

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: STREETWORKS

Report Number: P870019

Luminaire Tested: **MEM2-HTN-SA-30-840-U-T3-HSS**

Issue Date: 08/21/2024



**Test Information**

Test Method: LM-79-08  
Report Number: P870019  
Test Lab: INNOVATION CENTER(G3)  
Issue Date: 08/21/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: STREETWORKS  
Catalog Number: MEM2-HTN-SA-30-840-U-T3-HSS  
Description: EPIC MODERN TALL HOUSING DISCRETE LED ARRAYS 30W 80CRI 4000K  
FITURE w/ TYPE III DISTRIBUTION OPTIC AND HOUSE SIDE SHIELD  
Light Source: (10) 4000K CCT, 80 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

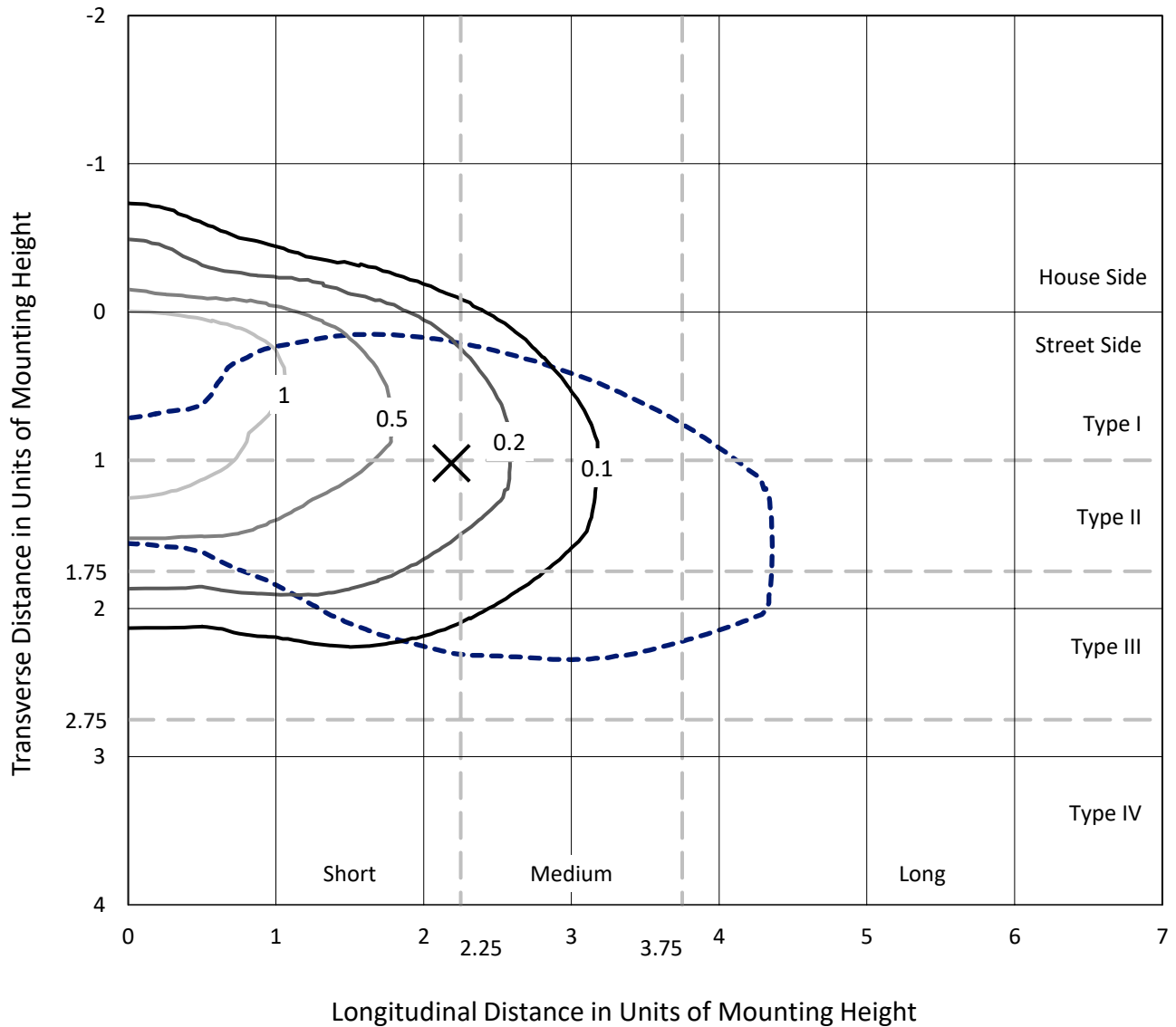
Lumens per Lamp: N/A  
Luminaire Lumens: 3287 lumens  
Efficiency: N/A  
Efficacy: 100.2 lumens/watt  
Luminous Opening: Rectangular (W 0.33' x L: 0.33' x H: 0')  
IES Classification: Type III - Short  
BUG Rating: B0 - U0 - G1

Input Watts (W): 32.8  
Input Voltage (V): 120  
Input Current (A<sub>in</sub>): NR  
Voltage Rise (V): NR  
Power Factor: 0.99  
Total Harmonic Distortion (THDi): 9.76%  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT

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### Iso-Footcandle Lines of Horizontal Illumination

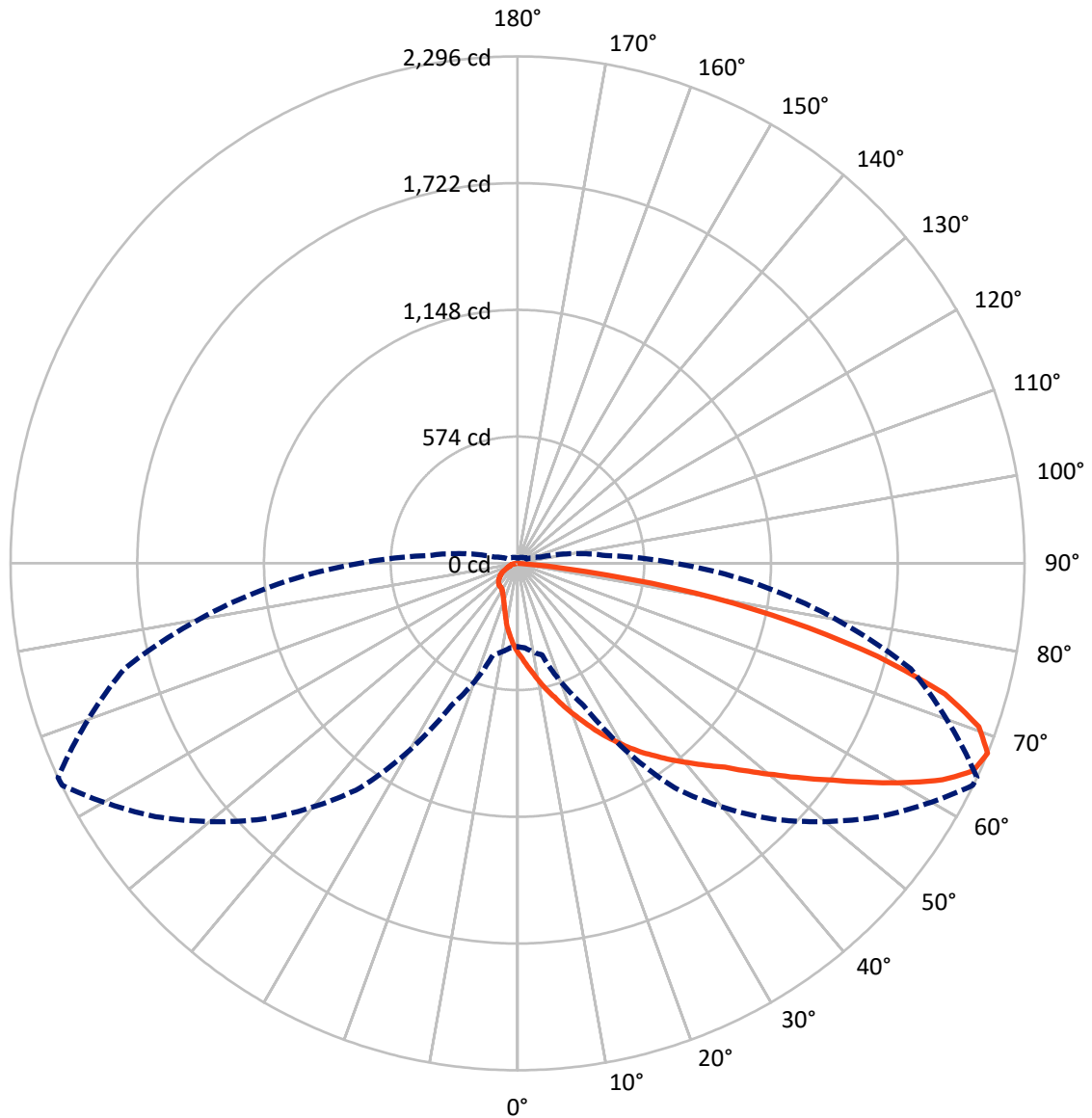
× Max cd  
 - - - 1/2 Max cd



Based on 20 foot mounting height. Maximum calculated value = 1.9 fc  
 Type III - Short - N/A

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### Luminous Intensity Polar Plot



— Vertical Plane Through 65-Deg Lateral    - - - Horizontal Cone Through 67.5-Deg Vertical

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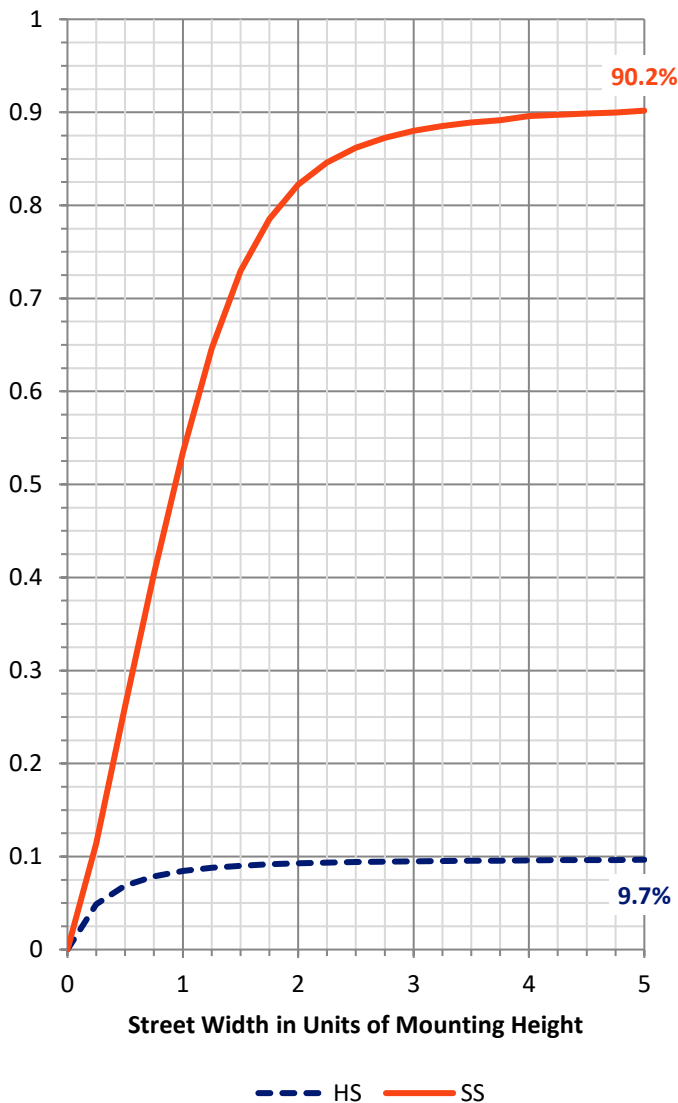
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 319.9    | 0.0    | 319.9  |
|                    | % Fixture | 9.7      | 0.0    | 9.7    |
| <b>Street Side</b> | Lumens    | 2967.0   | 0.0    | 2967.0 |
|                    | % Fixture | 90.3     | 0.0    | 90.3   |
| <b>Total</b>       | Lumens    | 3287.0   | 0.0    | 3287.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 39.7   | 1.2       |
| 10°-20°   | 131.9  | 4.0       |
| 20°-30°   | 240.1  | 7.3       |
| 30°-40°   | 371.5  | 11.3      |
| 40°-50°   | 561.6  | 17.1      |
| 50°-60°   | 730.6  | 22.2      |
| 60°-70°   | 720.7  | 21.9      |
| 70°-80°   | 438.7  | 13.3      |
| 80°-90°   | 52.1   | 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°    | 3287.0 | 100.0     |
| 0°-180°   | 3287.0 | 100.0     |

**Coefficient of Utilization**



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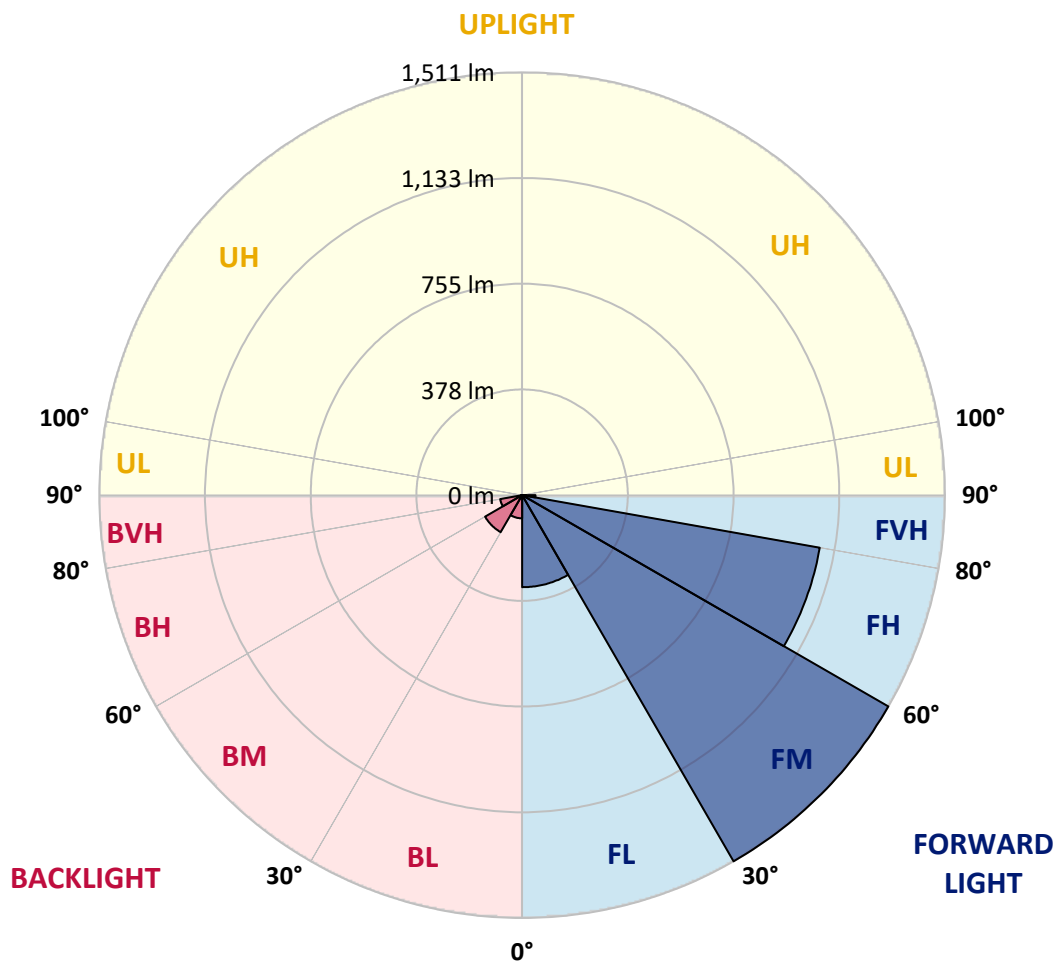
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**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone           | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|----------------|--------|-----------|-------------------------|------|---------|
|                |        |           | B                       | U    | G       |
| FL (0°-30°)    | 328.9  | 10.0      |                         |      |         |
| FM (30°-60°)   | 1510.7 | 46.0      |                         |      |         |
| FH (60°-80°)   | 1079.8 | 32.9      |                         |      | G1/1800 |
| FVH (80°-90°)  | 47.7   | 1.5       |                         |      | G1/100  |
| BL (0°-30°)    | 82.8   | 2.5       | B0/110                  |      |         |
| BM (30°-60°)   | 153.0  | 4.7       | B0/220                  |      |         |
| BH (60°-80°)   | 79.7   | 2.4       | B0/110                  |      | G0/110  |
| BVH (80°-90°)  | 4.5    | 0.1       |                         |      | 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 III Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 64°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 406.2  | 406.2  | 406.2  | 406.2  | 406.2  | 406.2  | 406.2  | 406.2  | 406.2  | 406.2  | 406.2  |
| 2.5°  | 474.6  | 470.9  | 473.7  | 467.1  | 459.6  | 454.0  | 442.7  | 433.4  | 432.4  | 423.0  | 412.7  |
| 5°    | 565.6  | 553.4  | 554.4  | 541.2  | 525.3  | 508.4  | 490.6  | 467.1  | 467.1  | 444.6  | 421.2  |
| 7.5°  | 647.2  | 645.4  | 636.9  | 616.3  | 597.5  | 571.3  | 538.4  | 508.4  | 501.8  | 467.1  | 430.5  |
| 10°   | 726.0  | 723.2  | 715.7  | 699.8  | 667.9  | 638.8  | 597.5  | 552.5  | 544.0  | 494.3  | 441.8  |
| 12.5° | 788.9  | 789.8  | 781.4  | 768.2  | 740.1  | 705.4  | 651.0  | 594.7  | 587.2  | 520.6  | 453.1  |
| 15°   | 844.2  | 843.3  | 841.4  | 830.1  | 802.9  | 771.0  | 707.3  | 641.6  | 629.4  | 548.7  | 464.3  |
| 17.5° | 886.4  | 884.5  | 880.8  | 871.4  | 858.3  | 827.3  | 766.4  | 691.3  | 681.0  | 581.6  | 477.4  |
| 20°   | 898.6  | 897.7  | 897.7  | 904.2  | 898.6  | 879.9  | 825.5  | 742.9  | 731.7  | 616.3  | 495.3  |
| 22.5° | 921.1  | 920.2  | 919.3  | 925.8  | 929.6  | 927.7  | 880.8  | 795.4  | 785.1  | 656.6  | 517.8  |
| 25°   | 950.2  | 948.3  | 945.5  | 952.1  | 956.8  | 968.0  | 936.1  | 857.3  | 845.2  | 703.5  | 540.3  |
| 27.5° | 988.7  | 990.5  | 986.8  | 985.9  | 985.9  | 992.4  | 984.9  | 912.7  | 901.4  | 748.5  | 566.6  |
| 30°   | 1039.3 | 1042.1 | 1035.6 | 1030.9 | 1022.4 | 1021.5 | 1023.4 | 974.6  | 958.7  | 797.3  | 593.8  |
| 32.5° | 1089.0 | 1091.8 | 1088.1 | 1081.5 | 1060.0 | 1051.5 | 1059.0 | 1027.1 | 1016.8 | 850.8  | 628.5  |
| 35°   | 1129.4 | 1135.9 | 1135.9 | 1122.8 | 1092.8 | 1088.1 | 1100.3 | 1078.7 | 1071.2 | 913.6  | 669.7  |
| 37.5° | 1183.8 | 1187.5 | 1183.8 | 1159.4 | 1121.9 | 1127.5 | 1146.3 | 1133.1 | 1128.4 | 981.2  | 718.5  |
| 40°   | 1300.1 | 1304.8 | 1280.4 | 1222.2 | 1162.2 | 1168.8 | 1201.6 | 1194.1 | 1186.6 | 1047.8 | 763.5  |
| 42.5° | 1462.4 | 1451.1 | 1446.4 | 1317.0 | 1224.1 | 1220.4 | 1261.6 | 1251.3 | 1250.4 | 1115.3 | 804.8  |
| 45°   | 1569.3 | 1573.1 | 1549.6 | 1426.7 | 1354.5 | 1284.1 | 1328.2 | 1324.5 | 1317.0 | 1183.8 | 854.5  |
| 47.5° | 1643.4 | 1635.0 | 1576.8 | 1517.7 | 1531.8 | 1367.6 | 1402.3 | 1411.7 | 1407.0 | 1261.6 | 915.5  |
| 50°   | 1674.4 | 1665.9 | 1627.5 | 1588.1 | 1604.9 | 1463.3 | 1478.3 | 1509.3 | 1504.6 | 1340.4 | 967.1  |
| 52.5° | 1635.9 | 1625.6 | 1628.4 | 1638.7 | 1630.3 | 1538.3 | 1572.1 | 1620.9 | 1615.3 | 1432.3 | 1027.1 |
| 55°   | 1391.1 | 1418.3 | 1523.3 | 1628.4 | 1625.6 | 1595.6 | 1672.5 | 1743.8 | 1732.5 | 1528.0 | 1078.7 |
| 57.5° | 1121.9 | 1136.9 | 1270.1 | 1554.3 | 1610.6 | 1643.4 | 1786.9 | 1875.1 | 1871.3 | 1623.7 | 1125.6 |
| 60°   | 892.1  | 908.0  | 1009.3 | 1400.5 | 1575.9 | 1693.1 | 1904.2 | 2020.5 | 2016.7 | 1720.3 | 1159.4 |
| 62.5° | 709.1  | 709.1  | 799.2  | 1179.1 | 1509.3 | 1722.2 | 1997.0 | 2166.8 | 2160.2 | 1798.2 | 1167.8 |
| 65°   | 510.3  | 516.8  | 584.4  | 948.3  | 1401.4 | 1714.7 | 2042.1 | 2270.9 | 2267.2 | 1842.3 | 1150.0 |
| 67.5° | 377.1  | 384.6  | 429.6  | 711.0  | 1241.9 | 1639.6 | 2000.8 | 2294.4 | 2296.3 | 1843.2 | 1091.8 |
| 70°   | 294.5  | 296.4  | 330.2  | 494.3  | 1017.7 | 1472.7 | 1846.0 | 2216.5 | 2216.5 | 1797.2 | 1005.6 |
| 72.5° | 224.2  | 226.1  | 255.1  | 336.7  | 749.5  | 1217.5 | 1614.3 | 2010.2 | 2024.2 | 1675.3 | 878.0  |
| 75°   | 173.5  | 177.3  | 197.0  | 242.0  | 469.9  | 865.8  | 1326.4 | 1646.2 | 1684.7 | 1438.9 | 723.2  |
| 77.5° | 134.1  | 137.9  | 153.8  | 177.3  | 273.9  | 533.7  | 932.4  | 1230.7 | 1265.4 | 1133.1 | 558.1  |
| 80°   | 107.9  | 109.7  | 120.1  | 133.2  | 166.0  | 274.8  | 569.4  | 808.6  | 818.9  | 770.1  | 369.6  |
| 82.5° | 49.7   | 53.5   | 64.7   | 73.2   | 82.5   | 127.6  | 242.9  | 299.2  | 312.4  | 305.8  | 152.0  |
| 85°   | 5.6    | 5.6    | 6.6    | 7.5    | 8.4    | 13.1   | 16.9   | 15.0   | 15.0   | 17.8   | 15.9   |
| 87.5° | 0.0    | 0.0    | 0.0    | 0.9    | 1.9    | 1.9    | 2.8    | 2.8    | 2.8    | 2.8    | 2.8    |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |



REPORT NUMBER: P870019

CATALOG NUMBER: MEM2-HTN-SA-30-840-U-T3-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°   | 95°   | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 406.2 | 406.2 | 406.2 | 406.2 | 406.2 | 406.2 | 406.2 | 406.2 | 406.2 | 406.2 | 406.2 |
| 2.5°  | 407.1 | 400.5 | 388.3 | 378.0 | 368.6 | 359.3 | 354.6 | 343.3 | 340.5 | 342.4 | 335.8 |
| 5°    | 409.0 | 395.8 | 370.5 | 347.1 | 327.4 | 308.6 | 292.7 | 275.8 | 272.0 | 266.4 | 263.6 |
| 7.5°  | 411.8 | 392.1 | 352.7 | 316.1 | 286.1 | 258.9 | 239.2 | 226.1 | 215.7 | 212.9 | 212.0 |
| 10°   | 415.5 | 387.4 | 333.0 | 287.0 | 245.8 | 217.6 | 199.8 | 190.4 | 186.7 | 183.9 | 184.8 |
| 12.5° | 418.4 | 382.7 | 314.2 | 254.2 | 213.9 | 188.5 | 180.1 | 172.6 | 170.7 | 169.8 | 169.8 |
| 15°   | 422.1 | 378.0 | 291.7 | 225.1 | 186.7 | 171.7 | 163.2 | 160.4 | 160.4 | 159.5 | 159.5 |
| 17.5° | 426.8 | 374.3 | 273.0 | 202.6 | 170.7 | 156.6 | 152.9 | 149.1 | 149.1 | 149.1 | 148.2 |
| 20°   | 436.2 | 372.4 | 256.1 | 183.9 | 156.6 | 147.3 | 141.6 | 138.8 | 137.9 | 137.0 | 137.0 |
| 22.5° | 445.6 | 372.4 | 237.3 | 169.8 | 147.3 | 137.0 | 131.3 | 128.5 | 127.6 | 127.6 | 127.6 |
| 25°   | 458.7 | 371.5 | 222.3 | 157.6 | 138.8 | 126.6 | 121.0 | 118.2 | 116.3 | 116.3 | 115.4 |
| 27.5° | 473.7 | 371.5 | 209.2 | 148.2 | 129.4 | 117.3 | 110.7 | 107.9 | 105.1 | 105.1 | 104.1 |
| 30°   | 488.7 | 373.3 | 197.9 | 140.7 | 120.1 | 108.8 | 100.4 | 96.6  | 94.7  | 93.8  | 93.8  |
| 32.5° | 508.4 | 379.0 | 190.4 | 135.1 | 111.6 | 100.4 | 91.9  | 88.2  | 86.3  | 85.4  | 85.4  |
| 35°   | 538.4 | 393.0 | 191.4 | 132.3 | 106.0 | 92.9  | 84.4  | 79.7  | 78.8  | 78.8  | 77.9  |
| 37.5° | 570.3 | 406.2 | 194.2 | 130.4 | 100.4 | 87.2  | 78.8  | 74.1  | 73.2  | 73.2  | 73.2  |
| 40°   | 597.5 | 417.4 | 197.9 | 129.4 | 95.7  | 81.6  | 74.1  | 70.4  | 68.5  | 68.5  | 68.5  |
| 42.5° | 624.7 | 424.0 | 198.9 | 126.6 | 92.9  | 76.9  | 70.4  | 66.6  | 64.7  | 65.7  | 65.7  |
| 45°   | 651.9 | 428.7 | 196.0 | 122.9 | 90.0  | 73.2  | 66.6  | 62.8  | 61.0  | 61.0  | 61.0  |
| 47.5° | 684.8 | 439.0 | 191.4 | 117.3 | 88.2  | 70.4  | 62.8  | 59.1  | 58.2  | 58.2  | 58.2  |
| 50°   | 717.6 | 447.4 | 187.6 | 110.7 | 83.5  | 66.6  | 60.0  | 55.3  | 54.4  | 54.4  | 54.4  |
| 52.5° | 744.8 | 451.2 | 182.9 | 102.2 | 78.8  | 62.8  | 56.3  | 51.6  | 49.7  | 49.7  | 49.7  |
| 55°   | 765.4 | 452.1 | 176.3 | 95.7  | 72.2  | 59.1  | 52.5  | 47.8  | 46.0  | 45.0  | 45.0  |
| 57.5° | 782.3 | 451.2 | 169.8 | 89.1  | 66.6  | 54.4  | 47.8  | 44.1  | 41.3  | 40.3  | 40.3  |
| 60°   | 791.7 | 448.4 | 160.4 | 80.7  | 59.1  | 49.7  | 44.1  | 39.4  | 37.5  | 36.6  | 36.6  |
| 62.5° | 786.1 | 440.9 | 147.3 | 67.5  | 53.5  | 45.0  | 40.3  | 36.6  | 33.8  | 32.8  | 32.8  |
| 65°   | 759.8 | 425.9 | 130.4 | 55.3  | 47.8  | 40.3  | 36.6  | 32.8  | 29.1  | 28.1  | 28.1  |
| 67.5° | 713.8 | 400.5 | 107.9 | 46.9  | 44.1  | 36.6  | 32.8  | 29.1  | 26.3  | 24.4  | 24.4  |
| 70°   | 650.0 | 366.8 | 84.4  | 40.3  | 39.4  | 33.8  | 30.0  | 26.3  | 23.5  | 21.6  | 21.6  |
| 72.5° | 559.1 | 311.4 | 62.8  | 34.7  | 34.7  | 31.0  | 27.2  | 24.4  | 21.6  | 19.7  | 19.7  |
| 75°   | 452.1 | 235.4 | 47.8  | 31.9  | 31.0  | 28.1  | 24.4  | 21.6  | 19.7  | 17.8  | 17.8  |
| 77.5° | 330.2 | 156.6 | 39.4  | 29.1  | 29.1  | 25.3  | 22.5  | 19.7  | 17.8  | 16.9  | 16.9  |
| 80°   | 200.7 | 90.0  | 28.1  | 22.5  | 22.5  | 21.6  | 18.8  | 16.9  | 15.9  | 14.1  | 13.1  |
| 82.5° | 81.6  | 34.7  | 15.0  | 11.3  | 11.3  | 10.3  | 6.6   | 5.6   | 5.6   | 5.6   | 4.7   |
| 85°   | 8.4   | 5.6   | 3.8   | 2.8   | 2.8   | 2.8   | 1.9   | 1.9   | 1.9   | 1.9   | 1.9   |
| 87.5° | 2.8   | 2.8   | 1.9   | 1.9   | 1.9   | 1.9   | 0.9   | 0.9   | 0.9   | 0.9   | 0.9   |
| 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



LM-79-2019: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

Streetworks

Report Number: SP1-2407-157-8

Test Date: 09/05/2024

Luminaire Tested: MEM2-HTN-SA-30-840-U-5WQ

Data in this report applies to families of products including MEM2-HTN-SA-30-840-U-5WQ

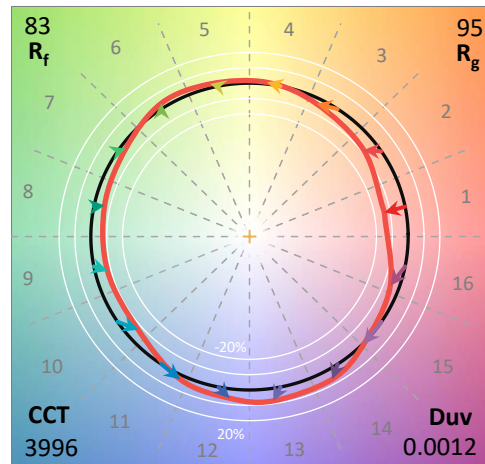
**Test Information**

Test Method: LM-79-2019  
 Report Number: SP1-2407-157-8  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 09/05/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: Streetworks  
 Catalog Number: **MEM2-HTN-SA-30-840-U-5WQ**  
 Description: Epic Modern Light Square 30W 5WQ Optic

**Spectral Parameters**

CCT (K): 3996  
 CIE u': 0.2245  
 CIE v': 0.5031  
 Duv: 0.0012  
 CIE x: 0.3815  
 CIE y: 0.3799  
 CIE z: 0.2386  
 Peak Wavelength (nm): 449  
 Dominant Wavelength (nm): 578  
 Purity: 28.49233  
 Rf: 82.6  
 Rg: 95.1

|           |      |      |      |
|-----------|------|------|------|
| CRI (Ra): | 80.6 |      |      |
| R1:       | 78.1 | R9:  | -5.8 |
| R2:       | 87.1 | R10: | 70.3 |
| R3:       | 94.5 | R11: | 78.7 |
| R4:       | 79.7 | R12: | 60.5 |
| R5:       | 78.7 | R13: | 80.2 |
| R6:       | 82.7 | R14: | 97.2 |
| R7:       | 84.3 | R15: | 70.6 |
| R8:       | 59.5 |      |      |



**Test Conditions**

Stabilization Time: 29M  
 Operation Time: 1H 29M  
 Sphere Temperature (°C): 24.3

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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 4000K 4-step quadrangle

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**Photopic Flux vs. Wavelength**



**Photopic Lumens: NR**

| $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) | $\lambda$<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>( $\phi$ /nm) |
|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|-------------------|-----------------------------|-------------------------|
| 360               | 0                           | NR                      | 490               | 289                         | NR                      | 620               | 725                         | NR                      | 750               | 17                          | NR                      | 880               | 0                           | NR                      |
| 365               | 0                           | NR                      | 495               | 351                         | NR                      | 625               | 673                         | NR                      | 755               | 15                          | NR                      | 885               | 0                           | NR                      |
| 370               | 0                           | NR                      | 500               | 414                         | NR                      | 630               | 619                         | NR                      | 760               | 13                          | NR                      | 890               | 0                           | NR                      |
| 375               | 0                           | NR                      | 505               | 470                         | NR                      | 635               | 562                         | NR                      | 765               | 11                          | NR                      | 895               | 0                           | NR                      |
| 380               | 0                           | NR                      | 510               | 513                         | NR                      | 640               | 506                         | NR                      | 770               | 9                           | NR                      | 900               | 0                           | NR                      |
| 385               | 0                           | NR                      | 515               | 546                         | NR                      | 645               | 452                         | NR                      | 775               | 8                           | NR                      | 905               | 0                           | NR                      |
| 390               | 0                           | NR                      | 520               | 571                         | NR                      | 650               | 400                         | NR                      | 780               | 7                           | NR                      | 910               | 0                           | NR                      |
| 395               | 1                           | NR                      | 525               | 592                         | NR                      | 655               | 352                         | NR                      | 785               | 6                           | NR                      | 915               | 0                           | NR                      |
| 400               | 3                           | NR                      | 530               | 606                         | NR                      | 660               | 307                         | NR                      | 790               | 5                           | NR                      | 920               | 0                           | NR                      |
| 405               | 6                           | NR                      | 535               | 624                         | NR                      | 665               | 267                         | NR                      | 795               | 4                           | NR                      | 925               | 0                           | NR                      |
| 410               | 12                          | NR                      | 540               | 642                         | NR                      | 670               | 231                         | NR                      | 800               | 4                           | NR                      | 930               | 0                           | NR                      |
| 415               | 22                          | NR                      | 545               | 663                         | NR                      | 675               | 199                         | NR                      | 805               | 3                           | NR                      | 935               | 0                           | NR                      |
| 420               | 44                          | NR                      | 550               | 686                         | NR                      | 680               | 171                         | NR                      | 810               | 3                           | NR                      | 940               | 0                           | NR                      |
| 425               | 83                          | NR                      | 555               | 713                         | NR                      | 685               | 146                         | NR                      | 815               | 2                           | NR                      | 945               | 0                           | NR                      |
| 430               | 150                         | NR                      | 560               | 745                         | NR                      | 690               | 125                         | NR                      | 820               | 2                           | NR                      | 950               | 0                           | NR                      |
| 435               | 267                         | NR                      | 565               | 774                         | NR                      | 695               | 106                         | NR                      | 825               | 2                           | NR                      | 955               | 0                           | NR                      |
| 440               | 466                         | NR                      | 570               | 806                         | NR                      | 700               | 90                          | NR                      | 830               | 1                           | NR                      | 960               | 0                           | NR                      |
| 445               | 804                         | NR                      | 575               | 835                         | NR                      | 705               | 76                          | NR                      | 835               | 1                           | NR                      | 965               | 0                           | NR                      |
| 450               | 1000                        | NR                      | 580               | 858                         | NR                      | 710               | 65                          | NR                      | 840               | 1                           | NR                      | 970               | 0                           | NR                      |
| 455               | 715                         | NR                      | 585               | 875                         | NR                      | 715               | 55                          | NR                      | 845               | 1                           | NR                      | 975               | 0                           | NR                      |
| 460               | 492                         | NR                      | 590               | 884                         | NR                      | 720               | 47                          | NR                      | 850               | 1                           | NR                      | 980               | 0                           | NR                      |
| 465               | 402                         | NR                      | 595               | 880                         | NR                      | 725               | 40                          | NR                      | 855               | 1                           | NR                      | 985               | 0                           | NR                      |
| 470               | 288                         | NR                      | 600               | 868                         | NR                      | 730               | 34                          | NR                      | 860               | 1                           | NR                      | 990               | 0                           | NR                      |
| 475               | 226                         | NR                      | 605               | 844                         | NR                      | 735               | 28                          | NR                      | 865               | 1                           | NR                      | 995               | 0                           | NR                      |
| 480               | 227                         | NR                      | 610               | 814                         | NR                      | 740               | 24                          | NR                      | 870               | 0                           | NR                      | 1000              | 0                           | NR                      |
| 485               | 248                         | NR                      | 615               | 771                         | NR                      | 745               | 20                          | NR                      | 875               | 0                           | NR                      |                   |                             |                         |

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**Scotopic Flux vs. Wavelength**



**Scotopic Lumens: NR**

**S/P: 1.66**

| λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 360    | 0                        | NR            | 490    | 289                      | NR            | 620    | 725                      | NR            | 750    | 17                       | NR            | 880    | 0                        | NR            |
| 365    | 0                        | NR            | 495    | 351                      | NR            | 625    | 673                      | NR            | 755    | 15                       | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 414                      | NR            | 630    | 619                      | NR            | 760    | 13                       | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 470                      | NR            | 635    | 562                      | NR            | 765    | 11                       | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 513                      | NR            | 640    | 506                      | NR            | 770    | 9                        | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 546                      | NR            | 645    | 452                      | NR            | 775    | 8                        | NR            | 905    | 0                        | NR            |
| 390    | 0                        | NR            | 520    | 571                      | NR            | 650    | 400                      | NR            | 780    | 7                        | NR            | 910    | 0                        | NR            |
| 395    | 1                        | NR            | 525    | 592                      | NR            | 655    | 352                      | NR            | 785    | 6                        | NR            | 915    | 0                        | NR            |
| 400    | 3                        | NR            | 530    | 606                      | NR            | 660    | 307                      | NR            | 790    | 5                        | NR            | 920    | 0                        | NR            |
| 405    | 6                        | NR            | 535    | 624                      | NR            | 665    | 267                      | NR            | 795    | 4                        | NR            | 925    | 0                        | NR            |
| 410    | 12                       | NR            | 540    | 642                      | NR            | 670    | 231                      | NR            | 800    | 4                        | NR            | 930    | 0                        | NR            |
| 415    | 22                       | NR            | 545    | 663                      | NR            | 675    | 199                      | NR            | 805    | 3                        | NR            | 935    | 0                        | NR            |
| 420    | 44                       | NR            | 550    | 686                      | NR            | 680    | 171                      | NR            | 810    | 3                        | NR            | 940    | 0                        | NR            |
| 425    | 83                       | NR            | 555    | 713                      | NR            | 685    | 146                      | NR            | 815    | 2                        | NR            | 945    | 0                        | NR            |
| 430    | 150                      | NR            | 560    | 745                      | NR            | 690    | 125                      | NR            | 820    | 2                        | NR            | 950    | 0                        | NR            |
| 435    | 267                      | NR            | 565    | 774                      | NR            | 695    | 106                      | NR            | 825    | 2                        | NR            | 955    | 0                        | NR            |
| 440    | 466                      | NR            | 570    | 806                      | NR            | 700    | 90                       | NR            | 830    | 1                        | NR            | 960    | 0                        | NR            |
| 445    | 804                      | NR            | 575    | 835                      | NR            | 705    | 76                       | NR            | 835    | 1                        | NR            | 965    | 0                        | NR            |
| 450    | 1000                     | NR            | 580    | 858                      | NR            | 710    | 65                       | NR            | 840    | 1                        | NR            | 970    | 0                        | NR            |
| 455    | 715                      | NR            | 585    | 875                      | NR            | 715    | 55                       | NR            | 845    | 1                        | NR            | 975    | 0                        | NR            |
| 460    | 492                      | NR            | 590    | 884                      | NR            | 720    | 47                       | NR            | 850    | 1                        | NR            | 980    | 0                        | NR            |
| 465    | 402                      | NR            | 595    | 880                      | NR            | 725    | 40                       | NR            | 855    | 1                        | NR            | 985    | 0                        | NR            |
| 470    | 288                      | NR            | 600    | 868                      | NR            | 730    | 34                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 226                      | NR            | 605    | 844                      | NR            | 735    | 28                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 227                      | NR            | 610    | 814                      | NR            | 740    | 24                       | NR            | 870    | 0                        | NR            | 1000   | 0                        | NR            |
| 485    | 248                      | NR            | 615    | 771                      | NR            | 745    | 20                       | NR            | 875    | 0                        | NR            |        |                          |               |

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Melanopic Flux vs. Wavelength



Melanopic Lumens: NR

M/P: 3.37

| λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (φ/nm) |
|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|--------|--------------------------|---------------|
| 360    | 0                        | NR            | 490    | 289                      | NR            | 620    | 725                      | NR            | 750    | 17                       | NR            | 880    | 0                        | NR            |
| 365    | 0                        | NR            | 495    | 351                      | NR            | 625    | 673                      | NR            | 755    | 15                       | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 414                      | NR            | 630    | 619                      | NR            | 760    | 13                       | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 470                      | NR            | 635    | 562                      | NR            | 765    | 11                       | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 513                      | NR            | 640    | 506                      | NR            | 770    | 9                        | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 546                      | NR            | 645    | 452                      | NR            | 775    | 8                        | NR            | 905    | 0                        | NR            |
| 390    | 0                        | NR            | 520    | 571                      | NR            | 650    | 400                      | NR            | 780    | 7                        | NR            | 910    | 0                        | NR            |
| 395    | 1                        | NR            | 525    | 592                      | NR            | 655    | 352                      | NR            | 785    | 6                        | NR            | 915    | 0                        | NR            |
| 400    | 3                        | NR            | 530    | 606                      | NR            | 660    | 307                      | NR            | 790    | 5                        | NR            | 920    | 0                        | NR            |
| 405    | 6                        | NR            | 535    | 624                      | NR            | 665    | 267                      | NR            | 795    | 4                        | NR            | 925    | 0                        | NR            |
| 410    | 12                       | NR            | 540    | 642                      | NR            | 670    | 231                      | NR            | 800    | 4                        | NR            | 930    | 0                        | NR            |
| 415    | 22                       | NR            | 545    | 663                      | NR            | 675    | 199                      | NR            | 805    | 3                        | NR            | 935    | 0                        | NR            |
| 420    | 44                       | NR            | 550    | 686                      | NR            | 680    | 171                      | NR            | 810    | 3                        | NR            | 940    | 0                        | NR            |
| 425    | 83                       | NR            | 555    | 713                      | NR            | 685    | 146                      | NR            | 815    | 2                        | NR            | 945    | 0                        | NR            |
| 430    | 150                      | NR            | 560    | 745                      | NR            | 690    | 125                      | NR            | 820    | 2                        | NR            | 950    | 0                        | NR            |
| 435    | 267                      | NR            | 565    | 774                      | NR            | 695    | 106                      | NR            | 825    | 2                        | NR            | 955    | 0                        | NR            |
| 440    | 466                      | NR            | 570    | 806                      | NR            | 700    | 90                       | NR            | 830    | 1                        | NR            | 960    | 0                        | NR            |
| 445    | 804                      | NR            | 575    | 835                      | NR            | 705    | 76                       | NR            | 835    | 1                        | NR            | 965    | 0                        | NR            |
| 450    | 1000                     | NR            | 580    | 858                      | NR            | 710    | 65                       | NR            | 840    | 1                        | NR            | 970    | 0                        | NR            |
| 455    | 715                      | NR            | 585    | 875                      | NR            | 715    | 55                       | NR            | 845    | 1                        | NR            | 975    | 0                        | NR            |
| 460    | 492                      | NR            | 590    | 884                      | NR            | 720    | 47                       | NR            | 850    | 1                        | NR            | 980    | 0                        | NR            |
| 465    | 402                      | NR            | 595    | 880                      | NR            | 725    | 40                       | NR            | 855    | 1                        | NR            | 985    | 0                        | NR            |
| 470    | 288                      | NR            | 600    | 868                      | NR            | 730    | 34                       | NR            | 860    | 1                        | NR            | 990    | 0                        | NR            |
| 475    | 226                      | NR            | 605    | 844                      | NR            | 735    | 28                       | NR            | 865    | 1                        | NR            | 995    | 0                        | NR            |
| 480    | 227                      | NR            | 610    | 814                      | NR            | 740    | 24                       | NR            | 870    | 0                        | NR            | 1000   | 0                        | NR            |
| 485    | 248                      | NR            | 615    | 771                      | NR            | 745    | 20                       | NR            | 875    | 0                        | NR            |        |                          |               |

**Summary**

$R_f = 82.6$   
 $R_g = 95.1$   
 CIE  $R_a = 80.6$   
 $R_g = -5.8$



**Color Vector Graphics**





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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 79 | CES51 = 94 | CES76 = 72 |
| CES02 = 61 | CES27 = 93 | CES52 = 94 | CES77 = 82 |
| CES03 = 31 | CES28 = 90 | CES53 = 88 | CES78 = 71 |
| CES04 = 69 | CES29 = 83 | CES54 = 89 | CES79 = 91 |
| CES05 = 48 | CES30 = 95 | CES55 = 88 | CES80 = 88 |
| CES06 = 50 | CES31 = 86 | CES56 = 84 | CES81 = 80 |
| CES07 = 40 | CES32 = 78 | CES57 = 84 | CES82 = 95 |
| CES08 = 39 | CES33 = 90 | CES58 = 84 | CES83 = 95 |
| CES09 = 29 | CES34 = 85 | CES59 = 90 | CES84 = 90 |
| CES10 = 74 | CES35 = 92 | CES60 = 91 | CES85 = 78 |
| CES11 = 57 | CES36 = 85 | CES61 = 87 | CES86 = 73 |
| CES12 = 63 | CES37 = 91 | CES62 = 87 | CES87 = 83 |
| CES13 = 42 | CES38 = 95 | CES63 = 84 | CES88 = 86 |
| CES14 = 74 | CES39 = 98 | CES64 = 78 | CES89 = 76 |
| CES15 = 71 | CES40 = 94 | CES65 = 75 | CES90 = 87 |
| CES16 = 46 | CES41 = 98 | CES66 = 75 | CES91 = 72 |
| CES17 = 49 | CES42 = 92 | CES67 = 73 | CES92 = 62 |
| CES18 = 56 | CES43 = 88 | CES68 = 77 | CES93 = 78 |
| CES19 = 71 | CES44 = 99 | CES69 = 82 | CES94 = 60 |
| CES20 = 65 | CES45 = 93 | CES70 = 72 | CES95 = 70 |
| CES21 = 86 | CES46 = 90 | CES71 = 67 | CES96 = 82 |
| CES22 = 78 | CES47 = 95 | CES72 = 89 | CES97 = 90 |
| CES23 = 91 | CES48 = 84 | CES73 = 65 | CES98 = 84 |
| CES24 = 90 | CES49 = 89 | CES74 = 93 | CES99 = 73 |
| CES25 = 71 | CES50 = 94 | CES75 = 69 |            |



Color Rendition by Hue-Angle Bin



Measure Comparisons



(END OF REPORT)