

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: P1435675

Luminaire Tested: **GALN-SB9A-935-U-T4LG**

Issue Date: 03/24/202

This test was performed under the Supervised Manufacturer's Testing Program. The results of this test have not been influenced by sources from within Cooper Lighting Solutions or from external interests.

Report Generated By 670245763



**Test Information**

Test Method: LM-79-08  
 Report Number: P1435675  
 Test Lab: INNOVATION CENTER(G1)  
 Issue Date: 03/24/202  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: McGRAW-EDISON  
 Catalog Number: GALN-SB9A-935-U-T4LG  
 Description: GALLEON II AREA AND ROADWAY HIGH DENSITY LUMINAIRE 350mA 9xLight Square PACKAGE 90CRI 3500K FIXTURE w/ TYPE IV LOW GLARE  
 Light Source: (234) 3500K CCT, 90 CRI LEDS  
 Ballast/Driver: ELECTRONIC DRIVER

Luminaire Equipment:

| <u>Sample No.</u> | <u>Condition</u> | <u>Description</u> |
|-------------------|------------------|--------------------|
| a                 | good             | reflector          |
| b                 | good             | lens               |
| c                 | good             | housing            |
| d                 | good             | cord               |

**Summary**

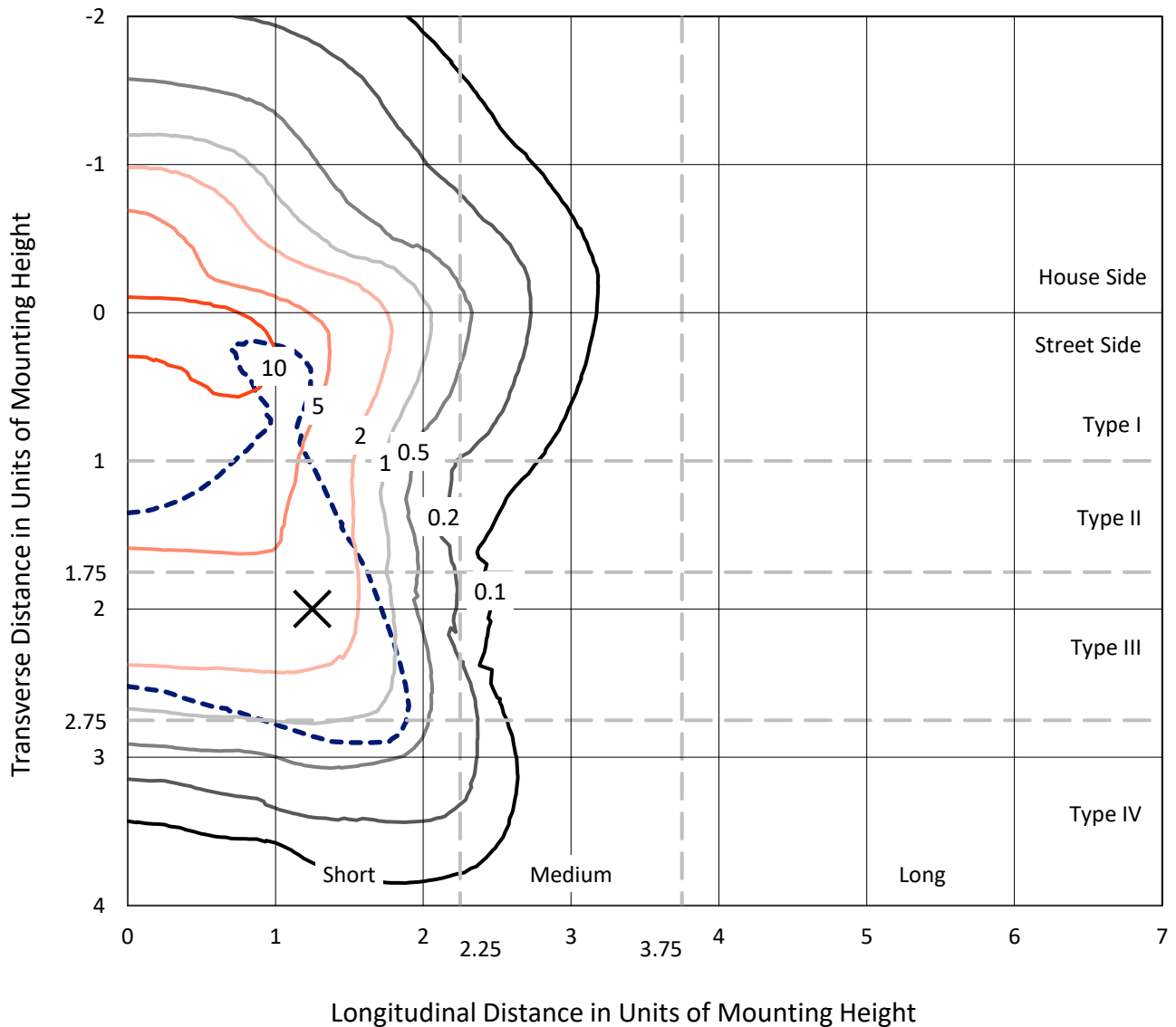
Lumens per Lamp: N/A  
 Luminaire Lumens: 27836.2 lumens  
 Efficiency: N/A  
 Efficacy: 108.9 lumens/watt  
 Luminous Opening: Rectangular (W 1.5' x L: 1.5' x H: 0')  
 IES Classification: Type IV - Short  
 BUG Rating: B3 - U0 - G3

Input Watts (W): 255.5  
 Input Voltage (V): 120  
 Input Current (Ain): NR  
 Voltage Rise (V): NR  
 Power Factor: 0.97  
 Total Harmonic Distortion (THDi): NR  
 Frequency (hertz): 60  
 Stabilization Time: NR  
 Operation Time: NR  
 Ambient Temperature (°C): NR  
 Test Distance: 28.75 FT

REPORT NUMBER: P1435675  
 CATALOG NUMBER: GALN-SB9A-935-U-T4LG

### Iso-Footcandle Lines of Horizontal Illumination

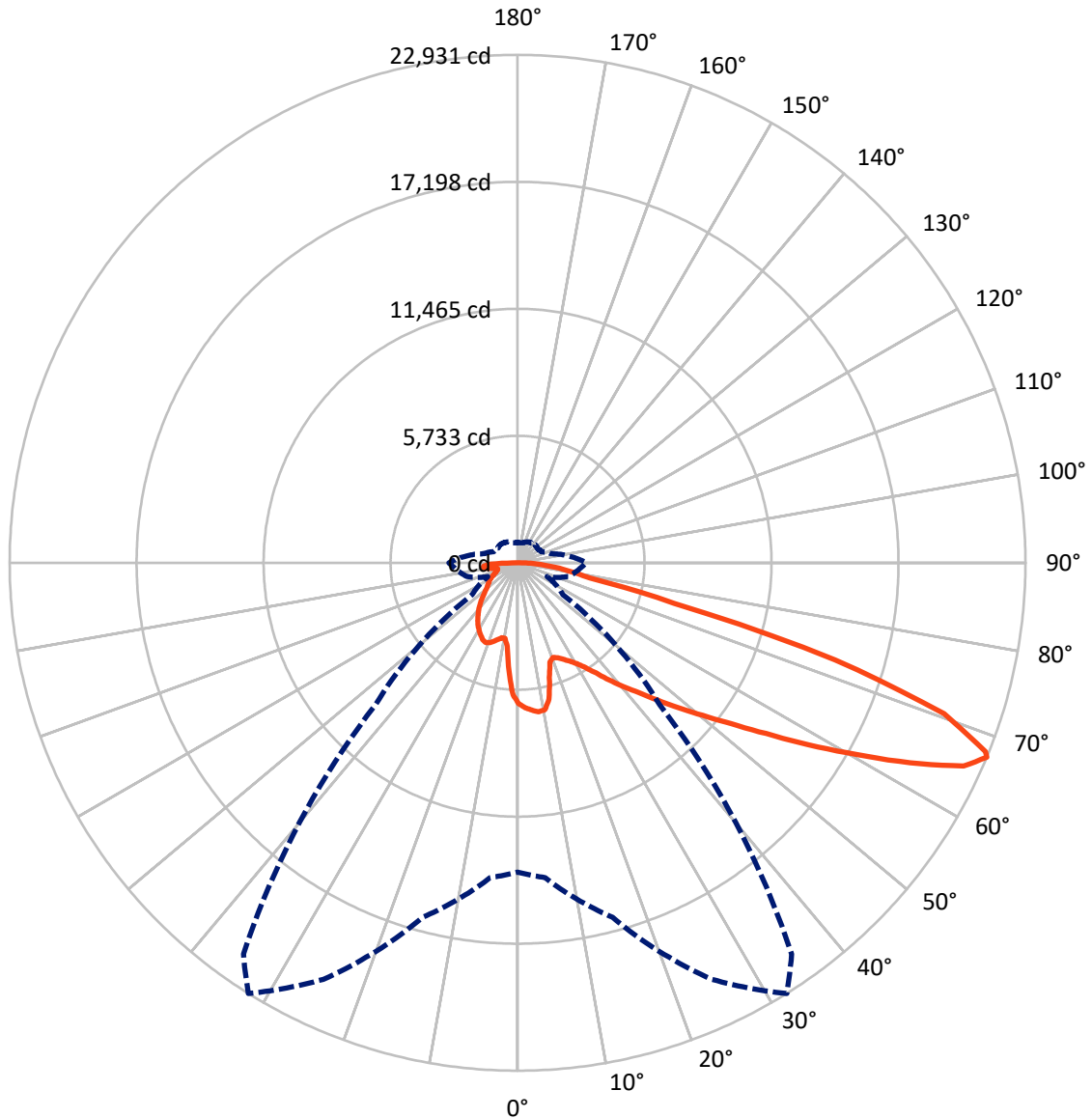
✕ Max cd  
 - - - 1/2 Max cd



Based on 20 foot mounting height. Maximum calculated value = 17.2 fc  
 Type IV - Short - N/A

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### Luminous Intensity Polar Plot



— Vertical Plane Through 32-Deg Lateral      - - - Horizontal Cone Through 67-Deg Vertical

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**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 6590.1   | 0.0    | 6590.1  |
|                    | % Fixture | 23.7     | 0.0    | 23.7    |
| <b>Street Side</b> | Lumens    | 21246.1  | 0.0    | 21246.1 |
|                    | % Fixture | 76.3     | 0.0    | 76.3    |
| <b>Total</b>       | Lumens    | 27836.2  | 0.0    | 27836.2 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**Coefficient of Utilization**

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 555.7   | 2.0       |
| 10°-20°   | 1475.4  | 5.3       |
| 20°-30°   | 2409.5  | 8.7       |
| 30°-40°   | 3551.4  | 12.8      |
| 40°-50°   | 4897.5  | 17.6      |
| 50°-60°   | 6187.1  | 22.2      |
| 60°-70°   | 5988.0  | 21.5      |
| 70°-80°   | 2137.1  | 7.7       |
| 80°-90°   | 634.6   | 2.3       |
| 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°    | 27836.2 | 100.0     |
| 0°-180°   | 27836.2 | 100.0     |

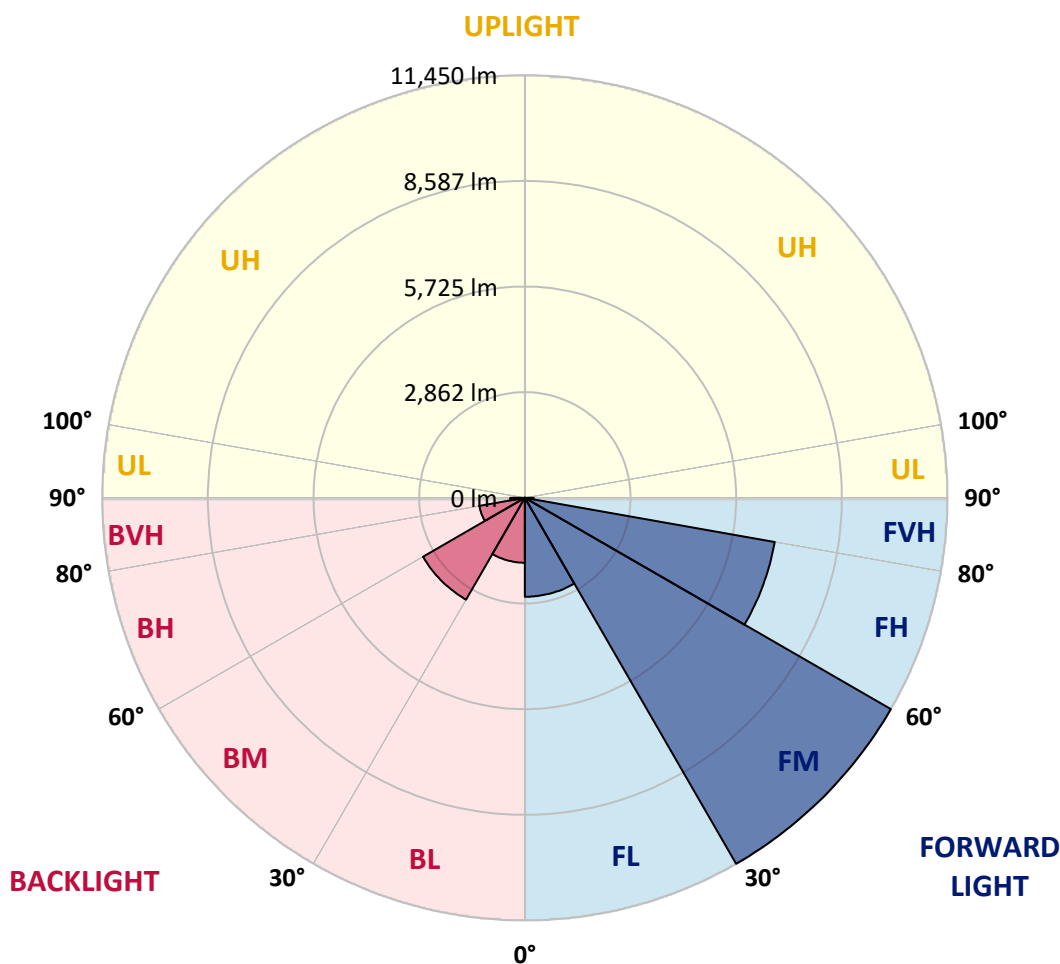


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**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone           | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|----------------|---------|-----------|-------------------------|------|---------|
|                |         |           | B                       | U    | G       |
| FL (0°-30°)    | 2682.1  | 9.6       |                         |      |         |
| FM (30°-60°)   | 11449.9 | 41.1      |                         |      |         |
| FH (60°-80°)   | 6875.0  | 24.7      |                         |      | G3/7500 |
| FVH (80°-90°)  | 239.1   | 0.9       |                         |      | G3/500  |
| BL (0°-30°)    | 1758.6  | 6.3       | B3/2500                 |      |         |
| BM (30°-60°)   | 3186.0  | 11.4      | B3/5000                 |      |         |
| BH (60°-80°)   | 1250.0  | 4.5       | B3/2500                 |      | G3/2500 |
| BVH (80°-90°)  | 395.5   | 1.4       |                         |      | G3/500  |
| UL (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |         |
| UH (100°-180°) | 0.0     | 0.0       |                         | U0/0 |         |

**BUG Rating: B3-U0-G3**  
 Type IV Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 32°     | 35°     | 45°     | 55°     | 65°     | 75°     | 85°    |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|
| 0°    | 6360.0  | 6360.0  | 6360.0  | 6360.0  | 6360.0  | 6360.0  | 6360.0  | 6360.0  | 6360.0  | 6360.0  | 6360.0 |
| 2.5°  | 6601.1  | 6582.5  | 6564.0  | 6576.3  | 6551.6  | 6545.4  | 6514.5  | 6502.2  | 6465.1  | 6458.9  | 6390.9 |
| 5°    | 6737.0  | 6700.0  | 6693.8  | 6706.1  | 6681.4  | 6681.4  | 6656.7  | 6638.2  | 6582.5  | 6551.6  | 6452.7 |
| 7.5°  | 6737.0  | 6730.9  | 6743.2  | 6786.5  | 6792.7  | 6792.7  | 6792.7  | 6798.9  | 6743.2  | 6700.0  | 6545.4 |
| 10°   | 6353.8  | 6292.0  | 6428.0  | 6644.3  | 6749.4  | 6811.2  | 6922.5  | 6990.5  | 6947.2  | 6916.3  | 6706.1 |
| 12.5° | 5210.4  | 5216.6  | 5432.9  | 5896.5  | 6316.8  | 6496.0  | 6959.6  | 7206.8  | 7225.3  | 7175.9  | 6910.1 |
| 15°   | 4419.3  | 4450.2  | 4561.4  | 4895.2  | 5377.3  | 5643.1  | 6743.2  | 7398.4  | 7546.7  | 7497.3  | 7157.3 |
| 17.5° | 4178.2  | 4196.7  | 4246.2  | 4437.8  | 4709.8  | 4926.1  | 6156.1  | 7522.0  | 7936.1  | 7874.3  | 7435.5 |
| 20°   | 4141.1  | 4153.5  | 4215.3  | 4376.0  | 4561.4  | 4685.0  | 5556.5  | 7423.1  | 8300.8  | 8276.1  | 7688.9 |
| 22.5° | 4147.3  | 4159.7  | 4240.0  | 4462.5  | 4654.1  | 4759.2  | 5364.9  | 7194.4  | 8684.0  | 8708.7  | 7948.5 |
| 25°   | 4159.7  | 4165.8  | 4289.5  | 4586.1  | 4827.2  | 4957.0  | 5488.5  | 6990.5  | 9005.4  | 9215.5  | 8232.8 |
| 27.5° | 4227.7  | 4246.2  | 4413.1  | 4746.8  | 5031.2  | 5179.5  | 5779.0  | 7058.5  | 9357.7  | 9790.4  | 8572.7 |
| 30°   | 4413.1  | 4425.4  | 4629.4  | 4975.5  | 5284.6  | 5439.1  | 6125.2  | 7330.4  | 9790.4  | 10383.7 | 8906.5 |
| 32.5° | 4703.6  | 4715.9  | 4950.8  | 5309.3  | 5643.1  | 5828.5  | 6576.3  | 7849.6  | 10272.5 | 11008.0 | 9240.3 |
| 35°   | 5105.3  | 5111.5  | 5377.3  | 5760.5  | 6112.8  | 6322.9  | 7101.7  | 8436.8  | 10773.1 | 11539.5 | 9487.5 |
| 37.5° | 5581.2  | 5624.5  | 5896.5  | 6298.2  | 6712.3  | 6903.9  | 7719.8  | 9122.8  | 11218.1 | 11990.7 | 9629.7 |
| 40°   | 6236.4  | 6248.8  | 6514.5  | 6903.9  | 7342.8  | 7528.2  | 8337.9  | 9771.8  | 11706.4 | 12256.5 | 9759.5 |
| 42.5° | 6910.1  | 7015.2  | 7237.7  | 7670.3  | 7997.9  | 8146.3  | 9042.5  | 10365.2 | 12095.8 | 12268.8 | 9703.8 |
| 45°   | 7812.5  | 7892.9  | 8115.4  | 8498.6  | 8826.2  | 8999.2  | 9802.7  | 10909.1 | 12293.6 | 12163.8 | 9580.2 |
| 47.5° | 8844.7  | 8894.1  | 9073.4  | 9419.5  | 9784.2  | 9907.8  | 10593.9 | 11218.1 | 12367.7 | 12089.6 | 9524.6 |
| 50°   | 10062.3 | 10062.3 | 10192.1 | 10488.8 | 10822.5 | 10995.6 | 11323.2 | 11403.5 | 12584.1 | 11959.8 | 9666.7 |
| 52.5° | 11088.3 | 11137.8 | 11310.8 | 11731.1 | 12064.9 | 12262.7 | 11891.8 | 11687.9 | 12145.2 | 11236.7 | 9710.0 |
| 55°   | 12071.1 | 12126.7 | 12516.1 | 13041.4 | 13610.1 | 13826.4 | 12602.6 | 11545.7 | 10668.0 | 10179.7 | 9413.3 |
| 57.5° | 13010.5 | 13128.0 | 13616.3 | 14642.3 | 15501.4 | 15482.9 | 13505.0 | 10272.5 | 8708.7  | 9011.6  | 8764.3 |
| 60°   | 14320.9 | 14444.5 | 15223.3 | 16515.0 | 17565.8 | 17126.9 | 13517.4 | 8548.0  | 6786.5  | 7194.4  | 7546.7 |
| 62.5° | 15414.9 | 15625.0 | 16768.5 | 18919.4 | 19883.6 | 19197.5 | 12398.6 | 6545.4  | 4505.8  | 5018.8  | 5834.7 |
| 65°   | 15316.0 | 15594.1 | 17368.0 | 20687.1 | 22127.2 | 21490.6 | 10760.7 | 4141.1  | 2324.0  | 3430.3  | 4085.5 |
| 67°   | 13968.6 | 14271.4 | 16570.7 | 20748.9 | 22930.7 | 21570.9 | 9085.7  | 2503.2  | 1477.2  | 2379.6  | 2837.0 |
| 67.5° | 13196.0 | 13641.0 | 16175.1 | 20631.4 | 22782.4 | 21231.0 | 8331.7  | 2095.3  | 1390.7  | 2212.7  | 2583.6 |
| 70°   | 8115.4  | 8832.3  | 12139.1 | 18239.5 | 20421.3 | 17769.7 | 4629.4  | 1186.7  | 1131.1  | 1483.4  | 1786.2 |
| 72.5° | 2441.4  | 2657.7  | 4685.0  | 11700.2 | 14988.4 | 13171.2 | 2082.9  | 914.8   | 1013.6  | 1192.9  | 1378.3 |
| 75°   | 1186.7  | 1267.1  | 1934.6  | 4783.9  | 7299.5  | 7262.4  | 1162.0  | 785.0   | 939.5   | 1001.3  | 1087.8 |
| 77.5° | 760.2   | 809.7   | 1205.3  | 2676.3  | 3343.8  | 2979.1  | 840.6   | 686.1   | 834.4   | 822.0   | 809.7  |
| 80°   | 475.9   | 500.6   | 772.6   | 1551.4  | 2466.1  | 2058.2  | 618.1   | 562.5   | 717.0   | 636.6   | 574.8  |
| 82.5° | 309.0   | 339.9   | 494.5   | 945.7   | 1761.5  | 1532.8  | 407.9   | 401.8   | 593.4   | 506.8   | 445.0  |
| 85°   | 204.0   | 228.7   | 315.2   | 556.3   | 1044.6  | 1094.0  | 265.8   | 278.1   | 457.4   | 383.2   | 339.9  |
| 87.5° | 74.2    | 92.7    | 160.7   | 247.2   | 488.3   | 605.7   | 111.3   | 105.1   | 222.5   | 179.2   | 142.2  |
| 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: GALN-SB9A-935-U-T4LG

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 6360.0 | 6360.0 | 6360.0 | 6360.0 | 6360.0 | 6360.0 | 6360.0 | 6360.0 | 6360.0 | 6360.0 | 6360.0 |
| 2.5°  | 6378.6 | 6360.0 | 6273.5 | 6199.3 | 6143.7 | 6069.5 | 5989.2 | 5896.5 | 5834.7 | 5847.0 | 5828.5 |
| 5°    | 6409.5 | 6360.0 | 6193.1 | 5939.7 | 5692.5 | 5383.5 | 4987.9 | 4753.0 | 4573.8 | 4481.1 | 4505.8 |
| 7.5°  | 6477.5 | 6390.9 | 6038.6 | 5525.6 | 4882.8 | 4252.4 | 3863.0 | 3640.5 | 3535.4 | 3492.1 | 3486.0 |
| 10°   | 6594.9 | 6446.6 | 5840.8 | 4882.8 | 4042.2 | 3615.8 | 3473.6 | 3411.8 | 3399.4 | 3399.4 | 3393.2 |
| 12.5° | 6737.0 | 6502.2 | 5507.1 | 4258.6 | 3640.5 | 3486.0 | 3461.2 | 3467.4 | 3486.0 | 3504.5 | 3473.6 |
| 15°   | 6910.1 | 6526.9 | 5093.0 | 3881.5 | 3560.1 | 3523.0 | 3560.1 | 3603.4 | 3634.3 | 3659.0 | 3628.1 |
| 17.5° | 7083.2 | 6502.2 | 4703.6 | 3702.3 | 3572.5 | 3621.9 | 3696.1 | 3764.1 | 3782.6 | 3819.7 | 3795.0 |
| 20°   | 7206.8 | 6415.6 | 4369.8 | 3634.3 | 3603.4 | 3714.6 | 3807.4 | 3881.5 | 3918.6 | 3943.3 | 3918.6 |
| 22.5° | 7299.5 | 6304.4 | 4128.8 | 3566.3 | 3603.4 | 3739.4 | 3850.6 | 3937.2 | 3980.4 | 4005.1 | 3974.2 |
| 25°   | 7379.9 | 6149.9 | 3943.3 | 3467.4 | 3529.2 | 3659.0 | 3782.6 | 3869.2 | 3931.0 | 3968.1 | 3949.5 |
| 27.5° | 7478.7 | 6026.3 | 3770.3 | 3319.1 | 3374.7 | 3498.3 | 3628.1 | 3733.2 | 3850.6 | 3912.4 | 3900.1 |
| 30°   | 7590.0 | 5964.5 | 3603.4 | 3158.4 | 3195.5 | 3319.1 | 3473.6 | 3615.8 | 3776.5 | 3856.8 | 3856.8 |
| 32.5° | 7719.8 | 5921.2 | 3448.9 | 3003.9 | 3034.8 | 3170.7 | 3319.1 | 3448.9 | 3621.9 | 3751.7 | 3745.6 |
| 35°   | 7775.4 | 5871.7 | 3325.3 | 2861.7 | 2923.5 | 3034.8 | 3152.2 | 3238.7 | 3418.0 | 3572.5 | 3584.9 |
| 37.5° | 7831.0 | 5853.2 | 3263.5 | 2750.4 | 2799.9 | 2886.4 | 2948.2 | 2991.5 | 3158.4 | 3319.1 | 3325.3 |
| 40°   | 7899.0 | 5939.7 | 3306.7 | 2676.3 | 2633.0 | 2719.5 | 2750.4 | 2775.2 | 2861.7 | 2966.8 | 2966.8 |
| 42.5° | 7855.8 | 6001.5 | 3405.6 | 2608.3 | 2429.0 | 2527.9 | 2540.3 | 2534.1 | 2540.3 | 2546.5 | 2540.3 |
| 45°   | 7744.5 | 5939.7 | 3405.6 | 2503.2 | 2212.7 | 2317.8 | 2311.6 | 2280.7 | 2231.3 | 2101.5 | 2082.9 |
| 47.5° | 7719.8 | 5902.6 | 3275.8 | 2330.2 | 1996.4 | 2082.9 | 2095.3 | 2033.5 | 1891.3 | 1755.3 | 1712.1 |
| 50°   | 7824.9 | 5970.6 | 3071.8 | 2120.0 | 1811.0 | 1885.1 | 1916.0 | 1811.0 | 1650.3 | 1508.1 | 1483.4 |
| 52.5° | 7979.4 | 6057.2 | 2775.2 | 1891.3 | 1656.4 | 1730.6 | 1767.7 | 1650.3 | 1483.4 | 1372.1 | 1359.8 |
| 55°   | 7960.8 | 6057.2 | 2441.4 | 1681.2 | 1539.0 | 1594.6 | 1656.4 | 1532.8 | 1403.0 | 1341.2 | 1335.0 |
| 57.5° | 7559.1 | 5828.5 | 2194.2 | 1532.8 | 1427.8 | 1477.2 | 1557.6 | 1440.1 | 1316.5 | 1328.9 | 1347.4 |
| 60°   | 6774.1 | 5235.1 | 2008.8 | 1433.9 | 1328.9 | 1378.3 | 1464.8 | 1328.9 | 1168.2 | 1124.9 | 1124.9 |
| 62.5° | 5581.2 | 4314.2 | 1860.4 | 1335.0 | 1236.2 | 1298.0 | 1341.2 | 1162.0 | 1056.9 | 1007.5 | 1007.5 |
| 65°   | 4184.4 | 3337.6 | 1705.9 | 1254.7 | 1155.8 | 1223.8 | 1174.3 | 1087.8 | 982.7  | 945.7  | 951.8  |
| 67°   | 3102.8 | 2589.7 | 1576.1 | 1186.7 | 1106.4 | 1137.3 | 1100.2 | 1038.4 | 933.3  | 902.4  | 933.3  |
| 67.5° | 2787.5 | 2460.0 | 1545.2 | 1168.2 | 1094.0 | 1118.7 | 1081.6 | 1032.2 | 920.9  | 890.0  | 920.9  |
| 70°   | 1916.0 | 1891.3 | 1378.3 | 1081.6 | 1026.0 | 1001.3 | 1019.8 | 958.0  | 865.3  | 852.9  | 883.9  |
| 72.5° | 1458.7 | 1508.1 | 1236.2 | 1007.5 | 951.8  | 920.9  | 964.2  | 902.4  | 809.7  | 828.2  | 859.1  |
| 75°   | 1143.4 | 1217.6 | 1106.4 | 902.4  | 865.3  | 871.5  | 958.0  | 933.3  | 859.1  | 877.7  | 883.9  |
| 77.5° | 846.8  | 982.7  | 945.7  | 785.0  | 754.1  | 840.6  | 1081.6 | 1155.8 | 1026.0 | 995.1  | 951.8  |
| 80°   | 618.1  | 704.6  | 797.3  | 649.0  | 630.4  | 809.7  | 1335.0 | 1477.2 | 1267.1 | 1143.4 | 1112.5 |
| 82.5° | 457.4  | 494.5  | 655.2  | 519.2  | 457.4  | 723.2  | 1483.4 | 1736.8 | 1508.1 | 1273.2 | 1236.2 |
| 85°   | 327.6  | 383.2  | 519.2  | 383.2  | 302.9  | 593.4  | 1452.5 | 1699.7 | 1495.7 | 1205.3 | 1174.3 |
| 87.5° | 117.4  | 166.9  | 222.5  | 173.1  | 154.5  | 407.9  | 1199.1 | 1223.8 | 933.3  | 426.5  | 432.7  |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

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



LM-79-08: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

McGRAW-EDISON

Report Number: SP1-2106-271-3

Luminaire Tested: GFLD-SA1-A-935-U-WR-X-BK

Test Date: 06/15/2021

**Test Information**

Test Method: LM-79-08  
 Report Number: SP1-2106-271-3  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry: 4π  
 Issue Date: 06/15/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: MCGRAW-EDISON  
 Catalog Number: **GFLD-SA1-A-935-U-WR-X-BK**  
 Description: MCGRAW EDISON

N6, BLACK

**Spectral Parameters**

CCT (K): 3364  
 CIE u': 0.2376  
 CIE v': 0.5188  
 Duv: 0.0036  
 CIE x: 0.4173  
 CIE y: 0.4050  
 CIE z: 0.1777  
 Peak Wavelength (nm): 622  
 Dominant Wavelength (nm): 580  
 Purity: 46.9  
 Rf: 92.6  
 Rg: 98.3

CRI (Ra): 92.0  
 R1: 91.7  
 R2: 94.0  
 R3: 95.5  
 R4: 93.0  
 R5: 90.9  
 R6: 92.2  
 R7: 94.8  
 R8: 84.1  
 R9: 59.7  
 R10: 85.2  
 R11: 92.8  
 R12: 78.2  
 R13: 92.0  
 R14: 96.9

**Test Conditions**  
 Stabilization Time: 76M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.8/44%  
 Sphere Temperature (°C): 24.9



REPORT NUMBER: SP1-2106-271-3

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | 76INCH SPHERE IN0058  | 1/31/2021        | 7/31/2021            |
| Power Meter                    | XITRON 2801 IN0071    | 12/1/2020        | 12/1/2021            |
| AC Power Source                | CHROMA 61603 IN0063   | 12/1/2020        | 12/1/2021            |
| DC Power Source                | AGILENT E3634A IN0208 | 12/1/2020        | 12/1/2021            |
| Sphere Thermometer             | ONSET IN0085          | 12/1/2020        | 12/1/2021            |
| Room Thermometer               | ONSET IN0046          | 12/1/2020        | 12/1/2021            |

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**CIE 1931 Chromaticity Diagram**



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



Point lies inside the ANSI 3500K 4-step quadrangle

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**Photopic Flux vs. Wavelength**



#####

| λ (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    | 792           | NR            | 490    | 14205         | NR            | 620    | 36151         | NR            | 750    | 3427          | NR            | 880    | 712           | NR            |
| 365    | 640           | NR            | 495    | 15647         | NR            | 625    | 36077         | NR            | 755    | 3047          | NR            | 885    | 942           | NR            |
| 370    | 630           | NR            | 500    | 17088         | NR            | 630    | 35451         | NR            | 760    | 2790          | NR            | 890    | 952           | NR            |
| 375    | 684           | NR            | 505    | 18475         | NR            | 635    | 34417         | NR            | 765    | 2433          | NR            | 895    | 764           | NR            |
| 380    | 731           | NR            | 510    | 19780         | NR            | 640    | 33166         | NR            | 770    | 2178          | NR            | 900    | 743           | NR            |
| 385    | 664           | NR            | 515    | 21055         | NR            | 645    | 32124         | NR            | 775    | 1893          | NR            | 905    | 776           | NR            |
| 390    | 595           | NR            | 520    | 22268         | NR            | 650    | 30559         | NR            | 780    | 1724          | NR            | 910    | 659           | NR            |
| 395    | 520           | NR            | 525    | 23497         | NR            | 655    | 28656         | NR            | 785    | 1549          | NR            | 915    | 701           | NR            |
| 400    | 491           | NR            | 530    | 24653         | NR            | 660    | 27033         | NR            | 790    | 1451          | NR            | 920    | 728           | NR            |
| 405    | 489           | NR            | 535    | 25661         | NR            | 665    | 25030         | NR            | 795    | 1317          | NR            | 925    | 793           | NR            |
| 410    | 585           | NR            | 540    | 26289         | NR            | 670    | 22820         | NR            | 800    | 1124          | NR            | 930    | 877           | NR            |
| 415    | 826           | NR            | 545    | 26945         | NR            | 675    | 20678         | NR            | 805    | 1116          | NR            | 935    | 923           | NR            |
| 420    | 1336          | NR            | 550    | 27713         | NR            | 680    | 18748         | NR            | 810    | 1105          | NR            | 940    | 1001          | NR            |
| 425    | 2406          | NR            | 555    | 28230         | NR            | 685    | 16904         | NR            | 815    | 1073          | NR            | 945    | 604           | NR            |
| 430    | 4355          | NR            | 560    | 28678         | NR            | 690    | 15203         | NR            | 820    | 977           | NR            | 950    | 424           | NR            |
| 435    | 7911          | NR            | 565    | 29242         | NR            | 695    | 13356         | NR            | 825    | 882           | NR            | 955    | 550           | NR            |
| 440    | 13821         | NR            | 570    | 29806         | NR            | 700    | 11948         | NR            | 830    | 875           | NR            | 960    | 709           | NR            |
| 445    | 19836         | NR            | 575    | 30322         | NR            | 705    | 10482         | NR            | 835    | 944           | NR            | 965    | 755           | NR            |
| 450    | 19902         | NR            | 580    | 31125         | NR            | 710    | 9351          | NR            | 840    | 956           | NR            | 970    | 426           | NR            |
| 455    | 15697         | NR            | 585    | 31838         | NR            | 715    | 8217          | NR            | 845    | 875           | NR            | 975    | 556           | NR            |
| 460    | 13589         | NR            | 590    | 32845         | NR            | 720    | 7313          | NR            | 850    | 801           | NR            | 980    | 1040          | NR            |
| 465    | 11857         | NR            | 595    | 33487         | NR            | 725    | 6460          | NR            | 855    | 890           | NR            | 985    | 833           | NR            |
| 470    | 10336         | NR            | 600    | 34359         | NR            | 730    | 5680          | NR            | 860    | 706           | NR            | 990    | 964           | NR            |
| 475    | 10504         | NR            | 605    | 35281         | NR            | 735    | 4904          | NR            | 865    | 902           | NR            | 995    | 953           | NR            |
| 480    | 11526         | NR            | 610    | 35679         | NR            | 740    | 4372          | NR            | 870    | 879           | NR            | 1000   | 950           | NR            |
| 485    | 12831         | NR            | 615    | 36113         | NR            | 745    | 3858          | NR            | 875    | 769           | NR            |        |               |               |

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**Scotopic Flux vs. Wavelength**



**Scotopic Lumens: 3109.5**

**S/P: 1.54**

| $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|
| 360               | 792                                  | NR                             | 490               | 14205                                | NR                             | 620               | 36151                                | NR                             | 750               | 3427                                 | NR                             | 880               | 712                                  | NR                             |
| 365               | 640                                  | NR                             | 495               | 15647                                | NR                             | 625               | 36077                                | NR                             | 755               | 3047                                 | NR                             | 885               | 942                                  | NR                             |
| 370               | 630                                  | NR                             | 500               | 17088                                | NR                             | 630               | 35451                                | NR                             | 760               | 2790                                 | NR                             | 890               | 952                                  | NR                             |
| 375               | 684                                  | NR                             | 505               | 18475                                | NR                             | 635               | 34417                                | NR                             | 765               | 2433                                 | NR                             | 895               | 764                                  | NR                             |
| 380               | 731                                  | NR                             | 510               | 19780                                | NR                             | 640               | 33166                                | NR                             | 770               | 2178                                 | NR                             | 900               | 743                                  | NR                             |
| 385               | 664                                  | NR                             | 515               | 21055                                | NR                             | 645               | 32124                                | NR                             | 775               | 1893                                 | NR                             | 905               | 776                                  | NR                             |
| 390               | 595                                  | NR                             | 520               | 22268                                | NR                             | 650               | 30559                                | NR                             | 780               | 1724                                 | NR                             | 910               | 659                                  | NR                             |
| 395               | 520                                  | NR                             | 525               | 23497                                | NR                             | 655               | 28656                                | NR                             | 785               | 1549                                 | NR                             | 915               | 701                                  | NR                             |
| 400               | 491                                  | NR                             | 530               | 24653                                | NR                             | 660               | 27033                                | NR                             | 790               | 1451                                 | NR                             | 920               | 728                                  | NR                             |
| 405               | 489                                  | NR                             | 535               | 25661                                | NR                             | 665               | 25030                                | NR                             | 795               | 1317                                 | NR                             | 925               | 793                                  | NR                             |
| 410               | 585                                  | NR                             | 540               | 26289                                | NR                             | 670               | 22820                                | NR                             | 800               | 1124                                 | NR                             | 930               | 877                                  | NR                             |
| 415               | 826                                  | NR                             | 545               | 26945                                | NR                             | 675               | 20678                                | NR                             | 805               | 1116                                 | NR                             | 935               | 923                                  | NR                             |
| 420               | 1336                                 | NR                             | 550               | 27713                                | NR                             | 680               | 18748                                | NR                             | 810               | 1105                                 | NR                             | 940               | 1001                                 | NR                             |
| 425               | 2406                                 | NR                             | 555               | 28230                                | NR                             | 685               | 16904                                | NR                             | 815               | 1073                                 | NR                             | 945               | 604                                  | NR                             |
| 430               | 4355                                 | NR                             | 560               | 28678                                | NR                             | 690               | 15203                                | NR                             | 820               | 977                                  | NR                             | 950               | 424                                  | NR                             |
| 435               | 7911                                 | NR                             | 565               | 29242                                | NR                             | 695               | 13356                                | NR                             | 825               | 882                                  | NR                             | 955               | 550                                  | NR                             |
| 440               | 13821                                | NR                             | 570               | 29806                                | NR                             | 700               | 11948                                | NR                             | 830               | 875                                  | NR                             | 960               | 709                                  | NR                             |
| 445               | 19836                                | NR                             | 575               | 30322                                | NR                             | 705               | 10482                                | NR                             | 835               | 944                                  | NR                             | 965               | 755                                  | NR                             |
| 450               | 19902                                | NR                             | 580               | 31125                                | NR                             | 710               | 9351                                 | NR                             | 840               | 956                                  | NR                             | 970               | 426                                  | NR                             |
| 455               | 15697                                | NR                             | 585               | 31838                                | NR                             | 715               | 8217                                 | NR                             | 845               | 875                                  | NR                             | 975               | 556                                  | NR                             |
| 460               | 13589                                | NR                             | 590               | 32845                                | NR                             | 720               | 7313                                 | NR                             | 850               | 801                                  | NR                             | 980               | 1040                                 | NR                             |
| 465               | 11857                                | NR                             | 595               | 33487                                | NR                             | 725               | 6460                                 | NR                             | 855               | 890                                  | NR                             | 985               | 833                                  | NR                             |
| 470               | 10336                                | NR                             | 600               | 34359                                | NR                             | 730               | 5680                                 | NR                             | 860               | 706                                  | NR                             | 990               | 964                                  | NR                             |
| 475               | 10504                                | NR                             | 605               | 35281                                | NR                             | 735               | 4904                                 | NR                             | 865               | 902                                  | NR                             | 995               | 953                                  | NR                             |
| 480               | 11526                                | NR                             | 610               | 35679                                | NR                             | 740               | 4372                                 | NR                             | 870               | 879                                  | NR                             | 1000              | 950                                  | NR                             |
| 485               | 12831                                | NR                             | 615               | 36113                                | NR                             | 745               | 3858                                 | NR                             | 875               | 769                                  | NR                             |                   |                                      |                                |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 1210.8 S/P: 0.6**

| 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    | 792           | NR            | 490    | 14205         | NR            | 620    | 36151         | NR            | 750    | 3427          | NR            | 880    | 712           | NR            |
| 365    | 640           | NR            | 495    | 15647         | NR            | 625    | 36077         | NR            | 755    | 3047          | NR            | 885    | 942           | NR            |
| 370    | 630           | NR            | 500    | 17088         | NR            | 630    | 35451         | NR            | 760    | 2790          | NR            | 890    | 952           | NR            |
| 375    | 684           | NR            | 505    | 18475         | NR            | 635    | 34417         | NR            | 765    | 2433          | NR            | 895    | 764           | NR            |
| 380    | 731           | NR            | 510    | 19780         | NR            | 640    | 33166         | NR            | 770    | 2178          | NR            | 900    | 743           | NR            |
| 385    | 664           | NR            | 515    | 21055         | NR            | 645    | 32124         | NR            | 775    | 1893          | NR            | 905    | 776           | NR            |
| 390    | 595           | NR            | 520    | 22268         | NR            | 650    | 30559         | NR            | 780    | 1724          | NR            | 910    | 659           | NR            |
| 395    | 520           | NR            | 525    | 23497         | NR            | 655    | 28656         | NR            | 785    | 1549          | NR            | 915    | 701           | NR            |
| 400    | 491           | NR            | 530    | 24653         | NR            | 660    | 27033         | NR            | 790    | 1451          | NR            | 920    | 728           | NR            |
| 405    | 489           | NR            | 535    | 25661         | NR            | 665    | 25030         | NR            | 795    | 1317          | NR            | 925    | 793           | NR            |
| 410    | 585           | NR            | 540    | 26289         | NR            | 670    | 22820         | NR            | 800    | 1124          | NR            | 930    | 877           | NR            |
| 415    | 826           | NR            | 545    | 26945         | NR            | 675    | 20678         | NR            | 805    | 1116          | NR            | 935    | 923           | NR            |
| 420    | 1336          | NR            | 550    | 27713         | NR            | 680    | 18748         | NR            | 810    | 1105          | NR            | 940    | 1001          | NR            |
| 425    | 2406          | NR            | 555    | 28230         | NR            | 685    | 16904         | NR            | 815    | 1073          | NR            | 945    | 604           | NR            |
| 430    | 4355          | NR            | 560    | 28678         | NR            | 690    | 15203         | NR            | 820    | 977           | NR            | 950    | 424           | NR            |
| 435    | 7911          | NR            | 565    | 29242         | NR            | 695    | 13356         | NR            | 825    | 882           | NR            | 955    | 550           | NR            |
| 440    | 13821         | NR            | 570    | 29806         | NR            | 700    | 11948         | NR            | 830    | 875           | NR            | 960    | 709           | NR            |
| 445    | 19836         | NR            | 575    | 30322         | NR            | 705    | 10482         | NR            | 835    | 944           | NR            | 965    | 755           | NR            |
| 450    | 19902         | NR            | 580    | 31125         | NR            | 710    | 9351          | NR            | 840    | 956           | NR            | 970    | 426           | NR            |
| 455    | 15697         | NR            | 585    | 31838         | NR            | 715    | 8217          | NR            | 845    | 875           | NR            | 975    | 556           | NR            |
| 460    | 13589         | NR            | 590    | 32845         | NR            | 720    | 7313          | NR            | 850    | 801           | NR            | 980    | 1040          | NR            |
| 465    | 11857         | NR            | 595    | 33487         | NR            | 725    | 6460          | NR            | 855    | 890           | NR            | 985    | 833           | NR            |
| 470    | 10336         | NR            | 600    | 34359         | NR            | 730    | 5680          | NR            | 860    | 706           | NR            | 990    | 964           | NR            |
| 475    | 10504         | NR            | 605    | 35281         | NR            | 735    | 4904          | NR            | 865    | 902           | NR            | 995    | 953           | NR            |
| 480    | 11526         | NR            | 610    | 35679         | NR            | 740    | 4372          | NR            | 870    | 879           | NR            | 1000   | 950           | NR            |
| 485    | 12831         | NR            | 615    | 36113         | NR            | 745    | 3858          | NR            | 875    | 769           | NR            |        |               |               |

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**Summary**

$R_f = 92.6$   
 $R_g = 98.3$   
 CIE  $R_a = 92.0$   
 $R_9 = 59.7$

**Spectral Power Distribution Comparison**



**Color Vector Graphics**



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 94 | CES51 = 97 | CES76 = 88 |
| CES02 = 62 | CES27 = 93 | CES52 = 98 | CES77 = 91 |
| CES03 = 31 | CES28 = 96 | CES53 = 96 | CES78 = 87 |
| CES04 = 70 | CES29 = 96 | CES54 = 95 | CES79 = 96 |
| CES05 = 50 | CES30 = 97 | CES55 = 94 | CES80 = 95 |
| CES06 = 51 | CES31 = 96 | CES56 = 94 | CES81 = 88 |
| CES07 = 42 | CES32 = 92 | CES57 = 93 | CES82 = 98 |
| CES08 = 41 | CES33 = 98 | CES58 = 94 | CES83 = 97 |
| CES09 = 29 | CES34 = 95 | CES59 = 96 | CES84 = 95 |
| CES10 = 75 | CES35 = 97 | CES60 = 94 | CES85 = 86 |
| CES11 = 58 | CES36 = 87 | CES61 = 93 | CES86 = 87 |
| CES12 = 64 | CES37 = 95 | CES62 = 91 | CES87 = 92 |
| CES13 = 43 | CES38 = 92 | CES63 = 93 | CES88 = 96 |
| CES14 = 74 | CES39 = 99 | CES64 = 91 | CES89 = 87 |
| CES15 = 71 | CES40 = 98 | CES65 = 89 | CES90 = 96 |
| CES16 = 48 | CES41 = 98 | CES66 = 89 | CES91 = 80 |
| CES17 = 49 | CES42 = 96 | CES67 = 88 | CES92 = 82 |
| CES18 = 56 | CES43 = 97 | CES68 = 90 | CES93 = 89 |
| CES19 = 71 | CES44 = 99 | CES69 = 91 | CES94 = 82 |
| CES20 = 66 | CES45 = 98 | CES70 = 88 | CES95 = 85 |
| CES21 = 86 | CES46 = 97 | CES71 = 85 | CES96 = 92 |
| CES22 = 78 | CES47 = 97 | CES72 = 95 | CES97 = 96 |
| CES23 = 91 | CES48 = 93 | CES73 = 84 | CES98 = 94 |
| CES24 = 90 | CES49 = 97 | CES74 = 94 | CES99 = 91 |
| CES25 = 71 | CES50 = 98 | CES75 = 86 |            |



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Color Rendition by Hue-Angle Bin



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Measure Comparisons



(END OF REPORT)