

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: P822954

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

Issue Date: 04/10/2024

**Test Information**

Test Method: LM-79-08  
Report Number: P822954  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1910-543-10)  
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  
Description: MESA POST TOP DECORATIVE LUMINAIRE. (1) LIGHTSQUARES WITH 16 LEDS EACH AND TYPE III OPTICS.  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 5834.6 lumens  
Efficiency: N/A  
Efficacy: 98.9 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 0.5' x H: 0')  
IES Classification: Type III - Short  
BUG Rating: B1 - U0 - G2

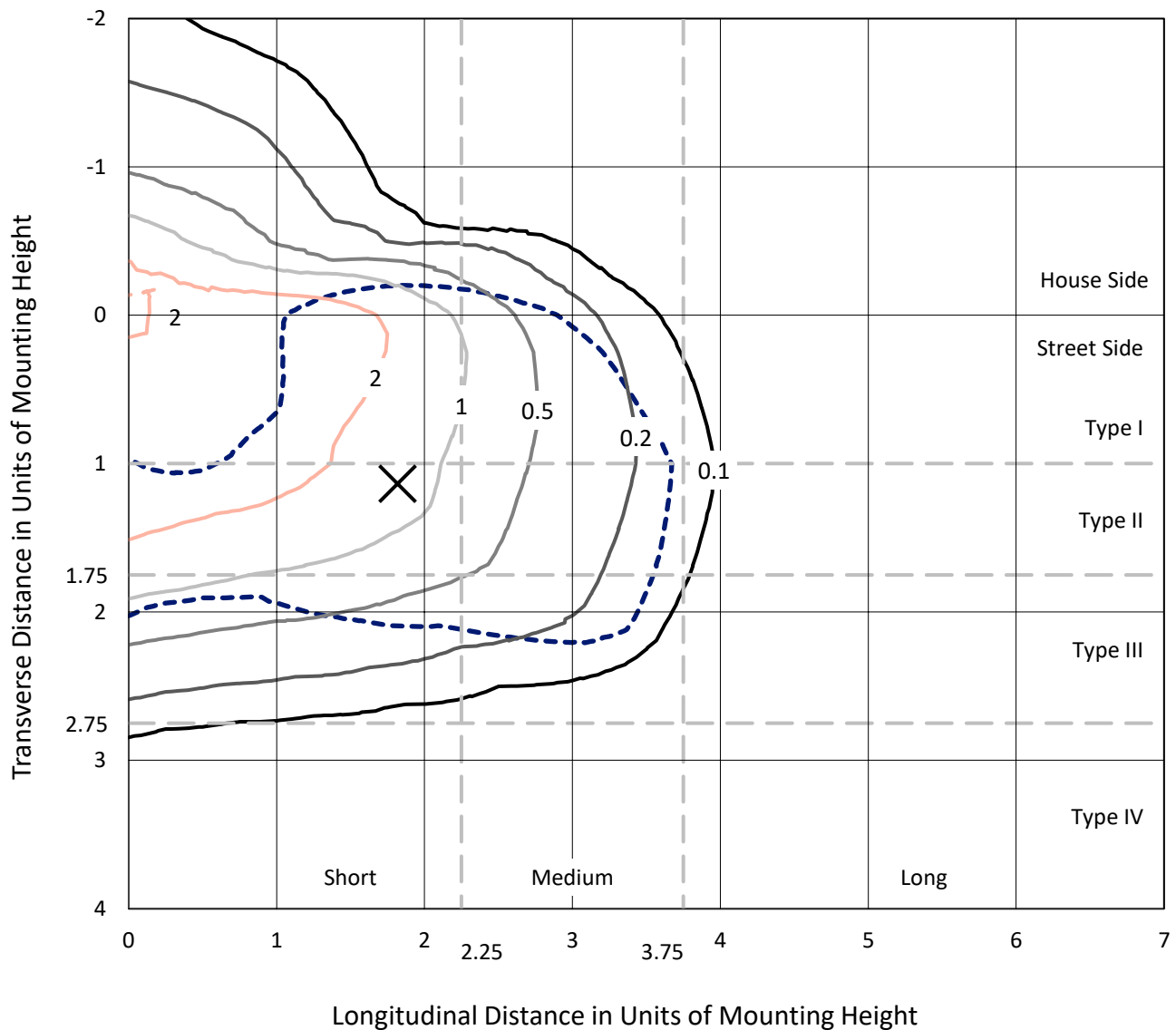
Input Watts (W): 59  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

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## Iso-Footcandle Lines of Horizontal Illumination

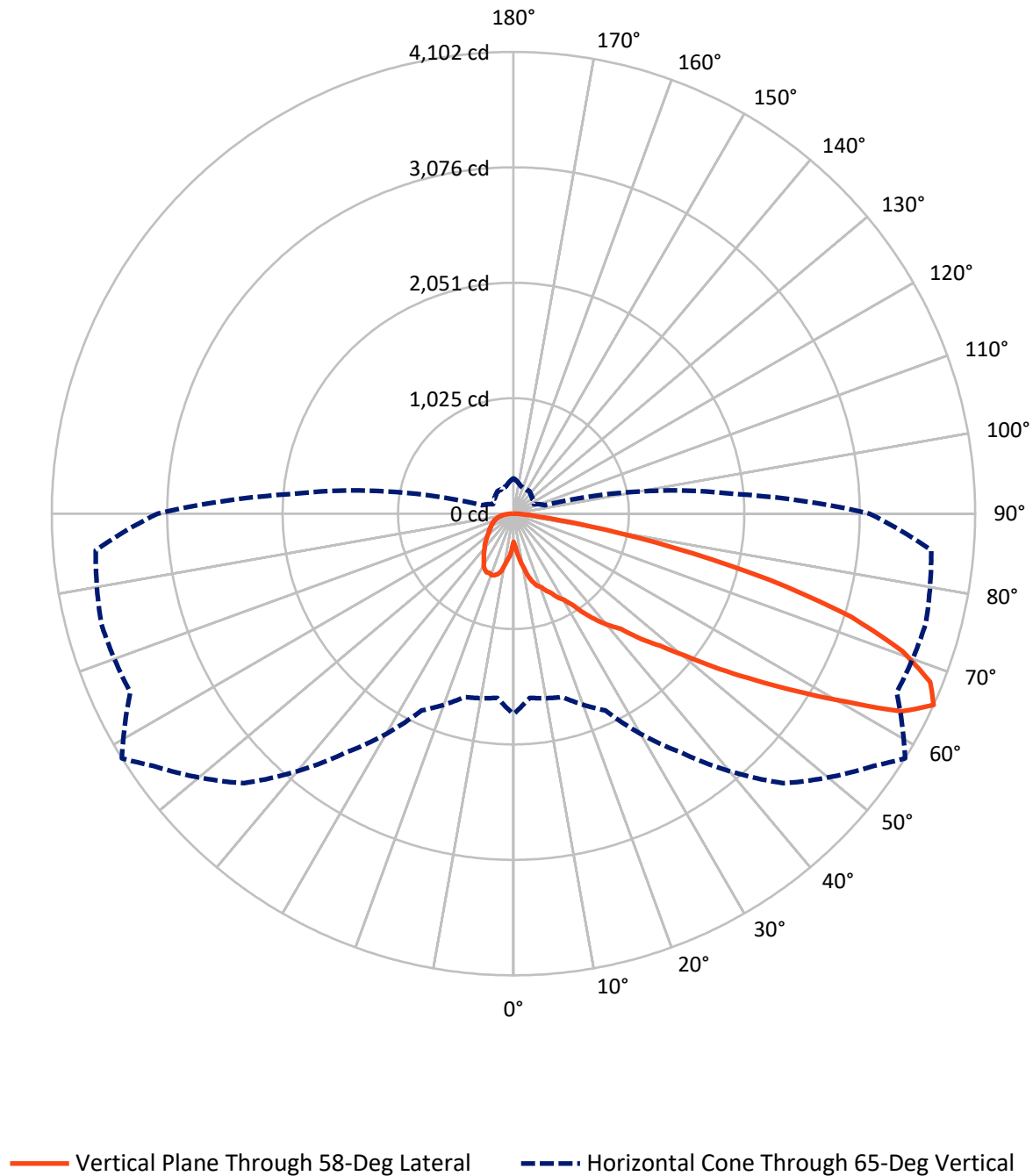
× Max cd  
 - - - 1/2 Max cd



Based on 15 foot mounting height. Maximum calculated value = 3.4 fc  
 Type III - Short - N/A

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## Luminous Intensity Polar Plot



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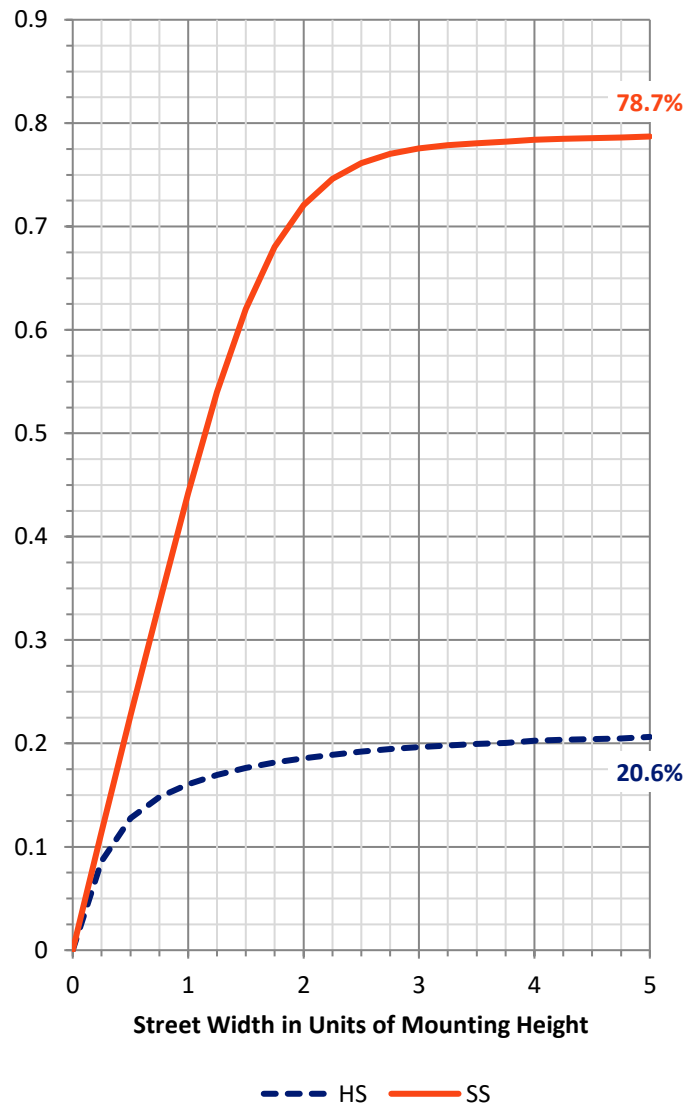
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 1228.9   | 0.0    | 1228.9 |
|                    | % Fixture | 21.1     | 0.0    | 21.1   |
| <b>Street Side</b> | Lumens    | 4605.7   | 0.0    | 4605.7 |
|                    | % Fixture | 78.9     | 0.0    | 78.9   |
| <b>Total</b>       | Lumens    | 5834.6   | 0.0    | 5834.6 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 38.2   | 0.7       |
| 10°-20°   | 166.5  | 2.9       |
| 20°-30°   | 319.5  | 5.5       |
| 30°-40°   | 527.5  | 9.0       |
| 40°-50°   | 876.8  | 15.0      |
| 50°-60°   | 1448.0 | 24.8      |
| 60°-70°   | 1624.4 | 27.8      |
| 70°-80°   | 738.6  | 12.7      |
| 80°-90°   | 95.2   | 1.6       |
| 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°    | 5834.6 | 100.0     |
| 0°-180°   | 5834.6 | 100.0     |

**Coefficient of Utilization**



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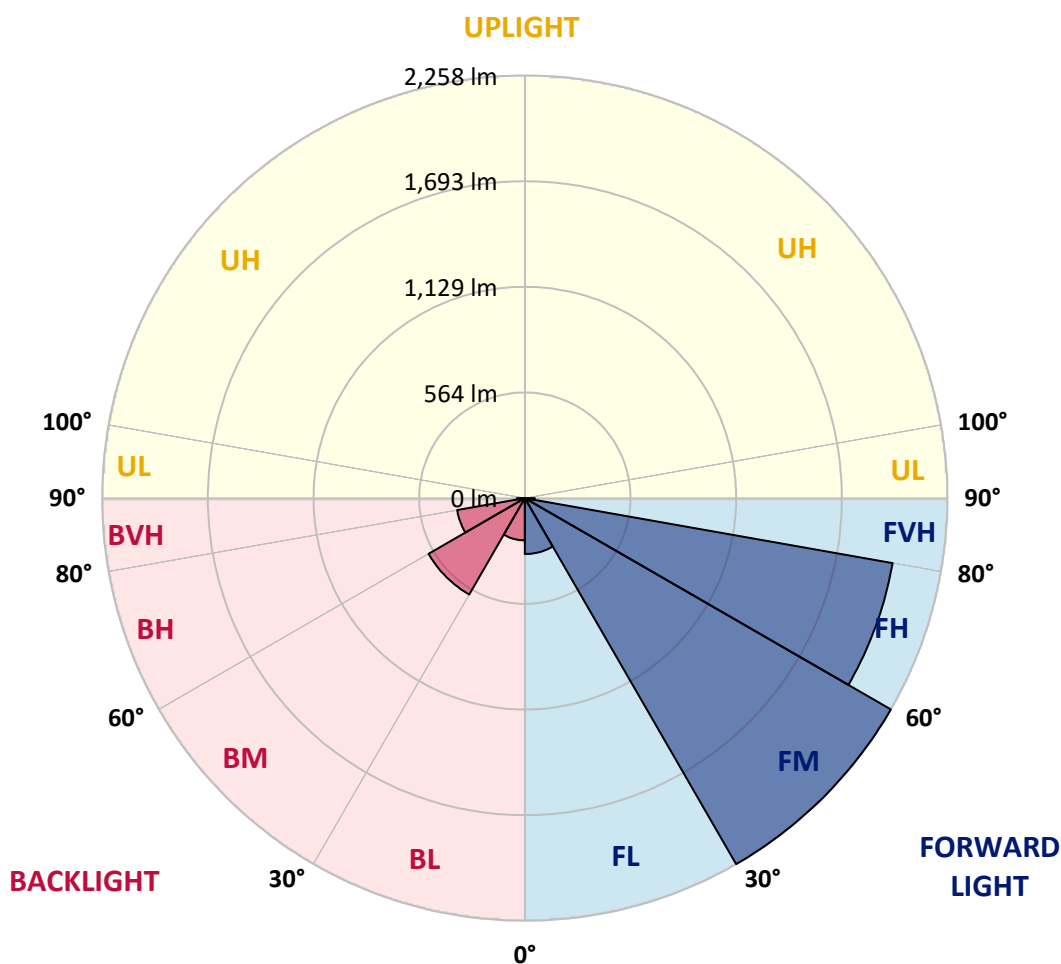
CATALOG NUMBER: MSA-SA1C-735-U-T3

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 298.6  | 5.1       |                         |      |         |
| FM   | (30°-60°)   | 2257.9 | 38.7      |                         |      |         |
| FH   | (60°-80°)   | 1995.6 | 34.2      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 53.6   | 0.9       |                         |      | G1/100  |
| BL   | (0°-30°)    | 225.6  | 3.9       | B1/500                  |      |         |
| BM   | (30°-60°)   | 594.4  | 10.2      | B1/1000                 |      |         |
| BH   | (60°-80°)   | 367.4  | 6.3       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 41.6   | 0.7       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B1-U0-G2**

Type III Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 58°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 250.5  | 250.5  | 250.5  | 250.5  | 250.5  | 250.5  | 250.5  | 250.5  | 250.5  | 250.5  | 250.5  |
| 2.5°  | 299.1  | 290.1  | 275.0  | 278.7  | 287.4  | 292.3  | 289.4  | 285.5  | 280.4  | 279.4  | 301.7  |
| 5°    | 387.3  | 370.0  | 363.0  | 360.1  | 349.4  | 343.1  | 354.0  | 352.5  | 358.4  | 369.1  | 391.0  |
| 7.5°  | 451.7  | 439.5  | 427.9  | 426.7  | 406.0  | 398.7  | 413.4  | 421.1  | 431.5  | 431.8  | 461.4  |
| 10°   | 486.2  | 475.8  | 475.5  | 464.6  | 462.9  | 476.7  | 477.0  | 482.8  | 484.1  | 496.4  | 490.6  |
| 12.5° | 523.7  | 522.9  | 536.2  | 536.0  | 551.6  | 574.4  | 563.0  | 563.0  | 566.4  | 551.3  | 569.8  |
| 15°   | 612.8  | 620.5  | 595.6  | 599.7  | 599.7  | 622.0  | 621.3  | 625.7  | 636.1  | 632.3  | 624.0  |
| 17.5° | 705.6  | 710.4  | 682.8  | 657.1  | 658.9  | 654.1  | 671.6  | 673.3  | 663.3  | 708.5  | 698.6  |
| 20°   | 765.4  | 784.3  | 726.0  | 693.7  | 700.0  | 705.6  | 706.3  | 695.9  | 690.8  | 760.3  | 746.7  |
| 22.5° | 839.3  | 823.3  | 769.8  | 734.0  | 743.5  | 736.0  | 734.6  | 742.6  | 749.6  | 775.8  | 797.9  |
| 25°   | 888.6  | 887.3  | 823.3  | 784.1  | 773.6  | 771.5  | 786.3  | 783.1  | 799.9  | 847.5  | 833.7  |
| 27.5° | 960.3  | 982.7  | 868.9  | 878.6  | 832.7  | 784.3  | 831.9  | 846.3  | 876.4  | 868.6  | 899.6  |
| 30°   | 1099.2 | 1082.4 | 963.6  | 960.9  | 909.0  | 868.4  | 901.4  | 889.3  | 943.5  | 941.8  | 964.7  |
| 32.5° | 1212.7 | 1224.4 | 1075.0 | 1047.0 | 1008.4 | 959.5  | 937.7  | 971.5  | 1000.6 | 1048.4 | 1061.4 |
| 35°   | 1332.7 | 1330.0 | 1188.9 | 1132.5 | 1068.6 | 1048.4 | 1075.4 | 1089.5 | 1151.5 | 1195.4 | 1164.9 |
| 37.5° | 1519.3 | 1498.2 | 1336.7 | 1230.0 | 1182.1 | 1174.8 | 1221.0 | 1200.6 | 1267.6 | 1278.1 | 1295.3 |
| 40°   | 1692.8 | 1629.2 | 1471.7 | 1349.5 | 1273.5 | 1300.7 | 1302.1 | 1304.8 | 1340.8 | 1369.2 | 1454.5 |
| 42.5° | 1857.8 | 1813.1 | 1609.0 | 1517.2 | 1405.1 | 1378.7 | 1395.2 | 1400.8 | 1491.7 | 1549.7 | 1667.8 |
| 45°   | 2083.3 | 1963.5 | 1806.3 | 1712.0 | 1586.6 | 1552.9 | 1541.2 | 1589.3 | 1677.1 | 1809.3 | 1910.5 |
| 47.5° | 2274.0 | 2165.9 | 2016.0 | 1891.8 | 1751.6 | 1848.1 | 1782.0 | 1755.0 | 1872.9 | 2036.7 | 2198.0 |
| 50°   | 2432.2 | 2313.2 | 2166.2 | 2094.5 | 2072.2 | 2158.1 | 1986.6 | 1989.7 | 2097.7 | 2328.7 | 2513.6 |
| 52.5° | 2554.7 | 2427.6 | 2297.3 | 2260.9 | 2385.8 | 2435.4 | 2311.5 | 2292.8 | 2371.5 | 2644.6 | 2866.6 |
| 55°   | 2669.1 | 2534.2 | 2433.7 | 2508.1 | 2718.4 | 2724.0 | 2715.3 | 2611.6 | 2706.3 | 2983.1 | 3232.1 |
| 57.5° | 2698.6 | 2553.2 | 2486.4 | 2593.1 | 2877.6 | 3099.0 | 3186.0 | 2982.3 | 3078.8 | 3290.9 | 3545.1 |
| 60°   | 2547.2 | 2422.7 | 2396.0 | 2540.8 | 2963.6 | 3287.2 | 3514.5 | 3392.7 | 3356.6 | 3538.0 | 3764.2 |
| 62.5° | 2237.1 | 2092.7 | 2114.4 | 2315.6 | 2873.0 | 3361.9 | 3773.9 | 3868.9 | 3649.8 | 3734.6 | 3860.0 |
| 65°   | 1780.6 | 1642.8 | 1686.5 | 1928.5 | 2588.5 | 3386.6 | 3906.7 | 4101.5 | 3755.7 | 3790.2 | 3724.4 |
| 67.5° | 1255.7 | 1130.6 | 1185.7 | 1498.7 | 2153.3 | 3069.3 | 3929.5 | 3993.1 | 3643.0 | 3631.6 | 3354.0 |
| 70°   | 711.5  | 632.9  | 692.7  | 953.7  | 1519.8 | 2445.1 | 3750.3 | 3666.6 | 3440.9 | 3279.0 | 2806.4 |
| 72.5° | 326.3  | 299.3  | 328.0  | 485.5  | 875.0  | 1626.9 | 3061.8 | 3137.8 | 2964.8 | 2762.5 | 2135.0 |
| 75°   | 173.5  | 164.1  | 176.2  | 242.5  | 409.4  | 885.2  | 2175.4 | 2346.4 | 2254.4 | 2095.2 | 1392.7 |
| 77.5° | 129.0  | 121.8  | 127.5  | 157.3  | 218.6  | 346.3  | 1236.0 | 1451.8 | 1486.8 | 1340.3 | 773.4  |
| 80°   | 98.9   | 93.1   | 98.9   | 118.8  | 151.4  | 164.5  | 528.5  | 676.7  | 770.7  | 622.8  | 307.3  |
| 82.5° | 73.4   | 69.5   | 78.4   | 89.2   | 106.4  | 102.8  | 187.6  | 233.5  | 301.1  | 205.8  | 119.8  |
| 85°   | 58.3   | 53.5   | 56.8   | 60.5   | 68.0   | 56.4   | 85.8   | 96.0   | 101.5  | 85.1   | 44.3   |
| 87.5° | 22.8   | 21.1   | 41.3   | 32.5   | 27.7   | 17.0   | 25.7   | 29.2   | 29.9   | 28.7   | 12.9   |
| 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

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 250.5  | 250.5  | 250.5 | 250.5 | 250.5 | 250.5 | 250.5 | 250.5 | 250.5 | 250.5 | 250.5 |
| 2.5°  | 304.2  | 301.7  | 287.4 | 292.1 | 299.6 | 301.1 | 304.2 | 295.5 | 291.1 | 307.1 | 307.9 |
| 5°    | 392.9  | 379.8  | 373.0 | 373.7 | 368.8 | 361.3 | 372.7 | 380.3 | 383.2 | 395.1 | 399.5 |
| 7.5°  | 461.7  | 445.9  | 434.4 | 421.4 | 402.8 | 391.0 | 410.8 | 425.5 | 433.2 | 458.0 | 467.8 |
| 10°   | 492.3  | 479.7  | 477.2 | 460.7 | 460.2 | 459.9 | 459.0 | 453.9 | 470.6 | 468.2 | 475.0 |
| 12.5° | 555.4  | 552.8  | 529.7 | 523.1 | 523.8 | 523.1 | 502.7 | 501.8 | 502.0 | 524.3 | 516.3 |
| 15°   | 614.3  | 614.8  | 593.6 | 569.8 | 548.4 | 541.8 | 533.8 | 530.2 | 535.5 | 548.2 | 540.4 |
| 17.5° | 686.9  | 689.3  | 628.8 | 591.2 | 563.0 | 562.2 | 543.0 | 520.5 | 553.0 | 560.8 | 552.3 |
| 20°   | 733.8  | 723.6  | 649.2 | 586.1 | 578.1 | 556.2 | 532.4 | 501.3 | 529.4 | 548.4 | 553.7 |
| 22.5° | 778.3  | 760.6  | 668.2 | 595.0 | 556.6 | 530.6 | 507.6 | 487.4 | 496.4 | 517.5 | 514.2 |
| 25°   | 808.3  | 803.5  | 694.4 | 616.7 | 556.0 | 498.1 | 467.0 | 454.2 | 458.7 | 491.5 | 488.3 |
| 27.5° | 880.3  | 827.8  | 689.8 | 622.3 | 532.6 | 453.6 | 438.1 | 424.3 | 419.6 | 455.1 | 464.8 |
| 30°   | 928.4  | 906.8  | 720.7 | 613.6 | 503.3 | 417.2 | 394.3 | 391.5 | 392.9 | 433.2 | 435.9 |
| 32.5° | 1010.0 | 954.0  | 771.2 | 580.0 | 460.5 | 390.2 | 364.0 | 365.2 | 371.8 | 401.1 | 407.2 |
| 35°   | 1095.1 | 1061.6 | 778.0 | 556.0 | 425.7 | 361.6 | 350.8 | 342.4 | 346.0 | 371.8 | 373.0 |
| 37.5° | 1253.0 | 1137.1 | 819.8 | 518.7 | 400.2 | 350.7 | 330.3 | 322.7 | 324.7 | 339.2 | 349.6 |
| 40°   | 1392.0 | 1289.0 | 800.3 | 482.8 | 368.6 | 336.0 | 310.5 | 304.9 | 299.1 | 313.5 | 320.0 |
| 42.5° | 1614.8 | 1397.4 | 793.8 | 443.2 | 353.8 | 316.4 | 298.9 | 284.0 | 278.5 | 290.6 | 302.5 |
| 45°   | 1837.7 | 1512.3 | 758.1 | 403.1 | 332.9 | 314.9 | 281.9 | 267.7 | 269.2 | 280.1 | 292.3 |
| 47.5° | 2085.9 | 1666.6 | 697.6 | 364.3 | 310.0 | 307.9 | 264.9 | 258.8 | 263.2 | 275.3 | 287.4 |
| 50°   | 2379.5 | 1830.4 | 647.6 | 329.2 | 293.7 | 286.7 | 262.6 | 255.4 | 259.5 | 273.8 | 285.7 |
| 52.5° | 2700.4 | 2009.9 | 611.1 | 296.9 | 275.3 | 270.0 | 265.6 | 258.5 | 263.4 | 275.8 | 288.1 |
| 55°   | 3019.5 | 2173.9 | 586.3 | 274.8 | 259.5 | 262.9 | 271.7 | 266.5 | 269.0 | 278.2 | 290.6 |
| 57.5° | 3256.1 | 2260.4 | 536.5 | 251.3 | 246.6 | 258.8 | 272.4 | 263.8 | 265.3 | 278.2 | 291.6 |
| 60°   | 3393.7 | 2276.9 | 454.6 | 232.1 | 236.4 | 250.5 | 264.9 | 254.0 | 252.9 | 274.1 | 290.8 |
| 62.5° | 3378.6 | 2181.0 | 360.6 | 214.5 | 224.8 | 238.1 | 253.4 | 243.0 | 245.7 | 274.5 | 292.3 |
| 65°   | 3162.9 | 1984.9 | 286.7 | 199.7 | 210.6 | 224.5 | 244.0 | 239.8 | 252.7 | 294.0 | 313.2 |
| 67.5° | 2783.8 | 1698.4 | 230.4 | 185.9 | 197.5 | 215.3 | 250.5 | 261.4 | 267.0 | 313.9 | 333.6 |
| 70°   | 2256.1 | 1319.6 | 191.9 | 173.7 | 187.1 | 219.7 | 269.4 | 267.3 | 262.6 | 304.4 | 320.0 |
| 72.5° | 1629.9 | 904.6  | 168.9 | 161.8 | 174.2 | 206.5 | 270.0 | 258.3 | 252.5 | 278.0 | 289.2 |
| 75°   | 1019.8 | 539.7  | 147.5 | 146.7 | 154.6 | 185.1 | 257.8 | 247.3 | 231.6 | 244.2 | 258.8 |
| 77.5° | 582.4  | 276.3  | 124.2 | 130.7 | 135.4 | 160.6 | 230.9 | 221.3 | 207.3 | 212.6 | 226.9 |
| 80°   | 222.3  | 133.7  | 104.7 | 116.2 | 115.0 | 136.1 | 195.6 | 193.4 | 177.4 | 179.1 | 187.8 |
| 82.5° | 104.7  | 74.8   | 87.0  | 99.9  | 93.3  | 108.3 | 158.9 | 158.2 | 144.1 | 130.5 | 137.5 |
| 85°   | 38.8   | 39.9   | 63.6  | 76.0  | 64.8  | 70.0  | 115.0 | 111.8 | 98.2  | 82.8  | 91.6  |
| 87.5° | 8.8    | 14.3   | 31.3  | 39.6  | 22.6  | 21.6  | 46.4  | 40.3  | 38.8  | 23.1  | 24.3  |
| 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**



CCT = 3388K  
 CIE  $x$  = 0.4153  
 CIE  $y$  = 0.4030  
 Duv = 0.0032

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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

| 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



**Measure Comparisons**



(END OF REPORT)