

Signify Classified - Internal  
Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



Scaled data based on original data using  
LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for  
Cooper Lighting Solutions  
(formerly Eaton)

Brand: LUMARK

Report Number: P1067135

Luminaire Tested: **NAV-SA3C-835-U-T3BC**

Issue Date: 08/07/2025

**Test Information**

Test Method: LM-79-08  
Report Number: P1067135  
Test Lab: INNOVATION CENTER(G3)  
Issue Date: 08/07/2025  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: LUMARK  
Catalog Number: NAV-SA3C-835-U-T3BC  
Description: Navion AREA AND ROADWAY LUMINAIRE 1050mA 3xLight Square PACKAGE  
80CRI 3500K FIXTURE w/ TYPE III ANGLED BACKLIGHT CONTROL  
Light Source: (42) 3500K CCT, 80 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 15182.7 lumens  
Efficiency: N/A  
Efficacy: 108.1 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 1.5' x H: 0')  
IES Classification: Type III - Short  
BUG Rating: B0 - U0 - G3

Input Watts (W): 140.4  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: 0.97  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT

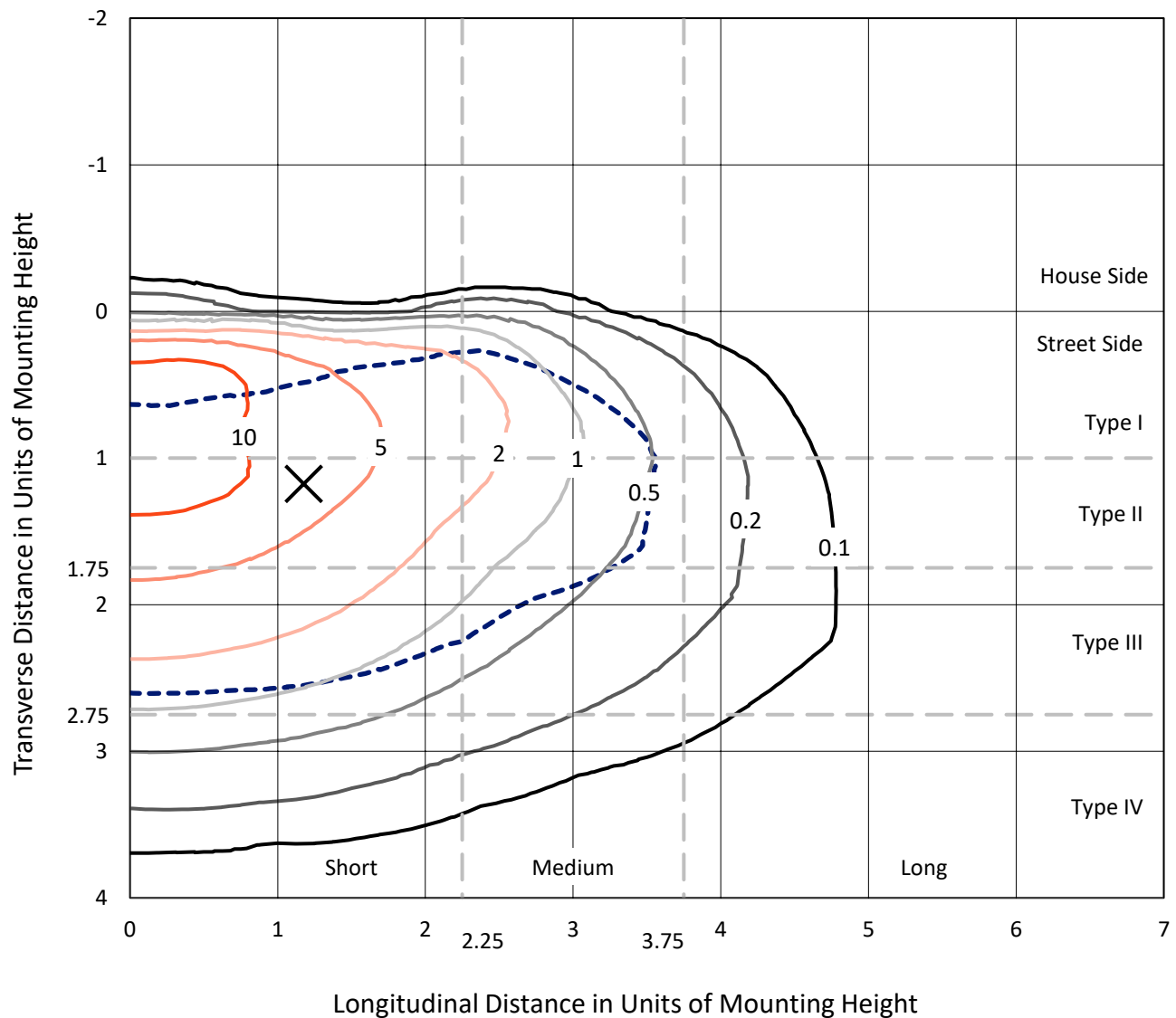


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## Iso-Footcandle Lines of Horizontal Illumination

× Max cd  
 - - - 1/2 Max cd

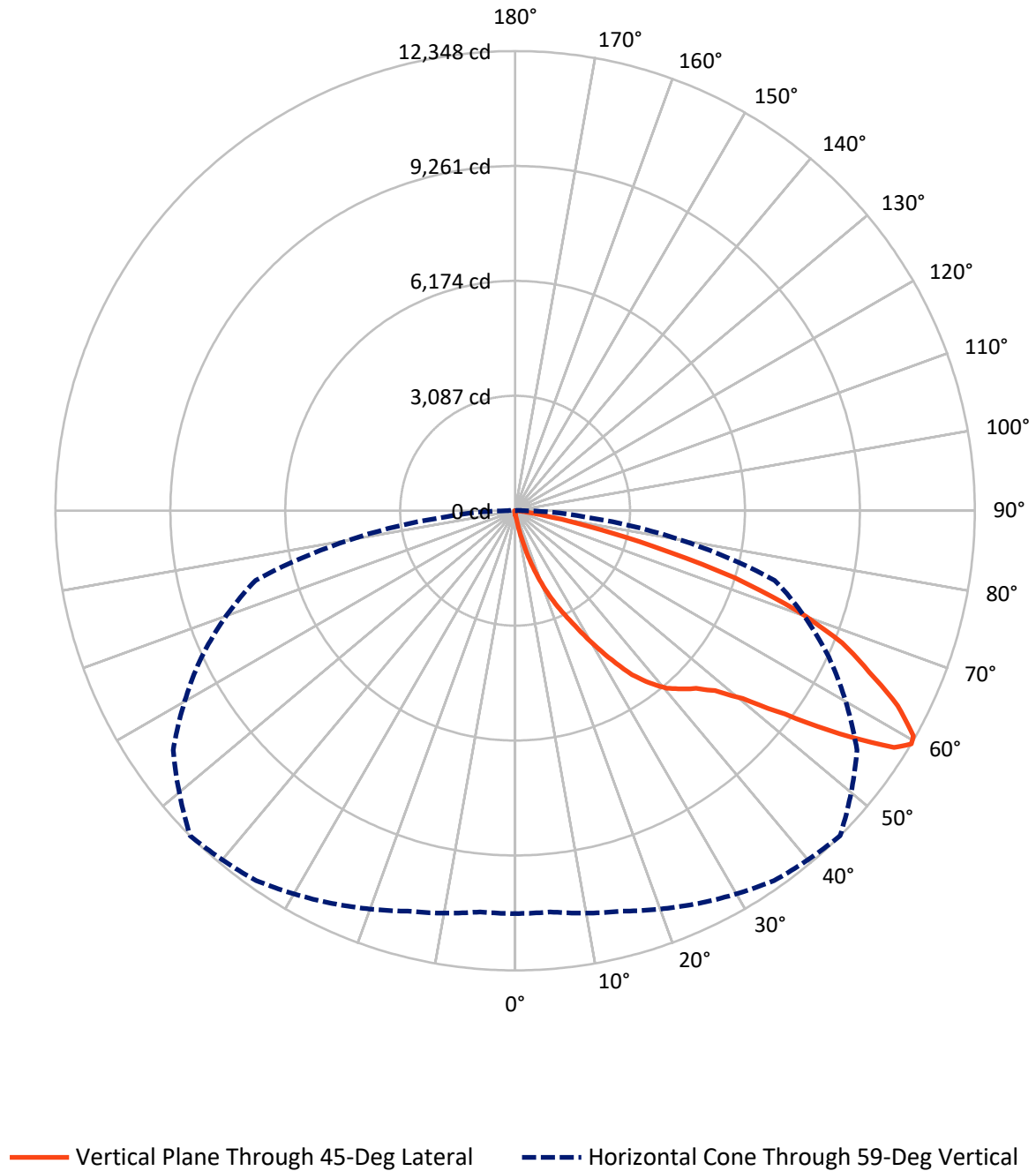


Based on 15 foot mounting height. Maximum calculated value = 16.6 fc  
 Type III - Short - N/A

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## Luminous Intensity Polar Plot



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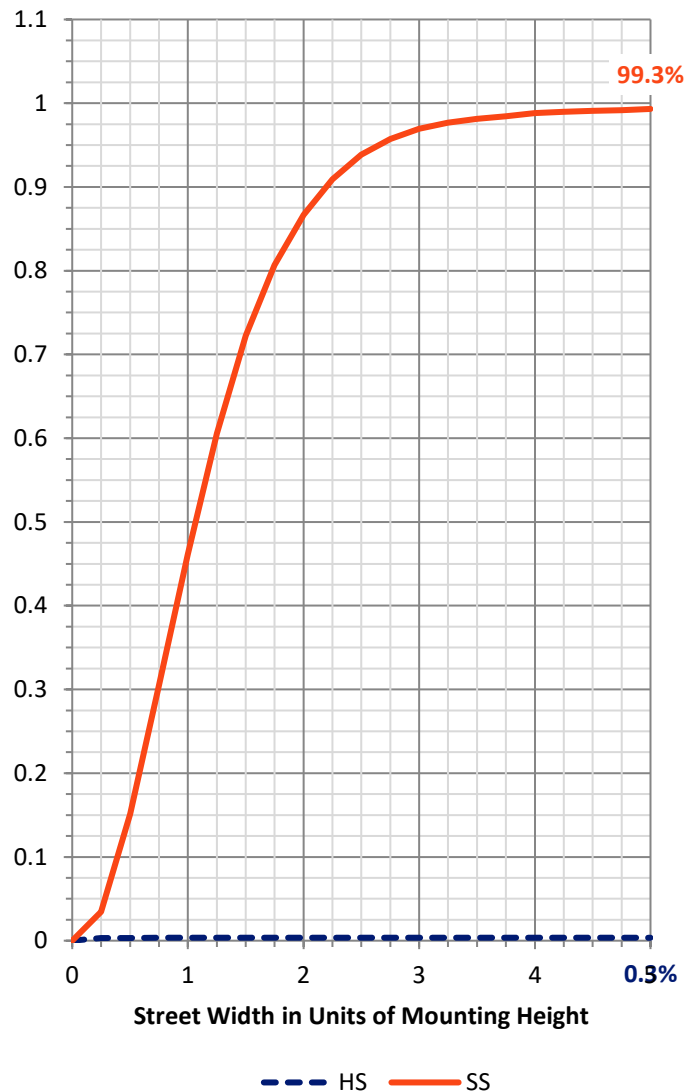
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 53.9     | 0.0    | 53.9    |
|                    | % Fixture | 0.4      | 0.0    | 0.4     |
| <b>Street Side</b> | Lumens    | 15128.8  | 0.0    | 15128.8 |
|                    | % Fixture | 99.6     | 0.0    | 99.6    |
| <b>Total</b>       | Lumens    | 15182.7  | 0.0    | 15182.7 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**Coefficient of Utilization**

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 14.1    | 0.1       |
| 10°-20°   | 167.8   | 1.1       |
| 20°-30°   | 603.0   | 4.0       |
| 30°-40°   | 1401.1  | 9.2       |
| 40°-50°   | 2388.2  | 15.7      |
| 50°-60°   | 3935.0  | 25.9      |
| 60°-70°   | 4549.8  | 30.0      |
| 70°-80°   | 1954.7  | 12.9      |
| 80°-90°   | 168.9   | 1.1       |
| 90°-100°  | 0.0     | 0.0       |
| 100°-110° | 0.0     | 0.0       |
| 110°-120° | 0.0     | 0.0       |
| 120°-130° | 0.0     | 0.0       |
| 130°-140° | 0.0     | 0.0       |
| 140°-150° | 0.0     | 0.0       |
| 150°-160° | 0.0     | 0.0       |
| 160°-170° | 0.0     | 0.0       |
| 170°-180° | 0.0     | 0.0       |
| 0°-90°    | 15182.7 | 100.0     |
| 0°-180°   | 15182.7 | 100.0     |



REPORT NUMBER: P1067135

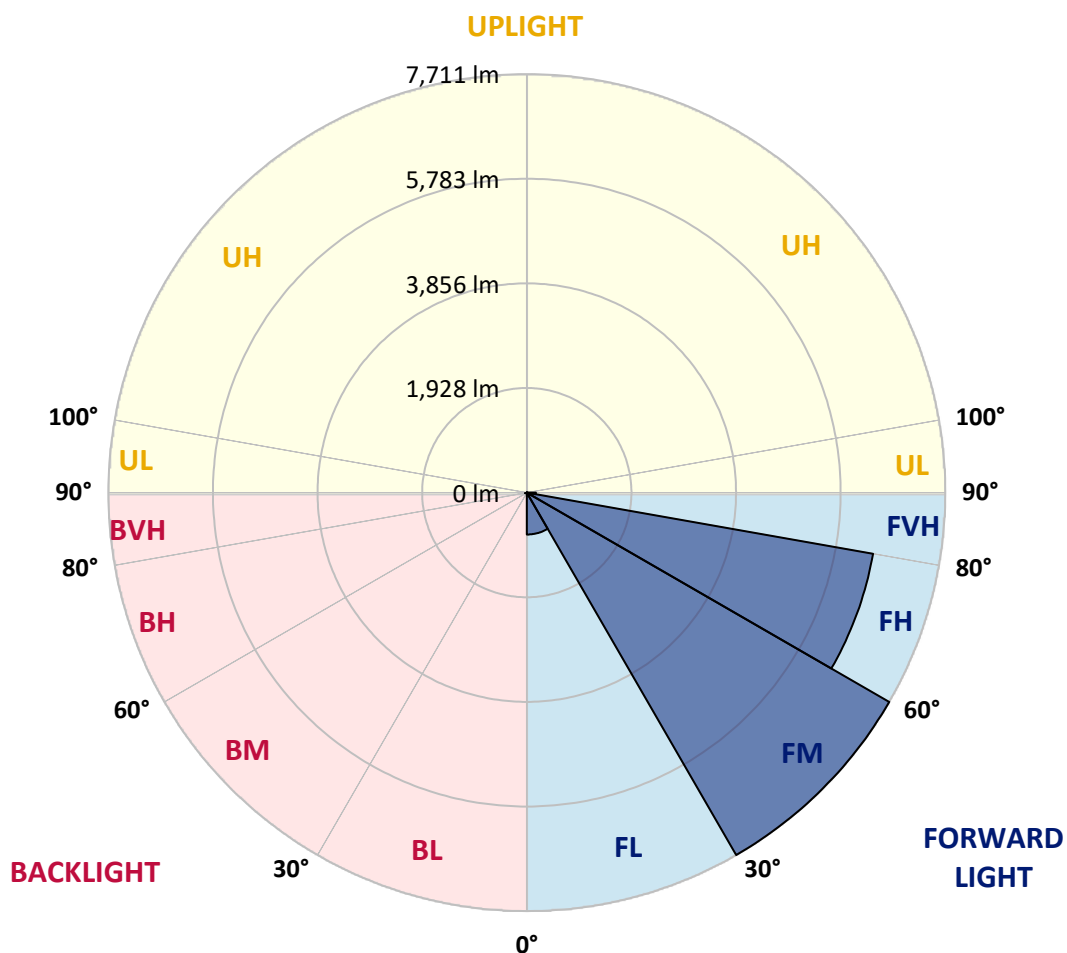
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**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 771.6  | 5.1       |                         |      |         |
| FM   | (30°-60°)   | 7711.3 | 50.8      |                         |      |         |
| FH   | (60°-80°)   | 6479.2 | 42.7      |                         |      | G3/7500 |
| FVH  | (80°-90°)   | 166.7  | 1.1       |                         |      | G2/225  |
| BL   | (0°-30°)    | 13.3   | 0.1       | B0/110                  |      |         |
| BM   | (30°-60°)   | 13.0   | 0.1       | B0/220                  |      |         |
| BH   | (60°-80°)   | 25.4   | 0.2       | B0/110                  |      | G0/110  |
| BVH  | (80°-90°)   | 2.2    | 0.0       |                         |      | G0/10   |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B0-U0-G3**

Type III Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 44°     | 45°     | 55°     | 65°     | 75°     | 85°    |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|
| 0°    | 96.0    | 96.0    | 96.0    | 96.0    | 96.0    | 96.0    | 96.0    | 96.0    | 96.0    | 96.0    | 96.0   |
| 2.5°  | 124.5   | 124.5   | 121.5   | 117.4   | 116.4   | 113.3   | 113.3   | 110.3   | 106.2   | 103.1   | 99.0   |
| 5°    | 180.7   | 179.7   | 171.5   | 161.3   | 148.0   | 139.9   | 139.9   | 128.6   | 118.4   | 109.2   | 101.1  |
| 7.5°  | 395.1   | 385.9   | 356.3   | 307.3   | 243.0   | 200.1   | 197.0   | 160.3   | 135.8   | 117.4   | 102.1  |
| 10°   | 906.5   | 874.9   | 833.0   | 715.6   | 528.8   | 369.6   | 362.4   | 233.8   | 162.3   | 126.6   | 104.1  |
| 12.5° | 1485.4  | 1510.9  | 1427.2  | 1242.4  | 1023.9  | 761.6   | 710.5   | 394.1   | 214.4   | 138.8   | 106.2  |
| 15°   | 2012.2  | 2006.0  | 1959.1  | 1808.0  | 1555.8  | 1206.7  | 1175.0  | 685.0   | 307.3   | 158.2   | 108.2  |
| 17.5° | 2406.2  | 2399.1  | 2354.2  | 2257.2  | 2063.2  | 1714.1  | 1686.5  | 1092.3  | 481.9   | 185.8   | 110.3  |
| 20°   | 2821.7  | 2812.5  | 2749.2  | 2671.7  | 2502.2  | 2205.1  | 2172.4  | 1547.7  | 754.4   | 230.7   | 110.3  |
| 22.5° | 3319.9  | 3302.6  | 3235.2  | 3103.5  | 2924.8  | 2666.6  | 2636.9  | 2013.2  | 1092.3  | 304.2   | 115.4  |
| 25°   | 3922.2  | 3892.6  | 3799.7  | 3681.3  | 3465.9  | 3122.9  | 3091.2  | 2531.8  | 1499.7  | 415.5   | 120.5  |
| 27.5° | 4609.3  | 4614.4  | 4488.8  | 4288.7  | 3999.8  | 3649.7  | 3590.5  | 2996.3  | 1921.3  | 574.8   | 126.6  |
| 30°   | 5425.0  | 5373.9  | 5197.3  | 4964.6  | 4683.8  | 4237.7  | 4180.5  | 3458.8  | 2395.0  | 809.6   | 136.8  |
| 32.5° | 6188.6  | 6133.5  | 5895.6  | 5602.6  | 5301.5  | 4830.8  | 4783.9  | 3978.4  | 2825.8  | 1087.2  | 155.2  |
| 35°   | 6844.0  | 6805.2  | 6472.4  | 6115.1  | 5847.6  | 5427.0  | 5412.7  | 4558.3  | 3332.2  | 1386.4  | 175.6  |
| 37.5° | 7420.8  | 7350.4  | 6922.6  | 6552.0  | 6280.5  | 5903.8  | 5873.2  | 5089.1  | 3820.2  | 1733.5  | 206.2  |
| 40°   | 7912.9  | 7874.1  | 7352.4  | 6865.5  | 6645.0  | 6308.1  | 6269.3  | 5554.6  | 4324.5  | 2136.7  | 244.0  |
| 42.5° | 8439.7  | 8388.6  | 7882.3  | 7336.1  | 6929.8  | 6569.4  | 6543.9  | 5938.5  | 4773.7  | 2579.8  | 300.1  |
| 45°   | 9034.8  | 8939.9  | 8495.8  | 8005.8  | 7388.2  | 6839.9  | 6811.4  | 6280.5  | 5234.1  | 3055.5  | 368.5  |
| 47.5° | 9670.9  | 9588.2  | 9228.8  | 8884.8  | 8174.2  | 7286.1  | 7224.8  | 6571.4  | 5691.4  | 3604.8  | 455.3  |
| 50°   | 10318.1 | 10320.1 | 10050.6 | 9885.2  | 9134.9  | 8010.9  | 7924.1  | 6999.2  | 6172.3  | 4192.8  | 583.9  |
| 52.5° | 11071.5 | 11090.9 | 11086.8 | 10964.3 | 10382.4 | 9196.1  | 9079.8  | 7648.5  | 6730.7  | 4878.8  | 761.6  |
| 55°   | 11387.0 | 11421.7 | 11647.3 | 11918.8 | 11760.6 | 10698.9 | 10574.3 | 8768.4  | 7470.8  | 5643.5  | 1025.0 |
| 57.5° | 11128.7 | 11167.5 | 11478.8 | 11954.6 | 12318.0 | 12014.8 | 12000.5 | 10226.2 | 8445.8  | 6570.4  | 1455.8 |
| 59°   | 10821.4 | 10816.3 | 11135.8 | 11640.1 | 12130.2 | 12327.2 | 12347.6 | 11212.4 | 9295.2  | 7220.7  | 1827.4 |
| 60°   | 10617.2 | 10621.3 | 10833.6 | 11351.2 | 11871.9 | 12213.9 | 12293.5 | 11793.3 | 9791.3  | 7688.3  | 2145.9 |
| 62.5° | 9829.1  | 9876.1  | 10044.5 | 10525.3 | 11019.4 | 11401.3 | 11537.0 | 12310.9 | 11211.4 | 8792.9  | 3253.6 |
| 65°   | 8972.6  | 8975.6  | 9215.5  | 9627.0  | 10100.7 | 10369.1 | 10454.9 | 11505.4 | 12159.8 | 9917.9  | 4706.3 |
| 67.5° | 7444.3  | 7506.6  | 7779.2  | 8445.8  | 9071.6  | 9411.6  | 9476.9  | 10014.9 | 11766.7 | 10650.9 | 5434.2 |
| 70°   | 5209.6  | 5291.3  | 5680.2  | 6544.9  | 7477.0  | 8035.4  | 8031.3  | 8325.3  | 10355.9 | 10324.2 | 4607.3 |
| 72.5° | 2601.2  | 2742.1  | 3059.6  | 3985.5  | 5114.6  | 5991.6  | 6176.4  | 6697.0  | 8319.2  | 8575.4  | 3437.3 |
| 75°   | 1149.5  | 1157.7  | 1338.4  | 1804.9  | 2542.0  | 3655.8  | 3821.2  | 5315.8  | 6382.6  | 5959.9  | 2482.8 |
| 77.5° | 668.7   | 674.8   | 707.5   | 810.6   | 1030.1  | 1791.7  | 1977.5  | 3486.3  | 4510.3  | 3463.9  | 1619.1 |
| 80°   | 243.0   | 249.1   | 248.1   | 307.3   | 451.2   | 705.4   | 786.1   | 1689.6  | 3008.6  | 1824.3  | 848.4  |
| 82.5° | 149.0   | 149.0   | 143.9   | 145.0   | 164.4   | 270.5   | 296.1   | 719.7   | 1465.0  | 898.4   | 243.0  |
| 85°   | 73.5    | 77.6    | 82.7    | 92.9    | 110.3   | 133.7   | 141.9   | 206.2   | 493.1   | 217.4   | 58.2   |
| 87.5° | 43.9    | 44.9    | 49.0    | 59.2    | 73.5    | 96.0    | 102.1   | 139.9   | 176.6   | 146.0   | 14.3   |
| 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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CATALOG NUMBER: NAV-SA3C-835-U-T3BC

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°  | 105° | 115° | 125° | 135° | 145° | 155° | 165° | 175° | 180° |
|-------|--------|------|------|------|------|------|------|------|------|------|------|
| 0°    | 96.0   | 96.0 | 96.0 | 96.0 | 96.0 | 96.0 | 96.0 | 96.0 | 96.0 | 96.0 | 96.0 |
| 2.5°  | 97.0   | 96.0 | 90.9 | 86.8 | 82.7 | 78.6 | 75.5 | 72.5 | 72.5 | 73.5 | 72.5 |
| 5°    | 97.0   | 92.9 | 84.7 | 77.6 | 71.5 | 66.4 | 61.3 | 57.2 | 56.1 | 56.1 | 57.2 |
| 7.5°  | 96.0   | 90.9 | 79.6 | 70.4 | 62.3 | 55.1 | 50.0 | 44.9 | 43.9 | 44.9 | 43.9 |
| 10°   | 94.9   | 88.8 | 75.5 | 64.3 | 53.1 | 45.9 | 38.8 | 33.7 | 33.7 | 33.7 | 34.7 |
| 12.5° | 94.9   | 85.8 | 71.5 | 58.2 | 45.9 | 37.8 | 30.6 | 25.5 | 24.5 | 24.5 | 24.5 |
| 15°   | 93.9   | 83.7 | 67.4 | 51.0 | 38.8 | 28.6 | 22.5 | 17.4 | 17.4 | 17.4 | 17.4 |
| 17.5° | 91.9   | 80.7 | 62.3 | 44.9 | 30.6 | 21.4 | 15.3 | 10.2 | 10.2 | 12.3 | 12.3 |
| 20°   | 89.8   | 77.6 | 56.1 | 36.8 | 25.5 | 16.3 | 10.2 | 6.1  | 6.1  | 9.2  | 10.2 |
| 22.5° | 90.9   | 77.6 | 52.1 | 32.7 | 20.4 | 12.3 | 8.2  | 5.1  | 4.1  | 7.1  | 9.2  |
| 25°   | 91.9   | 75.5 | 47.0 | 28.6 | 15.3 | 9.2  | 6.1  | 2.0  | 1.0  | 2.0  | 3.1  |
| 27.5° | 91.9   | 73.5 | 40.8 | 22.5 | 11.2 | 7.1  | 3.1  | 0.0  | 0.0  | 0.0  | 0.0  |
| 30°   | 90.9   | 70.4 | 35.7 | 18.4 | 8.2  | 4.1  | 1.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 32.5° | 89.8   | 67.4 | 32.7 | 14.3 | 7.1  | 2.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 35°   | 90.9   | 63.3 | 28.6 | 11.2 | 4.1  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 2.0  |
| 37.5° | 93.9   | 59.2 | 24.5 | 9.2  | 3.1  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 40°   | 98.0   | 56.1 | 20.4 | 7.1  | 1.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 42.5° | 106.2  | 56.1 | 18.4 | 5.1  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 45°   | 116.4  | 56.1 | 15.3 | 4.1  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 47.5° | 129.7  | 57.2 | 13.3 | 4.1  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 50°   | 146.0  | 59.2 | 12.3 | 3.1  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 52.5° | 158.2  | 57.2 | 11.2 | 3.1  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 55°   | 179.7  | 55.1 | 10.2 | 2.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 57.5° | 208.3  | 52.1 | 10.2 | 1.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 59°   | 236.8  | 48.0 | 10.2 | 1.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 60°   | 269.5  | 45.9 | 9.2  | 1.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 62.5° | 445.1  | 40.8 | 8.2  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 65°   | 859.6  | 38.8 | 7.1  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 67.5° | 1389.4 | 38.8 | 5.1  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 70°   | 1460.9 | 38.8 | 4.1  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 72.5° | 971.9  | 31.6 | 3.1  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 75°   | 520.7  | 28.6 | 3.1  | 1.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 77.5° | 280.7  | 26.5 | 4.1  | 2.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 80°   | 123.5  | 19.4 | 5.1  | 3.1  | 2.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 82.5° | 49.0   | 13.3 | 6.1  | 5.1  | 4.1  | 2.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 85°   | 23.5   | 10.2 | 8.2  | 7.1  | 5.1  | 3.1  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 87.5° | 11.2   | 10.2 | 9.2  | 8.2  | 7.1  | 5.1  | 1.0  | 0.0  | 0.0  | 0.0  | 0.0  |
| 90°   | 0.0    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  |



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

Report Prepared for

Cooper Lighting Solutions

McGraw-Edison

Report Number: SP1-2407-184-10

Test Date: 10/11/2024

Luminaire Tested: GSS-SB1A-835-U-5WQ

Data in this report applies to families of products including GSS-SB1A-835-U-5WQ

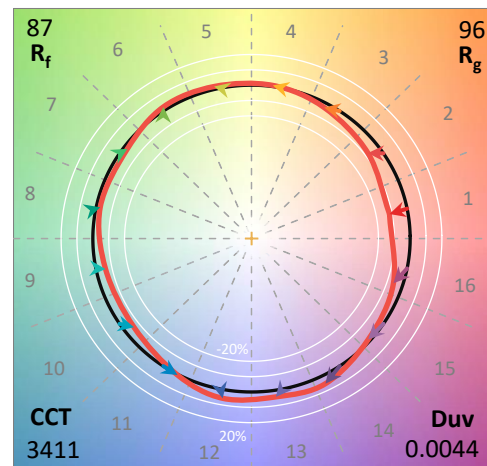
### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2407-184-10  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 10/15/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: McGraw-Edison  
 Catalog Number: **GSS-SB1A-835-U-5WQ**  
 Description: GALLEON II SITE SLIM 1SQ 350MA 5WQ HIGH DENSITY LIGHTSQUARE WITH 80 CRI  
 3500K CCT 26 LEDS

### Spectral Parameters

CCT (K): 3411  
 CIE  $u'$ : 0.2360  
 CIE  $v'$ : 0.5189  
 Duv: 0.0044  
 CIE x: 0.4154  
 CIE y: 0.4059  
 CIE z: 0.1787  
 Peak Wavelength (nm): 601  
 Dominant Wavelength (nm): 579  
 Purity: 46.51914  
 R<sub>f</sub>: 86.6  
 R<sub>g</sub>: 95.9

CRI (Ra): 83.5  
 R1: 81.1  
 R2: 88.9  
 R3: 97.2  
 R4: 83.8  
 R5: 81.7  
 R6: 86.9  
 R7: 86.1  
 R8: 62.2  
 R9: 6.3  
 R10: 75.4  
 R11: 84.1  
 R12: 69.7  
 R13: 82.8  
 R14: 98.5  
 R15: 72.6



### Test Conditions

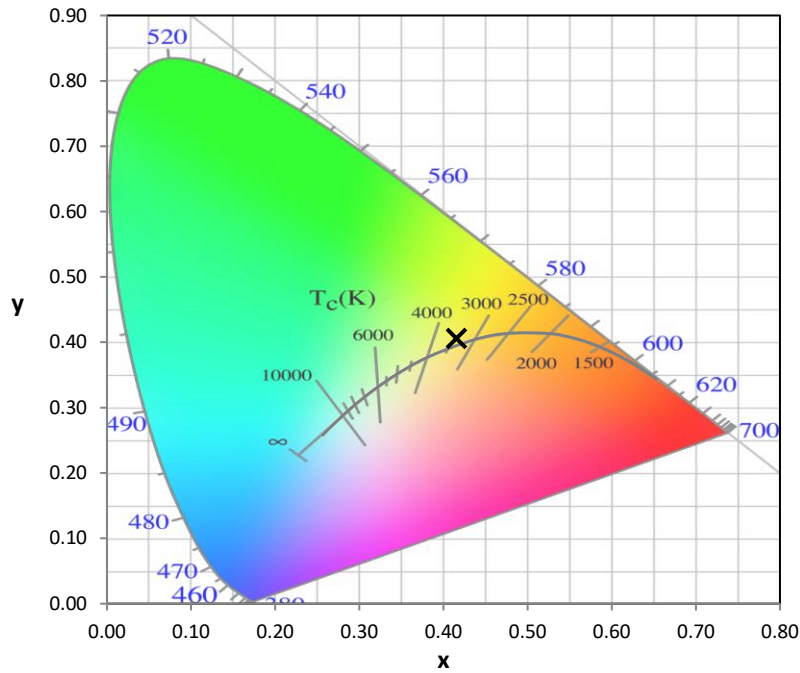
Stabilization Time: 35M  
 Operation Time: 1H 35M  
 Sphere Temperature (°C): 25.2

REPORT NUMBER: SP1-2407-184-10

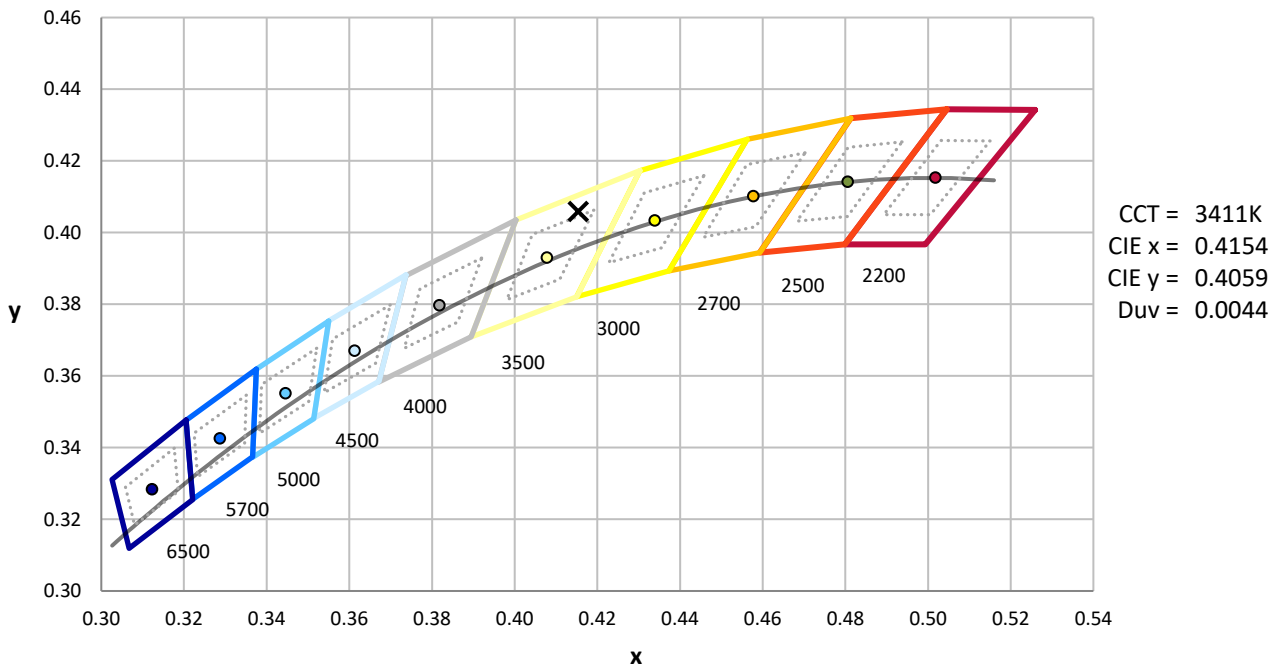
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date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

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**CIE 1931 Chromaticity Diagram**



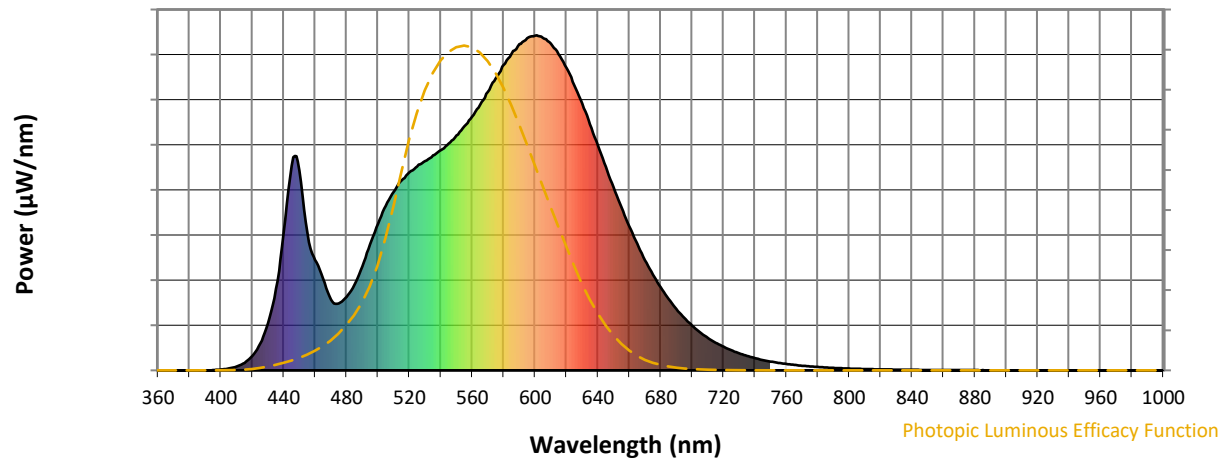
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 3500K 7-step quadrangle

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### Photopic Flux vs. Wavelength

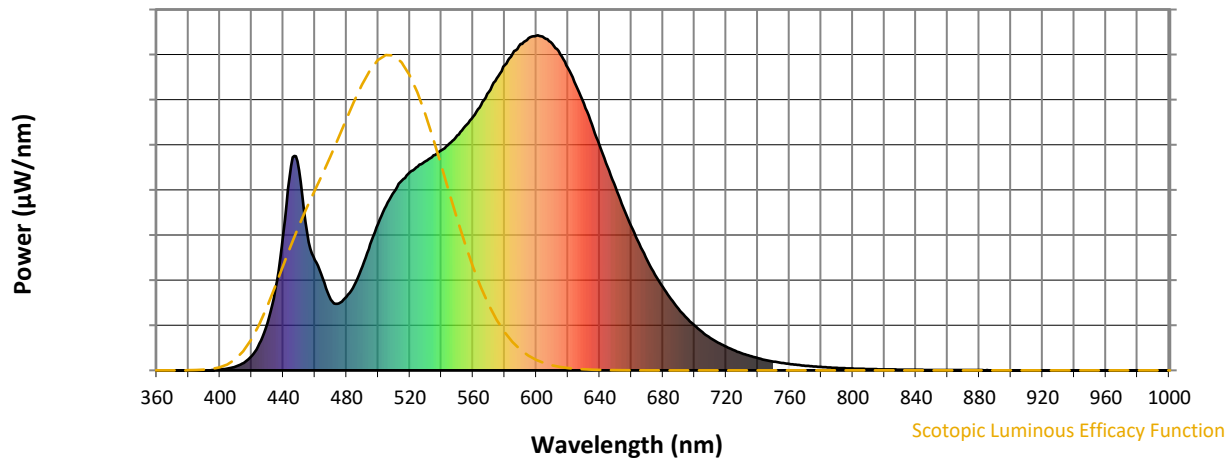


### Photopic Lumens: NR

| $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|
| 360               | 0                                    | NR                             | 490               | 311                                  | NR                             | 620               | 903                                  | NR                             | 750               | 26                                   | NR                             | 880               | 1                                    | NR                             |
| 365               | 0                                    | NR                             | 495               | 376                                  | NR                             | 625               | 851                                  | NR                             | 755               | 22                                   | NR                             | 885               | 1                                    | NR                             |
| 370               | 0                                    | NR                             | 500               | 438                                  | NR                             | 630               | 797                                  | NR                             | 760               | 19                                   | NR                             | 890               | 0                                    | NR                             |
| 375               | 0                                    | NR                             | 505               | 491                                  | NR                             | 635               | 735                                  | NR                             | 765               | 16                                   | NR                             | 895               | 0                                    | NR                             |
| 380               | 0                                    | NR                             | 510               | 533                                  | NR                             | 640               | 672                                  | NR                             | 770               | 14                                   | NR                             | 900               | 0                                    | NR                             |
| 385               | 0                                    | NR                             | 515               | 566                                  | NR                             | 645               | 607                                  | NR                             | 775               | 12                                   | NR                             | 905               | 0                                    | NR                             |
| 390               | 0                                    | NR                             | 520               | 592                                  | NR                             | 650               | 546                                  | NR                             | 780               | 10                                   | NR                             | 910               | 0                                    | NR                             |
| 395               | 1                                    | NR                             | 525               | 608                                  | NR                             | 655               | 487                                  | NR                             | 785               | 9                                    | NR                             | 915               | 0                                    | NR                             |
| 400               | 3                                    | NR                             | 530               | 625                                  | NR                             | 660               | 429                                  | NR                             | 790               | 7                                    | NR                             | 920               | 0                                    | NR                             |
| 405               | 6                                    | NR                             | 535               | 642                                  | NR                             | 665               | 378                                  | NR                             | 795               | 6                                    | NR                             | 925               | 0                                    | NR                             |
| 410               | 12                                   | NR                             | 540               | 657                                  | NR                             | 670               | 329                                  | NR                             | 800               | 5                                    | NR                             | 930               | 0                                    | NR                             |
| 415               | 22                                   | NR                             | 545               | 677                                  | NR                             | 675               | 286                                  | NR                             | 805               | 5                                    | NR                             | 935               | 0                                    | NR                             |
| 420               | 43                                   | NR                             | 550               | 701                                  | NR                             | 680               | 248                                  | NR                             | 810               | 4                                    | NR                             | 940               | 0                                    | NR                             |
| 425               | 80                                   | NR                             | 555               | 728                                  | NR                             | 685               | 213                                  | NR                             | 815               | 3                                    | NR                             | 945               | 0                                    | NR                             |
| 430               | 140                                  | NR                             | 560               | 757                                  | NR                             | 690               | 184                                  | NR                             | 820               | 3                                    | NR                             | 950               | 0                                    | NR                             |
| 435               | 243                                  | NR                             | 565               | 793                                  | NR                             | 695               | 156                                  | NR                             | 825               | 3                                    | NR                             | 955               | 0                                    | NR                             |
| 440               | 412                                  | NR                             | 570               | 831                                  | NR                             | 700               | 134                                  | NR                             | 830               | 2                                    | NR                             | 960               | 0                                    | NR                             |
| 445               | 610                                  | NR                             | 575               | 872                                  | NR                             | 705               | 114                                  | NR                             | 835               | 2                                    | NR                             | 965               | 0                                    | NR                             |
| 450               | 597                                  | NR                             | 580               | 911                                  | NR                             | 710               | 97                                   | NR                             | 840               | 2                                    | NR                             | 970               | 0                                    | NR                             |
| 455               | 412                                  | NR                             | 585               | 944                                  | NR                             | 715               | 83                                   | NR                             | 845               | 1                                    | NR                             | 975               | 0                                    | NR                             |
| 460               | 330                                  | NR                             | 590               | 974                                  | NR                             | 720               | 70                                   | NR                             | 850               | 1                                    | NR                             | 980               | 0                                    | NR                             |
| 465               | 274                                  | NR                             | 595               | 992                                  | NR                             | 725               | 60                                   | NR                             | 855               | 1                                    | NR                             | 985               | 0                                    | NR                             |
| 470               | 211                                  | NR                             | 600               | 999                                  | NR                             | 730               | 51                                   | NR                             | 860               | 1                                    | NR                             | 990               | 0                                    | NR                             |
| 475               | 200                                  | NR                             | 605               | 992                                  | NR                             | 735               | 43                                   | NR                             | 865               | 1                                    | NR                             | 995               | 0                                    | NR                             |
| 480               | 220                                  | NR                             | 610               | 975                                  | NR                             | 740               | 36                                   | NR                             | 870               | 1                                    | NR                             | 1000              | 0                                    | NR                             |
| 485               | 255                                  | NR                             | 615               | 944                                  | NR                             | 745               | 31                                   | NR                             | 875               | 1                                    | NR                             |                   |                                      |                                |

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### Scotopic Flux vs. Wavelength

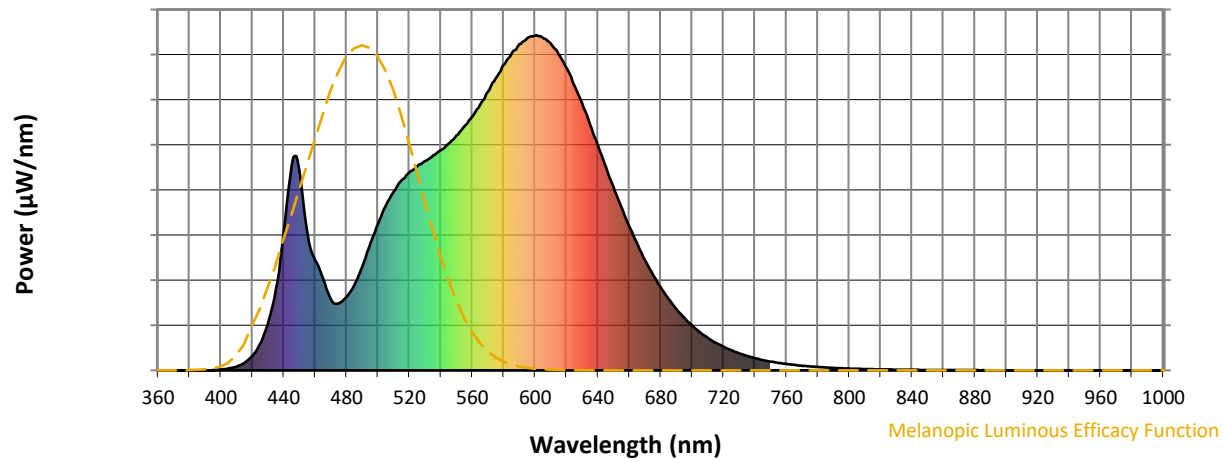


Scotopic Lumens: NR

S/P: 1.48

| λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) |
|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|
| 360       | 0                           | NR               | 490       | 311                         | NR               | 620       | 903                         | NR               | 750       | 26                          | NR               | 880       | 1                           | NR               |
| 365       | 0                           | NR               | 495       | 376                         | NR               | 625       | 851                         | NR               | 755       | 22                          | NR               | 885       | 1                           | NR               |
| 370       | 0                           | NR               | 500       | 438                         | NR               | 630       | 797                         | NR               | 760       | 19                          | NR               | 890       | 0                           | NR               |
| 375       | 0                           | NR               | 505       | 491                         | NR               | 635       | 735                         | NR               | 765       | 16                          | NR               | 895       | 0                           | NR               |
| 380       | 0                           | NR               | 510       | 533                         | NR               | 640       | 672                         | NR               | 770       | 14                          | NR               | 900       | 0                           | NR               |
| 385       | 0                           | NR               | 515       | 566                         | NR               | 645       | 607                         | NR               | 775       | 12                          | NR               | 905       | 0                           | NR               |
| 390       | 0                           | NR               | 520       | 592                         | NR               | 650       | 546                         | NR               | 780       | 10                          | NR               | 910       | 0                           | NR               |
| 395       | 1                           | NR               | 525       | 608                         | NR               | 655       | 487                         | NR               | 785       | 9                           | NR               | 915       | 0                           | NR               |
| 400       | 3                           | NR               | 530       | 625                         | NR               | 660       | 429                         | NR               | 790       | 7                           | NR               | 920       | 0                           | NR               |
| 405       | 6                           | NR               | 535       | 642                         | NR               | 665       | 378                         | NR               | 795       | 6                           | NR               | 925       | 0                           | NR               |
| 410       | 12                          | NR               | 540       | 657                         | NR               | 670       | 329                         | NR               | 800       | 5                           | NR               | 930       | 0                           | NR               |
| 415       | 22                          | NR               | 545       | 677                         | NR               | 675       | 286                         | NR               | 805       | 5                           | NR               | 935       | 0                           | NR               |
| 420       | 43                          | NR               | 550       | 701                         | NR               | 680       | 248                         | NR               | 810       | 4                           | NR               | 940       | 0                           | NR               |
| 425       | 80                          | NR               | 555       | 728                         | NR               | 685       | 213                         | NR               | 815       | 3                           | NR               | 945       | 0                           | NR               |
| 430       | 140                         | NR               | 560       | 757                         | NR               | 690       | 184                         | NR               | 820       | 3                           | NR               | 950       | 0                           | NR               |
| 435       | 243                         | NR               | 565       | 793                         | NR               | 695       | 156                         | NR               | 825       | 3                           | NR               | 955       | 0                           | NR               |
| 440       | 412                         | NR               | 570       | 831                         | NR               | 700       | 134                         | NR               | 830       | 2                           | NR               | 960       | 0                           | NR               |
| 445       | 610                         | NR               | 575       | 872                         | NR               | 705       | 114                         | NR               | 835       | 2                           | NR               | 965       | 0                           | NR               |
| 450       | 597                         | NR               | 580       | 911                         | NR               | 710       | 97                          | NR               | 840       | 2                           | NR               | 970       | 0                           | NR               |
| 455       | 412                         | NR               | 585       | 944                         | NR               | 715       | 83                          | NR               | 845       | 1                           | NR               | 975       | 0                           | NR               |
| 460       | 330                         | NR               | 590       | 974                         | NR               | 720       | 70                          | NR               | 850       | 1                           | NR               | 980       | 0                           | NR               |
| 465       | 274                         | NR               | 595       | 992                         | NR               | 725       | 60                          | NR               | 855       | 1                           | NR               | 985       | 0                           | NR               |
| 470       | 211                         | NR               | 600       | 999                         | NR               | 730       | 51                          | NR               | 860       | 1                           | NR               | 990       | 0                           | NR               |
| 475       | 200                         | NR               | 605       | 992                         | NR               | 735       | 43                          | NR               | 865       | 1                           | NR               | 995       | 0                           | NR               |
| 480       | 220                         | NR               | 610       | 975                         | NR               | 740       | 36                          | NR               | 870       | 1                           | NR               | 1000      | 0                           | NR               |
| 485       | 255                         | NR               | 615       | 944                         | NR               | 745       | 31                          | NR               | 875       | 1                           | NR               |           |                             |                  |

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**Melanopic Flux vs. Wavelength**

**Melanopic Lumens: NR**
**M/P: 2.88**

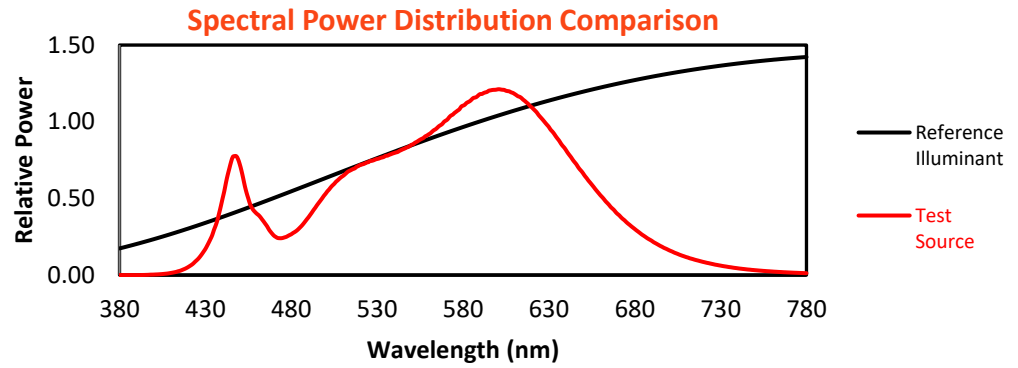
| $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|
| 360               | 0                                    | NR                             | 490               | 311                                  | NR                             | 620               | 903                                  | NR                             | 750               | 26                                   | NR                             | 880               | 1                                    | NR                             |
| 365               | 0                                    | NR                             | 495               | 376                                  | NR                             | 625               | 851                                  | NR                             | 755               | 22                                   | NR                             | 885               | 1                                    | NR                             |
| 370               | 0                                    | NR                             | 500               | 438                                  | NR                             | 630               | 797                                  | NR                             | 760               | 19                                   | NR                             | 890               | 0                                    | NR                             |
| 375               | 0                                    | NR                             | 505               | 491                                  | NR                             | 635               | 735                                  | NR                             | 765               | 16                                   | NR                             | 895               | 0                                    | NR                             |
| 380               | 0                                    | NR                             | 510               | 533                                  | NR                             | 640               | 672                                  | NR                             | 770               | 14                                   | NR                             | 900               | 0                                    | NR                             |
| 385               | 0                                    | NR                             | 515               | 566                                  | NR                             | 645               | 607                                  | NR                             | 775               | 12                                   | NR                             | 905               | 0                                    | NR                             |
| 390               | 0                                    | NR                             | 520               | 592                                  | NR                             | 650               | 546                                  | NR                             | 780               | 10                                   | NR                             | 910               | 0                                    | NR                             |
| 395               | 1                                    | NR                             | 525               | 608                                  | NR                             | 655               | 487                                  | NR                             | 785               | 9                                    | NR                             | 915               | 0                                    | NR                             |
| 400               | 3                                    | NR                             | 530               | 625                                  | NR                             | 660               | 429                                  | NR                             | 790               | 7                                    | NR                             | 920               | 0                                    | NR                             |
| 405               | 6                                    | NR                             | 535               | 642                                  | NR                             | 665               | 378                                  | NR                             | 795               | 6                                    | NR                             | 925               | 0                                    | NR                             |
| 410               | 12                                   | NR                             | 540               | 657                                  | NR                             | 670               | 329                                  | NR                             | 800               | 5                                    | NR                             | 930               | 0                                    | NR                             |
| 415               | 22                                   | NR                             | 545               | 677                                  | NR                             | 675               | 286                                  | NR                             | 805               | 5                                    | NR                             | 935               | 0                                    | NR                             |
| 420               | 43                                   | NR                             | 550               | 701                                  | NR                             | 680               | 248                                  | NR                             | 810               | 4                                    | NR                             | 940               | 0                                    | NR                             |
| 425               | 80                                   | NR                             | 555               | 728                                  | NR                             | 685               | 213                                  | NR                             | 815               | 3                                    | NR                             | 945               | 0                                    | NR                             |
| 430               | 140                                  | NR                             | 560               | 757                                  | NR                             | 690               | 184                                  | NR                             | 820               | 3                                    | NR                             | 950               | 0                                    | NR                             |
| 435               | 243                                  | NR                             | 565               | 793                                  | NR                             | 695               | 156                                  | NR                             | 825               | 3                                    | NR                             | 955               | 0                                    | NR                             |
| 440               | 412                                  | NR                             | 570               | 831                                  | NR                             | 700               | 134                                  | NR                             | 830               | 2                                    | NR                             | 960               | 0                                    | NR                             |
| 445               | 610                                  | NR                             | 575               | 872                                  | NR                             | 705               | 114                                  | NR                             | 835               | 2                                    | NR                             | 965               | 0                                    | NR                             |
| 450               | 597                                  | NR                             | 580               | 911                                  | NR                             | 710               | 97                                   | NR                             | 840               | 2                                    | NR                             | 970               | 0                                    | NR                             |
| 455               | 412                                  | NR                             | 585               | 944                                  | NR                             | 715               | 83                                   | NR                             | 845               | 1                                    | NR                             | 975               | 0                                    | NR                             |
| 460               | 330                                  | NR                             | 590               | 974                                  | NR                             | 720               | 70                                   | NR                             | 850               | 1                                    | NR                             | 980               | 0                                    | NR                             |
| 465               | 274                                  | NR                             | 595               | 992                                  | NR                             | 725               | 60                                   | NR                             | 855               | 1                                    | NR                             | 985               | 0                                    | NR                             |
| 470               | 211                                  | NR                             | 600               | 999                                  | NR                             | 730               | 51                                   | NR                             | 860               | 1                                    | NR                             | 990               | 0                                    | NR                             |
| 475               | 200                                  | NR                             | 605               | 992                                  | NR                             | 735               | 43                                   | NR                             | 865               | 1                                    | NR                             | 995               | 0                                    | NR                             |
| 480               | 220                                  | NR                             | 610               | 975                                  | NR                             | 740               | 36                                   | NR                             | 870               | 1                                    | NR                             | 1000              | 0                                    | NR                             |
| 485               | 255                                  | NR                             | 615               | 944                                  | NR                             | 745               | 31                                   | NR                             | 875               | 1                                    | NR                             |                   |                                      |                                |

REPORT NUMBER: SP1-2407-184-10

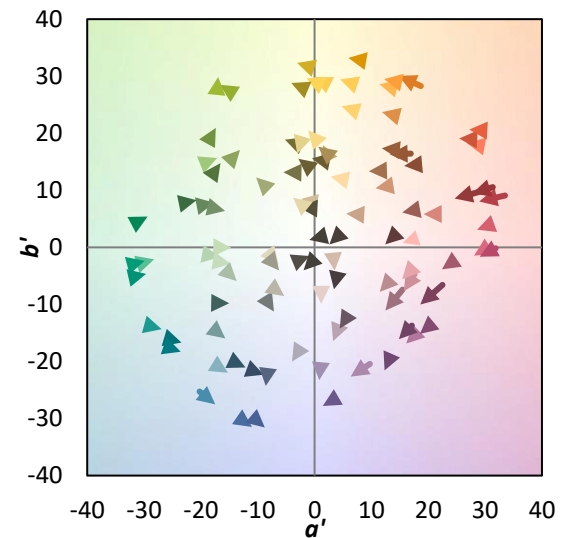
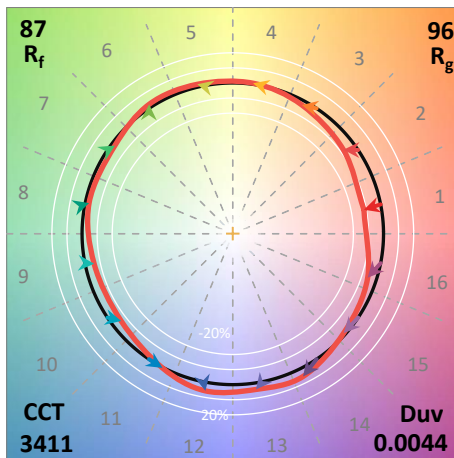
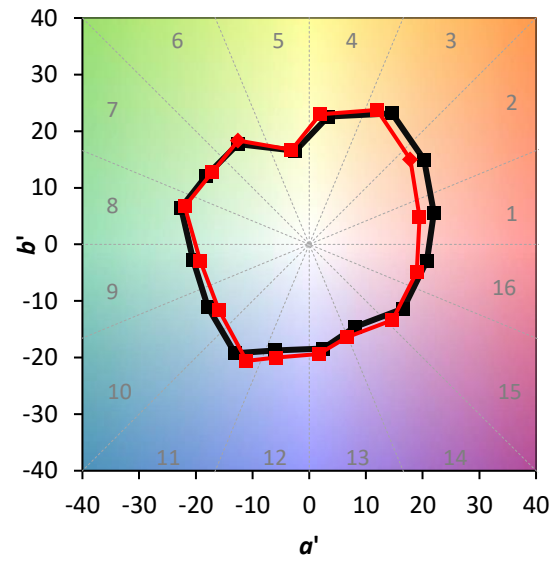
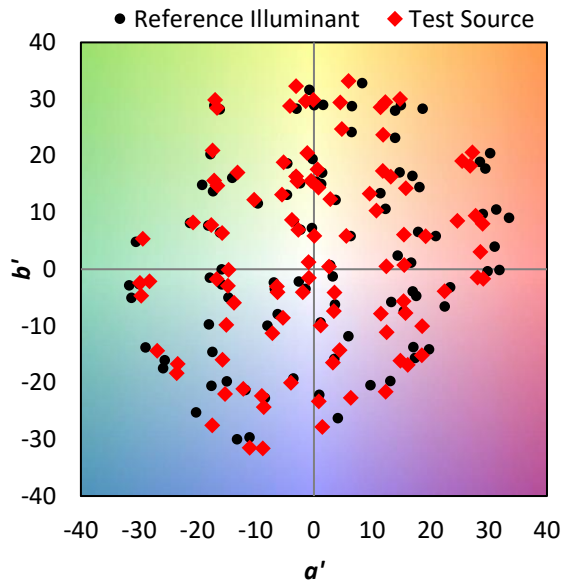
TM-30-18

### Summary

$R_f = 86.6$   
 $R_g = 95.9$   
 $CIE R_a = 83.5$   
 $R_9 = 6.3$



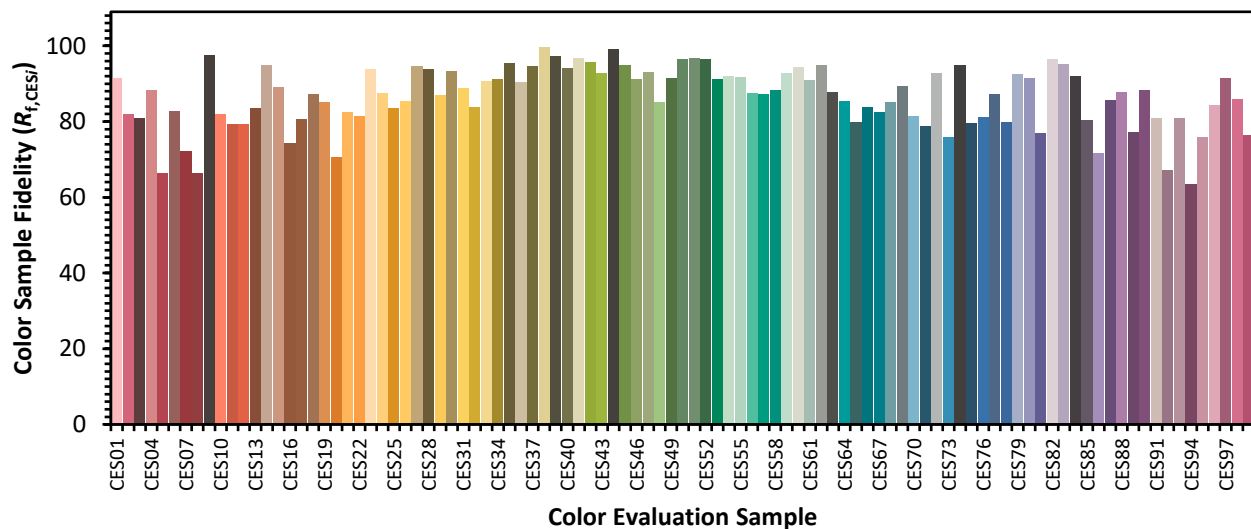
### Color Vector Graphics



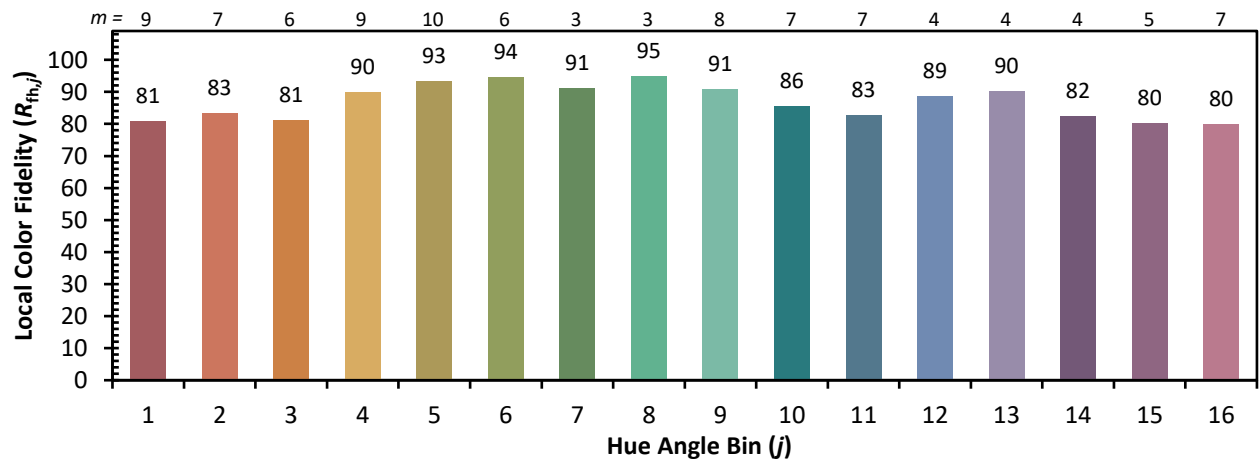
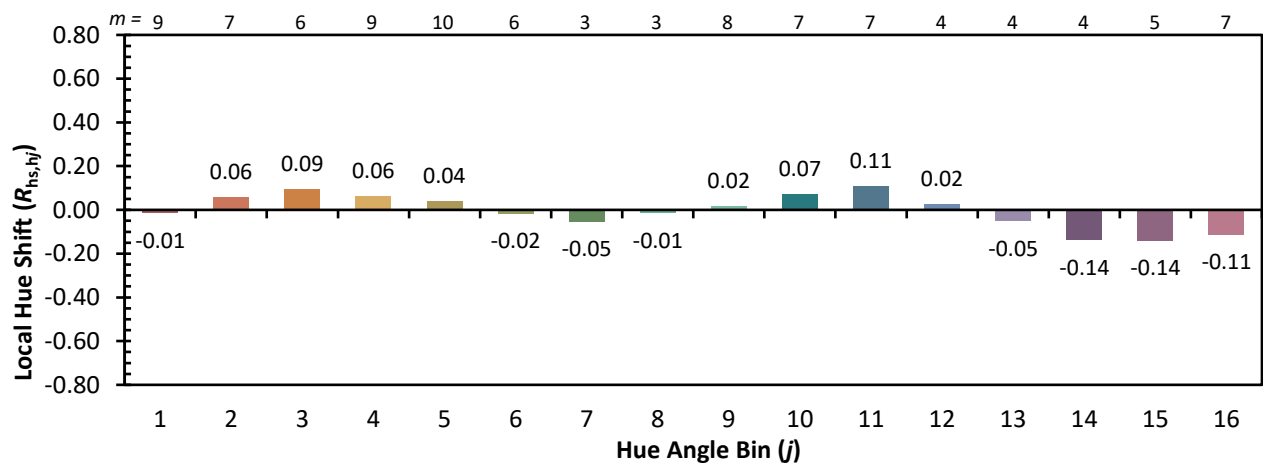
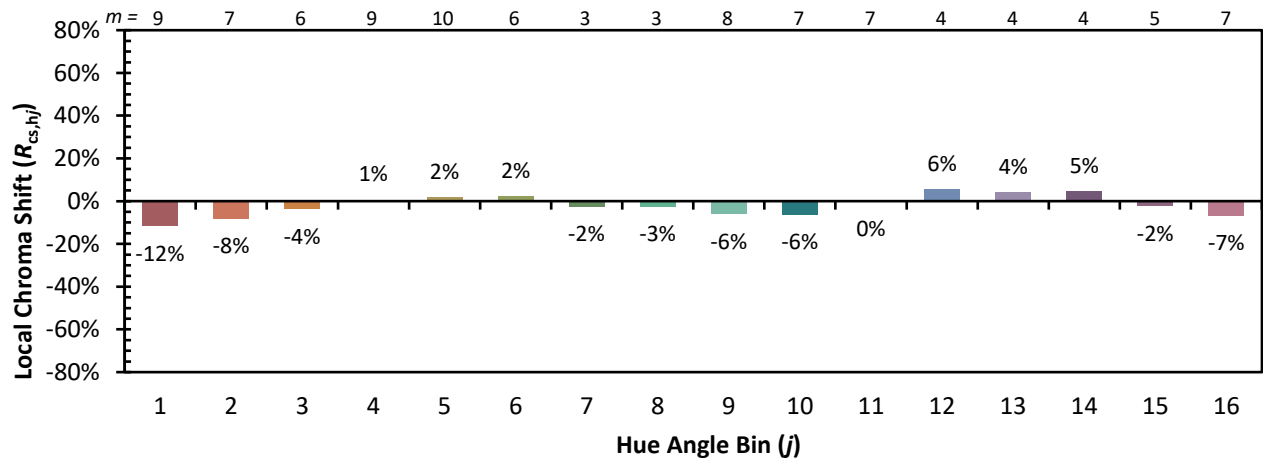


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

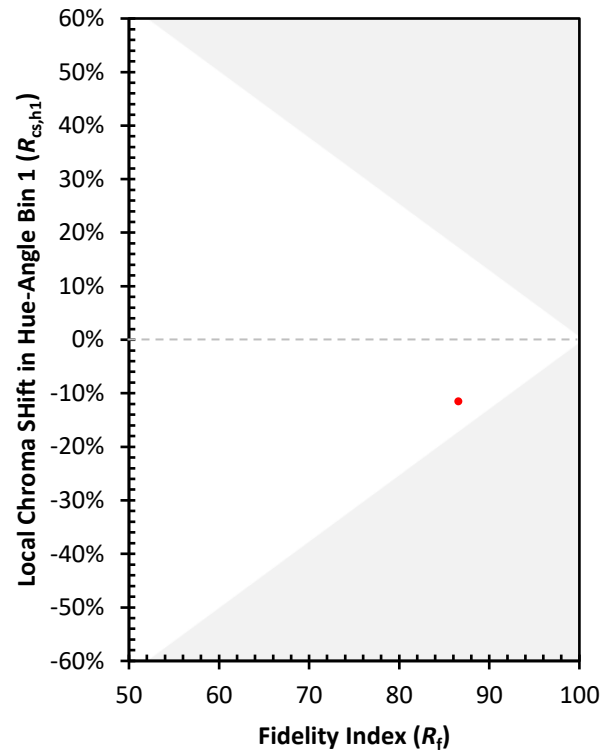
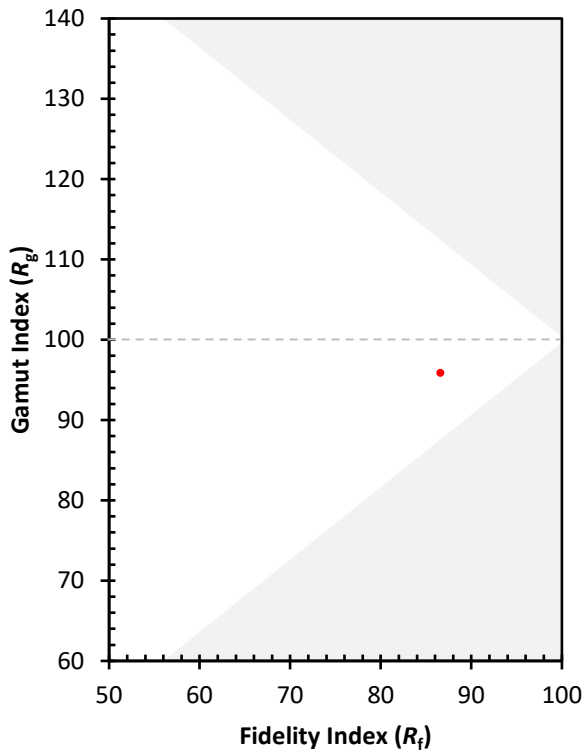
|            |             |            |            |
|------------|-------------|------------|------------|
| CES01 = 86 | CES26 = 85  | CES51 = 97 | CES76 = 81 |
| CES02 = 62 | CES27 = 95  | CES52 = 96 | CES77 = 87 |
| CES03 = 31 | CES28 = 94  | CES53 = 91 | CES78 = 80 |
| CES04 = 70 | CES29 = 87  | CES54 = 92 | CES79 = 93 |
| CES05 = 49 | CES30 = 93  | CES55 = 92 | CES80 = 91 |
| CES06 = 51 | CES31 = 89  | CES56 = 88 | CES81 = 77 |
| CES07 = 41 | CES32 = 84  | CES57 = 87 | CES82 = 96 |
| CES08 = 40 | CES33 = 91  | CES58 = 88 | CES83 = 95 |
| CES09 = 29 | CES34 = 91  | CES59 = 93 | CES84 = 92 |
| CES10 = 75 | CES35 = 95  | CES60 = 94 | CES85 = 80 |
| CES11 = 58 | CES36 = 90  | CES61 = 91 | CES86 = 72 |
| CES12 = 64 | CES37 = 95  | CES62 = 95 | CES87 = 86 |
| CES13 = 43 | CES38 = 100 | CES63 = 88 | CES88 = 88 |
| CES14 = 74 | CES39 = 97  | CES64 = 85 | CES89 = 77 |
| CES15 = 71 | CES40 = 94  | CES65 = 80 | CES90 = 88 |
| CES16 = 47 | CES41 = 97  | CES66 = 84 | CES91 = 81 |
| CES17 = 49 | CES42 = 96  | CES67 = 82 | CES92 = 67 |
| CES18 = 56 | CES43 = 93  | CES68 = 85 | CES93 = 81 |
| CES19 = 72 | CES44 = 99  | CES69 = 89 | CES94 = 63 |
| CES20 = 66 | CES45 = 95  | CES70 = 81 | CES95 = 76 |
| CES21 = 86 | CES46 = 91  | CES71 = 79 | CES96 = 84 |
| CES22 = 78 | CES47 = 93  | CES72 = 93 | CES97 = 92 |
| CES23 = 91 | CES48 = 85  | CES73 = 76 | CES98 = 86 |
| CES24 = 90 | CES49 = 92  | CES74 = 95 | CES99 = 77 |
| CES25 = 72 | CES50 = 96  | CES75 = 80 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)