

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: P323979

Luminaire Tested: **GLEON-SA5D-827-U-SL4-HSS**

Issue Date: 3/3/2020

### Test Information

Test Method: LM-79-08  
Report Number: P323979  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-25)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA5D-827-U-SL4-HSS  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(5) 80 CRI, 2700K, 1200mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV  
SPILL LIGHT ELIMINATOR OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

### Summary

Lumens per Lamp: N/A  
Luminaire Lumens: 23137 lumens  
Efficiency: N/A  
Efficacy: 72.3 lumens/watt  
Luminous Opening: Rectangular (W 1.5' x L: 1' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B2 - U0 - G4

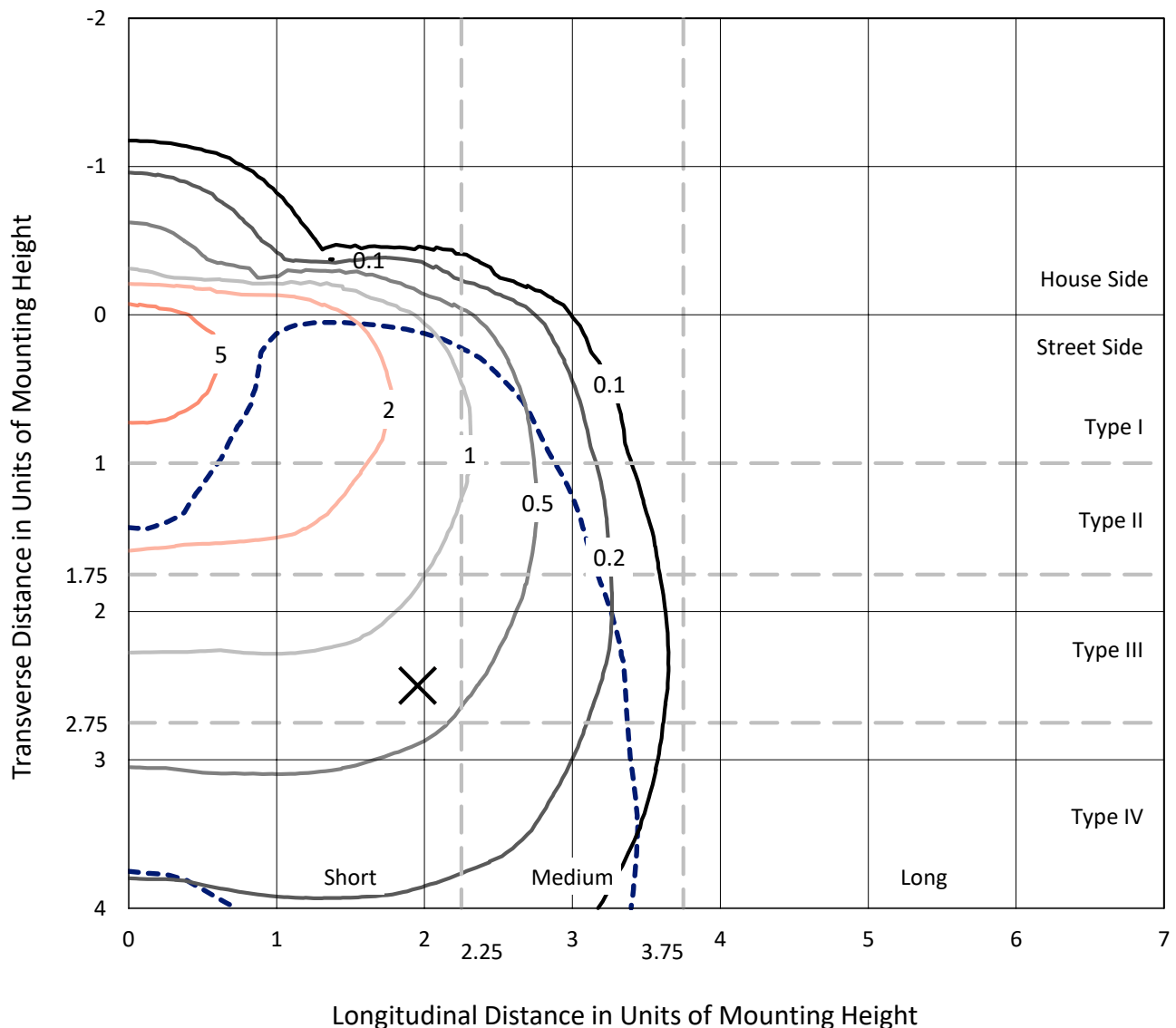
Input Watts (W): 320  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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## Iso-Footcandle Lines of Horizontal Illumination

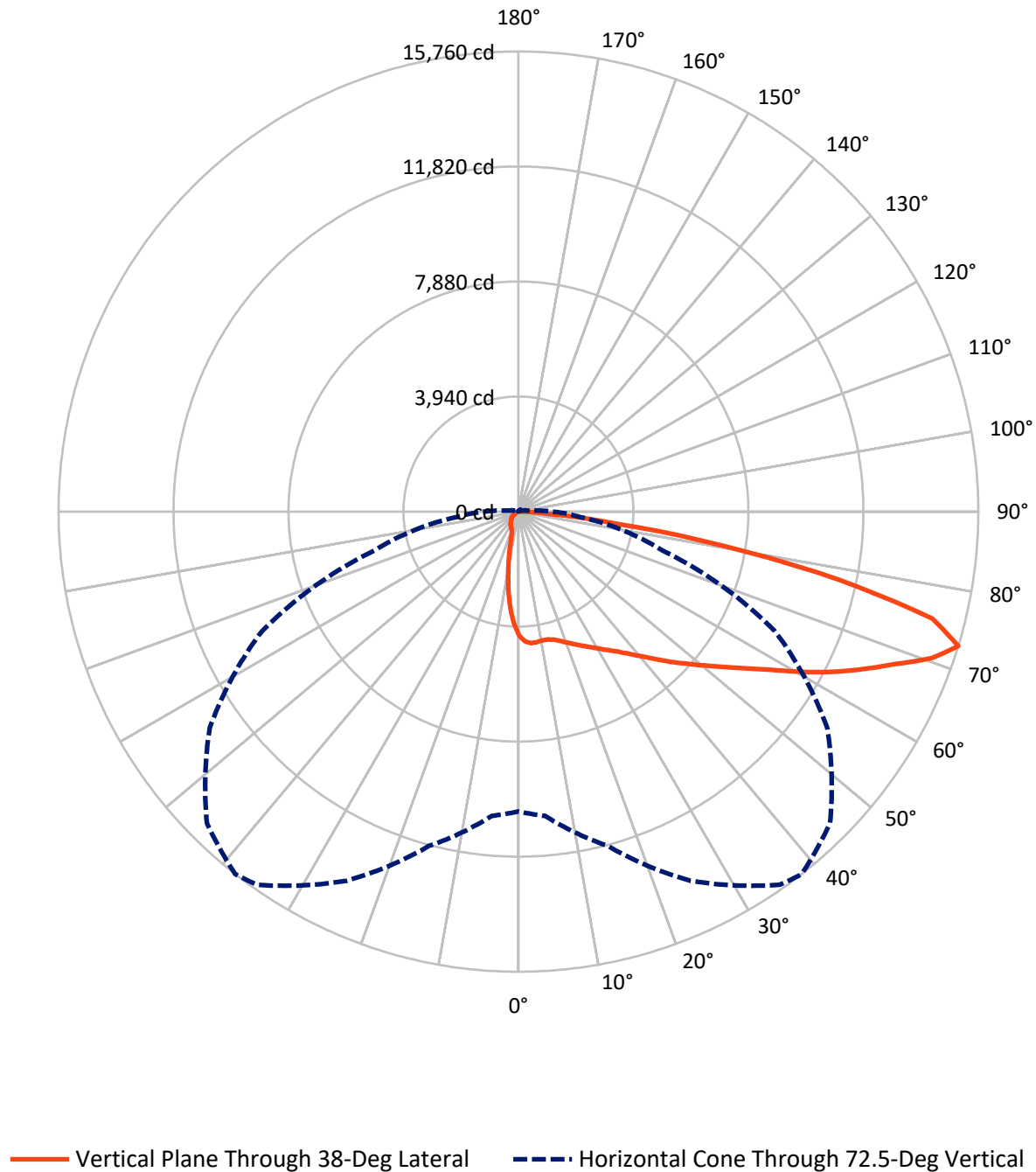
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 7.2 fc  
 Type IV - Short - N/A

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## Luminous Intensity Polar Plot



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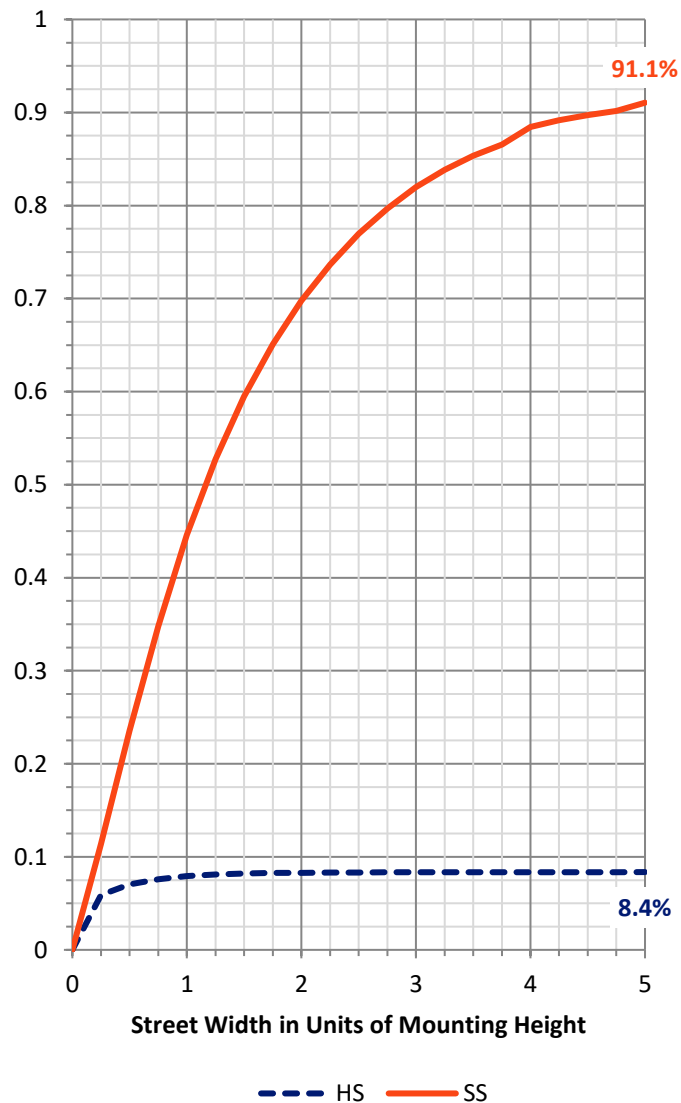
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 1947.1   | 0.0    | 1947.1  |
|                    | % Fixture | 8.4      | 0.0    | 8.4     |
| <b>Street Side</b> | Lumens    | 21189.9  | 0.0    | 21189.9 |
|                    | % Fixture | 91.6     | 0.0    | 91.6    |
| <b>Total</b>       | Lumens    | 23137.0  | 0.0    | 23137.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 362.6   | 1.6       |
| 10°-20°   | 886.6   | 3.8       |
| 20°-30°   | 1410.2  | 6.1       |
| 30°-40°   | 2120.0  | 9.2       |
| 40°-50°   | 3234.2  | 14.0      |
| 50°-60°   | 4571.0  | 19.8      |
| 60°-70°   | 5733.6  | 24.8      |
| 70°-80°   | 4287.1  | 18.5      |
| 80°-90°   | 531.6   | 2.3       |
| 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°    | 23137.0 | 100.0     |
| 0°-180°   | 23137.0 | 100.0     |

**Coefficient of Utilization**



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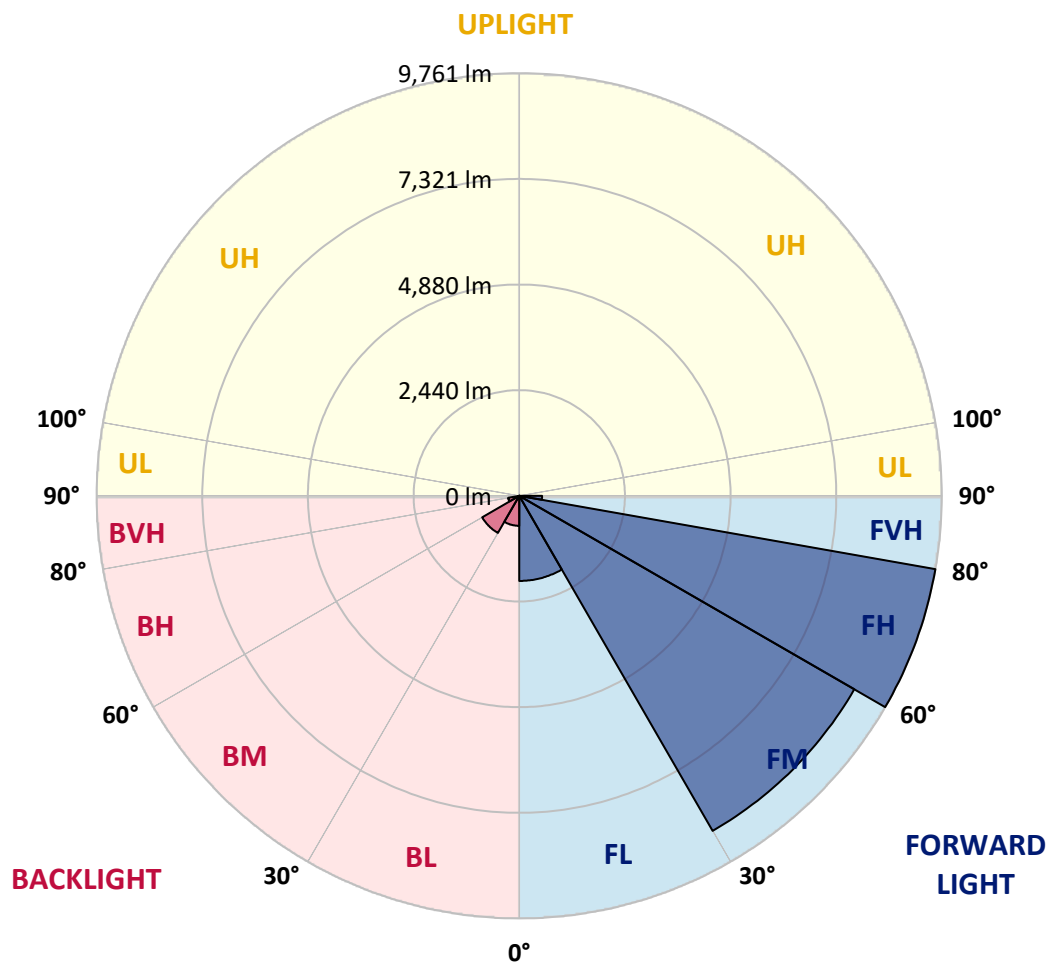
CATALOG NUMBER: GLEON-SA5D-827-U-SL4-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |          |
|------|-------------|--------|-----------|-------------------------|------|----------|
|      |             |        |           | B                       | U    | G        |
| FL   | (0°-30°)    | 1966.1 | 8.5       |                         |      |          |
| FM   | (30°-60°)   | 8936.5 | 38.6      |                         |      |          |
| FH   | (60°-80°)   | 9760.7 | 42.2      |                         |      | G4/12000 |
| FVH  | (80°-90°)   | 526.6  | 2.3       |                         |      | G4/750   |
| BL   | (0°-30°)    | 693.3  | 3.0       | B2/1000                 |      |          |
| BM   | (30°-60°)   | 988.7  | 4.3       | B1/1000                 |      |          |
| BH   | (60°-80°)   | 260.1  | 1.1       | B1/500                  |      | G1/500   |
| BVH  | (80°-90°)   | 5.0    | 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 IV Short



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 38°     | 45°     | 55°     | 65°     | 75°     | 85°    |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|
| 0°    | 4254.8  | 4254.8  | 4254.8  | 4254.8  | 4254.8  | 4254.8  | 4254.8  | 4254.8  | 4254.8  | 4254.8  | 4254.8 |
| 2.5°  | 4516.2  | 4517.1  | 4506.6  | 4489.3  | 4467.2  | 4455.6  | 4436.4  | 4405.7  | 4373.0  | 4314.4  | 4251.0 |
| 5°    | 4608.4  | 4608.4  | 4595.0  | 4571.9  | 4536.4  | 4525.8  | 4489.3  | 4440.3  | 4373.0  | 4277.9  | 4171.2 |
| 7.5°  | 4598.8  | 4600.7  | 4582.5  | 4558.5  | 4522.9  | 4513.3  | 4469.1  | 4414.3  | 4330.7  | 4215.4  | 4079.0 |
| 10°   | 4548.9  | 4553.7  | 4539.2  | 4527.7  | 4495.0  | 4484.5  | 4443.2  | 4388.4  | 4304.8  | 4181.8  | 4025.2 |
| 12.5° | 4497.9  | 4502.7  | 4507.5  | 4518.1  | 4497.9  | 4494.1  | 4461.4  | 4415.3  | 4335.5  | 4207.7  | 4030.9 |
| 15°   | 4465.3  | 4474.9  | 4509.5  | 4550.8  | 4555.6  | 4551.7  | 4530.6  | 4487.4  | 4406.6  | 4274.0  | 4072.2 |
| 17.5° | 4465.3  | 4480.6  | 4552.7  | 4631.5  | 4659.4  | 4662.2  | 4644.0  | 4583.4  | 4487.4  | 4345.1  | 4110.7 |
| 20°   | 4502.7  | 4523.9  | 4636.3  | 4747.8  | 4793.9  | 4793.9  | 4758.3  | 4673.8  | 4561.3  | 4409.5  | 4136.6 |
| 22.5° | 4598.8  | 4626.7  | 4767.9  | 4896.7  | 4945.7  | 4935.1  | 4887.1  | 4764.1  | 4638.2  | 4482.5  | 4169.3 |
| 25°   | 4788.1  | 4809.3  | 4956.3  | 5086.0  | 5115.8  | 5091.8  | 5031.2  | 4873.6  | 4736.2  | 4581.5  | 4228.9 |
| 27.5° | 5032.2  | 5035.1  | 5186.9  | 5296.4  | 5278.2  | 5261.8  | 5185.9  | 5011.0  | 4877.5  | 4722.8  | 4331.7 |
| 30°   | 5300.3  | 5300.3  | 5433.8  | 5517.4  | 5461.7  | 5448.2  | 5372.3  | 5177.3  | 5058.1  | 4914.9  | 4477.7 |
| 32.5° | 5559.7  | 5571.2  | 5679.8  | 5732.7  | 5670.2  | 5656.8  | 5582.8  | 5387.7  | 5298.3  | 5208.0  | 4705.5 |
| 35°   | 5810.5  | 5819.1  | 5922.0  | 5950.8  | 5891.2  | 5895.1  | 5842.2  | 5676.9  | 5643.3  | 5631.8  | 5048.5 |
| 37.5° | 6053.6  | 6055.5  | 6160.3  | 6178.5  | 6148.7  | 6181.4  | 6186.2  | 6040.2  | 6102.6  | 6195.8  | 5531.8 |
| 40°   | 6275.6  | 6277.5  | 6381.3  | 6428.3  | 6479.3  | 6521.6  | 6559.0  | 6481.2  | 6687.8  | 6904.0  | 6107.4 |
| 42.5° | 6453.3  | 6473.5  | 6605.2  | 6694.5  | 6829.0  | 6909.8  | 7011.6  | 7007.8  | 7384.4  | 7709.2  | 6803.1 |
| 45°   | 6610.0  | 6644.5  | 6828.1  | 6984.7  | 7215.3  | 7344.1  | 7503.6  | 7628.5  | 8168.5  | 8605.7  | 7507.4 |
| 47.5° | 6816.5  | 6849.2  | 7058.7  | 7315.3  | 7622.7  | 7791.9  | 8056.1  | 8326.1  | 9030.4  | 9485.9  | 8195.4 |
| 50°   | 7107.7  | 7093.3  | 7299.9  | 7667.9  | 8062.8  | 8284.8  | 8661.5  | 9066.0  | 9885.6  | 10252.7 | 8600.0 |
| 52.5° | 7418.1  | 7412.3  | 7565.1  | 8051.3  | 8581.7  | 8841.1  | 9338.9  | 9830.9  | 10703.3 | 10781.2 | 8785.4 |
| 55°   | 7802.4  | 7761.1  | 7889.9  | 8488.5  | 9197.6  | 9476.3  | 10062.4 | 10588.0 | 11354.8 | 11079.1 | 8878.6 |
| 57.5° | 8205.0  | 8136.8  | 8259.8  | 8975.7  | 9892.4  | 10221.9 | 10863.8 | 11326.0 | 11788.2 | 11282.8 | 8877.7 |
| 60°   | 8621.1  | 8540.4  | 8686.4  | 9584.9  | 10755.2 | 11136.7 | 11732.5 | 11824.7 | 12192.7 | 11385.6 | 8812.3 |
| 62.5° | 8968.9  | 8920.9  | 9138.1  | 10236.4 | 11719.0 | 12093.8 | 12388.7 | 12278.2 | 12533.8 | 11465.3 | 8659.5 |
| 65°   | 9337.0  | 9339.8  | 9690.6  | 10996.4 | 12743.3 | 12996.0 | 13021.0 | 12866.3 | 12819.2 | 11449.0 | 8142.6 |
| 67.5° | 9834.7  | 9880.8  | 10466.0 | 12028.4 | 13739.8 | 13934.8 | 13932.9 | 13503.4 | 13027.7 | 10799.4 | 6996.2 |
| 70°   | 10361.3 | 10469.9 | 11359.6 | 13209.3 | 14827.5 | 15025.4 | 14923.6 | 13908.9 | 12266.7 | 8732.6  | 4951.5 |
| 72.5° | 10272.9 | 10461.2 | 11856.4 | 13954.0 | 15608.7 | 15759.5 | 15097.5 | 12912.4 | 9695.4  | 5075.4  | 2108.2 |
| 75°   | 7925.4  | 8143.5  | 10871.5 | 13216.1 | 14789.0 | 14653.6 | 12972.0 | 10048.0 | 5298.3  | 1416.4  | 474.7  |
| 77.5° | 4186.6  | 4302.9  | 7181.7  | 10068.2 | 11531.6 | 11248.2 | 9138.1  | 5574.1  | 1615.3  | 350.7   | 213.3  |
| 80°   | 2192.7  | 2219.7  | 3129.6  | 5712.5  | 7117.3  | 7119.2  | 5415.6  | 2448.3  | 665.9   | 179.7   | 143.2  |
| 82.5° | 1174.2  | 1197.3  | 1653.7  | 2639.6  | 3729.2  | 3380.4  | 2073.6  | 1347.2  | 387.2   | 101.9   | 137.4  |
| 85°   | 282.5   | 287.3   | 937.8   | 1205.9  | 1466.3  | 1047.4  | 615.9   | 1131.0  | 104.7   | 59.6    | 111.5  |
| 87.5° | 108.6   | 110.5   | 347.8   | 521.8   | 373.8   | 242.1   | 288.3   | 421.8   | 13.5    | 23.1    | 17.3   |
| 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-SA5D-827-U-SL4-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 4254.8 | 4254.8 | 4254.8 | 4254.8 | 4254.8 | 4254.8 | 4254.8 | 4254.8 | 4254.8 | 4254.8 | 4254.8 |
| 2.5°  | 4212.5 | 4187.6 | 4126.1 | 4048.2 | 3979.0 | 3929.1 | 3854.1 | 3805.1 | 3772.5 | 3771.5 | 3759.0 |
| 5°    | 4105.9 | 4055.0 | 3922.4 | 3764.8 | 3621.6 | 3492.8 | 3341.0 | 3220.9 | 3131.5 | 3117.1 | 3086.4 |
| 7.5°  | 3991.5 | 3907.9 | 3704.2 | 3458.2 | 3218.0 | 2974.0 | 2690.5 | 2514.6 | 2363.8 | 2291.7 | 2284.0 |
| 10°   | 3921.4 | 3804.2 | 3514.9 | 3159.4 | 2782.7 | 2385.9 | 2015.0 | 1758.4 | 1573.0 | 1520.1 | 1480.7 |
| 12.5° | 3907.0 | 3752.3 | 3368.9 | 2878.8 | 2340.7 | 1816.1 | 1405.8 | 1132.9 | 984.9  | 937.8  | 925.3  |
| 15°   | 3921.4 | 3728.3 | 3245.9 | 2601.1 | 1893.0 | 1288.6 | 943.6  | 785.0  | 729.3  | 715.9  | 714.9  |
| 17.5° | 3930.0 | 3699.4 | 3106.6 | 2292.7 | 1458.6 | 920.5  | 722.6  | 676.5  | 667.8  | 666.9  | 668.8  |
| 20°   | 3929.1 | 3655.2 | 2940.3 | 1948.7 | 1084.8 | 723.5  | 653.4  | 643.8  | 641.9  | 642.8  | 641.9  |
| 22.5° | 3922.4 | 3603.3 | 2757.8 | 1594.1 | 819.6  | 646.7  | 623.6  | 617.9  | 616.9  | 616.9  | 616.9  |
| 25°   | 3934.8 | 3562.0 | 2556.9 | 1254.9 | 675.5  | 611.1  | 596.7  | 591.9  | 590.9  | 590.9  | 589.0  |
| 27.5° | 3980.0 | 3539.0 | 2336.9 | 965.7  | 610.2  | 579.4  | 567.9  | 566.9  | 564.0  | 563.1  | 565.0  |
| 30°   | 4053.0 | 3539.0 | 2095.7 | 751.4  | 570.8  | 546.7  | 538.1  | 536.2  | 535.2  | 534.3  | 535.2  |
| 32.5° | 4181.8 | 3565.9 | 1832.4 | 624.6  | 533.3  | 510.2  | 504.5  | 507.3  | 504.5  | 504.5  | 504.5  |
| 35°   | 4414.3 | 3646.6 | 1556.6 | 544.8  | 493.9  | 474.7  | 468.9  | 472.8  | 470.8  | 470.8  | 469.9  |
| 37.5° | 4753.5 | 3796.5 | 1278.9 | 496.8  | 459.3  | 439.1  | 431.4  | 437.2  | 435.3  | 435.3  | 434.3  |
| 40°   | 5166.7 | 4014.6 | 1014.7 | 460.3  | 425.7  | 404.5  | 397.8  | 400.7  | 395.9  | 395.9  | 397.8  |
| 42.5° | 5676.9 | 4291.3 | 784.1  | 424.7  | 392.0  | 371.9  | 368.0  | 365.1  | 356.5  | 351.7  | 352.6  |
| 45°   | 6243.9 | 4579.6 | 611.1  | 390.1  | 360.3  | 344.0  | 338.2  | 330.5  | 316.1  | 306.5  | 307.5  |
| 47.5° | 6750.2 | 4801.6 | 496.8  | 356.5  | 331.5  | 319.0  | 310.4  | 296.0  | 274.8  | 263.3  | 264.2  |
| 50°   | 7016.4 | 4835.2 | 422.8  | 322.9  | 304.6  | 292.1  | 279.6  | 257.5  | 232.5  | 220.0  | 219.1  |
| 52.5° | 7084.6 | 4677.6 | 368.0  | 292.1  | 277.7  | 263.3  | 246.9  | 217.2  | 189.3  | 175.8  | 173.9  |
| 55°   | 7109.6 | 4437.4 | 319.0  | 263.3  | 248.9  | 232.5  | 211.4  | 177.8  | 151.8  | 138.4  | 137.4  |
| 57.5° | 7027.0 | 4079.0 | 280.6  | 237.3  | 220.0  | 199.9  | 173.9  | 142.2  | 117.2  | 106.7  | 106.7  |
| 60°   | 6843.5 | 3593.7 | 250.8  | 209.5  | 190.3  | 167.2  | 140.3  | 110.5  | 87.4   | 78.8   | 78.8   |
| 62.5° | 6477.4 | 2965.3 | 222.9  | 180.6  | 162.4  | 138.4  | 113.4  | 83.6   | 61.5   | 56.7   | 57.7   |
| 65°   | 5786.5 | 2249.4 | 195.1  | 154.7  | 138.4  | 114.3  | 88.4   | 59.6   | 41.3   | 41.3   | 43.2   |
| 67.5° | 4718.9 | 1562.4 | 166.2  | 131.6  | 119.2  | 93.2   | 67.3   | 41.3   | 28.8   | 32.7   | 36.5   |
| 70°   | 3123.9 | 876.3  | 142.2  | 108.6  | 101.9  | 74.0   | 50.0   | 27.9   | 23.1   | 30.7   | 37.5   |
| 72.5° | 1179.0 | 341.1  | 119.2  | 87.4   | 88.4   | 56.7   | 35.6   | 21.1   | 21.1   | 33.6   | 44.2   |
| 75°   | 328.6  | 167.2  | 85.5   | 64.4   | 69.2   | 41.3   | 25.9   | 18.3   | 20.2   | 38.4   | 51.9   |
| 77.5° | 193.1  | 123.0  | 55.7   | 37.5   | 47.1   | 28.8   | 17.3   | 14.4   | 17.3   | 32.7   | 50.0   |
| 80°   | 155.7  | 65.3   | 32.7   | 19.2   | 25.9   | 16.3   | 11.5   | 8.6    | 4.8    | 12.5   | 25.9   |
| 82.5° | 155.7  | 39.4   | 15.4   | 13.5   | 13.5   | 8.6    | 5.8    | 3.8    | 1.0    | 0.0    | 6.7    |
| 85°   | 104.7  | 16.3   | 9.6    | 8.6    | 6.7    | 2.9    | 1.9    | 1.0    | 0.0    | 0.0    | 0.0    |
| 87.5° | 17.3   | 6.7    | 3.8    | 1.9    | 1.0    | 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    |



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

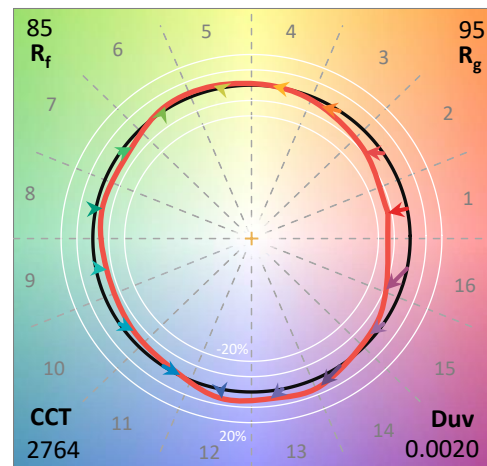
### Test Information

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**

| 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**

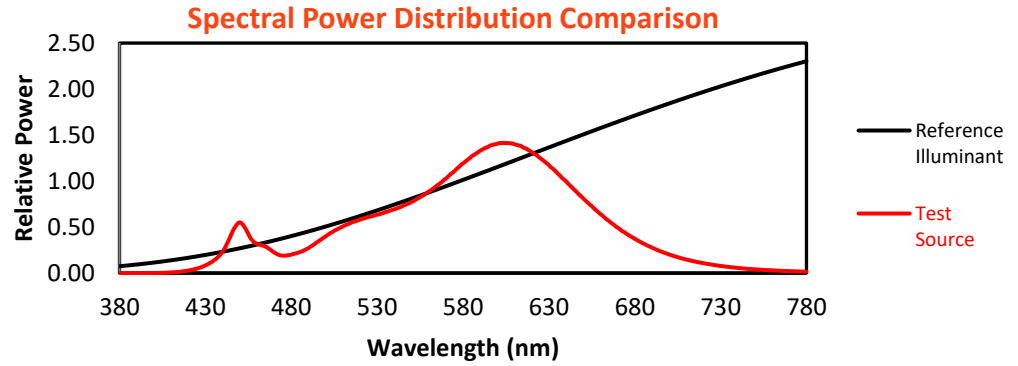
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 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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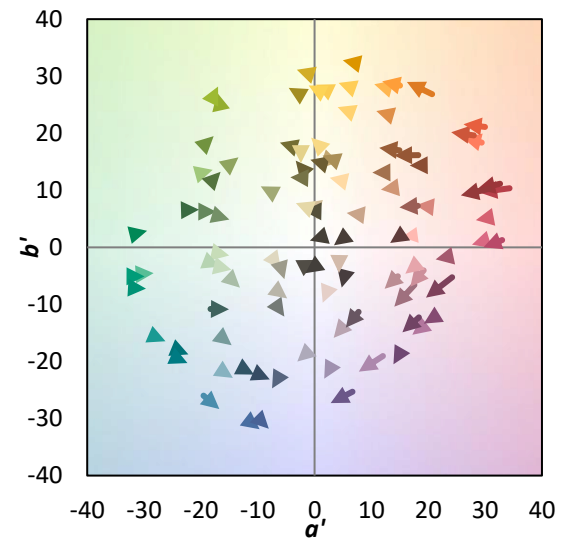
TM-30-18

### Summary

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



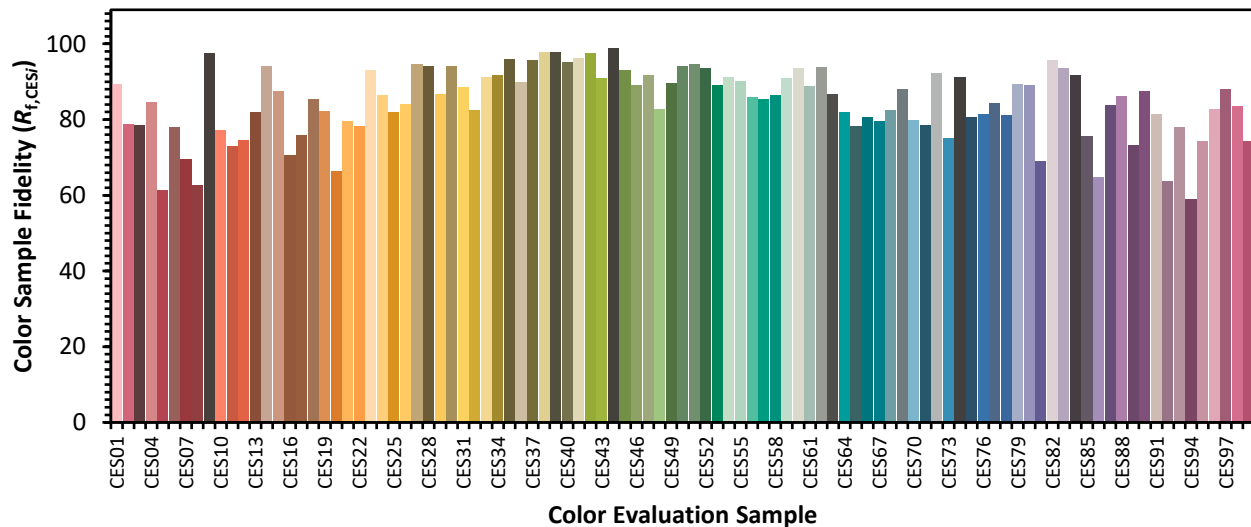
### Color Vector Graphics





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

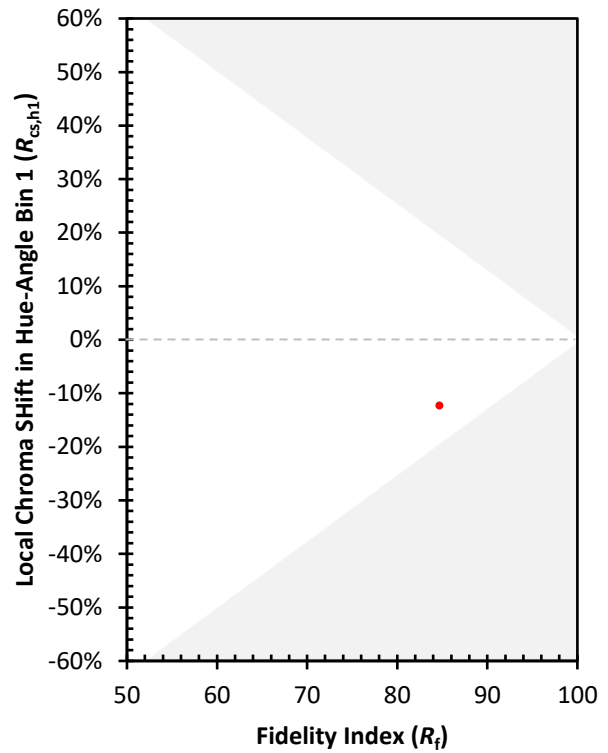
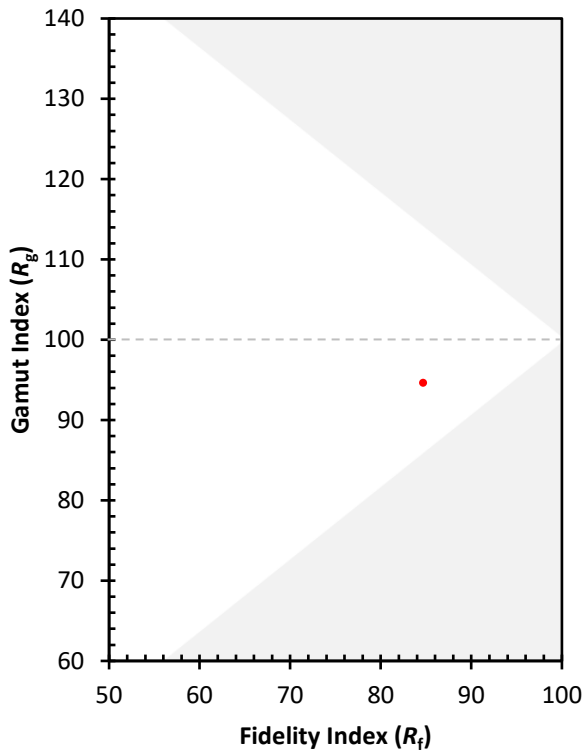
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 84 | CES51 = 95 | CES76 = 81 |
| CES02 = 63 | CES27 = 95 | CES52 = 94 | CES77 = 84 |
| CES03 = 31 | CES28 = 94 | CES53 = 89 | CES78 = 81 |
| CES04 = 71 | CES29 = 87 | CES54 = 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)