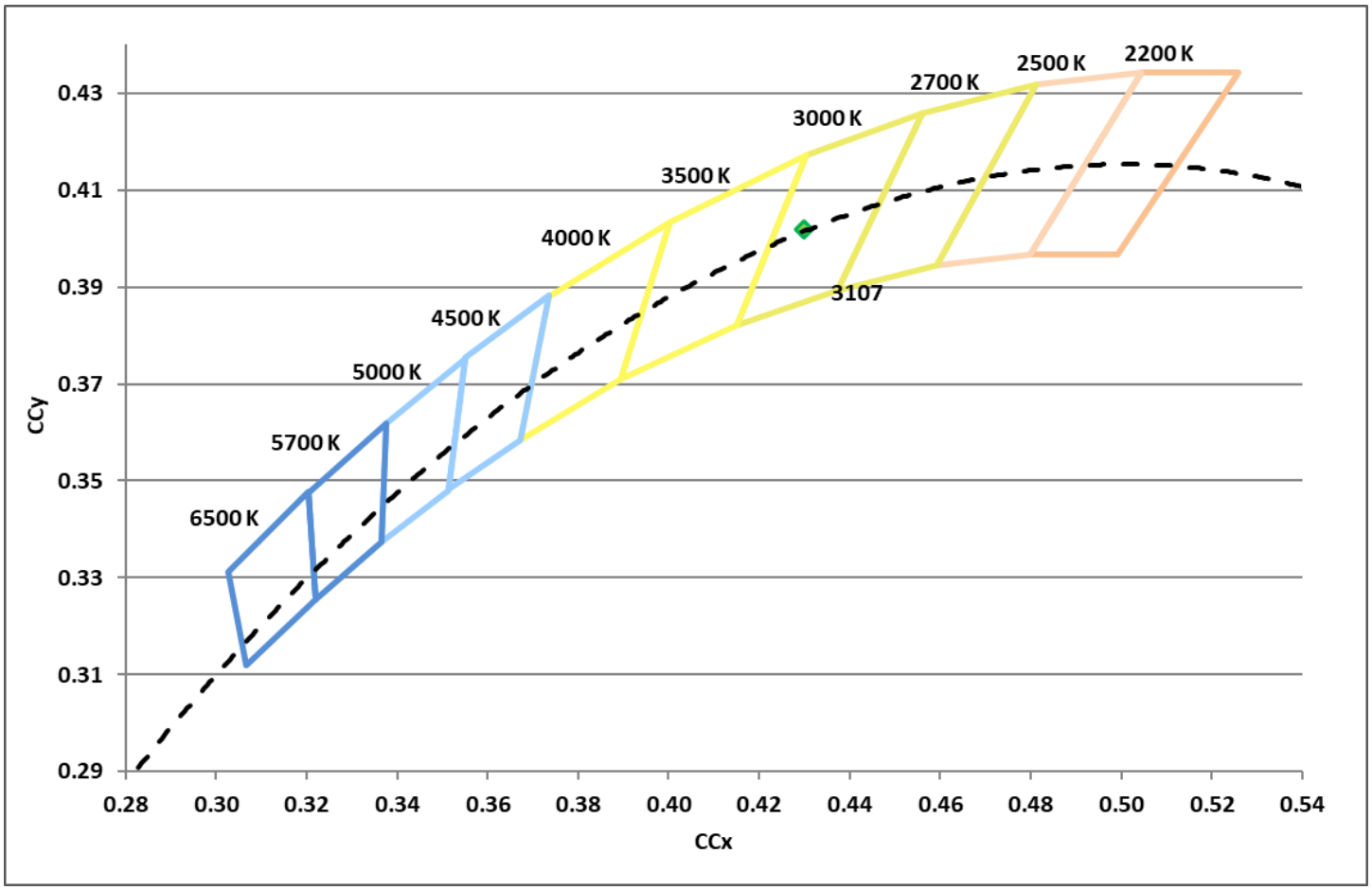
Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.4298	0.4020	0.2469	0.3463	0.2469	0.5195	0.0002

Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
93	94	98	99	93	94	97	92	82	60	94	94	80	95	100

Chromaticity Diagram



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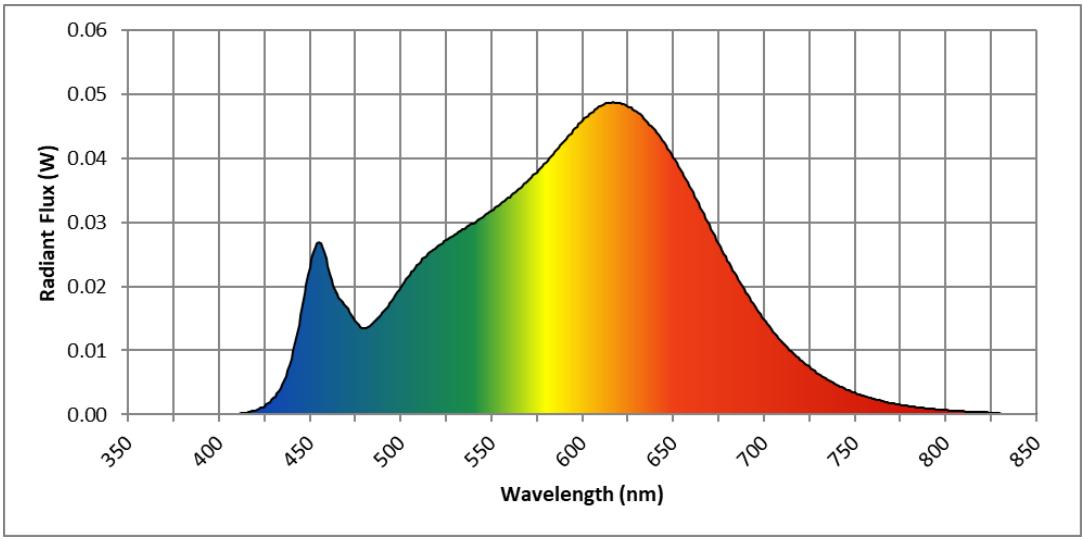
Spectral Distribution

λ(nm)	W/nm	λ(nm)	W/nm	λ(nm)	W/nm
360	0.000015	530	0.028098	700	0.014901
370	0.000068	540	0.029836	710	0.011326
380	0.000018	550	0.031894	720	0.008635
390	0.000039	560	0.033922	730	0.006386
400	0.000004	570	0.036483	740	0.004655
410	0.000090	580	0.039313	750	0.003401
420	0.000650	590	0.042637	760	0.002464
430	0.002534	600	0.045845	770	0.001787
440	0.008775	610	0.048161	780	0.001299
450	0.022996	620	0.048690	790	0.000933
460	0.023078	630	0.047217	800	0.000682
470	0.016815	640	0.044381	810	0.000489
480	0.013544	650	0.040182	820	0.000355
490	0.015833	660	0.035180	830	0.000255
500	0.019841	670	0.029615		
510	0.023556	680	0.024079		
520	0.026227	690	0.019138		

Dominant Wavelength	582	nm
Peak Wavelength	618	nm

Spectral Power Distribution (W/nm)



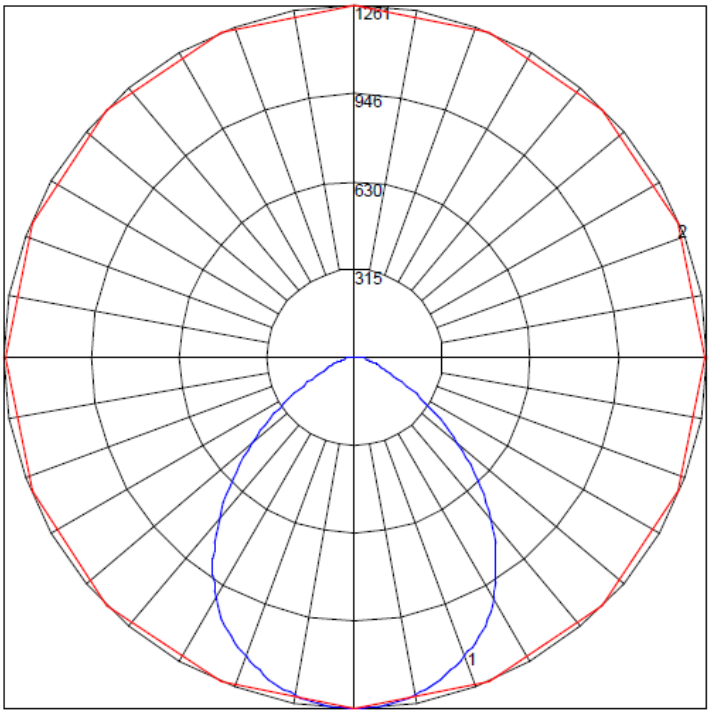
Zonal Lumen Summary

Zone	Lumens	% of Total	Zone	Lumens
0-20	455.09	18.0	0-10	118.7
0-30	951.71	37.6	10-20	336.4
0-40	1502.65	59.3	20-30	496.6
0-60	2295.08	90.6	30-40	551
0-80	2511.84	99.1	40-50	477
0-90	2534.35	100.0	50-60	315
10-90	2415.65	95.3	60-70	145
20-40	1047.56	41.3	70-80	72
20-50	1524.71	60.2	80-90	23
40-70	937.48	37.0	90-100	0.0
60-80	216.76	8.6	100-110	0.0
70-80	71.71	2.8	110-120	0.0
80-90	22.51	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	**2534.35**	**100**		

Luminance Data (Cd./Sq.M)

Average in Degrees	Average 0-Deg	Average 45-Deg	Average 90-Deg
45	24081	24160	24157
55	16839	16937	16966
65	9072	9035	9042
75	7199	7210	7234
85	6392	6498	6474

Candela Plots



Maximum Candela = 1260.745 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	99	100	98	95	97	95	93	93	91	90	88
2	102	96	90	85	100	94	88	84	90	86	82	87	83	80	84	81	79	77
3	95	86	79	73	92	84	78	72	81	76	71	79	74	70	76	72	69	67
4	88	77	70	64	86	76	69	63	74	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	47
7	71	58	50	45	69	57	50	45	56	49	44	55	49	44	53	48	44	42
8	66	54	46	40	64	53	45	40	52	45	40	50	44	40	49	44	40	38
9	62	49	42	37	60	49	42	37	48	41	36	47	41	36	46	40	36	34
10	58	46	38	34	57	45	38	34	44	38	33	43	37	33	43	37	33	31

Candela Tabulations

	0	22.5	45	67.5	90
0	1257.9	1257.9	1257.9	1257.9	1257.9
1	1255.7	1256.4	1258.3	1259.2	1260.7
2	1255.4	1257.3	1257.0	1257.7	1257.7
3	1253.3	1254.8	1256.3	1256.4	1255.1
4	1252.3	1252.1	1251.9	1253.1	1255.8
5	1247.8	1249.0	1250.4	1252.1	1253.4
6	1244.0	1246.2	1247.2	1248.8	1249.1
7	1241.3	1242.1	1244.4	1245.1	1244.2
8	1238.0	1237.1	1239.1	1240.4	1240.9
9	1233.3	1233.2	1234.5	1235.4	1237.5
10	1228.7	1229.0	1229.5	1230.3	1231.4
11	1221.6	1224.2	1224.9	1225.4	1223.4
12	1215.0	1215.3	1217.8	1219.5	1219.9
13	1208.6	1207.9	1208.9	1211.3	1212.7
14	1199.9	1201.4	1201.5	1202.6	1203.4
15	1192.9	1193.2	1194.7	1194.5	1196.3
16	1182.4	1184.0	1186.0	1186.7	1186.0
17	1173.9	1172.9	1175.3	1177.0	1175.4
18	1163.9	1164.1	1164.0	1165.8	1167.0
19	1152.7	1154.7	1154.9	1156.0	1157.0
20	1140.0	1141.4	1143.7	1143.6	1143.5
21	1128.4	1129.4	1130.6	1132.8	1132.4
22	1117.8	1118.9	1120.3	1120.9	1122.0
23	1107.3	1107.0	1108.2	1108.9	1110.2
24	1092.2	1093.7	1095.7	1096.1	1096.3
25	1078.9	1080.2	1081.7	1081.7	1082.8
26	1064.9	1066.6	1067.8	1069.0	1070.0
27	1051.1	1051.0	1052.2	1053.1	1053.6
28	1030.3	1032.6	1034.1	1036.1	1036.9
29	1011.7	1014.4	1015.9	1017.4	1016.4
30	995.3	995.7	995.9	997.6	996.0
31	973.8	974.1	975.3	976.0	976.3
32	950.5	951.5	953.2	954.7	954.2
33	928.2	929.5	930.5	932.3	931.9
34	905.3	907.5	908.1	909.1	909.6
35	882.5	883.6	883.3	884.6	884.5
36	858.4	858.5	859.4	860.1	862.2

Candela Tabulations (Continued)

	0	22.5	45	67.5	90
37	833.9	834.9	837.3	836.6	837.1
38	808.5	810.3	812.2	811.5	812.0
39	782.5	784.2	785.0	785.6	786.3
40	756.4	756.6	758.5	757.7	760.1
41	727.9	730.2	731.5	730.8	732.0
42	700.4	702.2	704.1	704.2	704.8
43	672.1	674.4	675.3	676.4	676.2
44	646.4	647.6	648.9	649.6	649.1
45	618.5	620.6	620.6	622.2	620.5
46	590.9	591.8	591.7	593.1	592.0
47	565.4	564.3	564.1	564.7	565.4
48	537.8	537.2	536.6	538.5	538.0
49	510.2	508.7	508.2	509.6	510.3
50	481.7	481.1	481.4	481.4	482.5
51	456.4	455.9	455.3	455.5	457.3
52	429.8	428.9	428.8	428.8	430.4
53	402.2	402.4	402.6	402.6	403.1
54	376.1	377.4	377.4	377.5	377.9
55	350.8	352.7	352.9	352.9	353.5
56	325.6	327.4	327.7	327.7	327.1
57	301.4	302.9	302.5	302.8	302.4
58	278.4	279.7	279.5	279.4	279.2
59	254.8	256.0	255.4	255.8	255.5
60	232.0	233.0	232.2	233.0	233.0
61	211.9	211.8	211.2	212.0	211.9
62	191.9	191.1	190.7	191.3	191.1
63	171.9	171.7	171.4	172.0	171.9
64	154.7	154.3	154.0	154.5	154.3
65	139.3	139.0	138.7	138.9	138.8
66	124.9	124.9	125.0	124.8	124.7
67	113.0	113.2	113.5	113.2	112.9
68	104.3	104.6	104.7	104.5	104.4
69	97.5	98.1	98.0	97.9	97.8
70	92.2	92.5	92.5	92.4	92.2
71	87.1	87.6	87.5	87.4	87.3
72	82.3	82.6	82.5	82.4	82.2
73	77.4	77.6	77.6	77.5	77.5

Candela Tabulations (Continued)

	0	22.5	45	67.5	90
74	72.5	72.8	72.7	72.7	72.8
75	67.7	67.9	67.8	67.9	68.0
76	63.1	63.0	63.0	63.0	63.1
77	58.3	58.2	58.2	58.2	58.2
78	53.5	53.5	53.6	53.5	53.6
79	48.8	48.8	48.7	48.8	48.8
80	44.0	44.0	44.1	44.1	44.1
81	39.6	39.4	39.5	39.4	39.3
82	34.6	34.7	34.6	34.6	34.6
83	29.9	29.9	30.0	30.0	30.0
84	25.1	25.3	25.3	25.3	25.3
85	20.2	20.4	20.6	20.5	20.5
86	15.6	15.8	15.8	15.7	15.7
87	10.8	11.0	11.1	10.8	10.9
88	6.0	6.3	6.3	5.9	6.0
89	2.2	2.3	2.5	2.3	2.3
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 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
03/25/2022	A	DMS	Origination	M. Hubbard	J. Vollers