

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



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

Test Report Prepared for  
Cooper Lighting Solutions

Brand: STREETWORKS

Report Number: P359255

Luminaire Tested: NVN-SA1D-740-U-T2

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-2019  
Report Number: P359255  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-12)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: STREETWORKS  
Catalog Number: NVN-SA1D-740-U-T2  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(1) 70 CRI, 4000K, 1200mA LIGHTSQUARE WITH 16 LEDS AND TYPE II OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 7796 lumens  
Efficiency: N/A  
Efficacy: 116.4 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

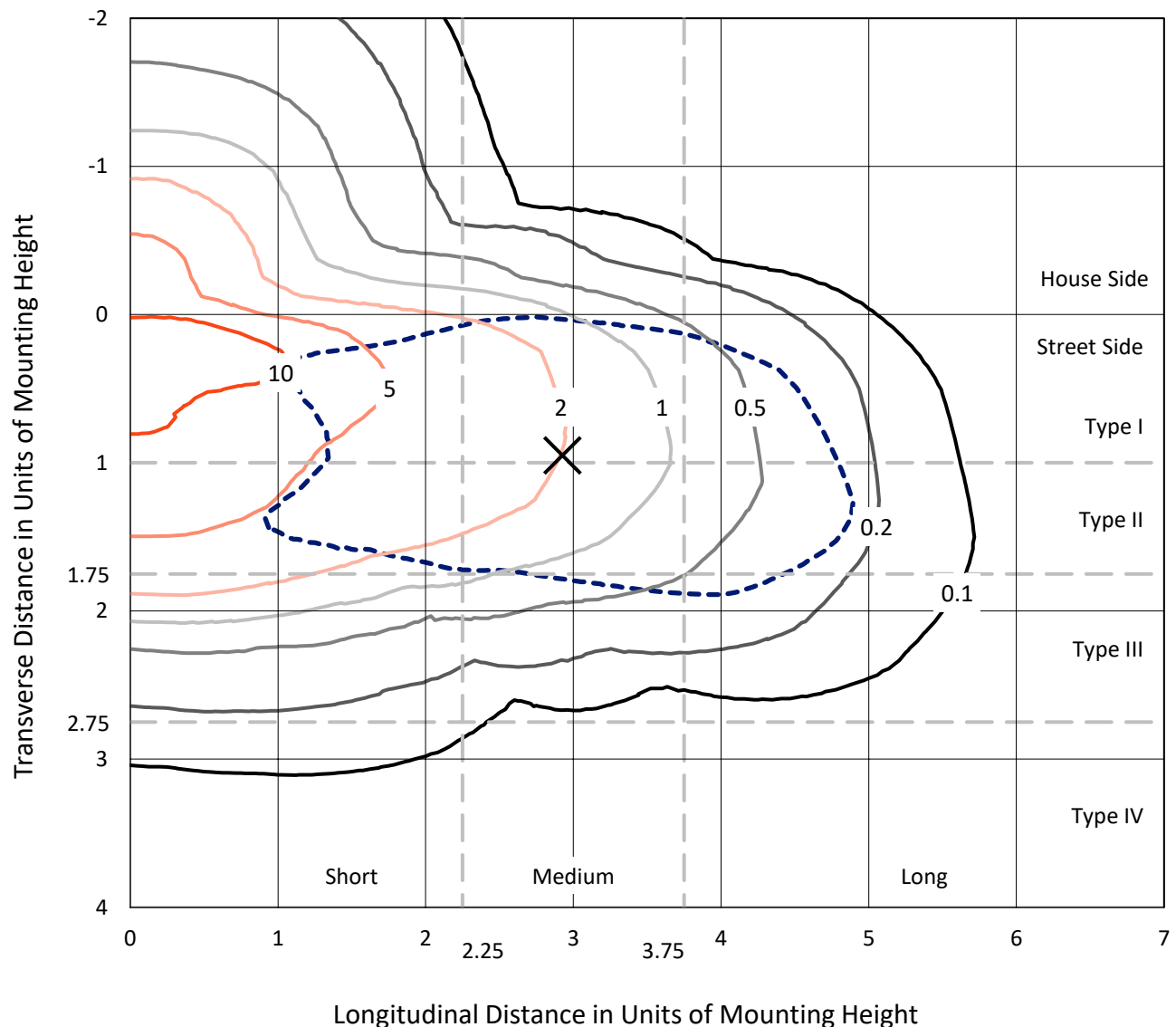
Input Watts (W): 67  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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## Iso-Footcandle Lines of Horizontal Illumination

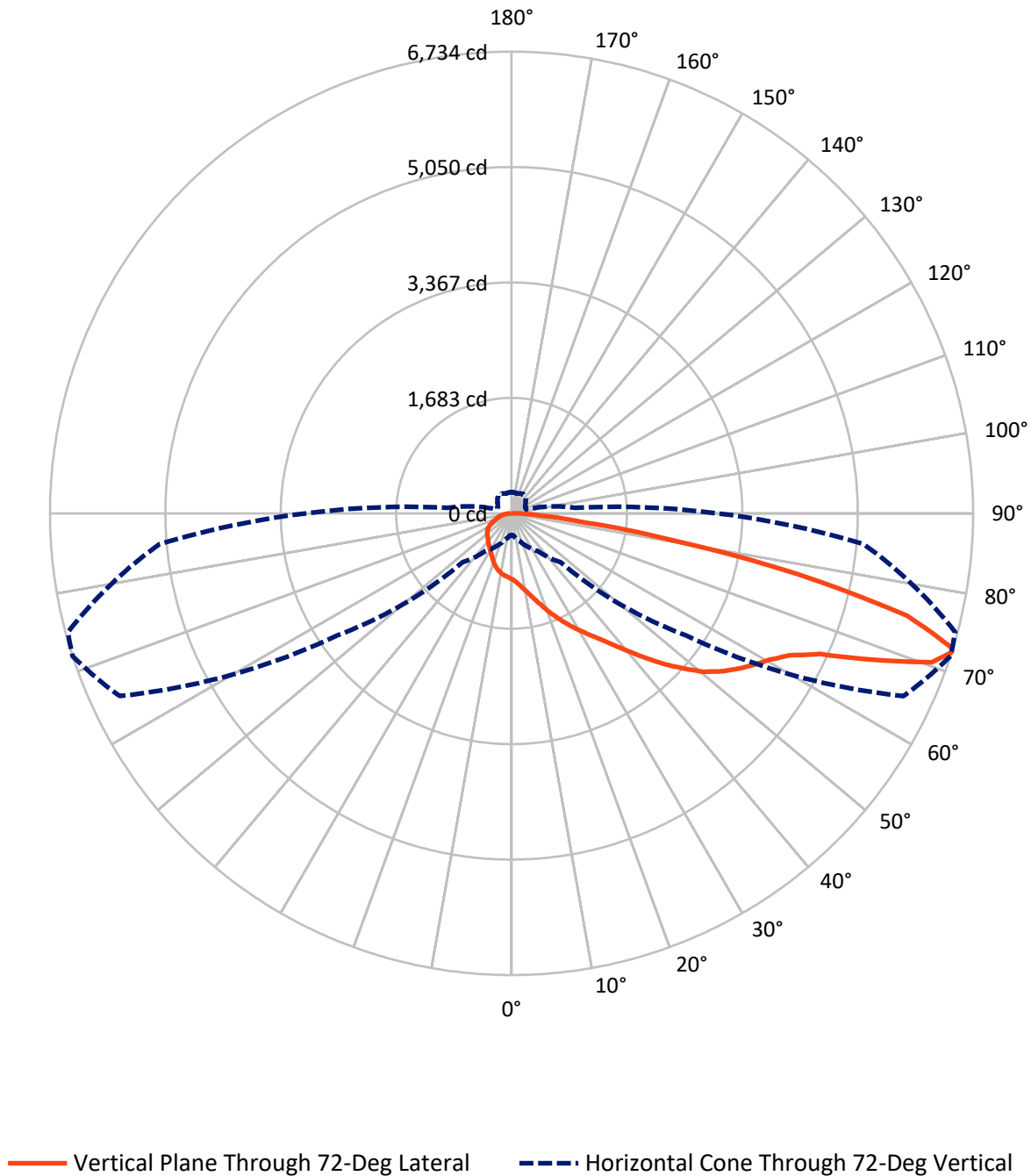
✕ Max cd  
 - - - 1/2 Max cd



Based on 10 foot mounting height. Maximum calculated value = 13.2 fc  
 Type III - Medium - N/A

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## Luminous Intensity Polar Plot



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CATALOG NUMBER: NVN-SA1D-740-U-T2

**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 1446.2   | 0.0    | 1446.2 |
|                    | % Fixture | 18.6     | 0.0    | 18.6   |
| <b>Street Side</b> | Lumens    | 6349.8   | 0.0    | 6349.8 |
|                    | % Fixture | 81.4     | 0.0    | 81.4   |
| <b>Total</b>       | Lumens    | 7796.0   | 0.0    | 7796.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 96.1   | 1.2       |
| 10°-20°   | 310.6  | 4.0       |
| 20°-30°   | 544.2  | 7.0       |
| 30°-40°   | 806.9  | 10.4      |
| 40°-50°   | 1180.1 | 15.1      |
| 50°-60°   | 1623.9 | 20.8      |
| 60°-70°   | 1807.9 | 23.2      |
| 70°-80°   | 1225.0 | 15.7      |
| 80°-90°   | 201.3  | 2.6       |
| 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°    | 7796.0 | 100.0     |
| 0°-180°   | 7796.0 | 100.0     |

**Coefficient of Utilization**



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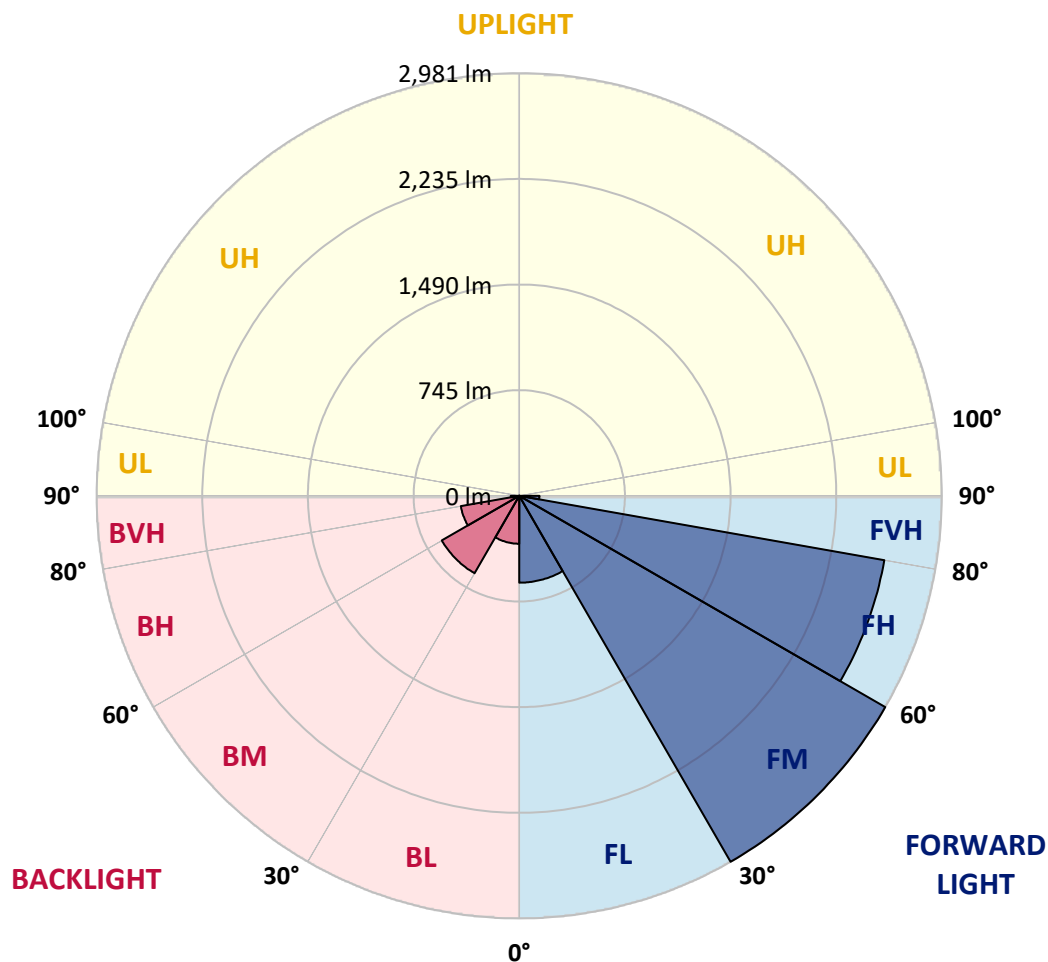
CATALOG NUMBER: NVN-SA1D-740-U-T2

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 612.8  | 7.9       |                         |      |         |
| FM   | (30°-60°)   | 2980.5 | 38.2      |                         |      |         |
| FH   | (60°-80°)   | 2614.5 | 33.5      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 142.0  | 1.8       |                         |      | G2/225  |
| BL   | (0°-30°)    | 338.1  | 4.3       | B1/500                  |      |         |
| BM   | (30°-60°)   | 630.4  | 8.1       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 418.4  | 5.4       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 59.3   | 0.8       |                         |      | G1/100  |
| 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°    | 55°    | 65°    | 72°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 959.1  | 959.1  | 959.1  | 959.1  | 959.1  | 959.1  | 959.1  | 959.1  | 959.1  | 959.1  | 959.1  |
| 2.5°  | 1059.5 | 1057.9 | 1052.3 | 1052.3 | 1041.5 | 1032.4 | 1015.2 | 1003.7 | 990.0  | 985.1  | 969.0  |
| 5°    | 1162.0 | 1162.6 | 1155.6 | 1150.8 | 1134.9 | 1115.6 | 1086.3 | 1059.8 | 1033.2 | 1022.5 | 989.4  |
| 7.5°  | 1248.2 | 1247.1 | 1245.3 | 1241.2 | 1226.5 | 1206.6 | 1167.1 | 1127.7 | 1088.5 | 1072.4 | 1015.5 |
| 10°   | 1303.5 | 1305.9 | 1307.5 | 1309.4 | 1303.2 | 1289.0 | 1251.7 | 1203.7 | 1152.4 | 1130.4 | 1046.6 |
| 12.5° | 1331.4 | 1335.7 | 1343.2 | 1356.1 | 1366.3 | 1364.7 | 1337.6 | 1286.6 | 1225.7 | 1198.0 | 1085.5 |
| 15°   | 1347.8 | 1353.4 | 1365.3 | 1388.3 | 1417.1 | 1433.4 | 1426.2 | 1380.0 | 1312.1 | 1278.0 | 1133.1 |
| 17.5° | 1358.0 | 1362.6 | 1380.8 | 1411.7 | 1454.4 | 1497.9 | 1516.9 | 1478.3 | 1409.8 | 1370.9 | 1187.5 |
| 20°   | 1365.0 | 1368.5 | 1391.3 | 1427.5 | 1482.8 | 1552.1 | 1605.2 | 1595.6 | 1517.5 | 1467.0 | 1244.5 |
| 22.5° | 1380.6 | 1383.5 | 1405.2 | 1441.8 | 1503.0 | 1592.3 | 1690.3 | 1704.8 | 1631.0 | 1573.8 | 1305.4 |
| 25°   | 1424.0 | 1424.0 | 1442.3 | 1467.8 | 1525.2 | 1627.2 | 1762.3 | 1826.4 | 1747.0 | 1680.4 | 1361.8 |
| 27.5° | 1507.0 | 1506.2 | 1512.9 | 1521.7 | 1565.2 | 1662.7 | 1826.4 | 1933.8 | 1867.2 | 1794.5 | 1416.5 |
| 30°   | 1605.2 | 1610.6 | 1611.4 | 1607.1 | 1627.5 | 1707.0 | 1885.7 | 2047.1 | 1988.3 | 1909.9 | 1472.6 |
| 32.5° | 1731.7 | 1735.2 | 1731.1 | 1716.9 | 1713.9 | 1769.8 | 1944.0 | 2165.7 | 2119.3 | 2030.4 | 1523.9 |
| 35°   | 1892.2 | 1885.5 | 1872.9 | 1843.9 | 1816.2 | 1853.8 | 2010.6 | 2284.4 | 2266.4 | 2176.2 | 1594.5 |
| 37.5° | 2064.3 | 2064.5 | 2048.9 | 1983.2 | 1945.1 | 1961.2 | 2102.4 | 2418.9 | 2444.4 | 2349.6 | 1685.0 |
| 40°   | 2202.2 | 2209.5 | 2219.1 | 2132.7 | 2083.3 | 2105.6 | 2219.1 | 2574.8 | 2654.8 | 2555.2 | 1802.8 |
| 42.5° | 2298.6 | 2306.9 | 2334.3 | 2280.1 | 2228.8 | 2270.1 | 2356.6 | 2741.2 | 2891.0 | 2792.5 | 1940.8 |
| 45°   | 2400.6 | 2405.2 | 2424.5 | 2401.1 | 2368.4 | 2461.5 | 2511.5 | 2913.6 | 3140.9 | 3045.4 | 2095.1 |
| 47.5° | 2508.0 | 2512.8 | 2532.7 | 2517.1 | 2499.9 | 2640.3 | 2673.1 | 3076.0 | 3380.4 | 3323.2 | 2259.9 |
| 50°   | 2640.6 | 2643.8 | 2662.6 | 2634.4 | 2639.8 | 2775.1 | 2817.5 | 3225.0 | 3631.4 | 3572.8 | 2425.3 |
| 52.5° | 2821.5 | 2822.3 | 2848.3 | 2822.8 | 2797.6 | 2873.8 | 2941.8 | 3365.3 | 3828.1 | 3800.5 | 2590.6 |
| 55°   | 2963.2 | 2971.8 | 3057.2 | 3051.8 | 3037.3 | 2963.5 | 3045.6 | 3499.0 | 4003.7 | 4016.8 | 2766.2 |
| 57.5° | 2872.8 | 2906.3 | 3079.2 | 3201.1 | 3319.7 | 3186.6 | 3186.0 | 3649.6 | 4166.9 | 4229.2 | 2959.2 |
| 60°   | 2516.0 | 2561.7 | 2816.4 | 3086.7 | 3458.0 | 3574.7 | 3477.6 | 3833.5 | 4331.7 | 4439.6 | 3201.1 |
| 62.5° | 1796.9 | 1872.1 | 2217.3 | 2648.9 | 3268.4 | 3831.9 | 4070.8 | 4125.3 | 4555.8 | 4683.4 | 3515.4 |
| 65°   | 908.4  | 965.3  | 1254.7 | 1774.6 | 2611.3 | 3663.8 | 4715.6 | 4764.2 | 4945.3 | 5058.6 | 3999.4 |
| 67.5° | 551.9  | 573.4  | 714.6  | 987.0  | 1600.9 | 2854.0 | 4926.0 | 5829.0 | 5699.1 | 5759.2 | 4689.5 |
| 70°   | 406.7  | 422.5  | 510.6  | 655.5  | 920.7  | 1674.8 | 4280.2 | 6589.0 | 6503.6 | 6496.9 | 5199.5 |
| 72°   | 316.8  | 328.3  | 406.1  | 529.6  | 673.2  | 1004.7 | 3102.3 | 6308.4 | 6733.9 | 6700.1 | 5152.8 |
| 72.5° | 300.4  | 310.6  | 381.4  | 498.5  | 636.2  | 910.8  | 2789.3 | 6119.2 | 6717.3 | 6702.0 | 5092.4 |
| 75°   | 236.5  | 243.7  | 282.4  | 385.5  | 497.9  | 516.7  | 1528.5 | 4742.1 | 5958.9 | 6206.7 | 4580.3 |
| 77.5° | 195.7  | 196.8  | 217.2  | 280.5  | 388.2  | 365.3  | 750.8  | 3290.2 | 4267.0 | 4539.5 | 3244.6 |
| 80°   | 159.4  | 160.8  | 170.5  | 196.8  | 293.7  | 270.3  | 356.5  | 1891.9 | 2389.1 | 2392.0 | 1543.0 |
| 82.5° | 127.0  | 127.2  | 138.0  | 143.9  | 211.0  | 193.3  | 204.3  | 888.2  | 1043.9 | 1004.2 | 554.6  |
| 85°   | 89.4   | 87.5   | 134.8  | 118.1  | 138.0  | 124.0  | 112.7  | 351.6  | 431.6  | 412.9  | 173.7  |
| 87.5° | 29.8   | 30.9   | 59.9   | 76.5   | 80.5   | 70.3   | 50.2   | 134.8  | 162.9  | 161.6  | 55.0   |
| 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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**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 959.1  | 959.1  | 959.1 | 959.1 | 959.1 | 959.1 | 959.1 | 959.1 | 959.1 | 959.1 | 959.1 |
| 2.5°  | 963.9  | 955.4  | 942.7 | 928.8 | 917.8 | 906.5 | 898.2 | 893.9 | 889.1 | 885.0 | 889.9 |
| 5°    | 974.1  | 958.0  | 931.2 | 904.9 | 885.6 | 868.4 | 856.0 | 849.6 | 843.7 | 839.7 | 840.2 |
| 7.5°  | 990.8  | 964.7  | 919.7 | 881.3 | 854.4 | 835.9 | 823.3 | 819.0 | 815.2 | 814.2 | 815.5 |
| 10°   | 1008.5 | 970.1  | 904.4 | 853.3 | 822.7 | 807.4 | 801.8 | 804.8 | 807.4 | 809.9 | 812.5 |
| 12.5° | 1028.6 | 974.9  | 882.1 | 820.6 | 794.6 | 788.7 | 794.3 | 807.2 | 816.6 | 822.2 | 825.7 |
| 15°   | 1054.9 | 979.2  | 856.3 | 787.9 | 770.4 | 777.1 | 796.2 | 818.5 | 834.8 | 845.3 | 846.9 |
| 17.5° | 1079.1 | 979.0  | 823.3 | 754.8 | 750.8 | 770.4 | 799.1 | 830.5 | 852.5 | 867.3 | 870.3 |
| 20°   | 1104.1 | 971.7  | 784.9 | 722.6 | 730.9 | 763.2 | 800.5 | 838.3 | 864.9 | 882.1 | 886.1 |
| 22.5° | 1127.4 | 959.1  | 742.8 | 693.4 | 714.3 | 753.5 | 795.4 | 833.8 | 860.3 | 874.3 | 878.6 |
| 25°   | 1143.3 | 937.1  | 700.1 | 668.7 | 699.5 | 741.7 | 778.7 | 809.6 | 829.5 | 836.4 | 837.5 |
| 27.5° | 1151.3 | 908.4  | 659.8 | 647.2 | 684.2 | 722.4 | 747.9 | 763.2 | 768.8 | 768.3 | 767.2 |
| 30°   | 1152.4 | 870.5  | 625.2 | 629.7 | 666.5 | 693.9 | 706.0 | 703.0 | 695.8 | 683.4 | 684.5 |
| 32.5° | 1148.9 | 827.8  | 596.2 | 613.1 | 644.0 | 659.3 | 659.8 | 645.6 | 626.3 | 606.7 | 601.3 |
| 35°   | 1150.0 | 786.0  | 570.7 | 594.3 | 616.6 | 623.3 | 617.1 | 596.2 | 569.9 | 544.7 | 539.3 |
| 37.5° | 1161.8 | 749.5  | 548.7 | 572.6 | 586.3 | 587.9 | 579.0 | 557.0 | 537.7 | 513.0 | 510.8 |
| 40°   | 1190.0 | 723.4  | 527.7 | 548.1 | 555.9 | 556.7 | 544.1 | 528.5 | 530.2 | 517.0 | 516.7 |
| 42.5° | 1240.7 | 712.2  | 509.2 | 522.6 | 527.5 | 529.1 | 519.4 | 509.5 | 523.4 | 514.9 | 511.9 |
| 45°   | 1306.2 | 714.8  | 493.6 | 497.7 | 506.5 | 514.0 | 508.1 | 496.1 | 501.4 | 464.1 | 451.8 |
| 47.5° | 1381.9 | 732.0  | 481.3 | 476.2 | 491.5 | 505.7 | 496.6 | 478.3 | 459.3 | 422.2 | 415.3 |
| 50°   | 1470.5 | 758.6  | 470.0 | 455.0 | 475.1 | 494.5 | 485.3 | 459.3 | 430.6 | 412.6 | 410.2 |
| 52.5° | 1562.8 | 791.1  | 458.8 | 431.6 | 454.5 | 485.9 | 481.3 | 455.0 | 419.6 | 401.8 | 398.6 |
| 55°   | 1667.5 | 823.8  | 444.5 | 404.5 | 432.2 | 481.8 | 479.4 | 439.4 | 411.2 | 401.3 | 398.9 |
| 57.5° | 1797.7 | 861.1  | 425.7 | 376.3 | 411.2 | 467.3 | 459.8 | 430.0 | 402.6 | 395.1 | 394.3 |
| 60°   | 1967.3 | 916.2  | 398.6 | 346.3 | 385.7 | 445.1 | 443.5 | 416.3 | 389.0 | 383.6 | 382.5 |
| 62.5° | 2221.8 | 1007.2 | 361.3 | 316.2 | 357.3 | 407.2 | 422.0 | 397.8 | 374.5 | 374.2 | 374.7 |
| 65°   | 2616.4 | 1144.1 | 320.8 | 289.9 | 328.6 | 375.3 | 397.0 | 378.8 | 359.7 | 365.1 | 365.9 |
| 67.5° | 3073.8 | 1257.6 | 281.0 | 264.1 | 299.3 | 344.9 | 374.5 | 359.7 | 340.1 | 354.1 | 354.3 |
| 70°   | 3226.0 | 1156.1 | 246.2 | 238.6 | 269.0 | 315.7 | 350.0 | 338.8 | 318.9 | 332.9 | 331.5 |
| 72°   | 3002.2 | 933.3  | 223.6 | 219.3 | 246.2 | 291.5 | 328.3 | 319.2 | 299.6 | 309.0 | 305.5 |
| 72.5° | 2931.6 | 889.9  | 218.0 | 214.5 | 240.0 | 285.3 | 322.7 | 314.3 | 294.7 | 302.8 | 299.6 |
| 75°   | 2615.1 | 772.8  | 187.4 | 188.2 | 209.4 | 255.3 | 291.0 | 288.3 | 268.2 | 269.0 | 267.9 |
| 77.5° | 1896.7 | 566.7  | 157.8 | 163.2 | 178.2 | 224.4 | 259.0 | 257.4 | 235.4 | 231.4 | 230.6 |
| 80°   | 880.2  | 289.1  | 128.6 | 131.0 | 146.6 | 187.6 | 220.9 | 218.8 | 201.1 | 196.0 | 193.0 |
| 82.5° | 301.5  | 137.4  | 96.6  | 98.2  | 113.5 | 151.1 | 191.7 | 190.3 | 175.6 | 165.6 | 159.4 |
| 85°   | 107.6  | 68.5   | 67.6  | 66.0  | 81.1  | 118.9 | 167.0 | 159.7 | 138.0 | 117.6 | 117.0 |
| 87.5° | 34.9   | 29.3   | 34.9  | 34.6  | 47.2  | 80.5  | 121.3 | 103.3 | 100.1 | 83.2  | 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

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| 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

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### 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              |           |                  |                  |

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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)