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: McGRAW-EDISON

Report Number: P821323

Luminaire Tested: **TT-D5-740-24VDC-CQ-UPL**

Issue Date: 7/23/2020

Report Generated By 670245763

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: | P821323 |
| | REPORT IS FROM IESNA LM-79-08 TEST DATA - UPLIGHT (G2-2002-677-1) AND |
| Test Lab: | INNOVATION CENTER |
| Issue Date: | 7/23/2020 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS (FORMERLY EATON) |
| Product Line: | McGRAW-EDISON |
| Catalog Number: | TT-D5-740-24VDC-CQ-UPL |
| Description: | TOPTIER LED PARKING GARAGE LUMINAIRE WITH UPLIGHT |
| | 4000K, 70 CRI LEDS AND CONCENTRATED DISTRIBUTION |
| Light Source: | - |
| Ballast/Driver: | ELECTRONIC DRIVER |

**Summary**

| | |
|---|---|
| Lumens per Lamp: | N/A |
| Luminaire Lumens: | 10304.7 lumens |
| Efficiency: | N/A |
| Efficacy: | 141.2 lumens/watt |
| Luminous Opening: | Vertical Cylinder (Dia: 1.12' x H: 0.1') |
| IES Classification: | Type V - Short |
| BUG Rating: | B3 - U4 - G1 |

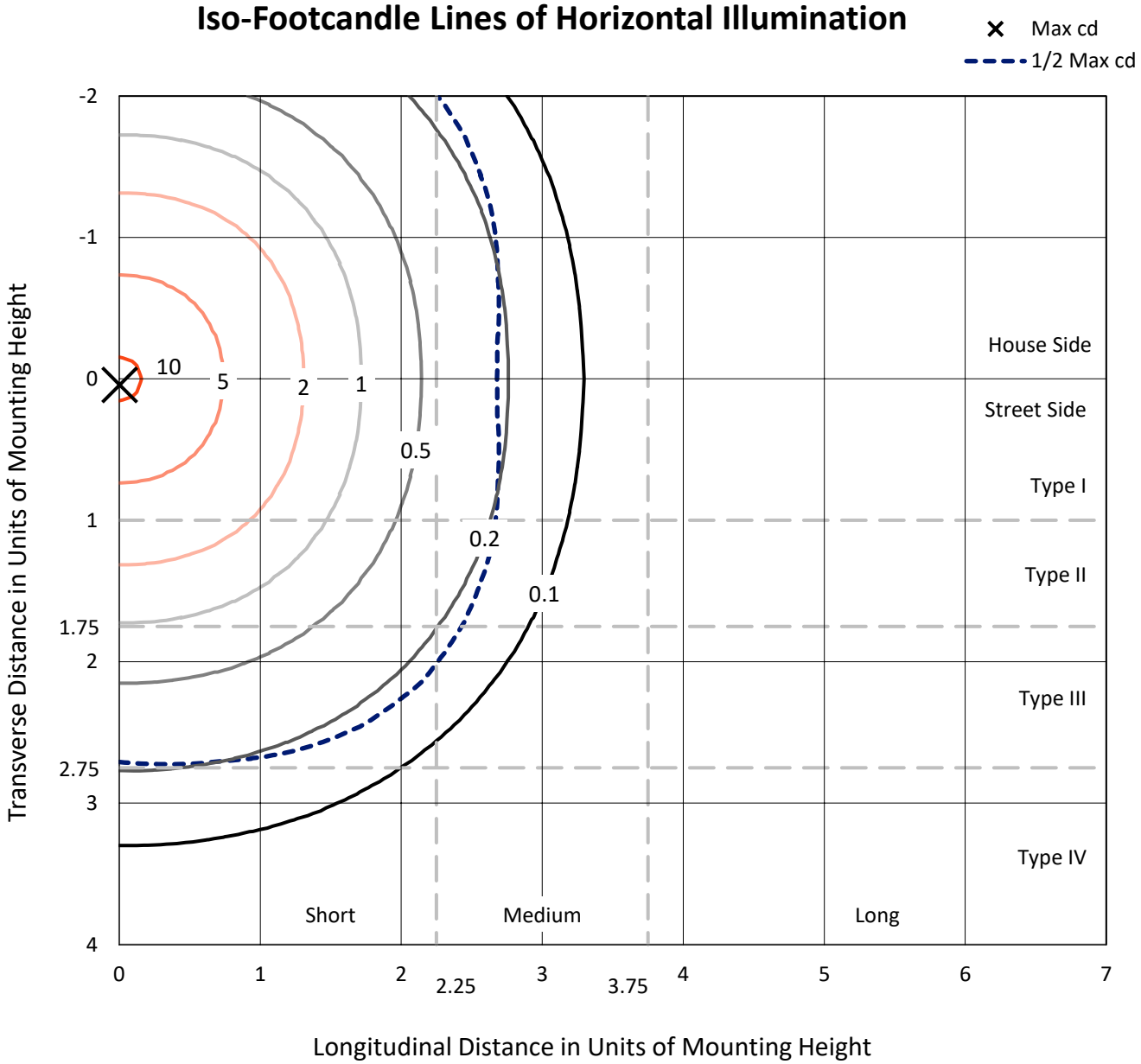
| | |
|---|---|
| Input Watts (W): | 73 |
| Input Voltage (V): | NR |
| Input Current (Ain): | NR |
| Voltage Rise (V): | NR |
| Power Factor: | NR |
| Total Harmonic Distortion (THDi): | NR |
| Frequency (hertz): | 60 |
| Stabilization Time: | NR |
| Operation Time: | NR |
| Ambient Temperature (°C): | NR |
| Test Distance: | 25 FT |

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Scaled Data Report

REPORT NUMBER: P821323
CATALOG NUMBER: TT-D5-740-24VDC-CQ-UPL

## Iso-Footcandle Lines of Horizontal Illumination



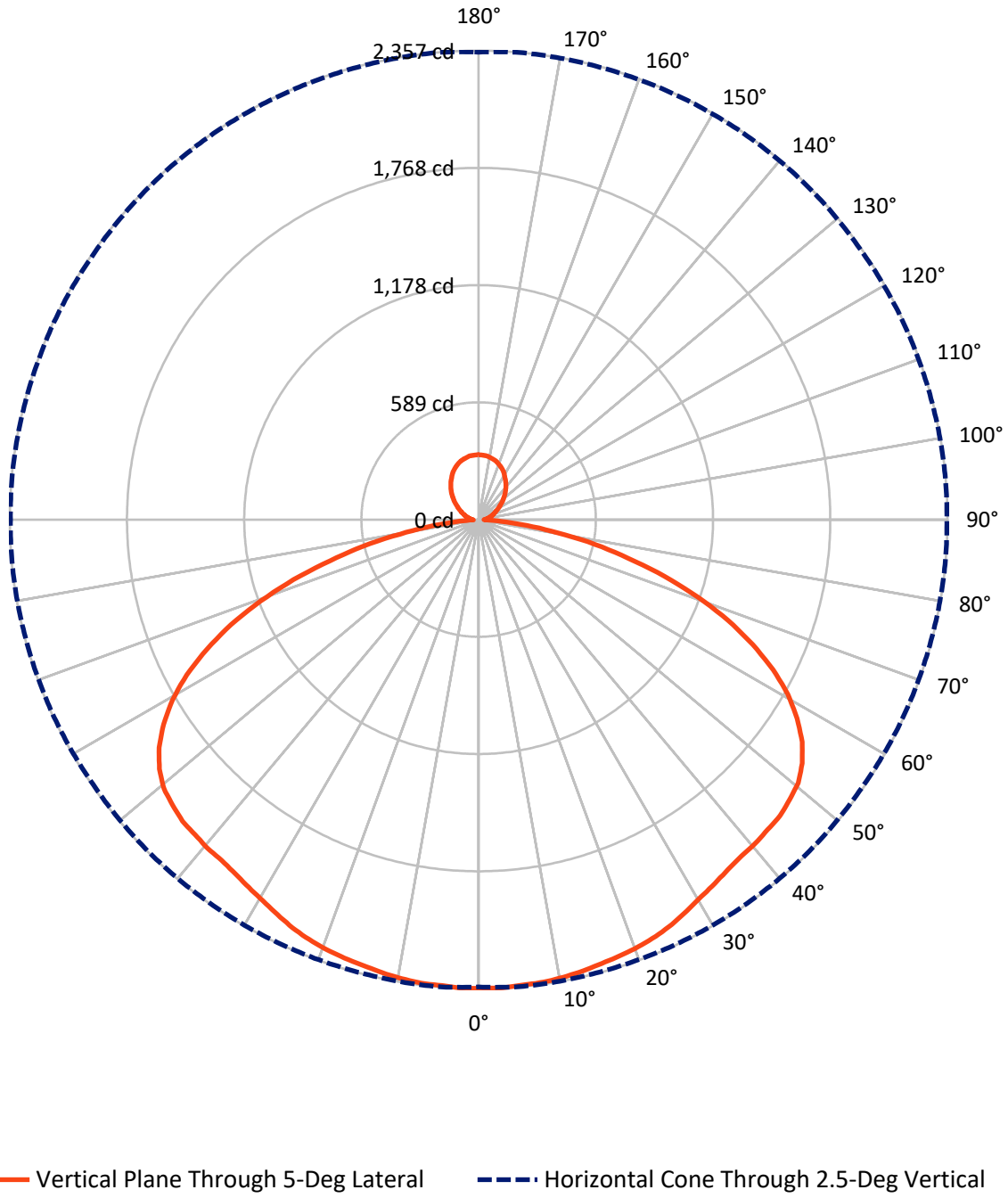

Based on 15 foot mounting height. Maximum calculated value = 10.5 fc
Type V - Short - N/A

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Scaled Data Report

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## Luminous Intensity Polar Plot



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Scaled Data Report

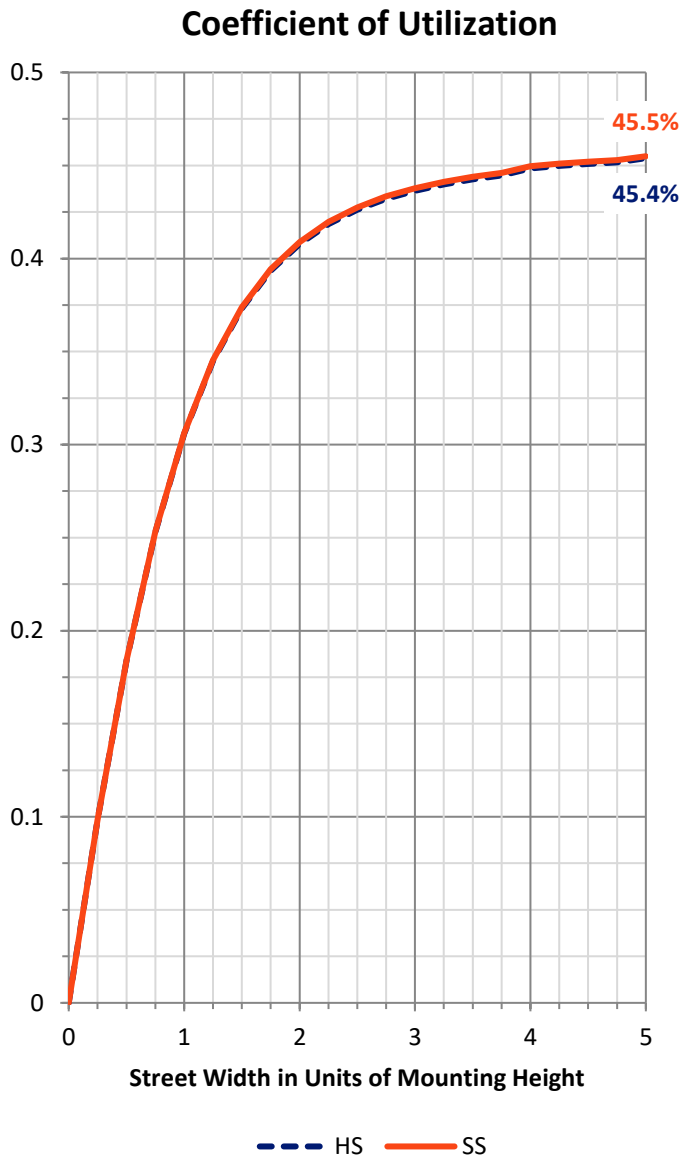
REPORT NUMBER: P821323
CATALOG NUMBER: TT-D5-740-24VDC-CQ-UPL

**FLUX DISTRIBUTION:**

| | | Downward | Upward | Total |
|---|---|---|---|---|
| **House Side** | Lumens | 4709.6 | 442.7 | 5152.4 |
| | % Fixture | 45.7 | 4.3 | 50.0 |
| **Street Side** | Lumens | 4709.6 | 442.7 | 5152.4 |
| | % Fixture | 45.7 | 4.3 | 50.0 |
| **Total** | Lumens | 9419.3 | 885.5 | 10304.7 |
| | % Fixture | 91.4 | 8.6 | 100.0 |

**ZONAL LUMENS:**

| Zone | Lumens | % Fixture |
|---|---|---|
| 0°-10° | 224.0 | 2.2 |
| 10°-20° | 656.1 | 6.4 |
| 20°-30° | 1043.3 | 10.1 |
| 30°-40° | 1372.5 | 13.3 |
| 40°-50° | 1679.8 | 16.3 |
| 50°-60° | 1819.5 | 17.7 |
| 60°-70° | 1565.3 | 15.2 |
| 70°-80° | 880.0 | 8.5 |
| 80°-90° | 178.7 | 1.7 |
| 90°-100° | 45.4 | 0.4 |
| 100°-110° | 70.3 | 0.7 |
| 110°-120° | 97.7 | 0.9 |
| 120°-130° | 126.6 | 1.2 |
| 130°-140° | 147.6 | 1.4 |
| 140°-150° | 149.5 | 1.5 |
| 150°-160° | 129.8 | 1.3 |
| 160°-170° | 87.7 | 0.9 |
| 170°-180° | 30.8 | 0.3 |
| 0°-90° | 9419.3 | 91.4 |
| 0°-180° | 10304.7 | 100.0 |



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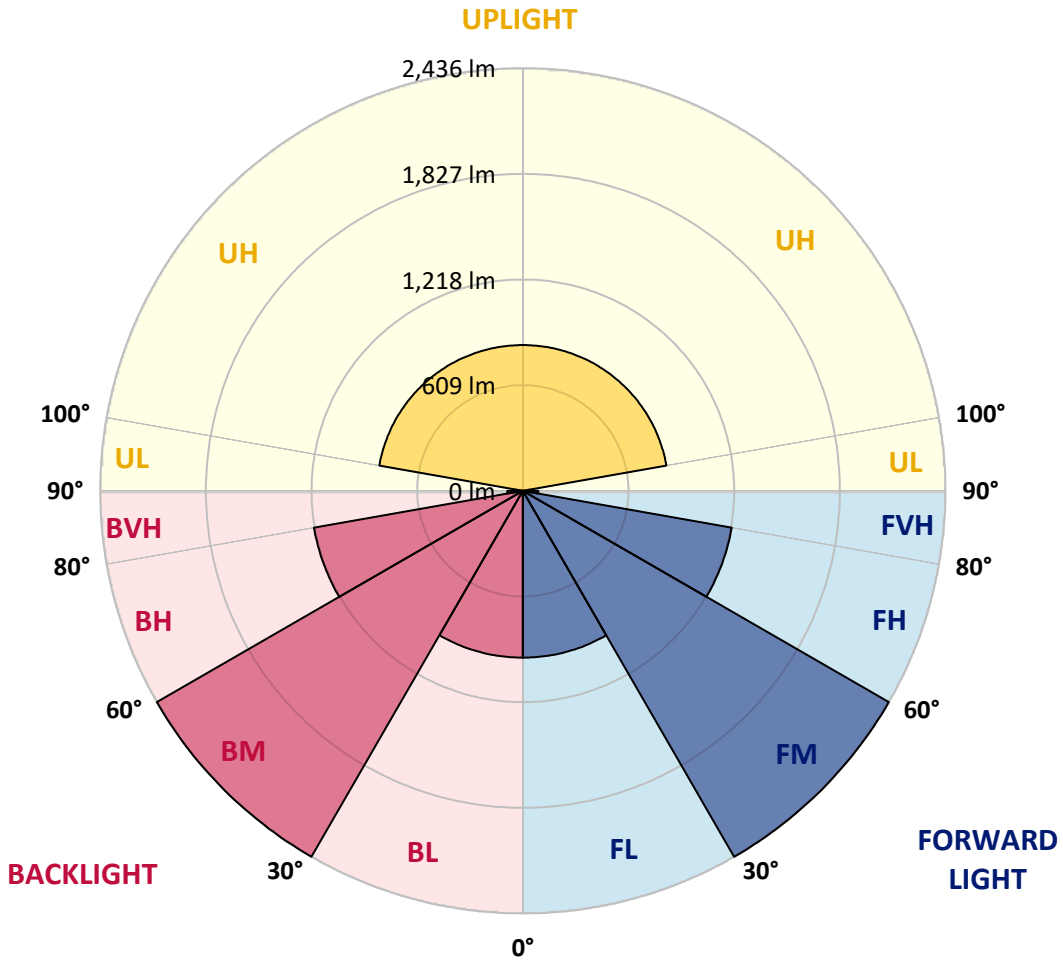
Scaled Data Report

REPORT NUMBER: P821323
CATALOG NUMBER: TT-D5-740-24VDC-CQ-UPL

## LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:

| Zone | | Lumens | % Fixture | Zone Rating/Lumen Limit B | U | G |
|---|---|---|---|---|---|---|
| FL | (0°-30°) | 961.7 | 9.3 | | | |
| FM | (30°-60°) | 2435.9 | 23.6 | | | |
| FH | (60°-80°) | 1222.7 | 11.9 | | | G1/1800 |
| FVH | (80°-90°) | 89.4 | 0.9 | | | G1/100 |
| BL | (0°-30°) | 961.7 | 9.3 | B2/1000 | | |
| BM | (30°-60°) | 2435.9 | 23.6 | B2/2500 | | |
| BH | (60°-80°) | 1222.7 | 11.9 | B3/2500 | | G1/1800 |
| BVH | (80°-90°) | 89.4 | 0.9 | | | G1/100 |
| UL | (90°-100°) | 45.4 | 0.4 | | U2/50 | |
| UH | (100°-180°) | 840.1 | 8.2 | | U4/1000 | |

**BUG Rating: B3-U4-G1**
Type V Short



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Scaled Data Report

REPORT NUMBER: P821323
CATALOG NUMBER: TT-D5-740-24VDC-CQ-UPL

**CANDELA DISTRIBUTION (FULL):**

| | 0° | 5° | 15° | 25° | 35° | 45° | 55° | 65° | 75° | 85° | 90° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 2355.4 | 2355.4 | 2355.4 | 2355.4 | 2355.4 | 2355.4 | 2355.4 | 2355.4 | 2355.4 | 2355.4 | 2355.4 |
| 2.5° | 2349.4 | 2356.9 | 2353.9 | 2353.9 | 2353.9 | 2353.9 | 2350.9 | 2353.9 | 2353.9 | 2355.4 | 2353.9 |
| 5° | 2350.9 | 2349.4 | 2349.4 | 2350.9 | 2350.9 | 2352.4 | 2349.4 | 2350.9 | 2352.4 | 2352.4 | 2353.9 |
| 7.5° | 2346.4 | 2347.9 | 2344.9 | 2347.9 | 2344.9 | 2346.4 | 2346.4 | 2347.9 | 2346.4 | 2347.9 | 2350.9 |
| 10° | 2337.4 | 2338.9 | 2337.4 | 2337.4 | 2337.4 | 2340.4 | 2334.4 | 2338.9 | 2337.4 | 2338.9 | 2337.4 |
| 12.5° | 2320.9 | 2328.4 | 2325.4 | 2328.4 | 2328.4 | 2328.4 | 2323.9 | 2326.9 | 2328.4 | 2328.4 | 2328.4 |
| 15° | 2313.4 | 2314.9 | 2310.4 | 2316.4 | 2317.9 | 2319.4 | 2313.4 | 2316.4 | 2316.4 | 2317.9 | 2319.4 |
| 17.5° | 2296.9 | 2304.4 | 2302.9 | 2307.4 | 2305.9 | 2310.4 | 2308.9 | 2307.4 | 2305.9 | 2308.9 | 2305.9 |
| 20° | 2284.9 | 2292.4 | 2290.9 | 2295.4 | 2296.9 | 2301.4 | 2296.9 | 2296.9 | 2292.4 | 2293.9 | 2298.4 |
| 22.5° | 2272.9 | 2275.9 | 2275.9 | 2280.4 | 2280.4 | 2284.9 | 2280.4 | 2278.9 | 2278.9 | 2277.4 | 2281.9 |
| 25° | 2253.5 | 2255.0 | 2253.5 | 2258.0 | 2261.0 | 2264.0 | 2262.5 | 2259.5 | 2258.0 | 2258.0 | 2256.5 |
| 27.5° | 2222.0 | 2228.0 | 2231.0 | 2237.0 | 2238.5 | 2243.0 | 2237.0 | 2237.0 | 2234.0 | 2231.0 | 2232.5 |
| 30° | 2198.0 | 2201.0 | 2201.0 | 2214.5 | 2214.5 | 2222.0 | 2214.5 | 2213.0 | 2211.5 | 2210.0 | 2207.0 |
| 32.5° | 2175.6 | 2180.1 | 2184.5 | 2195.0 | 2202.5 | 2205.5 | 2201.0 | 2198.0 | 2190.5 | 2186.0 | 2184.5 |
| 35° | 2157.6 | 2159.1 | 2168.1 | 2183.1 | 2192.0 | 2199.5 | 2193.5 | 2186.0 | 2175.6 | 2168.1 | 2174.1 |
| 37.5° | 2144.1 | 2145.6 | 2159.1 | 2178.6 | 2195.0 | 2201.0 | 2192.0 | 2180.1 | 2163.6 | 2154.6 | 2151.6 |
| 40° | 2132.1 | 2141.1 | 2156.1 | 2183.1 | 2201.0 | 2210.0 | 2202.5 | 2186.0 | 2162.1 | 2144.1 | 2142.6 |
| 42.5° | 2126.1 | 2130.6 | 2153.1 | 2184.5 | 2210.0 | 2222.0 | 2211.5 | 2189.0 | 2159.1 | 2138.1 | 2136.6 |
| 45° | 2111.1 | 2124.6 | 2145.6 | 2186.0 | 2214.5 | 2229.5 | 2214.5 | 2186.0 | 2150.1 | 2126.1 | 2121.6 |
| 47.5° | 2099.1 | 2103.6 | 2136.6 | 2183.1 | 2217.5 | 2229.5 | 2214.5 | 2178.6 | 2133.6 | 2102.1 | 2099.1 |
| 50° | 2070.7 | 2081.2 | 2114.1 | 2163.6 | 2204.0 | 2216.0 | 2198.0 | 2150.1 | 2099.1 | 2064.7 | 2058.7 |
| 52.5° | 2027.2 | 2036.2 | 2075.2 | 2136.6 | 2175.6 | 2189.0 | 2162.1 | 2111.1 | 2051.2 | 2009.2 | 2009.2 |
| 55° | 1959.8 | 1973.3 | 2013.7 | 2076.7 | 2126.1 | 2138.1 | 2106.6 | 2052.7 | 1985.3 | 1943.3 | 1941.8 |
| 57.5° | 1878.9 | 1887.9 | 1931.3 | 2000.3 | 2048.2 | 2066.2 | 2034.7 | 1974.8 | 1907.4 | 1857.9 | 1853.4 |
| 60° | 1774.0 | 1786.0 | 1832.4 | 1898.4 | 1947.8 | 1962.8 | 1935.8 | 1875.9 | 1807.0 | 1754.5 | 1754.5 |
| 62.5° | 1648.2 | 1661.6 | 1708.1 | 1775.5 | 1826.5 | 1848.9 | 1811.5 | 1754.5 | 1682.6 | 1631.7 | 1627.2 |
| 65° | 1501.3 | 1513.3 | 1555.3 | 1625.7 | 1678.1 | 1694.6 | 1666.1 | 1606.2 | 1537.3 | 1489.3 | 1484.8 |
| 67.5° | 1336.5 | 1353.0 | 1394.9 | 1454.9 | 1499.8 | 1520.8 | 1502.8 | 1448.9 | 1377.0 | 1327.5 | 1323.0 |
| 70° | 1158.2 | 1170.2 | 1203.2 | 1258.6 | 1309.5 | 1324.5 | 1297.5 | 1261.6 | 1194.2 | 1149.2 | 1143.2 |
| 72.5° | 967.9 | 978.4 | 1005.4 | 1057.8 | 1093.8 | 1113.3 | 1098.3 | 1051.8 | 997.9 | 960.4 | 966.4 |
| 75° | 776.1 | 774.6 | 804.6 | 842.1 | 875.0 | 888.5 | 878.0 | 848.0 | 798.6 | 767.1 | 765.6 |
| 77.5° | 584.3 | 599.3 | 609.8 | 641.3 | 668.3 | 678.7 | 663.8 | 639.8 | 602.3 | 576.9 | 581.3 |
| 80° | 410.5 | 401.5 | 421.0 | 440.5 | 458.5 | 469.0 | 460.0 | 446.5 | 421.0 | 401.5 | 398.6 |
| 82.5° | 251.7 | 244.2 | 253.2 | 271.2 | 283.2 | 286.2 | 287.7 | 271.2 | 260.7 | 245.7 | 248.7 |
| 85° | 110.9 | 112.4 | 119.9 | 131.9 | 133.4 | 134.8 | 134.8 | 131.9 | 119.9 | 118.4 | 115.4 |
| 87.5° | 27.0 | 27.0 | 28.5 | 33.0 | 33.0 | 34.5 | 34.5 | 30.0 | 28.5 | 25.5 | 27.0 |
| 90° | 32.0 | 31.0 | 31.0 | 31.0 | 31.0 | 31.0 | 31.0 | 31.0 | 31.0 | 31.0 | 31.0 |
| 92.5° | 37.0 | 37.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 | 36.0 |
| 95° | 42.0 | 42.0 | 42.0 | 41.0 | 41.0 | 41.0 | 41.0 | 41.0 | 41.0 | 41.0 | 41.0 |
| 97.5° | 48.0 | 48.0 | 47.0 | 47.0 | 47.0 | 47.0 | 47.0 | 47.0 | 47.0 | 47.0 | 47.0 |
| 100° | 53.0 | 53.0 | 53.0 | 53.0 | 53.0 | 53.0 | 53.0 | 53.0 | 53.0 | 53.0 | 53.0 |
| 102.5° | 60.0 | 59.0 | 60.0 | 60.0 | 59.0 | 59.0 | 59.0 | 60.0 | 60.0 | 60.0 | 59.0 |
| 105° | 66.0 | 66.0 | 66.0 | 66.0 | 66.0 | 66.0 | 66.0 | 67.0 | 66.0 | 66.0 | 66.0 |
| 107.5° | 73.0 | 73.0 | 73.0 | 74.0 | 74.0 | 74.0 | 74.0 | 74.0 | 73.0 | 74.0 | 73.0 |
| 110° | 80.0 | 80.0 | 81.0 | 81.0 | 81.0 | 81.0 | 81.0 | 81.0 | 81.0 | 81.0 | 81.0 |

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Peachtree City, GA 30269

Scaled Data Report

REPORT NUMBER: P821323
CATALOG NUMBER: TT-D5-740-24VDC-CQ-UPL

**CANDELA DISTRIBUTION (continued):**

| | 0° | 5° | 15° | 25° | 35° | 45° | 55° | 65° | 75° | 85° | 90° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 112.5° | 89.0 | *89.0* | 89.0 | 89.0 | 89.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 89.0 |
| 115° | 97.0 | *97.0* | 98.0 | 98.0 | 98.0 | 98.0 | 99.0 | 99.0 | 98.0 | 98.0 | 98.0 |
| 117.5° | 107.0 | *107.0* | 107.0 | 107.0 | 107.0 | 108.0 | 108.0 | 108.0 | 108.0 | 108.0 | 107.0 |
| 120° | 117.0 | *117.0* | 117.0 | 118.0 | 118.0 | 118.0 | 119.0 | 119.0 | 118.0 | 118.0 | 118.0 |
| 122.5° | 129.0 | *128.0* | 129.0 | 129.0 | 129.0 | 129.0 | 130.0 | 130.0 | 130.0 | 130.0 | 129.0 |
| 125° | 140.0 | *140.0* | 141.0 | 141.0 | 141.0 | 141.0 | 142.0 | 142.0 | 142.0 | 142.0 | 141.0 |
| 127.5° | 153.0 | *153.0* | 153.0 | 153.0 | 153.0 | 154.0 | 154.0 | 154.0 | 154.0 | 154.0 | 154.0 |
| 130° | 165.0 | *165.0* | 166.0 | 166.0 | 166.0 | 166.0 | 167.0 | 167.0 | 167.0 | 167.0 | 166.0 |
| 132.5° | 179.0 | *178.0* | 179.0 | 178.0 | 178.0 | 179.0 | 179.0 | 180.0 | 179.0 | 180.0 | 179.0 |
| 135° | 191.0 | *191.0* | 191.0 | 191.0 | 191.0 | 192.0 | 192.0 | 192.0 | 192.0 | 192.0 | 192.0 |
| 137.5° | 204.0 | *203.0* | 204.0 | 203.0 | 203.0 | 204.0 | 204.0 | 204.0 | 204.0 | 204.0 | 204.0 |
| 140° | 216.0 | *215.0* | 216.0 | 215.0 | 216.0 | 216.0 | 216.0 | 216.0 | 216.0 | 216.0 | 216.0 |
| 142.5° | 228.0 | *227.0* | 228.0 | 227.0 | 227.0 | 228.0 | 228.0 | 228.0 | 228.0 | 228.0 | 228.0 |
| 145° | 239.0 | *239.0* | 239.0 | 238.0 | 239.0 | 239.0 | 239.0 | 239.0 | 239.0 | 239.0 | 239.0 |
| 147.5° | 250.0 | *249.0* | 250.0 | 249.0 | 249.0 | 250.0 | 250.0 | 250.0 | 250.0 | 250.0 | 250.0 |
| 150° | 263.0 | *262.0* | 263.0 | 262.0 | 263.0 | 263.0 | 263.0 | 263.0 | 263.0 | 263.0 | 263.0 |
| 152.5° | 273.0 | *273.0* | 273.0 | 273.0 | 273.0 | 273.0 | 273.0 | 273.0 | 273.0 | 273.0 | 273.0 |
| 155° | 282.0 | *282.0* | 283.0 | 282.0 | 282.0 | 282.0 | 283.0 | 282.0 | 282.0 | 282.0 | 282.0 |
| 157.5° | 290.0 | *290.0* | 290.0 | 290.0 | 290.0 | 290.0 | 291.0 | 291.0 | 290.0 | 291.0 | 290.0 |
| 160° | 298.0 | *298.0* | 299.0 | 298.0 | 298.0 | 298.0 | 299.0 | 298.0 | 298.0 | 298.0 | 298.0 |
| 162.5° | 306.0 | *305.0* | 306.0 | 305.0 | 306.0 | 306.0 | 306.0 | 306.0 | 306.0 | 306.0 | 306.0 |
| 165° | 311.0 | *311.0* | 312.0 | 311.0 | 311.0 | 311.0 | 312.0 | 311.0 | 311.0 | 311.0 | 311.0 |
| 167.5° | 316.0 | *315.0* | 316.0 | 316.0 | 316.0 | 316.0 | 316.0 | 316.0 | 316.0 | 316.0 | 316.0 |
| 170° | 319.0 | *319.0* | 320.0 | 319.0 | 319.0 | 319.0 | 320.0 | 319.0 | 319.0 | 319.0 | 319.0 |
| 172.5° | 323.0 | *323.0* | 323.0 | 323.0 | 323.0 | 323.0 | 323.0 | 323.0 | 323.0 | 323.0 | 323.0 |
| 175° | 324.0 | *324.0* | 325.0 | 324.0 | 325.0 | 324.0 | 325.0 | 324.0 | 324.0 | 324.0 | 324.0 |
| 177.5° | 325.0 | *325.0* | 326.0 | 325.0 | 325.0 | 325.0 | 325.0 | 325.0 | 325.0 | 325.0 | 325.0 |
| 180° | 326.0 | *326.0* | 326.0 | 326.0 | 326.0 | 326.0 | 326.0 | 326.0 | 326.0 | 326.0 | 326.0 |

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

Streetworks

Report Number: SP1-2407-176-5

Test Date: 09/24/2024

Luminaire Tested: MEM2-HTN-VA-30-740-U-WQ

Data in this report applies to families of products including MEM2-HTN-VA-30-740-U-WQ

Report Generated By FNC07603 / LDUCLS01DT446
Version: v7.04

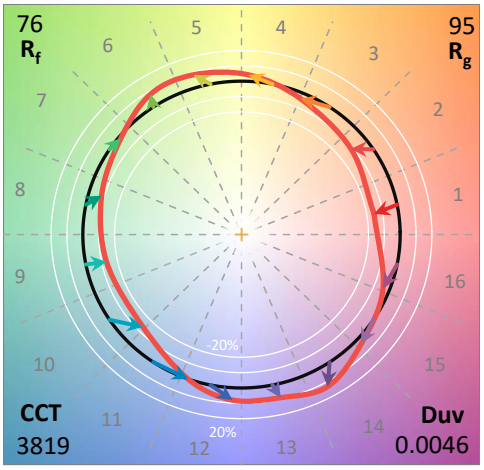
## Test Information

| | |
|---|---|
| Test Method: | LM-79-2019 |
| Report Number: | SP1-2407-176-5 |
| Test Lab: | COOPER LIGHTING SOLUTIONS |
| Photometer: | SP1 - 76IN SPHERE |
| Measurement Geometry: | 4π |
| Issue Date: | 09/27/2024 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS |
| Product Line: | Streetworks |
| Catalog Number: | **MEM2-HTN-VA-30-740-U-WQ** |
| Description: | EPIC MODERN VISUAL COMFORT 30W WAVESTREAM WIDE |

## Spectral Parameters

| | | | | | |
|---|---|---|---|---|---|
| CCT (K): | 3819 | CRI (Ra): | 72.9 | | |
| CIE u': | 0.2261 | R1: | 70.1 | R9: | -21.5 |
| CIE v': | 0.5108 | R2: | 78.4 | R10: | 48.5 |
| Duv: | 0.0046 | R3: | 85.0 | R11: | 68.4 |
| CIE x: | 0.3926 | R4: | 72.9 | R12: | 39.0 |
| CIE y: | 0.3942 | R5: | 69.1 | R13: | 71.1 |
| CIE z: | 0.2132 | R6: | 69.2 | R14: | 91.3 |
| Peak Wavelength (nm): | 450 | R7: | 82.8 | R15: | 63.2 |
| Dominant Wavelength (nm): | 577 | R8: | 55.4 | | |
| Purity: | 36.15483 | | | | |

| | |
|---|---|
| Rf: | 75.6 |
| Rg: | 94.8 |




## Test Conditions

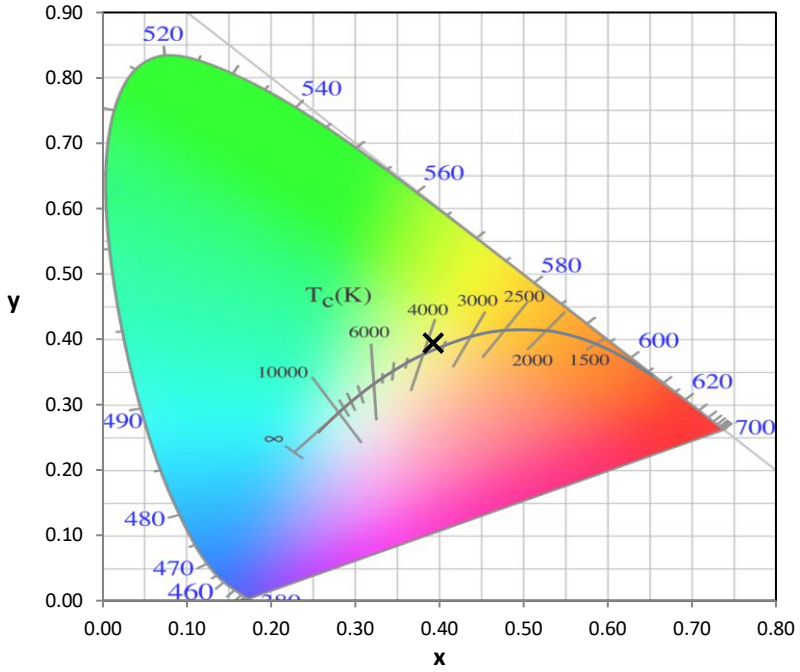
| | |
|---|---|
| Stabilization Time: | 30M |
| Operation Time: | 1H 30M |
| Sphere Temperature (°C): | 25.2 |

REPORT NUMBER: SP1-2407-176-5

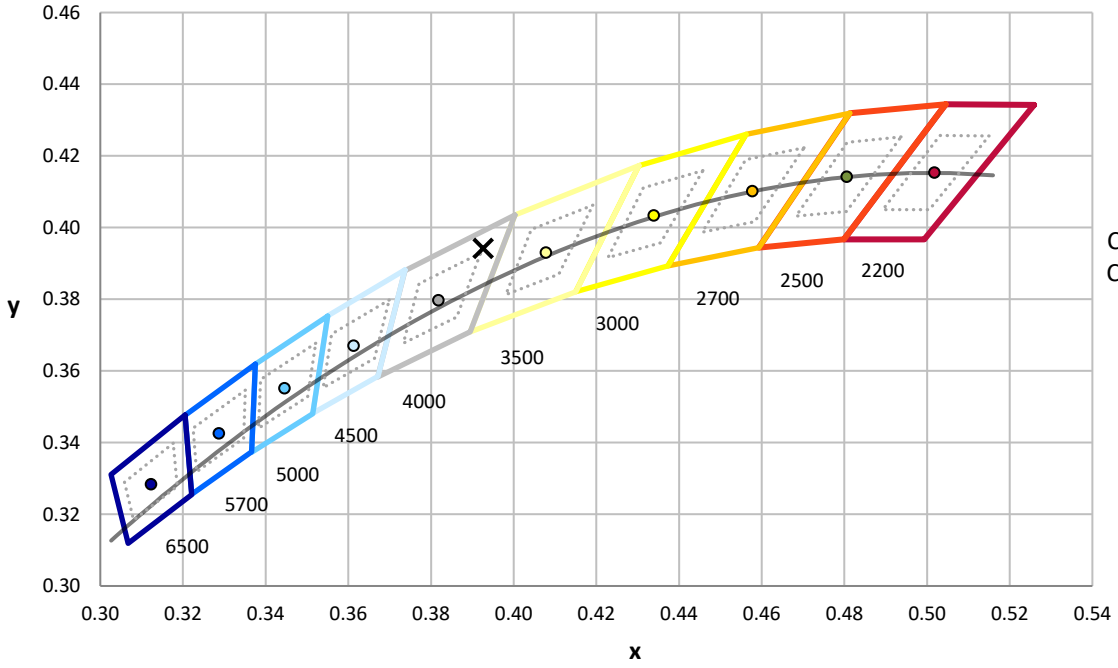
| Measurement and Test Equipment | | | |
|---|---|---|---|
| Instrument | Identification Number | Calibration Date | Calibration Due Date |
| Photometer | IN0058 | 6/18/2024 | 12/18/2024 |
| Power Meter | INXT2011004 | 2/8/2024 | 2/8/2025 |
| AC Power Source | IN0063 | 10/24/2023 | 10/24/2024 |
| DC 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: SP1-2407-176-5

## CIE 1931 Chromaticity Diagram




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

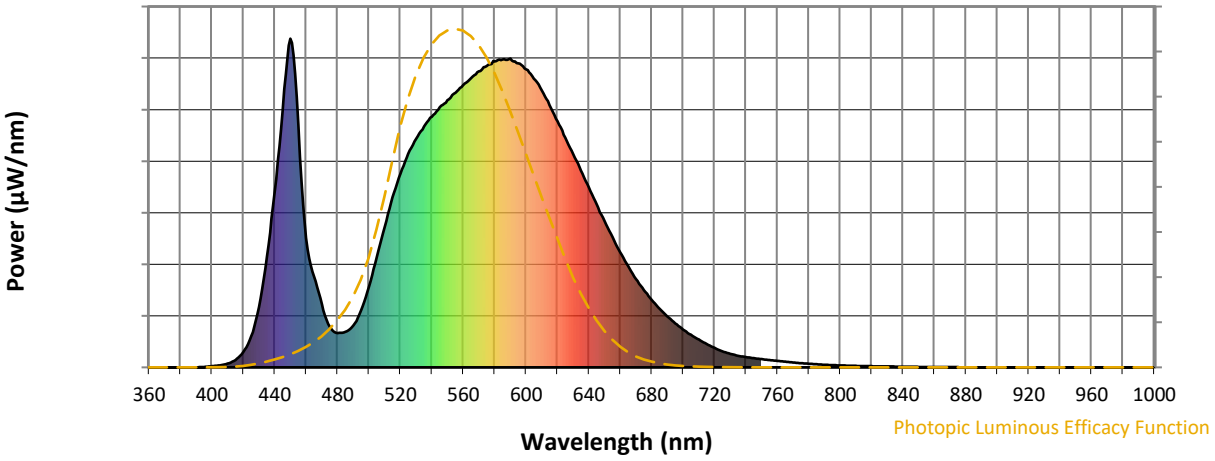



CCT = 3819K
CIE x = 0.3926
CIE y = 0.3942
Duv = 0.0046

Point lies inside the ANSI 4000K 7-step quadrangle

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## Photopic Flux vs. Wavelength

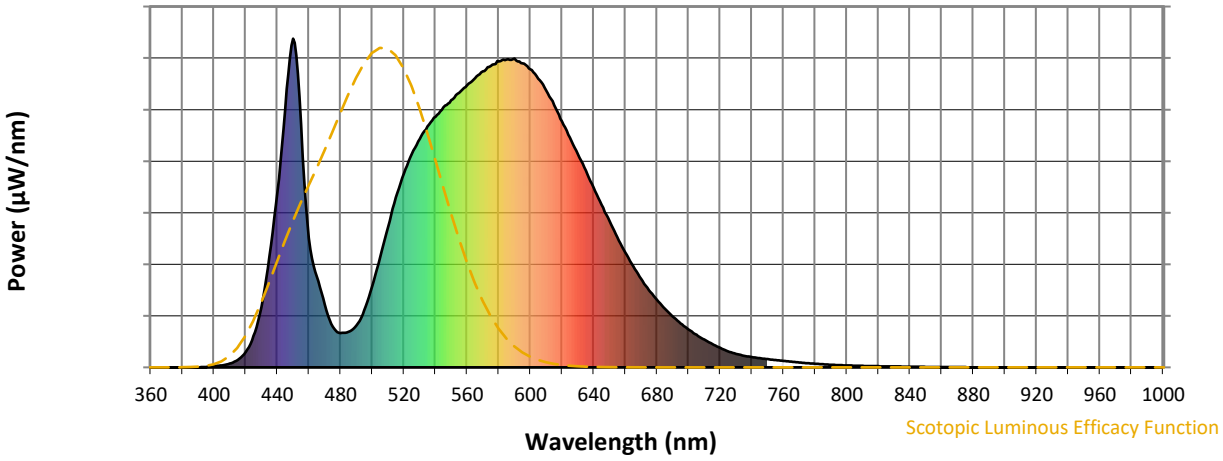



## Photopic Lumens: NR

| 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 | 127 | NR | 620 | 748 | NR | 750 | 25 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 173 | NR | 625 | 699 | NR | 755 | 22 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 246 | NR | 630 | 648 | NR | 760 | 20 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 335 | NR | 635 | 599 | NR | 765 | 17 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 427 | NR | 640 | 547 | NR | 770 | 15 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 517 | NR | 645 | 495 | NR | 775 | 13 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 589 | NR | 650 | 445 | NR | 780 | 11 | NR | 910 | 0 | NR |
| 395 | 1 | NR | 525 | 649 | NR | 655 | 396 | NR | 785 | 9 | NR | 915 | 0 | NR |
| 400 | 4 | NR | 530 | 695 | NR | 660 | 349 | NR | 790 | 8 | NR | 920 | 0 | NR |
| 405 | 6 | NR | 535 | 733 | NR | 665 | 308 | NR | 795 | 7 | NR | 925 | 0 | NR |
| 410 | 11 | NR | 540 | 763 | NR | 670 | 269 | NR | 800 | 6 | NR | 930 | 0 | NR |
| 415 | 23 | NR | 545 | 792 | NR | 675 | 235 | NR | 805 | 5 | NR | 935 | 0 | NR |
| 420 | 46 | NR | 550 | 813 | NR | 680 | 205 | NR | 810 | 5 | NR | 940 | 0 | NR |
| 425 | 95 | NR | 555 | 835 | NR | 685 | 178 | NR | 815 | 4 | NR | 945 | 0 | NR |
| 430 | 183 | NR | 560 | 859 | NR | 690 | 155 | NR | 820 | 3 | NR | 950 | 0 | NR |
| 435 | 338 | NR | 565 | 880 | NR | 695 | 134 | NR | 825 | 3 | NR | 955 | 0 | NR |
| 440 | 534 | NR | 570 | 900 | NR | 700 | 115 | NR | 830 | 3 | NR | 960 | 0 | NR |
| 445 | 782 | NR | 575 | 918 | NR | 705 | 99 | NR | 835 | 2 | NR | 965 | 0 | NR |
| 450 | 1000 | NR | 580 | 931 | NR | 710 | 84 | NR | 840 | 2 | NR | 970 | 0 | NR |
| 455 | 739 | NR | 585 | 937 | NR | 715 | 71 | NR | 845 | 2 | NR | 975 | 0 | NR |
| 460 | 393 | NR | 590 | 939 | NR | 720 | 59 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 276 | NR | 595 | 925 | NR | 725 | 49 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 190 | NR | 600 | 907 | NR | 730 | 41 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 123 | NR | 605 | 878 | NR | 735 | 35 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 105 | NR | 610 | 842 | NR | 740 | 31 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 108 | NR | 615 | 797 | NR | 745 | 28 | NR | 875 | 1 | NR | | | |

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## Scotopic Flux vs. Wavelength

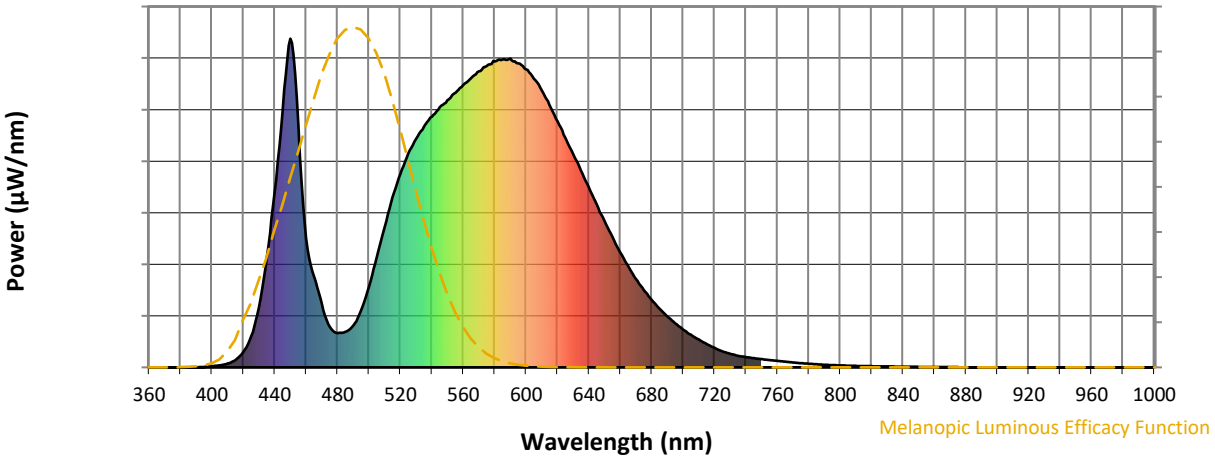



**Scotopic Lumens: NR** **S/P: 1.45**

| 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 | 127 | NR | 620 | 748 | NR | 750 | 25 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 173 | NR | 625 | 699 | NR | 755 | 22 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 246 | NR | 630 | 648 | NR | 760 | 20 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 335 | NR | 635 | 599 | NR | 765 | 17 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 427 | NR | 640 | 547 | NR | 770 | 15 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 517 | NR | 645 | 495 | NR | 775 | 13 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 589 | NR | 650 | 445 | NR | 780 | 11 | NR | 910 | 0 | NR |
| 395 | 1 | NR | 525 | 649 | NR | 655 | 396 | NR | 785 | 9 | NR | 915 | 0 | NR |
| 400 | 4 | NR | 530 | 695 | NR | 660 | 349 | NR | 790 | 8 | NR | 920 | 0 | NR |
| 405 | 6 | NR | 535 | 733 | NR | 665 | 308 | NR | 795 | 7 | NR | 925 | 0 | NR |
| 410 | 11 | NR | 540 | 763 | NR | 670 | 269 | NR | 800 | 6 | NR | 930 | 0 | NR |
| 415 | 23 | NR | 545 | 792 | NR | 675 | 235 | NR | 805 | 5 | NR | 935 | 0 | NR |
| 420 | 46 | NR | 550 | 813 | NR | 680 | 205 | NR | 810 | 5 | NR | 940 | 0 | NR |
| 425 | 95 | NR | 555 | 835 | NR | 685 | 178 | NR | 815 | 4 | NR | 945 | 0 | NR |
| 430 | 183 | NR | 560 | 859 | NR | 690 | 155 | NR | 820 | 3 | NR | 950 | 0 | NR |
| 435 | 338 | NR | 565 | 880 | NR | 695 | 134 | NR | 825 | 3 | NR | 955 | 0 | NR |
| 440 | 534 | NR | 570 | 900 | NR | 700 | 115 | NR | 830 | 3 | NR | 960 | 0 | NR |
| 445 | 782 | NR | 575 | 918 | NR | 705 | 99 | NR | 835 | 2 | NR | 965 | 0 | NR |
| 450 | 1000 | NR | 580 | 931 | NR | 710 | 84 | NR | 840 | 2 | NR | 970 | 0 | NR |
| 455 | 739 | NR | 585 | 937 | NR | 715 | 71 | NR | 845 | 2 | NR | 975 | 0 | NR |
| 460 | 393 | NR | 590 | 939 | NR | 720 | 59 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 276 | NR | 595 | 925 | NR | 725 | 49 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 190 | NR | 600 | 907 | NR | 730 | 41 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 123 | NR | 605 | 878 | NR | 735 | 35 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 105 | NR | 610 | 842 | NR | 740 | 31 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 108 | NR | 615 | 797 | NR | 745 | 28 | NR | 875 | 1 | NR | | | |

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## Melanopic Flux vs. Wavelength




**Melanopic Lumens: NR** **M/P: 2.76**

| 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 | 127 | NR | 620 | 748 | NR | 750 | 25 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 173 | NR | 625 | 699 | NR | 755 | 22 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 246 | NR | 630 | 648 | NR | 760 | 20 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 335 | NR | 635 | 599 | NR | 765 | 17 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 427 | NR | 640 | 547 | NR | 770 | 15 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 517 | NR | 645 | 495 | NR | 775 | 13 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 589 | NR | 650 | 445 | NR | 780 | 11 | NR | 910 | 0 | NR |
| 395 | 1 | NR | 525 | 649 | NR | 655 | 396 | NR | 785 | 9 | NR | 915 | 0 | NR |
| 400 | 4 | NR | 530 | 695 | NR | 660 | 349 | NR | 790 | 8 | NR | 920 | 0 | NR |
| 405 | 6 | NR | 535 | 733 | NR | 665 | 308 | NR | 795 | 7 | NR | 925 | 0 | NR |
| 410 | 11 | NR | 540 | 763 | NR | 670 | 269 | NR | 800 | 6 | NR | 930 | 0 | NR |
| 415 | 23 | NR | 545 | 792 | NR | 675 | 235 | NR | 805 | 5 | NR | 935 | 0 | NR |
| 420 | 46 | NR | 550 | 813 | NR | 680 | 205 | NR | 810 | 5 | NR | 940 | 0 | NR |
| 425 | 95 | NR | 555 | 835 | NR | 685 | 178 | NR | 815 | 4 | NR | 945 | 0 | NR |
| 430 | 183 | NR | 560 | 859 | NR | 690 | 155 | NR | 820 | 3 | NR | 950 | 0 | NR |
| 435 | 338 | NR | 565 | 880 | NR | 695 | 134 | NR | 825 | 3 | NR | 955 | 0 | NR |
| 440 | 534 | NR | 570 | 900 | NR | 700 | 115 | NR | 830 | 3 | NR | 960 | 0 | NR |
| 445 | 782 | NR | 575 | 918 | NR | 705 | 99 | NR | 835 | 2 | NR | 965 | 0 | NR |
| 450 | 1000 | NR | 580 | 931 | NR | 710 | 84 | NR | 840 | 2 | NR | 970 | 0 | NR |
| 455 | 739 | NR | 585 | 937 | NR | 715 | 71 | NR | 845 | 2 | NR | 975 | 0 | NR |
| 460 | 393 | NR | 590 | 939 | NR | 720 | 59 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 276 | NR | 595 | 925 | NR | 725 | 49 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 190 | NR | 600 | 907 | NR | 730 | 41 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 123 | NR | 605 | 878 | NR | 735 | 35 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 105 | NR | 610 | 842 | NR | 740 | 31 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 108 | NR | 615 | 797 | NR | 745 | 28 | NR | 875 | 1 | NR | | | |

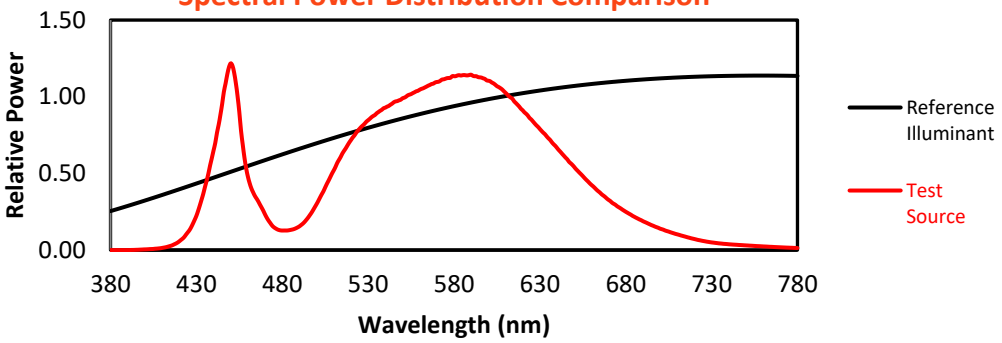
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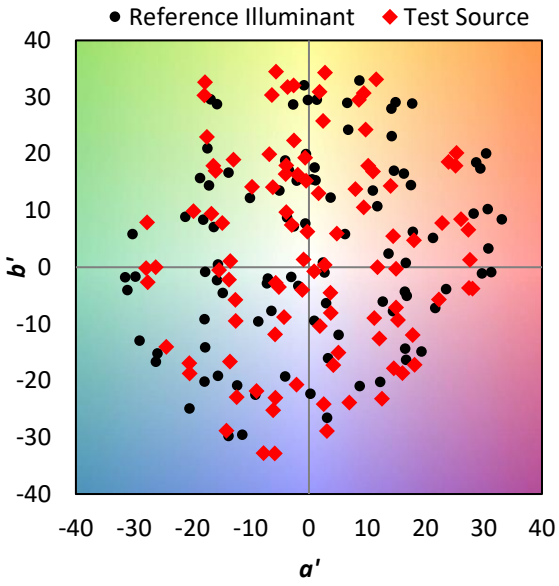
## Summary

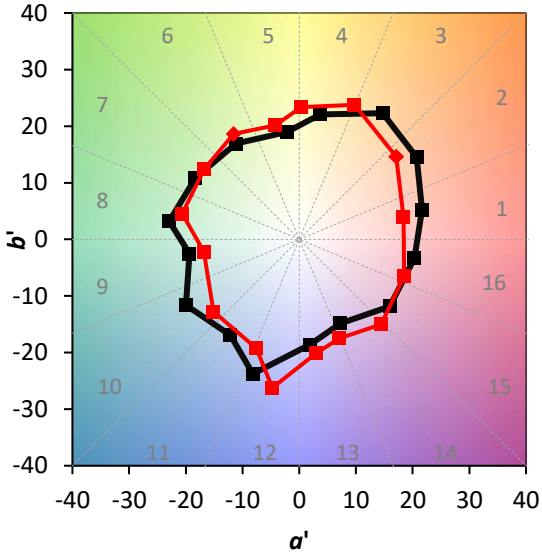
$R_f$ = 75.6
$R_g$ = 94.8
CIE $R_a$ = 72.9
$R_9$ = -21.5

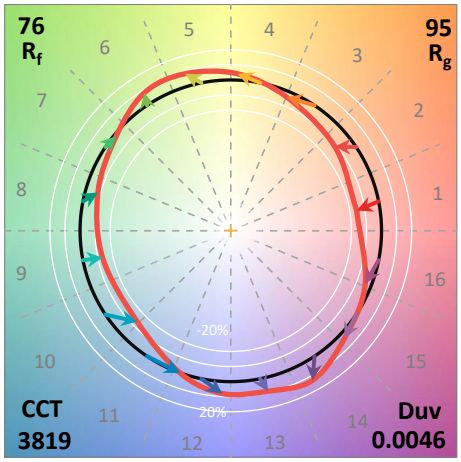
## Spectral Power Distribution Comparison

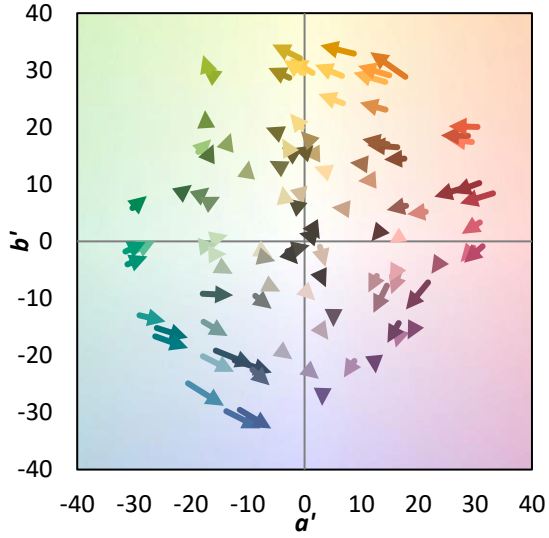



## Color Vector Graphics



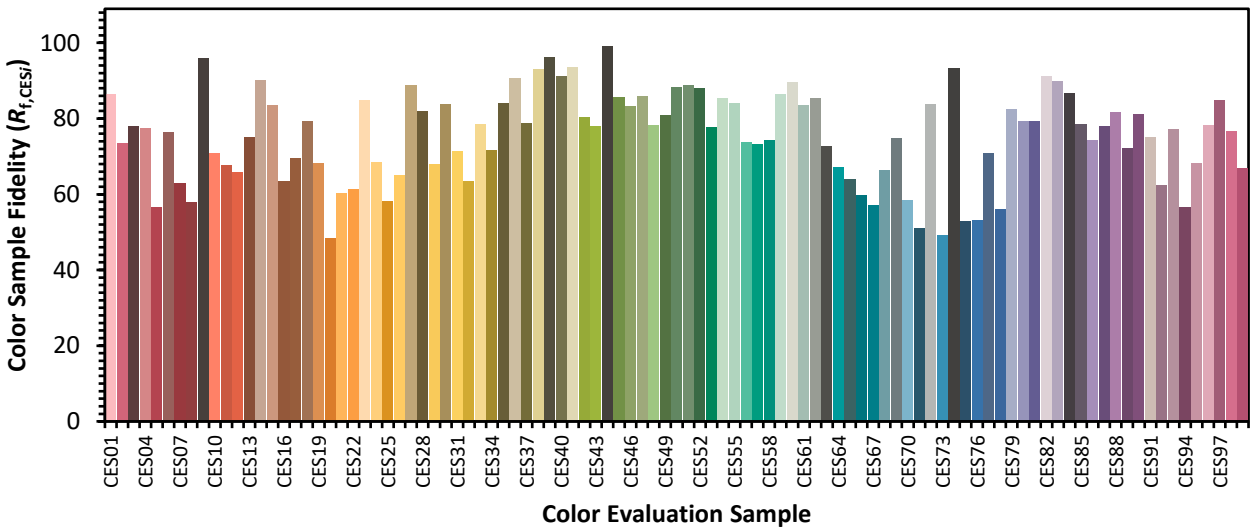



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**Individual Sample Fidelity Index ($R_{f,i}$)**

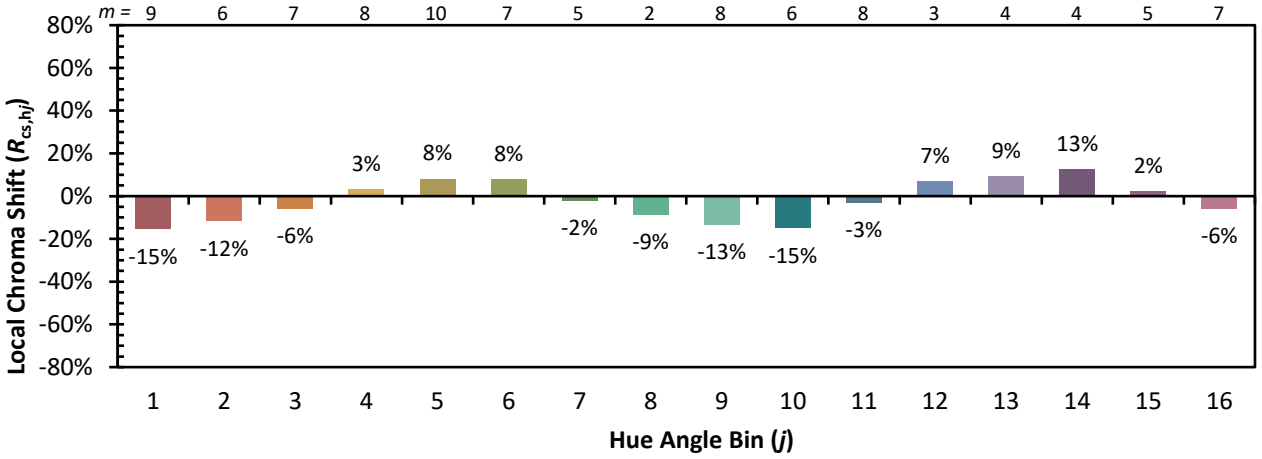
| | | | |
|---|---|---|---|
| CES01 = 85 | CES26 = 65 | CES51 = 89 | CES76 = 53 |
| CES02 = 61 | CES27 = 89 | CES52 = 88 | CES77 = 71 |
| CES03 = 30 | CES28 = 82 | CES53 = 78 | CES78 = 56 |
| CES04 = 70 | CES29 = 68 | CES54 = 85 | CES79 = 83 |
| CES05 = 48 | CES30 = 84 | CES55 = 84 | CES80 = 79 |
| CES06 = 50 | CES31 = 71 | CES56 = 74 | CES81 = 79 |
| CES07 = 40 | CES32 = 63 | CES57 = 73 | CES82 = 91 |
| CES08 = 39 | CES33 = 79 | CES58 = 74 | CES83 = 90 |
| CES09 = 29 | CES34 = 72 | CES59 = 86 | CES84 = 87 |
| CES10 = 74 | CES35 = 84 | CES60 = 90 | CES85 = 78 |
| CES11 = 57 | CES36 = 91 | CES61 = 84 | CES86 = 74 |
| CES12 = 63 | CES37 = 79 | CES62 = 85 | CES87 = 78 |
| CES13 = 42 | CES38 = 93 | CES63 = 73 | CES88 = 82 |
| CES14 = 74 | CES39 = 96 | CES64 = 67 | CES89 = 72 |
| CES15 = 71 | CES40 = 91 | CES65 = 64 | CES90 = 81 |
| CES16 = 47 | CES41 = 93 | CES66 = 60 | CES91 = 75 |
| CES17 = 49 | CES42 = 80 | CES67 = 57 | CES92 = 62 |
| CES18 = 56 | CES43 = 78 | CES68 = 66 | CES93 = 77 |
| CES19 = 72 | CES44 = 99 | CES69 = 75 | CES94 = 57 |
| CES20 = 65 | CES45 = 86 | CES70 = 58 | CES95 = 68 |
| CES21 = 86 | CES46 = 83 | CES71 = 51 | CES96 = 78 |
| CES22 = 78 | CES47 = 86 | CES72 = 84 | CES97 = 85 |
| CES23 = 92 | CES48 = 78 | CES73 = 49 | CES98 = 77 |
| CES24 = 91 | CES49 = 81 | CES74 = 93 | CES99 = 67 |
| CES25 = 72 | CES50 = 88 | CES75 = 53 | |

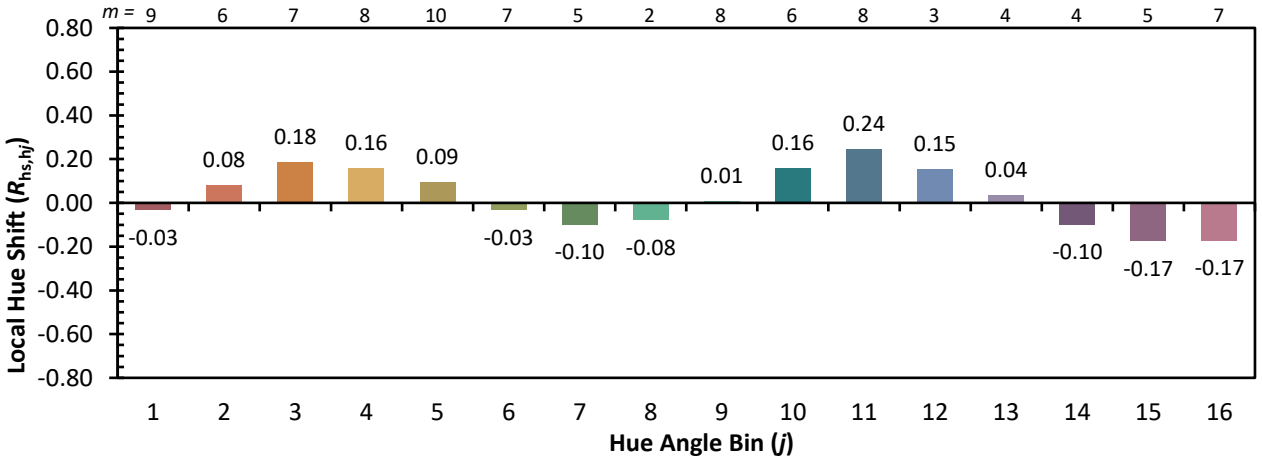


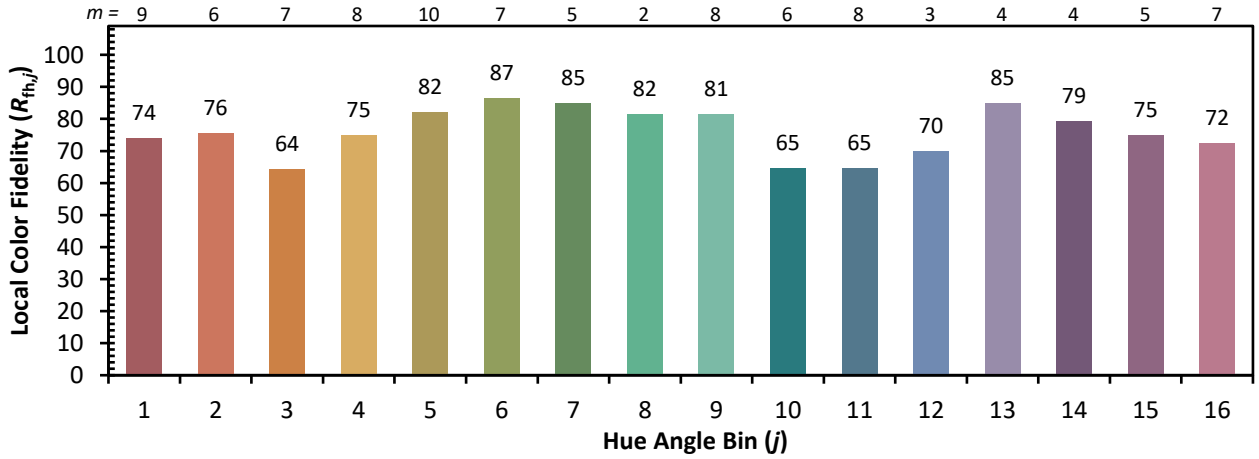
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## Color Rendition by Hue-Angle Bin



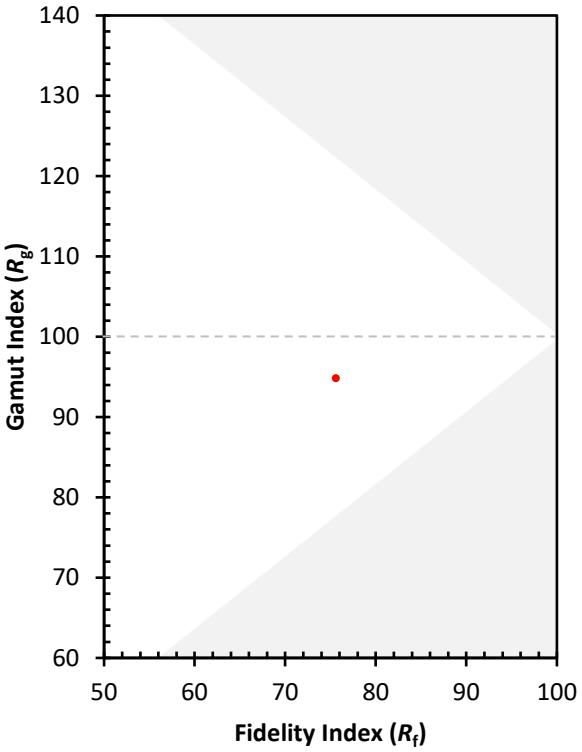



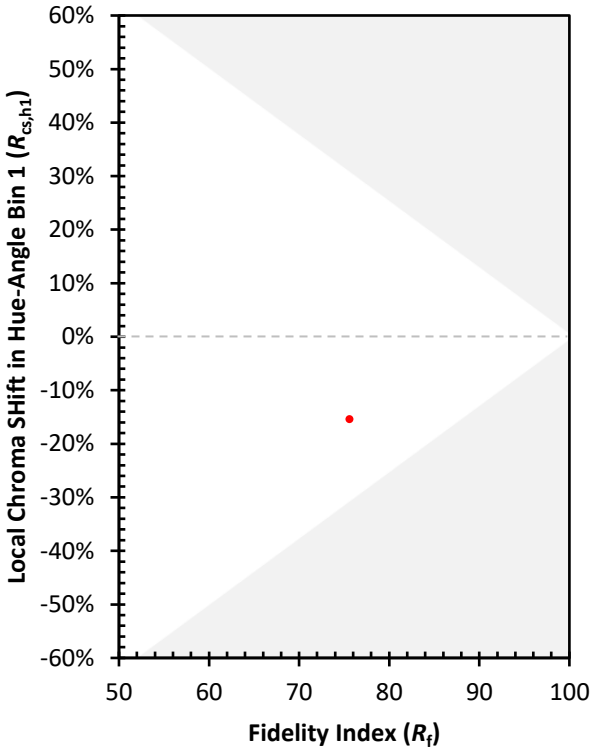



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## Measure Comparisons




(END OF REPORT)