

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: P828164

Luminaire Tested: **OHB-18HE-W-UNV-L940-CD-UPL24**

Issue Date: 5/3/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P828164  
REPORT IS A COMBINATION OF REPORTS P826196 AND G3-2310-221-6  
Test Lab: INNOVATION CENTER  
Issue Date: 5/3/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: METALUX  
Catalog Number: OHB-18HE-W-UNV-L940-CD-UPL24  
Description:  
Light Source: -  
Ballast/Driver: -

**Summary**

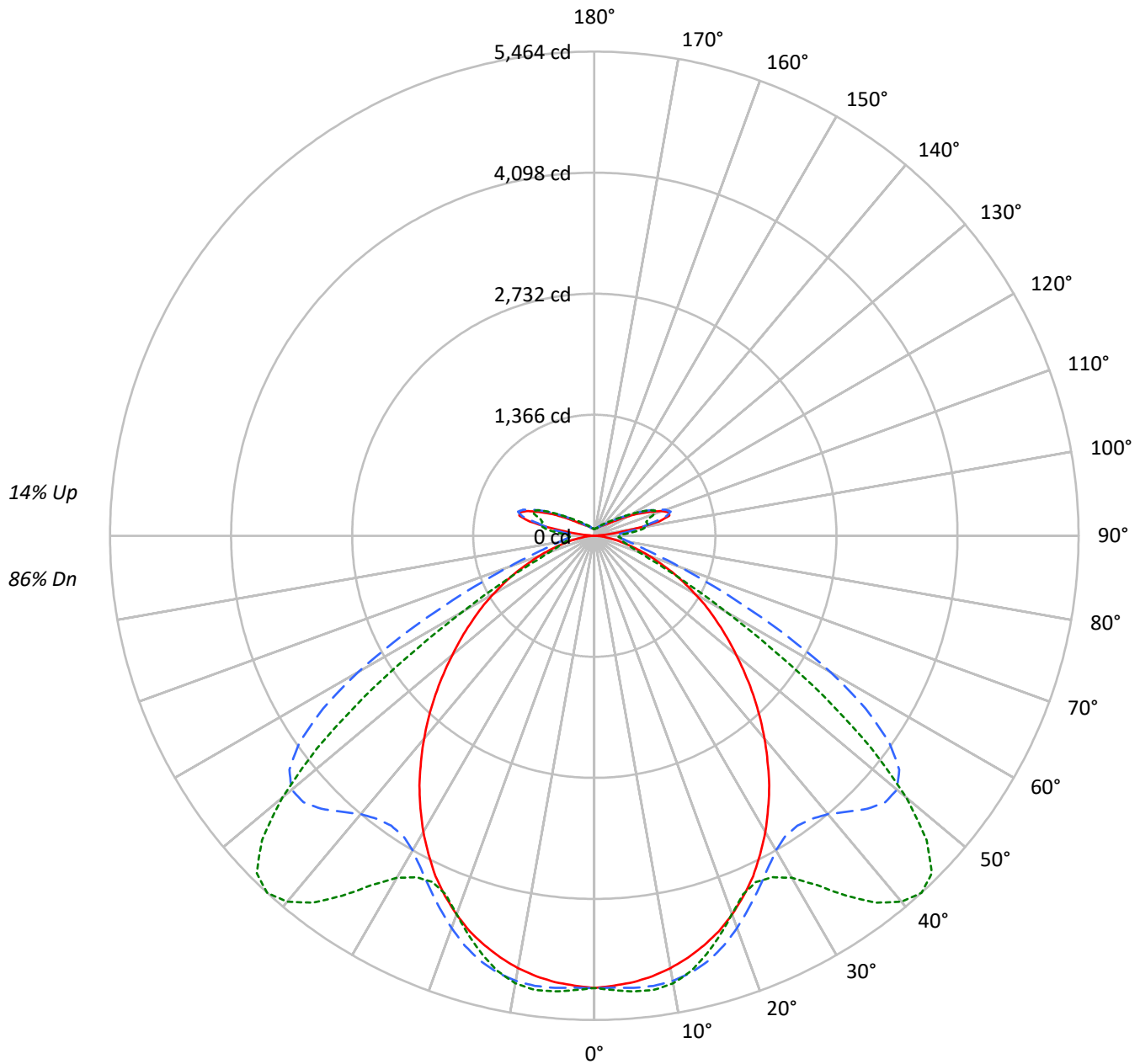
Lumens per Lamp: N/A  
Luminaire Lumens: 17385.6 lumens  
Efficiency: N/A  
Efficacy: 142.0 lumens/watt  
Spacing Criteria (0/90/45): 1.14 / 1.58 / 1.62  
Luminous Opening: Rectangular w/ Sides (W: 1.93' x L: 1.67' x H: 0.17')  
CIE Type: Semi-Direct

Input Watts (W): 122.4  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

TEST NUMBER: P828164

CATALOG NUMBER: OHB-18HE-W-UNV-L940-CD-UPL24

### Luminous Intensity Polar Plot





TEST NUMBER: P828164

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

|     |     |     |     |     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|
| RF  | 20  |     |     |     | 20  |     |     |     |     | 20  |     |    |    |    | 20 |    |    |    |    | 20 |
| RC  | 80  |     |     |     | 70  |     |     |     |     | 50  |     |    |    |    | 30 |    |    |    |    | 10 |
| RW  | 70  | 50  | 30  | 10  | 70  | 50  | 30  | 10  | 50  | 30  | 10  | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 |
| RCR |     |     |     |     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |
| 0   | 116 | 116 | 116 | 116 | 111 | 111 | 111 | 111 | 103 | 103 | 103 | 96 | 96 | 96 | 89 | 89 | 89 | 86 |    |    |
| 1   | 106 | 101 | 97  | 94  | 102 | 98  | 94  | 91  | 91  | 88  | 86  | 85 | 83 | 80 | 79 | 77 | 76 | 73 |    |    |
| 2   | 97  | 89  | 82  | 77  | 93  | 86  | 80  | 75  | 80  | 75  | 71  | 75 | 71 | 67 | 70 | 67 | 64 | 61 |    |    |
| 3   | 88  | 78  | 70  | 64  | 85  | 75  | 68  | 63  | 71  | 65  | 60  | 66 | 61 | 57 | 62 | 58 | 54 | 52 |    |    |
| 4   | 81  | 69  | 61  | 54  | 77  | 67  | 59  | 53  | 63  | 56  | 51  | 59 | 53 | 49 | 55 | 50 | 47 | 44 |    |    |
| 5   | 74  | 62  | 53  | 46  | 71  | 60  | 52  | 45  | 56  | 49  | 44  | 53 | 47 | 42 | 49 | 44 | 40 | 38 |    |    |
| 6   | 68  | 55  | 46  | 40  | 65  | 54  | 45  | 39  | 50  | 43  | 38  | 47 | 41 | 37 | 45 | 39 | 35 | 33 |    |    |
| 7   | 63  | 50  | 41  | 35  | 60  | 48  | 40  | 35  | 46  | 39  | 33  | 43 | 37 | 32 | 40 | 35 | 31 | 29 |    |    |
| 8   | 59  | 45  | 37  | 31  | 56  | 44  | 36  | 31  | 42  | 35  | 30  | 39 | 33 | 29 | 37 | 32 | 28 | 26 |    |    |
| 9   | 55  | 41  | 33  | 28  | 52  | 40  | 33  | 27  | 38  | 31  | 27  | 36 | 30 | 26 | 34 | 29 | 25 | 23 |    |    |
| 10  | 51  | 38  | 30  | 25  | 49  | 37  | 30  | 25  | 35  | 28  | 24  | 33 | 27 | 23 | 32 | 26 | 23 | 21 |    |    |

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

|     | 0°    | 45°   | 90°   |
|-----|-------|-------|-------|
| 0°  | 17049 | 17049 | 17049 |
| 5°  | 16808 | 16981 | 17180 |
| 10° | 16517 | 16912 | 17137 |
| 15° | 16114 | 16589 | 16526 |
| 20° | 15595 | 15976 | 15656 |
| 25° | 14929 | 15245 | 15279 |
| 30° | 14074 | 14692 | 16370 |
| 35° | 13114 | 14915 | 19065 |
| 40° | 12018 | 16098 | 21923 |
| 45° | 10881 | 18189 | 23423 |
| 50° | 9704  | 20022 | 21644 |
| 55° | 8597  | 19891 | 16399 |
| 60° | 7474  | 16719 | 9921  |
| 65° | 6299  | 11450 | 5928  |
| 70° | 4994  | 7320  | 4199  |
| 75° | 3664  | 5164  | 3785  |
| 80° | 2473  | 4426  | 4068  |
| 85° | 1477  | 4649  | 5803  |



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**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 487.7   | 2.8       |
| 10°-20°   | 1381.1  | 7.9       |
| 20°-30°   | 2021.0  | 11.6      |
| 30°-40°   | 2624.6  | 15.1      |
| 40°-50°   | 3205.0  | 18.4      |
| 50°-60°   | 2822.5  | 16.2      |
| 60°-70°   | 1470.8  | 8.5       |
| 70°-80°   | 630.7   | 3.6       |
| 80°-90°   | 308.3   | 1.8       |
| 90°-100°  | 343.9   | 2.0       |
| 100°-110° | 788.3   | 4.5       |
| 110°-120° | 652.6   | 3.8       |
| 120°-130° | 316.4   | 1.8       |
| 130°-140° | 158.4   | 0.9       |
| 140°-150° | 90.4    | 0.5       |
| 150°-160° | 51.1    | 0.3       |
| 160°-170° | 25.2    | 0.1       |
| 170°-180° | 7.7     | 0.0       |
| 0°-30°    | 3889.7  | 22.4      |
| 0°-40°    | 6514.4  | 37.5      |
| 0°-60°    | 12541.9 | 72.1      |
| 0°-90°    | 14951.7 | 86.0      |
| 90°-120°  | 1784.8  | 10.3      |
| 90°-150°  | 2350.0  | 13.5      |
| 90°-180°  | 2434.0  | 14.0      |
| 0°-180°   | 17385.6 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°   | 22.5° | 45°  | 67.5° | 90°  | Flux |
|------|------|-------|------|-------|------|------|
| 0°   | 5104 | 5104  | 5104 | 5104  | 5104 |      |
| 5°   | 5056 | 5095  | 5122 | 5168  | 5162 | 479  |
| 15°  | 4784 | 4919  | 4966 | 4929  | 4889 | 1347 |
| 25°  | 4239 | 4466  | 4390 | 4308  | 4312 | 1945 |
| 35°  | 3441 | 3804  | 3995 | 4659  | 4957 | 2145 |
| 45°  | 2534 | 3188  | 4357 | 5275  | 5386 | 1954 |
| 55°  | 1687 | 2792  | 4058 | 3558  | 3162 | 1514 |
| 65°  | 968  | 1935  | 1858 | 1033  | 889  | 958  |
| 75°  | 390  | 905   | 597  | 409   | 388  | 425  |
| 85°  | 83   | 323   | 304  | 297   | 301  | 92   |
| 90°  | 6    | 146   | 241  | 283   | 295  | 9    |
| 95°  | 48   | 165   | 309  | 385   | 417  | 145  |
| 105° | 876  | 901   | 837  | 647   | 606  | 832  |
| 115° | 608  | 630   | 672  | 684   | 681  | 614  |
| 125° | 302  | 321   | 353  | 363   | 362  | 282  |
| 135° | 180  | 184   | 201  | 215   | 218  | 143  |
| 145° | 135  | 136   | 140  | 147   | 150  | 85   |
| 155° | 110  | 111   | 111  | 112   | 112  | 50   |
| 165° | 87   | 88    | 89   | 89    | 89   | 25   |
| 175° | 78   | 79    | 79   | 80    | 80   | 8    |
| 180° | 78   | 78    | 78   | 78    | 78   |      |



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**CANDELA DISTRIBUTION (FULL):**

|        | 0°     | 22.5°  | 45°    | 67.5°  | 90°    |
|--------|--------|--------|--------|--------|--------|
| 0°     | 5103.7 | 5103.7 | 5103.7 | 5103.7 | 5103.7 |
| 2.5°   | 5081.6 | 5103.7 | 5104.8 | 5135.6 | 5132.3 |
| 5°     | 5056.3 | 5094.9 | 5122.4 | 5167.5 | 5162.1 |
| 7.5°   | 5014.5 | 5075.0 | 5123.5 | 5173.1 | 5168.7 |
| 10°    | 4955.1 | 5037.6 | 5101.5 | 5142.2 | 5129.0 |
| 12.5°  | 4877.9 | 4987.0 | 5049.7 | 5058.5 | 5033.2 |
| 15°    | 4784.4 | 4918.7 | 4966.1 | 4928.6 | 4889.0 |
| 17.5°  | 4678.7 | 4836.1 | 4852.6 | 4771.2 | 4721.6 |
| 20°    | 4546.5 | 4726.0 | 4709.5 | 4597.2 | 4542.2 |
| 22.5°  | 4400.1 | 4604.9 | 4552.1 | 4434.3 | 4381.4 |
| 25°    | 4239.3 | 4466.2 | 4390.2 | 4307.6 | 4312.0 |
| 27.5°  | 4051.0 | 4308.7 | 4234.9 | 4272.4 | 4342.8 |
| 30°    | 3859.5 | 4143.5 | 4098.4 | 4316.4 | 4455.1 |
| 32.5°  | 3649.1 | 3974.0 | 4014.7 | 4445.2 | 4672.0 |
| 35°    | 3441.0 | 3804.3 | 3994.8 | 4658.8 | 4957.2 |
| 37.5°  | 3210.9 | 3632.6 | 4026.8 | 4905.5 | 5218.2 |
| 40°    | 2987.3 | 3465.3 | 4099.4 | 5126.9 | 5391.1 |
| 42.5°  | 2759.4 | 3315.5 | 4221.7 | 5257.9 | 5463.8 |
| 45°    | 2533.6 | 3187.7 | 4357.1 | 5275.4 | 5385.6 |
| 47.5°  | 2307.9 | 3079.8 | 4450.7 | 5135.6 | 5084.9 |
| 50°    | 2089.9 | 2984.0 | 4457.3 | 4799.8 | 4592.8 |
| 52.5°  | 1886.3 | 2895.9 | 4336.2 | 4264.6 | 3943.1 |
| 55°    | 1686.9 | 2792.5 | 4057.6 | 3557.7 | 3162.4 |
| 57.5°  | 1505.3 | 2649.3 | 3628.2 | 2798.0 | 2366.3 |
| 60°    | 1312.5 | 2455.5 | 3073.2 | 2047.0 | 1706.7 |
| 62.5°  | 1135.2 | 2214.4 | 2451.1 | 1424.8 | 1226.6 |
| 65°    | 967.9  | 1934.7 | 1857.6 | 1032.8 | 888.6  |
| 67.5°  | 790.6  | 1645.1 | 1370.9 | 753.2  | 660.7  |
| 70°    | 651.8  | 1376.4 | 1020.7 | 585.8  | 531.8  |
| 72.5°  | 509.8  | 1121.0 | 763.1  | 475.7  | 445.9  |
| 75°    | 389.8  | 905.1  | 596.8  | 408.6  | 387.6  |
| 77.5°  | 287.4  | 715.7  | 480.1  | 361.2  | 341.3  |
| 80°    | 201.5  | 563.7  | 401.9  | 322.7  | 314.9  |
| 82.5°  | 135.5  | 436.0  | 342.5  | 307.2  | 308.3  |
| 85°    | 82.6   | 322.7  | 303.9  | 297.3  | 300.6  |
| 87.5°  | 39.6   | 229.0  | 261.0  | 270.9  | 274.1  |
| 90°    | 5.5    | 146.2  | 241.3  | 282.9  | 294.6  |
| 92.5°  | 14.8   | 128.3  | 238.7  | 293.5  | 310.3  |
| 95°    | 48.3   | 164.8  | 309.2  | 385.4  | 417.0  |
| 97.5°  | 236.1  | 309.2  | 415.2  | 501.3  | 533.3  |
| 100°   | 483.2  | 557.9  | 539.0  | 590.0  | 601.1  |
| 102.5° | 744.9  | 780.2  | 651.8  | 620.4  | 615.7  |
| 105°   | 876.5  | 901.0  | 837.3  | 647.0  | 606.5  |



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CATALOG NUMBER: OHB-18HE-W-UNV-L940-CD-UPL24

**CANDELA DISTRIBUTION (continued):**

|        | 0°    | 22.5° | 45°   | 67.5° | 90°   |
|--------|-------|-------|-------|-------|-------|
| 112.5° | 709.1 | 739.4 | 771.7 | 767.1 | 741.5 |
| 115°   | 608.3 | 629.7 | 671.6 | 684.2 | 681.2 |
| 117.5° | 522.4 | 535.4 | 575.2 | 587.6 | 589.6 |
| 120°   | 433.8 | 452.1 | 491.8 | 500.7 | 496.6 |
| 122.5° | 365.1 | 381.0 | 415.9 | 426.3 | 422.2 |
| 125°   | 301.6 | 320.6 | 353.1 | 363.2 | 361.7 |
| 127.5° | 255.3 | 267.7 | 300.6 | 312.5 | 312.7 |
| 130°   | 223.1 | 230.1 | 258.6 | 270.5 | 273.5 |
| 132.5° | 198.8 | 204.8 | 226.3 | 240.8 | 242.1 |
| 135°   | 180.5 | 184.0 | 201.1 | 214.9 | 217.8 |
| 137.5° | 165.7 | 168.3 | 181.3 | 194.8 | 197.1 |
| 140°   | 152.7 | 156.2 | 164.9 | 177.6 | 179.6 |
| 142.5° | 142.5 | 144.8 | 151.6 | 162.2 | 163.3 |
| 145°   | 134.9 | 136.2 | 139.9 | 147.4 | 150.4 |
| 147.5° | 127.0 | 129.5 | 131.2 | 137.3 | 138.4 |
| 150°   | 120.9 | 122.7 | 123.1 | 126.2 | 129.3 |
| 152.5° | 114.9 | 116.6 | 117.0 | 117.9 | 120.1 |
| 155°   | 109.6 | 111.4 | 110.9 | 111.8 | 111.8 |
| 157.5° | 96.5  | 98.2  | 100.0 | 100.9 | 100.9 |
| 160°   | 93.0  | 93.9  | 95.6  | 96.5  | 96.5  |
| 162.5° | 89.6  | 90.4  | 91.3  | 92.2  | 92.2  |
| 165°   | 86.9  | 87.8  | 88.7  | 88.7  | 88.7  |
| 167.5° | 84.3  | 84.3  | 85.2  | 86.1  | 86.1  |
| 170°   | 81.7  | 82.6  | 82.6  | 83.5  | 83.5  |
| 172.5° | 80.0  | 80.9  | 80.9  | 80.9  | 81.7  |
| 175°   | 78.2  | 79.1  | 79.1  | 80.0  | 80.0  |
| 177.5° | 78.2  | 78.2  | 78.2  | 78.2  | 78.2  |
| 180°   | 78.2  | 78.2  | 78.2  | 78.2  | 78.2  |



Report Generated By 670246072 / DESKTOP-50001EG





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







|        |       |       |       |       |       |
|--------|-------|-------|-------|-------|-------|
| 107.5° | 881.0 | 913.2 | 903.7 | 745.0 | 641.1 |
| 110°   | 813.2 | 845.3 | 857.9 | 808.6 | 725.6 |



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

Report Prepared for

Cooper Lighting Solutions

METALUX

Report Number: SP1-2307-100-8

Test Date: 08/01/2023

Luminaire Tested: OHB-15SE-N-UNV-L940-CD

Data in this report applies to families of products including OHB-15SE-N-UNV-L940-CD.

### Test Information

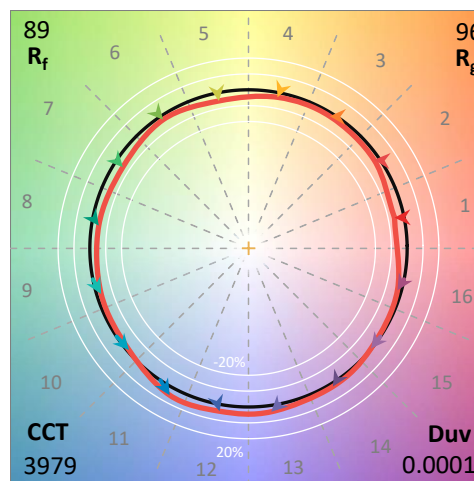
Test Method: LM-79-2019  
 Report Number: SP1-2307-100-8  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 08/04/2023  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: METALUX  
 Catalog Number: **OHB-15SE-N-UNV-L940-CD**  
 Description: 15000 LUMEN OHB SE LED LUMINAIRE WITH 90CRI, 4000K LEDS AND NARROW LENS

LENS

### Spectral Parameters

CCT (K): 3979  
 CIE u': 0.2254  
 CIE v': 0.5020  
 Duv: 0.0001  
 CIE x: 0.3813  
 CIE y: 0.3773  
 CIE z: 0.2414  
 Peak Wavelength (nm): 455  
 Dominant Wavelength (nm): 579  
 Purity: 27.8  
 Rf: 88.6  
 Rg: 96.2

CRI (Ra): 91.5  
 R1: 91.7  
 R2: 96.4  
 R3: 97.6  
 R4: 89.2  
 R5: 90.3  
 R6: 93.0  
 R7: 91.6  
 R8: 81.9  
 R9: 57.0  
 R10: 89.6  
 R11: 89.1  
 R12: 69.6  
 R13: 93.4  
 R14: 98.9



### Test Conditions

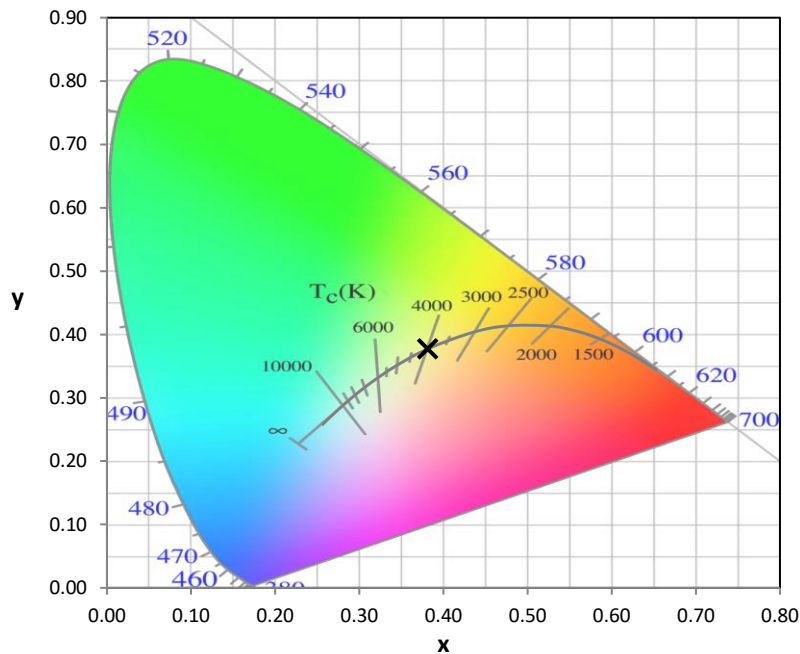
Stabilization Time: 23M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.7/57%  
 Sphere Temperature (°C): 25.2

REPORT NUMBER: SP1-2307-100-8

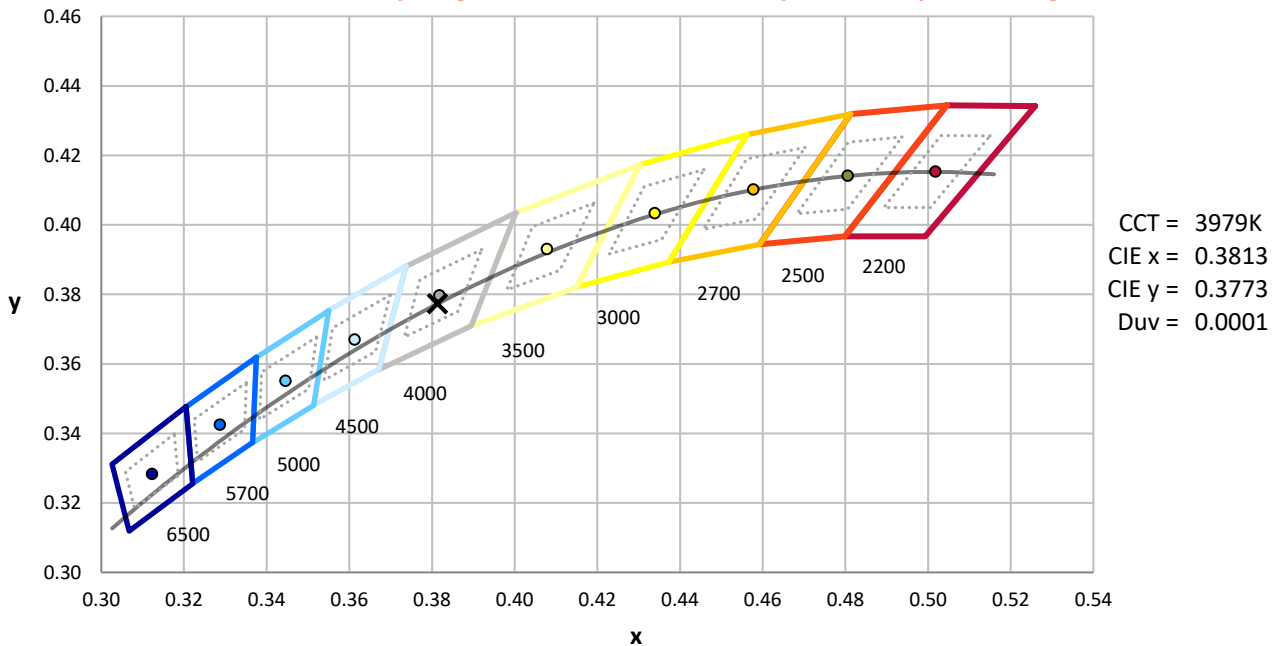
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| 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 4000K 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       | 6299             | NR               | 490       | 95290            | NR               | 620       | 202945           | NR               | 750       | 17048            | NR               | 880       | 6802             | NR               |
| 365       | 5178             | NR               | 495       | 104168           | NR               | 625       | 198934           | NR               | 755       | 15396            | NR               | 885       | 7389             | NR               |
| 370       | 5490             | NR               | 500       | 113725           | NR               | 630       | 192455           | NR               | 760       | 13359            | NR               | 890       | 5235             | NR               |
| 375       | 6104             | NR               | 505       | 126034           | NR               | 635       | 185651           | NR               | 765       | 12573            | NR               | 895       | 4778             | NR               |
| 380       | 6149             | NR               | 510       | 134848           | NR               | 640       | 177659           | NR               | 770       | 10940            | NR               | 900       | 5847             | NR               |
| 385       | 5688             | NR               | 515       | 142720           | NR               | 645       | 169230           | NR               | 775       | 9589             | NR               | 905       | 5969             | NR               |
| 390       | 5262             | NR               | 520       | 149276           | NR               | 650       | 157607           | NR               | 780       | 8802             | NR               | 910       | 6399             | NR               |
| 395       | 4581             | NR               | 525       | 154675           | NR               | 655       | 148474           | NR               | 785       | 8257             | NR               | 915       | 5912             | NR               |
| 400       | 4118             | NR               | 530       | 159852           | NR               | 660       | 137175           | NR               | 790       | 7397             | NR               | 920       | 6048             | NR               |
| 405       | 4084             | NR               | 535       | 164319           | NR               | 665       | 125124           | NR               | 795       | 7591             | NR               | 925       | 5552             | NR               |
| 410       | 4438             | NR               | 540       | 169099           | NR               | 670       | 113759           | NR               | 800       | 7116             | NR               | 930       | 7244             | NR               |
| 415       | 5782             | NR               | 545       | 173030           | NR               | 675       | 102656           | NR               | 805       | 6905             | NR               | 935       | 6076             | NR               |
| 420       | 8737             | NR               | 550       | 175415           | NR               | 680       | 92651            | NR               | 810       | 6711             | NR               | 940       | 6581             | NR               |
| 425       | 14203            | NR               | 555       | 179385           | NR               | 685       | 82728            | NR               | 815       | 6202             | NR               | 945       | 7094             | NR               |
| 430       | 23287            | NR               | 560       | 183651           | NR               | 690       | 72755            | NR               | 820       | 6421             | NR               | 950       | 6374             | NR               |
| 435       | 39198            | NR               | 565       | 186704           | NR               | 695       | 64864            | NR               | 825       | 6067             | NR               | 955       | 5408             | NR               |
| 440       | 65090            | NR               | 570       | 189735           | NR               | 700       | 57132            | NR               | 830       | 6507             | NR               | 960       | 5406             | NR               |
| 445       | 111800           | NR               | 575       | 192391           | NR               | 705       | 50899            | NR               | 835       | 6304             | NR               | 965       | 5676             | NR               |
| 450       | 185327           | NR               | 580       | 195587           | NR               | 710       | 44715            | NR               | 840       | 5605             | NR               | 970       | 6132             | NR               |
| 455       | 231910           | NR               | 585       | 198690           | NR               | 715       | 39661            | NR               | 845       | 5975             | NR               | 975       | 7732             | NR               |
| 460       | 199850           | NR               | 590       | 200528           | NR               | 720       | 35220            | NR               | 850       | 5252             | NR               | 980       | 4497             | NR               |
| 465       | 159032           | NR               | 595       | 204245           | NR               | 725       | 31033            | NR               | 855       | 6570             | NR               | 985       | 1796             | NR               |
| 470       | 134681           | NR               | 600       | 206961           | NR               | 730       | 27573            | NR               | 860       | 6167             | NR               | 990       | 6719             | NR               |
| 475       | 109873           | NR               | 605       | 207509           | NR               | 735       | 24077            | NR               | 865       | 5558             | NR               | 995       | 10730            | NR               |
| 480       | 92595            | NR               | 610       | 206751           | NR               | 740       | 21375            | NR               | 870       | 5280             | NR               | 1000      | 10317            | NR               |
| 485       | 90323            | NR               | 615       | 205233           | NR               | 745       | 19152            | NR               | 875       | 5889             | NR               |           |                  |                  |

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Scotopic Flux vs. Wavelength



Scotopic Lumens: 22729.8

S/P: 1.79

| 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       | 6299             | NR               | 490       | 95290            | NR               | 620       | 202945           | NR               | 750       | 17048            | NR               | 880       | 6802             | NR               |
| 365       | 5178             | NR               | 495       | 104168           | NR               | 625       | 198934           | NR               | 755       | 15396            | NR               | 885       | 7389             | NR               |
| 370       | 5490             | NR               | 500       | 113725           | NR               | 630       | 192455           | NR               | 760       | 13359            | NR               | 890       | 5235             | NR               |
| 375       | 6104             | NR               | 505       | 126034           | NR               | 635       | 185651           | NR               | 765       | 12573            | NR               | 895       | 4778             | NR               |
| 380       | 6149             | NR               | 510       | 134848           | NR               | 640       | 177659           | NR               | 770       | 10940            | NR               | 900       | 5847             | NR               |
| 385       | 5688             | NR               | 515       | 142720           | NR               | 645       | 169230           | NR               | 775       | 9589             | NR               | 905       | 5969             | NR               |
| 390       | 5262             | NR               | 520       | 149276           | NR               | 650       | 157607           | NR               | 780       | 8802             | NR               | 910       | 6399             | NR               |
| 395       | 4581             | NR               | 525       | 154675           | NR               | 655       | 148474           | NR               | 785       | 8257             | NR               | 915       | 5912             | NR               |
| 400       | 4118             | NR               | 530       | 159852           | NR               | 660       | 137175           | NR               | 790       | 7397             | NR               | 920       | 6048             | NR               |
| 405       | 4084             | NR               | 535       | 164319           | NR               | 665       | 125124           | NR               | 795       | 7591             | NR               | 925       | 5552             | NR               |
| 410       | 4438             | NR               | 540       | 169099           | NR               | 670       | 113759           | NR               | 800       | 7116             | NR               | 930       | 7244             | NR               |
| 415       | 5782             | NR               | 545       | 173030           | NR               | 675       | 102656           | NR               | 805       | 6905             | NR               | 935       | 6076             | NR               |
| 420       | 8737             | NR               | 550       | 175415           | NR               | 680       | 92651            | NR               | 810       | 6711             | NR               | 940       | 6581             | NR               |
| 425       | 14203            | NR               | 555       | 179385           | NR               | 685       | 82728            | NR               | 815       | 6202             | NR               | 945       | 7094             | NR               |
| 430       | 23287            | NR               | 560       | 183651           | NR               | 690       | 72755            | NR               | 820       | 6421             | NR               | 950       | 6374             | NR               |
| 435       | 39198            | NR               | 565       | 186704           | NR               | 695       | 64864            | NR               | 825       | 6067             | NR               | 955       | 5408             | NR               |
| 440       | 65090            | NR               | 570       | 189735           | NR               | 700       | 57132            | NR               | 830       | 6507             | NR               | 960       | 5406             | NR               |
| 445       | 111800           | NR               | 575       | 192391           | NR               | 705       | 50899            | NR               | 835       | 6304             | NR               | 965       | 5676             | NR               |
| 450       | 185327           | NR               | 580       | 195587           | NR               | 710       | 44715            | NR               | 840       | 5605             | NR               | 970       | 6132             | NR               |
| 455       | 231910           | NR               | 585       | 198690           | NR               | 715       | 39661            | NR               | 845       | 5975             | NR               | 975       | 7732             | NR               |
| 460       | 199850           | NR               | 590       | 200528           | NR               | 720       | 35220            | NR               | 850       | 5252             | NR               | 980       | 4497             | NR               |
| 465       | 159032           | NR               | 595       | 204245           | NR               | 725       | 31033            | NR               | 855       | 6570             | NR               | 985       | 1796             | NR               |
| 470       | 134681           | NR               | 600       | 206961           | NR               | 730       | 27573            | NR               | 860       | 6167             | NR               | 990       | 6719             | NR               |
| 475       | 109873           | NR               | 605       | 207509           | NR               | 735       | 24077            | NR               | 865       | 5558             | NR               | 995       | 10730            | NR               |
| 480       | 92595            | NR               | 610       | 206751           | NR               | 740       | 21375            | NR               | 870       | 5280             | NR               | 1000      | 10317            | NR               |
| 485       | 90323            | NR               | 615       | 205233           | NR               | 745       | 19152            | NR               | 875       | 5889             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 9423.4 M/P: 0.74**

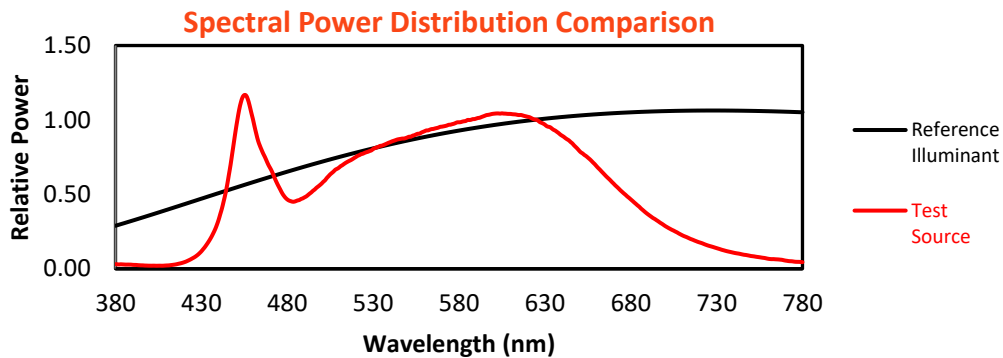
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 6299             | NR               | 490       | 95290            | NR               | 620       | 202945           | NR               | 750       | 17048            | NR               | 880       | 6802             | NR               |
| 365       | 5178             | NR               | 495       | 104168           | NR               | 625       | 198934           | NR               | 755       | 15396            | NR               | 885       | 7389             | NR               |
| 370       | 5490             | NR               | 500       | 113725           | NR               | 630       | 192455           | NR               | 760       | 13359            | NR               | 890       | 5235             | NR               |
| 375       | 6104             | NR               | 505       | 126034           | NR               | 635       | 185651           | NR               | 765       | 12573            | NR               | 895       | 4778             | NR               |
| 380       | 6149             | NR               | 510       | 134848           | NR               | 640       | 177659           | NR               | 770       | 10940            | NR               | 900       | 5847             | NR               |
| 385       | 5688             | NR               | 515       | 142720           | NR               | 645       | 169230           | NR               | 775       | 9589             | NR               | 905       | 5969             | NR               |
| 390       | 5262             | NR               | 520       | 149276           | NR               | 650       | 157607           | NR               | 780       | 8802             | NR               | 910       | 6399             | NR               |
| 395       | 4581             | NR               | 525       | 154675           | NR               | 655       | 148474           | NR               | 785       | 8257             | NR               | 915       | 5912             | NR               |
| 400       | 4118             | NR               | 530       | 159852           | NR               | 660       | 137175           | NR               | 790       | 7397             | NR               | 920       | 6048             | NR               |
| 405       | 4084             | NR               | 535       | 164319           | NR               | 665       | 125124           | NR               | 795       | 7591             | NR               | 925       | 5552             | NR               |
| 410       | 4438             | NR               | 540       | 169099           | NR               | 670       | 113759           | NR               | 800       | 7116             | NR               | 930       | 7244             | NR               |
| 415       | 5782             | NR               | 545       | 173030           | NR               | 675       | 102656           | NR               | 805       | 6905             | NR               | 935       | 6076             | NR               |
| 420       | 8737             | NR               | 550       | 175415           | NR               | 680       | 92651            | NR               | 810       | 6711             | NR               | 940       | 6581             | NR               |
| 425       | 14203            | NR               | 555       | 179385           | NR               | 685       | 82728            | NR               | 815       | 6202             | NR               | 945       | 7094             | NR               |
| 430       | 23287            | NR               | 560       | 183651           | NR               | 690       | 72755            | NR               | 820       | 6421             | NR               | 950       | 6374             | NR               |
| 435       | 39198            | NR               | 565       | 186704           | NR               | 695       | 64864            | NR               | 825       | 6067             | NR               | 955       | 5408             | NR               |
| 440       | 65090            | NR               | 570       | 189735           | NR               | 700       | 57132            | NR               | 830       | 6507             | NR               | 960       | 5406             | NR               |
| 445       | 111800           | NR               | 575       | 192391           | NR               | 705       | 50899            | NR               | 835       | 6304             | NR               | 965       | 5676             | NR               |
| 450       | 185327           | NR               | 580       | 195587           | NR               | 710       | 44715            | NR               | 840       | 5605             | NR               | 970       | 6132             | NR               |
| 455       | 231910           | NR               | 585       | 198690           | NR               | 715       | 39661            | NR               | 845       | 5975             | NR               | 975       | 7732             | NR               |
| 460       | 199850           | NR               | 590       | 200528           | NR               | 720       | 35220            | NR               | 850       | 5252             | NR               | 980       | 4497             | NR               |
| 465       | 159032           | NR               | 595       | 204245           | NR               | 725       | 31033            | NR               | 855       | 6570             | NR               | 985       | 1796             | NR               |
| 470       | 134681           | NR               | 600       | 206961           | NR               | 730       | 27573            | NR               | 860       | 6167             | NR               | 990       | 6719             | NR               |
| 475       | 109873           | NR               | 605       | 207509           | NR               | 735       | 24077            | NR               | 865       | 5558             | NR               | 995       | 10730            | NR               |
| 480       | 92595            | NR               | 610       | 206751           | NR               | 740       | 21375            | NR               | 870       | 5280             | NR               | 1000      | 10317            | NR               |
| 485       | 90323            | NR               | 615       | 205233           | NR               | 745       | 19152            | NR               | 875       | 5889             | NR               |           |                  |                  |

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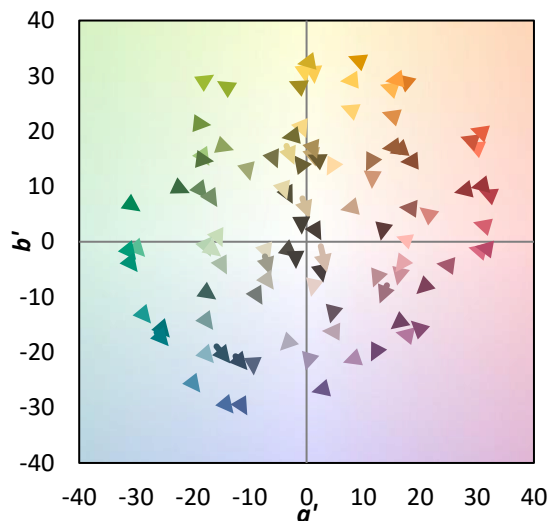
**TM-30-18**

**Summary**

$R_f = 88.6$   
 $R_g = 96.2$   
 $CIE R_a = 91.5$   
 $R_9 = 57.0$



**Color Vector Graphics**

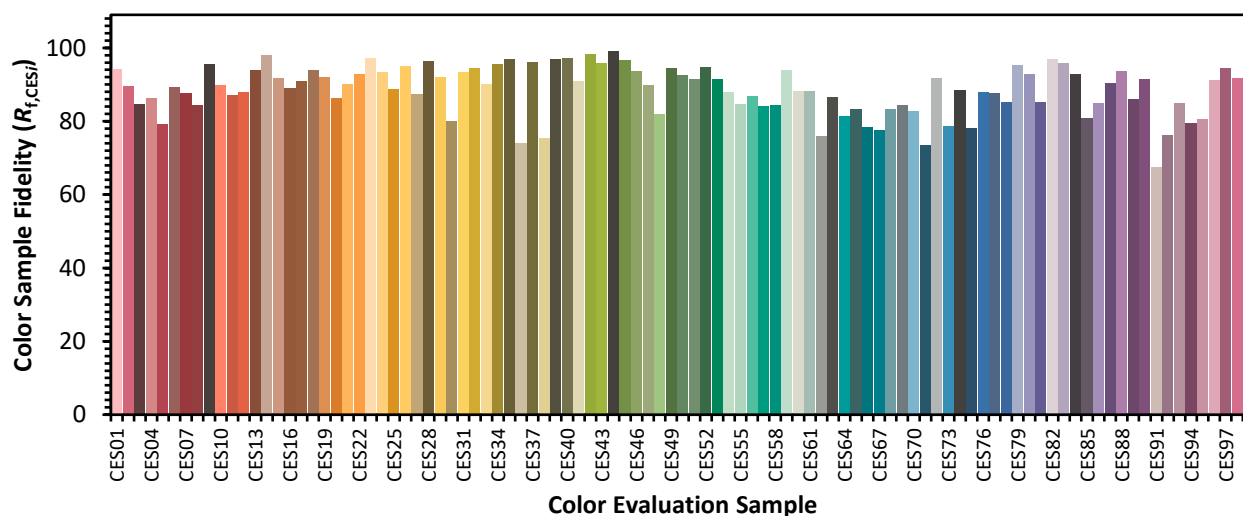


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Individual Sample Fidelity Index ( $R_{f,i}$ )

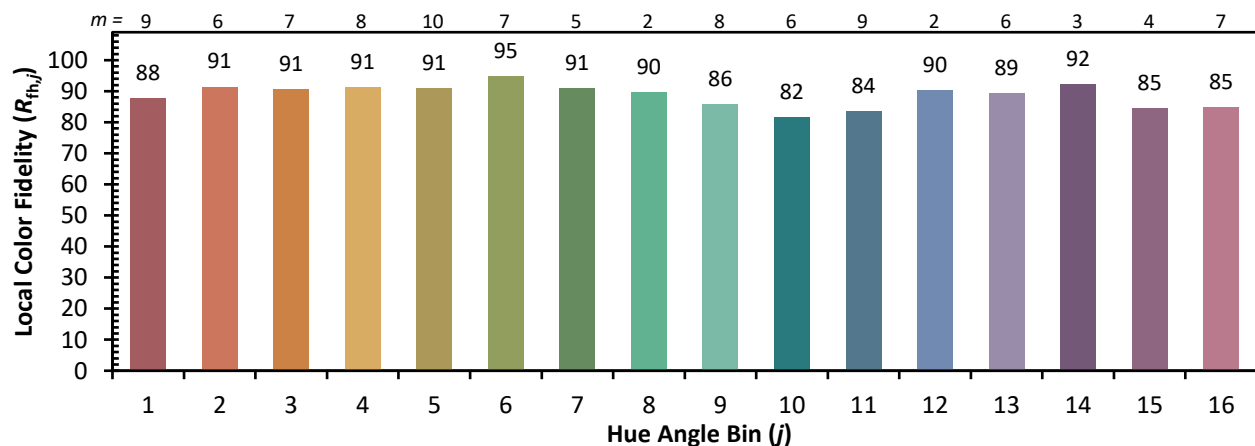
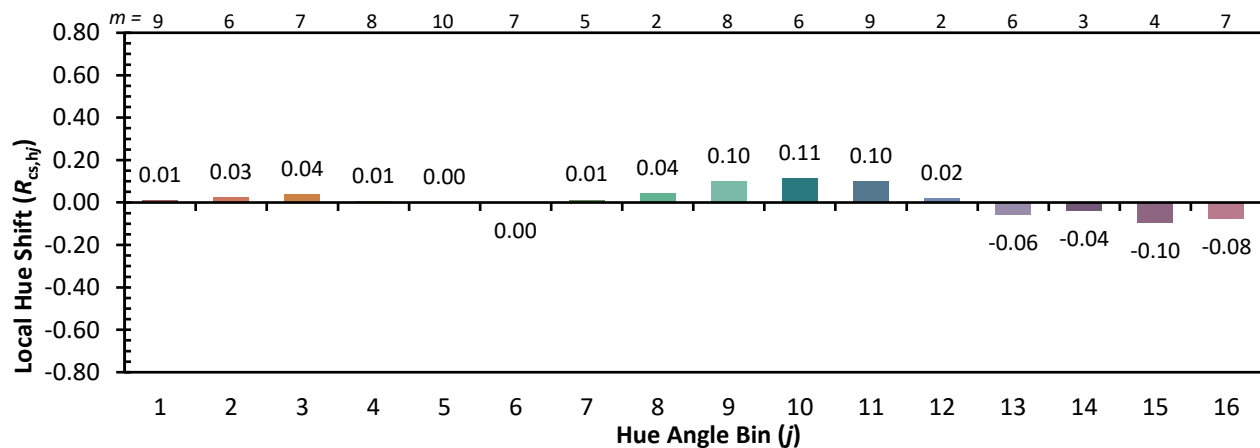
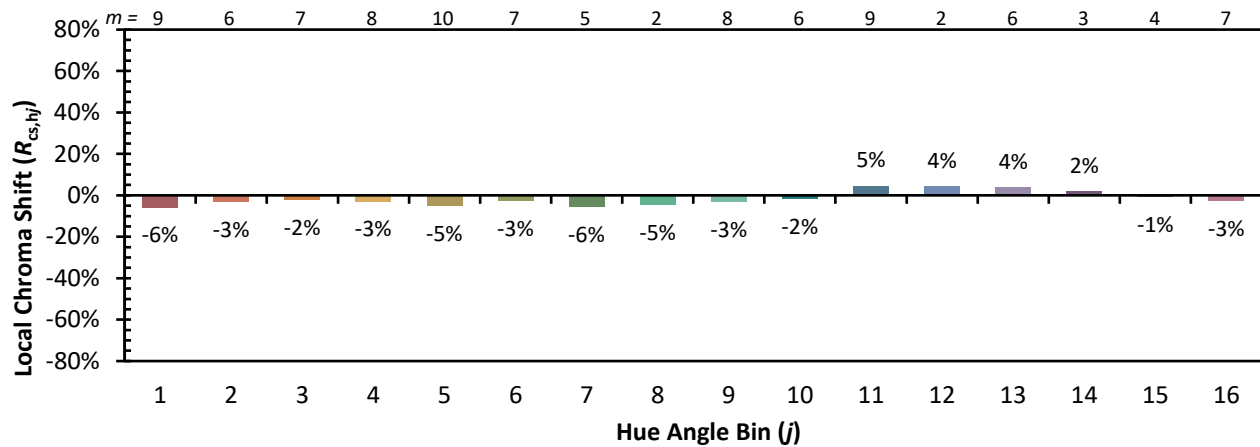
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 95 | CES51 = 92 | CES76 = 88 |
| CES02 = 62 | CES27 = 87 | CES52 = 95 | CES77 = 88 |
| CES03 = 31 | CES28 = 96 | CES53 = 92 | CES78 = 85 |
| CES04 = 69 | CES29 = 92 | CES54 = 88 | CES79 = 95 |
| CES05 = 49 | CES30 = 80 | CES55 = 85 | CES80 = 93 |
| CES06 = 50 | CES31 = 93 | CES56 = 87 | CES81 = 85 |
| CES07 = 42 | CES32 = 94 | CES57 = 84 | CES82 = 97 |
| CES08 = 41 | CES33 = 90 | CES58 = 84 | CES83 = 96 |
| CES09 = 29 | CES34 = 96 | CES59 = 94 | CES84 = 93 |
| CES10 = 74 | CES35 = 97 | CES60 = 88 | CES85 = 81 |
| CES11 = 57 | CES36 = 74 | CES61 = 88 | CES86 = 85 |
| CES12 = 63 | CES37 = 96 | CES62 = 76 | CES87 = 90 |
| CES13 = 43 | CES38 = 75 | CES63 = 86 | CES88 = 94 |
| CES14 = 74 | CES39 = 97 | CES64 = 81 | CES89 = 86 |
| CES15 = 71 | CES40 = 97 | CES65 = 83 | CES90 = 91 |
| CES16 = 47 | CES41 = 91 | CES66 = 78 | CES91 = 67 |
| CES17 = 49 | CES42 = 98 | CES67 = 78 | CES92 = 76 |
| CES18 = 56 | CES43 = 96 | CES68 = 83 | CES93 = 85 |
| CES19 = 71 | CES44 = 99 | CES69 = 84 | CES94 = 79 |
| CES20 = 66 | CES45 = 97 | CES70 = 83 | CES95 = 81 |
| CES21 = 85 | CES46 = 94 | CES71 = 74 | CES96 = 91 |
| CES22 = 78 | CES47 = 90 | CES72 = 92 | CES97 = 94 |
| CES23 = 91 | CES48 = 82 | CES73 = 79 | CES98 = 92 |
| CES24 = 90 | CES49 = 94 | CES74 = 89 | CES99 = 89 |
| CES25 = 71 | CES50 = 93 | CES75 = 78 |            |



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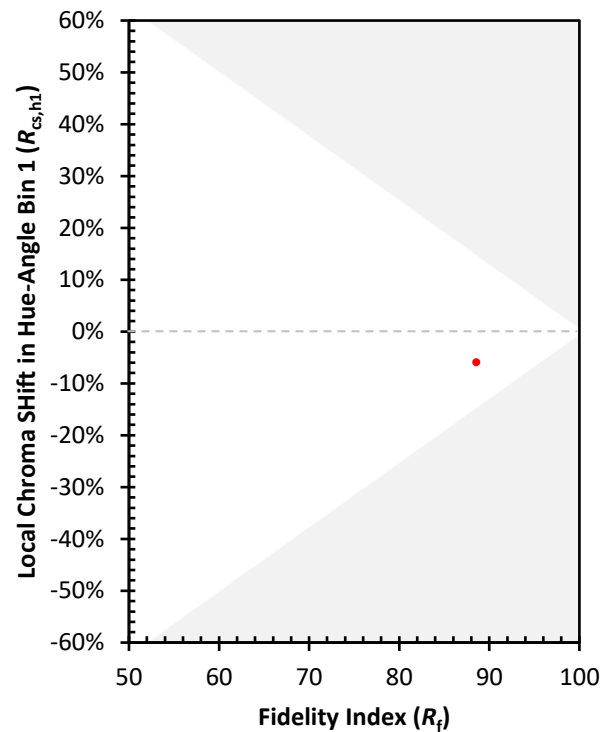
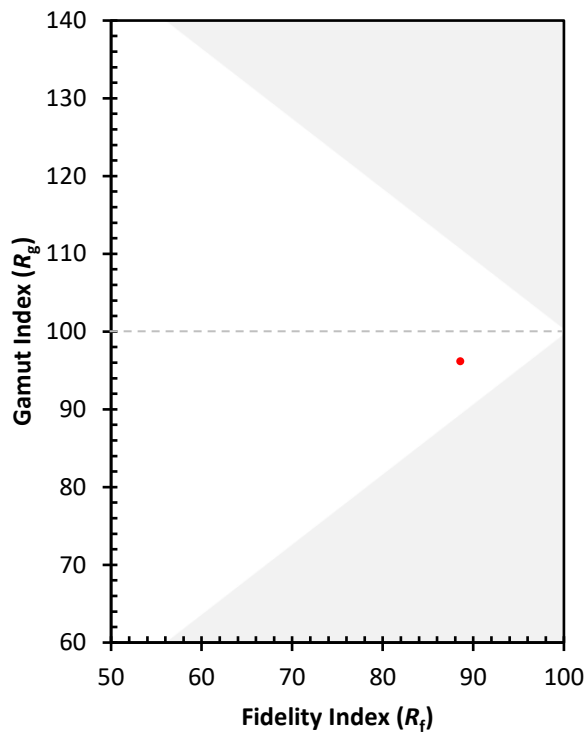
**Color Rendition by Hue-Angle Bin**



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**TM-30-18**

**Measure Comparisons**



(END OF REPORT)