

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: P322703

Luminaire Tested: **GLEON-SA9D-827-U-T4FT-HSS**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P322703  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-17)  
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-T4FT-HSS  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(9) 80 CRI, 2700K, 1200mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV  
FORWARD THROW OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 36211 lumens  
Efficiency: N/A  
Efficacy: 63.0 lumens/watt  
Luminous Opening: Rectangular (W 2.5' x L: 1' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B3 - U0 - G5

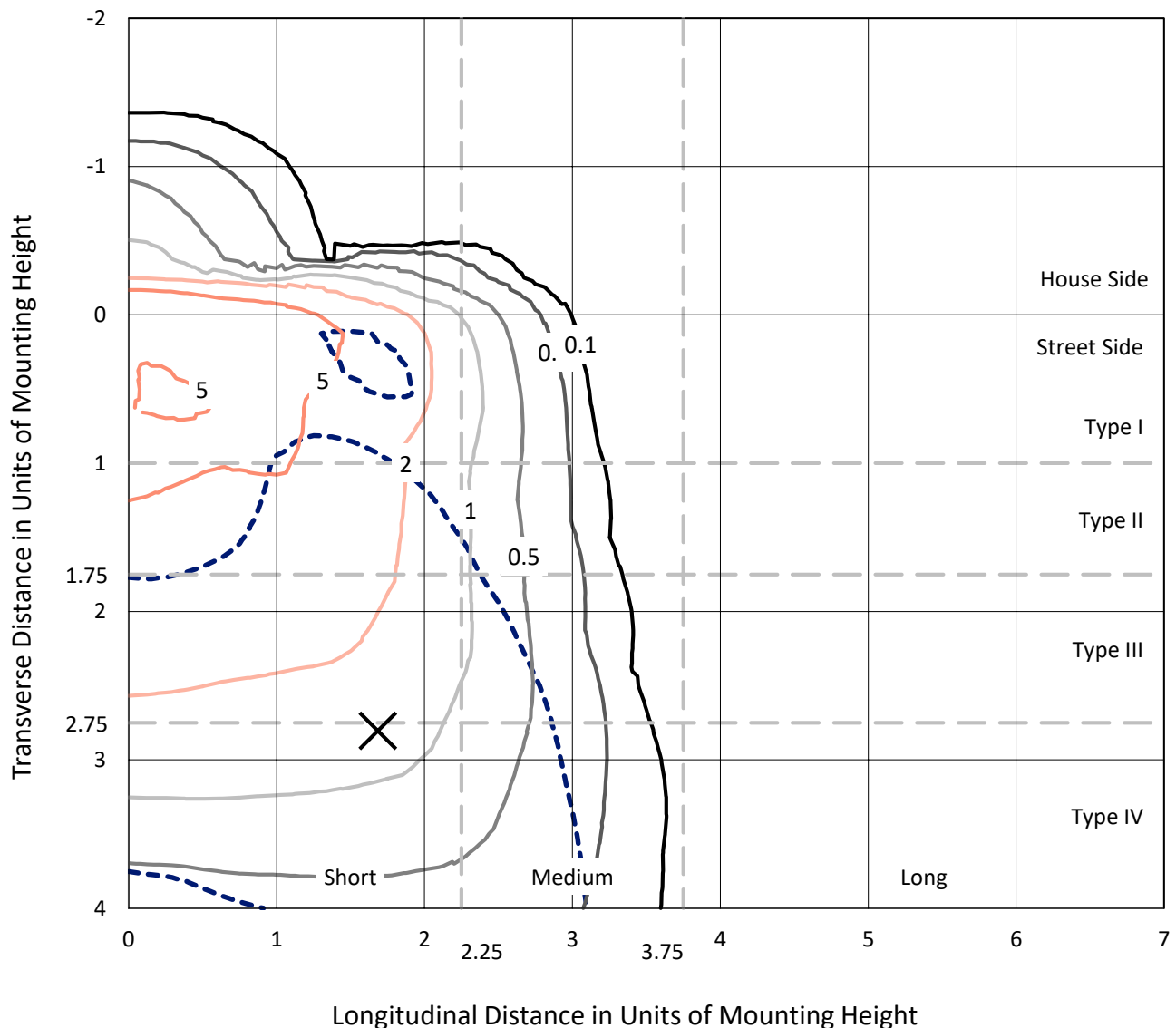
Input Watts (W): 575  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



REPORT NUMBER: P322703  
 CATALOG NUMBER: GLEON-SA9D-827-U-T4FT-HSS

## Iso-Footcandle Lines of Horizontal Illumination

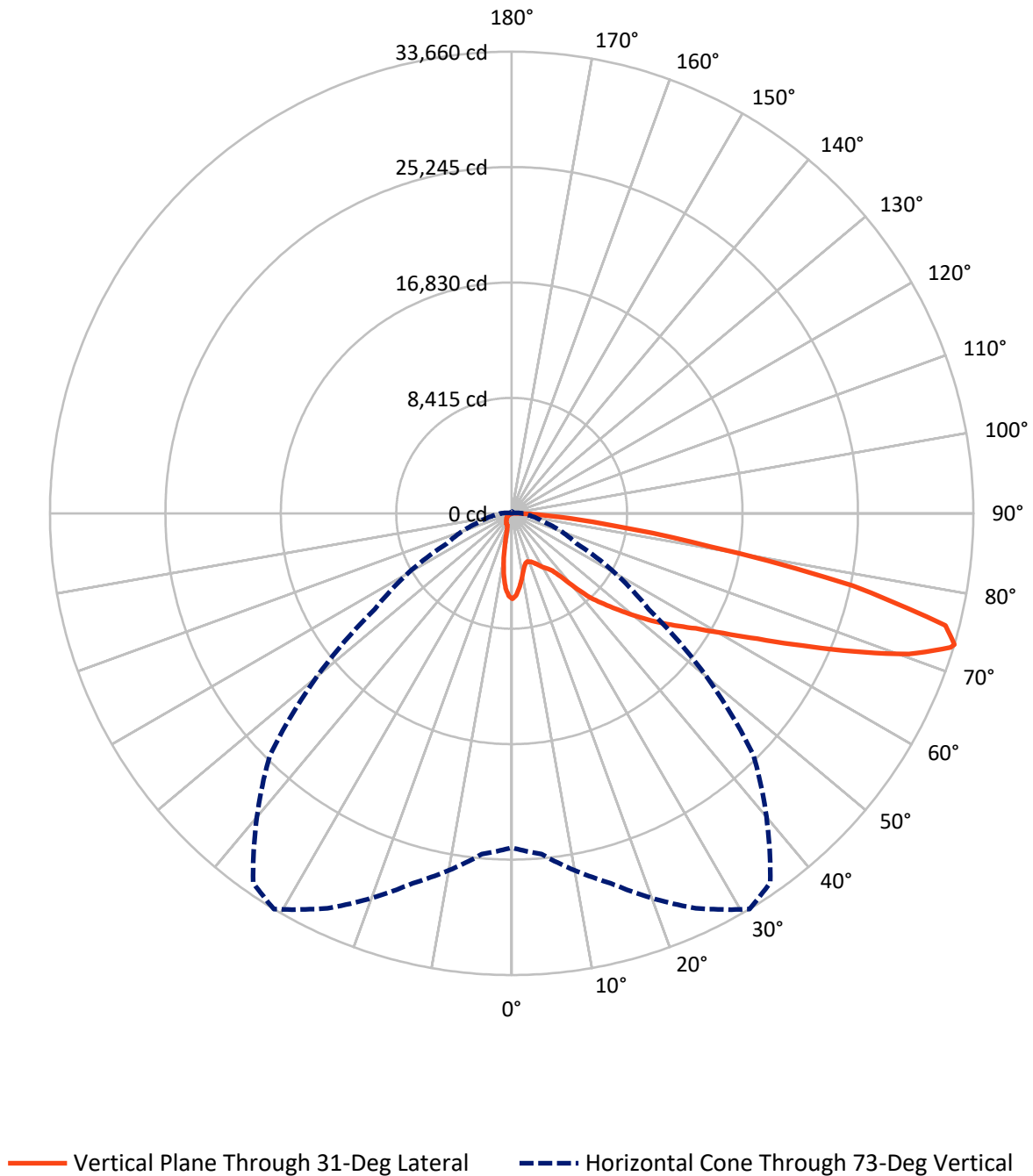
× Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 10 fc  
 Type IV - Short - N/A

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CATALOG NUMBER: GLEON-SA9D-827-U-T4FT-HSS

## Luminous Intensity Polar Plot



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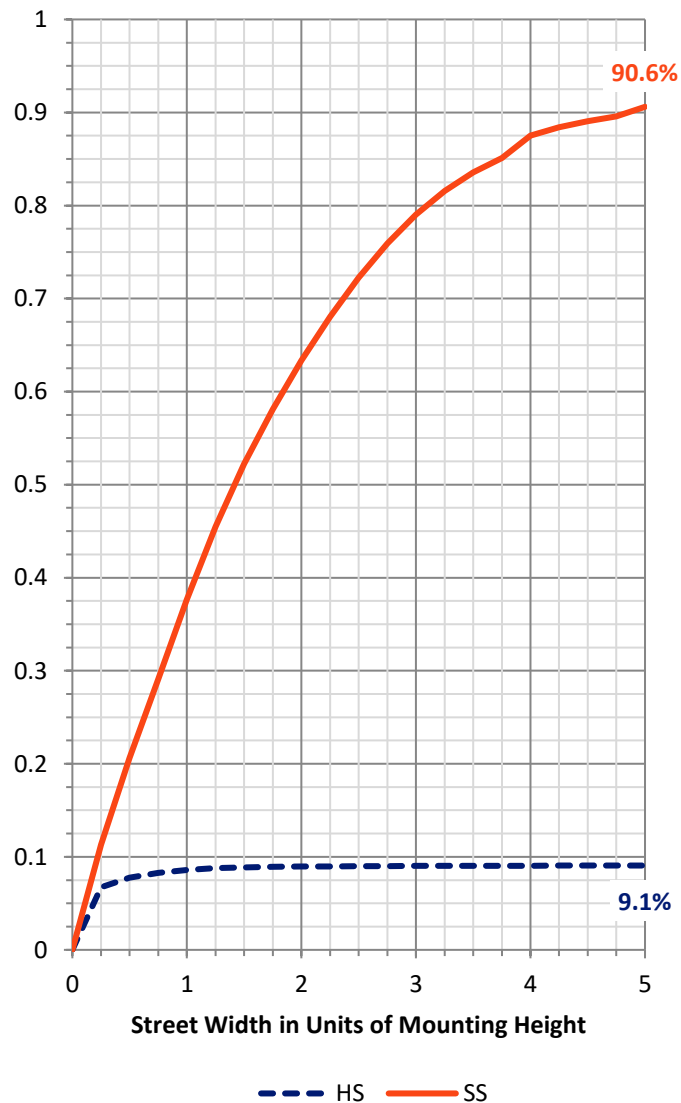
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 3300.8   | 0.0    | 3300.8  |
|                    | % Fixture | 9.1      | 0.0    | 9.1     |
| <b>Street Side</b> | Lumens    | 32910.2  | 0.0    | 32910.2 |
|                    | % Fixture | 90.9     | 0.0    | 90.9    |
| <b>Total</b>       | Lumens    | 36211.0  | 0.0    | 36211.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 516.6   | 1.4       |
| 10°-20°   | 1121.6  | 3.1       |
| 20°-30°   | 1680.5  | 4.6       |
| 30°-40°   | 2673.7  | 7.4       |
| 40°-50°   | 4774.5  | 13.2      |
| 50°-60°   | 7408.6  | 20.5      |
| 60°-70°   | 9848.8  | 27.2      |
| 70°-80°   | 7408.3  | 20.5      |
| 80°-90°   | 778.5   | 2.1       |
| 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°    | 36211.0 | 100.0     |
| 0°-180°   | 36211.0 | 100.0     |

**Coefficient of Utilization**



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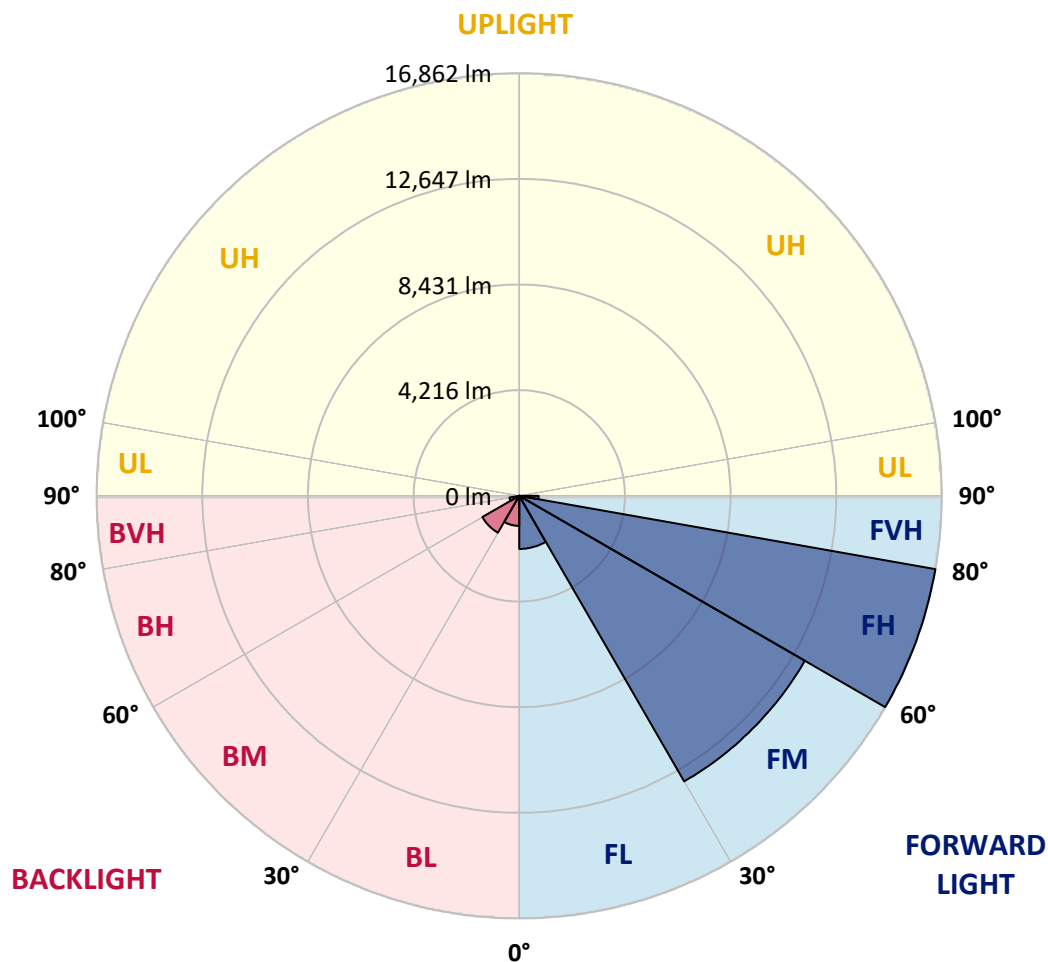
CATALOG NUMBER: GLEON-SA9D-827-U-T4FT-HSS

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |        |
|------|-------------|---------|-----------|-------------------------|------|--------|
|      |             |         |           | B                       | U    | G      |
| FL   | (0°-30°)    | 2118.4  | 5.9       |                         |      |        |
| FM   | (30°-60°)   | 13157.8 | 36.3      |                         |      |        |
| FH   | (60°-80°)   | 16862.1 | 46.6      |                         |      | G5     |
| FVH  | (80°-90°)   | 771.9   | 2.1       |                         |      | G5     |
| BL   | (0°-30°)    | 1200.3  | 3.3       | B3/2500                 |      |        |
| BM   | (30°-60°)   | 1699.0  | 4.7       | B2/2500                 |      |        |
| BH   | (60°-80°)   | 394.9   | 1.1       | B1/500                  |      | G1/500 |
| BVH  | (80°-90°)   | 6.6     | 0.0       |                         |      | G0/10  |
| UL   | (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |        |
| UH   | (100°-180°) | 0.0     | 0.0       |                         | U0/0 |        |

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

Type IV Short





REPORT NUMBER: P322703

CATALOG NUMBER: GLEON-SA9D-827-U-T4FT-HSS

**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 31°     | 35°     | 45°     | 55°     | 65°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 6230.2  | 6230.2  | 6230.2  | 6230.2  | 6230.2  | 6230.2  | 6230.2  | 6230.2  | 6230.2  | 6230.2  | 6230.2  |
| 2.5°  | 5904.1  | 5928.9  | 5955.5  | 5960.8  | 6005.1  | 6006.9  | 6070.7  | 6118.5  | 6166.4  | 6212.5  | 6228.4  |
| 5°    | 5298.1  | 5338.9  | 5386.7  | 5434.6  | 5528.5  | 5565.7  | 5721.6  | 5881.1  | 6033.5  | 6178.8  | 6249.7  |
| 7.5°  | 4651.4  | 4697.4  | 4764.8  | 4883.5  | 4988.0  | 5060.7  | 5307.0  | 5590.5  | 5874.0  | 6141.6  | 6295.7  |
| 10°   | 4061.3  | 4103.8  | 4174.7  | 4300.5  | 4461.8  | 4561.0  | 4892.4  | 5285.7  | 5702.1  | 6107.9  | 6364.8  |
| 12.5° | 3685.7  | 3708.7  | 3747.7  | 3882.3  | 4027.6  | 4139.3  | 4529.1  | 5016.4  | 5560.4  | 6106.1  | 6476.5  |
| 15°   | 3616.6  | 3623.6  | 3591.7  | 3652.0  | 3765.4  | 3873.5  | 4268.6  | 4798.4  | 5452.3  | 6134.5  | 6621.8  |
| 17.5° | 3726.4  | 3722.9  | 3616.6  | 3609.5  | 3699.8  | 3788.4  | 4141.0  | 4647.8  | 5376.1  | 6200.1  | 6809.6  |
| 20°   | 3893.0  | 3880.6  | 3696.3  | 3662.6  | 3758.3  | 3841.6  | 4132.2  | 4591.1  | 5347.7  | 6309.9  | 7038.2  |
| 22.5° | 4114.5  | 4093.2  | 3804.4  | 3768.9  | 3871.7  | 3958.5  | 4242.0  | 4646.1  | 5372.6  | 6457.0  | 7304.0  |
| 25°   | 4389.1  | 4357.2  | 3990.4  | 3951.4  | 4056.0  | 4142.8  | 4438.7  | 4803.8  | 5447.0  | 6636.0  | 7640.6  |
| 27.5° | 4699.2  | 4653.1  | 4288.1  | 4187.1  | 4305.8  | 4396.2  | 4701.0  | 5044.7  | 5563.9  | 6825.6  | 8053.5  |
| 30°   | 4991.6  | 4931.3  | 4601.8  | 4435.2  | 4580.5  | 4681.5  | 4984.5  | 5331.8  | 5751.8  | 7117.9  | 8618.8  |
| 32.5° | 5285.7  | 5218.4  | 4881.7  | 4683.3  | 4814.4  | 4924.2  | 5276.9  | 5726.9  | 6104.4  | 7564.5  | 9370.1  |
| 35°   | 5962.6  | 5891.7  | 5478.9  | 5151.1  | 5149.3  | 5211.3  | 5686.2  | 6267.4  | 6570.4  | 8186.4  | 10266.7 |
| 37.5° | 7102.0  | 7061.2  | 6667.8  | 6045.9  | 5879.3  | 5810.2  | 6244.4  | 6912.4  | 7240.2  | 9042.3  | 11278.5 |
| 40°   | 8349.4  | 8314.0  | 7872.8  | 7309.3  | 7055.9  | 6885.8  | 7045.3  | 7810.8  | 8186.4  | 10087.7 | 12311.5 |
| 42.5° | 9758.1  | 9589.8  | 8803.0  | 8634.7  | 8407.9  | 8278.6  | 8135.0  | 8918.2  | 9348.8  | 11225.3 | 13335.7 |
| 45°   | 11037.5 | 10754.0 | 9733.3  | 9478.2  | 9426.8  | 9458.7  | 9538.4  | 10406.7 | 10656.5 | 12577.3 | 14356.3 |
| 47.5° | 11799.4 | 11576.2 | 10792.9 | 10548.4 | 10534.2 | 10745.1 | 11347.6 | 12088.2 | 11958.9 | 13755.6 | 15254.7 |
| 50°   | 12524.1 | 12322.1 | 11671.8 | 11732.1 | 11797.6 | 12084.7 | 13401.3 | 13817.7 | 13147.9 | 14824.1 | 16078.7 |
| 52.5° | 13110.7 | 12802.3 | 12462.1 | 12800.6 | 13123.1 | 13585.5 | 15520.5 | 15369.9 | 13991.3 | 15674.7 | 16783.9 |
| 55°   | 13449.1 | 13309.1 | 13473.9 | 13814.1 | 14420.1 | 15171.4 | 17521.0 | 16661.6 | 14608.0 | 16450.8 | 17253.5 |
| 57.5° | 14689.5 | 14414.8 | 14742.6 | 15036.8 | 15827.1 | 16877.8 | 19234.5 | 17623.8 | 15052.7 | 16931.0 | 17361.6 |
| 60°   | 16190.3 | 15968.8 | 16162.0 | 16651.0 | 17717.7 | 18952.8 | 20836.4 | 18408.8 | 15284.8 | 17239.3 | 17081.6 |
| 62.5° | 18578.9 | 18286.5 | 18166.0 | 18713.6 | 20127.6 | 21476.0 | 22051.9 | 18952.8 | 15233.5 | 17102.9 | 16121.2 |
| 65°   | 21779.0 | 21476.0 | 20937.4 | 21433.5 | 23232.0 | 24183.6 | 23411.0 | 19068.0 | 14879.1 | 15998.9 | 13693.6 |
| 67.5° | 25057.1 | 24837.4 | 24376.7 | 25213.1 | 26836.2 | 27142.7 | 24848.1 | 18788.0 | 13737.9 | 12972.4 | 9674.8  |
| 70°   | 27222.5 | 27128.6 | 27428.0 | 29277.9 | 30725.6 | 30637.0 | 26166.4 | 17283.6 | 10707.9 | 7977.3  | 4786.0  |
| 72.5° | 25661.4 | 26111.5 | 28322.9 | 31677.2 | 33445.6 | 32722.6 | 25489.5 | 13271.9 | 6120.3  | 3069.0  | 1383.9  |
| 73°   | 24367.9 | 24943.7 | 27920.6 | 31767.5 | 33660.0 | 32867.9 | 24920.7 | 12182.2 | 5216.6  | 2422.3  | 1049.0  |
| 75°   | 16952.2 | 17659.3 | 23115.1 | 29586.3 | 32657.0 | 31315.7 | 20772.6 | 7456.4  | 2416.9  | 1073.8  | 423.5   |
| 77.5° | 8230.7  | 8753.4  | 12727.9 | 21376.8 | 25397.4 | 24467.1 | 12931.7 | 2778.4  | 1091.5  | 671.6   | 194.9   |
| 80°   | 3072.6  | 3416.3  | 5524.9  | 10879.8 | 14677.1 | 15061.6 | 5688.0  | 1050.8  | 726.5   | 540.4   | 99.2    |
| 82.5° | 804.5   | 896.6   | 2037.7  | 4851.6  | 7521.9  | 7872.8  | 1793.2  | 529.8   | 531.6   | 444.8   | 60.2    |
| 85°   | 256.9   | 294.1   | 636.1   | 2177.7  | 3543.9  | 3111.5  | 467.8   | 256.9   | 386.3   | 331.4   | 33.7    |
| 87.5° | 31.9    | 40.8    | 202.0   | 512.1   | 781.4   | 434.1   | 72.6    | 76.2    | 164.8   | 184.3   | 19.5    |
| 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-T4FT-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 6230.2  | 6230.2 | 6230.2 | 6230.2 | 6230.2 | 6230.2 | 6230.2 | 6230.2 | 6230.2 | 6230.2 | 6230.2 |
| 2.5°  | 6244.4  | 6235.5 | 6237.3 | 6191.2 | 6161.1 | 6100.8 | 6038.8 | 6010.5 | 5980.3 | 5967.9 | 5980.3 |
| 5°    | 6276.2  | 6260.3 | 6214.2 | 6072.5 | 5921.9 | 5726.9 | 5544.4 | 5406.2 | 5232.6 | 5184.7 | 5234.3 |
| 7.5°  | 6325.9  | 6294.0 | 6159.3 | 5870.5 | 5535.6 | 5163.5 | 4745.3 | 4440.5 | 4190.7 | 4029.4 | 4087.9 |
| 10°   | 6398.5  | 6338.3 | 6067.2 | 5576.3 | 4977.4 | 4318.2 | 3724.6 | 3262.2 | 2934.3 | 2799.7 | 2794.4 |
| 12.5° | 6520.8  | 6407.4 | 5953.8 | 5193.6 | 4295.2 | 3416.3 | 2638.4 | 2137.0 | 1871.2 | 1699.3 | 1695.8 |
| 15°   | 6655.4  | 6488.9 | 5810.2 | 4734.7 | 3501.4 | 2447.1 | 1699.3 | 1318.3 | 1146.5 | 1091.5 | 1084.4 |
| 17.5° | 6820.2  | 6582.8 | 5624.2 | 4169.4 | 2670.3 | 1621.3 | 1109.2 | 999.4  | 992.3  | 987.0  | 987.0  |
| 20°   | 7027.6  | 6694.4 | 5385.0 | 3522.6 | 1894.2 | 1082.7 | 942.7  | 949.8  | 953.3  | 946.2  | 948.0  |
| 22.5° | 7268.5  | 6807.8 | 5099.7 | 2828.0 | 1281.1 | 905.5  | 901.9  | 910.8  | 914.3  | 910.8  | 912.6  |
| 25°   | 7548.5  | 6939.0 | 4752.4 | 2099.8 | 925.0  | 859.4  | 868.3  | 880.7  | 889.5  | 889.5  | 889.5  |
| 27.5° | 7895.8  | 7098.4 | 4334.2 | 1465.4 | 799.1  | 811.6  | 836.4  | 859.4  | 871.8  | 875.3  | 875.3  |
| 30°   | 8347.7  | 7296.9 | 3832.7 | 1004.7 | 726.5  | 747.8  | 793.8  | 838.1  | 861.2  | 864.7  | 866.5  |
| 32.5° | 8918.2  | 7520.2 | 3251.5 | 742.4  | 664.5  | 680.4  | 730.0  | 804.5  | 848.8  | 855.9  | 855.9  |
| 35°   | 9572.1  | 7778.9 | 2626.0 | 646.8  | 620.2  | 625.5  | 664.5  | 749.5  | 827.5  | 847.0  | 848.8  |
| 37.5° | 10287.9 | 8034.0 | 1997.0 | 604.2  | 583.0  | 583.0  | 611.3  | 684.0  | 776.1  | 836.4  | 843.4  |
| 40°   | 10956.0 | 8188.2 | 1399.8 | 570.6  | 549.3  | 549.3  | 574.1  | 627.3  | 714.1  | 804.5  | 824.0  |
| 42.5° | 11572.6 | 8241.3 | 974.6  | 538.7  | 517.4  | 522.7  | 544.0  | 586.5  | 652.1  | 742.4  | 760.2  |
| 45°   | 12207.0 | 8232.5 | 710.6  | 501.5  | 485.5  | 501.5  | 517.4  | 549.3  | 597.1  | 648.5  | 652.1  |
| 47.5° | 12685.4 | 8158.1 | 563.5  | 466.0  | 455.4  | 476.7  | 490.8  | 512.1  | 538.7  | 535.1  | 535.1  |
| 50°   | 13133.7 | 7977.3 | 453.6  | 418.2  | 425.3  | 450.1  | 457.2  | 464.3  | 466.0  | 432.4  | 428.8  |
| 52.5° | 13473.9 | 7695.6 | 363.2  | 366.8  | 395.1  | 420.0  | 412.9  | 402.2  | 384.5  | 343.8  | 336.7  |
| 55°   | 13587.3 | 7153.4 | 285.3  | 303.0  | 350.8  | 382.7  | 356.2  | 333.1  | 299.5  | 265.8  | 258.7  |
| 57.5° | 13381.8 | 6453.4 | 232.1  | 235.7  | 295.9  | 322.5  | 292.4  | 265.8  | 228.6  | 200.2  | 194.9  |
| 60°   | 12945.9 | 5675.6 | 191.4  | 177.2  | 228.6  | 251.6  | 232.1  | 205.5  | 171.9  | 150.6  | 148.8  |
| 62.5° | 12081.2 | 4846.3 | 157.7  | 138.2  | 173.7  | 193.1  | 180.7  | 161.2  | 132.9  | 118.7  | 116.9  |
| 65°   | 10263.1 | 3877.0 | 127.6  | 111.6  | 134.7  | 150.6  | 140.0  | 125.8  | 104.5  | 93.9   | 92.1   |
| 67.5° | 7164.0  | 2620.7 | 104.5  | 92.1   | 106.3  | 118.7  | 109.9  | 102.8  | 83.3   | 81.5   | 83.3   |
| 70°   | 3455.3  | 1263.4 | 86.8   | 74.4   | 83.3   | 92.1   | 88.6   | 83.3   | 79.7   | 92.1   | 106.3  |
| 72.5° | 990.5   | 423.5  | 69.1   | 62.0   | 67.3   | 72.6   | 76.2   | 74.4   | 86.8   | 111.6  | 129.4  |
| 73°   | 761.9   | 342.0  | 65.6   | 58.5   | 63.8   | 70.9   | 74.4   | 72.6   | 88.6   | 113.4  | 129.4  |
| 75°   | 326.0   | 164.8  | 49.6   | 47.8   | 53.2   | 62.0   | 65.6   | 65.6   | 88.6   | 115.2  | 124.0  |
| 77.5° | 147.1   | 88.6   | 31.9   | 37.2   | 46.1   | 49.6   | 54.9   | 54.9   | 70.9   | 88.6   | 88.6   |
| 80°   | 83.3    | 47.8   | 24.8   | 28.4   | 33.7   | 33.7   | 33.7   | 30.1   | 31.9   | 35.4   | 39.0   |
| 82.5° | 53.2    | 31.9   | 19.5   | 23.0   | 21.3   | 17.7   | 14.2   | 14.2   | 12.4   | 14.2   | 17.7   |
| 85°   | 30.1    | 17.7   | 17.7   | 14.2   | 8.9    | 7.1    | 8.9    | 7.1    | 1.8    | 0.0    | 1.8    |
| 87.5° | 17.7    | 10.6   | 5.3    | 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    |



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  
 Rf: 84.7  
 Rg: 94.6

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



### Test Conditions

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

REPORT NUMBER: SP1-2407-157-9

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

REPORT NUMBER: SP1-2407-157-9

**CIE 1931 Chromaticity Diagram**

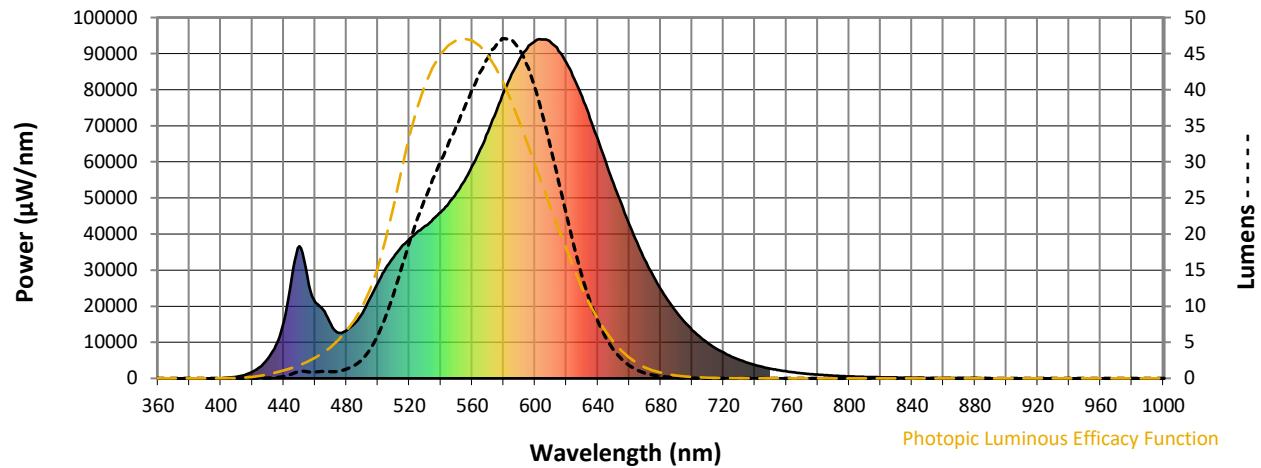


**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



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           |        |               |               |

REPORT NUMBER: SP1-2407-157-9

### 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              |           |                  |                  |

REPORT NUMBER: SP1-2407-157-9



**Melanopic Lumens: 9797**

**M/P: 2.26**

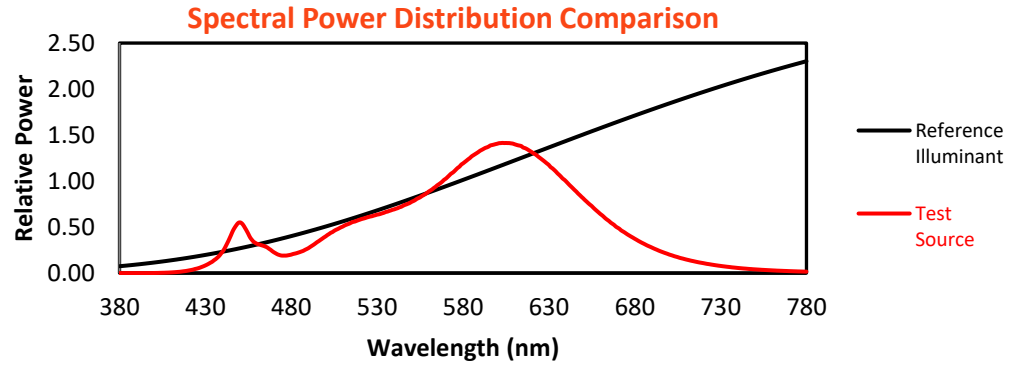
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------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

REPORT NUMBER: SP1-2407-157-9

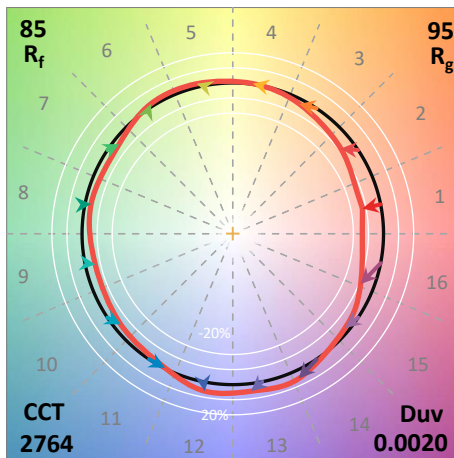
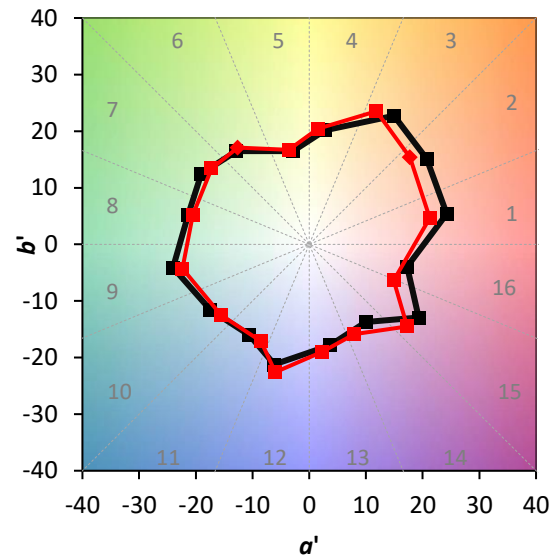
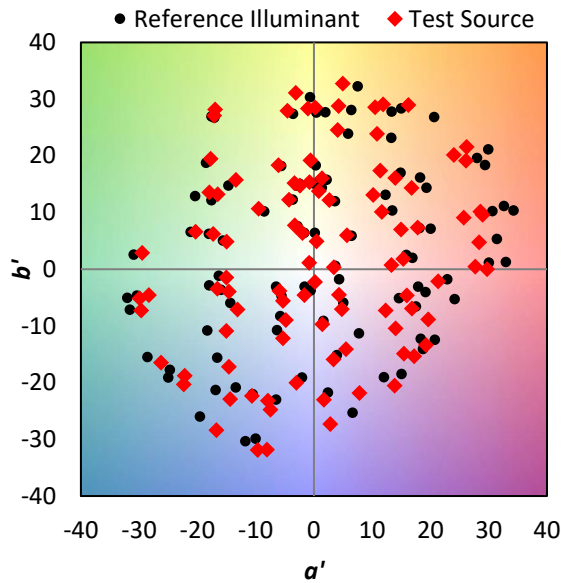
TM-30-18

### Summary

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



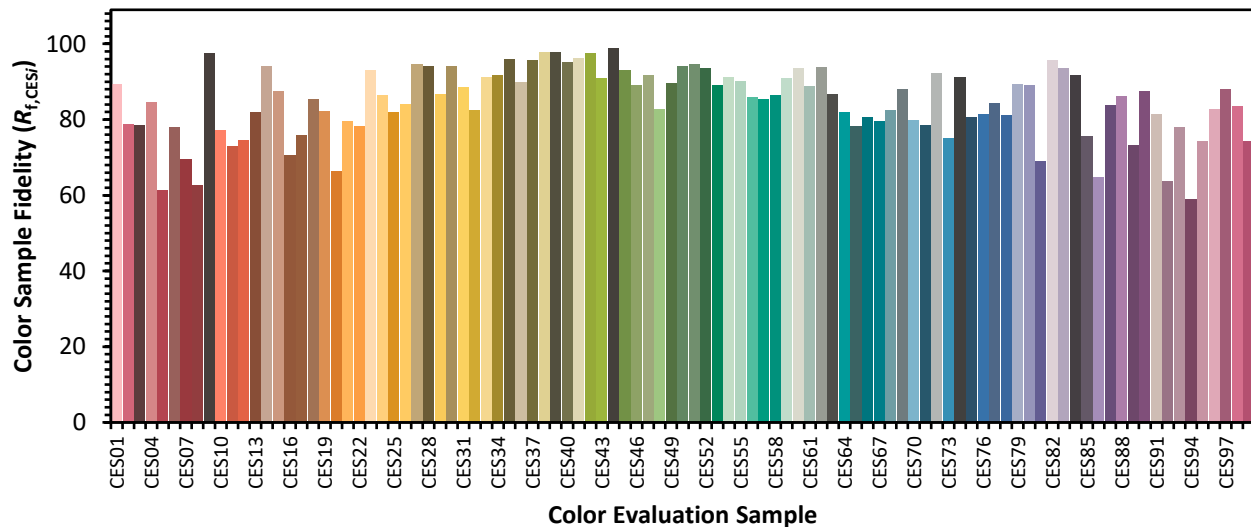
### Color Vector Graphics





**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)