

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: P321097

Luminaire Tested: **GLEON-SA3D-827-U-AFL**

Issue Date: 3/3/2020

### Test Information

Test Method: LM-79-08  
Report Number: P321097  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-29)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA3D-827-U-AFL  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(3) 80 CRI, 2700K, 1200mA LIGHTSQUARES WITH 16 LEDS EACH AND AUTOMOTIVE  
FRONTLINE OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

### Summary

Lumens per Lamp: N/A  
Luminaire Lumens: 17865 lumens  
Efficiency: N/A  
Efficacy: 93.5 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B2 - U0 - G2

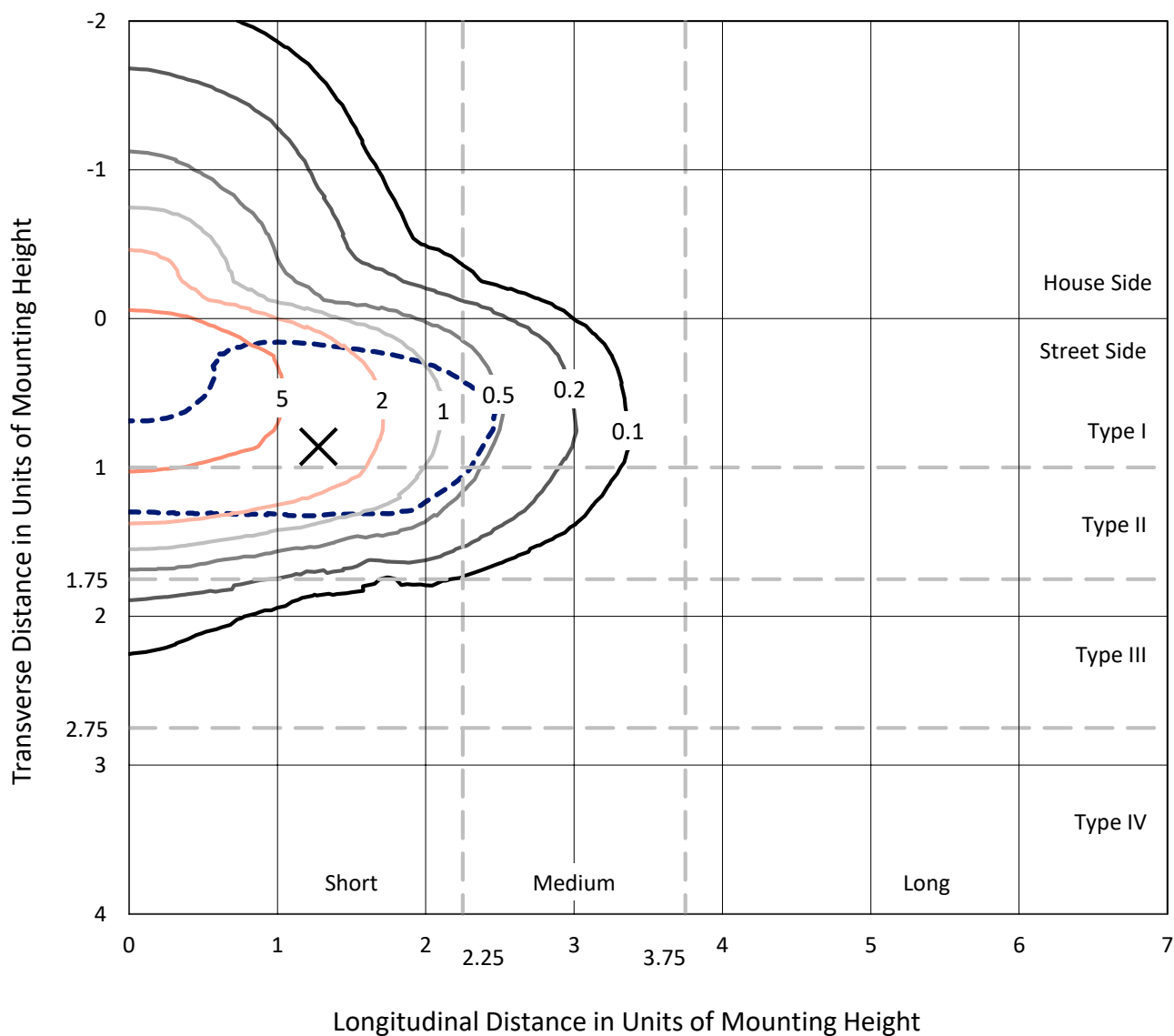
Input Watts (W): 191  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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## Iso-Footcandle Lines of Horizontal Illumination

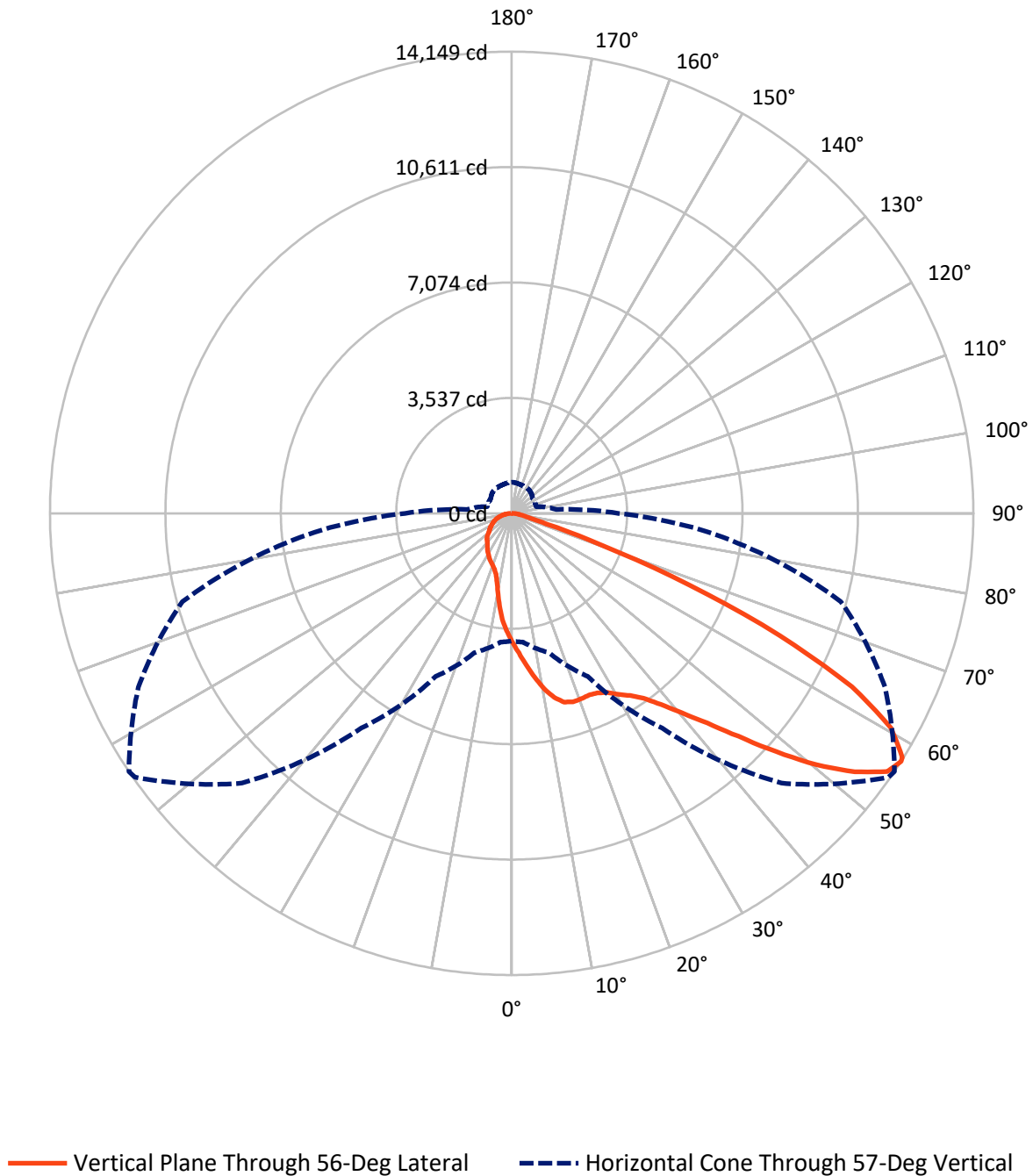
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 8.8 fc  
 Type II - Short - N/A

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## Luminous Intensity Polar Plot



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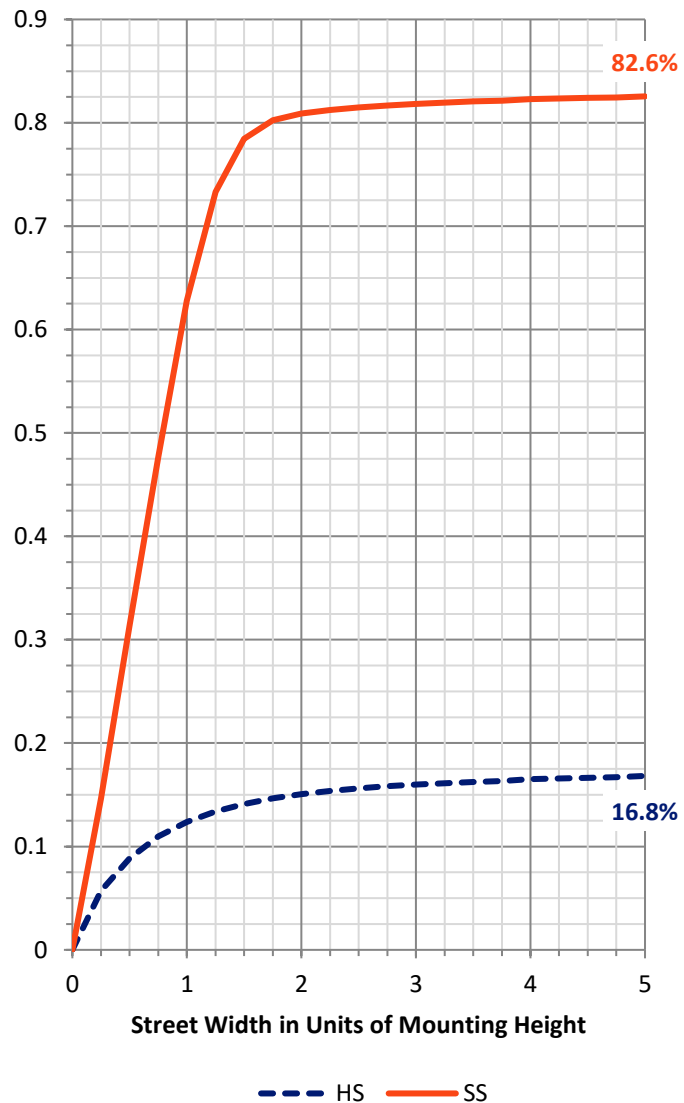
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 3079.5   | 0.0    | 3079.5  |
|                    | % Fixture | 17.2     | 0.0    | 17.2    |
| <b>Street Side</b> | Lumens    | 14785.5  | 0.0    | 14785.5 |
|                    | % Fixture | 82.8     | 0.0    | 82.8    |
| <b>Total</b>       | Lumens    | 17865.0  | 0.0    | 17865.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 378.5   | 2.1       |
| 10°-20°   | 1070.2  | 6.0       |
| 20°-30°   | 1743.1  | 9.8       |
| 30°-40°   | 2605.7  | 14.6      |
| 40°-50°   | 3952.3  | 22.1      |
| 50°-60°   | 4429.8  | 24.8      |
| 60°-70°   | 2616.4  | 14.6      |
| 70°-80°   | 857.2   | 4.8       |
| 80°-90°   | 211.8   | 1.2       |
| 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°    | 17865.0 | 100.0     |
| 0°-180°   | 17865.0 | 100.0     |

**Coefficient of Utilization**



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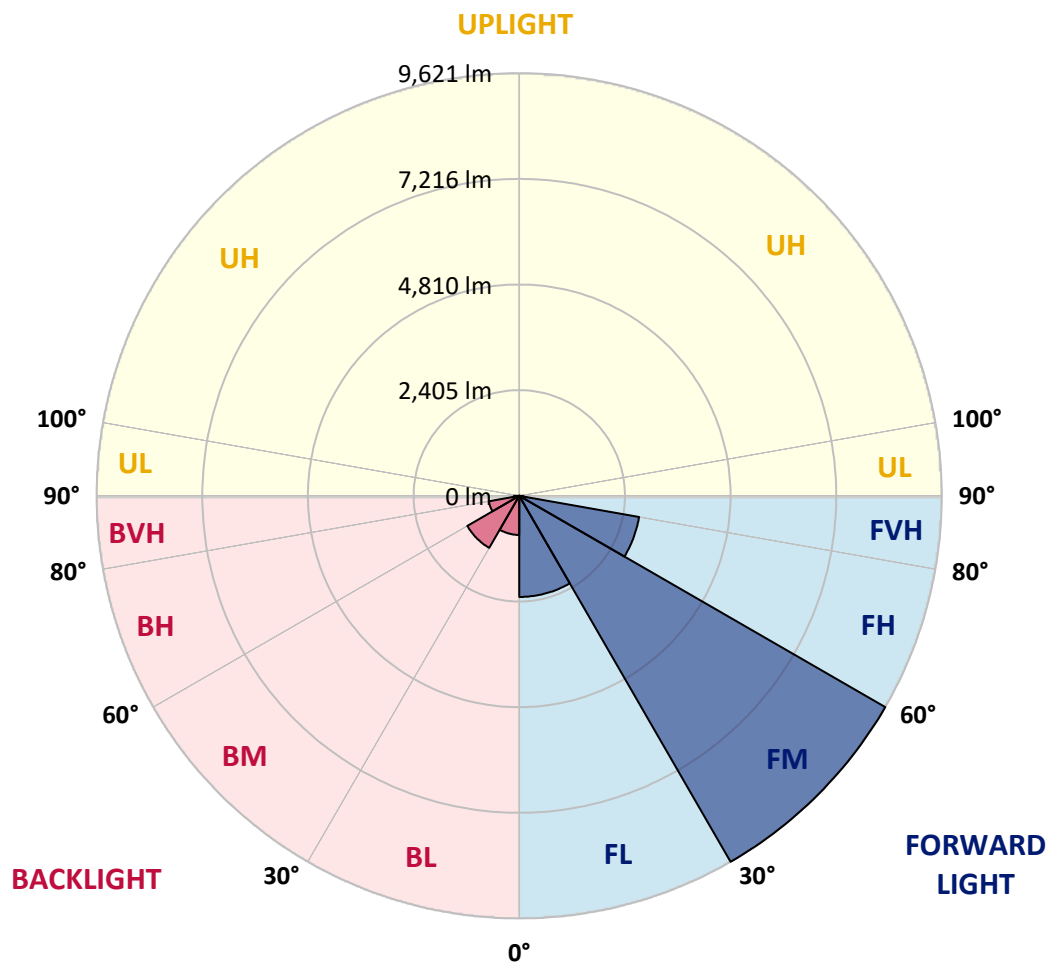
CATALOG NUMBER: GLEON-SA3D-827-U-AFL

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 2301.3 | 12.9      |                         |      |         |
| FM   | (30°-60°)   | 9620.9 | 53.9      |                         |      |         |
| FH   | (60°-80°)   | 2770.0 | 15.5      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 93.3   | 0.5       |                         |      | G1/100  |
| BL   | (0°-30°)    | 890.5  | 5.0       | B2/1000                 |      |         |
| BM   | (30°-60°)   | 1366.9 | 7.7       | B2/2500                 |      |         |
| BH   | (60°-80°)   | 703.6  | 3.9       | B2/1000                 |      | G2/1000 |
| BVH  | (80°-90°)   | 118.5  | 0.7       |                         |      | G2/225  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

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

Type II Short



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°     | 35°     | 45°     | 55°     | 56°     | 65°     | 75°     | 85°    |
|-------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|--------|
| 0°    | 3962.5 | 3962.5 | 3962.5 | 3962.5  | 3962.5  | 3962.5  | 3962.5  | 3962.5  | 3962.5  | 3962.5  | 3962.5 |
| 2.5°  | 4550.0 | 4591.8 | 4573.4 | 4509.5  | 4460.4  | 4391.0  | 4313.7  | 4290.3  | 4208.7  | 4117.2  | 4007.3 |
| 5°    | 5270.2 | 5249.3 | 5219.2 | 5119.8  | 5014.8  | 4892.6  | 4698.6  | 4667.9  | 4486.2  | 4279.3  | 4060.7 |
| 7.5°  | 5680.3 | 5678.5 | 5660.7 | 5602.4  | 5506.6  | 5346.9  | 5113.0  | 5076.8  | 4802.4  | 4469.6  | 4130.7 |
| 10°   | 5620.8 | 5616.5 | 5645.9 | 5706.7  | 5735.6  | 5702.4  | 5505.3  | 5469.1  | 5132.1  | 4680.2  | 4211.7 |
| 12.5° | 5282.5 | 5284.9 | 5332.2 | 5459.9  | 5633.7  | 5842.4  | 5810.5  | 5792.7  | 5474.0  | 4918.4  | 4310.0 |
| 15°   | 5019.1 | 5024.6 | 5062.1 | 5173.2  | 5378.3  | 5757.1  | 5995.9  | 6002.0  | 5805.0  | 5181.2  | 4424.8 |
| 17.5° | 4903.7 | 4915.3 | 4932.5 | 5010.5  | 5198.4  | 5587.0  | 6040.1  | 6073.3  | 6094.7  | 5453.8  | 4535.3 |
| 20°   | 4940.5 | 4951.6 | 4956.5 | 5006.2  | 5160.3  | 5483.9  | 6009.4  | 6069.0  | 6317.0  | 5710.4  | 4645.8 |
| 22.5° | 5105.7 | 5112.4 | 5115.5 | 5128.4  | 5248.1  | 5513.3  | 5989.1  | 6051.8  | 6477.9  | 5940.6  | 4729.3 |
| 25°   | 5379.5 | 5374.6 | 5354.9 | 5338.3  | 5418.8  | 5630.0  | 6035.8  | 6095.4  | 6608.6  | 6149.4  | 4783.9 |
| 27.5° | 5707.3 | 5701.2 | 5663.1 | 5617.7  | 5663.7  | 5811.7  | 6170.3  | 6217.5  | 6725.9  | 6344.6  | 4811.6 |
| 30°   | 6100.9 | 6084.9 | 6013.1 | 5959.1  | 5976.9  | 6084.3  | 6391.9  | 6434.9  | 6907.0  | 6566.3  | 4838.6 |
| 32.5° | 6555.8 | 6538.6 | 6434.9 | 6345.2  | 6345.2  | 6434.9  | 6620.3  | 6655.9  | 7060.5  | 6816.8  | 4882.2 |
| 35°   | 7125.6 | 7104.1 | 6969.0 | 6818.6  | 6776.2  | 6821.7  | 6931.6  | 6956.7  | 7336.8  | 7132.3  | 4961.4 |
| 37.5° | 7797.2 | 7768.4 | 7593.4 | 7392.0  | 7299.3  | 7296.9  | 7376.1  | 7427.6  | 7778.2  | 7546.7  | 5095.8 |
| 40°   | 8470.8 | 8450.5 | 8297.6 | 8139.2  | 7957.5  | 7899.2  | 8021.3  | 8037.3  | 8355.3  | 8061.2  | 5267.7 |
| 42.5° | 8991.4 | 8987.7 | 8959.5 | 8980.3  | 8794.3  | 8676.4  | 8772.2  | 8785.1  | 9060.2  | 8618.1  | 5450.7 |
| 45°   | 9266.4 | 9272.6 | 9409.5 | 9712.8  | 9781.6  | 9695.6  | 9742.9  | 9746.6  | 9865.7  | 9179.9  | 5618.3 |
| 47.5° | 9046.0 | 9078.0 | 9424.2 | 10102.6 | 10665.6 | 10951.1 | 10872.6 | 10918.0 | 10646.6 | 9662.4  | 5749.7 |
| 50°   | 8187.1 | 8226.4 | 8815.8 | 9928.9  | 11078.2 | 12166.2 | 12125.0 | 12114.6 | 11276.5 | 10016.1 | 5820.9 |
| 52.5° | 7123.1 | 7153.8 | 7640.1 | 9025.8  | 10775.5 | 12837.8 | 13215.4 | 13161.4 | 11836.5 | 10280.7 | 5834.4 |
| 55°   | 5502.9 | 5550.8 | 6016.8 | 7223.2  | 9551.3  | 12581.2 | 14017.2 | 13968.7 | 12346.7 | 10419.5 | 5818.5 |
| 57°   | 3912.1 | 3962.5 | 4425.4 | 5512.7  | 8034.8  | 11692.8 | 14097.0 | 14148.6 | 12622.3 | 10442.8 | 5836.3 |
| 57.5° | 3491.0 | 3542.5 | 4001.2 | 5057.2  | 7562.1  | 11371.7 | 14028.3 | 14114.2 | 12672.1 | 10439.1 | 5846.1 |
| 60°   | 1757.8 | 1777.4 | 2069.6 | 2823.0  | 4780.3  | 9193.4  | 13131.3 | 13352.9 | 12716.9 | 10258.6 | 5888.5 |
| 62.5° | 1092.8 | 1078.7 | 1069.5 | 1300.4  | 2325.7  | 6096.6  | 11280.2 | 11706.9 | 11859.2 | 9821.5  | 5785.9 |
| 65°   | 960.8  | 934.4  | 833.1  | 814.7   | 1027.1  | 2961.1  | 8494.7  | 9025.8  | 10026.5 | 9132.6  | 5541.6 |
| 67.5° | 902.5  | 876.7  | 762.5  | 693.8   | 694.4   | 1173.9  | 5273.9  | 5871.9  | 7810.8  | 7967.9  | 4965.1 |
| 70°   | 842.3  | 819.0  | 712.2  | 631.1   | 591.2   | 650.2   | 2426.4  | 2880.1  | 5091.5  | 6263.0  | 4149.7 |
| 72.5° | 765.0  | 749.0  | 647.7  | 564.2   | 521.9   | 486.9   | 928.9   | 1097.1  | 2947.6  | 4206.2  | 2881.9 |
| 75°   | 683.9  | 669.2  | 582.6  | 502.8   | 451.3   | 383.1   | 523.1   | 563.6   | 1497.4  | 2151.9  | 1418.9 |
| 77.5° | 594.9  | 586.3  | 518.2  | 444.5   | 403.4   | 317.4   | 370.2   | 389.9   | 642.2   | 922.8   | 711.6  |
| 80°   | 473.4  | 489.9  | 453.1  | 396.0   | 357.9   | 254.2   | 262.2   | 275.1   | 373.9   | 450.6   | 404.0  |
| 82.5° | 308.2  | 337.1  | 354.9  | 321.7   | 294.7   | 200.1   | 188.5   | 194.0   | 243.7   | 275.1   | 175.6  |
| 85°   | 128.3  | 144.3  | 233.3  | 210.6   | 195.9   | 146.1   | 126.5   | 128.9   | 151.0   | 156.6   | 71.8   |
| 87.5° | 57.1   | 60.8   | 102.5  | 96.4    | 82.9    | 50.3    | 54.0    | 58.9    | 80.4    | 76.1    | 27.6   |
| 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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CATALOG NUMBER: GLEON-SA3D-827-U-AFL

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 3962.5 | 3962.5 | 3962.5 | 3962.5 | 3962.5 | 3962.5 | 3962.5 | 3962.5 | 3962.5 | 3962.5 | 3962.5 |
| 2.5°  | 3966.2 | 3914.6 | 3826.2 | 3728.6 | 3648.7 | 3584.9 | 3520.4 | 3476.2 | 3424.6 | 3397.0 | 3382.9 |
| 5°    | 3969.2 | 3867.9 | 3681.9 | 3491.0 | 3320.3 | 3164.3 | 3015.8 | 2901.6 | 2794.7 | 2737.0 | 2721.1 |
| 7.5°  | 3982.1 | 3829.9 | 3529.0 | 3214.7 | 2911.4 | 2634.5 | 2420.8 | 2287.0 | 2190.6 | 2147.6 | 2135.3 |
| 10°   | 3992.6 | 3785.0 | 3339.9 | 2874.5 | 2462.0 | 2181.4 | 2015.6 | 1940.7 | 1907.6 | 1902.0 | 1896.5 |
| 12.5° | 4017.1 | 3739.0 | 3141.0 | 2519.7 | 2112.6 | 1918.6 | 1860.9 | 1856.0 | 1865.2 | 1878.7 | 1878.7 |
| 15°   | 4055.8 | 3693.6 | 2913.8 | 2215.2 | 1890.4 | 1822.2 | 1833.9 | 1860.9 | 1886.1 | 1906.9 | 1910.0 |
| 17.5° | 4084.0 | 3637.7 | 2669.5 | 1971.4 | 1771.9 | 1790.3 | 1832.0 | 1870.1 | 1895.9 | 1916.2 | 1918.0 |
| 20°   | 4104.3 | 3551.1 | 2408.6 | 1785.4 | 1703.7 | 1760.8 | 1813.0 | 1846.8 | 1864.6 | 1884.8 | 1887.9 |
| 22.5° | 4093.9 | 3435.1 | 2177.1 | 1652.2 | 1648.5 | 1717.8 | 1767.6 | 1808.1 | 1794.6 | 1774.9 | 1787.8 |
| 25°   | 4043.5 | 3275.5 | 1938.9 | 1552.7 | 1590.1 | 1660.1 | 1721.5 | 1694.5 | 1649.1 | 1640.5 | 1645.4 |
| 27.5° | 3953.9 | 3071.6 | 1718.5 | 1460.6 | 1522.6 | 1606.7 | 1603.0 | 1576.0 | 1560.1 | 1549.0 | 1555.8 |
| 30°   | 3857.5 | 2850.6 | 1525.7 | 1380.2 | 1447.7 | 1517.1 | 1503.0 | 1502.4 | 1486.4 | 1468.6 | 1477.2 |
| 32.5° | 3762.3 | 2628.3 | 1372.8 | 1313.9 | 1391.2 | 1400.4 | 1431.1 | 1440.3 | 1409.0 | 1371.6 | 1369.1 |
| 35°   | 3679.4 | 2418.4 | 1256.8 | 1253.7 | 1323.1 | 1324.3 | 1369.1 | 1356.2 | 1278.3 | 1239.6 | 1239.6 |
| 37.5° | 3617.4 | 2209.0 | 1168.4 | 1199.7 | 1233.4 | 1265.4 | 1288.1 | 1234.7 | 1221.8 | 1200.3 | 1199.7 |
| 40°   | 3590.4 | 2024.8 | 1113.1 | 1158.5 | 1170.2 | 1210.7 | 1152.4 | 1173.3 | 1179.4 | 1168.4 | 1168.4 |
| 42.5° | 3562.2 | 1864.6 | 1065.2 | 1127.2 | 1125.4 | 1119.9 | 1090.4 | 1117.4 | 1142.0 | 1142.6 | 1140.7 |
| 45°   | 3533.9 | 1726.4 | 1022.9 | 1060.3 | 1086.1 | 1026.5 | 1032.1 | 1060.9 | 1095.3 | 1107.6 | 1107.6 |
| 47.5° | 3502.6 | 1617.2 | 984.2  | 989.7  | 1029.6 | 989.7  | 985.4  | 1007.5 | 1048.0 | 1067.7 | 1072.0 |
| 50°   | 3433.9 | 1518.9 | 940.0  | 927.7  | 938.7  | 952.2  | 955.9  | 966.4  | 1011.2 | 1042.5 | 1049.9 |
| 52.5° | 3338.7 | 1431.1 | 883.5  | 870.6  | 870.6  | 921.5  | 938.7  | 941.8  | 979.9  | 1017.3 | 1024.7 |
| 55°   | 3259.5 | 1375.3 | 825.2  | 822.7  | 820.2  | 889.0  | 918.5  | 923.4  | 949.8  | 979.3  | 982.9  |
| 57°   | 3265.0 | 1371.0 | 780.3  | 782.8  | 782.2  | 855.9  | 899.4  | 909.9  | 923.4  | 948.6  | 952.9  |
| 57.5° | 3268.1 | 1374.0 | 770.5  | 771.7  | 771.1  | 846.6  | 893.9  | 905.6  | 916.0  | 942.4  | 946.7  |
| 60°   | 3314.1 | 1382.0 | 730.6  | 717.1  | 720.2  | 797.5  | 862.6  | 877.3  | 884.1  | 919.1  | 924.6  |
| 62.5° | 3246.0 | 1346.4 | 698.7  | 666.1  | 666.1  | 746.0  | 819.0  | 842.3  | 852.8  | 900.1  | 909.3  |
| 65°   | 3048.3 | 1246.3 | 661.2  | 608.4  | 614.6  | 694.4  | 766.8  | 804.9  | 820.9  | 879.8  | 889.6  |
| 67.5° | 2743.2 | 1130.3 | 621.3  | 556.9  | 563.0  | 640.4  | 712.8  | 753.9  | 779.1  | 857.7  | 865.7  |
| 70°   | 2345.9 | 988.5  | 567.3  | 502.2  | 509.6  | 581.4  | 649.0  | 695.6  | 733.1  | 836.8  | 839.3  |
| 72.5° | 1729.5 | 810.4  | 491.8  | 442.0  | 450.0  | 512.7  | 584.5  | 638.5  | 688.9  | 784.6  | 783.4  |
| 75°   | 1028.4 | 633.6  | 408.3  | 381.3  | 386.8  | 445.1  | 526.2  | 591.9  | 667.4  | 764.4  | 776.0  |
| 77.5° | 623.8  | 477.0  | 332.8  | 319.3  | 326.0  | 385.6  | 484.4  | 554.4  | 658.2  | 720.8  | 717.1  |
| 80°   | 377.0  | 340.7  | 265.8  | 257.2  | 264.0  | 329.7  | 448.2  | 526.2  | 575.3  | 615.8  | 615.8  |
| 82.5° | 197.1  | 208.1  | 195.2  | 188.5  | 197.7  | 267.7  | 407.7  | 459.2  | 508.4  | 436.5  | 407.7  |
| 85°   | 80.4   | 108.7  | 118.5  | 117.9  | 123.4  | 185.4  | 351.8  | 392.9  | 327.9  | 311.3  | 318.6  |
| 87.5° | 27.0   | 46.0   | 57.7   | 49.7   | 52.2   | 116.7  | 243.7  | 189.7  | 225.3  | 157.2  | 149.2  |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |



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

Report Prepared for

Cooper Lighting Solutions

Invue

Report Number: SP1-2407-157-9

Test Date: 10/03/2024

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

Data applicable to all product families utilizing light square engine

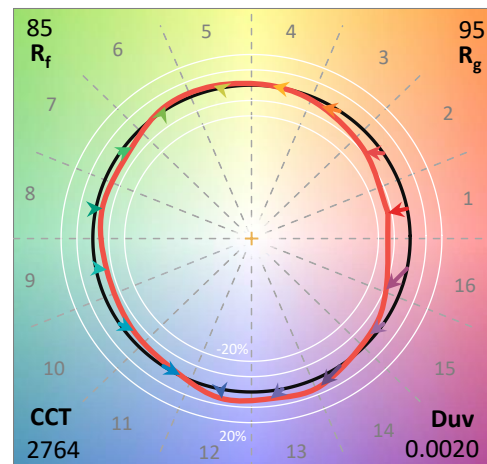
### Test Information

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

### Spectral Parameters

CCT (K): 2764  
 CIE  $u'$ : 0.2591  
 CIE  $v'$ : 0.5290  
 Duv: 0.0020  
 CIE x: 0.4581  
 CIE y: 0.4156  
 CIE z: 0.1263  
 Peak Wavelength (nm): 603  
 Dominant Wavelength (nm): 583  
 Purity: 62.2537  
 R<sub>f</sub>: 84.7  
 R<sub>g</sub>: 94.6

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



### Test Conditions

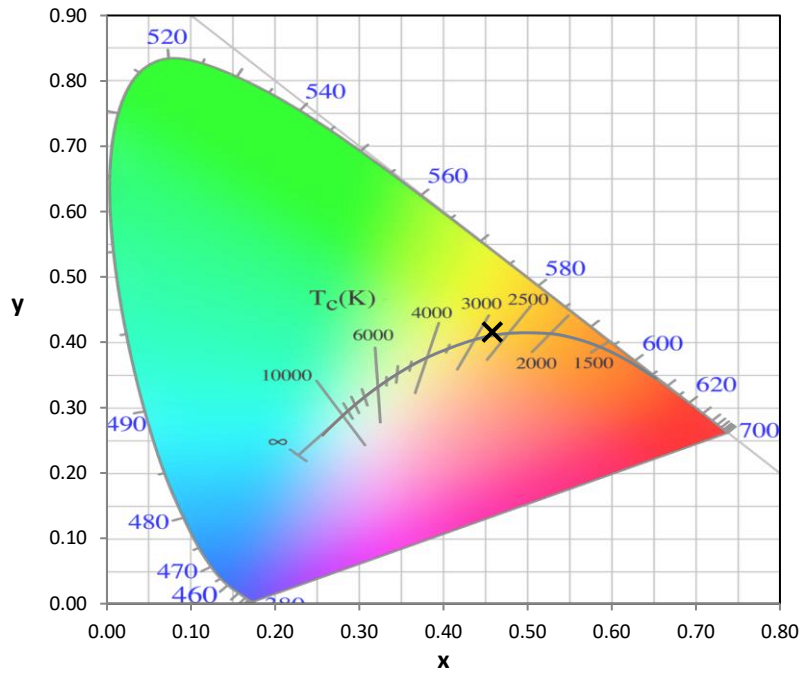
Stabilization Time: 81M  
 Operation Time: 2H 21M  
 Sphere Temperature (°C): 25.2

REPORT NUMBER: SP1-2407-157-9

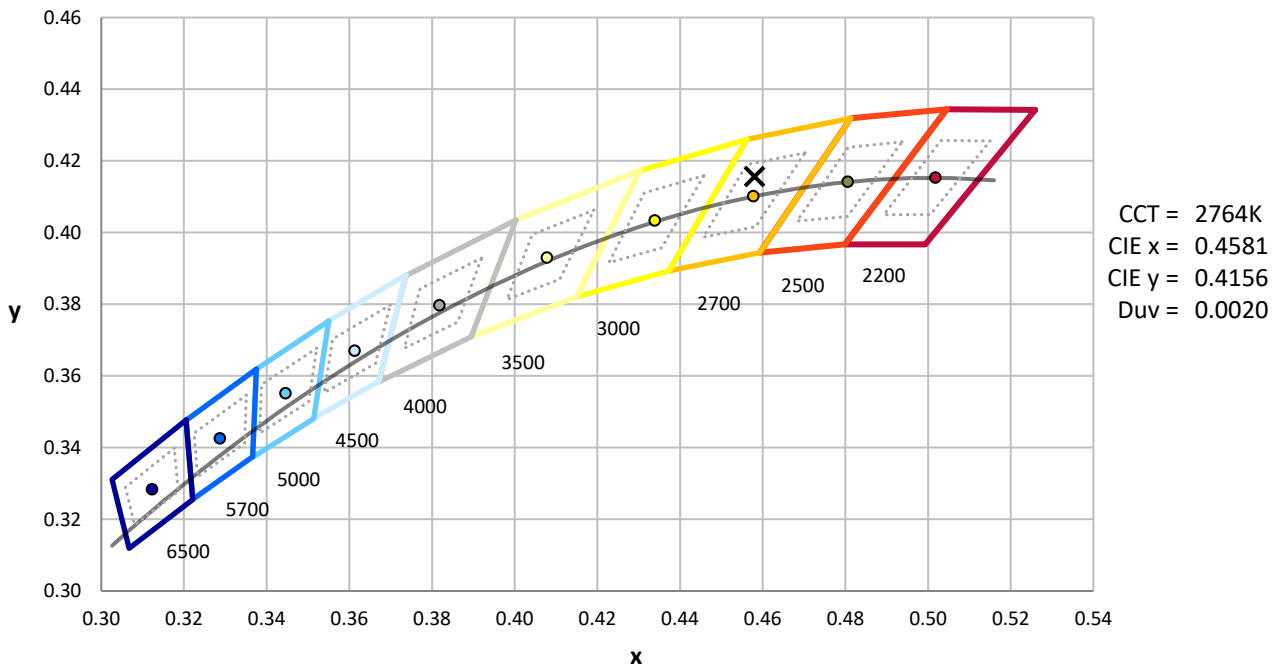
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date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

REPORT NUMBER: SP1-2407-157-9

**CIE 1931 Chromaticity Diagram**



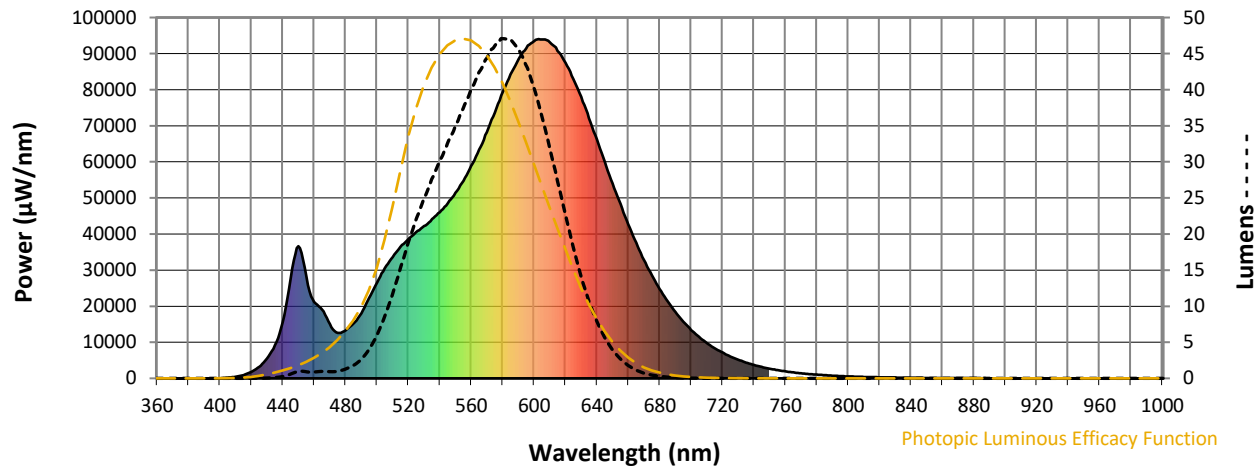
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 2700K 4-step quadrangle

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### Photopic Flux vs. Wavelength

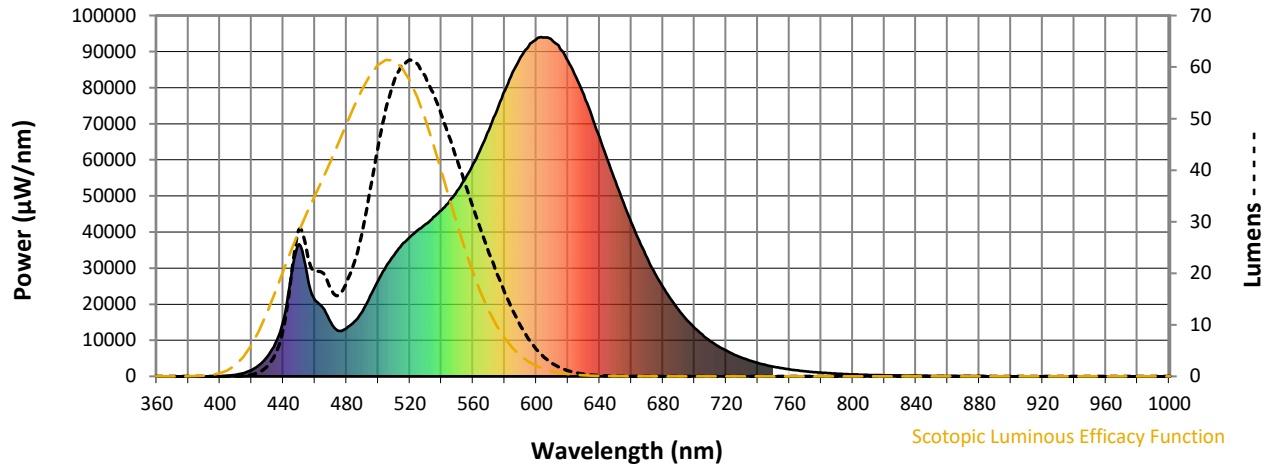


### Photopic Lumens: 4337.9

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

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### Scotopic Flux vs. Wavelength



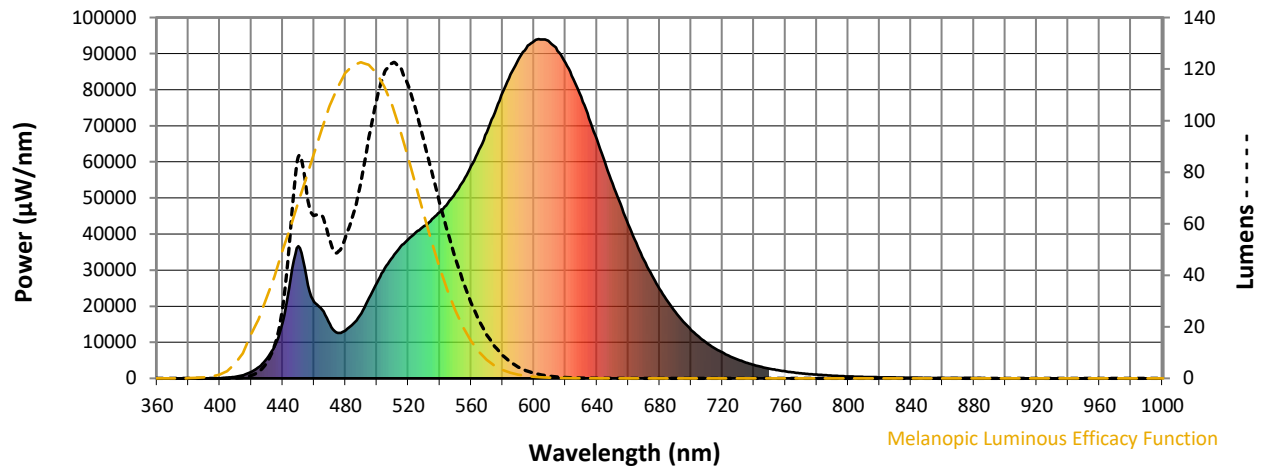
Scotopic Lumens: 5286.7

S/P: 1.22

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

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 9797**

**M/P: 2.26**

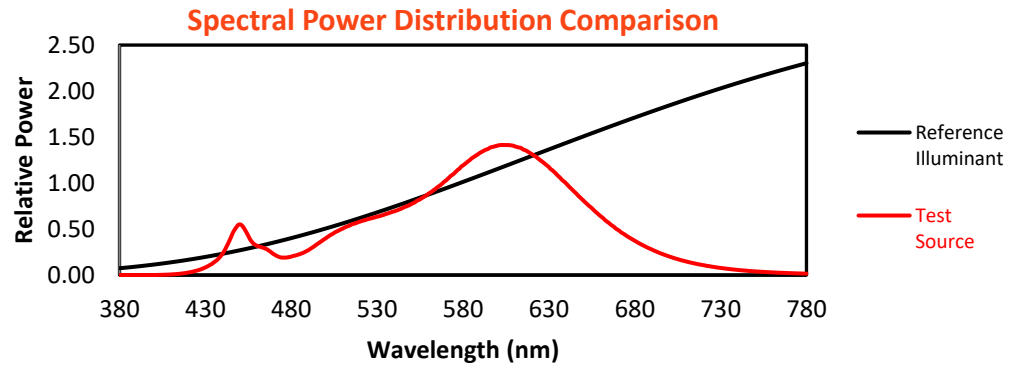
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------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

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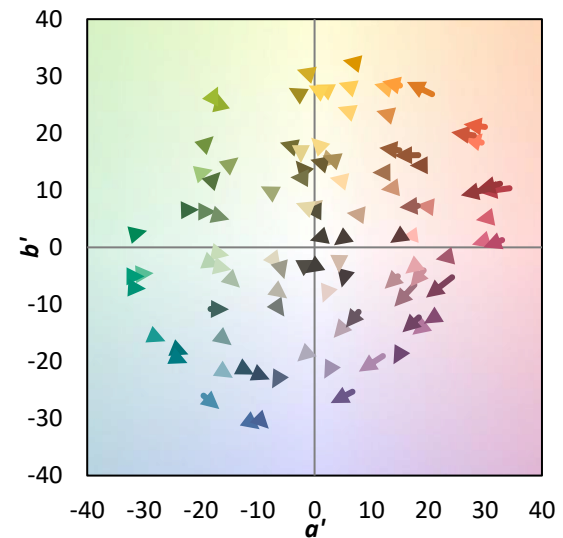
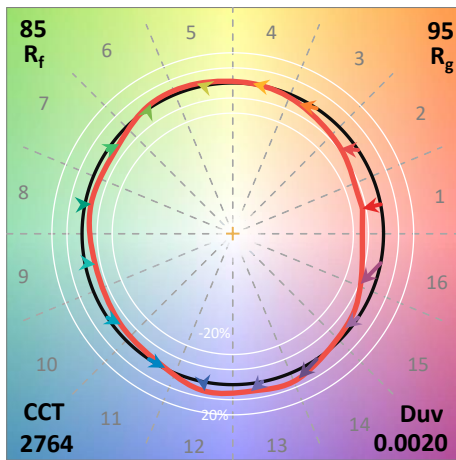
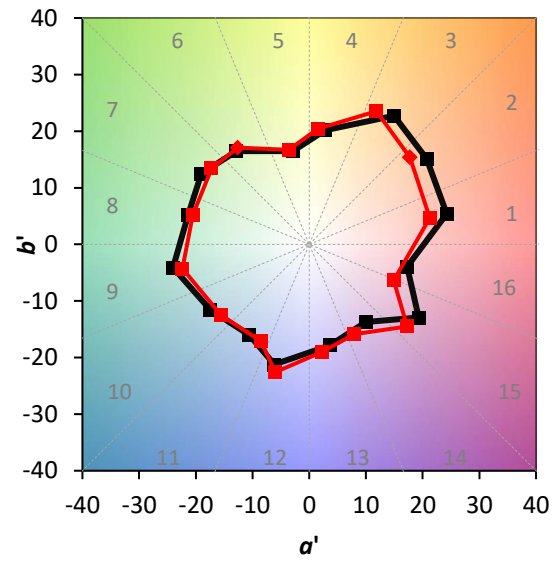
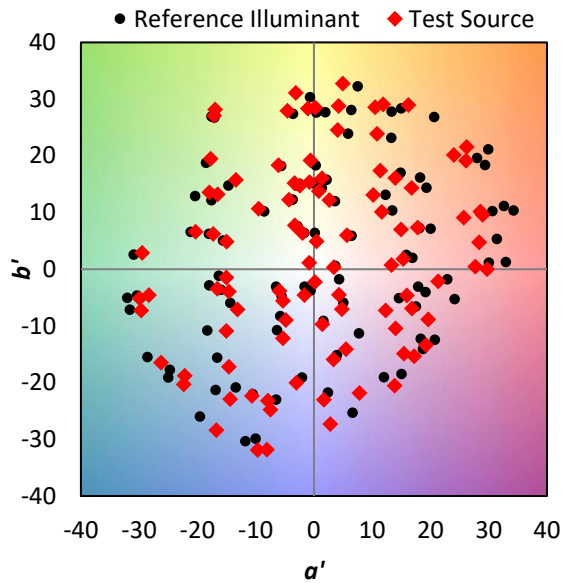
TM-30-18

### Summary

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



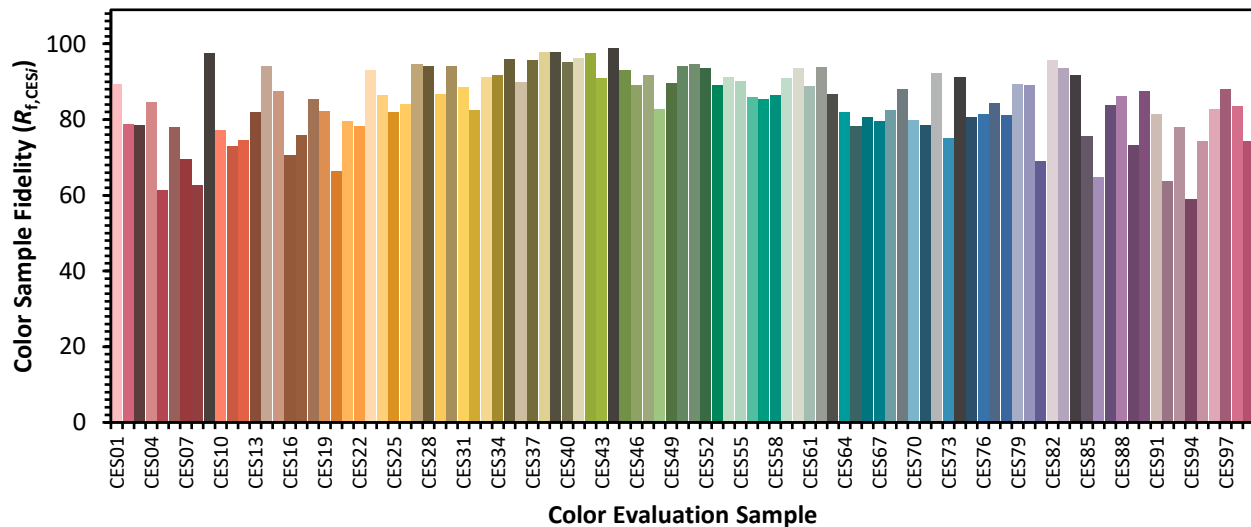
### Color Vector Graphics



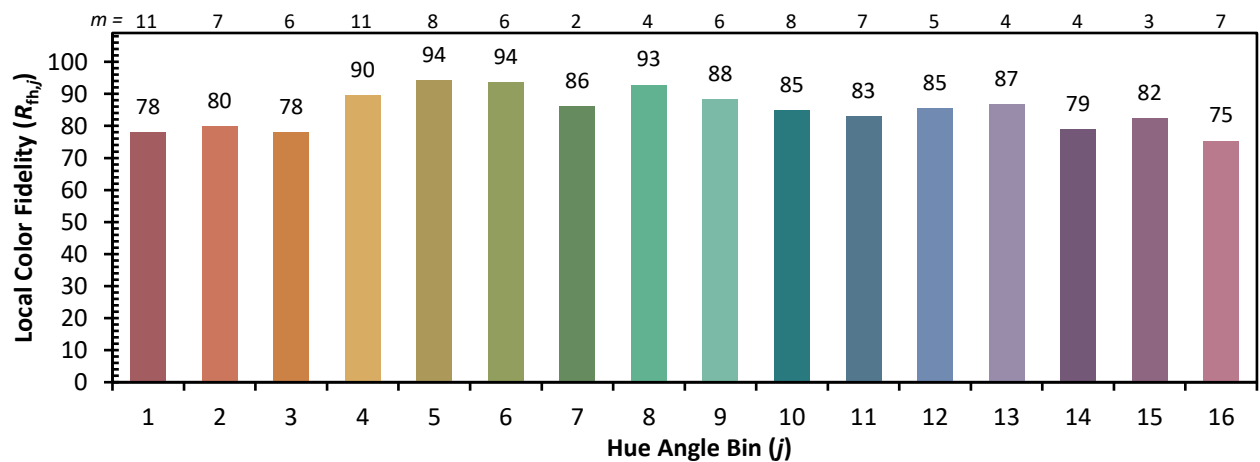
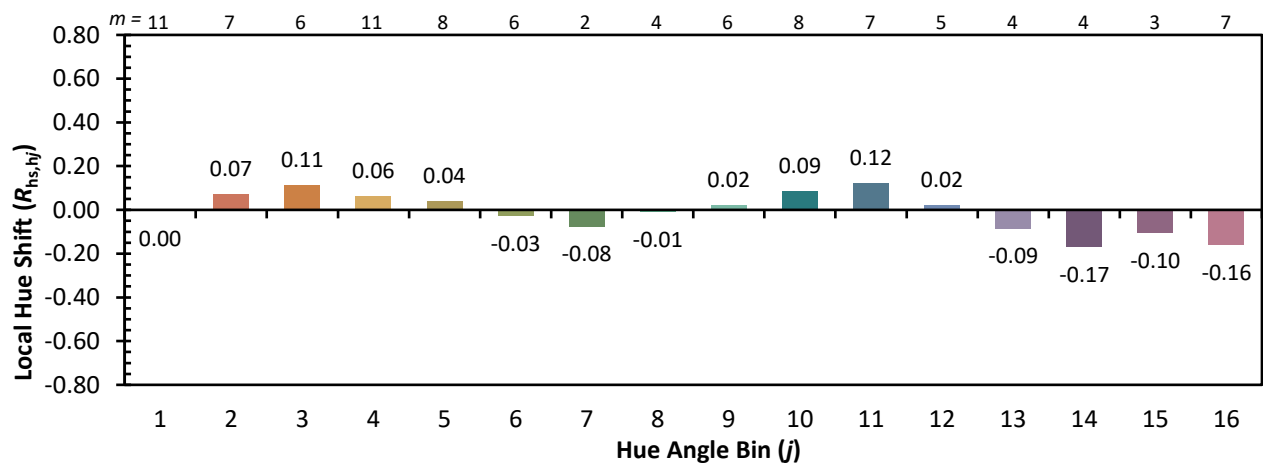
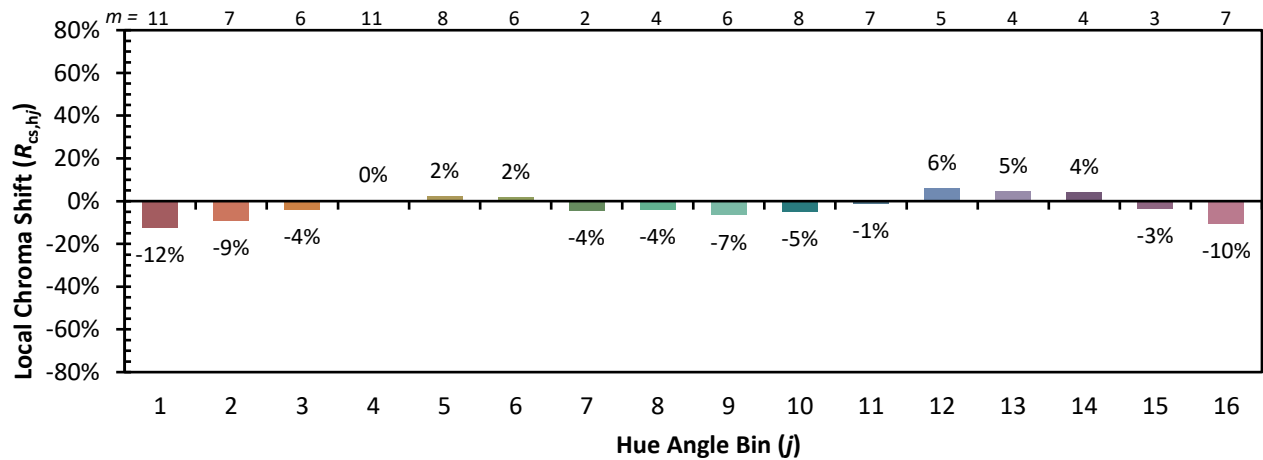


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

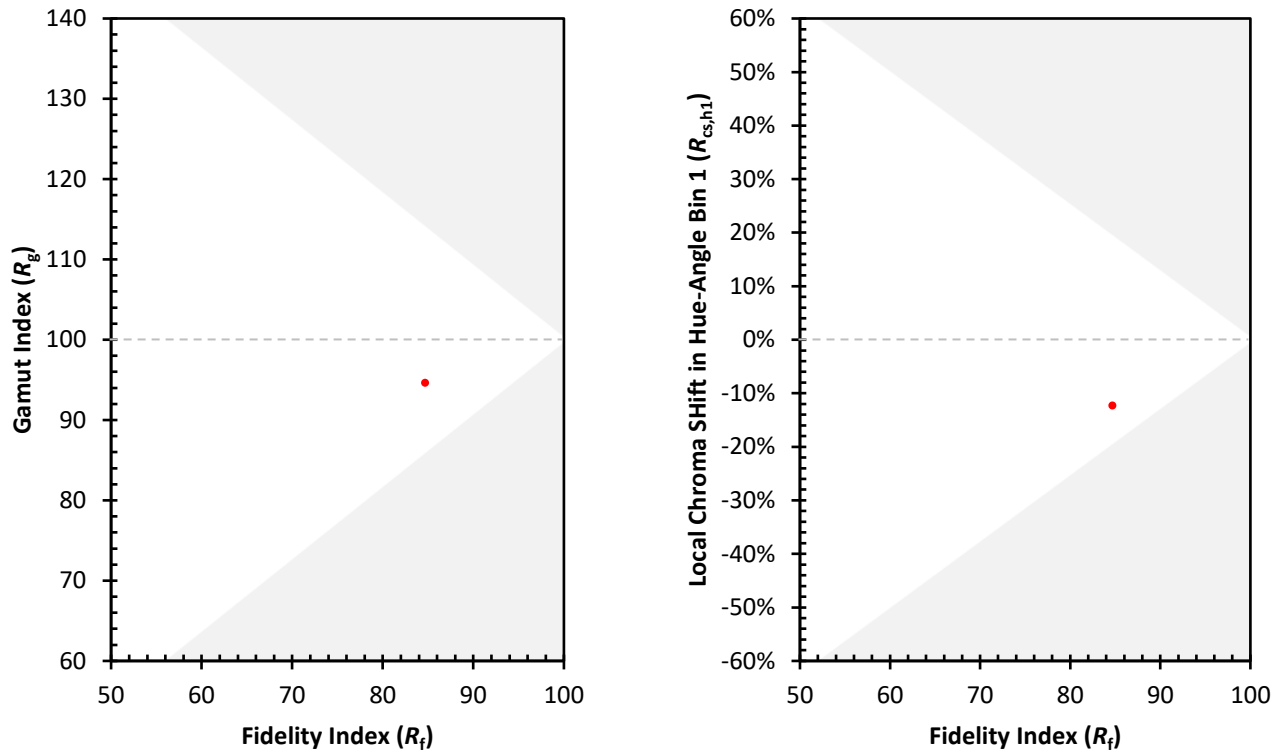
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 84 | CES51 = 95 | CES76 = 81 |
| CES02 = 63 | CES27 = 95 | CES52 = 94 | CES77 = 84 |
| CES03 = 31 | CES28 = 94 | CES53 = 89 | CES78 = 81 |
| CES04 = 71 | CES29 = 87 | CES54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



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)