

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: P319993

Luminaire Tested: **GLEON-SA9A-740-U-SL4**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P319993  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-24)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA9A-740-U-SL4  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(9) 70 CRI, 4000K, 615mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV SPILL  
LIGHT ELIMINATOR OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 39589 lumens  
Efficiency: N/A  
Efficacy: 136.5 lumens/watt  
Luminous Opening: Rectangular (W 2.5' x L: 1' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B3 - U0 - G5

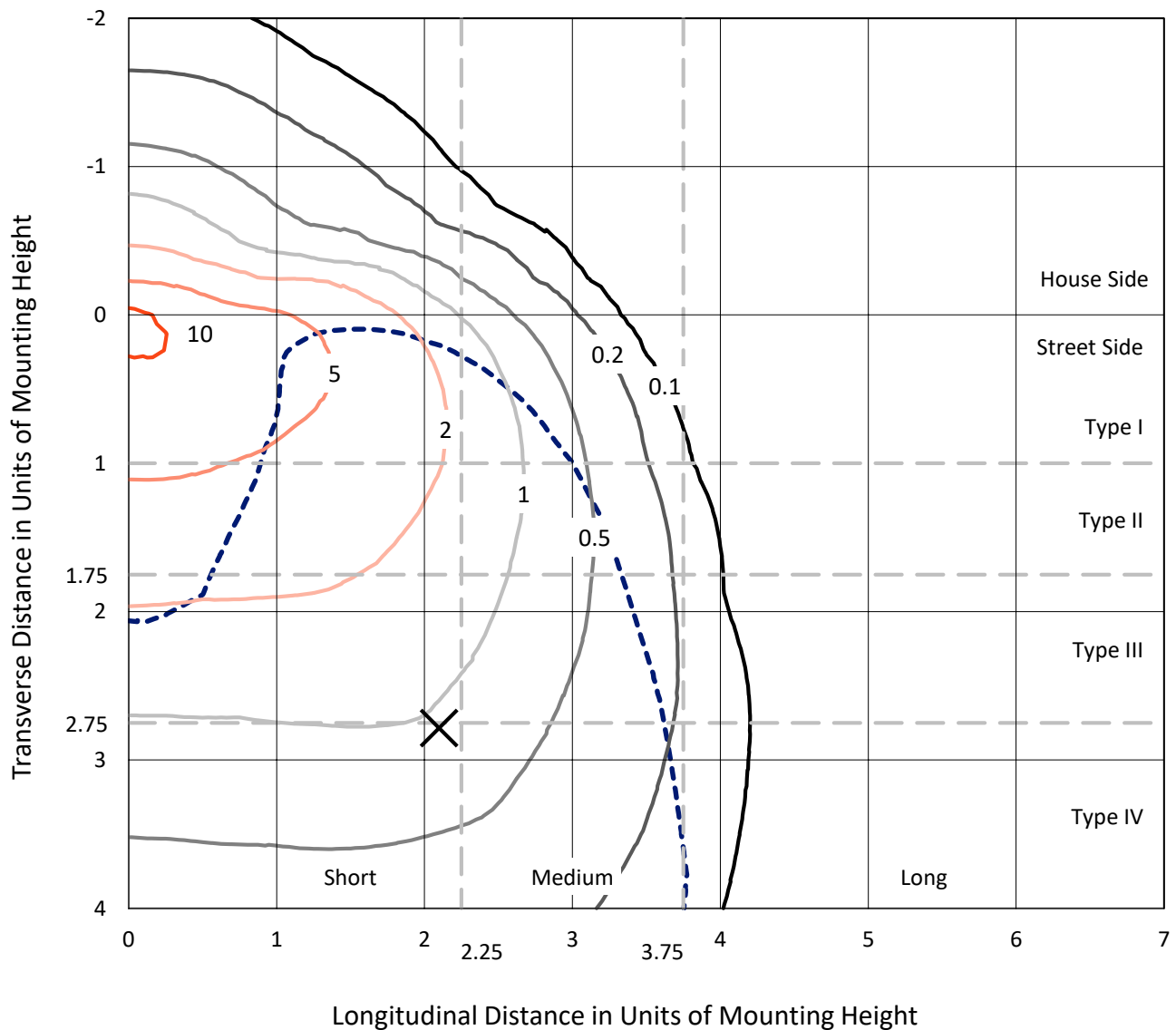
Input Watts (W): 290  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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## Iso-Footcandle Lines of Horizontal Illumination

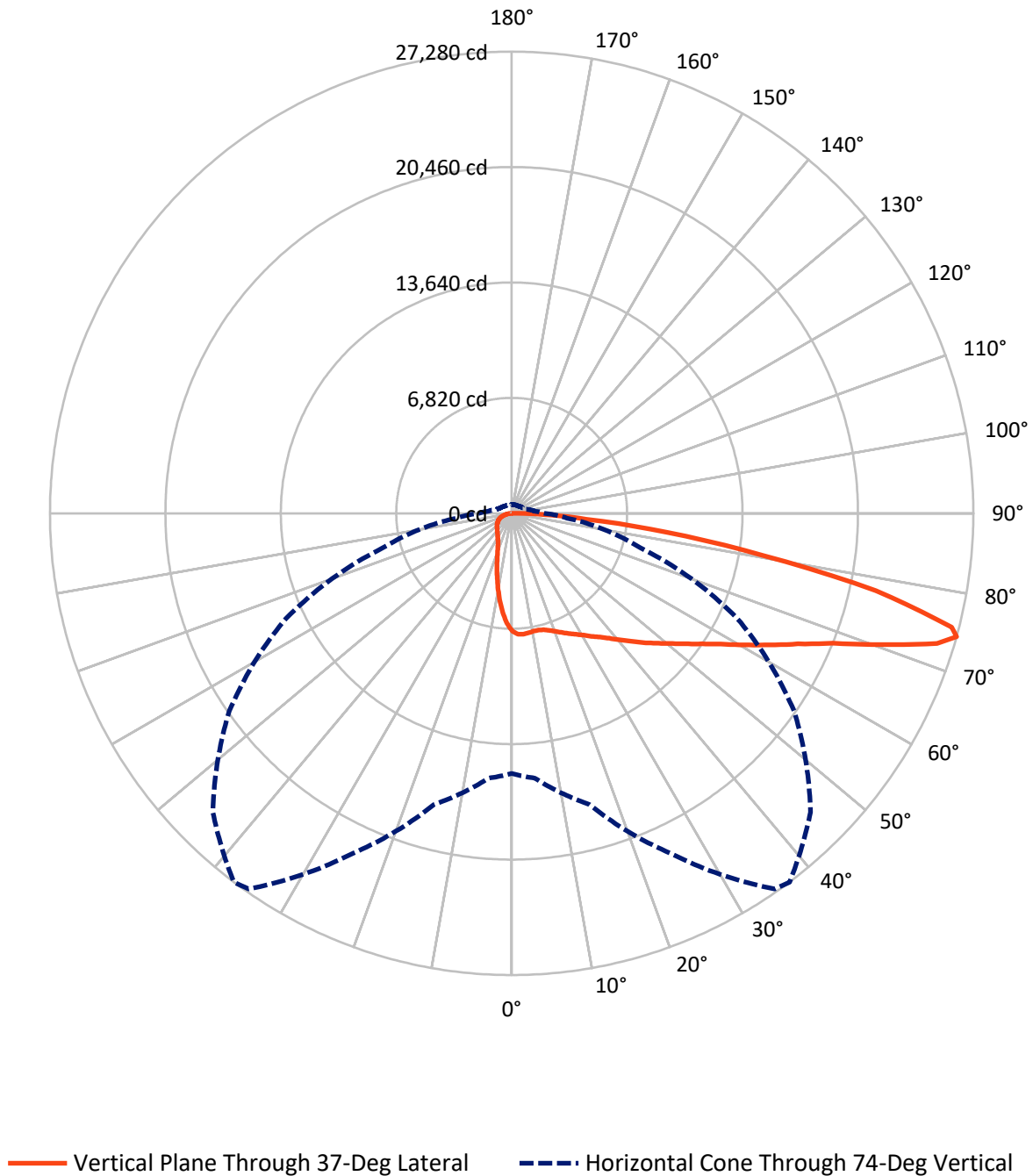
× Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 11.3 fc  
 Type IV - Short - N/A

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## Luminous Intensity Polar Plot



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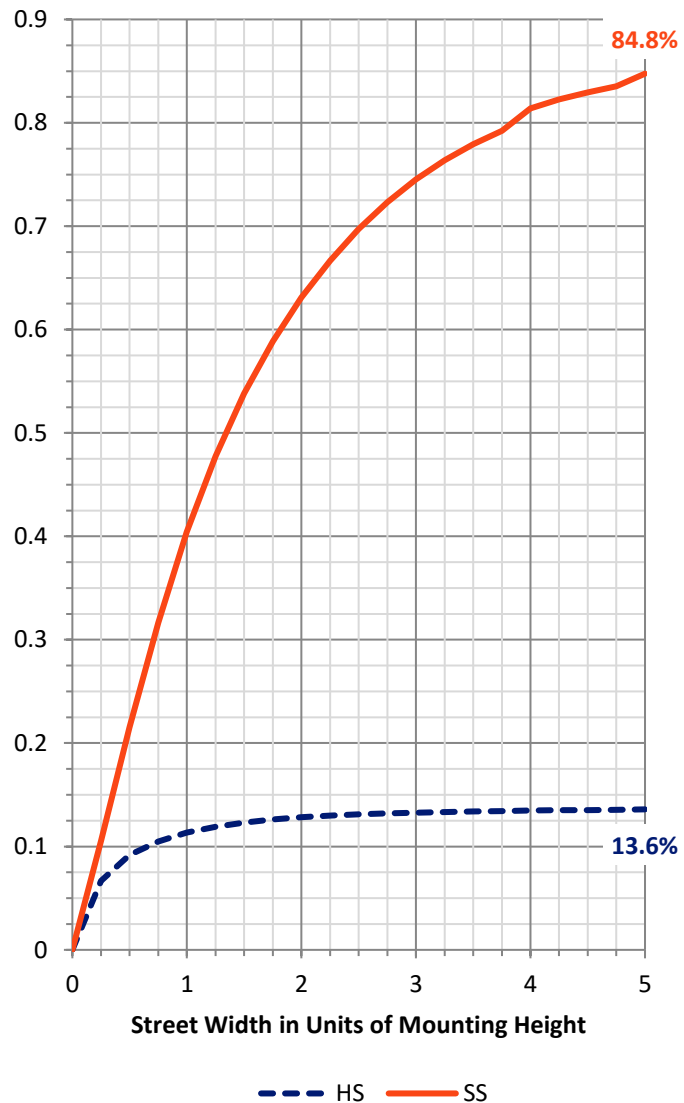
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 5447.2   | 0.0    | 5447.2  |
|                    | % Fixture | 13.8     | 0.0    | 13.8    |
| <b>Street Side</b> | Lumens    | 34141.8  | 0.0    | 34141.8 |
|                    | % Fixture | 86.2     | 0.0    | 86.2    |
| <b>Total</b>       | Lumens    | 39589.0  | 0.0    | 39589.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 614.3   | 1.6       |
| 10°-20°   | 1574.5  | 4.0       |
| 20°-30°   | 2426.0  | 6.1       |
| 30°-40°   | 3527.8  | 8.9       |
| 40°-50°   | 5192.3  | 13.1      |
| 50°-60°   | 7291.7  | 18.4      |
| 60°-70°   | 9229.0  | 23.3      |
| 70°-80°   | 8126.5  | 20.5      |
| 80°-90°   | 1606.8  | 4.1       |
| 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°    | 39589.0 | 100.0     |
| 0°-180°   | 39589.0 | 100.0     |

**Coefficient of Utilization**



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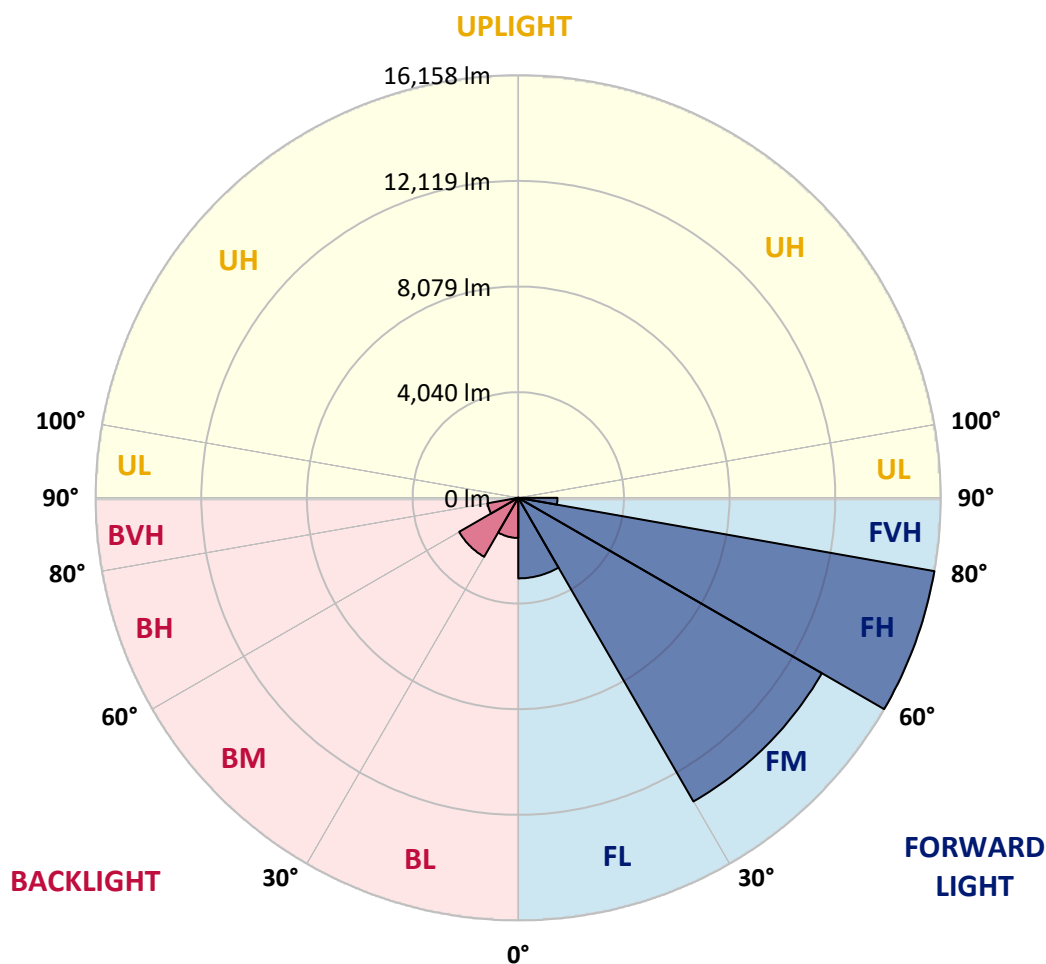
CATALOG NUMBER: GLEON-SA9A-740-U-SL4

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|---------|-----------|-------------------------|------|---------|
|      |             |         |           | B                       | U    | G       |
| FL   | (0°-30°)    | 3080.5  | 7.8       |                         |      |         |
| FM   | (30°-60°)   | 13405.1 | 33.9      |                         |      |         |
| FH   | (60°-80°)   | 16158.2 | 40.8      |                         |      | G5      |
| FVH  | (80°-90°)   | 1498.0  | 3.8       |                         |      | G5      |
| BL   | (0°-30°)    | 1534.3  | 3.9       | B3/2500                 |      |         |
| BM   | (30°-60°)   | 2606.7  | 6.6       | B3/5000                 |      |         |
| BH   | (60°-80°)   | 1197.3  | 3.0       | B3/2500                 |      | G3/2500 |
| BVH  | (80°-90°)   | 108.8   | 0.3       |                         |      | G2/225  |
| UL   | (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0     | 0.0       |                         | U0/0 |         |

**BUG Rating: B3-U0-G5**

Type IV Short



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 37°     | 45°     | 55°     | 65°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 6975.4  | 6975.4  | 6975.4  | 6975.4  | 6975.4  | 6975.4  | 6975.4  | 6975.4  | 6975.4  | 6975.4  | 6975.4  |
| 2.5°  | 7213.9  | 7215.3  | 7213.9  | 7202.7  | 7176.2  | 7153.9  | 7135.8  | 7109.3  | 7050.7  | 7006.1  | 6939.2  |
| 5°    | 7282.2  | 7273.9  | 7268.3  | 7247.4  | 7205.5  | 7180.4  | 7145.6  | 7095.4  | 6999.1  | 6909.9  | 6801.1  |
| 7.5°  | 7250.2  | 7240.4  | 7227.8  | 7202.7  | 7155.3  | 7134.4  | 7085.6  | 7020.1  | 6904.3  | 6787.2  | 6631.0  |
| 10°   | 7151.1  | 7148.3  | 7142.8  | 7137.2  | 7096.8  | 7080.0  | 7035.4  | 6965.7  | 6851.3  | 6709.1  | 6526.4  |
| 12.5° | 7041.0  | 7047.9  | 7070.3  | 7099.5  | 7081.4  | 7073.0  | 7045.2  | 6997.7  | 6880.6  | 6727.2  | 6506.9  |
| 15°   | 6971.2  | 6990.8  | 7050.7  | 7127.4  | 7142.8  | 7140.0  | 7133.0  | 7102.3  | 6978.2  | 6808.1  | 6551.5  |
| 17.5° | 6947.5  | 6979.6  | 7094.0  | 7220.9  | 7265.5  | 7275.3  | 7278.0  | 7225.0  | 7087.0  | 6907.1  | 6597.5  |
| 20°   | 6990.8  | 7031.2  | 7198.6  | 7372.9  | 7444.0  | 7449.6  | 7437.0  | 7345.0  | 7190.2  | 6992.2  | 6622.6  |
| 22.5° | 7121.9  | 7158.1  | 7367.3  | 7563.9  | 7644.8  | 7653.2  | 7615.5  | 7476.1  | 7299.0  | 7092.6  | 6657.5  |
| 25°   | 7374.3  | 7418.9  | 7628.1  | 7824.7  | 7866.5  | 7867.9  | 7813.5  | 7640.6  | 7441.2  | 7233.4  | 6732.8  |
| 27.5° | 7703.4  | 7748.0  | 7936.3  | 8128.7  | 8106.4  | 8093.8  | 8019.9  | 7847.0  | 7626.7  | 7427.3  | 6866.7  |
| 30°   | 8070.1  | 8118.9  | 8297.4  | 8434.1  | 8381.1  | 8356.0  | 8296.0  | 8072.9  | 7884.7  | 7692.2  | 7071.7  |
| 32.5° | 8449.4  | 8494.1  | 8650.3  | 8743.7  | 8676.8  | 8665.6  | 8575.0  | 8371.4  | 8220.7  | 8096.6  | 7403.5  |
| 35°   | 8838.5  | 8870.6  | 9024.0  | 9077.0  | 8987.7  | 8984.9  | 8959.8  | 8773.0  | 8678.1  | 8736.7  | 7886.1  |
| 37.5° | 9236.0  | 9244.3  | 9375.4  | 9378.2  | 9351.7  | 9362.9  | 9389.4  | 9272.2  | 9298.7  | 9481.4  | 8513.6  |
| 40°   | 9590.2  | 9612.5  | 9707.3  | 9736.6  | 9782.6  | 9821.7  | 9954.1  | 9877.4  | 10082.4 | 10406.0 | 9294.5  |
| 42.5° | 9852.3  | 9895.6  | 10047.6 | 10122.9 | 10272.1 | 10333.5 | 10520.3 | 10591.4 | 11004.2 | 11489.5 | 10223.3 |
| 45°   | 10074.1 | 10141.0 | 10385.0 | 10539.8 | 10792.3 | 10899.6 | 11167.4 | 11405.8 | 12045.9 | 12665.1 | 11200.8 |
| 47.5° | 10313.9 | 10399.0 | 10704.4 | 11000.0 | 11343.1 | 11464.4 | 11951.1 | 12308.1 | 13157.4 | 13847.7 | 12122.6 |
| 50°   | 10666.7 | 10732.3 | 11030.7 | 11495.1 | 11923.2 | 12079.4 | 12753.0 | 13264.7 | 14286.9 | 14974.4 | 12921.7 |
| 52.5° | 11159.0 | 11133.9 | 11386.3 | 12037.6 | 12612.1 | 12804.6 | 13609.2 | 14282.8 | 15431.8 | 15993.8 | 13596.6 |
| 55°   | 11654.1 | 11612.2 | 11789.3 | 12605.1 | 13415.4 | 13617.6 | 14551.9 | 15304.9 | 16521.0 | 16911.4 | 14114.0 |
| 57.5° | 12204.9 | 12125.4 | 12274.6 | 13245.2 | 14330.2 | 14571.4 | 15607.6 | 16391.3 | 17592.0 | 17653.3 | 14443.1 |
| 60°   | 12772.5 | 12665.1 | 12832.4 | 14038.7 | 15491.8 | 15776.3 | 16843.1 | 17451.1 | 18601.6 | 18247.4 | 14549.1 |
| 62.5° | 13268.9 | 13193.6 | 13451.6 | 14924.2 | 16801.3 | 17113.6 | 18056.3 | 18577.9 | 19597.3 | 18494.2 | 14167.0 |
| 65°   | 13702.6 | 13715.2 | 14161.4 | 15919.9 | 18261.3 | 18594.6 | 19448.1 | 19966.8 | 20381.0 | 18347.8 | 13273.1 |
| 67.5° | 14220.0 | 14291.1 | 15052.5 | 17230.8 | 20099.3 | 20464.7 | 21472.9 | 21481.3 | 20818.9 | 17488.8 | 11513.2 |
| 70°   | 14974.4 | 15120.9 | 16278.3 | 19049.3 | 22712.7 | 23214.7 | 23992.9 | 22371.0 | 20203.9 | 15159.9 | 9058.9  |
| 72.5° | 15643.8 | 15917.1 | 17582.2 | 21129.9 | 25897.8 | 26278.5 | 25466.9 | 21857.8 | 17633.8 | 11361.2 | 5643.7  |
| 74°   | 15371.9 | 15710.8 | 17819.3 | 22154.9 | 27097.1 | 27279.8 | 24969.0 | 20360.1 | 14702.5 | 7867.9  | 3279.9  |
| 75°   | 14786.2 | 15154.3 | 17473.4 | 22145.1 | 26945.1 | 26843.3 | 23766.9 | 18649.0 | 12108.7 | 5366.1  | 2182.4  |
| 77.5° | 11933.0 | 12322.0 | 14723.4 | 18979.5 | 22093.5 | 21997.3 | 18257.2 | 12510.3 | 5303.4  | 1759.9  | 1108.6  |
| 80°   | 6937.8  | 7234.8  | 9139.7  | 12052.9 | 14897.7 | 15072.1 | 12006.9 | 6190.3  | 2086.2  | 988.7   | 751.7   |
| 82.5° | 3081.9  | 3286.9  | 4415.1  | 6152.7  | 8990.5  | 9215.0  | 6287.9  | 3243.7  | 1288.5  | 601.0   | 451.8   |
| 85°   | 2022.1  | 2174.1  | 2680.3  | 2929.9  | 4281.2  | 4434.6  | 3077.7  | 2525.5  | 850.7   | 330.5   | 331.9   |
| 87.5° | 1454.5  | 1600.9  | 1991.4  | 1739.0  | 1964.9  | 1860.3  | 1674.8  | 2337.2  | 341.7   | 188.3   | 111.6   |
| 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: P319993

CATALOG NUMBER: GLEON-SA9A-740-U-SL4

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 6975.4  | 6975.4 | 6975.4 | 6975.4 | 6975.4 | 6975.4 | 6975.4 | 6975.4 | 6975.4 | 6975.4 | 6975.4 |
| 2.5°  | 6909.9  | 6887.6 | 6837.4 | 6742.5 | 6689.6 | 6644.9 | 6571.0 | 6527.8 | 6508.3 | 6506.9 | 6515.2 |
| 5°    | 6738.4  | 6686.8 | 6557.1 | 6398.1 | 6271.2 | 6155.4 | 6011.8 | 5925.3 | 5864.0 | 5827.7 | 5837.5 |
| 7.5°  | 6538.9  | 6458.1 | 6254.5 | 6000.7 | 5797.1 | 5572.5 | 5350.8 | 5218.3 | 5115.1 | 5038.4 | 5052.4 |
| 10°   | 6402.3  | 6290.7 | 5993.7 | 5628.3 | 5289.4 | 4963.1 | 4657.7 | 4475.0 | 4330.0 | 4218.4 | 4226.8 |
| 12.5° | 6356.3  | 6205.6 | 5794.3 | 5306.2 | 4830.6 | 4384.4 | 3985.6 | 3705.3 | 3556.0 | 3429.1 | 3438.9 |
| 15°   | 6363.2  | 6161.0 | 5626.9 | 5016.1 | 4417.9 | 3855.9 | 3372.0 | 3044.3 | 2842.0 | 2754.2 | 2755.6 |
| 17.5° | 6368.8  | 6109.4 | 5451.2 | 4705.1 | 4009.3 | 3362.2 | 2836.5 | 2504.6 | 2313.5 | 2232.6 | 2234.0 |
| 20°   | 6350.7  | 6025.8 | 5233.7 | 4348.1 | 3582.5 | 2909.0 | 2400.0 | 2118.3 | 1973.3 | 1910.5 | 1910.5 |
| 22.5° | 6327.0  | 5926.7 | 4988.2 | 3989.7 | 3161.4 | 2515.7 | 2087.6 | 1872.9 | 1789.2 | 1747.3 | 1745.9 |
| 25°   | 6338.1  | 5852.8 | 4737.2 | 3621.6 | 2773.7 | 2202.0 | 1879.8 | 1737.6 | 1681.8 | 1655.3 | 1653.9 |
| 27.5° | 6398.1  | 5818.0 | 4505.7 | 3254.8 | 2434.8 | 1966.3 | 1740.4 | 1640.0 | 1603.7 | 1587.0 | 1587.0 |
| 30°   | 6506.9  | 5818.0 | 4264.5 | 2942.5 | 2153.2 | 1792.0 | 1633.0 | 1564.7 | 1539.6 | 1528.4 | 1528.4 |
| 32.5° | 6696.5  | 5850.0 | 4031.6 | 2632.9 | 1928.6 | 1655.3 | 1543.7 | 1497.7 | 1478.2 | 1472.6 | 1472.6 |
| 35°   | 7022.8  | 5958.8 | 3804.3 | 2340.0 | 1747.3 | 1543.7 | 1458.7 | 1432.2 | 1418.2 | 1416.8 | 1421.0 |
| 37.5° | 7481.6  | 6180.5 | 3590.9 | 2123.9 | 1619.0 | 1453.1 | 1387.6 | 1366.6 | 1358.3 | 1365.2 | 1370.8 |
| 40°   | 8059.0  | 6481.8 | 3397.1 | 1928.6 | 1521.4 | 1380.6 | 1322.0 | 1308.1 | 1303.9 | 1313.6 | 1322.0 |
| 42.5° | 8756.2  | 6889.0 | 3238.1 | 1787.8 | 1446.1 | 1319.2 | 1266.2 | 1249.5 | 1245.3 | 1256.5 | 1267.6 |
| 45°   | 9510.7  | 7326.8 | 3126.5 | 1683.2 | 1387.6 | 1273.2 | 1217.4 | 1199.3 | 1190.9 | 1196.5 | 1209.1 |
| 47.5° | 10196.8 | 7741.0 | 3081.9 | 1609.3 | 1331.8 | 1234.2 | 1174.2 | 1151.9 | 1137.9 | 1135.1 | 1144.9 |
| 50°   | 10775.5 | 8049.2 | 3102.8 | 1564.7 | 1287.1 | 1190.9 | 1132.4 | 1107.3 | 1086.3 | 1073.8 | 1080.8 |
| 52.5° | 11196.7 | 8243.1 | 3122.3 | 1545.1 | 1252.3 | 1143.5 | 1086.3 | 1062.6 | 1034.7 | 1013.8 | 1013.8 |
| 55°   | 11502.1 | 8287.7 | 3079.1 | 1529.8 | 1225.8 | 1091.9 | 1034.7 | 1012.4 | 984.5  | 960.8  | 958.0  |
| 57.5° | 11622.0 | 8162.2 | 2918.7 | 1507.5 | 1207.7 | 1043.1 | 980.4  | 963.6  | 939.9  | 912.0  | 910.6  |
| 60°   | 11460.2 | 7774.5 | 2609.2 | 1460.1 | 1184.0 | 1002.7 | 926.0  | 914.8  | 903.7  | 877.2  | 875.8  |
| 62.5° | 10810.4 | 6923.8 | 2208.9 | 1363.8 | 1136.5 | 959.4  | 875.8  | 881.3  | 882.7  | 864.6  | 861.8  |
| 65°   | 9632.0  | 5755.2 | 1818.5 | 1238.3 | 1065.4 | 907.8  | 824.2  | 850.7  | 866.0  | 863.2  | 859.0  |
| 67.5° | 7919.5  | 4479.2 | 1541.0 | 1105.9 | 972.0  | 836.7  | 768.4  | 799.1  | 811.6  | 821.4  | 818.6  |
| 70°   | 5877.9  | 3158.6 | 1274.6 | 966.4  | 859.0  | 753.0  | 695.9  | 711.2  | 702.8  | 714.0  | 718.2  |
| 72.5° | 3277.1  | 1895.2 | 1038.9 | 827.0  | 741.9  | 655.4  | 615.0  | 612.2  | 594.1  | 594.1  | 594.1  |
| 74°   | 1966.3  | 1390.3 | 913.4  | 740.5  | 670.8  | 591.3  | 556.4  | 543.9  | 527.1  | 528.5  | 527.1  |
| 75°   | 1581.4  | 1195.1 | 838.1  | 683.3  | 620.6  | 553.6  | 518.8  | 502.0  | 489.5  | 489.5  | 488.1  |
| 77.5° | 998.5   | 907.8  | 675.0  | 543.9  | 496.5  | 456.0  | 432.3  | 410.0  | 410.0  | 408.6  | 407.2  |
| 80°   | 754.4   | 722.4  | 525.7  | 411.4  | 380.7  | 350.0  | 334.7  | 324.9  | 324.9  | 329.1  | 327.7  |
| 82.5° | 517.4   | 543.9  | 369.5  | 287.3  | 271.9  | 249.6  | 246.8  | 248.2  | 244.0  | 238.5  | 237.1  |
| 85°   | 377.9   | 408.6  | 249.6  | 181.3  | 165.9  | 152.0  | 163.2  | 168.7  | 161.8  | 149.2  | 143.6  |
| 87.5° | 145.0   | 267.7  | 133.9  | 75.3   | 69.7   | 60.0   | 69.7   | 72.5   | 78.1   | 61.4   | 62.8   |
| 90°   | 0.0     | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

LM-79-08: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

MCGRAW, INVUE, LUMARK AND STREETWORKS

DATA VALID FOR LUMINAIRES UTILIZING SA LIGHT ENGINES

Report Number: SP1-2101-121-2

Luminaire Tested: IFLD-S-SA2A-740-U-T3R-HSS

Test Date: 03/05/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2101-121-2  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 03/05/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: STREETWORKS  
 Catalog Number: **IFLD-S-SA2A-740-U-T3R-HSS**  
 Description: STREETWORKS INF FLOOD

SHIELD, DRIVER PROGRAMMED @ 615mA.

### Spectral Parameters

|                           |         |           |      |      |       |
|---------------------------|---------|-----------|------|------|-------|
| CCT (K):                  | 3905    | CRI (Ra): | 71.2 |      |       |
| CIE u':                   | 0.2273  | R1:       | 68.9 | R9:  | -29.7 |
| CIE v':                   | 0.5024  | R2:       | 77.0 | R10: | 46.2  |
| Duv:                      | -0.0008 | R3:       | 84.0 | R11: | 68.8  |
| CIE x:                    | 0.3841  | R4:       | 71.6 | R12: | 45.6  |
| CIE y:                    | 0.3774  | R5:       | 68.9 | R13: | 69.5  |
| CIE z:                    | 0.2385  | R6:       | 68.3 | R14: | 90.7  |
| Peak Wavelength (nm):     | 443     | R7:       | 78.7 |      |       |
| Dominant Wavelength (nm): | 579     | R8:       | 52.2 |      |       |
| Purity:                   | 28.7    |           |      |      |       |
| Rf:                       | 71.7    |           |      |      |       |
| Rg:                       | 96.9    |           |      |      |       |



### Test Conditions

Stabilization Time: 211M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.8/312%  
 Sphere Temperature (°C): 24.1

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| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 1/31/2021        | 7/31/2021            |
| Power Meter                    | IN0071                | 12/1/2020        | 12/1/2021            |
| AC Power Source                | IN0063                | 12/1/2020        | 12/1/2021            |
| DC Power Source                | IN0208                | 12/1/2020        | 12/1/2021            |
| Sphere Thermometer             | IN0085                | 12/1/2020        | 12/1/2021            |
| Room Thermometer               | IN0046                | 12/1/2020        | 12/1/2021            |

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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 4000K 4-step quadrangle

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### Photopic Flux vs. Wavelength

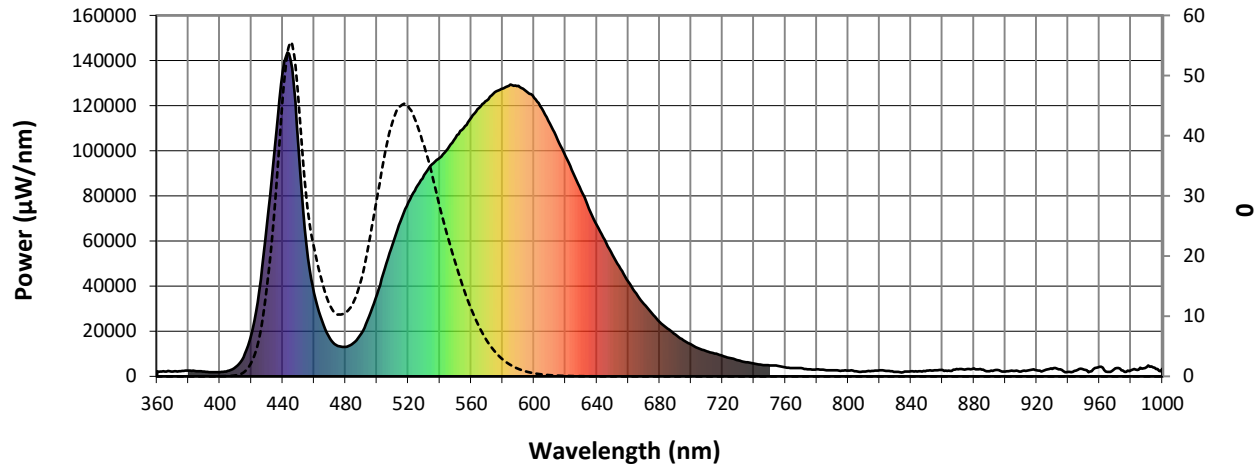


#####

| 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       | 2304             | 0.0              | 490       | 19043            | 2.7              | 620       | 97577            | 25.4             | 750       | 4830             | 0.0              | 880       | 3505             | 0.0              |
| 365       | 2150             | 0.0              | 495       | 26606            | 4.8              | 625       | 90158            | 19.9             | 755       | 4664             | 0.0              | 885       | 2991             | 0.0              |
| 370       | 2146             | 0.0              | 500       | 36376            | 8.0              | 630       | 82240            | 14.9             | 760       | 4006             | 0.0              | 890       | 2327             | 0.0              |
| 375       | 2332             | 0.0              | 505       | 47714            | 13.3             | 635       | 74361            | 11.2             | 765       | 3715             | 0.0              | 895       | 2775             | 0.0              |
| 380       | 2527             | 0.0              | 510       | 58741            | 20.2             | 640       | 66994            | 8.0              | 770       | 3696             | 0.0              | 900       | 2141             | 0.0              |
| 385       | 2304             | 0.0              | 515       | 68716            | 28.5             | 645       | 60405            | 5.8              | 775       | 3117             | 0.0              | 905       | 2421             | 0.0              |
| 390       | 2064             | 0.0              | 520       | 77136            | 37.4             | 650       | 53806            | 3.9              | 780       | 3062             | 0.0              | 910       | 2200             | 0.0              |
| 395       | 1856             | 0.0              | 525       | 83567            | 44.9             | 655       | 47610            | 2.7              | 785       | 2907             | 0.0              | 915       | 2716             | 0.0              |
| 400       | 1856             | 0.0              | 530       | 89283            | 52.6             | 660       | 42018            | 1.8              | 790       | 2655             | 0.0              | 920       | 2656             | 0.0              |
| 405       | 2374             | 0.0              | 535       | 94097            | 58.4             | 665       | 36742            | 1.2              | 795       | 2467             | 0.0              | 925       | 2671             | 0.0              |
| 410       | 4084             | 0.0              | 540       | 96845            | 63.1             | 670       | 32105            | 0.7              | 800       | 2609             | 0.0              | 930       | 3292             | 0.0              |
| 415       | 8543             | 0.0              | 545       | 100829           | 67.1             | 675       | 27946            | 0.5              | 805       | 2293             | 0.0              | 935       | 3188             | 0.0              |
| 420       | 18394            | 0.1              | 550       | 105648           | 71.8             | 680       | 24146            | 0.3              | 810       | 2188             | 0.0              | 940       | 1997             | 0.0              |
| 425       | 37987            | 0.2              | 555       | 110017           | 75.1             | 685       | 21191            | 0.2              | 815       | 2386             | 0.0              | 945       | 2623             | 0.0              |
| 430       | 67605            | 0.5              | 560       | 114586           | 77.9             | 690       | 18544            | 0.1              | 820       | 2712             | 0.0              | 950       | 2969             | 0.0              |
| 435       | 102160           | 1.2              | 565       | 118987           | 79.1             | 695       | 16058            | 0.1              | 825       | 2473             | 0.0              | 955       | 2277             | 0.0              |
| 440       | 135103           | 2.1              | 570       | 122326           | 79.5             | 700       | 14133            | 0.0              | 830       | 1969             | 0.0              | 960       | 4267             | 0.0              |
| 445       | 140126           | 2.9              | 575       | 125968           | 78.4             | 705       | 12309            | 0.0              | 835       | 1917             | 0.0              | 965       | 2034             | 0.0              |
| 450       | 102339           | 2.7              | 580       | 127613           | 75.8             | 710       | 11142            | 0.0              | 840       | 2248             | 0.0              | 970       | 3586             | 0.0              |
| 455       | 58751            | 2.0              | 585       | 129466           | 71.9             | 715       | 10143            | 0.0              | 845       | 2266             | 0.0              | 975       | 2505             | 0.0              |
| 460       | 36892            | 1.5              | 590       | 128813           | 66.6             | 720       | 9072             | 0.0              | 850       | 2558             | 0.0              | 980       | 2666             | 0.0              |
| 465       | 24637            | 1.3              | 595       | 126387           | 59.9             | 725       | 8130             | 0.0              | 855       | 2767             | 0.0              | 985       | 2934             | 0.0              |
| 470       | 16738            | 1.0              | 600       | 123477           | 53.2             | 730       | 7149             | 0.0              | 860       | 2826             | 0.0              | 990       | 4120             | 0.0              |
| 475       | 13456            | 1.1              | 605       | 118718           | 46.0             | 735       | 6311             | 0.0              | 865       | 2385             | 0.0              | 995       | 3858             | 0.0              |
| 480       | 13081            | 1.2              | 610       | 112091           | 38.5             | 740       | 5711             | 0.0              | 870       | 3194             | 0.0              | 1000      | 3405             | 0.0              |
| 485       | 14734            | 1.7              | 615       | 105039           | 31.7             | 745       | 5111             | 0.0              | 875       | 3189             | 0.0              |           |                  |                  |

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### Scotopic Flux vs. Wavelength



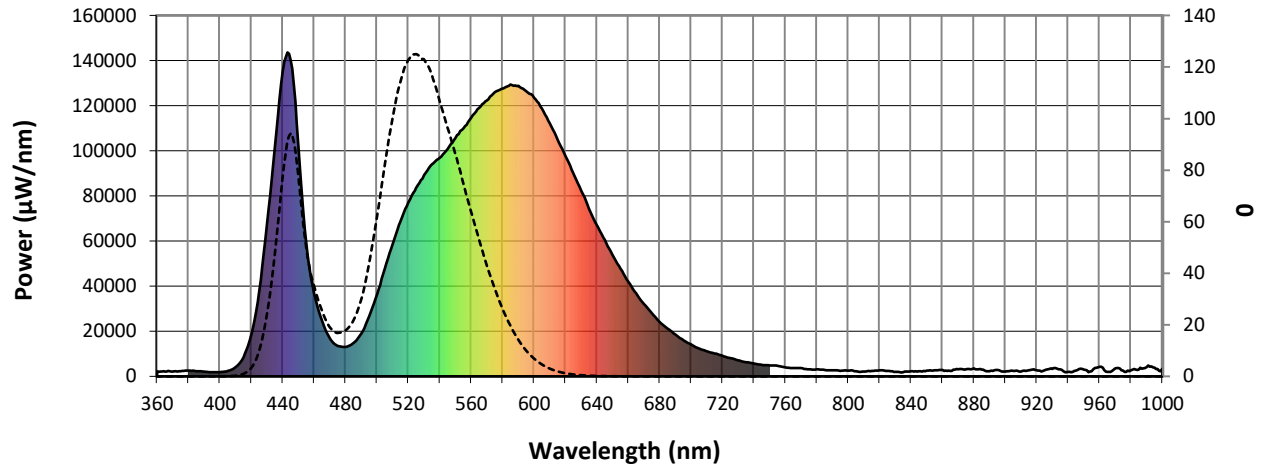
Scotopic Lumens: 10425.8

S/P: 1.47

| $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) |
|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|
| 360               | 2304                          | 0.0                            | 490               | 19043                         | 29.3                           | 620               | 97577                         | 1.2                            | 750               | 4830                          | 0.0                            | 880               | 3505                          | 0.0                            |
| 365               | 2150                          | 0.0                            | 495               | 26606                         | 43.0                           | 625               | 90158                         | 0.8                            | 755               | 4664                          | 0.0                            | 885               | 2991                          | 0.0                            |
| 370               | 2146                          | 0.0                            | 500               | 36376                         | 60.8                           | 630               | 82240                         | 0.5                            | 760               | 4006                          | 0.0                            | 890               | 2327                          | 0.0                            |
| 375               | 2332                          | 0.0                            | 505               | 47714                         | 81.1                           | 635               | 74361                         | 0.3                            | 765               | 3715                          | 0.0                            | 895               | 2775                          | 0.0                            |
| 380               | 2527                          | 0.0                            | 510               | 58741                         | 99.6                           | 640               | 66994                         | 0.2                            | 770               | 3696                          | 0.0                            | 900               | 2141                          | 0.0                            |
| 385               | 2304                          | 0.0                            | 515               | 68716                         | 113.9                          | 645               | 60405                         | 0.1                            | 775               | 3117                          | 0.0                            | 905               | 2421                          | 0.0                            |
| 390               | 2064                          | 0.0                            | 520               | 77136                         | 122.6                          | 650               | 53806                         | 0.1                            | 780               | 3062                          | 0.0                            | 910               | 2200                          | 0.0                            |
| 395               | 1856                          | 0.0                            | 525               | 83567                         | 125.0                          | 655               | 47610                         | 0.0                            | 785               | 2907                          | 0.0                            | 915               | 2716                          | 0.0                            |
| 400               | 1856                          | 0.0                            | 530               | 89283                         | 123.1                          | 660               | 42018                         | 0.0                            | 790               | 2655                          | 0.0                            | 920               | 2656                          | 0.0                            |
| 405               | 2374                          | 0.1                            | 535               | 94097                         | 117.3                          | 665               | 36742                         | 0.0                            | 795               | 2467                          | 0.0                            | 925               | 2671                          | 0.0                            |
| 410               | 4084                          | 0.2                            | 540               | 96845                         | 107.0                          | 670               | 32105                         | 0.0                            | 800               | 2609                          | 0.0                            | 930               | 3292                          | 0.0                            |
| 415               | 8543                          | 0.9                            | 545               | 100829                        | 96.7                           | 675               | 27946                         | 0.0                            | 805               | 2293                          | 0.0                            | 935               | 3188                          | 0.0                            |
| 420               | 18394                         | 3.0                            | 550               | 105648                        | 86.4                           | 680               | 24146                         | 0.0                            | 810               | 2188                          | 0.0                            | 940               | 1997                          | 0.0                            |
| 425               | 37987                         | 9.3                            | 555               | 110017                        | 75.2                           | 685               | 21191                         | 0.0                            | 815               | 2386                          | 0.0                            | 945               | 2623                          | 0.0                            |
| 430               | 67605                         | 23.0                           | 560               | 114586                        | 64.0                           | 690               | 18544                         | 0.0                            | 820               | 2712                          | 0.0                            | 950               | 2969                          | 0.0                            |
| 435               | 102160                        | 45.7                           | 565               | 118987                        | 53.4                           | 695               | 16058                         | 0.0                            | 825               | 2473                          | 0.0                            | 955               | 2277                          | 0.0                            |
| 440               | 135103                        | 75.5                           | 570               | 122326                        | 43.2                           | 700               | 14133                         | 0.0                            | 830               | 1969                          | 0.0                            | 960               | 4267                          | 0.0                            |
| 445               | 140126                        | 93.8                           | 575               | 125968                        | 34.3                           | 705               | 12309                         | 0.0                            | 835               | 1917                          | 0.0                            | 965               | 2034                          | 0.0                            |
| 450               | 102339                        | 79.3                           | 580               | 127613                        | 26.3                           | 710               | 11142                         | 0.0                            | 840               | 2248                          | 0.0                            | 970               | 3586                          | 0.0                            |
| 455               | 58751                         | 51.3                           | 585               | 129466                        | 19.8                           | 715               | 10143                         | 0.0                            | 845               | 2266                          | 0.0                            | 975               | 2505                          | 0.0                            |
| 460               | 36892                         | 35.6                           | 590               | 128813                        | 14.3                           | 720               | 9072                          | 0.0                            | 850               | 2558                          | 0.0                            | 980               | 2666                          | 0.0                            |
| 465               | 24637                         | 26.0                           | 595               | 126387                        | 10.1                           | 725               | 8130                          | 0.0                            | 855               | 2767                          | 0.0                            | 985               | 2934                          | 0.0                            |
| 470               | 16738                         | 19.3                           | 600               | 123477                        | 7.0                            | 730               | 7149                          | 0.0                            | 860               | 2826                          | 0.0                            | 990               | 4120                          | 0.0                            |
| 475               | 13456                         | 16.8                           | 605               | 118718                        | 4.7                            | 735               | 6311                          | 0.0                            | 865               | 2385                          | 0.0                            | 995               | 3858                          | 0.0                            |
| 480               | 13081                         | 17.7                           | 610               | 112091                        | 3.0                            | 740               | 5711                          | 0.0                            | 870               | 3194                          | 0.0                            | 1000              | 3405                          | 0.0                            |
| 485               | 14734                         | 21.4                           | 615               | 105039                        | 1.9                            | 745               | 5111                          | 0.0                            | 875               | 3189                          | 0.0                            |                   |                               |                                |

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### Melanopic Flux vs. Wavelength


**Melanopic Lumens: 3927.2**
**M/P: 0.55**

| 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       | 2304             | 0.0              | 490       | 19043            | 15.8             | 620       | 97577            | 0.1              | 750       | 4830             | 0.0              | 880       | 3505             | 0.0              |
| 365       | 2150             | 0.0              | 495       | 26606            | 22.0             | 625       | 90158            | 0.0              | 755       | 4664             | 0.0              | 885       | 2991             | 0.0              |
| 370       | 2146             | 0.0              | 500       | 36376            | 29.2             | 630       | 82240            | 0.0              | 760       | 4006             | 0.0              | 890       | 2327             | 0.0              |
| 375       | 2332             | 0.0              | 505       | 47714            | 36.6             | 635       | 74361            | 0.0              | 765       | 3715             | 0.0              | 895       | 2775             | 0.0              |
| 380       | 2527             | 0.0              | 510       | 58741            | 42.2             | 640       | 66994            | 0.0              | 770       | 3696             | 0.0              | 900       | 2141             | 0.0              |
| 385       | 2304             | 0.0              | 515       | 68716            | 44.9             | 645       | 60405            | 0.0              | 775       | 3117             | 0.0              | 905       | 2421             | 0.0              |
| 390       | 2064             | 0.0              | 520       | 77136            | 44.9             | 650       | 53806            | 0.0              | 780       | 3062             | 0.0              | 910       | 2200             | 0.0              |
| 395       | 1856             | 0.0              | 525       | 83567            | 42.4             | 655       | 47610            | 0.0              | 785       | 2907             | 0.0              | 915       | 2716             | 0.0              |
| 400       | 1856             | 0.0              | 530       | 89283            | 38.6             | 660       | 42018            | 0.0              | 790       | 2655             | 0.0              | 920       | 2656             | 0.0              |
| 405       | 2374             | 0.0              | 535       | 94097            | 33.9             | 665       | 36742            | 0.0              | 795       | 2467             | 0.0              | 925       | 2671             | 0.0              |
| 410       | 4084             | 0.2              | 540       | 96845            | 28.3             | 670       | 32105            | 0.0              | 800       | 2609             | 0.0              | 930       | 3292             | 0.0              |
| 415       | 8543             | 0.6              | 545       | 100829           | 23.4             | 675       | 27946            | 0.0              | 805       | 2293             | 0.0              | 935       | 3188             | 0.0              |
| 420       | 18394            | 2.1              | 550       | 105648           | 19.0             | 680       | 24146            | 0.0              | 810       | 2188             | 0.0              | 940       | 1997             | 0.0              |
| 425       | 37987            | 5.9              | 555       | 110017           | 14.8             | 685       | 21191            | 0.0              | 815       | 2386             | 0.0              | 945       | 2623             | 0.0              |
| 430       | 67605            | 14.3             | 560       | 114586           | 11.3             | 690       | 18544            | 0.0              | 820       | 2712             | 0.0              | 950       | 2969             | 0.0              |
| 435       | 102160           | 27.3             | 565       | 118987           | 8.4              | 695       | 16058            | 0.0              | 825       | 2473             | 0.0              | 955       | 2277             | 0.0              |
| 440       | 135103           | 45.1             | 570       | 122326           | 6.0              | 700       | 14133            | 0.0              | 830       | 1969             | 0.0              | 960       | 4267             | 0.0              |
| 445       | 140126           | 55.3             | 575       | 125968           | 4.2              | 705       | 12309            | 0.0              | 835       | 1917             | 0.0              | 965       | 2034             | 0.0              |
| 450       | 102339           | 47.2             | 580       | 127613           | 2.9              | 710       | 11142            | 0.0              | 840       | 2248             | 0.0              | 970       | 3586             | 0.0              |
| 455       | 58751            | 30.8             | 585       | 129466           | 1.9              | 715       | 10143            | 0.0              | 845       | 2266             | 0.0              | 975       | 2505             | 0.0              |
| 460       | 36892            | 21.7             | 590       | 128813           | 1.3              | 720       | 9072             | 0.0              | 850       | 2558             | 0.0              | 980       | 2666             | 0.0              |
| 465       | 24637            | 16.1             | 595       | 126387           | 0.8              | 725       | 8130             | 0.0              | 855       | 2767             | 0.0              | 985       | 2934             | 0.0              |
| 470       | 16738            | 12.0             | 600       | 123477           | 0.5              | 730       | 7149             | 0.0              | 860       | 2826             | 0.0              | 990       | 4120             | 0.0              |
| 475       | 13456            | 10.3             | 605       | 118718           | 0.3              | 735       | 6311             | 0.0              | 865       | 2385             | 0.0              | 995       | 3858             | 0.0              |
| 480       | 13081            | 10.5             | 610       | 112091           | 0.2              | 740       | 5711             | 0.0              | 870       | 3194             | 0.0              | 1000      | 3405             | 0.0              |
| 485       | 14734            | 12.1             | 615       | 105039           | 0.1              | 745       | 5111             | 0.0              | 875       | 3189             | 0.0              |           |                  |                  |

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TM-30-18

### Summary

$R_f = 71.7$   
 $R_g = 96.9$   
 CIE  $R_a = 71.2$   
 $R_g = -29.7$



### Color Vector Graphics



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 55 | CES51 = 86 | CES76 = 45 |
| CES02 = 61 | CES27 = 80 | CES52 = 87 | CES77 = 68 |
| CES03 = 30 | CES28 = 79 | CES53 = 74 | CES78 = 49 |
| CES04 = 70 | CES29 = 51 | CES54 = 81 | CES79 = 77 |
| CES05 = 47 | CES30 = 60 | CES55 = 80 | CES80 = 75 |
| CES06 = 50 | CES31 = 56 | CES56 = 69 | CES81 = 75 |
| CES07 = 40 | CES32 = 52 | CES57 = 67 | CES82 = 90 |
| CES08 = 39 | CES33 = 62 | CES58 = 69 | CES83 = 85 |
| CES09 = 29 | CES34 = 65 | CES59 = 86 | CES84 = 87 |
| CES10 = 74 | CES35 = 81 | CES60 = 91 | CES85 = 83 |
| CES11 = 57 | CES36 = 92 | CES61 = 85 | CES86 = 72 |
| CES12 = 63 | CES37 = 74 | CES62 = 81 | CES87 = 77 |
| CES13 = 42 | CES38 = 69 | CES63 = 72 | CES88 = 77 |
| CES14 = 74 | CES39 = 92 | CES64 = 69 | CES89 = 72 |
| CES15 = 71 | CES40 = 86 | CES65 = 64 | CES90 = 75 |
| CES16 = 46 | CES41 = 84 | CES66 = 63 | CES91 = 91 |
| CES17 = 49 | CES42 = 75 | CES67 = 60 | CES92 = 66 |
| CES18 = 56 | CES43 = 70 | CES68 = 67 | CES93 = 80 |
| CES19 = 72 | CES44 = 98 | CES69 = 77 | CES94 = 56 |
| CES20 = 65 | CES45 = 80 | CES70 = 57 | CES95 = 72 |
| CES21 = 86 | CES46 = 77 | CES71 = 53 | CES96 = 78 |
| CES22 = 78 | CES47 = 74 | CES72 = 84 | CES97 = 83 |
| CES23 = 92 | CES48 = 66 | CES73 = 47 | CES98 = 73 |
| CES24 = 91 | CES49 = 76 | CES74 = 96 | CES99 = 63 |
| CES25 = 72 | CES50 = 85 | CES75 = 52 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**


(END OF REPORT)