

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: P324933

Luminaire Tested: **GLEON-SA9C-827-U-AFL-HSS**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P324933  
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-SA9C-827-U-AFL-HSS  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(9) 80 CRI, 2700K, 1050mA 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: 38053 lumens  
Efficiency: N/A  
Efficacy: 76.0 lumens/watt  
Luminous Opening: Rectangular (W 2.5' x L: 1' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B2 - U0 - G3

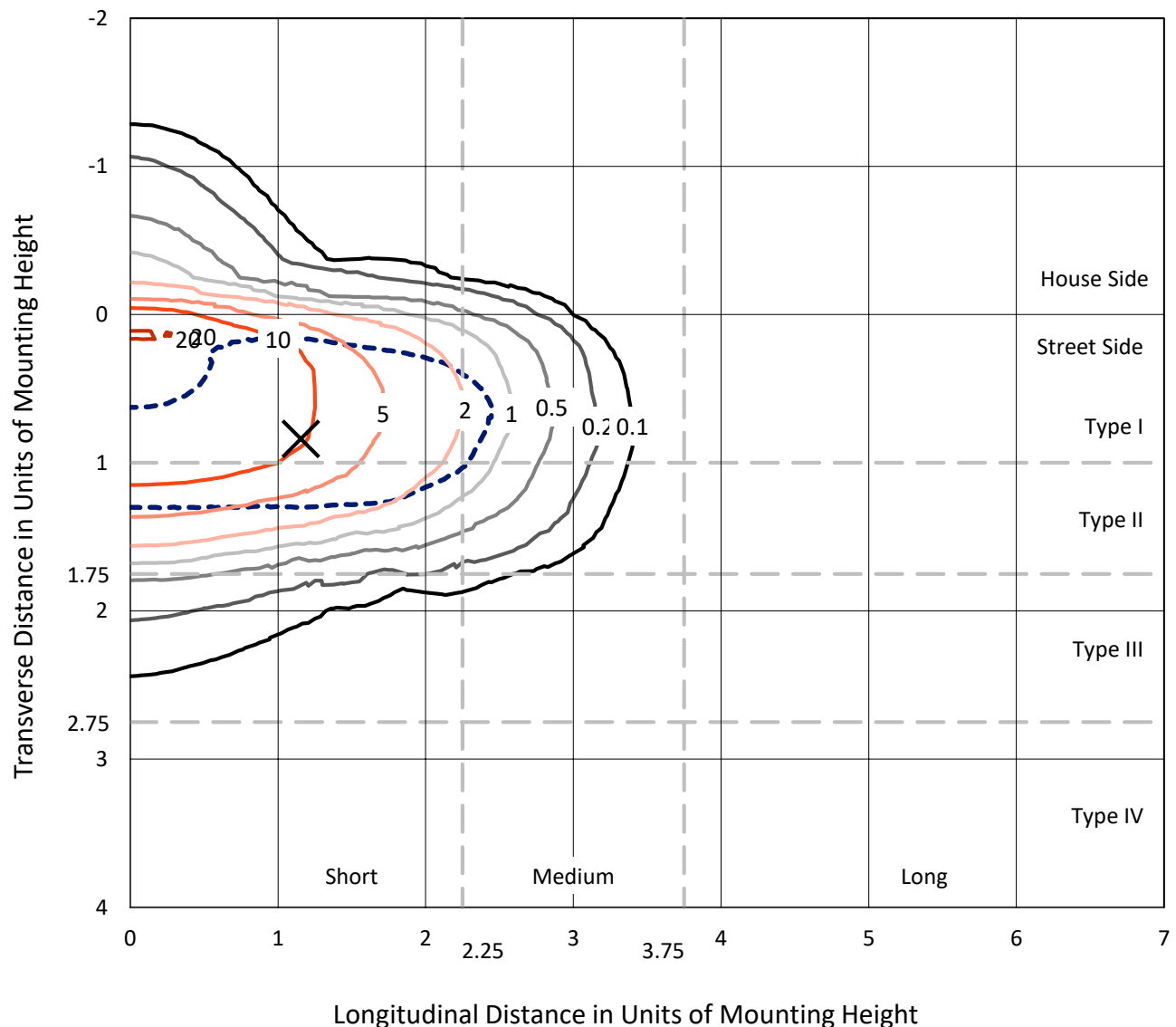
Input Watts (W): 501  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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## Iso-Footcandle Lines of Horizontal Illumination

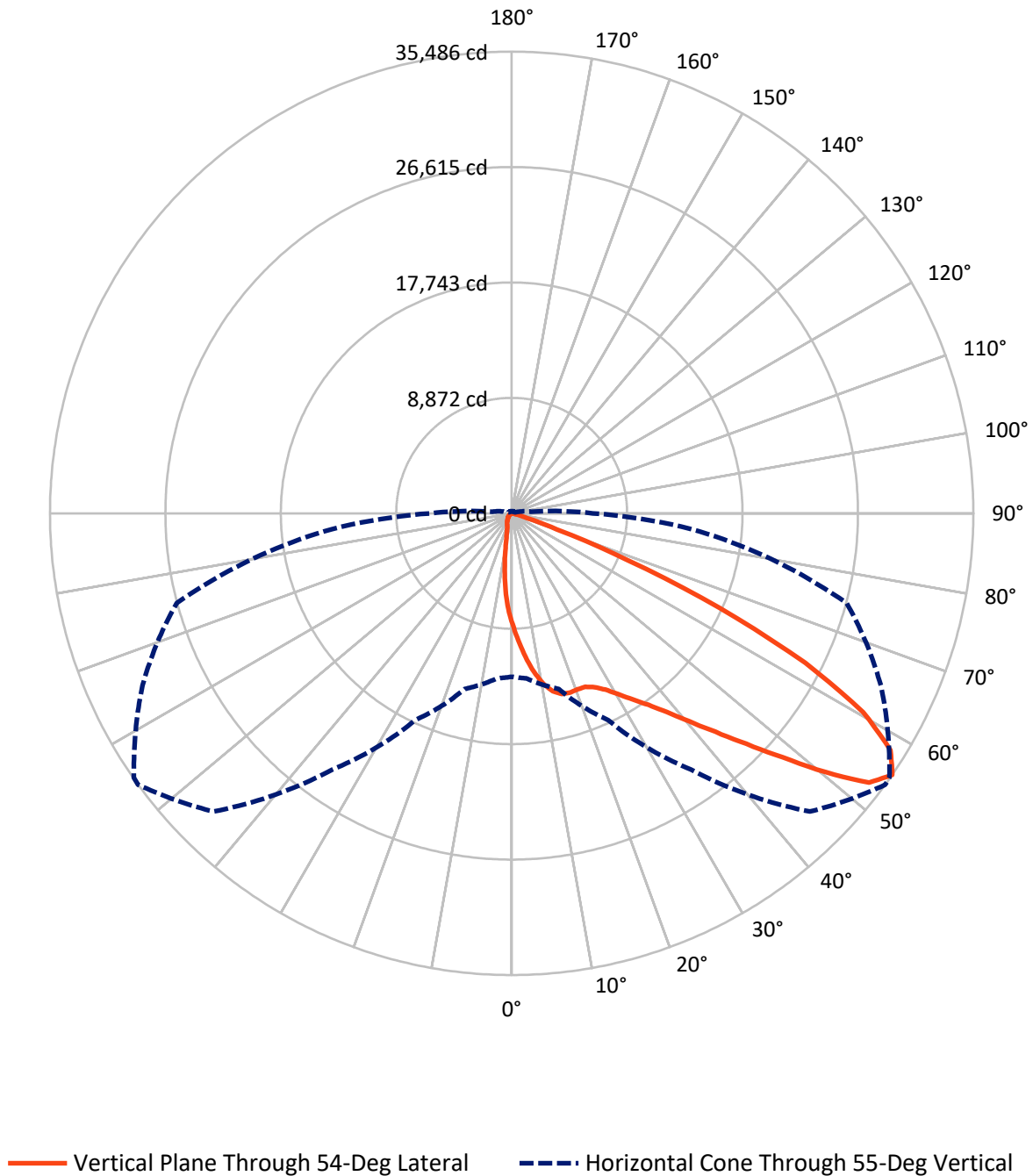
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 20.9 fc  
 Type II - Short - N/A

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## Luminous Intensity Polar Plot



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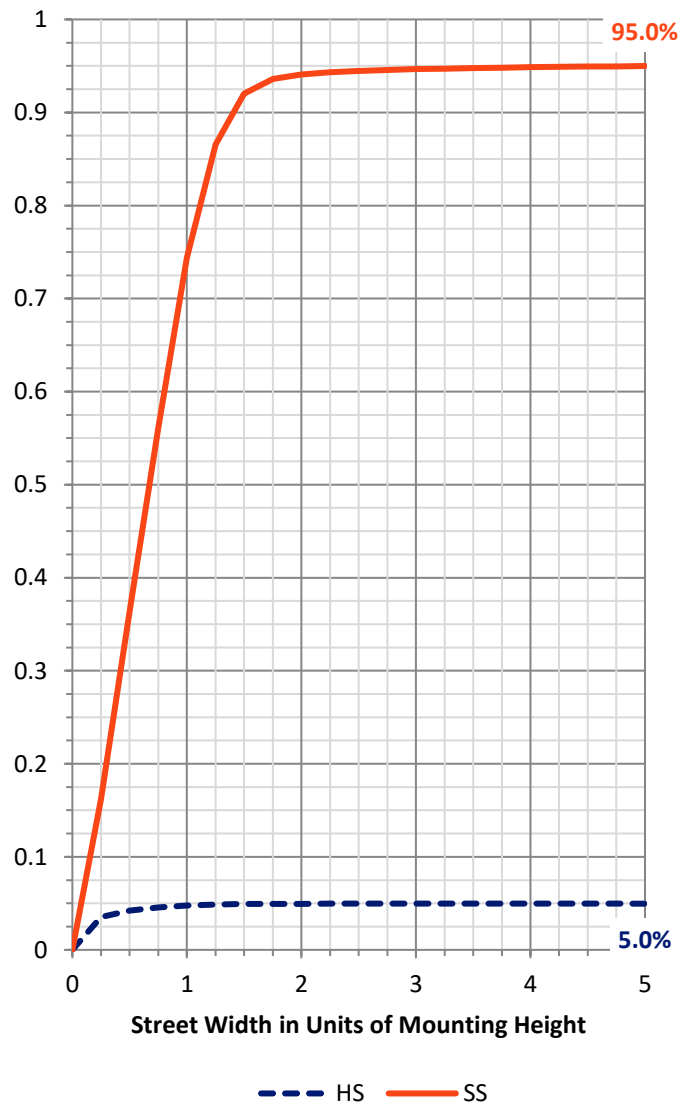
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 1898.6   | 0.0    | 1898.6  |
|                    | % Fixture | 5.0      | 0.0    | 5.0     |
| <b>Street Side</b> | Lumens    | 36154.4  | 0.0    | 36154.4 |
|                    | % Fixture | 95.0     | 0.0    | 95.0    |
| <b>Total</b>       | Lumens    | 38053.0  | 0.0    | 38053.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 784.8   | 2.1       |
| 10°-20°   | 2152.4  | 5.7       |
| 20°-30°   | 3674.8  | 9.7       |
| 30°-40°   | 5897.4  | 15.5      |
| 40°-50°   | 9424.1  | 24.8      |
| 50°-60°   | 10098.2 | 26.5      |
| 60°-70°   | 5184.7  | 13.6      |
| 70°-80°   | 785.4   | 2.1       |
| 80°-90°   | 51.1    | 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°    | 38053.0 | 100.0     |
| 0°-180°   | 38053.0 | 100.0     |

**Coefficient of Utilization**



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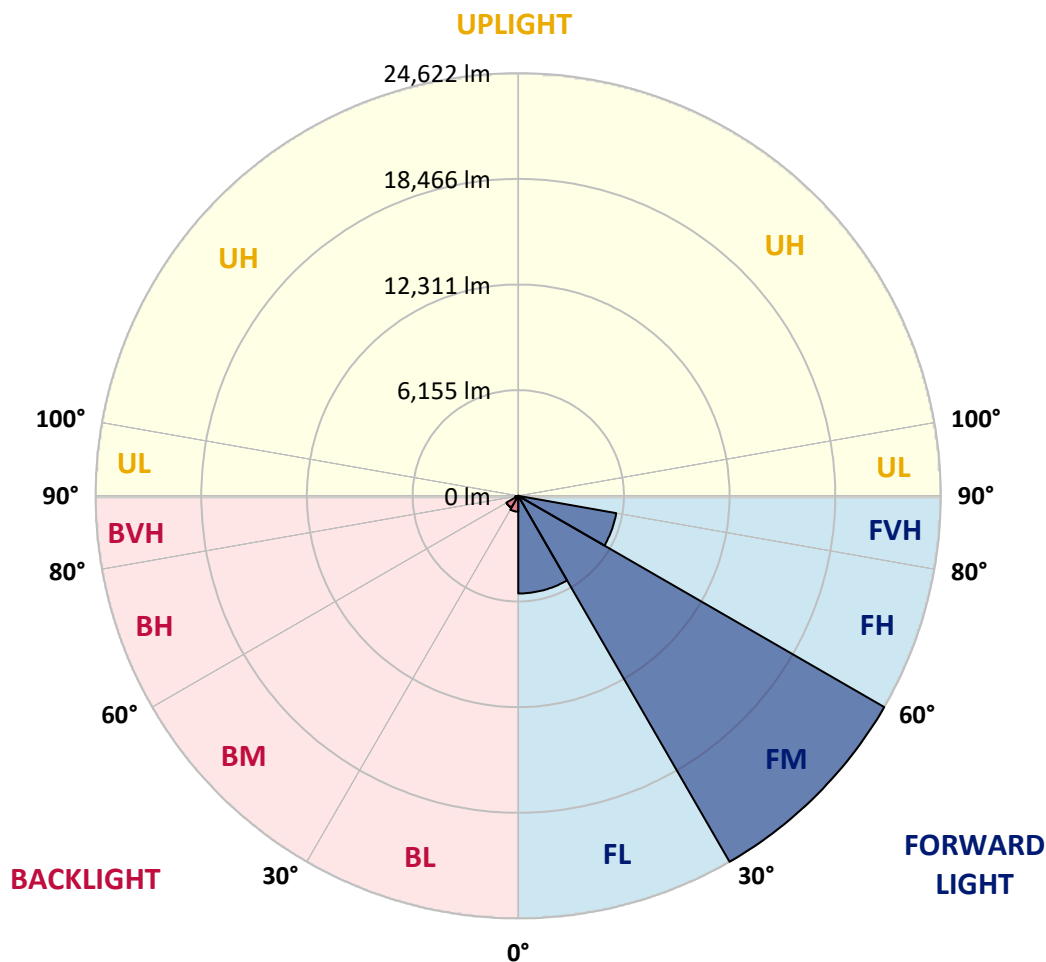
CATALOG NUMBER: GLEON-SA9C-827-U-AFL-HSS

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|---------|-----------|-------------------------|------|---------|
|      |             |         |           | B                       | U    | G       |
| FL   | (0°-30°)    | 5688.3  | 14.9      |                         |      |         |
| FM   | (30°-60°)   | 24622.0 | 64.7      |                         |      |         |
| FH   | (60°-80°)   | 5795.1  | 15.2      |                         |      | G3/7500 |
| FVH  | (80°-90°)   | 49.1    | 0.1       |                         |      | G1/100  |
| BL   | (0°-30°)    | 923.7   | 2.4       | B2/1000                 |      |         |
| BM   | (30°-60°)   | 797.8   | 2.1       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 175.0   | 0.5       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 2.1     | 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-G3**

Type II Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 54°     | 55°     | 65°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 8522.3  | 8522.3  | 8522.3  | 8522.3  | 8522.3  | 8522.3  | 8522.3  | 8522.3  | 8522.3  | 8522.3  | 8522.3  |
| 2.5°  | 10694.8 | 10535.4 | 10540.4 | 10468.1 | 10203.5 | 9996.4  | 9781.1  | 9730.2  | 9395.0  | 9043.3  | 8704.8  |
| 5°    | 12543.6 | 12426.9 | 12399.0 | 12259.3 | 11891.2 | 11501.7 | 11084.3 | 10987.3 | 10331.7 | 9611.9  | 8903.6  |
| 7.5°  | 13493.4 | 13495.1 | 13472.1 | 13421.1 | 13191.1 | 12813.1 | 12303.7 | 12201.8 | 11309.4 | 10229.8 | 9110.7  |
| 10°   | 13217.4 | 13279.8 | 13408.0 | 13577.2 | 13753.1 | 13705.4 | 13322.5 | 13230.5 | 12260.9 | 10883.8 | 9340.7  |
| 12.5° | 12573.2 | 12581.4 | 12724.4 | 13002.1 | 13508.2 | 14027.5 | 14034.1 | 14002.9 | 13169.7 | 11567.4 | 9593.8  |
| 15°   | 12252.7 | 12283.9 | 12336.5 | 12515.7 | 12995.5 | 13827.0 | 14421.9 | 14466.3 | 14002.9 | 12293.8 | 9863.3  |
| 17.5° | 12463.1 | 12507.4 | 12463.1 | 12484.4 | 12762.2 | 13509.9 | 14489.3 | 14602.7 | 14730.9 | 13011.9 | 10118.0 |
| 20°   | 13033.3 | 13074.4 | 12995.5 | 12908.4 | 12962.6 | 13417.8 | 14441.6 | 14594.5 | 15301.1 | 13649.6 | 10331.7 |
| 22.5° | 13802.4 | 13818.8 | 13698.9 | 13555.9 | 13516.4 | 13730.1 | 14481.1 | 14638.8 | 15758.0 | 14226.4 | 10466.4 |
| 25°   | 14648.7 | 14663.5 | 14514.0 | 14349.6 | 14255.9 | 14343.0 | 14804.8 | 14923.1 | 16160.6 | 14776.9 | 10543.6 |
| 27.5° | 15570.6 | 15583.8 | 15396.4 | 15194.3 | 15085.8 | 15089.1 | 15338.9 | 15465.4 | 16589.5 | 15404.6 | 10606.1 |
| 30°   | 16545.1 | 16538.5 | 16366.0 | 16085.0 | 15946.9 | 15943.7 | 16108.0 | 16236.2 | 17210.7 | 16209.9 | 10691.5 |
| 32.5° | 17639.6 | 17626.4 | 17381.6 | 17033.2 | 16877.1 | 16900.1 | 17046.3 | 17120.3 | 17981.4 | 17067.7 | 10844.4 |
| 35°   | 19080.8 | 19043.0 | 18673.2 | 18241.0 | 17953.5 | 17945.2 | 18068.5 | 18127.6 | 18964.1 | 18106.3 | 11099.1 |
| 37.5° | 20950.9 | 20916.4 | 20415.2 | 19787.4 | 19383.2 | 19232.0 | 19378.2 | 19453.8 | 20365.9 | 19439.0 | 11508.3 |
| 40°   | 22794.7 | 22760.2 | 22462.8 | 21887.6 | 21264.8 | 20901.6 | 21016.6 | 21097.2 | 22116.0 | 21056.1 | 12024.3 |
| 42.5° | 24066.7 | 24096.2 | 24199.8 | 24247.4 | 23664.1 | 22901.5 | 22954.1 | 23037.9 | 23954.9 | 22784.9 | 12614.3 |
| 45°   | 24401.9 | 24466.0 | 25051.0 | 26199.7 | 26418.3 | 25823.4 | 25272.9 | 25318.9 | 25823.4 | 24513.7 | 13204.2 |
| 47.5° | 23394.5 | 23512.9 | 24641.8 | 26778.2 | 28628.6 | 29049.3 | 28007.4 | 27946.6 | 27616.3 | 25912.1 | 13623.3 |
| 50°   | 21105.4 | 21213.8 | 22676.4 | 25836.5 | 29299.1 | 32128.9 | 31284.2 | 31105.1 | 29188.9 | 26748.6 | 13771.2 |
| 52.5° | 17792.4 | 17923.9 | 19112.0 | 22872.0 | 28035.3 | 33502.7 | 34386.8 | 34237.3 | 30342.6 | 26814.3 | 13795.8 |
| 55°   | 12565.0 | 12724.4 | 13981.5 | 17529.5 | 24030.5 | 32409.9 | 35486.2 | 35441.8 | 31300.6 | 26640.1 | 13848.4 |
| 57.5° | 7061.4  | 7176.5  | 8532.2  | 11237.1 | 17600.1 | 28229.2 | 34337.5 | 34631.7 | 31879.1 | 26337.8 | 13927.3 |
| 60°   | 3135.5  | 3166.7  | 3868.4  | 5593.9  | 10303.7 | 21573.7 | 31049.2 | 31545.5 | 31382.8 | 25933.5 | 14060.4 |
| 62.5° | 1738.7  | 1712.4  | 1712.4  | 2325.3  | 4478.1  | 13355.4 | 25318.9 | 26138.9 | 29264.5 | 25455.3 | 14067.0 |
| 65°   | 1362.3  | 1337.7  | 1267.0  | 1276.9  | 1705.8  | 5927.5  | 17532.8 | 18990.4 | 25241.7 | 24053.5 | 13593.7 |
| 67.5° | 1155.3  | 1133.9  | 1063.2  | 1035.3  | 1060.0  | 1955.6  | 9633.2  | 11146.8 | 19153.1 | 20410.2 | 11774.5 |
| 70°   | 976.1   | 961.4   | 925.2   | 890.7   | 828.2   | 966.3   | 3686.0  | 4714.7  | 11802.4 | 13577.2 | 8037.6  |
| 72.5° | 785.5   | 778.9   | 792.1   | 762.5   | 686.9   | 644.2   | 1260.4  | 1526.7  | 5301.4  | 6059.0  | 3311.3  |
| 75°   | 677.1   | 673.8   | 680.3   | 650.8   | 565.3   | 448.6   | 640.9   | 700.1   | 1495.4  | 1482.3  | 670.5   |
| 77.5° | 440.4   | 445.3   | 563.7   | 550.5   | 486.4   | 299.1   | 332.0   | 358.2   | 453.6   | 340.2   | 203.8   |
| 80°   | 281.0   | 277.7   | 285.9   | 456.8   | 437.1   | 228.4   | 166.0   | 174.2   | 218.6   | 167.6   | 98.6    |
| 82.5° | 170.9   | 167.6   | 187.3   | 213.6   | 220.2   | 159.4   | 101.9   | 103.5   | 136.4   | 108.5   | 52.6    |
| 85°   | 14.8    | 19.7    | 113.4   | 105.2   | 75.6    | 49.3    | 49.3    | 52.6    | 72.3    | 64.1    | 29.6    |
| 87.5° | 0.0     | 0.0     | 19.7    | 29.6    | 16.4    | 18.1    | 18.1    | 19.7    | 27.9    | 27.9    | 14.8    |
| 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: P324933

CATALOG NUMBER: GLEON-SA9C-827-U-AFL-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 8522.3 | 8522.3 | 8522.3 | 8522.3 | 8522.3 | 8522.3 | 8522.3 | 8522.3 | 8522.3 | 8522.3 | 8522.3 |
| 2.5°  | 8528.9 | 8358.0 | 8012.9 | 7681.0 | 7399.9 | 7128.8 | 6819.8 | 6514.2 | 6371.2 | 6313.7 | 6254.5 |
| 5°    | 8543.7 | 8192.0 | 7480.5 | 6764.0 | 6021.2 | 5352.3 | 4782.1 | 4197.1 | 3904.6 | 3776.4 | 3717.2 |
| 7.5°  | 8563.4 | 8027.7 | 6877.4 | 5674.4 | 4478.1 | 3571.0 | 2778.9 | 2269.4 | 2049.2 | 2014.7 | 1929.3 |
| 10°   | 8566.7 | 7828.9 | 6177.3 | 4471.5 | 3002.4 | 2152.8 | 1656.5 | 1393.5 | 1296.6 | 1280.2 | 1252.2 |
| 12.5° | 8573.3 | 7593.9 | 5400.0 | 3311.3 | 2001.6 | 1439.6 | 1198.0 | 1110.9 | 1084.6 | 1083.0 | 1083.0 |
| 15°   | 8593.0 | 7347.4 | 4593.1 | 2386.1 | 1437.9 | 1140.5 | 1051.7 | 1017.2 | 1007.4 | 1012.3 | 1010.7 |
| 17.5° | 8593.0 | 7056.5 | 3801.0 | 1778.1 | 1161.8 | 1025.4 | 976.1  | 953.1  | 949.8  | 954.8  | 956.4  |
| 20°   | 8530.6 | 6703.2 | 3074.7 | 1383.7 | 1030.4 | 951.5  | 907.1  | 885.8  | 877.5  | 880.8  | 882.5  |
| 22.5° | 8381.0 | 6269.3 | 2483.1 | 1145.4 | 943.3  | 884.1  | 836.5  | 803.6  | 790.4  | 792.1  | 792.1  |
| 25°   | 8147.7 | 5755.0 | 1942.4 | 990.9  | 872.6  | 811.8  | 755.9  | 718.1  | 709.9  | 708.3  | 711.6  |
| 27.5° | 7848.6 | 5186.4 | 1546.4 | 872.6  | 788.8  | 731.3  | 675.4  | 644.2  | 637.6  | 639.3  | 640.9  |
| 30°   | 7554.4 | 4596.4 | 1219.4 | 772.4  | 695.1  | 640.9  | 598.2  | 583.4  | 583.4  | 588.3  | 590.0  |
| 32.5° | 7284.9 | 4029.5 | 964.6  | 685.3  | 611.3  | 562.0  | 537.4  | 535.7  | 543.9  | 547.2  | 548.9  |
| 35°   | 7053.2 | 3505.2 | 798.7  | 617.9  | 545.6  | 502.9  | 494.6  | 501.2  | 511.1  | 517.7  | 519.3  |
| 37.5° | 6888.9 | 3036.9 | 698.4  | 562.0  | 494.6  | 460.1  | 458.5  | 471.6  | 484.8  | 499.6  | 502.9  |
| 40°   | 6819.8 | 2640.8 | 629.4  | 512.7  | 453.6  | 427.3  | 422.3  | 440.4  | 465.1  | 486.4  | 489.7  |
| 42.5° | 6762.3 | 2317.1 | 570.2  | 465.1  | 420.7  | 382.9  | 381.3  | 404.3  | 433.8  | 455.2  | 460.1  |
| 45°   | 6713.0 | 2057.5 | 516.0  | 414.1  | 378.0  | 328.7  | 333.6  | 363.2  | 386.2  | 409.2  | 414.1  |
| 47.5° | 6611.1 | 1843.8 | 456.8  | 359.9  | 312.2  | 281.0  | 290.9  | 317.2  | 335.2  | 369.8  | 374.7  |
| 50°   | 6428.7 | 1669.6 | 396.0  | 294.2  | 254.7  | 243.2  | 258.0  | 276.1  | 299.1  | 328.7  | 332.0  |
| 52.5° | 6305.5 | 1538.2 | 343.5  | 246.5  | 210.3  | 213.6  | 228.4  | 235.0  | 248.1  | 259.6  | 256.4  |
| 55°   | 6234.8 | 1465.9 | 300.7  | 213.6  | 179.1  | 189.0  | 192.3  | 184.1  | 177.5  | 166.0  | 161.0  |
| 57.5° | 6226.6 | 1400.1 | 267.9  | 185.7  | 157.8  | 162.7  | 151.2  | 123.3  | 100.2  | 87.1   | 83.8   |
| 60°   | 6213.5 | 1319.6 | 241.6  | 156.1  | 139.7  | 133.1  | 108.5  | 67.4   | 47.7   | 44.4   | 44.4   |
| 62.5° | 6070.5 | 1194.7 | 221.9  | 131.5  | 118.3  | 100.2  | 62.4   | 31.2   | 26.3   | 27.9   | 27.9   |
| 65°   | 5615.3 | 1020.5 | 202.1  | 106.8  | 93.7   | 72.3   | 31.2   | 18.1   | 9.9    | 11.5   | 11.5   |
| 67.5° | 4773.9 | 813.5  | 180.8  | 82.2   | 70.7   | 46.0   | 18.1   | 8.2    | 0.0    | 0.0    | 0.0    |
| 70°   | 3196.3 | 504.5  | 152.8  | 57.5   | 46.0   | 27.9   | 13.1   | 1.6    | 0.0    | 0.0    | 0.0    |
| 72.5° | 1225.9 | 272.8  | 123.3  | 34.5   | 29.6   | 19.7   | 8.2    | 0.0    | 0.0    | 0.0    | 0.0    |
| 75°   | 276.1  | 179.1  | 85.5   | 24.7   | 21.4   | 13.1   | 3.3    | 0.0    | 0.0    | 0.0    | 0.0    |
| 77.5° | 105.2  | 129.8  | 49.3   | 16.4   | 14.8   | 8.2    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 80°   | 50.9   | 77.2   | 23.0   | 9.9    | 8.2    | 3.3    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 82.5° | 26.3   | 29.6   | 9.9    | 4.9    | 3.3    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 85°   | 14.8   | 14.8   | 4.9    | 3.3    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 87.5° | 8.2    | 4.9    | 1.6    | 1.6    | 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

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           |

REPORT NUMBER: SP1-2407-157-9

**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

REPORT NUMBER: SP1-2407-157-9

### 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 (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         | 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**

| 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            | 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)