

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: P826563

Luminaire Tested: **OHBL-30HE-A-UNV-L830-CD-UPL15**

Issue Date: 5/3/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P826563  
REPORT IS A COMBINATION OF REPORTS P826119 AND G3-2310-221-10  
Test Lab: INNOVATION CENTER  
Issue Date: 5/3/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: METALUX  
Catalog Number: OHBL-30HE-A-UNV-L830-CD-UPL15  
Description:  
Light Source: -  
Ballast/Driver: -

**Summary**

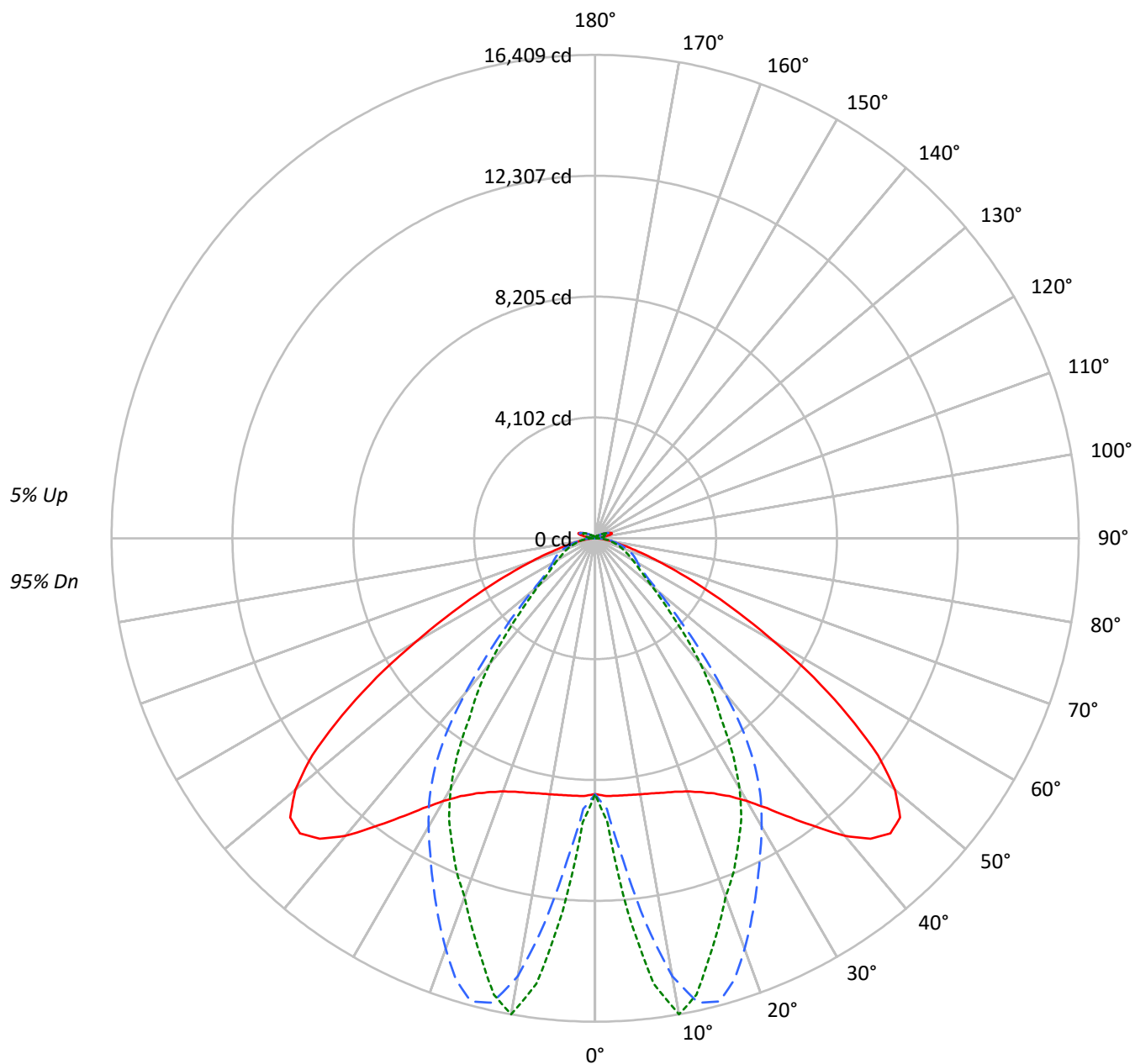
Lumens per Lamp: N/A  
Luminaire Lumens: 29278.3 lumens  
Efficiency: N/A  
Efficacy: 168.2 lumens/watt  
Spacing Criteria (0/90/45): 2.18 / 1.37 / 1.3  
Luminous Opening: Rectangular w/ Sides (W: 3.78' x L: 1.8' x H: 0.17')  
CIE Type: Direct

Input Watts (W): 174.1  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

TEST NUMBER: P826563

CATALOG NUMBER: OHBL-30HE-A-UNV-L830-CD-UPL15

### Luminous Intensity Polar Plot





TEST NUMBER: P826563

CATALOG NUMBER: OHBL-30HE-A-UNV-L830-CD-UPL15

**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   | 118 | 118 | 118 | 118 | 115 | 115 | 115 | 115 | 108 | 108 | 108 | 103 | 103 | 103 | 98 | 98 | 98 | 95 |    |    |
| 1   | 109 | 105 | 102 | 99  | 106 | 103 | 100 | 97  | 98  | 95  | 93  | 93  | 91  | 89  | 89 | 87 | 86 | 83 |    |    |
| 2   | 101 | 94  | 88  | 84  | 98  | 92  | 87  | 82  | 88  | 83  | 80  | 84  | 80  | 77  | 80 | 77 | 75 | 73 |    |    |
| 3   | 94  | 85  | 78  | 72  | 91  | 83  | 76  | 71  | 79  | 74  | 69  | 76  | 71  | 68  | 73 | 69 | 66 | 64 |    |    |
| 4   | 87  | 76  | 69  | 63  | 84  | 75  | 68  | 62  | 72  | 66  | 61  | 69  | 64  | 60  | 66 | 62 | 58 | 56 |    |    |
| 5   | 81  | 69  | 61  | 56  | 78  | 68  | 61  | 55  | 65  | 59  | 54  | 63  | 57  | 53  | 61 | 56 | 52 | 50 |    |    |
| 6   | 75  | 63  | 55  | 49  | 73  | 62  | 54  | 49  | 60  | 53  | 48  | 58  | 52  | 48  | 56 | 51 | 47 | 45 |    |    |
| 7   | 70  | 58  | 50  | 44  | 68  | 57  | 49  | 44  | 55  | 48  | 43  | 53  | 47  | 43  | 51 | 46 | 42 | 40 |    |    |
| 8   | 65  | 53  | 45  | 40  | 64  | 52  | 45  | 40  | 51  | 44  | 39  | 49  | 43  | 39  | 48 | 42 | 38 | 37 |    |    |
| 9   | 61  | 49  | 42  | 37  | 60  | 48  | 41  | 36  | 47  | 40  | 36  | 46  | 40  | 36  | 44 | 39 | 35 | 33 |    |    |
| 10  | 58  | 46  | 38  | 33  | 56  | 45  | 38  | 33  | 44  | 37  | 33  | 42  | 37  | 33  | 41 | 36 | 32 | 31 |    |    |

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

|     | 0°    | 45°   | 90°   |
|-----|-------|-------|-------|
| 0°  | 13733 | 13733 | 13733 |
| 5°  | 13811 | 17280 | 20130 |
| 10° | 13943 | 23834 | 26147 |
| 15° | 14285 | 25976 | 23999 |
| 20° | 14885 | 24113 | 21447 |
| 25° | 15982 | 21696 | 19618 |
| 30° | 17835 | 19546 | 17445 |
| 35° | 20984 | 17118 | 13901 |
| 40° | 25253 | 13044 | 11063 |
| 45° | 28997 | 8893  | 7874  |
| 50° | 29431 | 6105  | 5824  |
| 55° | 25510 | 4809  | 4758  |
| 60° | 19088 | 4505  | 4281  |
| 65° | 13112 | 4527  | 4055  |
| 70° | 8408  | 4375  | 3927  |
| 75° | 5078  | 4062  | 3757  |
| 80° | 3008  | 3585  | 3877  |
| 85° | 1468  | 3107  | 3594  |



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**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 1133.6  | 3.9       |
| 10°-20°   | 4001.1  | 13.7      |
| 20°-30°   | 5895.8  | 20.1      |
| 30°-40°   | 6195.6  | 21.2      |
| 40°-50°   | 4740.8  | 16.2      |
| 50°-60°   | 2862.7  | 9.8       |
| 60°-70°   | 1746.9  | 6.0       |
| 70°-80°   | 953.5   | 3.3       |
| 80°-90°   | 338.3   | 1.2       |
| 90°-100°  | 135.5   | 0.5       |
| 100°-110° | 469.5   | 1.6       |
| 110°-120° | 403.5   | 1.4       |
| 120°-130° | 193.6   | 0.7       |
| 130°-140° | 96.8    | 0.3       |
| 140°-150° | 56.2    | 0.2       |
| 150°-160° | 32.8    | 0.1       |
| 160°-170° | 17.0    | 0.1       |
| 170°-180° | 5.2     | 0.0       |
| 0°-30°    | 11030.5 | 37.7      |
| 0°-40°    | 17226.1 | 58.8      |
| 0°-60°    | 24829.5 | 84.8      |
| 0°-90°    | 27868.2 | 95.2      |
| 90°-120°  | 1008.5  | 3.4       |
| 90°-150°  | 1355.2  | 4.6       |
| 90°-180°  | 1410.0  | 4.8       |
| 0°-180°   | 29278.3 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°    | 22.5° | 45°   | 67.5° | 90°   | Flux  |
|------|-------|-------|-------|-------|-------|-------|
| 0°   | 8683  | 8683  | 8683  | 8683  | 8683  |       |
| 5°   | 8770  | 9409  | 10977 | 12256 | 12729 | 839   |
| 15°  | 8941  | 13926 | 16276 | 15188 | 14831 | 2542  |
| 25°  | 9555  | 16163 | 12994 | 11764 | 11474 | 4465  |
| 35°  | 11574 | 12944 | 9466  | 7884  | 7423  | 7342  |
| 45°  | 14166 | 7386  | 4361  | 3837  | 3676  | 10703 |
| 55°  | 10476 | 2504  | 1985  | 1840  | 1834  | 9257  |
| 65°  | 4200  | 1586  | 1460  | 1250  | 1186  | 4303  |
| 75°  | 1118  | 986   | 904   | 746   | 716   | 1287  |
| 85°  | 166   | 306   | 360   | 328   | 298   | 206   |
| 90°  | 3     | 20    | 27    | 35    | 40    | 11    |
| 95°  | 26    | 67    | 100   | 132   | 154   | 93    |
| 105° | 589   | 581   | 495   | 350   | 321   | 558   |
| 115° | 406   | 406   | 409   | 408   | 399   | 410   |
| 125° | 196   | 208   | 213   | 211   | 210   | 186   |
| 135° | 116   | 120   | 123   | 125   | 126   | 92    |
| 145° | 85    | 86    | 88    | 90    | 90    | 54    |
| 155° | 68    | 69    | 71    | 71    | 72    | 32    |
| 165° | 59    | 59    | 60    | 60    | 60    | 17    |
| 175° | 53    | 53    | 53    | 54    | 54    | 5     |
| 180° | 53    | 53    | 53    | 53    | 53    |       |



TEST NUMBER: P826563

CATALOG NUMBER: OHBL-30HE-A-UNV-L830-CD-UPL15

**CANDELA DISTRIBUTION (FULL):**

|        | 0°      | 22.5°   | 45°     | 67.5°   | 90°     |
|--------|---------|---------|---------|---------|---------|
| 0°     | 8683.4  | 8683.4  | 8683.4  | 8683.4  | 8683.4  |
| 2.5°   | 8754.5  | 8843.8  | 9196.1  | 9561.7  | 9650.7  |
| 5°     | 8770.5  | 9409.4  | 10976.7 | 12256.4 | 12729.3 |
| 7.5°   | 8789.1  | 10325.8 | 13182.9 | 14749.8 | 15251.3 |
| 10°    | 8824.5  | 11484.5 | 15094.5 | 16219.5 | 16409.0 |
| 12.5°  | 8868.4  | 12712.2 | 16146.5 | 16105.5 | 15866.4 |
| 15°    | 8941.4  | 13926.5 | 16276.1 | 15188.1 | 14830.9 |
| 17.5°  | 9018.1  | 14953.8 | 15710.8 | 14189.4 | 13878.5 |
| 20°    | 9142.8  | 15716.4 | 14831.7 | 13301.7 | 12948.3 |
| 22.5°  | 9322.7  | 16135.7 | 13909.8 | 12498.8 | 12268.4 |
| 25°    | 9554.7  | 16162.9 | 12994.1 | 11764.3 | 11473.8 |
| 27.5°  | 9865.6  | 15787.9 | 12116.5 | 11044.5 | 10737.7 |
| 30°    | 10288.6 | 15070.0 | 11301.0 | 10176.5 | 9796.0  |
| 32.5°  | 10863.1 | 14036.7 | 10460.3 | 9128.7  | 8702.0  |
| 35°    | 11573.6 | 12943.5 | 9466.4  | 7883.6  | 7422.6  |
| 37.5°  | 12348.8 | 11729.6 | 8260.4  | 6781.0  | 6512.5  |
| 40°    | 13182.9 | 10478.9 | 6830.8  | 5749.2  | 5557.1  |
| 42.5°  | 13833.8 | 9119.0  | 5503.0  | 4777.8  | 4573.3  |
| 45°    | 14165.6 | 7385.7  | 4360.7  | 3837.1  | 3675.9  |
| 47.5°  | 14036.3 | 5733.2  | 3456.9  | 3048.9  | 3000.5  |
| 50°    | 13282.3 | 4233.3  | 2767.4  | 2511.6  | 2491.5  |
| 52.5°  | 12103.5 | 3155.3  | 2285.9  | 2127.6  | 2093.0  |
| 55°    | 10475.9 | 2504.5  | 1985.1  | 1839.8  | 1834.2  |
| 57.5°  | 8795.4  | 2127.6  | 1801.8  | 1689.4  | 1650.2  |
| 60°    | 7002.9  | 1897.1  | 1662.9  | 1536.0  | 1456.7  |
| 62.5°  | 5489.3  | 1736.0  | 1560.9  | 1388.5  | 1314.4  |
| 65°    | 4199.8  | 1585.5  | 1460.4  | 1249.6  | 1186.0  |
| 67.5°  | 3130.8  | 1442.2  | 1337.5  | 1103.6  | 1066.4  |
| 70°    | 2281.1  | 1295.1  | 1197.5  | 981.6   | 952.1   |
| 72.5°  | 1625.7  | 1148.3  | 1057.5  | 866.8   | 834.4   |
| 75°    | 1118.2  | 986.0   | 904.5   | 746.2   | 716.1   |
| 77.5°  | 754.4   | 820.3   | 753.7   | 637.1   | 624.4   |
| 80°    | 503.8   | 650.6   | 609.5   | 539.9   | 532.1   |
| 82.5°  | 305.7   | 472.2   | 481.1   | 439.0   | 417.8   |
| 85°    | 166.5   | 305.7   | 360.4   | 328.4   | 297.9   |
| 87.5°  | 65.1    | 169.5   | 248.4   | 223.1   | 210.0   |
| 90°    | 2.8     | 20.5    | 27.0    | 35.4    | 40.0    |
| 92.5°  | 9.3     | 26.1    | 42.8    | 59.6    | 68.9    |
| 95°    | 26.1    | 67.0    | 99.6    | 132.1   | 153.5   |
| 97.5°  | 154.5   | 174.0   | 189.8   | 218.7   | 235.4   |
| 100°   | 313.6   | 338.7   | 278.2   | 292.2   | 298.7   |
| 102.5° | 504.4   | 487.6   | 360.1   | 323.8   | 318.2   |
| 105°   | 589.0   | 580.7   | 495.1   | 349.9   | 321.0   |



TEST NUMBER: P826563

CATALOG NUMBER: OHBL-30HE-A-UNV-L830-CD-UPL15

**CANDELA DISTRIBUTION (continued):**

|        | 0°    | 22.5° | 45°   | 67.5° | 90°   |
|--------|-------|-------|-------|-------|-------|
| 112.5° | 473.7 | 480.2 | 471.8 | 455.0 | 438.3 |
| 115°   | 405.7 | 405.7 | 409.4 | 407.6 | 399.2 |
| 117.5° | 348.0 | 346.2 | 349.9 | 348.0 | 346.2 |
| 120°   | 290.3 | 294.1 | 295.0 | 293.1 | 292.2 |
| 122.5° | 240.1 | 247.5 | 252.2 | 249.4 | 248.5 |
| 125°   | 196.3 | 207.5 | 213.1 | 211.2 | 210.3 |
| 127.5° | 167.5 | 174.0 | 181.5 | 181.5 | 179.6 |
| 130°   | 145.2 | 149.8 | 155.4 | 156.3 | 156.3 |
| 132.5° | 129.3 | 133.1 | 137.7 | 138.7 | 139.6 |
| 135°   | 116.3 | 120.0 | 122.8 | 124.7 | 125.6 |
| 137.5° | 107.0 | 108.9 | 112.6 | 113.5 | 114.5 |
| 140°   | 97.7  | 100.5 | 103.3 | 104.2 | 105.2 |
| 142.5° | 91.2  | 93.1  | 94.9  | 96.8  | 96.8  |
| 145°   | 84.7  | 86.5  | 88.4  | 90.3  | 90.3  |
| 147.5° | 80.0  | 81.9  | 83.8  | 83.8  | 84.7  |
| 150°   | 75.4  | 77.2  | 78.2  | 79.1  | 79.1  |
| 152.5° | 71.7  | 72.6  | 74.4  | 74.4  | 75.4  |
| 155°   | 67.9  | 68.9  | 70.7  | 70.7  | 71.7  |
| 157.5° | 65.1  | 66.1  | 67.0  | 67.9  | 67.9  |
| 160°   | 62.3  | 63.3  | 64.2  | 64.2  | 65.1  |
| 162.5° | 60.5  | 61.4  | 61.4  | 62.3  | 62.3  |
| 165°   | 58.6  | 58.6  | 59.6  | 59.6  | 59.6  |
| 167.5° | 56.8  | 56.8  | 57.7  | 57.7  | 58.6  |
| 170°   | 54.9  | 55.8  | 55.8  | 55.8  | 56.8  |
| 172.5° | 54.0  | 54.0  | 54.9  | 54.9  | 54.9  |
| 175°   | 53.0  | 53.0  | 53.0  | 54.0  | 54.0  |
| 177.5° | 52.1  | 53.0  | 53.0  | 53.0  | 53.0  |
| 180°   | 53.0  | 53.0  | 53.0  | 53.0  | 53.0  |



Report Generated By 670246072 / DESKTOP-50001EG





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







|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| 107.5° | 589.0 | 590.0 | 546.2 | 420.6 | 352.7 |
| 110°   | 543.4 | 548.1 | 523.9 | 476.4 | 418.8 |



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

Report Prepared for

Cooper Lighting Solutions

METALUX

Report Number: SP1-2307-100-4

Test Date: 07/27/2023

Luminaire Tested: OHB-15SE-N-UNV-L830-CD

Data in this report applies to families of products including OHB-15SE-N-UNV-L830-CD.

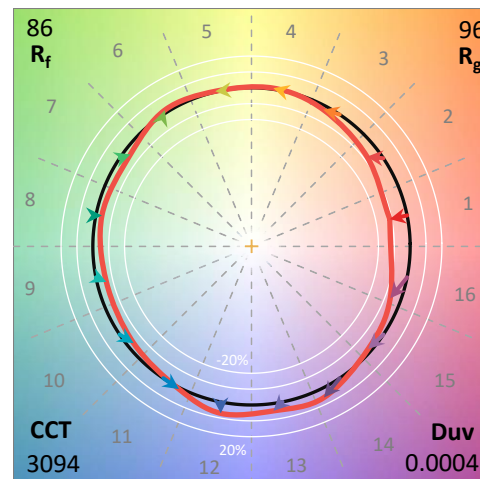
### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2307-100-4  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 08/04/2023  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: METALUX  
 Catalog Number: **OHB-15SE-N-UNV-L830-CD**  
 Description: 15000 LUMEN OHB SE LED LUMINAIRE WITH 80CRI, 3000K LEDS AND NARROW LENS

LENS

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 3094   | CRI (Ra): | 83.1 |      |      |
| CIE u':                   | 0.2471 | R1:       | 81.4 | R9:  | 8.0  |
| CIE v':                   | 0.5200 | R2:       | 91.2 | R10: | 80.2 |
| Duv:                      | 0.0004 | R3:       | 96.3 | R11: | 80.9 |
| CIE x:                    | 0.4308 | R4:       | 81.2 | R12: | 72.3 |
| CIE y:                    | 0.4028 | R5:       | 81.8 | R13: | 83.8 |
| CIE z:                    | 0.1664 | R6:       | 89.5 | R14: | 98.6 |
| Peak Wavelength (nm):     | 601    | R7:       | 83.2 |      |      |
| Dominant Wavelength (nm): | 582    | R8:       | 59.8 |      |      |
| Purity:                   | 50.4   |           |      |      |      |
| Rf:                       | 85.5   |           |      |      |      |
| Rg:                       | 95.7   |           |      |      |      |



### Test Conditions

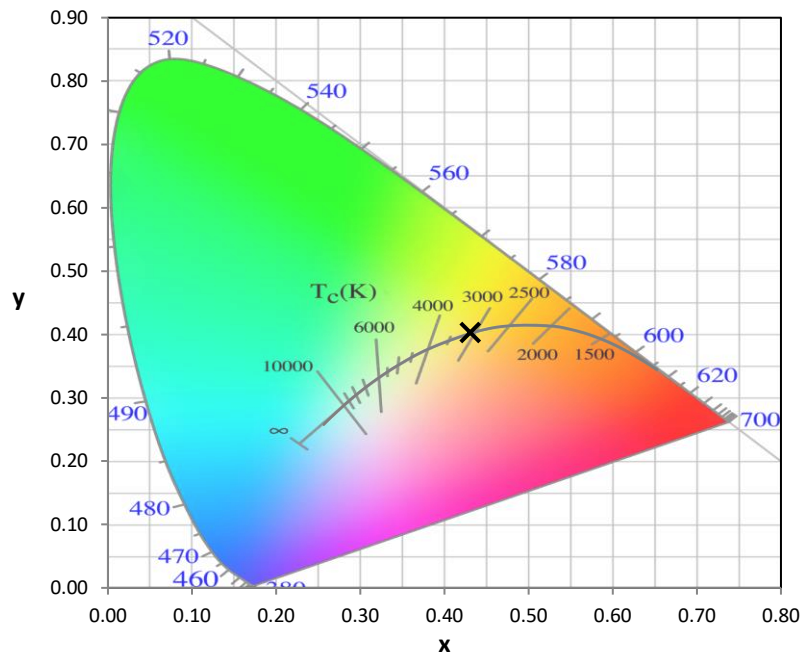
Stabilization Time: 23M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.7/57%  
 Sphere Temperature (°C): 25.2

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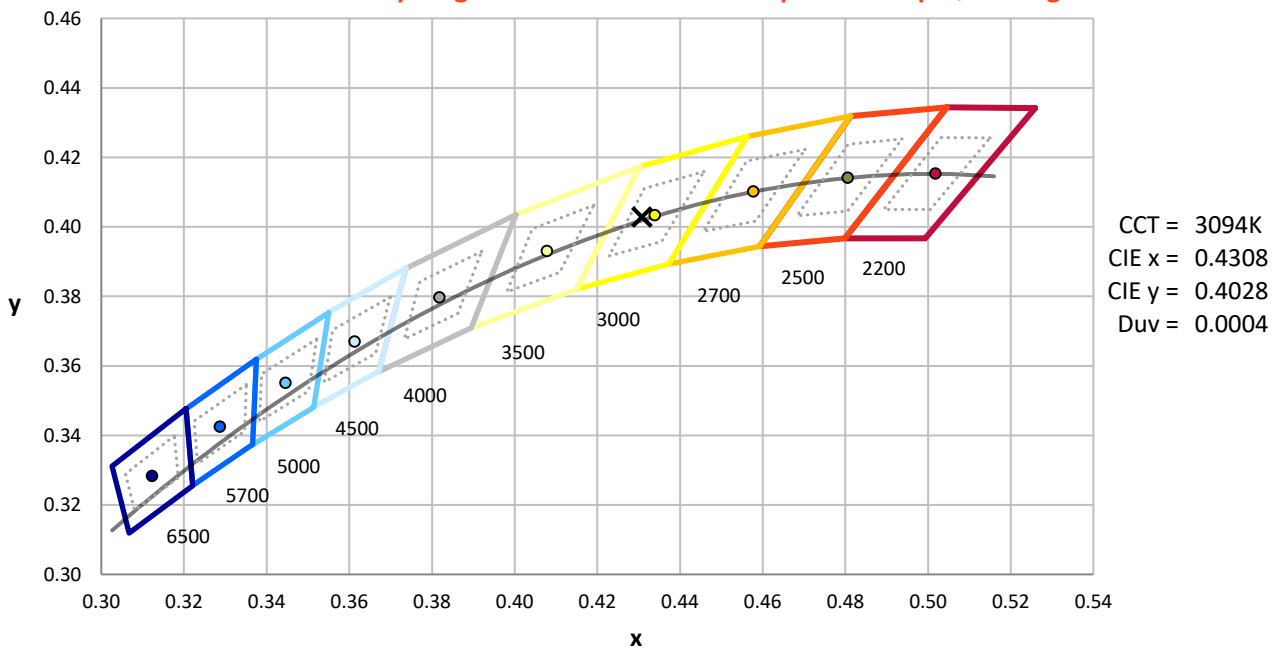
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| 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       | 5588             | NR               | 490       | 67760            | NR               | 620       | 245592           | NR               | 750       | 12500            | NR               | 880       | 5775             | NR               |
| 365       | 4653             | NR               | 495       | 80150            | NR               | 625       | 233690           | NR               | 755       | 11226            | NR               | 885       | 6968             | NR               |
| 370       | 4816             | NR               | 500       | 92862            | NR               | 630       | 218514           | NR               | 760       | 10108            | NR               | 890       | 4448             | NR               |
| 375       | 5382             | NR               | 505       | 106466           | NR               | 635       | 203332           | NR               | 765       | 9635             | NR               | 895       | 3971             | NR               |
| 380       | 5471             | NR               | 510       | 115999           | NR               | 640       | 188047           | NR               | 770       | 8591             | NR               | 900       | 4881             | NR               |
| 385       | 5274             | NR               | 515       | 124150           | NR               | 645       | 172926           | NR               | 775       | 7303             | NR               | 905       | 5743             | NR               |
| 390       | 4889             | NR               | 520       | 130163           | NR               | 650       | 155620           | NR               | 780       | 6289             | NR               | 910       | 5113             | NR               |
| 395       | 4299             | NR               | 525       | 135224           | NR               | 655       | 141125           | NR               | 785       | 5911             | NR               | 915       | 4407             | NR               |
| 400       | 4023             | NR               | 530       | 140755           | NR               | 660       | 126216           | NR               | 790       | 5635             | NR               | 920       | 4245             | NR               |
| 405       | 3768             | NR               | 535       | 146504           | NR               | 665       | 111397           | NR               | 795       | 5646             | NR               | 925       | 3908             | NR               |
| 410       | 4601             | NR               | 540       | 152733           | NR               | 670       | 97878            | NR               | 800       | 5673             | NR               | 930       | 5417             | NR               |
| 415       | 6365             | NR               | 545       | 159328           | NR               | 675       | 85741            | NR               | 805       | 5281             | NR               | 935       | 4964             | NR               |
| 420       | 9813             | NR               | 550       | 166801           | NR               | 680       | 74760            | NR               | 810       | 5525             | NR               | 940       | 3949             | NR               |
| 425       | 16211            | NR               | 555       | 175954           | NR               | 685       | 65227            | NR               | 815       | 4927             | NR               | 945       | 4140             | NR               |
| 430       | 25392            | NR               | 560       | 187354           | NR               | 690       | 56436            | NR               | 820       | 5126             | NR               | 950       | 3965             | NR               |
| 435       | 39464            | NR               | 565       | 198482           | NR               | 695       | 48938            | NR               | 825       | 4905             | NR               | 955       | 4799             | NR               |
| 440       | 61997            | NR               | 570       | 210996           | NR               | 700       | 42760            | NR               | 830       | 5269             | NR               | 960       | 3231             | NR               |
| 445       | 101388           | NR               | 575       | 223758           | NR               | 705       | 37659            | NR               | 835       | 4331             | NR               | 965       | 3690             | NR               |
| 450       | 140880           | NR               | 580       | 236632           | NR               | 710       | 33026            | NR               | 840       | 4092             | NR               | 970       | 6116             | NR               |
| 455       | 134821           | NR               | 585       | 248639           | NR               | 715       | 29202            | NR               | 845       | 4761             | NR               | 975       | 5312             | NR               |
| 460       | 103575           | NR               | 590       | 256555           | NR               | 720       | 25763            | NR               | 850       | 4730             | NR               | 980       | 4400             | NR               |
| 465       | 86441            | NR               | 595       | 264551           | NR               | 725       | 22755            | NR               | 855       | 4934             | NR               | 985       | 4764             | NR               |
| 470       | 70678            | NR               | 600       | 268886           | NR               | 730       | 20059            | NR               | 860       | 5495             | NR               | 990       | 4803             | NR               |
| 475       | 58575            | NR               | 605       | 267857           | NR               | 735       | 17717            | NR               | 865       | 5241             | NR               | 995       | 3507             | NR               |
| 480       | 55102            | NR               | 610       | 262898           | NR               | 740       | 15495            | NR               | 870       | 5223             | NR               | 1000      | 6247             | NR               |
| 485       | 58801            | NR               | 615       | 255346           | NR               | 745       | 14094            | NR               | 875       | 5501             | NR               |           |                  |                  |

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Scotopic Flux vs. Wavelength



Scotopic Lumens: 18580

S/P: 1.39

| 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       | 5588             | NR               | 490       | 67760            | NR               | 620       | 245592           | NR               | 750       | 12500            | NR               | 880       | 5775             | NR               |
| 365       | 4653             | NR               | 495       | 80150            | NR               | 625       | 233690           | NR               | 755       | 11226            | NR               | 885       | 6968             | NR               |
| 370       | 4816             | NR               | 500       | 92862            | NR               | 630       | 218514           | NR               | 760       | 10108            | NR               | 890       | 4448             | NR               |
| 375       | 5382             | NR               | 505       | 106466           | NR               | 635       | 203332           | NR               | 765       | 9635             | NR               | 895       | 3971             | NR               |
| 380       | 5471             | NR               | 510       | 115999           | NR               | 640       | 188047           | NR               | 770       | 8591             | NR               | 900       | 4881             | NR               |
| 385       | 5274             | NR               | 515       | 124150           | NR               | 645       | 172926           | NR               | 775       | 7303             | NR               | 905       | 5743             | NR               |
| 390       | 4889             | NR               | 520       | 130163           | NR               | 650       | 155620           | NR               | 780       | 6289             | NR               | 910       | 5113             | NR               |
| 395       | 4299             | NR               | 525       | 135224           | NR               | 655       | 141125           | NR               | 785       | 5911             | NR               | 915       | 4407             | NR               |
| 400       | 4023             | NR               | 530       | 140755           | NR               | 660       | 126216           | NR               | 790       | 5635             | NR               | 920       | 4245             | NR               |
| 405       | 3768             | NR               | 535       | 146504           | NR               | 665       | 111397           | NR               | 795       | 5646             | NR               | 925       | 3908             | NR               |
| 410       | 4601             | NR               | 540       | 152733           | NR               | 670       | 97878            | NR               | 800       | 5673             | NR               | 930       | 5417             | NR               |
| 415       | 6365             | NR               | 545       | 159328           | NR               | 675       | 85741            | NR               | 805       | 5281             | NR               | 935       | 4964             | NR               |
| 420       | 9813             | NR               | 550       | 166801           | NR               | 680       | 74760            | NR               | 810       | 5525             | NR               | 940       | 3949             | NR               |
| 425       | 16211            | NR               | 555       | 175954           | NR               | 685       | 65227            | NR               | 815       | 4927             | NR               | 945       | 4140             | NR               |
| 430       | 25392            | NR               | 560       | 187354           | NR               | 690       | 56436            | NR               | 820       | 5126             | NR               | 950       | 3965             | NR               |
| 435       | 39464            | NR               | 565       | 198482           | NR               | 695       | 48938            | NR               | 825       | 4905             | NR               | 955       | 4799             | NR               |
| 440       | 61997            | NR               | 570       | 210996           | NR               | 700       | 42760            | NR               | 830       | 5269             | NR               | 960       | 3231             | NR               |
| 445       | 101388           | NR               | 575       | 223758           | NR               | 705       | 37659            | NR               | 835       | 4331             | NR               | 965       | 3690             | NR               |
| 450       | 140880           | NR               | 580       | 236632           | NR               | 710       | 33026            | NR               | 840       | 4092             | NR               | 970       | 6116             | NR               |
| 455       | 134821           | NR               | 585       | 248639           | NR               | 715       | 29202            | NR               | 845       | 4761             | NR               | 975       | 5312             | NR               |
| 460       | 103575           | NR               | 590       | 256555           | NR               | 720       | 25763            | NR               | 850       | 4730             | NR               | 980       | 4400             | NR               |
| 465       | 86441            | NR               | 595       | 264551           | NR               | 725       | 22755            | NR               | 855       | 4934             | NR               | 985       | 4764             | NR               |
| 470       | 70678            | NR               | 600       | 268886           | NR               | 730       | 20059            | NR               | 860       | 5495             | NR               | 990       | 4803             | NR               |
| 475       | 58575            | NR               | 605       | 267857           | NR               | 735       | 17717            | NR               | 865       | 5241             | NR               | 995       | 3507             | NR               |
| 480       | 55102            | NR               | 610       | 262898           | NR               | 740       | 15495            | NR               | 870       | 5223             | NR               | 1000      | 6247             | NR               |
| 485       | 58801            | NR               | 615       | 255346           | NR               | 745       | 14094            | NR               | 875       | 5501             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 7125.5**

**M/P: 0.53**

| 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       | 5588             | NR               | 490       | 67760            | NR               | 620       | 245592           | NR               | 750       | 12500            | NR               | 880       | 5775             | NR               |
| 365       | 4653             | NR               | 495       | 80150            | NR               | 625       | 233690           | NR               | 755       | 11226            | NR               | 885       | 6968             | NR               |
| 370       | 4816             | NR               | 500       | 92862            | NR               | 630       | 218514           | NR               | 760       | 10108            | NR               | 890       | 4448             | NR               |
| 375       | 5382             | NR               | 505       | 106466           | NR               | 635       | 203332           | NR               | 765       | 9635             | NR               | 895       | 3971             | NR               |
| 380       | 5471             | NR               | 510       | 115999           | NR               | 640       | 188047           | NR               | 770       | 8591             | NR               | 900       | 4881             | NR               |
| 385       | 5274             | NR               | 515       | 124150           | NR               | 645       | 172926           | NR               | 775       | 7303             | NR               | 905       | 5743             | NR               |
| 390       | 4889             | NR               | 520       | 130163           | NR               | 650       | 155620           | NR               | 780       | 6289             | NR               | 910       | 5113             | NR               |
| 395       | 4299             | NR               | 525       | 135224           | NR               | 655       | 141125           | NR               | 785       | 5911             | NR               | 915       | 4407             | NR               |
| 400       | 4023             | NR               | 530       | 140755           | NR               | 660       | 126216           | NR               | 790       | 5635             | NR               | 920       | 4245             | NR               |
| 405       | 3768             | NR               | 535       | 146504           | NR               | 665       | 111397           | NR               | 795       | 5646             | NR               | 925       | 3908             | NR               |
| 410       | 4601             | NR               | 540       | 152733           | NR               | 670       | 97878            | NR               | 800       | 5673             | NR               | 930       | 5417             | NR               |
| 415       | 6365             | NR               | 545       | 159328           | NR               | 675       | 85741            | NR               | 805       | 5281             | NR               | 935       | 4964             | NR               |
| 420       | 9813             | NR               | 550       | 166801           | NR               | 680       | 74760            | NR               | 810       | 5525             | NR               | 940       | 3949             | NR               |
| 425       | 16211            | NR               | 555       | 175954           | NR               | 685       | 65227            | NR               | 815       | 4927             | NR               | 945       | 4140             | NR               |
| 430       | 25392            | NR               | 560       | 187354           | NR               | 690       | 56436            | NR               | 820       | 5126             | NR               | 950       | 3965             | NR               |
| 435       | 39464            | NR               | 565       | 198482           | NR               | 695       | 48938            | NR               | 825       | 4905             | NR               | 955       | 4799             | NR               |
| 440       | 61997            | NR               | 570       | 210996           | NR               | 700       | 42760            | NR               | 830       | 5269             | NR               | 960       | 3231             | NR               |
| 445       | 101388           | NR               | 575       | 223758           | NR               | 705       | 37659            | NR               | 835       | 4331             | NR               | 965       | 3690             | NR               |
| 450       | 140880           | NR               | 580       | 236632           | NR               | 710       | 33026            | NR               | 840       | 4092             | NR               | 970       | 6116             | NR               |
| 455       | 134821           | NR               | 585       | 248639           | NR               | 715       | 29202            | NR               | 845       | 4761             | NR               | 975       | 5312             | NR               |
| 460       | 103575           | NR               | 590       | 256555           | NR               | 720       | 25763            | NR               | 850       | 4730             | NR               | 980       | 4400             | NR               |
| 465       | 86441            | NR               | 595       | 264551           | NR               | 725       | 22755            | NR               | 855       | 4934             | NR               | 985       | 4764             | NR               |
| 470       | 70678            | NR               | 600       | 268886           | NR               | 730       | 20059            | NR               | 860       | 5495             | NR               | 990       | 4803             | NR               |
| 475       | 58575            | NR               | 605       | 267857           | NR               | 735       | 17717            | NR               | 865       | 5241             | NR               | 995       | 3507             | NR               |
| 480       | 55102            | NR               | 610       | 262898           | NR               | 740       | 15495            | NR               | 870       | 5223             | NR               | 1000      | 6247             | NR               |
| 485       | 58801            | NR               | 615       | 255346           | NR               | 745       | 14094            | NR               | 875       | 5501             | NR               |           |                  |                  |

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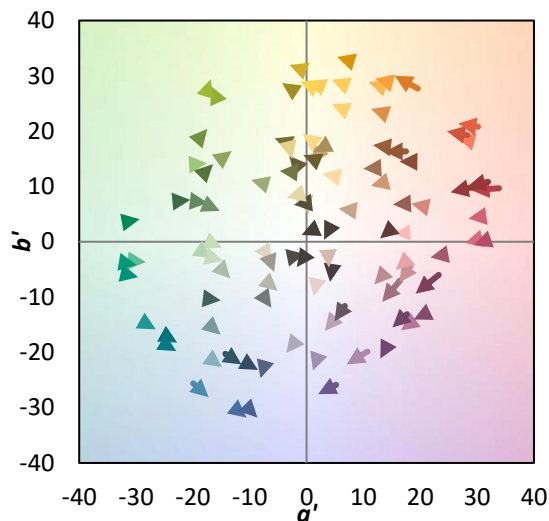
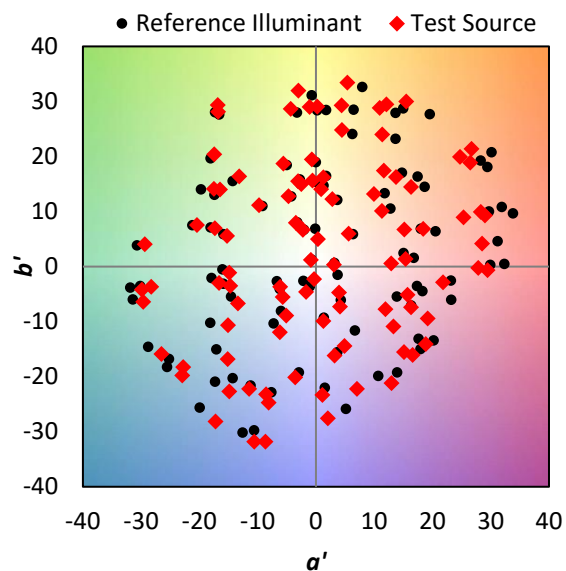
**TM-30-18**

**Summary**

$R_f = 85.5$   
 $R_g = 95.7$   
 $CIE R_a = 83.1$   
 $R_9 = 8.0$



**Color Vector Graphics**

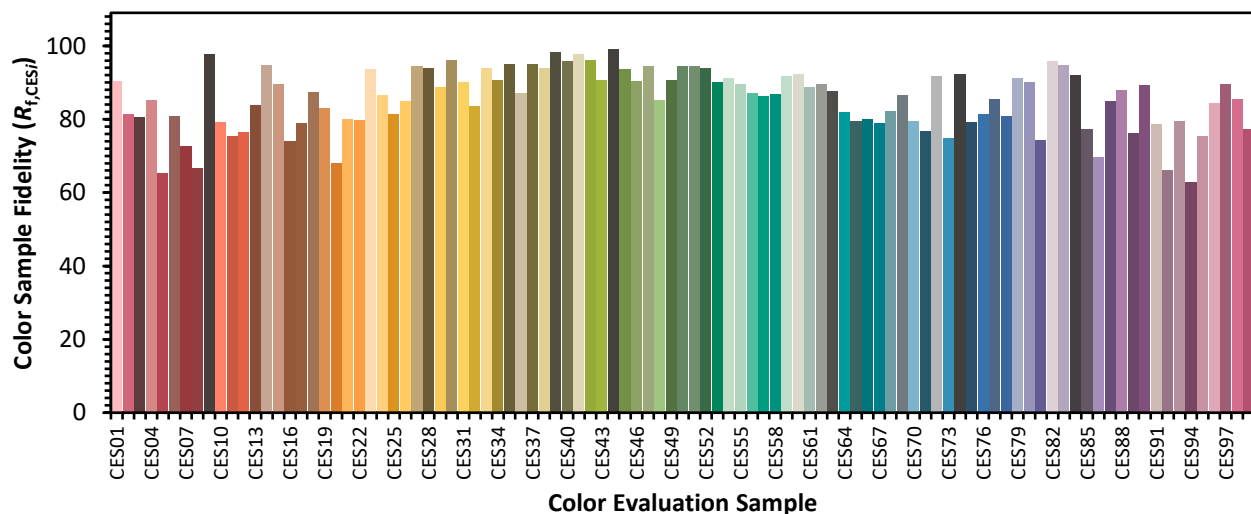


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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

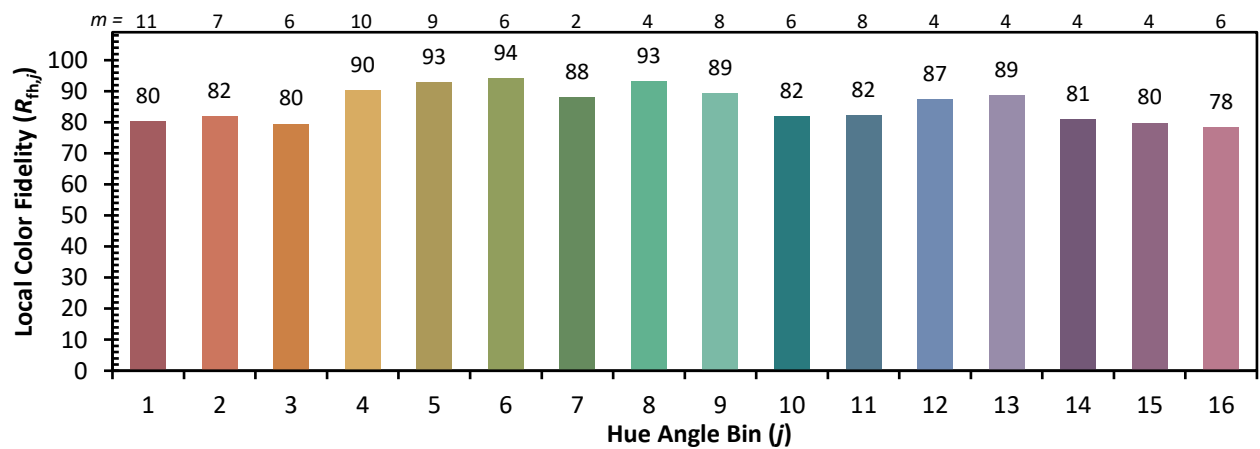
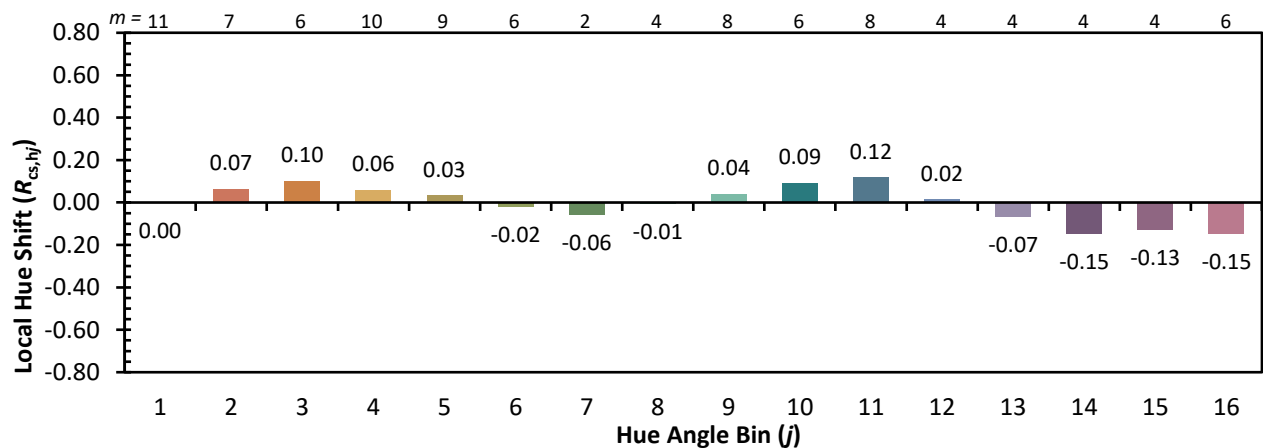
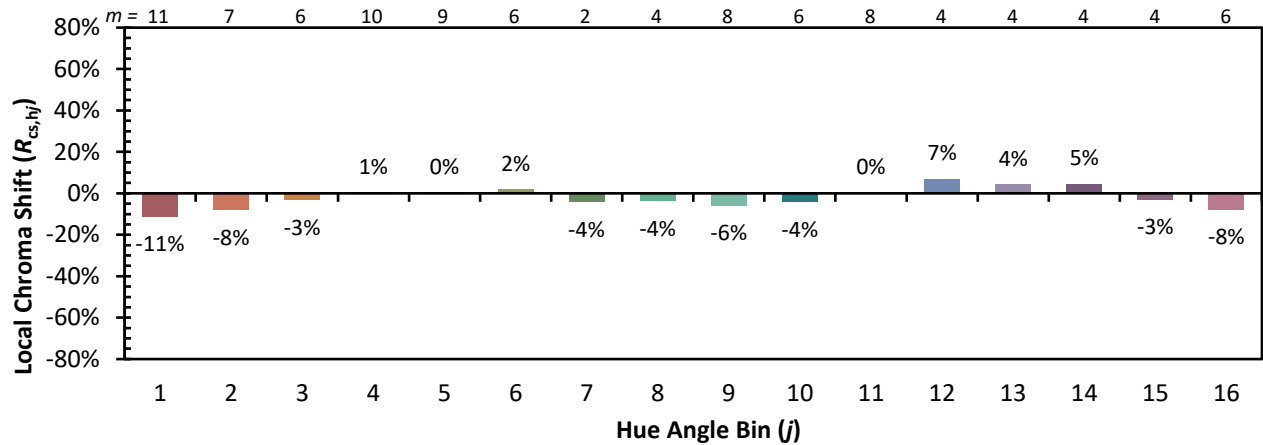
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 85 | CES51 = 94 | CES76 = 81 |
| CES02 = 63 | CES27 = 94 | CES52 = 94 | CES77 = 85 |
| CES03 = 31 | CES28 = 94 | CES53 = 90 | CES78 = 81 |
| CES04 = 70 | CES29 = 89 | CES54 = 91 | CES79 = 91 |
| CES05 = 49 | CES30 = 96 | CES55 = 90 | CES80 = 90 |
| CES06 = 51 | CES31 = 90 | CES56 = 87 | CES81 = 74 |
| CES07 = 42 | CES32 = 83 | CES57 = 86 | CES82 = 96 |
| CES08 = 41 | CES33 = 94 | CES58 = 87 | CES83 = 95 |
| CES09 = 29 | CES34 = 91 | CES59 = 92 | CES84 = 92 |
| CES10 = 76 | CES35 = 95 | CES60 = 92 | CES85 = 77 |
| CES11 = 59 | CES36 = 87 | CES61 = 89 | CES86 = 70 |
| CES12 = 65 | CES37 = 95 | CES62 = 90 | CES87 = 85 |
| CES13 = 43 | CES38 = 94 | CES63 = 88 | CES88 = 88 |
| CES14 = 74 | CES39 = 98 | CES64 = 82 | CES89 = 76 |
| CES15 = 71 | CES40 = 96 | CES65 = 80 | CES90 = 89 |
| CES16 = 47 | CES41 = 98 | CES66 = 80 | CES91 = 79 |
| CES17 = 50 | CES42 = 96 | CES67 = 79 | CES92 = 66 |
| CES18 = 56 | CES43 = 91 | CES68 = 82 | CES93 = 79 |
| CES19 = 72 | CES44 = 99 | CES69 = 87 | CES94 = 63 |
| CES20 = 66 | CES45 = 94 | CES70 = 79 | CES95 = 75 |
| CES21 = 87 | CES46 = 91 | CES71 = 77 | CES96 = 84 |
| CES22 = 79 | CES47 = 94 | CES72 = 92 | CES97 = 90 |
| CES23 = 92 | CES48 = 85 | CES73 = 75 | CES98 = 86 |
| CES24 = 91 | CES49 = 91 | CES74 = 92 | CES99 = 77 |
| CES25 = 72 | CES50 = 95 | CES75 = 79 |            |



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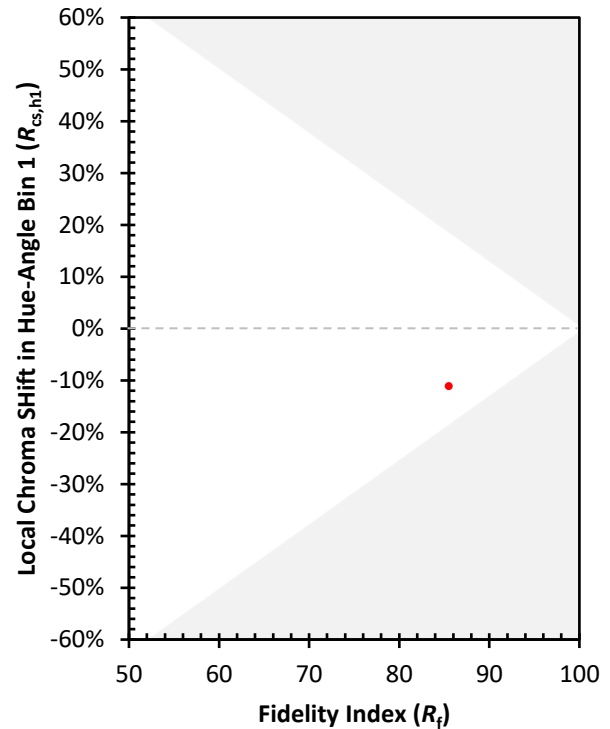
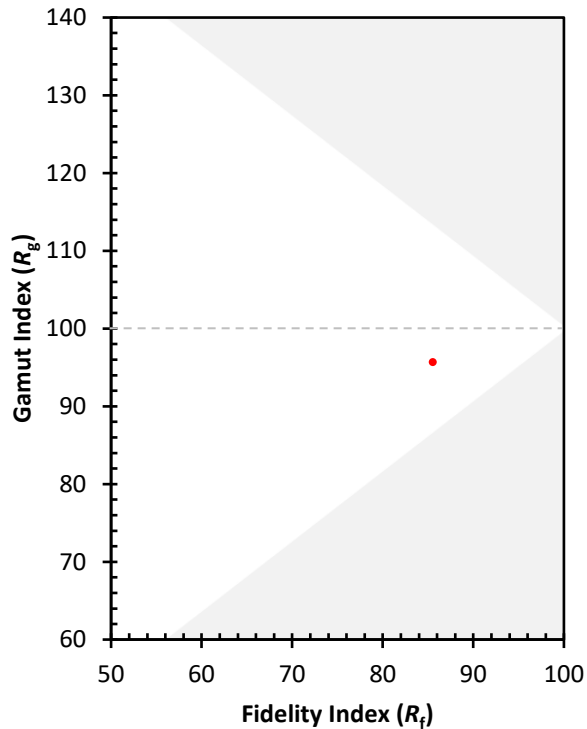
**Color Rendition by Hue-Angle Bin**



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**Measure Comparisons**



(END OF REPORT)