

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



Scaled data based on original data using  
LM-79-2019 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for

Cooper Lighting Solutions

Brand: McGRAW-EDISON

Report Number: P638390

Luminaire Tested: GWS-SA4E-760-U-T3R-W-GRSBK

Issue Date: 1/10/2023

**Test Information**

Test Method: LM-79-2019  
Report Number: P638390  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2209-782-16)  
Test Lab: COOPER LIGHTING SOLUTIONS  
Issue Date: 1/10/2023  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: McGRAW-EDISON  
Catalog Number: GWS-SA4E-760-U-T3R-W-GRSBK  
Description: GALLEON WALL SLIM LUMINAIRE. (4) LIGHTSQUARES WITH 16 LEDS EACH AND TYPE III ROADWAY OPTICS W/ FACTORY INSTALLED GLARE SHIELD, BK  
Light Source: (64) 5700K CCT, 70 CRI LEDS  
Ballast/Driver: -

**Summary**

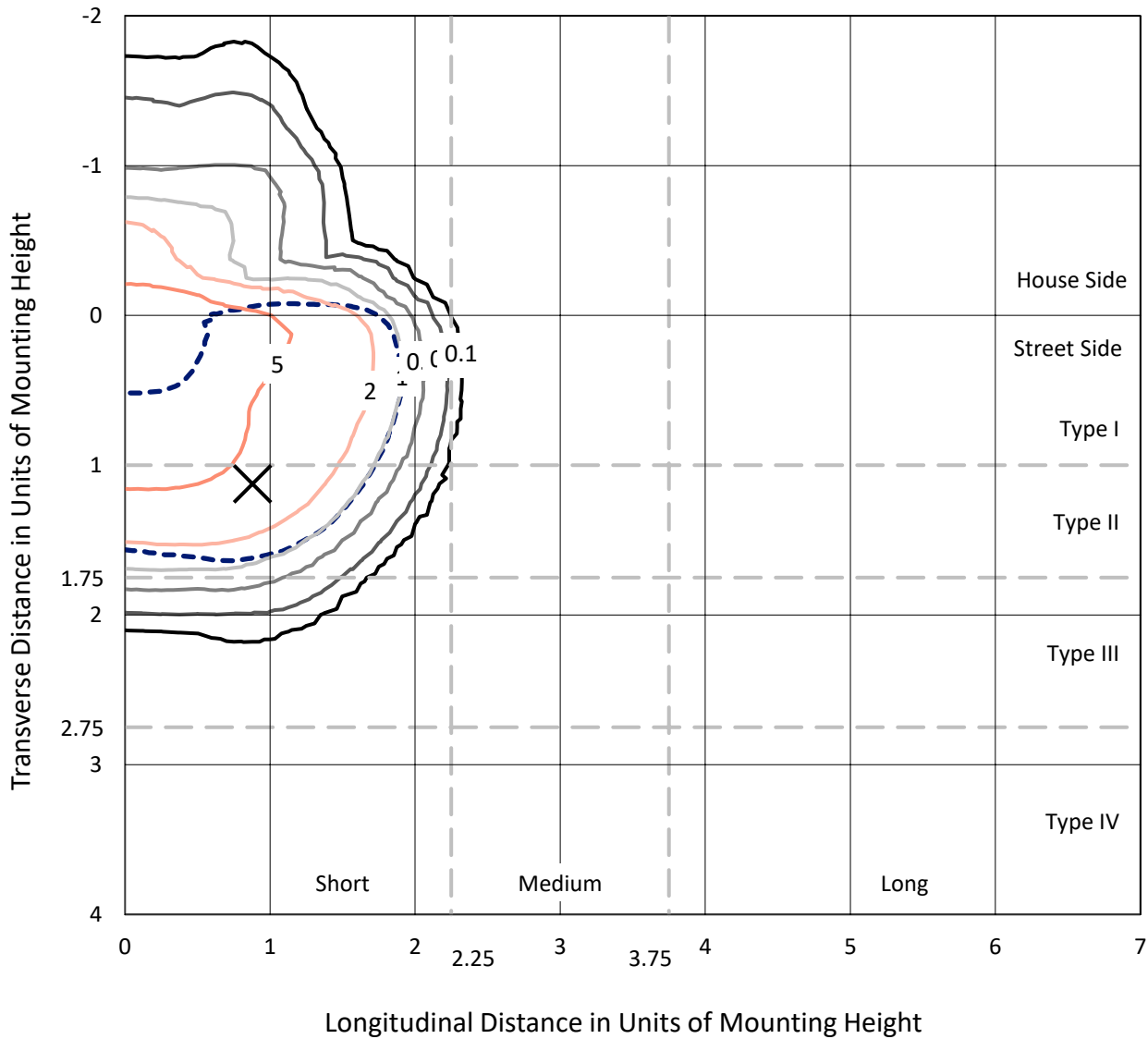
Lumens per Lamp: N/A  
Luminaire Lumens: 19364.4 lumens  
Efficiency: N/A  
Efficacy: 95.6 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B3 - U0 - G1  
  
Input Watts (W): 202.6  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 0  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



REPORT NUMBER: P638390  
 CATALOG NUMBER: GWS-SA4E-760-U-T3R-W-GRSBK

### Iso-Footcandle Lines of Horizontal Illumination

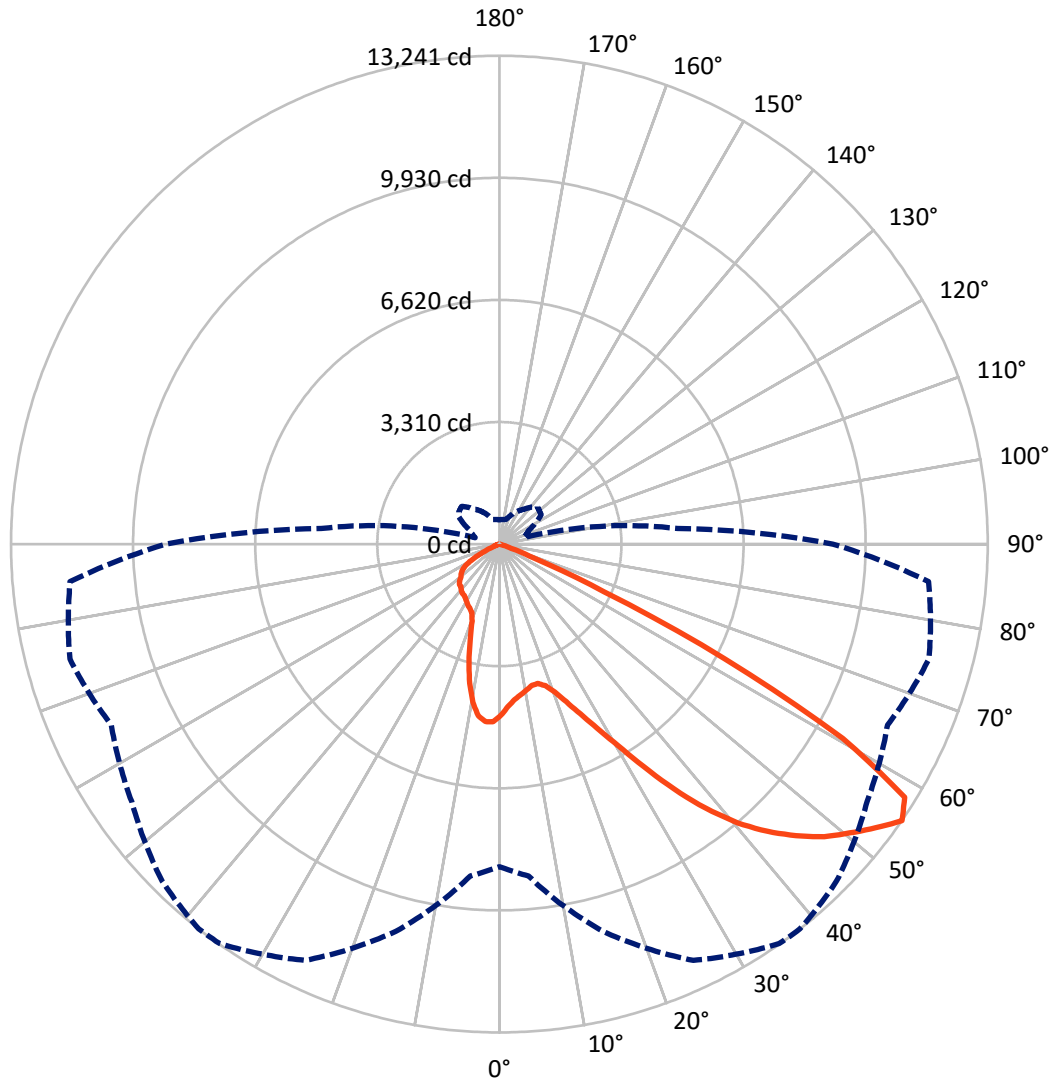
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 7.8 fc  
 Type II - Short - N/A

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### Luminous Intensity Polar Plot



— Vertical Plane Through 38-Deg Lateral    - - - Horizontal Cone Through 55-Deg Vertical

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**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 3772.8   | 0.0    | 3772.8  |
|                    | % Fixture | 19.5     | 0.0    | 19.5    |
| <b>Street Side</b> | Lumens    | 15591.6  | 0.0    | 15591.6 |
|                    | % Fixture | 80.5     | 0.0    | 80.5    |
| <b>Total</b>       | Lumens    | 19364.4  | 0.0    | 19364.4 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 429.4   | 2.2       |
| 10°-20°   | 1155.9  | 6.0       |
| 20°-30°   | 1983.6  | 10.2      |
| 30°-40°   | 3290.0  | 17.0      |
| 40°-50°   | 4836.4  | 25.0      |
| 50°-60°   | 5651.5  | 29.2      |
| 60°-70°   | 1915.7  | 9.9       |
| 70°-80°   | 97.9    | 0.5       |
| 80°-90°   | 3.8     | 0.0       |
| 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°    | 19364.4 | 100.0     |
| 0°-180°   | 19364.4 | 100.0     |

**Coefficient of Utilization**



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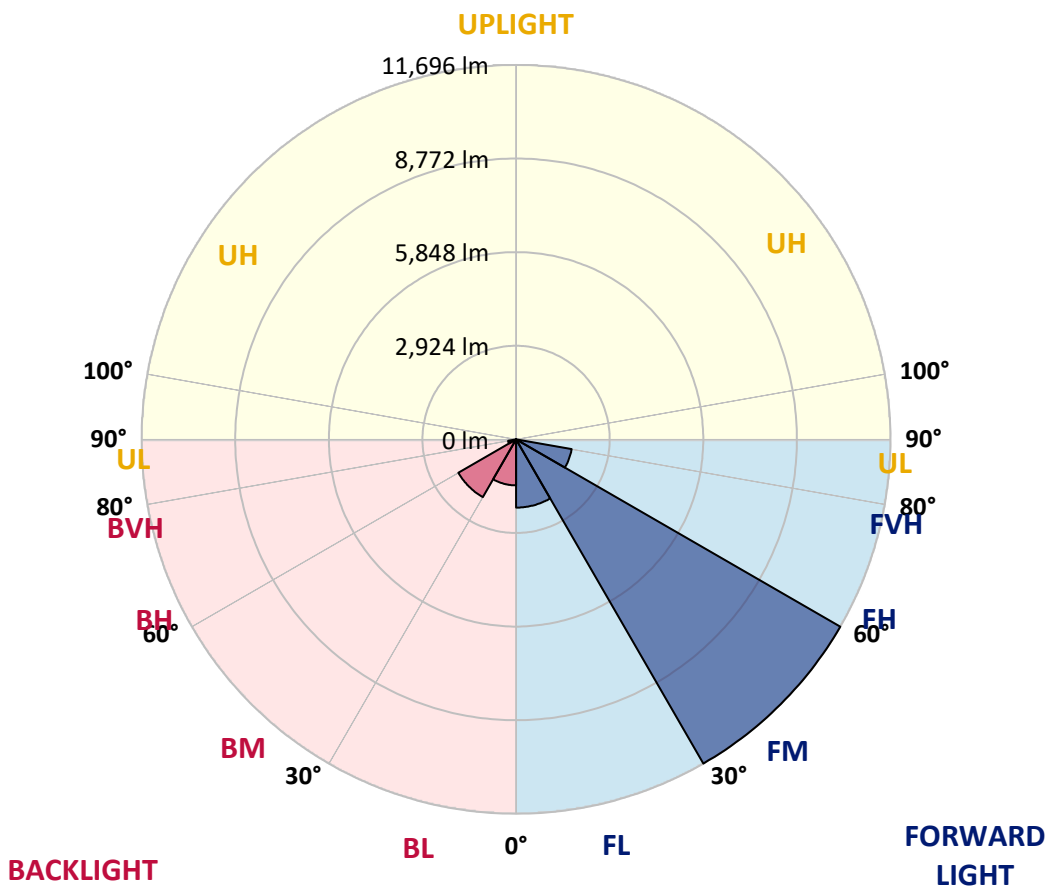
CATALOG NUMBER: GWS-SA4E-760-U-T3R-W-GRSBK

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

| Zone           | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|----------------|---------|-----------|-------------------------|------|---------|
|                |         |           | B                       | U    | G       |
| FL (0°-30°)    | 2131.6  | 11.0      |                         |      |         |
| FM (30°-60°)   | 11695.6 | 60.4      |                         |      |         |
| FH (60°-80°)   | 1762.5  | 9.1       |                         |      | G1/1800 |
| FVH (80°-90°)  | 2.0     | 0.0       |                         |      | G0/10   |
| BL (0°-30°)    | 1437.4  | 7.4       | B3/2500                 |      |         |
| BM (30°-60°)   | 2082.4  | 10.8      | B2/2500                 |      |         |
| BH (60°-80°)   | 251.2   | 1.3       | B1/500                  |      | G1/500  |
| BVH (80°-90°)  | 1.8     | 0.0       |                         |      | G0/10   |
| UL (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |         |
| UH (100°-180°) | 0.0     | 0.0       |                         | U0/0 |         |

**BUG Rating: B3-U0-G1**

Type II Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 38°     | 45°     | 55°     | 65°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 4643.7  | 4643.7  | 4643.7  | 4643.7  | 4643.7  | 4643.7  | 4643.7  | 4643.7  | 4643.7  | 4643.7  | 4643.7  |
| 2.5°  | 4325.0  | 4316.1  | 4333.9  | 4369.3  | 4402.5  | 4413.5  | 4446.7  | 4493.2  | 4522.0  | 4590.6  | 4645.9  |
| 5°    | 4130.2  | 4125.8  | 4143.5  | 4174.5  | 4218.8  | 4234.3  | 4285.2  | 4362.6  | 4440.1  | 4559.6  | 4676.9  |
| 7.5°  | 3953.1  | 3950.9  | 3977.5  | 4046.1  | 4110.3  | 4130.2  | 4192.2  | 4287.4  | 4391.4  | 4575.1  | 4747.8  |
| 10°   | 3720.7  | 3723.0  | 3773.9  | 3871.3  | 3988.6  | 4028.4  | 4128.0  | 4265.2  | 4400.3  | 4637.1  | 4876.1  |
| 12.5° | 3645.5  | 3649.9  | 3676.5  | 3751.7  | 3880.1  | 3931.0  | 4070.5  | 4278.5  | 4451.2  | 4725.6  | 5042.1  |
| 15°   | 3829.2  | 3829.2  | 3807.1  | 3815.9  | 3873.5  | 3919.9  | 4066.0  | 4322.8  | 4537.5  | 4831.9  | 5205.9  |
| 17.5° | 4185.6  | 4172.3  | 4116.9  | 4041.7  | 4021.8  | 4037.3  | 4154.6  | 4418.0  | 4659.2  | 4955.8  | 5391.9  |
| 20°   | 4668.1  | 4672.5  | 4564.0  | 4406.9  | 4280.7  | 4278.5  | 4349.3  | 4586.2  | 4834.1  | 5104.1  | 5593.3  |
| 22.5° | 5252.4  | 5234.7  | 5090.8  | 4876.1  | 4657.0  | 4639.3  | 4668.1  | 4842.9  | 5086.4  | 5338.7  | 5841.2  |
| 25°   | 5929.7  | 5920.9  | 5717.2  | 5429.5  | 5139.5  | 5097.5  | 5097.5  | 5270.1  | 5447.2  | 5673.0  | 6137.8  |
| 27.5° | 6638.0  | 6638.0  | 6441.0  | 6109.0  | 5723.9  | 5648.6  | 5637.6  | 5841.2  | 5958.5  | 6002.8  | 6387.9  |
| 30°   | 7366.2  | 7357.4  | 7162.6  | 6821.7  | 6410.0  | 6332.6  | 6301.6  | 6452.1  | 6536.2  | 6403.4  | 6700.0  |
| 32.5° | 8105.5  | 8121.0  | 7924.0  | 7607.5  | 7240.1  | 7189.2  | 7094.0  | 7094.0  | 7162.6  | 6976.7  | 7191.4  |
| 35°   | 8900.1  | 8895.7  | 8740.8  | 8526.1  | 8211.7  | 8154.2  | 7997.0  | 7751.4  | 7855.4  | 7773.5  | 7870.9  |
| 37.5° | 9601.8  | 9635.0  | 9559.7  | 9400.3  | 9145.8  | 9088.3  | 8829.3  | 8384.4  | 8464.1  | 8592.5  | 8678.8  |
| 40°   | 10314.5 | 10341.0 | 10416.3 | 10365.4 | 10044.4 | 9938.2  | 9477.8  | 8747.4  | 8835.9  | 9276.4  | 9524.3  |
| 42.5° | 11013.9 | 11027.2 | 11179.9 | 11264.0 | 10834.6 | 10648.7 | 9969.2  | 8968.7  | 9061.7  | 9812.0  | 10245.9 |
| 45°   | 11458.8 | 11487.6 | 11739.9 | 11996.7 | 11531.9 | 11277.3 | 10396.4 | 9252.0  | 9291.9  | 10183.9 | 10779.3 |
| 47.5° | 11441.1 | 11507.5 | 11981.2 | 12448.2 | 12131.7 | 11857.2 | 10909.9 | 9705.8  | 9639.4  | 10533.6 | 11131.2 |
| 50°   | 11084.8 | 11164.4 | 11843.9 | 12585.4 | 12563.3 | 12308.8 | 11481.0 | 10363.2 | 10155.1 | 10843.5 | 11175.5 |
| 52.5° | 10345.5 | 10575.7 | 11602.7 | 12603.1 | 12910.8 | 12782.4 | 12187.0 | 11248.5 | 10852.3 | 11288.4 | 11246.3 |
| 55°   | 8747.4  | 9030.7  | 10870.1 | 12452.6 | 13225.1 | 13240.6 | 12928.5 | 12171.5 | 11609.3 | 12054.2 | 11682.4 |
| 57.5° | 6640.2  | 6866.0  | 8366.7  | 11084.8 | 12705.0 | 12959.5 | 13216.3 | 12658.5 | 12076.4 | 12576.6 | 11784.2 |
| 60°   | 4001.8  | 4263.0  | 5239.1  | 8134.3  | 10261.4 | 10695.2 | 11702.3 | 11593.8 | 10892.2 | 11106.9 | 9663.7  |
| 62.5° | 1622.4  | 1759.7  | 2419.3  | 4482.2  | 6458.7  | 6863.8  | 7828.8  | 7992.6  | 7820.0  | 7600.8  | 5861.1  |
| 65°   | 593.2   | 648.5   | 969.5   | 1852.6  | 2970.4  | 3118.7  | 3627.8  | 3917.7  | 4156.8  | 3539.2  | 2180.2  |
| 67.5° | 367.4   | 402.8   | 630.8   | 951.8   | 1080.1  | 1004.9  | 1022.6  | 1219.6  | 1164.3  | 719.4   | 389.6   |
| 70°   | 272.2   | 301.0   | 493.6   | 659.6   | 436.0   | 336.4   | 228.0   | 243.5   | 219.1   | 192.6   | 190.4   |
| 72.5° | 188.1   | 214.7   | 369.6   | 389.6   | 168.2   | 119.5   | 84.1    | 117.3   | 132.8   | 130.6   | 135.0   |
| 75°   | 124.0   | 143.9   | 232.4   | 152.7   | 42.1    | 33.2    | 28.8    | 62.0    | 79.7    | 79.7    | 81.9    |
| 77.5° | 73.0    | 84.1    | 81.9    | 31.0    | 8.9     | 8.9     | 6.6     | 11.1    | 17.7    | 19.9    | 24.3    |
| 80°   | 8.9     | 6.6     | 4.4     | 4.4     | 4.4     | 4.4     | 4.4     | 4.4     | 6.6     | 6.6     | 6.6     |
| 82.5° | 2.2     | 2.2     | 2.2     | 4.4     | 4.4     | 4.4     | 4.4     | 4.4     | 4.4     | 6.6     | 6.6     |
| 85°   | 0.0     | 0.0     | 2.2     | 2.2     | 4.4     | 4.4     | 4.4     | 4.4     | 4.4     | 6.6     | 6.6     |
| 87.5° | 0.0     | 0.0     | 2.2     | 2.2     | 4.4     | 4.4     | 4.4     | 4.4     | 4.4     | 6.6     | 6.6     |
| 90°   | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |



REPORT NUMBER: P638390

CATALOG NUMBER: GWS-SA4E-760-U-T3R-W-GRSBK

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 4643.7 | 4643.7 | 4643.7 | 4643.7 | 4643.7 | 4643.7 | 4643.7 | 4643.7 | 4643.7 | 4643.7 | 4643.7 |
| 2.5°  | 4688.0 | 4672.5 | 4736.7 | 4783.2 | 4820.8 | 4838.5 | 4814.2 | 4812.0 | 4812.0 | 4763.3 | 4750.0 |
| 5°    | 4743.3 | 4750.0 | 4840.7 | 4880.6 | 4887.2 | 4865.1 | 4809.7 | 4772.1 | 4750.0 | 4699.1 | 4670.3 |
| 7.5°  | 4849.6 | 4871.7 | 4958.0 | 4951.4 | 4891.6 | 4789.8 | 4643.7 | 4530.8 | 4457.8 | 4378.1 | 4329.4 |
| 10°   | 5002.3 | 5044.4 | 5097.5 | 5004.5 | 4814.2 | 4555.2 | 4254.2 | 4039.5 | 3911.1 | 3820.3 | 3765.0 |
| 12.5° | 5188.2 | 5230.3 | 5212.6 | 4993.4 | 4597.2 | 4134.6 | 3747.3 | 3437.4 | 3289.1 | 3207.2 | 3149.7 |
| 15°   | 5376.4 | 5402.9 | 5287.8 | 4860.6 | 4214.3 | 3592.4 | 3160.7 | 2853.1 | 2671.6 | 2605.2 | 2556.5 |
| 17.5° | 5568.9 | 5562.3 | 5301.1 | 4599.5 | 3703.0 | 2981.5 | 2556.5 | 2346.2 | 2295.3 | 2284.2 | 2279.8 |
| 20°   | 5770.4 | 5710.6 | 5248.0 | 4225.4 | 3087.7 | 2377.2 | 2135.9 | 2149.2 | 2242.2 | 2286.5 | 2295.3 |
| 22.5° | 6000.6 | 5850.0 | 5115.2 | 3718.5 | 2459.1 | 1981.0 | 2005.3 | 2135.9 | 2262.1 | 2321.9 | 2330.7 |
| 25°   | 6246.2 | 5978.4 | 4893.8 | 3067.8 | 1938.9 | 1821.6 | 1965.5 | 2116.0 | 2251.0 | 2324.1 | 2332.9 |
| 27.5° | 6407.8 | 6009.4 | 4530.8 | 2412.6 | 1664.5 | 1759.7 | 1912.4 | 2056.3 | 2195.7 | 2275.4 | 2286.5 |
| 30°   | 6582.7 | 5996.1 | 4037.3 | 1859.3 | 1571.5 | 1706.5 | 1839.3 | 1969.9 | 2098.3 | 2186.8 | 2195.7 |
| 32.5° | 6839.4 | 5987.3 | 3435.2 | 1509.5 | 1533.9 | 1664.5 | 1761.9 | 1870.3 | 1958.9 | 2009.8 | 2003.1 |
| 35°   | 7175.9 | 5976.2 | 2733.6 | 1361.2 | 1511.8 | 1631.3 | 1708.8 | 1759.7 | 1662.3 | 1631.3 | 1637.9 |
| 37.5° | 7607.5 | 6002.8 | 2142.6 | 1299.3 | 1505.1 | 1622.4 | 1688.8 | 1542.7 | 1392.2 | 1334.7 | 1325.8 |
| 40°   | 8085.6 | 6071.4 | 1633.5 | 1274.9 | 1527.3 | 1644.6 | 1613.6 | 1372.3 | 1186.4 | 1073.5 | 1049.2 |
| 42.5° | 8565.9 | 6146.6 | 1292.6 | 1266.1 | 1564.9 | 1706.5 | 1489.6 | 1248.4 | 969.5  | 905.3  | 896.4  |
| 45°   | 8922.3 | 6133.4 | 1117.8 | 1250.6 | 1598.1 | 1742.0 | 1456.4 | 1071.3 | 865.4  | 836.7  | 838.9  |
| 47.5° | 9101.5 | 5987.3 | 1022.6 | 1215.2 | 1611.4 | 1706.5 | 1374.5 | 998.2  | 794.6  | 825.6  | 852.2  |
| 50°   | 9006.4 | 5608.8 | 934.1  | 1146.5 | 1582.6 | 1660.1 | 1243.9 | 942.9  | 759.2  | 887.6  | 947.3  |
| 52.5° | 8891.3 | 5144.0 | 836.7  | 1040.3 | 1514.0 | 1595.9 | 1193.0 | 927.4  | 737.1  | 856.6  | 900.9  |
| 55°   | 9044.0 | 4849.6 | 677.3  | 876.5  | 1379.0 | 1445.4 | 1153.2 | 925.2  | 686.2  | 666.2  | 659.6  |
| 57.5° | 8829.3 | 4263.0 | 484.7  | 630.8  | 1058.0 | 1144.3 | 1124.4 | 909.7  | 608.7  | 606.5  | 615.3  |
| 60°   | 6823.9 | 2600.8 | 332.0  | 400.6  | 648.5  | 730.4  | 1020.4 | 869.9  | 524.6  | 482.5  | 484.7  |
| 62.5° | 3877.9 | 1106.7 | 228.0  | 247.9  | 332.0  | 394.0  | 779.1  | 790.2  | 484.7  | 460.4  | 484.7  |
| 65°   | 1350.2 | 396.2  | 177.1  | 166.0  | 183.7  | 210.3  | 447.1  | 610.9  | 440.5  | 398.4  | 402.8  |
| 67.5° | 278.9  | 197.0  | 157.2  | 137.2  | 137.2  | 137.2  | 228.0  | 380.7  | 363.0  | 316.5  | 320.9  |
| 70°   | 177.1  | 168.2  | 137.2  | 117.3  | 112.9  | 104.0  | 130.6  | 210.3  | 250.1  | 230.2  | 232.4  |
| 72.5° | 130.6  | 128.4  | 108.5  | 95.2   | 84.1   | 75.3   | 81.9   | 104.0  | 128.4  | 132.8  | 135.0  |
| 75°   | 79.7   | 81.9   | 70.8   | 59.8   | 53.1   | 46.5   | 48.7   | 48.7   | 48.7   | 44.3   | 48.7   |
| 77.5° | 24.3   | 26.6   | 22.1   | 17.7   | 15.5   | 15.5   | 15.5   | 13.3   | 11.1   | 6.6    | 6.6    |
| 80°   | 6.6    | 6.6    | 6.6    | 6.6    | 6.6    | 4.4    | 4.4    | 2.2    | 2.2    | 0.0    | 0.0    |
| 82.5° | 6.6    | 6.6    | 6.6    | 6.6    | 4.4    | 4.4    | 2.2    | 2.2    | 0.0    | 0.0    | 0.0    |
| 85°   | 6.6    | 6.6    | 6.6    | 6.6    | 4.4    | 4.4    | 2.2    | 2.2    | 0.0    | 0.0    | 0.0    |
| 87.5° | 6.6    | 6.6    | 6.6    | 6.6    | 4.4    | 4.4    | 2.2    | 2.2    | 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    |



Signify Classified - Internal  
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1121 Highway 74 South  
Peachtree City, GA 30269



LM-79-2008: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

McGRAW-EDISON

Report Number: SP1-1908-441-9-R4

Test Date: 10/23/2019

Luminaire Tested: SA1C-760-U-5WQ

Data in this report applies to families of products SA1C-760-U-5WQ .

**Test Information**

Test Method: LM-79-2008  
 Report Number: SP1-1908-441-9-R4  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry: 4π  
 Issue Date: 10/28/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: MCGRAW-EDISON  
 Catalog Number: **SA1C-760-U-5WQ**  
 Description: MCGRAW EDISON ROADWAY AND AREA LUMINAIRE

\*\*\*THIS IS A REVISION OF SP1-1908-441-4-R3. TO UPDATE THE CATALOG INFORMATION.\*\*\*TESTED IN SITU. ROADWAY AND AREA LUMINAIRE. (1) 70 CRI, 5000K, 1050MA LIGHTSQUARE WITH 16 LEDS AND TYPE V WIDE OPTICS.

**Spectral Parameters**

CCT (K): 5474  
 CIE u': 0.2052  
 CIE v': 0.4804  
 Duv: 0.0025  
 CIE x: 0.3330  
 CIE y: 0.3466  
 CIE z: 0.3204  
 Peak Wavelength (nm): 442  
 Dominant Wavelength (nm): 554  
 Purity: 4.1

|           |      |      |       |
|-----------|------|------|-------|
| CRI (Ra): | 71.7 |      |       |
| R1:       | 70.6 | R9:  | -27.1 |
| R2:       | 74.6 | R10: | 40.8  |
| R3:       | 78.3 | R11: | 74.6  |
| R4:       | 73.8 | R12: | 50.4  |
| R5:       | 72.4 | R13: | 70.0  |
| R6:       | 67.5 | R14: | 87.8  |
| R7:       | 77.5 |      |       |
| R8:       | 58.9 |      |       |

Rf: 72.1  
 Rg: 97.2



**Test Conditions**

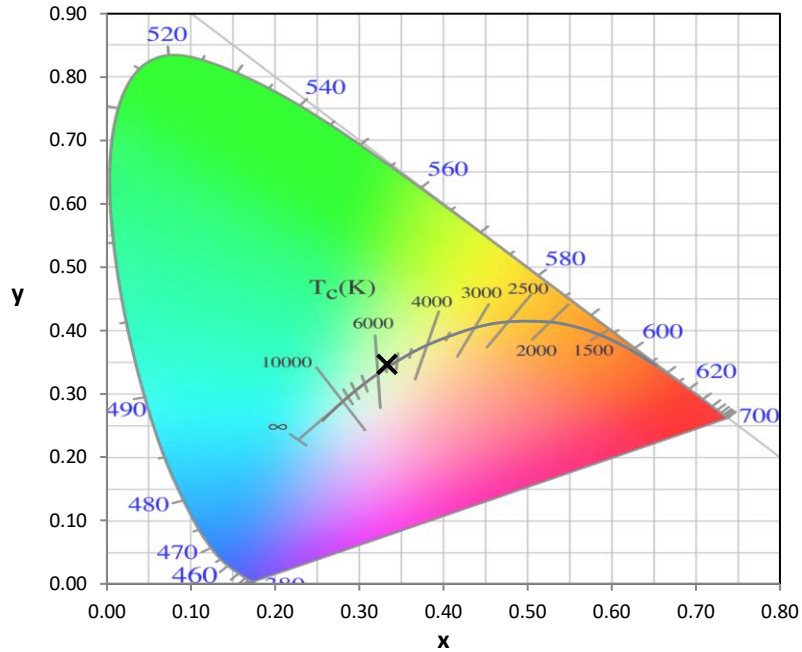
Stabilization Time: 240M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.6/31%  
 Sphere Temperature (°C): 25.9

REPORT NUMBER: SP1-1908-441-9-R4

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 6/28/2019        | 12/28/2019           |
| Power Meter                    | IN0071                | 12/5/2018        | 12/5/2019            |
| AC Power Source                | IN0063                | 12/5/2018        | 12/5/2019            |
| DC Power Source                | IN0208                | 12/5/2018        | 12/5/2019            |
| Sphere Thermometer             | IN0085                | 12/5/2018        | 12/5/2019            |
| Room Thermometer               | IN0046                | 12/5/2018        | 12/5/2019            |

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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 5700K 4-step quadrangle

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**Photopic Flux vs. Wavelength**



#####

| $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|
| 360               | 3540                                 | NR                             | 490               | 33363                                | NR                             | 620               | 80193                                | NR                             | 750               | 4663                                 | NR                             | 880               | 4678                                 | NR                             |
| 365               | 2862                                 | NR                             | 495               | 44177                                | NR                             | 625               | 73091                                | NR                             | 755               | 4147                                 | NR                             | 885               | 4128                                 | NR                             |
| 370               | 2865                                 | NR                             | 500               | 57019                                | NR                             | 630               | 66269                                | NR                             | 760               | 4040                                 | NR                             | 890               | 4504                                 | NR                             |
| 375               | 3254                                 | NR                             | 505               | 70030                                | NR                             | 635               | 60012                                | NR                             | 765               | 3474                                 | NR                             | 895               | 4371                                 | NR                             |
| 380               | 3076                                 | NR                             | 510               | 81972                                | NR                             | 640               | 53914                                | NR                             | 770               | 3469                                 | NR                             | 900               | 4082                                 | NR                             |
| 385               | 2904                                 | NR                             | 515               | 92590                                | NR                             | 645               | 48385                                | NR                             | 775               | 3181                                 | NR                             | 905               | 2982                                 | NR                             |
| 390               | 2689                                 | NR                             | 520               | 100305                               | NR                             | 650               | 43219                                | NR                             | 780               | 2969                                 | NR                             | 910               | 4351                                 | NR                             |
| 395               | 2619                                 | NR                             | 525               | 107452                               | NR                             | 655               | 38562                                | NR                             | 785               | 3132                                 | NR                             | 915               | 3365                                 | NR                             |
| 400               | 2679                                 | NR                             | 530               | 111373                               | NR                             | 660               | 34110                                | NR                             | 790               | 2507                                 | NR                             | 920               | 3430                                 | NR                             |
| 405               | 3515                                 | NR                             | 535               | 114505                               | NR                             | 665               | 30085                                | NR                             | 795               | 2968                                 | NR                             | 925               | 4264                                 | NR                             |
| 410               | 6934                                 | NR                             | 540               | 116408                               | NR                             | 670               | 26205                                | NR                             | 800               | 2758                                 | NR                             | 930               | 4095                                 | NR                             |
| 415               | 14943                                | NR                             | 545               | 118700                               | NR                             | 675               | 22906                                | NR                             | 805               | 2872                                 | NR                             | 935               | 5048                                 | NR                             |
| 420               | 31939                                | NR                             | 550               | 119209                               | NR                             | 680               | 20058                                | NR                             | 810               | 3094                                 | NR                             | 940               | 4074                                 | NR                             |
| 425               | 64701                                | NR                             | 555               | 120742                               | NR                             | 685               | 17413                                | NR                             | 815               | 3222                                 | NR                             | 945               | 4949                                 | NR                             |
| 430               | 110939                               | NR                             | 560               | 121594                               | NR                             | 690               | 15447                                | NR                             | 820               | 3238                                 | NR                             | 950               | 4387                                 | NR                             |
| 435               | 164597                               | NR                             | 565               | 121913                               | NR                             | 695               | 13398                                | NR                             | 825               | 3524                                 | NR                             | 955               | 4978                                 | NR                             |
| 440               | 207696                               | NR                             | 570               | 122147                               | NR                             | 700               | 11777                                | NR                             | 830               | 2921                                 | NR                             | 960               | 4706                                 | NR                             |
| 445               | 201830                               | NR                             | 575               | 121605                               | NR                             | 705               | 10412                                | NR                             | 835               | 3595                                 | NR                             | 965               | 5083                                 | NR                             |
| 450               | 145410                               | NR                             | 580               | 120248                               | NR                             | 710               | 9544                                 | NR                             | 840               | 3016                                 | NR                             | 970               | 4522                                 | NR                             |
| 455               | 89594                                | NR                             | 585               | 117717                               | NR                             | 715               | 8940                                 | NR                             | 845               | 4032                                 | NR                             | 975               | 4740                                 | NR                             |
| 460               | 58321                                | NR                             | 590               | 114359                               | NR                             | 720               | 7897                                 | NR                             | 850               | 3579                                 | NR                             | 980               | 6122                                 | NR                             |
| 465               | 39318                                | NR                             | 595               | 109974                               | NR                             | 725               | 7045                                 | NR                             | 855               | 4571                                 | NR                             | 985               | 6450                                 | NR                             |
| 470               | 27693                                | NR                             | 600               | 105269                               | NR                             | 730               | 6483                                 | NR                             | 860               | 4485                                 | NR                             | 990               | 4875                                 | NR                             |
| 475               | 23081                                | NR                             | 605               | 99453                                | NR                             | 735               | 5838                                 | NR                             | 865               | 3978                                 | NR                             | 995               | 4764                                 | NR                             |
| 480               | 23002                                | NR                             | 610               | 92921                                | NR                             | 740               | 5261                                 | NR                             | 870               | 4298                                 | NR                             | 1000              | 3640                                 | NR                             |
| 485               | 26201                                | NR                             | 615               | 86989                                | NR                             | 745               | 4760                                 | NR                             | 875               | 4356                                 | NR                             |                   |                                      |                                |

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Scotopic Flux vs. Wavelength



Scotopic Lumens: 13759.3 S/P: 1.85

| λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) |
|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|
| 360    | 3540          | NR            | 490    | 33363         | NR            | 620    | 80193         | NR            | 750    | 4663          | NR            | 880    | 4678          | NR            |
| 365    | 2862          | NR            | 495    | 44177         | NR            | 625    | 73091         | NR            | 755    | 4147          | NR            | 885    | 4128          | NR            |
| 370    | 2865          | NR            | 500    | 57019         | NR            | 630    | 66269         | NR            | 760    | 4040          | NR            | 890    | 4504          | NR            |
| 375    | 3254          | NR            | 505    | 70030         | NR            | 635    | 60012         | NR            | 765    | 3474          | NR            | 895    | 4371          | NR            |
| 380    | 3076          | NR            | 510    | 81972         | NR            | 640    | 53914         | NR            | 770    | 3469          | NR            | 900    | 4082          | NR            |
| 385    | 2904          | NR            | 515    | 92590         | NR            | 645    | 48385         | NR            | 775    | 3181          | NR            | 905    | 2982          | NR            |
| 390    | 2689          | NR            | 520    | 100305        | NR            | 650    | 43219         | NR            | 780    | 2969          | NR            | 910    | 4351          | NR            |
| 395    | 2619          | NR            | 525    | 107452        | NR            | 655    | 38562         | NR            | 785    | 3132          | NR            | 915    | 3365          | NR            |
| 400    | 2679          | NR            | 530    | 111373        | NR            | 660    | 34110         | NR            | 790    | 2507          | NR            | 920    | 3430          | NR            |
| 405    | 3515          | NR            | 535    | 114505        | NR            | 665    | 30085         | NR            | 795    | 2968          | NR            | 925    | 4264          | NR            |
| 410    | 6934          | NR            | 540    | 116408        | NR            | 670    | 26205         | NR            | 800    | 2758          | NR            | 930    | 4095          | NR            |
| 415    | 14943         | NR            | 545    | 118700        | NR            | 675    | 22906         | NR            | 805    | 2872          | NR            | 935    | 5048          | NR            |
| 420    | 31939         | NR            | 550    | 119209        | NR            | 680    | 20058         | NR            | 810    | 3094          | NR            | 940    | 4074          | NR            |
| 425    | 64701         | NR            | 555    | 120742        | NR            | 685    | 17413         | NR            | 815    | 3222          | NR            | 945    | 4949          | NR            |
| 430    | 110939        | NR            | 560    | 121594        | NR            | 690    | 15447         | NR            | 820    | 3238          | NR            | 950    | 4387          | NR            |
| 435    | 164597        | NR            | 565    | 121913        | NR            | 695    | 13398         | NR            | 825    | 3524          | NR            | 955    | 4978          | NR            |
| 440    | 207696        | NR            | 570    | 122147        | NR            | 700    | 11777         | NR            | 830    | 2921          | NR            | 960    | 4706          | NR            |
| 445    | 201830        | NR            | 575    | 121605        | NR            | 705    | 10412         | NR            | 835    | 3595          | NR            | 965    | 5083          | NR            |
| 450    | 145410        | NR            | 580    | 120248        | NR            | 710    | 9544          | NR            | 840    | 3016          | NR            | 970    | 4522          | NR            |
| 455    | 89594         | NR            | 585    | 117717        | NR            | 715    | 8940          | NR            | 845    | 4032          | NR            | 975    | 4740          | NR            |
| 460    | 58321         | NR            | 590    | 114359        | NR            | 720    | 7897          | NR            | 850    | 3579          | NR            | 980    | 6122          | NR            |
| 465    | 39318         | NR            | 595    | 109974        | NR            | 725    | 7045          | NR            | 855    | 4571          | NR            | 985    | 6450          | NR            |
| 470    | 27693         | NR            | 600    | 105269        | NR            | 730    | 6483          | NR            | 860    | 4485          | NR            | 990    | 4875          | NR            |
| 475    | 23081         | NR            | 605    | 99453         | NR            | 735    | 5838          | NR            | 865    | 3978          | NR            | 995    | 4764          | NR            |
| 480    | 23002         | NR            | 610    | 92921         | NR            | 740    | 5261          | NR            | 870    | 4298          | NR            | 1000   | 3640          | NR            |
| 485    | 26201         | NR            | 615    | 86989         | NR            | 745    | 4760          | NR            | 875    | 4356          | NR            |        |               |               |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 5527.6 M/P: 0.74**

| λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) |
|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|
| 360    | 3540          | NR            | 490    | 33363         | NR            | 620    | 80193         | NR            | 750    | 4663          | NR            | 880    | 4678          | NR            |
| 365    | 2862          | NR            | 495    | 44177         | NR            | 625    | 73091         | NR            | 755    | 4147          | NR            | 885    | 4128          | NR            |
| 370    | 2865          | NR            | 500    | 57019         | NR            | 630    | 66269         | NR            | 760    | 4040          | NR            | 890    | 4504          | NR            |
| 375    | 3254          | NR            | 505    | 70030         | NR            | 635    | 60012         | NR            | 765    | 3474          | NR            | 895    | 4371          | NR            |
| 380    | 3076          | NR            | 510    | 81972         | NR            | 640    | 53914         | NR            | 770    | 3469          | NR            | 900    | 4082          | NR            |
| 385    | 2904          | NR            | 515    | 92590         | NR            | 645    | 48385         | NR            | 775    | 3181          | NR            | 905    | 2982          | NR            |
| 390    | 2689          | NR            | 520    | 100305        | NR            | 650    | 43219         | NR            | 780    | 2969          | NR            | 910    | 4351          | NR            |
| 395    | 2619          | NR            | 525    | 107452        | NR            | 655    | 38562         | NR            | 785    | 3132          | NR            | 915    | 3365          | NR            |
| 400    | 2679          | NR            | 530    | 111373        | NR            | 660    | 34110         | NR            | 790    | 2507          | NR            | 920    | 3430          | NR            |
| 405    | 3515          | NR            | 535    | 114505        | NR            | 665    | 30085         | NR            | 795    | 2968          | NR            | 925    | 4264          | NR            |
| 410    | 6934          | NR            | 540    | 116408        | NR            | 670    | 26205         | NR            | 800    | 2758          | NR            | 930    | 4095          | NR            |
| 415    | 14943         | NR            | 545    | 118700        | NR            | 675    | 22906         | NR            | 805    | 2872          | NR            | 935    | 5048          | NR            |
| 420    | 31939         | NR            | 550    | 119209        | NR            | 680    | 20058         | NR            | 810    | 3094          | NR            | 940    | 4074          | NR            |
| 425    | 64701         | NR            | 555    | 120742        | NR            | 685    | 17413         | NR            | 815    | 3222          | NR            | 945    | 4949          | NR            |
| 430    | 110939        | NR            | 560    | 121594        | NR            | 690    | 15447         | NR            | 820    | 3238          | NR            | 950    | 4387          | NR            |
| 435    | 164597        | NR            | 565    | 121913        | NR            | 695    | 13398         | NR            | 825    | 3524          | NR            | 955    | 4978          | NR            |
| 440    | 207696        | NR            | 570    | 122147        | NR            | 700    | 11777         | NR            | 830    | 2921          | NR            | 960    | 4706          | NR            |
| 445    | 201830        | NR            | 575    | 121605        | NR            | 705    | 10412         | NR            | 835    | 3595          | NR            | 965    | 5083          | NR            |
| 450    | 145410        | NR            | 580    | 120248        | NR            | 710    | 9544          | NR            | 840    | 3016          | NR            | 970    | 4522          | NR            |
| 455    | 89594         | NR            | 585    | 117717        | NR            | 715    | 8940          | NR            | 845    | 4032          | NR            | 975    | 4740          | NR            |
| 460    | 58321         | NR            | 590    | 114359        | NR            | 720    | 7897          | NR            | 850    | 3579          | NR            | 980    | 6122          | NR            |
| 465    | 39318         | NR            | 595    | 109974        | NR            | 725    | 7045          | NR            | 855    | 4571          | NR            | 985    | 6450          | NR            |
| 470    | 27693         | NR            | 600    | 105269        | NR            | 730    | 6483          | NR            | 860    | 4485          | NR            | 990    | 4875          | NR            |
| 475    | 23081         | NR            | 605    | 99453         | NR            | 735    | 5838          | NR            | 865    | 3978          | NR            | 995    | 4764          | NR            |
| 480    | 23002         | NR            | 610    | 92921         | NR            | 740    | 5261          | NR            | 870    | 4298          | NR            | 1000   | 3640          | NR            |
| 485    | 26201         | NR            | 615    | 86989         | NR            | 745    | 4760          | NR            | 875    | 4356          | NR            |        |               |               |

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**Summary**

$R_f = 72.1$   
 $R_g = 97.2$   
 CIE  $R_a = 71.7$   
 $R_g = -27.1$



**Color Vector Graphics**





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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 54 | CES51 = 88 | CES76 = 43 |
| CES02 = 59 | CES27 = 79 | CES52 = 90 | CES77 = 64 |
| CES03 = 30 | CES28 = 77 | CES53 = 77 | CES78 = 46 |
| CES04 = 69 | CES29 = 50 | CES54 = 81 | CES79 = 74 |
| CES05 = 46 | CES30 = 59 | CES55 = 80 | CES80 = 70 |
| CES06 = 50 | CES31 = 55 | CES56 = 70 | CES81 = 71 |
| CES07 = 38 | CES32 = 52 | CES57 = 68 | CES82 = 88 |
| CES08 = 38 | CES33 = 63 | CES58 = 70 | CES83 = 82 |
| CES09 = 29 | CES34 = 63 | CES59 = 88 | CES84 = 87 |
| CES10 = 72 | CES35 = 79 | CES60 = 92 | CES85 = 84 |
| CES11 = 55 | CES36 = 90 | CES61 = 88 | CES86 = 76 |
| CES12 = 61 | CES37 = 72 | CES62 = 81 | CES87 = 75 |
| CES13 = 41 | CES38 = 68 | CES63 = 75 | CES88 = 77 |
| CES14 = 74 | CES39 = 91 | CES64 = 72 | CES89 = 76 |
| CES15 = 70 | CES40 = 83 | CES65 = 65 | CES90 = 76 |
| CES16 = 46 | CES41 = 84 | CES66 = 66 | CES91 = 92 |
| CES17 = 48 | CES42 = 70 | CES67 = 64 | CES92 = 70 |
| CES18 = 55 | CES43 = 69 | CES68 = 71 | CES93 = 83 |
| CES19 = 70 | CES44 = 98 | CES69 = 80 | CES94 = 60 |
| CES20 = 64 | CES45 = 79 | CES70 = 58 | CES95 = 73 |
| CES21 = 85 | CES46 = 78 | CES71 = 55 | CES96 = 79 |
| CES22 = 77 | CES47 = 76 | CES72 = 84 | CES97 = 84 |
| CES23 = 91 | CES48 = 68 | CES73 = 47 | CES98 = 73 |
| CES24 = 90 | CES49 = 78 | CES74 = 94 | CES99 = 62 |
| CES25 = 71 | CES50 = 87 | CES75 = 51 |            |



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Color Rendition by Hue-Angle Bin



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Measure Comparisons



(END OF REPORT)