NVLAP Lab Code 500089-0

Report Number:	PL16737-003A
Model:	CDR8-B-ALS-9ACK-10V5-xx-UNV (4000K-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 (4000K-HIGH)
Serial Number	16737-003
LED Type	Smalite SL-ID2835FTA-31KAG

Product Description
CDR 8" Downlight luminare, white painted reflector, selectable CCT (4000K) 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	2560.9	2583	lm
Efficacy	102.32	104.79	lm/W
Correlated Color Temperature (CCT)	4062	K	
Color Rendering Index (CRI)	93		
R_9	68		
Duv	0.0026		
S/P Ratio**	1.81		
CIE Type	Direct		

	Sphere		Goniophotometer		
Electrical Measurements	**120V**	**277V**	**120V**	**277V**	
Input Wattage	25.03	-	24.65	24.59	W
Input Current	0.212	-	0.209	0.090	A
Input Voltage	120.17	-	120.12	277.27	V
Power Factor	0.983	-	0.983	0.985	
Off-State Power	0	-	0	0	W
Total Harmonic Distortion (Voltage)	0.11	-	0.04	0.23	%
Total Harmonic Distortion (Amperage)	4.52	-	4.62	7.56	%

Note: All photometric measurements taken at 120VAC.

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	54	30	min
Total Operating Time (Stabilization + Test)	64	50	min
Ambient Temperature	24.64	24.5	˚C

Spacing Criteria

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

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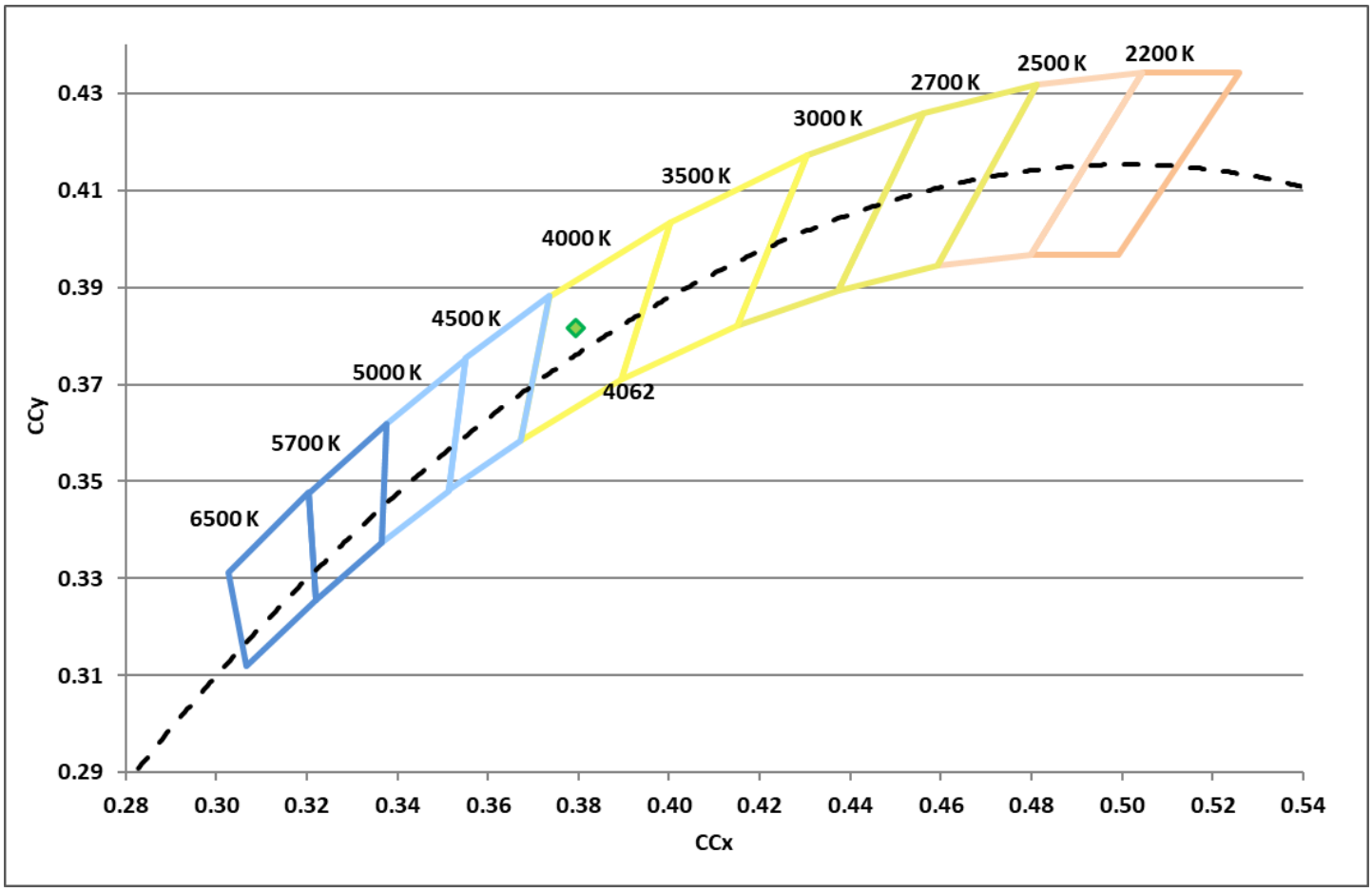
Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.3795	0.3817	0.2225	0.3357	0.2225	0.5036	0.0026

Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
93	93	96	96	93	92	93	95	87	68	88	93	69	94	98

Chromaticity Diagram



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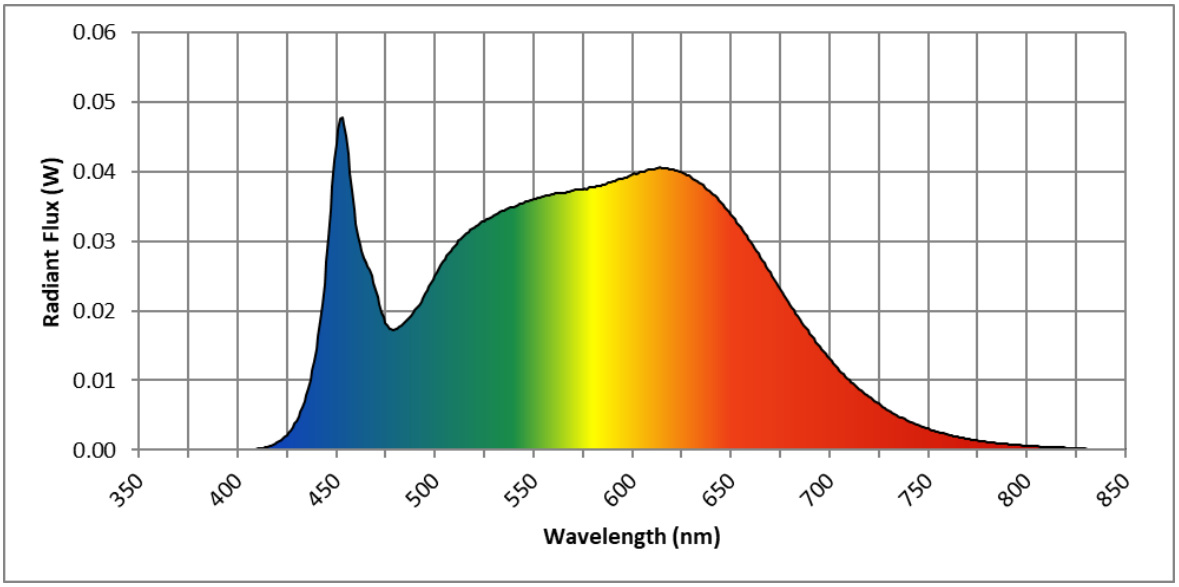
Spectral Distribution

λ(nm)	W/nm	λ(nm)	W/nm	λ(nm)	W/nm
360	0.000007	530	0.033699	700	0.013126
370	0.000021	540	0.034919	710	0.010018
380	0.000006	550	0.036045	720	0.007669
390	0.000007	560	0.036699	730	0.005682
400	0.000026	570	0.037315	740	0.004152
410	0.000151	580	0.037788	750	0.003038
420	0.001020	590	0.038623	760	0.002207
430	0.004202	600	0.039608	770	0.001617
440	0.014500	610	0.040374	780	0.001152
450	0.044083	620	0.040315	790	0.000830
460	0.032520	630	0.039163	800	0.000603
470	0.023008	640	0.036996	810	0.000437
480	0.017349	650	0.033835	820	0.000310
490	0.020029	660	0.029920	830	0.000219
500	0.024999	670	0.025504		
510	0.029288	680	0.020910		
520	0.032037	690	0.016738		

Dominant Wavelength	577	nm
Peak Wavelength	453	nm

Spectral Power Distribution (W/nm)



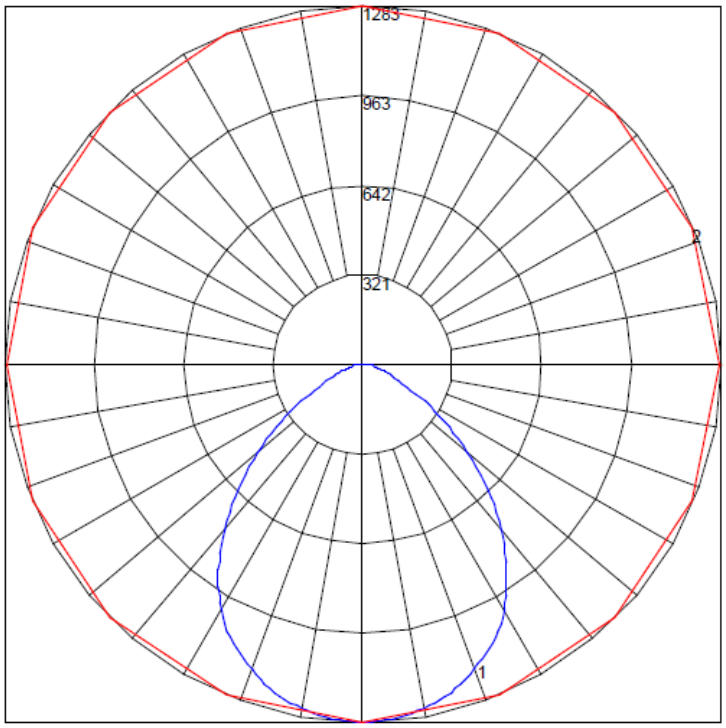
Zonal Lumen Summary

Zone	Lumens	% of Total	Zone	Lumens
0-20	463.5	17.9	0-10	120.9
0-30	969.15	37.5	10-20	342.6
0-40	1530.32	59.2	20-30	505.7
0-60	2337.99	90.5	30-40	561
0-80	2559.98	99.1	40-50	486
0-90	2583.02	100.0	50-60	321
10-90	2462.13	95.3	60-70	149
20-40	1066.82	41.3	70-80	73
20-50	1553.26	60.1	80-90	23
40-70	956.53	37.0	90-100	0.0
60-80	221.99	8.6	100-110	0.0
70-80	73.13	2.8	110-120	0.0
80-90	23.05	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	**2583.02**	**100**		

Luminance Data (Cd./Sq.M)

Average in Degrees	Average 0-Deg	Average 45-Deg	Average 90-Deg
45	24588	24699	24665
55	17208	17200	17231
65	9368	9277	9237
75	7372	7376	7348
85	6469	6571	6570

Candela Plots



Maximum Candela = 1283.395 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	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	33	44	38	33	43	37	33	43	37	33	31

Candela Tabulations

	0	22.5	45	67.5	90
0	1281.4	1281.4	1281.4	1281.4	1281.4
1	1279.9	1280.8	1280.5	1281.5	1283.4
2	1280.0	1278.9	1280.0	1280.9	1279.7
3	1278.3	1277.4	1278.9	1279.6	1280.3
4	1276.5	1275.0	1276.2	1276.0	1276.8
5	1272.7	1272.5	1272.9	1274.0	1274.1
6	1270.9	1268.6	1270.7	1271.6	1271.0
7	1267.6	1265.4	1266.1	1266.6	1268.0
8	1261.7	1261.5	1262.8	1263.5	1263.5
9	1257.5	1257.7	1258.3	1258.4	1257.6
10	1252.9	1250.5	1251.6	1252.2	1252.2
11	1245.8	1244.6	1245.8	1246.6	1247.0
12	1238.5	1238.6	1240.0	1240.2	1240.4
13	1232.5	1231.7	1231.5	1232.9	1233.1
14	1222.7	1223.3	1224.6	1224.9	1224.8
15	1216.8	1215.3	1216.2	1216.0	1217.9
16	1206.3	1205.8	1206.9	1208.4	1207.6
17	1197.8	1196.5	1197.4	1197.0	1198.2
18	1186.5	1186.3	1187.5	1186.0	1187.2
19	1175.8	1174.9	1175.9	1177.3	1177.0
20	1164.9	1164.0	1164.6	1165.2	1165.8
21	1151.9	1151.9	1152.3	1152.5	1153.5
22	1139.8	1138.5	1141.1	1141.0	1141.1
23	1128.1	1128.0	1127.6	1128.8	1127.8
24	1112.6	1114.2	1115.3	1115.7	1115.0
25	1100.0	1099.9	1101.3	1101.5	1102.6
26	1085.0	1086.0	1086.2	1087.1	1087.3
27	1070.6	1070.3	1070.8	1071.5	1070.8
28	1050.9	1051.5	1052.6	1052.9	1054.3
29	1032.9	1033.4	1034.0	1034.3	1035.9
30	1014.7	1014.3	1015.3	1015.5	1014.7
31	993.2	992.6	994.4	994.1	993.4
32	970.9	970.8	971.5	971.4	972.4
33	948.3	947.6	949.2	949.2	949.2
34	926.5	925.2	925.9	926.0	926.3
35	899.6	899.8	901.2	901.1	900.7
36	875.4	874.7	876.2	876.9	876.0

Candela Tabulations (Continued)

	0	22.5	45	67.5	90
37	851.9	851.0	850.8	851.5	850.5
38	825.4	825.3	825.7	825.5	826.0
39	795.3	796.7	797.9	798.9	797.9
40	770.4	770.3	771.3	771.9	771.8
41	743.2	744.0	744.3	744.6	746.0
42	714.1	714.9	715.9	715.9	716.2
43	686.2	686.6	688.1	688.5	688.6
44	658.8	660.1	661.8	660.9	661.7
45	631.5	632.6	634.4	633.3	633.5
46	604.5	603.5	605.4	604.3	604.0
47	575.9	575.5	576.6	575.9	576.6
48	549.2	548.3	549.6	548.3	547.0
49	520.8	519.3	520.4	519.6	518.4
50	492.5	491.1	491.1	491.4	490.8
51	466.2	464.1	463.9	464.0	463.5
52	438.7	437.8	436.8	437.2	436.6
53	409.7	409.5	409.3	410.0	409.4
54	383.4	383.8	383.4	384.3	384.1
55	358.5	358.8	358.4	359.1	359.0
56	332.6	333.4	333.0	333.6	333.5
57	307.4	307.9	308.5	308.6	308.8
58	283.8	284.6	285.4	285.0	285.0
59	260.8	260.9	262.1	261.5	261.1
60	238.1	237.5	238.4	238.1	237.9
61	217.2	216.7	217.0	216.7	215.8
62	197.3	196.0	196.8	196.1	195.2
63	177.1	176.0	176.1	176.1	175.4
64	159.8	158.3	158.0	158.4	157.8
65	143.8	142.8	142.4	142.6	141.8
66	129.7	128.5	128.0	128.6	127.8
67	117.6	116.5	116.4	116.8	116.7
68	108.4	107.7	107.5	107.8	107.7
69	100.4	100.4	100.4	100.3	100.2
70	94.3	94.2	94.2	94.3	94.1
71	89.2	89.3	89.2	89.1	89.0
72	84.0	84.1	84.3	84.0	83.9
73	79.0	79.0	79.1	79.0	78.9

Candela Tabulations (Continued)

	0	22.5	45	67.5	90
74	74.2	74.2	74.2	74.1	74.0
75	69.3	69.3	69.3	69.2	69.1
76	64.6	64.3	64.3	64.3	64.0
77	59.7	59.4	59.4	59.4	59.3
78	54.9	54.7	54.6	54.6	54.4
79	49.8	49.8	49.6	49.6	49.6
80	45.1	44.8	44.7	44.8	44.7
81	40.1	40.1	40.0	40.0	40.0
82	35.2	35.1	35.2	35.2	35.3
83	30.1	30.3	30.3	30.4	30.5
84	25.4	25.5	25.7	25.6	25.7
85	20.5	20.6	20.8	20.8	20.8
86	15.8	15.8	15.9	15.9	15.9
87	11.1	11.2	11.3	11.1	11.0
88	6.9	6.8	7.0	6.8	6.5
89	4.3	3.5	3.5	3.7	3.7
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 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