

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: P830757

Luminaire Tested: **OHBL-72SE-MCL-UNV-L840-CD**

Issue Date: 5/3/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P830757  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-2103-200-1)  
Test Lab: INNOVATION CENTER  
Issue Date: 5/3/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: METALUX  
Catalog Number: OHBL-72SE-MCL-UNV-L840-CD  
Description: 72000 LUMEN OHBL SE LED LUMINAIRE WITH 80CRI, 4000K LEDS AND MEDIUM CLEAR LENS  
Light Source: -  
Ballast/Driver: -

**Summary**

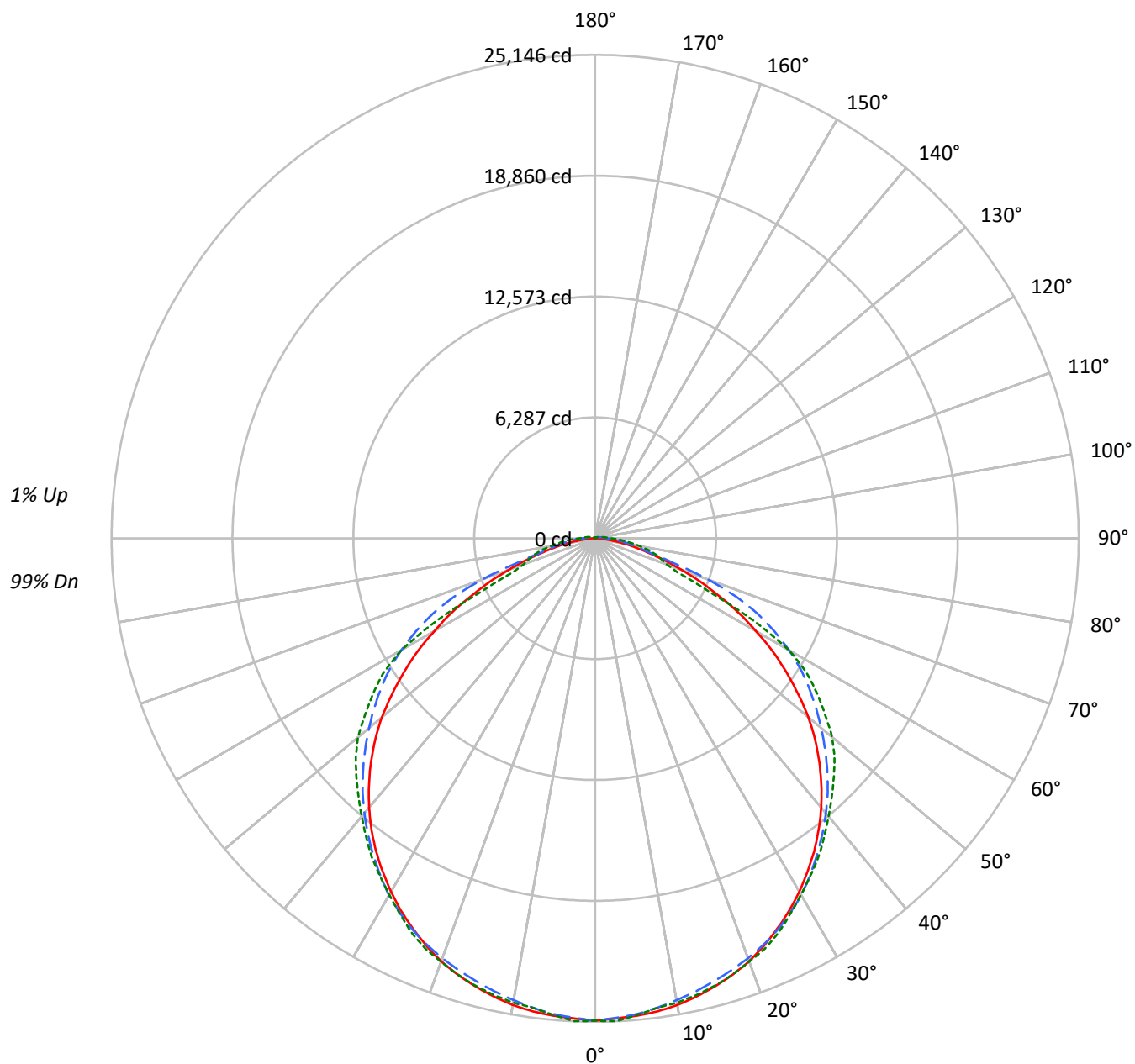
Lumens per Lamp: N/A  
Luminaire Lumens: 70929.0 lumens  
Efficiency: N/A  
Efficacy: 171.5 lumens/watt  
Spacing Criteria (0/90/45): 1.26 / 1.27 / 1.39  
Luminous Opening: Rectangular w/ Sides (W: 1.8' x L: 3.78' x H: 0.17')  
CIE Type: Direct

Input Watts (W): 413.7  
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: P830757

CATALOG NUMBER: OHBL-72SE-MCL-UNV-L840-CD

### Luminous Intensity Polar Plot





TEST NUMBER: P830757

CATALOG NUMBER: OHBL-72SE-MCL-UNV-L840-CD

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

|     |     |     |     |     |  |     |     |     |     |  |     |     |     |  |     |     |     |  |     |     |     |
|-----|-----|-----|-----|-----|--|-----|-----|-----|-----|--|-----|-----|-----|--|-----|-----|-----|--|-----|-----|-----|
| RF  | 20  |     |     |     |  | 20  |     |     |     |  | 20  |     |     |  |     | 20  |     |  |     |     | 20  |
| RC  | 80  |     |     |     |  | 70  |     |     |     |  | 50  |     |     |  |     | 30  |     |  |     |     | 10  |
| RW  | 70  | 50  | 30  | 10  |  | 70  | 50  | 30  | 10  |  | 50  | 30  | 10  |  | 50  | 30  | 10  |  | 50  | 30  | 10  |
| RCR |     |     |     |     |  |     |     |     |     |  |     |     |     |  |     |     |     |  |     |     |     |
| 0   | 119 | 119 | 119 | 119 |  | 116 | 116 | 116 | 116 |  | 110 | 110 | 110 |  | 106 | 106 | 106 |  | 101 | 101 | 101 |
| 1   | 109 | 104 | 100 | 96  |  | 106 | 102 | 98  | 95  |  | 97  | 94  | 91  |  | 93  | 91  | 88  |  | 90  | 87  | 86  |
| 2   | 99  | 91  | 84  | 79  |  | 96  | 89  | 83  | 78  |  | 85  | 80  | 76  |  | 82  | 78  | 74  |  | 79  | 75  | 72  |
| 3   | 91  | 80  | 72  | 66  |  | 88  | 79  | 71  | 65  |  | 75  | 69  | 64  |  | 72  | 67  | 63  |  | 70  | 65  | 61  |
| 4   | 83  | 71  | 62  | 56  |  | 81  | 70  | 62  | 55  |  | 67  | 60  | 54  |  | 65  | 59  | 54  |  | 62  | 57  | 53  |
| 5   | 76  | 64  | 55  | 48  |  | 74  | 62  | 54  | 48  |  | 60  | 53  | 47  |  | 58  | 52  | 46  |  | 56  | 50  | 46  |
| 6   | 70  | 57  | 48  | 42  |  | 68  | 56  | 48  | 42  |  | 54  | 47  | 41  |  | 52  | 46  | 41  |  | 51  | 45  | 40  |
| 7   | 65  | 52  | 43  | 37  |  | 63  | 51  | 43  | 37  |  | 49  | 42  | 36  |  | 48  | 41  | 36  |  | 46  | 40  | 36  |
| 8   | 61  | 47  | 39  | 33  |  | 59  | 46  | 38  | 33  |  | 45  | 38  | 33  |  | 44  | 37  | 32  |  | 42  | 36  | 32  |
| 9   | 57  | 43  | 35  | 30  |  | 55  | 43  | 35  | 29  |  | 41  | 34  | 29  |  | 40  | 34  | 29  |  | 39  | 33  | 29  |
| 10  | 53  | 40  | 32  | 27  |  | 52  | 39  | 32  | 27  |  | 38  | 31  | 27  |  | 37  | 31  | 26  |  | 36  | 30  | 26  |

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

|     | 0°    | 45°   | 90°   |
|-----|-------|-------|-------|
| 0°  | 39687 | 39687 | 39687 |
| 5°  | 39427 | 39110 | 39192 |
| 10° | 39283 | 38518 | 38757 |
| 15° | 39033 | 38075 | 38498 |
| 20° | 38784 | 37796 | 38157 |
| 25° | 38316 | 37514 | 37819 |
| 30° | 37807 | 37072 | 37104 |
| 35° | 37199 | 36369 | 36709 |
| 40° | 36408 | 35642 | 36172 |
| 45° | 35311 | 34802 | 35934 |
| 50° | 33825 | 33846 | 35649 |
| 55° | 31464 | 32905 | 34319 |
| 60° | 28373 | 31528 | 31728 |
| 65° | 24339 | 28972 | 20108 |
| 70° | 19604 | 22617 | 14579 |
| 75° | 14698 | 13426 | 14796 |
| 80° | 10231 | 11163 | 14127 |
| 85° | 5823  | 10229 | 13241 |



TEST NUMBER: P830757

CATALOG NUMBER: OHBL-72SE-MCL-UNV-L840-CD

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 2366.2  | 3.3       |
| 10°-20°   | 6785.1  | 9.6       |
| 20°-30°   | 10363.1 | 14.6      |
| 30°-40°   | 12573.9 | 17.7      |
| 40°-50°   | 13178.7 | 18.6      |
| 50°-60°   | 11941.9 | 16.8      |
| 60°-70°   | 8006.6  | 11.3      |
| 70°-80°   | 3595.3  | 5.1       |
| 80°-90°   | 1304.7  | 1.8       |
| 90°-100°  | 392.7   | 0.6       |
| 100°-110° | 185.3   | 0.3       |
| 110°-120° | 92.9    | 0.1       |
| 120°-130° | 51.2    | 0.1       |
| 130°-140° | 35.2    | 0.0       |
| 140°-150° | 23.7    | 0.0       |
| 150°-160° | 17.6    | 0.0       |
| 160°-170° | 11.3    | 0.0       |
| 170°-180° | 3.6     | 0.0       |
| <hr/>     |         |           |
| 0°-30°    | 19514.4 | 27.5      |
| 0°-40°    | 32088.4 | 45.2      |
| 0°-60°    | 57208.9 | 80.7      |
| 0°-90°    | 70115.5 | 98.9      |
| 90°-120°  | 670.9   | 0.9       |
| 90°-150°  | 781.0   | 1.1       |
| 90°-180°  | 814.0   | 1.1       |
| 0°-180°   | 70929.0 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°    | 22.5° | 45°   | 67.5° | 90°   | Flux  |
|------|-------|-------|-------|-------|-------|-------|
| 0°   | 25095 | 25095 | 25095 | 25095 | 25095 |       |
| 5°   | 24932 | 25018 | 24844 | 24921 | 24888 | ###   |
| 15°  | 24122 | 24028 | 23857 | 24068 | 24097 | 6811  |
| 25°  | 22410 | 22312 | 22468 | 22674 | 22609 | 10330 |
| 35°  | 19862 | 19910 | 20113 | 20327 | 20247 | 12415 |
| 45°  | 16484 | 16753 | 17065 | 17500 | 17555 | 12699 |
| 55°  | 12130 | 12714 | 13582 | 14126 | 14093 | 10828 |
| 65°  | 7119  | 8233  | 9347  | 7888  | 6441  | 7093  |
| 75°  | 2801  | 4064  | 2990  | 3059  | 3258  | 3061  |
| 85°  | 483   | 925   | 1186  | 1433  | 1502  | 589   |
| 90°  | 4     | 308   | 613   | 769   | 806   | 29    |
| 95°  | 4     | 192   | 421   | 512   | 526   | 5     |
| 105° | 14    | 84    | 207   | 250   | 261   | 17    |
| 115° | 29    | 44    | 105   | 134   | 142   | 27    |
| 125° | 25    | 29    | 65    | 76    | 80    | 25    |
| 135° | 33    | 36    | 40    | 58    | 62    | 26    |
| 145° | 33    | 36    | 36    | 40    | 44    | 22    |
| 155° | 36    | 40    | 40    | 40    | 36    | 17    |
| 165° | 40    | 40    | 40    | 40    | 40    | 11    |
| 175° | 40    | 40    | 36    | 33    | 33    | 4     |
| 180° | 36    | 36    | 36    | 36    | 36    |       |



TEST NUMBER: P830757

CATALOG NUMBER: OHBL-72SE-MCL-UNV-L840-CD

**CANDELA DISTRIBUTION (FULL):**

|        | 0°      | 22.5°   | 45°     | 67.5°   | 90°     |
|--------|---------|---------|---------|---------|---------|
| 0°     | 25094.7 | 25094.7 | 25094.7 | 25094.7 | 25094.7 |
| 2.5°   | 24993.1 | 25098.4 | 24967.7 | 25109.3 | 25145.5 |
| 5°     | 24931.5 | 25018.5 | 24844.4 | 24920.6 | 24887.9 |
| 7.5°   | 24819.0 | 24848.0 | 24641.2 | 24702.9 | 24637.5 |
| 10°    | 24652.1 | 24637.5 | 24394.4 | 24514.2 | 24528.7 |
| 12.5°  | 24405.3 | 24361.8 | 24144.1 | 24325.5 | 24329.1 |
| 15°    | 24122.3 | 24028.0 | 23857.4 | 24067.9 | 24096.9 |
| 17.5°  | 23795.7 | 23672.4 | 23559.9 | 23832.0 | 23788.5 |
| 20°    | 23414.7 | 23269.6 | 23247.8 | 23545.4 | 23436.5 |
| 22.5°  | 22943.0 | 22830.6 | 22881.4 | 23164.4 | 23095.4 |
| 25°    | 22409.6 | 22311.7 | 22467.7 | 22674.5 | 22609.2 |
| 27.5°  | 21847.2 | 21789.2 | 21967.0 | 22126.6 | 21999.6 |
| 30°    | 21230.4 | 21197.7 | 21433.6 | 21564.2 | 21404.6 |
| 32.5°  | 20559.1 | 20570.0 | 20795.0 | 20972.8 | 20824.0 |
| 35°    | 19862.4 | 19909.6 | 20112.8 | 20326.9 | 20247.1 |
| 37.5°  | 19096.8 | 19202.0 | 19405.2 | 19648.4 | 19564.9 |
| 40°    | 18287.7 | 18440.1 | 18665.0 | 18958.9 | 18882.7 |
| 42.5°  | 17413.2 | 17605.5 | 17895.8 | 18222.4 | 18215.1 |
| 45°    | 16484.3 | 16752.8 | 17064.9 | 17500.3 | 17554.7 |
| 47.5°  | 15519.1 | 15820.3 | 16215.8 | 16796.3 | 16879.8 |
| 50°    | 14470.5 | 14847.8 | 15341.3 | 16038.0 | 16088.8 |
| 52.5°  | 13302.1 | 13817.3 | 14470.5 | 15138.1 | 15076.4 |
| 55°    | 12130.1 | 12714.3 | 13581.5 | 14125.8 | 14093.1 |
| 57.5°  | 10961.7 | 11618.5 | 12670.7 | 13059.0 | 13055.4 |
| 60°    | 9655.5  | 10486.4 | 11636.6 | 11930.5 | 11640.2 |
| 62.5°  | 8447.2  | 9339.8  | 10533.5 | 10319.5 | 9325.3  |
| 65°    | 7119.1  | 8233.1  | 9347.0  | 7888.4  | 6440.6  |
| 67.5°  | 5939.9  | 7101.0  | 7939.2  | 5402.8  | 4626.3  |
| 70°    | 4753.3  | 6034.2  | 6190.2  | 4009.5  | 3955.1  |
| 72.5°  | 3701.1  | 5065.4  | 4270.8  | 3432.6  | 3606.7  |
| 75°    | 2801.2  | 4063.9  | 2989.9  | 3058.8  | 3258.4  |
| 77.5°  | 2042.8  | 3120.5  | 2325.9  | 2681.5  | 2844.7  |
| 80°    | 1404.2  | 2209.8  | 1897.7  | 2253.3  | 2365.8  |
| 82.5°  | 881.7   | 1458.7  | 1520.3  | 1814.3  | 1930.4  |
| 85°    | 482.6   | 925.3   | 1186.5  | 1433.3  | 1502.2  |
| 87.5°  | 199.6   | 558.8   | 907.1   | 1106.7  | 1164.8  |
| 90°    | 3.6     | 308.4   | 613.2   | 769.2   | 805.5   |
| 92.5°  | 3.6     | 235.9   | 500.7   | 620.5   | 645.9   |
| 95°    | 3.6     | 192.3   | 420.9   | 511.6   | 526.1   |
| 97.5°  | 7.3     | 152.4   | 352.0   | 424.5   | 439.0   |
| 100°   | 10.9    | 127.0   | 293.9   | 355.6   | 366.5   |
| 102.5° | 14.5    | 101.6   | 246.7   | 297.5   | 308.4   |
| 105°   | 14.5    | 83.5    | 206.8   | 250.4   | 261.3   |



TEST NUMBER: P830757

CATALOG NUMBER: OHBL-72SE-MCL-UNV-L840-CD

**CANDELA DISTRIBUTION (continued):**

|        | 0°   | 22.5° | 45°   | 67.5° | 90°   |
|--------|------|-------|-------|-------|-------|
| 112.5° | 25.4 | 50.8  | 123.4 | 156.0 | 163.3 |
| 115°   | 29.0 | 43.5  | 105.2 | 134.3 | 141.5 |
| 117.5° | 29.0 | 36.3  | 90.7  | 112.5 | 119.7 |
| 120°   | 29.0 | 32.7  | 79.8  | 98.0  | 101.6 |
| 122.5° | 29.0 | 29.0  | 68.9  | 87.1  | 90.7  |
| 125°   | 25.4 | 29.0  | 65.3  | 76.2  | 79.8  |
| 127.5° | 29.0 | 29.0  | 58.1  | 68.9  | 72.6  |
| 130°   | 29.0 | 32.7  | 50.8  | 65.3  | 65.3  |
| 132.5° | 32.7 | 36.3  | 47.2  | 61.7  | 61.7  |
| 135°   | 32.7 | 36.3  | 39.9  | 58.1  | 61.7  |
| 137.5° | 36.3 | 36.3  | 36.3  | 54.4  | 58.1  |
| 140°   | 36.3 | 36.3  | 32.7  | 47.2  | 50.8  |
| 142.5° | 32.7 | 36.3  | 32.7  | 43.5  | 47.2  |
| 145°   | 32.7 | 36.3  | 36.3  | 39.9  | 43.5  |
| 147.5° | 36.3 | 36.3  | 36.3  | 36.3  | 39.9  |
| 150°   | 36.3 | 36.3  | 36.3  | 36.3  | 36.3  |
| 152.5° | 36.3 | 36.3  | 36.3  | 36.3  | 36.3  |
| 155°   | 36.3 | 39.9  | 39.9  | 39.9  | 36.3  |
| 157.5° | 36.3 | 39.9  | 39.9  | 39.9  | 39.9  |
| 160°   | 36.3 | 39.9  | 39.9  | 39.9  | 39.9  |
| 162.5° | 39.9 | 39.9  | 39.9  | 39.9  | 39.9  |
| 165°   | 39.9 | 39.9  | 39.9  | 39.9  | 39.9  |
| 167.5° | 39.9 | 43.5  | 39.9  | 39.9  | 39.9  |
| 170°   | 39.9 | 39.9  | 39.9  | 36.3  | 36.3  |
| 172.5° | 39.9 | 39.9  | 39.9  | 36.3  | 36.3  |
| 175°   | 39.9 | 39.9  | 36.3  | 32.7  | 32.7  |
| 177.5° | 43.5 | 39.9  | 36.3  | 32.7  | 29.0  |
| 180°   | 36.3 | 36.3  | 36.3  | 36.3  | 36.3  |



Report Generated By 670246072 / DESKTOP-50001EG





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







|        |      |      |       |       |       |
|--------|------|------|-------|-------|-------|
| 107.5° | 18.1 | 68.9 | 177.8 | 214.1 | 221.3 |
| 110°   | 21.8 | 58.1 | 148.8 | 181.4 | 188.7 |



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

Report Prepared for

Cooper Lighting Solutions

METALUX

Report Number: SP1-2304-001-1

Test Date: 05/31/2023

Luminaire Tested: OHB-15SE-N-UNV-L840

Data in this report applies to families of products including OHB-15SE-N-UNV-L840.

### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2304-001-1  
 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-L840**  
 Description: 15SE OHB WITH APT LEDS, NARROW LENS, 80CRI 4000K

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 4018   | CRI (Ra): | 84.0 |      |      |
| CIE u':                   | 0.2242 | R1:       | 82.5 | R9:  | 11.5 |
| CIE v':                   | 0.5025 | R2:       | 91.6 | R10: | 79.8 |
| Duv:                      | 0.0010 | R3:       | 96.1 | R11: | 80.5 |
| CIE x:                    | 0.3803 | R4:       | 81.4 | R12: | 64.0 |
| CIE y:                    | 0.3788 | R5:       | 82.4 | R13: | 85.1 |
| CIE z:                    | 0.2410 | R6:       | 88.0 | R14: | 98.4 |
| Peak Wavelength (nm):     | 454    | R7:       | 85.5 |      |      |
| Dominant Wavelength (nm): | 578    | R8:       | 64.7 |      |      |
| Purity:                   | 27.9   |           |      |      |      |
| Rf:                       | 84.5   |           |      |      |      |
| Rg:                       | 93.7   |           |      |      |      |



### Test Conditions

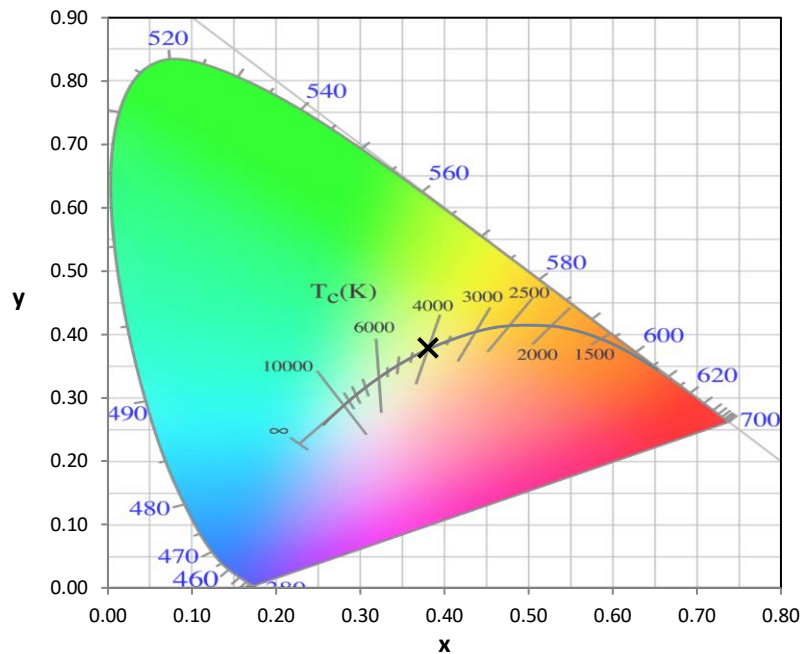
Stabilization Time: 23M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.7/44%  
 Sphere Temperature (°C): 25.3

REPORT NUMBER: SP1-2304-001-1

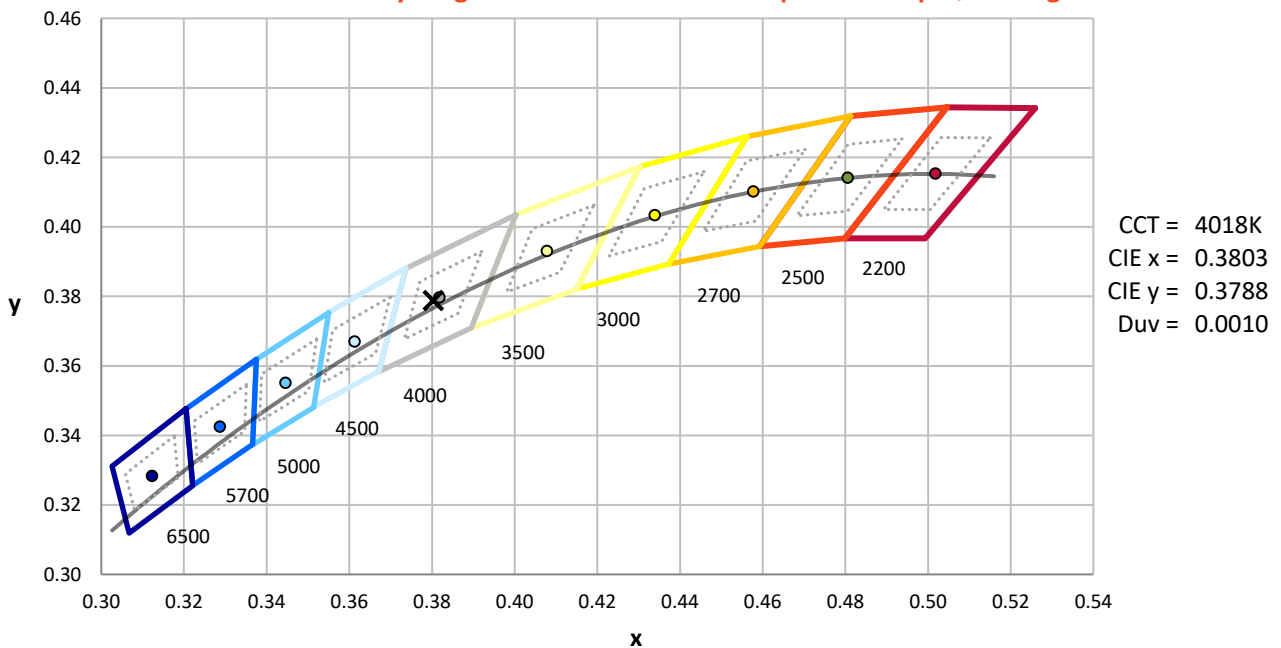
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date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

REPORT NUMBER: SP1-2304-001-1

CIE 1931 Chromaticity Diagram



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



Point lies inside the ANSI 4000K 4-step quadrangle

REPORT NUMBER: SP1-2304-001-1

**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       | 6853             | NR               | 490       | 98921            | NR               | 620       | 217813           | NR               | 750       | 11077            | NR               | 880       | 7212             | NR               |
| 365       | 5941             | NR               | 495       | 111249           | NR               | 625       | 204757           | NR               | 755       | 10374            | NR               | 885       | 8336             | NR               |
| 370       | 6345             | NR               | 500       | 125186           | NR               | 630       | 189812           | NR               | 760       | 9527             | NR               | 890       | 8299             | NR               |
| 375       | 7044             | NR               | 505       | 139782           | NR               | 635       | 174714           | NR               | 765       | 9227             | NR               | 895       | 8295             | NR               |
| 380       | 6587             | NR               | 510       | 150374           | NR               | 640       | 160641           | NR               | 770       | 8071             | NR               | 900       | 5725             | NR               |
| 385       | 6443             | NR               | 515       | 158837           | NR               | 645       | 146146           | NR               | 775       | 7303             | NR               | 905       | 5085             | NR               |
| 390       | 5977             | NR               | 520       | 167163           | NR               | 650       | 132087           | NR               | 780       | 6839             | NR               | 910       | 6133             | NR               |
| 395       | 5473             | NR               | 525       | 171514           | NR               | 655       | 118817           | NR               | 785       | 5988             | NR               | 915       | 6429             | NR               |
| 400       | 4874             | NR               | 530       | 176783           | NR               | 660       | 105411           | NR               | 790       | 5761             | NR               | 920       | 7354             | NR               |
| 405       | 4470             | NR               | 535       | 182412           | NR               | 665       | 92911            | NR               | 795       | 6396             | NR               | 925       | 6889             | NR               |
| 410       | 5232             | NR               | 540       | 187578           | NR               | 670       | 81240            | NR               | 800       | 6049             | NR               | 930       | 7465             | NR               |
| 415       | 7030             | NR               | 545       | 192635           | NR               | 675       | 70762            | NR               | 805       | 5748             | NR               | 935       | 9430             | NR               |
| 420       | 11074            | NR               | 550       | 198282           | NR               | 680       | 61913            | NR               | 810       | 5571             | NR               | 940       | 6867             | NR               |
| 425       | 19121            | NR               | 555       | 206255           | NR               | 685       | 53742            | NR               | 815       | 5977             | NR               | 945       | 7026             | NR               |
| 430       | 32148            | NR               | 560       | 213621           | NR               | 690       | 46348            | NR               | 820       | 6580             | NR               | 950       | 9476             | NR               |
| 435       | 54073            | NR               | 565       | 222021           | NR               | 695       | 40313            | NR               | 825       | 6610             | NR               | 955       | 8237             | NR               |
| 440       | 89242            | NR               | 570       | 230974           | NR               | 700       | 35240            | NR               | 830       | 6652             | NR               | 960       | 7127             | NR               |
| 445       | 153497           | NR               | 575       | 237268           | NR               | 705       | 30635            | NR               | 835       | 5919             | NR               | 965       | 5614             | NR               |
| 450       | 236793           | NR               | 580       | 244317           | NR               | 710       | 27359            | NR               | 840       | 5707             | NR               | 970       | 9396             | NR               |
| 455       | 259282           | NR               | 585       | 250340           | NR               | 715       | 24401            | NR               | 845       | 5548             | NR               | 975       | 9700             | NR               |
| 460       | 209272           | NR               | 590       | 252316           | NR               | 720       | 21810            | NR               | 850       | 5560             | NR               | 980       | 8916             | NR               |
| 465       | 162456           | NR               | 595       | 253019           | NR               | 725       | 19005            | NR               | 855       | 6972             | NR               | 985       | 9548             | NR               |
| 470       | 132627           | NR               | 600       | 252244           | NR               | 730       | 17009            | NR               | 860       | 8311             | NR               | 990       | 10271            | NR               |
| 475       | 106283           | NR               | 605       | 246798           | NR               | 735       | 14940            | NR               | 865       | 6330             | NR               | 995       | 7323             | NR               |
| 480       | 91347            | NR               | 610       | 238764           | NR               | 740       | 13159            | NR               | 870       | 8019             | NR               | 1000      | 8719             | NR               |
| 485       | 91575            | NR               | 615       | 229100           | NR               | 745       | 12000            | NR               | 875       | 7419             | NR               |           |                  |                  |

REPORT NUMBER: SP1-2304-001-1

Scotopic Flux vs. Wavelength



Scotopic Lumens: 25258.1

S/P: 1.73

| 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       | 6853             | NR               | 490       | 98921            | NR               | 620       | 217813           | NR               | 750       | 11077            | NR               | 880       | 7212             | NR               |
| 365       | 5941             | NR               | 495       | 111249           | NR               | 625       | 204757           | NR               | 755       | 10374            | NR               | 885       | 8336             | NR               |
| 370       | 6345             | NR               | 500       | 125186           | NR               | 630       | 189812           | NR               | 760       | 9527             | NR               | 890       | 8299             | NR               |
| 375       | 7044             | NR               | 505       | 139782           | NR               | 635       | 174714           | NR               | 765       | 9227             | NR               | 895       | 8295             | NR               |
| 380       | 6587             | NR               | 510       | 150374           | NR               | 640       | 160641           | NR               | 770       | 8071             | NR               | 900       | 5725             | NR               |
| 385       | 6443             | NR               | 515       | 158837           | NR               | 645       | 146146           | NR               | 775       | 7303             | NR               | 905       | 5085             | NR               |
| 390       | 5977             | NR               | 520       | 167163           | NR               | 650       | 132087           | NR               | 780       | 6839             | NR               | 910       | 6133             | NR               |
| 395       | 5473             | NR               | 525       | 171514           | NR               | 655       | 118817           | NR               | 785       | 5988             | NR               | 915       | 6429             | NR               |
| 400       | 4874             | NR               | 530       | 176783           | NR               | 660       | 105411           | NR               | 790       | 5761             | NR               | 920       | 7354             | NR               |
| 405       | 4470             | NR               | 535       | 182412           | NR               | 665       | 92911            | NR               | 795       | 6396             | NR               | 925       | 6889             | NR               |
| 410       | 5232             | NR               | 540       | 187578           | NR               | 670       | 81240            | NR               | 800       | 6049             | NR               | 930       | 7465             | NR               |
| 415       | 7030             | NR               | 545       | 192635           | NR               | 675       | 70762            | NR               | 805       | 5748             | NR               | 935       | 9430             | NR               |
| 420       | 11074            | NR               | 550       | 198282           | NR               | 680       | 61913            | NR               | 810       | 5571             | NR               | 940       | 6867             | NR               |
| 425       | 19121            | NR               | 555       | 206255           | NR               | 685       | 53742            | NR               | 815       | 5977             | NR               | 945       | 7026             | NR               |
| 430       | 32148            | NR               | 560       | 213621           | NR               | 690       | 46348            | NR               | 820       | 6580             | NR               | 950       | 9476             | NR               |
| 435       | 54073            | NR               | 565       | 222021           | NR               | 695       | 40313            | NR               | 825       | 6610             | NR               | 955       | 8237             | NR               |
| 440       | 89242            | NR               | 570       | 230974           | NR               | 700       | 35240            | NR               | 830       | 6652             | NR               | 960       | 7127             | NR               |
| 445       | 153497           | NR               | 575       | 237268           | NR               | 705       | 30635            | NR               | 835       | 5919             | NR               | 965       | 5614             | NR               |
| 450       | 236793           | NR               | 580       | 244317           | NR               | 710       | 27359            | NR               | 840       | 5707             | NR               | 970       | 9396             | NR               |
| 455       | 259282           | NR               | 585       | 250340           | NR               | 715       | 24401            | NR               | 845       | 5548             | NR               | 975       | 9700             | NR               |
| 460       | 209272           | NR               | 590       | 252316           | NR               | 720       | 21810            | NR               | 850       | 5560             | NR               | 980       | 8916             | NR               |
| 465       | 162456           | NR               | 595       | 253019           | NR               | 725       | 19005            | NR               | 855       | 6972             | NR               | 985       | 9548             | NR               |
| 470       | 132627           | NR               | 600       | 252244           | NR               | 730       | 17009            | NR               | 860       | 8311             | NR               | 990       | 10271            | NR               |
| 475       | 106283           | NR               | 605       | 246798           | NR               | 735       | 14940            | NR               | 865       | 6330             | NR               | 995       | 7323             | NR               |
| 480       | 91347            | NR               | 610       | 238764           | NR               | 740       | 13159            | NR               | 870       | 8019             | NR               | 1000      | 8719             | NR               |
| 485       | 91575            | NR               | 615       | 229100           | NR               | 745       | 12000            | NR               | 875       | 7419             | NR               |           |                  |                  |

REPORT NUMBER: SP1-2304-001-1

**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 10357.9 M/P: 0.71**

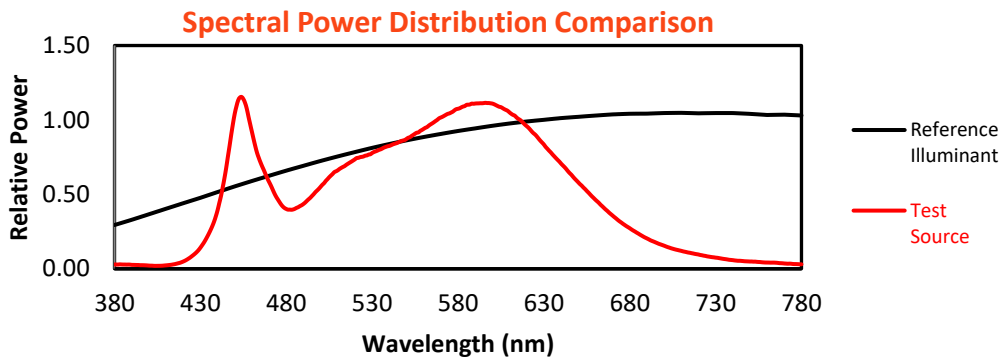
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 6853             | NR               | 490       | 98921            | NR               | 620       | 217813           | NR               | 750       | 11077            | NR               | 880       | 7212             | NR               |
| 365       | 5941             | NR               | 495       | 111249           | NR               | 625       | 204757           | NR               | 755       | 10374            | NR               | 885       | 8336             | NR               |
| 370       | 6345             | NR               | 500       | 125186           | NR               | 630       | 189812           | NR               | 760       | 9527             | NR               | 890       | 8299             | NR               |
| 375       | 7044             | NR               | 505       | 139782           | NR               | 635       | 174714           | NR               | 765       | 9227             | NR               | 895       | 8295             | NR               |
| 380       | 6587             | NR               | 510       | 150374           | NR               | 640       | 160641           | NR               | 770       | 8071             | NR               | 900       | 5725             | NR               |
| 385       | 6443             | NR               | 515       | 158837           | NR               | 645       | 146146           | NR               | 775       | 7303             | NR               | 905       | 5085             | NR               |
| 390       | 5977             | NR               | 520       | 167163           | NR               | 650       | 132087           | NR               | 780       | 6839             | NR               | 910       | 6133             | NR               |
| 395       | 5473             | NR               | 525       | 171514           | NR               | 655       | 118817           | NR               | 785       | 5988             | NR               | 915       | 6429             | NR               |
| 400       | 4874             | NR               | 530       | 176783           | NR               | 660       | 105411           | NR               | 790       | 5761             | NR               | 920       | 7354             | NR               |
| 405       | 4470             | NR               | 535       | 182412           | NR               | 665       | 92911            | NR               | 795       | 6396             | NR               | 925       | 6889             | NR               |
| 410       | 5232             | NR               | 540       | 187578           | NR               | 670       | 81240            | NR               | 800       | 6049             | NR               | 930       | 7465             | NR               |
| 415       | 7030             | NR               | 545       | 192635           | NR               | 675       | 70762            | NR               | 805       | 5748             | NR               | 935       | 9430             | NR               |
| 420       | 11074            | NR               | 550       | 198282           | NR               | 680       | 61913            | NR               | 810       | 5571             | NR               | 940       | 6867             | NR               |
| 425       | 19121            | NR               | 555       | 206255           | NR               | 685       | 53742            | NR               | 815       | 5977             | NR               | 945       | 7026             | NR               |
| 430       | 32148            | NR               | 560       | 213621           | NR               | 690       | 46348            | NR               | 820       | 6580             | NR               | 950       | 9476             | NR               |
| 435       | 54073            | NR               | 565       | 222021           | NR               | 695       | 40313            | NR               | 825       | 6610             | NR               | 955       | 8237             | NR               |
| 440       | 89242            | NR               | 570       | 230974           | NR               | 700       | 35240            | NR               | 830       | 6652             | NR               | 960       | 7127             | NR               |
| 445       | 153497           | NR               | 575       | 237268           | NR               | 705       | 30635            | NR               | 835       | 5919             | NR               | 965       | 5614             | NR               |
| 450       | 236793           | NR               | 580       | 244317           | NR               | 710       | 27359            | NR               | 840       | 5707             | NR               | 970       | 9396             | NR               |
| 455       | 259282           | NR               | 585       | 250340           | NR               | 715       | 24401            | NR               | 845       | 5548             | NR               | 975       | 9700             | NR               |
| 460       | 209272           | NR               | 590       | 252316           | NR               | 720       | 21810            | NR               | 850       | 5560             | NR               | 980       | 8916             | NR               |
| 465       | 162456           | NR               | 595       | 253019           | NR               | 725       | 19005            | NR               | 855       | 6972             | NR               | 985       | 9548             | NR               |
| 470       | 132627           | NR               | 600       | 252244           | NR               | 730       | 17009            | NR               | 860       | 8311             | NR               | 990       | 10271            | NR               |
| 475       | 106283           | NR               | 605       | 246798           | NR               | 735       | 14940            | NR               | 865       | 6330             | NR               | 995       | 7323             | NR               |
| 480       | 91347            | NR               | 610       | 238764           | NR               | 740       | 13159            | NR               | 870       | 8019             | NR               | 1000      | 8719             | NR               |
| 485       | 91575            | NR               | 615       | 229100           | NR               | 745       | 12000            | NR               | 875       | 7419             | NR               |           |                  |                  |

REPORT NUMBER: SP1-2304-001-1

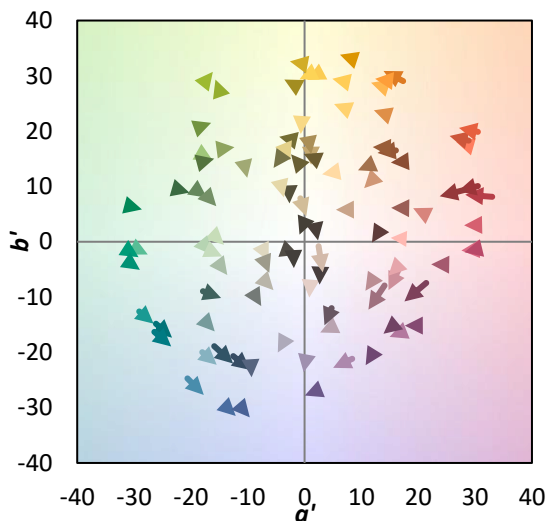
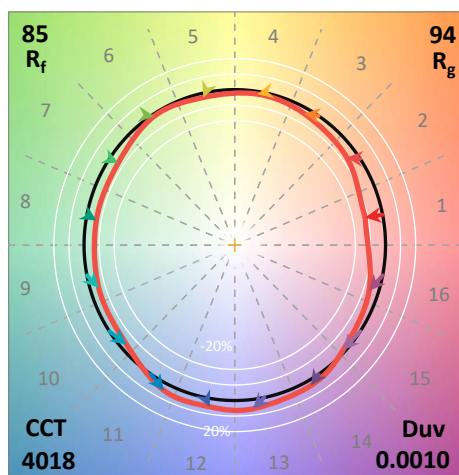
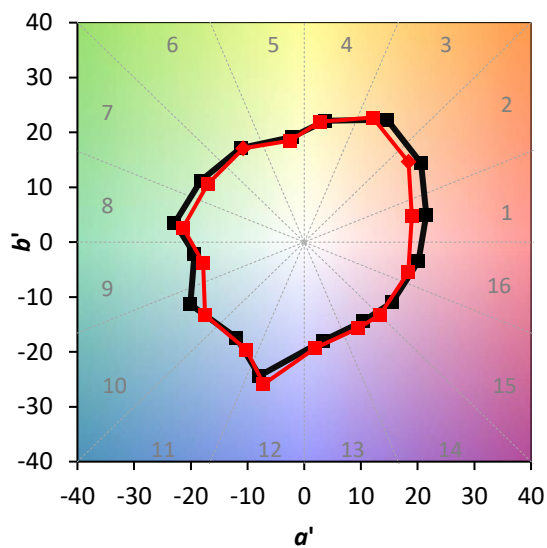
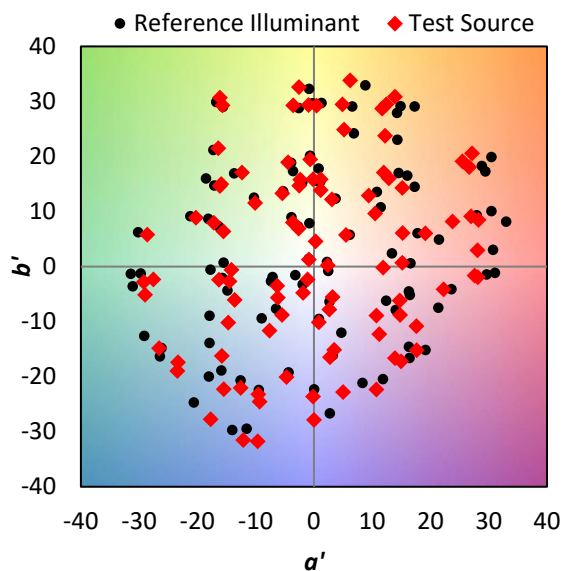
**TM-30-18**

**Summary**

$R_f = 84.5$   
 $R_g = 93.7$   
 CIE  $R_a = 84.0$   
 $R_9 = 11.5$



**Color Vector Graphics**



REPORT NUMBER: SP1-2304-001-1

TM-30-18

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

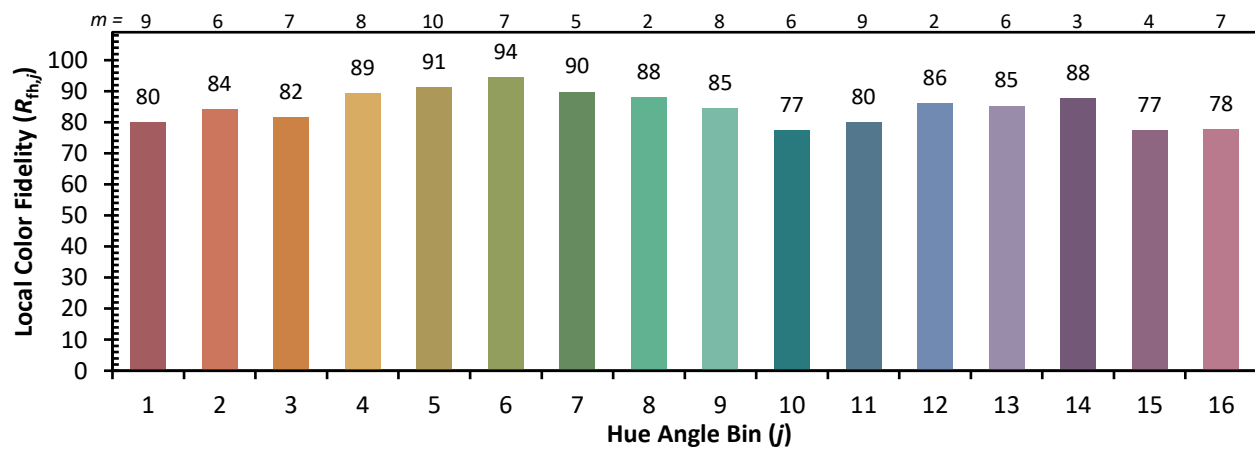
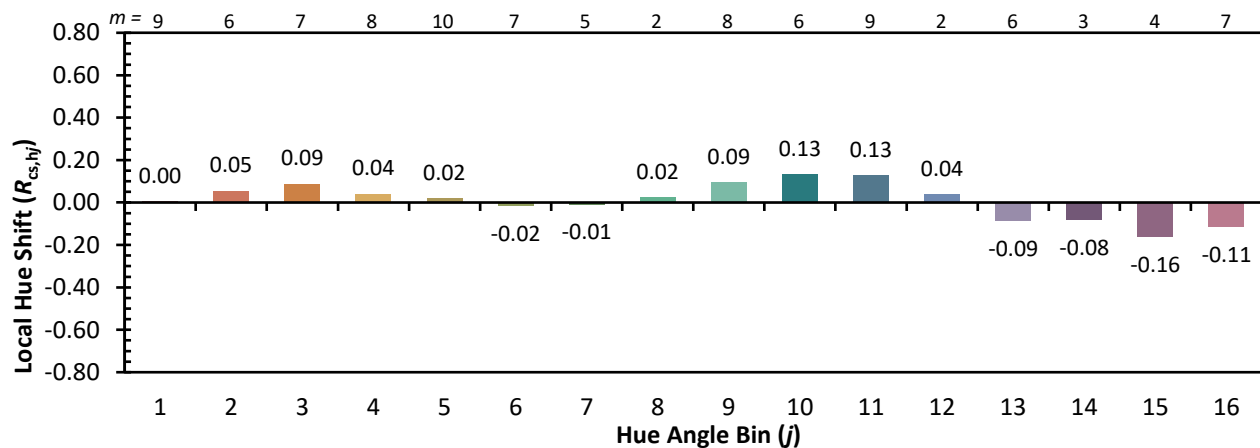
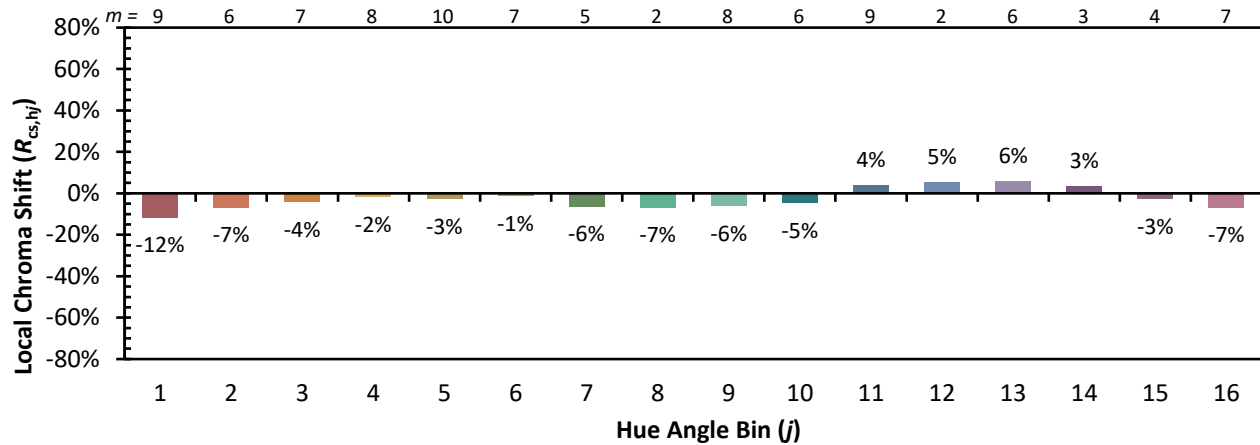
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|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 88 | CES51 = 91 | CES76 = 81 |
| CES02 = 61 | CES27 = 90 | CES52 = 93 | CES77 = 85 |
| CES03 = 31 | CES28 = 94 | CES53 = 89 | CES78 = 80 |
| CES04 = 69 | CES29 = 93 | CES54 = 88 | CES79 = 93 |
| CES05 = 48 | CES30 = 87 | CES55 = 85 | CES80 = 91 |
| CES06 = 50 | CES31 = 95 | CES56 = 84 | CES81 = 78 |
| CES07 = 41 | CES32 = 88 | CES57 = 82 | CES82 = 96 |
| CES08 = 40 | CES33 = 96 | CES58 = 82 | CES83 = 96 |
| CES09 = 29 | CES34 = 92 | CES59 = 91 | CES84 = 91 |
| CES10 = 74 | CES35 = 95 | CES60 = 88 | CES85 = 77 |
| CES11 = 57 | CES36 = 77 | CES61 = 86 | CES86 = 74 |
| CES12 = 63 | CES37 = 95 | CES62 = 78 | CES87 = 84 |
| CES13 = 42 | CES38 = 81 | CES63 = 85 | CES88 = 88 |
| CES14 = 74 | CES39 = 98 | CES64 = 77 | CES89 = 78 |
| CES15 = 71 | CES40 = 97 | CES65 = 77 | CES90 = 89 |
| CES16 = 47 | CES41 = 94 | CES66 = 74 | CES91 = 68 |
| CES17 = 49 | CES42 = 97 | CES67 = 73 | CES92 = 64 |
| CES18 = 56 | CES43 = 93 | CES68 = 79 | CES93 = 78 |
| CES19 = 71 | CES44 = 99 | CES69 = 82 | CES94 = 65 |
| CES20 = 65 | CES45 = 94 | CES70 = 77 | CES95 = 73 |
| CES21 = 86 | CES46 = 91 | CES71 = 69 | CES96 = 84 |
| CES22 = 78 | CES47 = 93 | CES72 = 90 | CES97 = 90 |
| CES23 = 91 | CES48 = 82 | CES73 = 72 | CES98 = 86 |
| CES24 = 90 | CES49 = 92 | CES74 = 90 | CES99 = 77 |
| CES25 = 71 | CES50 = 92 | CES75 = 74 |            |



REPORT NUMBER: SP1-2304-001-1

**TM-30-18**

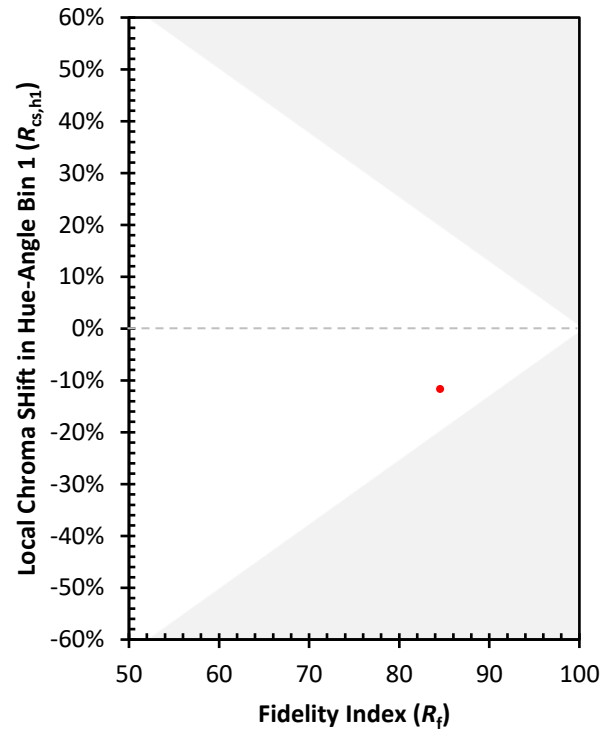
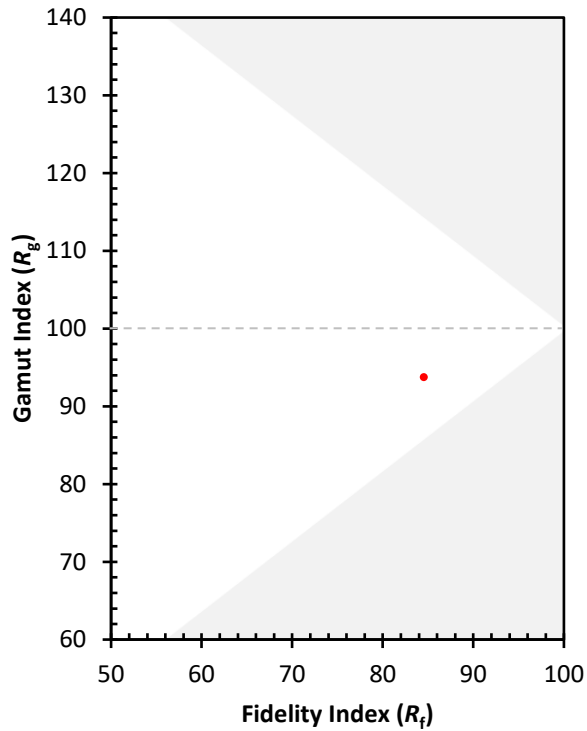
**Color Rendition by Hue-Angle Bin**



REPORT NUMBER: SP1-2304-001-1

**TM-30-18**

**Measure Comparisons**



(END OF REPORT)