

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: P317902

Luminaire Tested: **GLEON-SA8D-827-U-T3R**

Issue Date: 3/3/2020

### Test Information

Test Method: LM-79-08  
Report Number: P317902  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-10)  
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-T3R  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(8) 80 CRI, 2700K, 1200mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE III  
ROADWAY OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

### Summary

Lumens per Lamp: N/A  
Luminaire Lumens: 46739 lumens  
Efficiency: N/A  
Efficacy: 91.5 lumens/watt  
Luminous Opening: Rectangular (W 2' x L: 1' x H: 0')  
IES Classification: Type IV - Medium  
BUG Rating: B3 - U0 - G5

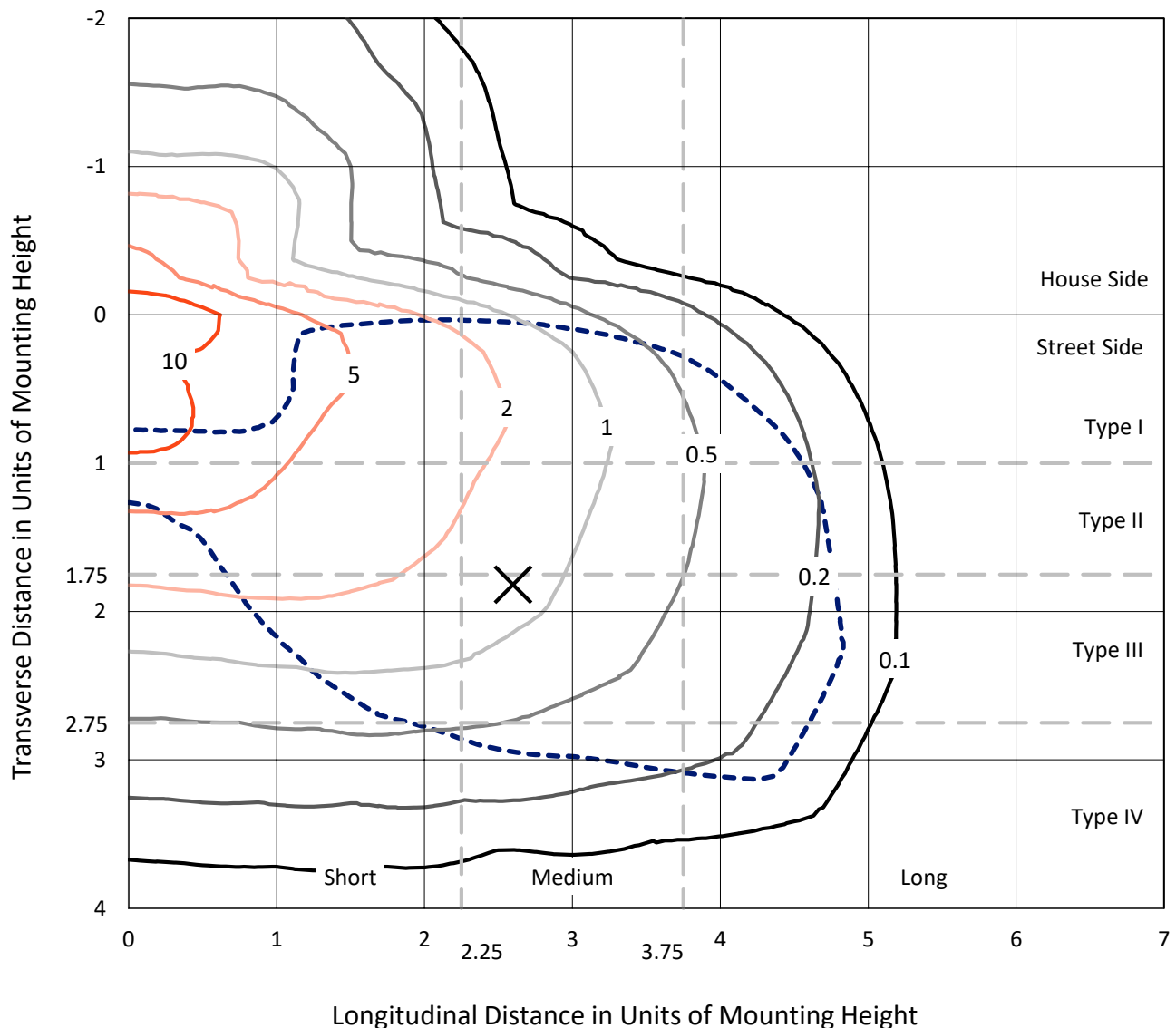
Input Watts (W): 511  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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## Iso-Footcandle Lines of Horizontal Illumination

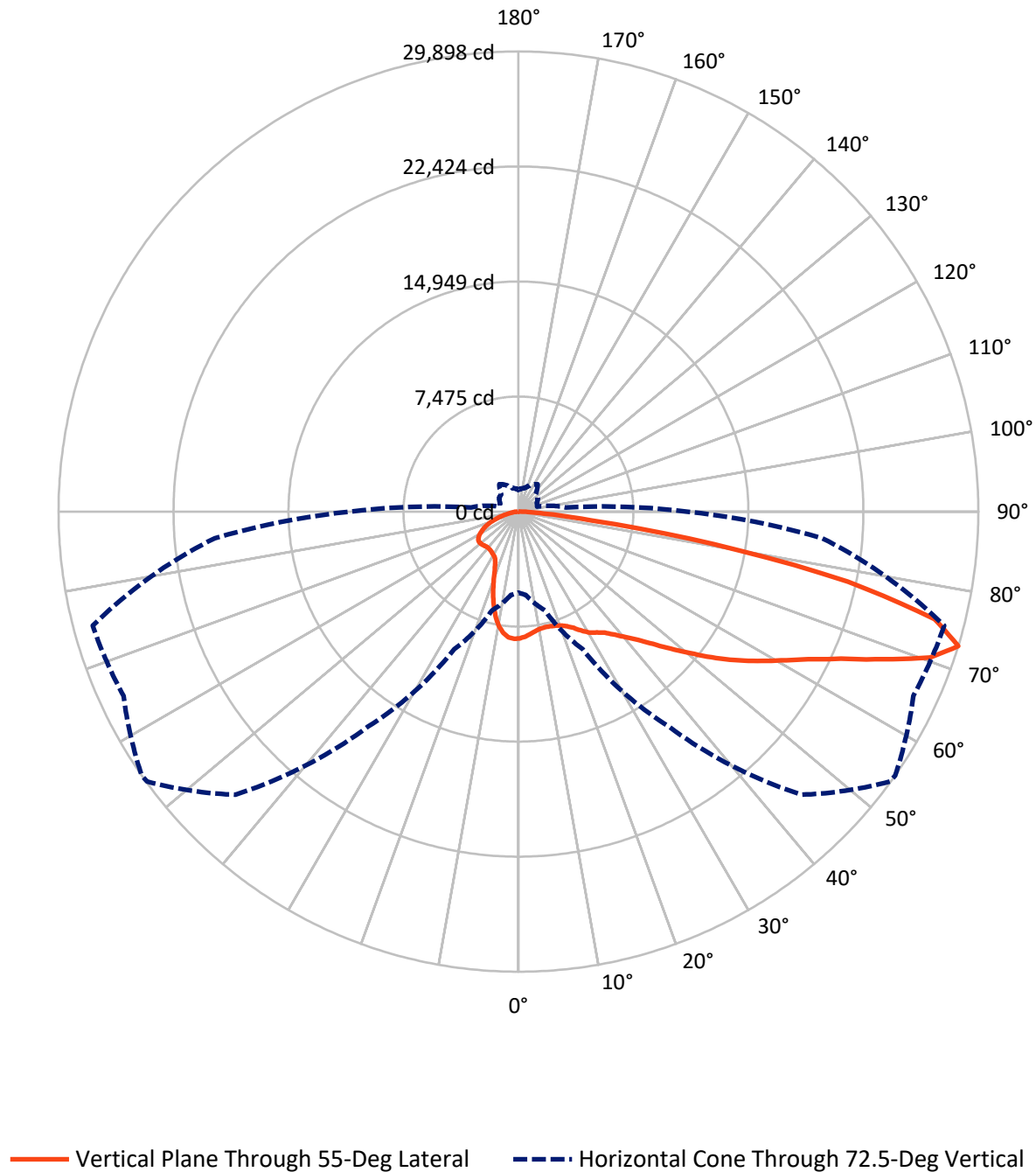
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 13.3 fc  
 Type IV - Medium - N/A

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## Luminous Intensity Polar Plot



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CATALOG NUMBER: GLEON-SA8D-827-U-T3R

**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 8687.3   | 0.0    | 8687.3  |
|                    | % Fixture | 18.6     | 0.0    | 18.6    |
| <b>Street Side</b> | Lumens    | 38051.7  | 0.0    | 38051.7 |
|                    | % Fixture | 81.4     | 0.0    | 81.4    |
| <b>Total</b>       | Lumens    | 46739.0  | 0.0    | 46739.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 746.0   | 1.6       |
| 10°-20°   | 1986.0  | 4.2       |
| 20°-30°   | 3274.5  | 7.0       |
| 30°-40°   | 4843.8  | 10.4      |
| 40°-50°   | 6760.9  | 14.5      |
| 50°-60°   | 8802.9  | 18.8      |
| 60°-70°   | 10818.4 | 23.1      |
| 70°-80°   | 8480.4  | 18.1      |
| 80°-90°   | 1026.2  | 2.2       |
| 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°    | 46739.0 | 100.0     |
| 0°-180°   | 46739.0 | 100.0     |

**Coefficient of Utilization**



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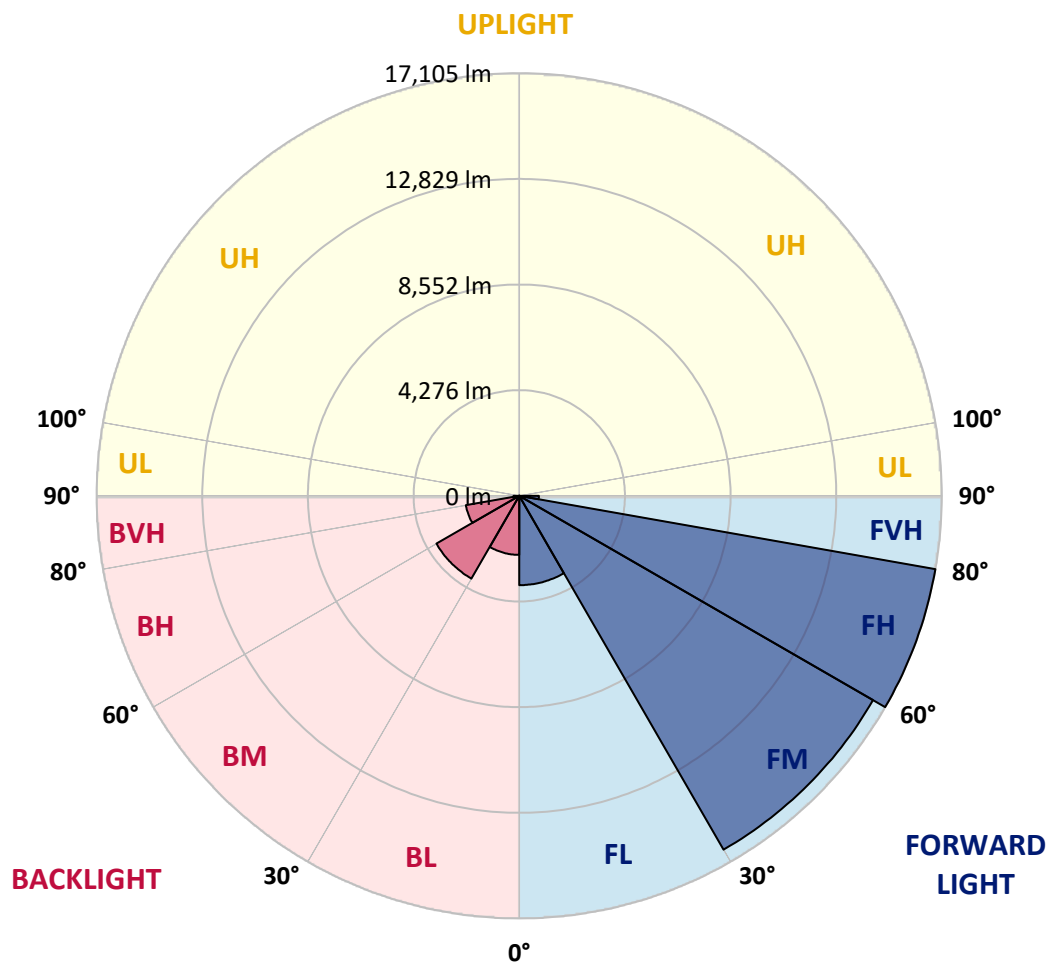
CATALOG NUMBER: GLEON-SA8D-827-U-T3R

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|---------|-----------|-------------------------|------|---------|
|      |             |         |           | B                       | U    | G       |
| FL   | (0°-30°)    | 3616.2  | 7.7       |                         |      |         |
| FM   | (30°-60°)   | 16537.2 | 35.4      |                         |      |         |
| FH   | (60°-80°)   | 17104.9 | 36.6      |                         |      | G5      |
| FVH  | (80°-90°)   | 793.4   | 1.7       |                         |      | G5      |
| BL   | (0°-30°)    | 2390.2  | 5.1       | B3/2500                 |      |         |
| BM   | (30°-60°)   | 3870.3  | 8.3       | B3/5000                 |      |         |
| BH   | (60°-80°)   | 2193.9  | 4.7       | B3/2500                 |      | G3/2500 |
| BVH  | (80°-90°)   | 232.8   | 0.5       |                         |      | 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 IV Medium





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 54°     | 55°     | 65°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 8243.8  | 8243.8  | 8243.8  | 8243.8  | 8243.8  | 8243.8  | 8243.8  | 8243.8  | 8243.8  | 8243.8  | 8243.8  |
| 2.5°  | 7975.4  | 7956.4  | 7980.1  | 8013.3  | 8049.6  | 8098.5  | 8126.9  | 8139.6  | 8188.5  | 8207.4  | 8248.5  |
| 5°    | 7606.0  | 7596.5  | 7636.0  | 7692.8  | 7773.3  | 7887.0  | 7978.5  | 7995.9  | 8125.4  | 8216.9  | 8300.6  |
| 7.5°  | 7337.6  | 7337.6  | 7383.4  | 7451.3  | 7541.3  | 7694.4  | 7823.8  | 7847.5  | 8066.9  | 8264.3  | 8419.0  |
| 10°   | 7124.5  | 7132.4  | 7186.1  | 7266.6  | 7372.3  | 7534.9  | 7707.0  | 7733.8  | 8051.2  | 8374.8  | 8621.1  |
| 12.5° | 6982.4  | 7001.3  | 7050.3  | 7122.9  | 7253.9  | 7451.3  | 7669.1  | 7705.4  | 8084.3  | 8532.6  | 8864.2  |
| 15°   | 7072.4  | 7104.0  | 7108.7  | 7138.7  | 7211.3  | 7426.0  | 7691.2  | 7729.1  | 8155.3  | 8693.7  | 9140.4  |
| 17.5° | 7467.1  | 7478.1  | 7429.2  | 7366.0  | 7331.3  | 7468.6  | 7757.5  | 7797.0  | 8240.6  | 8853.1  | 9405.6  |
| 20°   | 8066.9  | 8060.6  | 7954.9  | 7784.4  | 7607.6  | 7629.7  | 7866.5  | 7907.5  | 8355.8  | 8993.6  | 9670.9  |
| 22.5° | 8824.7  | 8802.6  | 8640.0  | 8325.8  | 8024.3  | 7898.0  | 8057.5  | 8092.2  | 8529.5  | 9194.1  | 9955.0  |
| 25°   | 9743.5  | 9694.5  | 9479.8  | 9058.3  | 8614.7  | 8289.5  | 8344.8  | 8377.9  | 8782.1  | 9418.3  | 10215.5 |
| 27.5° | 10712.8 | 10663.8 | 10390.7 | 9880.8  | 9290.4  | 8783.7  | 8741.0  | 8769.4  | 9069.4  | 9584.0  | 10408.1 |
| 30°   | 11726.3 | 11674.2 | 11424.8 | 10853.3 | 10007.1 | 9295.1  | 9110.4  | 9121.5  | 9271.5  | 9674.0  | 10566.0 |
| 32.5° | 12744.5 | 12695.6 | 12416.1 | 11753.1 | 10785.4 | 9844.5  | 9377.2  | 9363.0  | 9393.0  | 9767.2  | 10744.3 |
| 35°   | 13777.0 | 13795.9 | 13469.1 | 12735.0 | 11647.3 | 10455.5 | 9693.0  | 9663.0  | 9596.7  | 9958.2  | 10996.9 |
| 37.5° | 14882.0 | 14869.4 | 14446.3 | 13679.1 | 12548.8 | 11118.5 | 10146.0 | 10141.3 | 9912.4  | 10319.7 | 11393.2 |
| 40°   | 15620.8 | 15628.7 | 15371.4 | 14645.2 | 13459.6 | 11852.6 | 10727.0 | 10715.9 | 10416.0 | 10861.2 | 11912.6 |
| 42.5° | 15909.7 | 15961.8 | 16028.1 | 15567.2 | 14413.2 | 12703.5 | 11420.0 | 11404.2 | 11118.5 | 11637.9 | 12523.5 |
| 45°   | 15930.2 | 16034.4 | 16444.9 | 16386.5 | 15379.3 | 13677.5 | 12305.6 | 12261.4 | 12056.2 | 12670.3 | 13252.8 |
| 47.5° | 15753.4 | 15860.8 | 16542.8 | 16874.3 | 16242.8 | 14705.2 | 13341.2 | 13306.5 | 13129.7 | 13961.7 | 14042.2 |
| 50°   | 15366.7 | 15469.3 | 16340.7 | 17112.7 | 16953.2 | 15693.4 | 14534.7 | 14443.1 | 14348.4 | 15453.5 | 14945.2 |
| 52.5° | 14642.1 | 14839.4 | 16070.7 | 17169.5 | 17377.9 | 16571.2 | 15789.7 | 15729.8 | 15781.8 | 17027.4 | 15849.7 |
| 55°   | 12926.1 | 13147.1 | 15374.6 | 17122.1 | 17692.0 | 17308.4 | 17044.8 | 17041.6 | 17311.6 | 18678.7 | 16820.6 |
| 57.5° | 11964.7 | 12120.9 | 13956.9 | 17041.6 | 18064.6 | 18040.9 | 18287.2 | 18317.2 | 18842.9 | 20476.8 | 17837.3 |
| 60°   | 11421.6 | 11585.8 | 13238.6 | 16743.3 | 18642.4 | 18988.1 | 19554.8 | 19614.8 | 20399.4 | 22467.5 | 19060.7 |
| 62.5° | 10927.5 | 11107.4 | 12793.4 | 16135.5 | 19322.8 | 20342.6 | 21073.5 | 21127.2 | 22047.5 | 24513.4 | 20243.1 |
| 65°   | 10082.9 | 10286.5 | 12141.5 | 15736.1 | 19941.6 | 22109.1 | 23004.2 | 23040.5 | 23940.4 | 26657.2 | 21147.7 |
| 67.5° | 8889.4  | 9075.7  | 10911.7 | 14853.6 | 20399.4 | 24254.5 | 25571.1 | 25591.6 | 25817.4 | 28171.2 | 21610.3 |
| 70°   | 7495.5  | 7566.5  | 9159.4  | 13031.8 | 19857.9 | 26261.0 | 28384.3 | 28389.0 | 27528.6 | 29140.5 | 21534.5 |
| 72.5° | 5266.4  | 5433.7  | 6649.3  | 9865.0  | 17065.3 | 26016.3 | 29844.5 | 29898.2 | 28324.3 | 28651.1 | 19813.7 |
| 75°   | 3229.9  | 3406.7  | 4170.8  | 5978.4  | 10826.4 | 20461.0 | 27574.4 | 27947.0 | 26832.5 | 25545.8 | 16186.0 |
| 77.5° | 2159.6  | 2225.9  | 2721.6  | 3485.7  | 4904.9  | 11772.1 | 21199.8 | 21900.7 | 22290.7 | 18629.7 | 10351.3 |
| 80°   | 1204.5  | 1330.8  | 1804.4  | 2165.9  | 2181.7  | 4677.6  | 12711.4 | 12875.5 | 12401.9 | 7418.1  | 3193.6  |
| 82.5° | 637.8   | 707.2   | 1204.5  | 1272.4  | 1190.3  | 1566.0  | 4737.6  | 4742.3  | 3962.4  | 1989.1  | 948.8   |
| 85°   | 494.1   | 552.5   | 825.6   | 776.7   | 607.8   | 694.6   | 1562.9  | 1648.1  | 1348.2  | 814.6   | 309.4   |
| 87.5° | 246.3   | 306.3   | 560.4   | 492.5   | 238.4   | 198.9   | 558.8   | 596.7   | 532.0   | 318.9   | 112.1   |
| 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-T3R

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 8243.8  | 8243.8 | 8243.8 | 8243.8 | 8243.8 | 8243.8 | 8243.8 | 8243.8 | 8243.8 | 8243.8 | 8243.8 |
| 2.5°  | 8264.3  | 8278.5 | 8295.8 | 8276.9 | 8270.6 | 8245.3 | 8202.7 | 8193.2 | 8171.1 | 8172.7 | 8185.3 |
| 5°    | 8336.9  | 8360.6 | 8351.1 | 8278.5 | 8191.7 | 8070.1 | 7943.8 | 7836.5 | 7765.4 | 7760.7 | 7755.9 |
| 7.5°  | 8475.8  | 8491.6 | 8417.4 | 8210.6 | 7967.5 | 7686.5 | 7421.3 | 7189.2 | 7048.7 | 7014.0 | 7006.1 |
| 10°   | 8693.7  | 8690.5 | 8486.9 | 8070.1 | 7585.5 | 7083.4 | 6657.2 | 6335.2 | 6147.3 | 6092.0 | 6077.8 |
| 12.5° | 8936.8  | 8900.5 | 8510.5 | 7814.4 | 7045.6 | 6349.4 | 5809.5 | 5451.1 | 5255.4 | 5192.2 | 5176.4 |
| 15°   | 9187.8  | 9097.8 | 8452.1 | 7432.3 | 6382.5 | 5558.5 | 4991.7 | 4660.2 | 4554.4 | 4519.7 | 4513.4 |
| 17.5° | 9421.4  | 9247.8 | 8284.8 | 6914.5 | 5626.3 | 4770.7 | 4328.7 | 4196.1 | 4221.3 | 4267.1 | 4268.7 |
| 20°   | 9650.3  | 9348.8 | 8016.4 | 6261.0 | 4829.1 | 4121.9 | 3971.9 | 4069.8 | 4189.8 | 4282.9 | 4295.5 |
| 22.5° | 9876.1  | 9419.9 | 7670.7 | 5506.4 | 4115.6 | 3757.2 | 3863.0 | 4041.4 | 4178.7 | 4279.7 | 4297.1 |
| 25°   | 10065.5 | 9437.2 | 7193.9 | 4701.2 | 3619.9 | 3619.9 | 3810.9 | 3979.8 | 4115.6 | 4215.0 | 4232.4 |
| 27.5° | 10135.0 | 9320.4 | 6521.4 | 3956.1 | 3370.4 | 3556.7 | 3738.3 | 3878.8 | 3994.0 | 4099.8 | 4118.7 |
| 30°   | 10161.8 | 9104.1 | 5744.7 | 3357.8 | 3267.8 | 3488.8 | 3640.4 | 3760.4 | 3869.3 | 3968.7 | 3986.1 |
| 32.5° | 10166.6 | 8843.6 | 4920.7 | 3018.4 | 3196.8 | 3417.8 | 3518.8 | 3624.6 | 3741.4 | 3780.9 | 3787.2 |
| 35°   | 10196.6 | 8535.8 | 4052.4 | 2844.7 | 3130.5 | 3351.5 | 3432.0 | 3507.8 | 3318.3 | 3332.5 | 3345.2 |
| 37.5° | 10283.4 | 8231.1 | 3326.2 | 2746.9 | 3087.9 | 3316.8 | 3413.1 | 3138.4 | 2990.0 | 2955.2 | 2950.5 |
| 40°   | 10446.0 | 7905.9 | 2787.9 | 2667.9 | 3072.1 | 3334.1 | 3291.5 | 2930.0 | 2674.2 | 2483.2 | 2454.8 |
| 42.5° | 10671.7 | 7555.5 | 2443.8 | 2615.8 | 3083.1 | 3417.8 | 3122.6 | 2729.5 | 2304.8 | 2181.7 | 2165.9 |
| 45°   | 10925.9 | 7187.6 | 2257.5 | 2579.5 | 3121.0 | 3482.5 | 3087.9 | 2462.7 | 2132.8 | 2039.6 | 2031.7 |
| 47.5° | 11172.2 | 6737.7 | 2161.2 | 2563.7 | 3173.1 | 3430.4 | 2941.0 | 2380.6 | 2050.7 | 2001.7 | 2006.5 |
| 50°   | 11454.7 | 6332.0 | 2102.8 | 2546.4 | 3218.9 | 3397.3 | 2775.3 | 2338.0 | 2019.1 | 2079.1 | 2142.2 |
| 52.5° | 11693.1 | 5912.1 | 2050.7 | 2511.6 | 3236.2 | 3338.9 | 2732.7 | 2345.9 | 2019.1 | 2134.3 | 2194.3 |
| 55°   | 11975.7 | 5594.8 | 1990.7 | 2439.0 | 3203.1 | 3173.1 | 2702.7 | 2393.2 | 2042.8 | 1970.2 | 1976.5 |
| 57.5° | 12340.4 | 5490.6 | 1924.4 | 2325.4 | 3092.6 | 2931.6 | 2688.5 | 2439.0 | 2028.6 | 1982.8 | 1998.6 |
| 60°   | 12845.5 | 5601.1 | 1897.5 | 2177.0 | 2920.5 | 2742.1 | 2690.0 | 2415.3 | 1929.1 | 1850.2 | 1851.8 |
| 62.5° | 13327.0 | 5724.2 | 1896.0 | 2083.8 | 2709.0 | 2573.2 | 2653.7 | 2338.0 | 1878.6 | 1832.8 | 1850.2 |
| 65°   | 13484.9 | 5599.5 | 1820.2 | 1979.6 | 2470.6 | 2371.1 | 2587.4 | 2255.9 | 1840.7 | 1771.3 | 1768.1 |
| 67.5° | 13273.4 | 5212.7 | 1667.1 | 1810.7 | 2197.5 | 2135.9 | 2500.6 | 2158.0 | 1780.7 | 1723.9 | 1714.4 |
| 70°   | 12645.1 | 4349.2 | 1477.6 | 1588.1 | 1886.5 | 1870.7 | 2363.3 | 2044.4 | 1700.2 | 1651.3 | 1610.2 |
| 72.5° | 10954.3 | 3098.9 | 1245.6 | 1321.3 | 1536.0 | 1586.6 | 2173.8 | 1896.0 | 1586.6 | 1480.8 | 1417.6 |
| 75°   | 8996.8  | 2293.8 | 1023.0 | 1038.8 | 1166.6 | 1304.0 | 1913.3 | 1722.3 | 1452.4 | 1272.4 | 1223.5 |
| 77.5° | 5509.5  | 1403.4 | 814.6  | 820.9  | 836.7  | 1040.3 | 1575.5 | 1528.1 | 1281.9 | 1060.9 | 1026.1 |
| 80°   | 1783.9  | 765.6  | 588.8  | 618.8  | 571.5  | 762.5  | 1218.7 | 1300.8 | 1100.3 | 887.2  | 849.3  |
| 82.5° | 678.8   | 446.8  | 397.8  | 418.3  | 396.2  | 511.5  | 888.8  | 1041.9 | 901.4  | 729.3  | 593.6  |
| 85°   | 328.4   | 252.6  | 235.2  | 263.6  | 244.7  | 262.1  | 568.3  | 767.2  | 683.6  | 475.2  | 442.0  |
| 87.5° | 116.8   | 112.1  | 90.0   | 121.6  | 104.2  | 93.1   | 173.7  | 386.8  | 451.5  | 326.8  | 292.1  |
| 90°   | 0.0     | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

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

Report Prepared for

Cooper Lighting Solutions

Invue

Report Number: SP1-2407-157-9

Test Date: 10/03/2024

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

Data applicable to all product families utilizing light square engine

### Test Information

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

### Spectral Parameters

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

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



### Test Conditions

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

REPORT NUMBER: SP1-2407-157-9

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

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**CIE 1931 Chromaticity Diagram**



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



Point lies inside the ANSI 2700K 4-step quadrangle

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### Photopic Flux vs. Wavelength



### Photopic Lumens: 4337.9

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

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### Scotopic Flux vs. Wavelength


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

| $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|
| 360               | 0                                    | 0.0                            | 490               | 18018                                | 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)