

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



Scaled data based on original data using  
LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for  
Cooper Lighting Solutions  
(formerly Eaton)

Brand: STREETWORKS

Report Number: P800982

Luminaire Tested: **ARCH-M-PA2-80-827-24VDC-T3**

Issue Date: 5/19/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P800982  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1910-568-10)  
Test Lab: INNOVATION CENTER  
Issue Date: 5/19/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: STREETWORKS  
Catalog Number: ARCH-M-PA2-80-827-24VDC-T3  
Description: ARCHEON-M ROADWAY AND AREA LUMINAIRE  
(2) 80 CRI, 2700K, 535mA LIGHT ENGINES WITH 16 LEDS AND TYPE III OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

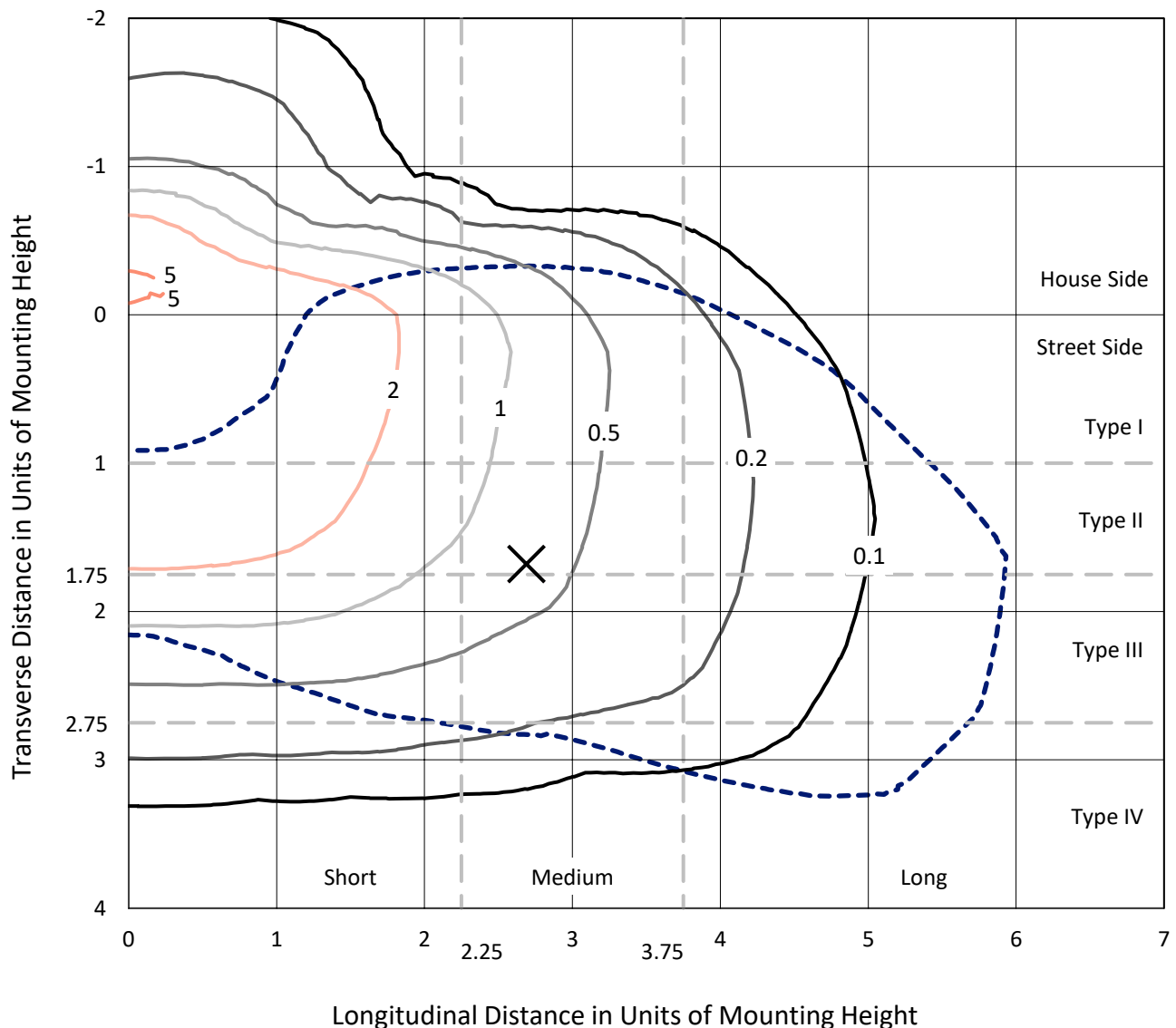
Lumens per Lamp: N/A  
Luminaire Lumens: 9715 lumens  
Efficiency: N/A  
Efficacy: 121.4 lumens/watt  
Luminous Opening: Rectangular (W 0.75' x L: 1' x H: 0')  
IES Classification: Type IV - Medium  
BUG Rating: B2 - U0 - G3

Input Watts (W): 80  
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: 25 FT

REPORT NUMBER: P800982  
 CATALOG NUMBER: ARCH-M-PA2-80-827-24VDC-T3

## Iso-Footcandle Lines of Horizontal Illumination

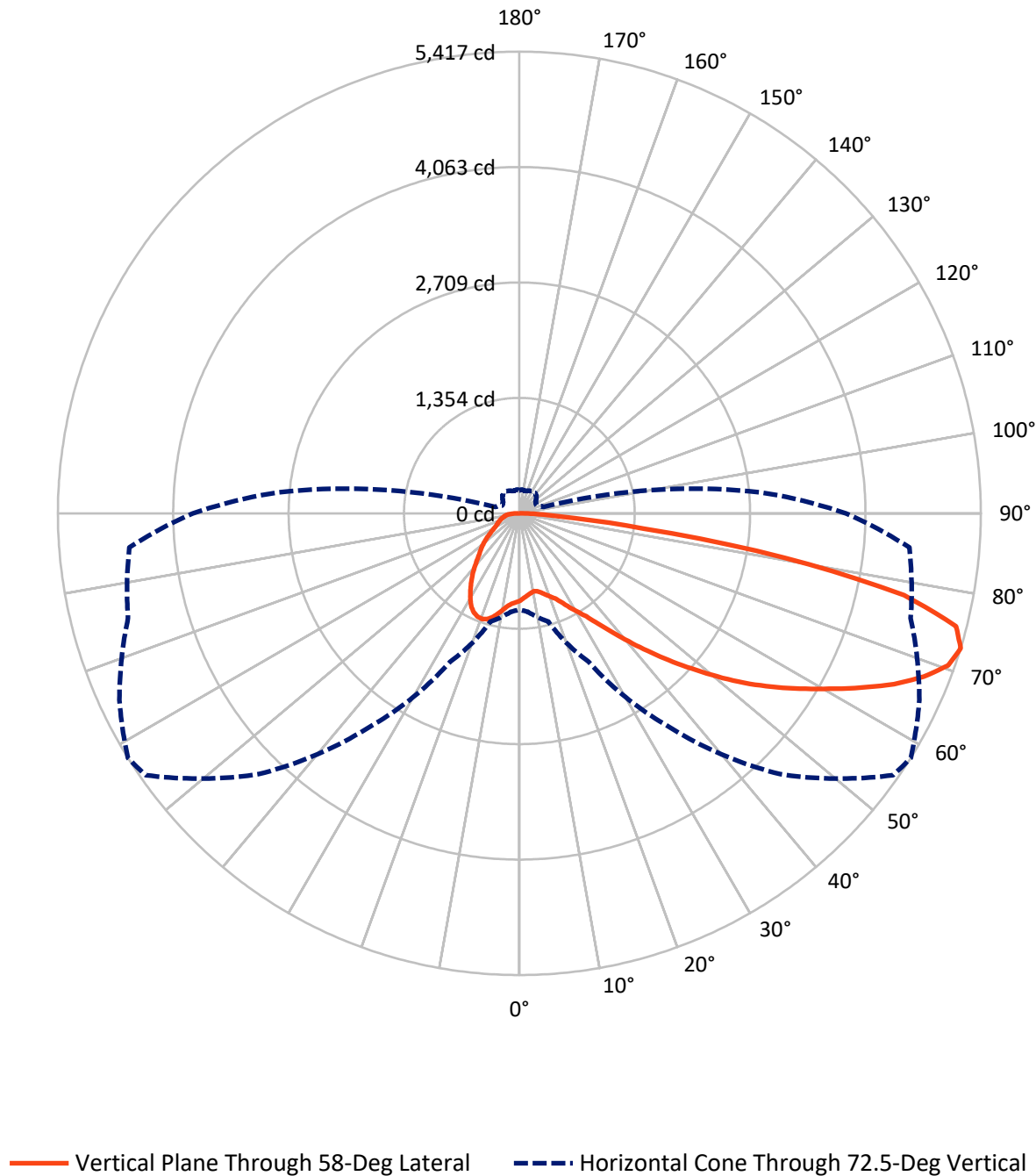
✕ Max cd  
 - - - 1/2 Max cd



Based on 15 foot mounting height. Maximum calculated value = 5.3 fc  
 Type IV - Medium - N/A

REPORT NUMBER: P800982  
CATALOG NUMBER: ARCH-M-PA2-80-827-24VDC-T3

## Luminous Intensity Polar Plot



REPORT NUMBER: P800982

CATALOG NUMBER: ARCH-M-PA2-80-827-24VDC-T3

**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 2203.3   | 0.0    | 2203.3 |
|                    | % Fixture | 22.7     | 0.0    | 22.7   |
| <b>Street Side</b> | Lumens    | 7511.7   | 0.0    | 7511.7 |
|                    | % Fixture | 77.3     | 0.0    | 77.3   |
| <b>Total</b>       | Lumens    | 9715.0   | 0.0    | 9715.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 98.7   | 1.0       |
| 10°-20°   | 313.5  | 3.2       |
| 20°-30°   | 561.6  | 5.8       |
| 30°-40°   | 844.7  | 8.7       |
| 40°-50°   | 1367.9 | 14.1      |
| 50°-60°   | 2059.2 | 21.2      |
| 60°-70°   | 2423.5 | 24.9      |
| 70°-80°   | 1718.4 | 17.7      |
| 80°-90°   | 327.4  | 3.4       |
| 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°    | 9715.0 | 100.0     |
| 0°-180°   | 9715.0 | 100.0     |

**Coefficient of Utilization**



REPORT NUMBER: P800982

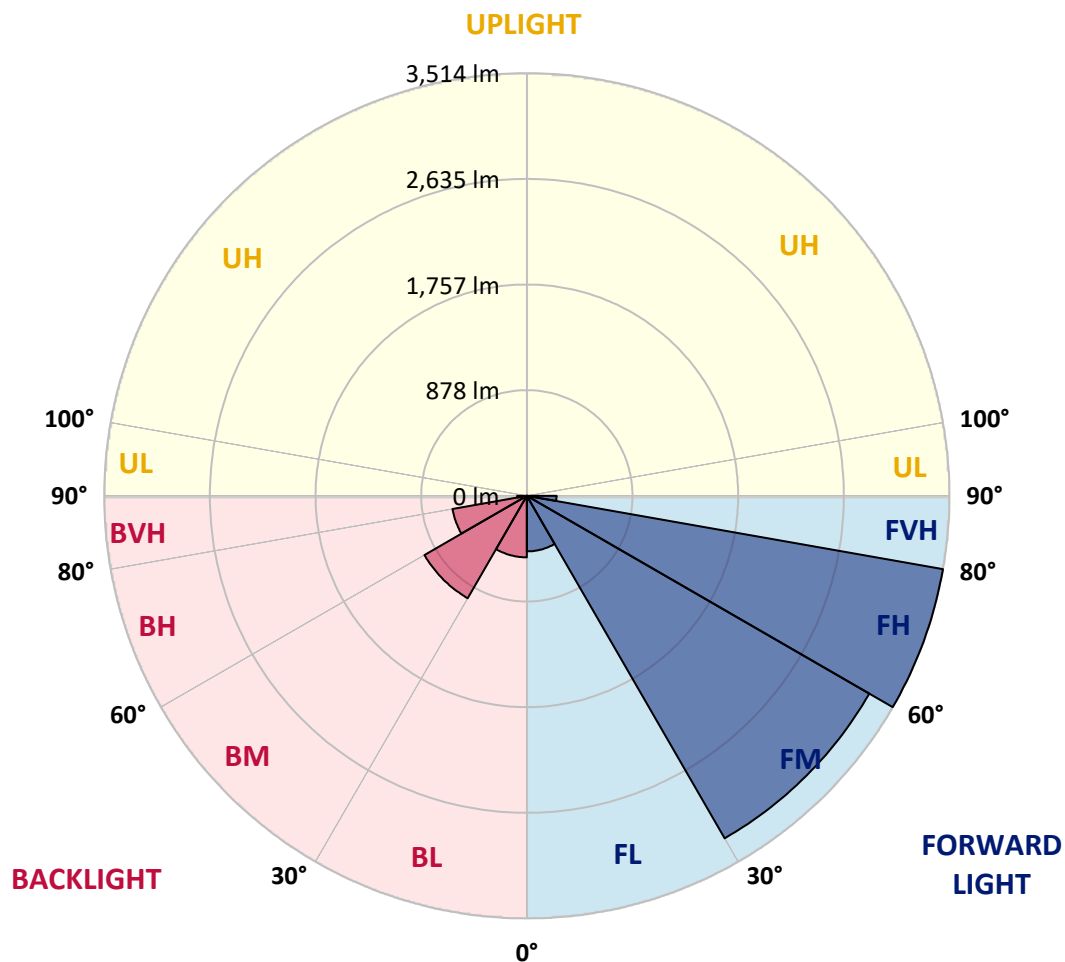
CATALOG NUMBER: ARCH-M-PA2-80-827-24VDC-T3

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 462.0  | 4.8       |                         |      |         |
| FM   | (30°-60°)   | 3288.8 | 33.9      |                         |      |         |
| FH   | (60°-80°)   | 3514.0 | 36.2      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 247.0  | 2.5       |                         |      | G3/500  |
| BL   | (0°-30°)    | 511.8  | 5.3       | B2/1000                 |      |         |
| BM   | (30°-60°)   | 983.1  | 10.1      | B1/1000                 |      |         |
| BH   | (60°-80°)   | 627.9  | 6.5       | B2/1000                 |      | G2/1000 |
| BVH  | (80°-90°)   | 80.5   | 0.8       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B2-U0-G3**

Type IV Medium



REPORT NUMBER: P800982

CATALOG NUMBER: ARCH-M-PA2-80-827-24VDC-T3

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 58°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1024.7 | 1024.7 | 1024.7 | 1024.7 | 1024.7 | 1024.7 | 1024.7 | 1024.7 | 1024.7 | 1024.7 | 1024.7 |
| 2.5°  | 986.3  | 981.1  | 982.4  | 982.4  | 987.5  | 990.1  | 991.4  | 995.2  | 997.8  | 1004.2 | 1013.2 |
| 5°    | 940.1  | 936.2  | 937.5  | 938.8  | 947.8  | 956.8  | 964.4  | 969.6  | 977.3  | 987.5  | 1000.4 |
| 7.5°  | 906.7  | 904.2  | 905.5  | 908.0  | 915.7  | 926.0  | 938.8  | 946.5  | 958.0  | 977.3  | 999.1  |
| 10°   | 882.4  | 882.4  | 883.6  | 888.8  | 896.5  | 909.3  | 919.6  | 928.5  | 951.6  | 986.3  | 1019.6 |
| 12.5° | 863.1  | 863.1  | 867.0  | 877.2  | 890.1  | 902.9  | 927.3  | 937.5  | 968.3  | 1015.7 | 1055.5 |
| 15°   | 861.8  | 863.1  | 864.4  | 873.4  | 887.5  | 915.7  | 951.6  | 967.0  | 1004.2 | 1060.6 | 1106.8 |
| 17.5° | 882.4  | 883.6  | 878.5  | 881.1  | 897.8  | 937.5  | 985.0  | 1002.9 | 1050.4 | 1111.9 | 1159.4 |
| 20°   | 945.2  | 945.2  | 929.8  | 915.7  | 927.3  | 970.9  | 1024.7 | 1042.7 | 1095.3 | 1163.2 | 1210.7 |
| 22.5° | 1073.5 | 1079.9 | 1044.0 | 1013.2 | 995.2  | 1019.6 | 1068.3 | 1087.6 | 1146.6 | 1219.7 | 1267.1 |
| 25°   | 1228.6 | 1235.1 | 1186.3 | 1142.7 | 1109.4 | 1105.5 | 1137.6 | 1158.1 | 1206.8 | 1282.5 | 1322.3 |
| 27.5° | 1378.7 | 1367.2 | 1322.3 | 1281.2 | 1238.9 | 1204.3 | 1228.6 | 1246.6 | 1303.0 | 1360.7 | 1385.1 |
| 30°   | 1496.7 | 1487.7 | 1444.1 | 1414.6 | 1374.9 | 1330.0 | 1315.9 | 1335.1 | 1381.3 | 1435.1 | 1448.0 |
| 32.5° | 1627.5 | 1621.1 | 1577.5 | 1539.0 | 1505.7 | 1463.3 | 1432.6 | 1441.5 | 1467.2 | 1505.7 | 1513.4 |
| 35°   | 1794.2 | 1808.3 | 1762.2 | 1683.9 | 1646.7 | 1605.7 | 1583.9 | 1586.5 | 1605.7 | 1630.1 | 1617.2 |
| 37.5° | 1969.9 | 1986.6 | 1989.2 | 1866.1 | 1816.0 | 1778.8 | 1755.8 | 1764.7 | 1787.8 | 1804.5 | 1764.7 |
| 40°   | 2295.7 | 2279.0 | 2212.3 | 2121.3 | 2044.3 | 2008.4 | 1976.3 | 1975.1 | 1991.7 | 2021.2 | 1949.4 |
| 42.5° | 2727.9 | 2712.5 | 2577.8 | 2459.9 | 2338.0 | 2297.0 | 2234.1 | 2207.2 | 2214.9 | 2252.1 | 2152.1 |
| 45°   | 3142.2 | 3135.7 | 3028.0 | 2890.8 | 2744.6 | 2665.1 | 2521.4 | 2456.0 | 2449.6 | 2479.1 | 2359.8 |
| 47.5° | 3510.2 | 3482.0 | 3403.8 | 3297.3 | 3281.9 | 3074.2 | 2810.0 | 2721.5 | 2690.7 | 2707.4 | 2574.0 |
| 50°   | 3904.0 | 3807.8 | 3700.0 | 3634.6 | 3746.2 | 3552.6 | 3101.1 | 3008.8 | 2933.1 | 2944.6 | 2806.1 |
| 52.5° | 4113.0 | 3951.4 | 3880.9 | 3900.1 | 4050.2 | 3975.8 | 3417.9 | 3305.0 | 3183.2 | 3199.9 | 3037.0 |
| 55°   | 3933.5 | 3932.2 | 3963.0 | 4082.2 | 4291.3 | 4205.4 | 3719.3 | 3592.3 | 3458.9 | 3462.8 | 3302.5 |
| 57.5° | 3687.2 | 3737.2 | 3896.3 | 4159.2 | 4590.1 | 4446.5 | 4015.5 | 3880.9 | 3759.0 | 3739.8 | 3603.9 |
| 60°   | 3462.8 | 3517.9 | 3748.8 | 4146.4 | 4694.0 | 4667.1 | 4297.7 | 4179.7 | 4080.9 | 4024.5 | 3920.6 |
| 62.5° | 3121.6 | 3162.7 | 3489.7 | 4064.3 | 4606.8 | 4826.1 | 4583.7 | 4502.9 | 4428.5 | 4311.8 | 4261.8 |
| 65°   | 2720.2 | 2734.3 | 3079.3 | 3793.7 | 4497.8 | 4887.6 | 4868.4 | 4832.5 | 4760.7 | 4588.8 | 4599.1 |
| 67.5° | 2285.4 | 2313.6 | 2616.3 | 3361.5 | 4259.2 | 4859.4 | 5089.0 | 5118.5 | 5033.9 | 4776.1 | 4814.5 |
| 70°   | 1822.4 | 1857.1 | 2086.6 | 2763.8 | 3853.9 | 4737.6 | 5292.9 | 5340.4 | 5177.5 | 4837.6 | 4854.3 |
| 72.5° | 1127.3 | 1160.7 | 1314.6 | 1919.9 | 3054.9 | 4328.5 | 5355.8 | 5417.3 | 5181.3 | 4755.5 | 4595.2 |
| 75°   | 389.9  | 393.7  | 514.3  | 920.8  | 1813.5 | 3267.8 | 5150.6 | 5295.5 | 5018.5 | 4456.7 | 3998.9 |
| 77.5° | 178.3  | 184.7  | 228.3  | 379.6  | 804.1  | 1763.5 | 4252.8 | 4615.8 | 4523.4 | 3989.9 | 3078.0 |
| 80°   | 123.1  | 125.7  | 157.7  | 227.0  | 464.3  | 620.7  | 2684.3 | 3157.5 | 3319.1 | 3089.6 | 1972.5 |
| 82.5° | 92.3   | 94.9   | 121.8  | 153.9  | 334.7  | 301.4  | 1022.2 | 1467.2 | 1823.7 | 1790.4 | 824.7  |
| 85°   | 88.5   | 87.2   | 94.9   | 102.6  | 223.2  | 179.6  | 330.9  | 454.0  | 711.8  | 609.2  | 207.8  |
| 87.5° | 38.5   | 42.3   | 97.5   | 57.7   | 116.7  | 83.4   | 143.6  | 168.0  | 216.7  | 188.5  | 74.4   |
| 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: P800982

CATALOG NUMBER: ARCH-M-PA2-80-827-24VDC-T3

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1024.7 | 1024.7 | 1024.7 | 1024.7 | 1024.7 | 1024.7 | 1024.7 | 1024.7 | 1024.7 | 1024.7 | 1024.7 |
| 2.5°  | 1017.0 | 1019.6 | 1027.3 | 1038.8 | 1045.2 | 1058.1 | 1067.0 | 1072.2 | 1076.0 | 1077.3 | 1077.3 |
| 5°    | 1008.1 | 1013.2 | 1029.9 | 1049.1 | 1067.0 | 1094.0 | 1118.3 | 1132.5 | 1142.7 | 1146.6 | 1147.8 |
| 7.5°  | 1010.6 | 1023.4 | 1047.8 | 1076.0 | 1099.1 | 1133.7 | 1163.2 | 1191.5 | 1214.5 | 1223.5 | 1223.5 |
| 10°   | 1035.0 | 1052.9 | 1086.3 | 1123.5 | 1153.0 | 1188.9 | 1219.7 | 1244.0 | 1271.0 | 1286.4 | 1288.9 |
| 12.5° | 1072.2 | 1094.0 | 1137.6 | 1178.6 | 1212.0 | 1240.2 | 1268.4 | 1286.4 | 1299.2 | 1310.7 | 1313.3 |
| 15°   | 1124.8 | 1151.7 | 1195.3 | 1237.6 | 1267.1 | 1285.1 | 1292.8 | 1292.8 | 1291.5 | 1292.8 | 1295.3 |
| 17.5° | 1177.3 | 1203.0 | 1246.6 | 1288.9 | 1303.0 | 1292.8 | 1283.8 | 1281.2 | 1279.9 | 1277.4 | 1278.7 |
| 20°   | 1228.6 | 1253.0 | 1290.2 | 1322.3 | 1310.7 | 1274.8 | 1263.3 | 1262.0 | 1258.1 | 1255.6 | 1253.0 |
| 22.5° | 1279.9 | 1297.9 | 1328.7 | 1340.2 | 1294.1 | 1242.8 | 1228.6 | 1221.0 | 1215.8 | 1209.4 | 1203.0 |
| 25°   | 1338.9 | 1344.1 | 1367.2 | 1349.2 | 1253.0 | 1183.8 | 1163.2 | 1151.7 | 1146.6 | 1140.2 | 1135.0 |
| 27.5° | 1394.1 | 1394.1 | 1397.9 | 1335.1 | 1192.7 | 1105.5 | 1074.7 | 1054.2 | 1052.9 | 1051.7 | 1050.4 |
| 30°   | 1444.1 | 1437.7 | 1424.9 | 1292.8 | 1114.5 | 1009.3 | 963.2  | 942.6  | 950.3  | 956.8  | 958.0  |
| 32.5° | 1503.1 | 1490.3 | 1454.4 | 1235.1 | 1020.9 | 901.6  | 845.2  | 836.2  | 845.2  | 852.9  | 847.7  |
| 35°   | 1595.4 | 1572.4 | 1485.1 | 1168.4 | 931.1  | 802.9  | 749.0  | 736.2  | 733.6  | 732.3  | 722.1  |
| 37.5° | 1727.5 | 1687.8 | 1509.5 | 1096.5 | 842.6  | 715.6  | 675.9  | 649.0  | 624.6  | 598.9  | 595.1  |
| 40°   | 1889.1 | 1821.2 | 1526.2 | 1014.5 | 749.0  | 642.5  | 600.2  | 565.6  | 524.5  | 479.7  | 474.5  |
| 42.5° | 2066.1 | 1964.8 | 1533.9 | 923.4  | 666.9  | 582.3  | 529.7  | 486.1  | 439.9  | 405.3  | 398.9  |
| 45°   | 2257.2 | 2120.0 | 1527.5 | 836.2  | 600.2  | 531.0  | 472.0  | 424.5  | 387.3  | 363.0  | 357.8  |
| 47.5° | 2443.2 | 2298.3 | 1509.5 | 766.9  | 548.9  | 487.4  | 427.1  | 383.5  | 355.3  | 328.3  | 321.9  |
| 50°   | 2681.7 | 2468.8 | 1487.7 | 713.1  | 492.5  | 443.7  | 398.9  | 352.7  | 320.6  | 307.8  | 305.2  |
| 52.5° | 2945.9 | 2639.4 | 1462.1 | 645.1  | 437.3  | 409.1  | 380.9  | 339.9  | 329.6  | 305.2  | 301.4  |
| 55°   | 3231.9 | 2842.0 | 1456.9 | 559.2  | 388.6  | 384.8  | 363.0  | 351.4  | 354.0  | 305.2  | 298.8  |
| 57.5° | 3533.3 | 3058.8 | 1468.5 | 473.2  | 348.8  | 363.0  | 370.6  | 361.7  | 357.8  | 311.7  | 298.8  |
| 60°   | 3847.5 | 3267.8 | 1433.8 | 393.7  | 318.1  | 345.0  | 379.6  | 356.5  | 328.3  | 309.1  | 300.1  |
| 62.5° | 4152.8 | 3443.5 | 1283.8 | 337.3  | 295.0  | 339.9  | 374.5  | 337.3  | 305.2  | 305.2  | 301.4  |
| 65°   | 4374.6 | 3521.8 | 1004.2 | 296.3  | 279.6  | 333.5  | 365.5  | 324.5  | 298.8  | 307.8  | 302.7  |
| 67.5° | 4400.3 | 3441.0 | 674.6  | 264.2  | 266.8  | 321.9  | 345.0  | 312.9  | 292.4  | 315.5  | 307.8  |
| 70°   | 4242.5 | 3230.6 | 413.0  | 239.8  | 250.1  | 301.4  | 327.0  | 301.4  | 283.4  | 309.1  | 297.5  |
| 72.5° | 3833.4 | 2838.2 | 291.1  | 219.3  | 232.1  | 282.2  | 310.4  | 291.1  | 270.6  | 279.6  | 268.0  |
| 75°   | 3144.7 | 2199.5 | 230.9  | 200.1  | 214.2  | 264.2  | 296.3  | 275.7  | 255.2  | 251.4  | 243.7  |
| 77.5° | 2227.7 | 1409.5 | 186.0  | 184.7  | 194.9  | 242.4  | 277.0  | 257.8  | 237.3  | 229.6  | 224.4  |
| 80°   | 1281.2 | 691.3  | 160.3  | 166.7  | 177.0  | 220.6  | 253.9  | 237.3  | 218.0  | 206.5  | 198.8  |
| 82.5° | 489.9  | 241.1  | 141.1  | 144.9  | 156.5  | 197.5  | 230.9  | 216.7  | 197.5  | 207.8  | 174.4  |
| 85°   | 159.0  | 132.1  | 115.4  | 119.3  | 130.8  | 164.2  | 203.9  | 192.4  | 170.6  | 151.3  | 139.8  |
| 87.5° | 70.5   | 71.8   | 61.6   | 68.0   | 82.1   | 109.0  | 148.8  | 141.1  | 124.4  | 103.9  | 100.0  |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

STREETWORKS

Report Number: SP1-2101-121-9

Luminaire Tested: IFLD-S-SA2A-827-U-T2

Test Date: 03/05/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2101-121-9  
 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-827-U-T2**  
 Description: STREETWORKS INF FLOOD

PROGRAMMED @ 615mA.

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 2709   | CRI (Ra): | 82.1 |      |      |
| CIE u':                   | 0.2620 | R1:       | 80.4 | R9:  | 4.5  |
| CIE v':                   | 0.5273 | R2:       | 91.2 | R10: | 81.3 |
| Duv:                      | 0.0001 | R3:       | 95.2 | R11: | 81.0 |
| CIE x:                    | 0.4591 | R4:       | 80.5 | R12: | 79.0 |
| CIE y:                    | 0.4107 | R5:       | 81.2 | R13: | 82.9 |
| CIE z:                    | 0.1301 | R6:       | 90.9 | R14: | 97.9 |
| Peak Wavelength (nm):     | 606    | R7:       | 81.1 |      |      |
| Dominant Wavelength (nm): | 584    | R8:       | 56.0 |      |      |
| Purity:                   | 61.2   |           |      |      |      |
| Rf:                       | 85.2   |           |      |      |      |
| Rg:                       | 96.4   |           |      |      |      |



### Test Conditions

Stabilization Time: 60M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.9/31%  
 Sphere Temperature (°C): 24.4

REPORT NUMBER: SP1-2101-121-9

| 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            |

REPORT NUMBER: SP1-2101-121-9

**CIE 1931 Chromaticity Diagram**



**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 2700K 4-step quadrangle

REPORT NUMBER: SP1-2101-121-9

### Photopic Flux vs. Wavelength



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| 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       | 2013             | 0.0              | 490       | 33356            | 4.7              | 620       | 150993           | 39.3             | 750       | 7593             | 0.0              | 880       | 2373             | 0.0              |
| 365       | 1908             | 0.0              | 495       | 40031            | 7.3              | 625       | 145077           | 32.0             | 755       | 6765             | 0.0              | 885       | 2481             | 0.0              |
| 370       | 1889             | 0.0              | 500       | 46287            | 10.2             | 630       | 136072           | 24.6             | 760       | 6000             | 0.0              | 890       | 2394             | 0.0              |
| 375       | 2095             | 0.0              | 505       | 51783            | 14.5             | 635       | 126417           | 19.0             | 765       | 5393             | 0.0              | 895       | 2574             | 0.0              |
| 380       | 2228             | 0.0              | 510       | 56588            | 19.4             | 640       | 116412           | 13.9             | 770       | 5030             | 0.0              | 900       | 2048             | 0.0              |
| 385       | 2074             | 0.0              | 515       | 60751            | 25.2             | 645       | 107525           | 10.4             | 775       | 4491             | 0.0              | 905       | 2381             | 0.0              |
| 390       | 1820             | 0.0              | 520       | 63966            | 31.0             | 650       | 97857            | 7.2              | 780       | 3943             | 0.0              | 910       | 2017             | 0.0              |
| 395       | 1728             | 0.0              | 525       | 66683            | 35.8             | 655       | 88582            | 5.1              | 785       | 3682             | 0.0              | 915       | 1904             | 0.0              |
| 400       | 1557             | 0.0              | 530       | 69869            | 41.1             | 660       | 79462            | 3.3              | 790       | 3402             | 0.0              | 920       | 2254             | 0.0              |
| 405       | 1644             | 0.0              | 535       | 72510            | 45.0             | 665       | 70606            | 2.2              | 795       | 3156             | 0.0              | 925       | 1998             | 0.0              |
| 410       | 2044             | 0.0              | 540       | 75299            | 49.1             | 670       | 61774            | 1.4              | 800       | 3062             | 0.0              | 930       | 1776             | 0.0              |
| 415       | 3009             | 0.0              | 545       | 79297            | 52.8             | 675       | 53771            | 0.9              | 805       | 2712             | 0.0              | 935       | 2086             | 0.0              |
| 420       | 4992             | 0.0              | 550       | 84946            | 57.7             | 680       | 46786            | 0.5              | 810       | 2896             | 0.0              | 940       | 1766             | 0.0              |
| 425       | 8631             | 0.0              | 555       | 90790            | 62.0             | 685       | 40747            | 0.4              | 815       | 2605             | 0.0              | 945       | 1738             | 0.0              |
| 430       | 14680            | 0.1              | 560       | 98231            | 66.8             | 690       | 35400            | 0.2              | 820       | 2901             | 0.0              | 950       | 2303             | 0.0              |
| 435       | 23899            | 0.3              | 565       | 105738           | 70.3             | 695       | 30445            | 0.1              | 825       | 2541             | 0.0              | 955       | 2567             | 0.0              |
| 440       | 38159            | 0.6              | 570       | 114034           | 74.1             | 700       | 26278            | 0.1              | 830       | 2014             | 0.0              | 960       | 2492             | 0.0              |
| 445       | 53061            | 1.1              | 575       | 123632           | 76.9             | 705       | 22703            | 0.0              | 835       | 2258             | 0.0              | 965       | 810              | 0.0              |
| 450       | 53893            | 1.4              | 580       | 132443           | 78.7             | 710       | 19853            | 0.0              | 840       | 2203             | 0.0              | 970       | 3201             | 0.0              |
| 455       | 41221            | 1.4              | 585       | 141502           | 78.6             | 715       | 17730            | 0.0              | 845       | 2073             | 0.0              | 975       | 1858             | 0.0              |
| 460       | 32969            | 1.4              | 590       | 148917           | 77.0             | 720       | 15616            | 0.0              | 850       | 2096             | 0.0              | 980       | 1769             | 0.0              |
| 465       | 28048            | 1.4              | 595       | 154326           | 73.2             | 725       | 13986            | 0.0              | 855       | 2751             | 0.0              | 985       | 1043             | 0.0              |
| 470       | 23347            | 1.5              | 600       | 159208           | 68.6             | 730       | 12029            | 0.0              | 860       | 2501             | 0.0              | 990       | 2950             | 0.0              |
| 475       | 22136            | 1.7              | 605       | 161290           | 62.5             | 735       | 10461            | 0.0              | 865       | 2512             | 0.0              | 995       | 1643             | 0.0              |
| 480       | 24192            | 2.3              | 610       | 159549           | 54.8             | 740       | 9230             | 0.0              | 870       | 2913             | 0.0              | 1000      | 292              | 0.0              |
| 485       | 28231            | 3.3              | 615       | 156663           | 47.3             | 745       | 8376             | 0.0              | 875       | 2299             | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2101-121-9

### Scotopic Flux vs. Wavelength


**Scotopic Lumens: 8911.3**
**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       | 2013             | 0.0              | 490       | 33356            | 51.4             | 620       | 150993           | 1.9              | 750       | 7593             | 0.0              | 880       | 2373             | 0.0              |
| 365       | 1908             | 0.0              | 495       | 40031            | 64.7             | 625       | 145077           | 1.2              | 755       | 6765             | 0.0              | 885       | 2481             | 0.0              |
| 370       | 1889             | 0.0              | 500       | 46287            | 77.4             | 630       | 136072           | 0.8              | 760       | 6000             | 0.0              | 890       | 2394             | 0.0              |
| 375       | 2095             | 0.0              | 505       | 51783            | 88.0             | 635       | 126417           | 0.5              | 765       | 5393             | 0.0              | 895       | 2574             | 0.0              |
| 380       | 2228             | 0.0              | 510       | 56588            | 95.9             | 640       | 116412           | 0.3              | 770       | 5030             | 0.0              | 900       | 2048             | 0.0              |
| 385       | 2074             | 0.0              | 515       | 60751            | 100.7            | 645       | 107525           | 0.2              | 775       | 4491             | 0.0              | 905       | 2381             | 0.0              |
| 390       | 1820             | 0.0              | 520       | 63966            | 101.7            | 650       | 97857            | 0.1              | 780       | 3943             | 0.0              | 910       | 2017             | 0.0              |
| 395       | 1728             | 0.0              | 525       | 66683            | 99.8             | 655       | 88582            | 0.1              | 785       | 3682             | 0.0              | 915       | 1904             | 0.0              |
| 400       | 1557             | 0.0              | 530       | 69869            | 96.3             | 660       | 79462            | 0.0              | 790       | 3402             | 0.0              | 920       | 2254             | 0.0              |
| 405       | 1644             | 0.1              | 535       | 72510            | 90.4             | 665       | 70606            | 0.0              | 795       | 3156             | 0.0              | 925       | 1998             | 0.0              |
| 410       | 2044             | 0.1              | 540       | 75299            | 83.2             | 670       | 61774            | 0.0              | 800       | 3062             | 0.0              | 930       | 1776             | 0.0              |
| 415       | 3009             | 0.3              | 545       | 79297            | 76.0             | 675       | 53771            | 0.0              | 805       | 2712             | 0.0              | 935       | 2086             | 0.0              |
| 420       | 4992             | 0.8              | 550       | 84946            | 69.5             | 680       | 46786            | 0.0              | 810       | 2896             | 0.0              | 940       | 1766             | 0.0              |
| 425       | 8631             | 2.1              | 555       | 90790            | 62.0             | 685       | 40747            | 0.0              | 815       | 2605             | 0.0              | 945       | 1738             | 0.0              |
| 430       | 14680            | 5.0              | 560       | 98231            | 54.9             | 690       | 35400            | 0.0              | 820       | 2901             | 0.0              | 950       | 2303             | 0.0              |
| 435       | 23899            | 10.7             | 565       | 105738           | 47.4             | 695       | 30445            | 0.0              | 825       | 2541             | 0.0              | 955       | 2567             | 0.0              |
| 440       | 38159            | 21.3             | 570       | 114034           | 40.2             | 700       | 26278            | 0.0              | 830       | 2014             | 0.0              | 960       | 2492             | 0.0              |
| 445       | 53061            | 35.5             | 575       | 123632           | 33.7             | 705       | 22703            | 0.0              | 835       | 2258             | 0.0              | 965       | 810              | 0.0              |
| 450       | 53893            | 41.8             | 580       | 132443           | 27.3             | 710       | 19853            | 0.0              | 840       | 2203             | 0.0              | 970       | 3201             | 0.0              |
| 455       | 41221            | 36.0             | 585       | 141502           | 21.6             | 715       | 17730            | 0.0              | 845       | 2073             | 0.0              | 975       | 1858             | 0.0              |
| 460       | 32969            | 31.8             | 590       | 148917           | 16.6             | 720       | 15616            | 0.0              | 850       | 2096             | 0.0              | 980       | 1769             | 0.0              |
| 465       | 28048            | 29.6             | 595       | 154326           | 12.3             | 725       | 13986            | 0.0              | 855       | 2751             | 0.0              | 985       | 1043             | 0.0              |
| 470       | 23347            | 26.9             | 600       | 159208           | 9.0              | 730       | 12029            | 0.0              | 860       | 2501             | 0.0              | 990       | 2950             | 0.0              |
| 475       | 22136            | 27.7             | 605       | 161290           | 6.3              | 735       | 10461            | 0.0              | 865       | 2512             | 0.0              | 995       | 1643             | 0.0              |
| 480       | 24192            | 32.7             | 610       | 159549           | 4.3              | 740       | 9230             | 0.0              | 870       | 2913             | 0.0              | 1000      | 292              | 0.0              |
| 485       | 28231            | 40.9             | 615       | 156663           | 2.9              | 745       | 8376             | 0.0              | 875       | 2299             | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2101-121-9

### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 3277.6**

**M/P: 0.45**

| 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       | 2013             | 0.0              | 490       | 33356            | 27.8             | 620       | 150993           | 0.1              | 750       | 7593             | 0.0              | 880       | 2373             | 0.0              |
| 365       | 1908             | 0.0              | 495       | 40031            | 33.0             | 625       | 145077           | 0.1              | 755       | 6765             | 0.0              | 885       | 2481             | 0.0              |
| 370       | 1889             | 0.0              | 500       | 46287            | 37.2             | 630       | 136072           | 0.0              | 760       | 6000             | 0.0              | 890       | 2394             | 0.0              |
| 375       | 2095             | 0.0              | 505       | 51783            | 39.7             | 635       | 126417           | 0.0              | 765       | 5393             | 0.0              | 895       | 2574             | 0.0              |
| 380       | 2228             | 0.0              | 510       | 56588            | 40.6             | 640       | 116412           | 0.0              | 770       | 5030             | 0.0              | 900       | 2048             | 0.0              |
| 385       | 2074             | 0.0              | 515       | 60751            | 39.7             | 645       | 107525           | 0.0              | 775       | 4491             | 0.0              | 905       | 2381             | 0.0              |
| 390       | 1820             | 0.0              | 520       | 63966            | 37.2             | 650       | 97857            | 0.0              | 780       | 3943             | 0.0              | 910       | 2017             | 0.0              |
| 395       | 1728             | 0.0              | 525       | 66683            | 33.8             | 655       | 88582            | 0.0              | 785       | 3682             | 0.0              | 915       | 1904             | 0.0              |
| 400       | 1557             | 0.0              | 530       | 69869            | 30.2             | 660       | 79462            | 0.0              | 790       | 3402             | 0.0              | 920       | 2254             | 0.0              |
| 405       | 1644             | 0.0              | 535       | 72510            | 26.1             | 665       | 70606            | 0.0              | 795       | 3156             | 0.0              | 925       | 1998             | 0.0              |
| 410       | 2044             | 0.1              | 540       | 75299            | 22.0             | 670       | 61774            | 0.0              | 800       | 3062             | 0.0              | 930       | 1776             | 0.0              |
| 415       | 3009             | 0.2              | 545       | 79297            | 18.4             | 675       | 53771            | 0.0              | 805       | 2712             | 0.0              | 935       | 2086             | 0.0              |
| 420       | 4992             | 0.6              | 550       | 84946            | 15.2             | 680       | 46786            | 0.0              | 810       | 2896             | 0.0              | 940       | 1766             | 0.0              |
| 425       | 8631             | 1.3              | 555       | 90790            | 12.2             | 685       | 40747            | 0.0              | 815       | 2605             | 0.0              | 945       | 1738             | 0.0              |
| 430       | 14680            | 3.1              | 560       | 98231            | 9.7              | 690       | 35400            | 0.0              | 820       | 2901             | 0.0              | 950       | 2303             | 0.0              |
| 435       | 23899            | 6.4              | 565       | 105738           | 7.4              | 695       | 30445            | 0.0              | 825       | 2541             | 0.0              | 955       | 2567             | 0.0              |
| 440       | 38159            | 12.8             | 570       | 114034           | 5.6              | 700       | 26278            | 0.0              | 830       | 2014             | 0.0              | 960       | 2492             | 0.0              |
| 445       | 53061            | 20.9             | 575       | 123632           | 4.1              | 705       | 22703            | 0.0              | 835       | 2258             | 0.0              | 965       | 810              | 0.0              |
| 450       | 53893            | 24.8             | 580       | 132443           | 3.0              | 710       | 19853            | 0.0              | 840       | 2203             | 0.0              | 970       | 3201             | 0.0              |
| 455       | 41221            | 21.6             | 585       | 141502           | 2.1              | 715       | 17730            | 0.0              | 845       | 2073             | 0.0              | 975       | 1858             | 0.0              |
| 460       | 32969            | 19.4             | 590       | 148917           | 1.5              | 720       | 15616            | 0.0              | 850       | 2096             | 0.0              | 980       | 1769             | 0.0              |
| 465       | 28048            | 18.3             | 595       | 154326           | 1.0              | 725       | 13986            | 0.0              | 855       | 2751             | 0.0              | 985       | 1043             | 0.0              |
| 470       | 23347            | 16.7             | 600       | 159208           | 0.7              | 730       | 12029            | 0.0              | 860       | 2501             | 0.0              | 990       | 2950             | 0.0              |
| 475       | 22136            | 16.9             | 605       | 161290           | 0.4              | 735       | 10461            | 0.0              | 865       | 2512             | 0.0              | 995       | 1643             | 0.0              |
| 480       | 24192            | 19.4             | 610       | 159549           | 0.3              | 740       | 9230             | 0.0              | 870       | 2913             | 0.0              | 1000      | 292              | 0.0              |
| 485       | 28231            | 23.3             | 615       | 156663           | 0.2              | 745       | 8376             | 0.0              | 875       | 2299             | 0.0              |           |                  |                  |

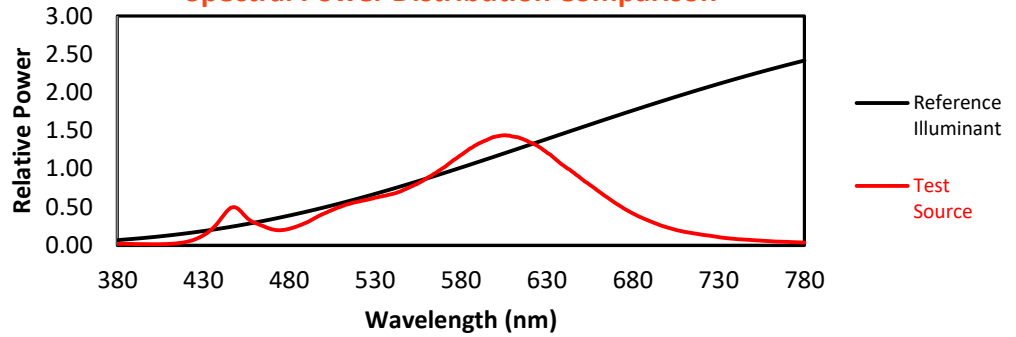
REPORT NUMBER: SP1-2101-121-9

TM-30-18

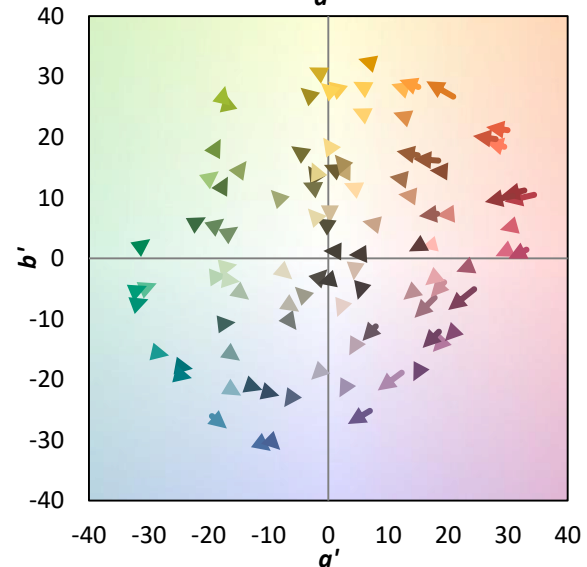
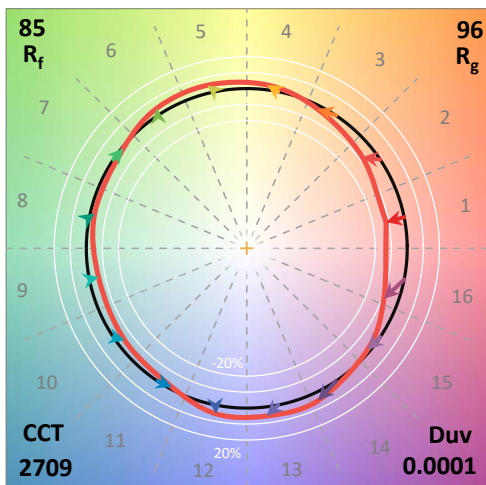
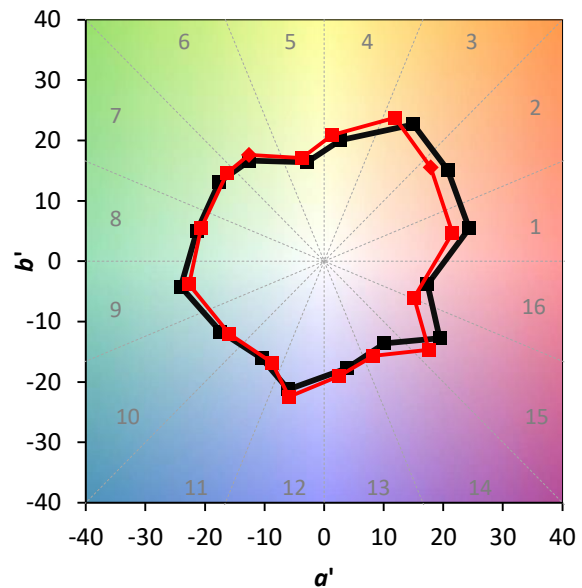
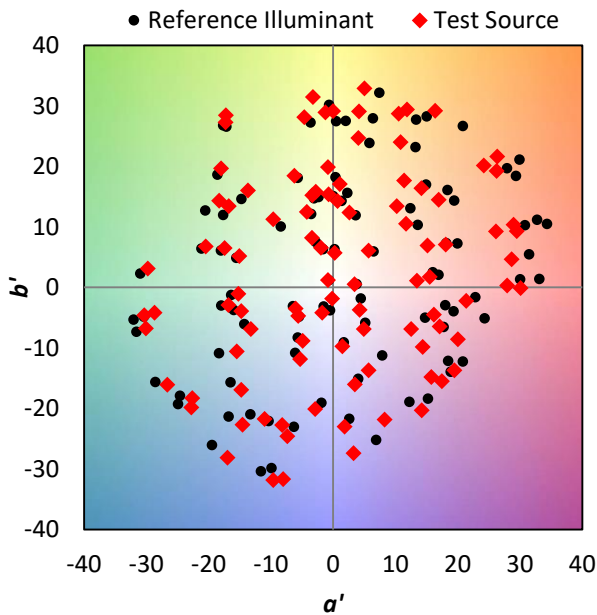
### Summary

$R_f = 85.2$   
 $R_g = 96.4$   
 CIE  $R_a = 82.1$   
 $R_g = 4.5$

### Spectral Power Distribution Comparison



### Color Vector Graphics

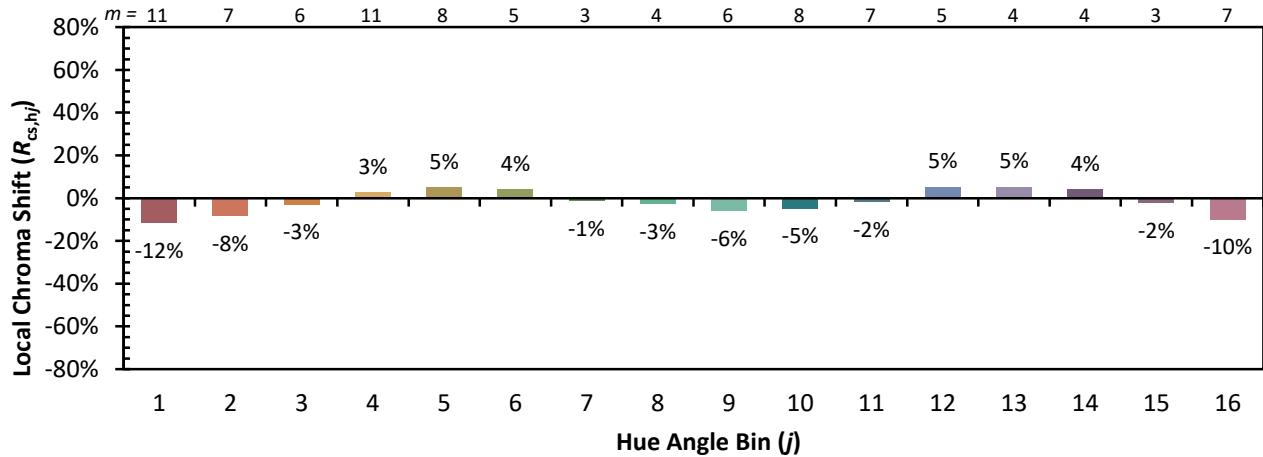


Individual Sample Fidelity Index ( $R_{f,i}$ )

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 83 | CES51 = 95 | CES76 = 83 |
| CES02 = 64 | CES27 = 95 | CES52 = 94 | CES77 = 85 |
| CES03 = 31 | CES28 = 94 | CES53 = 89 | CES78 = 82 |
| CES04 = 71 | CES29 = 82 | CES54 = 92 | CES79 = 89 |
| CES05 = 50 | CES30 = 87 | CES55 = 92 | CES80 = 89 |
| CES06 = 52 | CES31 = 85 | CES56 = 87 | CES81 = 69 |
| CES07 = 43 | CES32 = 80 | CES57 = 87 | CES82 = 96 |
| CES08 = 42 | CES33 = 86 | CES58 = 88 | CES83 = 93 |
| CES09 = 29 | CES34 = 91 | CES59 = 92 | CES84 = 93 |
| CES10 = 77 | CES35 = 96 | CES60 = 96 | CES85 = 78 |
| CES11 = 60 | CES36 = 96 | CES61 = 91 | CES86 = 65 |
| CES12 = 66 | CES37 = 95 | CES62 = 97 | CES87 = 85 |
| CES13 = 44 | CES38 = 93 | CES63 = 87 | CES88 = 86 |
| CES14 = 74 | CES39 = 97 | CES64 = 86 | CES89 = 74 |
| CES15 = 72 | CES40 = 94 | CES65 = 81 | CES90 = 86 |
| CES16 = 48 | CES41 = 93 | CES66 = 85 | CES91 = 87 |
| CES17 = 50 | CES42 = 95 | CES67 = 84 | CES92 = 67 |
| CES18 = 57 | CES43 = 88 | CES68 = 85 | CES93 = 80 |
| CES19 = 73 | CES44 = 99 | CES69 = 91 | CES94 = 61 |
| CES20 = 67 | CES45 = 92 | CES70 = 82 | CES95 = 77 |
| CES21 = 87 | CES46 = 88 | CES71 = 83 | CES96 = 84 |
| CES22 = 79 | CES47 = 88 | CES72 = 93 | CES97 = 88 |
| CES23 = 92 | CES48 = 81 | CES73 = 78 | CES98 = 84 |
| CES24 = 91 | CES49 = 88 | CES74 = 91 | CES99 = 76 |
| CES25 = 72 | CES50 = 94 | CES75 = 85 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)