

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: P1067331

Luminaire Tested: **NAV-SA4C-827-U-T2BC**

Issue Date: 08/07/2025

**Test Information**

Test Method: LM-79-08  
Report Number: P1067331  
Test Lab: INNOVATION CENTER(G3)  
Issue Date: 08/07/2025  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: LUMARK  
Catalog Number: NAV-SA4C-827-U-T2BC  
Description: Navion AREA AND ROADWAY LUMINAIRE 1050mA 4xLight Square PACKAGE  
80CRI 2700K FIXTURE w/ TYPE II ANGLED BACKLIGHT CONTROL  
Light Source: (56) 2700K CCT, 80 CRI LEDs  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 15902.8 lumens  
Efficiency: N/A  
Efficacy: 83.5 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B0 - U0 - G3

Input Watts (W): 190.4  
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

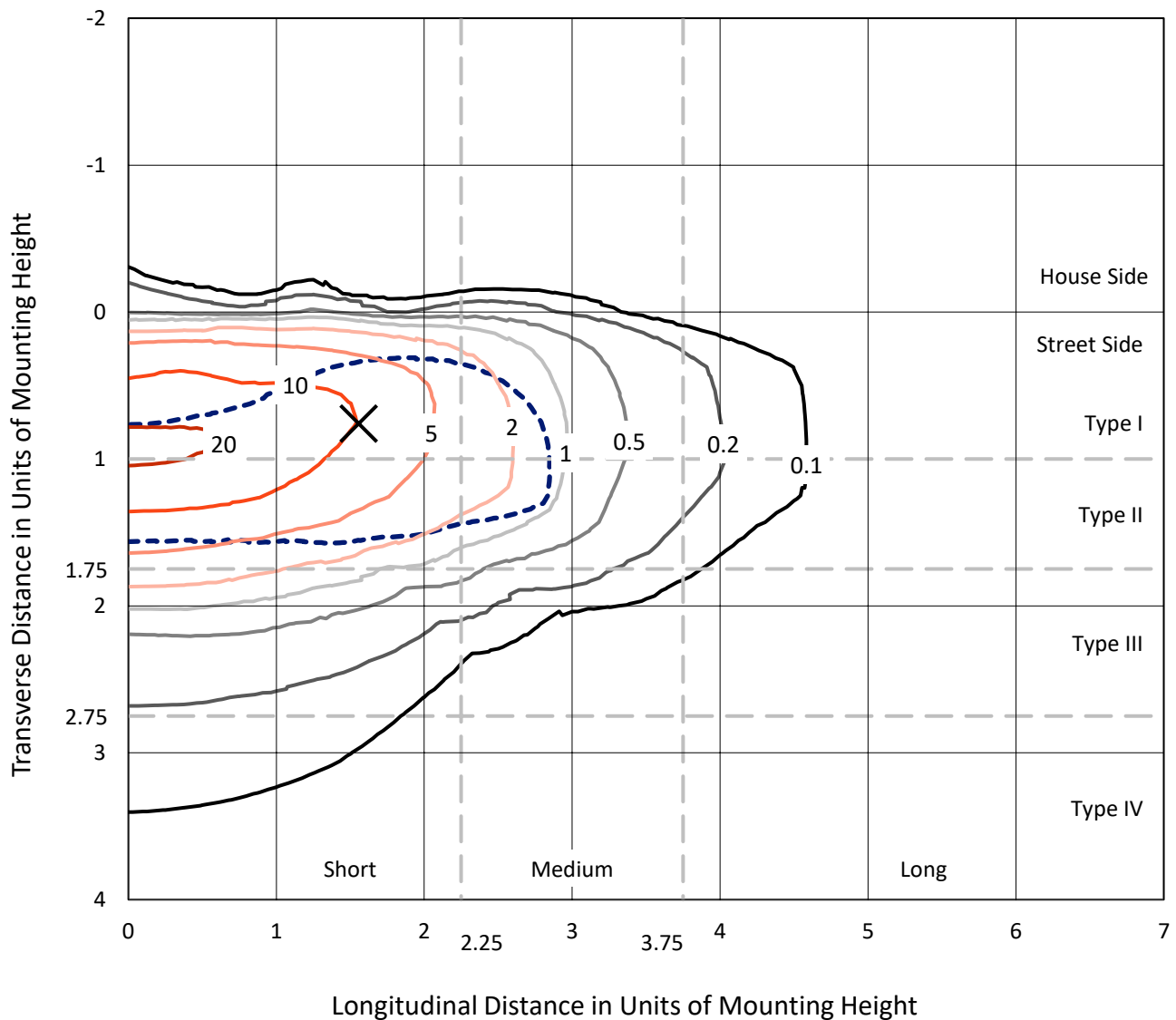


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## Iso-Footcandle Lines of Horizontal Illumination

× Max cd  
 - - - 1/2 Max cd

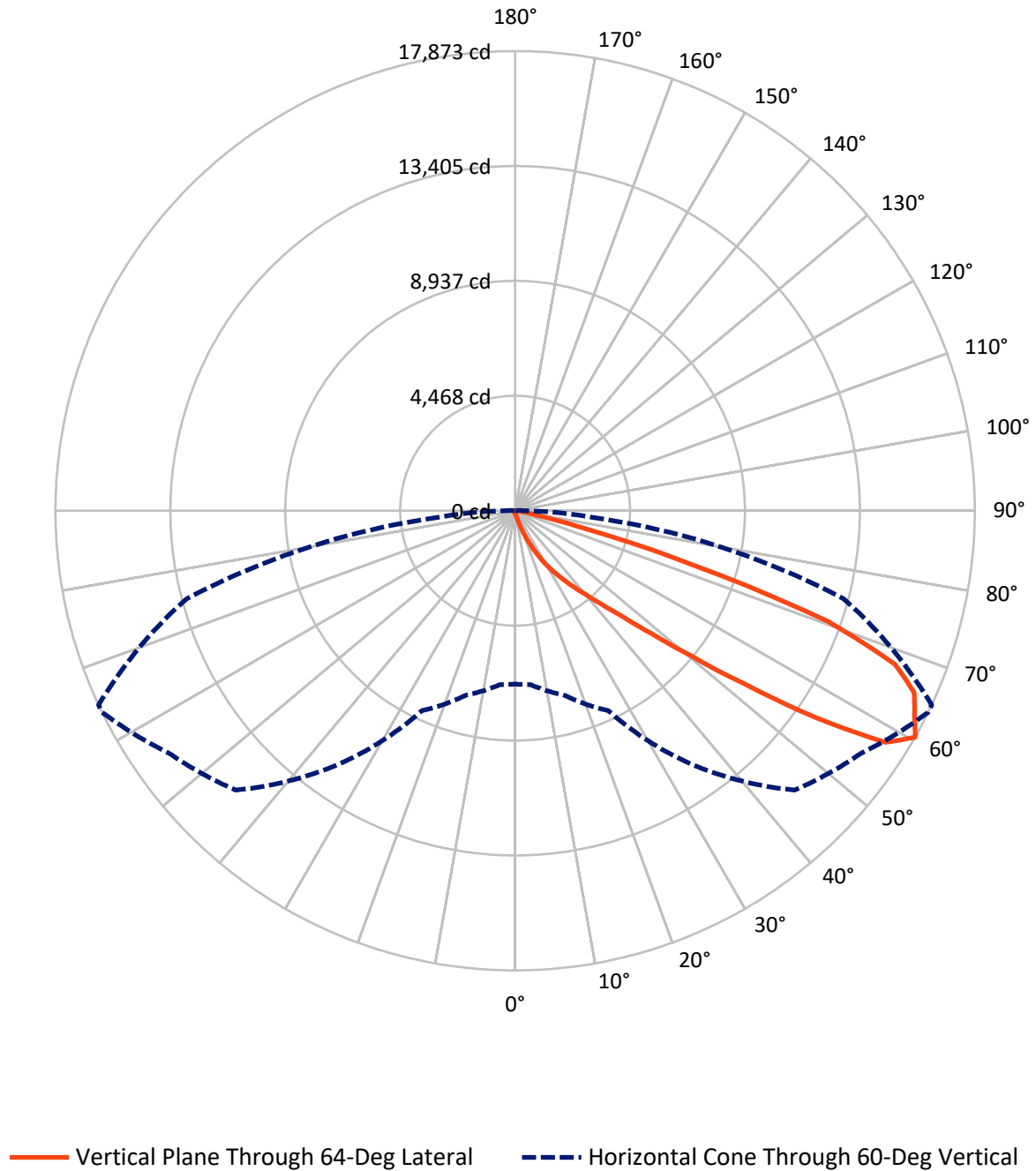


Based on 15 foot mounting height. Maximum calculated value = 22.8 fc  
 Type II - Short - N/A

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## Luminous Intensity Polar Plot



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**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 64.5     | 0.0    | 64.5    |
|                    | % Fixture | 0.4      | 0.0    | 0.4     |
| <b>Street Side</b> | Lumens    | 15838.3  | 0.0    | 15838.3 |
|                    | % Fixture | 99.6     | 0.0    | 99.6    |
| <b>Total</b>       | Lumens    | 15902.8  | 0.0    | 15902.8 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**Coefficient of Utilization**

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 15.8    | 0.1       |
| 10°-20°   | 156.3   | 1.0       |
| 20°-30°   | 519.0   | 3.3       |
| 30°-40°   | 1384.9  | 8.7       |
| 40°-50°   | 3520.1  | 22.1      |
| 50°-60°   | 5131.6  | 32.3      |
| 60°-70°   | 3963.6  | 24.9      |
| 70°-80°   | 1088.5  | 6.8       |
| 80°-90°   | 122.9   | 0.8       |
| 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°    | 15902.8 | 100.0     |
| 0°-180°   | 15902.8 | 100.0     |



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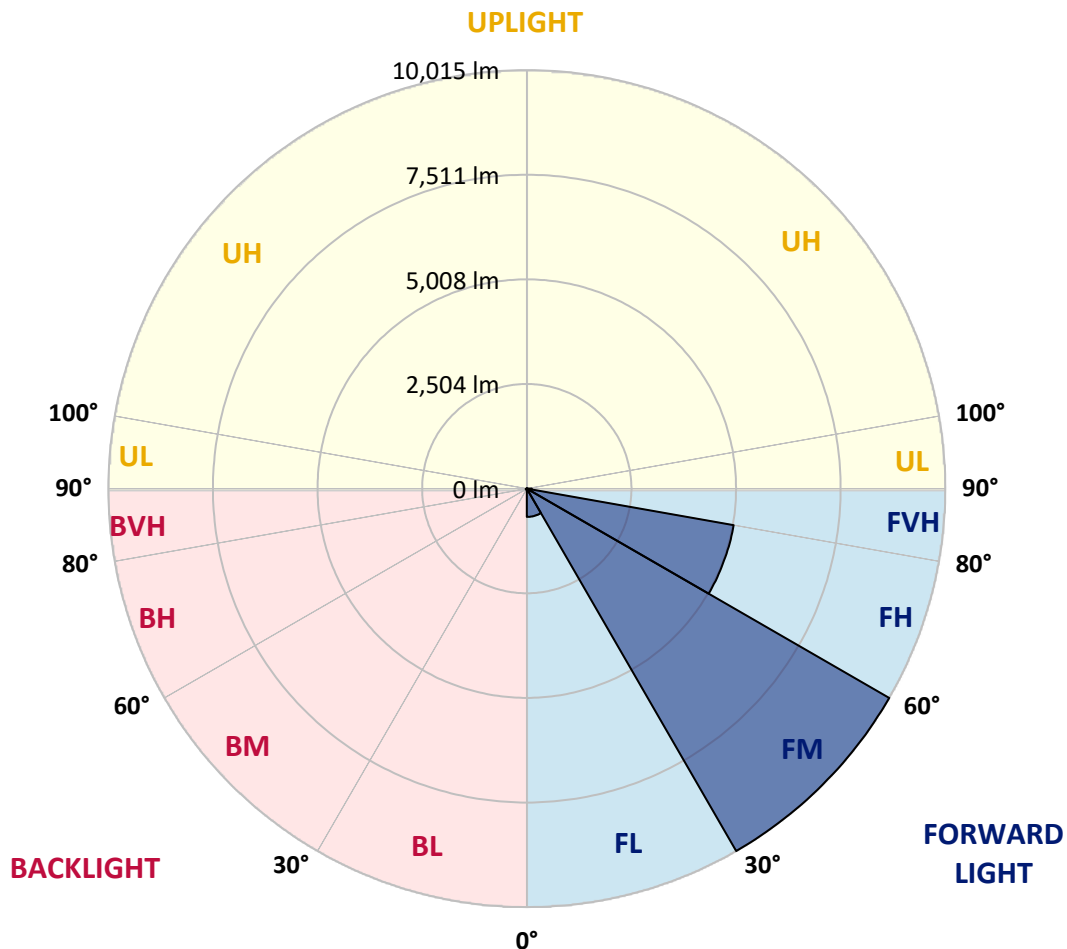
CATALOG NUMBER: NAV-SA4C-827-U-T2BC

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|---------|-----------|-------------------------|------|---------|
|      |             |         |           | B                       | U    | G       |
| FL   | (0°-30°)    | 676.6   | 4.3       |                         |      |         |
| FM   | (30°-60°)   | 10015.3 | 63.0      |                         |      |         |
| FH   | (60°-80°)   | 5026.4  | 31.6      |                         |      | G3/7500 |
| FVH  | (80°-90°)   | 120.0   | 0.8       |                         |      | G2/225  |
| BL   | (0°-30°)    | 14.5    | 0.1       | B0/110                  |      |         |
| BM   | (30°-60°)   | 21.4    | 0.1       | B0/220                  |      |         |
| BH   | (60°-80°)   | 25.7    | 0.2       | B0/110                  |      | G0/110  |
| BVH  | (80°-90°)   | 2.9     | 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 II Short



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 55°     | 64°     | 65°     | 75°     | 85°    |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|
| 0°    | 105.1   | 105.1   | 105.1   | 105.1   | 105.1   | 105.1   | 105.1   | 105.1   | 105.1   | 105.1   | 105.1  |
| 2.5°  | 140.1   | 140.1   | 140.1   | 135.7   | 131.3   | 131.3   | 126.9   | 122.6   | 122.6   | 113.8   | 109.4  |
| 5°    | 214.5   | 214.5   | 205.7   | 197.0   | 183.9   | 166.3   | 148.8   | 135.7   | 135.7   | 122.6   | 113.8  |
| 7.5°  | 420.2   | 433.4   | 394.0   | 345.8   | 280.2   | 236.4   | 188.2   | 157.6   | 153.2   | 131.3   | 113.8  |
| 10°   | 910.5   | 901.8   | 840.5   | 722.3   | 569.1   | 411.5   | 262.6   | 192.6   | 183.9   | 140.1   | 113.8  |
| 12.5° | 1370.1  | 1383.3  | 1317.6  | 1186.3  | 1002.4  | 731.0   | 450.9   | 249.5   | 240.8   | 153.2   | 113.8  |
| 15°   | 1764.1  | 1764.1  | 1720.3  | 1654.7  | 1453.3  | 1168.8  | 726.7   | 372.1   | 341.4   | 166.3   | 109.4  |
| 17.5° | 2035.5  | 2031.1  | 2013.6  | 1996.1  | 1877.9  | 1584.6  | 1111.9  | 595.3   | 525.3   | 197.0   | 109.4  |
| 20°   | 2341.9  | 2328.8  | 2350.7  | 2315.7  | 2223.7  | 1991.7  | 1519.0  | 884.2   | 818.6   | 249.5   | 109.4  |
| 22.5° | 2661.5  | 2674.6  | 2692.1  | 2657.1  | 2556.4  | 2355.1  | 1948.0  | 1256.3  | 1186.3  | 345.8   | 113.8  |
| 25°   | 3068.6  | 3059.8  | 3099.2  | 3068.6  | 2941.6  | 2705.3  | 2350.7  | 1663.4  | 1562.8  | 481.5   | 122.6  |
| 27.5° | 3567.6  | 3550.1  | 3576.4  | 3497.6  | 3331.2  | 3090.5  | 2709.6  | 2079.3  | 1961.1  | 691.6   | 140.1  |
| 30°   | 4228.6  | 4241.8  | 4123.6  | 4031.6  | 3795.3  | 3475.7  | 3108.0  | 2525.8  | 2403.2  | 941.2   | 157.6  |
| 32.5° | 5270.5  | 5178.5  | 4994.7  | 4622.6  | 4311.8  | 3904.7  | 3506.3  | 2915.4  | 2805.9  | 1260.7  | 183.9  |
| 35°   | 6894.5  | 6912.0  | 6509.3  | 5590.0  | 4915.9  | 4443.1  | 3944.1  | 3344.4  | 3265.6  | 1624.0  | 218.9  |
| 37.5° | 8873.1  | 8824.9  | 8470.4  | 7310.3  | 5800.1  | 5112.9  | 4443.1  | 3812.8  | 3698.9  | 2018.0  | 262.6  |
| 40°   | 11114.4 | 10913.0 | 10707.3 | 9919.3  | 7643.0  | 5953.3  | 5073.5  | 4355.6  | 4268.0  | 2473.3  | 332.7  |
| 42.5° | 12909.1 | 12856.6 | 12891.6 | 12563.3 | 10716.0 | 7384.8  | 5909.6  | 5020.9  | 4915.9  | 3038.0  | 455.3  |
| 45°   | 13793.4 | 13718.9 | 13929.1 | 14174.2 | 13701.4 | 10431.5 | 7257.8  | 5870.2  | 5730.1  | 3703.3  | 643.5  |
| 47.5° | 13557.0 | 13504.4 | 13955.3 | 14436.8 | 15067.2 | 13964.1 | 9459.7  | 7139.6  | 6898.9  | 4556.9  | 923.6  |
| 50°   | 12392.6 | 12397.0 | 13136.7 | 14034.1 | 15032.2 | 15754.5 | 12720.9 | 8877.5  | 8575.4  | 5690.7  | 1361.4 |
| 52.5° | 11258.8 | 11293.8 | 12077.4 | 13386.3 | 14511.3 | 15964.6 | 15583.7 | 11219.4 | 10729.1 | 7025.8  | 1877.9 |
| 55°   | 10094.4 | 10111.9 | 10803.6 | 12646.5 | 14266.1 | 15338.6 | 17054.6 | 14235.5 | 13714.6 | 8689.2  | 2381.3 |
| 57.5° | 8973.8  | 8973.8  | 9232.1  | 10869.2 | 13999.1 | 15281.7 | 16879.5 | 16993.3 | 16568.7 | 10589.1 | 2753.4 |
| 60°   | 6741.3  | 6785.1  | 7428.5  | 8575.4  | 12073.0 | 15364.9 | 16433.0 | 17873.1 | 17873.1 | 13224.3 | 3038.0 |
| 62.5° | 3405.7  | 3471.3  | 4272.4  | 5388.6  | 8282.1  | 14218.0 | 16503.0 | 17431.0 | 17501.1 | 15548.7 | 3685.8 |
| 65°   | 1597.8  | 1672.2  | 2101.2  | 2889.1  | 4456.2  | 10006.9 | 15776.3 | 17054.6 | 17032.7 | 15106.6 | 5051.6 |
| 67.5° | 1146.9  | 1168.8  | 1313.2  | 1685.3  | 2398.8  | 4386.2  | 12042.4 | 15929.6 | 15938.3 | 12834.7 | 5808.9 |
| 70°   | 1028.7  | 1028.7  | 1063.7  | 1173.2  | 1444.6  | 1961.1  | 5852.7  | 12900.4 | 13526.3 | 9910.6  | 5384.3 |
| 72.5° | 1015.6  | 1006.8  | 998.1   | 1002.4  | 976.2   | 984.9   | 2009.3  | 7284.1  | 8177.1  | 6933.9  | 4294.3 |
| 75°   | 989.3   | 989.3   | 980.5   | 949.9   | 779.2   | 634.7   | 691.6   | 2946.0  | 3405.7  | 4631.3  | 3186.8 |
| 77.5° | 783.6   | 862.4   | 954.3   | 897.4   | 713.5   | 477.1   | 402.7   | 853.6   | 1076.9  | 2841.0  | 2311.3 |
| 80°   | 363.3   | 367.7   | 363.3   | 380.8   | 455.3   | 341.4   | 297.7   | 415.9   | 420.2   | 1575.9  | 1431.4 |
| 82.5° | 262.6   | 267.0   | 253.9   | 227.6   | 201.4   | 183.9   | 245.1   | 306.4   | 328.3   | 722.3   | 534.0  |
| 85°   | 78.8    | 74.4    | 87.5    | 118.2   | 140.1   | 162.0   | 205.7   | 258.3   | 271.4   | 267.0   | 78.8   |
| 87.5° | 35.0    | 35.0    | 43.8    | 61.3    | 83.2    | 122.6   | 179.5   | 236.4   | 240.8   | 275.8   | 21.9   |
| 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-SA4C-827-U-T2BC

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°   | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 105.1  | 105.1 | 105.1 | 105.1 | 105.1 | 105.1 | 105.1 | 105.1 | 105.1 | 105.1 | 105.1 |
| 2.5°  | 109.4  | 105.1 | 100.7 | 96.3  | 91.9  | 87.5  | 83.2  | 83.2  | 87.5  | 87.5  | 87.5  |
| 5°    | 105.1  | 100.7 | 91.9  | 83.2  | 78.8  | 74.4  | 70.0  | 70.0  | 74.4  | 74.4  | 74.4  |
| 7.5°  | 105.1  | 96.3  | 87.5  | 78.8  | 70.0  | 65.7  | 61.3  | 61.3  | 61.3  | 65.7  | 65.7  |
| 10°   | 105.1  | 96.3  | 83.2  | 70.0  | 61.3  | 56.9  | 52.5  | 48.2  | 52.5  | 52.5  | 52.5  |
| 12.5° | 100.7  | 91.9  | 78.8  | 65.7  | 52.5  | 43.8  | 39.4  | 39.4  | 39.4  | 39.4  | 39.4  |
| 15°   | 96.3   | 87.5  | 74.4  | 56.9  | 43.8  | 35.0  | 26.3  | 26.3  | 26.3  | 30.6  | 30.6  |
| 17.5° | 91.9   | 83.2  | 65.7  | 43.8  | 30.6  | 21.9  | 17.5  | 17.5  | 17.5  | 21.9  | 21.9  |
| 20°   | 91.9   | 78.8  | 56.9  | 35.0  | 21.9  | 13.1  | 8.8   | 8.8   | 8.8   | 13.1  | 17.5  |
| 22.5° | 91.9   | 78.8  | 52.5  | 26.3  | 13.1  | 8.8   | 4.4   | 4.4   | 4.4   | 4.4   | 4.4   |
| 25°   | 91.9   | 74.4  | 48.2  | 21.9  | 8.8   | 4.4   | 0.0   | 0.0   | 4.4   | 8.8   | 13.1  |
| 27.5° | 91.9   | 70.0  | 39.4  | 13.1  | 8.8   | 4.4   | 0.0   | 4.4   | 8.8   | 8.8   | 8.8   |
| 30°   | 91.9   | 70.0  | 35.0  | 13.1  | 4.4   | 0.0   | 0.0   | 4.4   | 8.8   | 8.8   | 13.1  |
| 32.5° | 96.3   | 65.7  | 30.6  | 8.8   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 35°   | 100.7  | 61.3  | 26.3  | 8.8   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 37.5° | 109.4  | 61.3  | 17.5  | 4.4   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 40°   | 122.6  | 65.7  | 17.5  | 4.4   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 42.5° | 153.2  | 70.0  | 13.1  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 45°   | 214.5  | 87.5  | 13.1  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 47.5° | 315.2  | 131.3 | 13.1  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 50°   | 459.6  | 179.5 | 8.8   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 52.5° | 564.7  | 179.5 | 8.8   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 55°   | 560.3  | 113.8 | 4.4   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 57.5° | 429.0  | 78.8  | 4.4   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 60°   | 363.3  | 56.9  | 4.4   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 62.5° | 437.7  | 43.8  | 4.4   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 65°   | 779.2  | 39.4  | 4.4   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 67.5° | 1252.0 | 39.4  | 4.4   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 70°   | 1400.8 | 39.4  | 4.4   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 72.5° | 1094.4 | 35.0  | 4.4   | 4.4   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 75°   | 599.7  | 30.6  | 4.4   | 4.4   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 77.5° | 302.0  | 21.9  | 8.8   | 4.4   | 4.4   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 80°   | 126.9  | 17.5  | 8.8   | 4.4   | 4.4   | 4.4   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 82.5° | 43.8   | 17.5  | 8.8   | 8.8   | 4.4   | 4.4   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 85°   | 21.9   | 13.1  | 13.1  | 8.8   | 8.8   | 4.4   | 4.4   | 0.0   | 0.0   | 0.0   | 0.0   |
| 87.5° | 13.1   | 13.1  | 13.1  | 8.8   | 8.8   | 4.4   | 4.4   | 0.0   | 0.0   | 0.0   | 4.4   |
| 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: SP1-2407-184-8

Test Date: 10/10/2024

Luminaire Tested: GSS-SB1A-827-U-5WQ

Data in this report applies to families of products including GSS-SB1A-827-U-5WQ

### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2407-184-8  
 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-827-U-5WQ**  
 Description: GALLEON II SITE SLIM 1SQ 350MA 5WQ HIGH DENSITY LIGHTSQUARE WITH 80 CRI  
 2700K CCT 26 LEDS

### Spectral Parameters

CCT (K): 2756  
 CIE  $u'$ : 0.2599  
 CIE  $v'$ : 0.5271  
 Duv: 0.0006  
 CIE x: 0.4563  
 CIE y: 0.4112  
 CIE z: 0.1325  
 Peak Wavelength (nm): 609  
 Dominant Wavelength (nm): 583  
 Purity: 60.41121  
 R<sub>f</sub>: 82.2  
 R<sub>g</sub>: 99.9

CRI (Ra): 82.9  
 R1: 81.6  
 R2: 88.8  
 R3: 96.0  
 R4: 83.4  
 R5: 81.4  
 R6: 87.0  
 R7: 84.0  
 R8: 60.8  
 R9: 10.8  
 R10: 74.8  
 R11: 84.3  
 R12: 72.1  
 R13: 82.9  
 R14: 97.3  
 R15: 73.7



### Test Conditions

Stabilization Time: 29M  
 Operation Time: 1H 29M  
 Sphere Temperature (°C): 25.2

REPORT NUMBER: SP1-2407-184-8

| 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 2700K 4-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               | 158                                    | NR                             | 620               | 959                                    | NR                             | 750               | 35                                     | NR                             | 880               | 1                                      | NR                             |
| 365               | 0                                      | NR                             | 495               | 211                                    | NR                             | 625               | 918                                    | NR                             | 755               | 30                                     | NR                             | 885               | 1                                      | NR                             |
| 370               | 0                                      | NR                             | 500               | 264                                    | NR                             | 630               | 873                                    | NR                             | 760               | 26                                     | NR                             | 890               | 1                                      | NR                             |
| 375               | 0                                      | NR                             | 505               | 318                                    | NR                             | 635               | 816                                    | NR                             | 765               | 22                                     | NR                             | 895               | 1                                      | NR                             |
| 380               | 0                                      | NR                             | 510               | 363                                    | NR                             | 640               | 755                                    | NR                             | 770               | 19                                     | NR                             | 900               | 1                                      | NR                             |
| 385               | 0                                      | NR                             | 515               | 403                                    | NR                             | 645               | 689                                    | NR                             | 775               | 16                                     | NR                             | 905               | 1                                      | NR                             |
| 390               | 0                                      | NR                             | 520               | 435                                    | NR                             | 650               | 626                                    | NR                             | 780               | 14                                     | NR                             | 910               | 0                                      | NR                             |
| 395               | 1                                      | NR                             | 525               | 459                                    | NR                             | 655               | 564                                    | NR                             | 785               | 12                                     | NR                             | 915               | 0                                      | NR                             |
| 400               | 3                                      | NR                             | 530               | 481                                    | NR                             | 660               | 503                                    | NR                             | 790               | 10                                     | NR                             | 920               | 0                                      | NR                             |
| 405               | 6                                      | NR                             | 535               | 501                                    | NR                             | 665               | 447                                    | NR                             | 795               | 9                                      | NR                             | 925               | 0                                      | NR                             |
| 410               | 13                                     | NR                             | 540               | 519                                    | NR                             | 670               | 392                                    | NR                             | 800               | 8                                      | NR                             | 930               | 0                                      | NR                             |
| 415               | 26                                     | NR                             | 545               | 542                                    | NR                             | 675               | 343                                    | NR                             | 805               | 7                                      | NR                             | 935               | 0                                      | NR                             |
| 420               | 51                                     | NR                             | 550               | 565                                    | NR                             | 680               | 299                                    | NR                             | 810               | 6                                      | NR                             | 940               | 0                                      | NR                             |
| 425               | 93                                     | NR                             | 555               | 593                                    | NR                             | 685               | 260                                    | NR                             | 815               | 5                                      | NR                             | 945               | 0                                      | NR                             |
| 430               | 156                                    | NR                             | 560               | 624                                    | NR                             | 690               | 225                                    | NR                             | 820               | 4                                      | NR                             | 950               | 0                                      | NR                             |
| 435               | 250                                    | NR                             | 565               | 662                                    | NR                             | 695               | 194                                    | NR                             | 825               | 4                                      | NR                             | 955               | 0                                      | NR                             |
| 440               | 391                                    | NR                             | 570               | 707                                    | NR                             | 700               | 166                                    | NR                             | 830               | 3                                      | NR                             | 960               | 0                                      | NR                             |
| 445               | 460                                    | NR                             | 575               | 756                                    | NR                             | 705               | 143                                    | NR                             | 835               | 3                                      | NR                             | 965               | 0                                      | NR                             |
| 450               | 293                                    | NR                             | 580               | 810                                    | NR                             | 710               | 122                                    | NR                             | 840               | 2                                      | NR                             | 970               | 0                                      | NR                             |
| 455               | 188                                    | NR                             | 585               | 860                                    | NR                             | 715               | 105                                    | NR                             | 845               | 2                                      | NR                             | 975               | 0                                      | NR                             |
| 460               | 149                                    | NR                             | 590               | 910                                    | NR                             | 720               | 90                                     | NR                             | 850               | 2                                      | NR                             | 980               | 0                                      | NR                             |
| 465               | 103                                    | NR                             | 595               | 950                                    | NR                             | 725               | 77                                     | NR                             | 855               | 2                                      | NR                             | 985               | 0                                      | NR                             |
| 470               | 80                                     | NR                             | 600               | 980                                    | NR                             | 730               | 66                                     | NR                             | 860               | 1                                      | NR                             | 990               | 0                                      | NR                             |
| 475               | 82                                     | NR                             | 605               | 995                                    | NR                             | 735               | 56                                     | NR                             | 865               | 1                                      | NR                             | 995               | 0                                      | NR                             |
| 480               | 92                                     | NR                             | 610               | 998                                    | NR                             | 740               | 48                                     | NR                             | 870               | 1                                      | NR                             | 1000              | 0                                      | NR                             |
| 485               | 116                                    | NR                             | 615               | 985                                    | NR                             | 745               | 41                                     | NR                             | 875               | 1                                      | NR                             |                   |                                        |                                |

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### Scotopic Flux vs. Wavelength



Scotopic Lumens: NR

S/P: 1.2

| 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       | 158                         | NR               | 620       | 959                         | NR               | 750       | 35                          | NR               | 880       | 1                           | NR               |
| 365       | 0                           | NR               | 495       | 211                         | NR               | 625       | 918                         | NR               | 755       | 30                          | NR               | 885       | 1                           | NR               |
| 370       | 0                           | NR               | 500       | 264                         | NR               | 630       | 873                         | NR               | 760       | 26                          | NR               | 890       | 1                           | NR               |
| 375       | 0                           | NR               | 505       | 318                         | NR               | 635       | 816                         | NR               | 765       | 22                          | NR               | 895       | 1                           | NR               |
| 380       | 0                           | NR               | 510       | 363                         | NR               | 640       | 755                         | NR               | 770       | 19                          | NR               | 900       | 1                           | NR               |
| 385       | 0                           | NR               | 515       | 403                         | NR               | 645       | 689                         | NR               | 775       | 16                          | NR               | 905       | 1                           | NR               |
| 390       | 0                           | NR               | 520       | 435                         | NR               | 650       | 626                         | NR               | 780       | 14                          | NR               | 910       | 0                           | NR               |
| 395       | 1                           | NR               | 525       | 459                         | NR               | 655       | 564                         | NR               | 785       | 12                          | NR               | 915       | 0                           | NR               |
| 400       | 3                           | NR               | 530       | 481                         | NR               | 660       | 503                         | NR               | 790       | 10                          | NR               | 920       | 0                           | NR               |
| 405       | 6                           | NR               | 535       | 501                         | NR               | 665       | 447                         | NR               | 795       | 9                           | NR               | 925       | 0                           | NR               |
| 410       | 13                          | NR               | 540       | 519                         | NR               | 670       | 392                         | NR               | 800       | 8                           | NR               | 930       | 0                           | NR               |
| 415       | 26                          | NR               | 545       | 542                         | NR               | 675       | 343                         | NR               | 805       | 7                           | NR               | 935       | 0                           | NR               |
| 420       | 51                          | NR               | 550       | 565                         | NR               | 680       | 299                         | NR               | 810       | 6                           | NR               | 940       | 0                           | NR               |
| 425       | 93                          | NR               | 555       | 593                         | NR               | 685       | 260                         | NR               | 815       | 5                           | NR               | 945       | 0                           | NR               |
| 430       | 156                         | NR               | 560       | 624                         | NR               | 690       | 225                         | NR               | 820       | 4                           | NR               | 950       | 0                           | NR               |
| 435       | 250                         | NR               | 565       | 662                         | NR               | 695       | 194                         | NR               | 825       | 4                           | NR               | 955       | 0                           | NR               |
| 440       | 391                         | NR               | 570       | 707                         | NR               | 700       | 166                         | NR               | 830       | 3                           | NR               | 960       | 0                           | NR               |
| 445       | 460                         | NR               | 575       | 756                         | NR               | 705       | 143                         | NR               | 835       | 3                           | NR               | 965       | 0                           | NR               |
| 450       | 293                         | NR               | 580       | 810                         | NR               | 710       | 122                         | NR               | 840       | 2                           | NR               | 970       | 0                           | NR               |
| 455       | 188                         | NR               | 585       | 860                         | NR               | 715       | 105                         | NR               | 845       | 2                           | NR               | 975       | 0                           | NR               |
| 460       | 149                         | NR               | 590       | 910                         | NR               | 720       | 90                          | NR               | 850       | 2                           | NR               | 980       | 0                           | NR               |
| 465       | 103                         | NR               | 595       | 950                         | NR               | 725       | 77                          | NR               | 855       | 2                           | NR               | 985       | 0                           | NR               |
| 470       | 80                          | NR               | 600       | 980                         | NR               | 730       | 66                          | NR               | 860       | 1                           | NR               | 990       | 0                           | NR               |
| 475       | 82                          | NR               | 605       | 995                         | NR               | 735       | 56                          | NR               | 865       | 1                           | NR               | 995       | 0                           | NR               |
| 480       | 92                          | NR               | 610       | 998                         | NR               | 740       | 48                          | NR               | 870       | 1                           | NR               | 1000      | 0                           | NR               |
| 485       | 116                         | NR               | 615       | 985                         | NR               | 745       | 41                          | NR               | 875       | 1                           | NR               |           |                             |                  |

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### Melanopic Flux vs. Wavelength


**Melanopic Lumens: NR**
**M/P: 2.16**

| $\lambda$<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               | 158                                  | NR                             | 620               | 959                                  | NR                             | 750               | 35                                   | NR                             | 880               | 1                                    | NR                             |
| 365               | 0                                    | NR                             | 495               | 211                                  | NR                             | 625               | 918                                  | NR                             | 755               | 30                                   | NR                             | 885               | 1                                    | NR                             |
| 370               | 0                                    | NR                             | 500               | 264                                  | NR                             | 630               | 873                                  | NR                             | 760               | 26                                   | NR                             | 890               | 1                                    | NR                             |
| 375               | 0                                    | NR                             | 505               | 318                                  | NR                             | 635               | 816                                  | NR                             | 765               | 22                                   | NR                             | 895               | 1                                    | NR                             |
| 380               | 0                                    | NR                             | 510               | 363                                  | NR                             | 640               | 755                                  | NR                             | 770               | 19                                   | NR                             | 900               | 1                                    | NR                             |
| 385               | 0                                    | NR                             | 515               | 403                                  | NR                             | 645               | 689                                  | NR                             | 775               | 16                                   | NR                             | 905               | 1                                    | NR                             |
| 390               | 0                                    | NR                             | 520               | 435                                  | NR                             | 650               | 626                                  | NR                             | 780               | 14                                   | NR                             | 910               | 0                                    | NR                             |
| 395               | 1                                    | NR                             | 525               | 459                                  | NR                             | 655               | 564                                  | NR                             | 785               | 12                                   | NR                             | 915               | 0                                    | NR                             |
| 400               | 3                                    | NR                             | 530               | 481                                  | NR                             | 660               | 503                                  | NR                             | 790               | 10                                   | NR                             | 920               | 0                                    | NR                             |
| 405               | 6                                    | NR                             | 535               | 501                                  | NR                             | 665               | 447                                  | NR                             | 795               | 9                                    | NR                             | 925               | 0                                    | NR                             |
| 410               | 13                                   | NR                             | 540               | 519                                  | NR                             | 670               | 392                                  | NR                             | 800               | 8                                    | NR                             | 930               | 0                                    | NR                             |
| 415               | 26                                   | NR                             | 545               | 542                                  | NR                             | 675               | 343                                  | NR                             | 805               | 7                                    | NR                             | 935               | 0                                    | NR                             |
| 420               | 51                                   | NR                             | 550               | 565                                  | NR                             | 680               | 299                                  | NR                             | 810               | 6                                    | NR                             | 940               | 0                                    | NR                             |
| 425               | 93                                   | NR                             | 555               | 593                                  | NR                             | 685               | 260                                  | NR                             | 815               | 5                                    | NR                             | 945               | 0                                    | NR                             |
| 430               | 156                                  | NR                             | 560               | 624                                  | NR                             | 690               | 225                                  | NR                             | 820               | 4                                    | NR                             | 950               | 0                                    | NR                             |
| 435               | 250                                  | NR                             | 565               | 662                                  | NR                             | 695               | 194                                  | NR                             | 825               | 4                                    | NR                             | 955               | 0                                    | NR                             |
| 440               | 391                                  | NR                             | 570               | 707                                  | NR                             | 700               | 166                                  | NR                             | 830               | 3                                    | NR                             | 960               | 0                                    | NR                             |
| 445               | 460                                  | NR                             | 575               | 756                                  | NR                             | 705               | 143                                  | NR                             | 835               | 3                                    | NR                             | 965               | 0                                    | NR                             |
| 450               | 293                                  | NR                             | 580               | 810                                  | NR                             | 710               | 122                                  | NR                             | 840               | 2                                    | NR                             | 970               | 0                                    | NR                             |
| 455               | 188                                  | NR                             | 585               | 860                                  | NR                             | 715               | 105                                  | NR                             | 845               | 2                                    | NR                             | 975               | 0                                    | NR                             |
| 460               | 149                                  | NR                             | 590               | 910                                  | NR                             | 720               | 90                                   | NR                             | 850               | 2                                    | NR                             | 980               | 0                                    | NR                             |
| 465               | 103                                  | NR                             | 595               | 950                                  | NR                             | 725               | 77                                   | NR                             | 855               | 2                                    | NR                             | 985               | 0                                    | NR                             |
| 470               | 80                                   | NR                             | 600               | 980                                  | NR                             | 730               | 66                                   | NR                             | 860               | 1                                    | NR                             | 990               | 0                                    | NR                             |
| 475               | 82                                   | NR                             | 605               | 995                                  | NR                             | 735               | 56                                   | NR                             | 865               | 1                                    | NR                             | 995               | 0                                    | NR                             |
| 480               | 92                                   | NR                             | 610               | 998                                  | NR                             | 740               | 48                                   | NR                             | 870               | 1                                    | NR                             | 1000              | 0                                    | NR                             |
| 485               | 116                                  | NR                             | 615               | 985                                  | NR                             | 745               | 41                                   | NR                             | 875               | 1                                    | NR                             |                   |                                      |                                |

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TM-30-18

### Summary

$R_f = 82.2$   
 $R_g = 99.9$   
 $CIE R_a = 82.9$   
 $R_9 = 10.8$



### Color Vector Graphics



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 76 | CES51 = 89 | CES76 = 75 |
| CES02 = 63 | CES27 = 89 | CES52 = 91 | CES77 = 87 |
| CES03 = 31 | CES28 = 90 | CES53 = 82 | CES78 = 76 |
| CES04 = 71 | CES29 = 68 | CES54 = 88 | CES79 = 91 |
| CES05 = 50 | CES30 = 69 | CES55 = 87 | CES80 = 90 |
| CES06 = 52 | CES31 = 72 | CES56 = 80 | CES81 = 74 |
| CES07 = 43 | CES32 = 71 | CES57 = 78 | CES82 = 95 |
| CES08 = 42 | CES33 = 71 | CES58 = 80 | CES83 = 90 |
| CES09 = 29 | CES34 = 84 | CES59 = 93 | CES84 = 94 |
| CES10 = 77 | CES35 = 92 | CES60 = 96 | CES85 = 83 |
| CES11 = 59 | CES36 = 92 | CES61 = 94 | CES86 = 69 |
| CES12 = 66 | CES37 = 89 | CES62 = 84 | CES87 = 85 |
| CES13 = 44 | CES38 = 75 | CES63 = 79 | CES88 = 84 |
| CES14 = 74 | CES39 = 93 | CES64 = 85 | CES89 = 74 |
| CES15 = 72 | CES40 = 89 | CES65 = 79 | CES90 = 81 |
| CES16 = 48 | CES41 = 85 | CES66 = 83 | CES91 = 96 |
| CES17 = 50 | CES42 = 88 | CES67 = 82 | CES92 = 72 |
| CES18 = 57 | CES43 = 81 | CES68 = 86 | CES93 = 84 |
| CES19 = 73 | CES44 = 98 | CES69 = 92 | CES94 = 63 |
| CES20 = 67 | CES45 = 87 | CES70 = 81 | CES95 = 80 |
| CES21 = 87 | CES46 = 82 | CES71 = 81 | CES96 = 85 |
| CES22 = 79 | CES47 = 76 | CES72 = 93 | CES97 = 87 |
| CES23 = 92 | CES48 = 71 | CES73 = 75 | CES98 = 82 |
| CES24 = 91 | CES49 = 81 | CES74 = 91 | CES99 = 76 |
| CES25 = 72 | CES50 = 88 | CES75 = 79 |            |



### Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)