

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: P319063

Luminaire Tested: **GLEON-SA9D-740-U-T4W**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P319063  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-18)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA9D-740-U-T4W  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(9) 70 CRI, 4000K, 1200mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV WIDE OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 68881 lumens  
Efficiency: N/A  
Efficacy: 119.8 lumens/watt  
Luminous Opening: Rectangular (W 2.5' x L: 1' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B4 - U0 - G5

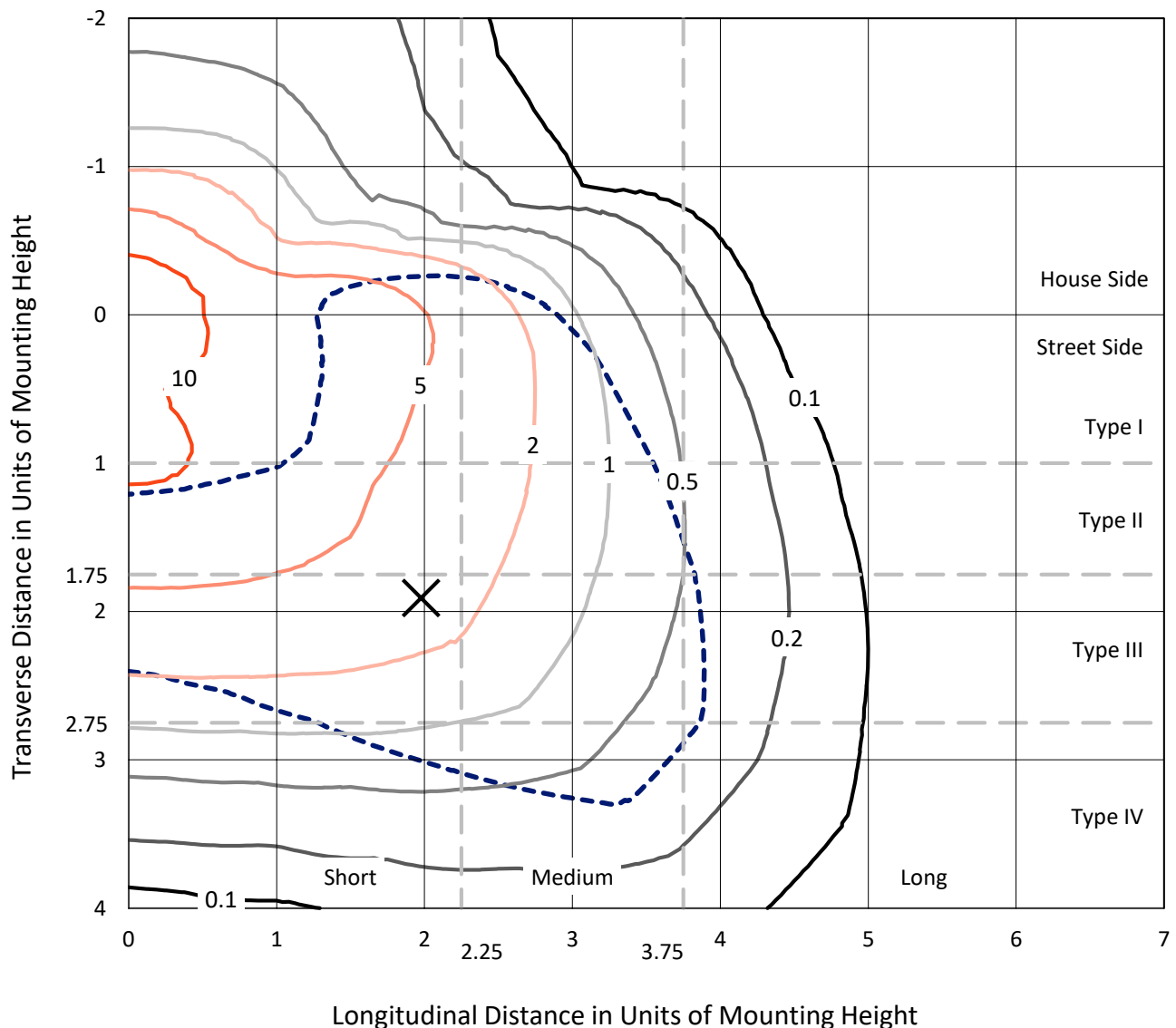
Input Watts (W): 575  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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 CATALOG NUMBER: GLEON-SA9D-740-U-T4W

## Iso-Footcandle Lines of Horizontal Illumination

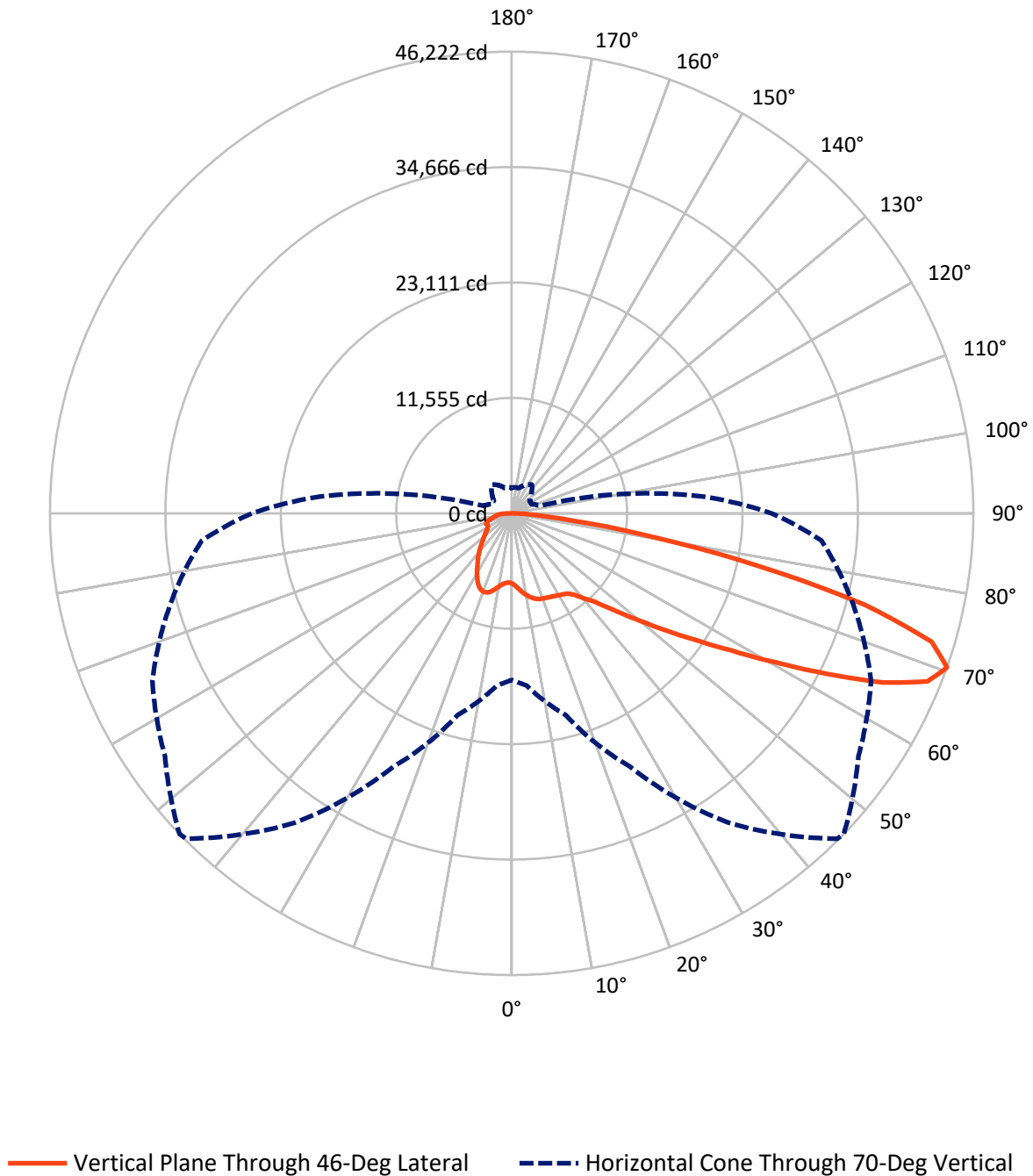
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 14 fc  
 Type IV - Short - N/A

REPORT NUMBER: P319063  
CATALOG NUMBER: GLEON-SA9D-740-U-T4W

## Luminous Intensity Polar Plot



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CATALOG NUMBER: GLEON-SA9D-740-U-T4W

**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 15787.3  | 0.0    | 15787.3 |
|                    | % Fixture | 22.9     | 0.0    | 22.9    |
| <b>Street Side</b> | Lumens    | 53093.7  | 0.0    | 53093.7 |
|                    | % Fixture | 77.1     | 0.0    | 77.1    |
| <b>Total</b>       | Lumens    | 68881.0  | 0.0    | 68881.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 715.4   | 1.0       |
| 10°-20°   | 2383.5  | 3.5       |
| 20°-30°   | 3974.2  | 5.8       |
| 30°-40°   | 5639.6  | 8.2       |
| 40°-50°   | 8295.6  | 12.0      |
| 50°-60°   | 14048.5 | 20.4      |
| 60°-70°   | 19941.6 | 29.0      |
| 70°-80°   | 12114.7 | 17.6      |
| 80°-90°   | 1768.0  | 2.6       |
| 90°-100°  | 0.0     | 0.0       |
| 100°-110° | 0.0     | 0.0       |
| 110°-120° | 0.0     | 0.0       |
| 120°-130° | 0.0     | 0.0       |
| 130°-140° | 0.0     | 0.0       |
| 140°-150° | 0.0     | 0.0       |
| 150°-160° | 0.0     | 0.0       |
| 160°-170° | 0.0     | 0.0       |
| 170°-180° | 0.0     | 0.0       |
| 0°-90°    | 68881.0 | 100.0     |
| 0°-180°   | 68881.0 | 100.0     |

**Coefficient of Utilization**



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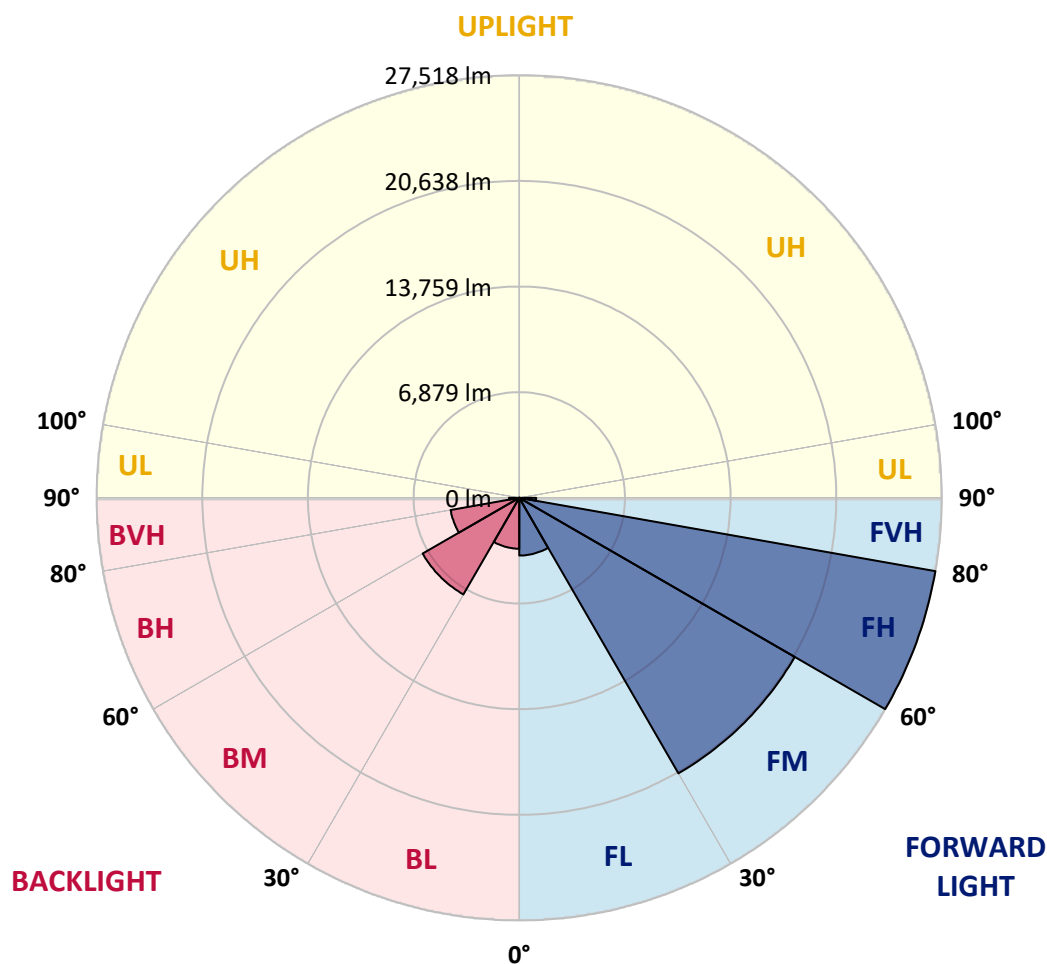
CATALOG NUMBER: GLEON-SA9D-740-U-T4W

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|---------|-----------|-------------------------|------|---------|
|      |             |         |           | B                       | U    | G       |
| FL   | (0°-30°)    | 3758.5  | 5.5       |                         |      |         |
| FM   | (30°-60°)   | 20716.3 | 30.1      |                         |      |         |
| FH   | (60°-80°)   | 27517.6 | 39.9      |                         |      | G5      |
| FVH  | (80°-90°)   | 1101.3  | 1.6       |                         |      | G5      |
| BL   | (0°-30°)    | 3314.6  | 4.8       | B4/5000                 |      |         |
| BM   | (30°-60°)   | 7267.3  | 10.6      | B4/8500                 |      |         |
| BH   | (60°-80°)   | 4538.7  | 6.6       | B4/5000                 |      | G4/5000 |
| BVH  | (80°-90°)   | 666.7   | 1.0       |                         |      | G4/750  |
| UL   | (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0     | 0.0       |                         | U0/0 |         |

**BUG Rating: B4-U0-G5**

Type IV Short





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CATALOG NUMBER: GLEON-SA9D-740-U-T4W

**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 46°     | 55°     | 65°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 7017.6  | 7017.6  | 7017.6  | 7017.6  | 7017.6  | 7017.6  | 7017.6  | 7017.6  | 7017.6  | 7017.6  | 7017.6  |
| 2.5°  | 7368.9  | 7373.6  | 7383.0  | 7359.4  | 7293.4  | 7274.6  | 7267.5  | 7199.1  | 7154.3  | 7088.3  | 7031.8  |
| 5°    | 7958.2  | 7962.9  | 7948.8  | 7882.7  | 7736.6  | 7628.2  | 7618.7  | 7463.2  | 7321.7  | 7170.8  | 7057.7  |
| 7.5°  | 8573.4  | 8580.5  | 8535.7  | 8410.8  | 8205.7  | 8017.1  | 8005.3  | 7793.2  | 7578.7  | 7350.0  | 7180.3  |
| 10°   | 9118.0  | 9089.7  | 9016.6  | 8842.2  | 8599.4  | 8368.3  | 8358.9  | 8137.3  | 7889.8  | 7614.0  | 7387.7  |
| 12.5° | 9481.0  | 9457.4  | 9363.1  | 9151.0  | 8884.6  | 8672.4  | 8653.6  | 8448.5  | 8208.1  | 7906.3  | 7635.2  |
| 15°   | 9681.4  | 9697.9  | 9570.6  | 9330.1  | 9070.8  | 8891.7  | 8875.2  | 8729.0  | 8514.5  | 8210.4  | 7899.2  |
| 17.5° | 9707.3  | 9721.4  | 9598.8  | 9360.8  | 9148.6  | 9026.0  | 9019.0  | 8922.3  | 8766.7  | 8474.4  | 8149.1  |
| 20°   | 9556.4  | 9565.8  | 9464.5  | 9268.8  | 9129.7  | 9092.0  | 9089.7  | 9047.2  | 8931.7  | 8672.4  | 8356.6  |
| 22.5° | 9337.2  | 9344.3  | 9271.2  | 9129.7  | 9082.6  | 9141.5  | 9158.0  | 9141.5  | 9059.0  | 8816.2  | 8519.2  |
| 25°   | 9283.0  | 9278.3  | 9202.8  | 9059.0  | 9099.1  | 9224.0  | 9245.3  | 9252.3  | 9195.8  | 8983.6  | 8726.7  |
| 27.5° | 9544.6  | 9528.1  | 9384.3  | 9153.3  | 9179.3  | 9330.1  | 9358.4  | 9426.8  | 9391.4  | 9205.2  | 8962.4  |
| 30°   | 10301.3 | 10273.0 | 9978.4  | 9511.6  | 9384.3  | 9462.1  | 9497.5  | 9605.9  | 9613.0  | 9457.4  | 9275.9  |
| 32.5° | 11579.0 | 11543.6 | 11015.6 | 10181.1 | 9730.9  | 9596.5  | 9629.5  | 9792.1  | 9879.4  | 9759.1  | 9563.5  |
| 35°   | 13193.7 | 13153.6 | 12460.6 | 11319.7 | 10310.7 | 9853.4  | 9877.0  | 10006.7 | 10181.1 | 10011.4 | 9752.1  |
| 37.5° | 14876.8 | 14780.2 | 14113.0 | 12658.6 | 11232.4 | 10402.7 | 10402.7 | 10419.2 | 10501.7 | 10148.1 | 9973.7  |
| 40°   | 16550.5 | 16453.8 | 15850.4 | 14233.3 | 12425.2 | 11267.8 | 11213.6 | 10848.2 | 10782.2 | 10478.1 | 10419.2 |
| 42.5° | 18106.3 | 18078.0 | 17722.0 | 16013.0 | 13825.5 | 12118.8 | 12043.3 | 11423.4 | 11437.5 | 11248.9 | 11251.3 |
| 45°   | 19761.1 | 19761.1 | 19471.1 | 17809.3 | 15456.7 | 13486.0 | 13410.6 | 12498.3 | 12639.7 | 12552.5 | 12762.3 |
| 47.5° | 21111.8 | 21154.2 | 21114.2 | 19680.9 | 17354.3 | 15223.3 | 15086.6 | 13988.1 | 14384.1 | 14683.5 | 15294.0 |
| 50°   | 22490.8 | 22556.8 | 22563.9 | 21734.1 | 19647.9 | 17288.3 | 17132.7 | 15965.9 | 16849.8 | 17707.9 | 18907.8 |
| 52.5° | 24492.2 | 24640.7 | 24049.0 | 23782.6 | 22457.8 | 19739.9 | 19586.6 | 18509.4 | 19985.0 | 21189.6 | 23256.9 |
| 55°   | 26347.3 | 26217.7 | 25795.7 | 25960.7 | 25465.7 | 22530.9 | 22415.4 | 21470.1 | 23478.5 | 25043.8 | 27728.7 |
| 57.5° | 27351.5 | 27342.1 | 27766.4 | 28473.6 | 28709.3 | 25972.5 | 25875.9 | 24956.5 | 27417.5 | 28593.8 | 31927.0 |
| 60°   | 28530.2 | 28546.7 | 29598.0 | 31203.3 | 32174.5 | 30258.1 | 30215.6 | 29517.9 | 31243.4 | 31908.2 | 35220.1 |
| 62.5° | 28695.2 | 28992.2 | 30802.6 | 33565.3 | 35418.1 | 35264.9 | 35359.2 | 33626.6 | 34666.2 | 34553.0 | 37678.8 |
| 65°   | 26797.6 | 27188.9 | 30465.5 | 34279.6 | 38642.9 | 40740.9 | 40828.1 | 37758.9 | 37365.3 | 36813.7 | 38558.0 |
| 67.5° | 22908.1 | 23487.9 | 27047.4 | 32726.1 | 39706.0 | 44788.3 | 44910.9 | 40962.5 | 39604.7 | 37579.8 | 36441.2 |
| 70°   | 16670.7 | 17314.2 | 20897.3 | 27950.3 | 37810.8 | 46082.5 | 46221.6 | 42379.2 | 39689.5 | 35399.3 | 31109.0 |
| 72.5° | 10070.3 | 10574.8 | 13528.4 | 20576.7 | 31912.9 | 43725.2 | 43972.7 | 40583.0 | 36236.1 | 29984.6 | 22971.7 |
| 75°   | 4422.3  | 4752.3  | 6541.5  | 11857.1 | 22846.8 | 36177.2 | 36486.0 | 34736.9 | 29442.4 | 21790.7 | 13577.9 |
| 77.5° | 1883.5  | 1977.8  | 2682.6  | 5150.7  | 12915.5 | 24720.8 | 25145.1 | 25380.8 | 19975.6 | 11857.1 | 5737.6  |
| 80°   | 1173.9  | 1211.6  | 1518.1  | 2331.4  | 6044.1  | 13884.4 | 14341.7 | 14933.4 | 9919.4  | 4358.6  | 2003.7  |
| 82.5° | 714.3   | 756.7   | 1008.9  | 1409.7  | 3147.0  | 6293.9  | 6513.2  | 6930.4  | 3849.4  | 1883.5  | 1037.2  |
| 85°   | 429.0   | 459.7   | 617.6   | 891.1   | 1791.5  | 2475.1  | 2472.8  | 2734.4  | 1812.7  | 1211.6  | 546.9   |
| 87.5° | 205.1   | 228.7   | 330.0   | 462.0   | 902.8   | 928.8   | 869.8   | 985.3   | 1100.9  | 794.4   | 275.8   |
| 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: P319063

CATALOG NUMBER: GLEON-SA9D-740-U-T4W

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°     | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 7017.6  | 7017.6  | 7017.6 | 7017.6 | 7017.6 | 7017.6 | 7017.6 | 7017.6 | 7017.6 | 7017.6 | 7017.6 |
| 2.5°  | 7012.9  | 7003.5  | 6972.8 | 6949.3 | 6944.5 | 6930.4 | 6918.6 | 6925.7 | 6935.1 | 6937.5 | 6937.5 |
| 5°    | 7010.6  | 6984.6  | 6944.5 | 6928.0 | 6949.3 | 6977.6 | 7012.9 | 7060.1 | 7088.3 | 7109.6 | 7123.7 |
| 7.5°  | 7123.7  | 7074.2  | 7029.4 | 7020.0 | 7062.4 | 7137.8 | 7218.0 | 7317.0 | 7385.4 | 7432.5 | 7441.9 |
| 10°   | 7312.3  | 7251.0  | 7206.2 | 7215.6 | 7291.1 | 7399.5 | 7512.7 | 7639.9 | 7743.7 | 7807.3 | 7812.0 |
| 12.5° | 7529.2  | 7470.2  | 7427.8 | 7467.9 | 7592.8 | 7724.8 | 7842.7 | 7953.5 | 8047.8 | 8111.4 | 8111.4 |
| 15°   | 7779.0  | 7736.6  | 7687.1 | 7779.0 | 7948.8 | 8066.6 | 8116.1 | 8170.3 | 8222.2 | 8269.3 | 8259.9 |
| 17.5° | 8019.5  | 7979.4  | 7953.5 | 8061.9 | 8238.7 | 8292.9 | 8259.9 | 8219.8 | 8219.8 | 8245.8 | 8250.5 |
| 20°   | 8226.9  | 8191.6  | 8208.1 | 8314.1 | 8406.1 | 8349.5 | 8226.9 | 8099.6 | 8047.8 | 8061.9 | 8076.0 |
| 22.5° | 8408.4  | 8391.9  | 8441.4 | 8490.9 | 8424.9 | 8226.9 | 8000.6 | 7828.5 | 7764.9 | 7760.2 | 7764.9 |
| 25°   | 8620.6  | 8618.2  | 8679.5 | 8589.9 | 8297.6 | 7932.3 | 7628.2 | 7460.8 | 7425.4 | 7453.7 | 7500.9 |
| 27.5° | 8884.6  | 8910.5  | 8941.2 | 8613.5 | 8038.3 | 7486.7 | 7177.9 | 7062.4 | 7097.8 | 7166.1 | 7210.9 |
| 30°   | 9221.7  | 9292.4  | 9226.4 | 8554.6 | 7665.9 | 6977.6 | 6682.9 | 6649.9 | 6746.5 | 6843.2 | 6890.3 |
| 32.5° | 9549.3  | 9660.1  | 9499.8 | 8401.3 | 7185.0 | 6437.7 | 6209.1 | 6199.6 | 6317.5 | 6411.8 | 6477.8 |
| 35°   | 9813.4  | 10032.6 | 9704.9 | 8097.3 | 6628.7 | 5940.3 | 5773.0 | 5709.3 | 5751.8 | 5862.6 | 5938.0 |
| 37.5° | 10157.5 | 10522.9 | 9846.4 | 7632.9 | 6025.2 | 5530.2 | 5334.5 | 5188.4 | 5150.7 | 5195.4 | 5233.2 |
| 40°   | 10786.9 | 11270.2 | 9912.4 | 6984.6 | 5435.9 | 5120.0 | 4922.0 | 4707.5 | 4559.0 | 4450.5 | 4452.9 |
| 42.5° | 11814.7 | 12243.7 | 9869.9 | 6197.3 | 4891.4 | 4719.3 | 4495.3 | 4247.8 | 4007.4 | 3762.2 | 3743.4 |
| 45°   | 13483.6 | 13691.1 | 9742.6 | 5362.8 | 4412.8 | 4299.7 | 4089.9 | 3842.4 | 3521.8 | 3243.6 | 3217.7 |
| 47.5° | 16154.4 | 15694.8 | 9544.6 | 4634.4 | 3990.9 | 3943.7 | 3750.4 | 3465.2 | 3125.8 | 2901.8 | 2883.0 |
| 50°   | 19796.4 | 18587.2 | 9448.0 | 4054.5 | 3618.4 | 3632.6 | 3474.6 | 3172.9 | 2852.3 | 2687.3 | 2668.4 |
| 52.5° | 24152.7 | 21955.7 | 9634.2 | 3606.6 | 3319.1 | 3368.6 | 3250.7 | 2967.8 | 2699.1 | 2569.4 | 2550.6 |
| 55°   | 28671.6 | 25444.5 | 9834.6 | 3281.3 | 3036.2 | 3132.8 | 3092.8 | 2859.4 | 2616.6 | 2496.4 | 2479.9 |
| 57.5° | 32539.9 | 28049.3 | 9433.8 | 3017.3 | 2783.9 | 2934.8 | 2970.2 | 2791.0 | 2574.2 | 2465.7 | 2446.9 |
| 60°   | 34975.0 | 29098.3 | 8382.5 | 2769.8 | 2583.6 | 2776.9 | 2899.5 | 2772.2 | 2590.7 | 2581.2 | 2567.1 |
| 62.5° | 36130.0 | 29006.3 | 6805.5 | 2574.2 | 2458.6 | 2708.5 | 2951.3 | 2878.2 | 2779.2 | 2864.1 | 2871.2 |
| 65°   | 35611.4 | 27620.3 | 5068.2 | 2444.5 | 2369.1 | 2734.4 | 3106.9 | 3078.6 | 2833.5 | 2918.3 | 2930.1 |
| 67.5° | 32198.1 | 24313.0 | 3752.8 | 2331.4 | 2270.1 | 2807.5 | 3389.8 | 3144.6 | 2727.4 | 2788.7 | 2750.9 |
| 70°   | 26024.4 | 19275.5 | 2894.7 | 2204.1 | 2168.7 | 2798.1 | 3517.1 | 3104.5 | 2611.9 | 2626.0 | 2524.6 |
| 72.5° | 17946.0 | 13144.2 | 2354.9 | 2086.2 | 2022.5 | 2550.6 | 3427.5 | 3005.5 | 2515.2 | 2406.8 | 2272.4 |
| 75°   | 9759.1  | 7055.3  | 2001.3 | 1963.6 | 1765.6 | 2239.4 | 3262.5 | 2934.8 | 2428.0 | 2284.2 | 2208.8 |
| 77.5° | 3840.0  | 2927.7  | 1737.3 | 1796.2 | 1544.0 | 1977.8 | 3078.6 | 2800.4 | 2307.8 | 2119.2 | 2081.5 |
| 80°   | 1567.6  | 1494.5  | 1440.3 | 1553.4 | 1327.1 | 1730.2 | 2857.0 | 2642.5 | 2164.0 | 1966.0 | 1890.5 |
| 82.5° | 888.7   | 928.8   | 1119.7 | 1225.8 | 1077.3 | 1593.5 | 2750.9 | 2515.2 | 1991.9 | 1760.9 | 1671.3 |
| 85°   | 455.0   | 544.5   | 780.3  | 879.3  | 792.0  | 1355.4 | 2534.1 | 2201.7 | 1598.2 | 1348.4 | 1355.4 |
| 87.5° | 219.2   | 304.1   | 492.7  | 551.6  | 513.9  | 980.6  | 1892.9 | 1595.9 | 1244.6 | 985.3  | 954.7  |
| 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

REPORT NUMBER: SP1-2101-121-2

| 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            |

REPORT NUMBER: SP1-2101-121-2

**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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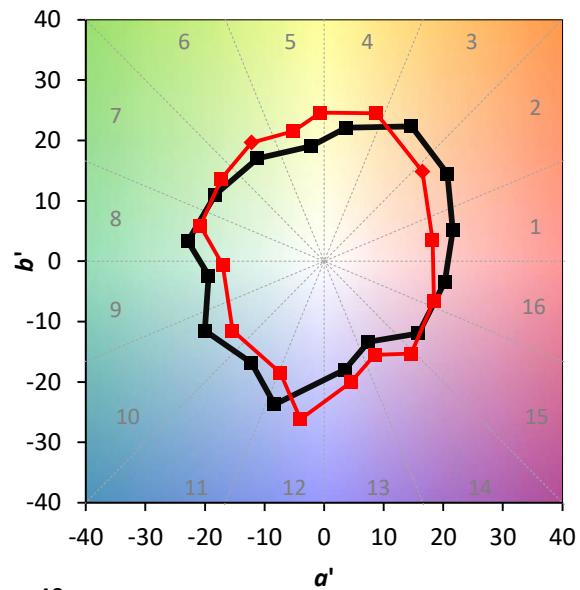
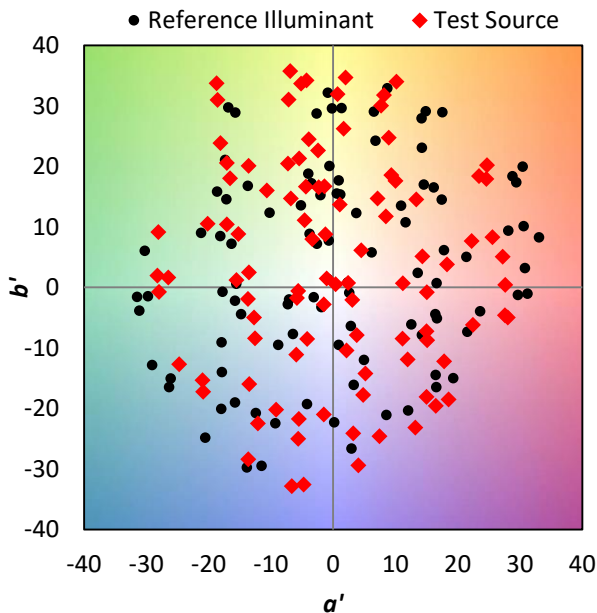
TM-30-18

### 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)