

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: P386405

Luminaire Tested: **GWC-SA2A-740-U-T4W**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P386405  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-18)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GWC-SA2A-740-U-T4W  
Description: GALLEON WALL LUMINAIRE  
(2) 70 CRI, 4000K, 615mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV WIDE OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 9658 lumens  
Efficiency: N/A  
Efficacy: 146.3 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 0.5' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B2 - U0 - G2

Input Watts (W): 66  
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

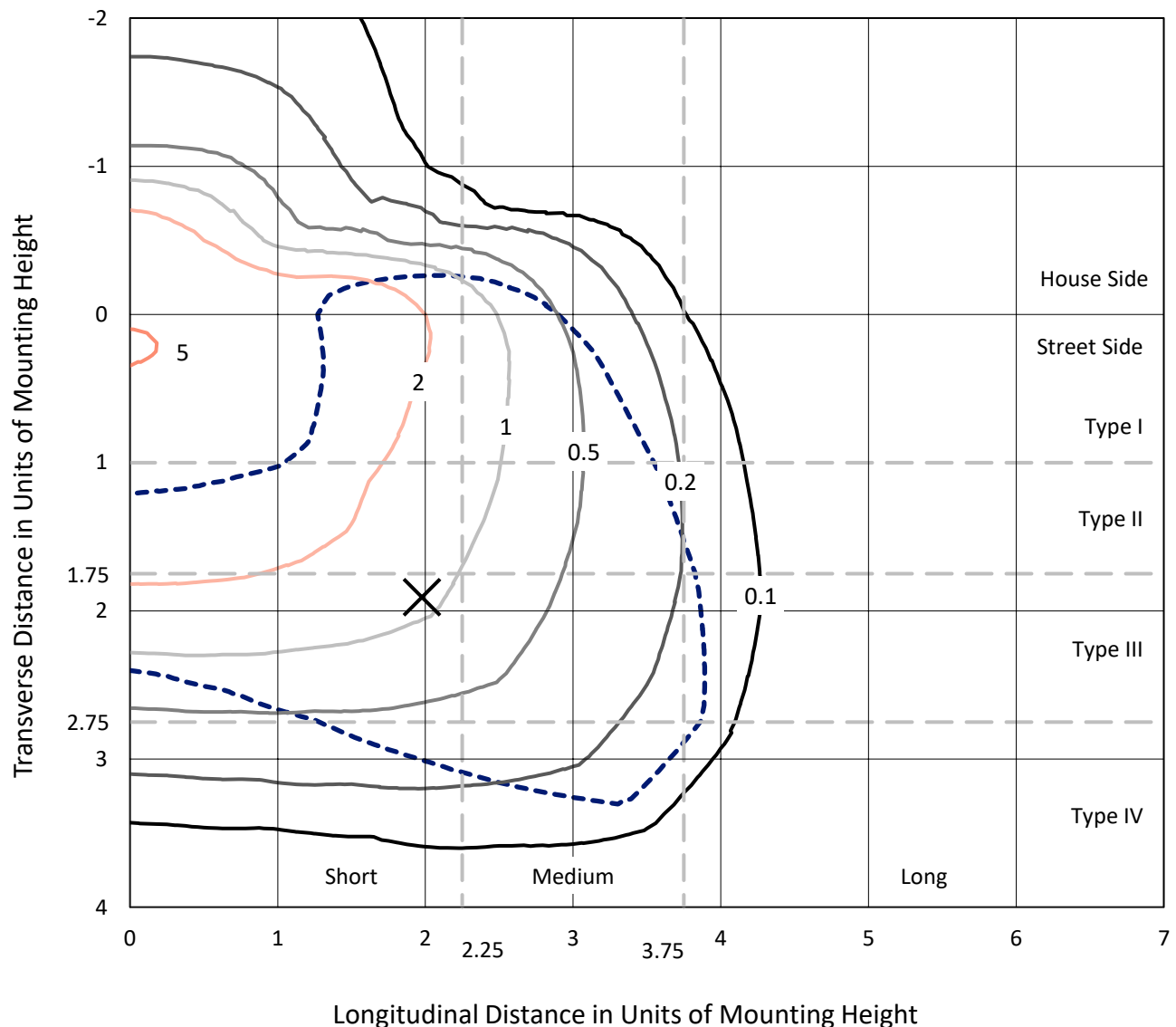


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CATALOG NUMBER: GWC-SA2A-740-U-T4W

## Iso-Footcandle Lines of Horizontal Illumination

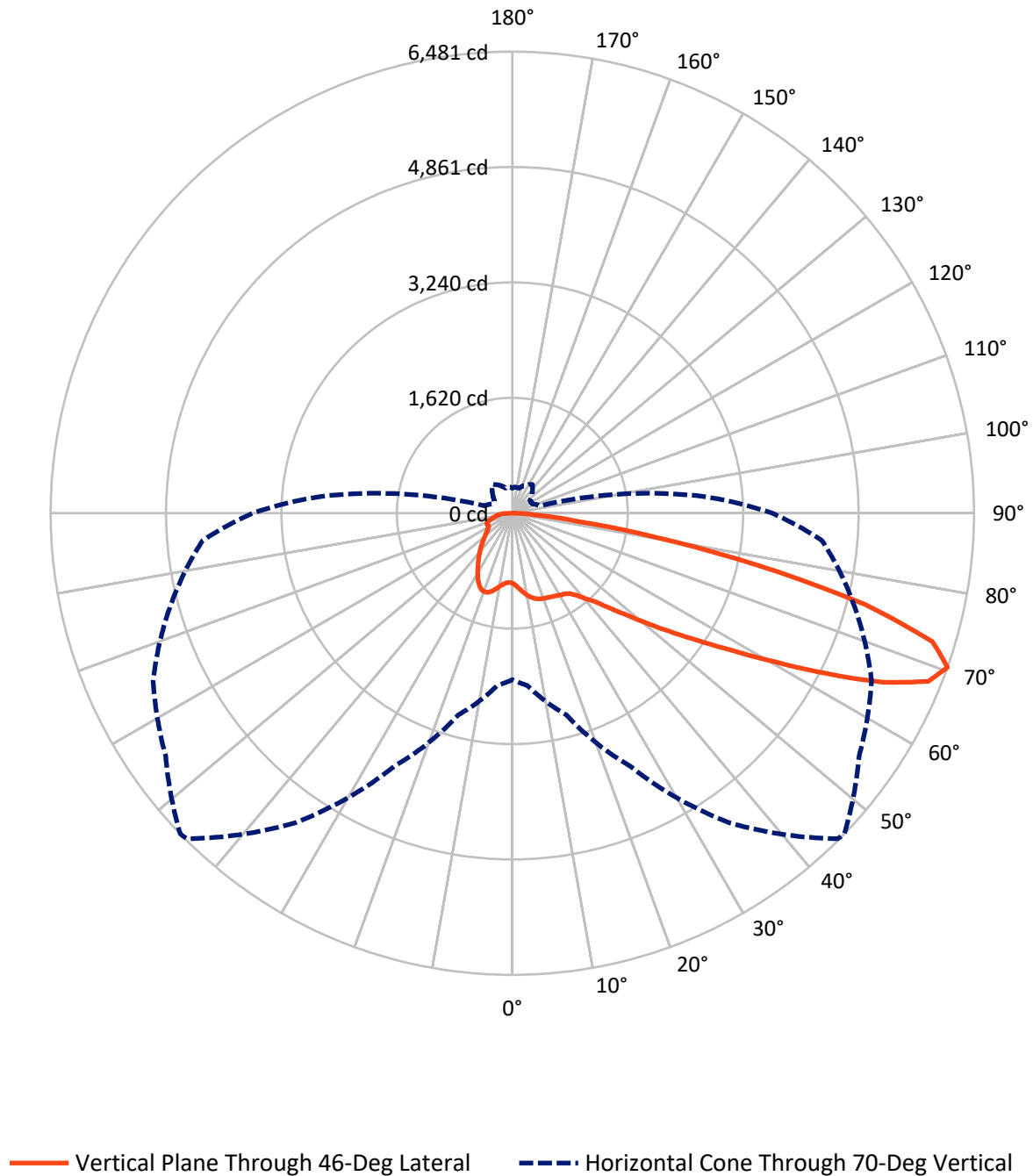
✕ Max cd  
 - - - 1/2 Max cd



Based on 15 foot mounting height. Maximum calculated value = 5.5 fc  
 Type IV - Short - N/A

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## Luminous Intensity Polar Plot



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CATALOG NUMBER: GWC-SA2A-740-U-T4W

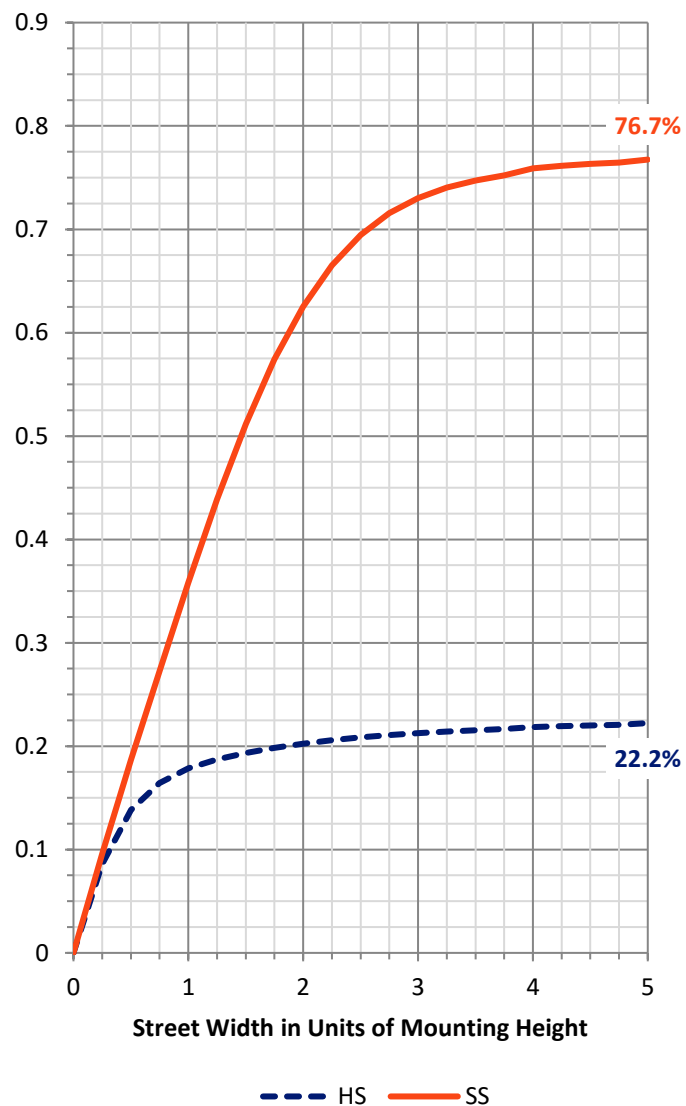
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 2213.6   | 0.0    | 2213.6 |
|                    | % Fixture | 22.9     | 0.0    | 22.9   |
| <b>Street Side</b> | Lumens    | 7444.4   | 0.0    | 7444.4 |
|                    | % Fixture | 77.1     | 0.0    | 77.1   |
| <b>Total</b>       | Lumens    | 9658.0   | 0.0    | 9658.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 100.3  | 1.0       |
| 10°-20°   | 334.2  | 3.5       |
| 20°-30°   | 557.2  | 5.8       |
| 30°-40°   | 790.7  | 8.2       |
| 40°-50°   | 1163.1 | 12.0      |
| 50°-60°   | 1969.8 | 20.4      |
| 60°-70°   | 2796.1 | 29.0      |
| 70°-80°   | 1698.6 | 17.6      |
| 80°-90°   | 247.9  | 2.6       |
| 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°    | 9658.0 | 100.0     |
| 0°-180°   | 9658.0 | 100.0     |

**Coefficient of Utilization**



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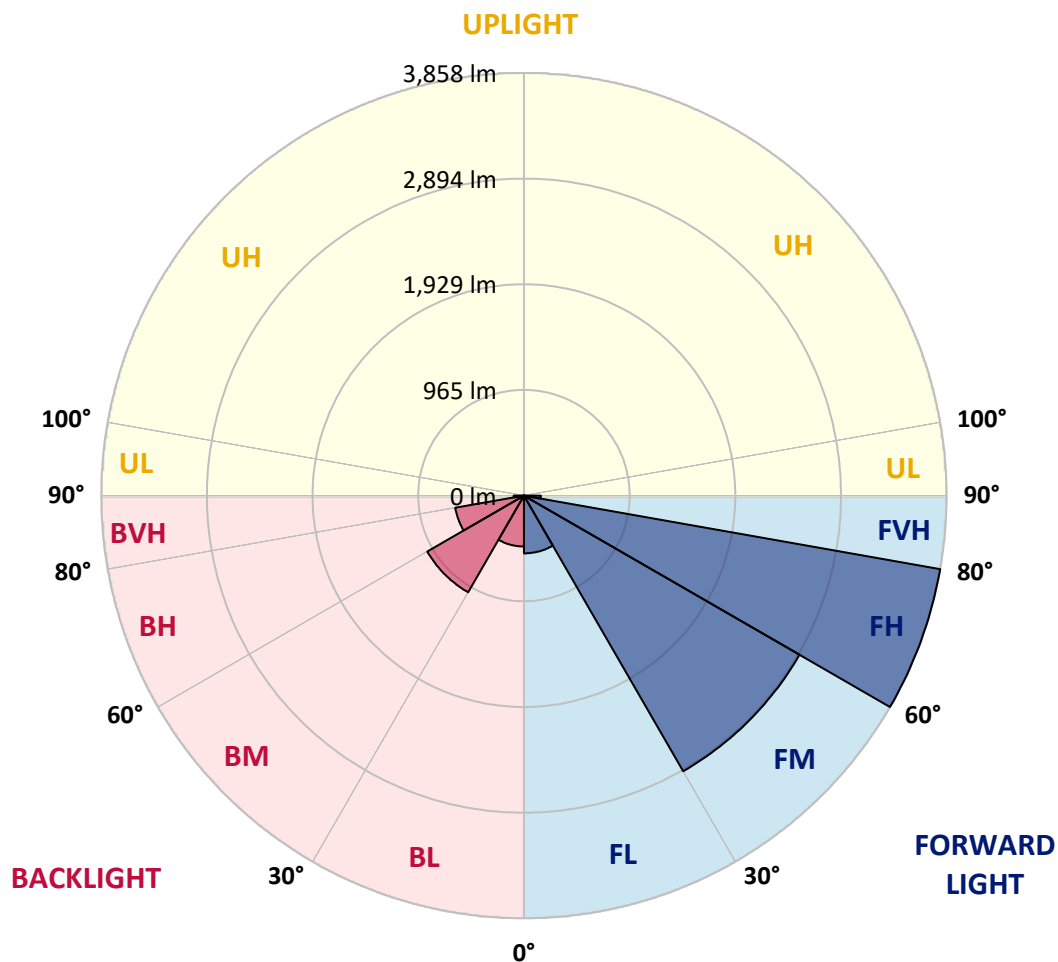
CATALOG NUMBER: GWC-SA2A-740-U-T4W

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 527.0  | 5.5       |                         |      |         |
| FM   | (30°-60°)   | 2904.7 | 30.1      |                         |      |         |
| FH   | (60°-80°)   | 3858.3 | 39.9      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 154.4  | 1.6       |                         |      | G2/225  |
| BL   | (0°-30°)    | 464.7  | 4.8       | B1/500                  |      |         |
| BM   | (30°-60°)   | 1019.0 | 10.6      | B2/2500                 |      |         |
| BH   | (60°-80°)   | 636.4  | 6.6       | B2/1000                 |      | G2/1000 |
| BVH  | (80°-90°)   | 93.5   | 1.0       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B2-U0-G2**

Type IV Short





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CATALOG NUMBER: GWC-SA2A-740-U-T4W

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 46°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 984.0  | 984.0  | 984.0  | 984.0  | 984.0  | 984.0  | 984.0  | 984.0  | 984.0  | 984.0  | 984.0  |
| 2.5°  | 1033.2 | 1033.9 | 1035.2 | 1031.9 | 1022.6 | 1020.0 | 1019.0 | 1009.4 | 1003.1 | 993.9  | 985.9  |
| 5°    | 1115.8 | 1116.5 | 1114.5 | 1105.3 | 1084.8 | 1069.6 | 1068.2 | 1046.4 | 1026.6 | 1005.4 | 989.6  |
| 7.5°  | 1202.1 | 1203.1 | 1196.8 | 1179.3 | 1150.5 | 1124.1 | 1122.4 | 1092.7 | 1062.6 | 1030.6 | 1006.8 |
| 10°   | 1278.5 | 1274.5 | 1264.2 | 1239.8 | 1205.7 | 1173.3 | 1172.0 | 1141.0 | 1106.3 | 1067.6 | 1035.9 |
| 12.5° | 1329.4 | 1326.1 | 1312.8 | 1283.1 | 1245.7 | 1216.0 | 1213.3 | 1184.6 | 1150.9 | 1108.6 | 1070.6 |
| 15°   | 1357.4 | 1359.8 | 1341.9 | 1308.2 | 1271.8 | 1246.7 | 1244.4 | 1223.9 | 1193.8 | 1151.2 | 1107.6 |
| 17.5° | 1361.1 | 1363.1 | 1345.9 | 1312.5 | 1282.8 | 1265.6 | 1264.6 | 1251.0 | 1229.2 | 1188.2 | 1142.6 |
| 20°   | 1339.9 | 1341.3 | 1327.0 | 1299.6 | 1280.1 | 1274.8 | 1274.5 | 1268.5 | 1252.3 | 1216.0 | 1171.7 |
| 22.5° | 1309.2 | 1310.2 | 1299.9 | 1280.1 | 1273.5 | 1281.8 | 1284.1 | 1281.8 | 1270.2 | 1236.1 | 1194.5 |
| 25°   | 1301.6 | 1300.9 | 1290.4 | 1270.2 | 1275.8 | 1293.3 | 1296.3 | 1297.3 | 1289.4 | 1259.6 | 1223.6 |
| 27.5° | 1338.3 | 1336.0 | 1315.8 | 1283.4 | 1287.0 | 1308.2 | 1312.2 | 1321.8 | 1316.8 | 1290.7 | 1256.6 |
| 30°   | 1444.4 | 1440.4 | 1399.1 | 1333.7 | 1315.8 | 1326.7 | 1331.7 | 1346.9 | 1347.9 | 1326.1 | 1300.6 |
| 32.5° | 1623.5 | 1618.6 | 1544.5 | 1427.5 | 1364.4 | 1345.6 | 1350.2 | 1373.0 | 1385.2 | 1368.4 | 1340.9 |
| 35°   | 1849.9 | 1844.3 | 1747.1 | 1587.2 | 1445.7 | 1381.6 | 1384.9 | 1403.1 | 1427.5 | 1403.7 | 1367.4 |
| 37.5° | 2085.9 | 2072.4 | 1978.8 | 1774.9 | 1574.9 | 1458.6 | 1458.6 | 1460.9 | 1472.5 | 1422.9 | 1398.4 |
| 40°   | 2320.6 | 2307.0 | 2222.4 | 1995.7 | 1742.2 | 1579.9 | 1572.3 | 1521.1 | 1511.8 | 1469.2 | 1460.9 |
| 42.5° | 2538.7 | 2534.8 | 2484.9 | 2245.2 | 1938.5 | 1699.2 | 1688.6 | 1601.7 | 1603.7 | 1577.2 | 1577.6 |
| 45°   | 2770.8 | 2770.8 | 2730.1 | 2497.1 | 2167.2 | 1890.9 | 1880.3 | 1752.4 | 1772.3 | 1760.0 | 1789.4 |
| 47.5° | 2960.1 | 2966.1 | 2960.5 | 2759.5 | 2433.3 | 2134.5 | 2115.3 | 1961.3 | 2016.8 | 2058.8 | 2144.4 |
| 50°   | 3153.5 | 3162.8 | 3163.7 | 3047.4 | 2754.9 | 2424.0 | 2402.2 | 2238.6 | 2362.6 | 2482.9 | 2651.1 |
| 52.5° | 3434.1 | 3454.9 | 3372.0 | 3334.6 | 3148.9 | 2767.8 | 2746.3 | 2595.3 | 2802.2 | 2971.1 | 3260.9 |
| 55°   | 3694.2 | 3676.1 | 3616.9 | 3640.0 | 3570.6 | 3159.1 | 3142.9 | 3010.4 | 3292.0 | 3511.5 | 3887.9 |
| 57.5° | 3835.0 | 3833.7 | 3893.2 | 3992.4 | 4025.4 | 3641.7 | 3628.1 | 3499.2 | 3844.3 | 4009.2 | 4476.6 |
| 60°   | 4000.3 | 4002.6 | 4150.0 | 4375.1 | 4511.3 | 4242.6 | 4236.6 | 4138.8 | 4380.7 | 4473.9 | 4938.3 |
| 62.5° | 4023.4 | 4065.1 | 4318.9 | 4706.3 | 4966.1 | 4944.6 | 4957.8 | 4714.9 | 4860.6 | 4844.8 | 5283.0 |
| 65°   | 3757.4 | 3812.2 | 4271.7 | 4806.4 | 5418.2 | 5712.4 | 5724.6 | 5294.3 | 5239.1 | 5161.7 | 5406.3 |
| 67.5° | 3212.0 | 3293.3 | 3792.4 | 4588.6 | 5567.3 | 6279.9 | 6297.1 | 5743.5 | 5553.1 | 5269.2 | 5109.5 |
| 70°   | 2337.4 | 2427.7 | 2930.1 | 3919.0 | 5301.6 | 6461.4 | 6480.9 | 5942.1 | 5565.0 | 4963.4 | 4361.9 |
| 72.5° | 1412.0 | 1482.7 | 1896.9 | 2885.1 | 4474.6 | 6130.8 | 6165.5 | 5690.3 | 5080.8 | 4204.2 | 3220.9 |
| 75°   | 620.1  | 666.3  | 917.2  | 1662.5 | 3203.4 | 5072.5 | 5115.8 | 4870.6 | 4128.2 | 3055.3 | 1903.8 |
| 77.5° | 264.1  | 277.3  | 376.1  | 722.2  | 1810.9 | 3466.2 | 3525.7 | 3558.7 | 2800.8 | 1662.5 | 804.5  |
| 80°   | 164.6  | 169.9  | 212.9  | 326.9  | 847.5  | 1946.8 | 2010.9 | 2093.9 | 1390.8 | 611.1  | 280.9  |
| 82.5° | 100.1  | 106.1  | 141.5  | 197.7  | 441.2  | 882.5  | 913.2  | 971.7  | 539.7  | 264.1  | 145.4  |
| 85°   | 60.2   | 64.5   | 86.6   | 124.9  | 251.2  | 347.0  | 346.7  | 383.4  | 254.2  | 169.9  | 76.7   |
| 87.5° | 28.8   | 32.1   | 46.3   | 64.8   | 126.6  | 130.2  | 122.0  | 138.2  | 154.4  | 111.4  | 38.7   |
| 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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CATALOG NUMBER: GWC-SA2A-740-U-T4W

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 984.0  | 984.0  | 984.0  | 984.0  | 984.0  | 984.0  | 984.0  | 984.0  | 984.0  | 984.0  | 984.0  |
| 2.5°  | 983.3  | 982.0  | 977.7  | 974.4  | 973.7  | 971.7  | 970.1  | 971.1  | 972.4  | 972.7  | 972.7  |
| 5°    | 983.0  | 979.3  | 973.7  | 971.4  | 974.4  | 978.3  | 983.3  | 989.9  | 993.9  | 996.9  | 998.8  |
| 7.5°  | 998.8  | 991.9  | 985.6  | 984.3  | 990.2  | 1000.8 | 1012.1 | 1025.9 | 1035.5 | 1042.1 | 1043.5 |
| 10°   | 1025.3 | 1016.7 | 1010.4 | 1011.7 | 1022.3 | 1037.5 | 1053.4 | 1071.2 | 1085.8 | 1094.7 | 1095.3 |
| 12.5° | 1055.7 | 1047.4 | 1041.5 | 1047.1 | 1064.6 | 1083.1 | 1099.6 | 1115.2 | 1128.4 | 1137.3 | 1137.3 |
| 15°   | 1090.7 | 1084.8 | 1077.8 | 1090.7 | 1114.5 | 1131.0 | 1138.0 | 1145.6 | 1152.9 | 1159.5 | 1158.1 |
| 17.5° | 1124.4 | 1118.8 | 1115.2 | 1130.4 | 1155.2 | 1162.8 | 1158.1 | 1152.5 | 1152.5 | 1156.2 | 1156.8 |
| 20°   | 1153.5 | 1148.6 | 1150.9 | 1165.7 | 1178.6 | 1170.7 | 1153.5 | 1135.7 | 1128.4 | 1130.4 | 1132.4 |
| 22.5° | 1179.0 | 1176.7 | 1183.6 | 1190.5 | 1181.3 | 1153.5 | 1121.8 | 1097.7 | 1088.7 | 1088.1 | 1088.7 |
| 25°   | 1208.7 | 1208.4 | 1217.0 | 1204.4 | 1163.4 | 1112.2 | 1069.6 | 1046.1 | 1041.1 | 1045.1 | 1051.7 |
| 27.5° | 1245.7 | 1249.4 | 1253.7 | 1207.7 | 1127.1 | 1049.7 | 1006.4 | 990.2  | 995.2  | 1004.8 | 1011.1 |
| 30°   | 1293.0 | 1302.9 | 1293.7 | 1199.5 | 1074.9 | 978.3  | 937.0  | 932.4  | 946.0  | 959.5  | 966.1  |
| 32.5° | 1338.9 | 1354.5 | 1332.0 | 1178.0 | 1007.4 | 902.7  | 870.6  | 869.3  | 885.8  | 899.0  | 908.3  |
| 35°   | 1376.0 | 1406.7 | 1360.8 | 1135.3 | 929.4  | 832.9  | 809.4  | 800.5  | 806.5  | 822.0  | 832.6  |
| 37.5° | 1424.2 | 1475.4 | 1380.6 | 1070.2 | 844.8  | 775.4  | 748.0  | 727.5  | 722.2  | 728.5  | 733.8  |
| 40°   | 1512.5 | 1580.2 | 1389.8 | 979.3  | 762.2  | 717.9  | 690.1  | 660.1  | 639.2  | 624.0  | 624.4  |
| 42.5° | 1656.6 | 1716.7 | 1383.9 | 868.9  | 685.8  | 661.7  | 630.3  | 595.6  | 561.9  | 527.5  | 524.9  |
| 45°   | 1890.6 | 1919.7 | 1366.0 | 751.9  | 618.7  | 602.9  | 573.5  | 538.7  | 493.8  | 454.8  | 451.2  |
| 47.5° | 2265.1 | 2200.6 | 1338.3 | 649.8  | 559.6  | 553.0  | 525.9  | 485.9  | 438.3  | 406.9  | 404.2  |
| 50°   | 2775.7 | 2606.2 | 1324.7 | 568.5  | 507.3  | 509.3  | 487.2  | 444.9  | 399.9  | 376.8  | 374.1  |
| 52.5° | 3386.5 | 3078.5 | 1350.8 | 505.7  | 465.4  | 472.3  | 455.8  | 416.1  | 378.4  | 360.3  | 357.6  |
| 55°   | 4020.1 | 3567.6 | 1378.9 | 460.1  | 425.7  | 439.3  | 433.6  | 400.9  | 366.9  | 350.0  | 347.7  |
| 57.5° | 4562.5 | 3932.9 | 1322.7 | 423.1  | 390.3  | 411.5  | 416.5  | 391.3  | 360.9  | 345.7  | 343.1  |
| 60°   | 4903.9 | 4080.0 | 1175.3 | 388.4  | 362.3  | 389.4  | 406.5  | 388.7  | 363.2  | 361.9  | 359.9  |
| 62.5° | 5065.9 | 4067.1 | 954.2  | 360.9  | 344.7  | 379.8  | 413.8  | 403.6  | 389.7  | 401.6  | 402.6  |
| 65°   | 4993.2 | 3872.7 | 710.6  | 342.8  | 332.2  | 383.4  | 435.6  | 431.7  | 397.3  | 409.2  | 410.8  |
| 67.5° | 4514.6 | 3409.0 | 526.2  | 326.9  | 318.3  | 393.7  | 475.3  | 440.9  | 382.4  | 391.0  | 385.7  |
| 70°   | 3649.0 | 2702.7 | 405.9  | 309.0  | 304.1  | 392.3  | 493.1  | 435.3  | 366.2  | 368.2  | 354.0  |
| 72.5° | 2516.3 | 1843.0 | 330.2  | 292.5  | 283.6  | 357.6  | 480.6  | 421.4  | 352.7  | 337.5  | 318.6  |
| 75°   | 1368.4 | 989.2  | 280.6  | 275.3  | 247.6  | 314.0  | 457.4  | 411.5  | 340.4  | 320.3  | 309.7  |
| 77.5° | 538.4  | 410.5  | 243.6  | 251.9  | 216.5  | 277.3  | 431.7  | 392.7  | 323.6  | 297.1  | 291.9  |
| 80°   | 219.8  | 209.6  | 201.9  | 217.8  | 186.1  | 242.6  | 400.6  | 370.5  | 303.4  | 275.7  | 265.1  |
| 82.5° | 124.6  | 130.2  | 157.0  | 171.9  | 151.0  | 223.4  | 385.7  | 352.7  | 279.3  | 246.9  | 234.3  |
| 85°   | 63.8   | 76.4   | 109.4  | 123.3  | 111.1  | 190.0  | 355.3  | 308.7  | 224.1  | 189.1  | 190.0  |
| 87.5° | 30.7   | 42.6   | 69.1   | 77.3   | 72.1   | 137.5  | 265.4  | 223.8  | 174.5  | 138.2  | 133.9  |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |



Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

INVUE

Report Number: SP1-2104-224-3

Luminaire Tested: CCW-SA-2A-740-U-SL4

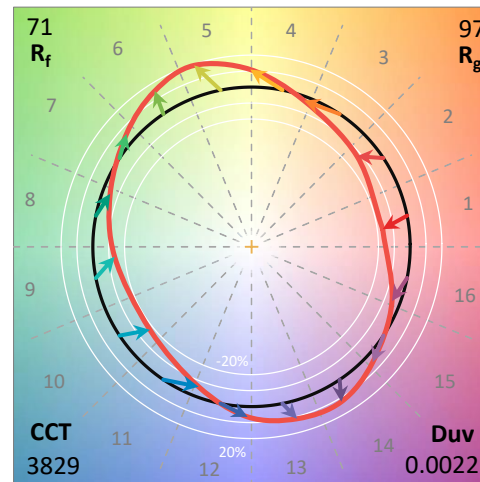
Test Date: 04/26/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2104-224-3  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 04/26/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: INVUE  
 Catalog Number: **CCW-SA-2A-740-U-SL4**  
 Description: INVUE WALL PACK ClearCurve Light Square

### Spectral Parameters

|                           |        |           |      |      |       |
|---------------------------|--------|-----------|------|------|-------|
| CCT (K):                  | 3829   | CRI (Ra): | 69.8 |      |       |
| CIE u':                   | 0.2271 | R1:       | 67.2 | R9:  | -35.1 |
| CIE v':                   | 0.5076 | R2:       | 75.2 | R10: | 43.1  |
| Duv:                      | 0.0022 | R3:       | 83.2 | R11: | 69.0  |
| CIE x:                    | 0.3900 | R4:       | 71.0 | R12: | 44.3  |
| CIE y:                    | 0.3873 | R5:       | 67.4 | R13: | 67.6  |
| CIE z:                    | 0.2227 | R6:       | 66.8 | R14: | 90.3  |
| Peak Wavelength (nm):     | 440    | R7:       | 77.6 |      |       |
| Dominant Wavelength (nm): | 578    | R8:       | 50.3 |      |       |
| Purity:                   | 33.4   |           |      |      |       |
| Rf:                       | 70.6   |           |      |      |       |
| Rg:                       | 96.7   |           |      |      |       |



### Test Conditions

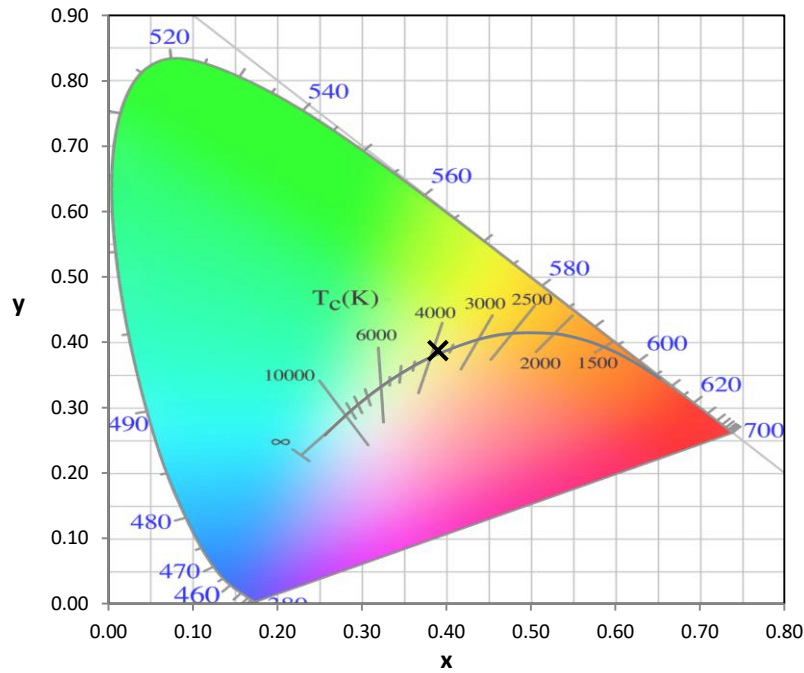
Stabilization Time: 62M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.8/39%  
 Sphere Temperature (°C): 24.2

REPORT NUMBER: SP1-2104-224-3

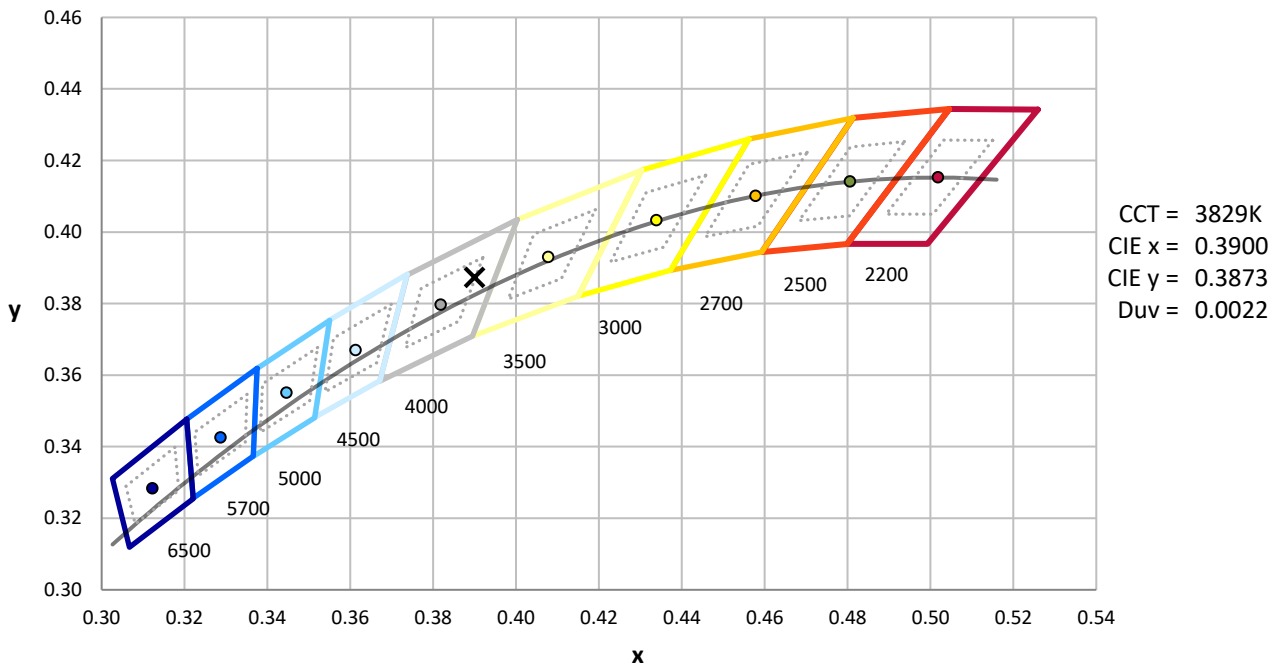
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| 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**



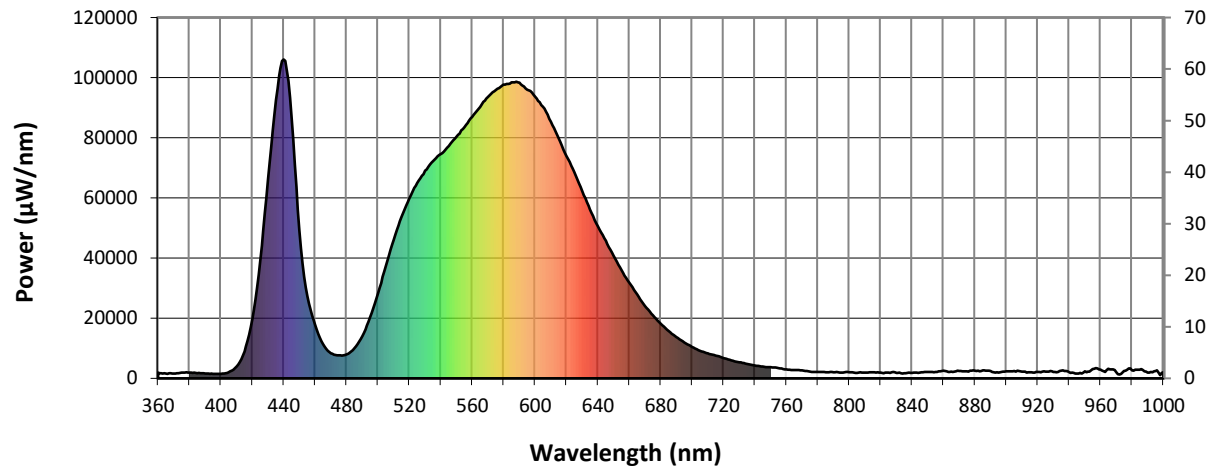
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 4000K 7-step quadrangle

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### Photopic Flux vs. Wavelength

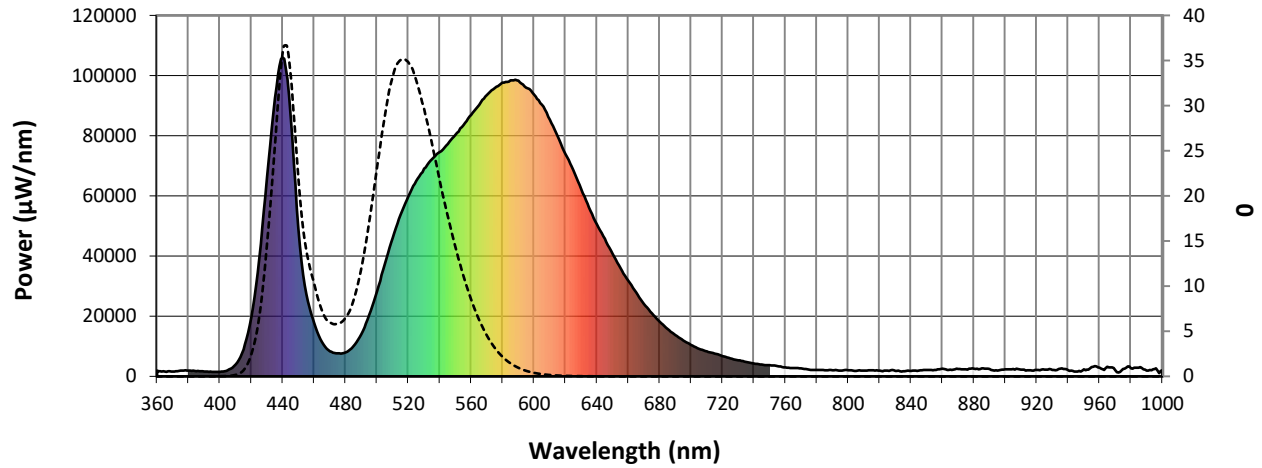


#####

| 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       | 1901             | 0.0              | 490       | 14057            | 2.0              | 620       | 73853            | 19.2             | 750       | 3678             | 0.0              | 880       | 2528             | 0.0              |
| 365       | 1585             | 0.0              | 495       | 20304            | 3.7              | 625       | 68653            | 15.1             | 755       | 3385             | 0.0              | 885       | 2638             | 0.0              |
| 370       | 1604             | 0.0              | 500       | 28346            | 6.3              | 630       | 62254            | 11.3             | 760       | 2963             | 0.0              | 890       | 2417             | 0.0              |
| 375       | 1905             | 0.0              | 505       | 37228            | 10.4             | 635       | 56177            | 8.4              | 765       | 2782             | 0.0              | 895       | 1902             | 0.0              |
| 380       | 1882             | 0.0              | 510       | 46037            | 15.8             | 640       | 50521            | 6.0              | 770       | 2657             | 0.0              | 900       | 2330             | 0.0              |
| 385       | 1693             | 0.0              | 515       | 53619            | 22.2             | 645       | 45727            | 4.4              | 775       | 2259             | 0.0              | 905       | 2456             | 0.0              |
| 390       | 1640             | 0.0              | 520       | 59890            | 29.0             | 650       | 40814            | 3.0              | 780       | 2169             | 0.0              | 910       | 2205             | 0.0              |
| 395       | 1513             | 0.0              | 525       | 64946            | 34.9             | 655       | 35925            | 2.1              | 785       | 2065             | 0.0              | 915       | 2002             | 0.0              |
| 400       | 1481             | 0.0              | 530       | 69048            | 40.7             | 660       | 31824            | 1.3              | 790       | 2054             | 0.0              | 920       | 2125             | 0.0              |
| 405       | 2044             | 0.0              | 535       | 72246            | 44.8             | 665       | 27860            | 0.9              | 795       | 1908             | 0.0              | 925       | 2266             | 0.0              |
| 410       | 3966             | 0.0              | 540       | 74621            | 48.6             | 670       | 24069            | 0.5              | 800       | 2026             | 0.0              | 930       | 2159             | 0.0              |
| 415       | 8943             | 0.0              | 545       | 77288            | 51.4             | 675       | 20926            | 0.4              | 805       | 1766             | 0.0              | 935       | 2581             | 0.0              |
| 420       | 19566            | 0.1              | 550       | 80334            | 54.6             | 680       | 18170            | 0.2              | 810       | 1913             | 0.0              | 940       | 2052             | 0.0              |
| 425       | 39243            | 0.2              | 555       | 83561            | 57.1             | 685       | 15785            | 0.1              | 815       | 2019             | 0.0              | 945       | 1631             | 0.0              |
| 430       | 66113            | 0.5              | 560       | 86964            | 59.1             | 690       | 13770            | 0.1              | 820       | 1876             | 0.0              | 950       | 2301             | 0.0              |
| 435       | 92550            | 1.1              | 565       | 90264            | 60.0             | 695       | 11953            | 0.1              | 825       | 1869             | 0.0              | 955       | 3077             | 0.0              |
| 440       | 106034           | 1.7              | 570       | 93519            | 60.8             | 700       | 10452            | 0.0              | 830       | 1862             | 0.0              | 960       | 2911             | 0.0              |
| 445       | 86383            | 1.8              | 575       | 95920            | 59.7             | 705       | 9162             | 0.0              | 835       | 1663             | 0.0              | 965       | 3163             | 0.0              |
| 450       | 49216            | 1.3              | 580       | 97650            | 58.0             | 710       | 8266             | 0.0              | 840       | 1843             | 0.0              | 970       | 1995             | 0.0              |
| 455       | 27376            | 0.9              | 585       | 98486            | 54.7             | 715       | 7583             | 0.0              | 845       | 1921             | 0.0              | 975       | 2418             | 0.0              |
| 460       | 17830            | 0.7              | 590       | 98332            | 50.8             | 720       | 6750             | 0.0              | 850       | 2105             | 0.0              | 980       | 2674             | 0.0              |
| 465       | 11374            | 0.6              | 595       | 96023            | 45.5             | 725       | 5965             | 0.0              | 855       | 2096             | 0.0              | 985       | 2850             | 0.0              |
| 470       | 8344             | 0.5              | 600       | 93650            | 40.4             | 730       | 5310             | 0.0              | 860       | 2601             | 0.0              | 990       | 1972             | 0.0              |
| 475       | 7639             | 0.6              | 605       | 90313            | 35.0             | 735       | 4838             | 0.0              | 865       | 2199             | 0.0              | 995       | 2443             | 0.0              |
| 480       | 7991             | 0.8              | 610       | 85305            | 29.3             | 740       | 4280             | 0.0              | 870       | 2491             | 0.0              | 1000      | 1979             | 0.0              |
| 485       | 9994             | 1.2              | 615       | 79870            | 24.1             | 745       | 3928             | 0.0              | 875       | 2370             | 0.0              |           |                  |                  |

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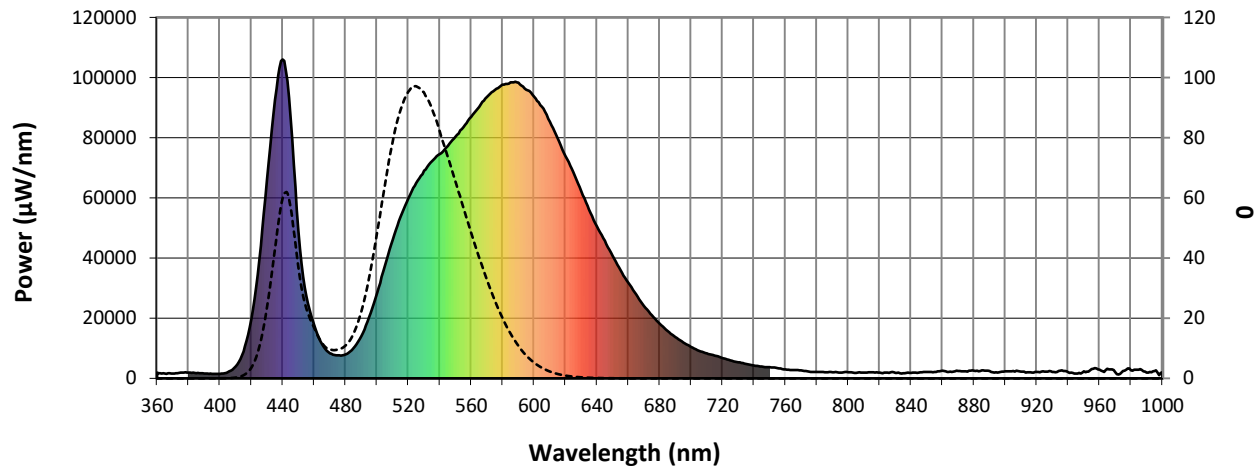
### Scotopic Flux vs. Wavelength


**Scotopic Lumens: 7682.8**
**S/P: 1.42**

| 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       | 1901             | 0.0              | 490       | 14057            | 21.6             | 620       | 73853            | 0.9              | 750       | 3678             | 0.0              | 880       | 2528             | 0.0              |
| 365       | 1585             | 0.0              | 495       | 20304            | 32.8             | 625       | 68653            | 0.6              | 755       | 3385             | 0.0              | 885       | 2638             | 0.0              |
| 370       | 1604             | 0.0              | 500       | 28346            | 47.4             | 630       | 62254            | 0.4              | 760       | 2963             | 0.0              | 890       | 2417             | 0.0              |
| 375       | 1905             | 0.0              | 505       | 37228            | 63.3             | 635       | 56177            | 0.2              | 765       | 2782             | 0.0              | 895       | 1902             | 0.0              |
| 380       | 1882             | 0.0              | 510       | 46037            | 78.0             | 640       | 50521            | 0.1              | 770       | 2657             | 0.0              | 900       | 2330             | 0.0              |
| 385       | 1693             | 0.0              | 515       | 53619            | 88.9             | 645       | 45727            | 0.1              | 775       | 2259             | 0.0              | 905       | 2456             | 0.0              |
| 390       | 1640             | 0.0              | 520       | 59890            | 95.2             | 650       | 40814            | 0.0              | 780       | 2169             | 0.0              | 910       | 2205             | 0.0              |
| 395       | 1513             | 0.0              | 525       | 64946            | 97.2             | 655       | 35925            | 0.0              | 785       | 2065             | 0.0              | 915       | 2002             | 0.0              |
| 400       | 1481             | 0.0              | 530       | 69048            | 95.2             | 660       | 31824            | 0.0              | 790       | 2054             | 0.0              | 920       | 2125             | 0.0              |
| 405       | 2044             | 0.1              | 535       | 72246            | 90.0             | 665       | 27860            | 0.0              | 795       | 1908             | 0.0              | 925       | 2266             | 0.0              |
| 410       | 3966             | 0.2              | 540       | 74621            | 82.5             | 670       | 24069            | 0.0              | 800       | 2026             | 0.0              | 930       | 2159             | 0.0              |
| 415       | 8943             | 0.9              | 545       | 77288            | 74.1             | 675       | 20926            | 0.0              | 805       | 1766             | 0.0              | 935       | 2581             | 0.0              |
| 420       | 19566            | 3.2              | 550       | 80334            | 65.7             | 680       | 18170            | 0.0              | 810       | 1913             | 0.0              | 940       | 2052             | 0.0              |
| 425       | 39243            | 9.6              | 555       | 83561            | 57.1             | 685       | 15785            | 0.0              | 815       | 2019             | 0.0              | 945       | 1631             | 0.0              |
| 430       | 66113            | 22.5             | 560       | 86964            | 48.6             | 690       | 13770            | 0.0              | 820       | 1876             | 0.0              | 950       | 2301             | 0.0              |
| 435       | 92550            | 41.4             | 565       | 90264            | 40.5             | 695       | 11953            | 0.0              | 825       | 1869             | 0.0              | 955       | 3077             | 0.0              |
| 440       | 106034           | 59.3             | 570       | 93519            | 33.0             | 700       | 10452            | 0.0              | 830       | 1862             | 0.0              | 960       | 2911             | 0.0              |
| 445       | 86383            | 57.8             | 575       | 95920            | 26.1             | 705       | 9162             | 0.0              | 835       | 1663             | 0.0              | 965       | 3163             | 0.0              |
| 450       | 49216            | 38.1             | 580       | 97650            | 20.1             | 710       | 8266             | 0.0              | 840       | 1843             | 0.0              | 970       | 1995             | 0.0              |
| 455       | 27376            | 23.9             | 585       | 98486            | 15.1             | 715       | 7583             | 0.0              | 845       | 1921             | 0.0              | 975       | 2418             | 0.0              |
| 460       | 17830            | 17.2             | 590       | 98332            | 10.9             | 720       | 6750             | 0.0              | 850       | 2105             | 0.0              | 980       | 2674             | 0.0              |
| 465       | 11374            | 12.0             | 595       | 96023            | 7.7              | 725       | 5965             | 0.0              | 855       | 2096             | 0.0              | 985       | 2850             | 0.0              |
| 470       | 8344             | 9.6              | 600       | 93650            | 5.3              | 730       | 5310             | 0.0              | 860       | 2601             | 0.0              | 990       | 1972             | 0.0              |
| 475       | 7639             | 9.6              | 605       | 90313            | 3.5              | 735       | 4838             | 0.0              | 865       | 2199             | 0.0              | 995       | 2443             | 0.0              |
| 480       | 7991             | 10.8             | 610       | 85305            | 2.3              | 740       | 4280             | 0.0              | 870       | 2491             | 0.0              | 1000      | 1979             | 0.0              |
| 485       | 9994             | 14.5             | 615       | 79870            | 1.5              | 745       | 3928             | 0.0              | 875       | 2370             | 0.0              |           |                  |                  |

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### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 2823**

**M/P: 0.52**

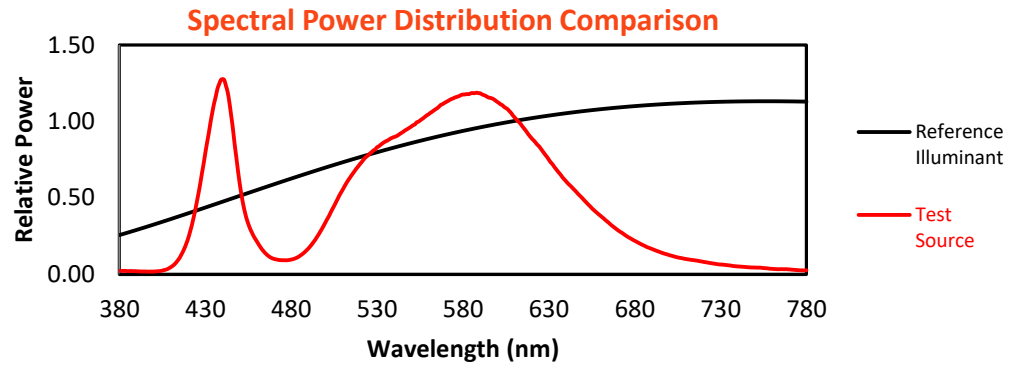
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 1901             | 0.0              | 490       | 14057            | 11.7             | 620       | 73853            | 0.1              | 750       | 3678             | 0.0              | 880       | 2528             | 0.0              |
| 365       | 1585             | 0.0              | 495       | 20304            | 16.8             | 625       | 68653            | 0.0              | 755       | 3385             | 0.0              | 885       | 2638             | 0.0              |
| 370       | 1604             | 0.0              | 500       | 28346            | 22.8             | 630       | 62254            | 0.0              | 760       | 2963             | 0.0              | 890       | 2417             | 0.0              |
| 375       | 1905             | 0.0              | 505       | 37228            | 28.6             | 635       | 56177            | 0.0              | 765       | 2782             | 0.0              | 895       | 1902             | 0.0              |
| 380       | 1882             | 0.0              | 510       | 46037            | 33.1             | 640       | 50521            | 0.0              | 770       | 2657             | 0.0              | 900       | 2330             | 0.0              |
| 385       | 1693             | 0.0              | 515       | 53619            | 35.0             | 645       | 45727            | 0.0              | 775       | 2259             | 0.0              | 905       | 2456             | 0.0              |
| 390       | 1640             | 0.0              | 520       | 59890            | 34.9             | 650       | 40814            | 0.0              | 780       | 2169             | 0.0              | 910       | 2205             | 0.0              |
| 395       | 1513             | 0.0              | 525       | 64946            | 32.9             | 655       | 35925            | 0.0              | 785       | 2065             | 0.0              | 915       | 2002             | 0.0              |
| 400       | 1481             | 0.0              | 530       | 69048            | 29.8             | 660       | 31824            | 0.0              | 790       | 2054             | 0.0              | 920       | 2125             | 0.0              |
| 405       | 2044             | 0.0              | 535       | 72246            | 26.0             | 665       | 27860            | 0.0              | 795       | 1908             | 0.0              | 925       | 2266             | 0.0              |
| 410       | 3966             | 0.2              | 540       | 74621            | 21.8             | 670       | 24069            | 0.0              | 800       | 2026             | 0.0              | 930       | 2159             | 0.0              |
| 415       | 8943             | 0.6              | 545       | 77288            | 18.0             | 675       | 20926            | 0.0              | 805       | 1766             | 0.0              | 935       | 2581             | 0.0              |
| 420       | 19566            | 2.2              | 550       | 80334            | 14.4             | 680       | 18170            | 0.0              | 810       | 1913             | 0.0              | 940       | 2052             | 0.0              |
| 425       | 39243            | 6.1              | 555       | 83561            | 11.3             | 685       | 15785            | 0.0              | 815       | 2019             | 0.0              | 945       | 1631             | 0.0              |
| 430       | 66113            | 14.0             | 560       | 86964            | 8.6              | 690       | 13770            | 0.0              | 820       | 1876             | 0.0              | 950       | 2301             | 0.0              |
| 435       | 92550            | 24.7             | 565       | 90264            | 6.3              | 695       | 11953            | 0.0              | 825       | 1869             | 0.0              | 955       | 3077             | 0.0              |
| 440       | 106034           | 35.4             | 570       | 93519            | 4.6              | 700       | 10452            | 0.0              | 830       | 1862             | 0.0              | 960       | 2911             | 0.0              |
| 445       | 86383            | 34.1             | 575       | 95920            | 3.2              | 705       | 9162             | 0.0              | 835       | 1663             | 0.0              | 965       | 3163             | 0.0              |
| 450       | 49216            | 22.7             | 580       | 97650            | 2.2              | 710       | 8266             | 0.0              | 840       | 1843             | 0.0              | 970       | 1995             | 0.0              |
| 455       | 27376            | 14.3             | 585       | 98486            | 1.5              | 715       | 7583             | 0.0              | 845       | 1921             | 0.0              | 975       | 2418             | 0.0              |
| 460       | 17830            | 10.5             | 590       | 98332            | 1.0              | 720       | 6750             | 0.0              | 850       | 2105             | 0.0              | 980       | 2674             | 0.0              |
| 465       | 11374            | 7.4              | 595       | 96023            | 0.6              | 725       | 5965             | 0.0              | 855       | 2096             | 0.0              | 985       | 2850             | 0.0              |
| 470       | 8344             | 6.0              | 600       | 93650            | 0.4              | 730       | 5310             | 0.0              | 860       | 2601             | 0.0              | 990       | 1972             | 0.0              |
| 475       | 7639             | 5.8              | 605       | 90313            | 0.2              | 735       | 4838             | 0.0              | 865       | 2199             | 0.0              | 995       | 2443             | 0.0              |
| 480       | 7991             | 6.4              | 610       | 85305            | 0.2              | 740       | 4280             | 0.0              | 870       | 2491             | 0.0              | 1000      | 1979             | 0.0              |
| 485       | 9994             | 8.2              | 615       | 79870            | 0.1              | 745       | 3928             | 0.0              | 875       | 2370             | 0.0              |           |                  |                  |

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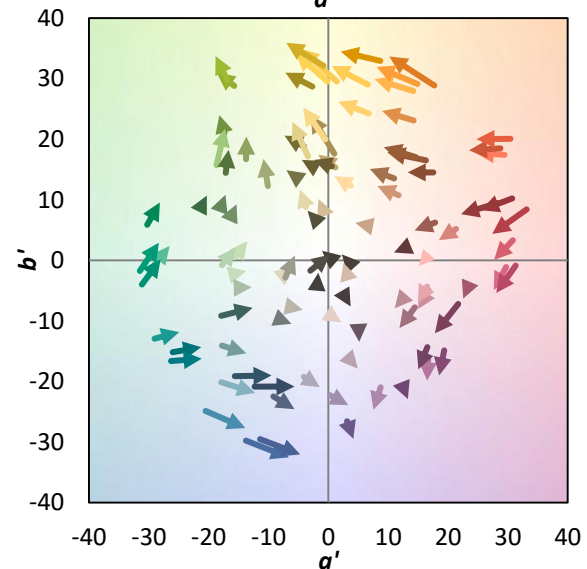
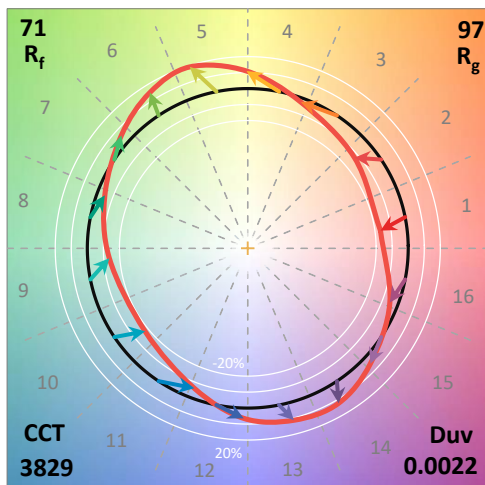
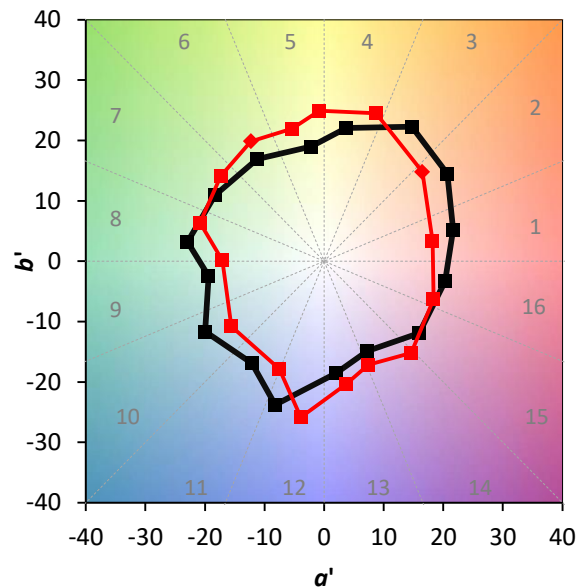
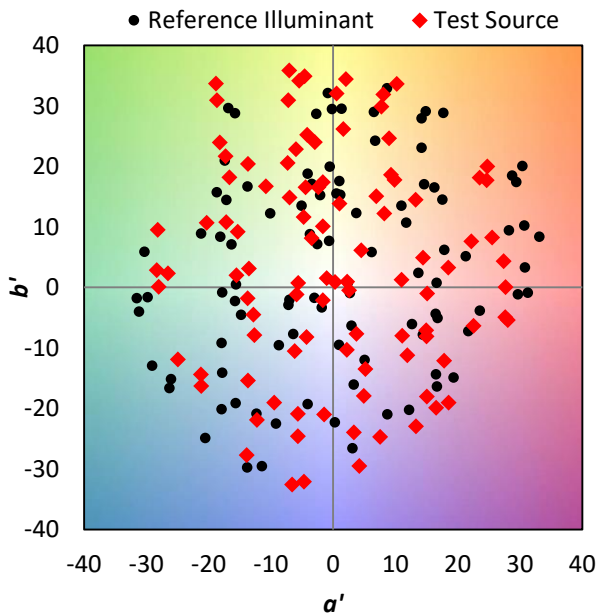
TM-30-18

### Summary

$R_f = 70.6$   
 $R_g = 96.7$   
 $CIE R_a = 69.8$   
 $R_g = -35.1$



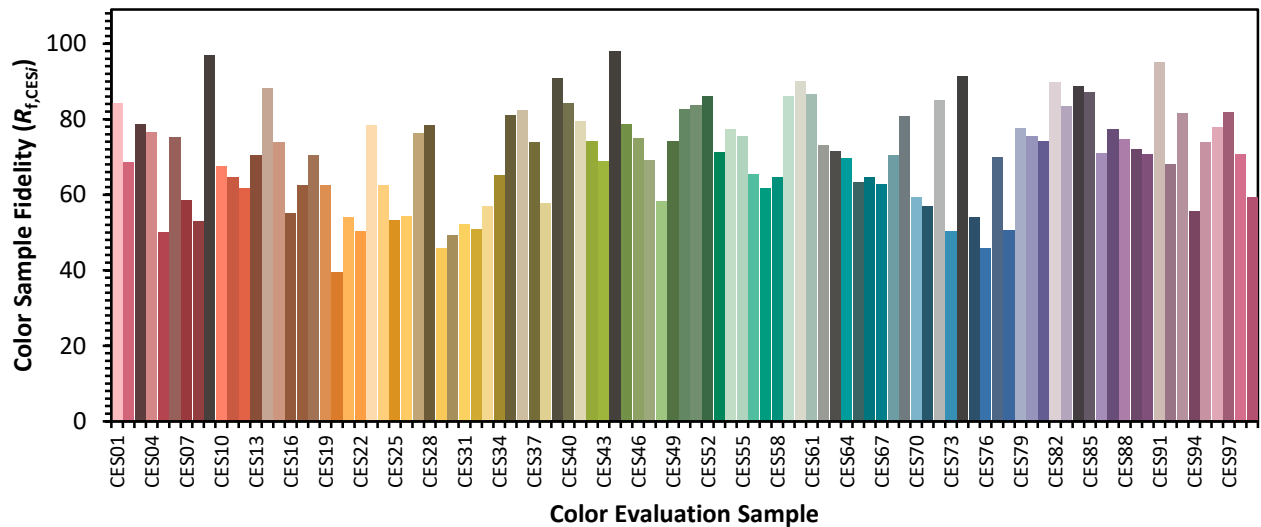
### Color Vector Graphics



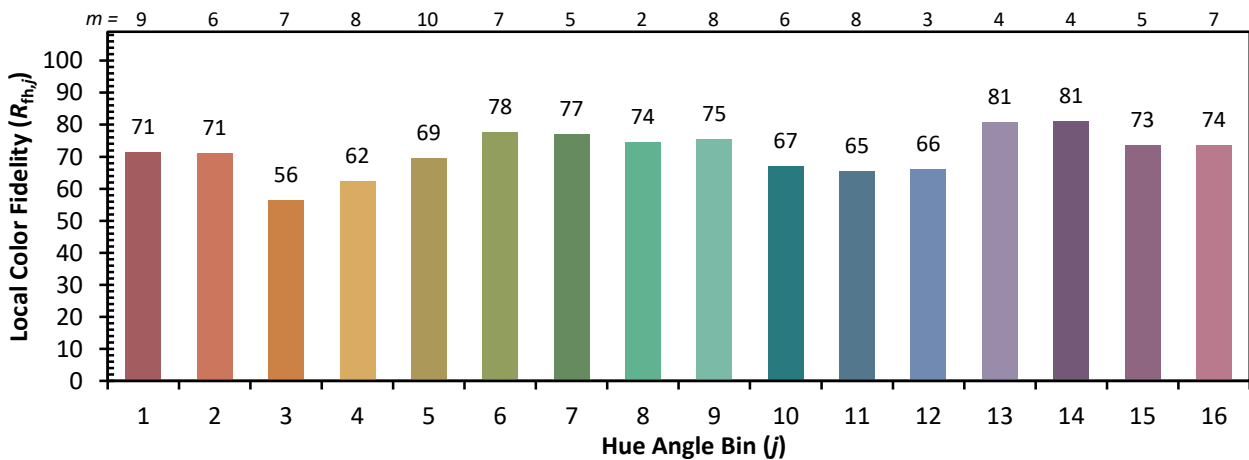
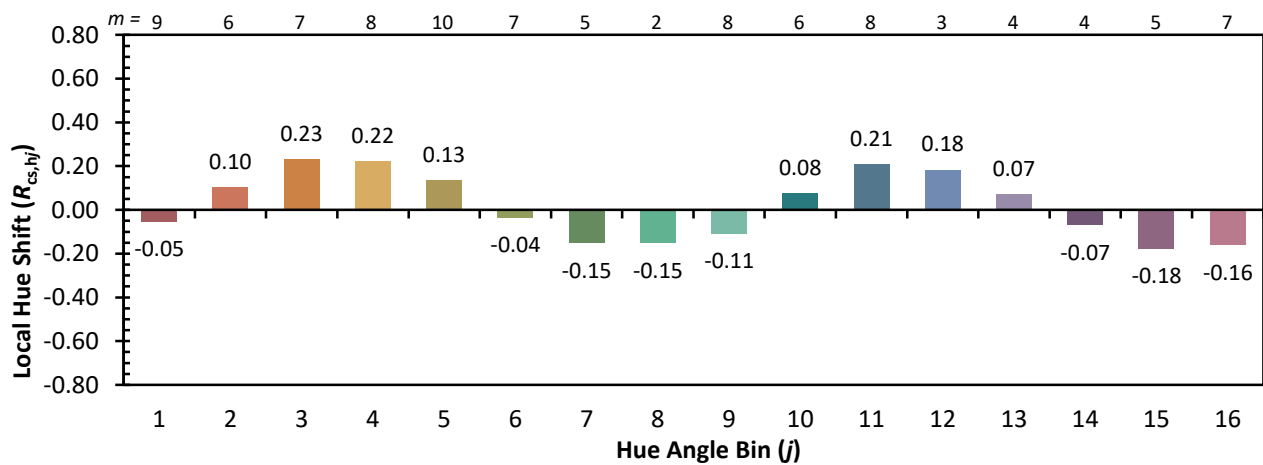
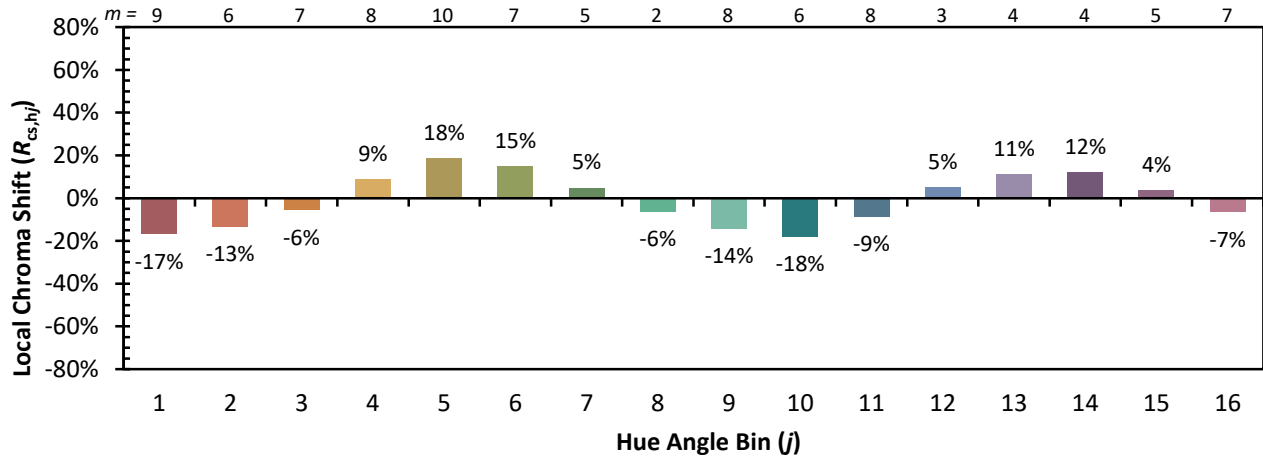


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

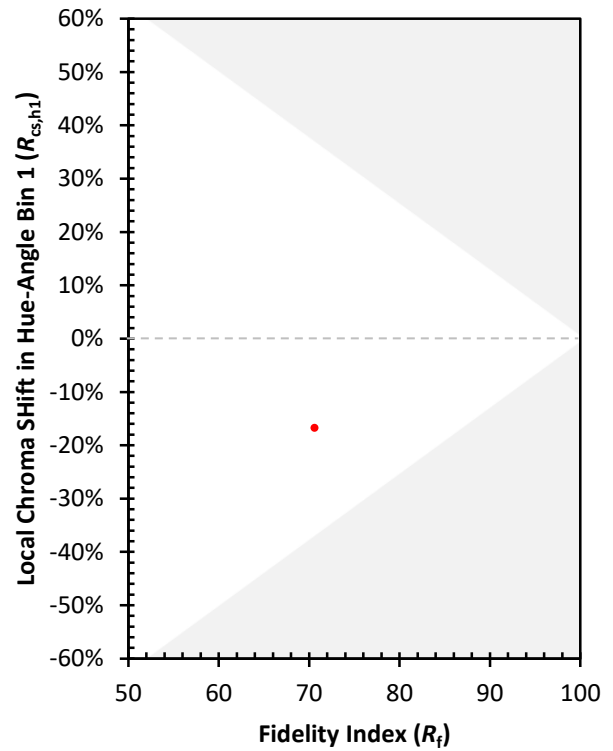
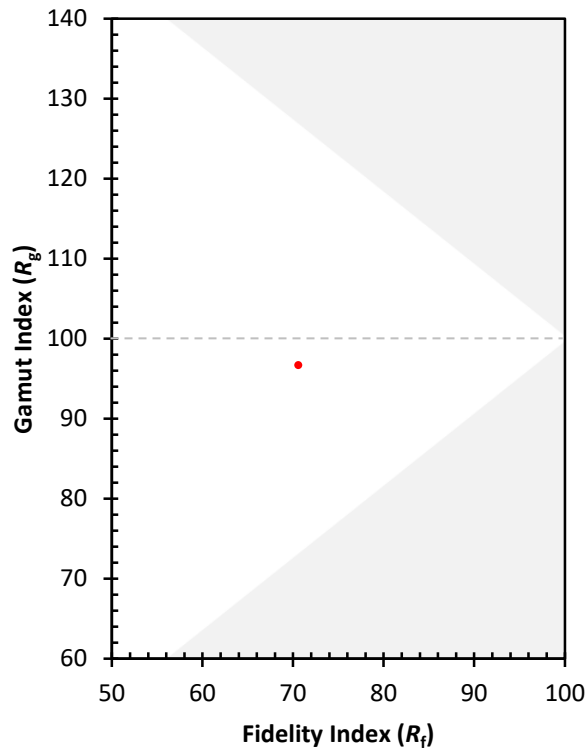
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 54 | CES51 = 84 | CES76 = 46 |
| CES02 = 61 | CES27 = 76 | CES52 = 86 | CES77 = 70 |
| CES03 = 30 | CES28 = 78 | CES53 = 71 | CES78 = 50 |
| CES04 = 70 | CES29 = 46 | CES54 = 77 | CES79 = 77 |
| CES05 = 47 | CES30 = 49 | CES55 = 76 | CES80 = 75 |
| CES06 = 50 | CES31 = 52 | CES56 = 65 | CES81 = 74 |
| CES07 = 40 | CES32 = 51 | CES57 = 62 | CES82 = 90 |
| CES08 = 39 | CES33 = 57 | CES58 = 65 | CES83 = 84 |
| CES09 = 29 | CES34 = 65 | CES59 = 86 | CES84 = 89 |
| CES10 = 74 | CES35 = 81 | CES60 = 90 | CES85 = 87 |
| CES11 = 57 | CES36 = 82 | CES61 = 87 | CES86 = 71 |
| CES12 = 63 | CES37 = 74 | CES62 = 73 | CES87 = 77 |
| CES13 = 42 | CES38 = 58 | CES63 = 72 | CES88 = 75 |
| CES14 = 74 | CES39 = 91 | CES64 = 70 | CES89 = 72 |
| CES15 = 71 | CES40 = 84 | CES65 = 63 | CES90 = 71 |
| CES16 = 46 | CES41 = 79 | CES66 = 65 | CES91 = 95 |
| CES17 = 49 | CES42 = 74 | CES67 = 63 | CES92 = 68 |
| CES18 = 56 | CES43 = 69 | CES68 = 70 | CES93 = 82 |
| CES19 = 72 | CES44 = 98 | CES69 = 81 | CES94 = 56 |
| CES20 = 65 | CES45 = 79 | CES70 = 59 | CES95 = 74 |
| CES21 = 86 | CES46 = 75 | CES71 = 57 | CES96 = 78 |
| CES22 = 78 | CES47 = 69 | CES72 = 85 | CES97 = 82 |
| CES23 = 92 | CES48 = 58 | CES73 = 50 | CES98 = 71 |
| CES24 = 91 | CES49 = 74 | CES74 = 91 | CES99 = 59 |
| CES25 = 72 | CES50 = 83 | CES75 = 54 |            |



### Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)