

Report Number: PL16963-001A
Model: C-TR-D-FP24-S58L-SCCT-UL-xx-xx (HIGH 3500K)
Date: 10/31/2022

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

Prepared For:

Eduardo Torices

Cree Lighting

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Prepared By:



Meranda Hubbard, Photometric Test Technician

Approved By:



Jonathan Vollers, Technical Manager

Product Information

Manufacturer	Cree Lighting
Model Number (SKU)	C-TR-D-FP24-S58L-SCCT-UL-xx-xx (HIGH 3500K)
Serial Number	16963-001
LED Type	SAMSUNG SPMWHR22

Product Description

2'x4' Flat Panel luminaire with power select and CCT select switches integrated set to HIGH power at 3500K CCT

Driver Information (Where Applicable)

TOSPO EAC-042S105DNPRE 900320

Length	Width	Height
47.75"	23.81"	1.8"

Sample

The following sample was submitted for evaluation



Key Photometric Data	Sphere Output	Goniophotometer	
Luminous Flux	4867.1	4791	lm
Efficacy	123.44	122.97	lm/W
Correlated Color Temperature (CCT)	3448	K	
Color Rendering Index (CRI)	84		
R ₉	14		
Duv	-0.0004		
S/P Ratio*	1.53		
CIE Type	Direct		

	Sphere		Goniophotometer		
Electrical Measurements	120V	277V	120V	277V	
Input Wattage	39.43	-	38.96	38.34	W
Input Current	0.331	-	0.327	0.148	A
Input Voltage	120.08	-	120.22	277.34	V
Power Factor	0.991	-	0.991	0.935	
Off-State Power	0	-	0	0	W
Total Harmonic Distortion (Voltage)	0.18	-	0.09	0.10	%
Total Harmonic Distortion (Amperage)	10.25	-	10.44	13.12	%

Note: All photometric measurements taken at 120VAC.

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	54	37	min
Total Operating Time (Stabilization + Test)	64	57	min
Ambient Temperature	24.56	25.1	°C

Spacing Criteria

Spacing Criterion (0 - 180)	1.30
Spacing Criterion (90 - 270)	1.26
Spacing Criterion (Diagonal)	1.40

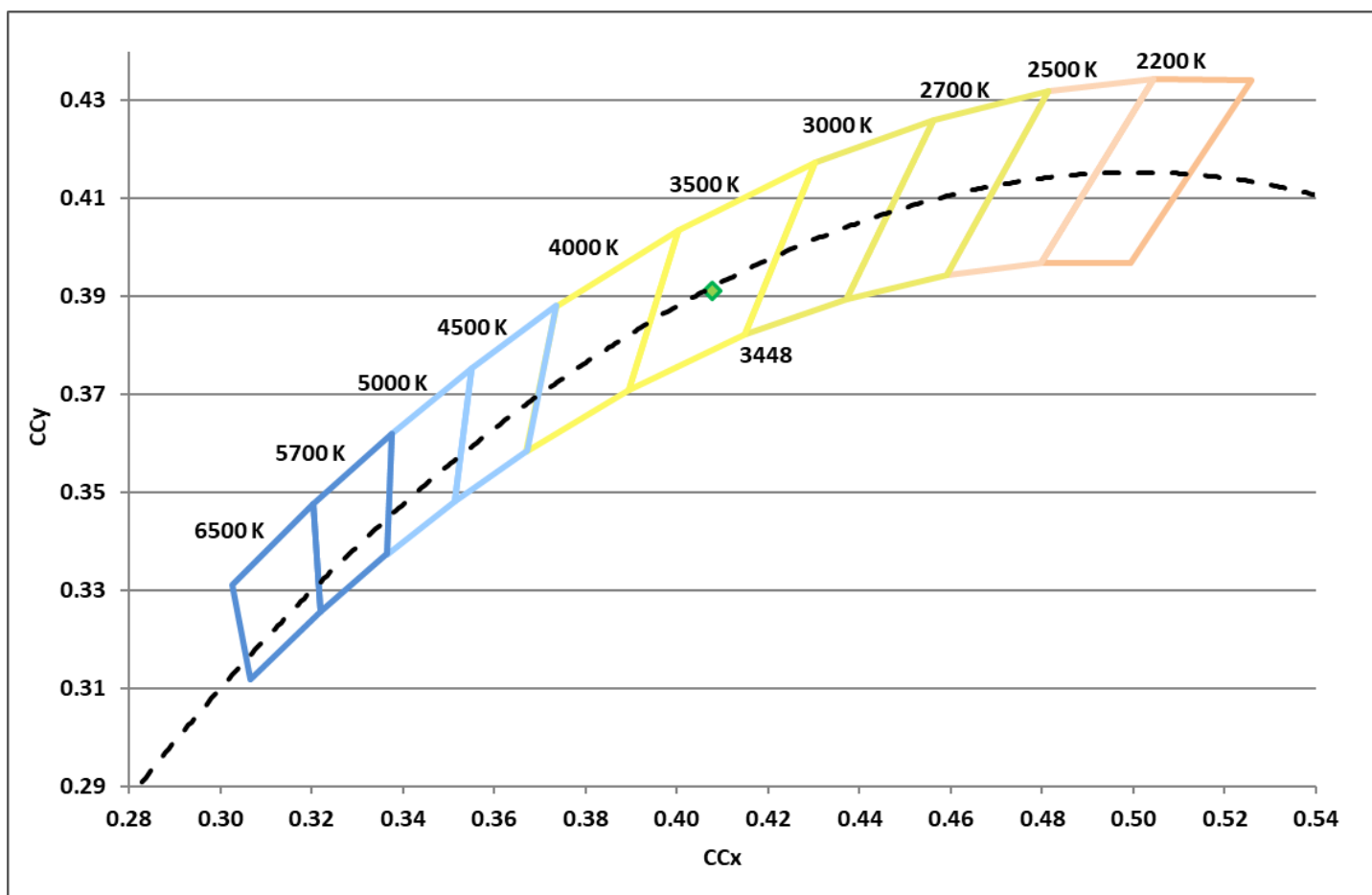
Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.4078	0.3911	0.2372	0.3412	0.2372	0.5118	-0.0004

Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
84	83	91	97	83	83	89	85	64	14	80	83	66	85	99

Chromaticity Diagram



Spectral Distribution

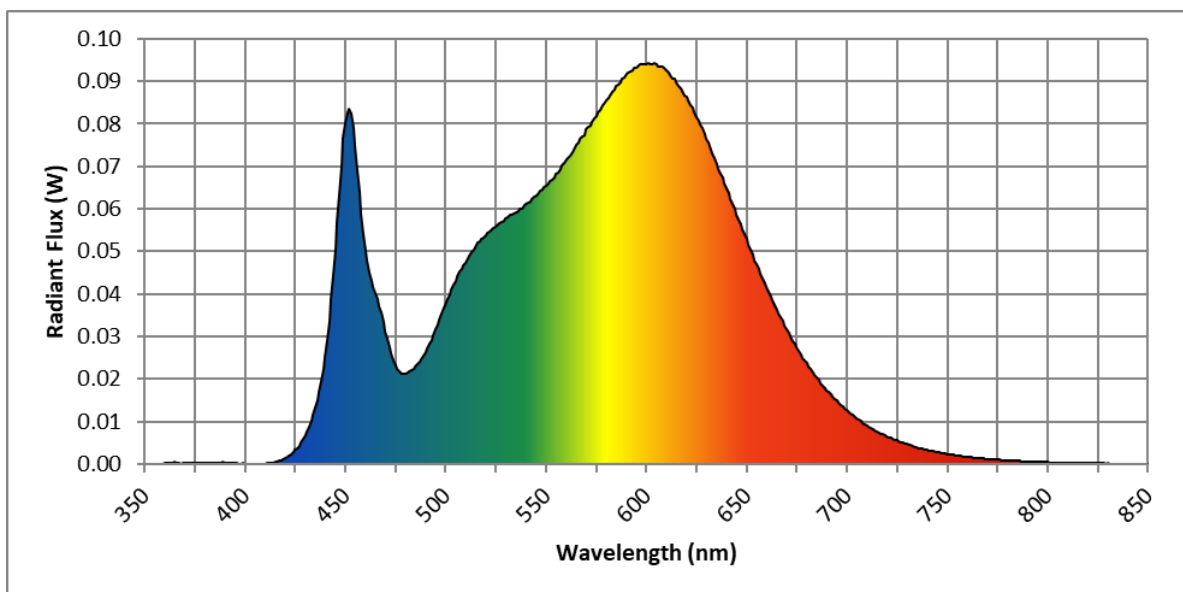
$\lambda(\text{nm})$	W/nm
360	0.000249
370	0.000256
380	0.000257
390	0.000247
400	0.000084
410	0.000118
420	0.001446
430	0.006707
440	0.025305
450	0.080121
460	0.050221
470	0.031258
480	0.021337
490	0.026343
500	0.037348
510	0.047310
520	0.053737

$\lambda(\text{nm})$	W/nm
530	0.057770
540	0.061046
550	0.065391
560	0.071506
570	0.078655
580	0.085383
590	0.091606
600	0.093969
610	0.092488
620	0.086259
630	0.076307
640	0.064801
650	0.052826
660	0.041604
670	0.031752
680	0.023673
690	0.017375

$\lambda(\text{nm})$	W/nm
700	0.012681
710	0.009143
720	0.006547
730	0.004681
740	0.003308
750	0.002336
760	0.001663
770	0.001189
780	0.000838
790	0.000593
800	0.000417
810	0.000304
820	0.000208
830	0.000133

Dominant Wavelength	581	nm
Peak Wavelength	601	nm

Spectral Power Distribution (W/nm)



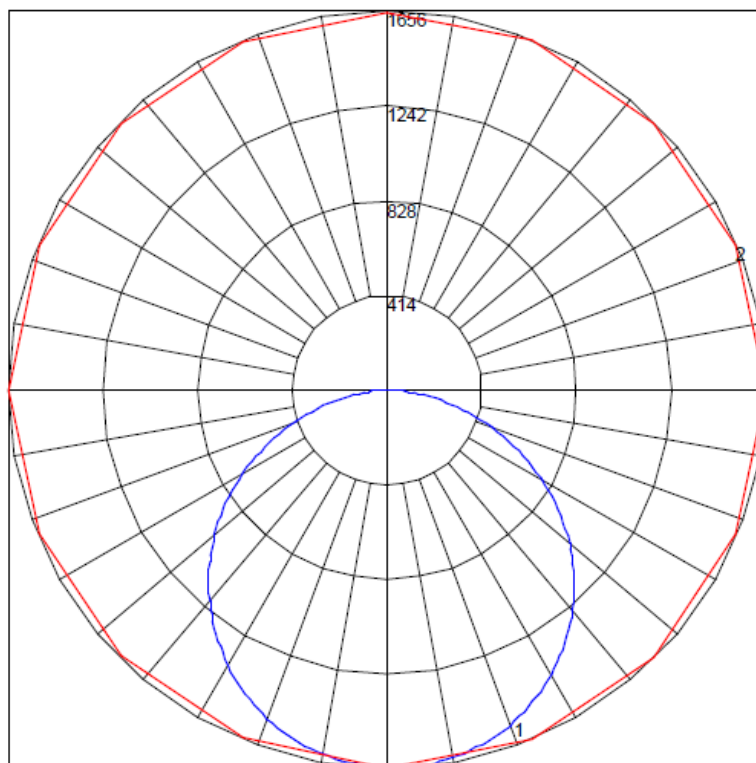
Zonal Lumen Summary

Zone	Lumens	% of Total	Zone	Lumens
0-20	605.8	12.6	0-10	156.5
0-30	1288.7	26.9	10-20	449.2
0-40	2115.7	44.2	20-30	682.9
0-60	3760.8	78.5	30-40	827.0
0-80	4696.2	98.0	40-50	862.5
0-90	4790.7	100.0	50-60	782.7
10-90	4634.2	96.7	60-70	595.1
20-40	1509.9	31.5	70-80	340.2
20-50	2372.4	49.5	80-90	94.6
40-70	2240.3	46.8	90-100	0
60-80	935.3	19.5	100-110	0
70-80	340.2	7.1	110-120	0
80-90	94.6	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	4790.7	100		

Luminance Data (Cd./Sq.M)

Average in Degrees	Average 0-Deg	Average 45-Deg	Average 90-Deg
45	2583	2523	2486
55	2511	2443	2398
65	2371	2277	2227
75	2092	1968	1910
85	1673	1469	1402

Candela Plots



Maximum Candela = 1655.61 Located At Horizontal Angle = 0, Vertical Angle = 3
 # 1 - Vertical Plane Through Horizontal Angles (0 - 180) (Through Max. Cd.)
 # 2 - Horizontal Cone Through Vertical Angle (3) (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	76	63	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	29	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	1654.6	1654.6	1654.6	1654.6	1654.6	1654.6	1654.6	1654.6	1654.6
1	1653.4	1654.4	1654.0	1653.8	1654.4	1654.1	1653.3	1652.9	1654.2
2	1653.5	1652.2	1653.9	1654.6	1653.2	1652.5	1651.9	1651.8	1650.7
3	1655.6	1652.5	1653.8	1653.6	1653.8	1649.8	1648.2	1649.7	1651.8
4	1653.3	1652.2	1648.4	1651.2	1650.6	1649.1	1644.8	1646.4	1645.2
5	1651.2	1648.5	1646.1	1647.9	1646.7	1647.3	1645.3	1643.1	1640.8
6	1650.5	1645.4	1646.7	1643.7	1644.9	1643.1	1641.9	1641.1	1639.4
7	1648.5	1644.9	1643.5	1641.5	1640.5	1637.6	1634.8	1636.3	1637.6
8	1642.2	1641.2	1640.1	1639.1	1636.1	1635.0	1629.6	1630.9	1630.8
9	1638.3	1634.7	1632.2	1635.3	1631.7	1630.1	1627.5	1624.6	1623.5
10	1634.4	1630.3	1630.4	1628.4	1628.0	1624.3	1621.5	1622.5	1619.3
11	1631.0	1626.6	1626.0	1623.3	1621.6	1617.4	1613.9	1615.3	1613.9
12	1625.9	1620.0	1618.9	1616.9	1612.6	1612.2	1608.6	1607.6	1604.5
13	1618.2	1611.8	1609.9	1610.1	1607.2	1603.9	1602.4	1600.0	1597.7
14	1611.8	1606.3	1604.2	1602.2	1601.3	1598.1	1593.5	1591.5	1591.6
15	1605.4	1600.8	1598.3	1593.3	1590.5	1588.5	1583.5	1584.8	1582.4
16	1598.3	1590.8	1587.9	1585.1	1580.6	1576.4	1576.5	1576.6	1571.5
17	1589.7	1581.0	1578.8	1578.1	1573.1	1569.2	1567.7	1565.4	1563.5
18	1580.6	1573.3	1570.7	1566.5	1564.4	1560.9	1555.7	1555.0	1553.5
19	1573.5	1564.1	1561.2	1554.4	1553.3	1549.4	1546.4	1545.8	1541.9
20	1563.8	1553.6	1549.1	1545.2	1539.2	1537.1	1535.6	1536.3	1530.3
21	1550.2	1542.6	1537.7	1533.9	1528.5	1525.2	1525.5	1523.0	1517.3
22	1540.0	1531.9	1528.4	1522.6	1519.1	1512.6	1511.3	1510.8	1504.8
23	1531.5	1521.8	1516.2	1510.5	1505.2	1501.2	1497.3	1500.7	1494.5
24	1519.1	1508.7	1501.0	1497.3	1490.4	1490.1	1486.3	1486.2	1480.6
25	1503.5	1495.0	1490.0	1483.9	1478.9	1476.8	1474.0	1472.7	1465.5
26	1491.9	1482.0	1476.7	1472.1	1466.2	1459.9	1457.7	1459.3	1452.0
27	1480.0	1468.8	1462.3	1457.0	1449.2	1446.6	1442.7	1444.3	1440.1
28	1462.2	1453.2	1447.0	1439.6	1434.0	1433.3	1430.4	1428.7	1423.6
29	1449.0	1439.0	1431.8	1425.6	1420.2	1415.1	1415.0	1412.4	1408.3
30	1436.4	1424.8	1416.1	1412.0	1406.3	1397.8	1396.2	1397.2	1393.8
31	1418.9	1406.9	1399.7	1393.8	1387.5	1383.7	1381.4	1381.5	1375.6
32	1402.4	1389.4	1382.9	1375.1	1368.9	1368.2	1362.7	1363.7	1357.0
33	1388.5	1374.3	1366.3	1359.5	1353.0	1348.4	1348.2	1348.4	1339.9
34	1372.7	1357.8	1350.2	1343.0	1334.7	1329.2	1330.5	1331.0	1322.9
35	1353.9	1339.3	1332.1	1323.3	1317.4	1313.4	1309.7	1312.3	1304.5
36	1334.2	1321.4	1314.4	1303.7	1296.6	1294.2	1291.5	1292.6	1285.7

Candela Tabulations (Continued)

	0	22.5	45	67.5	90	112.5	135	157.5	180
37	1317.5	1303.3	1293.4	1285.5	1277.9	1274.4	1274.6	1274.8	1266.0
38	1297.2	1285.5	1275.0	1266.1	1259.3	1254.7	1254.8	1256.1	1247.7
39	1279.2	1264.7	1257.1	1246.3	1239.2	1236.0	1233.6	1236.5	1231.1
40	1259.4	1243.3	1235.8	1226.8	1218.8	1215.5	1214.3	1216.2	1209.4
41	1239.3	1223.8	1214.2	1204.8	1196.9	1193.6	1195.2	1195.6	1187.5
42	1217.2	1203.4	1194.0	1183.7	1176.2	1171.9	1173.0	1175.0	1169.0
43	1196.2	1181.7	1173.0	1163.0	1155.6	1151.1	1149.7	1153.6	1148.9
44	1175.3	1159.4	1150.0	1141.2	1133.6	1128.6	1129.3	1131.3	1125.8
45	1154.3	1137.1	1127.2	1118.9	1110.6	1106.9	1108.0	1108.9	1101.8
46	1131.6	1115.6	1106.0	1096.4	1087.3	1085.2	1085.0	1086.7	1080.7
47	1110.0	1091.9	1083.1	1072.9	1065.9	1062.6	1061.9	1064.8	1058.5
48	1086.6	1068.0	1059.2	1049.6	1043.0	1038.6	1040.5	1041.6	1033.9
49	1061.9	1046.2	1034.6	1025.9	1017.8	1014.5	1016.0	1018.1	1008.8
50	1040.0	1020.7	1011.7	1000.8	994.1	991.3	991.3	994.3	985.9
51	1015.5	996.5	987.6	977.4	970.8	966.9	967.3	970.2	962.3
52	988.8	972.7	961.7	953.1	945.0	942.6	943.5	946.1	936.8
53	964.4	946.9	936.5	926.7	920.0	918.4	918.9	921.2	911.9
54	937.2	919.5	910.9	899.9	894.8	893.0	894.3	895.8	887.9
55	910.1	894.1	885.3	874.9	869.1	865.6	868.3	870.9	862.7
56	884.0	868.9	858.4	850.3	842.4	839.4	842.3	845.6	836.9
57	856.3	841.2	831.3	822.6	815.4	813.9	814.9	817.9	812.6
58	828.7	814.1	804.3	795.2	789.5	786.2	787.0	790.3	784.6
59	802.2	785.8	775.4	765.9	760.1	756.6	759.0	762.6	755.1
60	773.0	756.3	747.1	738.2	731.9	731.1	732.9	736.1	727.8
61	745.2	728.4	720.2	710.7	704.0	703.7	704.6	708.6	699.6
62	716.7	701.3	692.5	684.2	678.0	676.5	677.1	681.6	672.1
63	689.5	673.0	664.0	656.6	650.3	648.8	651.2	655.0	644.5
64	662.2	644.2	635.6	627.9	622.0	621.0	623.1	627.6	616.7
65	633.1	616.1	608.1	599.2	594.7	593.2	594.8	599.9	589.3
66	602.9	588.1	578.3	571.7	567.0	565.3	567.2	572.3	563.0
67	574.4	558.2	549.7	542.8	538.4	537.2	539.9	544.3	534.9
68	545.0	528.9	520.9	513.6	509.7	509.4	511.6	516.4	506.9
69	514.1	500.1	491.9	485.5	481.1	480.3	482.9	487.9	480.1
70	484.0	471.2	462.5	456.6	453.0	451.6	455.3	459.6	453.3
71	455.3	441.9	433.5	427.7	423.4	423.8	427.4	431.9	425.2
72	426.2	413.1	405.7	399.6	395.1	396.3	398.9	404.5	397.1
73	397.5	384.8	377.7	371.5	367.1	368.7	371.9	376.8	370.7

Candela Tabulations (Continued)

	0	22.5	45	67.5	90	112.5	135	157.5	180
74	369.4	356.8	349.3	343.4	339.8	341.2	344.9	349.6	343.6
75	342.1	329.1	321.9	316.0	312.4	314.4	318.3	323.1	315.9
76	315.9	302.4	295.6	289.5	286.2	288.5	291.6	297.0	289.7
77	288.8	276.2	269.1	262.9	260.4	262.0	266.2	271.3	264.1
78	262.9	249.6	242.6	236.7	235.0	236.2	241.2	245.8	238.9
79	237.1	224.0	217.5	211.9	210.4	211.7	216.3	221.5	213.9
80	211.2	199.2	193.0	187.8	186.1	187.6	192.1	197.2	190.1
81	185.8	174.5	168.4	163.8	162.4	163.9	168.6	173.6	167.0
82	161.4	150.3	145.4	141.0	139.5	141.5	145.8	150.6	144.5
83	137.0	127.3	122.8	119.3	117.5	120.1	123.7	128.6	122.9
84	113.9	104.9	101.2	98.4	96.8	99.3	102.6	107.0	102.1
85	92.1	83.6	80.9	78.3	77.2	79.6	82.5	86.3	82.2
86	71.4	63.5	61.5	59.8	59.0	61.3	63.6	66.9	63.0
87	51.9	44.7	43.2	42.4	42.0	44.2	45.6	48.1	44.9
88	33.7	27.3	26.7	26.4	26.6	28.4	29.4	30.9	27.8
89	17.5	12.5	12.6	13.3	14.0	14.6	14.4	15.3	12.3
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.

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

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

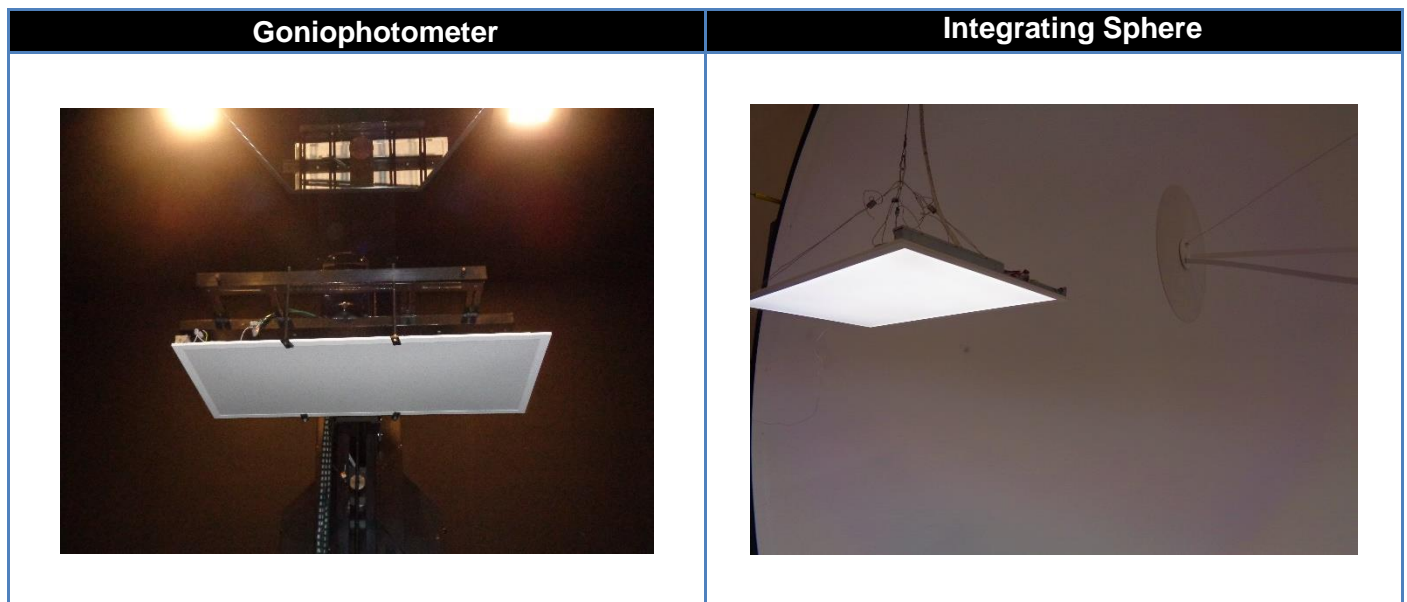
In the event that the recorded temperature is outside of $25 \pm 1^{\circ}\text{C}$, this is considered a non-standard condition.

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