

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: McGRAW-EDISON

Report Number: P386990

Luminaire Tested: **GWC-SA2D-722-U-T4FT-HSS**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P386990  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-17)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: MCGRAW-EDISON  
Catalog Number: GWC-SA2D-722-U-T4FT-HSS  
Description: GALLEON WALL LUMINAIRE  
(2) 70 CRI, 2200K, 1200mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV  
FORWARD THROW OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 8453 lumens  
Efficiency: N/A  
Efficacy: 66.0 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 0.5' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B1 - U0 - G2

Input Watts (W): 128  
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: 28.75 FT



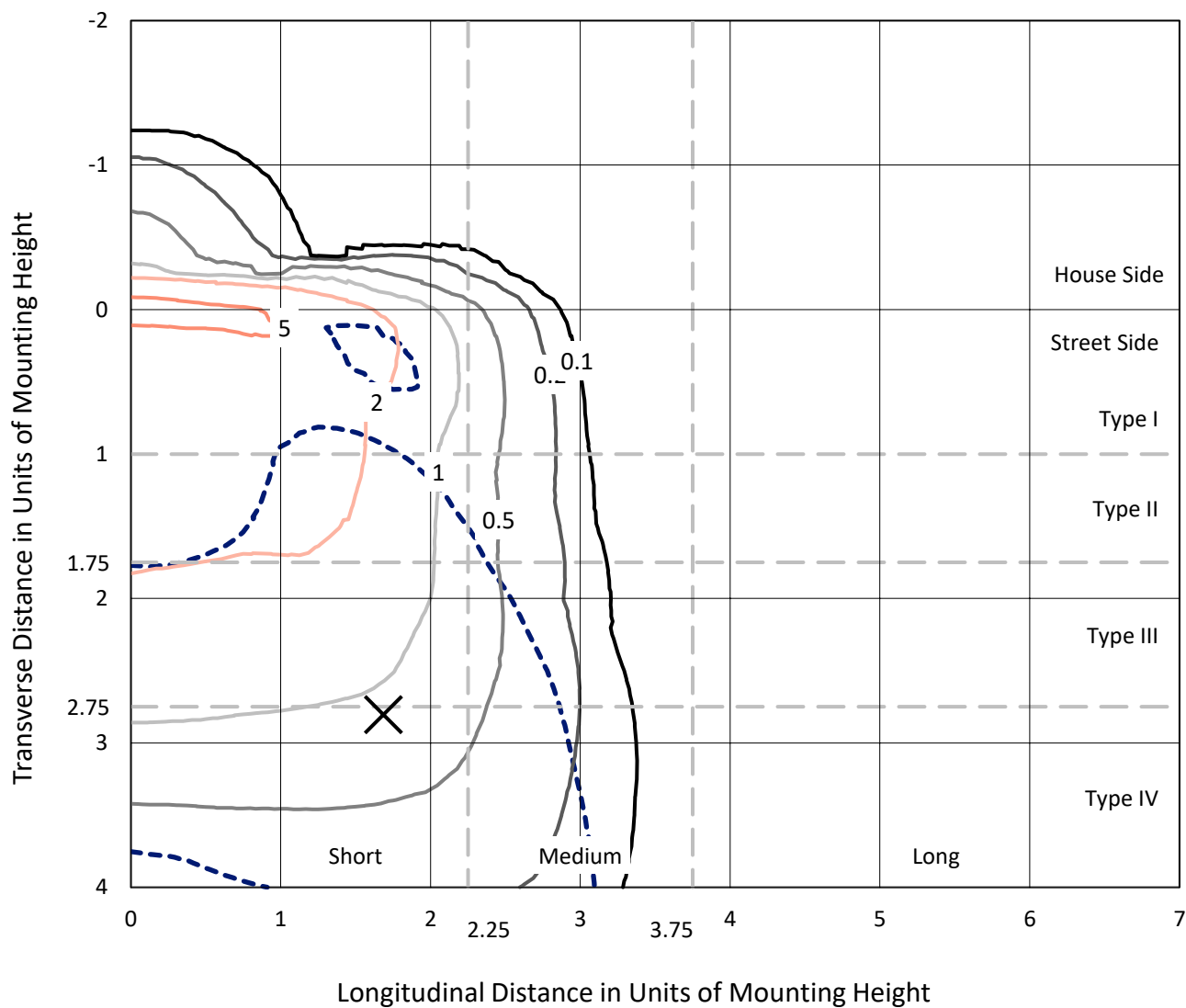
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## Iso-Footcandle Lines of Horizontal Illumination

× Max cd

--- 1/2 Max cd

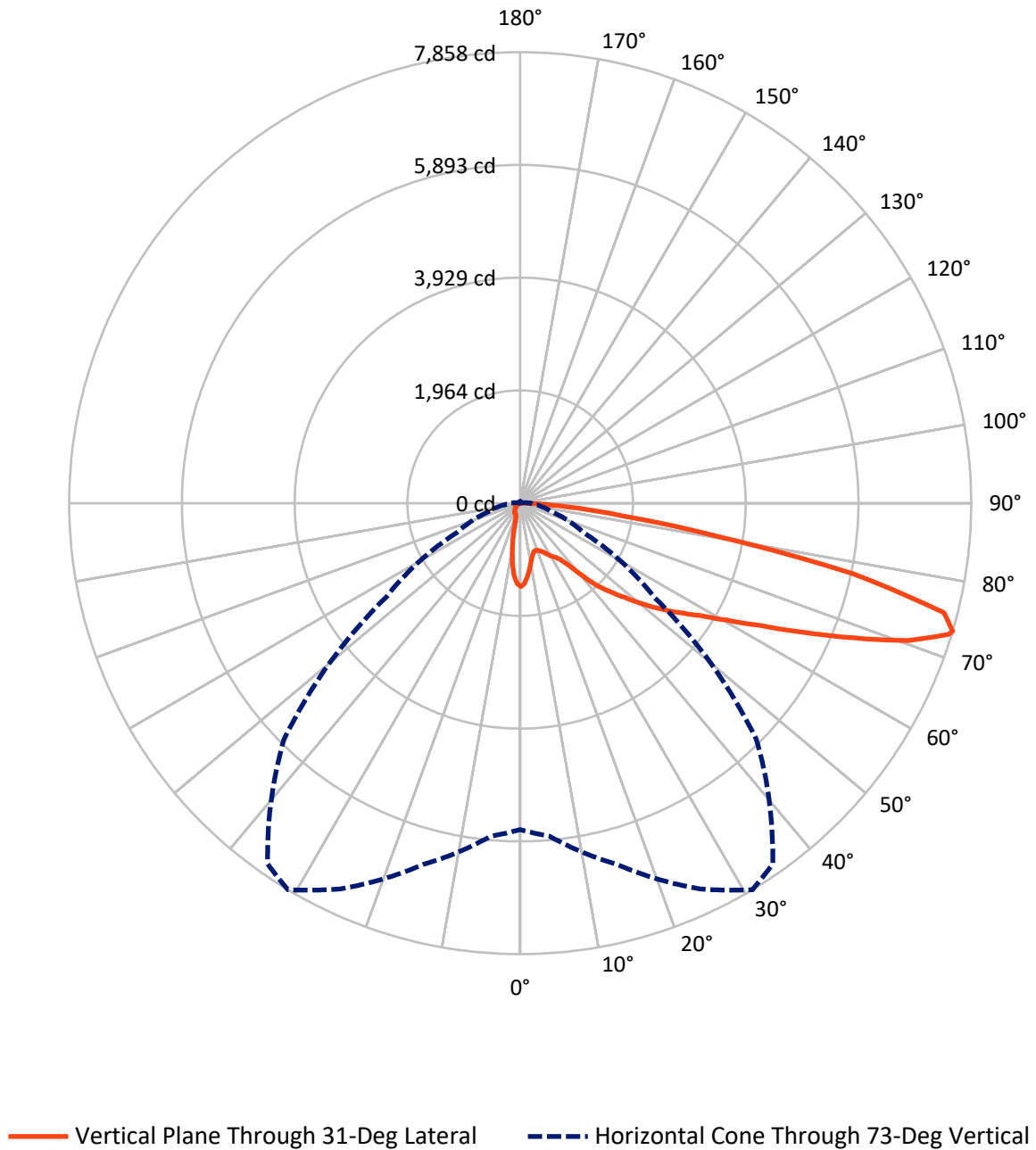


Based on 15 foot mounting height. Maximum calculated value = 6.5 fc

Type IV - Short - N/A

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CATALOG NUMBER: GWC-SA2D-722-U-T4FT-HSS

## Luminous Intensity Polar Plot



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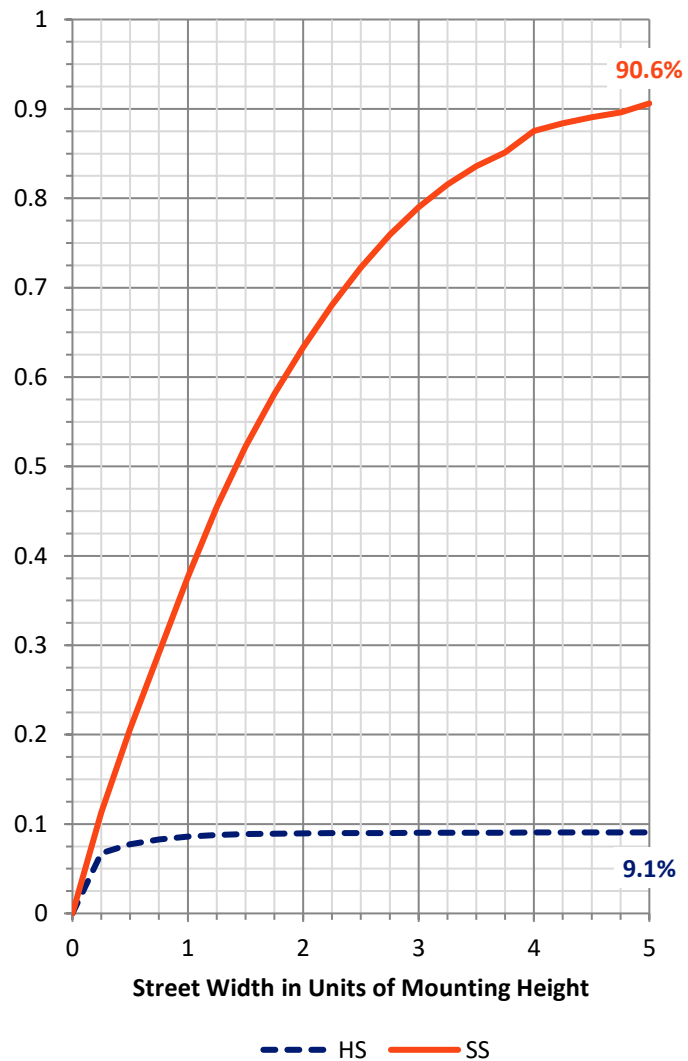
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 770.5    | 0.0    | 770.5  |
|                    | % Fixture | 9.1      | 0.0    | 9.1    |
| <b>Street Side</b> | Lumens    | 7682.5   | 0.0    | 7682.5 |
|                    | % Fixture | 90.9     | 0.0    | 90.9   |
| <b>Total</b>       | Lumens    | 8453.0   | 0.0    | 8453.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 120.6  | 1.4       |
| 10°-20°   | 261.8  | 3.1       |
| 20°-30°   | 392.3  | 4.6       |
| 30°-40°   | 624.1  | 7.4       |
| 40°-50°   | 1114.5 | 13.2      |
| 50°-60°   | 1729.5 | 20.5      |
| 60°-70°   | 2299.1 | 27.2      |
| 70°-80°   | 1729.4 | 20.5      |
| 80°-90°   | 181.7  | 2.1       |
| 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°    | 8453.0 | 100.0     |
| 0°-180°   | 8453.0 | 100.0     |

**Coefficient of Utilization**



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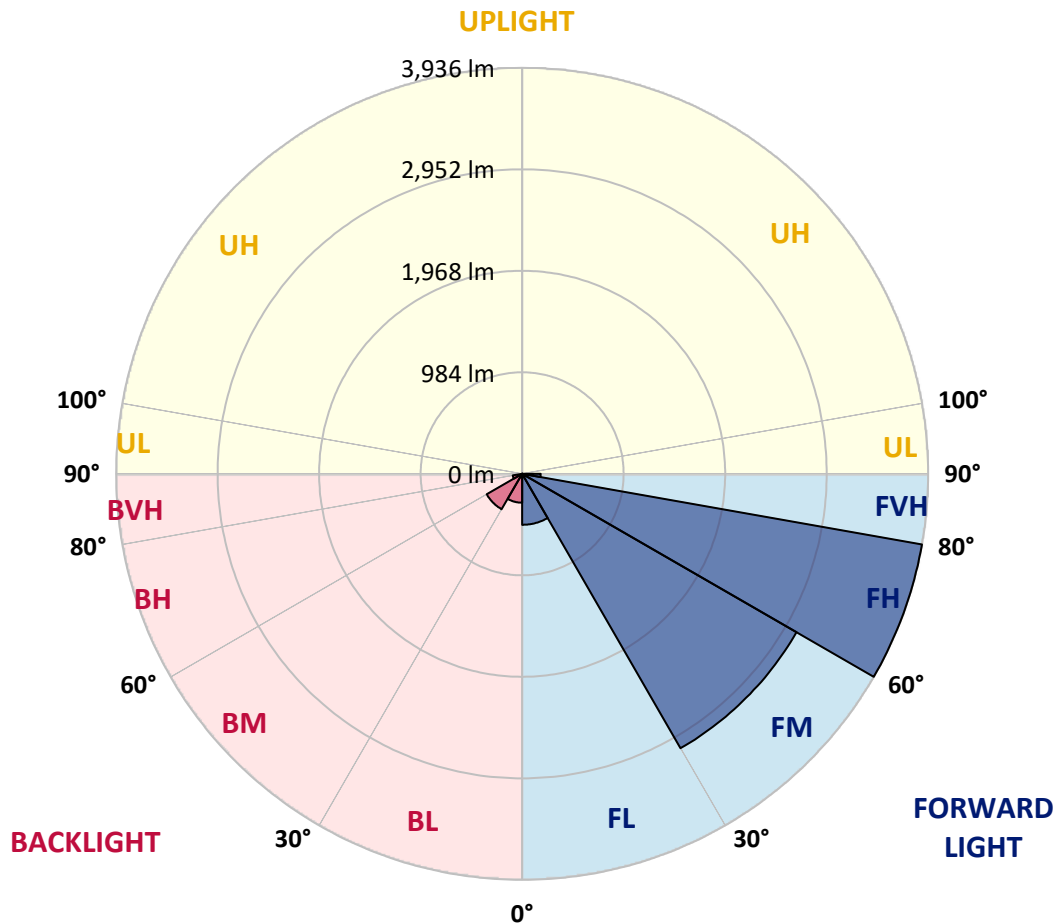
CATALOG NUMBER: GWC-SA2D-722-U-T4FT-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 494.5  | 5.9       |                         |      |         |
| FM   | (30°-60°)   | 3071.5 | 36.3      |                         |      |         |
| FH   | (60°-80°)   | 3936.2 | 46.6      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 180.2  | 2.1       |                         |      | G2/225  |
| BL   | (0°-30°)    | 280.2  | 3.3       | B1/500                  |      |         |
| BM   | (30°-60°)   | 396.6  | 4.7       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 92.2   | 1.1       | B0/110                  |      | G0/110  |
| BVH  | (80°-90°)   | 1.5    | 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-G2**

Type IV Short



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 31°    | 35°    | 45°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1454.4 | 1454.4 | 1454.4 | 1454.4 | 1454.4 | 1454.4 | 1454.4 | 1454.4 | 1454.4 | 1454.4 | 1454.4 |
| 2.5°  | 1378.2 | 1384.0 | 1390.2 | 1391.5 | 1401.8 | 1402.2 | 1417.1 | 1428.3 | 1439.5 | 1450.2 | 1453.9 |
| 5°    | 1236.8 | 1246.3 | 1257.5 | 1268.6 | 1290.6 | 1299.2 | 1335.6 | 1372.9 | 1408.4 | 1442.4 | 1458.9 |
| 7.5°  | 1085.8 | 1096.6 | 1112.3 | 1140.0 | 1164.4 | 1181.4 | 1238.8 | 1305.0 | 1371.2 | 1433.7 | 1469.7 |
| 10°   | 948.1  | 958.0  | 974.5  | 1003.9 | 1041.5 | 1064.7 | 1142.1 | 1233.9 | 1331.1 | 1425.8 | 1485.8 |
| 12.5° | 860.4  | 865.7  | 874.8  | 906.3  | 940.2  | 966.3  | 1057.3 | 1171.0 | 1298.0 | 1425.4 | 1511.9 |
| 15°   | 844.2  | 845.9  | 838.4  | 852.5  | 879.0  | 904.2  | 996.5  | 1120.1 | 1272.8 | 1432.0 | 1545.8 |
| 17.5° | 869.9  | 869.1  | 844.2  | 842.6  | 863.7  | 884.4  | 966.7  | 1085.0 | 1255.0 | 1447.3 | 1589.6 |
| 20°   | 908.8  | 905.9  | 862.9  | 855.0  | 877.3  | 896.8  | 964.6  | 1071.7 | 1248.4 | 1473.0 | 1643.0 |
| 22.5° | 960.5  | 955.5  | 888.1  | 879.8  | 903.8  | 924.1  | 990.3  | 1084.6 | 1254.2 | 1507.3 | 1705.0 |
| 25°   | 1024.6 | 1017.1 | 931.5  | 922.4  | 946.8  | 967.1  | 1036.2 | 1121.4 | 1271.5 | 1549.1 | 1783.6 |
| 27.5° | 1097.0 | 1086.2 | 1001.0 | 977.4  | 1005.1 | 1026.2 | 1097.4 | 1177.6 | 1298.8 | 1593.3 | 1880.0 |
| 30°   | 1165.2 | 1151.2 | 1074.2 | 1035.3 | 1069.3 | 1092.8 | 1163.6 | 1244.6 | 1342.7 | 1661.6 | 2011.9 |
| 32.5° | 1233.9 | 1218.2 | 1139.6 | 1093.2 | 1123.9 | 1149.5 | 1231.8 | 1336.9 | 1425.0 | 1765.8 | 2187.3 |
| 35°   | 1391.9 | 1375.4 | 1279.0 | 1202.4 | 1202.0 | 1216.5 | 1327.4 | 1463.0 | 1533.8 | 1911.0 | 2396.6 |
| 37.5° | 1657.9 | 1648.4 | 1556.5 | 1411.3 | 1372.5 | 1356.3 | 1457.7 | 1613.6 | 1690.1 | 2110.8 | 2632.8 |
| 40°   | 1949.1 | 1940.8 | 1837.8 | 1706.3 | 1647.1 | 1607.4 | 1644.6 | 1823.3 | 1911.0 | 2354.8 | 2874.0 |
| 42.5° | 2277.9 | 2238.6 | 2055.0 | 2015.7 | 1962.7 | 1932.5 | 1899.0 | 2081.8 | 2182.4 | 2620.4 | 3113.0 |
| 45°   | 2576.6 | 2510.4 | 2272.1 | 2212.6 | 2200.6 | 2208.0 | 2226.6 | 2429.3 | 2487.6 | 2936.0 | 3351.3 |
| 47.5° | 2754.4 | 2702.3 | 2519.5 | 2462.4 | 2459.1 | 2508.3 | 2648.9 | 2821.8 | 2791.7 | 3211.1 | 3561.0 |
| 50°   | 2923.6 | 2876.4 | 2724.6 | 2738.7 | 2754.0 | 2821.0 | 3128.4 | 3225.6 | 3069.2 | 3460.5 | 3753.4 |
| 52.5° | 3060.5 | 2988.5 | 2909.1 | 2988.1 | 3063.4 | 3171.4 | 3623.1 | 3587.9 | 3266.1 | 3659.1 | 3918.0 |
| 55°   | 3139.5 | 3106.8 | 3145.3 | 3224.7 | 3366.2 | 3541.6 | 4090.1 | 3889.5 | 3410.0 | 3840.2 | 4027.6 |
| 57.5° | 3429.1 | 3365.0 | 3441.5 | 3510.1 | 3694.6 | 3939.9 | 4490.1 | 4114.1 | 3513.9 | 3952.3 | 4052.8 |
| 60°   | 3779.4 | 3727.7 | 3772.8 | 3887.0 | 4136.0 | 4424.3 | 4864.0 | 4297.3 | 3568.1 | 4024.3 | 3987.5 |
| 62.5° | 4337.0 | 4268.8 | 4240.6 | 4368.4 | 4698.5 | 5013.3 | 5147.7 | 4424.3 | 3556.1 | 3992.4 | 3763.3 |
| 65°   | 5084.0 | 5013.3 | 4887.6 | 5003.4 | 5423.2 | 5645.3 | 5465.0 | 4451.2 | 3473.3 | 3734.7 | 3196.6 |
| 67.5° | 5849.3 | 5798.0 | 5690.4 | 5885.7 | 6264.6 | 6336.1 | 5800.5 | 4385.8 | 3206.9 | 3028.3 | 2258.5 |
| 70°   | 6354.7 | 6332.8 | 6402.7 | 6834.6 | 7172.5 | 7151.8 | 6108.2 | 4034.6 | 2499.6 | 1862.2 | 1117.2 |
| 72.5° | 5990.3 | 6095.4 | 6611.6 | 7394.6 | 7807.4 | 7638.7 | 5950.2 | 3098.2 | 1428.7 | 716.4  | 323.1  |
| 73°   | 5688.4 | 5822.8 | 6517.7 | 7415.7 | 7857.5 | 7672.6 | 5817.4 | 2843.8 | 1217.8 | 565.4  | 244.9  |
| 75°   | 3957.3 | 4122.3 | 5395.9 | 6906.5 | 7623.4 | 7310.2 | 4849.1 | 1740.6 | 564.2  | 250.7  | 98.9   |
| 77.5° | 1921.4 | 2043.4 | 2971.2 | 4990.1 | 5928.7 | 5711.5 | 3018.7 | 648.6  | 254.8  | 156.8  | 45.5   |
| 80°   | 717.3  | 797.5  | 1289.7 | 2539.7 | 3426.2 | 3515.9 | 1327.8 | 245.3  | 169.6  | 126.2  | 23.2   |
| 82.5° | 187.8  | 209.3  | 475.7  | 1132.5 | 1755.9 | 1837.8 | 418.6  | 123.7  | 124.1  | 103.8  | 14.1   |
| 85°   | 60.0   | 68.7   | 148.5  | 508.4  | 827.3  | 726.4  | 109.2  | 60.0   | 90.2   | 77.4   | 7.9    |
| 87.5° | 7.4    | 9.5    | 47.2   | 119.5  | 182.4  | 101.3  | 17.0   | 17.8   | 38.5   | 43.0   | 4.6    |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

REPORT NUMBER: P386990

CATALOG NUMBER: GWC-SA2D-722-U-T4FT-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1454.4 | 1454.4 | 1454.4 | 1454.4 | 1454.4 | 1454.4 | 1454.4 | 1454.4 | 1454.4 | 1454.4 | 1454.4 |
| 2.5°  | 1457.7 | 1455.6 | 1456.0 | 1445.3 | 1438.2 | 1424.2 | 1409.7 | 1403.1 | 1396.0 | 1393.1 | 1396.0 |
| 5°    | 1465.1 | 1461.4 | 1450.6 | 1417.5 | 1382.4 | 1336.9 | 1294.3 | 1262.0 | 1221.5 | 1210.3 | 1221.9 |
| 7.5°  | 1476.7 | 1469.2 | 1437.8 | 1370.4 | 1292.2 | 1205.3 | 1107.7 | 1036.6 | 978.3  | 940.6  | 954.3  |
| 10°   | 1493.7 | 1479.6 | 1416.3 | 1301.7 | 1161.9 | 1008.0 | 869.5  | 761.5  | 685.0  | 653.6  | 652.3  |
| 12.5° | 1522.2 | 1495.7 | 1389.8 | 1212.4 | 1002.7 | 797.5  | 615.9  | 498.8  | 436.8  | 396.7  | 395.9  |
| 15°   | 1553.6 | 1514.7 | 1356.3 | 1105.2 | 817.4  | 571.2  | 396.7  | 307.7  | 267.6  | 254.8  | 253.1  |
| 17.5° | 1592.1 | 1536.7 | 1312.9 | 973.3  | 623.4  | 378.5  | 258.9  | 233.3  | 231.6  | 230.4  | 230.4  |
| 20°   | 1640.5 | 1562.7 | 1257.0 | 822.3  | 442.2  | 252.7  | 220.1  | 221.7  | 222.5  | 220.9  | 221.3  |
| 22.5° | 1696.7 | 1589.2 | 1190.5 | 660.2  | 299.1  | 211.4  | 210.5  | 212.6  | 213.4  | 212.6  | 213.0  |
| 25°   | 1762.1 | 1619.8 | 1109.4 | 490.2  | 215.9  | 200.6  | 202.7  | 205.6  | 207.6  | 207.6  | 207.6  |
| 27.5° | 1843.2 | 1657.0 | 1011.8 | 342.1  | 186.6  | 189.4  | 195.2  | 200.6  | 203.5  | 204.3  | 204.3  |
| 30°   | 1948.7 | 1703.4 | 894.7  | 234.5  | 169.6  | 174.6  | 185.3  | 195.7  | 201.0  | 201.9  | 202.3  |
| 32.5° | 2081.8 | 1755.5 | 759.0  | 173.3  | 155.1  | 158.8  | 170.4  | 187.8  | 198.1  | 199.8  | 199.8  |
| 35°   | 2234.5 | 1815.9 | 613.0  | 151.0  | 144.8  | 146.0  | 155.1  | 175.0  | 193.2  | 197.7  | 198.1  |
| 37.5° | 2401.6 | 1875.4 | 466.2  | 141.1  | 136.1  | 136.1  | 142.7  | 159.7  | 181.2  | 195.2  | 196.9  |
| 40°   | 2557.5 | 1911.4 | 326.8  | 133.2  | 128.2  | 128.2  | 134.0  | 146.4  | 166.7  | 187.8  | 192.3  |
| 42.5° | 2701.5 | 1923.8 | 227.5  | 125.7  | 120.8  | 122.0  | 127.0  | 136.9  | 152.2  | 173.3  | 177.5  |
| 45°   | 2849.6 | 1921.8 | 165.9  | 117.1  | 113.3  | 117.1  | 120.8  | 128.2  | 139.4  | 151.4  | 152.2  |
| 47.5° | 2961.2 | 1904.4 | 131.5  | 108.8  | 106.3  | 111.3  | 114.6  | 119.5  | 125.7  | 124.9  | 124.9  |
| 50°   | 3065.9 | 1862.2 | 105.9  | 97.6   | 99.3   | 105.1  | 106.7  | 108.4  | 108.8  | 100.9  | 100.1  |
| 52.5° | 3145.3 | 1796.4 | 84.8   | 85.6   | 92.2   | 98.0   | 96.4   | 93.9   | 89.8   | 80.2   | 78.6   |
| 55°   | 3171.8 | 1669.9 | 66.6   | 70.7   | 81.9   | 89.3   | 83.1   | 77.8   | 69.9   | 62.0   | 60.4   |
| 57.5° | 3123.8 | 1506.5 | 54.2   | 55.0   | 69.1   | 75.3   | 68.3   | 62.0   | 53.4   | 46.7   | 45.5   |
| 60°   | 3022.0 | 1324.9 | 44.7   | 41.4   | 53.4   | 58.7   | 54.2   | 48.0   | 40.1   | 35.2   | 34.7   |
| 62.5° | 2820.2 | 1131.3 | 36.8   | 32.3   | 40.5   | 45.1   | 42.2   | 37.6   | 31.0   | 27.7   | 27.3   |
| 65°   | 2395.8 | 905.0  | 29.8   | 26.1   | 31.4   | 35.2   | 32.7   | 29.4   | 24.4   | 21.9   | 21.5   |
| 67.5° | 1672.3 | 611.8  | 24.4   | 21.5   | 24.8   | 27.7   | 25.6   | 24.0   | 19.4   | 19.0   | 19.4   |
| 70°   | 806.6  | 294.9  | 20.3   | 17.4   | 19.4   | 21.5   | 20.7   | 19.4   | 18.6   | 21.5   | 24.8   |
| 72.5° | 231.2  | 98.9   | 16.1   | 14.5   | 15.7   | 17.0   | 17.8   | 17.4   | 20.3   | 26.1   | 30.2   |
| 73°   | 177.9  | 79.8   | 15.3   | 13.7   | 14.9   | 16.5   | 17.4   | 17.0   | 20.7   | 26.5   | 30.2   |
| 75°   | 76.1   | 38.5   | 11.6   | 11.2   | 12.4   | 14.5   | 15.3   | 15.3   | 20.7   | 26.9   | 29.0   |
| 77.5° | 34.3   | 20.7   | 7.4    | 8.7    | 10.8   | 11.6   | 12.8   | 12.8   | 16.5   | 20.7   | 20.7   |
| 80°   | 19.4   | 11.2   | 5.8    | 6.6    | 7.9    | 7.9    | 7.9    | 7.0    | 7.4    | 8.3    | 9.1    |
| 82.5° | 12.4   | 7.4    | 4.6    | 5.4    | 5.0    | 4.1    | 3.3    | 3.3    | 2.9    | 3.3    | 4.1    |
| 85°   | 7.0    | 4.1    | 4.1    | 3.3    | 2.1    | 1.7    | 2.1    | 1.7    | 0.4    | 0.0    | 0.4    |
| 87.5° | 4.1    | 2.5    | 1.2    | 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    |



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

Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

STREETWORKS

Report Number: SP1-2101-121-4

Luminaire Tested: IFLD-S-SA2B-722-U-T3R

Test Date: 03/03/2021

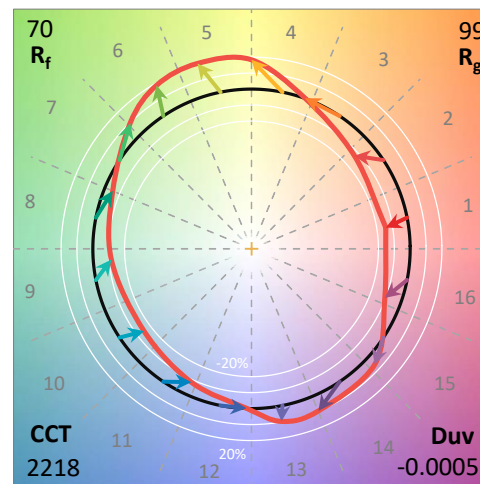
### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2101-121-4  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 03/03/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: STREETWORKS  
 Catalog Number: **IFLD-S-SA2B-722-U-T3R**  
 Description: STREETWORKS INF FLOOD

PROGRAMMED @ 800mA.

### Spectral Parameters

|                           |         |           |      |      |       |
|---------------------------|---------|-----------|------|------|-------|
| CCT (K):                  | 2218    | CRI (Ra): | 72.2 |      |       |
| CIE u':                   | 0.2889  | R1:       | 69.1 | R9:  | -16.8 |
| CIE v':                   | 0.5350  | R2:       | 83.2 | R10: | 61.9  |
| Duv:                      | -0.0005 | R3:       | 95.4 | R11: | 60.1  |
| CIE x:                    | 0.5026  | R4:       | 66.4 | R12: | 51.2  |
| CIE y:                    | 0.4136  | R5:       | 66.2 | R13: | 71.3  |
| CIE z:                    | 0.0839  | R6:       | 76.7 | R14: | 97.1  |
| Peak Wavelength (nm):     | 606     | R7:       | 76.7 |      |       |
| Dominant Wavelength (nm): | 587     | R8:       | 43.9 |      |       |
| Purity:                   | 75.3    |           |      |      |       |
| Rf:                       | 70      |           |      |      |       |
| Rg:                       | 99.3    |           |      |      |       |



### Test Conditions

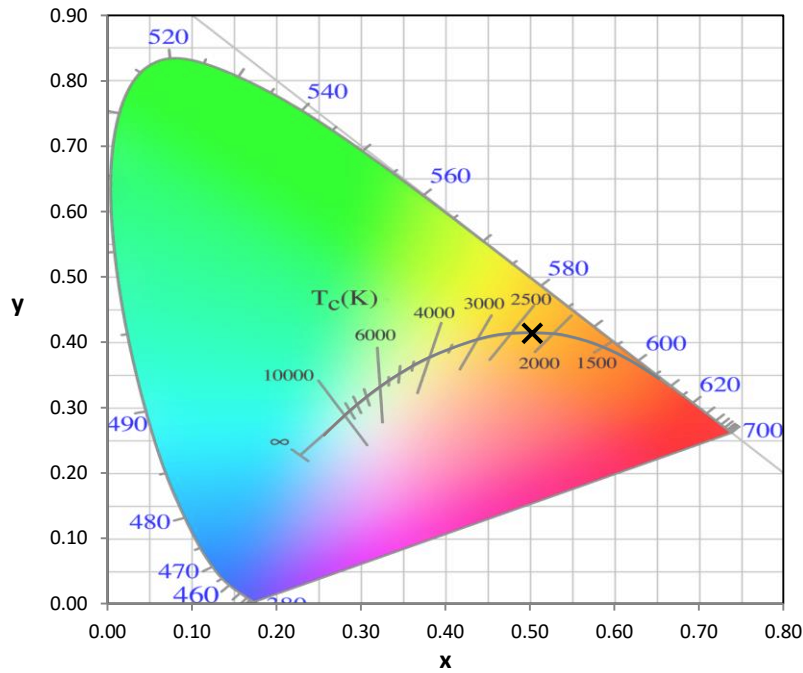
Stabilization Time: 95M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.3/31%  
 Sphere Temperature (°C): 24.8

REPORT NUMBER: SP1-2101-121-4

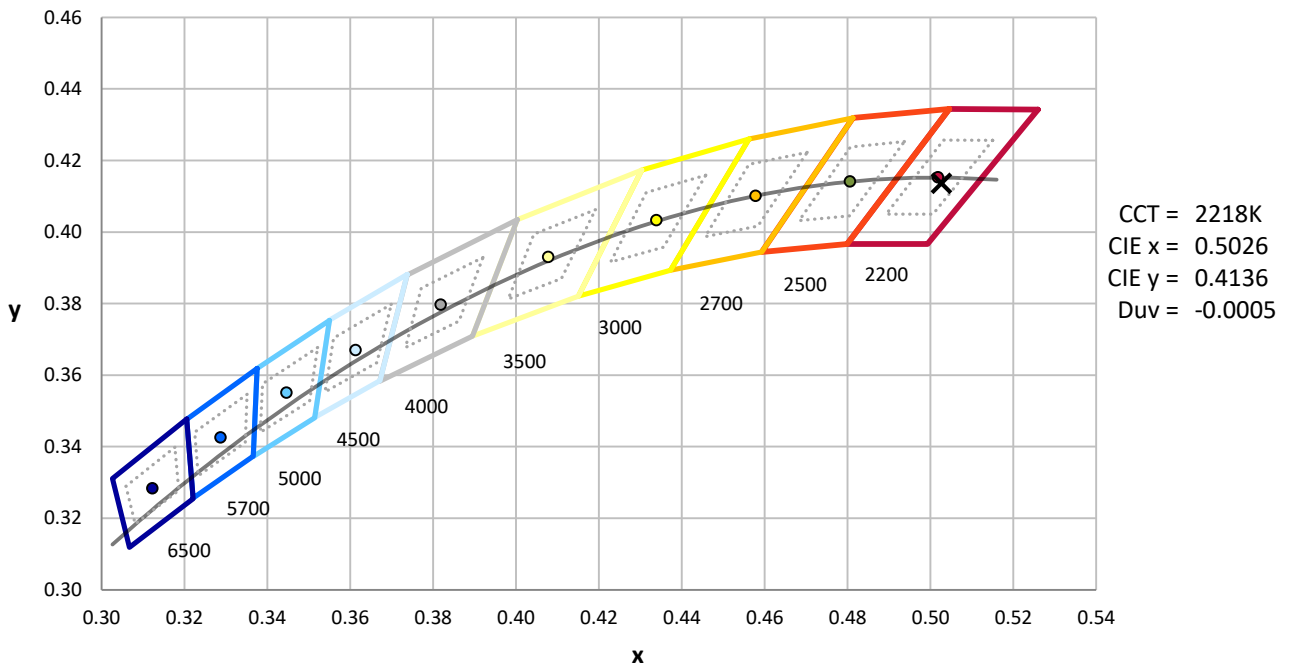
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 1/31/2021        | 7/31/2021            |
| Power Meter                    | IN0071                | 12/1/2020        | 12/1/2021            |
| AC Power Source                | IN0063                | 12/1/2020        | 12/1/2021            |
| DC Power Source                | IN0208                | 12/1/2020        | 12/1/2021            |
| Sphere Thermometer             | IN0085                | 12/1/2020        | 12/1/2021            |
| Room Thermometer               | IN0046                | 12/1/2020        | 12/1/2021            |

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**CIE 1931 Chromaticity Diagram**



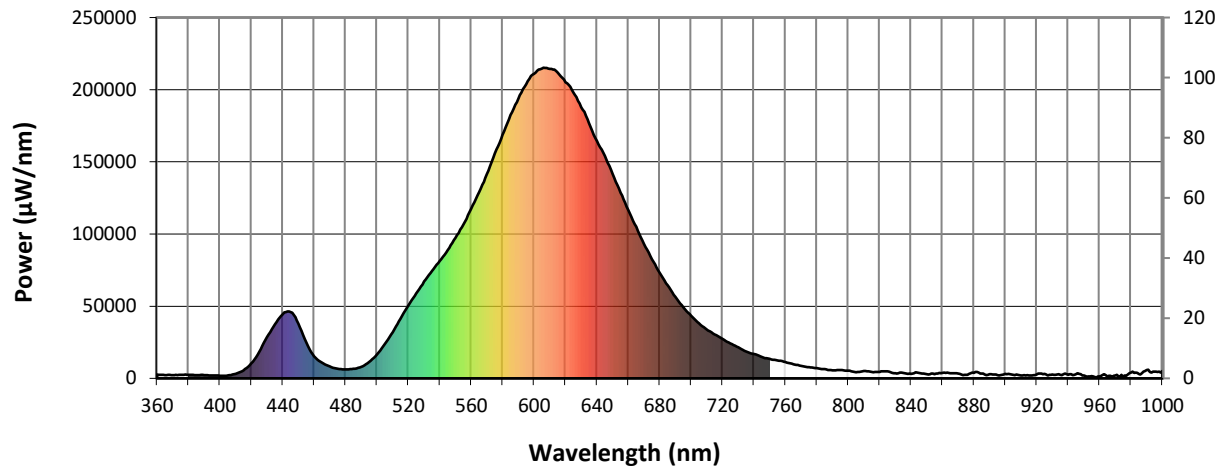
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 2200K 4-step quadrangle

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### Photopic Flux vs. Wavelength

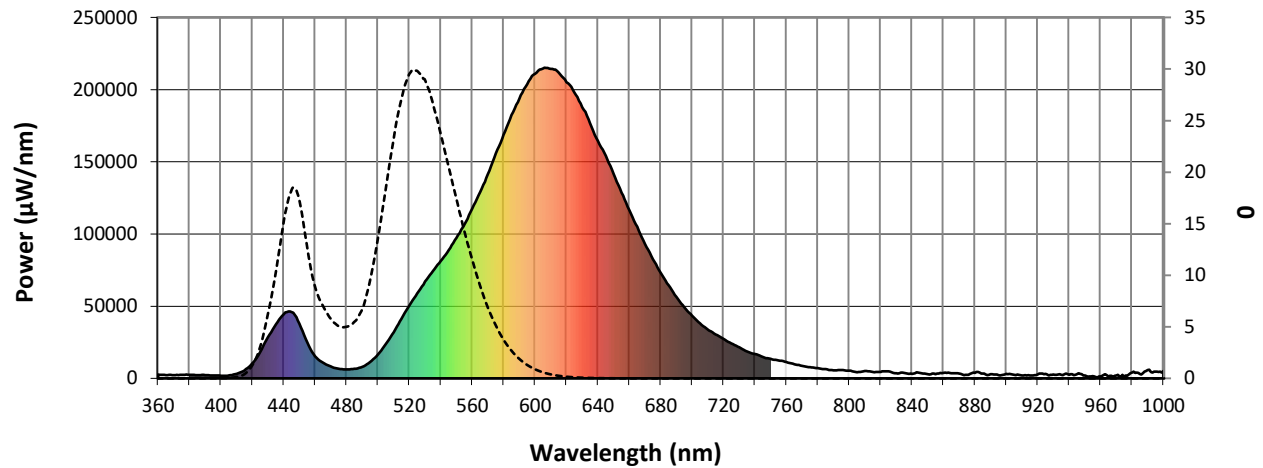


#####

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2623             | 0.0              | 490       | 7941             | 1.1              | 620       | 205150           | 53.4             | 750       | 13431            | 0.0              | 880       | 3867             | 0.0              |
| 365       | 2260             | 0.0              | 495       | 11299            | 2.0              | 625       | 198277           | 43.7             | 755       | 12426            | 0.0              | 885       | 3345             | 0.0              |
| 370       | 2306             | 0.0              | 500       | 16633            | 3.7              | 630       | 187878           | 34.0             | 760       | 11385            | 0.0              | 890       | 2956             | 0.0              |
| 375       | 2437             | 0.0              | 505       | 23672            | 6.6              | 635       | 176836           | 26.6             | 765       | 9797             | 0.0              | 895       | 2272             | 0.0              |
| 380       | 2473             | 0.0              | 510       | 32025            | 11.0             | 640       | 164455           | 19.7             | 770       | 8562             | 0.0              | 900       | 3003             | 0.0              |
| 385       | 2203             | 0.0              | 515       | 41295            | 17.1             | 645       | 154086           | 14.8             | 775       | 7810             | 0.0              | 905       | 2480             | 0.0              |
| 390       | 2262             | 0.0              | 520       | 50628            | 24.6             | 650       | 141592           | 10.3             | 780       | 7052             | 0.0              | 910       | 2068             | 0.0              |
| 395       | 2028             | 0.0              | 525       | 58836            | 31.6             | 655       | 128604           | 7.4              | 785       | 6345             | 0.0              | 915       | 2064             | 0.0              |
| 400       | 1806             | 0.0              | 530       | 67109            | 39.5             | 660       | 116713           | 4.9              | 790       | 5524             | 0.0              | 920       | 2581             | 0.0              |
| 405       | 1945             | 0.0              | 535       | 74404            | 46.1             | 665       | 104993           | 3.3              | 795       | 5788             | 0.0              | 925       | 3137             | 0.0              |
| 410       | 3199             | 0.0              | 540       | 81280            | 53.0             | 670       | 93149            | 2.0              | 800       | 5282             | 0.0              | 930       | 2747             | 0.0              |
| 415       | 5572             | 0.0              | 545       | 88806            | 59.1             | 675       | 82543            | 1.4              | 805       | 4258             | 0.0              | 935       | 2471             | 0.0              |
| 420       | 10322            | 0.0              | 550       | 97367            | 66.2             | 680       | 73089            | 0.8              | 810       | 5156             | 0.0              | 940       | 2339             | 0.0              |
| 425       | 18494            | 0.1              | 555       | 106598           | 72.8             | 685       | 64438            | 0.6              | 815       | 4391             | 0.0              | 945       | 2917             | 0.0              |
| 430       | 28541            | 0.2              | 560       | 117615           | 79.9             | 690       | 56546            | 0.3              | 820       | 4383             | 0.0              | 950       | 1966             | 0.0              |
| 435       | 37453            | 0.4              | 565       | 129103           | 85.8             | 695       | 49328            | 0.2              | 825       | 4881             | 0.0              | 955       | 1580             | 0.0              |
| 440       | 44455            | 0.7              | 570       | 141415           | 92.0             | 700       | 43493            | 0.1              | 830       | 3588             | 0.0              | 960       | 1318             | 0.0              |
| 445       | 45934            | 1.0              | 575       | 155854           | 97.0             | 705       | 38035            | 0.1              | 835       | 3835             | 0.0              | 965       | 1419             | 0.0              |
| 450       | 37926            | 1.0              | 580       | 168613           | 100.2            | 710       | 33716            | 0.0              | 840       | 3014             | 0.0              | 970       | 1917             | 0.0              |
| 455       | 24793            | 0.8              | 585       | 182390           | 101.3            | 715       | 30449            | 0.0              | 845       | 3765             | 0.0              | 975       | 1210             | 0.0              |
| 460       | 15340            | 0.6              | 590       | 194054           | 100.3            | 720       | 27240            | 0.0              | 850       | 2906             | 0.0              | 980       | 3915             | 0.0              |
| 465       | 10883            | 0.6              | 595       | 203639           | 96.5             | 725       | 24231            | 0.0              | 855       | 2947             | 0.0              | 985       | 3180             | 0.0              |
| 470       | 8138             | 0.5              | 600       | 211043           | 91.0             | 730       | 21490            | 0.0              | 860       | 3864             | 0.0              | 990       | 5676             | 0.0              |
| 475       | 6653             | 0.5              | 605       | 214591           | 83.1             | 735       | 18548            | 0.0              | 865       | 3546             | 0.0              | 995       | 4736             | 0.0              |
| 480       | 6220             | 0.6              | 610       | 214337           | 73.6             | 740       | 16963            | 0.0              | 870       | 3253             | 0.0              | 1000      | 5113             | 0.0              |
| 485       | 6613             | 0.8              | 615       | 211915           | 64.0             | 745       | 14922            | 0.0              | 875       | 2450             | 0.0              |           |                  |                  |

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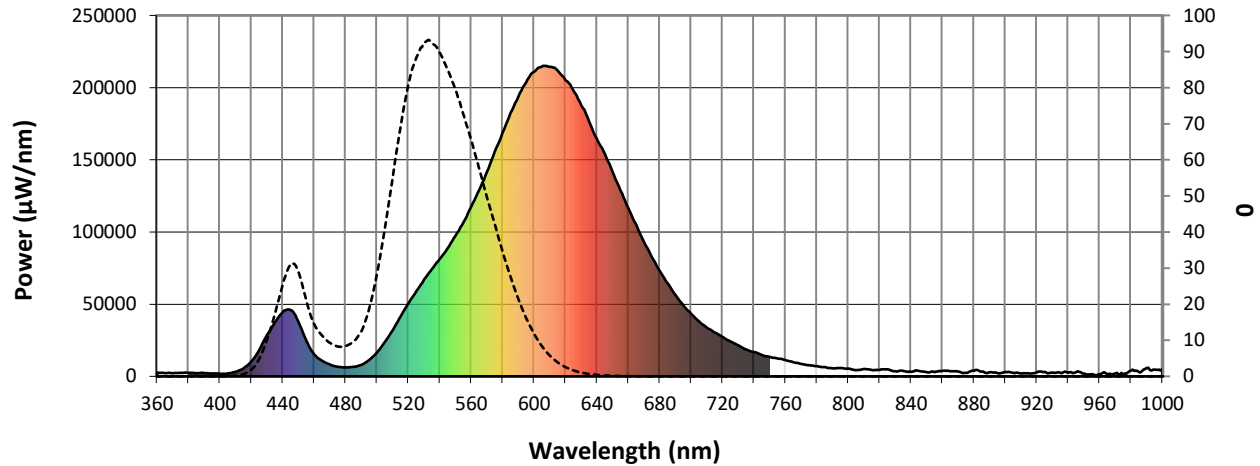
### Scotopic Flux vs. Wavelength


**Scotopic Lumens: 7290.1**
**S/P: 0.84**

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2623             | 0.0              | 490       | 7941             | 12.2             | 620       | 205150           | 2.6              | 750       | 13431            | 0.0              | 880       | 3867             | 0.0              |
| 365       | 2260             | 0.0              | 495       | 11299            | 18.3             | 625       | 198277           | 1.7              | 755       | 12426            | 0.0              | 885       | 3345             | 0.0              |
| 370       | 2306             | 0.0              | 500       | 16633            | 27.8             | 630       | 187878           | 1.1              | 760       | 11385            | 0.0              | 890       | 2956             | 0.0              |
| 375       | 2437             | 0.0              | 505       | 23672            | 40.2             | 635       | 176836           | 0.7              | 765       | 9797             | 0.0              | 895       | 2272             | 0.0              |
| 380       | 2473             | 0.0              | 510       | 32025            | 54.3             | 640       | 164455           | 0.4              | 770       | 8562             | 0.0              | 900       | 3003             | 0.0              |
| 385       | 2203             | 0.0              | 515       | 41295            | 68.4             | 645       | 154086           | 0.3              | 775       | 7810             | 0.0              | 905       | 2480             | 0.0              |
| 390       | 2262             | 0.0              | 520       | 50628            | 80.5             | 650       | 141592           | 0.2              | 780       | 7052             | 0.0              | 910       | 2068             | 0.0              |
| 395       | 2028             | 0.0              | 525       | 58836            | 88.0             | 655       | 128604           | 0.1              | 785       | 6345             | 0.0              | 915       | 2064             | 0.0              |
| 400       | 1806             | 0.0              | 530       | 67109            | 92.5             | 660       | 116713           | 0.1              | 790       | 5524             | 0.0              | 920       | 2581             | 0.0              |
| 405       | 1945             | 0.1              | 535       | 74404            | 92.7             | 665       | 104993           | 0.0              | 795       | 5788             | 0.0              | 925       | 3137             | 0.0              |
| 410       | 3199             | 0.2              | 540       | 81280            | 89.8             | 670       | 93149            | 0.0              | 800       | 5282             | 0.0              | 930       | 2747             | 0.0              |
| 415       | 5572             | 0.6              | 545       | 88806            | 85.1             | 675       | 82543            | 0.0              | 805       | 4258             | 0.0              | 935       | 2471             | 0.0              |
| 420       | 10322            | 1.7              | 550       | 97367            | 79.6             | 680       | 73089            | 0.0              | 810       | 5156             | 0.0              | 940       | 2339             | 0.0              |
| 425       | 18494            | 4.5              | 555       | 106598           | 72.8             | 685       | 64438            | 0.0              | 815       | 4391             | 0.0              | 945       | 2917             | 0.0              |
| 430       | 28541            | 9.7              | 560       | 117615           | 65.7             | 690       | 56546            | 0.0              | 820       | 4383             | 0.0              | 950       | 1966             | 0.0              |
| 435       | 37453            | 16.7             | 565       | 129103           | 57.9             | 695       | 49328            | 0.0              | 825       | 4881             | 0.0              | 955       | 1580             | 0.0              |
| 440       | 44455            | 24.8             | 570       | 141415           | 49.9             | 700       | 43493            | 0.0              | 830       | 3588             | 0.0              | 960       | 1318             | 0.0              |
| 445       | 45934            | 30.8             | 575       | 155854           | 42.4             | 705       | 38035            | 0.0              | 835       | 3835             | 0.0              | 965       | 1419             | 0.0              |
| 450       | 37926            | 29.4             | 580       | 168613           | 34.7             | 710       | 33716            | 0.0              | 840       | 3014             | 0.0              | 970       | 1917             | 0.0              |
| 455       | 24793            | 21.7             | 585       | 182390           | 27.9             | 715       | 30449            | 0.0              | 845       | 3765             | 0.0              | 975       | 1210             | 0.0              |
| 460       | 15340            | 14.8             | 590       | 194054           | 21.6             | 720       | 27240            | 0.0              | 850       | 2906             | 0.0              | 980       | 3915             | 0.0              |
| 465       | 10883            | 11.5             | 595       | 203639           | 16.2             | 725       | 24231            | 0.0              | 855       | 2947             | 0.0              | 985       | 3180             | 0.0              |
| 470       | 8138             | 9.4              | 600       | 211043           | 11.9             | 730       | 21490            | 0.0              | 860       | 3864             | 0.0              | 990       | 5676             | 0.0              |
| 475       | 6653             | 8.3              | 605       | 214591           | 8.4              | 735       | 18548            | 0.0              | 865       | 3546             | 0.0              | 995       | 4736             | 0.0              |
| 480       | 6220             | 8.4              | 610       | 214337           | 5.8              | 740       | 16963            | 0.0              | 870       | 3253             | 0.0              | 1000      | 5113             | 0.0              |
| 485       | 6613             | 9.6              | 615       | 211915           | 3.9              | 745       | 14922            | 0.0              | 875       | 2450             | 0.0              |           |                  |                  |

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### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 2276.7**

**M/P: 0.26**

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2623             | 0.0              | 490       | 7941             | 6.6              | 620       | 205150           | 0.2              | 750       | 13431            | 0.0              | 880       | 3867             | 0.0              |
| 365       | 2260             | 0.0              | 495       | 11299            | 9.3              | 625       | 198277           | 0.1              | 755       | 12426            | 0.0              | 885       | 3345             | 0.0              |
| 370       | 2306             | 0.0              | 500       | 16633            | 13.4             | 630       | 187878           | 0.1              | 760       | 11385            | 0.0              | 890       | 2956             | 0.0              |
| 375       | 2437             | 0.0              | 505       | 23672            | 18.2             | 635       | 176836           | 0.0              | 765       | 9797             | 0.0              | 895       | 2272             | 0.0              |
| 380       | 2473             | 0.0              | 510       | 32025            | 23.0             | 640       | 164455           | 0.0              | 770       | 8562             | 0.0              | 900       | 3003             | 0.0              |
| 385       | 2203             | 0.0              | 515       | 41295            | 27.0             | 645       | 154086           | 0.0              | 775       | 7810             | 0.0              | 905       | 2480             | 0.0              |
| 390       | 2262             | 0.0              | 520       | 50628            | 29.5             | 650       | 141592           | 0.0              | 780       | 7052             | 0.0              | 910       | 2068             | 0.0              |
| 395       | 2028             | 0.0              | 525       | 58836            | 29.8             | 655       | 128604           | 0.0              | 785       | 6345             | 0.0              | 915       | 2064             | 0.0              |
| 400       | 1806             | 0.0              | 530       | 67109            | 29.0             | 660       | 116713           | 0.0              | 790       | 5524             | 0.0              | 920       | 2581             | 0.0              |
| 405       | 1945             | 0.0              | 535       | 74404            | 26.8             | 665       | 104993           | 0.0              | 795       | 5788             | 0.0              | 925       | 3137             | 0.0              |
| 410       | 3199             | 0.1              | 540       | 81280            | 23.8             | 670       | 93149            | 0.0              | 800       | 5282             | 0.0              | 930       | 2747             | 0.0              |
| 415       | 5572             | 0.4              | 545       | 88806            | 20.6             | 675       | 82543            | 0.0              | 805       | 4258             | 0.0              | 935       | 2471             | 0.0              |
| 420       | 10322            | 1.2              | 550       | 97367            | 17.5             | 680       | 73089            | 0.0              | 810       | 5156             | 0.0              | 940       | 2339             | 0.0              |
| 425       | 18494            | 2.9              | 555       | 106598           | 14.4             | 685       | 64438            | 0.0              | 815       | 4391             | 0.0              | 945       | 2917             | 0.0              |
| 430       | 28541            | 6.0              | 560       | 117615           | 11.6             | 690       | 56546            | 0.0              | 820       | 4383             | 0.0              | 950       | 1966             | 0.0              |
| 435       | 37453            | 10.0             | 565       | 129103           | 9.1              | 695       | 49328            | 0.0              | 825       | 4881             | 0.0              | 955       | 1580             | 0.0              |
| 440       | 44455            | 14.9             | 570       | 141415           | 6.9              | 700       | 43493            | 0.0              | 830       | 3588             | 0.0              | 960       | 1318             | 0.0              |
| 445       | 45934            | 18.1             | 575       | 155854           | 5.2              | 705       | 38035            | 0.0              | 835       | 3835             | 0.0              | 965       | 1419             | 0.0              |
| 450       | 37926            | 17.5             | 580       | 168613           | 3.8              | 710       | 33716            | 0.0              | 840       | 3014             | 0.0              | 970       | 1917             | 0.0              |
| 455       | 24793            | 13.0             | 585       | 182390           | 2.7              | 715       | 30449            | 0.0              | 845       | 3765             | 0.0              | 975       | 1210             | 0.0              |
| 460       | 15340            | 9.0              | 590       | 194054           | 1.9              | 720       | 27240            | 0.0              | 850       | 2906             | 0.0              | 980       | 3915             | 0.0              |
| 465       | 10883            | 7.1              | 595       | 203639           | 1.3              | 725       | 24231            | 0.0              | 855       | 2947             | 0.0              | 985       | 3180             | 0.0              |
| 470       | 8138             | 5.8              | 600       | 211043           | 0.9              | 730       | 21490            | 0.0              | 860       | 3864             | 0.0              | 990       | 5676             | 0.0              |
| 475       | 6653             | 5.1              | 605       | 214591           | 0.6              | 735       | 18548            | 0.0              | 865       | 3546             | 0.0              | 995       | 4736             | 0.0              |
| 480       | 6220             | 5.0              | 610       | 214337           | 0.4              | 740       | 16963            | 0.0              | 870       | 3253             | 0.0              | 1000      | 5113             | 0.0              |
| 485       | 6613             | 5.5              | 615       | 211915           | 0.3              | 745       | 14922            | 0.0              | 875       | 2450             | 0.0              |           |                  |                  |

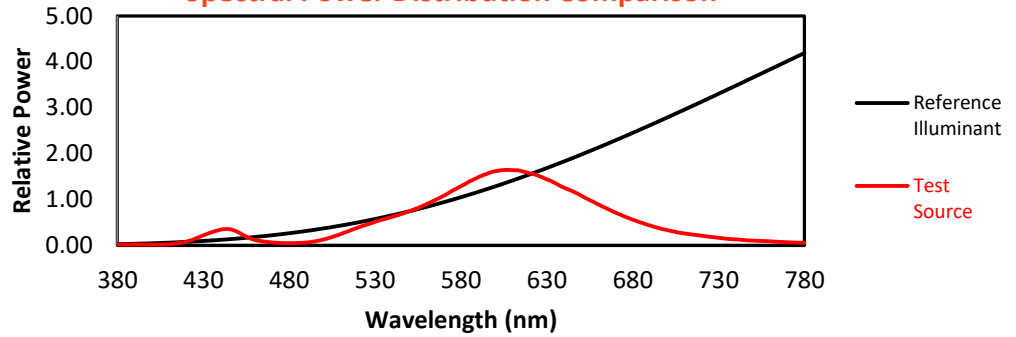
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TM-30-18

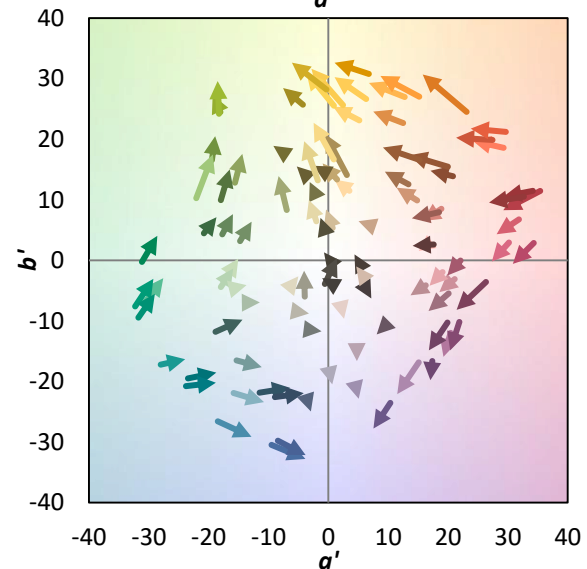
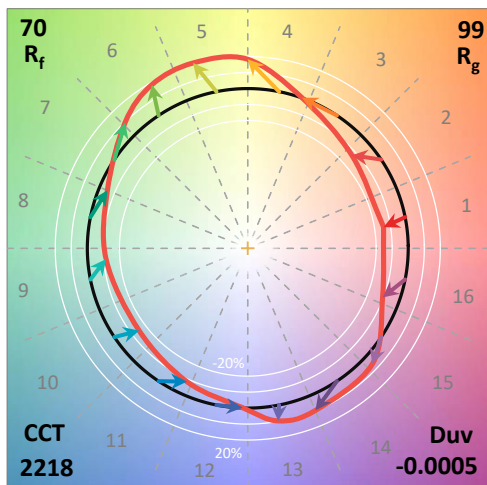
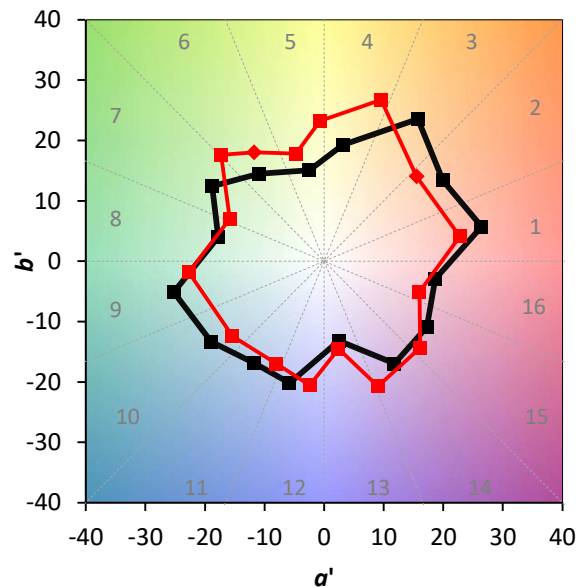
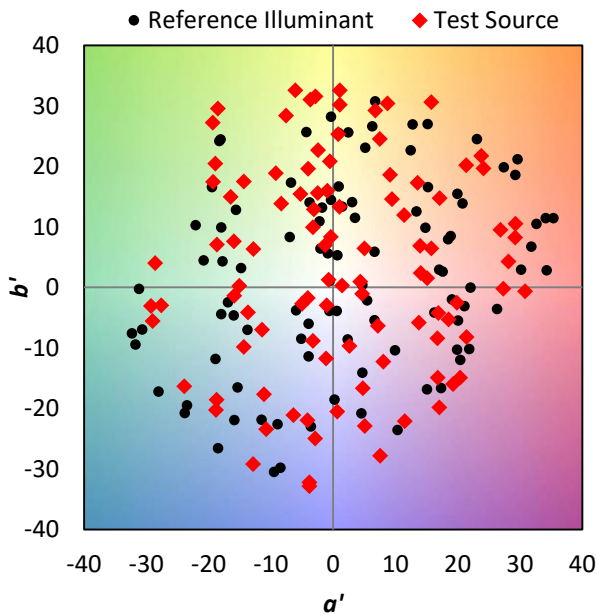
### Summary

$R_f = 70$   
 $R_g = 99.3$   
 CIE  $R_a = 72.2$   
 $R_g = -16.8$

### Spectral Power Distribution Comparison



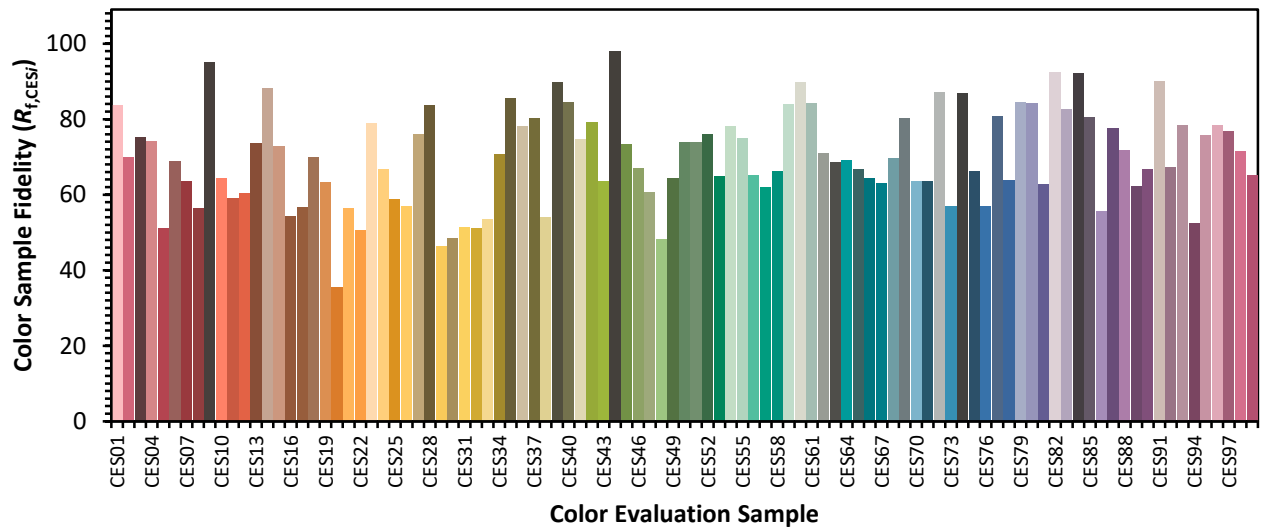
### Color Vector Graphics



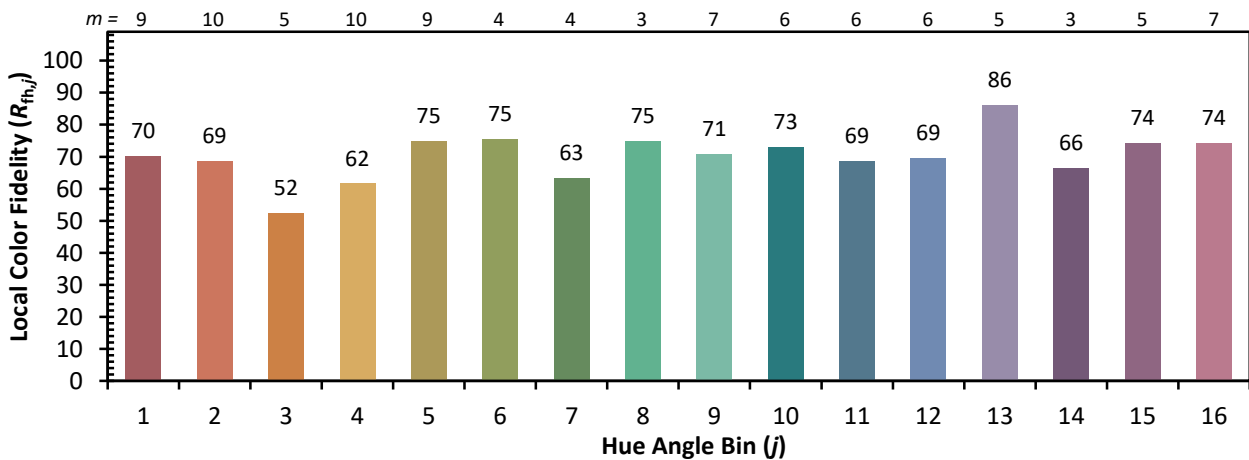
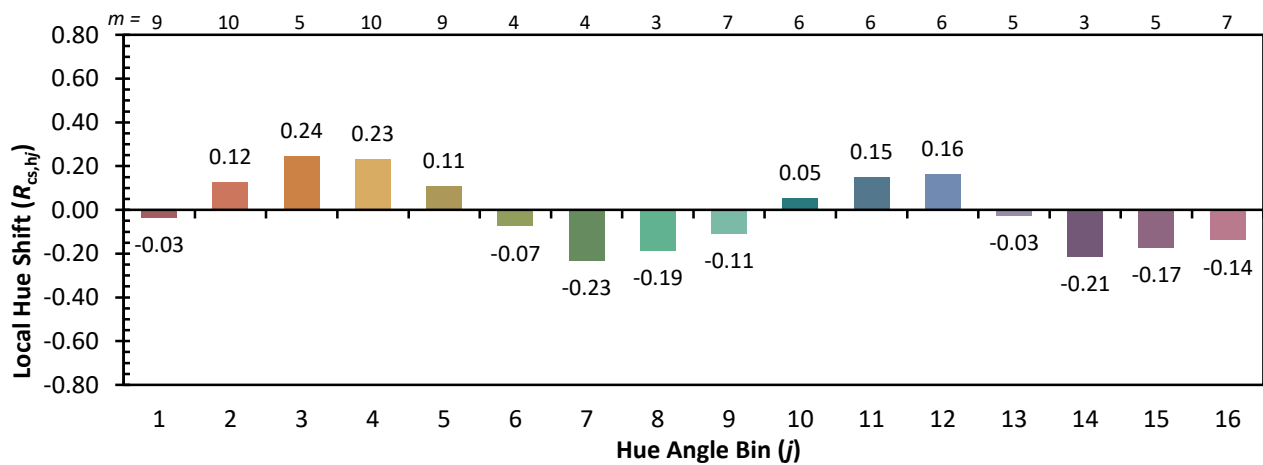
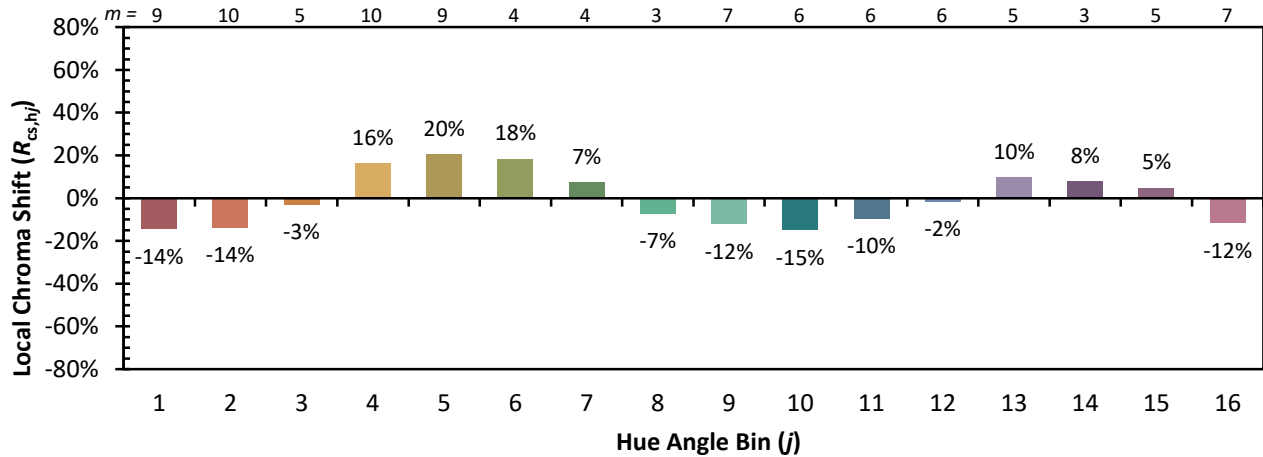


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

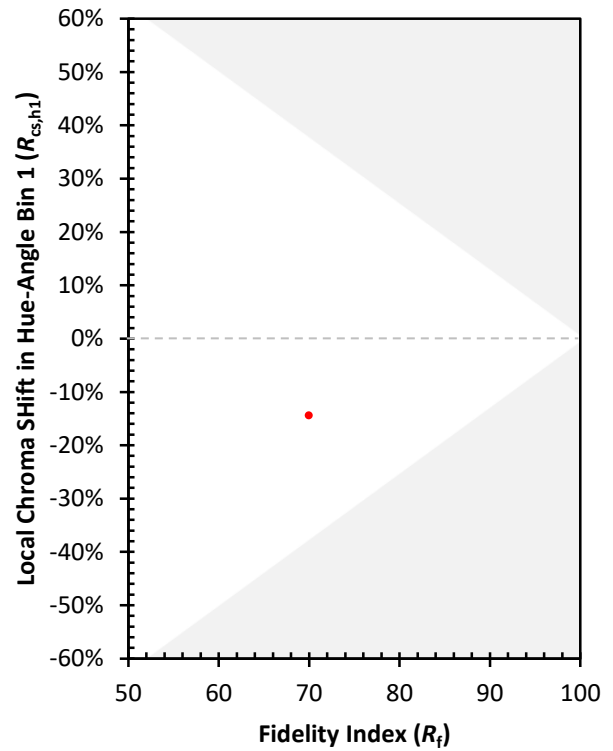
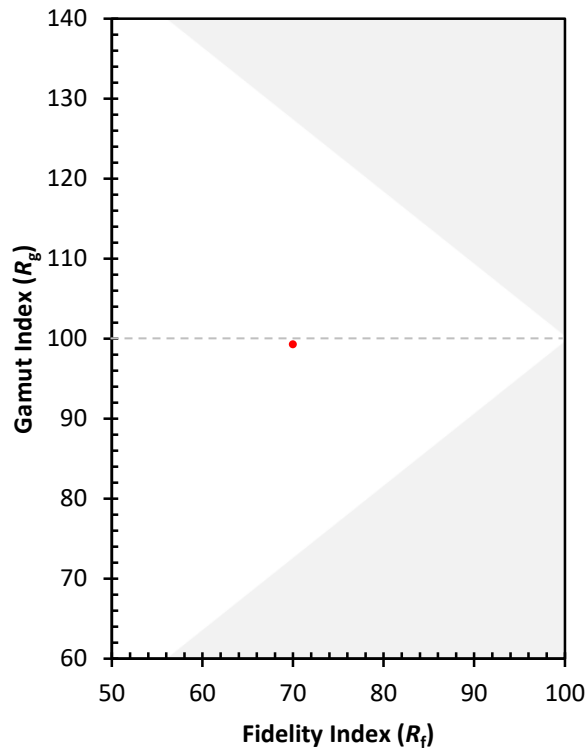
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 87 | CES26 = 57 | CES51 = 74 | CES76 = 57 |
| CES02 = 65 | CES27 = 76 | CES52 = 76 | CES77 = 81 |
| CES03 = 32 | CES28 = 84 | CES53 = 65 | CES78 = 64 |
| CES04 = 72 | CES29 = 46 | CES54 = 78 | CES79 = 85 |
| CES05 = 52 | CES30 = 48 | CES55 = 75 | CES80 = 84 |
| CES06 = 52 | CES31 = 52 | CES56 = 65 | CES81 = 63 |
| CES07 = 44 | CES32 = 51 | CES57 = 62 | CES82 = 92 |
| CES08 = 43 | CES33 = 54 | CES58 = 66 | CES83 = 83 |
| CES09 = 29 | CES34 = 71 | CES59 = 84 | CES84 = 92 |
| CES10 = 79 | CES35 = 86 | CES60 = 90 | CES85 = 81 |
| CES11 = 62 | CES36 = 78 | CES61 = 84 | CES86 = 56 |
| CES12 = 68 | CES37 = 80 | CES62 = 71 | CES87 = 78 |
| CES13 = 45 | CES38 = 54 | CES63 = 68 | CES88 = 72 |
| CES14 = 75 | CES39 = 90 | CES64 = 69 | CES89 = 62 |
| CES15 = 72 | CES40 = 85 | CES65 = 67 | CES90 = 67 |
| CES16 = 49 | CES41 = 75 | CES66 = 64 | CES91 = 90 |
| CES17 = 51 | CES42 = 79 | CES67 = 63 | CES92 = 67 |
| CES18 = 57 | CES43 = 64 | CES68 = 70 | CES93 = 78 |
| CES19 = 74 | CES44 = 98 | CES69 = 80 | CES94 = 52 |
| CES20 = 68 | CES45 = 73 | CES70 = 64 | CES95 = 76 |
| CES21 = 89 | CES46 = 67 | CES71 = 64 | CES96 = 78 |
| CES22 = 81 | CES47 = 61 | CES72 = 87 | CES97 = 77 |
| CES23 = 92 | CES48 = 48 | CES73 = 57 | CES98 = 72 |
| CES24 = 92 | CES49 = 64 | CES74 = 87 | CES99 = 65 |
| CES25 = 74 | CES50 = 74 | CES75 = 66 |            |



### Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)