

Signify Classified - Internal  
Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



Scaled data based on original data using  
LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for  
Cooper Lighting Solutions  
(formerly Eaton)

Brand: McGRAW-EDISON

Report Number: P438611

Luminaire Tested: **ISW-SA1D-827-U-T4FT-HSS**

Issue Date: 12/10/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P438611  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G3-2011-074-11)  
Test Lab: INNOVATION CENTER  
Issue Date: 12/10/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: ISW-SA1D-827-U-T4FT-HSS  
Description: IMPACT ELITE LED WEDGE LUMINAIRE  
(1) 80 CRI, 2700K, 800mA LIGHTSQUARE WITH 16 LEDS AND TYPE IV FORWARD  
THROW OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

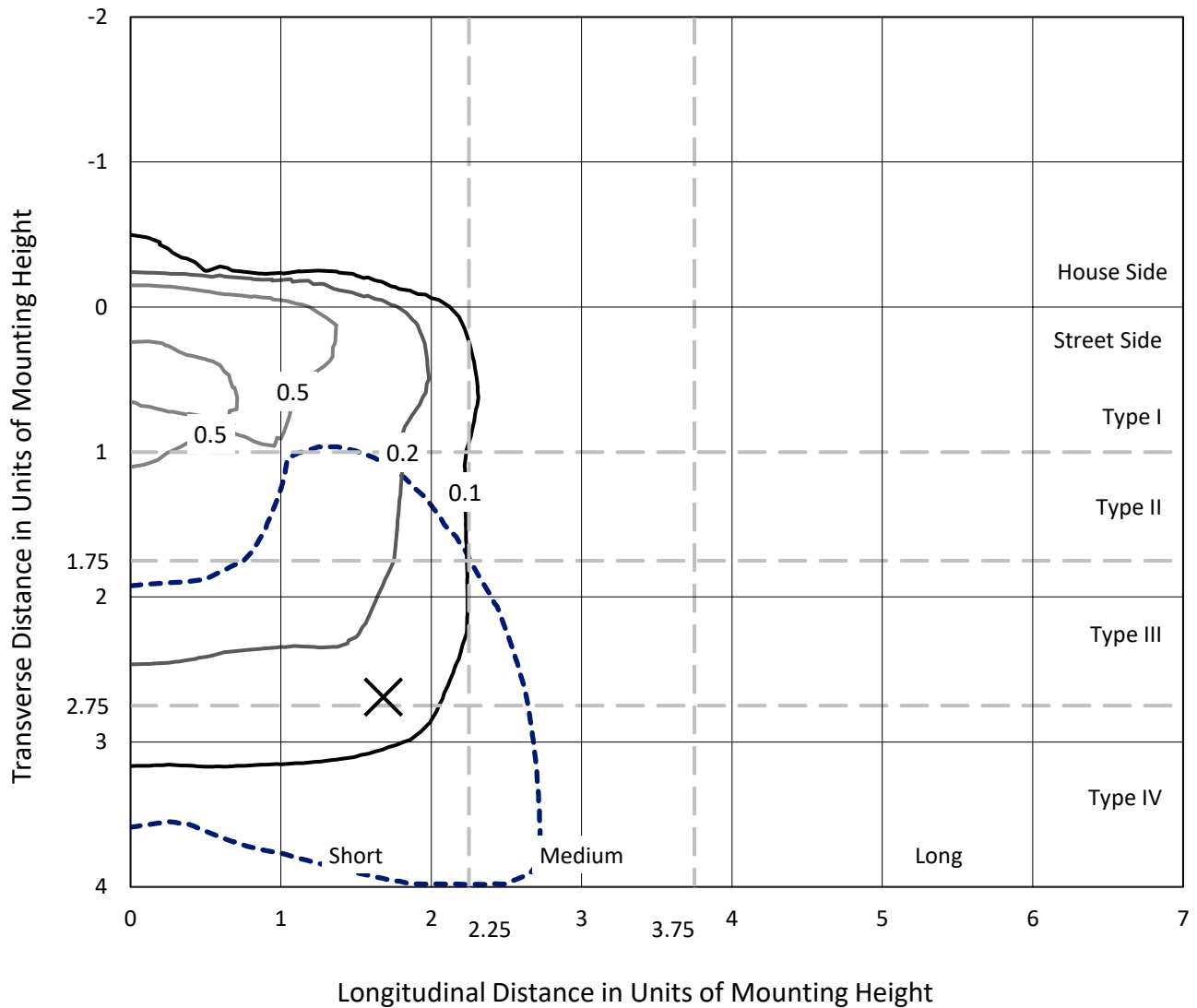
Lumens per Lamp: N/A  
Luminaire Lumens: 3196 lumens  
Efficiency: N/A  
Efficacy: 70.7 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 0.5' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B0 - U0 - G1  
  
Input Watts (W): 45.2  
Input Voltage (V): NR  
Input Current (Ain): NR  
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: 28.75 FT



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### Iso-Footcandle Lines of Horizontal Illumination

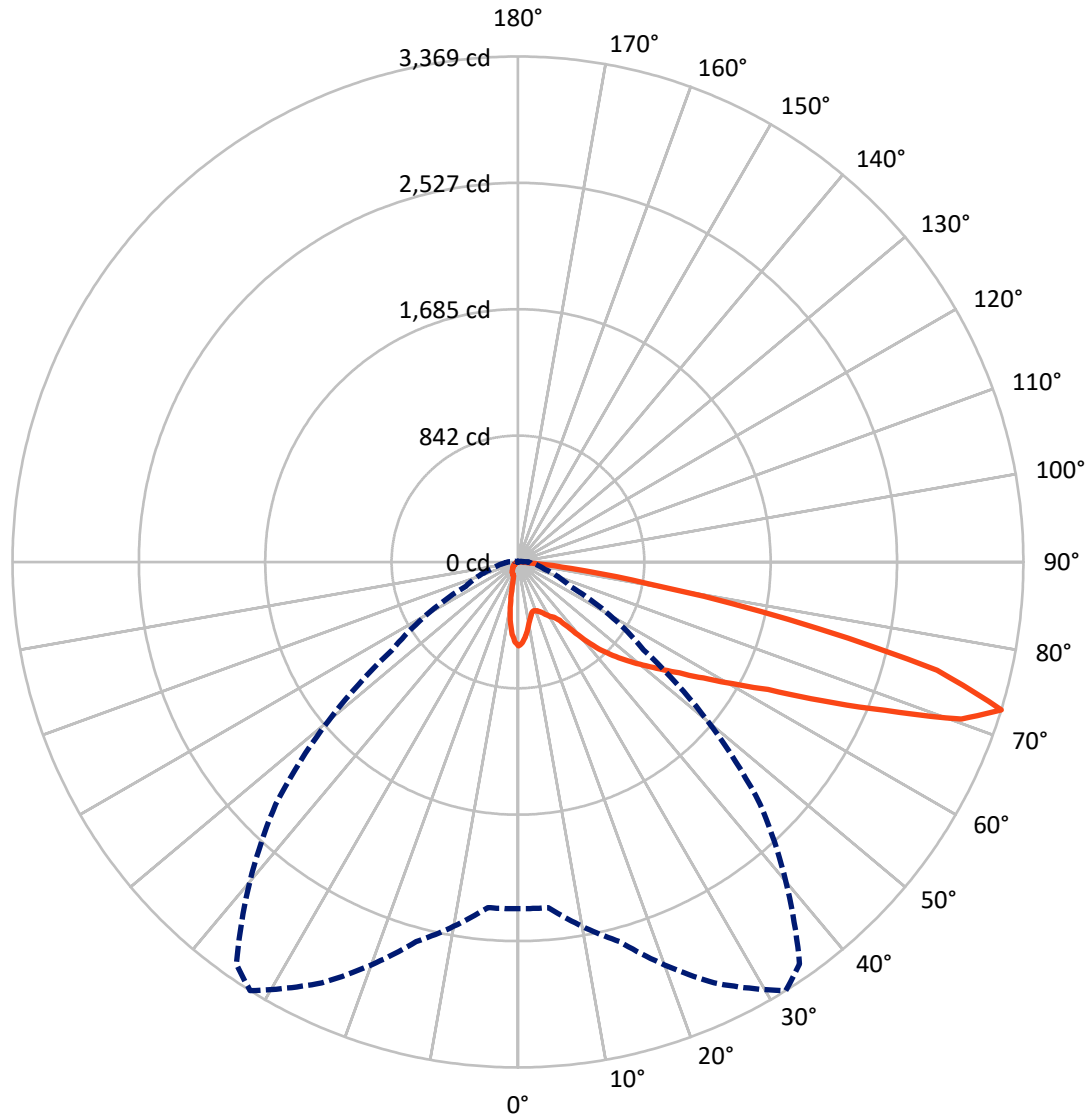
× Max cd  
 - - - 1/2 Max cd



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

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### Luminous Intensity Polar Plot



— Vertical Plane Through 32-Deg Lateral      - - - Horizontal Cone Through 72.5-Deg Vertical

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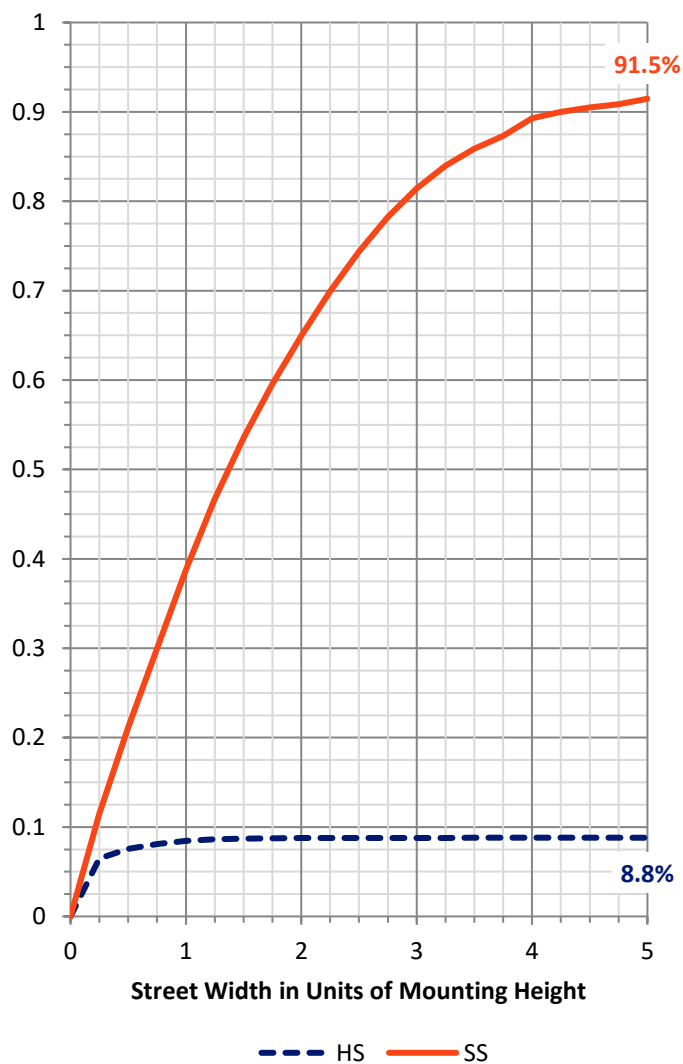
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 282.9    | 0.0    | 282.9  |
|                    | % Fixture | 8.9      | 0.0    | 8.9    |
| <b>Street Side</b> | Lumens    | 2913.1   | 0.0    | 2913.1 |
|                    | % Fixture | 91.1     | 0.0    | 91.1   |
| <b>Total</b>       | Lumens    | 3196.0   | 0.0    | 3196.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 46.5   | 1.5       |
| 10°-20°   | 101.0  | 3.2       |
| 20°-30°   | 152.8  | 4.8       |
| 30°-40°   | 246.4  | 7.7       |
| 40°-50°   | 436.3  | 13.7      |
| 50°-60°   | 668.3  | 20.9      |
| 60°-70°   | 894.1  | 28.0      |
| 70°-80°   | 617.2  | 19.3      |
| 80°-90°   | 33.4   | 1.0       |
| 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°    | 3196.0 | 100.0     |
| 0°-180°   | 3196.0 | 100.0     |

**Coefficient of Utilization**



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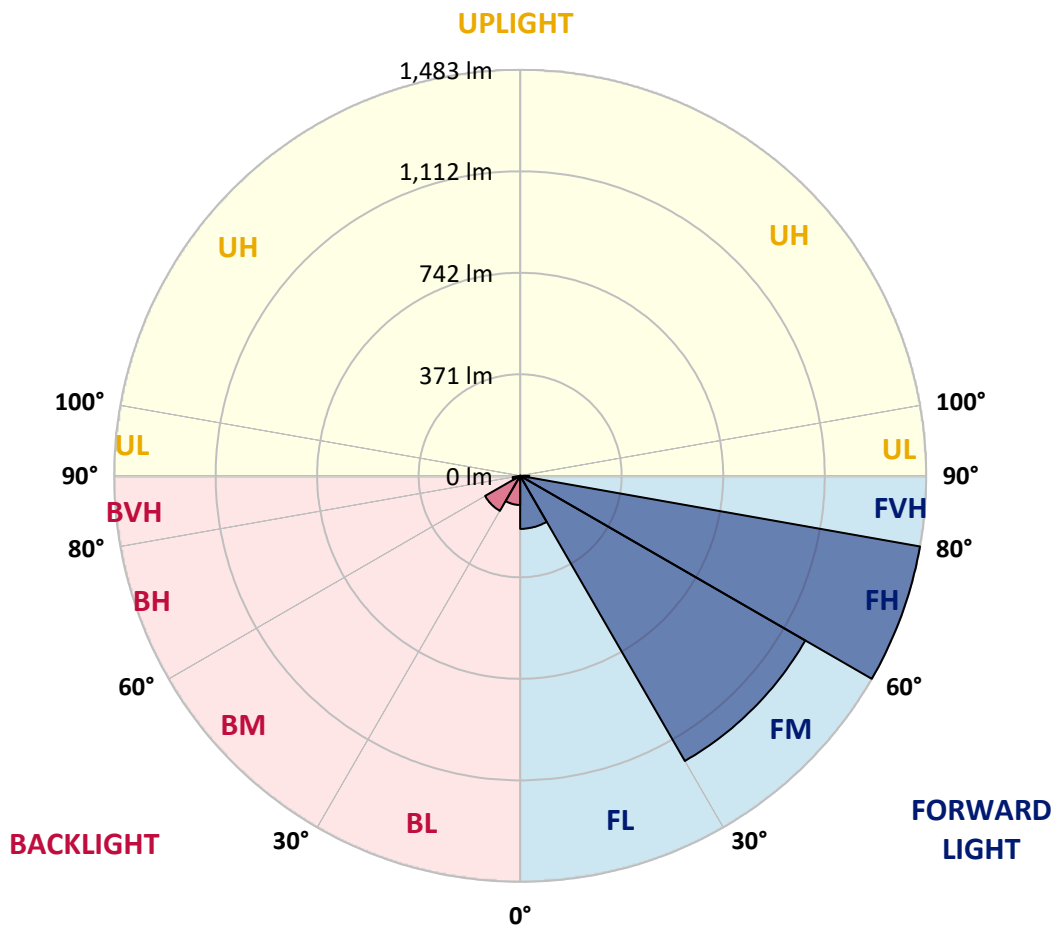
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**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone           | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|----------------|--------|-----------|-------------------------|------|---------|
|                |        |           | B                       | U    | G       |
| FL (0°-30°)    | 193.8  | 6.1       |                         |      |         |
| FM (30°-60°)   | 1203.1 | 37.6      |                         |      |         |
| FH (60°-80°)   | 1483.2 | 46.4      |                         |      | G1/1800 |
| FVH (80°-90°)  | 33.0   | 1.0       |                         |      | G1/100  |
| BL (0°-30°)    | 106.5  | 3.3       | B0/110                  |      |         |
| BM (30°-60°)   | 147.9  | 4.6       | B0/220                  |      |         |
| BH (60°-80°)   | 28.1   | 0.9       | B0/110                  |      | G0/110  |
| BVH (80°-90°)  | 0.4    | 0.0       |                         |      | G0/10   |
| UL (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B0-U0-G1**

Type IV Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 32°    | 35°    | 45°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 559.9  | 559.9  | 559.9  | 559.9  | 559.9  | 559.9  | 559.9  | 559.9  | 559.9  | 559.9  | 559.9  |
| 2.5°  | 538.9  | 538.9  | 540.5  | 542.1  | 542.1  | 547.0  | 553.5  | 555.1  | 559.9  | 563.2  | 564.8  |
| 5°    | 482.3  | 488.7  | 488.7  | 496.8  | 503.3  | 509.8  | 526.0  | 535.7  | 551.9  | 563.2  | 566.4  |
| 7.5°  | 430.5  | 432.1  | 436.9  | 446.7  | 459.6  | 464.5  | 485.5  | 513.0  | 543.8  | 563.2  | 571.3  |
| 10°   | 378.7  | 380.3  | 383.5  | 398.1  | 411.1  | 422.4  | 451.5  | 485.5  | 529.2  | 563.2  | 577.7  |
| 12.5° | 341.5  | 341.5  | 344.7  | 360.9  | 375.5  | 386.8  | 419.1  | 462.8  | 514.6  | 564.8  | 587.5  |
| 15°   | 328.5  | 328.5  | 326.9  | 335.0  | 347.9  | 357.7  | 394.9  | 443.4  | 501.7  | 568.0  | 597.2  |
| 17.5° | 335.0  | 335.0  | 328.5  | 330.1  | 341.5  | 347.9  | 380.3  | 428.9  | 495.2  | 574.5  | 613.3  |
| 20°   | 347.9  | 347.9  | 335.0  | 335.0  | 346.3  | 351.2  | 378.7  | 420.8  | 492.0  | 585.8  | 636.0  |
| 22.5° | 362.5  | 364.1  | 346.3  | 346.3  | 357.7  | 362.5  | 388.4  | 425.6  | 496.8  | 600.4  | 658.7  |
| 25°   | 386.8  | 386.8  | 364.1  | 364.1  | 373.8  | 381.9  | 406.2  | 440.2  | 503.3  | 618.2  | 694.3  |
| 27.5° | 420.8  | 419.1  | 390.0  | 381.9  | 396.5  | 403.0  | 430.5  | 458.0  | 509.8  | 639.2  | 726.6  |
| 30°   | 461.2  | 453.1  | 424.0  | 407.8  | 420.8  | 425.6  | 453.1  | 482.3  | 529.2  | 670.0  | 776.8  |
| 32.5° | 504.9  | 508.2  | 461.2  | 432.1  | 438.6  | 445.0  | 480.6  | 519.5  | 561.6  | 710.4  | 844.8  |
| 35°   | 590.7  | 590.7  | 542.1  | 487.1  | 475.8  | 479.0  | 517.9  | 568.0  | 602.0  | 778.4  | 922.4  |
| 37.5° | 697.5  | 700.7  | 655.4  | 597.2  | 561.6  | 547.0  | 574.5  | 626.3  | 660.3  | 864.2  | 1008.2 |
| 40°   | 814.0  | 809.2  | 762.2  | 708.8  | 679.7  | 661.9  | 647.3  | 708.8  | 739.6  | 956.4  | 1094.0 |
| 42.5° | 911.1  | 901.4  | 838.3  | 810.8  | 793.0  | 770.3  | 741.2  | 812.4  | 841.5  | 1073.0 | 1192.7 |
| 45°   | 974.2  | 966.1  | 903.0  | 894.9  | 888.5  | 875.5  | 882.0  | 937.0  | 964.5  | 1207.3 | 1296.3 |
| 47.5° | 1022.8 | 1011.5 | 958.1  | 969.4  | 982.3  | 995.3  | 1051.9 | 1092.4 | 1085.9 | 1330.3 | 1380.4 |
| 50°   | 1089.1 | 1073.0 | 1022.8 | 1045.4 | 1079.4 | 1105.3 | 1234.8 | 1246.1 | 1195.9 | 1435.5 | 1456.5 |
| 52.5° | 1129.6 | 1110.2 | 1097.2 | 1134.5 | 1184.6 | 1217.0 | 1435.5 | 1391.8 | 1283.3 | 1511.5 | 1516.4 |
| 55°   | 1163.6 | 1162.0 | 1184.6 | 1233.2 | 1306.0 | 1346.5 | 1600.5 | 1516.4 | 1340.0 | 1589.2 | 1548.7 |
| 57.5° | 1267.2 | 1260.7 | 1299.5 | 1338.4 | 1459.7 | 1527.7 | 1778.5 | 1607.0 | 1380.4 | 1631.3 | 1530.9 |
| 60°   | 1414.4 | 1417.7 | 1419.3 | 1490.5 | 1645.8 | 1739.7 | 1919.3 | 1683.1 | 1411.2 | 1637.8 | 1479.2 |
| 62.5° | 1644.2 | 1666.9 | 1628.0 | 1683.1 | 1870.8 | 1988.9 | 2055.3 | 1738.1 | 1401.5 | 1590.8 | 1348.1 |
| 65°   | 1977.6 | 1969.5 | 1914.5 | 1976.0 | 2226.8 | 2299.7 | 2196.1 | 1754.3 | 1344.8 | 1429.0 | 1102.1 |
| 67.5° | 2317.5 | 2320.7 | 2294.8 | 2391.9 | 2636.3 | 2623.3 | 2354.7 | 1699.2 | 1199.2 | 1079.4 | 691.0  |
| 70°   | 2539.2 | 2544.0 | 2608.8 | 2870.9 | 3136.3 | 3047.3 | 2484.1 | 1505.0 | 844.8  | 514.6  | 262.2  |
| 72.5° | 2311.0 | 2312.6 | 2620.1 | 3095.9 | 3369.4 | 3272.3 | 2283.5 | 1022.8 | 385.2  | 182.9  | 92.2   |
| 75°   | 1463.0 | 1390.1 | 1946.9 | 2624.9 | 2885.5 | 2790.0 | 1628.0 | 477.4  | 169.9  | 92.2   | 38.8   |
| 77.5° | 509.8  | 517.9  | 793.0  | 1511.5 | 1843.3 | 1882.1 | 836.7  | 157.0  | 93.9   | 63.1   | 21.0   |
| 80°   | 102.0  | 114.9  | 234.7  | 556.7  | 873.9  | 907.9  | 302.6  | 76.1   | 61.5   | 48.5   | 11.3   |
| 82.5° | 6.5    | 8.1    | 69.6   | 231.4  | 357.7  | 339.8  | 59.9   | 38.8   | 42.1   | 34.0   | 6.5    |
| 85°   | 0.0    | 0.0    | 4.9    | 38.8   | 64.7   | 48.5   | 6.5    | 9.7    | 17.8   | 19.4   | 3.2    |
| 87.5° | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 1.6    | 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    |



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 CATALOG NUMBER: ISW-SA1D-827-U-T4FT-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°   | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 559.9  | 559.9 | 559.9 | 559.9 | 559.9 | 559.9 | 559.9 | 559.9 | 559.9 | 559.9 | 559.9 |
| 2.5°  | 564.8  | 564.8 | 556.7 | 553.5 | 548.6 | 542.1 | 535.7 | 532.4 | 526.0 | 527.6 | 527.6 |
| 5°    | 566.4  | 563.2 | 553.5 | 538.9 | 522.7 | 506.5 | 487.1 | 474.2 | 459.6 | 462.8 | 461.2 |
| 7.5°  | 569.7  | 568.0 | 545.4 | 519.5 | 490.4 | 454.8 | 420.8 | 391.6 | 365.7 | 359.3 | 354.4 |
| 10°   | 576.1  | 571.3 | 538.9 | 496.8 | 438.6 | 380.3 | 322.0 | 271.9 | 250.8 | 228.2 | 223.3 |
| 12.5° | 582.6  | 574.5 | 527.6 | 464.5 | 375.5 | 289.7 | 213.6 | 168.3 | 140.8 | 132.7 | 129.5 |
| 15°   | 592.3  | 579.4 | 513.0 | 419.1 | 301.0 | 195.8 | 134.3 | 110.0 | 105.2 | 103.6 | 103.6 |
| 17.5° | 605.3  | 582.6 | 498.4 | 367.4 | 221.7 | 126.2 | 98.7  | 98.7  | 100.3 | 102.0 | 102.0 |
| 20°   | 624.7  | 590.7 | 477.4 | 304.2 | 148.9 | 95.5  | 93.9  | 95.5  | 97.1  | 98.7  | 98.7  |
| 22.5° | 645.7  | 603.6 | 453.1 | 237.9 | 105.2 | 89.0  | 89.0  | 90.6  | 92.2  | 93.9  | 93.9  |
| 25°   | 670.0  | 613.3 | 420.8 | 169.9 | 87.4  | 84.2  | 84.2  | 85.8  | 87.4  | 89.0  | 89.0  |
| 27.5° | 695.9  | 624.7 | 377.1 | 116.5 | 79.3  | 79.3  | 80.9  | 82.5  | 84.2  | 84.2  | 85.8  |
| 30°   | 734.7  | 642.5 | 331.8 | 85.8  | 72.8  | 72.8  | 76.1  | 79.3  | 80.9  | 80.9  | 82.5  |
| 32.5° | 784.9  | 657.0 | 270.3 | 72.8  | 68.0  | 66.4  | 69.6  | 74.4  | 77.7  | 79.3  | 79.3  |
| 35°   | 839.9  | 678.1 | 202.3 | 66.4  | 63.1  | 61.5  | 63.1  | 68.0  | 74.4  | 77.7  | 77.7  |
| 37.5° | 896.6  | 697.5 | 150.5 | 63.1  | 58.3  | 56.6  | 58.3  | 61.5  | 68.0  | 74.4  | 76.1  |
| 40°   | 953.2  | 700.7 | 108.4 | 58.3  | 55.0  | 53.4  | 53.4  | 56.6  | 63.1  | 69.6  | 71.2  |
| 42.5° | 1011.5 | 713.7 | 82.5  | 55.0  | 50.2  | 50.2  | 50.2  | 51.8  | 56.6  | 61.5  | 63.1  |
| 45°   | 1077.8 | 721.8 | 66.4  | 50.2  | 46.9  | 46.9  | 46.9  | 46.9  | 50.2  | 51.8  | 51.8  |
| 47.5° | 1134.5 | 710.4 | 53.4  | 45.3  | 43.7  | 43.7  | 43.7  | 42.1  | 42.1  | 40.5  | 40.5  |
| 50°   | 1174.9 | 684.6 | 43.7  | 40.5  | 40.5  | 42.1  | 38.8  | 35.6  | 35.6  | 32.4  | 32.4  |
| 52.5° | 1199.2 | 645.7 | 37.2  | 35.6  | 38.8  | 38.8  | 34.0  | 32.4  | 29.1  | 25.9  | 24.3  |
| 55°   | 1197.6 | 581.0 | 32.4  | 30.7  | 34.0  | 34.0  | 29.1  | 25.9  | 22.7  | 19.4  | 19.4  |
| 57.5° | 1150.6 | 509.8 | 29.1  | 25.9  | 29.1  | 27.5  | 24.3  | 19.4  | 16.2  | 12.9  | 12.9  |
| 60°   | 1077.8 | 433.7 | 25.9  | 21.0  | 22.7  | 21.0  | 19.4  | 14.6  | 11.3  | 8.1   | 8.1   |
| 62.5° | 979.1  | 362.5 | 21.0  | 17.8  | 16.2  | 16.2  | 14.6  | 11.3  | 6.5   | 4.9   | 4.9   |
| 65°   | 791.4  | 268.6 | 16.2  | 12.9  | 11.3  | 12.9  | 9.7   | 6.5   | 3.2   | 1.6   | 1.6   |
| 67.5° | 488.7  | 153.7 | 12.9  | 9.7   | 8.1   | 9.7   | 6.5   | 4.9   | 1.6   | 0.0   | 0.0   |
| 70°   | 192.6  | 66.4  | 9.7   | 6.5   | 6.5   | 6.5   | 4.9   | 3.2   | 0.0   | 0.0   | 0.0   |
| 72.5° | 66.4   | 29.1  | 8.1   | 4.9   | 4.9   | 3.2   | 3.2   | 1.6   | 0.0   | 0.0   | 0.0   |
| 75°   | 29.1   | 17.8  | 6.5   | 4.9   | 3.2   | 3.2   | 1.6   | 1.6   | 0.0   | 0.0   | 0.0   |
| 77.5° | 16.2   | 11.3  | 4.9   | 3.2   | 3.2   | 1.6   | 1.6   | 1.6   | 0.0   | 0.0   | 0.0   |
| 80°   | 9.7    | 6.5   | 3.2   | 3.2   | 3.2   | 1.6   | 1.6   | 1.6   | 0.0   | 0.0   | 0.0   |
| 82.5° | 6.5    | 3.2   | 1.6   | 1.6   | 1.6   | 1.6   | 1.6   | 1.6   | 0.0   | 0.0   | 0.0   |
| 85°   | 3.2    | 1.6   | 0.0   | 1.6   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 87.5° | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 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   |



Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



**Test Information**

Test Method: LM-79-2019  
 Report Number: SP1-2407-157-9  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry: 4π  
 Issue Date: 10/03/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: Invue  
 Catalog Number: **EMM2-HTN-SA1A-827-U-5WQ**  
 Description: Epic Modern Light Square 40W 5WQ Optic

**Spectral Parameters**

CCT (K): 2764  
 CIE u': 0.2591  
 CIE v': 0.5290  
 Duv: 0.0020  
 CIE x: 0.4581  
 CIE y: 0.4156  
 CIE z: 0.1263  
 Peak Wavelength (nm): 603  
 Dominant Wavelength (nm): 583  
 Purity: 62.2537  
 Rf: 84.7  
 Rg: 94.6

|           |      |      |      |
|-----------|------|------|------|
| CRI (Ra): | 80.9 |      |      |
| R1:       | 78.8 | R9:  | -1.5 |
| R2:       | 89.9 | R10: | 77.9 |
| R3:       | 96.2 | R11: | 78.9 |
| R4:       | 79.1 | R12: | 71.6 |
| R5:       | 79.1 | R13: | 81.2 |
| R6:       | 88.8 | R14: | 98.5 |
| R7:       | 81.3 | R15: | 69.9 |
| R8:       | 54.3 |      |      |



**Test Conditions**

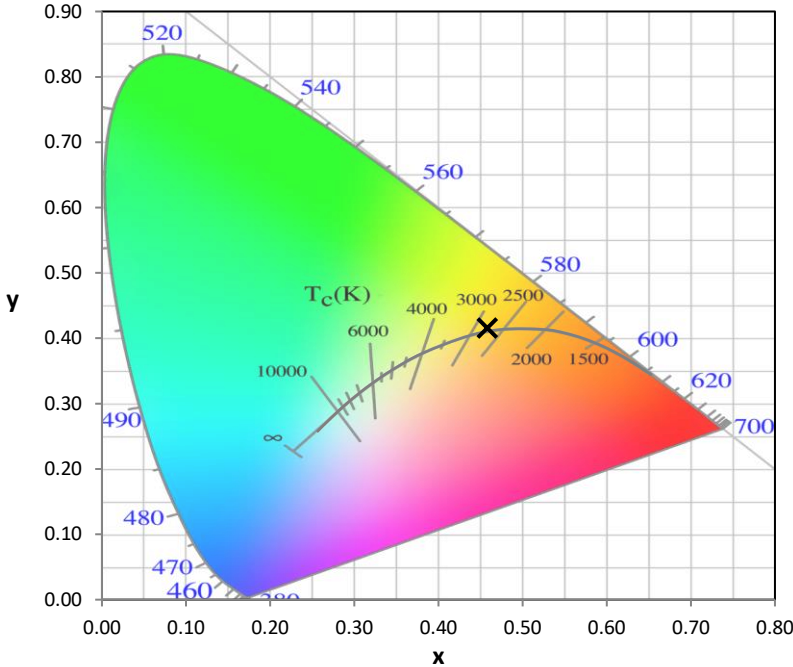
Stabilization Time: 81M  
 Operation Time: 2H 21M  
 Sphere Temperature (°C): 25.2

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| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 6/18/2024        | 12/18/2024           |
| Power Meter                    | INXT2011004           | 2/8/2024         | 2/8/2025             |
| AC Power Source                | IN0063                | 10/24/2023       | 10/24/2024           |
| DC Power Source                | IN0208                | 10/24/2023       | 10/24/2024           |
| Sphere Thermometer             | IN0085                | 10/24/2023       | 10/24/2024           |
| Room Thermometer               | IN0046                | 10/24/2023       | 10/24/2024           |

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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 2700K 4-step quadrangle

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**Photopic Flux vs. Wavelength**



**Photopic Lumens: 4337.9**

| λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) |
|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|
| 360    | 0             | 0.0           | 490    | 18018         | 2.6           | 620    | 87426         | 22.8          | 750    | 2680          | 0.0           | 880    | 58            | 0.0           |
| 365    | 0             | 0.0           | 495    | 22295         | 3.9           | 625    | 83013         | 18.2          | 755    | 2287          | 0.0           | 885    | 46            | 0.0           |
| 370    | 0             | 0.0           | 500    | 26478         | 5.8           | 630    | 78077         | 14.1          | 760    | 1944          | 0.0           | 890    | 45            | 0.0           |
| 375    | 0             | 0.0           | 505    | 30524         | 8.5           | 635    | 72080         | 10.7          | 765    | 1653          | 0.0           | 895    | 41            | 0.0           |
| 380    | 0             | 0.0           | 510    | 33611         | 11.5          | 640    | 66249         | 7.9           | 770    | 1413          | 0.0           | 900    | 38            | 0.0           |
| 385    | 0             | 0.0           | 515    | 36490         | 15.2          | 645    | 59973         | 5.7           | 775    | 1198          | 0.0           | 905    | 33            | 0.0           |
| 390    | 0             | 0.0           | 520    | 38610         | 18.7          | 650    | 53972         | 3.9           | 780    | 1025          | 0.0           | 910    | 30            | 0.0           |
| 395    | 0             | 0.0           | 525    | 40511         | 21.9          | 655    | 48369         | 2.7           | 785    | 874           | 0.0           | 915    | 23            | 0.0           |
| 400    | 48            | 0.0           | 530    | 42223         | 24.9          | 660    | 42641         | 1.8           | 790    | 747           | 0.0           | 920    | 24            | 0.0           |
| 405    | 201           | 0.0           | 535    | 44137         | 27.6          | 665    | 37602         | 1.1           | 795    | 639           | 0.0           | 925    | 22            | 0.0           |
| 410    | 457           | 0.0           | 540    | 46032         | 30.0          | 670    | 32798         | 0.7           | 800    | 547           | 0.0           | 930    | 22            | 0.0           |
| 415    | 925           | 0.0           | 545    | 48553         | 32.5          | 675    | 28558         | 0.5           | 805    | 473           | 0.0           | 935    | 17            | 0.0           |
| 420    | 1816          | 0.0           | 550    | 51408         | 34.9          | 680    | 24782         | 0.3           | 810    | 401           | 0.0           | 940    | 13            | 0.0           |
| 425    | 3217          | 0.0           | 555    | 54711         | 37.4          | 685    | 21386         | 0.2           | 815    | 351           | 0.0           | 945    | 6             | 0.0           |
| 430    | 5520          | 0.0           | 560    | 58847         | 40.0          | 690    | 18413         | 0.1           | 820    | 307           | 0.0           | 950    | 10            | 0.0           |
| 435    | 9225          | 0.1           | 565    | 63386         | 42.4          | 695    | 15721         | 0.1           | 825    | 261           | 0.0           | 955    | 11            | 0.0           |
| 440    | 15522         | 0.2           | 570    | 68196         | 44.3          | 700    | 13432         | 0.0           | 830    | 228           | 0.0           | 960    | 8             | 0.0           |
| 445    | 27642         | 0.6           | 575    | 73613         | 46.0          | 705    | 11513         | 0.0           | 835    | 193           | 0.0           | 965    | 12            | 0.0           |
| 450    | 36602         | 0.9           | 580    | 79207         | 47.1          | 710    | 9780          | 0.0           | 840    | 174           | 0.0           | 970    | 3             | 0.0           |
| 455    | 28292         | 0.9           | 585    | 84248         | 47.0          | 715    | 8356          | 0.0           | 845    | 151           | 0.0           | 975    | 8             | 0.0           |
| 460    | 21166         | 0.9           | 590    | 88397         | 45.7          | 720    | 7161          | 0.0           | 850    | 123           | 0.0           | 980    | 2             | 0.0           |
| 465    | 19092         | 1.0           | 595    | 91428         | 43.4          | 725    | 6067          | 0.0           | 855    | 106           | 0.0           | 985    | 13            | 0.0           |
| 470    | 14951         | 0.9           | 600    | 93452         | 40.3          | 730    | 5164          | 0.0           | 860    | 95            | 0.0           | 990    | 16            | 0.0           |
| 475    | 12606         | 1.0           | 605    | 93959         | 36.4          | 735    | 4393          | 0.0           | 865    | 82            | 0.0           | 995    | 20            | 0.0           |
| 480    | 13323         | 1.3           | 610    | 93079         | 32.0          | 740    | 3694          | 0.0           | 870    | 77            | 0.0           | 1000   | 0             | 0.0           |
| 485    | 15164         | 1.8           | 615    | 90707         | 27.3          | 745    | 3157          | 0.0           | 875    | 65            | 0.0           |        |               |               |

REPORT NUMBER: SP1-2407-157-9

**Scotopic Flux vs. Wavelength**



**Scotopic Lumens: 5286.7**

**S/P: 1.22**

| $\lambda$ (nm) | Power ( $\mu\text{W}/\text{nm}$ ) | Lumens ( $\phi/\text{nm}$ ) | $\lambda$ (nm) | Power ( $\mu\text{W}/\text{nm}$ ) | Lumens ( $\phi/\text{nm}$ ) | $\lambda$ (nm) | Power ( $\mu\text{W}/\text{nm}$ ) | Lumens ( $\phi/\text{nm}$ ) | $\lambda$ (nm) | Power ( $\mu\text{W}/\text{nm}$ ) | Lumens ( $\phi/\text{nm}$ ) | $\lambda$ (nm) | Power ( $\mu\text{W}/\text{nm}$ ) | Lumens ( $\phi/\text{nm}$ ) |
|----------------|-----------------------------------|-----------------------------|----------------|-----------------------------------|-----------------------------|----------------|-----------------------------------|-----------------------------|----------------|-----------------------------------|-----------------------------|----------------|-----------------------------------|-----------------------------|
| 360            | 0                                 | 0.0                         | 490            | 18018                             | 75.9                        | 620            | 87426                             | 0.4                         | 750            | 2680                              | 0.0                         | 880            | 58                                | 0.0                         |
| 365            | 0                                 | 0.0                         | 495            | 22295                             | 93.2                        | 625            | 83013                             | 0.2                         | 755            | 2287                              | 0.0                         | 885            | 46                                | 0.0                         |
| 370            | 0                                 | 0.0                         | 500            | 26478                             | 107.8                       | 630            | 78077                             | 0.1                         | 760            | 1944                              | 0.0                         | 890            | 45                                | 0.0                         |
| 375            | 0                                 | 0.0                         | 505            | 30524                             | 118.7                       | 635            | 72080                             | 0.1                         | 765            | 1653                              | 0.0                         | 895            | 41                                | 0.0                         |
| 380            | 0                                 | 0.0                         | 510            | 33611                             | 122.2                       | 640            | 66249                             | 0.1                         | 770            | 1413                              | 0.0                         | 900            | 38                                | 0.0                         |
| 385            | 0                                 | 0.0                         | 515            | 36490                             | 120.8                       | 645            | 59973                             | 0.0                         | 775            | 1198                              | 0.0                         | 905            | 33                                | 0.0                         |
| 390            | 0                                 | 0.0                         | 520            | 38610                             | 113.9                       | 650            | 53972                             | 0.0                         | 780            | 1025                              | 0.0                         | 910            | 30                                | 0.0                         |
| 395            | 0                                 | 0.0                         | 525            | 40511                             | 104.1                       | 655            | 48369                             | 0.0                         | 785            | 874                               | 0.0                         | 915            | 23                                | 0.0                         |
| 400            | 48                                | 0.0                         | 530            | 42223                             | 92.4                        | 660            | 42641                             | 0.0                         | 790            | 747                               | 0.0                         | 920            | 24                                | 0.0                         |
| 405            | 201                               | 0.0                         | 535            | 44137                             | 80.5                        | 665            | 37602                             | 0.0                         | 795            | 639                               | 0.0                         | 925            | 22                                | 0.0                         |
| 410            | 457                               | 0.1                         | 540            | 46032                             | 68.2                        | 670            | 32798                             | 0.0                         | 800            | 547                               | 0.0                         | 930            | 22                                | 0.0                         |
| 415            | 925                               | 0.3                         | 545            | 48553                             | 57.1                        | 675            | 28558                             | 0.0                         | 805            | 473                               | 0.0                         | 935            | 17                                | 0.0                         |
| 420            | 1816                              | 1.1                         | 550            | 51408                             | 46.7                        | 680            | 24782                             | 0.0                         | 810            | 401                               | 0.0                         | 940            | 13                                | 0.0                         |
| 425            | 3217                              | 2.5                         | 555            | 54711                             | 37.4                        | 685            | 21386                             | 0.0                         | 815            | 351                               | 0.0                         | 945            | 6                                 | 0.0                         |
| 430            | 5520                              | 5.9                         | 560            | 58847                             | 29.4                        | 690            | 18413                             | 0.0                         | 820            | 307                               | 0.0                         | 950            | 10                                | 0.0                         |
| 435            | 9225                              | 12.5                        | 565            | 63386                             | 22.5                        | 695            | 15721                             | 0.0                         | 825            | 261                               | 0.0                         | 955            | 11                                | 0.0                         |
| 440            | 15522                             | 26.3                        | 570            | 68196                             | 16.9                        | 700            | 13432                             | 0.0                         | 830            | 228                               | 0.0                         | 960            | 8                                 | 0.0                         |
| 445            | 27642                             | 55.2                        | 575            | 73613                             | 12.4                        | 705            | 11513                             | 0.0                         | 835            | 193                               | 0.0                         | 965            | 12                                | 0.0                         |
| 450            | 36602                             | 85.4                        | 580            | 79207                             | 9.0                         | 710            | 9780                              | 0.0                         | 840            | 174                               | 0.0                         | 970            | 3                                 | 0.0                         |
| 455            | 28292                             | 75.1                        | 585            | 84248                             | 6.3                         | 715            | 8356                              | 0.0                         | 845            | 151                               | 0.0                         | 975            | 8                                 | 0.0                         |
| 460            | 21166                             | 63.2                        | 590            | 88397                             | 4.4                         | 720            | 7161                              | 0.0                         | 850            | 123                               | 0.0                         | 980            | 2                                 | 0.0                         |
| 465            | 19092                             | 63.2                        | 595            | 91428                             | 3.0                         | 725            | 6067                              | 0.0                         | 855            | 106                               | 0.0                         | 985            | 13                                | 0.0                         |
| 470            | 14951                             | 54.2                        | 600            | 93452                             | 2.0                         | 730            | 5164                              | 0.0                         | 860            | 95                                | 0.0                         | 990            | 16                                | 0.0                         |
| 475            | 12606                             | 48.8                        | 605            | 93959                             | 1.3                         | 735            | 4393                              | 0.0                         | 865            | 82                                | 0.0                         | 995            | 20                                | 0.0                         |
| 480            | 13323                             | 54.2                        | 610            | 93079                             | 0.9                         | 740            | 3694                              | 0.0                         | 870            | 77                                | 0.0                         | 1000           | 0                                 | 0.0                         |
| 485            | 15164                             | 63.3                        | 615            | 90707                             | 0.5                         | 745            | 3157                              | 0.0                         | 875            | 65                                | 0.0                         |                |                                   |                             |

REPORT NUMBER: SP1-2407-157-9

**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 9797**

**M/P: 2.26**

| λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) |
|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|
| 360    | 0             | 0.0           | 490    | 18018         | 27.7          | 620    | 87426         | 1.1           | 750    | 2680          | 0.0           | 880    | 58            | 0.0           |
| 365    | 0             | 0.0           | 495    | 22295         | 36.0          | 625    | 83013         | 0.7           | 755    | 2287          | 0.0           | 885    | 46            | 0.0           |
| 370    | 0             | 0.0           | 500    | 26478         | 44.2          | 630    | 78077         | 0.4           | 760    | 1944          | 0.0           | 890    | 45            | 0.0           |
| 375    | 0             | 0.0           | 505    | 30524         | 51.8          | 635    | 72080         | 0.3           | 765    | 1653          | 0.0           | 895    | 41            | 0.0           |
| 380    | 0             | 0.0           | 510    | 33611         | 57.0          | 640    | 66249         | 0.2           | 770    | 1413          | 0.0           | 900    | 38            | 0.0           |
| 385    | 0             | 0.0           | 515    | 36490         | 60.5          | 645    | 59973         | 0.1           | 775    | 1198          | 0.0           | 905    | 33            | 0.0           |
| 390    | 0             | 0.0           | 520    | 38610         | 61.4          | 650    | 53972         | 0.1           | 780    | 1025          | 0.0           | 910    | 30            | 0.0           |
| 395    | 0             | 0.0           | 525    | 40511         | 60.6          | 655    | 48369         | 0.0           | 785    | 874           | 0.0           | 915    | 23            | 0.0           |
| 400    | 48            | 0.0           | 530    | 42223         | 58.2          | 660    | 42641         | 0.0           | 790    | 747           | 0.0           | 920    | 24            | 0.0           |
| 405    | 201           | 0.0           | 535    | 44137         | 55.0          | 665    | 37602         | 0.0           | 795    | 639           | 0.0           | 925    | 22            | 0.0           |
| 410    | 457           | 0.0           | 540    | 46032         | 50.9          | 670    | 32798         | 0.0           | 800    | 547           | 0.0           | 930    | 22            | 0.0           |
| 415    | 925           | 0.1           | 545    | 48553         | 46.6          | 675    | 28558         | 0.0           | 805    | 473           | 0.0           | 935    | 17            | 0.0           |
| 420    | 1816          | 0.3           | 550    | 51408         | 42.0          | 680    | 24782         | 0.0           | 810    | 401           | 0.0           | 940    | 13            | 0.0           |
| 425    | 3217          | 0.8           | 555    | 54711         | 37.4          | 685    | 21386         | 0.0           | 815    | 351           | 0.0           | 945    | 6             | 0.0           |
| 430    | 5520          | 1.9           | 560    | 58847         | 32.9          | 690    | 18413         | 0.0           | 820    | 307           | 0.0           | 950    | 10            | 0.0           |
| 435    | 9225          | 4.1           | 565    | 63386         | 28.4          | 695    | 15721         | 0.0           | 825    | 261           | 0.0           | 955    | 11            | 0.0           |
| 440    | 15522         | 8.7           | 570    | 68196         | 24.1          | 700    | 13432         | 0.0           | 830    | 228           | 0.0           | 960    | 8             | 0.0           |
| 445    | 27642         | 18.5          | 575    | 73613         | 20.0          | 705    | 11513         | 0.0           | 835    | 193           | 0.0           | 965    | 12            | 0.0           |
| 450    | 36602         | 28.3          | 580    | 79207         | 16.3          | 710    | 9780          | 0.0           | 840    | 174           | 0.0           | 970    | 3             | 0.0           |
| 455    | 28292         | 24.7          | 585    | 84248         | 12.9          | 715    | 8356          | 0.0           | 845    | 151           | 0.0           | 975    | 8             | 0.0           |
| 460    | 21166         | 20.4          | 590    | 88397         | 9.8           | 720    | 7161          | 0.0           | 850    | 123           | 0.0           | 980    | 2             | 0.0           |
| 465    | 19092         | 20.1          | 595    | 91428         | 7.3           | 725    | 6067          | 0.0           | 855    | 106           | 0.0           | 985    | 13            | 0.0           |
| 470    | 14951         | 17.2          | 600    | 93452         | 5.3           | 730    | 5164          | 0.0           | 860    | 95            | 0.0           | 990    | 16            | 0.0           |
| 475    | 12606         | 15.7          | 605    | 93959         | 3.7           | 735    | 4393          | 0.0           | 865    | 82            | 0.0           | 995    | 20            | 0.0           |
| 480    | 13323         | 18.0          | 610    | 93079         | 2.5           | 740    | 3694          | 0.0           | 870    | 77            | 0.0           | 1000   | 0             | 0.0           |
| 485    | 15164         | 21.9          | 615    | 90707         | 1.7           | 745    | 3157          | 0.0           | 875    | 65            | 0.0           |        |               |               |

**Summary**

$R_f = 84.7$   
 $R_g = 94.6$   
 CIE  $R_a = 80.9$   
 $R_g = -1.5$



**Color Vector Graphics**





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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 84 | CES51 = 95 | CES76 = 81 |
| CES02 = 63 | CES27 = 95 | CES52 = 94 | CES77 = 84 |
| CES03 = 31 | CES28 = 94 | CES53 = 89 | CES78 = 81 |
| CES04 = 71 | CES29 = 87 | CES54 = 91 | CES79 = 89 |
| CES05 = 50 | CES30 = 94 | CES55 = 90 | CES80 = 89 |
| CES06 = 52 | CES31 = 89 | CES56 = 86 | CES81 = 69 |
| CES07 = 43 | CES32 = 82 | CES57 = 85 | CES82 = 96 |
| CES08 = 41 | CES33 = 91 | CES58 = 86 | CES83 = 93 |
| CES09 = 29 | CES34 = 92 | CES59 = 91 | CES84 = 92 |
| CES10 = 77 | CES35 = 96 | CES60 = 94 | CES85 = 76 |
| CES11 = 60 | CES36 = 90 | CES61 = 89 | CES86 = 65 |
| CES12 = 66 | CES37 = 96 | CES62 = 94 | CES87 = 84 |
| CES13 = 44 | CES38 = 98 | CES63 = 87 | CES88 = 86 |
| CES14 = 74 | CES39 = 98 | CES64 = 82 | CES89 = 73 |
| CES15 = 72 | CES40 = 95 | CES65 = 78 | CES90 = 88 |
| CES16 = 48 | CES41 = 96 | CES66 = 81 | CES91 = 82 |
| CES17 = 50 | CES42 = 97 | CES67 = 80 | CES92 = 64 |
| CES18 = 57 | CES43 = 91 | CES68 = 83 | CES93 = 78 |
| CES19 = 73 | CES44 = 99 | CES69 = 88 | CES94 = 59 |
| CES20 = 67 | CES45 = 93 | CES70 = 80 | CES95 = 74 |
| CES21 = 87 | CES46 = 89 | CES71 = 79 | CES96 = 83 |
| CES22 = 79 | CES47 = 92 | CES72 = 92 | CES97 = 88 |
| CES23 = 92 | CES48 = 83 | CES73 = 75 | CES98 = 83 |
| CES24 = 91 | CES49 = 90 | CES74 = 91 | CES99 = 74 |
| CES25 = 72 | CES50 = 94 | CES75 = 81 |            |



Color Rendition by Hue-Angle Bin



Measure Comparisons



(END OF REPORT)