

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: P833939

Luminaire Tested: **TTN-D3-740-U-WQ-UPL2**

Issue Date: 5/15/2024

**Test Information**

Test Method: LM-79-08  
Report Number: P833939  
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-D3-740-U-WQ-UPL2  
Description: TOPTIER NANO LED PARKING GARAGE LUMINAIRE WITH UPLIGHT  
4000K, 70 CRI LEDS AND WIDE DISTRIBUTION  
Light Source: -  
Ballast/Driver: -

**Summary**

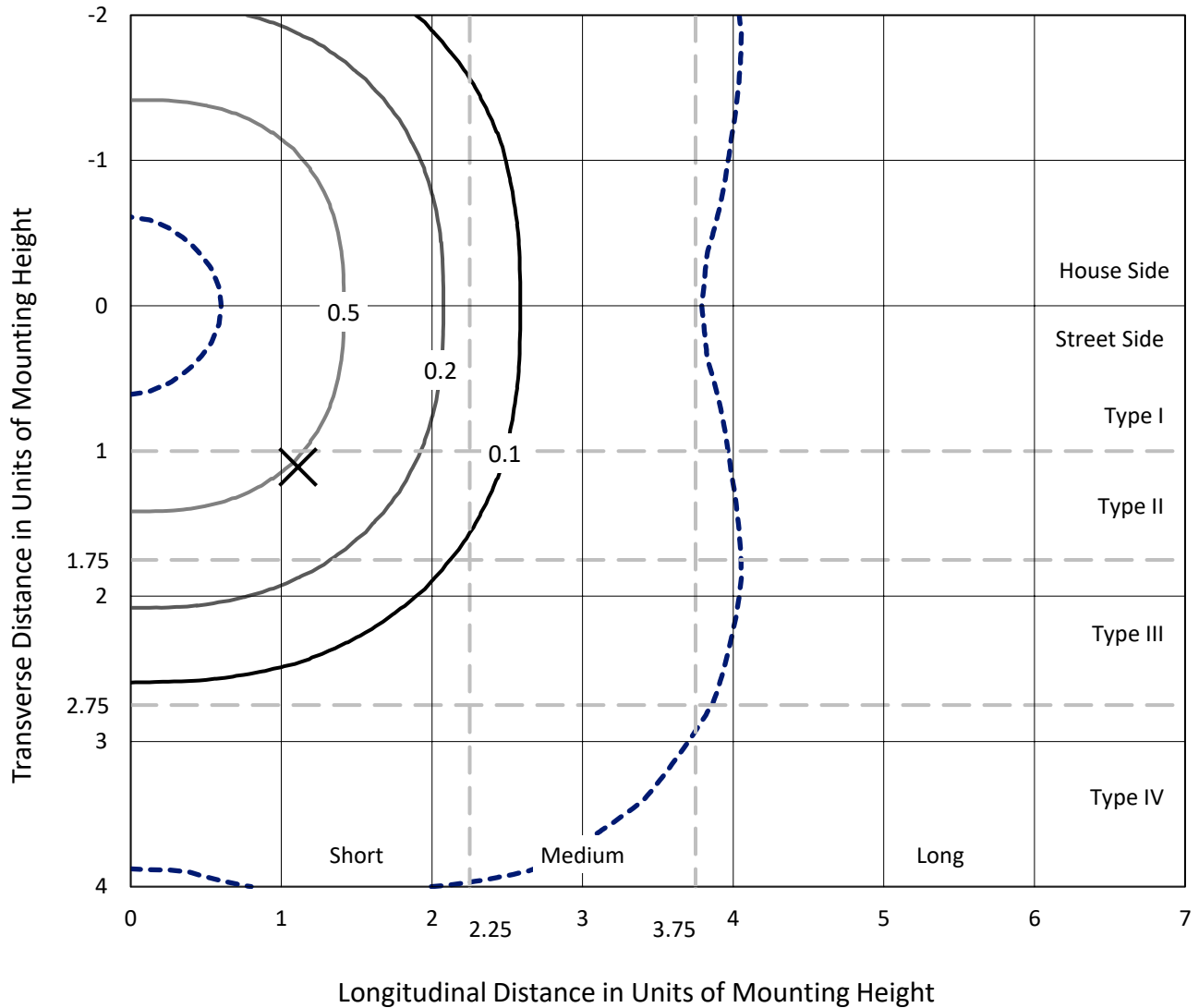
Lumens per Lamp: N/A  
Luminaire Lumens: 7620.7 lumens  
Efficiency: N/A  
Efficacy: 119.6 lumens/watt  
Luminous Opening: Vertical Cylinder (Dia: 0.71' x H: 0.1')  
IES Classification: Type V - Short  
BUG Rating: B3 - U4 - G2  
  
Input Watts (W): 63.7  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



REPORT NUMBER: P833939  
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### Iso-Footcandle Lines of Horizontal Illumination

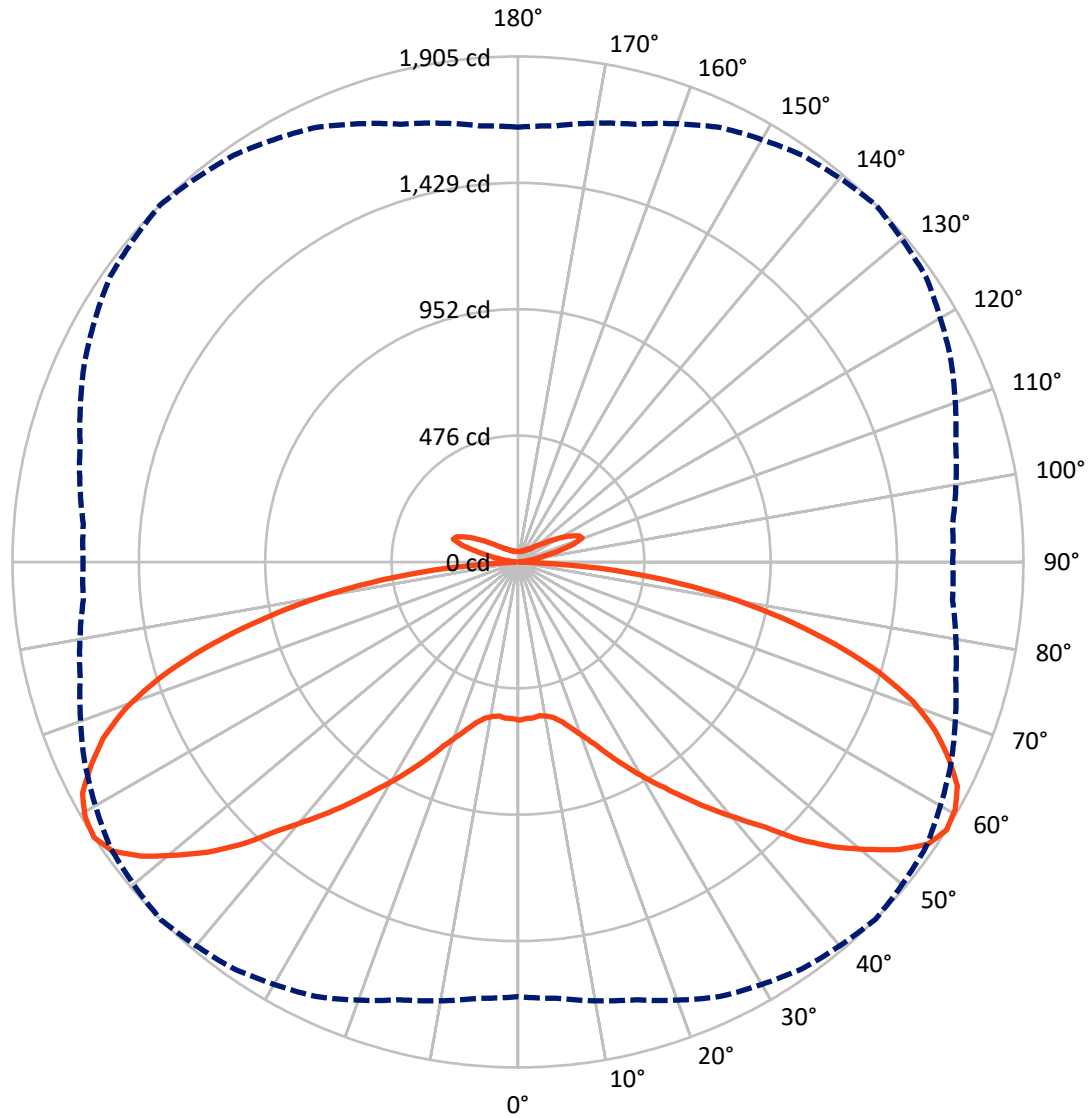
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 1 fc  
 Type V - Short - N/A

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### Luminous Intensity Polar Plot



— Vertical Plane Through 45-Deg Lateral    - - - Horizontal Cone Through 57.5-Deg Vertical

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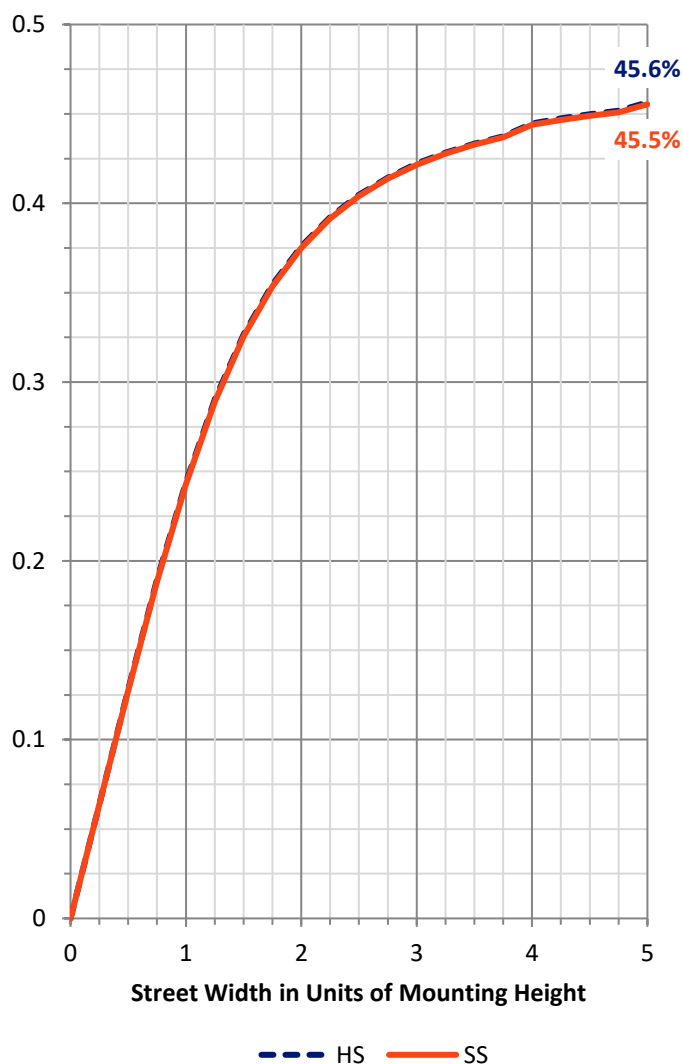
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 3517.9   | 292.5  | 3810.4 |
|                    | % Fixture | 46.2     | 3.8    | 50.0   |
| <b>Street Side</b> | Lumens    | 3517.9   | 292.5  | 3810.4 |
|                    | % Fixture | 46.2     | 3.8    | 50.0   |
| <b>Total</b>       | Lumens    | 7035.8   | 584.9  | 7620.7 |
|                    | % Fixture | 92.3     | 7.7    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 56.0   | 0.7       |
| 10°-20°   | 178.9  | 2.3       |
| 20°-30°   | 375.3  | 4.9       |
| 30°-40°   | 680.9  | 8.9       |
| 40°-50°   | 1109.9 | 14.6      |
| 50°-60°   | 1553.6 | 20.4      |
| 60°-70°   | 1621.9 | 21.3      |
| 70°-80°   | 1158.8 | 15.2      |
| 80°-90°   | 300.6  | 3.9       |
| 90°-100°  | 13.1   | 0.2       |
| 100°-110° | 132.7  | 1.7       |
| 110°-120° | 194.0  | 2.5       |
| 120°-130° | 112.6  | 1.5       |
| 130°-140° | 59.7   | 0.8       |
| 140°-150° | 35.4   | 0.5       |
| 150°-160° | 21.8   | 0.3       |
| 160°-170° | 11.9   | 0.2       |
| 170°-180° | 3.9    | 0.1       |
| 0°-90°    | 7035.8 | 92.3      |
| 0°-180°   | 7620.7 | 100.0     |

**Coefficient of Utilization**



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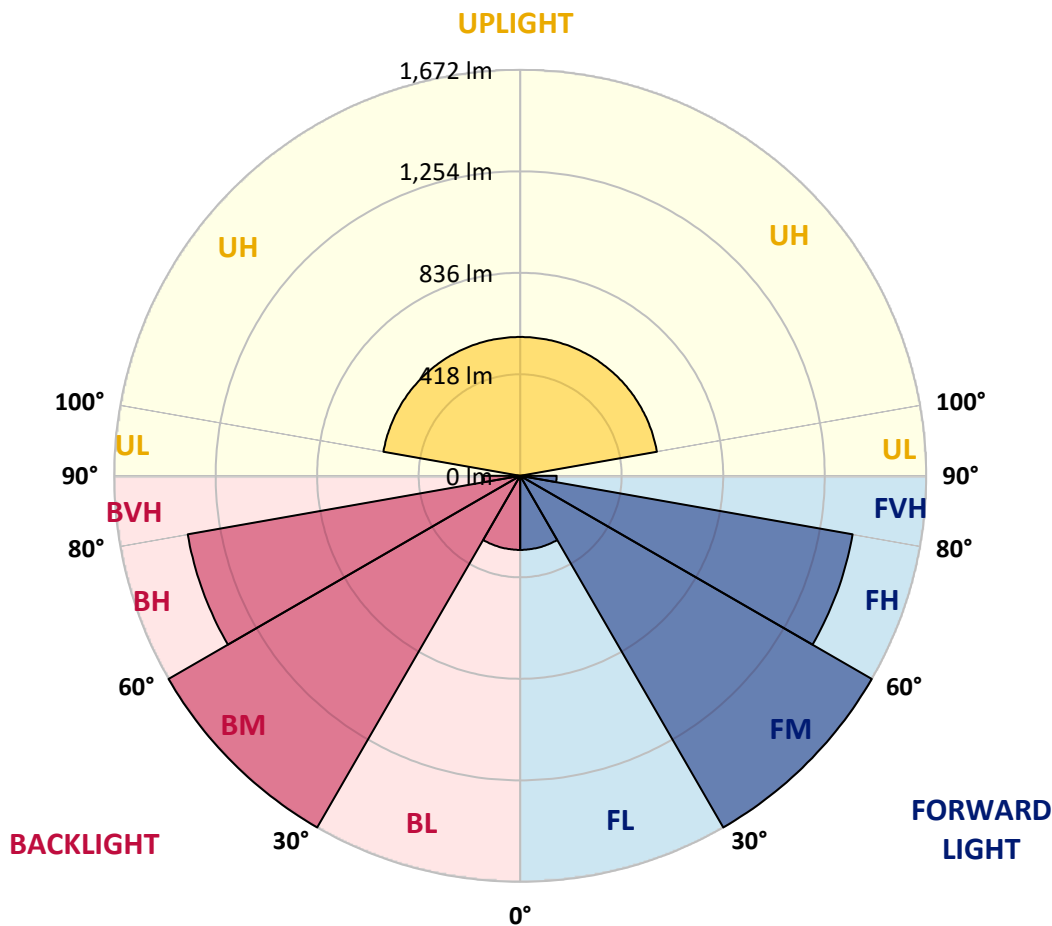
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**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone           | Lumens | % Fixture | Zone Rating/Lumen Limit |         |         |
|----------------|--------|-----------|-------------------------|---------|---------|
|                |        |           | B                       | U       | G       |
| FL (0°-30°)    | 305.1  | 4.0       |                         |         |         |
| FM (30°-60°)   | 1672.2 | 21.9      |                         |         |         |
| FH (60°-80°)   | 1390.3 | 18.2      |                         |         | G1/1800 |
| FVH (80°-90°)  | 150.3  | 2.0       |                         |         | G2/225  |
| BL (0°-30°)    | 305.1  | 4.0       | B1/500                  |         |         |
| BM (30°-60°)   | 1672.2 | 21.9      | B2/2500                 |         |         |
| BH (60°-80°)   | 1390.3 | 18.2      | B3/2500                 |         | G1/1800 |
| BVH (80°-90°)  | 150.3  | 2.0       |                         |         | G2/225  |
| UL (90°-100°)  | 13.1   | 0.2       |                         | U2/50   |         |
| UH (100°-180°) | 571.8  | 7.5       |                         | U4/1000 |         |

**BUG Rating: B3-U4-G2**

Type V Short





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**CANDELA DISTRIBUTION (FULL):**

|        | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 65°    | 75°    | 85°    | 90°    |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°     | 596.3  | 596.3  | 596.3  | 596.3  | 596.3  | 596.3  | 596.3  | 596.3  | 596.3  | 596.3  | 596.3  |
| 2.5°   | 590.5  | 590.5  | 590.5  | 590.5  | 590.5  | 590.5  | 590.5  | 590.5  | 590.5  | 590.5  | 590.5  |
| 5°     | 590.5  | 590.5  | 590.5  | 590.5  | 590.5  | 590.5  | 590.5  | 590.5  | 590.5  | 590.5  | 590.5  |
| 7.5°   | 578.9  | 578.9  | 584.7  | 584.7  | 584.7  | 584.7  | 584.7  | 584.7  | 584.7  | 584.7  | 584.7  |
| 10°    | 578.9  | 578.9  | 584.7  | 584.7  | 590.5  | 590.5  | 590.5  | 584.7  | 584.7  | 578.9  | 578.9  |
| 12.5°  | 590.5  | 590.5  | 590.5  | 596.3  | 602.1  | 602.1  | 602.1  | 596.3  | 596.3  | 590.5  | 590.5  |
| 15°    | 607.9  | 613.7  | 613.7  | 619.5  | 625.3  | 625.3  | 625.3  | 619.5  | 619.5  | 613.7  | 613.7  |
| 17.5°  | 642.6  | 642.6  | 642.6  | 648.4  | 654.2  | 660.0  | 660.0  | 648.4  | 648.4  | 642.6  | 648.4  |
| 20°    | 677.4  | 683.2  | 683.2  | 688.9  | 694.7  | 700.5  | 694.7  | 688.9  | 683.2  | 683.2  | 683.2  |
| 22.5°  | 729.5  | 729.5  | 735.3  | 735.3  | 746.8  | 746.8  | 746.8  | 735.3  | 735.3  | 735.3  | 735.3  |
| 25°    | 787.4  | 787.4  | 793.2  | 798.9  | 810.5  | 810.5  | 804.7  | 793.2  | 793.2  | 793.2  | 798.9  |
| 27.5°  | 856.8  | 856.8  | 862.6  | 862.6  | 874.2  | 874.2  | 868.4  | 862.6  | 862.6  | 862.6  | 868.4  |
| 30°    | 920.5  | 920.5  | 932.1  | 937.9  | 943.7  | 943.7  | 943.7  | 932.1  | 932.1  | 926.3  | 926.3  |
| 32.5°  | 978.4  | 984.2  | 990.0  | 1007.4 | 1018.9 | 1013.2 | 1018.9 | 1007.4 | 995.8  | 990.0  | 990.0  |
| 35°    | 1042.1 | 1047.9 | 1059.5 | 1076.8 | 1094.2 | 1094.2 | 1094.2 | 1076.8 | 1065.3 | 1053.7 | 1059.5 |
| 37.5°  | 1117.4 | 1117.4 | 1134.7 | 1152.1 | 1175.3 | 1181.0 | 1175.3 | 1157.9 | 1140.5 | 1128.9 | 1128.9 |
| 40°    | 1198.4 | 1198.4 | 1215.8 | 1233.2 | 1262.1 | 1267.9 | 1262.1 | 1238.9 | 1215.8 | 1210.0 | 1210.0 |
| 42.5°  | 1279.5 | 1279.5 | 1302.6 | 1320.0 | 1354.7 | 1366.3 | 1354.7 | 1325.8 | 1302.6 | 1285.3 | 1291.0 |
| 45°    | 1366.3 | 1372.1 | 1401.0 | 1435.8 | 1476.3 | 1493.7 | 1476.3 | 1441.6 | 1406.8 | 1372.1 | 1372.1 |
| 47.5°  | 1464.7 | 1464.7 | 1499.5 | 1540.0 | 1586.3 | 1603.7 | 1580.5 | 1545.8 | 1499.5 | 1470.5 | 1470.5 |
| 50°    | 1528.4 | 1534.2 | 1580.5 | 1632.6 | 1690.5 | 1702.1 | 1684.7 | 1632.6 | 1580.5 | 1540.0 | 1534.2 |
| 52.5°  | 1592.1 | 1597.9 | 1650.0 | 1725.3 | 1783.1 | 1800.5 | 1777.4 | 1725.3 | 1650.0 | 1597.9 | 1597.9 |
| 55°    | 1632.6 | 1644.2 | 1702.1 | 1783.1 | 1846.8 | 1875.8 | 1841.0 | 1783.1 | 1696.3 | 1638.4 | 1632.6 |
| 57.5°  | 1638.4 | 1650.0 | 1707.9 | 1806.3 | 1870.0 | 1904.7 | 1875.8 | 1800.5 | 1707.9 | 1644.2 | 1638.4 |
| 60°    | 1626.8 | 1632.6 | 1690.5 | 1794.7 | 1870.0 | 1893.1 | 1870.0 | 1788.9 | 1684.7 | 1632.6 | 1621.0 |
| 62.5°  | 1597.9 | 1609.5 | 1667.4 | 1754.2 | 1841.0 | 1858.4 | 1835.3 | 1748.4 | 1661.6 | 1597.9 | 1586.3 |
| 65°    | 1505.3 | 1516.8 | 1603.7 | 1690.5 | 1765.8 | 1783.1 | 1765.8 | 1690.5 | 1597.9 | 1505.3 | 1493.7 |
| 67.5°  | 1401.0 | 1406.8 | 1493.7 | 1597.9 | 1667.4 | 1696.3 | 1667.4 | 1603.7 | 1487.9 | 1401.0 | 1389.5 |
| 70°    | 1291.0 | 1296.8 | 1366.3 | 1476.3 | 1545.8 | 1580.5 | 1551.6 | 1482.1 | 1360.5 | 1285.3 | 1279.5 |
| 72.5°  | 1163.7 | 1163.7 | 1233.2 | 1320.0 | 1389.5 | 1424.2 | 1401.0 | 1314.2 | 1221.6 | 1146.3 | 1134.7 |
| 75°    | 990.0  | 995.8  | 1071.0 | 1134.7 | 1210.0 | 1233.2 | 1210.0 | 1140.5 | 1053.7 | 978.4  | 966.8  |
| 77.5°  | 810.5  | 816.3  | 880.0  | 932.1  | 1001.6 | 1018.9 | 1001.6 | 943.7  | 862.6  | 798.9  | 793.2  |
| 80°    | 613.7  | 619.5  | 671.6  | 717.9  | 775.8  | 798.9  | 781.6  | 723.7  | 660.0  | 602.1  | 584.7  |
| 82.5°  | 399.5  | 405.3  | 457.4  | 492.1  | 544.2  | 561.6  | 550.0  | 497.9  | 445.8  | 387.9  | 382.1  |
| 85°    | 179.5  | 185.3  | 231.6  | 260.5  | 301.1  | 318.4  | 306.8  | 260.5  | 220.0  | 167.9  | 156.3  |
| 87.5°  | 17.4   | 17.4   | 17.4   | 17.4   | 17.4   | 23.2   | 23.2   | 17.4   | 17.4   | 17.4   | 17.4   |
| 90°    | 5.0    | 5.0    | 6.0    | 6.0    | 6.0    | 6.0    | 6.0    | 6.0    | 6.0    | 5.0    | 5.0    |
| 92.5°  | 5.0    | 5.0    | 5.0    | 7.0    | 8.0    | 7.0    | 8.0    | 6.0    | 6.0    | 5.0    | 5.0    |
| 95°    | 6.0    | 6.0    | 7.0    | 9.0    | 11.0   | 12.0   | 12.0   | 7.0    | 7.0    | 6.0    | 6.0    |
| 97.5°  | 8.0    | 9.0    | 9.0    | 11.0   | 18.0   | 33.0   | 20.0   | 10.0   | 10.0   | 9.0    | 8.0    |
| 100°   | 13.0   | 14.0   | 14.0   | 25.0   | 53.0   | 71.1   | 51.0   | 26.0   | 19.0   | 14.0   | 14.0   |
| 102.5° | 42.0   | 44.0   | 54.0   | 81.1   | 120.1  | 109.1  | 92.1   | 87.1   | 60.0   | 48.0   | 46.0   |
| 105°   | 107.1  | 106.1  | 114.1  | 135.1  | 168.1  | 165.1  | 152.1  | 138.1  | 119.1  | 110.1  | 110.1  |
| 107.5° | 141.1  | 141.1  | 148.1  | 166.1  | 191.1  | 223.2  | 226.2  | 179.1  | 157.1  | 147.1  | 146.1  |
| 110°   | 159.1  | 159.1  | 165.1  | 180.1  | 213.2  | 258.2  | 256.2  | 221.2  | 194.1  | 181.1  | 179.1  |



REPORT NUMBER: P833939  
 CATALOG NUMBER: TTN-D3-740-U-WQ-UPL2

**CANDELA DISTRIBUTION (continued):**

|        | 0°    | 5°    | 15°   | 25°   | 35°   | 45°   | 55°   | 65°   | 75°   | 85°   | 90°   |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 112.5° | 163.1 | 164.1 | 172.1 | 195.1 | 231.2 | 251.2 | 242.2 | 228.2 | 216.2 | 206.2 | 204.2 |
| 115°   | 169.1 | 169.1 | 178.1 | 200.2 | 220.2 | 228.2 | 218.2 | 207.2 | 199.2 | 195.1 | 197.1 |
| 117.5° | 167.1 | 170.1 | 172.1 | 184.1 | 197.1 | 203.2 | 198.1 | 183.1 | 177.1 | 175.1 | 172.1 |
| 120°   | 155.1 | 155.1 | 157.1 | 163.1 | 170.1 | 173.1 | 171.1 | 161.1 | 156.1 | 155.1 | 153.1 |
| 122.5° | 138.1 | 139.1 | 138.1 | 141.1 | 146.1 | 149.1 | 147.1 | 139.1 | 137.1 | 137.1 | 135.1 |
| 125°   | 121.1 | 121.1 | 120.1 | 122.1 | 125.1 | 124.1 | 125.1 | 121.1 | 120.1 | 120.1 | 119.1 |
| 127.5° | 109.1 | 108.1 | 106.1 | 107.1 | 108.1 | 108.1 | 109.1 | 105.1 | 106.1 | 107.1 | 106.1 |
| 130°   | 97.1  | 97.1  | 95.1  | 95.1  | 95.1  | 93.1  | 95.1  | 93.1  | 94.1  | 95.1  | 96.1  |
| 132.5° | 86.1  | 86.1  | 83.1  | 82.1  | 82.1  | 82.1  | 83.1  | 82.1  | 84.1  | 86.1  | 86.1  |
| 135°   | 77.1  | 77.1  | 74.1  | 75.1  | 75.1  | 74.1  | 75.1  | 74.1  | 76.1  | 77.1  | 77.1  |
| 137.5° | 70.1  | 70.1  | 68.1  | 68.1  | 68.1  | 67.1  | 68.1  | 68.1  | 69.1  | 71.1  | 72.1  |
| 140°   | 64.0  | 64.0  | 63.0  | 63.0  | 62.0  | 63.0  | 63.0  | 63.0  | 64.0  | 65.0  | 65.0  |
| 142.5° | 61.0  | 60.0  | 59.0  | 58.0  | 59.0  | 59.0  | 59.0  | 58.0  | 59.0  | 61.0  | 61.0  |
| 145°   | 56.0  | 56.0  | 55.0  | 55.0  | 55.0  | 56.0  | 55.0  | 55.0  | 56.0  | 56.0  | 57.0  |
| 147.5° | 53.0  | 53.0  | 52.0  | 53.0  | 53.0  | 53.0  | 53.0  | 52.0  | 53.0  | 53.0  | 54.0  |
| 150°   | 52.0  | 51.0  | 50.0  | 51.0  | 51.0  | 50.0  | 50.0  | 50.0  | 50.0  | 51.0  | 51.0  |
| 152.5° | 49.0  | 49.0  | 48.0  | 49.0  | 48.0  | 48.0  | 48.0  | 48.0  | 48.0  | 49.0  | 50.0  |
| 155°   | 47.0  | 47.0  | 46.0  | 47.0  | 47.0  | 47.0  | 47.0  | 47.0  | 47.0  | 47.0  | 47.0  |
| 157.5° | 45.0  | 46.0  | 45.0  | 45.0  | 45.0  | 45.0  | 45.0  | 45.0  | 45.0  | 46.0  | 46.0  |
| 160°   | 44.0  | 44.0  | 44.0  | 44.0  | 43.0  | 43.0  | 43.0  | 44.0  | 44.0  | 44.0  | 45.0  |
| 162.5° | 43.0  | 43.0  | 43.0  | 43.0  | 42.0  | 42.0  | 42.0  | 42.0  | 43.0  | 43.0  | 44.0  |
| 165°   | 43.0  | 42.0  | 42.0  | 42.0  | 41.0  | 41.0  | 41.0  | 41.0  | 42.0  | 43.0  | 42.0  |
| 167.5° | 41.0  | 41.0  | 41.0  | 41.0  | 41.0  | 40.0  | 40.0  | 41.0  | 41.0  | 41.0  | 42.0  |
| 170°   | 41.0  | 41.0  | 40.0  | 40.0  | 40.0  | 40.0  | 40.0  | 40.0  | 40.0  | 40.0  | 41.0  |
| 172.5° | 41.0  | 41.0  | 41.0  | 41.0  | 40.0  | 40.0  | 40.0  | 40.0  | 40.0  | 41.0  | 41.0  |
| 175°   | 41.0  | 41.0  | 41.0  | 41.0  | 40.0  | 40.0  | 40.0  | 41.0  | 41.0  | 41.0  | 40.0  |
| 177.5° | 41.0  | 41.0  | 41.0  | 41.0  | 40.0  | 41.0  | 41.0  | 41.0  | 41.0  | 41.0  | 41.0  |
| 180°   | 41.0  | 41.0  | 41.0  | 41.0  | 41.0  | 41.0  | 41.0  | 41.0  | 41.0  | 41.0  | 41.0  |



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: SP1-2411-284-2

Test Date: 11/20/2024

Luminaire Tested: TTN-D0-740-U-WQ

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

**Test Information**

Test Method: LM-79-2019  
 Report Number: SP1-2411-284-2  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry: 4π  
 Issue Date: 11/20/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: MCGRAW EDISON  
 Catalog Number: **TTN-D0-740-U-WQ**  
 Description: TOPTIER NANO LED PARKING GARAGE LUMINAIRE. 4000K, 70 CRI LEDS AND WIDE DISTRIBUTION

**Spectral Parameters**

CCT (K): 3863  
 CIE u': 0.2247  
 CIE v': 0.5111  
 Duv: 0.0055  
 CIE x: 0.3911  
 CIE y: 0.3954  
 CIE z: 0.2136  
 Peak Wavelength (nm): 448  
 Dominant Wavelength (nm): 577  
 Purity: 36.03443  
 Rf: 74.7  
 Rg: 95.4

|           |      |      |       |
|-----------|------|------|-------|
| CRI (Ra): | 71.9 |      |       |
| R1:       | 69.4 | R9:  | -23.5 |
| R2:       | 76.9 | R10: | 45.4  |
| R3:       | 83.3 | R11: | 68.7  |
| R4:       | 72.7 | R12: | 38.7  |
| R5:       | 68.4 | R13: | 70.0  |
| R6:       | 67.5 | R14: | 90.3  |
| R7:       | 82.0 | R15: | 62.1  |
| R8:       | 55.3 |      |       |



**Test Conditions**

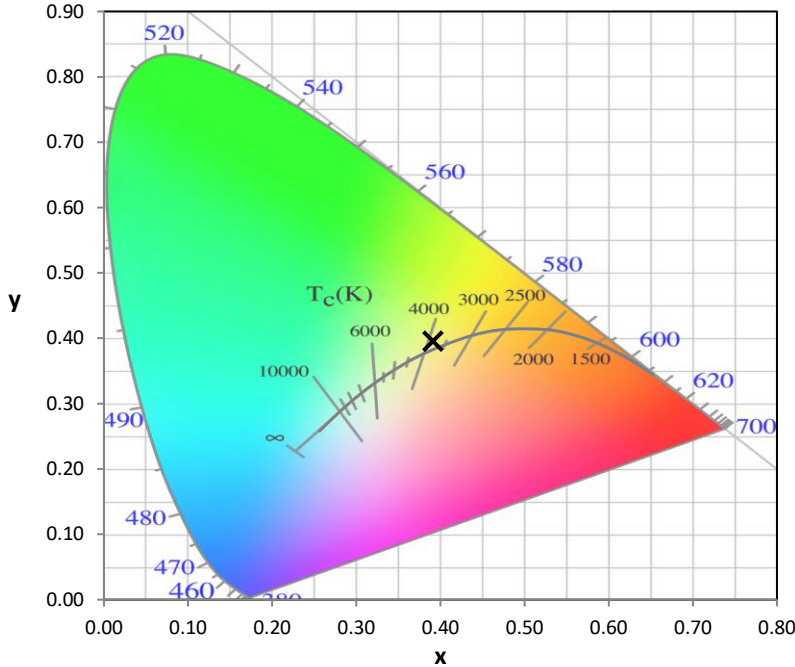
Stabilization Time: 37M  
 Operation Time: 1H 37M  
 Sphere Temperature (°C): 25.0

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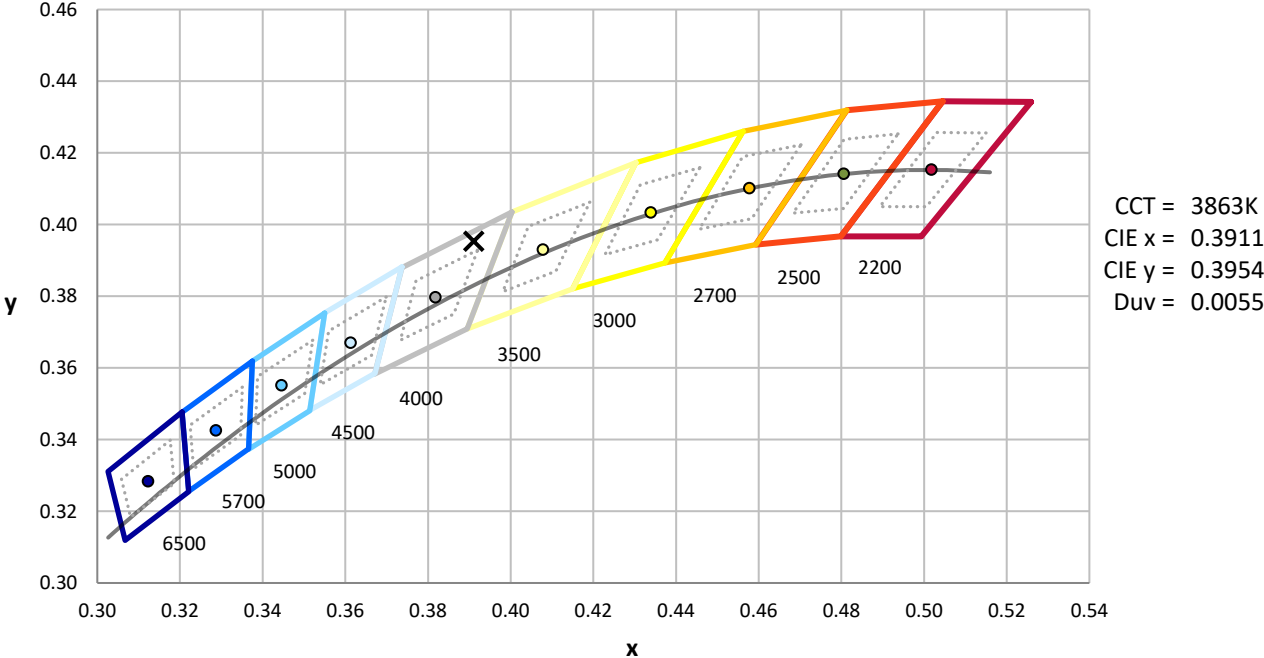
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| 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 4000K 7-step quadrangle

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**Photopic Flux vs. Wavelength**



**Photopic Lumens: NR**

| λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 360    | 0                        | NR            | 490    | 118                      | NR            | 620    | 730                      | NR            | 750    | 25                       | NR            | 880    | 1                        | NR            |
| 365    | 0                        | NR            | 495    | 170                      | NR            | 625    | 680                      | NR            | 755    | 22                       | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 245                      | NR            | 630    | 630                      | NR            | 760    | 19                       | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 338                      | NR            | 635    | 579                      | NR            | 765    | 17                       | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 431                      | NR            | 640    | 529                      | NR            | 770    | 14                       | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 521                      | NR            | 645    | 477                      | NR            | 775    | 13                       | NR            | 905    | 0                        | NR            |
| 390    | 1                        | NR            | 520    | 596                      | NR            | 650    | 429                      | NR            | 780    | 11                       | NR            | 910    | 0                        | NR            |
| 395    | 3                        | NR            | 525    | 655                      | NR            | 655    | 383                      | NR            | 785    | 9                        | NR            | 915    | 0                        | NR            |
| 400    | 6                        | NR            | 530    | 701                      | NR            | 660    | 338                      | NR            | 790    | 8                        | NR            | 920    | 0                        | NR            |
| 405    | 9                        | NR            | 535    | 739                      | NR            | 665    | 298                      | NR            | 795    | 7                        | NR            | 925    | 0                        | NR            |
| 410    | 16                       | NR            | 540    | 766                      | NR            | 670    | 261                      | NR            | 800    | 6                        | NR            | 930    | 0                        | NR            |
| 415    | 32                       | NR            | 545    | 791                      | NR            | 675    | 228                      | NR            | 805    | 5                        | NR            | 935    | 0                        | NR            |
| 420    | 65                       | NR            | 550    | 813                      | NR            | 680    | 200                      | NR            | 810    | 5                        | NR            | 940    | 0                        | NR            |
| 425    | 131                      | NR            | 555    | 833                      | NR            | 685    | 173                      | NR            | 815    | 4                        | NR            | 945    | 0                        | NR            |
| 430    | 245                      | NR            | 560    | 852                      | NR            | 690    | 151                      | NR            | 820    | 3                        | NR            | 950    | 0                        | NR            |
| 435    | 432                      | NR            | 565    | 870                      | NR            | 695    | 130                      | NR            | 825    | 3                        | NR            | 955    | 0                        | NR            |
| 440    | 622                      | NR            | 570    | 885                      | NR            | 700    | 112                      | NR            | 830    | 3                        | NR            | 960    | 0                        | NR            |
| 445    | 870                      | NR            | 575    | 900                      | NR            | 705    | 97                       | NR            | 835    | 2                        | NR            | 965    | 0                        | NR            |
| 450    | 969                      | NR            | 580    | 911                      | NR            | 710    | 83                       | NR            | 840    | 2                        | NR            | 970    | 0                        | NR            |
| 455    | 544                      | NR            | 585    | 916                      | NR            | 715    | 71                       | NR            | 845    | 2                        | NR            | 975    | 0                        | NR            |
| 460    | 304                      | NR            | 590    | 912                      | NR            | 720    | 60                       | NR            | 850    | 1                        | NR            | 980    | 0                        | NR            |
| 465    | 231                      | NR            | 595    | 901                      | NR            | 725    | 51                       | NR            | 855    | 1                        | NR            | 985    | 0                        | NR            |
| 470    | 142                      | NR            | 600    | 882                      | NR            | 730    | 43                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 96                       | NR            | 605    | 855                      | NR            | 735    | 37                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 92                       | NR            | 610    | 820                      | NR            | 740    | 32                       | NR            | 870    | 1                        | NR            | 1000   | 0                        | NR            |
| 485    | 96                       | NR            | 615    | 776                      | NR            | 745    | 29                       | NR            | 875    | 1                        | NR            |        |                          |               |

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**Scotopic Flux vs. Wavelength**



**Scotopic Lumens: NR**

**S/P: 1.45**

| λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 360    | 0                        | NR            | 490    | 118                      | NR            | 620    | 730                      | NR            | 750    | 25                       | NR            | 880    | 1                        | NR            |
| 365    | 0                        | NR            | 495    | 170                      | NR            | 625    | 680                      | NR            | 755    | 22                       | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 245                      | NR            | 630    | 630                      | NR            | 760    | 19                       | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 338                      | NR            | 635    | 579                      | NR            | 765    | 17                       | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 431                      | NR            | 640    | 529                      | NR            | 770    | 14                       | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 521                      | NR            | 645    | 477                      | NR            | 775    | 13                       | NR            | 905    | 0                        | NR            |
| 390    | 1                        | NR            | 520    | 596                      | NR            | 650    | 429                      | NR            | 780    | 11                       | NR            | 910    | 0                        | NR            |
| 395    | 3                        | NR            | 525    | 655                      | NR            | 655    | 383                      | NR            | 785    | 9                        | NR            | 915    | 0                        | NR            |
| 400    | 6                        | NR            | 530    | 701                      | NR            | 660    | 338                      | NR            | 790    | 8                        | NR            | 920    | 0                        | NR            |
| 405    | 9                        | NR            | 535    | 739                      | NR            | 665    | 298                      | NR            | 795    | 7                        | NR            | 925    | 0                        | NR            |
| 410    | 16                       | NR            | 540    | 766                      | NR            | 670    | 261                      | NR            | 800    | 6                        | NR            | 930    | 0                        | NR            |
| 415    | 32                       | NR            | 545    | 791                      | NR            | 675    | 228                      | NR            | 805    | 5                        | NR            | 935    | 0                        | NR            |
| 420    | 65                       | NR            | 550    | 813                      | NR            | 680    | 200                      | NR            | 810    | 5                        | NR            | 940    | 0                        | NR            |
| 425    | 131                      | NR            | 555    | 833                      | NR            | 685    | 173                      | NR            | 815    | 4                        | NR            | 945    | 0                        | NR            |
| 430    | 245                      | NR            | 560    | 852                      | NR            | 690    | 151                      | NR            | 820    | 3                        | NR            | 950    | 0                        | NR            |
| 435    | 432                      | NR            | 565    | 870                      | NR            | 695    | 130                      | NR            | 825    | 3                        | NR            | 955    | 0                        | NR            |
| 440    | 622                      | NR            | 570    | 885                      | NR            | 700    | 112                      | NR            | 830    | 3                        | NR            | 960    | 0                        | NR            |
| 445    | 870                      | NR            | 575    | 900                      | NR            | 705    | 97                       | NR            | 835    | 2                        | NR            | 965    | 0                        | NR            |
| 450    | 969                      | NR            | 580    | 911                      | NR            | 710    | 83                       | NR            | 840    | 2                        | NR            | 970    | 0                        | NR            |
| 455    | 544                      | NR            | 585    | 916                      | NR            | 715    | 71                       | NR            | 845    | 2                        | NR            | 975    | 0                        | NR            |
| 460    | 304                      | NR            | 590    | 912                      | NR            | 720    | 60                       | NR            | 850    | 1                        | NR            | 980    | 0                        | NR            |
| 465    | 231                      | NR            | 595    | 901                      | NR            | 725    | 51                       | NR            | 855    | 1                        | NR            | 985    | 0                        | NR            |
| 470    | 142                      | NR            | 600    | 882                      | NR            | 730    | 43                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 96                       | NR            | 605    | 855                      | NR            | 735    | 37                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 92                       | NR            | 610    | 820                      | NR            | 740    | 32                       | NR            | 870    | 1                        | NR            | 1000   | 0                        | NR            |
| 485    | 96                       | NR            | 615    | 776                      | NR            | 745    | 29                       | NR            | 875    | 1                        | NR            |        |                          |               |

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**Melanopic Flux vs. Wavelength**



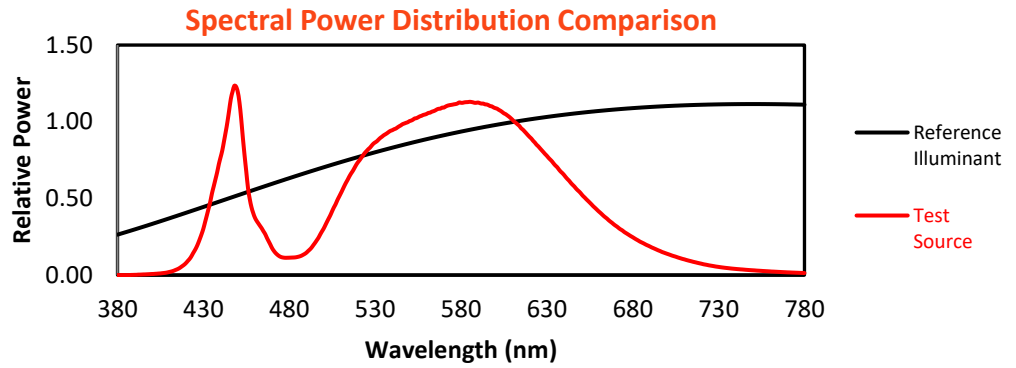
**Melanopic Lumens: NR**

**M/P: 2.72**

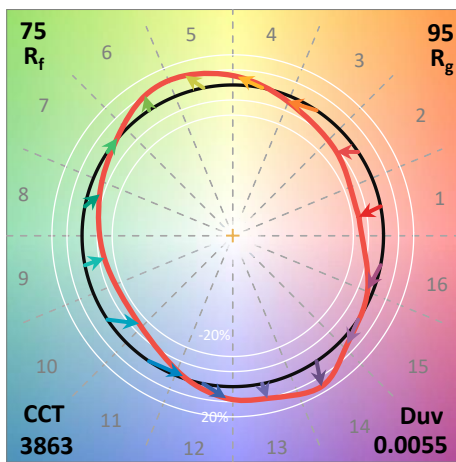
| λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 360    | 0                        | NR            | 490    | 118                      | NR            | 620    | 730                      | NR            | 750    | 25                       | NR            | 880    | 1                        | NR            |
| 365    | 0                        | NR            | 495    | 170                      | NR            | 625    | 680                      | NR            | 755    | 22                       | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 245                      | NR            | 630    | 630                      | NR            | 760    | 19                       | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 338                      | NR            | 635    | 579                      | NR            | 765    | 17                       | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 431                      | NR            | 640    | 529                      | NR            | 770    | 14                       | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 521                      | NR            | 645    | 477                      | NR            | 775    | 13                       | NR            | 905    | 0                        | NR            |
| 390    | 1                        | NR            | 520    | 596                      | NR            | 650    | 429                      | NR            | 780    | 11                       | NR            | 910    | 0                        | NR            |
| 395    | 3                        | NR            | 525    | 655                      | NR            | 655    | 383                      | NR            | 785    | 9                        | NR            | 915    | 0                        | NR            |
| 400    | 6                        | NR            | 530    | 701                      | NR            | 660    | 338                      | NR            | 790    | 8                        | NR            | 920    | 0                        | NR            |
| 405    | 9                        | NR            | 535    | 739                      | NR            | 665    | 298                      | NR            | 795    | 7                        | NR            | 925    | 0                        | NR            |
| 410    | 16                       | NR            | 540    | 766                      | NR            | 670    | 261                      | NR            | 800    | 6                        | NR            | 930    | 0                        | NR            |
| 415    | 32                       | NR            | 545    | 791                      | NR            | 675    | 228                      | NR            | 805    | 5                        | NR            | 935    | 0                        | NR            |
| 420    | 65                       | NR            | 550    | 813                      | NR            | 680    | 200                      | NR            | 810    | 5                        | NR            | 940    | 0                        | NR            |
| 425    | 131                      | NR            | 555    | 833                      | NR            | 685    | 173                      | NR            | 815    | 4                        | NR            | 945    | 0                        | NR            |
| 430    | 245                      | NR            | 560    | 852                      | NR            | 690    | 151                      | NR            | 820    | 3                        | NR            | 950    | 0                        | NR            |
| 435    | 432                      | NR            | 565    | 870                      | NR            | 695    | 130                      | NR            | 825    | 3                        | NR            | 955    | 0                        | NR            |
| 440    | 622                      | NR            | 570    | 885                      | NR            | 700    | 112                      | NR            | 830    | 3                        | NR            | 960    | 0                        | NR            |
| 445    | 870                      | NR            | 575    | 900                      | NR            | 705    | 97                       | NR            | 835    | 2                        | NR            | 965    | 0                        | NR            |
| 450    | 969                      | NR            | 580    | 911                      | NR            | 710    | 83                       | NR            | 840    | 2                        | NR            | 970    | 0                        | NR            |
| 455    | 544                      | NR            | 585    | 916                      | NR            | 715    | 71                       | NR            | 845    | 2                        | NR            | 975    | 0                        | NR            |
| 460    | 304                      | NR            | 590    | 912                      | NR            | 720    | 60                       | NR            | 850    | 1                        | NR            | 980    | 0                        | NR            |
| 465    | 231                      | NR            | 595    | 901                      | NR            | 725    | 51                       | NR            | 855    | 1                        | NR            | 985    | 0                        | NR            |
| 470    | 142                      | NR            | 600    | 882                      | NR            | 730    | 43                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 96                       | NR            | 605    | 855                      | NR            | 735    | 37                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 92                       | NR            | 610    | 820                      | NR            | 740    | 32                       | NR            | 870    | 1                        | NR            | 1000   | 0                        | NR            |
| 485    | 96                       | NR            | 615    | 776                      | NR            | 745    | 29                       | NR            | 875    | 1                        | NR            |        |                          |               |

**Summary**

$R_f = 74.7$   
 $R_g = 95.4$   
 $CIE R_a = 71.9$   
 $R_9 = -23.5$



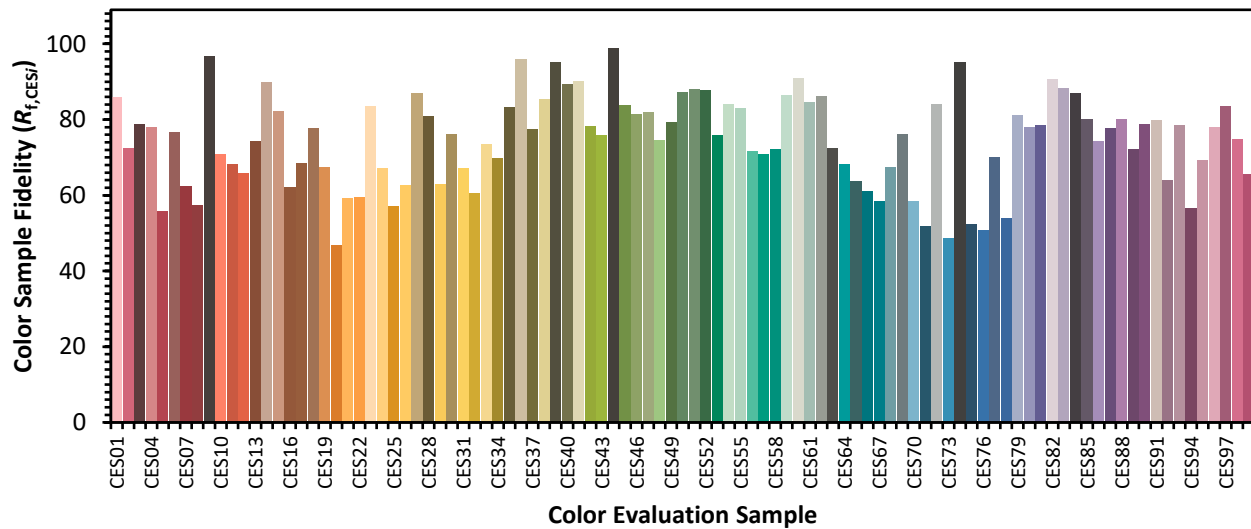
**Color Vector Graphics**



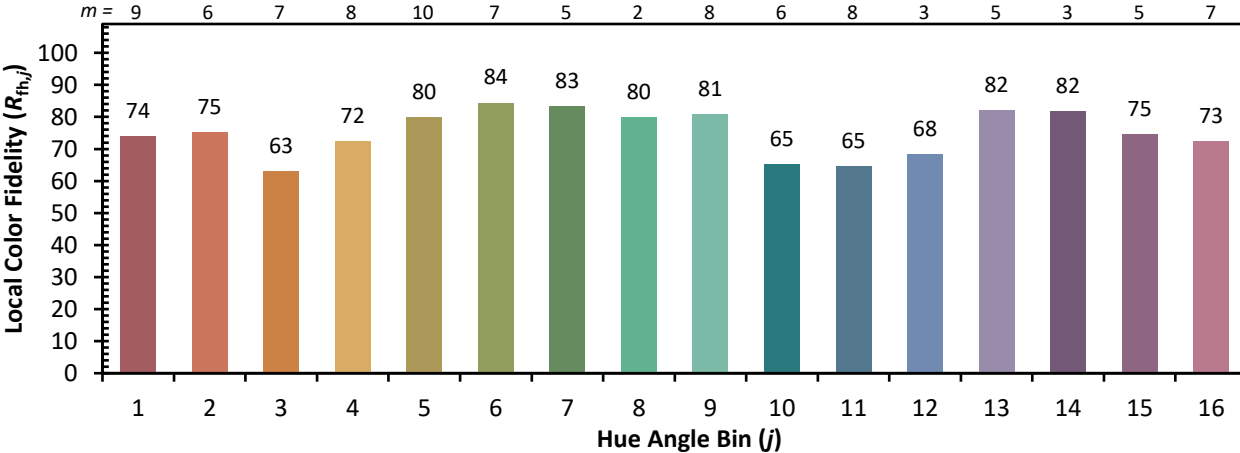


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

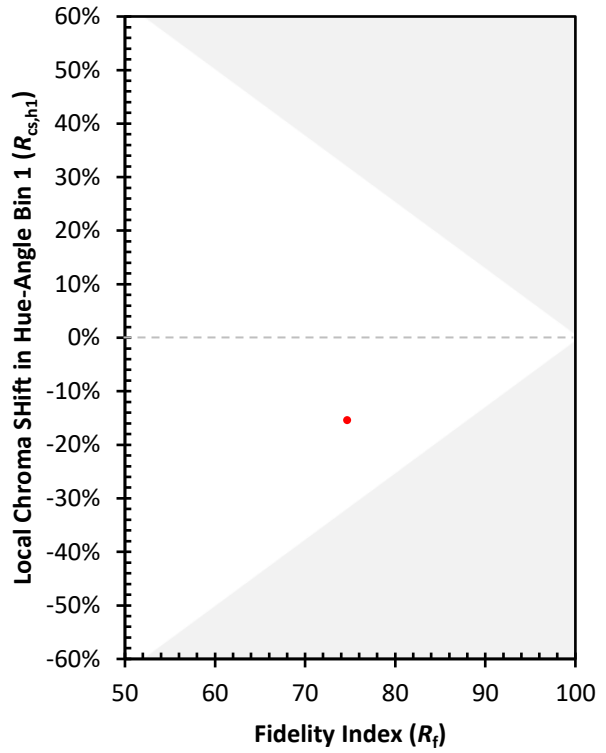
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 63 | CES51 = 88 | CES76 = 51 |
| CES02 = 61 | CES27 = 87 | CES52 = 88 | CES77 = 70 |
| CES03 = 30 | CES28 = 81 | CES53 = 76 | CES78 = 54 |
| CES04 = 70 | CES29 = 63 | CES54 = 84 | CES79 = 81 |
| CES05 = 47 | CES30 = 76 | CES55 = 83 | CES80 = 78 |
| CES06 = 50 | CES31 = 67 | CES56 = 72 | CES81 = 79 |
| CES07 = 40 | CES32 = 61 | CES57 = 71 | CES82 = 91 |
| CES08 = 39 | CES33 = 73 | CES58 = 72 | CES83 = 88 |
| CES09 = 29 | CES34 = 70 | CES59 = 86 | CES84 = 87 |
| CES10 = 74 | CES35 = 83 | CES60 = 91 | CES85 = 80 |
| CES11 = 57 | CES36 = 96 | CES61 = 85 | CES86 = 74 |
| CES12 = 63 | CES37 = 77 | CES62 = 86 | CES87 = 78 |
| CES13 = 42 | CES38 = 85 | CES63 = 72 | CES88 = 80 |
| CES14 = 74 | CES39 = 95 | CES64 = 68 | CES89 = 72 |
| CES15 = 71 | CES40 = 89 | CES65 = 64 | CES90 = 79 |
| CES16 = 46 | CES41 = 90 | CES66 = 61 | CES91 = 80 |
| CES17 = 49 | CES42 = 78 | CES67 = 58 | CES92 = 64 |
| CES18 = 56 | CES43 = 76 | CES68 = 67 | CES93 = 78 |
| CES19 = 71 | CES44 = 99 | CES69 = 76 | CES94 = 57 |
| CES20 = 65 | CES45 = 84 | CES70 = 58 | CES95 = 69 |
| CES21 = 86 | CES46 = 81 | CES71 = 52 | CES96 = 78 |
| CES22 = 78 | CES47 = 82 | CES72 = 84 | CES97 = 84 |
| CES23 = 92 | CES48 = 75 | CES73 = 49 | CES98 = 75 |
| CES24 = 91 | CES49 = 79 | CES74 = 95 | CES99 = 66 |
| CES25 = 72 | CES50 = 87 | CES75 = 52 |            |



Color Rendition by Hue-Angle Bin



Measure Comparisons



(END OF REPORT)