

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: INVUE

Report Number: P822974

Luminaire Tested: **MSA-SA1D-735-U-T2-HSS**

Issue Date: 04/10/2024

**Test Information**

Test Method: LM-79-08  
Report Number: P822974  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1910-543-9)  
Test Lab: INNOVATION CENTER  
Issue Date: 04/10/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: MSA-SA1D-735-U-T2-HSS  
Description: MESA POST TOP DECORATIVE LUMINAIRE. (1) LIGHTSQUARES WITH 16 LEDS  
EACH AND TYPE II OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 4818.2 lumens  
Efficiency: N/A  
Efficacy: 71.9 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 0.5' x H: 0')  
IES Classification: Type II - Medium  
BUG Rating: B1 - U0 - G1

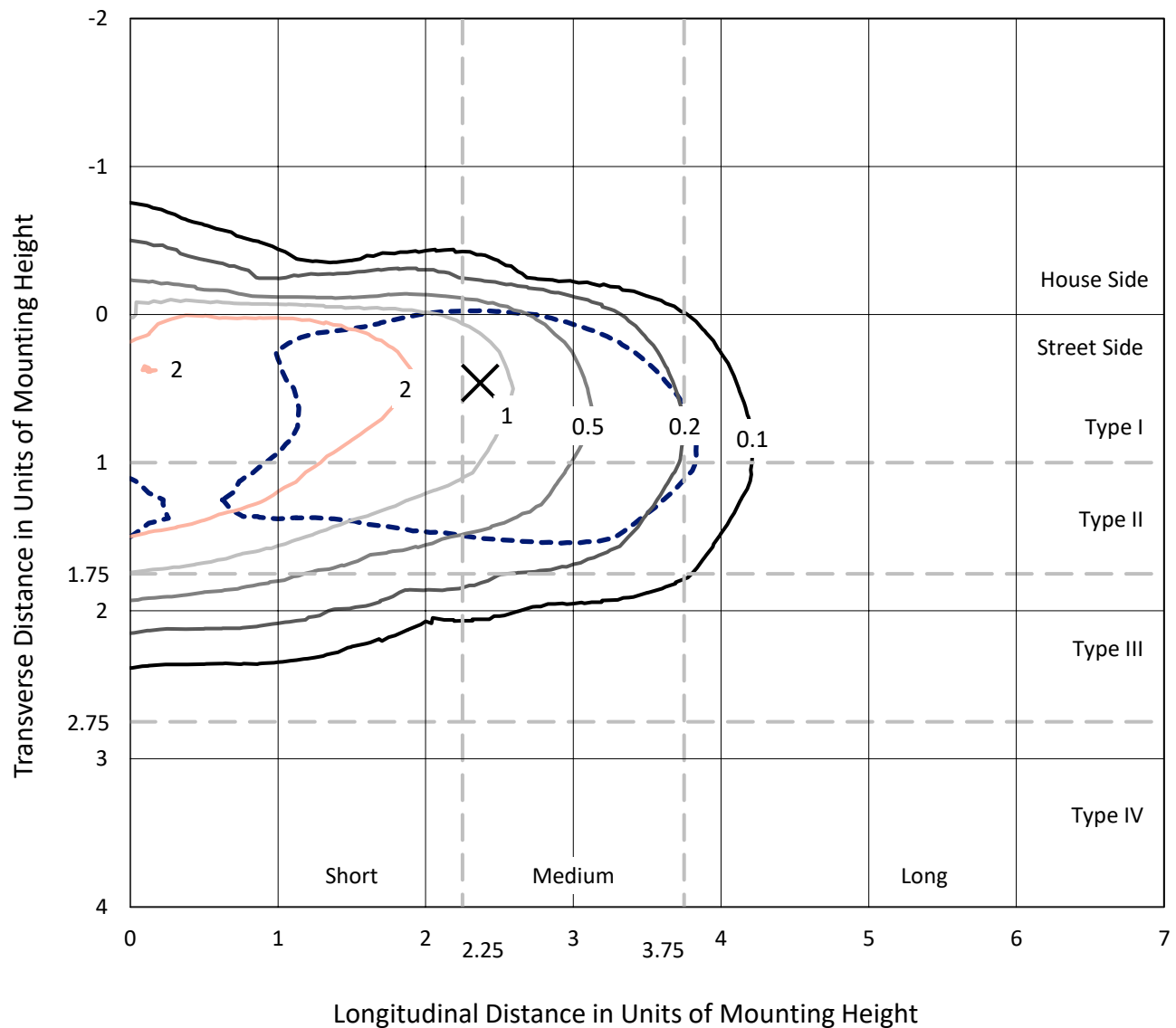
Input Watts (W): 67  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

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## Iso-Footcandle Lines of Horizontal Illumination

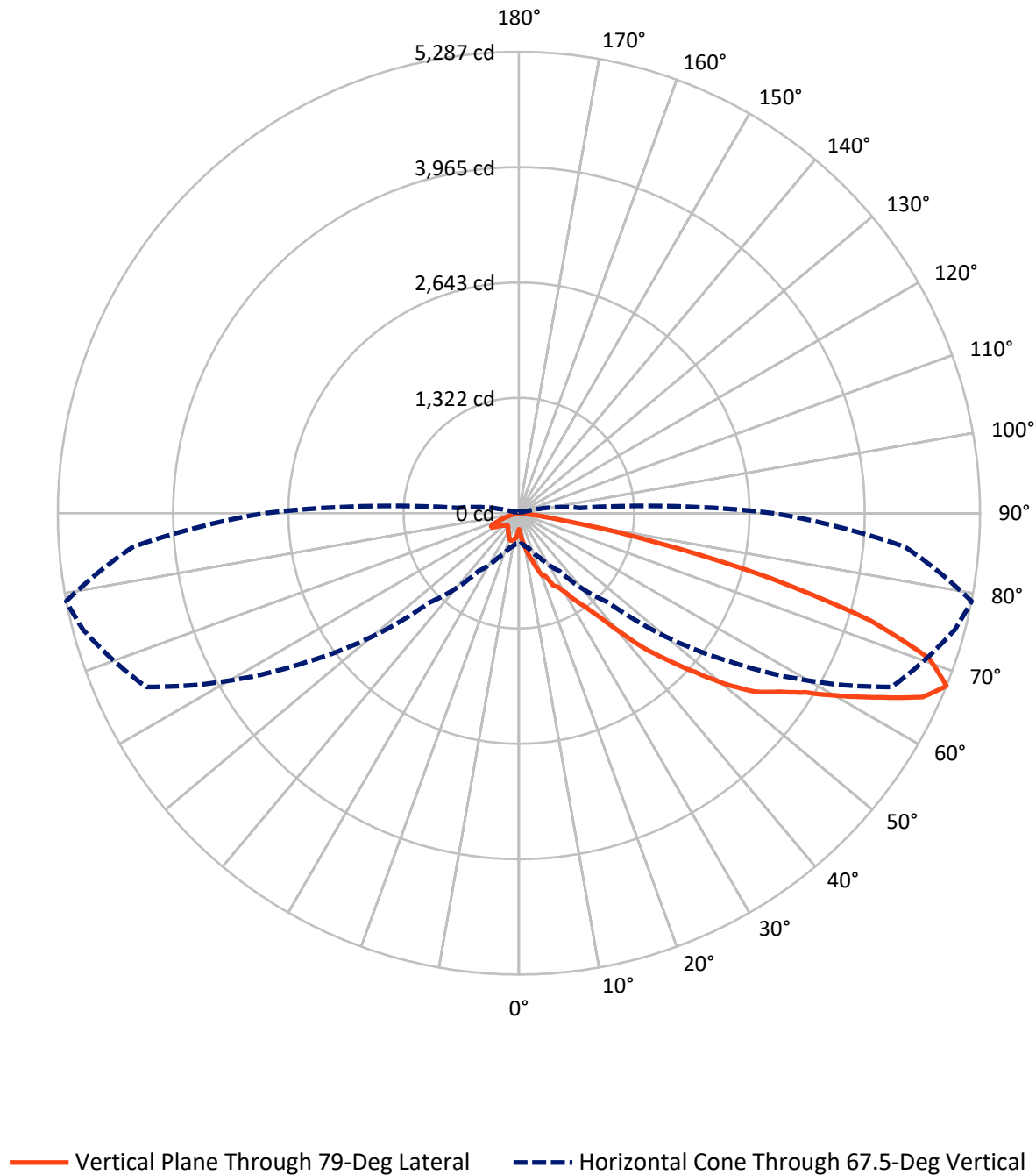
× Max cd  
 - - - 1/2 Max cd



Based on 15 foot mounting height. Maximum calculated value = 4 fc  
 Type II - Medium - N/A

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## Luminous Intensity Polar Plot



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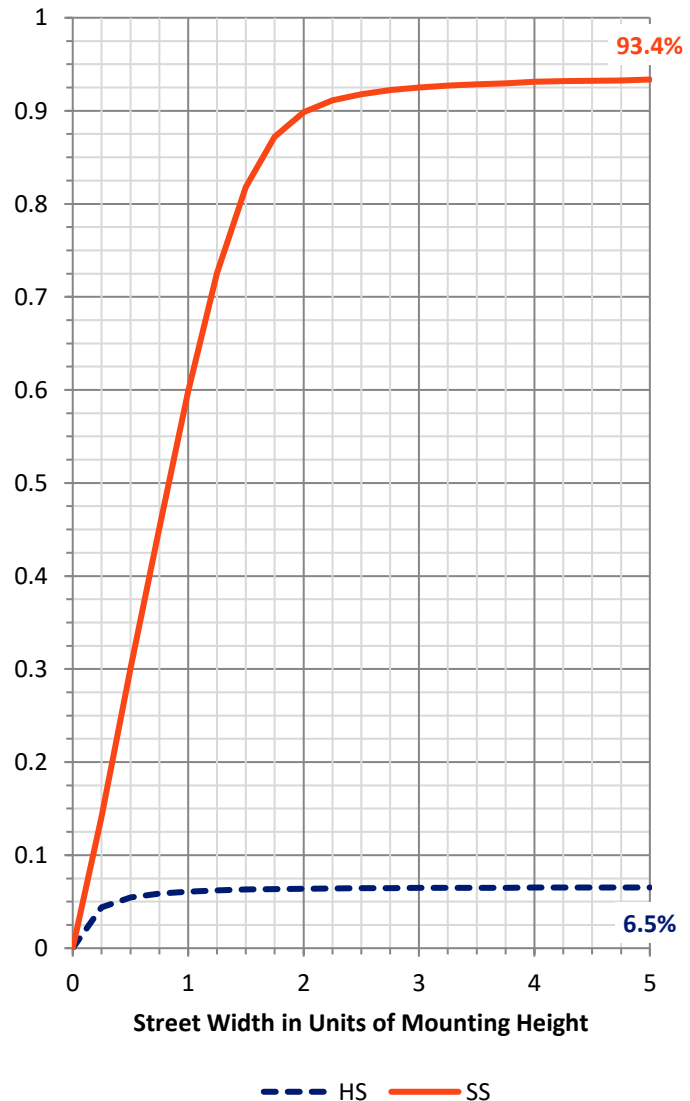
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 316.6    | 0.0    | 316.6  |
|                    | % Fixture | 6.6      | 0.0    | 6.6    |
| <b>Street Side</b> | Lumens    | 4501.6   | 0.0    | 4501.6 |
|                    | % Fixture | 93.4     | 0.0    | 93.4   |
| <b>Total</b>       | Lumens    | 4818.2   | 0.0    | 4818.2 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**Coefficient of Utilization**

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 27.0   | 0.6       |
| 10°-20°   | 107.7  | 2.2       |
| 20°-30°   | 207.7  | 4.3       |
| 30°-40°   | 408.0  | 8.5       |
| 40°-50°   | 817.3  | 17.0      |
| 50°-60°   | 1306.4 | 27.1      |
| 60°-70°   | 1314.5 | 27.3      |
| 70°-80°   | 593.0  | 12.3      |
| 80°-90°   | 36.7   | 0.8       |
| 90°-100°  | 0.0    | 0.0       |
| 100°-110° | 0.0    | 0.0       |
| 110°-120° | 0.0    | 0.0       |
| 120°-130° | 0.0    | 0.0       |
| 130°-140° | 0.0    | 0.0       |
| 140°-150° | 0.0    | 0.0       |
| 150°-160° | 0.0    | 0.0       |
| 160°-170° | 0.0    | 0.0       |
| 170°-180° | 0.0    | 0.0       |
| 0°-90°    | 4818.2 | 100.0     |
| 0°-180°   | 4818.2 | 100.0     |



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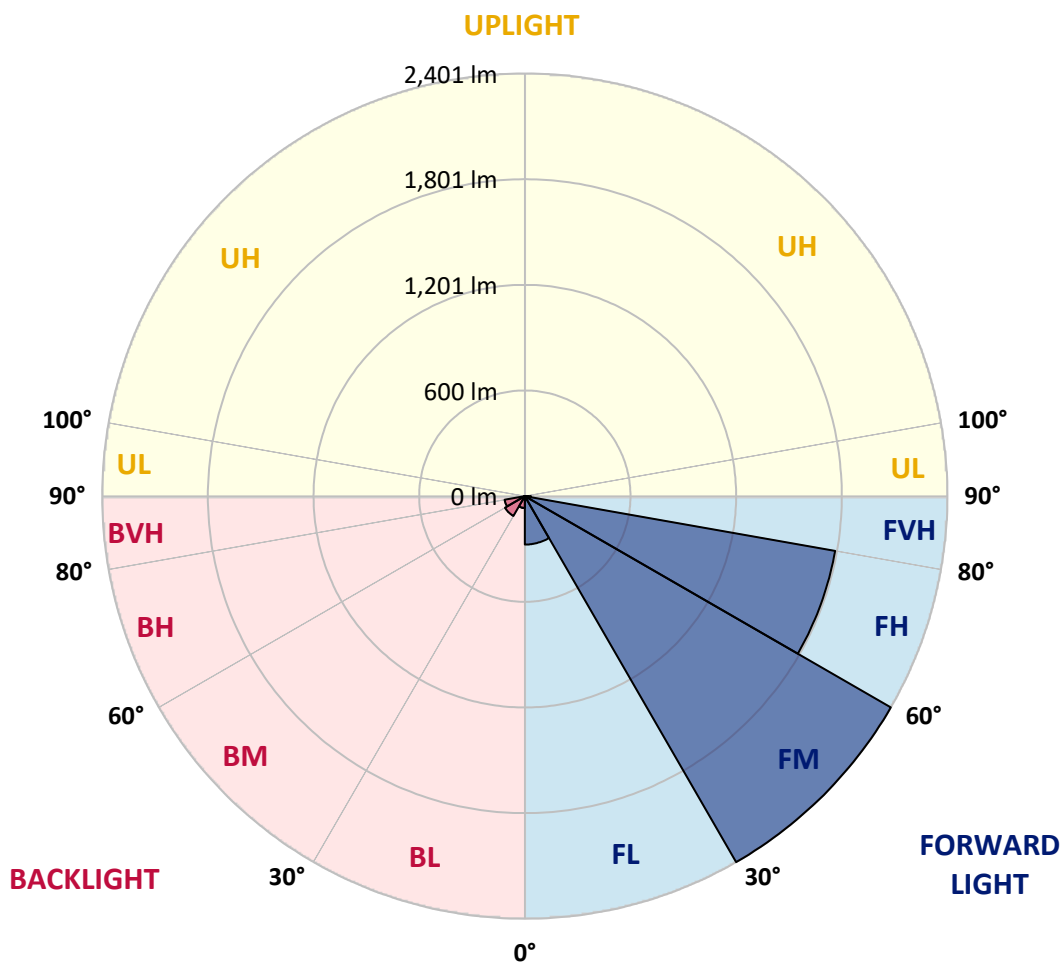
CATALOG NUMBER: MSA-SA1D-735-U-T2-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 275.1  | 5.7       |                         |      |         |
| FM   | (30°-60°)   | 2401.5 | 49.8      |                         |      |         |
| FH   | (60°-80°)   | 1790.7 | 37.2      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 34.4   | 0.7       |                         |      | G1/100  |
| BL   | (0°-30°)    | 67.3   | 1.4       | B0/110                  |      |         |
| BM   | (30°-60°)   | 130.3  | 2.7       | B0/220                  |      |         |
| BH   | (60°-80°)   | 116.7  | 2.4       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 2.3    | 0.0       |                         |      | G0/10   |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B1-U0-G1**

Type II Medium



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 65°    | 75°    | 79°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 185.7  | 185.7  | 185.7  | 185.7  | 185.7  | 185.7  | 185.7  | 185.7  | 185.7  | 185.7  | 185.7  |
| 2.5°  | 250.7  | 241.7  | 227.1  | 235.3  | 234.8  | 239.0  | 231.0  | 222.3  | 208.2  | 222.3  | 223.4  |
| 5°    | 361.0  | 344.2  | 333.6  | 331.5  | 319.8  | 308.9  | 306.5  | 297.5  | 290.6  | 278.1  | 289.3  |
| 7.5°  | 449.7  | 442.0  | 423.1  | 421.0  | 392.3  | 376.4  | 381.4  | 377.4  | 351.1  | 338.1  | 349.0  |
| 10°   | 487.4  | 474.1  | 476.8  | 474.1  | 461.9  | 466.4  | 456.0  | 444.1  | 423.1  | 401.6  | 374.5  |
| 12.5° | 502.0  | 499.9  | 521.9  | 519.3  | 548.0  | 582.4  | 559.3  | 539.5  | 490.9  | 485.5  | 448.6  |
| 15°   | 533.3  | 546.7  | 543.4  | 554.6  | 572.9  | 631.6  | 631.1  | 635.8  | 584.3  | 556.7  | 503.3  |
| 17.5° | 561.2  | 571.1  | 555.1  | 567.9  | 617.8  | 653.4  | 700.9  | 682.3  | 688.2  | 660.0  | 577.4  |
| 20°   | 549.3  | 560.5  | 544.5  | 536.8  | 624.7  | 692.2  | 755.6  | 742.1  | 777.1  | 759.6  | 645.7  |
| 22.5° | 623.9  | 602.9  | 562.8  | 537.8  | 603.5  | 691.3  | 775.0  | 831.6  | 825.5  | 782.5  | 709.1  |
| 25°   | 716.1  | 703.4  | 655.3  | 611.1  | 617.0  | 686.6  | 836.1  | 919.3  | 937.3  | 919.0  | 769.5  |
| 27.5° | 840.4  | 837.4  | 739.2  | 720.0  | 663.2  | 665.6  | 845.7  | 1029.8 | 988.6  | 959.9  | 839.8  |
| 30°   | 1002.7 | 979.6  | 862.9  | 838.0  | 754.0  | 712.9  | 904.1  | 1125.1 | 1094.8 | 1055.8 | 906.0  |
| 32.5° | 1177.2 | 1180.6 | 1031.8 | 949.6  | 882.0  | 833.2  | 881.0  | 1169.7 | 1226.3 | 1194.7 | 988.6  |
| 35°   | 1375.3 | 1390.7 | 1208.8 | 1112.1 | 980.9  | 908.9  | 980.3  | 1306.8 | 1408.2 | 1325.1 | 1099.4 |
| 37.5° | 1680.5 | 1680.0 | 1467.5 | 1274.9 | 1179.6 | 1101.4 | 1145.9 | 1431.3 | 1631.9 | 1515.1 | 1298.0 |
| 40°   | 1949.0 | 1890.6 | 1693.0 | 1471.7 | 1323.0 | 1301.7 | 1269.6 | 1601.9 | 1870.7 | 1800.3 | 1474.6 |
| 42.5° | 2149.6 | 2108.4 | 1869.6 | 1697.5 | 1513.2 | 1445.7 | 1434.3 | 1851.8 | 2223.2 | 2124.6 | 1726.7 |
| 45°   | 2389.4 | 2254.5 | 2078.7 | 1923.6 | 1735.8 | 1716.1 | 1689.3 | 2105.5 | 2633.3 | 2411.2 | 1945.8 |
| 47.5° | 2604.3 | 2477.3 | 2311.0 | 2111.8 | 1896.2 | 2058.2 | 1955.1 | 2328.3 | 2931.5 | 2723.0 | 2187.6 |
| 50°   | 2785.1 | 2650.2 | 2464.0 | 2312.4 | 2219.9 | 2329.9 | 2158.1 | 2511.9 | 3253.7 | 3084.7 | 2413.6 |
| 52.5° | 2877.3 | 2724.6 | 2580.6 | 2486.9 | 2543.5 | 2518.8 | 2433.2 | 2734.2 | 3528.3 | 3401.9 | 2613.8 |
| 55°   | 2801.6 | 2652.4 | 2592.1 | 2638.6 | 2810.4 | 2738.9 | 2745.8 | 3078.7 | 3787.5 | 3613.3 | 2788.1 |
| 57.5° | 2465.9 | 2329.7 | 2356.5 | 2483.6 | 2813.1 | 3000.0 | 3102.3 | 3413.3 | 3995.5 | 3876.8 | 3056.9 |
| 60°   | 1865.3 | 1755.7 | 1855.0 | 2080.7 | 2548.5 | 2948.0 | 3355.2 | 3748.0 | 4292.7 | 4255.5 | 3463.8 |
| 62.5° | 1139.2 | 1079.7 | 1220.5 | 1502.0 | 2030.8 | 2692.7 | 3502.5 | 4194.2 | 4610.7 | 4650.3 | 3895.4 |
| 65°   | 581.1  | 554.3  | 671.7  | 919.3  | 1372.2 | 2212.0 | 3396.1 | 4471.5 | 4939.3 | 5085.3 | 4306.8 |
| 67.5° | 366.0  | 348.7  | 411.4  | 560.7  | 809.6  | 1442.8 | 2973.5 | 4714.0 | 5171.4 | 5286.9 | 4444.1 |
| 70°   | 253.7  | 242.8  | 297.0  | 384.8  | 510.8  | 777.1  | 2207.7 | 4487.7 | 4987.3 | 4992.6 | 4111.9 |
| 72.5° | 161.0  | 152.5  | 205.3  | 285.0  | 376.9  | 401.3  | 1265.6 | 3521.4 | 4269.1 | 4220.0 | 3329.9 |
| 75°   | 104.3  | 100.1  | 130.4  | 208.8  | 289.5  | 247.5  | 625.5  | 2376.1 | 3061.1 | 2984.1 | 2211.7 |
| 77.5° | 74.9   | 72.2   | 87.4   | 139.5  | 206.1  | 173.2  | 280.5  | 1416.2 | 1755.1 | 1586.7 | 1073.6 |
| 80°   | 45.2   | 44.9   | 63.3   | 87.4   | 146.6  | 122.1  | 129.6  | 643.0  | 680.4  | 554.9  | 328.0  |
| 82.5° | 22.5   | 23.4   | 35.3   | 56.3   | 94.3   | 79.9   | 59.2   | 214.1  | 182.8  | 134.6  | 66.4   |
| 85°   | 5.3    | 6.6    | 18.6   | 38.8   | 47.2   | 31.9   | 28.1   | 56.1   | 50.2   | 38.0   | 19.4   |
| 87.5° | 0.0    | 0.0    | 5.9    | 9.3    | 12.8   | 5.3    | 9.6    | 10.6   | 13.5   | 10.6   | 4.0    |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

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**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°   | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 185.7  | 185.7 | 185.7 | 185.7 | 185.7 | 185.7 | 185.7 | 185.7 | 185.7 | 185.7 | 185.7 |
| 2.5°  | 223.7  | 220.4 | 201.0 | 196.0 | 195.4 | 190.0 | 191.3 | 185.9 | 186.2 | 198.2 | 198.2 |
| 5°    | 285.0  | 266.4 | 247.8 | 231.3 | 220.2 | 204.2 | 198.4 | 196.0 | 193.9 | 198.7 | 201.6 |
| 7.5°  | 334.6  | 307.3 | 273.8 | 238.0 | 204.8 | 181.9 | 178.8 | 172.9 | 170.8 | 175.6 | 179.2 |
| 10°   | 356.7  | 322.7 | 276.8 | 224.4 | 193.4 | 174.8 | 159.4 | 151.1 | 149.5 | 149.2 | 150.6 |
| 12.5° | 403.5  | 361.2 | 279.9 | 219.4 | 185.7 | 165.2 | 147.7 | 133.9 | 121.1 | 122.4 | 121.1 |
| 15°   | 440.9  | 391.0 | 279.9 | 207.2 | 167.0 | 146.6 | 115.8 | 108.9 | 107.0 | 109.9 | 107.6 |
| 17.5° | 497.5  | 420.4 | 265.9 | 185.4 | 151.1 | 113.9 | 102.3 | 101.7 | 105.5 | 109.6 | 107.0 |
| 20°   | 531.5  | 424.4 | 242.2 | 160.4 | 124.0 | 98.8  | 94.6  | 90.3  | 95.6  | 99.0  | 97.7  |
| 22.5° | 566.8  | 424.7 | 218.6 | 147.1 | 99.9  | 90.1  | 83.1  | 79.7  | 80.5  | 83.7  | 84.2  |
| 25°   | 582.0  | 414.4 | 196.6 | 129.6 | 90.6  | 80.5  | 73.3  | 69.6  | 68.3  | 69.9  | 69.3  |
| 27.5° | 623.1  | 394.4 | 172.6 | 110.5 | 86.1  | 71.5  | 64.8  | 60.3  | 56.3  | 59.0  | 59.5  |
| 30°   | 628.9  | 388.0 | 159.7 | 98.3  | 80.2  | 63.3  | 57.4  | 52.6  | 49.7  | 53.4  | 53.4  |
| 32.5° | 647.6  | 353.0 | 153.0 | 93.3  | 74.1  | 58.4  | 50.5  | 47.0  | 46.5  | 48.9  | 49.1  |
| 35°   | 676.2  | 337.6 | 143.2 | 89.2  | 68.6  | 52.8  | 45.5  | 43.8  | 43.3  | 45.2  | 45.2  |
| 37.5° | 773.4  | 318.4 | 132.3 | 85.8  | 63.7  | 49.9  | 44.1  | 41.5  | 41.7  | 43.3  | 44.3  |
| 40°   | 838.0  | 320.8 | 116.1 | 81.5  | 58.1  | 47.2  | 41.5  | 39.6  | 39.3  | 40.2  | 40.9  |
| 42.5° | 957.8  | 322.7 | 108.9 | 77.0  | 53.9  | 44.1  | 38.8  | 37.5  | 36.4  | 37.2  | 38.0  |
| 45°   | 1091.6 | 332.6 | 105.2 | 73.3  | 51.5  | 42.2  | 36.4  | 35.6  | 33.2  | 33.7  | 34.7  |
| 47.5° | 1220.8 | 368.4 | 100.7 | 68.0  | 49.4  | 41.2  | 34.0  | 32.1  | 30.6  | 30.3  | 31.3  |
| 50°   | 1367.3 | 403.2 | 95.6  | 62.1  | 47.2  | 39.6  | 31.6  | 28.7  | 27.7  | 27.7  | 28.4  |
| 52.5° | 1498.6 | 436.4 | 90.8  | 58.1  | 45.6  | 36.6  | 29.4  | 26.6  | 25.8  | 25.8  | 26.8  |
| 55°   | 1636.6 | 471.2 | 86.5  | 54.4  | 43.6  | 33.7  | 27.7  | 25.0  | 24.7  | 24.1  | 25.0  |
| 57.5° | 1880.5 | 547.1 | 81.2  | 51.2  | 40.6  | 31.3  | 26.0  | 23.4  | 22.8  | 22.1  | 22.8  |
| 60°   | 2235.7 | 663.8 | 74.3  | 48.1  | 37.2  | 29.7  | 24.7  | 21.5  | 20.7  | 19.4  | 19.7  |
| 62.5° | 2582.8 | 758.0 | 66.4  | 44.1  | 34.0  | 28.1  | 22.5  | 19.4  | 18.1  | 16.5  | 16.8  |
| 65°   | 2880.2 | 795.2 | 57.9  | 39.3  | 30.8  | 24.4  | 19.7  | 17.0  | 15.2  | 13.0  | 12.8  |
| 67.5° | 2915.3 | 702.2 | 49.7  | 34.7  | 27.7  | 20.7  | 16.8  | 15.2  | 12.2  | 10.3  | 9.8   |
| 70°   | 2623.7 | 523.3 | 41.5  | 30.8  | 23.9  | 17.5  | 14.3  | 13.3  | 11.5  | 9.8   | 9.0   |
| 72.5° | 2089.3 | 386.1 | 34.7  | 27.4  | 21.0  | 14.9  | 12.2  | 12.5  | 11.5  | 9.6   | 8.5   |
| 75°   | 1381.7 | 221.0 | 28.4  | 22.8  | 17.5  | 11.9  | 11.2  | 11.2  | 10.9  | 9.0   | 8.0   |
| 77.5° | 664.8  | 95.4  | 21.8  | 18.1  | 14.1  | 9.0   | 10.1  | 10.1  | 10.3  | 8.2   | 6.6   |
| 80°   | 188.6  | 28.7  | 13.5  | 12.2  | 10.3  | 6.1   | 8.0   | 7.7   | 6.9   | 4.8   | 2.9   |
| 82.5° | 33.7   | 11.2  | 6.1   | 6.3   | 5.9   | 2.4   | 4.5   | 4.3   | 3.4   | 1.9   | 0.3   |
| 85°   | 9.3    | 4.3   | 3.4   | 3.7   | 2.9   | 0.8   | 1.9   | 2.4   | 1.9   | 1.0   | 0.0   |
| 87.5° | 2.4    | 1.9   | 2.4   | 2.7   | 2.1   | 0.3   | 0.8   | 0.3   | 0.8   | 0.3   | 0.0   |
| 90°   | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |

Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

STREETWORKS

Report Number: SP1-2101-121-7

Luminaire Tested: IFLD-S-SA2A-735-U-T2

Test Date: 03/04/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2101-121-7  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 03/04/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: STREETWORKS  
 Catalog Number: **IFLD-S-SA2A-735-U-T2**  
 Description: STREETWORKS INF FLOOD

PROGRAMMED @ 615mA.

### Spectral Parameters

|                           |        |           |      |      |       |
|---------------------------|--------|-----------|------|------|-------|
| CCT (K):                  | 3388   | CRI (Ra): | 73.1 |      |       |
| CIE u':                   | 0.2371 | R1:       | 68.9 | R9:  | -34.6 |
| CIE v':                   | 0.5177 | R2:       | 81.1 | R10: | 57.8  |
| Duv:                      | 0.0032 | R3:       | 93.1 | R11: | 68.6  |
| CIE x:                    | 0.4153 | R4:       | 71.6 | R12: | 53.9  |
| CIE y:                    | 0.4030 | R5:       | 69.4 | R13: | 70.9  |
| CIE z:                    | 0.1817 | R6:       | 75.0 | R14: | 96.2  |
| Peak Wavelength (nm):     | 590    | R7:       | 79.5 |      |       |
| Dominant Wavelength (nm): | 580    | R8:       | 46.4 |      |       |
| Purity:                   | 45.7   |           |      |      |       |
| Rf:                       | 76.9   |           |      |      |       |
| Rg:                       | 94.4   |           |      |      |       |



### Test Conditions

Stabilization Time: 81M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.0/30%  
 Sphere Temperature (°C): 24.1

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| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 1/31/2021        | 7/31/2021            |
| Power Meter                    | IN0071                | 12/1/2020        | 12/1/2021            |
| AC Power Source                | IN0063                | 12/1/2020        | 12/1/2021            |
| DC Power Source                | IN0208                | 12/1/2020        | 12/1/2021            |
| Sphere Thermometer             | IN0085                | 12/1/2020        | 12/1/2021            |
| Room Thermometer               | IN0046                | 12/1/2020        | 12/1/2021            |

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**CIE 1931 Chromaticity Diagram**



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



Point lies inside the ANSI 3500K 4-step quadrangle

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### Photopic Flux vs. Wavelength



#####

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2672             | 0.0              | 490       | 34553            | 4.9              | 620       | 136720           | 35.6             | 750       | 5870             | 0.0              | 880       | 4216             | 0.0              |
| 365       | 2252             | 0.0              | 495       | 44336            | 8.0              | 625       | 126308           | 27.9             | 755       | 5421             | 0.0              | 885       | 4132             | 0.0              |
| 370       | 2217             | 0.0              | 500       | 54643            | 12.1             | 630       | 114625           | 20.7             | 760       | 5097             | 0.0              | 890       | 3992             | 0.0              |
| 375       | 2697             | 0.0              | 505       | 64676            | 18.1             | 635       | 103216           | 15.5             | 765       | 4626             | 0.0              | 895       | 3214             | 0.0              |
| 380       | 3039             | 0.0              | 510       | 73825            | 25.4             | 640       | 92605            | 11.1             | 770       | 3782             | 0.0              | 900       | 2580             | 0.0              |
| 385       | 2655             | 0.0              | 515       | 81872            | 33.9             | 645       | 83234            | 8.0              | 775       | 3506             | 0.0              | 905       | 1776             | 0.0              |
| 390       | 2357             | 0.0              | 520       | 88574            | 43.0             | 650       | 73263            | 5.4              | 780       | 3507             | 0.0              | 910       | 3995             | 0.0              |
| 395       | 2186             | 0.0              | 525       | 93289            | 50.1             | 655       | 64627            | 3.7              | 785       | 3267             | 0.0              | 915       | 4288             | 0.0              |
| 400       | 2015             | 0.0              | 530       | 98393            | 57.9             | 660       | 56614            | 2.4              | 790       | 2849             | 0.0              | 920       | 2446             | 0.0              |
| 405       | 2234             | 0.0              | 535       | 103269           | 64.0             | 665       | 49537            | 1.6              | 795       | 3037             | 0.0              | 925       | 3009             | 0.0              |
| 410       | 3412             | 0.0              | 540       | 107316           | 69.9             | 670       | 42866            | 0.9              | 800       | 2716             | 0.0              | 930       | 3026             | 0.0              |
| 415       | 6135             | 0.0              | 545       | 113101           | 75.3             | 675       | 36708            | 0.6              | 805       | 2648             | 0.0              | 935       | 4734             | 0.0              |
| 420       | 12146            | 0.0              | 550       | 120690           | 82.0             | 680       | 31814            | 0.4              | 810       | 3187             | 0.0              | 940       | 3719             | 0.0              |
| 425       | 23983            | 0.1              | 555       | 128583           | 87.8             | 685       | 27485            | 0.2              | 815       | 2931             | 0.0              | 945       | 1480             | 0.0              |
| 430       | 42142            | 0.3              | 560       | 137796           | 93.6             | 690       | 23698            | 0.1              | 820       | 2717             | 0.0              | 950       | 3450             | 0.0              |
| 435       | 68228            | 0.8              | 565       | 146577           | 97.5             | 695       | 20309            | 0.1              | 825       | 2236             | 0.0              | 955       | 5051             | 0.0              |
| 440       | 99323            | 1.6              | 570       | 154581           | 100.5            | 700       | 17890            | 0.1              | 830       | 2628             | 0.0              | 960       | 3176             | 0.0              |
| 445       | 115584           | 2.4              | 575       | 162633           | 101.2            | 705       | 15500            | 0.0              | 835       | 3140             | 0.0              | 965       | 5178             | 0.0              |
| 450       | 94997            | 2.5              | 580       | 168101           | 99.9             | 710       | 13699            | 0.0              | 840       | 3675             | 0.0              | 970       | 6385             | 0.0              |
| 455       | 61433            | 2.1              | 585       | 173145           | 96.2             | 715       | 12398            | 0.0              | 845       | 3283             | 0.0              | 975       | 3810             | 0.0              |
| 460       | 43373            | 1.8              | 590       | 174675           | 90.3             | 720       | 11147            | 0.0              | 850       | 3055             | 0.0              | 980       | 4322             | 0.0              |
| 465       | 32472            | 1.7              | 595       | 173724           | 82.3             | 725       | 9761             | 0.0              | 855       | 2932             | 0.0              | 985       | 4200             | 0.0              |
| 470       | 24257            | 1.5              | 600       | 171241           | 73.8             | 730       | 8651             | 0.0              | 860       | 3382             | 0.0              | 990       | 4661             | 0.0              |
| 475       | 21690            | 1.7              | 605       | 165134           | 64.0             | 735       | 7730             | 0.0              | 865       | 2605             | 0.0              | 995       | 6746             | 0.0              |
| 480       | 23173            | 2.2              | 610       | 156652           | 53.8             | 740       | 6847             | 0.0              | 870       | 3325             | 0.0              | 1000      | 4150             | 0.0              |
| 485       | 27564            | 3.3              | 615       | 147879           | 44.6             | 745       | 6124             | 0.0              | 875       | 3325             | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2101-121-7

### Scotopic Flux vs. Wavelength



Scotopic Lumens: 12126

S/P: 1.36

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2672             | 0.0              | 490       | 34553            | 53.2             | 620       | 136720           | 1.7              | 750       | 5870             | 0.0              | 880       | 4216             | 0.0              |
| 365       | 2252             | 0.0              | 495       | 44336            | 71.7             | 625       | 126308           | 1.1              | 755       | 5421             | 0.0              | 885       | 4132             | 0.0              |
| 370       | 2217             | 0.0              | 500       | 54643            | 91.4             | 630       | 114625           | 0.6              | 760       | 5097             | 0.0              | 890       | 3992             | 0.0              |
| 375       | 2697             | 0.0              | 505       | 64676            | 110.0            | 635       | 103216           | 0.4              | 765       | 4626             | 0.0              | 895       | 3214             | 0.0              |
| 380       | 3039             | 0.0              | 510       | 73825            | 125.1            | 640       | 92605            | 0.2              | 770       | 3782             | 0.0              | 900       | 2580             | 0.0              |
| 385       | 2655             | 0.0              | 515       | 81872            | 135.7            | 645       | 83234            | 0.1              | 775       | 3506             | 0.0              | 905       | 1776             | 0.0              |
| 390       | 2357             | 0.0              | 520       | 88574            | 140.8            | 650       | 73263            | 0.1              | 780       | 3507             | 0.0              | 910       | 3995             | 0.0              |
| 395       | 2186             | 0.0              | 525       | 93289            | 139.6            | 655       | 64627            | 0.1              | 785       | 3267             | 0.0              | 915       | 4288             | 0.0              |
| 400       | 2015             | 0.0              | 530       | 98393            | 135.7            | 660       | 56614            | 0.0              | 790       | 2849             | 0.0              | 920       | 2446             | 0.0              |
| 405       | 2234             | 0.1              | 535       | 103269           | 128.7            | 665       | 49537            | 0.0              | 795       | 3037             | 0.0              | 925       | 3009             | 0.0              |
| 410       | 3412             | 0.2              | 540       | 107316           | 118.6            | 670       | 42866            | 0.0              | 800       | 2716             | 0.0              | 930       | 3026             | 0.0              |
| 415       | 6135             | 0.6              | 545       | 113101           | 108.4            | 675       | 36708            | 0.0              | 805       | 2648             | 0.0              | 935       | 4734             | 0.0              |
| 420       | 12146            | 2.0              | 550       | 120690           | 98.7             | 680       | 31814            | 0.0              | 810       | 3187             | 0.0              | 940       | 3719             | 0.0              |
| 425       | 23983            | 5.9              | 555       | 128583           | 87.9             | 685       | 27485            | 0.0              | 815       | 2931             | 0.0              | 945       | 1480             | 0.0              |
| 430       | 42142            | 14.3             | 560       | 137796           | 77.0             | 690       | 23698            | 0.0              | 820       | 2717             | 0.0              | 950       | 3450             | 0.0              |
| 435       | 68228            | 30.5             | 565       | 146577           | 65.8             | 695       | 20309            | 0.0              | 825       | 2236             | 0.0              | 955       | 5051             | 0.0              |
| 440       | 99323            | 55.5             | 570       | 154581           | 54.6             | 700       | 17890            | 0.0              | 830       | 2628             | 0.0              | 960       | 3176             | 0.0              |
| 445       | 115584           | 77.4             | 575       | 162633           | 44.3             | 705       | 15500            | 0.0              | 835       | 3140             | 0.0              | 965       | 5178             | 0.0              |
| 450       | 94997            | 73.6             | 580       | 168101           | 34.6             | 710       | 13699            | 0.0              | 840       | 3675             | 0.0              | 970       | 6385             | 0.0              |
| 455       | 61433            | 53.7             | 585       | 173145           | 26.5             | 715       | 12398            | 0.0              | 845       | 3283             | 0.0              | 975       | 3810             | 0.0              |
| 460       | 43373            | 41.9             | 590       | 174675           | 19.5             | 720       | 11147            | 0.0              | 850       | 3055             | 0.0              | 980       | 4322             | 0.0              |
| 465       | 32472            | 34.3             | 595       | 173724           | 13.9             | 725       | 9761             | 0.0              | 855       | 2932             | 0.0              | 985       | 4200             | 0.0              |
| 470       | 24257            | 27.9             | 600       | 171241           | 9.7              | 730       | 8651             | 0.0              | 860       | 3382             | 0.0              | 990       | 4661             | 0.0              |
| 475       | 21690            | 27.1             | 605       | 165134           | 6.5              | 735       | 7730             | 0.0              | 865       | 2605             | 0.0              | 995       | 6746             | 0.0              |
| 480       | 23173            | 31.3             | 610       | 156652           | 4.2              | 740       | 6847             | 0.0              | 870       | 3325             | 0.0              | 1000      | 4150             | 0.0              |
| 485       | 27564            | 40.0             | 615       | 147879           | 2.7              | 745       | 6124             | 0.0              | 875       | 3325             | 0.0              |           |                  |                  |

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### Melanopic Flux vs. Wavelength



Melanopic Lumens: 4490.7

M/P: 0.5

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2672             | 0.0              | 490       | 34553            | 28.8             | 620       | 136720           | 0.1              | 750       | 5870             | 0.0              | 880       | 4216             | 0.0              |
| 365       | 2252             | 0.0              | 495       | 44336            | 36.6             | 625       | 126308           | 0.1              | 755       | 5421             | 0.0              | 885       | 4132             | 0.0              |
| 370       | 2217             | 0.0              | 500       | 54643            | 43.9             | 630       | 114625           | 0.0              | 760       | 5097             | 0.0              | 890       | 3992             | 0.0              |
| 375       | 2697             | 0.0              | 505       | 64676            | 49.6             | 635       | 103216           | 0.0              | 765       | 4626             | 0.0              | 895       | 3214             | 0.0              |
| 380       | 3039             | 0.0              | 510       | 73825            | 53.0             | 640       | 92605            | 0.0              | 770       | 3782             | 0.0              | 900       | 2580             | 0.0              |
| 385       | 2655             | 0.0              | 515       | 81872            | 53.5             | 645       | 83234            | 0.0              | 775       | 3506             | 0.0              | 905       | 1776             | 0.0              |
| 390       | 2357             | 0.0              | 520       | 88574            | 51.6             | 650       | 73263            | 0.0              | 780       | 3507             | 0.0              | 910       | 3995             | 0.0              |
| 395       | 2186             | 0.0              | 525       | 93289            | 47.3             | 655       | 64627            | 0.0              | 785       | 3267             | 0.0              | 915       | 4288             | 0.0              |
| 400       | 2015             | 0.0              | 530       | 98393            | 42.5             | 660       | 56614            | 0.0              | 790       | 2849             | 0.0              | 920       | 2446             | 0.0              |
| 405       | 2234             | 0.0              | 535       | 103269           | 37.2             | 665       | 49537            | 0.0              | 795       | 3037             | 0.0              | 925       | 3009             | 0.0              |
| 410       | 3412             | 0.1              | 540       | 107316           | 31.4             | 670       | 42866            | 0.0              | 800       | 2716             | 0.0              | 930       | 3026             | 0.0              |
| 415       | 6135             | 0.4              | 545       | 113101           | 26.3             | 675       | 36708            | 0.0              | 805       | 2648             | 0.0              | 935       | 4734             | 0.0              |
| 420       | 12146            | 1.4              | 550       | 120690           | 21.7             | 680       | 31814            | 0.0              | 810       | 3187             | 0.0              | 940       | 3719             | 0.0              |
| 425       | 23983            | 3.7              | 555       | 128583           | 17.3             | 685       | 27485            | 0.0              | 815       | 2931             | 0.0              | 945       | 1480             | 0.0              |
| 430       | 42142            | 8.9              | 560       | 137796           | 13.6             | 690       | 23698            | 0.0              | 820       | 2717             | 0.0              | 950       | 3450             | 0.0              |
| 435       | 68228            | 18.2             | 565       | 146577           | 10.3             | 695       | 20309            | 0.0              | 825       | 2236             | 0.0              | 955       | 5051             | 0.0              |
| 440       | 99323            | 33.2             | 570       | 154581           | 7.6              | 700       | 17890            | 0.0              | 830       | 2628             | 0.0              | 960       | 3176             | 0.0              |
| 445       | 115584           | 45.6             | 575       | 162633           | 5.4              | 705       | 15500            | 0.0              | 835       | 3140             | 0.0              | 965       | 5178             | 0.0              |
| 450       | 94997            | 43.8             | 580       | 168101           | 3.8              | 710       | 13699            | 0.0              | 840       | 3675             | 0.0              | 970       | 6385             | 0.0              |
| 455       | 61433            | 32.2             | 585       | 173145           | 2.6              | 715       | 12398            | 0.0              | 845       | 3283             | 0.0              | 975       | 3810             | 0.0              |
| 460       | 43373            | 25.6             | 590       | 174675           | 1.7              | 720       | 11147            | 0.0              | 850       | 3055             | 0.0              | 980       | 4322             | 0.0              |
| 465       | 32472            | 21.2             | 595       | 173724           | 1.1              | 725       | 9761             | 0.0              | 855       | 2932             | 0.0              | 985       | 4200             | 0.0              |
| 470       | 24257            | 17.4             | 600       | 171241           | 0.7              | 730       | 8651             | 0.0              | 860       | 3382             | 0.0              | 990       | 4661             | 0.0              |
| 475       | 21690            | 16.6             | 605       | 165134           | 0.5              | 735       | 7730             | 0.0              | 865       | 2605             | 0.0              | 995       | 6746             | 0.0              |
| 480       | 23173            | 18.6             | 610       | 156652           | 0.3              | 740       | 6847             | 0.0              | 870       | 3325             | 0.0              | 1000      | 4150             | 0.0              |
| 485       | 27564            | 22.7             | 615       | 147879           | 0.2              | 745       | 6124             | 0.0              | 875       | 3325             | 0.0              |           |                  |                  |

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TM-30-18

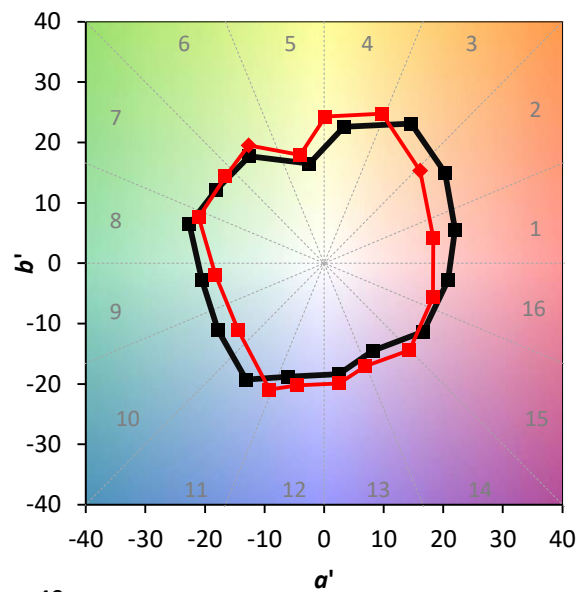
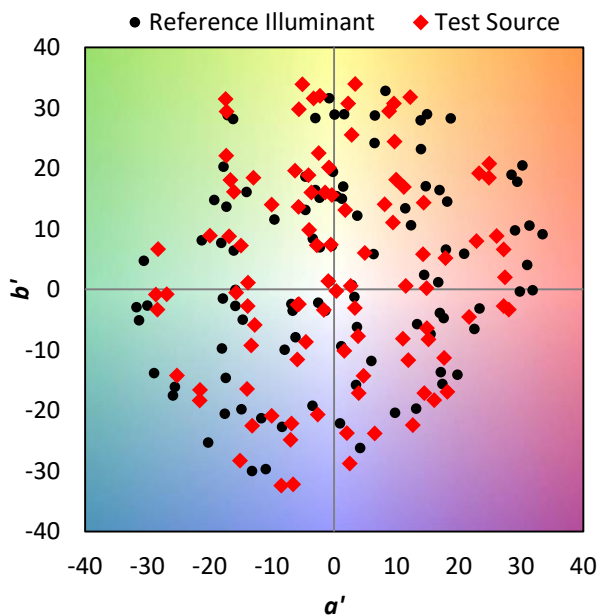
### Summary

$R_f = 76.9$   
 $R_g = 94.4$   
 CIE  $R_a = 73.1$   
 $R_g = -34.6$

### Spectral Power Distribution Comparison



### Color Vector Graphics



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 68 | CES51 = 90 | CES76 = 63 |
| CES02 = 62 | CES27 = 88 | CES52 = 89 | CES77 = 80 |
| CES03 = 31 | CES28 = 87 | CES53 = 80 | CES78 = 65 |
| CES04 = 70 | CES29 = 67 | CES54 = 84 | CES79 = 87 |
| CES05 = 48 | CES30 = 74 | CES55 = 84 | CES80 = 86 |
| CES06 = 51 | CES31 = 71 | CES56 = 75 | CES81 = 75 |
| CES07 = 40 | CES32 = 67 | CES57 = 74 | CES82 = 94 |
| CES08 = 39 | CES33 = 74 | CES58 = 76 | CES83 = 91 |
| CES09 = 29 | CES34 = 78 | CES59 = 87 | CES84 = 89 |
| CES10 = 75 | CES35 = 89 | CES60 = 93 | CES85 = 80 |
| CES11 = 58 | CES36 = 98 | CES61 = 86 | CES86 = 66 |
| CES12 = 64 | CES37 = 86 | CES62 = 89 | CES87 = 79 |
| CES13 = 43 | CES38 = 82 | CES63 = 77 | CES88 = 79 |
| CES14 = 74 | CES39 = 95 | CES64 = 74 | CES89 = 70 |
| CES15 = 71 | CES40 = 91 | CES65 = 68 | CES90 = 77 |
| CES16 = 47 | CES41 = 89 | CES66 = 71 | CES91 = 88 |
| CES17 = 50 | CES42 = 88 | CES67 = 69 | CES92 = 60 |
| CES18 = 56 | CES43 = 82 | CES68 = 74 | CES93 = 77 |
| CES19 = 72 | CES44 = 99 | CES69 = 82 | CES94 = 52 |
| CES20 = 65 | CES45 = 87 | CES70 = 67 | CES95 = 69 |
| CES21 = 86 | CES46 = 82 | CES71 = 66 | CES96 = 78 |
| CES22 = 79 | CES47 = 82 | CES72 = 88 | CES97 = 85 |
| CES23 = 92 | CES48 = 72 | CES73 = 59 | CES98 = 76 |
| CES24 = 91 | CES49 = 82 | CES74 = 97 | CES99 = 63 |
| CES25 = 72 | CES50 = 88 | CES75 = 66 |            |



### Color Rendition by Hue-Angle Bin



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**TM-30-18**

**Measure Comparisons**



(END OF REPORT)