

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: P822953

Luminaire Tested: **MSA-SA1C-735-U-T3-HSS**

Issue Date: 04/10/2024

**Test Information**

Test Method: LM-79-08  
Report Number: P822953  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1910-543-11)  
Test Lab: INNOVATION CENTER  
Issue Date: 04/10/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: MSA-SA1C-735-U-T3-HSS  
Description: MESA POST TOP DECORATIVE LUMINAIRE. (1) LIGHTSQUARES WITH 16 LEDS  
EACH AND TYPE III OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 4315.2 lumens  
Efficiency: N/A  
Efficacy: 73.1 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 0.5' x H: 0')  
IES Classification: Type III - Short  
BUG Rating: B1 - U0 - G1

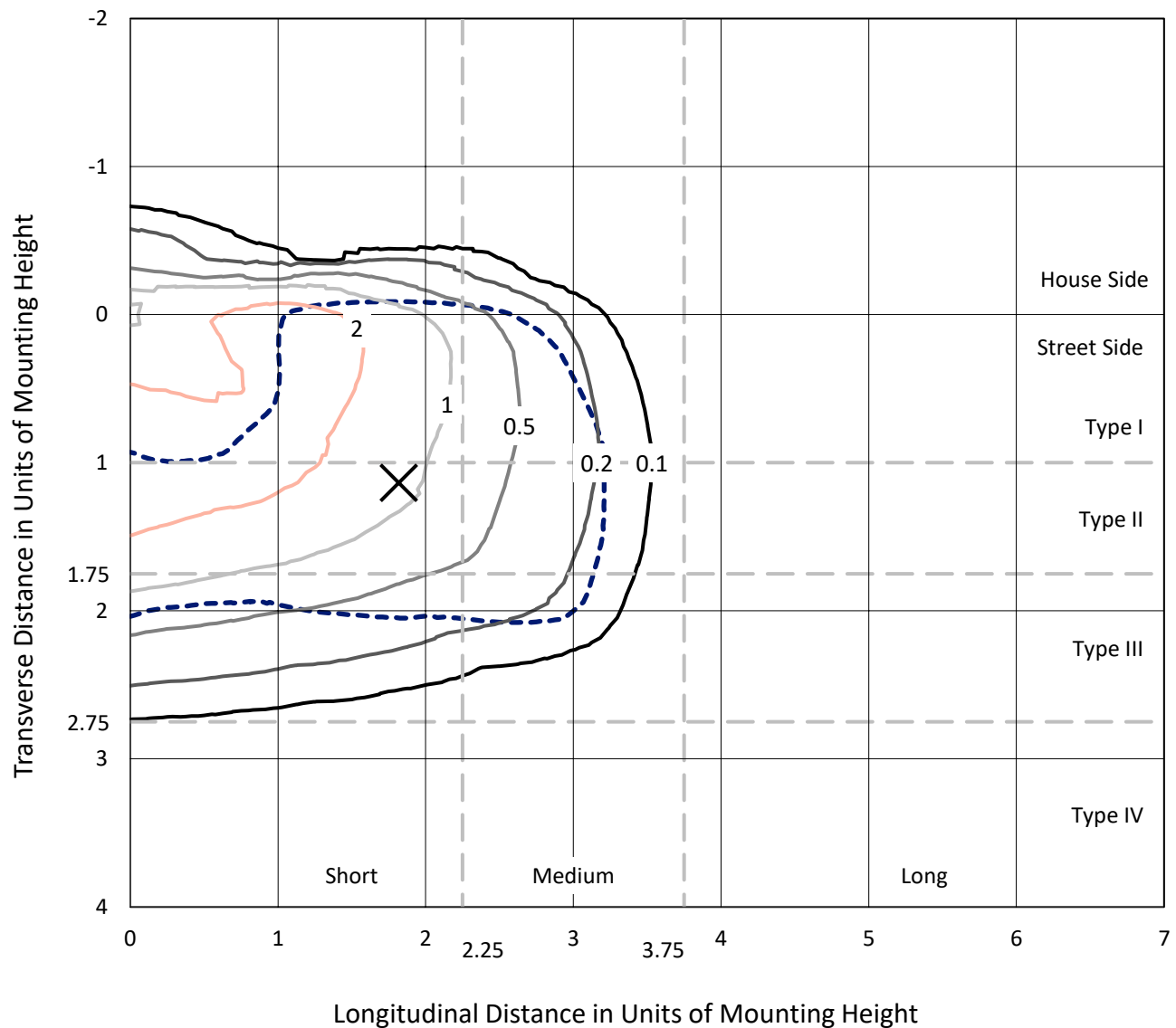
Input Watts (W): 59  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

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## Iso-Footcandle Lines of Horizontal Illumination

× Max cd  
 - - - 1/2 Max cd

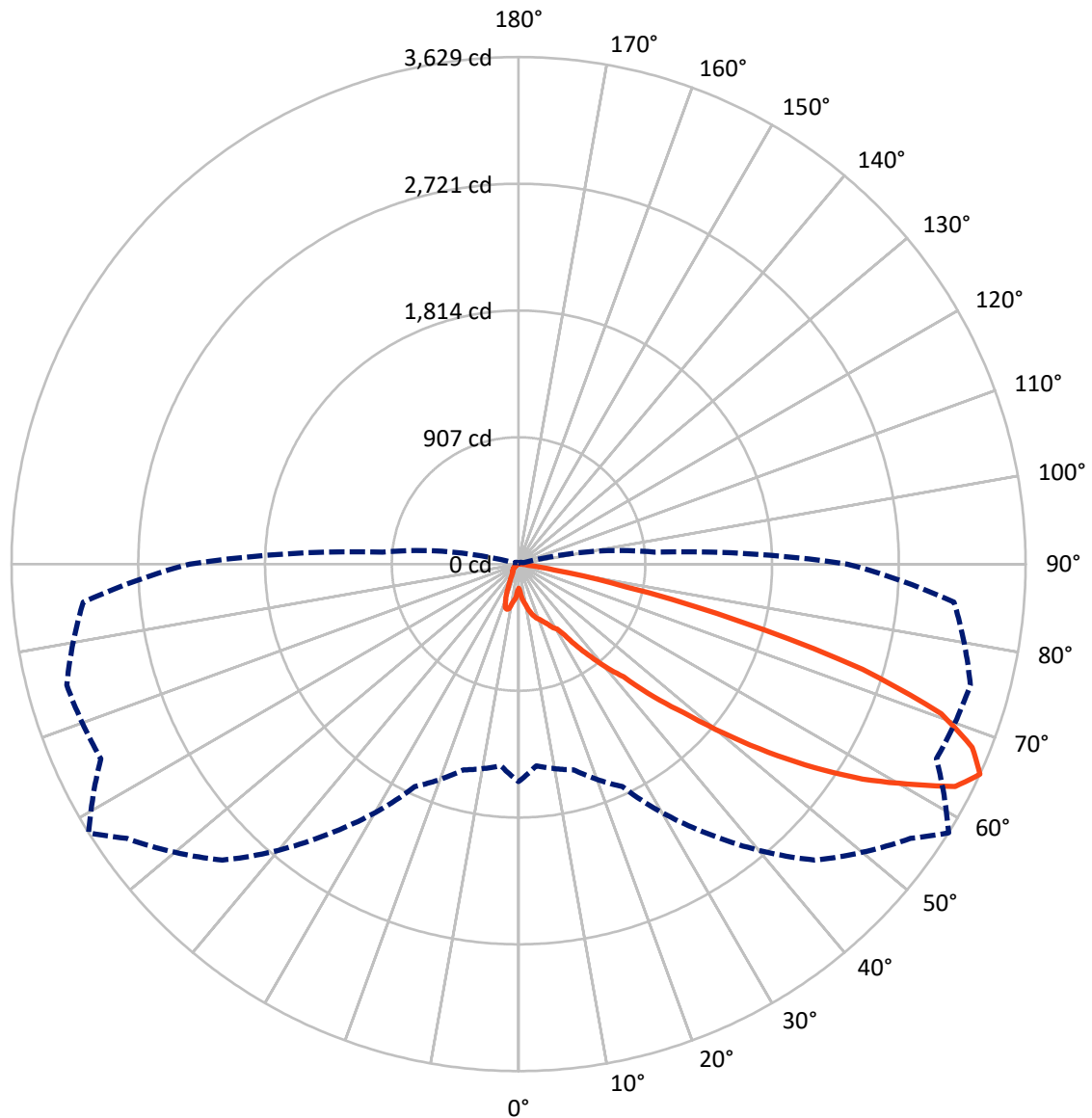


Based on 15 foot mounting height. Maximum calculated value = 3.1 fc  
 Type III - Short - N/A

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## Luminous Intensity Polar Plot



— Vertical Plane Through 58-Deg Lateral      - - - Horizontal Cone Through 65-Deg Vertical

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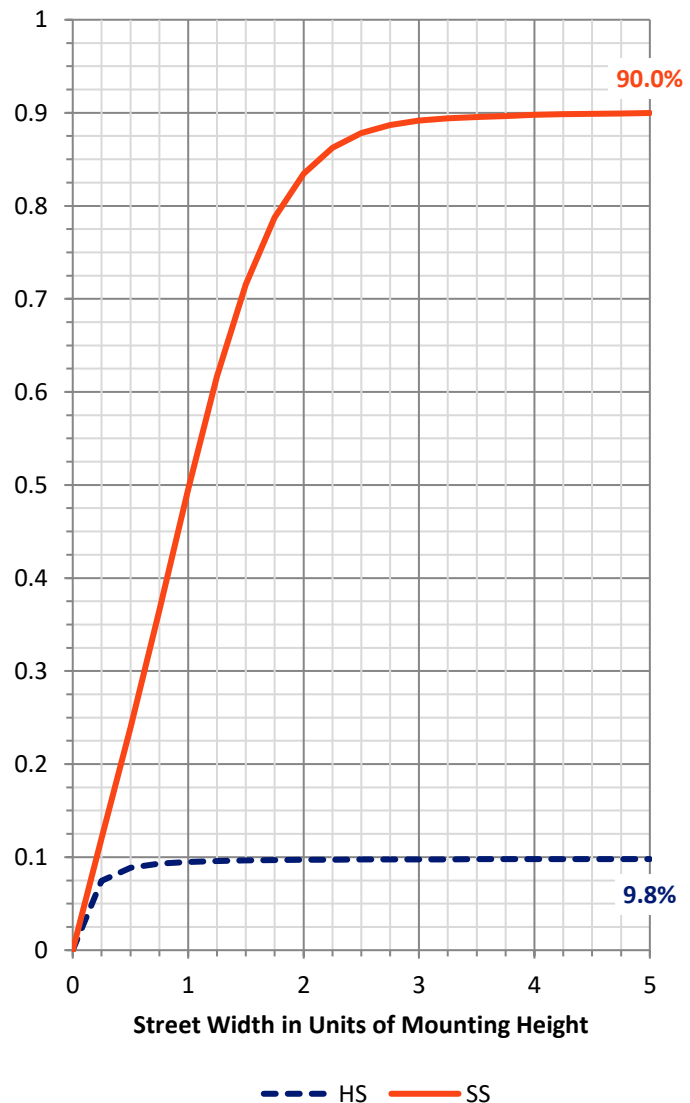
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 425.8    | 0.0    | 425.8  |
|                    | % Fixture | 9.9      | 0.0    | 9.9    |
| <b>Street Side</b> | Lumens    | 3889.4   | 0.0    | 3889.4 |
|                    | % Fixture | 90.1     | 0.0    | 90.1   |
| <b>Total</b>       | Lumens    | 4315.2   | 0.0    | 4315.2 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**Coefficient of Utilization**

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 24.3   | 0.6       |
| 10°-20°   | 88.6   | 2.1       |
| 20°-30°   | 171.5  | 4.0       |
| 30°-40°   | 342.1  | 7.9       |
| 40°-50°   | 699.3  | 16.2      |
| 50°-60°   | 1240.4 | 28.7      |
| 60°-70°   | 1307.7 | 30.3      |
| 70°-80°   | 424.0  | 9.8       |
| 80°-90°   | 17.3   | 0.4       |
| 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°    | 4315.2 | 100.0     |
| 0°-180°   | 4315.2 | 100.0     |



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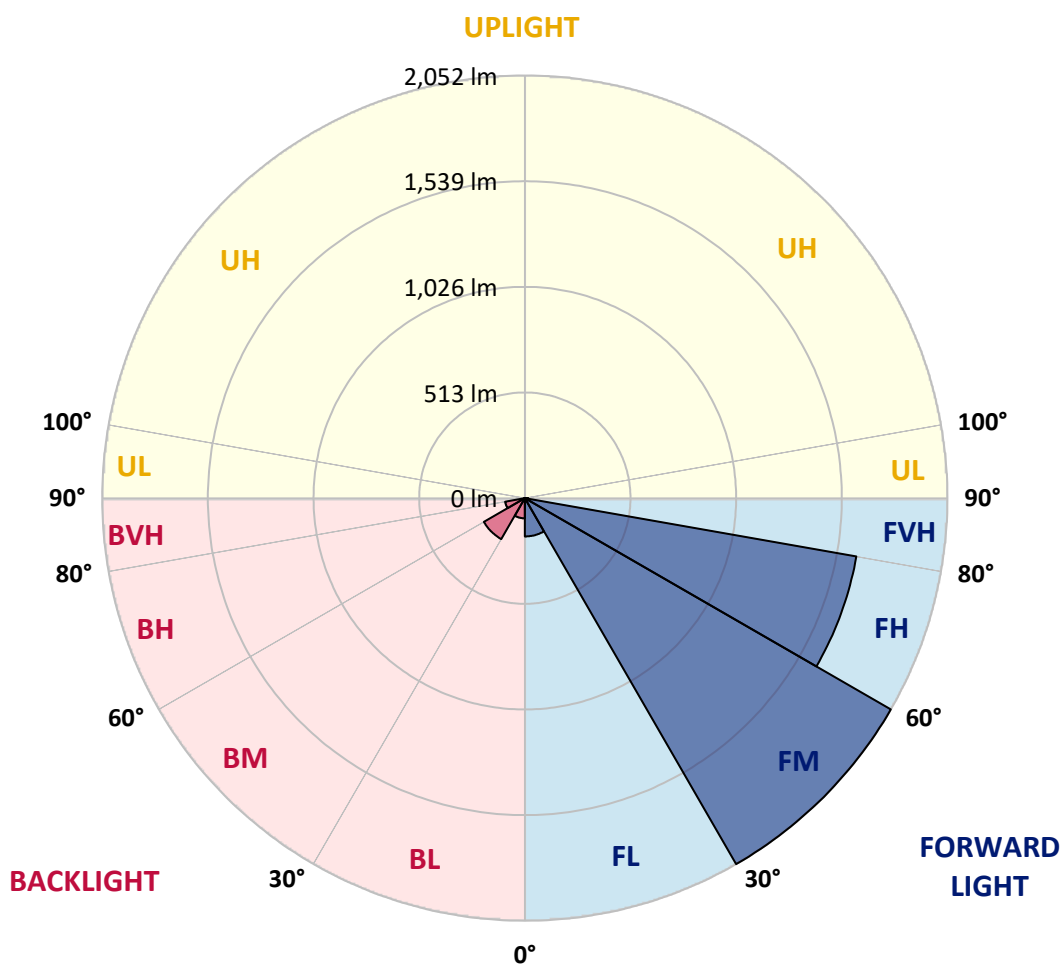
CATALOG NUMBER: MSA-SA1C-735-U-T3-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 186.2  | 4.3       |                         |      |         |
| FM   | (30°-60°)   | 2052.1 | 47.6      |                         |      |         |
| FH   | (60°-80°)   | 1634.5 | 37.9      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 16.6   | 0.4       |                         |      | G1/100  |
| BL   | (0°-30°)    | 98.1   | 2.3       | B0/110                  |      |         |
| BM   | (30°-60°)   | 229.7  | 5.3       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 97.2   | 2.3       | B0/110                  |      | G0/110  |
| BVH  | (80°-90°)   | 0.7    | 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 III Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 58°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 172.7  | 172.7  | 172.7  | 172.7  | 172.7  | 172.7  | 172.7  | 172.7  | 172.7  | 172.7  | 172.7  |
| 2.5°  | 210.9  | 204.6  | 194.6  | 196.3  | 198.2  | 202.2  | 199.0  | 196.1  | 192.9  | 188.7  | 204.6  |
| 5°    | 254.6  | 244.2  | 243.2  | 241.0  | 239.3  | 239.0  | 243.0  | 241.8  | 243.4  | 251.3  | 259.3  |
| 7.5°  | 270.6  | 266.3  | 258.1  | 261.4  | 256.1  | 251.9  | 269.2  | 274.8  | 285.4  | 289.1  | 310.0  |
| 10°   | 269.0  | 262.6  | 266.1  | 267.7  | 271.4  | 286.5  | 297.4  | 303.4  | 312.6  | 332.6  | 328.5  |
| 12.5° | 276.7  | 282.3  | 286.0  | 286.2  | 304.9  | 332.6  | 340.4  | 345.5  | 362.0  | 369.8  | 390.2  |
| 15°   | 302.8  | 312.0  | 306.1  | 308.5  | 314.6  | 348.4  | 366.6  | 377.8  | 401.1  | 426.4  | 431.5  |
| 17.5° | 339.9  | 345.7  | 333.6  | 324.8  | 341.6  | 360.1  | 393.1  | 404.8  | 419.6  | 478.7  | 489.6  |
| 20°   | 386.8  | 396.8  | 370.5  | 335.7  | 357.9  | 379.7  | 415.7  | 421.3  | 437.1  | 514.1  | 531.4  |
| 22.5° | 496.4  | 481.5  | 441.5  | 387.3  | 380.7  | 390.4  | 424.7  | 446.5  | 473.3  | 534.0  | 574.1  |
| 25°   | 604.5  | 599.4  | 540.3  | 479.9  | 436.1  | 414.3  | 459.7  | 471.9  | 515.5  | 581.4  | 603.5  |
| 27.5° | 724.8  | 734.9  | 636.3  | 599.6  | 513.9  | 442.4  | 481.5  | 511.9  | 563.6  | 598.6  | 651.8  |
| 30°   | 883.4  | 867.1  | 751.4  | 714.8  | 616.9  | 519.9  | 538.2  | 540.1  | 616.2  | 655.5  | 706.1  |
| 32.5° | 1007.8 | 1018.2 | 872.9  | 816.5  | 738.4  | 639.3  | 580.7  | 605.9  | 660.3  | 748.1  | 796.0  |
| 35°   | 1142.4 | 1141.4 | 999.8  | 924.0  | 821.7  | 736.6  | 706.8  | 725.3  | 793.5  | 892.8  | 905.5  |
| 37.5° | 1343.6 | 1326.3 | 1159.2 | 1048.1 | 961.1  | 888.5  | 865.6  | 841.1  | 911.6  | 1006.3 | 1053.7 |
| 40°   | 1533.3 | 1473.8 | 1319.2 | 1187.6 | 1076.3 | 1046.7 | 964.0  | 979.1  | 1000.0 | 1125.1 | 1256.1 |
| 42.5° | 1725.0 | 1688.1 | 1481.5 | 1371.2 | 1234.5 | 1164.0 | 1110.1 | 1103.0 | 1202.4 | 1350.6 | 1485.9 |
| 45°   | 1977.9 | 1865.0 | 1699.7 | 1602.8 | 1444.4 | 1373.6 | 1330.2 | 1356.2 | 1445.6 | 1662.1 | 1752.2 |
| 47.5° | 2190.3 | 2086.3 | 1944.4 | 1797.1 | 1631.0 | 1710.4 | 1628.8 | 1587.7 | 1710.4 | 1934.2 | 2054.0 |
| 50°   | 2372.7 | 2256.8 | 2113.2 | 2004.2 | 1977.2 | 2053.4 | 1888.3 | 1903.4 | 1983.0 | 2245.9 | 2313.4 |
| 52.5° | 2505.4 | 2383.4 | 2258.0 | 2205.3 | 2315.9 | 2354.2 | 2271.4 | 2238.2 | 2310.6 | 2511.7 | 2544.5 |
| 55°   | 2605.2 | 2480.4 | 2382.5 | 2455.0 | 2668.8 | 2656.3 | 2685.4 | 2571.7 | 2641.0 | 2788.9 | 2773.4 |
| 57.5° | 2611.3 | 2463.3 | 2406.0 | 2522.9 | 2816.4 | 3012.0 | 3097.2 | 2903.8 | 2943.2 | 3005.6 | 2970.7 |
| 60°   | 2420.4 | 2273.1 | 2268.5 | 2434.5 | 2859.2 | 3104.0 | 3290.6 | 3196.3 | 3143.6 | 3190.1 | 3123.7 |
| 62.5° | 2039.8 | 1936.9 | 1985.0 | 2168.4 | 2700.0 | 3053.2 | 3393.6 | 3507.1 | 3301.8 | 3312.2 | 3217.9 |
| 65°   | 1557.6 | 1449.5 | 1524.8 | 1755.9 | 2352.1 | 2996.4 | 3422.8 | 3628.6 | 3298.9 | 3347.0 | 3127.6 |
| 67.5° | 1031.6 | 969.0  | 1054.2 | 1308.8 | 1870.0 | 2645.1 | 3407.7 | 3501.0 | 3194.2 | 3211.1 | 2792.1 |
| 70°   | 532.6  | 517.2  | 586.3  | 787.2  | 1257.3 | 2032.1 | 3259.8 | 3208.7 | 2981.6 | 2766.3 | 2153.6 |
| 72.5° | 170.6  | 171.3  | 237.7  | 359.6  | 677.8  | 1237.2 | 2505.6 | 2575.6 | 2385.8 | 2023.6 | 1314.9 |
| 75°   | 75.6   | 74.3   | 99.4   | 150.9  | 282.6  | 554.7  | 1556.6 | 1632.2 | 1485.4 | 1113.3 | 552.7  |
| 77.5° | 54.4   | 52.7   | 63.6   | 88.2   | 139.9  | 188.1  | 729.8  | 787.7  | 673.5  | 385.8  | 126.6  |
| 80°   | 38.4   | 38.1   | 46.2   | 62.0   | 87.5   | 83.6   | 230.6  | 258.5  | 207.0  | 93.5   | 37.2   |
| 82.5° | 21.6   | 22.4   | 32.0   | 43.7   | 53.2   | 41.8   | 64.8   | 71.5   | 69.7   | 49.8   | 16.3   |
| 85°   | 10.4   | 11.6   | 20.9   | 31.6   | 27.9   | 16.3   | 23.1   | 25.1   | 29.2   | 28.9   | 8.3    |
| 87.5° | 0.0    | 0.0    | 8.5    | 14.3   | 7.5    | 2.4    | 7.1    | 8.0    | 7.7    | 9.2    | 2.0    |
| 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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CATALOG NUMBER: MSA-SA1C-735-U-T3-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 172.7  | 172.7  | 172.7 | 172.7 | 172.7 | 172.7 | 172.7 | 172.7 | 172.7 | 172.7 | 172.7 |
| 2.5°  | 207.7  | 206.3  | 187.8 | 189.3 | 193.4 | 191.7 | 193.1 | 189.8 | 185.9 | 201.7 | 201.4 |
| 5°    | 262.6  | 251.7  | 245.8 | 240.5 | 241.5 | 230.6 | 236.9 | 239.8 | 239.3 | 248.3 | 250.7 |
| 7.5°  | 310.8  | 296.2  | 284.5 | 273.3 | 256.3 | 241.0 | 250.5 | 256.6 | 260.7 | 276.2 | 282.3 |
| 10°   | 333.3  | 321.4  | 316.8 | 294.9 | 282.8 | 273.3 | 261.9 | 253.7 | 257.0 | 252.9 | 257.0 |
| 12.5° | 382.9  | 374.9  | 357.2 | 335.0 | 320.5 | 301.0 | 258.5 | 223.0 | 201.1 | 201.4 | 199.9 |
| 15°   | 428.1  | 427.6  | 401.1 | 364.4 | 322.1 | 266.8 | 200.5 | 155.8 | 135.1 | 129.2 | 127.3 |
| 17.5° | 487.1  | 479.9  | 431.5 | 377.3 | 301.3 | 206.5 | 136.6 | 106.7 | 104.7 | 108.2 | 106.7 |
| 20°   | 524.8  | 514.1  | 446.5 | 358.6 | 248.3 | 139.7 | 103.0 | 94.5  | 100.3 | 105.2 | 104.0 |
| 22.5° | 562.4  | 546.4  | 458.0 | 335.7 | 176.6 | 102.3 | 93.1  | 91.6  | 95.2  | 101.4 | 102.3 |
| 25°   | 583.1  | 579.9  | 480.3 | 293.0 | 121.0 | 89.6  | 89.6  | 89.2  | 90.4  | 94.7  | 94.0  |
| 27.5° | 643.1  | 600.3  | 463.6 | 228.6 | 93.5  | 82.4  | 83.6  | 83.1  | 78.7  | 83.1  | 83.4  |
| 30°   | 680.5  | 660.9  | 464.8 | 162.8 | 82.4  | 72.9  | 76.0  | 72.2  | 65.6  | 69.2  | 68.5  |
| 32.5° | 755.8  | 706.8  | 461.1 | 109.8 | 75.1  | 69.5  | 64.7  | 59.1  | 54.2  | 55.6  | 54.4  |
| 35°   | 843.6  | 806.1  | 411.8 | 88.2  | 70.0  | 61.5  | 53.7  | 48.1  | 43.0  | 44.3  | 44.0  |
| 37.5° | 1018.0 | 899.2  | 371.0 | 79.5  | 66.6  | 56.4  | 47.4  | 39.6  | 36.9  | 37.6  | 38.4  |
| 40°   | 1179.6 | 1054.5 | 294.9 | 75.6  | 60.7  | 50.3  | 39.1  | 33.5  | 31.9  | 32.3  | 33.1  |
| 42.5° | 1421.1 | 1177.8 | 222.8 | 71.6  | 54.9  | 42.5  | 32.5  | 28.9  | 27.2  | 28.2  | 28.7  |
| 45°   | 1654.8 | 1282.8 | 166.4 | 68.3  | 50.0  | 36.7  | 27.5  | 25.1  | 23.1  | 23.8  | 24.8  |
| 47.5° | 1888.3 | 1399.4 | 124.2 | 62.9  | 44.7  | 31.6  | 23.6  | 21.9  | 20.7  | 20.9  | 22.1  |
| 50°   | 2097.2 | 1453.9 | 97.6  | 56.4  | 40.3  | 27.5  | 21.4  | 19.7  | 19.2  | 19.5  | 20.4  |
| 52.5° | 2250.7 | 1454.3 | 82.4  | 50.5  | 36.2  | 24.3  | 20.1  | 18.3  | 18.0  | 18.4  | 19.5  |
| 55°   | 2389.5 | 1415.5 | 71.5  | 45.5  | 32.5  | 22.1  | 19.2  | 17.5  | 17.5  | 18.0  | 18.9  |
| 57.5° | 2481.6 | 1344.0 | 62.0  | 40.1  | 29.4  | 20.9  | 18.4  | 16.8  | 16.5  | 16.3  | 17.0  |
| 60°   | 2526.5 | 1246.6 | 52.4  | 35.2  | 26.5  | 20.1  | 18.0  | 14.8  | 14.5  | 14.1  | 14.5  |
| 62.5° | 2498.1 | 1124.6 | 44.0  | 30.4  | 23.6  | 19.2  | 15.8  | 12.9  | 12.4  | 11.5  | 12.1  |
| 65°   | 2352.8 | 976.4  | 37.2  | 26.0  | 20.4  | 16.3  | 13.3  | 10.9  | 9.7   | 8.5   | 8.3   |
| 67.5° | 2055.7 | 793.3  | 31.1  | 22.4  | 17.5  | 13.3  | 10.9  | 9.7   | 7.5   | 6.5   | 6.3   |
| 70°   | 1540.6 | 541.5  | 25.7  | 19.2  | 14.5  | 11.5  | 9.2   | 8.8   | 7.1   | 6.3   | 5.9   |
| 72.5° | 903.8  | 292.2  | 21.6  | 16.8  | 12.4  | 9.5   | 7.5   | 8.0   | 7.1   | 5.9   | 5.3   |
| 75°   | 361.0  | 97.2   | 17.2  | 13.3  | 10.0  | 6.8   | 6.3   | 6.5   | 6.3   | 5.3   | 4.4   |
| 77.5° | 82.4   | 30.6   | 13.3  | 10.4  | 7.7   | 4.4   | 5.1   | 5.6   | 5.6   | 4.4   | 3.2   |
| 80°   | 25.7   | 12.1   | 7.7   | 6.5   | 5.6   | 2.4   | 3.6   | 3.9   | 2.7   | 1.2   | 0.0   |
| 82.5° | 8.3    | 3.4    | 2.7   | 2.7   | 2.4   | 0.5   | 0.7   | 0.5   | 0.0   | 0.0   | 0.0   |
| 85°   | 3.2    | 2.1    | 1.7   | 1.7   | 0.9   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 87.5° | 1.2    | 0.9    | 0.7   | 0.9   | 0.5   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 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

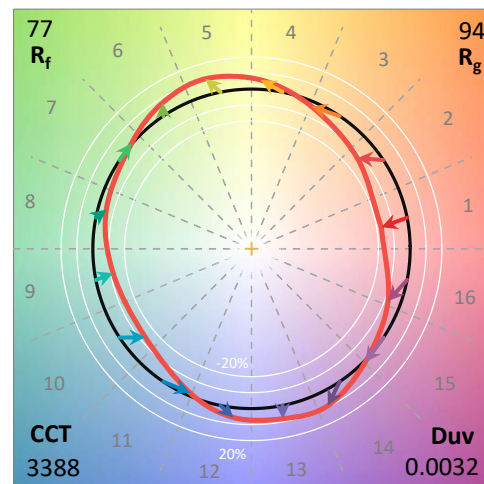
### Test Information

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**



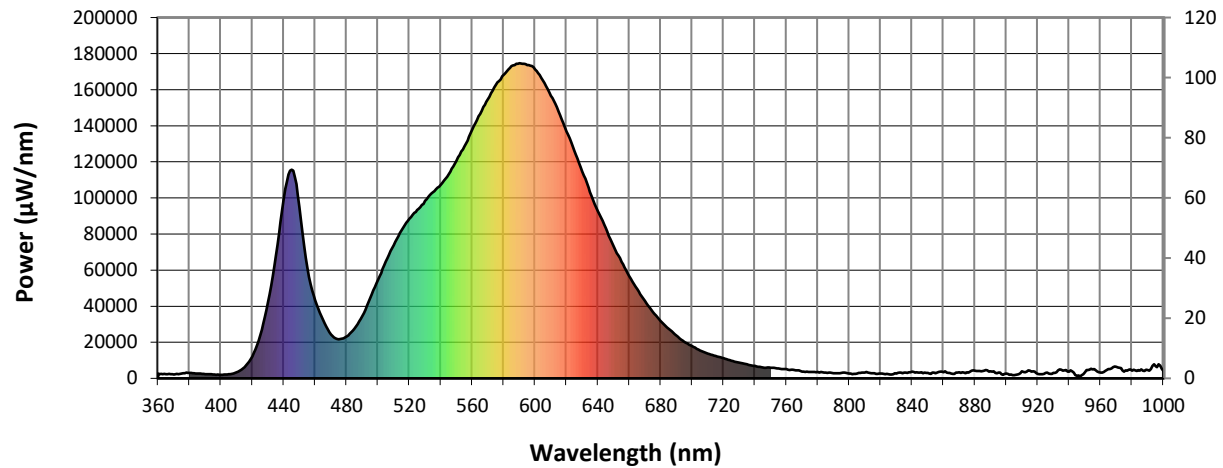
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 3500K 4-step quadrangle

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### Photopic Flux vs. Wavelength

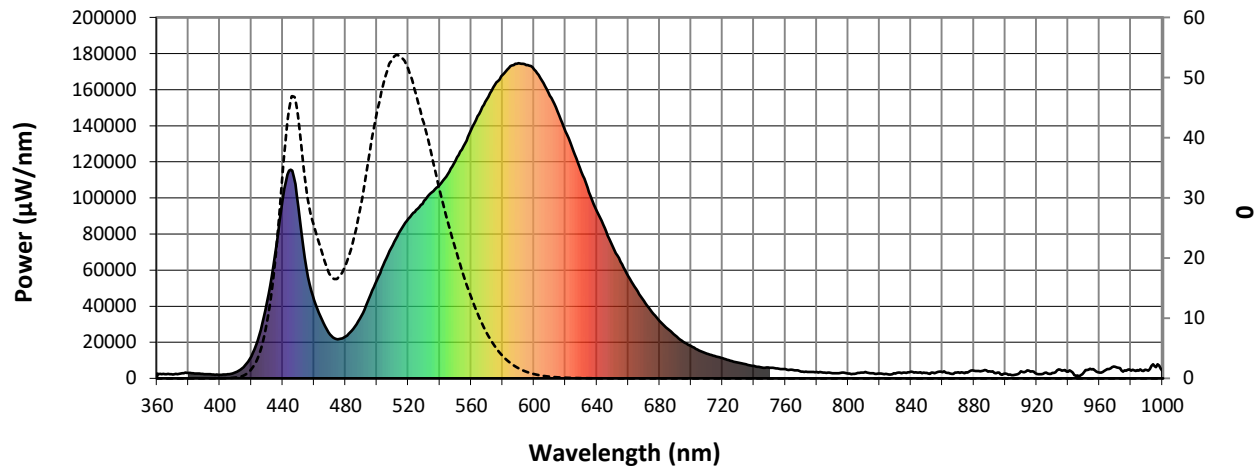


#####

| 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              |           |                  |                  |

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### Scotopic Flux vs. Wavelength



Scotopic Lumens: 12126

S/P: 1.36

| $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) |
|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|
| 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              |           |                  |                  |

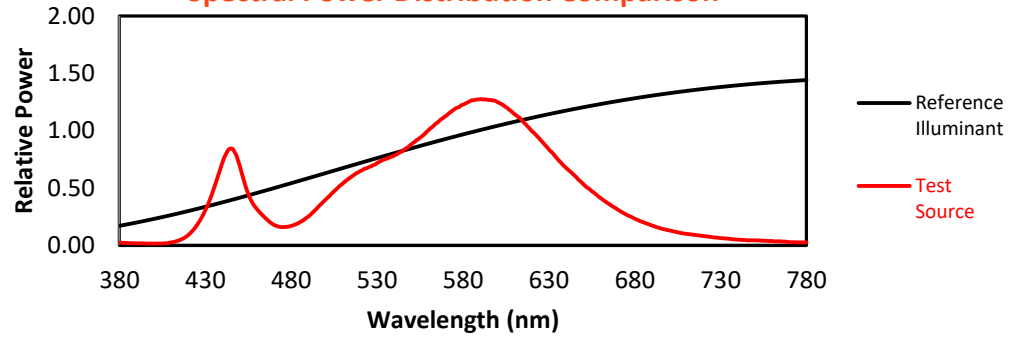
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TM-30-18

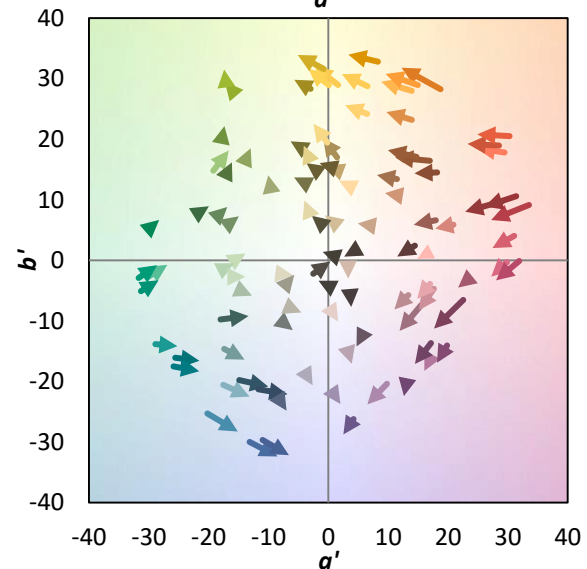
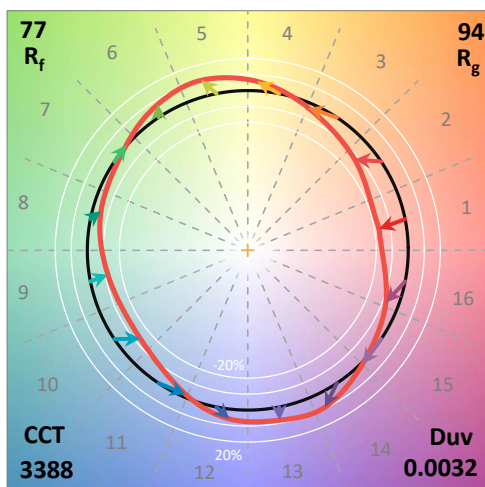
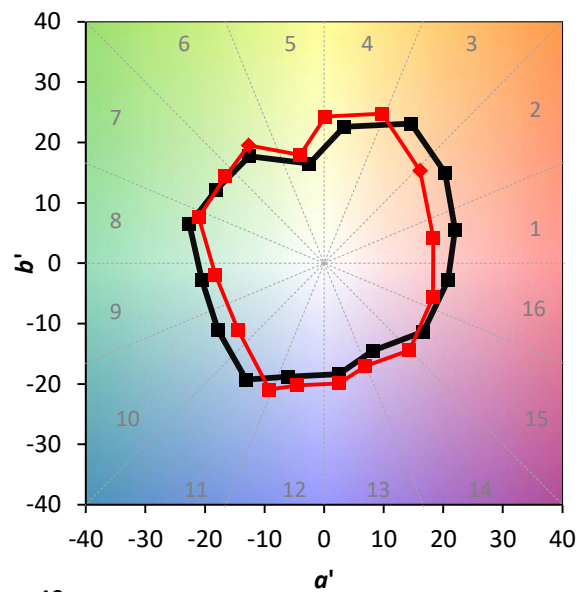
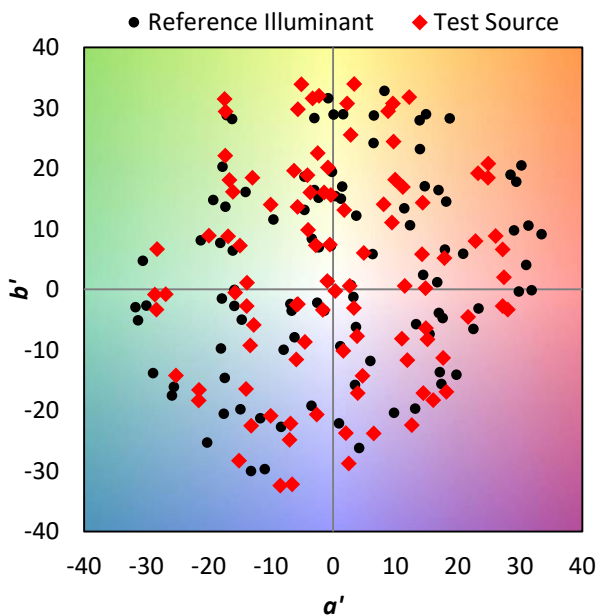
### Summary

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

### Spectral Power Distribution Comparison

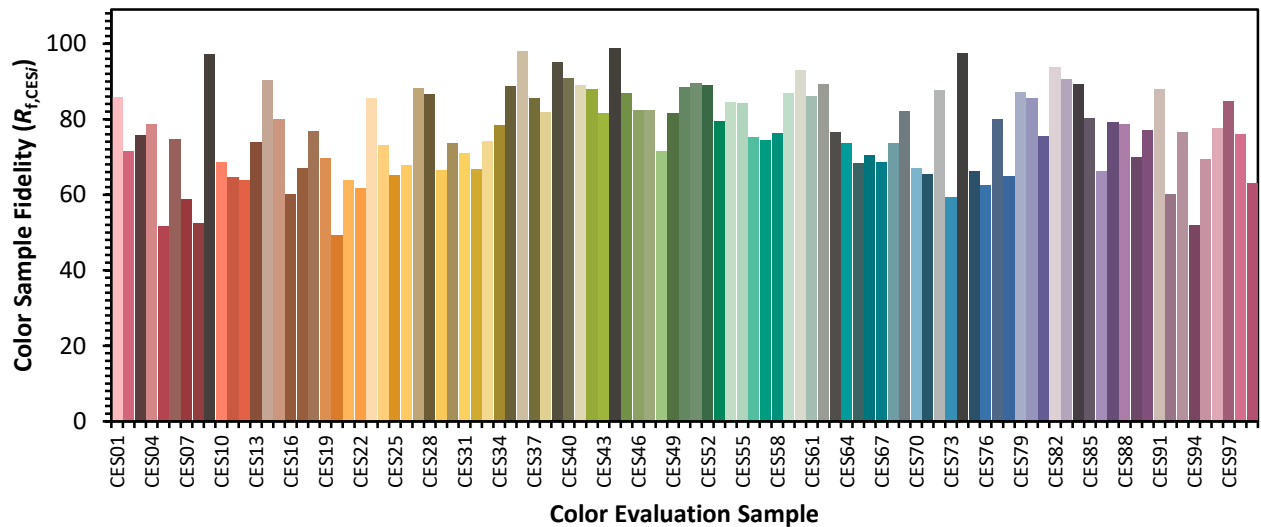


### Color Vector Graphics



**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**


**Measure Comparisons**



(END OF REPORT)