

Report Number: PL16961-001A
Model: C-TR-D-FP14-S35L-SCCT-UL-xx-xx (HIGH 4000K)
Date: 10/31/2022

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

Prepared For:

Eduardo Torices

Cree Lighting

9201 Washington Avenue

Racine, WI 53406

Prepared By:



Meranda Hubbard, Photometric Test Technician

Approved By:



Jonathan Vollers, Technical Manager

Product Information

Manufacturer	Cree Lighting
Model Number (SKU)	C-TR-D-FP14-S35L-SCCT-UL-xx-xx (HIGH 4000K)
Serial Number	16961
LED Type	SAMSUNG SPMWHR22

Product Description

1'x4' Flat Panel luminaire with power select and CCT select switches integrated set to HIGH power at 4000K CCT

Driver Information (Where Applicable)

TOSPO EAC- 032S080DNPRED 900320

Length	Width	Height
47.75"	11.75"	1.8"

Sample

The following sample was submitted for evaluation



Key Photometric Data	Sphere Output	Goniophotometer	
Luminous Flux	3898.9	3852	lm
Efficacy	131.29	131.29	lm/W
Correlated Color Temperature (CCT)	4020	K	
Color Rendering Index (CRI)	84		
R ₉	14		
Duv	0.0003		
S/P Ratio*	1.72		
CIE Type	Direct		

Electrical Measurements	Sphere		Goniophotometer		
	120V	277V	120V	277V	
Input Wattage	29.70	-	29.34	29.10	W
Input Current	0.250	-	0.247	0.112	A
Input Voltage	120.11	-	120.22	277.33	V
Power Factor	0.988	-	0.989	0.934	
Off-State Power	0	-	0	0	W
Total Harmonic Distortion (Voltage)	0.12	-	0.14	0.07	%
Total Harmonic Distortion (Amperage)	10.21	-	10.52	13.96	%

Note: All photometric measurements taken at 120VAC.

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	51	33	min
Total Operating Time (Stabilization + Test)	61	53	min
Ambient Temperature	24.20	25.1	°C

Spacing Criteria

Spacing Criterion (0 - 180)	1.28
Spacing Criterion (90 - 270)	1.28
Spacing Criterion (Diagonal)	1.40

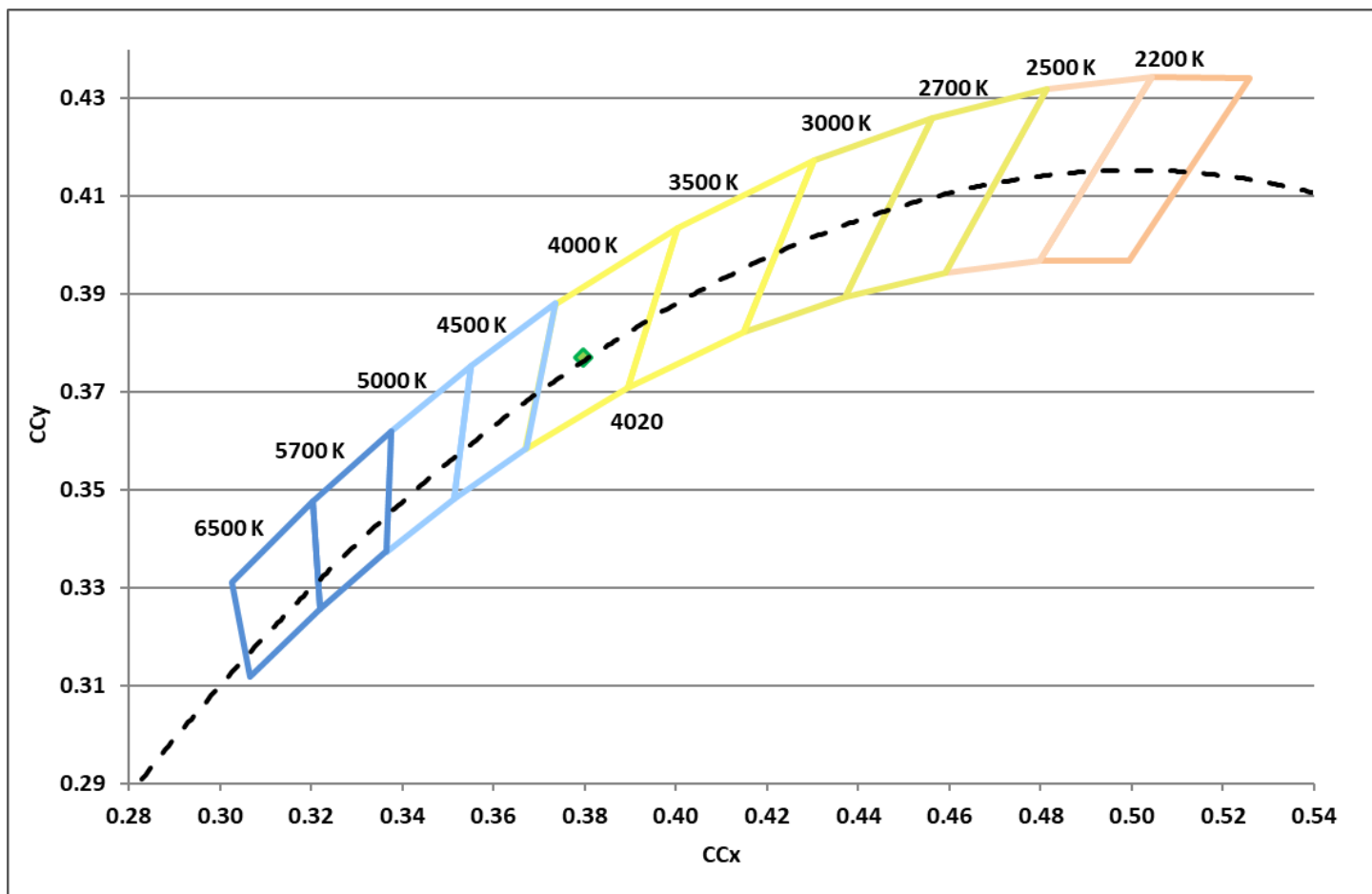
Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.3798	0.3770	0.2246	0.3344	0.2246	0.5016	0.0003

Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
84	83	91	96	82	83	87	86	66	14	78	82	59	85	98

Chromaticity Diagram



Spectral Distribution

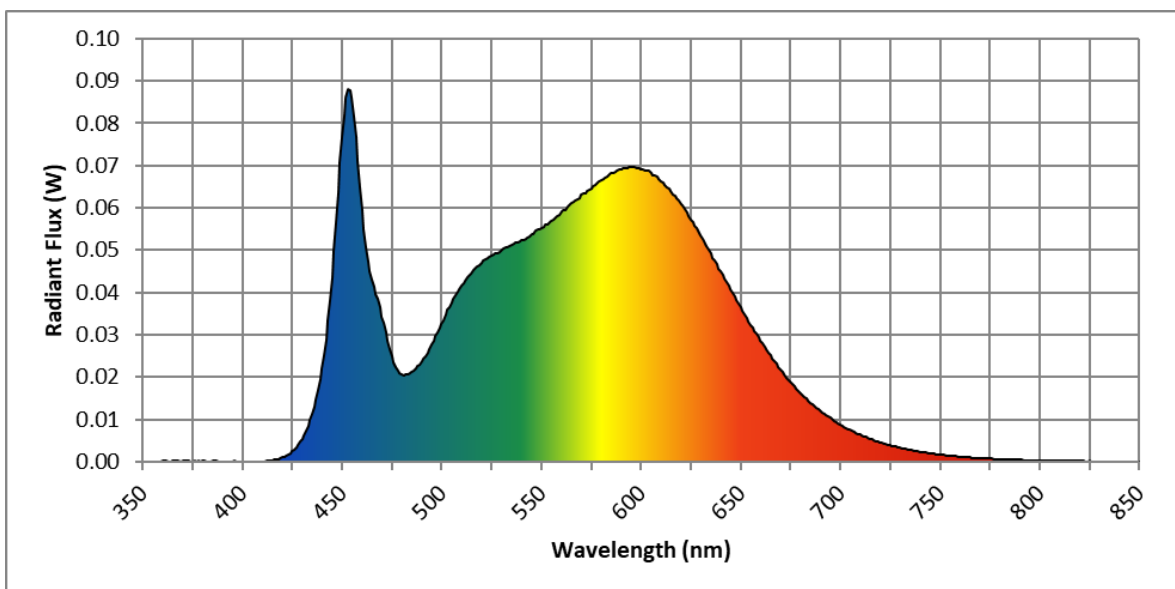
λ (nm)	W/nm
360	0.000197
370	0.000200
380	0.000137
390	0.000073
400	0.000029
410	0.000116
420	0.000990
430	0.005392
440	0.022076
450	0.076721
460	0.059431
470	0.034305
480	0.020595
490	0.023676
500	0.032419
510	0.041536
520	0.046976

λ (nm)	W/nm
530	0.049889
540	0.052357
550	0.055293
560	0.059144
570	0.063073
580	0.066482
590	0.069171
600	0.069039
610	0.066356
620	0.060949
630	0.053587
640	0.044994
650	0.036550
660	0.028717
670	0.021830
680	0.016253
690	0.012066

λ (nm)	W/nm
700	0.008805
710	0.006408
720	0.004628
730	0.003296
740	0.002355
750	0.001681
760	0.001208
770	0.000866
780	0.000621
790	0.000446
800	0.000297
810	0.000224
820	0.000149
830	0.000111

Dominant Wavelength	578	nm
Peak Wavelength	453	nm

Spectral Power Distribution (W/nm)



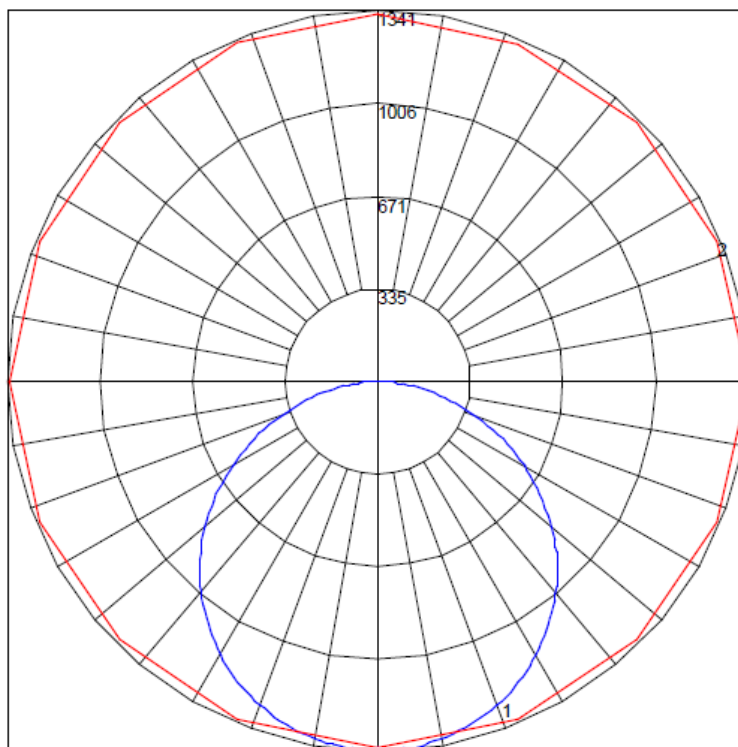
Zonal Lumen Summary

Zone	Lumens	% of Total	Zone	Lumens
0-20	486.6	12.6	0-10	125.7
0-30	1035.4	26.9	10-20	360.9
0-40	1700.3	44.1	20-30	548.8
0-60	3022.0	78.5	30-40	664.9
0-80	3775.6	98.0	40-50	693.6
0-90	3851.5	100.0	50-60	628.1
10-90	3725.8	96.7	60-70	479.2
20-40	1213.7	31.5	70-80	274.4
20-50	1907.3	49.5	80-90	75.9
40-70	1800.9	46.8	90-100	0
60-80	753.6	19.6	100-110	0
70-80	274.4	7.1	110-120	0
80-90	75.9	2.0	120-130	0
90-110	0	0	130-140	0
90-120	0	0	140-150	0
90-130	0	0	150-160	0
90-150	0	0	160-170	0
90-180	0	0	170-180	0
110-180	0	0		
Total	3851.5	100		

Luminance Data (Cd./Sq.M)

Average in Degrees	Average 0-Deg	Average 45-Deg	Average 90-Deg
45	4625	4505	4527
55	4471	4336	4348
65	4227	4047	4045
75	3751	3501	3486
85	2952	2560	2548

Candela Plots



Maximum Candela = 1341.12 Located At Horizontal Angle = 0, Vertical Angle = 1
 # 1 - Vertical Plane Through Horizontal Angles (0 - 180) (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	109	104	99	96	106	101	98	94	97	94	91	93	91	88	90	88	86	83
2	99	90	83	78	96	88	82	77	85	79	75	82	77	73	78	75	71	69
3	90	79	71	64	87	78	70	64	75	68	63	72	66	61	69	64	60	58
4	82	70	61	54	80	69	60	54	66	59	53	64	58	52	62	56	52	50
5	75	62	53	47	73	61	53	46	59	52	46	57	51	45	55	50	45	43
6	70	56	47	41	68	55	47	41	53	46	40	52	45	40	50	44	39	37
7	65	51	42	36	63	50	42	36	49	41	35	47	40	35	46	40	35	33
8	60	46	38	32	59	46	38	32	44	37	32	43	36	31	42	36	31	29
9	56	43	34	29	55	42	34	29	41	34	28	40	33	28	39	33	28	26
10	53	39	31	26	51	39	31	26	38	31	26	37	30	26	36	30	26	24

Candela Tabulations

	0	22.5	45	67.5	90	112.5	135	157.5	180
0	1328.8	1328.8	1328.8	1328.8	1328.8	1328.8	1328.8	1328.8	1328.8
1	1341.1	1329.5	1322.1	1324.6	1328.4	1326.7	1323.3	1329.5	1336.7
2	1337.7	1327.9	1322.3	1324.3	1326.6	1324.8	1322.7	1329.2	1339.2
3	1334.3	1327.5	1322.9	1325.9	1326.7	1324.1	1323.0	1325.8	1336.5
4	1332.7	1325.1	1319.1	1322.6	1327.1	1323.5	1320.8	1327.7	1333.0
5	1332.1	1322.6	1316.3	1320.5	1322.6	1321.8	1317.6	1323.7	1333.8
6	1332.9	1321.3	1315.9	1318.4	1318.8	1318.7	1319.2	1322.3	1330.7
7	1329.5	1318.6	1312.7	1314.5	1318.6	1314.3	1314.7	1320.4	1326.8
8	1324.6	1314.1	1308.6	1311.3	1313.9	1310.8	1310.4	1317.4	1325.4
9	1319.6	1309.0	1305.4	1309.4	1310.1	1309.9	1306.4	1313.2	1319.9
10	1318.3	1306.4	1300.0	1302.4	1306.2	1306.4	1304.2	1307.9	1315.4
11	1313.3	1302.3	1296.3	1298.1	1303.3	1301.0	1299.1	1303.7	1310.4
12	1305.8	1295.0	1291.7	1292.8	1297.0	1294.4	1292.9	1300.9	1306.3
13	1300.0	1289.5	1285.1	1288.7	1291.0	1289.5	1287.9	1295.1	1302.8
14	1297.1	1285.4	1278.3	1281.0	1283.2	1284.1	1284.1	1287.7	1295.3
15	1291.4	1279.0	1273.0	1273.8	1277.9	1277.1	1277.2	1282.3	1287.4
16	1281.0	1269.9	1266.9	1268.9	1270.5	1269.1	1267.9	1276.8	1281.9
17	1274.1	1261.4	1257.6	1261.7	1264.1	1264.2	1260.7	1269.4	1275.4
18	1268.8	1255.6	1248.0	1251.0	1256.5	1256.2	1255.8	1261.2	1265.4
19	1261.0	1246.7	1241.5	1241.9	1246.9	1245.6	1247.7	1253.0	1257.3
20	1251.4	1238.4	1233.5	1235.8	1239.1	1237.8	1237.4	1246.0	1251.2
21	1243.7	1228.3	1222.6	1226.3	1227.7	1228.0	1228.5	1239.4	1242.4
22	1235.7	1219.9	1213.3	1215.1	1219.5	1219.0	1221.2	1229.6	1231.6
23	1223.1	1210.4	1204.8	1205.9	1210.3	1209.3	1210.0	1217.3	1221.4
24	1214.2	1198.9	1194.0	1197.6	1200.2	1198.6	1200.3	1208.3	1213.6
25	1205.1	1187.7	1183.4	1185.8	1187.8	1190.2	1190.4	1199.6	1202.6
26	1192.3	1177.8	1171.2	1172.9	1177.1	1177.7	1178.5	1188.7	1189.8
27	1182.5	1166.3	1161.1	1161.8	1166.2	1166.8	1168.6	1177.7	1179.6
28	1171.8	1155.5	1149.2	1151.4	1153.0	1154.4	1157.3	1165.2	1168.9
29	1155.7	1143.0	1138.4	1138.5	1141.5	1141.6	1143.2	1152.3	1154.4
30	1144.1	1129.9	1124.1	1125.5	1128.6	1129.5	1130.0	1141.5	1143.7
31	1132.6	1116.4	1111.1	1111.0	1115.4	1117.5	1118.3	1127.2	1130.6
32	1119.5	1103.7	1095.4	1097.6	1101.1	1102.7	1105.1	1114.3	1115.0
33	1103.8	1090.0	1083.1	1084.4	1087.1	1088.4	1091.7	1101.3	1102.8
34	1091.2	1076.3	1068.8	1068.8	1072.7	1073.9	1077.6	1086.8	1089.8
35	1078.4	1062.1	1055.5	1055.9	1057.8	1060.1	1062.6	1072.9	1075.3
36	1064.0	1047.4	1041.1	1040.3	1043.3	1044.8	1046.8	1058.2	1058.8

Candela Tabulations (Continued)

	0	22.5	45	67.5	90	112.5	135	157.5	180
37	1047.4	1031.9	1025.2	1025.7	1028.6	1028.5	1034.3	1042.6	1045.8
38	1031.4	1016.7	1008.6	1010.7	1013.2	1014.0	1018.9	1027.6	1030.8
39	1018.2	1001.4	994.5	993.8	995.9	999.9	1001.3	1011.9	1015.4
40	1002.3	985.0	977.2	977.3	980.5	983.3	986.0	997.0	997.7
41	983.4	967.9	959.6	960.2	963.8	966.0	971.2	981.3	981.2
42	966.1	951.8	944.3	943.9	947.1	948.7	953.6	963.2	965.7
43	949.1	934.4	928.0	926.1	928.3	932.0	934.2	946.3	948.8
44	930.6	916.1	909.4	908.5	912.0	915.2	917.1	929.9	930.0
45	913.4	897.7	889.6	890.9	894.0	896.6	901.6	911.1	910.3
46	897.0	880.1	871.7	872.7	875.8	878.9	883.1	891.6	892.1
47	878.6	861.5	854.6	853.7	857.1	860.0	863.9	874.6	874.8
48	859.5	843.0	836.5	835.7	837.9	841.7	846.4	856.8	857.1
49	842.8	823.8	816.3	817.8	819.3	822.5	827.8	837.2	836.7
50	822.6	804.1	798.2	798.2	799.8	804.2	808.1	817.2	816.2
51	802.0	784.6	777.5	776.8	779.6	784.4	788.4	798.7	797.7
52	783.1	762.2	755.8	756.1	757.8	761.7	766.5	778.5	778.9
53	758.9	743.2	736.6	736.8	738.2	742.8	746.3	755.6	754.8
54	737.3	723.1	715.3	715.4	717.9	722.2	725.2	735.6	734.3
55	716.3	701.6	694.5	693.9	696.5	700.9	704.2	715.2	715.0
56	695.8	680.7	673.2	674.2	675.6	679.7	683.7	694.5	694.3
57	673.9	659.9	653.0	652.8	654.9	658.3	662.9	672.2	671.9
58	651.7	638.4	631.0	630.7	633.5	637.1	640.4	650.4	650.5
59	631.4	615.3	608.3	608.7	610.5	615.4	618.9	628.1	627.5
60	610.9	593.1	587.6	586.6	588.1	593.5	597.7	606.3	605.5
61	588.2	571.9	565.5	565.7	566.9	571.6	575.9	584.9	584.6
62	567.1	549.7	543.6	543.4	544.4	548.9	553.6	562.6	561.0
63	545.9	527.1	521.4	520.8	521.3	526.6	531.7	541.1	539.2
64	522.5	505.3	500.1	499.7	499.6	505.1	509.4	518.8	516.1
65	498.9	483.5	477.7	477.1	477.4	482.8	487.3	495.8	494.4
66	476.3	460.8	455.1	454.8	455.3	460.6	465.2	473.9	471.6
67	453.3	437.9	432.9	431.8	433.5	438.1	442.7	451.4	449.0
68	430.2	415.6	410.5	408.5	409.6	415.3	420.2	427.7	425.7
69	406.5	393.5	387.9	385.2	387.4	392.0	397.3	404.5	403.5
70	382.5	370.0	365.3	363.1	364.6	369.4	374.3	381.8	381.3
71	358.8	346.7	342.3	340.5	341.9	346.3	351.6	358.8	357.6
72	336.7	324.2	319.4	316.9	318.6	323.6	328.9	334.9	334.3
73	314.9	301.7	297.2	294.6	296.1	300.8	306.1	312.5	312.0

Candela Tabulations (Continued)

	0	22.5	45	67.5	90	112.5	135	157.5	180
74	292.7	279.2	275.2	272.9	273.9	277.9	283.8	290.7	289.7
75	271.1	257.3	253.1	250.8	252.0	255.8	261.6	268.4	267.1
76	250.3	236.2	231.5	229.1	230.3	234.2	239.9	246.7	244.9
77	228.9	215.3	211.0	208.6	209.3	213.3	218.6	225.5	223.6
78	208.0	194.3	190.6	188.2	189.0	192.7	197.8	205.0	203.0
79	186.8	174.5	170.3	168.0	169.2	172.8	177.6	184.7	182.5
80	166.6	155.4	150.9	148.4	150.0	153.1	157.6	164.5	162.2
81	146.4	136.1	132.0	129.7	130.9	134.3	138.6	145.1	142.7
82	127.0	117.3	113.6	111.5	112.6	115.8	120.2	126.0	123.9
83	107.6	99.2	96.0	93.8	95.1	98.0	102.3	107.2	105.3
84	89.3	81.4	78.9	77.1	78.1	80.7	84.6	88.7	87.3
85	71.9	64.2	62.3	61.3	62.0	64.4	67.8	71.2	70.1
86	55.4	47.9	46.9	46.3	47.3	49.2	51.9	54.8	53.6
87	40.1	32.7	32.6	32.4	33.6	35.1	37.1	39.1	37.8
88	25.7	18.9	19.6	20.3	21.3	22.5	23.5	24.7	23.1
89	12.5	8.1	9.9	11.4	12.4	12.7	12.3	12.5	10.3
90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Integrating Sphere Equipment List

Description	Manufacturer	Model	Serial Number
3M Sphere	Labsphere	ILLUMIA PLUS 3020-300 4PI	1115184557
CCD Array Spectrometer	Labsphere	MC-9801:3683L	98010844
Programmable AC Source	Chroma	61602	62012PF01504
Power Analyzer	Xitron	XT2640	2641AD2006002

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.

Disclaimers:

This report must not be used by the customer to claim product certification, approval or endorsement by NVLAP, NIST or any agency of the federal government.

The results contained in this report pertain only to the tested sample.

This report shall not be reproduced, except in full, without written approval of the RESTL.

*Items marked with a single asterisk are not covered by the NVLAP accreditation.

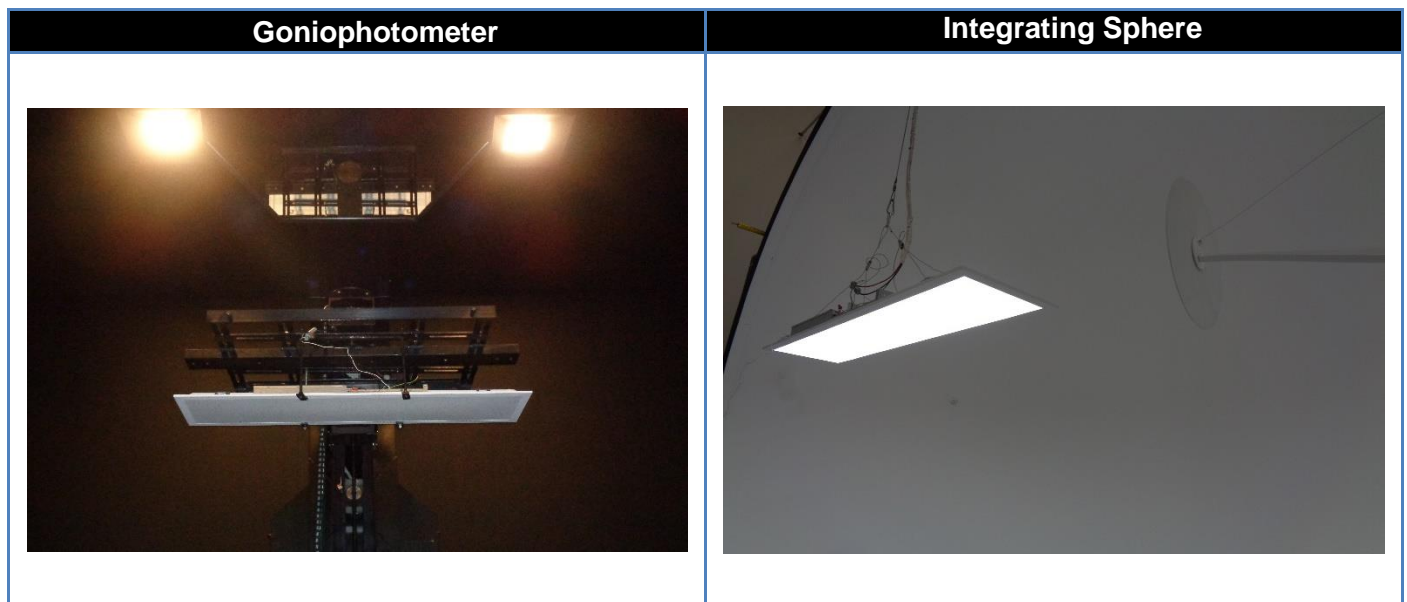
In the event that the recorded temperature is outside of $25 \pm 1^{\circ}\text{C}$, this is considered a non-standard condition.

This report may contain data not covered by the NVLAP accreditation, and are identified with **.

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.



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
10/31/2022	A	DMS	Origination	M. Hubbard	J. Vollers