

**Report Number:** PL16963-003A  
**Model:** C-TR-D-FP24-S58L-SCCT-UL-xx-xx (HIGH 5000K)  
**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

<b>Manufacturer</b>	Cree Lighting
<b>Model Number (SKU)</b>	C-TR-D-FP24-S58L-SCCT-UL-xx-xx (HIGH 5000K)
<b>Serial Number</b>	16963-003
<b>LED Type</b>	SAMSUNG SPMWHR22

### Product Description

2'x4' Flat Panel luminaire with power select and CCT select switches integrated set to HIGH power at 5000K 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	4885.1	4772	lm
Efficacy	124.09	122.64	lm/W
Correlated Color Temperature (CCT)	4913	K	
Color Rendering Index (CRI)	83		
R <sub>9</sub>	9		
Duv	0.0030		
S/P Ratio*	1.95		
CIE Type	Direct		

	Sphere		Goniophotometer		
Electrical Measurements	120V	277V	120V	277V	
Input Wattage	39.37	-	38.91	38.19	W
Input Current	0.331	-	0.326	0.147	A
Input Voltage	120.04	-	120.25	277.41	V
Power Factor	0.991	-	0.991	0.935	
Off-State Power	0	-	0	0	W
Total Harmonic Distortion (Voltage)	0.19	-	0.20	0.15	%
Total Harmonic Distortion (Amperage)	10.13	-	10.39	13.04	%

**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	24.52	24.8	°C

### Spacing Criteria

Spacing Criterion (0 - 180)	1.30
Spacing Criterion (90 - 270)	1.28
Spacing Criterion (Diagonal)	1.40

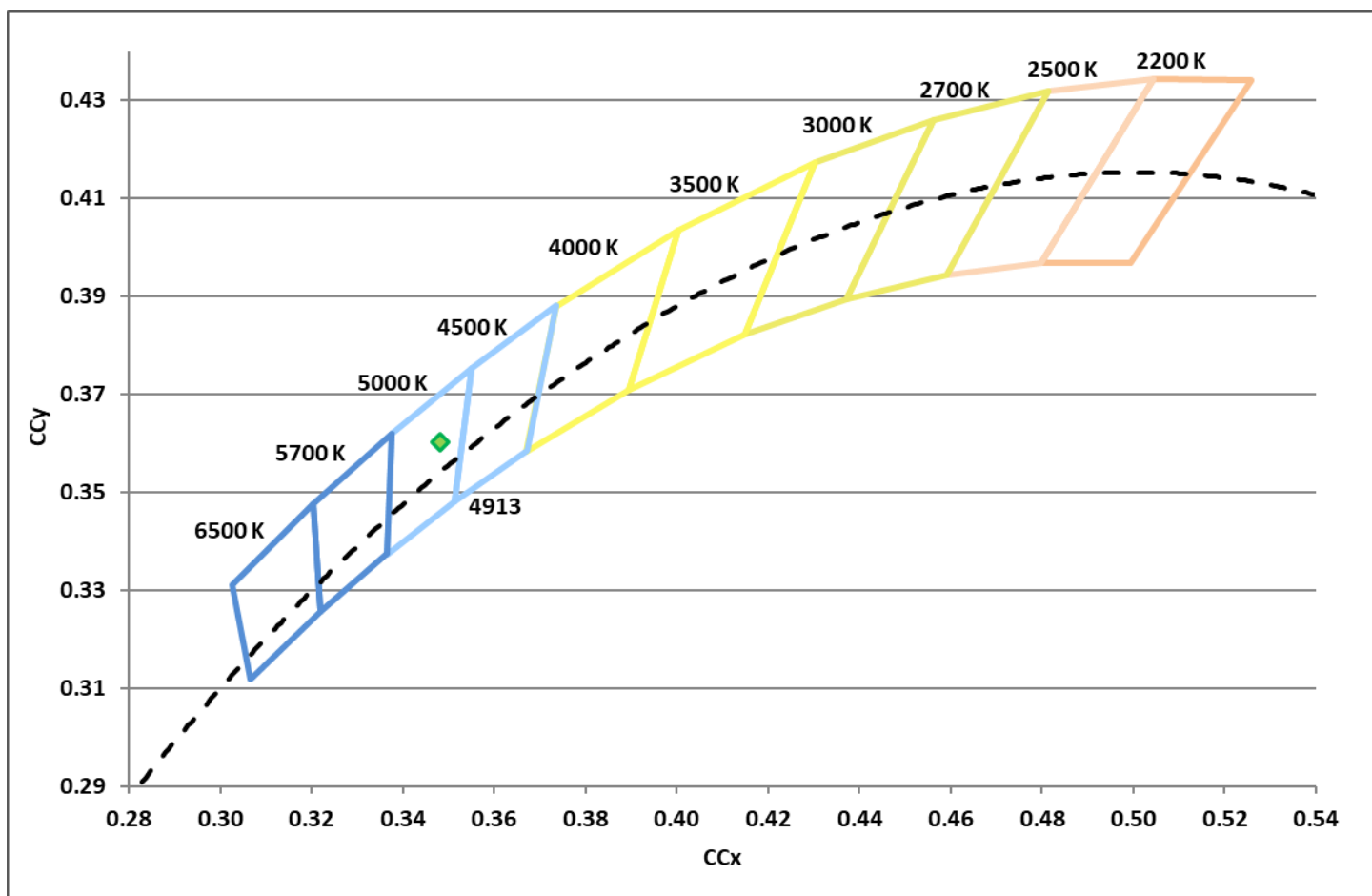
### Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.3483	0.3602	0.2103	0.3262	0.2103	0.4893	0.0030

### Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
83	81	89	94	81	81	84	88	67	9	74	80	53	84	97

### Chromaticity Diagram



**Spectral Distribution**

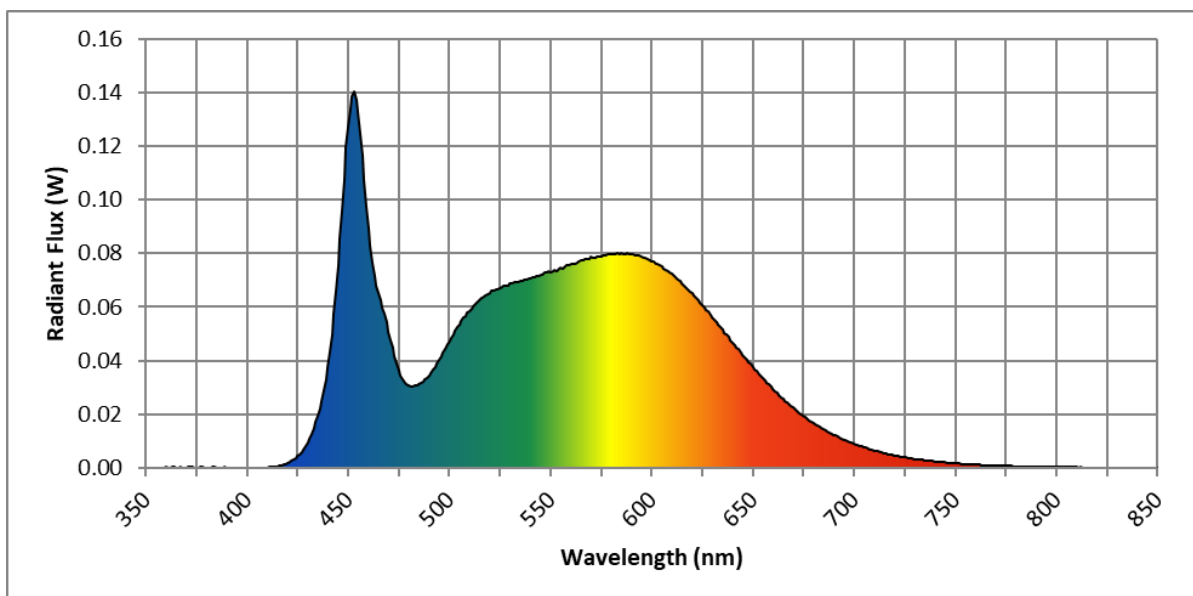
$\lambda(\text{nm})$	W/nm
360	0.000270
370	0.000166
380	0.000202
390	0.000094
400	0.000059
410	0.000210
420	0.001847
430	0.009471
440	0.037746
450	0.127226
460	0.089103
470	0.050770
480	0.030583
490	0.034567
500	0.046683
510	0.058316
520	0.065205

$\lambda(\text{nm})$	W/nm
530	0.068784
540	0.070830
550	0.073109
560	0.076033
570	0.078591
580	0.079628
590	0.079738
600	0.077030
610	0.072259
620	0.065038
630	0.056184
640	0.046852
650	0.037776
660	0.029552
670	0.022497
680	0.016733
690	0.012349

$\lambda(\text{nm})$	W/nm
700	0.009036
710	0.006537
720	0.004723
730	0.003378
740	0.002409
750	0.001745
760	0.001250
770	0.000879
780	0.000638
790	0.000451
800	0.000319
810	0.000222
820	0.000134
830	0.000088

<b>Dominant Wavelength</b>	571	nm
<b>Peak Wavelength</b>	453	nm

**Spectral Power Distribution (W/nm)**



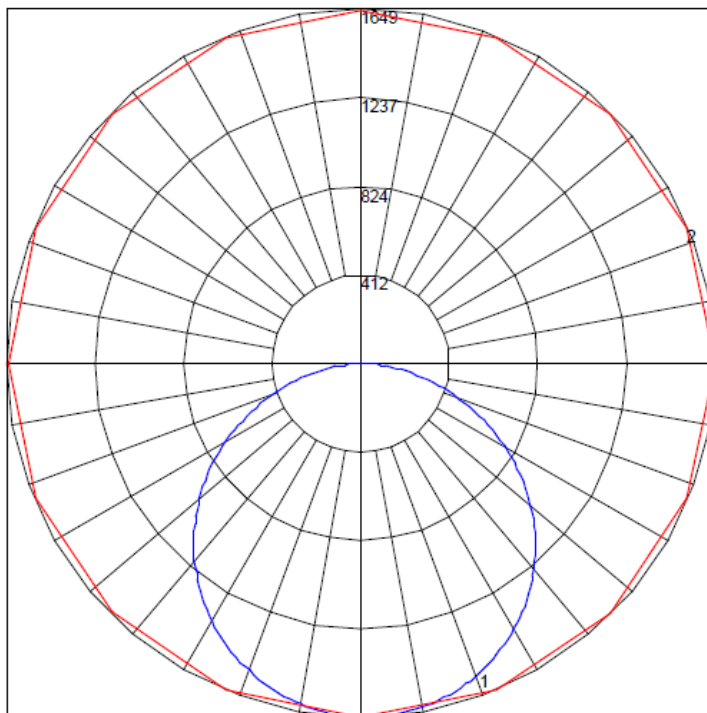
**Zonal Lumen Summary**

Zone	Lumens	% of Total	Zone	Lumens
0-20	603.1	12.6	0-10	155.9
0-30	1283.0	26.9	10-20	447.2
0-40	2106.5	44.1	20-30	679.9
0-60	3744.9	78.5	30-40	823.5
0-80	4677.5	98.0	40-50	859.1
0-90	4771.8	100.0	50-60	779.3
10-90	4616.0	96.7	60-70	593.0
20-40	1503.4	31.5	70-80	339.6
20-50	2362.6	49.5	80-90	94.4
40-70	2231.4	46.8	90-100	0
60-80	932.6	19.5	100-110	0
70-80	339.6	7.1	110-120	0
80-90	94.4	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		
<b>Total</b>	<b>4771.8</b>	<b>100</b>		

**Luminance Data (Cd./Sq.M)**

Average in Degrees	Average 0-Deg	Average 45-Deg	Average 90-Deg
45	2569	2506	2477
55	2496	2421	2388
65	2363	2259	2220
75	2118	1958	1917
85	1735	1449	1405

### Candela Plots



Maximum Candela = 1648.68 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	1647.2	1647.2	1647.2	1647.2	1647.2	1647.2	1647.2	1647.2	1647.2
1	1645.1	1645.7	1644.9	1647.8	1648.5	1646.0	1645.6	1645.9	1646.6
2	1645.8	1645.7	1643.1	1645.9	1647.6	1645.2	1643.7	1644.9	1643.1
3	1648.7	1644.8	1643.8	1643.7	1646.3	1645.4	1641.5	1643.1	1641.3
4	1643.8	1643.8	1644.1	1643.0	1643.2	1640.7	1639.5	1639.6	1640.0
5	1645.3	1640.5	1640.2	1642.5	1639.3	1639.4	1637.1	1636.2	1635.2
6	1640.6	1637.4	1636.0	1638.4	1637.8	1635.9	1634.4	1634.7	1630.2
7	1637.6	1635.0	1634.8	1635.0	1635.0	1634.0	1630.6	1629.3	1627.4
8	1636.6	1631.5	1632.3	1631.8	1631.1	1626.6	1625.3	1623.7	1624.0
9	1629.7	1627.2	1626.2	1625.5	1624.2	1625.4	1621.0	1621.3	1617.9
10	1625.1	1621.7	1619.1	1619.0	1619.3	1616.6	1615.3	1617.0	1610.3
11	1624.0	1616.9	1614.2	1615.0	1614.0	1612.6	1609.0	1609.3	1603.1
12	1618.1	1610.8	1610.7	1609.8	1607.9	1605.4	1601.2	1601.9	1596.8
13	1608.7	1605.2	1601.9	1601.7	1600.0	1596.9	1596.1	1594.9	1590.6
14	1602.6	1595.5	1595.0	1593.6	1593.2	1590.2	1589.8	1587.2	1584.5
15	1598.6	1591.0	1587.7	1586.5	1586.8	1583.6	1579.0	1580.3	1574.6
16	1588.6	1582.4	1577.6	1578.8	1576.7	1575.1	1571.6	1573.1	1564.9
17	1580.1	1572.0	1570.4	1567.5	1565.6	1563.6	1562.7	1561.2	1555.5
18	1570.1	1562.9	1560.6	1559.1	1557.4	1553.1	1551.2	1553.4	1546.4
19	1564.2	1555.7	1551.2	1548.4	1547.9	1543.2	1540.5	1543.2	1535.4
20	1555.6	1544.4	1540.1	1538.8	1534.7	1533.6	1531.4	1530.3	1522.5
21	1541.9	1531.5	1529.4	1525.9	1521.9	1521.1	1520.8	1520.8	1512.2
22	1530.9	1519.9	1517.7	1515.4	1511.7	1507.8	1508.4	1508.0	1501.3
23	1521.3	1510.2	1505.8	1502.7	1500.8	1495.9	1494.5	1494.3	1486.1
24	1510.8	1497.9	1493.7	1489.9	1484.2	1483.7	1483.1	1482.0	1475.8
25	1495.6	1483.7	1479.7	1475.4	1471.9	1469.8	1470.0	1470.7	1460.4
26	1482.4	1470.4	1465.6	1462.2	1458.6	1454.4	1454.3	1455.8	1446.3
27	1471.0	1458.2	1452.0	1449.9	1445.7	1440.5	1440.9	1440.3	1431.3
28	1457.2	1441.6	1438.0	1434.7	1429.7	1428.1	1427.5	1427.6	1417.5
29	1440.4	1427.6	1421.8	1419.0	1412.9	1412.1	1411.2	1414.4	1404.2
30	1427.0	1412.5	1406.4	1402.7	1399.3	1394.7	1393.7	1396.8	1389.1
31	1412.7	1397.6	1391.6	1387.1	1383.8	1379.7	1378.3	1380.4	1370.6
32	1395.5	1380.6	1374.4	1369.5	1365.3	1364.1	1363.3	1365.0	1353.0
33	1379.6	1364.1	1357.6	1351.7	1346.6	1346.0	1344.5	1348.0	1337.4
34	1363.8	1348.1	1340.6	1334.8	1329.9	1326.5	1326.1	1328.4	1319.1
35	1346.7	1330.3	1322.8	1317.7	1312.7	1309.2	1309.4	1310.5	1299.3
36	1326.2	1309.4	1304.1	1297.3	1293.4	1291.5	1291.2	1292.9	1283.1

**Candela Tabulations (Continued)**

	0	22.5	45	67.5	90	112.5	135	157.5	180
37	1309.6	1292.9	1284.7	1277.1	1273.4	1270.2	1272.6	1274.1	1262.8
38	1291.0	1273.5	1265.8	1259.3	1253.6	1251.0	1252.3	1254.3	1242.3
39	1271.4	1252.5	1246.3	1240.1	1234.0	1230.8	1233.7	1235.1	1224.7
40	1251.8	1233.7	1226.8	1218.9	1213.7	1211.9	1211.5	1215.0	1204.9
41	1230.4	1212.7	1204.6	1197.0	1192.4	1191.2	1193.2	1194.8	1182.8
42	1211.3	1192.4	1185.4	1177.2	1171.5	1171.2	1172.5	1174.3	1161.8
43	1188.5	1171.6	1163.4	1157.3	1151.1	1149.2	1149.0	1154.7	1144.1
44	1166.9	1150.0	1141.7	1134.8	1129.2	1127.1	1129.5	1131.8	1121.5
45	1147.9	1129.0	1119.9	1110.2	1106.9	1105.3	1107.5	1110.1	1097.7
46	1127.1	1106.1	1097.0	1089.7	1084.0	1083.0	1084.5	1088.6	1074.8
47	1102.7	1084.1	1074.9	1067.1	1063.0	1060.4	1061.7	1066.6	1053.8
48	1079.8	1060.3	1052.2	1043.5	1040.4	1038.5	1039.3	1041.5	1028.9
49	1057.3	1036.3	1027.3	1021.5	1015.9	1014.6	1017.1	1019.6	1004.1
50	1033.7	1012.3	1002.8	996.0	990.6	989.5	993.5	995.7	981.9
51	1007.6	987.2	980.3	970.9	966.8	965.1	968.5	971.6	956.8
52	983.9	961.6	956.2	947.2	942.4	940.9	943.4	947.2	934.1
53	958.4	936.0	929.4	922.7	916.2	915.7	918.7	921.9	906.7
54	932.8	911.2	902.7	895.3	891.5	889.9	893.0	896.2	881.3
55	904.8	885.2	877.4	869.6	865.3	863.2	867.6	871.1	858.3
56	878.8	858.5	852.2	843.9	839.2	838.4	841.5	845.5	831.8
57	854.0	832.5	825.1	816.2	812.5	812.8	814.9	819.5	805.8
58	825.4	806.0	796.1	789.3	785.2	785.2	787.5	792.1	776.4
59	800.7	777.9	768.7	761.0	757.3	756.3	759.5	764.1	749.8
60	771.0	749.9	741.7	733.7	731.0	730.2	732.9	737.9	724.4
61	743.4	723.0	714.6	706.2	703.6	703.7	706.2	710.6	695.6
62	716.5	694.8	686.4	679.7	676.5	675.2	679.8	682.9	667.2
63	688.8	666.4	658.9	652.5	648.9	648.7	652.4	656.5	639.7
64	660.4	638.5	631.6	624.0	621.0	620.6	625.0	629.5	613.2
65	630.9	609.6	603.3	595.7	592.9	592.1	597.0	600.9	586.3
66	601.1	581.4	574.5	568.0	564.9	564.6	568.4	572.5	557.2
67	571.8	551.7	545.3	539.6	536.6	536.0	540.5	545.2	529.7
68	543.4	523.2	516.3	510.3	508.1	508.0	511.6	517.2	502.7
69	513.4	494.3	487.1	481.6	479.6	480.2	483.7	489.2	476.3
70	485.4	465.2	458.7	453.4	451.4	451.9	455.6	461.6	447.9
71	456.5	437.5	429.6	424.8	423.2	424.3	427.0	433.7	419.6
72	428.0	409.2	401.7	396.3	395.0	396.7	400.1	405.8	392.9
73	400.6	381.1	374.6	369.0	367.3	368.4	373.2	379.0	365.4

**Candela Tabulations (Continued)**

	0	22.5	45	67.5	90	112.5	135	157.5	180
74	373.7	354.0	346.5	341.5	340.2	341.3	345.9	352.1	337.4
75	346.3	327.1	320.2	314.9	313.5	315.1	319.5	325.4	310.8
76	319.3	300.3	293.4	288.5	286.8	288.7	293.8	299.3	285.4
77	291.9	273.7	266.8	262.2	260.2	262.5	268.0	273.3	259.0
78	265.8	247.8	241.5	235.9	234.5	237.1	242.3	247.8	233.7
79	239.7	222.5	216.5	211.6	209.8	212.5	217.2	222.7	209.9
80	213.5	197.6	191.4	186.5	185.3	188.2	192.6	198.2	185.9
81	187.8	172.9	167.1	162.3	161.8	164.7	168.9	173.9	162.7
82	164.0	149.1	144.2	139.7	138.9	141.9	145.8	150.7	140.0
83	139.8	126.1	121.6	117.7	117.3	120.2	123.8	128.7	119.0
84	117.3	104.2	100.0	96.7	96.9	99.5	102.7	107.2	97.8
85	95.6	83.2	79.8	77.1	77.4	79.7	82.9	86.6	78.0
86	75.4	63.2	60.8	58.8	59.5	61.1	63.9	67.2	58.7
87	56.1	44.6	42.9	41.9	42.7	43.9	46.4	48.9	40.8
88	37.6	27.5	26.5	26.2	27.2	28.3	30.1	31.8	24.1
89	21.1	13.0	13.3	13.5	14.4	14.7	15.5	16.3	9.2
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.

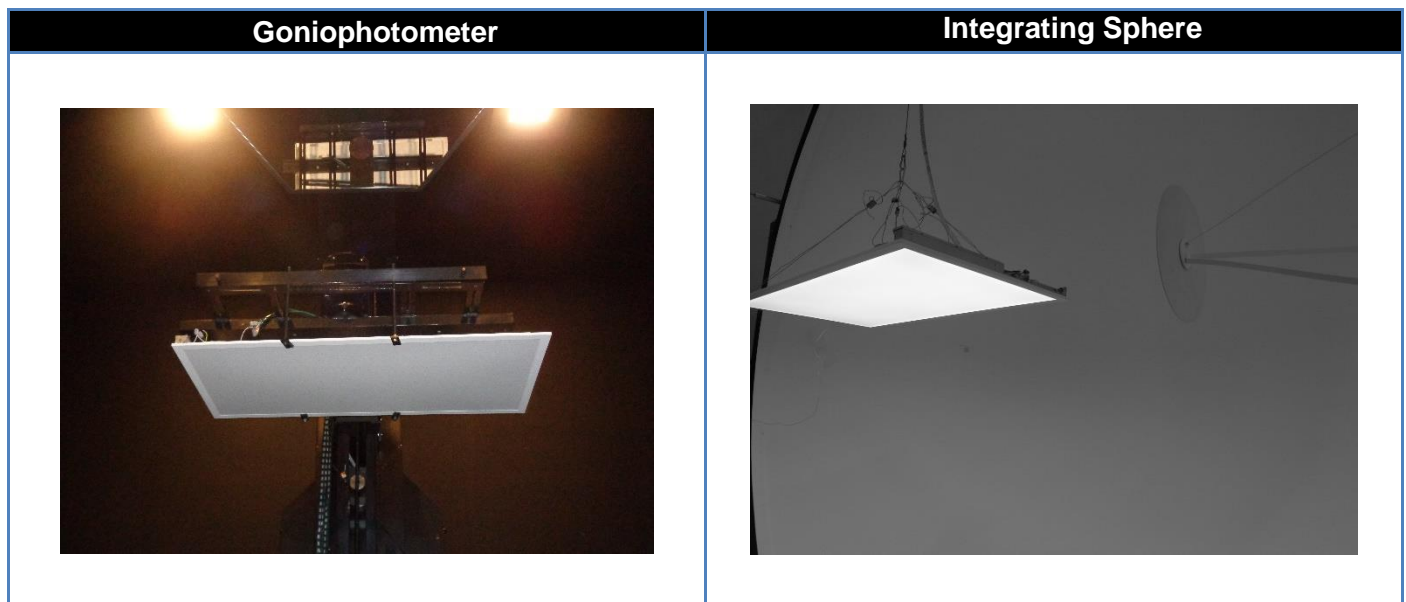
In the event that the recorded temperature is outside of  $25 \pm 1^{\circ}\text{C}$ , this is considered a non-standard condition.

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