

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: P833582

Luminaire Tested: **TTN-D2-750-U-CQ-UPL2**

Issue Date: 5/15/2024

**Test Information**

Test Method: LM-79-08  
Report Number: P833582  
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-D2-750-U-CQ-UPL2  
Description: TOPTIER NANO LED PARKING GARAGE LUMINAIRE WITH UPLIGHT  
5000K, 70 CRI LEDS AND CONCENTRATED DISTRIBUTION  
Light Source: -  
Ballast/Driver: -

**Summary**

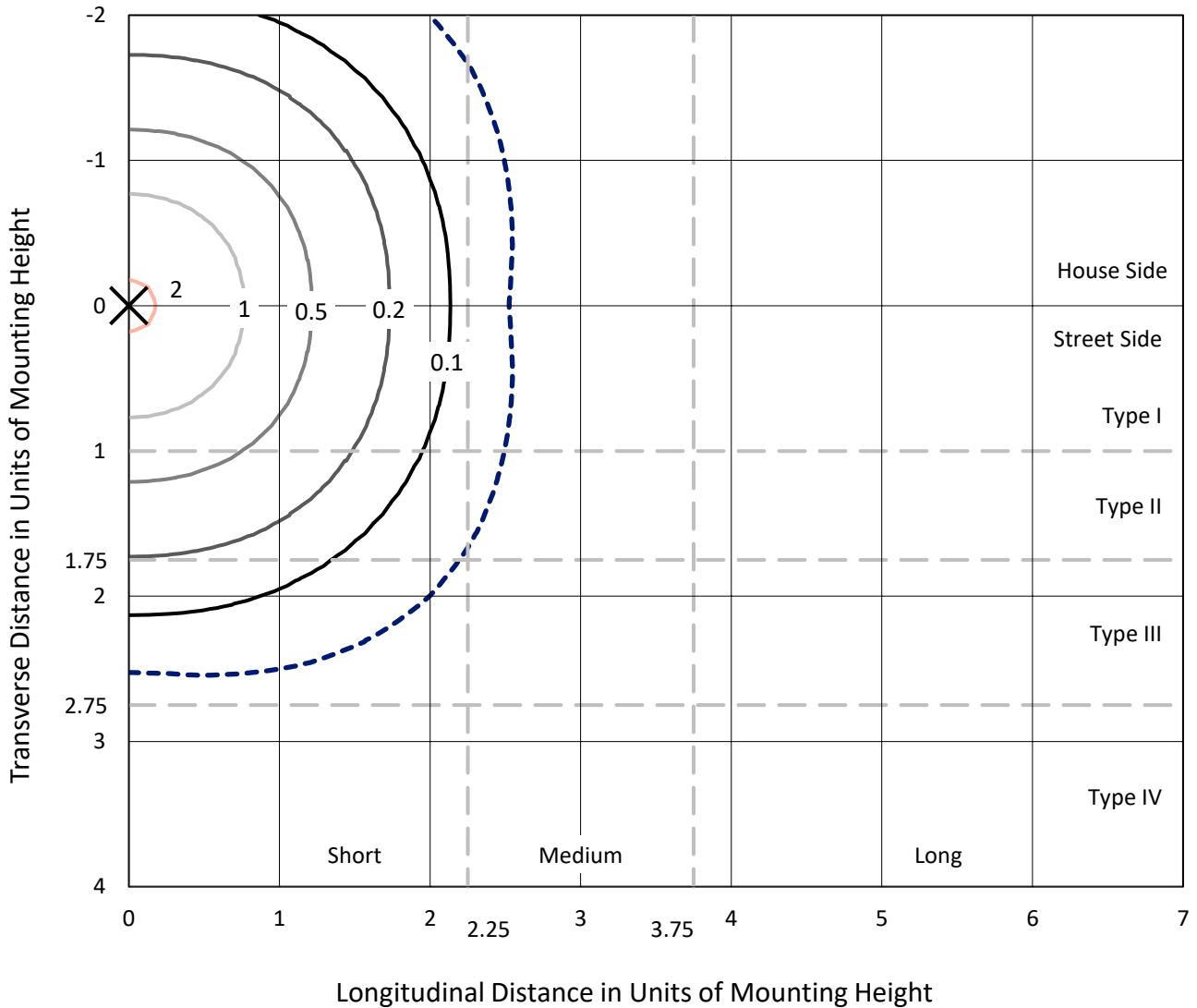
Lumens per Lamp: N/A  
Luminaire Lumens: 5901.7 lumens  
Efficiency: N/A  
Efficacy: 125.6 lumens/watt  
Luminous Opening: Vertical Cylinder (Dia: 0.71' x H: 0.1')  
IES Classification: Type V - Short  
BUG Rating: B2 - U4 - G1  
  
Input Watts (W): 47  
Input Voltage (V): NR  
Input Current (Ain): NR  
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: P833582  
 CATALOG NUMBER: TTN-D2-750-U-CQ-UPL2

### Iso-Footcandle Lines of Horizontal Illumination

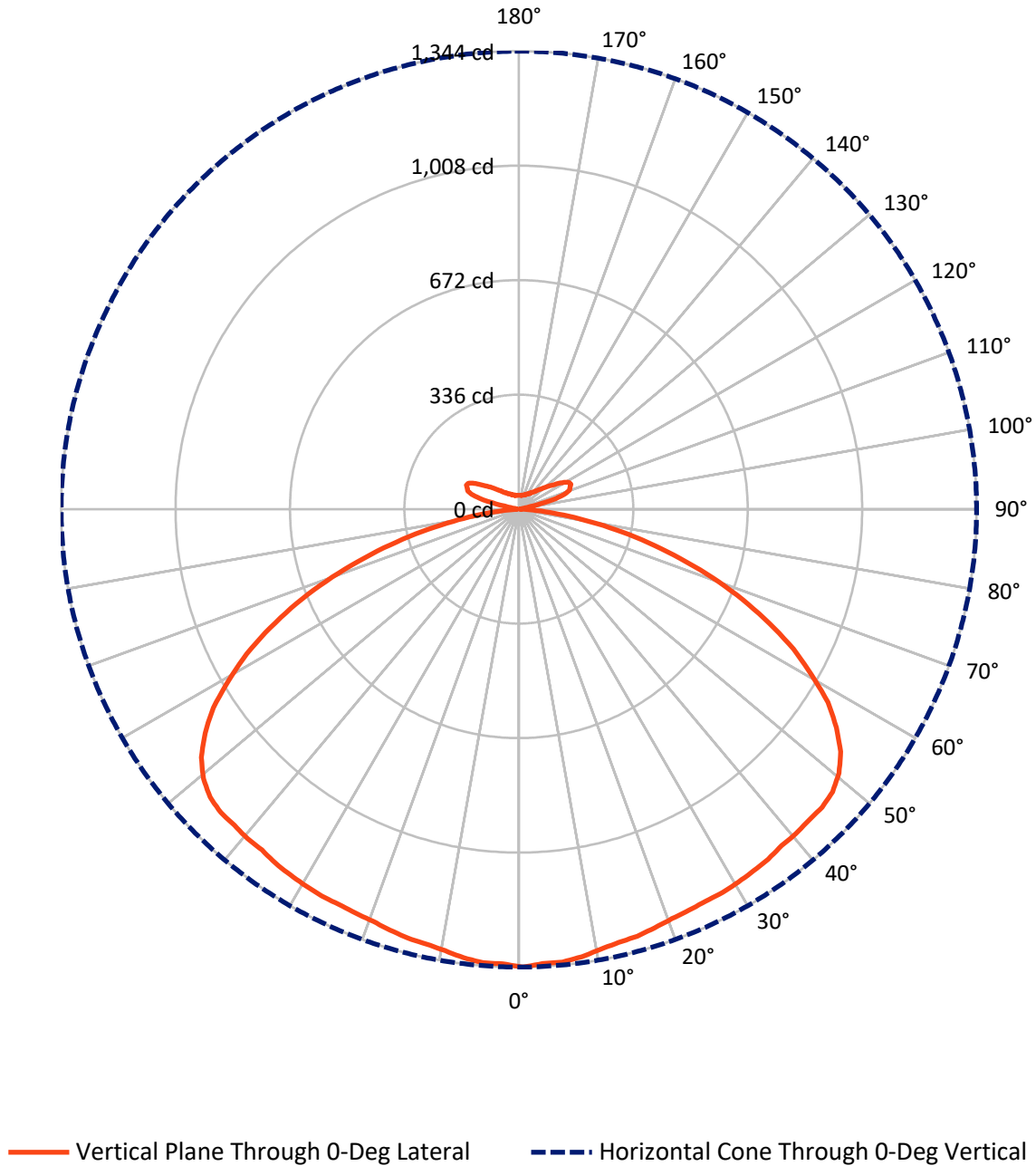
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 2.2 fc  
 Type V - Short - N/A

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### Luminous Intensity Polar Plot



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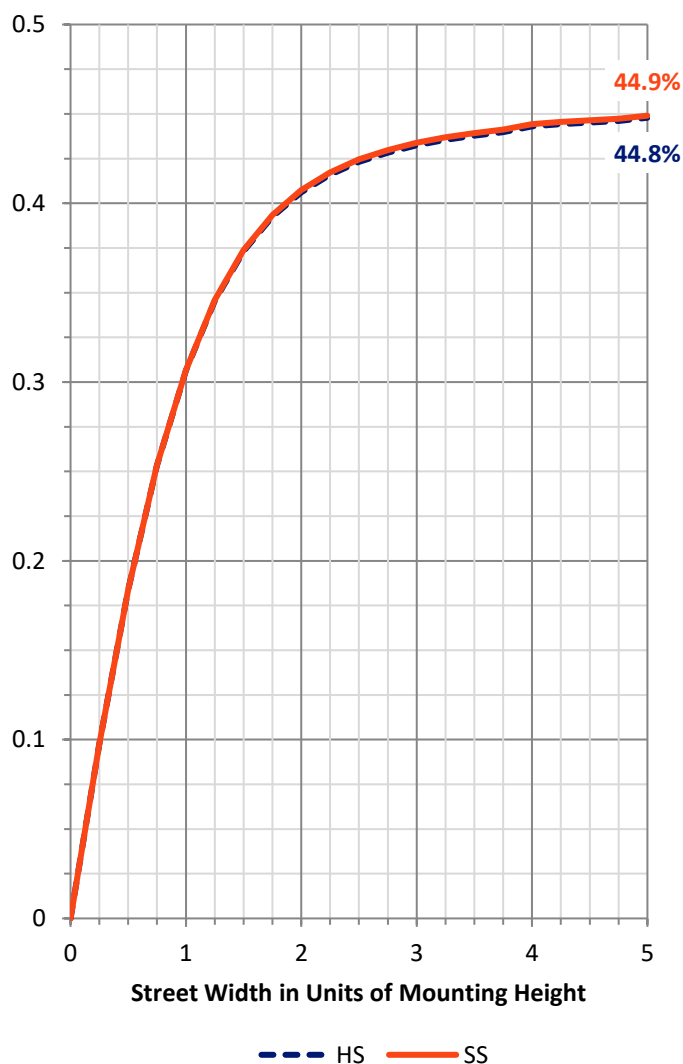
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 2658.4   | 292.5  | 2950.9 |
|                    | % Fixture | 45.0     | 5.0    | 50.0   |
| <b>Street Side</b> | Lumens    | 2658.4   | 292.5  | 2950.9 |
|                    | % Fixture | 45.0     | 5.0    | 50.0   |
| <b>Total</b>       | Lumens    | 5316.8   | 584.9  | 5901.7 |
|                    | % Fixture | 90.1     | 9.9    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 126.7  | 2.1       |
| 10°-20°   | 368.0  | 6.2       |
| 20°-30°   | 592.6  | 10.0      |
| 30°-40°   | 797.1  | 13.5      |
| 40°-50°   | 983.4  | 16.7      |
| 50°-60°   | 1055.1 | 17.9      |
| 60°-70°   | 855.6  | 14.5      |
| 70°-80°   | 453.5  | 7.7       |
| 80°-90°   | 84.7   | 1.4       |
| 90°-100°  | 13.1   | 0.2       |
| 100°-110° | 132.7  | 2.2       |
| 110°-120° | 194.0  | 3.3       |
| 120°-130° | 112.6  | 1.9       |
| 130°-140° | 59.7   | 1.0       |
| 140°-150° | 35.4   | 0.6       |
| 150°-160° | 21.8   | 0.4       |
| 160°-170° | 11.9   | 0.2       |
| 170°-180° | 3.9    | 0.1       |
| 0°-90°    | 5316.8 | 90.1      |
| 0°-180°   | 5901.7 | 100.0     |

**Coefficient of Utilization**



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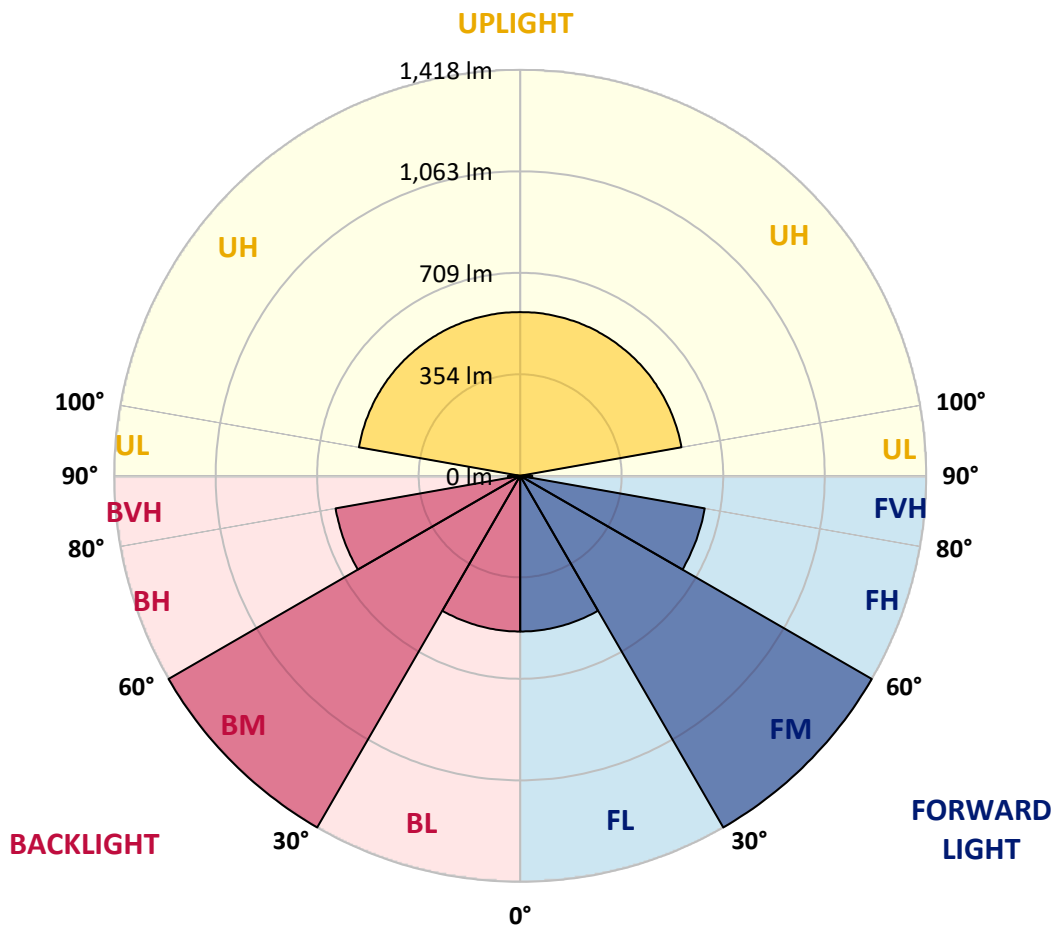
CATALOG NUMBER: TTN-D2-750-U-CQ-UPL2

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

| Zone           | Lumens | % Fixture | Zone Rating/Lumen Limit |         |        |
|----------------|--------|-----------|-------------------------|---------|--------|
|                |        |           | B                       | U       | G      |
| FL (0°-30°)    | 543.7  | 9.2       |                         |         |        |
| FM (30°-60°)   | 1417.8 | 24.0      |                         |         |        |
| FH (60°-80°)   | 654.6  | 11.1      |                         |         | G0/660 |
| FVH (80°-90°)  | 42.3   | 0.7       |                         |         | G1/100 |
| BL (0°-30°)    | 543.7  | 9.2       | B2/1000                 |         |        |
| BM (30°-60°)   | 1417.8 | 24.0      | B2/2500                 |         |        |
| BH (60°-80°)   | 654.6  | 11.1      | B2/1000                 |         | G0/660 |
| BVH (80°-90°)  | 42.3   | 0.7       |                         |         | G1/100 |
| UL (90°-100°)  | 13.1   | 0.2       |                         | U2/50   |        |
| UH (100°-180°) | 571.8  | 9.7       |                         | U4/1000 |        |

**BUG Rating: B2-U4-G1**

Type V Short





REPORT NUMBER: P833582  
 CATALOG NUMBER: TTN-D2-750-U-CQ-UPL2

**CANDELA DISTRIBUTION (FULL):**

|        | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 65°    | 75°    | 85°    | 90°    |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°     | 1344.2 | 1344.2 | 1344.2 | 1344.2 | 1344.2 | 1344.2 | 1344.2 | 1344.2 | 1344.2 | 1344.2 | 1344.2 |
| 2.5°   | 1335.5 | 1335.5 | 1335.5 | 1335.5 | 1335.5 | 1335.5 | 1335.5 | 1335.5 | 1335.5 | 1335.5 | 1339.9 |
| 5°     | 1335.5 | 1335.5 | 1335.5 | 1335.5 | 1331.2 | 1335.5 | 1335.5 | 1335.5 | 1335.5 | 1335.5 | 1335.5 |
| 7.5°   | 1326.8 | 1326.8 | 1326.8 | 1326.8 | 1326.8 | 1326.8 | 1326.8 | 1326.8 | 1326.8 | 1326.8 | 1326.8 |
| 10°    | 1313.8 | 1313.8 | 1313.8 | 1313.8 | 1313.8 | 1313.8 | 1313.8 | 1313.8 | 1313.8 | 1313.8 | 1313.8 |
| 12.5°  | 1305.1 | 1305.1 | 1305.1 | 1305.1 | 1305.1 | 1305.1 | 1305.1 | 1305.1 | 1305.1 | 1305.1 | 1305.1 |
| 15°    | 1300.7 | 1300.7 | 1300.7 | 1300.7 | 1300.7 | 1300.7 | 1300.7 | 1300.7 | 1300.7 | 1296.4 | 1296.4 |
| 17.5°  | 1292.0 | 1292.0 | 1292.0 | 1292.0 | 1296.4 | 1296.4 | 1296.4 | 1292.0 | 1292.0 | 1292.0 | 1292.0 |
| 20°    | 1283.3 | 1283.3 | 1283.3 | 1287.7 | 1287.7 | 1287.7 | 1287.7 | 1287.7 | 1283.3 | 1283.3 | 1283.3 |
| 22.5°  | 1279.0 | 1279.0 | 1279.0 | 1279.0 | 1283.3 | 1283.3 | 1283.3 | 1283.3 | 1279.0 | 1279.0 | 1279.0 |
| 25°    | 1274.6 | 1274.6 | 1279.0 | 1279.0 | 1283.3 | 1283.3 | 1283.3 | 1279.0 | 1279.0 | 1274.6 | 1274.6 |
| 27.5°  | 1274.6 | 1274.6 | 1279.0 | 1279.0 | 1283.3 | 1283.3 | 1283.3 | 1283.3 | 1279.0 | 1274.6 | 1274.6 |
| 30°    | 1270.3 | 1274.6 | 1274.6 | 1279.0 | 1283.3 | 1283.3 | 1283.3 | 1279.0 | 1274.6 | 1270.3 | 1270.3 |
| 32.5°  | 1265.9 | 1265.9 | 1270.3 | 1274.6 | 1279.0 | 1279.0 | 1279.0 | 1274.6 | 1270.3 | 1265.9 | 1261.6 |
| 35°    | 1261.6 | 1261.6 | 1261.6 | 1270.3 | 1274.6 | 1274.6 | 1274.6 | 1270.3 | 1261.6 | 1257.2 | 1257.2 |
| 37.5°  | 1252.9 | 1257.2 | 1261.6 | 1265.9 | 1274.6 | 1274.6 | 1274.6 | 1265.9 | 1257.2 | 1252.9 | 1248.5 |
| 40°    | 1252.9 | 1252.9 | 1261.6 | 1265.9 | 1279.0 | 1279.0 | 1274.6 | 1265.9 | 1257.2 | 1248.5 | 1244.2 |
| 42.5°  | 1248.5 | 1252.9 | 1261.6 | 1274.6 | 1287.7 | 1287.7 | 1283.3 | 1270.3 | 1257.2 | 1248.5 | 1244.2 |
| 45°    | 1248.5 | 1248.5 | 1261.6 | 1279.0 | 1296.4 | 1300.7 | 1292.0 | 1279.0 | 1261.6 | 1244.2 | 1244.2 |
| 47.5°  | 1239.8 | 1239.8 | 1257.2 | 1279.0 | 1300.7 | 1305.1 | 1300.7 | 1279.0 | 1257.2 | 1244.2 | 1239.8 |
| 50°    | 1218.1 | 1218.1 | 1239.8 | 1265.9 | 1292.0 | 1300.7 | 1292.0 | 1274.6 | 1244.2 | 1226.8 | 1222.4 |
| 52.5°  | 1183.3 | 1183.3 | 1205.0 | 1239.8 | 1265.9 | 1279.0 | 1270.3 | 1248.5 | 1218.1 | 1192.0 | 1187.6 |
| 55°    | 1131.1 | 1135.4 | 1157.2 | 1196.3 | 1226.8 | 1239.8 | 1231.1 | 1205.0 | 1170.2 | 1144.1 | 1135.4 |
| 57.5°  | 1070.2 | 1070.2 | 1100.6 | 1139.8 | 1170.2 | 1183.3 | 1174.6 | 1148.5 | 1109.3 | 1083.2 | 1074.5 |
| 60°    | 987.5  | 991.9  | 1018.0 | 1070.2 | 1100.6 | 1113.7 | 1105.0 | 1074.5 | 1031.0 | 1000.6 | 991.9  |
| 62.5°  | 904.9  | 909.2  | 935.3  | 978.8  | 1013.6 | 1022.3 | 1013.6 | 983.2  | 944.0  | 913.6  | 904.9  |
| 65°    | 809.1  | 813.5  | 843.9  | 883.1  | 909.2  | 922.3  | 909.2  | 883.1  | 848.3  | 817.8  | 813.5  |
| 67.5°  | 709.1  | 713.4  | 743.9  | 778.7  | 804.8  | 813.5  | 800.4  | 778.7  | 743.9  | 717.8  | 709.1  |
| 70°    | 604.7  | 609.0  | 635.1  | 665.6  | 687.3  | 696.0  | 687.3  | 661.2  | 635.1  | 609.0  | 604.7  |
| 72.5°  | 495.9  | 500.3  | 526.4  | 552.5  | 569.9  | 578.6  | 565.5  | 548.1  | 522.0  | 500.3  | 495.9  |
| 75°    | 391.5  | 391.5  | 413.3  | 435.0  | 452.4  | 456.8  | 448.1  | 435.0  | 413.3  | 395.9  | 387.2  |
| 77.5°  | 291.5  | 291.5  | 313.2  | 326.3  | 335.0  | 343.7  | 335.0  | 321.9  | 308.9  | 291.5  | 291.5  |
| 80°    | 195.8  | 195.8  | 213.2  | 221.9  | 230.6  | 234.9  | 230.6  | 221.9  | 213.2  | 200.1  | 195.8  |
| 82.5°  | 117.5  | 117.5  | 126.2  | 134.9  | 134.9  | 139.2  | 139.2  | 134.9  | 126.2  | 117.5  | 117.5  |
| 85°    | 52.2   | 47.9   | 56.6   | 60.9   | 60.9   | 65.3   | 65.3   | 60.9   | 56.6   | 52.2   | 52.2   |
| 87.5°  | 4.4    | 8.7    | 8.7    | 13.1   | 13.1   | 13.1   | 13.1   | 13.1   | 8.7    | 8.7    | 8.7    |
| 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: P833582  
 CATALOG NUMBER: TTN-D2-750-U-CQ-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: SP1-2411-284-3

Test Date: 11/21/2024

Luminaire Tested: TTN-D0-750-U-WQ

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

**Test Information**

Test Method: LM-79-2019  
 Report Number: SP1-2411-284-3  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry: 4π  
 Issue Date: 11/21/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: MCGRAW EDISON  
 Catalog Number: **TTN-D0-750-U-WQ**  
 Description: TOPTIER NANO LED PARKING GARAGE LUMINAIRE. 5000K, 70 CRI LEDS AND WIDE DISTRIBUTION

**Spectral Parameters**

CCT (K): 4876  
 CIE u': 0.2086  
 CIE v': 0.4932  
 Duv: 0.0061  
 CIE x: 0.3502  
 CIE y: 0.3680  
 CIE z: 0.2818  
 Peak Wavelength (nm): 451  
 Dominant Wavelength (nm): 569  
 Purity: 15.51324  
 Rf: 74.6  
 Rg: 94.4

|           |      |      |       |
|-----------|------|------|-------|
| CRI (Ra): | 72.6 |      |       |
| R1:       | 69.5 | R9:  | -24.6 |
| R2:       | 77.0 | R10: | 44.8  |
| R3:       | 82.2 | R11: | 68.2  |
| R4:       | 72.6 | R12: | 36.1  |
| R5:       | 69.3 | R13: | 70.5  |
| R6:       | 67.6 | R14: | 89.9  |
| R7:       | 83.7 | R15: | 63.1  |
| R8:       | 58.6 |      |       |



**Test Conditions**

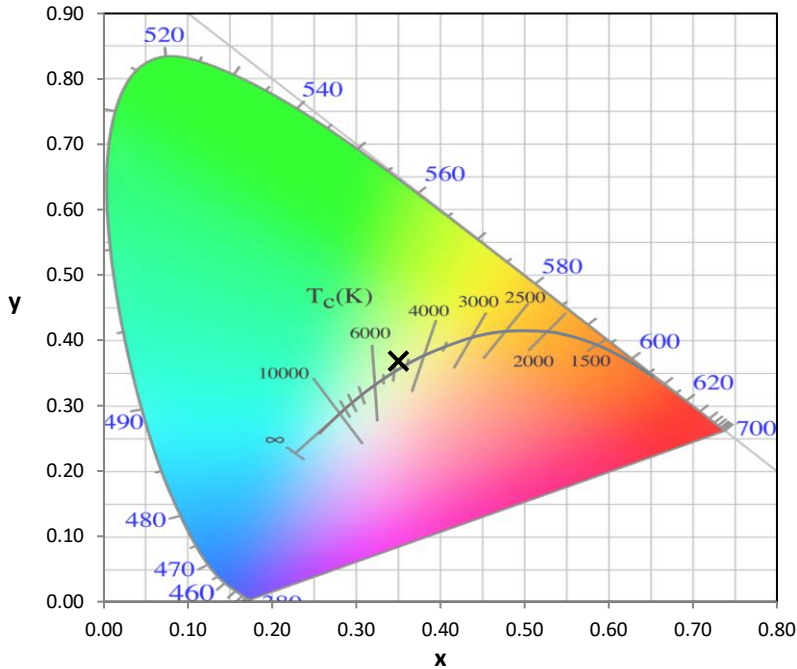
Stabilization Time: 51M  
 Operation Time: 1H 51M  
 Sphere Temperature (°C): 24.9

REPORT NUMBER: SP1-2411-284-3

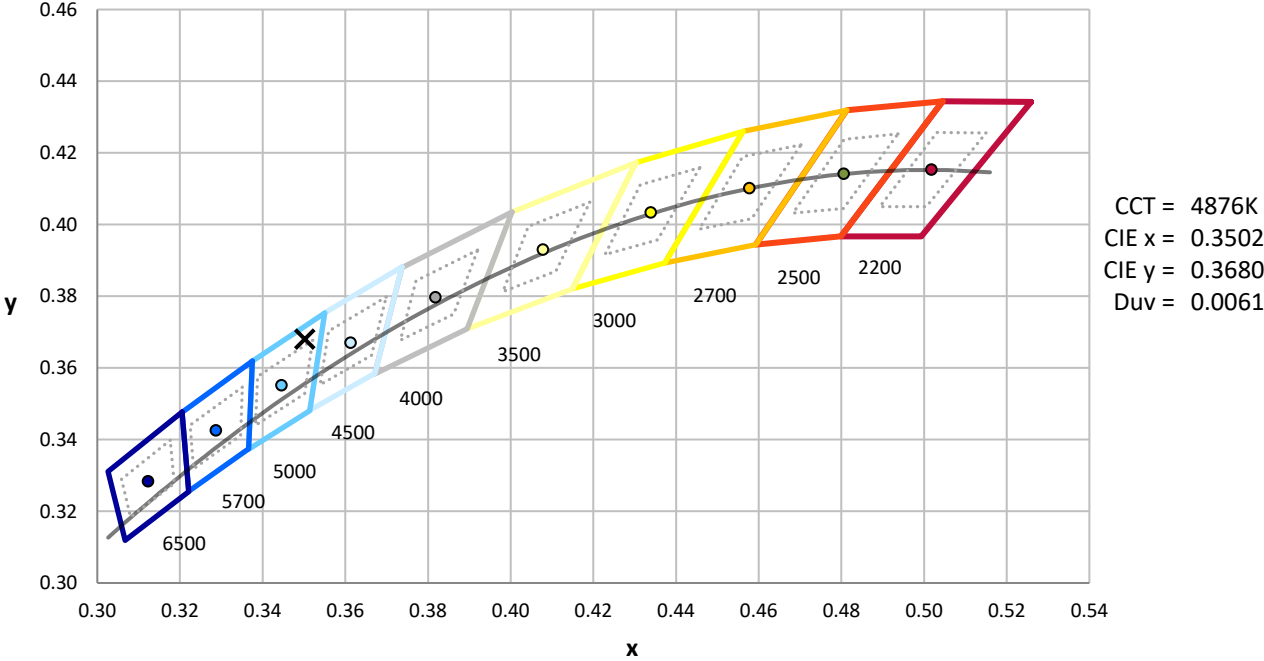
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| 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           |

REPORT NUMBER: SP1-2411-284-3

**CIE 1931 Chromaticity Diagram**



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



Point lies inside the ANSI 5000K 7-step quadrangle

REPORT NUMBER: SP1-2411-284-3

**Photopic Flux vs. Wavelength**

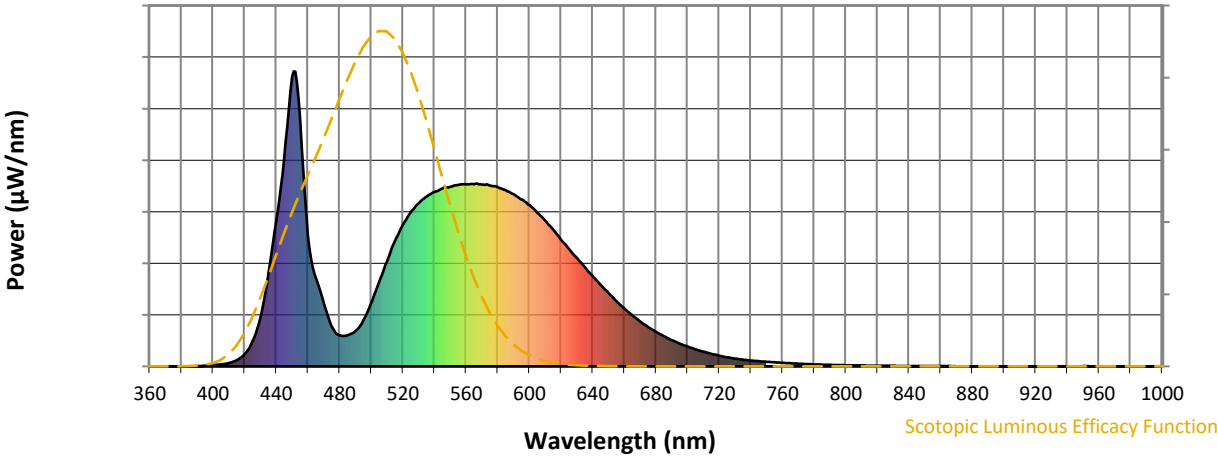


**Photopic Lumens: NR**

| $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) |
|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|
| 360               | 0                           | NR                      | 490               | 119                         | NR                      | 620               | 430                         | NR                      | 750               | 16                          | NR                      | 880               | 0                           | NR                      |
| 365               | 0                           | NR                      | 495               | 156                         | NR                      | 625               | 398                         | NR                      | 755               | 14                          | NR                      | 885               | 0                           | NR                      |
| 370               | 0                           | NR                      | 500               | 214                         | NR                      | 630               | 368                         | NR                      | 760               | 12                          | NR                      | 890               | 0                           | NR                      |
| 375               | 0                           | NR                      | 505               | 286                         | NR                      | 635               | 336                         | NR                      | 765               | 11                          | NR                      | 895               | 0                           | NR                      |
| 380               | 0                           | NR                      | 510               | 357                         | NR                      | 640               | 306                         | NR                      | 770               | 9                           | NR                      | 900               | 0                           | NR                      |
| 385               | 0                           | NR                      | 515               | 425                         | NR                      | 645               | 276                         | NR                      | 775               | 8                           | NR                      | 905               | 0                           | NR                      |
| 390               | 1                           | NR                      | 520               | 480                         | NR                      | 650               | 248                         | NR                      | 780               | 7                           | NR                      | 910               | 0                           | NR                      |
| 395               | 2                           | NR                      | 525               | 523                         | NR                      | 655               | 221                         | NR                      | 785               | 6                           | NR                      | 915               | 0                           | NR                      |
| 400               | 4                           | NR                      | 530               | 554                         | NR                      | 660               | 196                         | NR                      | 790               | 5                           | NR                      | 920               | 0                           | NR                      |
| 405               | 7                           | NR                      | 535               | 575                         | NR                      | 665               | 173                         | NR                      | 795               | 4                           | NR                      | 925               | 0                           | NR                      |
| 410               | 11                          | NR                      | 540               | 592                         | NR                      | 670               | 152                         | NR                      | 800               | 4                           | NR                      | 930               | 0                           | NR                      |
| 415               | 21                          | NR                      | 545               | 603                         | NR                      | 675               | 133                         | NR                      | 805               | 3                           | NR                      | 935               | 0                           | NR                      |
| 420               | 42                          | NR                      | 550               | 609                         | NR                      | 680               | 117                         | NR                      | 810               | 3                           | NR                      | 940               | 0                           | NR                      |
| 425               | 85                          | NR                      | 555               | 615                         | NR                      | 685               | 102                         | NR                      | 815               | 3                           | NR                      | 945               | 0                           | NR                      |
| 430               | 165                         | NR                      | 560               | 617                         | NR                      | 690               | 89                          | NR                      | 820               | 2                           | NR                      | 950               | 1                           | NR                      |
| 435               | 316                         | NR                      | 565               | 617                         | NR                      | 695               | 77                          | NR                      | 825               | 2                           | NR                      | 955               | 0                           | NR                      |
| 440               | 497                         | NR                      | 570               | 616                         | NR                      | 700               | 67                          | NR                      | 830               | 2                           | NR                      | 960               | 0                           | NR                      |
| 445               | 702                         | NR                      | 575               | 613                         | NR                      | 705               | 58                          | NR                      | 835               | 2                           | NR                      | 965               | 0                           | NR                      |
| 450               | 981                         | NR                      | 580               | 607                         | NR                      | 710               | 50                          | NR                      | 840               | 1                           | NR                      | 970               | 0                           | NR                      |
| 455               | 840                         | NR                      | 585               | 598                         | NR                      | 715               | 43                          | NR                      | 845               | 1                           | NR                      | 975               | 0                           | NR                      |
| 460               | 446                         | NR                      | 590               | 583                         | NR                      | 720               | 36                          | NR                      | 850               | 1                           | NR                      | 980               | 0                           | NR                      |
| 465               | 300                         | NR                      | 595               | 566                         | NR                      | 725               | 31                          | NR                      | 855               | 1                           | NR                      | 985               | 0                           | NR                      |
| 470               | 215                         | NR                      | 600               | 546                         | NR                      | 730               | 26                          | NR                      | 860               | 1                           | NR                      | 990               | 0                           | NR                      |
| 475               | 135                         | NR                      | 605               | 521                         | NR                      | 735               | 23                          | NR                      | 865               | 1                           | NR                      | 995               | 0                           | NR                      |
| 480               | 105                         | NR                      | 610               | 494                         | NR                      | 740               | 20                          | NR                      | 870               | 1                           | NR                      | 1000              | 0                           | NR                      |
| 485               | 106                         | NR                      | 615               | 463                         | NR                      | 745               | 18                          | NR                      | 875               | 0                           | NR                      |                   |                             |                         |

REPORT NUMBER: SP1-2411-284-3

Scotopic Flux vs. Wavelength

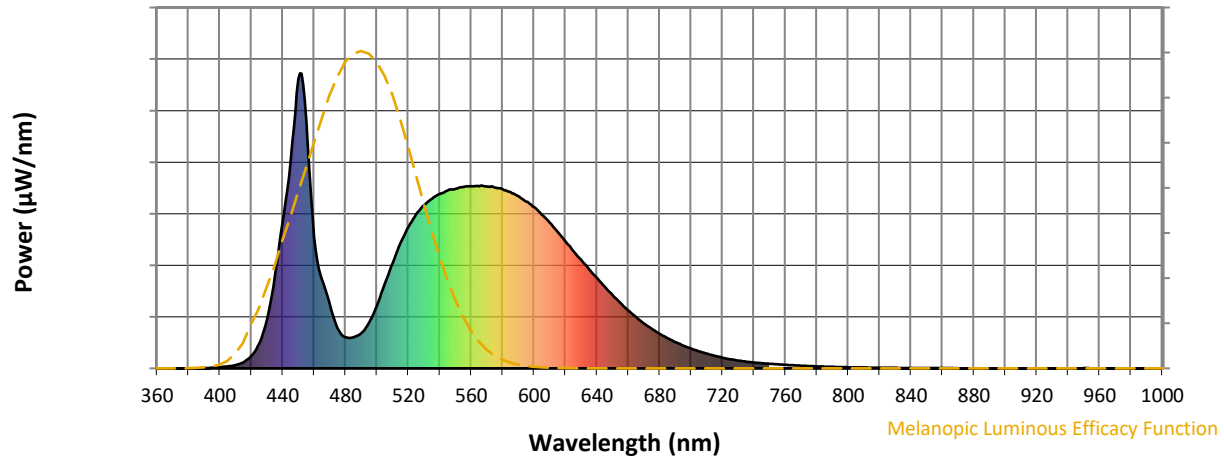


Scotopic Lumens: NR S/P: 1.74

| 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    | 119                      | NR            | 620    | 430                      | NR            | 750    | 16                       | NR            | 880    | 0                        | NR            |
| 365    | 0                        | NR            | 495    | 156                      | NR            | 625    | 398                      | NR            | 755    | 14                       | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 214                      | NR            | 630    | 368                      | NR            | 760    | 12                       | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 286                      | NR            | 635    | 336                      | NR            | 765    | 11                       | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 357                      | NR            | 640    | 306                      | NR            | 770    | 9                        | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 425                      | NR            | 645    | 276                      | NR            | 775    | 8                        | NR            | 905    | 0                        | NR            |
| 390    | 1                        | NR            | 520    | 480                      | NR            | 650    | 248                      | NR            | 780    | 7                        | NR            | 910    | 0                        | NR            |
| 395    | 2                        | NR            | 525    | 523                      | NR            | 655    | 221                      | NR            | 785    | 6                        | NR            | 915    | 0                        | NR            |
| 400    | 4                        | NR            | 530    | 554                      | NR            | 660    | 196                      | NR            | 790    | 5                        | NR            | 920    | 0                        | NR            |
| 405    | 7                        | NR            | 535    | 575                      | NR            | 665    | 173                      | NR            | 795    | 4                        | NR            | 925    | 0                        | NR            |
| 410    | 11                       | NR            | 540    | 592                      | NR            | 670    | 152                      | NR            | 800    | 4                        | NR            | 930    | 0                        | NR            |
| 415    | 21                       | NR            | 545    | 603                      | NR            | 675    | 133                      | NR            | 805    | 3                        | NR            | 935    | 0                        | NR            |
| 420    | 42                       | NR            | 550    | 609                      | NR            | 680    | 117                      | NR            | 810    | 3                        | NR            | 940    | 0                        | NR            |
| 425    | 85                       | NR            | 555    | 615                      | NR            | 685    | 102                      | NR            | 815    | 3                        | NR            | 945    | 0                        | NR            |
| 430    | 165                      | NR            | 560    | 617                      | NR            | 690    | 89                       | NR            | 820    | 2                        | NR            | 950    | 1                        | NR            |
| 435    | 316                      | NR            | 565    | 617                      | NR            | 695    | 77                       | NR            | 825    | 2                        | NR            | 955    | 0                        | NR            |
| 440    | 497                      | NR            | 570    | 616                      | NR            | 700    | 67                       | NR            | 830    | 2                        | NR            | 960    | 0                        | NR            |
| 445    | 702                      | NR            | 575    | 613                      | NR            | 705    | 58                       | NR            | 835    | 2                        | NR            | 965    | 0                        | NR            |
| 450    | 981                      | NR            | 580    | 607                      | NR            | 710    | 50                       | NR            | 840    | 1                        | NR            | 970    | 0                        | NR            |
| 455    | 840                      | NR            | 585    | 598                      | NR            | 715    | 43                       | NR            | 845    | 1                        | NR            | 975    | 0                        | NR            |
| 460    | 446                      | NR            | 590    | 583                      | NR            | 720    | 36                       | NR            | 850    | 1                        | NR            | 980    | 0                        | NR            |
| 465    | 300                      | NR            | 595    | 566                      | NR            | 725    | 31                       | NR            | 855    | 1                        | NR            | 985    | 0                        | NR            |
| 470    | 215                      | NR            | 600    | 546                      | NR            | 730    | 26                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 135                      | NR            | 605    | 521                      | NR            | 735    | 23                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 105                      | NR            | 610    | 494                      | NR            | 740    | 20                       | NR            | 870    | 1                        | NR            | 1000   | 0                        | NR            |
| 485    | 106                      | NR            | 615    | 463                      | NR            | 745    | 18                       | NR            | 875    | 0                        | NR            |        |                          |               |

REPORT NUMBER: SP1-2411-284-3

**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: NR**

**M/P: 3.51**

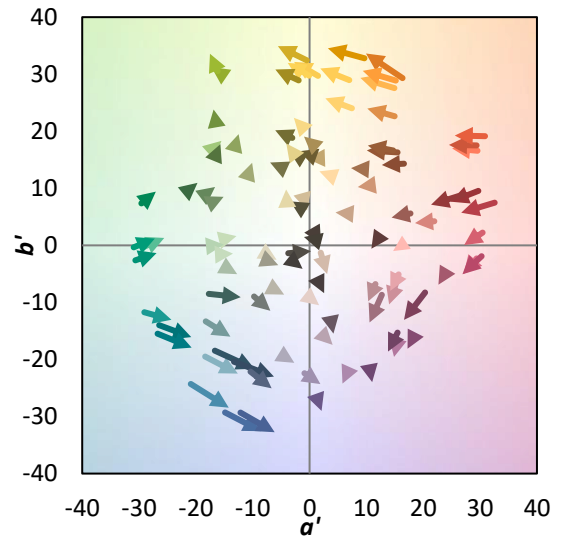
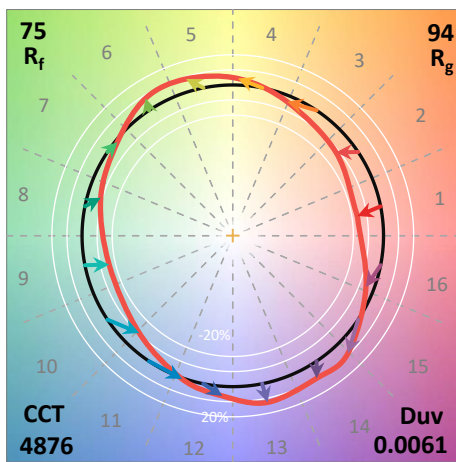
| λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 360    | 0                        | NR            | 490    | 119                      | NR            | 620    | 430                      | NR            | 750    | 16                       | NR            | 880    | 0                        | NR            |
| 365    | 0                        | NR            | 495    | 156                      | NR            | 625    | 398                      | NR            | 755    | 14                       | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 214                      | NR            | 630    | 368                      | NR            | 760    | 12                       | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 286                      | NR            | 635    | 336                      | NR            | 765    | 11                       | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 357                      | NR            | 640    | 306                      | NR            | 770    | 9                        | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 425                      | NR            | 645    | 276                      | NR            | 775    | 8                        | NR            | 905    | 0                        | NR            |
| 390    | 1                        | NR            | 520    | 480                      | NR            | 650    | 248                      | NR            | 780    | 7                        | NR            | 910    | 0                        | NR            |
| 395    | 2                        | NR            | 525    | 523                      | NR            | 655    | 221                      | NR            | 785    | 6                        | NR            | 915    | 0                        | NR            |
| 400    | 4                        | NR            | 530    | 554                      | NR            | 660    | 196                      | NR            | 790    | 5                        | NR            | 920    | 0                        | NR            |
| 405    | 7                        | NR            | 535    | 575                      | NR            | 665    | 173                      | NR            | 795    | 4                        | NR            | 925    | 0                        | NR            |
| 410    | 11                       | NR            | 540    | 592                      | NR            | 670    | 152                      | NR            | 800    | 4                        | NR            | 930    | 0                        | NR            |
| 415    | 21                       | NR            | 545    | 603                      | NR            | 675    | 133                      | NR            | 805    | 3                        | NR            | 935    | 0                        | NR            |
| 420    | 42                       | NR            | 550    | 609                      | NR            | 680    | 117                      | NR            | 810    | 3                        | NR            | 940    | 0                        | NR            |
| 425    | 85                       | NR            | 555    | 615                      | NR            | 685    | 102                      | NR            | 815    | 3                        | NR            | 945    | 0                        | NR            |
| 430    | 165                      | NR            | 560    | 617                      | NR            | 690    | 89                       | NR            | 820    | 2                        | NR            | 950    | 1                        | NR            |
| 435    | 316                      | NR            | 565    | 617                      | NR            | 695    | 77                       | NR            | 825    | 2                        | NR            | 955    | 0                        | NR            |
| 440    | 497                      | NR            | 570    | 616                      | NR            | 700    | 67                       | NR            | 830    | 2                        | NR            | 960    | 0                        | NR            |
| 445    | 702                      | NR            | 575    | 613                      | NR            | 705    | 58                       | NR            | 835    | 2                        | NR            | 965    | 0                        | NR            |
| 450    | 981                      | NR            | 580    | 607                      | NR            | 710    | 50                       | NR            | 840    | 1                        | NR            | 970    | 0                        | NR            |
| 455    | 840                      | NR            | 585    | 598                      | NR            | 715    | 43                       | NR            | 845    | 1                        | NR            | 975    | 0                        | NR            |
| 460    | 446                      | NR            | 590    | 583                      | NR            | 720    | 36                       | NR            | 850    | 1                        | NR            | 980    | 0                        | NR            |
| 465    | 300                      | NR            | 595    | 566                      | NR            | 725    | 31                       | NR            | 855    | 1                        | NR            | 985    | 0                        | NR            |
| 470    | 215                      | NR            | 600    | 546                      | NR            | 730    | 26                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 135                      | NR            | 605    | 521                      | NR            | 735    | 23                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 105                      | NR            | 610    | 494                      | NR            | 740    | 20                       | NR            | 870    | 1                        | NR            | 1000   | 0                        | NR            |
| 485    | 106                      | NR            | 615    | 463                      | NR            | 745    | 18                       | NR            | 875    | 0                        | NR            |        |                          |               |

**Summary**

$R_f = 74.6$   
 $R_g = 94.4$   
 $CIE R_a = 72.6$   
 $R_g = -24.6$



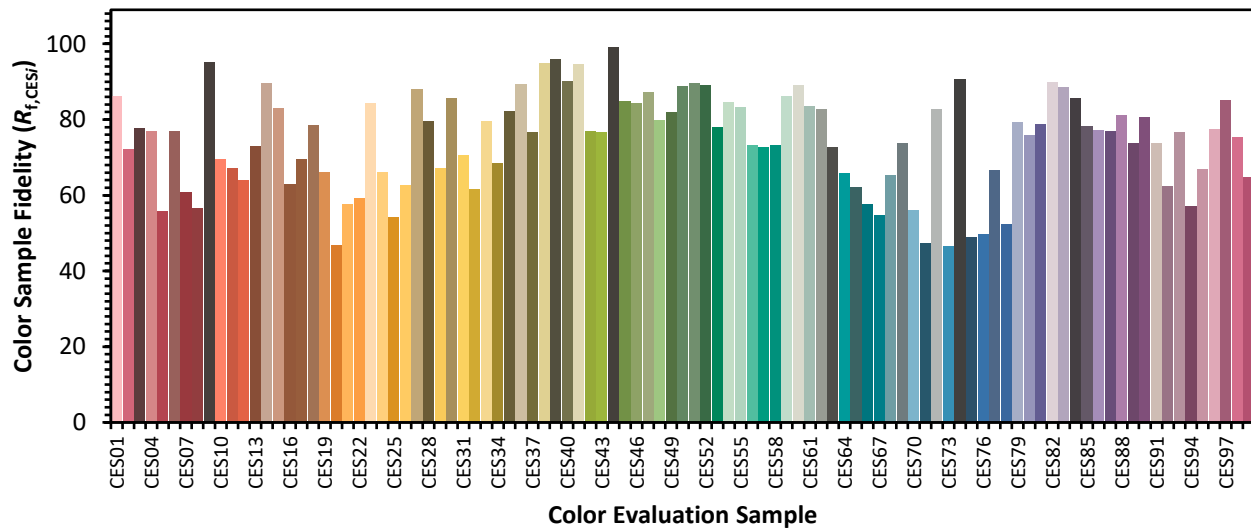
**Color Vector Graphics**



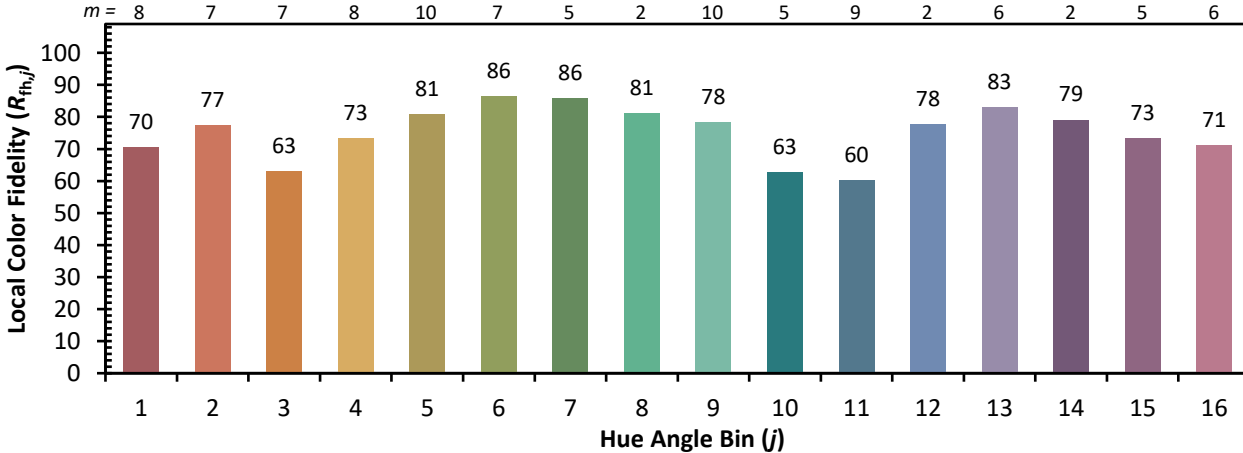


Individual Sample Fidelity Index ( $R_{f,i}$ )

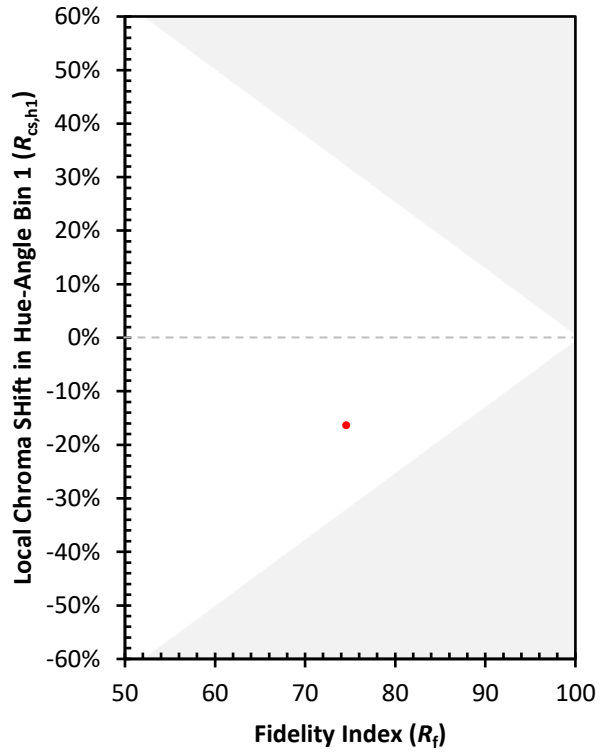
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 63 | CES51 = 90 | CES76 = 50 |
| CES02 = 59 | CES27 = 88 | CES52 = 89 | CES77 = 67 |
| CES03 = 30 | CES28 = 80 | CES53 = 78 | CES78 = 52 |
| CES04 = 69 | CES29 = 67 | CES54 = 85 | CES79 = 79 |
| CES05 = 46 | CES30 = 86 | CES55 = 83 | CES80 = 76 |
| CES06 = 50 | CES31 = 70 | CES56 = 73 | CES81 = 79 |
| CES07 = 39 | CES32 = 62 | CES57 = 73 | CES82 = 90 |
| CES08 = 38 | CES33 = 80 | CES58 = 73 | CES83 = 89 |
| CES09 = 29 | CES34 = 69 | CES59 = 86 | CES84 = 86 |
| CES10 = 72 | CES35 = 82 | CES60 = 89 | CES85 = 78 |
| CES11 = 55 | CES36 = 89 | CES61 = 83 | CES86 = 77 |
| CES12 = 61 | CES37 = 77 | CES62 = 83 | CES87 = 77 |
| CES13 = 41 | CES38 = 95 | CES63 = 73 | CES88 = 81 |
| CES14 = 74 | CES39 = 96 | CES64 = 66 | CES89 = 74 |
| CES15 = 70 | CES40 = 90 | CES65 = 62 | CES90 = 81 |
| CES16 = 46 | CES41 = 95 | CES66 = 58 | CES91 = 74 |
| CES17 = 49 | CES42 = 77 | CES67 = 55 | CES92 = 62 |
| CES18 = 55 | CES43 = 77 | CES68 = 65 | CES93 = 77 |
| CES19 = 71 | CES44 = 99 | CES69 = 74 | CES94 = 57 |
| CES20 = 64 | CES45 = 85 | CES70 = 56 | CES95 = 67 |
| CES21 = 85 | CES46 = 84 | CES71 = 47 | CES96 = 77 |
| CES22 = 77 | CES47 = 87 | CES72 = 83 | CES97 = 85 |
| CES23 = 91 | CES48 = 80 | CES73 = 46 | CES98 = 75 |
| CES24 = 90 | CES49 = 82 | CES74 = 91 | CES99 = 65 |
| CES25 = 71 | CES50 = 89 | CES75 = 49 |            |



Color Rendition by Hue-Angle Bin



Measure Comparisons



(END OF REPORT)