

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: P833687

Luminaire Tested: **TTN-D2-830-U-RW-CG-UPL2**

Issue Date: 5/15/2024

Test Information

Test Method: LM-79-08
Report Number: P833687
REPORT IS FROM IESNA LM-79-08 TEST DATA - UPLIGHT (G3-2308-121-4) AND
Test Lab: INNOVATION CENTER
Issue Date: 5/15/2024
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)
Product Line: MCGRAW-EDISON
Catalog Number: TTN-D2-830-U-RW-CG-UPL2
Description: TOPTIER NANO LED PARKING GARAGE LUMINAIRE WITH UPLIGHT
3000K, 80 CRI LEDS AND RECTANGULAR DISTRIBUTION WITH CLEAR GLASS
Light Source: -
Ballast/Driver: -

Summary

Lumens per Lamp: N/A
Luminaire Lumens: 4865.8 lumens
Efficiency: N/A
Efficacy: 103.5 lumens/watt
Luminous Opening: Vertical Cylinder (Dia: 0.71' x H: 0.1')
IES Classification: Type II - Short
BUG Rating: B2 - U4 - G2

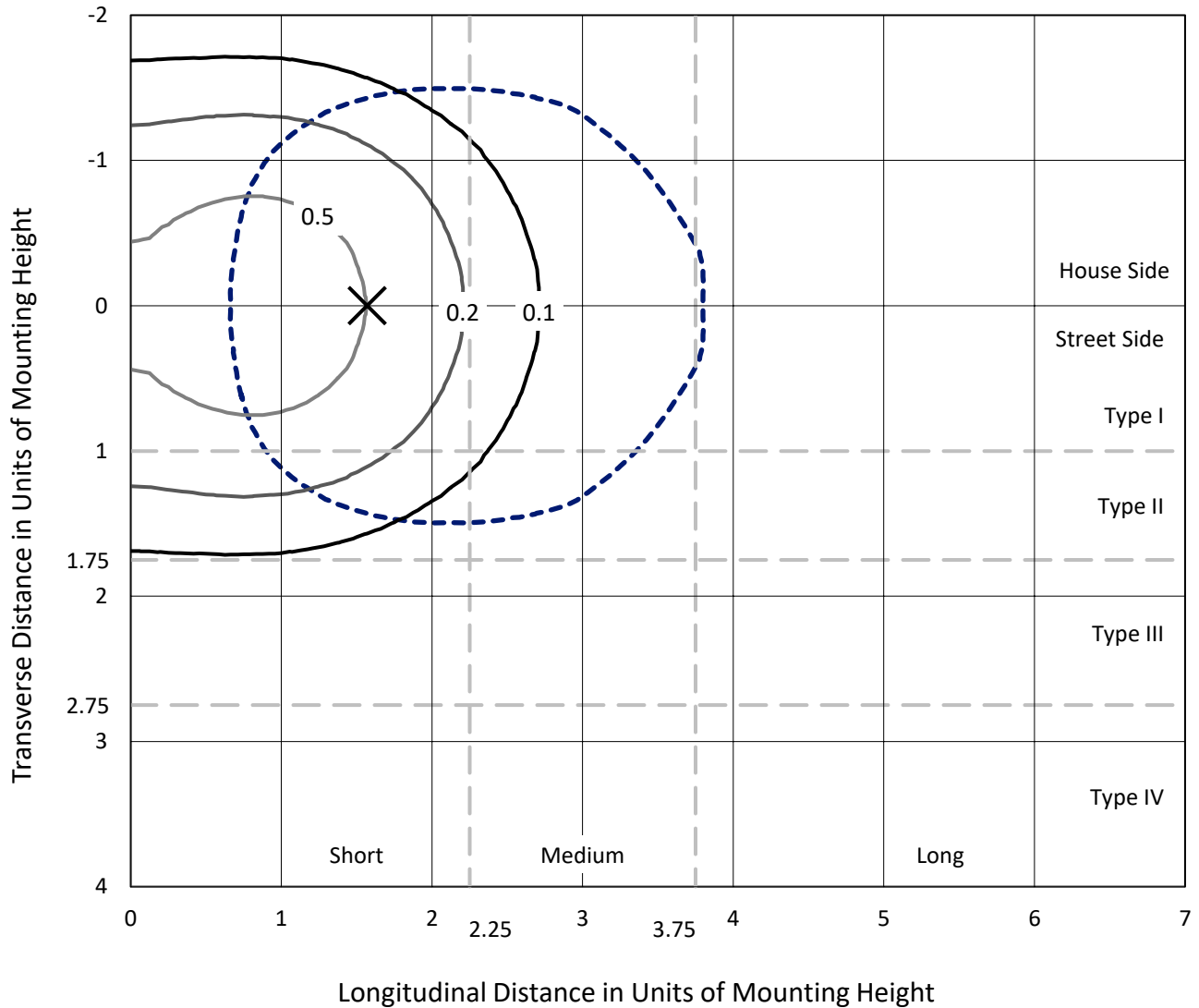
Input Watts (W): 47
Input Voltage (V): NR
Input Current (Ain): NR
Voltage Rise (V): NR
Power Factor: NR
Total Harmonic Distortion (THDi): NR
Frequency (hertz): 60
Stabilization Time: NR
Operation Time: NR
Ambient Temperature (°C): NR
Test Distance: 24 FT



REPORT NUMBER: P833687
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Iso-Footcandle Lines of Horizontal Illumination

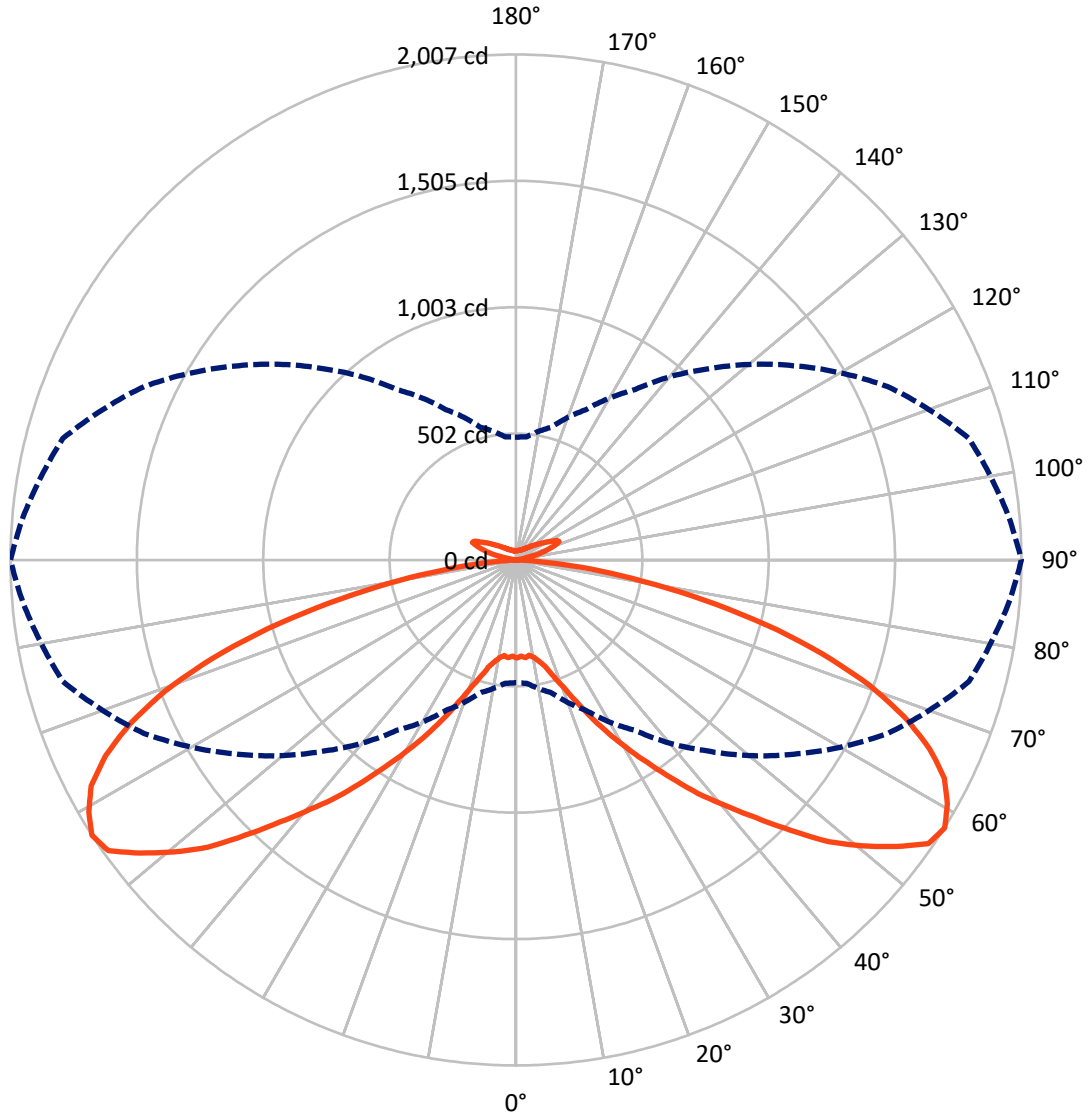
✕ Max cd
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 0.9 fc
 Type II - Short - N/A

REPORT NUMBER: P833687
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Luminous Intensity Polar Plot



— Vertical Plane Through 90-Deg Lateral - - - Horizontal Cone Through 57.5-Deg Vertical

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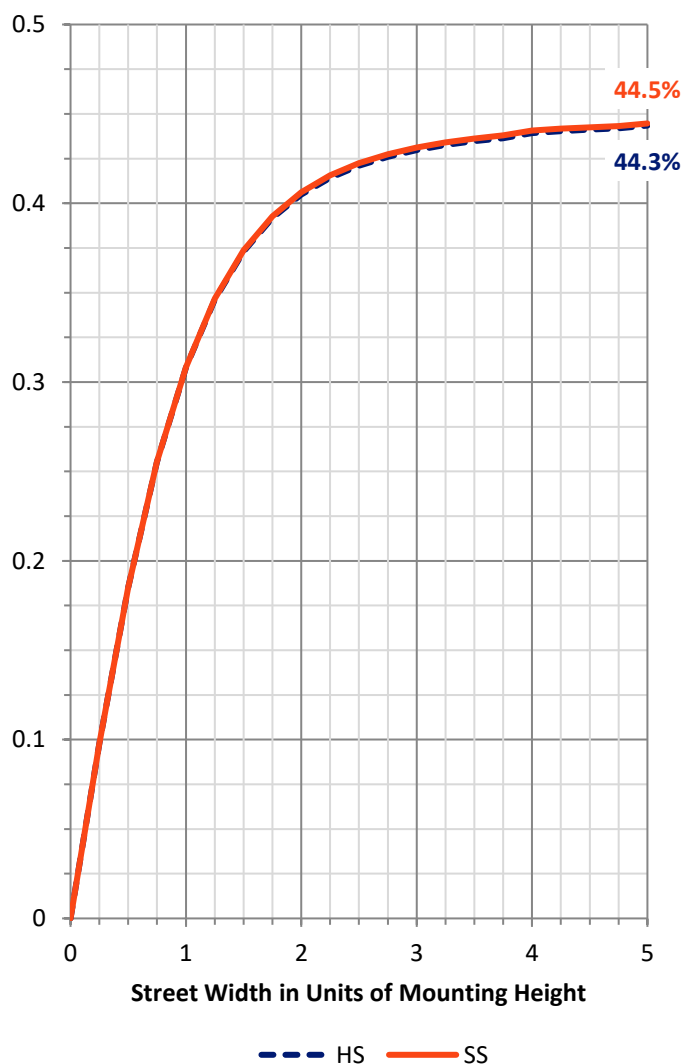
FLUX DISTRIBUTION:

| | | Downward | Upward | Total |
|--------------------|-----------|----------|--------|--------|
| House Side | Lumens | 2165.9 | 267.0 | 2432.9 |
| | % Fixture | 44.5 | 5.5 | 50.0 |
| Street Side | Lumens | 2165.9 | 267.0 | 2432.9 |
| | % Fixture | 44.5 | 5.5 | 50.0 |
| Total | Lumens | 4331.7 | 534.0 | 4865.8 |
| | % Fixture | 89.0 | 11.0 | 100.0 |

ZONAL LUMENS:

| Zone | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10° | 37.1 | 0.8 |
| 10°-20° | 119.7 | 2.5 |
| 20°-30° | 254.7 | 5.2 |
| 30°-40° | 469.4 | 9.6 |
| 40°-50° | 755.8 | 15.5 |
| 50°-60° | 1023.0 | 21.0 |
| 60°-70° | 994.7 | 20.4 |
| 70°-80° | 578.7 | 11.9 |
| 80°-90° | 98.6 | 2.0 |
| 90°-100° | 11.9 | 0.2 |
| 100°-110° | 121.1 | 2.5 |
| 110°-120° | 177.1 | 3.6 |
| 120°-130° | 102.8 | 2.1 |
| 130°-140° | 54.4 | 1.1 |
| 140°-150° | 32.3 | 0.7 |
| 150°-160° | 19.9 | 0.4 |
| 160°-170° | 10.9 | 0.2 |
| 170°-180° | 3.5 | 0.1 |
| 0°-90° | 4331.7 | 89.0 |
| 0°-180° | 4865.8 | 100.0 |

Coefficient of Utilization

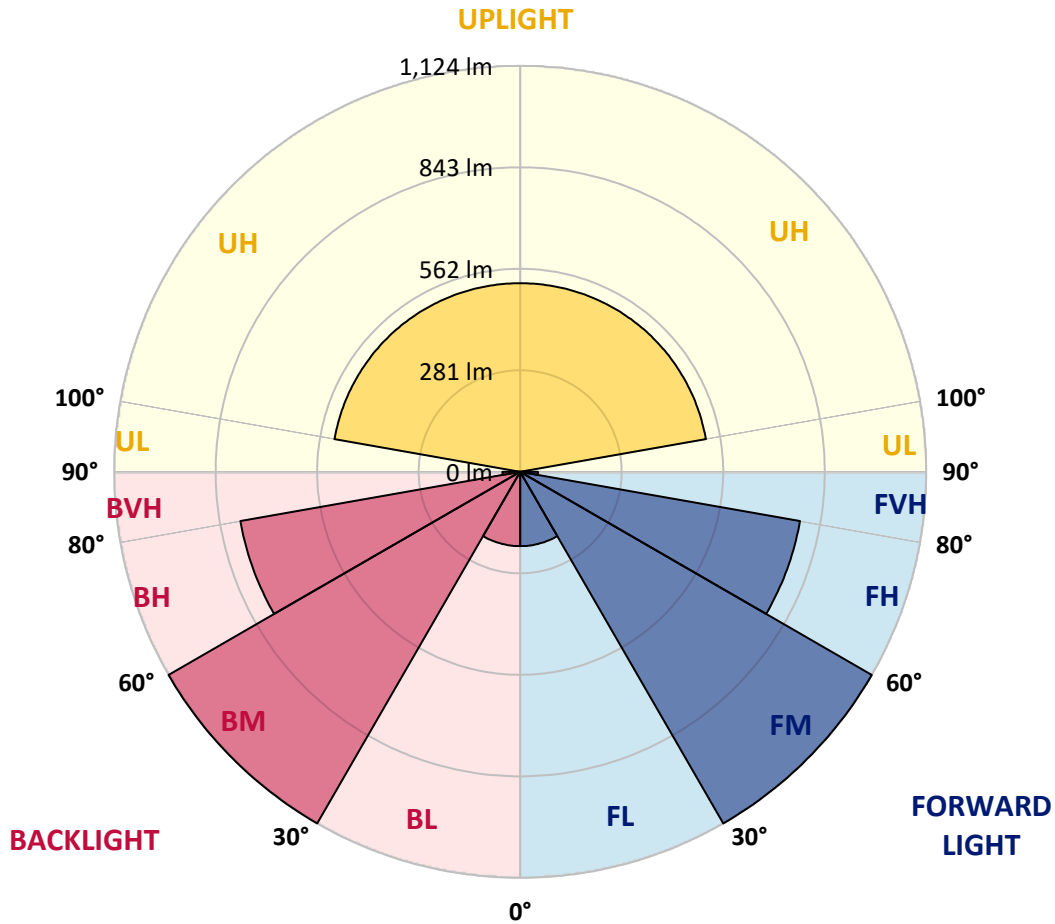


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LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:

| Zone | Lumens | % Fixture | Zone Rating/Lumen Limit | | |
|----------------|--------|-----------|-------------------------|---------|---------|
| | | | B | U | G |
| FL (0°-30°) | 205.7 | 4.2 | | | |
| FM (30°-60°) | 1124.2 | 23.1 | | | |
| FH (60°-80°) | 786.7 | 16.2 | | | G1/1800 |
| FVH (80°-90°) | 49.3 | 1.0 | | | G1/100 |
| BL (0°-30°) | 205.7 | 4.2 | B1/500 | | |
| BM (30°-60°) | 1124.2 | 23.1 | B2/2500 | | |
| BH (60°-80°) | 786.7 | 16.2 | B2/1000 | | G2/1000 |
| BVH (80°-90°) | 49.3 | 1.0 | | | G1/100 |
| UL (90°-100°) | 11.9 | 0.2 | | U2/50 | |
| UH (100°-180°) | 522.1 | 10.7 | | U4/1000 | |

BUG Rating: B2-U4-G2
 Type II Short





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CANDELA DISTRIBUTION (FULL):

| | 0° | 5° | 15° | 25° | 35° | 45° | 55° | 65° | 75° | 85° | 90° |
|--------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| 0° | 389.7 | 389.7 | 389.7 | 389.7 | 389.7 | 389.7 | 389.7 | 389.7 | 389.7 | 389.7 | 389.7 |
| 2.5° | 389.7 | 389.7 | 389.7 | 389.7 | 385.8 | 385.8 | 385.8 | 381.9 | 381.9 | 381.9 | 381.9 |
| 5° | 389.7 | 389.7 | 389.7 | 393.6 | 393.6 | 393.6 | 389.7 | 389.7 | 389.7 | 389.7 | 389.7 |
| 7.5° | 389.7 | 393.6 | 393.6 | 389.7 | 389.7 | 385.8 | 385.8 | 385.8 | 381.9 | 381.9 | 381.9 |
| 10° | 389.7 | 389.7 | 389.7 | 389.7 | 385.8 | 385.8 | 389.7 | 389.7 | 393.6 | 393.6 | 393.6 |
| 12.5° | 385.8 | 385.8 | 389.7 | 389.7 | 389.7 | 393.6 | 401.4 | 405.3 | 409.2 | 413.1 | 413.1 |
| 15° | 389.7 | 389.7 | 393.6 | 397.5 | 401.4 | 409.2 | 420.9 | 432.5 | 440.3 | 444.2 | 440.3 |
| 17.5° | 389.7 | 393.6 | 397.5 | 405.3 | 417.0 | 428.6 | 448.1 | 463.7 | 479.3 | 483.2 | 487.1 |
| 20° | 397.5 | 397.5 | 401.4 | 417.0 | 436.4 | 455.9 | 483.2 | 510.5 | 530.0 | 537.8 | 537.8 |
| 22.5° | 401.4 | 405.3 | 409.2 | 428.6 | 459.8 | 491.0 | 530.0 | 561.1 | 588.4 | 604.0 | 607.9 |
| 25° | 413.1 | 413.1 | 420.9 | 448.1 | 487.1 | 533.9 | 584.5 | 631.3 | 666.4 | 685.8 | 689.7 |
| 27.5° | 420.9 | 424.7 | 436.4 | 471.5 | 522.2 | 580.6 | 650.8 | 705.3 | 748.2 | 771.6 | 775.5 |
| 30° | 428.6 | 432.5 | 455.9 | 494.9 | 557.2 | 627.4 | 709.2 | 779.4 | 833.9 | 861.2 | 865.1 |
| 32.5° | 440.3 | 444.2 | 471.5 | 514.4 | 588.4 | 674.1 | 767.7 | 853.4 | 931.3 | 954.7 | 958.6 |
| 35° | 452.0 | 455.9 | 487.1 | 537.8 | 623.5 | 720.9 | 830.0 | 931.3 | 1024.9 | 1056.0 | 1063.8 |
| 37.5° | 463.7 | 467.6 | 498.8 | 561.1 | 658.6 | 771.6 | 900.2 | 1021.0 | 1122.3 | 1165.1 | 1176.8 |
| 40° | 475.4 | 479.3 | 514.4 | 584.5 | 693.6 | 826.1 | 974.2 | 1106.7 | 1223.6 | 1274.2 | 1282.0 |
| 42.5° | 483.2 | 487.1 | 526.1 | 604.0 | 728.7 | 876.8 | 1052.1 | 1200.2 | 1324.9 | 1391.2 | 1398.9 |
| 45° | 494.9 | 498.8 | 541.7 | 631.3 | 759.9 | 935.2 | 1126.2 | 1305.4 | 1449.6 | 1523.6 | 1531.4 |
| 47.5° | 502.7 | 506.6 | 553.3 | 646.9 | 794.9 | 989.8 | 1204.1 | 1398.9 | 1570.4 | 1648.3 | 1671.7 |
| 50° | 506.6 | 510.5 | 561.1 | 662.5 | 818.3 | 1028.8 | 1266.5 | 1492.5 | 1675.6 | 1773.0 | 1784.7 |
| 52.5° | 506.6 | 514.4 | 565.0 | 674.1 | 833.9 | 1063.8 | 1317.1 | 1570.4 | 1776.9 | 1886.0 | 1889.9 |
| 55° | 502.7 | 506.6 | 561.1 | 670.2 | 841.7 | 1079.4 | 1352.2 | 1617.2 | 1847.1 | 1952.3 | 1987.4 |
| 57.5° | 487.1 | 491.0 | 545.6 | 658.6 | 826.1 | 1071.6 | 1344.4 | 1628.9 | 1862.7 | 1964.0 | 2006.8 |
| 60° | 463.7 | 471.5 | 522.2 | 631.3 | 802.7 | 1044.3 | 1321.0 | 1605.5 | 1839.3 | 1964.0 | 1967.9 |
| 62.5° | 436.4 | 440.3 | 491.0 | 596.2 | 767.7 | 1001.5 | 1278.1 | 1558.7 | 1784.7 | 1913.3 | 1909.4 |
| 65° | 397.5 | 401.4 | 444.2 | 553.3 | 705.3 | 919.6 | 1192.4 | 1484.7 | 1679.5 | 1815.9 | 1804.2 |
| 67.5° | 354.6 | 358.5 | 397.5 | 494.9 | 631.3 | 830.0 | 1075.5 | 1360.0 | 1531.4 | 1671.7 | 1663.9 |
| 70° | 307.8 | 307.8 | 342.9 | 424.7 | 553.3 | 728.7 | 946.9 | 1196.3 | 1367.8 | 1484.7 | 1488.6 |
| 72.5° | 253.3 | 253.3 | 284.5 | 354.6 | 463.7 | 611.8 | 798.8 | 1021.0 | 1161.2 | 1262.6 | 1270.4 |
| 75° | 198.7 | 194.8 | 222.1 | 280.6 | 366.3 | 487.1 | 631.3 | 822.2 | 931.3 | 1028.8 | 1024.9 |
| 77.5° | 140.3 | 140.3 | 155.9 | 202.6 | 265.0 | 362.4 | 467.6 | 619.6 | 693.6 | 775.5 | 759.9 |
| 80° | 89.6 | 89.6 | 97.4 | 132.5 | 175.4 | 241.6 | 307.8 | 420.9 | 471.5 | 533.9 | 514.4 |
| 82.5° | 46.8 | 42.9 | 50.7 | 70.1 | 93.5 | 132.5 | 171.5 | 245.5 | 268.9 | 315.6 | 300.1 |
| 85° | 15.6 | 15.6 | 15.6 | 23.4 | 35.1 | 50.7 | 66.2 | 105.2 | 109.1 | 140.3 | 128.6 |
| 87.5° | 3.9 | 0.0 | 0.0 | 3.9 | 3.9 | 3.9 | 3.9 | 11.7 | 11.7 | 23.4 | 15.6 |
| 90° | 4.6 | 4.6 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 4.6 | 4.6 |
| 92.5° | 4.6 | 4.6 | 4.6 | 6.4 | 7.3 | 6.4 | 7.3 | 5.5 | 5.5 | 4.6 | 4.6 |
| 95° | 5.5 | 5.5 | 6.4 | 8.2 | 10.1 | 11.0 | 11.0 | 6.4 | 6.4 | 5.5 | 5.5 |
| 97.5° | 7.3 | 8.2 | 8.2 | 10.1 | 16.4 | 30.2 | 18.3 | 9.1 | 9.1 | 8.2 | 7.3 |
| 100° | 11.9 | 12.8 | 12.8 | 22.8 | 48.4 | 64.9 | 46.6 | 23.8 | 17.4 | 12.8 | 12.8 |
| 102.5° | 38.4 | 40.2 | 49.3 | 74.0 | 109.6 | 99.6 | 84.1 | 79.5 | 54.8 | 43.9 | 42.0 |
| 105° | 97.8 | 96.8 | 104.2 | 123.3 | 153.5 | 150.8 | 138.9 | 126.1 | 108.7 | 100.5 | 100.5 |
| 107.5° | 128.8 | 128.8 | 135.2 | 151.7 | 174.5 | 203.7 | 206.5 | 163.5 | 143.4 | 134.3 | 133.4 |
| 110° | 145.3 | 145.3 | 150.8 | 164.5 | 194.6 | 235.7 | 233.9 | 201.9 | 177.3 | 165.4 | 163.5 |



REPORT NUMBER: P833687
 CATALOG NUMBER: TTN-D2-830-U-RW-CG-UPL2

CANDELA DISTRIBUTION (continued):

| | 0° | 5° | 15° | 25° | 35° | 45° | 55° | 65° | 75° | 85° | 90° |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 112.5° | 148.9 | 149.8 | 157.1 | 178.2 | 211.1 | 229.3 | 221.1 | 208.3 | 197.4 | 188.2 | 186.4 |
| 115° | 154.4 | 154.4 | 162.6 | 182.7 | 201.0 | 208.3 | 199.2 | 189.1 | 181.8 | 178.2 | 180.0 |
| 117.5° | 152.6 | 155.3 | 157.1 | 168.1 | 180.0 | 185.5 | 180.9 | 167.2 | 161.7 | 159.9 | 157.1 |
| 120° | 141.6 | 141.6 | 143.4 | 148.9 | 155.3 | 158.1 | 156.2 | 147.1 | 142.5 | 141.6 | 139.8 |
| 122.5° | 126.1 | 127.0 | 126.1 | 128.8 | 133.4 | 136.1 | 134.3 | 127.0 | 125.2 | 125.2 | 123.3 |
| 125° | 110.6 | 110.6 | 109.6 | 111.5 | 114.2 | 113.3 | 114.2 | 110.6 | 109.6 | 109.6 | 108.7 |
| 127.5° | 99.6 | 98.7 | 96.8 | 97.8 | 98.7 | 98.7 | 99.6 | 95.9 | 96.8 | 97.8 | 96.8 |
| 130° | 88.6 | 88.6 | 86.8 | 86.8 | 86.8 | 85.0 | 86.8 | 85.0 | 85.9 | 86.8 | 87.7 |
| 132.5° | 78.6 | 78.6 | 75.8 | 74.9 | 74.9 | 74.9 | 75.8 | 74.9 | 76.7 | 78.6 | 78.6 |
| 135° | 70.4 | 70.4 | 67.6 | 68.5 | 68.5 | 67.6 | 68.5 | 67.6 | 69.4 | 70.4 | 70.4 |
| 137.5° | 64.0 | 64.0 | 62.1 | 62.1 | 62.1 | 61.2 | 62.1 | 62.1 | 63.0 | 64.9 | 65.8 |
| 140° | 58.5 | 58.5 | 57.6 | 57.6 | 56.6 | 57.6 | 57.6 | 57.6 | 58.5 | 59.4 | 59.4 |
| 142.5° | 55.7 | 54.8 | 53.9 | 53.0 | 53.9 | 53.9 | 53.9 | 53.0 | 53.9 | 55.7 | 55.7 |
| 145° | 51.2 | 51.2 | 50.3 | 50.3 | 50.3 | 51.2 | 50.3 | 50.3 | 51.2 | 51.2 | 52.1 |
| 147.5° | 48.4 | 48.4 | 47.5 | 48.4 | 48.4 | 48.4 | 48.4 | 47.5 | 48.4 | 48.4 | 49.3 |
| 150° | 47.5 | 46.6 | 45.7 | 46.6 | 46.6 | 45.7 | 45.7 | 45.7 | 45.7 | 46.6 | 46.6 |
| 152.5° | 44.8 | 44.8 | 43.9 | 44.8 | 43.9 | 43.9 | 43.9 | 43.9 | 43.9 | 44.8 | 45.7 |
| 155° | 42.9 | 42.9 | 42.0 | 42.9 | 42.9 | 42.9 | 42.9 | 42.9 | 42.9 | 42.9 | 42.9 |
| 157.5° | 41.1 | 42.0 | 41.1 | 41.1 | 41.1 | 41.1 | 41.1 | 41.1 | 41.1 | 42.0 | 42.0 |
| 160° | 40.2 | 40.2 | 40.2 | 40.2 | 39.3 | 39.3 | 39.3 | 40.2 | 40.2 | 40.2 | 41.1 |
| 162.5° | 39.3 | 39.3 | 39.3 | 39.3 | 38.4 | 38.4 | 38.4 | 38.4 | 39.3 | 39.3 | 40.2 |
| 165° | 39.3 | 38.4 | 38.4 | 38.4 | 37.5 | 37.5 | 37.5 | 37.5 | 38.4 | 39.3 | 38.4 |
| 167.5° | 37.5 | 37.5 | 37.5 | 37.5 | 37.5 | 36.5 | 36.5 | 37.5 | 37.5 | 37.5 | 38.4 |
| 170° | 37.5 | 37.5 | 36.5 | 36.5 | 36.5 | 36.5 | 36.5 | 36.5 | 36.5 | 36.5 | 37.5 |
| 172.5° | 37.5 | 37.5 | 37.5 | 37.5 | 36.5 | 36.5 | 36.5 | 36.5 | 36.5 | 37.5 | 37.5 |
| 175° | 37.5 | 37.5 | 37.5 | 37.5 | 36.5 | 36.5 | 36.5 | 37.5 | 37.5 | 37.5 | 36.5 |
| 177.5° | 37.5 | 37.5 | 37.5 | 37.5 | 36.5 | 37.5 | 37.5 | 37.5 | 37.5 | 37.5 | 37.5 |
| 180° | 37.5 | 37.5 | 37.5 | 37.5 | 37.5 | 37.5 | 37.5 | 37.5 | 37.5 | 37.5 | 37.5 |

Cooper Lighting Solutions Photometric Lab
1121 Highway 74 South
Peachtree City, GA 30269



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

Report Prepared for

Cooper Lighting Solutions

MCGRAW EDISON

Report Number: SP1-2411-284-4

Test Date: 11/22/2024

Luminaire Tested: TTN-D0-830-U-WQ

Data in this report applies to TT and TTN families of products

Test Information

Test Method: LM-79-2019
 Report Number: SP1-2411-284-4
 Test Lab: COOPER LIGHTING SOLUTIONS
 Photometer: SP1 - 76IN SPHERE
 Measurement Geometry: 4π
 Issue Date: 11/22/2024
 Manufacturer: COOPER LIGHTING SOLUTIONS
 Product Line: MCGRAW EDISON
 Catalog Number: **TTN-D0-830-U-WQ**
 Description: TOPTIER NANO LED PARKING GARAGE LUMINAIRE. 3000K, 80 CRI LEDS AND WIDE DISTRIBUTION

Spectral Parameters

CCT (K): 2963
 CIE u': 0.2515
 CIE v': 0.5238
 Duv: 0.0012
 CIE x: 0.4414
 CIE y: 0.4086
 CIE z: 0.1501
 Peak Wavelength (nm): 603
 Dominant Wavelength (nm): 582
 Purity: 55.12798
 Rf: 86.1
 Rg: 94.9

| | | | |
|-----------|------|------|------|
| CRI (Ra): | 82.9 | | |
| R1: | 81.4 | R9: | 3.9 |
| R2: | 91.9 | R10: | 82.5 |
| R3: | 95.2 | R11: | 82.3 |
| R4: | 81.6 | R12: | 76.5 |
| R5: | 82.3 | R13: | 83.9 |
| R6: | 91.4 | R14: | 97.8 |
| R7: | 82.0 | R15: | 72.6 |
| R8: | 57.2 | | |



Test Conditions

Stabilization Time: 37M
 Operation Time: 1H 37M
 Sphere Temperature (°C): 25.0

REPORT NUMBER: SP1-2411-284-4

| Measurement and Test Equipment | | | |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument | Identification Number | Calibration Date | Calibration Due Date |
| Photometer | IN0058 | 6/18/2024 | 12/18/2024 |
| Power Meter | INXT2011004 | 2/8/2024 | 2/8/2025 |
| AC Power Source | IN0063 | 10/22/2024 | 10/22/2025 |
| DC Power Source | IN0208 | 10/22/2024 | 10/22/2025 |
| Sphere Thermometer | IN0085 | 10/22/2024 | 10/22/2025 |
| Room Thermometer | IN0046 | 10/22/2024 | 10/22/2025 |

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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 3000K 4-step quadrangle

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Photopic Flux vs. Wavelength



Photopic Lumens: NR

| λ (nm) | Power W [^] /nm | Lumens (ϕ /nm) | λ (nm) | Power W [^] /nm | Lumens (ϕ /nm) | λ (nm) | Power W [^] /nm | Lumens (ϕ /nm) | λ (nm) | Power W [^] /nm | Lumens (ϕ /nm) | λ (nm) | Power W [^] /nm | Lumens (ϕ /nm) |
|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|
| 360 | 0 | NR | 490 | 267 | NR | 620 | 915 | NR | 750 | 23 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 315 | NR | 625 | 866 | NR | 755 | 20 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 360 | NR | 630 | 811 | NR | 760 | 17 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 396 | NR | 635 | 750 | NR | 765 | 14 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 418 | NR | 640 | 686 | NR | 770 | 12 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 435 | NR | 645 | 619 | NR | 775 | 10 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 448 | NR | 650 | 554 | NR | 780 | 9 | NR | 910 | 0 | NR |
| 395 | 0 | NR | 525 | 462 | NR | 655 | 491 | NR | 785 | 7 | NR | 915 | 0 | NR |
| 400 | 1 | NR | 530 | 476 | NR | 660 | 431 | NR | 790 | 6 | NR | 920 | 0 | NR |
| 405 | 2 | NR | 535 | 495 | NR | 665 | 376 | NR | 795 | 5 | NR | 925 | 0 | NR |
| 410 | 5 | NR | 540 | 520 | NR | 670 | 325 | NR | 800 | 4 | NR | 930 | 0 | NR |
| 415 | 10 | NR | 545 | 547 | NR | 675 | 280 | NR | 805 | 4 | NR | 935 | 0 | NR |
| 420 | 21 | NR | 550 | 576 | NR | 680 | 241 | NR | 810 | 3 | NR | 940 | 0 | NR |
| 425 | 42 | NR | 555 | 612 | NR | 685 | 207 | NR | 815 | 3 | NR | 945 | 0 | NR |
| 430 | 77 | NR | 560 | 651 | NR | 690 | 176 | NR | 820 | 2 | NR | 950 | 0 | NR |
| 435 | 135 | NR | 565 | 693 | NR | 695 | 149 | NR | 825 | 2 | NR | 955 | 0 | NR |
| 440 | 215 | NR | 570 | 741 | NR | 700 | 127 | NR | 830 | 2 | NR | 960 | 0 | NR |
| 445 | 321 | NR | 575 | 793 | NR | 705 | 107 | NR | 835 | 2 | NR | 965 | 0 | NR |
| 450 | 479 | NR | 580 | 847 | NR | 710 | 89 | NR | 840 | 1 | NR | 970 | 0 | NR |
| 455 | 432 | NR | 585 | 897 | NR | 715 | 75 | NR | 845 | 1 | NR | 975 | 0 | NR |
| 460 | 265 | NR | 590 | 940 | NR | 720 | 62 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 231 | NR | 595 | 971 | NR | 725 | 51 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 204 | NR | 600 | 993 | NR | 730 | 43 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 168 | NR | 605 | 996 | NR | 735 | 36 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 183 | NR | 610 | 986 | NR | 740 | 31 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 223 | NR | 615 | 957 | NR | 745 | 26 | NR | 875 | 0 | NR | | | |

REPORT NUMBER: SP1-2411-284-4

Scotopic Flux vs. Wavelength



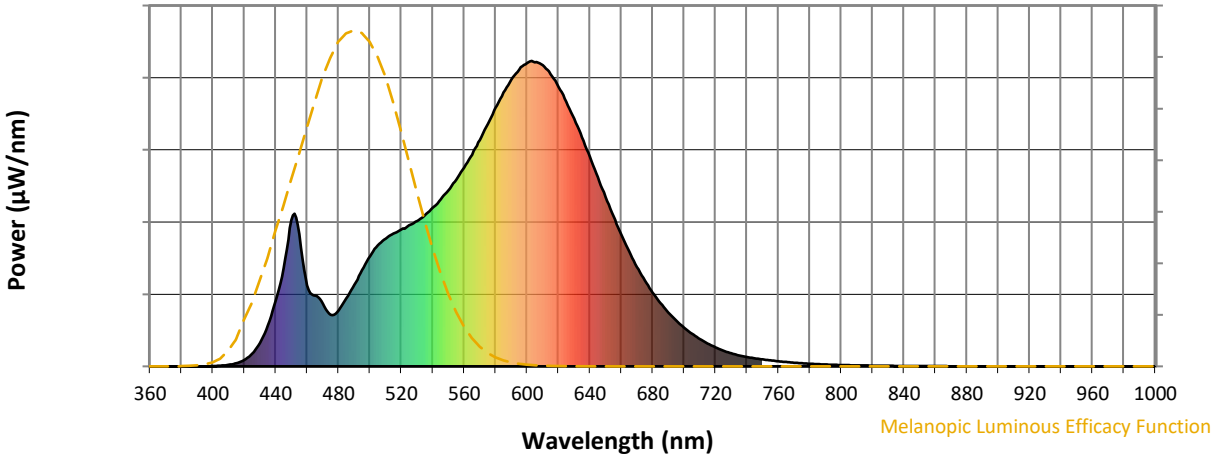
Scotopic Lumens: NR

S/P: 1.34

| λ (nm) | Power W [^] /nm | Lumens (φ/nm) | λ (nm) | Power W [^] /nm | Lumens (φ/nm) | λ (nm) | Power W [^] /nm | Lumens (φ/nm) | λ (nm) | Power W [^] /nm | Lumens (φ/nm) | λ (nm) | Power W [^] /nm | Lumens (φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 360 | 0 | NR | 490 | 267 | NR | 620 | 915 | NR | 750 | 23 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 315 | NR | 625 | 866 | NR | 755 | 20 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 360 | NR | 630 | 811 | NR | 760 | 17 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 396 | NR | 635 | 750 | NR | 765 | 14 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 418 | NR | 640 | 686 | NR | 770 | 12 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 435 | NR | 645 | 619 | NR | 775 | 10 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 448 | NR | 650 | 554 | NR | 780 | 9 | NR | 910 | 0 | NR |
| 395 | 0 | NR | 525 | 462 | NR | 655 | 491 | NR | 785 | 7 | NR | 915 | 0 | NR |
| 400 | 1 | NR | 530 | 476 | NR | 660 | 431 | NR | 790 | 6 | NR | 920 | 0 | NR |
| 405 | 2 | NR | 535 | 495 | NR | 665 | 376 | NR | 795 | 5 | NR | 925 | 0 | NR |
| 410 | 5 | NR | 540 | 520 | NR | 670 | 325 | NR | 800 | 4 | NR | 930 | 0 | NR |
| 415 | 10 | NR | 545 | 547 | NR | 675 | 280 | NR | 805 | 4 | NR | 935 | 0 | NR |
| 420 | 21 | NR | 550 | 576 | NR | 680 | 241 | NR | 810 | 3 | NR | 940 | 0 | NR |
| 425 | 42 | NR | 555 | 612 | NR | 685 | 207 | NR | 815 | 3 | NR | 945 | 0 | NR |
| 430 | 77 | NR | 560 | 651 | NR | 690 | 176 | NR | 820 | 2 | NR | 950 | 0 | NR |
| 435 | 135 | NR | 565 | 693 | NR | 695 | 149 | NR | 825 | 2 | NR | 955 | 0 | NR |
| 440 | 215 | NR | 570 | 741 | NR | 700 | 127 | NR | 830 | 2 | NR | 960 | 0 | NR |
| 445 | 321 | NR | 575 | 793 | NR | 705 | 107 | NR | 835 | 2 | NR | 965 | 0 | NR |
| 450 | 479 | NR | 580 | 847 | NR | 710 | 89 | NR | 840 | 1 | NR | 970 | 0 | NR |
| 455 | 432 | NR | 585 | 897 | NR | 715 | 75 | NR | 845 | 1 | NR | 975 | 0 | NR |
| 460 | 265 | NR | 590 | 940 | NR | 720 | 62 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 231 | NR | 595 | 971 | NR | 725 | 51 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 204 | NR | 600 | 993 | NR | 730 | 43 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 168 | NR | 605 | 996 | NR | 735 | 36 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 183 | NR | 610 | 986 | NR | 740 | 31 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 223 | NR | 615 | 957 | NR | 745 | 26 | NR | 875 | 0 | NR | | | |

REPORT NUMBER: SP1-2411-284-4

Melanopic Flux vs. Wavelength

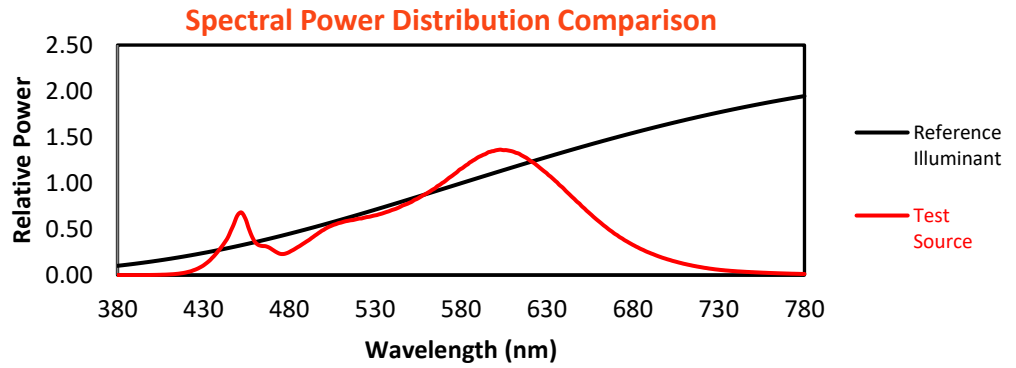


Melanopic Lumens: NR M/P: 2.58

| λ (nm) | Power W [^] /nm | Lumens (φ/nm) | λ (nm) | Power W [^] /nm | Lumens (φ/nm) | λ (nm) | Power W [^] /nm | Lumens (φ/nm) | λ (nm) | Power W [^] /nm | Lumens (φ/nm) | λ (nm) | Power W [^] /nm | Lumens (φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 360 | 0 | NR | 490 | 267 | NR | 620 | 915 | NR | 750 | 23 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 315 | NR | 625 | 866 | NR | 755 | 20 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 360 | NR | 630 | 811 | NR | 760 | 17 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 396 | NR | 635 | 750 | NR | 765 | 14 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 418 | NR | 640 | 686 | NR | 770 | 12 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 435 | NR | 645 | 619 | NR | 775 | 10 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 448 | NR | 650 | 554 | NR | 780 | 9 | NR | 910 | 0 | NR |
| 395 | 0 | NR | 525 | 462 | NR | 655 | 491 | NR | 785 | 7 | NR | 915 | 0 | NR |
| 400 | 1 | NR | 530 | 476 | NR | 660 | 431 | NR | 790 | 6 | NR | 920 | 0 | NR |
| 405 | 2 | NR | 535 | 495 | NR | 665 | 376 | NR | 795 | 5 | NR | 925 | 0 | NR |
| 410 | 5 | NR | 540 | 520 | NR | 670 | 325 | NR | 800 | 4 | NR | 930 | 0 | NR |
| 415 | 10 | NR | 545 | 547 | NR | 675 | 280 | NR | 805 | 4 | NR | 935 | 0 | NR |
| 420 | 21 | NR | 550 | 576 | NR | 680 | 241 | NR | 810 | 3 | NR | 940 | 0 | NR |
| 425 | 42 | NR | 555 | 612 | NR | 685 | 207 | NR | 815 | 3 | NR | 945 | 0 | NR |
| 430 | 77 | NR | 560 | 651 | NR | 690 | 176 | NR | 820 | 2 | NR | 950 | 0 | NR |
| 435 | 135 | NR | 565 | 693 | NR | 695 | 149 | NR | 825 | 2 | NR | 955 | 0 | NR |
| 440 | 215 | NR | 570 | 741 | NR | 700 | 127 | NR | 830 | 2 | NR | 960 | 0 | NR |
| 445 | 321 | NR | 575 | 793 | NR | 705 | 107 | NR | 835 | 2 | NR | 965 | 0 | NR |
| 450 | 479 | NR | 580 | 847 | NR | 710 | 89 | NR | 840 | 1 | NR | 970 | 0 | NR |
| 455 | 432 | NR | 585 | 897 | NR | 715 | 75 | NR | 845 | 1 | NR | 975 | 0 | NR |
| 460 | 265 | NR | 590 | 940 | NR | 720 | 62 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 231 | NR | 595 | 971 | NR | 725 | 51 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 204 | NR | 600 | 993 | NR | 730 | 43 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 168 | NR | 605 | 996 | NR | 735 | 36 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 183 | NR | 610 | 986 | NR | 740 | 31 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 223 | NR | 615 | 957 | NR | 745 | 26 | NR | 875 | 0 | NR | | | |

Summary

$R_f = 86.1$
 $R_g = 94.9$
 CIE $R_a = 82.9$
 $R_9 = 3.9$



Color Vector Graphics

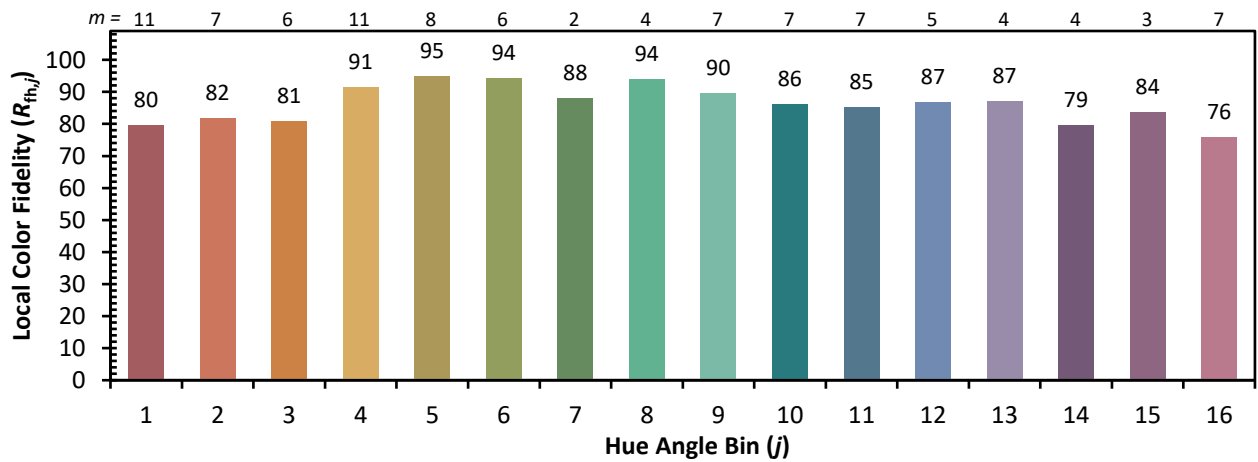


Individual Sample Fidelity Index ($R_{f,i}$)

| | | | |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 87 | CES51 = 95 | CES76 = 85 |
| CES02 = 63 | CES27 = 95 | CES52 = 95 | CES77 = 85 |
| CES03 = 31 | CES28 = 96 | CES53 = 91 | CES78 = 83 |
| CES04 = 70 | CES29 = 90 | CES54 = 92 | CES79 = 89 |
| CES05 = 50 | CES30 = 96 | CES55 = 91 | CES80 = 89 |
| CES06 = 51 | CES31 = 92 | CES56 = 88 | CES81 = 70 |
| CES07 = 42 | CES32 = 86 | CES57 = 87 | CES82 = 96 |
| CES08 = 41 | CES33 = 94 | CES58 = 88 | CES83 = 94 |
| CES09 = 29 | CES34 = 94 | CES59 = 92 | CES84 = 92 |
| CES10 = 76 | CES35 = 97 | CES60 = 93 | CES85 = 76 |
| CES11 = 59 | CES36 = 88 | CES61 = 90 | CES86 = 66 |
| CES12 = 65 | CES37 = 98 | CES62 = 92 | CES87 = 85 |
| CES13 = 44 | CES38 = 95 | CES63 = 90 | CES88 = 87 |
| CES14 = 74 | CES39 = 98 | CES64 = 85 | CES89 = 75 |
| CES15 = 72 | CES40 = 96 | CES65 = 81 | CES90 = 89 |
| CES16 = 48 | CES41 = 97 | CES66 = 84 | CES91 = 80 |
| CES17 = 50 | CES42 = 98 | CES67 = 83 | CES92 = 64 |
| CES18 = 57 | CES43 = 92 | CES68 = 85 | CES93 = 79 |
| CES19 = 72 | CES44 = 99 | CES69 = 89 | CES94 = 61 |
| CES20 = 67 | CES45 = 94 | CES70 = 83 | CES95 = 75 |
| CES21 = 87 | CES46 = 91 | CES71 = 81 | CES96 = 84 |
| CES22 = 79 | CES47 = 92 | CES72 = 93 | CES97 = 89 |
| CES23 = 92 | CES48 = 84 | CES73 = 78 | CES98 = 85 |
| CES24 = 91 | CES49 = 92 | CES74 = 91 | CES99 = 76 |
| CES25 = 72 | CES50 = 95 | CES75 = 84 | |



Color Rendition by Hue-Angle Bin



Measure Comparisons



(END OF REPORT)