

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: P828579

Luminaire Tested: **OHBL-15SE-A-UNV-L950-CD-UPL15**

Issue Date: 5/3/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P828579  
REPORT IS A COMBINATION OF REPORTS P826113 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-15SE-A-UNV-L950-CD-UPL15  
Description:  
Light Source: -  
Ballast/Driver: -

**Summary**

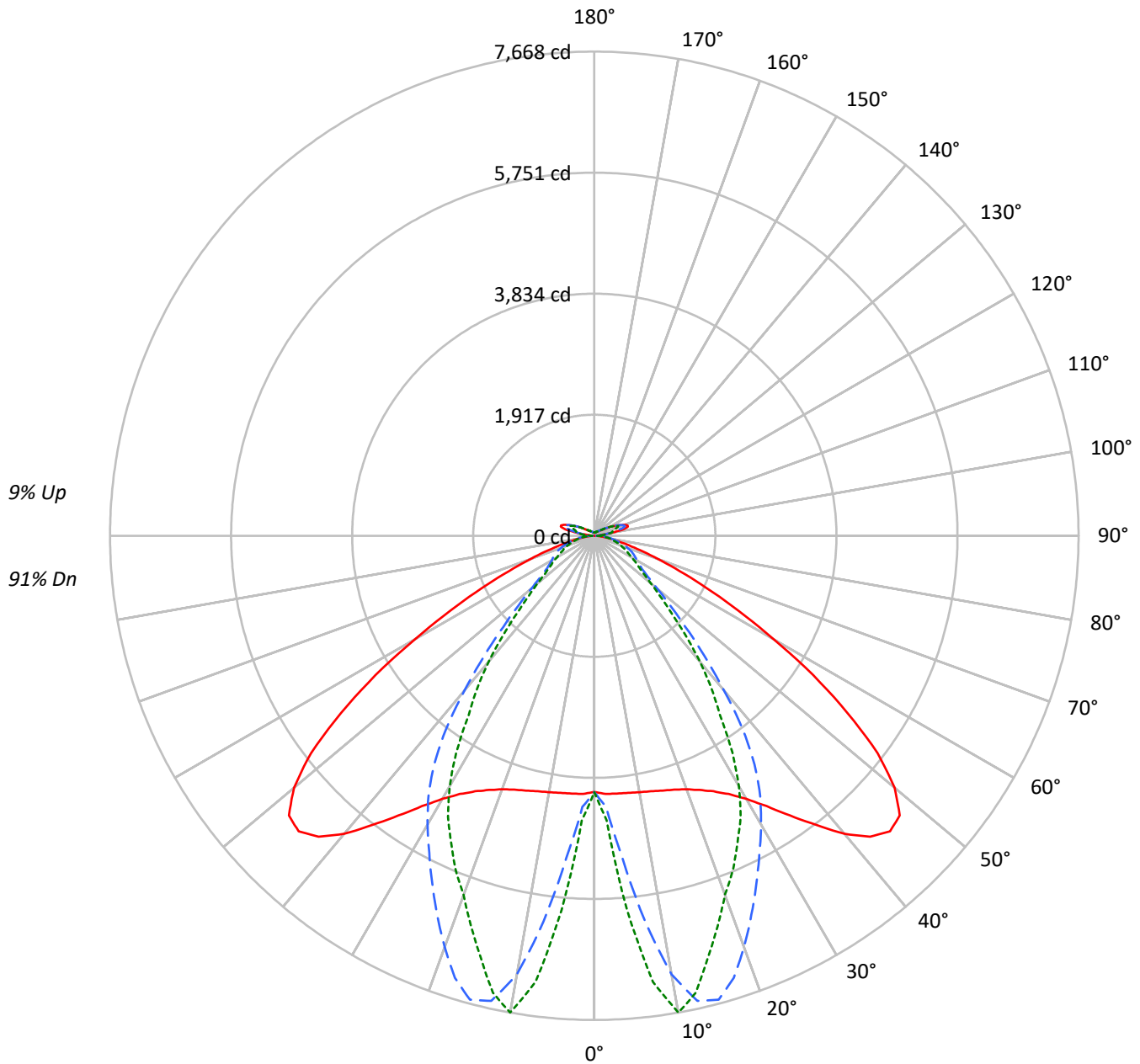
Lumens per Lamp: N/A  
Luminaire Lumens: 14341.7 lumens  
Efficiency: N/A  
Efficacy: 147.4 lumens/watt  
Spacing Criteria (0/90/45): 2.18 / 1.37 / 1.3  
Luminous Opening: Rectangular w/ Sides (W: 3.78' x L: 0.88' x H: 0.17')  
CIE Type: Direct

Input Watts (W): 97.3  
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: P828579

CATALOG NUMBER: OHBL-15SE-A-UNV-L950-CD-UPL15

### Luminous Intensity Polar Plot





TEST NUMBER: P828579

CATALOG NUMBER: OHBL-15SE-A-UNV-L950-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   | 117 | 117 | 117 | 117 | 113 | 113 | 113 | 113 | 106 | 106 | 106 | 100 | 100 | 100 | 94 | 94 | 94 | 91 |    |    |
| 1   | 108 | 104 | 101 | 98  | 105 | 101 | 98  | 95  | 95  | 93  | 91  | 90  | 88  | 86  | 85 | 84 | 82 | 80 |    |    |
| 2   | 100 | 93  | 87  | 83  | 97  | 91  | 85  | 81  | 86  | 81  | 78  | 81  | 78  | 75  | 77 | 74 | 72 | 69 |    |    |
| 3   | 93  | 84  | 77  | 71  | 90  | 81  | 75  | 70  | 77  | 72  | 68  | 73  | 69  | 65  | 70 | 66 | 63 | 61 |    |    |
| 4   | 86  | 75  | 68  | 62  | 83  | 73  | 66  | 61  | 70  | 64  | 59  | 67  | 62  | 58  | 64 | 59 | 56 | 54 |    |    |
| 5   | 80  | 68  | 60  | 55  | 77  | 67  | 59  | 54  | 64  | 57  | 53  | 61  | 55  | 51  | 58 | 54 | 50 | 48 |    |    |
| 6   | 74  | 62  | 54  | 49  | 72  | 61  | 53  | 48  | 58  | 52  | 47  | 56  | 50  | 46  | 53 | 49 | 45 | 43 |    |    |
| 7   | 69  | 57  | 49  | 44  | 67  | 56  | 48  | 43  | 53  | 47  | 42  | 51  | 46  | 41  | 49 | 44 | 40 | 39 |    |    |
| 8   | 65  | 52  | 45  | 39  | 63  | 51  | 44  | 39  | 49  | 43  | 38  | 47  | 42  | 38  | 46 | 41 | 37 | 35 |    |    |
| 9   | 60  | 48  | 41  | 36  | 59  | 47  | 40  | 35  | 46  | 39  | 35  | 44  | 38  | 34  | 42 | 37 | 34 | 32 |    |    |
| 10  | 57  | 45  | 38  | 33  | 55  | 44  | 37  | 32  | 42  | 36  | 32  | 41  | 35  | 31  | 40 | 34 | 31 | 29 |    |    |

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

|     | 0°    | 45°   | 90°   |
|-----|-------|-------|-------|
| 0°  | 13201 | 13201 | 13201 |
| 5°  | 13165 | 16511 | 19351 |
| 10° | 13180 | 22639 | 25135 |
| 15° | 13389 | 24526 | 23069 |
| 20° | 13832 | 22629 | 20617 |
| 25° | 14719 | 20231 | 18859 |
| 30° | 16271 | 18104 | 16769 |
| 35° | 18951 | 15740 | 13363 |
| 40° | 22556 | 11900 | 10635 |
| 45° | 25581 | 8041  | 7569  |
| 50° | 25601 | 5464  | 5598  |
| 55° | 21827 | 4254  | 4574  |
| 60° | 16010 | 3928  | 4115  |
| 65° | 10725 | 3875  | 3898  |
| 70° | 6655  | 3656  | 3775  |
| 75° | 3839  | 3281  | 3612  |
| 80° | 2120  | 2749  | 3727  |
| 85° | 914   | 2170  | 3455  |



TEST NUMBER: P828579

CATALOG NUMBER: OHBL-15SE-A-UNV-L950-CD-UPL15

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 529.7   | 3.7       |
| 10°-20°   | 1869.7  | 13.0      |
| 20°-30°   | 2755.1  | 19.2      |
| 30°-40°   | 2895.1  | 20.2      |
| 40°-50°   | 2215.3  | 15.4      |
| 50°-60°   | 1337.7  | 9.3       |
| 60°-70°   | 816.3   | 5.7       |
| 70°-80°   | 445.5   | 3.1       |
| 80°-90°   | 159.7   | 1.1       |
| 90°-100°  | 126.6   | 0.9       |
| 100°-110° | 438.7   | 3.1       |
| 110°-120° | 377.0   | 2.6       |
| 120°-130° | 180.9   | 1.3       |
| 130°-140° | 90.4    | 0.6       |
| 140°-150° | 52.5    | 0.4       |
| 150°-160° | 30.6    | 0.2       |
| 160°-170° | 15.9    | 0.1       |
| 170°-180° | 4.8     | 0.0       |
| 0°-30°    | 5154.4  | 35.9      |
| 0°-40°    | 8049.6  | 56.1      |
| 0°-60°    | 11602.6 | 80.9      |
| 0°-90°    | 13024.1 | 90.8      |
| 90°-120°  | 942.3   | 6.6       |
| 90°-150°  | 1266.2  | 8.8       |
| 90°-180°  | 1318.0  | 9.2       |
| 0°-180°   | 14341.7 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°   | 22.5° | 45°  | 67.5° | 90°  | Flux |
|------|------|-------|------|-------|------|------|
| 0°   | 4058 | 4058  | 4058 | 4058  | 4058 |      |
| 5°   | 4098 | 4397  | 5129 | 5727  | 5948 | 392  |
| 15°  | 4178 | 6508  | 7606 | 7097  | 6930 | 1188 |
| 25°  | 4465 | 7553  | 6072 | 5497  | 5362 | 2087 |
| 35°  | 5408 | 6048  | 4424 | 3684  | 3468 | 3431 |
| 45°  | 6619 | 3451  | 2038 | 1793  | 1718 | 5001 |
| 55°  | 4895 | 1170  | 928  | 860   | 857  | 4326 |
| 65°  | 1962 | 741   | 682  | 584   | 554  | 2011 |
| 75°  | 522  | 461   | 423  | 349   | 335  | 601  |
| 85°  | 78   | 143   | 168  | 154   | 139  | 96   |
| 90°  | 3    | 19    | 25   | 33    | 37   | 6    |
| 95°  | 24   | 63    | 93   | 124   | 144  | 87   |
| 105° | 550  | 542   | 462  | 327   | 300  | 521  |
| 115° | 379  | 379   | 383  | 381   | 373  | 383  |
| 125° | 184  | 194   | 199  | 197   | 196  | 173  |
| 135° | 109  | 112   | 115  | 116   | 117  | 86   |
| 145° | 79   | 81    | 83   | 84    | 84   | 51   |
| 155° | 64   | 64    | 66   | 66    | 67   | 30   |
| 165° | 55   | 55    | 56   | 56    | 56   | 16   |
| 175° | 50   | 50    | 50   | 50    | 50   | 5    |
| 180° | 50   | 50    | 50   | 50    | 50   |      |



TEST NUMBER: P828579

CATALOG NUMBER: OHBL-15SE-A-UNV-L950-CD-UPL15

**CANDELA DISTRIBUTION (FULL):**

|        | 0°     | 22.5°  | 45°    | 67.5°  | 90°    |
|--------|--------|--------|--------|--------|--------|
| 0°     | 4057.6 | 4057.6 | 4057.6 | 4057.6 | 4057.6 |
| 2.5°   | 4090.9 | 4132.6 | 4297.2 | 4468.1 | 4509.7 |
| 5°     | 4098.4 | 4397.0 | 5129.3 | 5727.3 | 5948.3 |
| 7.5°   | 4107.1 | 4825.2 | 6160.2 | 6892.4 | 7126.7 |
| 10°    | 4123.6 | 5366.6 | 7053.5 | 7579.2 | 7667.7 |
| 12.5°  | 4144.1 | 5940.3 | 7545.0 | 7525.9 | 7414.3 |
| 15°    | 4178.2 | 6507.7 | 7605.6 | 7097.2 | 6930.3 |
| 17.5°  | 4214.0 | 6987.7 | 7341.5 | 6630.6 | 6485.3 |
| 20°    | 4272.4 | 7344.1 | 6930.7 | 6215.7 | 6050.6 |
| 22.5°  | 4356.4 | 7540.0 | 6499.9 | 5840.6 | 5732.9 |
| 25°    | 4464.8 | 7552.8 | 6072.0 | 5497.3 | 5361.6 |
| 27.5°  | 4610.1 | 7377.5 | 5661.9 | 5160.9 | 5017.6 |
| 30°    | 4807.8 | 7042.1 | 5280.8 | 4755.3 | 4577.5 |
| 32.5°  | 5076.3 | 6559.2 | 4887.9 | 4265.8 | 4066.3 |
| 35°    | 5408.2 | 6048.4 | 4423.6 | 3683.9 | 3468.5 |
| 37.5°  | 5770.5 | 5481.2 | 3860.0 | 3168.7 | 3043.2 |
| 40°    | 6160.2 | 4896.6 | 3192.0 | 2686.5 | 2596.8 |
| 42.5°  | 6464.4 | 4261.2 | 2571.6 | 2232.6 | 2137.0 |
| 45°    | 6619.4 | 3451.3 | 2037.7 | 1793.1 | 1717.7 |
| 47.5°  | 6559.0 | 2679.0 | 1615.4 | 1424.7 | 1402.1 |
| 50°    | 6206.7 | 1978.2 | 1293.1 | 1173.6 | 1164.2 |
| 52.5°  | 5655.8 | 1474.5 | 1068.2 | 994.2  | 978.0  |
| 55°    | 4895.2 | 1170.3 | 927.6  | 859.7  | 857.1  |
| 57.5°  | 4110.0 | 994.2  | 842.0  | 789.5  | 771.2  |
| 60°    | 3272.4 | 886.5  | 777.1  | 717.7  | 680.7  |
| 62.5°  | 2565.1 | 811.2  | 729.4  | 648.9  | 614.2  |
| 65°    | 1962.5 | 740.9  | 682.4  | 583.9  | 554.2  |
| 67.5°  | 1463.0 | 673.9  | 625.0  | 515.8  | 498.4  |
| 70°    | 1065.9 | 605.1  | 559.6  | 458.6  | 444.9  |
| 72.5°  | 759.6  | 536.6  | 494.2  | 405.1  | 389.9  |
| 75°    | 522.5  | 460.7  | 422.6  | 348.7  | 334.6  |
| 77.5°  | 352.6  | 383.3  | 352.2  | 297.7  | 291.8  |
| 80°    | 235.4  | 304.0  | 284.8  | 252.3  | 248.7  |
| 82.5°  | 142.8  | 220.7  | 224.8  | 205.1  | 195.2  |
| 85°    | 77.8   | 142.8  | 168.4  | 153.5  | 139.2  |
| 87.5°  | 30.4   | 79.2   | 116.1  | 104.2  | 98.2   |
| 90°    | 2.6    | 19.1   | 25.2   | 33.0   | 37.4   |
| 92.5°  | 8.7    | 24.3   | 40.0   | 55.6   | 64.3   |
| 95°    | 24.3   | 62.6   | 93.0   | 123.5  | 143.5  |
| 97.5°  | 144.3  | 162.6  | 177.4  | 204.3  | 220.0  |
| 100°   | 293.0  | 316.5  | 260.0  | 273.0  | 279.1  |
| 102.5° | 471.2  | 455.6  | 336.5  | 302.6  | 297.4  |
| 105°   | 550.4  | 542.5  | 462.5  | 326.9  | 300.0  |



TEST NUMBER: P828579

CATALOG NUMBER: OHBL-15SE-A-UNV-L950-CD-UPL15

**CANDELA DISTRIBUTION (continued):**

|        | 0°    | 22.5° | 45°   | 67.5° | 90°   |
|--------|-------|-------|-------|-------|-------|
| 112.5° | 442.5 | 448.6 | 440.8 | 425.2 | 409.5 |
| 115°   | 379.1 | 379.1 | 382.6 | 380.8 | 373.0 |
| 117.5° | 325.2 | 323.4 | 326.9 | 325.2 | 323.4 |
| 120°   | 271.3 | 274.7 | 275.6 | 273.9 | 273.0 |
| 122.5° | 224.3 | 231.3 | 235.6 | 233.0 | 232.1 |
| 125°   | 183.5 | 193.9 | 199.1 | 197.4 | 196.5 |
| 127.5° | 156.5 | 162.6 | 169.5 | 169.5 | 167.8 |
| 130°   | 135.6 | 140.0 | 145.2 | 146.1 | 146.1 |
| 132.5° | 120.9 | 124.3 | 128.7 | 129.5 | 130.4 |
| 135°   | 108.7 | 112.2 | 114.8 | 116.5 | 117.4 |
| 137.5° | 100.0 | 101.7 | 105.2 | 106.1 | 106.9 |
| 140°   | 91.3  | 93.9  | 96.5  | 97.4  | 98.2  |
| 142.5° | 85.2  | 86.9  | 88.7  | 90.4  | 90.4  |
| 145°   | 79.1  | 80.9  | 82.6  | 84.3  | 84.3  |
| 147.5° | 74.8  | 76.5  | 78.2  | 78.2  | 79.1  |
| 150°   | 70.4  | 72.2  | 73.0  | 73.9  | 73.9  |
| 152.5° | 66.9  | 67.8  | 69.6  | 69.6  | 70.4  |
| 155°   | 63.5  | 64.3  | 66.1  | 66.1  | 66.9  |
| 157.5° | 60.9  | 61.7  | 62.6  | 63.5  | 63.5  |
| 160°   | 58.3  | 59.1  | 60.0  | 60.0  | 60.9  |
| 162.5° | 56.5  | 57.4  | 57.4  | 58.3  | 58.3  |
| 165°   | 54.8  | 54.8  | 55.6  | 55.6  | 55.6  |
| 167.5° | 53.0  | 53.0  | 53.9  | 53.9  | 54.8  |
| 170°   | 51.3  | 52.2  | 52.2  | 52.2  | 53.0  |
| 172.5° | 50.4  | 50.4  | 51.3  | 51.3  | 51.3  |
| 175°   | 49.6  | 49.6  | 49.6  | 50.4  | 50.4  |
| 177.5° | 48.7  | 49.6  | 49.6  | 49.6  | 49.6  |
| 180°   | 49.6  | 49.6  | 49.6  | 49.6  | 49.6  |



Report Generated By 670246072 / DESKTOP-50001EG





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







|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| 107.5° | 550.4 | 551.2 | 510.4 | 393.0 | 329.5 |
| 110°   | 507.8 | 512.1 | 489.5 | 445.2 | 391.2 |



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

Report Prepared for

Cooper Lighting Solutions

METALUX

Report Number: SP1-2307-100-9

Test Date: 08/01/2023

Luminaire Tested: OHB-15SE-N-UNV-L950-CD

Data in this report applies to families of products including OHB-15SE-N-UNV-L950-CD.

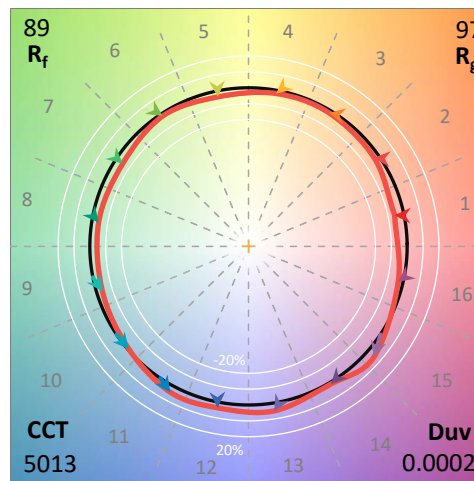
### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2307-100-9  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry: 4π  
 Issue Date: 08/04/2023  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: METALUX  
 Catalog Number: **OHB-15SE-N-UNV-L950-CD**  
 Description: 15000 LUMEN OHB SE LED LUMINAIRE WITH 90CRI, 5000K LEDS AND NARROW LENS

LENS

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 5013   | CRI (Ra): | 92.0 |      |      |
| CIE u':                   | 0.2111 | R1:       | 92.6 | R9:  | 62.7 |
| CIE v':                   | 0.4847 | R2:       | 96.7 | R10: | 90.0 |
| Duv:                      | 0.0002 | R3:       | 96.5 | R11: | 89.8 |
| CIE x:                    | 0.3447 | R4:       | 90.1 | R12: | 69.9 |
| CIE y:                    | 0.3517 | R5:       | 91.1 | R13: | 94.5 |
| CIE z:                    | 0.3036 | R6:       | 92.0 | R14: | 98.3 |
| Peak Wavelength (nm):     | 455    | R7:       | 92.4 |      |      |
| Dominant Wavelength (nm): | 572    | R8:       | 84.9 |      |      |
| Purity:                   | 9.1    |           |      |      |      |
| Rf:                       | 88.9   |           |      |      |      |
| Rg:                       | 97.2   |           |      |      |      |



### Test Conditions

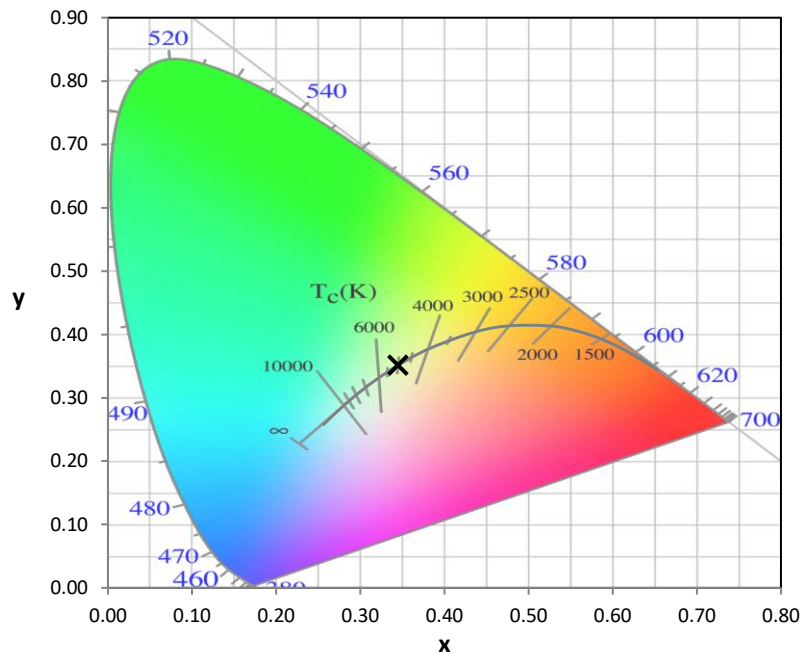
Stabilization Time: 26M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.7/57%  
 Sphere Temperature (°C): 25.2

REPORT NUMBER: SP1-2307-100-9

| 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: SP1-2307-100-9

CIE 1931 Chromaticity Diagram



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



Point lies inside the ANSI 5000K 4-step quadrangle

REPORT NUMBER: SP1-2307-100-9

**Photopic Flux vs. Wavelength**

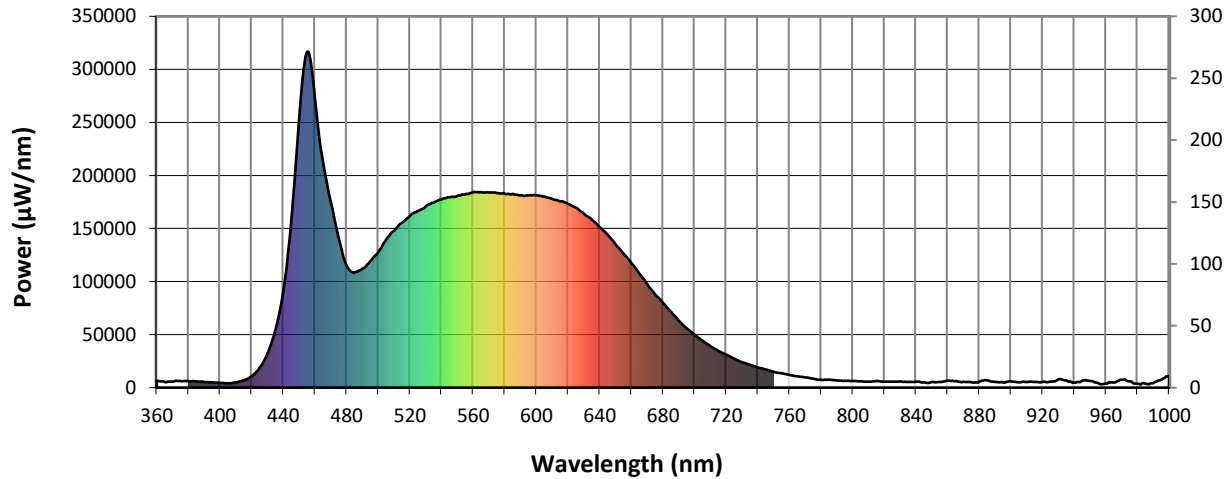


#####

| 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       | 6694             | NR               | 490       | 112019           | NR               | 620       | 173132           | NR               | 750       | 14981            | NR               | 880       | 5536             | NR               |
| 365       | 5354             | NR               | 495       | 119136           | NR               | 625       | 169860           | NR               | 755       | 13480            | NR               | 885       | 6938             | NR               |
| 370       | 5722             | NR               | 500       | 127627           | NR               | 630       | 163982           | NR               | 760       | 11900            | NR               | 890       | 5411             | NR               |
| 375       | 6251             | NR               | 505       | 139687           | NR               | 635       | 158304           | NR               | 765       | 10671            | NR               | 895       | 4784             | NR               |
| 380       | 6177             | NR               | 510       | 148127           | NR               | 640       | 151433           | NR               | 770       | 9643             | NR               | 900       | 5872             | NR               |
| 385       | 5889             | NR               | 515       | 155327           | NR               | 645       | 144044           | NR               | 775       | 8310             | NR               | 905       | 5214             | NR               |
| 390       | 5252             | NR               | 520       | 161724           | NR               | 650       | 134971           | NR               | 780       | 7378             | NR               | 910       | 5425             | NR               |
| 395       | 5012             | NR               | 525       | 166350           | NR               | 655       | 126523           | NR               | 785       | 7348             | NR               | 915       | 5372             | NR               |
| 400       | 4505             | NR               | 530       | 170827           | NR               | 660       | 117624           | NR               | 790       | 6731             | NR               | 920       | 5263             | NR               |
| 405       | 4163             | NR               | 535       | 174287           | NR               | 665       | 107737           | NR               | 795       | 6603             | NR               | 925       | 5581             | NR               |
| 410       | 4931             | NR               | 540       | 177402           | NR               | 670       | 97796            | NR               | 800       | 6333             | NR               | 930       | 7934             | NR               |
| 415       | 6887             | NR               | 545       | 179468           | NR               | 675       | 88146            | NR               | 805       | 5919             | NR               | 935       | 6835             | NR               |
| 420       | 10750            | NR               | 550       | 180621           | NR               | 680       | 80008            | NR               | 810       | 5757             | NR               | 940       | 4871             | NR               |
| 425       | 18574            | NR               | 555       | 182239           | NR               | 685       | 71588            | NR               | 815       | 6226             | NR               | 945       | 6554             | NR               |
| 430       | 31943            | NR               | 560       | 184077           | NR               | 690       | 63388            | NR               | 820       | 5694             | NR               | 950       | 6239             | NR               |
| 435       | 54504            | NR               | 565       | 184113           | NR               | 695       | 56106            | NR               | 825       | 5621             | NR               | 955       | 4562             | NR               |
| 440       | 91570            | NR               | 570       | 183843           | NR               | 700       | 49976            | NR               | 830       | 5832             | NR               | 960       | 3863             | NR               |
| 445       | 155007           | NR               | 575       | 183242           | NR               | 705       | 44326            | NR               | 835       | 5478             | NR               | 965       | 4898             | NR               |
| 450       | 253466           | NR               | 580       | 182759           | NR               | 710       | 39116            | NR               | 840       | 5675             | NR               | 970       | 7576             | NR               |
| 455       | 316705           | NR               | 585       | 182781           | NR               | 715       | 34755            | NR               | 845       | 4960             | NR               | 975       | 6056             | NR               |
| 460       | 273954           | NR               | 590       | 181075           | NR               | 720       | 30900            | NR               | 850       | 5274             | NR               | 980       | 3439             | NR               |
| 465       | 214019           | NR               | 595       | 181315           | NR               | 725       | 27349            | NR               | 855       | 5470             | NR               | 985       | 3623             | NR               |
| 470       | 175153           | NR               | 600       | 181289           | NR               | 730       | 23954            | NR               | 860       | 6539             | NR               | 990       | 4301             | NR               |
| 475       | 140894           | NR               | 605       | 180053           | NR               | 735       | 21526            | NR               | 865       | 6378             | NR               | 995       | 7368             | NR               |
| 480       | 115223           | NR               | 610       | 177907           | NR               | 740       | 18965            | NR               | 870       | 5702             | NR               | 1000      | 10668            | NR               |
| 485       | 108577           | NR               | 615       | 175575           | NR               | 745       | 17153            | NR               | 875       | 4933             | NR               |           |                  |                  |

REPORT NUMBER: SP1-2307-100-9

Scotopic Flux vs. Wavelength



Scotopic Lumens: 26039.5

S/P: 2.08

| 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       | 6694             | NR               | 490       | 112019           | NR               | 620       | 173132           | NR               | 750       | 14981            | NR               | 880       | 5536             | NR               |
| 365       | 5354             | NR               | 495       | 119136           | NR               | 625       | 169860           | NR               | 755       | 13480            | NR               | 885       | 6938             | NR               |
| 370       | 5722             | NR               | 500       | 127627           | NR               | 630       | 163982           | NR               | 760       | 11900            | NR               | 890       | 5411             | NR               |
| 375       | 6251             | NR               | 505       | 139687           | NR               | 635       | 158304           | NR               | 765       | 10671            | NR               | 895       | 4784             | NR               |
| 380       | 6177             | NR               | 510       | 148127           | NR               | 640       | 151433           | NR               | 770       | 9643             | NR               | 900       | 5872             | NR               |
| 385       | 5889             | NR               | 515       | 155327           | NR               | 645       | 144044           | NR               | 775       | 8310             | NR               | 905       | 5214             | NR               |
| 390       | 5252             | NR               | 520       | 161724           | NR               | 650       | 134971           | NR               | 780       | 7378             | NR               | 910       | 5425             | NR               |
| 395       | 5012             | NR               | 525       | 166350           | NR               | 655       | 126523           | NR               | 785       | 7348             | NR               | 915       | 5372             | NR               |
| 400       | 4505             | NR               | 530       | 170827           | NR               | 660       | 117624           | NR               | 790       | 6731             | NR               | 920       | 5263             | NR               |
| 405       | 4163             | NR               | 535       | 174287           | NR               | 665       | 107737           | NR               | 795       | 6603             | NR               | 925       | 5581             | NR               |
| 410       | 4931             | NR               | 540       | 177402           | NR               | 670       | 97796            | NR               | 800       | 6333             | NR               | 930       | 7934             | NR               |
| 415       | 6887             | NR               | 545       | 179468           | NR               | 675       | 88146            | NR               | 805       | 5919             | NR               | 935       | 6835             | NR               |
| 420       | 10750            | NR               | 550       | 180621           | NR               | 680       | 80008            | NR               | 810       | 5757             | NR               | 940       | 4871             | NR               |
| 425       | 18574            | NR               | 555       | 182239           | NR               | 685       | 71588            | NR               | 815       | 6226             | NR               | 945       | 6554             | NR               |
| 430       | 31943            | NR               | 560       | 184077           | NR               | 690       | 63388            | NR               | 820       | 5694             | NR               | 950       | 6239             | NR               |
| 435       | 54504            | NR               | 565       | 184113           | NR               | 695       | 56106            | NR               | 825       | 5621             | NR               | 955       | 4562             | NR               |
| 440       | 91570            | NR               | 570       | 183843           | NR               | 700       | 49976            | NR               | 830       | 5832             | NR               | 960       | 3863             | NR               |
| 445       | 155007           | NR               | 575       | 183242           | NR               | 705       | 44326            | NR               | 835       | 5478             | NR               | 965       | 4898             | NR               |
| 450       | 253466           | NR               | 580       | 182759           | NR               | 710       | 39116            | NR               | 840       | 5675             | NR               | 970       | 7576             | NR               |
| 455       | 316705           | NR               | 585       | 182781           | NR               | 715       | 34755            | NR               | 845       | 4960             | NR               | 975       | 6056             | NR               |
| 460       | 273954           | NR               | 590       | 181075           | NR               | 720       | 30900            | NR               | 850       | 5274             | NR               | 980       | 3439             | NR               |
| 465       | 214019           | NR               | 595       | 181315           | NR               | 725       | 27349            | NR               | 855       | 5470             | NR               | 985       | 3623             | NR               |
| 470       | 175153           | NR               | 600       | 181289           | NR               | 730       | 23954            | NR               | 860       | 6539             | NR               | 990       | 4301             | NR               |
| 475       | 140894           | NR               | 605       | 180053           | NR               | 735       | 21526            | NR               | 865       | 6378             | NR               | 995       | 7368             | NR               |
| 480       | 115223           | NR               | 610       | 177907           | NR               | 740       | 18965            | NR               | 870       | 5702             | NR               | 1000      | 10668            | NR               |
| 485       | 108577           | NR               | 615       | 175575           | NR               | 745       | 17153            | NR               | 875       | 4933             | NR               |           |                  |                  |

REPORT NUMBER: SP1-2307-100-9

**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 11248.3 M/P: 0.9**

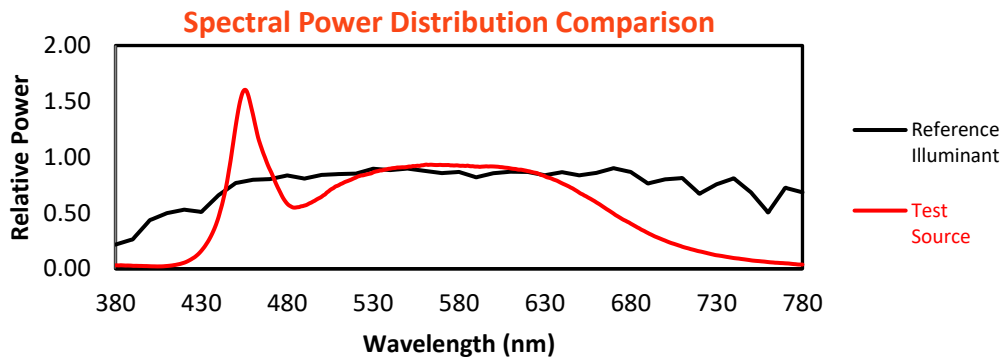
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 6694             | NR               | 490       | 112019           | NR               | 620       | 173132           | NR               | 750       | 14981            | NR               | 880       | 5536             | NR               |
| 365       | 5354             | NR               | 495       | 119136           | NR               | 625       | 169860           | NR               | 755       | 13480            | NR               | 885       | 6938             | NR               |
| 370       | 5722             | NR               | 500       | 127627           | NR               | 630       | 163982           | NR               | 760       | 11900            | NR               | 890       | 5411             | NR               |
| 375       | 6251             | NR               | 505       | 139687           | NR               | 635       | 158304           | NR               | 765       | 10671            | NR               | 895       | 4784             | NR               |
| 380       | 6177             | NR               | 510       | 148127           | NR               | 640       | 151433           | NR               | 770       | 9643             | NR               | 900       | 5872             | NR               |
| 385       | 5889             | NR               | 515       | 155327           | NR               | 645       | 144044           | NR               | 775       | 8310             | NR               | 905       | 5214             | NR               |
| 390       | 5252             | NR               | 520       | 161724           | NR               | 650       | 134971           | NR               | 780       | 7378             | NR               | 910       | 5425             | NR               |
| 395       | 5012             | NR               | 525       | 166350           | NR               | 655       | 126523           | NR               | 785       | 7348             | NR               | 915       | 5372             | NR               |
| 400       | 4505             | NR               | 530       | 170827           | NR               | 660       | 117624           | NR               | 790       | 6731             | NR               | 920       | 5263             | NR               |
| 405       | 4163             | NR               | 535       | 174287           | NR               | 665       | 107737           | NR               | 795       | 6603             | NR               | 925       | 5581             | NR               |
| 410       | 4931             | NR               | 540       | 177402           | NR               | 670       | 97796            | NR               | 800       | 6333             | NR               | 930       | 7934             | NR               |
| 415       | 6887             | NR               | 545       | 179468           | NR               | 675       | 88146            | NR               | 805       | 5919             | NR               | 935       | 6835             | NR               |
| 420       | 10750            | NR               | 550       | 180621           | NR               | 680       | 80008            | NR               | 810       | 5757             | NR               | 940       | 4871             | NR               |
| 425       | 18574            | NR               | 555       | 182239           | NR               | 685       | 71588            | NR               | 815       | 6226             | NR               | 945       | 6554             | NR               |
| 430       | 31943            | NR               | 560       | 184077           | NR               | 690       | 63388            | NR               | 820       | 5694             | NR               | 950       | 6239             | NR               |
| 435       | 54504            | NR               | 565       | 184113           | NR               | 695       | 56106            | NR               | 825       | 5621             | NR               | 955       | 4562             | NR               |
| 440       | 91570            | NR               | 570       | 183843           | NR               | 700       | 49976            | NR               | 830       | 5832             | NR               | 960       | 3863             | NR               |
| 445       | 155007           | NR               | 575       | 183242           | NR               | 705       | 44326            | NR               | 835       | 5478             | NR               | 965       | 4898             | NR               |
| 450       | 253466           | NR               | 580       | 182759           | NR               | 710       | 39116            | NR               | 840       | 5675             | NR               | 970       | 7576             | NR               |
| 455       | 316705           | NR               | 585       | 182781           | NR               | 715       | 34755            | NR               | 845       | 4960             | NR               | 975       | 6056             | NR               |
| 460       | 273954           | NR               | 590       | 181075           | NR               | 720       | 30900            | NR               | 850       | 5274             | NR               | 980       | 3439             | NR               |
| 465       | 214019           | NR               | 595       | 181315           | NR               | 725       | 27349            | NR               | 855       | 5470             | NR               | 985       | 3623             | NR               |
| 470       | 175153           | NR               | 600       | 181289           | NR               | 730       | 23954            | NR               | 860       | 6539             | NR               | 990       | 4301             | NR               |
| 475       | 140894           | NR               | 605       | 180053           | NR               | 735       | 21526            | NR               | 865       | 6378             | NR               | 995       | 7368             | NR               |
| 480       | 115223           | NR               | 610       | 177907           | NR               | 740       | 18965            | NR               | 870       | 5702             | NR               | 1000      | 10668            | NR               |
| 485       | 108577           | NR               | 615       | 175575           | NR               | 745       | 17153            | NR               | 875       | 4933             | NR               |           |                  |                  |

REPORT NUMBER: SP1-2307-100-9

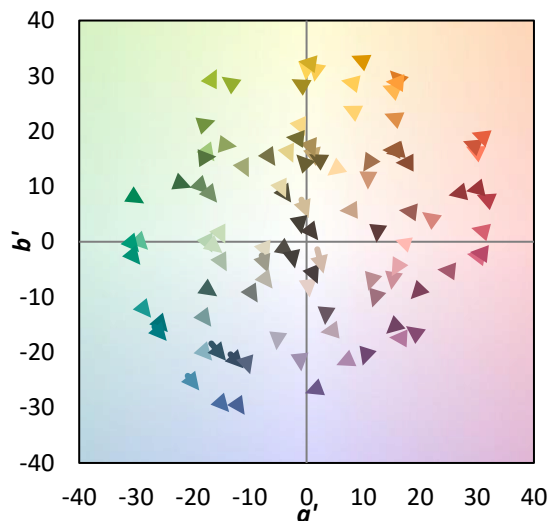
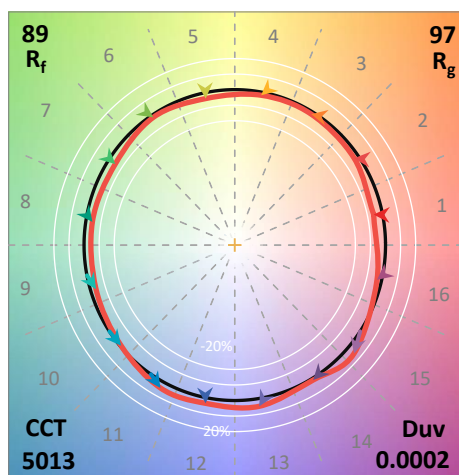
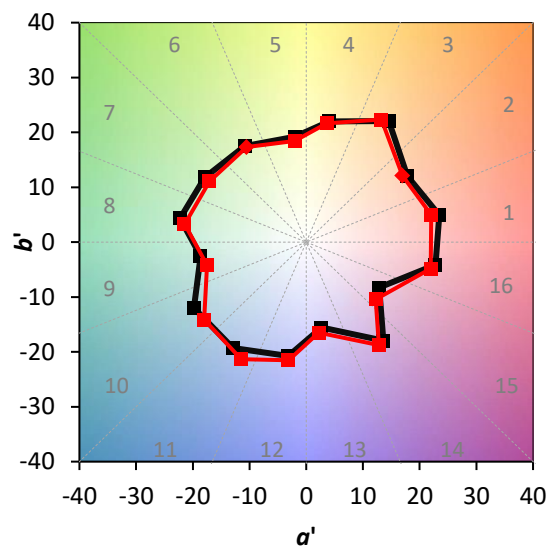
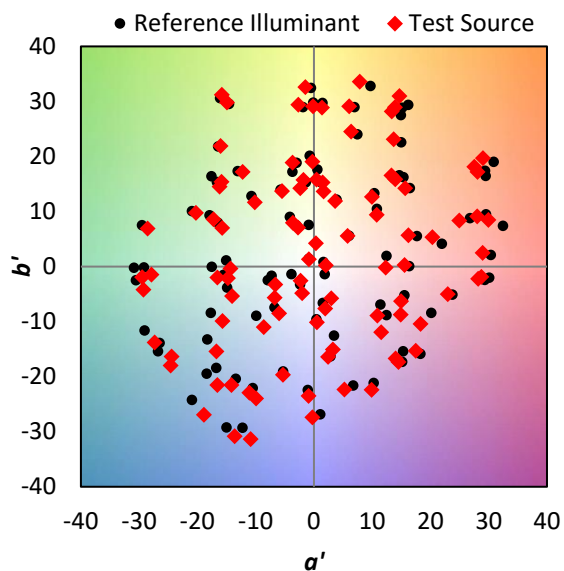
**TM-30-18**

**Summary**

$R_f = 88.9$   
 $R_g = 97.2$   
 $CIE R_a = 92.0$   
 $R_9 = 62.7$



**Color Vector Graphics**

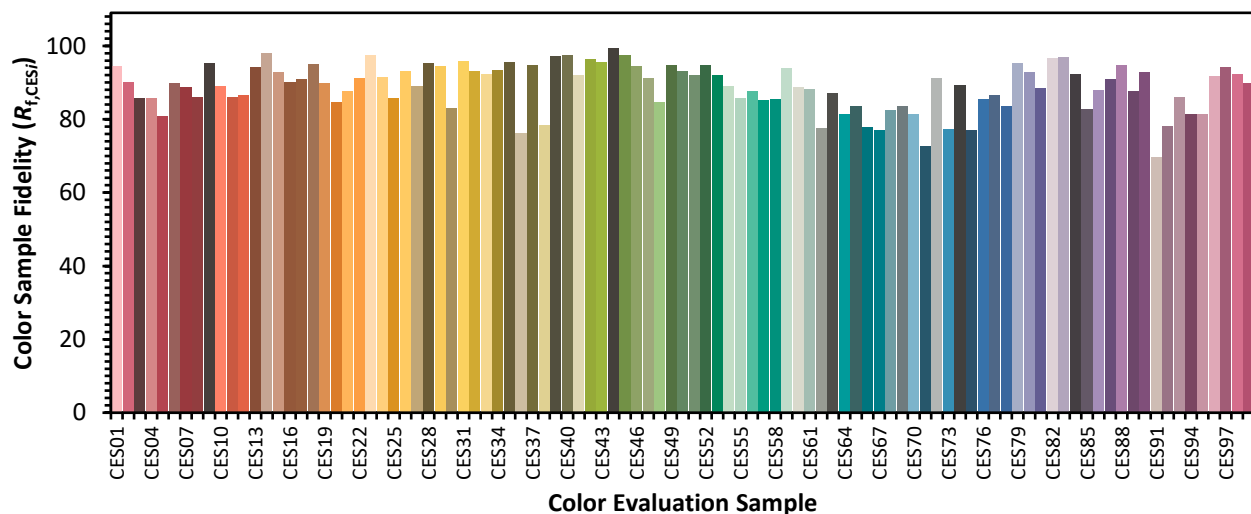


REPORT NUMBER: SP1-2307-100-9

TM-30-18

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

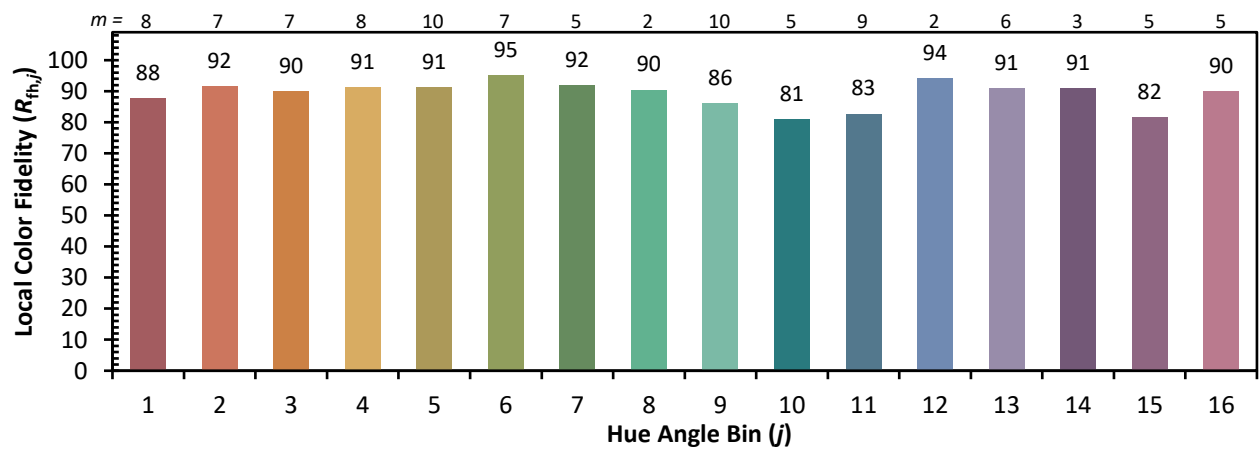
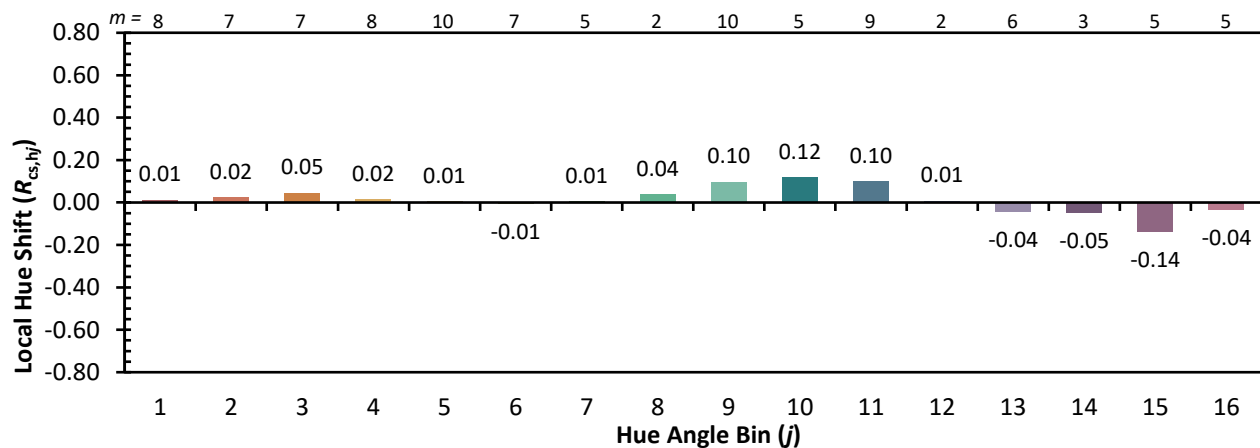
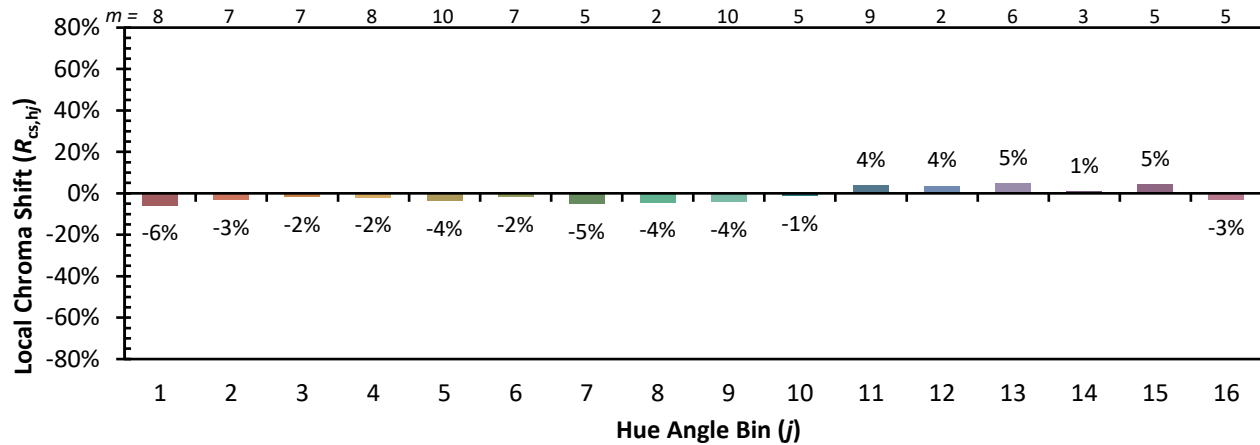
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 93 | CES51 = 92 | CES76 = 85 |
| CES02 = 61 | CES27 = 89 | CES52 = 95 | CES77 = 86 |
| CES03 = 31 | CES28 = 95 | CES53 = 92 | CES78 = 84 |
| CES04 = 69 | CES29 = 94 | CES54 = 89 | CES79 = 95 |
| CES05 = 48 | CES30 = 83 | CES55 = 86 | CES80 = 93 |
| CES06 = 50 | CES31 = 96 | CES56 = 88 | CES81 = 89 |
| CES07 = 41 | CES32 = 93 | CES57 = 85 | CES82 = 97 |
| CES08 = 40 | CES33 = 92 | CES58 = 85 | CES83 = 97 |
| CES09 = 29 | CES34 = 93 | CES59 = 94 | CES84 = 92 |
| CES10 = 73 | CES35 = 96 | CES60 = 89 | CES85 = 83 |
| CES11 = 56 | CES36 = 76 | CES61 = 88 | CES86 = 88 |
| CES12 = 62 | CES37 = 95 | CES62 = 78 | CES87 = 91 |
| CES13 = 42 | CES38 = 78 | CES63 = 87 | CES88 = 95 |
| CES14 = 74 | CES39 = 97 | CES64 = 81 | CES89 = 88 |
| CES15 = 71 | CES40 = 97 | CES65 = 84 | CES90 = 93 |
| CES16 = 46 | CES41 = 92 | CES66 = 78 | CES91 = 70 |
| CES17 = 49 | CES42 = 96 | CES67 = 77 | CES92 = 78 |
| CES18 = 56 | CES43 = 95 | CES68 = 82 | CES93 = 86 |
| CES19 = 70 | CES44 = 99 | CES69 = 84 | CES94 = 81 |
| CES20 = 65 | CES45 = 97 | CES70 = 81 | CES95 = 81 |
| CES21 = 85 | CES46 = 95 | CES71 = 73 | CES96 = 92 |
| CES22 = 77 | CES47 = 91 | CES72 = 91 | CES97 = 94 |
| CES23 = 91 | CES48 = 85 | CES73 = 77 | CES98 = 92 |
| CES24 = 90 | CES49 = 95 | CES74 = 89 | CES99 = 90 |
| CES25 = 70 | CES50 = 93 | CES75 = 77 |            |



REPORT NUMBER: SP1-2307-100-9

**TM-30-18**

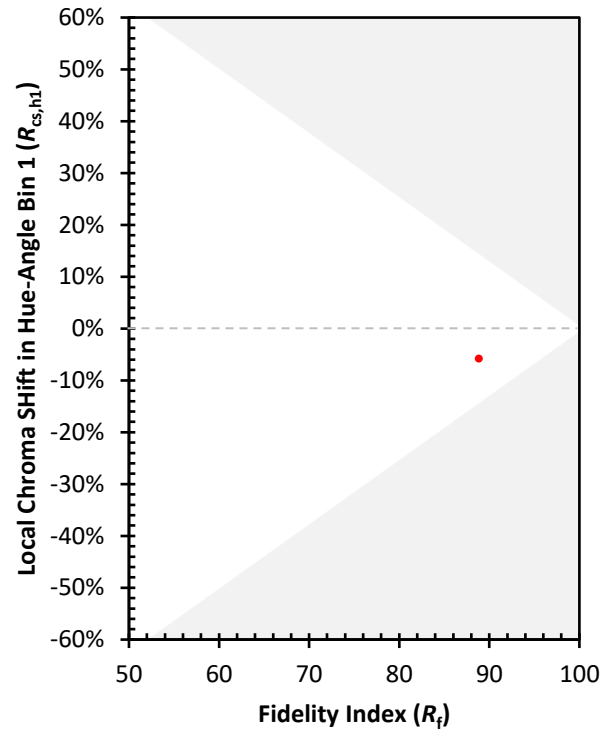
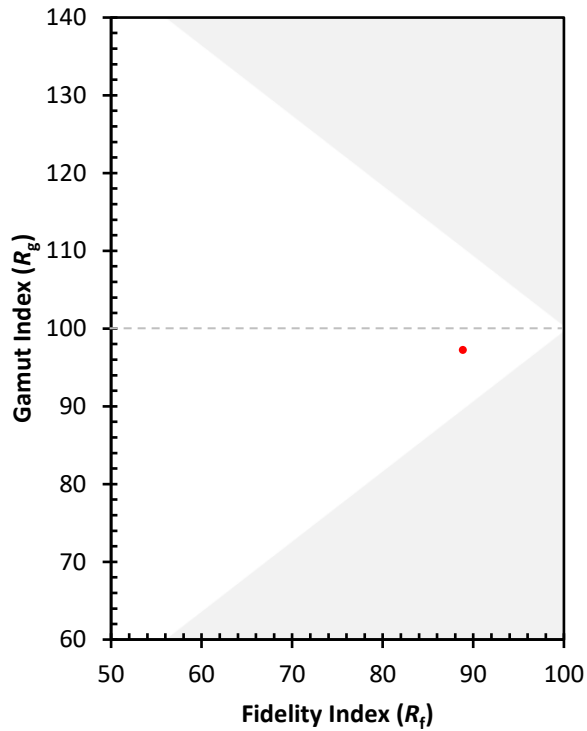
**Color Rendition by Hue-Angle Bin**



REPORT NUMBER: SP1-2307-100-9

**TM-30-18**

**Measure Comparisons**



(END OF REPORT)