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

Scaled data based on original data using

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

Test Report Prepared for

Cooper Lighting Solutions

Brand: FAIL-SAFE

Report Number: P1357544

Luminaire Tested: 8ASL4-35VHE-3-G52-UNV

Issue Date: 2/17/2026

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

Scaled Data Report

**Test Information**

| | |
|---|---|
| Test Method: | LM-79-2019 |
| Report Number: | P1357544 |
| | TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2511-597-12) |
| Test Lab: | INNOVATION CENTER |
| Issue Date: | 2/17/2026 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS |
| Product Line: | FAIL-SAFE |
| Catalog Number: | 8ASL4-35VHE-3-G52-UNV |
| Description: | 8FT 3500 LUMEN PER FOOT 4ASL LED LUMINAIRE WITH OPL LENS AND G52 LEDS 3 ROW |
| Light Source: | - |
| Ballast/Driver: | - |

**Summary**

| | |
|---|---|
| Lumens per Lamp: | N/A |
| Luminaire Lumens: | 13860.0 lumens |
| Efficiency: | N/A |
| Efficacy: | 47.6 lumens/watt |
| Spacing Criteria (0/90/45): | 1.21 / 1.3 / 1.39 |
| Luminous Opening: | Rectangular w/ Sides (W: 0.33' x L: 7.98' x H: 0.1') |
| CIE Type: | Direct |

| | |
|---|---|
| Input Watts (W): | 291.1 |
| 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: | 24 FT |

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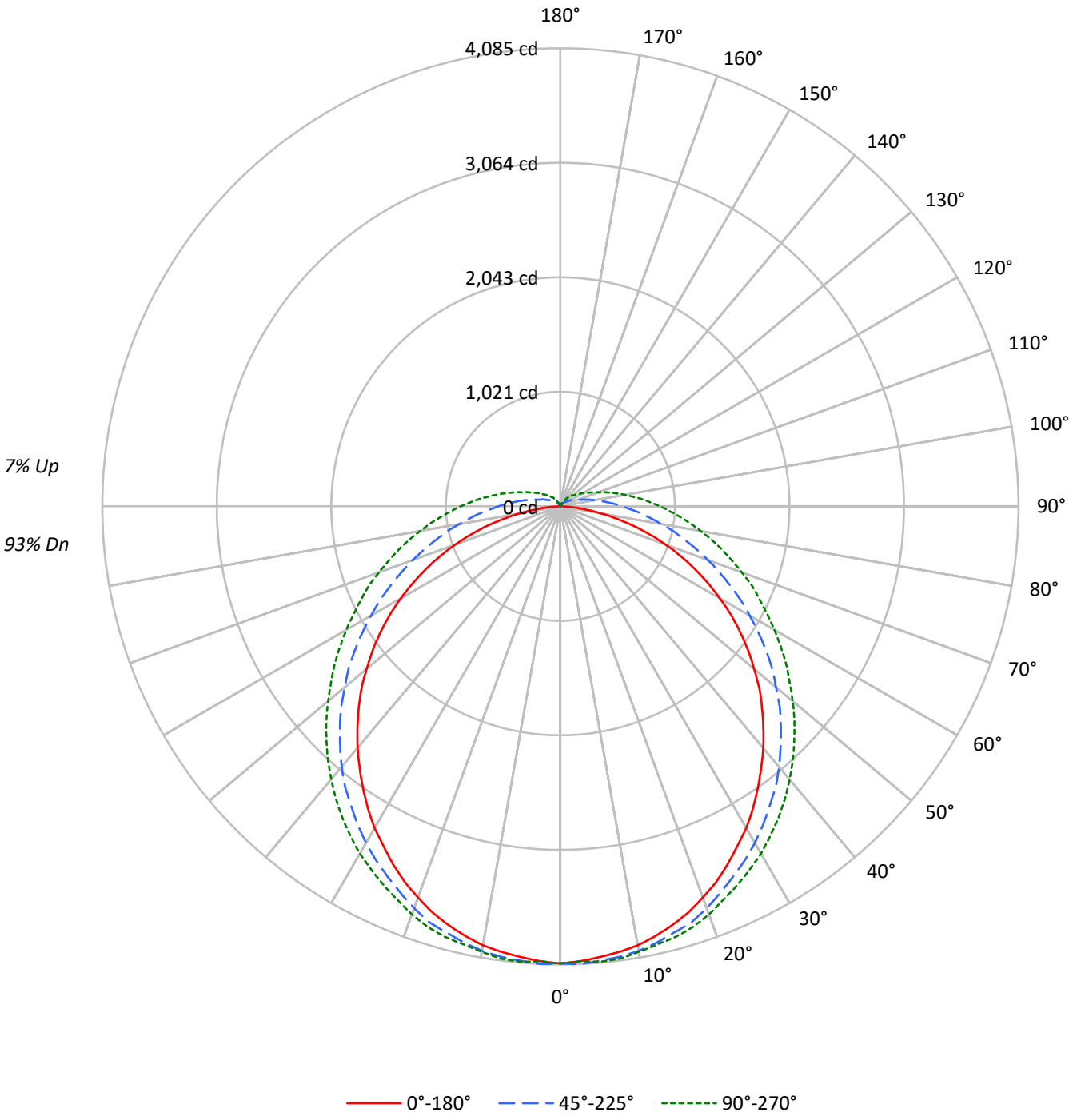
Scaled Data Report

TEST NUMBER: P1357544
CATALOG NUMBER: 8ASL4-35VHE-3-G52-UNV

## Luminous Intensity Polar Plot



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Scaled Data Report

TEST NUMBER: P1357544
CATALOG NUMBER: 8ASL4-35VHE-3-G52-UNV

## COEFFICIENT OF UTILIZATION - ZONAL CAVITY METHOD:

| RF | 20 | | | | 20 | | | | 20 | | | 20 | | | 20 | | | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RC | 80 | | | | 70 | | | | 50 | | | 30 | | | 10 | | | 0 |
| RW | 70 | 50 | 30 | 10 | 70 | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 | 0 |
| RCR | | | | | | | | | | | | | | | | | | |
| 0 | 117 | 117 | 117 | 117 | 114 | 114 | 114 | 114 | 107 | 107 | 107 | 101 | 101 | 101 | 96 | 96 | 96 | 93 |
| 1 | 105 | 100 | 95 | 91 | 102 | 97 | 92 | 88 | 91 | 88 | 84 | 86 | 83 | 80 | 81 | 79 | 77 | 74 |
| 2 | 95 | 86 | 79 | 72 | 92 | 84 | 77 | 71 | 79 | 73 | 68 | 75 | 70 | 66 | 71 | 67 | 63 | 61 |
| 3 | 86 | 75 | 67 | 60 | 83 | 73 | 65 | 59 | 69 | 62 | 57 | 65 | 60 | 55 | 62 | 57 | 53 | 50 |
| 4 | 79 | 66 | 57 | 50 | 76 | 65 | 56 | 49 | 61 | 54 | 48 | 58 | 52 | 47 | 55 | 50 | 45 | 43 |
| 5 | 73 | 59 | 50 | 43 | 70 | 58 | 49 | 42 | 55 | 47 | 41 | 52 | 45 | 40 | 49 | 44 | 39 | 37 |
| 6 | 67 | 53 | 44 | 37 | 64 | 52 | 43 | 37 | 49 | 42 | 36 | 47 | 40 | 35 | 45 | 39 | 34 | 32 |
| 7 | 62 | 48 | 39 | 33 | 60 | 47 | 38 | 32 | 45 | 37 | 32 | 43 | 36 | 31 | 41 | 35 | 30 | 28 |
| 8 | 58 | 44 | 35 | 29 | 56 | 43 | 35 | 29 | 41 | 34 | 28 | 39 | 32 | 28 | 37 | 32 | 27 | 25 |
| 9 | 54 | 40 | 32 | 26 | 52 | 39 | 31 | 26 | 38 | 30 | 25 | 36 | 30 | 25 | 35 | 29 | 24 | 22 |
| 10 | 50 | 37 | 29 | 24 | 49 | 36 | 29 | 23 | 35 | 28 | 23 | 33 | 27 | 23 | 32 | 26 | 22 | 20 |

## AVERAGE LUMINANCE (cd/sqm):

| | 0° | 45° | 90° |
|---|---|---|---|
| 0° | 16497 | 16497 | 16497 |
| 5° | 16369 | 16200 | 16120 |
| 10° | 16296 | 15898 | 15712 |
| 15° | 16135 | 15518 | 15367 |
| 20° | 15911 | 15155 | 14977 |
| 25° | 15648 | 14695 | 14533 |
| 30° | 15369 | 14298 | 14158 |
| 35° | 15020 | 13846 | 13741 |
| 40° | 14704 | 13434 | 13302 |
| 45° | 14364 | 12933 | 12861 |
| 50° | 13976 | 12394 | 12402 |
| 55° | 13560 | 11881 | 11990 |
| 60° | 13013 | 11280 | 11572 |
| 65° | 12316 | 10703 | 11225 |
| 70° | 11423 | 10136 | 10953 |
| 75° | 10109 | 9623 | 10767 |
| 80° | 8092 | 9252 | 10687 |
| 85° | 5136 | 9212 | 10845 |

## MAXIMUM LUMINANCE 45°-90°:

Horizontal Angle: 0°
Vertical Angle: 45°
Luminance: 14364 cd/sqm

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Scaled Data Report

TEST NUMBER: P1357544
CATALOG NUMBER: 8ASL4-35VHE-3-G52-UNV

**ZONAL LUMENS:**

| Zone | Lumens | % Fixture |
|---|---|---|
| 0°-10° | 386.5 | 2.8 |
| 10°-20° | 1109.9 | 8.0 |
| 20°-30° | 1678.0 | 12.1 |
| 30°-40° | 2031.8 | 14.7 |
| 40°-50° | 2134.0 | 15.4 |
| 50°-60° | 1991.0 | 14.4 |
| 60°-70° | 1645.4 | 11.9 |
| 70°-80° | 1184.7 | 8.5 |
| 80°-90° | 736.2 | 5.3 |
| 90°-100° | 431.4 | 3.1 |
| 100°-110° | 246.8 | 1.8 |
| 110°-120° | 139.3 | 1.0 |
| 120°-130° | 80.2 | 0.6 |
| 130°-140° | 43.2 | 0.3 |
| 140°-150° | 18.2 | 0.1 |
| 150°-160° | 3.4 | 0.0 |
| 160°-170° | 0.0 | 0.0 |
| 170°-180° | 0.0 | 0.0 |
| 0°-30° | 3174.4 | 22.9 |
| 0°-40° | 5206.3 | 37.6 |
| 0°-60° | 9331.3 | 67.3 |
| 0°-90° | 12897.6 | 93.1 |
| 90°-120° | 817.5 | 5.9 |
| 90°-150° | 959.0 | 6.9 |
| 90°-180° | 962.0 | 6.9 |
| 0°-180° | 13860.0 | 100.0 |

**CANDELA DISTRIBUTION:**

| | 0° | 22.5° | 45° | 67.5° | 90° | Flux |
|---|---|---|---|---|---|---|
| 0° | 4076 | 4076 | 4076 | 4076 | 4076 | |
| 5° | 4034 | 4068 | 4068 | 4068 | 4076 | 383 |
| 15° | 3864 | 3915 | 3932 | 3958 | 3975 | 1090 |
| 25° | 3526 | 3585 | 3644 | 3695 | 3729 | 1624 |
| 35° | 3068 | 3153 | 3254 | 3348 | 3390 | 1920 |
| 45° | 2542 | 2636 | 2780 | 2898 | 2949 | 1962 |
| 55° | 1958 | 2068 | 2237 | 2398 | 2458 | 1749 |
| 65° | 1322 | 1449 | 1670 | 1881 | 1958 | 1308 |
| 75° | 678 | 848 | 1144 | 1390 | 1492 | 717 |
| 85° | 127 | 381 | 720 | 975 | 1068 | 155 |
| 90° | 0 | 229 | 551 | 788 | 890 | 6 |
| 95° | 0 | 144 | 415 | 636 | 729 | 0 |
| 105° | 0 | 51 | 229 | 398 | 466 | 0 |
| 115° | 0 | 25 | 136 | 246 | 288 | 0 |
| 125° | 0 | 17 | 85 | 161 | 186 | 0 |
| 135° | 0 | 0 | 51 | 102 | 127 | 0 |
| 145° | 0 | 0 | 25 | 59 | 68 | 0 |
| 155° | 0 | 0 | 0 | 17 | 25 | 0 |
| 165° | 0 | 0 | 0 | 0 | 0 | 0 |
| 175° | 0 | 0 | 0 | 0 | 0 | 0 |
| 180° | 0 | 0 | 0 | 0 | 0 | |

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TEST NUMBER: P1357544
CATALOG NUMBER: 8ASL4-35VHE-3-G52-UNV

**CANDELA DISTRIBUTION (FULL):**

| | 0° | 22.5° | 45° | 67.5° | 90° |
|---|---|---|---|---|---|
| 0° | 4076.4 | *4076.4* | 4076.4 | 4076.4 | 4076.4 |
| 2.5° | *4059.5* | *4084.9* | *4084.9* | *4059.5* | *4059.5* |
| 5° | 4034.0 | *4067.9* | 4067.9 | 4067.9 | 4076.4 |
| 7.5° | 4008.6 | *4051.0* | 4051.0 | 4051.0 | 4067.9 |
| 10° | 3974.7 | *4017.1* | 4025.6 | 4025.6 | 4034.0 |
| 12.5° | 3923.9 | *3974.7* | 3983.2 | 3991.7 | 4000.1 |
| 15° | 3864.5 | *3915.4* | 3932.3 | 3957.8 | 3974.7 |
| 17.5° | 3796.7 | *3856.1* | 3890.0 | 3915.4 | 3932.3 |
| 20° | 3712.0 | *3771.3* | 3813.7 | 3847.6 | 3873.0 |
| 22.5° | 3627.2 | *3678.1* | 3728.9 | 3771.3 | 3796.7 |
| 25° | 3525.5 | *3584.9* | 3644.2 | 3695.0 | 3728.9 |
| 27.5° | 3415.4 | *3483.2* | 3559.4 | 3618.8 | 3652.7 |
| 30° | 3313.7 | *3381.5* | 3466.2 | 3542.5 | 3576.4 |
| 32.5° | 3195.0 | *3271.3* | 3364.5 | 3440.8 | 3483.2 |
| 35° | 3067.9 | *3152.7* | 3254.3 | 3347.6 | 3389.9 |
| 37.5° | 2940.8 | *3025.5* | 3152.7 | 3245.9 | 3288.2 |
| 40° | 2813.7 | *2898.4* | 3034.0 | 3135.7 | 3178.1 |
| 42.5° | 2678.1 | *2762.8* | 2906.9 | 3017.1 | 3067.9 |
| 45° | 2542.5 | *2635.7* | 2779.8 | 2898.4 | 2949.3 |
| 47.5° | 2406.9 | *2500.1* | 2652.6 | 2779.8 | 2830.6 |
| 50° | 2254.3 | *2356.0* | 2508.6 | 2652.6 | 2703.5 |
| 52.5° | 2110.2 | *2211.9* | 2381.4 | 2525.5 | 2576.4 |
| 55° | 1957.7 | *2067.9* | 2237.4 | 2398.4 | 2457.7 |
| 57.5° | 1805.1 | *1915.3* | 2093.3 | 2262.8 | 2330.6 |
| 60° | 1644.1 | *1762.8* | 1949.2 | 2127.2 | 2203.5 |
| 62.5° | 1483.1 | *1610.2* | 1813.6 | 2000.1 | 2076.3 |
| 65° | 1322.1 | *1449.2* | 1669.5 | 1881.4 | 1957.7 |
| 67.5° | 1161.1 | *1296.7* | 1534.0 | 1754.3 | 1847.5 |
| 70° | 1000.0 | *1144.1* | 1398.4 | 1627.2 | 1720.4 |
| 72.5° | 839.0 | *991.6* | 1271.2 | 1508.5 | 1601.8 |
| 75° | 678.0 | *847.5* | 1144.1 | 1389.9 | 1491.6 |
| 77.5° | 517.0 | *711.9* | 1033.9 | 1279.7 | 1381.4 |
| 80° | 372.9 | *593.2* | 915.3 | 1169.5 | 1271.2 |
| 82.5° | 237.3 | *474.6* | 813.6 | 1067.8 | 1169.5 |
| 85° | 127.1 | *381.4* | 720.4 | 974.6 | 1067.8 |
| 87.5° | 42.4 | *296.6* | 627.1 | 881.4 | 974.6 |
| 90° | 0.0 | *228.8* | 550.9 | 788.2 | 889.9 |
| 92.5° | 0.0 | *178.0* | 483.1 | 711.9 | 805.1 |
| 95° | 0.0 | *144.1* | 415.3 | 635.6 | 728.8 |
| 97.5° | 0.0 | *118.6* | 364.4 | 567.8 | 652.6 |
| 100° | 0.0 | *93.2* | 313.6 | 508.5 | 584.8 |
| 102.5° | 0.0 | *76.3* | 271.2 | 449.2 | 525.4 |
| 105° | 0.0 | *50.8* | 228.8 | 398.3 | 466.1 |
| 107.5° | 0.0 | *42.4* | 194.9 | 355.9 | 415.3 |
| 110° | 0.0 | *33.9* | 178.0 | 305.1 | 364.4 |

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Scaled Data Report

TEST NUMBER: P1357544
CATALOG NUMBER: 8ASL4-35VHE-3-G52-UNV

**CANDELA DISTRIBUTION (continued):**

| | 0° | 22.5° | 45° | 67.5° | 90° |
|---|---|---|---|---|---|
| 112.5° | 0.0 | *25.4* | 161.0 | 271.2 | 330.5 |
| 115° | 0.0 | *25.4* | 135.6 | 245.8 | 288.1 |
| 117.5° | 0.0 | *25.4* | 118.6 | 220.3 | 262.7 |
| 120° | 0.0 | *16.9* | 110.2 | 194.9 | 237.3 |
| 122.5° | 0.0 | *16.9* | 93.2 | 178.0 | 211.9 |
| 125° | 0.0 | *16.9* | 84.7 | 161.0 | 186.4 |
| 127.5° | 0.0 | *8.5* | 76.3 | 144.1 | 169.5 |
| 130° | 0.0 | *8.5* | 67.8 | 127.1 | 152.5 |
| 132.5° | 0.0 | *8.5* | 59.3 | 118.6 | 144.1 |
| 135° | 0.0 | *0.0* | 50.8 | 101.7 | 127.1 |
| 137.5° | 0.0 | *0.0* | 42.4 | 93.2 | 110.2 |
| 140° | 0.0 | *0.0* | 33.9 | 76.3 | 101.7 |
| 142.5° | 0.0 | *0.0* | 25.4 | 67.8 | 84.7 |
| 145° | 0.0 | *0.0* | 25.4 | 59.3 | 67.8 |
| 147.5° | 0.0 | *0.0* | 16.9 | 42.4 | 59.3 |
| 150° | 0.0 | *0.0* | 8.5 | 33.9 | 42.4 |
| 152.5° | 0.0 | *0.0* | 0.0 | 25.4 | 33.9 |
| 155° | 0.0 | *0.0* | 0.0 | 16.9 | 25.4 |
| 157.5° | 0.0 | *0.0* | 0.0 | 0.0 | 8.5 |
| 160° | 0.0 | *0.0* | 0.0 | 0.0 | 0.0 |
| 162.5° | 0.0 | *0.0* | 0.0 | 0.0 | 0.0 |
| 165° | 0.0 | *0.0* | 0.0 | 0.0 | 0.0 |
| 167.5° | 0.0 | *0.0* | 0.0 | 0.0 | 0.0 |
| 170° | 0.0 | *0.0* | 0.0 | 0.0 | 0.0 |
| 172.5° | 0.0 | *0.0* | 0.0 | 0.0 | 0.0 |
| 175° | 0.0 | *0.0* | 0.0 | 0.0 | 0.0 |
| 177.5° | 0.0 | *0.0* | 0.0 | 0.0 | 0.0 |
| 180° | 0.0 | *0.0* | 0.0 | 0.0 | 0.0 |

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TEST NUMBER: P1357544
CATALOG NUMBER: 8ASL4-35VHE-3-G52-UNV

**CIE UGR TABLE:**

| Reflectances: | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ceiling | 0.7 | 0.7 | 0.5 | 0.5 | 0.3 | 0.7 | 0.7 | 0.5 | 0.5 | 0.3 |
| | Wall | 0.5 | 0.3 | 0.5 | 0.3 | 0.3 | 0.5 | 0.3 | 0.5 | 0.3 | 0.3 |
| | Reference plane | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| Room dimensions | | Viewed crosswise | | | | | Viewed endwise | | | | |
| X=2H | Y=2H | 19.09 | 20.63 | 19.56 | 21.08 | 21.57 | 21.16 | 22.70 | 21.63 | 23.15 | 23.63 |
| | 3H | 20.58 | 21.99 | 21.06 | 22.45 | 22.98 | 23.64 | 25.04 | 24.12 | 25.51 | 26.03 |
| | 4H | 21.06 | 22.40 | 21.57 | 22.88 | 23.42 | 24.85 | 26.18 | 25.35 | 26.67 | 27.20 |
| | 6H | 21.34 | 22.58 | 21.85 | 23.07 | 23.63 | 26.13 | 27.37 | 26.65 | 27.87 | 28.42 |
| | 8H | 21.39 | 22.58 | 21.92 | 23.10 | 23.66 | 26.80 | 27.99 | 27.33 | 28.51 | 29.07 |
| | 12H | 21.40 | 22.54 | 21.94 | 23.06 | 23.65 | 27.55 | 28.69 | 28.08 | 29.20 | 29.79 |
| 4H | 2H | 19.97 | 21.30 | 20.47 | 21.79 | 22.32 | 21.59 | 22.92 | 22.09 | 23.40 | 23.94 |
| | 3H | 21.71 | 22.84 | 22.22 | 23.37 | 23.93 | 24.30 | 25.43 | 24.81 | 25.96 | 26.52 |
| | 4H | 22.31 | 23.35 | 22.85 | 23.89 | 24.48 | 25.68 | 26.72 | 26.22 | 27.26 | 27.85 |
| | 6H | 22.71 | 23.63 | 23.26 | 24.19 | 24.79 | 27.15 | 28.07 | 27.71 | 28.63 | 29.24 |
| | 8H | 22.80 | 23.67 | 23.36 | 24.23 | 24.85 | 27.93 | 28.79 | 28.49 | 29.35 | 29.97 |
| | 12H | 22.85 | 23.63 | 23.43 | 24.22 | 24.85 | 28.80 | 29.58 | 29.38 | 30.17 | 30.80 |
| 8H | 4H | 23.00 | 23.86 | 23.56 | 24.43 | 25.05 | 25.90 | 26.76 | 26.46 | 27.32 | 27.94 |
| | 6H | 23.58 | 24.31 | 24.17 | 24.92 | 25.54 | 27.54 | 28.27 | 28.13 | 28.87 | 29.50 |
| | 8H | 23.76 | 24.42 | 24.37 | 25.04 | 25.68 | 28.45 | 29.11 | 29.06 | 29.73 | 30.36 |
| | 12H | 23.88 | 24.47 | 24.48 | 25.07 | 25.77 | 29.51 | 30.10 | 30.12 | 30.70 | 31.41 |
| 12H | 4H | 23.20 | 23.98 | 23.78 | 24.57 | 25.20 | 25.90 | 26.69 | 26.49 | 27.28 | 27.90 |
| | 6H | 23.88 | 24.54 | 24.49 | 25.16 | 25.79 | 27.57 | 28.23 | 28.18 | 28.85 | 29.49 |
| | 8H | 24.16 | 24.75 | 24.77 | 25.35 | 26.06 | 28.56 | 29.15 | 29.16 | 29.75 | 30.45 |

Cooper Lighting Solutions Photometric Lab
1121 Highway 74 South
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# LM-79-2019: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

Fail-Safe

Report Number: SP1-2511-597-8

Test Date: 01/22/2026

Luminaire Tested: 4ASL-2-G520-UNV-OPL-1_600mA

Data in this report applies to families of products including 4ASL

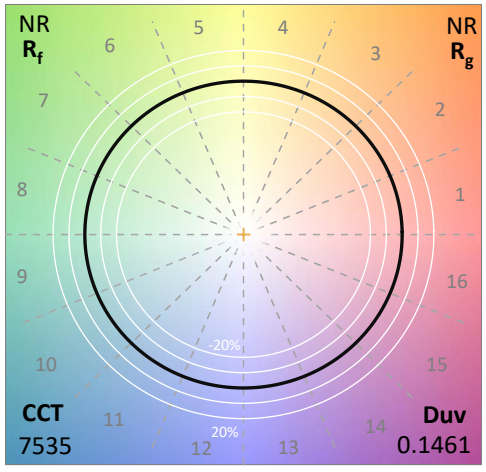
Report Generated By FNC07603 / LDUCLS01DT446
Version: v7.05

## Test Information

| | |
|---|---|
| Test Method: | LM-79-2019 |
| Report Number: | SP1-2511-597-8 |
| Test Lab: | COOPER LIGHTING SOLUTIONS |
| Photometer: | SP1 - 76IN SPHERE |
| Measurement Geometry: | 4π |
| Issue Date: | 01/29/2026 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS |
| Product Line: | Fail-Safe |
| Catalog Number: | **4ASL-2-G520-UNV-OPL-1_600mA** |
| Description: | 2foot 4ASL LED LUMINAIRE WITH OPL LENS AND GREEN 520NM LEDS with 1 rows at 600mA |

## Spectral Parameters

| | | | | | |
|---|---|---|---|---|---|
| CCT (K): | 7535 | CRI (Ra): | -11.7 | | |
| CIE u': | 0.0718 | R1: | -30.6 | R9: | -351.9 |
| CIE v': | 0.5710 | R2: | 5.1 | R10: | -75.5 |
| Duv: | 0.1461 | R3: | 5.6 | R11: | -78.0 |
| CIE x: | 0.1962 | R4: | -51.7 | R12: | -14.7 |
| CIE y: | 0.6931 | R5: | -6.4 | R13: | -32.5 |
| CIE z: | 0.1107 | R6: | -0.6 | R14: | 52.7 |
| Peak Wavelength (nm): | 524 | R7: | 10.9 | R15: | -37.0 |
| Dominant Wavelength (nm): | 529 | R8: | -25.8 | | |
| Purity: | 75.95236 | | | | |
| Rf: | NR | | | | |
| Rg: | NR | | | | |




## Test Conditions

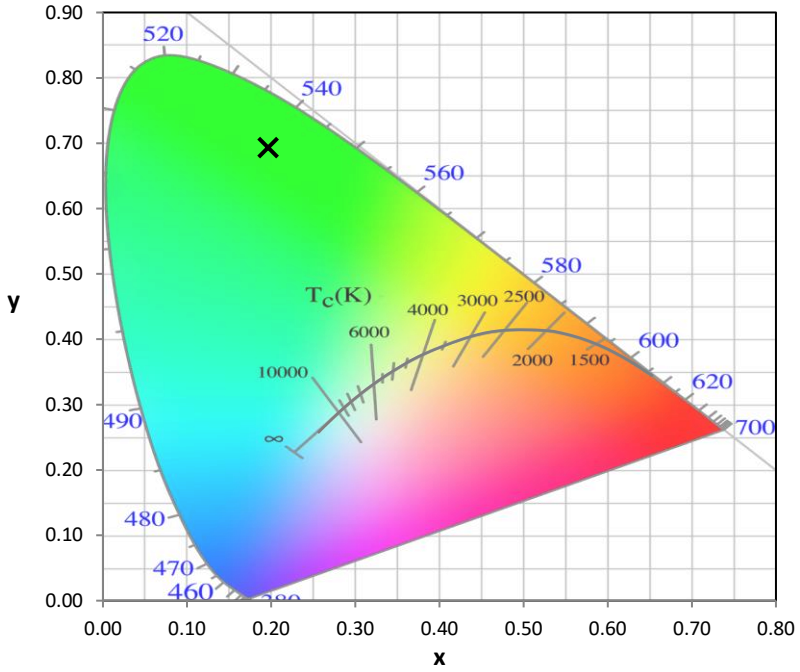
| | |
|---|---|
| Stabilization Time: | 48M |
| Operation Time: | 1H 48M |
| Sphere Temperature (°C): | 25.1 |

REPORT NUMBER: SP1-2511-597-8

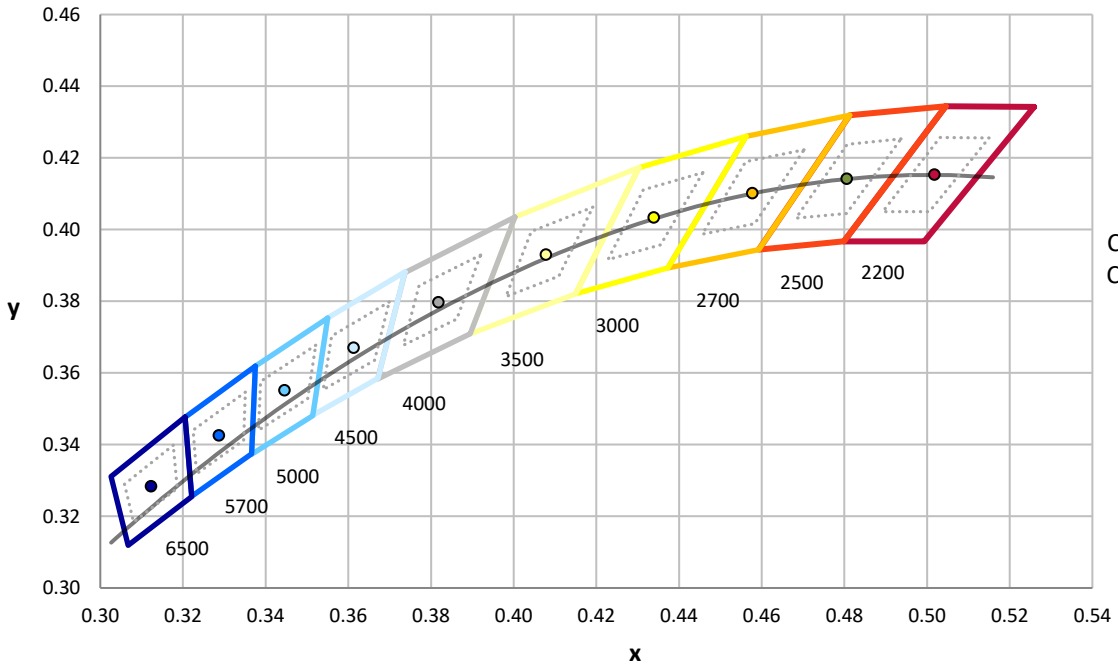
| Measurement and Test Equipment | | | |
|---|---|---|---|
| Instrument | Identification Number | Calibration Date | Calibration Due Date |
| Photometer | 76INCH SPHERE IN0058 | 12/16/2025 | 6/16/2026 |
| Power Meter | XITRON INXT2011004 | 10/21/2025 | 10/21/2026 |
| AC Power Source | CHROMA 61603 IN0063 | 10/21/2025 | 10/21/2026 |
| DC Power Source | AGILENT E3634A IN0208 | 10/21/2025 | 10/21/2026 |
| Sphere Thermometer | ONSET IN0085 | 10/21/2025 | 10/21/2026 |
| Room Thermometer | ONSET IN0046 | 10/21/2025 | 10/21/2026 |

REPORT NUMBER: SP1-2511-597-8

## CIE 1931 Chromaticity Diagram




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

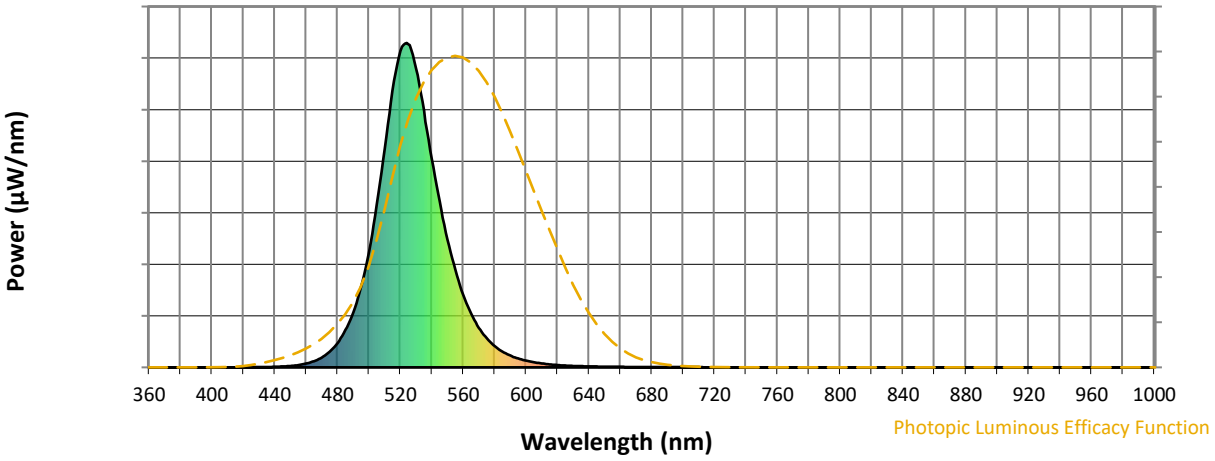



CCT = 7535K
CIE x = 0.1962
CIE y = 0.6931
Duv = 0.1461

Point lies outside the range

REPORT NUMBER: SP1-2511-597-8

## 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 | 169 | NR | 620 | 7 | NR | 750 | 0 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 249 | NR | 625 | 6 | NR | 755 | 0 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 356 | NR | 630 | 4 | NR | 760 | 0 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 502 | NR | 635 | 4 | NR | 765 | 0 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 674 | NR | 640 | 3 | NR | 770 | 0 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 853 | NR | 645 | 3 | NR | 775 | 0 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 976 | NR | 650 | 2 | NR | 780 | 0 | NR | 910 | 0 | NR |
| 395 | 0 | NR | 525 | 996 | NR | 655 | 2 | NR | 785 | 0 | NR | 915 | 0 | NR |
| 400 | 0 | NR | 530 | 920 | NR | 660 | 2 | NR | 790 | 0 | NR | 920 | 0 | NR |
| 405 | 0 | NR | 535 | 792 | NR | 665 | 1 | NR | 795 | 0 | NR | 925 | 0 | NR |
| 410 | 0 | NR | 540 | 642 | NR | 670 | 1 | NR | 800 | 0 | NR | 930 | 0 | NR |
| 415 | 0 | NR | 545 | 511 | NR | 675 | 1 | NR | 805 | 0 | NR | 935 | 0 | NR |
| 420 | 0 | NR | 550 | 394 | NR | 680 | 1 | NR | 810 | 0 | NR | 940 | 0 | NR |
| 425 | 1 | NR | 555 | 300 | NR | 685 | 1 | NR | 815 | 0 | NR | 945 | 0 | NR |
| 430 | 1 | NR | 560 | 224 | NR | 690 | 1 | NR | 820 | 0 | NR | 950 | 0 | NR |
| 435 | 1 | NR | 565 | 166 | NR | 695 | 1 | NR | 825 | 0 | NR | 955 | 0 | NR |
| 440 | 2 | NR | 570 | 122 | NR | 700 | 1 | NR | 830 | 0 | NR | 960 | 0 | NR |
| 445 | 3 | NR | 575 | 90 | NR | 705 | 1 | NR | 835 | 0 | NR | 965 | 0 | NR |
| 450 | 4 | NR | 580 | 66 | NR | 710 | 1 | NR | 840 | 0 | NR | 970 | 0 | NR |
| 455 | 7 | NR | 585 | 48 | NR | 715 | 0 | NR | 845 | 0 | NR | 975 | 0 | NR |
| 460 | 12 | NR | 590 | 36 | NR | 720 | 0 | NR | 850 | 0 | NR | 980 | 0 | NR |
| 465 | 19 | NR | 595 | 27 | NR | 725 | 0 | NR | 855 | 0 | NR | 985 | 0 | NR |
| 470 | 31 | NR | 600 | 21 | NR | 730 | 0 | NR | 860 | 0 | NR | 990 | 0 | NR |
| 475 | 49 | NR | 605 | 16 | NR | 735 | 0 | NR | 865 | 0 | NR | 995 | 0 | NR |
| 480 | 75 | NR | 610 | 12 | NR | 740 | 0 | NR | 870 | 0 | NR | 1000 | 0 | NR |
| 485 | 115 | NR | 615 | 9 | NR | 745 | 0 | NR | 875 | 0 | NR | | | |

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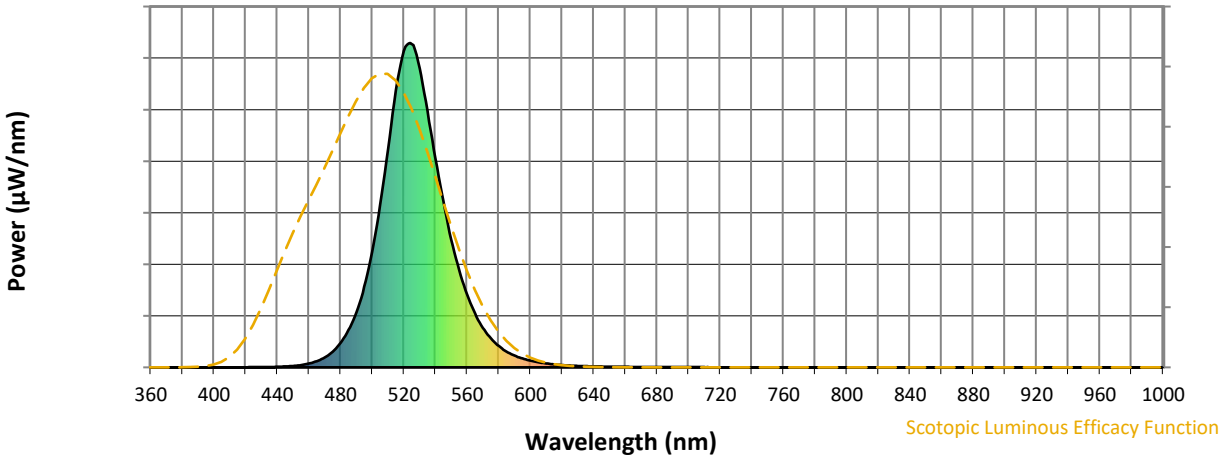
## Scotopic Flux vs. Wavelength




**Scotopic Lumens: NR** **S/P: 2.63**

| 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 | 169 | NR | 620 | 7 | NR | 750 | 0 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 249 | NR | 625 | 6 | NR | 755 | 0 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 356 | NR | 630 | 4 | NR | 760 | 0 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 502 | NR | 635 | 4 | NR | 765 | 0 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 674 | NR | 640 | 3 | NR | 770 | 0 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 853 | NR | 645 | 3 | NR | 775 | 0 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 976 | NR | 650 | 2 | NR | 780 | 0 | NR | 910 | 0 | NR |
| 395 | 0 | NR | 525 | 996 | NR | 655 | 2 | NR | 785 | 0 | NR | 915 | 0 | NR |
| 400 | 0 | NR | 530 | 920 | NR | 660 | 2 | NR | 790 | 0 | NR | 920 | 0 | NR |
| 405 | 0 | NR | 535 | 792 | NR | 665 | 1 | NR | 795 | 0 | NR | 925 | 0 | NR |
| 410 | 0 | NR | 540 | 642 | NR | 670 | 1 | NR | 800 | 0 | NR | 930 | 0 | NR |
| 415 | 0 | NR | 545 | 511 | NR | 675 | 1 | NR | 805 | 0 | NR | 935 | 0 | NR |
| 420 | 0 | NR | 550 | 394 | NR | 680 | 1 | NR | 810 | 0 | NR | 940 | 0 | NR |
| 425 | 1 | NR | 555 | 300 | NR | 685 | 1 | NR | 815 | 0 | NR | 945 | 0 | NR |
| 430 | 1 | NR | 560 | 224 | NR | 690 | 1 | NR | 820 | 0 | NR | 950 | 0 | NR |
| 435 | 1 | NR | 565 | 166 | NR | 695 | 1 | NR | 825 | 0 | NR | 955 | 0 | NR |
| 440 | 2 | NR | 570 | 122 | NR | 700 | 1 | NR | 830 | 0 | NR | 960 | 0 | NR |
| 445 | 3 | NR | 575 | 90 | NR | 705 | 1 | NR | 835 | 0 | NR | 965 | 0 | NR |
| 450 | 4 | NR | 580 | 66 | NR | 710 | 1 | NR | 840 | 0 | NR | 970 | 0 | NR |
| 455 | 7 | NR | 585 | 48 | NR | 715 | 0 | NR | 845 | 0 | NR | 975 | 0 | NR |
| 460 | 12 | NR | 590 | 36 | NR | 720 | 0 | NR | 850 | 0 | NR | 980 | 0 | NR |
| 465 | 19 | NR | 595 | 27 | NR | 725 | 0 | NR | 855 | 0 | NR | 985 | 0 | NR |
| 470 | 31 | NR | 600 | 21 | NR | 730 | 0 | NR | 860 | 0 | NR | 990 | 0 | NR |
| 475 | 49 | NR | 605 | 16 | NR | 735 | 0 | NR | 865 | 0 | NR | 995 | 0 | NR |
| 480 | 75 | NR | 610 | 12 | NR | 740 | 0 | NR | 870 | 0 | NR | 1000 | 0 | NR |
| 485 | 115 | NR | 615 | 9 | NR | 745 | 0 | NR | 875 | 0 | NR | | | |

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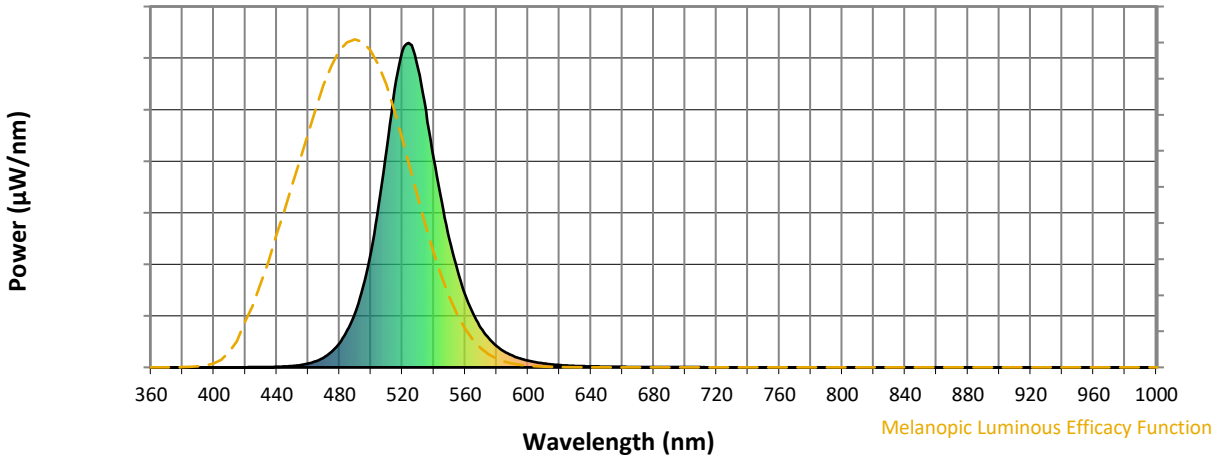
## Melanopic Flux vs. Wavelength




**Melanopic Lumens: NR** **M/P: 4.87**

| 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 | 169 | NR | 620 | 7 | NR | 750 | 0 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 249 | NR | 625 | 6 | NR | 755 | 0 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 356 | NR | 630 | 4 | NR | 760 | 0 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 502 | NR | 635 | 4 | NR | 765 | 0 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 674 | NR | 640 | 3 | NR | 770 | 0 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 853 | NR | 645 | 3 | NR | 775 | 0 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 976 | NR | 650 | 2 | NR | 780 | 0 | NR | 910 | 0 | NR |
| 395 | 0 | NR | 525 | 996 | NR | 655 | 2 | NR | 785 | 0 | NR | 915 | 0 | NR |
| 400 | 0 | NR | 530 | 920 | NR | 660 | 2 | NR | 790 | 0 | NR | 920 | 0 | NR |
| 405 | 0 | NR | 535 | 792 | NR | 665 | 1 | NR | 795 | 0 | NR | 925 | 0 | NR |
| 410 | 0 | NR | 540 | 642 | NR | 670 | 1 | NR | 800 | 0 | NR | 930 | 0 | NR |
| 415 | 0 | NR | 545 | 511 | NR | 675 | 1 | NR | 805 | 0 | NR | 935 | 0 | NR |
| 420 | 0 | NR | 550 | 394 | NR | 680 | 1 | NR | 810 | 0 | NR | 940 | 0 | NR |
| 425 | 1 | NR | 555 | 300 | NR | 685 | 1 | NR | 815 | 0 | NR | 945 | 0 | NR |
| 430 | 1 | NR | 560 | 224 | NR | 690 | 1 | NR | 820 | 0 | NR | 950 | 0 | NR |
| 435 | 1 | NR | 565 | 166 | NR | 695 | 1 | NR | 825 | 0 | NR | 955 | 0 | NR |
| 440 | 2 | NR | 570 | 122 | NR | 700 | 1 | NR | 830 | 0 | NR | 960 | 0 | NR |
| 445 | 3 | NR | 575 | 90 | NR | 705 | 1 | NR | 835 | 0 | NR | 965 | 0 | NR |
| 450 | 4 | NR | 580 | 66 | NR | 710 | 1 | NR | 840 | 0 | NR | 970 | 0 | NR |
| 455 | 7 | NR | 585 | 48 | NR | 715 | 0 | NR | 845 | 0 | NR | 975 | 0 | NR |
| 460 | 12 | NR | 590 | 36 | NR | 720 | 0 | NR | 850 | 0 | NR | 980 | 0 | NR |
| 465 | 19 | NR | 595 | 27 | NR | 725 | 0 | NR | 855 | 0 | NR | 985 | 0 | NR |
| 470 | 31 | NR | 600 | 21 | NR | 730 | 0 | NR | 860 | 0 | NR | 990 | 0 | NR |
| 475 | 49 | NR | 605 | 16 | NR | 735 | 0 | NR | 865 | 0 | NR | 995 | 0 | NR |
| 480 | 75 | NR | 610 | 12 | NR | 740 | 0 | NR | 870 | 0 | NR | 1000 | 0 | NR |
| 485 | 115 | NR | 615 | 9 | NR | 745 | 0 | NR | 875 | 0 | NR | | | |

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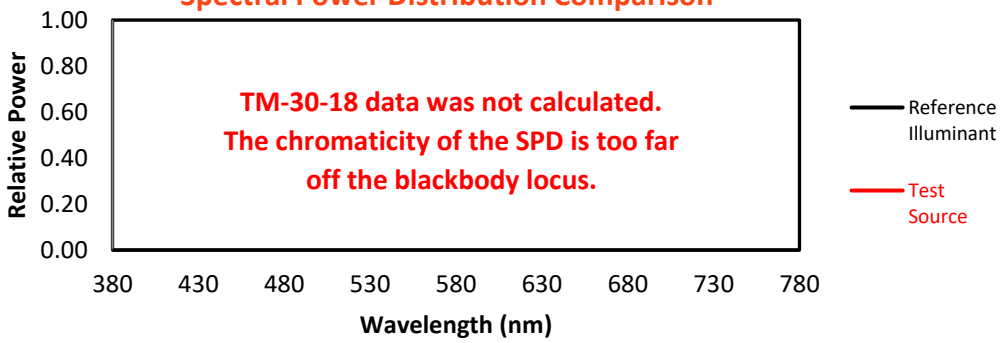
# TM-30-18

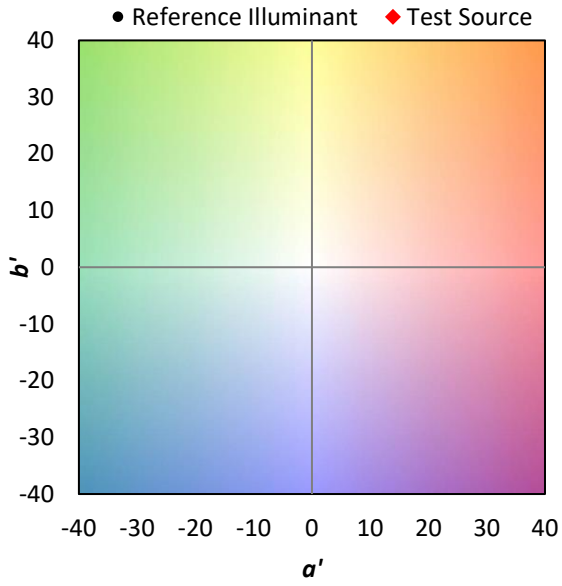
## Summary

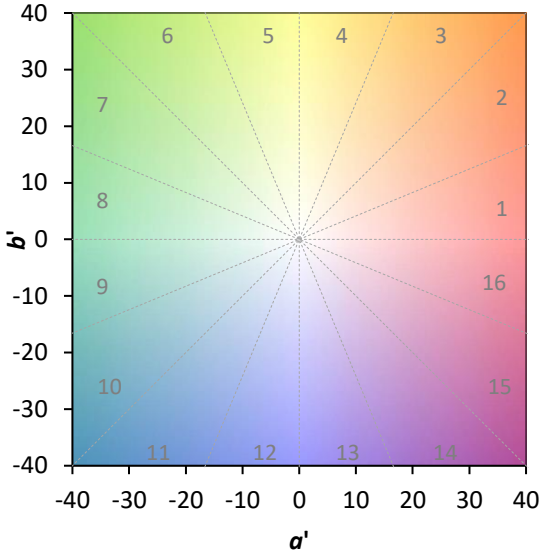
$R_f$ = 0
$R_g$ = 0
CIE $R_a$ = -11.7
$R_9$ = -351.9

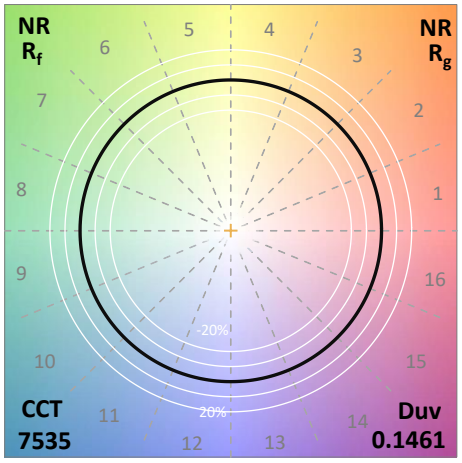
## Spectral Power Distribution Comparison

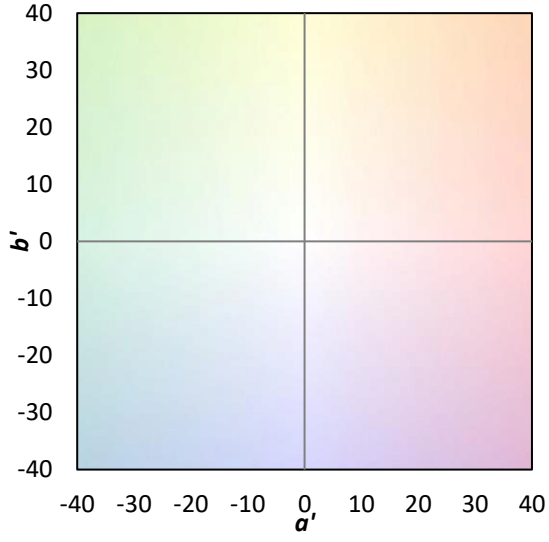



## Color Vector Graphics



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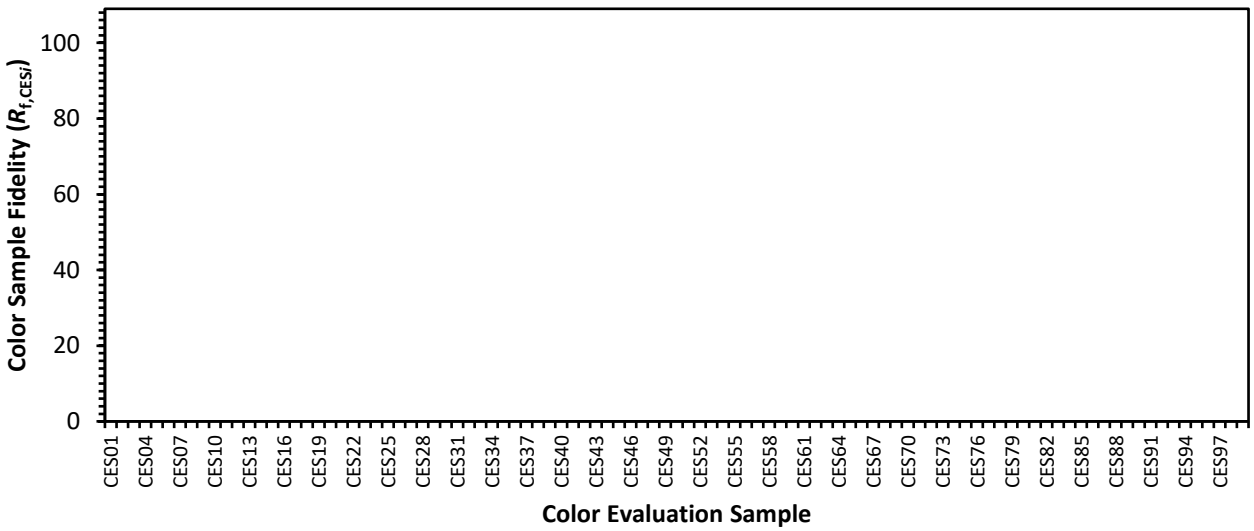
## TM-30-18

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

| | | | |
|---|---|---|---|
| CES01 = 0 | CES26 = 0 | CES51 = 0 | CES76 = 0 |
| CES02 = 0 | CES27 = 0 | CES52 = 0 | CES77 = 0 |
| CES03 = 0 | CES28 = 0 | CES53 = 0 | CES78 = 0 |
| CES04 = 0 | CES29 = 0 | CES54 = 0 | CES79 = 0 |
| CES05 = 0 | CES30 = 0 | CES55 = 0 | CES80 = 0 |
| CES06 = 0 | CES31 = 0 | CES56 = 0 | CES81 = 0 |
| CES07 = 0 | CES32 = 0 | CES57 = 0 | CES82 = 0 |
| CES08 = 0 | CES33 = 0 | CES58 = 0 | CES83 = 0 |
| CES09 = 0 | CES34 = 0 | CES59 = 0 | CES84 = 0 |
| CES10 = 0 | CES35 = 0 | CES60 = 0 | CES85 = 0 |
| CES11 = 0 | CES36 = 0 | CES61 = 0 | CES86 = 0 |
| CES12 = 0 | CES37 = 0 | CES62 = 0 | CES87 = 0 |
| CES13 = 0 | CES38 = 0 | CES63 = 0 | CES88 = 0 |
| CES14 = 0 | CES39 = 0 | CES64 = 0 | CES89 = 0 |
| CES15 = 0 | CES40 = 0 | CES65 = 0 | CES90 = 0 |
| CES16 = 0 | CES41 = 0 | CES66 = 0 | CES91 = 0 |
| CES17 = 0 | CES42 = 0 | CES67 = 0 | CES92 = 0 |
| CES18 = 0 | CES43 = 0 | CES68 = 0 | CES93 = 0 |
| CES19 = 0 | CES44 = 0 | CES69 = 0 | CES94 = 0 |
| CES20 = 0 | CES45 = 0 | CES70 = 0 | CES95 = 0 |
| CES21 = 0 | CES46 = 0 | CES71 = 0 | CES96 = 0 |
| CES22 = 0 | CES47 = 0 | CES72 = 0 | CES97 = 0 |
| CES23 = 0 | CES48 = 0 | CES73 = 0 | CES98 = 0 |
| CES24 = 0 | CES49 = 0 | CES74 = 0 | CES99 = 0 |
| CES25 = 0 | CES50 = 0 | CES75 = 0 | |



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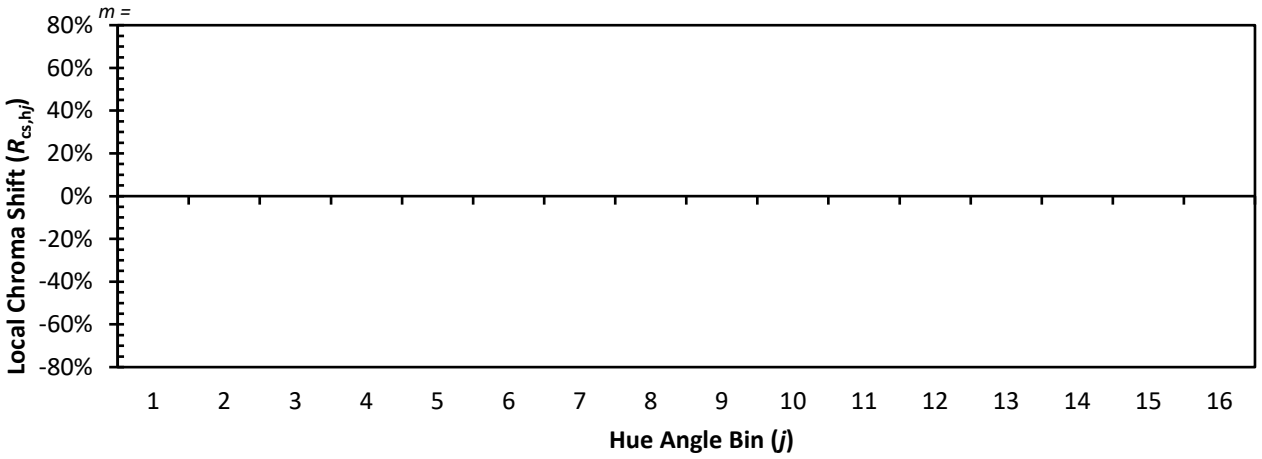
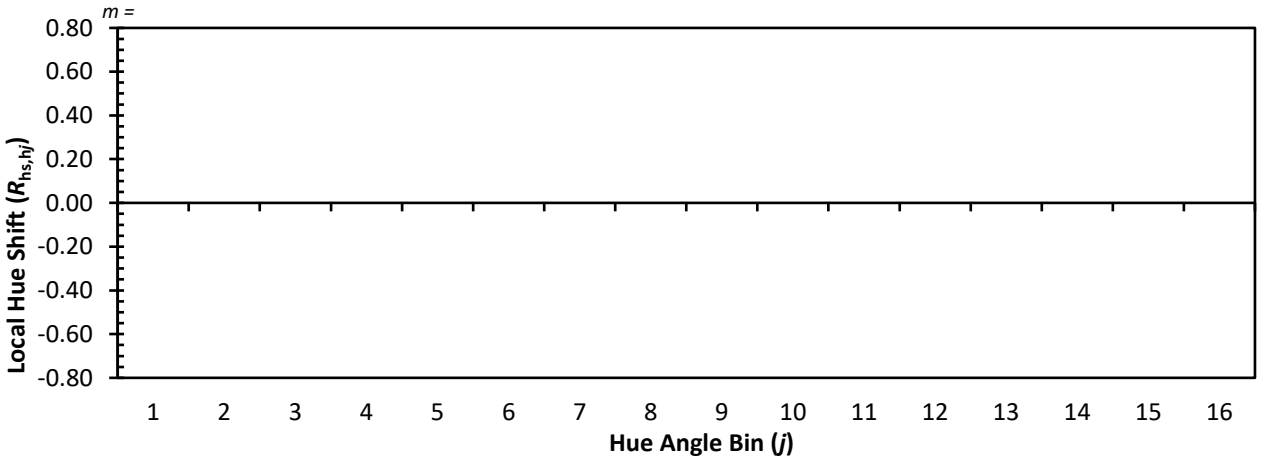
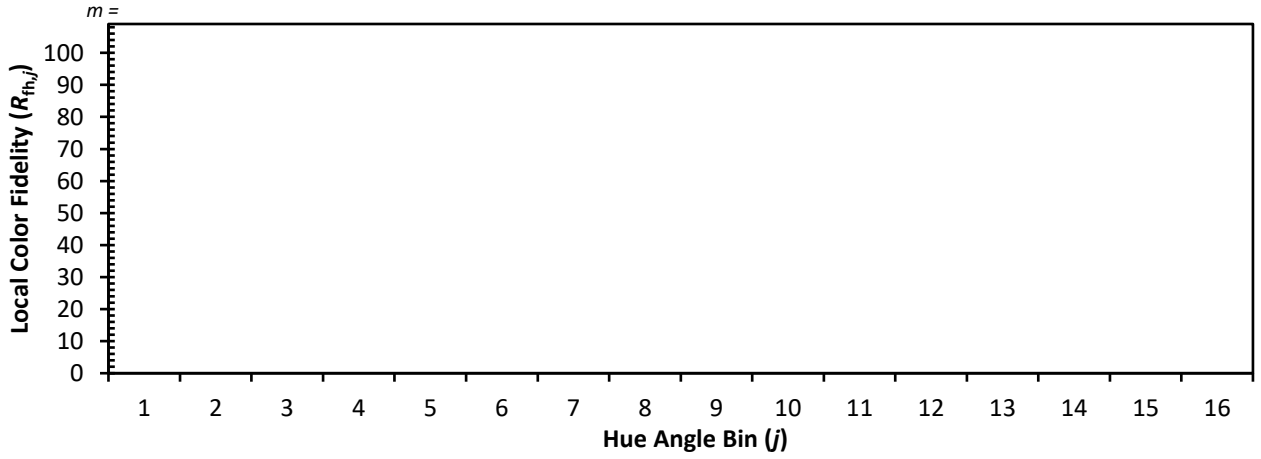
## Color Rendition by Hue-Angle Bin



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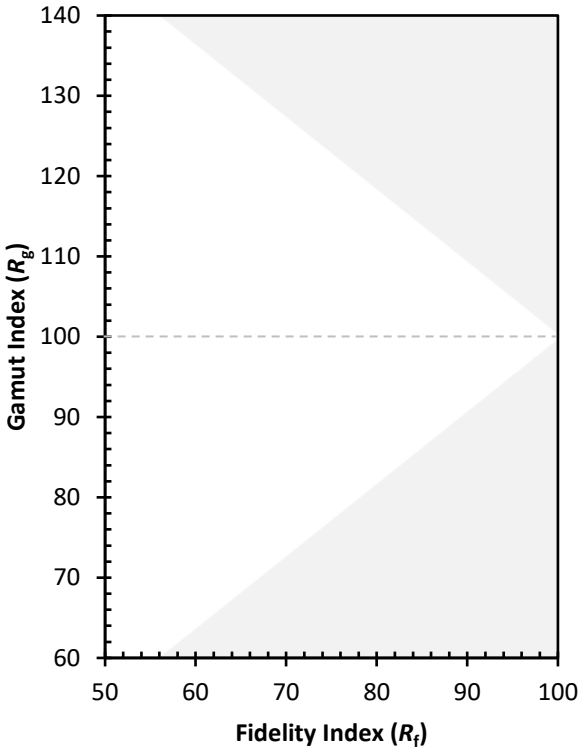
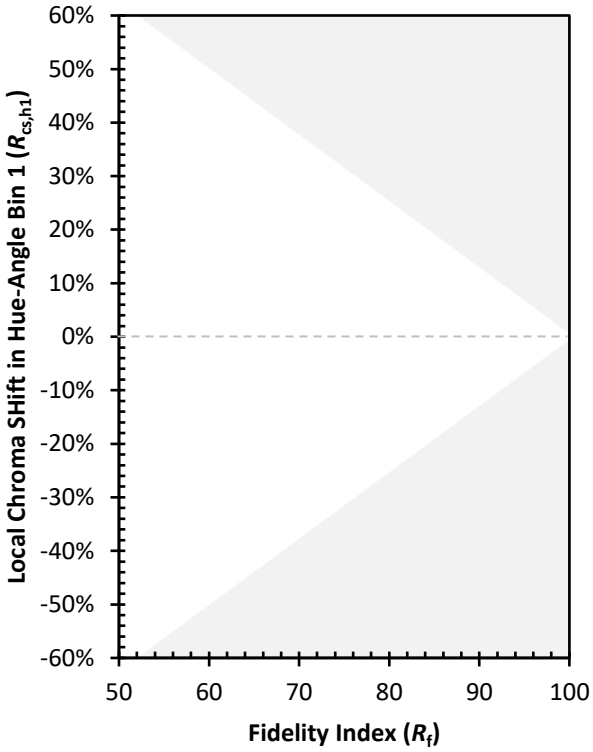
## Measure Comparisons

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