

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: P510638

Luminaire Tested: **CTN-CA6-230-722-U-T3-HSS**

Issue Date: 4/6/2021

**Test Information**

Test Method: LM-79-08  
Report Number: P510638  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G3-2102-151-16)  
Test Lab: COOPER LIGHTING SOLUTIONS  
Issue Date: 4/6/2021  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: CTN-CA6-230-722-U-T3-HSS  
Description: CELESTEON HIGH MAST LUMINAIRE  
Light Source: (6) 2200K CCT, 70 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 26189 lumens  
Efficiency: N/A  
Efficacy: 115.0 lumens/watt  
Luminous Opening: Circular (Dia: 2.08' x H: 0')  
IES Classification: Type III - Short  
BUG Rating: B3 - U0 - G4

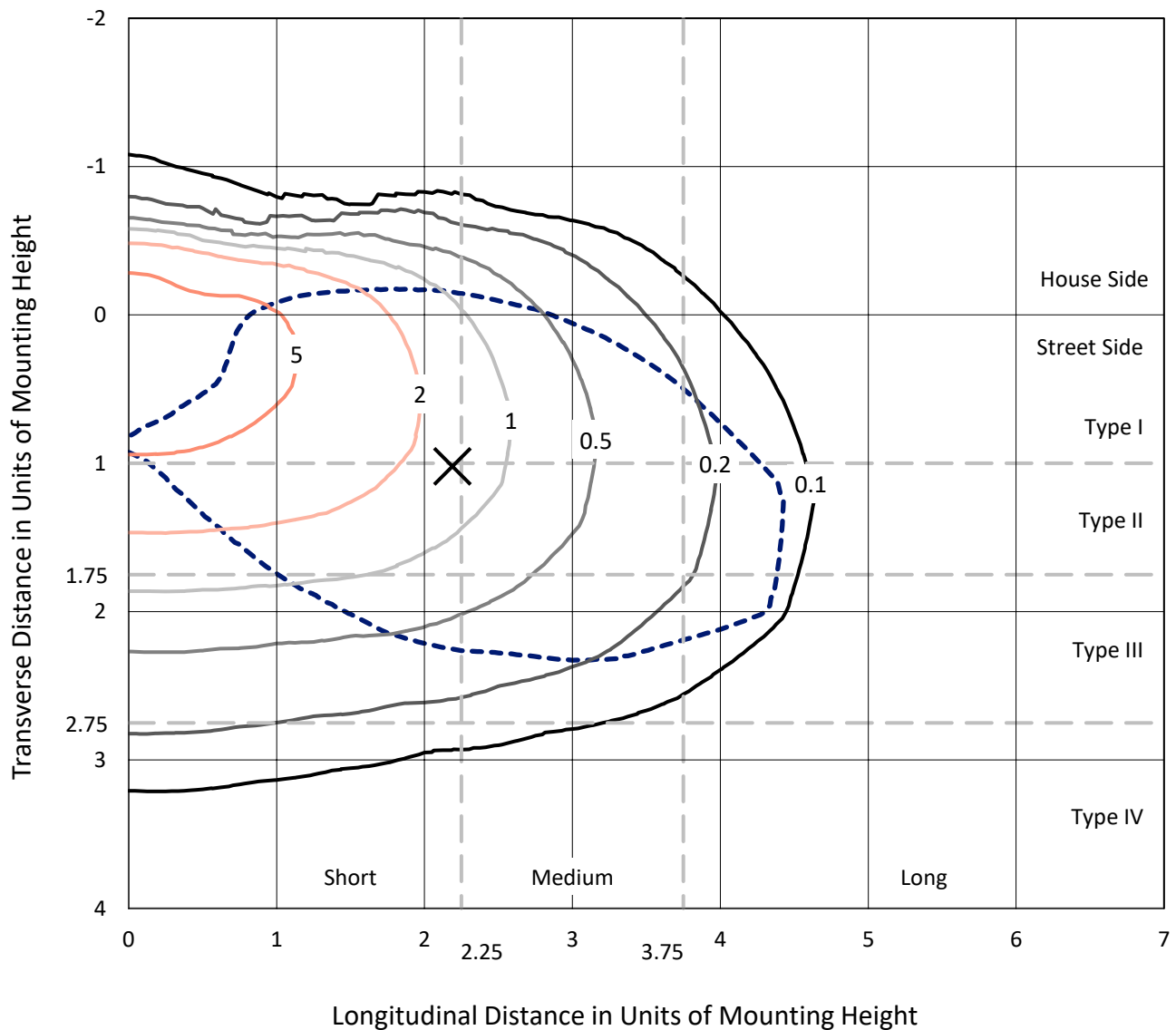
Input Watts (W): 227.8  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



REPORT NUMBER: P510638  
 CATALOG NUMBER: CTN-CA6-230-722-U-T3-HSS

## Iso-Footcandle Lines of Horizontal Illumination

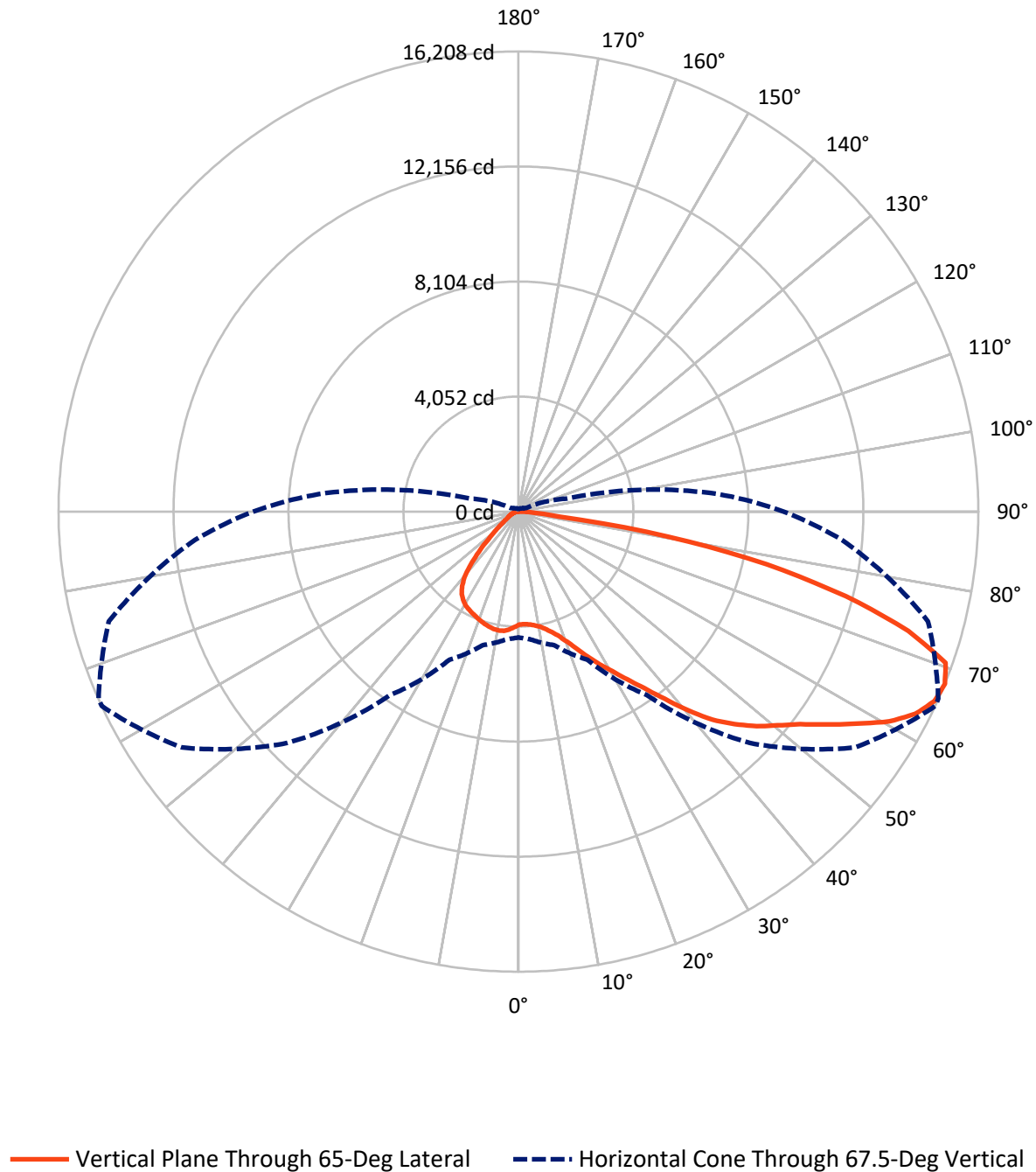
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 7.5 fc  
 Type III - Short - N/A

REPORT NUMBER: P510638  
CATALOG NUMBER: CTN-CA6-230-722-U-T3-HSS

## Luminous Intensity Polar Plot



REPORT NUMBER: P510638

CATALOG NUMBER: CTN-CA6-230-722-U-T3-HSS

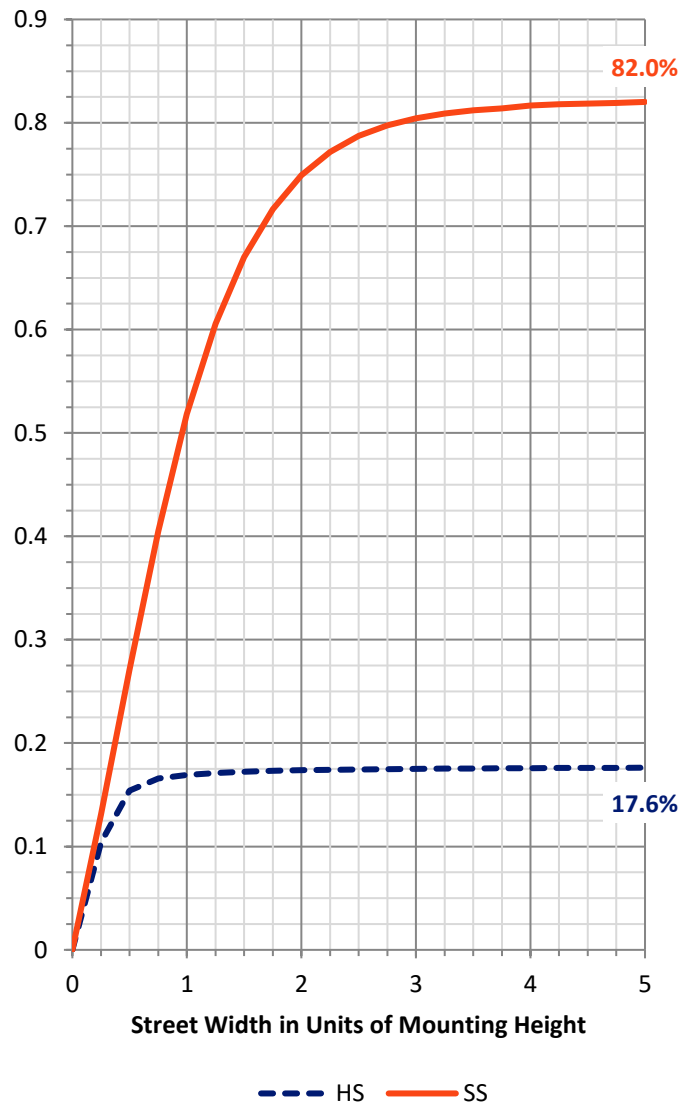
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 4680.6   | 0.0    | 4680.6  |
|                    | % Fixture | 17.9     | 0.0    | 17.9    |
| <b>Street Side</b> | Lumens    | 21508.4  | 0.0    | 21508.4 |
|                    | % Fixture | 82.1     | 0.0    | 82.1    |
| <b>Total</b>       | Lumens    | 26189.0  | 0.0    | 26189.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 393.7   | 1.5       |
| 10°-20°   | 1215.5  | 4.6       |
| 20°-30°   | 2108.7  | 8.1       |
| 30°-40°   | 3181.0  | 12.1      |
| 40°-50°   | 4410.6  | 16.8      |
| 50°-60°   | 5444.3  | 20.8      |
| 60°-70°   | 5800.9  | 22.1      |
| 70°-80°   | 3319.3  | 12.7      |
| 80°-90°   | 314.9   | 1.2       |
| 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°    | 26189.0 | 100.0     |
| 0°-180°   | 26189.0 | 100.0     |

**Coefficient of Utilization**



REPORT NUMBER: P510638

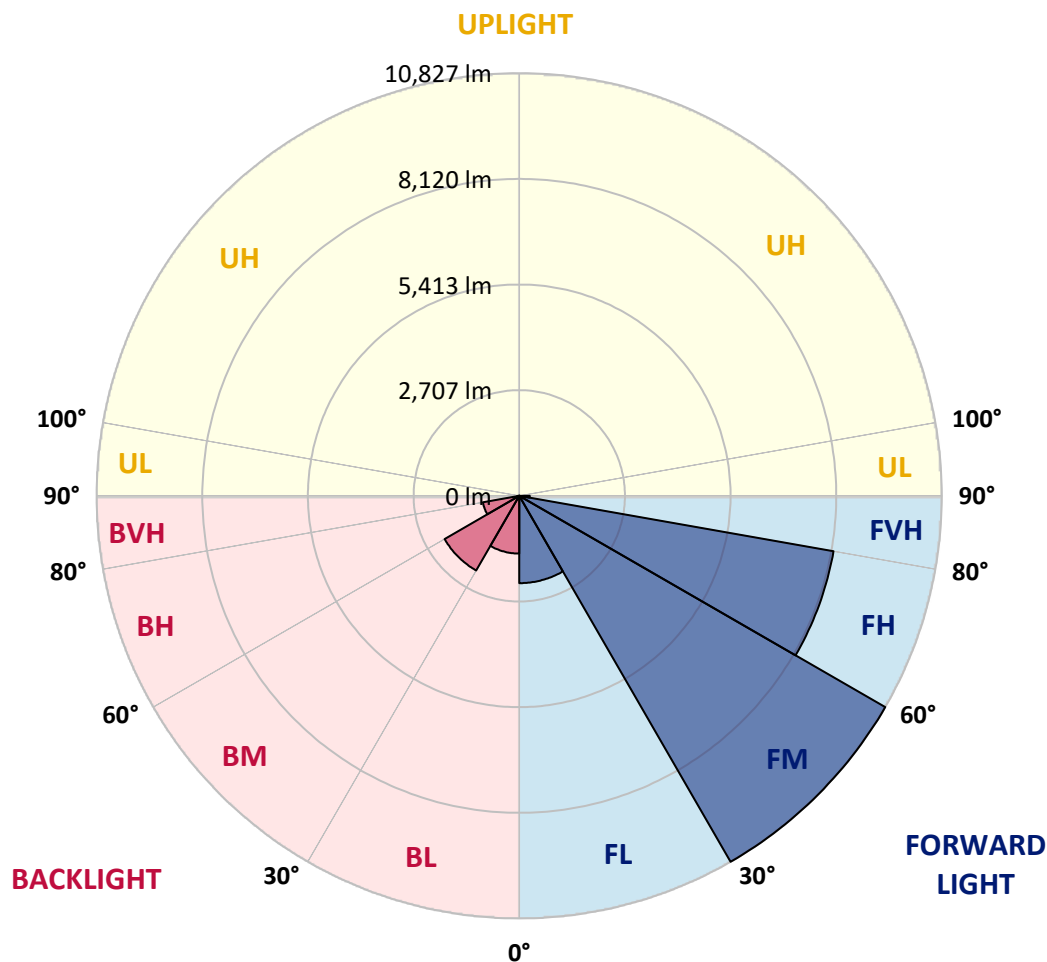
CATALOG NUMBER: CTN-CA6-230-722-U-T3-HSS

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |          |
|------|-------------|---------|-----------|-------------------------|------|----------|
|      |             |         |           | B                       | U    | G        |
| FL   | (0°-30°)    | 2236.9  | 8.5       |                         |      |          |
| FM   | (30°-60°)   | 10826.9 | 41.3      |                         |      |          |
| FH   | (60°-80°)   | 8175.5  | 31.2      |                         |      | G4/12000 |
| FVH  | (80°-90°)   | 269.1   | 1.0       |                         |      | G3/500   |
| BL   | (0°-30°)    | 1481.1  | 5.7       | B3/2500                 |      |          |
| BM   | (30°-60°)   | 2209.0  | 8.4       | B2/2500                 |      |          |
| BH   | (60°-80°)   | 944.7   | 3.6       | B2/1000                 |      | G2/1000  |
| BVH  | (80°-90°)   | 45.8    | 0.2       |                         |      | G1/100   |
| UL   | (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |          |
| UH   | (100°-180°) | 0.0     | 0.0       |                         | U0/0 |          |

**BUG Rating: B3-U0-G4**

Type III Short



REPORT NUMBER: P510638

CATALOG NUMBER: CTN-CA6-230-722-U-T3-HSS

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°     | 45°     | 55°     | 65°     | 66°     | 75°     | 85°     |
|-------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 3979.6 | 3979.6 | 3979.6 | 3979.6 | 3979.6  | 3979.6  | 3979.6  | 3979.6  | 3979.6  | 3979.6  | 3979.6  |
| 2.5°  | 3941.2 | 3936.0 | 3931.4 | 3939.4 | 3944.0  | 3951.5  | 3962.4  | 3969.8  | 3972.1  | 3979.0  | 3987.6  |
| 5°    | 4004.3 | 4003.7 | 3997.4 | 3993.9 | 3984.2  | 3980.7  | 3983.0  | 3992.2  | 3992.8  | 4001.4  | 4028.4  |
| 7.5°  | 4128.2 | 4127.0 | 4111.5 | 4104.7 | 4084.0  | 4061.1  | 4043.8  | 4045.6  | 4045.0  | 4053.6  | 4089.7  |
| 10°   | 4315.2 | 4306.0 | 4284.2 | 4263.0 | 4222.8  | 4179.8  | 4148.3  | 4119.6  | 4119.6  | 4132.2  | 4172.3  |
| 12.5° | 4526.3 | 4538.9 | 4509.1 | 4477.0 | 4409.8  | 4332.4  | 4277.3  | 4245.2  | 4241.8  | 4248.1  | 4276.8  |
| 15°   | 4788.5 | 4788.5 | 4768.4 | 4722.5 | 4663.4  | 4555.6  | 4442.0  | 4401.2  | 4395.5  | 4408.7  | 4407.0  |
| 17.5° | 5083.9 | 5092.5 | 5054.7 | 5031.7 | 4941.1  | 4821.7  | 4679.5  | 4608.9  | 4608.9  | 4600.3  | 4560.7  |
| 20°   | 5460.8 | 5413.8 | 5417.8 | 5379.9 | 5313.4  | 5140.1  | 4995.6  | 4892.9  | 4891.7  | 4874.5  | 4763.2  |
| 22.5° | 5870.4 | 5844.6 | 5822.2 | 5789.0 | 5697.2  | 5542.3  | 5341.5  | 5240.0  | 5237.7  | 5195.2  | 5030.0  |
| 25°   | 6274.3 | 6293.8 | 6269.1 | 6208.3 | 6141.2  | 5972.5  | 5751.1  | 5651.3  | 5650.7  | 5580.1  | 5346.1  |
| 27.5° | 6689.6 | 6710.9 | 6702.8 | 6647.8 | 6558.3  | 6426.3  | 6216.9  | 6086.7  | 6078.7  | 6032.8  | 5738.5  |
| 30°   | 7148.6 | 7129.6 | 7154.3 | 7130.8 | 7086.0  | 6870.9  | 6681.6  | 6530.2  | 6549.7  | 6535.9  | 6184.2  |
| 32.5° | 7482.5 | 7494.5 | 7575.4 | 7577.7 | 7530.6  | 7371.2  | 7140.0  | 7047.0  | 7078.0  | 7059.7  | 6732.1  |
| 35°   | 7784.2 | 7803.7 | 7908.1 | 8010.8 | 8045.2  | 7870.8  | 7635.6  | 7629.9  | 7670.0  | 7781.9  | 7487.0  |
| 37.5° | 8043.5 | 8057.3 | 8203.6 | 8337.2 | 8448.5  | 8329.2  | 8158.2  | 8361.9  | 8421.0  | 8649.9  | 8266.1  |
| 40°   | 8199.0 | 8216.8 | 8406.1 | 8594.2 | 8792.7  | 8750.3  | 8734.2  | 9216.1  | 9271.7  | 9473.1  | 8834.6  |
| 42.5° | 8111.2 | 8146.2 | 8461.7 | 8805.9 | 9097.9  | 9182.8  | 9402.5  | 10022.1 | 10085.8 | 10103.0 | 9393.4  |
| 45°   | 7954.6 | 7998.2 | 8351.0 | 8908.0 | 9384.2  | 9656.7  | 10074.9 | 10679.0 | 10714.0 | 10665.2 | 9856.3  |
| 47.5° | 7785.9 | 7832.4 | 8226.5 | 8877.6 | 9614.2  | 10208.0 | 10675.5 | 11297.4 | 11322.1 | 11172.3 | 10322.7 |
| 50°   | 7594.3 | 7637.3 | 8061.3 | 8806.5 | 9787.5  | 10728.3 | 11292.8 | 11832.1 | 11924.4 | 11628.4 | 10685.3 |
| 52.5° | 7361.4 | 7407.3 | 7857.1 | 8695.2 | 9939.5  | 11114.4 | 11837.2 | 12436.1 | 12442.5 | 12198.6 | 11093.7 |
| 55°   | 7059.7 | 7139.4 | 7600.6 | 8502.4 | 10019.2 | 11446.0 | 12311.7 | 13235.3 | 13276.0 | 13040.2 | 11435.7 |
| 57.5° | 6724.1 | 6793.5 | 7292.0 | 8245.4 | 9947.5  | 11697.8 | 13074.6 | 14092.3 | 14087.2 | 13613.9 | 11734.5 |
| 60°   | 6280.6 | 6329.9 | 6889.8 | 7909.3 | 9716.3  | 12002.4 | 13869.2 | 15010.8 | 15001.6 | 14176.1 | 11926.7 |
| 62.5° | 5711.5 | 5760.9 | 6287.5 | 7382.1 | 9376.7  | 12206.7 | 14408.4 | 15698.6 | 15672.3 | 14585.1 | 11985.8 |
| 65°   | 5051.8 | 5140.1 | 5597.4 | 6697.7 | 8776.1  | 12072.4 | 14668.9 | 16103.7 | 16061.2 | 14897.2 | 11844.7 |
| 67.5° | 4433.4 | 4508.5 | 4870.5 | 5755.7 | 7889.8  | 11528.0 | 14485.3 | 16208.1 | 16195.4 | 14942.5 | 11446.0 |
| 70°   | 3557.9 | 3585.5 | 3917.1 | 4674.9 | 6564.6  | 10362.3 | 13850.8 | 15967.1 | 15972.9 | 14524.9 | 10645.1 |
| 72.5° | 2435.3 | 2502.4 | 2649.8 | 3248.2 | 4777.0  | 8240.9  | 11938.2 | 14370.0 | 14371.2 | 13024.2 | 9274.6  |
| 75°   | 1309.7 | 1413.5 | 1585.6 | 1882.2 | 2670.5  | 5288.1  | 9587.3  | 11923.9 | 11946.2 | 10859.1 | 7371.7  |
| 77.5° | 649.4  | 686.7  | 786.5  | 1006.8 | 1224.2  | 2494.9  | 6165.9  | 8950.5  | 9003.8  | 8335.5  | 5027.7  |
| 80°   | 297.2  | 303.5  | 310.9  | 309.2  | 468.7   | 1094.6  | 2646.9  | 5375.3  | 5391.4  | 4957.7  | 2295.3  |
| 82.5° | 232.3  | 231.2  | 234.6  | 213.4  | 214.6   | 422.2   | 916.2   | 1407.8  | 1501.3  | 1181.8  | 728.0   |
| 85°   | 140.6  | 140.0  | 150.9  | 117.0  | 144.0   | 228.3   | 462.4   | 561.6   | 568.5   | 462.4   | 376.9   |
| 87.5° | 53.4   | 51.6   | 47.6   | 41.9   | 48.2    | 64.3    | 160.1   | 206.5   | 201.9   | 143.4   | 130.2   |
| 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: P510638

CATALOG NUMBER: CTN-CA6-230-722-U-T3-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 3979.6  | 3979.6 | 3979.6 | 3979.6 | 3979.6 | 3979.6 | 3979.6 | 3979.6 | 3979.6 | 3979.6 | 3979.6 |
| 2.5°  | 3995.1  | 4013.4 | 4047.3 | 4073.1 | 4081.7 | 4109.2 | 4135.6 | 4140.2 | 4159.1 | 4166.6 | 4191.3 |
| 5°    | 4045.0  | 4076.0 | 4128.7 | 4163.7 | 4179.2 | 4225.1 | 4255.0 | 4269.9 | 4264.7 | 4267.6 | 4295.1 |
| 7.5°  | 4117.8  | 4147.1 | 4189.6 | 4232.0 | 4239.5 | 4247.5 | 4244.6 | 4242.3 | 4222.3 | 4205.0 | 4230.9 |
| 10°   | 4184.4  | 4211.9 | 4238.3 | 4244.6 | 4206.8 | 4185.5 | 4147.7 | 4118.4 | 4079.4 | 4061.6 | 4082.3 |
| 12.5° | 4277.9  | 4283.6 | 4257.8 | 4223.4 | 4141.9 | 4066.2 | 4004.8 | 3951.5 | 3903.3 | 3870.0 | 3897.6 |
| 15°   | 4376.6  | 4354.2 | 4279.0 | 4178.7 | 4052.4 | 3944.0 | 3843.6 | 3754.7 | 3675.0 | 3655.5 | 3662.9 |
| 17.5° | 4507.4  | 4446.6 | 4295.1 | 4126.5 | 3930.3 | 3761.6 | 3632.5 | 3520.1 | 3415.7 | 3372.1 | 3368.1 |
| 20°   | 4666.9  | 4568.8 | 4327.8 | 4060.5 | 3785.7 | 3561.4 | 3361.7 | 3193.7 | 3049.7 | 2931.5 | 2934.4 |
| 22.5° | 4874.5  | 4732.3 | 4377.1 | 3991.6 | 3625.6 | 3326.7 | 3036.5 | 2750.8 | 2513.8 | 2411.7 | 2386.5 |
| 25°   | 5148.7  | 4936.5 | 4447.1 | 3929.1 | 3446.6 | 3028.4 | 2618.3 | 2215.0 | 1964.3 | 1865.0 | 1854.1 |
| 27.5° | 5490.1  | 5210.7 | 4553.8 | 3859.7 | 3255.0 | 2674.5 | 2084.7 | 1689.5 | 1459.4 | 1355.0 | 1320.0 |
| 30°   | 5877.9  | 5548.6 | 4663.4 | 3787.4 | 3023.3 | 2219.6 | 1589.7 | 1202.4 | 966.6  | 873.1  | 861.1  |
| 32.5° | 6379.8  | 5976.6 | 4826.3 | 3673.8 | 2684.8 | 1744.5 | 1108.9 | 750.4  | 590.3  | 550.2  | 538.7  |
| 35°   | 7092.9  | 6555.4 | 5027.7 | 3530.4 | 2250.0 | 1218.5 | 687.3  | 439.4  | 354.0  | 333.9  | 329.9  |
| 37.5° | 7757.8  | 7123.3 | 5230.8 | 3292.3 | 1708.4 | 760.7  | 393.0  | 281.7  | 262.7  | 263.3  | 264.5  |
| 40°   | 8285.0  | 7511.7 | 5394.8 | 2979.1 | 1123.8 | 432.0  | 273.1  | 234.1  | 234.6  | 232.9  | 231.8  |
| 42.5° | 8754.3  | 7821.5 | 5468.9 | 2516.1 | 651.1  | 289.1  | 236.9  | 215.7  | 210.5  | 212.3  | 211.1  |
| 45°   | 9142.7  | 8137.6 | 5325.4 | 1995.8 | 383.8  | 259.3  | 223.7  | 200.2  | 194.5  | 203.7  | 204.8  |
| 47.5° | 9551.1  | 8437.6 | 5105.7 | 1503.6 | 311.5  | 246.7  | 211.7  | 188.7  | 185.9  | 197.3  | 198.5  |
| 50°   | 9894.8  | 8655.0 | 4731.1 | 1133.0 | 297.2  | 232.9  | 200.8  | 177.3  | 176.7  | 187.0  | 187.0  |
| 52.5° | 10182.2 | 8786.4 | 4286.5 | 874.9  | 287.4  | 220.9  | 189.9  | 166.4  | 166.4  | 169.8  | 170.4  |
| 55°   | 10384.7 | 8760.0 | 4021.5 | 688.4  | 277.1  | 209.4  | 178.4  | 156.0  | 149.2  | 146.9  | 148.0  |
| 57.5° | 10421.4 | 8690.0 | 3714.0 | 537.0  | 265.0  | 198.5  | 168.1  | 144.0  | 131.4  | 129.7  | 129.1  |
| 60°   | 10397.9 | 8536.3 | 3362.9 | 448.6  | 251.3  | 188.2  | 157.8  | 131.4  | 118.8  | 114.7  | 115.9  |
| 62.5° | 10299.8 | 8263.8 | 2957.3 | 393.5  | 237.5  | 180.1  | 146.3  | 122.8  | 111.3  | 106.1  | 106.1  |
| 65°   | 10003.8 | 7873.7 | 2354.9 | 344.8  | 220.3  | 171.5  | 137.1  | 119.3  | 106.7  | 101.0  | 99.8   |
| 67.5° | 9353.2  | 7064.2 | 1769.8 | 302.3  | 203.7  | 162.4  | 136.0  | 118.8  | 104.4  | 96.4   | 95.2   |
| 70°   | 8480.7  | 6068.3 | 1208.2 | 265.6  | 185.3  | 153.7  | 135.4  | 119.3  | 102.1  | 91.8   | 90.6   |
| 72.5° | 7079.7  | 4783.9 | 695.9  | 231.2  | 166.9  | 145.7  | 133.1  | 119.9  | 98.1   | 85.5   | 83.8   |
| 75°   | 5319.7  | 3355.4 | 408.5  | 198.5  | 149.2  | 133.7  | 126.8  | 116.5  | 91.8   | 78.0   | 76.3   |
| 77.5° | 3199.4  | 1566.7 | 307.5  | 164.6  | 127.9  | 117.6  | 113.0  | 106.7  | 83.8   | 72.3   | 70.6   |
| 80°   | 1173.7  | 594.9  | 241.5  | 131.9  | 101.5  | 102.1  | 97.5   | 93.5   | 76.3   | 66.5   | 65.4   |
| 82.5° | 511.7   | 363.7  | 178.4  | 100.4  | 79.7   | 91.2   | 80.3   | 76.9   | 65.4   | 59.7   | 57.4   |
| 85°   | 310.4   | 216.8  | 114.7  | 68.3   | 55.1   | 62.0   | 56.2   | 59.1   | 50.5   | 47.0   | 45.3   |
| 87.5° | 102.7   | 64.8   | 51.1   | 33.3   | 27.5   | 25.8   | 25.2   | 30.4   | 28.7   | 26.4   | 26.4   |
| 90°   | 0.0     | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |



Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

STREETWORKS

Report Number: SP1-2104-215-4

Luminaire Tested: CST-CA10-630-722-U-T3

Test Date: 04/20/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2104-215-4  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 04/20/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: STREETWORKS  
 Catalog Number: **CST-CA10-630-722-U-T3**  
 Description: STREETWORKS HIGH MAST LUMINAIRE

### Spectral Parameters

|                           |         |           |      |      |       |
|---------------------------|---------|-----------|------|------|-------|
| CCT (K):                  | 2174    | CRI (Ra): | 72.8 |      |       |
| CIE u':                   | 0.2919  | R1:       | 70.2 | R9:  | -23.3 |
| CIE v':                   | 0.5354  | R2:       | 86.8 | R10: | 71.8  |
| Duv:                      | -0.0007 | R3:       | 92.8 | R11: | 63.6  |
| CIE x:                    | 0.5067  | R4:       | 66.8 | R12: | 66.0  |
| CIE y:                    | 0.4131  | R5:       | 69.1 | R13: | 73.5  |
| CIE z:                    | 0.0802  | R6:       | 84.7 | R14: | 96.9  |
| Peak Wavelength (nm):     | 608     | R7:       | 73.2 |      |       |
| Dominant Wavelength (nm): | 587     | R8:       | 39.0 |      |       |
| Purity:                   | 76.7    |           |      |      |       |
| Rf:                       | 75.7    |           |      |      |       |
| Rg:                       | 96.7    |           |      |      |       |



### Test Conditions

Stabilization Time: 79M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.7/32%  
 Sphere Temperature (°C): 24.8

REPORT NUMBER: SP1-2104-215-4

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 1/31/2021        | 7/31/2021            |
| Power Meter                    | IN0071                | 12/1/2020        | 12/1/2021            |
| AC Power Source                | IN0063                | 12/1/2020        | 12/1/2021            |
| DC Power Source                | IN0208                | 12/1/2020        | 12/1/2021            |
| Sphere Thermometer             | IN0085                | 12/1/2020        | 12/1/2021            |
| Room Thermometer               | IN0046                | 12/1/2020        | 12/1/2021            |

REPORT NUMBER: SP1-2104-215-4

**CIE 1931 Chromaticity Diagram**



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



Point lies inside the ANSI 2200K 7-step quadrangle

REPORT NUMBER: SP1-2104-215-4

### 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       | 23398            | 0.0              | 490       | 137099           | 19.5             | 620       | 2038916          | 530.6            | 750       | 99721            | 0.0              | 880       | 32326            | 0.0              |
| 365       | 18626            | 0.0              | 495       | 174286           | 31.6             | 625       | 1946743          | 429.5            | 755       | 91432            | 0.0              | 885       | 29783            | 0.0              |
| 370       | 21702            | 0.0              | 500       | 232711           | 51.3             | 630       | 1814508          | 328.4            | 760       | 83300            | 0.0              | 890       | 12135            | 0.0              |
| 375       | 22606            | 0.0              | 505       | 303528           | 84.9             | 635       | 1681061          | 252.6            | 765       | 72172            | 0.0              | 895       | 22953            | 0.0              |
| 380       | 25296            | 0.0              | 510       | 374456           | 128.6            | 640       | 1557170          | 186.1            | 770       | 65008            | 0.0              | 900       | 27214            | 0.0              |
| 385       | 27032            | 0.0              | 515       | 445274           | 184.5            | 645       | 1430182          | 137.7            | 775       | 56809            | 0.0              | 905       | 17038            | 0.0              |
| 390       | 22156            | 0.0              | 520       | 510296           | 247.5            | 650       | 1300435          | 95.0             | 780       | 49368            | 0.0              | 910       | 6896             | 0.0              |
| 395       | 20190            | 0.0              | 525       | 566771           | 304.3            | 655       | 1165554          | 66.9             | 785       | 51733            | 0.0              | 915       | 17142            | 0.0              |
| 400       | 18423            | 0.0              | 530       | 617892           | 363.8            | 660       | 1044122          | 43.5             | 790       | 41796            | 0.0              | 920       | 7675             | 0.0              |
| 405       | 16139            | 0.0              | 535       | 664903           | 412.3            | 665       | 932131           | 29.6             | 795       | 42601            | 0.0              | 925       | 21587            | 0.0              |
| 410       | 19812            | 0.0              | 540       | 711603           | 463.7            | 670       | 808971           | 17.7             | 800       | 36382            | 0.0              | 930       | 32992            | 0.0              |
| 415       | 29121            | 0.1              | 545       | 768835           | 511.7            | 675       | 701208           | 11.7             | 805       | 41419            | 0.0              | 935       | 35464            | 0.0              |
| 420       | 46007            | 0.1              | 550       | 841179           | 571.6            | 680       | 610741           | 7.1              | 810       | 35865            | 0.0              | 940       | 34460            | 0.0              |
| 425       | 76329            | 0.4              | 555       | 932641           | 637.0            | 685       | 533825           | 4.6              | 815       | 39722            | 0.0              | 945       | 46305            | 0.0              |
| 430       | 117696           | 0.9              | 560       | 1040487          | 707.1            | 690       | 459427           | 2.6              | 820       | 37236            | 0.0              | 950       | 38353            | 0.0              |
| 435       | 166890           | 2.0              | 565       | 1164360          | 774.2            | 695       | 399973           | 1.7              | 825       | 31566            | 0.0              | 955       | 30772            | 0.0              |
| 440       | 227762           | 3.6              | 570       | 1307677          | 850.3            | 700       | 347460           | 1.0              | 830       | 42647            | 0.0              | 960       | 32413            | 0.0              |
| 445       | 315427           | 6.6              | 575       | 1470810          | 915.2            | 705       | 302187           | 0.6              | 835       | 41433            | 0.0              | 965       | 35310            | 0.0              |
| 450       | 409560           | 10.6             | 580       | 1637734          | 973.2            | 710       | 262909           | 0.4              | 840       | 24213            | 0.0              | 970       | 28048            | 0.0              |
| 455       | 381103           | 12.8             | 585       | 1807622          | 1004.4           | 715       | 236689           | 0.3              | 845       | 31358            | 0.0              | 975       | 26258            | 0.0              |
| 460       | 269221           | 11.0             | 590       | 1958195          | 1012.4           | 720       | 209675           | 0.1              | 850       | 30957            | 0.0              | 980       | 31067            | 0.0              |
| 465       | 203513           | 10.5             | 595       | 2055425          | 974.3            | 725       | 184999           | 0.1              | 855       | 38865            | 0.0              | 985       | 40288            | 0.0              |
| 470       | 163989           | 10.2             | 600       | 2141598          | 923.0            | 730       | 160261           | 0.1              | 860       | 23238            | 0.0              | 990       | 29366            | 0.0              |
| 475       | 129159           | 10.1             | 605       | 2185430          | 846.3            | 735       | 140736           | 0.0              | 865       | 32686            | 0.0              | 995       | 54854            | 0.0              |
| 480       | 115440           | 11.0             | 610       | 2170089          | 745.5            | 740       | 125207           | 0.0              | 870       | 41855            | 0.0              | 1000      | 50994            | 0.0              |
| 485       | 120959           | 14.3             | 615       | 2123505          | 641.1            | 745       | 110736           | 0.0              | 875       | 35838            | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2104-215-4

### Scotopic Flux vs. Wavelength


**Scotopic Lumens: 72942.9**
**S/P: 0.88**

| $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) |
|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|
| 360               | 23398                         | 0.0                            | 490               | 137099                        | 211.1                          | 620               | 2038916                       | 25.5                           | 750               | 99721                         | 0.0                            | 880               | 32326                         | 0.0                            |
| 365               | 18626                         | 0.0                            | 495               | 174286                        | 281.7                          | 625               | 1946743                       | 16.4                           | 755               | 91432                         | 0.0                            | 885               | 29783                         | 0.0                            |
| 370               | 21702                         | 0.0                            | 500               | 232711                        | 389.3                          | 630               | 1814508                       | 10.3                           | 760               | 83300                         | 0.0                            | 890               | 12135                         | 0.0                            |
| 375               | 22606                         | 0.0                            | 505               | 303528                        | 516.0                          | 635               | 1681061                       | 6.4                            | 765               | 72172                         | 0.0                            | 895               | 22953                         | 0.0                            |
| 380               | 25296                         | 0.0                            | 510               | 374456                        | 634.7                          | 640               | 1557170                       | 4.0                            | 770               | 65008                         | 0.0                            | 900               | 27214                         | 0.0                            |
| 385               | 27032                         | 0.1                            | 515               | 445274                        | 738.0                          | 645               | 1430182                       | 2.4                            | 775               | 56809                         | 0.0                            | 905               | 17038                         | 0.0                            |
| 390               | 22156                         | 0.1                            | 520               | 510296                        | 811.1                          | 650               | 1300435                       | 1.5                            | 780               | 49368                         | 0.0                            | 910               | 6896                          | 0.0                            |
| 395               | 20190                         | 0.2                            | 525               | 566771                        | 847.9                          | 655               | 1165554                       | 0.9                            | 785               | 51733                         | 0.0                            | 915               | 17142                         | 0.0                            |
| 400               | 18423                         | 0.3                            | 530               | 617892                        | 851.9                          | 660               | 1044122                       | 0.6                            | 790               | 41796                         | 0.0                            | 920               | 7675                          | 0.0                            |
| 405               | 16139                         | 0.5                            | 535               | 664903                        | 828.5                          | 665               | 932131                        | 0.3                            | 795               | 42601                         | 0.0                            | 925               | 21587                         | 0.0                            |
| 410               | 19812                         | 1.2                            | 540               | 711603                        | 786.3                          | 670               | 808971                        | 0.2                            | 800               | 36382                         | 0.0                            | 930               | 32992                         | 0.0                            |
| 415               | 29121                         | 3.0                            | 545               | 768835                        | 737.2                          | 675               | 701208                        | 0.1                            | 805               | 41419                         | 0.0                            | 935               | 35464                         | 0.0                            |
| 420               | 46007                         | 7.6                            | 550               | 841179                        | 687.8                          | 680               | 610741                        | 0.1                            | 810               | 35865                         | 0.0                            | 940               | 34460                         | 0.0                            |
| 425               | 76329                         | 18.7                           | 555               | 932641                        | 637.4                          | 685               | 533825                        | 0.0                            | 815               | 39722                         | 0.0                            | 945               | 46305                         | 0.0                            |
| 430               | 117696                        | 40.1                           | 560               | 1040487                       | 581.6                          | 690               | 459427                        | 0.0                            | 820               | 37236                         | 0.0                            | 950               | 38353                         | 0.0                            |
| 435               | 166890                        | 74.6                           | 565               | 1164360                       | 522.4                          | 695               | 399973                        | 0.0                            | 825               | 31566                         | 0.0                            | 955               | 30772                         | 0.0                            |
| 440               | 227762                        | 127.3                          | 570               | 1307677                       | 461.5                          | 700               | 347460                        | 0.0                            | 830               | 42647                         | 0.0                            | 960               | 32413                         | 0.0                            |
| 445               | 315427                        | 211.2                          | 575               | 1470810                       | 400.6                          | 705               | 302187                        | 0.0                            | 835               | 41433                         | 0.0                            | 965               | 35310                         | 0.0                            |
| 450               | 409560                        | 317.4                          | 580               | 1637734                       | 337.4                          | 710               | 262909                        | 0.0                            | 840               | 24213                         | 0.0                            | 970               | 28048                         | 0.0                            |
| 455               | 381103                        | 333.0                          | 585               | 1807622                       | 276.3                          | 715               | 236689                        | 0.0                            | 845               | 31358                         | 0.0                            | 975               | 26258                         | 0.0                            |
| 460               | 269221                        | 260.0                          | 590               | 1958195                       | 218.0                          | 720               | 209675                        | 0.0                            | 850               | 30957                         | 0.0                            | 980               | 31067                         | 0.0                            |
| 465               | 203513                        | 214.9                          | 595               | 2055425                       | 163.9                          | 725               | 184999                        | 0.0                            | 855               | 38865                         | 0.0                            | 985               | 40288                         | 0.0                            |
| 470               | 163989                        | 188.8                          | 600               | 2141598                       | 120.7                          | 730               | 160261                        | 0.0                            | 860               | 23238                         | 0.0                            | 990               | 29366                         | 0.0                            |
| 475               | 129159                        | 161.5                          | 605               | 2185430                       | 85.9                           | 735               | 140736                        | 0.0                            | 865               | 32686                         | 0.0                            | 995               | 54854                         | 0.0                            |
| 480               | 115440                        | 155.9                          | 610               | 2170089                       | 58.8                           | 740               | 125207                        | 0.0                            | 870               | 41855                         | 0.0                            | 1000              | 50994                         | 0.0                            |
| 485               | 120959                        | 175.3                          | 615               | 2123505                       | 39.3                           | 745               | 110736                        | 0.0                            | 875               | 35838                         | 0.0                            |                   |                               |                                |

REPORT NUMBER: SP1-2104-215-4

### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 23955.7**    **M/P: 0.29**

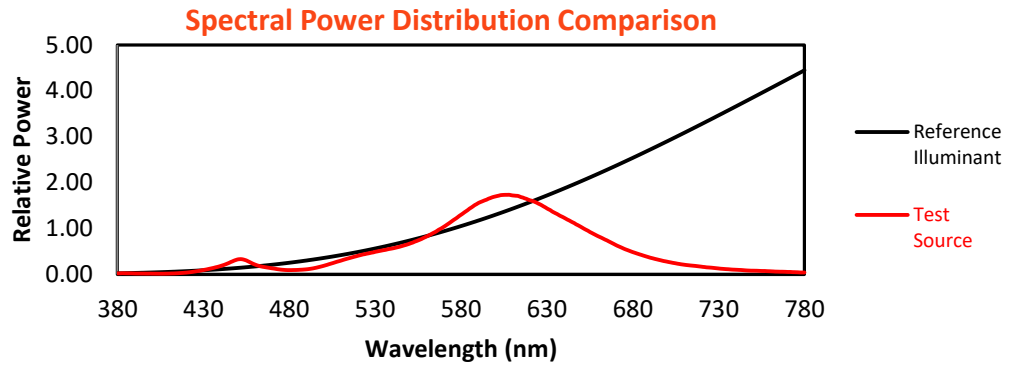
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 23398            | 0.0              | 490       | 137099           | 114.1            | 620       | 2038916          | 1.6              | 750       | 99721            | 0.0              | 880       | 32326            | 0.0              |
| 365       | 18626            | 0.0              | 495       | 174286           | 143.9            | 625       | 1946743          | 1.0              | 755       | 91432            | 0.0              | 885       | 29783            | 0.0              |
| 370       | 21702            | 0.0              | 500       | 232711           | 187.1            | 630       | 1814508          | 0.6              | 760       | 83300            | 0.0              | 890       | 12135            | 0.0              |
| 375       | 22606            | 0.0              | 505       | 303528           | 232.9            | 635       | 1681061          | 0.4              | 765       | 72172            | 0.0              | 895       | 22953            | 0.0              |
| 380       | 25296            | 0.0              | 510       | 374456           | 268.9            | 640       | 1557170          | 0.2              | 770       | 65008            | 0.0              | 900       | 27214            | 0.0              |
| 385       | 27032            | 0.0              | 515       | 445274           | 290.9            | 645       | 1430182          | 0.2              | 775       | 56809            | 0.0              | 905       | 17038            | 0.0              |
| 390       | 22156            | 0.1              | 520       | 510296           | 297.1            | 650       | 1300435          | 0.1              | 780       | 49368            | 0.0              | 910       | 6896             | 0.0              |
| 395       | 20190            | 0.1              | 525       | 566771           | 287.4            | 655       | 1165554          | 0.1              | 785       | 51733            | 0.0              | 915       | 17142            | 0.0              |
| 400       | 18423            | 0.2              | 530       | 617892           | 267.0            | 660       | 1044122          | 0.0              | 790       | 41796            | 0.0              | 920       | 7675             | 0.0              |
| 405       | 16139            | 0.3              | 535       | 664903           | 239.3            | 665       | 932131           | 0.0              | 795       | 42601            | 0.0              | 925       | 21587            | 0.0              |
| 410       | 19812            | 0.8              | 540       | 711603           | 208.3            | 670       | 808971           | 0.0              | 800       | 36382            | 0.0              | 930       | 32992            | 0.0              |
| 415       | 29121            | 1.9              | 545       | 768835           | 178.6            | 675       | 701208           | 0.0              | 805       | 41419            | 0.0              | 935       | 35464            | 0.0              |
| 420       | 46007            | 5.3              | 550       | 841179           | 151.0            | 680       | 610741           | 0.0              | 810       | 35865            | 0.0              | 940       | 34460            | 0.0              |
| 425       | 76329            | 11.9             | 555       | 932641           | 125.8            | 685       | 533825           | 0.0              | 815       | 39722            | 0.0              | 945       | 46305            | 0.0              |
| 430       | 117696           | 24.9             | 560       | 1040487          | 102.6            | 690       | 459427           | 0.0              | 820       | 37236            | 0.0              | 950       | 38353            | 0.0              |
| 435       | 166890           | 44.5             | 565       | 1164360          | 81.7             | 695       | 399973           | 0.0              | 825       | 31566            | 0.0              | 955       | 30772            | 0.0              |
| 440       | 227762           | 76.1             | 570       | 1307677          | 63.9             | 700       | 347460           | 0.0              | 830       | 42647            | 0.0              | 960       | 32413            | 0.0              |
| 445       | 315427           | 124.4            | 575       | 1470810          | 49.0             | 705       | 302187           | 0.0              | 835       | 41433            | 0.0              | 965       | 35310            | 0.0              |
| 450       | 409560           | 188.7            | 580       | 1637734          | 36.6             | 710       | 262909           | 0.0              | 840       | 24213            | 0.0              | 970       | 28048            | 0.0              |
| 455       | 381103           | 199.7            | 585       | 1807622          | 26.9             | 715       | 236689           | 0.0              | 845       | 31358            | 0.0              | 975       | 26258            | 0.0              |
| 460       | 269221           | 158.6            | 590       | 1958195          | 19.2             | 720       | 209675           | 0.0              | 850       | 30957            | 0.0              | 980       | 31067            | 0.0              |
| 465       | 203513           | 133.0            | 595       | 2055425          | 13.2             | 725       | 184999           | 0.0              | 855       | 38865            | 0.0              | 985       | 40288            | 0.0              |
| 470       | 163989           | 117.4            | 600       | 2141598          | 9.0              | 730       | 160261           | 0.0              | 860       | 23238            | 0.0              | 990       | 29366            | 0.0              |
| 475       | 129159           | 98.6             | 605       | 2185430          | 6.0              | 735       | 140736           | 0.0              | 865       | 32686            | 0.0              | 995       | 54854            | 0.0              |
| 480       | 115440           | 92.8             | 610       | 2170089          | 3.9              | 740       | 125207           | 0.0              | 870       | 41855            | 0.0              | 1000      | 50994            | 0.0              |
| 485       | 120959           | 99.7             | 615       | 2123505          | 2.5              | 745       | 110736           | 0.0              | 875       | 35838            | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2104-215-4

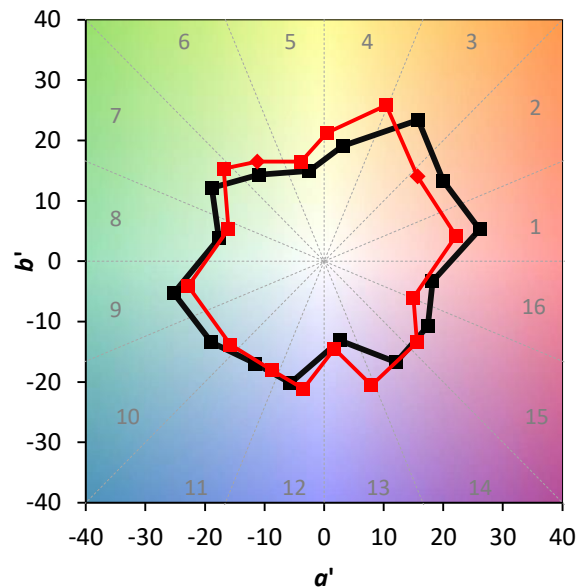
TM-30-18

### Summary

$R_f = 75.7$   
 $R_g = 96.7$   
 CIE  $R_a = 72.8$   
 $R_g = -23.3$



### Color Vector Graphics





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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 87 | CES26 = 68 | CES51 = 84 | CES76 = 70 |
| CES02 = 65 | CES27 = 88 | CES52 = 83 | CES77 = 79 |
| CES03 = 32 | CES28 = 89 | CES53 = 77 | CES78 = 73 |
| CES04 = 72 | CES29 = 66 | CES54 = 87 | CES79 = 85 |
| CES05 = 52 | CES30 = 75 | CES55 = 85 | CES80 = 84 |
| CES06 = 53 | CES31 = 69 | CES56 = 76 | CES81 = 57 |
| CES07 = 44 | CES32 = 65 | CES57 = 75 | CES82 = 93 |
| CES08 = 43 | CES33 = 73 | CES58 = 78 | CES83 = 87 |
| CES09 = 29 | CES34 = 81 | CES59 = 86 | CES84 = 92 |
| CES10 = 79 | CES35 = 91 | CES60 = 94 | CES85 = 72 |
| CES11 = 62 | CES36 = 96 | CES61 = 85 | CES86 = 52 |
| CES12 = 68 | CES37 = 90 | CES62 = 92 | CES87 = 78 |
| CES13 = 45 | CES38 = 81 | CES63 = 78 | CES88 = 77 |
| CES14 = 75 | CES39 = 94 | CES64 = 73 | CES89 = 62 |
| CES15 = 72 | CES40 = 90 | CES65 = 71 | CES90 = 77 |
| CES16 = 49 | CES41 = 86 | CES66 = 71 | CES91 = 91 |
| CES17 = 51 | CES42 = 87 | CES67 = 69 | CES92 = 60 |
| CES18 = 57 | CES43 = 74 | CES68 = 74 | CES93 = 74 |
| CES19 = 74 | CES44 = 99 | CES69 = 85 | CES94 = 49 |
| CES20 = 69 | CES45 = 81 | CES70 = 70 | CES95 = 71 |
| CES21 = 89 | CES46 = 76 | CES71 = 72 | CES96 = 77 |
| CES22 = 81 | CES47 = 77 | CES72 = 89 | CES97 = 79 |
| CES23 = 92 | CES48 = 66 | CES73 = 64 | CES98 = 75 |
| CES24 = 92 | CES49 = 75 | CES74 = 87 | CES99 = 67 |
| CES25 = 74 | CES50 = 84 | CES75 = 75 |            |



**Color Rendition by Hue-Angle Bin**


**Measure Comparisons**


(END OF REPORT)