

Signify Classified - Internal  
Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



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: P323738

Luminaire Tested: **GLEON-SA4D-722-U-SL3-HSS**

Issue Date: 3/3/2020

### Test Information

Test Method: LM-79-08  
Report Number: P323738  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-23)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA4D-722-U-SL3-HSS  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(4) 70 CRI, 2200K, 1200mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE III  
SPILL LIGHT ELIMINATOR OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

### Summary

Lumens per Lamp: N/A  
Luminaire Lumens: 19656 lumens  
Efficiency: N/A  
Efficacy: 76.2 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1' x H: 0')  
IES Classification: Type III - Medium  
BUG Rating: B2 - U0 - G4

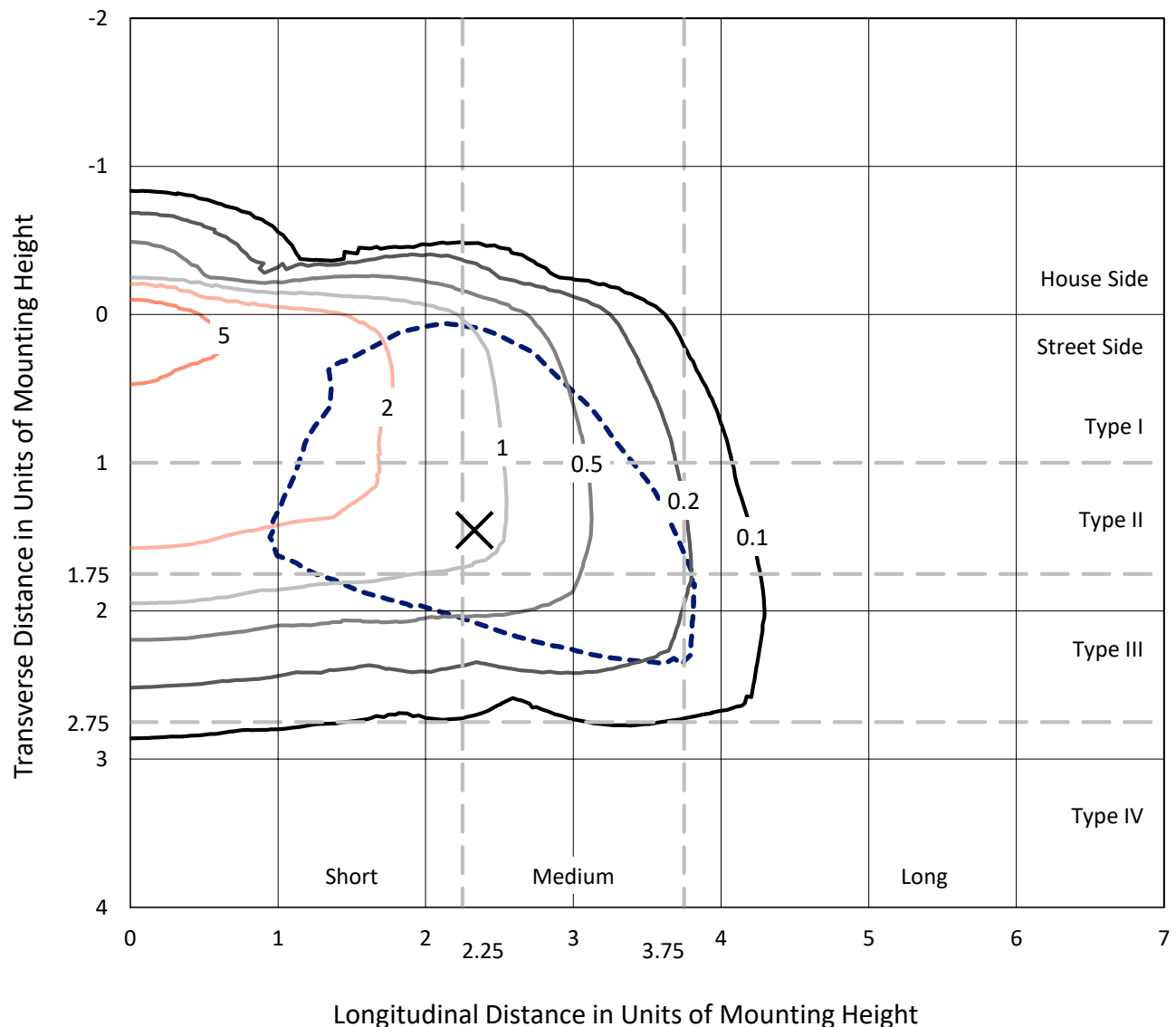
Input Watts (W): 258  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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## Iso-Footcandle Lines of Horizontal Illumination

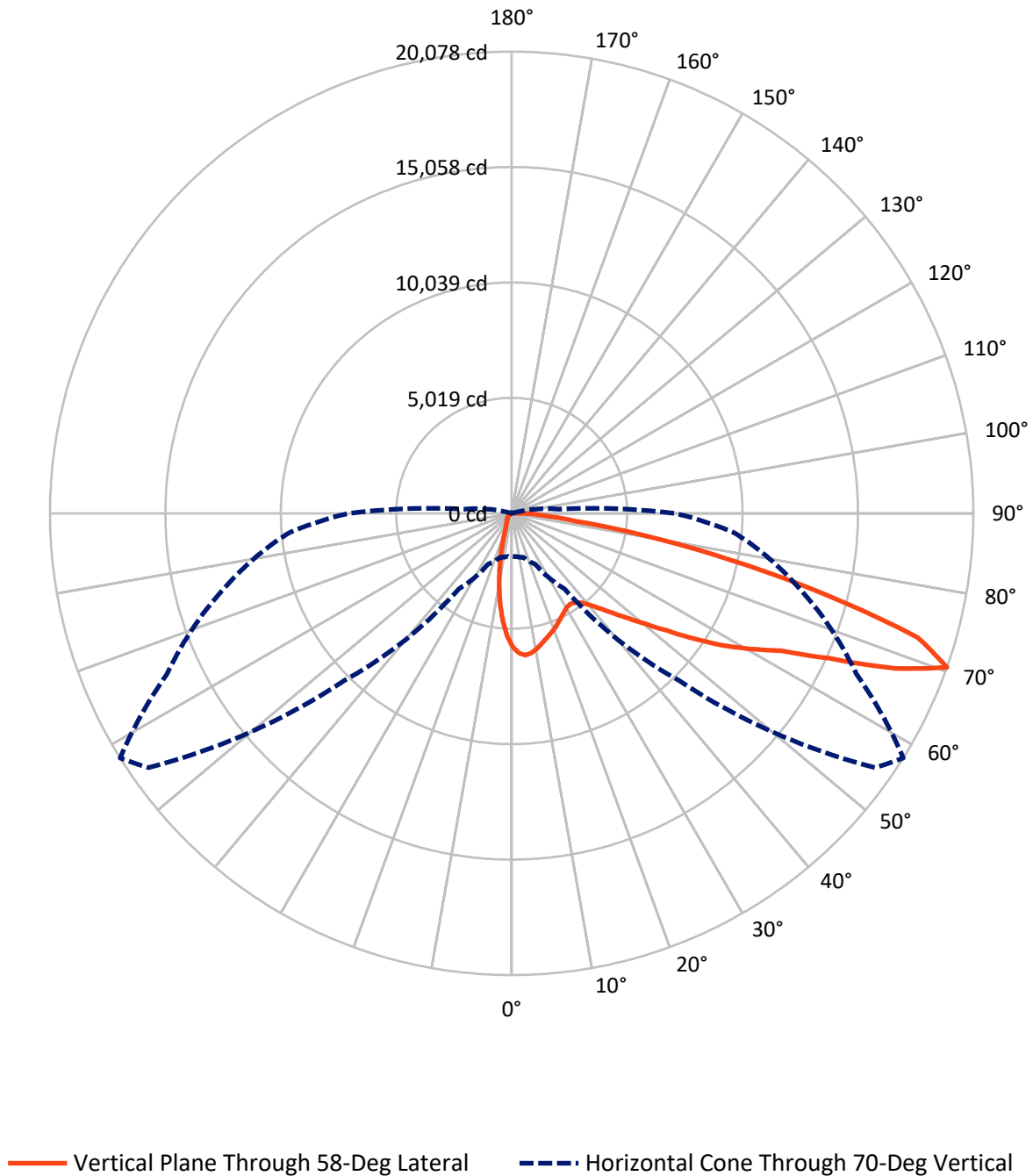
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 9.4 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    | 1682.1   | 0.0    | 1682.1  |
|                    | % Fixture | 8.6      | 0.0    | 8.6     |
| <b>Street Side</b> | Lumens    | 17973.9  | 0.0    | 17973.9 |
|                    | % Fixture | 91.4     | 0.0    | 91.4    |
| <b>Total</b>       | Lumens    | 19656.0  | 0.0    | 19656.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 474.8   | 2.4       |
| 10°-20°   | 996.5   | 5.1       |
| 20°-30°   | 1310.1  | 6.7       |
| 30°-40°   | 1735.0  | 8.8       |
| 40°-50°   | 2593.3  | 13.2      |
| 50°-60°   | 4154.4  | 21.1      |
| 60°-70°   | 5236.6  | 26.6      |
| 70°-80°   | 2824.6  | 14.4      |
| 80°-90°   | 330.6   | 1.7       |
| 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°    | 19656.0 | 100.0     |
| 0°-180°   | 19656.0 | 100.0     |

**Coefficient of Utilization**



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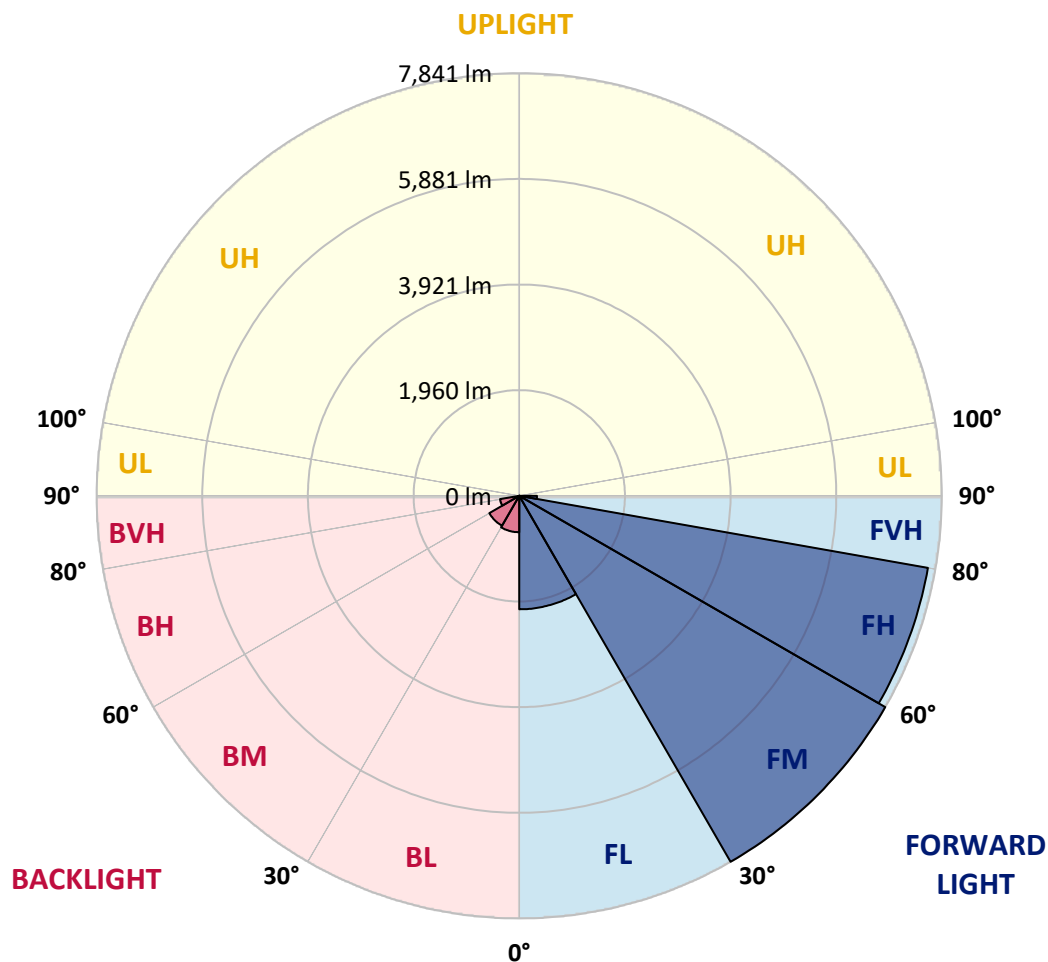
CATALOG NUMBER: GLEON-SA4D-722-U-SL3-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |          |
|------|-------------|--------|-----------|-------------------------|------|----------|
|      |             |        |           | B                       | U    | G        |
| FL   | (0°-30°)    | 2105.6 | 10.7      |                         |      |          |
| FM   | (30°-60°)   | 7841.1 | 39.9      |                         |      |          |
| FH   | (60°-80°)   | 7699.5 | 39.2      |                         |      | G4/12000 |
| FVH  | (80°-90°)   | 327.8  | 1.7       |                         |      | G3/500   |
| BL   | (0°-30°)    | 675.8  | 3.4       | B2/1000                 |      |          |
| BM   | (30°-60°)   | 641.7  | 3.3       | B1/1000                 |      |          |
| BH   | (60°-80°)   | 361.8  | 1.8       | B1/500                  |      | G1/500   |
| BVH  | (80°-90°)   | 2.9    | 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°     | 55°     | 58°     | 65°     | 75°     | 85°     |
|-------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 5806.3 | 5806.3 | 5806.3 | 5806.3 | 5806.3  | 5806.3  | 5806.3  | 5806.3  | 5806.3  | 5806.3  | 5806.3  |
| 2.5°  | 6287.7 | 6272.2 | 6266.4 | 6256.6 | 6219.0  | 6182.3  | 6109.5  | 6089.1  | 6043.3  | 5934.6  | 5819.4  |
| 5°    | 6292.6 | 6291.8 | 6308.9 | 6304.9 | 6291.8  | 6274.6  | 6222.3  | 6195.3  | 6117.7  | 5962.4  | 5751.5  |
| 7.5°  | 5989.4 | 6004.9 | 6043.3 | 6074.4 | 6110.3  | 6156.9  | 6163.5  | 6137.3  | 6073.6  | 5906.0  | 5626.5  |
| 10°   | 5582.3 | 5606.9 | 5660.8 | 5722.1 | 5816.1  | 5909.3  | 5992.6  | 5989.4  | 5967.3  | 5802.2  | 5476.1  |
| 12.5° | 5174.5 | 5203.1 | 5265.2 | 5355.9 | 5489.2  | 5641.2  | 5789.9  | 5810.4  | 5847.2  | 5709.0  | 5337.1  |
| 15°   | 4817.3 | 4841.8 | 4903.1 | 5014.3 | 5179.4  | 5383.7  | 5602.0  | 5639.6  | 5734.4  | 5636.3  | 5221.1  |
| 17.5° | 4514.1 | 4529.6 | 4574.6 | 4698.0 | 4889.2  | 5136.9  | 5420.5  | 5494.1  | 5635.5  | 5579.1  | 5120.6  |
| 20°   | 4302.4 | 4304.9 | 4334.3 | 4420.9 | 4612.2  | 4889.2  | 5232.5  | 5338.0  | 5530.9  | 5530.0  | 5016.8  |
| 22.5° | 4197.8 | 4189.6 | 4195.3 | 4245.2 | 4385.8  | 4653.0  | 5044.5  | 5169.6  | 5436.9  | 5488.3  | 4911.3  |
| 25°   | 4178.2 | 4171.6 | 4155.3 | 4161.8 | 4246.8  | 4446.3  | 4854.9  | 4999.6  | 5354.3  | 5463.0  | 4819.8  |
| 27.5° | 4239.5 | 4246.0 | 4218.2 | 4188.8 | 4195.3  | 4312.2  | 4686.6  | 4854.1  | 5287.3  | 5463.0  | 4755.2  |
| 30°   | 4362.9 | 4366.2 | 4345.7 | 4307.3 | 4255.8  | 4274.6  | 4569.7  | 4737.2  | 5253.8  | 5500.6  | 4714.3  |
| 32.5° | 4499.4 | 4517.4 | 4514.9 | 4483.9 | 4410.3  | 4334.3  | 4541.9  | 4694.7  | 5251.3  | 5584.0  | 4710.3  |
| 35°   | 4668.6 | 4689.0 | 4723.3 | 4716.8 | 4640.0  | 4514.9  | 4636.7  | 4756.8  | 5299.5  | 5721.3  | 4754.4  |
| 37.5° | 4848.4 | 4879.4 | 4953.0 | 4988.1 | 4938.3  | 4796.9  | 4849.2  | 4935.0  | 5428.7  | 5943.6  | 4866.4  |
| 40°   | 5022.5 | 5057.6 | 5191.7 | 5329.8 | 5292.2  | 5146.7  | 5171.2  | 5239.9  | 5658.4  | 6263.2  | 5078.9  |
| 42.5° | 5193.3 | 5245.6 | 5442.6 | 5669.8 | 5714.7  | 5598.7  | 5611.8  | 5666.5  | 5999.2  | 6702.9  | 5426.2  |
| 45°   | 5397.6 | 5456.5 | 5748.3 | 6028.6 | 6148.7  | 6098.1  | 6153.7  | 6189.6  | 6444.6  | 7284.0  | 5894.6  |
| 47.5° | 5697.6 | 5765.4 | 6123.4 | 6443.0 | 6653.9  | 6686.6  | 6798.5  | 6822.2  | 7007.8  | 7960.8  | 6505.1  |
| 50°   | 6282.8 | 6301.6 | 6625.3 | 6915.4 | 7219.4  | 7415.6  | 7543.1  | 7561.1  | 7689.4  | 8700.4  | 7267.7  |
| 52.5° | 7019.2 | 7031.5 | 7214.5 | 7409.1 | 7754.8  | 8155.3  | 8453.6  | 8478.9  | 8505.9  | 9421.3  | 8020.4  |
| 55°   | 7750.7 | 7749.1 | 7870.0 | 7984.5 | 8380.1  | 8962.0  | 9609.3  | 9624.8  | 9431.1  | 10105.4 | 8595.8  |
| 57.5° | 8207.6 | 8251.7 | 8435.6 | 8582.7 | 9135.3  | 9881.5  | 10779.7 | 10836.9 | 10402.9 | 10612.2 | 9164.7  |
| 60°   | 8062.1 | 8083.4 | 8491.2 | 9035.5 | 10076.0 | 11188.4 | 11964.0 | 11978.7 | 11133.6 | 11118.1 | 9883.9  |
| 62.5° | 6868.8 | 6880.3 | 7521.0 | 8643.2 | 10552.5 | 12883.5 | 13392.7 | 13153.2 | 11973.8 | 11820.2 | 10744.6 |
| 65°   | 4707.8 | 4782.2 | 5317.5 | 6704.5 | 9677.1  | 13946.9 | 15604.4 | 15208.0 | 13254.6 | 12832.0 | 11522.7 |
| 67.5° | 2772.4 | 2756.8 | 3021.7 | 4043.3 | 7107.5  | 13240.7 | 18402.1 | 18008.2 | 15001.2 | 13509.6 | 11294.6 |
| 70°   | 1893.7 | 1883.1 | 1984.5 | 2447.9 | 4012.3  | 10271.3 | 19282.4 | 20077.6 | 16543.5 | 13053.5 | 9720.5  |
| 72.5° | 1351.9 | 1357.6 | 1507.2 | 1901.9 | 2519.0  | 5984.5  | 16581.9 | 18464.2 | 16060.5 | 11379.6 | 7388.6  |
| 75°   | 917.9  | 933.4  | 1147.5 | 1560.3 | 2208.4  | 3044.5  | 11767.1 | 14036.0 | 13078.0 | 8270.5  | 4246.8  |
| 77.5° | 493.7  | 510.8  | 763.4  | 1257.0 | 1996.7  | 2115.2  | 7569.3  | 9660.0  | 8215.0  | 3718.0  | 1230.9  |
| 80°   | 206.0  | 215.8  | 357.2  | 913.8  | 1725.4  | 1857.8  | 4453.6  | 5857.8  | 3500.6  | 733.1   | 274.6   |
| 82.5° | 89.1   | 94.0   | 148.8  | 545.2  | 1289.7  | 1568.5  | 2358.0  | 2818.1  | 1060.9  | 161.0   | 138.1   |
| 85°   | 17.2   | 18.0   | 61.3   | 288.5  | 823.0   | 885.2   | 1528.4  | 1498.2  | 476.5   | 69.5    | 100.5   |
| 87.5° | 0.0    | 0.0    | 14.7   | 90.7   | 241.9   | 482.2   | 932.6   | 921.1   | 161.8   | 33.5    | 37.6    |
| 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: P323738

CATALOG NUMBER: GLEON-SA4D-722-U-SL3-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 5806.3 | 5806.3 | 5806.3 | 5806.3 | 5806.3 | 5806.3 | 5806.3 | 5806.3 | 5806.3 | 5806.3 | 5806.3 |
| 2.5°  | 5760.5 | 5704.1 | 5585.6 | 5439.3 | 5327.3 | 5203.9 | 5105.8 | 4981.6 | 4927.7 | 4930.1 | 4900.7 |
| 5°    | 5631.4 | 5515.3 | 5253.0 | 4921.9 | 4666.9 | 4403.8 | 4177.4 | 3951.8 | 3818.6 | 3775.2 | 3734.4 |
| 7.5°  | 5446.7 | 5262.8 | 4844.3 | 4334.3 | 3902.7 | 3481.0 | 3114.0 | 2791.2 | 2586.8 | 2487.1 | 2450.3 |
| 10°   | 5238.2 | 4980.0 | 4374.3 | 3702.5 | 3086.2 | 2515.7 | 2040.0 | 1626.5 | 1461.4 | 1349.4 | 1320.8 |
| 12.5° | 5055.2 | 4705.4 | 3915.0 | 3054.4 | 2322.8 | 1634.7 | 1181.0 | 923.6  | 811.6  | 767.5  | 760.1  |
| 15°   | 4882.7 | 4448.7 | 3472.8 | 2467.5 | 1608.5 | 1006.1 | 751.1  | 663.7  | 637.5  | 630.2  | 630.2  |
| 17.5° | 4720.1 | 4204.3 | 3040.5 | 1889.7 | 1064.2 | 705.4  | 622.0  | 602.4  | 594.2  | 593.4  | 594.2  |
| 20°   | 4550.1 | 3959.9 | 2615.4 | 1384.6 | 743.0  | 597.5  | 574.6  | 564.0  | 561.5  | 561.5  | 561.5  |
| 22.5° | 4387.4 | 3715.6 | 2201.9 | 989.0  | 595.8  | 545.2  | 533.7  | 526.4  | 523.9  | 523.1  | 521.5  |
| 25°   | 4231.3 | 3483.4 | 1798.1 | 698.8  | 523.1  | 499.4  | 489.6  | 479.8  | 472.4  | 468.3  | 465.9  |
| 27.5° | 4103.0 | 3276.7 | 1422.1 | 560.7  | 472.4  | 452.0  | 439.7  | 425.0  | 407.0  | 398.9  | 395.6  |
| 30°   | 4000.8 | 3087.9 | 1096.0 | 473.2  | 425.0  | 404.6  | 385.8  | 360.4  | 334.3  | 320.4  | 319.6  |
| 32.5° | 3920.7 | 2902.3 | 832.0  | 418.5  | 382.5  | 357.2  | 330.2  | 298.3  | 268.1  | 252.6  | 251.7  |
| 35°   | 3881.5 | 2738.9 | 635.9  | 378.4  | 344.9  | 313.0  | 279.5  | 244.4  | 215.0  | 200.2  | 198.6  |
| 37.5° | 3907.6 | 2600.7 | 496.1  | 344.9  | 313.0  | 276.3  | 237.0  | 200.2  | 174.1  | 161.0  | 160.2  |
| 40°   | 4003.3 | 2512.5 | 402.9  | 316.3  | 286.1  | 241.1  | 198.6  | 164.3  | 142.2  | 131.6  | 130.8  |
| 42.5° | 4206.8 | 2479.8 | 344.1  | 292.6  | 259.9  | 208.4  | 165.1  | 135.7  | 115.2  | 107.9  | 106.3  |
| 45°   | 4546.8 | 2528.0 | 304.0  | 269.7  | 232.9  | 177.4  | 136.5  | 111.2  | 93.2   | 87.5   | 86.6   |
| 47.5° | 4999.6 | 2654.7 | 275.4  | 247.7  | 208.4  | 149.6  | 113.6  | 89.9   | 76.0   | 70.3   | 69.5   |
| 50°   | 5583.2 | 2855.7 | 251.7  | 225.6  | 185.5  | 126.7  | 94.0   | 71.1   | 58.8   | 54.8   | 54.8   |
| 52.5° | 6218.2 | 3095.2 | 230.5  | 205.1  | 162.6  | 105.4  | 76.0   | 54.8   | 46.6   | 41.7   | 41.7   |
| 55°   | 6742.9 | 3304.5 | 207.6  | 189.6  | 134.9  | 87.5   | 58.0   | 41.7   | 34.3   | 31.9   | 31.9   |
| 57.5° | 7266.9 | 3527.6 | 181.4  | 162.6  | 107.9  | 71.1   | 44.1   | 31.1   | 25.3   | 23.7   | 23.7   |
| 60°   | 7946.1 | 3800.6 | 156.1  | 132.4  | 85.0   | 53.9   | 32.7   | 22.1   | 18.8   | 18.0   | 18.0   |
| 62.5° | 8693.1 | 3960.8 | 133.2  | 106.3  | 66.2   | 40.0   | 23.7   | 14.7   | 13.9   | 13.9   | 13.1   |
| 65°   | 9150.0 | 3734.4 | 112.0  | 85.0   | 51.5   | 30.2   | 15.5   | 10.6   | 12.3   | 11.4   | 9.8    |
| 67.5° | 8567.2 | 2923.6 | 91.5   | 66.2   | 40.0   | 22.9   | 9.8    | 7.4    | 13.1   | 10.6   | 8.2    |
| 70°   | 7093.6 | 2046.6 | 71.1   | 46.6   | 31.9   | 19.6   | 6.5    | 4.9    | 13.9   | 10.6   | 6.5    |
| 72.5° | 5308.5 | 1369.8 | 56.4   | 31.1   | 23.7   | 17.2   | 5.7    | 2.5    | 12.3   | 9.0    | 5.7    |
| 75°   | 2900.7 | 551.7  | 45.0   | 19.6   | 14.7   | 12.3   | 4.1    | 1.6    | 8.2    | 6.5    | 4.1    |
| 77.5° | 763.4  | 145.5  | 32.7   | 13.1   | 8.2    | 4.9    | 2.5    | 0.8    | 4.1    | 3.3    | 1.6    |
| 80°   | 194.5  | 56.4   | 21.3   | 9.0    | 5.7    | 2.5    | 0.0    | 0.0    | 0.8    | 0.0    | 0.0    |
| 82.5° | 103.8  | 23.7   | 13.1   | 6.5    | 3.3    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 85°   | 78.5   | 15.5   | 7.4    | 4.1    | 0.8    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 87.5° | 30.2   | 4.9    | 2.5    | 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-79-2008: Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Report Prepared for

Cooper Lighting Solutions

McGRAW-EDISON

Report Number: SP1-1908-441-10-R4

Test Date: 10/25/2019

Luminaire Tested: SA1C-722-U-5WQ

Data in this report applies to families of products SA1C-722-U-5WQ.

### Test Information

Test Method: LM-79-2008 Report  
 Number: SP1-1908-441-10-R4  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 10/28/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: MCGRAW-EDISON  
 Catalog Number: **SA1C-722-U-5WQ**  
 Description: MCGRAW EDISON ROADWAY AND AREA LUMINAIRE

\*\*\*THIS IS A REVISION OF SP1-1908-441-4-R3. TO UPDATE THE CATALOG INFORMATION.\*\*\*TESTED IN SITU. ROADWAY AND AREA LUMINAIRE. (1) 70 CRI, 5000K, 1050MA LIGHTSQUARE WITH 16 LEDS AND TYPE V WIDE OPTICS.

### Spectral Parameters

|                           |         |           |      |      |       |
|---------------------------|---------|-----------|------|------|-------|
| CCT (K):                  | 2237    | CRI (Ra): | 72.0 |      |       |
| CIE u':                   | 0.2876  | R1:       | 68.9 | R9:  | -17.4 |
| CIE v':                   | 0.5346  | R2:       | 83.0 | R10: | 61.3  |
| Duv:                      | -0.0006 | R3:       | 95.2 | R11: | 59.8  |
| CIE x:                    | 0.5005  | R4:       | 66.2 | R12: | 50.5  |
| CIE y:                    | 0.4134  | R5:       | 65.9 | R13: | 71.1  |
| CIE z:                    | 0.0860  | R6:       | 76.3 | R14: | 96.9  |
| Peak Wavelength (nm):     | 603     | R7:       | 76.7 |      |       |
| Dominant Wavelength (nm): | 587     | R8:       | 43.8 |      |       |
| Purity:                   | 74.5    |           |      |      |       |
| Rf:                       | 69.8    |           |      |      |       |
| Rg:                       | 99.2    |           |      |      |       |



### Test Conditions

Stabilization Time: 71M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.7/41%  
 Sphere Temperature (°C): 25.6

REPORT NUMBER: SP1-1908-441-10-R4

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 6/28/2019        | 12/28/2019           |
| Power Meter                    | IN0071                | 12/5/2018        | 12/5/2019            |
| AC Power Source                | IN0063                | 12/5/2018        | 12/5/2019            |
| DC Power Source                | IN0208                | 12/5/2018        | 12/5/2019            |
| Sphere Thermometer             | IN0085                | 12/5/2018        | 12/5/2019            |
| Room Thermometer               | IN0046                | 12/5/2018        | 12/5/2019            |

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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 2200K 4-step quadrangle

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**Photopic Flux vs. Wavelength**



#####

| 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       | 1768             | NR               | 490       | 5206             | NR               | 620       | 130919           | NR               | 750       | 8553             | NR               | 880       | 2713             | NR               |
| 365       | 1569             | NR               | 495       | 7286             | NR               | 625       | 125335           | NR               | 755       | 7696             | NR               | 885       | 2316             | NR               |
| 370       | 1594             | NR               | 500       | 10654            | NR               | 630       | 118388           | NR               | 760       | 6978             | NR               | 890       | 2539             | NR               |
| 375       | 1744             | NR               | 505       | 15189            | NR               | 635       | 111855           | NR               | 765       | 6377             | NR               | 895       | 1933             | NR               |
| 380       | 1659             | NR               | 510       | 20541            | NR               | 640       | 104062           | NR               | 770       | 5600             | NR               | 900       | 2216             | NR               |
| 385       | 1504             | NR               | 515       | 26492            | NR               | 645       | 96365            | NR               | 775       | 5000             | NR               | 905       | 2067             | NR               |
| 390       | 1541             | NR               | 520       | 32294            | NR               | 650       | 88651            | NR               | 780       | 4709             | NR               | 910       | 1959             | NR               |
| 395       | 1355             | NR               | 525       | 38123            | NR               | 655       | 81152            | NR               | 785       | 4305             | NR               | 915       | 1874             | NR               |
| 400       | 1243             | NR               | 530       | 43232            | NR               | 660       | 73523            | NR               | 790       | 4040             | NR               | 920       | 1484             | NR               |
| 405       | 1417             | NR               | 535       | 48012            | NR               | 665       | 66123            | NR               | 795       | 3642             | NR               | 925       | 1914             | NR               |
| 410       | 2147             | NR               | 540       | 52623            | NR               | 670       | 58677            | NR               | 800       | 3594             | NR               | 930       | 1948             | NR               |
| 415       | 3837             | NR               | 545       | 57516            | NR               | 675       | 52349            | NR               | 805       | 3190             | NR               | 935       | 2079             | NR               |
| 420       | 7159             | NR               | 550       | 62613            | NR               | 680       | 46159            | NR               | 810       | 3241             | NR               | 940       | 2263             | NR               |
| 425       | 12599            | NR               | 555       | 68554            | NR               | 685       | 40525            | NR               | 815       | 2732             | NR               | 945       | 1688             | NR               |
| 430       | 19019            | NR               | 560       | 75325            | NR               | 690       | 35615            | NR               | 820       | 2612             | NR               | 950       | 1560             | NR               |
| 435       | 24875            | NR               | 565       | 82533            | NR               | 695       | 31158            | NR               | 825       | 2966             | NR               | 955       | 2826             | NR               |
| 440       | 29103            | NR               | 570       | 90909            | NR               | 700       | 27409            | NR               | 830       | 2574             | NR               | 960       | 1477             | NR               |
| 445       | 29901            | NR               | 575       | 99621            | NR               | 705       | 24204            | NR               | 835       | 2633             | NR               | 965       | 1568             | NR               |
| 450       | 24862            | NR               | 580       | 108484           | NR               | 710       | 21558            | NR               | 840       | 2526             | NR               | 970       | 2030             | NR               |
| 455       | 15942            | NR               | 585       | 116679           | NR               | 715       | 19222            | NR               | 845       | 2631             | NR               | 975       | 1986             | NR               |
| 460       | 9916             | NR               | 590       | 123752           | NR               | 720       | 17310            | NR               | 850       | 2079             | NR               | 980       | 2540             | NR               |
| 465       | 7051             | NR               | 595       | 129324           | NR               | 725       | 15280            | NR               | 855       | 2309             | NR               | 985       | 1139             | NR               |
| 470       | 5227             | NR               | 600       | 134082           | NR               | 730       | 13282            | NR               | 860       | 2528             | NR               | 990       | 2018             | NR               |
| 475       | 4257             | NR               | 605       | 135698           | NR               | 735       | 11753            | NR               | 865       | 2121             | NR               | 995       | 3445             | NR               |
| 480       | 4052             | NR               | 610       | 135144           | NR               | 740       | 10654            | NR               | 870       | 2751             | NR               | 1000      | 3704             | NR               |
| 485       | 4298             | NR               | 615       | 134180           | NR               | 745       | 9451             | NR               | 875       | 2317             | NR               |           |                  |                  |

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Scotopic Flux vs. Wavelength



Scotopic Lumens: 4696.9

S/P: 0.85

| 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       | 1768             | NR               | 490       | 5206             | NR               | 620       | 130919           | NR               | 750       | 8553             | NR               | 880       | 2713             | NR               |
| 365       | 1569             | NR               | 495       | 7286             | NR               | 625       | 125335           | NR               | 755       | 7696             | NR               | 885       | 2316             | NR               |
| 370       | 1594             | NR               | 500       | 10654            | NR               | 630       | 118388           | NR               | 760       | 6978             | NR               | 890       | 2539             | NR               |
| 375       | 1744             | NR               | 505       | 15189            | NR               | 635       | 111855           | NR               | 765       | 6377             | NR               | 895       | 1933             | NR               |
| 380       | 1659             | NR               | 510       | 20541            | NR               | 640       | 104062           | NR               | 770       | 5600             | NR               | 900       | 2216             | NR               |
| 385       | 1504             | NR               | 515       | 26492            | NR               | 645       | 96365            | NR               | 775       | 5000             | NR               | 905       | 2067             | NR               |
| 390       | 1541             | NR               | 520       | 32294            | NR               | 650       | 88651            | NR               | 780       | 4709             | NR               | 910       | 1959             | NR               |
| 395       | 1355             | NR               | 525       | 38123            | NR               | 655       | 81152            | NR               | 785       | 4305             | NR               | 915       | 1874             | NR               |
| 400       | 1243             | NR               | 530       | 43232            | NR               | 660       | 73523            | NR               | 790       | 4040             | NR               | 920       | 1484             | NR               |
| 405       | 1417             | NR               | 535       | 48012            | NR               | 665       | 66123            | NR               | 795       | 3642             | NR               | 925       | 1914             | NR               |
| 410       | 2147             | NR               | 540       | 52623            | NR               | 670       | 58677            | NR               | 800       | 3594             | NR               | 930       | 1948             | NR               |
| 415       | 3837             | NR               | 545       | 57516            | NR               | 675       | 52349            | NR               | 805       | 3190             | NR               | 935       | 2079             | NR               |
| 420       | 7159             | NR               | 550       | 62613            | NR               | 680       | 46159            | NR               | 810       | 3241             | NR               | 940       | 2263             | NR               |
| 425       | 12599            | NR               | 555       | 68554            | NR               | 685       | 40525            | NR               | 815       | 2732             | NR               | 945       | 1688             | NR               |
| 430       | 19019            | NR               | 560       | 75325            | NR               | 690       | 35615            | NR               | 820       | 2612             | NR               | 950       | 1560             | NR               |
| 435       | 24875            | NR               | 565       | 82533            | NR               | 695       | 31158            | NR               | 825       | 2966             | NR               | 955       | 2826             | NR               |
| 440       | 29103            | NR               | 570       | 90909            | NR               | 700       | 27409            | NR               | 830       | 2574             | NR               | 960       | 1477             | NR               |
| 445       | 29901            | NR               | 575       | 99621            | NR               | 705       | 24204            | NR               | 835       | 2633             | NR               | 965       | 1568             | NR               |
| 450       | 24862            | NR               | 580       | 108484           | NR               | 710       | 21558            | NR               | 840       | 2526             | NR               | 970       | 2030             | NR               |
| 455       | 15942            | NR               | 585       | 116679           | NR               | 715       | 19222            | NR               | 845       | 2631             | NR               | 975       | 1986             | NR               |
| 460       | 9916             | NR               | 590       | 123752           | NR               | 720       | 17310            | NR               | 850       | 2079             | NR               | 980       | 2540             | NR               |
| 465       | 7051             | NR               | 595       | 129324           | NR               | 725       | 15280            | NR               | 855       | 2309             | NR               | 985       | 1139             | NR               |
| 470       | 5227             | NR               | 600       | 134082           | NR               | 730       | 13282            | NR               | 860       | 2528             | NR               | 990       | 2018             | NR               |
| 475       | 4257             | NR               | 605       | 135698           | NR               | 735       | 11753            | NR               | 865       | 2121             | NR               | 995       | 3445             | NR               |
| 480       | 4052             | NR               | 610       | 135144           | NR               | 740       | 10654            | NR               | 870       | 2751             | NR               | 1000      | 3704             | NR               |
| 485       | 4298             | NR               | 615       | 134180           | NR               | 745       | 9451             | NR               | 875       | 2317             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 1470.8 M/P: 0.27**

| 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       | 1768             | NR               | 490       | 5206             | NR               | 620       | 130919           | NR               | 750       | 8553             | NR               | 880       | 2713             | NR               |
| 365       | 1569             | NR               | 495       | 7286             | NR               | 625       | 125335           | NR               | 755       | 7696             | NR               | 885       | 2316             | NR               |
| 370       | 1594             | NR               | 500       | 10654            | NR               | 630       | 118388           | NR               | 760       | 6978             | NR               | 890       | 2539             | NR               |
| 375       | 1744             | NR               | 505       | 15189            | NR               | 635       | 111855           | NR               | 765       | 6377             | NR               | 895       | 1933             | NR               |
| 380       | 1659             | NR               | 510       | 20541            | NR               | 640       | 104062           | NR               | 770       | 5600             | NR               | 900       | 2216             | NR               |
| 385       | 1504             | NR               | 515       | 26492            | NR               | 645       | 96365            | NR               | 775       | 5000             | NR               | 905       | 2067             | NR               |
| 390       | 1541             | NR               | 520       | 32294            | NR               | 650       | 88651            | NR               | 780       | 4709             | NR               | 910       | 1959             | NR               |
| 395       | 1355             | NR               | 525       | 38123            | NR               | 655       | 81152            | NR               | 785       | 4305             | NR               | 915       | 1874             | NR               |
| 400       | 1243             | NR               | 530       | 43232            | NR               | 660       | 73523            | NR               | 790       | 4040             | NR               | 920       | 1484             | NR               |
| 405       | 1417             | NR               | 535       | 48012            | NR               | 665       | 66123            | NR               | 795       | 3642             | NR               | 925       | 1914             | NR               |
| 410       | 2147             | NR               | 540       | 52623            | NR               | 670       | 58677            | NR               | 800       | 3594             | NR               | 930       | 1948             | NR               |
| 415       | 3837             | NR               | 545       | 57516            | NR               | 675       | 52349            | NR               | 805       | 3190             | NR               | 935       | 2079             | NR               |
| 420       | 7159             | NR               | 550       | 62613            | NR               | 680       | 46159            | NR               | 810       | 3241             | NR               | 940       | 2263             | NR               |
| 425       | 12599            | NR               | 555       | 68554            | NR               | 685       | 40525            | NR               | 815       | 2732             | NR               | 945       | 1688             | NR               |
| 430       | 19019            | NR               | 560       | 75325            | NR               | 690       | 35615            | NR               | 820       | 2612             | NR               | 950       | 1560             | NR               |
| 435       | 24875            | NR               | 565       | 82533            | NR               | 695       | 31158            | NR               | 825       | 2966             | NR               | 955       | 2826             | NR               |
| 440       | 29103            | NR               | 570       | 90909            | NR               | 700       | 27409            | NR               | 830       | 2574             | NR               | 960       | 1477             | NR               |
| 445       | 29901            | NR               | 575       | 99621            | NR               | 705       | 24204            | NR               | 835       | 2633             | NR               | 965       | 1568             | NR               |
| 450       | 24862            | NR               | 580       | 108484           | NR               | 710       | 21558            | NR               | 840       | 2526             | NR               | 970       | 2030             | NR               |
| 455       | 15942            | NR               | 585       | 116679           | NR               | 715       | 19222            | NR               | 845       | 2631             | NR               | 975       | 1986             | NR               |
| 460       | 9916             | NR               | 590       | 123752           | NR               | 720       | 17310            | NR               | 850       | 2079             | NR               | 980       | 2540             | NR               |
| 465       | 7051             | NR               | 595       | 129324           | NR               | 725       | 15280            | NR               | 855       | 2309             | NR               | 985       | 1139             | NR               |
| 470       | 5227             | NR               | 600       | 134082           | NR               | 730       | 13282            | NR               | 860       | 2528             | NR               | 990       | 2018             | NR               |
| 475       | 4257             | NR               | 605       | 135698           | NR               | 735       | 11753            | NR               | 865       | 2121             | NR               | 995       | 3445             | NR               |
| 480       | 4052             | NR               | 610       | 135144           | NR               | 740       | 10654            | NR               | 870       | 2751             | NR               | 1000      | 3704             | NR               |
| 485       | 4298             | NR               | 615       | 134180           | NR               | 745       | 9451             | NR               | 875       | 2317             | NR               |           |                  |                  |

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### Summary

$R_f = 69.8$   
 $R_g = 99.2$   
 CIE  $R_a = 72.0$   
 $R_g = -17.4$



### Color Vector Graphics



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 87 | CES26 = 56 | CES51 = 74 | CES76 = 56 |
| CES02 = 65 | CES27 = 76 | CES52 = 76 | CES77 = 81 |
| CES03 = 32 | CES28 = 83 | CES53 = 65 | CES78 = 63 |
| CES04 = 72 | CES29 = 46 | CES54 = 78 | CES79 = 84 |
| CES05 = 52 | CES30 = 48 | CES55 = 75 | CES80 = 84 |
| CES06 = 52 | CES31 = 51 | CES56 = 65 | CES81 = 63 |
| CES07 = 44 | CES32 = 51 | CES57 = 62 | CES82 = 92 |
| CES08 = 42 | CES33 = 53 | CES58 = 66 | CES83 = 83 |
| CES09 = 29 | CES34 = 70 | CES59 = 84 | CES84 = 92 |
| CES10 = 78 | CES35 = 85 | CES60 = 90 | CES85 = 81 |
| CES11 = 61 | CES36 = 78 | CES61 = 84 | CES86 = 56 |
| CES12 = 68 | CES37 = 80 | CES62 = 70 | CES87 = 78 |
| CES13 = 45 | CES38 = 53 | CES63 = 68 | CES88 = 72 |
| CES14 = 75 | CES39 = 90 | CES64 = 69 | CES89 = 62 |
| CES15 = 72 | CES40 = 84 | CES65 = 67 | CES90 = 67 |
| CES16 = 49 | CES41 = 75 | CES66 = 64 | CES91 = 90 |
| CES17 = 51 | CES42 = 79 | CES67 = 63 | CES92 = 67 |
| CES18 = 57 | CES43 = 64 | CES68 = 69 | CES93 = 79 |
| CES19 = 74 | CES44 = 98 | CES69 = 80 | CES94 = 52 |
| CES20 = 68 | CES45 = 73 | CES70 = 63 | CES95 = 76 |
| CES21 = 89 | CES46 = 67 | CES71 = 63 | CES96 = 78 |
| CES22 = 81 | CES47 = 60 | CES72 = 87 | CES97 = 77 |
| CES23 = 92 | CES48 = 48 | CES73 = 56 | CES98 = 71 |
| CES24 = 92 | CES49 = 64 | CES74 = 87 | CES99 = 65 |
| CES25 = 74 | CES50 = 74 | CES75 = 66 |            |



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Color Rendition by Hue-Angle Bin



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**Measure Comparisons**



(END OF REPORT)