NVLAP Lab Code 500089-0

Report Number:	PL16737-004A
Model:	CDR8-B-ALS-9ACK-10V5-xx-UNV (3500K-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 (3500K-HIGH)
Serial Number	16737-004
LED Type	Smalite SL-ID2835FTA-31KAG

Product Description
CDR 8" Downlight luminare, white painted reflector, selectable CCT (3500K) 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.

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Key Photometric Data	Sphere Output	Goniophotometer	
Luminous Flux	2650.0	2673	lm
Efficacy	109.64	112.4	lm/W
Correlated Color Temperature (CCT)	3484	K	
Color Rendering Index (CRI)	94		
R_9	68		
Duv	0.0002		
S/P Ratio**	1.64		
CIE Type	Direct		

	Sphere		Goniophotometer		
Electrical Measurements	**120V**	**277V**	**120V**	**277V**	
Input Wattage	24.17	-	23.78	23.88	W
Input Current	0.204	-	0.200	0.088	A
Input Voltage	120.18	-	120.21	277.23	V
Power Factor	0.988	-	0.988	0.984	
Off-State Power	0	-	0	0	W
Total Harmonic Distortion (Voltage)	0.09	-	0.13	0.19	%
Total Harmonic Distortion (Amperage)	4.61	-	4.72	7.73	%

Note: All photometric measurements taken at 120VAC.

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	52	30	min
Total Operating Time (Stabilization + Test)	62	50	min
Ambient Temperature	24.26	24.9	˚C

Spacing Criteria

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

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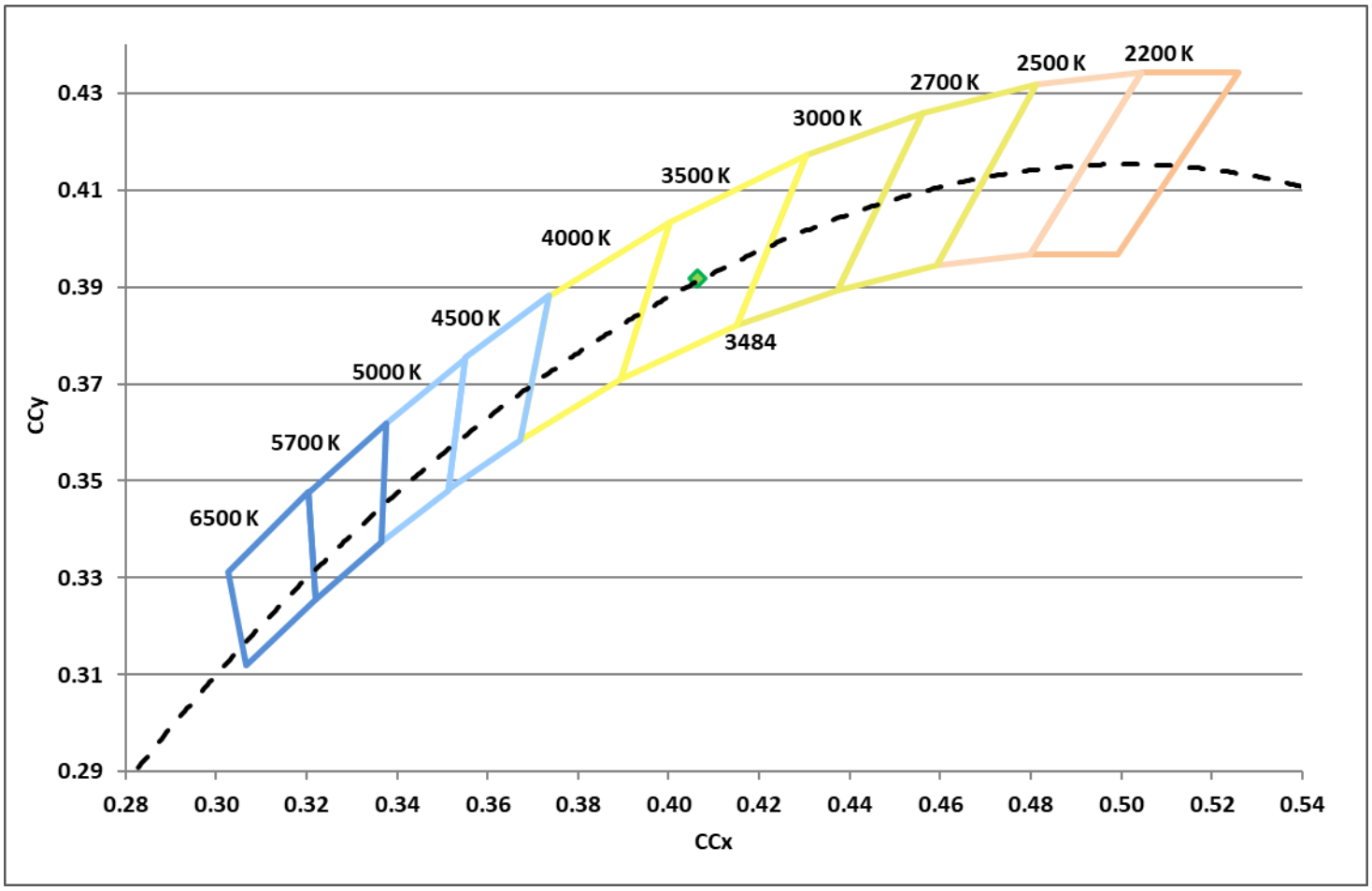
Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.4065	0.3918	0.2360	0.3413	0.2360	0.5119	0.0002

Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
94	95	98	99	94	94	96	94	86	68	94	95	76	96	99

Chromaticity Diagram



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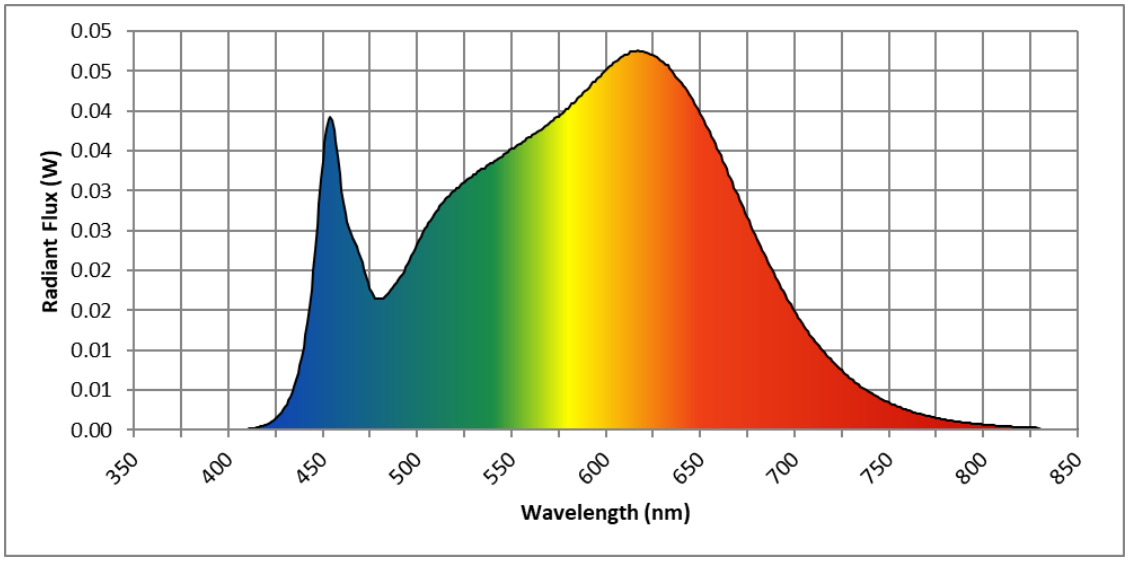
Spectral Distribution

λ(nm)	W/nm	λ(nm)	W/nm	λ(nm)	W/nm
360	0.000043	530	0.032000	700	0.014900
370	0.000019	540	0.033500	710	0.011400
380	0.000010	550	0.035300	720	0.008670
390	0.000028	560	0.036700	730	0.006410
400	0.000036	570	0.038400	740	0.004660
410	0.000105	580	0.040300	750	0.003410
420	0.000674	590	0.042700	760	0.002470
430	0.002850	600	0.045200	770	0.001790
440	0.010400	610	0.047000	780	0.001290
450	0.033700	620	0.047400	790	0.000928
460	0.030100	630	0.046200	800	0.000673
470	0.021700	640	0.043500	810	0.000481
480	0.016400	650	0.039700	820	0.000338
490	0.018800	660	0.034900	830	0.000251
500	0.023300	670	0.029500		
510	0.027300	680	0.024100		
520	0.030100	690	0.019200		

Dominant Wavelength	580	nm
Peak Wavelength	617	nm

Spectral Power Distribution (W/nm)



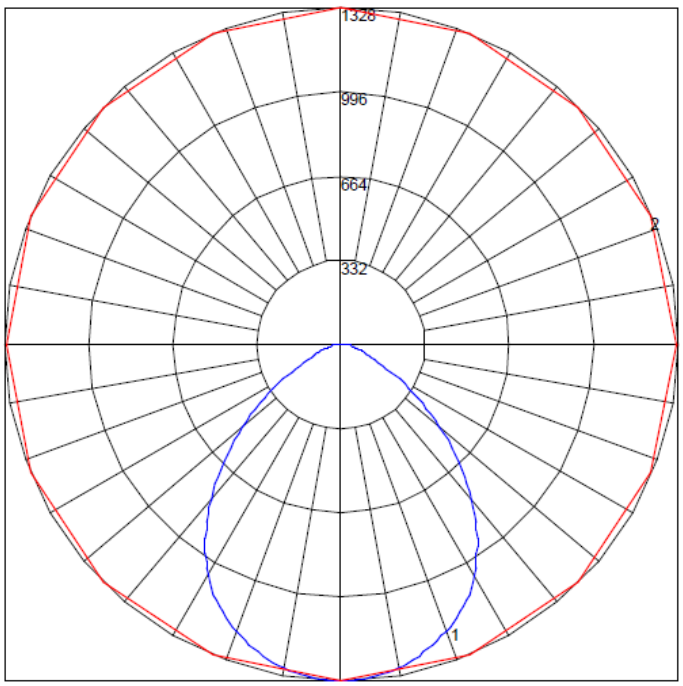
Zonal Lumen Summary

Zone	Lumens	% of Total	Zone	Lumens
0-20	479.67	17.9	0-10	125.1
0-30	1003.17	37.5	10-20	354.6
0-40	1584.16	59.3	20-30	523.5
0-60	2420.63	90.6	30-40	581
0-80	2649.23	99.1	40-50	504
0-90	2672.91	100.0	50-60	332
10-90	2547.79	95.3	60-70	153
20-40	1104.49	41.3	70-80	76
20-50	1608.57	60.2	80-90	24
40-70	989.4	37.0	90-100	0.0
60-80	228.6	8.6	100-110	0.0
70-80	75.68	2.8	110-120	0.0
80-90	23.67	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	**2672.91**	**100**		

Luminance Data (Cd./Sq.M)

Average in Degrees	Average 0-Deg	Average 45-Deg	Average 90-Deg
45	25398	25493	25507
55	17794	17873	17806
65	9580	9530	9512
75	7623	7623	7627
85	6804	6834	6799

Candela Plots



Maximum Candela = 1328.055 Located At Horizontal Angle = 90, Vertical Angle = 2
1 - Vertical Plane Through Horizontal Angles (90 - 270) (Through Max. Cd.)
2 - Horizontal Cone Through Vertical Angle (2) (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	94	93	93	91	90	88
2	102	95	90	85	100	94	88	84	90	86	82	87	83	80	84	81	78	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	70	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	1325.9	1325.9	1325.9	1325.9	1325.9
1	1325.9	1325.4	1327.0	1326.9	1325.6
2	1320.6	1324.1	1324.5	1326.8	1328.1
3	1322.9	1320.9	1323.6	1323.4	1321.6
4	1316.0	1319.2	1320.8	1322.0	1324.8
5	1318.0	1317.7	1318.0	1320.4	1318.0
6	1312.5	1314.2	1314.2	1315.2	1317.3
7	1309.0	1308.7	1312.3	1312.7	1312.4
8	1305.4	1305.8	1307.1	1306.7	1307.8
9	1300.6	1300.5	1301.0	1304.7	1303.2
10	1292.7	1293.4	1297.0	1294.9	1296.8
11	1289.0	1289.3	1289.4	1291.6	1292.9
12	1278.7	1281.3	1282.8	1284.2	1283.5
13	1274.7	1271.9	1276.4	1277.9	1275.3
14	1265.4	1267.2	1265.5	1267.2	1270.2
15	1256.7	1256.3	1260.2	1258.8	1258.6
16	1246.4	1249.0	1248.1	1251.3	1252.1
17	1236.0	1238.4	1239.1	1241.4	1240.1
18	1227.5	1226.1	1226.7	1228.0	1229.5
19	1214.0	1216.7	1216.7	1218.8	1216.2
20	1203.4	1203.9	1206.2	1207.4	1208.1
21	1190.6	1192.9	1191.1	1194.1	1194.8
22	1179.0	1178.6	1182.5	1180.8	1181.6
23	1163.7	1166.1	1167.8	1169.0	1170.5
24	1153.4	1153.6	1155.0	1154.9	1154.2
25	1135.8	1137.6	1140.7	1141.0	1143.6
26	1123.8	1124.4	1126.5	1125.4	1125.5
27	1106.6	1106.2	1108.5	1110.8	1111.9
28	1086.9	1089.6	1091.2	1090.7	1090.6
29	1068.6	1068.1	1070.1	1071.9	1072.7
30	1045.8	1049.7	1051.3	1052.5	1050.9
31	1026.7	1026.5	1026.0	1030.7	1030.5
32	1001.9	1004.9	1005.4	1005.0	1008.3
33	979.9	981.2	980.4	985.2	982.3
34	954.2	958.3	958.5	959.8	961.3
35	929.8	931.8	931.6	933.9	935.7
36	906.0	905.0	906.7	907.4	907.3

Candela Tabulations (Continued)

	0	22.5	45	67.5	90
37	878.6	880.2	882.6	881.4	883.6
38	851.8	854.0	854.6	855.1	855.2
39	825.8	825.8	828.7	826.9	829.2
40	797.6	797.6	800.6	799.2	800.9
41	770.9	773.3	772.8	772.9	773.0
42	739.8	742.6	746.5	744.5	744.2
43	709.9	713.2	713.9	715.7	715.3
44	681.3	684.2	685.8	685.6	685.9
45	652.4	655.5	654.8	656.8	655.1
46	623.9	624.8	624.9	626.7	626.8
47	594.4	594.4	595.8	596.9	596.9
48	566.5	568.2	565.9	568.6	568.9
49	538.5	538.5	537.8	538.5	538.0
50	509.2	506.9	508.2	508.3	508.9
51	482.0	481.1	480.2	480.0	481.6
52	452.3	452.7	452.7	452.8	453.0
53	424.7	424.4	425.0	423.4	424.2
54	396.1	396.6	398.1	396.8	398.5
55	370.7	371.5	372.4	370.7	371.0
56	343.3	345.3	345.9	345.3	345.1
57	316.9	318.3	319.2	318.7	318.4
58	293.3	294.9	294.7	294.5	294.8
59	268.9	270.2	270.4	270.6	269.7
60	245.2	245.8	245.4	245.8	245.3
61	223.5	223.1	223.5	223.1	223.6
62	202.1	203.0	201.9	202.0	201.7
63	182.4	181.3	181.3	181.4	181.1
64	163.5	162.6	162.6	162.3	163.0
65	147.1	146.6	146.3	146.0	146.0
66	131.9	131.8	131.5	131.2	131.3
67	119.0	118.6	119.1	118.9	118.9
68	109.6	110.2	109.9	109.7	109.7
69	102.9	103.3	103.1	103.2	102.9
70	97.2	97.4	97.7	97.4	97.4
71	92.1	92.3	92.0	92.2	92.1
72	86.8	87.2	87.2	87.1	86.9
73	81.6	81.9	81.8	82.0	81.8

Candela Tabulations (Continued)

	0	22.5	45	67.5	90
74	76.7	76.8	76.9	76.7	76.7
75	71.7	71.9	71.7	71.8	71.7
76	66.5	66.4	66.5	66.5	66.4
77	61.6	61.4	61.4	61.4	61.6
78	56.5	56.4	56.6	56.4	56.4
79	51.5	51.4	51.4	51.3	51.4
80	46.6	46.3	46.5	46.4	46.5
81	41.6	41.5	41.6	41.5	41.5
82	36.5	36.4	36.6	36.5	36.4
83	31.5	31.5	31.6	31.6	31.5
84	26.6	26.7	26.6	26.7	26.6
85	21.5	21.6	21.6	21.7	21.5
86	16.4	16.6	16.6	16.6	16.5
87	11.5	11.7	11.6	11.4	11.3
88	6.4	6.6	6.6	6.3	6.1
89	1.9	2.1	2.1	2.0	1.9
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
03/25/2022	A	DMS	Origination	M. Hubbard	J. Vollers