

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: P828013

Luminaire Tested: **OHBL-18SE-MCL-UNV-L935-CD-UPL18**

Issue Date: 5/3/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P828013  
REPORT IS A COMBINATION OF REPORTS P826162 AND G3-2310-221-8  
Test Lab: INNOVATION CENTER  
Issue Date: 5/3/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: METALUX  
Catalog Number: OHBL-18SE-MCL-UNV-L935-CD-UPL18  
Description:  
Light Source: -  
Ballast/Driver: -

**Summary**

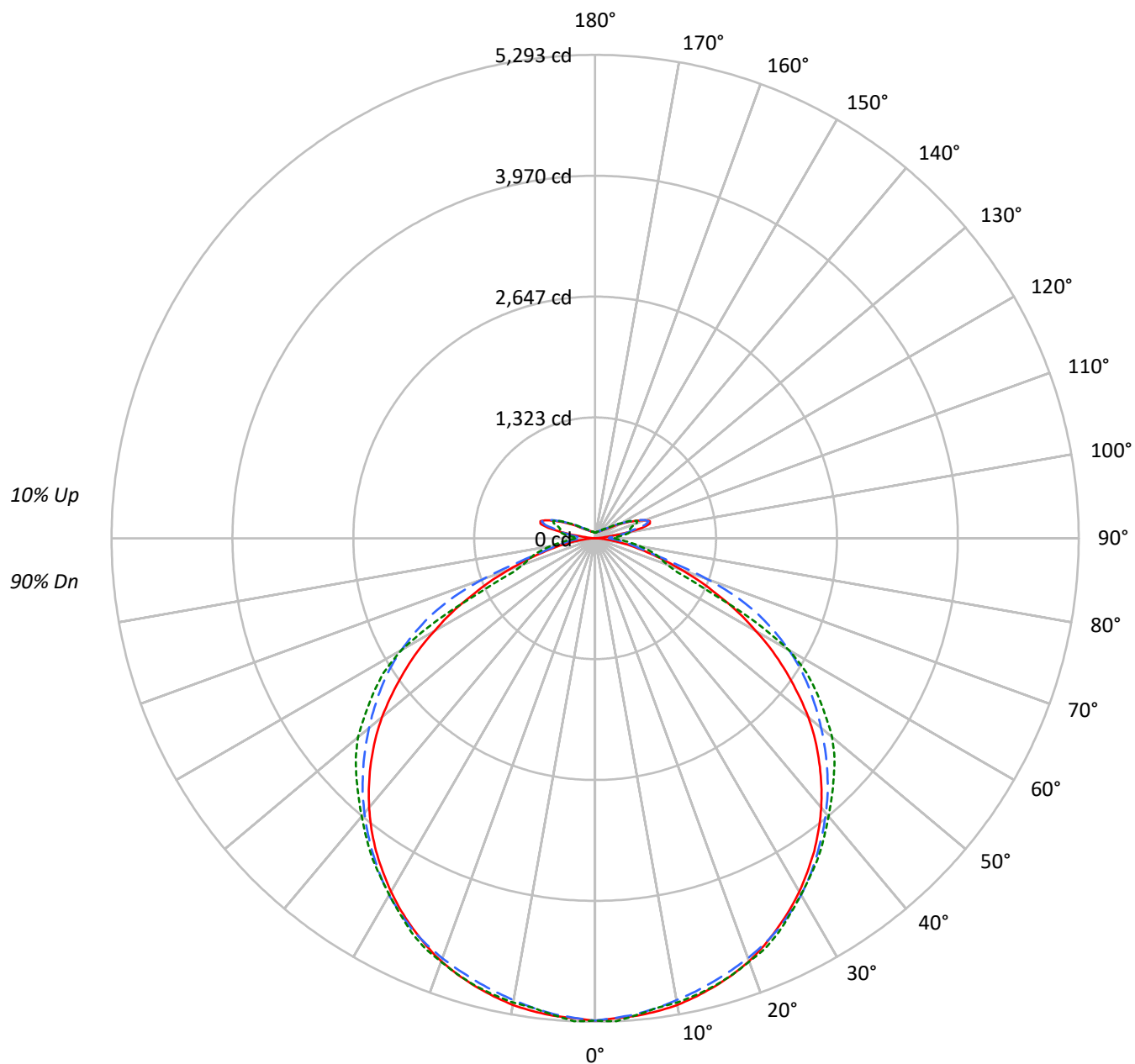
Lumens per Lamp: N/A  
Luminaire Lumens: 16420.7 lumens  
Efficiency: N/A  
Efficacy: 140.0 lumens/watt  
Spacing Criteria (0/90/45): 1.26 / 1.27 / 1.39  
Luminous Opening: Rectangular w/ Sides (W: 3.78' x L: 1.67' x H: 0.17')  
CIE Type: Semi-Direct

Input Watts (W): 117.3  
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: P828013

CATALOG NUMBER: OHBL-18SE-MCL-UNV-L935-CD-UPL18

### Luminous Intensity Polar Plot





TEST NUMBER: P828013

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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 |
| RCR |     |     |     |     |     |     |     |     |     |     |     |  |    |    |    |  |    |
| 0   | 117 | 117 | 117 | 117 | 113 | 113 | 113 | 113 | 105 | 105 | 105 |  | 99 | 99 | 99 |  | 93 |
| 1   | 107 | 102 | 98  | 94  | 103 | 99  | 95  | 92  | 93  | 90  | 87  |  | 87 | 85 | 83 |  | 82 |
| 2   | 97  | 89  | 83  | 77  | 94  | 87  | 81  | 76  | 82  | 77  | 72  |  | 77 | 73 | 69 |  | 72 |
| 3   | 89  | 79  | 71  | 64  | 86  | 76  | 69  | 63  | 72  | 66  | 61  |  | 68 | 63 | 59 |  | 64 |
| 4   | 81  | 70  | 61  | 55  | 78  | 68  | 60  | 54  | 64  | 57  | 52  |  | 60 | 55 | 50 |  | 57 |
| 5   | 75  | 62  | 53  | 47  | 72  | 60  | 52  | 46  | 57  | 50  | 45  |  | 54 | 48 | 43 |  | 51 |
| 6   | 69  | 56  | 47  | 41  | 66  | 54  | 46  | 40  | 52  | 45  | 39  |  | 49 | 43 | 38 |  | 47 |
| 7   | 64  | 51  | 42  | 36  | 62  | 49  | 41  | 36  | 47  | 40  | 35  |  | 45 | 38 | 34 |  | 42 |
| 8   | 59  | 46  | 38  | 32  | 57  | 45  | 37  | 32  | 43  | 36  | 31  |  | 41 | 35 | 30 |  | 39 |
| 9   | 55  | 42  | 34  | 29  | 53  | 41  | 34  | 28  | 39  | 33  | 28  |  | 38 | 31 | 27 |  | 36 |
| 10  | 52  | 39  | 31  | 26  | 50  | 38  | 31  | 26  | 36  | 30  | 25  |  | 35 | 29 | 25 |  | 33 |

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

|     | 0°   | 45°  | 90°  |
|-----|------|------|------|
| 0°  | 9021 | 9021 | 9021 |
| 5°  | 8919 | 8886 | 8947 |
| 10° | 8843 | 8748 | 8885 |
| 15° | 8743 | 8643 | 8864 |
| 20° | 8643 | 8576 | 8824 |
| 25° | 8493 | 8508 | 8788 |
| 30° | 8332 | 8403 | 8665 |
| 35° | 8147 | 8239 | 8620 |
| 40° | 7918 | 8069 | 8545 |
| 45° | 7619 | 7874 | 8548 |
| 50° | 7231 | 7651 | 8549 |
| 55° | 6653 | 7431 | 8310 |
| 60° | 5917 | 7111 | 7776 |
| 65° | 4986 | 6525 | 5005 |
| 70° | 3919 | 5083 | 3708 |
| 75° | 2833 | 3009 | 3886 |
| 80° | 1855 | 2490 | 3918 |
| 85° | 929  | 2261 | 4120 |



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**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 498.0   | 3.0       |
| 10°-20°   | 1428.1  | 8.7       |
| 20°-30°   | 2181.2  | 13.3      |
| 30°-40°   | 2646.6  | 16.1      |
| 40°-50°   | 2773.9  | 16.9      |
| 50°-60°   | 2513.5  | 15.3      |
| 60°-70°   | 1685.2  | 10.3      |
| 70°-80°   | 756.7   | 4.6       |
| 80°-90°   | 278.4   | 1.7       |
| 90°-100°  | 225.3   | 1.4       |
| 100°-110° | 534.5   | 3.3       |
| 110°-120° | 445.3   | 2.7       |
| 120°-130° | 215.2   | 1.3       |
| 130°-140° | 109.5   | 0.7       |
| 140°-150° | 64.3    | 0.4       |
| 150°-160° | 38.3    | 0.2       |
| 160°-170° | 20.3    | 0.1       |
| 170°-180° | 6.2     | 0.0       |
| <hr/>     |         |           |
| 0°-30°    | 4107.4  | 25.0      |
| 0°-40°    | 6754.0  | 41.1      |
| 0°-60°    | 12041.4 | 73.3      |
| 0°-90°    | 14761.7 | 89.9      |
| 90°-120°  | 1205.1  | 7.3       |
| 90°-150°  | 1594.2  | 9.7       |
| 90°-180°  | 1659.0  | 10.1      |
| 0°-180°   | 16420.7 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°   | 22.5° | 45°  | 67.5° | 90°  | Flux |
|------|------|-------|------|-------|------|------|
| 0°   | 5282 | 5282  | 5282 | 5282  | 5282 |      |
| 5°   | 5248 | 5266  | 5229 | 5245  | 5238 | 499  |
| 15°  | 5077 | 5057  | 5022 | 5066  | 5072 | 1434 |
| 25°  | 4717 | 4696  | 4729 | 4773  | 4759 | 2174 |
| 35°  | 4181 | 4191  | 4233 | 4278  | 4262 | 2613 |
| 45°  | 3470 | 3526  | 3592 | 3684  | 3695 | 2673 |
| 55°  | 2553 | 2676  | 2859 | 2973  | 2966 | 2279 |
| 65°  | 1498 | 1733  | 1967 | 1660  | 1356 | 1493 |
| 75°  | 590  | 855   | 629  | 644   | 686  | 644  |
| 85°  | 102  | 195   | 250  | 302   | 316  | 124  |
| 90°  | 4    | 86    | 157  | 199   | 211  | 8    |
| 95°  | 32   | 109   | 196  | 247   | 270  | 101  |
| 105° | 621  | 629   | 565  | 420   | 394  | 589  |
| 115° | 434  | 442   | 454  | 455   | 456  | 437  |
| 125° | 214  | 224   | 238  | 239   | 238  | 201  |
| 135° | 130  | 134   | 138  | 144   | 146  | 103  |
| 145° | 97   | 99    | 102  | 103   | 104  | 62   |
| 155° | 79   | 82    | 83   | 83    | 83   | 37   |
| 165° | 70   | 71    | 71   | 72    | 72   | 20   |
| 175° | 64   | 64    | 64   | 64    | 64   | 6    |
| 180° | 64   | 64    | 64   | 64    | 64   |      |



TEST NUMBER: P828013

CATALOG NUMBER: OHBL-18SE-MCL-UNV-L935-CD-UPL18

**CANDELA DISTRIBUTION (FULL):**

|        | 0°     | 22.5°  | 45°    | 67.5°  | 90°    |
|--------|--------|--------|--------|--------|--------|
| 0°     | 5281.9 | 5281.9 | 5281.9 | 5281.9 | 5281.9 |
| 2.5°   | 5260.6 | 5282.8 | 5255.2 | 5285.0 | 5292.7 |
| 5°     | 5247.6 | 5265.9 | 5229.3 | 5245.3 | 5238.4 |
| 7.5°   | 5223.9 | 5230.0 | 5186.5 | 5199.5 | 5185.8 |
| 10°    | 5188.8 | 5185.8 | 5134.6 | 5159.8 | 5162.8 |
| 12.5°  | 5136.8 | 5127.7 | 5081.8 | 5120.0 | 5120.8 |
| 15°    | 5077.2 | 5057.4 | 5021.5 | 5065.8 | 5071.9 |
| 17.5°  | 5008.5 | 4982.6 | 4958.9 | 5016.2 | 5007.0 |
| 20°    | 4928.3 | 4897.8 | 4893.2 | 4955.8 | 4932.9 |
| 22.5°  | 4829.1 | 4805.4 | 4816.1 | 4875.7 | 4861.2 |
| 25°    | 4716.8 | 4696.2 | 4729.0 | 4772.6 | 4758.8 |
| 27.5°  | 4598.4 | 4586.2 | 4623.6 | 4657.2 | 4630.5 |
| 30°    | 4468.6 | 4461.7 | 4511.3 | 4538.8 | 4505.2 |
| 32.5°  | 4327.2 | 4329.6 | 4376.9 | 4414.3 | 4383.1 |
| 35°    | 4180.7 | 4190.6 | 4233.3 | 4278.4 | 4261.6 |
| 37.5°  | 4019.5 | 4041.7 | 4084.4 | 4135.6 | 4118.0 |
| 40°    | 3849.2 | 3881.2 | 3928.6 | 3990.5 | 3974.4 |
| 42.5°  | 3665.2 | 3705.6 | 3766.8 | 3835.4 | 3833.9 |
| 45°    | 3469.6 | 3526.2 | 3591.8 | 3683.5 | 3694.9 |
| 47.5°  | 3266.5 | 3329.8 | 3413.1 | 3535.3 | 3552.8 |
| 50°    | 3045.8 | 3125.2 | 3229.1 | 3375.7 | 3386.4 |
| 52.5°  | 2799.8 | 2908.2 | 3045.8 | 3186.2 | 3173.3 |
| 55°    | 2553.2 | 2676.1 | 2858.7 | 2973.2 | 2966.3 |
| 57.5°  | 2307.2 | 2445.5 | 2666.9 | 2748.7 | 2747.9 |
| 60°    | 2032.2 | 2207.2 | 2449.2 | 2511.2 | 2450.1 |
| 62.5°  | 1778.0 | 1965.8 | 2217.1 | 2172.1 | 1962.8 |
| 65°    | 1498.4 | 1732.9 | 1967.3 | 1660.3 | 1355.6 |
| 67.5°  | 1250.2 | 1494.6 | 1671.0 | 1137.2 | 973.8  |
| 70°    | 1000.5 | 1270.1 | 1302.9 | 843.9  | 832.5  |
| 72.5°  | 779.0  | 1066.2 | 898.9  | 722.5  | 759.2  |
| 75°    | 589.6  | 855.4  | 629.3  | 643.8  | 685.8  |
| 77.5°  | 430.0  | 656.8  | 489.6  | 564.4  | 598.8  |
| 80°    | 295.6  | 465.1  | 399.4  | 474.3  | 497.9  |
| 82.5°  | 185.6  | 307.0  | 320.0  | 381.8  | 406.3  |
| 85°    | 101.6  | 194.8  | 249.8  | 301.7  | 316.2  |
| 87.5°  | 42.0   | 117.6  | 190.9  | 232.9  | 245.2  |
| 90°    | 4.1    | 85.8   | 157.4  | 199.4  | 211.2  |
| 92.5°  | 11.6   | 77.2   | 151.2  | 193.9  | 205.9  |
| 95°    | 32.4   | 108.8  | 196.1  | 246.8  | 269.9  |
| 97.5°  | 164.0  | 209.6  | 272.4  | 324.3  | 340.8  |
| 100°   | 337.2  | 378.4  | 356.8  | 384.0  | 391.3  |
| 102.5° | 527.3  | 544.8  | 430.2  | 404.3  | 401.6  |
| 105°   | 620.6  | 629.2  | 565.2  | 420.2  | 394.2  |



TEST NUMBER: P828013

CATALOG NUMBER: OHBL-18SE-MCL-UNV-L935-CD-UPL18

**CANDELA DISTRIBUTION (continued):**

|        | 0°    | 22.5° | 45°   | 67.5° | 90°   |
|--------|-------|-------|-------|-------|-------|
| 112.5° | 507.0 | 515.7 | 521.0 | 514.5 | 495.2 |
| 115°   | 433.6 | 441.7 | 453.8 | 454.9 | 455.6 |
| 117.5° | 370.2 | 374.3 | 387.4 | 390.3 | 392.7 |
| 120°   | 310.2 | 316.8 | 330.2 | 331.4 | 330.6 |
| 122.5° | 260.2 | 267.8 | 280.3 | 281.7 | 280.8 |
| 125°   | 213.7 | 224.4 | 237.9 | 239.3 | 238.5 |
| 127.5° | 182.8 | 190.3 | 203.9 | 205.3 | 204.4 |
| 130°   | 159.4 | 166.0 | 174.8 | 178.8 | 179.6 |
| 132.5° | 144.3 | 147.7 | 154.9 | 158.8 | 160.5 |
| 135°   | 130.2 | 133.5 | 138.4 | 143.9 | 145.5 |
| 137.5° | 120.2 | 122.7 | 126.0 | 131.4 | 133.1 |
| 140°   | 111.0 | 113.5 | 115.2 | 119.9 | 121.5 |
| 142.5° | 102.7 | 106.0 | 107.7 | 110.8 | 112.4 |
| 145°   | 96.8  | 99.3  | 101.8 | 103.4 | 104.2 |
| 147.5° | 91.8  | 93.5  | 95.2  | 96.8  | 97.6  |
| 150°   | 86.8  | 88.5  | 90.2  | 91.0  | 91.8  |
| 152.5° | 83.5  | 84.3  | 86.0  | 86.8  | 86.8  |
| 155°   | 79.3  | 81.8  | 82.6  | 83.4  | 82.7  |
| 157.5° | 76.8  | 78.4  | 79.2  | 80.1  | 80.1  |
| 160°   | 74.3  | 75.1  | 75.9  | 76.8  | 76.8  |
| 162.5° | 72.6  | 72.6  | 73.4  | 74.2  | 74.2  |
| 165°   | 70.1  | 70.9  | 70.9  | 71.8  | 71.8  |
| 167.5° | 68.4  | 69.2  | 69.2  | 69.2  | 70.1  |
| 170°   | 66.8  | 66.8  | 67.6  | 66.8  | 66.8  |
| 172.5° | 65.1  | 65.9  | 65.9  | 65.2  | 65.2  |
| 175°   | 64.2  | 64.2  | 64.3  | 63.5  | 63.5  |
| 177.5° | 64.2  | 64.2  | 63.5  | 62.7  | 61.9  |
| 180°   | 63.5  | 63.5  | 63.5  | 63.5  | 63.5  |



Report Generated By 670246072 / DESKTOP-50001EG







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







|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| 107.5° | 627.2 | 637.8 | 612.4 | 491.8 | 420.8 |
| 110°   | 575.4 | 589.8 | 583.8 | 540.7 | 484.8 |



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

Report Prepared for

Cooper Lighting Solutions

METALUX

Report Number: SP1-2307-100-7

Test Date: 07/28/2023

Luminaire Tested: OHB-15SE-N-UNV-L935-CD

Data in this report applies to families of products including OHB-15SE-N-UNV-L935-CD.

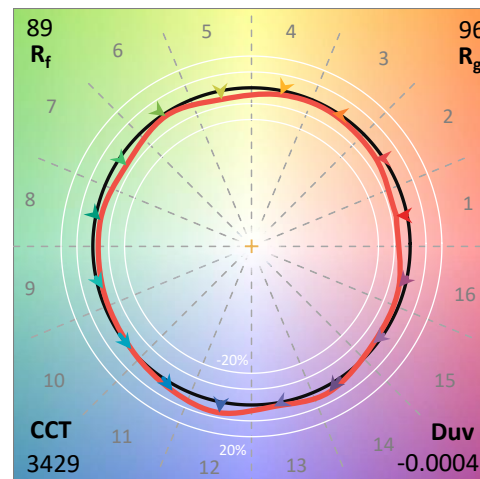
### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2307-100-7  
 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-L935-CD**  
 Description: 15000 LUMEN OHB SE LED LUMINAIRE WITH 90CRI, 3500K LEDS AND NARROW LENS

LENS

### Spectral Parameters

|                           |         |           |      |      |      |
|---------------------------|---------|-----------|------|------|------|
| CCT (K):                  | 3429    | CRI (Ra): | 90.9 |      |      |
| CIE u':                   | 0.2376  | R1:       | 91.1 | R9:  | 50.7 |
| CIE v':                   | 0.5121  | R2:       | 96.7 | R10: | 90.8 |
| Duv:                      | -0.0004 | R3:       | 97.7 | R11: | 88.9 |
| CIE x:                    | 0.4088  | R4:       | 88.8 | R12: | 74.6 |
| CIE y:                    | 0.3916  | R5:       | 90.3 | R13: | 92.9 |
| CIE z:                    | 0.1997  | R6:       | 94.5 | R14: | 99.5 |
| Peak Wavelength (nm):     | 609     | R7:       | 89.8 |      |      |
| Dominant Wavelength (nm): | 581     | R8:       | 78.2 |      |      |
| Purity:                   | 40.4    |           |      |      |      |
| Rf:                       | 88.9    |           |      |      |      |
| Rg:                       | 96.3    |           |      |      |      |



### Test Conditions

Stabilization Time: 23M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.7/55%  
 Sphere Temperature (°C): 25.2

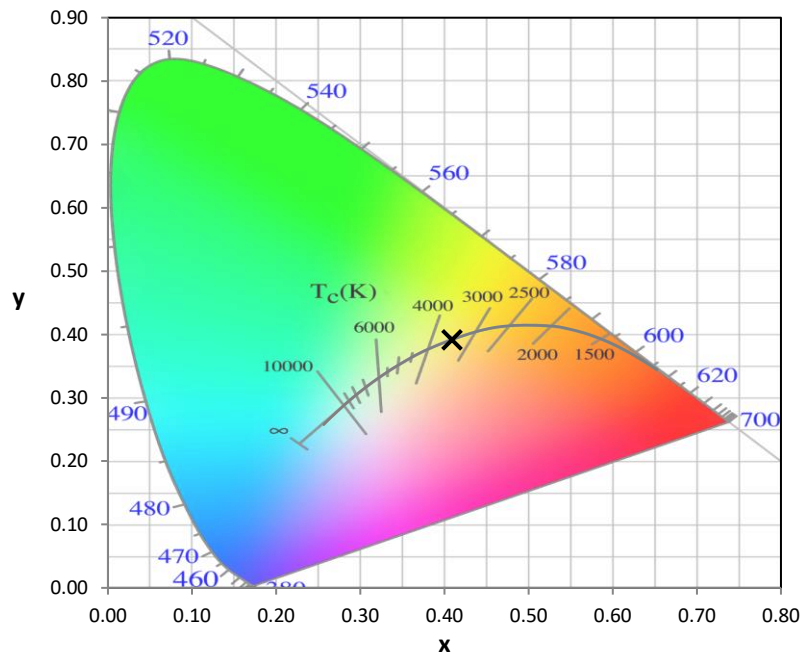


REPORT NUMBER: SP1-2307-100-7

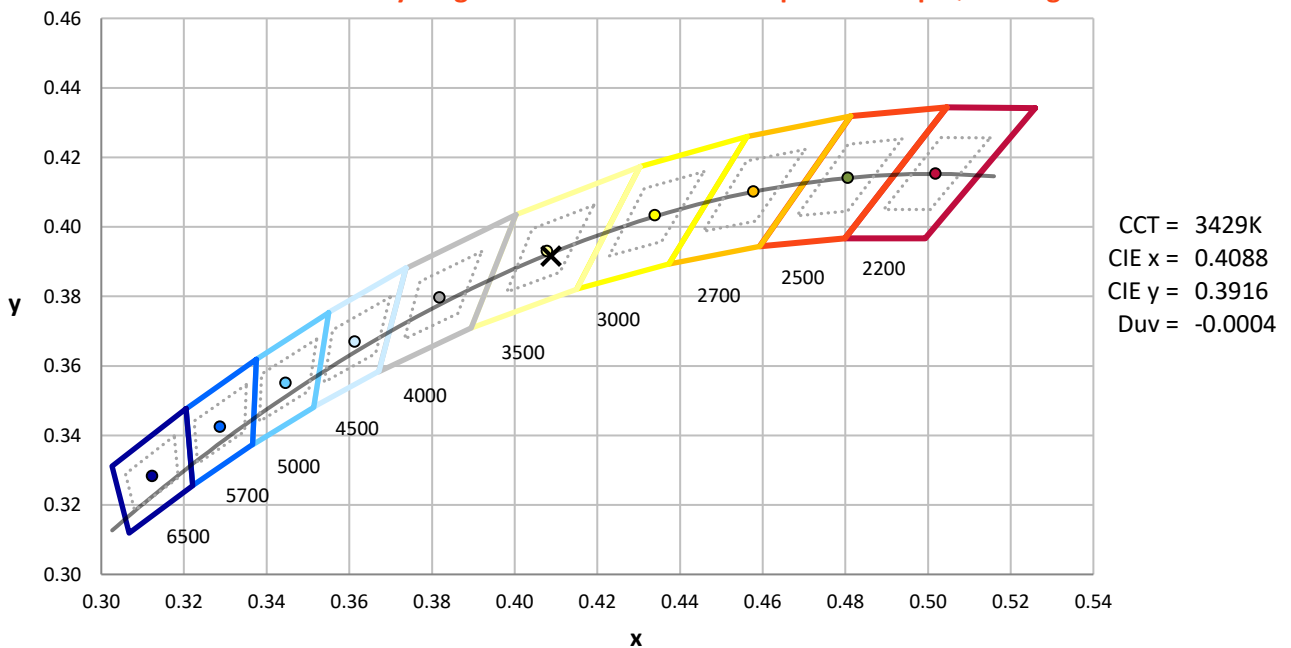
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date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



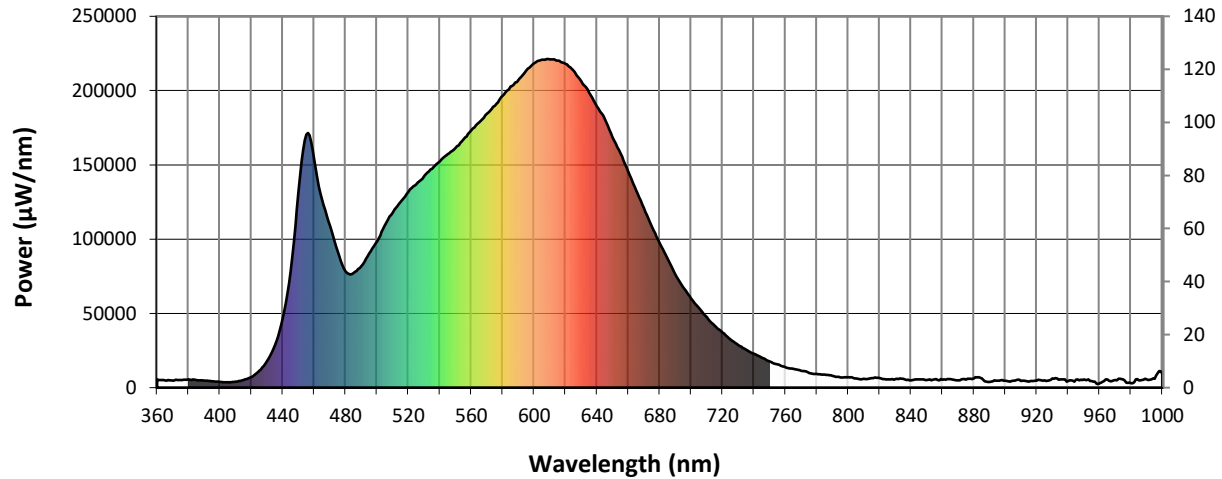
CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 3500K 4-step quadrangle

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**Photopic Flux vs. Wavelength**

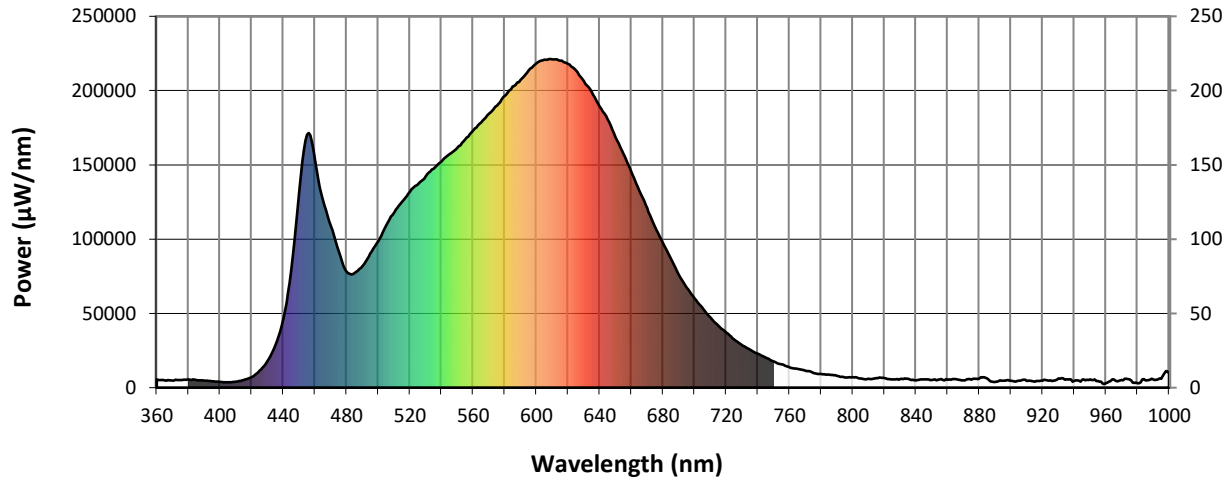


#####

| 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       | 5498             | NR               | 490       | 81900            | NR               | 620       | 217907           | NR               | 750       | 17550            | NR               | 880       | 6189             | NR               |
| 365       | 4903             | NR               | 495       | 90120            | NR               | 625       | 213734           | NR               | 755       | 15662            | NR               | 885       | 6187             | NR               |
| 370       | 4767             | NR               | 500       | 98453            | NR               | 630       | 206250           | NR               | 760       | 13792            | NR               | 890       | 3830             | NR               |
| 375       | 5225             | NR               | 505       | 109244           | NR               | 635       | 198796           | NR               | 765       | 12765            | NR               | 895       | 4688             | NR               |
| 380       | 5499             | NR               | 510       | 117784           | NR               | 640       | 189406           | NR               | 770       | 11372            | NR               | 900       | 4680             | NR               |
| 385       | 5081             | NR               | 515       | 125000           | NR               | 645       | 180677           | NR               | 775       | 9965             | NR               | 905       | 4599             | NR               |
| 390       | 4739             | NR               | 520       | 131786           | NR               | 650       | 168402           | NR               | 780       | 9154             | NR               | 910       | 4495             | NR               |
| 395       | 4255             | NR               | 525       | 136796           | NR               | 655       | 157693           | NR               | 785       | 8847             | NR               | 915       | 3983             | NR               |
| 400       | 3864             | NR               | 530       | 142357           | NR               | 660       | 145357           | NR               | 790       | 7937             | NR               | 920       | 4675             | NR               |
| 405       | 3583             | NR               | 535       | 147243           | NR               | 665       | 132743           | NR               | 795       | 6956             | NR               | 925       | 4952             | NR               |
| 410       | 3994             | NR               | 540       | 152273           | NR               | 670       | 120757           | NR               | 800       | 6970             | NR               | 930       | 6097             | NR               |
| 415       | 5055             | NR               | 545       | 157222           | NR               | 675       | 108421           | NR               | 805       | 6299             | NR               | 935       | 5657             | NR               |
| 420       | 7131             | NR               | 550       | 161271           | NR               | 680       | 97325            | NR               | 810       | 6023             | NR               | 940       | 4574             | NR               |
| 425       | 11311            | NR               | 555       | 167038           | NR               | 685       | 86839            | NR               | 815       | 6343             | NR               | 945       | 5252             | NR               |
| 430       | 17754            | NR               | 560       | 173115           | NR               | 690       | 76248            | NR               | 820       | 6462             | NR               | 950       | 5635             | NR               |
| 435       | 28634            | NR               | 565       | 178502           | NR               | 695       | 67406            | NR               | 825       | 5476             | NR               | 955       | 4501             | NR               |
| 440       | 46392            | NR               | 570       | 184331           | NR               | 700       | 60039            | NR               | 830       | 5786             | NR               | 960       | 2938             | NR               |
| 445       | 78344            | NR               | 575       | 189666           | NR               | 705       | 53650            | NR               | 835       | 5884             | NR               | 965       | 5544             | NR               |
| 450       | 131219           | NR               | 580       | 196488           | NR               | 710       | 47273            | NR               | 840       | 4862             | NR               | 970       | 5050             | NR               |
| 455       | 170311           | NR               | 585       | 202769           | NR               | 715       | 41664            | NR               | 845       | 5651             | NR               | 975       | 5575             | NR               |
| 460       | 154269           | NR               | 590       | 207213           | NR               | 720       | 37083            | NR               | 850       | 5178             | NR               | 980       | 2973             | NR               |
| 465       | 126622           | NR               | 595       | 213472           | NR               | 725       | 32494            | NR               | 855       | 5510             | NR               | 985       | 4912             | NR               |
| 470       | 109065           | NR               | 600       | 218473           | NR               | 730       | 28665            | NR               | 860       | 5438             | NR               | 990       | 5454             | NR               |
| 475       | 91762            | NR               | 605       | 220737           | NR               | 735       | 25540            | NR               | 865       | 5848             | NR               | 995       | 6068             | NR               |
| 480       | 78213            | NR               | 610       | 221090           | NR               | 740       | 22878            | NR               | 870       | 4969             | NR               | 1000      | 9406             | NR               |
| 485       | 77035            | NR               | 615       | 220059           | NR               | 745       | 20304            | NR               | 875       | 5438             | NR               |           |                  |                  |

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Scotopic Flux vs. Wavelength



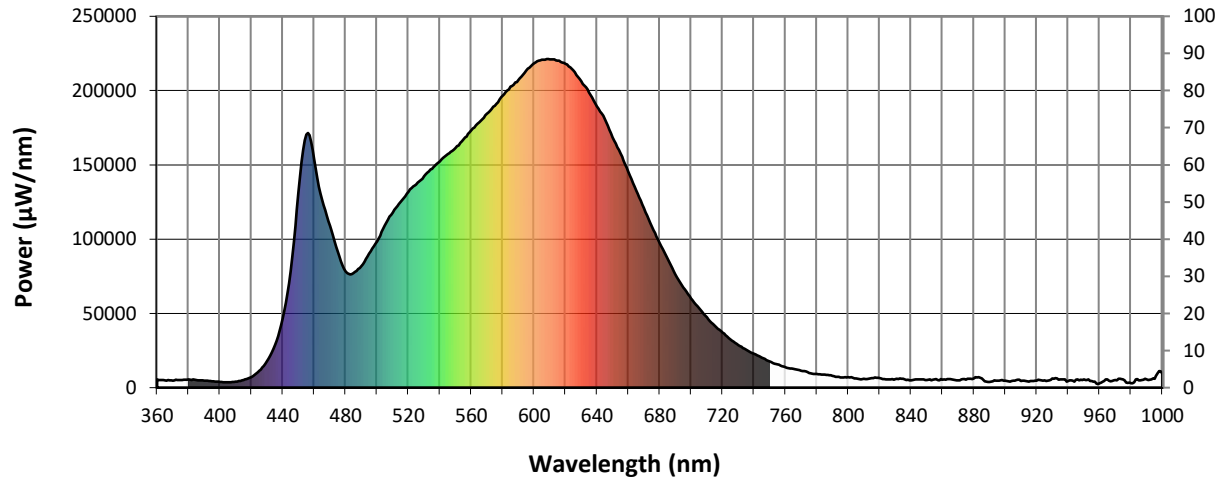
Scotopic Lumens: 19629.6

S/P: 1.6

| 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       | 5498             | NR               | 490       | 81900            | NR               | 620       | 217907           | NR               | 750       | 17550            | NR               | 880       | 6189             | NR               |
| 365       | 4903             | NR               | 495       | 90120            | NR               | 625       | 213734           | NR               | 755       | 15662            | NR               | 885       | 6187             | NR               |
| 370       | 4767             | NR               | 500       | 98453            | NR               | 630       | 206250           | NR               | 760       | 13792            | NR               | 890       | 3830             | NR               |
| 375       | 5225             | NR               | 505       | 109244           | NR               | 635       | 198796           | NR               | 765       | 12765            | NR               | 895       | 4688             | NR               |
| 380       | 5499             | NR               | 510       | 117784           | NR               | 640       | 189406           | NR               | 770       | 11372            | NR               | 900       | 4680             | NR               |
| 385       | 5081             | NR               | 515       | 125000           | NR               | 645       | 180677           | NR               | 775       | 9965             | NR               | 905       | 4599             | NR               |
| 390       | 4739             | NR               | 520       | 131786           | NR               | 650       | 168402           | NR               | 780       | 9154             | NR               | 910       | 4495             | NR               |
| 395       | 4255             | NR               | 525       | 136796           | NR               | 655       | 157693           | NR               | 785       | 8847             | NR               | 915       | 3983             | NR               |
| 400       | 3864             | NR               | 530       | 142357           | NR               | 660       | 145357           | NR               | 790       | 7937             | NR               | 920       | 4675             | NR               |
| 405       | 3583             | NR               | 535       | 147243           | NR               | 665       | 132743           | NR               | 795       | 6956             | NR               | 925       | 4952             | NR               |
| 410       | 3994             | NR               | 540       | 152273           | NR               | 670       | 120757           | NR               | 800       | 6970             | NR               | 930       | 6097             | NR               |
| 415       | 5055             | NR               | 545       | 157222           | NR               | 675       | 108421           | NR               | 805       | 6299             | NR               | 935       | 5657             | NR               |
| 420       | 7131             | NR               | 550       | 161271           | NR               | 680       | 97325            | NR               | 810       | 6023             | NR               | 940       | 4574             | NR               |
| 425       | 11311            | NR               | 555       | 167038           | NR               | 685       | 86839            | NR               | 815       | 6343             | NR               | 945       | 5252             | NR               |
| 430       | 17754            | NR               | 560       | 173115           | NR               | 690       | 76248            | NR               | 820       | 6462             | NR               | 950       | 5635             | NR               |
| 435       | 28634            | NR               | 565       | 178502           | NR               | 695       | 67406            | NR               | 825       | 5476             | NR               | 955       | 4501             | NR               |
| 440       | 46392            | NR               | 570       | 184331           | NR               | 700       | 60039            | NR               | 830       | 5786             | NR               | 960       | 2938             | NR               |
| 445       | 78344            | NR               | 575       | 189666           | NR               | 705       | 53650            | NR               | 835       | 5884             | NR               | 965       | 5544             | NR               |
| 450       | 131219           | NR               | 580       | 196488           | NR               | 710       | 47273            | NR               | 840       | 4862             | NR               | 970       | 5050             | NR               |
| 455       | 170311           | NR               | 585       | 202769           | NR               | 715       | 41664            | NR               | 845       | 5651             | NR               | 975       | 5575             | NR               |
| 460       | 154269           | NR               | 590       | 207213           | NR               | 720       | 37083            | NR               | 850       | 5178             | NR               | 980       | 2973             | NR               |
| 465       | 126622           | NR               | 595       | 213472           | NR               | 725       | 32494            | NR               | 855       | 5510             | NR               | 985       | 4912             | NR               |
| 470       | 109065           | NR               | 600       | 218473           | NR               | 730       | 28665            | NR               | 860       | 5438             | NR               | 990       | 5454             | NR               |
| 475       | 91762            | NR               | 605       | 220737           | NR               | 735       | 25540            | NR               | 865       | 5848             | NR               | 995       | 6068             | NR               |
| 480       | 78213            | NR               | 610       | 221090           | NR               | 740       | 22878            | NR               | 870       | 4969             | NR               | 1000      | 9406             | NR               |
| 485       | 77035            | NR               | 615       | 220059           | NR               | 745       | 20304            | NR               | 875       | 5438             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 7912.5**

**M/P: 0.65**

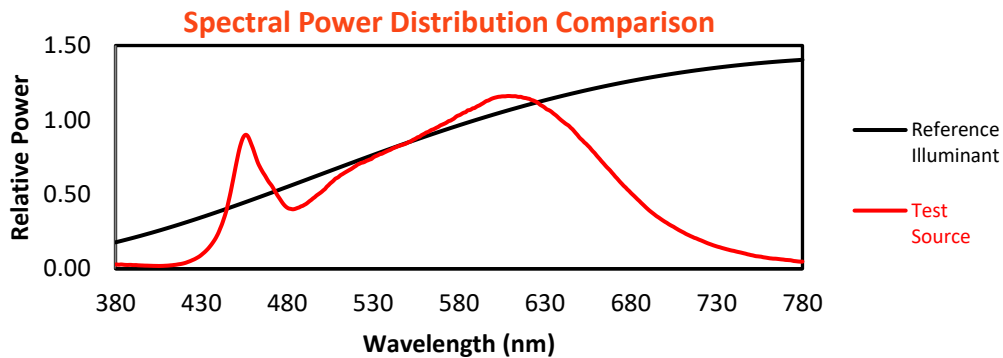
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 5498             | NR               | 490       | 81900            | NR               | 620       | 217907           | NR               | 750       | 17550            | NR               | 880       | 6189             | NR               |
| 365       | 4903             | NR               | 495       | 90120            | NR               | 625       | 213734           | NR               | 755       | 15662            | NR               | 885       | 6187             | NR               |
| 370       | 4767             | NR               | 500       | 98453            | NR               | 630       | 206250           | NR               | 760       | 13792            | NR               | 890       | 3830             | NR               |
| 375       | 5225             | NR               | 505       | 109244           | NR               | 635       | 198796           | NR               | 765       | 12765            | NR               | 895       | 4688             | NR               |
| 380       | 5499             | NR               | 510       | 117784           | NR               | 640       | 189406           | NR               | 770       | 11372            | NR               | 900       | 4680             | NR               |
| 385       | 5081             | NR               | 515       | 125000           | NR               | 645       | 180677           | NR               | 775       | 9965             | NR               | 905       | 4599             | NR               |
| 390       | 4739             | NR               | 520       | 131786           | NR               | 650       | 168402           | NR               | 780       | 9154             | NR               | 910       | 4495             | NR               |
| 395       | 4255             | NR               | 525       | 136796           | NR               | 655       | 157693           | NR               | 785       | 8847             | NR               | 915       | 3983             | NR               |
| 400       | 3864             | NR               | 530       | 142357           | NR               | 660       | 145357           | NR               | 790       | 7937             | NR               | 920       | 4675             | NR               |
| 405       | 3583             | NR               | 535       | 147243           | NR               | 665       | 132743           | NR               | 795       | 6956             | NR               | 925       | 4952             | NR               |
| 410       | 3994             | NR               | 540       | 152273           | NR               | 670       | 120757           | NR               | 800       | 6970             | NR               | 930       | 6097             | NR               |
| 415       | 5055             | NR               | 545       | 157222           | NR               | 675       | 108421           | NR               | 805       | 6299             | NR               | 935       | 5657             | NR               |
| 420       | 7131             | NR               | 550       | 161271           | NR               | 680       | 97325            | NR               | 810       | 6023             | NR               | 940       | 4574             | NR               |
| 425       | 11311            | NR               | 555       | 167038           | NR               | 685       | 86839            | NR               | 815       | 6343             | NR               | 945       | 5252             | NR               |
| 430       | 17754            | NR               | 560       | 173115           | NR               | 690       | 76248            | NR               | 820       | 6462             | NR               | 950       | 5635             | NR               |
| 435       | 28634            | NR               | 565       | 178502           | NR               | 695       | 67406            | NR               | 825       | 5476             | NR               | 955       | 4501             | NR               |
| 440       | 46392            | NR               | 570       | 184331           | NR               | 700       | 60039            | NR               | 830       | 5786             | NR               | 960       | 2938             | NR               |
| 445       | 78344            | NR               | 575       | 189666           | NR               | 705       | 53650            | NR               | 835       | 5884             | NR               | 965       | 5544             | NR               |
| 450       | 131219           | NR               | 580       | 196488           | NR               | 710       | 47273            | NR               | 840       | 4862             | NR               | 970       | 5050             | NR               |
| 455       | 170311           | NR               | 585       | 202769           | NR               | 715       | 41664            | NR               | 845       | 5651             | NR               | 975       | 5575             | NR               |
| 460       | 154269           | NR               | 590       | 207213           | NR               | 720       | 37083            | NR               | 850       | 5178             | NR               | 980       | 2973             | NR               |
| 465       | 126622           | NR               | 595       | 213472           | NR               | 725       | 32494            | NR               | 855       | 5510             | NR               | 985       | 4912             | NR               |
| 470       | 109065           | NR               | 600       | 218473           | NR               | 730       | 28665            | NR               | 860       | 5438             | NR               | 990       | 5454             | NR               |
| 475       | 91762            | NR               | 605       | 220737           | NR               | 735       | 25540            | NR               | 865       | 5848             | NR               | 995       | 6068             | NR               |
| 480       | 78213            | NR               | 610       | 221090           | NR               | 740       | 22878            | NR               | 870       | 4969             | NR               | 1000      | 9406             | NR               |
| 485       | 77035            | NR               | 615       | 220059           | NR               | 745       | 20304            | NR               | 875       | 5438             | NR               |           |                  |                  |

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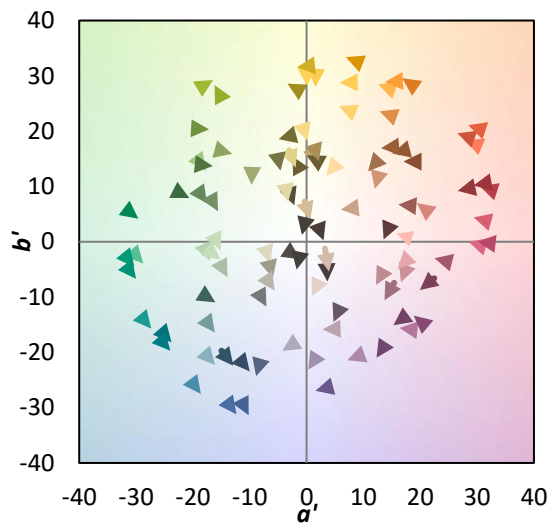
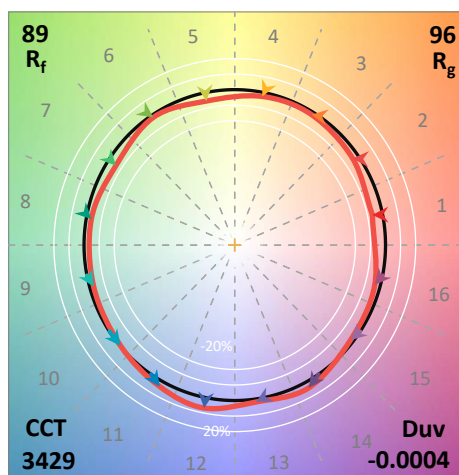
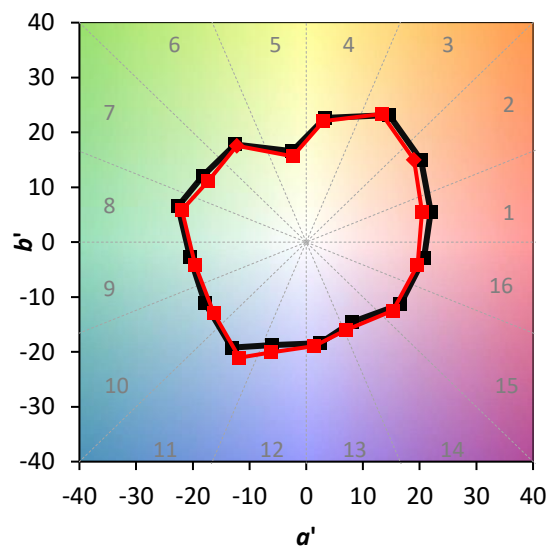
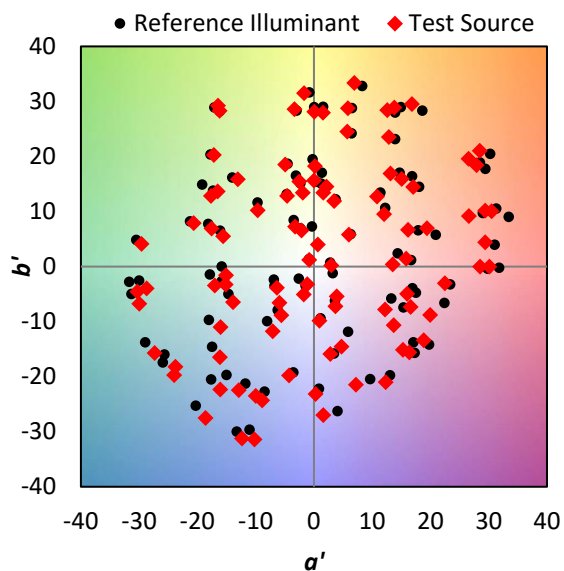
**TM-30-18**

**Summary**

$R_f = 88.9$   
 $R_g = 96.3$   
 $CIE R_a = 90.9$   
 $R_g = 50.7$



**Color Vector Graphics**

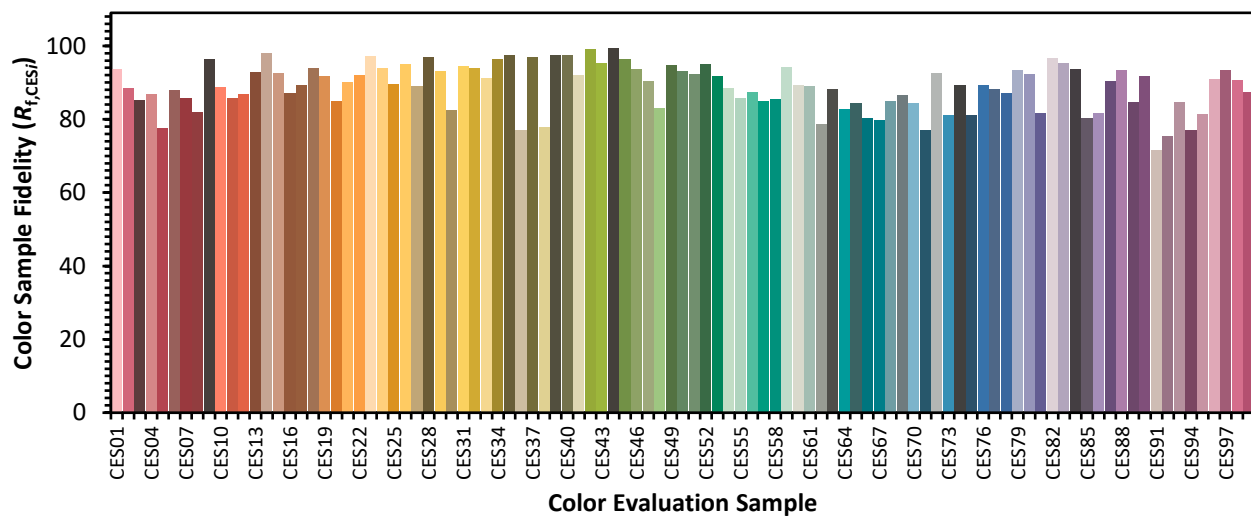


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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

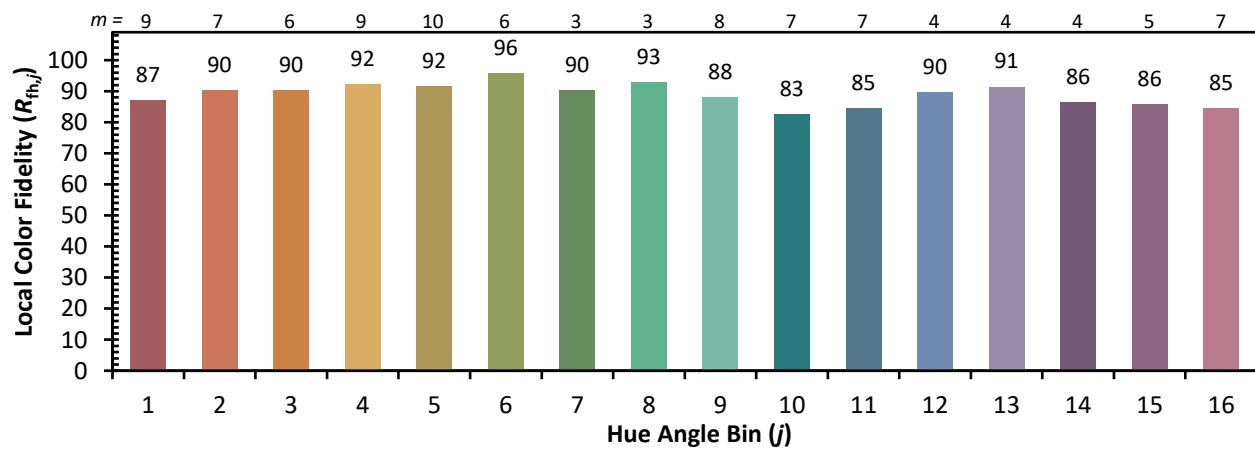
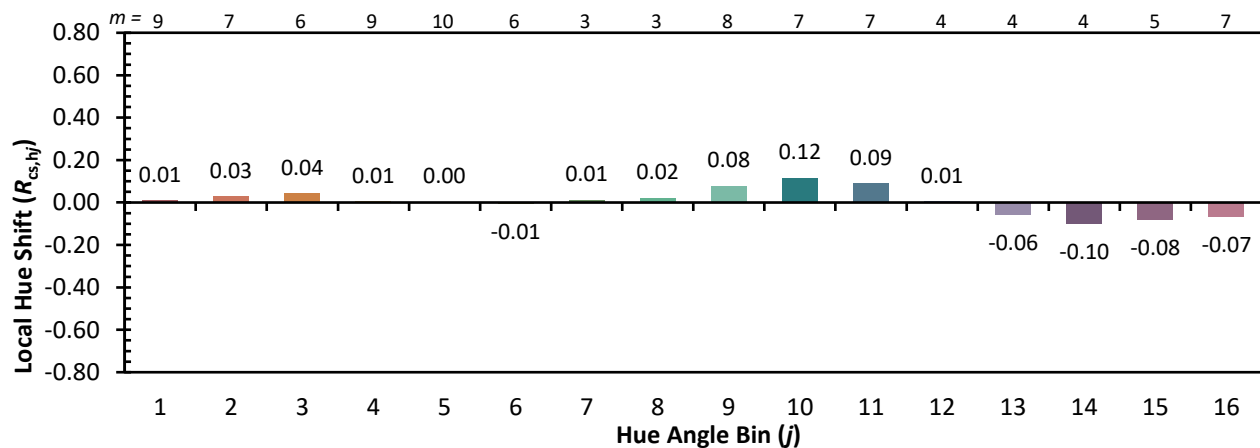
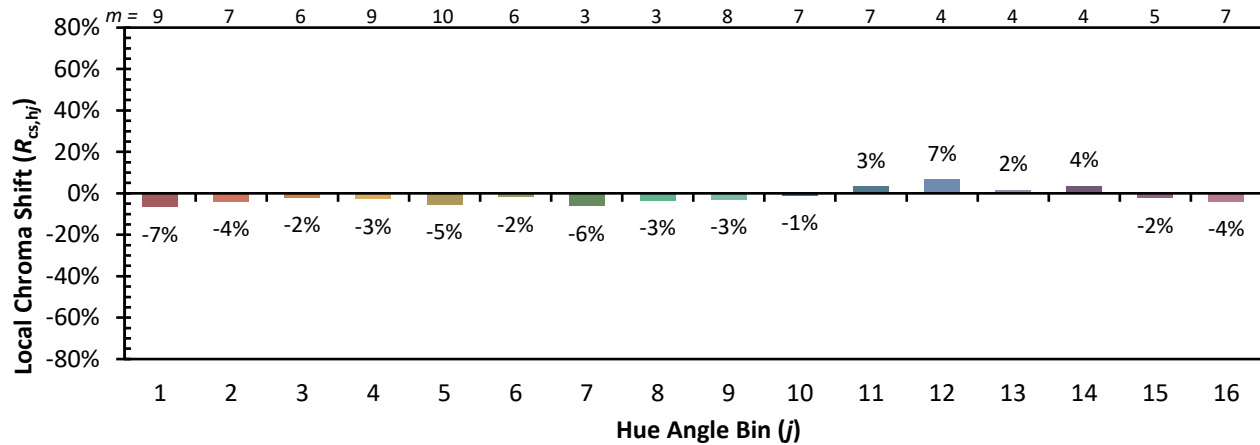
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|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 95 | CES51 = 92 | CES76 = 89 |
| CES02 = 62 | CES27 = 89 | CES52 = 95 | CES77 = 88 |
| CES03 = 31 | CES28 = 97 | CES53 = 92 | CES78 = 87 |
| CES04 = 70 | CES29 = 93 | CES54 = 89 | CES79 = 93 |
| CES05 = 49 | CES30 = 82 | CES55 = 86 | CES80 = 92 |
| CES06 = 51 | CES31 = 95 | CES56 = 87 | CES81 = 82 |
| CES07 = 42 | CES32 = 94 | CES57 = 85 | CES82 = 97 |
| CES08 = 41 | CES33 = 91 | CES58 = 85 | CES83 = 95 |
| CES09 = 29 | CES34 = 96 | CES59 = 94 | CES84 = 94 |
| CES10 = 75 | CES35 = 97 | CES60 = 89 | CES85 = 80 |
| CES11 = 58 | CES36 = 77 | CES61 = 89 | CES86 = 82 |
| CES12 = 64 | CES37 = 97 | CES62 = 79 | CES87 = 90 |
| CES13 = 43 | CES38 = 78 | CES63 = 88 | CES88 = 93 |
| CES14 = 74 | CES39 = 97 | CES64 = 83 | CES89 = 85 |
| CES15 = 71 | CES40 = 98 | CES65 = 84 | CES90 = 92 |
| CES16 = 47 | CES41 = 92 | CES66 = 80 | CES91 = 72 |
| CES17 = 50 | CES42 = 99 | CES67 = 80 | CES92 = 75 |
| CES18 = 56 | CES43 = 95 | CES68 = 85 | CES93 = 85 |
| CES19 = 71 | CES44 = 99 | CES69 = 86 | CES94 = 77 |
| CES20 = 66 | CES45 = 96 | CES70 = 84 | CES95 = 81 |
| CES21 = 86 | CES46 = 94 | CES71 = 77 | CES96 = 91 |
| CES22 = 78 | CES47 = 91 | CES72 = 93 | CES97 = 93 |
| CES23 = 91 | CES48 = 83 | CES73 = 81 | CES98 = 91 |
| CES24 = 90 | CES49 = 95 | CES74 = 89 | CES99 = 87 |
| CES25 = 71 | CES50 = 93 | CES75 = 81 |            |



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**Color Rendition by Hue-Angle Bin**

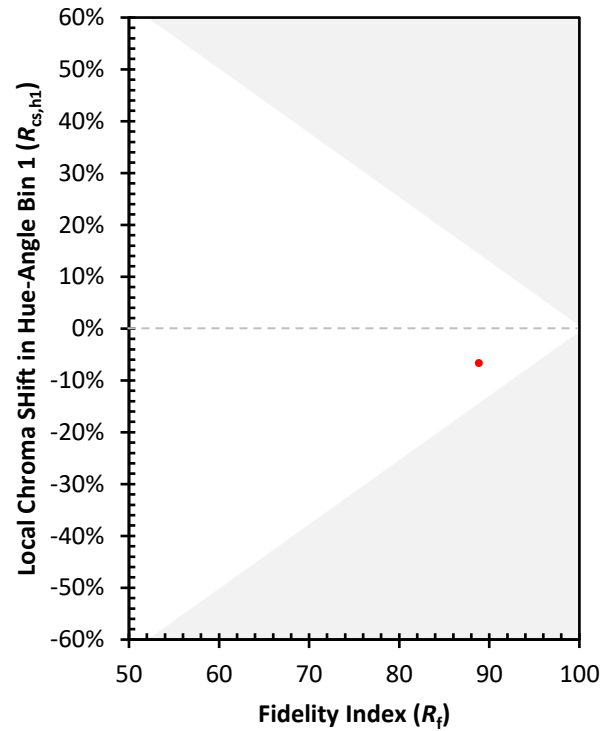
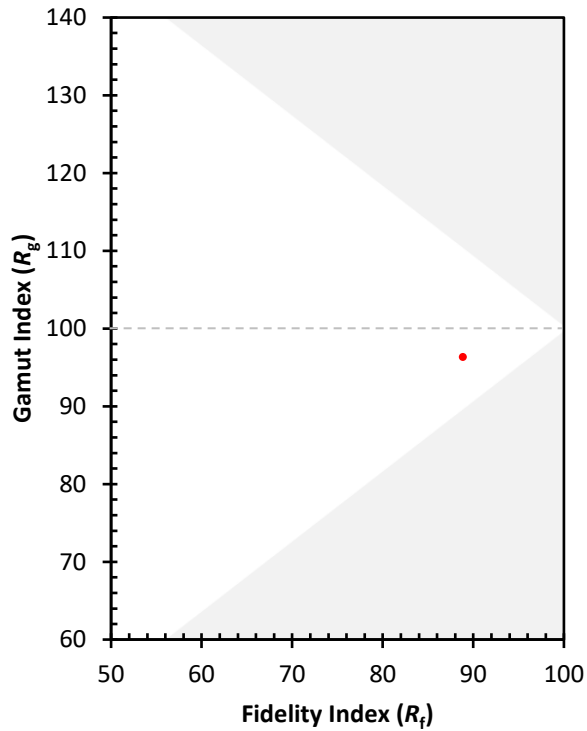




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**Measure Comparisons**



(END OF REPORT)