

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: P237521

Luminaire Tested: **CTN-8-4-D-E1-T4-7050-HSS**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P237521  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1707-171-27)  
Test Lab: INNOVATION CENTER(G2)  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: MCGRAW-EDISON  
Catalog Number: CTN-8-4-D-E1-T4-7050-HSS  
Description: CELESTEON HIGH MAST LUMINAIRE  
(8) 70 CRI, 5000K LEDS AND TYPE IV OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 38270 lumens  
Efficiency: N/A  
Efficacy: 117.8 lumens/watt  
Luminous Opening: Circular (Dia: 2.08' x H: 0')  
IES Classification: Type IV - Short - Non-Cutoff  
BUG Rating: B3 - U0 - G5

Input Watts (W): 325  
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: 25 FT



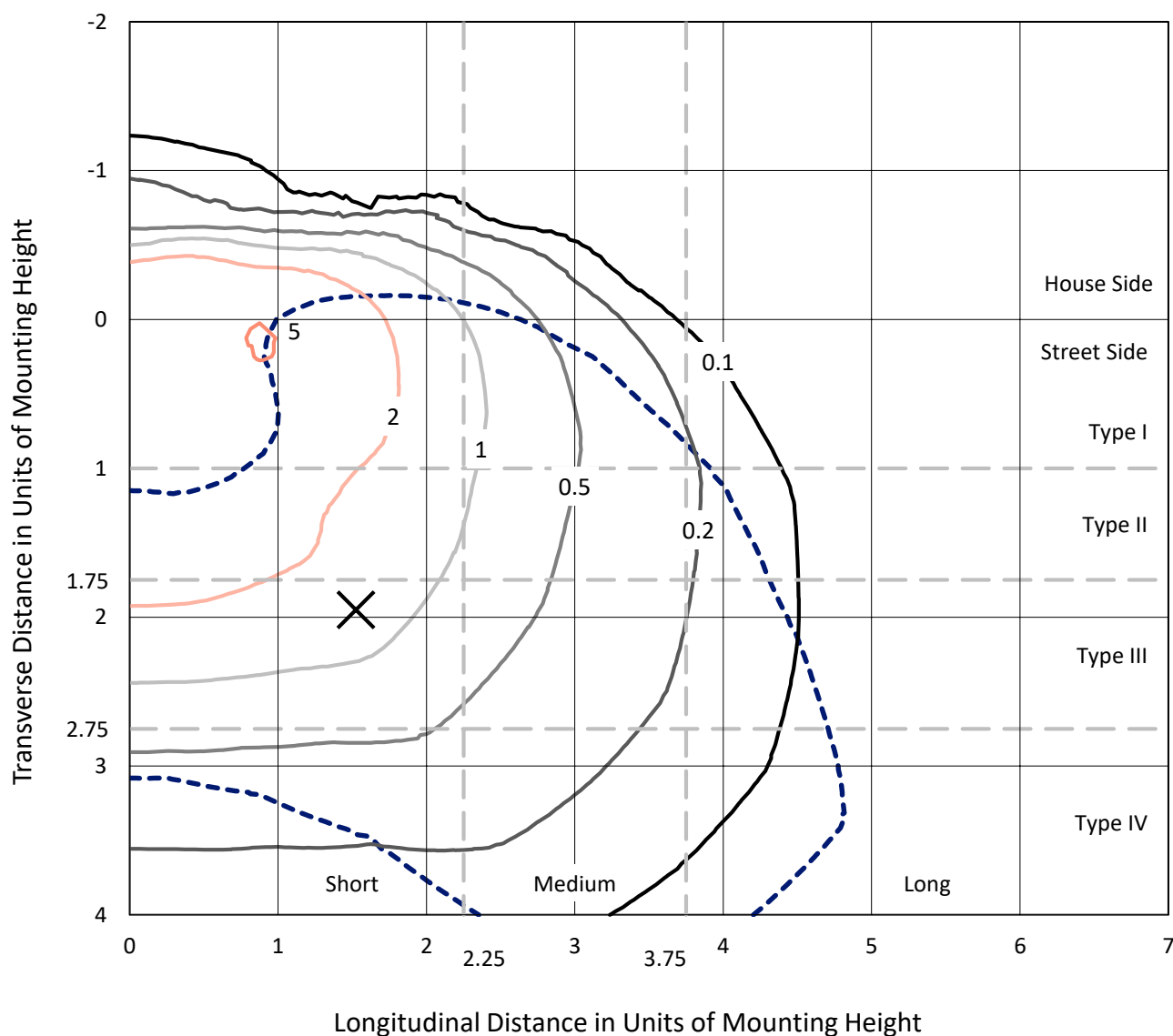
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## Iso-Footcandle Lines of Horizontal Illumination

× Max cd

--- 1/2 Max cd

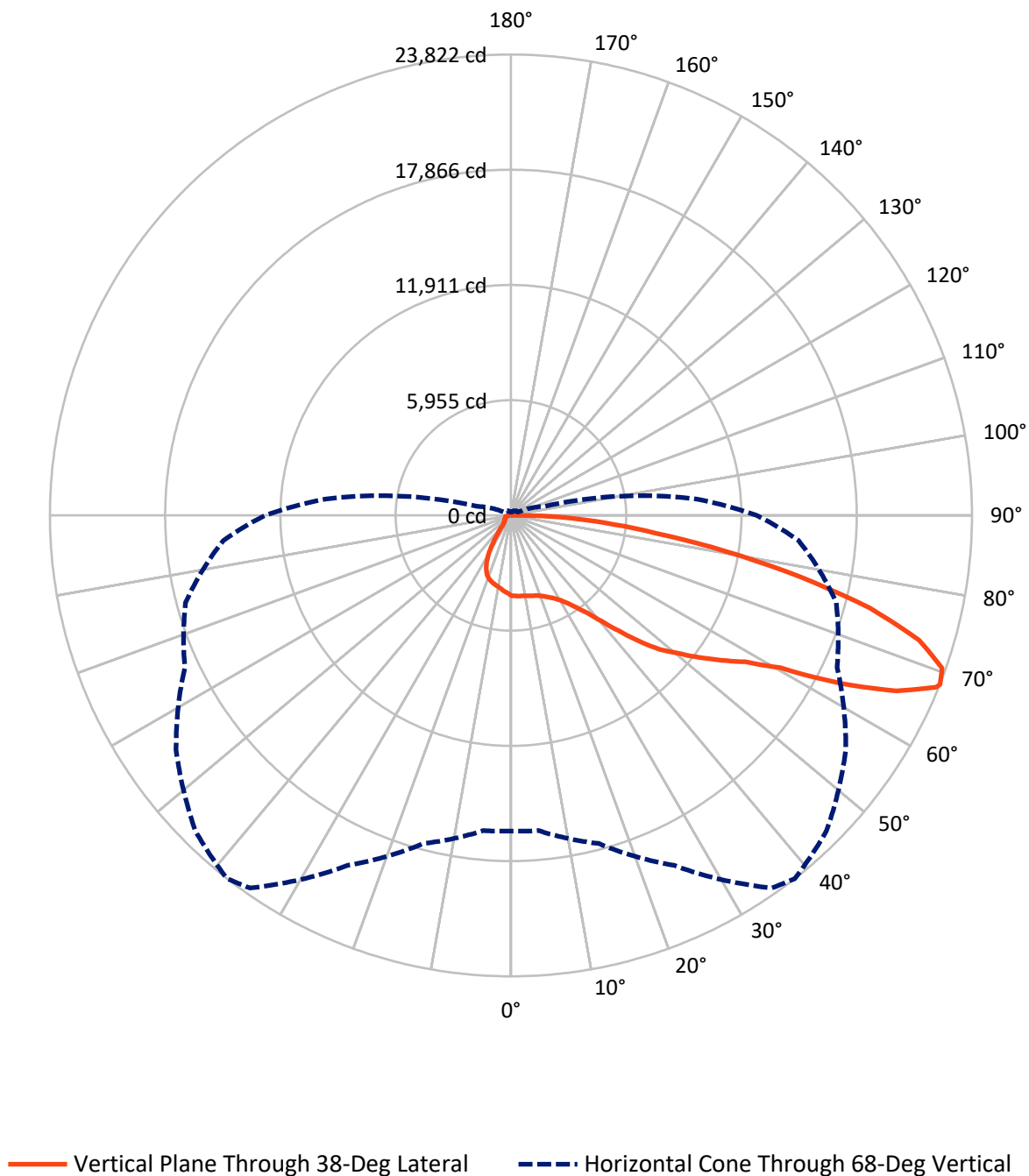


Based on 30 foot mounting height. Maximum calculated value = 5.2 fc  
 Type IV - Short - Non-Cutoff

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## Luminous Intensity Polar Plot



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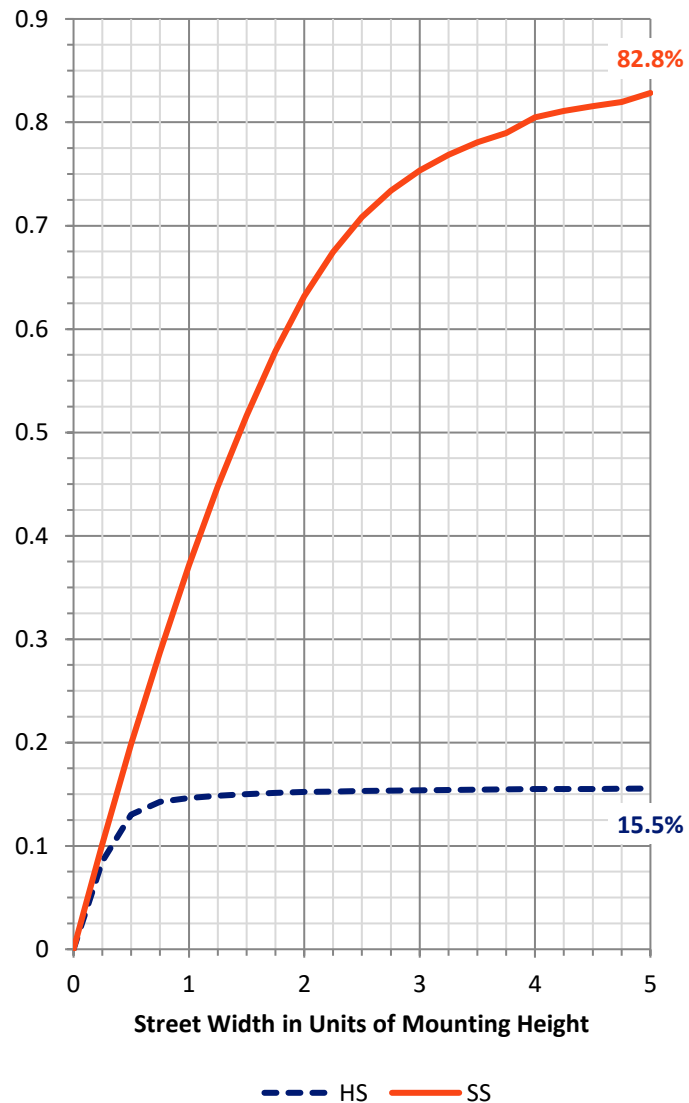
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 6036.3   | 0.0    | 6036.3  |
|                    | % Fixture | 15.8     | 0.0    | 15.8    |
| <b>Street Side</b> | Lumens    | 32233.7  | 0.0    | 32233.7 |
|                    | % Fixture | 84.2     | 0.0    | 84.2    |
| <b>Total</b>       | Lumens    | 38270.0  | 0.0    | 38270.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 391.8   | 1.0       |
| 10°-20°   | 1163.7  | 3.0       |
| 20°-30°   | 1942.1  | 5.1       |
| 30°-40°   | 2979.0  | 7.8       |
| 40°-50°   | 5128.7  | 13.4      |
| 50°-60°   | 7621.9  | 19.9      |
| 60°-70°   | 10083.1 | 26.3      |
| 70°-80°   | 7405.2  | 19.3      |
| 80°-90°   | 1554.4  | 4.1       |
| 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°    | 38270.0 | 100.0     |
| 0°-180°   | 38270.0 | 100.0     |

**Coefficient of Utilization**



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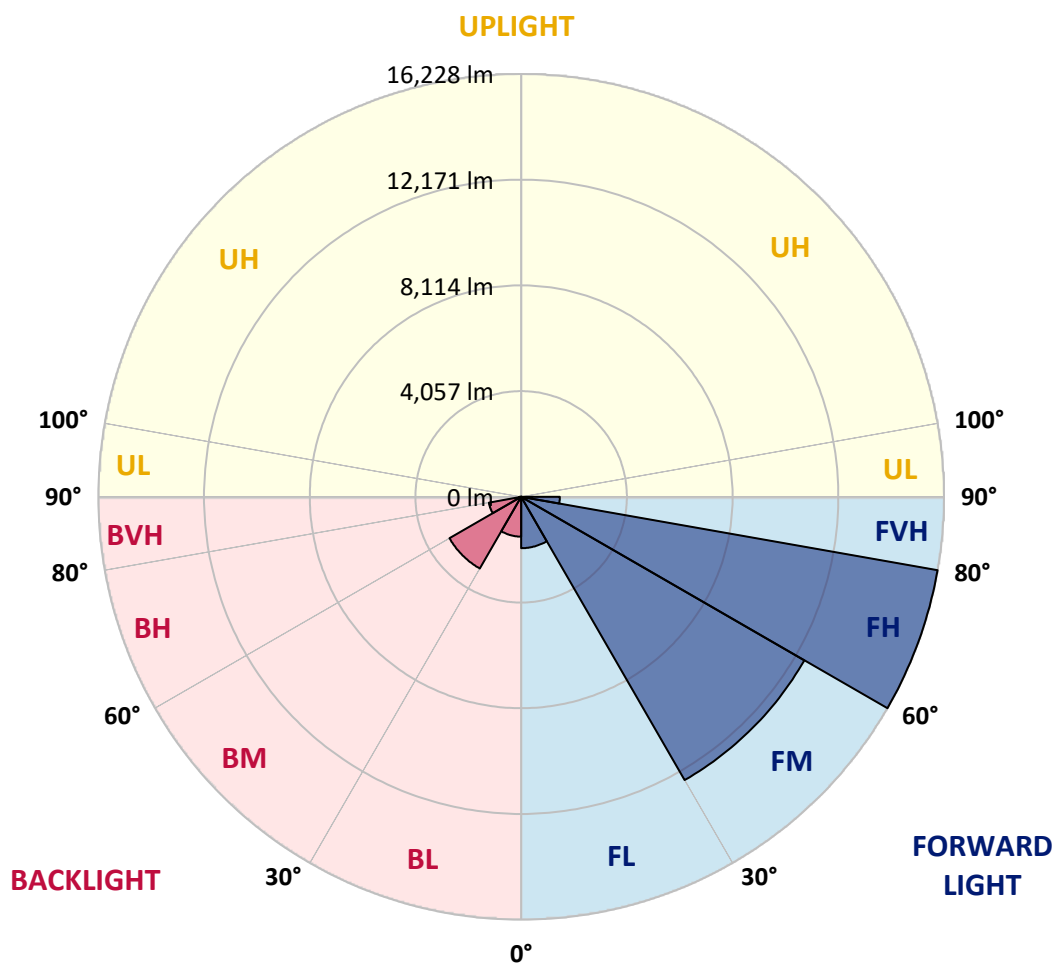
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**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|---------|-----------|-------------------------|------|---------|
|      |             |         |           | B                       | U    | G       |
| FL   | (0°-30°)    | 1970.4  | 5.1       |                         |      |         |
| FM   | (30°-60°)   | 12551.9 | 32.8      |                         |      |         |
| FH   | (60°-80°)   | 16228.4 | 42.4      |                         |      | G5      |
| FVH  | (80°-90°)   | 1482.9  | 3.9       |                         |      | G5      |
| BL   | (0°-30°)    | 1527.3  | 4.0       | B3/2500                 |      |         |
| BM   | (30°-60°)   | 3177.6  | 8.3       | B3/5000                 |      |         |
| BH   | (60°-80°)   | 1259.9  | 3.3       | B3/2500                 |      | G3/2500 |
| BVH  | (80°-90°)   | 71.5    | 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-G5**

Type IV Short



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 38°     | 45°     | 55°     | 65°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 4156.1  | 4156.1  | 4156.1  | 4156.1  | 4156.1  | 4156.1  | 4156.1  | 4156.1  | 4156.1  | 4156.1  | 4156.1  |
| 2.5°  | 4244.3  | 4214.9  | 4220.5  | 4238.7  | 4164.5  | 4158.9  | 4182.7  | 4156.1  | 4191.1  | 4174.3  | 4175.7  |
| 5°    | 4255.5  | 4227.5  | 4238.7  | 4266.6  | 4196.7  | 4195.3  | 4221.9  | 4188.3  | 4214.9  | 4193.9  | 4188.3  |
| 7.5°  | 4245.7  | 4220.5  | 4228.9  | 4255.5  | 4195.3  | 4199.5  | 4234.5  | 4223.3  | 4262.5  | 4241.5  | 4226.1  |
| 10°   | 4241.5  | 4224.7  | 4226.1  | 4262.5  | 4214.9  | 4226.1  | 4270.8  | 4277.8  | 4340.8  | 4322.6  | 4315.6  |
| 12.5° | 4203.7  | 4191.1  | 4203.7  | 4261.1  | 4245.7  | 4268.0  | 4328.2  | 4364.6  | 4438.7  | 4431.7  | 4445.7  |
| 15°   | 4181.3  | 4175.7  | 4185.5  | 4252.7  | 4270.8  | 4307.2  | 4387.0  | 4458.3  | 4547.8  | 4560.4  | 4592.6  |
| 17.5° | 4207.9  | 4216.3  | 4234.5  | 4289.0  | 4314.2  | 4352.0  | 4441.5  | 4539.4  | 4666.7  | 4721.3  | 4759.1  |
| 20°   | 4319.8  | 4329.6  | 4346.4  | 4381.4  | 4409.3  | 4441.5  | 4521.2  | 4633.2  | 4802.4  | 4887.8  | 4947.9  |
| 22.5° | 4482.1  | 4465.3  | 4489.1  | 4518.5  | 4526.8  | 4554.8  | 4636.0  | 4747.9  | 4939.5  | 5068.2  | 5152.2  |
| 25°   | 4608.0  | 4596.8  | 4620.6  | 4670.9  | 4669.5  | 4694.7  | 4774.4  | 4889.2  | 5096.2  | 5280.9  | 5429.1  |
| 27.5° | 4739.5  | 4732.5  | 4742.3  | 4809.4  | 4836.0  | 4866.8  | 4936.7  | 5065.4  | 5299.0  | 5531.3  | 5764.9  |
| 30°   | 4929.7  | 4945.1  | 4928.3  | 5005.3  | 5062.6  | 5097.6  | 5168.9  | 5327.0  | 5577.4  | 5895.0  | 6190.1  |
| 32.5° | 5224.9  | 5231.9  | 5203.9  | 5289.2  | 5371.8  | 5424.9  | 5493.5  | 5700.5  | 5974.7  | 6362.2  | 6742.7  |
| 35°   | 5854.4  | 5855.8  | 5741.1  | 5728.5  | 5774.7  | 5851.6  | 5952.3  | 6260.1  | 6668.6  | 7265.9  | 7696.8  |
| 37.5° | 6808.5  | 6762.3  | 6653.2  | 6440.5  | 6372.0  | 6386.0  | 6530.1  | 6958.1  | 7577.8  | 8680.2  | 9092.9  |
| 40°   | 7902.4  | 7849.2  | 7657.6  | 7376.4  | 7175.0  | 7162.4  | 7211.3  | 7724.7  | 8631.2  | 10270.7 | 10479.2 |
| 42.5° | 9083.1  | 9046.7  | 8736.1  | 8445.2  | 8187.8  | 8147.2  | 8036.7  | 8551.5  | 9792.3  | 11690.6 | 11689.2 |
| 45°   | 10172.8 | 10165.8 | 9786.7  | 9642.6  | 9369.8  | 9263.5  | 9132.0  | 9532.1  | 10985.6 | 12809.7 | 12675.4 |
| 47.5° | 11195.4 | 11174.4 | 10771.5 | 10606.5 | 10398.0 | 10340.7 | 10185.4 | 10465.2 | 12005.4 | 13854.7 | 13520.4 |
| 50°   | 12281.0 | 12216.6 | 11617.9 | 11451.4 | 11245.8 | 11201.0 | 11119.9 | 11441.6 | 13116.1 | 14768.2 | 14214.2 |
| 52.5° | 13542.8 | 13444.8 | 12627.9 | 12318.7 | 12171.8 | 12201.2 | 12149.5 | 12437.6 | 14358.3 | 15532.0 | 14782.2 |
| 55°   | 15035.4 | 14741.6 | 13961.0 | 13400.1 | 13074.1 | 13209.8 | 13109.1 | 13468.6 | 15550.2 | 16126.5 | 15196.3 |
| 57.5° | 16130.7 | 16129.3 | 15811.8 | 15014.4 | 14275.8 | 14282.8 | 14079.9 | 14489.8 | 16514.0 | 16718.3 | 15438.3 |
| 60°   | 17384.1 | 17458.3 | 17567.4 | 17213.5 | 16342.0 | 15976.8 | 15263.4 | 15501.2 | 17289.0 | 17147.7 | 15546.0 |
| 62.5° | 18473.9 | 18517.3 | 18999.9 | 19135.6 | 19202.7 | 19113.2 | 17526.8 | 16666.5 | 17922.7 | 17386.9 | 15576.8 |
| 65°   | 18434.7 | 18430.5 | 19474.1 | 20383.4 | 21796.3 | 21876.0 | 21418.6 | 18396.9 | 18413.7 | 17417.7 | 15417.3 |
| 67.5° | 16635.7 | 16721.1 | 18117.2 | 20065.8 | 23435.8 | 23687.6 | 23056.7 | 20909.4 | 18595.6 | 17403.7 | 15036.8 |
| 68°   | 16314.0 | 16350.4 | 17557.6 | 19953.9 | 23505.7 | 23821.9 | 23059.5 | 21119.2 | 18590.0 | 17405.1 | 14919.3 |
| 70°   | 14264.6 | 14319.2 | 15726.4 | 18598.4 | 23525.3 | 23634.4 | 22714.0 | 21233.9 | 18405.3 | 17275.0 | 14071.5 |
| 72.5° | 11261.2 | 11324.1 | 12606.9 | 15692.9 | 22059.3 | 22055.1 | 21165.4 | 20272.9 | 17780.0 | 16323.8 | 11936.8 |
| 75°   | 8158.4  | 8364.0  | 9485.9  | 12325.7 | 18883.8 | 19171.9 | 19057.2 | 18879.6 | 16000.6 | 13794.6 | 8424.2  |
| 77.5° | 5720.1  | 5825.0  | 6881.2  | 9270.5  | 14839.5 | 15280.2 | 16053.8 | 16283.2 | 13338.5 | 10244.2 | 3793.8  |
| 80°   | 3607.8  | 3805.0  | 4679.3  | 6583.2  | 10810.7 | 11217.8 | 12155.1 | 12541.1 | 9845.5  | 5024.9  | 664.5   |
| 82.5° | 2102.5  | 2220.1  | 2863.6  | 4263.9  | 7268.7  | 7552.7  | 8166.8  | 7692.6  | 3991.1  | 668.7   | 369.3   |
| 85°   | 1018.4  | 1126.1  | 1537.4  | 2425.7  | 4538.0  | 4824.8  | 5156.3  | 3354.6  | 660.3   | 263.0   | 249.0   |
| 87.5° | 412.7   | 423.9   | 629.5   | 1077.2  | 2262.0  | 2508.2  | 2427.1  | 1100.9  | 172.1   | 95.1    | 78.3    |
| 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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**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°     | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 4156.1  | 4156.1  | 4156.1 | 4156.1 | 4156.1 | 4156.1 | 4156.1 | 4156.1 | 4156.1 | 4156.1 | 4156.1 |
| 2.5°  | 4182.7  | 4161.7  | 4136.6 | 4128.2 | 4069.4 | 4066.6 | 4017.6 | 4089.0 | 4068.0 | 4069.4 | 4086.2 |
| 5°    | 4185.5  | 4161.7  | 4112.8 | 4090.4 | 4027.4 | 4010.6 | 3929.5 | 3974.3 | 3926.7 | 3922.5 | 3950.5 |
| 7.5°  | 4214.9  | 4188.3  | 4118.4 | 4083.4 | 3965.9 | 3909.9 | 3833.0 | 3872.2 | 3799.4 | 3784.0 | 3789.6 |
| 10°   | 4293.2  | 4259.7  | 4174.3 | 4091.8 | 3946.3 | 3865.2 | 3714.1 | 3726.7 | 3662.3 | 3641.3 | 3659.5 |
| 12.5° | 4412.1  | 4371.6  | 4269.4 | 4147.7 | 3963.1 | 3820.4 | 3635.7 | 3561.6 | 3463.7 | 3431.5 | 3441.3 |
| 15°   | 4574.4  | 4526.8  | 4392.5 | 4251.3 | 3999.5 | 3799.4 | 3547.6 | 3393.7 | 3203.5 | 3150.3 | 3130.7 |
| 17.5° | 4752.1  | 4701.7  | 4546.4 | 4368.8 | 4063.8 | 3775.6 | 3446.9 | 3202.1 | 2927.9 | 2807.6 | 2800.6 |
| 20°   | 4960.5  | 4905.9  | 4743.7 | 4505.9 | 4115.6 | 3746.3 | 3321.0 | 2969.9 | 2613.1 | 2411.7 | 2397.7 |
| 22.5° | 5199.7  | 5152.2  | 4968.9 | 4627.6 | 4142.1 | 3669.3 | 3130.7 | 2673.3 | 2227.1 | 1975.2 | 1962.7 |
| 25°   | 5480.9  | 5436.1  | 5178.7 | 4712.9 | 4112.8 | 3533.6 | 2870.5 | 2309.6 | 1772.4 | 1520.6 | 1509.4 |
| 27.5° | 5816.6  | 5746.7  | 5343.8 | 4738.1 | 4026.0 | 3311.2 | 2544.6 | 1842.4 | 1309.4 | 1117.7 | 1107.9 |
| 30°   | 6198.5  | 6074.0  | 5499.1 | 4731.1 | 3872.2 | 3027.2 | 2095.6 | 1358.3 | 930.3  | 801.6  | 797.4  |
| 32.5° | 6679.8  | 6461.5  | 5647.4 | 4675.1 | 3652.5 | 2655.1 | 1594.7 | 942.9  | 668.7  | 605.7  | 604.3  |
| 35°   | 7482.7  | 7015.5  | 5809.6 | 4574.4 | 3354.6 | 2166.9 | 1105.1 | 642.1  | 544.2  | 531.6  | 531.6  |
| 37.5° | 8680.2  | 7929.0  | 6040.5 | 4413.5 | 2968.5 | 1652.1 | 727.4  | 510.6  | 512.0  | 519.0  | 520.4  |
| 40°   | 9909.8  | 8979.5  | 6374.8 | 4174.3 | 2518.0 | 1161.1 | 528.8  | 474.2  | 491.0  | 502.2  | 510.6  |
| 42.5° | 11038.7 | 9930.8  | 6746.9 | 3847.0 | 2008.8 | 766.6  | 472.8  | 456.0  | 464.4  | 472.8  | 481.2  |
| 45°   | 11985.8 | 10764.5 | 7098.0 | 3473.5 | 1488.4 | 545.6  | 468.6  | 435.1  | 430.9  | 436.5  | 442.1  |
| 47.5° | 12784.6 | 11443.0 | 7344.2 | 3052.4 | 1012.8 | 467.2  | 457.4  | 412.7  | 398.7  | 400.1  | 402.9  |
| 50°   | 13394.5 | 11922.8 | 7453.3 | 2589.4 | 671.5  | 454.6  | 436.5  | 388.9  | 366.5  | 366.5  | 369.3  |
| 52.5° | 13805.8 | 12223.6 | 7389.0 | 2067.6 | 482.6  | 447.6  | 419.7  | 363.7  | 337.1  | 341.3  | 344.1  |
| 55°   | 14110.7 | 12384.5 | 7135.8 | 1519.2 | 425.3  | 426.7  | 400.1  | 334.3  | 312.0  | 323.1  | 327.3  |
| 57.5° | 14229.6 | 12380.3 | 6710.5 | 1049.2 | 422.5  | 394.5  | 372.1  | 309.2  | 291.0  | 306.4  | 313.4  |
| 60°   | 14186.3 | 12176.0 | 6092.2 | 714.8  | 414.1  | 369.3  | 342.7  | 285.4  | 271.4  | 271.4  | 272.8  |
| 62.5° | 14099.5 | 11889.3 | 5195.5 | 530.2  | 394.5  | 351.1  | 320.3  | 265.8  | 249.0  | 240.6  | 237.8  |
| 65°   | 13707.8 | 11194.0 | 3814.8 | 457.4  | 374.9  | 341.3  | 299.4  | 247.6  | 225.2  | 211.2  | 208.4  |
| 67.5° | 12932.8 | 9997.9  | 2131.9 | 422.5  | 360.9  | 335.7  | 285.4  | 230.8  | 205.6  | 188.9  | 187.5  |
| 68°   | 12695.0 | 9624.4  | 1807.4 | 419.7  | 363.7  | 335.7  | 284.0  | 226.6  | 202.8  | 184.7  | 183.3  |
| 70°   | 11287.7 | 7763.9  | 747.0  | 394.5  | 383.3  | 337.1  | 277.0  | 214.0  | 191.6  | 173.5  | 172.1  |
| 72.5° | 8537.5  | 4497.5  | 394.5  | 342.7  | 373.5  | 331.5  | 279.8  | 204.2  | 181.9  | 160.9  | 158.1  |
| 75°   | 4704.5  | 1288.4  | 351.1  | 278.4  | 345.5  | 349.7  | 285.4  | 202.8  | 176.3  | 149.7  | 144.1  |
| 77.5° | 1045.0  | 419.7   | 327.3  | 243.4  | 298.0  | 321.7  | 264.4  | 193.0  | 179.1  | 137.1  | 131.5  |
| 80°   | 400.1   | 341.3   | 310.6  | 187.5  | 236.4  | 272.8  | 219.6  | 172.1  | 183.3  | 128.7  | 121.7  |
| 82.5° | 334.3   | 299.4   | 285.4  | 145.5  | 163.7  | 200.0  | 176.3  | 146.9  | 169.3  | 118.9  | 113.3  |
| 85°   | 246.2   | 289.6   | 201.4  | 114.7  | 120.3  | 123.1  | 123.1  | 114.7  | 145.5  | 104.9  | 99.3   |
| 87.5° | 99.3    | 139.9   | 85.3   | 53.2   | 61.6   | 57.4   | 50.4   | 61.6   | 83.9   | 74.1   | 74.1   |
| 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: SP1-2104-215-7

Luminaire Tested: CST-CA6-230-750-U-T4

Test Date: 04/22/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2104-215-7  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 04/22/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: STREETWORKS  
 Catalog Number: **CST-CA6-230-750-U-T4**  
 Description: STREETWORKS HIGH MAST LUMINAIRE

### Spectral Parameters

|                           |        |           |      |      |       |
|---------------------------|--------|-----------|------|------|-------|
| CCT (K):                  | 4852   | CRI (Ra): | 74.1 |      |       |
| CIE u':                   | 0.2118 | R1:       | 71.0 | R9:  | -25.4 |
| CIE v':                   | 0.4888 | R2:       | 79.6 | R10: | 51.4  |
| Duv:                      | 0.0017 | R3:       | 85.8 | R11: | 70.1  |
| CIE x:                    | 0.3498 | R4:       | 73.5 | R12: | 42.9  |
| CIE y:                    | 0.3588 | R5:       | 71.4 | R13: | 72.5  |
| CIE z:                    | 0.2914 | R6:       | 71.2 | R14: | 92.1  |
| Peak Wavelength (nm):     | 449    | R7:       | 82.9 |      |       |
| Dominant Wavelength (nm): | 572    | R8:       | 57.2 |      |       |
| Purity:                   | 12.7   |           |      |      |       |
| Rf:                       | 75.2   |           |      |      |       |
| Rg:                       | 94.7   |           |      |      |       |



### Test Conditions

Stabilization Time: 72M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.4/13%  
 Sphere Temperature (°C): 24.0

REPORT NUMBER: SP1-2104-215-7

| 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: SP1-2104-215-7

**CIE 1931 Chromaticity Diagram**



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



Point lies inside the ANSI 5000K 4-step quadrangle

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### Photopic Flux vs. Wavelength

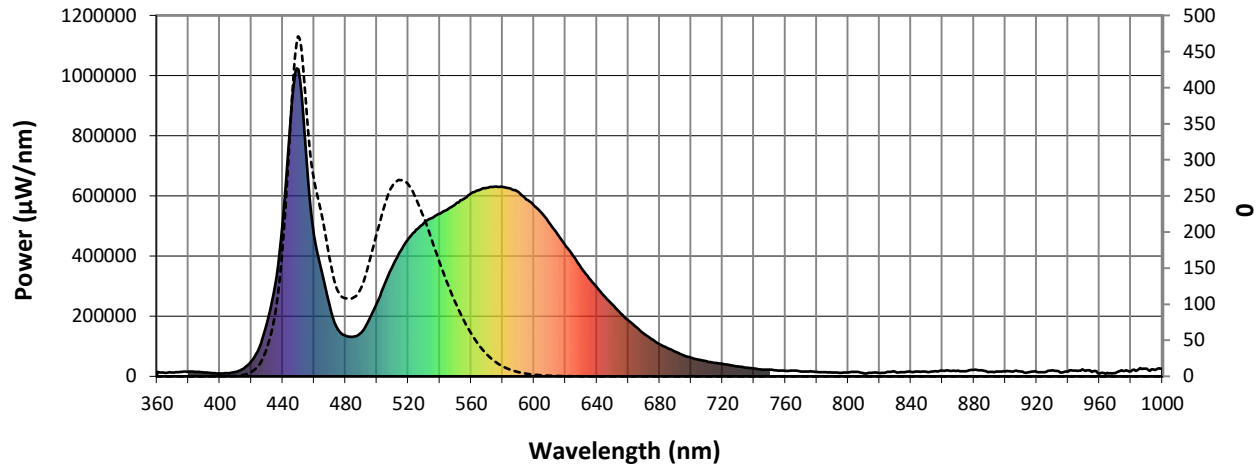


#####

| 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       | 15077            | 0.0              | 490       | 146327           | 20.8             | 620       | 434415           | 113.0            | 750       | 22886            | 0.0              | 880       | 20960            | 0.0              |
| 365       | 12138            | 0.0              | 495       | 188585           | 34.2             | 625       | 400670           | 88.4             | 755       | 19692            | 0.0              | 885       | 20315            | 0.0              |
| 370       | 12993            | 0.0              | 500       | 245069           | 54.1             | 630       | 360611           | 65.3             | 760       | 18199            | 0.0              | 890       | 15211            | 0.0              |
| 375       | 14513            | 0.0              | 505       | 307682           | 86.1             | 635       | 326986           | 49.1             | 765       | 19191            | 0.0              | 895       | 15502            | 0.0              |
| 380       | 15679            | 0.0              | 510       | 367102           | 126.1            | 640       | 295583           | 35.3             | 770       | 16229            | 0.0              | 900       | 15935            | 0.0              |
| 385       | 14569            | 0.0              | 515       | 416068           | 172.4            | 645       | 264664           | 25.5             | 775       | 16351            | 0.0              | 905       | 15965            | 0.0              |
| 390       | 13091            | 0.0              | 520       | 457470           | 221.8            | 650       | 238441           | 17.4             | 780       | 14567            | 0.0              | 910       | 16119            | 0.0              |
| 395       | 10927            | 0.0              | 525       | 486980           | 261.4            | 655       | 210047           | 12.1             | 785       | 13349            | 0.0              | 915       | 13972            | 0.0              |
| 400       | 9655             | 0.0              | 530       | 511184           | 301.0            | 660       | 186019           | 7.8              | 790       | 12552            | 0.0              | 920       | 14830            | 0.0              |
| 405       | 10895            | 0.0              | 535       | 527191           | 326.9            | 665       | 164001           | 5.2              | 795       | 11517            | 0.0              | 925       | 13744            | 0.0              |
| 410       | 14929            | 0.0              | 540       | 540658           | 352.3            | 670       | 142007           | 3.1              | 800       | 13250            | 0.0              | 930       | 20340            | 0.0              |
| 415       | 25993            | 0.0              | 545       | 555639           | 369.8            | 675       | 123441           | 2.1              | 805       | 15135            | 0.0              | 935       | 13272            | 0.0              |
| 420       | 49620            | 0.1              | 550       | 572229           | 388.9            | 680       | 106894           | 1.2              | 810       | 9873             | 0.0              | 940       | 16357            | 0.0              |
| 425       | 95836            | 0.5              | 555       | 589788           | 402.8            | 685       | 94026            | 0.8              | 815       | 11566            | 0.0              | 945       | 19257            | 0.0              |
| 430       | 178101           | 1.4              | 560       | 608278           | 413.4            | 690       | 82099            | 0.5              | 820       | 11216            | 0.0              | 950       | 19804            | 0.0              |
| 435       | 300144           | 3.5              | 565       | 619317           | 411.8            | 695       | 70275            | 0.3              | 825       | 15165            | 0.0              | 955       | 14877            | 0.0              |
| 440       | 512674           | 8.1              | 570       | 627176           | 407.8            | 700       | 61784            | 0.2              | 830       | 14983            | 0.0              | 960       | 9882             | 0.0              |
| 445       | 857336           | 17.9             | 575       | 631114           | 392.7            | 705       | 55550            | 0.1              | 835       | 13993            | 0.0              | 965       | 11741            | 0.0              |
| 450       | 1021494          | 26.5             | 580       | 630436           | 374.6            | 710       | 50234            | 0.1              | 840       | 15281            | 0.0              | 970       | 11068            | 0.0              |
| 455       | 730207           | 24.4             | 585       | 625204           | 347.4            | 715       | 44909            | 0.0              | 845       | 15737            | 0.0              | 975       | 18108            | 0.0              |
| 460       | 467897           | 19.2             | 590       | 612752           | 316.8            | 720       | 41441            | 0.0              | 850       | 15148            | 0.0              | 980       | 17506            | 0.0              |
| 465       | 344659           | 17.8             | 595       | 589048           | 279.2            | 725       | 36834            | 0.0              | 855       | 17198            | 0.0              | 985       | 23821            | 0.0              |
| 470       | 230541           | 14.3             | 600       | 567479           | 244.6            | 730       | 32988            | 0.0              | 860       | 19169            | 0.0              | 990       | 25862            | 0.0              |
| 475       | 157156           | 12.3             | 605       | 542722           | 210.2            | 735       | 28984            | 0.0              | 865       | 18632            | 0.0              | 995       | 21133            | 0.0              |
| 480       | 134805           | 12.8             | 610       | 507118           | 174.2            | 740       | 26177            | 0.0              | 870       | 18831            | 0.0              | 1000      | 25640            | 0.0              |
| 485       | 132031           | 15.6             | 615       | 472188           | 142.5            | 745       | 22680            | 0.0              | 875       | 16978            | 0.0              |           |                  |                  |

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### Scotopic Flux vs. Wavelength



Scotopic Lumens: 66024.8

S/P: 1.78

| $\lambda$<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               | 15077                         | 0.0                            | 490               | 146327                        | 225.3                          | 620               | 434415                        | 5.4                            | 750               | 22886                         | 0.0                            | 880               | 20960                         | 0.0                            |
| 365               | 12138                         | 0.0                            | 495               | 188585                        | 304.9                          | 625               | 400670                        | 3.4                            | 755               | 19692                         | 0.0                            | 885               | 20315                         | 0.0                            |
| 370               | 12993                         | 0.0                            | 500               | 245069                        | 409.9                          | 630               | 360611                        | 2.0                            | 760               | 18199                         | 0.0                            | 890               | 15211                         | 0.0                            |
| 375               | 14513                         | 0.0                            | 505               | 307682                        | 523.1                          | 635               | 326986                        | 1.2                            | 765               | 19191                         | 0.0                            | 895               | 15502                         | 0.0                            |
| 380               | 15679                         | 0.0                            | 510               | 367102                        | 622.2                          | 640               | 295583                        | 0.8                            | 770               | 16229                         | 0.0                            | 900               | 15935                         | 0.0                            |
| 385               | 14569                         | 0.0                            | 515               | 416068                        | 689.6                          | 645               | 264664                        | 0.5                            | 775               | 16351                         | 0.0                            | 905               | 15965                         | 0.0                            |
| 390               | 13091                         | 0.0                            | 520               | 457470                        | 727.1                          | 650               | 238441                        | 0.3                            | 780               | 14567                         | 0.0                            | 910               | 16119                         | 0.0                            |
| 395               | 10927                         | 0.1                            | 525               | 486980                        | 728.5                          | 655               | 210047                        | 0.2                            | 785               | 13349                         | 0.0                            | 915               | 13972                         | 0.0                            |
| 400               | 9655                          | 0.2                            | 530               | 511184                        | 704.8                          | 660               | 186019                        | 0.1                            | 790               | 12552                         | 0.0                            | 920               | 14830                         | 0.0                            |
| 405               | 10895                         | 0.3                            | 535               | 527191                        | 656.9                          | 665               | 164001                        | 0.1                            | 795               | 11517                         | 0.0                            | 925               | 13744                         | 0.0                            |
| 410               | 14929                         | 0.9                            | 540               | 540658                        | 597.4                          | 670               | 142007                        | 0.0                            | 800               | 13250                         | 0.0                            | 930               | 20340                         | 0.0                            |
| 415               | 25993                         | 2.7                            | 545               | 555639                        | 532.7                          | 675               | 123441                        | 0.0                            | 805               | 15135                         | 0.0                            | 935               | 13272                         | 0.0                            |
| 420               | 49620                         | 8.2                            | 550               | 572229                        | 467.9                          | 680               | 106894                        | 0.0                            | 810               | 9873                          | 0.0                            | 940               | 16357                         | 0.0                            |
| 425               | 95836                         | 23.4                           | 555               | 589788                        | 403.1                          | 685               | 94026                         | 0.0                            | 815               | 11566                         | 0.0                            | 945               | 19257                         | 0.0                            |
| 430               | 178101                        | 60.6                           | 560               | 608278                        | 340.0                          | 690               | 82099                         | 0.0                            | 820               | 11216                         | 0.0                            | 950               | 19804                         | 0.0                            |
| 435               | 300144                        | 134.2                          | 565               | 619317                        | 277.8                          | 695               | 70275                         | 0.0                            | 825               | 15165                         | 0.0                            | 955               | 14877                         | 0.0                            |
| 440               | 512674                        | 286.5                          | 570               | 627176                        | 221.3                          | 700               | 61784                         | 0.0                            | 830               | 14983                         | 0.0                            | 960               | 9882                          | 0.0                            |
| 445               | 857336                        | 574.1                          | 575               | 631114                        | 171.9                          | 705               | 55550                         | 0.0                            | 835               | 13993                         | 0.0                            | 965               | 11741                         | 0.0                            |
| 450               | 1021494                       | 791.7                          | 580               | 630436                        | 129.9                          | 710               | 50234                         | 0.0                            | 840               | 15281                         | 0.0                            | 970               | 11068                         | 0.0                            |
| 455               | 730207                        | 638.1                          | 585               | 625204                        | 95.5                           | 715               | 44909                         | 0.0                            | 845               | 15737                         | 0.0                            | 975               | 18108                         | 0.0                            |
| 460               | 467897                        | 451.9                          | 590               | 612752                        | 68.2                           | 720               | 41441                         | 0.0                            | 850               | 15148                         | 0.0                            | 980               | 17506                         | 0.0                            |
| 465               | 344659                        | 364.0                          | 595               | 589048                        | 47.0                           | 725               | 36834                         | 0.0                            | 855               | 17198                         | 0.0                            | 985               | 23821                         | 0.0                            |
| 470               | 230541                        | 265.5                          | 600               | 567479                        | 32.0                           | 730               | 32988                         | 0.0                            | 860               | 19169                         | 0.0                            | 990               | 25862                         | 0.0                            |
| 475               | 157156                        | 196.5                          | 605               | 542722                        | 21.3                           | 735               | 28984                         | 0.0                            | 865               | 18632                         | 0.0                            | 995               | 21133                         | 0.0                            |
| 480               | 134805                        | 182.1                          | 610               | 507118                        | 13.7                           | 740               | 26177                         | 0.0                            | 870               | 18831                         | 0.0                            | 1000              | 25640                         | 0.0                            |
| 485               | 132031                        | 191.4                          | 615               | 472188                        | 8.7                            | 745               | 22680                         | 0.0                            | 875               | 16978                         | 0.0                            |                   |                               |                                |

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### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 26696.3**      **M/P: 0.72**

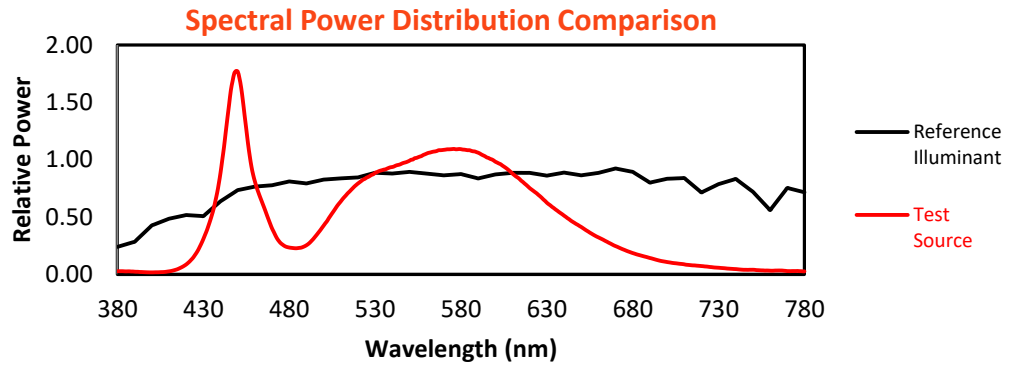
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 15077            | 0.0              | 490       | 146327           | 121.8            | 620       | 434415           | 0.3              | 750       | 22886            | 0.0              | 880       | 20960            | 0.0              |
| 365       | 12138            | 0.0              | 495       | 188585           | 155.7            | 625       | 400670           | 0.2              | 755       | 19692            | 0.0              | 885       | 20315            | 0.0              |
| 370       | 12993            | 0.0              | 500       | 245069           | 197.0            | 630       | 360611           | 0.1              | 760       | 18199            | 0.0              | 890       | 15211            | 0.0              |
| 375       | 14513            | 0.0              | 505       | 307682           | 236.1            | 635       | 326986           | 0.1              | 765       | 19191            | 0.0              | 895       | 15502            | 0.0              |
| 380       | 15679            | 0.0              | 510       | 367102           | 263.6            | 640       | 295583           | 0.0              | 770       | 16229            | 0.0              | 900       | 15935            | 0.0              |
| 385       | 14569            | 0.0              | 515       | 416068           | 271.9            | 645       | 264664           | 0.0              | 775       | 16351            | 0.0              | 905       | 15965            | 0.0              |
| 390       | 13091            | 0.0              | 520       | 457470           | 266.3            | 650       | 238441           | 0.0              | 780       | 14567            | 0.0              | 910       | 16119            | 0.0              |
| 395       | 10927            | 0.1              | 525       | 486980           | 247.0            | 655       | 210047           | 0.0              | 785       | 13349            | 0.0              | 915       | 13972            | 0.0              |
| 400       | 9655             | 0.1              | 530       | 511184           | 220.9            | 660       | 186019           | 0.0              | 790       | 12552            | 0.0              | 920       | 14830            | 0.0              |
| 405       | 10895            | 0.2              | 535       | 527191           | 189.7            | 665       | 164001           | 0.0              | 795       | 11517            | 0.0              | 925       | 13744            | 0.0              |
| 410       | 14929            | 0.6              | 540       | 540658           | 158.2            | 670       | 142007           | 0.0              | 800       | 13250            | 0.0              | 930       | 20340            | 0.0              |
| 415       | 25993            | 1.7              | 545       | 555639           | 129.1            | 675       | 123441           | 0.0              | 805       | 15135            | 0.0              | 935       | 13272            | 0.0              |
| 420       | 49620            | 5.7              | 550       | 572229           | 102.7            | 680       | 106894           | 0.0              | 810       | 9873             | 0.0              | 940       | 16357            | 0.0              |
| 425       | 95836            | 14.9             | 555       | 589788           | 79.5             | 685       | 94026            | 0.0              | 815       | 11566            | 0.0              | 945       | 19257            | 0.0              |
| 430       | 178101           | 37.6             | 560       | 608278           | 60.0             | 690       | 82099            | 0.0              | 820       | 11216            | 0.0              | 950       | 19804            | 0.0              |
| 435       | 300144           | 80.1             | 565       | 619317           | 43.5             | 695       | 70275            | 0.0              | 825       | 15165            | 0.0              | 955       | 14877            | 0.0              |
| 440       | 512674           | 171.3            | 570       | 627176           | 30.6             | 700       | 61784            | 0.0              | 830       | 14983            | 0.0              | 960       | 9882             | 0.0              |
| 445       | 857336           | 338.2            | 575       | 631114           | 21.0             | 705       | 55550            | 0.0              | 835       | 13993            | 0.0              | 965       | 11741            | 0.0              |
| 450       | 1021494          | 470.7            | 580       | 630436           | 14.1             | 710       | 50234            | 0.0              | 840       | 15281            | 0.0              | 970       | 11068            | 0.0              |
| 455       | 730207           | 382.6            | 585       | 625204           | 9.3              | 715       | 44909            | 0.0              | 845       | 15737            | 0.0              | 975       | 18108            | 0.0              |
| 460       | 467897           | 275.7            | 590       | 612752           | 6.0              | 720       | 41441            | 0.0              | 850       | 15148            | 0.0              | 980       | 17506            | 0.0              |
| 465       | 344659           | 225.2            | 595       | 589048           | 3.8              | 725       | 36834            | 0.0              | 855       | 17198            | 0.0              | 985       | 23821            | 0.0              |
| 470       | 230541           | 165.0            | 600       | 567479           | 2.4              | 730       | 32988            | 0.0              | 860       | 19169            | 0.0              | 990       | 25862            | 0.0              |
| 475       | 157156           | 120.0            | 605       | 542722           | 1.5              | 735       | 28984            | 0.0              | 865       | 18632            | 0.0              | 995       | 21133            | 0.0              |
| 480       | 134805           | 108.3            | 610       | 507118           | 0.9              | 740       | 26177            | 0.0              | 870       | 18831            | 0.0              | 1000      | 25640            | 0.0              |
| 485       | 132031           | 108.8            | 615       | 472188           | 0.6              | 745       | 22680            | 0.0              | 875       | 16978            | 0.0              |           |                  |                  |

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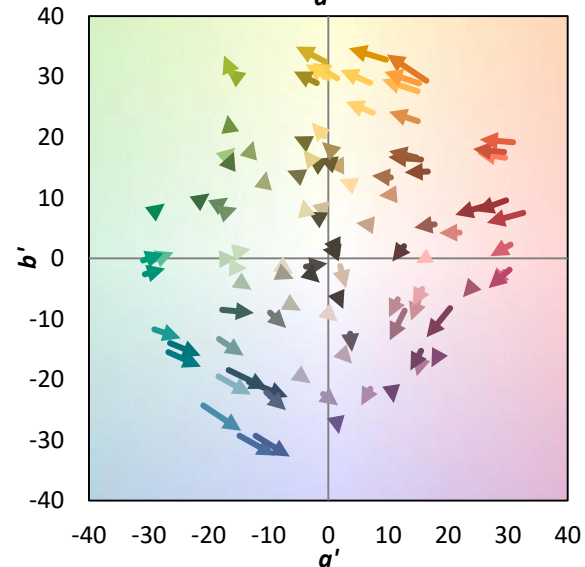
TM-30-18

### Summary

$R_f = 75.2$   
 $R_g = 94.7$   
 CIE  $R_a = 74.1$   
 $R_g = -25.4$



### Color Vector Graphics



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 63 | CES51 = 90 | CES76 = 52 |
| CES02 = 60 | CES27 = 88 | CES52 = 90 | CES77 = 68 |
| CES03 = 30 | CES28 = 81 | CES53 = 81 | CES78 = 54 |
| CES04 = 69 | CES29 = 67 | CES54 = 86 | CES79 = 81 |
| CES05 = 46 | CES30 = 85 | CES55 = 84 | CES80 = 77 |
| CES06 = 50 | CES31 = 71 | CES56 = 76 | CES81 = 79 |
| CES07 = 39 | CES32 = 63 | CES57 = 75 | CES82 = 91 |
| CES08 = 38 | CES33 = 79 | CES58 = 76 | CES83 = 89 |
| CES09 = 29 | CES34 = 70 | CES59 = 87 | CES84 = 86 |
| CES10 = 73 | CES35 = 83 | CES60 = 89 | CES85 = 79 |
| CES11 = 56 | CES36 = 90 | CES61 = 83 | CES86 = 76 |
| CES12 = 62 | CES37 = 79 | CES62 = 85 | CES87 = 78 |
| CES13 = 42 | CES38 = 94 | CES63 = 76 | CES88 = 82 |
| CES14 = 74 | CES39 = 96 | CES64 = 67 | CES89 = 74 |
| CES15 = 70 | CES40 = 91 | CES65 = 64 | CES90 = 81 |
| CES16 = 46 | CES41 = 95 | CES66 = 61 | CES91 = 74 |
| CES17 = 49 | CES42 = 80 | CES67 = 58 | CES92 = 61 |
| CES18 = 55 | CES43 = 78 | CES68 = 66 | CES93 = 77 |
| CES19 = 71 | CES44 = 99 | CES69 = 74 | CES94 = 56 |
| CES20 = 64 | CES45 = 86 | CES70 = 58 | CES95 = 67 |
| CES21 = 85 | CES46 = 85 | CES71 = 51 | CES96 = 78 |
| CES22 = 77 | CES47 = 88 | CES72 = 83 | CES97 = 86 |
| CES23 = 91 | CES48 = 80 | CES73 = 48 | CES98 = 77 |
| CES24 = 90 | CES49 = 83 | CES74 = 92 | CES99 = 65 |
| CES25 = 71 | CES50 = 90 | CES75 = 52 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)