

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: P321069

Luminaire Tested: **GLEON-SA5A-827-U-AFL**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P321069  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-29)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA5A-827-U-AFL  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(5) 80 CRI, 2700K, 615mA LIGHTSQUARES WITH 16 LEDS EACH AND AUTOMOTIVE  
FRONTLINE OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 17566 lumens  
Efficiency: N/A  
Efficacy: 108.4 lumens/watt  
Luminous Opening: Rectangular (W 1.5' x L: 1' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B2 - U0 - G2

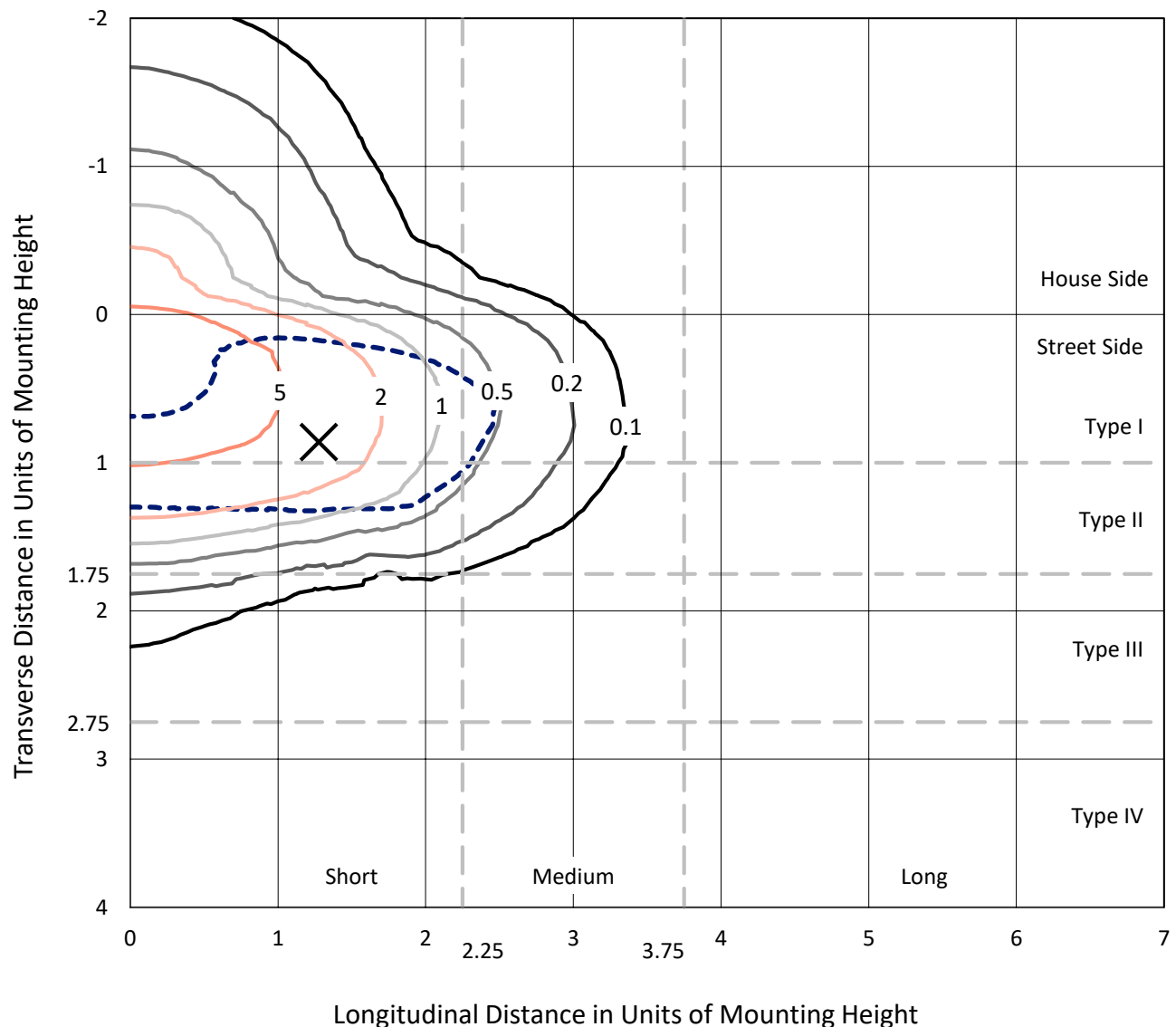
Input Watts (W): 162  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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## Iso-Footcandle Lines of Horizontal Illumination

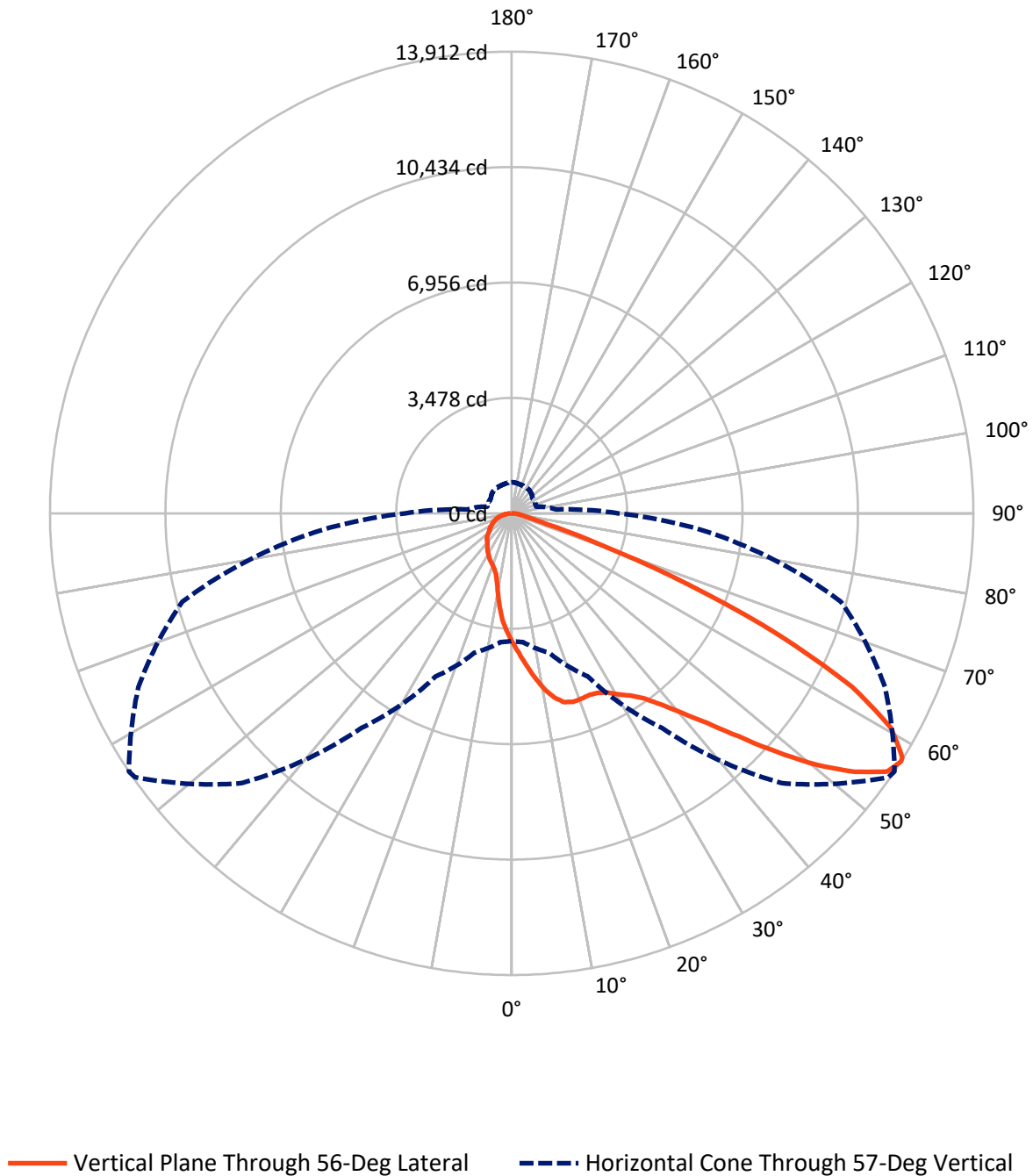
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 8.6 fc  
 Type II - Short - N/A

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## Luminous Intensity Polar Plot



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CATALOG NUMBER: GLEON-SA5A-827-U-AFL

**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 3028.0   | 0.0    | 3028.0  |
|                    | % Fixture | 17.2     | 0.0    | 17.2    |
| <b>Street Side</b> | Lumens    | 14538.0  | 0.0    | 14538.0 |
|                    | % Fixture | 82.8     | 0.0    | 82.8    |
| <b>Total</b>       | Lumens    | 17566.0  | 0.0    | 17566.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 372.2   | 2.1       |
| 10°-20°   | 1052.2  | 6.0       |
| 20°-30°   | 1713.9  | 9.8       |
| 30°-40°   | 2562.1  | 14.6      |
| 40°-50°   | 3886.1  | 22.1      |
| 50°-60°   | 4355.7  | 24.8      |
| 60°-70°   | 2572.6  | 14.6      |
| 70°-80°   | 842.9   | 4.8       |
| 80°-90°   | 208.2   | 1.2       |
| 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°    | 17566.0 | 100.0     |
| 0°-180°   | 17566.0 | 100.0     |

**Coefficient of Utilization**



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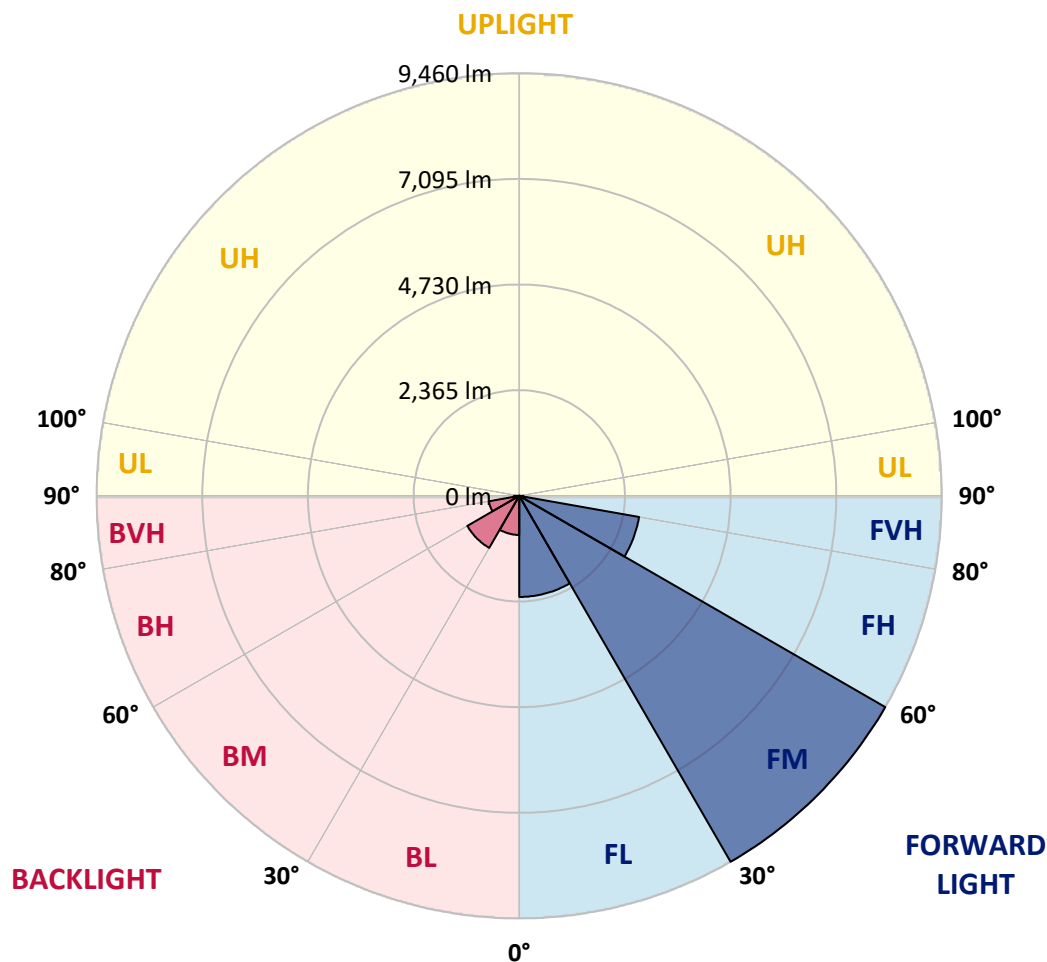
CATALOG NUMBER: GLEON-SA5A-827-U-AFL

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 2262.8 | 12.9      |                         |      |         |
| FM   | (30°-60°)   | 9459.9 | 53.9      |                         |      |         |
| FH   | (60°-80°)   | 2723.7 | 15.5      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 91.7   | 0.5       |                         |      | G1/100  |
| BL   | (0°-30°)    | 875.6  | 5.0       | B2/1000                 |      |         |
| BM   | (30°-60°)   | 1344.0 | 7.7       | B2/2500                 |      |         |
| BH   | (60°-80°)   | 691.9  | 3.9       | B2/1000                 |      | G2/1000 |
| BVH  | (80°-90°)   | 116.6  | 0.7       |                         |      | G2/225  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B2-U0-G2**

Type II Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°     | 45°     | 55°     | 56°     | 65°     | 75°     | 85°    |
|-------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------|--------|
| 0°    | 3896.2 | 3896.2 | 3896.2 | 3896.2 | 3896.2  | 3896.2  | 3896.2  | 3896.2  | 3896.2  | 3896.2  | 3896.2 |
| 2.5°  | 4473.9 | 4514.9 | 4496.8 | 4434.0 | 4385.7  | 4317.5  | 4241.5  | 4218.5  | 4138.2  | 4048.3  | 3940.2 |
| 5°    | 5182.0 | 5161.5 | 5131.9 | 5034.1 | 4930.9  | 4810.7  | 4620.0  | 4589.8  | 4411.1  | 4207.7  | 3992.7 |
| 7.5°  | 5585.3 | 5583.4 | 5565.9 | 5508.6 | 5414.4  | 5257.5  | 5027.5  | 4991.8  | 4722.0  | 4394.8  | 4061.6 |
| 10°   | 5526.7 | 5522.5 | 5551.4 | 5611.2 | 5639.6  | 5607.0  | 5413.2  | 5377.6  | 5046.2  | 4601.9  | 4141.2 |
| 12.5° | 5194.1 | 5196.5 | 5243.0 | 5368.5 | 5539.4  | 5744.6  | 5713.2  | 5695.7  | 5382.4  | 4836.1  | 4237.8 |
| 15°   | 4935.1 | 4940.5 | 4977.3 | 5086.6 | 5288.2  | 5660.7  | 5895.5  | 5901.6  | 5707.8  | 5094.5  | 4350.7 |
| 17.5° | 4821.6 | 4833.1 | 4850.0 | 4926.6 | 5111.4  | 5493.5  | 5939.0  | 5971.6  | 5992.7  | 5362.5  | 4459.4 |
| 20°   | 4857.8 | 4868.7 | 4873.5 | 4922.4 | 5073.9  | 5392.1  | 5908.8  | 5967.4  | 6211.3  | 5614.8  | 4568.1 |
| 22.5° | 5020.2 | 5026.8 | 5029.9 | 5042.5 | 5160.3  | 5421.1  | 5888.9  | 5950.5  | 6369.4  | 5841.2  | 4650.2 |
| 25°   | 5289.4 | 5284.6 | 5265.3 | 5249.0 | 5328.1  | 5535.8  | 5934.8  | 5993.3  | 6498.0  | 6046.5  | 4703.9 |
| 27.5° | 5611.8 | 5605.8 | 5568.4 | 5523.7 | 5569.0  | 5714.4  | 6067.0  | 6113.5  | 6613.3  | 6238.4  | 4731.0 |
| 30°   | 5998.8 | 5983.1 | 5912.4 | 5859.3 | 5876.8  | 5982.5  | 6284.9  | 6327.2  | 6791.4  | 6456.4  | 4757.6 |
| 32.5° | 6446.1 | 6429.2 | 6327.2 | 6239.0 | 6239.0  | 6327.2  | 6509.5  | 6544.5  | 6942.3  | 6702.7  | 4800.5 |
| 35°   | 7006.3 | 6985.2 | 6852.4 | 6704.5 | 6662.8  | 6707.5  | 6815.6  | 6840.3  | 7214.0  | 7013.0  | 4878.3 |
| 37.5° | 7666.7 | 7638.4 | 7466.3 | 7268.3 | 7177.2  | 7174.7  | 7252.6  | 7303.3  | 7648.0  | 7420.4  | 5010.5 |
| 40°   | 8329.0 | 8309.1 | 8158.7 | 8003.0 | 7824.3  | 7767.0  | 7887.1  | 7902.8  | 8215.5  | 7926.3  | 5179.6 |
| 42.5° | 8840.9 | 8837.3 | 8809.5 | 8830.0 | 8647.1  | 8531.2  | 8625.4  | 8638.1  | 8908.5  | 8473.9  | 5359.5 |
| 45°   | 9111.4 | 9117.4 | 9252.0 | 9550.2 | 9617.8  | 9533.3  | 9579.8  | 9583.4  | 9700.5  | 9026.2  | 5524.3 |
| 47.5° | 8894.6 | 8926.0 | 9266.5 | 9933.6 | 10487.1 | 10767.9 | 10690.6 | 10735.3 | 10468.4 | 9500.7  | 5653.5 |
| 50°   | 8050.1 | 8088.7 | 8668.3 | 9762.7 | 10892.8 | 11962.5 | 11922.1 | 11911.8 | 11087.8 | 9848.4  | 5723.5 |
| 52.5° | 7003.9 | 7034.1 | 7512.2 | 8874.7 | 10595.2 | 12623.0 | 12994.2 | 12941.1 | 11638.4 | 10108.6 | 5736.8 |
| 55°   | 5410.8 | 5457.9 | 5916.1 | 7102.3 | 9391.5  | 12370.6 | 13782.6 | 13734.9 | 12140.0 | 10245.1 | 5721.1 |
| 57°   | 3846.7 | 3896.2 | 4351.3 | 5420.4 | 7900.4  | 11497.1 | 13861.1 | 13911.8 | 12411.1 | 10268.0 | 5738.6 |
| 57.5° | 3432.5 | 3483.2 | 3934.2 | 4972.5 | 7435.5  | 11181.4 | 13793.5 | 13878.0 | 12460.0 | 10264.4 | 5748.2 |
| 60°   | 1728.3 | 1747.7 | 2035.0 | 2775.7 | 4700.3  | 9039.5  | 12911.5 | 13129.5 | 12504.0 | 10086.9 | 5789.9 |
| 62.5° | 1074.6 | 1060.7 | 1051.6 | 1278.6 | 2286.7  | 5994.5  | 11091.4 | 11511.0 | 11660.7 | 9657.1  | 5689.1 |
| 65°   | 944.8  | 918.8  | 819.2  | 801.1  | 1010.0  | 2911.6  | 8352.5  | 8874.7  | 9858.7  | 8979.7  | 5448.8 |
| 67.5° | 887.4  | 862.1  | 749.8  | 682.2  | 682.8   | 1154.2  | 5185.6  | 5773.6  | 7680.0  | 7834.6  | 4882.0 |
| 70°   | 828.2  | 805.3  | 700.3  | 620.6  | 581.3   | 639.3   | 2385.7  | 2831.9  | 5006.3  | 6158.1  | 4080.3 |
| 72.5° | 752.2  | 736.5  | 636.9  | 554.8  | 513.1   | 478.7   | 913.4   | 1078.8  | 2898.3  | 4135.8  | 2833.7 |
| 75°   | 672.5  | 658.0  | 572.9  | 494.4  | 443.7   | 376.7   | 514.3   | 554.2   | 1472.4  | 2115.9  | 1395.1 |
| 77.5° | 585.0  | 576.5  | 509.5  | 437.1  | 396.6   | 312.1   | 364.0   | 383.3   | 631.4   | 907.3   | 699.7  |
| 80°   | 465.4  | 481.7  | 445.5  | 389.4  | 351.9   | 249.9   | 257.8   | 270.4   | 367.6   | 443.1   | 397.2  |
| 82.5° | 303.0  | 331.4  | 348.9  | 316.3  | 289.8   | 196.8   | 185.3   | 190.8   | 239.7   | 270.4   | 172.7  |
| 85°   | 126.2  | 141.9  | 229.4  | 207.1  | 192.6   | 143.7   | 124.4   | 126.8   | 148.5   | 153.9   | 70.6   |
| 87.5° | 56.1   | 59.8   | 100.8  | 94.8   | 81.5    | 49.5    | 53.1    | 58.0    | 79.1    | 74.9    | 27.2   |
| 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: P321069

CATALOG NUMBER: GLEON-SA5A-827-U-AFL

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 3896.2 | 3896.2 | 3896.2 | 3896.2 | 3896.2 | 3896.2 | 3896.2 | 3896.2 | 3896.2 | 3896.2 | 3896.2 |
| 2.5°  | 3899.8 | 3849.1 | 3762.1 | 3666.2 | 3587.7 | 3524.9 | 3461.5 | 3418.0 | 3367.3 | 3340.2 | 3326.3 |
| 5°    | 3902.8 | 3803.2 | 3620.3 | 3432.5 | 3264.7 | 3111.4 | 2965.3 | 2853.0 | 2748.0 | 2691.2 | 2675.5 |
| 7.5°  | 3915.5 | 3765.8 | 3470.0 | 3160.9 | 2862.7 | 2590.4 | 2380.3 | 2248.7 | 2153.9 | 2111.7 | 2099.6 |
| 10°   | 3925.7 | 3721.7 | 3284.0 | 2826.4 | 2420.8 | 2144.9 | 1981.9 | 1908.2 | 1875.6 | 1870.2 | 1864.8 |
| 12.5° | 3949.9 | 3676.4 | 3088.4 | 2477.5 | 2077.3 | 1886.5 | 1829.8 | 1824.9 | 1834.0 | 1847.3 | 1847.3 |
| 15°   | 3987.9 | 3631.7 | 2865.1 | 2178.1 | 1858.7 | 1791.7 | 1803.2 | 1829.8 | 1854.5 | 1875.0 | 1878.1 |
| 17.5° | 4015.7 | 3576.8 | 2624.8 | 1938.4 | 1742.2 | 1760.3 | 1801.4 | 1838.8 | 1864.2 | 1884.1 | 1885.9 |
| 20°   | 4035.6 | 3491.7 | 2368.2 | 1755.5 | 1675.2 | 1731.4 | 1782.7 | 1815.9 | 1833.4 | 1853.3 | 1856.3 |
| 22.5° | 4025.3 | 3377.6 | 2140.7 | 1624.5 | 1620.9 | 1689.1 | 1738.0 | 1777.8 | 1764.6 | 1745.2 | 1757.9 |
| 25°   | 3975.8 | 3220.6 | 1906.4 | 1526.7 | 1563.5 | 1632.4 | 1692.7 | 1666.2 | 1621.5 | 1613.0 | 1617.9 |
| 27.5° | 3887.7 | 3020.2 | 1689.7 | 1436.2 | 1497.1 | 1579.8 | 1576.2 | 1549.6 | 1534.0 | 1523.1 | 1529.7 |
| 30°   | 3792.9 | 2802.9 | 1500.1 | 1357.1 | 1423.5 | 1491.7 | 1477.8 | 1477.2 | 1461.5 | 1444.0 | 1452.5 |
| 32.5° | 3699.4 | 2584.4 | 1349.8 | 1291.9 | 1367.9 | 1377.0 | 1407.2 | 1416.2 | 1385.4 | 1348.6 | 1346.2 |
| 35°   | 3617.9 | 2377.9 | 1235.7 | 1232.7 | 1300.9 | 1302.1 | 1346.2 | 1333.5 | 1256.9 | 1218.8 | 1218.8 |
| 37.5° | 3556.9 | 2172.0 | 1148.8 | 1179.6 | 1212.8 | 1244.2 | 1266.5 | 1214.0 | 1201.3 | 1180.2 | 1179.6 |
| 40°   | 3530.3 | 1990.9 | 1094.5 | 1139.1 | 1150.6 | 1190.5 | 1133.1 | 1153.6 | 1159.7 | 1148.8 | 1148.8 |
| 42.5° | 3502.6 | 1833.4 | 1047.4 | 1108.4 | 1106.5 | 1101.1 | 1072.1 | 1098.7 | 1122.8 | 1123.4 | 1121.6 |
| 45°   | 3474.8 | 1697.5 | 1005.7 | 1042.6 | 1067.9 | 1009.4 | 1014.8 | 1043.2 | 1077.0 | 1089.0 | 1089.0 |
| 47.5° | 3444.0 | 1590.1 | 967.7  | 973.1  | 1012.4 | 973.1  | 968.9  | 990.6  | 1030.5 | 1049.8 | 1054.0 |
| 50°   | 3376.4 | 1493.5 | 924.2  | 912.2  | 923.0  | 936.3  | 939.9  | 950.2  | 994.3  | 1025.0 | 1032.3 |
| 52.5° | 3282.8 | 1407.2 | 868.7  | 856.0  | 856.0  | 906.1  | 923.0  | 926.0  | 963.5  | 1000.3 | 1007.5 |
| 55°   | 3204.9 | 1352.2 | 811.3  | 808.9  | 806.5  | 874.1  | 903.1  | 907.9  | 933.9  | 962.9  | 966.5  |
| 57°   | 3210.4 | 1348.0 | 767.3  | 769.7  | 769.1  | 841.5  | 884.4  | 894.7  | 907.9  | 932.7  | 936.9  |
| 57.5° | 3213.4 | 1351.0 | 757.6  | 758.8  | 758.2  | 832.5  | 879.0  | 890.4  | 900.7  | 926.6  | 930.9  |
| 60°   | 3258.7 | 1358.9 | 718.4  | 705.1  | 708.1  | 784.2  | 848.2  | 862.7  | 869.3  | 903.7  | 909.1  |
| 62.5° | 3191.7 | 1323.9 | 687.0  | 655.0  | 655.0  | 733.5  | 805.3  | 828.2  | 838.5  | 885.0  | 894.1  |
| 65°   | 2997.3 | 1225.5 | 650.2  | 598.2  | 604.3  | 682.8  | 754.0  | 791.4  | 807.1  | 865.1  | 874.7  |
| 67.5° | 2697.2 | 1111.4 | 610.9  | 547.5  | 553.6  | 629.6  | 700.9  | 741.3  | 766.1  | 843.3  | 851.2  |
| 70°   | 2306.7 | 971.9  | 557.8  | 493.8  | 501.1  | 571.7  | 638.1  | 684.0  | 720.8  | 822.8  | 825.2  |
| 72.5° | 1700.6 | 796.9  | 483.5  | 434.7  | 442.5  | 504.1  | 574.7  | 627.8  | 677.3  | 771.5  | 770.3  |
| 75°   | 1011.2 | 623.0  | 401.4  | 374.9  | 380.3  | 437.7  | 517.4  | 581.9  | 656.2  | 751.6  | 763.1  |
| 77.5° | 613.3  | 469.1  | 327.2  | 313.9  | 320.6  | 379.1  | 476.3  | 545.1  | 647.1  | 708.7  | 705.1  |
| 80°   | 370.7  | 335.0  | 261.4  | 252.9  | 259.6  | 324.2  | 440.7  | 517.4  | 565.6  | 605.5  | 605.5  |
| 82.5° | 193.8  | 204.6  | 192.0  | 185.3  | 194.4  | 263.2  | 400.8  | 451.6  | 499.8  | 429.2  | 400.8  |
| 85°   | 79.1   | 106.9  | 116.5  | 115.9  | 121.3  | 182.3  | 345.9  | 386.4  | 322.4  | 306.1  | 313.3  |
| 87.5° | 26.6   | 45.3   | 56.7   | 48.9   | 51.3   | 114.7  | 239.7  | 186.5  | 221.6  | 154.5  | 146.7  |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

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

Report Prepared for

Cooper Lighting Solutions

Invue

Report Number: SP1-2407-157-9

Test Date: 10/03/2024

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

Data applicable to all product families utilizing light square engine

### Test Information

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

### Spectral Parameters

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

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



### Test Conditions

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

REPORT NUMBER: SP1-2407-157-9

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

REPORT NUMBER: SP1-2407-157-9

**CIE 1931 Chromaticity Diagram**



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



Point lies inside the ANSI 2700K 4-step quadrangle

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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)