

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: P318222

Luminaire Tested: **GLEON-SA8D-827-U-T2**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P318222  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-12)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA8D-827-U-T2  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(8) 80 CRI, 2700K, 1200mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE II OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 44860 lumens  
Efficiency: N/A  
Efficacy: 87.8 lumens/watt  
Luminous Opening: Rectangular (W 2' x L: 1' x H: 0')  
IES Classification: Type III - Medium  
BUG Rating: B3 - U0 - G5

Input Watts (W): 511  
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

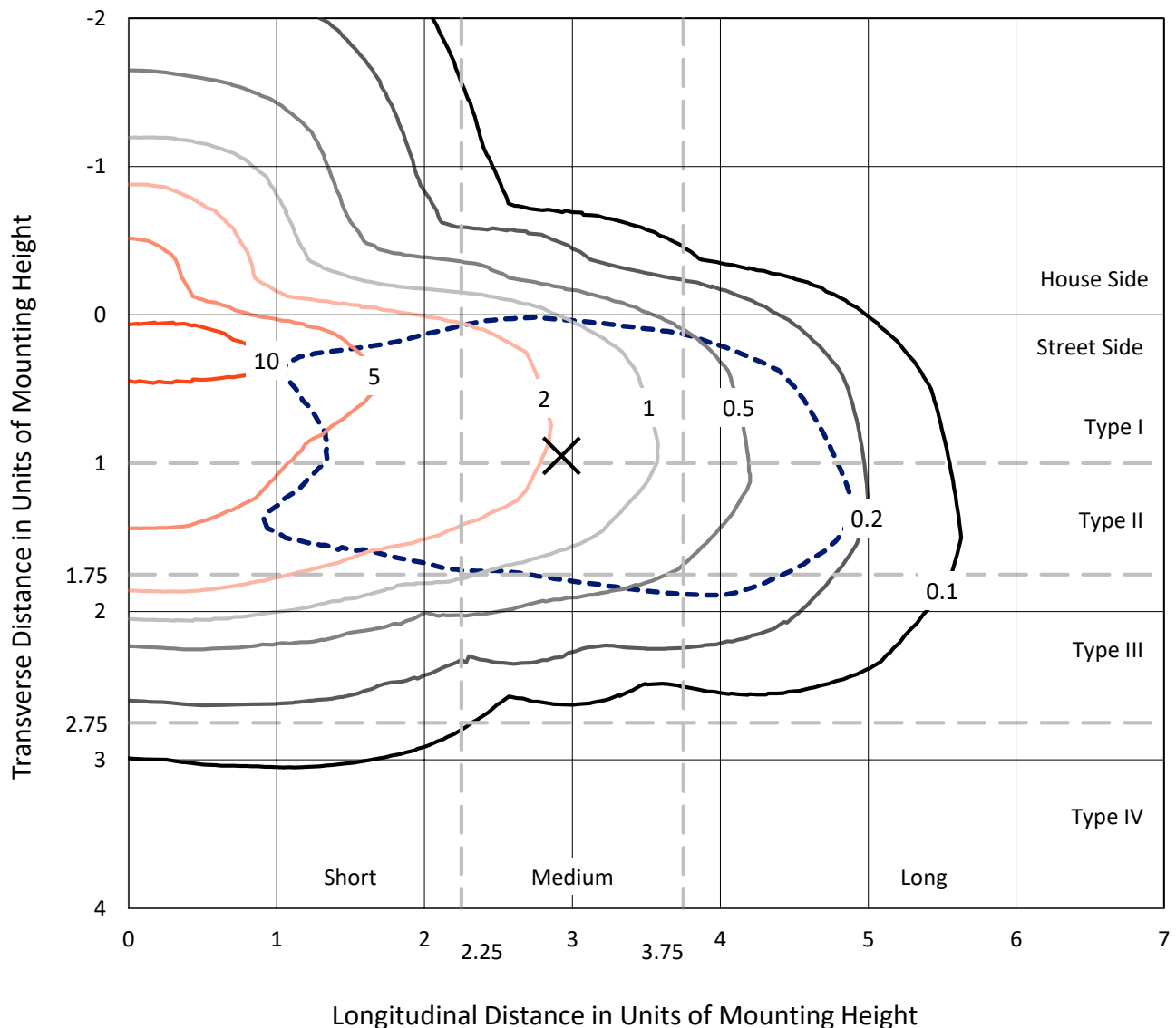


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## Iso-Footcandle Lines of Horizontal Illumination

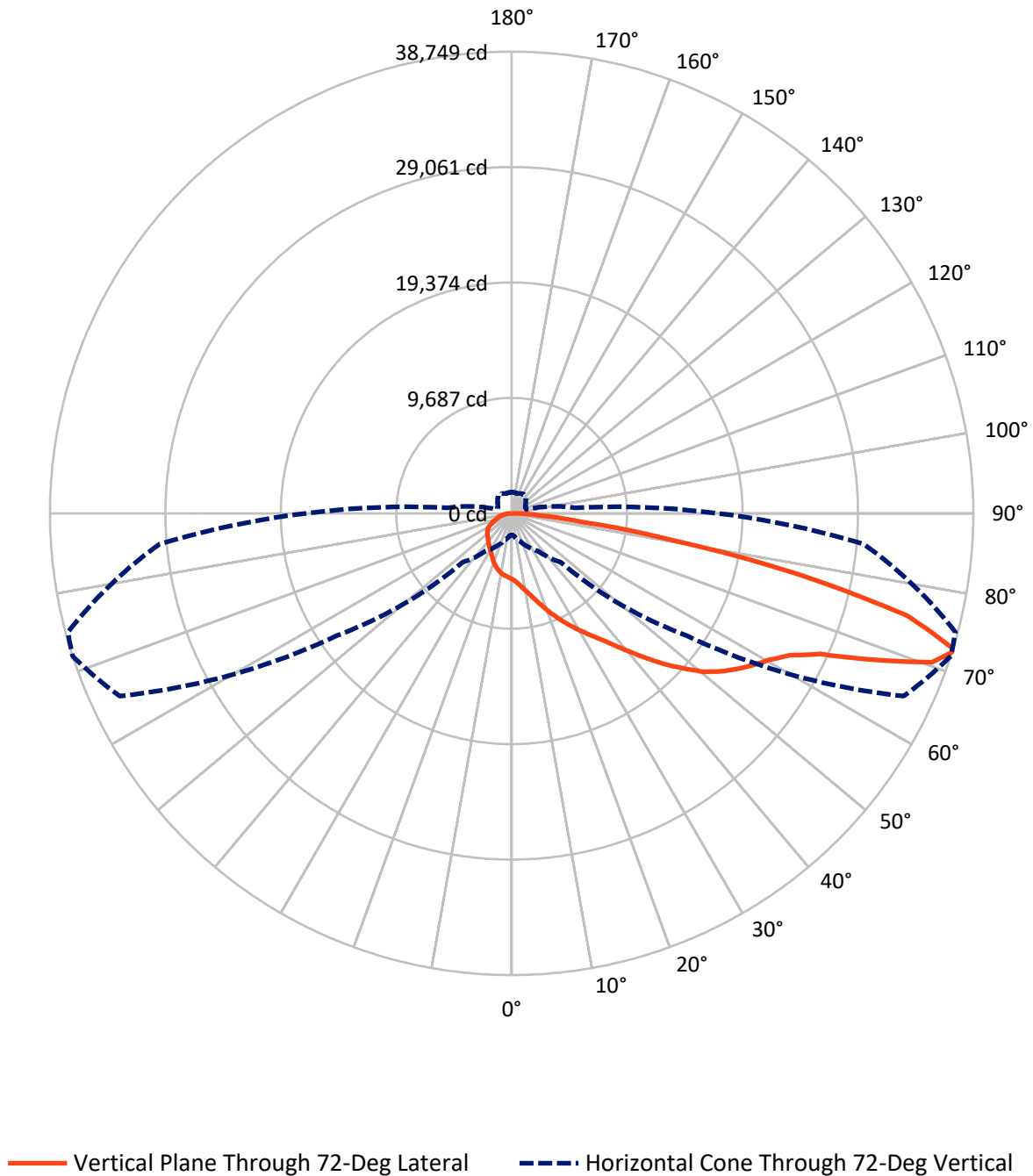
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 12.2 fc  
 Type III - Medium - N/A

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## Luminous Intensity Polar Plot



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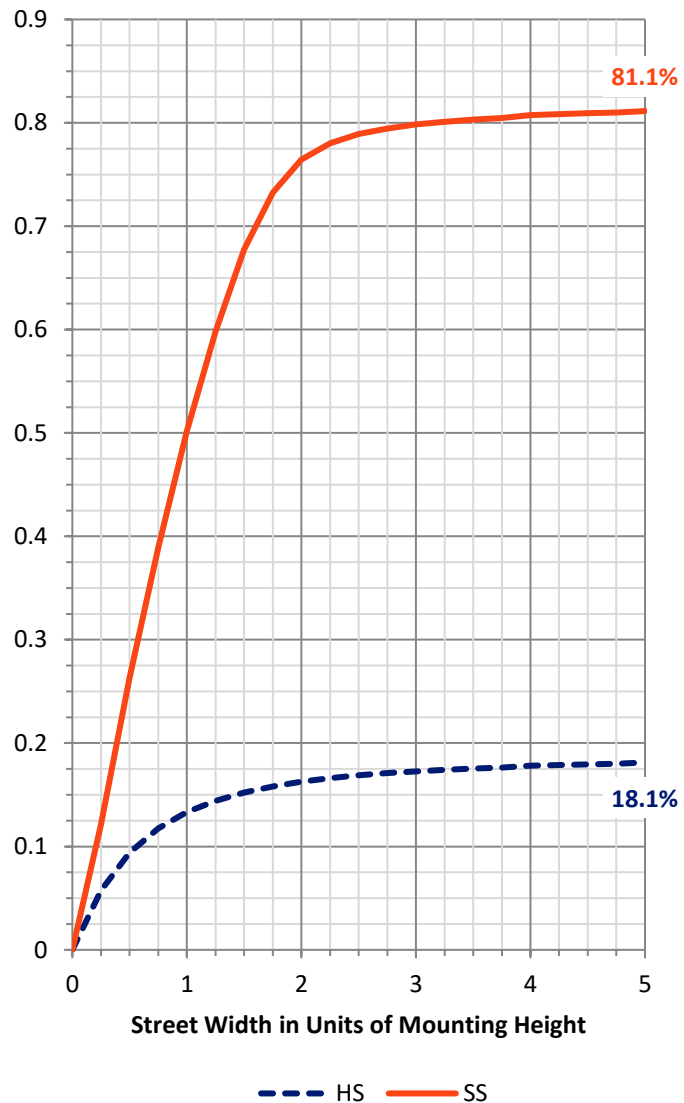
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 8321.8   | 0.0    | 8321.8  |
|                    | % Fixture | 18.6     | 0.0    | 18.6    |
| <b>Street Side</b> | Lumens    | 36538.2  | 0.0    | 36538.2 |
|                    | % Fixture | 81.4     | 0.0    | 81.4    |
| <b>Total</b>       | Lumens    | 44860.0  | 0.0    | 44860.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 553.0   | 1.2       |
| 10°-20°   | 1787.1  | 4.0       |
| 20°-30°   | 3131.5  | 7.0       |
| 30°-40°   | 4643.1  | 10.4      |
| 40°-50°   | 6790.9  | 15.1      |
| 50°-60°   | 9344.2  | 20.8      |
| 60°-70°   | 10402.8 | 23.2      |
| 70°-80°   | 7048.9  | 15.7      |
| 80°-90°   | 1158.6  | 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°    | 44860.0 | 100.0     |
| 0°-180°   | 44860.0 | 100.0     |

**Coefficient of Utilization**



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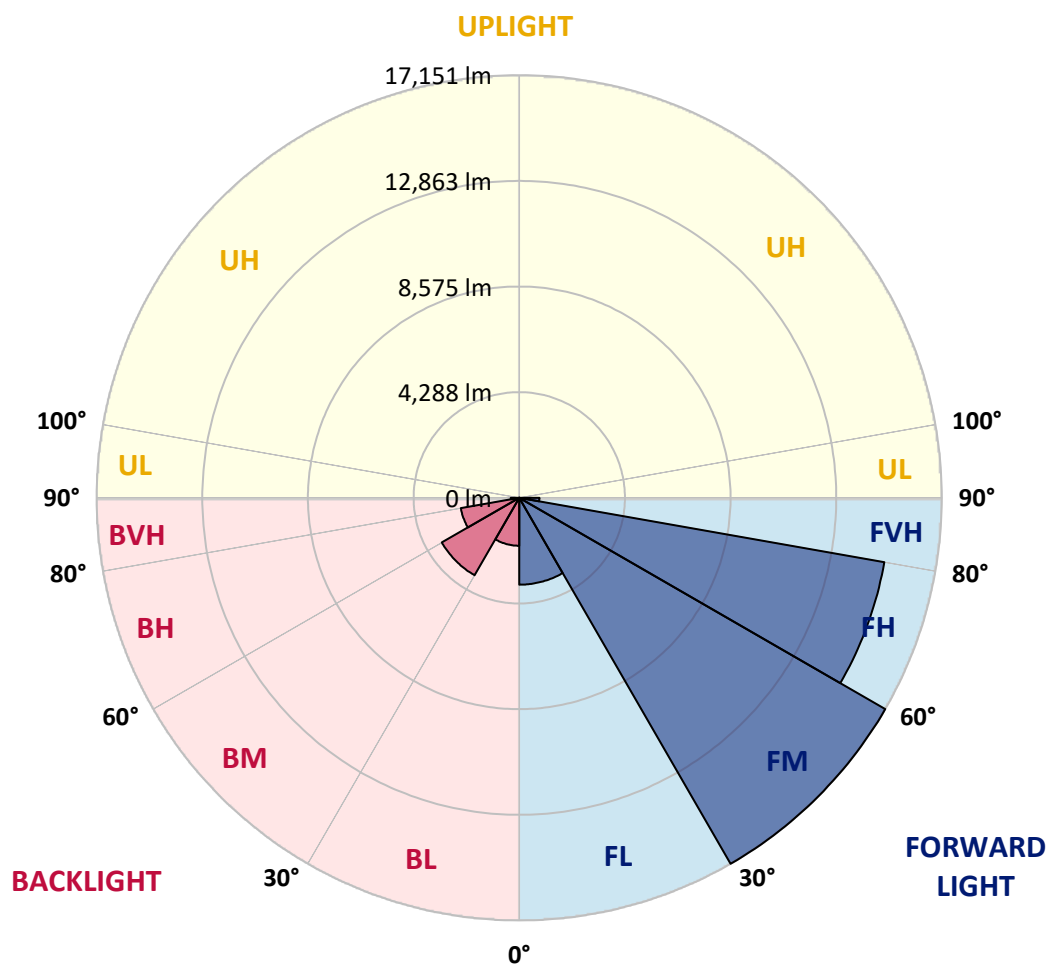
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**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|---------|-----------|-------------------------|------|---------|
|      |             |         |           | B                       | U    | G       |
| FL   | (0°-30°)    | 3526.3  | 7.9       |                         |      |         |
| FM   | (30°-60°)   | 17150.5 | 38.2      |                         |      |         |
| FH   | (60°-80°)   | 15044.2 | 33.5      |                         |      | G5      |
| FVH  | (80°-90°)   | 817.2   | 1.8       |                         |      | G5      |
| BL   | (0°-30°)    | 1945.3  | 4.3       | B3/2500                 |      |         |
| BM   | (30°-60°)   | 3627.5  | 8.1       | B3/5000                 |      |         |
| BH   | (60°-80°)   | 2407.6  | 5.4       | B3/2500                 |      | G3/2500 |
| BVH  | (80°-90°)   | 341.3   | 0.8       |                         |      | G3/500  |
| UL   | (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0     | 0.0       |                         | U0/0 |         |

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

Type III Medium



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 55°     | 65°     | 72°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 5519.0  | 5519.0  | 5519.0  | 5519.0  | 5519.0  | 5519.0  | 5519.0  | 5519.0  | 5519.0  | 5519.0  | 5519.0  |
| 2.5°  | 6096.6  | 6087.4  | 6054.9  | 6054.9  | 5993.2  | 5940.6  | 5841.8  | 5775.4  | 5696.6  | 5668.8  | 5576.1  |
| 5°    | 6686.7  | 6689.8  | 6649.6  | 6621.8  | 6530.7  | 6419.5  | 6251.1  | 6098.2  | 5945.3  | 5883.5  | 5693.5  |
| 7.5°  | 7182.5  | 7176.3  | 7165.5  | 7142.4  | 7057.4  | 6943.1  | 6716.0  | 6489.0  | 6263.5  | 6170.8  | 5843.3  |
| 10°   | 7500.7  | 7514.6  | 7523.9  | 7534.7  | 7499.2  | 7417.3  | 7202.6  | 6926.1  | 6631.1  | 6504.4  | 6022.5  |
| 12.5° | 7661.3  | 7686.1  | 7729.3  | 7803.5  | 7862.1  | 7852.9  | 7696.9  | 7403.4  | 7052.8  | 6893.7  | 6246.5  |
| 15°   | 7755.6  | 7788.0  | 7856.0  | 7988.8  | 8154.1  | 8248.3  | 8206.6  | 7940.9  | 7550.1  | 7354.0  | 6519.9  |
| 17.5° | 7814.3  | 7840.5  | 7945.6  | 8123.2  | 8368.8  | 8619.0  | 8728.7  | 8506.3  | 8112.4  | 7888.4  | 6833.4  |
| 20°   | 7854.4  | 7874.5  | 8005.8  | 8214.3  | 8532.5  | 8931.0  | 9236.9  | 9181.3  | 8731.8  | 8441.4  | 7160.9  |
| 22.5° | 7944.0  | 7961.0  | 8086.1  | 8296.2  | 8648.4  | 9162.7  | 9726.5  | 9809.9  | 9385.2  | 9056.1  | 7511.5  |
| 25°   | 8194.2  | 8194.2  | 8299.3  | 8446.0  | 8776.6  | 9363.5  | 10140.5 | 10509.6 | 10052.4 | 9669.4  | 7835.9  |
| 27.5° | 8671.5  | 8666.9  | 8705.5  | 8756.5  | 9006.7  | 9567.4  | 10509.6 | 11127.5 | 10744.4 | 10325.8 | 8151.0  |
| 30°   | 9236.9  | 9267.8  | 9272.4  | 9247.7  | 9365.1  | 9822.3  | 10851.0 | 11779.3 | 11441.0 | 10990.0 | 8473.8  |
| 32.5° | 9964.4  | 9984.5  | 9961.3  | 9879.4  | 9862.4  | 10183.7 | 11186.2 | 12462.0 | 12194.8 | 11683.6 | 8768.8  |
| 35°   | 10888.1 | 10849.5 | 10776.9 | 10610.0 | 10450.9 | 10667.2 | 11569.3 | 13144.8 | 13041.3 | 12522.3 | 9175.1  |
| 37.5° | 11878.2 | 11879.7 | 11790.1 | 11411.7 | 11192.4 | 11285.0 | 12097.5 | 13918.6 | 14065.4 | 13520.1 | 9695.6  |
| 40°   | 12672.1 | 12713.8 | 12769.4 | 12272.1 | 11987.8 | 12116.0 | 12769.4 | 14816.1 | 15276.4 | 14703.3 | 10373.7 |
| 42.5° | 13226.6 | 13274.5 | 13432.1 | 13120.1 | 12825.0 | 13062.9 | 13560.3 | 15773.7 | 16635.6 | 16068.7 | 11167.6 |
| 45°   | 13813.6 | 13839.9 | 13951.1 | 13816.7 | 13628.2 | 14164.2 | 14451.5 | 16765.4 | 18073.7 | 17523.8 | 12055.8 |
| 47.5° | 14431.4 | 14459.2 | 14573.6 | 14484.0 | 14385.1 | 15192.9 | 15381.4 | 17699.9 | 19451.5 | 19122.5 | 13004.2 |
| 50°   | 15194.5 | 15213.0 | 15321.1 | 15159.0 | 15189.9 | 15968.3 | 16212.4 | 18557.1 | 20895.7 | 20559.0 | 13955.7 |
| 52.5° | 16235.6 | 16240.2 | 16390.0 | 16243.3 | 16098.1 | 16536.8 | 16927.6 | 19365.0 | 22027.9 | 21868.8 | 14907.2 |
| 55°   | 17051.1 | 17100.6 | 17591.8 | 17560.9 | 17477.4 | 17052.7 | 17525.3 | 20134.2 | 23038.1 | 23113.8 | 15917.4 |
| 57.5° | 16530.6 | 16723.7 | 17718.4 | 18419.7 | 19102.4 | 18336.3 | 18333.2 | 21000.7 | 23977.2 | 24335.6 | 17028.0 |
| 60°   | 14477.8 | 14740.4 | 16206.2 | 17761.7 | 19897.9 | 20569.8 | 20010.6 | 22058.8 | 24925.6 | 25546.6 | 18419.7 |
| 62.5° | 10339.7 | 10772.2 | 12758.6 | 15242.4 | 18807.4 | 22049.5 | 23424.3 | 23737.8 | 26215.4 | 26949.1 | 20228.4 |
| 65°   | 5227.0  | 5554.5  | 7219.6  | 10211.5 | 15026.1 | 21082.6 | 27134.5 | 27414.0 | 28456.7 | 29108.5 | 23013.4 |
| 67.5° | 3175.8  | 3299.3  | 4111.8  | 5679.6  | 9212.2  | 16422.5 | 28345.4 | 33541.6 | 32794.0 | 33140.0 | 26984.6 |
| 70°   | 2340.1  | 2431.2  | 2937.9  | 3772.0  | 5298.1  | 9636.9  | 24629.1 | 37914.4 | 37423.2 | 37384.6 | 29919.4 |
| 72°   | 1822.7  | 1889.1  | 2337.0  | 3047.5  | 3873.9  | 5781.5  | 17851.2 | 36300.3 | 38748.5 | 38553.9 | 29650.6 |
| 72.5° | 1728.4  | 1787.1  | 2194.9  | 2868.4  | 3660.8  | 5240.9  | 16050.2 | 35211.3 | 38652.7 | 38564.7 | 29303.1 |
| 75°   | 1360.8  | 1402.5  | 1624.9  | 2218.1  | 2865.3  | 2973.4  | 8795.1  | 27287.4 | 34289.2 | 35714.9 | 26356.0 |
| 77.5° | 1126.0  | 1132.2  | 1249.6  | 1614.1  | 2233.5  | 2102.2  | 4320.3  | 18932.5 | 24553.4 | 26121.2 | 18669.9 |
| 80°   | 917.5   | 925.2   | 980.8   | 1132.2  | 1689.8  | 1555.4  | 2051.3  | 10886.5 | 13747.2 | 13764.2 | 8878.5  |
| 82.5° | 730.6   | 732.2   | 793.9   | 827.9   | 1214.1  | 1112.1  | 1175.5  | 5111.2  | 6007.1  | 5778.4  | 3191.2  |
| 85°   | 514.4   | 503.5   | 775.4   | 679.6   | 793.9   | 713.6   | 648.7   | 2023.5  | 2483.8  | 2375.6  | 999.4   |
| 87.5° | 171.5   | 177.6   | 344.5   | 440.2   | 463.4   | 404.7   | 288.8   | 775.4   | 937.6   | 929.9   | 316.6   |
| 90°   | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |



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CATALOG NUMBER: GLEON-SA8D-827-U-T2

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 5519.0  | 5519.0 | 5519.0 | 5519.0 | 5519.0 | 5519.0 | 5519.0 | 5519.0 | 5519.0 | 5519.0 | 5519.0 |
| 2.5°  | 5546.8  | 5497.3 | 5424.7 | 5344.4 | 5281.1 | 5216.2 | 5168.3 | 5143.6 | 5115.8 | 5092.6 | 5120.4 |
| 5°    | 5605.4  | 5512.8 | 5358.3 | 5206.9 | 5095.7 | 4996.9 | 4925.8 | 4888.7 | 4854.8 | 4831.6 | 4834.7 |
| 7.5°  | 5701.2  | 5551.4 | 5291.9 | 5071.0 | 4916.5 | 4810.0 | 4737.4 | 4712.7 | 4691.0 | 4684.9 | 4692.6 |
| 10°   | 5803.2  | 5582.3 | 5203.8 | 4910.4 | 4734.3 | 4646.2 | 4613.8 | 4630.8 | 4646.2 | 4660.1 | 4675.6 |
| 12.5° | 5919.0  | 5610.1 | 5075.6 | 4721.9 | 4572.1 | 4538.1 | 4570.5 | 4644.7 | 4698.8 | 4731.2 | 4751.3 |
| 15°   | 6070.4  | 5634.8 | 4927.4 | 4533.5 | 4433.1 | 4471.7 | 4581.4 | 4709.6 | 4803.8 | 4864.0 | 4873.3 |
| 17.5° | 6209.4  | 5633.3 | 4737.4 | 4343.5 | 4320.3 | 4433.1 | 4598.4 | 4779.1 | 4905.7 | 4990.7 | 5007.7 |
| 20°   | 6353.0  | 5591.5 | 4516.5 | 4158.1 | 4206.0 | 4391.4 | 4606.1 | 4823.9 | 4976.8 | 5075.6 | 5098.8 |
| 22.5° | 6487.4  | 5519.0 | 4274.0 | 3989.8 | 4110.3 | 4335.8 | 4576.7 | 4797.6 | 4950.5 | 5030.8 | 5055.6 |
| 25°   | 6578.6  | 5392.3 | 4028.4 | 3847.7 | 4025.3 | 4267.8 | 4481.0 | 4658.6 | 4772.9 | 4813.1 | 4819.2 |
| 27.5° | 6624.9  | 5227.0 | 3796.7 | 3724.1 | 3937.3 | 4156.6 | 4303.3 | 4391.4 | 4423.8 | 4420.7 | 4414.5 |
| 30°   | 6631.1  | 5009.2 | 3597.4 | 3623.7 | 3835.3 | 3992.9 | 4062.4 | 4045.4 | 4003.7 | 3932.6 | 3938.8 |
| 32.5° | 6611.0  | 4763.6 | 3430.6 | 3527.9 | 3705.6 | 3793.6 | 3796.7 | 3714.8 | 3603.6 | 3490.9 | 3460.0 |
| 35°   | 6617.2  | 4522.7 | 3283.9 | 3419.8 | 3548.0 | 3586.6 | 3551.1 | 3430.6 | 3279.2 | 3134.0 | 3103.2 |
| 37.5° | 6685.1  | 4312.6 | 3157.2 | 3294.7 | 3373.5 | 3382.7 | 3331.8 | 3205.1 | 3093.9 | 2951.8 | 2939.4 |
| 40°   | 6847.3  | 4162.8 | 3036.7 | 3154.1 | 3198.9 | 3203.6 | 3131.0 | 3041.4 | 3050.6 | 2975.0 | 2973.4 |
| 42.5° | 7139.3  | 4097.9 | 2930.2 | 3007.4 | 3035.2 | 3044.5 | 2988.9 | 2931.7 | 3012.0 | 2962.6 | 2945.6 |
| 45°   | 7516.2  | 4113.3 | 2840.6 | 2863.7 | 2914.7 | 2958.0 | 2924.0 | 2854.5 | 2885.4 | 2670.7 | 2599.6 |
| 47.5° | 7951.7  | 4212.2 | 2769.5 | 2740.2 | 2828.2 | 2910.1 | 2857.6 | 2752.5 | 2642.9 | 2429.7 | 2389.5 |
| 50°   | 8461.5  | 4365.1 | 2704.6 | 2618.1 | 2734.0 | 2845.2 | 2792.7 | 2642.9 | 2477.6 | 2374.1 | 2360.2 |
| 52.5° | 8992.8  | 4552.0 | 2639.8 | 2483.8 | 2615.1 | 2795.8 | 2769.5 | 2618.1 | 2414.3 | 2312.3 | 2293.8 |
| 55°   | 9595.2  | 4740.5 | 2557.9 | 2327.8 | 2486.8 | 2772.6 | 2758.7 | 2528.6 | 2366.4 | 2309.2 | 2295.3 |
| 57.5° | 10344.4 | 4955.2 | 2449.8 | 2165.6 | 2366.4 | 2689.2 | 2645.9 | 2474.5 | 2316.9 | 2273.7 | 2269.1 |
| 60°   | 11320.6 | 5271.8 | 2293.8 | 1992.6 | 2219.6 | 2561.0 | 2551.7 | 2395.7 | 2238.2 | 2207.3 | 2201.1 |
| 62.5° | 12784.9 | 5795.4 | 2079.1 | 1819.6 | 2055.9 | 2343.2 | 2428.2 | 2289.1 | 2154.8 | 2153.2 | 2156.3 |
| 65°   | 15055.5 | 6583.2 | 1845.8 | 1668.2 | 1890.6 | 2159.4 | 2284.5 | 2179.5 | 2069.8 | 2100.7 | 2105.3 |
| 67.5° | 17687.5 | 7236.6 | 1617.2 | 1519.9 | 1722.3 | 1984.8 | 2154.8 | 2069.8 | 1957.0 | 2037.4 | 2038.9 |
| 70°   | 18563.3 | 6652.7 | 1416.4 | 1373.2 | 1547.7 | 1816.5 | 2014.2 | 1949.3 | 1835.0 | 1915.3 | 1907.6 |
| 72°   | 17275.1 | 5370.7 | 1286.7 | 1262.0 | 1416.4 | 1677.5 | 1889.1 | 1836.6 | 1723.8 | 1777.9 | 1757.8 |
| 72.5° | 16868.9 | 5120.4 | 1254.2 | 1234.2 | 1380.9 | 1641.9 | 1856.6 | 1808.8 | 1696.0 | 1742.3 | 1723.8 |
| 75°   | 15047.8 | 4447.0 | 1078.1 | 1082.8 | 1204.8 | 1468.9 | 1674.4 | 1658.9 | 1543.1 | 1547.7 | 1541.5 |
| 77.5° | 10914.3 | 3260.7 | 908.2  | 939.1  | 1025.6 | 1291.3 | 1490.6 | 1481.3 | 1354.6 | 1331.5 | 1326.8 |
| 80°   | 5064.8  | 1663.6 | 739.9  | 753.8  | 843.4  | 1079.7 | 1271.2 | 1258.9 | 1156.9 | 1127.6 | 1110.6 |
| 82.5° | 1734.6  | 790.8  | 556.1  | 565.3  | 653.4  | 869.6  | 1102.9 | 1095.1 | 1010.2 | 953.0  | 917.5  |
| 85°   | 619.4   | 393.9  | 389.2  | 380.0  | 466.5  | 684.3  | 960.8  | 919.1  | 793.9  | 676.5  | 673.5  |
| 87.5° | 200.8   | 168.4  | 200.8  | 199.3  | 271.9  | 463.4  | 698.2  | 594.7  | 576.1  | 478.8  | 469.6  |
| 90°   | 0.0     | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

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

Report Prepared for

Cooper Lighting Solutions

Invue

Report Number: SP1-2407-157-9

Test Date: 10/03/2024

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

Data applicable to all product families utilizing light square engine

### Test Information

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

### Spectral Parameters

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

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



### Test Conditions

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

REPORT NUMBER: SP1-2407-157-9

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 6/18/2024        | 12/18/2024           |
| Power Meter                    | INXT2011004           | 2/8/2024         | 2/8/2025             |
| AC Power Source                | IN0063                | 10/24/2023       | 10/24/2024           |
| DC Power Source                | IN0208                | 10/24/2023       | 10/24/2024           |
| Sphere Thermometer             | IN0085                | 10/24/2023       | 10/24/2024           |
| Room Thermometer               | IN0046                | 10/24/2023       | 10/24/2024           |

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**CIE 1931 Chromaticity Diagram**



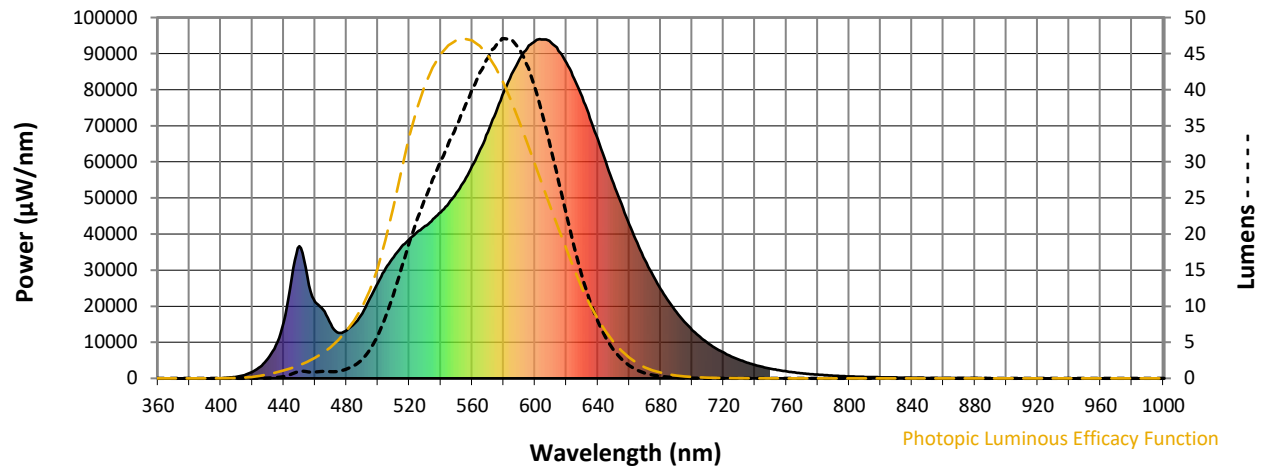
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 2700K 4-step quadrangle

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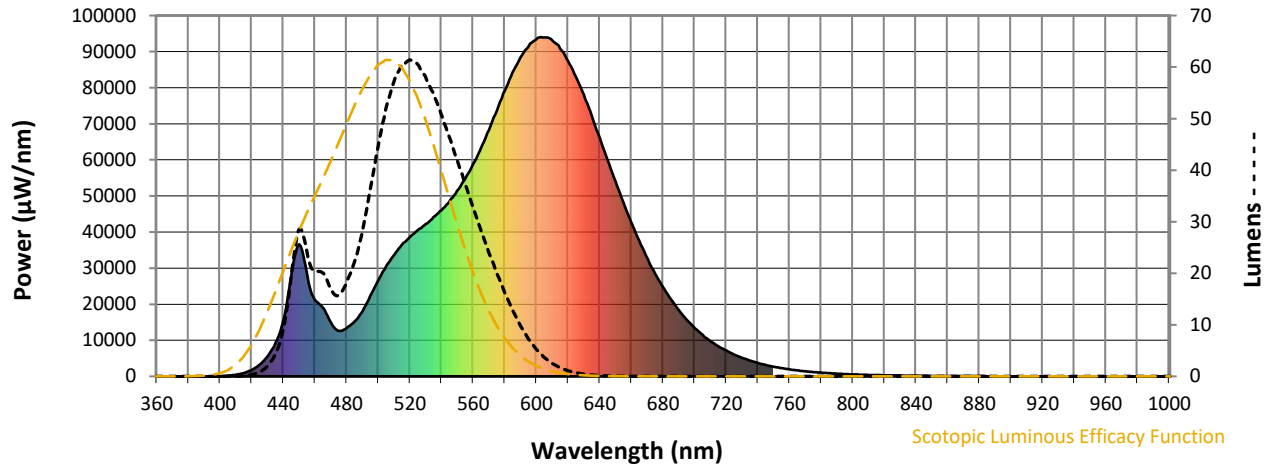
### Photopic Flux vs. Wavelength


**Photopic Lumens: 4337.9**

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

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### Scotopic Flux vs. Wavelength


**Scotopic Lumens: 5286.7**
**S/P: 1.22**

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

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### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 9797**

**M/P: 2.26**

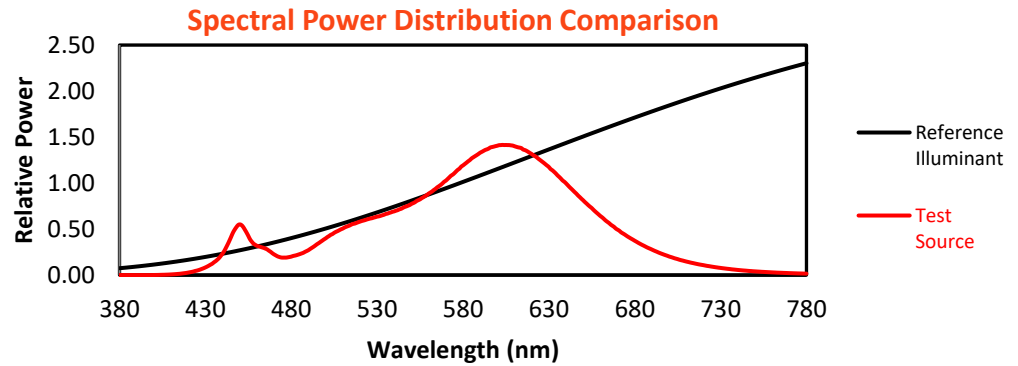
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------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

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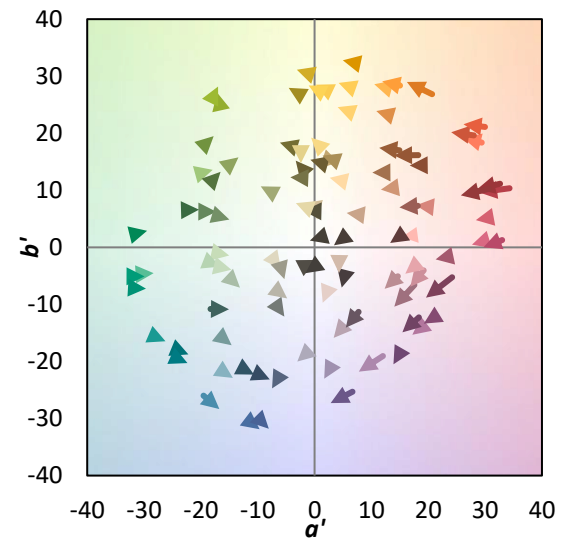
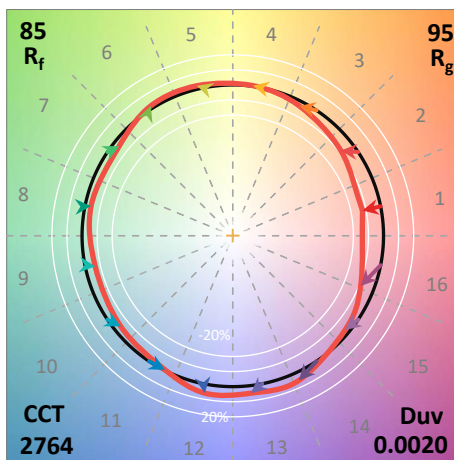
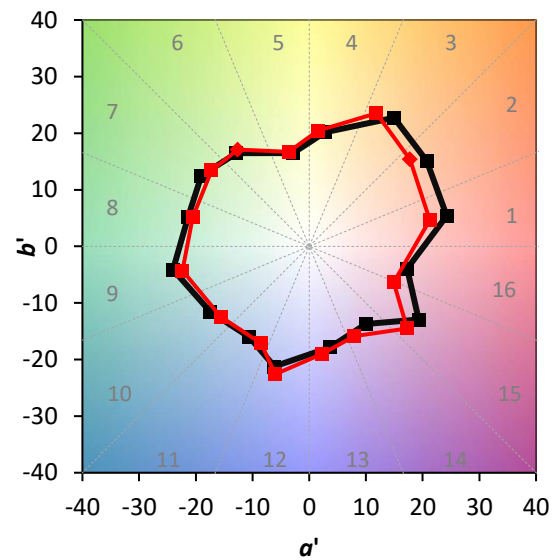
TM-30-18

### Summary

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



### Color Vector Graphics



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

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



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)