Signify Classified - Internal
Cooper Lighting Solutions Photometric Lab
1121 Highway 74 South
Peachtree City, GA 30269

Scaled data based on original data using

LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Test Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

Brand: LUMARK

Report Number: P895738

Luminaire Tested: **CLCS15S-PC-4000K-80%**

Issue Date: 11/14/2024

Cooper Lighting Solutions Photometric Lab
1121 Highway 74 South
Peachtree City, GA 30269

Scaled Data Report

**Test Information**

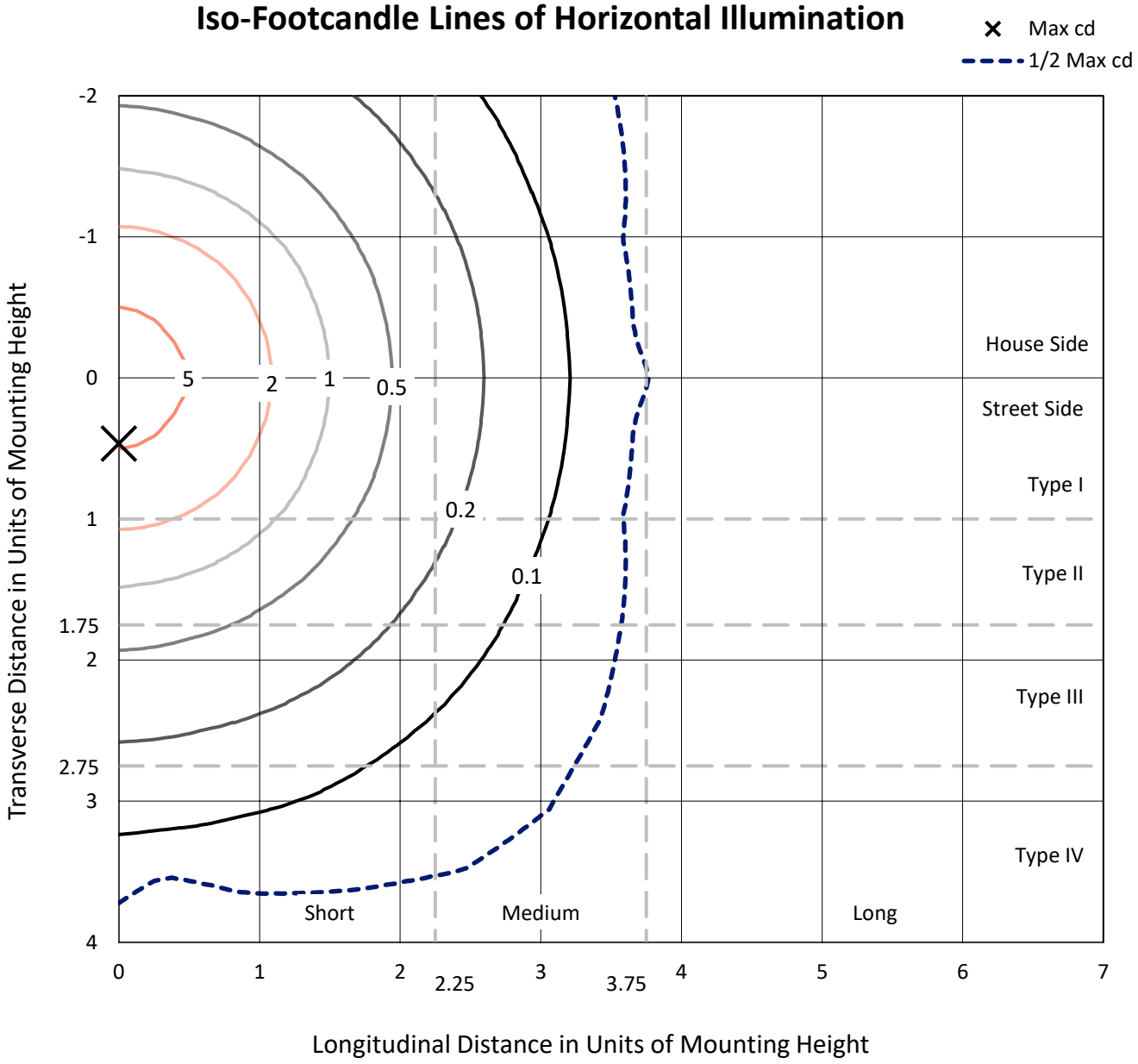
| | |
|---|---|
| Test Method: | LM-79-08 |
| Report Number: | P895738 |
| Test Lab: | INNOVATION CENTER(G2) |
| Issue Date: | 11/14/2024 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS (FORMERLY EATON) |
| Product Line: | LUMARK |
| Catalog Number: | CLCS15S-PC-4000K-80% |
| Description: | LUMARK SMALL LED CANOPY 8000LM, 60W, PC 80 CRI 4000K FIXTURE @ 80% OUTPUT |
| Light Source: | 4000K CCT,80 CRI LEDS |
| Ballast/Driver: | ELECTRONIC DRIVER |

**Summary**

| | |
|---|---|
| Lumens per Lamp: | N/A |
| Luminaire Lumens: | 6799.8 lumens |
| Efficiency: | N/A |
| Efficacy: | 145.0 lumens/watt |
| Luminous Opening: | Rectangular w/ Sides (W: 0.8' x L: 0.8' x H: 0.1') |
| IES Classification: | Type V - Short |
| BUG Rating: | B2 - U3 - G2 |
| Input Watts (W): | 46.9 |
| Input Voltage (V): | 120 |
| Input Current (Ain): | NR |
| Voltage Rise (V): | NR |
| Power Factor: | 0.98 |
| Total Harmonic Distortion (THDi): | NR |
| Frequency (hertz): | 60 |
| Stabilization Time: | NR |
| Operation Time: | NR |
| Ambient Temperature (°C): | NR |
| Test Distance: | 28.75 FT |

REPORT NUMBER: P895738
CATALOG NUMBER: CLCS15S-PC-4000K-80%

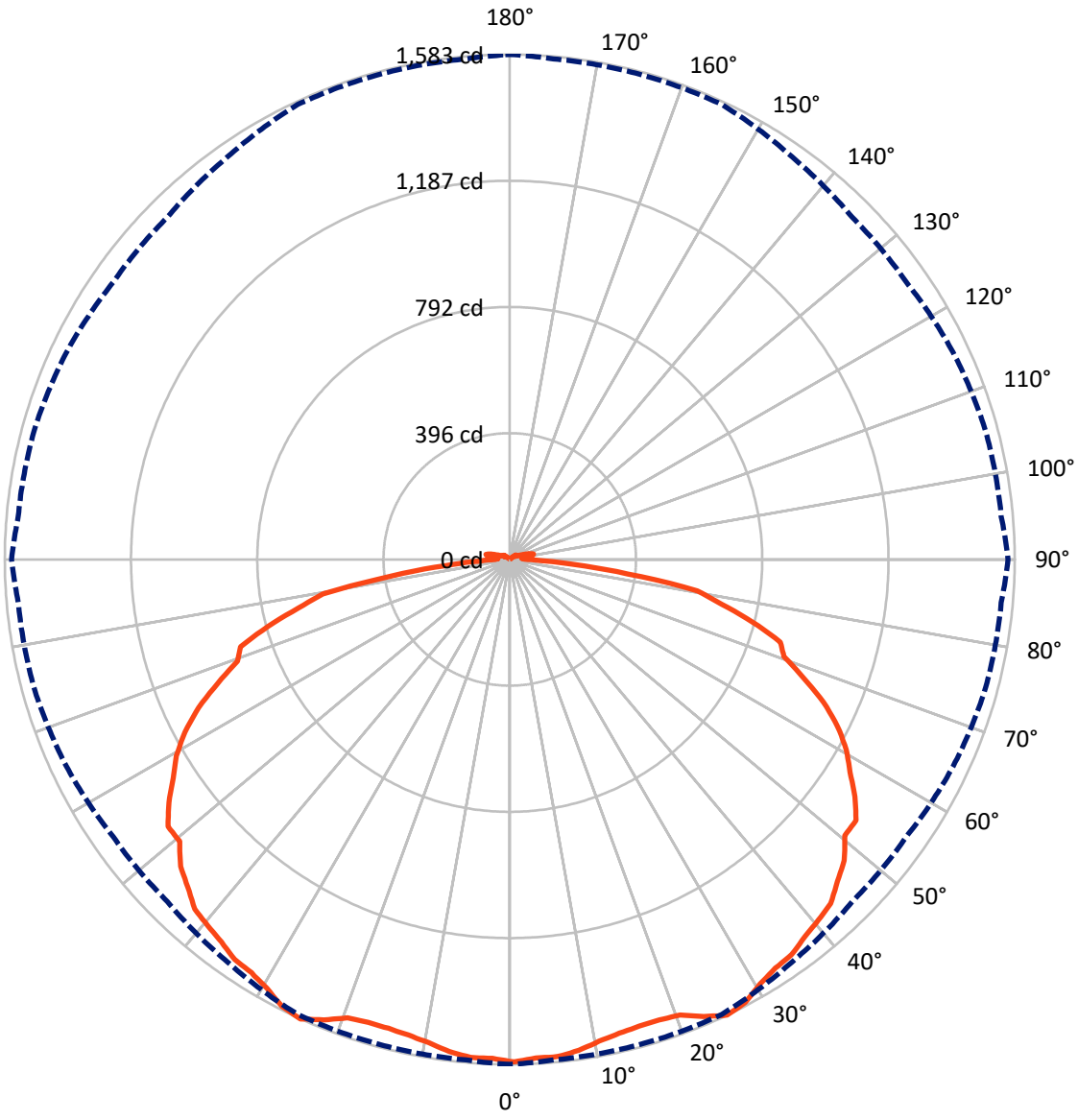
## Iso-Footcandle Lines of Horizontal Illumination




Based on 15 foot mounting height. Maximum calculated value = 7 fc
Type V - Short - N/A

REPORT NUMBER: P895738
CATALOG NUMBER: CLCS15S-PC-4000K-80%

## Luminous Intensity Polar Plot




Vertical Plane Through 0-Deg Lateral — Horizontal Cone Through 25-Deg Vertical

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1121 Highway 74 South
Peachtree City, GA 30269

Scaled Data Report

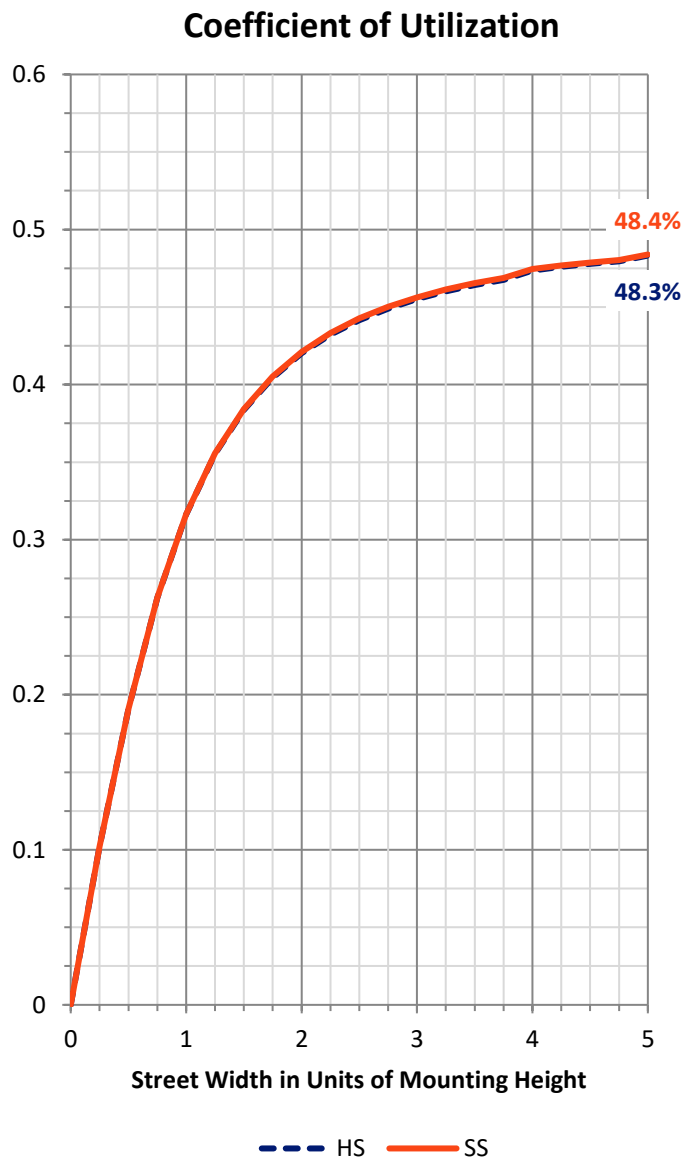
REPORT NUMBER: P895738
CATALOG NUMBER: CLCS15S-PC-4000K-80%

**FLUX DISTRIBUTION:**

| | | Downward | Upward | Total |
|---|---|---|---|---|
| **House Side** | Lumens | 3333.1 | 66.8 | 3399.9 |
| | % Fixture | 49.0 | 1.0 | 50.0 |
| **Street Side** | Lumens | 3333.1 | 66.8 | 3399.9 |
| | % Fixture | 49.0 | 1.0 | 50.0 |
| **Total** | Lumens | 6666.1 | 133.6 | 6799.8 |
| | % Fixture | 98.0 | 2.0 | 100.0 |

**ZONAL LUMENS:**

| Zone | Lumens | % Fixture |
|---|---|---|
| 0°-10° | 149.1 | 2.2 |
| 10°-20° | 432.2 | 6.4 |
| 20°-30° | 710.7 | 10.5 |
| 30°-40° | 942.2 | 13.9 |
| 40°-50° | 1114.5 | 16.4 |
| 50°-60° | 1172.4 | 17.2 |
| 60°-70° | 1072.2 | 15.8 |
| 70°-80° | 827.9 | 12.2 |
| 80°-90° | 245.0 | 3.6 |
| 90°-100° | 46.7 | 0.7 |
| 100°-110° | 51.8 | 0.8 |
| 110°-120° | 20.2 | 0.3 |
| 120°-130° | 11.1 | 0.2 |
| 130°-140° | 3.3 | 0.0 |
| 140°-150° | 0.5 | 0.0 |
| 150°-160° | 0.0 | 0.0 |
| 160°-170° | 0.0 | 0.0 |
| 170°-180° | 0.0 | 0.0 |
| 0°-90° | 6666.1 | 98.0 |
| 0°-180° | 6799.8 | 100.0 |

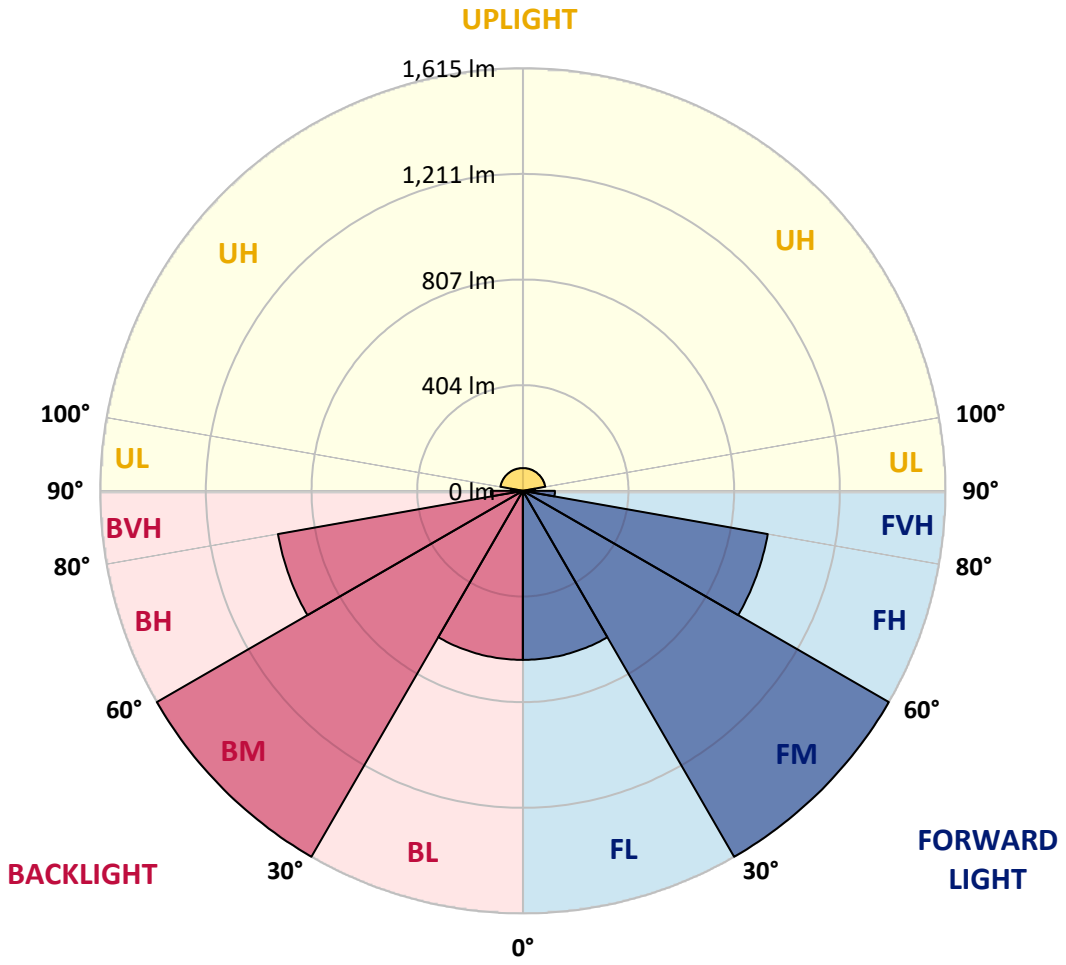


REPORT NUMBER: P895738
CATALOG NUMBER: CLCS15S-PC-4000K-80%

**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone | | Lumens | % Fixture | Zone Rating/Lumen Limit B | U | G |
|---|---|---|---|---|---|---|
| FL | (0°-30°) | 646.0 | 9.5 | | | |
| FM | (30°-60°) | 1614.5 | 23.7 | | | |
| FH | (60°-80°) | 950.1 | 14.0 | | | G1/1800 |
| FVH | (80°-90°) | 122.5 | 1.8 | | | G2/225 |
| BL | (0°-30°) | 646.0 | 9.5 | B2/1000 | | |
| BM | (30°-60°) | 1614.5 | 23.7 | B2/2500 | | |
| BH | (60°-80°) | 950.1 | 14.0 | B2/1000 | | G1/1800 |
| BVH | (80°-90°) | 122.5 | 1.8 | | | G2/225 |
| UL | (90°-100°) | 46.7 | 0.7 | | U2/50 | |
| UH | (100°-180°) | 87.0 | 1.3 | | U3/500 | |

**BUG Rating: B2-U3-G2**
Type V Short



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Scaled Data Report

REPORT NUMBER: P895738
CATALOG NUMBER: CLCS15S-PC-4000K-80%

**CANDELA DISTRIBUTION (FULL):**

| | 0° | 5° | 15° | 25° | 35° | 45° | 55° | 65° | 75° | 85° | 90° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | *1575.4* | 1575.4 | 1575.4 | 1575.4 | 1575.4 | 1575.4 | 1575.4 | 1575.4 | 1575.4 | 1575.4 | 1575.4 |
| 2.5° | *1565.3* | 1566.1 | 1567.7 | 1571.1 | 1569.4 | 1570.3 | 1570.3 | 1567.7 | 1571.1 | 1570.3 | 1575.4 |
| 5° | *1566.1* | 1566.1 | 1566.1 | 1570.3 | 1570.3 | 1571.1 | 1572.8 | 1572.8 | 1574.6 | 1575.4 | 1578.8 |
| 7.5° | *1554.2* | 1555.9 | 1554.2 | 1557.6 | 1558.4 | 1562.7 | 1564.4 | 1563.5 | 1566.9 | 1566.9 | 1573.7 |
| 10° | *1536.4* | 1537.3 | 1537.3 | 1540.6 | 1544.0 | 1549.1 | 1549.1 | 1548.3 | 1550.0 | 1549.1 | 1554.2 |
| 12.5° | *1524.6* | 1524.6 | 1523.7 | 1528.7 | 1532.1 | 1535.6 | 1536.4 | 1537.3 | 1539.8 | 1543.1 | 1548.3 |
| 15° | *1518.6* | 1518.6 | 1517.7 | 1524.6 | 1523.7 | 1523.7 | 1527.0 | 1530.4 | 1530.4 | 1533.0 | 1540.6 |
| 17.5° | *1517.7* | 1515.2 | 1506.7 | 1516.0 | 1513.4 | 1512.7 | 1515.2 | 1514.3 | 1521.1 | 1522.0 | 1524.6 |
| 20° | *1524.6* | 1521.1 | 1520.3 | 1522.8 | 1512.7 | 1510.1 | 1512.7 | 1511.0 | 1515.2 | 1516.9 | 1525.4 |
| 22.5° | *1556.7* | 1555.0 | 1546.6 | 1536.4 | 1513.4 | 1502.4 | 1500.0 | 1512.7 | 1527.0 | 1525.4 | 1528.7 |
| 25° | *1583.0* | *1575.4* | *1574.6* | *1573.7* | *1541.4* | *1517.7* | *1516.9* | *1533.8* | *1544.9* | *1546.6* | *1561.8* |
| 27.5° | *1572.8* | 1563.5 | 1567.7 | 1569.4 | 1543.1 | 1514.3 | 1504.2 | 1528.7 | 1544.0 | 1557.6 | 1567.7 |
| 30° | *1544.9* | 1538.1 | 1542.3 | 1545.7 | 1530.4 | 1505.0 | 1489.7 | 1510.1 | 1536.4 | 1557.6 | 1553.4 |
| 32.5° | *1527.9* | 1527.9 | 1527.9 | 1517.7 | 1509.3 | 1493.1 | 1470.3 | 1505.9 | 1516.9 | 1525.4 | 1532.1 |
| 35° | *1522.0* | 1521.1 | 1521.1 | 1510.1 | 1491.4 | 1479.6 | 1479.6 | 1488.0 | 1498.3 | 1502.4 | 1518.6 |
| 37.5° | *1501.6* | 1488.0 | 1500.0 | 1502.4 | 1483.8 | 1477.9 | 1479.6 | 1480.4 | 1494.0 | 1505.9 | 1505.0 |
| 40° | *1488.0* | 1472.0 | 1466.9 | 1472.0 | 1475.3 | 1475.3 | 1469.4 | 1473.6 | 1486.4 | 1492.3 | 1484.7 |
| 42.5° | *1475.3* | 1464.3 | 1463.4 | 1455.9 | 1449.0 | 1459.3 | 1452.4 | 1454.1 | 1460.0 | 1473.6 | 1477.0 |
| 45° | *1439.7* | 1438.0 | 1437.2 | 1436.3 | 1418.6 | 1454.1 | 1449.0 | 1439.7 | 1453.3 | 1452.4 | 1477.0 |
| 47.5° | *1410.9* | 1420.2 | 1403.3 | 1405.0 | 1422.7 | 1427.0 | 1422.7 | 1416.9 | 1440.6 | 1434.6 | 1460.9 |
| 50° | *1360.9* | 1360.9 | 1370.2 | 1382.9 | 1405.0 | 1399.0 | 1399.9 | 1414.3 | 1410.0 | 1419.4 | 1447.3 |
| 52.5° | *1359.2* | 1328.6 | 1318.5 | 1330.3 | 1358.3 | 1374.4 | 1358.3 | 1399.9 | 1351.6 | 1372.7 | 1381.2 |
| 55° | *1312.6* | 1276.1 | 1282.0 | 1288.8 | 1309.2 | 1311.7 | 1352.4 | 1327.8 | 1311.7 | 1332.9 | 1345.6 |
| 57.5° | *1257.5* | 1228.6 | 1217.6 | 1252.3 | 1247.2 | 1282.9 | 1277.8 | 1274.3 | 1286.3 | 1284.6 | 1286.3 |
| 60° | *1212.5* | 1186.2 | 1159.9 | 1190.5 | 1220.9 | 1209.1 | 1230.3 | 1244.7 | 1231.2 | 1234.5 | 1227.8 |
| 62.5° | *1153.2* | 1152.3 | 1131.9 | 1146.4 | 1142.1 | 1170.1 | 1162.5 | 1179.5 | 1175.2 | 1170.9 | 1181.1 |
| 65° | *1081.1* | 1075.1 | 1071.8 | 1087.0 | 1090.4 | 1090.4 | 1082.8 | 1100.5 | 1097.2 | 1094.6 | 1106.5 |
| 67.5° | *994.5* | 992.1 | 995.4 | 997.1 | 1014.9 | 1016.7 | 1013.2 | 1027.7 | 1026.0 | 1024.2 | 1028.5 |
| 70° | *911.5* | 897.1 | 879.3 | 927.6 | 948.0 | 953.1 | 940.3 | 931.0 | 924.2 | 914.8 | 920.0 |
| 72.5° | *886.9* | 870.8 | 873.4 | 905.5 | 903.8 | 912.4 | 892.0 | 862.3 | 862.3 | 852.1 | 856.4 |
| 75° | *786.8* | 752.1 | 798.7 | 836.9 | 864.8 | 848.7 | 858.1 | 825.8 | 786.0 | 782.6 | 794.4 |
| 77.5° | *680.0* | 659.7 | 660.5 | 711.4 | 758.0 | 772.4 | 747.0 | 708.9 | 676.6 | 666.4 | 673.3 |
| 80° | *596.0* | 574.0 | 529.9 | 512.2 | 523.2 | 547.7 | 527.3 | 506.2 | 517.2 | 529.9 | 542.6 |
| 82.5° | *372.2* | 367.9 | 380.7 | 356.1 | 321.4 | 309.5 | 311.2 | 337.5 | 340.0 | 335.8 | 340.0 |
| 85° | *202.7* | 195.8 | 192.5 | 184.8 | 176.4 | 173.0 | 168.7 | 172.1 | 175.5 | 167.0 | 169.6 |
| 87.5° | *92.4* | 89.0 | 94.1 | 99.2 | 92.4 | 90.7 | 89.0 | 89.9 | 89.9 | 90.7 | 90.7 |
| 90° | *49.1* | 50.0 | 50.9 | 50.0 | 50.0 | 49.1 | 48.3 | 47.4 | 47.4 | 49.1 | 49.1 |
| 92.5° | *39.0* | 38.1 | 35.6 | 34.7 | 33.9 | 33.9 | 33.1 | 33.1 | 33.9 | 34.7 | 34.7 |
| 95° | *37.3* | 37.3 | 34.7 | 33.1 | 32.3 | 30.6 | 31.4 | 33.1 | 34.7 | 36.4 | 36.4 |
| 97.5° | *56.8* | 56.8 | 53.4 | 48.3 | 43.3 | 39.0 | 42.4 | 48.3 | 51.7 | 54.3 | 54.3 |
| 100° | *73.0* | 73.0 | 67.8 | 58.5 | 49.1 | 45.0 | 48.3 | 57.7 | 65.3 | 68.7 | 69.5 |
| 102.5° | *76.3* | 75.4 | 68.7 | 58.5 | 46.7 | 41.6 | 45.8 | 56.8 | 67.0 | 72.1 | 73.0 |
| 105° | *67.0* | 66.1 | 61.0 | 50.0 | 38.1 | 31.4 | 38.1 | 49.1 | 59.4 | 64.4 | 65.3 |
| 107.5° | *55.1* | 55.1 | 50.9 | 40.7 | 28.0 | 22.0 | 28.0 | 39.9 | 49.1 | 52.6 | 54.3 |
| 110° | *41.6* | 40.7 | 37.3 | 29.7 | 20.3 | 15.3 | 19.5 | 29.7 | 36.4 | 39.9 | 40.7 |

REPORT NUMBER: P895738
CATALOG NUMBER: CLCS15S-PC-4000K-80%

**CANDELA DISTRIBUTION (continued):**

| | 0° | 5° | 15° | 25° | 35° | 45° | 55° | 65° | 75° | 85° | 90° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 112.5° | *33.1* | 33.1 | 29.7 | 23.7 | 14.4 | 11.0 | 14.4 | 22.9 | 28.8 | 31.4 | 31.4 |
| 115° | *28.0* | 28.0 | 25.4 | 18.7 | 11.9 | 9.3 | 11.9 | 18.7 | 24.6 | 26.3 | 26.3 |
| 117.5° | *22.0* | 22.9 | 22.0 | 17.0 | 10.2 | 6.7 | 10.2 | 15.3 | 20.3 | 22.0 | 21.2 |
| 120° | *17.8* | 18.7 | 20.3 | 16.1 | 9.3 | 6.0 | 9.3 | 15.3 | 18.7 | 17.8 | 17.8 |
| 122.5° | *17.0* | 17.0 | 21.2 | 16.1 | 10.2 | 5.1 | 8.4 | 14.4 | 19.5 | 17.0 | 16.1 |
| 125° | *23.7* | 23.7 | 20.3 | 12.7 | 6.0 | 4.3 | 5.1 | 11.0 | 18.7 | 21.2 | 21.2 |
| 127.5° | *18.7* | 18.7 | 15.3 | 8.4 | 4.3 | 3.4 | 4.3 | 8.4 | 13.6 | 17.0 | 17.8 |
| 130° | *14.4* | 13.6 | 10.2 | 6.0 | 3.4 | 2.6 | 3.4 | 6.0 | 8.4 | 11.0 | 11.9 |
| 132.5° | *7.6* | 7.6 | 6.7 | 5.1 | 2.6 | 1.7 | 2.6 | 5.1 | 6.7 | 7.6 | 7.6 |
| 135° | *6.0* | 6.0 | 5.1 | 4.3 | 2.6 | 0.9 | 2.6 | 4.3 | 5.1 | 6.0 | 6.0 |
| 137.5° | *5.1* | 5.1 | 4.3 | 2.6 | 0.9 | 0.9 | 0.9 | 2.6 | 4.3 | 5.1 | 5.1 |
| 140° | *3.4* | 3.4 | 3.4 | 1.7 | 0.9 | 0.9 | 0.9 | 1.7 | 2.6 | 3.4 | 3.4 |
| 142.5° | *2.6* | 2.6 | 1.7 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 1.7 | 1.7 |
| 145° | *0.9* | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 |
| 147.5° | *0.0* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150° | *0.0* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 152.5° | *0.0* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 155° | *0.0* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 157.5° | *0.0* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 160° | *0.0* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 162.5° | *0.0* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 165° | *0.0* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 167.5° | *0.0* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 170° | *0.0* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 172.5° | *0.0* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 175° | *0.0* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 177.5° | *0.0* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 180° | *0.0* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

Cooper Lighting Solutions Photometric Lab
1121 Highway 74 South
Peachtree City, GA 30269

# LM-79-2019: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

Lumark

Report Number: SP1-2405-118-2

Test Date: 07/17/2024

Luminaire Tested: CLCS40S-4000K-HIGH

Data in this report applies to families of products including CLCS40S-4000K-HIGH

Report Generated By FNC07603 / LDUCLS01DT446
Version: v7.04

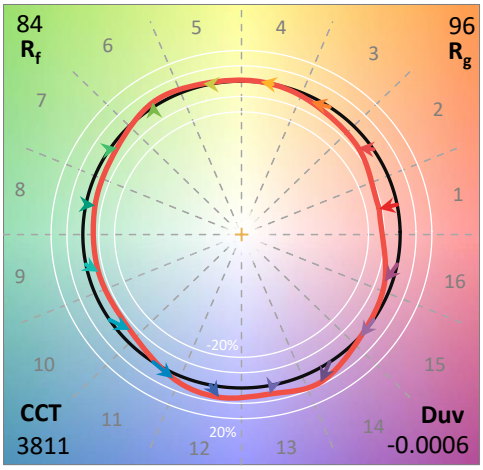
## Test Information

| | |
|---|---|
| Test Method: | LM-79-2019 |
| Report Number: | SP1-2405-118-2 |
| Test Lab: | COOPER LIGHTING SOLUTIONS |
| Photometer: | SP1 - 76IN SPHERE |
| Measurement Geometry: | 4π |
| Issue Date: | 07/18/2024 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS |
| Product Line: | Lumark |
| Catalog Number: | **CLCS40S-4000K-HIGH** |
| Description: | 120W LUMARK AP CANOPY SELECTABLE FIXTURE HIGHEST OUTPUT @4000K |

## Spectral Parameters

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CCT (K): | 3811 | CRI (Ra): | | 83.3 | | | |
| CIE u': | 0.2291 | R1: | | 82.1 | R9: | | 10.7 |
| CIE v': | 0.5044 | R2: | | 89.5 | R10: | | 74.6 |
| Duv: | -0.0006 | R3: | | 94.6 | R11: | | 81.3 |
| CIE x: | 0.3887 | R4: | | 82.3 | R12: | | 61.2 |
| CIE y: | 0.3804 | R5: | | 81.8 | R13: | | 84.0 |
| CIE z: | 0.2310 | R6: | | 85.2 | R14: | | 97.1 |
| Peak Wavelength (nm): | 452 | R7: | | 85.9 | R15: | | 75.9 |
| Dominant Wavelength (nm): | 580 | R8: | | 64.7 | | | |
| Purity: | 30.78715 | | | | | | |

| | |
|---|---|
| Rf: | 83.8 |
| Rg: | 96.1 |



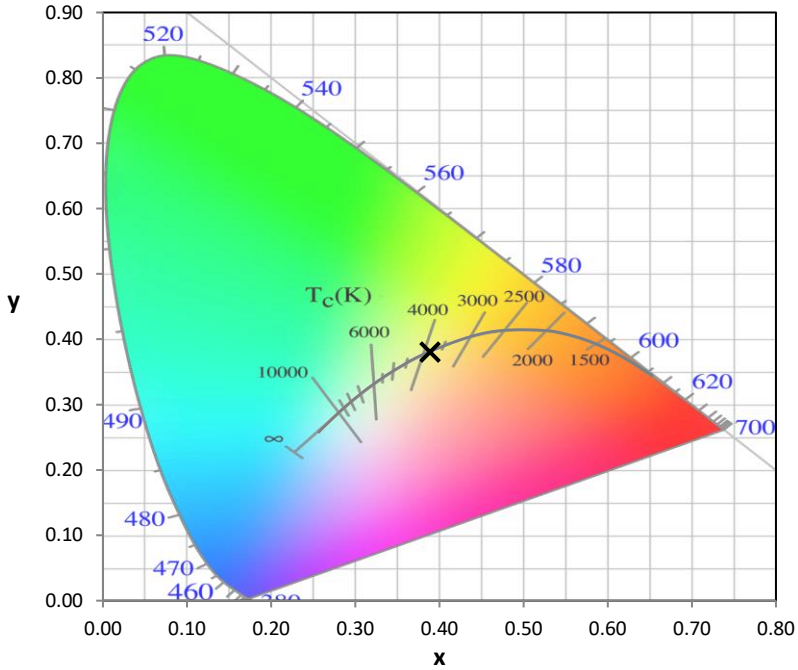

## Test Conditions

| | |
|---|---|
| Stabilization Time: | 27M |
| Operation Time: | 1H 27M |
| Sphere Temperature (°C): | 24.4 |

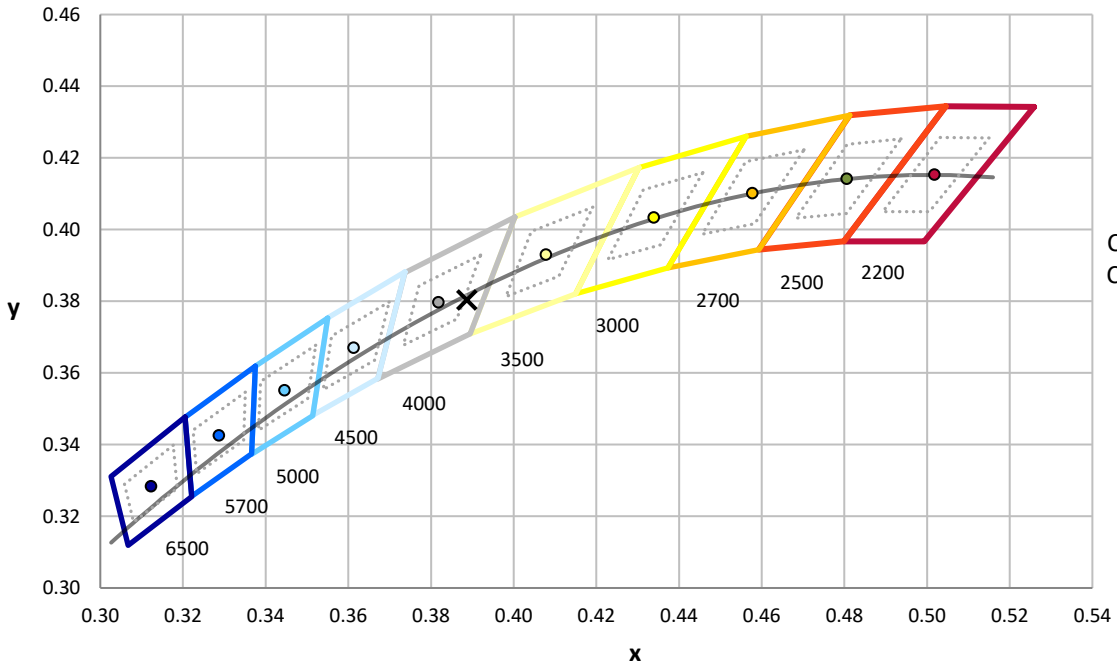
| Measurement and Test Equipment | | | |
|---|---|---|---|
| Instrument | Identification Number | Calibration Date | Calibration Due Date |
| Photometer | IN0058 | 6/18/2024 | 12/18/2024 |
| Power Meter | INXT2011004 | 2/8/2024 | 2/8/2025 |
| AC Power Source | IN0063 | 10/24/2023 | 10/24/2024 |
| DC Power Source | IN0208 | 10/24/2023 | 10/24/2024 |
| Sphere Thermometer | IN0085 | 10/24/2023 | 10/24/2024 |
| Room Thermometer | IN0046 | 10/24/2023 | 10/24/2024 |

REPORT NUMBER: SP1-2405-118-2

## CIE 1931 Chromaticity Diagram




## CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles

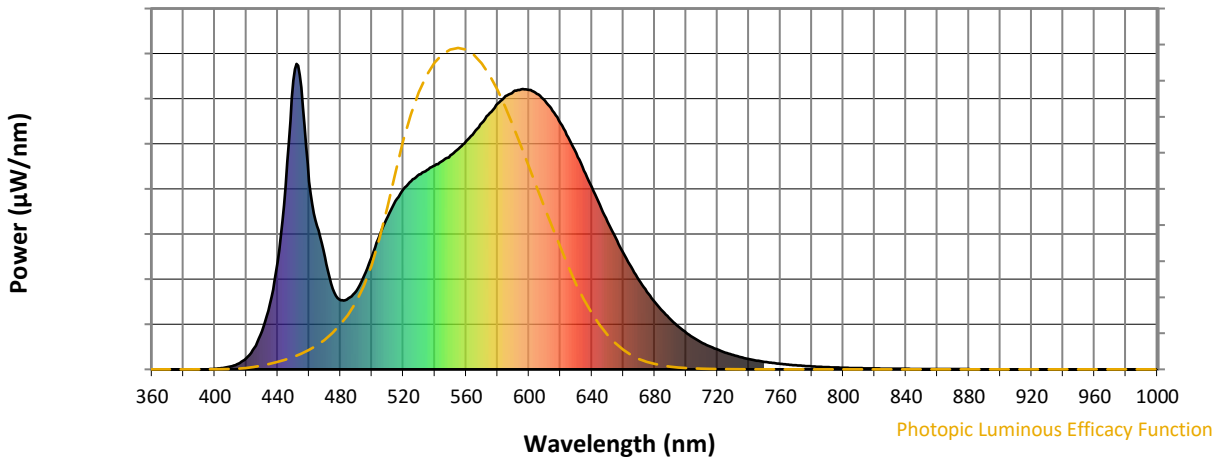



CCT = 3811K
CIE x = 0.3887
CIE y = 0.3804
Duv = -0.0006

Point lies inside the ANSI 4000K 7-step quadrangle

REPORT NUMBER: SP1-2405-118-2

## Photopic Flux vs. Wavelength

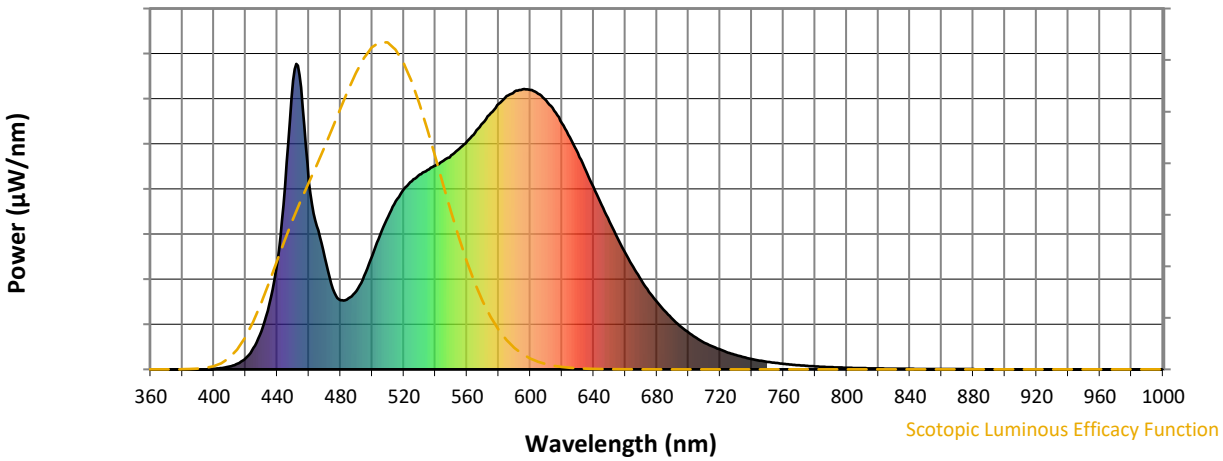



## Photopic Lumens: NR

| λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 360 | 0 | NR | 490 | 257 | NR | 620 | 806 | NR | 750 | 25 | NR | 880 | 1 | NR |
| 365 | 0 | NR | 495 | 306 | NR | 625 | 760 | NR | 755 | 21 | NR | 885 | 1 | NR |
| 370 | 0 | NR | 500 | 371 | NR | 630 | 709 | NR | 760 | 18 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 440 | NR | 635 | 651 | NR | 765 | 15 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 499 | NR | 640 | 596 | NR | 770 | 13 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 551 | NR | 645 | 539 | NR | 775 | 11 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 590 | NR | 650 | 483 | NR | 780 | 10 | NR | 910 | 0 | NR |
| 395 | 0 | NR | 525 | 616 | NR | 655 | 431 | NR | 785 | 8 | NR | 915 | 0 | NR |
| 400 | 2 | NR | 530 | 638 | NR | 660 | 381 | NR | 790 | 7 | NR | 920 | 0 | NR |
| 405 | 5 | NR | 535 | 653 | NR | 665 | 335 | NR | 795 | 6 | NR | 925 | 0 | NR |
| 410 | 9 | NR | 540 | 667 | NR | 670 | 292 | NR | 800 | 5 | NR | 930 | 0 | NR |
| 415 | 19 | NR | 545 | 683 | NR | 675 | 254 | NR | 805 | 5 | NR | 935 | 0 | NR |
| 420 | 37 | NR | 550 | 700 | NR | 680 | 221 | NR | 810 | 4 | NR | 940 | 0 | NR |
| 425 | 70 | NR | 555 | 722 | NR | 685 | 190 | NR | 815 | 3 | NR | 945 | 0 | NR |
| 430 | 124 | NR | 560 | 747 | NR | 690 | 165 | NR | 820 | 3 | NR | 950 | 0 | NR |
| 435 | 215 | NR | 565 | 775 | NR | 695 | 141 | NR | 825 | 3 | NR | 955 | 0 | NR |
| 440 | 352 | NR | 570 | 807 | NR | 700 | 120 | NR | 830 | 2 | NR | 960 | 0 | NR |
| 445 | 602 | NR | 575 | 839 | NR | 705 | 103 | NR | 835 | 2 | NR | 965 | 0 | NR |
| 450 | 946 | NR | 580 | 869 | NR | 710 | 88 | NR | 840 | 2 | NR | 970 | 0 | NR |
| 455 | 923 | NR | 585 | 895 | NR | 715 | 75 | NR | 845 | 1 | NR | 975 | 0 | NR |
| 460 | 615 | NR | 590 | 910 | NR | 720 | 65 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 469 | NR | 595 | 917 | NR | 725 | 55 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 366 | NR | 600 | 915 | NR | 730 | 47 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 264 | NR | 605 | 902 | NR | 735 | 40 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 226 | NR | 610 | 880 | NR | 740 | 34 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 232 | NR | 615 | 847 | NR | 745 | 29 | NR | 875 | 1 | NR | | | |

REPORT NUMBER: SP1-2405-118-2

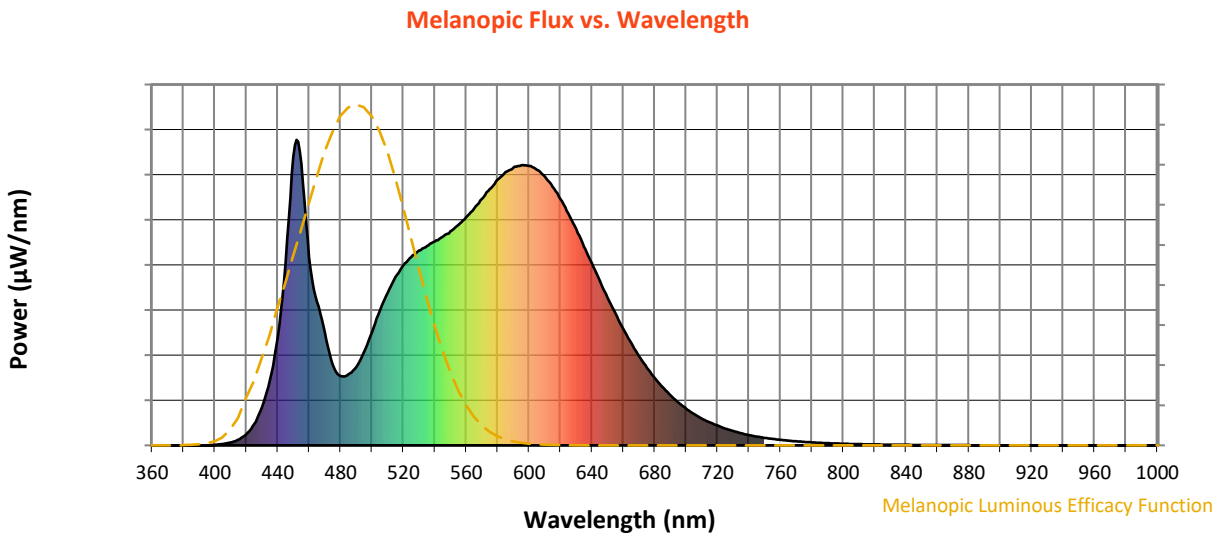
## Scotopic Flux vs. Wavelength




**Scotopic Lumens: NR** **S/P: 1.62**

| λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 360 | 0 | NR | 490 | 257 | NR | 620 | 806 | NR | 750 | 25 | NR | 880 | 1 | NR |
| 365 | 0 | NR | 495 | 306 | NR | 625 | 760 | NR | 755 | 21 | NR | 885 | 1 | NR |
| 370 | 0 | NR | 500 | 371 | NR | 630 | 709 | NR | 760 | 18 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 440 | NR | 635 | 651 | NR | 765 | 15 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 499 | NR | 640 | 596 | NR | 770 | 13 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 551 | NR | 645 | 539 | NR | 775 | 11 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 590 | NR | 650 | 483 | NR | 780 | 10 | NR | 910 | 0 | NR |
| 395 | 0 | NR | 525 | 616 | NR | 655 | 431 | NR | 785 | 8 | NR | 915 | 0 | NR |
| 400 | 2 | NR | 530 | 638 | NR | 660 | 381 | NR | 790 | 7 | NR | 920 | 0 | NR |
| 405 | 5 | NR | 535 | 653 | NR | 665 | 335 | NR | 795 | 6 | NR | 925 | 0 | NR |
| 410 | 9 | NR | 540 | 667 | NR | 670 | 292 | NR | 800 | 5 | NR | 930 | 0 | NR |
| 415 | 19 | NR | 545 | 683 | NR | 675 | 254 | NR | 805 | 5 | NR | 935 | 0 | NR |
| 420 | 37 | NR | 550 | 700 | NR | 680 | 221 | NR | 810 | 4 | NR | 940 | 0 | NR |
| 425 | 70 | NR | 555 | 722 | NR | 685 | 190 | NR | 815 | 3 | NR | 945 | 0 | NR |
| 430 | 124 | NR | 560 | 747 | NR | 690 | 165 | NR | 820 | 3 | NR | 950 | 0 | NR |
| 435 | 215 | NR | 565 | 775 | NR | 695 | 141 | NR | 825 | 3 | NR | 955 | 0 | NR |
| 440 | 352 | NR | 570 | 807 | NR | 700 | 120 | NR | 830 | 2 | NR | 960 | 0 | NR |
| 445 | 602 | NR | 575 | 839 | NR | 705 | 103 | NR | 835 | 2 | NR | 965 | 0 | NR |
| 450 | 946 | NR | 580 | 869 | NR | 710 | 88 | NR | 840 | 2 | NR | 970 | 0 | NR |
| 455 | 923 | NR | 585 | 895 | NR | 715 | 75 | NR | 845 | 1 | NR | 975 | 0 | NR |
| 460 | 615 | NR | 590 | 910 | NR | 720 | 65 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 469 | NR | 595 | 917 | NR | 725 | 55 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 366 | NR | 600 | 915 | NR | 730 | 47 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 264 | NR | 605 | 902 | NR | 735 | 40 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 226 | NR | 610 | 880 | NR | 740 | 34 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 232 | NR | 615 | 847 | NR | 745 | 29 | NR | 875 | 1 | NR | | | |

REPORT NUMBER: SP1-2405-118-2




**Melanopic Lumens: NR** **M/P: 3.3**

| λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 360 | 0 | NR | 490 | 257 | NR | 620 | 806 | NR | 750 | 25 | NR | 880 | 1 | NR |
| 365 | 0 | NR | 495 | 306 | NR | 625 | 760 | NR | 755 | 21 | NR | 885 | 1 | NR |
| 370 | 0 | NR | 500 | 371 | NR | 630 | 709 | NR | 760 | 18 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 440 | NR | 635 | 651 | NR | 765 | 15 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 499 | NR | 640 | 596 | NR | 770 | 13 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 551 | NR | 645 | 539 | NR | 775 | 11 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 590 | NR | 650 | 483 | NR | 780 | 10 | NR | 910 | 0 | NR |
| 395 | 0 | NR | 525 | 616 | NR | 655 | 431 | NR | 785 | 8 | NR | 915 | 0 | NR |
| 400 | 2 | NR | 530 | 638 | NR | 660 | 381 | NR | 790 | 7 | NR | 920 | 0 | NR |
| 405 | 5 | NR | 535 | 653 | NR | 665 | 335 | NR | 795 | 6 | NR | 925 | 0 | NR |
| 410 | 9 | NR | 540 | 667 | NR | 670 | 292 | NR | 800 | 5 | NR | 930 | 0 | NR |
| 415 | 19 | NR | 545 | 683 | NR | 675 | 254 | NR | 805 | 5 | NR | 935 | 0 | NR |
| 420 | 37 | NR | 550 | 700 | NR | 680 | 221 | NR | 810 | 4 | NR | 940 | 0 | NR |
| 425 | 70 | NR | 555 | 722 | NR | 685 | 190 | NR | 815 | 3 | NR | 945 | 0 | NR |
| 430 | 124 | NR | 560 | 747 | NR | 690 | 165 | NR | 820 | 3 | NR | 950 | 0 | NR |
| 435 | 215 | NR | 565 | 775 | NR | 695 | 141 | NR | 825 | 3 | NR | 955 | 0 | NR |
| 440 | 352 | NR | 570 | 807 | NR | 700 | 120 | NR | 830 | 2 | NR | 960 | 0 | NR |
| 445 | 602 | NR | 575 | 839 | NR | 705 | 103 | NR | 835 | 2 | NR | 965 | 0 | NR |
| 450 | 946 | NR | 580 | 869 | NR | 710 | 88 | NR | 840 | 2 | NR | 970 | 0 | NR |
| 455 | 923 | NR | 585 | 895 | NR | 715 | 75 | NR | 845 | 1 | NR | 975 | 0 | NR |
| 460 | 615 | NR | 590 | 910 | NR | 720 | 65 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 469 | NR | 595 | 917 | NR | 725 | 55 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 366 | NR | 600 | 915 | NR | 730 | 47 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 264 | NR | 605 | 902 | NR | 735 | 40 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 226 | NR | 610 | 880 | NR | 740 | 34 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 232 | NR | 615 | 847 | NR | 745 | 29 | NR | 875 | 1 | NR | | | |

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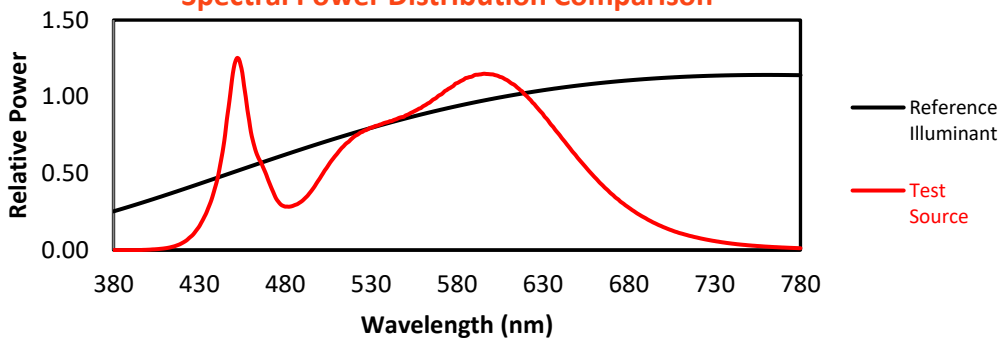
# TM-30-18

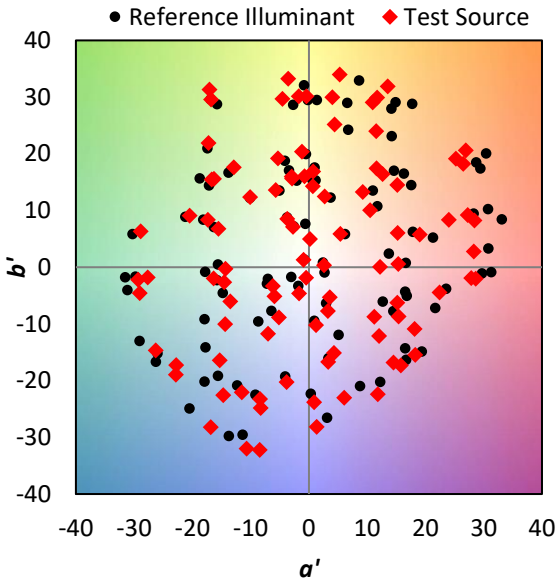
## Summary

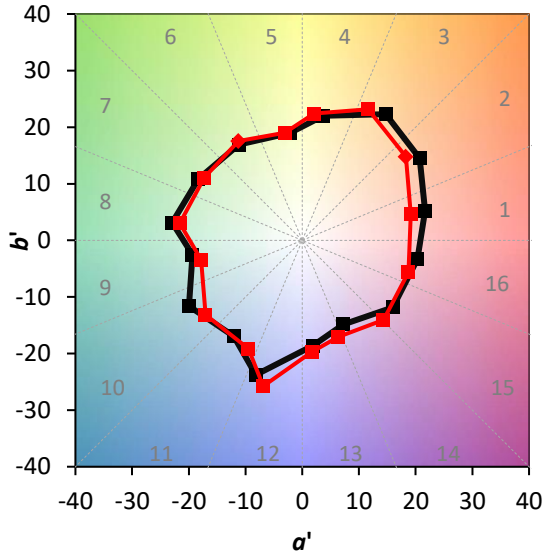
$R_f$ = 83.8
$R_g$ = 96.1
CIE $R_a$ = 83.3
$R_9$ = 10.7

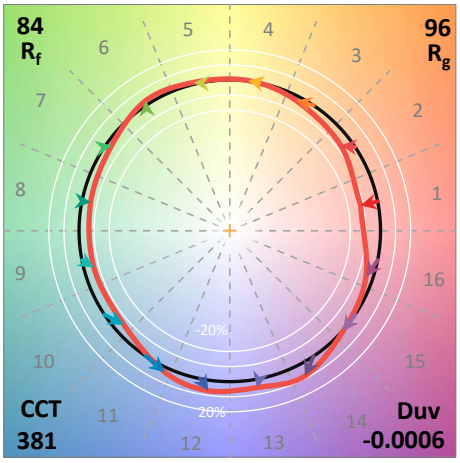
## Spectral Power Distribution Comparison

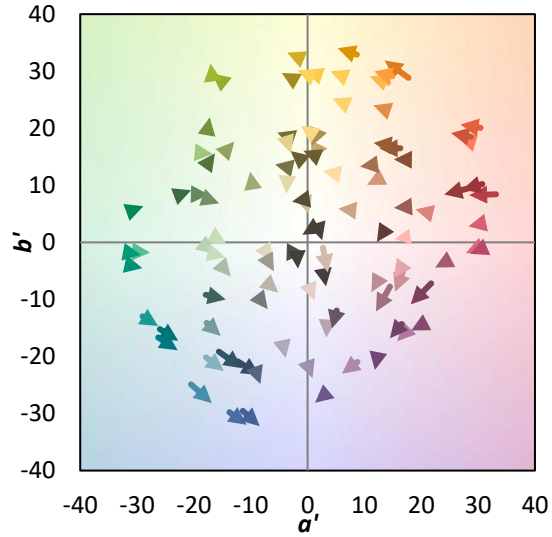



## Color Vector Graphics



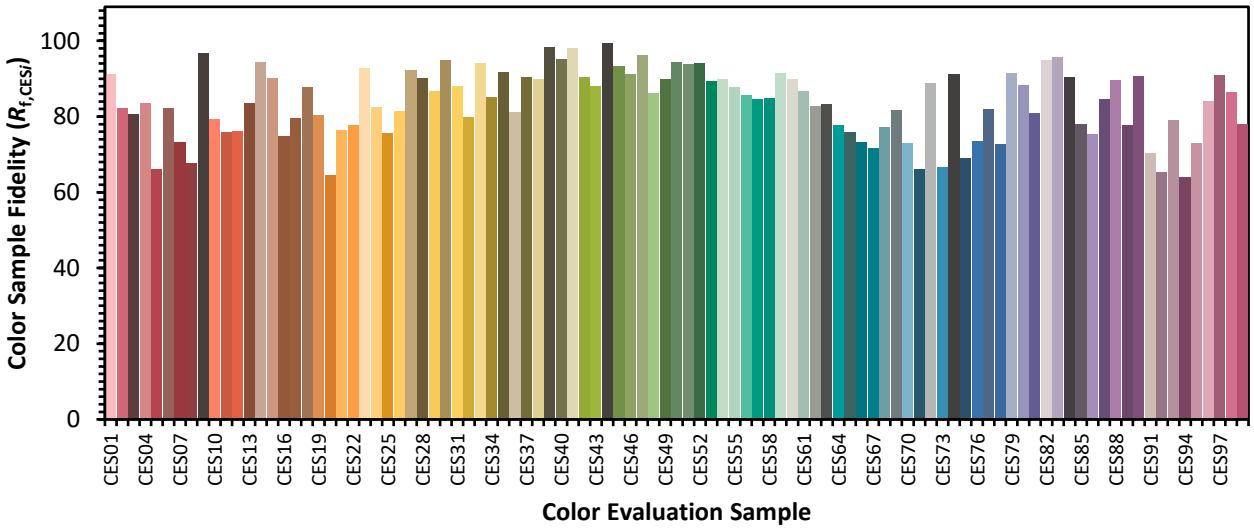



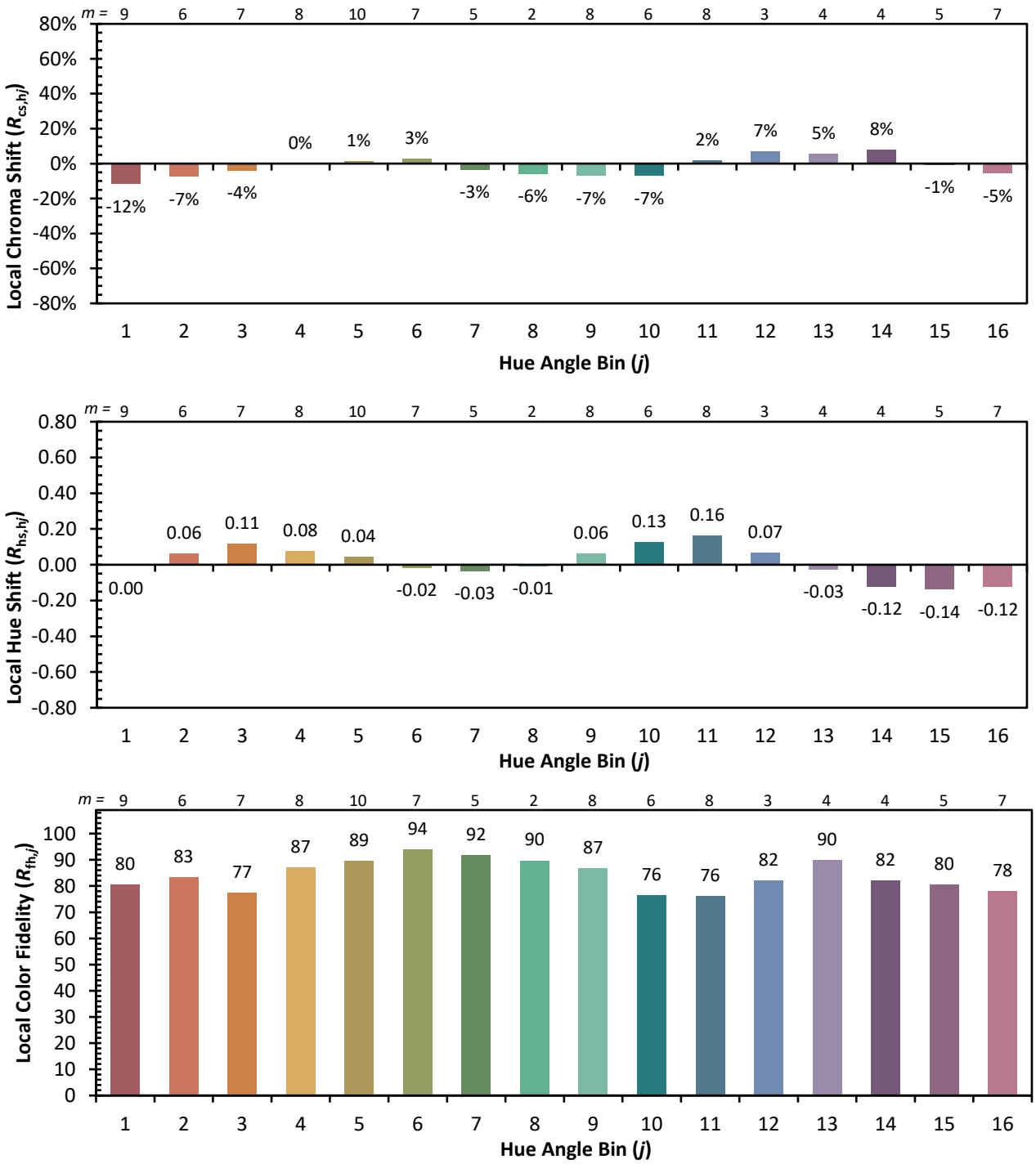



**Individual Sample Fidelity Index ($R_{f,i}$)**

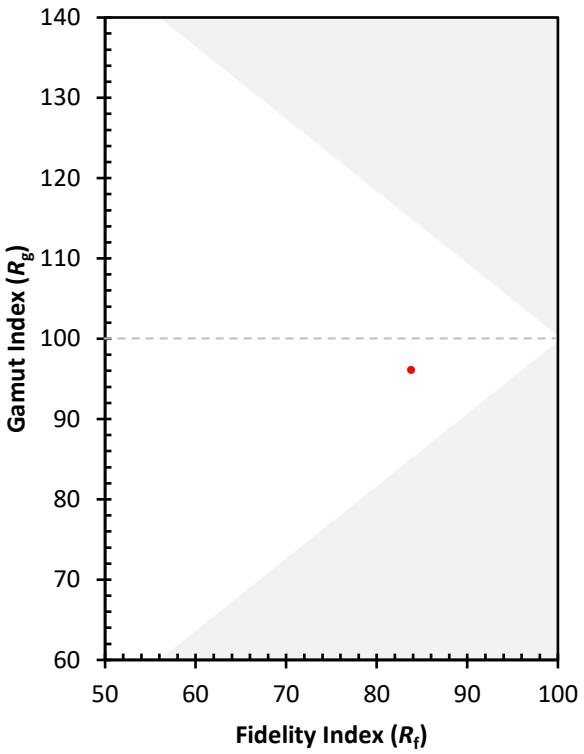
| | | | |
|---|---|---|---|
| CES01 = 86 | CES26 = 81 | CES51 = 94 | CES76 = 74 |
| CES02 = 61 | CES27 = 92 | CES52 = 94 | CES77 = 82 |
| CES03 = 31 | CES28 = 90 | CES53 = 89 | CES78 = 73 |
| CES04 = 70 | CES29 = 87 | CES54 = 90 | CES79 = 92 |
| CES05 = 48 | CES30 = 95 | CES55 = 88 | CES80 = 88 |
| CES06 = 51 | CES31 = 88 | CES56 = 86 | CES81 = 81 |
| CES07 = 41 | CES32 = 80 | CES57 = 85 | CES82 = 95 |
| CES08 = 40 | CES33 = 94 | CES58 = 85 | CES83 = 96 |
| CES09 = 29 | CES34 = 85 | CES59 = 91 | CES84 = 90 |
| CES10 = 74 | CES35 = 92 | CES60 = 90 | CES85 = 78 |
| CES11 = 57 | CES36 = 81 | CES61 = 87 | CES86 = 75 |
| CES12 = 63 | CES37 = 90 | CES62 = 83 | CES87 = 85 |
| CES13 = 43 | CES38 = 90 | CES63 = 83 | CES88 = 90 |
| CES14 = 74 | CES39 = 98 | CES64 = 78 | CES89 = 78 |
| CES15 = 71 | CES40 = 95 | CES65 = 76 | CES90 = 91 |
| CES16 = 47 | CES41 = 98 | CES66 = 73 | CES91 = 70 |
| CES17 = 49 | CES42 = 91 | CES67 = 72 | CES92 = 65 |
| CES18 = 56 | CES43 = 88 | CES68 = 77 | CES93 = 79 |
| CES19 = 71 | CES44 = 99 | CES69 = 82 | CES94 = 64 |
| CES20 = 65 | CES45 = 93 | CES70 = 73 | CES95 = 73 |
| CES21 = 86 | CES46 = 91 | CES71 = 66 | CES96 = 84 |
| CES22 = 78 | CES47 = 96 | CES72 = 89 | CES97 = 91 |
| CES23 = 91 | CES48 = 86 | CES73 = 67 | CES98 = 86 |
| CES24 = 90 | CES49 = 90 | CES74 = 91 | CES99 = 78 |
| CES25 = 71 | CES50 = 94 | CES75 = 69 | |

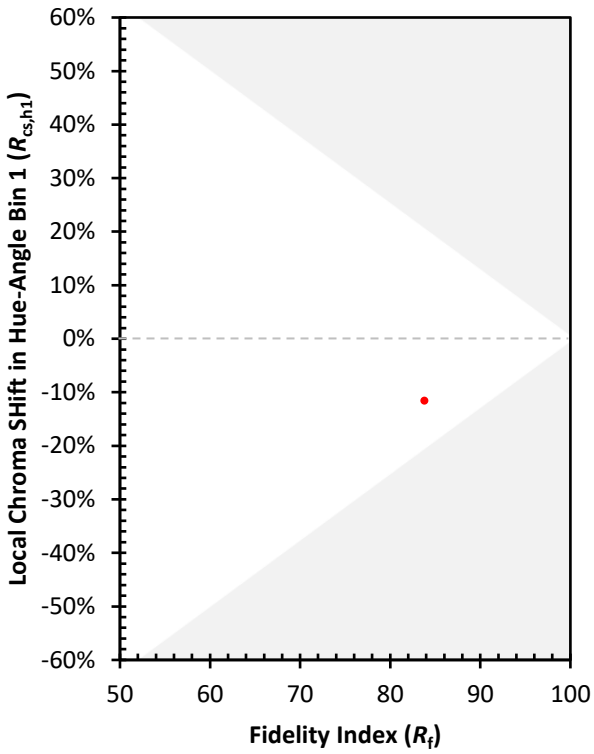


## Color Rendition by Hue-Angle Bin



## Measure Comparisons




(END OF REPORT)