

Signify Classified - Internal  
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: McGRAW-EDISON

Report Number: P387203

Luminaire Tested: **TT-D2-830-U-5WQ-PM**

Issue Date: 2/18/2020

### Test Information

Test Method: LM-79-08  
Report Number: P387203  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G3-1908-473-14)  
Test Lab: INNOVATIONS CENTER  
Issue Date: 2/18/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: TT-D2-830-U-5WQ-PM  
Description: TOPTIER LED SITE LUMINAIRE  
3000K, 80 CRI LEDS AND WIDE DISTRIBUTION  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

### Summary

Lumens per Lamp: N/A  
Luminaire Lumens: 4695 lumens  
Efficiency: N/A  
Efficacy: 119.8 lumens/watt  
Luminous Opening: Circular (Dia: 1.12' x H: 0')  
IES Classification: Type V - Short  
BUG Rating: B3 - U0 - G2

Input Watts (W): 39.2  
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: 28.75 FT



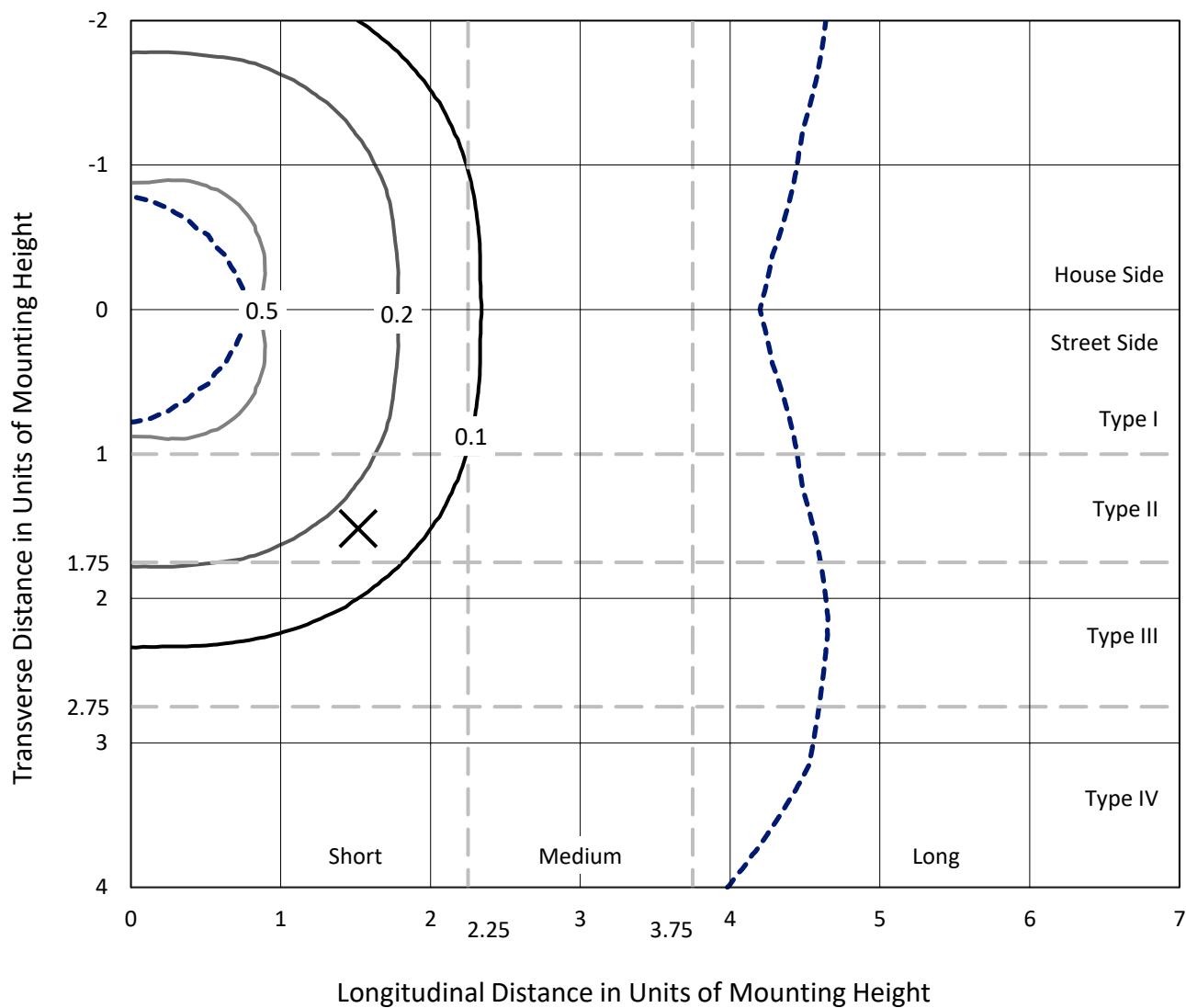
REPORT NUMBER: P387203

CATALOG NUMBER: TT-D2-830-U-5WQ-PM

## Iso-Footcandle Lines of Horizontal Illumination

✕ Max cd

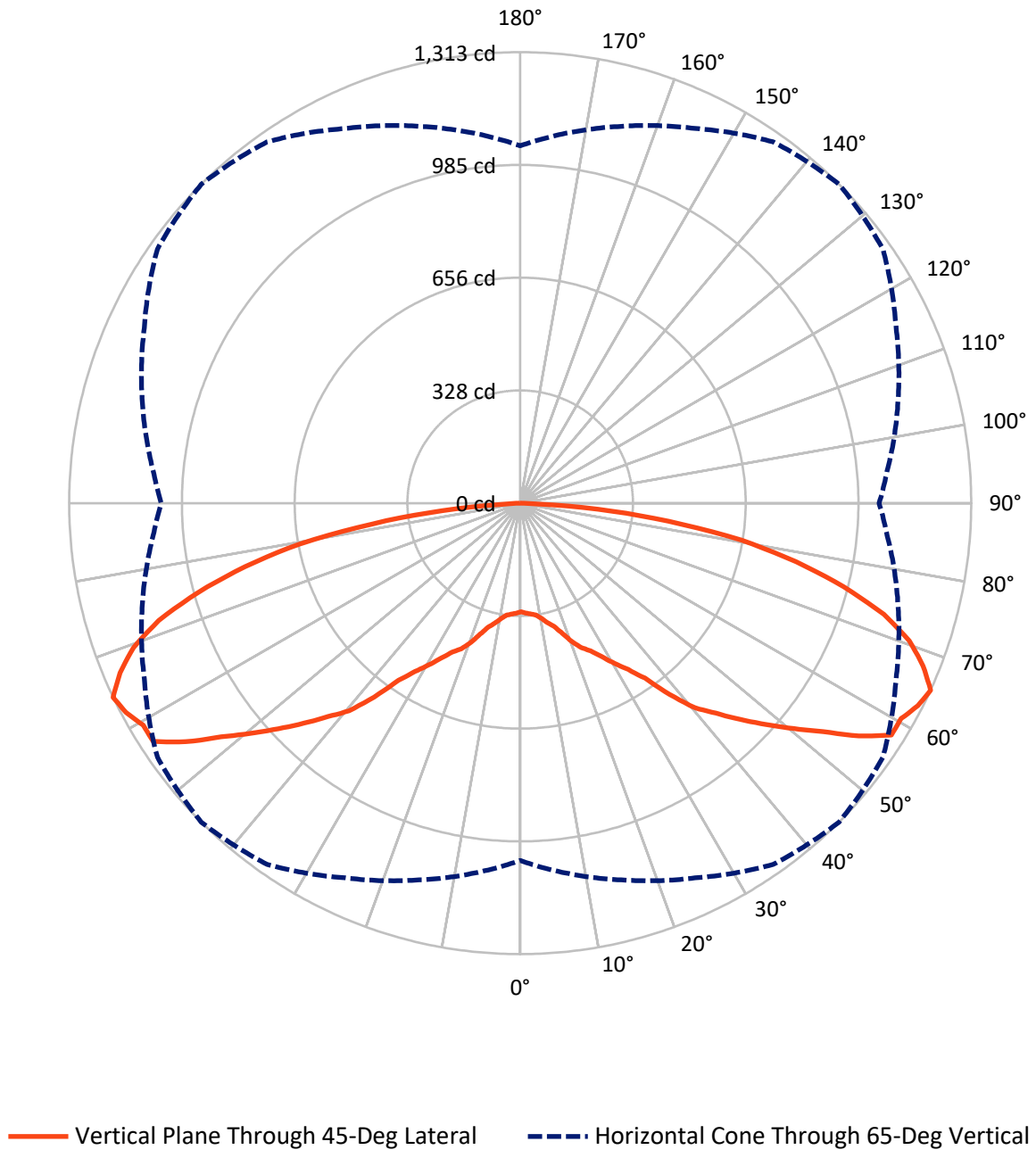
--- 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 0.6 fc  
 Type V - Short - N/A

REPORT NUMBER: P387203  
CATALOG NUMBER: TT-D2-830-U-5WQ-PM

## Luminous Intensity Polar Plot



REPORT NUMBER: P387203

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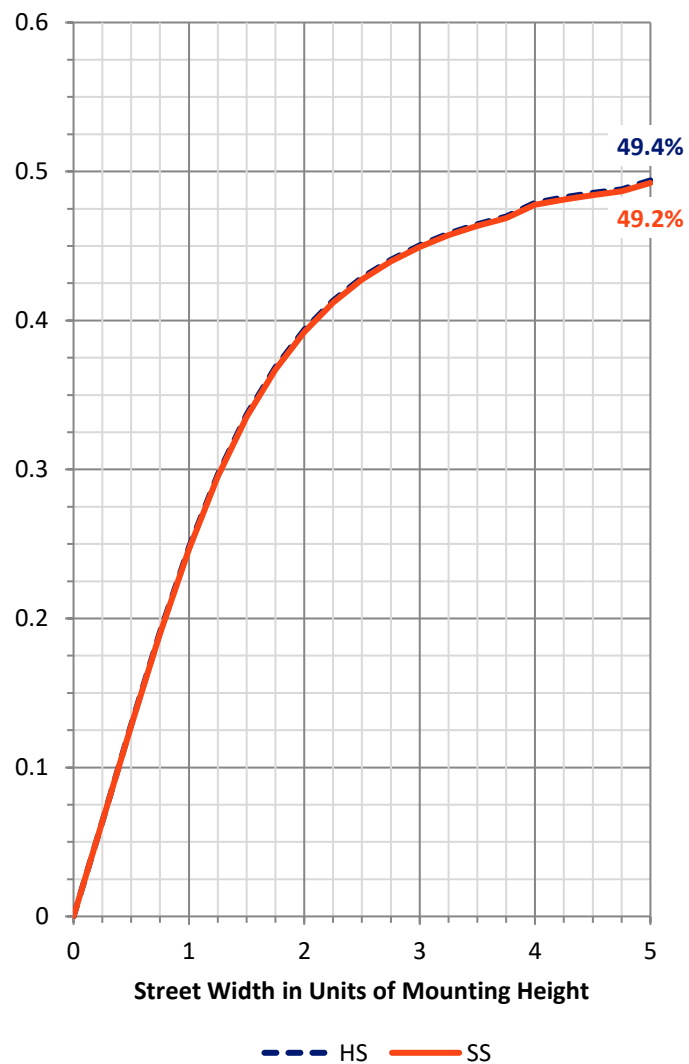
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 2347.5   | 0.0    | 2347.5 |
|                    | % Fixture | 50.0     | 0.0    | 50.0   |
| <b>Street Side</b> | Lumens    | 2347.5   | 0.0    | 2347.5 |
|                    | % Fixture | 50.0     | 0.0    | 50.0   |
| <b>Total</b>       | Lumens    | 4695.0   | 0.0    | 4695.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 31.5   | 0.7       |
| 10°-20°   | 108.4  | 2.3       |
| 20°-30°   | 222.5  | 4.7       |
| 30°-40°   | 395.4  | 8.4       |
| 40°-50°   | 666.5  | 14.2      |
| 50°-60°   | 983.1  | 20.9      |
| 60°-70°   | 1153.8 | 24.6      |
| 70°-80°   | 898.9  | 19.1      |
| 80°-90°   | 235.0  | 5.0       |
| 90°-100°  | 0.0    | 0.0       |
| 100°-110° | 0.0    | 0.0       |
| 110°-120° | 0.0    | 0.0       |
| 120°-130° | 0.0    | 0.0       |
| 130°-140° | 0.0    | 0.0       |
| 140°-150° | 0.0    | 0.0       |
| 150°-160° | 0.0    | 0.0       |
| 160°-170° | 0.0    | 0.0       |
| 170°-180° | 0.0    | 0.0       |
| 0°-90°    | 4695.0 | 100.0     |
| 0°-180°   | 4695.0 | 100.0     |

**Coefficient of Utilization**



REPORT NUMBER: P387203

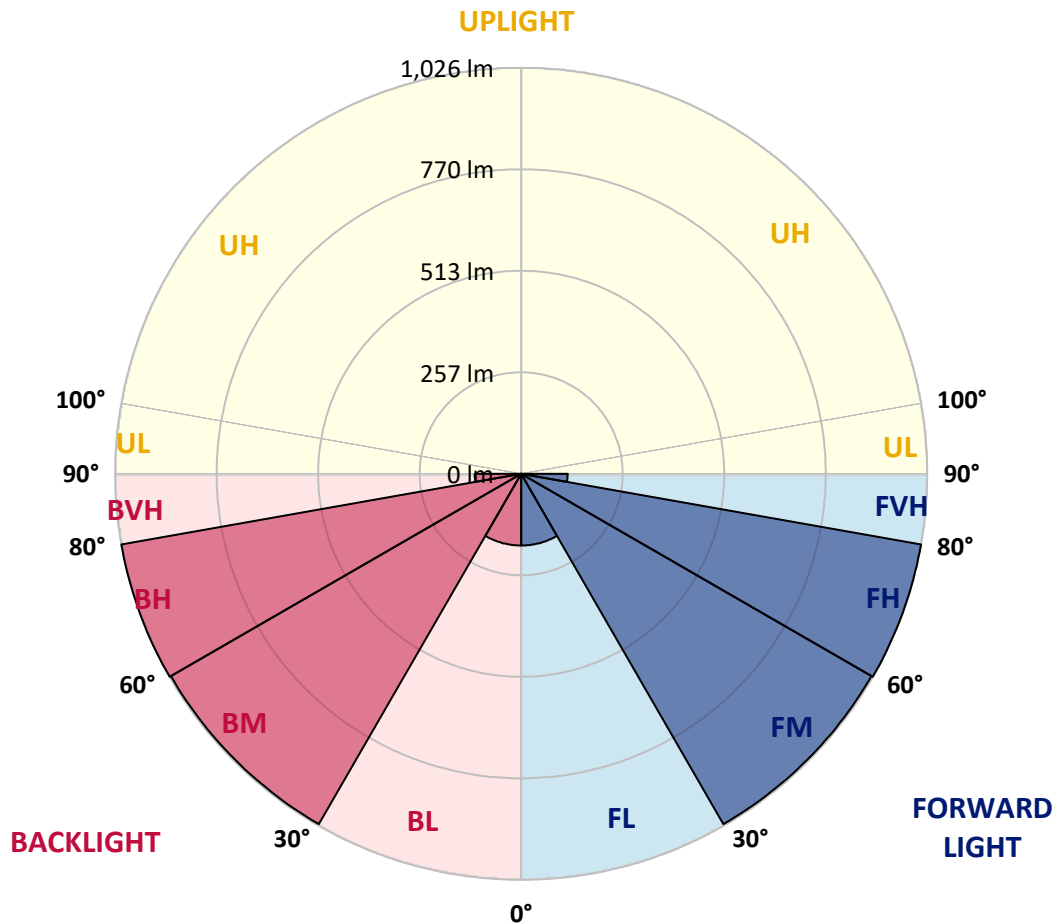
CATALOG NUMBER: TT-D2-830-U-5WQ-PM

**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 181.2  | 3.9       |                         |      |         |
| FM   | (30°-60°)   | 1022.5 | 21.8      |                         |      |         |
| FH   | (60°-80°)   | 1026.3 | 21.9      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 117.5  | 2.5       |                         |      | G2/225  |
| BL   | (0°-30°)    | 181.2  | 3.9       | B1/500                  |      |         |
| BM   | (30°-60°)   | 1022.5 | 21.8      | B2/2500                 |      |         |
| BH   | (60°-80°)   | 1026.3 | 21.9      | B3/2500                 |      | G1/1800 |
| BVH  | (80°-90°)   | 117.5  | 2.5       |                         |      | G2/225  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B3-U0-G2**

Type V Short



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CATALOG NUMBER: TT-D2-830-U-5WQ-PM

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 65°    | 75°    | 85°    | 90°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 316.0  | 316.0  | 316.0  | 316.0  | 316.0  | 316.0  | 316.0  | 316.0  | 316.0  | 316.0  | 316.0  |
| 2.5°  | 321.2  | 321.2  | 321.2  | 320.4  | 320.4  | 320.4  | 320.4  | 321.2  | 321.2  | 321.2  | 321.2  |
| 5°    | 328.5  | 328.5  | 327.1  | 325.6  | 324.1  | 324.1  | 324.8  | 325.6  | 326.3  | 327.8  | 327.8  |
| 7.5°  | 333.0  | 333.0  | 332.2  | 330.8  | 328.5  | 328.5  | 329.3  | 330.8  | 331.5  | 331.5  | 330.8  |
| 10°   | 338.9  | 339.6  | 341.8  | 342.6  | 341.1  | 341.1  | 341.8  | 342.6  | 341.1  | 338.9  | 338.9  |
| 12.5° | 352.9  | 353.6  | 356.6  | 358.8  | 358.8  | 357.3  | 358.1  | 359.5  | 355.9  | 352.2  | 352.9  |
| 15°   | 372.8  | 372.8  | 373.6  | 375.8  | 374.3  | 372.8  | 374.3  | 375.1  | 372.8  | 372.1  | 373.6  |
| 17.5° | 399.4  | 399.4  | 395.0  | 398.7  | 399.4  | 398.7  | 400.2  | 396.5  | 394.2  | 397.2  | 398.7  |
| 20°   | 428.2  | 425.3  | 423.0  | 426.0  | 431.9  | 429.7  | 432.6  | 424.5  | 422.3  | 423.8  | 424.5  |
| 22.5° | 446.7  | 448.9  | 450.4  | 451.8  | 460.0  | 457.0  | 460.0  | 451.1  | 449.6  | 446.7  | 444.5  |
| 25°   | 468.8  | 471.0  | 479.9  | 475.5  | 480.6  | 476.2  | 479.9  | 474.7  | 477.7  | 468.8  | 468.8  |
| 27.5° | 493.9  | 498.3  | 503.5  | 501.3  | 507.9  | 505.7  | 507.9  | 500.6  | 501.3  | 497.6  | 496.1  |
| 30°   | 527.9  | 527.9  | 526.4  | 530.8  | 542.6  | 541.2  | 541.9  | 532.3  | 525.7  | 526.4  | 529.4  |
| 32.5° | 561.8  | 557.4  | 559.6  | 572.9  | 580.3  | 577.3  | 578.8  | 574.4  | 559.6  | 556.7  | 558.9  |
| 35°   | 593.6  | 600.2  | 605.4  | 616.5  | 626.8  | 625.3  | 624.6  | 617.2  | 607.6  | 595.8  | 592.1  |
| 37.5° | 643.1  | 650.4  | 664.5  | 684.4  | 702.9  | 706.5  | 696.9  | 687.3  | 665.2  | 648.2  | 639.4  |
| 40°   | 708.0  | 708.8  | 725.0  | 763.4  | 780.4  | 783.3  | 778.2  | 761.9  | 728.0  | 708.8  | 708.0  |
| 42.5° | 764.9  | 759.7  | 786.3  | 818.8  | 834.3  | 835.7  | 832.1  | 818.8  | 786.3  | 759.0  | 764.1  |
| 45°   | 809.2  | 809.2  | 840.9  | 866.8  | 891.9  | 897.8  | 891.1  | 863.1  | 841.7  | 809.9  | 807.7  |
| 47.5° | 849.8  | 860.8  | 887.4  | 919.2  | 954.6  | 962.7  | 954.6  | 921.4  | 885.2  | 861.6  | 849.0  |
| 50°   | 898.5  | 911.8  | 931.0  | 980.4  | 1020.3 | 1031.4 | 1019.6 | 983.4  | 931.0  | 911.0  | 903.7  |
| 52.5° | 955.3  | 966.4  | 996.7  | 1058.7 | 1088.2 | 1104.5 | 1094.9 | 1060.2 | 998.2  | 967.9  | 962.0  |
| 55°   | 1023.3 | 1012.9 | 1060.2 | 1120.0 | 1174.6 | 1196.0 | 1176.8 | 1121.5 | 1067.6 | 1012.9 | 1023.3 |
| 57.5° | 1058.0 | 1046.2 | 1112.6 | 1169.5 | 1245.5 | 1273.6 | 1249.9 | 1173.9 | 1112.6 | 1049.8 | 1057.2 |
| 60°   | 1060.9 | 1066.1 | 1116.3 | 1209.3 | 1261.7 | 1273.6 | 1266.2 | 1216.0 | 1118.5 | 1070.5 | 1056.5 |
| 62.5° | 1052.1 | 1083.8 | 1126.6 | 1222.6 | 1269.9 | 1298.7 | 1273.6 | 1224.1 | 1131.1 | 1089.0 | 1052.8 |
| 65°   | 1040.3 | 1072.0 | 1135.5 | 1203.4 | 1283.9 | 1312.7 | 1289.1 | 1207.1 | 1138.4 | 1072.0 | 1044.7 |
| 67.5° | 1019.6 | 1008.5 | 1086.8 | 1177.6 | 1247.7 | 1264.7 | 1249.9 | 1179.0 | 1086.0 | 1007.0 | 1021.8 |
| 70°   | 953.9  | 944.3  | 1011.5 | 1111.1 | 1178.3 | 1201.9 | 1184.2 | 1112.6 | 1012.9 | 946.5  | 955.3  |
| 72.5° | 856.4  | 859.4  | 924.3  | 1019.6 | 1091.9 | 1106.7 | 1097.1 | 1018.8 | 928.0  | 863.1  | 851.2  |
| 75°   | 742.7  | 750.1  | 812.1  | 898.5  | 964.2  | 973.1  | 963.5  | 902.2  | 811.4  | 754.5  | 739.0  |
| 77.5° | 610.6  | 621.6  | 671.8  | 758.2  | 801.8  | 821.7  | 806.2  | 760.4  | 675.5  | 624.6  | 609.1  |
| 80°   | 473.2  | 476.9  | 512.4  | 581.8  | 639.4  | 652.6  | 637.9  | 584.0  | 516.8  | 478.4  | 467.3  |
| 82.5° | 310.1  | 316.0  | 347.7  | 400.9  | 438.5  | 434.9  | 438.5  | 396.5  | 351.4  | 314.5  | 296.1  |
| 85°   | 138.1  | 149.9  | 171.3  | 196.4  | 220.7  | 227.4  | 220.7  | 199.3  | 171.3  | 146.9  | 144.0  |
| 87.5° | 9.6    | 11.1   | 13.3   | 14.0   | 15.5   | 11.8   | 11.8   | 11.8   | 10.3   | 11.8   | 9.6    |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

LM-79-08: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

McGRAW-EDISON

Report Number: SP1-2006-844-5

Luminaire Tested: TT-D5-830-U-MQ

Data valid for TT-D\* family of products

Test Date: 09/30/2020



### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2006-844-5  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 09/30/2020  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: MCGRAW-EDISON  
 Catalog Number: **TT-D5-830-U-MQ**  
 Description: MCGRAW EDISON

### DISTRIBUTION

### Spectral Parameters

CCT (K): 2996  
 CIE  $u'$ : 0.2496  
 CIE  $v'$ : 0.5255  
 Duv: 0.0029  
 CIE x: 0.4414  
 CIE y: 0.4130  
 CIE z: 0.1455  
 Peak Wavelength (nm): 601  
 Dominant Wavelength (nm): 581  
 Purity: 56.8  
 Rf: 85.7  
 Rg: 94.5

CRI (Ra): 81.6  
 R1: 79.1  
 R2: 89.7  
 R3: 96.7  
 R4: 80.2  
 R5: 79.8  
 R6: 88.4  
 R7: 82.6  
 R8: 56.3  
 R9: -0.6  
 R10: 77.8  
 R11: 80.1  
 R12: 72.7  
 R13: 81.5  
 R14: 98.5



### Test Conditions

Stabilization Time: 55M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.5/43%  
 Sphere Temperature (°C): 25.9

REPORT NUMBER: SP1-2006-844-5

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 7/29/2020        | 1/29/2021            |
| Power Meter                    | IN0071                | 12/3/2019        | 12/3/2020            |
| AC Power Source                | IN0063                | 12/3/2019        | 12/3/2020            |
| DC Power Source                | IN0208                | 12/3/2019        | 12/3/2020            |
| Sphere Thermometer             | IN0085                | 12/3/2019        | 12/3/2020            |
| Room Thermometer               | IN0046                | 12/3/2019        | 12/3/2020            |

REPORT NUMBER: SP1-2006-844-5

**CIE 1931 Chromaticity Diagram**



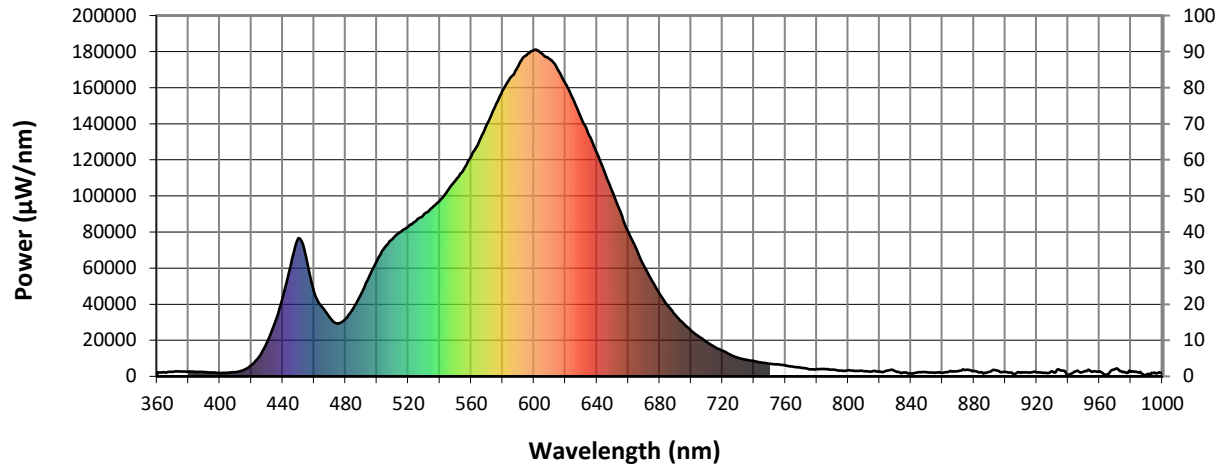
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 3000K 4-step quadrangle

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### Photopic Flux vs. Wavelength

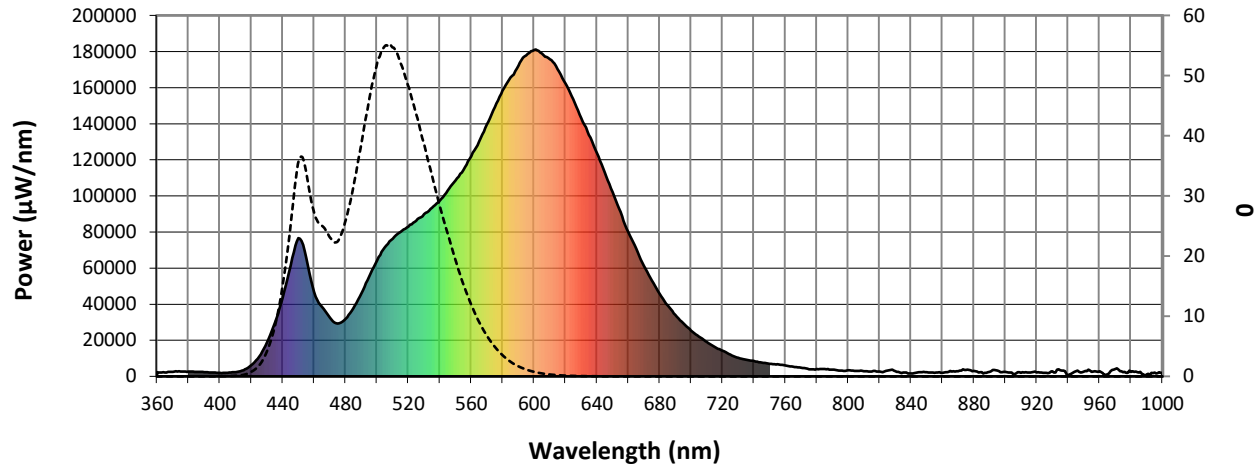


#####

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2265             | 0.0              | 490       | 45874            | 6.5              | 620       | 162337           | 42.2             | 750       | 6976             | 0.0              | 880       | 2976             | 0.0              |
| 365       | 2167             | 0.0              | 495       | 55189            | 10.0             | 625       | 153641           | 33.9             | 755       | 6666             | 0.0              | 885       | 2283             | 0.0              |
| 370       | 2505             | 0.0              | 500       | 64204            | 14.2             | 630       | 143151           | 25.9             | 760       | 5969             | 0.0              | 890       | 2506             | 0.0              |
| 375       | 2720             | 0.0              | 505       | 71441            | 20.0             | 635       | 133763           | 20.1             | 765       | 5281             | 0.0              | 895       | 3132             | 0.0              |
| 380       | 2601             | 0.0              | 510       | 76219            | 26.2             | 640       | 123759           | 14.8             | 770       | 4732             | 0.0              | 900       | 2539             | 0.0              |
| 385       | 2461             | 0.0              | 515       | 79949            | 33.1             | 645       | 112859           | 10.9             | 775       | 3998             | 0.0              | 905       | 1252             | 0.0              |
| 390       | 2308             | 0.0              | 520       | 83077            | 40.3             | 650       | 102080           | 7.5              | 780       | 4027             | 0.0              | 910       | 1938             | 0.0              |
| 395       | 2104             | 0.0              | 525       | 86267            | 46.3             | 655       | 91102            | 5.2              | 785       | 4088             | 0.0              | 915       | 2171             | 0.0              |
| 400       | 1900             | 0.0              | 530       | 89871            | 52.9             | 660       | 79928            | 3.3              | 790       | 3700             | 0.0              | 920       | 2123             | 0.0              |
| 405       | 1945             | 0.0              | 535       | 93544            | 58.0             | 665       | 70694            | 2.2              | 795       | 3213             | 0.0              | 925       | 1954             | 0.0              |
| 410       | 2378             | 0.0              | 540       | 97371            | 63.4             | 670       | 61201            | 1.3              | 800       | 3403             | 0.0              | 930       | 2800             | 0.0              |
| 415       | 3437             | 0.0              | 545       | 103011           | 68.6             | 675       | 53092            | 0.9              | 805       | 3079             | 0.0              | 935       | 3314             | 0.0              |
| 420       | 6173             | 0.0              | 550       | 108560           | 73.8             | 680       | 45718            | 0.5              | 810       | 2921             | 0.0              | 940       | 553              | 0.0              |
| 425       | 11052            | 0.1              | 555       | 114473           | 78.2             | 685       | 39372            | 0.3              | 815       | 2705             | 0.0              | 945       | 2793             | 0.0              |
| 430       | 18756            | 0.1              | 560       | 121896           | 82.8             | 690       | 34120            | 0.2              | 820       | 2685             | 0.0              | 950       | 2629             | 0.0              |
| 435       | 29750            | 0.4              | 565       | 130192           | 86.6             | 695       | 29427            | 0.1              | 825       | 3246             | 0.0              | 955       | 2418             | 0.0              |
| 440       | 43697            | 0.7              | 570       | 139595           | 90.8             | 700       | 25380            | 0.1              | 830       | 2813             | 0.0              | 960       | 2857             | 0.0              |
| 445       | 61462            | 1.3              | 575       | 149225           | 92.8             | 705       | 22079            | 0.0              | 835       | 2097             | 0.0              | 965       | 1052             | 0.0              |
| 450       | 76648            | 2.0              | 580       | 158344           | 94.1             | 710       | 18938            | 0.0              | 840       | 1606             | 0.0              | 970       | 4009             | 0.0              |
| 455       | 65529            | 2.2              | 585       | 165704           | 92.1             | 715       | 16322            | 0.0              | 845       | 2347             | 0.0              | 975       | 2341             | 0.0              |
| 460       | 46753            | 1.9              | 590       | 172269           | 89.1             | 720       | 14132            | 0.0              | 850       | 2273             | 0.0              | 980       | 2439             | 0.0              |
| 465       | 38422            | 2.0              | 595       | 177895           | 84.3             | 725       | 12072            | 0.0              | 855       | 1971             | 0.0              | 985       | 2098             | 0.0              |
| 470       | 32450            | 2.0              | 600       | 180887           | 78.0             | 730       | 10271            | 0.0              | 860       | 1962             | 0.0              | 990       | 1159             | 0.0              |
| 475       | 29284            | 2.3              | 605       | 178880           | 69.3             | 735       | 9202             | 0.0              | 865       | 2989             | 0.0              | 995       | 2146             | 0.0              |
| 480       | 31922            | 3.0              | 610       | 175843           | 60.4             | 740       | 8451             | 0.0              | 870       | 2921             | 0.0              | 1000      | 1904             | 0.0              |
| 485       | 37800            | 4.5              | 615       | 170321           | 51.4             | 745       | 7632             | 0.0              | 875       | 3581             | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2006-844-5

### Scotopic Flux vs. Wavelength


**Scotopic Lumens: 4357.3**
**S/P: 0.5**

| 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       | 2265             | 0.0              | 490       | 45874            | 70.6             | 620       | 162337           | 2.0              | 750       | 6976             | 0.0              | 880       | 2976             | 0.0              |
| 365       | 2167             | 0.0              | 495       | 55189            | 89.2             | 625       | 153641           | 1.3              | 755       | 6666             | 0.0              | 885       | 2283             | 0.0              |
| 370       | 2505             | 0.0              | 500       | 64204            | 107.4            | 630       | 143151           | 0.8              | 760       | 5969             | 0.0              | 890       | 2506             | 0.0              |
| 375       | 2720             | 0.0              | 505       | 71441            | 121.4            | 635       | 133763           | 0.5              | 765       | 5281             | 0.0              | 895       | 3132             | 0.0              |
| 380       | 2601             | 0.0              | 510       | 76219            | 129.2            | 640       | 123759           | 0.3              | 770       | 4732             | 0.0              | 900       | 2539             | 0.0              |
| 385       | 2461             | 0.0              | 515       | 79949            | 132.5            | 645       | 112859           | 0.2              | 775       | 3998             | 0.0              | 905       | 1252             | 0.0              |
| 390       | 2308             | 0.0              | 520       | 83077            | 132.1            | 650       | 102080           | 0.1              | 780       | 4027             | 0.0              | 910       | 1938             | 0.0              |
| 395       | 2104             | 0.0              | 525       | 86267            | 129.1            | 655       | 91102            | 0.1              | 785       | 4088             | 0.0              | 915       | 2171             | 0.0              |
| 400       | 1900             | 0.0              | 530       | 89871            | 123.9            | 660       | 79928            | 0.0              | 790       | 3700             | 0.0              | 920       | 2123             | 0.0              |
| 405       | 1945             | 0.1              | 535       | 93544            | 116.6            | 665       | 70694            | 0.0              | 795       | 3213             | 0.0              | 925       | 1954             | 0.0              |
| 410       | 2378             | 0.1              | 540       | 97371            | 107.6            | 670       | 61201            | 0.0              | 800       | 3403             | 0.0              | 930       | 2800             | 0.0              |
| 415       | 3437             | 0.4              | 545       | 103011           | 98.8             | 675       | 53092            | 0.0              | 805       | 3079             | 0.0              | 935       | 3314             | 0.0              |
| 420       | 6173             | 1.0              | 550       | 108560           | 88.8             | 680       | 45718            | 0.0              | 810       | 2921             | 0.0              | 940       | 553              | 0.0              |
| 425       | 11052            | 2.7              | 555       | 114473           | 78.2             | 685       | 39372            | 0.0              | 815       | 2705             | 0.0              | 945       | 2793             | 0.0              |
| 430       | 18756            | 6.4              | 560       | 121896           | 68.1             | 690       | 34120            | 0.0              | 820       | 2685             | 0.0              | 950       | 2629             | 0.0              |
| 435       | 29750            | 13.3             | 565       | 130192           | 58.4             | 695       | 29427            | 0.0              | 825       | 3246             | 0.0              | 955       | 2418             | 0.0              |
| 440       | 43697            | 24.4             | 570       | 139595           | 49.3             | 700       | 25380            | 0.0              | 830       | 2813             | 0.0              | 960       | 2857             | 0.0              |
| 445       | 61462            | 41.2             | 575       | 149225           | 40.6             | 705       | 22079            | 0.0              | 835       | 2097             | 0.0              | 965       | 1052             | 0.0              |
| 450       | 76648            | 59.4             | 580       | 158344           | 32.6             | 710       | 18938            | 0.0              | 840       | 1606             | 0.0              | 970       | 4009             | 0.0              |
| 455       | 65529            | 57.3             | 585       | 165704           | 25.3             | 715       | 16322            | 0.0              | 845       | 2347             | 0.0              | 975       | 2341             | 0.0              |
| 460       | 46753            | 45.2             | 590       | 172269           | 19.2             | 720       | 14132            | 0.0              | 850       | 2273             | 0.0              | 980       | 2439             | 0.0              |
| 465       | 38422            | 40.6             | 595       | 177895           | 14.2             | 725       | 12072            | 0.0              | 855       | 1971             | 0.0              | 985       | 2098             | 0.0              |
| 470       | 32450            | 37.4             | 600       | 180887           | 10.2             | 730       | 10271            | 0.0              | 860       | 1962             | 0.0              | 990       | 1159             | 0.0              |
| 475       | 29284            | 36.6             | 605       | 178880           | 7.0              | 735       | 9202             | 0.0              | 865       | 2989             | 0.0              | 995       | 2146             | 0.0              |
| 480       | 31922            | 43.1             | 610       | 175843           | 4.8              | 740       | 8451             | 0.0              | 870       | 2921             | 0.0              | 1000      | 1904             | 0.0              |
| 485       | 37800            | 54.8             | 615       | 170321           | 3.2              | 745       | 7632             | 0.0              | 875       | 3581             | 0.0              |           |                  |                  |

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### Melanopic Flux vs. Wavelength


**Melanopic Lumens: 11640.4 S/P: 1.33**

| 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       | 2265             | 0.0              | 490       | 45874            | 38.2             | 620       | 162337           | 0.1              | 750       | 6976             | 0.0              | 880       | 2976             | 0.0              |
| 365       | 2167             | 0.0              | 495       | 55189            | 45.6             | 625       | 153641           | 0.1              | 755       | 6666             | 0.0              | 885       | 2283             | 0.0              |
| 370       | 2505             | 0.0              | 500       | 64204            | 51.6             | 630       | 143151           | 0.0              | 760       | 5969             | 0.0              | 890       | 2506             | 0.0              |
| 375       | 2720             | 0.0              | 505       | 71441            | 54.8             | 635       | 133763           | 0.0              | 765       | 5281             | 0.0              | 895       | 3132             | 0.0              |
| 380       | 2601             | 0.0              | 510       | 76219            | 54.7             | 640       | 123759           | 0.0              | 770       | 4732             | 0.0              | 900       | 2539             | 0.0              |
| 385       | 2461             | 0.0              | 515       | 79949            | 52.2             | 645       | 112859           | 0.0              | 775       | 3998             | 0.0              | 905       | 1252             | 0.0              |
| 390       | 2308             | 0.0              | 520       | 83077            | 48.4             | 650       | 102080           | 0.0              | 780       | 4027             | 0.0              | 910       | 1938             | 0.0              |
| 395       | 2104             | 0.0              | 525       | 86267            | 43.7             | 655       | 91102            | 0.0              | 785       | 4088             | 0.0              | 915       | 2171             | 0.0              |
| 400       | 1900             | 0.0              | 530       | 89871            | 38.8             | 660       | 79928            | 0.0              | 790       | 3700             | 0.0              | 920       | 2123             | 0.0              |
| 405       | 1945             | 0.0              | 535       | 93544            | 33.7             | 665       | 70694            | 0.0              | 795       | 3213             | 0.0              | 925       | 1954             | 0.0              |
| 410       | 2378             | 0.1              | 540       | 97371            | 28.5             | 670       | 61201            | 0.0              | 800       | 3403             | 0.0              | 930       | 2800             | 0.0              |
| 415       | 3437             | 0.2              | 545       | 103011           | 23.9             | 675       | 53092            | 0.0              | 805       | 3079             | 0.0              | 935       | 3314             | 0.0              |
| 420       | 6173             | 0.7              | 550       | 108560           | 19.5             | 680       | 45718            | 0.0              | 810       | 2921             | 0.0              | 940       | 553              | 0.0              |
| 425       | 11052            | 1.7              | 555       | 114473           | 15.4             | 685       | 39372            | 0.0              | 815       | 2705             | 0.0              | 945       | 2793             | 0.0              |
| 430       | 18756            | 4.0              | 560       | 121896           | 12.0             | 690       | 34120            | 0.0              | 820       | 2685             | 0.0              | 950       | 2629             | 0.0              |
| 435       | 29750            | 7.9              | 565       | 130192           | 9.1              | 695       | 29427            | 0.0              | 825       | 3246             | 0.0              | 955       | 2418             | 0.0              |
| 440       | 43697            | 14.6             | 570       | 139595           | 6.8              | 700       | 25380            | 0.0              | 830       | 2813             | 0.0              | 960       | 2857             | 0.0              |
| 445       | 61462            | 24.2             | 575       | 149225           | 5.0              | 705       | 22079            | 0.0              | 835       | 2097             | 0.0              | 965       | 1052             | 0.0              |
| 450       | 76648            | 35.3             | 580       | 158344           | 3.5              | 710       | 18938            | 0.0              | 840       | 1606             | 0.0              | 970       | 4009             | 0.0              |
| 455       | 65529            | 34.3             | 585       | 165704           | 2.5              | 715       | 16322            | 0.0              | 845       | 2347             | 0.0              | 975       | 2341             | 0.0              |
| 460       | 46753            | 27.5             | 590       | 172269           | 1.7              | 720       | 14132            | 0.0              | 850       | 2273             | 0.0              | 980       | 2439             | 0.0              |
| 465       | 38422            | 25.1             | 595       | 177895           | 1.1              | 725       | 12072            | 0.0              | 855       | 1971             | 0.0              | 985       | 2098             | 0.0              |
| 470       | 32450            | 23.2             | 600       | 180887           | 0.8              | 730       | 10271            | 0.0              | 860       | 1962             | 0.0              | 990       | 1159             | 0.0              |
| 475       | 29284            | 22.4             | 605       | 178880           | 0.5              | 735       | 9202             | 0.0              | 865       | 2989             | 0.0              | 995       | 2146             | 0.0              |
| 480       | 31922            | 25.6             | 610       | 175843           | 0.3              | 740       | 8451             | 0.0              | 870       | 2921             | 0.0              | 1000      | 1904             | 0.0              |
| 485       | 37800            | 31.2             | 615       | 170321           | 0.2              | 745       | 7632             | 0.0              | 875       | 3581             | 0.0              |           |                  |                  |

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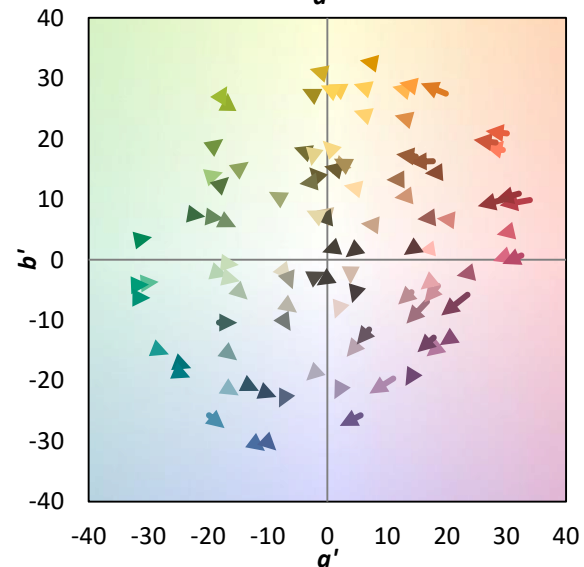
TM-30-18

### Summary

$R_f = 85.7$   
 $R_g = 94.5$   
 CIE  $R_a = 81.6$   
 $R_g = -0.6$



### Color Vector Graphics

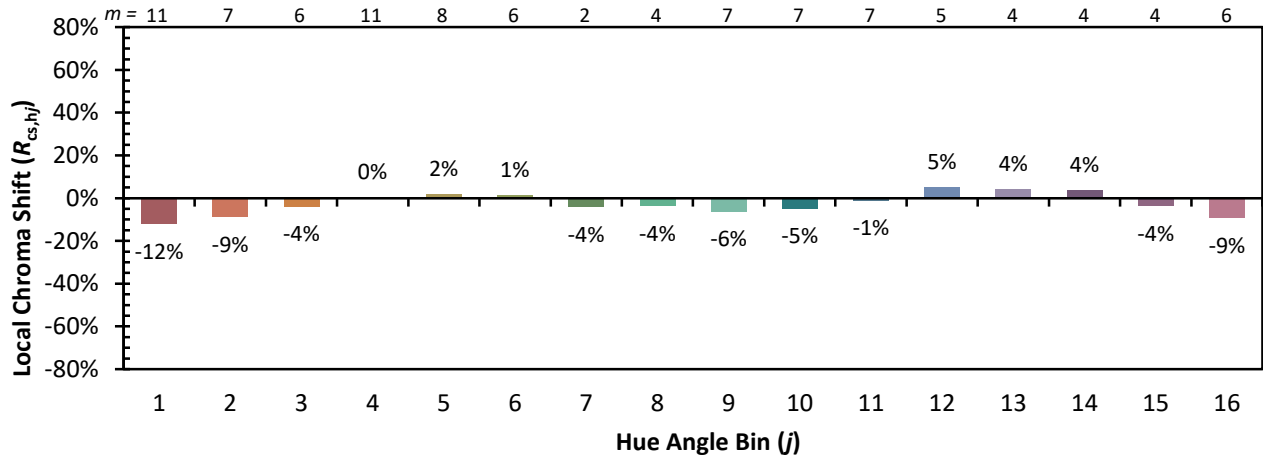


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 85 | CES51 = 95 | CES76 = 83 |
| CES02 = 63 | CES27 = 95 | CES52 = 94 | CES77 = 86 |
| CES03 = 31 | CES28 = 95 | CES53 = 90 | CES78 = 82 |
| CES04 = 70 | CES29 = 88 | CES54 = 91 | CES79 = 91 |
| CES05 = 50 | CES30 = 94 | CES55 = 91 | CES80 = 90 |
| CES06 = 51 | CES31 = 90 | CES56 = 87 | CES81 = 72 |
| CES07 = 42 | CES32 = 84 | CES57 = 86 | CES82 = 96 |
| CES08 = 41 | CES33 = 92 | CES58 = 87 | CES83 = 94 |
| CES09 = 29 | CES34 = 93 | CES59 = 91 | CES84 = 92 |
| CES10 = 76 | CES35 = 96 | CES60 = 94 | CES85 = 78 |
| CES11 = 59 | CES36 = 91 | CES61 = 90 | CES86 = 67 |
| CES12 = 65 | CES37 = 96 | CES62 = 95 | CES87 = 85 |
| CES13 = 43 | CES38 = 99 | CES63 = 88 | CES88 = 86 |
| CES14 = 74 | CES39 = 98 | CES64 = 84 | CES89 = 75 |
| CES15 = 72 | CES40 = 95 | CES65 = 79 | CES90 = 87 |
| CES16 = 47 | CES41 = 97 | CES66 = 83 | CES91 = 83 |
| CES17 = 50 | CES42 = 98 | CES67 = 82 | CES92 = 65 |
| CES18 = 56 | CES43 = 93 | CES68 = 84 | CES93 = 79 |
| CES19 = 72 | CES44 = 99 | CES69 = 89 | CES94 = 61 |
| CES20 = 67 | CES45 = 94 | CES70 = 81 | CES95 = 75 |
| CES21 = 87 | CES46 = 90 | CES71 = 80 | CES96 = 83 |
| CES22 = 79 | CES47 = 93 | CES72 = 93 | CES97 = 89 |
| CES23 = 92 | CES48 = 83 | CES73 = 77 | CES98 = 84 |
| CES24 = 91 | CES49 = 91 | CES74 = 93 | CES99 = 75 |
| CES25 = 72 | CES50 = 95 | CES75 = 82 |            |





**Color Rendition by Hue-Angle Bin**


**Measure Comparisons**



(END OF REPORT)