

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: McGRAW-EDISON

Report Number: P386739

Luminaire Tested: **GWC-SA2B-830-U-T4FT**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P386739  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-16)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: MCGRAW-EDISON  
Catalog Number: GWC-SA2B-830-U-T4FT  
Description: GALLEON WALL LUMINAIRE  
(2) 80 CRI, 3000K, 800mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV  
FORWARD THROW OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 9534 lumens  
Efficiency: N/A  
Efficacy: 112.2 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 0.5' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B2 - U0 - G3

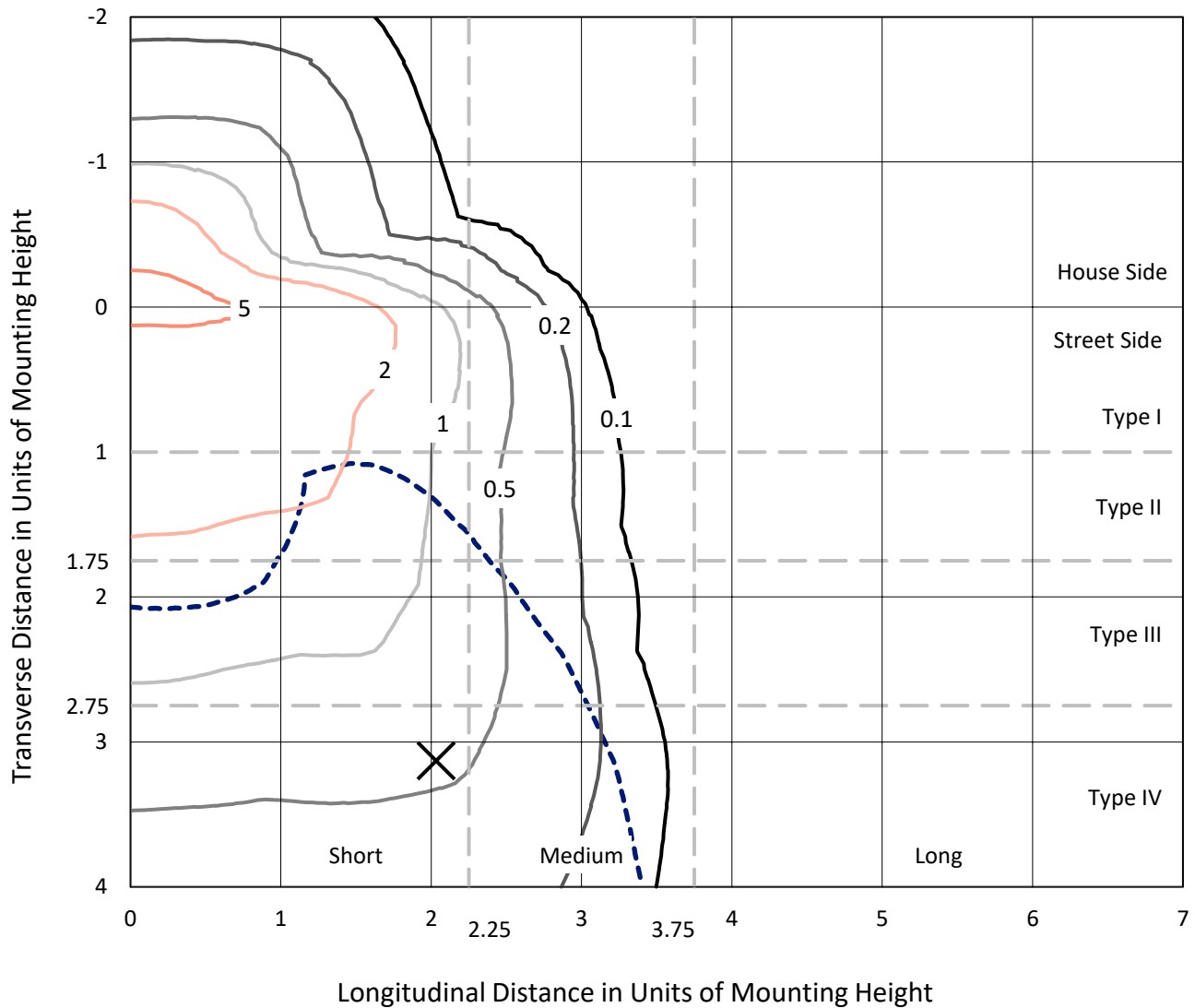
Input Watts (W): 85  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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 CATALOG NUMBER: GWC-SA2B-830-U-T4FT

## Iso-Footcandle Lines of Horizontal Illumination

✕ Max cd  
 - - - 1/2 Max cd

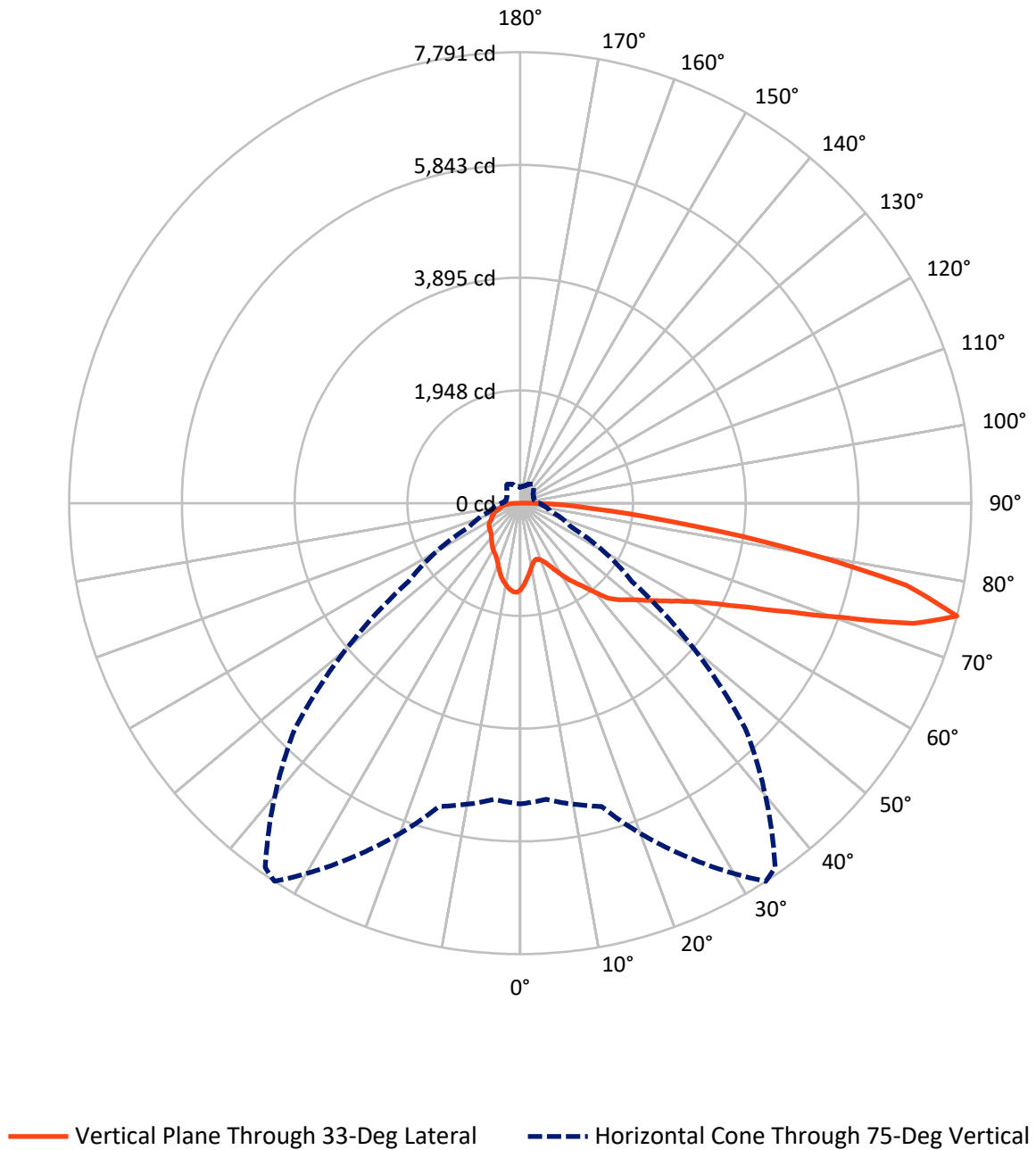


Based on 15 foot mounting height. Maximum calculated value = 6.6 fc  
 Type IV - Short - N/A

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CATALOG NUMBER: GWC-SA2B-830-U-T4FT

## Luminous Intensity Polar Plot



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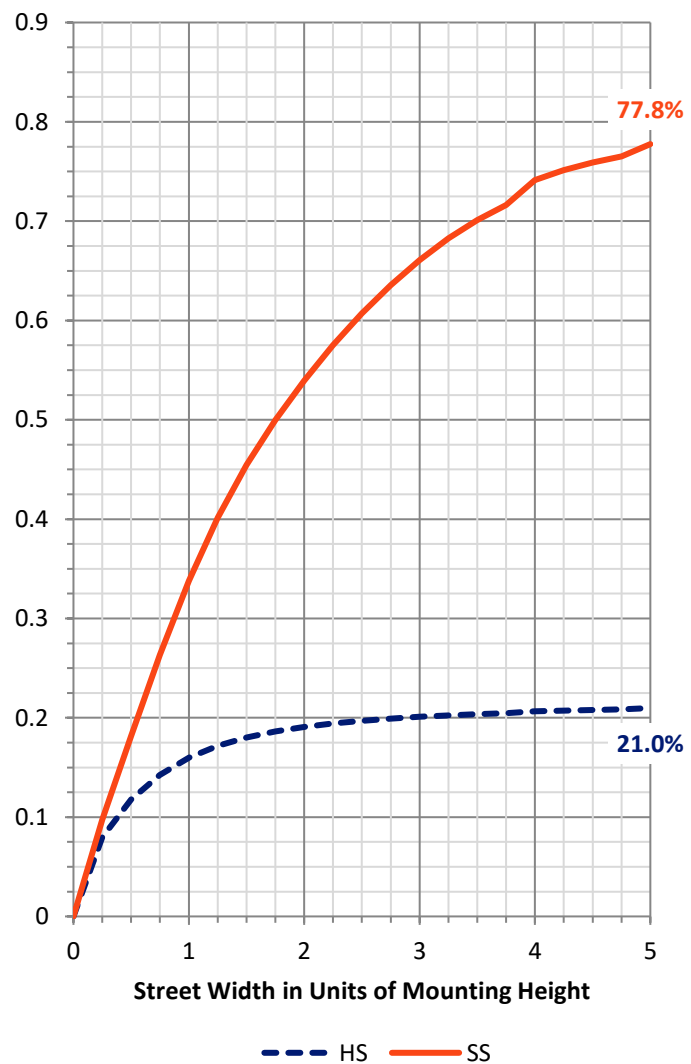
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 2047.2   | 0.0    | 2047.2 |
|                    | % Fixture | 21.5     | 0.0    | 21.5   |
| <b>Street Side</b> | Lumens    | 7486.8   | 0.0    | 7486.8 |
|                    | % Fixture | 78.5     | 0.0    | 78.5   |
| <b>Total</b>       | Lumens    | 9534.0   | 0.0    | 9534.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 134.8  | 1.4       |
| 10°-20°   | 365.0  | 3.8       |
| 20°-30°   | 596.1  | 6.3       |
| 30°-40°   | 887.8  | 9.3       |
| 40°-50°   | 1273.3 | 13.4      |
| 50°-60°   | 1748.1 | 18.3      |
| 60°-70°   | 2188.5 | 23.0      |
| 70°-80°   | 1979.8 | 20.8      |
| 80°-90°   | 360.6  | 3.8       |
| 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°    | 9534.0 | 100.0     |
| 0°-180°   | 9534.0 | 100.0     |

**Coefficient of Utilization**



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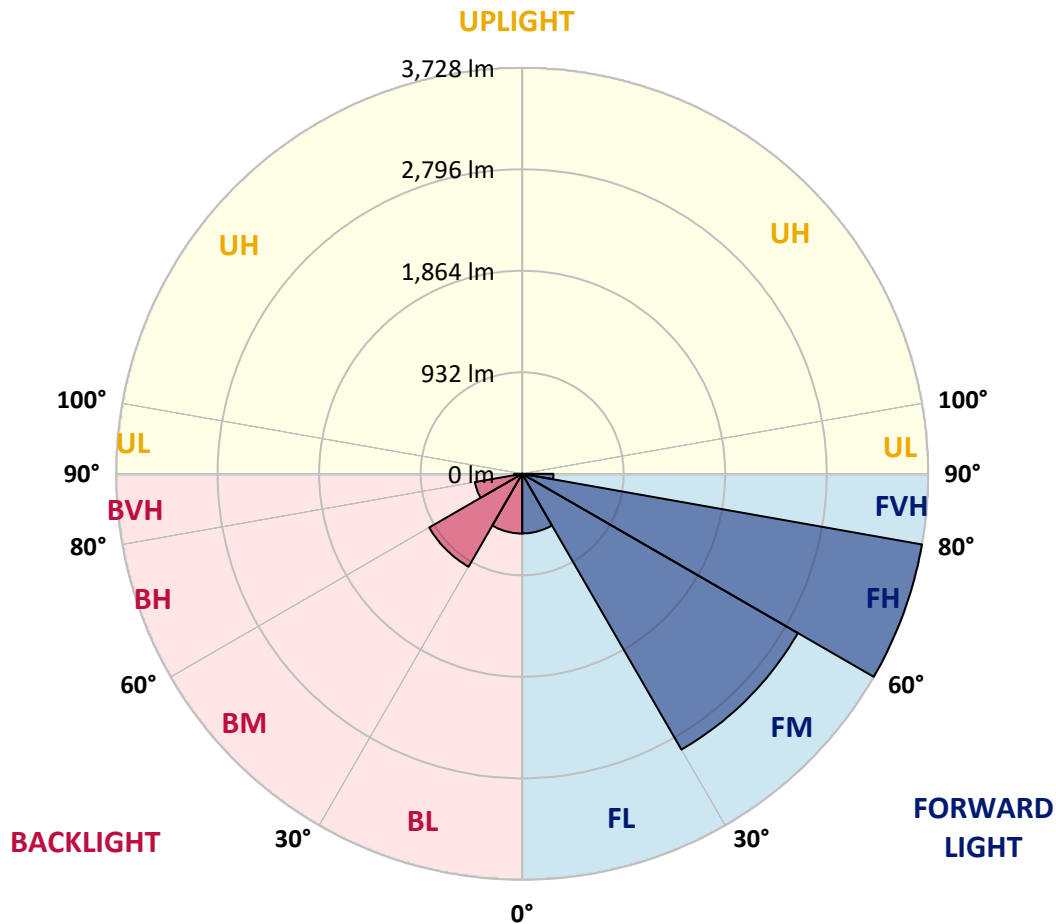
CATALOG NUMBER: GWC-SA2B-830-U-T4FT

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 547.6  | 5.7       |                         |      |         |
| FM   | (30°-60°)   | 2923.9 | 30.7      |                         |      |         |
| FH   | (60°-80°)   | 3728.1 | 39.1      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 287.2  | 3.0       |                         |      | G3/500  |
| BL   | (0°-30°)    | 548.3  | 5.8       | B2/1000                 |      |         |
| BM   | (30°-60°)   | 985.3  | 10.3      | B1/1000                 |      |         |
| BH   | (60°-80°)   | 440.2  | 4.6       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 73.4   | 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 Short



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 33°    | 35°    | 45°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1490.2 | 1490.2 | 1490.2 | 1490.2 | 1490.2 | 1490.2 | 1490.2 | 1490.2 | 1490.2 | 1490.2 | 1490.2 |
| 2.5°  | 1383.8 | 1378.6 | 1388.5 | 1389.8 | 1398.3 | 1401.6 | 1413.5 | 1431.9 | 1447.1 | 1464.5 | 1480.3 |
| 5°    | 1258.4 | 1254.7 | 1268.6 | 1278.5 | 1297.2 | 1305.1 | 1333.1 | 1372.3 | 1407.2 | 1446.7 | 1482.6 |
| 7.5°  | 1139.2 | 1137.2 | 1152.7 | 1175.0 | 1196.8 | 1207.7 | 1256.1 | 1313.0 | 1371.3 | 1435.2 | 1490.2 |
| 10°   | 1038.7 | 1038.0 | 1052.9 | 1074.9 | 1106.9 | 1119.1 | 1181.6 | 1256.7 | 1338.4 | 1426.3 | 1503.1 |
| 12.5° | 982.4  | 984.7  | 991.6  | 1010.1 | 1039.7 | 1051.9 | 1121.4 | 1209.6 | 1310.7 | 1423.4 | 1521.8 |
| 15°   | 996.2  | 999.8  | 988.0  | 987.3  | 1008.4 | 1018.0 | 1083.2 | 1176.0 | 1291.0 | 1428.3 | 1549.2 |
| 17.5° | 1055.2 | 1055.8 | 1024.5 | 1004.8 | 1017.6 | 1022.6 | 1071.3 | 1156.9 | 1279.4 | 1439.5 | 1583.4 |
| 20°   | 1138.2 | 1136.5 | 1081.2 | 1048.3 | 1055.2 | 1056.5 | 1088.1 | 1157.3 | 1278.5 | 1458.9 | 1627.9 |
| 22.5° | 1248.2 | 1236.0 | 1161.5 | 1116.8 | 1115.1 | 1113.1 | 1131.2 | 1181.6 | 1292.9 | 1490.5 | 1680.9 |
| 25°   | 1391.7 | 1380.2 | 1277.8 | 1216.5 | 1203.4 | 1198.4 | 1201.1 | 1233.7 | 1321.6 | 1524.5 | 1740.2 |
| 27.5° | 1551.5 | 1531.4 | 1432.6 | 1346.0 | 1318.6 | 1311.7 | 1295.9 | 1307.1 | 1352.9 | 1557.1 | 1810.7 |
| 30°   | 1685.2 | 1674.3 | 1588.0 | 1485.3 | 1453.0 | 1443.1 | 1401.6 | 1389.4 | 1398.0 | 1601.5 | 1899.6 |
| 32.5° | 1759.9 | 1752.7 | 1700.3 | 1617.3 | 1587.4 | 1573.5 | 1514.9 | 1490.5 | 1470.5 | 1671.7 | 2020.1 |
| 35°   | 1850.5 | 1845.9 | 1814.3 | 1754.0 | 1709.6 | 1695.1 | 1649.6 | 1624.3 | 1572.6 | 1768.2 | 2175.9 |
| 37.5° | 1965.8 | 1960.8 | 1961.5 | 1912.7 | 1859.7 | 1846.2 | 1816.3 | 1789.6 | 1704.9 | 1895.0 | 2345.2 |
| 40°   | 2096.2 | 2086.6 | 2083.0 | 2080.7 | 2047.1 | 2039.5 | 2023.7 | 1987.5 | 1870.9 | 2046.5 | 2512.1 |
| 42.5° | 2292.5 | 2258.5 | 2186.1 | 2213.4 | 2246.7 | 2242.7 | 2255.6 | 2203.5 | 2055.3 | 2225.6 | 2675.1 |
| 45°   | 2481.8 | 2426.2 | 2301.0 | 2307.0 | 2379.7 | 2401.8 | 2498.0 | 2461.1 | 2255.3 | 2421.9 | 2843.8 |
| 47.5° | 2568.1 | 2526.0 | 2419.6 | 2419.9 | 2492.0 | 2537.8 | 2748.6 | 2722.2 | 2465.4 | 2644.8 | 3049.6 |
| 50°   | 2664.6 | 2622.5 | 2526.9 | 2562.8 | 2625.7 | 2674.5 | 2990.6 | 2977.1 | 2665.3 | 2888.9 | 3296.3 |
| 52.5° | 2770.0 | 2698.5 | 2637.9 | 2702.2 | 2790.4 | 2847.1 | 3233.0 | 3196.1 | 2848.7 | 3134.6 | 3579.8 |
| 55°   | 2771.3 | 2751.9 | 2798.0 | 2845.1 | 2977.1 | 3046.6 | 3486.9 | 3389.5 | 2998.2 | 3376.0 | 3810.7 |
| 57.5° | 2929.1 | 2897.4 | 2995.3 | 3017.0 | 3189.6 | 3267.9 | 3739.5 | 3557.8 | 3150.4 | 3561.0 | 3935.2 |
| 60°   | 3137.9 | 3110.8 | 3190.9 | 3248.2 | 3452.4 | 3557.1 | 4009.3 | 3730.6 | 3269.9 | 3700.7 | 3929.2 |
| 62.5° | 3498.5 | 3467.8 | 3466.9 | 3547.2 | 3822.2 | 3944.1 | 4311.9 | 3900.3 | 3317.3 | 3728.3 | 3761.6 |
| 65°   | 4026.4 | 3977.6 | 3885.8 | 3924.0 | 4333.0 | 4454.5 | 4650.1 | 4023.1 | 3254.8 | 3580.1 | 3329.9 |
| 67.5° | 4540.1 | 4538.5 | 4425.5 | 4503.9 | 5007.5 | 5104.9 | 5035.5 | 4035.3 | 3059.5 | 3064.1 | 2563.8 |
| 70°   | 5052.2 | 5058.8 | 5039.7 | 5312.4 | 5918.7 | 6020.1 | 5445.8 | 3871.6 | 2620.5 | 2212.8 | 1536.0 |
| 72.5° | 5458.0 | 5456.3 | 5552.5 | 6255.6 | 7101.3 | 7078.6 | 5791.6 | 3375.6 | 1881.5 | 1194.5 | 734.1  |
| 75°   | 5195.2 | 5137.9 | 5424.4 | 6722.6 | 7790.6 | 7679.6 | 5497.5 | 2354.7 | 976.5  | 543.7  | 395.2  |
| 77.5° | 3388.5 | 3442.8 | 3863.4 | 5553.5 | 6814.5 | 6679.5 | 4033.3 | 1098.6 | 460.1  | 356.7  | 286.5  |
| 80°   | 1227.1 | 1284.4 | 1809.0 | 3145.8 | 4694.9 | 4672.9 | 1986.2 | 451.5  | 311.2  | 269.4  | 208.8  |
| 82.5° | 422.2  | 443.3  | 713.7  | 1397.0 | 2650.8 | 2749.6 | 747.2  | 256.5  | 226.2  | 191.0  | 142.9  |
| 85°   | 165.7  | 189.7  | 326.4  | 672.2  | 1337.1 | 1347.0 | 302.7  | 153.5  | 157.4  | 125.1  | 78.4   |
| 87.5° | 62.9   | 76.4   | 156.1  | 312.2  | 610.6  | 560.8  | 108.3  | 73.1   | 89.6   | 74.4   | 37.2   |
| 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°    | 1490.2 | 1490.2 | 1490.2 | 1490.2 | 1490.2 | 1490.2 | 1490.2 | 1490.2 | 1490.2 | 1490.2 | 1490.2 |
| 2.5°  | 1492.5 | 1499.4 | 1513.9 | 1523.8 | 1534.3 | 1537.3 | 1538.6 | 1541.3 | 1543.9 | 1542.9 | 1543.2 |
| 5°    | 1501.7 | 1515.2 | 1538.6 | 1548.5 | 1553.1 | 1547.9 | 1537.6 | 1529.4 | 1523.5 | 1520.2 | 1519.2 |
| 7.5°  | 1516.9 | 1536.0 | 1561.0 | 1559.4 | 1548.8 | 1525.5 | 1499.1 | 1479.3 | 1462.9 | 1457.0 | 1453.7 |
| 10°   | 1537.0 | 1559.4 | 1576.8 | 1558.1 | 1527.4 | 1486.9 | 1447.4 | 1416.8 | 1392.1 | 1382.5 | 1380.9 |
| 12.5° | 1562.7 | 1585.4 | 1588.7 | 1548.8 | 1498.1 | 1442.8 | 1389.1 | 1348.6 | 1311.7 | 1299.9 | 1297.2 |
| 15°   | 1595.9 | 1617.3 | 1596.9 | 1532.7 | 1461.9 | 1387.5 | 1318.0 | 1263.0 | 1224.1 | 1209.6 | 1204.4 |
| 17.5° | 1630.8 | 1651.3 | 1598.6 | 1506.0 | 1414.5 | 1321.9 | 1234.7 | 1178.3 | 1133.9 | 1117.1 | 1115.1 |
| 20°   | 1672.7 | 1681.9 | 1591.7 | 1467.8 | 1349.3 | 1237.0 | 1145.1 | 1092.1 | 1068.3 | 1056.5 | 1055.2 |
| 22.5° | 1724.4 | 1714.5 | 1575.8 | 1416.1 | 1266.6 | 1138.8 | 1064.1 | 1039.4 | 1033.4 | 1030.8 | 1031.8 |
| 25°   | 1779.0 | 1748.7 | 1552.5 | 1348.6 | 1162.2 | 1040.7 | 1004.8 | 1011.7 | 1019.6 | 1018.6 | 1018.6 |
| 27.5° | 1839.3 | 1783.7 | 1516.6 | 1259.0 | 1046.6 | 960.3  | 964.6  | 990.0  | 1001.8 | 1001.5 | 1001.2 |
| 30°   | 1916.7 | 1823.2 | 1470.8 | 1151.3 | 938.6  | 903.7  | 929.7  | 960.7  | 976.8  | 976.1  | 976.5  |
| 32.5° | 2011.9 | 1866.6 | 1408.5 | 1031.1 | 860.5  | 861.9  | 891.8  | 922.5  | 941.2  | 939.6  | 939.9  |
| 35°   | 2123.2 | 1915.4 | 1324.2 | 912.6  | 808.8  | 828.6  | 852.3  | 873.7  | 891.5  | 889.2  | 886.9  |
| 37.5° | 2244.4 | 1963.1 | 1212.3 | 806.5  | 766.7  | 797.6  | 817.4  | 821.0  | 829.3  | 823.3  | 819.0  |
| 40°   | 2359.6 | 1999.7 | 1068.0 | 719.6  | 724.2  | 771.3  | 784.1  | 769.6  | 754.8  | 752.8  | 746.9  |
| 42.5° | 2460.1 | 2011.9 | 922.1  | 650.1  | 679.4  | 743.6  | 751.5  | 721.2  | 694.6  | 682.0  | 676.8  |
| 45°   | 2566.1 | 2016.2 | 786.1  | 591.8  | 636.3  | 718.9  | 727.5  | 687.0  | 649.4  | 622.4  | 613.5  |
| 47.5° | 2704.8 | 2047.1 | 680.4  | 548.7  | 603.3  | 702.5  | 714.6  | 659.6  | 610.9  | 572.4  | 564.1  |
| 50°   | 2886.2 | 2108.4 | 594.4  | 515.7  | 581.9  | 691.6  | 705.4  | 633.0  | 579.3  | 532.9  | 524.6  |
| 52.5° | 3087.8 | 2164.7 | 525.0  | 489.1  | 561.2  | 672.5  | 693.6  | 613.9  | 549.7  | 496.3  | 487.4  |
| 55°   | 3228.8 | 2121.5 | 469.0  | 461.4  | 534.2  | 645.2  | 677.1  | 597.7  | 507.2  | 460.7  | 452.8  |
| 57.5° | 3255.8 | 1974.0 | 426.5  | 432.7  | 501.6  | 610.9  | 651.7  | 561.8  | 484.1  | 445.3  | 437.0  |
| 60°   | 3182.0 | 1768.5 | 394.9  | 406.4  | 466.7  | 567.8  | 604.3  | 536.5  | 462.0  | 428.8  | 421.9  |
| 62.5° | 2996.6 | 1558.1 | 371.5  | 382.7  | 434.1  | 524.0  | 574.7  | 509.8  | 439.7  | 410.0  | 403.1  |
| 65°   | 2622.1 | 1308.1 | 349.1  | 361.6  | 403.8  | 486.1  | 548.0  | 485.1  | 417.6  | 394.9  | 388.3  |
| 67.5° | 1979.3 | 979.8  | 328.0  | 339.2  | 376.8  | 453.2  | 519.0  | 460.7  | 396.2  | 381.7  | 373.8  |
| 70°   | 1165.5 | 613.5  | 304.0  | 315.8  | 348.4  | 418.9  | 488.1  | 434.1  | 369.5  | 362.9  | 352.7  |
| 72.5° | 542.4  | 369.2  | 276.6  | 288.2  | 312.9  | 373.1  | 448.2  | 399.1  | 337.9  | 323.4  | 309.6  |
| 75°   | 323.7  | 270.1  | 244.4  | 254.6  | 272.0  | 324.4  | 398.2  | 363.6  | 307.9  | 288.8  | 274.3  |
| 77.5° | 242.1  | 206.5  | 208.8  | 219.7  | 233.8  | 283.9  | 352.7  | 335.6  | 284.9  | 270.1  | 260.2  |
| 80°   | 174.2  | 156.8  | 170.3  | 182.1  | 196.9  | 258.2  | 337.9  | 310.2  | 257.5  | 237.8  | 228.6  |
| 82.5° | 116.3  | 112.6  | 128.1  | 140.3  | 154.8  | 225.9  | 317.5  | 271.7  | 220.0  | 195.0  | 174.5  |
| 85°   | 64.2   | 67.8   | 86.3   | 91.6   | 104.1  | 159.1  | 260.2  | 218.3  | 165.7  | 133.4  | 127.5  |
| 87.5° | 26.7   | 31.3   | 46.4   | 44.8   | 55.3   | 94.8   | 171.3  | 131.7  | 105.4  | 78.7   | 61.3   |
| 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

(formerly Eaton)

INVUE

Report Number: SP1-2012-088-3

Luminaire Tested: WIS-SA-830-2D-U-SL4

Test Date: 01/11/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2012-088-3  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 01/11/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: INVUE  
 Catalog Number: **WIS-SA-830-2D-U-SL4**  
 Description: INVUE. WALL PACK LIGHT SQUARE SL4 OPTICS 2-SQUARE.

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 3049   | CRI (Ra): | 81.7 |      |      |
| CIE u':                   | 0.2482 | R1:       | 79.6 | R9:  | 1.9  |
| CIE v':                   | 0.5224 | R2:       | 90.6 | R10: | 79.3 |
| Duv:                      | 0.0015 | R3:       | 95.7 | R11: | 78.7 |
| CIE x:                    | 0.4354 | R4:       | 79.4 | R12: | 72.2 |
| CIE y:                    | 0.4072 | R5:       | 80.2 | R13: | 82.2 |
| CIE z:                    | 0.1574 | R6:       | 89.0 | R14: | 98.1 |
| Peak Wavelength (nm):     | 601    | R7:       | 82.2 |      |      |
| Dominant Wavelength (nm): | 582    | R8:       | 57.0 |      |      |
| Purity:                   | 53     |           |      |      |      |
| Rf:                       | 85.1   |           |      |      |      |
| Rg:                       | 94.3   |           |      |      |      |



### Test Conditions

Stabilization Time: 83M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.6/29%  
 Sphere Temperature (°C): 25.6

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| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 7/29/2020        | 1/29/2021            |
| 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 3000K 4-step quadrangle

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### Photopic Flux vs. Wavelength

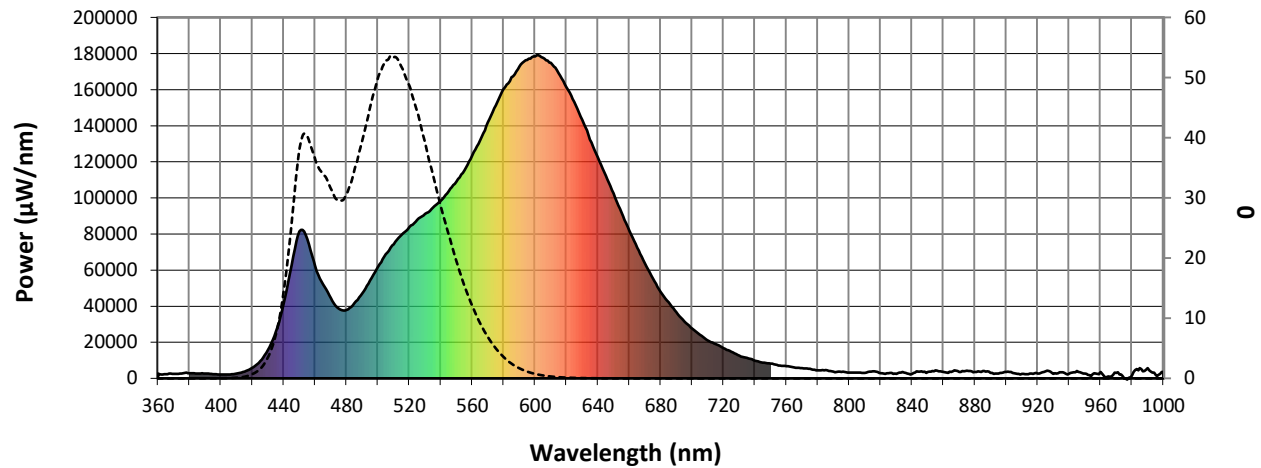


#####

| 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       | 2750             | 0.0              | 490       | 47173            | 6.7              | 620       | 161309           | 42.0             | 750       | 8155             | 0.0              | 880       | 3493             | 0.0              |
| 365       | 2250             | 0.0              | 495       | 54281            | 9.8              | 625       | 153301           | 33.8             | 755       | 7110             | 0.0              | 885       | 4023             | 0.0              |
| 370       | 2449             | 0.0              | 500       | 61837            | 13.6             | 630       | 143292           | 25.9             | 760       | 6829             | 0.0              | 890       | 2983             | 0.0              |
| 375       | 2752             | 0.0              | 505       | 68833            | 19.3             | 635       | 132368           | 19.9             | 765       | 6022             | 0.0              | 895       | 2605             | 0.0              |
| 380       | 2834             | 0.0              | 510       | 74324            | 25.5             | 640       | 122334           | 14.6             | 770       | 5682             | 0.0              | 900       | 3576             | 0.0              |
| 385       | 2613             | 0.0              | 515       | 79410            | 32.9             | 645       | 112200           | 10.8             | 775       | 5247             | 0.0              | 905       | 2786             | 0.0              |
| 390       | 2589             | 0.0              | 520       | 83815            | 40.6             | 650       | 102448           | 7.5              | 780       | 4493             | 0.0              | 910       | 2480             | 0.0              |
| 395       | 2344             | 0.0              | 525       | 87774            | 47.1             | 655       | 91886            | 5.3              | 785       | 4667             | 0.0              | 915       | 2633             | 0.0              |
| 400       | 2067             | 0.0              | 530       | 91247            | 53.7             | 660       | 81865            | 3.4              | 790       | 3736             | 0.0              | 920       | 2726             | 0.0              |
| 405       | 2087             | 0.0              | 535       | 94694            | 58.7             | 665       | 72448            | 2.3              | 795       | 3568             | 0.0              | 925       | 3905             | 0.0              |
| 410       | 2663             | 0.0              | 540       | 98431            | 64.1             | 670       | 63654            | 1.4              | 800       | 3190             | 0.0              | 930       | 2414             | 0.0              |
| 415       | 3760             | 0.0              | 545       | 103765           | 69.1             | 675       | 55284            | 0.9              | 805       | 3215             | 0.0              | 935       | 3414             | 0.0              |
| 420       | 5815             | 0.0              | 550       | 109130           | 74.2             | 680       | 47949            | 0.6              | 810       | 3108             | 0.0              | 940       | 2725             | 0.0              |
| 425       | 9591             | 0.1              | 555       | 115271           | 78.7             | 685       | 42173            | 0.4              | 815       | 3889             | 0.0              | 945       | 4070             | 0.0              |
| 430       | 15806            | 0.1              | 560       | 123390           | 83.9             | 690       | 36755            | 0.2              | 820       | 2869             | 0.0              | 950       | 2640             | 0.0              |
| 435       | 26035            | 0.3              | 565       | 131926           | 87.7             | 695       | 31630            | 0.1              | 825       | 2776             | 0.0              | 955       | 2231             | 0.0              |
| 440       | 41509            | 0.7              | 570       | 141815           | 92.2             | 700       | 27642            | 0.1              | 830       | 2538             | 0.0              | 960       | 3598             | 0.0              |
| 445       | 62857            | 1.3              | 575       | 151359           | 94.2             | 705       | 24213            | 0.1              | 835       | 3283             | 0.0              | 965       | 1098             | 0.0              |
| 450       | 81434            | 2.1              | 580       | 160364           | 95.3             | 710       | 21007            | 0.0              | 840       | 2477             | 0.0              | 970       | 3057             | 0.0              |
| 455       | 77103            | 2.6              | 585       | 166836           | 92.7             | 715       | 18986            | 0.0              | 845       | 3781             | 0.0              | 975       | 152              | 0.0              |
| 460       | 62408            | 2.6              | 590       | 172885           | 89.4             | 720       | 16766            | 0.0              | 850       | 3525             | 0.0              | 980       | 1629             | 0.0              |
| 465       | 52134            | 2.7              | 595       | 176548           | 83.7             | 725       | 14792            | 0.0              | 855       | 4413             | 0.0              | 985       | 5600             | 0.0              |
| 470       | 44297            | 2.8              | 600       | 178427           | 76.9             | 730       | 12553            | 0.0              | 860       | 3598             | 0.0              | 990       | 5671             | 0.0              |
| 475       | 38679            | 3.0              | 605       | 177729           | 68.8             | 735       | 11291            | 0.0              | 865       | 3617             | 0.0              | 995       | 1881             | 0.0              |
| 480       | 38032            | 3.6              | 610       | 174846           | 60.1             | 740       | 9818             | 0.0              | 870       | 3567             | 0.0              | 1000      | 3484             | 0.0              |
| 485       | 41652            | 4.9              | 615       | 169274           | 51.1             | 745       | 8656             | 0.0              | 875       | 4346             | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2012-088-3

### Scotopic Flux vs. Wavelength


**Scotopic Lumens: 4584.8**
**S/P: 0.52**

| $\lambda$<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               | 2750                          | 0.0                            | 490               | 47173                         | 72.6                           | 620               | 161309                        | 2.0                            | 750               | 8155                          | 0.0                            | 880               | 3493                          | 0.0                            |
| 365               | 2250                          | 0.0                            | 495               | 54281                         | 87.7                           | 625               | 153301                        | 1.3                            | 755               | 7110                          | 0.0                            | 885               | 4023                          | 0.0                            |
| 370               | 2449                          | 0.0                            | 500               | 61837                         | 103.4                          | 630               | 143292                        | 0.8                            | 760               | 6829                          | 0.0                            | 890               | 2983                          | 0.0                            |
| 375               | 2752                          | 0.0                            | 505               | 68833                         | 117.0                          | 635               | 132368                        | 0.5                            | 765               | 6022                          | 0.0                            | 895               | 2605                          | 0.0                            |
| 380               | 2834                          | 0.0                            | 510               | 74324                         | 126.0                          | 640               | 122334                        | 0.3                            | 770               | 5682                          | 0.0                            | 900               | 3576                          | 0.0                            |
| 385               | 2613                          | 0.0                            | 515               | 79410                         | 131.6                          | 645               | 112200                        | 0.2                            | 775               | 5247                          | 0.0                            | 905               | 2786                          | 0.0                            |
| 390               | 2589                          | 0.0                            | 520               | 83815                         | 133.2                          | 650               | 102448                        | 0.1                            | 780               | 4493                          | 0.0                            | 910               | 2480                          | 0.0                            |
| 395               | 2344                          | 0.0                            | 525               | 87774                         | 131.3                          | 655               | 91886                         | 0.1                            | 785               | 4667                          | 0.0                            | 915               | 2633                          | 0.0                            |
| 400               | 2067                          | 0.0                            | 530               | 91247                         | 125.8                          | 660               | 81865                         | 0.0                            | 790               | 3736                          | 0.0                            | 920               | 2726                          | 0.0                            |
| 405               | 2087                          | 0.1                            | 535               | 94694                         | 118.0                          | 665               | 72448                         | 0.0                            | 795               | 3568                          | 0.0                            | 925               | 3905                          | 0.0                            |
| 410               | 2663                          | 0.2                            | 540               | 98431                         | 108.8                          | 670               | 63654                         | 0.0                            | 800               | 3190                          | 0.0                            | 930               | 2414                          | 0.0                            |
| 415               | 3760                          | 0.4                            | 545               | 103765                        | 99.5                           | 675               | 55284                         | 0.0                            | 805               | 3215                          | 0.0                            | 935               | 3414                          | 0.0                            |
| 420               | 5815                          | 1.0                            | 550               | 109130                        | 89.2                           | 680               | 47949                         | 0.0                            | 810               | 3108                          | 0.0                            | 940               | 2725                          | 0.0                            |
| 425               | 9591                          | 2.3                            | 555               | 115271                        | 78.8                           | 685               | 42173                         | 0.0                            | 815               | 3889                          | 0.0                            | 945               | 4070                          | 0.0                            |
| 430               | 15806                         | 5.4                            | 560               | 123390                        | 69.0                           | 690               | 36755                         | 0.0                            | 820               | 2869                          | 0.0                            | 950               | 2640                          | 0.0                            |
| 435               | 26035                         | 11.6                           | 565               | 131926                        | 59.2                           | 695               | 31630                         | 0.0                            | 825               | 2776                          | 0.0                            | 955               | 2231                          | 0.0                            |
| 440               | 41509                         | 23.2                           | 570               | 141815                        | 50.0                           | 700               | 27642                         | 0.0                            | 830               | 2538                          | 0.0                            | 960               | 3598                          | 0.0                            |
| 445               | 62857                         | 42.1                           | 575               | 151359                        | 41.2                           | 705               | 24213                         | 0.0                            | 835               | 3283                          | 0.0                            | 965               | 1098                          | 0.0                            |
| 450               | 81434                         | 63.1                           | 580               | 160364                        | 33.0                           | 710               | 21007                         | 0.0                            | 840               | 2477                          | 0.0                            | 970               | 3057                          | 0.0                            |
| 455               | 77103                         | 67.4                           | 585               | 166836                        | 25.5                           | 715               | 18986                         | 0.0                            | 845               | 3781                          | 0.0                            | 975               | 152                           | 0.0                            |
| 460               | 62408                         | 60.3                           | 590               | 172885                        | 19.3                           | 720               | 16766                         | 0.0                            | 850               | 3525                          | 0.0                            | 980               | 1629                          | 0.0                            |
| 465               | 52134                         | 55.1                           | 595               | 176548                        | 14.1                           | 725               | 14792                         | 0.0                            | 855               | 4413                          | 0.0                            | 985               | 5600                          | 0.0                            |
| 470               | 44297                         | 51.0                           | 600               | 178427                        | 10.1                           | 730               | 12553                         | 0.0                            | 860               | 3598                          | 0.0                            | 990               | 5671                          | 0.0                            |
| 475               | 38679                         | 48.4                           | 605               | 177729                        | 7.0                            | 735               | 11291                         | 0.0                            | 865               | 3617                          | 0.0                            | 995               | 1881                          | 0.0                            |
| 480               | 38032                         | 51.4                           | 610               | 174846                        | 4.7                            | 740               | 9818                          | 0.0                            | 870               | 3567                          | 0.0                            | 1000              | 3484                          | 0.0                            |
| 485               | 41652                         | 60.4                           | 615               | 169274                        | 3.1                            | 745               | 8656                          | 0.0                            | 875               | 4346                          | 0.0                            |                   |                               |                                |

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### Melanopic Flux vs. Wavelength


**Melanopic Lumens: 12033.4      S/P: 1.36**

| 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       | 2750             | 0.0              | 490       | 47173            | 39.3             | 620       | 161309           | 0.1              | 750       | 8155             | 0.0              | 880       | 3493             | 0.0              |
| 365       | 2250             | 0.0              | 495       | 54281            | 44.8             | 625       | 153301           | 0.1              | 755       | 7110             | 0.0              | 885       | 4023             | 0.0              |
| 370       | 2449             | 0.0              | 500       | 61837            | 49.7             | 630       | 143292           | 0.0              | 760       | 6829             | 0.0              | 890       | 2983             | 0.0              |
| 375       | 2752             | 0.0              | 505       | 68833            | 52.8             | 635       | 132368           | 0.0              | 765       | 6022             | 0.0              | 895       | 2605             | 0.0              |
| 380       | 2834             | 0.0              | 510       | 74324            | 53.4             | 640       | 122334           | 0.0              | 770       | 5682             | 0.0              | 900       | 3576             | 0.0              |
| 385       | 2613             | 0.0              | 515       | 79410            | 51.9             | 645       | 112200           | 0.0              | 775       | 5247             | 0.0              | 905       | 2786             | 0.0              |
| 390       | 2589             | 0.0              | 520       | 83815            | 48.8             | 650       | 102448           | 0.0              | 780       | 4493             | 0.0              | 910       | 2480             | 0.0              |
| 395       | 2344             | 0.0              | 525       | 87774            | 44.5             | 655       | 91886            | 0.0              | 785       | 4667             | 0.0              | 915       | 2633             | 0.0              |
| 400       | 2067             | 0.0              | 530       | 91247            | 39.4             | 660       | 81865            | 0.0              | 790       | 3736             | 0.0              | 920       | 2726             | 0.0              |
| 405       | 2087             | 0.0              | 535       | 94694            | 34.1             | 665       | 72448            | 0.0              | 795       | 3568             | 0.0              | 925       | 3905             | 0.0              |
| 410       | 2663             | 0.1              | 540       | 98431            | 28.8             | 670       | 63654            | 0.0              | 800       | 3190             | 0.0              | 930       | 2414             | 0.0              |
| 415       | 3760             | 0.2              | 545       | 103765           | 24.1             | 675       | 55284            | 0.0              | 805       | 3215             | 0.0              | 935       | 3414             | 0.0              |
| 420       | 5815             | 0.7              | 550       | 109130           | 19.6             | 680       | 47949            | 0.0              | 810       | 3108             | 0.0              | 940       | 2725             | 0.0              |
| 425       | 9591             | 1.5              | 555       | 115271           | 15.5             | 685       | 42173            | 0.0              | 815       | 3889             | 0.0              | 945       | 4070             | 0.0              |
| 430       | 15806            | 3.3              | 560       | 123390           | 12.2             | 690       | 36755            | 0.0              | 820       | 2869             | 0.0              | 950       | 2640             | 0.0              |
| 435       | 26035            | 6.9              | 565       | 131926           | 9.3              | 695       | 31630            | 0.0              | 825       | 2776             | 0.0              | 955       | 2231             | 0.0              |
| 440       | 41509            | 13.9             | 570       | 141815           | 6.9              | 700       | 27642            | 0.0              | 830       | 2538             | 0.0              | 960       | 3598             | 0.0              |
| 445       | 62857            | 24.8             | 575       | 151359           | 5.0              | 705       | 24213            | 0.0              | 835       | 3283             | 0.0              | 965       | 1098             | 0.0              |
| 450       | 81434            | 37.5             | 580       | 160364           | 3.6              | 710       | 21007            | 0.0              | 840       | 2477             | 0.0              | 970       | 3057             | 0.0              |
| 455       | 77103            | 40.4             | 585       | 166836           | 2.5              | 715       | 18986            | 0.0              | 845       | 3781             | 0.0              | 975       | 152              | 0.0              |
| 460       | 62408            | 36.8             | 590       | 172885           | 1.7              | 720       | 16766            | 0.0              | 850       | 3525             | 0.0              | 980       | 1629             | 0.0              |
| 465       | 52134            | 34.1             | 595       | 176548           | 1.1              | 725       | 14792            | 0.0              | 855       | 4413             | 0.0              | 985       | 5600             | 0.0              |
| 470       | 44297            | 31.7             | 600       | 178427           | 0.8              | 730       | 12553            | 0.0              | 860       | 3598             | 0.0              | 990       | 5671             | 0.0              |
| 475       | 38679            | 29.5             | 605       | 177729           | 0.5              | 735       | 11291            | 0.0              | 865       | 3617             | 0.0              | 995       | 1881             | 0.0              |
| 480       | 38032            | 30.6             | 610       | 174846           | 0.3              | 740       | 9818             | 0.0              | 870       | 3567             | 0.0              | 1000      | 3484             | 0.0              |
| 485       | 41652            | 34.3             | 615       | 169274           | 0.2              | 745       | 8656             | 0.0              | 875       | 4346             | 0.0              |           |                  |                  |

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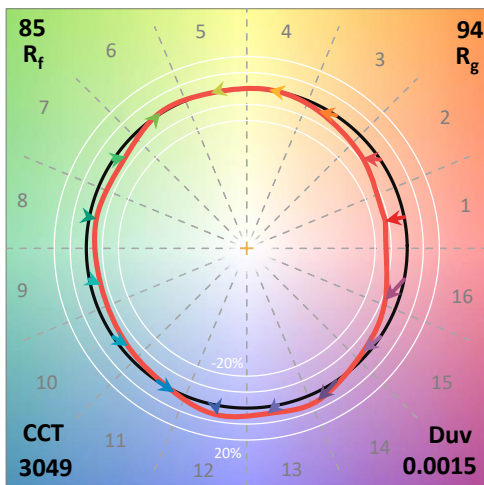
TM-30-18

### Summary

$R_f = 85.1$   
 $R_g = 94.3$   
 CIE  $R_a = 81.7$   
 $R_g = 1.9$



### Color Vector Graphics



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 85 | CES51 = 93 | CES76 = 82 |
| CES02 = 63 | CES27 = 94 | CES52 = 93 | CES77 = 85 |
| CES03 = 31 | CES28 = 95 | CES53 = 89 | CES78 = 82 |
| CES04 = 70 | CES29 = 90 | CES54 = 90 | CES79 = 91 |
| CES05 = 49 | CES30 = 96 | CES55 = 89 | CES80 = 90 |
| CES06 = 51 | CES31 = 91 | CES56 = 86 | CES81 = 72 |
| CES07 = 42 | CES32 = 85 | CES57 = 85 | CES82 = 96 |
| CES08 = 41 | CES33 = 95 | CES58 = 86 | CES83 = 95 |
| CES09 = 29 | CES34 = 92 | CES59 = 91 | CES84 = 92 |
| CES10 = 76 | CES35 = 96 | CES60 = 92 | CES85 = 77 |
| CES11 = 59 | CES36 = 87 | CES61 = 88 | CES86 = 68 |
| CES12 = 65 | CES37 = 96 | CES62 = 90 | CES87 = 84 |
| CES13 = 43 | CES38 = 94 | CES63 = 88 | CES88 = 87 |
| CES14 = 74 | CES39 = 98 | CES64 = 81 | CES89 = 75 |
| CES15 = 71 | CES40 = 96 | CES65 = 79 | CES90 = 88 |
| CES16 = 47 | CES41 = 97 | CES66 = 80 | CES91 = 79 |
| CES17 = 50 | CES42 = 98 | CES67 = 78 | CES92 = 65 |
| CES18 = 56 | CES43 = 92 | CES68 = 82 | CES93 = 78 |
| CES19 = 72 | CES44 = 99 | CES69 = 87 | CES94 = 61 |
| CES20 = 66 | CES45 = 93 | CES70 = 80 | CES95 = 74 |
| CES21 = 87 | CES46 = 90 | CES71 = 77 | CES96 = 83 |
| CES22 = 79 | CES47 = 95 | CES72 = 92 | CES97 = 88 |
| CES23 = 92 | CES48 = 84 | CES73 = 75 | CES98 = 84 |
| CES24 = 91 | CES49 = 91 | CES74 = 92 | CES99 = 75 |
| CES25 = 72 | CES50 = 94 | CES75 = 80 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)