

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: P1067138

Luminaire Tested: **NAV-SA4B-835-U-T3BC**

Issue Date: 08/07/2025

**Test Information**

Test Method: LM-79-08  
Report Number: P1067138  
Test Lab: INNOVATION CENTER(G3)  
Issue Date: 08/07/2025  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: LUMARK  
Catalog Number: NAV-SA4B-835-U-T3BC  
Description: Navion AREA AND ROADWAY LUMINAIRE 800mA 4xLight Square PACKAGE  
80CRI 3500K FIXTURE w/ TYPE III ANGLED BACKLIGHT CONTROL  
Light Source: (56) 3500K CCT, 80 CRI LEDs  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 16128.1 lumens  
Efficiency: N/A  
Efficacy: 111.9 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1' x H: 0')  
IES Classification: Type III - Short  
BUG Rating: B0 - U0 - G3

Input Watts (W): 144.1  
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

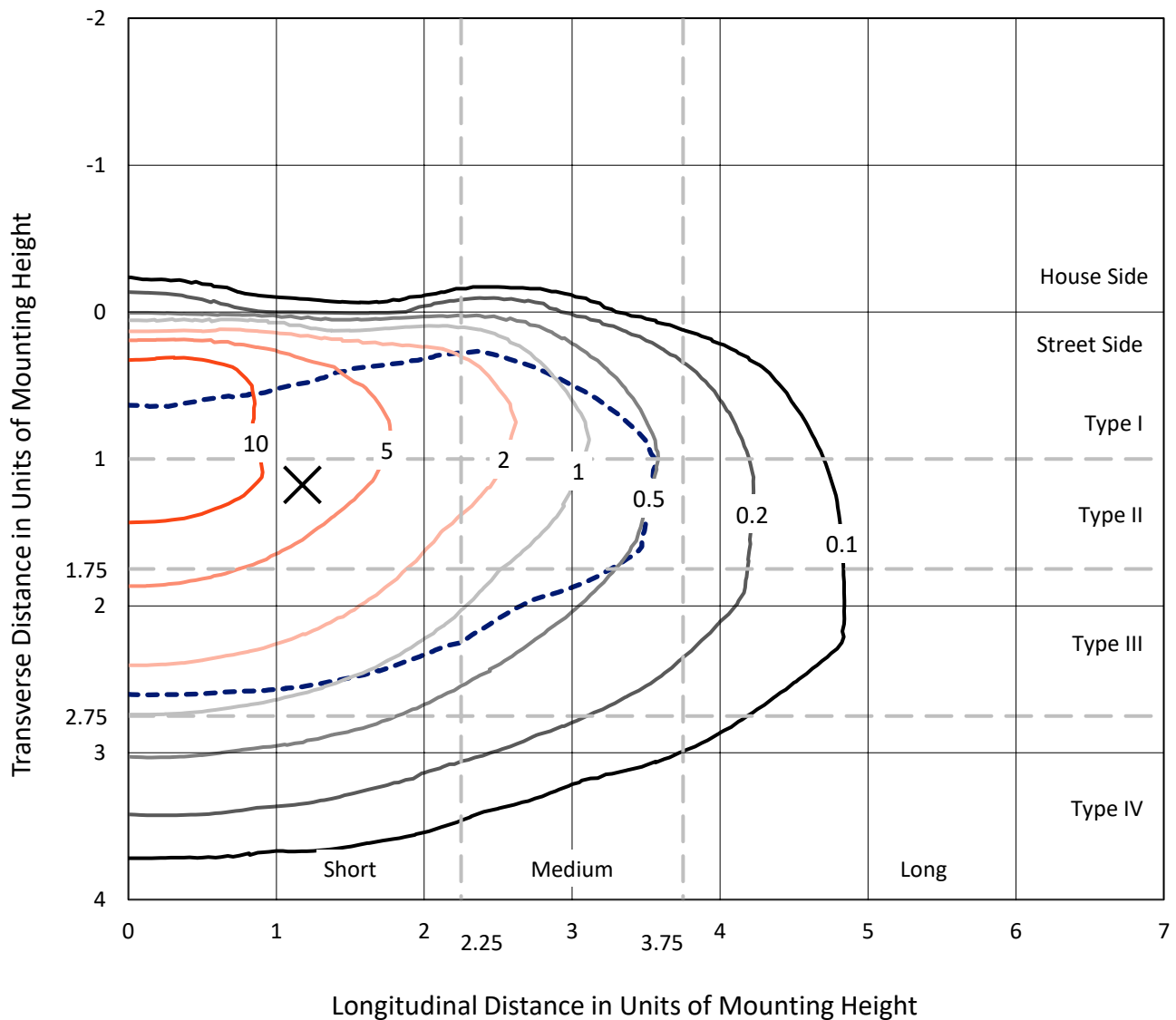


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## Iso-Footcandle Lines of Horizontal Illumination

× Max cd  
 - - - 1/2 Max cd

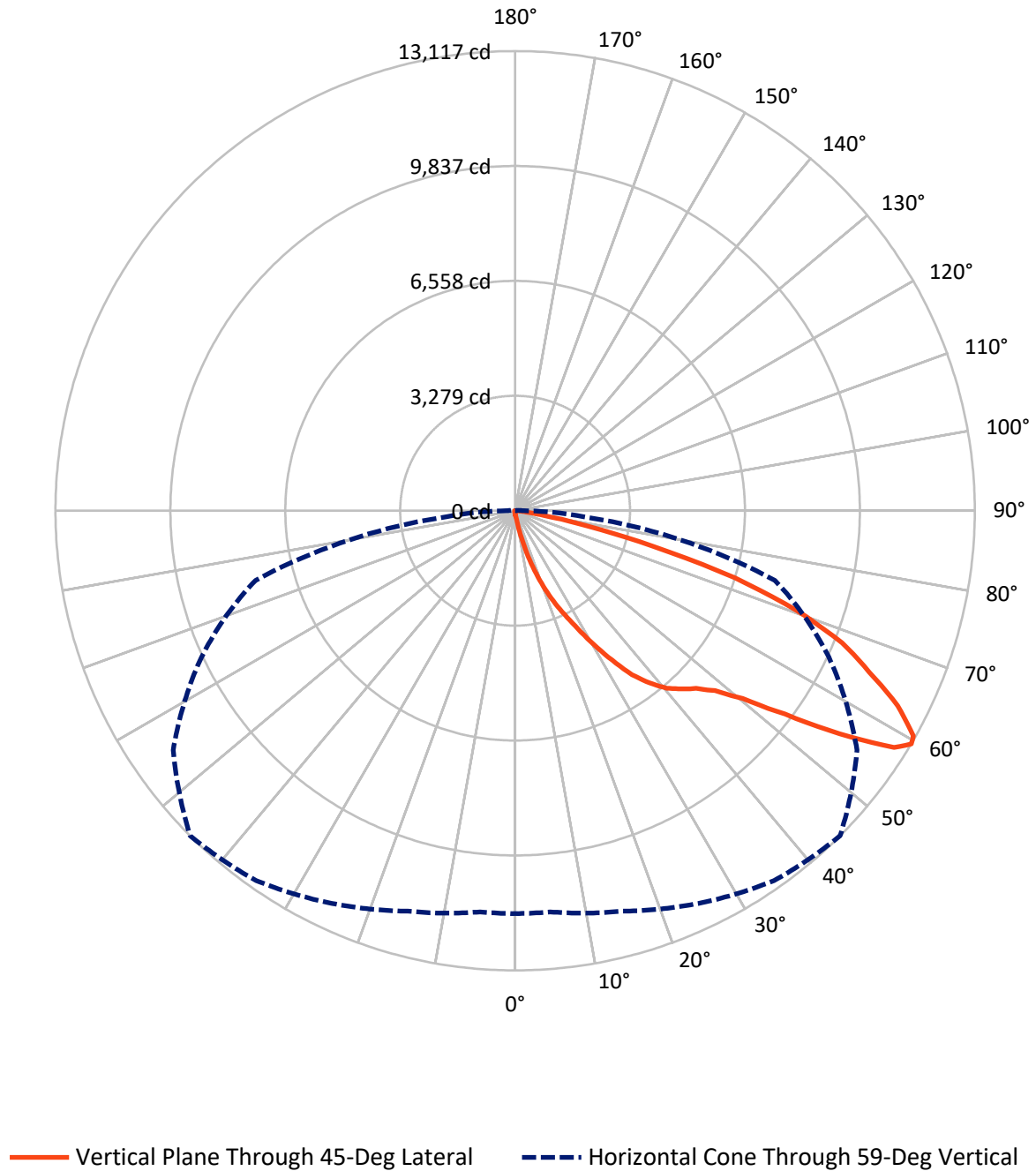


Based on 15 foot mounting height. Maximum calculated value = 17.6 fc  
 Type III - Short - N/A

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## Luminous Intensity Polar Plot



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**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 57.3     | 0.0    | 57.3    |
|                    | % Fixture | 0.4      | 0.0    | 0.4     |
| <b>Street Side</b> | Lumens    | 16070.8  | 0.0    | 16070.8 |
|                    | % Fixture | 99.6     | 0.0    | 99.6    |
| <b>Total</b>       | Lumens    | 16128.1  | 0.0    | 16128.1 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**Coefficient of Utilization**

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 15.0    | 0.1       |
| 10°-20°   | 178.3   | 1.1       |
| 20°-30°   | 640.5   | 4.0       |
| 30°-40°   | 1488.4  | 9.2       |
| 40°-50°   | 2536.9  | 15.7      |
| 50°-60°   | 4180.1  | 25.9      |
| 60°-70°   | 4833.1  | 30.0      |
| 70°-80°   | 2076.4  | 12.9      |
| 80°-90°   | 179.4   | 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°    | 16128.1 | 100.0     |
| 0°-180°   | 16128.1 | 100.0     |



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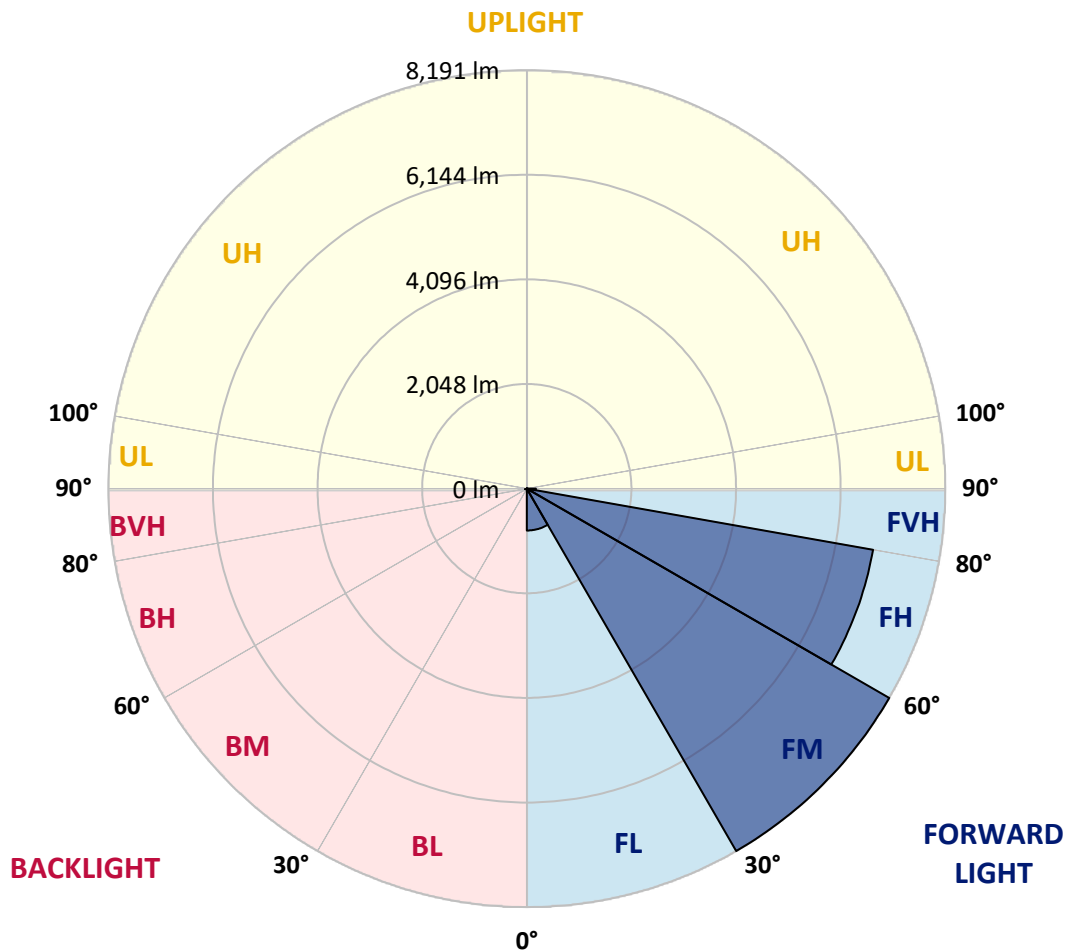
CATALOG NUMBER: NAV-SA4B-835-U-T3BC

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 819.6  | 5.1       |                         |      |         |
| FM   | (30°-60°)   | 8191.5 | 50.8      |                         |      |         |
| FH   | (60°-80°)   | 6882.6 | 42.7      |                         |      | G3/7500 |
| FVH  | (80°-90°)   | 177.1  | 1.1       |                         |      | G2/225  |
| BL   | (0°-30°)    | 14.1   | 0.1       | B0/110                  |      |         |
| BM   | (30°-60°)   | 13.8   | 0.1       | B0/220                  |      |         |
| BH   | (60°-80°)   | 26.9   | 0.2       | B0/110                  |      | G0/110  |
| BVH  | (80°-90°)   | 2.3    | 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°    | 101.9   | 101.9   | 101.9   | 101.9   | 101.9   | 101.9   | 101.9   | 101.9   | 101.9   | 101.9   | 101.9  |
| 2.5°  | 132.3   | 132.3   | 129.1   | 124.7   | 123.6   | 120.4   | 120.4   | 117.1   | 112.8   | 109.5   | 105.2  |
| 5°    | 191.9   | 190.9   | 182.2   | 171.3   | 157.2   | 148.6   | 148.6   | 136.6   | 125.8   | 116.0   | 107.4  |
| 7.5°  | 419.7   | 409.9   | 378.5   | 326.4   | 258.1   | 212.6   | 209.3   | 170.3   | 144.2   | 124.7   | 108.4  |
| 10°   | 963.0   | 929.4   | 884.9   | 760.2   | 561.7   | 392.6   | 385.0   | 248.3   | 172.4   | 134.5   | 110.6  |
| 12.5° | 1577.9  | 1605.0  | 1516.1  | 1319.8  | 1087.7  | 809.0   | 754.8   | 418.6   | 227.7   | 147.5   | 112.8  |
| 15°   | 2137.5  | 2131.0  | 2081.1  | 1920.6  | 1652.7  | 1281.8  | 1248.2  | 727.7   | 326.4   | 168.1   | 115.0  |
| 17.5° | 2556.1  | 2548.5  | 2500.8  | 2397.7  | 2191.7  | 1820.8  | 1791.5  | 1160.4  | 511.9   | 197.4   | 117.1  |
| 20°   | 2997.4  | 2987.7  | 2920.4  | 2838.0  | 2658.0  | 2342.4  | 2307.7  | 1644.0  | 801.4   | 245.1   | 117.1  |
| 22.5° | 3526.7  | 3508.2  | 3436.6  | 3296.7  | 3107.0  | 2832.6  | 2801.1  | 2138.5  | 1160.4  | 323.2   | 122.5  |
| 25°   | 4166.5  | 4135.0  | 4036.3  | 3910.5  | 3681.7  | 3317.4  | 3283.7  | 2689.5  | 1593.1  | 441.4   | 128.0  |
| 27.5° | 4896.3  | 4901.7  | 4768.4  | 4555.8  | 4248.9  | 3876.9  | 3814.0  | 3182.9  | 2040.9  | 610.5   | 134.5  |
| 30°   | 5762.8  | 5708.6  | 5521.0  | 5273.7  | 4975.5  | 4501.6  | 4440.8  | 3674.1  | 2544.1  | 860.0   | 145.3  |
| 32.5° | 6574.0  | 6515.4  | 6262.7  | 5951.5  | 5631.6  | 5131.6  | 5081.8  | 4226.1  | 3001.8  | 1154.9  | 164.8  |
| 35°   | 7270.2  | 7229.0  | 6875.5  | 6495.9  | 6211.8  | 5765.0  | 5749.8  | 4842.1  | 3539.7  | 1472.7  | 186.5  |
| 37.5° | 7882.9  | 7808.1  | 7353.7  | 6960.0  | 6671.6  | 6271.4  | 6238.9  | 5406.0  | 4058.0  | 1841.4  | 219.1  |
| 40°   | 8405.6  | 8364.4  | 7810.3  | 7293.0  | 7058.7  | 6700.9  | 6659.6  | 5900.5  | 4593.8  | 2269.8  | 259.2  |
| 42.5° | 8965.2  | 8911.0  | 8373.1  | 7792.9  | 7361.3  | 6978.5  | 6951.4  | 6308.3  | 5070.9  | 2740.4  | 318.8  |
| 45°   | 9597.4  | 9496.6  | 9024.8  | 8504.3  | 7848.2  | 7265.9  | 7235.5  | 6671.6  | 5560.0  | 3245.8  | 391.5  |
| 47.5° | 10273.1 | 10185.2 | 9803.5  | 9438.0  | 8683.2  | 7739.8  | 7674.7  | 6980.6  | 6045.8  | 3829.2  | 483.7  |
| 50°   | 10960.6 | 10962.8 | 10676.5 | 10500.8 | 9703.7  | 8509.7  | 8417.5  | 7435.0  | 6556.6  | 4453.9  | 620.3  |
| 52.5° | 11760.9 | 11781.5 | 11777.2 | 11647.1 | 11028.9 | 9768.8  | 9645.2  | 8124.7  | 7149.8  | 5182.6  | 809.0  |
| 55°   | 12096.0 | 12132.9 | 12372.6 | 12661.0 | 12492.9 | 11365.1 | 11232.8 | 9314.4  | 7936.0  | 5994.9  | 1088.8 |
| 57.5° | 11821.7 | 11862.9 | 12193.6 | 12699.0 | 13085.0 | 12763.0 | 12747.8 | 10863.0 | 8971.7  | 6979.6  | 1546.4 |
| 59°   | 11495.2 | 11489.8 | 11829.2 | 12365.0 | 12885.5 | 13094.8 | 13116.5 | 11910.6 | 9874.0  | 7670.4  | 1941.2 |
| 60°   | 11278.3 | 11282.7 | 11508.2 | 12058.1 | 12611.1 | 12974.4 | 13059.0 | 12527.6 | 10401.0 | 8167.0  | 2279.5 |
| 62.5° | 10441.1 | 10491.0 | 10670.0 | 11180.7 | 11705.6 | 12111.2 | 12255.4 | 13077.5 | 11909.5 | 9340.4  | 3456.2 |
| 65°   | 9531.3  | 9534.5  | 9789.4  | 10226.4 | 10729.6 | 11014.8 | 11105.9 | 12221.8 | 12917.0 | 10535.5 | 4999.3 |
| 67.5° | 7907.9  | 7974.0  | 8263.6  | 8971.7  | 9636.5  | 9997.6  | 10067.0 | 10638.5 | 12499.4 | 11314.1 | 5772.6 |
| 70°   | 5534.0  | 5620.7  | 6033.9  | 6952.4  | 7942.6  | 8535.8  | 8531.4  | 8843.7  | 11000.7 | 10967.1 | 4894.2 |
| 72.5° | 2763.2  | 2912.8  | 3250.1  | 4233.7  | 5433.1  | 6364.7  | 6561.0  | 7114.0  | 8837.2  | 9109.4  | 3651.4 |
| 75°   | 1221.1  | 1229.8  | 1421.7  | 1917.3  | 2700.3  | 3883.4  | 4059.1  | 5646.8  | 6780.0  | 6331.1  | 2637.4 |
| 77.5° | 710.3   | 716.8   | 751.5   | 861.1   | 1094.2  | 1903.2  | 2100.6  | 3703.4  | 4791.1  | 3679.6  | 1719.9 |
| 80°   | 258.1   | 264.6   | 263.5   | 326.4   | 479.3   | 749.4   | 835.0   | 1794.8  | 3195.9  | 1937.9  | 901.2  |
| 82.5° | 158.3   | 158.3   | 152.9   | 154.0   | 174.6   | 287.4   | 314.5   | 764.5   | 1556.2  | 954.3   | 258.1  |
| 85°   | 78.1    | 82.4    | 87.8    | 98.7    | 117.1   | 142.1   | 150.7   | 219.1   | 523.8   | 231.0   | 61.8   |
| 87.5° | 46.6    | 47.7    | 52.1    | 62.9    | 78.1    | 101.9   | 108.4   | 148.6   | 187.6   | 155.1   | 15.2   |
| 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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**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°   | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 101.9  | 101.9 | 101.9 | 101.9 | 101.9 | 101.9 | 101.9 | 101.9 | 101.9 | 101.9 | 101.9 |
| 2.5°  | 103.0  | 101.9 | 96.5  | 92.2  | 87.8  | 83.5  | 80.2  | 77.0  | 77.0  | 78.1  | 77.0  |
| 5°    | 103.0  | 98.7  | 90.0  | 82.4  | 75.9  | 70.5  | 65.1  | 60.7  | 59.6  | 59.6  | 60.7  |
| 7.5°  | 101.9  | 96.5  | 84.6  | 74.8  | 66.2  | 58.6  | 53.1  | 47.7  | 46.6  | 47.7  | 46.6  |
| 10°   | 100.9  | 94.3  | 80.2  | 68.3  | 56.4  | 48.8  | 41.2  | 35.8  | 35.8  | 35.8  | 36.9  |
| 12.5° | 100.9  | 91.1  | 75.9  | 61.8  | 48.8  | 40.1  | 32.5  | 27.1  | 26.0  | 26.0  | 26.0  |
| 15°   | 99.8   | 88.9  | 71.6  | 54.2  | 41.2  | 30.4  | 23.9  | 18.4  | 18.4  | 18.4  | 18.4  |
| 17.5° | 97.6   | 85.7  | 66.2  | 47.7  | 32.5  | 22.8  | 16.3  | 10.8  | 10.8  | 13.0  | 13.0  |
| 20°   | 95.4   | 82.4  | 59.6  | 39.0  | 27.1  | 17.4  | 10.8  | 6.5   | 6.5   | 9.8   | 10.8  |
| 22.5° | 96.5   | 82.4  | 55.3  | 34.7  | 21.7  | 13.0  | 8.7   | 5.4   | 4.3   | 7.6   | 9.8   |
| 25°   | 97.6   | 80.2  | 49.9  | 30.4  | 16.3  | 9.8   | 6.5   | 2.2   | 1.1   | 2.2   | 3.3   |
| 27.5° | 97.6   | 78.1  | 43.4  | 23.9  | 11.9  | 7.6   | 3.3   | 0.0   | 0.0   | 0.0   | 0.0   |
| 30°   | 96.5   | 74.8  | 38.0  | 19.5  | 8.7   | 4.3   | 1.1   | 0.0   | 0.0   | 0.0   | 0.0   |
| 32.5° | 95.4   | 71.6  | 34.7  | 15.2  | 7.6   | 2.2   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 35°   | 96.5   | 67.2  | 30.4  | 11.9  | 4.3   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 2.2   |
| 37.5° | 99.8   | 62.9  | 26.0  | 9.8   | 3.3   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 40°   | 104.1  | 59.6  | 21.7  | 7.6   | 1.1   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 42.5° | 112.8  | 59.6  | 19.5  | 5.4   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 45°   | 123.6  | 59.6  | 16.3  | 4.3   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 47.5° | 137.7  | 60.7  | 14.1  | 4.3   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 50°   | 155.1  | 62.9  | 13.0  | 3.3   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 52.5° | 168.1  | 60.7  | 11.9  | 3.3   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 55°   | 190.9  | 58.6  | 10.8  | 2.2   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 57.5° | 221.2  | 55.3  | 10.8  | 1.1   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 59°   | 251.6  | 51.0  | 10.8  | 1.1   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 60°   | 286.3  | 48.8  | 9.8   | 1.1   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 62.5° | 472.8  | 43.4  | 8.7   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 65°   | 913.1  | 41.2  | 7.6   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 67.5° | 1475.9 | 41.2  | 5.4   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 70°   | 1551.9 | 41.2  | 4.3   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 72.5° | 1032.4 | 33.6  | 3.3   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 75°   | 553.1  | 30.4  | 3.3   | 1.1   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 77.5° | 298.2  | 28.2  | 4.3   | 2.2   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 80°   | 131.2  | 20.6  | 5.4   | 3.3   | 2.2   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 82.5° | 52.1   | 14.1  | 6.5   | 5.4   | 4.3   | 2.2   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 85°   | 24.9   | 10.8  | 8.7   | 7.6   | 5.4   | 3.3   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 87.5° | 11.9   | 10.8  | 9.8   | 8.7   | 7.6   | 5.4   | 1.1   | 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           |

REPORT NUMBER: SP1-2407-184-10

**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

REPORT NUMBER: SP1-2407-184-10

### 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                             |                   |                                        |                                |

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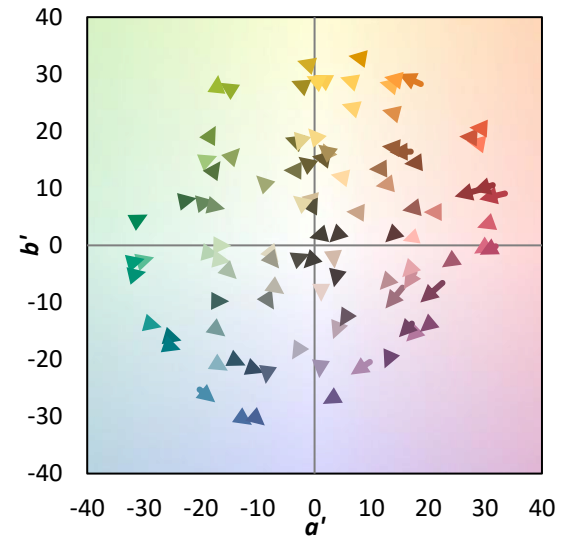
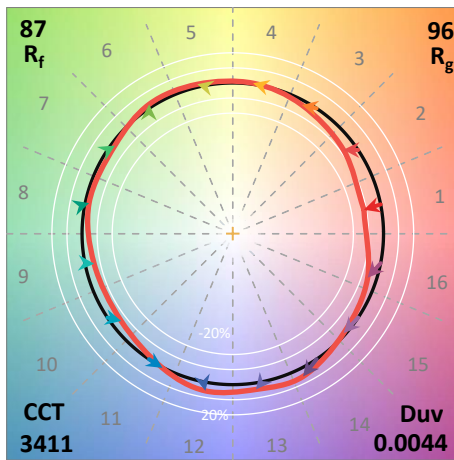
TM-30-18

### Summary

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



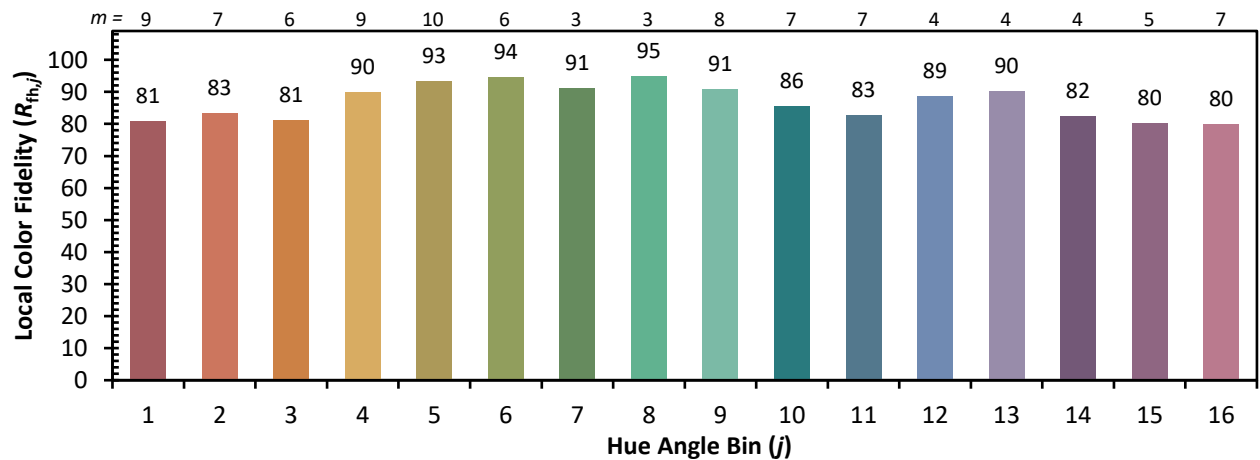
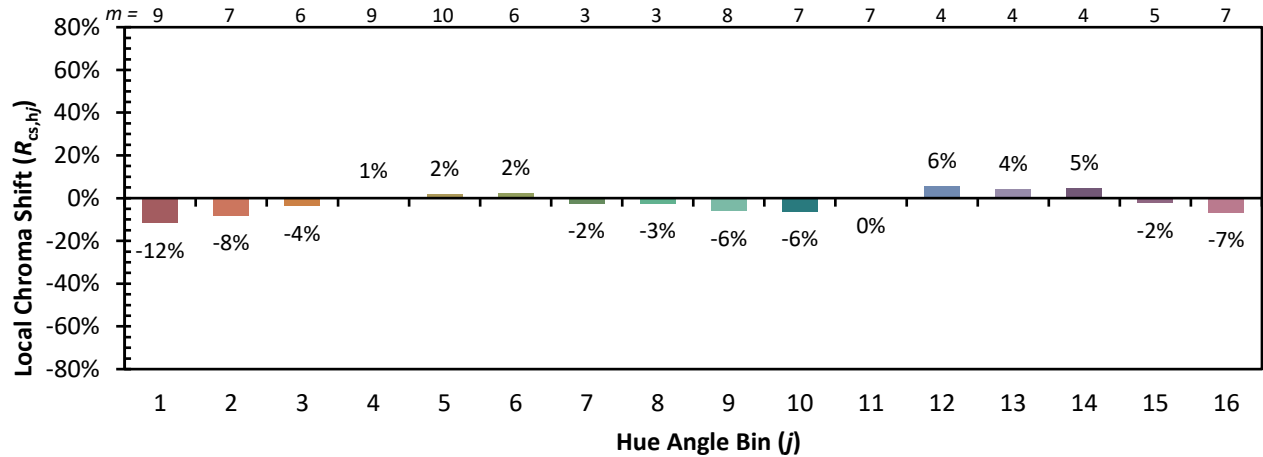
### Color Vector Graphics

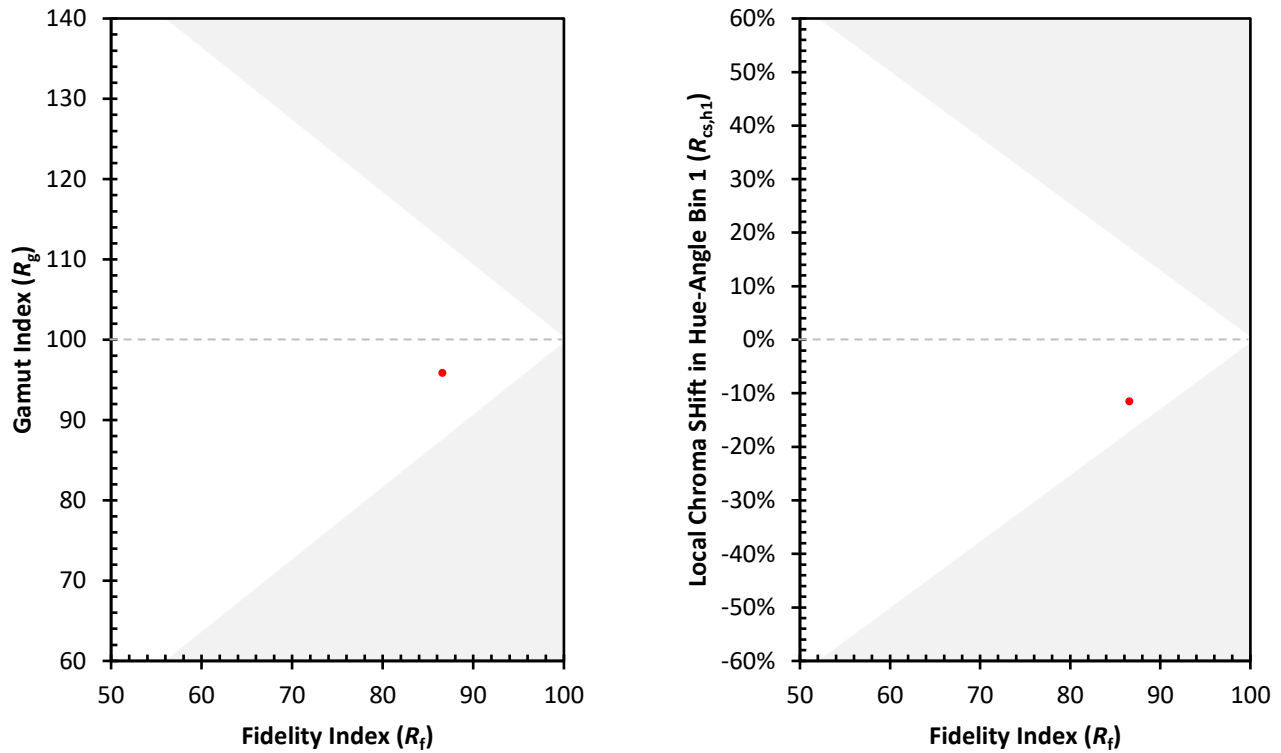


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |             |            |            |
|------------|-------------|------------|------------|
| 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)