

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: METALUX

Report Number: P830912

Luminaire Tested: **OHBL-9HE-MFL-UNV-L835-CD**

Issue Date: 5/3/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P830912  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2106-285-1)  
Test Lab: INNOVATION CENTER  
Issue Date: 5/3/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: METALUX  
Catalog Number: OHBL-9HE-MFL-UNV-L835-CD  
Description: 9000 LUMEN OHBL HE LED LUMINAIRE WITH 80CRI, 3500K LEDS AND MEDIUM FROSTED LENS  
Light Source: -  
Ballast/Driver: -

**Summary**

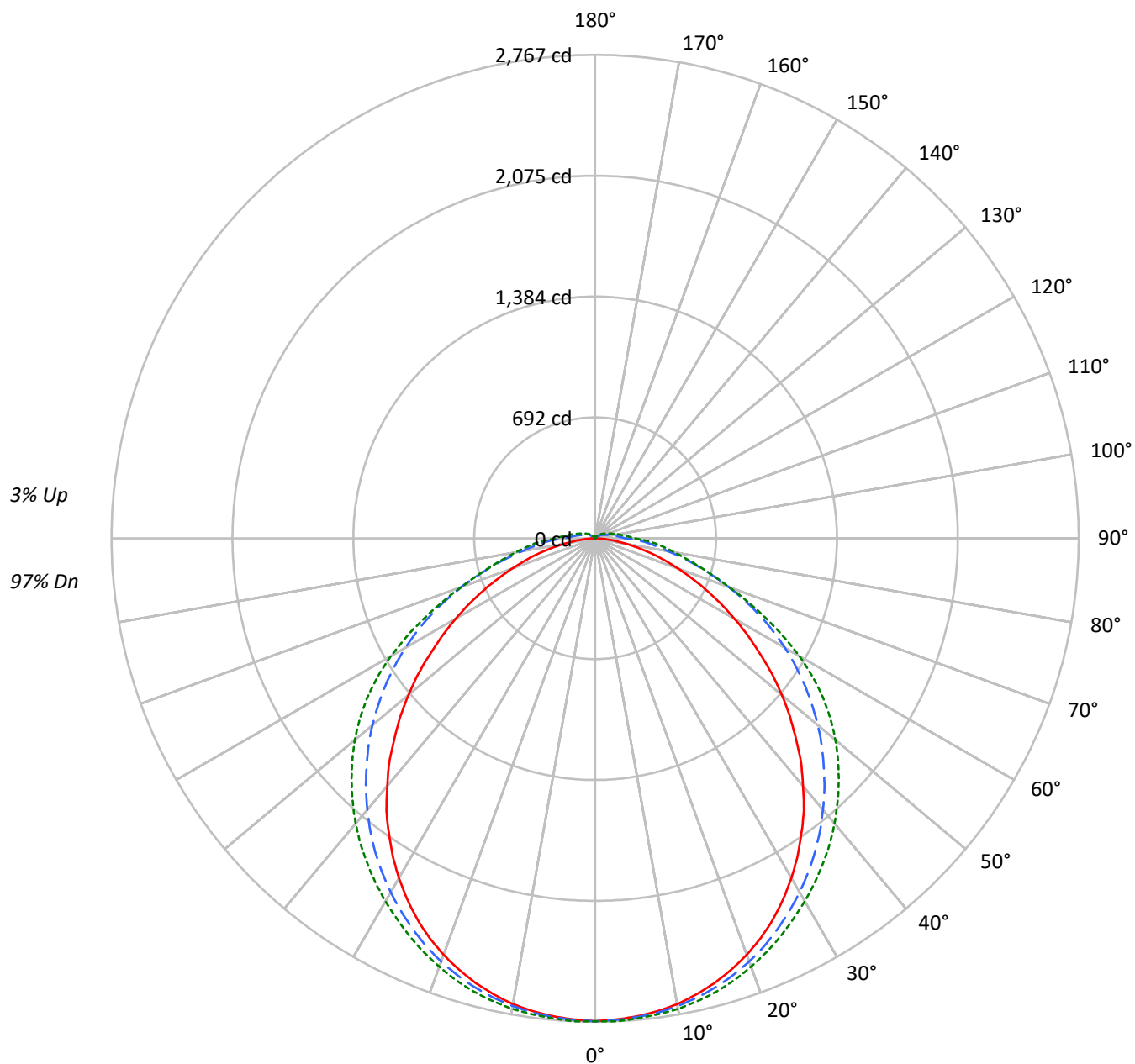
Lumens per Lamp: N/A  
Luminaire Lumens: 8274.0 lumens  
Efficiency: N/A  
Efficacy: 159.1 lumens/watt  
Spacing Criteria (0/90/45): 1.21 / 1.29 / 1.38  
Luminous Opening: Rectangular w/ Sides (W: 1.67' x L: 3.78' x H: 0.17')  
CIE Type: Direct

Input Watts (W): 52  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

TEST NUMBER: P830912

CATALOG NUMBER: OHBL-9HE-MFL-UNV-L835-CD

### Luminous Intensity Polar Plot





TEST NUMBER: P830912

CATALOG NUMBER: OHBL-9HE-MFL-UNV-L835-CD

**COEFFICIENT OF UTILIZATION - ZONAL CAVITY METHOD:**

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|
| RF  | 20  |     |     |     | 20  |     |     |     | 20  |     |     |     | 20  |     |    |    | 20 |
| RC  | 80  |     |     |     | 70  |     |     |     | 50  |     |     |     | 30  |     |    |    | 10 |
| RW  | 70  | 50  | 30  | 10  | 70  | 50  | 30  | 10  | 50  | 30  | 10  | 50  | 30  | 10  | 50 | 30 | 10 |
| RCR |     |     |     |     |     |     |     |     |     |     |     |     |     |     |    |    |    |
| 0   | 118 | 118 | 118 | 118 | 115 | 115 | 115 | 115 | 109 | 109 | 109 | 104 | 104 | 104 | 99 | 99 | 99 |
| 1   | 107 | 102 | 98  | 94  | 104 | 100 | 96  | 92  | 95  | 91  | 88  | 90  | 88  | 85  | 86 | 84 | 82 |
| 2   | 98  | 89  | 82  | 76  | 95  | 87  | 80  | 75  | 83  | 77  | 73  | 79  | 74  | 71  | 75 | 72 | 68 |
| 3   | 89  | 78  | 70  | 63  | 86  | 76  | 69  | 62  | 73  | 66  | 61  | 70  | 64  | 59  | 67 | 62 | 58 |
| 4   | 81  | 69  | 60  | 53  | 79  | 68  | 59  | 53  | 65  | 57  | 52  | 62  | 56  | 51  | 59 | 54 | 50 |
| 5   | 75  | 62  | 53  | 46  | 72  | 60  | 52  | 46  | 58  | 50  | 45  | 56  | 49  | 44  | 53 | 48 | 43 |
| 6   | 69  | 56  | 47  | 40  | 67  | 54  | 46  | 40  | 52  | 45  | 39  | 50  | 44  | 39  | 48 | 43 | 38 |
| 7   | 64  | 50  | 42  | 35  | 62  | 49  | 41  | 35  | 48  | 40  | 35  | 46  | 39  | 34  | 44 | 38 | 34 |
| 8   | 60  | 46  | 37  | 31  | 58  | 45  | 37  | 31  | 43  | 36  | 31  | 42  | 35  | 31  | 41 | 35 | 30 |
| 9   | 56  | 42  | 34  | 28  | 54  | 41  | 34  | 28  | 40  | 33  | 28  | 39  | 32  | 28  | 37 | 32 | 27 |
| 10  | 52  | 39  | 31  | 26  | 51  | 38  | 31  | 26  | 37  | 30  | 25  | 36  | 29  | 25  | 35 | 29 | 25 |

**AVERAGE LUMINANCE (cd/sqm):**

|     | 0°   | 45°  | 90°  |
|-----|------|------|------|
| 0°  | 4722 | 4722 | 4722 |
| 5°  | 4692 | 4675 | 4688 |
| 10° | 4659 | 4632 | 4661 |
| 15° | 4607 | 4580 | 4626 |
| 20° | 4538 | 4518 | 4576 |
| 25° | 4445 | 4441 | 4525 |
| 30° | 4318 | 4357 | 4473 |
| 35° | 4163 | 4268 | 4429 |
| 40° | 3977 | 4165 | 4384 |
| 45° | 3758 | 4054 | 4328 |
| 50° | 3519 | 3941 | 4260 |
| 55° | 3224 | 3803 | 4148 |
| 60° | 2923 | 3640 | 3930 |
| 65° | 2593 | 3433 | 3575 |
| 70° | 2236 | 3170 | 3191 |
| 75° | 1875 | 2866 | 2926 |
| 80° | 1422 | 2641 | 2883 |
| 85° | 899  | 2720 | 3180 |



TEST NUMBER: P830912

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**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 262.0  | 3.2       |
| 10°-20°   | 751.5  | 9.1       |
| 20°-30°   | 1136.6 | 13.7      |
| 30°-40°   | 1364.4 | 16.5      |
| 40°-50°   | 1409.3 | 17.0      |
| 50°-60°   | 1267.9 | 15.3      |
| 60°-70°   | 955.1  | 11.5      |
| 70°-80°   | 576.7  | 7.0       |
| 80°-90°   | 282.1  | 3.4       |
| 90°-100°  | 118.7  | 1.4       |
| 100°-110° | 67.8   | 0.8       |
| 110°-120° | 39.8   | 0.5       |
| 120°-130° | 22.5   | 0.3       |
| 130°-140° | 11.8   | 0.1       |
| 140°-150° | 5.8    | 0.1       |
| 150°-160° | 2.1    | 0.0       |
| 160°-170° | 0.0    | 0.0       |
| 170°-180° | 0.0    | 0.0       |
| <hr/>     |        |           |
| 0°-30°    | 2150.0 | 26.0      |
| 0°-40°    | 3514.5 | 42.5      |
| 0°-60°    | 6191.6 | 74.8      |
| 0°-90°    | 8005.5 | 96.8      |
| 90°-120°  | 226.3  | 2.7       |
| 90°-150°  | 266.4  | 3.2       |
| 90°-180°  | 269.0  | 3.3       |
| 0°-180°   | 8274.0 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°   | 22.5° | 45°  | 67.5° | 90°  | Flux |
|------|------|-------|------|-------|------|------|
| 0°   | 2765 | 2765  | 2765 | 2765  | 2765 |      |
| 5°   | 2747 | 2754  | 2751 | 2762  | 2758 | 261  |
| 15°  | 2636 | 2649  | 2661 | 2683  | 2686 | 743  |
| 25°  | 2407 | 2434  | 2468 | 2507  | 2513 | 1107 |
| 35°  | 2058 | 2106  | 2193 | 2259  | 2273 | 1287 |
| 45°  | 1624 | 1706  | 1849 | 1950  | 1971 | 1254 |
| 55°  | 1151 | 1270  | 1463 | 1573  | 1592 | 1032 |
| 65°  | 702  | 846   | 1035 | 1087  | 1074 | 698  |
| 75°  | 331  | 475   | 600  | 615   | 609  | 353  |
| 85°  | 69   | 182   | 300  | 342   | 348  | 80   |
| 90°  | 0    | 71    | 172  | 216   | 225  | 4    |
| 95°  | 3    | 48    | 129  | 164   | 170  | 3    |
| 105° | 5    | 28    | 74   | 97    | 102  | 5    |
| 115° | 5    | 16    | 46   | 62    | 64   | 6    |
| 125° | 5    | 7     | 28   | 40    | 42   | 5    |
| 135° | 5    | 6     | 14   | 24    | 27   | 4    |
| 145° | 7    | 6     | 7    | 12    | 14   | 4    |
| 155° | 7    | 7     | 7    | 6     | 7    | 2    |
| 165° | 0    | 0     | 0    | 0     | 0    | 0    |
| 175° | 0    | 0     | 0    | 0     | 0    | 0    |
| 180° | 0    | 0     | 0    | 0     | 0    |      |



TEST NUMBER: P830912

CATALOG NUMBER: OHBL-9HE-MFL-UNV-L835-CD

**CANDELA DISTRIBUTION (FULL):**

|        | 0°     | 22.5°  | 45°    | 67.5°  | 90°    |
|--------|--------|--------|--------|--------|--------|
| 0°     | 2764.6 | 2764.6 | 2764.6 | 2764.6 | 2764.6 |
| 2.5°   | 2756.5 | 2763.3 | 2759.2 | 2768.0 | 2767.3 |
| 5°     | 2747.0 | 2754.5 | 2751.1 | 2761.9 | 2758.5 |
| 7.5°   | 2730.8 | 2738.9 | 2738.2 | 2750.4 | 2749.0 |
| 10°    | 2707.1 | 2715.9 | 2718.6 | 2734.8 | 2734.8 |
| 12.5°  | 2674.6 | 2686.1 | 2692.9 | 2712.5 | 2713.2 |
| 15°    | 2636.1 | 2648.9 | 2661.1 | 2683.4 | 2686.1 |
| 17.5°  | 2589.4 | 2605.6 | 2622.5 | 2648.2 | 2651.6 |
| 20°    | 2536.6 | 2554.9 | 2577.9 | 2604.9 | 2609.0 |
| 22.5°  | 2475.7 | 2497.3 | 2527.1 | 2558.9 | 2563.7 |
| 25°    | 2407.4 | 2433.7 | 2468.3 | 2506.8 | 2512.9 |
| 27.5°  | 2329.5 | 2360.0 | 2406.7 | 2450.0 | 2455.4 |
| 30°    | 2245.0 | 2280.8 | 2339.0 | 2390.4 | 2399.2 |
| 32.5°  | 2155.7 | 2196.9 | 2268.7 | 2326.2 | 2338.3 |
| 35°    | 2058.2 | 2106.3 | 2192.9 | 2259.2 | 2272.7 |
| 37.5°  | 1962.2 | 2014.9 | 2113.0 | 2188.8 | 2205.1 |
| 40°    | 1849.8 | 1915.5 | 2027.8 | 2111.7 | 2131.3 |
| 42.5°  | 1744.3 | 1815.3 | 1942.5 | 2033.9 | 2052.8 |
| 45°    | 1624.5 | 1706.4 | 1849.2 | 1950.0 | 1970.9 |
| 47.5°  | 1512.2 | 1600.8 | 1759.2 | 1863.4 | 1885.0 |
| 50°    | 1393.8 | 1491.2 | 1663.1 | 1772.0 | 1794.4 |
| 52.5°  | 1275.4 | 1380.3 | 1563.6 | 1676.6 | 1697.6 |
| 55°    | 1150.9 | 1270.0 | 1462.8 | 1573.1 | 1592.1 |
| 57.5°  | 1035.2 | 1161.1 | 1359.3 | 1464.2 | 1475.7 |
| 60°    | 920.9  | 1051.4 | 1253.7 | 1345.8 | 1349.8 |
| 62.5°  | 809.2  | 946.6  | 1145.5 | 1218.6 | 1213.2 |
| 65°    | 702.3  | 845.8  | 1035.2 | 1086.6 | 1074.4 |
| 67.5°  | 599.5  | 747.6  | 922.2  | 955.4  | 939.1  |
| 70°    | 502.0  | 652.2  | 812.6  | 829.5  | 814.6  |
| 72.5°  | 416.1  | 561.6  | 701.6  | 715.8  | 705.0  |
| 75°    | 330.9  | 475.0  | 599.5  | 615.0  | 608.9  |
| 77.5°  | 251.0  | 391.1  | 505.4  | 525.7  | 527.1  |
| 80°    | 180.7  | 314.6  | 423.6  | 455.4  | 459.4  |
| 82.5°  | 119.1  | 244.3  | 355.2  | 395.8  | 401.9  |
| 85°    | 69.0   | 182.0  | 300.4  | 341.7  | 347.8  |
| 87.5°  | 29.8   | 131.3  | 241.5  | 278.8  | 286.2  |
| 90°    | 0.0    | 71.0   | 171.9  | 216.5  | 225.3  |
| 92.5°  | 2.0    | 58.9   | 147.5  | 188.1  | 195.5  |
| 95°    | 3.4    | 48.0   | 128.6  | 163.7  | 169.8  |
| 97.5°  | 4.1    | 40.6   | 111.6  | 142.8  | 148.9  |
| 100°   | 4.1    | 35.2   | 96.8   | 125.2  | 130.6  |
| 102.5° | 4.1    | 31.1   | 84.6   | 109.6  | 114.3  |
| 105°   | 4.7    | 27.7   | 74.4   | 97.4   | 101.5  |



TEST NUMBER: P830912

CATALOG NUMBER: OHBL-9HE-MFL-UNV-L835-CD

**CANDELA DISTRIBUTION (continued):**

|        | 0°  | 22.5° | 45°  | 67.5° | 90°  |
|--------|-----|-------|------|-------|------|
| 112.5° | 5.4 | 18.3  | 51.4 | 69.0  | 71.7 |
| 115°   | 5.4 | 15.6  | 46.0 | 61.6  | 64.3 |
| 117.5° | 6.1 | 13.5  | 40.6 | 55.5  | 57.5 |
| 120°   | 6.1 | 11.5  | 35.9 | 49.4  | 52.1 |
| 122.5° | 6.1 | 9.5   | 31.8 | 44.7  | 46.7 |
| 125°   | 5.4 | 7.4   | 27.7 | 39.9  | 41.9 |
| 127.5° | 4.7 | 6.1   | 23.7 | 35.9  | 37.9 |
| 130°   | 4.7 | 5.4   | 20.3 | 31.8  | 33.8 |
| 132.5° | 4.7 | 6.1   | 16.9 | 27.7  | 30.4 |
| 135°   | 4.7 | 6.1   | 14.2 | 24.4  | 27.1 |
| 137.5° | 4.7 | 6.1   | 11.5 | 21.0  | 23.7 |
| 140°   | 5.4 | 6.1   | 9.5  | 17.6  | 20.3 |
| 142.5° | 6.1 | 6.1   | 7.4  | 14.9  | 16.9 |
| 145°   | 6.8 | 6.1   | 6.8  | 12.2  | 14.2 |
| 147.5° | 6.8 | 6.8   | 6.8  | 9.5   | 11.5 |
| 150°   | 6.8 | 7.4   | 6.8  | 7.4   | 9.5  |
| 152.5° | 6.8 | 7.4   | 6.8  | 6.1   | 7.4  |
| 155°   | 6.8 | 7.4   | 6.8  | 6.1   | 6.8  |
| 157.5° | 0.0 | 0.0   | 0.0  | 0.0   | 0.0  |
| 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  |



Report Generated By 670246072 / DESKTOP-50001EG





— 0°-180°    - - 45°-225°    - - - 90°-270°







|        |     |      |      |      |      |
|--------|-----|------|------|------|------|
| 107.5° | 4.7 | 24.4 | 65.6 | 86.6 | 90.0 |
| 110°   | 4.7 | 21.7 | 58.2 | 77.1 | 80.5 |



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

Report Prepared for

Cooper Lighting Solutions

METALUX

Report Number: SP1-2307-100-5

Test Date: 08/01/2023

Luminaire Tested: OHB-15SE-N-UNV-L835-CD

Data in this report applies to families of products including OHB-15SE-N-UNV-L835-CD.

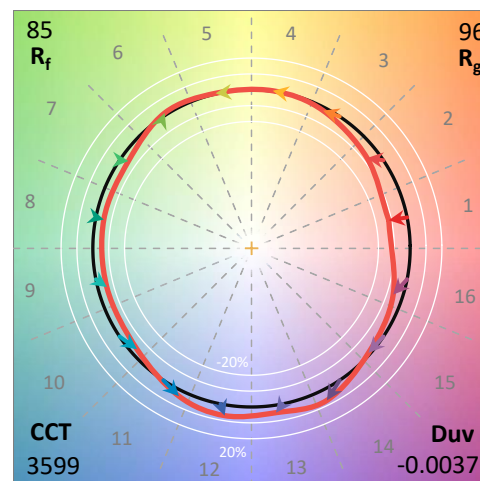
### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2307-100-5  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry: 4π  
 Issue Date: 08/04/2023  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: METALUX  
 Catalog Number: **OHB-15SE-N-UNV-L835-CD**  
 Description: 15000 LUMEN OHB SE LED LUMINAIRE WITH 80CRI, 3500K LEDS AND NARROW LENS

LENS

### Spectral Parameters

|                           |         |           |      |      |      |
|---------------------------|---------|-----------|------|------|------|
| CCT (K):                  | 3599    | CRI (Ra): | 84.0 |      |      |
| CIE u':                   | 0.2351  | R1:       | 83.2 | R9:  | 12.7 |
| CIE v':                   | 0.5044  | R2:       | 92.7 | R10: | 82.6 |
| Duv:                      | -0.0037 | R3:       | 95.2 | R11: | 80.5 |
| CIE x:                    | 0.3962  | R4:       | 81.4 | R12: | 70.1 |
| CIE y:                    | 0.3778  | R5:       | 83.6 | R13: | 85.9 |
| CIE z:                    | 0.2260  | R6:       | 89.5 | R14: | 98.2 |
| Peak Wavelength (nm):     | 600     | R7:       | 83.4 |      |      |
| Dominant Wavelength (nm): | 582     | R8:       | 62.9 |      |      |
| Purity:                   | 32.5    |           |      |      |      |
| Rf:                       | 84.6    |           |      |      |      |
| Rg:                       | 95.6    |           |      |      |      |



### Test Conditions

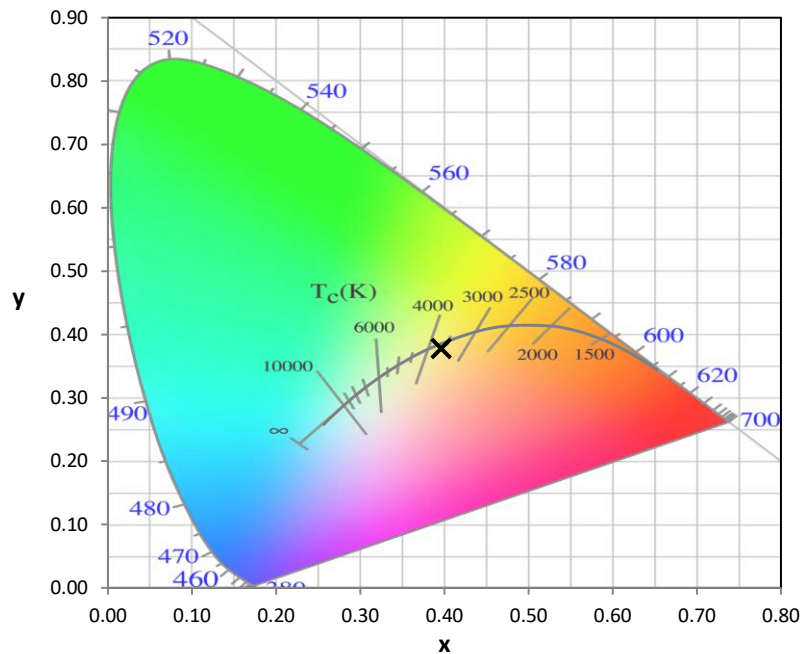
Stabilization Time: 24M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.7/57%  
 Sphere Temperature (°C): 25.2

REPORT NUMBER: SP1-2307-100-5

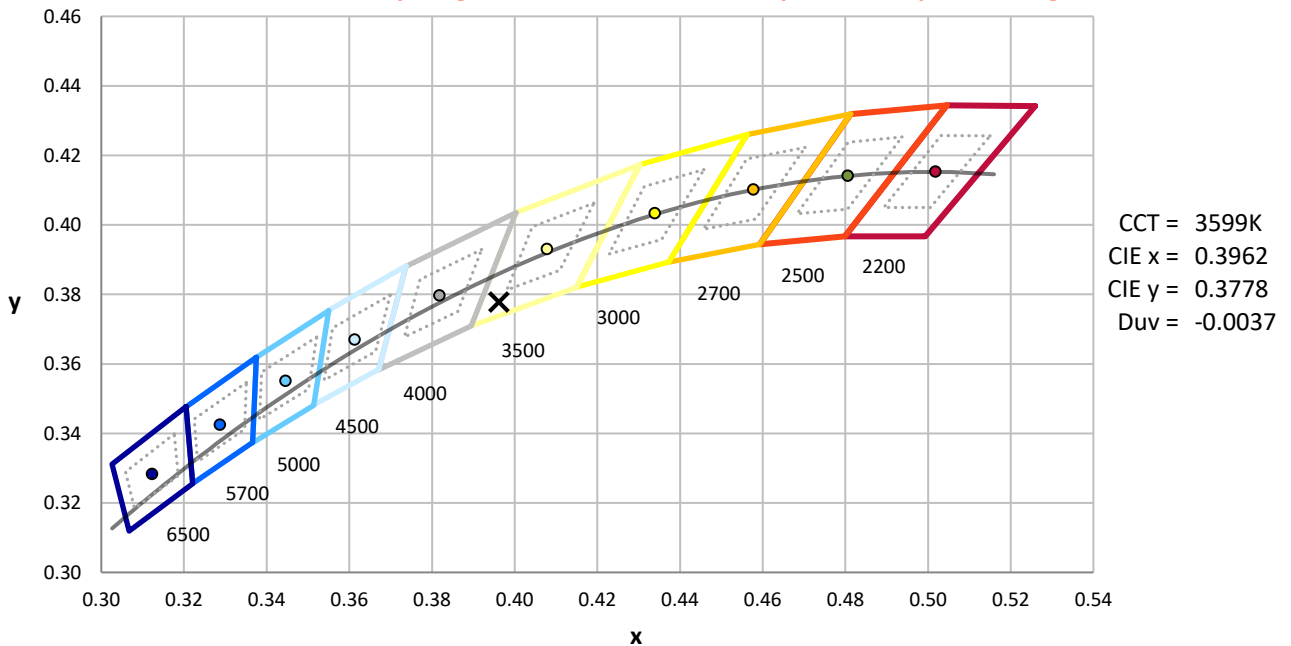
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | 76INCH SPHERE IN0058  | 2/9/2023         | 8/9/2023             |
| Power Meter                    | XITRON 2801 IN0071    | 11/29/2022       | 11/29/2023           |
| AC Power Source                | CHROMA 61603 IN0063   | 11/28/2022       | 11/28/2023           |
| DC Power Source                | AGILENT E3634A IN0208 | 11/28/2022       | 11/28/2023           |
| Sphere Thermometer             | ONSET IN0085          | 11/28/2022       | 11/28/2023           |
| Room Thermometer               | ONSET IN0046          | 11/28/2022       | 11/28/2023           |

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CIE 1931 Chromaticity Diagram



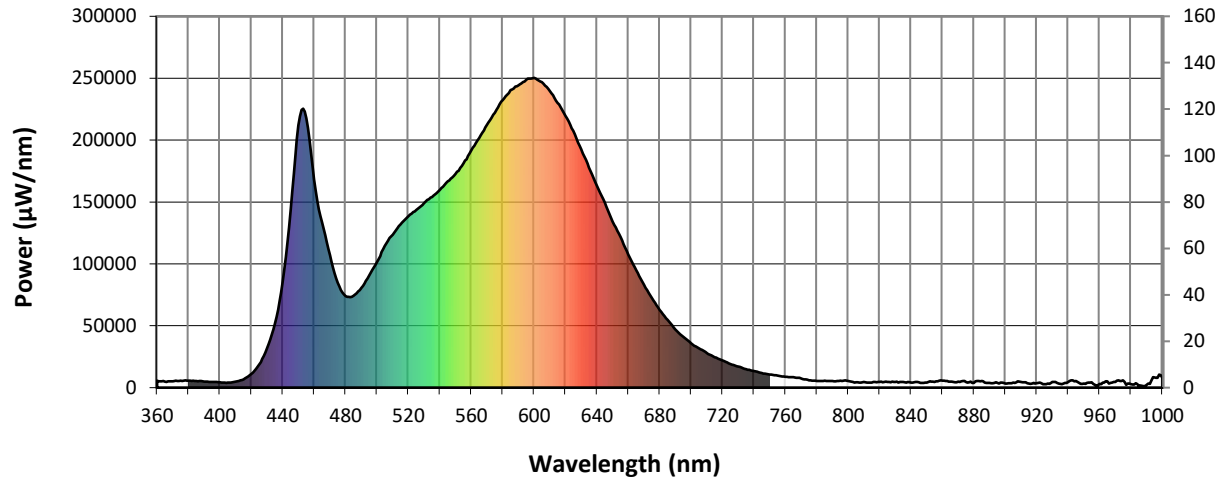
CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 3500K 7-step quadrangle

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**Photopic Flux vs. Wavelength**

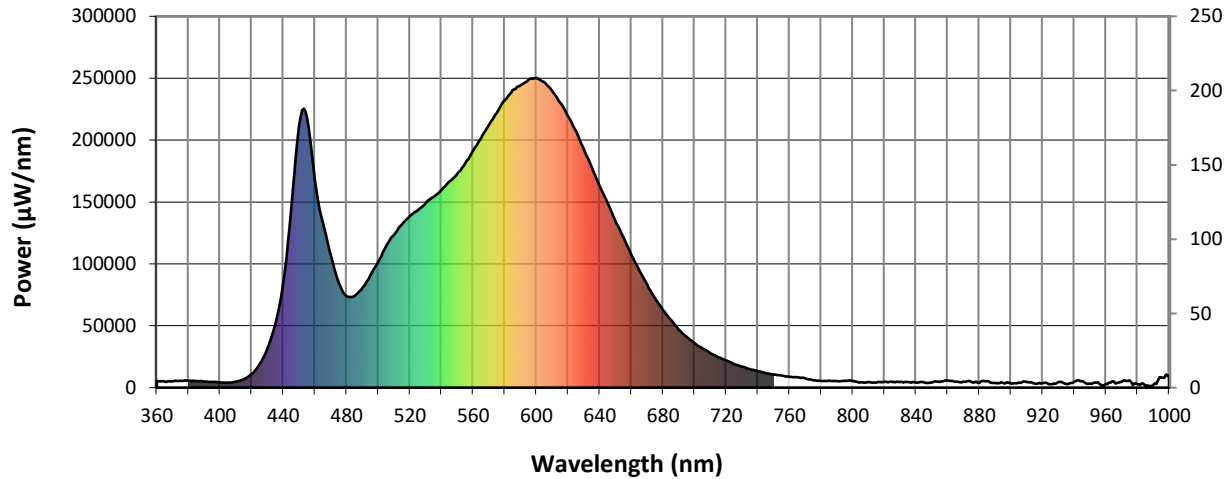


#####

| 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       | 5689             | NR               | 490       | 80602            | NR               | 620       | 219378           | NR               | 750       | 10550            | NR               | 880       | 3904             | NR               |
| 365       | 4945             | NR               | 495       | 90559            | NR               | 625       | 207438           | NR               | 755       | 9754             | NR               | 885       | 5303             | NR               |
| 370       | 5058             | NR               | 500       | 101536           | NR               | 630       | 192648           | NR               | 760       | 8782             | NR               | 890       | 3742             | NR               |
| 375       | 5547             | NR               | 505       | 114437           | NR               | 635       | 177922           | NR               | 765       | 8511             | NR               | 895       | 3742             | NR               |
| 380       | 5754             | NR               | 510       | 123519           | NR               | 640       | 162983           | NR               | 770       | 7407             | NR               | 900       | 3417             | NR               |
| 385       | 5303             | NR               | 515       | 131857           | NR               | 645       | 149259           | NR               | 775       | 5982             | NR               | 905       | 4099             | NR               |
| 390       | 4902             | NR               | 520       | 138423           | NR               | 650       | 134206           | NR               | 780       | 5500             | NR               | 910       | 4553             | NR               |
| 395       | 4577             | NR               | 525       | 143514           | NR               | 655       | 121625           | NR               | 785       | 5605             | NR               | 915       | 3226             | NR               |
| 400       | 4236             | NR               | 530       | 149228           | NR               | 660       | 107545           | NR               | 790       | 5276             | NR               | 920       | 3441             | NR               |
| 405       | 4029             | NR               | 535       | 153920           | NR               | 665       | 94899            | NR               | 795       | 5553             | NR               | 925       | 2872             | NR               |
| 410       | 4790             | NR               | 540       | 159839           | NR               | 670       | 83078            | NR               | 800       | 5352             | NR               | 930       | 4586             | NR               |
| 415       | 6714             | NR               | 545       | 166582           | NR               | 675       | 72258            | NR               | 805       | 4410             | NR               | 935       | 3012             | NR               |
| 420       | 10946            | NR               | 550       | 172661           | NR               | 680       | 62840            | NR               | 810       | 4496             | NR               | 940       | 4550             | NR               |
| 425       | 18816            | NR               | 555       | 181216           | NR               | 685       | 54770            | NR               | 815       | 4124             | NR               | 945       | 5413             | NR               |
| 430       | 31629            | NR               | 560       | 191583           | NR               | 690       | 47065            | NR               | 820       | 4683             | NR               | 950       | 3264             | NR               |
| 435       | 51925            | NR               | 565       | 201637           | NR               | 695       | 41041            | NR               | 825       | 4477             | NR               | 955       | 4446             | NR               |
| 440       | 85392            | NR               | 570       | 212190           | NR               | 700       | 35898            | NR               | 830       | 4677             | NR               | 960       | 3177             | NR               |
| 445       | 143452           | NR               | 575       | 222097           | NR               | 705       | 31818            | NR               | 835       | 4590             | NR               | 965       | 5088             | NR               |
| 450       | 211890           | NR               | 580       | 232192           | NR               | 710       | 27900            | NR               | 840       | 4206             | NR               | 970       | 4660             | NR               |
| 455       | 217588           | NR               | 585       | 240359           | NR               | 715       | 24493            | NR               | 845       | 4339             | NR               | 975       | 5979             | NR               |
| 460       | 168370           | NR               | 590       | 244370           | NR               | 720       | 21898            | NR               | 850       | 4152             | NR               | 980       | 2893             | NR               |
| 465       | 133710           | NR               | 595       | 248669           | NR               | 725       | 19106            | NR               | 855       | 4697             | NR               | 985       | 1574             | NR               |
| 470       | 107097           | NR               | 600       | 250268           | NR               | 730       | 16886            | NR               | 860       | 5661             | NR               | 990       | 2218             | NR               |
| 475       | 84824            | NR               | 605       | 246759           | NR               | 735       | 14933            | NR               | 865       | 4883             | NR               | 995       | 8203             | NR               |
| 480       | 73990            | NR               | 610       | 239510           | NR               | 740       | 13423            | NR               | 870       | 4777             | NR               | 1000      | 7943             | NR               |
| 485       | 74137            | NR               | 615       | 230040           | NR               | 745       | 11765            | NR               | 875       | 4721             | NR               |           |                  |                  |

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Scotopic Flux vs. Wavelength



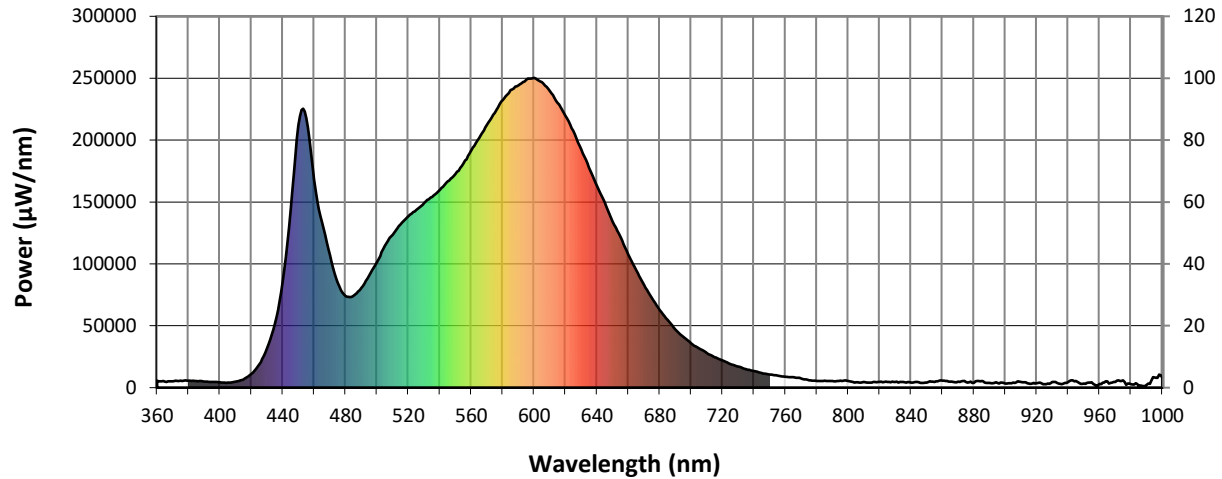
Scotopic Lumens: 21413.1

S/P: 1.61

| 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       | 5689             | NR               | 490       | 80602            | NR               | 620       | 219378           | NR               | 750       | 10550            | NR               | 880       | 3904             | NR               |
| 365       | 4945             | NR               | 495       | 90559            | NR               | 625       | 207438           | NR               | 755       | 9754             | NR               | 885       | 5303             | NR               |
| 370       | 5058             | NR               | 500       | 101536           | NR               | 630       | 192648           | NR               | 760       | 8782             | NR               | 890       | 3742             | NR               |
| 375       | 5547             | NR               | 505       | 114437           | NR               | 635       | 177922           | NR               | 765       | 8511             | NR               | 895       | 3742             | NR               |
| 380       | 5754             | NR               | 510       | 123519           | NR               | 640       | 162983           | NR               | 770       | 7407             | NR               | 900       | 3417             | NR               |
| 385       | 5303             | NR               | 515       | 131857           | NR               | 645       | 149259           | NR               | 775       | 5982             | NR               | 905       | 4099             | NR               |
| 390       | 4902             | NR               | 520       | 138423           | NR               | 650       | 134206           | NR               | 780       | 5500             | NR               | 910       | 4553             | NR               |
| 395       | 4577             | NR               | 525       | 143514           | NR               | 655       | 121625           | NR               | 785       | 5605             | NR               | 915       | 3226             | NR               |
| 400       | 4236             | NR               | 530       | 149228           | NR               | 660       | 107545           | NR               | 790       | 5276             | NR               | 920       | 3441             | NR               |
| 405       | 4029             | NR               | 535       | 153920           | NR               | 665       | 94899            | NR               | 795       | 5553             | NR               | 925       | 2872             | NR               |
| 410       | 4790             | NR               | 540       | 159839           | NR               | 670       | 83078            | NR               | 800       | 5352             | NR               | 930       | 4586             | NR               |
| 415       | 6714             | NR               | 545       | 166582           | NR               | 675       | 72258            | NR               | 805       | 4410             | NR               | 935       | 3012             | NR               |
| 420       | 10946            | NR               | 550       | 172661           | NR               | 680       | 62840            | NR               | 810       | 4496             | NR               | 940       | 4550             | NR               |
| 425       | 18816            | NR               | 555       | 181216           | NR               | 685       | 54770            | NR               | 815       | 4124             | NR               | 945       | 5413             | NR               |
| 430       | 31629            | NR               | 560       | 191583           | NR               | 690       | 47065            | NR               | 820       | 4683             | NR               | 950       | 3264             | NR               |
| 435       | 51925            | NR               | 565       | 201637           | NR               | 695       | 41041            | NR               | 825       | 4477             | NR               | 955       | 4446             | NR               |
| 440       | 85392            | NR               | 570       | 212190           | NR               | 700       | 35898            | NR               | 830       | 4677             | NR               | 960       | 3177             | NR               |
| 445       | 143452           | NR               | 575       | 222097           | NR               | 705       | 31818            | NR               | 835       | 4590             | NR               | 965       | 5088             | NR               |
| 450       | 211890           | NR               | 580       | 232192           | NR               | 710       | 27900            | NR               | 840       | 4206             | NR               | 970       | 4660             | NR               |
| 455       | 217588           | NR               | 585       | 240359           | NR               | 715       | 24493            | NR               | 845       | 4339             | NR               | 975       | 5979             | NR               |
| 460       | 168370           | NR               | 590       | 244370           | NR               | 720       | 21898            | NR               | 850       | 4152             | NR               | 980       | 2893             | NR               |
| 465       | 133710           | NR               | 595       | 248669           | NR               | 725       | 19106            | NR               | 855       | 4697             | NR               | 985       | 1574             | NR               |
| 470       | 107097           | NR               | 600       | 250268           | NR               | 730       | 16886            | NR               | 860       | 5661             | NR               | 990       | 2218             | NR               |
| 475       | 84824            | NR               | 605       | 246759           | NR               | 735       | 14933            | NR               | 865       | 4883             | NR               | 995       | 8203             | NR               |
| 480       | 73990            | NR               | 610       | 239510           | NR               | 740       | 13423            | NR               | 870       | 4777             | NR               | 1000      | 7943             | NR               |
| 485       | 74137            | NR               | 615       | 230040           | NR               | 745       | 11765            | NR               | 875       | 4721             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 8686**

**M/P: 0.65**

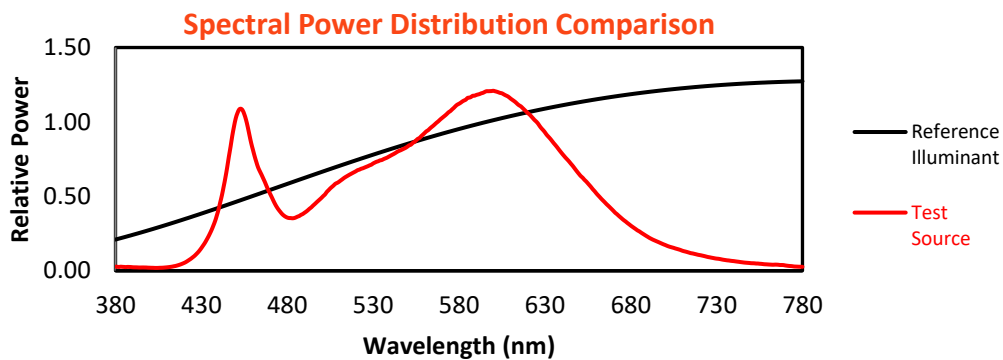
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 5689             | NR               | 490       | 80602            | NR               | 620       | 219378           | NR               | 750       | 10550            | NR               | 880       | 3904             | NR               |
| 365       | 4945             | NR               | 495       | 90559            | NR               | 625       | 207438           | NR               | 755       | 9754             | NR               | 885       | 5303             | NR               |
| 370       | 5058             | NR               | 500       | 101536           | NR               | 630       | 192648           | NR               | 760       | 8782             | NR               | 890       | 3742             | NR               |
| 375       | 5547             | NR               | 505       | 114437           | NR               | 635       | 177922           | NR               | 765       | 8511             | NR               | 895       | 3742             | NR               |
| 380       | 5754             | NR               | 510       | 123519           | NR               | 640       | 162983           | NR               | 770       | 7407             | NR               | 900       | 3417             | NR               |
| 385       | 5303             | NR               | 515       | 131857           | NR               | 645       | 149259           | NR               | 775       | 5982             | NR               | 905       | 4099             | NR               |
| 390       | 4902             | NR               | 520       | 138423           | NR               | 650       | 134206           | NR               | 780       | 5500             | NR               | 910       | 4553             | NR               |
| 395       | 4577             | NR               | 525       | 143514           | NR               | 655       | 121625           | NR               | 785       | 5605             | NR               | 915       | 3226             | NR               |
| 400       | 4236             | NR               | 530       | 149228           | NR               | 660       | 107545           | NR               | 790       | 5276             | NR               | 920       | 3441             | NR               |
| 405       | 4029             | NR               | 535       | 153920           | NR               | 665       | 94899            | NR               | 795       | 5553             | NR               | 925       | 2872             | NR               |
| 410       | 4790             | NR               | 540       | 159839           | NR               | 670       | 83078            | NR               | 800       | 5352             | NR               | 930       | 4586             | NR               |
| 415       | 6714             | NR               | 545       | 166582           | NR               | 675       | 72258            | NR               | 805       | 4410             | NR               | 935       | 3012             | NR               |
| 420       | 10946            | NR               | 550       | 172661           | NR               | 680       | 62840            | NR               | 810       | 4496             | NR               | 940       | 4550             | NR               |
| 425       | 18816            | NR               | 555       | 181216           | NR               | 685       | 54770            | NR               | 815       | 4124             | NR               | 945       | 5413             | NR               |
| 430       | 31629            | NR               | 560       | 191583           | NR               | 690       | 47065            | NR               | 820       | 4683             | NR               | 950       | 3264             | NR               |
| 435       | 51925            | NR               | 565       | 201637           | NR               | 695       | 41041            | NR               | 825       | 4477             | NR               | 955       | 4446             | NR               |
| 440       | 85392            | NR               | 570       | 212190           | NR               | 700       | 35898            | NR               | 830       | 4677             | NR               | 960       | 3177             | NR               |
| 445       | 143452           | NR               | 575       | 222097           | NR               | 705       | 31818            | NR               | 835       | 4590             | NR               | 965       | 5088             | NR               |
| 450       | 211890           | NR               | 580       | 232192           | NR               | 710       | 27900            | NR               | 840       | 4206             | NR               | 970       | 4660             | NR               |
| 455       | 217588           | NR               | 585       | 240359           | NR               | 715       | 24493            | NR               | 845       | 4339             | NR               | 975       | 5979             | NR               |
| 460       | 168370           | NR               | 590       | 244370           | NR               | 720       | 21898            | NR               | 850       | 4152             | NR               | 980       | 2893             | NR               |
| 465       | 133710           | NR               | 595       | 248669           | NR               | 725       | 19106            | NR               | 855       | 4697             | NR               | 985       | 1574             | NR               |
| 470       | 107097           | NR               | 600       | 250268           | NR               | 730       | 16886            | NR               | 860       | 5661             | NR               | 990       | 2218             | NR               |
| 475       | 84824            | NR               | 605       | 246759           | NR               | 735       | 14933            | NR               | 865       | 4883             | NR               | 995       | 8203             | NR               |
| 480       | 73990            | NR               | 610       | 239510           | NR               | 740       | 13423            | NR               | 870       | 4777             | NR               | 1000      | 7943             | NR               |
| 485       | 74137            | NR               | 615       | 230040           | NR               | 745       | 11765            | NR               | 875       | 4721             | NR               |           |                  |                  |

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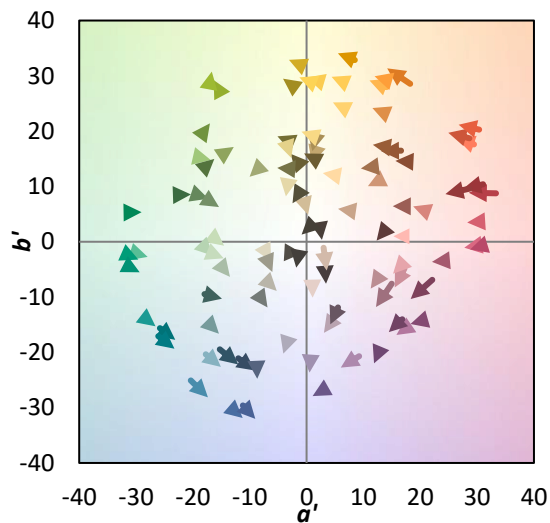
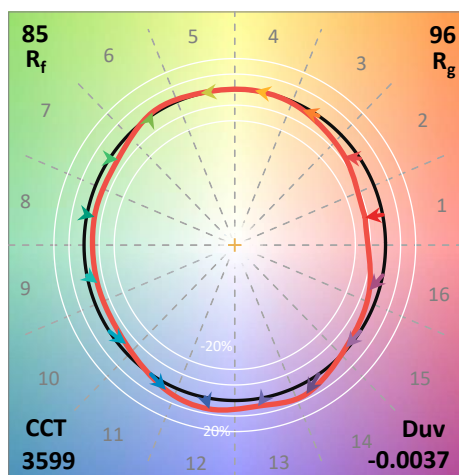
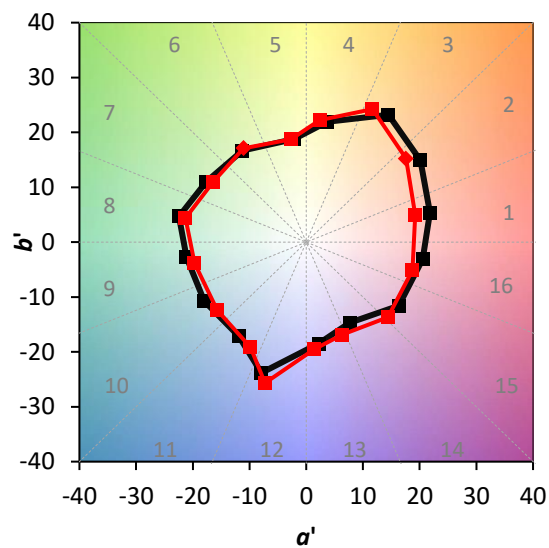
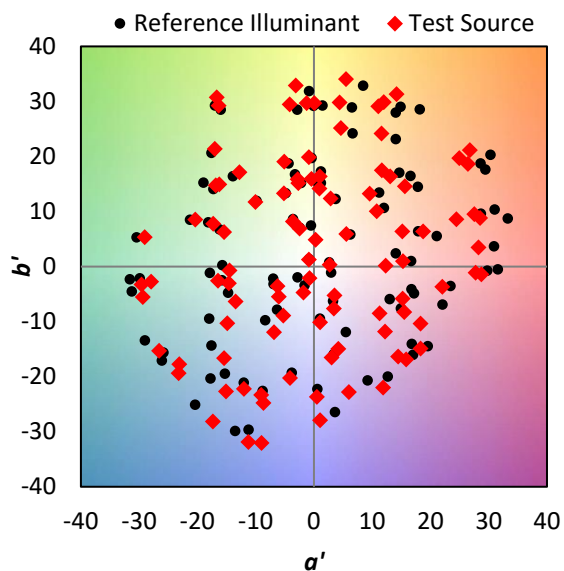
**TM-30-18**

**Summary**

$R_f = 84.6$   
 $R_g = 95.6$   
 $CIE R_a = 84.0$   
 $R_9 = 12.7$



**Color Vector Graphics**

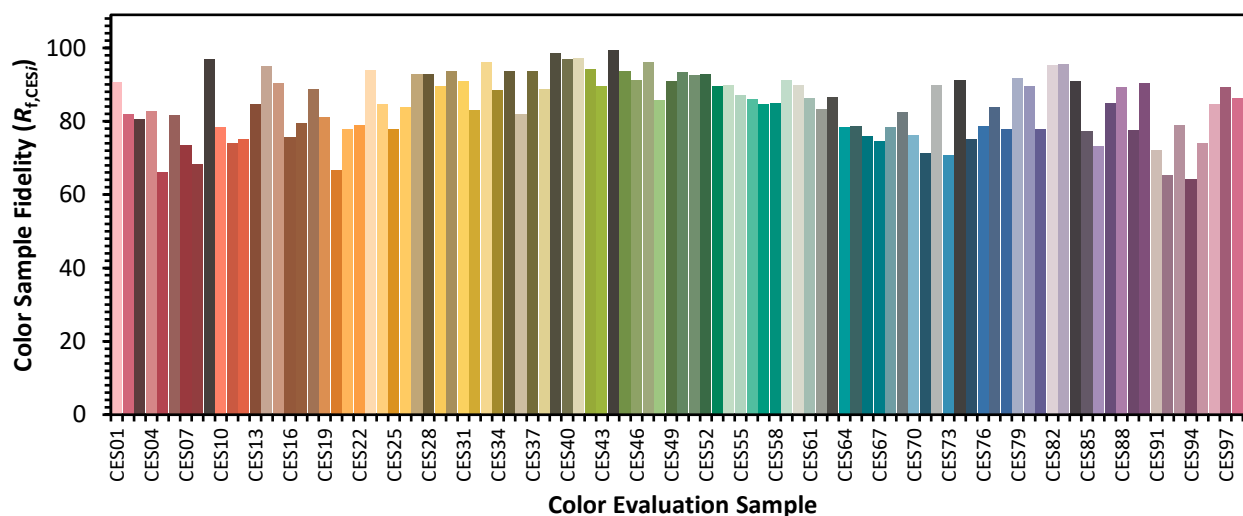


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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

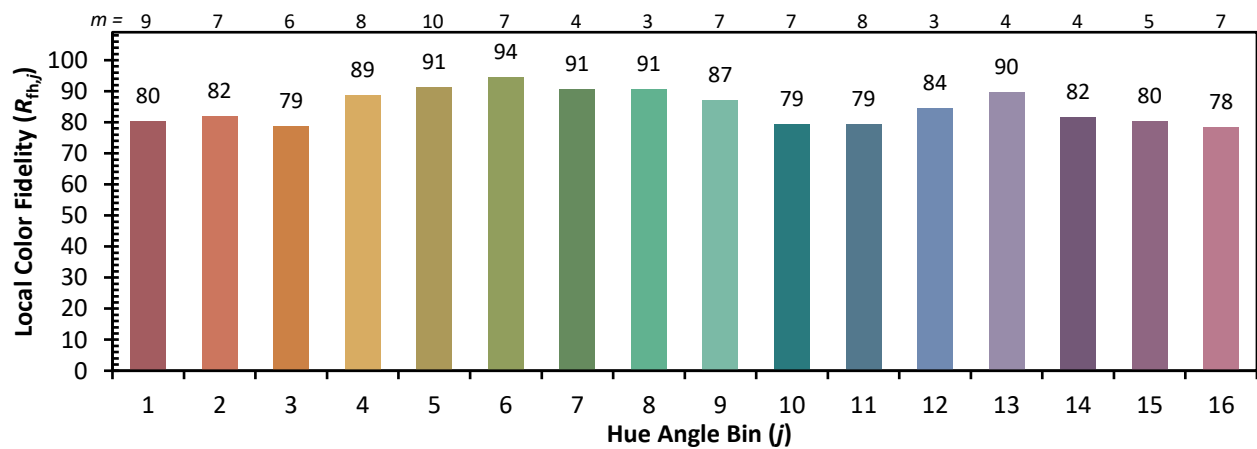
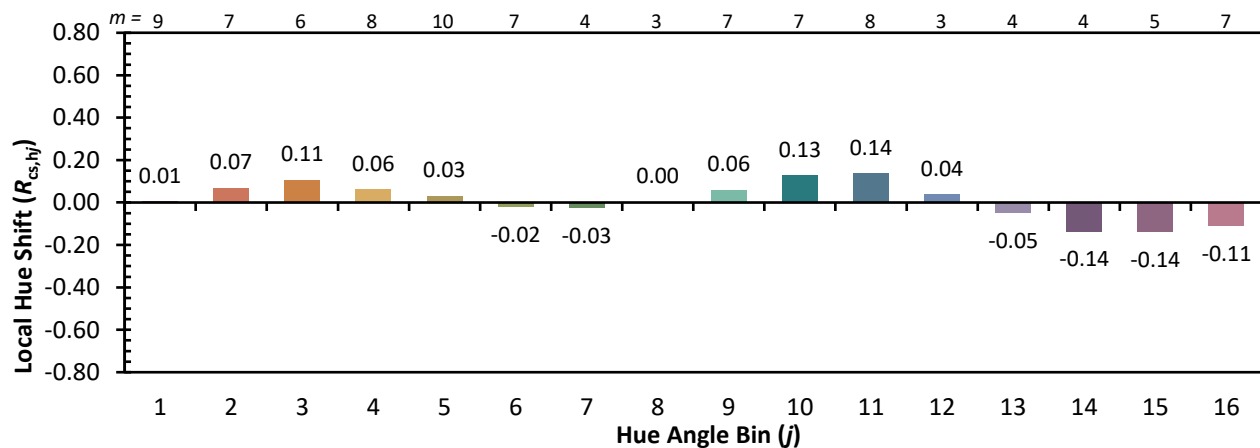
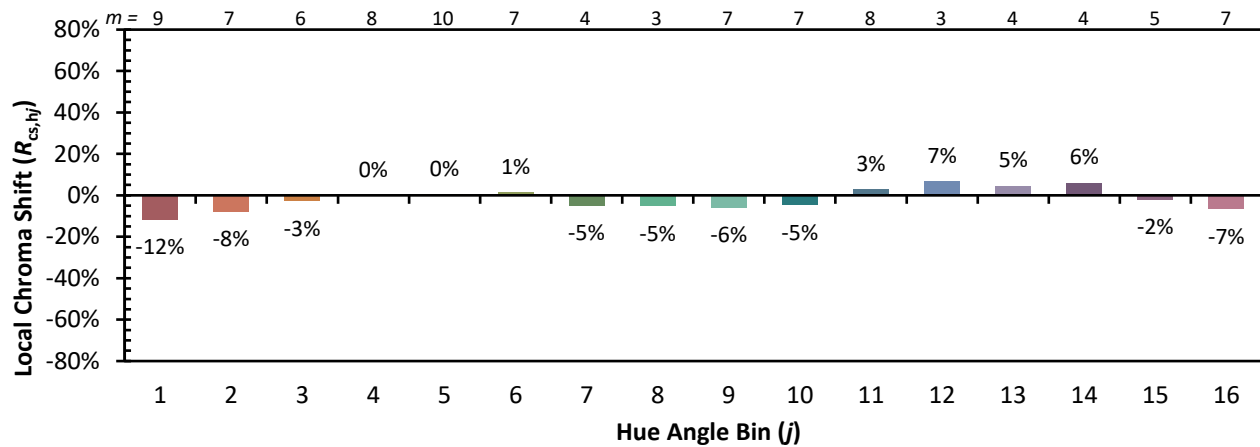
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 84 | CES51 = 93 | CES76 = 79 |
| CES02 = 62 | CES27 = 93 | CES52 = 93 | CES77 = 84 |
| CES03 = 31 | CES28 = 93 | CES53 = 89 | CES78 = 78 |
| CES04 = 70 | CES29 = 90 | CES54 = 90 | CES79 = 92 |
| CES05 = 49 | CES30 = 94 | CES55 = 87 | CES80 = 90 |
| CES06 = 51 | CES31 = 91 | CES56 = 86 | CES81 = 78 |
| CES07 = 41 | CES32 = 83 | CES57 = 85 | CES82 = 95 |
| CES08 = 40 | CES33 = 96 | CES58 = 85 | CES83 = 96 |
| CES09 = 29 | CES34 = 88 | CES59 = 91 | CES84 = 91 |
| CES10 = 75 | CES35 = 94 | CES60 = 90 | CES85 = 77 |
| CES11 = 58 | CES36 = 82 | CES61 = 86 | CES86 = 73 |
| CES12 = 64 | CES37 = 94 | CES62 = 83 | CES87 = 85 |
| CES13 = 43 | CES38 = 89 | CES63 = 86 | CES88 = 89 |
| CES14 = 74 | CES39 = 99 | CES64 = 78 | CES89 = 77 |
| CES15 = 71 | CES40 = 97 | CES65 = 79 | CES90 = 90 |
| CES16 = 47 | CES41 = 97 | CES66 = 76 | CES91 = 72 |
| CES17 = 50 | CES42 = 94 | CES67 = 75 | CES92 = 65 |
| CES18 = 56 | CES43 = 90 | CES68 = 78 | CES93 = 79 |
| CES19 = 72 | CES44 = 99 | CES69 = 82 | CES94 = 64 |
| CES20 = 66 | CES45 = 94 | CES70 = 76 | CES95 = 74 |
| CES21 = 86 | CES46 = 91 | CES71 = 71 | CES96 = 85 |
| CES22 = 78 | CES47 = 96 | CES72 = 90 | CES97 = 89 |
| CES23 = 92 | CES48 = 86 | CES73 = 71 | CES98 = 86 |
| CES24 = 90 | CES49 = 91 | CES74 = 91 | CES99 = 78 |
| CES25 = 72 | CES50 = 93 | CES75 = 75 |            |



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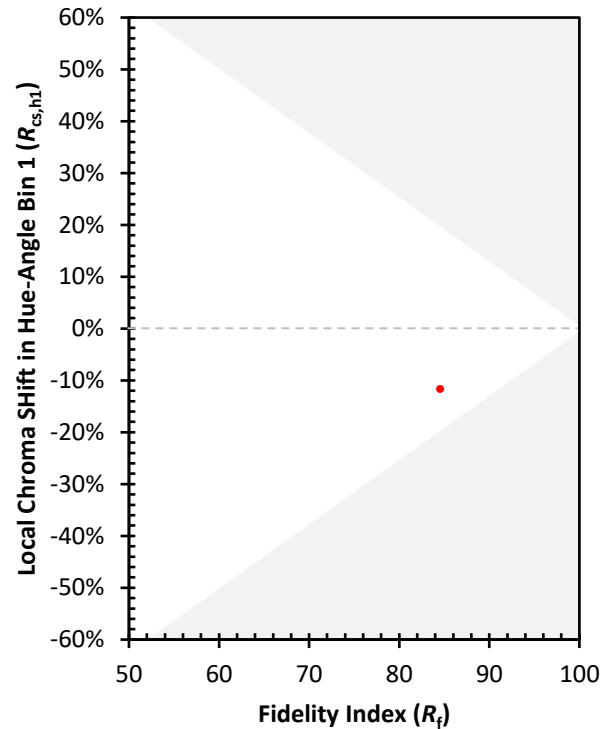
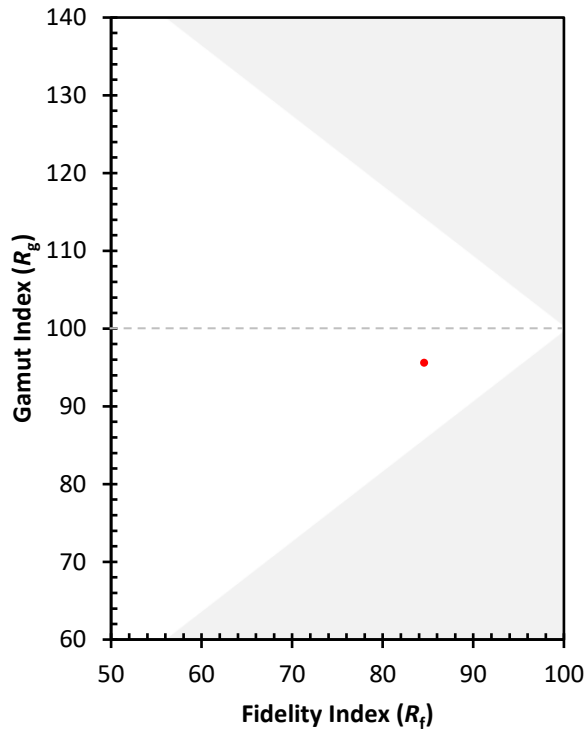
Color Rendition by Hue-Angle Bin



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**Measure Comparisons**



(END OF REPORT)