

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: P318698

Luminaire Tested: **GLEON-SA4D-730-U-T4FT**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P318698  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-16)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA4D-730-U-T4FT  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(4) 70 CRI, 3000K, 1200mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV  
FORWARD THROW OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 28676 lumens  
Efficiency: N/A  
Efficacy: 111.1 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B3 - U0 - G5

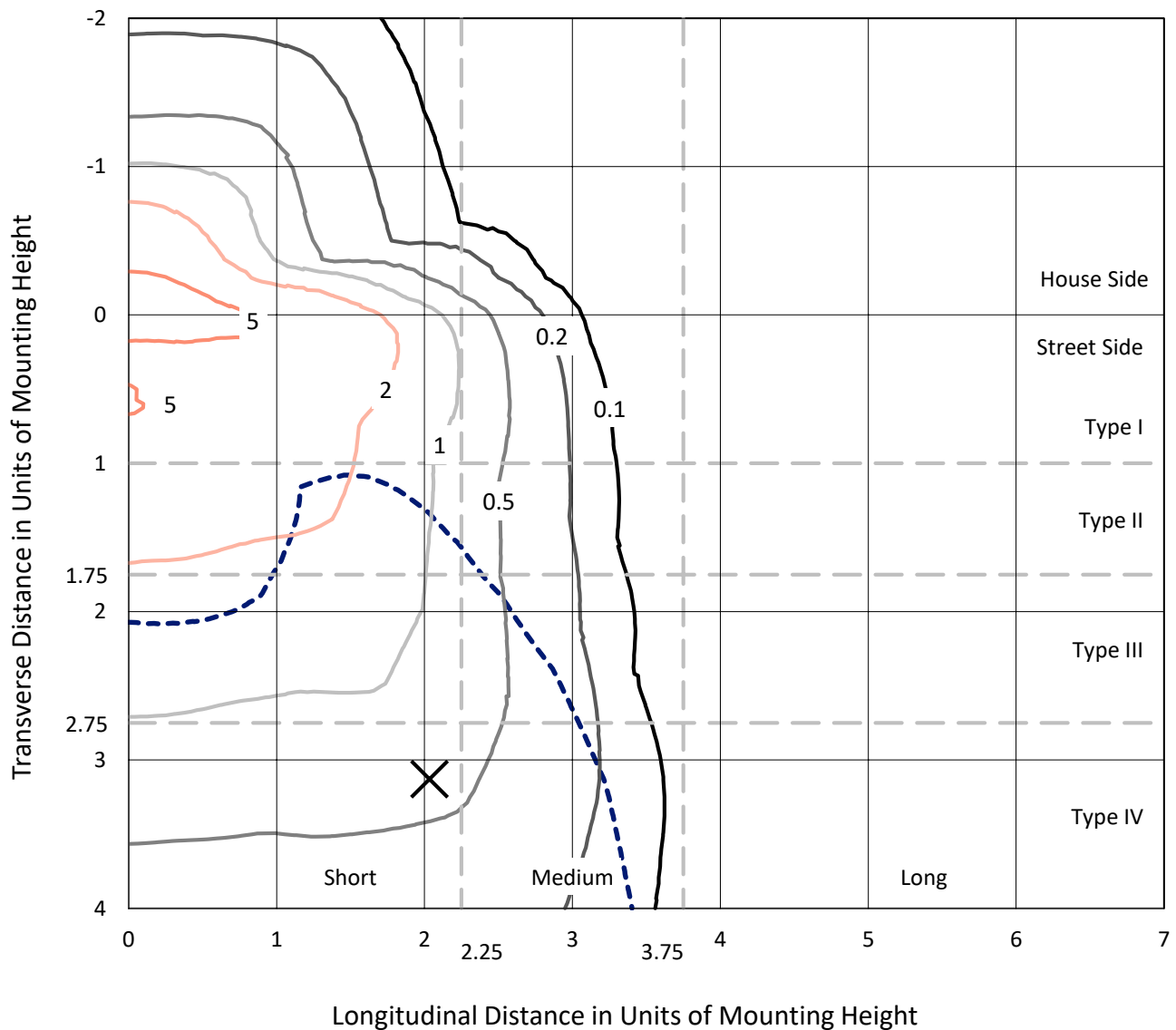
Input Watts (W): 258  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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## Iso-Footcandle Lines of Horizontal Illumination

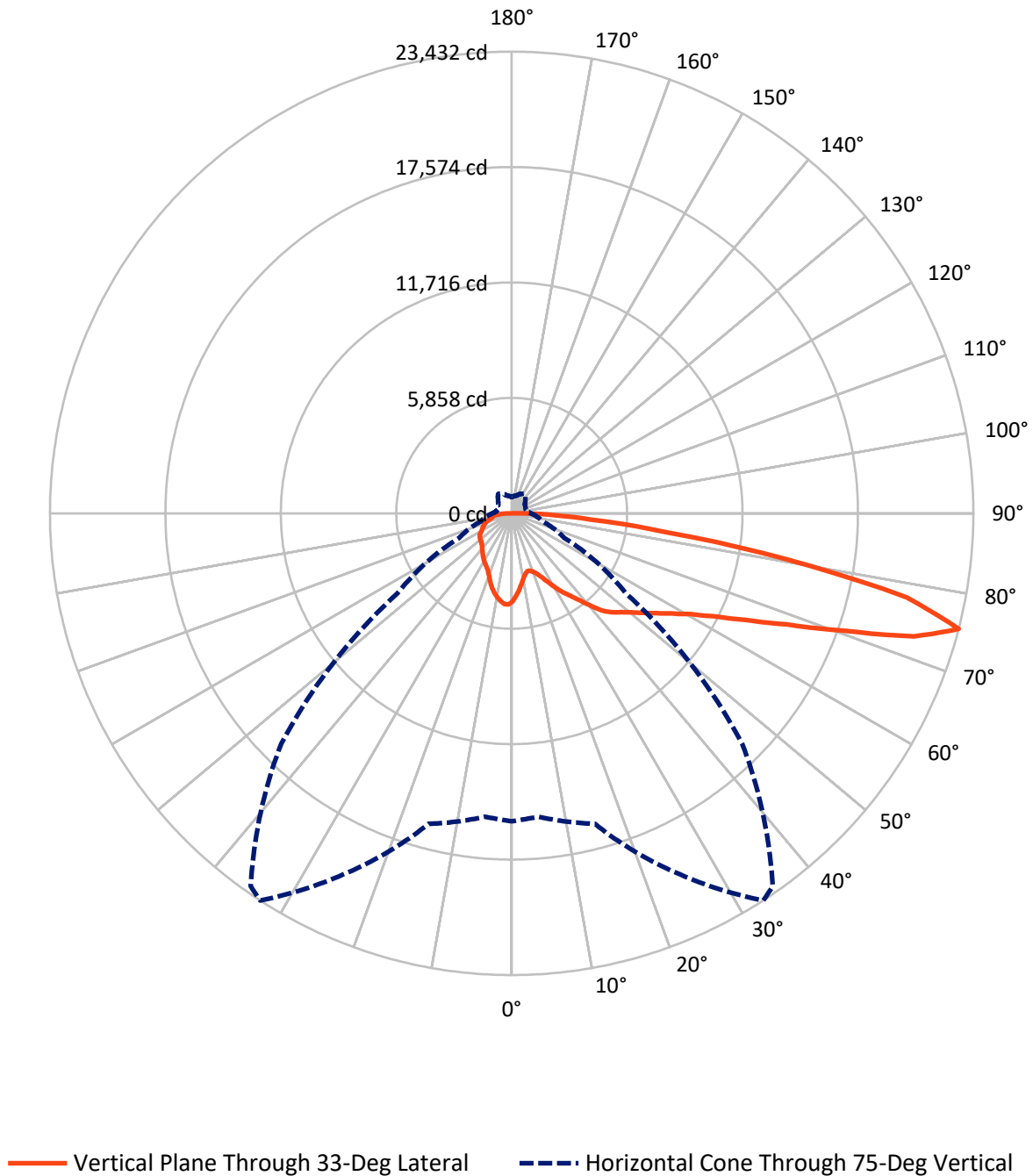
× Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 7.2 fc  
 Type IV - Short - N/A

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## Luminous Intensity Polar Plot



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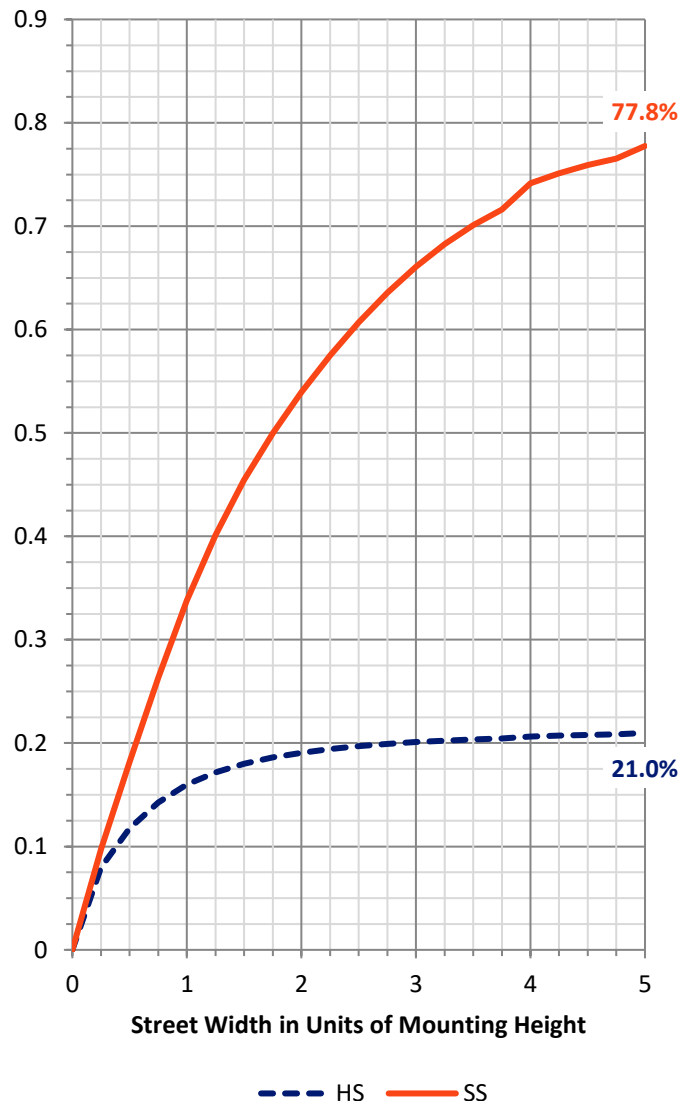
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 6157.5   | 0.0    | 6157.5  |
|                    | % Fixture | 21.5     | 0.0    | 21.5    |
| <b>Street Side</b> | Lumens    | 22518.5  | 0.0    | 22518.5 |
|                    | % Fixture | 78.5     | 0.0    | 78.5    |
| <b>Total</b>       | Lumens    | 28676.0  | 0.0    | 28676.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 405.4   | 1.4       |
| 10°-20°   | 1097.9  | 3.8       |
| 20°-30°   | 1793.0  | 6.3       |
| 30°-40°   | 2670.2  | 9.3       |
| 40°-50°   | 3829.8  | 13.4      |
| 50°-60°   | 5257.7  | 18.3      |
| 60°-70°   | 6582.5  | 23.0      |
| 70°-80°   | 5954.8  | 20.8      |
| 80°-90°   | 1084.7  | 3.8       |
| 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°    | 28676.0 | 100.0     |
| 0°-180°   | 28676.0 | 100.0     |

**Coefficient of Utilization**



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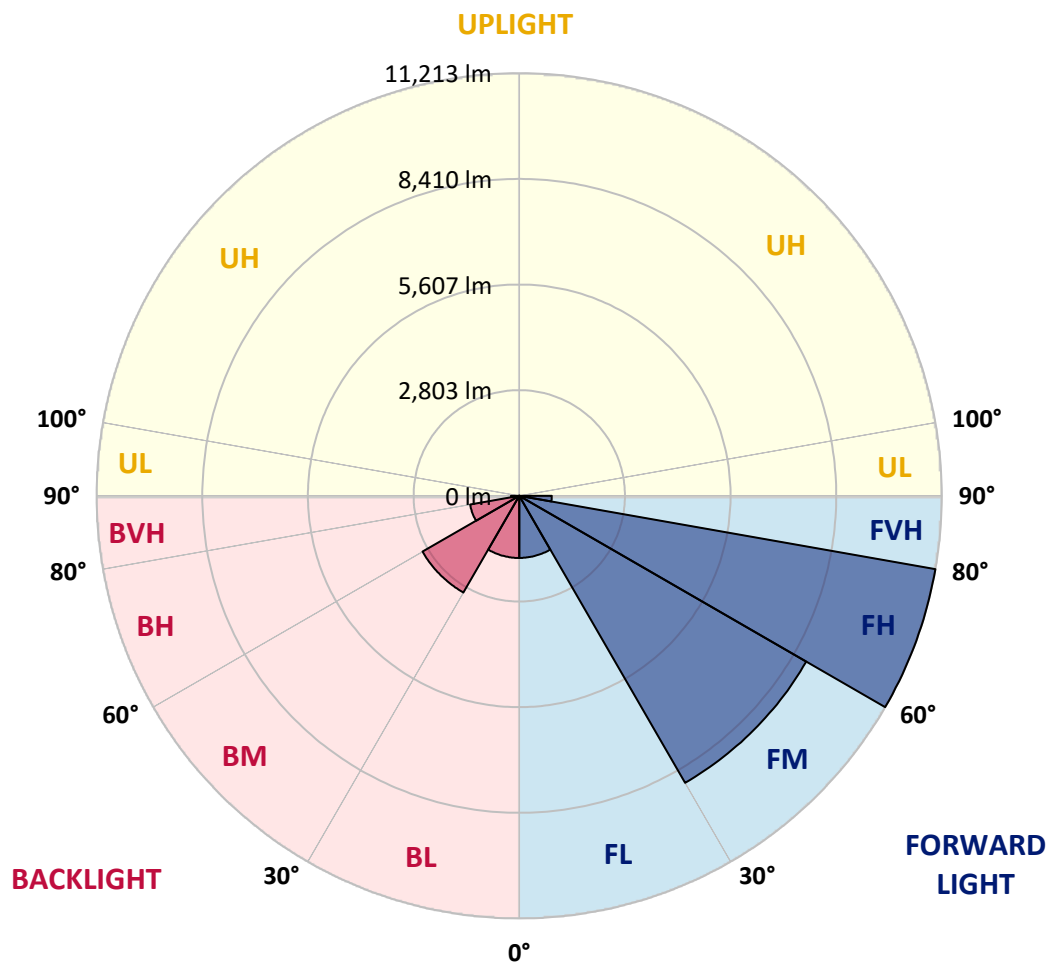
CATALOG NUMBER: GLEON-SA4D-730-U-T4FT

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |          |
|------|-------------|---------|-----------|-------------------------|------|----------|
|      |             |         |           | B                       | U    | G        |
| FL   | (0°-30°)    | 1647.0  | 5.7       |                         |      |          |
| FM   | (30°-60°)   | 8794.3  | 30.7      |                         |      |          |
| FH   | (60°-80°)   | 11213.3 | 39.1      |                         |      | G4/12000 |
| FVH  | (80°-90°)   | 863.9   | 3.0       |                         |      | G5       |
| BL   | (0°-30°)    | 1649.3  | 5.8       | B3/2500                 |      |          |
| BM   | (30°-60°)   | 2963.4  | 10.3      | B3/5000                 |      |          |
| BH   | (60°-80°)   | 1324.0  | 4.6       | B3/2500                 |      | G3/2500  |
| BVH  | (80°-90°)   | 220.8   | 0.8       |                         |      | G2/225   |
| UL   | (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |          |
| UH   | (100°-180°) | 0.0     | 0.0       |                         | U0/0 |          |

**BUG Rating: B3-U0-G5**

Type IV Short



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 33°     | 35°     | 45°     | 55°     | 65°    | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|--------|---------|---------|
| 0°    | 4482.2  | 4482.2  | 4482.2  | 4482.2  | 4482.2  | 4482.2  | 4482.2  | 4482.2  | 4482.2 | 4482.2  | 4482.2  |
| 2.5°  | 4162.3  | 4146.4  | 4176.1  | 4180.1  | 4205.9  | 4215.8  | 4251.4  | 4306.9  | 4352.5 | 4405.0  | 4452.5  |
| 5°    | 3784.9  | 3774.0  | 3815.6  | 3845.3  | 3901.8  | 3925.5  | 4009.7  | 4127.6  | 4232.6 | 4351.5  | 4459.4  |
| 7.5°  | 3426.3  | 3420.4  | 3466.9  | 3534.3  | 3599.6  | 3632.3  | 3777.9  | 3949.3  | 4124.6 | 4316.8  | 4482.2  |
| 10°   | 3124.2  | 3122.2  | 3166.8  | 3233.1  | 3329.2  | 3365.9  | 3554.1  | 3779.9  | 4025.6 | 4290.1  | 4520.9  |
| 12.5° | 2954.8  | 2961.7  | 2982.5  | 3038.0  | 3127.2  | 3163.8  | 3372.8  | 3638.3  | 3942.4 | 4281.1  | 4577.3  |
| 15°   | 2996.4  | 3007.3  | 2971.6  | 2969.7  | 3033.1  | 3061.8  | 3257.9  | 3537.2  | 3882.9 | 4296.0  | 4659.5  |
| 17.5° | 3173.7  | 3175.7  | 3081.6  | 3022.2  | 3060.8  | 3075.6  | 3222.2  | 3479.8  | 3848.3 | 4329.7  | 4762.5  |
| 20°   | 3423.3  | 3418.4  | 3252.0  | 3152.9  | 3173.7  | 3177.7  | 3272.8  | 3480.8  | 3845.3 | 4388.1  | 4896.3  |
| 22.5° | 3754.2  | 3717.5  | 3493.7  | 3358.9  | 3354.0  | 3348.0  | 3402.5  | 3554.1  | 3888.9 | 4483.2  | 5055.7  |
| 25°   | 4186.0  | 4151.4  | 3843.3  | 3659.1  | 3619.5  | 3604.6  | 3612.5  | 3710.6  | 3975.1 | 4585.2  | 5234.0  |
| 27.5° | 4666.5  | 4606.0  | 4308.9  | 4048.4  | 3966.1  | 3945.3  | 3897.8  | 3931.5  | 4069.2 | 4683.3  | 5446.0  |
| 30°   | 5068.6  | 5035.9  | 4776.4  | 4467.4  | 4370.3  | 4340.6  | 4215.8  | 4179.1  | 4204.9 | 4817.0  | 5713.5  |
| 32.5° | 5293.5  | 5271.7  | 5114.2  | 4864.6  | 4774.4  | 4732.8  | 4556.5  | 4483.2  | 4422.8 | 5028.0  | 6076.0  |
| 35°   | 5565.9  | 5552.0  | 5456.9  | 5275.6  | 5141.9  | 5098.3  | 4961.6  | 4885.4  | 4729.9 | 5318.2  | 6544.5  |
| 37.5° | 5912.6  | 5897.7  | 5899.7  | 5753.1  | 5593.6  | 5553.0  | 5462.9  | 5382.6  | 5128.1 | 5699.6  | 7053.7  |
| 40°   | 6304.8  | 6276.1  | 6265.2  | 6258.3  | 6157.2  | 6134.4  | 6086.9  | 5977.9  | 5627.3 | 6155.3  | 7555.9  |
| 42.5° | 6895.2  | 6793.2  | 6575.2  | 6657.5  | 6757.5  | 6745.6  | 6784.2  | 6627.7  | 6182.0 | 6694.1  | 8046.2  |
| 45°   | 7464.8  | 7297.4  | 6920.9  | 6938.8  | 7157.7  | 7224.1  | 7513.3  | 7402.3  | 6783.3 | 7284.5  | 8553.4  |
| 47.5° | 7724.3  | 7597.5  | 7277.5  | 7278.5  | 7495.5  | 7633.1  | 8267.1  | 8187.9  | 7415.2 | 7955.1  | 9172.5  |
| 50°   | 8014.5  | 7887.7  | 7600.5  | 7708.4  | 7897.6  | 8044.2  | 8995.1  | 8954.5  | 8016.5 | 8689.1  | 9914.4  |
| 52.5° | 8331.5  | 8116.5  | 7934.3  | 8127.4  | 8392.9  | 8563.3  | 9724.2  | 9613.2  | 8568.2 | 9428.0  | 10767.2 |
| 55°   | 8335.4  | 8277.0  | 8415.7  | 8557.3  | 8954.5  | 9163.5  | 10487.9 | 10194.7 | 9017.9 | 10154.1 | 11461.6 |
| 57.5° | 8809.9  | 8714.8  | 9009.0  | 9074.4  | 9593.4  | 9829.2  | 11247.6 | 10700.9 | 9475.6 | 10710.8 | 11836.0 |
| 60°   | 9437.9  | 9356.7  | 9597.4  | 9769.8  | 10383.9 | 10698.9 | 12058.9 | 11220.9 | 9835.1 | 11130.8 | 11818.2 |
| 62.5° | 10522.6 | 10430.4 | 10427.5 | 10669.2 | 11496.3 | 11862.8 | 12969.2 | 11731.0 | 9977.8 | 11214.0 | 11314.0 |
| 65°   | 12110.4 | 11963.8 | 11687.4 | 11802.4 | 13032.6 | 13398.1 | 13986.5 | 12100.5 | 9789.6 | 10768.2 | 10015.4 |
| 67.5° | 13655.7 | 13650.7 | 13311.0 | 13546.7 | 15061.2 | 15354.4 | 15145.4 | 12137.2 | 9202.2 | 9216.0  | 7711.4  |
| 70°   | 15196.0 | 15215.8 | 15158.3 | 15978.5 | 17802.1 | 18107.2 | 16379.7 | 11644.9 | 7881.8 | 6655.5  | 4619.9  |
| 72.5° | 16416.3 | 16411.4 | 16700.6 | 18815.4 | 21359.1 | 21290.8 | 17419.7 | 10153.1 | 5659.0 | 3592.7  | 2207.9  |
| 75°   | 15625.9 | 15453.5 | 16315.3 | 20220.0 | 23432.4 | 23098.5 | 16535.2 | 7082.4  | 2937.0 | 1635.4  | 1188.7  |
| 77.5° | 10191.7 | 10355.2 | 11620.1 | 16703.6 | 20496.4 | 20090.2 | 12131.2 | 3304.5  | 1383.8 | 1072.8  | 861.8   |
| 80°   | 3690.8  | 3863.1  | 5441.1  | 9461.7  | 14121.2 | 14054.9 | 5974.0  | 1358.0  | 936.1  | 810.3   | 628.0   |
| 82.5° | 1269.9  | 1333.3  | 2146.5  | 4201.9  | 7972.9  | 8270.1  | 2247.5  | 771.6   | 680.5  | 574.5   | 429.9   |
| 85°   | 498.2   | 570.6   | 981.6   | 2021.7  | 4021.6  | 4051.3  | 910.3   | 461.6   | 473.5  | 376.4   | 235.7   |
| 87.5° | 189.2   | 229.8   | 469.5   | 939.0   | 1836.5  | 1686.9  | 325.9   | 219.9   | 269.4  | 223.9   | 111.9   |
| 90°   | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0    | 0.0     | 0.0     |

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CATALOG NUMBER: GLEON-SA4D-730-U-T4FT

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 4482.2 | 4482.2 | 4482.2 | 4482.2 | 4482.2 | 4482.2 | 4482.2 | 4482.2 | 4482.2 | 4482.2 | 4482.2 |
| 2.5°  | 4489.2 | 4510.0 | 4553.5 | 4583.3 | 4615.0 | 4623.9 | 4627.8 | 4635.8 | 4643.7 | 4640.7 | 4641.7 |
| 5°    | 4516.9 | 4557.5 | 4627.8 | 4657.5 | 4671.4 | 4655.6 | 4624.9 | 4600.1 | 4582.3 | 4572.4 | 4569.4 |
| 7.5°  | 4562.5 | 4619.9 | 4695.2 | 4690.2 | 4658.5 | 4588.2 | 4509.0 | 4449.5 | 4400.0 | 4382.2 | 4372.3 |
| 10°   | 4622.9 | 4690.2 | 4742.7 | 4686.3 | 4594.2 | 4472.3 | 4353.4 | 4261.3 | 4187.0 | 4158.3 | 4153.4 |
| 12.5° | 4700.1 | 4768.5 | 4778.4 | 4658.5 | 4506.0 | 4339.6 | 4178.1 | 4056.3 | 3945.3 | 3909.7 | 3901.8 |
| 15°   | 4800.2 | 4864.6 | 4803.2 | 4610.0 | 4397.0 | 4173.2 | 3964.2 | 3798.7 | 3681.9 | 3638.3 | 3622.4 |
| 17.5° | 4905.2 | 4966.6 | 4808.1 | 4529.8 | 4254.4 | 3976.1 | 3713.6 | 3544.2 | 3410.4 | 3359.9 | 3354.0 |
| 20°   | 5031.0 | 5058.7 | 4787.3 | 4414.9 | 4058.3 | 3720.5 | 3444.1 | 3284.6 | 3213.3 | 3177.7 | 3173.7 |
| 22.5° | 5186.5 | 5156.8 | 4739.8 | 4259.3 | 3809.6 | 3425.3 | 3200.5 | 3126.2 | 3108.3 | 3100.4 | 3103.4 |
| 25°   | 5350.9 | 5259.8 | 4669.4 | 4056.3 | 3495.6 | 3130.1 | 3022.2 | 3043.0 | 3066.7 | 3063.8 | 3063.8 |
| 27.5° | 5532.2 | 5364.8 | 4561.5 | 3786.9 | 3148.0 | 2888.4 | 2901.3 | 2977.6 | 3013.2 | 3012.2 | 3011.3 |
| 30°   | 5765.0 | 5483.7 | 4423.8 | 3462.9 | 2823.1 | 2718.1 | 2796.3 | 2889.4 | 2938.0 | 2936.0 | 2937.0 |
| 32.5° | 6051.2 | 5614.4 | 4236.6 | 3101.4 | 2588.3 | 2592.3 | 2682.4 | 2774.5 | 2831.0 | 2826.0 | 2827.0 |
| 35°   | 6386.0 | 5761.0 | 3983.0 | 2744.8 | 2432.8 | 2492.2 | 2563.5 | 2627.9 | 2681.4 | 2674.5 | 2667.5 |
| 37.5° | 6750.6 | 5904.6 | 3646.2 | 2425.8 | 2306.0 | 2399.1 | 2458.5 | 2469.4 | 2494.2 | 2476.4 | 2463.5 |
| 40°   | 7097.3 | 6014.6 | 3212.3 | 2164.3 | 2178.2 | 2319.9 | 2358.5 | 2314.9 | 2270.3 | 2264.4 | 2246.6 |
| 42.5° | 7399.4 | 6051.2 | 2773.5 | 1955.3 | 2043.5 | 2236.7 | 2260.4 | 2169.3 | 2089.1 | 2051.4 | 2035.6 |
| 45°   | 7718.3 | 6064.1 | 2364.4 | 1780.0 | 1913.7 | 2162.4 | 2188.1 | 2066.3 | 1953.4 | 1872.1 | 1845.4 |
| 47.5° | 8135.4 | 6157.2 | 2046.5 | 1650.2 | 1814.7 | 2112.8 | 2149.5 | 1984.1 | 1837.5 | 1721.6 | 1696.8 |
| 50°   | 8681.1 | 6341.5 | 1787.9 | 1551.2 | 1750.3 | 2080.1 | 2121.7 | 1903.8 | 1742.4 | 1602.7 | 1577.9 |
| 52.5° | 9287.4 | 6510.9 | 1578.9 | 1471.0 | 1687.9 | 2022.7 | 2086.1 | 1846.4 | 1653.2 | 1492.8 | 1466.0 |
| 55°   | 9711.3 | 6381.1 | 1410.5 | 1387.8 | 1606.7 | 1940.5 | 2036.6 | 1797.8 | 1525.4 | 1385.8 | 1362.0 |
| 57.5° | 9792.5 | 5937.3 | 1282.8 | 1301.6 | 1508.6 | 1837.5 | 1960.3 | 1689.9 | 1456.1 | 1339.2 | 1314.5 |
| 60°   | 9570.7 | 5319.2 | 1187.7 | 1222.3 | 1403.6 | 1707.7 | 1817.7 | 1613.6 | 1389.7 | 1289.7 | 1268.9 |
| 62.5° | 9013.0 | 4686.3 | 1117.3 | 1151.0 | 1305.5 | 1576.0 | 1728.5 | 1533.4 | 1322.4 | 1233.2 | 1212.4 |
| 65°   | 7886.7 | 3934.4 | 1050.0 | 1087.6 | 1214.4 | 1462.0 | 1648.3 | 1459.1 | 1256.0 | 1187.7 | 1167.9 |
| 67.5° | 5953.2 | 2946.9 | 986.6  | 1020.3 | 1133.2 | 1363.0 | 1561.1 | 1385.8 | 1191.6 | 1148.0 | 1124.3 |
| 70°   | 3505.5 | 1845.4 | 914.3  | 949.9  | 1048.0 | 1260.0 | 1468.0 | 1305.5 | 1111.4 | 1091.6 | 1060.9 |
| 72.5° | 1631.4 | 1110.4 | 832.1  | 866.7  | 941.0  | 1122.3 | 1348.1 | 1200.5 | 1016.3 | 972.7  | 931.1  |
| 75°   | 973.7  | 812.2  | 735.0  | 765.7  | 818.2  | 975.7  | 1197.6 | 1093.6 | 926.2  | 868.7  | 825.1  |
| 77.5° | 728.1  | 621.1  | 628.0  | 660.7  | 703.3  | 853.9  | 1060.9 | 1009.4 | 856.8  | 812.2  | 782.5  |
| 80°   | 524.0  | 471.5  | 512.1  | 547.8  | 592.3  | 776.6  | 1016.3 | 933.1  | 774.6  | 715.2  | 687.4  |
| 82.5° | 349.7  | 338.8  | 385.3  | 422.0  | 465.6  | 679.5  | 954.9  | 817.2  | 661.7  | 586.4  | 525.0  |
| 85°   | 193.2  | 204.1  | 259.5  | 275.4  | 313.0  | 478.4  | 782.5  | 656.7  | 498.2  | 401.2  | 383.3  |
| 87.5° | 80.2   | 94.1   | 139.7  | 134.7  | 166.4  | 285.3  | 515.1  | 396.2  | 317.0  | 236.7  | 184.2  |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

LM-79-2008: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

McGRAW-EDISON

Report Number: SP1-1908-441-2-R4

Test Date: 10/03/2019

Luminaire Tested: SA1C-730-U-5WQ

Data in this report applies to families of products SA1C-730-U-5WQ .

### Test Information

Test Method: LM-79-2008  
 Report Number: SP1-1908-441-2-R4  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 10/28/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: MCGRAW-EDISON  
 Catalog Number: **SA1C-730-U-5WQ**  
 Description: MCGRAW EDISON ROADWAY AND AREA LUMINAIRE

\*\*\*THIS IS A REVISION OF SP1-1908-441-2-R3. TO UPDATE THE CATALOG INFORMATION.\*\*\*TESTED IN SITU. (1) 70 CRI, 3000K, 1050MA LIGHTSQUARE WITH 16 LEDS AND TYPE V WIDE OPTICS.

### Spectral Parameters

|                           |        |           |      |      |       |
|---------------------------|--------|-----------|------|------|-------|
| CCT (K):                  | 2993   | CRI (Ra): | 71.8 |      |       |
| CIE u':                   | 0.2508 | R1:       | 67.5 | R9:  | -38.3 |
| CIE v':                   | 0.5215 | R2:       | 82.9 | R10: | 62.5  |
| Duv:                      | 0.0000 | R3:       | 94.7 | R11: | 63.7  |
| CIE x:                    | 0.4374 | R4:       | 67.7 | R12: | 57.8  |
| CIE y:                    | 0.4043 | R5:       | 67.9 | R13: | 70.4  |
| CIE z:                    | 0.1583 | R6:       | 77.6 | R14: | 97.3  |
| Peak Wavelength (nm):     | 593    | R7:       | 76.0 |      |       |
| Dominant Wavelength (nm): | 582    | R8:       | 40.5 |      |       |
| Purity:                   | 53     |           |      |      |       |
| Rf:                       | 75.7   |           |      |      |       |
| Rg:                       | 93.9   |           |      |      |       |



### Test Conditions

Stabilization Time: 53M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.0./44%  
 Sphere Temperature (°C): 25.7

REPORT NUMBER: SP1-1908-441-2-R4

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 6/28/2019        | 12/28/2019           |
| Power Meter                    | IN0071                | 12/5/2018        | 12/5/2019            |
| AC Power Source                | IN0063                | 12/5/2018        | 12/5/2019            |
| DC Power Source                | IN0208                | 12/5/2018        | 12/5/2019            |
| Sphere Thermometer             | IN0085                | 12/5/2018        | 12/5/2019            |
| Room Thermometer               | IN0046                | 12/5/2018        | 12/5/2019            |

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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 3000K 4-step quadrangle

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**Photopic Flux vs. Wavelength**



#####

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2397             | NR               | 490       | 24908            | NR               | 620       | 118784           | NR               | 750       | 5037             | NR               | 880       | 2677             | NR               |
| 365       | 2084             | NR               | 495       | 30998            | NR               | 625       | 108951           | NR               | 755       | 4413             | NR               | 885       | 2940             | NR               |
| 370       | 2143             | NR               | 500       | 37103            | NR               | 630       | 99573            | NR               | 760       | 4189             | NR               | 890       | 3116             | NR               |
| 375       | 2413             | NR               | 505       | 42987            | NR               | 635       | 90444            | NR               | 765       | 3677             | NR               | 895       | 3345             | NR               |
| 380       | 2172             | NR               | 510       | 48702            | NR               | 640       | 80749            | NR               | 770       | 3366             | NR               | 900       | 2312             | NR               |
| 385       | 1997             | NR               | 515       | 53741            | NR               | 645       | 71664            | NR               | 775       | 3211             | NR               | 905       | 2829             | NR               |
| 390       | 1830             | NR               | 520       | 57283            | NR               | 650       | 63936            | NR               | 780       | 2682             | NR               | 910       | 2783             | NR               |
| 395       | 1861             | NR               | 525       | 61876            | NR               | 655       | 56611            | NR               | 785       | 2804             | NR               | 915       | 2662             | NR               |
| 400       | 1717             | NR               | 530       | 65398            | NR               | 660       | 49763            | NR               | 790       | 2581             | NR               | 920       | 3047             | NR               |
| 405       | 1761             | NR               | 535       | 69597            | NR               | 665       | 42891            | NR               | 795       | 2711             | NR               | 925       | 2256             | NR               |
| 410       | 2680             | NR               | 540       | 74214            | NR               | 670       | 36939            | NR               | 800       | 2609             | NR               | 930       | 2976             | NR               |
| 415       | 4374             | NR               | 545       | 79911            | NR               | 675       | 31946            | NR               | 805       | 2581             | NR               | 935       | 3503             | NR               |
| 420       | 8071             | NR               | 550       | 86153            | NR               | 680       | 27385            | NR               | 810       | 2404             | NR               | 940       | 4226             | NR               |
| 425       | 15169            | NR               | 555       | 93952            | NR               | 685       | 23504            | NR               | 815       | 2556             | NR               | 945       | 2930             | NR               |
| 430       | 26038            | NR               | 560       | 102904           | NR               | 690       | 20210            | NR               | 820       | 2742             | NR               | 950       | 2115             | NR               |
| 435       | 41316            | NR               | 565       | 112009           | NR               | 695       | 17459            | NR               | 825       | 2014             | NR               | 955       | 2634             | NR               |
| 440       | 59674            | NR               | 570       | 121662           | NR               | 700       | 15207            | NR               | 830       | 2488             | NR               | 960       | 4200             | NR               |
| 445       | 72751            | NR               | 575       | 130476           | NR               | 705       | 13322            | NR               | 835       | 2625             | NR               | 965       | 1982             | NR               |
| 450       | 65091            | NR               | 580       | 137926           | NR               | 710       | 11676            | NR               | 840       | 2754             | NR               | 970       | 3613             | NR               |
| 455       | 44894            | NR               | 585       | 143406           | NR               | 715       | 10626            | NR               | 845       | 2708             | NR               | 975       | 4034             | NR               |
| 460       | 32712            | NR               | 590       | 147039           | NR               | 720       | 9416             | NR               | 850       | 2608             | NR               | 980       | 3922             | NR               |
| 465       | 25296            | NR               | 595       | 147365           | NR               | 725       | 8333             | NR               | 855       | 2605             | NR               | 985       | 1909             | NR               |
| 470       | 19318            | NR               | 600       | 145800           | NR               | 730       | 7134             | NR               | 860       | 1765             | NR               | 990       | 3617             | NR               |
| 475       | 17265            | NR               | 605       | 141363           | NR               | 735       | 6437             | NR               | 865       | 2581             | NR               | 995       | 4767             | NR               |
| 480       | 18260            | NR               | 610       | 134199           | NR               | 740       | 5834             | NR               | 870       | 3016             | NR               | 1000      | 2528             | NR               |
| 485       | 20845            | NR               | 615       | 127683           | NR               | 745       | 5500             | NR               | 875       | 3952             | NR               |           |                  |                  |

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Scotopic Flux vs. Wavelength



Scotopic Lumens: 8494.8

S/P: 1.23

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2397             | NR               | 490       | 24908            | NR               | 620       | 118784           | NR               | 750       | 5037             | NR               | 880       | 2677             | NR               |
| 365       | 2084             | NR               | 495       | 30998            | NR               | 625       | 108951           | NR               | 755       | 4413             | NR               | 885       | 2940             | NR               |
| 370       | 2143             | NR               | 500       | 37103            | NR               | 630       | 99573            | NR               | 760       | 4189             | NR               | 890       | 3116             | NR               |
| 375       | 2413             | NR               | 505       | 42987            | NR               | 635       | 90444            | NR               | 765       | 3677             | NR               | 895       | 3345             | NR               |
| 380       | 2172             | NR               | 510       | 48702            | NR               | 640       | 80749            | NR               | 770       | 3366             | NR               | 900       | 2312             | NR               |
| 385       | 1997             | NR               | 515       | 53741            | NR               | 645       | 71664            | NR               | 775       | 3211             | NR               | 905       | 2829             | NR               |
| 390       | 1830             | NR               | 520       | 57283            | NR               | 650       | 63936            | NR               | 780       | 2682             | NR               | 910       | 2783             | NR               |
| 395       | 1861             | NR               | 525       | 61876            | NR               | 655       | 56611            | NR               | 785       | 2804             | NR               | 915       | 2662             | NR               |
| 400       | 1717             | NR               | 530       | 65398            | NR               | 660       | 49763            | NR               | 790       | 2581             | NR               | 920       | 3047             | NR               |
| 405       | 1761             | NR               | 535       | 69597            | NR               | 665       | 42891            | NR               | 795       | 2711             | NR               | 925       | 2256             | NR               |
| 410       | 2680             | NR               | 540       | 74214            | NR               | 670       | 36939            | NR               | 800       | 2609             | NR               | 930       | 2976             | NR               |
| 415       | 4374             | NR               | 545       | 79911            | NR               | 675       | 31946            | NR               | 805       | 2581             | NR               | 935       | 3503             | NR               |
| 420       | 8071             | NR               | 550       | 86153            | NR               | 680       | 27385            | NR               | 810       | 2404             | NR               | 940       | 4226             | NR               |
| 425       | 15169            | NR               | 555       | 93952            | NR               | 685       | 23504            | NR               | 815       | 2556             | NR               | 945       | 2930             | NR               |
| 430       | 26038            | NR               | 560       | 102904           | NR               | 690       | 20210            | NR               | 820       | 2742             | NR               | 950       | 2115             | NR               |
| 435       | 41316            | NR               | 565       | 112009           | NR               | 695       | 17459            | NR               | 825       | 2014             | NR               | 955       | 2634             | NR               |
| 440       | 59674            | NR               | 570       | 121662           | NR               | 700       | 15207            | NR               | 830       | 2488             | NR               | 960       | 4200             | NR               |
| 445       | 72751            | NR               | 575       | 130476           | NR               | 705       | 13322            | NR               | 835       | 2625             | NR               | 965       | 1982             | NR               |
| 450       | 65091            | NR               | 580       | 137926           | NR               | 710       | 11676            | NR               | 840       | 2754             | NR               | 970       | 3613             | NR               |
| 455       | 44894            | NR               | 585       | 143406           | NR               | 715       | 10626            | NR               | 845       | 2708             | NR               | 975       | 4034             | NR               |
| 460       | 32712            | NR               | 590       | 147039           | NR               | 720       | 9416             | NR               | 850       | 2608             | NR               | 980       | 3922             | NR               |
| 465       | 25296            | NR               | 595       | 147365           | NR               | 725       | 8333             | NR               | 855       | 2605             | NR               | 985       | 1909             | NR               |
| 470       | 19318            | NR               | 600       | 145800           | NR               | 730       | 7134             | NR               | 860       | 1765             | NR               | 990       | 3617             | NR               |
| 475       | 17265            | NR               | 605       | 141363           | NR               | 735       | 6437             | NR               | 865       | 2581             | NR               | 995       | 4767             | NR               |
| 480       | 18260            | NR               | 610       | 134199           | NR               | 740       | 5834             | NR               | 870       | 3016             | NR               | 1000      | 2528             | NR               |
| 485       | 20845            | NR               | 615       | 127683           | NR               | 745       | 5500             | NR               | 875       | 3952             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 3101.5 M/P: 0.45**

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2397             | NR               | 490       | 24908            | NR               | 620       | 118784           | NR               | 750       | 5037             | NR               | 880       | 2677             | NR               |
| 365       | 2084             | NR               | 495       | 30998            | NR               | 625       | 108951           | NR               | 755       | 4413             | NR               | 885       | 2940             | NR               |
| 370       | 2143             | NR               | 500       | 37103            | NR               | 630       | 99573            | NR               | 760       | 4189             | NR               | 890       | 3116             | NR               |
| 375       | 2413             | NR               | 505       | 42987            | NR               | 635       | 90444            | NR               | 765       | 3677             | NR               | 895       | 3345             | NR               |
| 380       | 2172             | NR               | 510       | 48702            | NR               | 640       | 80749            | NR               | 770       | 3366             | NR               | 900       | 2312             | NR               |
| 385       | 1997             | NR               | 515       | 53741            | NR               | 645       | 71664            | NR               | 775       | 3211             | NR               | 905       | 2829             | NR               |
| 390       | 1830             | NR               | 520       | 57283            | NR               | 650       | 63936            | NR               | 780       | 2682             | NR               | 910       | 2783             | NR               |
| 395       | 1861             | NR               | 525       | 61876            | NR               | 655       | 56611            | NR               | 785       | 2804             | NR               | 915       | 2662             | NR               |
| 400       | 1717             | NR               | 530       | 65398            | NR               | 660       | 49763            | NR               | 790       | 2581             | NR               | 920       | 3047             | NR               |
| 405       | 1761             | NR               | 535       | 69597            | NR               | 665       | 42891            | NR               | 795       | 2711             | NR               | 925       | 2256             | NR               |
| 410       | 2680             | NR               | 540       | 74214            | NR               | 670       | 36939            | NR               | 800       | 2609             | NR               | 930       | 2976             | NR               |
| 415       | 4374             | NR               | 545       | 79911            | NR               | 675       | 31946            | NR               | 805       | 2581             | NR               | 935       | 3503             | NR               |
| 420       | 8071             | NR               | 550       | 86153            | NR               | 680       | 27385            | NR               | 810       | 2404             | NR               | 940       | 4226             | NR               |
| 425       | 15169            | NR               | 555       | 93952            | NR               | 685       | 23504            | NR               | 815       | 2556             | NR               | 945       | 2930             | NR               |
| 430       | 26038            | NR               | 560       | 102904           | NR               | 690       | 20210            | NR               | 820       | 2742             | NR               | 950       | 2115             | NR               |
| 435       | 41316            | NR               | 565       | 112009           | NR               | 695       | 17459            | NR               | 825       | 2014             | NR               | 955       | 2634             | NR               |
| 440       | 59674            | NR               | 570       | 121662           | NR               | 700       | 15207            | NR               | 830       | 2488             | NR               | 960       | 4200             | NR               |
| 445       | 72751            | NR               | 575       | 130476           | NR               | 705       | 13322            | NR               | 835       | 2625             | NR               | 965       | 1982             | NR               |
| 450       | 65091            | NR               | 580       | 137926           | NR               | 710       | 11676            | NR               | 840       | 2754             | NR               | 970       | 3613             | NR               |
| 455       | 44894            | NR               | 585       | 143406           | NR               | 715       | 10626            | NR               | 845       | 2708             | NR               | 975       | 4034             | NR               |
| 460       | 32712            | NR               | 590       | 147039           | NR               | 720       | 9416             | NR               | 850       | 2608             | NR               | 980       | 3922             | NR               |
| 465       | 25296            | NR               | 595       | 147365           | NR               | 725       | 8333             | NR               | 855       | 2605             | NR               | 985       | 1909             | NR               |
| 470       | 19318            | NR               | 600       | 145800           | NR               | 730       | 7134             | NR               | 860       | 1765             | NR               | 990       | 3617             | NR               |
| 475       | 17265            | NR               | 605       | 141363           | NR               | 735       | 6437             | NR               | 865       | 2581             | NR               | 995       | 4767             | NR               |
| 480       | 18260            | NR               | 610       | 134199           | NR               | 740       | 5834             | NR               | 870       | 3016             | NR               | 1000      | 2528             | NR               |
| 485       | 20845            | NR               | 615       | 127683           | NR               | 745       | 5500             | NR               | 875       | 3952             | NR               |           |                  |                  |

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**Summary**

$R_f = 75.7$   
 $R_g = 93.9$   
 CIE  $R_a = 71.8$   
 $R_g = -38.3$



**Color Vector Graphics**



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 67 | CES51 = 87 | CES76 = 63 |
| CES02 = 63 | CES27 = 88 | CES52 = 86 | CES77 = 80 |
| CES03 = 31 | CES28 = 87 | CES53 = 78 | CES78 = 67 |
| CES04 = 71 | CES29 = 66 | CES54 = 84 | CES79 = 87 |
| CES05 = 49 | CES30 = 73 | CES55 = 84 | CES80 = 86 |
| CES06 = 51 | CES31 = 70 | CES56 = 75 | CES81 = 71 |
| CES07 = 41 | CES32 = 65 | CES57 = 74 | CES82 = 94 |
| CES08 = 40 | CES33 = 73 | CES58 = 76 | CES83 = 90 |
| CES09 = 29 | CES34 = 79 | CES59 = 85 | CES84 = 89 |
| CES10 = 76 | CES35 = 89 | CES60 = 93 | CES85 = 77 |
| CES11 = 59 | CES36 = 97 | CES61 = 84 | CES86 = 61 |
| CES12 = 65 | CES37 = 87 | CES62 = 91 | CES87 = 78 |
| CES13 = 43 | CES38 = 81 | CES63 = 77 | CES88 = 77 |
| CES14 = 74 | CES39 = 95 | CES64 = 72 | CES89 = 67 |
| CES15 = 71 | CES40 = 92 | CES65 = 68 | CES90 = 76 |
| CES16 = 47 | CES41 = 88 | CES66 = 69 | CES91 = 89 |
| CES17 = 50 | CES42 = 89 | CES67 = 67 | CES92 = 58 |
| CES18 = 56 | CES43 = 79 | CES68 = 72 | CES93 = 74 |
| CES19 = 73 | CES44 = 99 | CES69 = 81 | CES94 = 49 |
| CES20 = 66 | CES45 = 85 | CES70 = 66 | CES95 = 68 |
| CES21 = 87 | CES46 = 80 | CES71 = 67 | CES96 = 76 |
| CES22 = 79 | CES47 = 82 | CES72 = 88 | CES97 = 82 |
| CES23 = 92 | CES48 = 69 | CES73 = 59 | CES98 = 75 |
| CES24 = 91 | CES49 = 80 | CES74 = 95 | CES99 = 62 |
| CES25 = 73 | CES50 = 87 | CES75 = 69 |            |



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**Color Rendition by Hue-Angle Bin**



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**Measure Comparisons**



(END OF REPORT)