

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: P321714

Luminaire Tested: **GLEON-SA0A-827-U-T3R-HSS**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P321714  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-11)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA0A-827-U-T3R-HSS  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(10) 80 CRI, 2700K, 615mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE III  
ROADWAY OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 26079 lumens  
Efficiency: N/A  
Efficacy: 80.7 lumens/watt  
Luminous Opening: Rectangular (W 2.5' x L: 1' x H: 0')  
IES Classification: Type III - Medium  
BUG Rating: B2 - U0 - G4

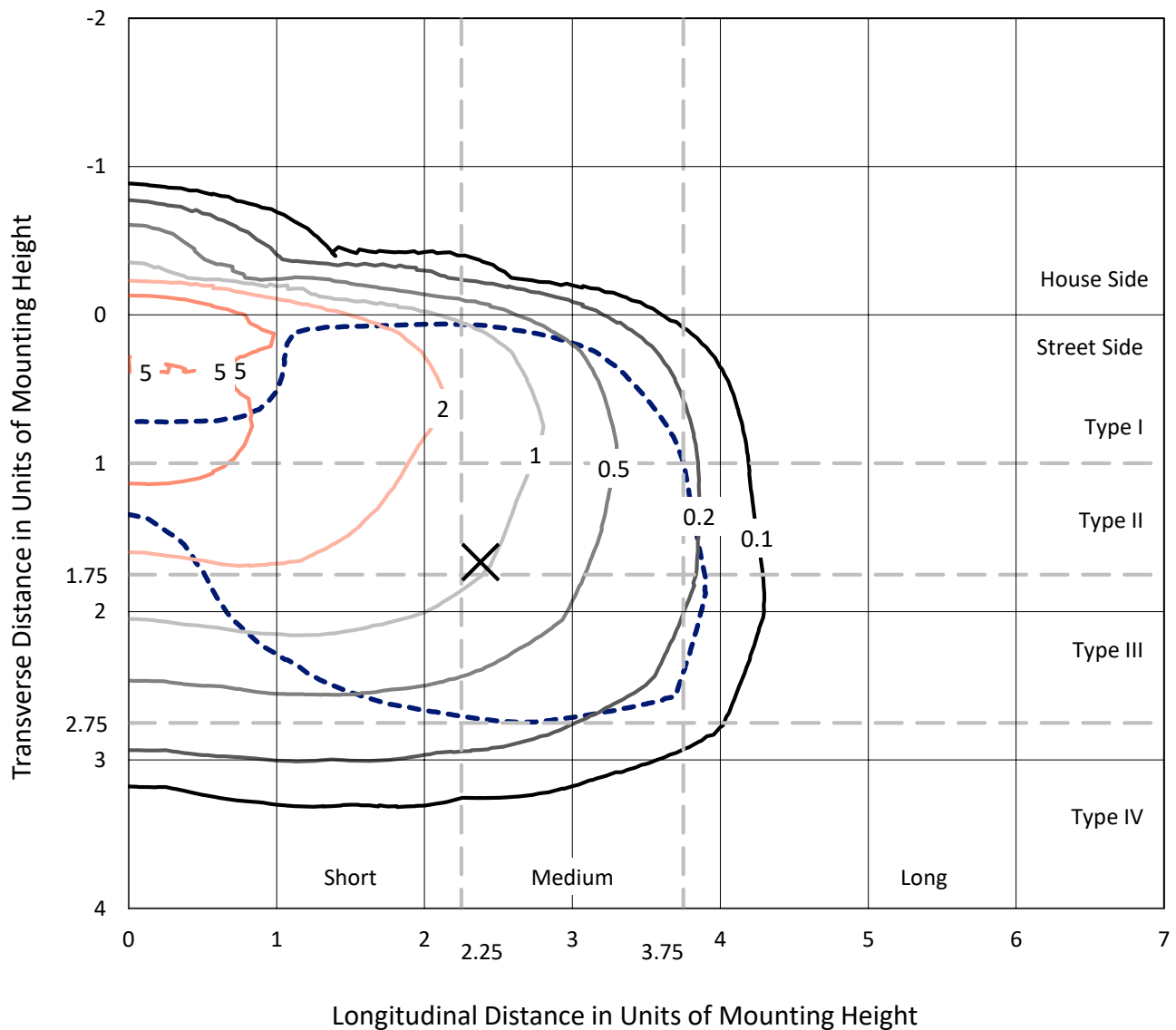
Input Watts (W): 323  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



REPORT NUMBER: P321714  
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## Iso-Footcandle Lines of Horizontal Illumination

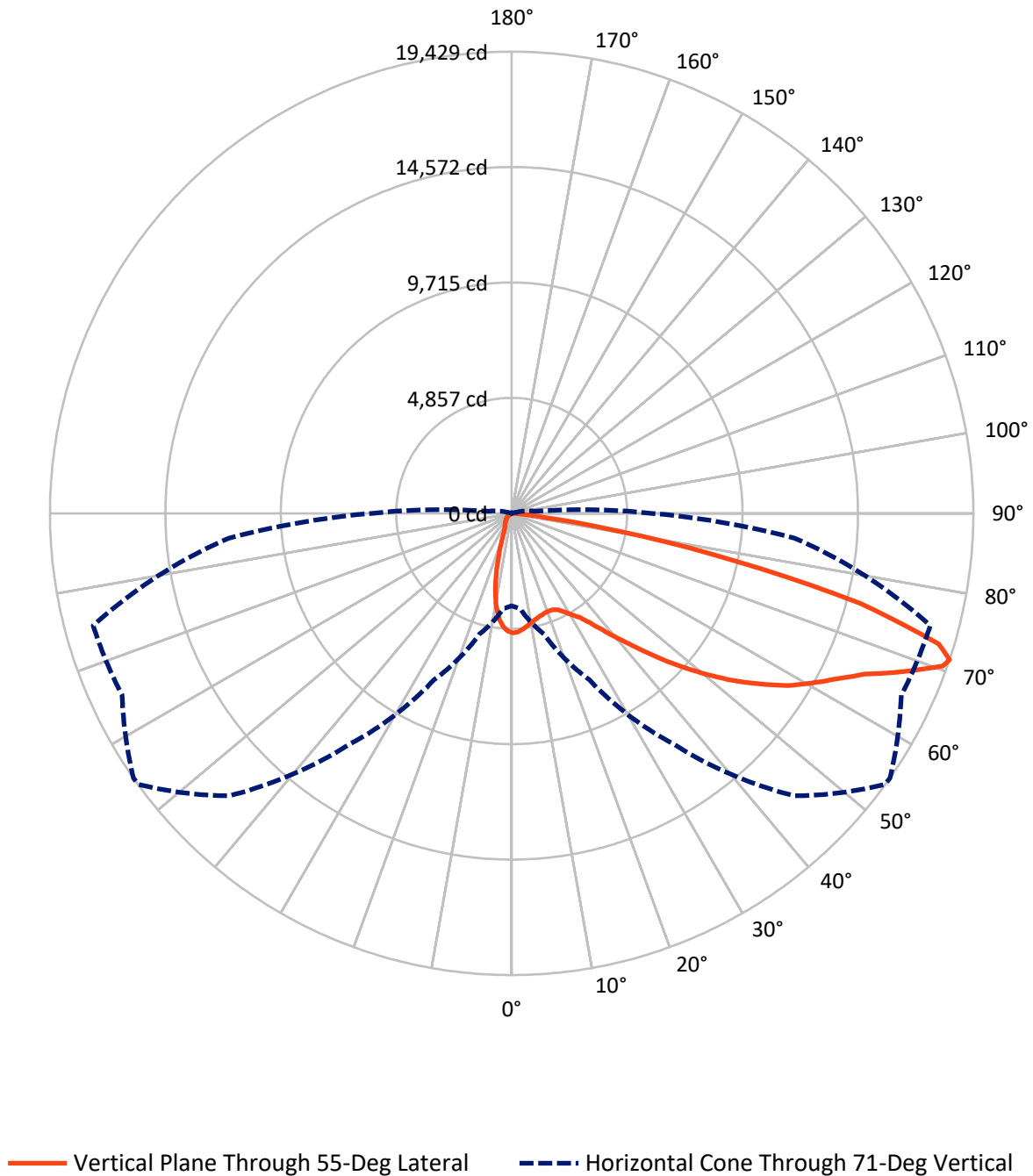
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 8.2 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    | 2064.7   | 0.0    | 2064.7  |
|                    | % Fixture | 7.9      | 0.0    | 7.9     |
| <b>Street Side</b> | Lumens    | 24014.3  | 0.0    | 24014.3 |
|                    | % Fixture | 92.1     | 0.0    | 92.1    |
| <b>Total</b>       | Lumens    | 26079.0  | 0.0    | 26079.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 428.8   | 1.6       |
| 10°-20°   | 968.1   | 3.7       |
| 20°-30°   | 1555.8  | 6.0       |
| 30°-40°   | 2643.4  | 10.1      |
| 40°-50°   | 4102.8  | 15.7      |
| 50°-60°   | 5516.1  | 21.2      |
| 60°-70°   | 6748.0  | 25.9      |
| 70°-80°   | 3945.4  | 15.1      |
| 80°-90°   | 170.5   | 0.7       |
| 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°    | 26079.0 | 100.0     |
| 0°-180°   | 26079.0 | 100.0     |

**Coefficient of Utilization**



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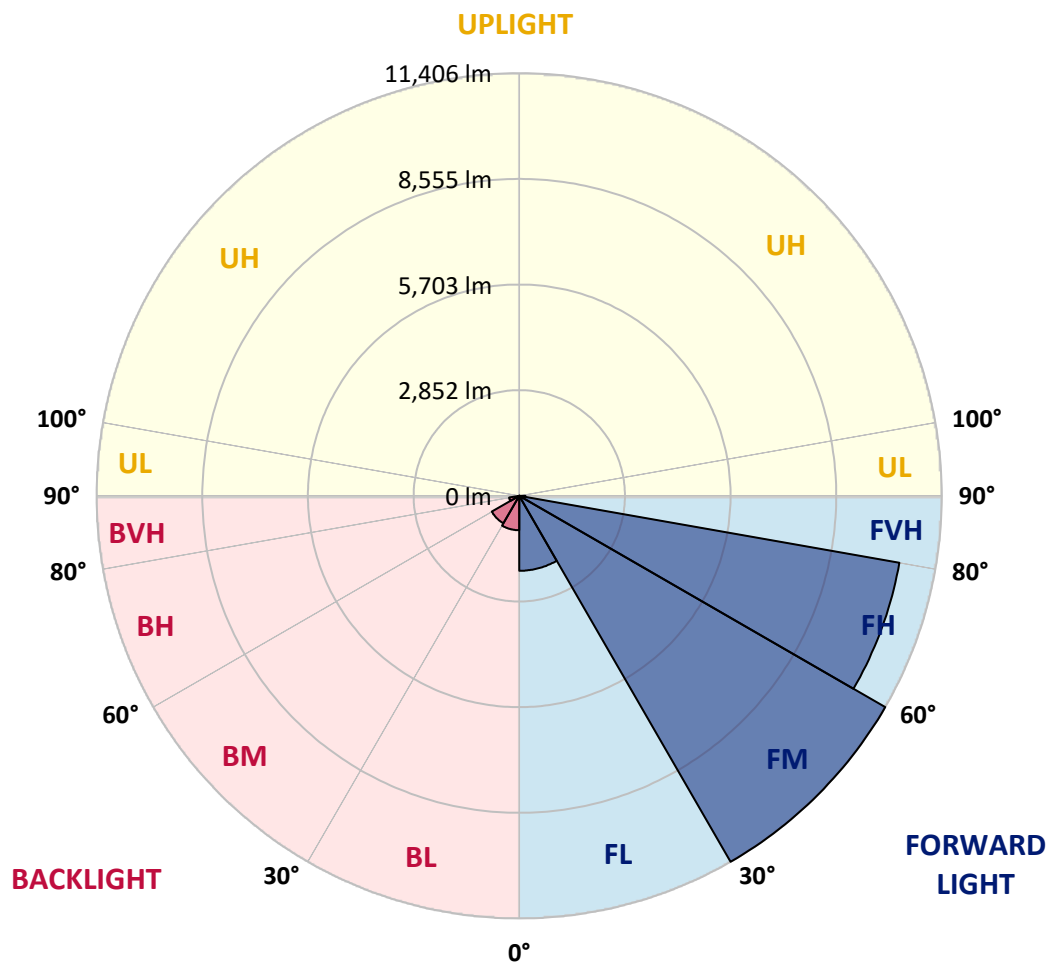
CATALOG NUMBER: GLEON-SA0A-827-U-T3R-HSS

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |          |
|------|-------------|---------|-----------|-------------------------|------|----------|
|      |             |         |           | B                       | U    | G        |
| FL   | (0°-30°)    | 2023.4  | 7.8       |                         |      |          |
| FM   | (30°-60°)   | 11406.2 | 43.7      |                         |      |          |
| FH   | (60°-80°)   | 10416.8 | 39.9      |                         |      | G4/12000 |
| FVH  | (80°-90°)   | 167.9   | 0.6       |                         |      | G2/225   |
| BL   | (0°-30°)    | 929.3   | 3.6       | B2/1000                 |      |          |
| BM   | (30°-60°)   | 856.1   | 3.3       | B1/1000                 |      |          |
| BH   | (60°-80°)   | 276.6   | 1.1       | B1/500                  |      | G1/500   |
| BVH  | (80°-90°)   | 2.7     | 0.0       |                         |      | G0/10    |
| UL   | (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |          |
| UH   | (100°-180°) | 0.0     | 0.0       |                         | U0/0 |          |

**BUG Rating: B2-U0-G4**

Type III Medium





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 54°     | 55°     | 65°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 5029.4  | 5029.4  | 5029.4  | 5029.4  | 5029.4  | 5029.4  | 5029.4  | 5029.4  | 5029.4  | 5029.4  | 5029.4  |
| 2.5°  | 4881.9  | 4887.7  | 4908.8  | 4918.2  | 4940.4  | 4977.9  | 4996.6  | 4997.8  | 5028.3  | 5040.0  | 5049.3  |
| 5°    | 4536.4  | 4571.6  | 4606.7  | 4644.2  | 4712.1  | 4802.3  | 4891.3  | 4899.4  | 4997.8  | 5070.4  | 5109.1  |
| 7.5°  | 4239.0  | 4270.6  | 4312.8  | 4372.5  | 4468.5  | 4610.2  | 4758.9  | 4776.5  | 4962.7  | 5127.8  | 5214.4  |
| 10°   | 3933.4  | 3959.1  | 4020.0  | 4107.9  | 4240.2  | 4429.9  | 4630.1  | 4659.4  | 4931.1  | 5205.1  | 5357.3  |
| 12.5° | 3606.7  | 3621.9  | 3695.7  | 3822.1  | 4016.5  | 4257.7  | 4521.2  | 4559.9  | 4911.2  | 5294.1  | 5525.9  |
| 15°   | 3358.4  | 3365.4  | 3435.7  | 3566.9  | 3789.3  | 4103.2  | 4436.9  | 4483.7  | 4915.8  | 5400.6  | 5709.8  |
| 17.5° | 3295.2  | 3298.7  | 3336.2  | 3426.3  | 3623.1  | 3965.0  | 4370.2  | 4427.5  | 4929.9  | 5504.9  | 5894.8  |
| 20°   | 3551.6  | 3527.0  | 3488.4  | 3474.3  | 3558.7  | 3881.9  | 4330.3  | 4394.7  | 4948.6  | 5597.4  | 6061.1  |
| 22.5° | 4255.4  | 4182.8  | 4022.4  | 3808.1  | 3678.1  | 3887.7  | 4340.9  | 4405.3  | 5008.4  | 5710.9  | 6253.1  |
| 25°   | 5299.9  | 5199.2  | 4926.4  | 4504.8  | 4099.7  | 4056.3  | 4428.7  | 4494.3  | 5124.3  | 5846.8  | 6437.0  |
| 27.5° | 6488.5  | 6389.0  | 6055.2  | 5453.3  | 4762.4  | 4390.1  | 4630.1  | 4691.0  | 5296.4  | 5967.4  | 6577.5  |
| 30°   | 7626.7  | 7598.6  | 7205.1  | 6521.3  | 5596.2  | 4931.1  | 4890.1  | 4941.6  | 5424.1  | 6040.0  | 6688.7  |
| 32.5° | 8591.6  | 8547.1  | 8230.9  | 7565.8  | 6550.6  | 5581.0  | 5195.7  | 5210.9  | 5520.1  | 6133.7  | 6833.9  |
| 35°   | 9486.2  | 9431.2  | 9153.7  | 8524.9  | 7529.5  | 6374.9  | 5666.5  | 5644.2  | 5729.7  | 6322.2  | 7044.7  |
| 37.5° | 10267.3 | 10317.6 | 10009.7 | 9411.3  | 8407.8  | 7200.5  | 6301.1  | 6234.4  | 6057.6  | 6629.0  | 7350.3  |
| 40°   | 10920.7 | 10920.7 | 10760.3 | 10261.4 | 9356.3  | 8054.1  | 7019.0  | 6931.1  | 6550.6  | 7102.1  | 7737.9  |
| 42.5° | 11156.1 | 11206.4 | 11266.2 | 10983.9 | 10205.2 | 8941.7  | 7818.7  | 7727.4  | 7245.0  | 7773.1  | 8227.4  |
| 45°   | 11170.1 | 11249.8 | 11555.4 | 11554.2 | 10972.2 | 9823.5  | 8720.4  | 8677.1  | 8134.9  | 8634.9  | 8834.0  |
| 47.5° | 10972.2 | 11071.8 | 11575.3 | 11861.0 | 11580.0 | 10644.4 | 9706.4  | 9652.5  | 9180.6  | 9691.2  | 9468.7  |
| 50°   | 10666.6 | 10776.7 | 11362.2 | 11981.6 | 11993.3 | 11358.7 | 10745.1 | 10664.3 | 10331.7 | 10898.5 | 10124.4 |
| 52.5° | 10119.7 | 10332.9 | 11171.3 | 12009.7 | 12265.0 | 11975.8 | 11733.4 | 11698.3 | 11619.8 | 12061.3 | 10646.7 |
| 55°   | 8949.9  | 9186.5  | 10692.4 | 12019.1 | 12516.8 | 12522.6 | 12659.6 | 12669.0 | 12827.1 | 13147.9 | 11035.5 |
| 57.5° | 8397.2  | 8530.7  | 9856.3  | 12063.6 | 12890.3 | 13143.3 | 13603.5 | 13676.1 | 13920.8 | 14179.6 | 11479.3 |
| 60°   | 8049.4  | 8207.5  | 9444.1  | 12002.7 | 13477.0 | 13957.1 | 14478.2 | 14502.8 | 14765.1 | 15244.0 | 12080.0 |
| 62.5° | 7771.9  | 7927.6  | 9184.1  | 11768.5 | 14136.3 | 14936.1 | 15333.0 | 15335.4 | 15532.1 | 16512.2 | 12762.7 |
| 65°   | 7086.9  | 7218.0  | 8658.3  | 11505.0 | 14571.9 | 15904.5 | 16326.0 | 16310.8 | 16471.2 | 17849.5 | 13555.5 |
| 67.5° | 6096.2  | 6196.9  | 7584.5  | 10506.2 | 14407.9 | 16785.1 | 17824.9 | 17774.6 | 17580.2 | 19005.3 | 13866.9 |
| 70°   | 4713.3  | 4749.6  | 5977.9  | 8755.5  | 12871.6 | 17123.5 | 19273.4 | 19247.7 | 18260.5 | 18798.0 | 12725.2 |
| 71°   | 3895.9  | 4015.3  | 5268.3  | 7727.4  | 11842.3 | 16810.8 | 19413.9 | 19429.2 | 18089.5 | 18233.6 | 11939.5 |
| 72.5° | 2262.4  | 2364.2  | 3818.6  | 5934.6  | 10054.2 | 15506.3 | 18685.6 | 18795.7 | 17290.9 | 16584.8 | 10198.2 |
| 75°   | 484.8   | 518.8   | 1415.7  | 2872.5  | 5530.6  | 10868.0 | 14748.7 | 15141.0 | 14092.9 | 11282.5 | 6146.6  |
| 77.5° | 337.2   | 364.2   | 606.6   | 1303.3  | 1827.9  | 5370.2  | 9161.9  | 9604.5  | 8419.5  | 4240.2  | 1967.3  |
| 80°   | 267.0   | 297.4   | 473.1   | 644.0   | 494.2   | 1731.9  | 4291.7  | 4562.2  | 2808.0  | 946.2   | 331.4   |
| 82.5° | 148.7   | 176.8   | 368.9   | 347.8   | 189.7   | 329.0   | 1201.4  | 1358.4  | 562.1   | 190.9   | 78.5    |
| 85°   | 43.3    | 52.7    | 237.7   | 252.9   | 80.8    | 63.2    | 204.9   | 254.1   | 106.6   | 50.4    | 35.1    |
| 87.5° | 0.0     | 0.0     | 114.8   | 97.2    | 23.4    | 9.4     | 18.7    | 21.1    | 21.1    | 21.1    | 23.4    |
| 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: P321714

CATALOG NUMBER: GLEON-SA0A-827-U-T3R-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 5029.4 | 5029.4 | 5029.4 | 5029.4 | 5029.4 | 5029.4 | 5029.4 | 5029.4 | 5029.4 | 5029.4 | 5029.4 |
| 2.5°  | 5049.3 | 5057.5 | 5028.3 | 4989.6 | 4948.6 | 4898.3 | 4845.6 | 4804.6 | 4803.4 | 4783.5 | 4763.6 |
| 5°    | 5111.4 | 5106.7 | 5025.9 | 4903.0 | 4757.8 | 4606.7 | 4462.7 | 4299.9 | 4246.0 | 4179.3 | 4157.0 |
| 7.5°  | 5226.2 | 5193.4 | 5022.4 | 4753.1 | 4434.6 | 4118.4 | 3791.7 | 3462.6 | 3322.1 | 3195.6 | 3173.4 |
| 10°   | 5370.2 | 5308.1 | 5000.2 | 4528.2 | 3943.9 | 3360.8 | 2867.8 | 2420.4 | 2223.7 | 2072.7 | 2065.6 |
| 12.5° | 5520.1 | 5425.2 | 4938.1 | 4188.7 | 3301.0 | 2481.3 | 1913.4 | 1473.1 | 1309.2 | 1203.8 | 1213.2 |
| 15°   | 5677.0 | 5535.3 | 4804.6 | 3730.8 | 2569.2 | 1683.9 | 1175.7 | 916.9  | 851.3  | 824.4  | 831.4  |
| 17.5° | 5837.4 | 5611.4 | 4618.4 | 3179.3 | 1846.7 | 1086.7 | 813.8  | 741.2  | 741.2  | 747.1  | 749.4  |
| 20°   | 5976.8 | 5652.4 | 4344.4 | 2561.0 | 1251.8 | 791.6  | 712.0  | 701.4  | 707.3  | 716.6  | 717.8  |
| 22.5° | 6114.9 | 5654.7 | 3987.2 | 1934.5 | 875.9  | 693.2  | 678.0  | 673.3  | 676.8  | 687.4  | 688.5  |
| 25°   | 6227.4 | 5626.6 | 3539.9 | 1375.9 | 699.1  | 653.4  | 646.4  | 644.0  | 646.4  | 659.3  | 659.3  |
| 27.5° | 6273.0 | 5524.8 | 2994.2 | 967.2  | 626.5  | 608.9  | 606.6  | 608.9  | 612.4  | 621.8  | 623.0  |
| 30°   | 6277.7 | 5346.8 | 2399.4 | 700.3  | 567.9  | 549.2  | 553.9  | 562.1  | 558.6  | 556.2  | 558.6  |
| 32.5° | 6289.4 | 5140.7 | 1819.7 | 576.1  | 518.8  | 489.5  | 483.6  | 483.6  | 469.6  | 461.4  | 456.7  |
| 35°   | 6328.1 | 4898.3 | 1319.7 | 517.6  | 468.4  | 434.4  | 412.2  | 386.4  | 359.5  | 345.4  | 341.9  |
| 37.5° | 6389.0 | 4644.2 | 945.0  | 478.9  | 423.9  | 385.3  | 343.1  | 297.4  | 258.8  | 248.3  | 248.3  |
| 40°   | 6500.2 | 4381.9 | 699.1  | 448.5  | 388.8  | 340.8  | 277.5  | 217.8  | 182.7  | 176.8  | 176.8  |
| 42.5° | 6675.8 | 4105.5 | 557.4  | 421.6  | 358.3  | 295.1  | 212.0  | 158.1  | 132.3  | 128.8  | 127.6  |
| 45°   | 6858.5 | 3801.1 | 487.1  | 395.8  | 325.5  | 242.4  | 156.9  | 117.1  | 101.9  | 98.4   | 98.4   |
| 47.5° | 7041.2 | 3476.7 | 453.2  | 371.2  | 293.9  | 188.5  | 117.1  | 92.5   | 85.5   | 85.5   | 86.7   |
| 50°   | 7195.8 | 3138.3 | 428.6  | 344.3  | 252.9  | 142.9  | 92.5   | 78.5   | 76.1   | 80.8   | 82.0   |
| 52.5° | 7234.4 | 2805.7 | 398.1  | 310.3  | 202.6  | 108.9  | 76.1   | 69.1   | 69.1   | 69.1   | 69.1   |
| 55°   | 7211.0 | 2548.1 | 358.3  | 268.2  | 149.9  | 86.7   | 65.6   | 60.9   | 59.7   | 59.7   | 59.7   |
| 57.5° | 7290.6 | 2395.9 | 286.9  | 208.4  | 107.7  | 70.3   | 57.4   | 53.9   | 51.5   | 50.4   | 50.4   |
| 60°   | 7451.0 | 2296.3 | 204.9  | 149.9  | 80.8   | 58.5   | 49.2   | 45.7   | 42.2   | 39.8   | 39.8   |
| 62.5° | 7664.2 | 2209.7 | 152.2  | 111.2  | 62.1   | 46.8   | 41.0   | 37.5   | 32.8   | 30.4   | 30.4   |
| 65°   | 7828.1 | 2055.1 | 115.9  | 83.1   | 46.8   | 37.5   | 31.6   | 30.4   | 23.4   | 21.1   | 19.9   |
| 67.5° | 7577.5 | 1715.5 | 93.7   | 60.9   | 35.1   | 29.3   | 24.6   | 23.4   | 14.1   | 11.7   | 11.7   |
| 70°   | 6499.0 | 1194.4 | 74.9   | 44.5   | 25.8   | 23.4   | 19.9   | 15.2   | 10.5   | 9.4    | 9.4    |
| 71°   | 5893.6 | 997.7  | 67.9   | 37.5   | 22.2   | 22.2   | 18.7   | 12.9   | 9.4    | 8.2    | 8.2    |
| 72.5° | 4895.9 | 708.5  | 57.4   | 29.3   | 19.9   | 23.4   | 19.9   | 11.7   | 9.4    | 8.2    | 7.0    |
| 75°   | 2842.0 | 296.3  | 39.8   | 19.9   | 15.2   | 28.1   | 25.8   | 10.5   | 7.0    | 5.9    | 5.9    |
| 77.5° | 854.8  | 108.9  | 22.2   | 12.9   | 11.7   | 24.6   | 29.3   | 9.4    | 3.5    | 1.2    | 1.2    |
| 80°   | 155.7  | 46.8   | 14.1   | 8.2    | 8.2    | 15.2   | 22.2   | 4.7    | 0.0    | 0.0    | 0.0    |
| 82.5° | 55.0   | 23.4   | 8.2    | 4.7    | 3.5    | 7.0    | 10.5   | 0.0    | 0.0    | 0.0    | 0.0    |
| 85°   | 31.6   | 16.4   | 4.7    | 2.3    | 0.0    | 1.2    | 2.3    | 0.0    | 0.0    | 0.0    | 0.0    |
| 87.5° | 21.1   | 4.7    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



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

### 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

| 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)