

Scaled data based on original data using  
LM-79-2019 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for  
Cooper Lighting Solutions

Brand: STREETWORKS

Report Number: P361125

Luminaire Tested: NVN-SA5C-722-U-T3R

Issue Date: 3/3/2020

### Test Information

Test Method: LM-79-2019  
Report Number: P361125  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-10)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: STREETWORKS  
Catalog Number: NVN-SA5C-722-U-T3R  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(5) 70 CRI, 2200K, 1050mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE III  
ROADWAY OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

### Summary

Lumens per Lamp: N/A  
Luminaire Lumens: 26716 lumens  
Efficiency: N/A  
Efficacy: 95.8 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1.5' x H: 0')  
IES Classification: Type IV - Medium  
BUG Rating: B3 - U0 - G4

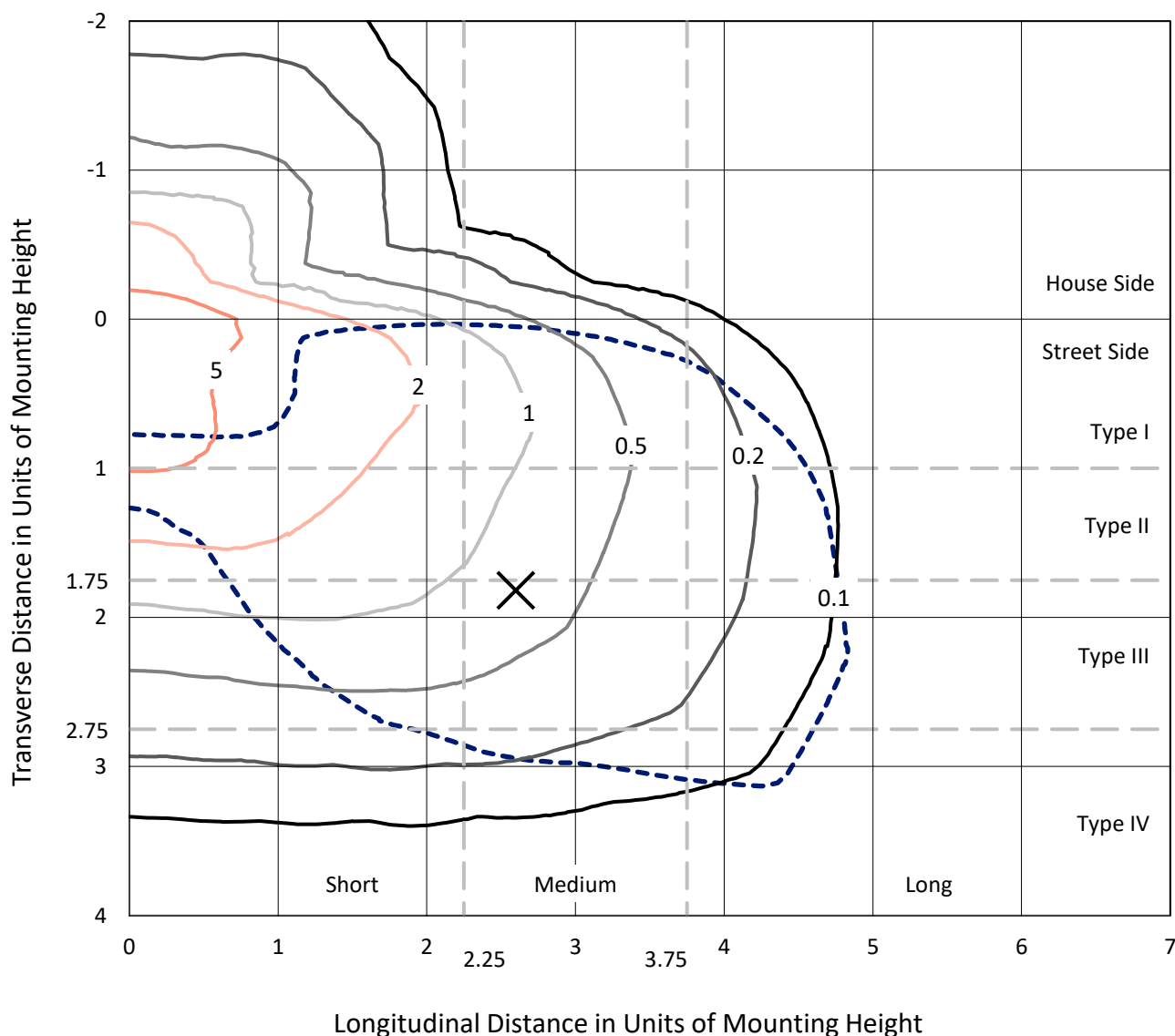
Input Watts (W): 279  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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## Iso-Footcandle Lines of Horizontal Illumination

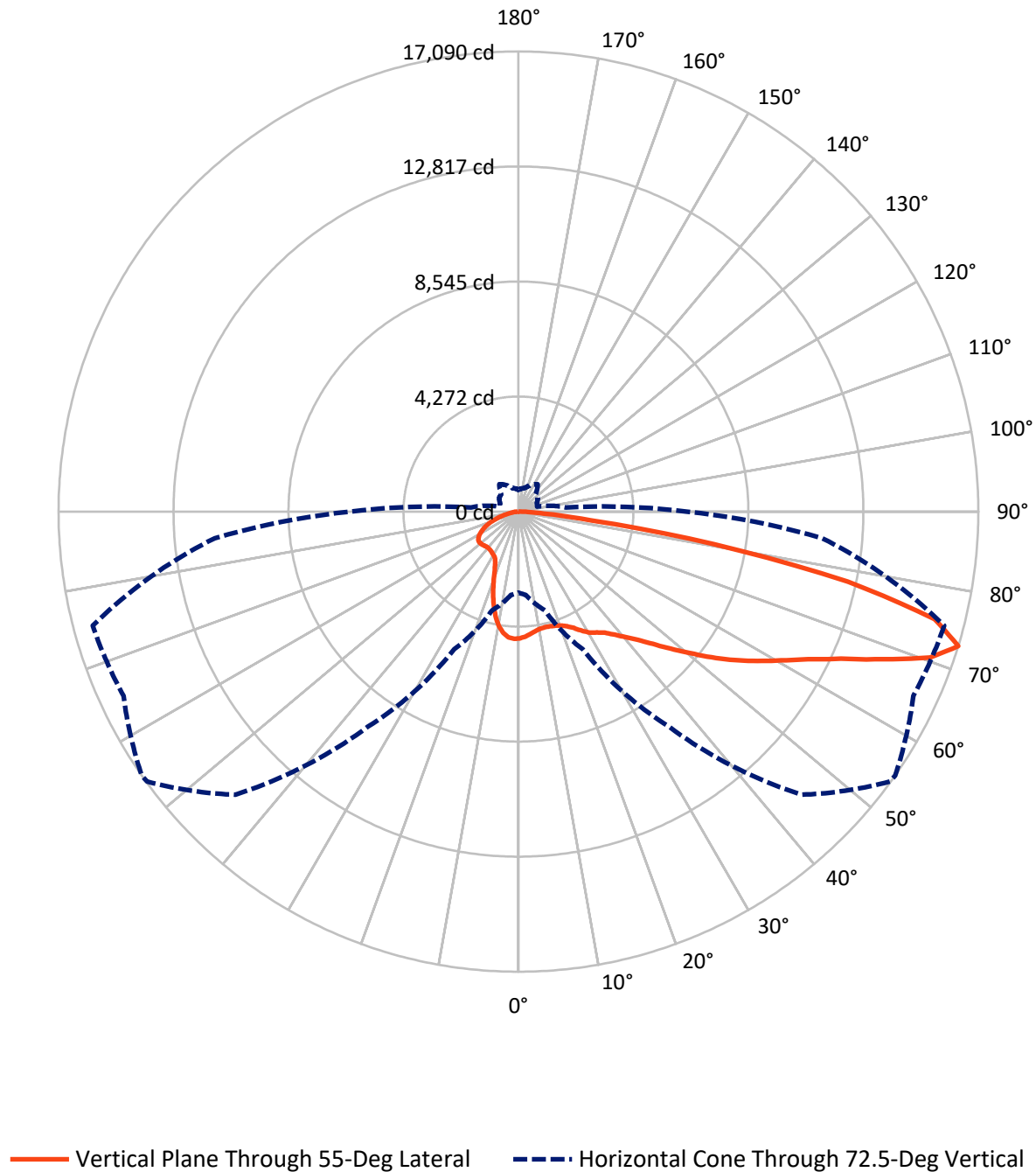
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 7.6 fc  
 Type IV - Medium - N/A

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## Luminous Intensity Polar Plot



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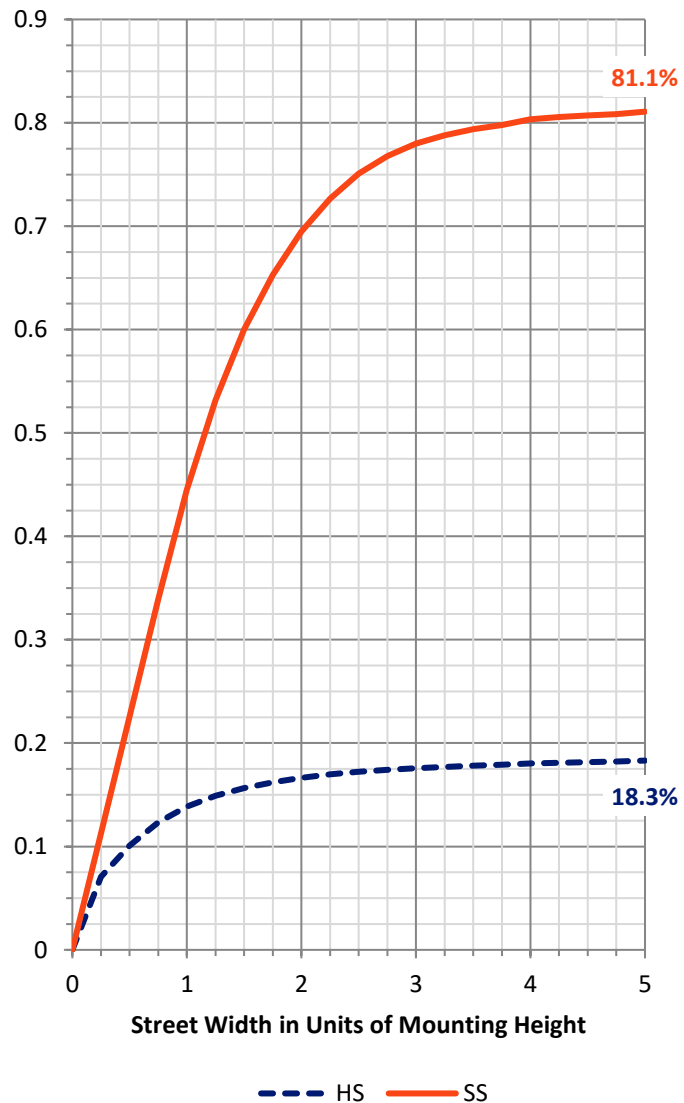
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 4965.6   | 0.0    | 4965.6  |
|                    | % Fixture | 18.6     | 0.0    | 18.6    |
| <b>Street Side</b> | Lumens    | 21750.4  | 0.0    | 21750.4 |
|                    | % Fixture | 81.4     | 0.0    | 81.4    |
| <b>Total</b>       | Lumens    | 26716.0  | 0.0    | 26716.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 426.4   | 1.6       |
| 10°-20°   | 1135.2  | 4.2       |
| 20°-30°   | 1871.7  | 7.0       |
| 30°-40°   | 2768.7  | 10.4      |
| 40°-50°   | 3864.5  | 14.5      |
| 50°-60°   | 5031.7  | 18.8      |
| 60°-70°   | 6183.8  | 23.1      |
| 70°-80°   | 4847.4  | 18.1      |
| 80°-90°   | 586.6   | 2.2       |
| 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°    | 26716.0 | 100.0     |
| 0°-180°   | 26716.0 | 100.0     |

**Coefficient of Utilization**



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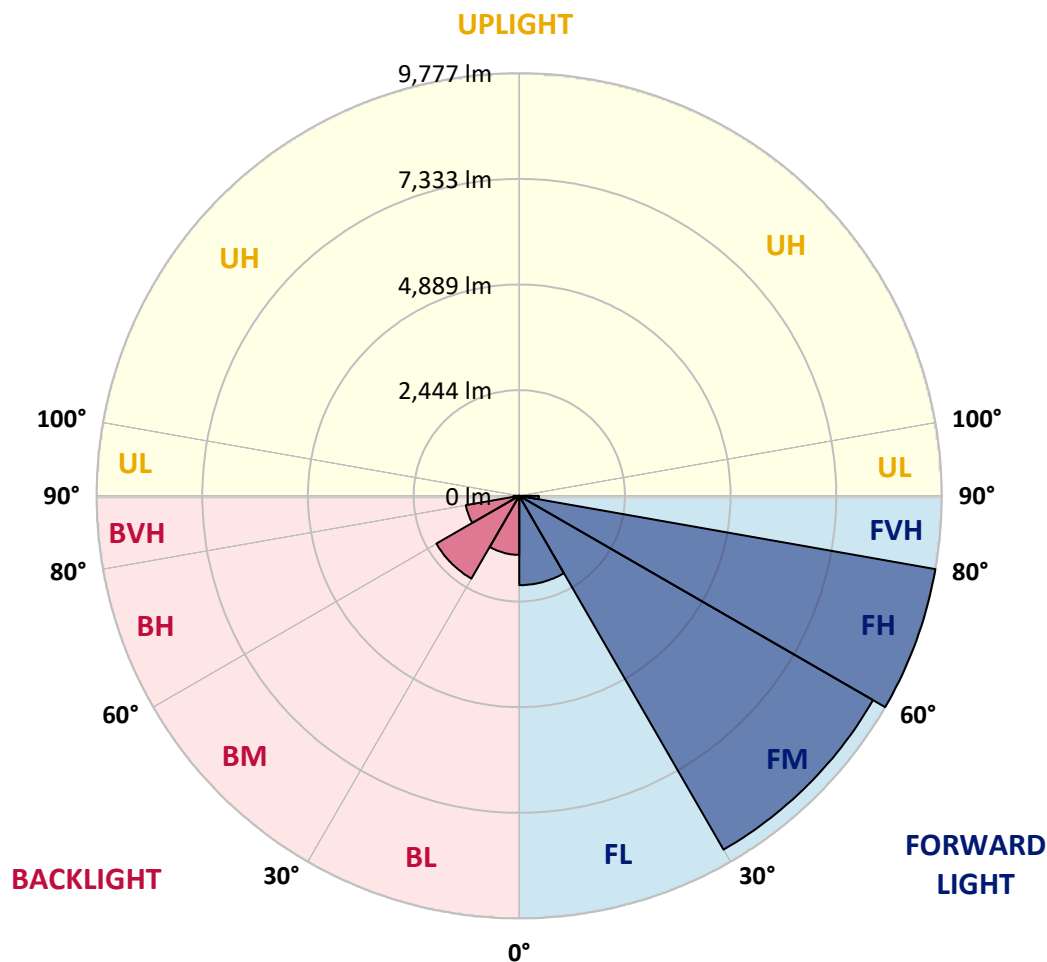
CATALOG NUMBER: NVN-SA5C-722-U-T3R

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |          |
|------|-------------|--------|-----------|-------------------------|------|----------|
|      |             |        |           | B                       | U    | G        |
| FL   | (0°-30°)    | 2067.0 | 7.7       |                         |      |          |
| FM   | (30°-60°)   | 9452.6 | 35.4      |                         |      |          |
| FH   | (60°-80°)   | 9777.2 | 36.6      |                         |      | G4/12000 |
| FVH  | (80°-90°)   | 453.5  | 1.7       |                         |      | G3/500   |
| BL   | (0°-30°)    | 1366.3 | 5.1       | B3/2500                 |      |          |
| BM   | (30°-60°)   | 2212.3 | 8.3       | B2/2500                 |      |          |
| BH   | (60°-80°)   | 1254.0 | 4.7       | B3/2500                 |      | G3/2500  |
| BVH  | (80°-90°)   | 133.1  | 0.5       |                         |      | G2/225   |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |          |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |          |

**BUG Rating: B3-U0-G4**

Type IV Medium





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°     | 45°     | 54°     | 55°     | 65°     | 75°     | 85°     |
|-------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 4712.1 | 4712.1 | 4712.1 | 4712.1 | 4712.1  | 4712.1  | 4712.1  | 4712.1  | 4712.1  | 4712.1  | 4712.1  |
| 2.5°  | 4558.7 | 4547.9 | 4561.4 | 4580.4 | 4601.1  | 4629.1  | 4645.4  | 4652.6  | 4680.5  | 4691.4  | 4714.8  |
| 5°    | 4347.6 | 4342.2 | 4364.7 | 4397.2 | 4443.2  | 4508.2  | 4560.5  | 4570.5  | 4644.5  | 4696.8  | 4744.6  |
| 7.5°  | 4194.2 | 4194.2 | 4220.3 | 4259.1 | 4310.6  | 4398.1  | 4472.1  | 4485.6  | 4611.1  | 4723.9  | 4812.3  |
| 10°   | 4072.4 | 4076.9 | 4107.5 | 4153.6 | 4214.0  | 4307.0  | 4405.3  | 4420.7  | 4602.0  | 4787.0  | 4927.8  |
| 12.5° | 3991.1 | 4002.0 | 4029.9 | 4071.5 | 4146.3  | 4259.1  | 4383.7  | 4404.4  | 4621.0  | 4877.3  | 5066.8  |
| 15°   | 4042.6 | 4060.6 | 4063.3 | 4080.5 | 4122.0  | 4244.7  | 4396.3  | 4418.0  | 4661.6  | 4969.3  | 5224.7  |
| 17.5° | 4268.2 | 4274.5 | 4246.5 | 4210.4 | 4190.6  | 4269.1  | 4434.2  | 4456.8  | 4710.3  | 5060.4  | 5376.3  |
| 20°   | 4611.1 | 4607.5 | 4547.0 | 4449.5 | 4348.5  | 4361.1  | 4496.5  | 4519.9  | 4776.2  | 5140.7  | 5527.9  |
| 22.5° | 5044.2 | 5031.6 | 4938.6 | 4759.1 | 4586.7  | 4514.5  | 4605.6  | 4625.5  | 4875.5  | 5255.3  | 5690.3  |
| 25°   | 5569.4 | 5541.4 | 5418.7 | 5177.7 | 4924.2  | 4738.3  | 4769.9  | 4788.8  | 5019.8  | 5383.5  | 5839.2  |
| 27.5° | 6123.4 | 6095.4 | 5939.3 | 5647.9 | 5310.4  | 5020.7  | 4996.4  | 5012.6  | 5184.1  | 5478.2  | 5949.3  |
| 30°   | 6702.7 | 6673.0 | 6530.4 | 6203.7 | 5720.1  | 5313.1  | 5207.5  | 5213.8  | 5299.6  | 5529.7  | 6039.5  |
| 32.5° | 7284.8 | 7256.8 | 7097.1 | 6718.1 | 6164.9  | 5627.1  | 5360.0  | 5351.9  | 5369.0  | 5582.9  | 6141.5  |
| 35°   | 7874.9 | 7885.7 | 7698.9 | 7279.3 | 6657.6  | 5976.3  | 5540.5  | 5523.3  | 5485.5  | 5692.1  | 6285.8  |
| 37.5° | 8506.6 | 8499.3 | 8257.5 | 7819.0 | 7172.9  | 6355.3  | 5799.5  | 5796.8  | 5665.9  | 5898.7  | 6512.3  |
| 40°   | 8928.9 | 8933.4 | 8786.3 | 8371.2 | 7693.5  | 6774.9  | 6131.5  | 6125.2  | 5953.8  | 6208.2  | 6809.2  |
| 42.5° | 9094.0 | 9123.8 | 9161.7 | 8898.2 | 8238.6  | 7261.3  | 6527.7  | 6518.7  | 6355.3  | 6652.2  | 7158.4  |
| 45°   | 9105.7 | 9165.3 | 9399.9 | 9366.5 | 8790.8  | 7818.1  | 7033.9  | 7008.6  | 6891.3  | 7242.3  | 7575.3  |
| 47.5° | 9004.7 | 9066.0 | 9455.8 | 9645.3 | 9284.4  | 8405.5  | 7625.9  | 7606.0  | 7504.9  | 7980.5  | 8026.5  |
| 50°   | 8783.6 | 8842.2 | 9340.3 | 9781.6 | 9690.5  | 8970.4  | 8308.0  | 8255.7  | 8201.6  | 8833.2  | 8542.6  |
| 52.5° | 8369.4 | 8482.2 | 9186.0 | 9814.1 | 9933.2  | 9472.1  | 9025.4  | 8991.1  | 9020.9  | 9732.9  | 9059.7  |
| 55°   | 7388.5 | 7514.9 | 8788.1 | 9787.0 | 10112.8 | 9893.5  | 9742.8  | 9741.0  | 9895.3  | 10676.7 | 9614.7  |
| 57.5° | 6839.0 | 6928.3 | 7977.8 | 9741.0 | 10325.7 | 10312.2 | 10452.9 | 10470.1 | 10770.6 | 11704.5 | 10195.8 |
| 60°   | 6528.6 | 6622.4 | 7567.2 | 9570.4 | 10656.0 | 10853.6 | 11177.5 | 11211.8 | 11660.3 | 12842.4 | 10895.1 |
| 62.5° | 6246.1 | 6349.0 | 7312.7 | 9223.0 | 11044.9 | 11627.8 | 12045.6 | 12076.3 | 12602.4 | 14011.9 | 11571.0 |
| 65°   | 5763.4 | 5879.8 | 6940.1 | 8994.7 | 11398.6 | 12637.6 | 13149.2 | 13170.0 | 13684.3 | 15237.3 | 12088.0 |
| 67.5° | 5081.2 | 5187.7 | 6237.1 | 8490.3 | 11660.3 | 13863.9 | 14616.4 | 14628.2 | 14757.2 | 16102.6 | 12352.4 |
| 70°   | 4284.4 | 4325.0 | 5235.5 | 7449.0 | 11350.8 | 15010.8 | 16224.4 | 16227.2 | 15735.4 | 16656.7 | 12309.1 |
| 72.5° | 3010.3 | 3105.9 | 3800.7 | 5638.9 | 9754.5  | 14870.9 | 17059.1 | 17089.8 | 16190.2 | 16376.9 | 11325.5 |
| 75°   | 1846.2 | 1947.3 | 2384.0 | 3417.2 | 6188.4  | 11695.5 | 15761.5 | 15974.5 | 15337.4 | 14602.0 | 9251.9  |
| 77.5° | 1234.4 | 1272.3 | 1555.7 | 1992.4 | 2803.6  | 6728.9  | 12117.8 | 12518.5 | 12741.3 | 10648.8 | 5916.8  |
| 80°   | 688.5  | 760.7  | 1031.4 | 1238.0 | 1247.1  | 2673.7  | 7265.8  | 7359.7  | 7088.9  | 4240.2  | 1825.5  |
| 82.5° | 364.6  | 404.3  | 688.5  | 727.3  | 680.4   | 895.1   | 2708.0  | 2710.7  | 2264.9  | 1137.0  | 542.3   |
| 85°   | 282.4  | 315.8  | 471.9  | 444.0  | 347.4   | 397.0   | 893.3   | 942.1   | 770.6   | 465.6   | 176.9   |
| 87.5° | 140.8  | 175.1  | 320.3  | 281.5  | 136.3   | 113.7   | 319.4   | 341.1   | 304.1   | 182.3   | 64.1    |
| 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: P361125

CATALOG NUMBER: NVN-SA5C-722-U-T3R

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 4712.1 | 4712.1 | 4712.1 | 4712.1 | 4712.1 | 4712.1 | 4712.1 | 4712.1 | 4712.1 | 4712.1 | 4712.1 |
| 2.5°  | 4723.9 | 4732.0 | 4741.9 | 4731.1 | 4727.5 | 4713.0 | 4688.7 | 4683.3 | 4670.6 | 4671.5 | 4678.7 |
| 5°    | 4765.4 | 4778.9 | 4773.5 | 4732.0 | 4682.3 | 4612.9 | 4540.7 | 4479.3 | 4438.7 | 4436.0 | 4433.3 |
| 7.5°  | 4844.8 | 4853.8 | 4811.4 | 4693.2 | 4554.2 | 4393.6 | 4242.0 | 4109.4 | 4029.0 | 4009.2 | 4004.7 |
| 10°   | 4969.3 | 4967.5 | 4851.1 | 4612.9 | 4335.8 | 4048.9 | 3805.3 | 3621.2 | 3513.8 | 3482.2 | 3474.1 |
| 12.5° | 5108.3 | 5087.5 | 4864.6 | 4466.7 | 4027.2 | 3629.3 | 3320.7 | 3115.9 | 3004.0 | 2967.9 | 2958.8 |
| 15°   | 5251.7 | 5200.3 | 4831.2 | 4248.3 | 3648.2 | 3177.2 | 2853.3 | 2663.8 | 2603.3 | 2583.5 | 2579.8 |
| 17.5° | 5385.3 | 5286.0 | 4735.6 | 3952.3 | 3216.0 | 2726.9 | 2474.3 | 2398.5 | 2412.9 | 2439.1 | 2440.0 |
| 20°   | 5516.1 | 5343.8 | 4582.2 | 3578.8 | 2760.3 | 2356.1 | 2270.3 | 2326.3 | 2394.9 | 2448.1 | 2455.3 |
| 22.5° | 5645.2 | 5384.4 | 4384.6 | 3147.4 | 2352.5 | 2147.6 | 2208.1 | 2310.0 | 2388.5 | 2446.3 | 2456.2 |
| 25°   | 5753.5 | 5394.3 | 4112.1 | 2687.2 | 2069.1 | 2069.1 | 2178.3 | 2274.9 | 2352.5 | 2409.3 | 2419.2 |
| 27.5° | 5793.2 | 5327.5 | 3727.7 | 2261.3 | 1926.5 | 2033.0 | 2136.8 | 2217.1 | 2283.0 | 2343.4 | 2354.3 |
| 30°   | 5808.5 | 5203.9 | 3283.7 | 1919.3 | 1867.9 | 1994.2 | 2080.8 | 2149.4 | 2211.7 | 2268.5 | 2278.5 |
| 32.5° | 5811.2 | 5055.0 | 2812.7 | 1725.3 | 1827.3 | 1953.6 | 2011.4 | 2071.8 | 2138.6 | 2161.2 | 2164.8 |
| 35°   | 5828.3 | 4879.1 | 2316.4 | 1626.1 | 1789.4 | 1915.7 | 1961.7 | 2005.0 | 1896.8 | 1904.9 | 1912.1 |
| 37.5° | 5878.0 | 4704.9 | 1901.3 | 1570.1 | 1765.0 | 1895.9 | 1950.9 | 1793.9 | 1709.1 | 1689.2 | 1686.5 |
| 40°   | 5970.9 | 4519.0 | 1593.6 | 1525.0 | 1756.0 | 1905.8 | 1881.4 | 1674.8 | 1528.6 | 1419.4 | 1403.2 |
| 42.5° | 6100.0 | 4318.7 | 1396.9 | 1495.2 | 1762.3 | 1953.6 | 1784.9 | 1560.2 | 1317.4 | 1247.1 | 1238.0 |
| 45°   | 6245.2 | 4108.4 | 1290.4 | 1474.5 | 1784.0 | 1990.6 | 1765.0 | 1407.7 | 1219.1 | 1165.9 | 1161.3 |
| 47.5° | 6386.0 | 3851.3 | 1235.3 | 1465.4 | 1813.7 | 1960.8 | 1681.1 | 1360.8 | 1172.2 | 1144.2 | 1146.9 |
| 50°   | 6547.5 | 3619.4 | 1201.9 | 1455.5 | 1839.9 | 1941.9 | 1586.4 | 1336.4 | 1154.1 | 1188.4 | 1224.5 |
| 52.5° | 6683.8 | 3379.3 | 1172.2 | 1435.7 | 1849.8 | 1908.5 | 1562.0 | 1340.9 | 1154.1 | 1220.0 | 1254.3 |
| 55°   | 6845.3 | 3198.0 | 1137.9 | 1394.1 | 1830.9 | 1813.7 | 1544.8 | 1368.0 | 1167.7 | 1126.1 | 1129.8 |
| 57.5° | 7053.8 | 3138.4 | 1100.0 | 1329.2 | 1767.7 | 1675.7 | 1536.7 | 1394.1 | 1159.5 | 1133.4 | 1142.4 |
| 60°   | 7342.5 | 3201.6 | 1084.6 | 1244.4 | 1669.4 | 1567.4 | 1537.6 | 1380.6 | 1102.7 | 1057.6 | 1058.5 |
| 62.5° | 7617.7 | 3272.0 | 1083.7 | 1191.1 | 1548.5 | 1470.8 | 1516.9 | 1336.4 | 1073.8 | 1047.6 | 1057.6 |
| 65°   | 7708.0 | 3200.7 | 1040.4 | 1131.6 | 1412.2 | 1355.3 | 1479.0 | 1289.5 | 1052.2 | 1012.4 | 1010.6 |
| 67.5° | 7587.0 | 2979.6 | 952.9  | 1035.0 | 1256.1 | 1220.9 | 1429.3 | 1233.5 | 1017.9 | 985.4  | 980.0  |
| 70°   | 7227.9 | 2486.0 | 844.6  | 907.8  | 1078.3 | 1069.3 | 1350.8 | 1168.6 | 971.8  | 943.9  | 920.4  |
| 72.5° | 6261.5 | 1771.3 | 712.0  | 755.3  | 878.0  | 906.9  | 1242.6 | 1083.7 | 906.9  | 846.4  | 810.3  |
| 75°   | 5142.6 | 1311.1 | 584.7  | 593.8  | 666.8  | 745.3  | 1093.7 | 984.5  | 830.2  | 727.3  | 699.3  |
| 77.5° | 3149.2 | 802.2  | 465.6  | 469.2  | 478.3  | 594.7  | 900.6  | 873.5  | 732.7  | 606.4  | 586.5  |
| 80°   | 1019.7 | 437.6  | 336.6  | 353.7  | 326.7  | 435.8  | 696.6  | 743.5  | 628.9  | 507.1  | 485.5  |
| 82.5° | 388.0  | 255.4  | 227.4  | 239.1  | 226.5  | 292.4  | 508.0  | 595.6  | 515.2  | 416.9  | 339.3  |
| 85°   | 187.7  | 144.4  | 134.5  | 150.7  | 139.9  | 149.8  | 324.8  | 438.5  | 390.7  | 271.6  | 252.7  |
| 87.5° | 66.8   | 64.1   | 51.4   | 69.5   | 59.6   | 53.2   | 99.3   | 221.1  | 258.1  | 186.8  | 166.9  |
| 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

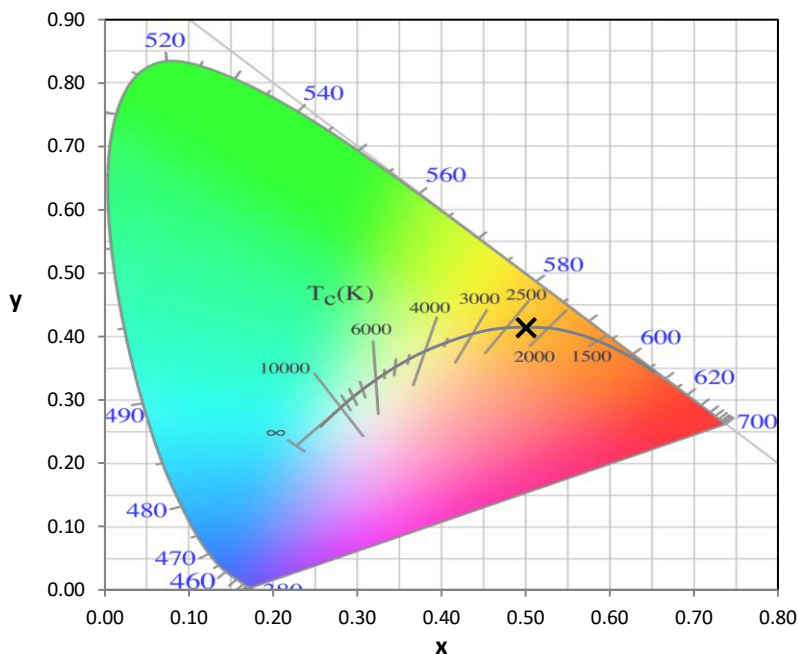
Stabilization Time: 71M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.7/41%  
 Sphere Temperature (°C): 25.6

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

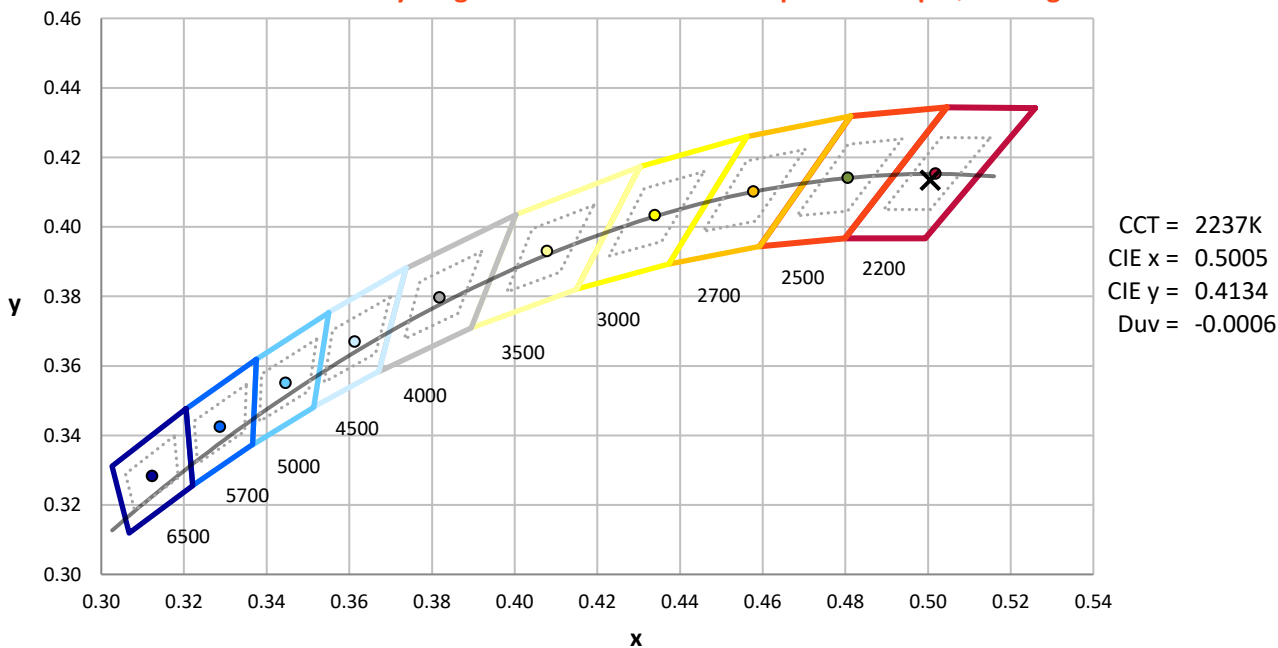
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| 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)