

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: P359670

Luminaire Tested: NVN-SA2A-740-U-AFL

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-2019  
Report Number: P359670  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-29)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: STREETWORKS  
Catalog Number: NVN-SA2A-740-U-AFL  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(2) 70 CRI, 4000K, 615mA LIGHTSQUARES WITH 16 LEDS EACH AND AUTOMOTIVE  
FRONTLINE OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 9771 lumens  
Efficiency: N/A  
Efficacy: 148.0 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 1' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B1 - U0 - G1

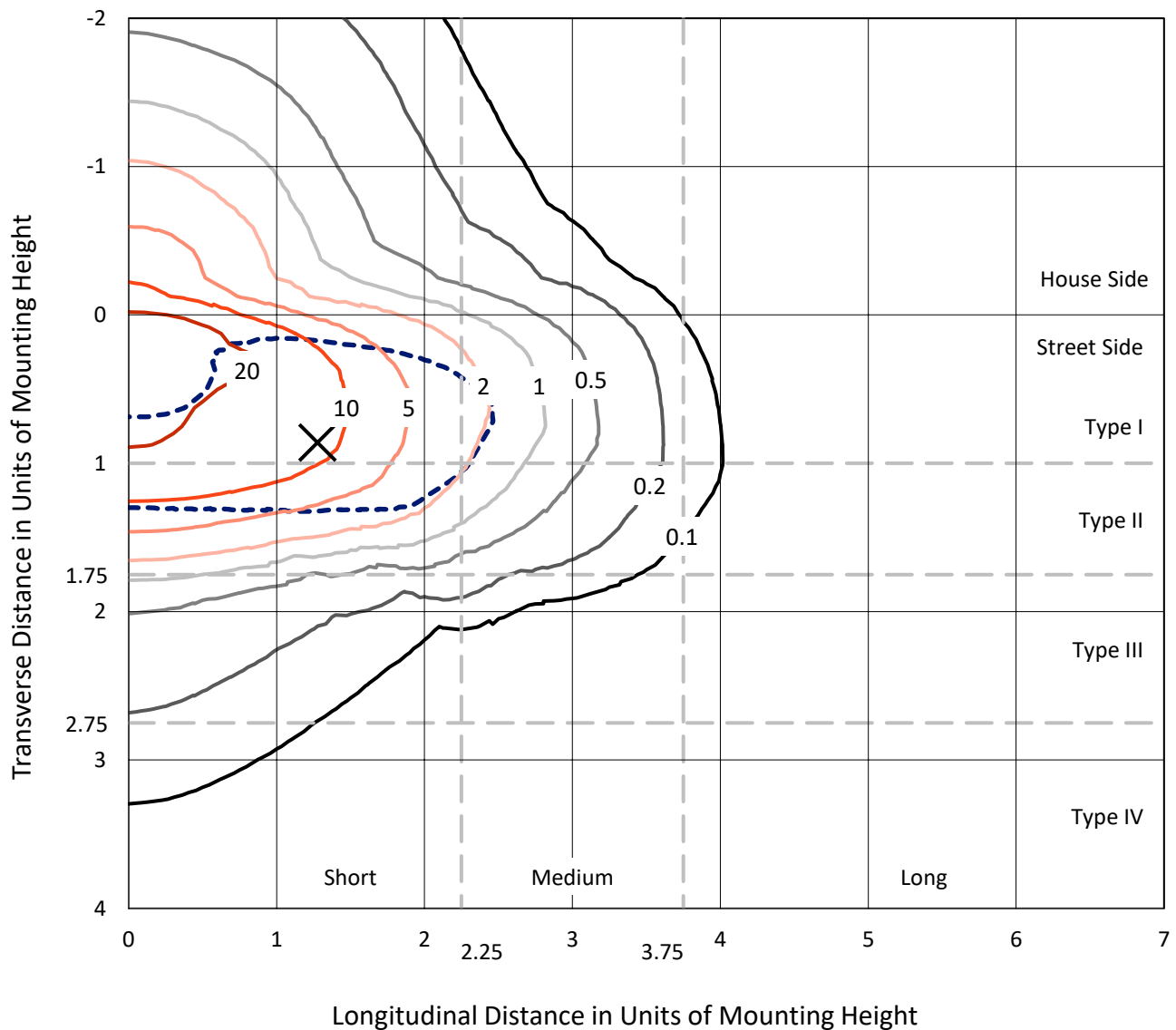
Input Watts (W): 66  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



REPORT NUMBER: P359670  
 CATALOG NUMBER: NVN-SA2A-740-U-AFL

## Iso-Footcandle Lines of Horizontal Illumination

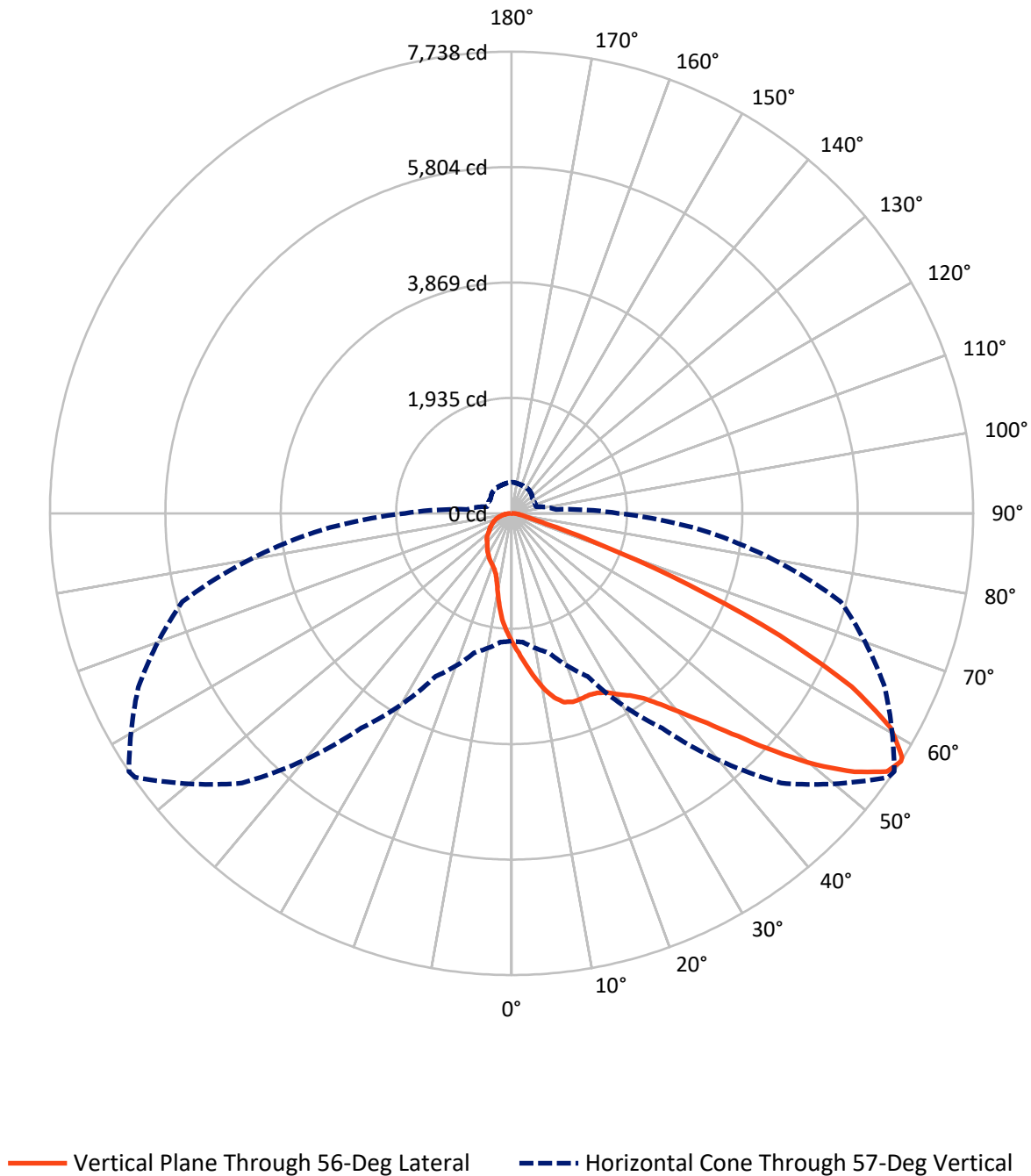
× Max cd  
 --- 1/2 Max cd



Based on 10 foot mounting height. Maximum calculated value = 30 fc  
 Type II - Short - N/A

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CATALOG NUMBER: NVN-SA2A-740-U-AFL

## Luminous Intensity Polar Plot



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CATALOG NUMBER: NVN-SA2A-740-U-AFL

**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 1684.3   | 0.0    | 1684.3 |
|                    | % Fixture | 17.2     | 0.0    | 17.2   |
| <b>Street Side</b> | Lumens    | 8086.7   | 0.0    | 8086.7 |
|                    | % Fixture | 82.8     | 0.0    | 82.8   |
| <b>Total</b>       | Lumens    | 9771.0   | 0.0    | 9771.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 207.0  | 2.1       |
| 10°-20°   | 585.3  | 6.0       |
| 20°-30°   | 953.3  | 9.8       |
| 30°-40°   | 1425.1 | 14.6      |
| 40°-50°   | 2161.6 | 22.1      |
| 50°-60°   | 2422.8 | 24.8      |
| 60°-70°   | 1431.0 | 14.6      |
| 70°-80°   | 468.9  | 4.8       |
| 80°-90°   | 115.8  | 1.2       |
| 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°    | 9771.0 | 100.0     |
| 0°-180°   | 9771.0 | 100.0     |

**Coefficient of Utilization**



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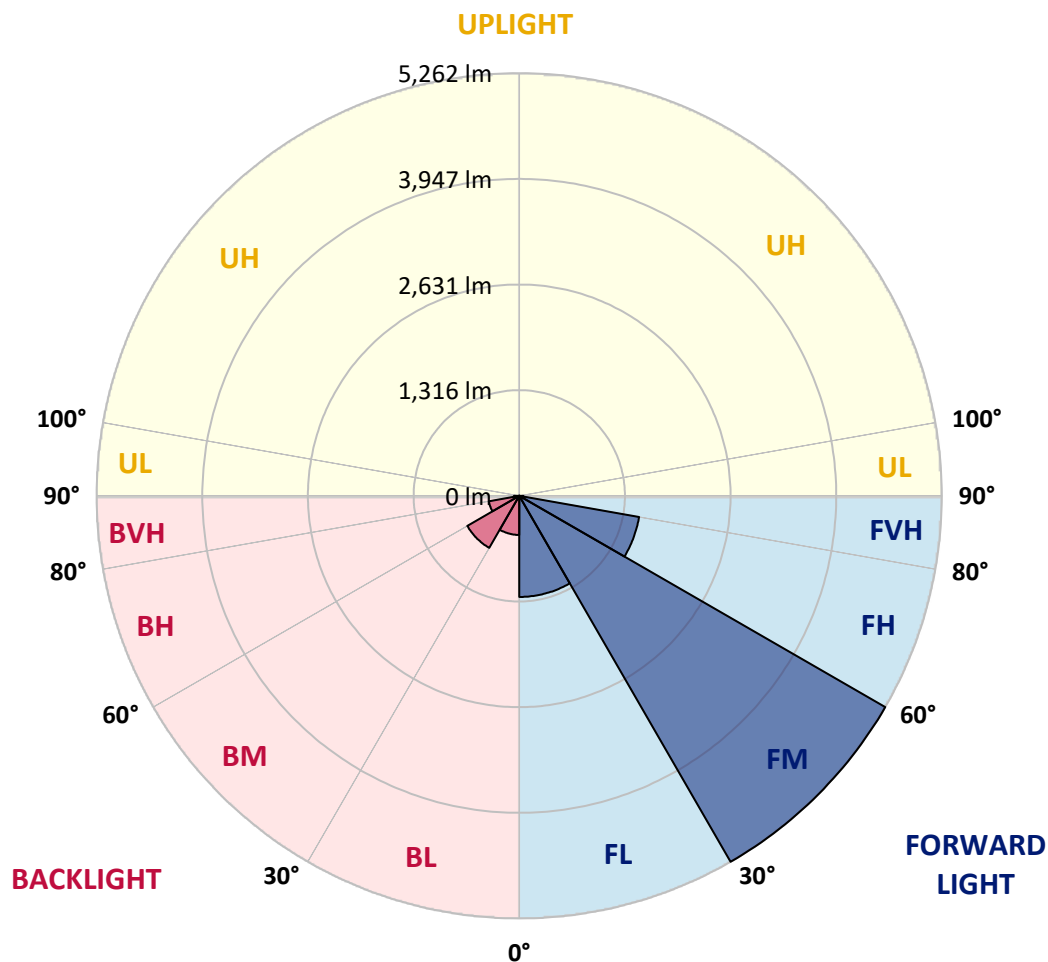
CATALOG NUMBER: NVN-SA2A-740-U-AFL

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 1258.7 | 12.9      |                         |      |         |
| FM   | (30°-60°)   | 5262.0 | 53.9      |                         |      |         |
| FH   | (60°-80°)   | 1515.0 | 15.5      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 51.0   | 0.5       |                         |      | G1/100  |
| BL   | (0°-30°)    | 487.0  | 5.0       | B1/500                  |      |         |
| BM   | (30°-60°)   | 747.6  | 7.7       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 384.8  | 3.9       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 64.8   | 0.7       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B1-U0-G1**

Type II Short





REPORT NUMBER: P359670

CATALOG NUMBER: NVN-SA2A-740-U-AFL

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 56°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2167.2 | 2167.2 | 2167.2 | 2167.2 | 2167.2 | 2167.2 | 2167.2 | 2167.2 | 2167.2 | 2167.2 | 2167.2 |
| 2.5°  | 2488.6 | 2511.4 | 2501.3 | 2466.4 | 2439.5 | 2401.6 | 2359.3 | 2346.5 | 2301.9 | 2251.8 | 2191.7 |
| 5°    | 2882.5 | 2871.0 | 2854.6 | 2800.2 | 2742.8 | 2675.9 | 2569.8 | 2553.0 | 2453.6 | 2340.5 | 2220.9 |
| 7.5°  | 3106.8 | 3105.8 | 3096.0 | 3064.1 | 3011.7 | 2924.4 | 2796.5 | 2776.7 | 2626.6 | 2444.6 | 2259.2 |
| 10°   | 3074.2 | 3071.8 | 3088.0 | 3121.2 | 3137.0 | 3118.9 | 3011.1 | 2991.3 | 2806.9 | 2559.8 | 2303.5 |
| 12.5° | 2889.2 | 2890.5 | 2916.4 | 2986.2 | 3081.2 | 3195.4 | 3178.0 | 3168.2 | 2993.9 | 2690.0 | 2357.3 |
| 15°   | 2745.1 | 2748.1 | 2768.6 | 2829.4 | 2941.6 | 3148.7 | 3279.4 | 3282.7 | 3174.9 | 2833.8 | 2420.1 |
| 17.5° | 2682.0 | 2688.4 | 2697.8 | 2740.4 | 2843.2 | 3055.7 | 3303.5 | 3321.7 | 3333.4 | 2982.9 | 2480.5 |
| 20°   | 2702.1 | 2708.2 | 2710.9 | 2738.1 | 2822.4 | 2999.3 | 3286.8 | 3319.3 | 3455.0 | 3123.2 | 2541.0 |
| 22.5° | 2792.5 | 2796.2 | 2797.8 | 2804.9 | 2870.4 | 3015.4 | 3275.7 | 3309.9 | 3543.0 | 3249.1 | 2586.6 |
| 25°   | 2942.2 | 2939.5 | 2928.8 | 2919.7 | 2963.7 | 3079.2 | 3301.2 | 3333.8 | 3614.5 | 3363.3 | 2616.5 |
| 27.5° | 3121.5 | 3118.2 | 3097.4 | 3072.5 | 3097.7 | 3178.6 | 3374.7 | 3400.6 | 3678.6 | 3470.1 | 2631.6 |
| 30°   | 3336.8 | 3328.1 | 3288.8 | 3259.2 | 3269.0 | 3327.7 | 3496.0 | 3519.5 | 3777.7 | 3591.3 | 2646.4 |
| 32.5° | 3585.6 | 3576.2 | 3519.5 | 3470.4 | 3470.4 | 3519.5 | 3620.9 | 3640.3 | 3861.6 | 3728.3 | 2670.2 |
| 35°   | 3897.2 | 3885.5 | 3811.6 | 3729.3 | 3706.2 | 3731.0 | 3791.1 | 3804.9 | 4012.7 | 3900.9 | 2713.6 |
| 37.5° | 4264.6 | 4248.8 | 4153.1 | 4043.0 | 3992.3 | 3990.9 | 4034.2 | 4062.4 | 4254.2 | 4127.6 | 2787.1 |
| 40°   | 4633.0 | 4621.9 | 4538.3 | 4451.6 | 4352.2 | 4320.3 | 4387.2 | 4395.9 | 4569.8 | 4409.0 | 2881.1 |
| 42.5° | 4917.7 | 4915.7 | 4900.2 | 4911.7 | 4809.9 | 4745.4 | 4797.8 | 4804.9 | 4955.3 | 4713.5 | 2981.2 |
| 45°   | 5068.1 | 5071.5 | 5146.4 | 5312.3 | 5349.9 | 5302.9 | 5328.7 | 5330.7 | 5395.9 | 5020.8 | 3072.9 |
| 47.5° | 4947.6 | 4965.1 | 5154.4 | 5525.5 | 5833.4 | 5989.6 | 5946.6 | 5971.4 | 5823.0 | 5284.7 | 3144.7 |
| 50°   | 4477.8 | 4499.3 | 4821.7 | 5430.5 | 6059.1 | 6654.1 | 6631.6 | 6625.9 | 6167.5 | 5478.1 | 3183.7 |
| 52.5° | 3895.9 | 3912.7 | 4178.6 | 4936.5 | 5893.5 | 7021.5 | 7228.0 | 7198.4 | 6473.8 | 5622.9 | 3191.1 |
| 55°   | 3009.7 | 3035.9 | 3290.8 | 3950.6 | 5224.0 | 6881.1 | 7666.5 | 7640.0 | 6752.8 | 5698.8 | 3182.3 |
| 57°   | 2139.7 | 2167.2 | 2420.4 | 3015.1 | 4394.5 | 6395.2 | 7710.2 | 7738.4 | 6903.6 | 5711.5 | 3192.1 |
| 57.5° | 1909.3 | 1937.5 | 2188.4 | 2765.9 | 4136.0 | 6219.6 | 7672.6 | 7719.6 | 6930.8 | 5709.5 | 3197.4 |
| 60°   | 961.4  | 972.1  | 1132.0 | 1544.0 | 2614.5 | 5028.2 | 7182.0 | 7303.2 | 6955.3 | 5610.8 | 3220.6 |
| 62.5° | 597.7  | 590.0  | 585.0  | 711.2  | 1272.0 | 3334.4 | 6169.5 | 6402.9 | 6486.2 | 5371.7 | 3164.5 |
| 65°   | 525.5  | 511.1  | 455.7  | 445.6  | 561.8  | 1619.5 | 4646.1 | 4936.5 | 5483.9 | 4994.9 | 3030.9 |
| 67.5° | 493.6  | 479.5  | 417.1  | 379.4  | 379.8  | 642.0  | 2884.5 | 3211.5 | 4272.0 | 4357.9 | 2715.6 |
| 70°   | 460.7  | 447.9  | 389.5  | 345.2  | 323.4  | 355.6  | 1327.1 | 1575.2 | 2784.7 | 3425.4 | 2269.6 |
| 72.5° | 418.4  | 409.7  | 354.3  | 308.6  | 285.4  | 266.3  | 508.1  | 600.1  | 1612.1 | 2300.5 | 1576.2 |
| 75°   | 374.1  | 366.0  | 318.7  | 275.0  | 246.8  | 209.5  | 286.1  | 308.3  | 819.0  | 1177.0 | 776.0  |
| 77.5° | 325.4  | 320.7  | 283.4  | 243.1  | 220.6  | 173.6  | 202.5  | 213.2  | 351.2  | 504.7  | 389.2  |
| 80°   | 258.9  | 268.0  | 247.8  | 216.6  | 195.8  | 139.0  | 143.4  | 150.4  | 204.5  | 246.5  | 221.0  |
| 82.5° | 168.6  | 184.4  | 194.1  | 176.0  | 161.2  | 109.5  | 103.1  | 106.1  | 133.3  | 150.4  | 96.0   |
| 85°   | 70.2   | 78.9   | 127.6  | 115.2  | 107.1  | 79.9   | 69.2   | 70.5   | 82.6   | 85.6   | 39.3   |
| 87.5° | 31.2   | 33.2   | 56.1   | 52.7   | 45.3   | 27.5   | 29.5   | 32.2   | 44.0   | 41.6   | 15.1   |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

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CATALOG NUMBER: NVN-SA2A-740-U-AFL

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2167.2 | 2167.2 | 2167.2 | 2167.2 | 2167.2 | 2167.2 | 2167.2 | 2167.2 | 2167.2 | 2167.2 | 2167.2 |
| 2.5°  | 2169.2 | 2141.0 | 2092.7 | 2039.3 | 1995.6 | 1960.7 | 1925.4 | 1901.3 | 1873.1 | 1858.0 | 1850.2 |
| 5°    | 2170.9 | 2115.5 | 2013.8 | 1909.3 | 1816.0 | 1730.7 | 1649.4 | 1587.0 | 1528.5 | 1497.0 | 1488.2 |
| 7.5°  | 2178.0 | 2094.7 | 1930.1 | 1758.2 | 1592.3 | 1440.9 | 1324.0 | 1250.8 | 1198.1 | 1174.6 | 1167.9 |
| 10°   | 2183.7 | 2070.2 | 1826.7 | 1572.2 | 1346.5 | 1193.1 | 1102.4 | 1061.4 | 1043.3 | 1040.3 | 1037.3 |
| 12.5° | 2197.1 | 2045.0 | 1717.9 | 1378.1 | 1155.5 | 1049.4 | 1017.8 | 1015.1 | 1020.1 | 1027.5 | 1027.5 |
| 15°   | 2218.3 | 2020.1 | 1593.7 | 1211.5 | 1033.9 | 996.6  | 1003.0 | 1017.8 | 1031.6 | 1043.0 | 1044.7 |
| 17.5° | 2233.7 | 1989.6 | 1460.0 | 1078.2 | 969.1  | 979.2  | 1002.0 | 1022.8 | 1036.9 | 1048.0 | 1049.0 |
| 20°   | 2244.8 | 1942.2 | 1317.3 | 976.5  | 931.8  | 963.1  | 991.6  | 1010.1 | 1019.8 | 1030.9 | 1032.6 |
| 22.5° | 2239.1 | 1878.8 | 1190.7 | 903.6  | 901.6  | 939.6  | 966.8  | 988.9  | 981.5  | 970.8  | 977.8  |
| 25°   | 2211.5 | 1791.5 | 1060.4 | 849.2  | 869.7  | 908.0  | 941.6  | 926.8  | 901.9  | 897.2  | 899.9  |
| 27.5° | 2162.5 | 1680.0 | 939.9  | 798.9  | 832.8  | 878.8  | 876.8  | 862.0  | 853.3  | 847.2  | 850.9  |
| 30°   | 2109.8 | 1559.1 | 834.4  | 754.9  | 791.8  | 829.7  | 822.0  | 821.7  | 813.0  | 803.2  | 807.9  |
| 32.5° | 2057.7 | 1437.5 | 750.8  | 718.6  | 760.9  | 765.9  | 782.7  | 787.8  | 770.6  | 750.2  | 748.8  |
| 35°   | 2012.4 | 1322.7 | 687.4  | 685.7  | 723.6  | 724.3  | 748.8  | 741.8  | 699.1  | 678.0  | 678.0  |
| 37.5° | 1978.5 | 1208.2 | 639.0  | 656.1  | 674.6  | 692.1  | 704.5  | 675.3  | 668.2  | 656.5  | 656.1  |
| 40°   | 1963.7 | 1107.4 | 608.8  | 633.6  | 640.0  | 662.2  | 630.3  | 641.7  | 645.1  | 639.0  | 639.0  |
| 42.5° | 1948.3 | 1019.8 | 582.6  | 616.5  | 615.5  | 612.5  | 596.4  | 611.1  | 624.6  | 624.9  | 623.9  |
| 45°   | 1932.8 | 944.3  | 559.4  | 579.9  | 594.0  | 561.4  | 564.5  | 580.3  | 599.1  | 605.8  | 605.8  |
| 47.5° | 1915.7 | 884.5  | 538.3  | 541.3  | 563.1  | 541.3  | 538.9  | 551.0  | 573.2  | 583.9  | 586.3  |
| 50°   | 1878.1 | 830.8  | 514.1  | 507.4  | 513.4  | 520.8  | 522.8  | 528.5  | 553.1  | 570.2  | 574.2  |
| 52.5° | 1826.0 | 782.7  | 483.2  | 476.2  | 476.2  | 504.0  | 513.4  | 515.1  | 535.9  | 556.4  | 560.4  |
| 55°   | 1782.7 | 752.2  | 451.3  | 450.0  | 448.6  | 486.2  | 502.3  | 505.0  | 519.5  | 535.6  | 537.6  |
| 57°   | 1785.8 | 749.8  | 426.8  | 428.1  | 427.8  | 468.1  | 491.9  | 497.6  | 505.0  | 518.8  | 521.2  |
| 57.5° | 1787.4 | 751.5  | 421.4  | 422.1  | 421.8  | 463.1  | 488.9  | 495.3  | 501.0  | 515.4  | 517.8  |
| 60°   | 1812.6 | 755.9  | 399.6  | 392.2  | 393.9  | 436.2  | 471.8  | 479.9  | 483.5  | 502.7  | 505.7  |
| 62.5° | 1775.3 | 736.4  | 382.1  | 364.3  | 364.3  | 408.0  | 447.9  | 460.7  | 466.4  | 492.3  | 497.3  |
| 65°   | 1667.2 | 681.7  | 361.7  | 332.8  | 336.1  | 379.8  | 419.4  | 440.2  | 449.0  | 481.2  | 486.6  |
| 67.5° | 1500.3 | 618.2  | 339.8  | 304.6  | 307.9  | 350.2  | 389.9  | 412.4  | 426.1  | 469.1  | 473.5  |
| 70°   | 1283.1 | 540.6  | 310.3  | 274.7  | 278.7  | 318.0  | 354.9  | 380.5  | 400.9  | 457.7  | 459.0  |
| 72.5° | 945.9  | 443.2  | 269.0  | 241.8  | 246.1  | 280.4  | 319.7  | 349.2  | 376.8  | 429.1  | 428.5  |
| 75°   | 562.5  | 346.5  | 223.3  | 208.5  | 211.6  | 243.5  | 287.8  | 323.7  | 365.0  | 418.1  | 424.4  |
| 77.5° | 341.2  | 260.9  | 182.0  | 174.6  | 178.3  | 210.9  | 264.9  | 303.2  | 360.0  | 394.2  | 392.2  |
| 80°   | 206.2  | 186.4  | 145.4  | 140.7  | 144.4  | 180.3  | 245.1  | 287.8  | 314.6  | 336.8  | 336.8  |
| 82.5° | 107.8  | 113.8  | 106.8  | 103.1  | 108.1  | 146.4  | 223.0  | 251.2  | 278.0  | 238.7  | 223.0  |
| 85°   | 44.0   | 59.4   | 64.8   | 64.5   | 67.5   | 101.4  | 192.4  | 214.9  | 179.3  | 170.2  | 174.3  |
| 87.5° | 14.8   | 25.2   | 31.6   | 27.2   | 28.5   | 63.8   | 133.3  | 103.8  | 123.2  | 86.0   | 81.6   |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

LM-79-08: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

MCGRAW, INVUE, LUMARK AND STREETWORKS

DATA VALID FOR LUMINAIRES UTILIZING SA LIGHT ENGINES

Report Number: SP1-2101-121-2

Luminaire Tested: IFLD-S-SA2A-740-U-T3R-HSS

Test Date: 03/05/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2101-121-2  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 03/05/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: STREETWORKS  
 Catalog Number: **IFLD-S-SA2A-740-U-T3R-HSS**  
 Description: STREETWORKS INF FLOOD

SHIELD, DRIVER PROGRAMMED @ 615mA.

### Spectral Parameters

|                           |         |           |      |      |       |
|---------------------------|---------|-----------|------|------|-------|
| CCT (K):                  | 3905    | CRI (Ra): | 71.2 |      |       |
| CIE u':                   | 0.2273  | R1:       | 68.9 | R9:  | -29.7 |
| CIE v':                   | 0.5024  | R2:       | 77.0 | R10: | 46.2  |
| Duv:                      | -0.0008 | R3:       | 84.0 | R11: | 68.8  |
| CIE x:                    | 0.3841  | R4:       | 71.6 | R12: | 45.6  |
| CIE y:                    | 0.3774  | R5:       | 68.9 | R13: | 69.5  |
| CIE z:                    | 0.2385  | R6:       | 68.3 | R14: | 90.7  |
| Peak Wavelength (nm):     | 443     | R7:       | 78.7 |      |       |
| Dominant Wavelength (nm): | 579     | R8:       | 52.2 |      |       |
| Purity:                   | 28.7    |           |      |      |       |
| Rf:                       | 71.7    |           |      |      |       |
| Rg:                       | 96.9    |           |      |      |       |



### Test Conditions

Stabilization Time: 211M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.8/312%  
 Sphere Temperature (°C): 24.1

REPORT NUMBER: SP1-2101-121-2

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 1/31/2021        | 7/31/2021            |
| Power Meter                    | IN0071                | 12/1/2020        | 12/1/2021            |
| AC Power Source                | IN0063                | 12/1/2020        | 12/1/2021            |
| DC Power Source                | IN0208                | 12/1/2020        | 12/1/2021            |
| Sphere Thermometer             | IN0085                | 12/1/2020        | 12/1/2021            |
| Room Thermometer               | IN0046                | 12/1/2020        | 12/1/2021            |

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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 4000K 4-step quadrangle

REPORT NUMBER: SP1-2101-121-2

### 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       | 2304             | 0.0              | 490       | 19043            | 2.7              | 620       | 97577            | 25.4             | 750       | 4830             | 0.0              | 880       | 3505             | 0.0              |
| 365       | 2150             | 0.0              | 495       | 26606            | 4.8              | 625       | 90158            | 19.9             | 755       | 4664             | 0.0              | 885       | 2991             | 0.0              |
| 370       | 2146             | 0.0              | 500       | 36376            | 8.0              | 630       | 82240            | 14.9             | 760       | 4006             | 0.0              | 890       | 2327             | 0.0              |
| 375       | 2332             | 0.0              | 505       | 47714            | 13.3             | 635       | 74361            | 11.2             | 765       | 3715             | 0.0              | 895       | 2775             | 0.0              |
| 380       | 2527             | 0.0              | 510       | 58741            | 20.2             | 640       | 66994            | 8.0              | 770       | 3696             | 0.0              | 900       | 2141             | 0.0              |
| 385       | 2304             | 0.0              | 515       | 68716            | 28.5             | 645       | 60405            | 5.8              | 775       | 3117             | 0.0              | 905       | 2421             | 0.0              |
| 390       | 2064             | 0.0              | 520       | 77136            | 37.4             | 650       | 53806            | 3.9              | 780       | 3062             | 0.0              | 910       | 2200             | 0.0              |
| 395       | 1856             | 0.0              | 525       | 83567            | 44.9             | 655       | 47610            | 2.7              | 785       | 2907             | 0.0              | 915       | 2716             | 0.0              |
| 400       | 1856             | 0.0              | 530       | 89283            | 52.6             | 660       | 42018            | 1.8              | 790       | 2655             | 0.0              | 920       | 2656             | 0.0              |
| 405       | 2374             | 0.0              | 535       | 94097            | 58.4             | 665       | 36742            | 1.2              | 795       | 2467             | 0.0              | 925       | 2671             | 0.0              |
| 410       | 4084             | 0.0              | 540       | 96845            | 63.1             | 670       | 32105            | 0.7              | 800       | 2609             | 0.0              | 930       | 3292             | 0.0              |
| 415       | 8543             | 0.0              | 545       | 100829           | 67.1             | 675       | 27946            | 0.5              | 805       | 2293             | 0.0              | 935       | 3188             | 0.0              |
| 420       | 18394            | 0.1              | 550       | 105648           | 71.8             | 680       | 24146            | 0.3              | 810       | 2188             | 0.0              | 940       | 1997             | 0.0              |
| 425       | 37987            | 0.2              | 555       | 110017           | 75.1             | 685       | 21191            | 0.2              | 815       | 2386             | 0.0              | 945       | 2623             | 0.0              |
| 430       | 67605            | 0.5              | 560       | 114586           | 77.9             | 690       | 18544            | 0.1              | 820       | 2712             | 0.0              | 950       | 2969             | 0.0              |
| 435       | 102160           | 1.2              | 565       | 118987           | 79.1             | 695       | 16058            | 0.1              | 825       | 2473             | 0.0              | 955       | 2277             | 0.0              |
| 440       | 135103           | 2.1              | 570       | 122326           | 79.5             | 700       | 14133            | 0.0              | 830       | 1969             | 0.0              | 960       | 4267             | 0.0              |
| 445       | 140126           | 2.9              | 575       | 125968           | 78.4             | 705       | 12309            | 0.0              | 835       | 1917             | 0.0              | 965       | 2034             | 0.0              |
| 450       | 102339           | 2.7              | 580       | 127613           | 75.8             | 710       | 11142            | 0.0              | 840       | 2248             | 0.0              | 970       | 3586             | 0.0              |
| 455       | 58751            | 2.0              | 585       | 129466           | 71.9             | 715       | 10143            | 0.0              | 845       | 2266             | 0.0              | 975       | 2505             | 0.0              |
| 460       | 36892            | 1.5              | 590       | 128813           | 66.6             | 720       | 9072             | 0.0              | 850       | 2558             | 0.0              | 980       | 2666             | 0.0              |
| 465       | 24637            | 1.3              | 595       | 126387           | 59.9             | 725       | 8130             | 0.0              | 855       | 2767             | 0.0              | 985       | 2934             | 0.0              |
| 470       | 16738            | 1.0              | 600       | 123477           | 53.2             | 730       | 7149             | 0.0              | 860       | 2826             | 0.0              | 990       | 4120             | 0.0              |
| 475       | 13456            | 1.1              | 605       | 118718           | 46.0             | 735       | 6311             | 0.0              | 865       | 2385             | 0.0              | 995       | 3858             | 0.0              |
| 480       | 13081            | 1.2              | 610       | 112091           | 38.5             | 740       | 5711             | 0.0              | 870       | 3194             | 0.0              | 1000      | 3405             | 0.0              |
| 485       | 14734            | 1.7              | 615       | 105039           | 31.7             | 745       | 5111             | 0.0              | 875       | 3189             | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2101-121-2

### Scotopic Flux vs. Wavelength



Scotopic Lumens: 10425.8

S/P: 1.47

| $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) |
|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|
| 360               | 2304                          | 0.0                            | 490               | 19043                         | 29.3                           | 620               | 97577                         | 1.2                            | 750               | 4830                          | 0.0                            | 880               | 3505                          | 0.0                            |
| 365               | 2150                          | 0.0                            | 495               | 26606                         | 43.0                           | 625               | 90158                         | 0.8                            | 755               | 4664                          | 0.0                            | 885               | 2991                          | 0.0                            |
| 370               | 2146                          | 0.0                            | 500               | 36376                         | 60.8                           | 630               | 82240                         | 0.5                            | 760               | 4006                          | 0.0                            | 890               | 2327                          | 0.0                            |
| 375               | 2332                          | 0.0                            | 505               | 47714                         | 81.1                           | 635               | 74361                         | 0.3                            | 765               | 3715                          | 0.0                            | 895               | 2775                          | 0.0                            |
| 380               | 2527                          | 0.0                            | 510               | 58741                         | 99.6                           | 640               | 66994                         | 0.2                            | 770               | 3696                          | 0.0                            | 900               | 2141                          | 0.0                            |
| 385               | 2304                          | 0.0                            | 515               | 68716                         | 113.9                          | 645               | 60405                         | 0.1                            | 775               | 3117                          | 0.0                            | 905               | 2421                          | 0.0                            |
| 390               | 2064                          | 0.0                            | 520               | 77136                         | 122.6                          | 650               | 53806                         | 0.1                            | 780               | 3062                          | 0.0                            | 910               | 2200                          | 0.0                            |
| 395               | 1856                          | 0.0                            | 525               | 83567                         | 125.0                          | 655               | 47610                         | 0.0                            | 785               | 2907                          | 0.0                            | 915               | 2716                          | 0.0                            |
| 400               | 1856                          | 0.0                            | 530               | 89283                         | 123.1                          | 660               | 42018                         | 0.0                            | 790               | 2655                          | 0.0                            | 920               | 2656                          | 0.0                            |
| 405               | 2374                          | 0.1                            | 535               | 94097                         | 117.3                          | 665               | 36742                         | 0.0                            | 795               | 2467                          | 0.0                            | 925               | 2671                          | 0.0                            |
| 410               | 4084                          | 0.2                            | 540               | 96845                         | 107.0                          | 670               | 32105                         | 0.0                            | 800               | 2609                          | 0.0                            | 930               | 3292                          | 0.0                            |
| 415               | 8543                          | 0.9                            | 545               | 100829                        | 96.7                           | 675               | 27946                         | 0.0                            | 805               | 2293                          | 0.0                            | 935               | 3188                          | 0.0                            |
| 420               | 18394                         | 3.0                            | 550               | 105648                        | 86.4                           | 680               | 24146                         | 0.0                            | 810               | 2188                          | 0.0                            | 940               | 1997                          | 0.0                            |
| 425               | 37987                         | 9.3                            | 555               | 110017                        | 75.2                           | 685               | 21191                         | 0.0                            | 815               | 2386                          | 0.0                            | 945               | 2623                          | 0.0                            |
| 430               | 67605                         | 23.0                           | 560               | 114586                        | 64.0                           | 690               | 18544                         | 0.0                            | 820               | 2712                          | 0.0                            | 950               | 2969                          | 0.0                            |
| 435               | 102160                        | 45.7                           | 565               | 118987                        | 53.4                           | 695               | 16058                         | 0.0                            | 825               | 2473                          | 0.0                            | 955               | 2277                          | 0.0                            |
| 440               | 135103                        | 75.5                           | 570               | 122326                        | 43.2                           | 700               | 14133                         | 0.0                            | 830               | 1969                          | 0.0                            | 960               | 4267                          | 0.0                            |
| 445               | 140126                        | 93.8                           | 575               | 125968                        | 34.3                           | 705               | 12309                         | 0.0                            | 835               | 1917                          | 0.0                            | 965               | 2034                          | 0.0                            |
| 450               | 102339                        | 79.3                           | 580               | 127613                        | 26.3                           | 710               | 11142                         | 0.0                            | 840               | 2248                          | 0.0                            | 970               | 3586                          | 0.0                            |
| 455               | 58751                         | 51.3                           | 585               | 129466                        | 19.8                           | 715               | 10143                         | 0.0                            | 845               | 2266                          | 0.0                            | 975               | 2505                          | 0.0                            |
| 460               | 36892                         | 35.6                           | 590               | 128813                        | 14.3                           | 720               | 9072                          | 0.0                            | 850               | 2558                          | 0.0                            | 980               | 2666                          | 0.0                            |
| 465               | 24637                         | 26.0                           | 595               | 126387                        | 10.1                           | 725               | 8130                          | 0.0                            | 855               | 2767                          | 0.0                            | 985               | 2934                          | 0.0                            |
| 470               | 16738                         | 19.3                           | 600               | 123477                        | 7.0                            | 730               | 7149                          | 0.0                            | 860               | 2826                          | 0.0                            | 990               | 4120                          | 0.0                            |
| 475               | 13456                         | 16.8                           | 605               | 118718                        | 4.7                            | 735               | 6311                          | 0.0                            | 865               | 2385                          | 0.0                            | 995               | 3858                          | 0.0                            |
| 480               | 13081                         | 17.7                           | 610               | 112091                        | 3.0                            | 740               | 5711                          | 0.0                            | 870               | 3194                          | 0.0                            | 1000              | 3405                          | 0.0                            |
| 485               | 14734                         | 21.4                           | 615               | 105039                        | 1.9                            | 745               | 5111                          | 0.0                            | 875               | 3189                          | 0.0                            |                   |                               |                                |

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### Melanopic Flux vs. Wavelength



Melanopic Lumens: 3927.2

M/P: 0.55

| 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       | 2304             | 0.0              | 490       | 19043            | 15.8             | 620       | 97577            | 0.1              | 750       | 4830             | 0.0              | 880       | 3505             | 0.0              |
| 365       | 2150             | 0.0              | 495       | 26606            | 22.0             | 625       | 90158            | 0.0              | 755       | 4664             | 0.0              | 885       | 2991             | 0.0              |
| 370       | 2146             | 0.0              | 500       | 36376            | 29.2             | 630       | 82240            | 0.0              | 760       | 4006             | 0.0              | 890       | 2327             | 0.0              |
| 375       | 2332             | 0.0              | 505       | 47714            | 36.6             | 635       | 74361            | 0.0              | 765       | 3715             | 0.0              | 895       | 2775             | 0.0              |
| 380       | 2527             | 0.0              | 510       | 58741            | 42.2             | 640       | 66994            | 0.0              | 770       | 3696             | 0.0              | 900       | 2141             | 0.0              |
| 385       | 2304             | 0.0              | 515       | 68716            | 44.9             | 645       | 60405            | 0.0              | 775       | 3117             | 0.0              | 905       | 2421             | 0.0              |
| 390       | 2064             | 0.0              | 520       | 77136            | 44.9             | 650       | 53806            | 0.0              | 780       | 3062             | 0.0              | 910       | 2200             | 0.0              |
| 395       | 1856             | 0.0              | 525       | 83567            | 42.4             | 655       | 47610            | 0.0              | 785       | 2907             | 0.0              | 915       | 2716             | 0.0              |
| 400       | 1856             | 0.0              | 530       | 89283            | 38.6             | 660       | 42018            | 0.0              | 790       | 2655             | 0.0              | 920       | 2656             | 0.0              |
| 405       | 2374             | 0.0              | 535       | 94097            | 33.9             | 665       | 36742            | 0.0              | 795       | 2467             | 0.0              | 925       | 2671             | 0.0              |
| 410       | 4084             | 0.2              | 540       | 96845            | 28.3             | 670       | 32105            | 0.0              | 800       | 2609             | 0.0              | 930       | 3292             | 0.0              |
| 415       | 8543             | 0.6              | 545       | 100829           | 23.4             | 675       | 27946            | 0.0              | 805       | 2293             | 0.0              | 935       | 3188             | 0.0              |
| 420       | 18394            | 2.1              | 550       | 105648           | 19.0             | 680       | 24146            | 0.0              | 810       | 2188             | 0.0              | 940       | 1997             | 0.0              |
| 425       | 37987            | 5.9              | 555       | 110017           | 14.8             | 685       | 21191            | 0.0              | 815       | 2386             | 0.0              | 945       | 2623             | 0.0              |
| 430       | 67605            | 14.3             | 560       | 114586           | 11.3             | 690       | 18544            | 0.0              | 820       | 2712             | 0.0              | 950       | 2969             | 0.0              |
| 435       | 102160           | 27.3             | 565       | 118987           | 8.4              | 695       | 16058            | 0.0              | 825       | 2473             | 0.0              | 955       | 2277             | 0.0              |
| 440       | 135103           | 45.1             | 570       | 122326           | 6.0              | 700       | 14133            | 0.0              | 830       | 1969             | 0.0              | 960       | 4267             | 0.0              |
| 445       | 140126           | 55.3             | 575       | 125968           | 4.2              | 705       | 12309            | 0.0              | 835       | 1917             | 0.0              | 965       | 2034             | 0.0              |
| 450       | 102339           | 47.2             | 580       | 127613           | 2.9              | 710       | 11142            | 0.0              | 840       | 2248             | 0.0              | 970       | 3586             | 0.0              |
| 455       | 58751            | 30.8             | 585       | 129466           | 1.9              | 715       | 10143            | 0.0              | 845       | 2266             | 0.0              | 975       | 2505             | 0.0              |
| 460       | 36892            | 21.7             | 590       | 128813           | 1.3              | 720       | 9072             | 0.0              | 850       | 2558             | 0.0              | 980       | 2666             | 0.0              |
| 465       | 24637            | 16.1             | 595       | 126387           | 0.8              | 725       | 8130             | 0.0              | 855       | 2767             | 0.0              | 985       | 2934             | 0.0              |
| 470       | 16738            | 12.0             | 600       | 123477           | 0.5              | 730       | 7149             | 0.0              | 860       | 2826             | 0.0              | 990       | 4120             | 0.0              |
| 475       | 13456            | 10.3             | 605       | 118718           | 0.3              | 735       | 6311             | 0.0              | 865       | 2385             | 0.0              | 995       | 3858             | 0.0              |
| 480       | 13081            | 10.5             | 610       | 112091           | 0.2              | 740       | 5711             | 0.0              | 870       | 3194             | 0.0              | 1000      | 3405             | 0.0              |
| 485       | 14734            | 12.1             | 615       | 105039           | 0.1              | 745       | 5111             | 0.0              | 875       | 3189             | 0.0              |           |                  |                  |

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TM-30-18

### Summary

$R_f = 71.7$   
 $R_g = 96.9$   
 CIE  $R_a = 71.2$   
 $R_g = -29.7$



### Color Vector Graphics



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 55 | CES51 = 86 | CES76 = 45 |
| CES02 = 61 | CES27 = 80 | CES52 = 87 | CES77 = 68 |
| CES03 = 30 | CES28 = 79 | CES53 = 74 | CES78 = 49 |
| CES04 = 70 | CES29 = 51 | CES54 = 81 | CES79 = 77 |
| CES05 = 47 | CES30 = 60 | CES55 = 80 | CES80 = 75 |
| CES06 = 50 | CES31 = 56 | CES56 = 69 | CES81 = 75 |
| CES07 = 40 | CES32 = 52 | CES57 = 67 | CES82 = 90 |
| CES08 = 39 | CES33 = 62 | CES58 = 69 | CES83 = 85 |
| CES09 = 29 | CES34 = 65 | CES59 = 86 | CES84 = 87 |
| CES10 = 74 | CES35 = 81 | CES60 = 91 | CES85 = 83 |
| CES11 = 57 | CES36 = 92 | CES61 = 85 | CES86 = 72 |
| CES12 = 63 | CES37 = 74 | CES62 = 81 | CES87 = 77 |
| CES13 = 42 | CES38 = 69 | CES63 = 72 | CES88 = 77 |
| CES14 = 74 | CES39 = 92 | CES64 = 69 | CES89 = 72 |
| CES15 = 71 | CES40 = 86 | CES65 = 64 | CES90 = 75 |
| CES16 = 46 | CES41 = 84 | CES66 = 63 | CES91 = 91 |
| CES17 = 49 | CES42 = 75 | CES67 = 60 | CES92 = 66 |
| CES18 = 56 | CES43 = 70 | CES68 = 67 | CES93 = 80 |
| CES19 = 72 | CES44 = 98 | CES69 = 77 | CES94 = 56 |
| CES20 = 65 | CES45 = 80 | CES70 = 57 | CES95 = 72 |
| CES21 = 86 | CES46 = 77 | CES71 = 53 | CES96 = 78 |
| CES22 = 78 | CES47 = 74 | CES72 = 84 | CES97 = 83 |
| CES23 = 92 | CES48 = 66 | CES73 = 47 | CES98 = 73 |
| CES24 = 91 | CES49 = 76 | CES74 = 96 | CES99 = 63 |
| CES25 = 72 | CES50 = 85 | CES75 = 52 |            |



**Color Rendition by Hue-Angle Bin**


**Measure Comparisons**


(END OF REPORT)