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: LUMARK

Report Number: P979170

Luminaire Tested: **WPLLED38S-130W-4000K**

Issue Date: 03/31/2025

Report Generated By 670245763

Cooper Lighting Solutions Photometric Lab
1121 Highway 74 South
Peachtree City, GA 30269

Scaled Data Report

**Test Information**

| | |
|---|---|
| Test Method: | LM-79-08 |
| Report Number: | P979170 |
| Test Lab: | Cooper Lighting Solutions |
| Issue Date: | 03/31/2025 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS (FORMERLY EATON) |
| Product Line: | LUMARK |
| Catalog Number: | WPLLED38S-130W-4000K |
| Description: | LUMARK WALL PACK LED LARGE 80CRI CCT AND LUMEN SELECTIVE FIXTURE OPERATING @130W-4000K |
| Light Source: | 4000K CCT, 80 CRI LEDS |
| Ballast/Driver: | ELECTRONIC DRIVER |

**Summary**

| | |
|---|---|
| Lumens per Lamp: | N/A |
| Luminaire Lumens: | 18972.9 lumens |
| Efficiency: | N/A |
| Efficacy: | 151.2 lumens/watt |
| Luminous Opening: | Rectangular w/ Sides (W: 1.25' x L: 0.33' x H: 0.58') |
| IES Classification: | Type IV - Short |
| BUG Rating: | B3 - U5 - G5 |

| | |
|---|---|
| Input Watts (W): | 125.5 |
| Input Voltage (V): | 120 |
| 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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REPORT NUMBER: P979170
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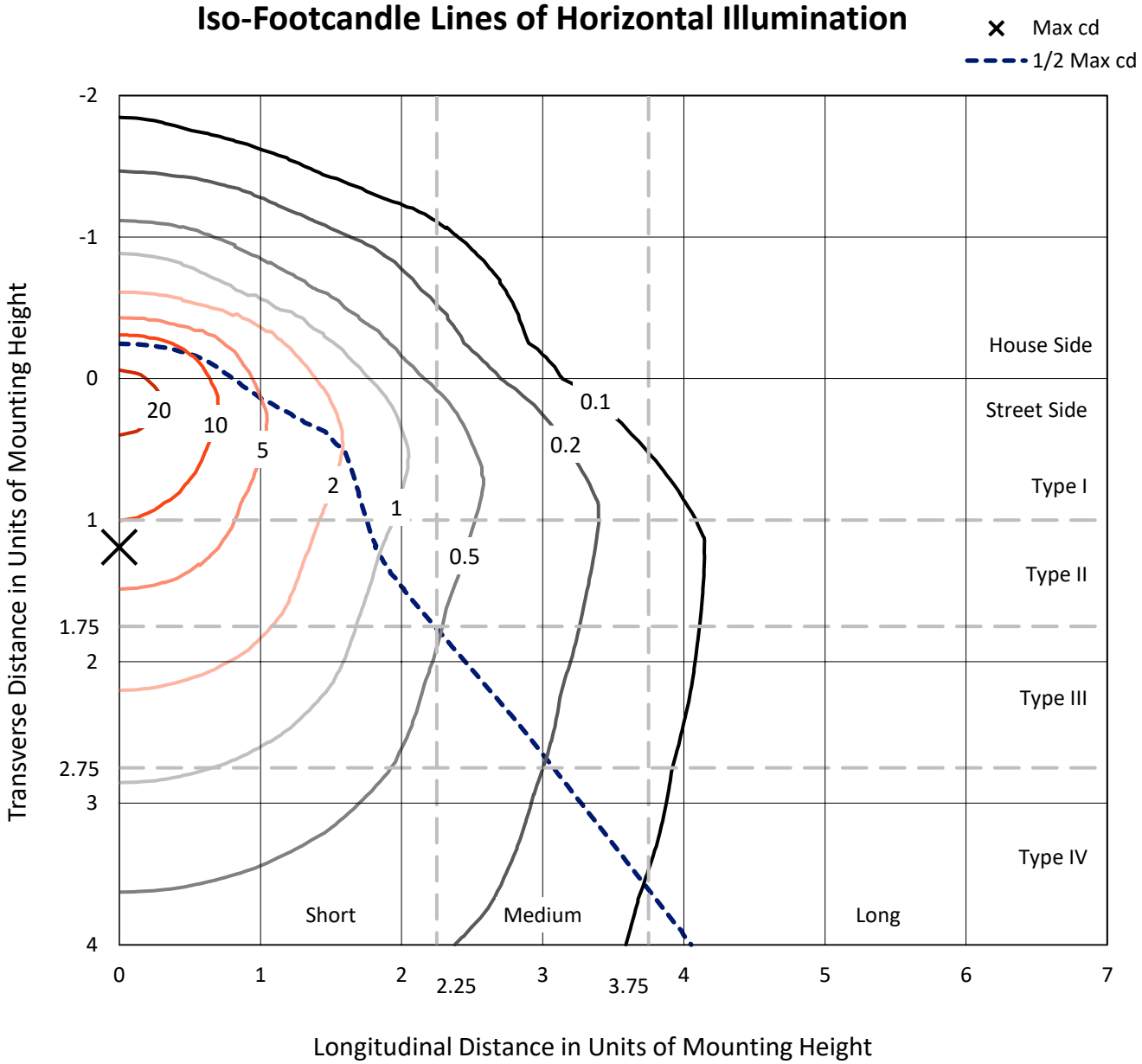
## Iso-Footcandle Lines of Horizontal Illumination




Based on 15 foot mounting height. Maximum calculated value = 23.7 fc
Type IV - Short - N/A

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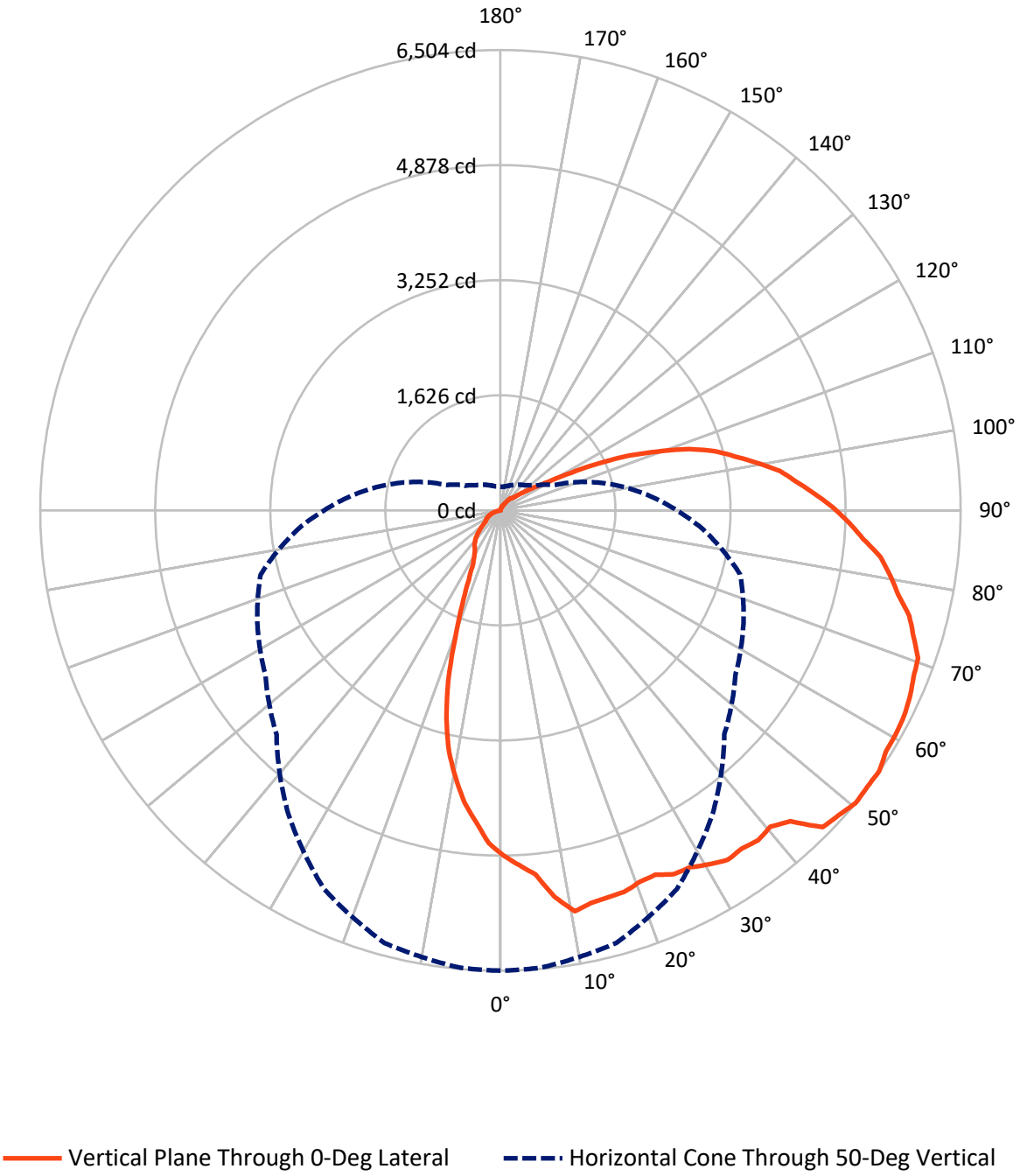
## Luminous Intensity Polar Plot



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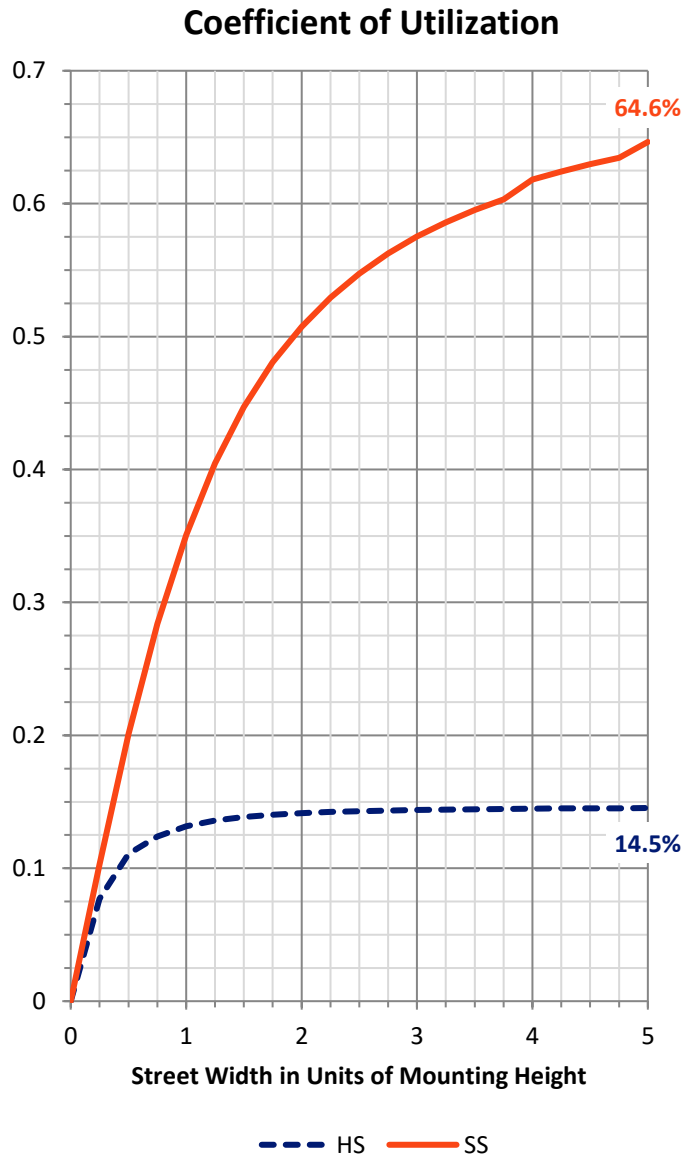
CATALOG NUMBER: WPLLED38S-130W-4000K

**FLUX DISTRIBUTION:**

| | | Downward | Upward | Total |
|---|---|---|---|---|
| **House Side** | Lumens | 2797.5 | 108.0 | 2905.5 |
| | % Fixture | 14.7 | 0.6 | 15.3 |
| **Street Side** | Lumens | 13455.5 | 2611.9 | 16067.4 |
| | % Fixture | 70.9 | 13.8 | 84.7 |
| **Total** | Lumens | 16253.0 | 2719.9 | 18972.9 |
| | % Fixture | 85.7 | 14.3 | 100.0 |

**ZONAL LUMENS:**

| Zone | Lumens | % Fixture |
|---|---|---|
| 0°-10° | 461.1 | 2.4 |
| 10°-20° | 1283.5 | 6.8 |
| 20°-30° | 1762.7 | 9.3 |
| 30°-40° | 2042.1 | 10.8 |
| 40°-50° | 2231.7 | 11.8 |
| 50°-60° | 2361.6 | 12.4 |
| 60°-70° | 2333.6 | 12.3 |
| 70°-80° | 2091.3 | 11.0 |
| 80°-90° | 1685.3 | 8.9 |
| 90°-100° | 1254.3 | 6.6 |
| 100°-110° | 806.0 | 4.2 |
| 110°-120° | 370.0 | 1.9 |
| 120°-130° | 149.5 | 0.8 |
| 130°-140° | 78.1 | 0.4 |
| 140°-150° | 39.5 | 0.2 |
| 150°-160° | 15.5 | 0.1 |
| 160°-170° | 5.5 | 0.0 |
| 170°-180° | 1.6 | 0.0 |
| 0°-90° | 16253.0 | 85.7 |
| 0°-180° | 18972.9 | 100.0 |



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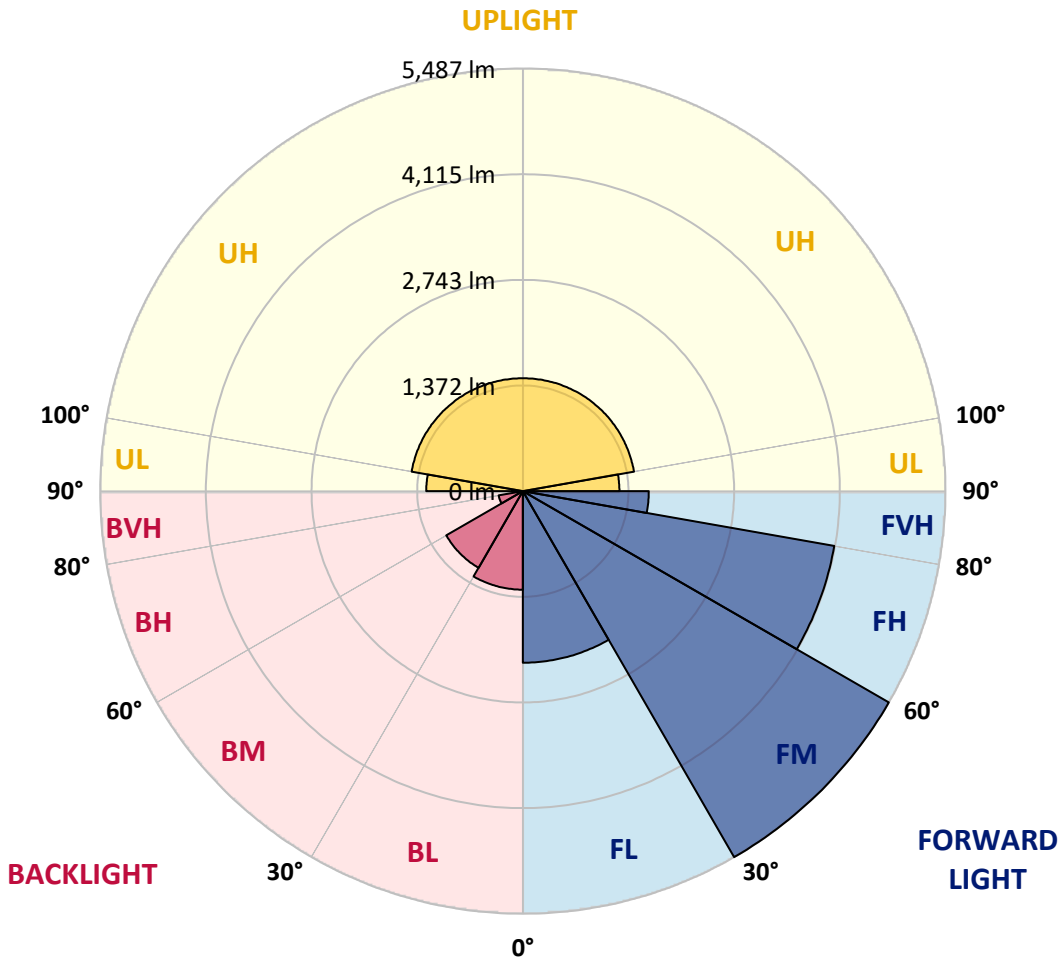
## LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:

| Zone | | Lumens | % Fixture | Zone Rating/Lumen Limit B | U | G |
|---|---|---|---|---|---|---|
| FL | (0°-30°) | 2228.1 | 11.7 | | | |
| FM | (30°-60°) | 5486.8 | 28.9 | | | |
| FH | (60°-80°) | 4105.8 | 21.6 | | | G2/5000 |
| FVH | (80°-90°) | 1634.8 | 8.6 | | | G5 |
| BL | (0°-30°) | 1279.2 | 6.7 | B3/2500 | | |
| BM | (30°-60°) | 1148.7 | 6.1 | B2/2500 | | |
| BH | (60°-80°) | 319.0 | 1.7 | B1/500 | | G1/500 |
| BVH | (80°-90°) | 50.5 | 0.3 | | | G1/100 |
| UL | (90°-100°) | 1254.3 | 6.6 | | U5 | |
| UH | (100°-180°) | 1465.6 | 7.7 | | U5 | |

**BUG Rating: B3-U5-G5**
Type IV Short



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CATALOG NUMBER: WPLLED38S-130W-4000K

**CANDELA DISTRIBUTION (FULL):**

| | 0° | 5° | 15° | 25° | 35° | 45° | 55° | 65° | 75° | 85° | 90° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 4876.7 | 4876.7 | 4876.7 | 4876.7 | 4876.7 | 4876.7 | 4876.7 | 4876.7 | 4876.7 | 4876.7 | 4876.7 |
| 2.5° | 5019.1 | 5004.7 | 5012.7 | 5023.9 | 4995.9 | 4993.5 | 4975.9 | 4927.1 | 4923.9 | 4899.9 | 4875.1 |
| 5° | 5168.0 | 5172.0 | 5164.8 | 5148.0 | 5128.0 | 5096.0 | 5099.2 | 5027.1 | 4976.7 | 4915.1 | 4873.5 |
| 7.5° | 5514.5 | 5535.3 | 5472.9 | 5408.1 | 5334.4 | 5248.8 | 5142.4 | 5075.2 | 4982.3 | 4885.5 | 4842.3 |
| 10° | 5761.0 | 5765.8 | 5745.8 | 5749.8 | 5592.1 | 5429.7 | 5276.0 | 5121.6 | 4991.1 | 4852.7 | 4794.3 |
| 12.5° | 5696.1 | 5717.7 | 5717.7 | 5716.9 | 5705.7 | 5680.9 | 5430.5 | 5180.8 | 5006.3 | 4817.5 | 4744.7 |
| 15° | 5674.5 | 5672.9 | 5674.5 | 5696.1 | 5686.5 | 5661.7 | 5589.7 | 5266.4 | 4982.3 | 4763.9 | 4662.2 |
| 17.5° | 5668.9 | 5669.7 | 5632.9 | 5644.9 | 5600.9 | 5593.7 | 5582.5 | 5321.6 | 4971.1 | 4719.8 | 4598.2 |
| 20° | 5608.1 | 5605.7 | 5620.1 | 5570.5 | 5540.9 | 5518.5 | 5479.3 | 5398.5 | 4926.3 | 4637.4 | 4509.4 |
| 22.5° | 5595.3 | 5596.9 | 5595.3 | 5499.3 | 5464.1 | 5432.9 | 5381.6 | 5356.8 | 4919.1 | 4542.2 | 4401.3 |
| 25° | 5696.1 | 5673.7 | 5633.7 | 5503.3 | 5372.8 | 5311.2 | 5248.8 | 5224.0 | 4847.9 | 4435.8 | 4265.3 |
| 27.5° | 5712.1 | 5699.3 | 5640.9 | 5549.7 | 5381.6 | 5204.0 | 5122.4 | 5070.3 | 4801.5 | 4306.1 | 4118.1 |
| 30° | 5806.6 | 5800.2 | 5709.7 | 5560.9 | 5360.0 | 5127.2 | 4967.1 | 4891.9 | 4695.0 | 4170.9 | 3954.0 |
| 32.5° | 5891.4 | 5892.2 | 5797.8 | 5621.7 | 5339.2 | 5067.9 | 4813.5 | 4723.8 | 4599.0 | 3998.0 | 3786.8 |
| 35° | 5873.0 | 5885.8 | 5817.8 | 5639.3 | 5353.6 | 4992.7 | 4679.8 | 4542.2 | 4461.4 | 3834.0 | 3572.3 |
| 37.5° | 5916.2 | 5933.8 | 5830.6 | 5624.1 | 5328.8 | 4930.3 | 4570.2 | 4386.1 | 4267.7 | 3614.7 | 3351.4 |
| 40° | 5877.0 | 5889.0 | 5781.8 | 5606.5 | 5277.6 | 4859.1 | 4451.8 | 4213.3 | 4066.0 | 3417.0 | 3143.4 |
| 42.5° | 6006.6 | 6021.8 | 5869.8 | 5605.7 | 5204.8 | 4727.8 | 4364.5 | 4091.7 | 3877.2 | 3240.2 | 2947.3 |
| 45° | 6386.8 | 6377.1 | 6125.1 | 5698.5 | 5192.0 | 4657.4 | 4240.5 | 3966.0 | 3720.3 | 3081.7 | 2766.4 |
| 47.5° | 6435.6 | 6431.6 | 6289.1 | 5828.2 | 5211.2 | 4551.8 | 4154.9 | 3881.2 | 3607.5 | 2968.9 | 2618.4 |
| 50° | 6504.4 | 6488.4 | 6329.1 | 5901.8 | 5230.4 | 4475.8 | 4054.8 | 3790.0 | 3509.1 | 2850.5 | 2492.0 |
| 52.5° | 6491.6 | 6481.2 | 6337.1 | 5934.6 | 5246.4 | 4405.3 | 3953.2 | 3710.7 | 3425.0 | 2753.6 | 2355.1 |
| 55° | 6499.6 | 6477.2 | 6342.7 | 5933.0 | 5256.0 | 4322.1 | 3817.2 | 3620.3 | 3341.0 | 2651.2 | 2226.3 |
| 57.5° | 6426.0 | 6401.2 | 6260.3 | 5917.0 | 5246.4 | 4242.1 | 3688.3 | 3490.7 | 3259.4 | 2544.0 | 2083.0 |
| 60° | 6422.0 | 6402.0 | 6230.7 | 5870.6 | 5201.6 | 4151.7 | 3569.9 | 3342.6 | 3157.8 | 2443.1 | 1921.4 |
| 62.5° | 6402.0 | 6380.4 | 6204.3 | 5852.2 | 5156.0 | 4069.2 | 3440.3 | 3202.6 | 3049.7 | 2317.5 | 1740.5 |
| 65° | 6360.3 | 6345.1 | 6171.5 | 5828.2 | 5104.0 | 3990.8 | 3301.8 | 3056.1 | 2925.7 | 2131.1 | 1519.7 |
| 67.5° | 6295.5 | 6284.3 | 6125.1 | 5777.8 | 5054.3 | 3912.4 | 3173.8 | 2904.9 | 2780.9 | 1900.6 | 1288.4 |
| 70° | 6261.9 | 6239.5 | 6075.5 | 5700.1 | 4983.1 | 3806.8 | 3042.5 | 2744.8 | 2601.6 | 1647.7 | 1036.3 |
| 72.5° | 6105.1 | 6088.3 | 5926.6 | 5576.1 | 4888.7 | 3699.5 | 2916.9 | 2570.4 | 2399.1 | 1349.2 | 785.0 |
| 75° | 5969.8 | 5965.8 | 5801.0 | 5438.5 | 4767.1 | 3583.5 | 2794.5 | 2399.9 | 2127.1 | 1056.3 | 586.6 |
| 77.5° | 5750.6 | 5725.0 | 5572.1 | 5256.0 | 4591.8 | 3429.0 | 2657.6 | 2221.5 | 1856.6 | 789.0 | 453.7 |
| 80° | 5584.9 | 5557.7 | 5419.3 | 5091.2 | 4438.2 | 3279.4 | 2520.8 | 2032.6 | 1563.7 | 569.0 | 364.9 |
| 82.5° | 5412.1 | 5367.2 | 5216.0 | 4871.1 | 4252.5 | 3113.8 | 2378.3 | 1879.8 | 1302.0 | 415.3 | 300.9 |
| 85° | 5141.6 | 5120.0 | 4947.1 | 4624.6 | 4014.8 | 2919.3 | 2231.1 | 1708.5 | 1069.1 | 321.7 | 247.3 |
| 87.5° | 4927.1 | 4891.1 | 4746.3 | 4400.5 | 3787.6 | 2740.0 | 2057.4 | 1514.1 | 841.9 | 260.9 | 208.1 |
| 90° | 4699.0 | 4650.2 | 4491.0 | 4155.7 | 3537.1 | 2536.8 | 1880.6 | 1337.2 | 673.8 | 222.5 | 183.3 |
| 92.5° | 4446.2 | 4401.3 | 4253.3 | 3907.6 | 3278.6 | 2339.9 | 1722.1 | 1166.0 | 528.2 | 198.5 | 168.1 |
| 95° | 4204.5 | 4166.9 | 4010.8 | 3665.9 | 3026.5 | 2145.5 | 1548.5 | 989.1 | 430.5 | 182.5 | 156.8 |
| 97.5° | 3988.4 | 3922.0 | 3742.7 | 3395.4 | 2755.2 | 1951.0 | 1378.0 | 826.7 | 364.9 | 172.9 | 151.2 |
| 100° | 3685.9 | 3657.9 | 3471.5 | 3113.0 | 2475.2 | 1749.3 | 1186.8 | 677.0 | 308.1 | 164.1 | 146.4 |
| 102.5° | 3393.8 | 3349.0 | 3200.2 | 2827.3 | 2204.7 | 1518.9 | 990.7 | 549.0 | 264.1 | 158.4 | 142.4 |
| 105° | 3133.0 | 3076.1 | 2920.9 | 2511.2 | 1902.2 | 1288.4 | 807.4 | 448.1 | 234.5 | 156.8 | 138.4 |
| 107.5° | 2801.7 | 2724.8 | 2535.2 | 2130.3 | 1588.5 | 1073.1 | 649.0 | 368.1 | 213.7 | 155.2 | 134.4 |
| 110° | 2367.1 | 2359.1 | 2174.3 | 1754.9 | 1289.2 | 854.7 | 517.8 | 307.3 | 198.5 | 151.2 | 130.4 |

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Scaled Data Report

REPORT NUMBER: P979170
CATALOG NUMBER: WPLLED38S-130W-4000K

**CANDELA DISTRIBUTION (continued):**

| | 0° | 5° | 15° | 25° | 35° | 45° | 55° | 65° | 75° | 85° | 90° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 112.5° | *1976.6* | 1937.4 | 1765.3 | 1378.0 | 1015.5 | 673.0 | 426.5 | 264.9 | 184.9 | 145.6 | 124.8 |
| 115° | *1539.7* | 1520.5 | 1357.2 | 1052.3 | 775.4 | 537.0 | 352.1 | 232.9 | 176.1 | 136.8 | 116.8 |
| 117.5° | *1129.9* | 1106.7 | 996.3 | 789.8 | 621.8 | 445.7 | 302.5 | 210.5 | 166.5 | 127.2 | 108.8 |
| 120° | *806.6* | 798.6 | 735.4 | 617.0 | 511.4 | 380.9 | 260.1 | 191.3 | 156.0 | 116.8 | 100.0 |
| 122.5° | *630.6* | 617.8 | 576.2 | 513.8 | 440.9 | 330.5 | 231.3 | 175.3 | 145.6 | 105.6 | 89.6 |
| 125° | *506.6* | 502.6 | 466.5 | 432.9 | 375.3 | 287.3 | 209.7 | 163.2 | 131.2 | 93.6 | 80.0 |
| 127.5° | *416.1* | 410.5 | 389.7 | 364.1 | 324.1 | 257.7 | 197.7 | 155.2 | 117.6 | 83.2 | 71.2 |
| 130° | *337.7* | 336.9 | 327.3 | 309.7 | 284.9 | 234.5 | 187.3 | 147.2 | 104.8 | 73.6 | 64.0 |
| 132.5° | *283.3* | 282.5 | 279.3 | 263.3 | 252.1 | 216.9 | 178.5 | 136.8 | 92.8 | 64.8 | 57.6 |
| 135° | *247.3* | 248.1 | 242.5 | 232.1 | 225.7 | 200.9 | 168.9 | 124.0 | 80.8 | 58.4 | 52.8 |
| 137.5° | *229.7* | 228.1 | 216.9 | 205.7 | 204.9 | 188.9 | 156.0 | 109.6 | 71.2 | 53.6 | 48.8 |
| 140° | *213.7* | 210.5 | 197.7 | 186.5 | 181.7 | 172.1 | 139.2 | 96.0 | 61.6 | 48.8 | 45.6 |
| 142.5° | *177.7* | 179.3 | 172.1 | 164.1 | 157.6 | 150.4 | 120.8 | 81.6 | 53.6 | 44.8 | 42.4 |
| 145° | *137.6* | 139.2 | 140.0 | 136.8 | 130.4 | 125.6 | 101.6 | 68.0 | 47.2 | 41.6 | 40.0 |
| 147.5° | *109.6* | 110.4 | 110.4 | 108.8 | 106.4 | 100.0 | 84.0 | 56.8 | 42.4 | 38.4 | 36.8 |
| 150° | *89.6* | 91.2 | 90.4 | 88.0 | 85.6 | 80.0 | 68.0 | 46.4 | 37.6 | 36.0 | 35.2 |
| 152.5° | *73.6* | 74.4 | 73.6 | 72.0 | 70.4 | 63.2 | 54.4 | 39.2 | 34.4 | 33.6 | 33.6 |
| 155° | *60.0* | 60.0 | 60.0 | 59.2 | 55.2 | 50.4 | 42.4 | 33.6 | 32.0 | 32.0 | 32.0 |
| 157.5° | *47.2* | 47.2 | 47.2 | 47.2 | 43.2 | 38.4 | 33.6 | 29.6 | 30.4 | 30.4 | 30.4 |
| 160° | *36.0* | 35.2 | 36.0 | 35.2 | 32.0 | 28.8 | 27.2 | 26.4 | 28.8 | 29.6 | 29.6 |
| 162.5° | *24.8* | 24.8 | 25.6 | 25.6 | 24.0 | 21.6 | 23.2 | 25.6 | 27.2 | 28.8 | 28.8 |
| 165° | *15.2* | 15.2 | 16.8 | 17.6 | 16.8 | 17.6 | 21.6 | 24.8 | 27.2 | 28.0 | 28.0 |
| 167.5° | *8.0* | 8.0 | 10.4 | 12.0 | 13.6 | 16.0 | 21.6 | 24.8 | 26.4 | 28.0 | 28.0 |
| 170° | *3.2* | 4.0 | 6.4 | 9.6 | 12.0 | 16.0 | 21.6 | 24.8 | 27.2 | 28.0 | 28.0 |
| 172.5° | *3.2* | 3.2 | 6.4 | 9.6 | 12.8 | 16.0 | 21.6 | 24.8 | 27.2 | 28.0 | 28.8 |
| 175° | *3.2* | 4.0 | 6.4 | 10.4 | 12.8 | 16.8 | 22.4 | 25.6 | 27.2 | 28.0 | 28.8 |
| 177.5° | *4.0* | 4.0 | 7.2 | 10.4 | 12.8 | 16.8 | 22.4 | 25.6 | 27.2 | 28.8 | 28.8 |
| 180° | *16.8* | 16.8 | 16.8 | 16.8 | 16.8 | 16.8 | 16.8 | 16.8 | 16.8 | 16.8 | 16.8 |

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REPORT NUMBER: P979170
CATALOG NUMBER: WPLLED38S-130W-4000K

**CANDELA DISTRIBUTION (continued):**

| | 95° | 105° | 115° | 125° | 135° | 145° | 155° | 165° | 175° | 180° |
|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 4876.7 | 4876.7 | 4876.7 | 4876.7 | 4876.7 | 4876.7 | 4876.7 | 4876.7 | 4876.7 | 4876.7 |
| 2.5° | 4850.3 | 4819.1 | 4791.1 | 4742.2 | 4715.8 | 4705.4 | 4679.0 | 4688.6 | 4695.8 | 4703.8 |
| 5° | 4829.5 | 4780.7 | 4723.8 | 4653.4 | 4579.0 | 4515.0 | 4435.8 | 4427.0 | 4431.8 | 4414.1 |
| 7.5° | 4791.9 | 4698.2 | 4580.6 | 4476.6 | 4380.5 | 4299.7 | 4231.7 | 4178.9 | 4157.3 | 4159.7 |
| 10° | 4742.2 | 4603.8 | 4435.8 | 4326.9 | 4152.5 | 4052.4 | 3956.4 | 3879.6 | 3851.6 | 3830.8 |
| 12.5° | 4681.4 | 4503.8 | 4302.9 | 4138.1 | 3934.8 | 3760.3 | 3636.3 | 3523.5 | 3469.1 | 3489.1 |
| 15° | 4582.2 | 4356.5 | 4140.5 | 3922.8 | 3672.3 | 3447.5 | 3264.2 | 3128.2 | 3064.9 | 3046.5 |
| 17.5° | 4498.2 | 4231.7 | 3963.6 | 3643.5 | 3357.8 | 3100.1 | 2846.5 | 2634.4 | 2514.4 | 2516.8 |
| 20° | 4380.5 | 4063.6 | 3749.9 | 3390.6 | 3026.5 | 2629.6 | 2297.5 | 2062.2 | 1932.6 | 1918.2 |
| 22.5° | 4243.7 | 3898.8 | 3535.5 | 3114.6 | 2636.8 | 2152.7 | 1770.9 | 1559.7 | 1483.7 | 1441.2 |
| 25° | 4093.3 | 3708.3 | 3294.6 | 2795.3 | 2193.5 | 1694.1 | 1351.6 | 1179.6 | 1090.7 | 1076.3 |
| 27.5° | 3926.0 | 3499.5 | 3018.5 | 2401.5 | 1778.1 | 1314.8 | 1041.9 | 899.5 | 858.7 | 849.1 |
| 30° | 3734.7 | 3296.2 | 2748.8 | 2035.0 | 1418.8 | 1031.5 | 849.9 | 777.0 | 753.8 | 749.8 |
| 32.5° | 3544.3 | 3062.5 | 2459.2 | 1695.7 | 1137.9 | 849.1 | 753.0 | 705.0 | 685.8 | 679.4 |
| 35° | 3313.0 | 2820.9 | 2174.3 | 1421.2 | 941.9 | 755.4 | 693.0 | 654.6 | 641.8 | 639.4 |
| 37.5° | 3090.5 | 2579.2 | 1891.0 | 1193.2 | 813.0 | 696.2 | 645.8 | 620.2 | 611.4 | 607.4 |
| 40° | 2862.5 | 2354.3 | 1630.9 | 986.7 | 723.4 | 642.6 | 607.4 | 571.4 | 561.8 | 561.8 |
| 42.5° | 2665.6 | 2143.1 | 1370.8 | 834.7 | 654.6 | 593.0 | 550.6 | 528.2 | 518.6 | 517.0 |
| 45° | 2473.6 | 1933.4 | 1153.2 | 724.2 | 595.4 | 533.8 | 504.2 | 465.7 | 452.1 | 456.1 |
| 47.5° | 2318.3 | 1713.3 | 975.5 | 655.4 | 549.0 | 493.0 | 442.5 | 408.9 | 391.3 | 391.3 |
| 50° | *2151.9* | *1488.5* | *845.9* | *606.6* | *498.6* | *440.9* | *392.1* | *353.7* | *331.3* | *334.5* |
| 52.5° | 1993.4 | 1299.6 | 752.2 | 565.0 | 456.1 | 393.7 | 344.9 | 308.1 | 280.9 | 277.7 |
| 55° | 1819.0 | 1121.9 | 691.4 | 523.4 | 408.9 | 350.5 | 304.1 | 265.7 | 249.7 | 248.9 |
| 57.5° | 1660.5 | 974.7 | 648.2 | 476.9 | 364.1 | 308.9 | 264.9 | 236.9 | 238.5 | 243.3 |
| 60° | 1468.4 | 857.1 | 611.4 | 432.9 | 322.5 | 265.7 | 232.9 | 214.5 | 217.7 | 219.3 |
| 62.5° | 1282.0 | 769.0 | 575.4 | 389.7 | 280.1 | 231.3 | 200.1 | 188.9 | 199.3 | 200.1 |
| 65° | 1071.5 | 695.4 | 530.6 | 342.5 | 243.3 | 199.3 | 171.3 | 173.7 | 178.5 | 180.1 |
| 67.5° | 873.1 | 636.2 | 480.1 | 304.1 | 209.7 | 165.7 | 152.8 | 152.0 | 159.2 | 158.4 |
| 70° | 702.6 | 578.6 | 427.3 | 260.1 | 177.7 | 137.6 | 131.2 | 129.6 | 132.0 | 133.6 |
| 72.5° | 577.8 | 518.6 | 368.9 | 221.7 | 148.0 | 115.2 | 107.2 | 105.6 | 103.2 | 104.8 |
| 75° | 494.6 | 456.9 | 314.5 | 184.1 | 118.4 | 92.0 | 81.6 | 76.8 | 73.6 | 75.2 |
| 77.5° | 428.1 | 392.1 | 265.7 | 152.0 | 93.6 | 70.4 | 55.2 | 44.8 | 42.4 | 42.4 |
| 80° | 362.5 | 326.5 | 221.7 | 123.2 | 72.8 | 47.2 | 25.6 | 16.0 | 13.6 | 13.6 |
| 82.5° | 308.1 | 273.7 | 184.1 | 99.2 | 52.8 | 24.8 | 5.6 | 0.8 | 0.0 | 0.0 |
| 85° | 259.3 | 228.9 | 155.2 | 82.4 | 43.2 | 20.8 | 6.4 | 1.6 | 0.0 | 0.0 |
| 87.5° | 218.5 | 192.1 | 136.0 | 72.0 | 39.2 | 20.0 | 7.2 | 2.4 | 0.8 | 0.8 |
| 90° | 189.7 | 168.1 | 120.0 | 64.8 | 36.0 | 19.2 | 7.2 | 3.2 | 2.4 | 2.4 |
| 92.5° | 171.3 | 151.2 | 110.4 | 60.0 | 33.6 | 18.4 | 8.0 | 4.8 | 3.2 | 3.2 |
| 95° | 156.0 | 137.6 | 100.8 | 56.0 | 32.0 | 18.4 | 8.8 | 5.6 | 4.0 | 4.0 |
| 97.5° | 144.8 | 128.0 | 92.8 | 52.0 | 30.4 | 18.4 | 9.6 | 6.4 | 5.6 | 4.8 |
| 100° | 134.4 | 118.4 | 84.8 | 48.8 | 29.6 | 18.4 | 9.6 | 7.2 | 5.6 | 5.6 |
| 102.5° | 127.2 | 111.2 | 78.4 | 45.6 | 28.8 | 17.6 | 9.6 | 7.2 | 5.6 | 5.6 |
| 105° | 122.4 | 106.4 | 72.8 | 43.2 | 27.2 | 17.6 | 9.6 | 7.2 | 5.6 | 5.6 |
| 107.5° | 117.6 | 102.4 | 66.4 | 41.6 | 25.6 | 16.8 | 9.6 | 7.2 | 5.6 | 5.6 |
| 110° | 113.6 | 95.2 | 61.6 | 39.2 | 24.8 | 16.0 | 9.6 | 6.4 | 4.8 | 4.8 |

Cooper Lighting Solutions Photometric Lab
1121 Highway 74 South
Peachtree City, GA 30269

Scaled Data Report

REPORT NUMBER: P979170
CATALOG NUMBER: WPLLED38S-130W-4000K

**CANDELA DISTRIBUTION (continued):**

| | 95° | 105° | 115° | 125° | 135° | 145° | 155° | 165° | 175° | 180° |
|---|---|---|---|---|---|---|---|---|---|---|
| 112.5° | 108.8 | 86.4 | 56.8 | 36.0 | 23.2 | 14.4 | 8.8 | 6.4 | 4.8 | 4.8 |
| 115° | 101.6 | 76.0 | 52.0 | 34.4 | 22.4 | 13.6 | 8.8 | 5.6 | 4.0 | 4.0 |
| 117.5° | 94.4 | 68.0 | 47.2 | 32.0 | 21.6 | 12.8 | 8.0 | 5.6 | 4.0 | 4.0 |
| 120° | 86.4 | 60.8 | 44.0 | 30.4 | 20.8 | 12.8 | 8.0 | 4.8 | 4.0 | 4.0 |
| 122.5° | 76.8 | 55.2 | 41.6 | 29.6 | 20.0 | 12.0 | 8.0 | 4.8 | 3.2 | 3.2 |
| 125° | 68.0 | 50.4 | 39.2 | 28.8 | 19.2 | 11.2 | 8.0 | 4.8 | 3.2 | 3.2 |
| 127.5° | 60.8 | 47.2 | 36.8 | 28.0 | 18.4 | 11.2 | 8.0 | 4.8 | 3.2 | 3.2 |
| 130° | 55.2 | 44.0 | 36.0 | 27.2 | 18.4 | 12.0 | 8.0 | 4.8 | 3.2 | 3.2 |
| 132.5° | 50.4 | 41.6 | 34.4 | 27.2 | 18.4 | 12.0 | 8.8 | 5.6 | 4.0 | 4.0 |
| 135° | 47.2 | 39.2 | 33.6 | 26.4 | 17.6 | 12.0 | 8.8 | 5.6 | 4.0 | 4.0 |
| 137.5° | 44.8 | 37.6 | 32.0 | 26.4 | 17.6 | 12.8 | 9.6 | 5.6 | 4.0 | 4.0 |
| 140° | 42.4 | 36.0 | 31.2 | 25.6 | 17.6 | 12.8 | 9.6 | 6.4 | 4.8 | 4.8 |
| 142.5° | 40.0 | 35.2 | 30.4 | 24.8 | 17.6 | 12.8 | 9.6 | 6.4 | 4.8 | 4.8 |
| 145° | 37.6 | 33.6 | 29.6 | 24.0 | 16.8 | 12.8 | 9.6 | 6.4 | 4.8 | 4.8 |
| 147.5° | 36.0 | 32.8 | 28.0 | 23.2 | 16.8 | 12.8 | 9.6 | 6.4 | 4.8 | 4.8 |
| 150° | 33.6 | 31.2 | 27.2 | 22.4 | 16.8 | 12.8 | 9.6 | 6.4 | 4.0 | 4.0 |
| 152.5° | 32.0 | 29.6 | 26.4 | 21.6 | 16.0 | 12.8 | 9.6 | 6.4 | 4.0 | 4.0 |
| 155° | 31.2 | 28.8 | 25.6 | 21.6 | 16.0 | 12.8 | 9.6 | 5.6 | 4.0 | 4.0 |
| 157.5° | 29.6 | 28.0 | 25.6 | 21.6 | 16.0 | 12.8 | 9.6 | 5.6 | 4.0 | 4.0 |
| 160° | 28.8 | 27.2 | 24.8 | 21.6 | 16.0 | 12.8 | 8.8 | 5.6 | 4.0 | 4.0 |
| 162.5° | 28.8 | 27.2 | 24.8 | 21.6 | 16.0 | 12.8 | 8.8 | 5.6 | 4.0 | 3.2 |
| 165° | 28.0 | 27.2 | 24.8 | 21.6 | 16.0 | 12.0 | 8.8 | 4.8 | 3.2 | 3.2 |
| 167.5° | 28.0 | 27.2 | 24.8 | 20.8 | 16.0 | 12.0 | 8.8 | 4.8 | 3.2 | 3.2 |
| 170° | 28.0 | 27.2 | 24.8 | 20.8 | 16.0 | 12.0 | 8.8 | 4.8 | 3.2 | 2.4 |
| 172.5° | 28.0 | 27.2 | 24.8 | 20.8 | 16.0 | 12.0 | 8.8 | 4.8 | 2.4 | 2.4 |
| 175° | 28.8 | 27.2 | 24.8 | 20.8 | 16.0 | 12.0 | 8.8 | 4.8 | 2.4 | 2.4 |
| 177.5° | 28.8 | 27.2 | 24.8 | 20.8 | 16.0 | 12.0 | 8.0 | 4.8 | 2.4 | 2.4 |
| 180° | 16.8 | 16.8 | 16.8 | 16.8 | 16.8 | 16.8 | 16.8 | 16.8 | 16.8 | 16.8 |

Cooper Lighting Solutions Photometric Lab
1121 Highway 74 South
Peachtree City, GA 30269

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

Report Prepared for

Cooper Lighting Solutions

Lumark

Report Number: SP1-2407-168-3

Test Date: 08/08/2024

Luminaire Tested: LSDL-92S-100W 4000k

Data in this report applies to families of products including LSDL-92S-100W 4000k.

Report Generated By FNC07603 / LDUCLS01DT446
Version: v7.04

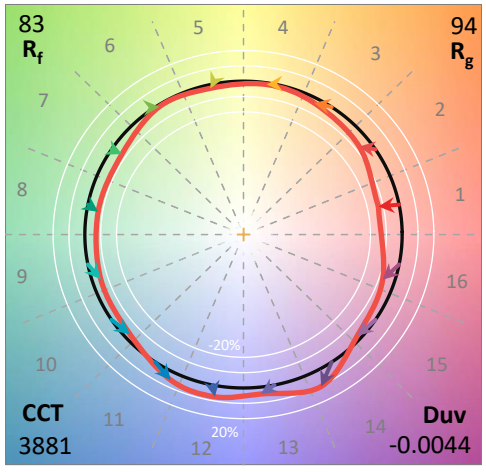
## Test Information

| | |
|---|---|
| Test Method: | LM-79-2019 |
| Report Number: | SP1-2407-168-3 |
| Test Lab: | COOPER LIGHTING SOLUTIONS |
| Photometer: | SP1 - 76IN SPHERE |
| Measurement Geometry: | 4π |
| Issue Date: | 08/12/2024 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS |
| Product Line: | Lumark |
| Catalog Number: | **LSDL-92S-100W 4000k** |
| Description: | Lumark Wallpack 100W |

## Spectral Parameters

| | | | | | |
|---|---|---|---|---|---|
| CCT (K): | 3881 | CRI (Ra): | 82.7 | | |
| CIE u': | 0.2297 | R1: | 82.3 | R9: | 4.8 |
| CIE v': | 0.4983 | R2: | 93.7 | R10: | 84.4 |
| Duv: | -0.0044 | R3: | 93.3 | R11: | 77.9 |
| CIE x: | 0.3825 | R4: | 79.0 | R12: | 66.7 |
| CIE y: | 0.3688 | R5: | 82.7 | R13: | 85.8 |
| CIE z: | 0.2487 | R6: | 89.4 | R14: | 97.2 |
| Peak Wavelength (nm): | 453 | R7: | 81.3 | R15: | 76.3 |
| Dominant Wavelength (nm): | 582 | R8: | 59.9 | | |
| Purity: | 25.44833 | | | | |

| | |
|---|---|
| Rf: | 82.8 |
| Rg: | 93.7 |




## Test Conditions

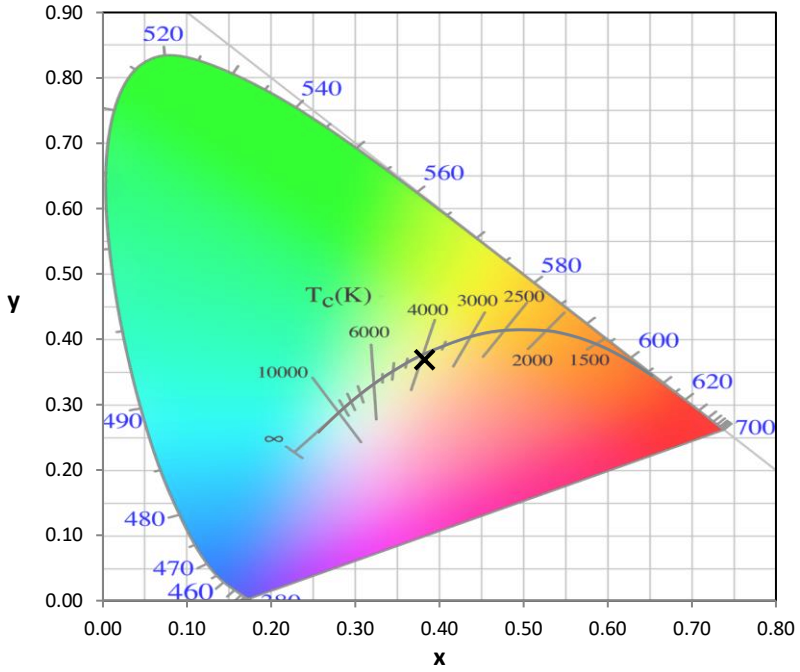
| | |
|---|---|
| Stabilization Time: | 20M |
| Operation Time: | 1H 20M |
| Sphere Temperature (°C): | 24.2 |

REPORT NUMBER: SP1-2407-168-3

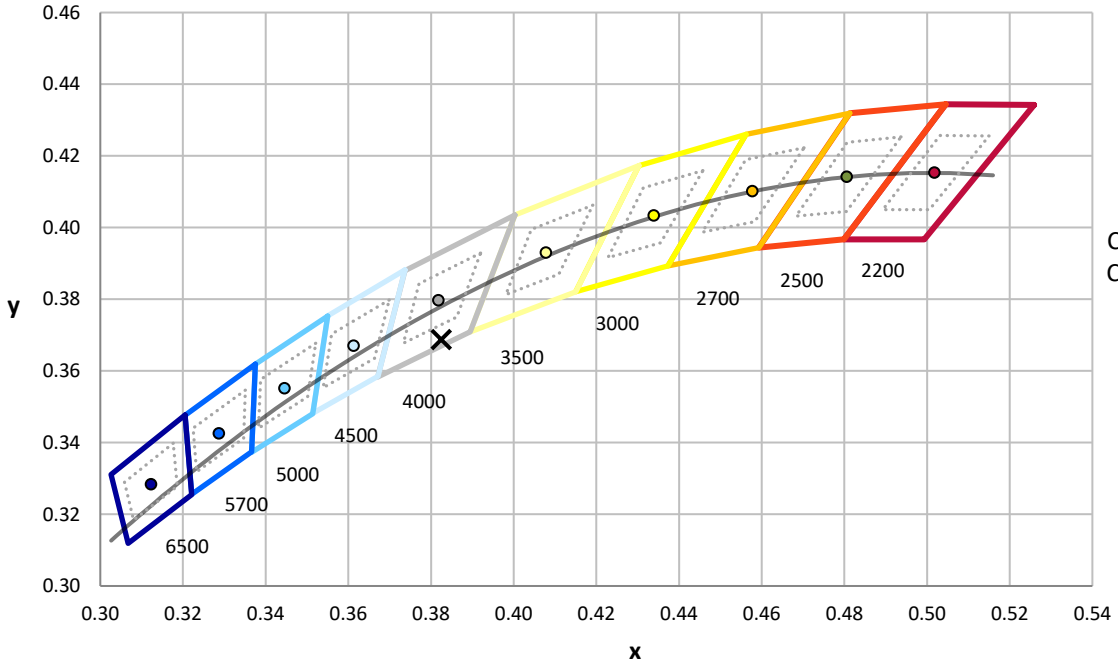
| Measurement and Test Equipment | | | |
|---|---|---|---|
| Instrument | Identification Number | Calibration Date | Calibration Due Date |
| Photometer | IN0058 | 6/18/2024 | 12/18/2024 |
| Power Meter | INXT2011004 | 2/8/2024 | 2/8/2025 |
| AC Power Source | IN0063 | 10/24/2023 | 10/24/2024 |
| DC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

REPORT NUMBER: SP1-2407-168-3

## CIE 1931 Chromaticity Diagram




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

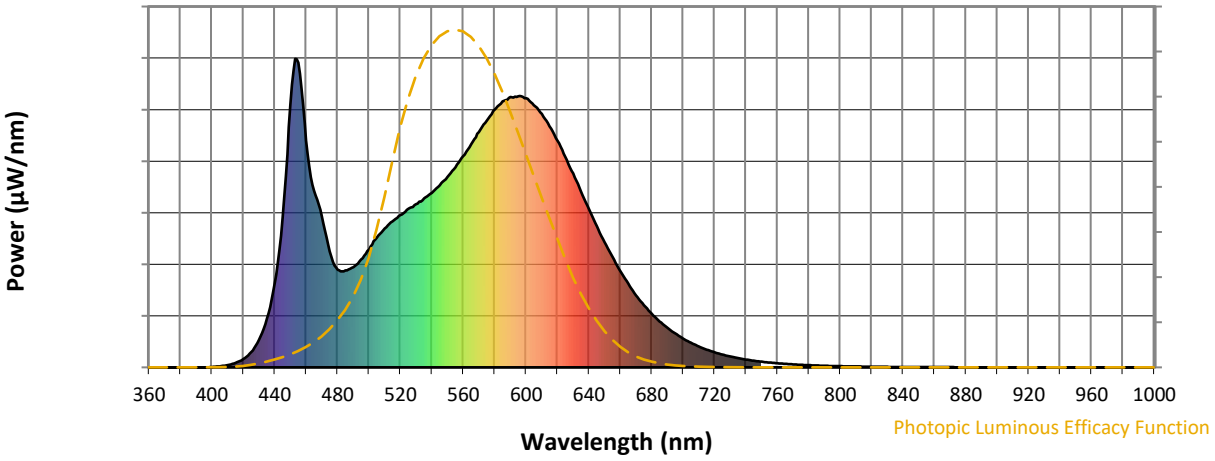



CCT = 3881K
CIE x = 0.3825
CIE y = 0.3688
Duv = -0.0044

Point lies inside the ANSI 4000K 7-step quadrangle

REPORT NUMBER: SP1-2407-168-3

## Photopic Flux vs. Wavelength

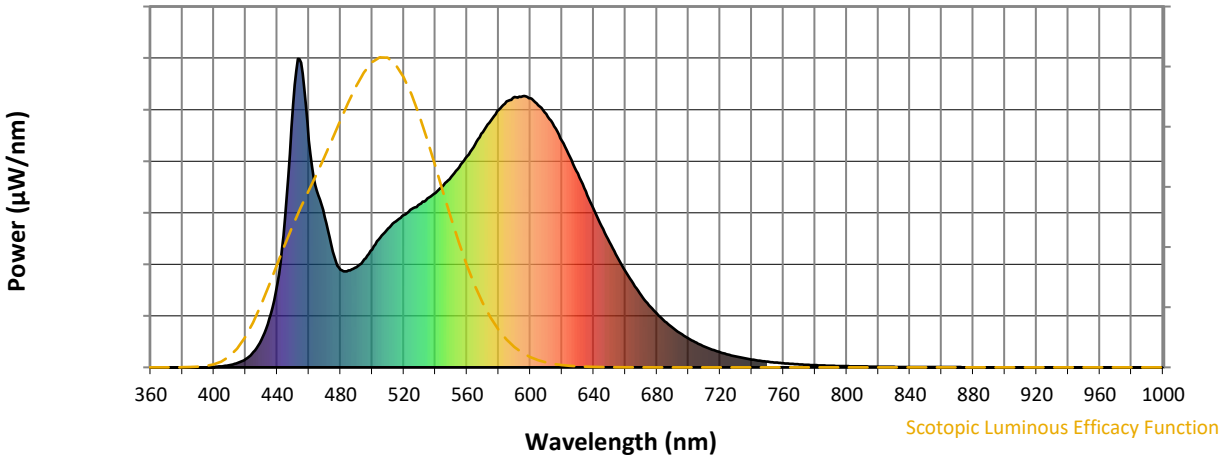



## Photopic Lumens: NR

| λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 360 | 0 | NR | 490 | 325 | NR | 620 | 735 | NR | 750 | 18 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 350 | NR | 625 | 682 | NR | 755 | 16 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 382 | NR | 630 | 629 | NR | 760 | 13 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 421 | NR | 635 | 570 | NR | 765 | 11 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 450 | NR | 640 | 514 | NR | 770 | 10 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 474 | NR | 645 | 458 | NR | 775 | 8 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 494 | NR | 650 | 406 | NR | 780 | 7 | NR | 910 | 0 | NR |
| 395 | 0 | NR | 525 | 513 | NR | 655 | 358 | NR | 785 | 6 | NR | 915 | 0 | NR |
| 400 | 2 | NR | 530 | 529 | NR | 660 | 312 | NR | 790 | 5 | NR | 920 | 0 | NR |
| 405 | 4 | NR | 535 | 548 | NR | 665 | 271 | NR | 795 | 4 | NR | 925 | 0 | NR |
| 410 | 8 | NR | 540 | 565 | NR | 670 | 234 | NR | 800 | 4 | NR | 930 | 0 | NR |
| 415 | 14 | NR | 545 | 591 | NR | 675 | 202 | NR | 805 | 3 | NR | 935 | 0 | NR |
| 420 | 27 | NR | 550 | 618 | NR | 680 | 174 | NR | 810 | 3 | NR | 940 | 0 | NR |
| 425 | 50 | NR | 555 | 649 | NR | 685 | 149 | NR | 815 | 2 | NR | 945 | 0 | NR |
| 430 | 89 | NR | 560 | 685 | NR | 690 | 129 | NR | 820 | 2 | NR | 950 | 0 | NR |
| 435 | 159 | NR | 565 | 723 | NR | 695 | 110 | NR | 825 | 2 | NR | 955 | 0 | NR |
| 440 | 272 | NR | 570 | 762 | NR | 700 | 93 | NR | 830 | 2 | NR | 960 | 0 | NR |
| 445 | 486 | NR | 575 | 800 | NR | 705 | 80 | NR | 835 | 1 | NR | 965 | 0 | NR |
| 450 | 852 | NR | 580 | 835 | NR | 710 | 67 | NR | 840 | 1 | NR | 970 | 0 | NR |
| 455 | 988 | NR | 585 | 862 | NR | 715 | 57 | NR | 845 | 1 | NR | 975 | 0 | NR |
| 460 | 735 | NR | 590 | 876 | NR | 720 | 49 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 572 | NR | 595 | 879 | NR | 725 | 42 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 486 | NR | 600 | 872 | NR | 730 | 35 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 375 | NR | 605 | 850 | NR | 735 | 30 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 317 | NR | 610 | 821 | NR | 740 | 25 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 314 | NR | 615 | 782 | NR | 745 | 22 | NR | 875 | 0 | NR | | | |

REPORT NUMBER: SP1-2407-168-3

## Scotopic Flux vs. Wavelength

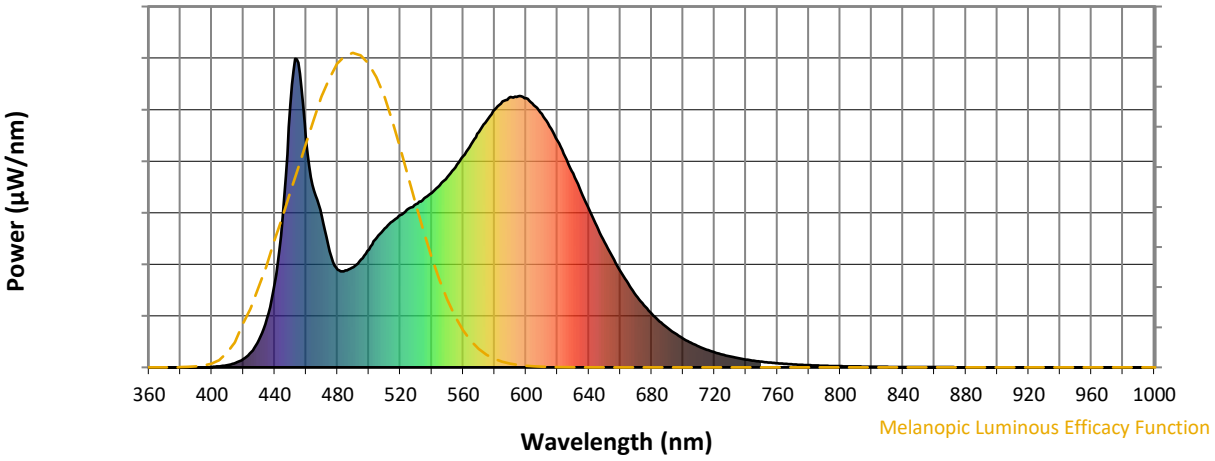



**Scotopic Lumens: NR** **S/P: 1.72**

| λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 360 | 0 | NR | 490 | 325 | NR | 620 | 735 | NR | 750 | 18 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 350 | NR | 625 | 682 | NR | 755 | 16 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 382 | NR | 630 | 629 | NR | 760 | 13 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 421 | NR | 635 | 570 | NR | 765 | 11 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 450 | NR | 640 | 514 | NR | 770 | 10 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 474 | NR | 645 | 458 | NR | 775 | 8 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 494 | NR | 650 | 406 | NR | 780 | 7 | NR | 910 | 0 | NR |
| 395 | 0 | NR | 525 | 513 | NR | 655 | 358 | NR | 785 | 6 | NR | 915 | 0 | NR |
| 400 | 2 | NR | 530 | 529 | NR | 660 | 312 | NR | 790 | 5 | NR | 920 | 0 | NR |
| 405 | 4 | NR | 535 | 548 | NR | 665 | 271 | NR | 795 | 4 | NR | 925 | 0 | NR |
| 410 | 8 | NR | 540 | 565 | NR | 670 | 234 | NR | 800 | 4 | NR | 930 | 0 | NR |
| 415 | 14 | NR | 545 | 591 | NR | 675 | 202 | NR | 805 | 3 | NR | 935 | 0 | NR |
| 420 | 27 | NR | 550 | 618 | NR | 680 | 174 | NR | 810 | 3 | NR | 940 | 0 | NR |
| 425 | 50 | NR | 555 | 649 | NR | 685 | 149 | NR | 815 | 2 | NR | 945 | 0 | NR |
| 430 | 89 | NR | 560 | 685 | NR | 690 | 129 | NR | 820 | 2 | NR | 950 | 0 | NR |
| 435 | 159 | NR | 565 | 723 | NR | 695 | 110 | NR | 825 | 2 | NR | 955 | 0 | NR |
| 440 | 272 | NR | 570 | 762 | NR | 700 | 93 | NR | 830 | 2 | NR | 960 | 0 | NR |
| 445 | 486 | NR | 575 | 800 | NR | 705 | 80 | NR | 835 | 1 | NR | 965 | 0 | NR |
| 450 | 852 | NR | 580 | 835 | NR | 710 | 67 | NR | 840 | 1 | NR | 970 | 0 | NR |
| 455 | 988 | NR | 585 | 862 | NR | 715 | 57 | NR | 845 | 1 | NR | 975 | 0 | NR |
| 460 | 735 | NR | 590 | 876 | NR | 720 | 49 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 572 | NR | 595 | 879 | NR | 725 | 42 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 486 | NR | 600 | 872 | NR | 730 | 35 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 375 | NR | 605 | 850 | NR | 735 | 30 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 317 | NR | 610 | 821 | NR | 740 | 25 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 314 | NR | 615 | 782 | NR | 745 | 22 | NR | 875 | 0 | NR | | | |

REPORT NUMBER: SP1-2407-168-3

## Melanopic Flux vs. Wavelength




**Melanopic Lumens: NR** **M/P: 3.62**

| λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 360 | 0 | NR | 490 | 325 | NR | 620 | 735 | NR | 750 | 18 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 350 | NR | 625 | 682 | NR | 755 | 16 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 382 | NR | 630 | 629 | NR | 760 | 13 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 421 | NR | 635 | 570 | NR | 765 | 11 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 450 | NR | 640 | 514 | NR | 770 | 10 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 474 | NR | 645 | 458 | NR | 775 | 8 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 494 | NR | 650 | 406 | NR | 780 | 7 | NR | 910 | 0 | NR |
| 395 | 0 | NR | 525 | 513 | NR | 655 | 358 | NR | 785 | 6 | NR | 915 | 0 | NR |
| 400 | 2 | NR | 530 | 529 | NR | 660 | 312 | NR | 790 | 5 | NR | 920 | 0 | NR |
| 405 | 4 | NR | 535 | 548 | NR | 665 | 271 | NR | 795 | 4 | NR | 925 | 0 | NR |
| 410 | 8 | NR | 540 | 565 | NR | 670 | 234 | NR | 800 | 4 | NR | 930 | 0 | NR |
| 415 | 14 | NR | 545 | 591 | NR | 675 | 202 | NR | 805 | 3 | NR | 935 | 0 | NR |
| 420 | 27 | NR | 550 | 618 | NR | 680 | 174 | NR | 810 | 3 | NR | 940 | 0 | NR |
| 425 | 50 | NR | 555 | 649 | NR | 685 | 149 | NR | 815 | 2 | NR | 945 | 0 | NR |
| 430 | 89 | NR | 560 | 685 | NR | 690 | 129 | NR | 820 | 2 | NR | 950 | 0 | NR |
| 435 | 159 | NR | 565 | 723 | NR | 695 | 110 | NR | 825 | 2 | NR | 955 | 0 | NR |
| 440 | 272 | NR | 570 | 762 | NR | 700 | 93 | NR | 830 | 2 | NR | 960 | 0 | NR |
| 445 | 486 | NR | 575 | 800 | NR | 705 | 80 | NR | 835 | 1 | NR | 965 | 0 | NR |
| 450 | 852 | NR | 580 | 835 | NR | 710 | 67 | NR | 840 | 1 | NR | 970 | 0 | NR |
| 455 | 988 | NR | 585 | 862 | NR | 715 | 57 | NR | 845 | 1 | NR | 975 | 0 | NR |
| 460 | 735 | NR | 590 | 876 | NR | 720 | 49 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 572 | NR | 595 | 879 | NR | 725 | 42 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 486 | NR | 600 | 872 | NR | 730 | 35 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 375 | NR | 605 | 850 | NR | 735 | 30 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 317 | NR | 610 | 821 | NR | 740 | 25 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 314 | NR | 615 | 782 | NR | 745 | 22 | NR | 875 | 0 | NR | | | |

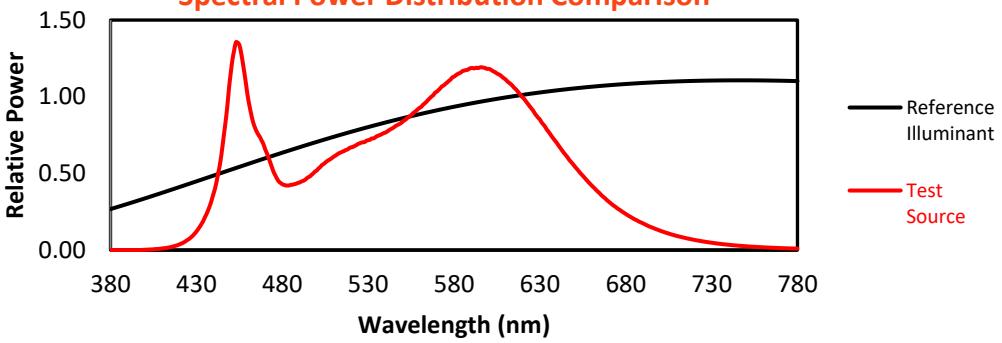
REPORT NUMBER: SP1-2407-168-3

# TM-30-18

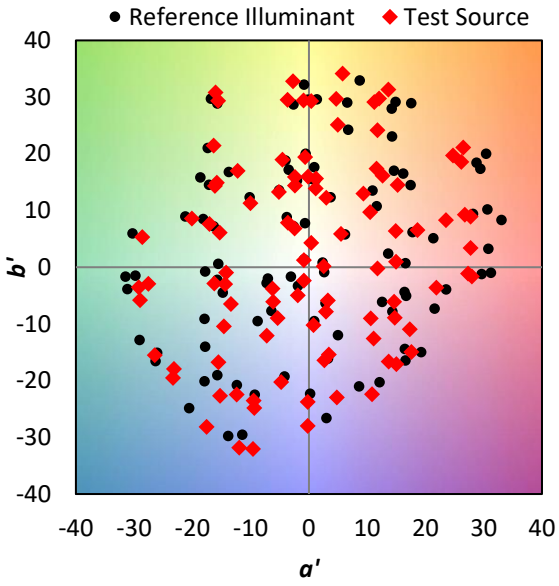
## Summary

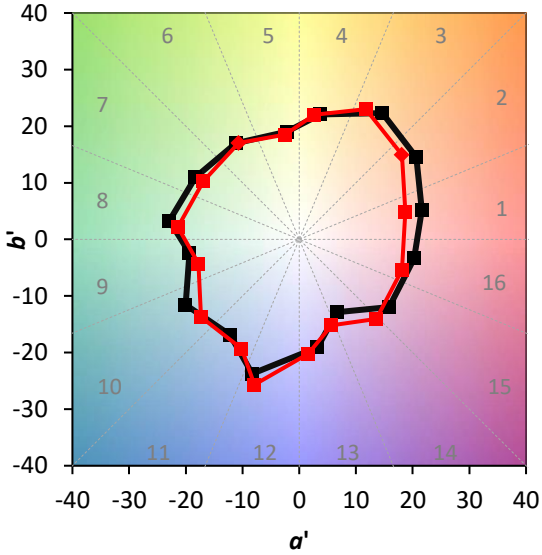
$R_f$ = 82.8
$R_g$ = 93.7
CIE $R_a$ = 82.7
$R_9$ = 4.8

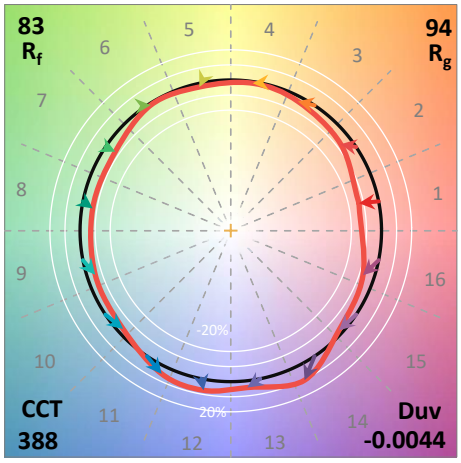
## Spectral Power Distribution Comparison

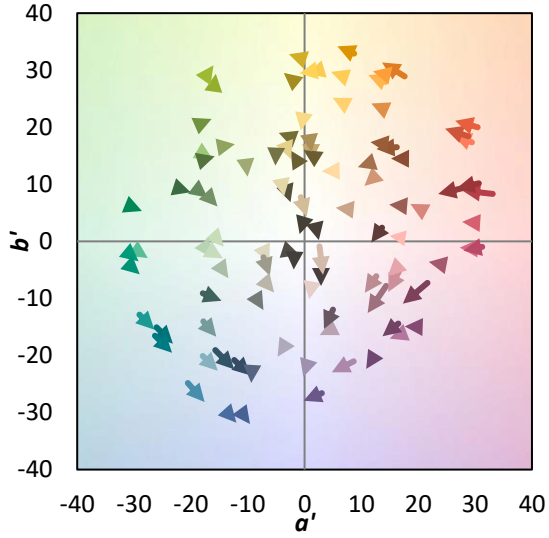



## Color Vector Graphics



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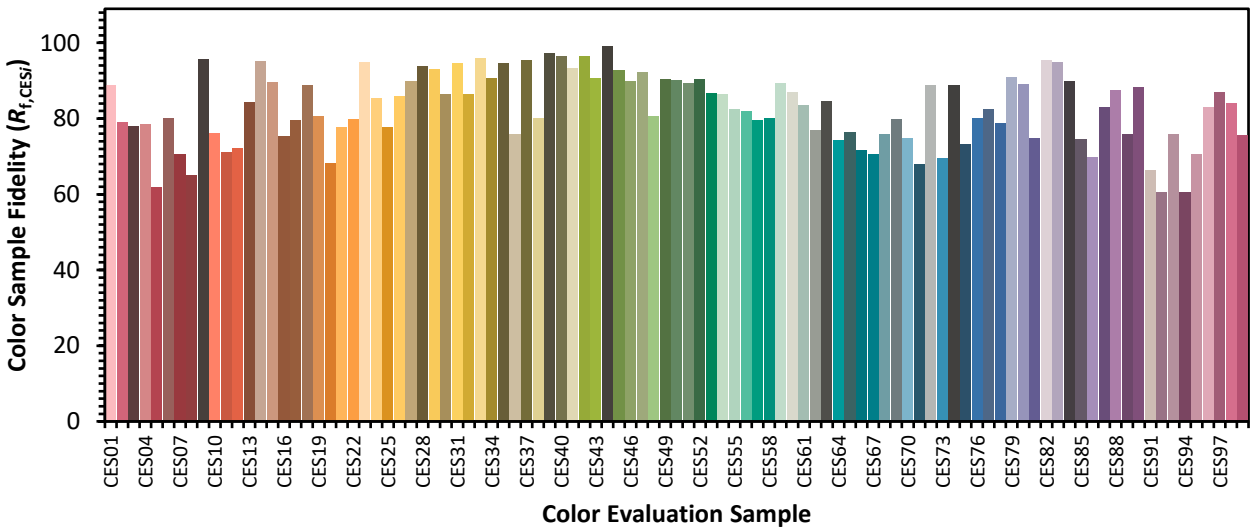
**Individual Sample Fidelity Index ($R_{f,i}$)**

| | | | |
|---|---|---|---|
| CES01 = 86 | CES26 = 86 | CES51 = 89 | CES76 = 80 |
| CES02 = 62 | CES27 = 90 | CES52 = 91 | CES77 = 83 |
| CES03 = 31 | CES28 = 94 | CES53 = 87 | CES78 = 79 |
| CES04 = 70 | CES29 = 93 | CES54 = 86 | CES79 = 91 |
| CES05 = 48 | CES30 = 86 | CES55 = 83 | CES80 = 89 |
| CES06 = 51 | CES31 = 95 | CES56 = 82 | CES81 = 75 |
| CES07 = 41 | CES32 = 86 | CES57 = 80 | CES82 = 95 |
| CES08 = 40 | CES33 = 96 | CES58 = 80 | CES83 = 95 |
| CES09 = 29 | CES34 = 91 | CES59 = 89 | CES84 = 90 |
| CES10 = 75 | CES35 = 95 | CES60 = 87 | CES85 = 75 |
| CES11 = 58 | CES36 = 76 | CES61 = 83 | CES86 = 70 |
| CES12 = 64 | CES37 = 95 | CES62 = 77 | CES87 = 83 |
| CES13 = 43 | CES38 = 80 | CES63 = 85 | CES88 = 88 |
| CES14 = 74 | CES39 = 97 | CES64 = 74 | CES89 = 76 |
| CES15 = 71 | CES40 = 96 | CES65 = 76 | CES90 = 88 |
| CES16 = 47 | CES41 = 93 | CES66 = 72 | CES91 = 66 |
| CES17 = 49 | CES42 = 96 | CES67 = 71 | CES92 = 60 |
| CES18 = 56 | CES43 = 91 | CES68 = 76 | CES93 = 76 |
| CES19 = 72 | CES44 = 99 | CES69 = 80 | CES94 = 61 |
| CES20 = 65 | CES45 = 93 | CES70 = 75 | CES95 = 71 |
| CES21 = 86 | CES46 = 90 | CES71 = 68 | CES96 = 83 |
| CES22 = 78 | CES47 = 92 | CES72 = 89 | CES97 = 87 |
| CES23 = 91 | CES48 = 81 | CES73 = 70 | CES98 = 84 |
| CES24 = 90 | CES49 = 90 | CES74 = 89 | CES99 = 76 |
| CES25 = 71 | CES50 = 90 | CES75 = 73 | |



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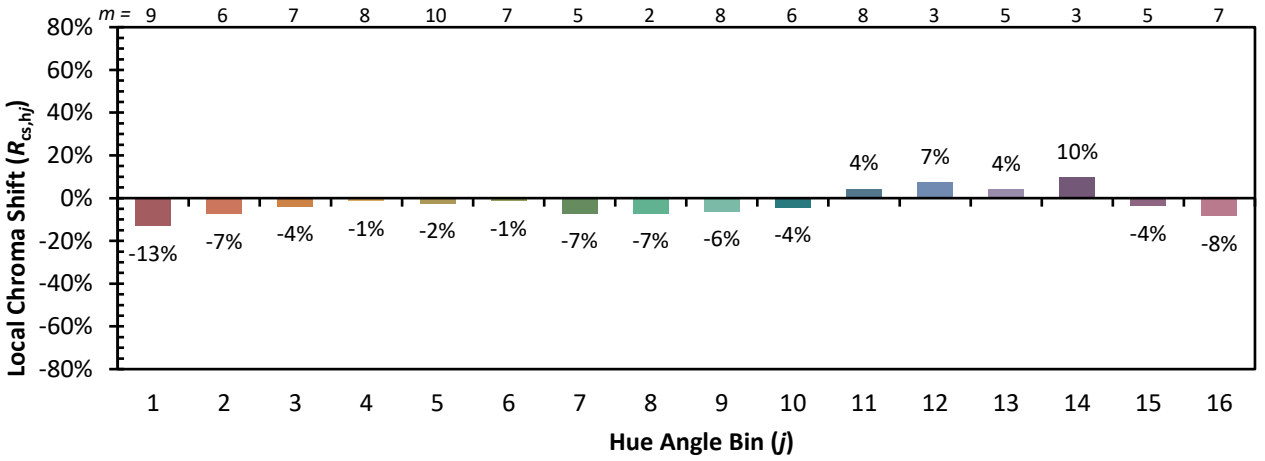
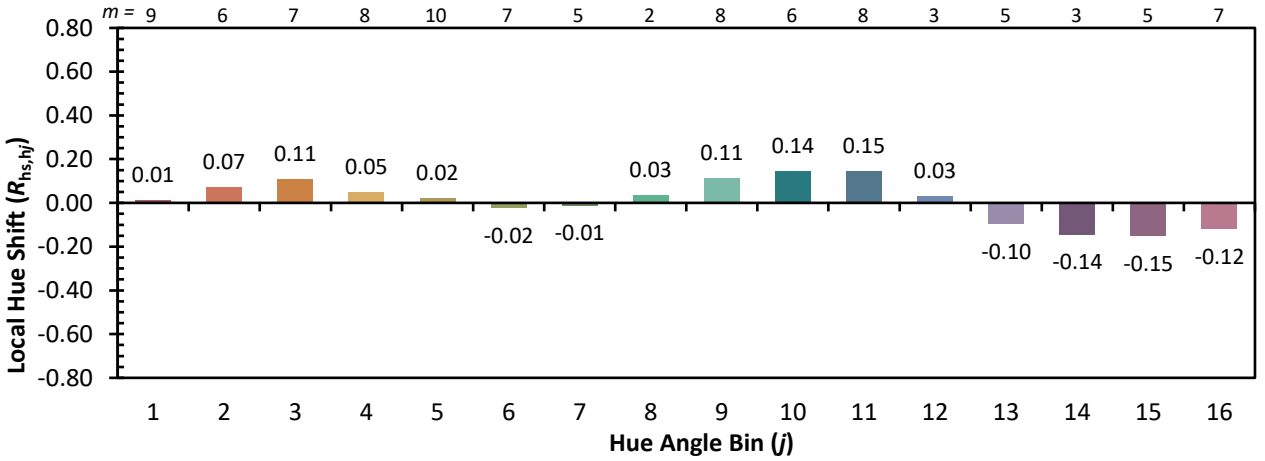
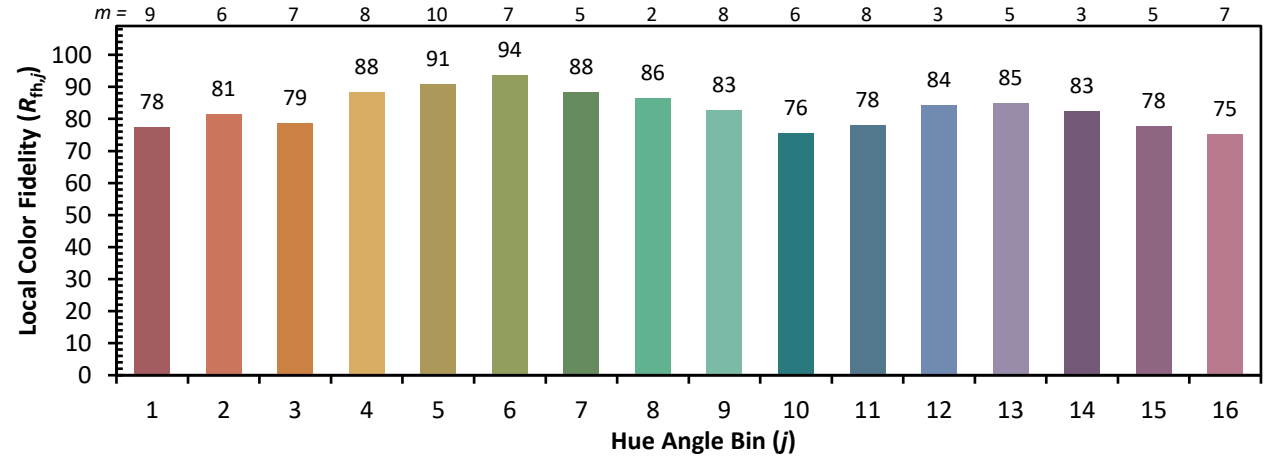
## Color Rendition by Hue-Angle Bin



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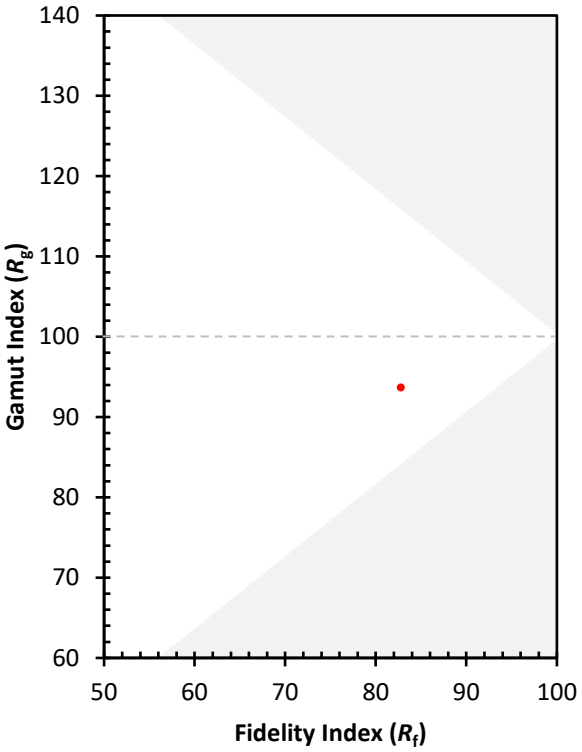
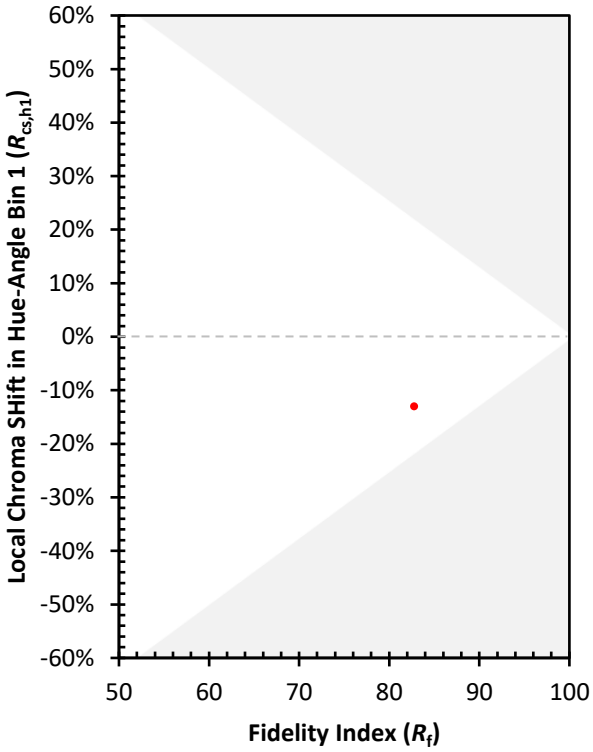
## Measure Comparisons




(END OF REPORT)