

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: P321729

Luminaire Tested: **GLEON-SA5C-827-U-T3R-HSS**

Issue Date: 3/3/2020

### Test Information

Test Method: LM-79-08  
Report Number: P321729  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-11)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA5C-827-U-T3R-HSS  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(5) 80 CRI, 2700K, 1050mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE III  
ROADWAY OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

### Summary

Lumens per Lamp: N/A  
Luminaire Lumens: 19987 lumens  
Efficiency: N/A  
Efficacy: 71.6 lumens/watt  
Luminous Opening: Rectangular (W 1.5' x L: 1' x H: 0')  
IES Classification: Type III - Medium  
BUG Rating: B2 - U0 - G4

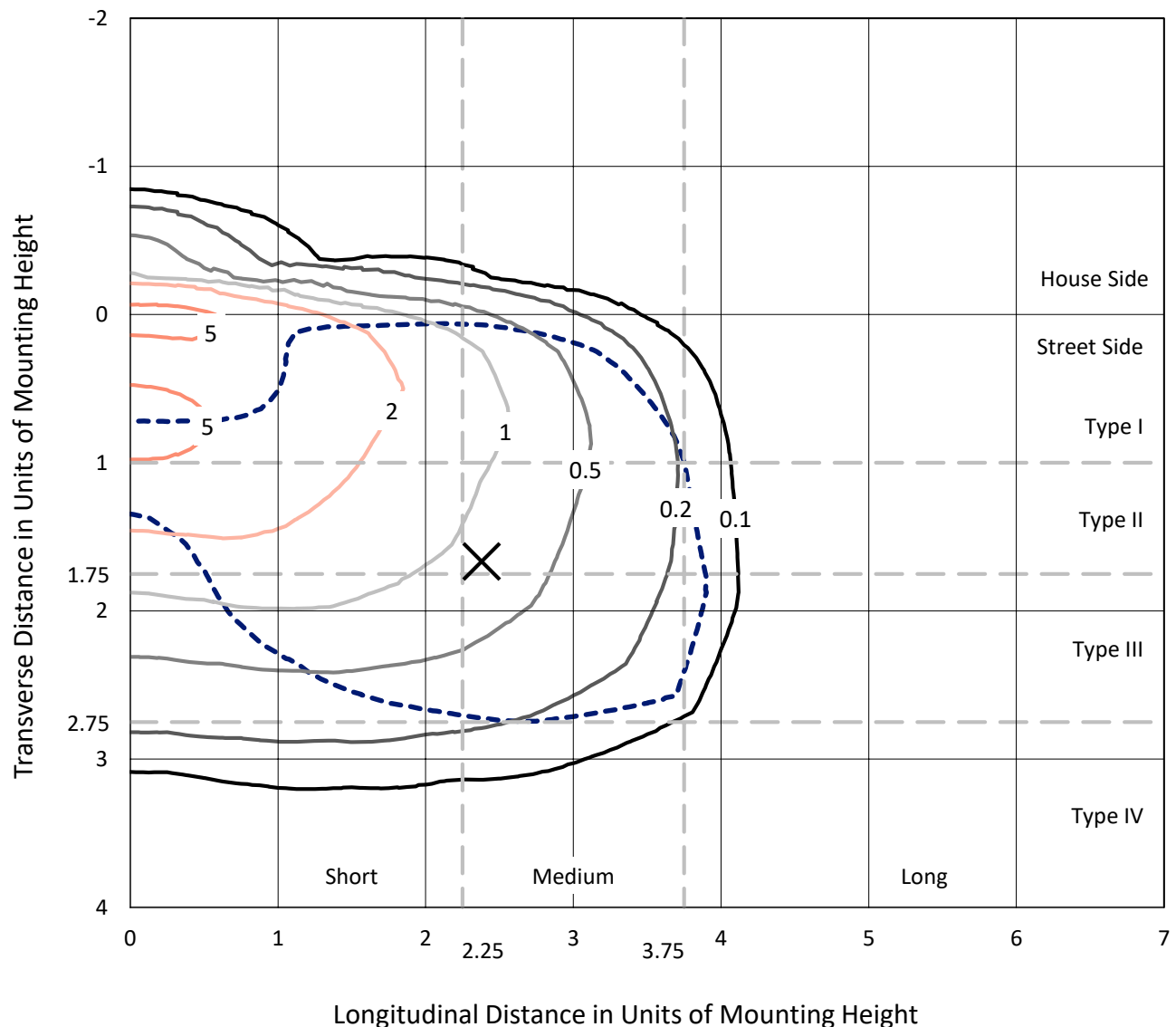
Input Watts (W): 279  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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## Iso-Footcandle Lines of Horizontal Illumination

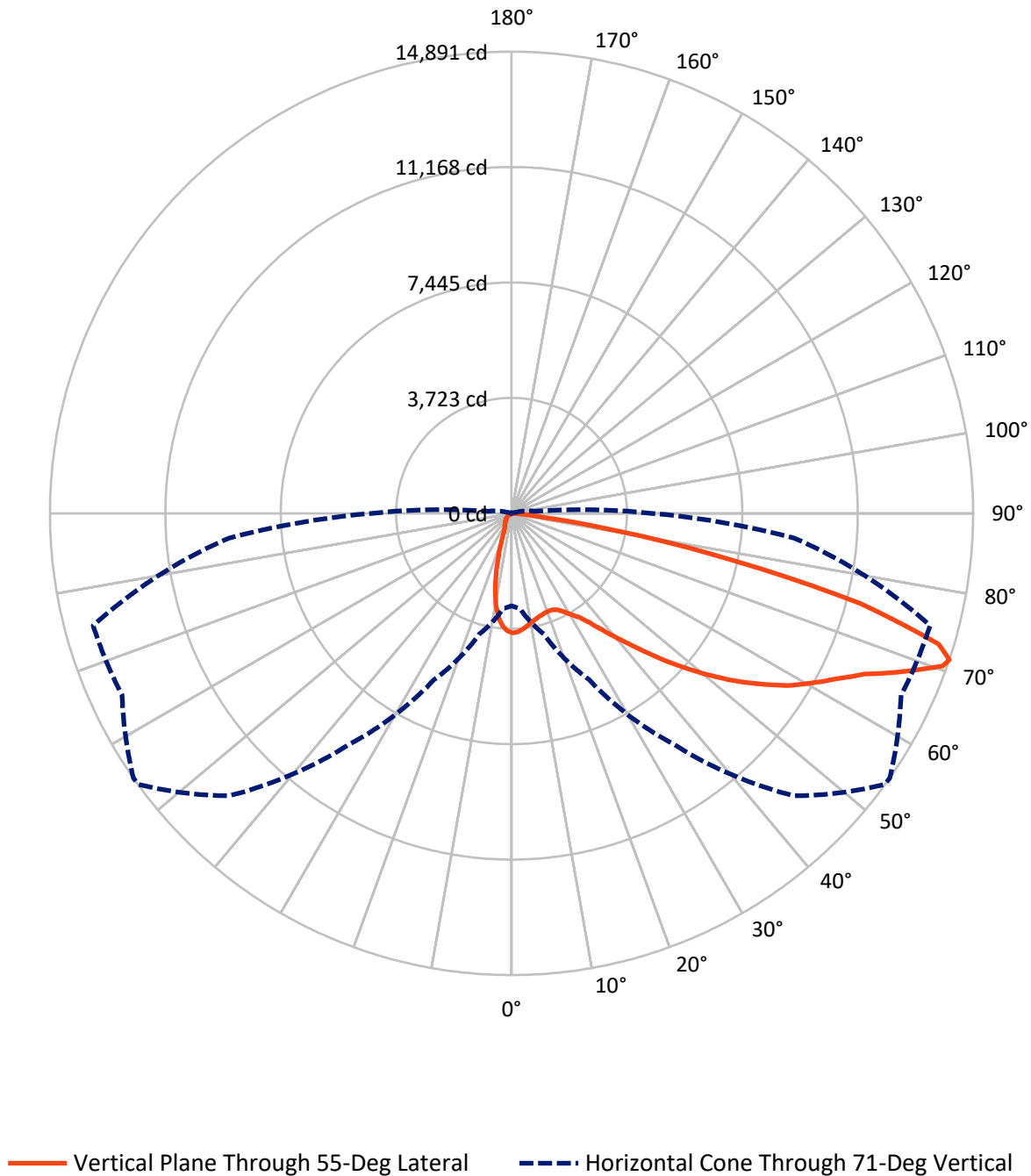
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 6.3 fc  
 Type III - Medium - N/A

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## Luminous Intensity Polar Plot



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**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 1582.4   | 0.0    | 1582.4  |
|                    | % Fixture | 7.9      | 0.0    | 7.9     |
| <b>Street Side</b> | Lumens    | 18404.6  | 0.0    | 18404.6 |
|                    | % Fixture | 92.1     | 0.0    | 92.1    |
| <b>Total</b>       | Lumens    | 19987.0  | 0.0    | 19987.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 328.7   | 1.6       |
| 10°-20°   | 742.0   | 3.7       |
| 20°-30°   | 1192.4  | 6.0       |
| 30°-40°   | 2025.9  | 10.1      |
| 40°-50°   | 3144.4  | 15.7      |
| 50°-60°   | 4227.6  | 21.2      |
| 60°-70°   | 5171.7  | 25.9      |
| 70°-80°   | 3023.8  | 15.1      |
| 80°-90°   | 130.7   | 0.7       |
| 90°-100°  | 0.0     | 0.0       |
| 100°-110° | 0.0     | 0.0       |
| 110°-120° | 0.0     | 0.0       |
| 120°-130° | 0.0     | 0.0       |
| 130°-140° | 0.0     | 0.0       |
| 140°-150° | 0.0     | 0.0       |
| 150°-160° | 0.0     | 0.0       |
| 160°-170° | 0.0     | 0.0       |
| 170°-180° | 0.0     | 0.0       |
| 0°-90°    | 19987.0 | 100.0     |
| 0°-180°   | 19987.0 | 100.0     |

**Coefficient of Utilization**



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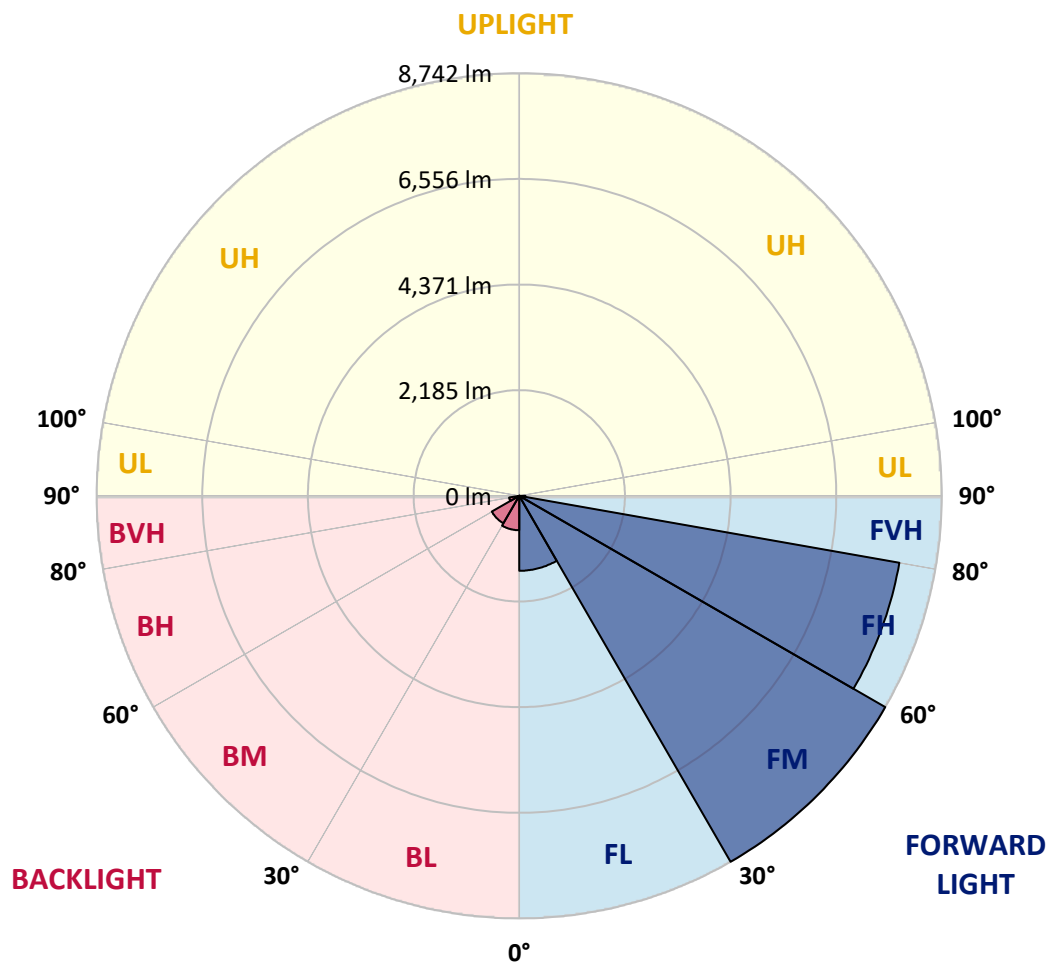
CATALOG NUMBER: GLEON-SA5C-827-U-T3R-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |          |
|------|-------------|--------|-----------|-------------------------|------|----------|
|      |             |        |           | B                       | U    | G        |
| FL   | (0°-30°)    | 1550.7 | 7.8       |                         |      |          |
| FM   | (30°-60°)   | 8741.7 | 43.7      |                         |      |          |
| FH   | (60°-80°)   | 7983.5 | 39.9      |                         |      | G4/12000 |
| FVH  | (80°-90°)   | 128.6  | 0.6       |                         |      | G2/225   |
| BL   | (0°-30°)    | 712.3  | 3.6       | B2/1000                 |      |          |
| BM   | (30°-60°)   | 656.1  | 3.3       | B1/1000                 |      |          |
| BH   | (60°-80°)   | 212.0  | 1.1       | B1/500                  |      | G1/500   |
| BVH  | (80°-90°)   | 2.1    | 0.0       |                         |      | G0/10    |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |          |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |          |

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

Type III Medium





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°     | 45°     | 54°     | 55°     | 65°     | 75°     | 85°     |
|-------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 3854.6 | 3854.6 | 3854.6 | 3854.6 | 3854.6  | 3854.6  | 3854.6  | 3854.6  | 3854.6  | 3854.6  | 3854.6  |
| 2.5°  | 3741.5 | 3746.0 | 3762.1 | 3769.3 | 3786.4  | 3815.1  | 3829.4  | 3830.3  | 3853.7  | 3862.6  | 3869.8  |
| 5°    | 3476.7 | 3503.7 | 3530.6 | 3559.3 | 3611.4  | 3680.5  | 3748.7  | 3754.9  | 3830.3  | 3886.0  | 3915.6  |
| 7.5°  | 3248.8 | 3273.0 | 3305.3 | 3351.1 | 3424.7  | 3533.3  | 3647.3  | 3660.7  | 3803.4  | 3930.0  | 3996.4  |
| 10°   | 3014.5 | 3034.3 | 3081.0 | 3148.3 | 3249.7  | 3395.1  | 3548.5  | 3571.0  | 3779.2  | 3989.2  | 4105.9  |
| 12.5° | 2764.2 | 2775.8 | 2832.4 | 2929.3 | 3078.3  | 3263.1  | 3465.1  | 3494.7  | 3763.9  | 4057.4  | 4235.1  |
| 15°   | 2573.9 | 2579.3 | 2633.1 | 2733.6 | 2904.2  | 3144.7  | 3400.5  | 3436.4  | 3767.5  | 4139.1  | 4376.0  |
| 17.5° | 2525.4 | 2528.1 | 2556.8 | 2626.0 | 2776.7  | 3038.8  | 3349.3  | 3393.3  | 3778.3  | 4218.9  | 4517.8  |
| 20°   | 2722.0 | 2703.1 | 2673.5 | 2662.7 | 2727.4  | 2975.1  | 3318.8  | 3368.1  | 3792.6  | 4289.8  | 4645.2  |
| 22.5° | 3261.3 | 3205.7 | 3082.8 | 2918.5 | 2818.9  | 2979.5  | 3326.9  | 3376.2  | 3838.4  | 4376.9  | 4792.4  |
| 25°   | 4061.9 | 3984.7 | 3775.6 | 3452.5 | 3142.0  | 3108.8  | 3394.2  | 3444.4  | 3927.3  | 4481.0  | 4933.3  |
| 27.5° | 4972.8 | 4896.5 | 4640.7 | 4179.4 | 3649.9  | 3364.6  | 3548.5  | 3595.2  | 4059.2  | 4573.4  | 5041.0  |
| 30°   | 5845.1 | 5823.6 | 5522.0 | 4997.9 | 4288.9  | 3779.2  | 3747.8  | 3787.3  | 4157.0  | 4629.1  | 5126.3  |
| 32.5° | 6584.6 | 6550.5 | 6308.2 | 5798.4 | 5020.4  | 4277.3  | 3982.0  | 3993.7  | 4230.6  | 4700.9  | 5237.5  |
| 35°   | 7270.3 | 7228.1 | 7015.4 | 6533.5 | 5770.6  | 4885.7  | 4342.8  | 4325.7  | 4391.2  | 4845.4  | 5399.1  |
| 37.5° | 7868.9 | 7907.5 | 7671.4 | 7212.8 | 6443.7  | 5518.4  | 4829.2  | 4778.0  | 4642.5  | 5080.5  | 5633.3  |
| 40°   | 8369.7 | 8369.7 | 8246.7 | 7864.4 | 7170.7  | 6172.7  | 5379.3  | 5312.0  | 5020.4  | 5443.1  | 5930.4  |
| 42.5° | 8550.0 | 8588.6 | 8634.4 | 8418.1 | 7821.3  | 6853.0  | 5992.3  | 5922.3  | 5552.5  | 5957.3  | 6305.5  |
| 45°   | 8560.8 | 8621.8 | 8856.1 | 8855.2 | 8409.1  | 7528.7  | 6683.3  | 6650.1  | 6234.6  | 6617.8  | 6770.4  |
| 47.5° | 8409.1 | 8485.4 | 8871.3 | 9090.3 | 8874.9  | 8157.9  | 7439.0  | 7397.7  | 7036.0  | 7427.3  | 7256.8  |
| 50°   | 8174.9 | 8259.3 | 8708.0 | 9182.7 | 9191.7  | 8705.3  | 8235.0  | 8173.1  | 7918.2  | 8352.6  | 7759.4  |
| 52.5° | 7755.8 | 7919.1 | 8561.7 | 9204.3 | 9399.9  | 9178.3  | 8992.5  | 8965.6  | 8905.4  | 9243.8  | 8159.7  |
| 55°   | 6859.2 | 7040.5 | 8194.7 | 9211.5 | 9592.9  | 9597.4  | 9702.4  | 9709.6  | 9830.7  | 10076.6 | 8457.6  |
| 57.5° | 6435.6 | 6538.0 | 7553.9 | 9245.6 | 9879.2  | 10073.0 | 10425.7 | 10481.4 | 10668.9 | 10867.3 | 8797.7  |
| 60°   | 6169.1 | 6290.3 | 7238.0 | 9198.9 | 10328.8 | 10696.8 | 11096.1 | 11115.0 | 11316.0 | 11683.1 | 9258.1  |
| 62.5° | 5956.4 | 6075.8 | 7038.7 | 9019.4 | 10834.1 | 11447.0 | 11751.3 | 11753.1 | 11903.8 | 12655.0 | 9781.4  |
| 65°   | 5431.4 | 5531.9 | 6635.8 | 8817.5 | 11167.9 | 12189.2 | 12512.3 | 12500.6 | 12623.6 | 13679.9 | 10388.9 |
| 67.5° | 4672.1 | 4749.3 | 5812.8 | 8052.0 | 11042.3 | 12864.1 | 13661.0 | 13622.5 | 13473.5 | 14565.7 | 10627.6 |
| 70°   | 3612.3 | 3640.1 | 4581.5 | 6710.3 | 9864.8  | 13123.5 | 14771.2 | 14751.5 | 13994.9 | 14406.8 | 9752.6  |
| 71°   | 2985.8 | 3077.4 | 4037.6 | 5922.3 | 9076.0  | 12883.8 | 14878.9 | 14890.6 | 13863.9 | 13974.3 | 9150.4  |
| 72.5° | 1733.9 | 1812.0 | 2926.6 | 4548.3 | 7705.5  | 11884.1 | 14320.7 | 14405.0 | 13251.8 | 12710.6 | 7815.9  |
| 75°   | 371.5  | 397.6  | 1085.0 | 2201.5 | 4238.7  | 8329.3  | 11303.4 | 11604.1 | 10800.9 | 8647.0  | 4710.7  |
| 77.5° | 258.5  | 279.1  | 464.9  | 998.9  | 1400.9  | 4115.7  | 7021.7  | 7360.9  | 6452.7  | 3249.7  | 1507.7  |
| 80°   | 204.6  | 228.0  | 362.6  | 493.6  | 378.7   | 1327.3  | 3289.2  | 3496.5  | 2152.1  | 725.1   | 254.0   |
| 82.5° | 114.0  | 135.5  | 282.7  | 266.5  | 145.4   | 252.2   | 920.8   | 1041.0  | 430.8   | 146.3   | 60.1    |
| 85°   | 33.2   | 40.4   | 182.2  | 193.9  | 61.9    | 48.5    | 157.1   | 194.7   | 81.7    | 38.6    | 26.9    |
| 87.5° | 0.0    | 0.0    | 88.0   | 74.5   | 17.9    | 7.2     | 14.4    | 16.2    | 16.2    | 16.2    | 17.9    |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |



REPORT NUMBER: P321729

CATALOG NUMBER: GLEON-SA5C-827-U-T3R-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 3854.6 | 3854.6 | 3854.6 | 3854.6 | 3854.6 | 3854.6 | 3854.6 | 3854.6 | 3854.6 | 3854.6 | 3854.6 |
| 2.5°  | 3869.8 | 3876.1 | 3853.7 | 3824.1 | 3792.6 | 3754.0 | 3713.7 | 3682.3 | 3681.4 | 3666.1 | 3650.8 |
| 5°    | 3917.4 | 3913.8 | 3851.9 | 3757.6 | 3646.4 | 3530.6 | 3420.2 | 3295.5 | 3254.2 | 3203.0 | 3186.0 |
| 7.5°  | 4005.3 | 3980.2 | 3849.2 | 3642.8 | 3398.7 | 3156.3 | 2906.0 | 2653.8 | 2546.1 | 2449.2 | 2432.1 |
| 10°   | 4115.7 | 4068.2 | 3832.1 | 3470.5 | 3022.6 | 2575.7 | 2197.9 | 1855.0 | 1704.3 | 1588.5 | 1583.1 |
| 12.5° | 4230.6 | 4157.9 | 3784.6 | 3210.2 | 2529.9 | 1901.7 | 1466.4 | 1129.0 | 1003.4 | 922.6  | 929.8  |
| 15°   | 4350.9 | 4242.3 | 3682.3 | 2859.3 | 1969.0 | 1290.5 | 901.0  | 702.7  | 652.4  | 631.8  | 637.2  |
| 17.5° | 4473.8 | 4300.6 | 3539.6 | 2436.6 | 1415.3 | 832.8  | 623.7  | 568.1  | 568.1  | 572.6  | 574.4  |
| 20°   | 4580.6 | 4332.0 | 3329.6 | 1962.7 | 959.4  | 606.7  | 545.7  | 537.6  | 542.1  | 549.2  | 550.1  |
| 22.5° | 4686.5 | 4333.8 | 3055.8 | 1482.6 | 671.3  | 531.3  | 519.6  | 516.0  | 518.7  | 526.8  | 527.7  |
| 25°   | 4772.7 | 4312.3 | 2713.0 | 1054.5 | 535.8  | 500.8  | 495.4  | 493.6  | 495.4  | 505.3  | 505.3  |
| 27.5° | 4807.7 | 4234.2 | 2294.8 | 741.3  | 480.1  | 466.7  | 464.9  | 466.7  | 469.4  | 476.5  | 477.4  |
| 30°   | 4811.3 | 4097.8 | 1838.9 | 536.7  | 435.3  | 420.9  | 424.5  | 430.8  | 428.1  | 426.3  | 428.1  |
| 32.5° | 4820.2 | 3939.8 | 1394.6 | 441.5  | 397.6  | 375.1  | 370.6  | 370.6  | 359.9  | 353.6  | 350.0  |
| 35°   | 4849.8 | 3754.0 | 1011.4 | 396.7  | 359.0  | 333.0  | 315.9  | 296.2  | 275.5  | 264.7  | 262.1  |
| 37.5° | 4896.5 | 3559.3 | 724.2  | 367.1  | 324.9  | 295.3  | 263.0  | 228.0  | 198.3  | 190.3  | 190.3  |
| 40°   | 4981.8 | 3358.3 | 535.8  | 343.7  | 298.0  | 261.2  | 212.7  | 166.9  | 140.0  | 135.5  | 135.5  |
| 42.5° | 5116.4 | 3146.5 | 427.2  | 323.1  | 274.6  | 226.2  | 162.4  | 121.2  | 101.4  | 98.7   | 97.8   |
| 45°   | 5256.4 | 2913.1 | 373.3  | 303.3  | 249.5  | 185.8  | 120.3  | 89.7   | 78.1   | 75.4   | 75.4   |
| 47.5° | 5396.4 | 2664.5 | 347.3  | 284.5  | 225.3  | 144.5  | 89.7   | 70.9   | 65.5   | 65.5   | 66.4   |
| 50°   | 5514.9 | 2405.2 | 328.5  | 263.9  | 193.9  | 109.5  | 70.9   | 60.1   | 58.3   | 61.9   | 62.8   |
| 52.5° | 5544.5 | 2150.3 | 305.1  | 237.8  | 155.3  | 83.5   | 58.3   | 52.9   | 52.9   | 52.9   | 52.9   |
| 55°   | 5526.5 | 1952.9 | 274.6  | 205.5  | 114.9  | 66.4   | 50.3   | 46.7   | 45.8   | 45.8   | 45.8   |
| 57.5° | 5587.5 | 1836.2 | 219.9  | 159.7  | 82.6   | 53.8   | 44.0   | 41.3   | 39.5   | 38.6   | 38.6   |
| 60°   | 5710.5 | 1759.9 | 157.1  | 114.9  | 61.9   | 44.9   | 37.7   | 35.0   | 32.3   | 30.5   | 30.5   |
| 62.5° | 5873.8 | 1693.5 | 116.7  | 85.3   | 47.6   | 35.9   | 31.4   | 28.7   | 25.1   | 23.3   | 23.3   |
| 65°   | 5999.5 | 1575.0 | 88.8   | 63.7   | 35.9   | 28.7   | 24.2   | 23.3   | 17.9   | 16.2   | 15.3   |
| 67.5° | 5807.4 | 1314.8 | 71.8   | 46.7   | 26.9   | 22.4   | 18.8   | 17.9   | 10.8   | 9.0    | 9.0    |
| 70°   | 4980.9 | 915.4  | 57.4   | 34.1   | 19.7   | 17.9   | 15.3   | 11.7   | 8.1    | 7.2    | 7.2    |
| 71°   | 4516.9 | 764.6  | 52.1   | 28.7   | 17.1   | 17.1   | 14.4   | 9.9    | 7.2    | 6.3    | 6.3    |
| 72.5° | 3752.3 | 543.0  | 44.0   | 22.4   | 15.3   | 17.9   | 15.3   | 9.0    | 7.2    | 6.3    | 5.4    |
| 75°   | 2178.1 | 227.1  | 30.5   | 15.3   | 11.7   | 21.5   | 19.7   | 8.1    | 5.4    | 4.5    | 4.5    |
| 77.5° | 655.1  | 83.5   | 17.1   | 9.9    | 9.0    | 18.8   | 22.4   | 7.2    | 2.7    | 0.9    | 0.9    |
| 80°   | 119.4  | 35.9   | 10.8   | 6.3    | 6.3    | 11.7   | 17.1   | 3.6    | 0.0    | 0.0    | 0.0    |
| 82.5° | 42.2   | 17.9   | 6.3    | 3.6    | 2.7    | 5.4    | 8.1    | 0.0    | 0.0    | 0.0    | 0.0    |
| 85°   | 24.2   | 12.6   | 3.6    | 1.8    | 0.0    | 0.9    | 1.8    | 0.0    | 0.0    | 0.0    | 0.0    |
| 87.5° | 16.2   | 3.6    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

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

Report Prepared for

Cooper Lighting Solutions

Invue

Report Number: SP1-2407-157-9

Test Date: 10/03/2024

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

Data applicable to all product families utilizing light square engine

### Test Information

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

### Spectral Parameters

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

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



### Test Conditions

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

REPORT NUMBER: SP1-2407-157-9

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

REPORT NUMBER: SP1-2407-157-9

**CIE 1931 Chromaticity Diagram**



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



Point lies inside the ANSI 2700K 4-step quadrangle

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### Photopic Flux vs. Wavelength



**Photopic Lumens: 4337.9**

| λ (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**

| $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|
| 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)