

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: P317583

Luminaire Tested: **GLEON-SA9D-827-U-T2R**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P317583  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-8)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA9D-827-U-T2R  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(9) 80 CRI, 2700K, 1200mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE II  
ROADWAY OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 53124 lumens  
Efficiency: N/A  
Efficacy: 92.4 lumens/watt  
Luminous Opening: Rectangular (W 2.5' x L: 1' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B3 - U0 - G5

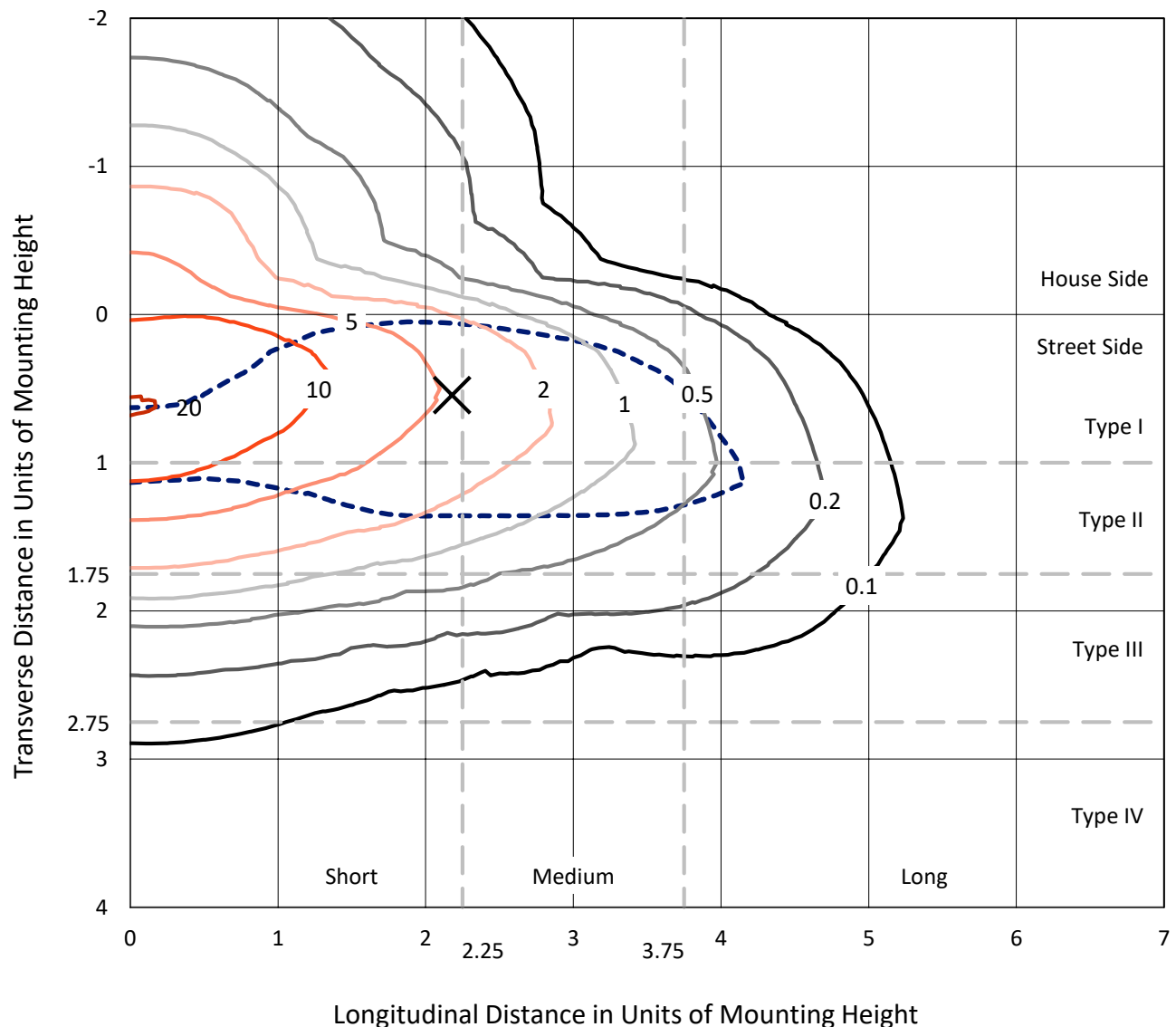
Input Watts (W): 575  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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 CATALOG NUMBER: GLEON-SA9D-827-U-T2R

## Iso-Footcandle Lines of Horizontal Illumination

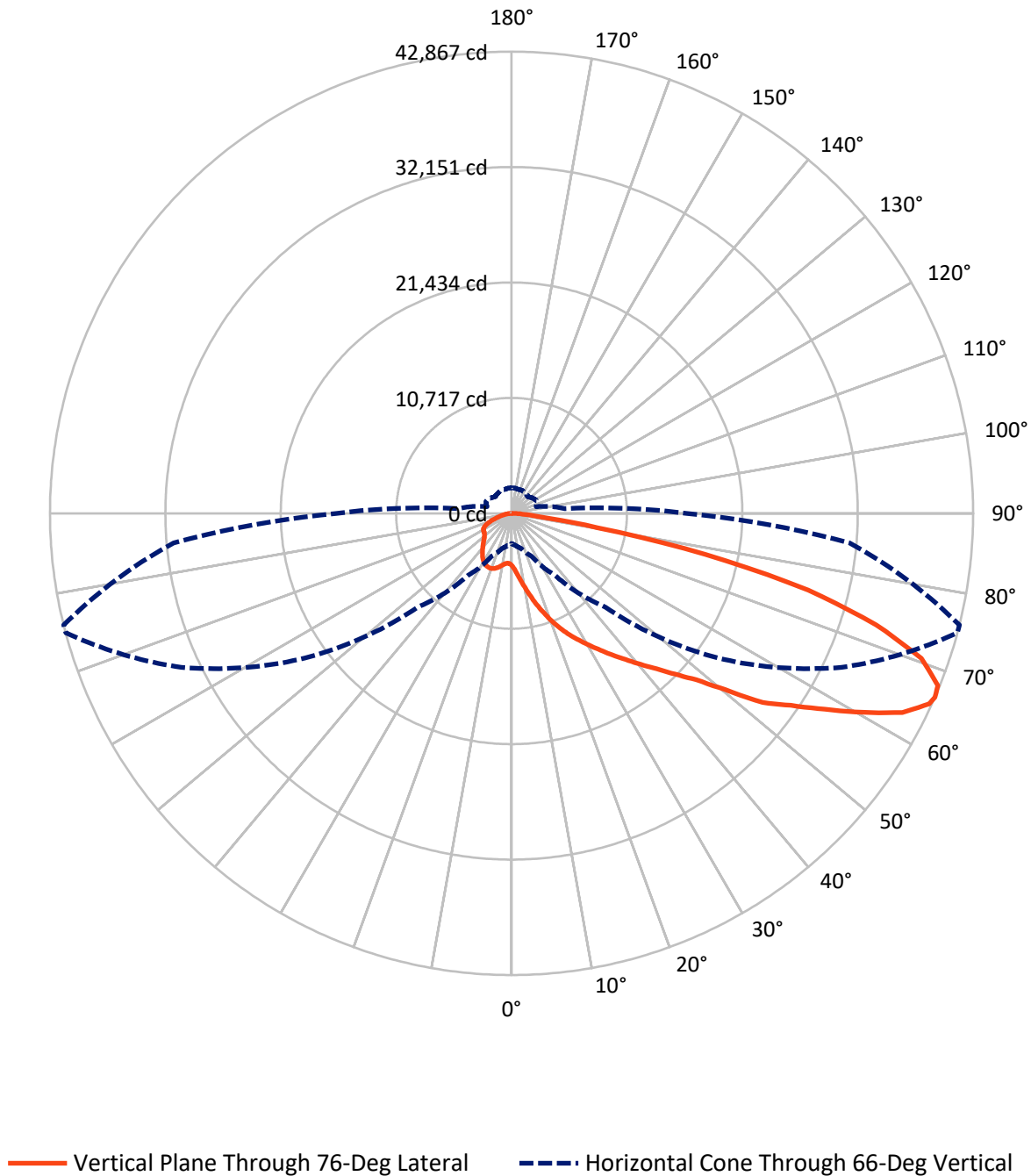
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 20.6 fc  
 Type II - Short - N/A

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## Luminous Intensity Polar Plot



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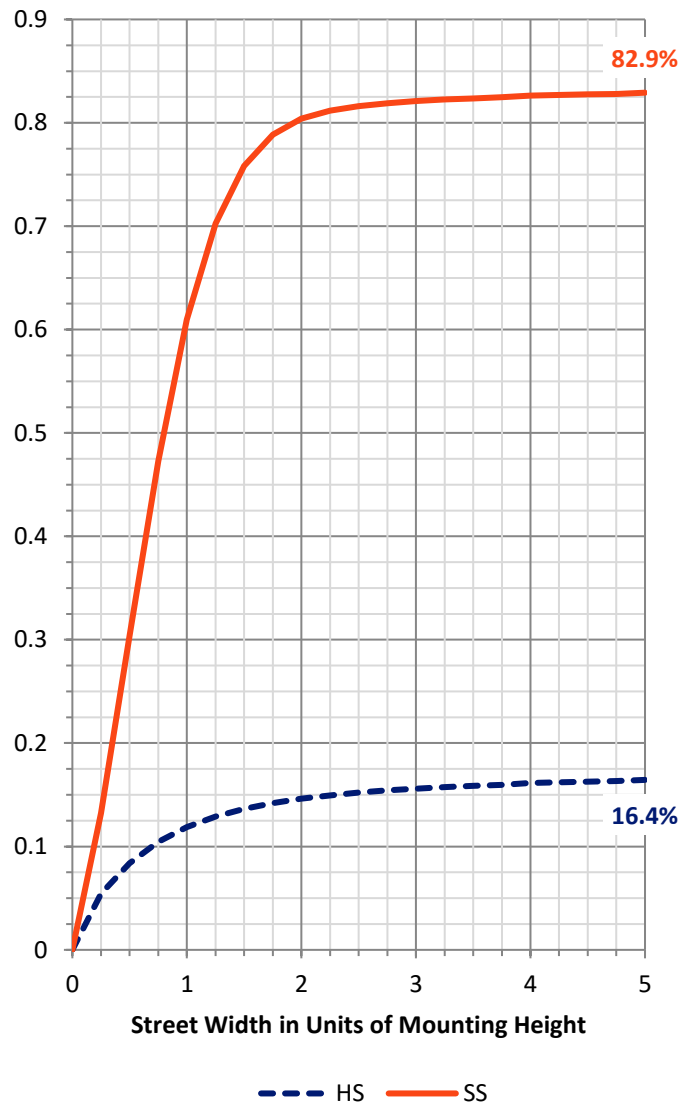
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 8938.9   | 0.0    | 8938.9  |
|                    | % Fixture | 16.8     | 0.0    | 16.8    |
| <b>Street Side</b> | Lumens    | 44185.1  | 0.0    | 44185.1 |
|                    | % Fixture | 83.2     | 0.0    | 83.2    |
| <b>Total</b>       | Lumens    | 53124.0  | 0.0    | 53124.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 586.7   | 1.1       |
| 10°-20°   | 2316.7  | 4.4       |
| 20°-30°   | 4501.9  | 8.5       |
| 30°-40°   | 7348.2  | 13.8      |
| 40°-50°   | 10039.4 | 18.9      |
| 50°-60°   | 11693.8 | 22.0      |
| 60°-70°   | 10483.7 | 19.7      |
| 70°-80°   | 5298.0  | 10.0      |
| 80°-90°   | 855.6   | 1.6       |
| 90°-100°  | 0.0     | 0.0       |
| 100°-110° | 0.0     | 0.0       |
| 110°-120° | 0.0     | 0.0       |
| 120°-130° | 0.0     | 0.0       |
| 130°-140° | 0.0     | 0.0       |
| 140°-150° | 0.0     | 0.0       |
| 150°-160° | 0.0     | 0.0       |
| 160°-170° | 0.0     | 0.0       |
| 170°-180° | 0.0     | 0.0       |
| 0°-90°    | 53124.0 | 100.0     |
| 0°-180°   | 53124.0 | 100.0     |

**Coefficient of Utilization**



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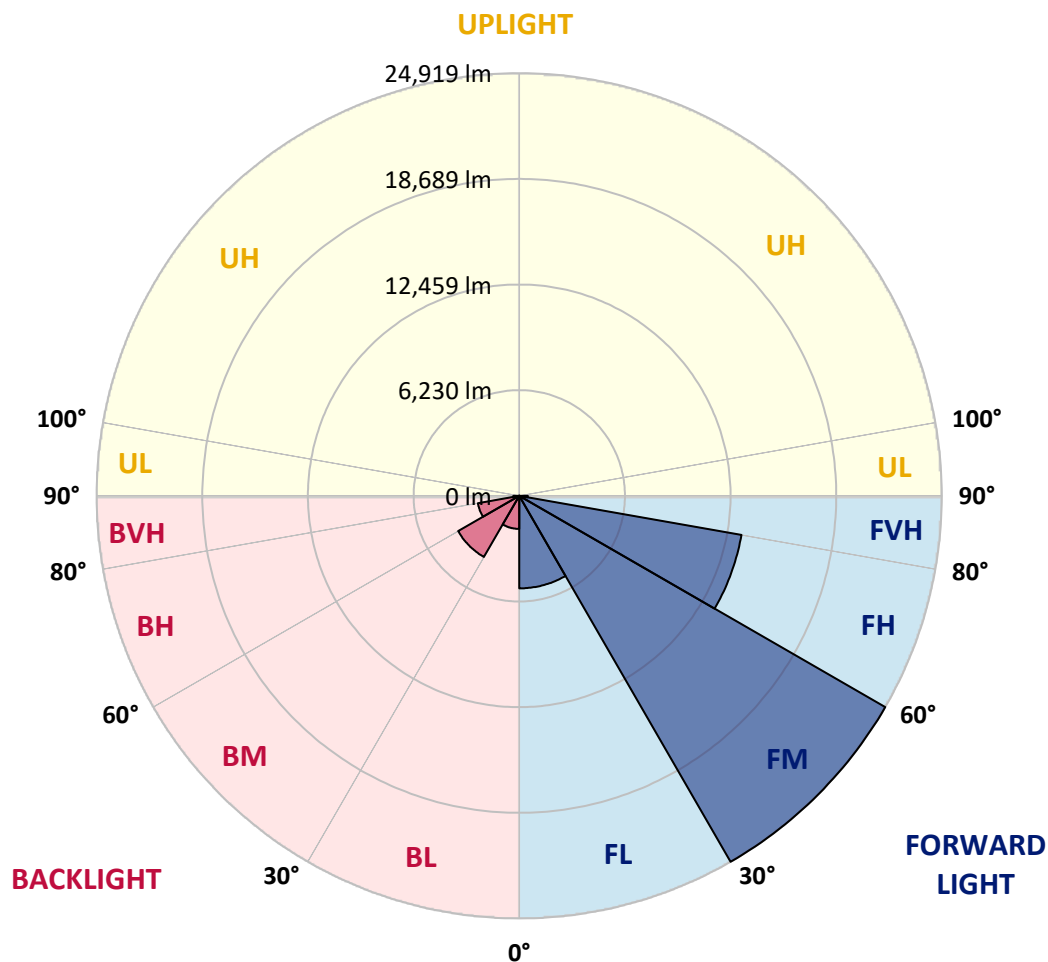
CATALOG NUMBER: GLEON-SA9D-827-U-T2R

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|---------|-----------|-------------------------|------|---------|
|      |             |         |           | B                       | U    | G       |
| FL   | (0°-30°)    | 5455.7  | 10.3      |                         |      |         |
| FM   | (30°-60°)   | 24918.8 | 46.9      |                         |      |         |
| FH   | (60°-80°)   | 13305.3 | 25.0      |                         |      | G5      |
| FVH  | (80°-90°)   | 505.3   | 1.0       |                         |      | G4/750  |
| BL   | (0°-30°)    | 1949.6  | 3.7       | B3/2500                 |      |         |
| BM   | (30°-60°)   | 4162.5  | 7.8       | B3/5000                 |      |         |
| BH   | (60°-80°)   | 2476.5  | 4.7       | B3/2500                 |      | G3/2500 |
| BVH  | (80°-90°)   | 350.3   | 0.7       |                         |      | G3/500  |
| UL   | (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0     | 0.0       |                         | U0/0 |         |

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

Type II Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 55°     | 65°     | 75°     | 76°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 4851.4  | 4851.4  | 4851.4  | 4851.4  | 4851.4  | 4851.4  | 4851.4  | 4851.4  | 4851.4  | 4851.4  | 4851.4  |
| 2.5°  | 6440.3  | 6342.9  | 6333.9  | 6191.4  | 6159.0  | 5886.6  | 5686.4  | 5477.2  | 5239.2  | 5192.3  | 5004.7  |
| 5°    | 8272.7  | 8263.6  | 8139.2  | 7906.6  | 7724.4  | 7259.1  | 6799.2  | 6312.3  | 5778.4  | 5691.9  | 5269.8  |
| 7.5°  | 9921.1  | 9906.6  | 9811.0  | 9560.4  | 9297.1  | 8725.3  | 8068.9  | 7322.2  | 6456.5  | 6328.5  | 5628.7  |
| 10°   | 11172.7 | 11167.3 | 11134.8 | 10950.9 | 10727.2 | 10179.0 | 9454.0  | 8435.0  | 7244.7  | 7069.7  | 6077.8  |
| 12.5° | 12139.4 | 12150.2 | 12171.8 | 12106.9 | 12000.5 | 11533.4 | 10790.4 | 9614.5  | 8085.1  | 7912.0  | 6577.4  |
| 15°   | 12794.0 | 12826.5 | 12938.3 | 13030.3 | 13086.2 | 12799.5 | 12079.9 | 10821.0 | 9026.5  | 8819.1  | 7131.0  |
| 17.5° | 13124.1 | 13160.2 | 13353.1 | 13630.9 | 13887.0 | 13858.1 | 13286.4 | 11971.6 | 9930.1  | 9729.9  | 7726.2  |
| 20°   | 13409.0 | 13436.1 | 13652.5 | 13986.2 | 14438.8 | 14639.0 | 14318.0 | 13079.0 | 10920.2 | 10682.1 | 8357.4  |
| 22.5° | 14235.0 | 14269.3 | 14334.2 | 14523.6 | 14924.0 | 15291.9 | 15136.8 | 14126.8 | 11827.4 | 11605.5 | 8956.2  |
| 25°   | 15829.3 | 15870.8 | 15730.1 | 15569.6 | 15645.4 | 15901.5 | 15930.3 | 15082.7 | 12747.1 | 12496.5 | 9600.0  |
| 27.5° | 17750.1 | 17809.6 | 17569.7 | 17156.7 | 16796.0 | 16696.8 | 16662.6 | 15865.4 | 13625.5 | 13335.1 | 10236.7 |
| 30°   | 19631.1 | 19733.9 | 19421.9 | 18886.3 | 18224.4 | 17759.1 | 17414.6 | 16631.9 | 14491.1 | 14213.4 | 10837.2 |
| 32.5° | 21468.9 | 21427.4 | 20974.7 | 20451.7 | 19676.2 | 19093.7 | 18260.5 | 17454.3 | 15465.0 | 15145.8 | 11434.2 |
| 35°   | 22727.7 | 22742.2 | 22321.9 | 21701.5 | 20962.1 | 20514.8 | 19393.1 | 18341.6 | 16458.8 | 16164.8 | 12112.3 |
| 37.5° | 23799.0 | 23732.3 | 23256.2 | 22677.2 | 22040.6 | 21849.4 | 20718.6 | 19319.1 | 17535.4 | 17214.4 | 12833.7 |
| 40°   | 24156.1 | 24078.6 | 23766.5 | 23349.9 | 22839.5 | 22823.3 | 22181.3 | 20426.5 | 18752.8 | 18435.4 | 13647.1 |
| 42.5° | 23939.7 | 23840.5 | 23712.4 | 23598.8 | 23441.9 | 23514.1 | 23555.5 | 21725.0 | 20091.0 | 19735.7 | 14588.5 |
| 45°   | 23140.7 | 22991.0 | 23081.2 | 23328.3 | 23669.2 | 24076.7 | 24796.3 | 23162.4 | 21589.7 | 21292.1 | 15694.1 |
| 47.5° | 21912.5 | 21777.3 | 22058.6 | 22587.1 | 23514.1 | 24545.7 | 25970.4 | 24749.5 | 23378.8 | 23083.0 | 17268.5 |
| 50°   | 20184.8 | 20224.5 | 20626.6 | 21587.9 | 22989.2 | 24762.1 | 27416.8 | 26850.5 | 25979.4 | 25703.5 | 19416.5 |
| 52.5° | 17349.7 | 17356.9 | 18489.5 | 20067.6 | 22058.6 | 24650.3 | 28219.4 | 29535.9 | 29530.5 | 29196.9 | 21461.7 |
| 55°   | 14716.6 | 14877.1 | 15773.4 | 17870.9 | 20550.9 | 24203.0 | 28780.3 | 30841.7 | 31862.5 | 31471.1 | 23368.0 |
| 57.5° | 12144.8 | 12238.6 | 13088.0 | 15194.5 | 18399.3 | 23010.9 | 29355.6 | 32408.9 | 34549.7 | 34302.6 | 25737.8 |
| 60°   | 9219.5  | 9363.8  | 10242.1 | 12188.1 | 15647.2 | 20895.4 | 29409.7 | 34044.7 | 37761.7 | 37512.8 | 28383.5 |
| 62.5° | 5984.0  | 6232.9  | 7055.3  | 8878.6  | 12317.9 | 17852.9 | 28154.5 | 35114.2 | 40806.0 | 40717.7 | 30731.7 |
| 65°   | 3439.3  | 3626.8  | 4198.6  | 5605.3  | 8498.1  | 14033.0 | 25169.7 | 34703.0 | 42679.9 | 42629.4 | 31610.0 |
| 66°   | 2809.9  | 2927.1  | 3365.3  | 4380.7  | 7012.0  | 12323.3 | 23434.7 | 33835.5 | 42865.6 | 42867.4 | 31509.0 |
| 67.5° | 2247.2  | 2299.5  | 2496.0  | 3136.3  | 5174.2  | 9767.8  | 20334.5 | 31922.0 | 42634.8 | 42697.9 | 30857.9 |
| 70°   | 1859.4  | 1886.5  | 1947.8  | 2102.9  | 2824.3  | 5890.2  | 14433.4 | 26949.7 | 40317.3 | 40366.0 | 28316.8 |
| 72.5° | 1668.2  | 1684.5  | 1707.9  | 1729.6  | 1992.9  | 3291.4  | 8815.5  | 21559.1 | 35348.6 | 35411.8 | 24444.7 |
| 75°   | 1511.3  | 1520.4  | 1516.7  | 1518.5  | 1671.8  | 2097.5  | 4555.6  | 16096.3 | 28581.9 | 28455.6 | 18725.8 |
| 77.5° | 1327.4  | 1336.4  | 1318.4  | 1322.0  | 1478.9  | 1612.3  | 2267.0  | 11268.3 | 19288.4 | 18397.5 | 10550.5 |
| 80°   | 1121.8  | 1129.0  | 1121.8  | 1134.4  | 1287.7  | 1217.4  | 1318.4  | 6339.3  | 8528.8  | 8067.1  | 3751.3  |
| 82.5° | 847.6   | 878.3   | 899.9   | 950.4   | 1060.5  | 865.7   | 881.9   | 2469.0  | 2597.0  | 2472.6  | 1150.6  |
| 85°   | 371.5   | 452.7   | 678.1   | 726.8   | 797.1   | 519.4   | 578.9   | 1006.4  | 1056.9  | 1024.4  | 418.4   |
| 87.5° | 97.4    | 106.4   | 335.5   | 422.0   | 441.9   | 234.5   | 301.2   | 458.1   | 483.3   | 458.1   | 138.9   |
| 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-SA9D-827-U-T2R

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 4851.4  | 4851.4 | 4851.4 | 4851.4 | 4851.4 | 4851.4 | 4851.4 | 4851.4 | 4851.4 | 4851.4 | 4851.4 |
| 2.5°  | 4905.5  | 4817.2 | 4658.4 | 4517.8 | 4411.4 | 4339.2 | 4267.1 | 4231.0 | 4209.4 | 4187.7 | 4191.3 |
| 5°    | 5062.4  | 4883.9 | 4611.6 | 4418.6 | 4310.4 | 4241.8 | 4205.8 | 4191.3 | 4182.3 | 4160.7 | 4160.7 |
| 7.5°  | 5298.7  | 5046.2 | 4671.1 | 4472.7 | 4387.9 | 4335.6 | 4314.0 | 4306.8 | 4295.9 | 4270.7 | 4274.3 |
| 10°   | 5596.3  | 5242.8 | 4795.5 | 4602.5 | 4525.0 | 4467.3 | 4436.6 | 4425.8 | 4406.0 | 4377.1 | 4380.7 |
| 12.5° | 5946.1  | 5486.3 | 4959.6 | 4757.6 | 4663.9 | 4586.3 | 4535.8 | 4505.1 | 4470.9 | 4433.0 | 4434.8 |
| 15°   | 6328.5  | 5751.4 | 5136.4 | 4896.5 | 4768.5 | 4660.2 | 4579.1 | 4526.8 | 4472.7 | 4425.8 | 4424.0 |
| 17.5° | 6716.2  | 6007.5 | 5271.6 | 4972.3 | 4799.1 | 4656.6 | 4546.6 | 4465.5 | 4398.7 | 4341.0 | 4335.6 |
| 20°   | 7134.7  | 6238.3 | 5347.4 | 4965.0 | 4741.4 | 4571.9 | 4425.8 | 4324.8 | 4250.9 | 4193.1 | 4184.1 |
| 22.5° | 7560.3  | 6454.7 | 5360.0 | 4891.1 | 4613.4 | 4406.0 | 4252.7 | 4140.8 | 4065.1 | 4005.6 | 3983.9 |
| 25°   | 7949.8  | 6622.5 | 5307.7 | 4748.6 | 4434.8 | 4211.2 | 4061.5 | 3947.9 | 3886.5 | 3816.2 | 3794.6 |
| 27.5° | 8305.1  | 6739.7 | 5203.1 | 4566.5 | 4234.6 | 4014.6 | 3873.9 | 3776.5 | 3709.8 | 3655.7 | 3637.7 |
| 30°   | 8624.3  | 6802.8 | 5031.8 | 4350.0 | 4029.0 | 3828.8 | 3709.8 | 3643.1 | 3585.4 | 3516.8 | 3504.2 |
| 32.5° | 8927.3  | 6802.8 | 4811.7 | 4113.8 | 3825.2 | 3664.7 | 3594.4 | 3552.9 | 3488.0 | 3421.2 | 3403.2 |
| 35°   | 9230.3  | 6761.3 | 4552.0 | 3866.7 | 3637.7 | 3547.5 | 3543.9 | 3495.2 | 3396.0 | 3305.8 | 3282.4 |
| 37.5° | 9549.5  | 6676.6 | 4259.9 | 3635.9 | 3484.4 | 3495.2 | 3525.8 | 3417.6 | 3277.0 | 3148.9 | 3114.6 |
| 40°   | 9910.2  | 6559.3 | 3956.9 | 3435.7 | 3356.3 | 3471.7 | 3477.2 | 3305.8 | 3031.7 | 2914.5 | 2883.8 |
| 42.5° | 10334.1 | 6442.1 | 3675.5 | 3258.9 | 3255.3 | 3401.4 | 3385.2 | 3064.1 | 2900.0 | 2840.5 | 2824.3 |
| 45°   | 10891.3 | 6375.4 | 3408.6 | 3091.2 | 3176.0 | 3287.8 | 3228.3 | 2930.7 | 2862.2 | 2827.9 | 2813.5 |
| 47.5° | 11769.7 | 6409.6 | 3163.3 | 2957.7 | 3096.6 | 3174.2 | 2936.1 | 2876.6 | 2827.9 | 2786.4 | 2772.0 |
| 50°   | 12869.8 | 6389.8 | 2965.0 | 2865.8 | 3006.4 | 3055.1 | 2804.4 | 2806.2 | 2781.0 | 2734.1 | 2712.5 |
| 52.5° | 13697.6 | 6234.7 | 2836.9 | 2813.5 | 2927.1 | 2844.1 | 2721.5 | 2737.7 | 2725.1 | 2656.6 | 2633.1 |
| 55°   | 14496.5 | 6101.2 | 2772.0 | 2793.6 | 2869.4 | 2580.8 | 2624.1 | 2663.8 | 2651.1 | 2584.4 | 2573.6 |
| 57.5° | 15490.3 | 6076.0 | 2732.3 | 2799.0 | 2820.7 | 2449.2 | 2530.3 | 2582.6 | 2573.6 | 2544.7 | 2539.3 |
| 60°   | 16707.6 | 6083.2 | 2696.2 | 2808.1 | 2766.6 | 2351.8 | 2441.9 | 2508.7 | 2514.1 | 2508.7 | 2505.1 |
| 62.5° | 17376.7 | 5886.6 | 2606.1 | 2782.8 | 2671.0 | 2267.0 | 2350.0 | 2447.4 | 2449.2 | 2460.0 | 2458.2 |
| 65°   | 16808.6 | 5298.7 | 2438.3 | 2694.4 | 2510.5 | 2196.7 | 2270.6 | 2377.0 | 2350.0 | 2398.7 | 2398.7 |
| 66°   | 16256.8 | 4959.6 | 2355.4 | 2636.7 | 2441.9 | 2169.6 | 2245.4 | 2340.9 | 2306.7 | 2373.4 | 2373.4 |
| 67.5° | 15129.6 | 4387.9 | 2205.7 | 2514.1 | 2344.6 | 2131.7 | 2216.5 | 2281.4 | 2234.5 | 2333.7 | 2326.5 |
| 70°   | 13070.0 | 3394.2 | 1904.5 | 2236.3 | 2184.0 | 2075.8 | 2176.8 | 2162.4 | 2093.9 | 2245.4 | 2216.5 |
| 72.5° | 11019.4 | 2579.0 | 1529.4 | 1872.0 | 1940.6 | 2005.5 | 2120.9 | 2010.9 | 1924.3 | 2030.7 | 1967.6 |
| 75°   | 8550.4  | 1938.8 | 1208.3 | 1455.4 | 1639.4 | 1895.5 | 2054.2 | 1836.0 | 1711.5 | 1700.7 | 1666.4 |
| 77.5° | 4622.4  | 1331.0 | 957.7  | 1111.0 | 1302.1 | 1758.4 | 2009.1 | 1648.4 | 1460.8 | 1417.6 | 1390.5 |
| 80°   | 1830.6  | 865.7  | 696.2  | 842.2  | 910.8  | 1560.0 | 1900.9 | 1430.2 | 1204.7 | 1161.5 | 1120.0 |
| 82.5° | 755.7   | 512.2  | 449.1  | 564.5  | 593.4  | 1334.6 | 1706.1 | 1172.3 | 930.6  | 1287.7 | 1367.1 |
| 85°   | 324.6   | 281.3  | 266.9  | 292.2  | 335.5  | 936.0  | 1358.0 | 894.5  | 1004.6 | 896.3  | 712.4  |
| 87.5° | 97.4    | 119.0  | 113.6  | 111.8  | 122.6  | 223.6  | 723.2  | 497.8  | 737.6  | 279.5  | 209.2  |
| 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

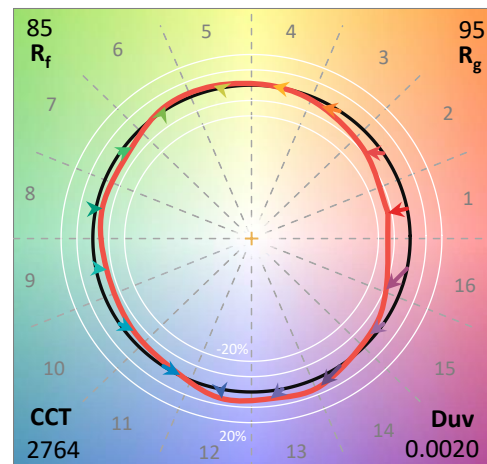
### Test Information

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

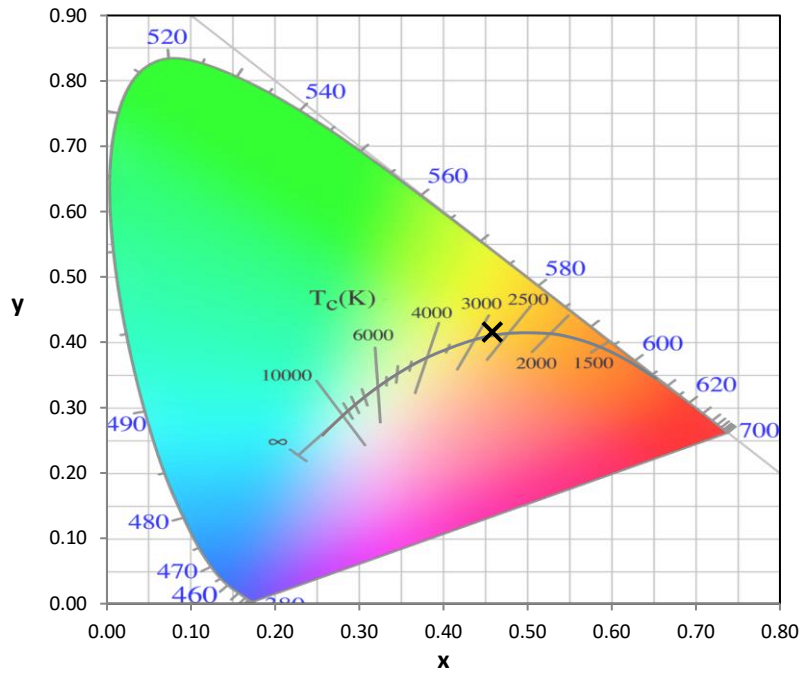
Stabilization Time: 81M  
 Operation Time: 2H 21M  
 Sphere Temperature (°C): 25.2

REPORT NUMBER: SP1-2407-157-9

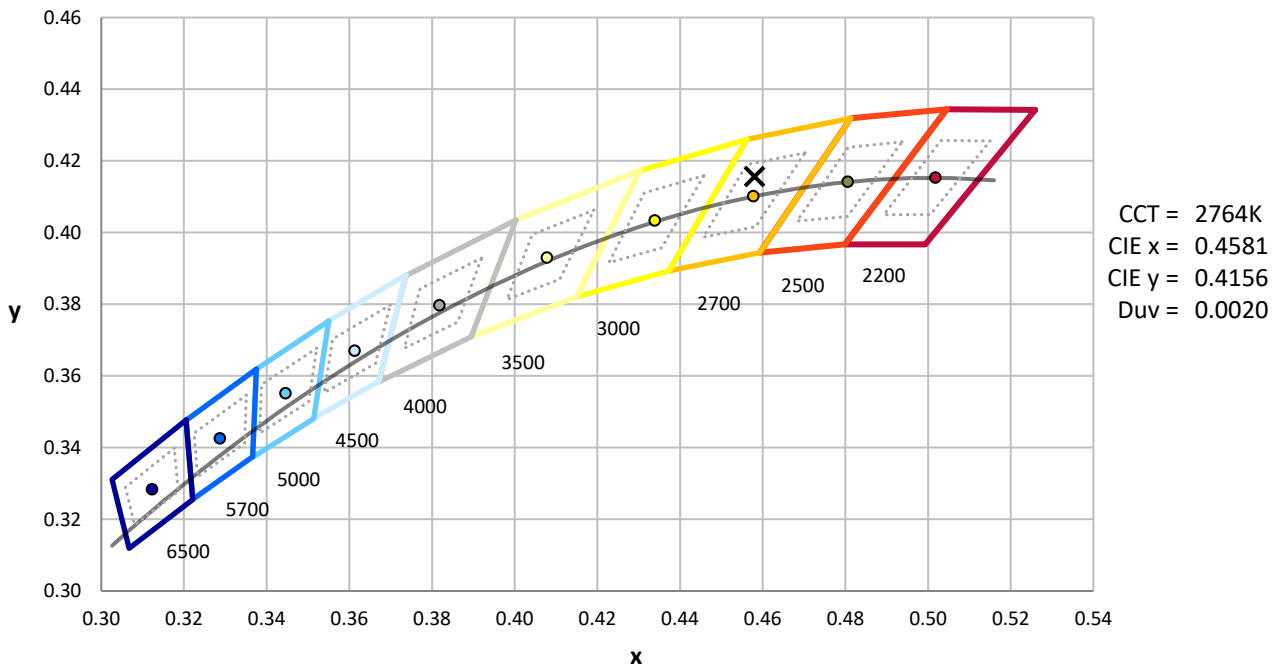
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| 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**



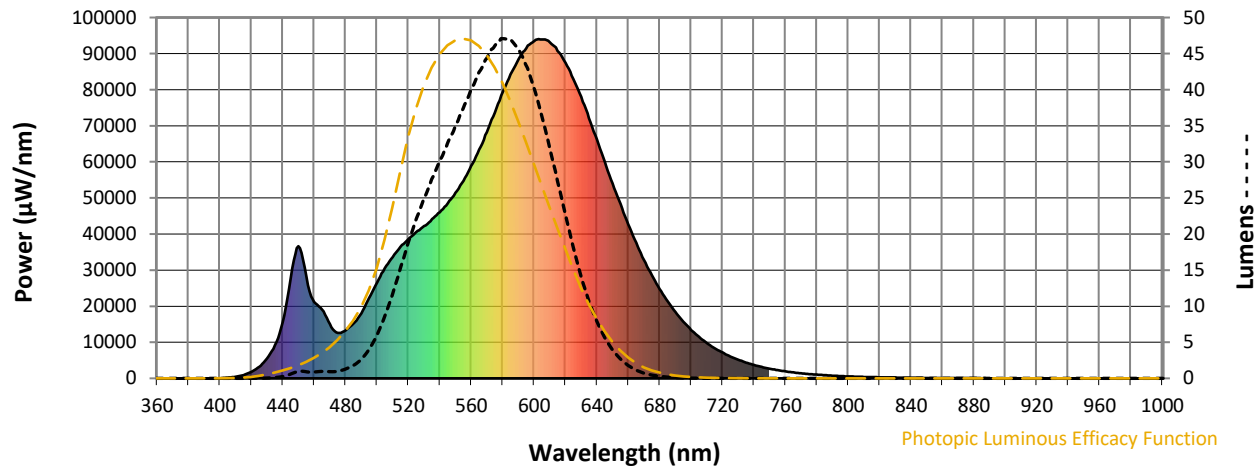
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 2700K 4-step quadrangle

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### Photopic Flux vs. Wavelength

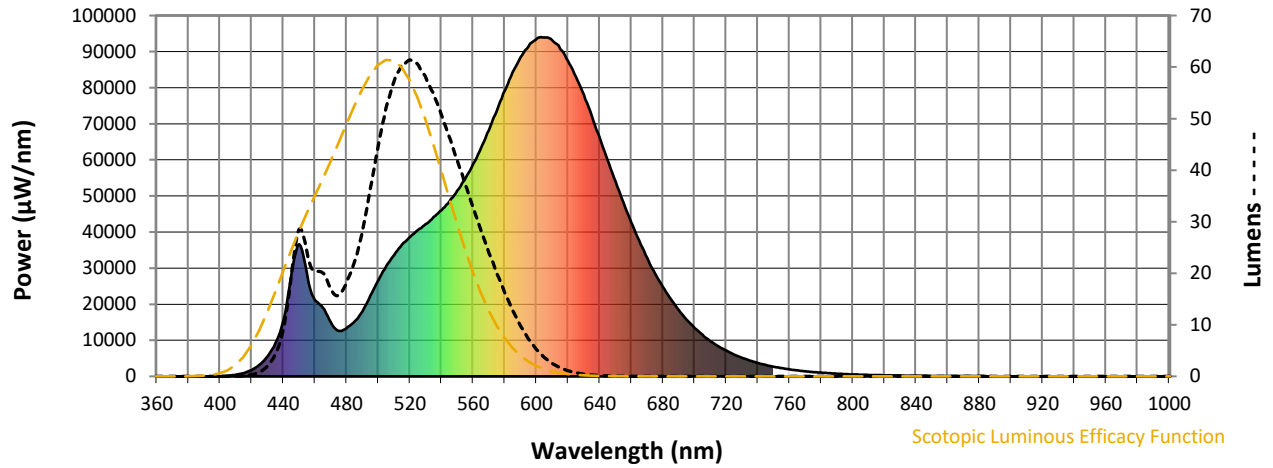


### Photopic Lumens: 4337.9

| 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

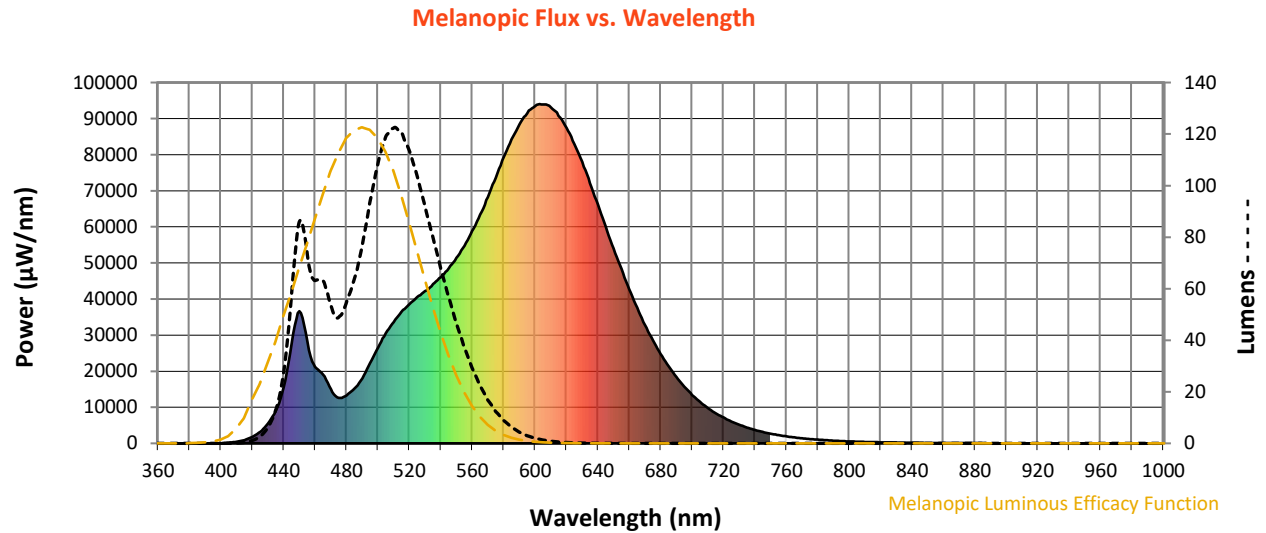


Scotopic Lumens: 5286.7

S/P: 1.22

| λ (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         | 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 Lumens: 9797**

**M/P: 2.26**

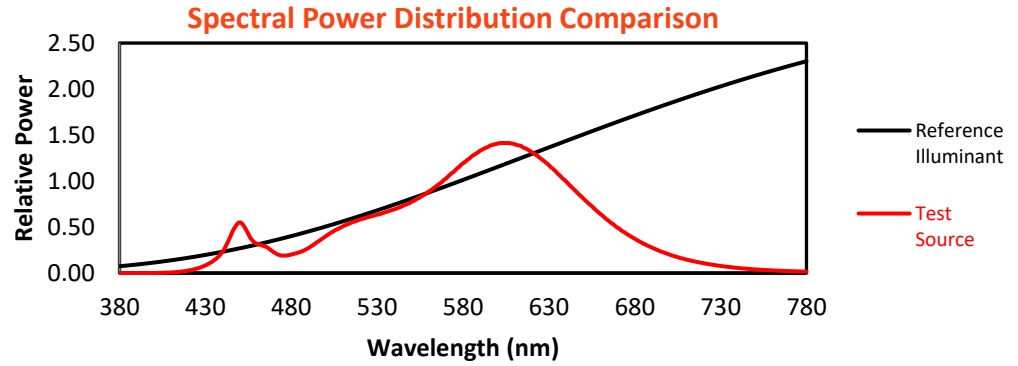
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------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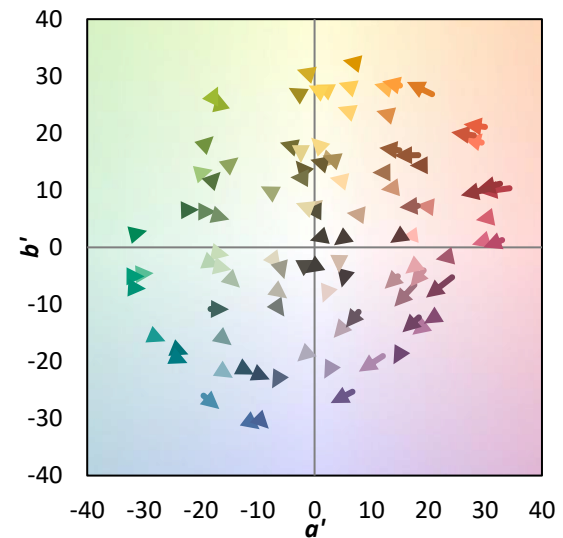
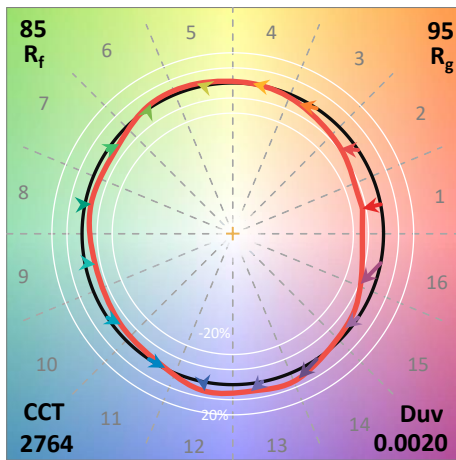
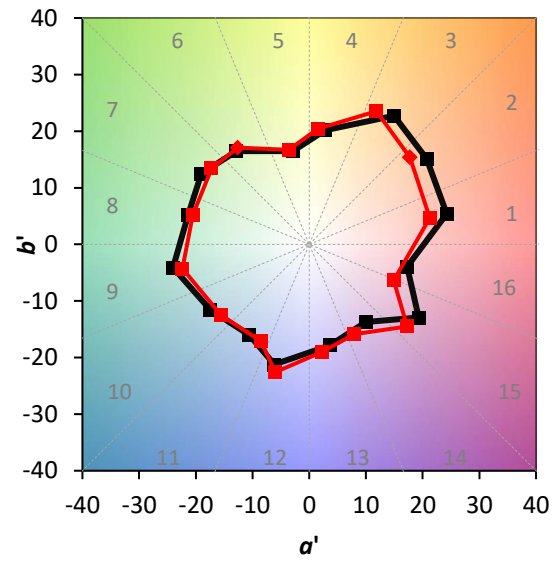
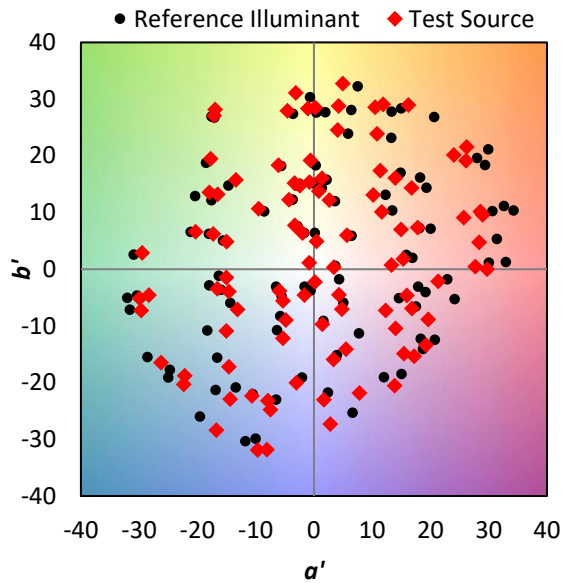
TM-30-18

### Summary

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



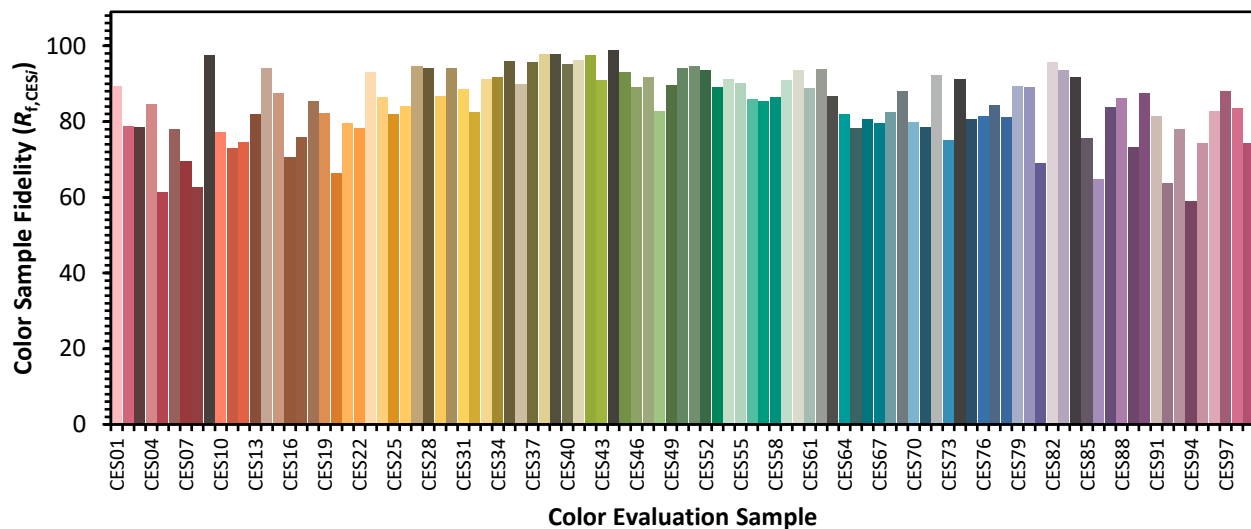
### Color Vector Graphics



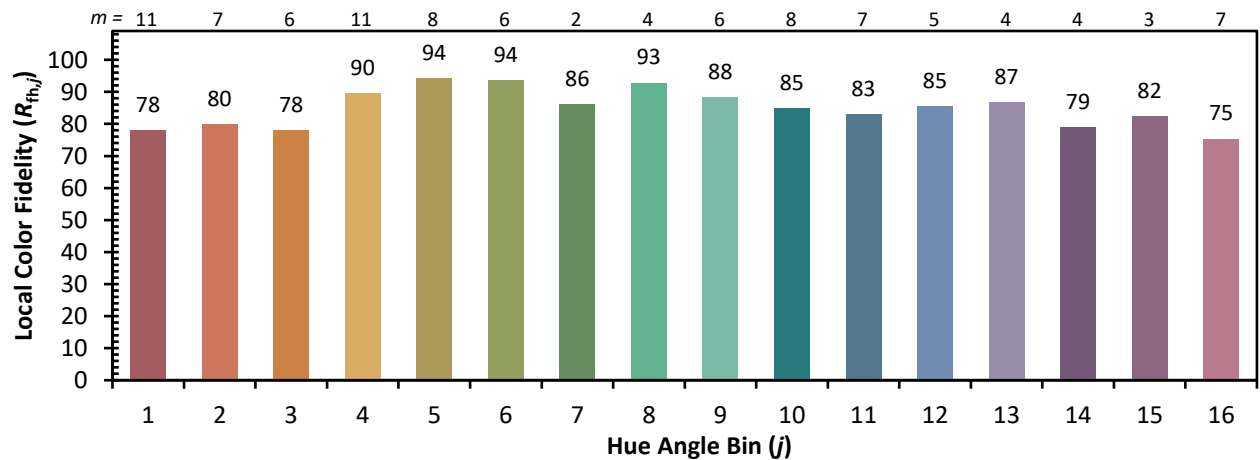
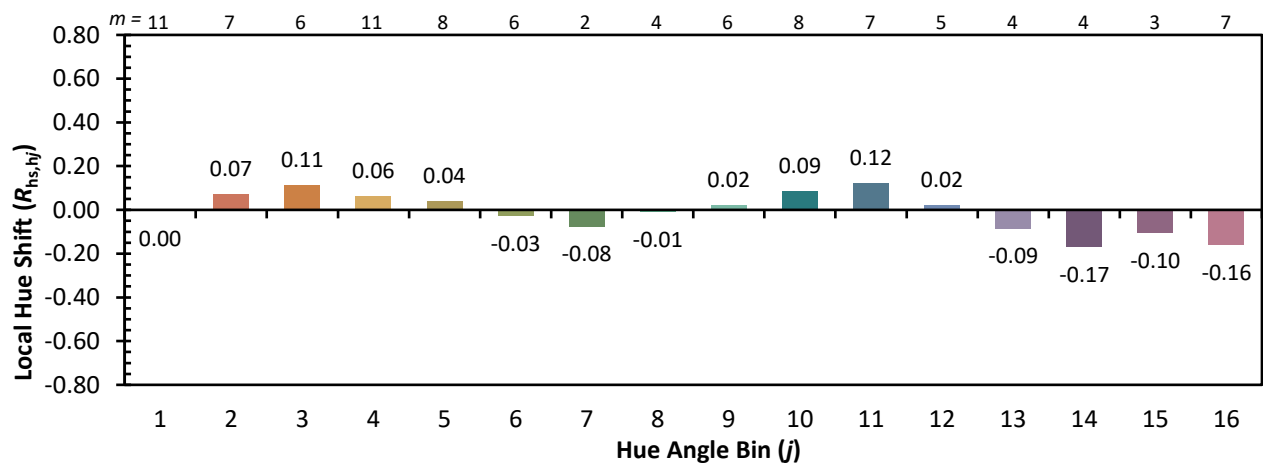
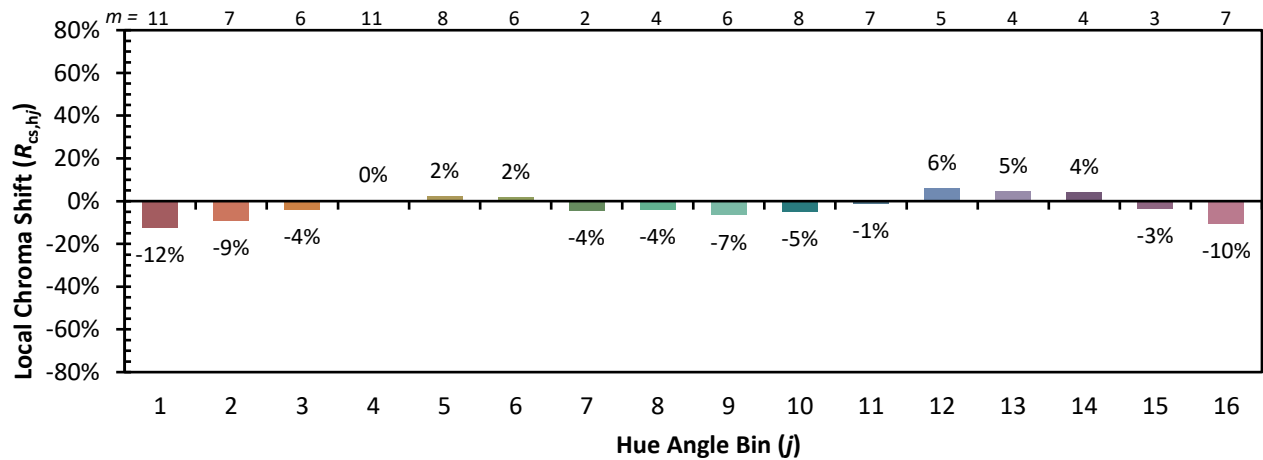


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

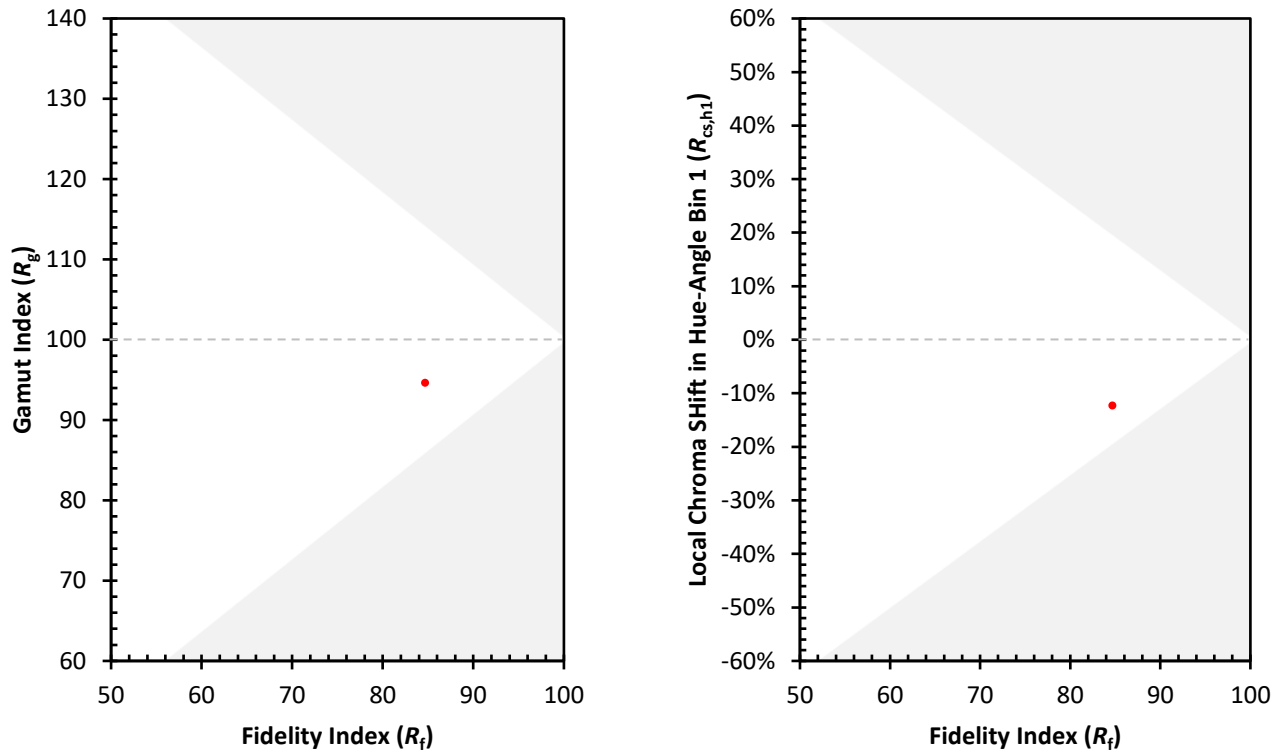
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 84 | CES51 = 95 | CES76 = 81 |
| CES02 = 63 | CES27 = 95 | CES52 = 94 | CES77 = 84 |
| CES03 = 31 | CES28 = 94 | CES53 = 89 | CES78 = 81 |
| CES04 = 71 | CES29 = 87 | CES54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