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

Scaled data based on original data using

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

Test Report Prepared for

Cooper Lighting Solutions

Brand: McGRAW-EDISON

Report Number: P634458

Luminaire Tested: GWS-SA3B-827-U-SL3-W-GRSBK

Issue Date: 1/10/2023

Report Generated By 670246102 / DESKTOP-G35701P

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

Scaled Data Report

**Test Information**

| | |
|---|---|
| Test Method: | LM-79-2019 |
| Report Number: | P634458 |
| | TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2209-782-32) |
| Test Lab: | COOPER LIGHTING SOLUTIONS |
| Issue Date: | 1/10/2023 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS |
| Product Line: | McGRAW-EDISON |
| Catalog Number: | GWS-SA3B-827-U-SL3-W-GRSBK |
| Description: | GALLEON WALL SLIM LUMINAIRE. (3) LIGHTSQUARES WITH 16 LEDS EACH AND TYPE III SPILL LIGHT ELIMINATOR OPTICS W/ FACTORY INSTALLED GLARE SHIELD, BK |
| Light Source: | (48) 2700K CCT, 80 CRI LEDS |
| Ballast/Driver: | - |

**Summary**

| | |
|---|---|
| Lumens per Lamp: | N/A |
| Luminaire Lumens: | 4472.3 lumens |
| Efficiency: | N/A |
| Efficacy: | 65.5 lumens/watt |
| Luminous Opening: | Rectangular (W 1.5' x L: 0.5' x H: 0') |
| IES Classification: | Type II - Short |
| BUG Rating: | B1 - U0 - G0 |

| | |
|---|---|
| Input Watts (W): | 68.3 |
| Input Voltage (V): | 120 |
| Input Current (Ain): | NR |
| Voltage Rise (V): | NR |
| Power Factor: | NR |
| Total Harmonic Distortion (THDi): | NR |
| Frequency (hertz): | 0 |
| Stabilization Time: | NR |
| Operation Time: | NR |
| Ambient Temperature (°C): | NR |
| Test Distance: | 28.75 FT |

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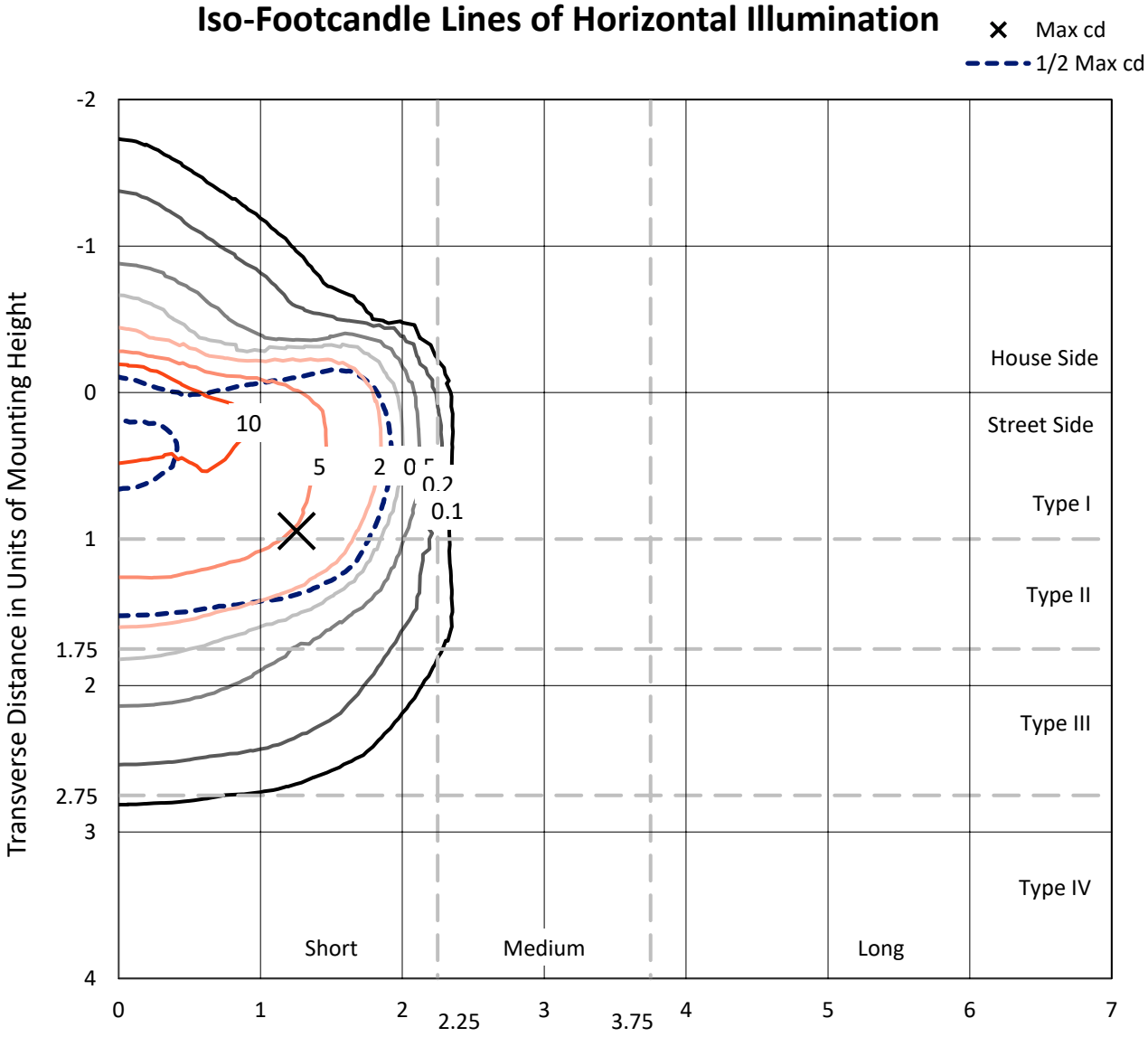
REPORT NUMBER: P634458
CATALOG NUMBER: GWS-SA3B-827-U-SL3-W-GRSBK

## Iso-Footcandle Lines of Horizontal Illumination




Based on 10 foot mounting height. Maximum calculated value = 19.6 fc
Type II - Short - N/A

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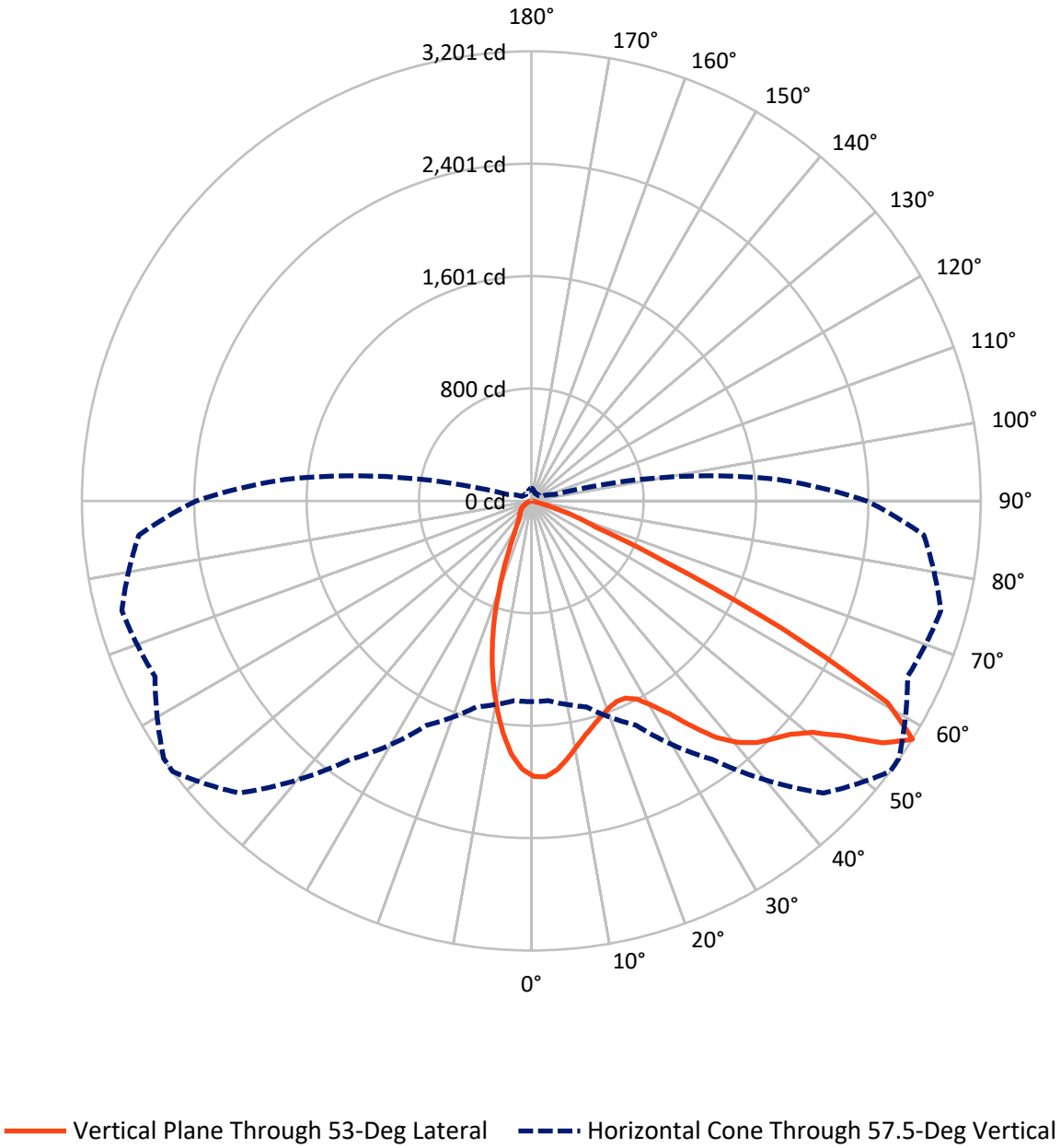
## Luminous Intensity Polar Plot



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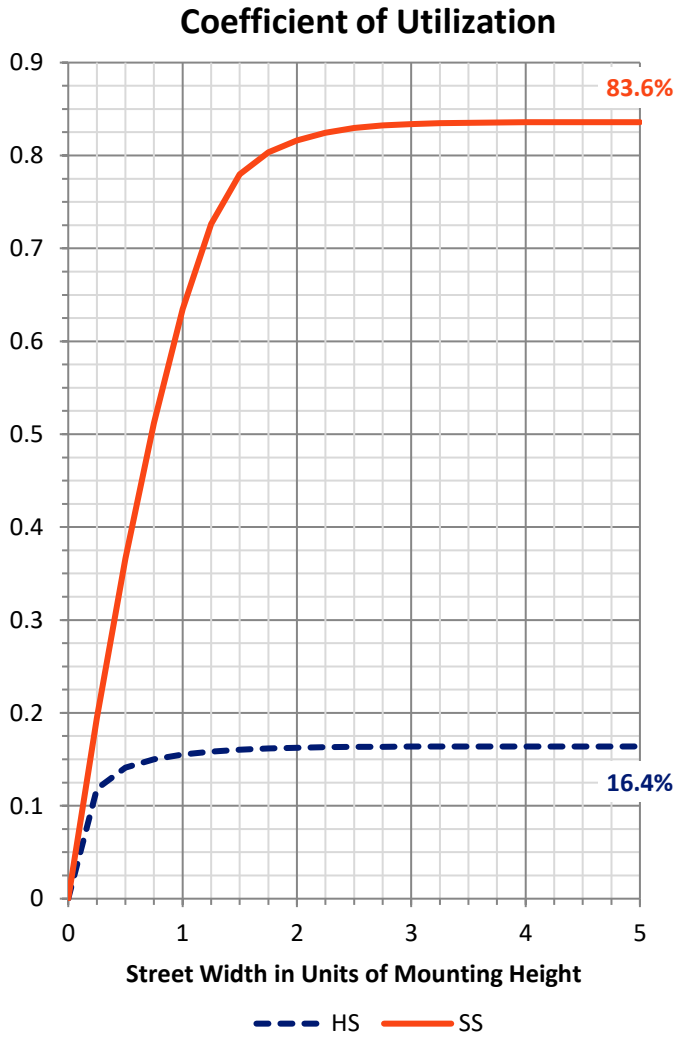
CATALOG NUMBER: GWS-SA3B-827-U-SL3-W-GRSBK

**FLUX DISTRIBUTION:**

| | | Downward | Upward | Total |
|---|---|---|---|---|
| **House Side** | Lumens | 738.8 | 0.0 | 738.8 |
| | % Fixture | 16.5 | 0.0 | 16.5 |
| **Street Side** | Lumens | 3733.5 | 0.0 | 3733.5 |
| | % Fixture | 83.5 | 0.0 | 83.5 |
| **Total** | Lumens | 4472.3 | 0.0 | 4472.3 |
| | % Fixture | 100.0 | 0.0 | 100.0 |

**ZONAL LUMENS:**

| Zone | Lumens | % Fixture |
|---|---|---|
| 0°-10° | 167.8 | 3.8 |
| 10°-20° | 368.5 | 8.2 |
| 20°-30° | 480.0 | 10.7 |
| 30°-40° | 696.3 | 15.6 |
| 40°-50° | 1004.7 | 22.5 |
| 50°-60° | 1215.1 | 27.2 |
| 60°-70° | 495.2 | 11.1 |
| 70°-80° | 44.5 | 1.0 |
| 80°-90° | 0.0 | 0.0 |
| 90°-100° | 0.0 | 0.0 |
| 100°-110° | 0.0 | 0.0 |
| 110°-120° | 0.0 | 0.0 |
| 120°-130° | 0.0 | 0.0 |
| 130°-140° | 0.0 | 0.0 |
| 140°-150° | 0.0 | 0.0 |
| 150°-160° | 0.0 | 0.0 |
| 160°-170° | 0.0 | 0.0 |
| 170°-180° | 0.0 | 0.0 |
| 0°-90° | 4472.3 | 100.0 |
| 0°-180° | 4472.3 | 100.0 |



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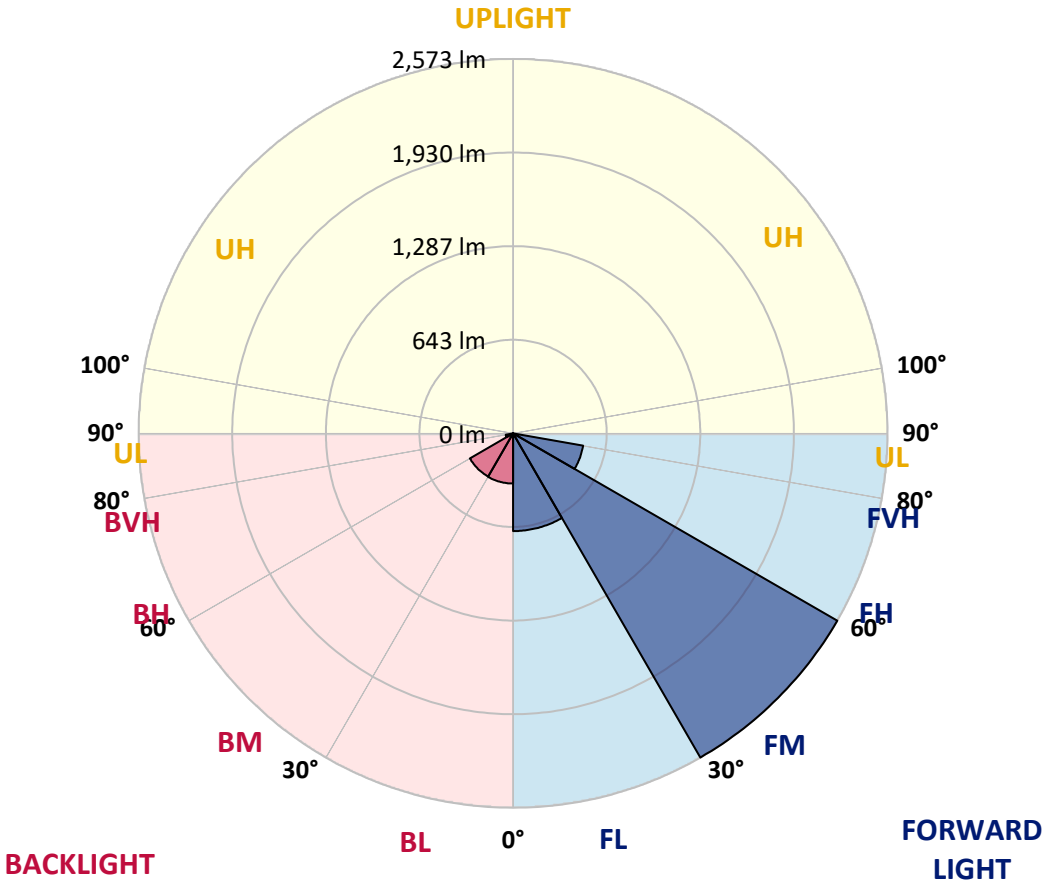
## LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:

| Zone | | Lumens | % Fixture | Zone Rating/Lumen Limit B | U | G |
|---|---|---|---|---|---|---|
| FL | (0°-30°) | 671.6 | 15.0 | | | |
| FM | (30°-60°) | 2573.3 | 57.5 | | | |
| FH | (60°-80°) | 488.7 | 10.9 | | | G0/660 |
| FVH | (80°-90°) | 0.0 | 0.0 | | | G0/10 |
| BL | (0°-30°) | 344.8 | 7.7 | B1/500 | | |
| BM | (30°-60°) | 342.9 | 7.7 | B1/1000 | | |
| BH | (60°-80°) | 51.1 | 1.1 | B0/110 | | G0/110 |
| BVH | (80°-90°) | 0.0 | 0.0 | | | G0/10 |
| UL | (90°-100°) | 0.0 | 0.0 | | U0/0 | |
| UH | (100°-180°) | 0.0 | 0.0 | | U0/0 | |

**BUG Rating: B1-U0-G0**
Type II Short



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CATALOG NUMBER: GWS-SA3B-827-U-SL3-W-GRSBK

**CANDELA DISTRIBUTION (FULL):**

| | 0° | 5° | 15° | 25° | 35° | 45° | 53° | 55° | 65° | 75° | 85° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 1961.8 | 1961.8 | 1961.8 | 1961.8 | 1961.8 | 1961.8 | *1961.8* | 1961.8 | 1961.8 | 1961.8 | 1961.8 |
| 2.5° | 1934.4 | 1938.8 | 1946.5 | 1956.3 | 1962.9 | 1966.2 | *1966.2* | 1975.5 | 1969.5 | 1964.5 | 1959.1 |
| 5° | 1851.6 | 1856.0 | 1866.4 | 1882.3 | 1898.2 | 1909.7 | *1922.9* | 1932.8 | 1936.6 | 1936.6 | 1927.3 |
| 7.5° | 1734.9 | 1740.9 | 1747.5 | 1769.4 | 1803.9 | 1829.7 | *1852.2* | 1866.4 | 1887.3 | 1893.8 | 1880.7 |
| 10° | 1609.3 | 1615.4 | 1630.2 | 1660.3 | 1699.8 | 1738.2 | *1776.5* | 1794.6 | 1830.3 | 1848.9 | 1834.1 |
| 12.5° | 1503.0 | 1505.8 | 1525.5 | 1561.7 | 1612.1 | 1664.7 | *1711.3* | 1729.9 | 1780.4 | 1808.3 | 1790.8 |
| 15° | 1415.3 | 1417.0 | 1436.7 | 1476.7 | 1534.8 | 1599.5 | *1658.1* | 1677.3 | 1739.3 | 1781.5 | 1755.2 |
| 17.5° | 1349.0 | 1349.5 | 1366.5 | 1409.8 | 1470.7 | 1542.5 | *1612.1* | 1635.7 | 1715.7 | 1766.7 | 1727.2 |
| 20° | 1315.5 | 1313.9 | 1326.0 | 1363.8 | 1421.3 | 1493.1 | *1575.4* | 1604.4 | 1702.5 | 1764.5 | 1705.8 |
| 22.5° | 1316.1 | 1312.3 | 1317.2 | 1344.0 | 1392.8 | 1460.3 | *1552.3* | 1585.2 | 1703.6 | 1773.8 | 1687.7 |
| 25° | 1347.3 | 1341.9 | 1343.0 | 1357.2 | 1391.7 | 1453.1 | *1555.6* | 1590.7 | 1725.6 | 1805.0 | 1681.2 |
| 27.5° | 1400.0 | 1393.9 | 1393.9 | 1401.1 | 1419.7 | 1475.6 | *1596.7* | 1636.8 | 1784.2 | 1865.9 | 1694.9 |
| 30° | 1467.9 | 1461.9 | 1459.7 | 1466.8 | 1482.2 | 1533.7 | *1688.3* | 1729.9 | 1884.5 | 1965.6 | 1738.7 |
| 32.5° | 1545.8 | 1538.6 | 1542.5 | 1552.3 | 1567.1 | 1638.4 | *1806.1* | 1861.5 | 2010.0 | 2099.9 | 1817.6 |
| 35° | 1628.0 | 1622.0 | 1639.5 | 1660.9 | 1683.9 | 1783.7 | *1968.9* | 2017.2 | 2164.1 | 2267.1 | 1938.2 |
| 37.5° | 1706.4 | 1703.6 | 1740.4 | 1785.3 | 1833.0 | 1958.0 | *2134.5* | 2171.7 | 2296.2 | 2449.1 | 2085.7 |
| 40° | 1784.8 | 1784.2 | 1847.2 | 1926.2 | 2002.4 | 2131.7 | *2260.0* | 2290.7 | 2376.8 | 2590.5 | 2227.1 |
| 42.5° | 1872.5 | 1872.5 | 1959.6 | 2064.9 | 2166.3 | 2278.6 | *2352.1* | 2365.8 | 2412.9 | 2672.2 | 2333.4 |
| 45° | 1956.3 | 1961.3 | 2062.1 | 2184.4 | 2304.4 | 2393.2 | *2415.7* | 2416.8 | 2427.7 | 2720.4 | 2421.7 |
| 47.5° | 2022.6 | 2027.0 | 2147.6 | 2288.5 | 2417.9 | 2480.3 | *2483.6* | 2478.7 | 2466.6 | 2766.5 | 2489.7 |
| 50° | 2076.4 | 2082.9 | 2209.0 | 2358.1 | 2495.7 | 2564.2 | *2589.4* | 2584.5 | 2553.8 | 2815.8 | 2537.4 |
| 52.5° | 2102.7 | 2112.0 | 2230.4 | 2392.6 | 2582.3 | 2707.8 | *2778.0* | 2789.5 | 2684.3 | 2843.2 | 2582.9 |
| 55° | 1892.2 | 1905.9 | 2015.0 | 2237.0 | 2630.5 | 2929.8 | *3040.0* | 3037.8 | 2825.7 | 2924.9 | 2693.6 |
| 57.5° | *1429.0* | *1427.9* | *1518.4* | *1761.2* | *2246.8* | *2942.4* | *3201.2* | *3196.8* | *2957.8* | *3019.7* | *2807.0* |
| 60° | 973.0 | 966.4 | 990.5 | 1107.8 | 1571.0 | 2397.0 | *2913.4* | 2972.6 | 2864.1 | 2789.5 | 2383.3 |
| 62.5° | 800.8 | 794.8 | 787.1 | 754.8 | 902.2 | 1493.1 | *2012.8* | 2102.7 | 2088.4 | 1938.8 | 1494.8 |
| 65° | 655.6 | 660.5 | 681.9 | 668.2 | 627.6 | 765.8 | *1044.8* | 1097.9 | 1003.7 | 844.7 | 522.4 |
| 67.5° | 483.5 | 485.7 | 513.6 | 586.0 | 564.0 | 509.8 | *491.7* | 500.5 | 293.3 | 134.8 | 87.2 |
| 70° | 285.6 | 287.2 | 313.0 | 410.0 | 457.7 | 391.4 | *332.2* | 327.2 | 116.2 | 36.2 | 39.5 |
| 72.5° | 161.7 | 158.4 | 163.3 | 195.1 | 249.4 | 207.7 | *171.0* | 155.7 | 35.1 | 20.3 | 20.3 |
| 75° | 76.7 | 74.5 | 64.1 | 60.3 | 54.8 | 35.1 | *21.9* | 18.6 | 8.8 | 8.2 | 8.2 |
| 77.5° | 0.5 | 1.6 | 1.1 | 1.6 | 1.6 | 1.1 | *0.5* | 0.5 | 1.6 | 1.6 | 2.2 |
| 80° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | *0.0* | 0.0 | 0.0 | 0.0 | 0.0 |
| 82.5° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | *0.0* | 0.0 | 0.0 | 0.0 | 0.0 |
| 85° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | *0.0* | 0.0 | 0.0 | 0.0 | 0.0 |
| 87.5° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | *0.0* | 0.0 | 0.0 | 0.0 | 0.0 |
| 90° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | *0.0* | 0.0 | 0.0 | 0.0 | 0.0 |

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Scaled Data Report

REPORT NUMBER: P634458
CATALOG NUMBER: GWS-SA3B-827-U-SL3-W-GRSBK

**CANDELA DISTRIBUTION (continued):**

| | 90° | 95° | 105° | 115° | 125° | 135° | 145° | 155° | 165° | 175° | 180° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 1961.8 | 1961.8 | 1961.8 | 1961.8 | 1961.8 | 1961.8 | 1961.8 | 1961.8 | 1961.8 | 1961.8 | 1961.8 |
| 2.5° | 1949.2 | 1932.8 | 1928.9 | 1927.8 | 1912.5 | 1896.0 | 1879.0 | 1872.5 | 1862.6 | 1856.6 | 1861.5 |
| 5° | 1912.5 | 1888.9 | 1868.1 | 1848.9 | 1814.9 | 1777.6 | 1745.3 | 1724.5 | 1704.7 | 1691.6 | 1694.9 |
| 7.5° | 1860.4 | 1829.7 | 1782.0 | 1733.2 | 1670.7 | 1614.8 | 1552.3 | 1514.0 | 1478.3 | 1458.6 | 1467.9 |
| 10° | 1805.0 | 1764.5 | 1688.3 | 1605.5 | 1507.4 | 1419.7 | 1330.3 | 1257.4 | 1215.2 | 1175.2 | 1179.6 |
| 12.5° | 1750.8 | 1697.1 | 1583.0 | 1457.5 | 1333.6 | 1204.3 | 1069.4 | 968.6 | 899.5 | 849.6 | 841.9 |
| 15° | 1700.3 | 1631.3 | 1480.5 | 1315.0 | 1146.2 | 974.1 | 801.9 | 657.8 | 577.7 | 528.4 | 525.1 |
| 17.5° | 1655.4 | 1569.9 | 1374.2 | 1165.9 | 954.3 | 734.0 | 536.1 | 428.1 | 382.1 | 360.7 | 358.5 |
| 20° | 1612.1 | 1507.9 | 1265.7 | 1014.6 | 744.9 | 515.3 | 370.0 | 320.1 | 305.3 | 296.5 | 297.6 |
| 22.5° | 1570.4 | 1440.5 | 1151.6 | 846.9 | 558.6 | 361.8 | 286.7 | 267.5 | 265.8 | 266.9 | 267.5 |
| 25° | 1535.4 | 1378.6 | 1034.3 | 685.2 | 398.5 | 275.7 | 239.5 | 234.1 | 239.0 | 246.1 | 247.2 |
| 27.5° | 1517.3 | 1328.2 | 919.8 | 522.4 | 288.3 | 224.2 | 207.7 | 209.9 | 218.7 | 226.4 | 227.5 |
| 30° | 1522.2 | 1290.3 | 801.4 | 378.8 | 222.0 | 189.1 | 183.6 | 188.0 | 196.8 | 203.9 | 205.0 |
| 32.5° | 1557.3 | 1271.1 | 680.2 | 275.7 | 182.5 | 165.0 | 162.8 | 166.1 | 173.8 | 179.2 | 179.8 |
| 35° | 1626.9 | 1275.5 | 565.1 | 211.0 | 156.8 | 146.9 | 146.4 | 148.5 | 152.4 | 156.2 | 156.8 |
| 37.5° | 1729.4 | 1311.2 | 451.7 | 175.4 | 142.0 | 134.8 | 132.7 | 132.7 | 135.4 | 137.0 | 138.1 |
| 40° | 1839.6 | 1364.9 | 361.8 | 155.1 | 131.6 | 123.9 | 119.5 | 117.9 | 120.0 | 122.2 | 122.8 |
| 42.5° | 1930.6 | 1418.6 | 293.8 | 140.9 | 123.3 | 112.9 | 107.4 | 106.3 | 109.1 | 112.9 | 114.0 |
| 45° | 2000.2 | 1460.3 | 245.0 | 129.4 | 114.0 | 102.5 | 96.5 | 96.5 | 101.4 | 108.0 | 109.1 |
| 47.5° | 2063.8 | 1493.7 | 208.8 | 118.9 | 105.2 | 93.2 | 87.2 | 88.3 | 96.5 | 105.2 | 106.9 |
| 50° | 2107.1 | 1520.6 | 182.0 | 109.6 | 98.1 | 85.5 | 80.0 | 82.2 | 92.1 | 102.5 | 104.1 |
| 52.5° | 2153.7 | 1553.4 | 164.4 | 101.4 | 91.5 | 79.5 | 74.5 | 76.2 | 87.2 | 98.7 | 100.9 |
| 55° | 2282.5 | 1663.6 | 163.9 | 90.4 | 80.0 | 71.3 | 69.1 | 69.6 | 80.6 | 93.7 | 96.5 |
| 57.5° | *2387.7* | *1760.6* | *174.9* | *76.2* | *66.9* | *62.5* | *61.4* | *61.9* | *71.8* | *86.6* | *89.9* |
| 60° | 1975.5 | 1368.2 | 144.7 | 63.0 | 55.9 | 54.8 | 53.2 | 54.3 | 63.6 | 76.7 | 79.5 |
| 62.5° | 1169.2 | 782.2 | 69.1 | 48.2 | 47.7 | 46.6 | 44.9 | 47.1 | 55.9 | 67.4 | 69.1 |
| 65° | 399.6 | 231.9 | 43.9 | 39.5 | 40.6 | 38.9 | 37.3 | 39.5 | 47.1 | 53.7 | 54.3 |
| 67.5° | 76.7 | 61.4 | 35.1 | 32.9 | 33.4 | 30.1 | 29.6 | 31.8 | 36.2 | 37.3 | 36.7 |
| 70° | 40.0 | 35.6 | 26.9 | 26.9 | 25.8 | 21.4 | 21.4 | 23.6 | 23.6 | 21.9 | 21.4 |
| 72.5° | 20.8 | 19.7 | 17.5 | 19.7 | 16.4 | 13.2 | 13.2 | 14.3 | 13.2 | 11.0 | 11.0 |
| 75° | 8.2 | 8.2 | 7.7 | 9.9 | 7.1 | 6.0 | 5.5 | 6.6 | 4.9 | 3.8 | 3.8 |
| 77.5° | 2.2 | 2.2 | 2.2 | 2.7 | 1.6 | 1.6 | 1.1 | 1.1 | 0.5 | 0.0 | 0.0 |
| 80° | 0.0 | 0.5 | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 82.5° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 85° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 87.5° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

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

Report Prepared for

Cooper Lighting Solutions

Invue

Report Number: SP1-2407-157-9

Test Date: 10/03/2024

Luminaire Tested: EMM2-HTN-SA1A-827-U-5WQ

Data applicable to all product families utilizing light square engine

Report Generated By FNC07603 / LDUCLS01DT446
Version: v7.04

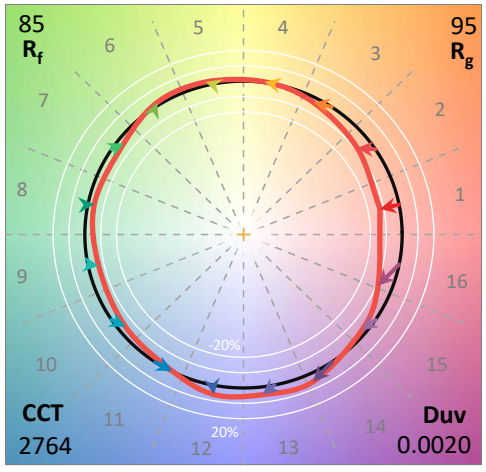
## Test Information

| | |
|---|---|
| Test Method: | LM-79-2019 |
| Report Number: | SP1-2407-157-9 |
| Test Lab: | COOPER LIGHTING SOLUTIONS |
| Photometer: | SP1 - 76IN SPHERE |
| Measurement Geometry: | 4π |
| Issue Date: | 10/03/2024 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS |
| Product Line: | Invue |
| Catalog Number: | **EMM2-HTN-SA1A-827-U-5WQ** |
| Description: | Epic Modern Light Square 40W 5WQ Optic |

## Spectral Parameters

| | |
|---|---|
| CCT (K): | 2764 |
| CIE u': | 0.2591 |
| CIE v': | 0.5290 |
| Duv: | 0.0020 |
| CIE x: | 0.4581 |
| CIE y: | 0.4156 |
| CIE z: | 0.1263 |
| Peak Wavelength (nm): | 603 |
| Dominant Wavelength (nm): | 583 |
| Purity: | 62.2537 |
| Rf: | 84.7 |
| Rg: | 94.6 |

| | |
|---|---|
| CRI (Ra): | 80.9 |
| R1: | 78.8 |
| R2: | 89.9 |
| R3: | 96.2 |
| R4: | 79.1 |
| R5: | 79.1 |
| R6: | 88.8 |
| R7: | 81.3 |
| R8: | 54.3 |
| R9: | -1.5 |
| R10: | 77.9 |
| R11: | 78.9 |
| R12: | 71.6 |
| R13: | 81.2 |
| R14: | 98.5 |
| R15: | 69.9 |




## Test Conditions

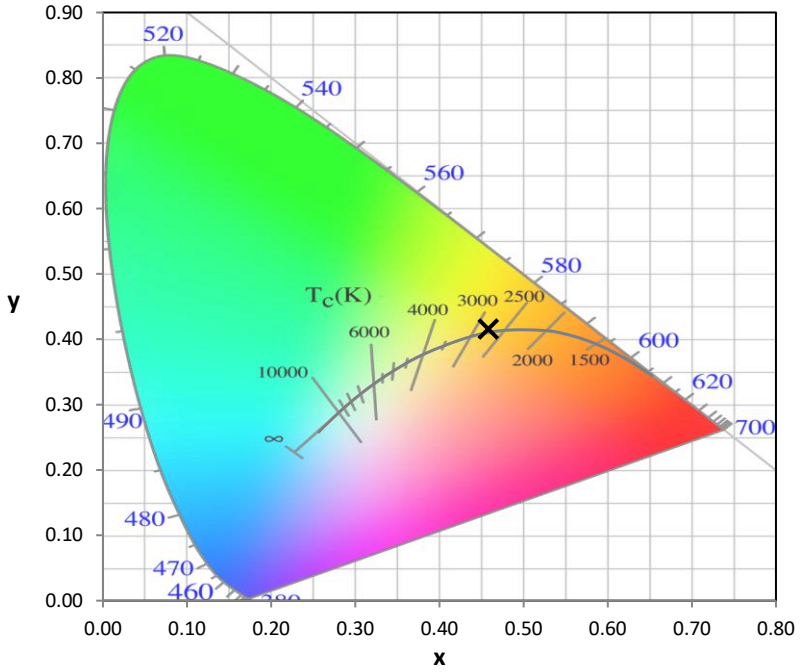
| | |
|---|---|
| Stabilization Time: | 81M |
| Operation Time: | 2H 21M |
| Sphere Temperature (°C): | 25.2 |

REPORT NUMBER: SP1-2407-157-9

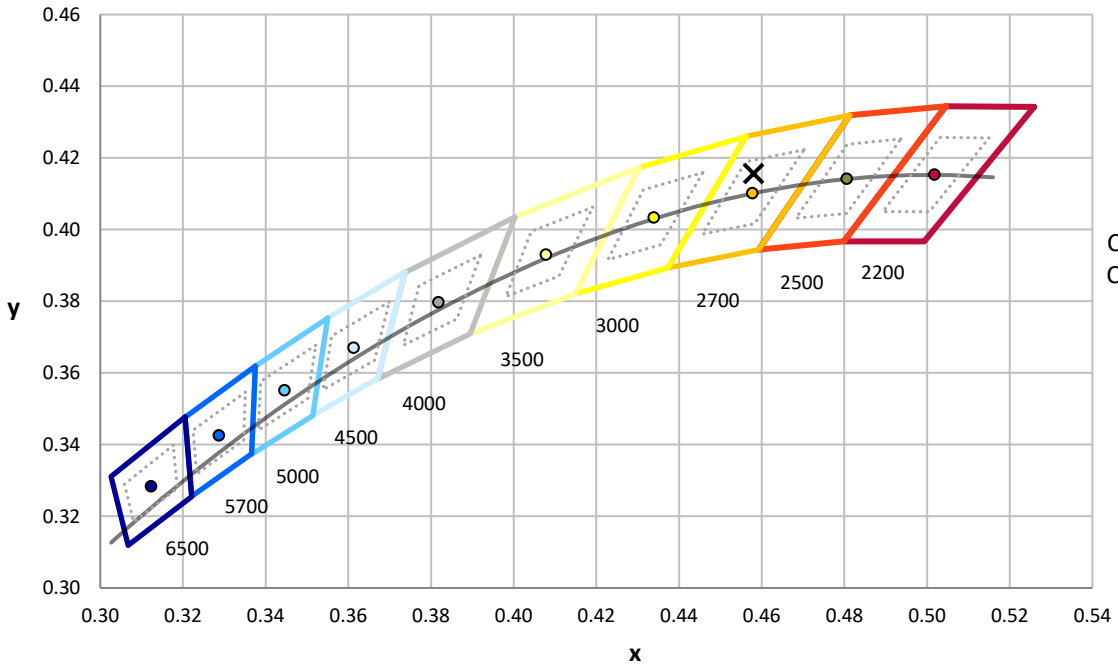
| Measurement and Test Equipment | | | |
|---|---|---|---|
| Instrument | Identification Number | Calibration Date | Calibration Due Date |
| Photometer | IN0058 | 6/18/2024 | 12/18/2024 |
| Power Meter | INXT2011004 | 2/8/2024 | 2/8/2025 |
| AC Power Source | IN0063 | 10/24/2023 | 10/24/2024 |
| DC 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: SP1-2407-157-9

## CIE 1931 Chromaticity Diagram




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




CCT = 2764K
CIE x = 0.4581
CIE y = 0.4156
Duv = 0.0020

Point lies inside the ANSI 2700K 4-step quadrangle

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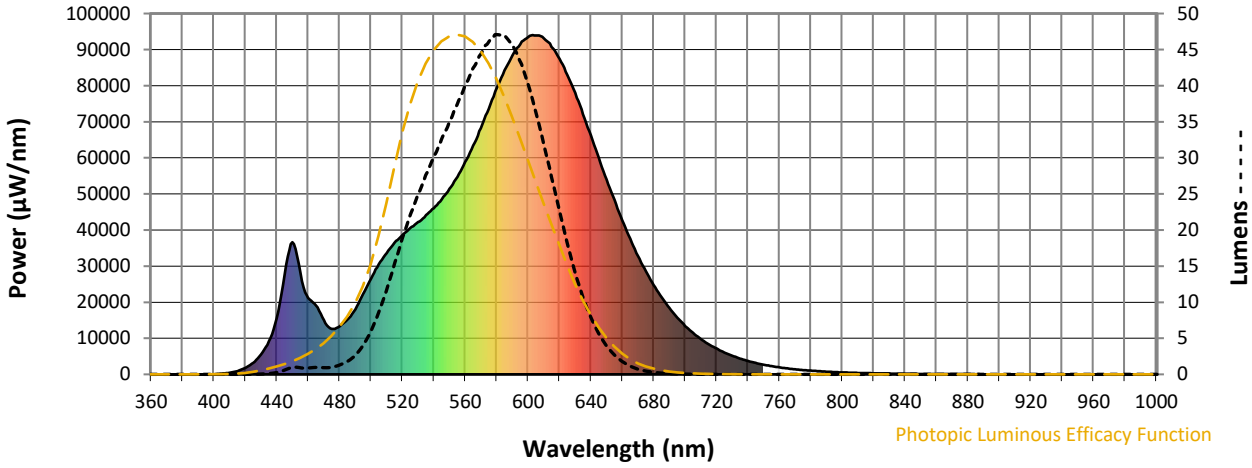
## Photopic Flux vs. Wavelength




**Photopic Lumens: 4337.9**

| λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) | λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) | λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) | λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) | λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 360 | 0 | 0.0 | 490 | 18018 | 2.6 | 620 | 87426 | 22.8 | 750 | 2680 | 0.0 | 880 | 58 | 0.0 |
| 365 | 0 | 0.0 | 495 | 22295 | 3.9 | 625 | 83013 | 18.2 | 755 | 2287 | 0.0 | 885 | 46 | 0.0 |
| 370 | 0 | 0.0 | 500 | 26478 | 5.8 | 630 | 78077 | 14.1 | 760 | 1944 | 0.0 | 890 | 45 | 0.0 |
| 375 | 0 | 0.0 | 505 | 30524 | 8.5 | 635 | 72080 | 10.7 | 765 | 1653 | 0.0 | 895 | 41 | 0.0 |
| 380 | 0 | 0.0 | 510 | 33611 | 11.5 | 640 | 66249 | 7.9 | 770 | 1413 | 0.0 | 900 | 38 | 0.0 |
| 385 | 0 | 0.0 | 515 | 36490 | 15.2 | 645 | 59973 | 5.7 | 775 | 1198 | 0.0 | 905 | 33 | 0.0 |
| 390 | 0 | 0.0 | 520 | 38610 | 18.7 | 650 | 53972 | 3.9 | 780 | 1025 | 0.0 | 910 | 30 | 0.0 |
| 395 | 0 | 0.0 | 525 | 40511 | 21.9 | 655 | 48369 | 2.7 | 785 | 874 | 0.0 | 915 | 23 | 0.0 |
| 400 | 48 | 0.0 | 530 | 42223 | 24.9 | 660 | 42641 | 1.8 | 790 | 747 | 0.0 | 920 | 24 | 0.0 |
| 405 | 201 | 0.0 | 535 | 44137 | 27.6 | 665 | 37602 | 1.1 | 795 | 639 | 0.0 | 925 | 22 | 0.0 |
| 410 | 457 | 0.0 | 540 | 46032 | 30.0 | 670 | 32798 | 0.7 | 800 | 547 | 0.0 | 930 | 22 | 0.0 |
| 415 | 925 | 0.0 | 545 | 48553 | 32.5 | 675 | 28558 | 0.5 | 805 | 473 | 0.0 | 935 | 17 | 0.0 |
| 420 | 1816 | 0.0 | 550 | 51408 | 34.9 | 680 | 24782 | 0.3 | 810 | 401 | 0.0 | 940 | 13 | 0.0 |
| 425 | 3217 | 0.0 | 555 | 54711 | 37.4 | 685 | 21386 | 0.2 | 815 | 351 | 0.0 | 945 | 6 | 0.0 |
| 430 | 5520 | 0.0 | 560 | 58847 | 40.0 | 690 | 18413 | 0.1 | 820 | 307 | 0.0 | 950 | 10 | 0.0 |
| 435 | 9225 | 0.1 | 565 | 63386 | 42.4 | 695 | 15721 | 0.1 | 825 | 261 | 0.0 | 955 | 11 | 0.0 |
| 440 | 15522 | 0.2 | 570 | 68196 | 44.3 | 700 | 13432 | 0.0 | 830 | 228 | 0.0 | 960 | 8 | 0.0 |
| 445 | 27642 | 0.6 | 575 | 73613 | 46.0 | 705 | 11513 | 0.0 | 835 | 193 | 0.0 | 965 | 12 | 0.0 |
| 450 | 36602 | 0.9 | 580 | 79207 | 47.1 | 710 | 9780 | 0.0 | 840 | 174 | 0.0 | 970 | 3 | 0.0 |
| 455 | 28292 | 0.9 | 585 | 84248 | 47.0 | 715 | 8356 | 0.0 | 845 | 151 | 0.0 | 975 | 8 | 0.0 |
| 460 | 21166 | 0.9 | 590 | 88397 | 45.7 | 720 | 7161 | 0.0 | 850 | 123 | 0.0 | 980 | 2 | 0.0 |
| 465 | 19092 | 1.0 | 595 | 91428 | 43.4 | 725 | 6067 | 0.0 | 855 | 106 | 0.0 | 985 | 13 | 0.0 |
| 470 | 14951 | 0.9 | 600 | 93452 | 40.3 | 730 | 5164 | 0.0 | 860 | 95 | 0.0 | 990 | 16 | 0.0 |
| 475 | 12606 | 1.0 | 605 | 93959 | 36.4 | 735 | 4393 | 0.0 | 865 | 82 | 0.0 | 995 | 20 | 0.0 |
| 480 | 13323 | 1.3 | 610 | 93079 | 32.0 | 740 | 3694 | 0.0 | 870 | 77 | 0.0 | 1000 | 0 | 0.0 |
| 485 | 15164 | 1.8 | 615 | 90707 | 27.3 | 745 | 3157 | 0.0 | 875 | 65 | 0.0 | | | |

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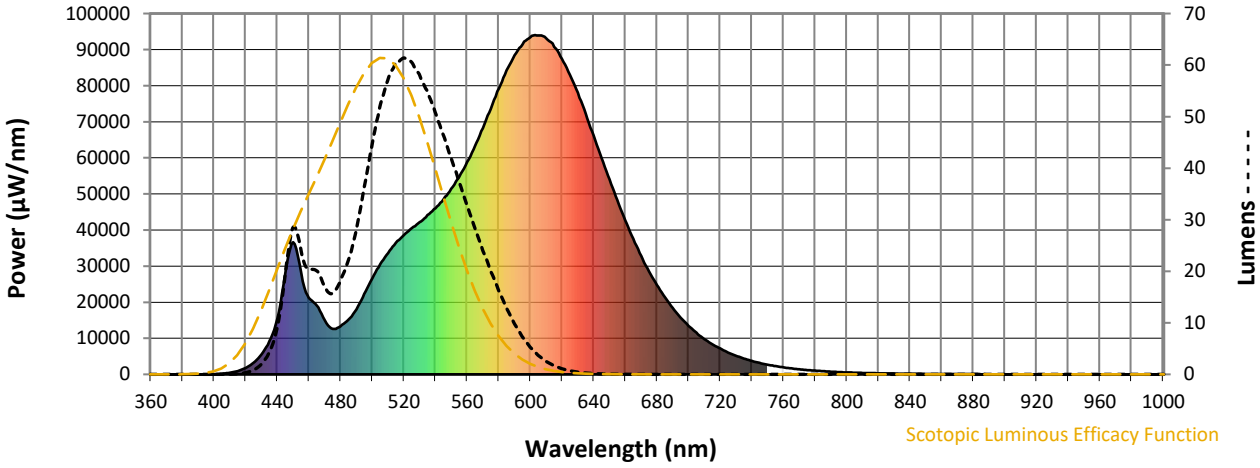
## Scotopic Flux vs. Wavelength




**Scotopic Lumens: 5286.7** **S/P: 1.22**

| λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) | λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) | λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) | λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) | λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 360 | 0 | 0.0 | 490 | 18018 | 75.9 | 620 | 87426 | 0.4 | 750 | 2680 | 0.0 | 880 | 58 | 0.0 |
| 365 | 0 | 0.0 | 495 | 22295 | 93.2 | 625 | 83013 | 0.2 | 755 | 2287 | 0.0 | 885 | 46 | 0.0 |
| 370 | 0 | 0.0 | 500 | 26478 | 107.8 | 630 | 78077 | 0.1 | 760 | 1944 | 0.0 | 890 | 45 | 0.0 |
| 375 | 0 | 0.0 | 505 | 30524 | 118.7 | 635 | 72080 | 0.1 | 765 | 1653 | 0.0 | 895 | 41 | 0.0 |
| 380 | 0 | 0.0 | 510 | 33611 | 122.2 | 640 | 66249 | 0.1 | 770 | 1413 | 0.0 | 900 | 38 | 0.0 |
| 385 | 0 | 0.0 | 515 | 36490 | 120.8 | 645 | 59973 | 0.0 | 775 | 1198 | 0.0 | 905 | 33 | 0.0 |
| 390 | 0 | 0.0 | 520 | 38610 | 113.9 | 650 | 53972 | 0.0 | 780 | 1025 | 0.0 | 910 | 30 | 0.0 |
| 395 | 0 | 0.0 | 525 | 40511 | 104.1 | 655 | 48369 | 0.0 | 785 | 874 | 0.0 | 915 | 23 | 0.0 |
| 400 | 48 | 0.0 | 530 | 42223 | 92.4 | 660 | 42641 | 0.0 | 790 | 747 | 0.0 | 920 | 24 | 0.0 |
| 405 | 201 | 0.0 | 535 | 44137 | 80.5 | 665 | 37602 | 0.0 | 795 | 639 | 0.0 | 925 | 22 | 0.0 |
| 410 | 457 | 0.1 | 540 | 46032 | 68.2 | 670 | 32798 | 0.0 | 800 | 547 | 0.0 | 930 | 22 | 0.0 |
| 415 | 925 | 0.3 | 545 | 48553 | 57.1 | 675 | 28558 | 0.0 | 805 | 473 | 0.0 | 935 | 17 | 0.0 |
| 420 | 1816 | 1.1 | 550 | 51408 | 46.7 | 680 | 24782 | 0.0 | 810 | 401 | 0.0 | 940 | 13 | 0.0 |
| 425 | 3217 | 2.5 | 555 | 54711 | 37.4 | 685 | 21386 | 0.0 | 815 | 351 | 0.0 | 945 | 6 | 0.0 |
| 430 | 5520 | 5.9 | 560 | 58847 | 29.4 | 690 | 18413 | 0.0 | 820 | 307 | 0.0 | 950 | 10 | 0.0 |
| 435 | 9225 | 12.5 | 565 | 63386 | 22.5 | 695 | 15721 | 0.0 | 825 | 261 | 0.0 | 955 | 11 | 0.0 |
| 440 | 15522 | 26.3 | 570 | 68196 | 16.9 | 700 | 13432 | 0.0 | 830 | 228 | 0.0 | 960 | 8 | 0.0 |
| 445 | 27642 | 55.2 | 575 | 73613 | 12.4 | 705 | 11513 | 0.0 | 835 | 193 | 0.0 | 965 | 12 | 0.0 |
| 450 | 36602 | 85.4 | 580 | 79207 | 9.0 | 710 | 9780 | 0.0 | 840 | 174 | 0.0 | 970 | 3 | 0.0 |
| 455 | 28292 | 75.1 | 585 | 84248 | 6.3 | 715 | 8356 | 0.0 | 845 | 151 | 0.0 | 975 | 8 | 0.0 |
| 460 | 21166 | 63.2 | 590 | 88397 | 4.4 | 720 | 7161 | 0.0 | 850 | 123 | 0.0 | 980 | 2 | 0.0 |
| 465 | 19092 | 63.2 | 595 | 91428 | 3.0 | 725 | 6067 | 0.0 | 855 | 106 | 0.0 | 985 | 13 | 0.0 |
| 470 | 14951 | 54.2 | 600 | 93452 | 2.0 | 730 | 5164 | 0.0 | 860 | 95 | 0.0 | 990 | 16 | 0.0 |
| 475 | 12606 | 48.8 | 605 | 93959 | 1.3 | 735 | 4393 | 0.0 | 865 | 82 | 0.0 | 995 | 20 | 0.0 |
| 480 | 13323 | 54.2 | 610 | 93079 | 0.9 | 740 | 3694 | 0.0 | 870 | 77 | 0.0 | 1000 | 0 | 0.0 |
| 485 | 15164 | 63.3 | 615 | 90707 | 0.5 | 745 | 3157 | 0.0 | 875 | 65 | 0.0 | | | |

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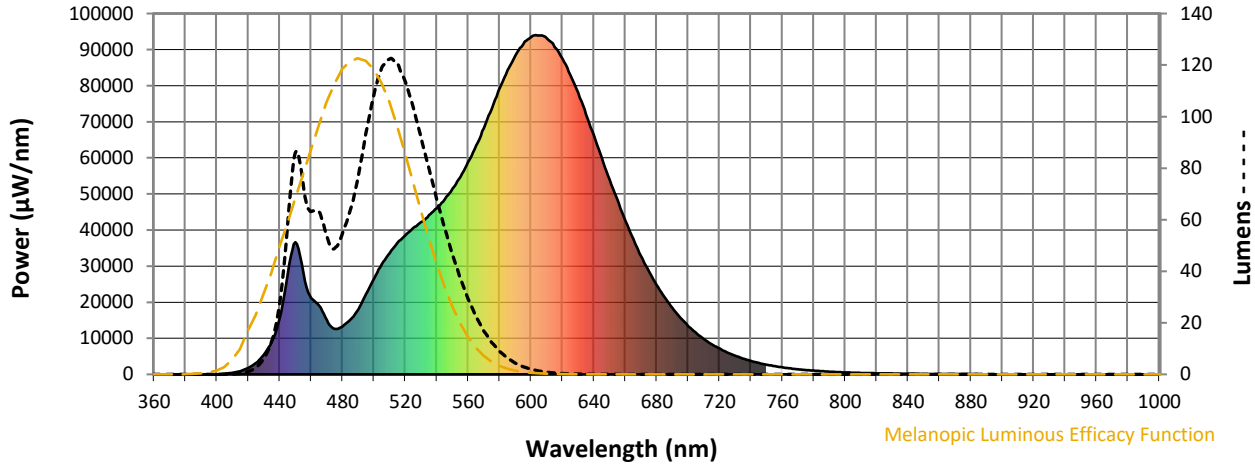
## Melanopic Flux vs. Wavelength




**Melanopic Lumens: 9797** **M/P: 2.26**

| λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) | λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) | λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) | λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) | λ (nm) | Power (µW/nm) | Lumens (ϕ/nm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 360 | 0 | 0.0 | 490 | 18018 | 27.7 | 620 | 87426 | 1.1 | 750 | 2680 | 0.0 | 880 | 58 | 0.0 |
| 365 | 0 | 0.0 | 495 | 22295 | 36.0 | 625 | 83013 | 0.7 | 755 | 2287 | 0.0 | 885 | 46 | 0.0 |
| 370 | 0 | 0.0 | 500 | 26478 | 44.2 | 630 | 78077 | 0.4 | 760 | 1944 | 0.0 | 890 | 45 | 0.0 |
| 375 | 0 | 0.0 | 505 | 30524 | 51.8 | 635 | 72080 | 0.3 | 765 | 1653 | 0.0 | 895 | 41 | 0.0 |
| 380 | 0 | 0.0 | 510 | 33611 | 57.0 | 640 | 66249 | 0.2 | 770 | 1413 | 0.0 | 900 | 38 | 0.0 |
| 385 | 0 | 0.0 | 515 | 36490 | 60.5 | 645 | 59973 | 0.1 | 775 | 1198 | 0.0 | 905 | 33 | 0.0 |
| 390 | 0 | 0.0 | 520 | 38610 | 61.4 | 650 | 53972 | 0.1 | 780 | 1025 | 0.0 | 910 | 30 | 0.0 |
| 395 | 0 | 0.0 | 525 | 40511 | 60.6 | 655 | 48369 | 0.0 | 785 | 874 | 0.0 | 915 | 23 | 0.0 |
| 400 | 48 | 0.0 | 530 | 42223 | 58.2 | 660 | 42641 | 0.0 | 790 | 747 | 0.0 | 920 | 24 | 0.0 |
| 405 | 201 | 0.0 | 535 | 44137 | 55.0 | 665 | 37602 | 0.0 | 795 | 639 | 0.0 | 925 | 22 | 0.0 |
| 410 | 457 | 0.0 | 540 | 46032 | 50.9 | 670 | 32798 | 0.0 | 800 | 547 | 0.0 | 930 | 22 | 0.0 |
| 415 | 925 | 0.1 | 545 | 48553 | 46.6 | 675 | 28558 | 0.0 | 805 | 473 | 0.0 | 935 | 17 | 0.0 |
| 420 | 1816 | 0.3 | 550 | 51408 | 42.0 | 680 | 24782 | 0.0 | 810 | 401 | 0.0 | 940 | 13 | 0.0 |
| 425 | 3217 | 0.8 | 555 | 54711 | 37.4 | 685 | 21386 | 0.0 | 815 | 351 | 0.0 | 945 | 6 | 0.0 |
| 430 | 5520 | 1.9 | 560 | 58847 | 32.9 | 690 | 18413 | 0.0 | 820 | 307 | 0.0 | 950 | 10 | 0.0 |
| 435 | 9225 | 4.1 | 565 | 63386 | 28.4 | 695 | 15721 | 0.0 | 825 | 261 | 0.0 | 955 | 11 | 0.0 |
| 440 | 15522 | 8.7 | 570 | 68196 | 24.1 | 700 | 13432 | 0.0 | 830 | 228 | 0.0 | 960 | 8 | 0.0 |
| 445 | 27642 | 18.5 | 575 | 73613 | 20.0 | 705 | 11513 | 0.0 | 835 | 193 | 0.0 | 965 | 12 | 0.0 |
| 450 | 36602 | 28.3 | 580 | 79207 | 16.3 | 710 | 9780 | 0.0 | 840 | 174 | 0.0 | 970 | 3 | 0.0 |
| 455 | 28292 | 24.7 | 585 | 84248 | 12.9 | 715 | 8356 | 0.0 | 845 | 151 | 0.0 | 975 | 8 | 0.0 |
| 460 | 21166 | 20.4 | 590 | 88397 | 9.8 | 720 | 7161 | 0.0 | 850 | 123 | 0.0 | 980 | 2 | 0.0 |
| 465 | 19092 | 20.1 | 595 | 91428 | 7.3 | 725 | 6067 | 0.0 | 855 | 106 | 0.0 | 985 | 13 | 0.0 |
| 470 | 14951 | 17.2 | 600 | 93452 | 5.3 | 730 | 5164 | 0.0 | 860 | 95 | 0.0 | 990 | 16 | 0.0 |
| 475 | 12606 | 15.7 | 605 | 93959 | 3.7 | 735 | 4393 | 0.0 | 865 | 82 | 0.0 | 995 | 20 | 0.0 |
| 480 | 13323 | 18.0 | 610 | 93079 | 2.5 | 740 | 3694 | 0.0 | 870 | 77 | 0.0 | 1000 | 0 | 0.0 |
| 485 | 15164 | 21.9 | 615 | 90707 | 1.7 | 745 | 3157 | 0.0 | 875 | 65 | 0.0 | | | |

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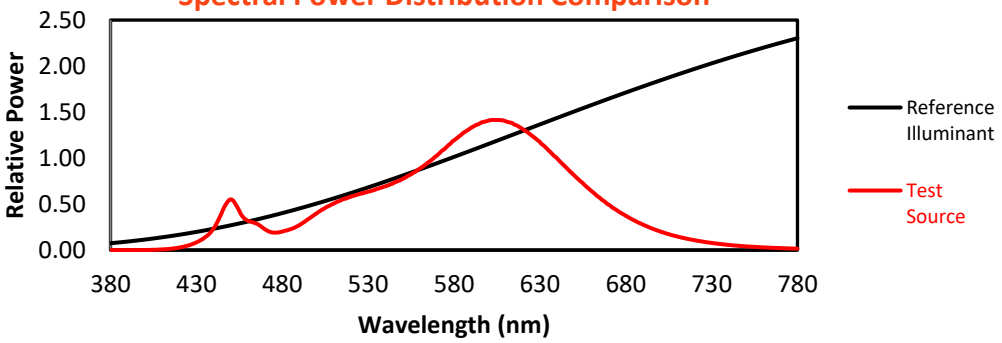
# TM-30-18

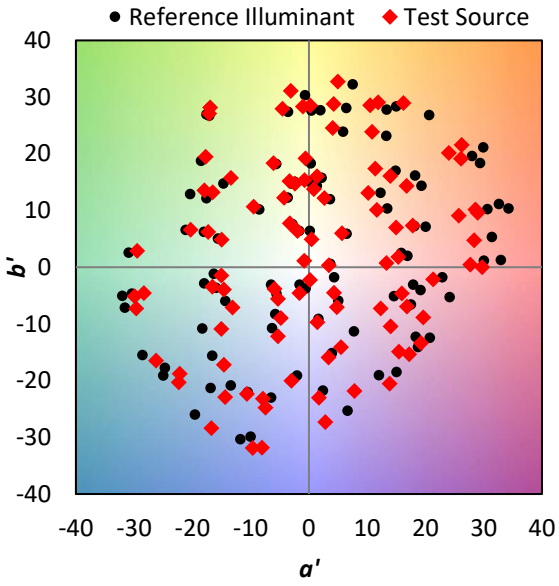
## Summary

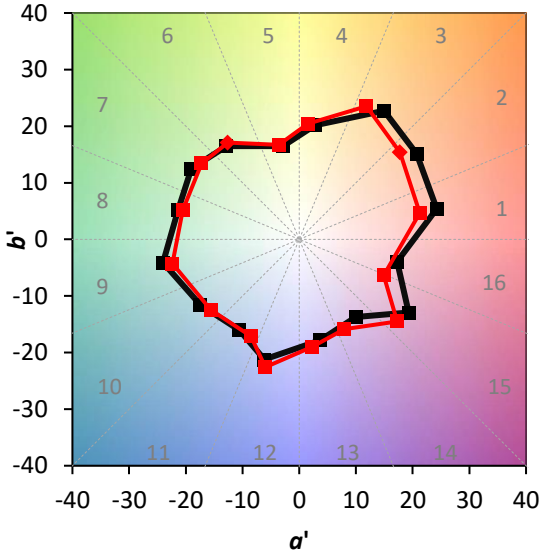
$R_f$ = 84.7
$R_g$ = 94.6
CIE $R_a$ = 80.9
$R_9$ = -1.5

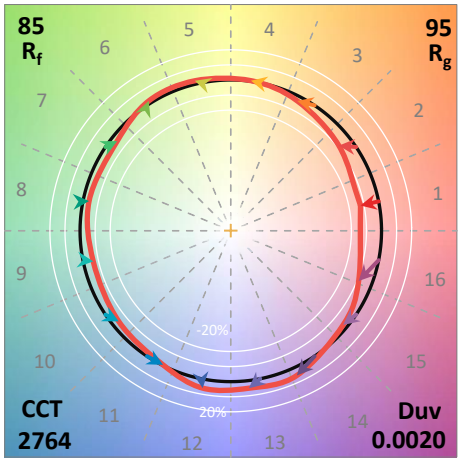
## Spectral Power Distribution Comparison

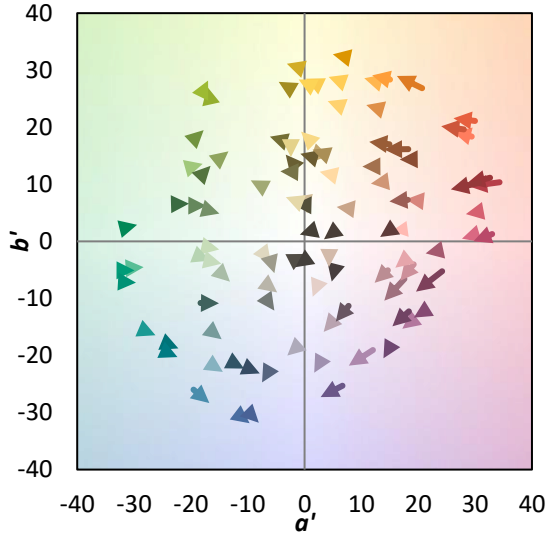



## Color Vector Graphics



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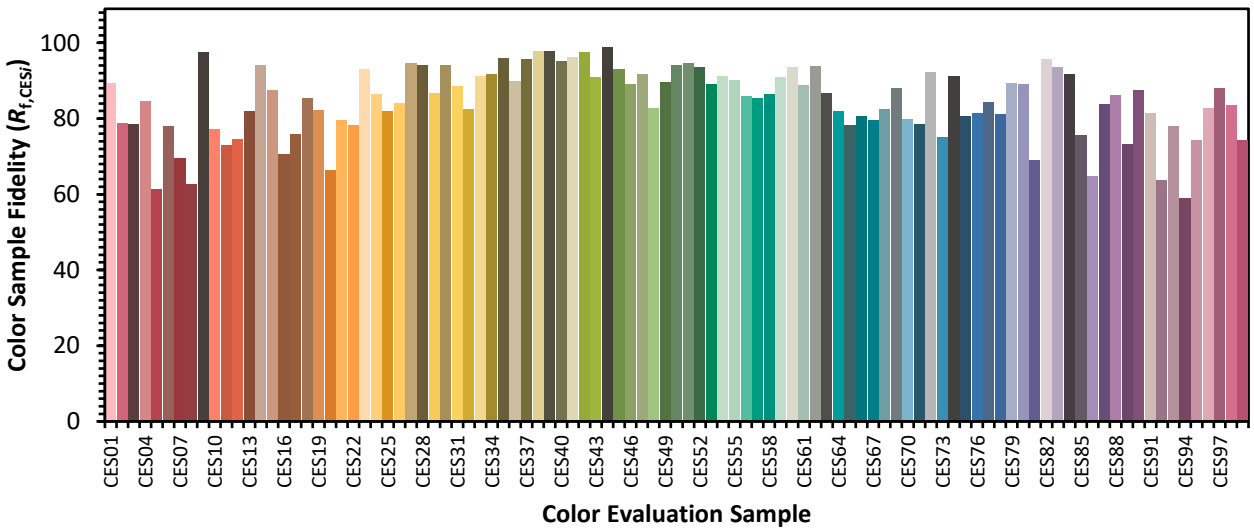
## TM-30-18

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

| | | | |
|---|---|---|---|
| CES01 = 86 | CES26 = 84 | CES51 = 95 | CES76 = 81 |
| CES02 = 63 | CES27 = 95 | CES52 = 94 | CES77 = 84 |
| CES03 = 31 | CES28 = 94 | CES53 = 89 | CES78 = 81 |
| CES04 = 71 | CES29 = 87 | CES54 = 91 | CES79 = 89 |
| CES05 = 50 | CES30 = 94 | CES55 = 90 | CES80 = 89 |
| CES06 = 52 | CES31 = 89 | CES56 = 86 | CES81 = 69 |
| CES07 = 43 | CES32 = 82 | CES57 = 85 | CES82 = 96 |
| CES08 = 41 | CES33 = 91 | CES58 = 86 | CES83 = 93 |
| CES09 = 29 | CES34 = 92 | CES59 = 91 | CES84 = 92 |
| CES10 = 77 | CES35 = 96 | CES60 = 94 | CES85 = 76 |
| CES11 = 60 | CES36 = 90 | CES61 = 89 | CES86 = 65 |
| CES12 = 66 | CES37 = 96 | CES62 = 94 | CES87 = 84 |
| CES13 = 44 | CES38 = 98 | CES63 = 87 | CES88 = 86 |
| CES14 = 74 | CES39 = 98 | CES64 = 82 | CES89 = 73 |
| CES15 = 72 | CES40 = 95 | CES65 = 78 | CES90 = 88 |
| CES16 = 48 | CES41 = 96 | CES66 = 81 | CES91 = 82 |
| CES17 = 50 | CES42 = 97 | CES67 = 80 | CES92 = 64 |
| CES18 = 57 | CES43 = 91 | CES68 = 83 | CES93 = 78 |
| CES19 = 73 | CES44 = 99 | CES69 = 88 | CES94 = 59 |
| CES20 = 67 | CES45 = 93 | CES70 = 80 | CES95 = 74 |
| CES21 = 87 | CES46 = 89 | CES71 = 79 | CES96 = 83 |
| CES22 = 79 | CES47 = 92 | CES72 = 92 | CES97 = 88 |
| CES23 = 92 | CES48 = 83 | CES73 = 75 | CES98 = 83 |
| CES24 = 91 | CES49 = 90 | CES74 = 91 | CES99 = 74 |
| CES25 = 72 | CES50 = 94 | CES75 = 81 | |



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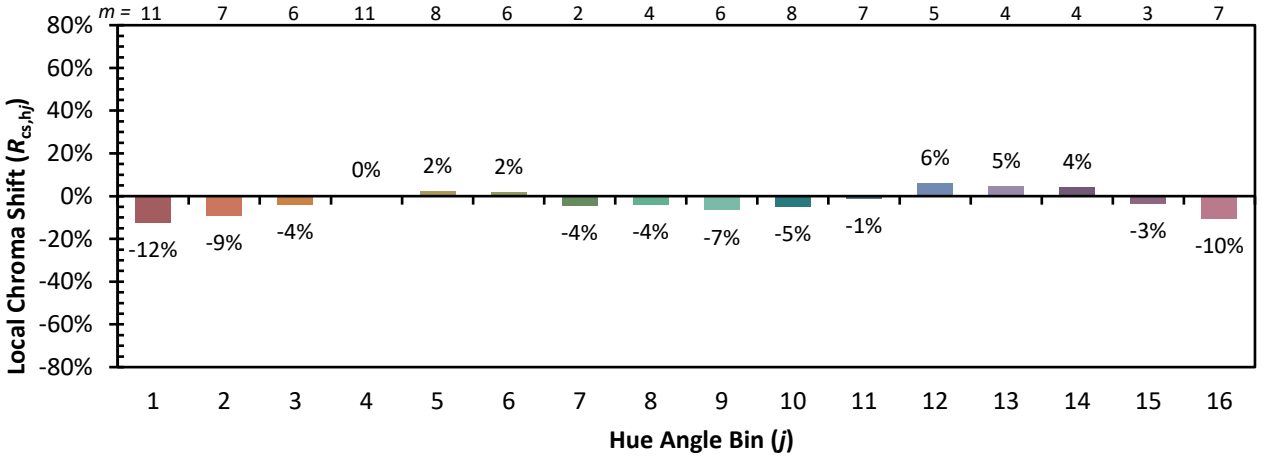
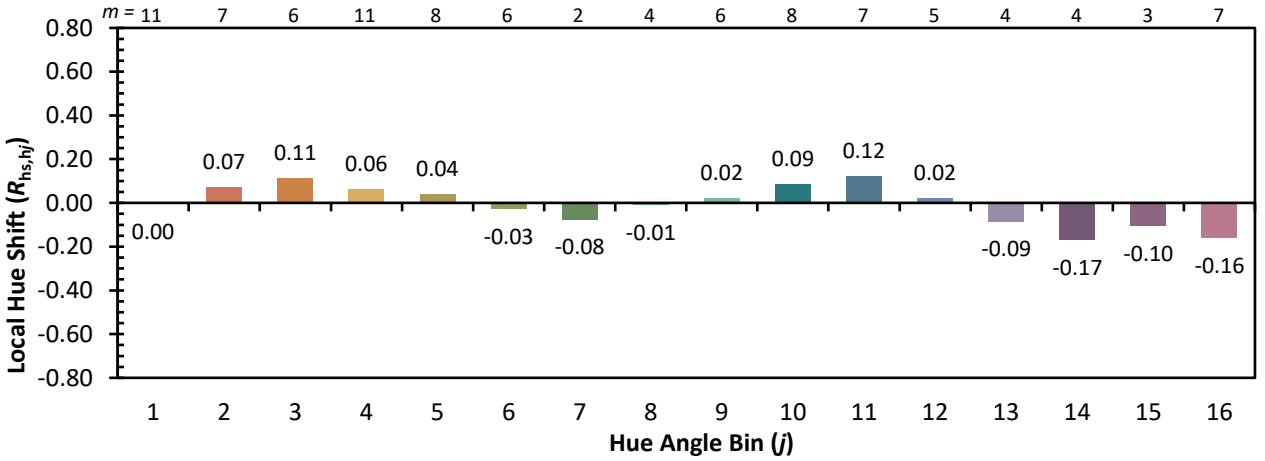
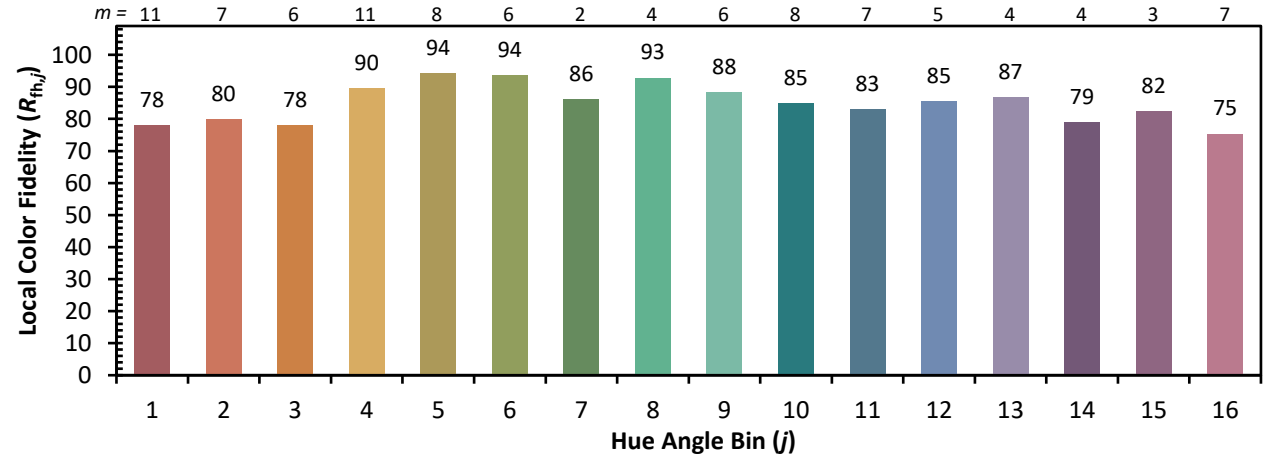
**TM-30-18**

## Color Rendition by Hue-Angle Bin



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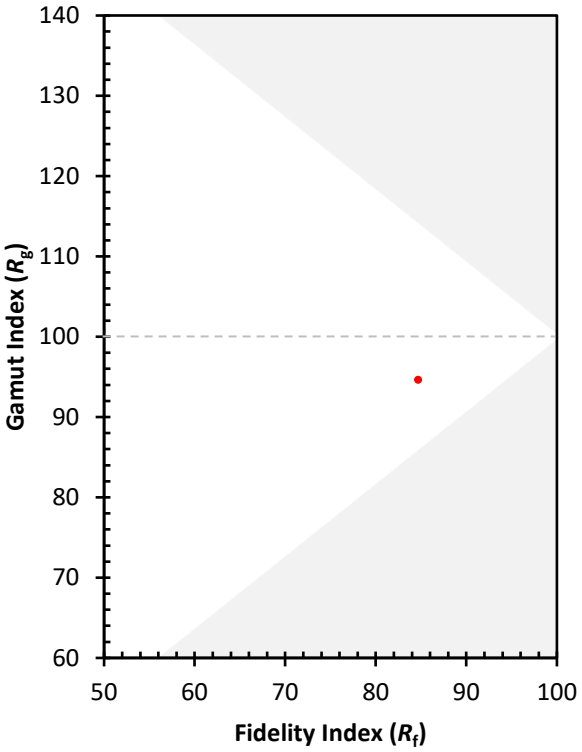
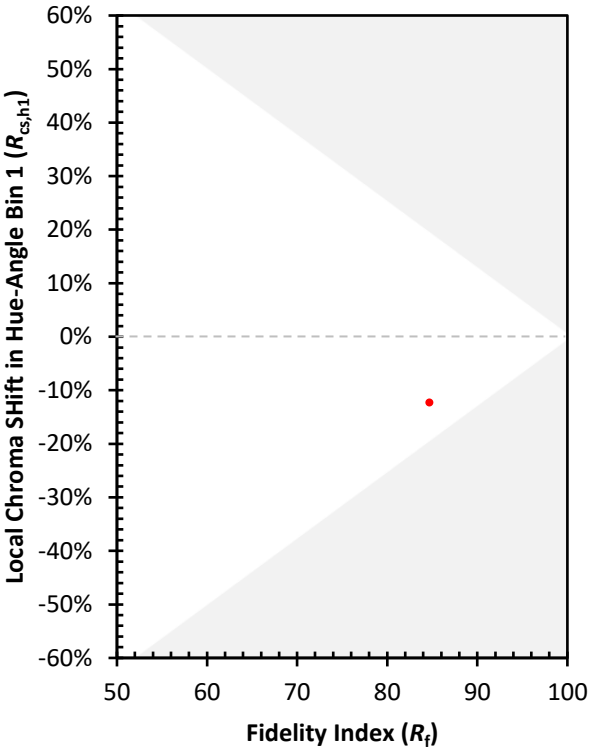
# TM-30-18

## Measure Comparisons




(END OF REPORT)