

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: McGRAW-EDISON

Report Number: P323773

Luminaire Tested: **GLEON-SA9C-727-U-SL4-HSS**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P323773  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-25)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA9C-727-U-SL4-HSS  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(9) 70 CRI, 2700K, 1050mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV  
SPILL LIGHT ELIMINATOR OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 42918 lumens  
Efficiency: N/A  
Efficacy: 85.7 lumens/watt  
Luminous Opening: Rectangular (W 2.5' x L: 1' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B3 - U0 - G5

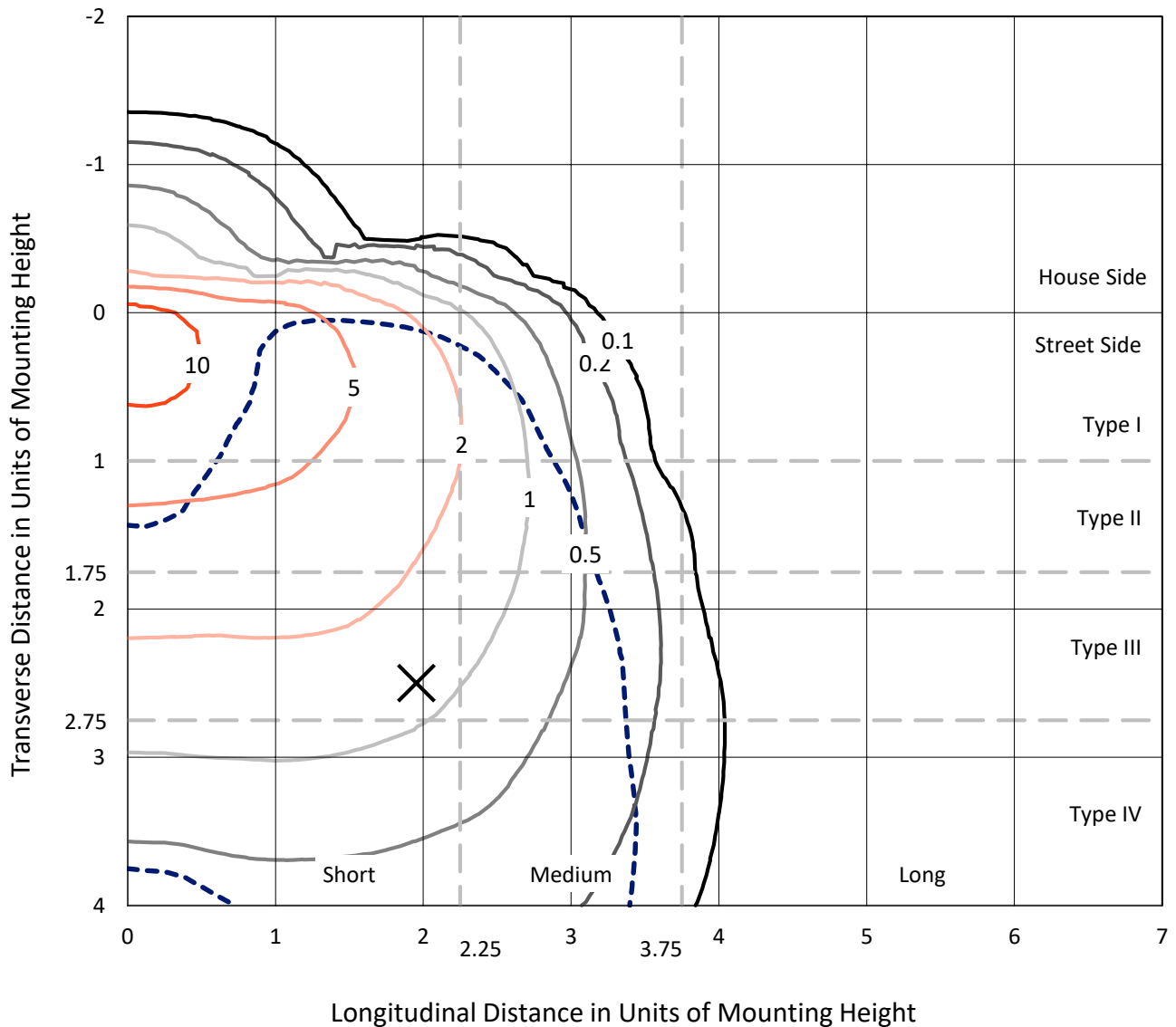
Input Watts (W): 501  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



REPORT NUMBER: P323773  
 CATALOG NUMBER: GLEON-SA9C-727-U-SL4-HSS

### Iso-Footcandle Lines of Horizontal Illumination

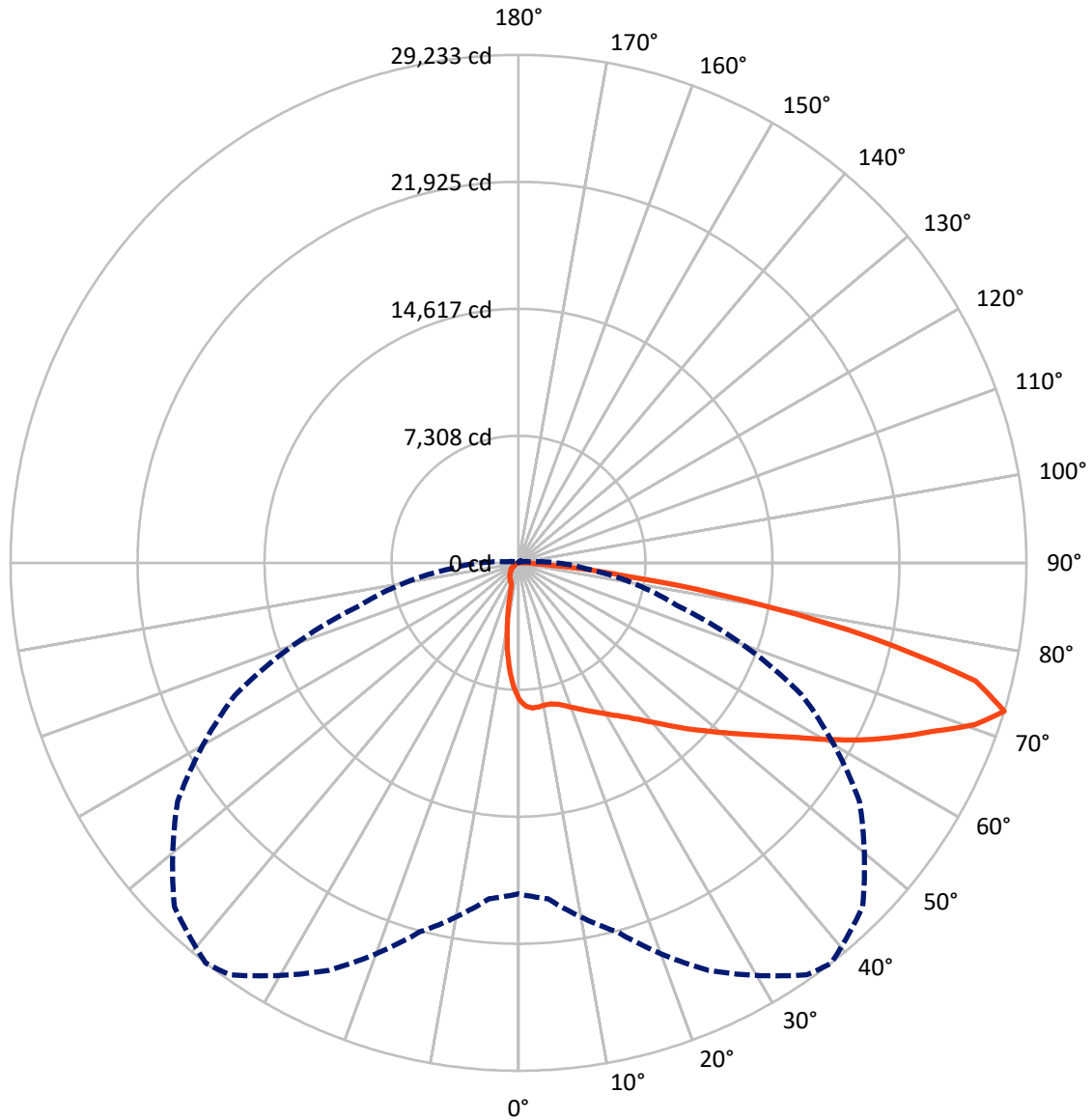
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 13.3 fc  
 Type IV - Short - N/A

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### Luminous Intensity Polar Plot



— Vertical Plane Through 38-Deg Lateral    - - - Horizontal Cone Through 72.5-Deg Vertical

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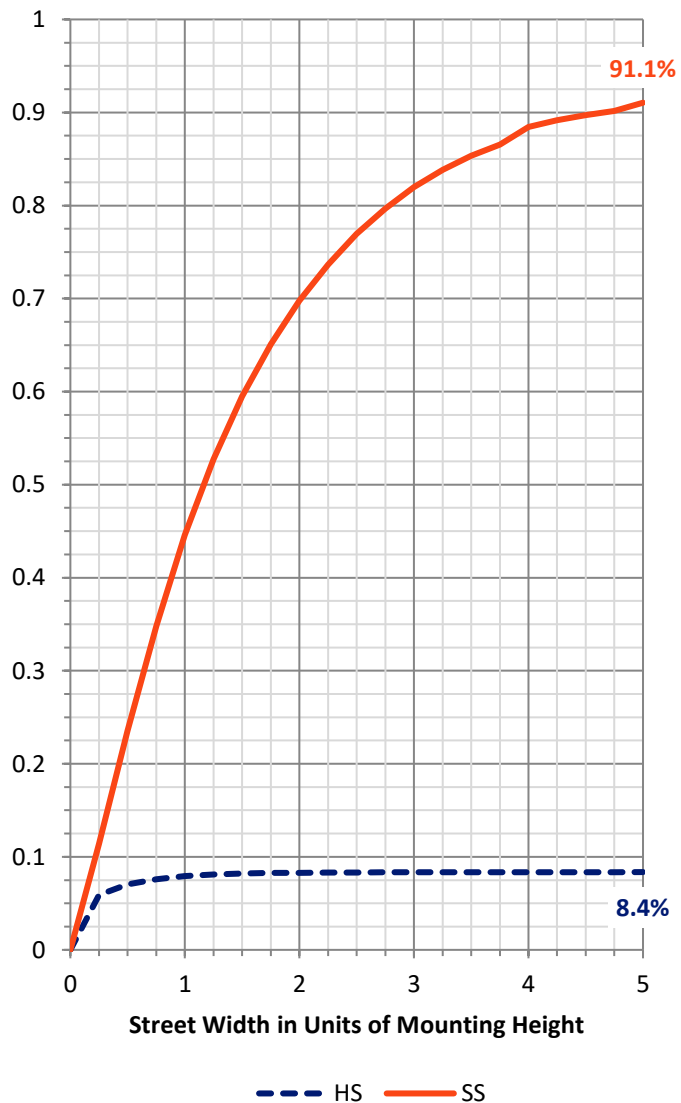
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 3611.7   | 0.0    | 3611.7  |
|                    | % Fixture | 8.4      | 0.0    | 8.4     |
| <b>Street Side</b> | Lumens    | 39306.3  | 0.0    | 39306.3 |
|                    | % Fixture | 91.6     | 0.0    | 91.6    |
| <b>Total</b>       | Lumens    | 42918.0  | 0.0    | 42918.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 672.6   | 1.6       |
| 10°-20°   | 1644.6  | 3.8       |
| 20°-30°   | 2615.8  | 6.1       |
| 30°-40°   | 3932.5  | 9.2       |
| 40°-50°   | 5999.3  | 14.0      |
| 50°-60°   | 8479.1  | 19.8      |
| 60°-70°   | 10635.6 | 24.8      |
| 70°-80°   | 7952.4  | 18.5      |
| 80°-90°   | 986.1   | 2.3       |
| 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°    | 42918.0 | 100.0     |
| 0°-180°   | 42918.0 | 100.0     |

**Coefficient of Utilization**

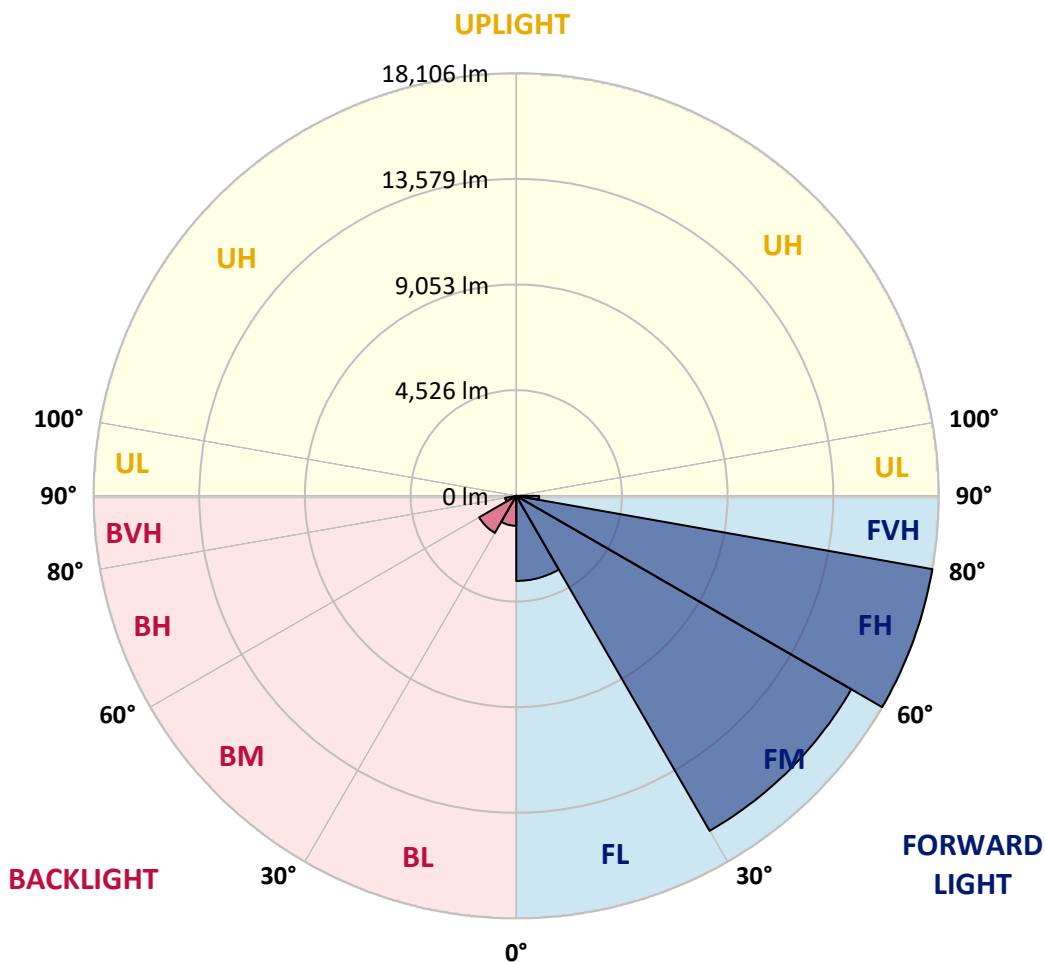


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**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone           | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |        |
|----------------|---------|-----------|-------------------------|------|--------|
|                |         |           | B                       | U    | G      |
| FL (0°-30°)    | 3647.0  | 8.5       |                         |      |        |
| FM (30°-60°)   | 16576.8 | 38.6      |                         |      |        |
| FH (60°-80°)   | 18105.6 | 42.2      |                         |      | G5     |
| FVH (80°-90°)  | 976.9   | 2.3       |                         |      | G5     |
| BL (0°-30°)    | 1286.0  | 3.0       | B3/2500                 |      |        |
| BM (30°-60°)   | 1834.1  | 4.3       | B2/2500                 |      |        |
| BH (60°-80°)   | 482.4   | 1.1       | B1/500                  |      | G1/500 |
| BVH (80°-90°)  | 9.2     | 0.0       |                         |      | G0/10  |
| UL (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |        |
| UH (100°-180°) | 0.0     | 0.0       |                         | U0/0 |        |

**BUG Rating: B3-U0-G5**  
 Type IV Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 38°     | 45°     | 55°     | 65°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 7892.5  | 7892.5  | 7892.5  | 7892.5  | 7892.5  | 7892.5  | 7892.5  | 7892.5  | 7892.5  | 7892.5  | 7892.5  |
| 2.5°  | 8377.3  | 8379.1  | 8359.5  | 8327.4  | 8286.4  | 8265.0  | 8229.4  | 8172.3  | 8111.7  | 8003.0  | 7885.3  |
| 5°    | 8548.4  | 8548.4  | 8523.4  | 8480.7  | 8414.7  | 8395.1  | 8327.4  | 8236.5  | 8111.7  | 7935.3  | 7737.4  |
| 7.5°  | 8530.6  | 8534.1  | 8500.3  | 8455.7  | 8389.8  | 8371.9  | 8290.0  | 8188.4  | 8033.3  | 7819.4  | 7566.3  |
| 10°   | 8437.9  | 8446.8  | 8420.1  | 8398.7  | 8338.1  | 8318.5  | 8241.8  | 8140.2  | 7985.2  | 7757.0  | 7466.5  |
| 12.5° | 8343.4  | 8352.3  | 8361.3  | 8380.9  | 8343.4  | 8336.3  | 8275.7  | 8190.1  | 8042.2  | 7805.1  | 7477.2  |
| 15°   | 8282.8  | 8300.6  | 8364.8  | 8441.5  | 8450.4  | 8443.2  | 8404.0  | 8323.8  | 8174.1  | 7928.1  | 7553.8  |
| 17.5° | 8282.8  | 8311.3  | 8445.0  | 8591.2  | 8642.9  | 8648.2  | 8614.4  | 8502.1  | 8323.8  | 8060.0  | 7625.1  |
| 20°   | 8352.3  | 8391.6  | 8600.1  | 8806.9  | 8892.4  | 8892.4  | 8826.5  | 8669.6  | 8461.1  | 8179.4  | 7673.2  |
| 22.5° | 8530.6  | 8582.3  | 8844.3  | 9083.1  | 9174.0  | 9154.4  | 9065.3  | 8837.2  | 8603.7  | 8314.9  | 7733.8  |
| 25°   | 8881.7  | 8920.9  | 9193.6  | 9434.3  | 9489.5  | 9445.0  | 9332.7  | 9040.3  | 8785.5  | 8498.5  | 7844.4  |
| 27.5° | 9334.4  | 9339.8  | 9621.4  | 9824.6  | 9790.7  | 9760.4  | 9619.6  | 9295.2  | 9047.5  | 8760.5  | 8035.1  |
| 30°   | 9831.7  | 9831.7  | 10079.5 | 10234.6 | 10131.2 | 10106.2 | 9965.4  | 9603.6  | 9382.6  | 9117.0  | 8306.0  |
| 32.5° | 10313.0 | 10334.4 | 10535.8 | 10633.8 | 10518.0 | 10493.0 | 10355.8 | 9993.9  | 9828.2  | 9660.6  | 8728.4  |
| 35°   | 10778.2 | 10794.2 | 10984.9 | 11038.4 | 10927.9 | 10935.0 | 10837.0 | 10530.4 | 10468.1 | 10446.7 | 9364.7  |
| 37.5° | 11229.1 | 11232.7 | 11427.0 | 11460.8 | 11405.6 | 11466.2 | 11475.1 | 11204.2 | 11320.0 | 11492.9 | 10261.3 |
| 40°   | 11640.9 | 11644.4 | 11836.9 | 11924.3 | 12018.7 | 12097.2 | 12166.7 | 12022.3 | 12405.5 | 12806.6 | 11329.0 |
| 42.5° | 11970.6 | 12008.0 | 12252.2 | 12418.0 | 12667.5 | 12817.3 | 13006.2 | 12999.1 | 13697.8 | 14300.2 | 12619.4 |
| 45°   | 12261.1 | 12325.3 | 12665.8 | 12956.3 | 13384.1 | 13622.9 | 13918.8 | 14150.5 | 15152.2 | 15963.2 | 13925.9 |
| 47.5° | 12644.4 | 12705.0 | 13093.5 | 13569.4 | 14139.8 | 14453.5 | 14943.7 | 15444.5 | 16751.0 | 17595.9 | 15202.1 |
| 50°   | 13184.4 | 13157.7 | 13540.9 | 14223.6 | 14956.1 | 15367.9 | 16066.6 | 16817.0 | 18337.4 | 19018.2 | 15952.5 |
| 52.5° | 13760.1 | 13749.5 | 14032.9 | 14934.8 | 15918.6 | 16399.9 | 17323.2 | 18235.8 | 19854.2 | 19998.6 | 16296.5 |
| 55°   | 14473.1 | 14396.5 | 14635.3 | 15745.7 | 17061.2 | 17578.1 | 18665.3 | 19640.3 | 21062.7 | 20551.1 | 16469.4 |
| 57.5° | 15219.9 | 15093.4 | 15321.5 | 16649.4 | 18349.8 | 18961.2 | 20151.8 | 21009.2 | 21866.5 | 20929.0 | 16467.6 |
| 60°   | 15991.7 | 15842.0 | 16112.9 | 17779.5 | 19950.4 | 20658.0 | 21763.1 | 21934.2 | 22616.9 | 21119.7 | 16346.4 |
| 62.5° | 16636.9 | 16547.8 | 16950.6 | 18987.9 | 21738.2 | 22433.3 | 22980.5 | 22775.5 | 23249.7 | 21267.6 | 16063.0 |
| 65°   | 17319.6 | 17325.0 | 17975.5 | 20397.8 | 23638.2 | 24107.0 | 24153.3 | 23866.4 | 23779.0 | 21237.3 | 15104.1 |
| 67.5° | 18242.9 | 18328.4 | 19413.9 | 22312.1 | 25486.6 | 25848.4 | 25844.8 | 25048.1 | 24165.8 | 20032.4 | 12977.7 |
| 70°   | 19219.6 | 19421.1 | 21071.6 | 24502.7 | 27504.3 | 27871.4 | 27682.5 | 25800.3 | 22754.2 | 16198.5 | 9184.7  |
| 72.5° | 19055.7 | 19405.0 | 21993.1 | 25884.1 | 28953.3 | 29233.2 | 28005.1 | 23951.9 | 17984.4 | 9414.7  | 3910.6  |
| 75°   | 14701.3 | 15105.9 | 20166.1 | 24515.2 | 27433.0 | 27181.6 | 24062.4 | 18638.6 | 9828.2  | 2627.3  | 880.5   |
| 77.5° | 7765.9  | 7981.6  | 13321.7 | 18676.0 | 21390.6 | 20864.8 | 16950.6 | 10339.7 | 2996.2  | 650.6   | 395.7   |
| 80°   | 4067.4  | 4117.4  | 5805.3  | 10596.4 | 13202.3 | 13205.8 | 10045.6 | 4541.6  | 1235.2  | 333.3   | 265.6   |
| 82.5° | 2178.1  | 2220.9  | 3067.5  | 4896.3  | 6917.5  | 6270.5  | 3846.4  | 2498.9  | 718.3   | 188.9   | 254.9   |
| 85°   | 524.0   | 532.9   | 1739.6  | 2236.9  | 2719.9  | 1942.8  | 1142.5  | 2097.9  | 194.3   | 110.5   | 206.8   |
| 87.5° | 201.4   | 205.0   | 645.2   | 967.8   | 693.4   | 449.2   | 534.7   | 782.5   | 25.0    | 42.8    | 32.1    |
| 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: P323773

CATALOG NUMBER: GLEON-SA9C-727-U-SL4-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 7892.5  | 7892.5 | 7892.5 | 7892.5 | 7892.5 | 7892.5 | 7892.5 | 7892.5 | 7892.5 | 7892.5 | 7892.5 |
| 2.5°  | 7814.1  | 7767.7 | 7653.6 | 7509.3 | 7380.9 | 7288.2 | 7149.2 | 7058.3 | 6997.7 | 6995.9 | 6972.8 |
| 5°    | 7616.2  | 7521.7 | 7275.8 | 6983.5 | 6717.9 | 6479.0 | 6197.4 | 5974.6 | 5808.9 | 5782.1 | 5725.1 |
| 7.5°  | 7404.1  | 7249.0 | 6871.2 | 6414.9 | 5969.3 | 5516.5 | 4990.7 | 4664.5 | 4384.7 | 4251.0 | 4236.8 |
| 10°   | 7274.0  | 7056.5 | 6520.0 | 5860.5 | 5161.8 | 4425.7 | 3737.7 | 3261.8 | 2917.8 | 2819.8 | 2746.7 |
| 12.5° | 7247.2  | 6960.3 | 6249.1 | 5340.1 | 4341.9 | 3368.7 | 2607.7 | 2101.5 | 1827.0 | 1739.6 | 1716.5 |
| 15°   | 7274.0  | 6915.7 | 6021.0 | 4825.0 | 3511.3 | 2390.2 | 1750.3 | 1456.2 | 1352.8 | 1327.9 | 1326.1 |
| 17.5° | 7290.0  | 6862.3 | 5762.5 | 4252.8 | 2705.7 | 1707.5 | 1340.4 | 1254.8 | 1238.8 | 1237.0 | 1240.6 |
| 20°   | 7288.2  | 6780.3 | 5454.2 | 3614.7 | 2012.3 | 1342.1 | 1212.0 | 1194.2 | 1190.6 | 1192.4 | 1190.6 |
| 22.5° | 7275.8  | 6684.0 | 5115.5 | 2957.0 | 1520.4 | 1199.6 | 1156.8 | 1146.1 | 1144.3 | 1144.3 | 1144.3 |
| 25°   | 7298.9  | 6607.4 | 4743.0 | 2327.8 | 1253.0 | 1133.6 | 1106.9 | 1098.0 | 1096.2 | 1096.2 | 1092.6 |
| 27.5° | 7382.7  | 6564.6 | 4334.8 | 1791.3 | 1131.8 | 1074.8 | 1053.4 | 1051.6 | 1046.3 | 1044.5 | 1048.1 |
| 30°   | 7518.2  | 6564.6 | 3887.4 | 1393.8 | 1058.7 | 1014.2 | 998.1  | 994.6  | 992.8  | 991.0  | 992.8  |
| 32.5° | 7757.0  | 6614.5 | 3399.0 | 1158.6 | 989.2  | 946.5  | 935.8  | 941.1  | 935.8  | 935.8  | 935.8  |
| 35°   | 8188.4  | 6764.2 | 2887.5 | 1010.6 | 916.2  | 880.5  | 869.8  | 876.9  | 873.4  | 873.4  | 871.6  |
| 37.5° | 8817.5  | 7042.3 | 2372.4 | 921.5  | 852.0  | 814.6  | 800.3  | 811.0  | 807.4  | 807.4  | 805.6  |
| 40°   | 9584.0  | 7446.9 | 1882.2 | 853.8  | 789.6  | 750.4  | 737.9  | 743.3  | 734.3  | 734.3  | 737.9  |
| 42.5° | 10530.4 | 7960.2 | 1454.4 | 787.8  | 727.2  | 689.8  | 682.7  | 677.3  | 661.3  | 652.4  | 654.1  |
| 45°   | 11582.1 | 8494.9 | 1133.6 | 723.7  | 668.4  | 638.1  | 627.4  | 613.1  | 586.4  | 568.6  | 570.4  |
| 47.5° | 12521.4 | 8906.7 | 921.5  | 661.3  | 614.9  | 591.8  | 575.7  | 549.0  | 509.8  | 488.4  | 490.2  |
| 50°   | 13015.1 | 8969.0 | 784.3  | 598.9  | 565.0  | 541.9  | 518.7  | 477.7  | 431.3  | 408.2  | 406.4  |
| 52.5° | 13141.7 | 8676.7 | 682.7  | 541.9  | 515.1  | 488.4  | 458.1  | 402.8  | 351.1  | 326.2  | 322.6  |
| 55°   | 13188.0 | 8231.1 | 591.8  | 488.4  | 461.6  | 431.3  | 392.1  | 329.7  | 281.6  | 256.7  | 254.9  |
| 57.5° | 13034.7 | 7566.3 | 520.5  | 440.3  | 408.2  | 370.7  | 322.6  | 263.8  | 217.5  | 197.8  | 197.8  |
| 60°   | 12694.3 | 6666.2 | 465.2  | 388.6  | 352.9  | 310.1  | 260.2  | 205.0  | 162.2  | 146.2  | 146.2  |
| 62.5° | 12015.2 | 5500.5 | 413.5  | 335.1  | 301.2  | 256.7  | 210.3  | 155.1  | 114.1  | 105.2  | 106.9  |
| 65°   | 10733.6 | 4172.6 | 361.8  | 287.0  | 256.7  | 212.1  | 164.0  | 110.5  | 76.6   | 76.6   | 80.2   |
| 67.5° | 8753.4  | 2898.2 | 308.4  | 244.2  | 221.0  | 172.9  | 124.8  | 76.6   | 53.5   | 60.6   | 67.7   |
| 70°   | 5794.6  | 1625.6 | 263.8  | 201.4  | 188.9  | 137.2  | 92.7   | 51.7   | 42.8   | 57.0   | 69.5   |
| 72.5° | 2187.0  | 632.8  | 221.0  | 162.2  | 164.0  | 105.2  | 65.9   | 39.2   | 39.2   | 62.4   | 82.0   |
| 75°   | 609.6   | 310.1  | 158.6  | 119.4  | 128.3  | 76.6   | 48.1   | 33.9   | 37.4   | 71.3   | 96.2   |
| 77.5° | 358.3   | 228.1  | 103.4  | 69.5   | 87.3   | 53.5   | 32.1   | 26.7   | 32.1   | 60.6   | 92.7   |
| 80°   | 288.7   | 121.2  | 60.6   | 35.6   | 48.1   | 30.3   | 21.4   | 16.0   | 8.9    | 23.2   | 48.1   |
| 82.5° | 288.7   | 73.1   | 28.5   | 25.0   | 25.0   | 16.0   | 10.7   | 7.1    | 1.8    | 0.0    | 12.5   |
| 85°   | 194.3   | 30.3   | 17.8   | 16.0   | 12.5   | 5.3    | 3.6    | 1.8    | 0.0    | 0.0    | 0.0    |
| 87.5° | 32.1    | 12.5   | 7.1    | 3.6    | 1.8    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 90°   | 0.0     | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |



Signify Classified - Internal  
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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: SP1-1908-441-1-R4

Test Date: 08/20/2019

Luminaire Tested: SA1C-727-U-5WQ

**Test Information**

Test Method: LM-79-2008  
 Report Number: SP1-1908-441-1-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-727-U-5WQ**  
 Description: McGRAW EDISON ROADWAY AND AREA LUMINAIRE

\*\*\*THIS IS A REVISION OF SP1-1908-441-1-R3. TO UPDATE THE CATALOG NUMBER.\*\*\*TESTED IN SITU. (1) 70 CRI, 2700K, 1050MA LIGHTSQUARE WITH 16 LEDS AND TYPE V WIDE OPTICS.

**Spectral Parameters**

CCT (K): 2741  
 CIE u': 0.2605  
 CIE v': 0.5272  
 Duv: 0.0005  
 CIE x: 0.4573  
 CIE y: 0.4113  
 CIE z: 0.1313  
 Peak Wavelength (nm): 602  
 Dominant Wavelength (nm): 583  
 Purity: 61.2

|           |      |      |       |
|-----------|------|------|-------|
| CRI (Ra): | 71.5 |      |       |
| R1:       | 69.2 | R9:  | -16.1 |
| R2:       | 79.4 | R10: | 51.4  |
| R3:       | 87.8 | R11: | 63.1  |
| R4:       | 69.4 | R12: | 42.0  |
| R5:       | 66.4 | R13: | 70.2  |
| R6:       | 69.8 | R14: | 92.4  |
| R7:       | 79.8 |      |       |
| R8:       | 50.1 |      |       |

Rf: 69.9  
 Rg: 98.3



**Test Conditions**

Stabilization Time: 56M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.3./42%  
 Sphere Temperature (°C): 25.7

REPORT NUMBER: SP1-1908-441-1-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 2700K 4-step quadrangle

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**Photopic Flux vs. Wavelength**



**Photopic Lumens: 6211.7**

| $\lambda$ (nm) | Power ( $\mu\text{W}/\text{nm}$ ) | Lumens ( $\phi/\text{nm}$ ) | $\lambda$ (nm) | Power ( $\mu\text{W}/\text{nm}$ ) | Lumens ( $\phi/\text{nm}$ ) | $\lambda$ (nm) | Power ( $\mu\text{W}/\text{nm}$ ) | Lumens ( $\phi/\text{nm}$ ) | $\lambda$ (nm) | Power ( $\mu\text{W}/\text{nm}$ ) | Lumens ( $\phi/\text{nm}$ ) | $\lambda$ (nm) | Power ( $\mu\text{W}/\text{nm}$ ) | Lumens ( $\phi/\text{nm}$ ) |
|----------------|-----------------------------------|-----------------------------|----------------|-----------------------------------|-----------------------------|----------------|-----------------------------------|-----------------------------|----------------|-----------------------------------|-----------------------------|----------------|-----------------------------------|-----------------------------|
| 360            | 2044                              | 0.0                         | 490            | 7179                              | 1.0                         | 620            | 118034                            | 30.7                        | 750            | 8362                              | 0.0                         | 880            | 3128                              | 0.0                         |
| 365            | 2016                              | 0.0                         | 495            | 10476                             | 1.9                         | 625            | 111884                            | 24.7                        | 755            | 7635                              | 0.0                         | 885            | 3110                              | 0.0                         |
| 370            | 2020                              | 0.0                         | 500            | 15549                             | 3.4                         | 630            | 106119                            | 19.2                        | 760            | 6582                              | 0.0                         | 890            | 2632                              | 0.0                         |
| 375            | 2137                              | 0.0                         | 505            | 22477                             | 6.3                         | 635            | 99706                             | 15.0                        | 765            | 5777                              | 0.0                         | 895            | 2709                              | 0.0                         |
| 380            | 2046                              | 0.0                         | 510            | 30417                             | 10.4                        | 640            | 92142                             | 11.0                        | 770            | 5474                              | 0.0                         | 900            | 2016                              | 0.0                         |
| 385            | 1925                              | 0.0                         | 515            | 39274                             | 16.3                        | 645            | 84987                             | 8.2                         | 775            | 4977                              | 0.0                         | 905            | 1748                              | 0.0                         |
| 390            | 1893                              | 0.0                         | 520            | 47282                             | 22.9                        | 650            | 78016                             | 5.7                         | 780            | 4723                              | 0.0                         | 910            | 2046                              | 0.0                         |
| 395            | 1695                              | 0.0                         | 525            | 55413                             | 29.7                        | 655            | 71541                             | 4.1                         | 785            | 4219                              | 0.0                         | 915            | 1844                              | 0.0                         |
| 400            | 1633                              | 0.0                         | 530            | 62377                             | 36.7                        | 660            | 64863                             | 2.7                         | 790            | 3969                              | 0.0                         | 920            | 2734                              | 0.0                         |
| 405            | 2065                              | 0.0                         | 535            | 68520                             | 42.5                        | 665            | 58485                             | 1.9                         | 795            | 4122                              | 0.0                         | 925            | 2307                              | 0.0                         |
| 410            | 3449                              | 0.0                         | 540            | 73435                             | 47.8                        | 670            | 51641                             | 1.1                         | 800            | 2864                              | 0.0                         | 930            | 2039                              | 0.0                         |
| 415            | 7117                              | 0.0                         | 545            | 78677                             | 52.4                        | 675            | 46030                             | 0.8                         | 805            | 3151                              | 0.0                         | 935            | 1784                              | 0.0                         |
| 420            | 13992                             | 0.0                         | 550            | 83331                             | 56.6                        | 680            | 40590                             | 0.5                         | 810            | 3022                              | 0.0                         | 940            | 2464                              | 0.0                         |
| 425            | 25176                             | 0.1                         | 555            | 89120                             | 60.9                        | 685            | 35691                             | 0.3                         | 815            | 3471                              | 0.0                         | 945            | 2794                              | 0.0                         |
| 430            | 38151                             | 0.3                         | 560            | 94613                             | 64.3                        | 690            | 31631                             | 0.2                         | 820            | 2749                              | 0.0                         | 950            | 3090                              | 0.0                         |
| 435            | 49673                             | 0.6                         | 565            | 99818                             | 66.4                        | 695            | 27437                             | 0.1                         | 825            | 2729                              | 0.0                         | 955            | 1866                              | 0.0                         |
| 440            | 57273                             | 0.9                         | 570            | 106526                            | 69.3                        | 700            | 24589                             | 0.1                         | 830            | 2282                              | 0.0                         | 960            | 3110                              | 0.0                         |
| 445            | 54802                             | 1.1                         | 575            | 111610                            | 69.4                        | 705            | 21832                             | 0.0                         | 835            | 3140                              | 0.0                         | 965            | 3880                              | 0.0                         |
| 450            | 39184                             | 1.0                         | 580            | 117163                            | 69.6                        | 710            | 19500                             | 0.0                         | 840            | 2365                              | 0.0                         | 970            | 3243                              | 0.0                         |
| 455            | 22506                             | 0.8                         | 585            | 122201                            | 67.9                        | 715            | 17870                             | 0.0                         | 845            | 3024                              | 0.0                         | 975            | 2014                              | 0.0                         |
| 460            | 13692                             | 0.6                         | 590            | 125662                            | 65.0                        | 720            | 15924                             | 0.0                         | 850            | 2510                              | 0.0                         | 980            | 1688                              | 0.0                         |
| 465            | 9446                              | 0.5                         | 595            | 127415                            | 60.4                        | 725            | 14268                             | 0.0                         | 855            | 2739                              | 0.0                         | 985            | 2827                              | 0.0                         |
| 470            | 6698                              | 0.4                         | 600            | 129155                            | 55.7                        | 730            | 12438                             | 0.0                         | 860            | 3515                              | 0.0                         | 990            | 4172                              | 0.0                         |
| 475            | 5328                              | 0.4                         | 605            | 128057                            | 49.6                        | 735            | 11255                             | 0.0                         | 865            | 3600                              | 0.0                         | 995            | 3177                              | 0.0                         |
| 480            | 5081                              | 0.5                         | 610            | 126031                            | 43.3                        | 740            | 9951                              | 0.0                         | 870            | 3609                              | 0.0                         | 1000           | 3241                              | 0.0                         |
| 485            | 5579                              | 0.7                         | 615            | 123059                            | 37.1                        | 745            | 8870                              | 0.0                         | 875            | 3208                              | 0.0                         |                |                                   |                             |

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Scotopic Flux vs. Wavelength



Scotopic Lumens: 6474.3 S/P: 1.04

| 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    | 2044          | 0.0           | 490    | 7179          | 6.0           | 620    | 118034        | 0.1           | 750    | 8362          | 0.0           | 880    | 3128          | 0.0           |
| 365    | 2016          | 0.0           | 495    | 10476         | 8.6           | 625    | 111884        | 0.1           | 755    | 7635          | 0.0           | 885    | 3110          | 0.0           |
| 370    | 2020          | 0.0           | 500    | 15549         | 12.5          | 630    | 106119        | 0.0           | 760    | 6582          | 0.0           | 890    | 2632          | 0.0           |
| 375    | 2137          | 0.0           | 505    | 22477         | 17.3          | 635    | 99706         | 0.0           | 765    | 5777          | 0.0           | 895    | 2709          | 0.0           |
| 380    | 2046          | 0.0           | 510    | 30417         | 21.8          | 640    | 92142         | 0.0           | 770    | 5474          | 0.0           | 900    | 2016          | 0.0           |
| 385    | 1925          | 0.0           | 515    | 39274         | 25.7          | 645    | 84987         | 0.0           | 775    | 4977          | 0.0           | 905    | 1748          | 0.0           |
| 390    | 1893          | 0.0           | 520    | 47282         | 27.5          | 650    | 78016         | 0.0           | 780    | 4723          | 0.0           | 910    | 2046          | 0.0           |
| 395    | 1695          | 0.0           | 525    | 55413         | 28.1          | 655    | 71541         | 0.0           | 785    | 4219          | 0.0           | 915    | 1844          | 0.0           |
| 400    | 1633          | 0.0           | 530    | 62377         | 27.0          | 660    | 64863         | 0.0           | 790    | 3969          | 0.0           | 920    | 2734          | 0.0           |
| 405    | 2065          | 0.0           | 535    | 68520         | 24.7          | 665    | 58485         | 0.0           | 795    | 4122          | 0.0           | 925    | 2307          | 0.0           |
| 410    | 3449          | 0.1           | 540    | 73435         | 21.5          | 670    | 51641         | 0.0           | 800    | 2864          | 0.0           | 930    | 2039          | 0.0           |
| 415    | 7117          | 0.5           | 545    | 78677         | 18.3          | 675    | 46030         | 0.0           | 805    | 3151          | 0.0           | 935    | 1784          | 0.0           |
| 420    | 13992         | 1.6           | 550    | 83331         | 15.0          | 680    | 40590         | 0.0           | 810    | 3022          | 0.0           | 940    | 2464          | 0.0           |
| 425    | 25176         | 3.9           | 555    | 89120         | 12.0          | 685    | 35691         | 0.0           | 815    | 3471          | 0.0           | 945    | 2794          | 0.0           |
| 430    | 38151         | 8.1           | 560    | 94613         | 9.3           | 690    | 31631         | 0.0           | 820    | 2749          | 0.0           | 950    | 3090          | 0.0           |
| 435    | 49673         | 13.3          | 565    | 99818         | 7.0           | 695    | 27437         | 0.0           | 825    | 2729          | 0.0           | 955    | 1866          | 0.0           |
| 440    | 57273         | 19.1          | 570    | 106526        | 5.2           | 700    | 24589         | 0.0           | 830    | 2282          | 0.0           | 960    | 3110          | 0.0           |
| 445    | 54802         | 21.6          | 575    | 111610        | 3.7           | 705    | 21832         | 0.0           | 835    | 3140          | 0.0           | 965    | 3880          | 0.0           |
| 450    | 39184         | 18.1          | 580    | 117163        | 2.6           | 710    | 19500         | 0.0           | 840    | 2365          | 0.0           | 970    | 3243          | 0.0           |
| 455    | 22506         | 11.8          | 585    | 122201        | 1.8           | 715    | 17870         | 0.0           | 845    | 3024          | 0.0           | 975    | 2014          | 0.0           |
| 460    | 13692         | 8.1           | 590    | 125662        | 1.2           | 720    | 15924         | 0.0           | 850    | 2510          | 0.0           | 980    | 1688          | 0.0           |
| 465    | 9446          | 6.2           | 595    | 127415        | 0.8           | 725    | 14268         | 0.0           | 855    | 2739          | 0.0           | 985    | 2827          | 0.0           |
| 470    | 6698          | 4.8           | 600    | 129155        | 0.5           | 730    | 12438         | 0.0           | 860    | 3515          | 0.0           | 990    | 4172          | 0.0           |
| 475    | 5328          | 4.1           | 605    | 128057        | 0.4           | 735    | 11255         | 0.0           | 865    | 3600          | 0.0           | 995    | 3177          | 0.0           |
| 480    | 5081          | 4.1           | 610    | 126031        | 0.2           | 740    | 9951          | 0.0           | 870    | 3609          | 0.0           | 1000   | 3241          | 0.0           |
| 485    | 5579          | 4.6           | 615    | 123059        | 0.1           | 745    | 8870          | 0.0           | 875    | 3208          | 0.0           |        |               |               |

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Melanopic Flux vs. Wavelength



Melanopic Lumens: 2145.7 M/P: 0.35

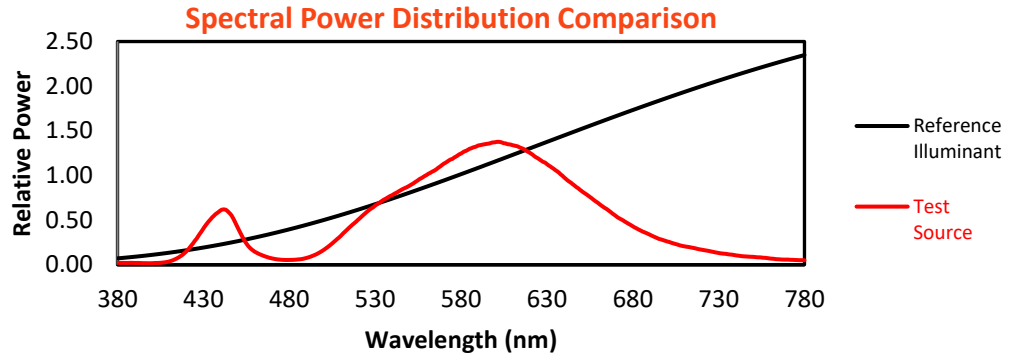
| λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) |
|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|
| 360    | 2044          | 0.0           | 490    | 7179          | 11.1          | 620    | 118034        | 1.5           | 750    | 8362          | 0.0           | 880    | 3128          | 0.0           |
| 365    | 2016          | 0.0           | 495    | 10476         | 16.9          | 625    | 111884        | 0.9           | 755    | 7635          | 0.0           | 885    | 3110          | 0.0           |
| 370    | 2020          | 0.0           | 500    | 15549         | 26.0          | 630    | 106119        | 0.6           | 760    | 6582          | 0.0           | 890    | 2632          | 0.0           |
| 375    | 2137          | 0.0           | 505    | 22477         | 38.2          | 635    | 99706         | 0.4           | 765    | 5777          | 0.0           | 895    | 2709          | 0.0           |
| 380    | 2046          | 0.0           | 510    | 30417         | 51.6          | 640    | 92142         | 0.2           | 770    | 5474          | 0.0           | 900    | 2016          | 0.0           |
| 385    | 1925          | 0.0           | 515    | 39274         | 65.1          | 645    | 84987         | 0.1           | 775    | 4977          | 0.0           | 905    | 1748          | 0.0           |
| 390    | 1893          | 0.0           | 520    | 47282         | 75.2          | 650    | 78016         | 0.1           | 780    | 4723          | 0.0           | 910    | 2046          | 0.0           |
| 395    | 1695          | 0.0           | 525    | 55413         | 82.9          | 655    | 71541         | 0.1           | 785    | 4219          | 0.0           | 915    | 1844          | 0.0           |
| 400    | 1633          | 0.0           | 530    | 62377         | 86.0          | 660    | 64863         | 0.0           | 790    | 3969          | 0.0           | 920    | 2734          | 0.0           |
| 405    | 2065          | 0.1           | 535    | 68520         | 85.4          | 665    | 58485         | 0.0           | 795    | 4122          | 0.0           | 925    | 2307          | 0.0           |
| 410    | 3449          | 0.2           | 540    | 73435         | 81.1          | 670    | 51641         | 0.0           | 800    | 2864          | 0.0           | 930    | 2039          | 0.0           |
| 415    | 7117          | 0.7           | 545    | 78677         | 75.4          | 675    | 46030         | 0.0           | 805    | 3151          | 0.0           | 935    | 1784          | 0.0           |
| 420    | 13992         | 2.3           | 550    | 83331         | 68.1          | 680    | 40590         | 0.0           | 810    | 3022          | 0.0           | 940    | 2464          | 0.0           |
| 425    | 25176         | 6.2           | 555    | 89120         | 60.9          | 685    | 35691         | 0.0           | 815    | 3471          | 0.0           | 945    | 2794          | 0.0           |
| 430    | 38151         | 13.0          | 560    | 94613         | 52.9          | 690    | 31631         | 0.0           | 820    | 2749          | 0.0           | 950    | 3090          | 0.0           |
| 435    | 49673         | 22.2          | 565    | 99818         | 44.8          | 695    | 27437         | 0.0           | 825    | 2729          | 0.0           | 955    | 1866          | 0.0           |
| 440    | 57273         | 32.0          | 570    | 106526        | 37.6          | 700    | 24589         | 0.0           | 830    | 2282          | 0.0           | 960    | 3110          | 0.0           |
| 445    | 54802         | 36.7          | 575    | 111610        | 30.4          | 705    | 21832         | 0.0           | 835    | 3140          | 0.0           | 965    | 3880          | 0.0           |
| 450    | 39184         | 30.4          | 580    | 117163        | 24.1          | 710    | 19500         | 0.0           | 840    | 2365          | 0.0           | 970    | 3243          | 0.0           |
| 455    | 22506         | 19.7          | 585    | 122201        | 18.7          | 715    | 17870         | 0.0           | 845    | 3024          | 0.0           | 975    | 2014          | 0.0           |
| 460    | 13692         | 13.2          | 590    | 125662        | 14.0          | 720    | 15924         | 0.0           | 850    | 2510          | 0.0           | 980    | 1688          | 0.0           |
| 465    | 9446          | 10.0          | 595    | 127415        | 10.2          | 725    | 14268         | 0.0           | 855    | 2739          | 0.0           | 985    | 2827          | 0.0           |
| 470    | 6698          | 7.7           | 600    | 129155        | 7.3           | 730    | 12438         | 0.0           | 860    | 3515          | 0.0           | 990    | 4172          | 0.0           |
| 475    | 5328          | 6.7           | 605    | 128057        | 5.0           | 735    | 11255         | 0.0           | 865    | 3600          | 0.0           | 995    | 3177          | 0.0           |
| 480    | 5081          | 6.9           | 610    | 126031        | 3.4           | 740    | 9951          | 0.0           | 870    | 3609          | 0.0           | 1000   | 3241          | 0.0           |
| 485    | 5579          | 8.1           | 615    | 123059        | 2.3           | 745    | 8870          | 0.0           | 875    | 3208          | 0.0           |        |               |               |

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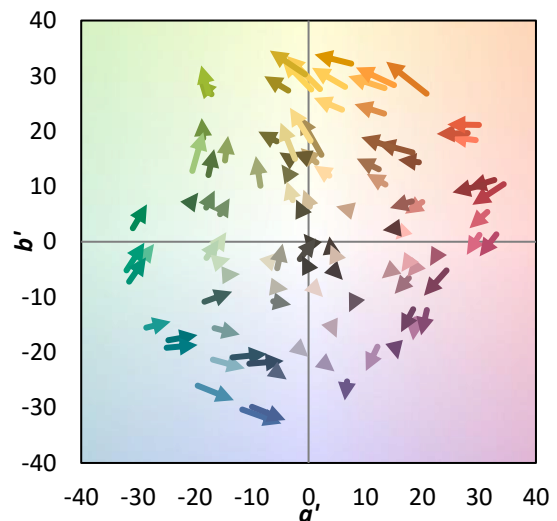
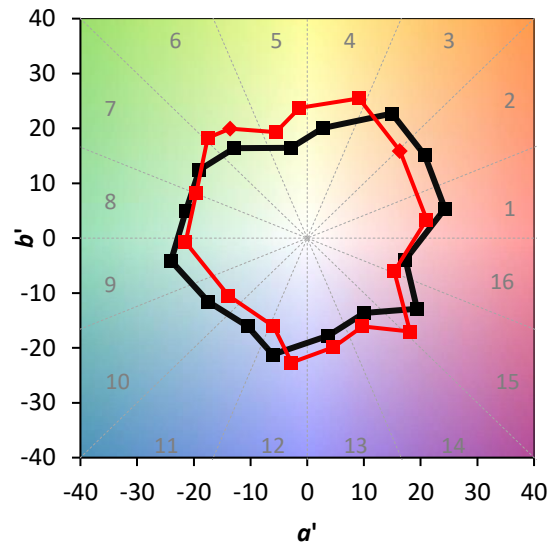
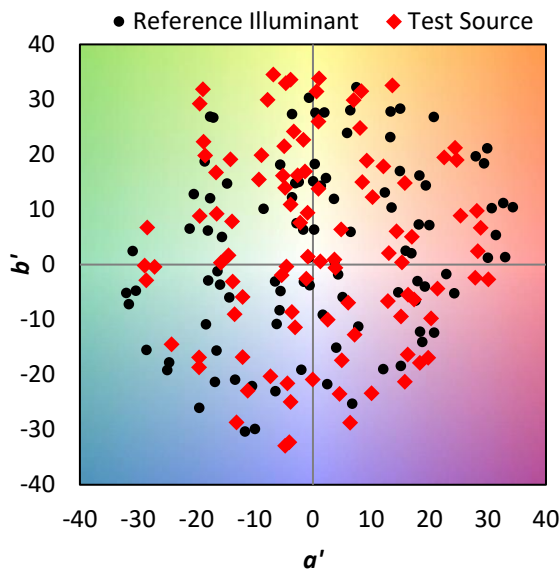
TM-30-18

**Summary**

$R_f = 69.9$   
 $R_g = 98.3$   
CIE  $R_a = 71.5$   
 $R_9 = -16.1$



**Color Vector Graphics**





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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 54 | CES51 = 77 | CES76 = 48 |
| CES02 = 63 | CES27 = 74 | CES52 = 80 | CES77 = 75 |
| CES03 = 31 | CES28 = 80 | CES53 = 66 | CES78 = 56 |
| CES04 = 71 | CES29 = 44 | CES54 = 77 | CES79 = 81 |
| CES05 = 50 | CES30 = 46 | CES55 = 74 | CES80 = 80 |
| CES06 = 52 | CES31 = 50 | CES56 = 63 | CES81 = 73 |
| CES07 = 42 | CES32 = 49 | CES57 = 60 | CES82 = 91 |
| CES08 = 41 | CES33 = 53 | CES58 = 63 | CES83 = 84 |
| CES09 = 29 | CES34 = 66 | CES59 = 85 | CES84 = 90 |
| CES10 = 77 | CES35 = 82 | CES60 = 89 | CES85 = 87 |
| CES11 = 60 | CES36 = 78 | CES61 = 85 | CES86 = 65 |
| CES12 = 66 | CES37 = 75 | CES62 = 69 | CES87 = 78 |
| CES13 = 43 | CES38 = 53 | CES63 = 68 | CES88 = 73 |
| CES14 = 74 | CES39 = 91 | CES64 = 68 | CES89 = 68 |
| CES15 = 71 | CES40 = 85 | CES65 = 65 | CES90 = 68 |
| CES16 = 48 | CES41 = 76 | CES66 = 62 | CES91 = 91 |
| CES17 = 50 | CES42 = 76 | CES67 = 60 | CES92 = 71 |
| CES18 = 57 | CES43 = 65 | CES68 = 68 | CES93 = 82 |
| CES19 = 73 | CES44 = 98 | CES69 = 77 | CES94 = 57 |
| CES20 = 67 | CES45 = 75 | CES70 = 60 | CES95 = 78 |
| CES21 = 88 | CES46 = 70 | CES71 = 57 | CES96 = 80 |
| CES22 = 80 | CES47 = 63 | CES72 = 86 | CES97 = 79 |
| CES23 = 92 | CES48 = 51 | CES73 = 52 | CES98 = 71 |
| CES24 = 91 | CES49 = 68 | CES74 = 90 | CES99 = 64 |
| CES25 = 73 | CES50 = 77 | CES75 = 58 |            |



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Color Rendition by Hue-Angle Bin



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Measure Comparisons



(END OF REPORT)