

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: P833605

Luminaire Tested: **TTN-D2-750-U-WQ-SG-UPL1**

Issue Date: 5/15/2024

**Test Information**

Test Method: LM-79-08  
Report Number: P833605  
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-WQ-SG-UPL1  
Description: TOPTIER NANO LED PARKING GARAGE LUMINAIRE WITH UPLIGHT  
5000K, 70 CRI LEDS AND WIDE DISTRIBUTION WITH SOLITE GLASS  
Light Source: -  
Ballast/Driver: -

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 5244.9 lumens  
Efficiency: N/A  
Efficacy: 116.3 lumens/watt  
Luminous Opening: Vertical Cylinder (Dia: 0.71' x H: 0.1')  
IES Classification: Type V - Short  
BUG Rating: B2 - U3 - G1

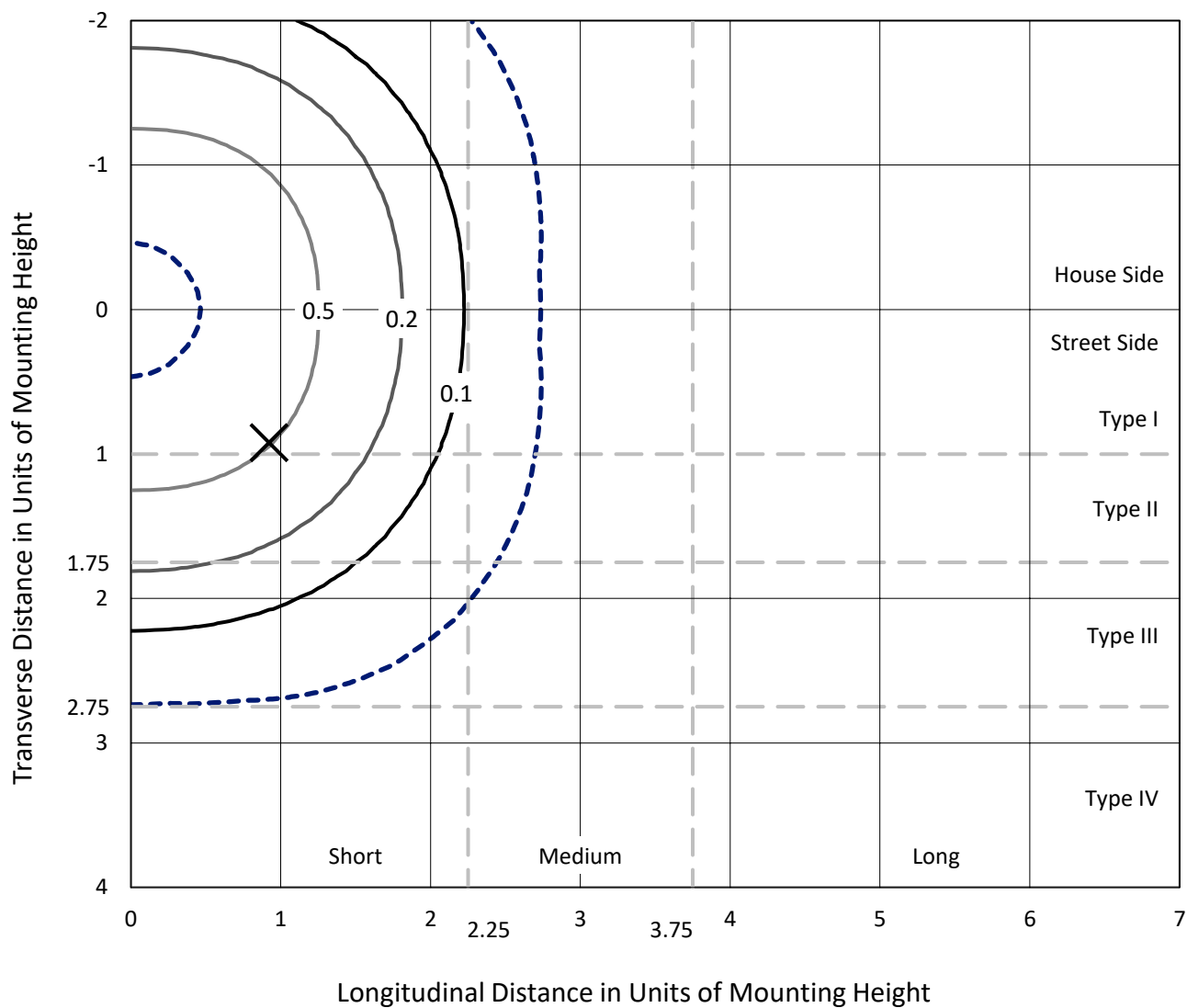
Input Watts (W): 45.1  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



REPORT NUMBER: P833605  
 CATALOG NUMBER: TTN-D2-750-U-WQ-SG-UPL1

## Iso-Footcandle Lines of Horizontal Illumination

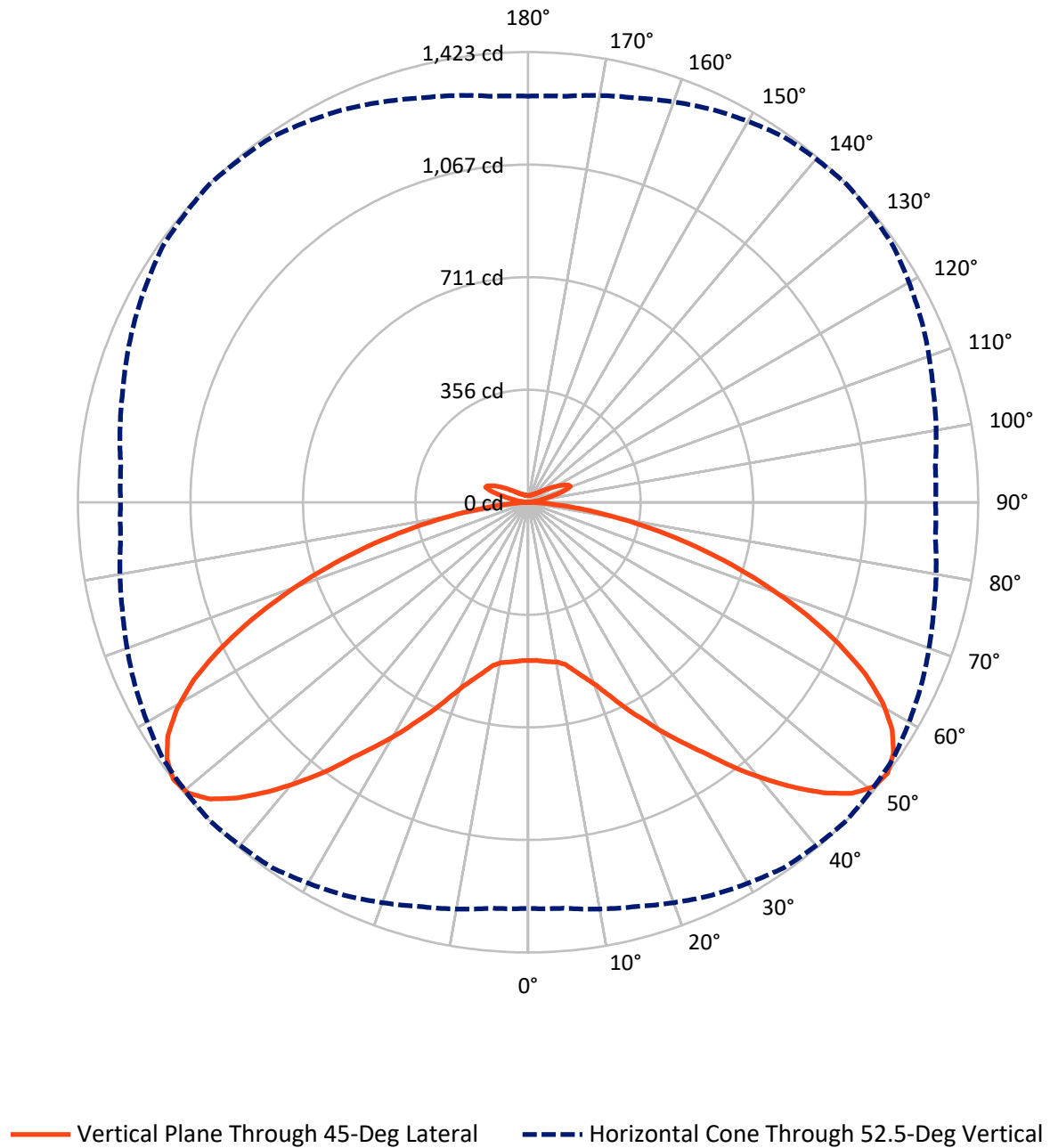
✕ Max cd  
 - - - 1/2 Max cd



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

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## Luminous Intensity Polar Plot



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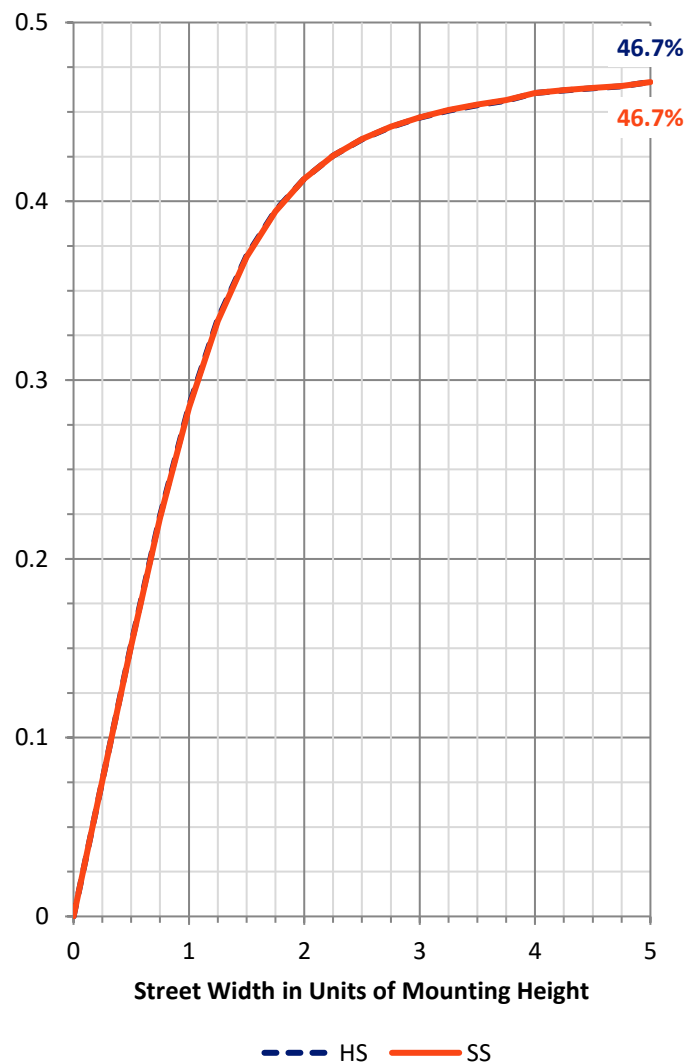
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 2460.7   | 161.7  | 2622.4 |
|                    | % Fixture | 46.9     | 3.1    | 50.0   |
| <b>Street Side</b> | Lumens    | 2460.7   | 161.7  | 2622.4 |
|                    | % Fixture | 46.9     | 3.1    | 50.0   |
| <b>Total</b>       | Lumens    | 4921.5   | 323.4  | 5244.9 |
|                    | % Fixture | 93.8     | 6.2    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 48.3   | 0.9       |
| 10°-20°   | 158.8  | 3.0       |
| 20°-30°   | 335.1  | 6.4       |
| 30°-40°   | 612.2  | 11.7      |
| 40°-50°   | 974.6  | 18.6      |
| 50°-60°   | 1178.5 | 22.5      |
| 60°-70°   | 990.9  | 18.9      |
| 70°-80°   | 525.3  | 10.0      |
| 80°-90°   | 97.6   | 1.9       |
| 90°-100°  | 7.2    | 0.1       |
| 100°-110° | 73.4   | 1.4       |
| 110°-120° | 107.3  | 2.0       |
| 120°-130° | 62.3   | 1.2       |
| 130°-140° | 33.0   | 0.6       |
| 140°-150° | 19.6   | 0.4       |
| 150°-160° | 12.1   | 0.2       |
| 160°-170° | 6.6    | 0.1       |
| 170°-180° | 2.1    | 0.0       |
| 0°-90°    | 4921.5 | 93.8      |
| 0°-180°   | 5244.9 | 100.0     |

**Coefficient of Utilization**



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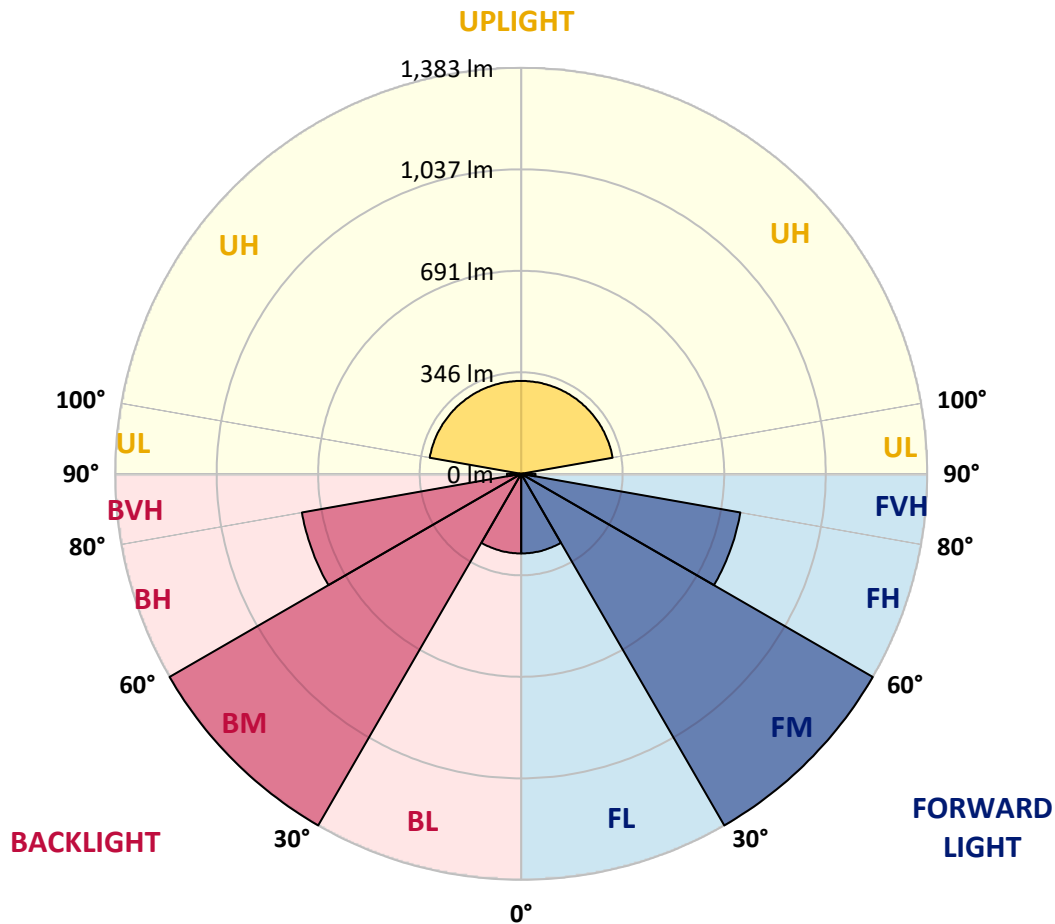
CATALOG NUMBER: TTN-D2-750-U-WQ-SG-UPL1

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |        |         |
|------|-------------|--------|-----------|-------------------------|--------|---------|
|      |             |        |           | B                       | U      | G       |
| FL   | (0°-30°)    | 271.1  | 5.2       |                         |        |         |
| FM   | (30°-60°)   | 1382.7 | 26.4      |                         |        |         |
| FH   | (60°-80°)   | 758.1  | 14.5      |                         |        | G1/1800 |
| FVH  | (80°-90°)   | 48.8   | 0.9       |                         |        | G1/100  |
| BL   | (0°-30°)    | 271.1  | 5.2       | B1/500                  |        |         |
| BM   | (30°-60°)   | 1382.7 | 26.4      | B2/2500                 |        |         |
| BH   | (60°-80°)   | 758.1  | 14.5      | B2/1000                 |        | G1/1800 |
| BVH  | (80°-90°)   | 48.8   | 0.9       |                         |        | G1/100  |
| UL   | (90°-100°)  | 7.2    | 0.1       |                         | U1/10  |         |
| UH   | (100°-180°) | 316.2  | 6.0       |                         | U3/500 |         |

**BUG Rating: B2-U3-G1**

Type V Short



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CATALOG NUMBER: TTN-D2-750-U-WQ-SG-UPL1

**CANDELA DISTRIBUTION (FULL):**

|        | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 65°    | 75°    | 85°    | 90°    |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°     | 500.3  | 500.3  | 500.3  | 500.3  | 500.3  | 500.3  | 500.3  | 500.3  | 500.3  | 500.3  | 500.3  |
| 2.5°   | 500.3  | 500.3  | 500.3  | 500.3  | 500.3  | 500.3  | 500.3  | 500.3  | 500.3  | 500.3  | 500.3  |
| 5°     | 504.7  | 504.7  | 500.3  | 504.7  | 504.7  | 504.7  | 504.7  | 504.7  | 504.7  | 504.7  | 504.7  |
| 7.5°   | 504.7  | 504.7  | 504.7  | 509.0  | 509.0  | 509.0  | 509.0  | 504.7  | 504.7  | 504.7  | 504.7  |
| 10°    | 513.4  | 513.4  | 513.4  | 513.4  | 513.4  | 513.4  | 513.4  | 513.4  | 513.4  | 513.4  | 513.4  |
| 12.5°  | 526.4  | 526.4  | 526.4  | 526.4  | 526.4  | 526.4  | 526.4  | 526.4  | 526.4  | 526.4  | 526.4  |
| 15°    | 548.2  | 548.2  | 548.2  | 548.2  | 552.5  | 552.5  | 552.5  | 548.2  | 548.2  | 548.2  | 548.2  |
| 17.5°  | 574.3  | 574.3  | 578.6  | 578.6  | 583.0  | 583.0  | 583.0  | 578.6  | 574.3  | 578.6  | 574.3  |
| 20°    | 613.4  | 613.4  | 613.4  | 617.8  | 622.1  | 617.8  | 622.1  | 613.4  | 613.4  | 613.4  | 613.4  |
| 22.5°  | 656.9  | 656.9  | 656.9  | 661.3  | 665.6  | 665.6  | 665.6  | 656.9  | 656.9  | 656.9  | 656.9  |
| 25°    | 709.1  | 709.1  | 709.1  | 713.5  | 717.8  | 722.2  | 722.2  | 713.5  | 709.1  | 709.1  | 704.8  |
| 27.5°  | 761.3  | 761.3  | 770.0  | 774.4  | 778.7  | 778.7  | 778.7  | 770.0  | 765.7  | 765.7  | 765.7  |
| 30°    | 822.2  | 822.2  | 830.9  | 835.3  | 844.0  | 844.0  | 844.0  | 830.9  | 826.6  | 822.2  | 822.2  |
| 32.5°  | 878.8  | 883.1  | 891.8  | 900.5  | 909.3  | 909.3  | 913.6  | 896.2  | 887.5  | 883.1  | 883.1  |
| 35°    | 939.7  | 944.1  | 952.8  | 965.8  | 974.5  | 978.9  | 983.2  | 965.8  | 952.8  | 948.4  | 948.4  |
| 37.5°  | 1009.3 | 1013.7 | 1026.7 | 1039.8 | 1057.2 | 1065.9 | 1070.2 | 1044.1 | 1022.4 | 1013.7 | 1013.7 |
| 40°    | 1087.6 | 1092.0 | 1105.0 | 1122.4 | 1139.8 | 1148.5 | 1152.9 | 1126.8 | 1105.0 | 1096.3 | 1092.0 |
| 42.5°  | 1152.9 | 1161.6 | 1174.6 | 1200.7 | 1218.1 | 1231.2 | 1231.2 | 1200.7 | 1174.6 | 1161.6 | 1161.6 |
| 45°    | 1213.8 | 1222.5 | 1244.2 | 1270.3 | 1296.4 | 1309.5 | 1305.1 | 1274.7 | 1244.2 | 1226.8 | 1222.5 |
| 47.5°  | 1261.6 | 1270.3 | 1296.4 | 1326.9 | 1361.7 | 1374.8 | 1370.4 | 1335.6 | 1296.4 | 1274.7 | 1270.3 |
| 50°    | 1287.7 | 1292.1 | 1322.5 | 1366.1 | 1400.9 | 1413.9 | 1405.2 | 1370.4 | 1326.9 | 1296.4 | 1292.1 |
| 52.5°  | 1283.4 | 1287.7 | 1322.5 | 1370.4 | 1409.6 | 1422.6 | 1409.6 | 1370.4 | 1326.9 | 1292.1 | 1287.7 |
| 55°    | 1257.3 | 1261.6 | 1296.4 | 1348.6 | 1387.8 | 1400.9 | 1387.8 | 1348.6 | 1300.8 | 1266.0 | 1261.6 |
| 57.5°  | 1209.4 | 1213.8 | 1248.6 | 1300.8 | 1344.3 | 1357.3 | 1339.9 | 1296.4 | 1248.6 | 1213.8 | 1213.8 |
| 60°    | 1139.8 | 1144.2 | 1179.0 | 1235.5 | 1274.7 | 1287.7 | 1266.0 | 1231.2 | 1183.3 | 1144.2 | 1139.8 |
| 62.5°  | 1048.5 | 1048.5 | 1087.6 | 1144.2 | 1179.0 | 1196.4 | 1174.6 | 1135.5 | 1092.0 | 1048.5 | 1052.8 |
| 65°    | 939.7  | 935.4  | 974.5  | 1026.7 | 1065.9 | 1078.9 | 1057.2 | 1022.4 | 978.9  | 939.7  | 939.7  |
| 67.5°  | 826.6  | 826.6  | 857.0  | 900.5  | 935.4  | 948.4  | 926.7  | 896.2  | 861.4  | 826.6  | 826.6  |
| 70°    | 704.8  | 704.8  | 726.5  | 770.0  | 800.5  | 809.2  | 796.1  | 765.7  | 735.2  | 704.8  | 704.8  |
| 72.5°  | 583.0  | 578.6  | 600.4  | 635.2  | 661.3  | 670.0  | 656.9  | 639.5  | 604.7  | 583.0  | 583.0  |
| 75°    | 461.2  | 456.8  | 469.9  | 500.3  | 522.1  | 530.8  | 517.7  | 504.7  | 478.6  | 461.2  | 461.2  |
| 77.5°  | 343.7  | 339.3  | 352.4  | 378.5  | 391.5  | 395.9  | 387.2  | 378.5  | 356.7  | 343.7  | 343.7  |
| 80°    | 234.9  | 230.6  | 239.3  | 256.7  | 269.7  | 269.7  | 265.4  | 261.0  | 243.6  | 234.9  | 239.3  |
| 82.5°  | 139.2  | 134.9  | 143.6  | 156.6  | 165.3  | 161.0  | 161.0  | 156.6  | 143.6  | 139.2  | 139.2  |
| 85°    | 60.9   | 56.6   | 60.9   | 69.6   | 78.3   | 74.0   | 74.0   | 74.0   | 65.3   | 60.9   | 60.9   |
| 87.5°  | 8.7    | 8.7    | 8.7    | 13.1   | 17.4   | 13.1   | 13.1   | 13.1   | 8.7    | 8.7    | 8.7    |
| 90°    | 2.8    | 2.8    | 3.3    | 3.3    | 3.3    | 3.3    | 3.3    | 3.3    | 3.3    | 2.8    | 2.8    |
| 92.5°  | 2.8    | 2.8    | 2.8    | 3.9    | 4.4    | 3.9    | 4.4    | 3.3    | 3.3    | 2.8    | 2.8    |
| 95°    | 3.3    | 3.3    | 3.9    | 5.0    | 6.1    | 6.6    | 6.6    | 3.9    | 3.9    | 3.3    | 3.3    |
| 97.5°  | 4.4    | 5.0    | 5.0    | 6.1    | 10.0   | 18.3   | 11.1   | 5.5    | 5.5    | 5.0    | 4.4    |
| 100°   | 7.2    | 7.7    | 7.7    | 13.8   | 29.3   | 39.3   | 28.2   | 14.4   | 10.5   | 7.7    | 7.7    |
| 102.5° | 23.2   | 24.3   | 29.9   | 44.8   | 66.4   | 60.3   | 50.9   | 48.1   | 33.2   | 26.6   | 25.5   |
| 105°   | 59.2   | 58.7   | 63.1   | 74.7   | 93.0   | 91.3   | 84.1   | 76.4   | 65.8   | 60.9   | 60.9   |
| 107.5° | 78.0   | 78.0   | 81.9   | 91.9   | 105.7  | 123.4  | 125.1  | 99.0   | 86.9   | 81.3   | 80.8   |
| 110°   | 88.0   | 88.0   | 91.3   | 99.6   | 117.9  | 142.8  | 141.6  | 122.3  | 107.3  | 100.2  | 99.0   |

REPORT NUMBER: P833605

CATALOG NUMBER: TTN-D2-750-U-WQ-SG-UPL1

**CANDELA DISTRIBUTION (continued):**

|        | 0°   | 5°   | 15°  | 25°   | 35°   | 45°   | 55°   | 65°   | 75°   | 85°   | 90°   |
|--------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|
| 112.5° | 90.2 | 90.7 | 95.2 | 107.9 | 127.8 | 138.9 | 133.9 | 126.2 | 119.5 | 114.0 | 112.9 |
| 115°   | 93.5 | 93.5 | 98.5 | 110.7 | 121.7 | 126.2 | 120.6 | 114.5 | 110.1 | 107.9 | 109.0 |
| 117.5° | 92.4 | 94.1 | 95.2 | 101.8 | 109.0 | 112.3 | 109.6 | 101.3 | 97.9  | 96.8  | 95.2  |
| 120°   | 85.8 | 85.8 | 86.9 | 90.2  | 94.1  | 95.7  | 94.6  | 89.1  | 86.3  | 85.8  | 84.7  |
| 122.5° | 76.4 | 76.9 | 76.4 | 78.0  | 80.8  | 82.4  | 81.3  | 76.9  | 75.8  | 75.8  | 74.7  |
| 125°   | 67.0 | 67.0 | 66.4 | 67.5  | 69.2  | 68.6  | 69.2  | 67.0  | 66.4  | 66.4  | 65.8  |
| 127.5° | 60.3 | 59.8 | 58.7 | 59.2  | 59.8  | 59.8  | 60.3  | 58.1  | 58.7  | 59.2  | 58.7  |
| 130°   | 53.7 | 53.7 | 52.6 | 52.6  | 52.6  | 51.5  | 52.6  | 51.5  | 52.0  | 52.6  | 53.1  |
| 132.5° | 47.6 | 47.6 | 45.9 | 45.4  | 45.4  | 45.4  | 45.9  | 45.4  | 46.5  | 47.6  | 47.6  |
| 135°   | 42.6 | 42.6 | 40.9 | 41.5  | 41.5  | 40.9  | 41.5  | 40.9  | 42.1  | 42.6  | 42.6  |
| 137.5° | 38.7 | 38.7 | 37.6 | 37.6  | 37.6  | 37.1  | 37.6  | 37.6  | 38.2  | 39.3  | 39.8  |
| 140°   | 35.4 | 35.4 | 34.9 | 34.9  | 34.3  | 34.9  | 34.9  | 34.9  | 35.4  | 36.0  | 36.0  |
| 142.5° | 33.8 | 33.2 | 32.6 | 32.1  | 32.6  | 32.6  | 32.6  | 32.1  | 32.6  | 33.8  | 33.8  |
| 145°   | 31.0 | 31.0 | 30.4 | 30.4  | 30.4  | 31.0  | 30.4  | 30.4  | 31.0  | 31.0  | 31.5  |
| 147.5° | 29.3 | 29.3 | 28.8 | 29.3  | 29.3  | 29.3  | 29.3  | 28.8  | 29.3  | 29.3  | 29.9  |
| 150°   | 28.8 | 28.2 | 27.7 | 28.2  | 28.2  | 27.7  | 27.7  | 27.7  | 27.7  | 28.2  | 28.2  |
| 152.5° | 27.1 | 27.1 | 26.6 | 27.1  | 26.6  | 26.6  | 26.6  | 26.6  | 26.6  | 27.1  | 27.7  |
| 155°   | 26.0 | 26.0 | 25.5 | 26.0  | 26.0  | 26.0  | 26.0  | 26.0  | 26.0  | 26.0  | 26.0  |
| 157.5° | 24.9 | 25.5 | 24.9 | 24.9  | 24.9  | 24.9  | 24.9  | 24.9  | 24.9  | 25.5  | 25.5  |
| 160°   | 24.3 | 24.3 | 24.3 | 24.3  | 23.8  | 23.8  | 23.8  | 24.3  | 24.3  | 24.3  | 24.9  |
| 162.5° | 23.8 | 23.8 | 23.8 | 23.8  | 23.2  | 23.2  | 23.2  | 23.2  | 23.8  | 23.8  | 24.3  |
| 165°   | 23.8 | 23.2 | 23.2 | 23.2  | 22.7  | 22.7  | 22.7  | 22.7  | 23.2  | 23.8  | 23.2  |
| 167.5° | 22.7 | 22.7 | 22.7 | 22.7  | 22.7  | 22.1  | 22.1  | 22.7  | 22.7  | 22.7  | 23.2  |
| 170°   | 22.7 | 22.7 | 22.1 | 22.1  | 22.1  | 22.1  | 22.1  | 22.1  | 22.1  | 22.1  | 22.7  |
| 172.5° | 22.7 | 22.7 | 22.7 | 22.7  | 22.1  | 22.1  | 22.1  | 22.1  | 22.1  | 22.7  | 22.7  |
| 175°   | 22.7 | 22.7 | 22.7 | 22.7  | 22.1  | 22.1  | 22.1  | 22.7  | 22.7  | 22.7  | 22.1  |
| 177.5° | 22.7 | 22.7 | 22.7 | 22.7  | 22.1  | 22.7  | 22.7  | 22.7  | 22.7  | 22.7  | 22.7  |
| 180°   | 22.7 | 22.7 | 22.7 | 22.7  | 22.7  | 22.7  | 22.7  | 22.7  | 22.7  | 22.7  | 22.7  |

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

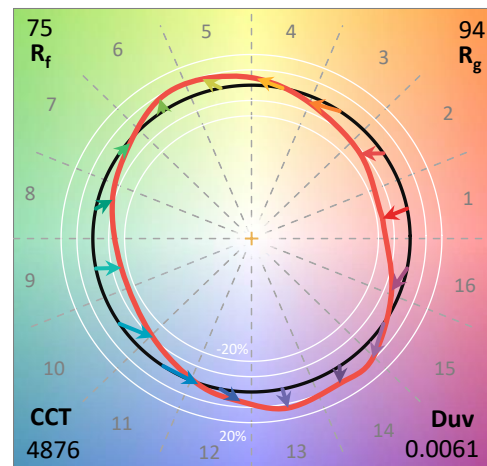
Data in this report applies to TT and TTN families of products

### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2411-284-3  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 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     | CRI (Ra): | 72.6 |      |       |
| CIE u':                   | 0.2086   | R1:       | 69.5 | R9:  | -24.6 |
| CIE v':                   | 0.4932   | R2:       | 77.0 | R10: | 44.8  |
| Duv:                      | 0.0061   | R3:       | 82.2 | R11: | 68.2  |
| CIE x:                    | 0.3502   | R4:       | 72.6 | R12: | 36.1  |
| CIE y:                    | 0.3680   | R5:       | 69.3 | R13: | 70.5  |
| CIE z:                    | 0.2818   | R6:       | 67.6 | R14: | 89.9  |
| Peak Wavelength (nm):     | 451      | R7:       | 83.7 | R15: | 63.1  |
| Dominant Wavelength (nm): | 569      | R8:       | 58.6 |      |       |
| Purity:                   | 15.51324 |           |      |      |       |
| Rf:                       | 74.6     |           |      |      |       |
| Rg:                       | 94.4     |           |      |      |       |



### Test Conditions

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

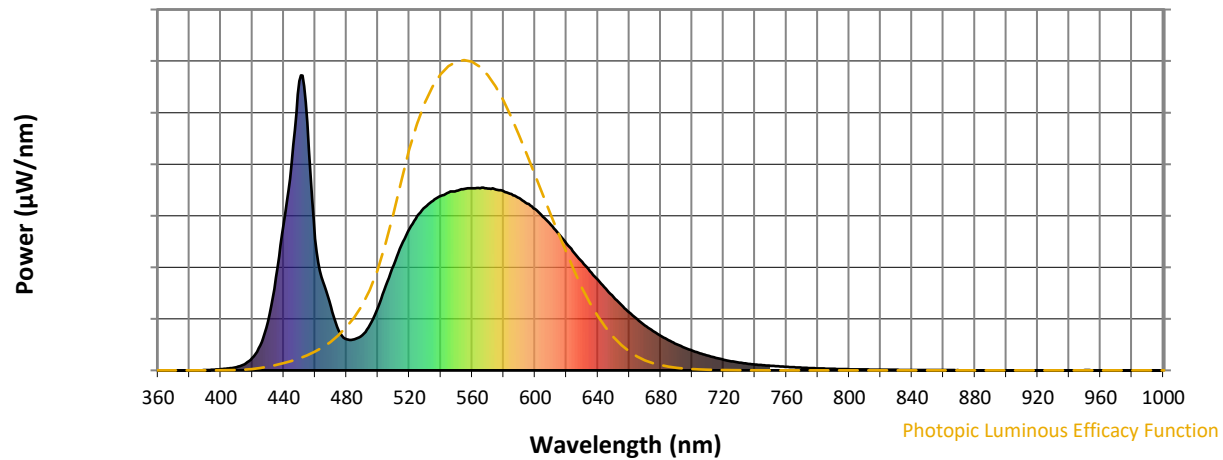
REPORT NUMBER: SP1-2411-284-3

| 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

### Photopic Flux vs. Wavelength

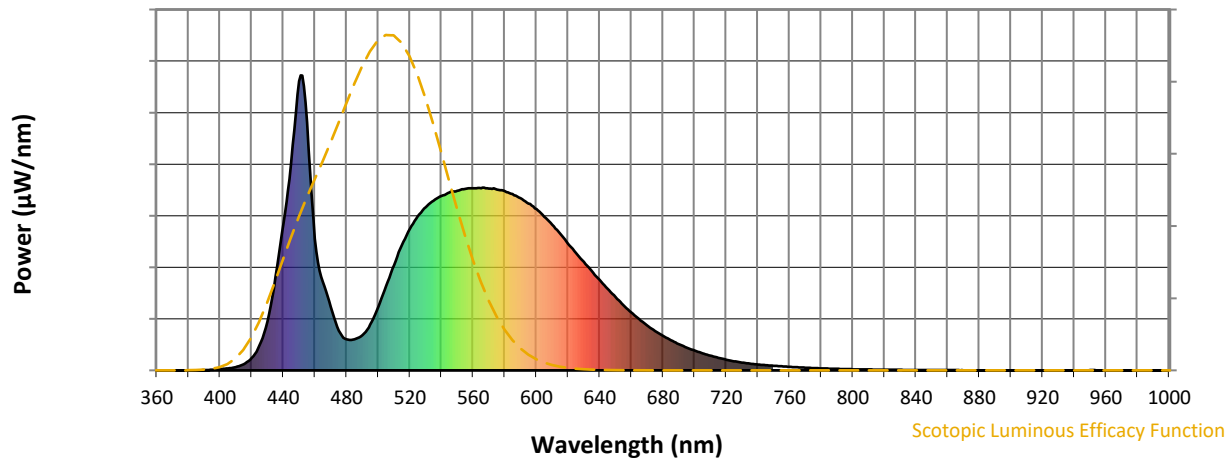


### Photopic Lumens: NR

| λ (nm) | Power W <sup>λ</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>λ</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>λ</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>λ</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>λ</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            |        |                          |               |

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### Scotopic Flux vs. Wavelength



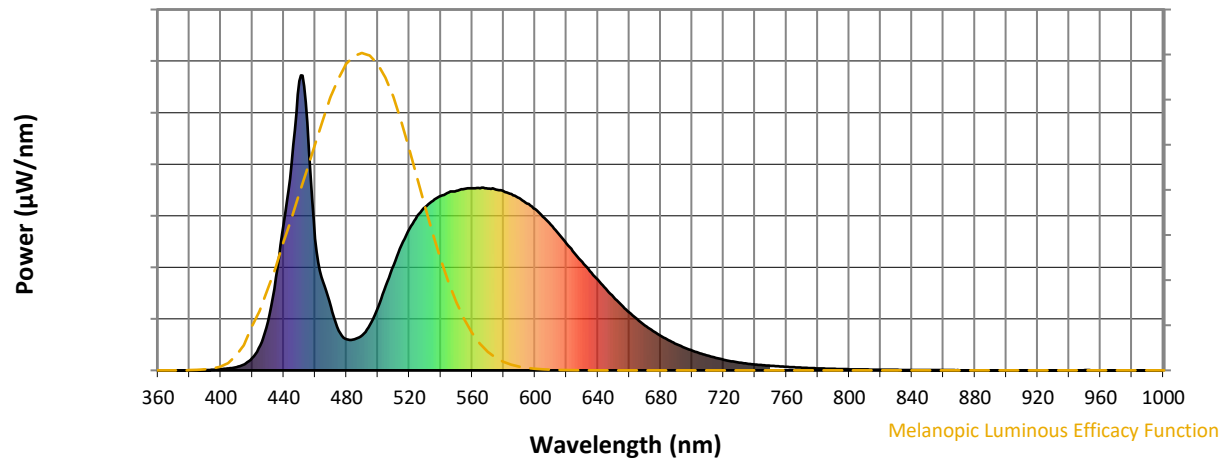
Scotopic Lumens: NR

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            |        |                          |               |

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### Melanopic Flux vs. Wavelength



Melanopic Lumens: NR

M/P: 3.51

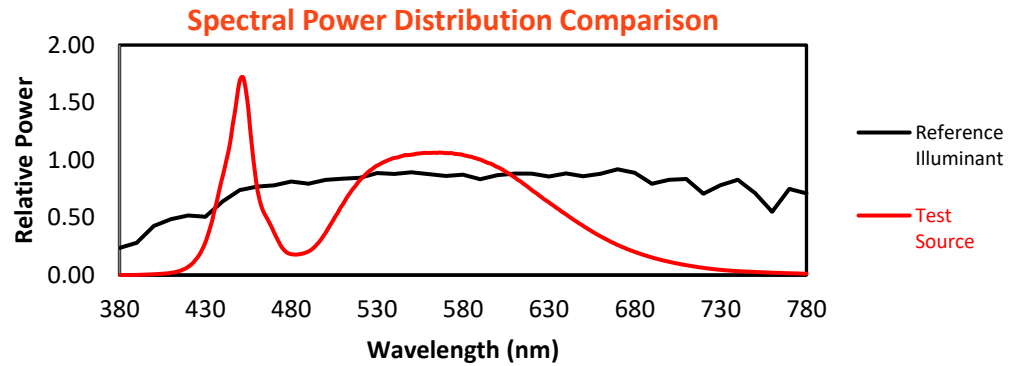
| λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) |
|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|
| 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               |           |                             |                  |

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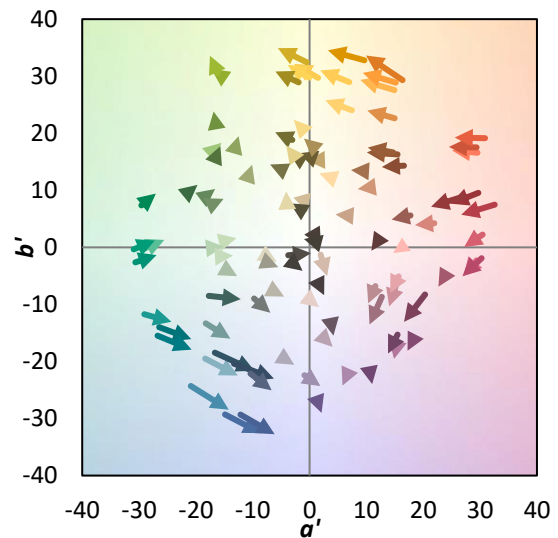
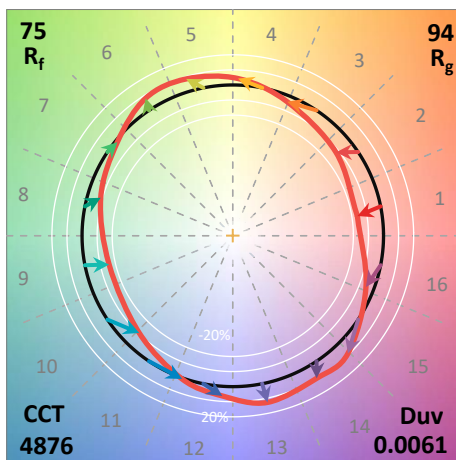
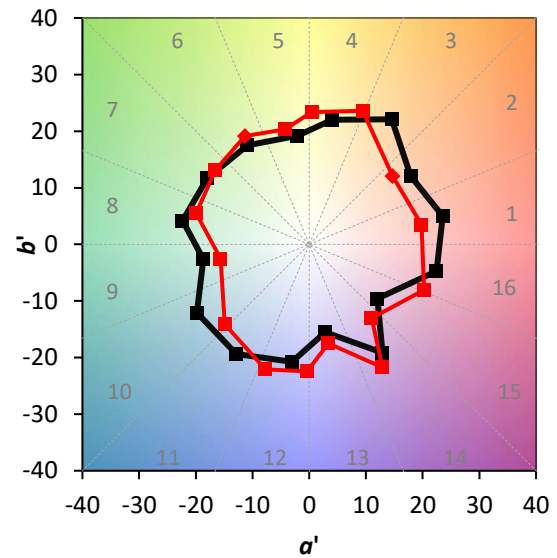
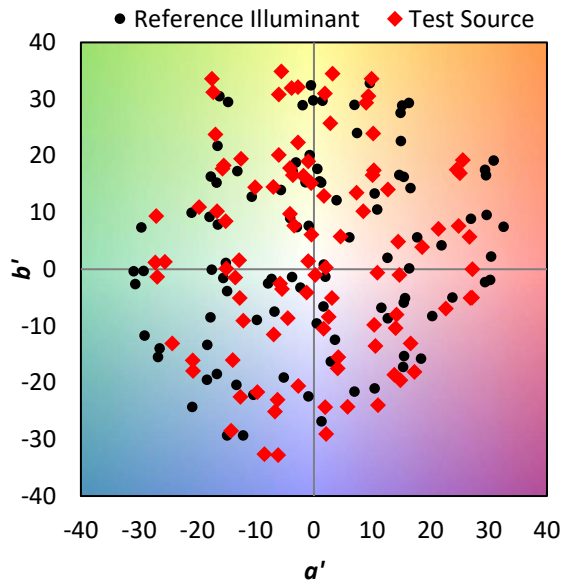
TM-30-18

### Summary

$R_f = 74.6$   
 $R_g = 94.4$   
 $\text{CIE } R_a = 72.6$   
 $R_g = -24.6$

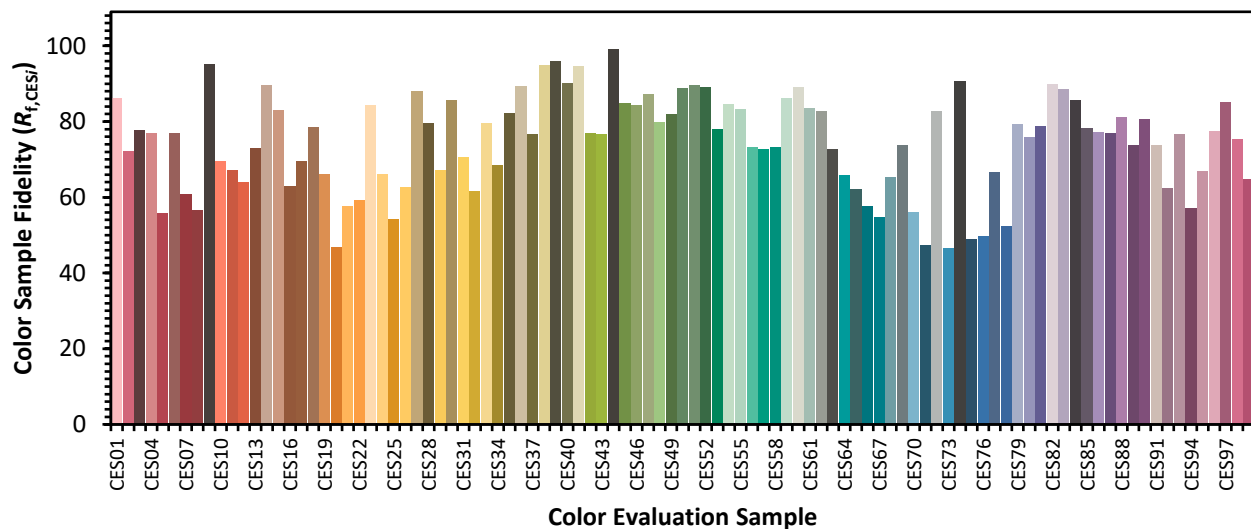


### Color Vector Graphics

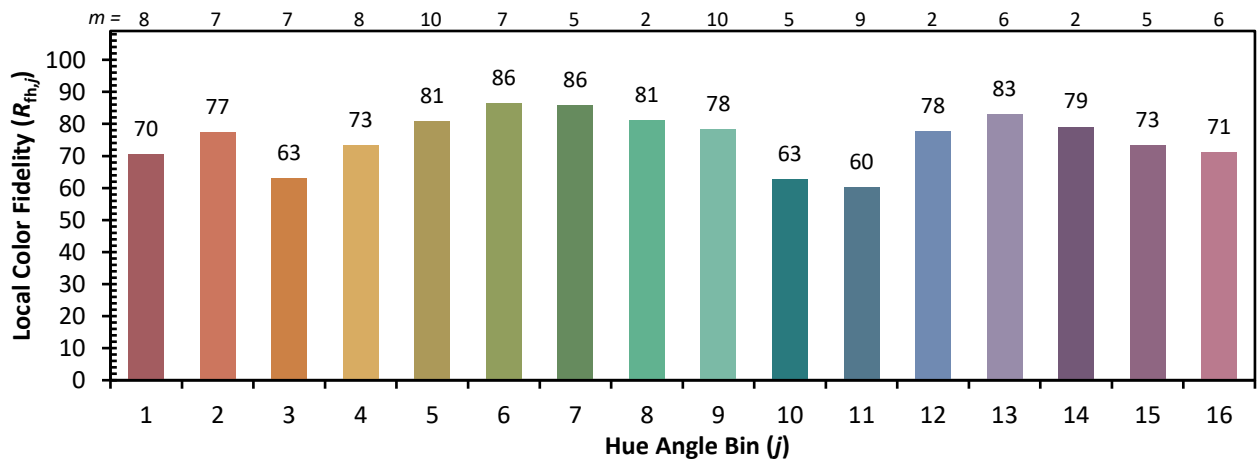
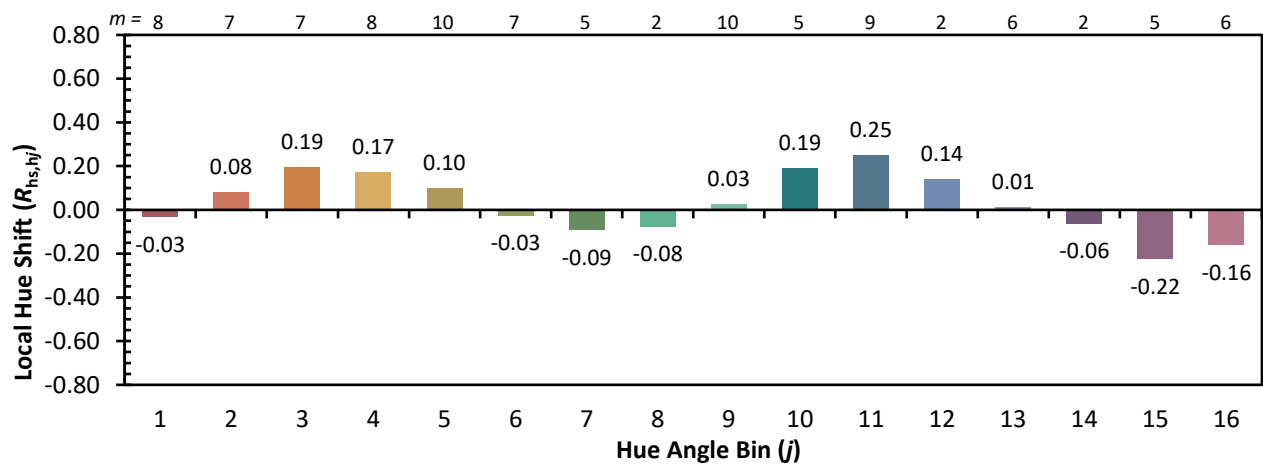
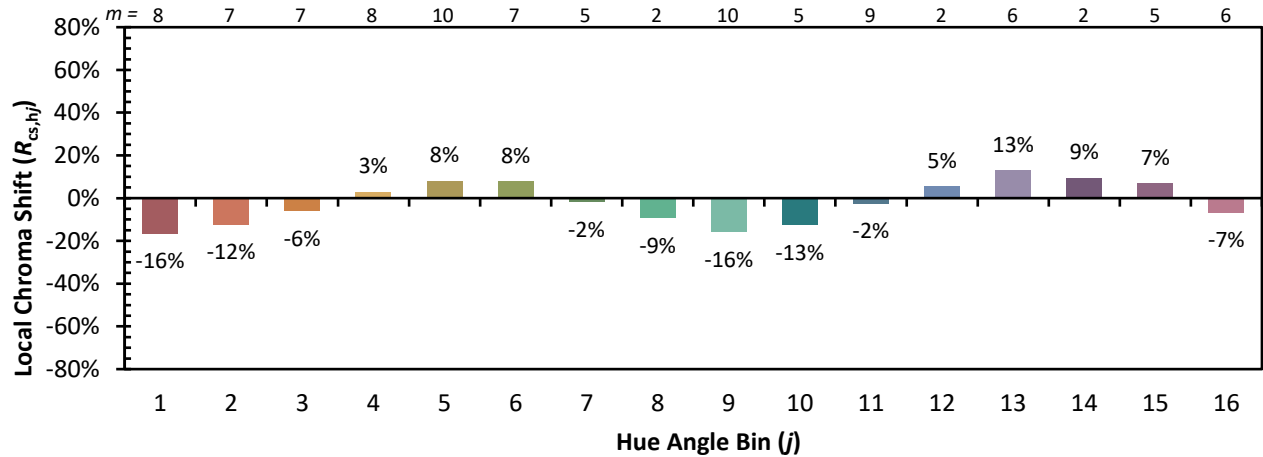


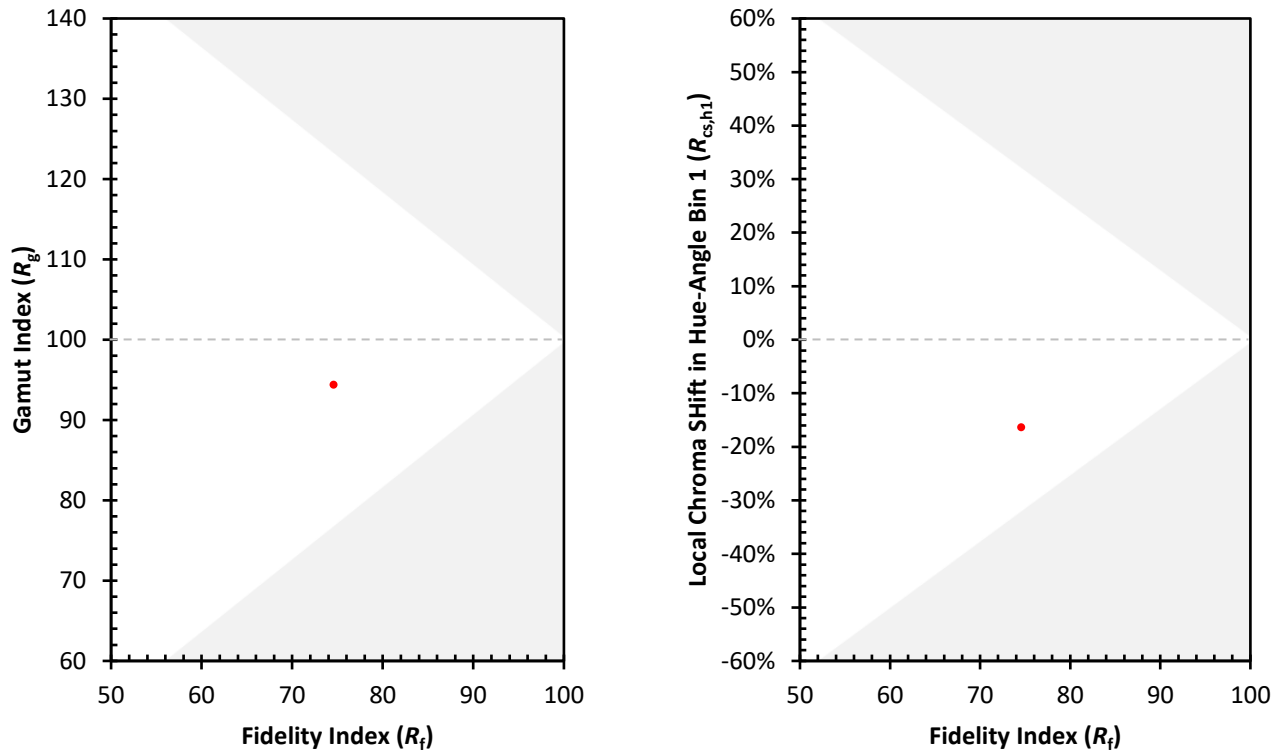
**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| 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)