

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: P359777

Luminaire Tested: NVN-SA1C-740-U-T3R-HSS

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-2019  
Report Number: P359777  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-11)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: STREETWORKS  
Catalog Number: NVN-SA1C-740-U-T3R-HSS  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(1) 70 CRI, 4000K, 1050mA LIGHTSQUARE WITH 16 LEDS AND TYPE III ROADWAY  
OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 5554 lumens  
Efficiency: N/A  
Efficacy: 94.1 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 0.5' x H: 0')  
IES Classification: Type III - Medium  
BUG Rating: B1 - U0 - G2

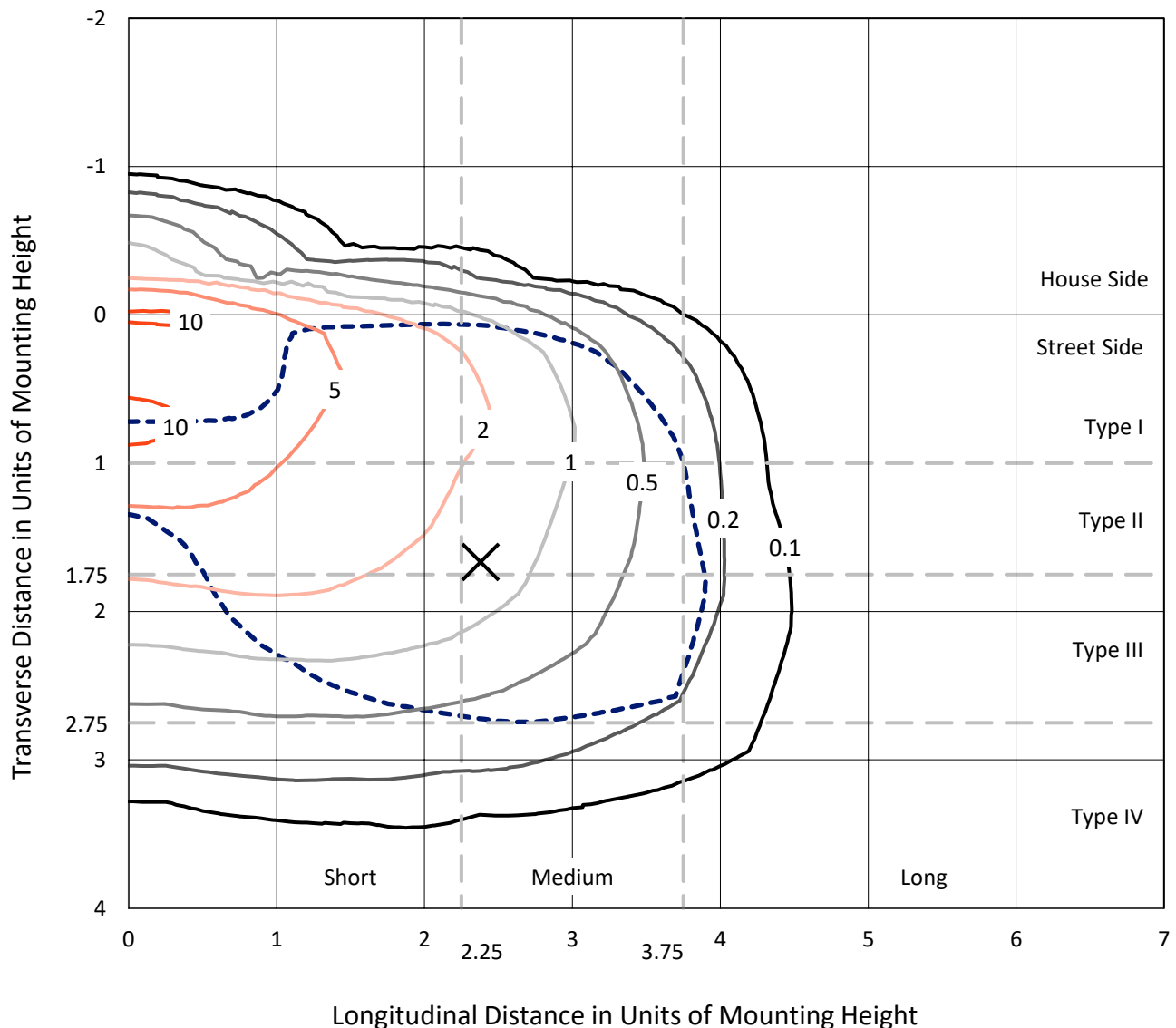
Input Watts (W): 59  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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## Iso-Footcandle Lines of Horizontal Illumination

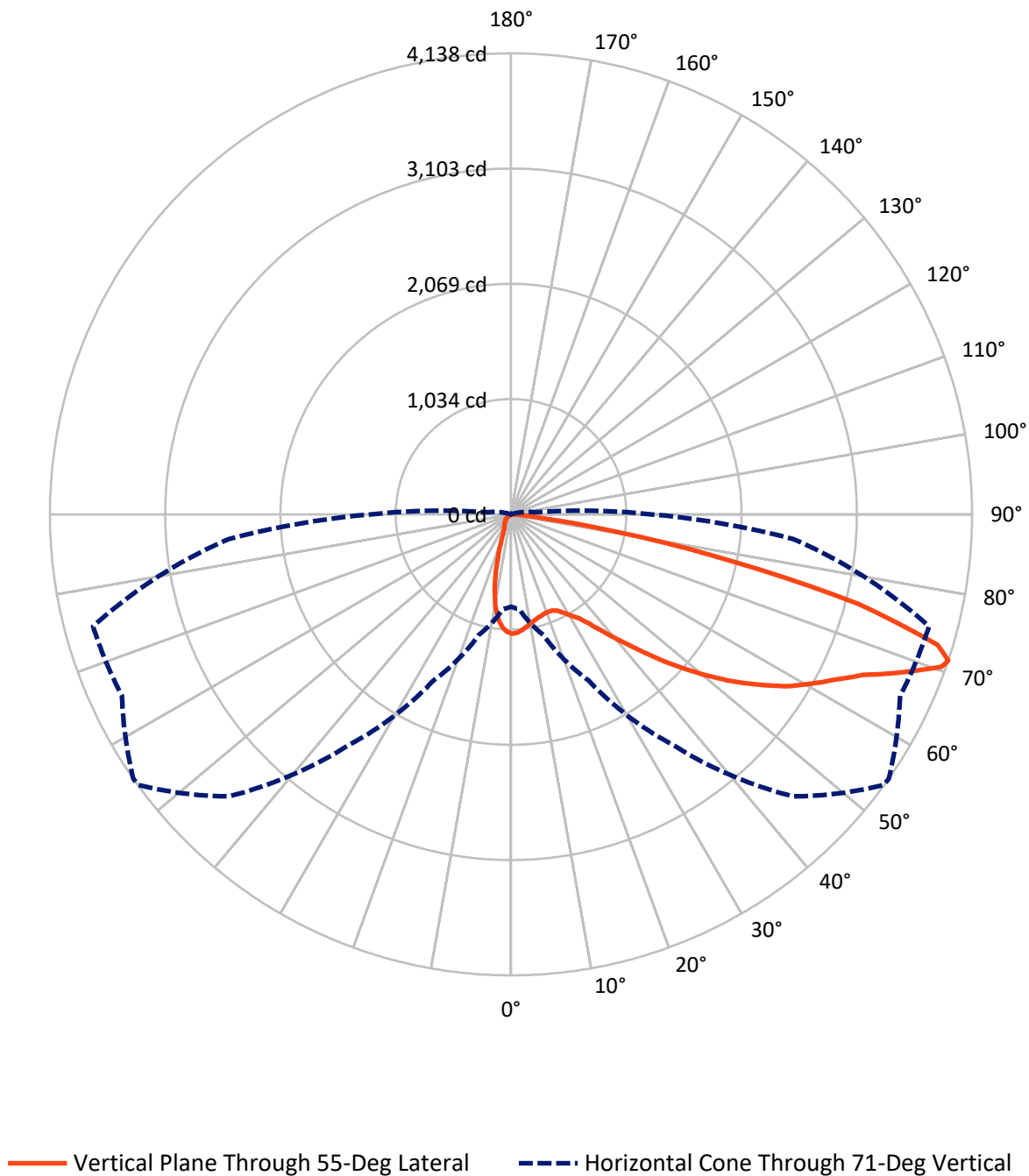
× Max cd  
 - - - 1/2 Max cd



Based on 10 foot mounting height. Maximum calculated value = 11 fc  
 Type III - Medium - N/A

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## Luminous Intensity Polar Plot



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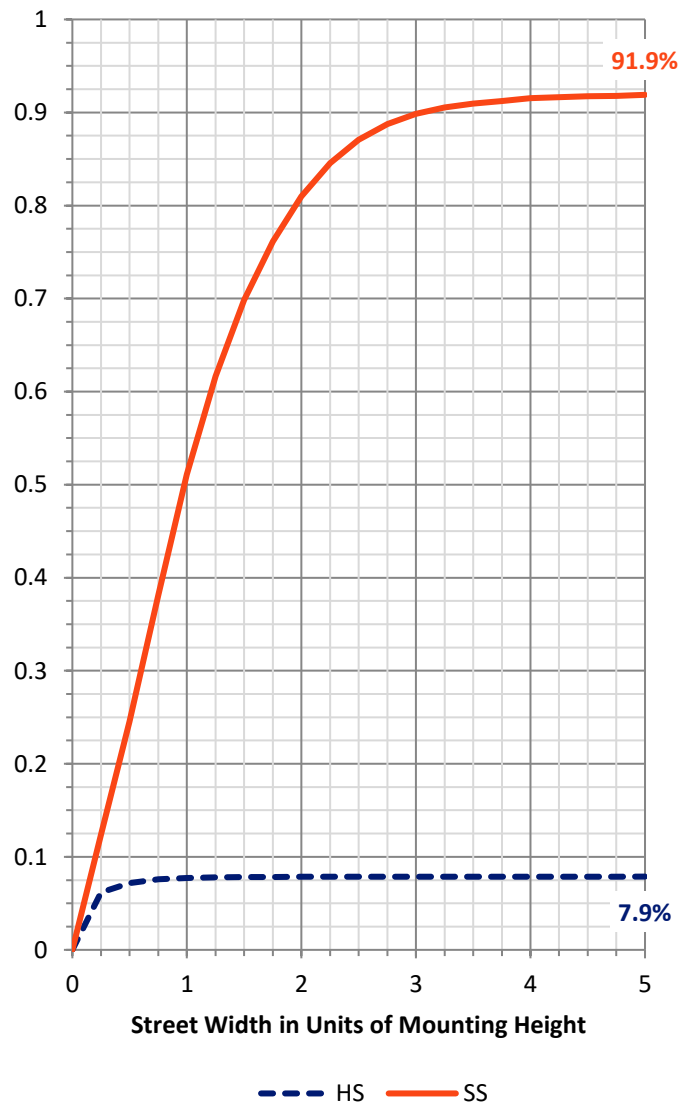
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 439.7    | 0.0    | 439.7  |
|                    | % Fixture | 7.9      | 0.0    | 7.9    |
| <b>Street Side</b> | Lumens    | 5114.3   | 0.0    | 5114.3 |
|                    | % Fixture | 92.1     | 0.0    | 92.1   |
| <b>Total</b>       | Lumens    | 5554.0   | 0.0    | 5554.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 91.3   | 1.6       |
| 10°-20°   | 206.2  | 3.7       |
| 20°-30°   | 331.3  | 6.0       |
| 30°-40°   | 563.0  | 10.1      |
| 40°-50°   | 873.8  | 15.7      |
| 50°-60°   | 1174.8 | 21.2      |
| 60°-70°   | 1437.1 | 25.9      |
| 70°-80°   | 840.2  | 15.1      |
| 80°-90°   | 36.3   | 0.7       |
| 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°    | 5554.0 | 100.0     |
| 0°-180°   | 5554.0 | 100.0     |

**Coefficient of Utilization**



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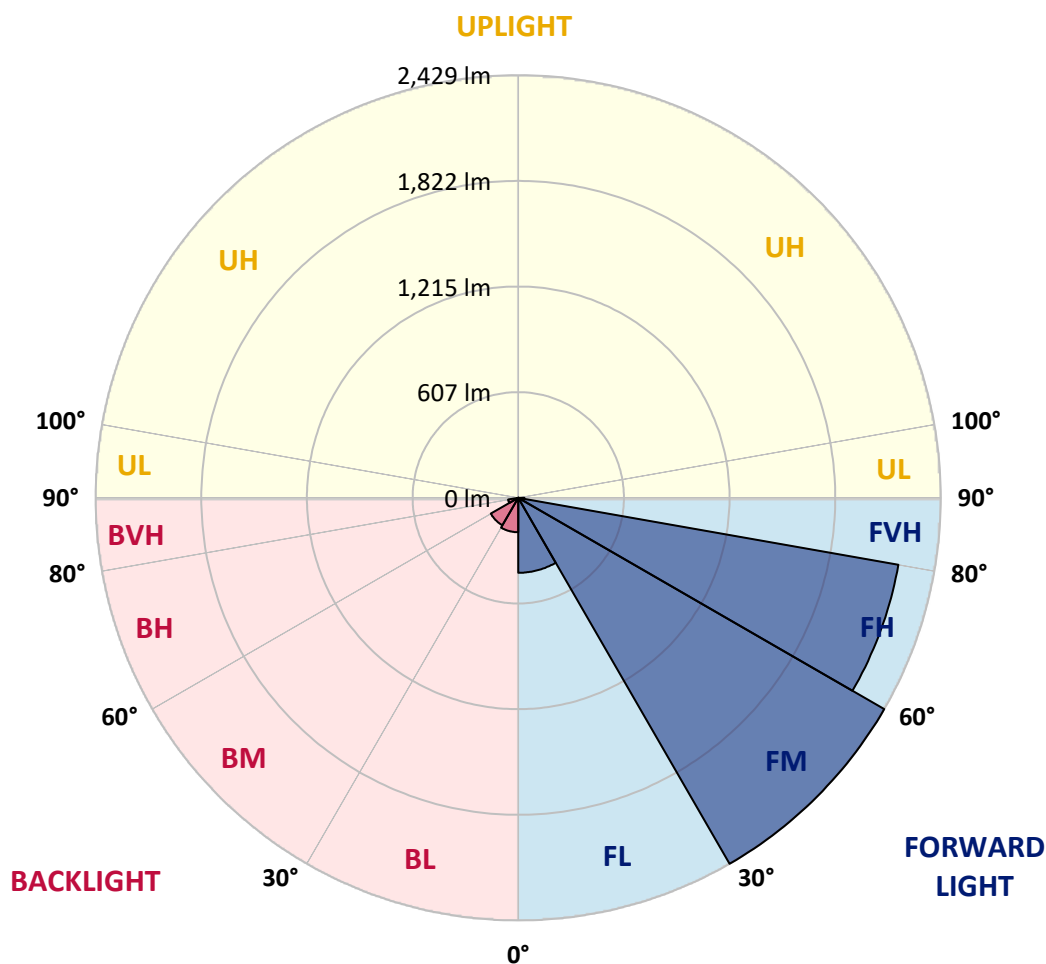
CATALOG NUMBER: NVN-SA1C-740-U-T3R-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 430.9  | 7.8       |                         |      |         |
| FM   | (30°-60°)   | 2429.2 | 43.7      |                         |      |         |
| FH   | (60°-80°)   | 2218.5 | 39.9      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 35.7   | 0.6       |                         |      | G1/100  |
| BL   | (0°-30°)    | 197.9  | 3.6       | B1/500                  |      |         |
| BM   | (30°-60°)   | 182.3  | 3.3       | B0/220                  |      |         |
| BH   | (60°-80°)   | 58.9   | 1.1       | B0/110                  |      | G0/110  |
| BVH  | (80°-90°)   | 0.6    | 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 III Medium





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 54°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1071.1 | 1071.1 | 1071.1 | 1071.1 | 1071.1 | 1071.1 | 1071.1 | 1071.1 | 1071.1 | 1071.1 | 1071.1 |
| 2.5°  | 1039.7 | 1040.9 | 1045.4 | 1047.4 | 1052.2 | 1060.1 | 1064.1 | 1064.4 | 1070.9 | 1073.4 | 1075.3 |
| 5°    | 966.1  | 973.6  | 981.1  | 989.1  | 1003.5 | 1022.7 | 1041.7 | 1043.4 | 1064.4 | 1079.8 | 1088.1 |
| 7.5°  | 902.8  | 909.5  | 918.5  | 931.2  | 951.7  | 981.8  | 1013.5 | 1017.2 | 1056.9 | 1092.1 | 1110.5 |
| 10°   | 837.7  | 843.2  | 856.1  | 874.8  | 903.0  | 943.4  | 986.1  | 992.3  | 1050.2 | 1108.5 | 1140.9 |
| 12.5° | 768.1  | 771.3  | 787.1  | 814.0  | 855.4  | 906.8  | 962.9  | 971.1  | 1045.9 | 1127.5 | 1176.8 |
| 15°   | 715.2  | 716.7  | 731.7  | 759.6  | 807.0  | 873.8  | 944.9  | 954.9  | 1046.9 | 1150.2 | 1216.0 |
| 17.5° | 701.8  | 702.5  | 710.5  | 729.7  | 771.6  | 844.4  | 930.7  | 942.9  | 1049.9 | 1172.4 | 1255.4 |
| 20°   | 756.4  | 751.1  | 742.9  | 739.9  | 757.9  | 826.7  | 922.2  | 935.9  | 1053.9 | 1192.1 | 1290.8 |
| 22.5° | 906.3  | 890.8  | 856.6  | 811.0  | 783.3  | 828.0  | 924.5  | 938.2  | 1066.6 | 1216.3 | 1331.7 |
| 25°   | 1128.7 | 1107.3 | 1049.2 | 959.4  | 873.1  | 863.9  | 943.2  | 957.1  | 1091.3 | 1245.2 | 1370.9 |
| 27.5° | 1381.8 | 1360.6 | 1289.6 | 1161.4 | 1014.2 | 934.9  | 986.1  | 999.0  | 1128.0 | 1270.9 | 1400.8 |
| 30°   | 1624.2 | 1618.3 | 1534.5 | 1388.8 | 1191.8 | 1050.2 | 1041.4 | 1052.4 | 1155.2 | 1286.3 | 1424.5 |
| 32.5° | 1829.7 | 1820.3 | 1752.9 | 1611.3 | 1395.1 | 1188.6 | 1106.5 | 1109.8 | 1175.6 | 1306.3 | 1455.4 |
| 35°   | 2020.3 | 2008.5 | 1949.4 | 1815.5 | 1603.5 | 1357.7 | 1206.8 | 1202.0 | 1220.2 | 1346.4 | 1500.3 |
| 37.5° | 2186.6 | 2197.3 | 2131.7 | 2004.3 | 1790.6 | 1533.5 | 1341.9 | 1327.7 | 1290.1 | 1411.8 | 1565.4 |
| 40°   | 2325.8 | 2325.8 | 2291.6 | 2185.4 | 1992.6 | 1715.3 | 1494.8 | 1476.1 | 1395.1 | 1512.5 | 1647.9 |
| 42.5° | 2375.9 | 2386.6 | 2399.3 | 2339.2 | 2173.4 | 1904.3 | 1665.1 | 1645.7 | 1542.9 | 1655.4 | 1752.2 |
| 45°   | 2378.9 | 2395.8 | 2460.9 | 2460.7 | 2336.7 | 2092.1 | 1857.2 | 1847.9 | 1732.5 | 1839.0 | 1881.4 |
| 47.5° | 2336.7 | 2357.9 | 2465.2 | 2526.0 | 2466.2 | 2266.9 | 2067.2 | 2055.7 | 1955.2 | 2063.9 | 2016.5 |
| 50°   | 2271.6 | 2295.1 | 2419.8 | 2551.7 | 2554.2 | 2419.0 | 2288.4 | 2271.1 | 2200.3 | 2321.0 | 2156.2 |
| 52.5° | 2155.2 | 2200.6 | 2379.1 | 2557.7 | 2612.1 | 2550.5 | 2498.8 | 2491.4 | 2474.6 | 2568.7 | 2267.4 |
| 55°   | 1906.1 | 1956.4 | 2277.1 | 2559.7 | 2665.7 | 2666.9 | 2696.1 | 2698.1 | 2731.8 | 2800.1 | 2350.2 |
| 57.5° | 1788.3 | 1816.8 | 2099.1 | 2569.2 | 2745.2 | 2799.1 | 2897.1 | 2912.6 | 2964.7 | 3019.8 | 2444.7 |
| 60°   | 1714.3 | 1747.9 | 2011.3 | 2556.2 | 2870.2 | 2972.4 | 3083.4 | 3088.6 | 3144.5 | 3246.5 | 2572.7 |
| 62.5° | 1655.2 | 1688.3 | 1955.9 | 2506.3 | 3010.6 | 3180.9 | 3265.4 | 3265.9 | 3307.8 | 3516.6 | 2718.0 |
| 65°   | 1509.3 | 1537.2 | 1844.0 | 2450.2 | 3103.3 | 3387.1 | 3476.9 | 3473.7 | 3507.9 | 3801.4 | 2886.9 |
| 67.5° | 1298.3 | 1319.7 | 1615.3 | 2237.5 | 3068.4 | 3574.7 | 3796.1 | 3785.4 | 3744.0 | 4047.5 | 2953.2 |
| 70°   | 1003.8 | 1011.5 | 1273.1 | 1864.7 | 2741.2 | 3646.8 | 4104.6 | 4099.1 | 3888.9 | 4003.4 | 2710.1 |
| 71°   | 829.7  | 855.1  | 1122.0 | 1645.7 | 2522.0 | 3580.2 | 4134.6 | 4137.8 | 3852.5 | 3883.2 | 2542.7 |
| 72.5° | 481.8  | 503.5  | 813.2  | 1263.9 | 2141.2 | 3302.4 | 3979.4 | 4002.9 | 3682.4 | 3532.0 | 2171.9 |
| 75°   | 103.2  | 110.5  | 301.5  | 611.7  | 1177.8 | 2314.5 | 3141.0 | 3224.5 | 3001.3 | 2402.8 | 1309.0 |
| 77.5° | 71.8   | 77.6   | 129.2  | 277.6  | 389.3  | 1143.7 | 1951.2 | 2045.5 | 1793.1 | 903.0  | 419.0  |
| 80°   | 56.9   | 63.3   | 100.8  | 137.2  | 105.2  | 368.8  | 914.0  | 971.6  | 598.0  | 201.5  | 70.6   |
| 82.5° | 31.7   | 37.7   | 78.6   | 74.1   | 40.4   | 70.1   | 255.9  | 289.3  | 119.7  | 40.6   | 16.7   |
| 85°   | 9.2    | 11.2   | 50.6   | 53.9   | 17.2   | 13.5   | 43.6   | 54.1   | 22.7   | 10.7   | 7.5    |
| 87.5° | 0.0    | 0.0    | 24.4   | 20.7   | 5.0    | 2.0    | 4.0    | 4.5    | 4.5    | 4.5    | 5.0    |
| 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-SA1C-740-U-T3R-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1071.1 | 1071.1 | 1071.1 | 1071.1 | 1071.1 | 1071.1 | 1071.1 | 1071.1 | 1071.1 | 1071.1 | 1071.1 |
| 2.5°  | 1075.3 | 1077.1 | 1070.9 | 1062.6 | 1053.9 | 1043.2 | 1032.0 | 1023.2 | 1023.0 | 1018.7 | 1014.5 |
| 5°    | 1088.6 | 1087.6 | 1070.4 | 1044.2 | 1013.3 | 981.1  | 950.4  | 915.7  | 904.3  | 890.1  | 885.3  |
| 7.5°  | 1113.0 | 1106.0 | 1069.6 | 1012.3 | 944.4  | 877.1  | 807.5  | 737.4  | 707.5  | 680.6  | 675.8  |
| 10°   | 1143.7 | 1130.5 | 1064.9 | 964.4  | 839.9  | 715.7  | 610.7  | 515.5  | 473.6  | 441.4  | 439.9  |
| 12.5° | 1175.6 | 1155.4 | 1051.7 | 892.1  | 703.0  | 528.4  | 407.5  | 313.7  | 278.8  | 256.4  | 258.4  |
| 15°   | 1209.0 | 1178.8 | 1023.2 | 794.5  | 547.2  | 358.6  | 250.4  | 195.3  | 181.3  | 175.6  | 177.1  |
| 17.5° | 1243.2 | 1195.1 | 983.6  | 677.1  | 393.3  | 231.4  | 173.3  | 157.9  | 157.9  | 159.1  | 159.6  |
| 20°   | 1272.9 | 1203.8 | 925.2  | 545.4  | 266.6  | 168.6  | 151.6  | 149.4  | 150.6  | 152.6  | 152.9  |
| 22.5° | 1302.3 | 1204.3 | 849.2  | 412.0  | 186.5  | 147.6  | 144.4  | 143.4  | 144.1  | 146.4  | 146.6  |
| 25°   | 1326.2 | 1198.3 | 753.9  | 293.0  | 148.9  | 139.2  | 137.7  | 137.2  | 137.7  | 140.4  | 140.4  |
| 27.5° | 1336.0 | 1176.6 | 637.7  | 206.0  | 133.4  | 129.7  | 129.2  | 129.7  | 130.4  | 132.4  | 132.7  |
| 30°   | 1337.0 | 1138.7 | 511.0  | 149.1  | 121.0  | 117.0  | 118.0  | 119.7  | 119.0  | 118.5  | 119.0  |
| 32.5° | 1339.4 | 1094.8 | 387.5  | 122.7  | 110.5  | 104.2  | 103.0  | 103.0  | 100.0  | 98.3   | 97.3   |
| 35°   | 1347.7 | 1043.2 | 281.1  | 110.2  | 99.8   | 92.5   | 87.8   | 82.3   | 76.6   | 73.6   | 72.8   |
| 37.5° | 1360.6 | 989.1  | 201.3  | 102.0  | 90.3   | 82.0   | 73.1   | 63.3   | 55.1   | 52.9   | 52.9   |
| 40°   | 1384.3 | 933.2  | 148.9  | 95.5   | 82.8   | 72.6   | 59.1   | 46.4   | 38.9   | 37.7   | 37.7   |
| 42.5° | 1421.7 | 874.3  | 118.7  | 89.8   | 76.3   | 62.8   | 45.1   | 33.7   | 28.2   | 27.4   | 27.2   |
| 45°   | 1460.6 | 809.5  | 103.7  | 84.3   | 69.3   | 51.6   | 33.4   | 24.9   | 21.7   | 20.9   | 20.9   |
| 47.5° | 1499.6 | 740.4  | 96.5   | 79.1   | 62.6   | 40.2   | 24.9   | 19.7   | 18.2   | 18.2   | 18.5   |
| 50°   | 1532.5 | 668.4  | 91.3   | 73.3   | 53.9   | 30.4   | 19.7   | 16.7   | 16.2   | 17.2   | 17.5   |
| 52.5° | 1540.7 | 597.5  | 84.8   | 66.1   | 43.1   | 23.2   | 16.2   | 14.7   | 14.7   | 14.7   | 14.7   |
| 55°   | 1535.7 | 542.7  | 76.3   | 57.1   | 31.9   | 18.5   | 14.0   | 13.0   | 12.7   | 12.7   | 12.7   |
| 57.5° | 1552.7 | 510.2  | 61.1   | 44.4   | 22.9   | 15.0   | 12.2   | 11.5   | 11.0   | 10.7   | 10.7   |
| 60°   | 1586.8 | 489.0  | 43.6   | 31.9   | 17.2   | 12.5   | 10.5   | 9.7    | 9.0    | 8.5    | 8.5    |
| 62.5° | 1632.2 | 470.6  | 32.4   | 23.7   | 13.2   | 10.0   | 8.7    | 8.0    | 7.0    | 6.5    | 6.5    |
| 65°   | 1667.1 | 437.7  | 24.7   | 17.7   | 10.0   | 8.0    | 6.7    | 6.5    | 5.0    | 4.5    | 4.2    |
| 67.5° | 1613.8 | 365.3  | 20.0   | 13.0   | 7.5    | 6.2    | 5.2    | 5.0    | 3.0    | 2.5    | 2.5    |
| 70°   | 1384.1 | 254.4  | 16.0   | 9.5    | 5.5    | 5.0    | 4.2    | 3.2    | 2.2    | 2.0    | 2.0    |
| 71°   | 1255.2 | 212.5  | 14.5   | 8.0    | 4.7    | 4.7    | 4.0    | 2.7    | 2.0    | 1.7    | 1.7    |
| 72.5° | 1042.7 | 150.9  | 12.2   | 6.2    | 4.2    | 5.0    | 4.2    | 2.5    | 2.0    | 1.7    | 1.5    |
| 75°   | 605.3  | 63.1   | 8.5    | 4.2    | 3.2    | 6.0    | 5.5    | 2.2    | 1.5    | 1.2    | 1.2    |
| 77.5° | 182.1  | 23.2   | 4.7    | 2.7    | 2.5    | 5.2    | 6.2    | 2.0    | 0.7    | 0.2    | 0.2    |
| 80°   | 33.2   | 10.0   | 3.0    | 1.7    | 1.7    | 3.2    | 4.7    | 1.0    | 0.0    | 0.0    | 0.0    |
| 82.5° | 11.7   | 5.0    | 1.7    | 1.0    | 0.7    | 1.5    | 2.2    | 0.0    | 0.0    | 0.0    | 0.0    |
| 85°   | 6.7    | 3.5    | 1.0    | 0.5    | 0.0    | 0.2    | 0.5    | 0.0    | 0.0    | 0.0    | 0.0    |
| 87.5° | 4.5    | 1.0    | 0.0    | 0.0    | 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    |

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              |           |                  |                  |

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### 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              |           |                  |                  |

### 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**


REPORT NUMBER: SP1-2101-121-2

**TM-30-18**

**Measure Comparisons**



(END OF REPORT)