

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: P832824

Luminaire Tested: **TTN-D0-735-U-WQ-CG-UPL3**

Issue Date: 5/15/2024

**Test Information**

Test Method: LM-79-08  
Report Number: P832824  
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-D0-735-U-WQ-CG-UPL3  
Description: TOPTIER NANO LED PARKING GARAGE LUMINAIRE WITH UPLIGHT  
3500K, 70 CRI LEDS AND WIDE DISTRIBUTION WITH CLEAR GLASS  
Light Source: -  
Ballast/Driver: -

**Summary**

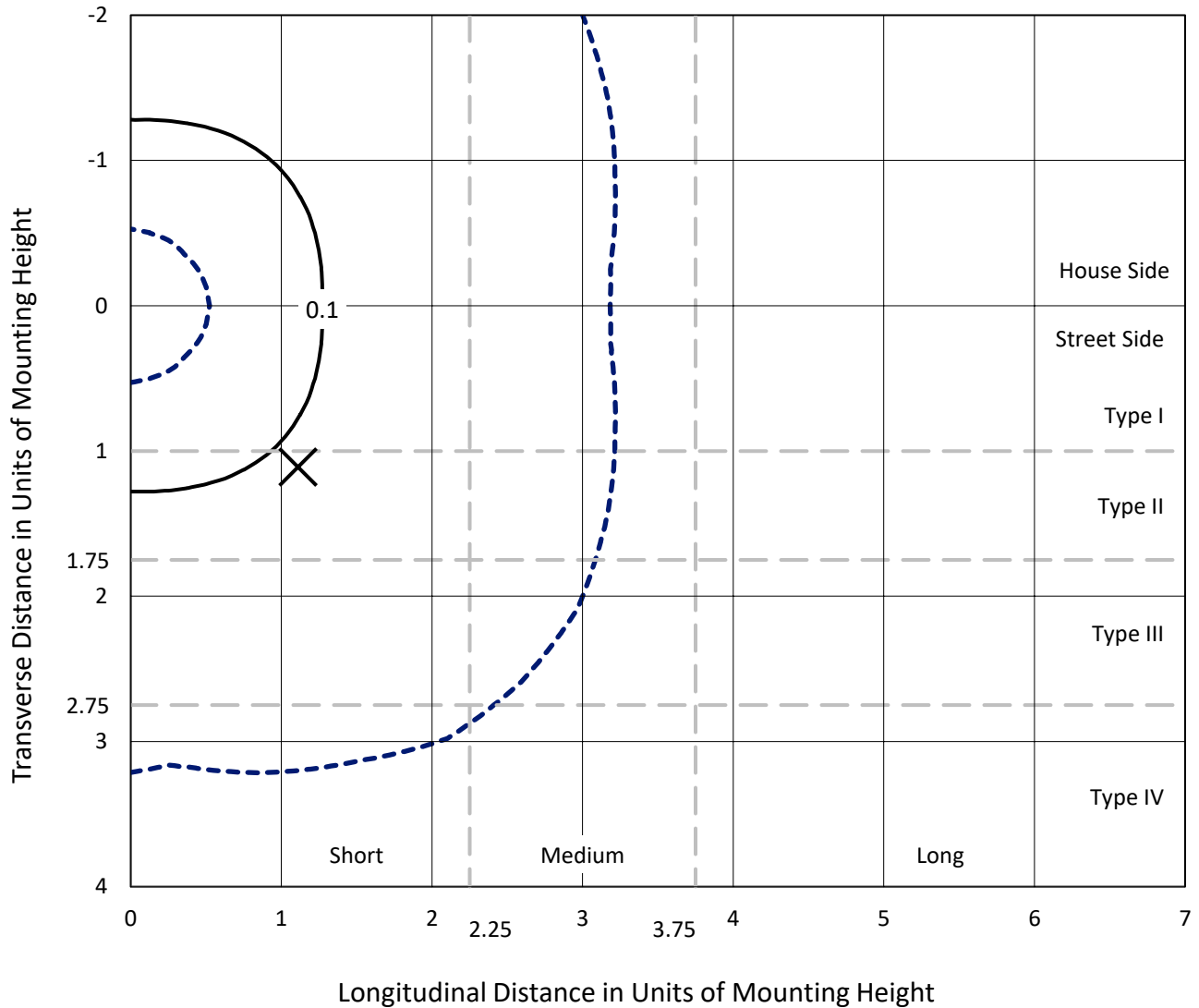
Lumens per Lamp: N/A  
Luminaire Lumens: 1847.7 lumens  
Efficiency: N/A  
Efficacy: 104.4 lumens/watt  
Luminous Opening: Vertical Cylinder (Dia: 0.71' x H: 0.1')  
IES Classification: Type V - Short  
BUG Rating: B1 - U4 - G1  
  
Input Watts (W): 17.7  
Input Voltage (V): NR  
Input Current (Ain): 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



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### Iso-Footcandle Lines of Horizontal Illumination

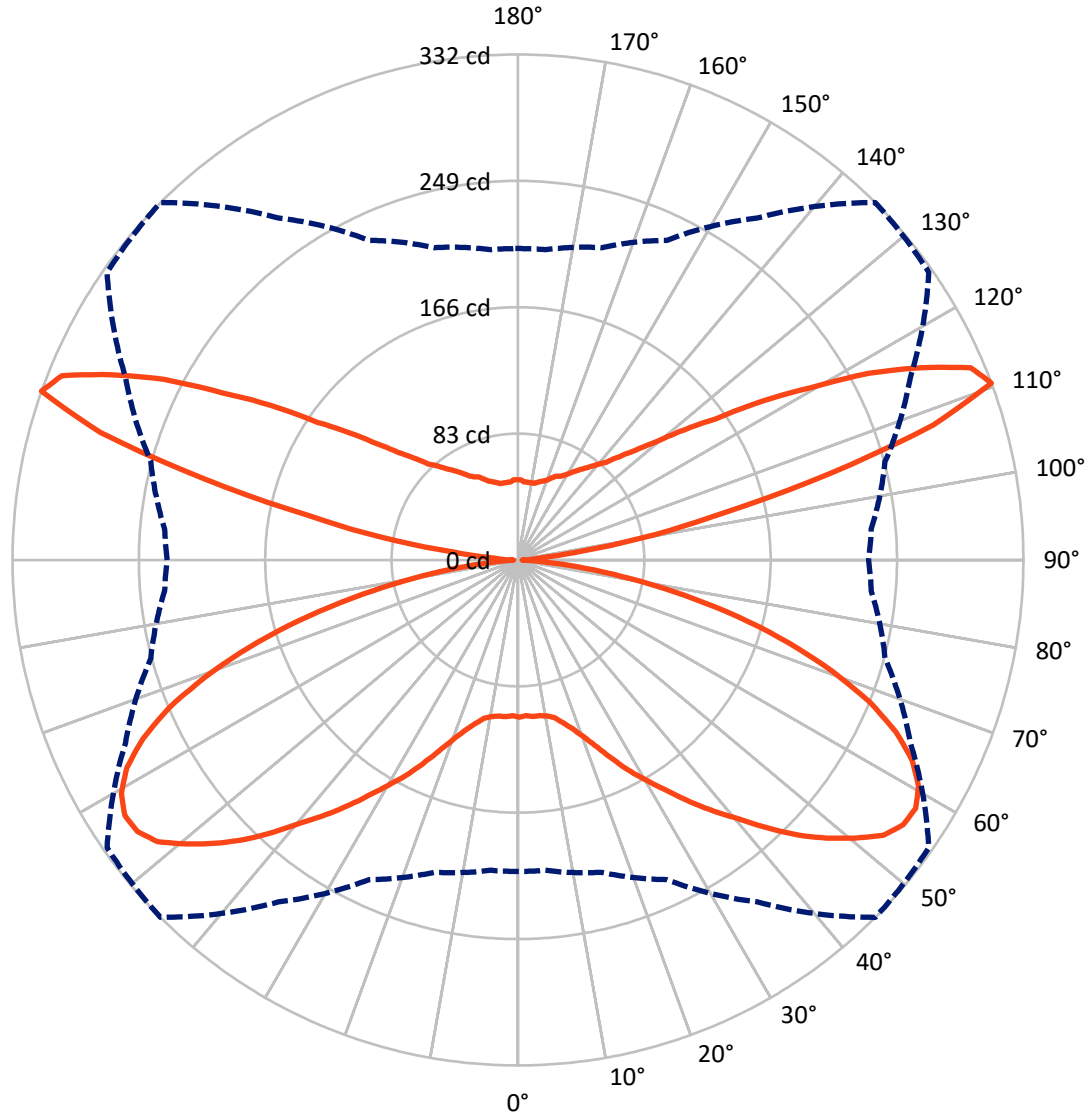
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 0.2 fc  
 Type V - Short - N/A

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### Luminous Intensity Polar Plot



— Vertical Plane Through 45-Deg Lateral    - - - Horizontal Cone Through 110-Deg Vertical

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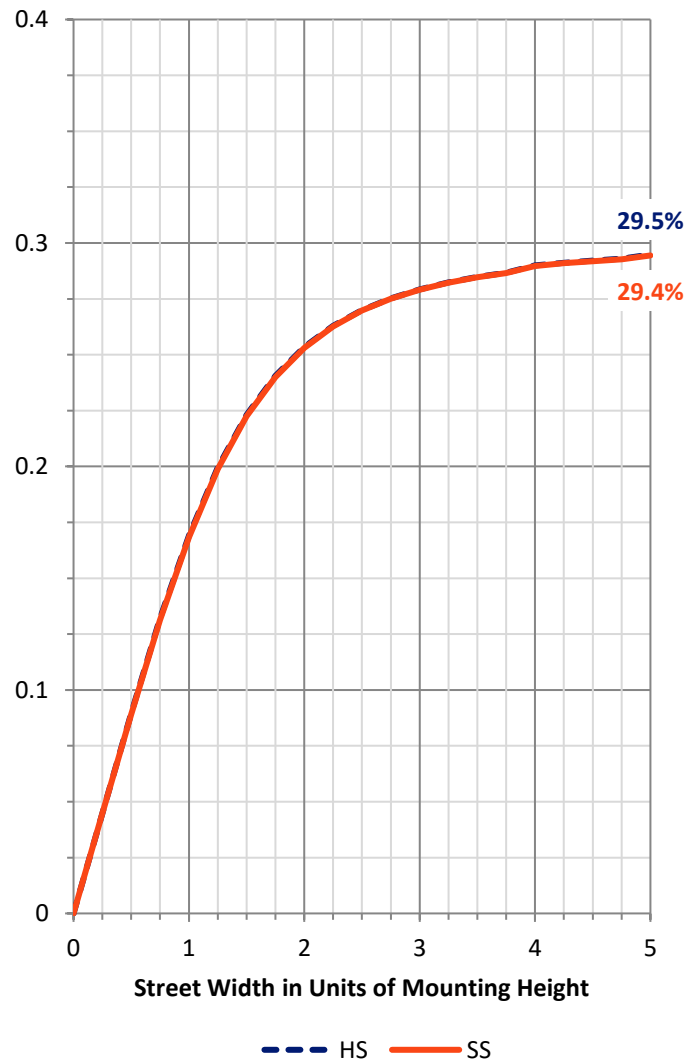
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 547.5    | 376.3  | 923.8  |
|                    | % Fixture | 29.6     | 20.4   | 50.0   |
| <b>Street Side</b> | Lumens    | 547.5    | 376.3  | 923.8  |
|                    | % Fixture | 29.6     | 20.4   | 50.0   |
| <b>Total</b>       | Lumens    | 1095.0   | 752.7  | 1847.7 |
|                    | % Fixture | 59.3     | 40.7   | 100.0  |

**Coefficient of Utilization**

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 9.9    | 0.5       |
| 10°-20°   | 31.9   | 1.7       |
| 20°-30°   | 67.0   | 3.6       |
| 30°-40°   | 120.9  | 6.5       |
| 40°-50°   | 192.1  | 10.4      |
| 50°-60°   | 256.3  | 13.9      |
| 60°-70°   | 247.7  | 13.4      |
| 70°-80°   | 143.5  | 7.8       |
| 80°-90°   | 25.7   | 1.4       |
| 90°-100°  | 16.8   | 0.9       |
| 100°-110° | 170.7  | 9.2       |
| 110°-120° | 249.6  | 13.5      |
| 120°-130° | 144.9  | 7.8       |
| 130°-140° | 76.7   | 4.2       |
| 140°-150° | 45.6   | 2.5       |
| 150°-160° | 28.1   | 1.5       |
| 160°-170° | 15.3   | 0.8       |
| 170°-180° | 5.0    | 0.3       |
| 0°-90°    | 1095.0 | 59.3      |
| 0°-180°   | 1847.7 | 100.0     |

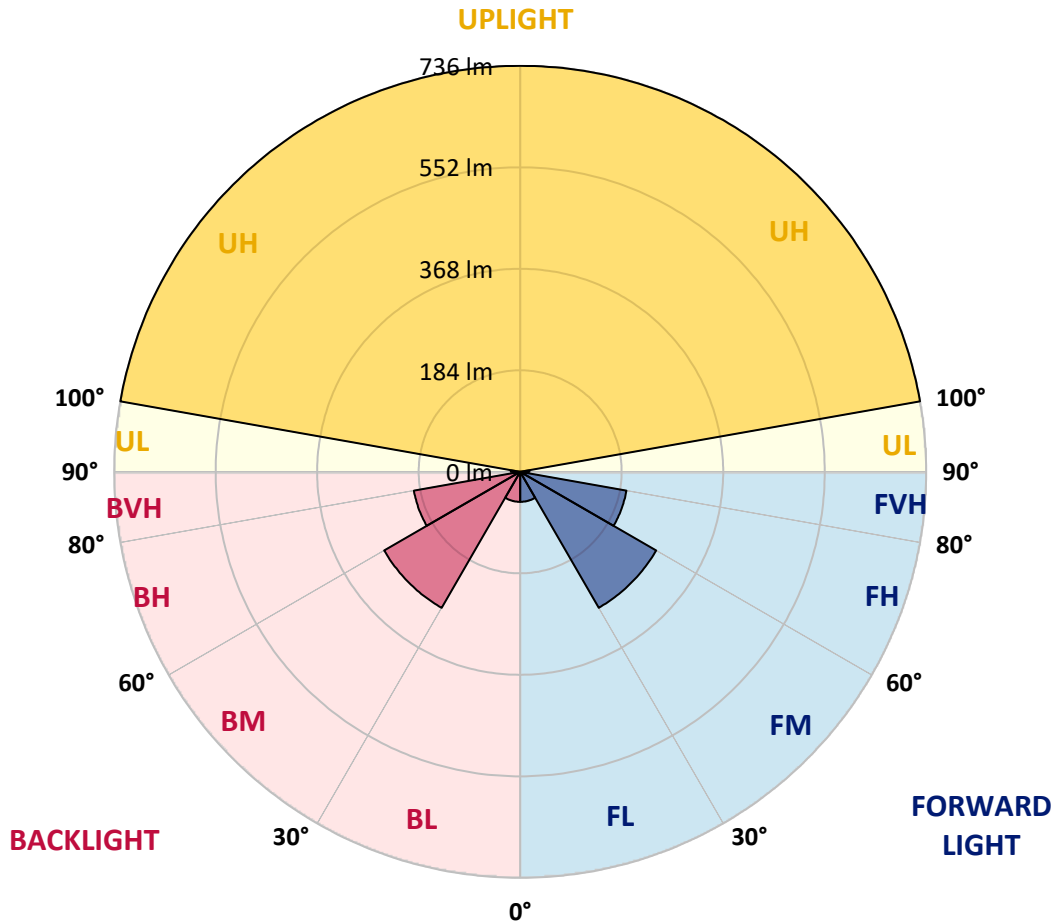


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**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone           | Lumens | % Fixture | Zone Rating/Lumen Limit |         |        |
|----------------|--------|-----------|-------------------------|---------|--------|
|                |        |           | B                       | U       | G      |
| FL (0°-30°)    | 54.4   | 2.9       |                         |         |        |
| FM (30°-60°)   | 284.7  | 15.4      |                         |         |        |
| FH (60°-80°)   | 195.6  | 10.6      |                         |         | G0/660 |
| FVH (80°-90°)  | 12.9   | 0.7       |                         |         | G1/100 |
| BL (0°-30°)    | 54.4   | 2.9       | B0/110                  |         |        |
| BM (30°-60°)   | 284.7  | 15.4      | B1/1000                 |         |        |
| BH (60°-80°)   | 195.6  | 10.6      | B1/500                  |         | G0/660 |
| BVH (80°-90°)  | 12.9   | 0.7       |                         |         | G1/100 |
| UL (90°-100°)  | 16.8   | 0.9       |                         | U2/50   |        |
| UH (100°-180°) | 735.8  | 39.8      |                         | U4/1000 |        |

**BUG Rating: B1-U4-G1**  
 Type V Short





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**CANDELA DISTRIBUTION (FULL):**

|        | 0°    | 5°    | 15°   | 25°   | 35°   | 45°   | 55°   | 65°   | 75°   | 85°   | 90°   |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°     | 103.3 | 103.3 | 103.3 | 103.3 | 103.3 | 103.3 | 103.3 | 103.3 | 103.3 | 103.3 | 103.3 |
| 2.5°   | 102.4 | 102.4 | 102.4 | 102.4 | 102.4 | 102.4 | 102.4 | 102.4 | 102.4 | 102.4 | 102.4 |
| 5°     | 103.3 | 103.3 | 103.3 | 103.3 | 103.3 | 103.3 | 103.3 | 103.3 | 103.3 | 103.3 | 103.3 |
| 7.5°   | 102.4 | 102.4 | 103.3 | 103.3 | 103.3 | 103.3 | 103.3 | 103.3 | 103.3 | 102.4 | 102.4 |
| 10°    | 103.3 | 103.3 | 103.3 | 104.3 | 104.3 | 104.3 | 104.3 | 104.3 | 103.3 | 103.3 | 103.3 |
| 12.5°  | 105.2 | 105.2 | 106.2 | 106.2 | 106.2 | 106.2 | 106.2 | 106.2 | 106.2 | 105.2 | 105.2 |
| 15°    | 110.0 | 110.0 | 110.0 | 110.9 | 110.9 | 110.9 | 110.9 | 110.9 | 110.0 | 110.0 | 110.0 |
| 17.5°  | 114.7 | 114.7 | 115.7 | 115.7 | 116.6 | 116.6 | 116.6 | 115.7 | 115.7 | 115.7 | 115.7 |
| 20°    | 121.4 | 121.4 | 122.3 | 122.3 | 123.3 | 124.2 | 124.2 | 123.3 | 122.3 | 122.3 | 122.3 |
| 22.5°  | 129.9 | 130.8 | 130.8 | 130.8 | 131.8 | 133.7 | 132.7 | 131.8 | 130.8 | 130.8 | 130.8 |
| 25°    | 140.3 | 141.3 | 142.2 | 142.2 | 143.2 | 145.1 | 145.1 | 142.2 | 142.2 | 142.2 | 142.2 |
| 27.5°  | 152.7 | 153.6 | 154.5 | 154.5 | 155.5 | 157.4 | 156.4 | 154.5 | 154.5 | 153.6 | 153.6 |
| 30°    | 164.0 | 165.0 | 165.9 | 166.9 | 167.8 | 168.8 | 168.8 | 166.9 | 165.9 | 165.0 | 164.0 |
| 32.5°  | 175.4 | 175.4 | 177.3 | 179.2 | 181.1 | 181.1 | 182.0 | 179.2 | 177.3 | 175.4 | 174.5 |
| 35°    | 186.8 | 187.7 | 188.7 | 191.5 | 194.4 | 195.3 | 194.4 | 191.5 | 188.7 | 186.8 | 186.8 |
| 37.5°  | 199.1 | 200.1 | 201.0 | 204.8 | 207.6 | 209.5 | 207.6 | 204.8 | 201.0 | 199.1 | 198.2 |
| 40°    | 212.4 | 213.3 | 214.3 | 219.0 | 221.9 | 223.8 | 220.9 | 218.1 | 214.3 | 212.4 | 211.4 |
| 42.5°  | 224.7 | 226.6 | 228.5 | 234.2 | 238.9 | 240.8 | 238.0 | 233.2 | 229.4 | 224.7 | 223.8 |
| 45°    | 239.9 | 241.8 | 244.6 | 250.3 | 255.0 | 257.9 | 254.1 | 249.4 | 243.7 | 239.9 | 238.9 |
| 47.5°  | 252.2 | 254.1 | 256.9 | 264.5 | 271.2 | 273.1 | 269.3 | 263.6 | 256.0 | 251.3 | 250.3 |
| 50°    | 261.7 | 263.6 | 269.3 | 277.8 | 285.4 | 287.3 | 283.5 | 275.9 | 267.4 | 260.7 | 259.8 |
| 52.5°  | 269.3 | 271.2 | 277.8 | 289.2 | 297.7 | 300.6 | 295.8 | 287.3 | 275.9 | 268.3 | 267.4 |
| 55°    | 273.1 | 274.0 | 282.5 | 294.9 | 303.4 | 307.2 | 302.5 | 293.0 | 280.6 | 272.1 | 271.2 |
| 57.5°  | 270.2 | 271.2 | 280.6 | 293.9 | 303.4 | 308.1 | 303.4 | 292.0 | 278.8 | 270.2 | 269.3 |
| 60°    | 264.5 | 264.5 | 273.1 | 288.2 | 299.6 | 302.5 | 297.7 | 286.3 | 272.1 | 263.6 | 262.6 |
| 62.5°  | 254.1 | 253.2 | 263.6 | 276.9 | 288.2 | 291.1 | 287.3 | 275.9 | 261.7 | 253.2 | 252.2 |
| 65°    | 234.2 | 232.3 | 247.5 | 259.8 | 270.2 | 273.1 | 270.2 | 259.8 | 246.5 | 233.2 | 231.3 |
| 67.5°  | 210.5 | 207.6 | 221.9 | 236.1 | 245.6 | 249.4 | 245.6 | 237.0 | 221.9 | 208.6 | 207.6 |
| 70°    | 185.8 | 183.0 | 194.4 | 206.7 | 217.1 | 219.0 | 215.2 | 206.7 | 192.5 | 183.9 | 183.9 |
| 72.5°  | 156.4 | 153.6 | 164.0 | 173.5 | 183.9 | 185.8 | 182.0 | 174.5 | 164.0 | 155.5 | 154.5 |
| 75°    | 124.2 | 121.4 | 130.8 | 138.4 | 148.9 | 149.8 | 147.9 | 139.4 | 130.8 | 122.3 | 122.3 |
| 77.5°  | 92.0  | 89.1  | 96.7  | 103.3 | 111.9 | 111.9 | 110.9 | 104.3 | 96.7  | 91.0  | 91.0  |
| 80°    | 60.7  | 58.8  | 65.4  | 68.3  | 75.9  | 75.9  | 74.9  | 70.2  | 64.5  | 60.7  | 59.7  |
| 82.5°  | 34.1  | 32.2  | 37.9  | 38.9  | 44.6  | 44.6  | 43.6  | 39.8  | 36.0  | 33.2  | 33.2  |
| 85°    | 13.3  | 11.4  | 15.2  | 16.1  | 19.0  | 19.0  | 18.0  | 17.1  | 14.2  | 12.3  | 12.3  |
| 87.5°  | 0.9   | 0.9   | 1.9   | 1.9   | 2.8   | 2.8   | 2.8   | 1.9   | 1.9   | 0.9   | 0.9   |
| 90°    | 6.4   | 6.4   | 7.7   | 7.7   | 7.7   | 7.7   | 7.7   | 7.7   | 7.7   | 6.4   | 6.4   |
| 92.5°  | 6.4   | 6.4   | 6.4   | 9.0   | 10.3  | 9.0   | 10.3  | 7.7   | 7.7   | 6.4   | 6.4   |
| 95°    | 7.7   | 7.7   | 9.0   | 11.6  | 14.2  | 15.5  | 15.5  | 9.0   | 9.0   | 7.7   | 7.7   |
| 97.5°  | 10.3  | 11.6  | 11.6  | 14.2  | 23.2  | 42.5  | 25.8  | 12.9  | 12.9  | 11.6  | 10.3  |
| 100°   | 16.7  | 18.0  | 18.0  | 32.2  | 68.2  | 91.4  | 65.7  | 33.5  | 24.5  | 18.0  | 18.0  |
| 102.5° | 54.1  | 56.7  | 69.5  | 104.3 | 154.5 | 140.4 | 118.5 | 112.0 | 77.3  | 61.8  | 59.2  |
| 105°   | 137.8 | 136.5 | 146.8 | 173.8 | 216.3 | 212.5 | 195.7 | 177.7 | 153.2 | 141.6 | 141.6 |
| 107.5° | 181.6 | 181.6 | 190.6 | 213.8 | 245.9 | 287.1 | 291.0 | 230.5 | 202.2 | 189.3 | 188.0 |
| 110°   | 204.7 | 204.7 | 212.5 | 231.8 | 274.3 | 332.2 | 329.6 | 284.6 | 249.8 | 233.1 | 230.5 |



REPORT NUMBER: P832824  
 CATALOG NUMBER: TTN-D0-735-U-WQ-CG-UPL3

**CANDELA DISTRIBUTION (continued):**

|        | 0°    | 5°    | 15°   | 25°   | 35°   | 45°   | 55°   | 65°   | 75°   | 85°   | 90°   |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 112.5° | 209.9 | 211.2 | 221.5 | 251.1 | 297.5 | 323.2 | 311.6 | 293.6 | 278.1 | 265.3 | 262.7 |
| 115°   | 217.6 | 217.6 | 229.2 | 257.5 | 283.3 | 293.6 | 280.7 | 266.5 | 256.2 | 251.1 | 253.7 |
| 117.5° | 215.0 | 218.9 | 221.5 | 236.9 | 253.7 | 261.4 | 255.0 | 235.6 | 227.9 | 225.3 | 221.5 |
| 120°   | 199.6 | 199.6 | 202.2 | 209.9 | 218.9 | 222.8 | 220.2 | 207.3 | 200.9 | 199.6 | 197.0 |
| 122.5° | 177.7 | 179.0 | 177.7 | 181.6 | 188.0 | 191.9 | 189.3 | 179.0 | 176.4 | 176.4 | 173.8 |
| 125°   | 155.8 | 155.8 | 154.5 | 157.1 | 161.0 | 159.7 | 161.0 | 155.8 | 154.5 | 154.5 | 153.2 |
| 127.5° | 140.4 | 139.1 | 136.5 | 137.8 | 139.1 | 139.1 | 140.4 | 135.2 | 136.5 | 137.8 | 136.5 |
| 130°   | 124.9 | 124.9 | 122.3 | 122.3 | 122.3 | 119.8 | 122.3 | 119.8 | 121.0 | 122.3 | 123.6 |
| 132.5° | 110.7 | 110.7 | 106.9 | 105.6 | 105.6 | 105.6 | 106.9 | 105.6 | 108.2 | 110.7 | 110.7 |
| 135°   | 99.2  | 99.2  | 95.3  | 96.6  | 96.6  | 95.3  | 96.6  | 95.3  | 97.9  | 99.2  | 99.2  |
| 137.5° | 90.1  | 90.1  | 87.6  | 87.6  | 87.6  | 86.3  | 87.6  | 87.6  | 88.8  | 91.4  | 92.7  |
| 140°   | 82.4  | 82.4  | 81.1  | 81.1  | 79.8  | 81.1  | 81.1  | 81.1  | 82.4  | 83.7  | 83.7  |
| 142.5° | 78.5  | 77.3  | 76.0  | 74.7  | 76.0  | 76.0  | 76.0  | 74.7  | 76.0  | 78.5  | 78.5  |
| 145°   | 72.1  | 72.1  | 70.8  | 70.8  | 70.8  | 72.1  | 70.8  | 70.8  | 72.1  | 72.1  | 73.4  |
| 147.5° | 68.2  | 68.2  | 67.0  | 68.2  | 68.2  | 68.2  | 68.2  | 67.0  | 68.2  | 68.2  | 69.5  |
| 150°   | 67.0  | 65.7  | 64.4  | 65.7  | 65.7  | 64.4  | 64.4  | 64.4  | 64.4  | 65.7  | 65.7  |
| 152.5° | 63.1  | 63.1  | 61.8  | 63.1  | 61.8  | 61.8  | 61.8  | 61.8  | 61.8  | 63.1  | 64.4  |
| 155°   | 60.5  | 60.5  | 59.2  | 60.5  | 60.5  | 60.5  | 60.5  | 60.5  | 60.5  | 60.5  | 60.5  |
| 157.5° | 57.9  | 59.2  | 57.9  | 57.9  | 57.9  | 57.9  | 57.9  | 57.9  | 57.9  | 59.2  | 59.2  |
| 160°   | 56.7  | 56.7  | 56.7  | 56.7  | 55.4  | 55.4  | 55.4  | 56.7  | 56.7  | 56.7  | 57.9  |
| 162.5° | 55.4  | 55.4  | 55.4  | 55.4  | 54.1  | 54.1  | 54.1  | 54.1  | 55.4  | 55.4  | 56.7  |
| 165°   | 55.4  | 54.1  | 54.1  | 54.1  | 52.8  | 52.8  | 52.8  | 52.8  | 54.1  | 55.4  | 54.1  |
| 167.5° | 52.8  | 52.8  | 52.8  | 52.8  | 52.8  | 51.5  | 51.5  | 52.8  | 52.8  | 52.8  | 54.1  |
| 170°   | 52.8  | 52.8  | 51.5  | 51.5  | 51.5  | 51.5  | 51.5  | 51.5  | 51.5  | 51.5  | 52.8  |
| 172.5° | 52.8  | 52.8  | 52.8  | 52.8  | 51.5  | 51.5  | 51.5  | 51.5  | 51.5  | 52.8  | 52.8  |
| 175°   | 52.8  | 52.8  | 52.8  | 52.8  | 51.5  | 51.5  | 51.5  | 52.8  | 52.8  | 52.8  | 51.5  |
| 177.5° | 52.8  | 52.8  | 52.8  | 52.8  | 51.5  | 52.8  | 52.8  | 52.8  | 52.8  | 52.8  | 52.8  |
| 180°   | 52.8  | 52.8  | 52.8  | 52.8  | 52.8  | 52.8  | 52.8  | 52.8  | 52.8  | 52.8  | 52.8  |



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: SP1-2411-284-1

Test Date: 11/15/2024

Luminaire Tested: TTN-D0-735-U-WQ

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

**Test Information**

Test Method: LM-79-2019  
 Report Number: SP1-2411-284-1  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry: 4π  
 Issue Date: 11/15/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: MCGRAW EDISON  
 Catalog Number: **TTN-D0-735-U-WQ**  
 Description: TOPTIER NANO LED PARKING GARAGE LUMINAIRE. 3500K, 70 CRI LEDS AND WIDE DISTRIBUTION

**Spectral Parameters**

CCT (K): 3405  
 CIE u': 0.2365  
 CIE v': 0.5180  
 Duv: 0.0036  
 CIE x: 0.4148  
 CIE y: 0.4038  
 CIE z: 0.1814  
 Peak Wavelength (nm): 596  
 Dominant Wavelength (nm): 579  
 Purity: 45.70672  
 Rf: 76.6  
 Rg: 95.4

|           |      |      |       |
|-----------|------|------|-------|
| CRI (Ra): | 73.9 |      |       |
| R1:       | 71.3 | R9:  | -18.0 |
| R2:       | 80.3 | R10: | 53.1  |
| R3:       | 87.8 | R11: | 68.6  |
| R4:       | 73.2 | R12: | 42.6  |
| R5:       | 69.8 | R13: | 72.5  |
| R6:       | 71.8 | R14: | 92.7  |
| R7:       | 82.8 | R15: | 64.3  |
| R8:       | 54.1 |      |       |



**Test Conditions**

Stabilization Time: 38M  
 Operation Time: 1H 38M  
 Sphere Temperature (°C): 24.9

REPORT NUMBER: SP1-2411-284-1

| 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: SP1-2411-284-1

CIE 1931 Chromaticity Diagram



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



Point lies inside the ANSI 3500K 4-step quadrangle

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**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               | 846                         | NR                      | 750               | 28                          | NR                      | 880               | 1                           | NR                      |
| 365               | 0                           | NR                      | 495               | 160                         | NR                      | 625               | 793                         | NR                      | 755               | 25                          | NR                      | 885               | 0                           | NR                      |
| 370               | 0                           | NR                      | 500               | 225                         | NR                      | 630               | 739                         | NR                      | 760               | 22                          | NR                      | 890               | 0                           | NR                      |
| 375               | 0                           | NR                      | 505               | 308                         | NR                      | 635               | 681                         | NR                      | 765               | 19                          | NR                      | 895               | 0                           | NR                      |
| 380               | 0                           | NR                      | 510               | 392                         | NR                      | 640               | 623                         | NR                      | 770               | 16                          | NR                      | 900               | 0                           | NR                      |
| 385               | 0                           | NR                      | 515               | 474                         | NR                      | 645               | 563                         | NR                      | 775               | 14                          | NR                      | 905               | 0                           | NR                      |
| 390               | 0                           | NR                      | 520               | 545                         | NR                      | 650               | 506                         | NR                      | 780               | 12                          | NR                      | 910               | 0                           | NR                      |
| 395               | 1                           | NR                      | 525               | 603                         | NR                      | 655               | 451                         | NR                      | 785               | 10                          | NR                      | 915               | 0                           | NR                      |
| 400               | 3                           | NR                      | 530               | 649                         | NR                      | 660               | 399                         | NR                      | 790               | 9                           | NR                      | 920               | 0                           | NR                      |
| 405               | 5                           | NR                      | 535               | 687                         | NR                      | 665               | 352                         | NR                      | 795               | 8                           | NR                      | 925               | 0                           | NR                      |
| 410               | 11                          | NR                      | 540               | 721                         | NR                      | 670               | 307                         | NR                      | 800               | 6                           | NR                      | 930               | 0                           | NR                      |
| 415               | 21                          | NR                      | 545               | 751                         | NR                      | 675               | 268                         | NR                      | 805               | 6                           | NR                      | 935               | 0                           | NR                      |
| 420               | 43                          | NR                      | 550               | 779                         | NR                      | 680               | 234                         | NR                      | 810               | 5                           | NR                      | 940               | 0                           | NR                      |
| 425               | 88                          | NR                      | 555               | 811                         | NR                      | 685               | 203                         | NR                      | 815               | 4                           | NR                      | 945               | 0                           | NR                      |
| 430               | 163                         | NR                      | 560               | 843                         | NR                      | 690               | 176                         | NR                      | 820               | 4                           | NR                      | 950               | 0                           | NR                      |
| 435               | 288                         | NR                      | 565               | 873                         | NR                      | 695               | 152                         | NR                      | 825               | 3                           | NR                      | 955               | 0                           | NR                      |
| 440               | 416                         | NR                      | 570               | 907                         | NR                      | 700               | 131                         | NR                      | 830               | 3                           | NR                      | 960               | 0                           | NR                      |
| 445               | 566                         | NR                      | 575               | 938                         | NR                      | 705               | 112                         | NR                      | 835               | 3                           | NR                      | 965               | 0                           | NR                      |
| 450               | 810                         | NR                      | 580               | 965                         | NR                      | 710               | 96                          | NR                      | 840               | 2                           | NR                      | 970               | 0                           | NR                      |
| 455               | 669                         | NR                      | 585               | 986                         | NR                      | 715               | 81                          | NR                      | 845               | 2                           | NR                      | 975               | 0                           | NR                      |
| 460               | 338                         | NR                      | 590               | 997                         | NR                      | 720               | 69                          | NR                      | 850               | 2                           | NR                      | 980               | 0                           | NR                      |
| 465               | 246                         | NR                      | 595               | 997                         | NR                      | 725               | 58                          | NR                      | 855               | 1                           | NR                      | 985               | 0                           | NR                      |
| 470               | 182                         | NR                      | 600               | 991                         | NR                      | 730               | 49                          | NR                      | 860               | 1                           | NR                      | 990               | 0                           | NR                      |
| 475               | 115                         | NR                      | 605               | 968                         | NR                      | 735               | 42                          | NR                      | 865               | 1                           | NR                      | 995               | 0                           | NR                      |
| 480               | 97                          | NR                      | 610               | 939                         | NR                      | 740               | 37                          | NR                      | 870               | 1                           | NR                      | 1000              | 0                           | NR                      |
| 485               | 103                         | NR                      | 615               | 896                         | NR                      | 745               | 32                          | NR                      | 875               | 1                           | NR                      |                   |                             |                         |

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**Scotopic Flux vs. Wavelength**



**Scotopic Lumens: NR**

**S/P: 1.33**

| 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    | 846                      | NR            | 750    | 28                       | NR            | 880    | 1                        | NR            |
| 365    | 0                        | NR            | 495    | 160                      | NR            | 625    | 793                      | NR            | 755    | 25                       | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 225                      | NR            | 630    | 739                      | NR            | 760    | 22                       | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 308                      | NR            | 635    | 681                      | NR            | 765    | 19                       | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 392                      | NR            | 640    | 623                      | NR            | 770    | 16                       | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 474                      | NR            | 645    | 563                      | NR            | 775    | 14                       | NR            | 905    | 0                        | NR            |
| 390    | 0                        | NR            | 520    | 545                      | NR            | 650    | 506                      | NR            | 780    | 12                       | NR            | 910    | 0                        | NR            |
| 395    | 1                        | NR            | 525    | 603                      | NR            | 655    | 451                      | NR            | 785    | 10                       | NR            | 915    | 0                        | NR            |
| 400    | 3                        | NR            | 530    | 649                      | NR            | 660    | 399                      | NR            | 790    | 9                        | NR            | 920    | 0                        | NR            |
| 405    | 5                        | NR            | 535    | 687                      | NR            | 665    | 352                      | NR            | 795    | 8                        | NR            | 925    | 0                        | NR            |
| 410    | 11                       | NR            | 540    | 721                      | NR            | 670    | 307                      | NR            | 800    | 6                        | NR            | 930    | 0                        | NR            |
| 415    | 21                       | NR            | 545    | 751                      | NR            | 675    | 268                      | NR            | 805    | 6                        | NR            | 935    | 0                        | NR            |
| 420    | 43                       | NR            | 550    | 779                      | NR            | 680    | 234                      | NR            | 810    | 5                        | NR            | 940    | 0                        | NR            |
| 425    | 88                       | NR            | 555    | 811                      | NR            | 685    | 203                      | NR            | 815    | 4                        | NR            | 945    | 0                        | NR            |
| 430    | 163                      | NR            | 560    | 843                      | NR            | 690    | 176                      | NR            | 820    | 4                        | NR            | 950    | 0                        | NR            |
| 435    | 288                      | NR            | 565    | 873                      | NR            | 695    | 152                      | NR            | 825    | 3                        | NR            | 955    | 0                        | NR            |
| 440    | 416                      | NR            | 570    | 907                      | NR            | 700    | 131                      | NR            | 830    | 3                        | NR            | 960    | 0                        | NR            |
| 445    | 566                      | NR            | 575    | 938                      | NR            | 705    | 112                      | NR            | 835    | 3                        | NR            | 965    | 0                        | NR            |
| 450    | 810                      | NR            | 580    | 965                      | NR            | 710    | 96                       | NR            | 840    | 2                        | NR            | 970    | 0                        | NR            |
| 455    | 669                      | NR            | 585    | 986                      | NR            | 715    | 81                       | NR            | 845    | 2                        | NR            | 975    | 0                        | NR            |
| 460    | 338                      | NR            | 590    | 997                      | NR            | 720    | 69                       | NR            | 850    | 2                        | NR            | 980    | 0                        | NR            |
| 465    | 246                      | NR            | 595    | 997                      | NR            | 725    | 58                       | NR            | 855    | 1                        | NR            | 985    | 0                        | NR            |
| 470    | 182                      | NR            | 600    | 991                      | NR            | 730    | 49                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 115                      | NR            | 605    | 968                      | NR            | 735    | 42                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 97                       | NR            | 610    | 939                      | NR            | 740    | 37                       | NR            | 870    | 1                        | NR            | 1000   | 0                        | NR            |
| 485    | 103                      | NR            | 615    | 896                      | NR            | 745    | 32                       | NR            | 875    | 1                        | NR            |        |                          |               |

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Melanopic Flux vs. Wavelength



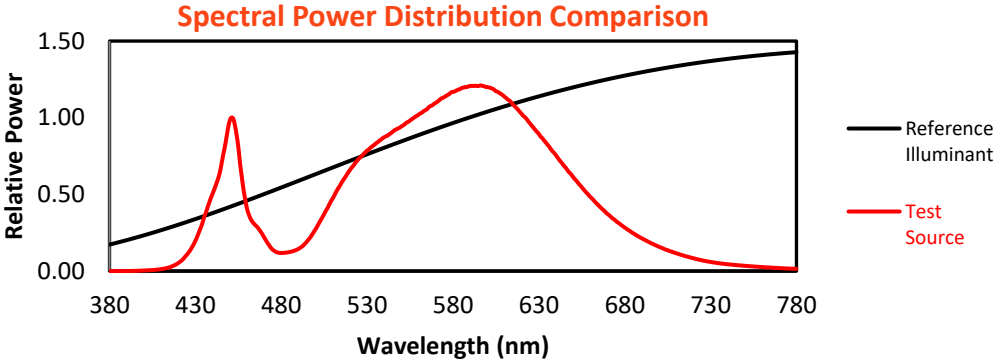
Melanopic Lumens: NR

M/P: 2.47

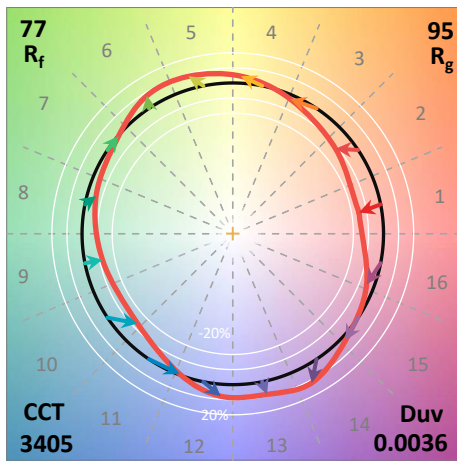
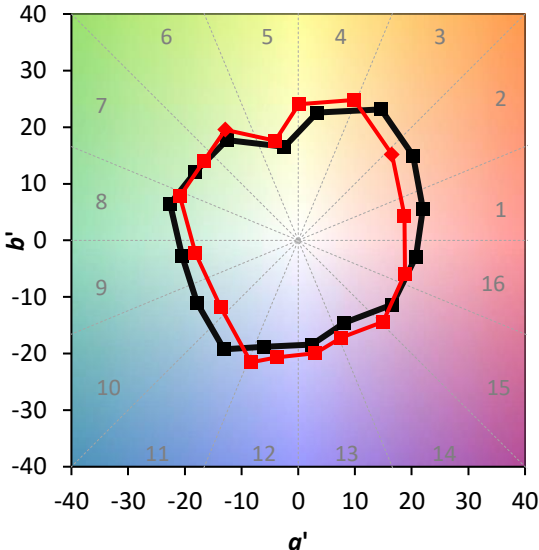
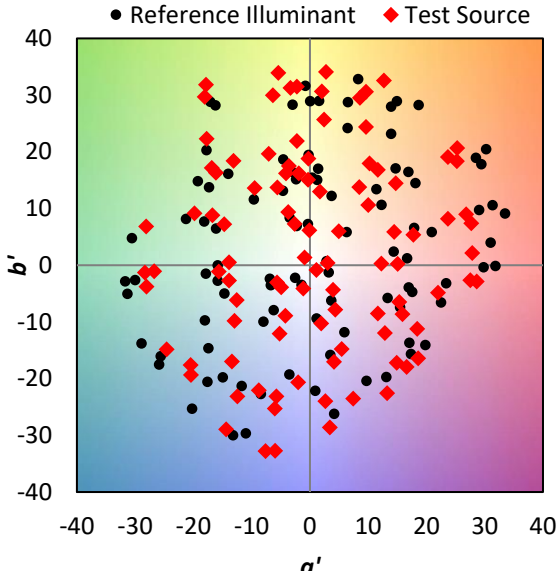
| λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 360    | 0                        | NR            | 490    | 119                      | NR            | 620    | 846                      | NR            | 750    | 28                       | NR            | 880    | 1                        | NR            |
| 365    | 0                        | NR            | 495    | 160                      | NR            | 625    | 793                      | NR            | 755    | 25                       | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 225                      | NR            | 630    | 739                      | NR            | 760    | 22                       | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 308                      | NR            | 635    | 681                      | NR            | 765    | 19                       | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 392                      | NR            | 640    | 623                      | NR            | 770    | 16                       | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 474                      | NR            | 645    | 563                      | NR            | 775    | 14                       | NR            | 905    | 0                        | NR            |
| 390    | 0                        | NR            | 520    | 545                      | NR            | 650    | 506                      | NR            | 780    | 12                       | NR            | 910    | 0                        | NR            |
| 395    | 1                        | NR            | 525    | 603                      | NR            | 655    | 451                      | NR            | 785    | 10                       | NR            | 915    | 0                        | NR            |
| 400    | 3                        | NR            | 530    | 649                      | NR            | 660    | 399                      | NR            | 790    | 9                        | NR            | 920    | 0                        | NR            |
| 405    | 5                        | NR            | 535    | 687                      | NR            | 665    | 352                      | NR            | 795    | 8                        | NR            | 925    | 0                        | NR            |
| 410    | 11                       | NR            | 540    | 721                      | NR            | 670    | 307                      | NR            | 800    | 6                        | NR            | 930    | 0                        | NR            |
| 415    | 21                       | NR            | 545    | 751                      | NR            | 675    | 268                      | NR            | 805    | 6                        | NR            | 935    | 0                        | NR            |
| 420    | 43                       | NR            | 550    | 779                      | NR            | 680    | 234                      | NR            | 810    | 5                        | NR            | 940    | 0                        | NR            |
| 425    | 88                       | NR            | 555    | 811                      | NR            | 685    | 203                      | NR            | 815    | 4                        | NR            | 945    | 0                        | NR            |
| 430    | 163                      | NR            | 560    | 843                      | NR            | 690    | 176                      | NR            | 820    | 4                        | NR            | 950    | 0                        | NR            |
| 435    | 288                      | NR            | 565    | 873                      | NR            | 695    | 152                      | NR            | 825    | 3                        | NR            | 955    | 0                        | NR            |
| 440    | 416                      | NR            | 570    | 907                      | NR            | 700    | 131                      | NR            | 830    | 3                        | NR            | 960    | 0                        | NR            |
| 445    | 566                      | NR            | 575    | 938                      | NR            | 705    | 112                      | NR            | 835    | 3                        | NR            | 965    | 0                        | NR            |
| 450    | 810                      | NR            | 580    | 965                      | NR            | 710    | 96                       | NR            | 840    | 2                        | NR            | 970    | 0                        | NR            |
| 455    | 669                      | NR            | 585    | 986                      | NR            | 715    | 81                       | NR            | 845    | 2                        | NR            | 975    | 0                        | NR            |
| 460    | 338                      | NR            | 590    | 997                      | NR            | 720    | 69                       | NR            | 850    | 2                        | NR            | 980    | 0                        | NR            |
| 465    | 246                      | NR            | 595    | 997                      | NR            | 725    | 58                       | NR            | 855    | 1                        | NR            | 985    | 0                        | NR            |
| 470    | 182                      | NR            | 600    | 991                      | NR            | 730    | 49                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 115                      | NR            | 605    | 968                      | NR            | 735    | 42                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 97                       | NR            | 610    | 939                      | NR            | 740    | 37                       | NR            | 870    | 1                        | NR            | 1000   | 0                        | NR            |
| 485    | 103                      | NR            | 615    | 896                      | NR            | 745    | 32                       | NR            | 875    | 1                        | NR            |        |                          |               |

**Summary**

$R_f = 76.6$   
 $R_g = 95.4$   
 $CIE R_a = 73.9$   
 $R_g = -18.0$



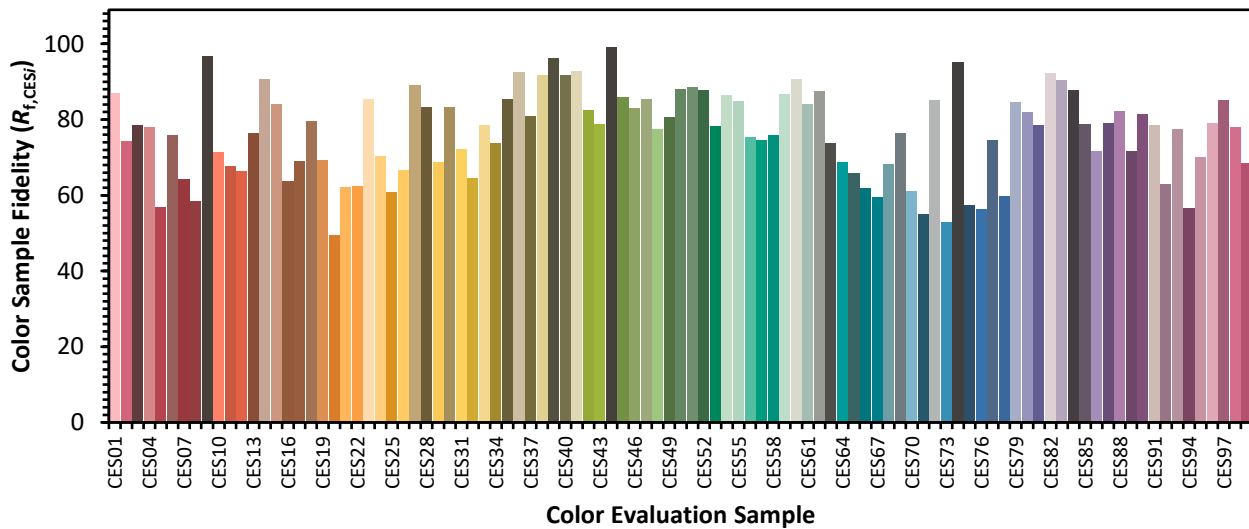
**Color Vector Graphics**





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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 67 | CES51 = 88 | CES76 = 56 |
| CES02 = 62 | CES27 = 89 | CES52 = 88 | CES77 = 75 |
| CES03 = 31 | CES28 = 83 | CES53 = 78 | CES78 = 60 |
| CES04 = 70 | CES29 = 69 | CES54 = 86 | CES79 = 85 |
| CES05 = 48 | CES30 = 83 | CES55 = 85 | CES80 = 82 |
| CES06 = 51 | CES31 = 72 | CES56 = 75 | CES81 = 78 |
| CES07 = 41 | CES32 = 65 | CES57 = 75 | CES82 = 92 |
| CES08 = 40 | CES33 = 78 | CES58 = 76 | CES83 = 90 |
| CES09 = 29 | CES34 = 74 | CES59 = 87 | CES84 = 88 |
| CES10 = 75 | CES35 = 86 | CES60 = 91 | CES85 = 79 |
| CES11 = 58 | CES36 = 93 | CES61 = 84 | CES86 = 72 |
| CES12 = 64 | CES37 = 81 | CES62 = 88 | CES87 = 79 |
| CES13 = 43 | CES38 = 92 | CES63 = 74 | CES88 = 82 |
| CES14 = 74 | CES39 = 96 | CES64 = 69 | CES89 = 72 |
| CES15 = 71 | CES40 = 92 | CES65 = 66 | CES90 = 82 |
| CES16 = 47 | CES41 = 93 | CES66 = 62 | CES91 = 79 |
| CES17 = 50 | CES42 = 83 | CES67 = 60 | CES92 = 63 |
| CES18 = 56 | CES43 = 79 | CES68 = 68 | CES93 = 77 |
| CES19 = 72 | CES44 = 99 | CES69 = 76 | CES94 = 56 |
| CES20 = 65 | CES45 = 86 | CES70 = 61 | CES95 = 70 |
| CES21 = 86 | CES46 = 83 | CES71 = 55 | CES96 = 79 |
| CES22 = 79 | CES47 = 85 | CES72 = 85 | CES97 = 85 |
| CES23 = 92 | CES48 = 78 | CES73 = 53 | CES98 = 78 |
| CES24 = 91 | CES49 = 81 | CES74 = 95 | CES99 = 68 |
| CES25 = 72 | CES50 = 88 | CES75 = 57 |            |



Color Rendition by Hue-Angle Bin



Measure Comparisons



(END OF REPORT)