

**Report Number:** PL16963-002A  
**Model:** C-TR-D-FP24-S58L-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

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**Prepared By:**



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**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 4000K)
<b>Serial Number</b>	16963-002
<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 4000K 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	5069.2	4973	lm
Efficacy	133.12	132.37	lm/W
Correlated Color Temperature (CCT)	4099	K	
Color Rendering Index (CRI)	85		
R <sub>9</sub>	18		
Duv	0.0001		
S/P Ratio*	1.75		
CIE Type	Direct		

Electrical Measurements	Sphere		Goniophotometer		
	120V	277V	120V	277V	
Input Wattage	38.08	-	37.57	37.06	W
Input Current	0.320	-	0.316	0.144	A
Input Voltage	120.09	-	120.15	277.29	V
Power Factor	0.991	-	0.991	0.931	
Off-State Power	0	-	0	0	W
Total Harmonic Distortion (Voltage)	0.10	-	0.04	0.09	%
Total Harmonic Distortion (Amperage)	10.57	-	10.81	13.62	%

**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	24.70	25.0	°C

### Spacing Criteria

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

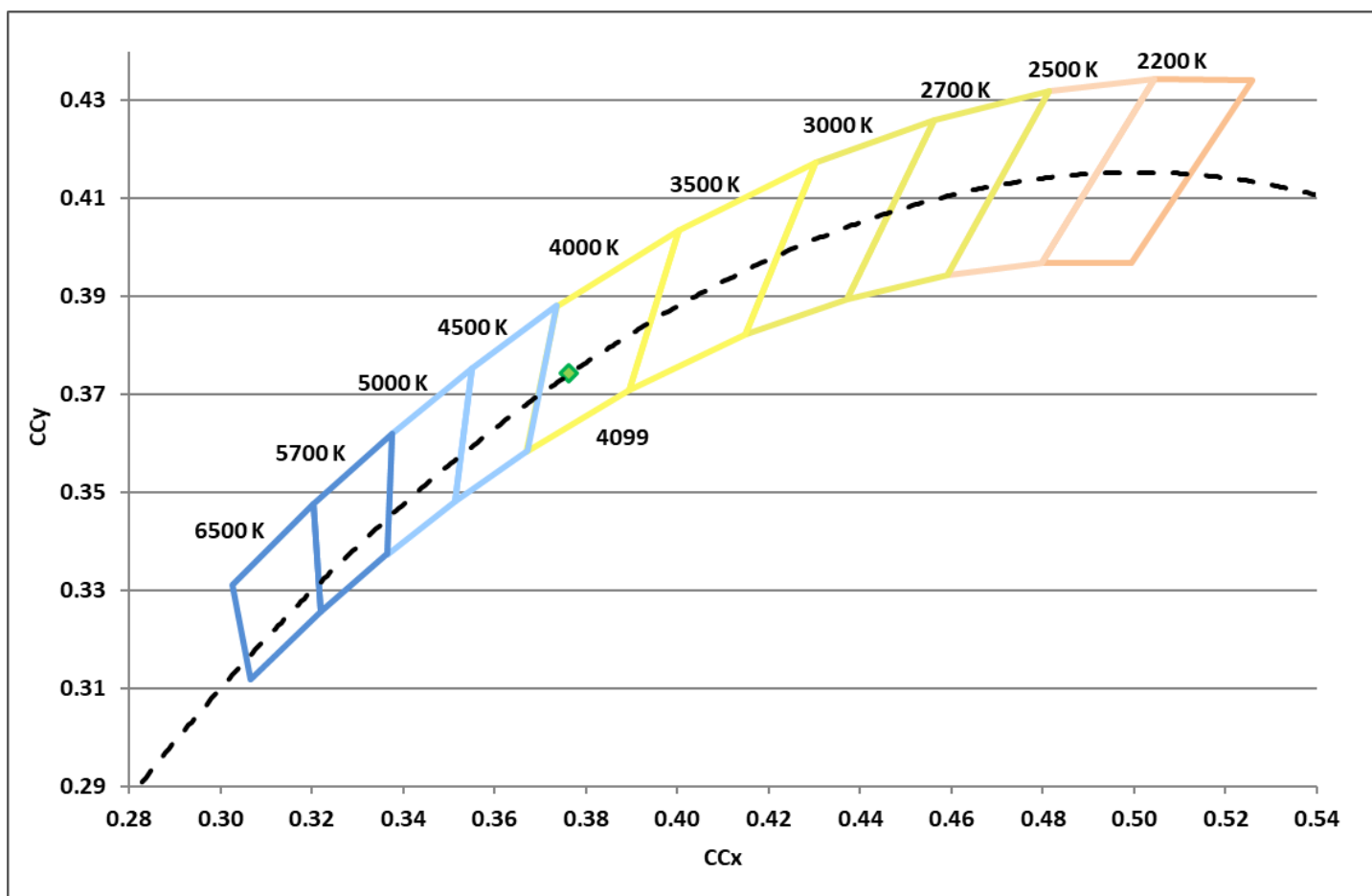
### Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.3762	0.3742	0.2233	0.3332	0.2233	0.4998	0.0001

### Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
85	84	92	96	83	84	88	87	67	18	80	83	60	86	98

### Chromaticity Diagram



**Spectral Distribution**

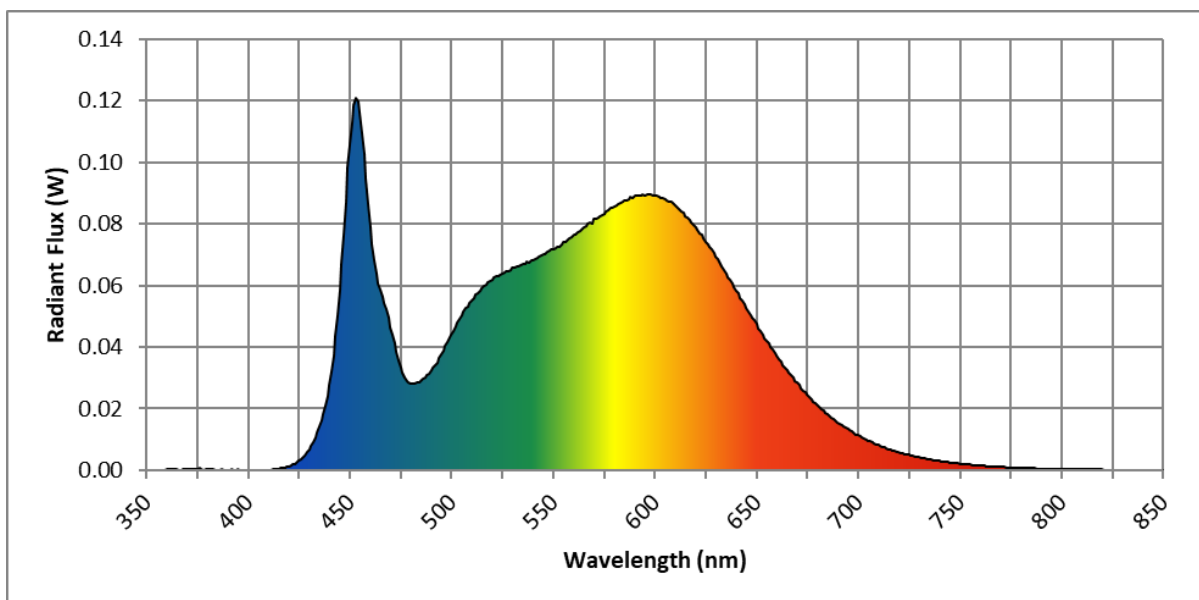
$\lambda(\text{nm})$	W/nm
360	0.000351
370	0.000208
380	0.000217
390	0.000138
400	0.000029
410	0.000128
420	0.001288
430	0.006765
440	0.027870
450	0.105910
460	0.078913
470	0.046486
480	0.028234
490	0.032365
500	0.043791
510	0.054928
520	0.061726

$\lambda(\text{nm})$	W/nm
530	0.065633
540	0.068333
550	0.071698
560	0.076423
570	0.081532
580	0.085590
590	0.088990
600	0.088961
610	0.085847
620	0.078960
630	0.069295
640	0.058428
650	0.047373
660	0.037199
670	0.028346
680	0.021127
690	0.015530

$\lambda(\text{nm})$	W/nm
700	0.011315
710	0.008180
720	0.005872
730	0.004187
740	0.002992
750	0.002145
760	0.001511
770	0.001076
780	0.000774
790	0.000553
800	0.000379
810	0.000263
820	0.000192
830	0.000133

<b>Dominant Wavelength</b>	578	nm
<b>Peak Wavelength</b>	453	nm

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



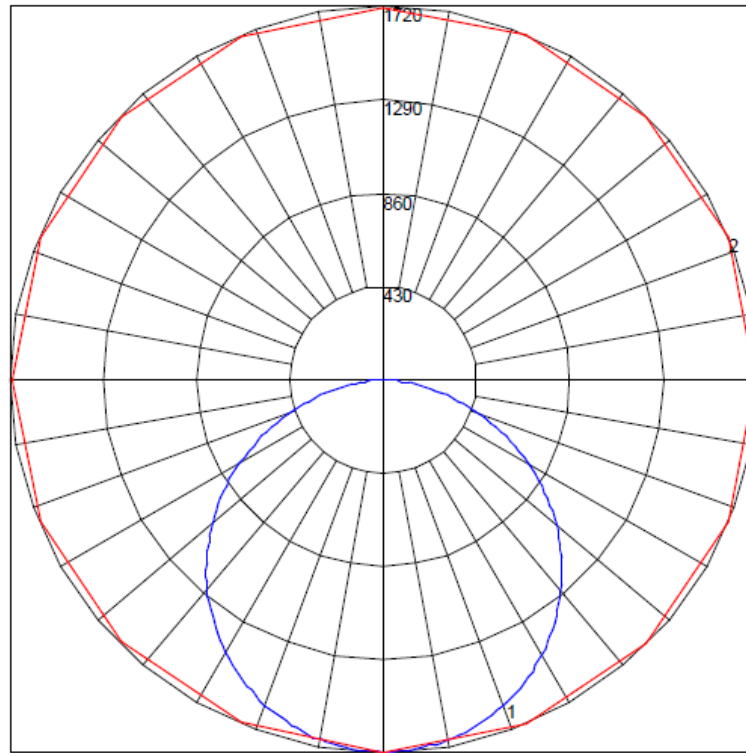
**Zonal Lumen Summary**

Zone	Lumens	% of Total	Zone	Lumens
0-20	628.5	12.6	0-10	162.4
0-30	1337.1	26.9	10-20	466.0
0-40	2195.3	44.1	20-30	708.6
0-60	3903.2	78.5	30-40	858.2
0-80	4874.8	98.0	40-50	895.2
0-90	4972.9	100.0	50-60	812.7
10-90	4810.5	96.7	60-70	618.4
20-40	1566.8	31.5	70-80	353.2
20-50	2462.0	49.5	80-90	98.1
40-70	2326.3	46.8	90-100	0
60-80	971.6	19.5	100-110	0
70-80	353.2	7.1	110-120	0
80-90	98.1	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>4972.9</b>	<b>100</b>		

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

Average in Degrees	Average 0-Deg	Average 45-Deg	Average 90-Deg
45	2662	2617	2579
55	2592	2523	2490
65	2448	2356	2315
75	2171	2033	1988
85	1733	1518	1466

### Candela Plots



Maximum Candela = 1719.67 Located At Horizontal Angle = 67.5, Vertical Angle = 1  
 # 1 - Vertical Plane Through Horizontal Angles (67.5 - 247.5) (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	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	1716.9	1716.9	1716.9	1716.9	1716.9	1716.9	1716.9	1716.9	1716.9
1	1714.7	1717.8	1717.1	1719.7	1716.9	1713.9	1711.4	1713.4	1714.5
2	1715.1	1717.1	1713.7	1714.5	1713.3	1715.0	1712.0	1710.2	1715.3
3	1718.5	1711.9	1711.4	1712.8	1714.2	1713.3	1713.2	1711.0	1713.1
4	1714.6	1713.4	1713.0	1714.8	1715.3	1712.4	1709.7	1711.0	1707.1
5	1713.9	1709.9	1710.6	1711.6	1709.7	1706.7	1706.6	1703.8	1702.6
6	1710.0	1708.3	1704.8	1704.2	1703.2	1704.0	1703.1	1701.8	1704.0
7	1707.2	1701.5	1702.7	1703.0	1701.2	1702.4	1697.0	1698.4	1698.8
8	1701.9	1702.7	1700.5	1702.8	1697.0	1699.0	1693.9	1694.4	1690.5
9	1702.9	1698.3	1696.2	1696.8	1696.5	1693.0	1688.2	1686.8	1685.6
10	1692.5	1691.8	1688.4	1688.3	1688.5	1683.2	1685.1	1683.0	1683.2
11	1688.3	1684.5	1683.0	1683.0	1680.0	1680.5	1675.1	1677.3	1673.4
12	1684.9	1681.0	1677.2	1676.8	1676.2	1673.4	1668.4	1667.2	1664.6
13	1675.7	1673.4	1672.6	1670.1	1669.7	1664.1	1663.2	1661.8	1659.9
14	1670.1	1666.8	1661.5	1661.6	1657.7	1656.3	1655.0	1656.7	1654.6
15	1664.6	1654.8	1656.0	1653.9	1649.8	1648.3	1645.1	1645.5	1640.1
16	1652.9	1648.4	1645.7	1643.4	1643.2	1638.6	1634.3	1636.2	1630.9
17	1645.0	1639.4	1637.0	1637.1	1633.7	1629.9	1629.3	1625.7	1623.6
18	1639.6	1629.7	1624.7	1627.2	1619.8	1619.2	1616.5	1615.6	1610.2
19	1629.4	1619.5	1618.6	1612.4	1611.1	1607.5	1606.5	1607.0	1601.8
20	1615.5	1609.3	1606.4	1603.5	1602.1	1598.1	1596.5	1596.9	1589.2
21	1607.9	1598.5	1592.8	1591.2	1587.5	1586.3	1583.9	1583.9	1576.2
22	1599.6	1587.2	1584.6	1576.8	1573.0	1571.0	1568.6	1571.8	1562.3
23	1583.0	1572.6	1571.6	1567.5	1561.8	1558.2	1557.4	1558.0	1552.1
24	1568.5	1562.6	1555.5	1553.4	1551.0	1547.0	1545.2	1545.0	1539.6
25	1561.0	1550.0	1542.5	1538.6	1537.1	1531.9	1528.8	1532.7	1523.0
26	1543.2	1532.6	1530.4	1523.9	1519.2	1515.7	1513.6	1514.3	1508.3
27	1529.4	1518.4	1514.4	1512.8	1503.6	1502.5	1500.3	1501.5	1492.9
28	1517.9	1507.8	1498.2	1493.4	1489.7	1484.9	1486.9	1488.7	1478.8
29	1501.0	1491.1	1484.3	1479.5	1474.6	1470.2	1467.8	1471.7	1464.4
30	1484.0	1473.1	1469.2	1462.1	1457.0	1454.1	1450.2	1451.4	1449.4
31	1466.5	1456.3	1452.0	1446.5	1441.2	1436.5	1436.6	1435.9	1428.0
32	1452.7	1438.8	1431.2	1428.5	1422.0	1418.8	1419.4	1419.3	1411.6
33	1438.5	1420.2	1413.9	1407.2	1404.5	1401.1	1399.0	1401.7	1396.7
34	1420.9	1403.4	1399.4	1390.7	1383.7	1383.1	1380.5	1383.6	1376.2
35	1398.4	1387.5	1378.8	1374.7	1367.5	1362.6	1364.2	1367.0	1354.8
36	1383.2	1368.0	1359.6	1352.6	1348.6	1344.2	1344.6	1347.2	1338.8

**Candela Tabulations (Continued)**

	0	22.5	45	67.5	90	112.5	135	157.5	180
37	1361.5	1350.1	1340.5	1331.8	1327.2	1323.0	1324.4	1325.9	1320.7
38	1344.6	1329.7	1320.6	1313.6	1306.2	1304.6	1303.0	1305.8	1297.3
39	1323.9	1309.0	1299.5	1292.5	1287.1	1286.1	1284.6	1287.3	1275.6
40	1301.8	1287.6	1278.5	1270.8	1266.7	1260.8	1265.0	1267.2	1259.6
41	1279.9	1266.6	1257.8	1250.2	1243.1	1240.3	1241.5	1245.3	1239.2
42	1256.0	1243.6	1235.7	1227.9	1219.9	1220.6	1219.0	1221.3	1212.9
43	1236.2	1223.2	1212.1	1205.7	1200.2	1197.9	1198.8	1200.8	1193.7
44	1215.6	1199.2	1192.0	1183.0	1177.6	1172.5	1176.6	1177.6	1170.4
45	1189.5	1176.8	1169.3	1158.0	1152.1	1152.7	1153.1	1156.2	1145.6
46	1167.1	1153.3	1142.6	1137.6	1130.5	1128.3	1129.0	1131.9	1126.2
47	1148.9	1127.7	1119.3	1111.5	1108.0	1104.0	1106.3	1108.3	1099.2
48	1124.8	1103.8	1097.2	1087.2	1080.7	1080.1	1082.3	1086.1	1078.0
49	1098.3	1082.3	1071.8	1062.9	1057.5	1055.5	1058.0	1059.5	1053.3
50	1074.8	1057.3	1046.2	1037.6	1033.0	1030.6	1032.4	1035.7	1025.9
51	1050.5	1030.8	1021.5	1013.9	1008.2	1005.9	1008.1	1011.4	1002.3
52	1024.6	1003.5	995.5	987.8	981.1	980.5	982.7	986.1	974.0
53	998.2	979.1	969.6	962.3	955.5	955.5	955.6	961.0	947.5
54	969.1	953.8	943.0	933.5	929.6	927.2	929.0	933.4	923.9
55	939.3	924.4	914.3	906.6	902.5	900.9	904.1	906.0	897.6
56	912.2	895.9	888.0	881.4	873.9	873.9	876.6	880.1	869.8
57	886.5	870.2	861.7	852.3	847.3	845.5	846.9	852.8	842.9
58	858.0	841.8	832.8	822.9	819.4	817.7	820.4	824.4	817.3
59	828.1	812.4	804.1	795.5	792.3	791.9	794.1	796.9	790.7
60	802.6	783.6	775.7	768.2	764.1	761.4	766.2	769.3	760.8
61	773.0	757.2	746.9	738.1	733.5	734.0	736.8	741.3	732.8
62	746.2	725.6	717.0	706.6	704.4	703.8	707.7	710.7	702.9
63	713.1	695.1	687.9	679.6	676.3	674.7	679.5	682.6	673.0
64	684.9	666.2	657.8	651.4	646.2	645.0	650.0	654.3	642.8
65	653.7	636.3	629.2	620.9	618.1	618.0	621.2	625.3	614.3
66	623.1	606.5	598.8	591.7	590.0	588.5	591.5	597.1	585.8
67	593.3	576.9	569.0	563.3	559.8	559.6	562.8	567.3	556.4
68	563.1	547.4	538.8	532.6	529.2	529.4	533.1	537.9	526.9
69	531.2	516.4	509.6	502.3	500.3	500.7	503.9	508.9	498.7
70	499.6	487.4	479.0	472.6	470.9	471.3	474.5	478.8	471.9
71	470.1	457.1	448.4	442.4	440.5	440.9	444.9	449.8	442.0
72	440.9	428.2	418.9	412.9	411.0	411.7	415.4	421.3	414.7
73	410.7	397.8	390.5	384.2	383.1	383.9	387.2	393.0	385.7

**Candela Tabulations (Continued)**

	0	22.5	45	67.5	90	112.5	135	157.5	180
74	382.4	367.8	360.9	354.4	354.1	355.0	359.6	364.7	356.7
75	355.0	339.8	332.5	327.0	325.1	326.3	331.9	337.8	330.4
76	327.5	312.5	305.0	299.3	297.8	299.1	304.6	310.7	302.2
77	299.6	284.0	278.2	272.1	270.5	272.7	277.9	284.3	274.6
78	272.2	257.3	251.2	246.0	244.3	245.6	251.8	257.5	248.3
79	245.3	231.5	224.9	220.2	219.1	220.0	226.0	231.7	221.8
80	218.9	205.6	199.1	195.0	193.4	195.3	200.4	205.9	197.3
81	192.8	179.9	174.6	169.7	168.7	171.0	176.0	181.5	173.3
82	166.5	155.8	150.3	146.3	144.9	147.6	152.5	157.2	149.5
83	141.2	131.9	126.7	123.2	122.3	125.0	129.1	133.4	127.1
84	117.9	108.7	104.6	101.0	101.0	103.1	106.8	111.1	105.7
85	95.4	86.8	83.6	80.3	80.7	83.0	86.0	90.0	85.1
86	74.3	65.9	63.0	61.1	61.4	63.4	66.2	69.6	64.9
87	54.0	46.3	44.1	43.2	43.9	45.5	47.7	50.2	46.1
88	35.6	28.0	27.3	27.0	28.0	29.3	30.7	32.8	28.5
89	18.3	12.7	12.9	13.6	14.5	15.0	15.3	16.5	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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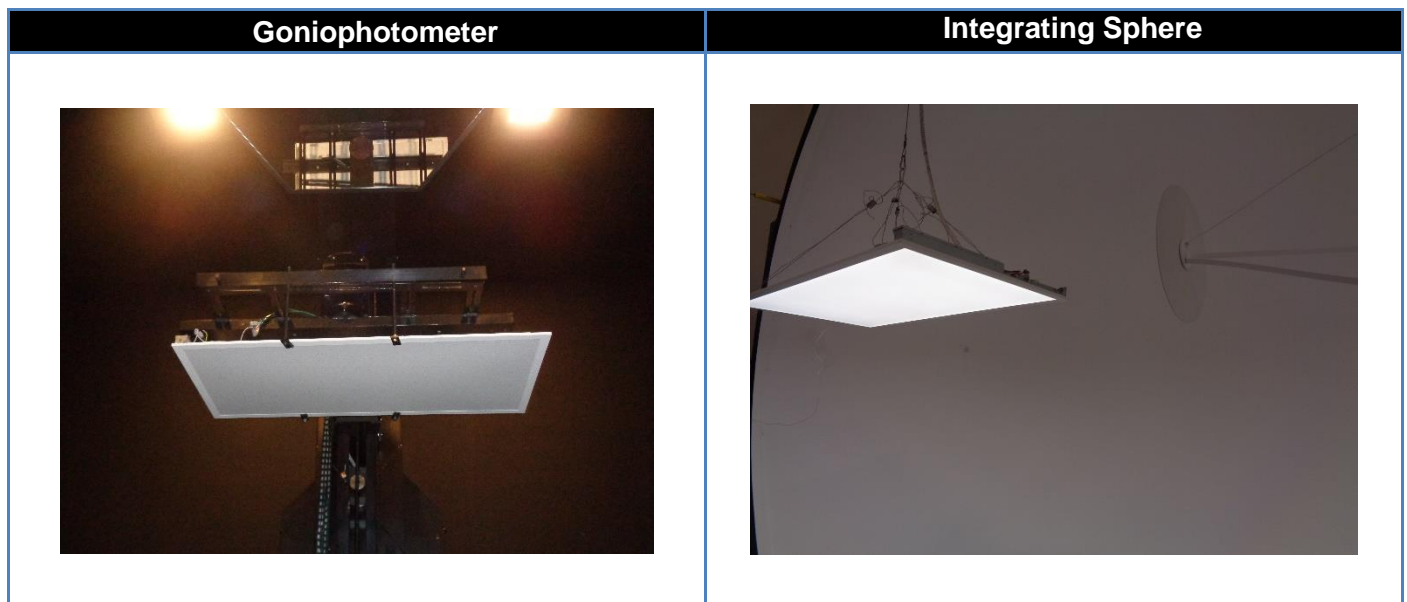
In the event that the recorded temperature is outside of  $25 \pm 1^{\circ}\text{C}$ , this is considered a non-standard condition.

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