

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: P322474

Luminaire Tested: **GLEON-SA0A-727-U-T4FT-HSS**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P322474  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-17)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA0A-727-U-T4FT-HSS  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(10) 70 CRI, 2700K, 615mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV  
FORWARD THROW OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 27394 lumens  
Efficiency: N/A  
Efficacy: 84.8 lumens/watt  
Luminous Opening: Rectangular (W 2.5' x L: 1' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B2 - U0 - G5

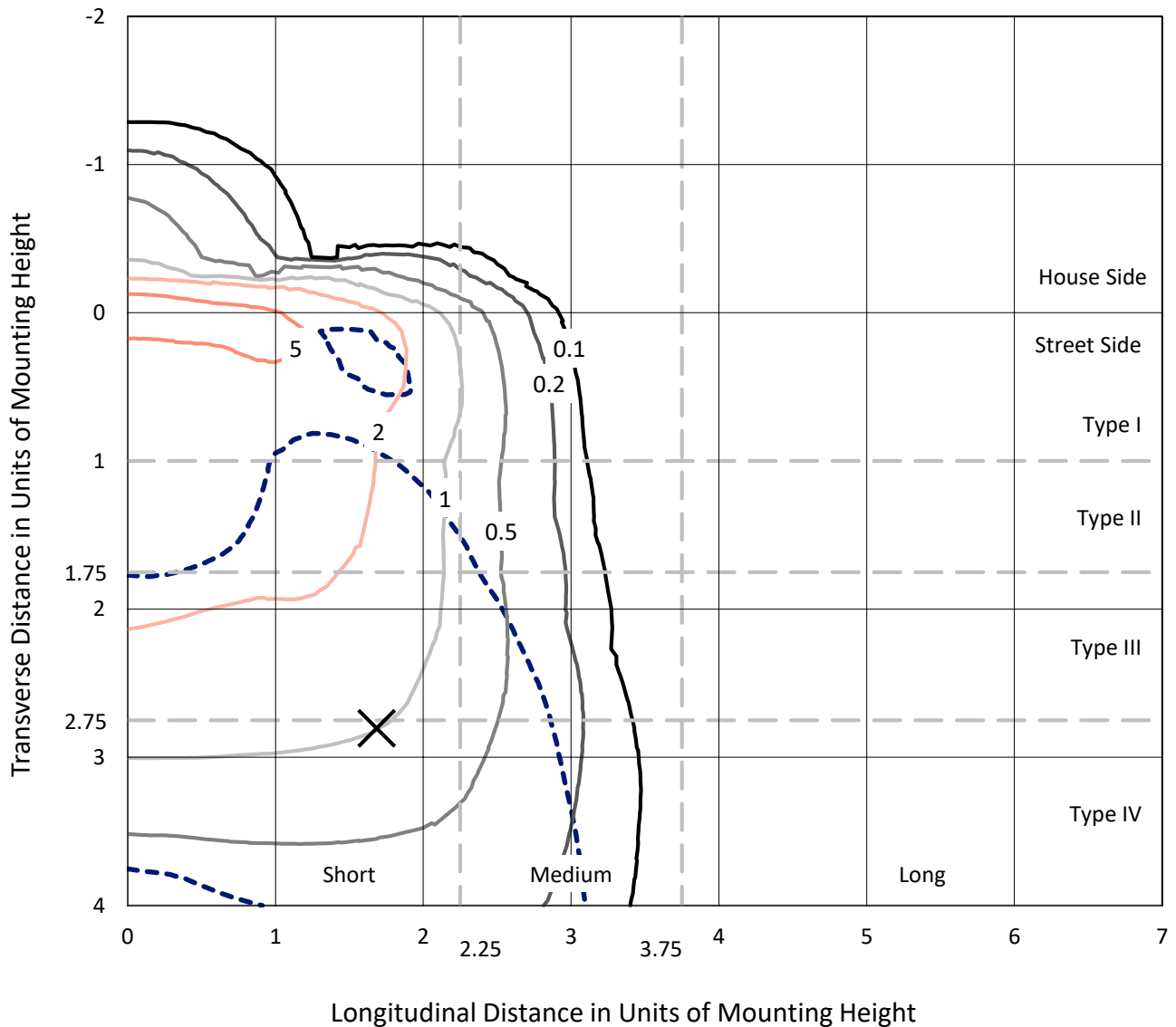
Input Watts (W): 323  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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### Iso-Footcandle Lines of Horizontal Illumination

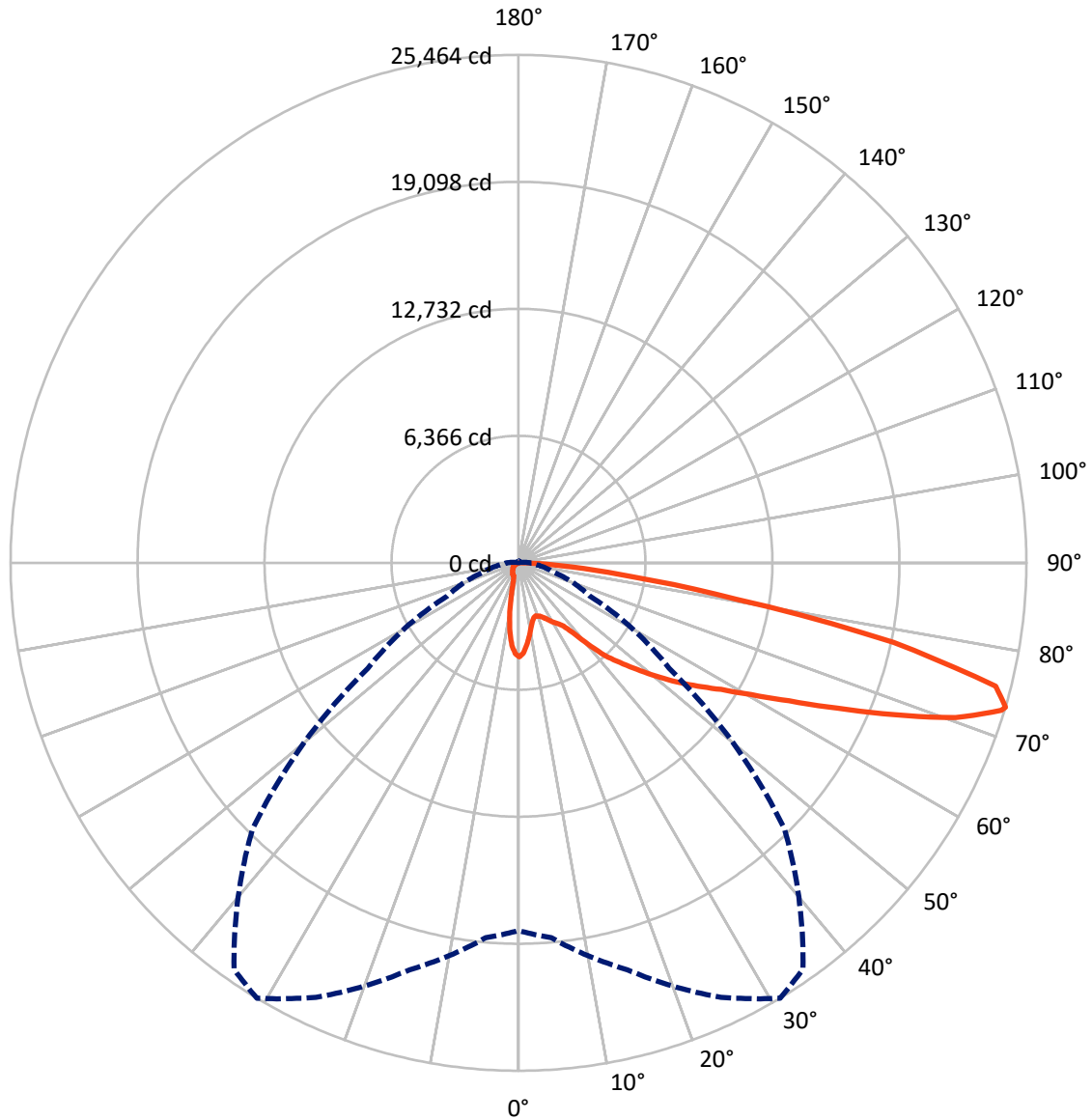
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 7.5 fc  
 Type IV - Short - N/A

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### Luminous Intensity Polar Plot



— Vertical Plane Through 31-Deg Lateral      - - - Horizontal Cone Through 73-Deg Vertical

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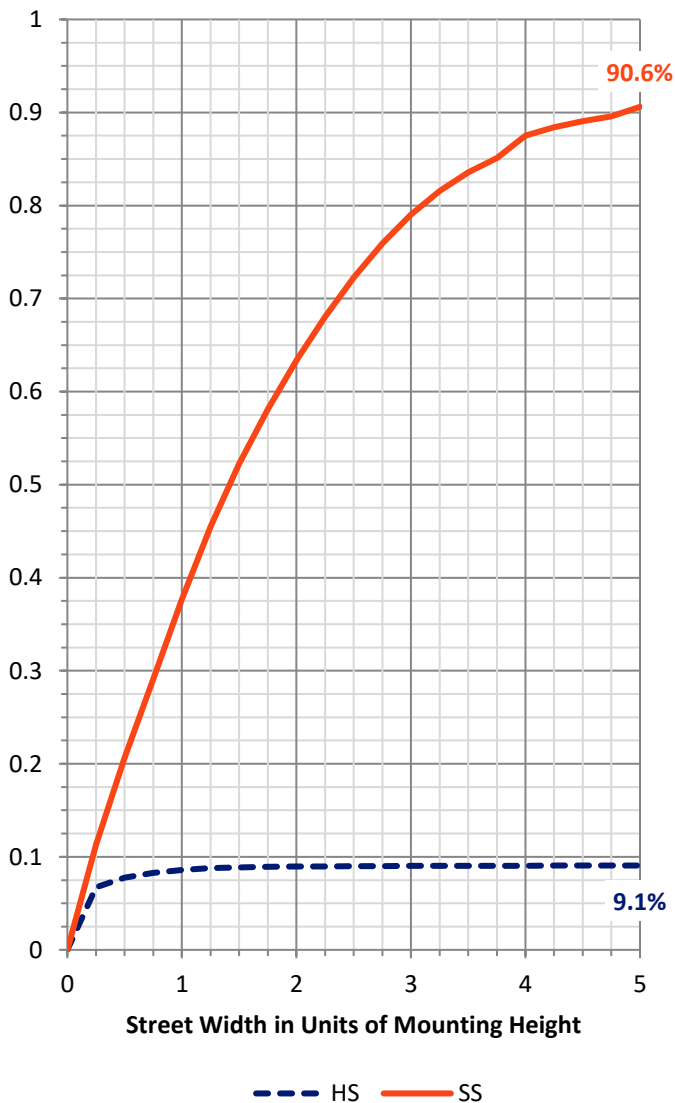
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 2497.1   | 0.0    | 2497.1  |
|                    | % Fixture | 9.1      | 0.0    | 9.1     |
| <b>Street Side</b> | Lumens    | 24896.9  | 0.0    | 24896.9 |
|                    | % Fixture | 90.9     | 0.0    | 90.9    |
| <b>Total</b>       | Lumens    | 27394.0  | 0.0    | 27394.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 390.8   | 1.4       |
| 10°-20°   | 848.5   | 3.1       |
| 20°-30°   | 1271.3  | 4.6       |
| 30°-40°   | 2022.7  | 7.4       |
| 40°-50°   | 3612.0  | 13.2      |
| 50°-60°   | 5604.7  | 20.5      |
| 60°-70°   | 7450.7  | 27.2      |
| 70°-80°   | 5604.4  | 20.5      |
| 80°-90°   | 588.9   | 2.1       |
| 90°-100°  | 0.0     | 0.0       |
| 100°-110° | 0.0     | 0.0       |
| 110°-120° | 0.0     | 0.0       |
| 120°-130° | 0.0     | 0.0       |
| 130°-140° | 0.0     | 0.0       |
| 140°-150° | 0.0     | 0.0       |
| 150°-160° | 0.0     | 0.0       |
| 160°-170° | 0.0     | 0.0       |
| 170°-180° | 0.0     | 0.0       |
| 0°-90°    | 27394.0 | 100.0     |
| 0°-180°   | 27394.0 | 100.0     |

**Coefficient of Utilization**

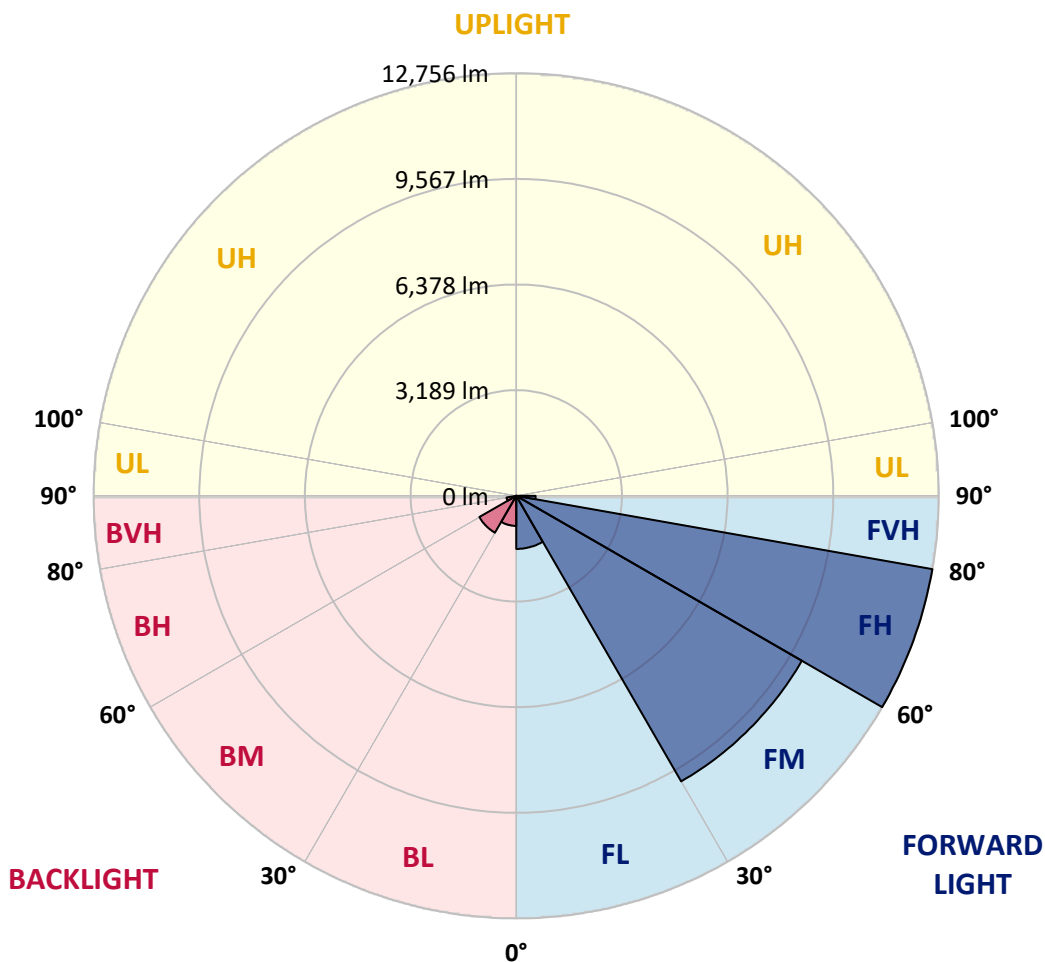


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**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone           | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |        |
|----------------|---------|-----------|-------------------------|------|--------|
|                |         |           | B                       | U    | G      |
| FL (0°-30°)    | 1602.6  | 5.9       |                         |      |        |
| FM (30°-60°)   | 9954.0  | 36.3      |                         |      |        |
| FH (60°-80°)   | 12756.4 | 46.6      |                         |      | G5     |
| FVH (80°-90°)  | 584.0   | 2.1       |                         |      | G4/750 |
| BL (0°-30°)    | 908.0   | 3.3       | B2/1000                 |      |        |
| BM (30°-60°)   | 1285.3  | 4.7       | B2/2500                 |      |        |
| BH (60°-80°)   | 298.8   | 1.1       | B1/500                  |      | G1/500 |
| BVH (80°-90°)  | 5.0     | 0.0       |                         |      | G0/10  |
| UL (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |        |
| UH (100°-180°) | 0.0     | 0.0       |                         | U0/0 |        |

**BUG Rating: B2-U0-G5**  
 Type IV Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 31°     | 35°     | 45°     | 55°     | 65°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 4713.2  | 4713.2  | 4713.2  | 4713.2  | 4713.2  | 4713.2  | 4713.2  | 4713.2  | 4713.2  | 4713.2  | 4713.2  |
| 2.5°  | 4466.5  | 4485.3  | 4505.4  | 4509.4  | 4543.0  | 4544.3  | 4592.5  | 4628.7  | 4664.9  | 4699.8  | 4711.9  |
| 5°    | 4008.1  | 4038.9  | 4075.1  | 4111.3  | 4182.4  | 4210.5  | 4328.5  | 4449.1  | 4564.4  | 4674.3  | 4727.9  |
| 7.5°  | 3518.8  | 3553.7  | 3604.6  | 3694.4  | 3773.5  | 3828.5  | 4014.8  | 4229.3  | 4443.8  | 4646.2  | 4762.8  |
| 10°   | 3072.4  | 3104.6  | 3158.2  | 3253.4  | 3375.4  | 3450.4  | 3701.1  | 3998.7  | 4313.7  | 4620.7  | 4815.1  |
| 12.5° | 2788.2  | 2805.7  | 2835.2  | 2937.0  | 3047.0  | 3131.4  | 3426.3  | 3795.0  | 4206.5  | 4619.4  | 4899.5  |
| 15°   | 2736.0  | 2741.3  | 2717.2  | 2762.8  | 2848.6  | 2930.3  | 3229.3  | 3630.1  | 4124.7  | 4640.8  | 5009.4  |
| 17.5° | 2819.1  | 2816.4  | 2736.0  | 2730.6  | 2799.0  | 2866.0  | 3132.7  | 3516.1  | 4067.1  | 4690.4  | 5151.5  |
| 20°   | 2945.1  | 2935.7  | 2796.3  | 2770.8  | 2843.2  | 2906.2  | 3126.0  | 3473.2  | 4045.6  | 4773.5  | 5324.5  |
| 22.5° | 3112.6  | 3096.6  | 2878.1  | 2851.2  | 2929.0  | 2994.7  | 3209.2  | 3514.8  | 4064.4  | 4884.8  | 5525.5  |
| 25°   | 3320.4  | 3296.3  | 3018.8  | 2989.3  | 3068.4  | 3134.1  | 3357.9  | 3634.1  | 4120.7  | 5020.2  | 5780.2  |
| 27.5° | 3555.0  | 3520.1  | 3244.0  | 3167.6  | 3257.4  | 3325.8  | 3556.3  | 3816.4  | 4209.2  | 5163.6  | 6092.6  |
| 30°   | 3776.2  | 3730.6  | 3481.3  | 3355.3  | 3465.2  | 3541.6  | 3770.8  | 4033.6  | 4351.3  | 5384.8  | 6520.2  |
| 32.5° | 3998.7  | 3947.8  | 3693.1  | 3542.9  | 3642.1  | 3725.2  | 3992.0  | 4332.5  | 4618.0  | 5722.6  | 7088.6  |
| 35°   | 4510.8  | 4457.2  | 4144.8  | 3896.8  | 3895.5  | 3942.4  | 4301.7  | 4741.3  | 4970.6  | 6193.1  | 7766.9  |
| 37.5° | 5372.7  | 5341.9  | 5044.3  | 4573.8  | 4447.8  | 4395.5  | 4723.9  | 5229.3  | 5477.3  | 6840.6  | 8532.3  |
| 40°   | 6316.4  | 6289.6  | 5955.8  | 5529.6  | 5337.9  | 5209.2  | 5329.8  | 5908.9  | 6193.1  | 7631.5  | 9313.8  |
| 42.5° | 7382.1  | 7254.8  | 6659.6  | 6532.3  | 6360.7  | 6262.8  | 6154.2  | 6746.7  | 7072.5  | 8492.1  | 10088.6 |
| 45°   | 8350.0  | 8135.5  | 7363.4  | 7170.3  | 7131.5  | 7155.6  | 7215.9  | 7872.7  | 8061.8  | 9514.9  | 10860.7 |
| 47.5° | 8926.4  | 8757.5  | 8165.0  | 7980.0  | 7969.3  | 8128.8  | 8584.6  | 9144.9  | 9047.0  | 10406.3 | 11540.4 |
| 50°   | 9474.6  | 9321.8  | 8829.9  | 8875.4  | 8925.0  | 9142.2  | 10138.2 | 10453.2 | 9946.5  | 11214.6 | 12163.7 |
| 52.5° | 9918.4  | 9685.1  | 9427.7  | 9683.8  | 9927.7  | 10277.6 | 11741.4 | 11627.5 | 10584.6 | 11858.1 | 12697.2 |
| 55°   | 10174.4 | 10068.5 | 10193.2 | 10450.5 | 10909.0 | 11477.4 | 13254.9 | 12604.7 | 11051.1 | 12445.2 | 13052.4 |
| 57.5° | 11112.7 | 10905.0 | 11153.0 | 11375.5 | 11973.3 | 12768.3 | 14551.1 | 13332.6 | 11387.5 | 12808.5 | 13134.2 |
| 60°   | 12248.1 | 12080.6 | 12226.7 | 12596.7 | 13403.6 | 14338.0 | 15762.9 | 13926.4 | 11563.1 | 13041.7 | 12922.4 |
| 62.5° | 14055.1 | 13833.9 | 13742.8 | 14157.0 | 15226.7 | 16246.8 | 16682.5 | 14338.0 | 11524.3 | 12938.5 | 12195.9 |
| 65°   | 16476.1 | 16246.8 | 15839.3 | 16214.7 | 17575.3 | 18295.1 | 17710.7 | 14425.1 | 11256.2 | 12103.4 | 10359.4 |
| 67.5° | 18956.0 | 18789.8 | 18441.2 | 19074.0 | 20301.9 | 20533.8 | 18797.8 | 14213.3 | 10392.9 | 9813.8  | 7319.1  |
| 70°   | 20594.1 | 20523.0 | 20749.6 | 22149.1 | 23244.2 | 23177.2 | 19795.1 | 13075.2 | 8100.6  | 6034.9  | 3620.7  |
| 72.5° | 19413.1 | 19753.6 | 21426.5 | 23964.1 | 25301.9 | 24755.0 | 19283.1 | 10040.3 | 4630.1  | 2321.7  | 1046.9  |
| 73°   | 18434.5 | 18870.2 | 21122.2 | 24032.5 | 25464.1 | 24864.9 | 18852.8 | 9215.9  | 3946.4  | 1832.5  | 793.6   |
| 75°   | 12824.6 | 13359.4 | 17486.8 | 22382.3 | 24705.4 | 23690.6 | 15714.7 | 5640.8  | 1828.4  | 812.3   | 320.4   |
| 77.5° | 6226.6  | 6622.1  | 9628.8  | 16171.8 | 19213.4 | 18509.6 | 9783.0  | 2101.9  | 825.7   | 508.0   | 147.5   |
| 80°   | 2324.4  | 2584.5  | 4179.7  | 8230.7  | 11103.4 | 11394.2 | 4303.0  | 794.9   | 549.6   | 408.9   | 75.1    |
| 82.5° | 608.6   | 678.3   | 1541.6  | 3670.3  | 5690.4  | 5955.8  | 1356.6  | 400.8   | 402.1   | 336.5   | 45.6    |
| 85°   | 194.4   | 222.5   | 481.2   | 1647.5  | 2681.0  | 2353.9  | 353.9   | 194.4   | 292.2   | 250.7   | 25.5    |
| 87.5° | 24.1    | 30.8    | 152.8   | 387.4   | 591.2   | 328.4   | 55.0    | 57.6    | 124.7   | 139.4   | 14.7    |
| 90°   | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |



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**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 4713.2  | 4713.2 | 4713.2 | 4713.2 | 4713.2 | 4713.2 | 4713.2 | 4713.2 | 4713.2 | 4713.2 | 4713.2 |
| 2.5°  | 4723.9  | 4717.2 | 4718.6 | 4683.7 | 4660.9 | 4615.3 | 4568.4 | 4547.0 | 4524.2 | 4514.8 | 4524.2 |
| 5°    | 4748.0  | 4736.0 | 4701.1 | 4593.9 | 4479.9 | 4332.5 | 4194.4 | 4089.9 | 3958.5 | 3922.3 | 3959.8 |
| 7.5°  | 4785.6  | 4761.5 | 4659.6 | 4441.1 | 4187.7 | 3906.2 | 3589.9 | 3359.3 | 3170.3 | 3048.3 | 3092.5 |
| 10°   | 4840.5  | 4795.0 | 4589.9 | 4218.5 | 3765.5 | 3266.8 | 2817.7 | 2467.9 | 2219.9 | 2118.0 | 2114.0 |
| 12.5° | 4933.0  | 4847.2 | 4504.1 | 3929.0 | 3249.4 | 2584.5 | 1996.0 | 1616.6 | 1415.6 | 1285.5 | 1282.9 |
| 15°   | 5034.9  | 4908.9 | 4395.5 | 3581.8 | 2648.8 | 1851.2 | 1285.5 | 997.3  | 867.3  | 825.7  | 820.4  |
| 17.5° | 5159.6  | 4980.0 | 4254.7 | 3154.2 | 2020.1 | 1226.6 | 839.2  | 756.0  | 750.7  | 746.7  | 746.7  |
| 20°   | 5316.4  | 5064.4 | 4073.8 | 2664.9 | 1433.0 | 819.0  | 713.1  | 718.5  | 721.2  | 715.8  | 717.2  |
| 22.5° | 5498.7  | 5150.2 | 3858.0 | 2139.4 | 969.2  | 685.0  | 682.3  | 689.0  | 691.7  | 689.0  | 690.4  |
| 25°   | 5710.5  | 5249.4 | 3595.2 | 1588.5 | 699.7  | 650.1  | 656.8  | 666.2  | 672.9  | 672.9  | 672.9  |
| 27.5° | 5973.3  | 5370.0 | 3278.9 | 1108.6 | 604.6  | 613.9  | 632.7  | 650.1  | 659.5  | 662.2  | 662.2  |
| 30°   | 6315.1  | 5520.2 | 2899.5 | 760.1  | 549.6  | 565.7  | 600.5  | 634.1  | 651.5  | 654.2  | 655.5  |
| 32.5° | 6746.7  | 5689.1 | 2459.8 | 561.7  | 502.7  | 514.8  | 552.3  | 608.6  | 642.1  | 647.5  | 647.5  |
| 35°   | 7241.4  | 5884.8 | 1986.6 | 489.3  | 469.2  | 473.2  | 502.7  | 567.0  | 626.0  | 640.8  | 642.1  |
| 37.5° | 7782.9  | 6077.8 | 1510.7 | 457.1  | 441.0  | 441.0  | 462.5  | 517.4  | 587.1  | 632.7  | 638.1  |
| 40°   | 8288.3  | 6194.4 | 1059.0 | 431.6  | 415.6  | 415.6  | 434.3  | 474.5  | 540.2  | 608.6  | 623.3  |
| 42.5° | 8754.8  | 6234.7 | 737.3  | 407.5  | 391.4  | 395.4  | 411.5  | 443.7  | 493.3  | 561.7  | 575.1  |
| 45°   | 9234.7  | 6228.0 | 537.5  | 379.4  | 367.3  | 379.4  | 391.4  | 415.6  | 451.7  | 490.6  | 493.3  |
| 47.5° | 9596.6  | 6171.7 | 426.3  | 352.6  | 344.5  | 360.6  | 371.3  | 387.4  | 407.5  | 404.8  | 404.8  |
| 50°   | 9935.8  | 6034.9 | 343.2  | 316.4  | 321.7  | 340.5  | 345.8  | 351.2  | 352.6  | 327.1  | 324.4  |
| 52.5° | 10193.2 | 5821.8 | 274.8  | 277.5  | 298.9  | 317.7  | 312.3  | 304.3  | 290.9  | 260.1  | 254.7  |
| 55°   | 10278.9 | 5411.6 | 215.8  | 229.2  | 265.4  | 289.5  | 269.4  | 252.0  | 226.5  | 201.1  | 195.7  |
| 57.5° | 10123.4 | 4882.1 | 175.6  | 178.3  | 223.9  | 244.0  | 221.2  | 201.1  | 172.9  | 151.5  | 147.5  |
| 60°   | 9793.7  | 4293.6 | 144.8  | 134.0  | 172.9  | 190.4  | 175.6  | 155.5  | 130.0  | 113.9  | 112.6  |
| 62.5° | 9139.5  | 3666.3 | 119.3  | 104.6  | 131.4  | 146.1  | 136.7  | 122.0  | 100.5  | 89.8   | 88.5   |
| 65°   | 7764.2  | 2933.0 | 96.5   | 84.5   | 101.9  | 113.9  | 105.9  | 95.2   | 79.1   | 71.0   | 69.7   |
| 67.5° | 5419.6  | 1982.6 | 79.1   | 69.7   | 80.4   | 89.8   | 83.1   | 77.7   | 63.0   | 61.7   | 63.0   |
| 70°   | 2614.0  | 955.8  | 65.7   | 56.3   | 63.0   | 69.7   | 67.0   | 63.0   | 60.3   | 69.7   | 80.4   |
| 72.5° | 749.3   | 320.4  | 52.3   | 46.9   | 50.9   | 55.0   | 57.6   | 56.3   | 65.7   | 84.5   | 97.9   |
| 73°   | 576.4   | 258.7  | 49.6   | 44.2   | 48.3   | 53.6   | 56.3   | 55.0   | 67.0   | 85.8   | 97.9   |
| 75°   | 246.7   | 124.7  | 37.5   | 36.2   | 40.2   | 46.9   | 49.6   | 49.6   | 67.0   | 87.1   | 93.8   |
| 77.5° | 111.3   | 67.0   | 24.1   | 28.2   | 34.9   | 37.5   | 41.6   | 41.6   | 53.6   | 67.0   | 67.0   |
| 80°   | 63.0    | 36.2   | 18.8   | 21.4   | 25.5   | 25.5   | 25.5   | 22.8   | 24.1   | 26.8   | 29.5   |
| 82.5° | 40.2    | 24.1   | 14.7   | 17.4   | 16.1   | 13.4   | 10.7   | 10.7   | 9.4    | 10.7   | 13.4   |
| 85°   | 22.8    | 13.4   | 13.4   | 10.7   | 6.7    | 5.4    | 6.7    | 5.4    | 1.3    | 0.0    | 1.3    |
| 87.5° | 13.4    | 8.0    | 4.0    | 0.0    | 0.0    | 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    |



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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: SP1-1908-441-1-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

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| 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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**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)