

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: P827734

Luminaire Tested: **OHBL-24HE-MFL-UNV-L930-CD-UPL24**

Issue Date: 5/3/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P827734  
REPORT IS A COMBINATION OF REPORTS P826241 AND G3-2310-221-6  
Test Lab: INNOVATION CENTER  
Issue Date: 5/3/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: METALUX  
Catalog Number: OHBL-24HE-MFL-UNV-L930-CD-UPL24  
Description:  
Light Source: -  
Ballast/Driver: -

**Summary**

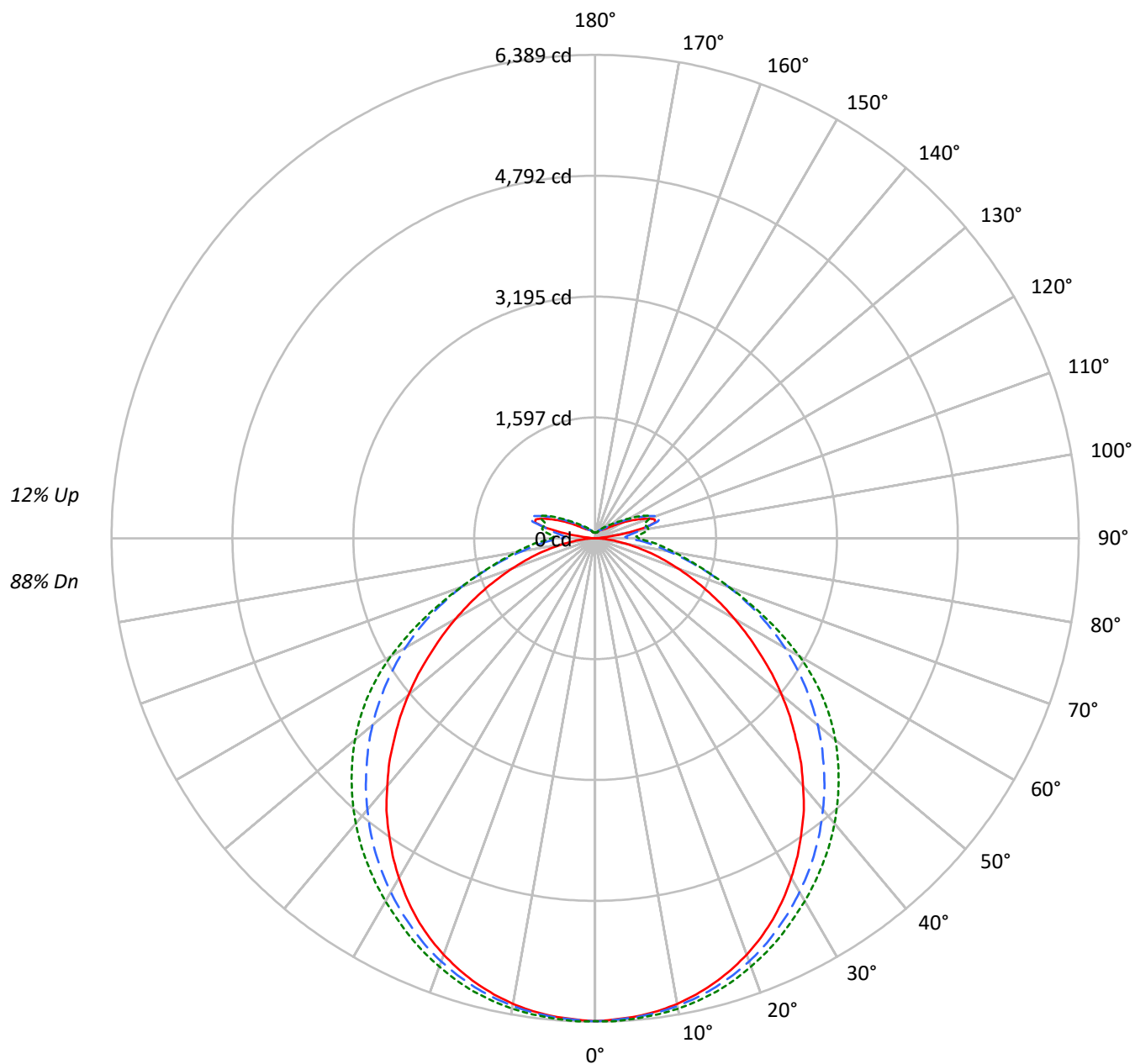
Lumens per Lamp: N/A  
Luminaire Lumens: 21058.1 lumens  
Efficiency: N/A  
Efficacy: 140.0 lumens/watt  
Spacing Criteria (0/90/45): 1.21 / 1.29 / 1.38  
Luminous Opening: Rectangular w/ Sides (W: 3.78' x L: 1.8' x H: 0.17')  
CIE Type: Semi-Direct

Input Watts (W): 150.4  
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

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CATALOG NUMBER: OHBL-24HE-MFL-UNV-L930-CD-UPL24

### Luminous Intensity Polar Plot





TEST NUMBER: P827734

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**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   | 116 | 116 | 116 | 116 | 112 | 112 | 112 | 112 | 104 | 104 | 104 | 97 | 97 | 97 | 91 | 91 | 91 | 88 |    |    |
| 1   | 105 | 100 | 96  | 92  | 101 | 97  | 93  | 89  | 91  | 87  | 84  | 85 | 82 | 80 | 79 | 77 | 75 | 72 |    |    |
| 2   | 96  | 87  | 81  | 75  | 92  | 84  | 78  | 73  | 79  | 74  | 69  | 74 | 70 | 66 | 69 | 66 | 63 | 60 |    |    |
| 3   | 87  | 77  | 69  | 62  | 84  | 74  | 67  | 61  | 69  | 63  | 58  | 65 | 60 | 56 | 61 | 57 | 53 | 50 |    |    |
| 4   | 80  | 68  | 59  | 52  | 77  | 66  | 58  | 51  | 62  | 55  | 49  | 58 | 52 | 47 | 54 | 50 | 46 | 43 |    |    |
| 5   | 73  | 61  | 52  | 45  | 70  | 59  | 50  | 44  | 55  | 48  | 43  | 52 | 46 | 41 | 49 | 44 | 40 | 37 |    |    |
| 6   | 68  | 54  | 46  | 39  | 65  | 53  | 45  | 39  | 50  | 43  | 37  | 47 | 41 | 36 | 44 | 39 | 35 | 32 |    |    |
| 7   | 63  | 49  | 41  | 35  | 60  | 48  | 40  | 34  | 45  | 38  | 33  | 43 | 37 | 32 | 40 | 35 | 31 | 29 |    |    |
| 8   | 58  | 45  | 37  | 31  | 56  | 44  | 36  | 30  | 41  | 34  | 29  | 39 | 33 | 28 | 37 | 32 | 28 | 26 |    |    |
| 9   | 54  | 41  | 33  | 28  | 52  | 40  | 32  | 27  | 38  | 31  | 26  | 36 | 30 | 26 | 34 | 29 | 25 | 23 |    |    |
| 10  | 51  | 38  | 30  | 25  | 49  | 37  | 30  | 25  | 35  | 29  | 24  | 33 | 27 | 23 | 32 | 26 | 23 | 21 |    |    |

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

|     | 0°    | 45°   | 90°   |
|-----|-------|-------|-------|
| 0°  | 10094 | 10094 | 10094 |
| 5°  | 9987  | 9998  | 10071 |
| 10° | 9875  | 9910  | 10061 |
| 15° | 9723  | 9805  | 10035 |
| 20° | 9534  | 9676  | 9977  |
| 25° | 9297  | 9514  | 9919  |
| 30° | 8984  | 9340  | 9864  |
| 35° | 8615  | 9154  | 9826  |
| 40° | 8181  | 8940  | 9796  |
| 45° | 7677  | 8706  | 9747  |
| 50° | 7130  | 8471  | 9683  |
| 55° | 6470  | 8182  | 9534  |
| 60° | 5795  | 7842  | 9157  |
| 65° | 5062  | 7408  | 8480  |
| 70° | 4272  | 6854  | 7757  |
| 75° | 3469  | 6214  | 7377  |
| 80° | 2491  | 5752  | 7727  |
| 85° | 1404  | 5979  | 9687  |



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**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 604.8   | 2.9       |
| 10°-20°   | 1735.0  | 8.2       |
| 20°-30°   | 2623.9  | 12.5      |
| 30°-40°   | 3150.0  | 15.0      |
| 40°-50°   | 3253.5  | 15.4      |
| 50°-60°   | 2927.1  | 13.9      |
| 60°-70°   | 2204.9  | 10.5      |
| 70°-80°   | 1331.4  | 6.3       |
| 80°-90°   | 656.2   | 3.1       |
| 90°-100°  | 461.5   | 2.2       |
| 100°-110° | 807.1   | 3.8       |
| 110°-120° | 650.0   | 3.1       |
| 120°-130° | 319.7   | 1.5       |
| 130°-140° | 161.3   | 0.8       |
| 140°-150° | 91.0    | 0.4       |
| 150°-160° | 50.2    | 0.2       |
| 160°-170° | 23.5    | 0.1       |
| 170°-180° | 7.1     | 0.0       |
| 0°-30°    | 4963.7  | 23.6      |
| 0°-40°    | 8113.7  | 38.5      |
| 0°-60°    | 14294.3 | 67.9      |
| 0°-90°    | 18486.8 | 87.8      |
| 90°-120°  | 1918.6  | 9.1       |
| 90°-150°  | 2490.6  | 11.8      |
| 90°-180°  | 2571.0  | 12.2      |
| 0°-180°   | 21058.1 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°   | 22.5° | 45°  | 67.5° | 90°  | Flux |
|------|------|-------|------|-------|------|------|
| 0°   | 6382 | 6382  | 6382 | 6382  | 6382 |      |
| 5°   | 6342 | 6359  | 6351 | 6376  | 6368 | 602  |
| 15°  | 6086 | 6115  | 6144 | 6195  | 6201 | 1716 |
| 25°  | 5558 | 5619  | 5698 | 5787  | 5801 | 2556 |
| 35°  | 4752 | 4863  | 5063 | 5216  | 5247 | 2971 |
| 45°  | 3750 | 3940  | 4269 | 4502  | 4550 | 2895 |
| 55°  | 2657 | 2932  | 3377 | 3632  | 3676 | 2382 |
| 65°  | 1621 | 1952  | 2390 | 2509  | 2480 | 1611 |
| 75°  | 764  | 1097  | 1384 | 1420  | 1406 | 815  |
| 85°  | 159  | 420   | 694  | 789   | 803  | 184  |
| 90°  | 4    | 192   | 435  | 550   | 576  | 13   |
| 95°  | 51   | 201   | 436  | 562   | 601  | 140  |
| 105° | 822  | 866   | 854  | 711   | 680  | 780  |
| 115° | 572  | 601   | 671  | 706   | 707  | 577  |
| 125° | 286  | 305   | 357  | 385   | 387  | 268  |
| 135° | 173  | 179   | 203  | 228   | 236  | 136  |
| 145° | 133  | 134   | 138  | 152   | 157  | 84   |
| 155° | 109  | 113   | 113  | 112   | 113  | 49   |
| 165° | 81   | 82    | 82   | 82    | 82   | 23   |
| 175° | 73   | 74    | 74   | 74    | 74   | 7    |
| 180° | 73   | 73    | 73   | 73    | 73   |      |



TEST NUMBER: P827734

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**CANDELA DISTRIBUTION (FULL):**

|        | 0°     | 22.5°  | 45°    | 67.5°  | 90°    |
|--------|--------|--------|--------|--------|--------|
| 0°     | 6382.5 | 6382.5 | 6382.5 | 6382.5 | 6382.5 |
| 2.5°   | 6363.8 | 6379.4 | 6370.0 | 6390.3 | 6388.7 |
| 5°     | 6341.9 | 6359.1 | 6351.2 | 6376.2 | 6368.5 |
| 7.5°   | 6304.4 | 6323.1 | 6321.6 | 6349.7 | 6346.5 |
| 10°    | 6249.7 | 6270.0 | 6276.3 | 6313.7 | 6313.7 |
| 12.5°  | 6174.8 | 6201.3 | 6216.9 | 6262.2 | 6263.8 |
| 15°    | 6085.7 | 6115.4 | 6143.5 | 6195.1 | 6201.3 |
| 17.5°  | 5977.9 | 6015.5 | 6054.5 | 6113.8 | 6121.7 |
| 20°    | 5856.1 | 5898.2 | 5951.4 | 6013.8 | 6023.2 |
| 22.5°  | 5715.5 | 5765.5 | 5834.2 | 5907.6 | 5918.5 |
| 25°    | 5557.8 | 5618.6 | 5698.3 | 5787.3 | 5801.4 |
| 27.5°  | 5378.1 | 5448.4 | 5556.2 | 5656.2 | 5668.7 |
| 30°    | 5182.9 | 5265.6 | 5400.0 | 5518.7 | 5539.0 |
| 32.5°  | 4976.7 | 5072.0 | 5237.5 | 5370.3 | 5398.4 |
| 35°    | 4751.7 | 4862.6 | 5062.6 | 5215.7 | 5246.9 |
| 37.5°  | 4529.9 | 4651.7 | 4878.2 | 5053.2 | 5090.7 |
| 40°    | 4270.6 | 4422.1 | 4681.5 | 4875.1 | 4920.4 |
| 42.5°  | 4027.0 | 4191.0 | 4484.6 | 4695.5 | 4739.3 |
| 45°    | 3750.4 | 3939.5 | 4269.1 | 4501.8 | 4550.2 |
| 47.5°  | 3491.2 | 3695.8 | 4061.3 | 4301.9 | 4351.8 |
| 50°    | 3217.8 | 3442.8 | 3839.5 | 4091.0 | 4142.5 |
| 52.5°  | 2944.4 | 3186.5 | 3609.9 | 3870.7 | 3919.1 |
| 55°    | 2657.0 | 2932.0 | 3377.1 | 3631.8 | 3675.5 |
| 57.5°  | 2389.9 | 2680.4 | 3138.1 | 3380.3 | 3406.8 |
| 60°    | 2125.9 | 2427.4 | 2894.5 | 3106.9 | 3116.3 |
| 62.5°  | 1868.2 | 2185.3 | 2644.5 | 2813.2 | 2800.7 |
| 65°    | 1621.4 | 1952.5 | 2389.9 | 2508.7 | 2480.5 |
| 67.5°  | 1383.9 | 1726.0 | 2129.1 | 2205.6 | 2168.1 |
| 70°    | 1159.1 | 1505.8 | 1876.0 | 1915.0 | 1880.7 |
| 72.5°  | 960.6  | 1296.5 | 1619.8 | 1652.6 | 1627.7 |
| 75°    | 763.9  | 1096.6 | 1383.9 | 1419.9 | 1405.9 |
| 77.5°  | 579.5  | 902.8  | 1166.8 | 1213.7 | 1216.9 |
| 80°    | 417.1  | 726.4  | 977.8  | 1051.2 | 1060.6 |
| 82.5°  | 274.9  | 563.9  | 820.1  | 913.8  | 927.9  |
| 85°    | 159.3  | 420.2  | 693.6  | 788.9  | 802.9  |
| 87.5°  | 68.7   | 303.0  | 557.7  | 643.6  | 660.7  |
| 90°    | 4.0    | 191.5  | 434.7  | 550.0  | 575.9  |
| 92.5°  | 18.4   | 172.3  | 398.8  | 516.7  | 544.4  |
| 95°    | 50.7   | 200.6  | 435.9  | 562.3  | 600.6  |
| 97.5°  | 226.8  | 328.9  | 510.7  | 635.9  | 676.7  |
| 100°   | 455.6  | 554.9  | 605.7  | 693.1  | 713.0  |
| 102.5° | 698.9  | 757.3  | 694.8  | 700.9  | 705.4  |
| 105°   | 821.7  | 865.9  | 854.1  | 710.8  | 680.5  |



TEST NUMBER: P827734

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**CANDELA DISTRIBUTION (continued):**

|        | 0°    | 22.5° | 45°   | 67.5° | 90°   |
|--------|-------|-------|-------|-------|-------|
| 112.5° | 665.7 | 705.0 | 768.6 | 790.6 | 771.0 |
| 115°   | 571.9 | 600.9 | 671.2 | 705.6 | 707.0 |
| 117.5° | 492.6 | 510.5 | 576.3 | 609.9 | 615.4 |
| 120°   | 410.1 | 431.6 | 495.0 | 522.3 | 523.6 |
| 122.5° | 346.3 | 363.8 | 420.2 | 448.2 | 448.1 |
| 125°   | 285.7 | 305.0 | 357.4 | 384.8 | 387.0 |
| 127.5° | 242.1 | 255.8 | 304.4 | 333.4 | 337.2 |
| 130°   | 212.2 | 220.3 | 262.7 | 290.0 | 295.5 |
| 132.5° | 189.6 | 198.4 | 229.0 | 257.2 | 262.7 |
| 135°   | 172.6 | 179.0 | 203.4 | 228.4 | 236.3 |
| 137.5° | 158.8 | 164.4 | 181.8 | 206.0 | 212.3 |
| 140°   | 148.3 | 153.1 | 165.0 | 185.3 | 192.4 |
| 142.5° | 139.4 | 142.6 | 149.0 | 167.7 | 172.4 |
| 145°   | 132.8 | 134.5 | 138.5 | 151.8 | 157.3 |
| 147.5° | 125.5 | 128.8 | 130.4 | 138.3 | 143.0 |
| 150°   | 119.9 | 123.1 | 123.9 | 126.3 | 131.8 |
| 152.5° | 114.2 | 117.5 | 118.3 | 117.5 | 120.7 |
| 155°   | 109.4 | 112.6 | 112.6 | 111.9 | 113.4 |
| 157.5° | 89.7  | 91.3  | 93.0  | 93.8  | 93.8  |
| 160°   | 86.5  | 87.3  | 88.9  | 89.7  | 89.7  |
| 162.5° | 83.3  | 84.1  | 84.9  | 85.7  | 85.7  |
| 165°   | 80.8  | 81.6  | 82.4  | 82.4  | 82.4  |
| 167.5° | 78.4  | 78.4  | 79.2  | 80.0  | 80.0  |
| 170°   | 76.0  | 76.8  | 76.8  | 77.6  | 77.6  |
| 172.5° | 74.4  | 75.2  | 75.2  | 75.2  | 76.0  |
| 175°   | 72.8  | 73.6  | 73.6  | 74.4  | 74.4  |
| 177.5° | 72.8  | 72.8  | 72.8  | 72.8  | 72.8  |
| 180°   | 72.8  | 72.8  | 72.8  | 72.8  | 72.8  |



Report Generated By 670246072 / DESKTOP-50001EG







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







|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| 107.5° | 824.9 | 873.5 | 905.7 | 789.2 | 698.4 |
| 110°   | 761.9 | 808.2 | 856.2 | 837.7 | 766.3 |



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

Report Prepared for

Cooper Lighting Solutions

METALUX

Report Number: SP1-2304-001-2

Test Date: 05/31/2023

Luminaire Tested: OHB-15SE-N-UNV-L930

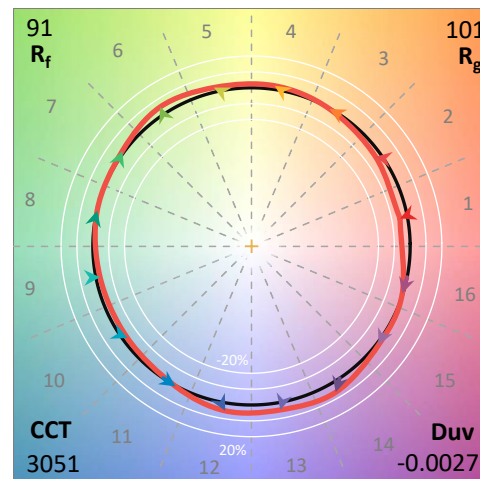
Data in this report applies to families of products including OHB-15SE-N-UNV-L930.

### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2304-001-2  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 05/31/2023  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: METALUX  
 Catalog Number: **OHB-15SE-N-UNV-L930**  
 Description: 15SE OHB WITH APT LEDS, NARROW LENS, 90CRI 3000K

### Spectral Parameters

|                           |         |           |      |      |      |
|---------------------------|---------|-----------|------|------|------|
| CCT (K):                  | 3051    | CRI (Ra): | 92.2 |      |      |
| CIE u':                   | 0.2497  | R1:       | 92.8 | R9:  | 60.2 |
| CIE v':                   | 0.5166  | R2:       | 95.6 | R10: | 88.6 |
| Duv:                      | -0.0027 | R3:       | 96.4 | R11: | 92.7 |
| CIE x:                    | 0.4295  | R4:       | 92.2 | R12: | 82.3 |
| CIE y:                    | 0.3950  | R5:       | 92.5 | R13: | 93.6 |
| CIE z:                    | 0.1755  | R6:       | 94.0 | R14: | 97.4 |
| Peak Wavelength (nm):     | 621     | R7:       | 91.7 |      |      |
| Dominant Wavelength (nm): | 583     | R8:       | 82.4 |      |      |
| Purity:                   | 47.8    |           |      |      |      |
| Rf:                       | 90.7    |           |      |      |      |
| Rg:                       | 101.5   |           |      |      |      |



### Test Conditions

Stabilization Time: 22M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.2/44%  
 Sphere Temperature (°C): 25.3

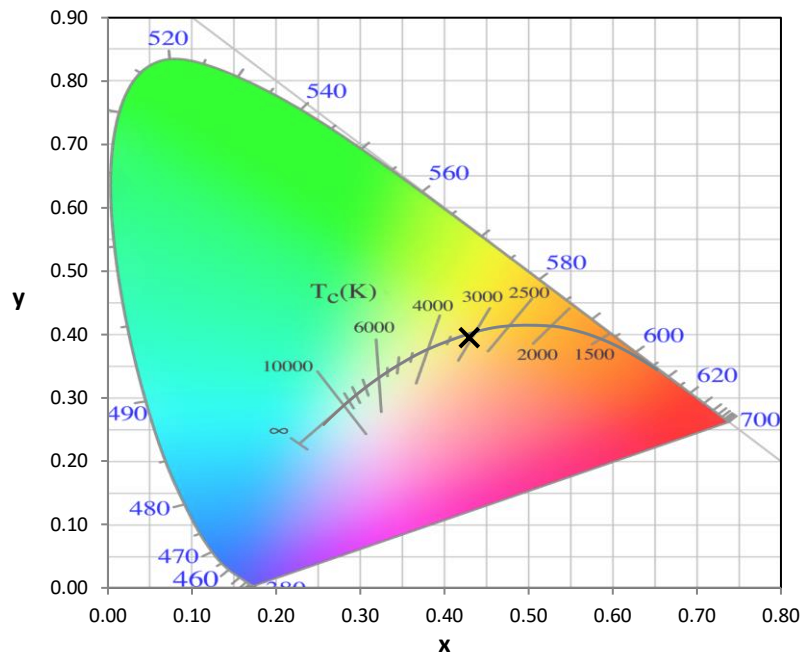


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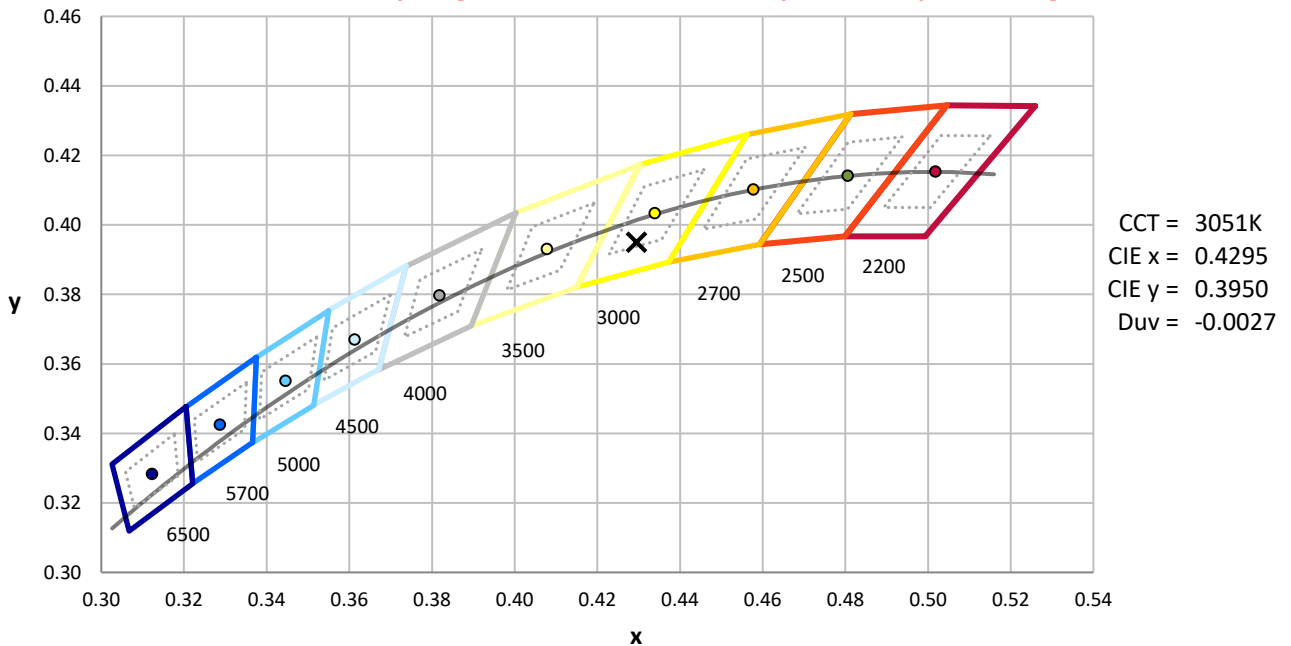
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date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



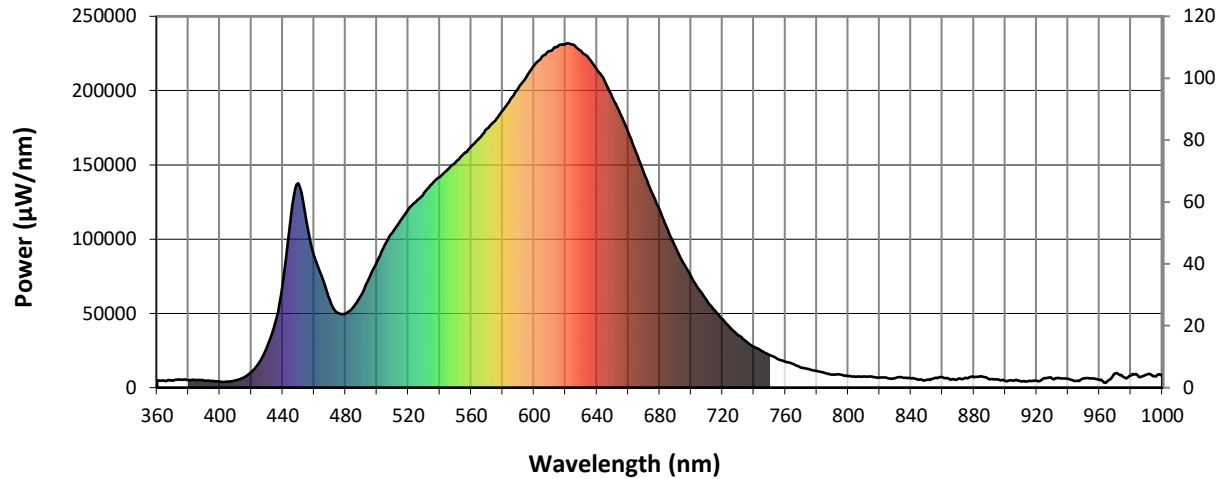
CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 3000K 4-step quadrangle

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**Photopic Flux vs. Wavelength**

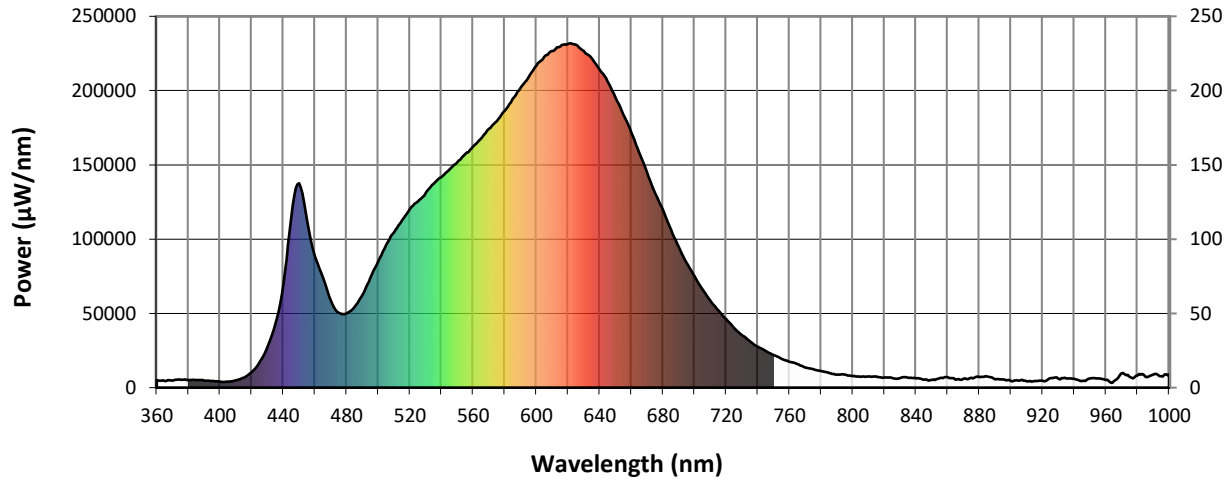


#####

| 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       | 5142             | NR               | 490       | 62439            | NR               | 620       | 231386           | NR               | 750       | 21976            | NR               | 880       | 7157             | NR               |
| 365       | 4540             | NR               | 495       | 73651            | NR               | 625       | 230941           | NR               | 755       | 19435            | NR               | 885       | 7445             | NR               |
| 370       | 4803             | NR               | 500       | 84837            | NR               | 630       | 226625           | NR               | 760       | 17457            | NR               | 890       | 5651             | NR               |
| 375       | 5429             | NR               | 505       | 96138            | NR               | 635       | 221573           | NR               | 765       | 15928            | NR               | 895       | 5663             | NR               |
| 380       | 5059             | NR               | 510       | 104675           | NR               | 640       | 214183           | NR               | 770       | 13612            | NR               | 900       | 4391             | NR               |
| 385       | 5164             | NR               | 515       | 112374           | NR               | 645       | 206197           | NR               | 775       | 12383            | NR               | 905       | 4718             | NR               |
| 390       | 4787             | NR               | 520       | 120074           | NR               | 650       | 195149           | NR               | 780       | 11099            | NR               | 910       | 4205             | NR               |
| 395       | 4429             | NR               | 525       | 125393           | NR               | 655       | 184048           | NR               | 785       | 9818             | NR               | 915       | 4466             | NR               |
| 400       | 3966             | NR               | 530       | 131080           | NR               | 660       | 171890           | NR               | 790       | 8853             | NR               | 920       | 4608             | NR               |
| 405       | 4026             | NR               | 535       | 137166           | NR               | 665       | 158117           | NR               | 795       | 8815             | NR               | 925       | 6506             | NR               |
| 410       | 4947             | NR               | 540       | 141770           | NR               | 670       | 144601           | NR               | 800       | 7747             | NR               | 930       | 6091             | NR               |
| 415       | 6735             | NR               | 545       | 146789           | NR               | 675       | 131155           | NR               | 805       | 7317             | NR               | 935       | 6242             | NR               |
| 420       | 10542            | NR               | 550       | 151664           | NR               | 680       | 119765           | NR               | 810       | 7417             | NR               | 940       | 5908             | NR               |
| 425       | 16995            | NR               | 555       | 157152           | NR               | 685       | 106544           | NR               | 815       | 7400             | NR               | 945       | 4377             | NR               |
| 430       | 27239            | NR               | 560       | 162379           | NR               | 690       | 94952            | NR               | 820       | 6832             | NR               | 950       | 6170             | NR               |
| 435       | 43016            | NR               | 565       | 167867           | NR               | 695       | 83928            | NR               | 825       | 6514             | NR               | 955       | 6143             | NR               |
| 440       | 69527            | NR               | 570       | 174214           | NR               | 700       | 74959            | NR               | 830       | 6419             | NR               | 960       | 5227             | NR               |
| 445       | 113795           | NR               | 575       | 179459           | NR               | 705       | 66186            | NR               | 835       | 6702             | NR               | 965       | 4363             | NR               |
| 450       | 137556           | NR               | 580       | 186493           | NR               | 710       | 58632            | NR               | 840       | 6224             | NR               | 970       | 9654             | NR               |
| 455       | 112457           | NR               | 585       | 194218           | NR               | 715       | 52023            | NR               | 845       | 5410             | NR               | 975       | 7378             | NR               |
| 460       | 88709            | NR               | 590       | 201759           | NR               | 720       | 46022            | NR               | 850       | 5183             | NR               | 980       | 8170             | NR               |
| 465       | 74548            | NR               | 595       | 208902           | NR               | 725       | 40235            | NR               | 855       | 6469             | NR               | 985       | 7350             | NR               |
| 470       | 58681            | NR               | 600       | 217002           | NR               | 730       | 35330            | NR               | 860       | 7161             | NR               | 990       | 8712             | NR               |
| 475       | 50369            | NR               | 605       | 222691           | NR               | 735       | 31141            | NR               | 865       | 5351             | NR               | 995       | 7670             | NR               |
| 480       | 50005            | NR               | 610       | 226497           | NR               | 740       | 27444            | NR               | 870       | 5943             | NR               | 1000      | 8916             | NR               |
| 485       | 54326            | NR               | 615       | 229506           | NR               | 745       | 24768            | NR               | 875       | 6650             | NR               |           |                  |                  |

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Scotopic Flux vs. Wavelength



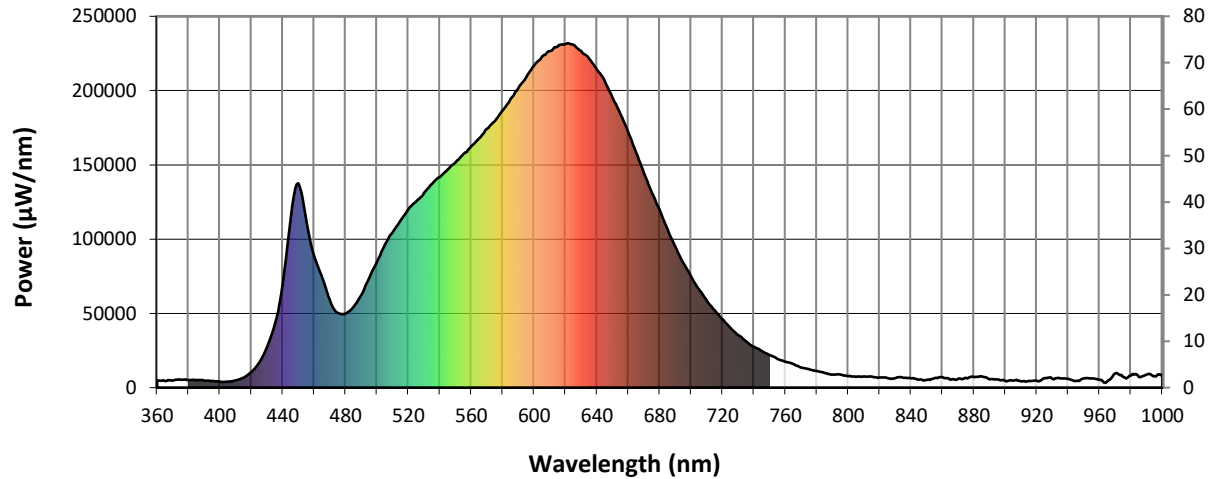
Scotopic Lumens: 16819.9

S/P: 1.43

| 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       | 5142             | NR               | 490       | 62439            | NR               | 620       | 231386           | NR               | 750       | 21976            | NR               | 880       | 7157             | NR               |
| 365       | 4540             | NR               | 495       | 73651            | NR               | 625       | 230941           | NR               | 755       | 19435            | NR               | 885       | 7445             | NR               |
| 370       | 4803             | NR               | 500       | 84837            | NR               | 630       | 226625           | NR               | 760       | 17457            | NR               | 890       | 5651             | NR               |
| 375       | 5429             | NR               | 505       | 96138            | NR               | 635       | 221573           | NR               | 765       | 15928            | NR               | 895       | 5663             | NR               |
| 380       | 5059             | NR               | 510       | 104675           | NR               | 640       | 214183           | NR               | 770       | 13612            | NR               | 900       | 4391             | NR               |
| 385       | 5164             | NR               | 515       | 112374           | NR               | 645       | 206197           | NR               | 775       | 12383            | NR               | 905       | 4718             | NR               |
| 390       | 4787             | NR               | 520       | 120074           | NR               | 650       | 195149           | NR               | 780       | 11099            | NR               | 910       | 4205             | NR               |
| 395       | 4429             | NR               | 525       | 125393           | NR               | 655       | 184048           | NR               | 785       | 9818             | NR               | 915       | 4466             | NR               |
| 400       | 3966             | NR               | 530       | 131080           | NR               | 660       | 171890           | NR               | 790       | 8853             | NR               | 920       | 4608             | NR               |
| 405       | 4026             | NR               | 535       | 137166           | NR               | 665       | 158117           | NR               | 795       | 8815             | NR               | 925       | 6506             | NR               |
| 410       | 4947             | NR               | 540       | 141770           | NR               | 670       | 144601           | NR               | 800       | 7747             | NR               | 930       | 6091             | NR               |
| 415       | 6735             | NR               | 545       | 146789           | NR               | 675       | 131155           | NR               | 805       | 7317             | NR               | 935       | 6242             | NR               |
| 420       | 10542            | NR               | 550       | 151664           | NR               | 680       | 119765           | NR               | 810       | 7417             | NR               | 940       | 5908             | NR               |
| 425       | 16995            | NR               | 555       | 157152           | NR               | 685       | 106544           | NR               | 815       | 7400             | NR               | 945       | 4377             | NR               |
| 430       | 27239            | NR               | 560       | 162379           | NR               | 690       | 94952            | NR               | 820       | 6832             | NR               | 950       | 6170             | NR               |
| 435       | 43016            | NR               | 565       | 167867           | NR               | 695       | 83928            | NR               | 825       | 6514             | NR               | 955       | 6143             | NR               |
| 440       | 69527            | NR               | 570       | 174214           | NR               | 700       | 74959            | NR               | 830       | 6419             | NR               | 960       | 5227             | NR               |
| 445       | 113795           | NR               | 575       | 179459           | NR               | 705       | 66186            | NR               | 835       | 6702             | NR               | 965       | 4363             | NR               |
| 450       | 137556           | NR               | 580       | 186493           | NR               | 710       | 58632            | NR               | 840       | 6224             | NR               | 970       | 9654             | NR               |
| 455       | 112457           | NR               | 585       | 194218           | NR               | 715       | 52023            | NR               | 845       | 5410             | NR               | 975       | 7378             | NR               |
| 460       | 88709            | NR               | 590       | 201759           | NR               | 720       | 46022            | NR               | 850       | 5183             | NR               | 980       | 8170             | NR               |
| 465       | 74548            | NR               | 595       | 208902           | NR               | 725       | 40235            | NR               | 855       | 6469             | NR               | 985       | 7350             | NR               |
| 470       | 58681            | NR               | 600       | 217002           | NR               | 730       | 35330            | NR               | 860       | 7161             | NR               | 990       | 8712             | NR               |
| 475       | 50369            | NR               | 605       | 222691           | NR               | 735       | 31141            | NR               | 865       | 5351             | NR               | 995       | 7670             | NR               |
| 480       | 50005            | NR               | 610       | 226497           | NR               | 740       | 27444            | NR               | 870       | 5943             | NR               | 1000      | 8916             | NR               |
| 485       | 54326            | NR               | 615       | 229506           | NR               | 745       | 24768            | NR               | 875       | 6650             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 6505.3 M/P: 0.55**

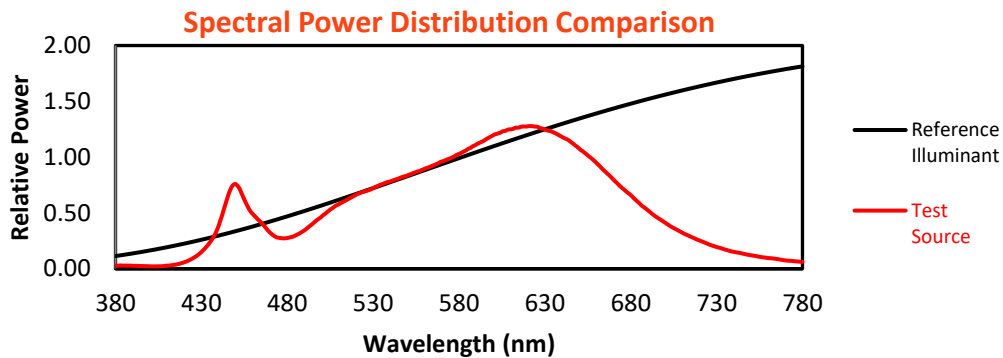
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 5142             | NR               | 490       | 62439            | NR               | 620       | 231386           | NR               | 750       | 21976            | NR               | 880       | 7157             | NR               |
| 365       | 4540             | NR               | 495       | 73651            | NR               | 625       | 230941           | NR               | 755       | 19435            | NR               | 885       | 7445             | NR               |
| 370       | 4803             | NR               | 500       | 84837            | NR               | 630       | 226625           | NR               | 760       | 17457            | NR               | 890       | 5651             | NR               |
| 375       | 5429             | NR               | 505       | 96138            | NR               | 635       | 221573           | NR               | 765       | 15928            | NR               | 895       | 5663             | NR               |
| 380       | 5059             | NR               | 510       | 104675           | NR               | 640       | 214183           | NR               | 770       | 13612            | NR               | 900       | 4391             | NR               |
| 385       | 5164             | NR               | 515       | 112374           | NR               | 645       | 206197           | NR               | 775       | 12383            | NR               | 905       | 4718             | NR               |
| 390       | 4787             | NR               | 520       | 120074           | NR               | 650       | 195149           | NR               | 780       | 11099            | NR               | 910       | 4205             | NR               |
| 395       | 4429             | NR               | 525       | 125393           | NR               | 655       | 184048           | NR               | 785       | 9818             | NR               | 915       | 4466             | NR               |
| 400       | 3966             | NR               | 530       | 131080           | NR               | 660       | 171890           | NR               | 790       | 8853             | NR               | 920       | 4608             | NR               |
| 405       | 4026             | NR               | 535       | 137166           | NR               | 665       | 158117           | NR               | 795       | 8815             | NR               | 925       | 6506             | NR               |
| 410       | 4947             | NR               | 540       | 141770           | NR               | 670       | 144601           | NR               | 800       | 7747             | NR               | 930       | 6091             | NR               |
| 415       | 6735             | NR               | 545       | 146789           | NR               | 675       | 131155           | NR               | 805       | 7317             | NR               | 935       | 6242             | NR               |
| 420       | 10542            | NR               | 550       | 151664           | NR               | 680       | 119765           | NR               | 810       | 7417             | NR               | 940       | 5908             | NR               |
| 425       | 16995            | NR               | 555       | 157152           | NR               | 685       | 106544           | NR               | 815       | 7400             | NR               | 945       | 4377             | NR               |
| 430       | 27239            | NR               | 560       | 162379           | NR               | 690       | 94952            | NR               | 820       | 6832             | NR               | 950       | 6170             | NR               |
| 435       | 43016            | NR               | 565       | 167867           | NR               | 695       | 83928            | NR               | 825       | 6514             | NR               | 955       | 6143             | NR               |
| 440       | 69527            | NR               | 570       | 174214           | NR               | 700       | 74959            | NR               | 830       | 6419             | NR               | 960       | 5227             | NR               |
| 445       | 113795           | NR               | 575       | 179459           | NR               | 705       | 66186            | NR               | 835       | 6702             | NR               | 965       | 4363             | NR               |
| 450       | 137556           | NR               | 580       | 186493           | NR               | 710       | 58632            | NR               | 840       | 6224             | NR               | 970       | 9654             | NR               |
| 455       | 112457           | NR               | 585       | 194218           | NR               | 715       | 52023            | NR               | 845       | 5410             | NR               | 975       | 7378             | NR               |
| 460       | 88709            | NR               | 590       | 201759           | NR               | 720       | 46022            | NR               | 850       | 5183             | NR               | 980       | 8170             | NR               |
| 465       | 74548            | NR               | 595       | 208902           | NR               | 725       | 40235            | NR               | 855       | 6469             | NR               | 985       | 7350             | NR               |
| 470       | 58681            | NR               | 600       | 217002           | NR               | 730       | 35330            | NR               | 860       | 7161             | NR               | 990       | 8712             | NR               |
| 475       | 50369            | NR               | 605       | 222691           | NR               | 735       | 31141            | NR               | 865       | 5351             | NR               | 995       | 7670             | NR               |
| 480       | 50005            | NR               | 610       | 226497           | NR               | 740       | 27444            | NR               | 870       | 5943             | NR               | 1000      | 8916             | NR               |
| 485       | 54326            | NR               | 615       | 229506           | NR               | 745       | 24768            | NR               | 875       | 6650             | NR               |           |                  |                  |

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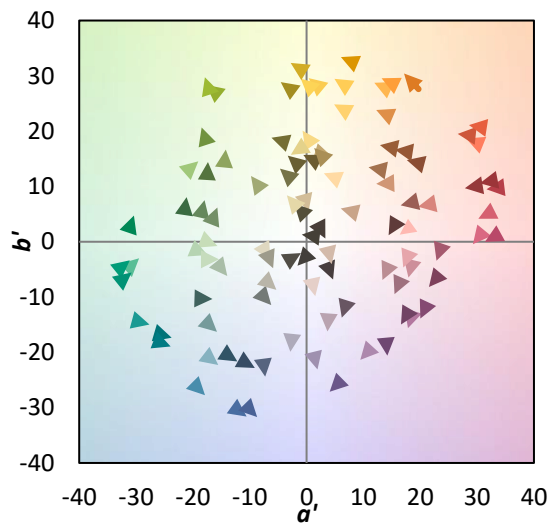
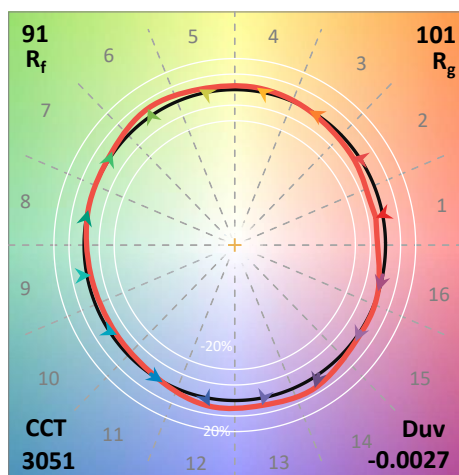
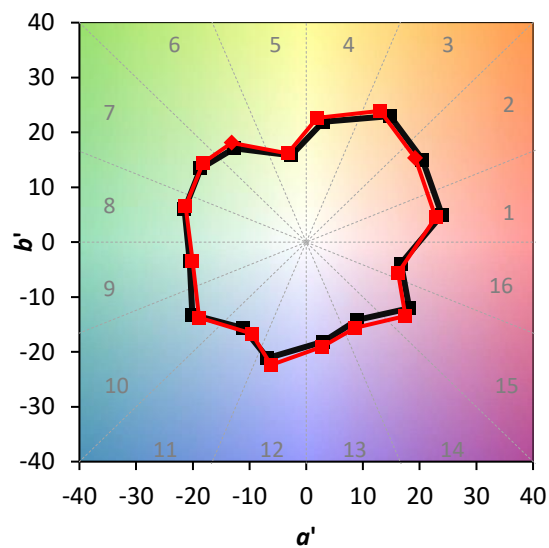
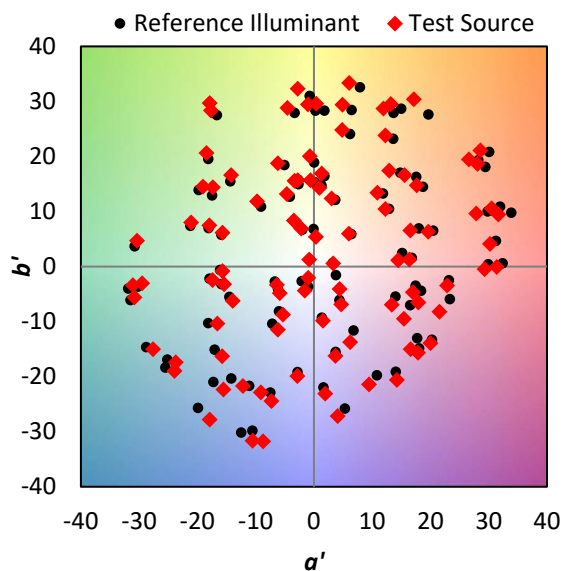
**TM-30-18**

**Summary**

$R_f = 90.7$   
 $R_g = 101.5$   
 CIE  $R_a = 92.2$   
 $R_9 = 60.2$



**Color Vector Graphics**

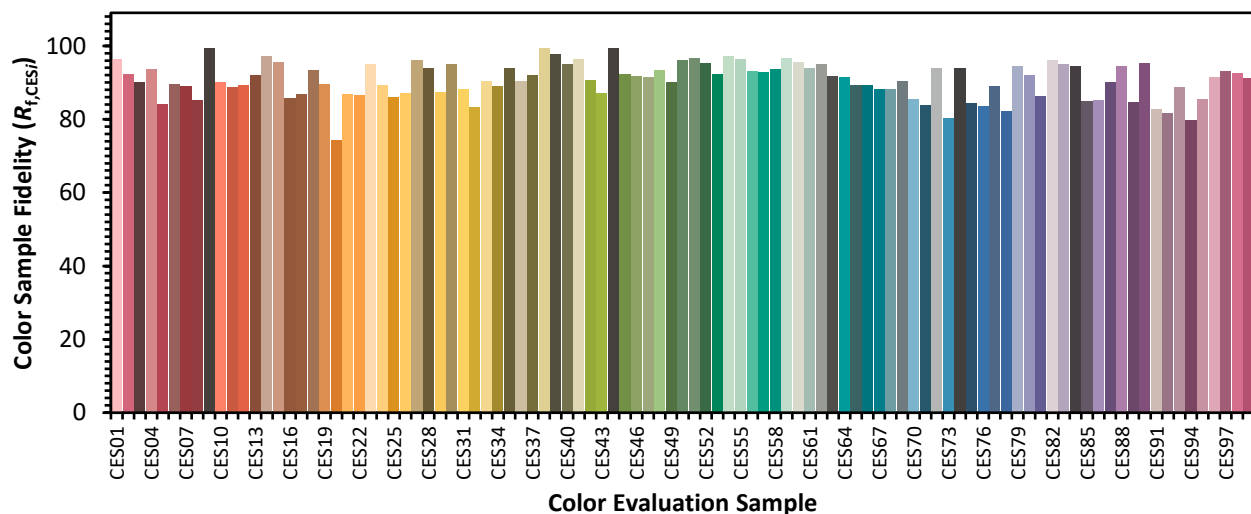


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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

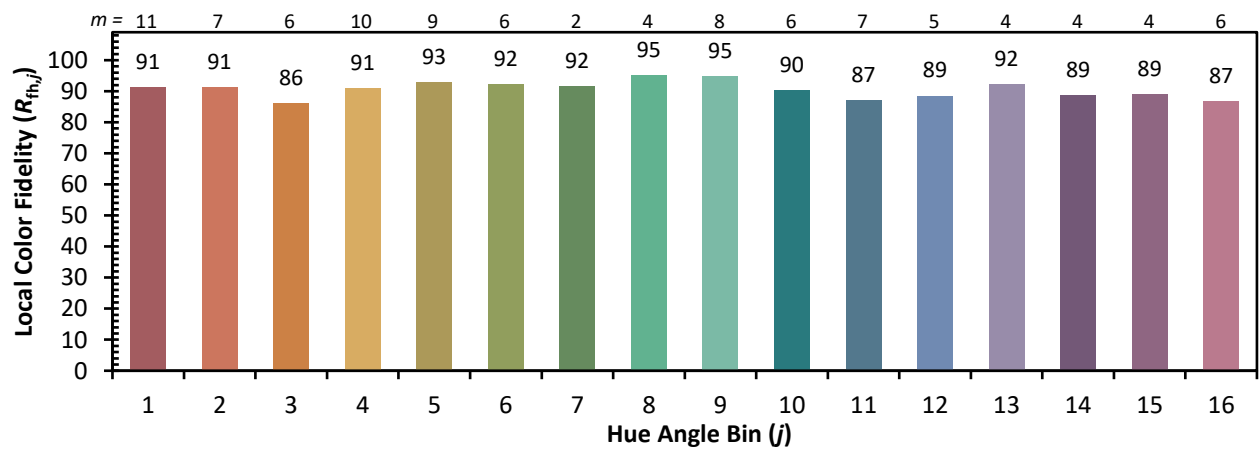
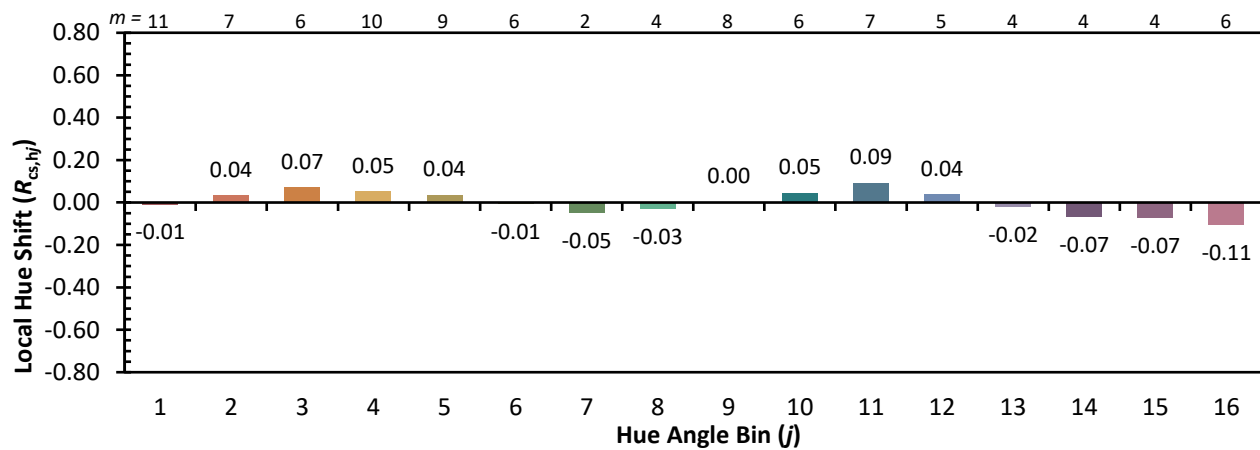
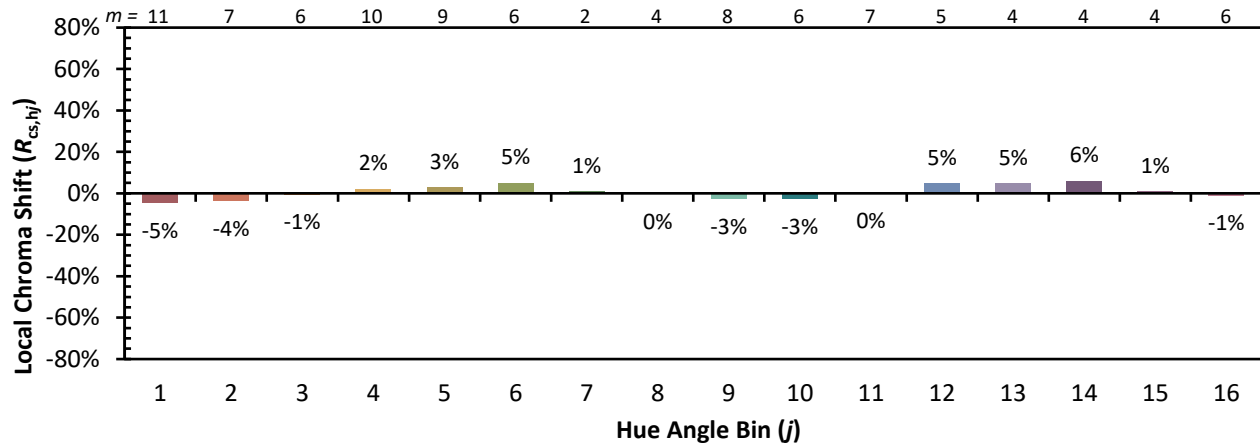
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|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 87 | CES51 = 97 | CES76 = 83 |
| CES02 = 63 | CES27 = 96 | CES52 = 95 | CES77 = 89 |
| CES03 = 32 | CES28 = 94 | CES53 = 92 | CES78 = 82 |
| CES04 = 70 | CES29 = 87 | CES54 = 97 | CES79 = 94 |
| CES05 = 51 | CES30 = 95 | CES55 = 96 | CES80 = 92 |
| CES06 = 51 | CES31 = 88 | CES56 = 93 | CES81 = 86 |
| CES07 = 43 | CES32 = 83 | CES57 = 93 | CES82 = 96 |
| CES08 = 42 | CES33 = 90 | CES58 = 94 | CES83 = 95 |
| CES09 = 29 | CES34 = 89 | CES59 = 97 | CES84 = 95 |
| CES10 = 76 | CES35 = 94 | CES60 = 96 | CES85 = 85 |
| CES11 = 59 | CES36 = 90 | CES61 = 94 | CES86 = 85 |
| CES12 = 65 | CES37 = 92 | CES62 = 95 | CES87 = 90 |
| CES13 = 44 | CES38 = 99 | CES63 = 92 | CES88 = 95 |
| CES14 = 74 | CES39 = 98 | CES64 = 91 | CES89 = 85 |
| CES15 = 72 | CES40 = 95 | CES65 = 89 | CES90 = 95 |
| CES16 = 48 | CES41 = 96 | CES66 = 89 | CES91 = 83 |
| CES17 = 50 | CES42 = 91 | CES67 = 88 | CES92 = 82 |
| CES18 = 57 | CES43 = 87 | CES68 = 88 | CES93 = 89 |
| CES19 = 72 | CES44 = 99 | CES69 = 90 | CES94 = 80 |
| CES20 = 67 | CES45 = 92 | CES70 = 85 | CES95 = 85 |
| CES21 = 86 | CES46 = 92 | CES71 = 84 | CES96 = 91 |
| CES22 = 79 | CES47 = 91 | CES72 = 94 | CES97 = 93 |
| CES23 = 92 | CES48 = 93 | CES73 = 80 | CES98 = 93 |
| CES24 = 91 | CES49 = 90 | CES74 = 94 | CES99 = 91 |
| CES25 = 72 | CES50 = 96 | CES75 = 84 |            |



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**Color Rendition by Hue-Angle Bin**

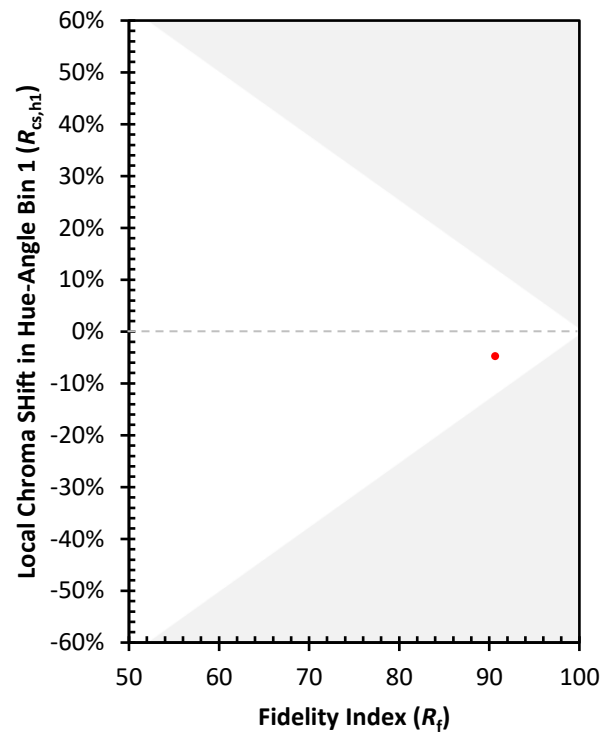
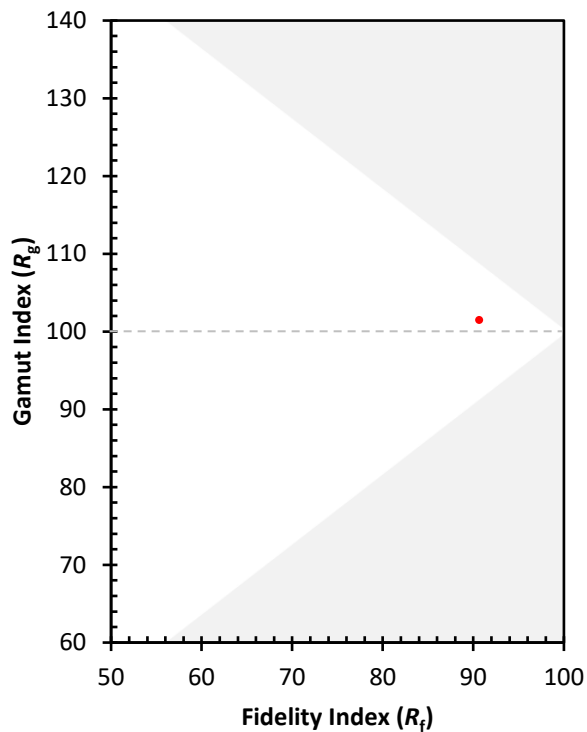




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**Measure Comparisons**



(END OF REPORT)