

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: P323003

Luminaire Tested: **GLEON-SA9B-827-U-T4W-HSS**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P323003  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-19)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA9B-827-U-T4W-HSS  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(9) 80 CRI, 2700K, 800mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV WIDE OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 27221 lumens  
Efficiency: N/A  
Efficacy: 72.8 lumens/watt  
Luminous Opening: Rectangular (W 2.5' x L: 1' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B2 - U0 - G5

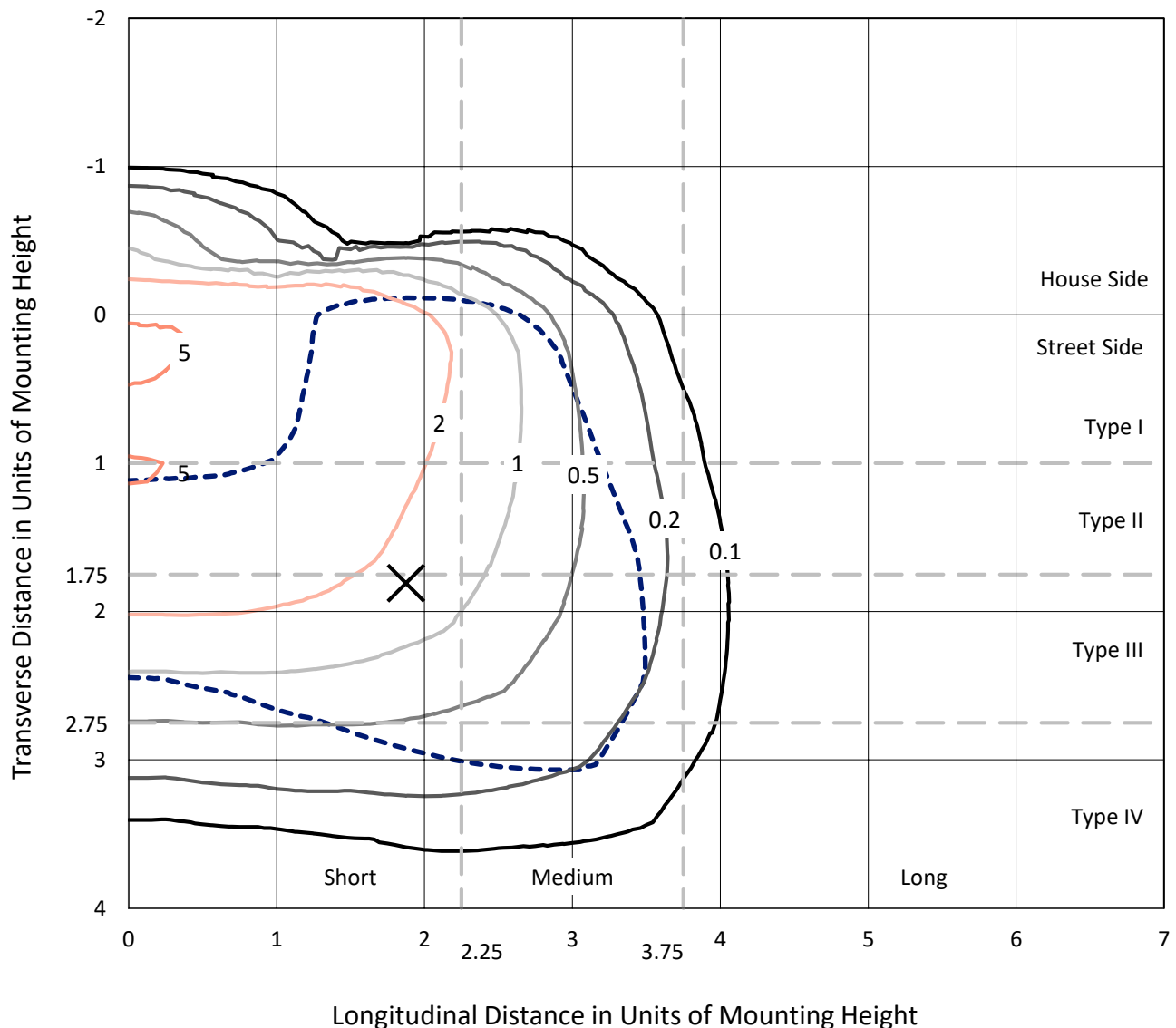
Input Watts (W): 374  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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## Iso-Footcandle Lines of Horizontal Illumination

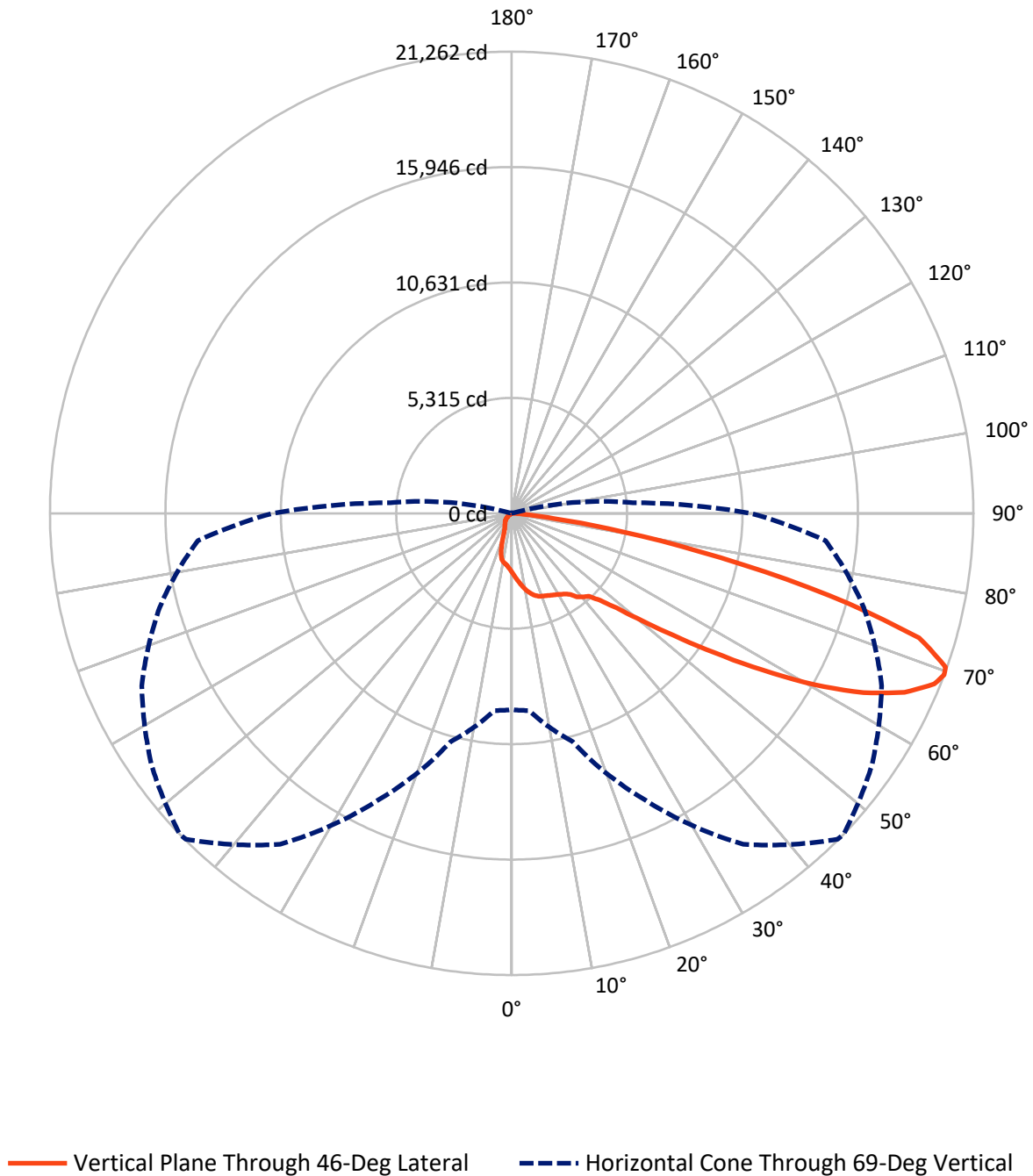
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 6.3 fc  
 Type IV - Short - N/A

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## Luminous Intensity Polar Plot



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**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 2793.6   | 0.0    | 2793.6  |
|                    | % Fixture | 10.3     | 0.0    | 10.3    |
| <b>Street Side</b> | Lumens    | 24427.4  | 0.0    | 24427.4 |
|                    | % Fixture | 89.7     | 0.0    | 89.7    |
| <b>Total</b>       | Lumens    | 27221.0  | 0.0    | 27221.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 271.5   | 1.0       |
| 10°-20°   | 823.6   | 3.0       |
| 20°-30°   | 1295.2  | 4.8       |
| 30°-40°   | 1857.4  | 6.8       |
| 40°-50°   | 3210.2  | 11.8      |
| 50°-60°   | 6342.1  | 23.3      |
| 60°-70°   | 8863.7  | 32.6      |
| 70°-80°   | 4282.1  | 15.7      |
| 80°-90°   | 275.2   | 1.0       |
| 90°-100°  | 0.0     | 0.0       |
| 100°-110° | 0.0     | 0.0       |
| 110°-120° | 0.0     | 0.0       |
| 120°-130° | 0.0     | 0.0       |
| 130°-140° | 0.0     | 0.0       |
| 140°-150° | 0.0     | 0.0       |
| 150°-160° | 0.0     | 0.0       |
| 160°-170° | 0.0     | 0.0       |
| 170°-180° | 0.0     | 0.0       |
| 0°-90°    | 27221.0 | 100.0     |
| 0°-180°   | 27221.0 | 100.0     |

**Coefficient of Utilization**



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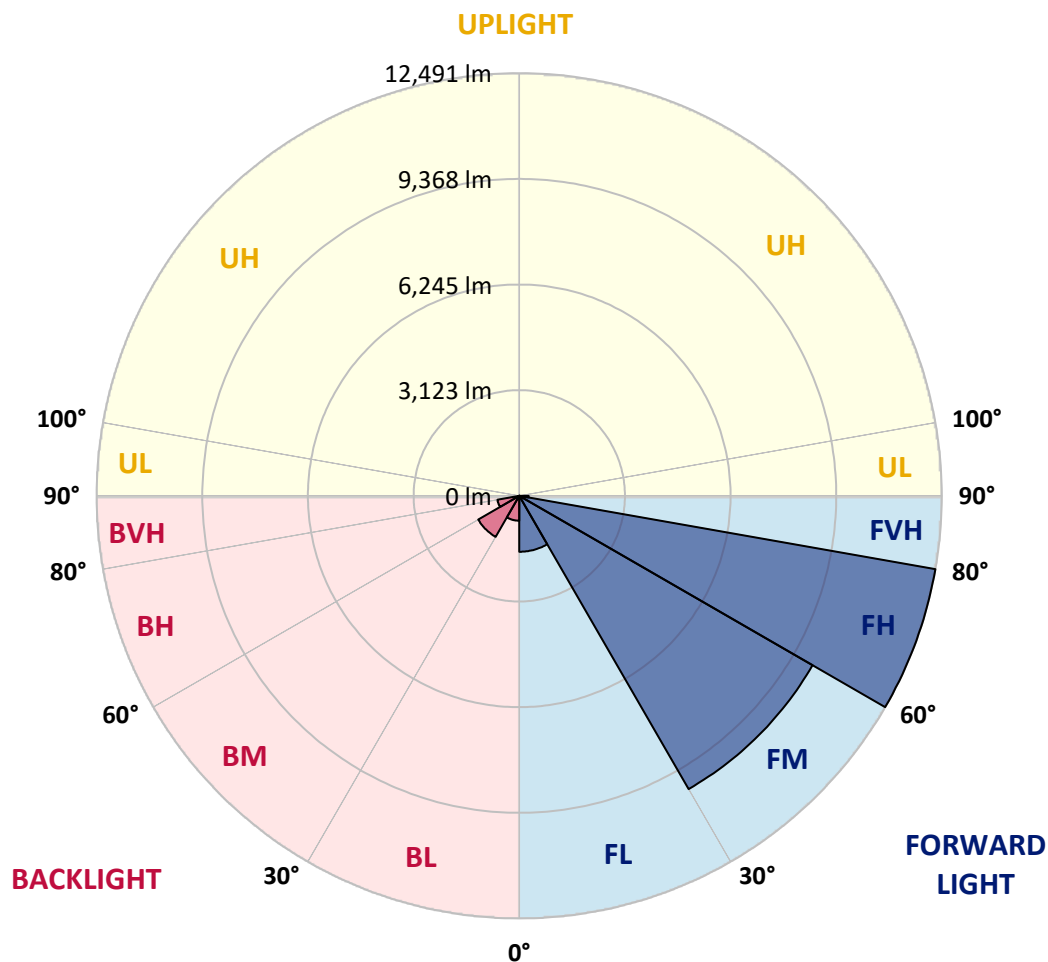
CATALOG NUMBER: GLEON-SA9B-827-U-T4W-HSS

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|---------|-----------|-------------------------|------|---------|
|      |             |         |           | B                       | U    | G       |
| FL   | (0°-30°)    | 1654.0  | 6.1       |                         |      |         |
| FM   | (30°-60°)   | 10009.8 | 36.8      |                         |      |         |
| FH   | (60°-80°)   | 12490.7 | 45.9      |                         |      | G5      |
| FVH  | (80°-90°)   | 272.9   | 1.0       |                         |      | G3/500  |
| BL   | (0°-30°)    | 736.3   | 2.7       | B2/1000                 |      |         |
| BM   | (30°-60°)   | 1399.9  | 5.1       | B2/2500                 |      |         |
| BH   | (60°-80°)   | 655.0   | 2.4       | B2/1000                 |      | G2/1000 |
| BVH  | (80°-90°)   | 2.3     | 0.0       |                         |      | G0/10   |
| UL   | (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0     | 0.0       |                         | U0/0 |         |

**BUG Rating: B2-U0-G5**

Type IV Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 46°     | 55°     | 65°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 2727.4  | 2727.4  | 2727.4  | 2727.4  | 2727.4  | 2727.4  | 2727.4  | 2727.4  | 2727.4  | 2727.4  | 2727.4  |
| 2.5°  | 3029.9  | 3026.1  | 3008.2  | 3000.6  | 2957.2  | 2931.6  | 2921.4  | 2889.5  | 2843.6  | 2797.6  | 2746.6  |
| 5°    | 3374.5  | 3373.2  | 3340.1  | 3308.2  | 3226.5  | 3149.9  | 3135.9  | 3061.8  | 2958.5  | 2861.5  | 2764.5  |
| 7.5°  | 3726.8  | 3710.2  | 3677.0  | 3615.7  | 3497.0  | 3374.5  | 3363.0  | 3258.4  | 3111.6  | 2971.2  | 2832.1  |
| 10°   | 4025.4  | 4015.2  | 3971.8  | 3878.7  | 3739.5  | 3600.4  | 3586.4  | 3457.5  | 3291.6  | 3119.3  | 2941.9  |
| 12.5° | 4257.7  | 4250.1  | 4192.6  | 4076.5  | 3928.4  | 3784.2  | 3765.1  | 3650.2  | 3472.8  | 3280.1  | 3070.8  |
| 15°   | 4399.4  | 4395.6  | 4325.4  | 4201.6  | 4056.1  | 3931.0  | 3914.4  | 3813.6  | 3648.9  | 3447.3  | 3211.2  |
| 17.5° | 4432.6  | 4433.8  | 4361.1  | 4236.0  | 4116.1  | 4026.7  | 4013.9  | 3937.4  | 3799.5  | 3599.2  | 3351.6  |
| 20°   | 4358.5  | 4373.9  | 4308.8  | 4200.3  | 4126.3  | 4079.0  | 4068.8  | 4022.9  | 3906.7  | 3717.8  | 3463.9  |
| 22.5° | 4253.9  | 4261.5  | 4216.9  | 4144.1  | 4113.5  | 4122.4  | 4117.3  | 4091.8  | 3993.5  | 3820.0  | 3574.9  |
| 25°   | 4190.1  | 4190.1  | 4163.3  | 4102.0  | 4122.4  | 4177.3  | 4178.6  | 4173.5  | 4095.6  | 3945.0  | 3710.2  |
| 27.5° | 4187.5  | 4179.9  | 4149.2  | 4103.3  | 4159.4  | 4243.7  | 4248.8  | 4283.2  | 4234.7  | 4096.9  | 3878.7  |
| 30°   | 4289.6  | 4280.7  | 4215.6  | 4155.6  | 4227.1  | 4317.7  | 4330.5  | 4405.8  | 4381.5  | 4261.5  | 4066.3  |
| 32.5° | 4528.3  | 4496.4  | 4352.2  | 4253.9  | 4307.5  | 4416.0  | 4432.6  | 4552.5  | 4590.8  | 4464.5  | 4247.5  |
| 35°   | 4855.0  | 4754.2  | 4546.2  | 4440.2  | 4445.3  | 4558.9  | 4574.2  | 4750.4  | 4864.0  | 4650.8  | 4387.9  |
| 37.5° | 5305.6  | 5255.8  | 4917.6  | 4634.2  | 4657.2  | 4829.5  | 4874.2  | 5065.6  | 5033.7  | 4752.9  | 4547.4  |
| 40°   | 6293.4  | 6215.6  | 5855.6  | 5177.9  | 4860.1  | 5049.0  | 5063.1  | 5165.2  | 5167.7  | 4983.9  | 4879.3  |
| 42.5° | 7638.6  | 7606.7  | 7227.7  | 6164.5  | 5259.6  | 5195.8  | 5221.3  | 5393.6  | 5586.3  | 5471.5  | 5466.4  |
| 45°   | 9128.1  | 9111.5  | 8709.4  | 7474.0  | 6067.5  | 5677.0  | 5708.9  | 5939.9  | 6308.7  | 6334.3  | 6496.3  |
| 47.5° | 10326.5 | 10318.8 | 10087.8 | 8935.3  | 7304.2  | 6492.5  | 6502.7  | 6747.8  | 7396.1  | 7716.5  | 7975.6  |
| 50°   | 11419.0 | 11456.0 | 11273.5 | 10516.7 | 8988.9  | 7770.1  | 7745.8  | 7909.2  | 8950.7  | 9475.2  | 9796.8  |
| 52.5° | 12937.8 | 12990.1 | 12478.3 | 11992.1 | 10756.6 | 9355.2  | 9336.1  | 9507.1  | 10819.2 | 11212.3 | 11269.7 |
| 55°   | 14279.2 | 14189.8 | 13785.3 | 13644.9 | 12912.3 | 11313.1 | 11308.0 | 11458.6 | 12626.4 | 12793.6 | 12899.5 |
| 57.5° | 14871.4 | 14836.9 | 15032.2 | 15353.8 | 15170.0 | 13627.0 | 13615.5 | 13500.6 | 14243.5 | 14261.3 | 14586.8 |
| 60°   | 15245.3 | 15287.5 | 15886.0 | 16877.7 | 17335.9 | 16117.1 | 16043.0 | 15342.3 | 15787.8 | 15748.2 | 16096.6 |
| 62.5° | 14964.6 | 15047.5 | 16124.7 | 17777.5 | 18956.8 | 18290.6 | 18185.9 | 17029.6 | 17107.5 | 16970.9 | 17295.1 |
| 65°   | 13473.8 | 13602.8 | 15367.9 | 17607.8 | 19760.9 | 19989.3 | 19883.4 | 18519.0 | 18155.3 | 17930.7 | 17750.7 |
| 67.5° | 10940.4 | 11017.0 | 12859.9 | 16131.1 | 19398.4 | 21002.7 | 20981.0 | 19824.7 | 18946.6 | 17768.6 | 16372.3 |
| 69°   | 9041.3  | 9116.6  | 10890.6 | 14576.6 | 18600.7 | 21219.7 | 21261.8 | 20243.3 | 18796.0 | 16783.3 | 14506.4 |
| 70°   | 7657.8  | 7738.2  | 9391.0  | 13244.1 | 17675.4 | 21118.9 | 21194.2 | 20203.8 | 18364.6 | 15642.3 | 12868.9 |
| 72.5° | 4016.5  | 4085.4  | 5781.6  | 9124.2  | 14409.4 | 19392.0 | 19620.5 | 18496.1 | 15567.0 | 11360.3 | 7609.3  |
| 75°   | 1262.3  | 1301.8  | 2257.8  | 4769.5  | 9865.8  | 15078.1 | 15130.5 | 14508.9 | 11054.0 | 6248.7  | 3169.0  |
| 77.5° | 481.2   | 469.7   | 751.7   | 1757.5  | 4987.8  | 9494.4  | 9814.7  | 9066.8  | 5800.8  | 2209.3  | 731.3   |
| 80°   | 259.1   | 260.4   | 390.5   | 727.5   | 2134.0  | 4879.3  | 5149.9  | 4394.3  | 2061.2  | 689.2   | 168.5   |
| 82.5° | 112.3   | 117.4   | 219.5   | 385.4   | 980.2   | 1799.6  | 1934.9  | 1610.7  | 787.5   | 463.3   | 62.5    |
| 85°   | 24.2    | 26.8    | 105.9   | 209.3   | 399.5   | 505.4   | 529.7   | 522.0   | 501.6   | 359.9   | 24.2    |
| 87.5° | 0.0     | 0.0     | 47.2    | 75.3    | 100.8   | 114.9   | 100.8   | 131.5   | 277.0   | 242.5   | 12.8    |
| 90°   | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |

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CATALOG NUMBER: GLEON-SA9B-827-U-T4W-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2727.4  | 2727.4 | 2727.4 | 2727.4 | 2727.4 | 2727.4 | 2727.4 | 2727.4 | 2727.4 | 2727.4 | 2727.4 |
| 2.5°  | 2730.0  | 2707.0 | 2667.5 | 2624.1 | 2593.4 | 2561.5 | 2536.0 | 2524.5 | 2511.7 | 2502.8 | 2514.3 |
| 5°    | 2724.9  | 2680.2 | 2603.6 | 2529.6 | 2476.0 | 2432.6 | 2396.9 | 2382.8 | 2368.8 | 2358.6 | 2357.3 |
| 7.5°  | 2769.6  | 2707.0 | 2589.6 | 2481.1 | 2398.2 | 2339.4 | 2290.9 | 2270.5 | 2253.9 | 2246.3 | 2239.9 |
| 10°   | 2855.1  | 2774.7 | 2617.7 | 2476.0 | 2368.8 | 2269.3 | 2164.6 | 2084.2 | 2031.9 | 2007.6 | 1998.7 |
| 12.5° | 2966.1  | 2865.3 | 2671.3 | 2502.8 | 2347.1 | 2155.7 | 1933.6 | 1742.1 | 1618.3 | 1577.5 | 1553.3 |
| 15°   | 3096.3  | 2971.2 | 2741.5 | 2537.3 | 2268.0 | 1918.3 | 1541.8 | 1291.6 | 1176.7 | 1153.8 | 1128.2 |
| 17.5° | 3221.4  | 3083.5 | 2825.7 | 2543.7 | 2094.4 | 1532.8 | 1129.5 | 959.8  | 915.1  | 930.4  | 934.2  |
| 20°   | 3331.1  | 3194.6 | 2908.7 | 2487.5 | 1779.2 | 1149.9 | 874.3  | 832.1  | 848.7  | 878.1  | 883.2  |
| 22.5° | 3442.2  | 3301.8 | 2985.3 | 2339.4 | 1375.8 | 873.0  | 787.5  | 797.7  | 814.3  | 843.6  | 848.7  |
| 25°   | 3577.5  | 3432.0 | 3056.7 | 2067.6 | 1032.5 | 742.8  | 747.9  | 763.2  | 779.8  | 806.6  | 809.2  |
| 27.5° | 3733.2  | 3596.6 | 3103.9 | 1714.1 | 765.8  | 682.8  | 699.4  | 722.4  | 739.0  | 764.5  | 769.6  |
| 30°   | 3939.9  | 3813.6 | 3119.3 | 1347.8 | 642.0  | 629.2  | 636.9  | 664.9  | 689.2  | 712.2  | 716.0  |
| 32.5° | 4133.9  | 4028.0 | 3068.2 | 1017.2 | 594.8  | 579.4  | 579.4  | 596.0  | 624.1  | 645.8  | 650.9  |
| 35°   | 4312.6  | 4243.7 | 2904.8 | 744.1  | 559.0  | 533.5  | 520.7  | 520.7  | 538.6  | 556.5  | 561.6  |
| 37.5° | 4548.7  | 4546.2 | 2640.7 | 593.5  | 524.6  | 495.2  | 468.4  | 448.0  | 441.6  | 445.4  | 448.0  |
| 40°   | 4953.3  | 4957.1 | 2296.1 | 532.2  | 495.2  | 455.6  | 414.8  | 377.8  | 343.3  | 331.8  | 330.6  |
| 42.5° | 5585.1  | 5527.6 | 1934.9 | 502.9  | 469.7  | 414.8  | 353.5  | 303.8  | 250.2  | 233.6  | 232.3  |
| 45°   | 6588.2  | 6247.5 | 1552.0 | 476.1  | 442.9  | 368.8  | 292.3  | 224.6  | 181.2  | 168.5  | 168.5  |
| 47.5° | 8049.6  | 7193.2 | 1202.3 | 446.7  | 407.1  | 316.5  | 220.8  | 162.1  | 132.7  | 126.4  | 127.6  |
| 50°   | 9560.7  | 8119.8 | 921.5  | 409.7  | 363.7  | 261.6  | 163.4  | 117.4  | 100.8  | 100.8  | 102.1  |
| 52.5° | 10900.8 | 8798.8 | 718.6  | 370.1  | 310.1  | 205.5  | 123.8  | 91.9   | 84.2   | 83.0   | 84.2   |
| 55°   | 12155.4 | 9236.5 | 550.1  | 324.2  | 246.3  | 153.2  | 94.4   | 75.3   | 70.2   | 67.6   | 66.4   |
| 57.5° | 13365.4 | 9453.5 | 412.2  | 261.6  | 178.7  | 111.0  | 75.3   | 63.8   | 58.7   | 54.9   | 53.6   |
| 60°   | 14170.7 | 9277.4 | 283.3  | 192.7  | 123.8  | 80.4   | 62.5   | 54.9   | 48.5   | 44.7   | 43.4   |
| 62.5° | 14625.1 | 8796.2 | 182.5  | 139.1  | 88.1   | 60.0   | 49.8   | 45.9   | 37.0   | 33.2   | 33.2   |
| 65°   | 14441.3 | 8002.4 | 127.6  | 99.6   | 63.8   | 44.7   | 37.0   | 37.0   | 26.8   | 21.7   | 20.4   |
| 67.5° | 12797.4 | 6760.5 | 97.0   | 74.0   | 45.9   | 33.2   | 28.1   | 31.9   | 16.6   | 10.2   | 10.2   |
| 69°   | 11010.6 | 5602.9 | 83.0   | 61.3   | 38.3   | 26.8   | 24.2   | 29.4   | 11.5   | 7.7    | 6.4    |
| 70°   | 9569.7  | 4833.3 | 75.3   | 53.6   | 31.9   | 23.0   | 21.7   | 28.1   | 11.5   | 6.4    | 5.1    |
| 72.5° | 5725.5  | 2695.5 | 57.4   | 38.3   | 20.4   | 17.9   | 17.9   | 31.9   | 11.5   | 6.4    | 5.1    |
| 75°   | 2313.9  | 949.6  | 42.1   | 26.8   | 15.3   | 15.3   | 21.7   | 40.8   | 10.2   | 5.1    | 3.8    |
| 77.5° | 524.6   | 208.0  | 24.2   | 16.6   | 10.2   | 15.3   | 25.5   | 31.9   | 6.4    | 2.6    | 0.0    |
| 80°   | 127.6   | 51.1   | 15.3   | 10.2   | 6.4    | 11.5   | 19.1   | 17.9   | 1.3    | 0.0    | 0.0    |
| 82.5° | 42.1    | 17.9   | 6.4    | 5.1    | 1.3    | 3.8    | 8.9    | 5.1    | 0.0    | 0.0    | 0.0    |
| 85°   | 17.9    | 10.2   | 2.6    | 1.3    | 0.0    | 0.0    | 1.3    | 0.0    | 0.0    | 0.0    | 0.0    |
| 87.5° | 11.5    | 3.8    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 90°   | 0.0     | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

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

Report Prepared for

Cooper Lighting Solutions

Invue

Report Number: SP1-2407-157-9

Test Date: 10/03/2024

Luminaire Tested: EMM2-HTN-SA1A-827-U-5WQ

Data applicable to all product families utilizing light square engine

### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2407-157-9  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 10/03/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: Invue  
 Catalog Number: **EMM2-HTN-SA1A-827-U-5WQ**  
 Description: Epic Modern Light Square 40W 5WQ Optic

### Spectral Parameters

CCT (K): 2764  
 CIE  $u'$ : 0.2591  
 CIE  $v'$ : 0.5290  
 Duv: 0.0020  
 CIE x: 0.4581  
 CIE y: 0.4156  
 CIE z: 0.1263  
 Peak Wavelength (nm): 603  
 Dominant Wavelength (nm): 583  
 Purity: 62.2537  
 R<sub>f</sub>: 84.7  
 R<sub>g</sub>: 94.6

CRI (Ra): 80.9  
 R1: 78.8  
 R2: 89.9  
 R3: 96.2  
 R4: 79.1  
 R5: 79.1  
 R6: 88.8  
 R7: 81.3  
 R8: 54.3  
 R9: -1.5  
 R10: 77.9  
 R11: 78.9  
 R12: 71.6  
 R13: 81.2  
 R14: 98.5  
 R15: 69.9



### Test Conditions

Stabilization Time: 81M  
 Operation Time: 2H 21M  
 Sphere Temperature (°C): 25.2

REPORT NUMBER: SP1-2407-157-9

| 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 2700K 4-step quadrangle

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### Photopic Flux vs. Wavelength



### Photopic Lumens: 4337.9

| λ (nm) | Power (μW/nm) | Lumens (φ/nm) | λ (nm) | Power (μW/nm) | Lumens (φ/nm) | λ (nm) | Power (μW/nm) | Lumens (φ/nm) | λ (nm) | Power (μW/nm) | Lumens (φ/nm) | λ (nm) | Power (μW/nm) | Lumens (φ/nm) |
|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|
| 360    | 0             | 0.0           | 490    | 18018         | 2.6           | 620    | 87426         | 22.8          | 750    | 2680          | 0.0           | 880    | 58            | 0.0           |
| 365    | 0             | 0.0           | 495    | 22295         | 3.9           | 625    | 83013         | 18.2          | 755    | 2287          | 0.0           | 885    | 46            | 0.0           |
| 370    | 0             | 0.0           | 500    | 26478         | 5.8           | 630    | 78077         | 14.1          | 760    | 1944          | 0.0           | 890    | 45            | 0.0           |
| 375    | 0             | 0.0           | 505    | 30524         | 8.5           | 635    | 72080         | 10.7          | 765    | 1653          | 0.0           | 895    | 41            | 0.0           |
| 380    | 0             | 0.0           | 510    | 33611         | 11.5          | 640    | 66249         | 7.9           | 770    | 1413          | 0.0           | 900    | 38            | 0.0           |
| 385    | 0             | 0.0           | 515    | 36490         | 15.2          | 645    | 59973         | 5.7           | 775    | 1198          | 0.0           | 905    | 33            | 0.0           |
| 390    | 0             | 0.0           | 520    | 38610         | 18.7          | 650    | 53972         | 3.9           | 780    | 1025          | 0.0           | 910    | 30            | 0.0           |
| 395    | 0             | 0.0           | 525    | 40511         | 21.9          | 655    | 48369         | 2.7           | 785    | 874           | 0.0           | 915    | 23            | 0.0           |
| 400    | 48            | 0.0           | 530    | 42223         | 24.9          | 660    | 42641         | 1.8           | 790    | 747           | 0.0           | 920    | 24            | 0.0           |
| 405    | 201           | 0.0           | 535    | 44137         | 27.6          | 665    | 37602         | 1.1           | 795    | 639           | 0.0           | 925    | 22            | 0.0           |
| 410    | 457           | 0.0           | 540    | 46032         | 30.0          | 670    | 32798         | 0.7           | 800    | 547           | 0.0           | 930    | 22            | 0.0           |
| 415    | 925           | 0.0           | 545    | 48553         | 32.5          | 675    | 28558         | 0.5           | 805    | 473           | 0.0           | 935    | 17            | 0.0           |
| 420    | 1816          | 0.0           | 550    | 51408         | 34.9          | 680    | 24782         | 0.3           | 810    | 401           | 0.0           | 940    | 13            | 0.0           |
| 425    | 3217          | 0.0           | 555    | 54711         | 37.4          | 685    | 21386         | 0.2           | 815    | 351           | 0.0           | 945    | 6             | 0.0           |
| 430    | 5520          | 0.0           | 560    | 58847         | 40.0          | 690    | 18413         | 0.1           | 820    | 307           | 0.0           | 950    | 10            | 0.0           |
| 435    | 9225          | 0.1           | 565    | 63386         | 42.4          | 695    | 15721         | 0.1           | 825    | 261           | 0.0           | 955    | 11            | 0.0           |
| 440    | 15522         | 0.2           | 570    | 68196         | 44.3          | 700    | 13432         | 0.0           | 830    | 228           | 0.0           | 960    | 8             | 0.0           |
| 445    | 27642         | 0.6           | 575    | 73613         | 46.0          | 705    | 11513         | 0.0           | 835    | 193           | 0.0           | 965    | 12            | 0.0           |
| 450    | 36602         | 0.9           | 580    | 79207         | 47.1          | 710    | 9780          | 0.0           | 840    | 174           | 0.0           | 970    | 3             | 0.0           |
| 455    | 28292         | 0.9           | 585    | 84248         | 47.0          | 715    | 8356          | 0.0           | 845    | 151           | 0.0           | 975    | 8             | 0.0           |
| 460    | 21166         | 0.9           | 590    | 88397         | 45.7          | 720    | 7161          | 0.0           | 850    | 123           | 0.0           | 980    | 2             | 0.0           |
| 465    | 19092         | 1.0           | 595    | 91428         | 43.4          | 725    | 6067          | 0.0           | 855    | 106           | 0.0           | 985    | 13            | 0.0           |
| 470    | 14951         | 0.9           | 600    | 93452         | 40.3          | 730    | 5164          | 0.0           | 860    | 95            | 0.0           | 990    | 16            | 0.0           |
| 475    | 12606         | 1.0           | 605    | 93959         | 36.4          | 735    | 4393          | 0.0           | 865    | 82            | 0.0           | 995    | 20            | 0.0           |
| 480    | 13323         | 1.3           | 610    | 93079         | 32.0          | 740    | 3694          | 0.0           | 870    | 77            | 0.0           | 1000   | 0             | 0.0           |
| 485    | 15164         | 1.8           | 615    | 90707         | 27.3          | 745    | 3157          | 0.0           | 875    | 65            | 0.0           |        |               |               |

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### Scotopic Flux vs. Wavelength



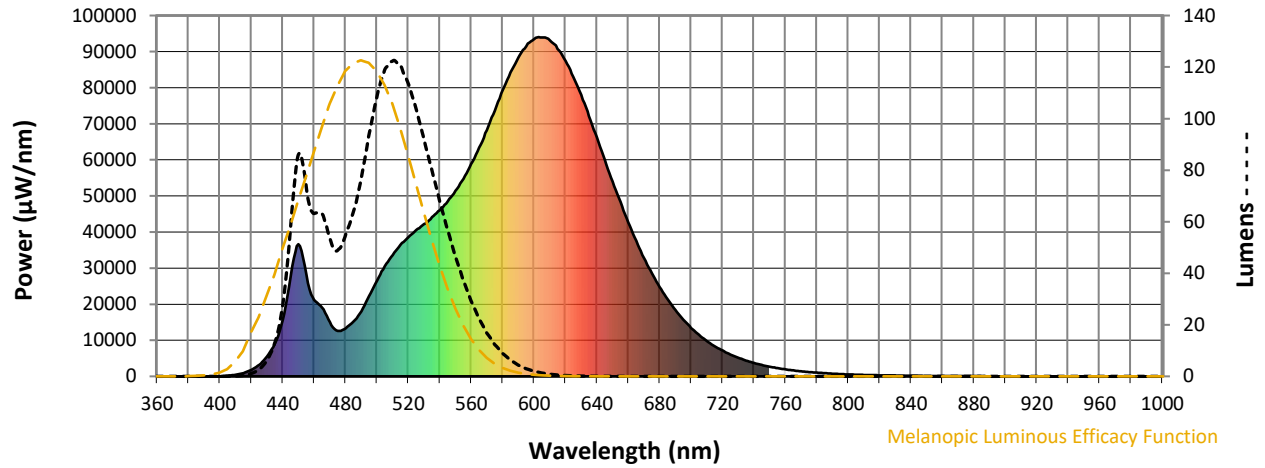
Scotopic Lumens: 5286.7

S/P: 1.22

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 0                | 0.0              | 490       | 18018            | 75.9             | 620       | 87426            | 0.4              | 750       | 2680             | 0.0              | 880       | 58               | 0.0              |
| 365       | 0                | 0.0              | 495       | 22295            | 93.2             | 625       | 83013            | 0.2              | 755       | 2287             | 0.0              | 885       | 46               | 0.0              |
| 370       | 0                | 0.0              | 500       | 26478            | 107.8            | 630       | 78077            | 0.1              | 760       | 1944             | 0.0              | 890       | 45               | 0.0              |
| 375       | 0                | 0.0              | 505       | 30524            | 118.7            | 635       | 72080            | 0.1              | 765       | 1653             | 0.0              | 895       | 41               | 0.0              |
| 380       | 0                | 0.0              | 510       | 33611            | 122.2            | 640       | 66249            | 0.1              | 770       | 1413             | 0.0              | 900       | 38               | 0.0              |
| 385       | 0                | 0.0              | 515       | 36490            | 120.8            | 645       | 59973            | 0.0              | 775       | 1198             | 0.0              | 905       | 33               | 0.0              |
| 390       | 0                | 0.0              | 520       | 38610            | 113.9            | 650       | 53972            | 0.0              | 780       | 1025             | 0.0              | 910       | 30               | 0.0              |
| 395       | 0                | 0.0              | 525       | 40511            | 104.1            | 655       | 48369            | 0.0              | 785       | 874              | 0.0              | 915       | 23               | 0.0              |
| 400       | 48               | 0.0              | 530       | 42223            | 92.4             | 660       | 42641            | 0.0              | 790       | 747              | 0.0              | 920       | 24               | 0.0              |
| 405       | 201              | 0.0              | 535       | 44137            | 80.5             | 665       | 37602            | 0.0              | 795       | 639              | 0.0              | 925       | 22               | 0.0              |
| 410       | 457              | 0.1              | 540       | 46032            | 68.2             | 670       | 32798            | 0.0              | 800       | 547              | 0.0              | 930       | 22               | 0.0              |
| 415       | 925              | 0.3              | 545       | 48553            | 57.1             | 675       | 28558            | 0.0              | 805       | 473              | 0.0              | 935       | 17               | 0.0              |
| 420       | 1816             | 1.1              | 550       | 51408            | 46.7             | 680       | 24782            | 0.0              | 810       | 401              | 0.0              | 940       | 13               | 0.0              |
| 425       | 3217             | 2.5              | 555       | 54711            | 37.4             | 685       | 21386            | 0.0              | 815       | 351              | 0.0              | 945       | 6                | 0.0              |
| 430       | 5520             | 5.9              | 560       | 58847            | 29.4             | 690       | 18413            | 0.0              | 820       | 307              | 0.0              | 950       | 10               | 0.0              |
| 435       | 9225             | 12.5             | 565       | 63386            | 22.5             | 695       | 15721            | 0.0              | 825       | 261              | 0.0              | 955       | 11               | 0.0              |
| 440       | 15522            | 26.3             | 570       | 68196            | 16.9             | 700       | 13432            | 0.0              | 830       | 228              | 0.0              | 960       | 8                | 0.0              |
| 445       | 27642            | 55.2             | 575       | 73613            | 12.4             | 705       | 11513            | 0.0              | 835       | 193              | 0.0              | 965       | 12               | 0.0              |
| 450       | 36602            | 85.4             | 580       | 79207            | 9.0              | 710       | 9780             | 0.0              | 840       | 174              | 0.0              | 970       | 3                | 0.0              |
| 455       | 28292            | 75.1             | 585       | 84248            | 6.3              | 715       | 8356             | 0.0              | 845       | 151              | 0.0              | 975       | 8                | 0.0              |
| 460       | 21166            | 63.2             | 590       | 88397            | 4.4              | 720       | 7161             | 0.0              | 850       | 123              | 0.0              | 980       | 2                | 0.0              |
| 465       | 19092            | 63.2             | 595       | 91428            | 3.0              | 725       | 6067             | 0.0              | 855       | 106              | 0.0              | 985       | 13               | 0.0              |
| 470       | 14951            | 54.2             | 600       | 93452            | 2.0              | 730       | 5164             | 0.0              | 860       | 95               | 0.0              | 990       | 16               | 0.0              |
| 475       | 12606            | 48.8             | 605       | 93959            | 1.3              | 735       | 4393             | 0.0              | 865       | 82               | 0.0              | 995       | 20               | 0.0              |
| 480       | 13323            | 54.2             | 610       | 93079            | 0.9              | 740       | 3694             | 0.0              | 870       | 77               | 0.0              | 1000      | 0                | 0.0              |
| 485       | 15164            | 63.3             | 615       | 90707            | 0.5              | 745       | 3157             | 0.0              | 875       | 65               | 0.0              |           |                  |                  |

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### Melanopic Flux vs. Wavelength


**Melanopic Lumens: 9797**
**M/P: 2.26**

| $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|
| 360               | 0                                    | 0.0                            | 490               | 18018                                | 27.7                           | 620               | 87426                                | 1.1                            | 750               | 2680                                 | 0.0                            | 880               | 58                                   | 0.0                            |
| 365               | 0                                    | 0.0                            | 495               | 22295                                | 36.0                           | 625               | 83013                                | 0.7                            | 755               | 2287                                 | 0.0                            | 885               | 46                                   | 0.0                            |
| 370               | 0                                    | 0.0                            | 500               | 26478                                | 44.2                           | 630               | 78077                                | 0.4                            | 760               | 1944                                 | 0.0                            | 890               | 45                                   | 0.0                            |
| 375               | 0                                    | 0.0                            | 505               | 30524                                | 51.8                           | 635               | 72080                                | 0.3                            | 765               | 1653                                 | 0.0                            | 895               | 41                                   | 0.0                            |
| 380               | 0                                    | 0.0                            | 510               | 33611                                | 57.0                           | 640               | 66249                                | 0.2                            | 770               | 1413                                 | 0.0                            | 900               | 38                                   | 0.0                            |
| 385               | 0                                    | 0.0                            | 515               | 36490                                | 60.5                           | 645               | 59973                                | 0.1                            | 775               | 1198                                 | 0.0                            | 905               | 33                                   | 0.0                            |
| 390               | 0                                    | 0.0                            | 520               | 38610                                | 61.4                           | 650               | 53972                                | 0.1                            | 780               | 1025                                 | 0.0                            | 910               | 30                                   | 0.0                            |
| 395               | 0                                    | 0.0                            | 525               | 40511                                | 60.6                           | 655               | 48369                                | 0.0                            | 785               | 874                                  | 0.0                            | 915               | 23                                   | 0.0                            |
| 400               | 48                                   | 0.0                            | 530               | 42223                                | 58.2                           | 660               | 42641                                | 0.0                            | 790               | 747                                  | 0.0                            | 920               | 24                                   | 0.0                            |
| 405               | 201                                  | 0.0                            | 535               | 44137                                | 55.0                           | 665               | 37602                                | 0.0                            | 795               | 639                                  | 0.0                            | 925               | 22                                   | 0.0                            |
| 410               | 457                                  | 0.0                            | 540               | 46032                                | 50.9                           | 670               | 32798                                | 0.0                            | 800               | 547                                  | 0.0                            | 930               | 22                                   | 0.0                            |
| 415               | 925                                  | 0.1                            | 545               | 48553                                | 46.6                           | 675               | 28558                                | 0.0                            | 805               | 473                                  | 0.0                            | 935               | 17                                   | 0.0                            |
| 420               | 1816                                 | 0.3                            | 550               | 51408                                | 42.0                           | 680               | 24782                                | 0.0                            | 810               | 401                                  | 0.0                            | 940               | 13                                   | 0.0                            |
| 425               | 3217                                 | 0.8                            | 555               | 54711                                | 37.4                           | 685               | 21386                                | 0.0                            | 815               | 351                                  | 0.0                            | 945               | 6                                    | 0.0                            |
| 430               | 5520                                 | 1.9                            | 560               | 58847                                | 32.9                           | 690               | 18413                                | 0.0                            | 820               | 307                                  | 0.0                            | 950               | 10                                   | 0.0                            |
| 435               | 9225                                 | 4.1                            | 565               | 63386                                | 28.4                           | 695               | 15721                                | 0.0                            | 825               | 261                                  | 0.0                            | 955               | 11                                   | 0.0                            |
| 440               | 15522                                | 8.7                            | 570               | 68196                                | 24.1                           | 700               | 13432                                | 0.0                            | 830               | 228                                  | 0.0                            | 960               | 8                                    | 0.0                            |
| 445               | 27642                                | 18.5                           | 575               | 73613                                | 20.0                           | 705               | 11513                                | 0.0                            | 835               | 193                                  | 0.0                            | 965               | 12                                   | 0.0                            |
| 450               | 36602                                | 28.3                           | 580               | 79207                                | 16.3                           | 710               | 9780                                 | 0.0                            | 840               | 174                                  | 0.0                            | 970               | 3                                    | 0.0                            |
| 455               | 28292                                | 24.7                           | 585               | 84248                                | 12.9                           | 715               | 8356                                 | 0.0                            | 845               | 151                                  | 0.0                            | 975               | 8                                    | 0.0                            |
| 460               | 21166                                | 20.4                           | 590               | 88397                                | 9.8                            | 720               | 7161                                 | 0.0                            | 850               | 123                                  | 0.0                            | 980               | 2                                    | 0.0                            |
| 465               | 19092                                | 20.1                           | 595               | 91428                                | 7.3                            | 725               | 6067                                 | 0.0                            | 855               | 106                                  | 0.0                            | 985               | 13                                   | 0.0                            |
| 470               | 14951                                | 17.2                           | 600               | 93452                                | 5.3                            | 730               | 5164                                 | 0.0                            | 860               | 95                                   | 0.0                            | 990               | 16                                   | 0.0                            |
| 475               | 12606                                | 15.7                           | 605               | 93959                                | 3.7                            | 735               | 4393                                 | 0.0                            | 865               | 82                                   | 0.0                            | 995               | 20                                   | 0.0                            |
| 480               | 13323                                | 18.0                           | 610               | 93079                                | 2.5                            | 740               | 3694                                 | 0.0                            | 870               | 77                                   | 0.0                            | 1000              | 0                                    | 0.0                            |
| 485               | 15164                                | 21.9                           | 615               | 90707                                | 1.7                            | 745               | 3157                                 | 0.0                            | 875               | 65                                   | 0.0                            |                   |                                      |                                |

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TM-30-18

### Summary

$R_f = 84.7$   
 $R_g = 94.6$   
 $CIE R_a = 80.9$   
 $R_g = -1.5$



### Color Vector Graphics



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 84 | CES51 = 95 | CES76 = 81 |
| CES02 = 63 | CES27 = 95 | CES52 = 94 | CES77 = 84 |
| CES03 = 31 | CES28 = 94 | CES53 = 89 | CES78 = 81 |
| CES04 = 71 | CES29 = 87 | CES54 = 91 | CES79 = 89 |
| CES05 = 50 | CES30 = 94 | CES55 = 90 | CES80 = 89 |
| CES06 = 52 | CES31 = 89 | CES56 = 86 | CES81 = 69 |
| CES07 = 43 | CES32 = 82 | CES57 = 85 | CES82 = 96 |
| CES08 = 41 | CES33 = 91 | CES58 = 86 | CES83 = 93 |
| CES09 = 29 | CES34 = 92 | CES59 = 91 | CES84 = 92 |
| CES10 = 77 | CES35 = 96 | CES60 = 94 | CES85 = 76 |
| CES11 = 60 | CES36 = 90 | CES61 = 89 | CES86 = 65 |
| CES12 = 66 | CES37 = 96 | CES62 = 94 | CES87 = 84 |
| CES13 = 44 | CES38 = 98 | CES63 = 87 | CES88 = 86 |
| CES14 = 74 | CES39 = 98 | CES64 = 82 | CES89 = 73 |
| CES15 = 72 | CES40 = 95 | CES65 = 78 | CES90 = 88 |
| CES16 = 48 | CES41 = 96 | CES66 = 81 | CES91 = 82 |
| CES17 = 50 | CES42 = 97 | CES67 = 80 | CES92 = 64 |
| CES18 = 57 | CES43 = 91 | CES68 = 83 | CES93 = 78 |
| CES19 = 73 | CES44 = 99 | CES69 = 88 | CES94 = 59 |
| CES20 = 67 | CES45 = 93 | CES70 = 80 | CES95 = 74 |
| CES21 = 87 | CES46 = 89 | CES71 = 79 | CES96 = 83 |
| CES22 = 79 | CES47 = 92 | CES72 = 92 | CES97 = 88 |
| CES23 = 92 | CES48 = 83 | CES73 = 75 | CES98 = 83 |
| CES24 = 91 | CES49 = 90 | CES74 = 91 | CES99 = 74 |
| CES25 = 72 | CES50 = 94 | CES75 = 81 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)