

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: P324953

Luminaire Tested: **GLEON-SA9A-830-U-AFL-HSS**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P324953  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-30)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA9A-830-U-AFL-HSS  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(9) 80 CRI, 3000K, 615mA LIGHTSQUARES WITH 16 LEDS EACH AND AUTOMOTIVE  
FRONTLINE OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 27102 lumens  
Efficiency: N/A  
Efficacy: 93.5 lumens/watt  
Luminous Opening: Rectangular (W 2.5' x L: 1' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B2 - U0 - G2

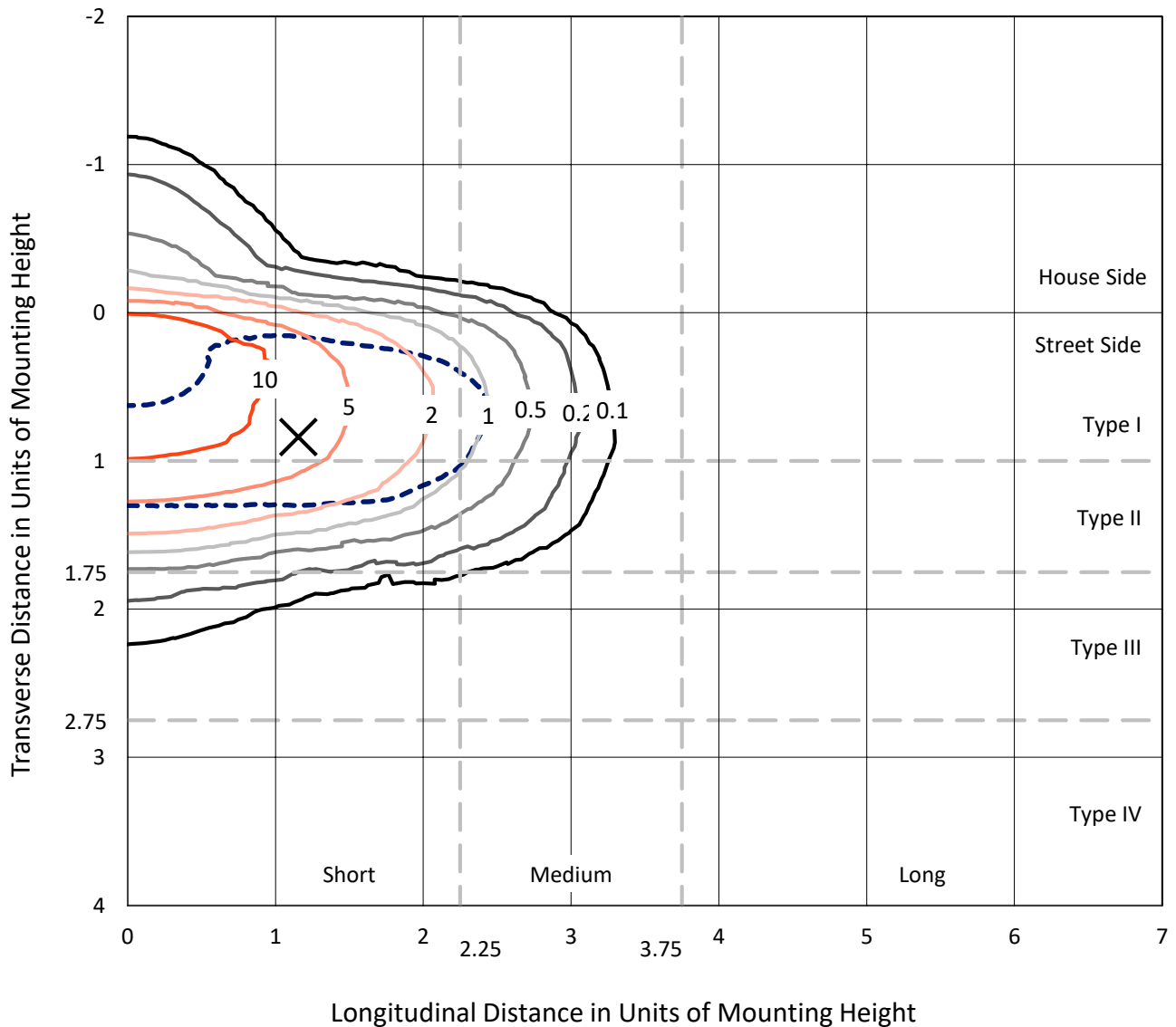
Input Watts (W): 290  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



REPORT NUMBER: P324953  
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### Iso-Footcandle Lines of Horizontal Illumination

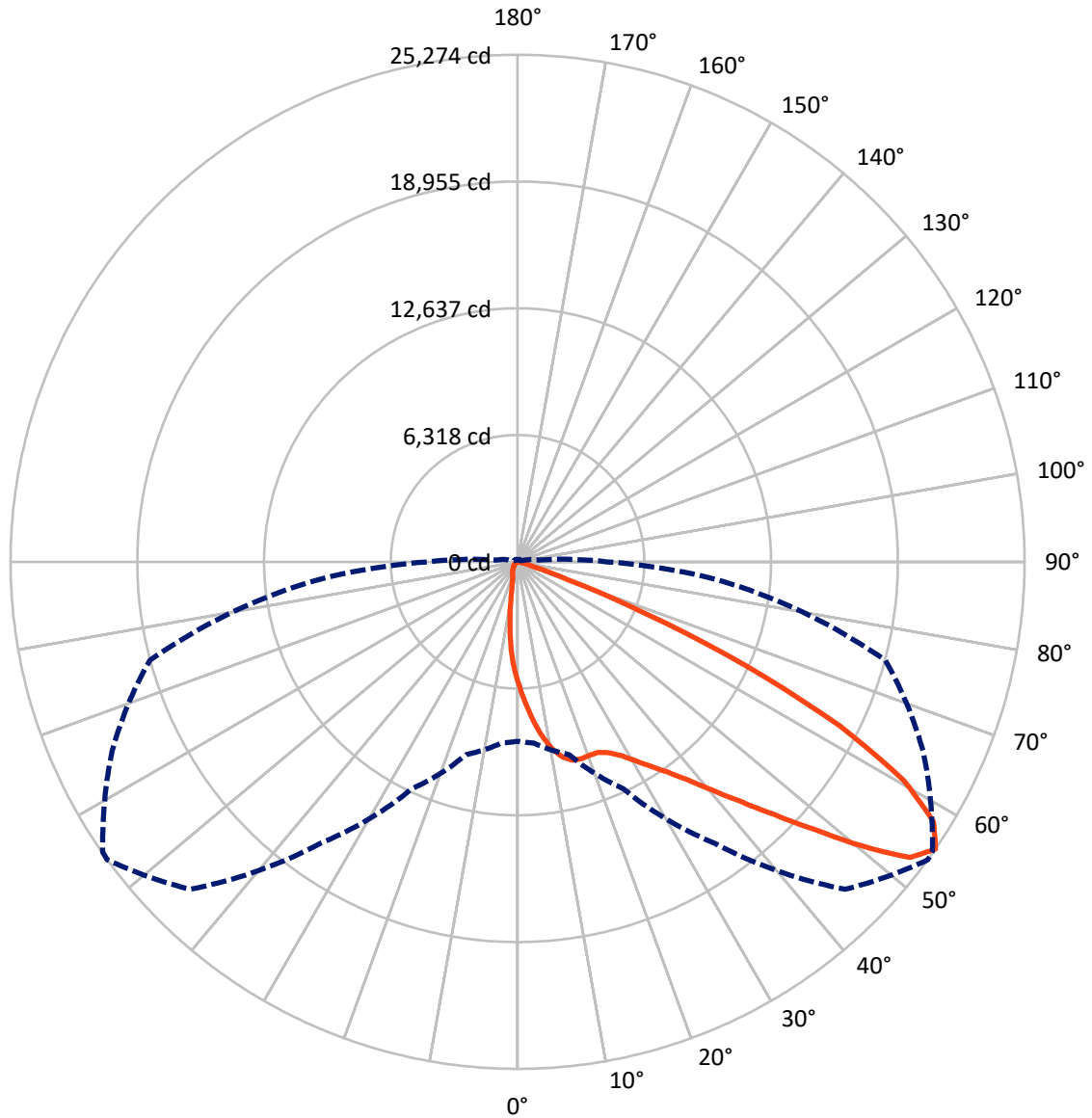
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 14.9 fc  
 Type II - Short - N/A

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### Luminous Intensity Polar Plot



— Vertical Plane Through 54-Deg Lateral      - - - Horizontal Cone Through 55-Deg Vertical

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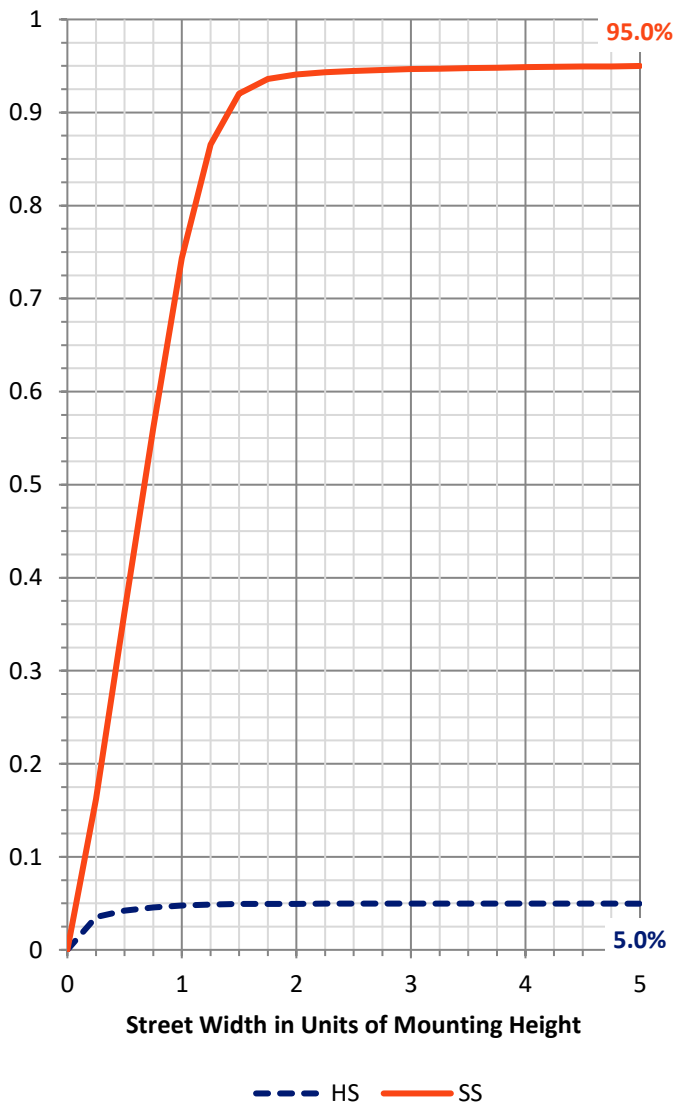
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 1352.2   | 0.0    | 1352.2  |
|                    | % Fixture | 5.0      | 0.0    | 5.0     |
| <b>Street Side</b> | Lumens    | 25749.8  | 0.0    | 25749.8 |
|                    | % Fixture | 95.0     | 0.0    | 95.0    |
| <b>Total</b>       | Lumens    | 27102.0  | 0.0    | 27102.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 559.0   | 2.1       |
| 10°-20°   | 1533.0  | 5.7       |
| 20°-30°   | 2617.3  | 9.7       |
| 30°-40°   | 4200.3  | 15.5      |
| 40°-50°   | 6712.0  | 24.8      |
| 50°-60°   | 7192.1  | 26.5      |
| 60°-70°   | 3692.6  | 13.6      |
| 70°-80°   | 559.4   | 2.1       |
| 80°-90°   | 36.4    | 0.1       |
| 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°    | 27102.0 | 100.0     |
| 0°-180°   | 27102.0 | 100.0     |

**Coefficient of Utilization**



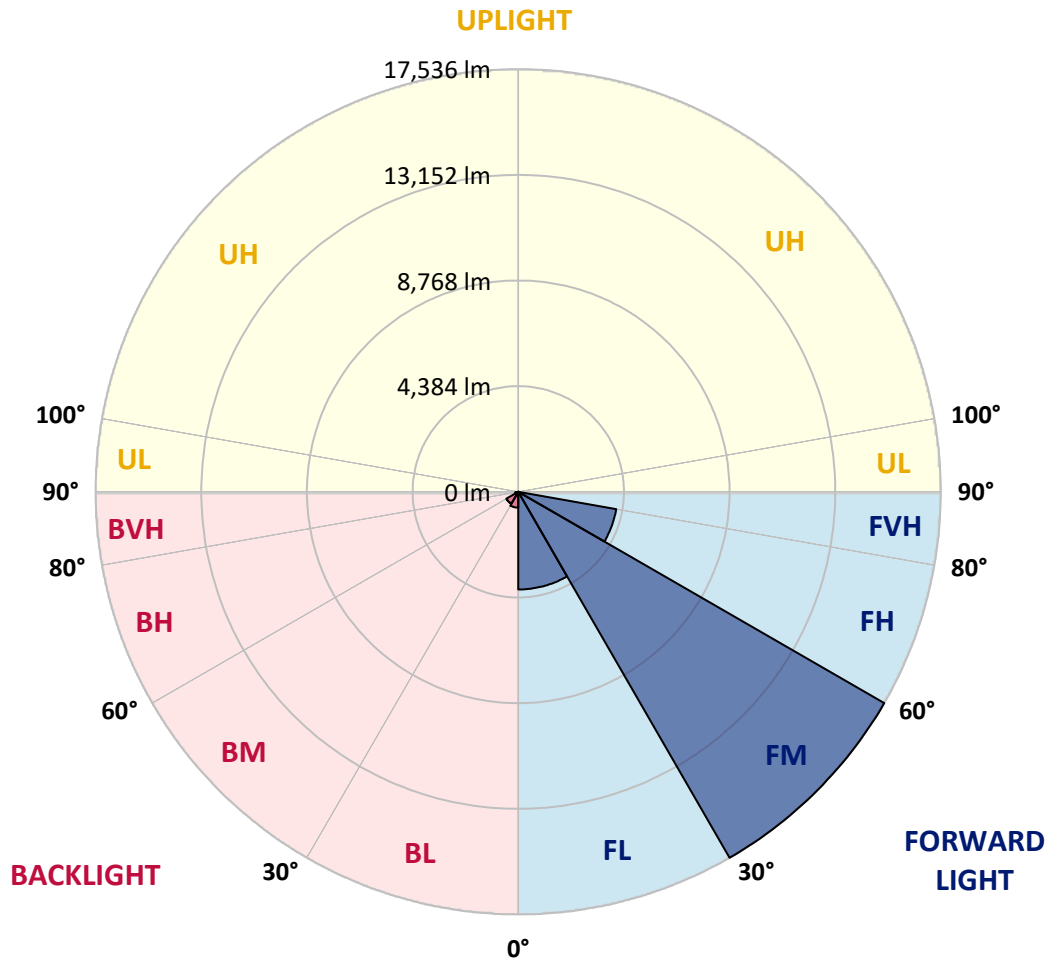
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**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone           | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|----------------|---------|-----------|-------------------------|------|---------|
|                |         |           | B                       | U    | G       |
| FL (0°-30°)    | 4051.3  | 14.9      |                         |      |         |
| FM (30°-60°)   | 17536.2 | 64.7      |                         |      |         |
| FH (60°-80°)   | 4127.4  | 15.2      |                         |      | G2/5000 |
| FVH (80°-90°)  | 35.0    | 0.1       |                         |      | G1/100  |
| BL (0°-30°)    | 657.9   | 2.4       | B2/1000                 |      |         |
| BM (30°-60°)   | 568.2   | 2.1       | B1/1000                 |      |         |
| BH (60°-80°)   | 124.6   | 0.5       | B1/500                  |      | G1/500  |
| BVH (80°-90°)  | 1.5     | 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-G2**

Type II Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 54°     | 55°     | 65°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 6069.8  | 6069.8  | 6069.8  | 6069.8  | 6069.8  | 6069.8  | 6069.8  | 6069.8  | 6069.8  | 6069.8  | 6069.8  |
| 2.5°  | 7617.0  | 7503.5  | 7507.0  | 7455.5  | 7267.1  | 7119.6  | 6966.3  | 6930.0  | 6691.2  | 6440.8  | 6199.7  |
| 5°    | 8933.8  | 8850.7  | 8830.8  | 8731.3  | 8469.1  | 8191.7  | 7894.4  | 7825.4  | 7358.4  | 6845.7  | 6341.3  |
| 7.5°  | 9610.3  | 9611.4  | 9595.0  | 9558.8  | 9394.9  | 9125.7  | 8762.9  | 8690.3  | 8054.8  | 7285.8  | 6488.8  |
| 10°   | 9413.6  | 9458.1  | 9549.4  | 9669.9  | 9795.2  | 9761.2  | 9488.5  | 9423.0  | 8732.4  | 7751.6  | 6652.6  |
| 12.5° | 8954.8  | 8960.7  | 9062.5  | 9260.3  | 9620.8  | 9990.6  | 9995.3  | 9973.1  | 9379.7  | 8238.5  | 6832.9  |
| 15°   | 8726.6  | 8748.8  | 8786.3  | 8913.9  | 9255.6  | 9847.9  | 10271.5 | 10303.1 | 9973.1  | 8755.9  | 7024.8  |
| 17.5° | 8876.4  | 8908.0  | 8876.4  | 8891.6  | 9089.4  | 9622.0  | 10319.5 | 10400.3 | 10491.6 | 9267.3  | 7206.2  |
| 20°   | 9282.5  | 9311.8  | 9255.6  | 9193.6  | 9232.2  | 9556.4  | 10285.6 | 10394.4 | 10897.7 | 9721.4  | 7358.4  |
| 22.5° | 9830.3  | 9842.0  | 9756.6  | 9654.7  | 9626.6  | 9778.8  | 10313.7 | 10426.0 | 11223.1 | 10132.3 | 7454.4  |
| 25°   | 10433.1 | 10443.6 | 10337.1 | 10220.0 | 10153.3 | 10215.4 | 10544.2 | 10628.5 | 11509.8 | 10524.4 | 7509.4  |
| 27.5° | 11089.7 | 11099.0 | 10965.6 | 10821.6 | 10744.4 | 10746.7 | 10924.6 | 11014.8 | 11815.3 | 10971.4 | 7553.8  |
| 30°   | 11783.7 | 11779.0 | 11656.1 | 11456.0 | 11357.7 | 11355.3 | 11472.4 | 11563.7 | 12257.7 | 11545.0 | 7614.7  |
| 32.5° | 12563.2 | 12553.8 | 12379.5 | 12131.3 | 12020.1 | 12036.5 | 12140.7 | 12193.4 | 12806.7 | 12155.9 | 7723.6  |
| 35°   | 13589.7 | 13562.7 | 13299.4 | 12991.6 | 12786.8 | 12780.9 | 12868.7 | 12910.8 | 13506.6 | 12895.6 | 7905.0  |
| 37.5° | 14921.6 | 14897.0 | 14540.0 | 14092.9 | 13805.0 | 13697.3 | 13801.5 | 13855.3 | 14504.9 | 13844.8 | 8196.4  |
| 40°   | 16234.8 | 16210.2 | 15998.4 | 15588.7 | 15145.1 | 14886.5 | 14968.4 | 15025.8 | 15751.4 | 14996.5 | 8563.9  |
| 42.5° | 17140.7 | 17161.8 | 17235.5 | 17269.4 | 16853.9 | 16310.9 | 16348.3 | 16408.0 | 17061.1 | 16227.8 | 8984.1  |
| 45°   | 17379.5 | 17425.1 | 17841.8 | 18659.9 | 18815.6 | 18391.9 | 17999.8 | 18032.5 | 18391.9 | 17459.0 | 9404.3  |
| 47.5° | 16662.0 | 16746.3 | 17550.3 | 19071.9 | 20389.8 | 20689.4 | 19947.3 | 19904.0 | 19668.8 | 18455.1 | 9702.7  |
| 50°   | 15031.6 | 15108.9 | 16150.5 | 18401.2 | 20867.3 | 22882.7 | 22281.1 | 22153.6 | 20788.9 | 19050.8 | 9808.1  |
| 52.5° | 12672.1 | 12765.7 | 13611.9 | 16289.8 | 19967.2 | 23861.2 | 24490.9 | 24384.4 | 21610.5 | 19097.6 | 9825.6  |
| 55°   | 8949.0  | 9062.5  | 9957.9  | 12484.8 | 17114.9 | 23082.9 | 25273.9 | 25242.3 | 22292.9 | 18973.6 | 9863.1  |
| 57.5° | 5029.3  | 5111.2  | 6076.8  | 8003.3  | 12535.1 | 20105.3 | 24455.8 | 24665.3 | 22704.8 | 18758.2 | 9919.2  |
| 60°   | 2233.1  | 2255.4  | 2755.2  | 3984.1  | 7338.5  | 15365.2 | 22113.8 | 22467.2 | 22351.4 | 18470.3 | 10014.1 |
| 62.5° | 1238.3  | 1219.6  | 1219.6  | 1656.1  | 3189.4  | 9511.9  | 18032.5 | 18616.6 | 20842.7 | 18129.7 | 10018.7 |
| 65°   | 970.3   | 952.7   | 902.4   | 909.4   | 1214.9  | 4221.7  | 12487.1 | 13525.3 | 17977.5 | 17131.3 | 9681.7  |
| 67.5° | 822.8   | 807.6   | 757.3   | 737.4   | 754.9   | 1392.8  | 6861.0  | 7938.9  | 13641.2 | 14536.5 | 8386.0  |
| 70°   | 695.2   | 684.7   | 658.9   | 634.4   | 589.9   | 688.2   | 2625.2  | 3357.9  | 8405.9  | 9669.9  | 5724.5  |
| 72.5° | 559.5   | 554.8   | 564.1   | 543.1   | 489.2   | 458.8   | 897.7   | 1087.3  | 3775.8  | 4315.3  | 2358.4  |
| 75°   | 482.2   | 479.9   | 484.6   | 463.5   | 402.6   | 319.5   | 456.5   | 498.6   | 1065.1  | 1055.7  | 477.5   |
| 77.5° | 313.7   | 317.2   | 401.5   | 392.1   | 346.4   | 213.0   | 236.4   | 255.1   | 323.0   | 242.3   | 145.1   |
| 80°   | 200.1   | 197.8   | 203.7   | 325.4   | 311.3   | 162.7   | 118.2   | 124.1   | 155.7   | 119.4   | 70.2    |
| 82.5° | 121.7   | 119.4   | 133.4   | 152.2   | 156.8   | 113.5   | 72.6    | 73.7    | 97.1    | 77.2    | 37.5    |
| 85°   | 10.5    | 14.0    | 80.8    | 74.9    | 53.8    | 35.1    | 35.1    | 37.5    | 51.5    | 45.6    | 21.1    |
| 87.5° | 0.0     | 0.0     | 14.0    | 21.1    | 11.7    | 12.9    | 12.9    | 14.0    | 19.9    | 19.9    | 10.5    |
| 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: P324953

CATALOG NUMBER: GLEON-SA9A-830-U-AFL-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 6069.8 | 6069.8 | 6069.8 | 6069.8 | 6069.8 | 6069.8 | 6069.8 | 6069.8 | 6069.8 | 6069.8 | 6069.8 |
| 2.5°  | 6074.4 | 5952.7 | 5706.9 | 5470.5 | 5270.4 | 5077.3 | 4857.2 | 4639.5 | 4537.7 | 4496.7 | 4454.6 |
| 5°    | 6085.0 | 5834.5 | 5327.7 | 4817.4 | 4288.4 | 3812.0 | 3405.9 | 2989.2 | 2780.9 | 2689.6 | 2647.5 |
| 7.5°  | 6099.0 | 5717.5 | 4898.2 | 4041.4 | 3189.4 | 2543.3 | 1979.2 | 1616.3 | 1459.5 | 1434.9 | 1374.1 |
| 10°   | 6101.4 | 5575.8 | 4399.6 | 3184.7 | 2138.3 | 1533.2 | 1179.8 | 992.5  | 923.5  | 911.8  | 891.9  |
| 12.5° | 6106.0 | 5408.5 | 3846.0 | 2358.4 | 1425.6 | 1025.3 | 853.2  | 791.2  | 772.5  | 771.3  | 771.3  |
| 15°   | 6120.1 | 5232.9 | 3271.3 | 1699.4 | 1024.1 | 812.3  | 749.1  | 724.5  | 717.5  | 721.0  | 719.8  |
| 17.5° | 6120.1 | 5025.8 | 2707.2 | 1266.4 | 827.5  | 730.3  | 695.2  | 678.8  | 676.5  | 680.0  | 681.2  |
| 20°   | 6075.6 | 4774.1 | 2189.8 | 985.5  | 733.8  | 677.7  | 646.1  | 630.9  | 625.0  | 627.3  | 628.5  |
| 22.5° | 5969.1 | 4465.1 | 1768.5 | 815.8  | 671.8  | 629.7  | 595.7  | 572.3  | 563.0  | 564.1  | 564.1  |
| 25°   | 5802.9 | 4098.8 | 1383.4 | 705.8  | 621.5  | 578.2  | 538.4  | 511.5  | 505.6  | 504.4  | 506.8  |
| 27.5° | 5589.9 | 3693.8 | 1101.4 | 621.5  | 561.8  | 520.8  | 481.0  | 458.8  | 454.1  | 455.3  | 456.5  |
| 30°   | 5380.4 | 3273.6 | 868.4  | 550.1  | 495.1  | 456.5  | 426.0  | 415.5  | 415.5  | 419.0  | 420.2  |
| 32.5° | 5188.4 | 2869.9 | 687.0  | 488.1  | 435.4  | 400.3  | 382.7  | 381.6  | 387.4  | 389.7  | 390.9  |
| 35°   | 5023.4 | 2496.5 | 568.8  | 440.1  | 388.6  | 358.1  | 352.3  | 357.0  | 364.0  | 368.7  | 369.9  |
| 37.5° | 4906.4 | 2162.9 | 497.4  | 400.3  | 352.3  | 327.7  | 326.5  | 335.9  | 345.3  | 355.8  | 358.1  |
| 40°   | 4857.2 | 1880.9 | 448.3  | 365.2  | 323.0  | 304.3  | 300.8  | 313.7  | 331.2  | 346.4  | 348.8  |
| 42.5° | 4816.2 | 1650.3 | 406.1  | 331.2  | 299.6  | 272.7  | 271.5  | 287.9  | 309.0  | 324.2  | 327.7  |
| 45°   | 4781.1 | 1465.4 | 367.5  | 294.9  | 269.2  | 234.1  | 237.6  | 258.7  | 275.0  | 291.4  | 294.9  |
| 47.5° | 4708.6 | 1313.2 | 325.4  | 256.3  | 222.4  | 200.1  | 207.2  | 225.9  | 238.8  | 263.3  | 266.9  |
| 50°   | 4578.7 | 1189.1 | 282.1  | 209.5  | 181.4  | 173.2  | 183.8  | 196.6  | 213.0  | 234.1  | 236.4  |
| 52.5° | 4490.9 | 1095.5 | 244.6  | 175.6  | 149.8  | 152.2  | 162.7  | 167.4  | 176.7  | 184.9  | 182.6  |
| 55°   | 4440.5 | 1044.0 | 214.2  | 152.2  | 127.6  | 134.6  | 136.9  | 131.1  | 126.4  | 118.2  | 114.7  |
| 57.5° | 4434.7 | 997.2  | 190.8  | 132.3  | 112.4  | 115.9  | 107.7  | 87.8   | 71.4   | 62.0   | 59.7   |
| 60°   | 4425.3 | 939.8  | 172.1  | 111.2  | 99.5   | 94.8   | 77.2   | 48.0   | 33.9   | 31.6   | 31.6   |
| 62.5° | 4323.5 | 850.9  | 158.0  | 93.6   | 84.3   | 71.4   | 44.5   | 22.2   | 18.7   | 19.9   | 19.9   |
| 65°   | 3999.3 | 726.8  | 144.0  | 76.1   | 66.7   | 51.5   | 22.2   | 12.9   | 7.0    | 8.2    | 8.2    |
| 67.5° | 3400.0 | 579.4  | 128.7  | 58.5   | 50.3   | 32.8   | 12.9   | 5.9    | 0.0    | 0.0    | 0.0    |
| 70°   | 2276.5 | 359.3  | 108.8  | 41.0   | 32.8   | 19.9   | 9.4    | 1.2    | 0.0    | 0.0    | 0.0    |
| 72.5° | 873.1  | 194.3  | 87.8   | 24.6   | 21.1   | 14.0   | 5.9    | 0.0    | 0.0    | 0.0    | 0.0    |
| 75°   | 196.6  | 127.6  | 60.9   | 17.6   | 15.2   | 9.4    | 2.3    | 0.0    | 0.0    | 0.0    | 0.0    |
| 77.5° | 74.9   | 92.5   | 35.1   | 11.7   | 10.5   | 5.9    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 80°   | 36.3   | 55.0   | 16.4   | 7.0    | 5.9    | 2.3    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 82.5° | 18.7   | 21.1   | 7.0    | 3.5    | 2.3    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 85°   | 10.5   | 10.5   | 3.5    | 2.3    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 87.5° | 5.9    | 3.5    | 1.2    | 1.2    | 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    |



Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



LM-79-2019: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

MCGRAW EDISON

Report Number: SP1-2408-195-9

Test Date: 08/07/2024

Luminaire Tested: GALN-SB1A-830-U-5WQ

Data in this report applies to families of products including GALN-SB1A-830-U-5WQ.

**Test Information**

Test Method: LM-79-2019  
 Report Number: SP1-2408-195-9  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry: 4π  
 Issue Date: 08/07/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: MCGRAW EDISON  
 Catalog Number: **GALN-SB1A-830-U-5WQ**  
 Description: GALLEON AREA AND ROADWAY LUMINAIRE. (1) 80 CRI, 3000K, 350MA HIGH DENSITY LIGHTSQUARE WITH 26 LEDS AND TYPE V WIDE OPTICS

**Spectral Parameters**

CCT (K): 3050  
 CIE u': 0.2476  
 CIE v': 0.5251  
 Duv: 0.0034  
 CIE x: 0.4383  
 CIE y: 0.4131  
 CIE z: 0.1487  
 Peak Wavelength (nm): 603  
 Dominant Wavelength (nm): 581  
 Purity: 55.55201  
 Rf: 81.5  
 Rg: 99.2

|           |      |      |      |
|-----------|------|------|------|
| CRI (Ra): | 81.0 |      |      |
| R1:       | 79.6 | R9:  | 7.1  |
| R2:       | 85.6 | R10: | 67.0 |
| R3:       | 92.0 | R11: | 82.7 |
| R4:       | 82.6 | R12: | 63.2 |
| R5:       | 78.9 | R13: | 80.3 |
| R6:       | 81.7 | R14: | 95.0 |
| R7:       | 85.2 | R15: | 71.7 |
| R8:       | 62.0 |      |      |



**Test Conditions**

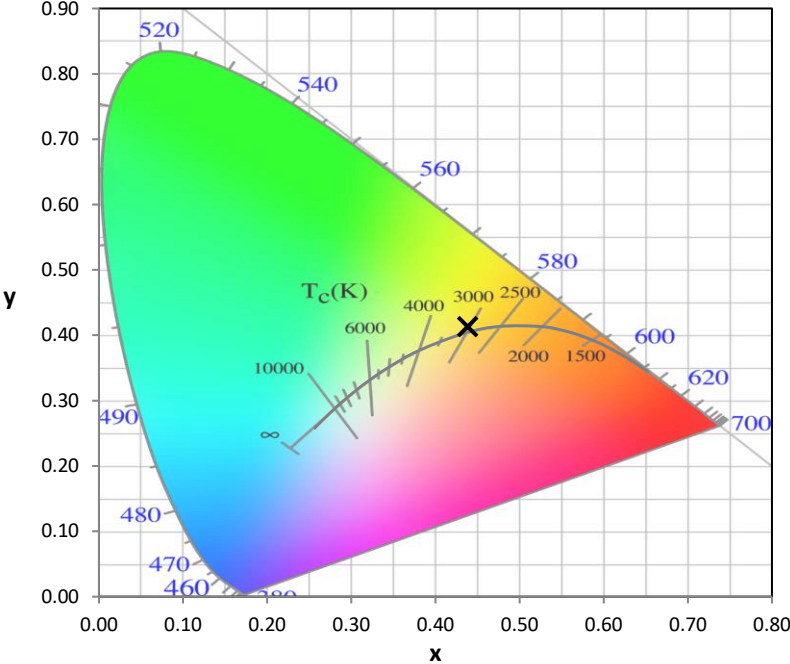
Stabilization Time: 20M  
 Operation Time: 1H 20M  
 Sphere Temperature (°C): 24.2

REPORT NUMBER: SP1-2408-195-9

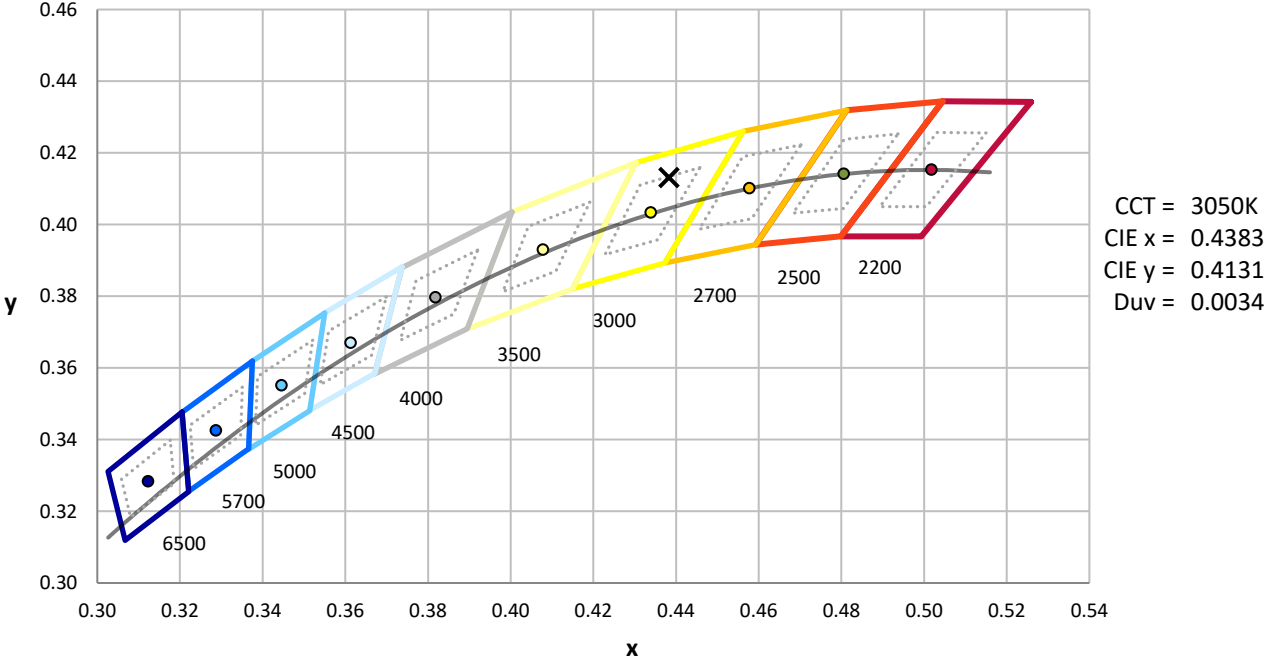
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 6/18/2024        | 12/18/2024           |
| Power Meter                    | INXT2011004           | 2/8/2024         | 2/8/2025             |
| AC Power Source                | IN0063                | 10/24/2023       | 10/24/2024           |
| DC Power Source                | IN0208                | 10/24/2023       | 10/24/2024           |
| Sphere Thermometer             | IN0085                | 10/24/2023       | 10/24/2024           |
| Room Thermometer               | IN0046                | 10/24/2023       | 10/24/2024           |

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CIE 1931 Chromaticity Diagram



CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 3000K 4-step quadrangle

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**Photopic Flux vs. Wavelength**



**Photopic Lumens: NR**

| $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) |
|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|
| 360               | 0                           | NR                      | 490               | 168                         | NR                      | 620               | 940                         | NR                      | 750               | 35                          | NR                      | 880               | 1                           | NR                      |
| 365               | 0                           | NR                      | 495               | 233                         | NR                      | 625               | 897                         | NR                      | 755               | 30                          | NR                      | 885               | 1                           | NR                      |
| 370               | 0                           | NR                      | 500               | 300                         | NR                      | 630               | 847                         | NR                      | 760               | 26                          | NR                      | 890               | 1                           | NR                      |
| 375               | 0                           | NR                      | 505               | 372                         | NR                      | 635               | 790                         | NR                      | 765               | 22                          | NR                      | 895               | 1                           | NR                      |
| 380               | 0                           | NR                      | 510               | 430                         | NR                      | 640               | 730                         | NR                      | 770               | 19                          | NR                      | 900               | 1                           | NR                      |
| 385               | 0                           | NR                      | 515               | 483                         | NR                      | 645               | 668                         | NR                      | 775               | 16                          | NR                      | 905               | 1                           | NR                      |
| 390               | 0                           | NR                      | 520               | 524                         | NR                      | 650               | 605                         | NR                      | 780               | 14                          | NR                      | 910               | 0                           | NR                      |
| 395               | 2                           | NR                      | 525               | 555                         | NR                      | 655               | 545                         | NR                      | 785               | 12                          | NR                      | 915               | 0                           | NR                      |
| 400               | 4                           | NR                      | 530               | 581                         | NR                      | 660               | 485                         | NR                      | 790               | 10                          | NR                      | 920               | 0                           | NR                      |
| 405               | 7                           | NR                      | 535               | 604                         | NR                      | 665               | 430                         | NR                      | 795               | 9                           | NR                      | 925               | 0                           | NR                      |
| 410               | 17                          | NR                      | 540               | 623                         | NR                      | 670               | 378                         | NR                      | 800               | 8                           | NR                      | 930               | 0                           | NR                      |
| 415               | 34                          | NR                      | 545               | 645                         | NR                      | 675               | 331                         | NR                      | 805               | 7                           | NR                      | 935               | 0                           | NR                      |
| 420               | 68                          | NR                      | 550               | 667                         | NR                      | 680               | 290                         | NR                      | 810               | 6                           | NR                      | 940               | 0                           | NR                      |
| 425               | 128                         | NR                      | 555               | 693                         | NR                      | 685               | 251                         | NR                      | 815               | 5                           | NR                      | 945               | 0                           | NR                      |
| 430               | 214                         | NR                      | 560               | 719                         | NR                      | 690               | 218                         | NR                      | 820               | 4                           | NR                      | 950               | 0                           | NR                      |
| 435               | 339                         | NR                      | 565               | 754                         | NR                      | 695               | 188                         | NR                      | 825               | 4                           | NR                      | 955               | 0                           | NR                      |
| 440               | 507                         | NR                      | 570               | 791                         | NR                      | 700               | 162                         | NR                      | 830               | 3                           | NR                      | 960               | 0                           | NR                      |
| 445               | 573                         | NR                      | 575               | 830                         | NR                      | 705               | 139                         | NR                      | 835               | 3                           | NR                      | 965               | 0                           | NR                      |
| 450               | 356                         | NR                      | 580               | 873                         | NR                      | 710               | 119                         | NR                      | 840               | 3                           | NR                      | 970               | 0                           | NR                      |
| 455               | 217                         | NR                      | 585               | 913                         | NR                      | 715               | 102                         | NR                      | 845               | 2                           | NR                      | 975               | 0                           | NR                      |
| 460               | 168                         | NR                      | 590               | 948                         | NR                      | 720               | 88                          | NR                      | 850               | 2                           | NR                      | 980               | 0                           | NR                      |
| 465               | 113                         | NR                      | 595               | 974                         | NR                      | 725               | 76                          | NR                      | 855               | 2                           | NR                      | 985               | 0                           | NR                      |
| 470               | 85                          | NR                      | 600               | 994                         | NR                      | 730               | 65                          | NR                      | 860               | 1                           | NR                      | 990               | 0                           | NR                      |
| 475               | 85                          | NR                      | 605               | 998                         | NR                      | 735               | 55                          | NR                      | 865               | 1                           | NR                      | 995               | 0                           | NR                      |
| 480               | 94                          | NR                      | 610               | 994                         | NR                      | 740               | 47                          | NR                      | 870               | 1                           | NR                      | 1000              | 0                           | NR                      |
| 485               | 120                         | NR                      | 615               | 973                         | NR                      | 745               | 41                          | NR                      | 875               | 1                           | NR                      |                   |                             |                         |

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**Scotopic Flux vs. Wavelength**



**Scotopic Lumens: NR**

**S/P: 1.27**

| $\lambda$ (nm) | Power W <sup>^</sup> /nm | Lumens ( $\phi$ /nm) | $\lambda$ (nm) | Power W <sup>^</sup> /nm | Lumens ( $\phi$ /nm) | $\lambda$ (nm) | Power W <sup>^</sup> /nm | Lumens ( $\phi$ /nm) | $\lambda$ (nm) | Power W <sup>^</sup> /nm | Lumens ( $\phi$ /nm) | $\lambda$ (nm) | Power W <sup>^</sup> /nm | Lumens ( $\phi$ /nm) |
|----------------|--------------------------|----------------------|----------------|--------------------------|----------------------|----------------|--------------------------|----------------------|----------------|--------------------------|----------------------|----------------|--------------------------|----------------------|
| 360            | 0                        | NR                   | 490            | 168                      | NR                   | 620            | 940                      | NR                   | 750            | 35                       | NR                   | 880            | 1                        | NR                   |
| 365            | 0                        | NR                   | 495            | 233                      | NR                   | 625            | 897                      | NR                   | 755            | 30                       | NR                   | 885            | 1                        | NR                   |
| 370            | 0                        | NR                   | 500            | 300                      | NR                   | 630            | 847                      | NR                   | 760            | 26                       | NR                   | 890            | 1                        | NR                   |
| 375            | 0                        | NR                   | 505            | 372                      | NR                   | 635            | 790                      | NR                   | 765            | 22                       | NR                   | 895            | 1                        | NR                   |
| 380            | 0                        | NR                   | 510            | 430                      | NR                   | 640            | 730                      | NR                   | 770            | 19                       | NR                   | 900            | 1                        | NR                   |
| 385            | 0                        | NR                   | 515            | 483                      | NR                   | 645            | 668                      | NR                   | 775            | 16                       | NR                   | 905            | 1                        | NR                   |
| 390            | 0                        | NR                   | 520            | 524                      | NR                   | 650            | 605                      | NR                   | 780            | 14                       | NR                   | 910            | 0                        | NR                   |
| 395            | 2                        | NR                   | 525            | 555                      | NR                   | 655            | 545                      | NR                   | 785            | 12                       | NR                   | 915            | 0                        | NR                   |
| 400            | 4                        | NR                   | 530            | 581                      | NR                   | 660            | 485                      | NR                   | 790            | 10                       | NR                   | 920            | 0                        | NR                   |
| 405            | 7                        | NR                   | 535            | 604                      | NR                   | 665            | 430                      | NR                   | 795            | 9                        | NR                   | 925            | 0                        | NR                   |
| 410            | 17                       | NR                   | 540            | 623                      | NR                   | 670            | 378                      | NR                   | 800            | 8                        | NR                   | 930            | 0                        | NR                   |
| 415            | 34                       | NR                   | 545            | 645                      | NR                   | 675            | 331                      | NR                   | 805            | 7                        | NR                   | 935            | 0                        | NR                   |
| 420            | 68                       | NR                   | 550            | 667                      | NR                   | 680            | 290                      | NR                   | 810            | 6                        | NR                   | 940            | 0                        | NR                   |
| 425            | 128                      | NR                   | 555            | 693                      | NR                   | 685            | 251                      | NR                   | 815            | 5                        | NR                   | 945            | 0                        | NR                   |
| 430            | 214                      | NR                   | 560            | 719                      | NR                   | 690            | 218                      | NR                   | 820            | 4                        | NR                   | 950            | 0                        | NR                   |
| 435            | 339                      | NR                   | 565            | 754                      | NR                   | 695            | 188                      | NR                   | 825            | 4                        | NR                   | 955            | 0                        | NR                   |
| 440            | 507                      | NR                   | 570            | 791                      | NR                   | 700            | 162                      | NR                   | 830            | 3                        | NR                   | 960            | 0                        | NR                   |
| 445            | 573                      | NR                   | 575            | 830                      | NR                   | 705            | 139                      | NR                   | 835            | 3                        | NR                   | 965            | 0                        | NR                   |
| 450            | 356                      | NR                   | 580            | 873                      | NR                   | 710            | 119                      | NR                   | 840            | 3                        | NR                   | 970            | 0                        | NR                   |
| 455            | 217                      | NR                   | 585            | 913                      | NR                   | 715            | 102                      | NR                   | 845            | 2                        | NR                   | 975            | 0                        | NR                   |
| 460            | 168                      | NR                   | 590            | 948                      | NR                   | 720            | 88                       | NR                   | 850            | 2                        | NR                   | 980            | 0                        | NR                   |
| 465            | 113                      | NR                   | 595            | 974                      | NR                   | 725            | 76                       | NR                   | 855            | 2                        | NR                   | 985            | 0                        | NR                   |
| 470            | 85                       | NR                   | 600            | 994                      | NR                   | 730            | 65                       | NR                   | 860            | 1                        | NR                   | 990            | 0                        | NR                   |
| 475            | 85                       | NR                   | 605            | 998                      | NR                   | 735            | 55                       | NR                   | 865            | 1                        | NR                   | 995            | 0                        | NR                   |
| 480            | 94                       | NR                   | 610            | 994                      | NR                   | 740            | 47                       | NR                   | 870            | 1                        | NR                   | 1000           | 0                        | NR                   |
| 485            | 120                      | NR                   | 615            | 973                      | NR                   | 745            | 41                       | NR                   | 875            | 1                        | NR                   |                |                          |                      |

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**Melanopic Flux vs. Wavelength**



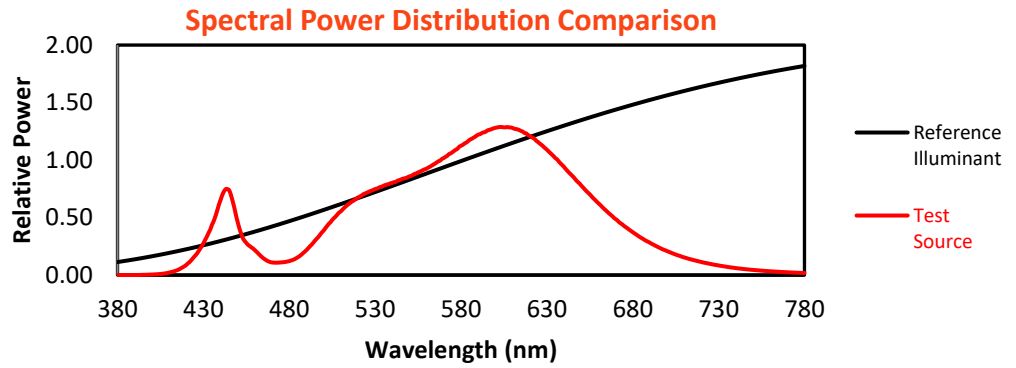
**Melanopic Lumens: NR**

**M/P: 2.32**

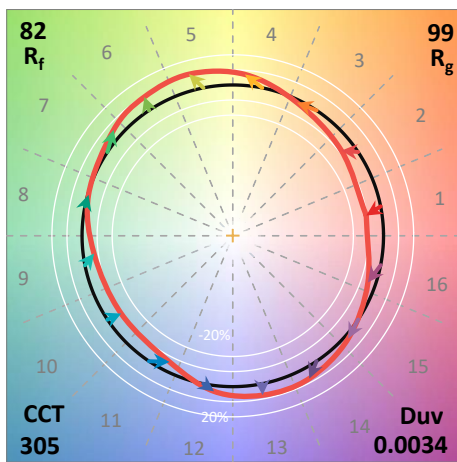
| λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 360    | 0                        | NR            | 490    | 168                      | NR            | 620    | 940                      | NR            | 750    | 35                       | NR            | 880    | 1                        | NR            |
| 365    | 0                        | NR            | 495    | 233                      | NR            | 625    | 897                      | NR            | 755    | 30                       | NR            | 885    | 1                        | NR            |
| 370    | 0                        | NR            | 500    | 300                      | NR            | 630    | 847                      | NR            | 760    | 26                       | NR            | 890    | 1                        | NR            |
| 375    | 0                        | NR            | 505    | 372                      | NR            | 635    | 790                      | NR            | 765    | 22                       | NR            | 895    | 1                        | NR            |
| 380    | 0                        | NR            | 510    | 430                      | NR            | 640    | 730                      | NR            | 770    | 19                       | NR            | 900    | 1                        | NR            |
| 385    | 0                        | NR            | 515    | 483                      | NR            | 645    | 668                      | NR            | 775    | 16                       | NR            | 905    | 1                        | NR            |
| 390    | 0                        | NR            | 520    | 524                      | NR            | 650    | 605                      | NR            | 780    | 14                       | NR            | 910    | 0                        | NR            |
| 395    | 2                        | NR            | 525    | 555                      | NR            | 655    | 545                      | NR            | 785    | 12                       | NR            | 915    | 0                        | NR            |
| 400    | 4                        | NR            | 530    | 581                      | NR            | 660    | 485                      | NR            | 790    | 10                       | NR            | 920    | 0                        | NR            |
| 405    | 7                        | NR            | 535    | 604                      | NR            | 665    | 430                      | NR            | 795    | 9                        | NR            | 925    | 0                        | NR            |
| 410    | 17                       | NR            | 540    | 623                      | NR            | 670    | 378                      | NR            | 800    | 8                        | NR            | 930    | 0                        | NR            |
| 415    | 34                       | NR            | 545    | 645                      | NR            | 675    | 331                      | NR            | 805    | 7                        | NR            | 935    | 0                        | NR            |
| 420    | 68                       | NR            | 550    | 667                      | NR            | 680    | 290                      | NR            | 810    | 6                        | NR            | 940    | 0                        | NR            |
| 425    | 128                      | NR            | 555    | 693                      | NR            | 685    | 251                      | NR            | 815    | 5                        | NR            | 945    | 0                        | NR            |
| 430    | 214                      | NR            | 560    | 719                      | NR            | 690    | 218                      | NR            | 820    | 4                        | NR            | 950    | 0                        | NR            |
| 435    | 339                      | NR            | 565    | 754                      | NR            | 695    | 188                      | NR            | 825    | 4                        | NR            | 955    | 0                        | NR            |
| 440    | 507                      | NR            | 570    | 791                      | NR            | 700    | 162                      | NR            | 830    | 3                        | NR            | 960    | 0                        | NR            |
| 445    | 573                      | NR            | 575    | 830                      | NR            | 705    | 139                      | NR            | 835    | 3                        | NR            | 965    | 0                        | NR            |
| 450    | 356                      | NR            | 580    | 873                      | NR            | 710    | 119                      | NR            | 840    | 3                        | NR            | 970    | 0                        | NR            |
| 455    | 217                      | NR            | 585    | 913                      | NR            | 715    | 102                      | NR            | 845    | 2                        | NR            | 975    | 0                        | NR            |
| 460    | 168                      | NR            | 590    | 948                      | NR            | 720    | 88                       | NR            | 850    | 2                        | NR            | 980    | 0                        | NR            |
| 465    | 113                      | NR            | 595    | 974                      | NR            | 725    | 76                       | NR            | 855    | 2                        | NR            | 985    | 0                        | NR            |
| 470    | 85                       | NR            | 600    | 994                      | NR            | 730    | 65                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 85                       | NR            | 605    | 998                      | NR            | 735    | 55                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 94                       | NR            | 610    | 994                      | NR            | 740    | 47                       | NR            | 870    | 1                        | NR            | 1000   | 0                        | NR            |
| 485    | 120                      | NR            | 615    | 973                      | NR            | 745    | 41                       | NR            | 875    | 1                        | NR            |        |                          |               |

**Summary**

$R_f = 81.5$   
 $R_g = 99.2$   
 $CIE R_a = 81.0$   
 $R_9 = 7.1$



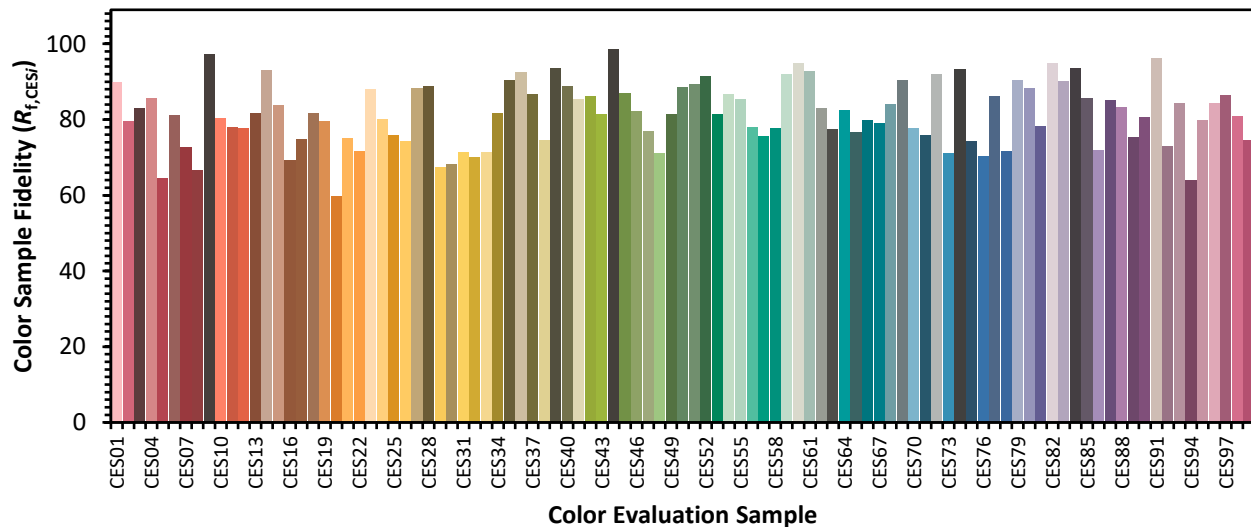
**Color Vector Graphics**



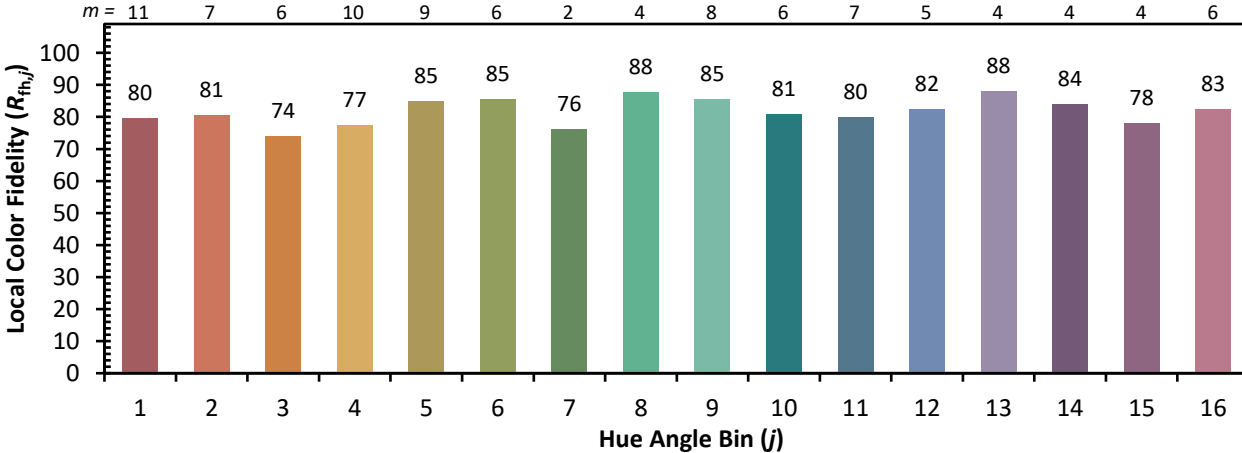


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 74 | CES51 = 89 | CES76 = 70 |
| CES02 = 63 | CES27 = 88 | CES52 = 92 | CES77 = 86 |
| CES03 = 31 | CES28 = 89 | CES53 = 81 | CES78 = 72 |
| CES04 = 70 | CES29 = 67 | CES54 = 87 | CES79 = 90 |
| CES05 = 50 | CES30 = 68 | CES55 = 85 | CES80 = 88 |
| CES06 = 51 | CES31 = 71 | CES56 = 78 | CES81 = 78 |
| CES07 = 42 | CES32 = 70 | CES57 = 76 | CES82 = 95 |
| CES08 = 41 | CES33 = 71 | CES58 = 78 | CES83 = 90 |
| CES09 = 29 | CES34 = 82 | CES59 = 92 | CES84 = 94 |
| CES10 = 76 | CES35 = 90 | CES60 = 95 | CES85 = 86 |
| CES11 = 59 | CES36 = 93 | CES61 = 93 | CES86 = 72 |
| CES12 = 65 | CES37 = 87 | CES62 = 83 | CES87 = 85 |
| CES13 = 43 | CES38 = 75 | CES63 = 77 | CES88 = 83 |
| CES14 = 74 | CES39 = 94 | CES64 = 83 | CES89 = 75 |
| CES15 = 71 | CES40 = 89 | CES65 = 77 | CES90 = 81 |
| CES16 = 47 | CES41 = 85 | CES66 = 80 | CES91 = 96 |
| CES17 = 50 | CES42 = 86 | CES67 = 79 | CES92 = 73 |
| CES18 = 56 | CES43 = 81 | CES68 = 84 | CES93 = 84 |
| CES19 = 72 | CES44 = 99 | CES69 = 91 | CES94 = 64 |
| CES20 = 66 | CES45 = 87 | CES70 = 78 | CES95 = 80 |
| CES21 = 87 | CES46 = 82 | CES71 = 76 | CES96 = 84 |
| CES22 = 79 | CES47 = 77 | CES72 = 92 | CES97 = 87 |
| CES23 = 92 | CES48 = 71 | CES73 = 71 | CES98 = 81 |
| CES24 = 91 | CES49 = 81 | CES74 = 93 | CES99 = 74 |
| CES25 = 72 | CES50 = 89 | CES75 = 74 |            |



Color Rendition by Hue-Angle Bin



Measure Comparisons



(END OF REPORT)