

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: P318831

Luminaire Tested: **GLEON-SA7A-827-U-T4FT**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P318831  
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-SA7A-827-U-T4FT  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(7) 80 CRI, 2700K, 615mA 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: 24377 lumens  
Efficiency: N/A  
Efficacy: 107.9 lumens/watt  
Luminous Opening: Rectangular (W 2' x L: 1' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B3 - U0 - G4

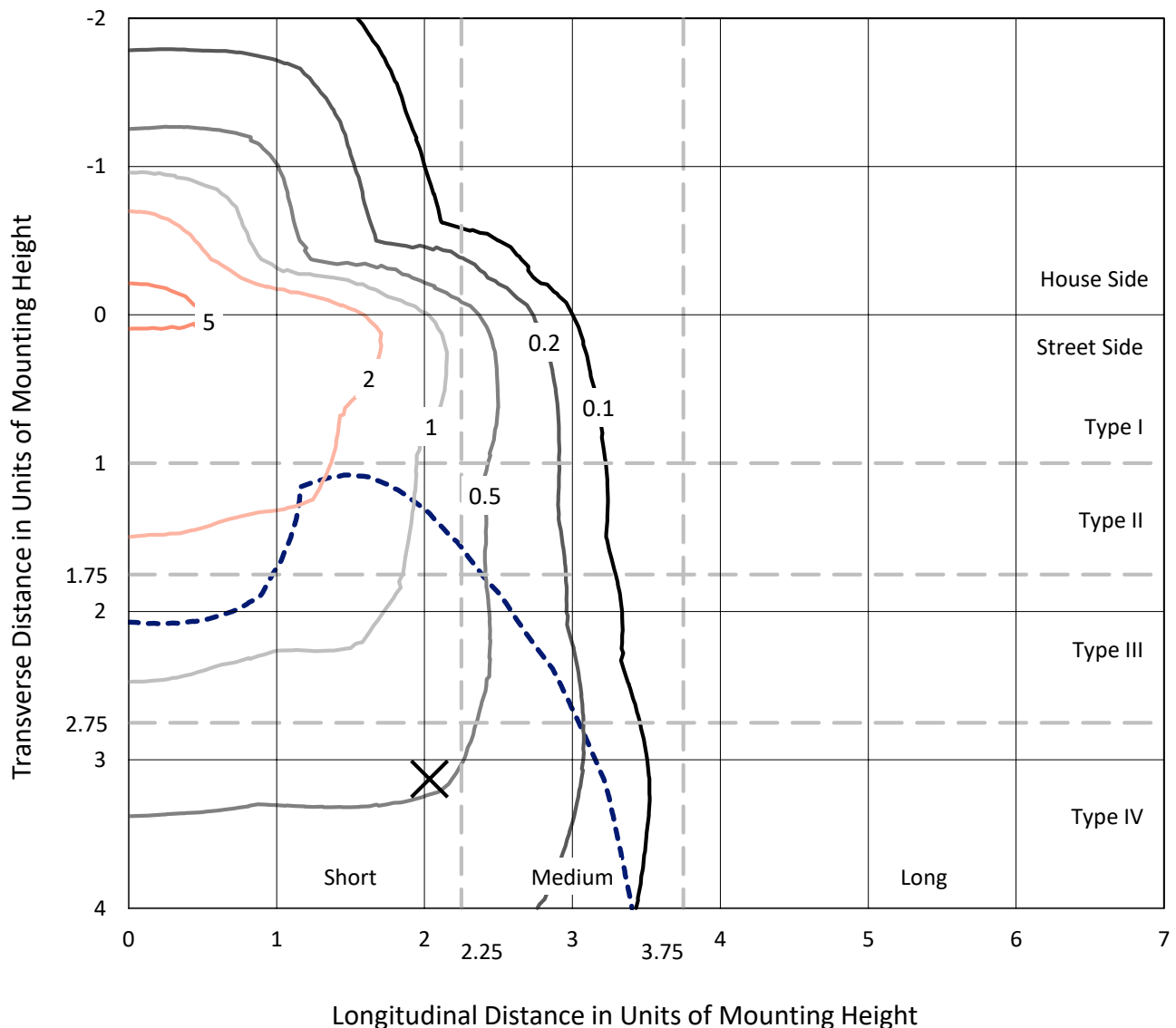
Input Watts (W): 226  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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## Iso-Footcandle Lines of Horizontal Illumination

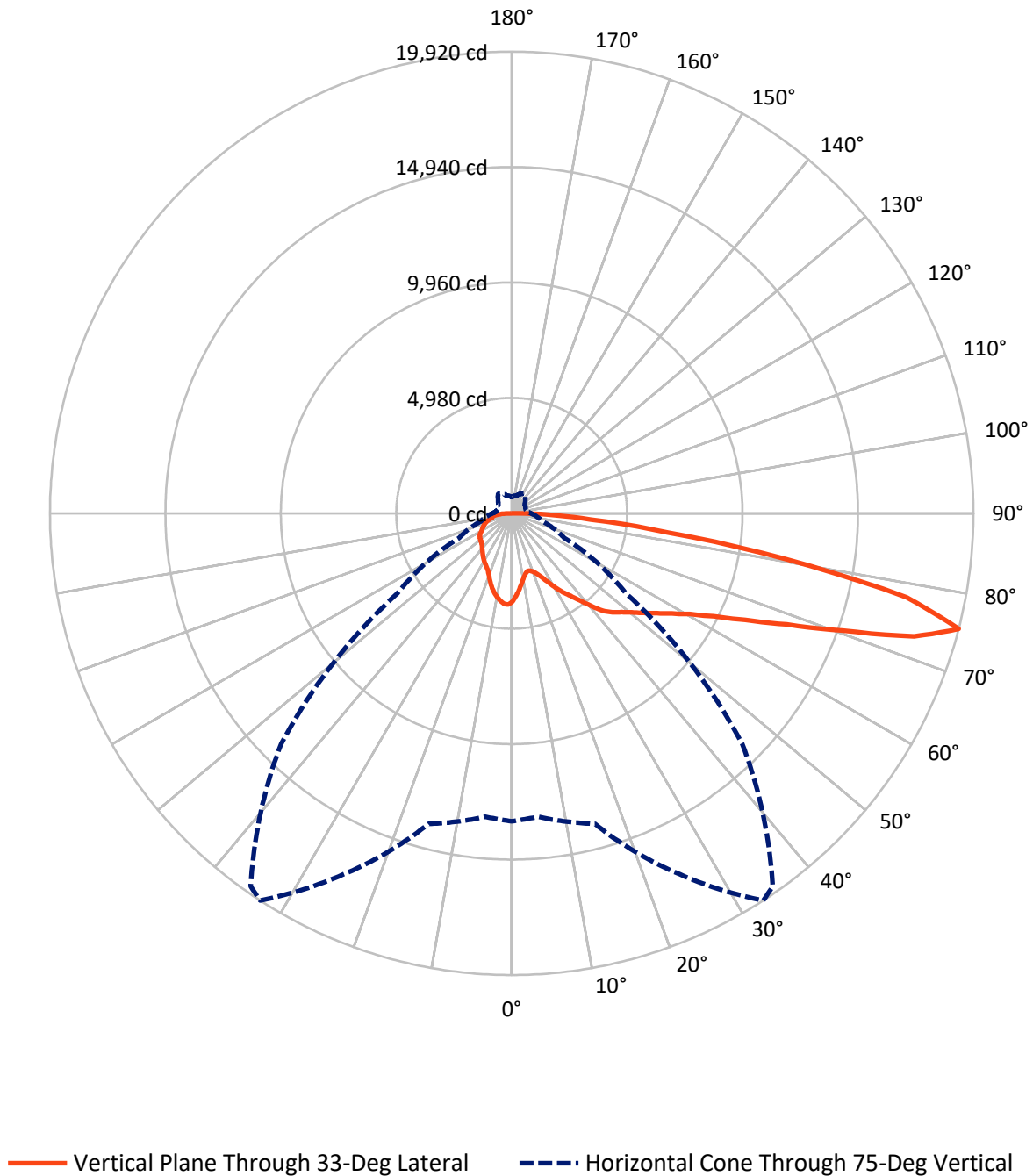
× Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 6.1 fc  
 Type IV - Short - N/A

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## Luminous Intensity Polar Plot



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CATALOG NUMBER: GLEON-SA7A-827-U-T4FT

**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 5234.4   | 0.0    | 5234.4  |
|                    | % Fixture | 21.5     | 0.0    | 21.5    |
| <b>Street Side</b> | Lumens    | 19142.6  | 0.0    | 19142.6 |
|                    | % Fixture | 78.5     | 0.0    | 78.5    |
| <b>Total</b>       | Lumens    | 24377.0  | 0.0    | 24377.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 344.6   | 1.4       |
| 10°-20°   | 933.3   | 3.8       |
| 20°-30°   | 1524.2  | 6.3       |
| 30°-40°   | 2269.9  | 9.3       |
| 40°-50°   | 3255.7  | 13.4      |
| 50°-60°   | 4469.5  | 18.3      |
| 60°-70°   | 5595.6  | 23.0      |
| 70°-80°   | 5062.1  | 20.8      |
| 80°-90°   | 922.1   | 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°    | 24377.0 | 100.0     |
| 0°-180°   | 24377.0 | 100.0     |

**Coefficient of Utilization**



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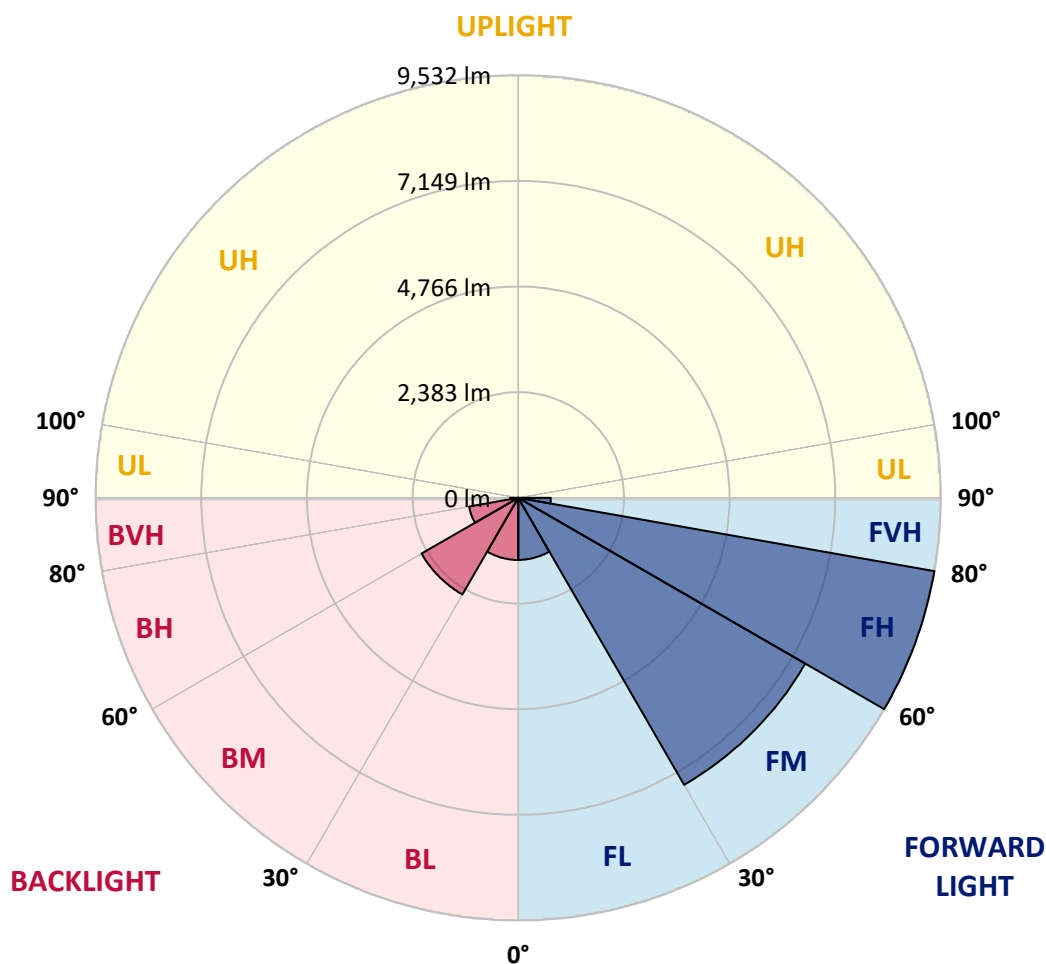
CATALOG NUMBER: GLEON-SA7A-827-U-T4FT

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |          |
|------|-------------|--------|-----------|-------------------------|------|----------|
|      |             |        |           | B                       | U    | G        |
| FL   | (0°-30°)    | 1400.1 | 5.7       |                         |      |          |
| FM   | (30°-60°)   | 7475.9 | 30.7      |                         |      |          |
| FH   | (60°-80°)   | 9532.3 | 39.1      |                         |      | G4/12000 |
| FVH  | (80°-90°)   | 734.4  | 3.0       |                         |      | G4/750   |
| BL   | (0°-30°)    | 1402.0 | 5.8       | B3/2500                 |      |          |
| BM   | (30°-60°)   | 2519.2 | 10.3      | B3/5000                 |      |          |
| BH   | (60°-80°)   | 1125.5 | 4.6       | B3/2500                 |      | G3/2500  |
| BVH  | (80°-90°)   | 187.7  | 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-G4**

Type IV Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 33°     | 35°     | 45°     | 55°     | 65°    | 75°    | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|--------|--------|---------|
| 0°    | 3810.3  | 3810.3  | 3810.3  | 3810.3  | 3810.3  | 3810.3  | 3810.3  | 3810.3  | 3810.3 | 3810.3 | 3810.3  |
| 2.5°  | 3538.3  | 3524.8  | 3550.1  | 3553.4  | 3575.3  | 3583.8  | 3614.1  | 3661.2  | 3700.0 | 3744.6 | 3785.0  |
| 5°    | 3217.5  | 3208.2  | 3243.6  | 3268.8  | 3316.8  | 3337.0  | 3408.6  | 3508.8  | 3598.1 | 3699.1 | 3790.9  |
| 7.5°  | 2912.6  | 2907.6  | 2947.2  | 3004.4  | 3060.0  | 3087.8  | 3211.6  | 3357.2  | 3506.3 | 3669.6 | 3810.3  |
| 10°   | 2655.8  | 2654.1  | 2692.0  | 2748.4  | 2830.1  | 2861.3  | 3021.3  | 3213.3  | 3422.1 | 3646.9 | 3843.1  |
| 12.5° | 2511.8  | 2517.7  | 2535.4  | 2582.6  | 2658.3  | 2689.5  | 2867.2  | 3092.8  | 3351.3 | 3639.3 | 3891.1  |
| 15°   | 2547.2  | 2556.5  | 2526.1  | 2524.5  | 2578.3  | 2602.8  | 2769.5  | 3006.9  | 3300.8 | 3652.0 | 3961.0  |
| 17.5° | 2697.9  | 2699.6  | 2619.6  | 2569.1  | 2601.9  | 2614.6  | 2739.2  | 2958.1  | 3271.4 | 3680.6 | 4048.6  |
| 20°   | 2910.1  | 2905.9  | 2764.4  | 2680.2  | 2697.9  | 2701.3  | 2782.1  | 2959.0  | 3268.8 | 3730.3 | 4162.2  |
| 22.5° | 3191.4  | 3160.2  | 2969.9  | 2855.4  | 2851.2  | 2846.1  | 2892.4  | 3021.3  | 3305.9 | 3811.1 | 4297.8  |
| 25°   | 3558.5  | 3529.0  | 3267.1  | 3110.5  | 3076.8  | 3064.2  | 3070.9  | 3154.3  | 3379.1 | 3897.8 | 4449.4  |
| 27.5° | 3966.9  | 3915.5  | 3662.9  | 3441.4  | 3371.6  | 3353.9  | 3313.5  | 3342.1  | 3459.1 | 3981.2 | 4629.6  |
| 30°   | 4308.8  | 4281.0  | 4060.3  | 3797.6  | 3715.1  | 3689.8  | 3583.8  | 3552.6  | 3574.5 | 4094.9 | 4856.9  |
| 32.5° | 4499.9  | 4481.4  | 4347.5  | 4135.3  | 4058.7  | 4023.3  | 3873.4  | 3811.1  | 3759.7 | 4274.2 | 5165.1  |
| 35°   | 4731.5  | 4719.7  | 4638.8  | 4484.7  | 4371.1  | 4334.0  | 4217.8  | 4153.0  | 4020.8 | 4520.9 | 5563.4  |
| 37.5° | 5026.2  | 5013.5  | 5015.2  | 4890.6  | 4755.0  | 4720.5  | 4643.9  | 4575.7  | 4359.3 | 4845.1 | 5996.2  |
| 40°   | 5359.6  | 5335.2  | 5325.9  | 5320.1  | 5234.2  | 5214.8  | 5174.4  | 5081.8  | 4783.7 | 5232.5 | 6423.1  |
| 42.5° | 5861.5  | 5774.8  | 5589.5  | 5659.4  | 5744.4  | 5734.3  | 5767.2  | 5634.1  | 5255.2 | 5690.6 | 6839.9  |
| 45°   | 6345.7  | 6203.4  | 5883.4  | 5898.5  | 6084.6  | 6141.0  | 6386.9  | 6292.6  | 5766.3 | 6192.4 | 7271.1  |
| 47.5° | 6566.3  | 6458.5  | 6186.5  | 6187.4  | 6371.8  | 6488.8  | 7027.7  | 6960.4  | 6303.6 | 6762.5 | 7797.4  |
| 50°   | 6813.0  | 6705.2  | 6461.0  | 6552.8  | 6713.6  | 6838.3  | 7646.6  | 7612.1  | 6814.7 | 7386.4 | 8428.0  |
| 52.5° | 7082.5  | 6899.7  | 6744.8  | 6909.0  | 7134.7  | 7279.5  | 8266.4  | 8172.1  | 7283.7 | 8014.6 | 9153.0  |
| 55°   | 7085.8  | 7036.1  | 7154.0  | 7274.4  | 7612.1  | 7789.8  | 8915.6  | 8666.3  | 7666.0 | 8631.8 | 9743.3  |
| 57.5° | 7489.2  | 7408.3  | 7658.4  | 7714.0  | 8155.2  | 8355.6  | 9561.4  | 9096.6  | 8055.0 | 9105.1 | 10061.6 |
| 60°   | 8023.0  | 7954.0  | 8158.6  | 8305.1  | 8827.2  | 9094.9  | 10251.1 | 9538.7  | 8360.7 | 9462.1 | 10046.5 |
| 62.5° | 8945.1  | 8866.8  | 8864.2  | 9069.7  | 9772.8  | 10084.4 | 11024.9 | 9972.4  | 8481.9 | 9532.8 | 9617.9  |
| 65°   | 10294.9 | 10170.2 | 9935.3  | 10033.0 | 11078.8 | 11389.5 | 11889.7 | 10286.4 | 8321.9 | 9153.9 | 8513.9  |
| 67.5° | 11608.5 | 11604.2 | 11315.4 | 11515.8 | 12803.3 | 13052.6 | 12874.9 | 10317.6 | 7822.6 | 7834.4 | 6555.3  |
| 70°   | 12917.8 | 12934.7 | 12885.8 | 13583.1 | 15133.3 | 15392.6 | 13924.1 | 9899.1  | 6700.2 | 5657.7 | 3927.3  |
| 72.5° | 13955.2 | 13951.0 | 14196.9 | 15994.7 | 18157.1 | 18099.0 | 14808.2 | 8631.0  | 4810.6 | 3054.1 | 1876.9  |
| 75°   | 13283.3 | 13136.8 | 13869.4 | 17188.7 | 19919.5 | 19635.7 | 14056.3 | 6020.6  | 2496.7 | 1390.2 | 1010.5  |
| 77.5° | 8663.8  | 8802.8  | 9878.1  | 14199.4 | 17423.6 | 17078.4 | 10312.5 | 2809.1  | 1176.3 | 911.9  | 732.6   |
| 80°   | 3137.5  | 3284.0  | 4625.4  | 8043.2  | 12004.2 | 11947.8 | 5078.4  | 1154.4  | 795.7  | 688.8  | 533.9   |
| 82.5° | 1079.5  | 1133.4  | 1824.7  | 3572.0  | 6777.6  | 7030.2  | 1910.6  | 656.0   | 578.5  | 488.4  | 365.4   |
| 85°   | 423.5   | 485.0   | 834.5   | 1718.6  | 3418.7  | 3444.0  | 773.8   | 392.4   | 402.5  | 320.0  | 200.4   |
| 87.5° | 160.8   | 195.4   | 399.1   | 798.3   | 1561.2  | 1434.0  | 277.0   | 186.9   | 229.0  | 190.3  | 95.2    |
| 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: P318831

CATALOG NUMBER: GLEON-SA7A-827-U-T4FT

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 3810.3 | 3810.3 | 3810.3 | 3810.3 | 3810.3 | 3810.3 | 3810.3 | 3810.3 | 3810.3 | 3810.3 | 3810.3 |
| 2.5°  | 3816.2 | 3833.8 | 3870.9 | 3896.2 | 3923.1 | 3930.7 | 3934.0 | 3940.8 | 3947.5 | 3945.0 | 3945.8 |
| 5°    | 3839.7 | 3874.3 | 3934.0 | 3959.3 | 3971.1 | 3957.6 | 3931.5 | 3910.5 | 3895.3 | 3886.9 | 3884.4 |
| 7.5°  | 3878.5 | 3927.3 | 3991.3 | 3987.1 | 3960.1 | 3900.4 | 3833.0 | 3782.5 | 3740.4 | 3725.2 | 3716.8 |
| 10°   | 3929.8 | 3987.1 | 4031.7 | 3983.7 | 3905.4 | 3801.8 | 3700.8 | 3622.5 | 3559.3 | 3534.9 | 3530.7 |
| 12.5° | 3995.5 | 4053.6 | 4062.0 | 3960.1 | 3830.5 | 3689.0 | 3551.8 | 3448.2 | 3353.9 | 3323.6 | 3316.8 |
| 15°   | 4080.6 | 4135.3 | 4083.1 | 3918.9 | 3737.8 | 3547.5 | 3369.9 | 3229.2 | 3129.9 | 3092.8 | 3079.4 |
| 17.5° | 4169.8 | 4222.0 | 4087.3 | 3850.7 | 3616.6 | 3380.0 | 3156.8 | 3012.8 | 2899.2 | 2856.2 | 2851.2 |
| 20°   | 4276.8 | 4300.3 | 4069.6 | 3753.0 | 3449.9 | 3162.7 | 2927.8 | 2792.2 | 2731.6 | 2701.3 | 2697.9 |
| 22.5° | 4409.0 | 4383.7 | 4029.2 | 3620.8 | 3238.5 | 2911.8 | 2720.7 | 2657.5 | 2642.3 | 2635.6 | 2638.1 |
| 25°   | 4548.7 | 4471.3 | 3969.4 | 3448.2 | 2971.6 | 2660.9 | 2569.1 | 2586.8 | 2607.0 | 2604.5 | 2604.5 |
| 27.5° | 4702.8 | 4560.5 | 3877.6 | 3219.1 | 2676.0 | 2455.4 | 2466.4 | 2531.2 | 2561.5 | 2560.7 | 2559.8 |
| 30°   | 4900.7 | 4661.6 | 3760.6 | 2943.8 | 2399.8 | 2310.6 | 2377.1 | 2456.3 | 2497.5 | 2495.8 | 2496.7 |
| 32.5° | 5144.1 | 4772.7 | 3601.4 | 2636.4 | 2200.3 | 2203.6 | 2280.3 | 2358.6 | 2406.6 | 2402.4 | 2403.2 |
| 35°   | 5428.7 | 4897.3 | 3385.9 | 2333.3 | 2068.1 | 2118.6 | 2179.2 | 2234.0 | 2279.4 | 2273.5 | 2267.6 |
| 37.5° | 5738.5 | 5019.4 | 3099.6 | 2062.2 | 1960.3 | 2039.4 | 2090.0 | 2099.2 | 2120.3 | 2105.1 | 2094.2 |
| 40°   | 6033.3 | 5112.9 | 2730.8 | 1839.9 | 1851.7 | 1972.1 | 2004.9 | 1967.9 | 1930.0 | 1924.9 | 1909.8 |
| 42.5° | 6290.1 | 5144.1 | 2357.7 | 1662.2 | 1737.1 | 1901.3 | 1921.6 | 1844.1 | 1775.9 | 1743.9 | 1730.4 |
| 45°   | 6561.2 | 5155.0 | 2010.0 | 1513.2 | 1626.8 | 1838.2 | 1860.1 | 1756.5 | 1660.5 | 1591.5 | 1568.7 |
| 47.5° | 6915.7 | 5234.2 | 1739.7 | 1402.8 | 1542.6 | 1796.1 | 1827.2 | 1686.6 | 1562.0 | 1463.5 | 1442.4 |
| 50°   | 7379.7 | 5390.8 | 1519.9 | 1318.6 | 1487.9 | 1768.3 | 1803.7 | 1618.4 | 1481.2 | 1362.4 | 1341.4 |
| 52.5° | 7895.0 | 5534.8 | 1342.2 | 1250.4 | 1434.8 | 1719.5 | 1773.4 | 1569.6 | 1405.4 | 1269.0 | 1246.2 |
| 55°   | 8255.4 | 5424.5 | 1199.1 | 1179.7 | 1365.8 | 1649.6 | 1731.2 | 1528.3 | 1296.8 | 1178.0 | 1157.8 |
| 57.5° | 8324.5 | 5047.2 | 1090.5 | 1106.4 | 1282.4 | 1562.0 | 1666.4 | 1436.5 | 1237.8 | 1138.4 | 1117.4 |
| 60°   | 8135.9 | 4521.8 | 1009.6 | 1039.1 | 1193.2 | 1451.7 | 1545.2 | 1371.7 | 1181.4 | 1096.3 | 1078.7 |
| 62.5° | 7661.8 | 3983.7 | 949.8  | 978.5  | 1109.8 | 1339.7 | 1469.4 | 1303.5 | 1124.1 | 1048.3 | 1030.7 |
| 65°   | 6704.4 | 3344.6 | 892.6  | 924.6  | 1032.3 | 1242.9 | 1401.2 | 1240.3 | 1067.7 | 1009.6 | 992.8  |
| 67.5° | 5060.7 | 2505.1 | 838.7  | 867.3  | 963.3  | 1158.7 | 1327.1 | 1178.0 | 1013.0 | 975.9  | 955.7  |
| 70°   | 2980.0 | 1568.7 | 777.2  | 807.5  | 890.9  | 1071.1 | 1247.9 | 1109.8 | 944.8  | 927.9  | 901.8  |
| 72.5° | 1386.9 | 943.9  | 707.3  | 736.8  | 799.9  | 954.0  | 1146.0 | 1020.6 | 863.9  | 826.9  | 791.5  |
| 75°   | 827.7  | 690.5  | 624.8  | 650.9  | 695.5  | 829.4  | 1018.0 | 929.6  | 787.3  | 738.5  | 701.4  |
| 77.5° | 618.9  | 528.0  | 533.9  | 561.6  | 597.9  | 725.8  | 901.8  | 858.0  | 728.4  | 690.5  | 665.2  |
| 80°   | 445.4  | 400.8  | 435.3  | 465.7  | 503.5  | 660.2  | 863.9  | 793.2  | 658.5  | 608.0  | 584.4  |
| 82.5° | 297.2  | 288.0  | 327.6  | 358.7  | 395.8  | 577.6  | 811.7  | 694.7  | 562.5  | 498.5  | 446.3  |
| 85°   | 164.2  | 173.5  | 220.6  | 234.1  | 266.1  | 406.7  | 665.2  | 558.3  | 423.5  | 341.0  | 325.9  |
| 87.5° | 68.2   | 80.0   | 118.7  | 114.5  | 141.5  | 242.5  | 437.9  | 336.8  | 269.5  | 201.2  | 156.6  |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

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

Report Prepared for

Cooper Lighting Solutions

Invue

Report Number: SP1-2407-157-9

Test Date: 10/03/2024

Luminaire Tested: EMM2-HTN-SA1A-827-U-5WQ

Data applicable to all product families utilizing light square engine

### Test Information

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

### Spectral Parameters

CCT (K): 2764  
 CIE  $u'$ : 0.2591  
 CIE  $v'$ : 0.5290  
 Duv: 0.0020  
 CIE x: 0.4581  
 CIE y: 0.4156  
 CIE z: 0.1263  
 Peak Wavelength (nm): 603  
 Dominant Wavelength (nm): 583  
 Purity: 62.2537  
 R<sub>f</sub>: 84.7  
 R<sub>g</sub>: 94.6

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



### Test Conditions

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

REPORT NUMBER: SP1-2407-157-9

| 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           |

REPORT NUMBER: SP1-2407-157-9

**CIE 1931 Chromaticity Diagram**



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



REPORT NUMBER: SP1-2407-157-9

### Photopic Flux vs. Wavelength



**Photopic Lumens: 4337.9**

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

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### Scotopic Flux vs. Wavelength


**Scotopic Lumens: 5286.7**
**S/P: 1.22**

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

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### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 9797**

**M/P: 2.26**

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

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TM-30-18

### Summary

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



### Color Vector Graphics



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

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



**Color Rendition by Hue-Angle Bin**


**Measure Comparisons**



(END OF REPORT)