

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: P317582

Luminaire Tested: **GLEON-SA8D-827-U-T2R**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P317582  
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-SA8D-827-U-T2R  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(8) 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: 47623 lumens  
Efficiency: N/A  
Efficacy: 93.2 lumens/watt  
Luminous Opening: Rectangular (W 2' x L: 1' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B3 - U0 - G4

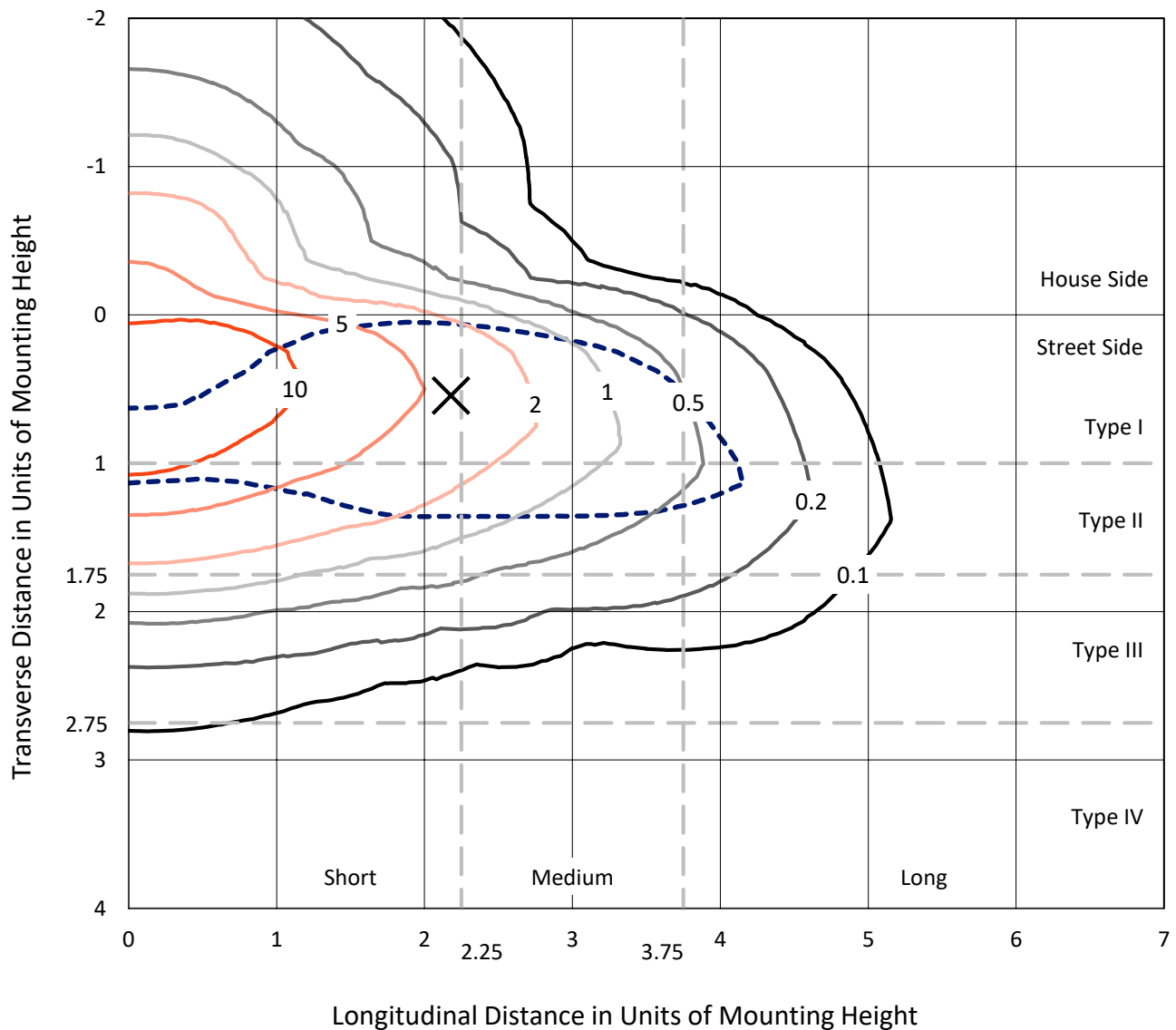
Input Watts (W): 511  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



REPORT NUMBER: P317582  
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## Iso-Footcandle Lines of Horizontal Illumination

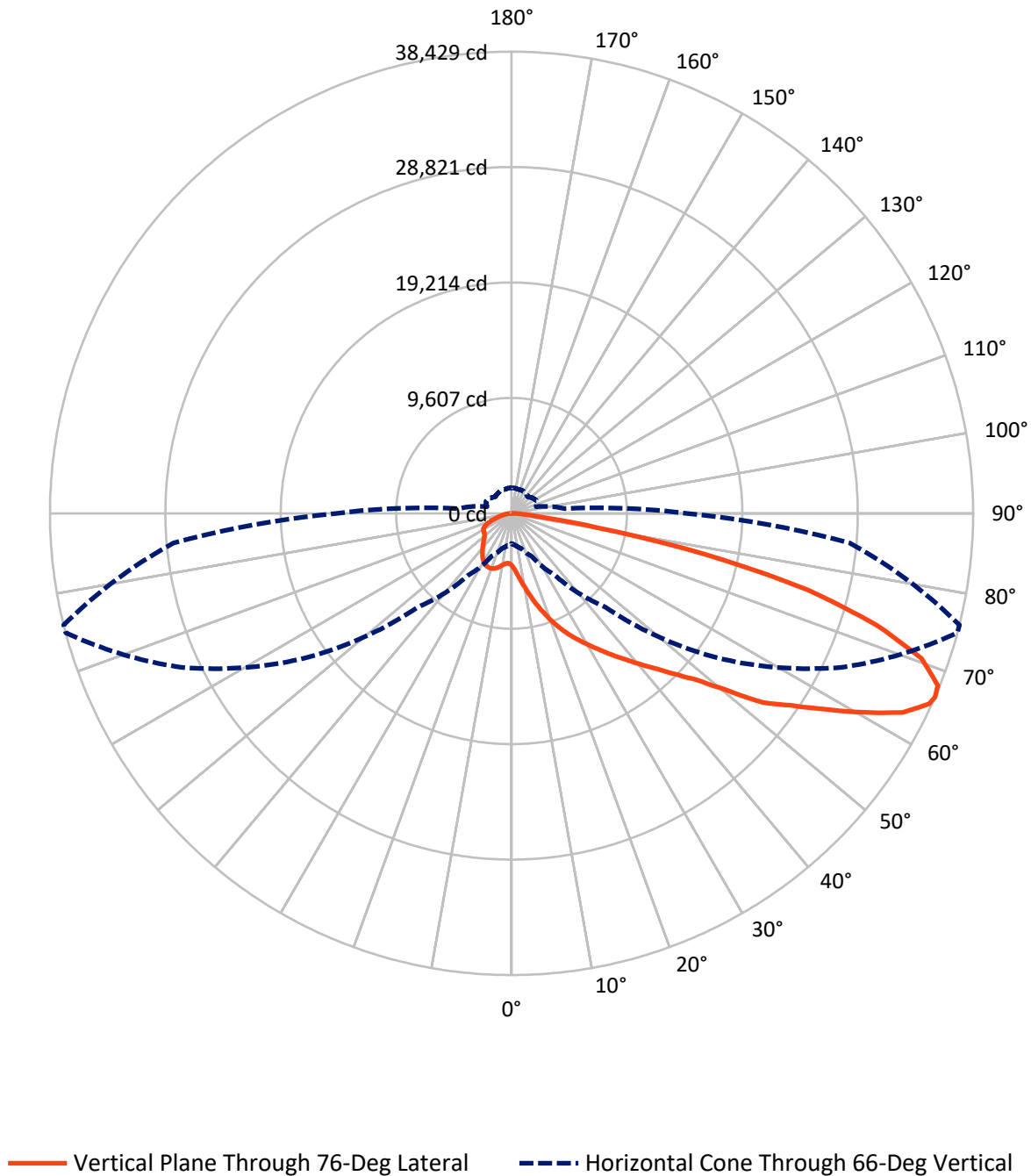
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 18.5 fc  
 Type II - Short - N/A

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## Luminous Intensity Polar Plot



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CATALOG NUMBER: GLEON-SA8D-827-U-T2R

**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 8013.3   | 0.0    | 8013.3  |
|                    | % Fixture | 16.8     | 0.0    | 16.8    |
| <b>Street Side</b> | Lumens    | 39609.7  | 0.0    | 39609.7 |
|                    | % Fixture | 83.2     | 0.0    | 83.2    |
| <b>Total</b>       | Lumens    | 47623.0  | 0.0    | 47623.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 525.9   | 1.1       |
| 10°-20°   | 2076.8  | 4.4       |
| 20°-30°   | 4035.8  | 8.5       |
| 30°-40°   | 6587.3  | 13.8      |
| 40°-50°   | 8999.8  | 18.9      |
| 50°-60°   | 10482.9 | 22.0      |
| 60°-70°   | 9398.1  | 19.7      |
| 70°-80°   | 4749.4  | 10.0      |
| 80°-90°   | 767.0   | 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°    | 47623.0 | 100.0     |
| 0°-180°   | 47623.0 | 100.0     |

**Coefficient of Utilization**



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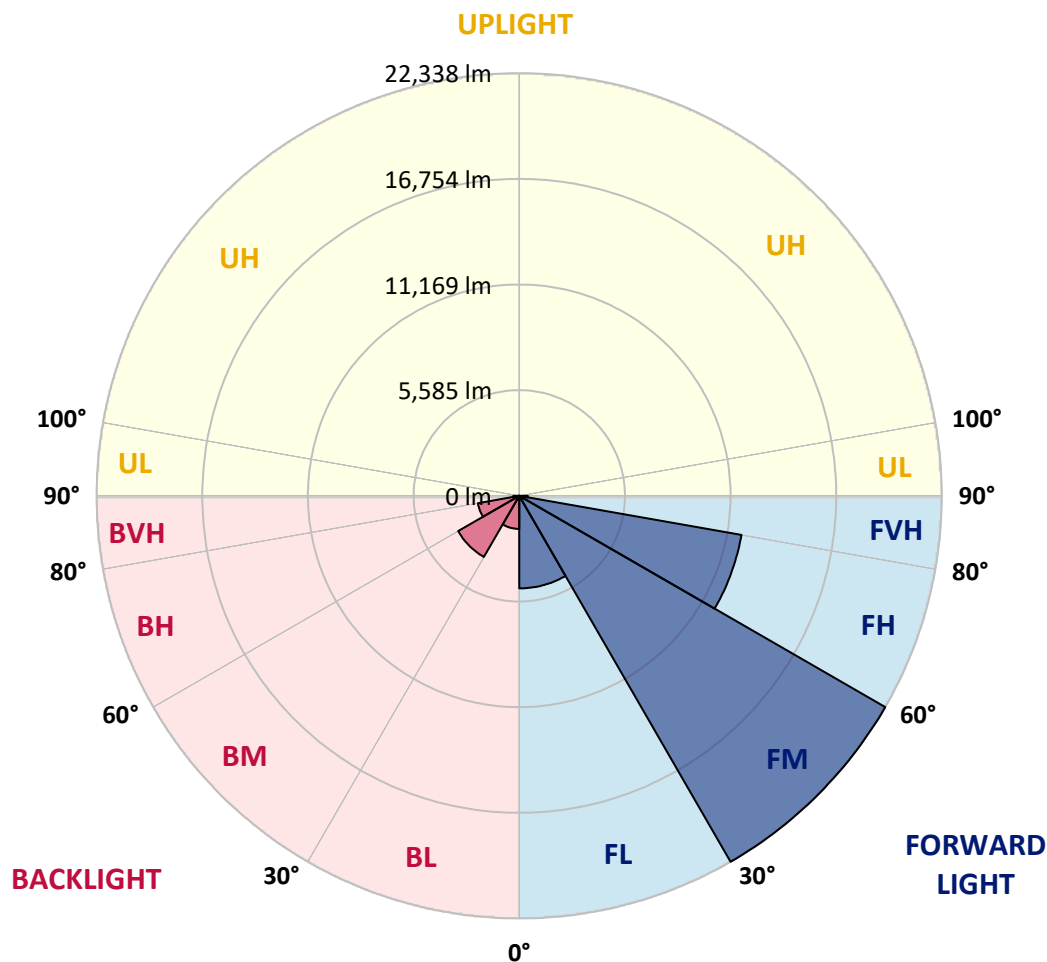
CATALOG NUMBER: GLEON-SA8D-827-U-T2R

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |          |
|------|-------------|---------|-----------|-------------------------|------|----------|
|      |             |         |           | B                       | U    | G        |
| FL   | (0°-30°)    | 4890.8  | 10.3      |                         |      |          |
| FM   | (30°-60°)   | 22338.5 | 46.9      |                         |      |          |
| FH   | (60°-80°)   | 11927.5 | 25.0      |                         |      | G4/12000 |
| FVH  | (80°-90°)   | 452.9   | 1.0       |                         |      | G3/500   |
| BL   | (0°-30°)    | 1747.7  | 3.7       | B3/2500                 |      |          |
| BM   | (30°-60°)   | 3731.5  | 7.8       | B3/5000                 |      |          |
| BH   | (60°-80°)   | 2220.1  | 4.7       | B3/2500                 |      | G3/2500  |
| BVH  | (80°-90°)   | 314.0   | 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-G4**

Type II Short



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 55°     | 65°     | 75°     | 76°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 4349.1  | 4349.1  | 4349.1  | 4349.1  | 4349.1  | 4349.1  | 4349.1  | 4349.1  | 4349.1  | 4349.1  | 4349.1  |
| 2.5°  | 5773.4  | 5686.1  | 5678.0  | 5550.3  | 5521.2  | 5277.1  | 5097.6  | 4910.1  | 4696.7  | 4654.6  | 4486.5  |
| 5°    | 7416.0  | 7407.9  | 7296.4  | 7087.8  | 6924.5  | 6507.4  | 6095.1  | 5658.6  | 5180.1  | 5102.5  | 4724.1  |
| 7.5°  | 8893.7  | 8880.8  | 8795.1  | 8570.4  | 8334.3  | 7821.8  | 7233.3  | 6564.0  | 5788.0  | 5673.2  | 5045.9  |
| 10°   | 10015.8 | 10010.9 | 9981.8  | 9816.9  | 9616.4  | 9124.9  | 8475.0  | 7561.5  | 6494.5  | 6337.7  | 5448.4  |
| 12.5° | 10882.3 | 10892.0 | 10911.4 | 10853.2 | 10757.8 | 10339.1 | 9673.0  | 8618.9  | 7247.9  | 7092.7  | 5896.3  |
| 15°   | 11469.2 | 11498.3 | 11598.6 | 11681.0 | 11731.1 | 11474.1 | 10829.0 | 9700.5  | 8091.8  | 7905.9  | 6392.6  |
| 17.5° | 11765.1 | 11797.4 | 11970.4 | 12219.4 | 12449.0 | 12423.1 | 11910.6 | 10732.0 | 8901.8  | 8722.4  | 6926.2  |
| 20°   | 12020.5 | 12044.8 | 12238.8 | 12537.9 | 12943.7 | 13123.1 | 12835.4 | 11724.7 | 9789.4  | 9576.0  | 7492.0  |
| 22.5° | 12761.0 | 12791.7 | 12849.9 | 13019.7 | 13378.6 | 13708.4 | 13569.4 | 12664.0 | 10602.6 | 10403.8 | 8028.8  |
| 25°   | 14190.2 | 14227.4 | 14101.3 | 13957.4 | 14025.3 | 14254.9 | 14280.7 | 13520.9 | 11427.2 | 11202.5 | 8606.0  |
| 27.5° | 15912.0 | 15965.4 | 15750.4 | 15380.1 | 15056.8 | 14967.9 | 14937.1 | 14222.5 | 12214.5 | 11954.2 | 9176.7  |
| 30°   | 17598.3 | 17690.5 | 17410.8 | 16930.6 | 16337.2 | 15920.1 | 15611.3 | 14909.7 | 12990.6 | 12741.6 | 9715.0  |
| 32.5° | 19245.8 | 19208.6 | 18802.8 | 18333.9 | 17638.7 | 17116.5 | 16369.6 | 15646.9 | 13863.6 | 13577.5 | 10250.2 |
| 35°   | 20374.3 | 20387.2 | 20010.5 | 19454.3 | 18791.5 | 18390.5 | 17384.9 | 16442.3 | 14754.4 | 14490.9 | 10858.1 |
| 37.5° | 21334.6 | 21274.8 | 20848.0 | 20329.0 | 19758.3 | 19586.9 | 18573.2 | 17318.6 | 15719.6 | 15431.9 | 11504.8 |
| 40°   | 21654.7 | 21585.2 | 21305.5 | 20932.0 | 20474.5 | 20460.0 | 19884.4 | 18311.3 | 16811.0 | 16526.4 | 12233.9 |
| 42.5° | 21460.7 | 21371.8 | 21257.0 | 21155.2 | 21014.5 | 21079.2 | 21116.4 | 19475.4 | 18010.6 | 17692.1 | 13077.9 |
| 45°   | 20744.5 | 20610.3 | 20691.1 | 20912.6 | 21218.2 | 21583.6 | 22228.7 | 20763.9 | 19354.1 | 19087.3 | 14068.9 |
| 47.5° | 19643.5 | 19522.2 | 19774.5 | 20248.2 | 21079.2 | 22003.9 | 23281.2 | 22186.6 | 20957.9 | 20692.8 | 15480.4 |
| 50°   | 18094.7 | 18130.2 | 18490.8 | 19352.5 | 20608.7 | 22198.0 | 24577.8 | 24070.2 | 23289.3 | 23041.9 | 17405.9 |
| 52.5° | 15553.1 | 15559.6 | 16574.9 | 17989.6 | 19774.5 | 22097.7 | 25297.3 | 26477.5 | 26472.6 | 26173.5 | 19239.3 |
| 55°   | 13192.7 | 13336.6 | 14140.1 | 16020.4 | 18422.9 | 21696.8 | 25800.1 | 27648.0 | 28563.1 | 28212.3 | 20948.2 |
| 57.5° | 10887.2 | 10971.3 | 11732.7 | 13621.1 | 16494.1 | 20628.1 | 26315.8 | 29053.0 | 30972.1 | 30750.6 | 23072.6 |
| 60°   | 8264.8  | 8394.2  | 9181.5  | 10926.0 | 14026.9 | 18731.7 | 26364.3 | 30519.4 | 33851.5 | 33628.4 | 25444.4 |
| 62.5° | 5364.4  | 5587.5  | 6324.7  | 7959.3  | 11042.4 | 16004.2 | 25239.1 | 31478.1 | 36580.6 | 36501.3 | 27549.4 |
| 65°   | 3083.1  | 3251.3  | 3763.8  | 5024.9  | 7618.1  | 12579.9 | 22563.3 | 31109.5 | 38260.4 | 38215.1 | 28336.8 |
| 66°   | 2518.9  | 2624.0  | 3016.9  | 3927.1  | 6285.9  | 11047.2 | 21008.0 | 30331.8 | 38426.9 | 38428.5 | 28246.2 |
| 67.5° | 2014.5  | 2061.4  | 2237.6  | 2811.5  | 4638.5  | 8756.3  | 18228.8 | 28616.5 | 38219.9 | 38276.5 | 27662.6 |
| 70°   | 1666.9  | 1691.1  | 1746.1  | 1885.1  | 2531.8  | 5280.3  | 12938.8 | 24159.1 | 36142.4 | 36186.1 | 25384.6 |
| 72.5° | 1495.5  | 1510.0  | 1531.1  | 1550.5  | 1786.5  | 2950.6  | 7902.7  | 19326.6 | 31688.3 | 31744.9 | 21913.4 |
| 75°   | 1354.8  | 1362.9  | 1359.7  | 1361.3  | 1498.7  | 1880.3  | 4083.9  | 14429.5 | 25622.2 | 25509.1 | 16786.7 |
| 77.5° | 1189.9  | 1198.0  | 1181.8  | 1185.1  | 1325.7  | 1445.4  | 2032.3  | 10101.4 | 17291.1 | 16492.5 | 9458.0  |
| 80°   | 1005.6  | 1012.1  | 1005.6  | 1016.9  | 1154.4  | 1091.3  | 1181.8  | 5682.9  | 7645.6  | 7231.7  | 3362.8  |
| 82.5° | 759.9   | 787.4   | 806.8   | 852.0   | 950.6   | 776.0   | 790.6   | 2213.3  | 2328.1  | 2216.6  | 1031.5  |
| 85°   | 333.1   | 405.8   | 607.9   | 651.5   | 714.6   | 465.6   | 519.0   | 902.1   | 947.4   | 918.3   | 375.1   |
| 87.5° | 87.3    | 95.4    | 300.7   | 378.3   | 396.1   | 210.2   | 270.0   | 410.7   | 433.3   | 410.7   | 124.5   |
| 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: P317582

CATALOG NUMBER: GLEON-SA8D-827-U-T2R

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 4349.1  | 4349.1 | 4349.1 | 4349.1 | 4349.1 | 4349.1 | 4349.1 | 4349.1 | 4349.1 | 4349.1 | 4349.1 |
| 2.5°  | 4397.6  | 4318.3 | 4176.1 | 4050.0 | 3954.6 | 3889.9 | 3825.2 | 3792.9 | 3773.5 | 3754.1 | 3757.3 |
| 5°    | 4538.2  | 4378.2 | 4134.0 | 3961.0 | 3864.0 | 3802.6 | 3770.3 | 3757.3 | 3749.2 | 3729.8 | 3729.8 |
| 7.5°  | 4750.0  | 4523.7 | 4187.4 | 4009.5 | 3933.5 | 3886.7 | 3867.3 | 3860.8 | 3851.1 | 3828.5 | 3831.7 |
| 10°   | 5016.8  | 4699.9 | 4298.9 | 4125.9 | 4056.4 | 4004.7 | 3977.2 | 3967.5 | 3949.7 | 3923.8 | 3927.1 |
| 12.5° | 5330.4  | 4918.1 | 4446.1 | 4265.0 | 4180.9 | 4111.4 | 4066.1 | 4038.6 | 4007.9 | 3974.0 | 3975.6 |
| 15°   | 5673.2  | 5155.8 | 4604.5 | 4389.5 | 4274.7 | 4177.7 | 4104.9 | 4058.0 | 4009.5 | 3967.5 | 3965.9 |
| 17.5° | 6020.8  | 5385.4 | 4725.8 | 4457.4 | 4302.2 | 4174.4 | 4075.8 | 4003.1 | 3943.3 | 3891.5 | 3886.7 |
| 20°   | 6395.9  | 5592.3 | 4793.7 | 4450.9 | 4250.4 | 4098.5 | 3967.5 | 3877.0 | 3810.7 | 3758.9 | 3750.9 |
| 22.5° | 6777.4  | 5786.3 | 4805.0 | 4384.6 | 4135.6 | 3949.7 | 3812.3 | 3712.1 | 3644.2 | 3590.8 | 3571.4 |
| 25°   | 7126.6  | 5936.7 | 4758.1 | 4256.9 | 3975.6 | 3775.1 | 3640.9 | 3539.1 | 3484.1 | 3421.0 | 3401.6 |
| 27.5° | 7445.1  | 6041.8 | 4664.3 | 4093.6 | 3796.1 | 3598.9 | 3472.8 | 3385.5 | 3325.7 | 3277.1 | 3261.0 |
| 30°   | 7731.3  | 6098.4 | 4510.7 | 3899.6 | 3611.8 | 3432.4 | 3325.7 | 3265.8 | 3214.1 | 3152.7 | 3141.3 |
| 32.5° | 8002.9  | 6098.4 | 4313.5 | 3687.8 | 3429.1 | 3285.2 | 3222.2 | 3185.0 | 3126.8 | 3067.0 | 3050.8 |
| 35°   | 8274.5  | 6061.2 | 4080.7 | 3466.3 | 3261.0 | 3180.1 | 3176.9 | 3133.3 | 3044.3 | 2963.5 | 2942.5 |
| 37.5° | 8560.7  | 5985.2 | 3818.8 | 3259.4 | 3123.6 | 3133.3 | 3160.7 | 3063.7 | 2937.6 | 2822.8 | 2792.1 |
| 40°   | 8884.0  | 5880.1 | 3547.1 | 3079.9 | 3008.8 | 3112.2 | 3117.1 | 2963.5 | 2717.8 | 2612.7 | 2585.2 |
| 42.5° | 9264.0  | 5775.0 | 3294.9 | 2921.5 | 2918.2 | 3049.2 | 3034.6 | 2746.9 | 2599.7 | 2546.4 | 2531.8 |
| 45°   | 9763.5  | 5715.2 | 3055.7 | 2771.1 | 2847.1 | 2947.3 | 2894.0 | 2627.2 | 2565.8 | 2535.1 | 2522.1 |
| 47.5° | 10550.9 | 5745.9 | 2835.8 | 2651.5 | 2776.0 | 2845.5 | 2632.1 | 2578.7 | 2535.1 | 2497.9 | 2484.9 |
| 50°   | 11537.1 | 5728.1 | 2657.9 | 2569.0 | 2695.1 | 2738.8 | 2514.0 | 2515.7 | 2493.0 | 2451.0 | 2431.6 |
| 52.5° | 12279.2 | 5589.1 | 2543.1 | 2522.1 | 2624.0 | 2549.6 | 2439.7 | 2454.2 | 2442.9 | 2381.5 | 2360.5 |
| 55°   | 12995.4 | 5469.5 | 2484.9 | 2504.3 | 2572.2 | 2313.6 | 2352.4 | 2387.9 | 2376.6 | 2316.8 | 2307.1 |
| 57.5° | 13886.3 | 5446.8 | 2449.4 | 2509.2 | 2528.6 | 2195.5 | 2268.3 | 2315.2 | 2307.1 | 2281.2 | 2276.4 |
| 60°   | 14977.6 | 5453.3 | 2417.0 | 2517.3 | 2480.1 | 2108.2 | 2189.1 | 2248.9 | 2253.7 | 2248.9 | 2245.7 |
| 62.5° | 15577.4 | 5277.1 | 2336.2 | 2494.6 | 2394.4 | 2032.3 | 2106.6 | 2193.9 | 2195.5 | 2205.2 | 2203.6 |
| 65°   | 15068.1 | 4750.0 | 2185.8 | 2415.4 | 2250.5 | 1969.2 | 2035.5 | 2130.9 | 2106.6 | 2150.3 | 2150.3 |
| 66°   | 14573.4 | 4446.1 | 2111.5 | 2363.7 | 2189.1 | 1944.9 | 2012.9 | 2098.5 | 2067.8 | 2127.6 | 2127.6 |
| 67.5° | 13562.9 | 3933.5 | 1977.3 | 2253.7 | 2101.8 | 1911.0 | 1987.0 | 2045.2 | 2003.2 | 2092.1 | 2085.6 |
| 70°   | 11716.6 | 3042.7 | 1707.3 | 2004.8 | 1957.9 | 1860.9 | 1951.4 | 1938.5 | 1877.0 | 2012.9 | 1987.0 |
| 72.5° | 9878.3  | 2312.0 | 1371.0 | 1678.2 | 1739.6 | 1797.8 | 1901.3 | 1802.7 | 1725.1 | 1820.5 | 1763.9 |
| 75°   | 7665.0  | 1738.0 | 1083.2 | 1304.7 | 1469.6 | 1699.2 | 1841.5 | 1645.9 | 1534.3 | 1524.6 | 1493.9 |
| 77.5° | 4143.7  | 1193.2 | 858.5  | 995.9  | 1167.3 | 1576.3 | 1801.1 | 1477.7 | 1309.6 | 1270.8 | 1246.5 |
| 80°   | 1641.0  | 776.0  | 624.1  | 755.0  | 816.5  | 1398.5 | 1704.1 | 1282.1 | 1080.0 | 1041.2 | 1004.0 |
| 82.5° | 677.4   | 459.2  | 402.6  | 506.0  | 531.9  | 1196.4 | 1529.4 | 1050.9 | 834.2  | 1154.4 | 1225.5 |
| 85°   | 291.0   | 252.2  | 239.3  | 261.9  | 300.7  | 839.1  | 1217.4 | 801.9  | 900.5  | 803.5  | 638.6  |
| 87.5° | 87.3    | 106.7  | 101.9  | 100.2  | 109.9  | 200.5  | 648.3  | 446.2  | 661.3  | 250.6  | 187.5  |
| 90°   | 0.0     | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

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



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

Report Prepared for

Cooper Lighting Solutions

Invue

Report Number: SP1-2407-157-9

Test Date: 10/03/2024

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

Data applicable to all product families utilizing light square engine

### Test Information

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

### Spectral Parameters

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

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



### Test Conditions

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

REPORT NUMBER: SP1-2407-157-9

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

REPORT NUMBER: SP1-2407-157-9

**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

REPORT NUMBER: SP1-2407-157-9

### Photopic Flux vs. Wavelength



**Photopic Lumens: 4337.9**

| 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            | 2.6              | 620       | 87426            | 22.8             | 750       | 2680             | 0.0              | 880       | 58               | 0.0              |
| 365       | 0                | 0.0              | 495       | 22295            | 3.9              | 625       | 83013            | 18.2             | 755       | 2287             | 0.0              | 885       | 46               | 0.0              |
| 370       | 0                | 0.0              | 500       | 26478            | 5.8              | 630       | 78077            | 14.1             | 760       | 1944             | 0.0              | 890       | 45               | 0.0              |
| 375       | 0                | 0.0              | 505       | 30524            | 8.5              | 635       | 72080            | 10.7             | 765       | 1653             | 0.0              | 895       | 41               | 0.0              |
| 380       | 0                | 0.0              | 510       | 33611            | 11.5             | 640       | 66249            | 7.9              | 770       | 1413             | 0.0              | 900       | 38               | 0.0              |
| 385       | 0                | 0.0              | 515       | 36490            | 15.2             | 645       | 59973            | 5.7              | 775       | 1198             | 0.0              | 905       | 33               | 0.0              |
| 390       | 0                | 0.0              | 520       | 38610            | 18.7             | 650       | 53972            | 3.9              | 780       | 1025             | 0.0              | 910       | 30               | 0.0              |
| 395       | 0                | 0.0              | 525       | 40511            | 21.9             | 655       | 48369            | 2.7              | 785       | 874              | 0.0              | 915       | 23               | 0.0              |
| 400       | 48               | 0.0              | 530       | 42223            | 24.9             | 660       | 42641            | 1.8              | 790       | 747              | 0.0              | 920       | 24               | 0.0              |
| 405       | 201              | 0.0              | 535       | 44137            | 27.6             | 665       | 37602            | 1.1              | 795       | 639              | 0.0              | 925       | 22               | 0.0              |
| 410       | 457              | 0.0              | 540       | 46032            | 30.0             | 670       | 32798            | 0.7              | 800       | 547              | 0.0              | 930       | 22               | 0.0              |
| 415       | 925              | 0.0              | 545       | 48553            | 32.5             | 675       | 28558            | 0.5              | 805       | 473              | 0.0              | 935       | 17               | 0.0              |
| 420       | 1816             | 0.0              | 550       | 51408            | 34.9             | 680       | 24782            | 0.3              | 810       | 401              | 0.0              | 940       | 13               | 0.0              |
| 425       | 3217             | 0.0              | 555       | 54711            | 37.4             | 685       | 21386            | 0.2              | 815       | 351              | 0.0              | 945       | 6                | 0.0              |
| 430       | 5520             | 0.0              | 560       | 58847            | 40.0             | 690       | 18413            | 0.1              | 820       | 307              | 0.0              | 950       | 10               | 0.0              |
| 435       | 9225             | 0.1              | 565       | 63386            | 42.4             | 695       | 15721            | 0.1              | 825       | 261              | 0.0              | 955       | 11               | 0.0              |
| 440       | 15522            | 0.2              | 570       | 68196            | 44.3             | 700       | 13432            | 0.0              | 830       | 228              | 0.0              | 960       | 8                | 0.0              |
| 445       | 27642            | 0.6              | 575       | 73613            | 46.0             | 705       | 11513            | 0.0              | 835       | 193              | 0.0              | 965       | 12               | 0.0              |
| 450       | 36602            | 0.9              | 580       | 79207            | 47.1             | 710       | 9780             | 0.0              | 840       | 174              | 0.0              | 970       | 3                | 0.0              |
| 455       | 28292            | 0.9              | 585       | 84248            | 47.0             | 715       | 8356             | 0.0              | 845       | 151              | 0.0              | 975       | 8                | 0.0              |
| 460       | 21166            | 0.9              | 590       | 88397            | 45.7             | 720       | 7161             | 0.0              | 850       | 123              | 0.0              | 980       | 2                | 0.0              |
| 465       | 19092            | 1.0              | 595       | 91428            | 43.4             | 725       | 6067             | 0.0              | 855       | 106              | 0.0              | 985       | 13               | 0.0              |
| 470       | 14951            | 0.9              | 600       | 93452            | 40.3             | 730       | 5164             | 0.0              | 860       | 95               | 0.0              | 990       | 16               | 0.0              |
| 475       | 12606            | 1.0              | 605       | 93959            | 36.4             | 735       | 4393             | 0.0              | 865       | 82               | 0.0              | 995       | 20               | 0.0              |
| 480       | 13323            | 1.3              | 610       | 93079            | 32.0             | 740       | 3694             | 0.0              | 870       | 77               | 0.0              | 1000      | 0                | 0.0              |
| 485       | 15164            | 1.8              | 615       | 90707            | 27.3             | 745       | 3157             | 0.0              | 875       | 65               | 0.0              |           |                  |                  |

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### Scotopic Flux vs. Wavelength



Scotopic Lumens: 5286.7

S/P: 1.22

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 0                | 0.0              | 490       | 18018            | 75.9             | 620       | 87426            | 0.4              | 750       | 2680             | 0.0              | 880       | 58               | 0.0              |
| 365       | 0                | 0.0              | 495       | 22295            | 93.2             | 625       | 83013            | 0.2              | 755       | 2287             | 0.0              | 885       | 46               | 0.0              |
| 370       | 0                | 0.0              | 500       | 26478            | 107.8            | 630       | 78077            | 0.1              | 760       | 1944             | 0.0              | 890       | 45               | 0.0              |
| 375       | 0                | 0.0              | 505       | 30524            | 118.7            | 635       | 72080            | 0.1              | 765       | 1653             | 0.0              | 895       | 41               | 0.0              |
| 380       | 0                | 0.0              | 510       | 33611            | 122.2            | 640       | 66249            | 0.1              | 770       | 1413             | 0.0              | 900       | 38               | 0.0              |
| 385       | 0                | 0.0              | 515       | 36490            | 120.8            | 645       | 59973            | 0.0              | 775       | 1198             | 0.0              | 905       | 33               | 0.0              |
| 390       | 0                | 0.0              | 520       | 38610            | 113.9            | 650       | 53972            | 0.0              | 780       | 1025             | 0.0              | 910       | 30               | 0.0              |
| 395       | 0                | 0.0              | 525       | 40511            | 104.1            | 655       | 48369            | 0.0              | 785       | 874              | 0.0              | 915       | 23               | 0.0              |
| 400       | 48               | 0.0              | 530       | 42223            | 92.4             | 660       | 42641            | 0.0              | 790       | 747              | 0.0              | 920       | 24               | 0.0              |
| 405       | 201              | 0.0              | 535       | 44137            | 80.5             | 665       | 37602            | 0.0              | 795       | 639              | 0.0              | 925       | 22               | 0.0              |
| 410       | 457              | 0.1              | 540       | 46032            | 68.2             | 670       | 32798            | 0.0              | 800       | 547              | 0.0              | 930       | 22               | 0.0              |
| 415       | 925              | 0.3              | 545       | 48553            | 57.1             | 675       | 28558            | 0.0              | 805       | 473              | 0.0              | 935       | 17               | 0.0              |
| 420       | 1816             | 1.1              | 550       | 51408            | 46.7             | 680       | 24782            | 0.0              | 810       | 401              | 0.0              | 940       | 13               | 0.0              |
| 425       | 3217             | 2.5              | 555       | 54711            | 37.4             | 685       | 21386            | 0.0              | 815       | 351              | 0.0              | 945       | 6                | 0.0              |
| 430       | 5520             | 5.9              | 560       | 58847            | 29.4             | 690       | 18413            | 0.0              | 820       | 307              | 0.0              | 950       | 10               | 0.0              |
| 435       | 9225             | 12.5             | 565       | 63386            | 22.5             | 695       | 15721            | 0.0              | 825       | 261              | 0.0              | 955       | 11               | 0.0              |
| 440       | 15522            | 26.3             | 570       | 68196            | 16.9             | 700       | 13432            | 0.0              | 830       | 228              | 0.0              | 960       | 8                | 0.0              |
| 445       | 27642            | 55.2             | 575       | 73613            | 12.4             | 705       | 11513            | 0.0              | 835       | 193              | 0.0              | 965       | 12               | 0.0              |
| 450       | 36602            | 85.4             | 580       | 79207            | 9.0              | 710       | 9780             | 0.0              | 840       | 174              | 0.0              | 970       | 3                | 0.0              |
| 455       | 28292            | 75.1             | 585       | 84248            | 6.3              | 715       | 8356             | 0.0              | 845       | 151              | 0.0              | 975       | 8                | 0.0              |
| 460       | 21166            | 63.2             | 590       | 88397            | 4.4              | 720       | 7161             | 0.0              | 850       | 123              | 0.0              | 980       | 2                | 0.0              |
| 465       | 19092            | 63.2             | 595       | 91428            | 3.0              | 725       | 6067             | 0.0              | 855       | 106              | 0.0              | 985       | 13               | 0.0              |
| 470       | 14951            | 54.2             | 600       | 93452            | 2.0              | 730       | 5164             | 0.0              | 860       | 95               | 0.0              | 990       | 16               | 0.0              |
| 475       | 12606            | 48.8             | 605       | 93959            | 1.3              | 735       | 4393             | 0.0              | 865       | 82               | 0.0              | 995       | 20               | 0.0              |
| 480       | 13323            | 54.2             | 610       | 93079            | 0.9              | 740       | 3694             | 0.0              | 870       | 77               | 0.0              | 1000      | 0                | 0.0              |
| 485       | 15164            | 63.3             | 615       | 90707            | 0.5              | 745       | 3157             | 0.0              | 875       | 65               | 0.0              |           |                  |                  |

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### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 9797**

**M/P: 2.26**

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 0                | 0.0              | 490       | 18018            | 27.7             | 620       | 87426            | 1.1              | 750       | 2680             | 0.0              | 880       | 58               | 0.0              |
| 365       | 0                | 0.0              | 495       | 22295            | 36.0             | 625       | 83013            | 0.7              | 755       | 2287             | 0.0              | 885       | 46               | 0.0              |
| 370       | 0                | 0.0              | 500       | 26478            | 44.2             | 630       | 78077            | 0.4              | 760       | 1944             | 0.0              | 890       | 45               | 0.0              |
| 375       | 0                | 0.0              | 505       | 30524            | 51.8             | 635       | 72080            | 0.3              | 765       | 1653             | 0.0              | 895       | 41               | 0.0              |
| 380       | 0                | 0.0              | 510       | 33611            | 57.0             | 640       | 66249            | 0.2              | 770       | 1413             | 0.0              | 900       | 38               | 0.0              |
| 385       | 0                | 0.0              | 515       | 36490            | 60.5             | 645       | 59973            | 0.1              | 775       | 1198             | 0.0              | 905       | 33               | 0.0              |
| 390       | 0                | 0.0              | 520       | 38610            | 61.4             | 650       | 53972            | 0.1              | 780       | 1025             | 0.0              | 910       | 30               | 0.0              |
| 395       | 0                | 0.0              | 525       | 40511            | 60.6             | 655       | 48369            | 0.0              | 785       | 874              | 0.0              | 915       | 23               | 0.0              |
| 400       | 48               | 0.0              | 530       | 42223            | 58.2             | 660       | 42641            | 0.0              | 790       | 747              | 0.0              | 920       | 24               | 0.0              |
| 405       | 201              | 0.0              | 535       | 44137            | 55.0             | 665       | 37602            | 0.0              | 795       | 639              | 0.0              | 925       | 22               | 0.0              |
| 410       | 457              | 0.0              | 540       | 46032            | 50.9             | 670       | 32798            | 0.0              | 800       | 547              | 0.0              | 930       | 22               | 0.0              |
| 415       | 925              | 0.1              | 545       | 48553            | 46.6             | 675       | 28558            | 0.0              | 805       | 473              | 0.0              | 935       | 17               | 0.0              |
| 420       | 1816             | 0.3              | 550       | 51408            | 42.0             | 680       | 24782            | 0.0              | 810       | 401              | 0.0              | 940       | 13               | 0.0              |
| 425       | 3217             | 0.8              | 555       | 54711            | 37.4             | 685       | 21386            | 0.0              | 815       | 351              | 0.0              | 945       | 6                | 0.0              |
| 430       | 5520             | 1.9              | 560       | 58847            | 32.9             | 690       | 18413            | 0.0              | 820       | 307              | 0.0              | 950       | 10               | 0.0              |
| 435       | 9225             | 4.1              | 565       | 63386            | 28.4             | 695       | 15721            | 0.0              | 825       | 261              | 0.0              | 955       | 11               | 0.0              |
| 440       | 15522            | 8.7              | 570       | 68196            | 24.1             | 700       | 13432            | 0.0              | 830       | 228              | 0.0              | 960       | 8                | 0.0              |
| 445       | 27642            | 18.5             | 575       | 73613            | 20.0             | 705       | 11513            | 0.0              | 835       | 193              | 0.0              | 965       | 12               | 0.0              |
| 450       | 36602            | 28.3             | 580       | 79207            | 16.3             | 710       | 9780             | 0.0              | 840       | 174              | 0.0              | 970       | 3                | 0.0              |
| 455       | 28292            | 24.7             | 585       | 84248            | 12.9             | 715       | 8356             | 0.0              | 845       | 151              | 0.0              | 975       | 8                | 0.0              |
| 460       | 21166            | 20.4             | 590       | 88397            | 9.8              | 720       | 7161             | 0.0              | 850       | 123              | 0.0              | 980       | 2                | 0.0              |
| 465       | 19092            | 20.1             | 595       | 91428            | 7.3              | 725       | 6067             | 0.0              | 855       | 106              | 0.0              | 985       | 13               | 0.0              |
| 470       | 14951            | 17.2             | 600       | 93452            | 5.3              | 730       | 5164             | 0.0              | 860       | 95               | 0.0              | 990       | 16               | 0.0              |
| 475       | 12606            | 15.7             | 605       | 93959            | 3.7              | 735       | 4393             | 0.0              | 865       | 82               | 0.0              | 995       | 20               | 0.0              |
| 480       | 13323            | 18.0             | 610       | 93079            | 2.5              | 740       | 3694             | 0.0              | 870       | 77               | 0.0              | 1000      | 0                | 0.0              |
| 485       | 15164            | 21.9             | 615       | 90707            | 1.7              | 745       | 3157             | 0.0              | 875       | 65               | 0.0              |           |                  |                  |

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TM-30-18

### Summary

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



### Color Vector Graphics



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 84 | CES51 = 95 | CES76 = 81 |
| CES02 = 63 | CES27 = 95 | CES52 = 94 | CES77 = 84 |
| CES03 = 31 | CES28 = 94 | CES53 = 89 | CES78 = 81 |
| CES04 = 71 | CES29 = 87 | CES54 = 91 | CES79 = 89 |
| CES05 = 50 | CES30 = 94 | CES55 = 90 | CES80 = 89 |
| CES06 = 52 | CES31 = 89 | CES56 = 86 | CES81 = 69 |
| CES07 = 43 | CES32 = 82 | CES57 = 85 | CES82 = 96 |
| CES08 = 41 | CES33 = 91 | CES58 = 86 | CES83 = 93 |
| CES09 = 29 | CES34 = 92 | CES59 = 91 | CES84 = 92 |
| CES10 = 77 | CES35 = 96 | CES60 = 94 | CES85 = 76 |
| CES11 = 60 | CES36 = 90 | CES61 = 89 | CES86 = 65 |
| CES12 = 66 | CES37 = 96 | CES62 = 94 | CES87 = 84 |
| CES13 = 44 | CES38 = 98 | CES63 = 87 | CES88 = 86 |
| CES14 = 74 | CES39 = 98 | CES64 = 82 | CES89 = 73 |
| CES15 = 72 | CES40 = 95 | CES65 = 78 | CES90 = 88 |
| CES16 = 48 | CES41 = 96 | CES66 = 81 | CES91 = 82 |
| CES17 = 50 | CES42 = 97 | CES67 = 80 | CES92 = 64 |
| CES18 = 57 | CES43 = 91 | CES68 = 83 | CES93 = 78 |
| CES19 = 73 | CES44 = 99 | CES69 = 88 | CES94 = 59 |
| CES20 = 67 | CES45 = 93 | CES70 = 80 | CES95 = 74 |
| CES21 = 87 | CES46 = 89 | CES71 = 79 | CES96 = 83 |
| CES22 = 79 | CES47 = 92 | CES72 = 92 | CES97 = 88 |
| CES23 = 92 | CES48 = 83 | CES73 = 75 | CES98 = 83 |
| CES24 = 91 | CES49 = 90 | CES74 = 91 | CES99 = 74 |
| CES25 = 72 | CES50 = 94 | CES75 = 81 |            |



**Color Rendition by Hue-Angle Bin**


**Measure Comparisons**



(END OF REPORT)