

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: P364297

Luminaire Tested: NVN-SA3D-722-U-AFL-HSS

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-2019  
Report Number: P364297  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-30)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: STREETWORKS  
Catalog Number: NVN-SA3D-722-U-AFL-HSS  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(3) 70 CRI, 2200K, 1200mA LIGHTSQUARES WITH 16 LEDS EACH AND AUTOMOTIVE  
FRONTLINE OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 14569 lumens  
Efficiency: N/A  
Efficacy: 76.3 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 1.5' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B1 - U0 - G2

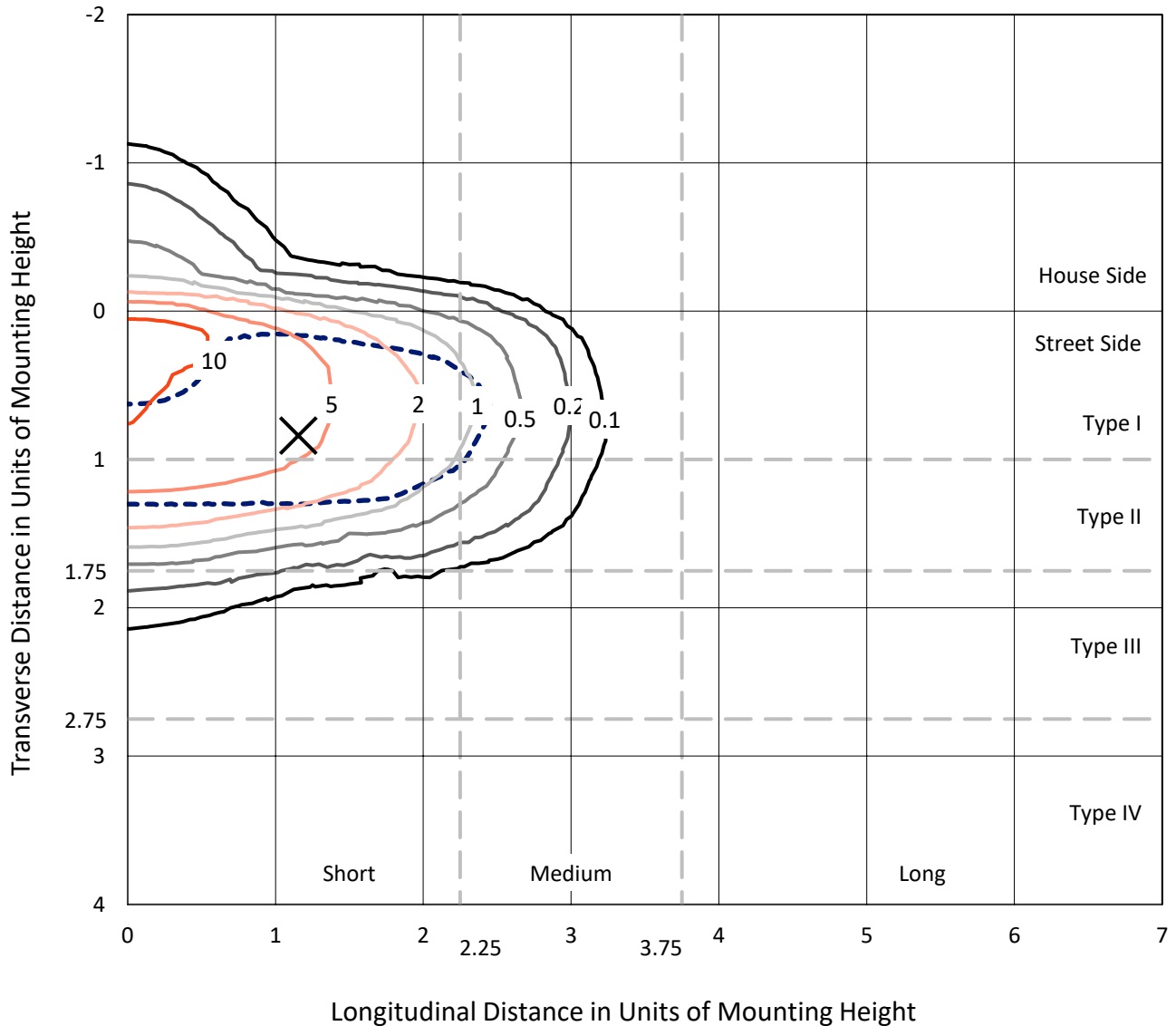
Input Watts (W): 191  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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### Iso-Footcandle Lines of Horizontal Illumination

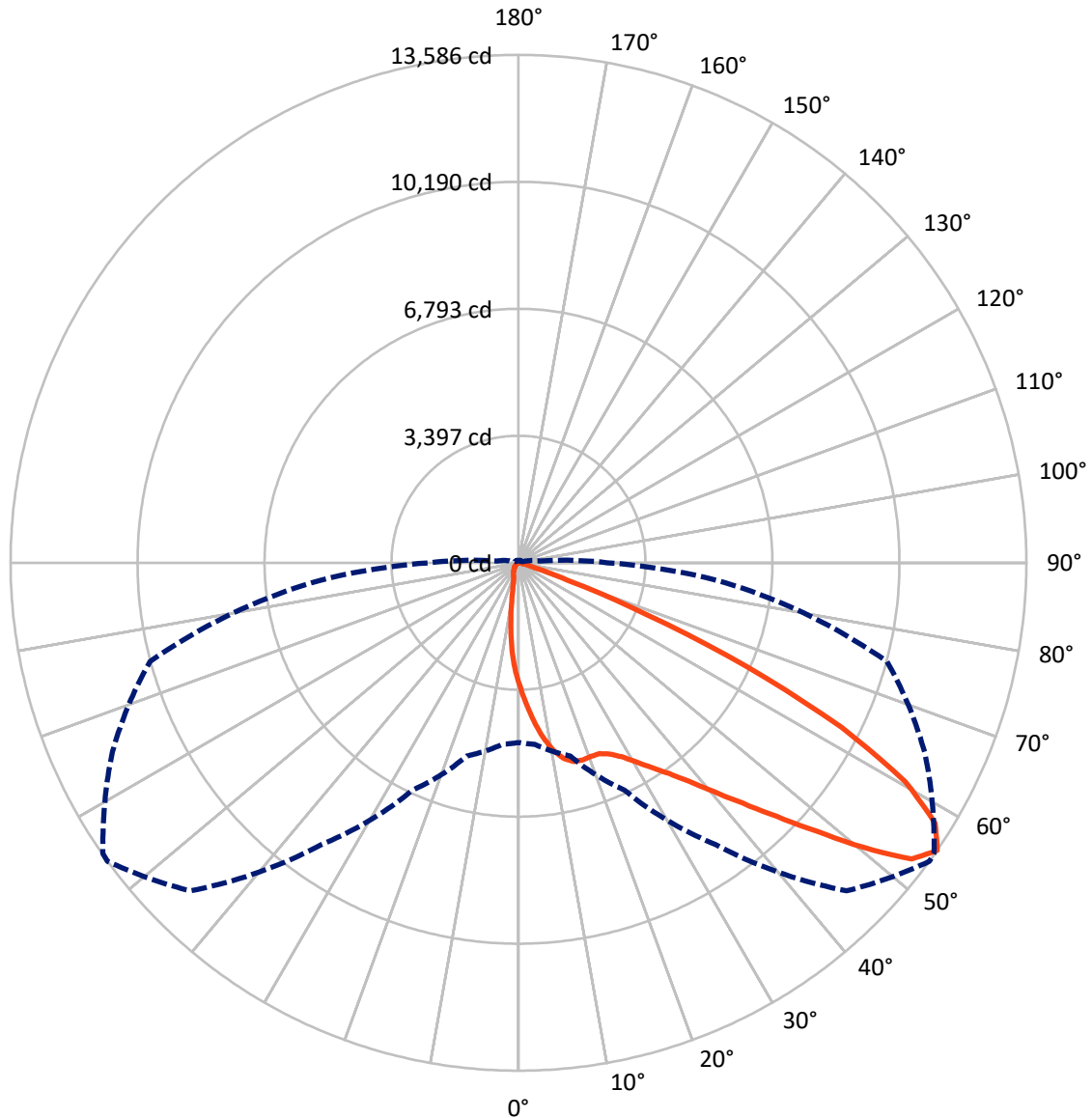
✕ Max cd  
 - - - 1/2 Max cd



Based on 20 foot mounting height. Maximum calculated value = 12.5 fc  
 Type II - Short - N/A

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### Luminous Intensity Polar Plot



— Vertical Plane Through 54-Deg Lateral      - - - Horizontal Cone Through 55-Deg Vertical

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**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 726.9    | 0.0    | 726.9   |
|                    | % Fixture | 5.0      | 0.0    | 5.0     |
| <b>Street Side</b> | Lumens    | 13842.1  | 0.0    | 13842.1 |
|                    | % Fixture | 95.0     | 0.0    | 95.0    |
| <b>Total</b>       | Lumens    | 14569.0  | 0.0    | 14569.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 300.5   | 2.1       |
| 10°-20°   | 824.1   | 5.7       |
| 20°-30°   | 1406.9  | 9.7       |
| 30°-40°   | 2257.9  | 15.5      |
| 40°-50°   | 3608.1  | 24.8      |
| 50°-60°   | 3866.2  | 26.5      |
| 60°-70°   | 1985.0  | 13.6      |
| 70°-80°   | 300.7   | 2.1       |
| 80°-90°   | 19.6    | 0.1       |
| 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°    | 14569.0 | 100.0     |
| 0°-180°   | 14569.0 | 100.0     |

**Coefficient of Utilization**

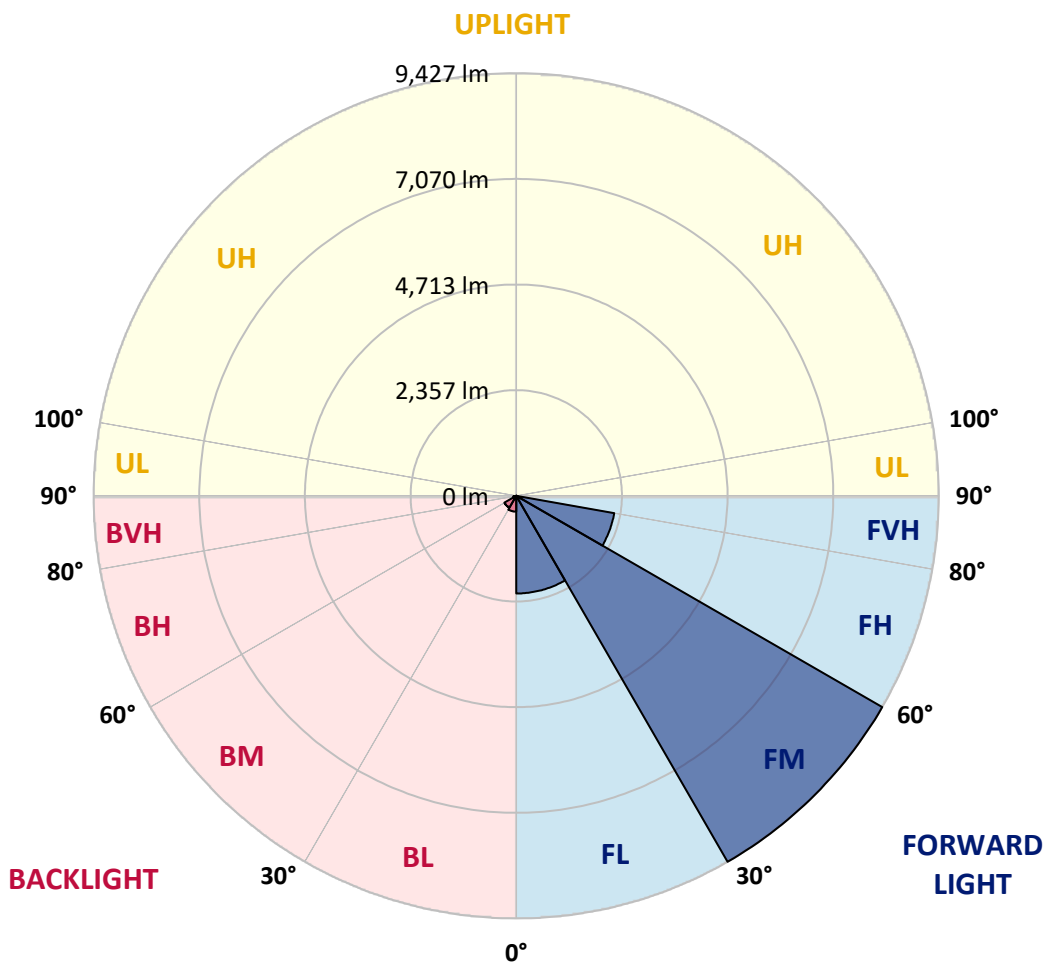


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**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone           | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|----------------|--------|-----------|-------------------------|------|---------|
|                |        |           | B                       | U    | G       |
| FL (0°-30°)    | 2177.8 | 14.9      |                         |      |         |
| FM (30°-60°)   | 9426.8 | 64.7      |                         |      |         |
| FH (60°-80°)   | 2218.7 | 15.2      |                         |      | G2/5000 |
| FVH (80°-90°)  | 18.8   | 0.1       |                         |      | G1/100  |
| BL (0°-30°)    | 353.7  | 2.4       | B1/500                  |      |         |
| BM (30°-60°)   | 305.5  | 2.1       | B1/1000                 |      |         |
| BH (60°-80°)   | 67.0   | 0.5       | B0/110                  |      | G0/110  |
| BVH (80°-90°)  | 0.8    | 0.0       |                         |      | G0/10   |
| UL (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B1-U0-G2**  
 Type II Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°     | 35°     | 45°     | 54°     | 55°     | 65°     | 75°     | 85°    |
|-------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|--------|
| 0°    | 3262.9 | 3262.9 | 3262.9 | 3262.9  | 3262.9  | 3262.9  | 3262.9  | 3262.9  | 3262.9  | 3262.9  | 3262.9 |
| 2.5°  | 4094.6 | 4033.6 | 4035.5 | 4007.8  | 3906.5  | 3827.2  | 3744.8  | 3725.3  | 3597.0  | 3462.3  | 3332.7 |
| 5°    | 4802.4 | 4757.8 | 4747.1 | 4693.6  | 4552.7  | 4403.6  | 4243.7  | 4206.6  | 3955.6  | 3680.0  | 3408.8 |
| 7.5°  | 5166.1 | 5166.7 | 5157.9 | 5138.4  | 5050.3  | 4905.6  | 4710.6  | 4671.6  | 4329.9  | 3916.6  | 3488.1 |
| 10°   | 5060.4 | 5084.3 | 5133.4 | 5198.2  | 5265.5  | 5247.3  | 5100.7  | 5065.4  | 4694.2  | 4167.0  | 3576.2 |
| 12.5° | 4813.8 | 4816.9 | 4871.7 | 4978.0  | 5171.8  | 5370.6  | 5373.1  | 5361.2  | 5042.2  | 4428.7  | 3673.1 |
| 15°   | 4691.1 | 4703.0 | 4723.2 | 4791.8  | 4975.5  | 5293.8  | 5521.6  | 5538.6  | 5361.2  | 4706.8  | 3776.3 |
| 17.5° | 4771.6 | 4788.6 | 4771.6 | 4779.8  | 4886.1  | 5172.4  | 5547.4  | 5590.8  | 5639.9  | 4981.8  | 3873.8 |
| 20°   | 4989.9 | 5005.7 | 4975.5 | 4942.1  | 4962.9  | 5137.2  | 5529.1  | 5587.7  | 5858.2  | 5225.9  | 3955.6 |
| 22.5° | 5284.4 | 5290.7 | 5244.8 | 5190.0  | 5174.9  | 5256.7  | 5544.2  | 5604.6  | 6033.1  | 5446.7  | 4007.2 |
| 25°   | 5608.4 | 5614.1 | 5556.8 | 5493.9  | 5458.0  | 5491.4  | 5668.2  | 5713.5  | 6187.2  | 5657.5  | 4036.7 |
| 27.5° | 5961.4 | 5966.4 | 5894.7 | 5817.3  | 5775.8  | 5777.0  | 5872.7  | 5921.1  | 6351.5  | 5897.8  | 4060.7 |
| 30°   | 6334.5 | 6332.0 | 6265.9 | 6158.3  | 6105.5  | 6104.2  | 6167.1  | 6216.2  | 6589.3  | 6206.1  | 4093.4 |
| 32.5° | 6753.5 | 6748.5 | 6654.7 | 6521.3  | 6461.6  | 6470.4  | 6526.4  | 6554.7  | 6884.4  | 6534.6  | 4151.9 |
| 35°   | 7305.3 | 7290.8 | 7149.2 | 6983.8  | 6873.7  | 6870.5  | 6917.7  | 6940.4  | 7260.6  | 6932.2  | 4249.4 |
| 37.5° | 8021.3 | 8008.1 | 7816.2 | 7575.8  | 7421.1  | 7363.2  | 7419.2  | 7448.1  | 7797.3  | 7442.4  | 4406.1 |
| 40°   | 8727.2 | 8714.0 | 8600.1 | 8379.9  | 8141.4  | 8002.4  | 8046.4  | 8077.3  | 8467.4  | 8061.5  | 4603.6 |
| 42.5° | 9214.2 | 9225.5 | 9265.1 | 9283.4  | 9060.0  | 8768.1  | 8788.2  | 8820.3  | 9171.4  | 8723.4  | 4829.5 |
| 45°   | 9342.5 | 9367.1 | 9591.1 | 10030.8 | 10114.5 | 9886.8  | 9676.0  | 9693.6  | 9886.8  | 9385.3  | 5055.4 |
| 47.5° | 8956.9 | 9002.2 | 9434.4 | 10252.3 | 10960.8 | 11121.8 | 10722.9 | 10699.7 | 10573.2 | 9920.7  | 5215.8 |
| 50°   | 8080.4 | 8121.9 | 8681.9 | 9891.8  | 11217.5 | 12300.9 | 11977.5 | 11908.9 | 11175.3 | 10241.0 | 5272.4 |
| 52.5° | 6812.0 | 6862.3 | 7317.2 | 8756.8  | 10733.6 | 12826.9 | 13165.4 | 13108.1 | 11617.0 | 10266.2 | 5281.9 |
| 55°   | 4810.6 | 4871.7 | 5353.0 | 6711.3  | 9200.3  | 12408.5 | 13586.3 | 13569.3 | 11983.8 | 10199.5 | 5302.0 |
| 57.5° | 2703.5 | 2747.6 | 3266.6 | 4302.3  | 6738.4  | 10807.9 | 13146.5 | 13259.1 | 12205.3 | 10083.7 | 5332.2 |
| 60°   | 1200.5 | 1212.4 | 1481.1 | 2141.7  | 3944.9  | 8259.7  | 11887.5 | 12077.5 | 12015.2 | 9928.9  | 5383.2 |
| 62.5° | 665.7  | 655.6  | 655.6  | 890.3   | 1714.5  | 5113.3  | 9693.6  | 10007.6 | 11204.2 | 9745.8  | 5385.7 |
| 65°   | 521.6  | 512.1  | 485.1  | 488.9   | 653.1   | 2269.4  | 6712.6  | 7270.7  | 9664.0  | 9209.1  | 5204.5 |
| 67.5° | 442.3  | 434.1  | 407.1  | 396.4   | 405.8   | 748.7   | 3688.2  | 4267.7  | 7333.0  | 7814.3  | 4508.0 |
| 70°   | 373.7  | 368.1  | 354.2  | 341.0   | 317.1   | 370.0   | 1411.2  | 1805.1  | 4518.7  | 5198.2  | 3077.3 |
| 72.5° | 300.7  | 298.2  | 303.3  | 291.9   | 263.0   | 246.6   | 482.6   | 584.5   | 2029.7  | 2319.7  | 1267.8 |
| 75°   | 259.2  | 258.0  | 260.5  | 249.2   | 216.4   | 171.8   | 245.4   | 268.0   | 572.5   | 567.5   | 256.7  |
| 77.5° | 168.6  | 170.5  | 215.8  | 210.8   | 186.2   | 114.5   | 127.1   | 137.2   | 173.7   | 130.2   | 78.0   |
| 80°   | 107.6  | 106.3  | 109.5  | 174.9   | 167.4   | 87.5    | 63.5    | 66.7    | 83.7    | 64.2    | 37.8   |
| 82.5° | 65.4   | 64.2   | 71.7   | 81.8    | 84.3    | 61.0    | 39.0    | 39.6    | 52.2    | 41.5    | 20.1   |
| 85°   | 5.7    | 7.6    | 43.4   | 40.3    | 28.9    | 18.9    | 18.9    | 20.1    | 27.7    | 24.5    | 11.3   |
| 87.5° | 0.0    | 0.0    | 7.6    | 11.3    | 6.3     | 6.9     | 6.9     | 7.6     | 10.7    | 10.7    | 5.7    |
| 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: P364297  
 CATALOG NUMBER: NVN-SA3D-722-U-AFL-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 3262.9 | 3262.9 | 3262.9 | 3262.9 | 3262.9 | 3262.9 | 3262.9 | 3262.9 | 3262.9 | 3262.9 | 3262.9 |
| 2.5°  | 3265.4 | 3200.0 | 3067.8 | 2940.7 | 2833.1 | 2729.3 | 2611.1 | 2494.0 | 2439.3 | 2417.3 | 2394.6 |
| 5°    | 3271.1 | 3136.4 | 2864.0 | 2589.7 | 2305.3 | 2049.2 | 1830.9 | 1606.9 | 1494.9 | 1445.8 | 1423.2 |
| 7.5°  | 3278.6 | 3073.5 | 2633.1 | 2172.5 | 1714.5 | 1367.2 | 1063.9 | 868.9  | 784.6  | 771.4  | 738.6  |
| 10°   | 3279.9 | 2997.4 | 2365.0 | 1712.0 | 1149.5 | 824.2  | 634.2  | 533.5  | 496.4  | 490.1  | 479.4  |
| 12.5° | 3282.4 | 2907.4 | 2067.4 | 1267.8 | 766.3  | 551.2  | 458.7  | 425.3  | 415.3  | 414.6  | 414.6  |
| 15°   | 3289.9 | 2813.0 | 1758.5 | 913.6  | 550.5  | 436.6  | 402.7  | 389.5  | 385.7  | 387.6  | 386.9  |
| 17.5° | 3289.9 | 2701.7 | 1455.3 | 680.8  | 444.8  | 392.6  | 373.7  | 364.9  | 363.7  | 365.5  | 366.2  |
| 20°   | 3266.0 | 2566.4 | 1177.2 | 529.8  | 394.5  | 364.3  | 347.3  | 339.1  | 336.0  | 337.2  | 337.9  |
| 22.5° | 3208.8 | 2400.3 | 950.7  | 438.5  | 361.1  | 338.5  | 320.2  | 307.7  | 302.6  | 303.3  | 303.3  |
| 25°   | 3119.4 | 2203.4 | 743.7  | 379.4  | 334.1  | 310.8  | 289.4  | 274.9  | 271.8  | 271.2  | 272.4  |
| 27.5° | 3004.9 | 1985.7 | 592.0  | 334.1  | 302.0  | 280.0  | 258.6  | 246.6  | 244.1  | 244.7  | 245.4  |
| 30°   | 2892.3 | 1759.8 | 466.8  | 295.7  | 266.1  | 245.4  | 229.0  | 223.4  | 223.4  | 225.2  | 225.9  |
| 32.5° | 2789.1 | 1542.7 | 369.3  | 262.4  | 234.1  | 215.2  | 205.7  | 205.1  | 208.3  | 209.5  | 210.1  |
| 35°   | 2700.4 | 1342.0 | 305.8  | 236.6  | 208.9  | 192.5  | 189.4  | 191.9  | 195.7  | 198.2  | 198.8  |
| 37.5° | 2637.5 | 1162.7 | 267.4  | 215.2  | 189.4  | 176.2  | 175.5  | 180.6  | 185.6  | 191.3  | 192.5  |
| 40°   | 2611.1 | 1011.1 | 241.0  | 196.3  | 173.7  | 163.6  | 161.7  | 168.6  | 178.1  | 186.2  | 187.5  |
| 42.5° | 2589.0 | 887.1  | 218.3  | 178.1  | 161.1  | 146.6  | 146.0  | 154.8  | 166.1  | 174.3  | 176.2  |
| 45°   | 2570.2 | 787.7  | 197.6  | 158.6  | 144.7  | 125.8  | 127.7  | 139.0  | 147.9  | 156.7  | 158.6  |
| 47.5° | 2531.1 | 705.9  | 174.9  | 137.8  | 119.5  | 107.6  | 111.4  | 121.4  | 128.4  | 141.6  | 143.5  |
| 50°   | 2461.3 | 639.2  | 151.6  | 112.6  | 97.5   | 93.1   | 98.8   | 105.7  | 114.5  | 125.8  | 127.1  |
| 52.5° | 2414.1 | 588.9  | 131.5  | 94.4   | 80.5   | 81.8   | 87.5   | 90.0   | 95.0   | 99.4   | 98.2   |
| 55°   | 2387.1 | 561.2  | 115.1  | 81.8   | 68.6   | 72.4   | 73.6   | 70.5   | 68.0   | 63.5   | 61.7   |
| 57.5° | 2383.9 | 536.1  | 102.6  | 71.1   | 60.4   | 62.3   | 57.9   | 47.2   | 38.4   | 33.3   | 32.1   |
| 60°   | 2378.9 | 505.2  | 92.5   | 59.8   | 53.5   | 51.0   | 41.5   | 25.8   | 18.2   | 17.0   | 17.0   |
| 62.5° | 2324.2 | 457.4  | 84.9   | 50.3   | 45.3   | 38.4   | 23.9   | 12.0   | 10.1   | 10.7   | 10.7   |
| 65°   | 2149.9 | 390.7  | 77.4   | 40.9   | 35.9   | 27.7   | 12.0   | 6.9    | 3.8    | 4.4    | 4.4    |
| 67.5° | 1827.7 | 311.4  | 69.2   | 31.5   | 27.1   | 17.6   | 6.9    | 3.1    | 0.0    | 0.0    | 0.0    |
| 70°   | 1223.7 | 193.2  | 58.5   | 22.0   | 17.6   | 10.7   | 5.0    | 0.6    | 0.0    | 0.0    | 0.0    |
| 72.5° | 469.4  | 104.4  | 47.2   | 13.2   | 11.3   | 7.6    | 3.1    | 0.0    | 0.0    | 0.0    | 0.0    |
| 75°   | 105.7  | 68.6   | 32.7   | 9.4    | 8.2    | 5.0    | 1.3    | 0.0    | 0.0    | 0.0    | 0.0    |
| 77.5° | 40.3   | 49.7   | 18.9   | 6.3    | 5.7    | 3.1    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 80°   | 19.5   | 29.6   | 8.8    | 3.8    | 3.1    | 1.3    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 82.5° | 10.1   | 11.3   | 3.8    | 1.9    | 1.3    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 85°   | 5.7    | 5.7    | 1.9    | 1.3    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 87.5° | 3.1    | 1.9    | 0.6    | 0.6    | 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    |



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

|           |      |      |       |
|-----------|------|------|-------|
| 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 |      |       |

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**



#####

| $\lambda$<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



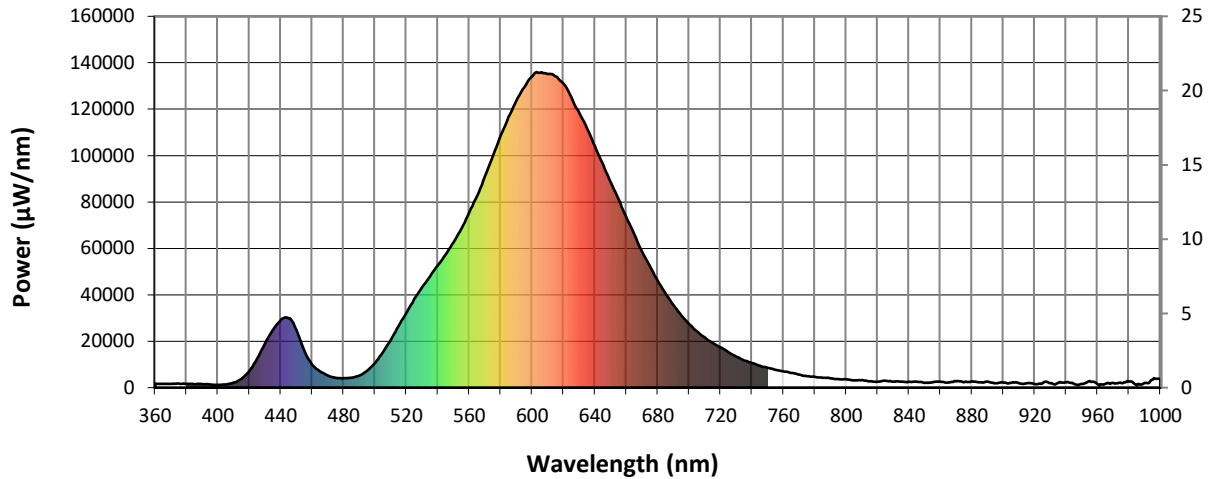
Scotopic Lumens: 4696.9

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**

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



**Color Vector Graphics**





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

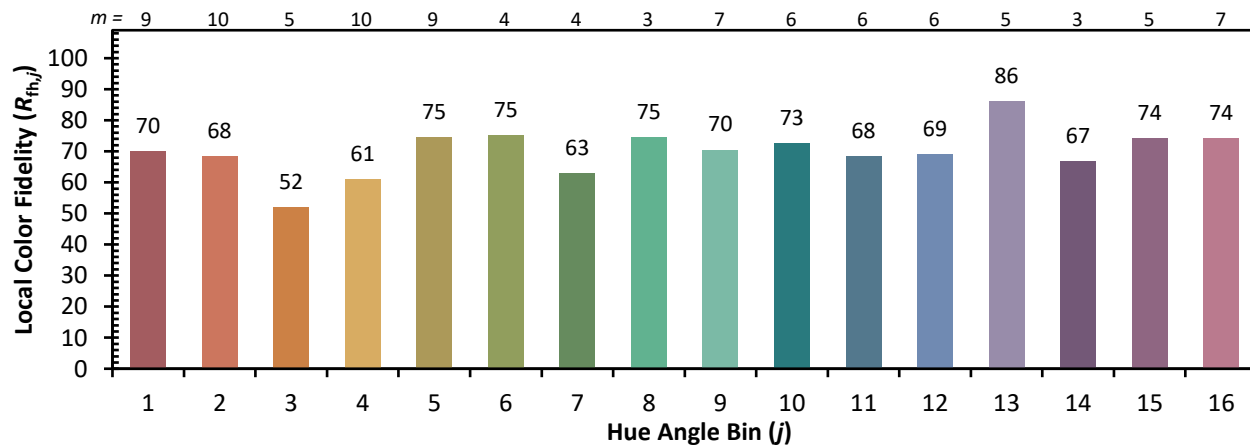
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 87 | CES26 = 56 | CES51 = 74 | CES76 = 56 |
| CES02 = 65 | CES27 = 76 | CES52 = 76 | CES77 = 81 |
| CES03 = 32 | CES28 = 83 | CES53 = 65 | CES78 = 63 |
| CES04 = 72 | CES29 = 46 | CES54 = 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)