

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: P360936

Luminaire Tested: NVN-SA2D-827-U-T2R

Issue Date: 3/3/2020

### Test Information

Test Method: LM-79-2019  
Report Number: P360936  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-8)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: STREETWORKS  
Catalog Number: NVN-SA2D-827-U-T2R  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(2) 80 CRI, 2700K, 1200mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE II  
ROADWAY OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

### Summary

Lumens per Lamp: N/A  
Luminaire Lumens: 12232 lumens  
Efficiency: N/A  
Efficacy: 94.8 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 1' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B2 - U0 - G2

Input Watts (W): 129  
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



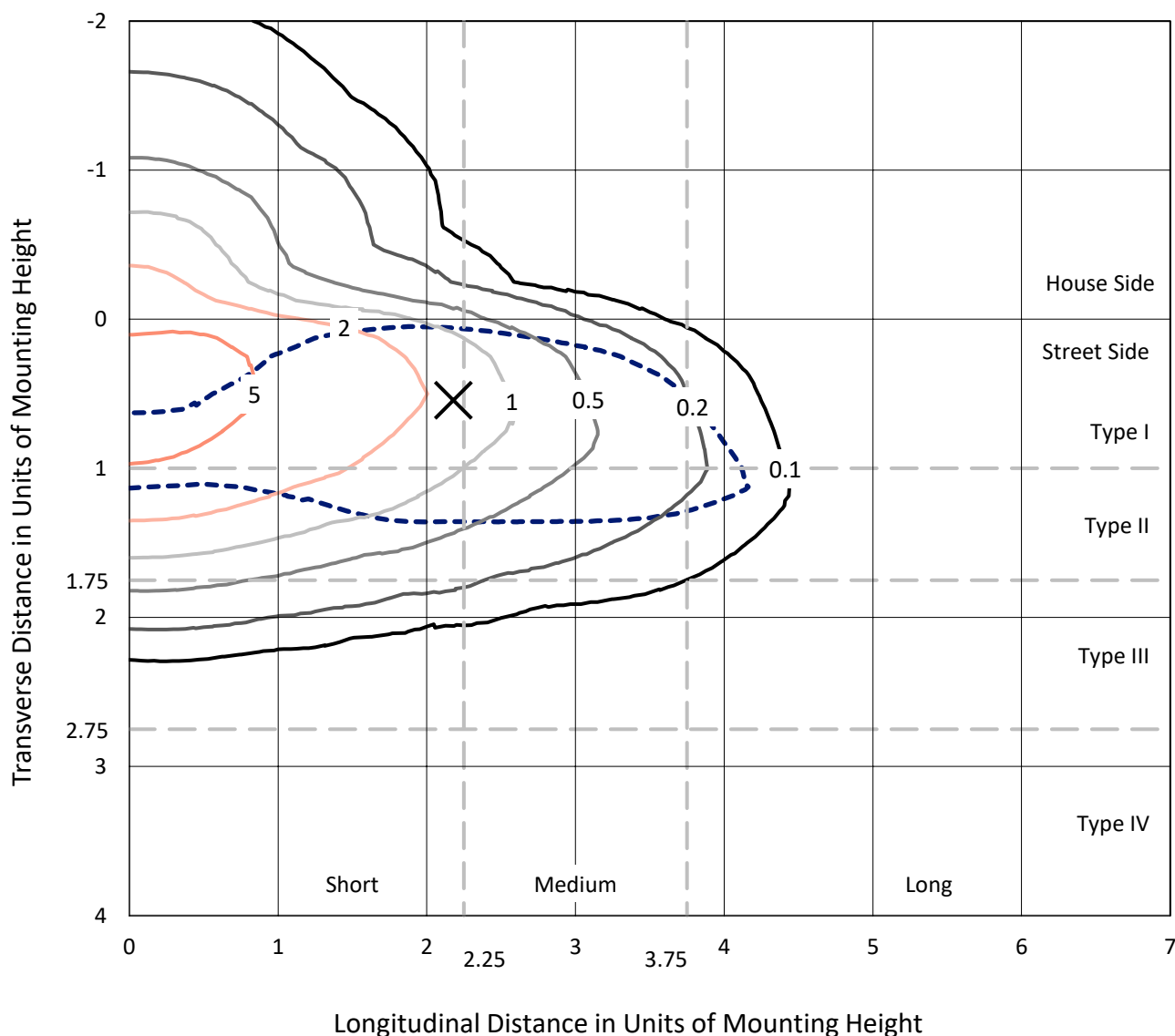
REPORT NUMBER: P360936

CATALOG NUMBER: NVN-SA2D-827-U-T2R

## Iso-Footcandle Lines of Horizontal Illumination

✕ Max cd

--- 1/2 Max cd

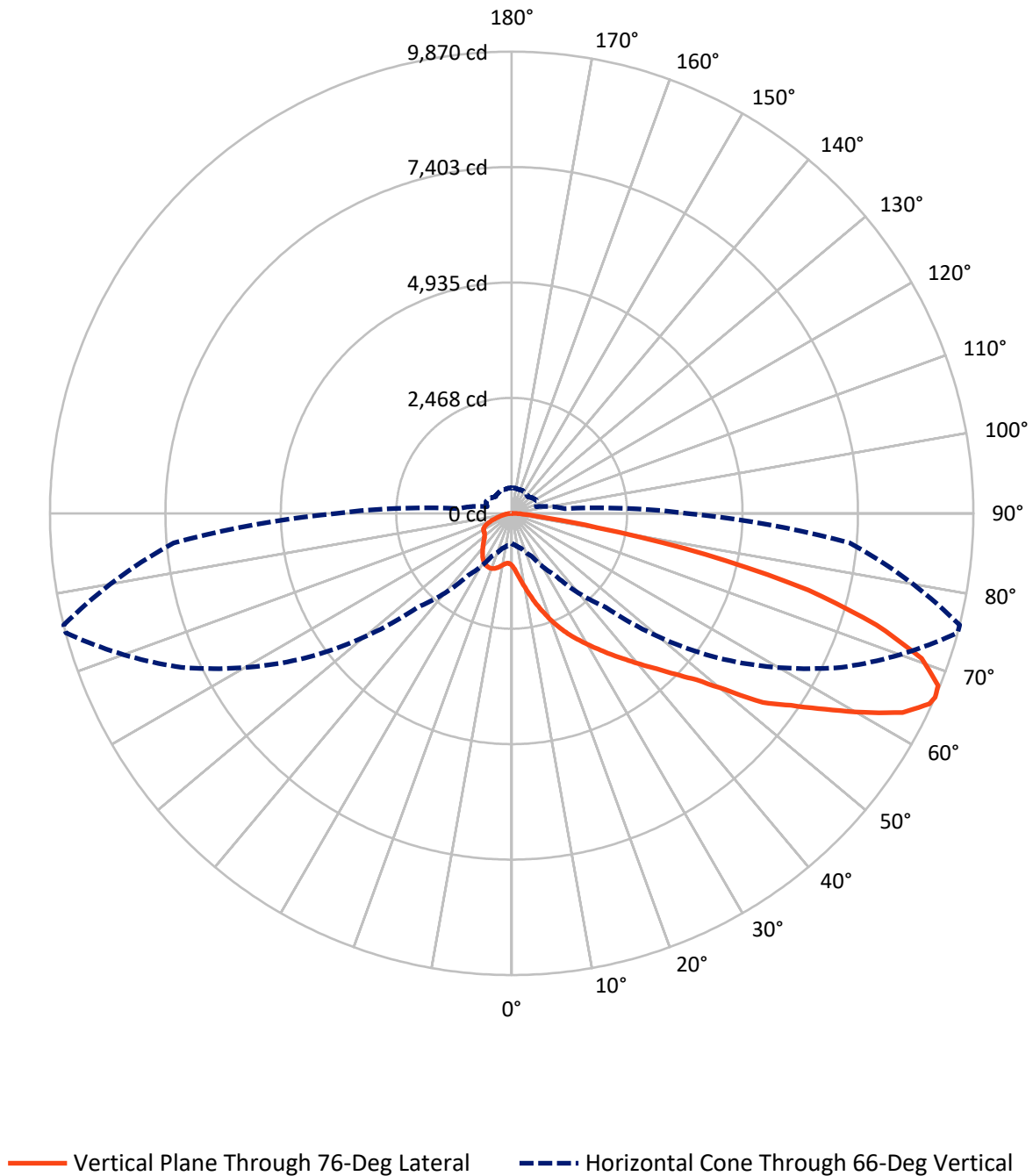


Based on 20 foot mounting height. Maximum calculated value = 7.4 fc

Type II - Short - N/A

REPORT NUMBER: P360936  
CATALOG NUMBER: NVN-SA2D-827-U-T2R

## Luminous Intensity Polar Plot



REPORT NUMBER: P360936

CATALOG NUMBER: NVN-SA2D-827-U-T2R

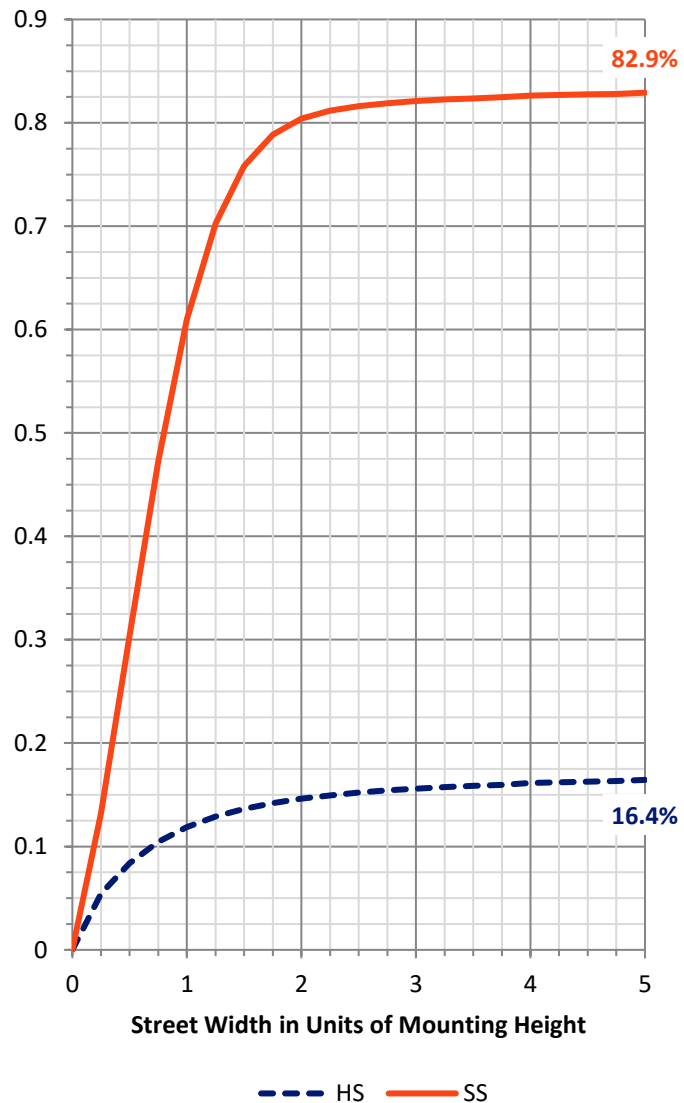
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 2058.2   | 0.0    | 2058.2  |
|                    | % Fixture | 16.8     | 0.0    | 16.8    |
| <b>Street Side</b> | Lumens    | 10173.8  | 0.0    | 10173.8 |
|                    | % Fixture | 83.2     | 0.0    | 83.2    |
| <b>Total</b>       | Lumens    | 12232.0  | 0.0    | 12232.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 135.1   | 1.1       |
| 10°-20°   | 533.4   | 4.4       |
| 20°-30°   | 1036.6  | 8.5       |
| 30°-40°   | 1691.9  | 13.8      |
| 40°-50°   | 2311.6  | 18.9      |
| 50°-60°   | 2692.5  | 22.0      |
| 60°-70°   | 2413.9  | 19.7      |
| 70°-80°   | 1219.9  | 10.0      |
| 80°-90°   | 197.0   | 1.6       |
| 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°    | 12232.0 | 100.0     |
| 0°-180°   | 12232.0 | 100.0     |

**Coefficient of Utilization**



REPORT NUMBER: P360936

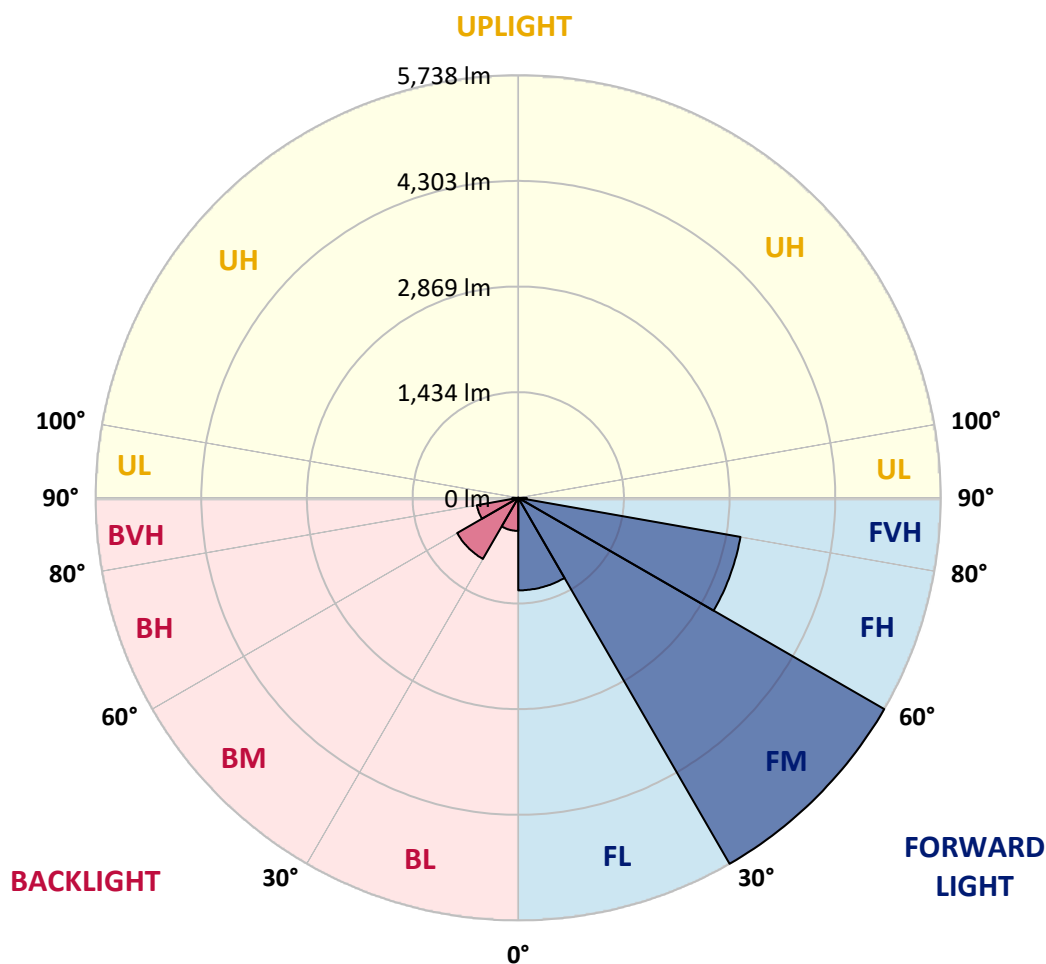
CATALOG NUMBER: NVN-SA2D-827-U-T2R

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 1256.2 | 10.3      |                         |      |         |
| FM   | (30°-60°)   | 5737.7 | 46.9      |                         |      |         |
| FH   | (60°-80°)   | 3063.6 | 25.0      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 116.3  | 1.0       |                         |      | G2/225  |
| BL   | (0°-30°)    | 448.9  | 3.7       | B1/500                  |      |         |
| BM   | (30°-60°)   | 958.4  | 7.8       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 570.2  | 4.7       | B2/1000                 |      | G2/1000 |
| BVH  | (80°-90°)   | 80.7   | 0.7       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B2-U0-G2**

Type II Short





REPORT NUMBER: P360936

CATALOG NUMBER: NVN-SA2D-827-U-T2R

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 65°    | 75°    | 76°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1117.1 | 1117.1 | 1117.1 | 1117.1 | 1117.1 | 1117.1 | 1117.1 | 1117.1 | 1117.1 | 1117.1 | 1117.1 |
| 2.5°  | 1482.9 | 1460.5 | 1458.4 | 1425.6 | 1418.1 | 1355.4 | 1309.3 | 1261.2 | 1206.3 | 1195.5 | 1152.4 |
| 5°    | 1904.8 | 1902.7 | 1874.1 | 1820.5 | 1778.6 | 1671.4 | 1565.5 | 1453.4 | 1330.5 | 1310.6 | 1213.4 |
| 7.5°  | 2284.4 | 2281.0 | 2259.0 | 2201.3 | 2140.7 | 2009.0 | 1857.9 | 1686.0 | 1486.6 | 1457.2 | 1296.0 |
| 10°   | 2572.6 | 2571.3 | 2563.8 | 2521.5 | 2470.0 | 2343.7 | 2176.8 | 1942.2 | 1668.1 | 1627.8 | 1399.4 |
| 12.5° | 2795.1 | 2797.6 | 2802.6 | 2787.7 | 2763.2 | 2655.6 | 2484.5 | 2213.8 | 1861.6 | 1821.8 | 1514.5 |
| 15°   | 2945.9 | 2953.4 | 2979.1 | 3000.3 | 3013.1 | 2947.1 | 2781.4 | 2491.6 | 2078.4 | 2030.6 | 1641.9 |
| 17.5° | 3021.9 | 3030.2 | 3074.6 | 3138.6 | 3197.5 | 3190.9 | 3059.2 | 2756.5 | 2286.4 | 2240.3 | 1779.0 |
| 20°   | 3087.5 | 3093.7 | 3143.5 | 3220.4 | 3324.6 | 3370.7 | 3296.8 | 3011.5 | 2514.4 | 2459.6 | 1924.3 |
| 22.5° | 3277.7 | 3285.6 | 3300.5 | 3344.1 | 3436.3 | 3521.0 | 3485.3 | 3252.8 | 2723.3 | 2672.2 | 2062.2 |
| 25°   | 3644.8 | 3654.3 | 3621.9 | 3585.0 | 3602.4 | 3661.4 | 3668.0 | 3472.8 | 2935.1 | 2877.4 | 2210.4 |
| 27.5° | 4087.0 | 4100.7 | 4045.5 | 3950.4 | 3867.3 | 3844.5 | 3836.6 | 3653.1 | 3137.3 | 3070.5 | 2357.0 |
| 30°   | 4520.1 | 4543.8 | 4472.0 | 4348.6 | 4196.2 | 4089.1 | 4009.8 | 3829.6 | 3336.6 | 3272.7 | 2495.3 |
| 32.5° | 4943.3 | 4933.7 | 4829.5 | 4709.1 | 4530.5 | 4396.4 | 4204.5 | 4018.9 | 3560.9 | 3487.4 | 2632.8 |
| 35°   | 5233.1 | 5236.5 | 5139.7 | 4996.9 | 4826.6 | 4723.6 | 4465.3 | 4223.2 | 3789.7 | 3722.0 | 2788.9 |
| 37.5° | 5479.8 | 5464.4 | 5354.8 | 5221.5 | 5074.9 | 5030.9 | 4770.5 | 4448.3 | 4037.6 | 3963.7 | 2955.0 |
| 40°   | 5562.0 | 5544.2 | 5472.3 | 5376.4 | 5258.9 | 5255.2 | 5107.3 | 4703.3 | 4317.9 | 4244.8 | 3142.3 |
| 42.5° | 5512.2 | 5489.4 | 5459.9 | 5433.7 | 5397.6 | 5414.2 | 5423.8 | 5002.3 | 4626.0 | 4544.2 | 3359.1 |
| 45°   | 5328.2 | 5293.8 | 5314.5 | 5371.4 | 5449.9 | 5543.8 | 5709.5 | 5333.2 | 4971.1 | 4902.6 | 3613.6 |
| 47.5° | 5045.4 | 5014.3 | 5079.1 | 5200.8 | 5414.2 | 5651.7 | 5979.8 | 5698.7 | 5383.1 | 5315.0 | 3976.1 |
| 50°   | 4647.6 | 4656.8 | 4749.4 | 4970.7 | 5293.4 | 5701.6 | 6312.8 | 6182.4 | 5981.9 | 5918.3 | 4470.7 |
| 52.5° | 3994.8 | 3996.5 | 4257.3 | 4620.6 | 5079.1 | 5675.8 | 6497.6 | 6800.8 | 6799.5 | 6722.7 | 4941.6 |
| 55°   | 3388.5 | 3425.5 | 3631.9 | 4114.8 | 4731.9 | 5572.8 | 6626.8 | 7101.4 | 7336.5 | 7246.3 | 5380.6 |
| 57.5° | 2796.4 | 2818.0 | 3013.6 | 3498.6 | 4236.5 | 5298.3 | 6759.2 | 7462.3 | 7955.2 | 7898.3 | 5926.2 |
| 60°   | 2122.8 | 2156.0 | 2358.3 | 2806.3 | 3602.8 | 4811.2 | 6771.7 | 7838.9 | 8694.8 | 8637.5 | 6535.4 |
| 62.5° | 1377.8 | 1435.1 | 1624.5 | 2044.3 | 2836.2 | 4110.7 | 6482.7 | 8085.2 | 9395.7 | 9375.4 | 7076.1 |
| 65°   | 791.9  | 835.1  | 966.7  | 1290.6 | 1956.7 | 3231.2 | 5795.4 | 7990.5 | 9827.2 | 9815.6 | 7278.3 |
| 66°   | 647.0  | 674.0  | 774.9  | 1008.7 | 1614.5 | 2837.5 | 5395.9 | 7790.7 | 9870.0 | 9870.4 | 7255.1 |
| 67.5° | 517.4  | 529.5  | 574.7  | 722.1  | 1191.4 | 2249.1 | 4682.1 | 7350.2 | 9816.8 | 9831.4 | 7105.2 |
| 70°   | 428.1  | 434.4  | 448.5  | 484.2  | 650.3  | 1356.2 | 3323.3 | 6205.3 | 9283.2 | 9294.4 | 6520.0 |
| 72.5° | 384.1  | 387.9  | 393.3  | 398.2  | 458.9  | 757.9  | 2029.8 | 4964.1 | 8139.2 | 8153.7 | 5628.5 |
| 75°   | 348.0  | 350.1  | 349.2  | 349.7  | 384.9  | 483.0  | 1049.0 | 3706.2 | 6581.1 | 6552.0 | 4311.7 |
| 77.5° | 305.6  | 307.7  | 303.6  | 304.4  | 340.5  | 371.2  | 522.0  | 2594.6 | 4441.2 | 4236.1 | 2429.3 |
| 80°   | 258.3  | 260.0  | 258.3  | 261.2  | 296.5  | 280.3  | 303.6  | 1459.6 | 1963.8 | 1857.5 | 863.7  |
| 82.5° | 195.2  | 202.2  | 207.2  | 218.8  | 244.2  | 199.3  | 203.1  | 568.5  | 598.0  | 569.3  | 264.9  |
| 85°   | 85.5   | 104.2  | 156.1  | 167.4  | 183.5  | 119.6  | 133.3  | 231.7  | 243.3  | 235.9  | 96.3   |
| 87.5° | 22.4   | 24.5   | 77.2   | 97.2   | 101.7  | 54.0   | 69.3   | 105.5  | 111.3  | 105.5  | 32.0   |
| 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: P360936

CATALOG NUMBER: NVN-SA2D-827-U-T2R

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1117.1 | 1117.1 | 1117.1 | 1117.1 | 1117.1 | 1117.1 | 1117.1 | 1117.1 | 1117.1 | 1117.1 | 1117.1 |
| 2.5°  | 1129.5 | 1109.2 | 1072.6 | 1040.2 | 1015.7 | 999.1  | 982.5  | 974.2  | 969.2  | 964.2  | 965.1  |
| 5°    | 1165.6 | 1124.5 | 1061.8 | 1017.4 | 992.5  | 976.7  | 968.4  | 965.1  | 963.0  | 958.0  | 958.0  |
| 7.5°  | 1220.0 | 1161.9 | 1075.5 | 1029.9 | 1010.3 | 998.3  | 993.3  | 991.6  | 989.2  | 983.3  | 984.2  |
| 10°   | 1288.6 | 1207.2 | 1104.2 | 1059.8 | 1041.9 | 1028.6 | 1021.5 | 1019.1 | 1014.5 | 1007.8 | 1008.7 |
| 12.5° | 1369.1 | 1263.2 | 1142.0 | 1095.5 | 1073.9 | 1056.0 | 1044.4 | 1037.3 | 1029.4 | 1020.7 | 1021.1 |
| 15°   | 1457.2 | 1324.3 | 1182.7 | 1127.4 | 1098.0 | 1073.0 | 1054.4 | 1042.3 | 1029.9 | 1019.1 | 1018.6 |
| 17.5° | 1546.4 | 1383.2 | 1213.8 | 1144.9 | 1105.0 | 1072.2 | 1046.9 | 1028.2 | 1012.8 | 999.5  | 998.3  |
| 20°   | 1642.8 | 1436.4 | 1231.3 | 1143.2 | 1091.7 | 1052.7 | 1019.1 | 995.8  | 978.8  | 965.5  | 963.4  |
| 22.5° | 1740.8 | 1486.2 | 1234.2 | 1126.2 | 1062.2 | 1014.5 | 979.2  | 953.4  | 936.0  | 922.3  | 917.3  |
| 25°   | 1830.5 | 1524.8 | 1222.1 | 1093.4 | 1021.1 | 969.6  | 935.2  | 909.0  | 894.9  | 878.7  | 873.7  |
| 27.5° | 1912.3 | 1551.8 | 1198.0 | 1051.4 | 975.0  | 924.4  | 892.0  | 869.6  | 854.2  | 841.7  | 837.6  |
| 30°   | 1985.8 | 1566.4 | 1158.6 | 1001.6 | 927.7  | 881.6  | 854.2  | 838.8  | 825.5  | 809.8  | 806.9  |
| 32.5° | 2055.6 | 1566.4 | 1107.9 | 947.2  | 880.8  | 843.8  | 827.6  | 818.1  | 803.1  | 787.8  | 783.6  |
| 35°   | 2125.3 | 1556.8 | 1048.1 | 890.3  | 837.6  | 816.8  | 816.0  | 804.8  | 781.9  | 761.2  | 755.8  |
| 37.5° | 2198.8 | 1537.3 | 980.9  | 837.2  | 802.3  | 804.8  | 811.8  | 786.9  | 754.5  | 725.0  | 717.2  |
| 40°   | 2281.9 | 1510.3 | 911.1  | 791.1  | 772.8  | 799.4  | 800.6  | 761.2  | 698.1  | 671.1  | 664.0  |
| 42.5° | 2379.5 | 1483.3 | 846.3  | 750.4  | 749.5  | 783.2  | 779.4  | 705.5  | 667.7  | 654.0  | 650.3  |
| 45°   | 2507.8 | 1468.0 | 784.8  | 711.8  | 731.3  | 757.0  | 743.3  | 674.8  | 659.0  | 651.1  | 647.8  |
| 47.5° | 2710.0 | 1475.8 | 728.4  | 681.0  | 713.0  | 730.9  | 676.0  | 662.3  | 651.1  | 641.6  | 638.3  |
| 50°   | 2963.3 | 1471.3 | 682.7  | 659.9  | 692.2  | 703.5  | 645.7  | 646.1  | 640.3  | 629.5  | 624.6  |
| 52.5° | 3153.9 | 1435.6 | 653.2  | 647.8  | 674.0  | 654.9  | 626.6  | 630.4  | 627.5  | 611.7  | 606.3  |
| 55°   | 3337.9 | 1404.8 | 638.3  | 643.2  | 660.7  | 594.2  | 604.2  | 613.3  | 610.4  | 595.1  | 592.6  |
| 57.5° | 3566.7 | 1399.0 | 629.1  | 644.5  | 649.5  | 563.9  | 582.6  | 594.7  | 592.6  | 585.9  | 584.7  |
| 60°   | 3847.0 | 1400.7 | 620.8  | 646.6  | 637.0  | 541.5  | 562.3  | 577.6  | 578.9  | 577.6  | 576.8  |
| 62.5° | 4001.1 | 1355.4 | 600.1  | 640.8  | 615.0  | 522.0  | 541.1  | 563.5  | 563.9  | 566.4  | 566.0  |
| 65°   | 3870.3 | 1220.0 | 561.4  | 620.4  | 578.0  | 505.8  | 522.8  | 547.3  | 541.1  | 552.3  | 552.3  |
| 66°   | 3743.2 | 1142.0 | 542.3  | 607.1  | 562.3  | 499.6  | 517.0  | 539.0  | 531.1  | 546.5  | 546.5  |
| 67.5° | 3483.6 | 1010.3 | 507.9  | 578.9  | 539.8  | 490.8  | 510.4  | 525.3  | 514.5  | 537.4  | 535.7  |
| 70°   | 3009.4 | 781.5  | 438.5  | 514.9  | 502.9  | 478.0  | 501.2  | 497.9  | 482.1  | 517.0  | 510.4  |
| 72.5° | 2537.3 | 593.8  | 352.1  | 431.0  | 446.8  | 461.8  | 488.3  | 463.0  | 443.1  | 467.6  | 453.1  |
| 75°   | 1968.8 | 446.4  | 278.2  | 335.1  | 377.5  | 436.4  | 473.0  | 422.7  | 394.1  | 391.6  | 383.7  |
| 77.5° | 1064.3 | 306.5  | 220.5  | 255.8  | 299.8  | 404.9  | 462.6  | 379.6  | 336.4  | 326.4  | 320.2  |
| 80°   | 421.5  | 199.3  | 160.3  | 193.9  | 209.7  | 359.2  | 437.7  | 329.3  | 277.4  | 267.4  | 257.9  |
| 82.5° | 174.0  | 117.9  | 103.4  | 130.0  | 136.6  | 307.3  | 392.8  | 269.9  | 214.3  | 296.5  | 314.8  |
| 85°   | 74.7   | 64.8   | 61.5   | 67.3   | 77.2   | 215.5  | 312.7  | 206.0  | 231.3  | 206.4  | 164.0  |
| 87.5° | 22.4   | 27.4   | 26.2   | 25.7   | 28.2   | 51.5   | 166.5  | 114.6  | 169.8  | 64.4   | 48.2   |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

LM-79-2019: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

Invue

Report Number: SP1-2407-157-9

Test Date: 10/03/2024

Luminaire Tested: EMM2-HTN-SA1A-827-U-5WQ

Data applicable to all product families utilizing light square engine

### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2407-157-9  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 10/03/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: Invue  
 Catalog Number: **EMM2-HTN-SA1A-827-U-5WQ**  
 Description: Epic Modern Light Square 40W 5WQ Optic

### Spectral Parameters

CCT (K): 2764  
 CIE  $u'$ : 0.2591  
 CIE  $v'$ : 0.5290  
 Duv: 0.0020  
 CIE x: 0.4581  
 CIE y: 0.4156  
 CIE z: 0.1263  
 Peak Wavelength (nm): 603  
 Dominant Wavelength (nm): 583  
 Purity: 62.2537  
 R<sub>f</sub>: 84.7  
 R<sub>g</sub>: 94.6

CRI (Ra): 80.9  
 R1: 78.8  
 R2: 89.9  
 R3: 96.2  
 R4: 79.1  
 R5: 79.1  
 R6: 88.8  
 R7: 81.3  
 R8: 54.3  
 R9: -1.5  
 R10: 77.9  
 R11: 78.9  
 R12: 71.6  
 R13: 81.2  
 R14: 98.5  
 R15: 69.9



### Test Conditions

Stabilization Time: 81M  
 Operation Time: 2H 21M  
 Sphere Temperature (°C): 25.2

REPORT NUMBER: SP1-2407-157-9

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 6/18/2024        | 12/18/2024           |
| Power Meter                    | INXT2011004           | 2/8/2024         | 2/8/2025             |
| AC Power Source                | IN0063                | 10/24/2023       | 10/24/2024           |
| DC Power Source                | IN0208                | 10/24/2023       | 10/24/2024           |
| Sphere Thermometer             | IN0085                | 10/24/2023       | 10/24/2024           |
| Room Thermometer               | IN0046                | 10/24/2023       | 10/24/2024           |



REPORT NUMBER: SP1-2407-157-9

### Photopic Flux vs. Wavelength



### Photopic Lumens: 4337.9

| 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    | 0             | 0.0           | 490    | 18018         | 2.6           | 620    | 87426         | 22.8          | 750    | 2680          | 0.0           | 880    | 58            | 0.0           |
| 365    | 0             | 0.0           | 495    | 22295         | 3.9           | 625    | 83013         | 18.2          | 755    | 2287          | 0.0           | 885    | 46            | 0.0           |
| 370    | 0             | 0.0           | 500    | 26478         | 5.8           | 630    | 78077         | 14.1          | 760    | 1944          | 0.0           | 890    | 45            | 0.0           |
| 375    | 0             | 0.0           | 505    | 30524         | 8.5           | 635    | 72080         | 10.7          | 765    | 1653          | 0.0           | 895    | 41            | 0.0           |
| 380    | 0             | 0.0           | 510    | 33611         | 11.5          | 640    | 66249         | 7.9           | 770    | 1413          | 0.0           | 900    | 38            | 0.0           |
| 385    | 0             | 0.0           | 515    | 36490         | 15.2          | 645    | 59973         | 5.7           | 775    | 1198          | 0.0           | 905    | 33            | 0.0           |
| 390    | 0             | 0.0           | 520    | 38610         | 18.7          | 650    | 53972         | 3.9           | 780    | 1025          | 0.0           | 910    | 30            | 0.0           |
| 395    | 0             | 0.0           | 525    | 40511         | 21.9          | 655    | 48369         | 2.7           | 785    | 874           | 0.0           | 915    | 23            | 0.0           |
| 400    | 48            | 0.0           | 530    | 42223         | 24.9          | 660    | 42641         | 1.8           | 790    | 747           | 0.0           | 920    | 24            | 0.0           |
| 405    | 201           | 0.0           | 535    | 44137         | 27.6          | 665    | 37602         | 1.1           | 795    | 639           | 0.0           | 925    | 22            | 0.0           |
| 410    | 457           | 0.0           | 540    | 46032         | 30.0          | 670    | 32798         | 0.7           | 800    | 547           | 0.0           | 930    | 22            | 0.0           |
| 415    | 925           | 0.0           | 545    | 48553         | 32.5          | 675    | 28558         | 0.5           | 805    | 473           | 0.0           | 935    | 17            | 0.0           |
| 420    | 1816          | 0.0           | 550    | 51408         | 34.9          | 680    | 24782         | 0.3           | 810    | 401           | 0.0           | 940    | 13            | 0.0           |
| 425    | 3217          | 0.0           | 555    | 54711         | 37.4          | 685    | 21386         | 0.2           | 815    | 351           | 0.0           | 945    | 6             | 0.0           |
| 430    | 5520          | 0.0           | 560    | 58847         | 40.0          | 690    | 18413         | 0.1           | 820    | 307           | 0.0           | 950    | 10            | 0.0           |
| 435    | 9225          | 0.1           | 565    | 63386         | 42.4          | 695    | 15721         | 0.1           | 825    | 261           | 0.0           | 955    | 11            | 0.0           |
| 440    | 15522         | 0.2           | 570    | 68196         | 44.3          | 700    | 13432         | 0.0           | 830    | 228           | 0.0           | 960    | 8             | 0.0           |
| 445    | 27642         | 0.6           | 575    | 73613         | 46.0          | 705    | 11513         | 0.0           | 835    | 193           | 0.0           | 965    | 12            | 0.0           |
| 450    | 36602         | 0.9           | 580    | 79207         | 47.1          | 710    | 9780          | 0.0           | 840    | 174           | 0.0           | 970    | 3             | 0.0           |
| 455    | 28292         | 0.9           | 585    | 84248         | 47.0          | 715    | 8356          | 0.0           | 845    | 151           | 0.0           | 975    | 8             | 0.0           |
| 460    | 21166         | 0.9           | 590    | 88397         | 45.7          | 720    | 7161          | 0.0           | 850    | 123           | 0.0           | 980    | 2             | 0.0           |
| 465    | 19092         | 1.0           | 595    | 91428         | 43.4          | 725    | 6067          | 0.0           | 855    | 106           | 0.0           | 985    | 13            | 0.0           |
| 470    | 14951         | 0.9           | 600    | 93452         | 40.3          | 730    | 5164          | 0.0           | 860    | 95            | 0.0           | 990    | 16            | 0.0           |
| 475    | 12606         | 1.0           | 605    | 93959         | 36.4          | 735    | 4393          | 0.0           | 865    | 82            | 0.0           | 995    | 20            | 0.0           |
| 480    | 13323         | 1.3           | 610    | 93079         | 32.0          | 740    | 3694          | 0.0           | 870    | 77            | 0.0           | 1000   | 0             | 0.0           |
| 485    | 15164         | 1.8           | 615    | 90707         | 27.3          | 745    | 3157          | 0.0           | 875    | 65            | 0.0           |        |               |               |

REPORT NUMBER: SP1-2407-157-9

### Scotopic Flux vs. Wavelength



Scotopic Lumens: 5286.7

S/P: 1.22

| 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       | 0                | 0.0              | 490       | 18018            | 75.9             | 620       | 87426            | 0.4              | 750       | 2680             | 0.0              | 880       | 58               | 0.0              |
| 365       | 0                | 0.0              | 495       | 22295            | 93.2             | 625       | 83013            | 0.2              | 755       | 2287             | 0.0              | 885       | 46               | 0.0              |
| 370       | 0                | 0.0              | 500       | 26478            | 107.8            | 630       | 78077            | 0.1              | 760       | 1944             | 0.0              | 890       | 45               | 0.0              |
| 375       | 0                | 0.0              | 505       | 30524            | 118.7            | 635       | 72080            | 0.1              | 765       | 1653             | 0.0              | 895       | 41               | 0.0              |
| 380       | 0                | 0.0              | 510       | 33611            | 122.2            | 640       | 66249            | 0.1              | 770       | 1413             | 0.0              | 900       | 38               | 0.0              |
| 385       | 0                | 0.0              | 515       | 36490            | 120.8            | 645       | 59973            | 0.0              | 775       | 1198             | 0.0              | 905       | 33               | 0.0              |
| 390       | 0                | 0.0              | 520       | 38610            | 113.9            | 650       | 53972            | 0.0              | 780       | 1025             | 0.0              | 910       | 30               | 0.0              |
| 395       | 0                | 0.0              | 525       | 40511            | 104.1            | 655       | 48369            | 0.0              | 785       | 874              | 0.0              | 915       | 23               | 0.0              |
| 400       | 48               | 0.0              | 530       | 42223            | 92.4             | 660       | 42641            | 0.0              | 790       | 747              | 0.0              | 920       | 24               | 0.0              |
| 405       | 201              | 0.0              | 535       | 44137            | 80.5             | 665       | 37602            | 0.0              | 795       | 639              | 0.0              | 925       | 22               | 0.0              |
| 410       | 457              | 0.1              | 540       | 46032            | 68.2             | 670       | 32798            | 0.0              | 800       | 547              | 0.0              | 930       | 22               | 0.0              |
| 415       | 925              | 0.3              | 545       | 48553            | 57.1             | 675       | 28558            | 0.0              | 805       | 473              | 0.0              | 935       | 17               | 0.0              |
| 420       | 1816             | 1.1              | 550       | 51408            | 46.7             | 680       | 24782            | 0.0              | 810       | 401              | 0.0              | 940       | 13               | 0.0              |
| 425       | 3217             | 2.5              | 555       | 54711            | 37.4             | 685       | 21386            | 0.0              | 815       | 351              | 0.0              | 945       | 6                | 0.0              |
| 430       | 5520             | 5.9              | 560       | 58847            | 29.4             | 690       | 18413            | 0.0              | 820       | 307              | 0.0              | 950       | 10               | 0.0              |
| 435       | 9225             | 12.5             | 565       | 63386            | 22.5             | 695       | 15721            | 0.0              | 825       | 261              | 0.0              | 955       | 11               | 0.0              |
| 440       | 15522            | 26.3             | 570       | 68196            | 16.9             | 700       | 13432            | 0.0              | 830       | 228              | 0.0              | 960       | 8                | 0.0              |
| 445       | 27642            | 55.2             | 575       | 73613            | 12.4             | 705       | 11513            | 0.0              | 835       | 193              | 0.0              | 965       | 12               | 0.0              |
| 450       | 36602            | 85.4             | 580       | 79207            | 9.0              | 710       | 9780             | 0.0              | 840       | 174              | 0.0              | 970       | 3                | 0.0              |
| 455       | 28292            | 75.1             | 585       | 84248            | 6.3              | 715       | 8356             | 0.0              | 845       | 151              | 0.0              | 975       | 8                | 0.0              |
| 460       | 21166            | 63.2             | 590       | 88397            | 4.4              | 720       | 7161             | 0.0              | 850       | 123              | 0.0              | 980       | 2                | 0.0              |
| 465       | 19092            | 63.2             | 595       | 91428            | 3.0              | 725       | 6067             | 0.0              | 855       | 106              | 0.0              | 985       | 13               | 0.0              |
| 470       | 14951            | 54.2             | 600       | 93452            | 2.0              | 730       | 5164             | 0.0              | 860       | 95               | 0.0              | 990       | 16               | 0.0              |
| 475       | 12606            | 48.8             | 605       | 93959            | 1.3              | 735       | 4393             | 0.0              | 865       | 82               | 0.0              | 995       | 20               | 0.0              |
| 480       | 13323            | 54.2             | 610       | 93079            | 0.9              | 740       | 3694             | 0.0              | 870       | 77               | 0.0              | 1000      | 0                | 0.0              |
| 485       | 15164            | 63.3             | 615       | 90707            | 0.5              | 745       | 3157             | 0.0              | 875       | 65               | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2407-157-9

### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 9797**

**M/P: 2.26**

| 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       | 0                | 0.0              | 490       | 18018            | 27.7             | 620       | 87426            | 1.1              | 750       | 2680             | 0.0              | 880       | 58               | 0.0              |
| 365       | 0                | 0.0              | 495       | 22295            | 36.0             | 625       | 83013            | 0.7              | 755       | 2287             | 0.0              | 885       | 46               | 0.0              |
| 370       | 0                | 0.0              | 500       | 26478            | 44.2             | 630       | 78077            | 0.4              | 760       | 1944             | 0.0              | 890       | 45               | 0.0              |
| 375       | 0                | 0.0              | 505       | 30524            | 51.8             | 635       | 72080            | 0.3              | 765       | 1653             | 0.0              | 895       | 41               | 0.0              |
| 380       | 0                | 0.0              | 510       | 33611            | 57.0             | 640       | 66249            | 0.2              | 770       | 1413             | 0.0              | 900       | 38               | 0.0              |
| 385       | 0                | 0.0              | 515       | 36490            | 60.5             | 645       | 59973            | 0.1              | 775       | 1198             | 0.0              | 905       | 33               | 0.0              |
| 390       | 0                | 0.0              | 520       | 38610            | 61.4             | 650       | 53972            | 0.1              | 780       | 1025             | 0.0              | 910       | 30               | 0.0              |
| 395       | 0                | 0.0              | 525       | 40511            | 60.6             | 655       | 48369            | 0.0              | 785       | 874              | 0.0              | 915       | 23               | 0.0              |
| 400       | 48               | 0.0              | 530       | 42223            | 58.2             | 660       | 42641            | 0.0              | 790       | 747              | 0.0              | 920       | 24               | 0.0              |
| 405       | 201              | 0.0              | 535       | 44137            | 55.0             | 665       | 37602            | 0.0              | 795       | 639              | 0.0              | 925       | 22               | 0.0              |
| 410       | 457              | 0.0              | 540       | 46032            | 50.9             | 670       | 32798            | 0.0              | 800       | 547              | 0.0              | 930       | 22               | 0.0              |
| 415       | 925              | 0.1              | 545       | 48553            | 46.6             | 675       | 28558            | 0.0              | 805       | 473              | 0.0              | 935       | 17               | 0.0              |
| 420       | 1816             | 0.3              | 550       | 51408            | 42.0             | 680       | 24782            | 0.0              | 810       | 401              | 0.0              | 940       | 13               | 0.0              |
| 425       | 3217             | 0.8              | 555       | 54711            | 37.4             | 685       | 21386            | 0.0              | 815       | 351              | 0.0              | 945       | 6                | 0.0              |
| 430       | 5520             | 1.9              | 560       | 58847            | 32.9             | 690       | 18413            | 0.0              | 820       | 307              | 0.0              | 950       | 10               | 0.0              |
| 435       | 9225             | 4.1              | 565       | 63386            | 28.4             | 695       | 15721            | 0.0              | 825       | 261              | 0.0              | 955       | 11               | 0.0              |
| 440       | 15522            | 8.7              | 570       | 68196            | 24.1             | 700       | 13432            | 0.0              | 830       | 228              | 0.0              | 960       | 8                | 0.0              |
| 445       | 27642            | 18.5             | 575       | 73613            | 20.0             | 705       | 11513            | 0.0              | 835       | 193              | 0.0              | 965       | 12               | 0.0              |
| 450       | 36602            | 28.3             | 580       | 79207            | 16.3             | 710       | 9780             | 0.0              | 840       | 174              | 0.0              | 970       | 3                | 0.0              |
| 455       | 28292            | 24.7             | 585       | 84248            | 12.9             | 715       | 8356             | 0.0              | 845       | 151              | 0.0              | 975       | 8                | 0.0              |
| 460       | 21166            | 20.4             | 590       | 88397            | 9.8              | 720       | 7161             | 0.0              | 850       | 123              | 0.0              | 980       | 2                | 0.0              |
| 465       | 19092            | 20.1             | 595       | 91428            | 7.3              | 725       | 6067             | 0.0              | 855       | 106              | 0.0              | 985       | 13               | 0.0              |
| 470       | 14951            | 17.2             | 600       | 93452            | 5.3              | 730       | 5164             | 0.0              | 860       | 95               | 0.0              | 990       | 16               | 0.0              |
| 475       | 12606            | 15.7             | 605       | 93959            | 3.7              | 735       | 4393             | 0.0              | 865       | 82               | 0.0              | 995       | 20               | 0.0              |
| 480       | 13323            | 18.0             | 610       | 93079            | 2.5              | 740       | 3694             | 0.0              | 870       | 77               | 0.0              | 1000      | 0                | 0.0              |
| 485       | 15164            | 21.9             | 615       | 90707            | 1.7              | 745       | 3157             | 0.0              | 875       | 65               | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2407-157-9

TM-30-18

### Summary

$R_f = 84.7$   
 $R_g = 94.6$   
 $CIE\ R_a = 80.9$   
 $R_g = -1.5$



### Color Vector Graphics



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 84 | CES51 = 95 | CES76 = 81 |
| CES02 = 63 | CES27 = 95 | CES52 = 94 | CES77 = 84 |
| CES03 = 31 | CES28 = 94 | CES53 = 89 | CES78 = 81 |
| CES04 = 71 | CES29 = 87 | CES54 = 91 | CES79 = 89 |
| CES05 = 50 | CES30 = 94 | CES55 = 90 | CES80 = 89 |
| CES06 = 52 | CES31 = 89 | CES56 = 86 | CES81 = 69 |
| CES07 = 43 | CES32 = 82 | CES57 = 85 | CES82 = 96 |
| CES08 = 41 | CES33 = 91 | CES58 = 86 | CES83 = 93 |
| CES09 = 29 | CES34 = 92 | CES59 = 91 | CES84 = 92 |
| CES10 = 77 | CES35 = 96 | CES60 = 94 | CES85 = 76 |
| CES11 = 60 | CES36 = 90 | CES61 = 89 | CES86 = 65 |
| CES12 = 66 | CES37 = 96 | CES62 = 94 | CES87 = 84 |
| CES13 = 44 | CES38 = 98 | CES63 = 87 | CES88 = 86 |
| CES14 = 74 | CES39 = 98 | CES64 = 82 | CES89 = 73 |
| CES15 = 72 | CES40 = 95 | CES65 = 78 | CES90 = 88 |
| CES16 = 48 | CES41 = 96 | CES66 = 81 | CES91 = 82 |
| CES17 = 50 | CES42 = 97 | CES67 = 80 | CES92 = 64 |
| CES18 = 57 | CES43 = 91 | CES68 = 83 | CES93 = 78 |
| CES19 = 73 | CES44 = 99 | CES69 = 88 | CES94 = 59 |
| CES20 = 67 | CES45 = 93 | CES70 = 80 | CES95 = 74 |
| CES21 = 87 | CES46 = 89 | CES71 = 79 | CES96 = 83 |
| CES22 = 79 | CES47 = 92 | CES72 = 92 | CES97 = 88 |
| CES23 = 92 | CES48 = 83 | CES73 = 75 | CES98 = 83 |
| CES24 = 91 | CES49 = 90 | CES74 = 91 | CES99 = 74 |
| CES25 = 72 | CES50 = 94 | CES75 = 81 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)