

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



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

Test Report Prepared for  
Cooper Lighting Solutions

Brand: STREETWORKS

Report Number: P361598

Luminaire Tested: NVN-SA4B-750-U-T4W

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-2019  
Report Number: P361598  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-18)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: STREETWORKS  
Catalog Number: NVN-SA4B-750-U-T4W  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(4) 70 CRI, 5000K, 800mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV WIDE OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 23146 lumens  
Efficiency: N/A  
Efficacy: 135.4 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1.5' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B3 - U0 - G4

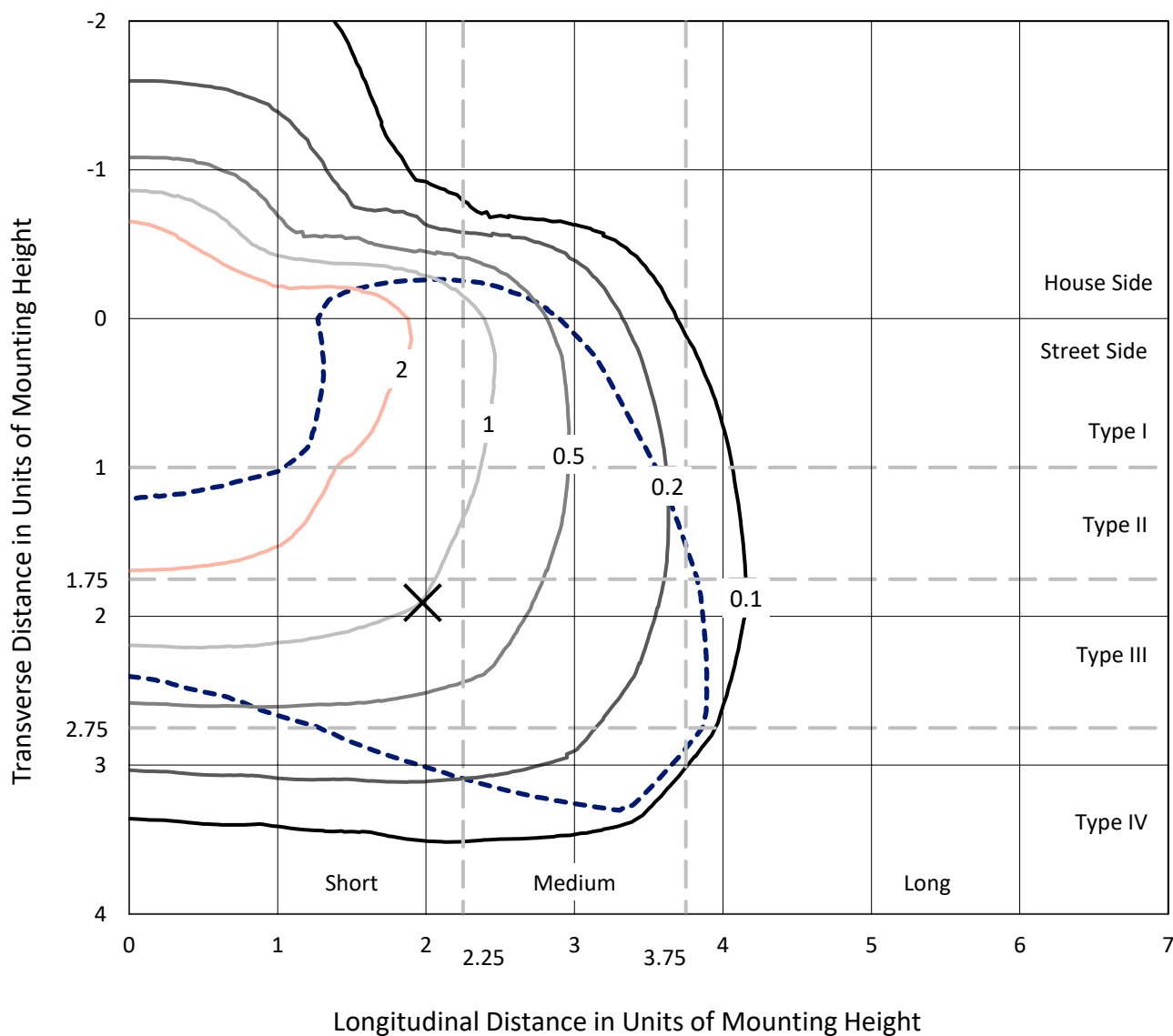
Input Watts (W): 171  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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## Iso-Footcandle Lines of Horizontal Illumination

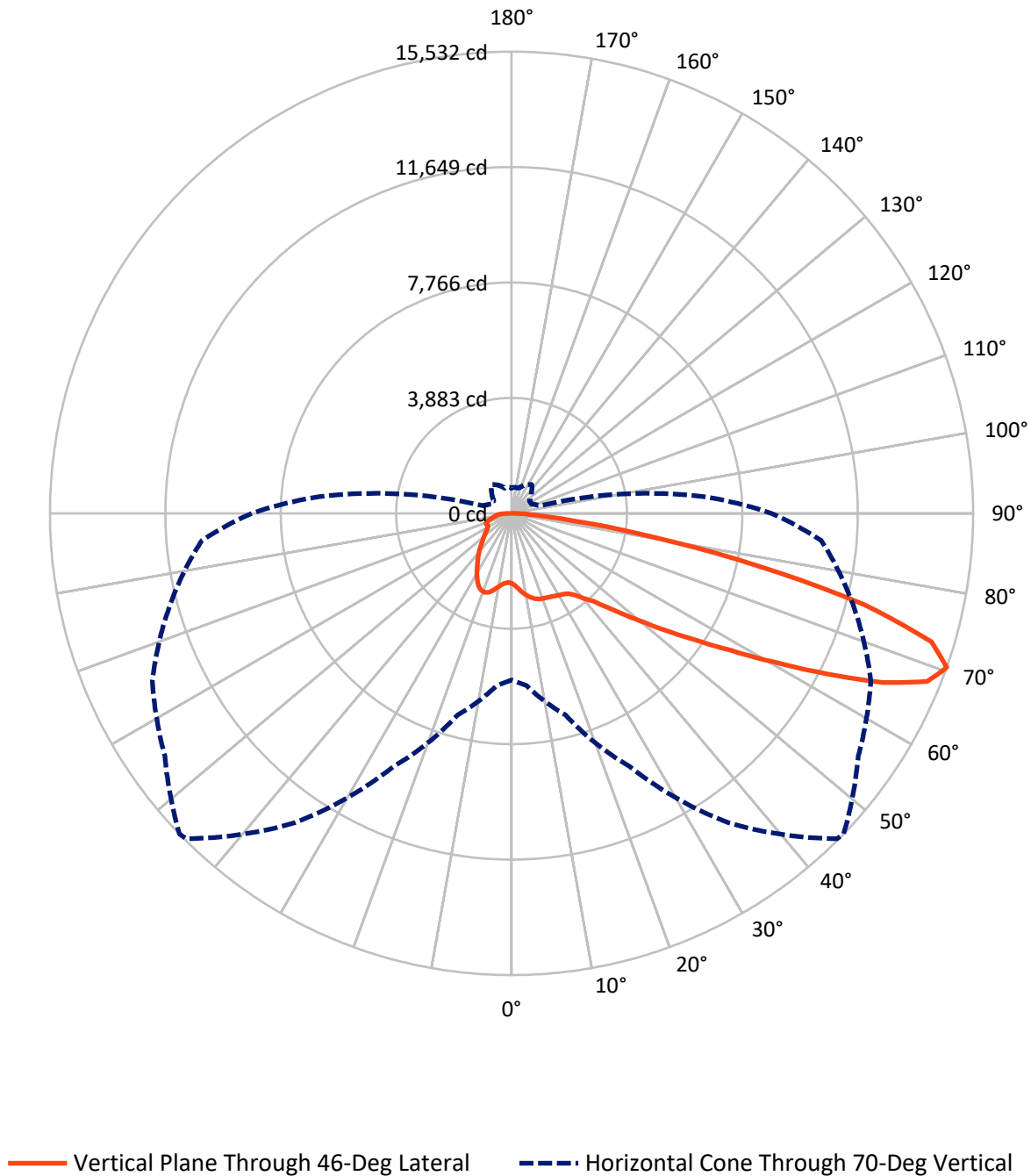
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 4.7 fc  
 Type IV - Short - N/A

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## Luminous Intensity Polar Plot



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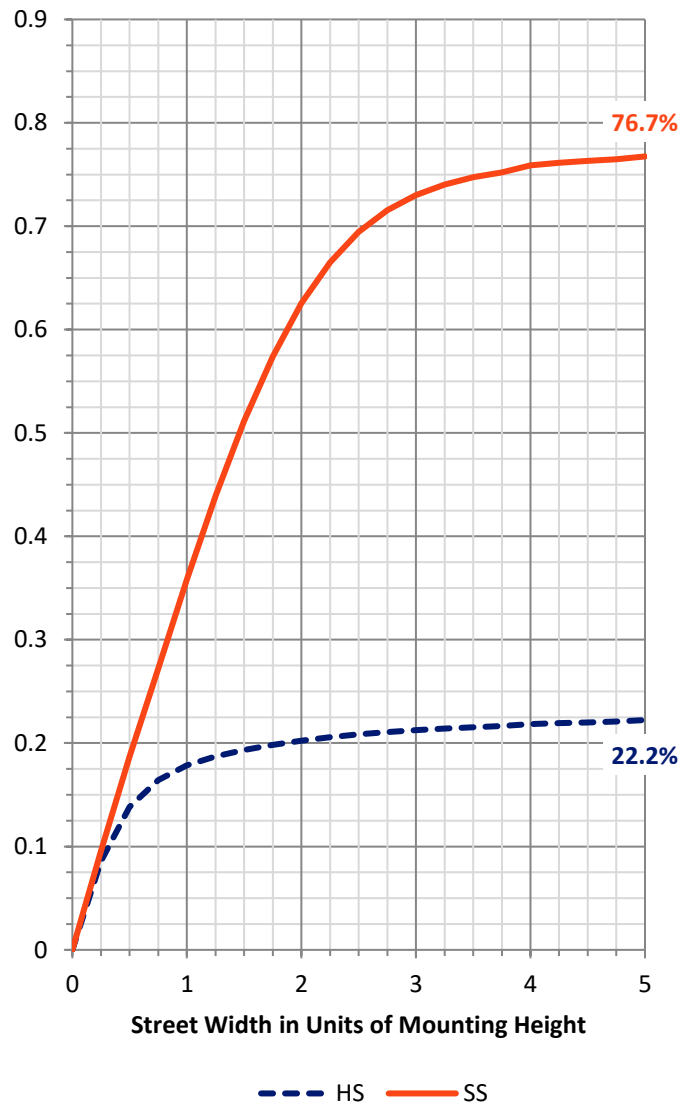
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 5305.0   | 0.0    | 5305.0  |
|                    | % Fixture | 22.9     | 0.0    | 22.9    |
| <b>Street Side</b> | Lumens    | 17841.0  | 0.0    | 17841.0 |
|                    | % Fixture | 77.1     | 0.0    | 77.1    |
| <b>Total</b>       | Lumens    | 23146.0  | 0.0    | 23146.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 240.4   | 1.0       |
| 10°-20°   | 800.9   | 3.5       |
| 20°-30°   | 1335.4  | 5.8       |
| 30°-40°   | 1895.1  | 8.2       |
| 40°-50°   | 2787.5  | 12.0      |
| 50°-60°   | 4720.7  | 20.4      |
| 60°-70°   | 6700.9  | 29.0      |
| 70°-80°   | 4070.9  | 17.6      |
| 80°-90°   | 594.1   | 2.6       |
| 90°-100°  | 0.0     | 0.0       |
| 100°-110° | 0.0     | 0.0       |
| 110°-120° | 0.0     | 0.0       |
| 120°-130° | 0.0     | 0.0       |
| 130°-140° | 0.0     | 0.0       |
| 140°-150° | 0.0     | 0.0       |
| 150°-160° | 0.0     | 0.0       |
| 160°-170° | 0.0     | 0.0       |
| 170°-180° | 0.0     | 0.0       |
| 0°-90°    | 23146.0 | 100.0     |
| 0°-180°   | 23146.0 | 100.0     |

**Coefficient of Utilization**



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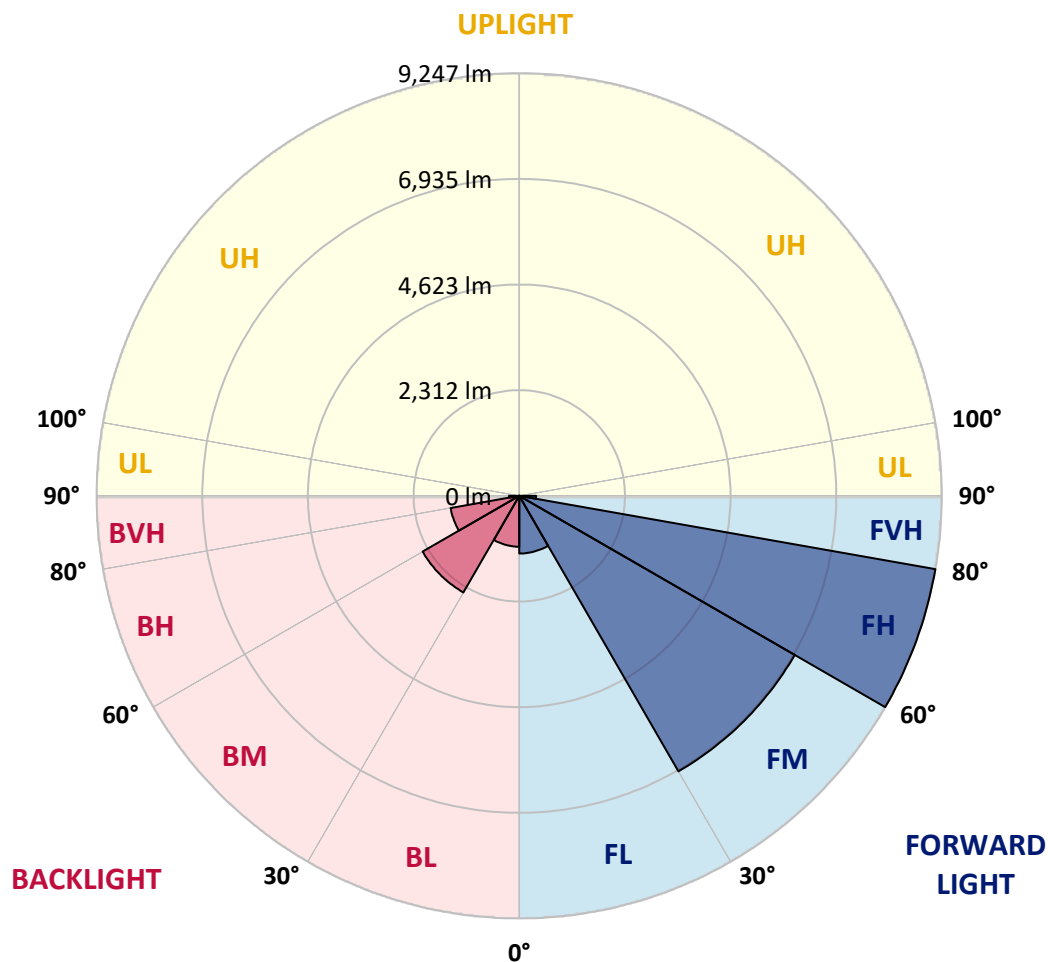
CATALOG NUMBER: NVN-SA4B-750-U-T4W

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |          |
|------|-------------|--------|-----------|-------------------------|------|----------|
|      |             |        |           | B                       | U    | G        |
| FL   | (0°-30°)    | 1263.0 | 5.5       |                         |      |          |
| FM   | (30°-60°)   | 6961.3 | 30.1      |                         |      |          |
| FH   | (60°-80°)   | 9246.7 | 39.9      |                         |      | G4/12000 |
| FVH  | (80°-90°)   | 370.1  | 1.6       |                         |      | G3/500   |
| BL   | (0°-30°)    | 1113.8 | 4.8       | B3/2500                 |      |          |
| BM   | (30°-60°)   | 2442.0 | 10.6      | B2/2500                 |      |          |
| BH   | (60°-80°)   | 1525.1 | 6.6       | B3/2500                 |      | G3/2500  |
| BVH  | (80°-90°)   | 224.0  | 1.0       |                         |      | G2/225   |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |          |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |          |

**BUG Rating: B3-U0-G4**

Type IV Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°     | 25°     | 35°     | 45°     | 46°     | 55°     | 65°     | 75°     | 85°     |
|-------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 2358.1 | 2358.1 | 2358.1  | 2358.1  | 2358.1  | 2358.1  | 2358.1  | 2358.1  | 2358.1  | 2358.1  | 2358.1  |
| 2.5°  | 2476.1 | 2477.7 | 2480.9  | 2473.0  | 2450.8  | 2444.5  | 2442.1  | 2419.1  | 2404.1  | 2381.9  | 2362.9  |
| 5°    | 2674.2 | 2675.8 | 2671.0  | 2648.8  | 2599.7  | 2563.3  | 2560.1  | 2507.8  | 2460.3  | 2409.6  | 2371.6  |
| 7.5°  | 2880.9 | 2883.3 | 2868.2  | 2826.3  | 2757.3  | 2694.0  | 2690.0  | 2618.7  | 2546.6  | 2469.8  | 2412.8  |
| 10°   | 3063.9 | 3054.4 | 3029.8  | 2971.2  | 2889.6  | 2812.0  | 2808.8  | 2734.4  | 2651.2  | 2558.5  | 2482.5  |
| 12.5° | 3185.9 | 3178.0 | 3146.3  | 3075.0  | 2985.5  | 2914.2  | 2907.9  | 2838.9  | 2758.1  | 2656.8  | 2565.7  |
| 15°   | 3253.2 | 3258.8 | 3216.0  | 3135.2  | 3048.1  | 2987.9  | 2982.3  | 2933.2  | 2861.1  | 2758.9  | 2654.4  |
| 17.5° | 3261.9 | 3266.7 | 3225.5  | 3145.5  | 3074.2  | 3033.0  | 3030.6  | 2998.2  | 2945.9  | 2847.7  | 2738.3  |
| 20°   | 3211.2 | 3214.4 | 3180.3  | 3114.6  | 3067.9  | 3055.2  | 3054.4  | 3040.1  | 3001.3  | 2914.2  | 2808.0  |
| 22.5° | 3137.6 | 3139.9 | 3115.4  | 3067.9  | 3052.0  | 3071.8  | 3077.4  | 3071.8  | 3044.1  | 2962.5  | 2862.7  |
| 25°   | 3119.3 | 3117.8 | 3092.4  | 3044.1  | 3057.6  | 3099.5  | 3106.7  | 3109.0  | 3090.0  | 3018.7  | 2932.4  |
| 27.5° | 3207.3 | 3201.7 | 3153.4  | 3075.8  | 3084.5  | 3135.2  | 3144.7  | 3167.7  | 3155.8  | 3093.2  | 3011.6  |
| 30°   | 3461.5 | 3452.0 | 3353.0  | 3196.2  | 3153.4  | 3179.5  | 3191.4  | 3227.9  | 3230.2  | 3178.0  | 3117.0  |
| 32.5° | 3890.9 | 3879.0 | 3701.6  | 3421.1  | 3269.8  | 3224.7  | 3235.8  | 3290.4  | 3319.8  | 3279.4  | 3213.6  |
| 35°   | 4433.5 | 4420.0 | 4187.1  | 3803.7  | 3464.7  | 3311.0  | 3319.0  | 3362.5  | 3421.1  | 3364.1  | 3277.0  |
| 37.5° | 4999.0 | 4966.6 | 4742.4  | 4253.7  | 3774.4  | 3495.6  | 3495.6  | 3501.1  | 3528.9  | 3410.1  | 3351.4  |
| 40°   | 5561.4 | 5529.0 | 5326.2  | 4782.8  | 4175.2  | 3786.3  | 3768.1  | 3645.3  | 3623.1  | 3520.9  | 3501.1  |
| 42.5° | 6084.2 | 6074.7 | 5955.1  | 5380.8  | 4645.8  | 4072.3  | 4046.9  | 3838.6  | 3843.3  | 3780.0  | 3780.8  |
| 45°   | 6640.3 | 6640.3 | 6542.9  | 5984.4  | 5193.9  | 4531.7  | 4506.3  | 4199.8  | 4247.3  | 4218.0  | 4288.5  |
| 47.5° | 7094.2 | 7108.4 | 7095.0  | 6613.4  | 5831.5  | 5115.5  | 5069.5  | 4700.4  | 4833.5  | 4934.1  | 5139.2  |
| 50°   | 7557.6 | 7579.7 | 7582.1  | 7303.3  | 6602.3  | 5809.4  | 5757.1  | 5365.0  | 5662.0  | 5950.4  | 6353.5  |
| 52.5° | 8230.1 | 8280.0 | 8081.2  | 7991.6  | 7546.5  | 6633.2  | 6581.7  | 6219.7  | 6715.5  | 7120.3  | 7815.0  |
| 55°   | 8853.5 | 8809.9 | 8668.1  | 8723.6  | 8557.2  | 7571.0  | 7532.2  | 7214.6  | 7889.5  | 8415.4  | 9317.6  |
| 57.5° | 9190.9 | 9187.7 | 9330.3  | 9567.9  | 9647.2  | 8727.5  | 8695.0  | 8386.1  | 9213.1  | 9608.3  | 10728.4 |
| 60°   | 9587.0 | 9592.5 | 9945.8  | 10485.2 | 10811.6 | 10167.6 | 10153.3 | 9918.9  | 10498.7 | 10722.1 | 11835.0 |
| 62.5° | 9642.4 | 9742.2 | 10350.6 | 11278.9 | 11901.5 | 11850.0 | 11881.7 | 11299.5 | 11648.8 | 11610.8 | 12661.2 |
| 65°   | 9004.8 | 9136.2 | 10237.3 | 11518.9 | 12985.1 | 13690.1 | 13719.4 | 12688.1 | 12555.8 | 12370.4 | 12956.6 |
| 67.5° | 7697.8 | 7892.6 | 9088.7  | 10996.9 | 13342.4 | 15050.2 | 15091.4 | 13764.6 | 13308.3 | 12627.9 | 12245.3 |
| 70°   | 5601.8 | 5818.1 | 7022.1  | 9392.1  | 12705.5 | 15485.0 | 15531.8 | 14240.6 | 13336.8 | 11895.2 | 10453.5 |
| 72.5° | 3383.9 | 3553.4 | 4545.9  | 6914.4  | 10723.6 | 14692.9 | 14776.1 | 13637.0 | 12176.4 | 10075.7 | 7719.2  |
| 75°   | 1486.0 | 1596.9 | 2198.1  | 3984.3  | 7677.2  | 12156.6 | 12260.3 | 11672.6 | 9893.5  | 7322.3  | 4562.6  |
| 77.5° | 632.9  | 664.6  | 901.4   | 1730.8  | 4340.0  | 8306.9  | 8449.5  | 8528.7  | 6712.4  | 3984.3  | 1928.0  |
| 80°   | 394.5  | 407.1  | 510.1   | 783.4   | 2031.0  | 4665.6  | 4819.2  | 5018.0  | 3333.2  | 1464.6  | 673.3   |
| 82.5° | 240.0  | 254.3  | 339.0   | 473.7   | 1057.5  | 2114.9  | 2188.6  | 2328.8  | 1293.5  | 632.9   | 348.5   |
| 85°   | 144.2  | 154.5  | 207.5   | 299.4   | 602.0   | 831.7   | 830.9   | 918.9   | 609.1   | 407.1   | 183.8   |
| 87.5° | 68.9   | 76.8   | 110.9   | 155.3   | 303.4   | 312.1   | 292.3   | 331.1   | 369.9   | 266.9   | 92.7    |
| 90°   | 0.0    | 0.0    | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |

REPORT NUMBER: P361598

CATALOG NUMBER: NVN-SA4B-750-U-T4W

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2358.1  | 2358.1 | 2358.1 | 2358.1 | 2358.1 | 2358.1 | 2358.1 | 2358.1 | 2358.1 | 2358.1 | 2358.1 |
| 2.5°  | 2356.5  | 2353.4 | 2343.1 | 2335.2 | 2333.6 | 2328.8 | 2324.9 | 2327.2 | 2330.4 | 2331.2 | 2331.2 |
| 5°    | 2355.7  | 2347.0 | 2333.6 | 2328.0 | 2335.2 | 2344.7 | 2356.5 | 2372.4 | 2381.9 | 2389.0 | 2393.8 |
| 7.5°  | 2393.8  | 2377.1 | 2362.1 | 2358.9 | 2373.2 | 2398.5 | 2425.5 | 2458.7 | 2481.7 | 2497.5 | 2500.7 |
| 10°   | 2457.1  | 2436.5 | 2421.5 | 2424.7 | 2450.0 | 2486.4 | 2524.5 | 2567.2 | 2602.1 | 2623.5 | 2625.1 |
| 12.5° | 2530.0  | 2510.2 | 2496.0 | 2509.4 | 2551.4 | 2595.8 | 2635.4 | 2672.6 | 2704.3 | 2725.7 | 2725.7 |
| 15°   | 2614.0  | 2599.7 | 2583.1 | 2614.0 | 2671.0 | 2710.6 | 2727.2 | 2745.5 | 2762.9 | 2778.7 | 2775.6 |
| 17.5° | 2694.8  | 2681.3 | 2672.6 | 2709.0 | 2768.4 | 2786.7 | 2775.6 | 2762.1 | 2762.1 | 2770.8 | 2772.4 |
| 20°   | 2764.5  | 2752.6 | 2758.1 | 2793.8 | 2824.7 | 2805.7 | 2764.5 | 2721.7 | 2704.3 | 2709.0 | 2713.8 |
| 22.5° | 2825.5  | 2819.9 | 2836.6 | 2853.2 | 2831.0 | 2764.5 | 2688.4 | 2630.6 | 2609.2 | 2607.6 | 2609.2 |
| 25°   | 2896.8  | 2896.0 | 2916.6 | 2886.5 | 2788.2 | 2665.5 | 2563.3 | 2507.0 | 2495.2 | 2504.7 | 2520.5 |
| 27.5° | 2985.5  | 2994.2 | 3004.5 | 2894.4 | 2701.1 | 2515.8 | 2412.0 | 2373.2 | 2385.1 | 2408.0 | 2423.1 |
| 30°   | 3098.8  | 3122.5 | 3100.3 | 2874.6 | 2576.0 | 2344.7 | 2245.6 | 2234.6 | 2267.0 | 2299.5 | 2315.4 |
| 32.5° | 3208.9  | 3246.1 | 3192.2 | 2823.1 | 2414.4 | 2163.3 | 2086.4 | 2083.3 | 2122.9 | 2154.6 | 2176.7 |
| 35°   | 3297.6  | 3371.2 | 3261.1 | 2720.9 | 2227.4 | 1996.1 | 1939.9 | 1918.5 | 1932.8 | 1970.0 | 1995.3 |
| 37.5° | 3413.2  | 3536.0 | 3308.7 | 2564.9 | 2024.6 | 1858.3 | 1792.6 | 1743.4 | 1730.8 | 1745.8 | 1758.5 |
| 40°   | 3624.7  | 3787.1 | 3330.8 | 2347.0 | 1826.6 | 1720.5 | 1653.9 | 1581.9 | 1531.9 | 1495.5 | 1496.3 |
| 42.5° | 3970.1  | 4114.2 | 3316.6 | 2082.5 | 1643.6 | 1585.8 | 1510.6 | 1427.4 | 1346.6 | 1264.2 | 1257.9 |
| 45°   | 4530.9  | 4600.6 | 3273.8 | 1802.1 | 1482.8 | 1444.8 | 1374.3 | 1291.1 | 1183.4 | 1089.9 | 1081.2 |
| 47.5° | 5428.4  | 5273.9 | 3207.3 | 1557.3 | 1341.0 | 1325.2 | 1260.3 | 1164.4 | 1050.3 | 975.1  | 968.8  |
| 50°   | 6652.2  | 6245.8 | 3174.8 | 1362.4 | 1215.9 | 1220.6 | 1167.6 | 1066.2 | 958.5  | 903.0  | 896.7  |
| 52.5° | 8116.0  | 7377.8 | 3237.4 | 1211.9 | 1115.3 | 1131.9 | 1092.3 | 997.3  | 907.0  | 863.4  | 857.1  |
| 55°   | 9634.5  | 8550.1 | 3304.7 | 1102.6 | 1020.2 | 1052.7 | 1039.3 | 960.8  | 879.2  | 838.8  | 833.3  |
| 57.5° | 10934.3 | 9425.4 | 3170.0 | 1013.9 | 935.5  | 986.2  | 998.1  | 937.9  | 865.0  | 828.6  | 822.2  |
| 60°   | 11752.6 | 9777.9 | 2816.8 | 930.7  | 868.2  | 933.1  | 974.3  | 931.5  | 870.5  | 867.4  | 862.6  |
| 62.5° | 12140.7 | 9747.0 | 2286.8 | 865.0  | 826.2  | 910.1  | 991.7  | 967.2  | 933.9  | 962.4  | 964.8  |
| 65°   | 11966.5 | 9281.2 | 1703.0 | 821.4  | 796.1  | 918.9  | 1044.0 | 1034.5 | 952.1  | 980.6  | 984.6  |
| 67.5° | 10819.5 | 8169.9 | 1261.0 | 783.4  | 762.8  | 943.4  | 1139.1 | 1056.7 | 916.5  | 937.1  | 924.4  |
| 70°   | 8744.9  | 6477.1 | 972.7  | 740.6  | 728.7  | 940.2  | 1181.8 | 1043.2 | 877.7  | 882.4  | 848.4  |
| 72.5° | 6030.4  | 4416.8 | 791.3  | 701.0  | 679.6  | 857.1  | 1151.7 | 1009.9 | 845.2  | 808.7  | 763.6  |
| 75°   | 3279.4  | 2370.8 | 672.5  | 659.8  | 593.3  | 752.5  | 1096.3 | 986.2  | 815.9  | 767.6  | 742.2  |
| 77.5° | 1290.4  | 983.8  | 583.8  | 603.6  | 518.8  | 664.6  | 1034.5 | 941.0  | 775.5  | 712.1  | 699.4  |
| 80°   | 526.8   | 502.2  | 484.0  | 522.0  | 446.0  | 581.4  | 960.0  | 888.0  | 727.2  | 660.6  | 635.3  |
| 82.5° | 298.6   | 312.1  | 376.3  | 411.9  | 362.0  | 535.5  | 924.4  | 845.2  | 669.3  | 591.7  | 561.6  |
| 85°   | 152.9   | 183.0  | 262.2  | 295.5  | 266.2  | 455.5  | 851.5  | 739.8  | 537.1  | 453.1  | 455.5  |
| 87.5° | 73.7    | 102.2  | 165.6  | 185.4  | 172.7  | 329.5  | 636.1  | 536.3  | 418.2  | 331.1  | 320.8  |
| 90°   | 0.0     | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |



LM-79-2008: Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Report Prepared for

Cooper Lighting Solutions

McGRAW-EDISON

Report Number: SP1-1908-441-4-R4

Test Date: 10/02/2019

Luminaire Tested: SA1C-750-U-5WQ

Data in this report applies to families of products SA1C-760-U-5WQ .

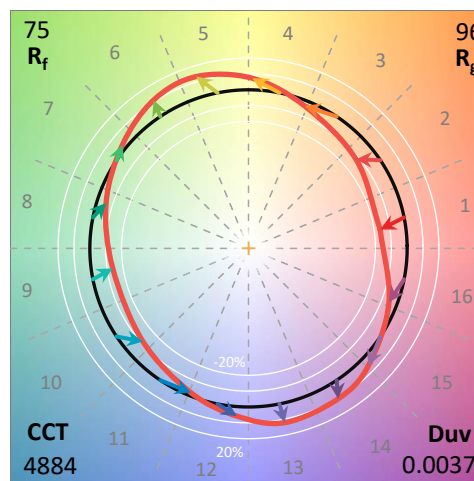
### Test Information

Test Method: LM-79-2008  
 Report Number: SP1-1908-441-4-R4  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 10/28/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: MCGRAW-EDISON  
 Catalog Number: **SA1C-750-U-5WQ**  
 Description: MCGRAW EDISON ROADWAY AND AREA LUMINAIRE

\*\*\*THIS IS A REVISION OF SP1-1908-441-4-R3. TO UPDATE THE CATALOG INFORMATION.\*\*\*TESTED IN SITU. ROADWAY AND AREA LUMINAIRE. (1) 70 CRI, 5000K, 1050MA LIGHTSQUARE WITH 16 LEDS AND TYPE V WIDE OPTICS.

### Spectral Parameters

|                           |        |           |      |      |       |
|---------------------------|--------|-----------|------|------|-------|
| CCT (K):                  | 4884   | CRI (Ra): | 73.5 |      |       |
| CIE u':                   | 0.2101 | R1:       | 70.5 | R9:  | -28.4 |
| CIE v':                   | 0.4904 | R2:       | 77.7 | R10: | 48.6  |
| Duv:                      | 0.0037 | R3:       | 84.6 | R11: | 73.2  |
| CIE x:                    | 0.3493 | R4:       | 74.7 | R12: | 50.7  |
| CIE y:                    | 0.3624 | R5:       | 71.9 | R13: | 71.2  |
| CIE z:                    | 0.2884 | R6:       | 70.7 | R14: | 91.4  |
| Peak Wavelength (nm):     | 444    | R7:       | 81.2 |      |       |
| Dominant Wavelength (nm): | 571    | R8:       | 56.9 |      |       |
| Purity:                   | 13.7   |           |      |      |       |
| Rf:                       | 74.9   |           |      |      |       |
| Rg:                       | 96.3   |           |      |      |       |

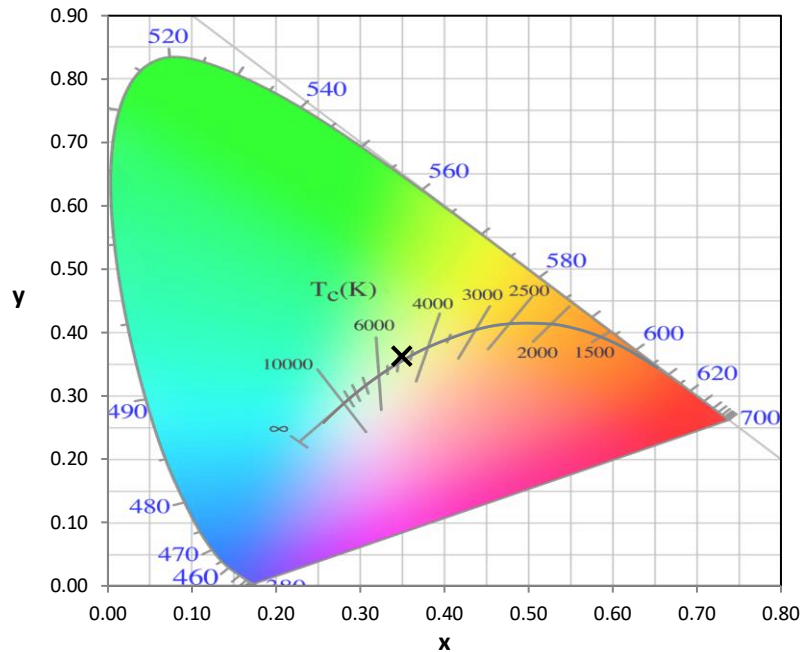


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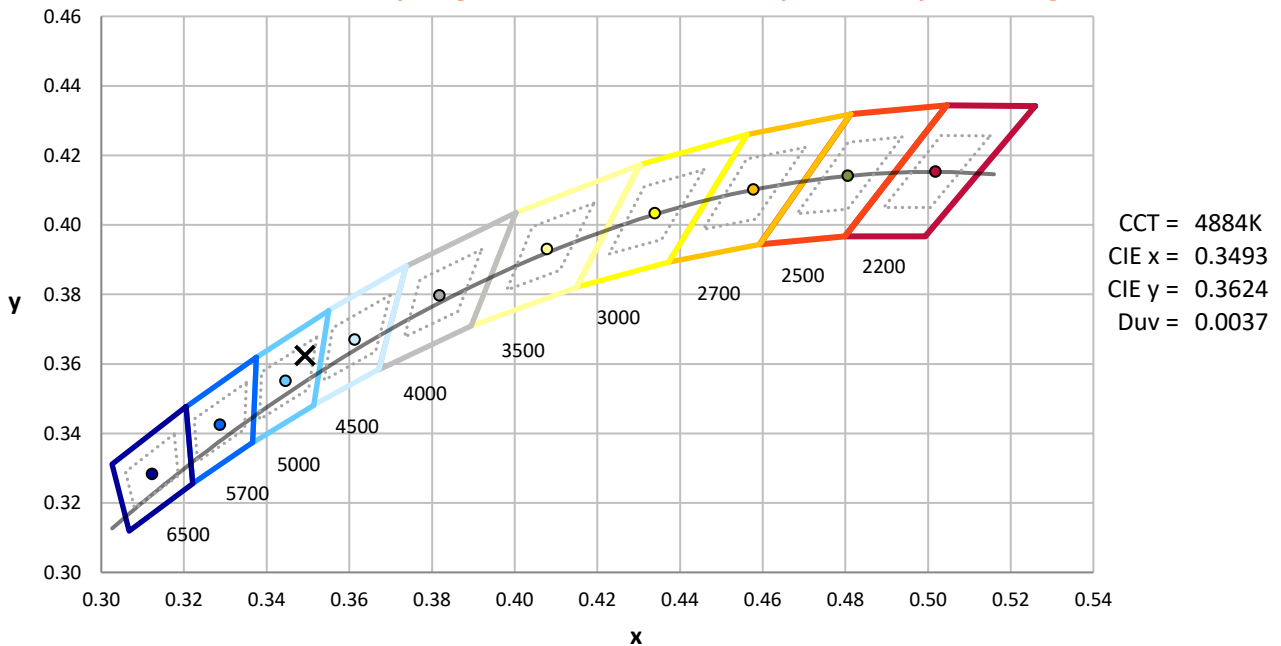
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 6/28/2019        | 12/28/2019           |
| Power Meter                    | IN0071                | 12/5/2018        | 12/5/2019            |
| AC Power Source                | IN0063                | 12/5/2018        | 12/5/2019            |
| DC Power Source                | IN0208                | 12/5/2018        | 12/5/2019            |
| Sphere Thermometer             | IN0085                | 12/5/2018        | 12/5/2019            |
| Room Thermometer               | IN0046                | 12/5/2018        | 12/5/2019            |

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CIE 1931 Chromaticity Diagram



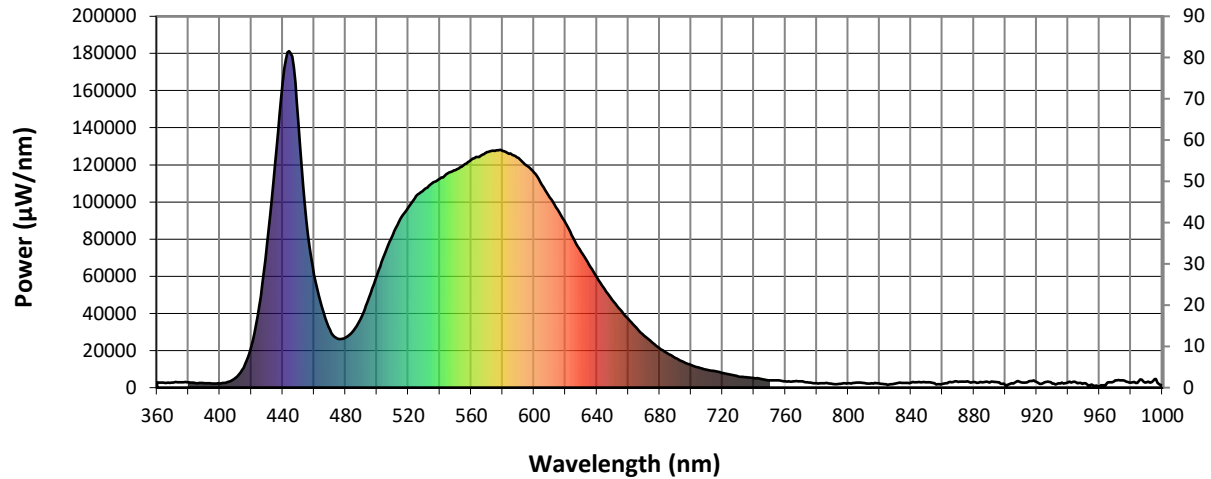
CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 5000K 4-step quadrangle

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**Photopic Flux vs. Wavelength**

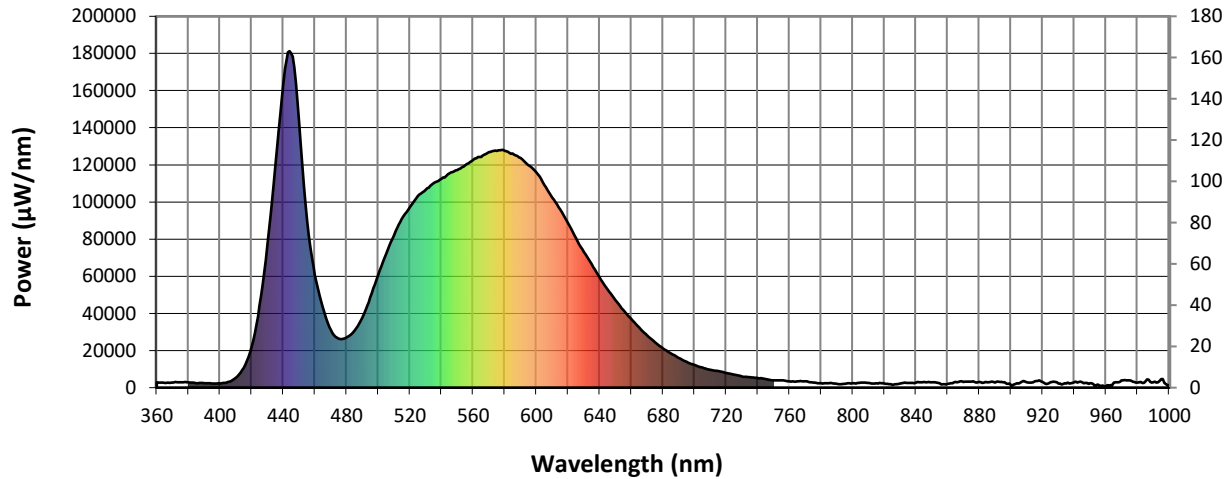


#####

| 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       | 2945             | NR               | 490       | 37941            | NR               | 620       | 88803            | NR               | 750       | 3908             | NR               | 880       | 2997             | NR               |
| 365       | 2596             | NR               | 495       | 48525            | NR               | 625       | 80578            | NR               | 755       | 3988             | NR               | 885       | 2927             | NR               |
| 370       | 2732             | NR               | 500       | 60609            | NR               | 630       | 73127            | NR               | 760       | 3335             | NR               | 890       | 2649             | NR               |
| 375       | 2894             | NR               | 505       | 72036            | NR               | 635       | 66244            | NR               | 765       | 3438             | NR               | 895       | 2828             | NR               |
| 380       | 2822             | NR               | 510       | 82168            | NR               | 640       | 59440            | NR               | 770       | 3427             | NR               | 900       | 1407             | NR               |
| 385       | 2394             | NR               | 515       | 90898            | NR               | 645       | 52864            | NR               | 775       | 2759             | NR               | 905       | 2224             | NR               |
| 390       | 2370             | NR               | 520       | 97142            | NR               | 650       | 47085            | NR               | 780       | 2340             | NR               | 910       | 2905             | NR               |
| 395       | 2267             | NR               | 525       | 103255           | NR               | 655       | 41789            | NR               | 785       | 2412             | NR               | 915       | 3350             | NR               |
| 400       | 2262             | NR               | 530       | 106697           | NR               | 660       | 37064            | NR               | 790       | 1999             | NR               | 920       | 3114             | NR               |
| 405       | 3000             | NR               | 535       | 110081           | NR               | 665       | 32299            | NR               | 795       | 2054             | NR               | 925       | 2834             | NR               |
| 410       | 5324             | NR               | 540       | 112494           | NR               | 670       | 28142            | NR               | 800       | 2331             | NR               | 930       | 2271             | NR               |
| 415       | 10725            | NR               | 545       | 115513           | NR               | 675       | 24505            | NR               | 805       | 2648             | NR               | 935       | 2228             | NR               |
| 420       | 22128            | NR               | 550       | 117203           | NR               | 680       | 21162            | NR               | 810       | 2485             | NR               | 940       | 2833             | NR               |
| 425       | 44095            | NR               | 555       | 119753           | NR               | 685       | 18400            | NR               | 815       | 2409             | NR               | 945       | 2941             | NR               |
| 430       | 77002            | NR               | 560       | 122602           | NR               | 690       | 16065            | NR               | 820       | 2221             | NR               | 950       | 2323             | NR               |
| 435       | 119881           | NR               | 565       | 124314           | NR               | 695       | 13860            | NR               | 825       | 1562             | NR               | 955       | 1667             | NR               |
| 440       | 164454           | NR               | 570       | 126775           | NR               | 700       | 12177            | NR               | 830       | 2249             | NR               | 960       | 749              | NR               |
| 445       | 179997           | NR               | 575       | 127511           | NR               | 705       | 10757            | NR               | 835       | 2573             | NR               | 965       | 2669             | NR               |
| 450       | 142822           | NR               | 580       | 127577           | NR               | 710       | 9601             | NR               | 840       | 2764             | NR               | 970       | 3968             | NR               |
| 455       | 90008            | NR               | 585       | 126153           | NR               | 715       | 8944             | NR               | 845       | 3109             | NR               | 975       | 3886             | NR               |
| 460       | 60557            | NR               | 590       | 123678           | NR               | 720       | 7947             | NR               | 850       | 2963             | NR               | 980       | 2788             | NR               |
| 465       | 43305            | NR               | 595       | 119774           | NR               | 725       | 7062             | NR               | 855       | 2336             | NR               | 985       | 3496             | NR               |
| 470       | 31089            | NR               | 600       | 115733           | NR               | 730       | 6004             | NR               | 860       | 2118             | NR               | 990       | 2913             | NR               |
| 475       | 26278            | NR               | 605       | 109231           | NR               | 735       | 5594             | NR               | 865       | 3144             | NR               | 995       | 4659             | NR               |
| 480       | 27060            | NR               | 610       | 102408           | NR               | 740       | 5165             | NR               | 870       | 3069             | NR               | 1000      | 1308             | NR               |
| 485       | 30698            | NR               | 615       | 96015            | NR               | 745       | 4687             | NR               | 875       | 3311             | NR               |           |                  |                  |

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Scotopic Flux vs. Wavelength



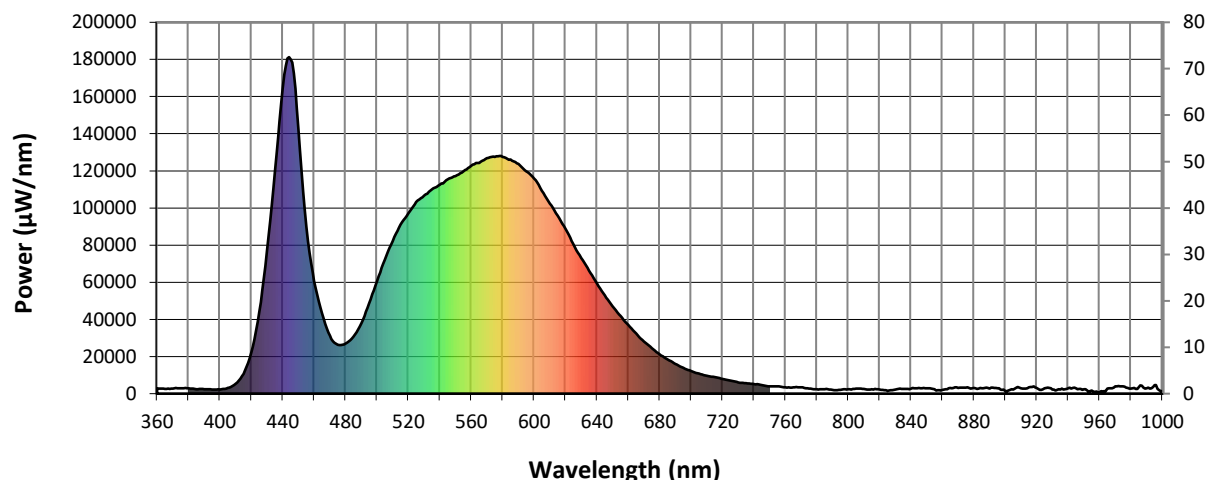
Scotopic Lumens: 13493.5

S/P: 1.77

| 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       | 2945             | NR               | 490       | 37941            | NR               | 620       | 88803            | NR               | 750       | 3908             | NR               | 880       | 2997             | NR               |
| 365       | 2596             | NR               | 495       | 48525            | NR               | 625       | 80578            | NR               | 755       | 3988             | NR               | 885       | 2927             | NR               |
| 370       | 2732             | NR               | 500       | 60609            | NR               | 630       | 73127            | NR               | 760       | 3335             | NR               | 890       | 2649             | NR               |
| 375       | 2894             | NR               | 505       | 72036            | NR               | 635       | 66244            | NR               | 765       | 3438             | NR               | 895       | 2828             | NR               |
| 380       | 2822             | NR               | 510       | 82168            | NR               | 640       | 59440            | NR               | 770       | 3427             | NR               | 900       | 1407             | NR               |
| 385       | 2394             | NR               | 515       | 90898            | NR               | 645       | 52864            | NR               | 775       | 2759             | NR               | 905       | 2224             | NR               |
| 390       | 2370             | NR               | 520       | 97142            | NR               | 650       | 47085            | NR               | 780       | 2340             | NR               | 910       | 2905             | NR               |
| 395       | 2267             | NR               | 525       | 103255           | NR               | 655       | 41789            | NR               | 785       | 2412             | NR               | 915       | 3350             | NR               |
| 400       | 2262             | NR               | 530       | 106697           | NR               | 660       | 37064            | NR               | 790       | 1999             | NR               | 920       | 3114             | NR               |
| 405       | 3000             | NR               | 535       | 110081           | NR               | 665       | 32299            | NR               | 795       | 2054             | NR               | 925       | 2834             | NR               |
| 410       | 5324             | NR               | 540       | 112494           | NR               | 670       | 28142            | NR               | 800       | 2331             | NR               | 930       | 2271             | NR               |
| 415       | 10725            | NR               | 545       | 115513           | NR               | 675       | 24505            | NR               | 805       | 2648             | NR               | 935       | 2228             | NR               |
| 420       | 22128            | NR               | 550       | 117203           | NR               | 680       | 21162            | NR               | 810       | 2485             | NR               | 940       | 2833             | NR               |
| 425       | 44095            | NR               | 555       | 119753           | NR               | 685       | 18400            | NR               | 815       | 2409             | NR               | 945       | 2941             | NR               |
| 430       | 77002            | NR               | 560       | 122602           | NR               | 690       | 16065            | NR               | 820       | 2221             | NR               | 950       | 2323             | NR               |
| 435       | 119881           | NR               | 565       | 124314           | NR               | 695       | 13860            | NR               | 825       | 1562             | NR               | 955       | 1667             | NR               |
| 440       | 164454           | NR               | 570       | 126775           | NR               | 700       | 12177            | NR               | 830       | 2249             | NR               | 960       | 749              | NR               |
| 445       | 179997           | NR               | 575       | 127511           | NR               | 705       | 10757            | NR               | 835       | 2573             | NR               | 965       | 2669             | NR               |
| 450       | 142822           | NR               | 580       | 127577           | NR               | 710       | 9601             | NR               | 840       | 2764             | NR               | 970       | 3968             | NR               |
| 455       | 90008            | NR               | 585       | 126153           | NR               | 715       | 8944             | NR               | 845       | 3109             | NR               | 975       | 3886             | NR               |
| 460       | 60557            | NR               | 590       | 123678           | NR               | 720       | 7947             | NR               | 850       | 2963             | NR               | 980       | 2788             | NR               |
| 465       | 43305            | NR               | 595       | 119774           | NR               | 725       | 7062             | NR               | 855       | 2336             | NR               | 985       | 3496             | NR               |
| 470       | 31089            | NR               | 600       | 115733           | NR               | 730       | 6004             | NR               | 860       | 2118             | NR               | 990       | 2913             | NR               |
| 475       | 26278            | NR               | 605       | 109231           | NR               | 735       | 5594             | NR               | 865       | 3144             | NR               | 995       | 4659             | NR               |
| 480       | 27060            | NR               | 610       | 102408           | NR               | 740       | 5165             | NR               | 870       | 3069             | NR               | 1000      | 1308             | NR               |
| 485       | 30698            | NR               | 615       | 96015            | NR               | 745       | 4687             | NR               | 875       | 3311             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 5378.9**

**M/P: 0.71**

| 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       | 2945             | NR               | 490       | 37941            | NR               | 620       | 88803            | NR               | 750       | 3908             | NR               | 880       | 2997             | NR               |
| 365       | 2596             | NR               | 495       | 48525            | NR               | 625       | 80578            | NR               | 755       | 3988             | NR               | 885       | 2927             | NR               |
| 370       | 2732             | NR               | 500       | 60609            | NR               | 630       | 73127            | NR               | 760       | 3335             | NR               | 890       | 2649             | NR               |
| 375       | 2894             | NR               | 505       | 72036            | NR               | 635       | 66244            | NR               | 765       | 3438             | NR               | 895       | 2828             | NR               |
| 380       | 2822             | NR               | 510       | 82168            | NR               | 640       | 59440            | NR               | 770       | 3427             | NR               | 900       | 1407             | NR               |
| 385       | 2394             | NR               | 515       | 90898            | NR               | 645       | 52864            | NR               | 775       | 2759             | NR               | 905       | 2224             | NR               |
| 390       | 2370             | NR               | 520       | 97142            | NR               | 650       | 47085            | NR               | 780       | 2340             | NR               | 910       | 2905             | NR               |
| 395       | 2267             | NR               | 525       | 103255           | NR               | 655       | 41789            | NR               | 785       | 2412             | NR               | 915       | 3350             | NR               |
| 400       | 2262             | NR               | 530       | 106697           | NR               | 660       | 37064            | NR               | 790       | 1999             | NR               | 920       | 3114             | NR               |
| 405       | 3000             | NR               | 535       | 110081           | NR               | 665       | 32299            | NR               | 795       | 2054             | NR               | 925       | 2834             | NR               |
| 410       | 5324             | NR               | 540       | 112494           | NR               | 670       | 28142            | NR               | 800       | 2331             | NR               | 930       | 2271             | NR               |
| 415       | 10725            | NR               | 545       | 115513           | NR               | 675       | 24505            | NR               | 805       | 2648             | NR               | 935       | 2228             | NR               |
| 420       | 22128            | NR               | 550       | 117203           | NR               | 680       | 21162            | NR               | 810       | 2485             | NR               | 940       | 2833             | NR               |
| 425       | 44095            | NR               | 555       | 119753           | NR               | 685       | 18400            | NR               | 815       | 2409             | NR               | 945       | 2941             | NR               |
| 430       | 77002            | NR               | 560       | 122602           | NR               | 690       | 16065            | NR               | 820       | 2221             | NR               | 950       | 2323             | NR               |
| 435       | 119881           | NR               | 565       | 124314           | NR               | 695       | 13860            | NR               | 825       | 1562             | NR               | 955       | 1667             | NR               |
| 440       | 164454           | NR               | 570       | 126775           | NR               | 700       | 12177            | NR               | 830       | 2249             | NR               | 960       | 749              | NR               |
| 445       | 179997           | NR               | 575       | 127511           | NR               | 705       | 10757            | NR               | 835       | 2573             | NR               | 965       | 2669             | NR               |
| 450       | 142822           | NR               | 580       | 127577           | NR               | 710       | 9601             | NR               | 840       | 2764             | NR               | 970       | 3968             | NR               |
| 455       | 90008            | NR               | 585       | 126153           | NR               | 715       | 8944             | NR               | 845       | 3109             | NR               | 975       | 3886             | NR               |
| 460       | 60557            | NR               | 590       | 123678           | NR               | 720       | 7947             | NR               | 850       | 2963             | NR               | 980       | 2788             | NR               |
| 465       | 43305            | NR               | 595       | 119774           | NR               | 725       | 7062             | NR               | 855       | 2336             | NR               | 985       | 3496             | NR               |
| 470       | 31089            | NR               | 600       | 115733           | NR               | 730       | 6004             | NR               | 860       | 2118             | NR               | 990       | 2913             | NR               |
| 475       | 26278            | NR               | 605       | 109231           | NR               | 735       | 5594             | NR               | 865       | 3144             | NR               | 995       | 4659             | NR               |
| 480       | 27060            | NR               | 610       | 102408           | NR               | 740       | 5165             | NR               | 870       | 3069             | NR               | 1000      | 1308             | NR               |
| 485       | 30698            | NR               | 615       | 96015            | NR               | 745       | 4687             | NR               | 875       | 3311             | NR               |           |                  |                  |

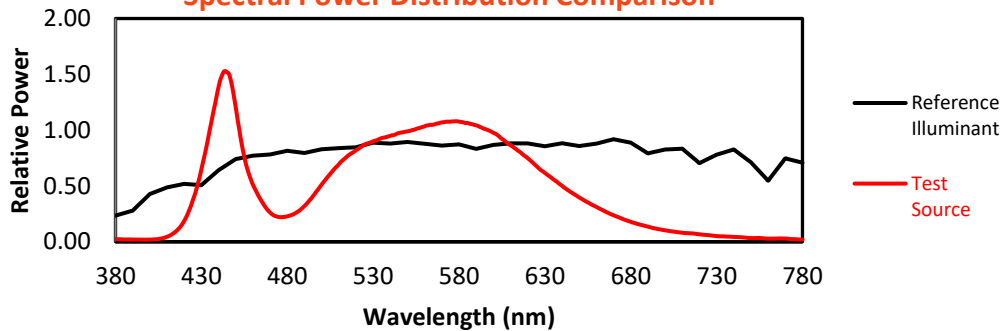
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**TM-30-18**

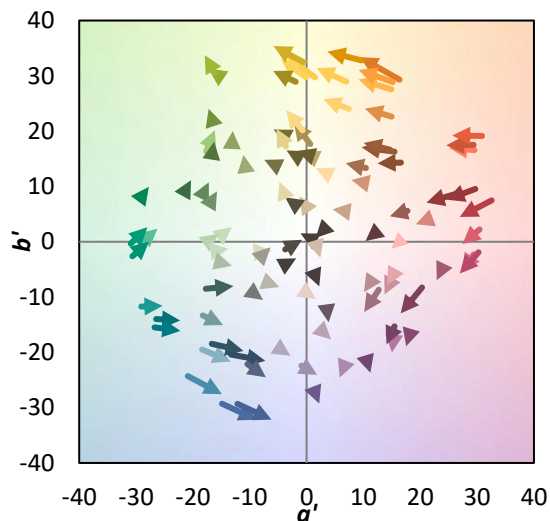
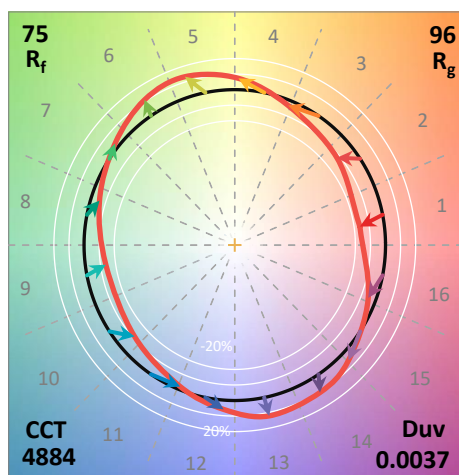
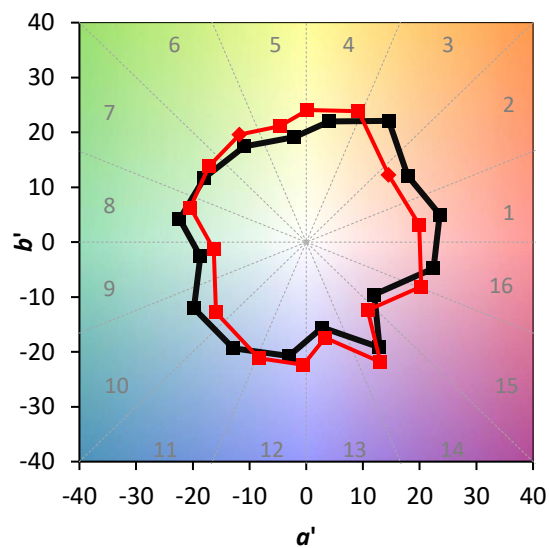
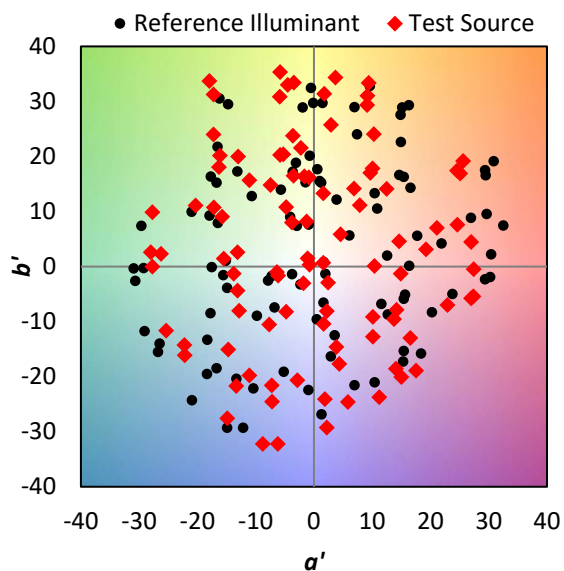
**Summary**

$R_f = 74.9$   
 $R_g = 96.3$   
 CIE  $R_a = 73.5$   
 $R_g = -28.4$

**Spectral Power Distribution Comparison**



**Color Vector Graphics**



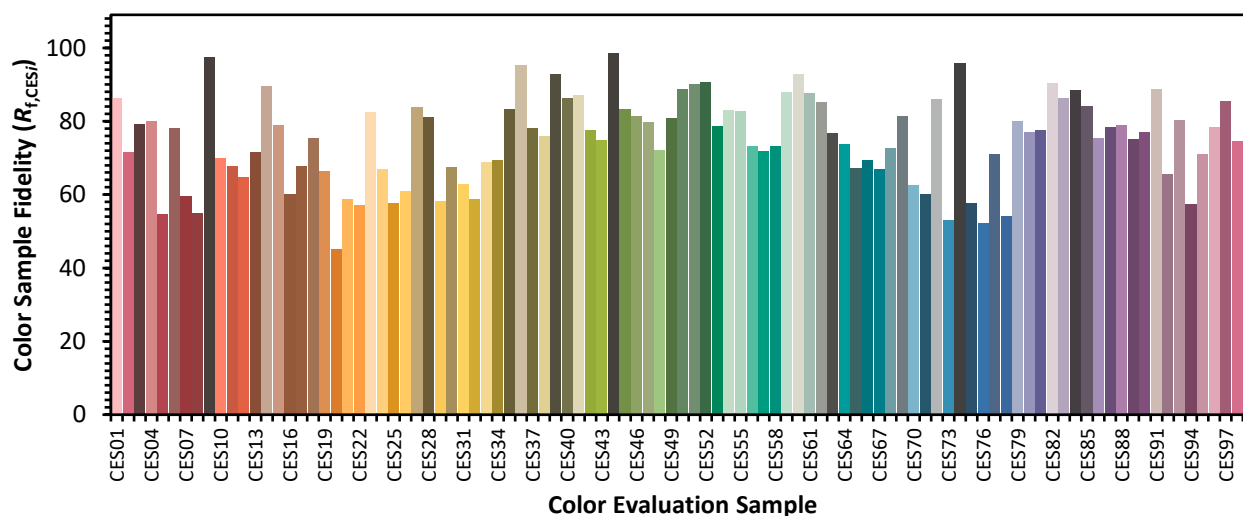


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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

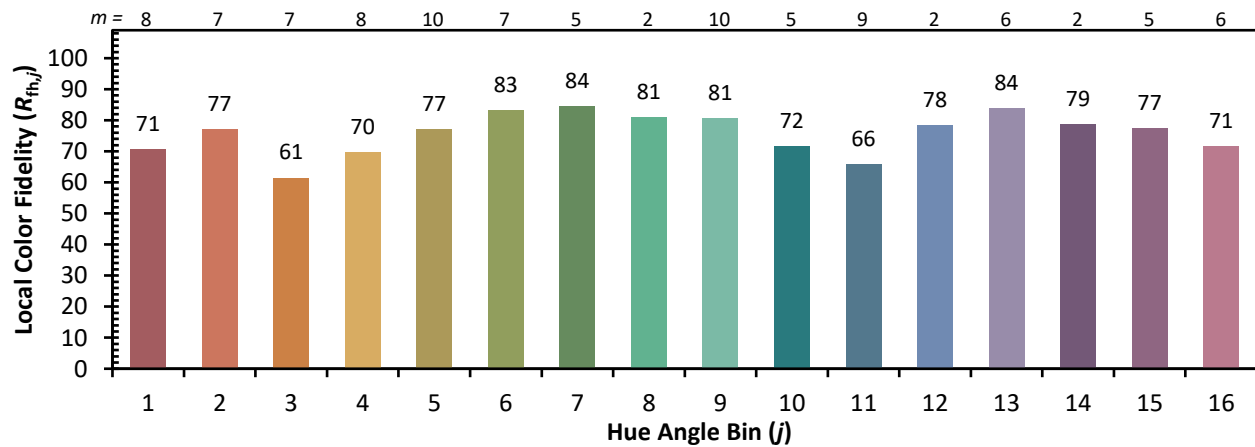
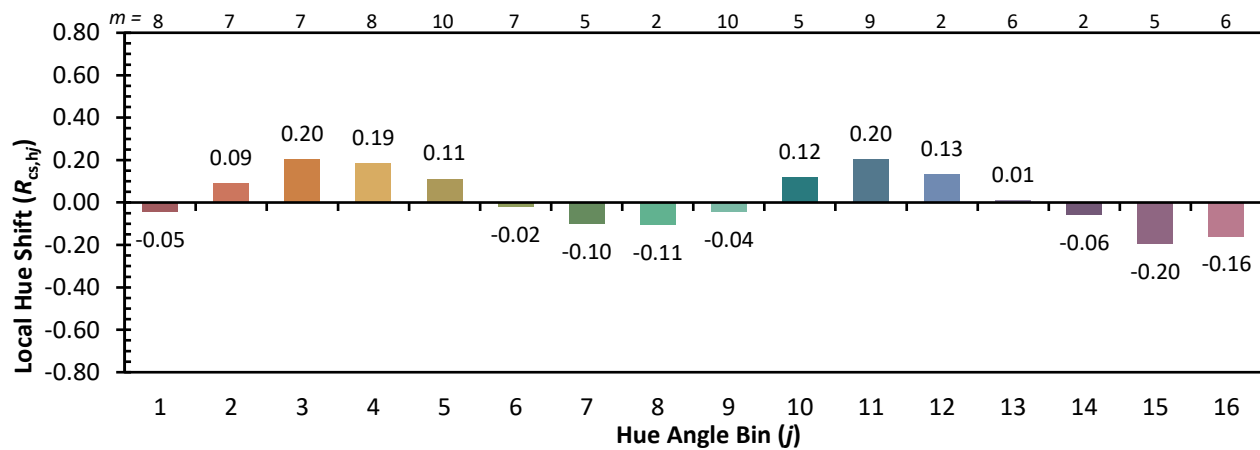
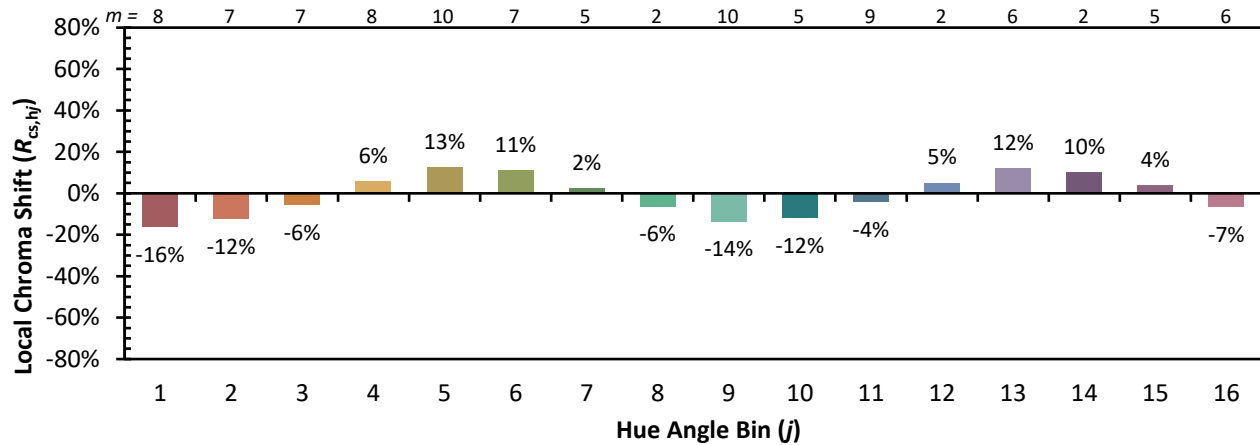
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 61 | CES51 = 90 | CES76 = 52 |
| CES02 = 60 | CES27 = 84 | CES52 = 91 | CES77 = 71 |
| CES03 = 30 | CES28 = 81 | CES53 = 79 | CES78 = 54 |
| CES04 = 69 | CES29 = 58 | CES54 = 83 | CES79 = 80 |
| CES05 = 46 | CES30 = 67 | CES55 = 83 | CES80 = 77 |
| CES06 = 50 | CES31 = 63 | CES56 = 73 | CES81 = 77 |
| CES07 = 39 | CES32 = 59 | CES57 = 72 | CES82 = 90 |
| CES08 = 38 | CES33 = 69 | CES58 = 73 | CES83 = 86 |
| CES09 = 29 | CES34 = 69 | CES59 = 88 | CES84 = 88 |
| CES10 = 73 | CES35 = 83 | CES60 = 93 | CES85 = 84 |
| CES11 = 56 | CES36 = 95 | CES61 = 88 | CES86 = 75 |
| CES12 = 61 | CES37 = 78 | CES62 = 85 | CES87 = 78 |
| CES13 = 41 | CES38 = 76 | CES63 = 77 | CES88 = 79 |
| CES14 = 74 | CES39 = 93 | CES64 = 74 | CES89 = 75 |
| CES15 = 70 | CES40 = 86 | CES65 = 67 | CES90 = 77 |
| CES16 = 46 | CES41 = 87 | CES66 = 69 | CES91 = 89 |
| CES17 = 49 | CES42 = 78 | CES67 = 67 | CES92 = 66 |
| CES18 = 55 | CES43 = 75 | CES68 = 73 | CES93 = 80 |
| CES19 = 71 | CES44 = 99 | CES69 = 81 | CES94 = 57 |
| CES20 = 64 | CES45 = 83 | CES70 = 63 | CES95 = 71 |
| CES21 = 85 | CES46 = 81 | CES71 = 60 | CES96 = 78 |
| CES22 = 77 | CES47 = 80 | CES72 = 86 | CES97 = 85 |
| CES23 = 91 | CES48 = 72 | CES73 = 53 | CES98 = 75 |
| CES24 = 90 | CES49 = 81 | CES74 = 96 | CES99 = 62 |
| CES25 = 71 | CES50 = 89 | CES75 = 58 |            |



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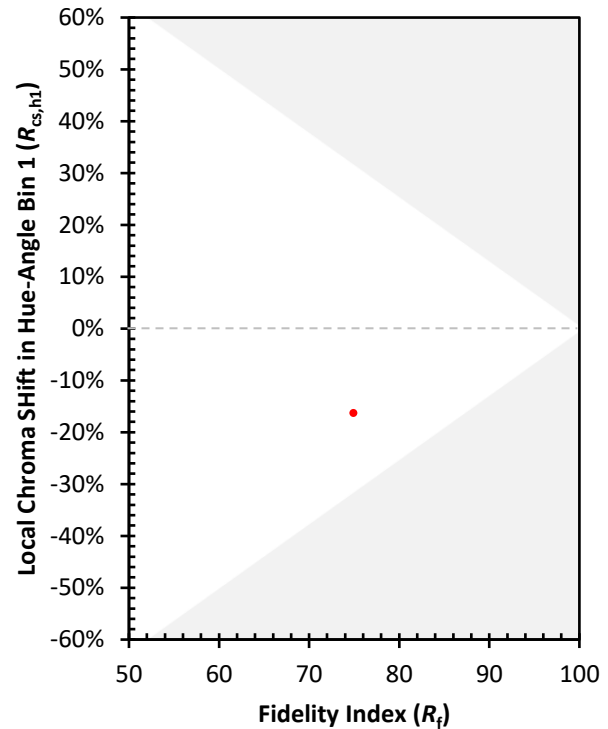
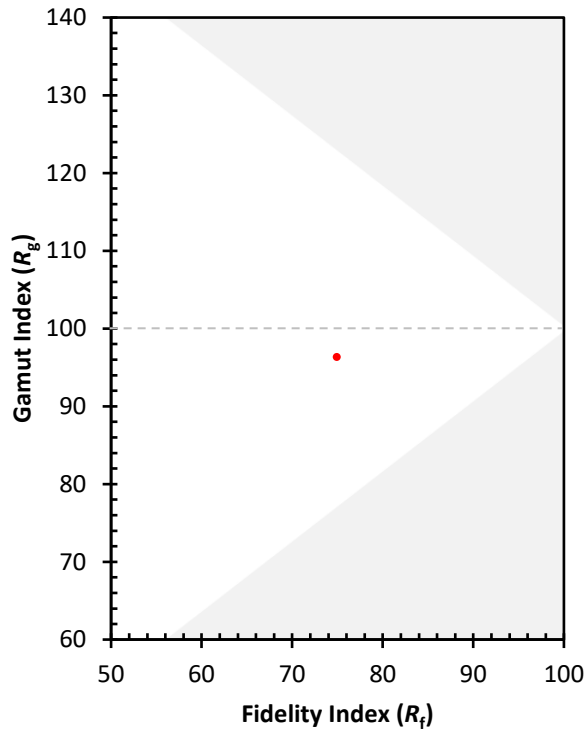
Color Rendition by Hue-Angle Bin



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**Measure Comparisons**



(END OF REPORT)