

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: P830888

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

Issue Date: 5/3/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P830888  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2103-200-1)  
Test Lab: INNOVATION CENTER  
Issue Date: 5/3/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: METALUX  
Catalog Number: OHBL-9HE-A-UNV-L835-CD  
Description: 9000 LUMEN OHBL HE LED LUMINAIRE WITH 80CRI, 3500K LEDS AND AISLE LENS  
Light Source: -  
Ballast/Driver: -

**Summary**

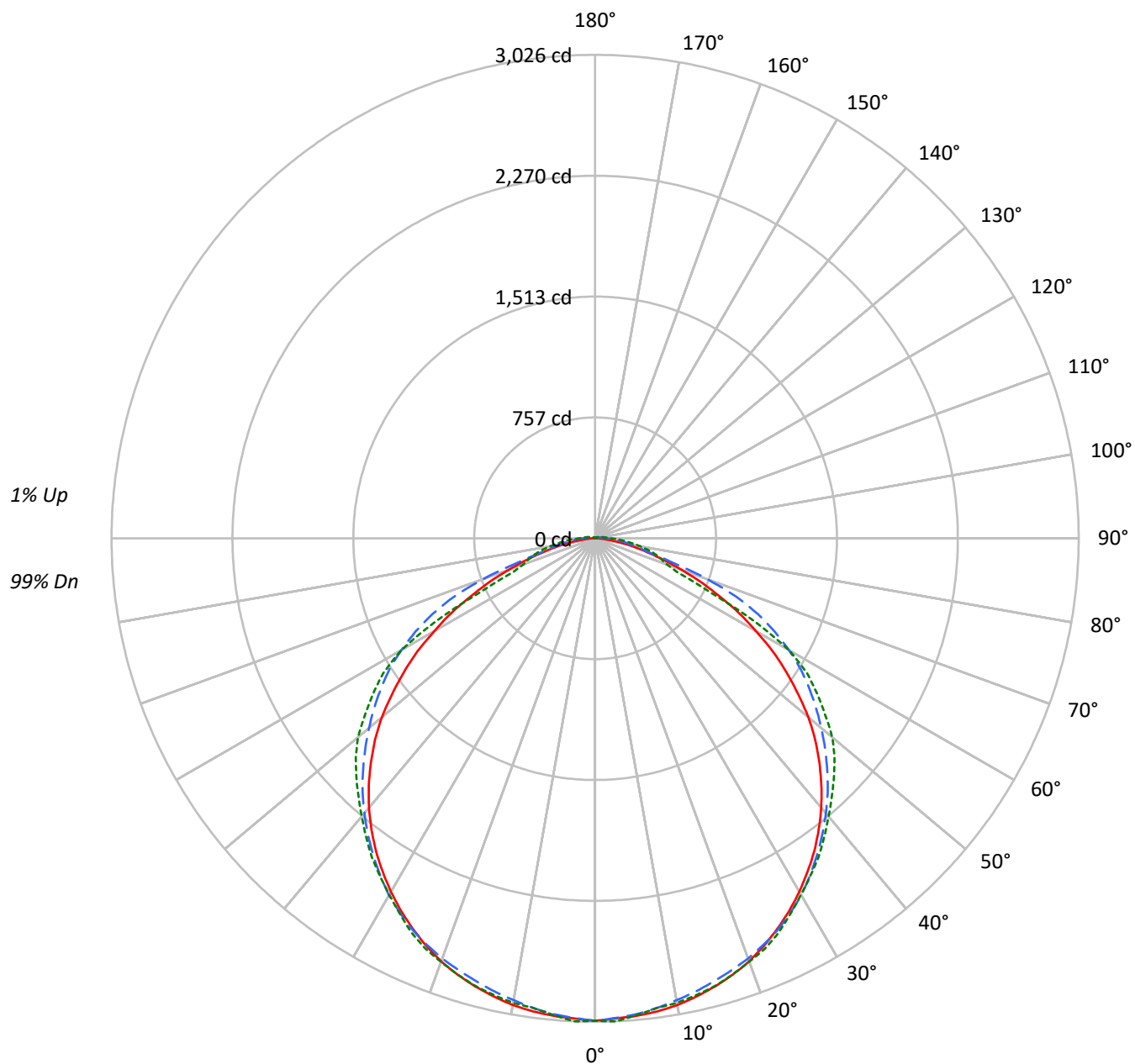
Lumens per Lamp: N/A  
Luminaire Lumens: 8537.0 lumens  
Efficiency: N/A  
Efficacy: 164.2 lumens/watt  
Spacing Criteria (0/90/45): 1.26 / 1.27 / 1.39  
Luminous Opening: Rectangular w/ Sides (W: 1.67' x L: 3.78' x H: 0.17')  
CIE Type: Direct

Input Watts (W): 52  
Input Voltage (V): NR  
Input Current (A<sub>in</sub>): 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: P830888

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

### Luminous Intensity Polar Plot





TEST NUMBER: P830888

CATALOG NUMBER: OHBL-9HE-A-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  | 50 | 30 | 10 |
| RCR |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |    |    |    |
| 0   | 119 | 119 | 119 | 119 | 116 | 116 | 116 | 116 | 110 | 110 | 110 | 106 | 106 | 106 | 101 | 101 | 101 |    |    | 99 |
| 1   | 109 | 104 | 100 | 96  | 106 | 102 | 98  | 95  | 97  | 94  | 91  | 93  | 91  | 88  | 90  | 87  | 86  |    |    | 83 |
| 2   | 99  | 91  | 84  | 79  | 96  | 89  | 83  | 78  | 85  | 80  | 76  | 82  | 78  | 74  | 79  | 75  | 72  |    |    | 70 |
| 3   | 91  | 80  | 72  | 66  | 88  | 79  | 71  | 65  | 75  | 69  | 64  | 72  | 67  | 63  | 70  | 65  | 61  |    |    | 59 |
| 4   | 83  | 71  | 62  | 56  | 81  | 70  | 62  | 55  | 67  | 60  | 54  | 65  | 59  | 54  | 62  | 57  | 53  |    |    | 51 |
| 5   | 76  | 64  | 55  | 48  | 74  | 62  | 54  | 48  | 60  | 53  | 47  | 58  | 52  | 46  | 56  | 50  | 46  |    |    | 44 |
| 6   | 70  | 57  | 48  | 42  | 68  | 56  | 48  | 42  | 54  | 47  | 41  | 52  | 46  | 41  | 51  | 45  | 40  |    |    | 38 |
| 7   | 65  | 52  | 43  | 37  | 63  | 51  | 43  | 37  | 49  | 42  | 36  | 48  | 41  | 36  | 46  | 40  | 36  |    |    | 34 |
| 8   | 61  | 47  | 39  | 33  | 59  | 46  | 38  | 33  | 45  | 38  | 33  | 44  | 37  | 32  | 42  | 36  | 32  |    |    | 30 |
| 9   | 57  | 43  | 35  | 30  | 55  | 43  | 35  | 29  | 41  | 34  | 29  | 40  | 34  | 29  | 39  | 33  | 29  |    |    | 27 |
| 10  | 53  | 40  | 32  | 27  | 52  | 39  | 32  | 27  | 38  | 31  | 27  | 37  | 31  | 26  | 36  | 30  | 26  |    |    | 24 |

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

|     | 0°   | 45°  | 90°  |
|-----|------|------|------|
| 0°  | 5159 | 5159 | 5159 |
| 5°  | 5125 | 5082 | 5091 |
| 10° | 5106 | 5002 | 5032 |
| 15° | 5074 | 4943 | 4995 |
| 20° | 5041 | 4904 | 4947 |
| 25° | 4981 | 4865 | 4900 |
| 30° | 4915 | 4805 | 4803 |
| 35° | 4835 | 4711 | 4749 |
| 40° | 4733 | 4614 | 4675 |
| 45° | 4590 | 4502 | 4640 |
| 50° | 4397 | 4375 | 4597 |
| 55° | 4090 | 4249 | 4420 |
| 60° | 3688 | 4067 | 4079 |
| 65° | 3164 | 3731 | 2580 |
| 70° | 2548 | 2907 | 1865 |
| 75° | 1911 | 1721 | 1885 |
| 80° | 1330 | 1424 | 1787 |
| 85° | 757  | 1293 | 1653 |



TEST NUMBER: P830888

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

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 284.8  | 3.3       |
| 10°-20°   | 816.7  | 9.6       |
| 20°-30°   | 1247.3 | 14.6      |
| 30°-40°   | 1513.4 | 17.7      |
| 40°-50°   | 1586.2 | 18.6      |
| 50°-60°   | 1437.3 | 16.8      |
| 60°-70°   | 963.7  | 11.3      |
| 70°-80°   | 432.7  | 5.1       |
| 80°-90°   | 157.0  | 1.8       |
| 90°-100°  | 47.3   | 0.6       |
| 100°-110° | 22.3   | 0.3       |
| 110°-120° | 11.2   | 0.1       |
| 120°-130° | 6.2    | 0.1       |
| 130°-140° | 4.2    | 0.0       |
| 140°-150° | 2.9    | 0.0       |
| 150°-160° | 2.1    | 0.0       |
| 160°-170° | 1.4    | 0.0       |
| 170°-180° | 0.4    | 0.0       |
| 0°-30°    | 2348.7 | 27.5      |
| 0°-40°    | 3862.1 | 45.2      |
| 0°-60°    | 6885.6 | 80.7      |
| 0°-90°    | 8439.1 | 98.9      |
| 90°-120°  | 80.7   | 0.9       |
| 90°-150°  | 94.0   | 1.1       |
| 90°-180°  | 98.0   | 1.1       |
| 0°-180°   | 8537.0 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°   | 22.5° | 45°  | 67.5° | 90°  | Flux |
|------|------|-------|------|-------|------|------|
| 0°   | 3020 | 3020  | 3020 | 3020  | 3020 |      |
| 5°   | 3001 | 3011  | 2990 | 2999  | 2996 | 285  |
| 15°  | 2903 | 2892  | 2872 | 2897  | 2900 | 820  |
| 25°  | 2697 | 2685  | 2704 | 2729  | 2721 | 1243 |
| 35°  | 2391 | 2396  | 2421 | 2446  | 2437 | 1494 |
| 45°  | 1984 | 2016  | 2054 | 2106  | 2113 | 1528 |
| 55°  | 1460 | 1530  | 1635 | 1700  | 1696 | 1303 |
| 65°  | 857  | 991   | 1125 | 949   | 775  | 854  |
| 75°  | 337  | 489   | 360  | 368   | 392  | 368  |
| 85°  | 58   | 111   | 143  | 172   | 181  | 71   |
| 90°  | 0    | 37    | 74   | 93    | 97   | 3    |
| 95°  | 0    | 23    | 51   | 62    | 63   | 1    |
| 105° | 2    | 10    | 25   | 30    | 31   | 2    |
| 115° | 4    | 5     | 13   | 16    | 17   | 3    |
| 125° | 3    | 4     | 8    | 9     | 10   | 3    |
| 135° | 4    | 4     | 5    | 7     | 7    | 3    |
| 145° | 4    | 4     | 4    | 5     | 5    | 3    |
| 155° | 4    | 5     | 5    | 5     | 4    | 2    |
| 165° | 5    | 5     | 5    | 5     | 5    | 1    |
| 175° | 5    | 5     | 4    | 4     | 4    | 0    |
| 180° | 4    | 4     | 4    | 4     | 4    |      |



TEST NUMBER: P830888

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

**CANDELA DISTRIBUTION (FULL):**

|        | 0°     | 22.5°  | 45°    | 67.5°  | 90°    |
|--------|--------|--------|--------|--------|--------|
| 0°     | 3020.4 | 3020.4 | 3020.4 | 3020.4 | 3020.4 |
| 2.5°   | 3008.2 | 3020.8 | 3005.1 | 3022.1 | 3026.5 |
| 5°     | 3000.7 | 3011.2 | 2990.3 | 2999.4 | 2995.5 |
| 7.5°   | 2987.2 | 2990.7 | 2965.8 | 2973.2 | 2965.4 |
| 10°    | 2967.1 | 2965.4 | 2936.1 | 2950.5 | 2952.3 |
| 12.5°  | 2937.4 | 2932.2 | 2906.0 | 2927.8 | 2928.2 |
| 15°    | 2903.4 | 2892.0 | 2871.5 | 2896.8 | 2900.3 |
| 17.5°  | 2864.0 | 2849.2 | 2835.7 | 2868.4 | 2863.2 |
| 20°    | 2818.2 | 2800.7 | 2798.1 | 2833.9 | 2820.8 |
| 22.5°  | 2761.4 | 2747.9 | 2754.0 | 2788.1 | 2779.8 |
| 25°    | 2697.2 | 2685.4 | 2704.2 | 2729.1 | 2721.2 |
| 27.5°  | 2629.5 | 2622.5 | 2643.9 | 2663.2 | 2647.9 |
| 30°    | 2555.3 | 2551.4 | 2579.7 | 2595.5 | 2576.2 |
| 32.5°  | 2474.5 | 2475.8 | 2502.9 | 2524.3 | 2506.4 |
| 35°    | 2390.6 | 2396.3 | 2420.8 | 2446.5 | 2436.9 |
| 37.5°  | 2298.5 | 2311.2 | 2335.6 | 2364.9 | 2354.8 |
| 40°    | 2201.1 | 2219.4 | 2246.5 | 2281.9 | 2272.7 |
| 42.5°  | 2095.8 | 2119.0 | 2153.9 | 2193.2 | 2192.4 |
| 45°    | 1984.0 | 2016.4 | 2053.9 | 2106.3 | 2112.9 |
| 47.5°  | 1867.9 | 1904.1 | 1951.7 | 2021.6 | 2031.6 |
| 50°    | 1741.7 | 1787.1 | 1846.5 | 1930.3 | 1936.4 |
| 52.5°  | 1601.0 | 1663.1 | 1741.7 | 1822.0 | 1814.6 |
| 55°    | 1460.0 | 1530.3 | 1634.7 | 1700.2 | 1696.2 |
| 57.5°  | 1319.3 | 1398.4 | 1525.0 | 1571.8 | 1571.3 |
| 60°    | 1162.1 | 1262.1 | 1400.6 | 1436.0 | 1401.0 |
| 62.5°  | 1016.7 | 1124.1 | 1267.8 | 1242.0 | 1122.4 |
| 65°    | 856.9  | 990.9  | 1125.0 | 949.4  | 775.2  |
| 67.5°  | 714.9  | 854.7  | 955.6  | 650.3  | 556.8  |
| 70°    | 572.1  | 726.3  | 745.1  | 482.6  | 476.0  |
| 72.5°  | 445.5  | 609.7  | 514.0  | 413.1  | 434.1  |
| 75°    | 337.2  | 489.1  | 359.9  | 368.2  | 392.2  |
| 77.5°  | 245.9  | 375.6  | 279.9  | 322.7  | 342.4  |
| 80°    | 169.0  | 266.0  | 228.4  | 271.2  | 284.7  |
| 82.5°  | 106.1  | 175.6  | 183.0  | 218.4  | 232.3  |
| 85°    | 58.1   | 111.4  | 142.8  | 172.5  | 180.8  |
| 87.5°  | 24.0   | 67.3   | 109.2  | 133.2  | 140.2  |
| 90°    | 0.4    | 37.1   | 73.8   | 92.6   | 97.0   |
| 92.5°  | 0.4    | 28.4   | 60.3   | 74.7   | 77.7   |
| 95°    | 0.4    | 23.1   | 50.7   | 61.6   | 63.3   |
| 97.5°  | 0.9    | 18.3   | 42.4   | 51.1   | 52.8   |
| 100°   | 1.3    | 15.3   | 35.4   | 42.8   | 44.1   |
| 102.5° | 1.7    | 12.2   | 29.7   | 35.8   | 37.1   |
| 105°   | 1.7    | 10.0   | 24.9   | 30.1   | 31.4   |



TEST NUMBER: P830888

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

**CANDELA DISTRIBUTION (continued):**

|        | 0°  | 22.5° | 45°  | 67.5° | 90°  |
|--------|-----|-------|------|-------|------|
| 112.5° | 3.1 | 6.1   | 14.8 | 18.8  | 19.7 |
| 115°   | 3.5 | 5.2   | 12.7 | 16.2  | 17.0 |
| 117.5° | 3.5 | 4.4   | 10.9 | 13.5  | 14.4 |
| 120°   | 3.5 | 3.9   | 9.6  | 11.8  | 12.2 |
| 122.5° | 3.5 | 3.5   | 8.3  | 10.5  | 10.9 |
| 125°   | 3.1 | 3.5   | 7.9  | 9.2   | 9.6  |
| 127.5° | 3.5 | 3.5   | 7.0  | 8.3   | 8.7  |
| 130°   | 3.5 | 3.9   | 6.1  | 7.9   | 7.9  |
| 132.5° | 3.9 | 4.4   | 5.7  | 7.4   | 7.4  |
| 135°   | 3.9 | 4.4   | 4.8  | 7.0   | 7.4  |
| 137.5° | 4.4 | 4.4   | 4.4  | 6.6   | 7.0  |
| 140°   | 4.4 | 4.4   | 3.9  | 5.7   | 6.1  |
| 142.5° | 3.9 | 4.4   | 3.9  | 5.2   | 5.7  |
| 145°   | 3.9 | 4.4   | 4.4  | 4.8   | 5.2  |
| 147.5° | 4.4 | 4.4   | 4.4  | 4.4   | 4.8  |
| 150°   | 4.4 | 4.4   | 4.4  | 4.4   | 4.4  |
| 152.5° | 4.4 | 4.4   | 4.4  | 4.4   | 4.4  |
| 155°   | 4.4 | 4.8   | 4.8  | 4.8   | 4.4  |
| 157.5° | 4.4 | 4.8   | 4.8  | 4.8   | 4.8  |
| 160°   | 4.4 | 4.8   | 4.8  | 4.8   | 4.8  |
| 162.5° | 4.8 | 4.8   | 4.8  | 4.8   | 4.8  |
| 165°   | 4.8 | 4.8   | 4.8  | 4.8   | 4.8  |
| 167.5° | 4.8 | 5.2   | 4.8  | 4.8   | 4.8  |
| 170°   | 4.8 | 4.8   | 4.8  | 4.4   | 4.4  |
| 172.5° | 4.8 | 4.8   | 4.8  | 4.4   | 4.4  |
| 175°   | 4.8 | 4.8   | 4.4  | 3.9   | 3.9  |
| 177.5° | 5.2 | 4.8   | 4.4  | 3.9   | 3.5  |
| 180°   | 4.4 | 4.4   | 4.4  | 4.4   | 4.4  |



Report Generated By 670246072 / DESKTOP-50001EG





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







|        |     |     |      |      |      |
|--------|-----|-----|------|------|------|
| 107.5° | 2.2 | 8.3 | 21.4 | 25.8 | 26.6 |
| 110°   | 2.6 | 7.0 | 17.9 | 21.8 | 22.7 |



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.

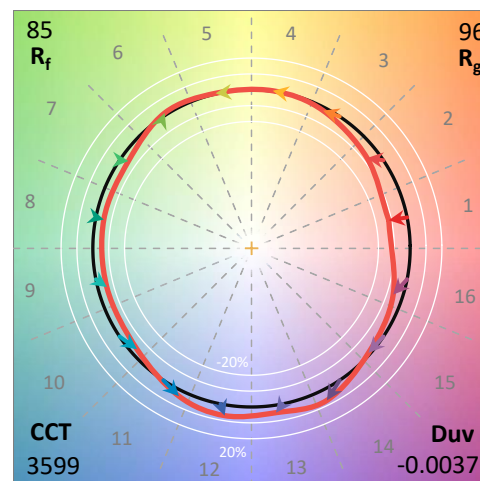
### Test Information

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

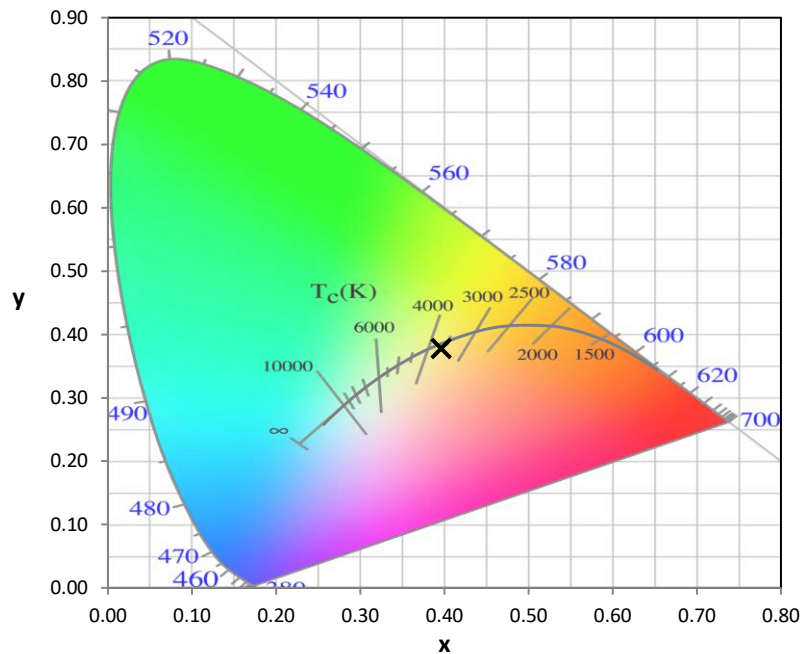
Stabilization Time: 24M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.7/57%  
 Sphere Temperature (°C): 25.2

REPORT NUMBER: SP1-2307-100-5

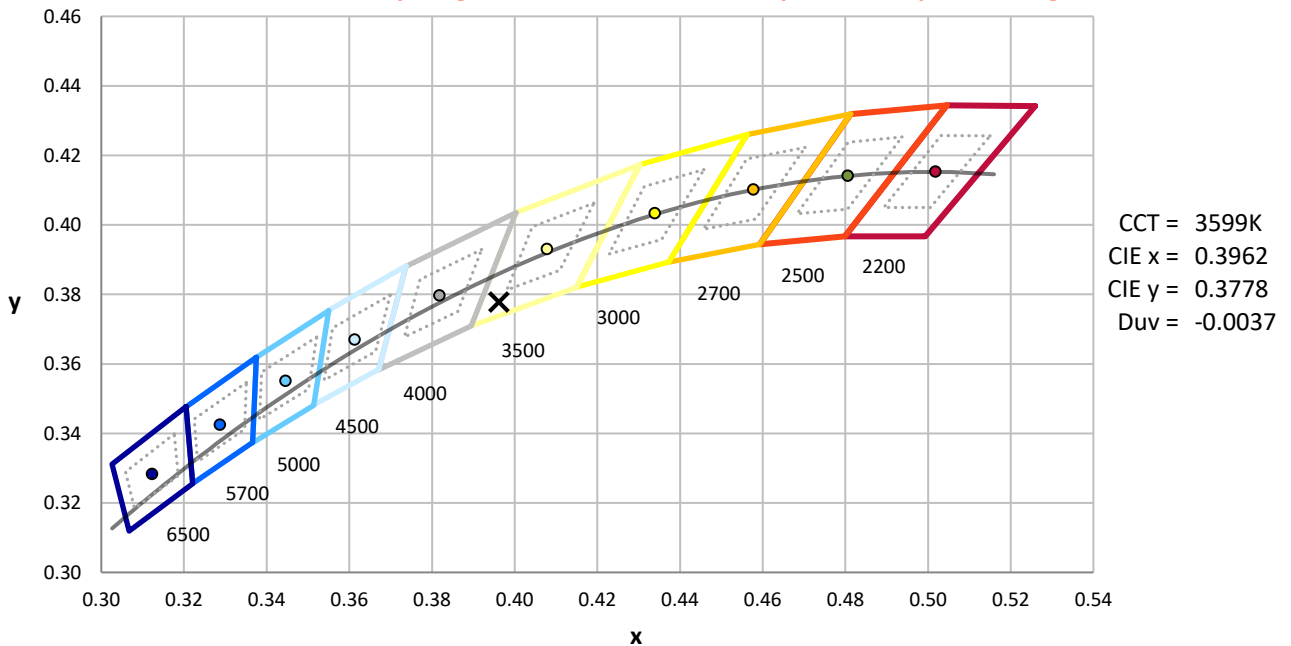
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| 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



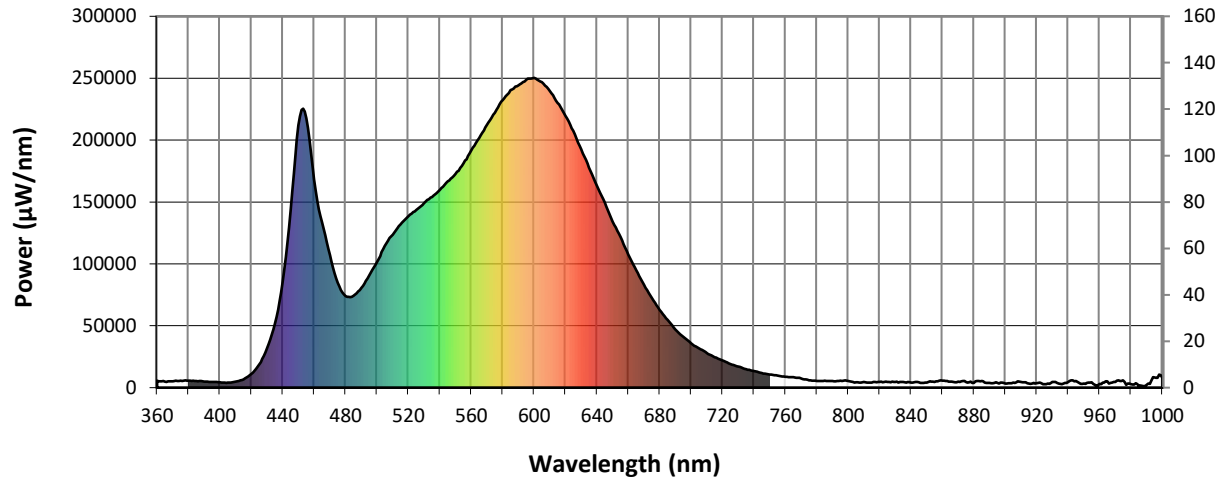
CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 3500K 7-step quadrangle

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**Photopic Flux vs. Wavelength**

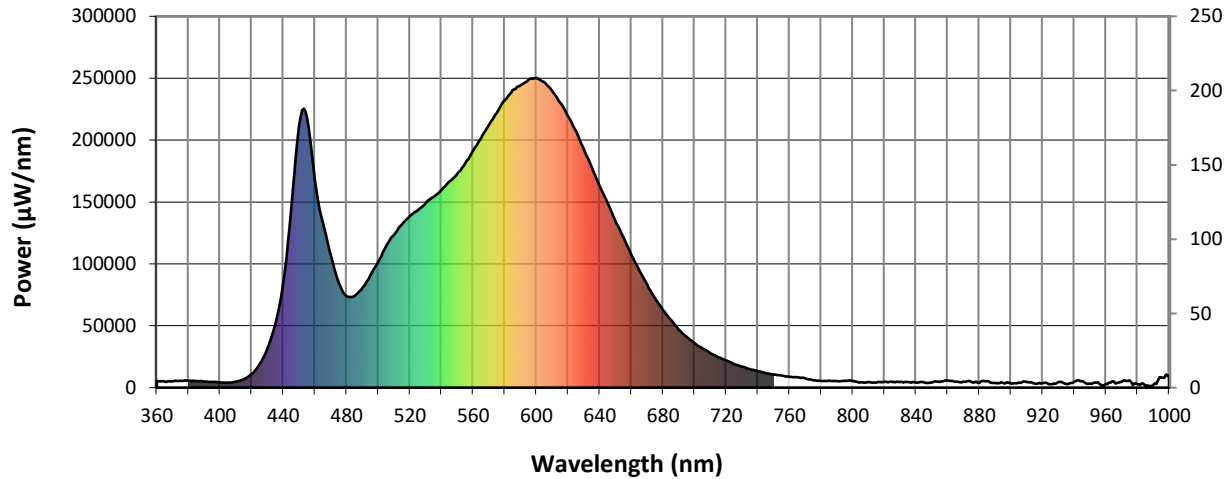


#####

| 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



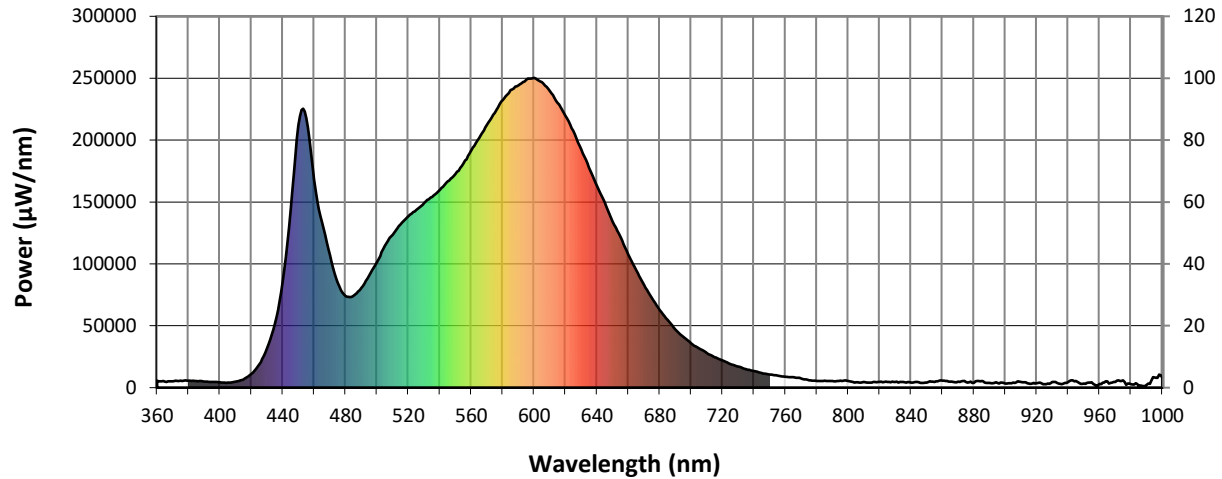
Scotopic Lumens: 21413.1

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**

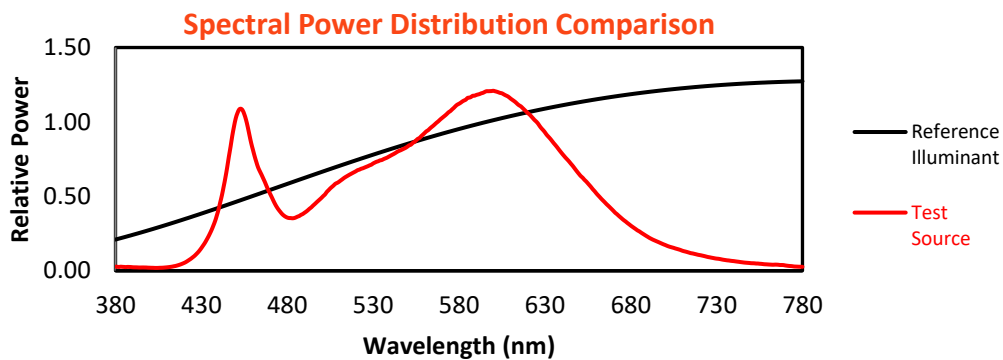
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 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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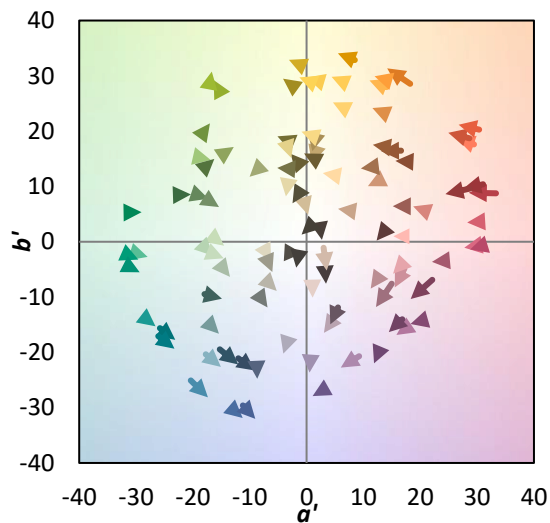
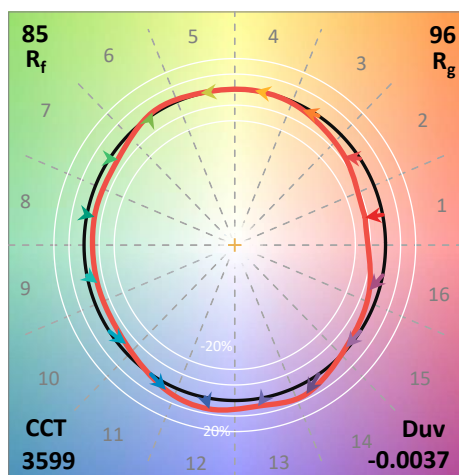
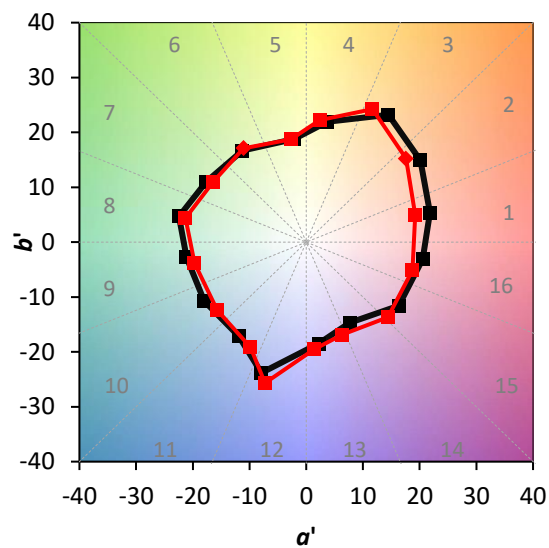
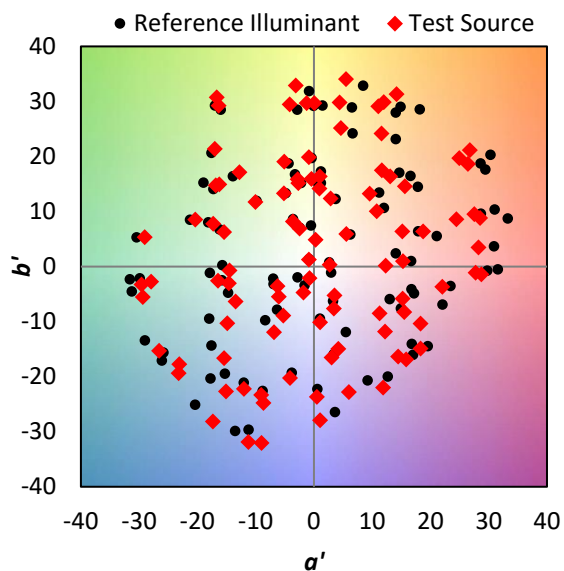
**TM-30-18**

**Summary**

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



**Color Vector Graphics**

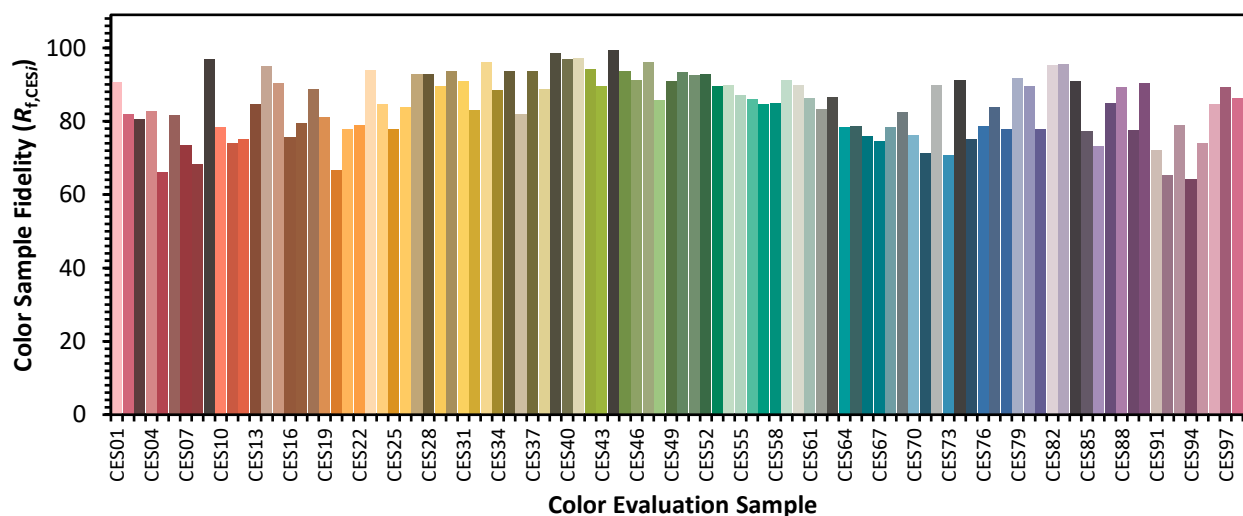


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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

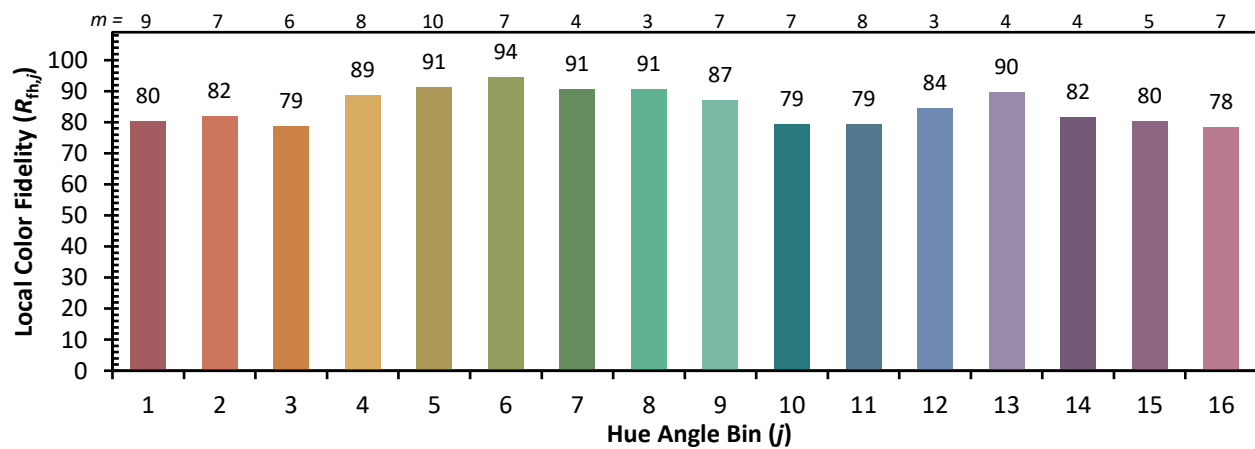
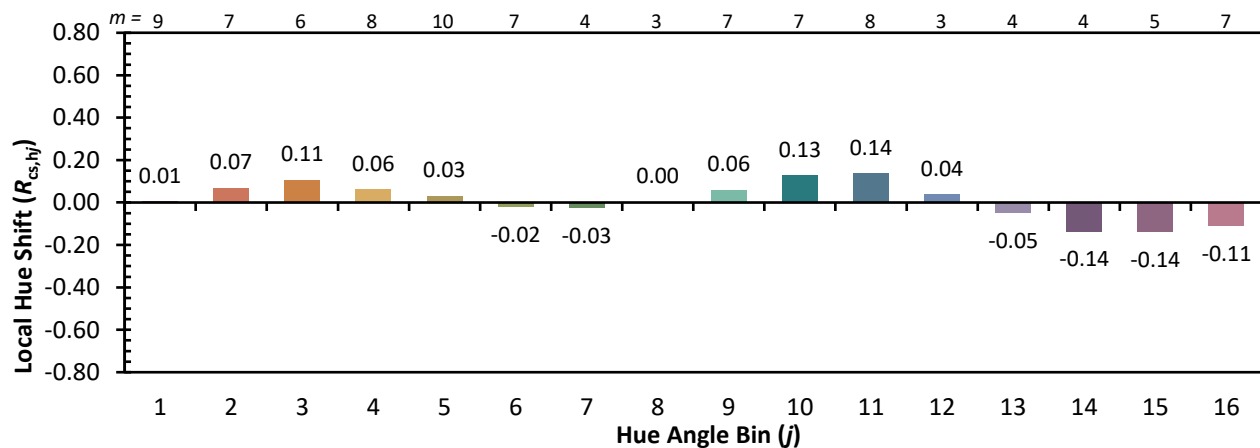
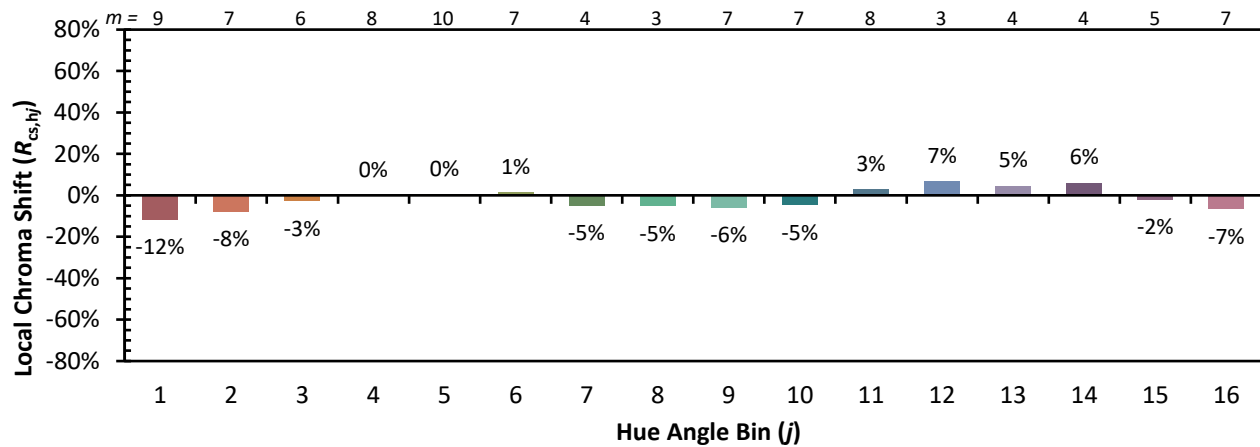
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|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 84 | CES51 = 93 | CES76 = 79 |
| CES02 = 62 | CES27 = 93 | CES52 = 93 | CES77 = 84 |
| CES03 = 31 | CES28 = 93 | CES53 = 89 | CES78 = 78 |
| CES04 = 70 | CES29 = 90 | CES54 = 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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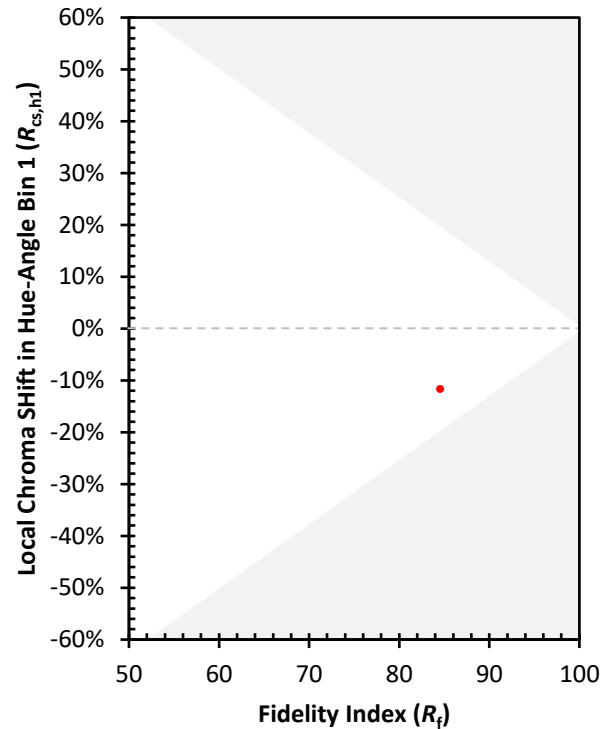
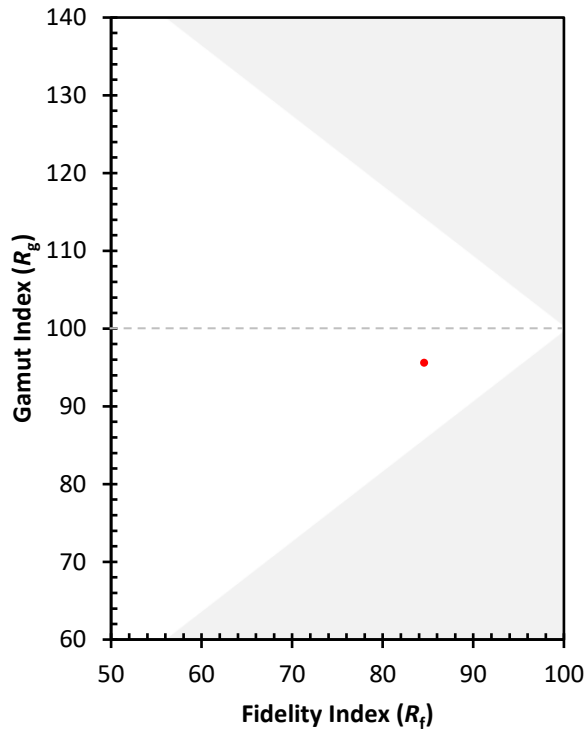
Color Rendition by Hue-Angle Bin



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**Measure Comparisons**



(END OF REPORT)