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: P437592

Luminaire Tested: **ISS-SA1D-830-U-SL3-HSS**

Issue Date: 12/9/2020

Report Generated By 670245982

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: | P437592 |
| | TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G3-2011-074-17) |
| Test Lab: | INNOVATION CENTER |
| Issue Date: | 12/9/2020 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS (FORMERLY EATON) |
| Product Line: | McGRAW-EDISON |
| Catalog Number: | ISS-SA1D-830-U-SL3-HSS |
| Description: | IMPACT ELITE LED QUARTER SPHERE LUMINAIRE |
| | (1) 80 CRI, 3000K, 800mA LIGHTSQUARE WITH 16 LEDS AND TYPE III SPILL LIGHT ELIMINATOR OPTICS WITH HOUSE SIDE SHIELD |
| Light Source: | - |
| Ballast/Driver: | ELECTRONIC DRIVER |

**Summary**

| | |
|---|---|
| Lumens per Lamp: | N/A |
| Luminaire Lumens: | 3807 lumens |
| Efficiency: | N/A |
| Efficacy: | 84.2 lumens/watt |
| Luminous Opening: | Rectangular (W 0.5' x L: 0.5' x H: 0') |
| IES Classification: | Type III - Short |
| BUG Rating: | B1 - U0 - G1 |

| | |
|---|---|
| Input Watts (W): | 45.2 |
| 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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REPORT NUMBER: P437592
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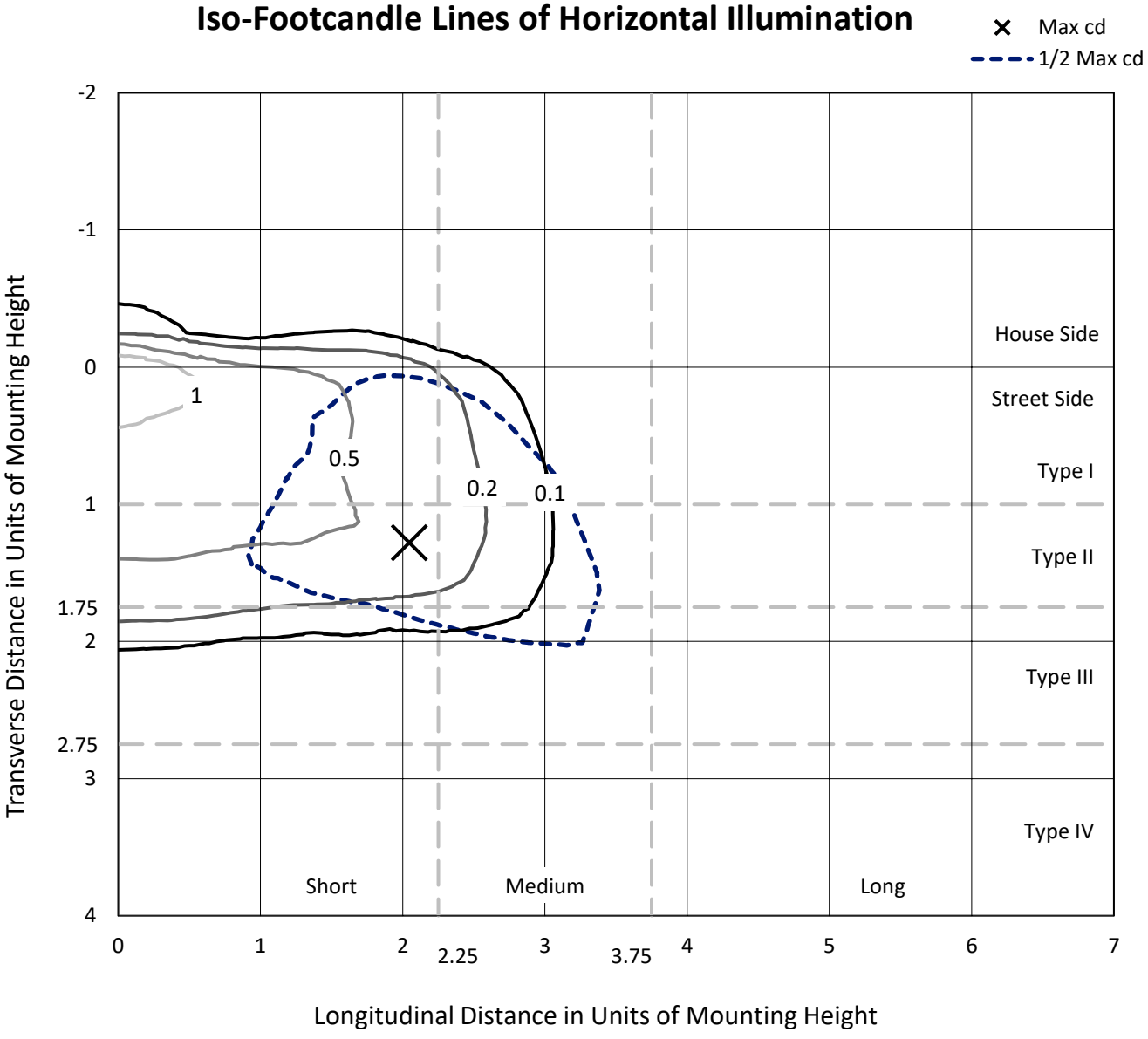
## Iso-Footcandle Lines of Horizontal Illumination




Based on 25 foot mounting height. Maximum calculated value = 1.8 fc
Type III - Short - N/A

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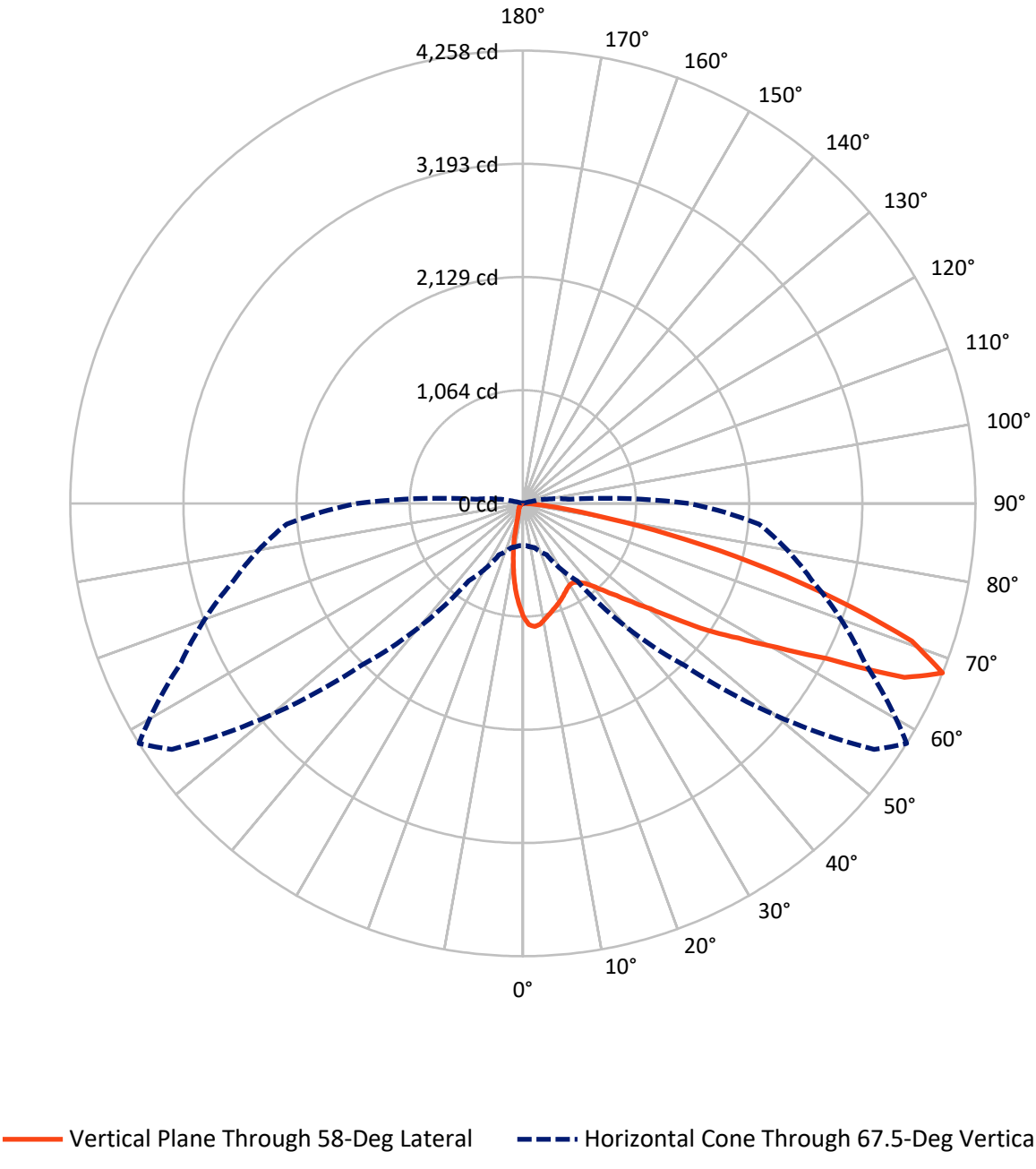
## Luminous Intensity Polar Plot



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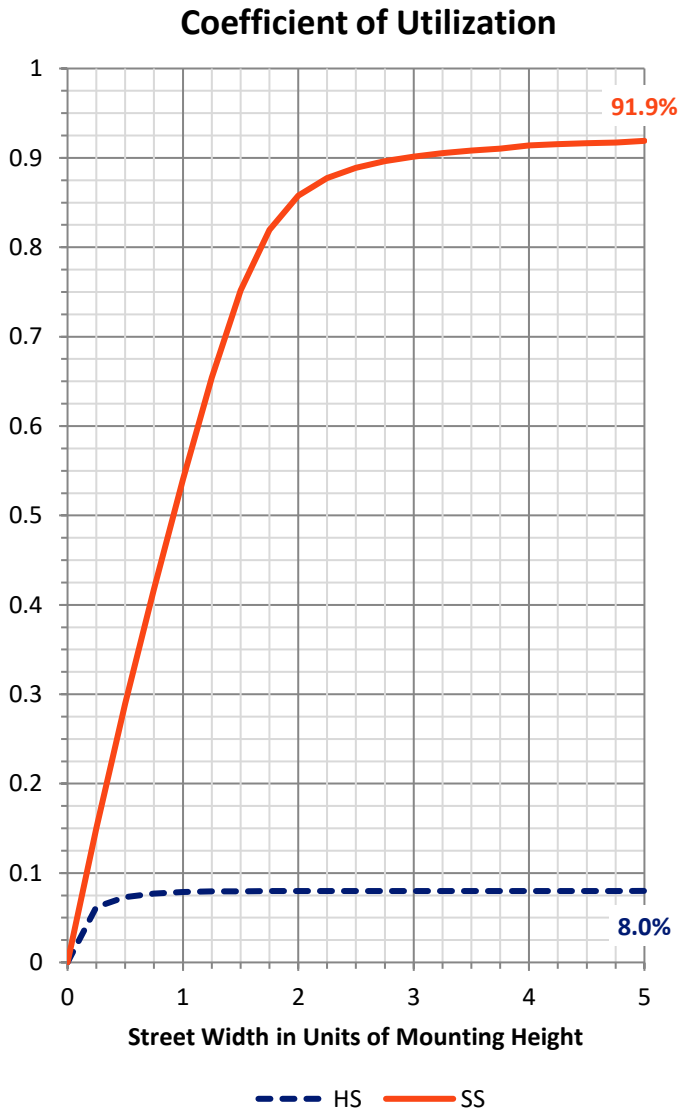
REPORT NUMBER: P437592
CATALOG NUMBER: ISS-SA1D-830-U-SL3-HSS

**FLUX DISTRIBUTION:**

| | | Downward | Upward | Total |
|---|---|---|---|---|
| **House Side** | Lumens | 306.9 | 0.0 | 306.9 |
| | % Fixture | 8.1 | 0.0 | 8.1 |
| **Street Side** | Lumens | 3500.1 | 0.0 | 3500.1 |
| | % Fixture | 91.9 | 0.0 | 91.9 |
| **Total** | Lumens | 3807.0 | 0.0 | 3807.0 |
| | % Fixture | 100.0 | 0.0 | 100.0 |

**ZONAL LUMENS:**

| Zone | Lumens | % Fixture |
|---|---|---|
| 0°-10° | 85.8 | 2.3 |
| 10°-20° | 180.9 | 4.8 |
| 20°-30° | 244.7 | 6.4 |
| 30°-40° | 336.6 | 8.8 |
| 40°-50° | 526.9 | 13.8 |
| 50°-60° | 887.6 | 23.3 |
| 60°-70° | 1053.4 | 27.7 |
| 70°-80° | 457.5 | 12.0 |
| 80°-90° | 33.6 | 0.9 |
| 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° | 3807.0 | 100.0 |
| 0°-180° | 3807.0 | 100.0 |



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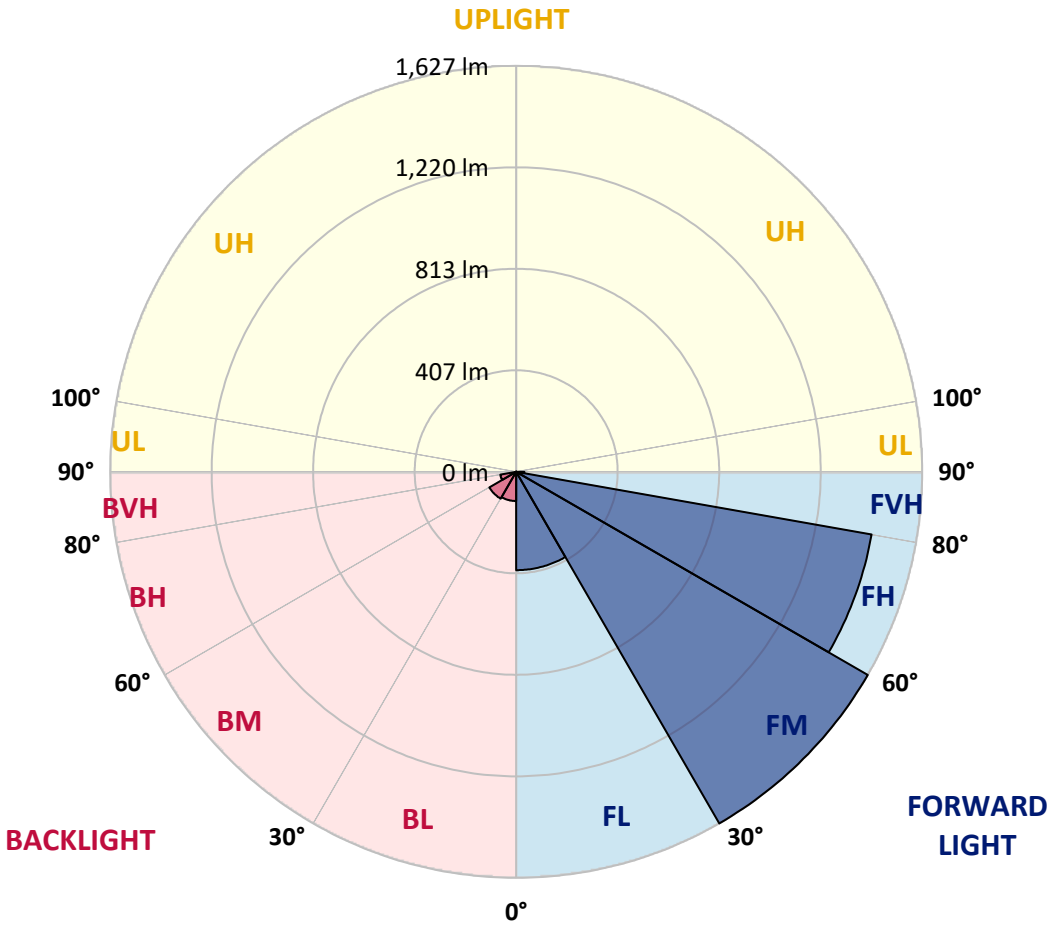
## LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:

| Zone | | Lumens | % Fixture | Zone Rating/Lumen Limit B | U | G |
|---|---|---|---|---|---|---|
| FL | (0°-30°) | 394.2 | 10.4 | | | |
| FM | (30°-60°) | 1627.0 | 42.7 | | | |
| FH | (60°-80°) | 1446.3 | 38.0 | | | G1/1800 |
| FVH | (80°-90°) | 32.6 | 0.9 | | | G1/100 |
| BL | (0°-30°) | 117.2 | 3.1 | B1/500 | | |
| BM | (30°-60°) | 124.1 | 3.3 | B0/220 | | |
| BH | (60°-80°) | 64.6 | 1.7 | B0/110 | | G0/110 |
| BVH | (80°-90°) | 1.0 | 0.0 | | | G0/10 |
| UL | (90°-100°) | 0.0 | 0.0 | | U0/0 | |
| UH | (100°-180°) | 0.0 | 0.0 | | U0/0 | |

**BUG Rating: B1-U0-G1**
Type III Short



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**CANDELA DISTRIBUTION (FULL):**

| | 0° | 5° | 15° | 25° | 35° | 45° | 55° | 58° | 65° | 75° | 85° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 1071.9 | 1071.9 | 1071.9 | 1071.9 | 1071.9 | 1071.9 | 1071.9 | *1071.9* | 1071.9 | 1071.9 | 1071.9 |
| 2.5° | 1196.4 | 1189.9 | 1186.6 | 1184.9 | 1173.5 | 1163.6 | 1144.0 | *1142.3* | 1129.2 | 1104.6 | 1080.1 |
| 5° | 1170.2 | 1175.1 | 1176.7 | 1181.7 | 1180.0 | 1180.0 | 1166.9 | *1163.6* | 1145.6 | 1111.2 | 1063.7 |
| 7.5° | 1112.8 | 1111.2 | 1114.5 | 1127.6 | 1134.1 | 1147.2 | 1145.6 | *1148.9* | 1140.7 | 1103.0 | 1035.8 |
| 10° | 1029.2 | 1032.5 | 1042.4 | 1053.8 | 1071.9 | 1094.8 | 1109.6 | *1112.8* | 1119.4 | 1088.2 | 1009.6 |
| 12.5° | 952.2 | 957.1 | 963.7 | 986.6 | 1006.3 | 1042.4 | 1070.2 | *1076.8* | 1089.9 | 1073.5 | 986.6 |
| 15° | 888.3 | 889.9 | 894.9 | 916.2 | 948.9 | 994.8 | 1035.8 | *1045.6* | 1066.9 | 1060.4 | 968.6 |
| 17.5° | 837.5 | 839.1 | 845.7 | 863.7 | 889.9 | 944.0 | 999.7 | *1016.1* | 1047.3 | 1052.2 | 948.9 |
| 20° | 809.6 | 809.6 | 809.6 | 821.1 | 847.3 | 898.1 | 963.7 | *986.6* | 1030.9 | 1039.1 | 932.5 |
| 22.5° | 801.4 | 801.4 | 798.2 | 801.4 | 817.8 | 860.4 | 927.6 | *955.5* | 1011.2 | 1034.2 | 912.9 |
| 25° | 812.9 | 808.0 | 808.0 | 799.8 | 801.4 | 829.3 | 894.9 | *926.0* | 999.7 | 1030.9 | 903.0 |
| 27.5° | 834.2 | 832.6 | 826.0 | 819.5 | 809.6 | 816.2 | 867.0 | *898.1* | 988.3 | 1035.8 | 894.9 |
| 30° | 858.8 | 858.8 | 855.5 | 852.2 | 835.9 | 822.7 | 853.9 | *881.7* | 983.4 | 1044.0 | 889.9 |
| 32.5° | 886.7 | 885.0 | 893.2 | 896.5 | 876.8 | 852.2 | 857.2 | *883.4* | 986.6 | 1068.6 | 893.2 |
| 35° | 919.4 | 919.4 | 934.2 | 953.9 | 937.5 | 899.8 | 888.3 | *911.2* | 1003.0 | 1094.8 | 906.3 |
| 37.5° | 955.5 | 957.1 | 983.4 | 1011.2 | 999.7 | 967.0 | 947.3 | *955.5* | 1037.4 | 1144.0 | 935.8 |
| 40° | 998.1 | 998.1 | 1037.4 | 1083.3 | 1083.3 | 1045.6 | 1019.4 | *1026.0* | 1086.6 | 1214.4 | 988.3 |
| 42.5° | 1044.0 | 1048.9 | 1104.6 | 1160.4 | 1176.7 | 1142.3 | 1114.5 | *1122.7* | 1165.3 | 1306.2 | 1065.3 |
| 45° | 1109.6 | 1124.3 | 1196.4 | 1250.5 | 1283.3 | 1266.9 | 1230.8 | *1237.4* | 1268.5 | 1439.0 | 1181.7 |
| 47.5° | 1225.9 | 1239.0 | 1301.3 | 1355.4 | 1396.4 | 1404.6 | 1388.2 | *1384.9* | 1398.0 | 1594.7 | 1329.2 |
| 50° | 1365.2 | 1376.7 | 1419.3 | 1465.2 | 1522.6 | 1571.7 | 1561.9 | *1557.0* | 1561.9 | 1765.1 | 1509.5 |
| 52.5° | 1502.9 | 1498.0 | 1548.8 | 1573.4 | 1653.7 | 1761.8 | 1804.5 | *1804.5* | 1778.2 | 1943.8 | 1686.5 |
| 55° | 1625.8 | 1647.1 | 1701.2 | 1745.5 | 1812.7 | 1942.1 | 2086.4 | *2104.4* | 2014.2 | 2120.8 | 1834.0 |
| 57.5° | 1611.1 | 1632.4 | 1732.3 | 1871.7 | 2070.0 | 2245.3 | 2386.3 | *2389.6* | 2258.4 | 2256.8 | 2015.9 |
| 60° | 1439.0 | 1440.6 | 1575.0 | 1786.4 | 2183.0 | 2682.9 | 2764.9 | *2748.5* | 2471.5 | 2446.9 | 2266.6 |
| 62.5° | 1012.9 | 1006.3 | 1180.0 | 1448.8 | 2014.2 | 2922.2 | 3338.5 | *3213.9* | 2825.5 | 2745.2 | 2501.0 |
| 65° | 590.0 | 586.7 | 653.9 | 865.4 | 1525.8 | 2753.4 | 3925.2 | *3944.9* | 3291.0 | 2897.6 | 2451.8 |
| 67.5° | *396.6* | *399.9* | *431.0* | *534.3* | *889.9* | *2160.1* | *4033.4* | *4257.9* | *3549.9* | *2819.0* | *2230.6* |
| 70° | 291.7 | 291.7 | 316.3 | 393.3 | 527.7 | 1353.8 | 3523.7 | *3882.6* | 3600.7 | 2622.3 | 1866.7 |
| 72.5° | 208.1 | 208.1 | 242.6 | 318.0 | 431.0 | 698.2 | 2619.0 | *3077.9* | 3040.2 | 2176.5 | 1291.5 |
| 75° | 132.8 | 136.0 | 173.7 | 260.6 | 393.3 | 447.4 | 1776.6 | *2230.6* | 2120.8 | 1217.7 | 550.7 |
| 77.5° | 50.8 | 57.4 | 93.4 | 191.8 | 344.2 | 372.0 | 1012.9 | *1406.2* | 1119.4 | 426.1 | 147.5 |
| 80° | 18.0 | 18.0 | 31.1 | 98.3 | 242.6 | 306.5 | 529.4 | *698.2* | 363.8 | 103.3 | 55.7 |
| 82.5° | 3.3 | 3.3 | 11.5 | 41.0 | 119.6 | 213.1 | 308.1 | *344.2* | 142.6 | 34.4 | 32.8 |
| 85° | 0.0 | 0.0 | 1.6 | 8.2 | 27.9 | 21.3 | 122.9 | *116.4* | 44.3 | 14.8 | 21.3 |
| 87.5° | 0.0 | 0.0 | 0.0 | 0.0 | 1.6 | 1.6 | 3.3 | *3.3* | 3.3 | 3.3 | 3.3 |
| 90° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | *0.0* | 0.0 | 0.0 | 0.0 |

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Scaled Data Report

REPORT NUMBER: P437592
CATALOG NUMBER: ISS-SA1D-830-U-SL3-HSS

**CANDELA DISTRIBUTION (continued):**

| | 90° | 95° | 105° | 115° | 125° | 135° | 145° | 155° | 165° | 175° | 180° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 1071.9 | 1071.9 | 1071.9 | 1071.9 | 1071.9 | 1071.9 | 1071.9 | 1071.9 | 1071.9 | 1071.9 | 1071.9 |
| 2.5° | 1060.4 | 1047.3 | 1009.6 | 983.4 | 947.3 | 911.2 | 888.3 | 870.3 | 862.1 | 850.6 | 855.5 |
| 5° | 1034.2 | 1004.7 | 935.8 | 873.5 | 814.5 | 752.3 | 706.4 | 665.4 | 652.3 | 629.3 | 626.1 |
| 7.5° | 994.8 | 953.9 | 852.2 | 753.9 | 658.8 | 580.2 | 509.7 | 455.6 | 406.5 | 385.1 | 398.3 |
| 10° | 957.1 | 901.4 | 768.7 | 637.5 | 511.3 | 401.5 | 318.0 | 252.4 | 214.7 | 198.3 | 201.6 |
| 12.5° | 921.1 | 850.6 | 681.8 | 526.1 | 372.0 | 247.5 | 180.3 | 145.9 | 134.4 | 132.8 | 129.5 |
| 15° | 889.9 | 803.1 | 604.8 | 408.1 | 247.5 | 155.7 | 127.8 | 119.6 | 118.0 | 118.0 | 118.0 |
| 17.5° | 855.5 | 753.9 | 521.2 | 299.9 | 162.3 | 121.3 | 113.1 | 111.4 | 109.8 | 109.8 | 109.8 |
| 20° | 829.3 | 711.3 | 444.1 | 209.8 | 124.6 | 108.2 | 104.9 | 104.9 | 103.3 | 103.3 | 103.3 |
| 22.5° | 801.4 | 667.0 | 368.8 | 154.1 | 106.5 | 100.0 | 96.7 | 95.1 | 95.1 | 93.4 | 93.4 |
| 25° | 775.2 | 626.1 | 296.6 | 118.0 | 95.1 | 90.1 | 86.9 | 85.2 | 85.2 | 83.6 | 81.9 |
| 27.5° | 758.8 | 593.3 | 232.7 | 100.0 | 85.2 | 81.9 | 78.7 | 75.4 | 72.1 | 70.5 | 70.5 |
| 30° | 747.4 | 554.0 | 177.0 | 86.9 | 78.7 | 73.8 | 68.8 | 63.9 | 59.0 | 57.4 | 57.4 |
| 32.5° | 731.0 | 522.8 | 136.0 | 78.7 | 70.5 | 65.6 | 59.0 | 54.1 | 49.2 | 45.9 | 45.9 |
| 35° | 731.0 | 496.6 | 104.9 | 70.5 | 63.9 | 57.4 | 52.4 | 44.3 | 39.3 | 37.7 | 36.1 |
| 37.5° | 742.4 | 467.1 | 86.9 | 65.6 | 59.0 | 52.4 | 45.9 | 37.7 | 32.8 | 31.1 | 31.1 |
| 40° | 768.7 | 457.3 | 73.8 | 59.0 | 52.4 | 45.9 | 39.3 | 31.1 | 27.9 | 24.6 | 24.6 |
| 42.5° | 822.7 | 460.5 | 65.6 | 55.7 | 47.5 | 41.0 | 32.8 | 26.2 | 22.9 | 21.3 | 21.3 |
| 45° | 901.4 | 470.4 | 60.6 | 50.8 | 42.6 | 34.4 | 27.9 | 22.9 | 18.0 | 16.4 | 16.4 |
| 47.5° | 1011.2 | 501.5 | 54.1 | 45.9 | 37.7 | 29.5 | 22.9 | 18.0 | 14.8 | 13.1 | 13.1 |
| 50° | 1142.3 | 555.6 | 50.8 | 41.0 | 34.4 | 24.6 | 18.0 | 13.1 | 9.8 | 9.8 | 9.8 |
| 52.5° | 1296.4 | 609.7 | 45.9 | 37.7 | 29.5 | 21.3 | 14.8 | 9.8 | 8.2 | 6.6 | 6.6 |
| 55° | 1425.9 | 657.2 | 41.0 | 34.4 | 24.6 | 16.4 | 11.5 | 8.2 | 6.6 | 4.9 | 4.9 |
| 57.5° | 1594.7 | 726.0 | 34.4 | 29.5 | 19.7 | 13.1 | 8.2 | 6.6 | 3.3 | 3.3 | 3.3 |
| 60° | 1820.8 | 808.0 | 29.5 | 24.6 | 14.8 | 9.8 | 6.6 | 3.3 | 3.3 | 1.6 | 1.6 |
| 62.5° | 1917.5 | 742.4 | 26.2 | 19.7 | 11.5 | 6.6 | 4.9 | 3.3 | 1.6 | 1.6 | 1.6 |
| 65° | 1811.0 | 606.4 | 21.3 | 14.8 | 8.2 | 4.9 | 3.3 | 1.6 | 1.6 | 0.0 | 0.0 |
| 67.5° | *1561.9* | *447.4* | *18.0* | *9.8* | *6.6* | *3.3* | *1.6* | *0.0* | *0.0* | *0.0* | *0.0* |
| 70° | 1273.4 | 331.1 | 13.1 | 6.6 | 3.3 | 3.3 | 1.6 | 0.0 | 0.0 | 0.0 | 0.0 |
| 72.5° | 881.7 | 199.9 | 9.8 | 4.9 | 3.3 | 1.6 | 1.6 | 0.0 | 0.0 | 0.0 | 0.0 |
| 75° | 342.5 | 78.7 | 8.2 | 4.9 | 3.3 | 1.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 77.5° | 96.7 | 27.9 | 6.6 | 3.3 | 3.3 | 1.6 | 1.6 | 1.6 | 0.0 | 0.0 | 0.0 |
| 80° | 39.3 | 14.8 | 4.9 | 3.3 | 3.3 | 3.3 | 1.6 | 1.6 | 0.0 | 0.0 | 0.0 |
| 82.5° | 24.6 | 8.2 | 3.3 | 1.6 | 1.6 | 1.6 | 1.6 | 0.0 | 0.0 | 0.0 | 0.0 |
| 85° | 16.4 | 4.9 | 3.3 | 1.6 | 1.6 | 0.0 | 0.0 | 0.0 | 0.0 | 1.6 | 1.6 |
| 87.5° | 3.3 | 3.3 | 1.6 | 1.6 | 1.6 | 1.6 | 0.0 | 0.0 | 0.0 | 0.0 | 1.6 |
| 90° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

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

Report Prepared for

Cooper Lighting Solutions

MCGRAW EDISON

Report Number: SP1-2408-195-9

Test Date: 08/07/2024

Luminaire Tested: GALN-SB1A-830-U-5WQ

Data in this report applies to families of products including GALN-SB1A-830-U-5WQ.

Report Generated By FNC07603 / LDUCLS01DT446
Version: v7.04

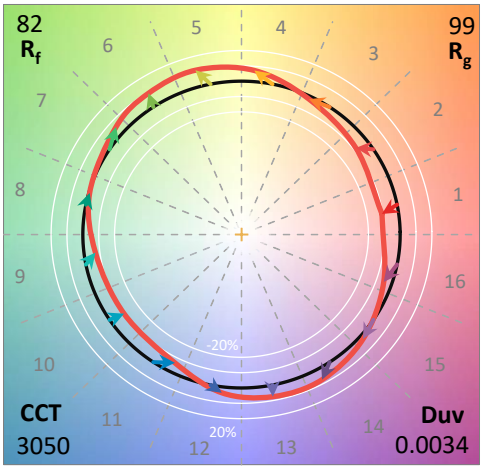
## Test Information

| | |
|---|---|
| Test Method: | LM-79-2019 |
| Report Number: | SP1-2408-195-9 |
| Test Lab: | COOPER LIGHTING SOLUTIONS |
| Photometer: | SP1 - 76IN SPHERE |
| Measurement Geometry: | 4π |
| Issue Date: | 08/07/2024 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS |
| Product Line: | MCGRAW EDISON |
| Catalog Number: | **GALN-SB1A-830-U-5WQ** |
| Description: | GALLEON AREA AND ROADWAY LUMINAIRE. (1) 80 CRI, 3000K, 350MA HIGH DENSITY LIGHTSQUARE WITH 26 LEDS AND TYPE V WIDE OPTICS |

## Spectral Parameters

| | | | | | |
|---|---|---|---|---|---|
| CCT (K): | 3050 | CRI (Ra): | 81.0 | | |
| CIE u': | 0.2476 | R1: | 79.6 | R9: | 7.1 |
| CIE v': | 0.5251 | R2: | 85.6 | R10: | 67.0 |
| Duv: | 0.0034 | R3: | 92.0 | R11: | 82.7 |
| CIE x: | 0.4383 | R4: | 82.6 | R12: | 63.2 |
| CIE y: | 0.4131 | R5: | 78.9 | R13: | 80.3 |
| CIE z: | 0.1487 | R6: | 81.7 | R14: | 95.0 |
| Peak Wavelength (nm): | 603 | R7: | 85.2 | R15: | 71.7 |
| Dominant Wavelength (nm): | 581 | R8: | 62.0 | | |
| Purity: | 55.55201 | | | | |

| | |
|---|---|
| Rf: | 81.5 |
| Rg: | 99.2 |




## Test Conditions

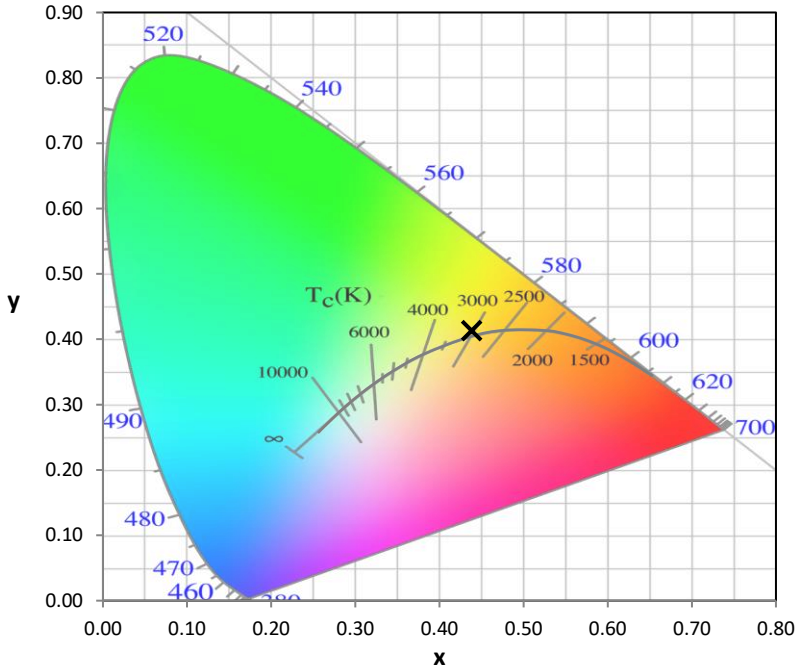
| | |
|---|---|
| Stabilization Time: | 20M |
| Operation Time: | 1H 20M |
| Sphere Temperature (°C): | 24.2 |

REPORT NUMBER: SP1-2408-195-9

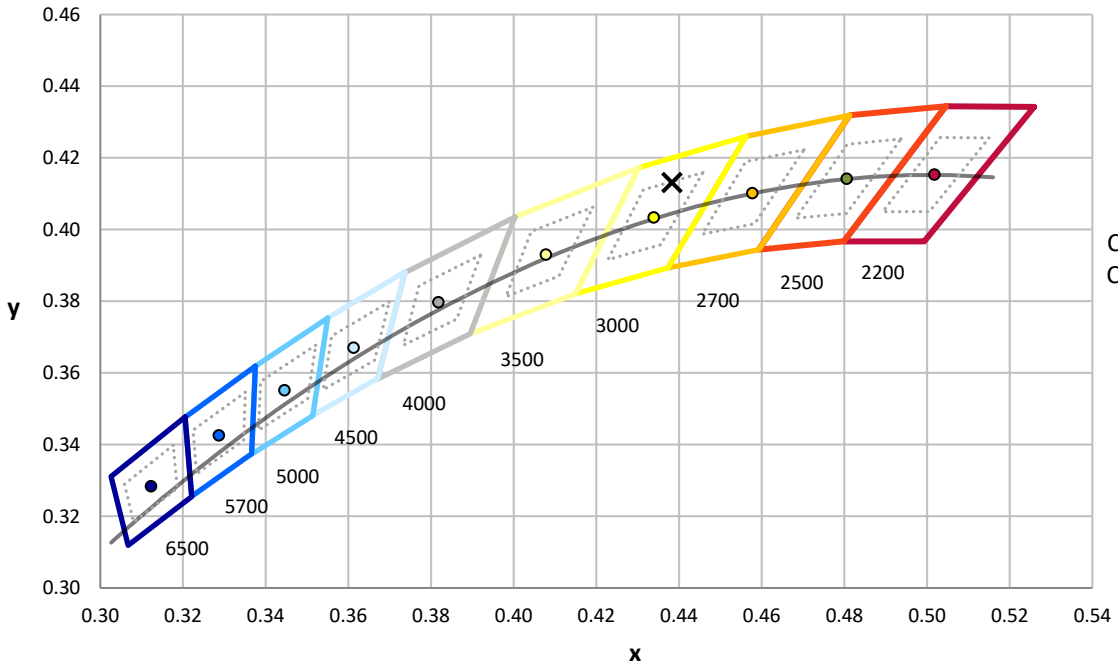
| Measurement and Test Equipment | | | |
|---|---|---|---|
| Instrument | Identification Number | Calibration Date | Calibration Due Date |
| Photometer | IN0058 | 6/18/2024 | 12/18/2024 |
| Power Meter | INXT2011004 | 2/8/2024 | 2/8/2025 |
| AC Power Source | IN0063 | 10/24/2023 | 10/24/2024 |
| DC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

REPORT NUMBER: SP1-2408-195-9

## CIE 1931 Chromaticity Diagram




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




CCT = 3050K
CIE x = 0.4383
CIE y = 0.4131
Duv = 0.0034

Point lies inside the ANSI 3000K 4-step quadrangle

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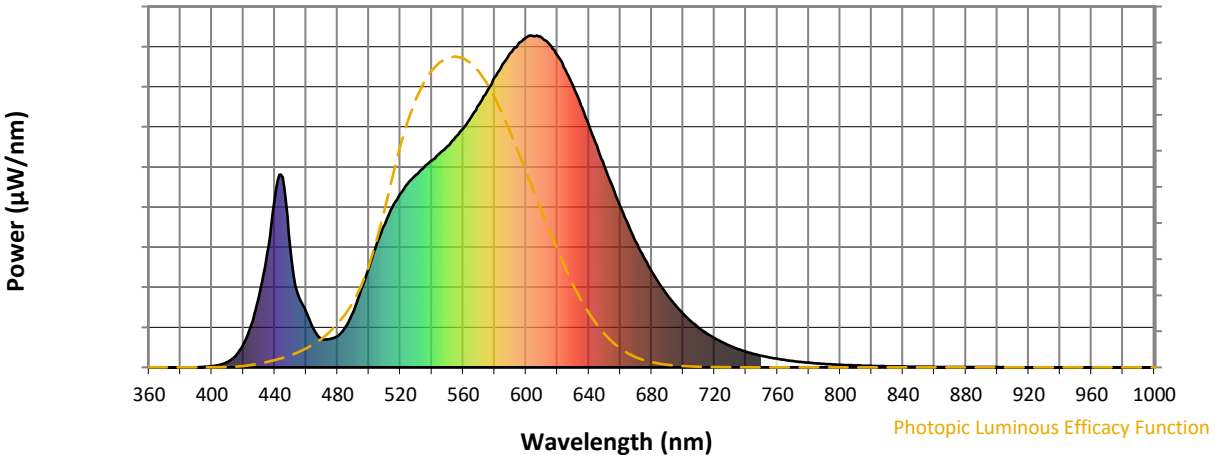
## Photopic Flux vs. Wavelength




## 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 | 168 | NR | 620 | 940 | NR | 750 | 35 | NR | 880 | 1 | NR |
| 365 | 0 | NR | 495 | 233 | NR | 625 | 897 | NR | 755 | 30 | NR | 885 | 1 | NR |
| 370 | 0 | NR | 500 | 300 | NR | 630 | 847 | NR | 760 | 26 | NR | 890 | 1 | NR |
| 375 | 0 | NR | 505 | 372 | NR | 635 | 790 | NR | 765 | 22 | NR | 895 | 1 | NR |
| 380 | 0 | NR | 510 | 430 | NR | 640 | 730 | NR | 770 | 19 | NR | 900 | 1 | NR |
| 385 | 0 | NR | 515 | 483 | NR | 645 | 668 | NR | 775 | 16 | NR | 905 | 1 | NR |
| 390 | 0 | NR | 520 | 524 | NR | 650 | 605 | NR | 780 | 14 | NR | 910 | 0 | NR |
| 395 | 2 | NR | 525 | 555 | NR | 655 | 545 | NR | 785 | 12 | NR | 915 | 0 | NR |
| 400 | 4 | NR | 530 | 581 | NR | 660 | 485 | NR | 790 | 10 | NR | 920 | 0 | NR |
| 405 | 7 | NR | 535 | 604 | NR | 665 | 430 | NR | 795 | 9 | NR | 925 | 0 | NR |
| 410 | 17 | NR | 540 | 623 | NR | 670 | 378 | NR | 800 | 8 | NR | 930 | 0 | NR |
| 415 | 34 | NR | 545 | 645 | NR | 675 | 331 | NR | 805 | 7 | NR | 935 | 0 | NR |
| 420 | 68 | NR | 550 | 667 | NR | 680 | 290 | NR | 810 | 6 | NR | 940 | 0 | NR |
| 425 | 128 | NR | 555 | 693 | NR | 685 | 251 | NR | 815 | 5 | NR | 945 | 0 | NR |
| 430 | 214 | NR | 560 | 719 | NR | 690 | 218 | NR | 820 | 4 | NR | 950 | 0 | NR |
| 435 | 339 | NR | 565 | 754 | NR | 695 | 188 | NR | 825 | 4 | NR | 955 | 0 | NR |
| 440 | 507 | NR | 570 | 791 | NR | 700 | 162 | NR | 830 | 3 | NR | 960 | 0 | NR |
| 445 | 573 | NR | 575 | 830 | NR | 705 | 139 | NR | 835 | 3 | NR | 965 | 0 | NR |
| 450 | 356 | NR | 580 | 873 | NR | 710 | 119 | NR | 840 | 3 | NR | 970 | 0 | NR |
| 455 | 217 | NR | 585 | 913 | NR | 715 | 102 | NR | 845 | 2 | NR | 975 | 0 | NR |
| 460 | 168 | NR | 590 | 948 | NR | 720 | 88 | NR | 850 | 2 | NR | 980 | 0 | NR |
| 465 | 113 | NR | 595 | 974 | NR | 725 | 76 | NR | 855 | 2 | NR | 985 | 0 | NR |
| 470 | 85 | NR | 600 | 994 | NR | 730 | 65 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 85 | NR | 605 | 998 | NR | 735 | 55 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 94 | NR | 610 | 994 | NR | 740 | 47 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 120 | NR | 615 | 973 | NR | 745 | 41 | NR | 875 | 1 | NR | | | |

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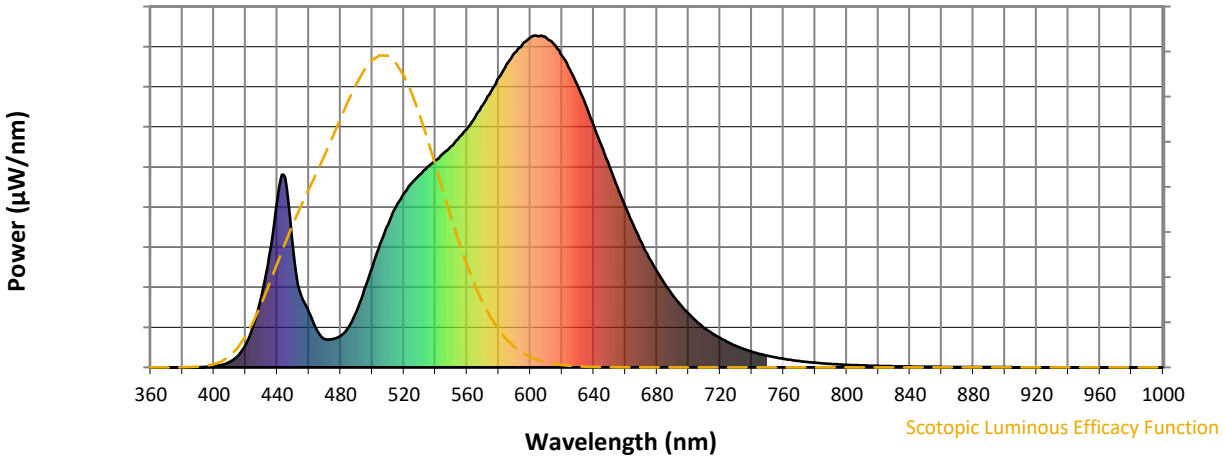
## Scotopic Flux vs. Wavelength




**Scotopic Lumens: NR** **S/P: 1.27**

| 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 | 168 | NR | 620 | 940 | NR | 750 | 35 | NR | 880 | 1 | NR |
| 365 | 0 | NR | 495 | 233 | NR | 625 | 897 | NR | 755 | 30 | NR | 885 | 1 | NR |
| 370 | 0 | NR | 500 | 300 | NR | 630 | 847 | NR | 760 | 26 | NR | 890 | 1 | NR |
| 375 | 0 | NR | 505 | 372 | NR | 635 | 790 | NR | 765 | 22 | NR | 895 | 1 | NR |
| 380 | 0 | NR | 510 | 430 | NR | 640 | 730 | NR | 770 | 19 | NR | 900 | 1 | NR |
| 385 | 0 | NR | 515 | 483 | NR | 645 | 668 | NR | 775 | 16 | NR | 905 | 1 | NR |
| 390 | 0 | NR | 520 | 524 | NR | 650 | 605 | NR | 780 | 14 | NR | 910 | 0 | NR |
| 395 | 2 | NR | 525 | 555 | NR | 655 | 545 | NR | 785 | 12 | NR | 915 | 0 | NR |
| 400 | 4 | NR | 530 | 581 | NR | 660 | 485 | NR | 790 | 10 | NR | 920 | 0 | NR |
| 405 | 7 | NR | 535 | 604 | NR | 665 | 430 | NR | 795 | 9 | NR | 925 | 0 | NR |
| 410 | 17 | NR | 540 | 623 | NR | 670 | 378 | NR | 800 | 8 | NR | 930 | 0 | NR |
| 415 | 34 | NR | 545 | 645 | NR | 675 | 331 | NR | 805 | 7 | NR | 935 | 0 | NR |
| 420 | 68 | NR | 550 | 667 | NR | 680 | 290 | NR | 810 | 6 | NR | 940 | 0 | NR |
| 425 | 128 | NR | 555 | 693 | NR | 685 | 251 | NR | 815 | 5 | NR | 945 | 0 | NR |
| 430 | 214 | NR | 560 | 719 | NR | 690 | 218 | NR | 820 | 4 | NR | 950 | 0 | NR |
| 435 | 339 | NR | 565 | 754 | NR | 695 | 188 | NR | 825 | 4 | NR | 955 | 0 | NR |
| 440 | 507 | NR | 570 | 791 | NR | 700 | 162 | NR | 830 | 3 | NR | 960 | 0 | NR |
| 445 | 573 | NR | 575 | 830 | NR | 705 | 139 | NR | 835 | 3 | NR | 965 | 0 | NR |
| 450 | 356 | NR | 580 | 873 | NR | 710 | 119 | NR | 840 | 3 | NR | 970 | 0 | NR |
| 455 | 217 | NR | 585 | 913 | NR | 715 | 102 | NR | 845 | 2 | NR | 975 | 0 | NR |
| 460 | 168 | NR | 590 | 948 | NR | 720 | 88 | NR | 850 | 2 | NR | 980 | 0 | NR |
| 465 | 113 | NR | 595 | 974 | NR | 725 | 76 | NR | 855 | 2 | NR | 985 | 0 | NR |
| 470 | 85 | NR | 600 | 994 | NR | 730 | 65 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 85 | NR | 605 | 998 | NR | 735 | 55 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 94 | NR | 610 | 994 | NR | 740 | 47 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 120 | NR | 615 | 973 | NR | 745 | 41 | NR | 875 | 1 | NR | | | |

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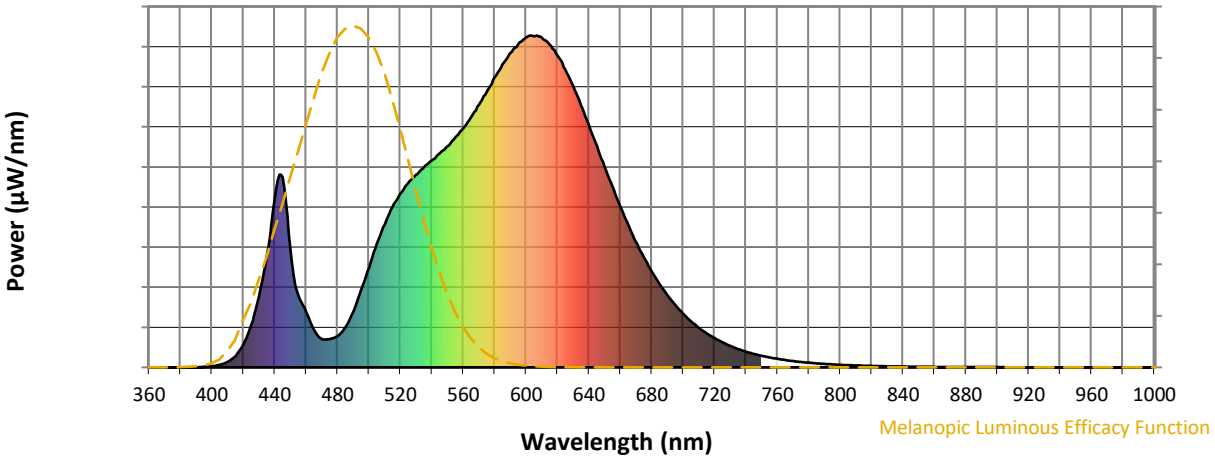
## Melanopic Flux vs. Wavelength




**Melanopic Lumens: NR** **M/P: 2.32**

| 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 | 168 | NR | 620 | 940 | NR | 750 | 35 | NR | 880 | 1 | NR |
| 365 | 0 | NR | 495 | 233 | NR | 625 | 897 | NR | 755 | 30 | NR | 885 | 1 | NR |
| 370 | 0 | NR | 500 | 300 | NR | 630 | 847 | NR | 760 | 26 | NR | 890 | 1 | NR |
| 375 | 0 | NR | 505 | 372 | NR | 635 | 790 | NR | 765 | 22 | NR | 895 | 1 | NR |
| 380 | 0 | NR | 510 | 430 | NR | 640 | 730 | NR | 770 | 19 | NR | 900 | 1 | NR |
| 385 | 0 | NR | 515 | 483 | NR | 645 | 668 | NR | 775 | 16 | NR | 905 | 1 | NR |
| 390 | 0 | NR | 520 | 524 | NR | 650 | 605 | NR | 780 | 14 | NR | 910 | 0 | NR |
| 395 | 2 | NR | 525 | 555 | NR | 655 | 545 | NR | 785 | 12 | NR | 915 | 0 | NR |
| 400 | 4 | NR | 530 | 581 | NR | 660 | 485 | NR | 790 | 10 | NR | 920 | 0 | NR |
| 405 | 7 | NR | 535 | 604 | NR | 665 | 430 | NR | 795 | 9 | NR | 925 | 0 | NR |
| 410 | 17 | NR | 540 | 623 | NR | 670 | 378 | NR | 800 | 8 | NR | 930 | 0 | NR |
| 415 | 34 | NR | 545 | 645 | NR | 675 | 331 | NR | 805 | 7 | NR | 935 | 0 | NR |
| 420 | 68 | NR | 550 | 667 | NR | 680 | 290 | NR | 810 | 6 | NR | 940 | 0 | NR |
| 425 | 128 | NR | 555 | 693 | NR | 685 | 251 | NR | 815 | 5 | NR | 945 | 0 | NR |
| 430 | 214 | NR | 560 | 719 | NR | 690 | 218 | NR | 820 | 4 | NR | 950 | 0 | NR |
| 435 | 339 | NR | 565 | 754 | NR | 695 | 188 | NR | 825 | 4 | NR | 955 | 0 | NR |
| 440 | 507 | NR | 570 | 791 | NR | 700 | 162 | NR | 830 | 3 | NR | 960 | 0 | NR |
| 445 | 573 | NR | 575 | 830 | NR | 705 | 139 | NR | 835 | 3 | NR | 965 | 0 | NR |
| 450 | 356 | NR | 580 | 873 | NR | 710 | 119 | NR | 840 | 3 | NR | 970 | 0 | NR |
| 455 | 217 | NR | 585 | 913 | NR | 715 | 102 | NR | 845 | 2 | NR | 975 | 0 | NR |
| 460 | 168 | NR | 590 | 948 | NR | 720 | 88 | NR | 850 | 2 | NR | 980 | 0 | NR |
| 465 | 113 | NR | 595 | 974 | NR | 725 | 76 | NR | 855 | 2 | NR | 985 | 0 | NR |
| 470 | 85 | NR | 600 | 994 | NR | 730 | 65 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 85 | NR | 605 | 998 | NR | 735 | 55 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 94 | NR | 610 | 994 | NR | 740 | 47 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 120 | NR | 615 | 973 | NR | 745 | 41 | NR | 875 | 1 | NR | | | |

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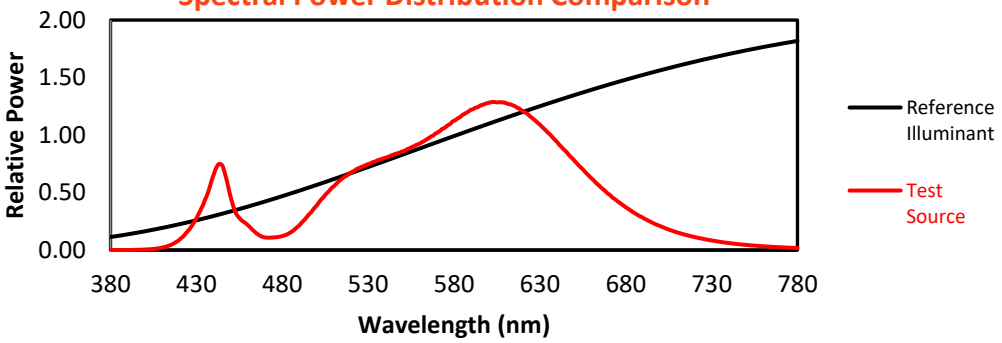
# TM-30-18

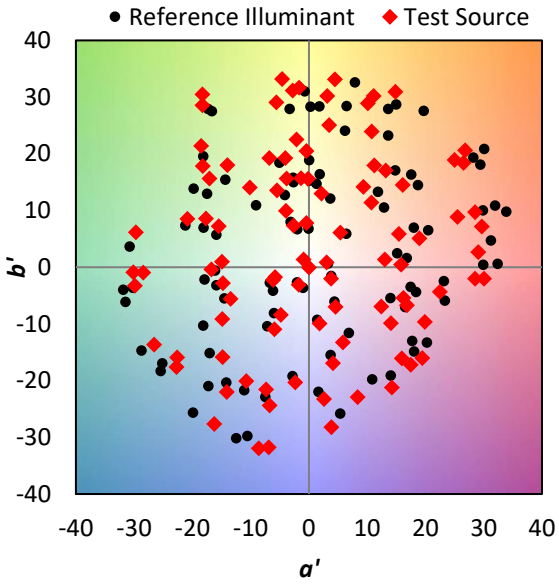
## Summary

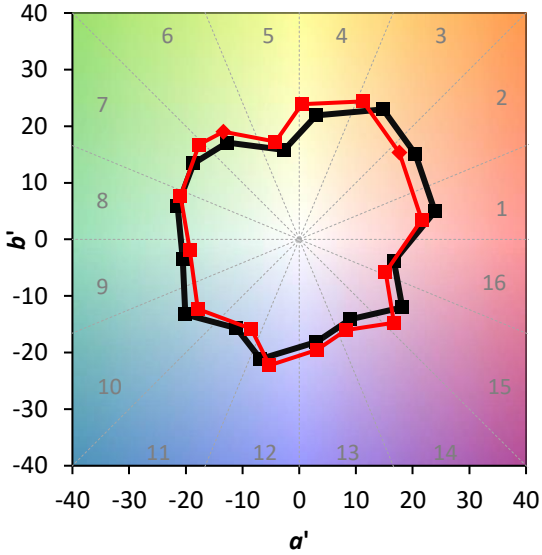
$R_f$ = 81.5
$R_g$ = 99.2
CIE $R_a$ = 81.0
$R_9$ = 7.1

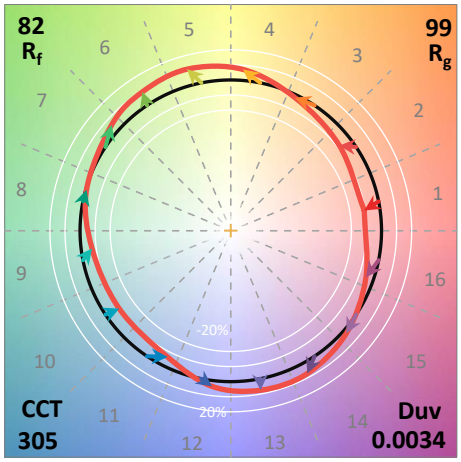
## Spectral Power Distribution Comparison

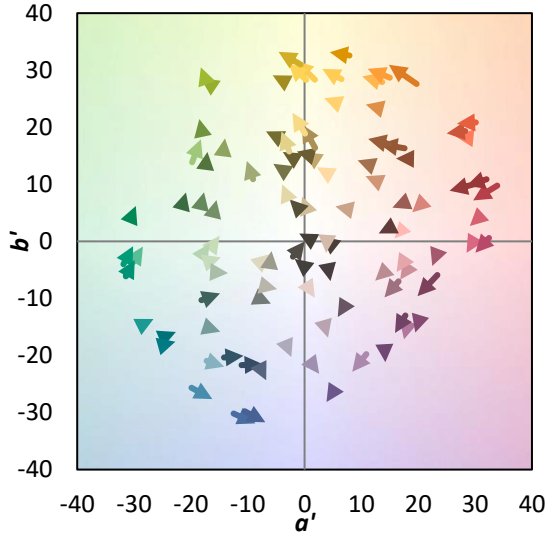



## Color Vector Graphics



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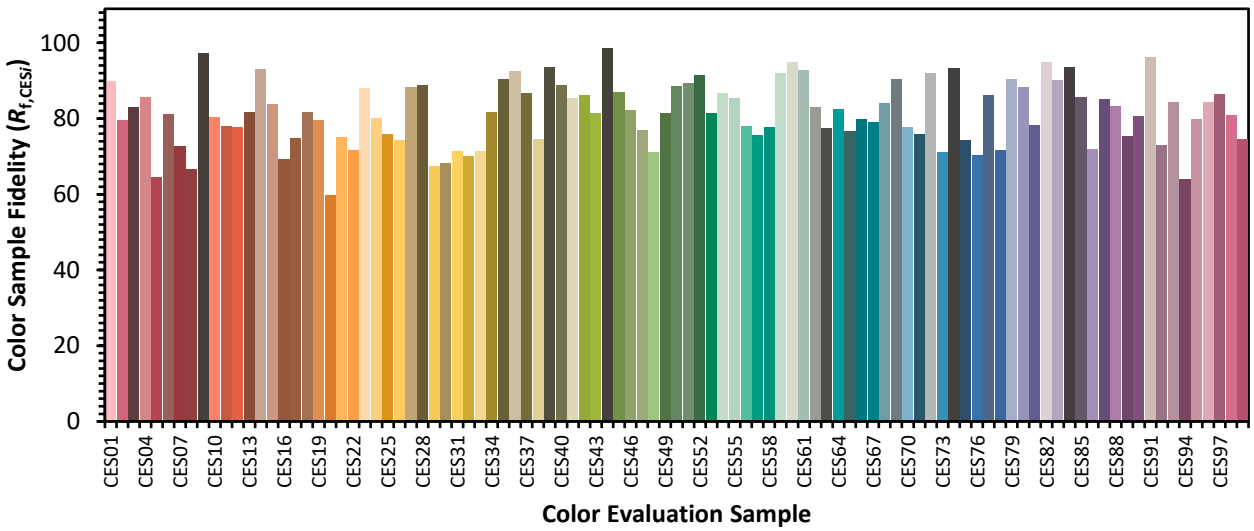
# TM-30-18

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

| | | | |
|---|---|---|---|
| CES01 = 86 | CES26 = 74 | CES51 = 89 | CES76 = 70 |
| CES02 = 63 | CES27 = 88 | CES52 = 92 | CES77 = 86 |
| CES03 = 31 | CES28 = 89 | CES53 = 81 | CES78 = 72 |
| CES04 = 70 | CES29 = 67 | CES54 = 87 | CES79 = 90 |
| CES05 = 50 | CES30 = 68 | CES55 = 85 | CES80 = 88 |
| CES06 = 51 | CES31 = 71 | CES56 = 78 | CES81 = 78 |
| CES07 = 42 | CES32 = 70 | CES57 = 76 | CES82 = 95 |
| CES08 = 41 | CES33 = 71 | CES58 = 78 | CES83 = 90 |
| CES09 = 29 | CES34 = 82 | CES59 = 92 | CES84 = 94 |
| CES10 = 76 | CES35 = 90 | CES60 = 95 | CES85 = 86 |
| CES11 = 59 | CES36 = 93 | CES61 = 93 | CES86 = 72 |
| CES12 = 65 | CES37 = 87 | CES62 = 83 | CES87 = 85 |
| CES13 = 43 | CES38 = 75 | CES63 = 77 | CES88 = 83 |
| CES14 = 74 | CES39 = 94 | CES64 = 83 | CES89 = 75 |
| CES15 = 71 | CES40 = 89 | CES65 = 77 | CES90 = 81 |
| CES16 = 47 | CES41 = 85 | CES66 = 80 | CES91 = 96 |
| CES17 = 50 | CES42 = 86 | CES67 = 79 | CES92 = 73 |
| CES18 = 56 | CES43 = 81 | CES68 = 84 | CES93 = 84 |
| CES19 = 72 | CES44 = 99 | CES69 = 91 | CES94 = 64 |
| CES20 = 66 | CES45 = 87 | CES70 = 78 | CES95 = 80 |
| CES21 = 87 | CES46 = 82 | CES71 = 76 | CES96 = 84 |
| CES22 = 79 | CES47 = 77 | CES72 = 92 | CES97 = 87 |
| CES23 = 92 | CES48 = 71 | CES73 = 71 | CES98 = 81 |
| CES24 = 91 | CES49 = 81 | CES74 = 93 | CES99 = 74 |
| CES25 = 72 | CES50 = 89 | CES75 = 74 | |



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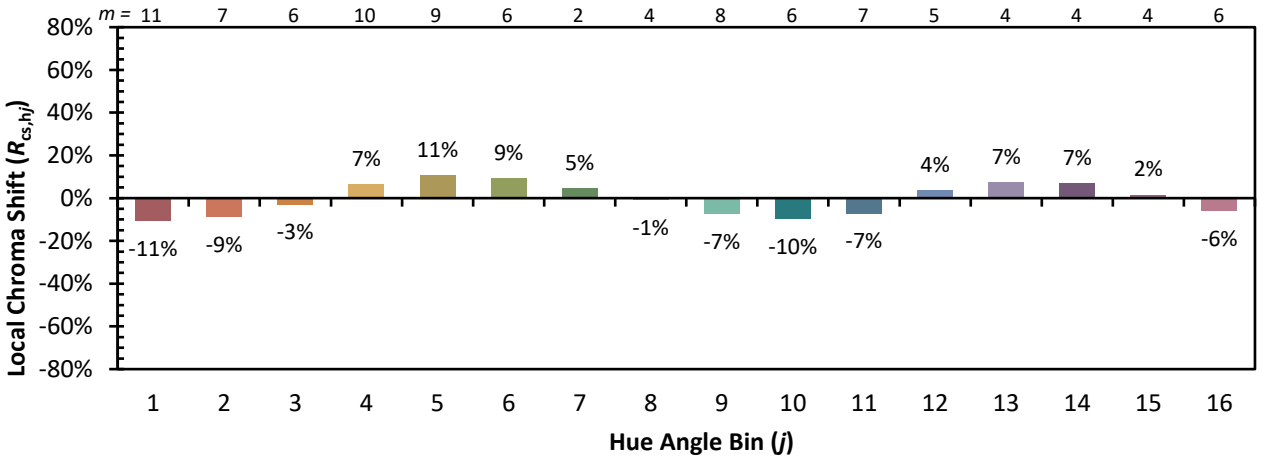
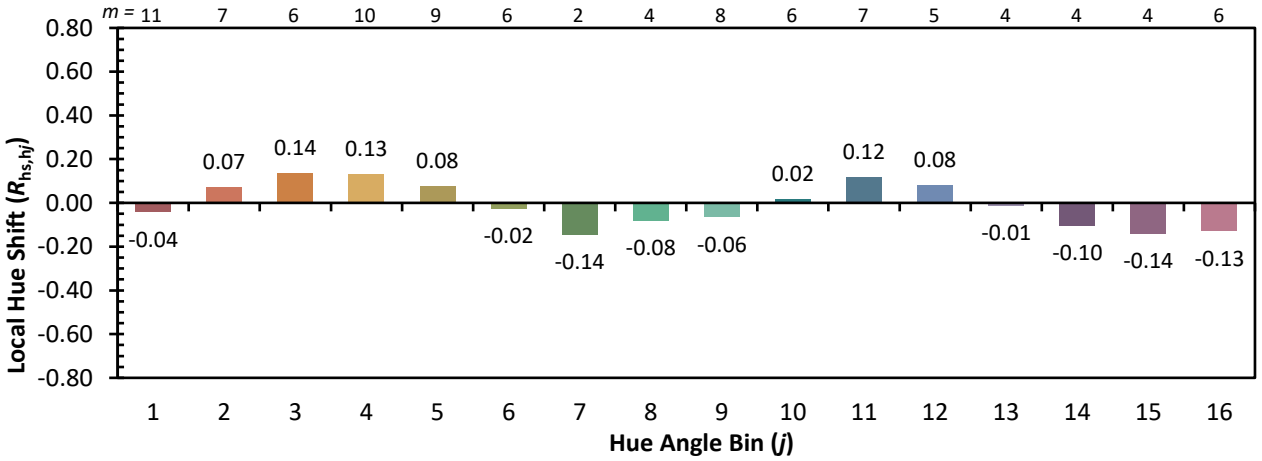
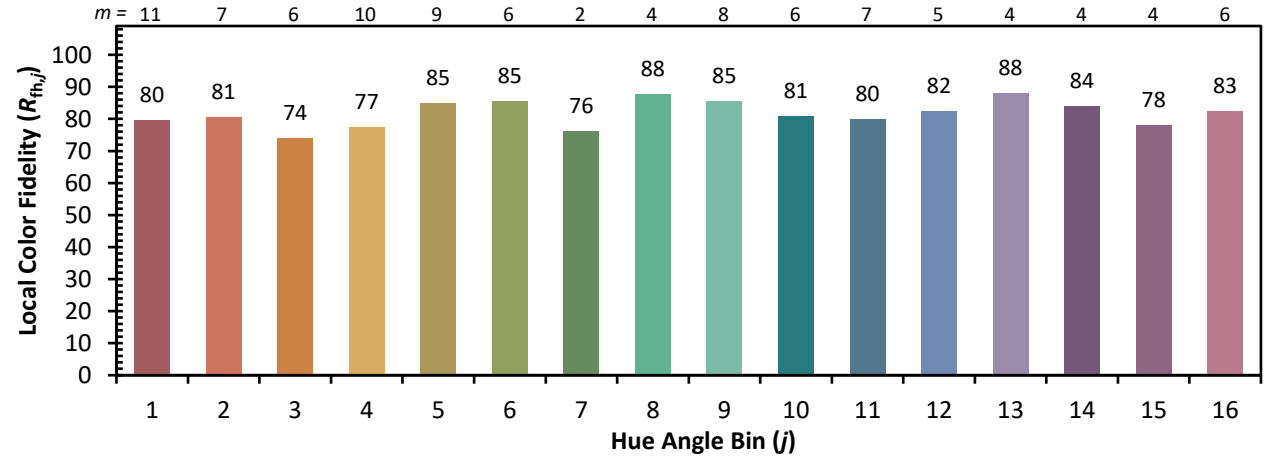
## Color Rendition by Hue-Angle Bin



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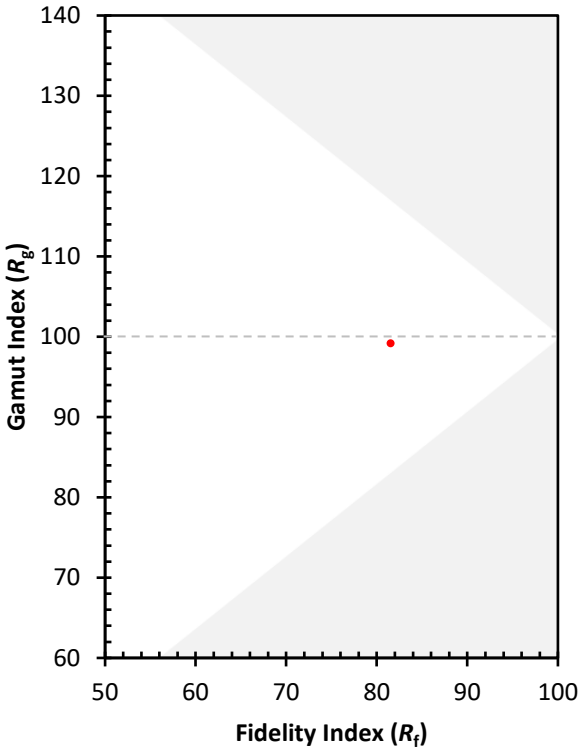
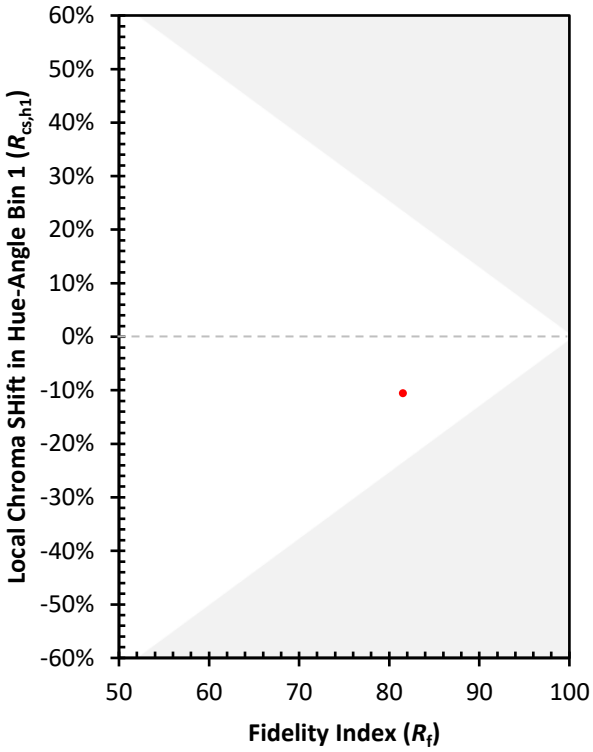
## TM-30-18

### Measure Comparisons

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