

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: P322669

Luminaire Tested: **GLEON-SA5A-827-U-T4FT-HSS**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P322669  
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-SA5A-827-U-T4FT-HSS  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(5) 80 CRI, 2700K, 615mA 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: 12159 lumens  
Efficiency: N/A  
Efficacy: 75.1 lumens/watt  
Luminous Opening: Rectangular (W 1.5' x L: 1' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B1 - U0 - G3

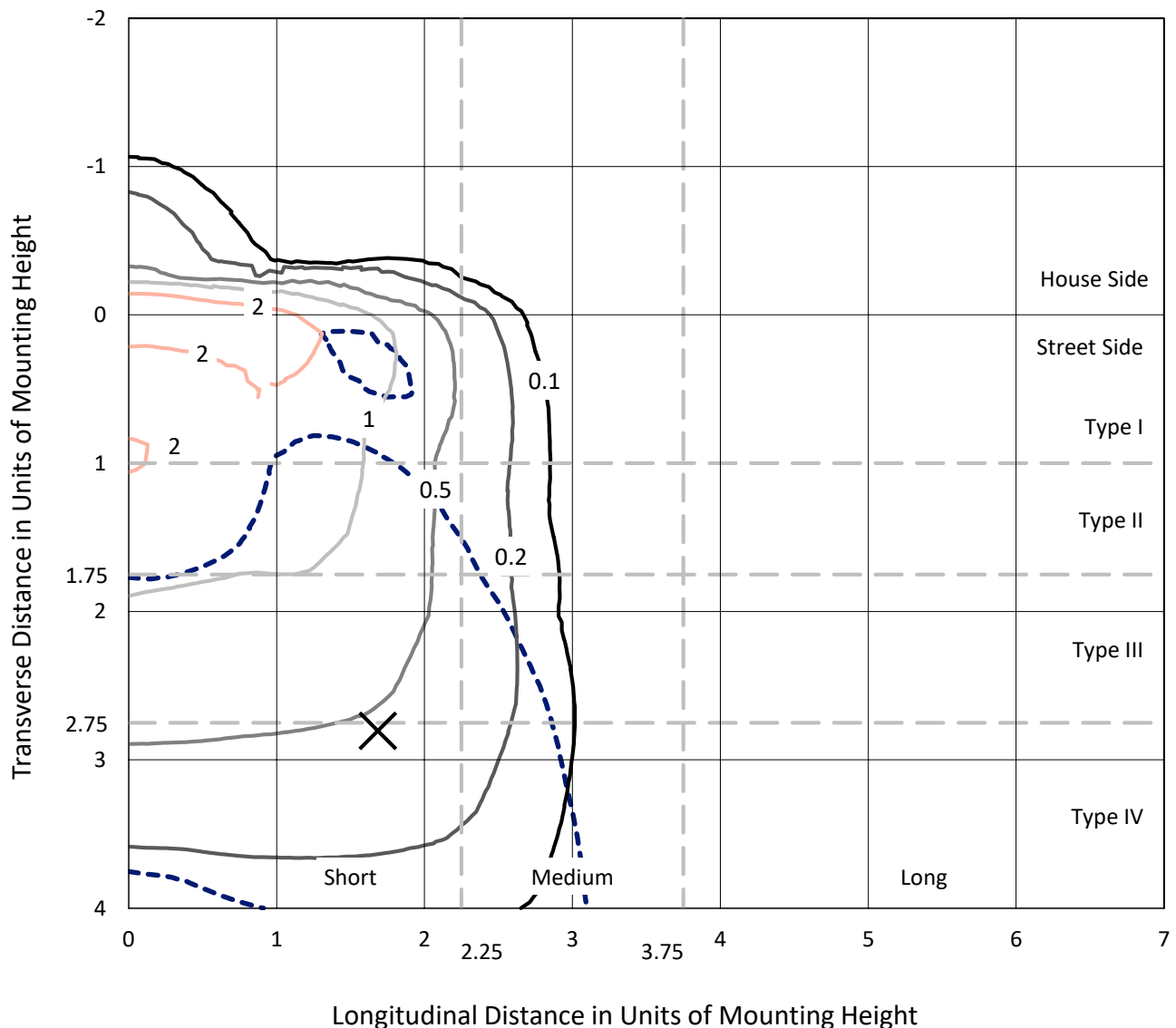
Input Watts (W): 162  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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## Iso-Footcandle Lines of Horizontal Illumination

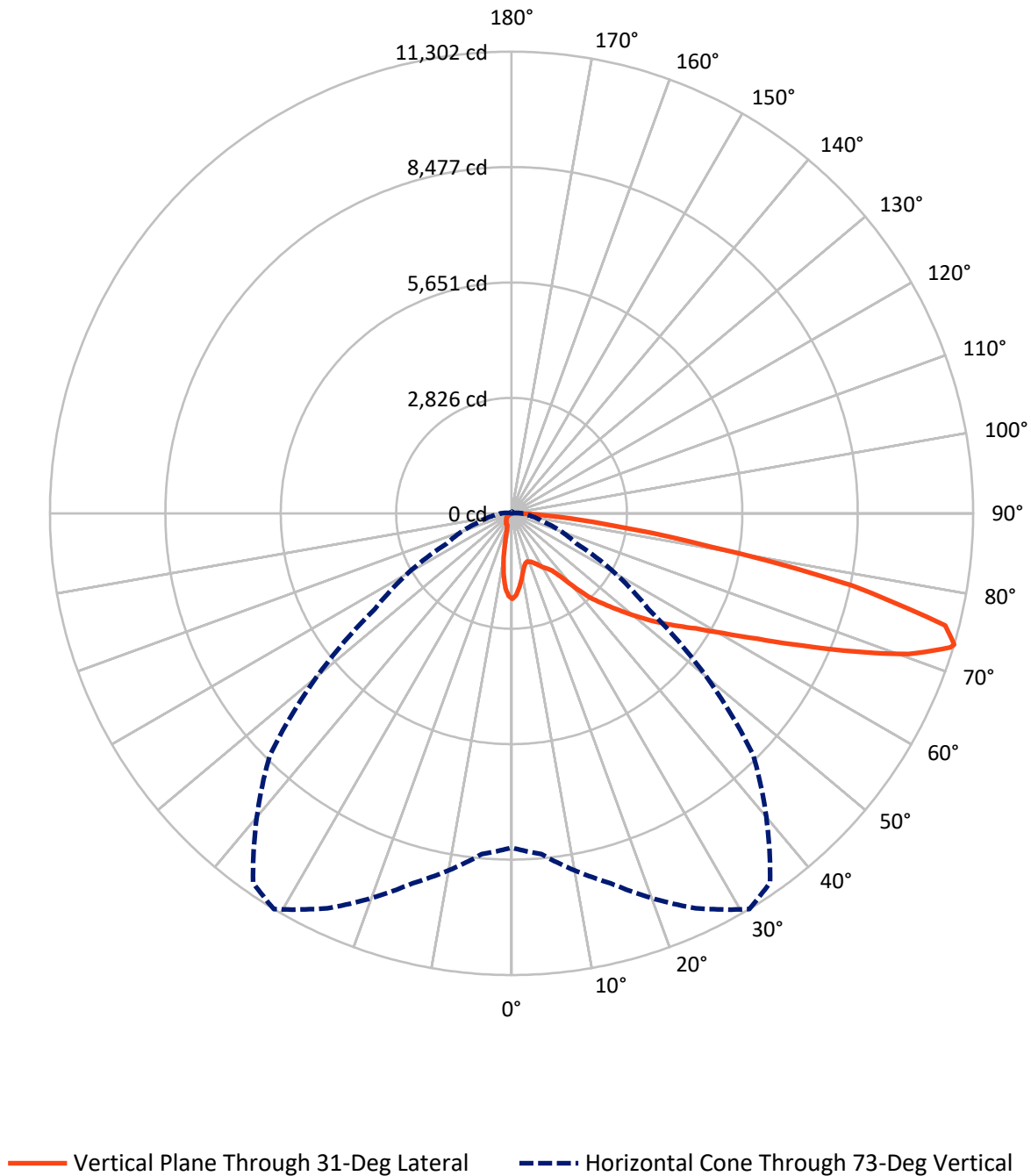
× Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 3.3 fc  
 Type IV - Short - N/A

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## Luminous Intensity Polar Plot



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**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 1108.3   | 0.0    | 1108.3  |
|                    | % Fixture | 9.1      | 0.0    | 9.1     |
| <b>Street Side</b> | Lumens    | 11050.7  | 0.0    | 11050.7 |
|                    | % Fixture | 90.9     | 0.0    | 90.9    |
| <b>Total</b>       | Lumens    | 12159.0  | 0.0    | 12159.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 173.5   | 1.4       |
| 10°-20°   | 376.6   | 3.1       |
| 20°-30°   | 564.3   | 4.6       |
| 30°-40°   | 897.8   | 7.4       |
| 40°-50°   | 1603.2  | 13.2      |
| 50°-60°   | 2487.7  | 20.5      |
| 60°-70°   | 3307.0  | 27.2      |
| 70°-80°   | 2487.6  | 20.5      |
| 80°-90°   | 261.4   | 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°    | 12159.0 | 100.0     |
| 0°-180°   | 12159.0 | 100.0     |

**Coefficient of Utilization**



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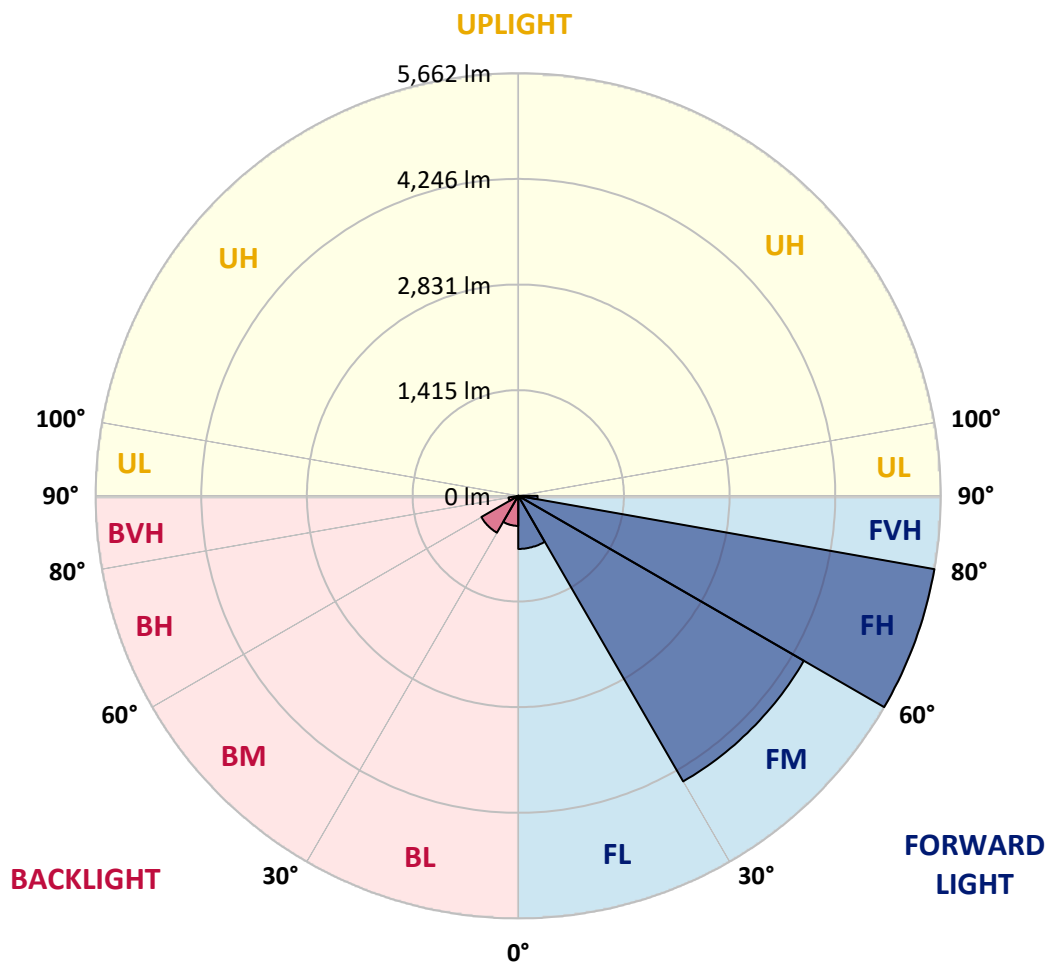
CATALOG NUMBER: GLEON-SA5A-827-U-T4FT-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 711.3  | 5.9       |                         |      |         |
| FM   | (30°-60°)   | 4418.2 | 36.3      |                         |      |         |
| FH   | (60°-80°)   | 5662.0 | 46.6      |                         |      | G3/7500 |
| FVH  | (80°-90°)   | 259.2  | 2.1       |                         |      | G3/500  |
| BL   | (0°-30°)    | 403.0  | 3.3       | B1/500                  |      |         |
| BM   | (30°-60°)   | 570.5  | 4.7       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 132.6  | 1.1       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 2.2    | 0.0       |                         |      | G0/10   |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B1-U0-G3**

Type IV Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°     | 31°     | 35°     | 45°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|---------|---------|---------|--------|--------|--------|--------|--------|
| 0°    | 2092.0 | 2092.0 | 2092.0 | 2092.0  | 2092.0  | 2092.0  | 2092.0 | 2092.0 | 2092.0 | 2092.0 | 2092.0 |
| 2.5°  | 1982.5 | 1990.8 | 1999.8 | 2001.5  | 2016.4  | 2017.0  | 2038.4 | 2054.5 | 2070.6 | 2086.0 | 2091.4 |
| 5°    | 1779.0 | 1792.7 | 1808.8 | 1824.8  | 1856.4  | 1868.9  | 1921.2 | 1974.8 | 2025.9 | 2074.7 | 2098.5 |
| 7.5°  | 1561.8 | 1577.3 | 1599.9 | 1639.8  | 1674.9  | 1699.3  | 1782.0 | 1877.2 | 1972.4 | 2062.2 | 2114.0 |
| 10°   | 1363.7 | 1378.0 | 1401.8 | 1444.0  | 1498.2  | 1531.5  | 1642.8 | 1774.9 | 1914.7 | 2050.9 | 2137.2 |
| 12.5° | 1237.6 | 1245.3 | 1258.4 | 1303.6  | 1352.4  | 1389.9  | 1520.8 | 1684.4 | 1867.1 | 2050.3 | 2174.7 |
| 15°   | 1214.4 | 1216.8 | 1206.0 | 1226.3  | 1264.4  | 1300.6  | 1433.3 | 1611.2 | 1830.8 | 2059.9 | 2223.5 |
| 17.5° | 1251.3 | 1250.1 | 1214.4 | 1212.0  | 1242.3  | 1272.1  | 1390.5 | 1560.7 | 1805.2 | 2081.9 | 2286.5 |
| 20°   | 1307.2 | 1303.0 | 1241.1 | 1229.8  | 1262.0  | 1289.9  | 1387.5 | 1541.6 | 1795.7 | 2118.8 | 2363.3 |
| 22.5° | 1381.6 | 1374.4 | 1277.4 | 1265.5  | 1300.1  | 1329.2  | 1424.4 | 1560.1 | 1804.0 | 2168.1 | 2452.5 |
| 25°   | 1473.8 | 1463.1 | 1339.9 | 1326.8  | 1361.9  | 1391.1  | 1490.4 | 1613.0 | 1829.0 | 2228.2 | 2565.6 |
| 27.5° | 1577.9 | 1562.4 | 1439.9 | 1406.0  | 1445.8  | 1476.2  | 1578.5 | 1693.9 | 1868.3 | 2291.9 | 2704.2 |
| 30°   | 1676.1 | 1655.9 | 1545.2 | 1489.3  | 1538.0  | 1572.0  | 1673.7 | 1790.3 | 1931.3 | 2390.1 | 2894.0 |
| 32.5° | 1774.9 | 1752.2 | 1639.2 | 1572.6  | 1616.6  | 1653.5  | 1771.9 | 1923.0 | 2049.7 | 2540.0 | 3146.3 |
| 35°   | 2002.1 | 1978.3 | 1839.7 | 1729.6  | 1729.0  | 1749.9  | 1909.3 | 2104.5 | 2206.2 | 2748.8 | 3447.4 |
| 37.5° | 2384.7 | 2371.0 | 2238.9 | 2030.1  | 1974.2  | 1951.0  | 2096.7 | 2321.1 | 2431.1 | 3036.2 | 3787.1 |
| 40°   | 2803.6 | 2791.7 | 2643.5 | 2454.3  | 2369.2  | 2312.1  | 2365.7 | 2622.7 | 2748.8 | 3387.3 | 4134.0 |
| 42.5° | 3276.6 | 3220.1 | 2955.9 | 2899.4  | 2823.2  | 2779.8  | 2731.6 | 2994.6 | 3139.2 | 3769.3 | 4477.9 |
| 45°   | 3706.2 | 3611.0 | 3268.3 | 3182.6  | 3165.3  | 3176.1  | 3202.8 | 3494.4 | 3578.3 | 4223.2 | 4820.6 |
| 47.5° | 3962.0 | 3887.1 | 3624.1 | 3542.0  | 3537.2  | 3608.0  | 3810.3 | 4059.0 | 4015.6 | 4618.9 | 5122.3 |
| 50°   | 4205.4 | 4137.6 | 3919.2 | 3939.4  | 3961.4  | 4057.8  | 4499.9 | 4639.7 | 4414.8 | 4977.7 | 5398.9 |
| 52.5° | 4402.3 | 4298.8 | 4184.6 | 4298.2  | 4406.5  | 4561.8  | 5211.5 | 5160.9 | 4698.0 | 5263.3 | 5635.7 |
| 55°   | 4516.0 | 4469.0 | 4524.3 | 4638.5  | 4842.0  | 5094.3  | 5883.2 | 5594.7 | 4905.1 | 5523.9 | 5793.4 |
| 57.5° | 4932.5 | 4840.2 | 4950.3 | 5049.1  | 5314.4  | 5667.3  | 6458.6 | 5917.8 | 5054.4 | 5685.1 | 5829.7 |
| 60°   | 5436.4 | 5362.0 | 5426.9 | 5591.1  | 5949.3  | 6364.0  | 6996.5 | 6181.3 | 5132.4 | 5788.6 | 5735.7 |
| 62.5° | 6238.5 | 6140.3 | 6099.8 | 6283.7  | 6758.5  | 7211.3  | 7404.6 | 6364.0 | 5115.1 | 5742.8 | 5413.2 |
| 65°   | 7313.0 | 7211.3 | 7030.4 | 7197.0  | 7800.9  | 8120.4  | 7861.0 | 6402.7 | 4996.1 | 5372.2 | 4598.1 |
| 67.5° | 8413.7 | 8340.0 | 8185.3 | 8466.1  | 9011.1  | 9114.0  | 8343.5 | 6308.7 | 4612.9 | 4355.9 | 3248.6 |
| 70°   | 9140.8 | 9109.3 | 9209.8 | 9831.0  | 10317.1 | 10287.4 | 8786.2 | 5803.5 | 3595.5 | 2678.6 | 1607.1 |
| 72.5° | 8616.6 | 8767.8 | 9510.3 | 10636.6 | 11230.4 | 10987.7 | 8558.9 | 4456.5 | 2055.1 | 1030.5 | 464.7  |
| 73°   | 8182.3 | 8375.7 | 9375.2 | 10667.0 | 11302.4 | 11036.4 | 8367.9 | 4090.5 | 1751.6 | 813.3  | 352.2  |
| 75°   | 5692.3 | 5929.7 | 7761.6 | 9934.5  | 10965.6 | 10515.2 | 6975.1 | 2503.7 | 811.6  | 360.6  | 142.2  |
| 77.5° | 2763.7 | 2939.2 | 4273.8 | 7177.9  | 8528.0  | 8215.6  | 4342.2 | 932.9  | 366.5  | 225.5  | 65.4   |
| 80°   | 1031.7 | 1147.1 | 1855.2 | 3653.2  | 4928.3  | 5057.4  | 1909.9 | 352.8  | 243.9  | 181.5  | 33.3   |
| 82.5° | 270.1  | 301.1  | 684.2  | 1629.1  | 2525.7  | 2643.5  | 602.1  | 177.9  | 178.5  | 149.3  | 20.2   |
| 85°   | 86.3   | 98.8   | 213.6  | 731.2   | 1190.0  | 1044.8  | 157.1  | 86.3   | 129.7  | 111.3  | 11.3   |
| 87.5° | 10.7   | 13.7   | 67.8   | 172.0   | 262.4   | 145.8   | 24.4   | 25.6   | 55.3   | 61.9   | 6.5    |
| 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-SA5A-827-U-T4FT-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2092.0 | 2092.0 | 2092.0 | 2092.0 | 2092.0 | 2092.0 | 2092.0 | 2092.0 | 2092.0 | 2092.0 | 2092.0 |
| 2.5°  | 2096.7 | 2093.8 | 2094.4 | 2078.9 | 2068.8 | 2048.5 | 2027.7 | 2018.2 | 2008.1 | 2003.9 | 2008.1 |
| 5°    | 2107.5 | 2102.1 | 2086.6 | 2039.0 | 1988.5 | 1923.0 | 1861.7 | 1815.3 | 1757.0 | 1740.9 | 1757.6 |
| 7.5°  | 2124.1 | 2113.4 | 2068.2 | 1971.2 | 1858.7 | 1733.8 | 1593.4 | 1491.0 | 1407.1 | 1353.0 | 1372.6 |
| 10°   | 2148.5 | 2128.3 | 2037.2 | 1872.4 | 1671.3 | 1450.0 | 1250.7 | 1095.4 | 985.3  | 940.1  | 938.3  |
| 12.5° | 2189.6 | 2151.5 | 1999.2 | 1743.9 | 1442.3 | 1147.1 | 885.9  | 717.6  | 628.3  | 570.6  | 569.4  |
| 15°   | 2234.8 | 2178.8 | 1951.0 | 1589.8 | 1175.7 | 821.7  | 570.6  | 442.7  | 385.0  | 366.5  | 364.1  |
| 17.5° | 2290.1 | 2210.4 | 1888.5 | 1400.0 | 896.6  | 544.4  | 372.5  | 335.6  | 333.2  | 331.4  | 331.4  |
| 20°   | 2359.7 | 2247.9 | 1808.2 | 1182.8 | 636.0  | 363.5  | 316.5  | 318.9  | 320.1  | 317.7  | 318.3  |
| 22.5° | 2440.6 | 2285.9 | 1712.4 | 949.6  | 430.2  | 304.0  | 302.8  | 305.8  | 307.0  | 305.8  | 306.4  |
| 25°   | 2534.7 | 2330.0 | 1595.8 | 705.1  | 310.6  | 288.6  | 291.5  | 295.7  | 298.7  | 298.7  | 298.7  |
| 27.5° | 2651.3 | 2383.5 | 1455.3 | 492.1  | 268.3  | 272.5  | 280.8  | 288.6  | 292.7  | 293.9  | 293.9  |
| 30°   | 2803.0 | 2450.2 | 1287.0 | 337.4  | 243.9  | 251.1  | 266.6  | 281.4  | 289.2  | 290.4  | 290.9  |
| 32.5° | 2994.6 | 2525.1 | 1091.8 | 249.3  | 223.1  | 228.5  | 245.1  | 270.1  | 285.0  | 287.4  | 287.4  |
| 35°   | 3214.1 | 2612.0 | 881.8  | 217.2  | 208.2  | 210.0  | 223.1  | 251.7  | 277.9  | 284.4  | 285.0  |
| 37.5° | 3454.5 | 2697.7 | 670.6  | 202.9  | 195.8  | 195.8  | 205.3  | 229.7  | 260.6  | 280.8  | 283.2  |
| 40°   | 3678.8 | 2749.4 | 470.0  | 191.6  | 184.4  | 184.4  | 192.8  | 210.6  | 239.8  | 270.1  | 276.7  |
| 42.5° | 3885.9 | 2767.3 | 327.2  | 180.9  | 173.7  | 175.5  | 182.7  | 196.9  | 219.0  | 249.3  | 255.3  |
| 45°   | 4098.9 | 2764.3 | 238.6  | 168.4  | 163.0  | 168.4  | 173.7  | 184.4  | 200.5  | 217.8  | 219.0  |
| 47.5° | 4259.5 | 2739.3 | 189.2  | 156.5  | 152.9  | 160.1  | 164.8  | 172.0  | 180.9  | 179.7  | 179.7  |
| 50°   | 4410.1 | 2678.6 | 152.3  | 140.4  | 142.8  | 151.1  | 153.5  | 155.9  | 156.5  | 145.2  | 144.0  |
| 52.5° | 4524.3 | 2584.0 | 122.0  | 123.2  | 132.7  | 141.0  | 138.6  | 135.1  | 129.1  | 115.4  | 113.0  |
| 55°   | 4562.4 | 2402.0 | 95.8   | 101.7  | 117.8  | 128.5  | 119.6  | 111.9  | 100.6  | 89.2   | 86.9   |
| 57.5° | 4493.4 | 2166.9 | 77.9   | 79.1   | 99.4   | 108.3  | 98.2   | 89.2   | 76.8   | 67.2   | 65.4   |
| 60°   | 4347.0 | 1905.7 | 64.3   | 59.5   | 76.8   | 84.5   | 77.9   | 69.0   | 57.7   | 50.6   | 50.0   |
| 62.5° | 4056.6 | 1627.3 | 53.0   | 46.4   | 58.3   | 64.9   | 60.7   | 54.1   | 44.6   | 39.9   | 39.3   |
| 65°   | 3446.2 | 1301.8 | 42.8   | 37.5   | 45.2   | 50.6   | 47.0   | 42.2   | 35.1   | 31.5   | 30.9   |
| 67.5° | 2405.5 | 880.0  | 35.1   | 30.9   | 35.7   | 39.9   | 36.9   | 34.5   | 28.0   | 27.4   | 28.0   |
| 70°   | 1160.2 | 424.2  | 29.2   | 25.0   | 28.0   | 30.9   | 29.7   | 28.0   | 26.8   | 30.9   | 35.7   |
| 72.5° | 332.6  | 142.2  | 23.2   | 20.8   | 22.6   | 24.4   | 25.6   | 25.0   | 29.2   | 37.5   | 43.4   |
| 73°   | 255.8  | 114.8  | 22.0   | 19.6   | 21.4   | 23.8   | 25.0   | 24.4   | 29.7   | 38.1   | 43.4   |
| 75°   | 109.5  | 55.3   | 16.7   | 16.1   | 17.8   | 20.8   | 22.0   | 22.0   | 29.7   | 38.7   | 41.6   |
| 77.5° | 49.4   | 29.7   | 10.7   | 12.5   | 15.5   | 16.7   | 18.4   | 18.4   | 23.8   | 29.7   | 29.7   |
| 80°   | 28.0   | 16.1   | 8.3    | 9.5    | 11.3   | 11.3   | 11.3   | 10.1   | 10.7   | 11.9   | 13.1   |
| 82.5° | 17.8   | 10.7   | 6.5    | 7.7    | 7.1    | 5.9    | 4.8    | 4.8    | 4.2    | 4.8    | 5.9    |
| 85°   | 10.1   | 5.9    | 5.9    | 4.8    | 3.0    | 2.4    | 3.0    | 2.4    | 0.6    | 0.0    | 0.6    |
| 87.5° | 5.9    | 3.6    | 1.8    | 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    |

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           |

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**CIE 1931 Chromaticity Diagram**



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



Point lies inside the ANSI 2700K 4-step quadrangle

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### Photopic Flux vs. Wavelength



**Photopic Lumens: 4337.9**

| λ (nm) | Power (μW/nm) | Lumens (Φ/nm) | λ (nm) | Power (μW/nm) | Lumens (Φ/nm) | λ (nm) | Power (μW/nm) | Lumens (Φ/nm) | λ (nm) | Power (μW/nm) | Lumens (Φ/nm) | λ (nm) | Power (μW/nm) | Lumens (Φ/nm) |
|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|
| 360    | 0             | 0.0           | 490    | 18018         | 2.6           | 620    | 87426         | 22.8          | 750    | 2680          | 0.0           | 880    | 58            | 0.0           |
| 365    | 0             | 0.0           | 495    | 22295         | 3.9           | 625    | 83013         | 18.2          | 755    | 2287          | 0.0           | 885    | 46            | 0.0           |
| 370    | 0             | 0.0           | 500    | 26478         | 5.8           | 630    | 78077         | 14.1          | 760    | 1944          | 0.0           | 890    | 45            | 0.0           |
| 375    | 0             | 0.0           | 505    | 30524         | 8.5           | 635    | 72080         | 10.7          | 765    | 1653          | 0.0           | 895    | 41            | 0.0           |
| 380    | 0             | 0.0           | 510    | 33611         | 11.5          | 640    | 66249         | 7.9           | 770    | 1413          | 0.0           | 900    | 38            | 0.0           |
| 385    | 0             | 0.0           | 515    | 36490         | 15.2          | 645    | 59973         | 5.7           | 775    | 1198          | 0.0           | 905    | 33            | 0.0           |
| 390    | 0             | 0.0           | 520    | 38610         | 18.7          | 650    | 53972         | 3.9           | 780    | 1025          | 0.0           | 910    | 30            | 0.0           |
| 395    | 0             | 0.0           | 525    | 40511         | 21.9          | 655    | 48369         | 2.7           | 785    | 874           | 0.0           | 915    | 23            | 0.0           |
| 400    | 48            | 0.0           | 530    | 42223         | 24.9          | 660    | 42641         | 1.8           | 790    | 747           | 0.0           | 920    | 24            | 0.0           |
| 405    | 201           | 0.0           | 535    | 44137         | 27.6          | 665    | 37602         | 1.1           | 795    | 639           | 0.0           | 925    | 22            | 0.0           |
| 410    | 457           | 0.0           | 540    | 46032         | 30.0          | 670    | 32798         | 0.7           | 800    | 547           | 0.0           | 930    | 22            | 0.0           |
| 415    | 925           | 0.0           | 545    | 48553         | 32.5          | 675    | 28558         | 0.5           | 805    | 473           | 0.0           | 935    | 17            | 0.0           |
| 420    | 1816          | 0.0           | 550    | 51408         | 34.9          | 680    | 24782         | 0.3           | 810    | 401           | 0.0           | 940    | 13            | 0.0           |
| 425    | 3217          | 0.0           | 555    | 54711         | 37.4          | 685    | 21386         | 0.2           | 815    | 351           | 0.0           | 945    | 6             | 0.0           |
| 430    | 5520          | 0.0           | 560    | 58847         | 40.0          | 690    | 18413         | 0.1           | 820    | 307           | 0.0           | 950    | 10            | 0.0           |
| 435    | 9225          | 0.1           | 565    | 63386         | 42.4          | 695    | 15721         | 0.1           | 825    | 261           | 0.0           | 955    | 11            | 0.0           |
| 440    | 15522         | 0.2           | 570    | 68196         | 44.3          | 700    | 13432         | 0.0           | 830    | 228           | 0.0           | 960    | 8             | 0.0           |
| 445    | 27642         | 0.6           | 575    | 73613         | 46.0          | 705    | 11513         | 0.0           | 835    | 193           | 0.0           | 965    | 12            | 0.0           |
| 450    | 36602         | 0.9           | 580    | 79207         | 47.1          | 710    | 9780          | 0.0           | 840    | 174           | 0.0           | 970    | 3             | 0.0           |
| 455    | 28292         | 0.9           | 585    | 84248         | 47.0          | 715    | 8356          | 0.0           | 845    | 151           | 0.0           | 975    | 8             | 0.0           |
| 460    | 21166         | 0.9           | 590    | 88397         | 45.7          | 720    | 7161          | 0.0           | 850    | 123           | 0.0           | 980    | 2             | 0.0           |
| 465    | 19092         | 1.0           | 595    | 91428         | 43.4          | 725    | 6067          | 0.0           | 855    | 106           | 0.0           | 985    | 13            | 0.0           |
| 470    | 14951         | 0.9           | 600    | 93452         | 40.3          | 730    | 5164          | 0.0           | 860    | 95            | 0.0           | 990    | 16            | 0.0           |
| 475    | 12606         | 1.0           | 605    | 93959         | 36.4          | 735    | 4393          | 0.0           | 865    | 82            | 0.0           | 995    | 20            | 0.0           |
| 480    | 13323         | 1.3           | 610    | 93079         | 32.0          | 740    | 3694          | 0.0           | 870    | 77            | 0.0           | 1000   | 0             | 0.0           |
| 485    | 15164         | 1.8           | 615    | 90707         | 27.3          | 745    | 3157          | 0.0           | 875    | 65            | 0.0           |        |               |               |

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### Scotopic Flux vs. Wavelength



Scotopic Lumens: 5286.7

S/P: 1.22

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

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### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 9797**

**M/P: 2.26**

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

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TM-30-18

### Summary

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



### Color Vector Graphics



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

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



### Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)