

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



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

Test Report Prepared for  
Cooper Lighting Solutions

Brand: STREETWORKS

Report Number: P362133

Luminaire Tested: NVN-SA5C-722-U-SL4

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-2019  
Report Number: P362133  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-24)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: STREETWORKS  
Catalog Number: NVN-SA5C-722-U-SL4  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(5) 70 CRI, 2200K, 1050mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV  
SPILL LIGHT ELIMINATOR OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 25057 lumens  
Efficiency: N/A  
Efficacy: 89.8 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1.5' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B2 - U0 - G5

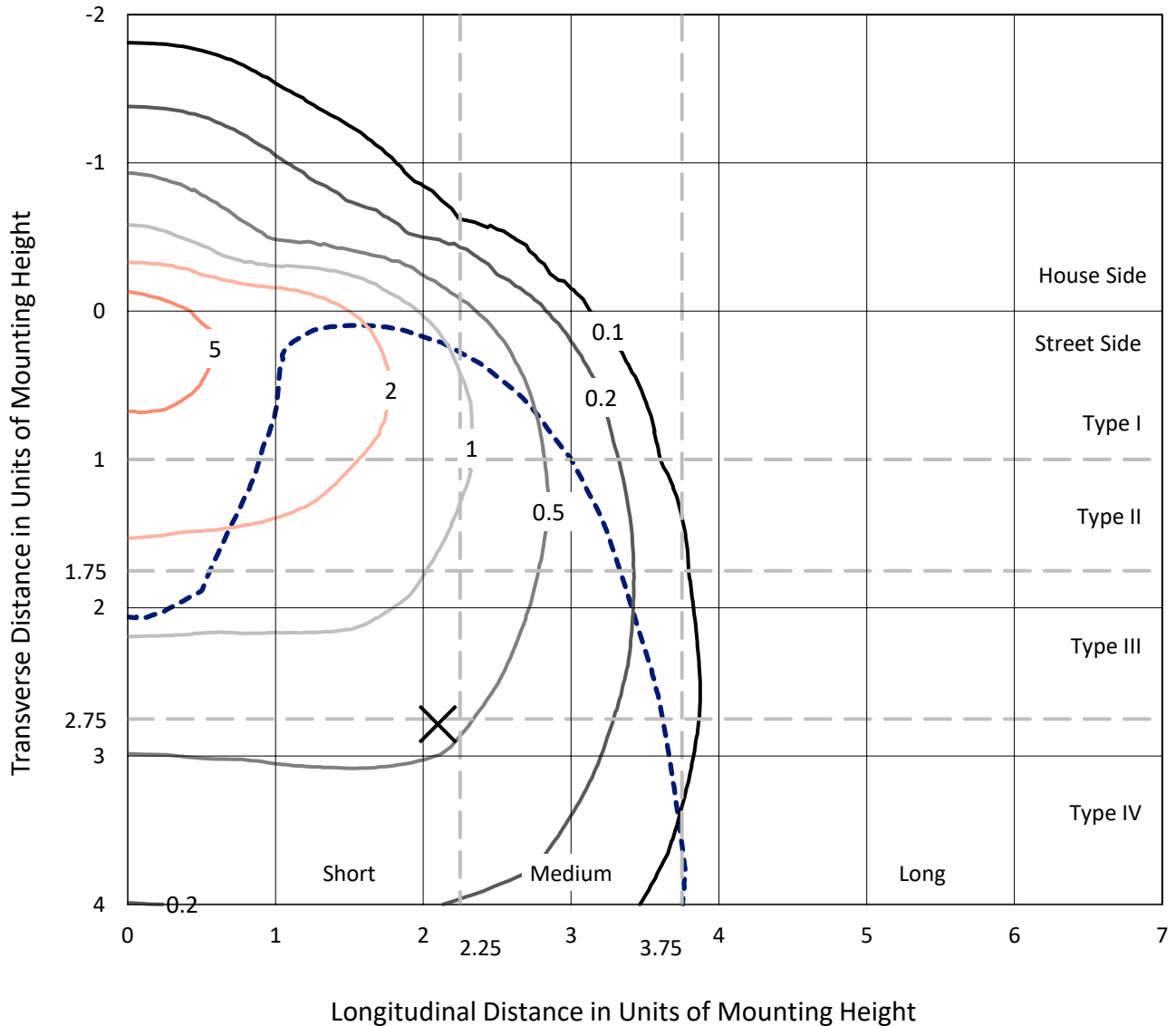
Input Watts (W): 279  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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### Iso-Footcandle Lines of Horizontal Illumination

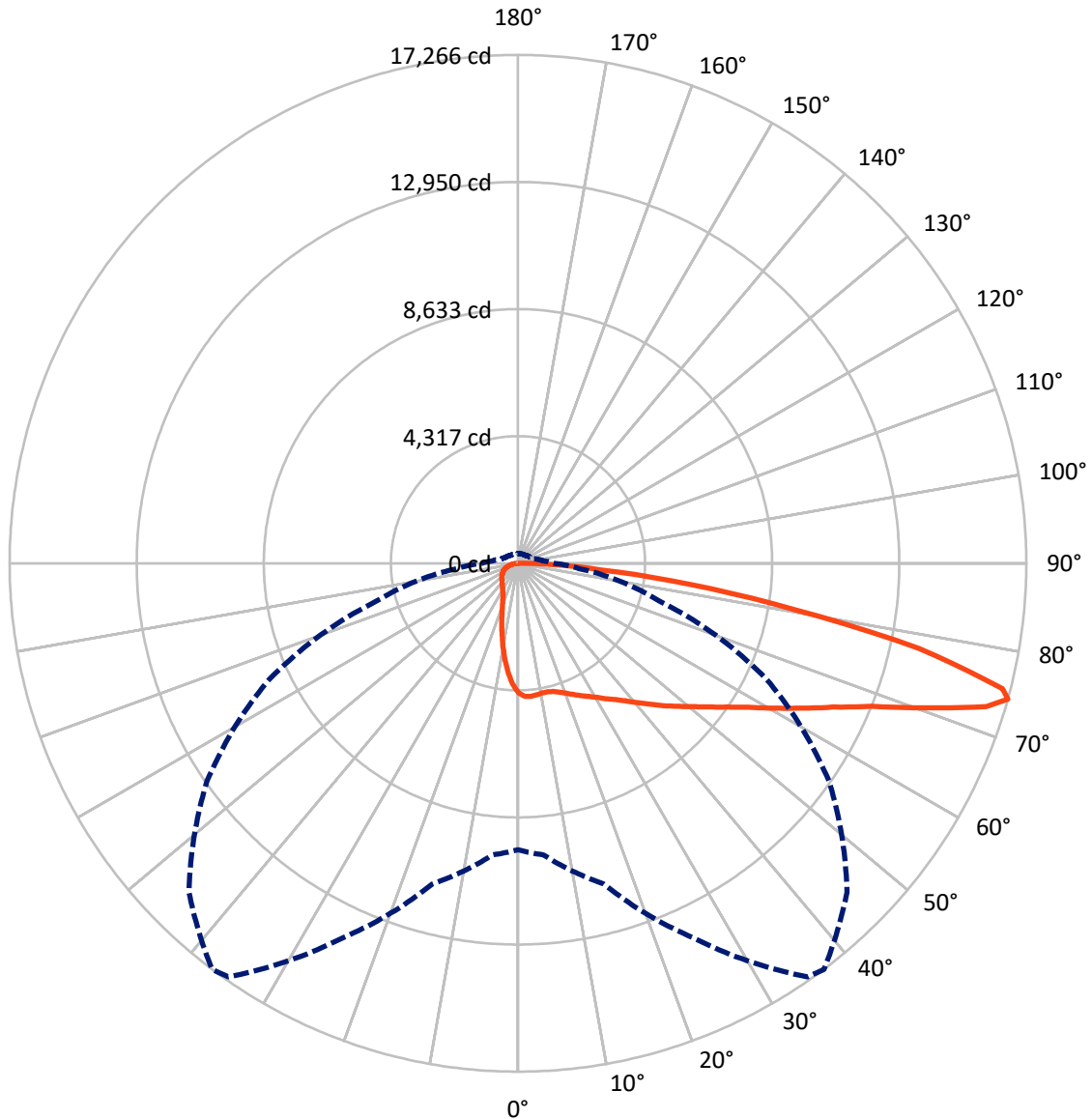
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 7.2 fc  
 Type IV - Short - N/A

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### Luminous Intensity Polar Plot



— Vertical Plane Through 37-Deg Lateral      - - - Horizontal Cone Through 74-Deg Vertical

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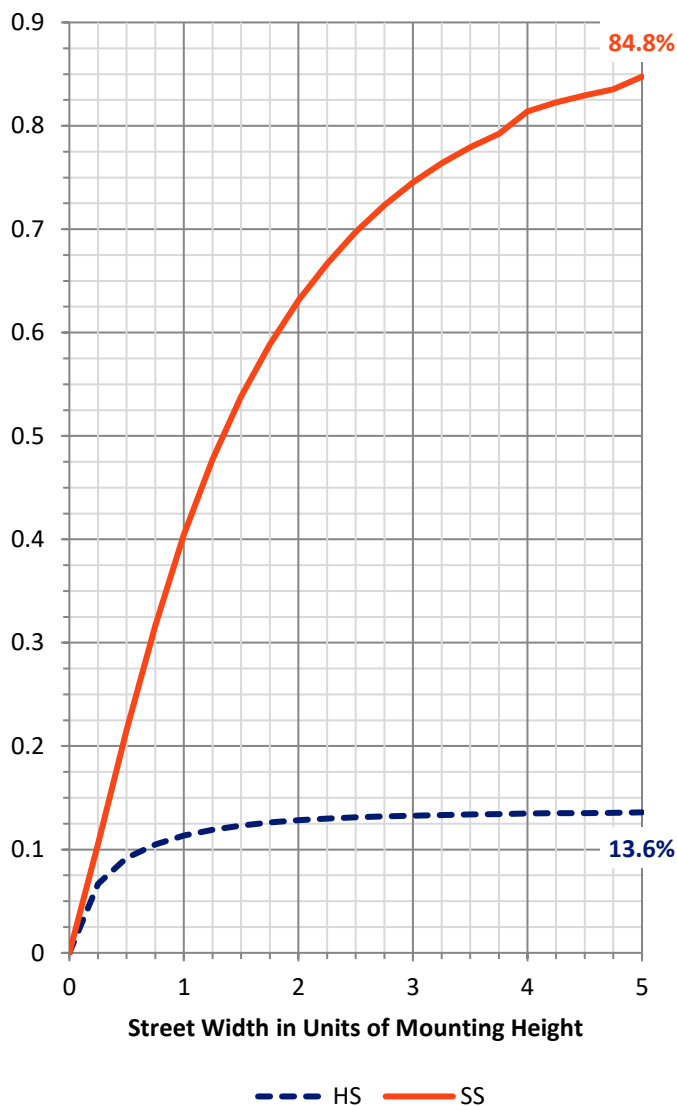
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 3447.7   | 0.0    | 3447.7  |
|                    | % Fixture | 13.8     | 0.0    | 13.8    |
| <b>Street Side</b> | Lumens    | 21609.3  | 0.0    | 21609.3 |
|                    | % Fixture | 86.2     | 0.0    | 86.2    |
| <b>Total</b>       | Lumens    | 25057.0  | 0.0    | 25057.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 388.8   | 1.6       |
| 10°-20°   | 996.6   | 4.0       |
| 20°-30°   | 1535.5  | 6.1       |
| 30°-40°   | 2232.8  | 8.9       |
| 40°-50°   | 3286.4  | 13.1      |
| 50°-60°   | 4615.1  | 18.4      |
| 60°-70°   | 5841.3  | 23.3      |
| 70°-80°   | 5143.5  | 20.5      |
| 80°-90°   | 1017.0  | 4.1       |
| 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°    | 25057.0 | 100.0     |
| 0°-180°   | 25057.0 | 100.0     |

**Coefficient of Utilization**



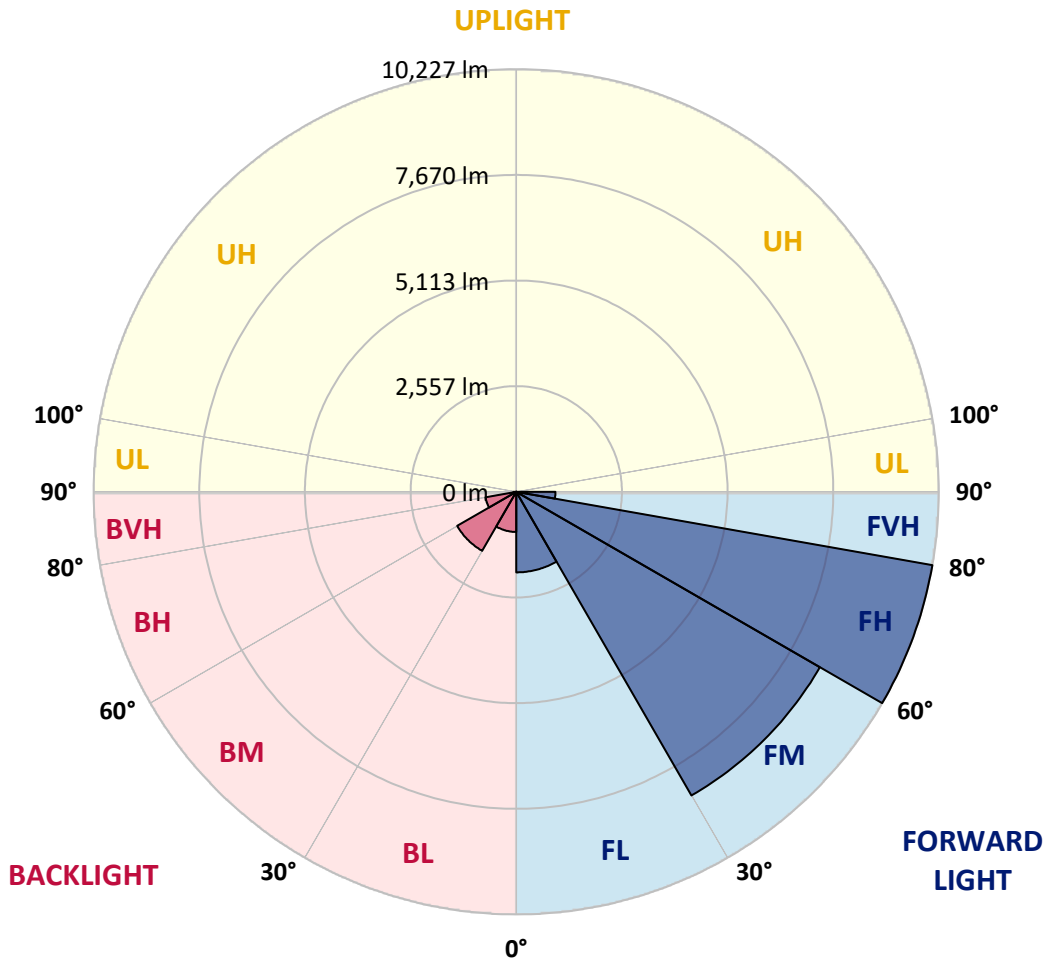
REPORT NUMBER: P362133  
 CATALOG NUMBER: NVN-SA5C-722-U-SL4

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

| Zone           | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |          |
|----------------|---------|-----------|-------------------------|------|----------|
|                |         |           | B                       | U    | G        |
| FL (0°-30°)    | 1949.7  | 7.8       |                         |      |          |
| FM (30°-60°)   | 8484.5  | 33.9      |                         |      |          |
| FH (60°-80°)   | 10227.0 | 40.8      |                         |      | G4/12000 |
| FVH (80°-90°)  | 948.1   | 3.8       |                         |      | G5       |
| BL (0°-30°)    | 971.1   | 3.9       | B2/1000                 |      |          |
| BM (30°-60°)   | 1649.8  | 6.6       | B2/2500                 |      |          |
| BH (60°-80°)   | 757.8   | 3.0       | B2/1000                 |      | G2/1000  |
| BVH (80°-90°)  | 68.9    | 0.3       |                         |      | G1/100   |
| UL (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |          |
| UH (100°-180°) | 0.0     | 0.0       |                         | U0/0 |          |

**BUG Rating: B2-U0-G5**

Type IV Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°      | 15°     | 25°     | 35°     | 37°     | 45°     | 55°     | 65°     | 75°     | 85°    |
|-------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|
| 0°    | 4414.9 | 4414.9  | 4414.9  | 4414.9  | 4414.9  | 4414.9  | 4414.9  | 4414.9  | 4414.9  | 4414.9  | 4414.9 |
| 2.5°  | 4565.9 | 4566.8  | 4565.9  | 4558.8  | 4542.0  | 4527.9  | 4516.4  | 4499.7  | 4462.6  | 4434.4  | 4392.0 |
| 5°    | 4609.1 | 4603.8  | 4600.3  | 4587.1  | 4560.6  | 4544.7  | 4522.6  | 4490.9  | 4430.0  | 4373.5  | 4304.6 |
| 7.5°  | 4588.8 | 4582.6  | 4574.7  | 4558.8  | 4528.8  | 4515.6  | 4484.7  | 4443.2  | 4369.9  | 4295.8  | 4196.9 |
| 10°   | 4526.2 | 4524.4  | 4520.9  | 4517.3  | 4491.7  | 4481.1  | 4452.9  | 4408.8  | 4336.4  | 4246.4  | 4130.7 |
| 12.5° | 4456.4 | 4460.8  | 4475.0  | 4493.5  | 4482.0  | 4476.7  | 4459.1  | 4429.1  | 4354.9  | 4257.8  | 4118.4 |
| 15°   | 4412.3 | 4424.7  | 4462.6  | 4511.2  | 4520.9  | 4519.1  | 4514.7  | 4495.3  | 4416.7  | 4309.0  | 4146.6 |
| 17.5° | 4397.3 | 4417.6  | 4490.0  | 4570.3  | 4598.5  | 4604.7  | 4606.5  | 4572.9  | 4485.6  | 4371.7  | 4175.8 |
| 20°   | 4424.7 | 4450.3  | 4556.2  | 4666.5  | 4711.5  | 4715.0  | 4707.1  | 4648.8  | 4550.9  | 4425.5  | 4191.6 |
| 22.5° | 4507.6 | 4530.6  | 4663.0  | 4787.4  | 4838.6  | 4843.9  | 4820.1  | 4731.8  | 4619.7  | 4489.1  | 4213.7 |
| 25°   | 4667.4 | 4695.6  | 4828.0  | 4952.5  | 4979.0  | 4979.8  | 4945.4  | 4836.0  | 4709.7  | 4578.2  | 4261.4 |
| 27.5° | 4875.7 | 4903.9  | 5023.1  | 5144.9  | 5130.8  | 5122.8  | 5076.0  | 4966.6  | 4827.1  | 4700.9  | 4346.1 |
| 30°   | 5107.8 | 5138.7  | 5251.7  | 5338.2  | 5304.6  | 5288.8  | 5250.8  | 5109.6  | 4990.4  | 4868.6  | 4475.8 |
| 32.5° | 5347.9 | 5376.1  | 5475.0  | 5534.1  | 5491.8  | 5484.7  | 5427.3  | 5298.5  | 5203.1  | 5124.6  | 4685.9 |
| 35°   | 5594.1 | 5614.4  | 5711.5  | 5745.1  | 5688.6  | 5686.8  | 5670.9  | 5552.7  | 5492.6  | 5529.7  | 4991.3 |
| 37.5° | 5845.7 | 5851.0  | 5934.0  | 5935.7  | 5919.0  | 5926.0  | 5942.8  | 5868.6  | 5885.4  | 6001.0  | 5388.5 |
| 40°   | 6069.9 | 6084.0  | 6144.0  | 6162.6  | 6191.7  | 6216.4  | 6300.3  | 6251.7  | 6381.5  | 6586.2  | 5882.8 |
| 42.5° | 6235.8 | 6263.2  | 6359.4  | 6407.1  | 6501.5  | 6540.3  | 6658.6  | 6703.6  | 6964.9  | 7272.0  | 6470.6 |
| 45°   | 6376.2 | 6418.5  | 6573.0  | 6671.0  | 6830.7  | 6898.7  | 7068.2  | 7219.1  | 7624.2  | 8016.1  | 7089.3 |
| 47.5° | 6528.0 | 6581.8  | 6775.1  | 6962.2  | 7179.4  | 7256.2  | 7564.2  | 7790.1  | 8327.7  | 8764.6  | 7672.8 |
| 50°   | 6751.3 | 6792.8  | 6981.7  | 7275.6  | 7546.5  | 7645.4  | 8071.7  | 8395.6  | 9042.6  | 9477.7  | 8178.5 |
| 52.5° | 7062.9 | 7047.0  | 7206.7  | 7618.9  | 7982.6  | 8104.4  | 8613.6  | 9040.0  | 9767.3  | 10123.0 | 8605.7 |
| 55°   | 7376.2 | 7349.7  | 7461.8  | 7978.1  | 8491.0  | 8618.9  | 9210.3  | 9686.9  | 10456.6 | 10703.7 | 8933.2 |
| 57.5° | 7724.8 | 7674.5  | 7769.0  | 8383.3  | 9070.0  | 9222.7  | 9878.5  | 10374.5 | 11134.5 | 11173.3 | 9141.5 |
| 60°   | 8084.1 | 8016.1  | 8122.0  | 8885.5  | 9805.2  | 9985.3  | 10660.5 | 11045.3 | 11773.5 | 11549.3 | 9208.5 |
| 62.5° | 8398.3 | 8350.6  | 8513.9  | 9446.0  | 10634.0 | 10831.7 | 11428.4 | 11758.5 | 12403.7 | 11705.5 | 8966.7 |
| 65°   | 8672.8 | 8680.7  | 8963.2  | 10076.2 | 11558.1 | 11769.1 | 12309.2 | 12637.6 | 12899.7 | 11612.8 | 8400.9 |
| 67.5° | 9000.2 | 9045.3  | 9527.2  | 10905.9 | 12721.4 | 12952.7 | 13590.8 | 13596.1 | 13176.9 | 11069.1 | 7287.0 |
| 70°   | 9477.7 | 9570.4  | 10303.0 | 12056.8 | 14375.5 | 14693.2 | 15185.8 | 14159.2 | 12787.6 | 9595.1  | 5733.6 |
| 72.5° | 9901.4 | 10074.4 | 11128.3 | 13373.7 | 16391.4 | 16632.4 | 16118.7 | 13834.4 | 11160.9 | 7190.8  | 3572.0 |
| 74°   | 9729.3 | 9943.8  | 11278.3 | 14022.4 | 17150.5 | 17266.1 | 15803.6 | 12886.5 | 9305.6  | 4979.8  | 2076.0 |
| 75°   | 9358.6 | 9591.6  | 11059.4 | 14016.3 | 17054.3 | 16989.9 | 15042.8 | 11803.5 | 7663.9  | 3396.4  | 1381.3 |
| 77.5° | 7552.7 | 7799.0  | 9318.9  | 12012.7 | 13983.6 | 13922.7 | 11555.5 | 7918.1  | 3356.7  | 1113.9  | 701.7  |
| 80°   | 4391.1 | 4579.1  | 5784.8  | 7628.6  | 9429.2  | 9539.5  | 7599.5  | 3918.0  | 1320.4  | 625.8   | 475.7  |
| 82.5° | 1950.6 | 2080.4  | 2794.4  | 3894.2  | 5690.4  | 5832.5  | 3979.8  | 2053.0  | 815.6   | 380.4   | 286.0  |
| 85°   | 1279.8 | 1376.0  | 1696.4  | 1854.4  | 2709.7  | 2806.8  | 1948.0  | 1598.5  | 538.4   | 209.2   | 210.1  |
| 87.5° | 920.6  | 1013.3  | 1260.4  | 1100.6  | 1243.6  | 1177.4  | 1060.0  | 1479.3  | 216.2   | 119.2   | 70.6   |
| 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: P362133  
 CATALOG NUMBER: NVN-SA5C-722-U-SL4

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 4414.9 | 4414.9 | 4414.9 | 4414.9 | 4414.9 | 4414.9 | 4414.9 | 4414.9 | 4414.9 | 4414.9 | 4414.9 |
| 2.5°  | 4373.5 | 4359.3 | 4327.6 | 4267.5 | 4234.0 | 4205.8 | 4159.0 | 4131.6 | 4119.3 | 4118.4 | 4123.7 |
| 5°    | 4264.9 | 4232.2 | 4150.2 | 4049.5 | 3969.2 | 3896.0 | 3805.0 | 3750.3 | 3711.5 | 3688.5 | 3694.7 |
| 7.5°  | 4138.7 | 4087.5 | 3958.6 | 3798.0 | 3669.1 | 3527.0 | 3386.7 | 3302.8 | 3237.5 | 3189.0 | 3197.8 |
| 10°   | 4052.2 | 3981.6 | 3793.6 | 3562.3 | 3347.8 | 3141.3 | 2948.0 | 2832.4 | 2740.6 | 2670.0 | 2675.3 |
| 12.5° | 4023.1 | 3927.7 | 3667.4 | 3358.4 | 3057.5 | 2775.0 | 2522.6 | 2345.2 | 2250.7 | 2170.4 | 2176.6 |
| 15°   | 4027.5 | 3899.5 | 3561.4 | 3174.8 | 2796.2 | 2440.5 | 2134.2 | 1926.8 | 1798.8 | 1743.2 | 1744.1 |
| 17.5° | 4031.0 | 3866.8 | 3450.2 | 2978.0 | 2537.6 | 2128.0 | 1795.3 | 1585.2 | 1464.3 | 1413.1 | 1414.0 |
| 20°   | 4019.5 | 3813.9 | 3312.5 | 2752.1 | 2267.5 | 1841.2 | 1519.0 | 1340.7 | 1248.9 | 1209.2 | 1209.2 |
| 22.5° | 4004.5 | 3751.2 | 3157.2 | 2525.2 | 2000.9 | 1592.3 | 1321.3 | 1185.4 | 1132.4 | 1105.9 | 1105.1 |
| 25°   | 4011.6 | 3704.4 | 2998.3 | 2292.2 | 1755.6 | 1393.7 | 1189.8 | 1099.8 | 1064.5 | 1047.7 | 1046.8 |
| 27.5° | 4049.5 | 3682.4 | 2851.8 | 2060.1 | 1541.1 | 1244.5 | 1101.5 | 1038.0 | 1015.0 | 1004.4 | 1004.4 |
| 30°   | 4118.4 | 3682.4 | 2699.1 | 1862.4 | 1362.8 | 1134.2 | 1033.6 | 990.3  | 974.4  | 967.4  | 967.4  |
| 32.5° | 4238.4 | 3702.7 | 2551.7 | 1666.4 | 1220.7 | 1047.7 | 977.1  | 948.0  | 935.6  | 932.1  | 932.1  |
| 35°   | 4445.0 | 3771.5 | 2407.8 | 1481.1 | 1105.9 | 977.1  | 923.2  | 906.5  | 897.6  | 896.8  | 899.4  |
| 37.5° | 4735.3 | 3911.8 | 2272.8 | 1344.3 | 1024.7 | 919.7  | 878.2  | 865.0  | 859.7  | 864.1  | 867.6  |
| 40°   | 5100.8 | 4102.5 | 2150.1 | 1220.7 | 963.0  | 873.8  | 836.7  | 827.9  | 825.3  | 831.4  | 836.7  |
| 42.5° | 5542.1 | 4360.2 | 2049.5 | 1131.5 | 915.3  | 835.0  | 801.4  | 790.8  | 788.2  | 795.3  | 802.3  |
| 45°   | 6019.6 | 4637.4 | 1978.9 | 1065.3 | 878.2  | 805.8  | 770.5  | 759.1  | 753.8  | 757.3  | 765.2  |
| 47.5° | 6453.8 | 4899.5 | 1950.6 | 1018.6 | 842.9  | 781.1  | 743.2  | 729.1  | 720.2  | 718.5  | 724.6  |
| 50°   | 6820.1 | 5094.6 | 1963.9 | 990.3  | 814.7  | 753.8  | 716.7  | 700.8  | 687.6  | 679.6  | 684.0  |
| 52.5° | 7086.7 | 5217.3 | 1976.2 | 978.0  | 792.6  | 723.8  | 687.6  | 672.6  | 654.9  | 641.7  | 641.7  |
| 55°   | 7280.0 | 5245.5 | 1948.9 | 968.3  | 775.8  | 691.1  | 654.9  | 640.8  | 623.1  | 608.1  | 606.4  |
| 57.5° | 7355.9 | 5166.1 | 1847.4 | 954.1  | 764.4  | 660.2  | 620.5  | 609.9  | 594.9  | 577.2  | 576.4  |
| 60°   | 7253.5 | 4920.7 | 1651.4 | 924.1  | 749.4  | 634.6  | 586.1  | 579.0  | 571.9  | 555.2  | 554.3  |
| 62.5° | 6842.2 | 4382.3 | 1398.1 | 863.2  | 719.3  | 607.3  | 554.3  | 557.8  | 558.7  | 547.2  | 545.5  |
| 65°   | 6096.4 | 3642.6 | 1151.0 | 783.8  | 674.3  | 574.6  | 521.6  | 538.4  | 548.1  | 546.4  | 543.7  |
| 67.5° | 5012.5 | 2835.0 | 975.3  | 699.9  | 615.2  | 529.6  | 486.3  | 505.8  | 513.7  | 519.9  | 518.1  |
| 70°   | 3720.3 | 1999.2 | 806.7  | 611.7  | 543.7  | 476.6  | 440.4  | 450.1  | 444.8  | 451.9  | 454.6  |
| 72.5° | 2074.2 | 1199.5 | 657.6  | 523.4  | 469.6  | 414.8  | 389.2  | 387.5  | 376.0  | 376.0  | 376.0  |
| 74°   | 1244.5 | 880.0  | 578.1  | 468.7  | 424.5  | 374.2  | 352.2  | 344.2  | 333.6  | 334.5  | 333.6  |
| 75°   | 1000.9 | 756.4  | 530.5  | 432.5  | 392.8  | 350.4  | 328.3  | 317.7  | 309.8  | 309.8  | 308.9  |
| 77.5° | 632.0  | 574.6  | 427.2  | 344.2  | 314.2  | 288.6  | 273.6  | 259.5  | 259.5  | 258.6  | 257.7  |
| 80°   | 477.5  | 457.2  | 332.8  | 260.4  | 241.0  | 221.5  | 211.8  | 205.7  | 205.7  | 208.3  | 207.4  |
| 82.5° | 327.5  | 344.2  | 233.9  | 181.8  | 172.1  | 158.0  | 156.2  | 157.1  | 154.5  | 150.9  | 150.0  |
| 85°   | 239.2  | 258.6  | 158.0  | 114.7  | 105.0  | 96.2   | 103.3  | 106.8  | 102.4  | 94.4   | 90.9   |
| 87.5° | 91.8   | 169.5  | 84.7   | 47.7   | 44.1   | 38.0   | 44.1   | 45.9   | 49.4   | 38.8   | 39.7   |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |



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



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: 4π  
 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  
 CIE u': 0.2876  
 CIE v': 0.5346  
 Duv: -0.0006  
 CIE x: 0.5005  
 CIE y: 0.4134  
 CIE z: 0.0860  
 Peak Wavelength (nm): 603  
 Dominant Wavelength (nm): 587  
 Purity: 74.5  
 Rf: 69.8  
 Rg: 99.2

|           |      |      |       |
|-----------|------|------|-------|
| CRI (Ra): | 72.0 |      |       |
| R1:       | 68.9 | R9:  | -17.4 |
| R2:       | 83.0 | R10: | 61.3  |
| R3:       | 95.2 | R11: | 59.8  |
| R4:       | 66.2 | R12: | 50.5  |
| R5:       | 65.9 | R13: | 71.1  |
| R6:       | 76.3 | R14: | 96.9  |
| R7:       | 76.7 |      |       |
| R8:       | 43.8 |      |       |



**Test Conditions**

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

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| 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**



#####

| $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|
| 360               | 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 (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    | 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 (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    | 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**

$R_f = 69.8$   
 $R_g = 99.2$   
 $CIE R_a = 72.0$   
 $R_9 = -17.4$



**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)