

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: P319208

Luminaire Tested: **GLEON-SA4C-830-U-T4W**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P319208  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-18)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA4C-830-U-T4W  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(4) 80 CRI, 3000K, 1050mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV WIDE OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 22515 lumens  
Efficiency: N/A  
Efficacy: 100.1 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B3 - U0 - G4

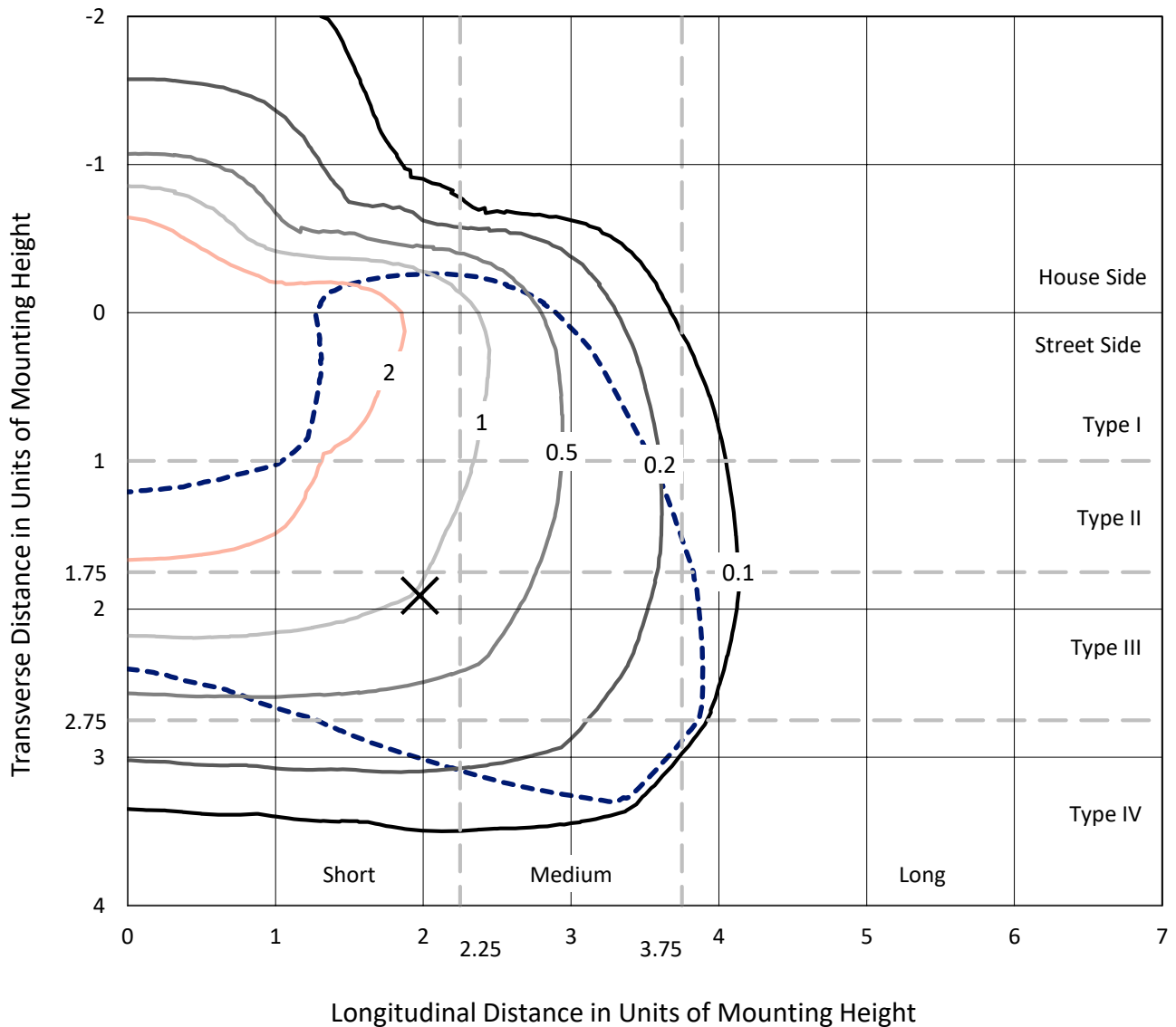
Input Watts (W): 225  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



REPORT NUMBER: P319208  
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### Iso-Footcandle Lines of Horizontal Illumination

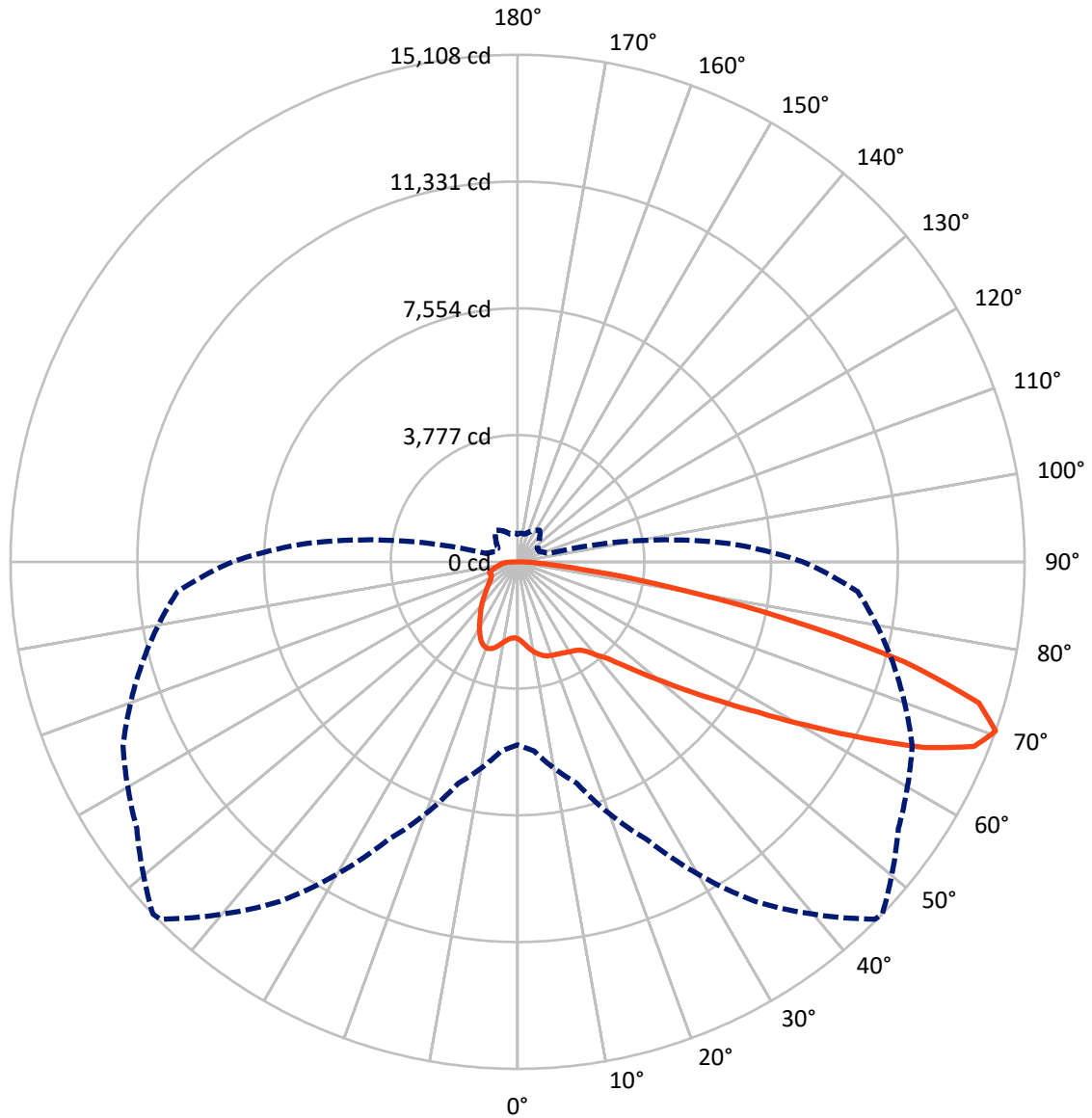
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 4.6 fc  
 Type IV - Short - N/A

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### Luminous Intensity Polar Plot



— Vertical Plane Through 46-Deg Lateral      - - - Horizontal Cone Through 70-Deg Vertical

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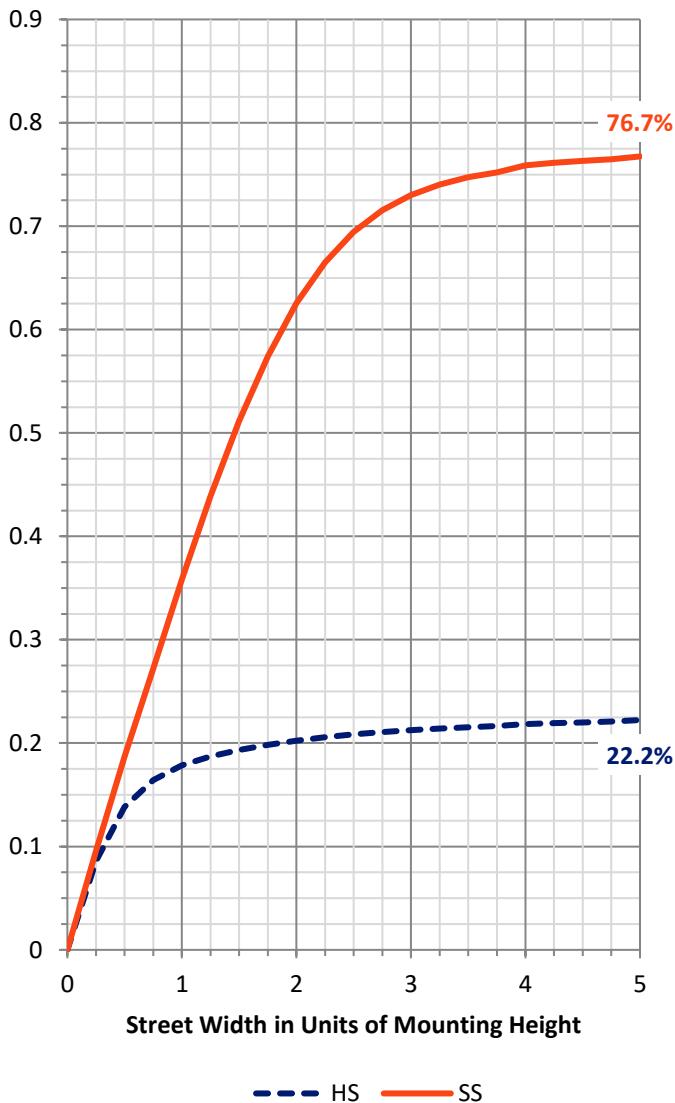
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 5160.4   | 0.0    | 5160.4  |
|                    | % Fixture | 22.9     | 0.0    | 22.9    |
| <b>Street Side</b> | Lumens    | 17354.6  | 0.0    | 17354.6 |
|                    | % Fixture | 77.1     | 0.0    | 77.1    |
| <b>Total</b>       | Lumens    | 22515.0  | 0.0    | 22515.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**Coefficient of Utilization**

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 233.8   | 1.0       |
| 10°-20°   | 779.1   | 3.5       |
| 20°-30°   | 1299.0  | 5.8       |
| 30°-40°   | 1843.4  | 8.2       |
| 40°-50°   | 2711.6  | 12.0      |
| 50°-60°   | 4592.0  | 20.4      |
| 60°-70°   | 6518.3  | 29.0      |
| 70°-80°   | 3959.9  | 17.6      |
| 80°-90°   | 577.9   | 2.6       |
| 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°    | 22515.0 | 100.0     |
| 0°-180°   | 22515.0 | 100.0     |

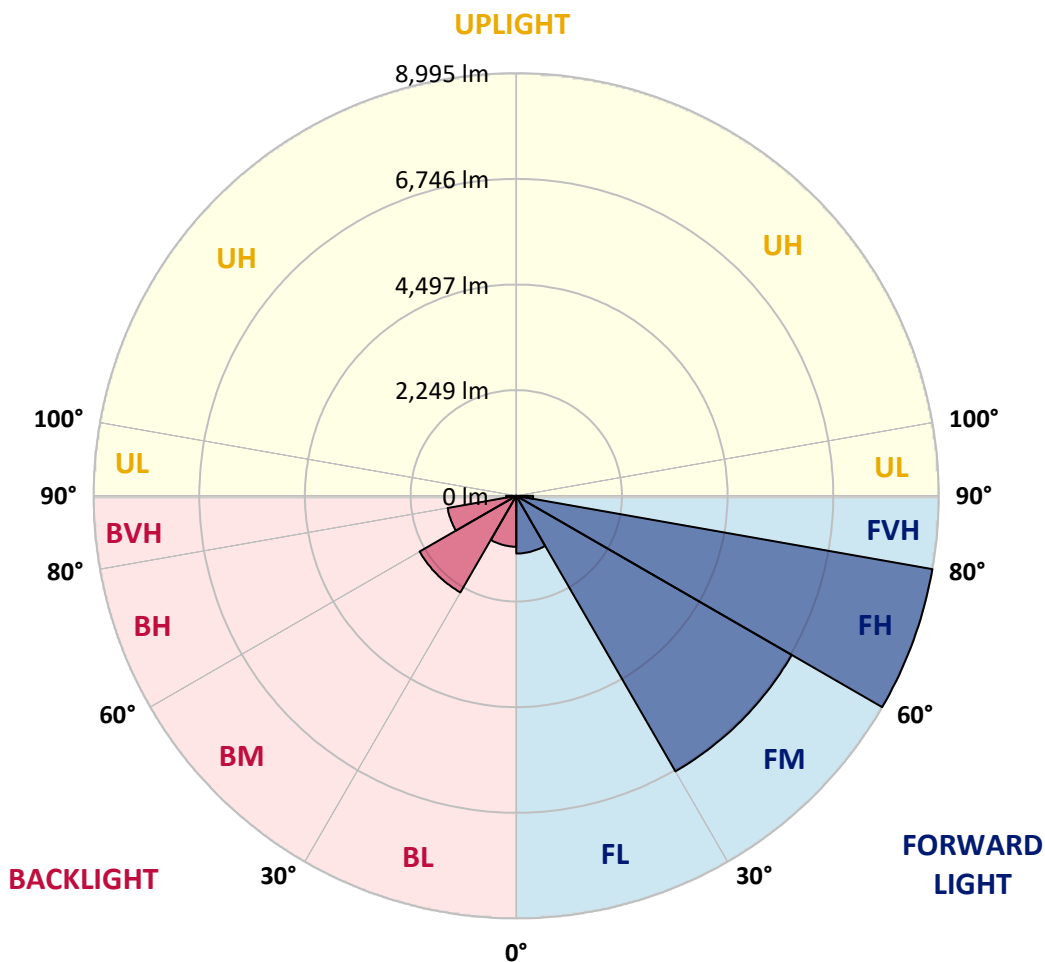


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**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone           | Lumens | % Fixture | Zone Rating/Lumen Limit |      |          |
|----------------|--------|-----------|-------------------------|------|----------|
|                |        |           | B                       | U    | G        |
| FL (0°-30°)    | 1228.5 | 5.5       |                         |      |          |
| FM (30°-60°)   | 6771.5 | 30.1      |                         |      |          |
| FH (60°-80°)   | 8994.6 | 39.9      |                         |      | G4/12000 |
| FVH (80°-90°)  | 360.0  | 1.6       |                         |      | G3/500   |
| BL (0°-30°)    | 1083.4 | 4.8       | B3/2500                 |      |          |
| BM (30°-60°)   | 2375.5 | 10.6      | B2/2500                 |      |          |
| BH (60°-80°)   | 1483.6 | 6.6       | B3/2500                 |      | G3/2500  |
| BVH (80°-90°)  | 217.9  | 1.0       |                         |      | G2/225   |
| UL (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |          |
| UH (100°-180°) | 0.0    | 0.0       |                         | U0/0 |          |

**BUG Rating: B3-U0-G4**  
 Type IV Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°     | 25°     | 35°     | 45°     | 46°     | 55°     | 65°     | 75°     | 85°     |
|-------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 2293.8 | 2293.8 | 2293.8  | 2293.8  | 2293.8  | 2293.8  | 2293.8  | 2293.8  | 2293.8  | 2293.8  | 2293.8  |
| 2.5°  | 2408.6 | 2410.2 | 2413.3  | 2405.6  | 2384.0  | 2377.8  | 2375.5  | 2353.2  | 2338.5  | 2317.0  | 2298.5  |
| 5°    | 2601.3 | 2602.8 | 2598.2  | 2576.6  | 2528.8  | 2493.4  | 2490.3  | 2439.5  | 2393.2  | 2343.9  | 2306.9  |
| 7.5°  | 2802.4 | 2804.7 | 2790.1  | 2749.2  | 2682.2  | 2620.5  | 2616.7  | 2547.3  | 2477.2  | 2402.5  | 2347.0  |
| 10°   | 2980.4 | 2971.1 | 2947.2  | 2890.2  | 2810.9  | 2735.3  | 2732.3  | 2659.8  | 2578.9  | 2488.8  | 2414.8  |
| 12.5° | 3099.0 | 3091.3 | 3060.5  | 2991.2  | 2904.1  | 2834.7  | 2828.6  | 2761.5  | 2683.0  | 2584.3  | 2495.7  |
| 15°   | 3164.5 | 3169.9 | 3128.3  | 3049.7  | 2965.0  | 2906.4  | 2901.0  | 2853.2  | 2783.1  | 2683.7  | 2582.0  |
| 17.5° | 3173.0 | 3177.6 | 3137.6  | 3059.7  | 2990.4  | 2950.3  | 2948.0  | 2916.4  | 2865.6  | 2770.0  | 2663.7  |
| 20°   | 3123.7 | 3126.8 | 3093.6  | 3029.7  | 2984.2  | 2971.9  | 2971.1  | 2957.3  | 2919.5  | 2834.7  | 2731.5  |
| 22.5° | 3052.0 | 3054.3 | 3030.5  | 2984.2  | 2968.8  | 2988.1  | 2993.5  | 2988.1  | 2961.1  | 2881.7  | 2784.7  |
| 25°   | 3034.3 | 3032.8 | 3008.1  | 2961.1  | 2974.2  | 3015.0  | 3022.0  | 3024.3  | 3005.8  | 2936.5  | 2852.5  |
| 27.5° | 3119.8 | 3114.4 | 3067.4  | 2991.9  | 3000.4  | 3049.7  | 3059.0  | 3081.3  | 3069.8  | 3008.9  | 2929.5  |
| 30°   | 3367.2 | 3357.9 | 3261.6  | 3109.0  | 3067.4  | 3092.9  | 3104.4  | 3139.9  | 3142.2  | 3091.3  | 3032.0  |
| 32.5° | 3784.8 | 3773.2 | 3600.6  | 3327.9  | 3180.7  | 3136.8  | 3147.6  | 3200.7  | 3229.2  | 3190.0  | 3126.0  |
| 35°   | 4312.6 | 4299.5 | 4073.0  | 3700.0  | 3370.3  | 3220.8  | 3228.5  | 3270.9  | 3327.9  | 3272.4  | 3187.6  |
| 37.5° | 4862.8 | 4831.2 | 4613.1  | 4137.7  | 3671.5  | 3400.3  | 3400.3  | 3405.7  | 3432.7  | 3317.1  | 3260.1  |
| 40°   | 5409.8 | 5378.2 | 5181.0  | 4652.4  | 4061.4  | 3683.1  | 3665.4  | 3545.9  | 3524.4  | 3425.0  | 3405.7  |
| 42.5° | 5918.4 | 5909.1 | 5792.8  | 5234.1  | 4519.1  | 3961.2  | 3936.6  | 3733.9  | 3738.6  | 3676.9  | 3677.7  |
| 45°   | 6459.3 | 6459.3 | 6364.5  | 5821.3  | 5052.3  | 4408.1  | 4383.5  | 4085.3  | 4131.5  | 4103.0  | 4171.6  |
| 47.5° | 6900.8 | 6914.6 | 6901.5  | 6433.1  | 5672.6  | 4976.0  | 4931.3  | 4572.3  | 4701.7  | 4799.6  | 4999.1  |
| 50°   | 7351.5 | 7373.1 | 7375.4  | 7104.2  | 6422.3  | 5651.0  | 5600.1  | 5218.7  | 5507.7  | 5788.1  | 6180.3  |
| 52.5° | 8005.7 | 8054.2 | 7860.8  | 7773.8  | 7340.7  | 6452.3  | 6402.3  | 6050.1  | 6532.5  | 6926.2  | 7601.9  |
| 55°   | 8612.1 | 8569.7 | 8431.8  | 8485.7  | 8323.9  | 7364.6  | 7326.9  | 7017.9  | 7674.4  | 8186.0  | 9063.6  |
| 57.5° | 8940.3 | 8937.3 | 9076.0  | 9307.1  | 9384.2  | 8489.6  | 8458.0  | 8157.5  | 8961.9  | 9346.4  | 10435.9 |
| 60°   | 9325.6 | 9331.0 | 9674.6  | 10199.4 | 10516.8 | 9890.4  | 9876.5  | 9648.5  | 10212.5 | 10429.8 | 11512.3 |
| 62.5° | 9379.5 | 9476.6 | 10068.4 | 10971.4 | 11577.1 | 11527.0 | 11557.8 | 10991.5 | 11331.3 | 11294.3 | 12316.0 |
| 65°   | 8759.3 | 8887.2 | 9958.2  | 11204.9 | 12631.1 | 13316.9 | 13345.4 | 12342.2 | 12213.5 | 12033.2 | 12603.4 |
| 67.5° | 7487.9 | 7677.5 | 8840.9  | 10697.1 | 12978.6 | 14639.9 | 14679.9 | 13389.3 | 12945.5 | 12283.6 | 11911.5 |
| 70°   | 5449.1 | 5659.5 | 6830.7  | 9136.1  | 12359.1 | 15062.9 | 15108.4 | 13852.4 | 12973.2 | 11570.9 | 10168.6 |
| 72.5° | 3291.7 | 3456.6 | 4422.0  | 6725.9  | 10431.3 | 14292.4 | 14373.3 | 13265.3 | 11844.4 | 9801.0  | 7508.7  |
| 75°   | 1445.5 | 1553.4 | 2138.2  | 3875.7  | 7467.9  | 11825.2 | 11926.1 | 11354.4 | 9623.8  | 7122.7  | 4438.2  |
| 77.5° | 615.6  | 646.5  | 876.9   | 1683.6  | 4221.7  | 8080.4  | 8219.1  | 8296.2  | 6529.4  | 3875.7  | 1875.4  |
| 80°   | 383.7  | 396.0  | 496.2   | 762.0   | 1975.6  | 4538.4  | 4687.8  | 4881.2  | 3242.3  | 1424.7  | 654.9   |
| 82.5° | 233.5  | 247.3  | 329.8   | 460.8   | 1028.6  | 2057.3  | 2128.9  | 2265.3  | 1258.3  | 615.6   | 339.0   |
| 85°   | 140.2  | 150.3  | 201.9   | 291.3   | 585.6   | 809.0   | 808.3   | 893.8   | 592.5   | 396.0   | 178.8   |
| 87.5° | 67.0   | 74.7   | 107.9   | 151.0   | 295.1   | 303.6   | 284.3   | 322.1   | 359.8   | 259.7   | 90.2    |
| 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: P319208  
 CATALOG NUMBER: GLEON-SA4C-830-U-T4W

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2293.8  | 2293.8 | 2293.8 | 2293.8 | 2293.8 | 2293.8 | 2293.8 | 2293.8 | 2293.8 | 2293.8 | 2293.8 |
| 2.5°  | 2292.3  | 2289.2 | 2279.2 | 2271.5 | 2270.0 | 2265.3 | 2261.5 | 2263.8 | 2266.9 | 2267.6 | 2267.6 |
| 5°    | 2291.5  | 2283.1 | 2270.0 | 2264.6 | 2271.5 | 2280.7 | 2292.3 | 2307.7 | 2317.0 | 2323.9 | 2328.5 |
| 7.5°  | 2328.5  | 2312.3 | 2297.7 | 2294.6 | 2308.5 | 2333.1 | 2359.3 | 2391.7 | 2414.0 | 2429.4 | 2432.5 |
| 10°   | 2390.2  | 2370.1 | 2355.5 | 2358.6 | 2383.2 | 2418.7 | 2455.6 | 2497.3 | 2531.2 | 2552.0 | 2553.5 |
| 12.5° | 2461.0  | 2441.8 | 2427.9 | 2441.0 | 2481.8 | 2525.0 | 2563.5 | 2599.7 | 2630.6 | 2651.4 | 2651.4 |
| 15°   | 2542.7  | 2528.8 | 2512.7 | 2542.7 | 2598.2 | 2636.7 | 2652.9 | 2670.6 | 2687.6 | 2703.0 | 2699.9 |
| 17.5° | 2621.3  | 2608.2 | 2599.7 | 2635.2 | 2693.0 | 2710.7 | 2699.9 | 2686.8 | 2686.8 | 2695.3 | 2696.8 |
| 20°   | 2689.1  | 2677.6 | 2683.0 | 2717.6 | 2747.7 | 2729.2 | 2689.1 | 2647.5 | 2630.6 | 2635.2 | 2639.8 |
| 22.5° | 2748.4  | 2743.1 | 2759.2 | 2775.4 | 2753.8 | 2689.1 | 2615.1 | 2558.9 | 2538.1 | 2536.6 | 2538.1 |
| 25°   | 2817.8  | 2817.0 | 2837.1 | 2807.8 | 2712.2 | 2592.8 | 2493.4 | 2438.7 | 2427.1 | 2436.4 | 2451.8 |
| 27.5° | 2904.1  | 2912.6 | 2922.6 | 2815.5 | 2627.5 | 2447.2 | 2346.2 | 2308.5 | 2320.0 | 2342.4 | 2357.0 |
| 30°   | 3014.3  | 3037.4 | 3015.8 | 2796.2 | 2505.7 | 2280.7 | 2184.4 | 2173.6 | 2205.2 | 2236.8 | 2252.2 |
| 32.5° | 3121.4  | 3157.6 | 3105.2 | 2746.1 | 2348.5 | 2104.3 | 2029.5 | 2026.5 | 2065.0 | 2095.8 | 2117.4 |
| 35°   | 3207.7  | 3279.3 | 3172.2 | 2646.7 | 2166.7 | 1941.7 | 1887.0 | 1866.2 | 1880.1 | 1916.3 | 1940.9 |
| 37.5° | 3320.2  | 3439.6 | 3218.5 | 2494.9 | 1969.4 | 1807.6 | 1743.7 | 1695.9 | 1683.6 | 1698.2 | 1710.6 |
| 40°   | 3525.9  | 3683.9 | 3240.0 | 2283.1 | 1776.8 | 1673.6 | 1608.8 | 1538.7 | 1490.2 | 1454.7 | 1455.5 |
| 42.5° | 3861.8  | 4002.1 | 3226.2 | 2025.7 | 1598.8 | 1542.6 | 1469.4 | 1388.5 | 1309.9 | 1229.7 | 1223.6 |
| 45°   | 4407.4  | 4475.2 | 3184.6 | 1752.9 | 1442.4 | 1405.4 | 1336.9 | 1255.9 | 1151.2 | 1060.2 | 1051.8 |
| 47.5° | 5280.4  | 5130.1 | 3119.8 | 1514.8 | 1304.5 | 1289.1 | 1225.9 | 1132.7 | 1021.7 | 948.5  | 942.3  |
| 50°   | 6470.8  | 6075.5 | 3088.2 | 1325.3 | 1182.7 | 1187.4 | 1135.7 | 1037.1 | 932.3  | 878.4  | 872.2  |
| 52.5° | 7894.7  | 7176.6 | 3149.1 | 1178.9 | 1084.9 | 1101.1 | 1062.5 | 970.1  | 882.2  | 839.9  | 833.7  |
| 55°   | 9371.8  | 8317.0 | 3214.6 | 1072.6 | 992.4  | 1024.0 | 1010.9 | 934.6  | 855.3  | 816.0  | 810.6  |
| 57.5° | 10636.3 | 9168.4 | 3083.6 | 986.3  | 910.0  | 959.3  | 970.9  | 912.3  | 841.4  | 806.0  | 799.8  |
| 60°   | 11432.2 | 9511.3 | 2740.0 | 905.4  | 844.5  | 907.7  | 947.7  | 906.1  | 846.8  | 843.7  | 839.1  |
| 62.5° | 11809.8 | 9481.2 | 2224.5 | 841.4  | 803.7  | 885.3  | 964.7  | 940.8  | 908.4  | 936.2  | 938.5  |
| 65°   | 11640.2 | 9028.2 | 1656.6 | 799.0  | 774.4  | 893.8  | 1015.5 | 1006.3 | 926.2  | 953.9  | 957.8  |
| 67.5° | 10524.5 | 7947.1 | 1226.7 | 762.0  | 742.0  | 917.7  | 1108.0 | 1027.9 | 891.5  | 911.5  | 899.2  |
| 70°   | 8506.5  | 6300.5 | 946.2  | 720.4  | 708.9  | 914.6  | 1149.6 | 1014.8 | 853.7  | 858.4  | 825.2  |
| 72.5° | 5866.0  | 4296.4 | 769.7  | 681.9  | 661.1  | 833.7  | 1120.3 | 982.4  | 822.1  | 786.7  | 742.8  |
| 75°   | 3190.0  | 2306.2 | 654.2  | 641.8  | 577.1  | 732.0  | 1066.4 | 959.3  | 793.6  | 746.6  | 722.0  |
| 77.5° | 1255.2  | 957.0  | 567.9  | 587.1  | 504.7  | 646.5  | 1006.3 | 915.4  | 754.3  | 692.7  | 680.4  |
| 80°   | 512.4   | 488.5  | 470.8  | 507.8  | 433.8  | 565.6  | 933.9  | 863.8  | 707.3  | 642.6  | 618.0  |
| 82.5° | 290.5   | 303.6  | 366.0  | 400.7  | 352.1  | 520.9  | 899.2  | 822.1  | 651.1  | 575.6  | 546.3  |
| 85°   | 148.7   | 178.0  | 255.0  | 287.4  | 258.9  | 443.0  | 828.3  | 719.7  | 522.4  | 440.7  | 443.0  |
| 87.5° | 71.7    | 99.4   | 161.0  | 180.3  | 168.0  | 320.5  | 618.7  | 521.6  | 406.8  | 322.1  | 312.1  |
| 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**

| 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            |        |                          |               |

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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)