

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: STREETWORKS

Report Number: P510468

Luminaire Tested: **CST-CA10-310-727-U-T3-HSS**

Issue Date: 4/6/2021

**Test Information**

Test Method: LM-79-08  
Report Number: P510468  
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: STREETWORKS  
Catalog Number: CST-CA10-310-727-U-T3-HSS  
Description: CELESTEON HIGH MAST LUMINAIRE  
Light Source: (10) 2700K CCT, 70 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 38265 lumens  
Efficiency: N/A  
Efficacy: 122.5 lumens/watt  
Luminous Opening: Circular (Dia: 2.08' x H: 0')  
IES Classification: Type III - Short  
BUG Rating: B3 - U0 - G4

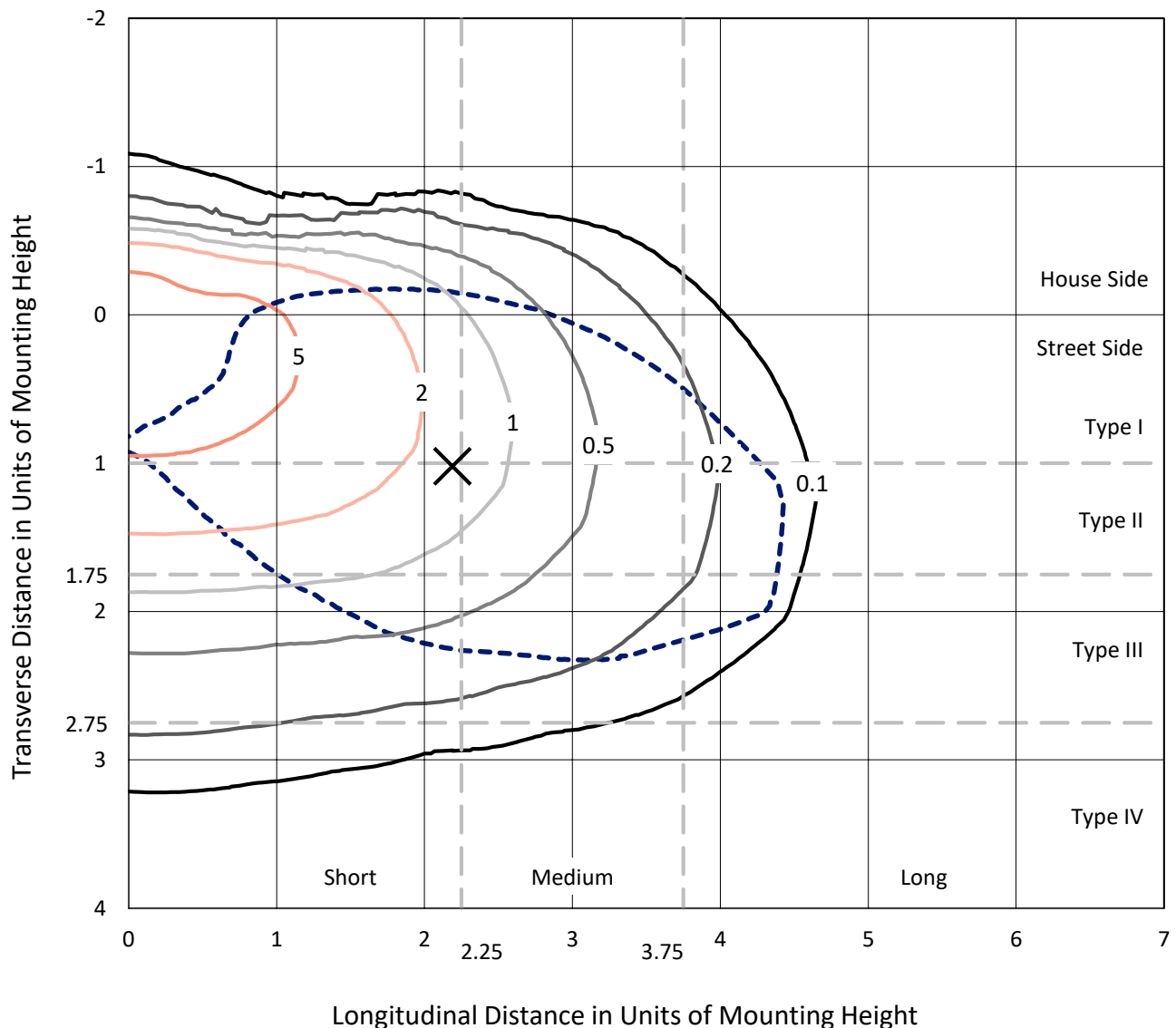
Input Watts (W): 312.4  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



REPORT NUMBER: P510468  
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## Iso-Footcandle Lines of Horizontal Illumination

✕ Max cd  
 - - - 1/2 Max cd

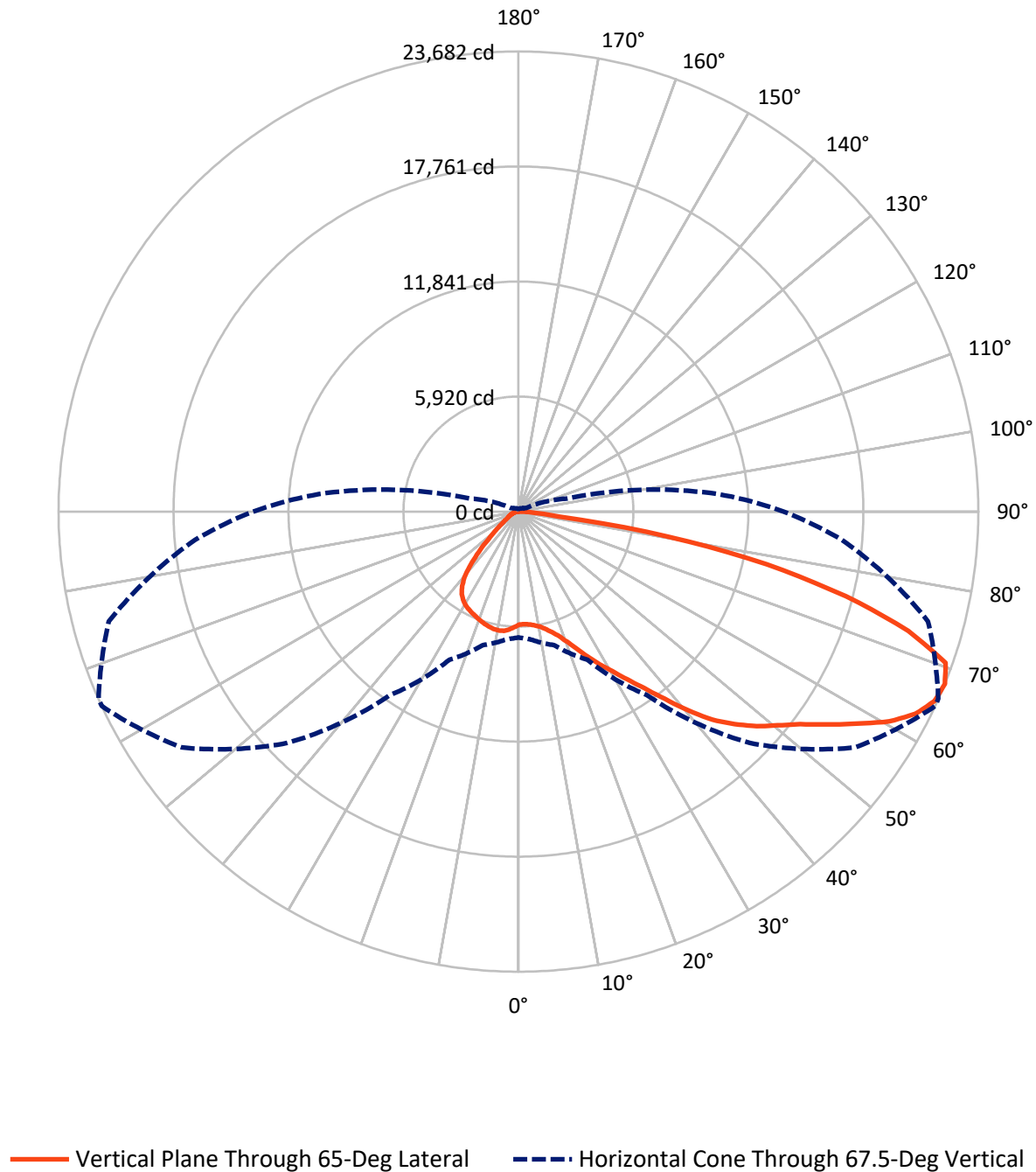


Based on 30 foot mounting height. Maximum calculated value = 7.6 fc  
 Type III - Short - N/A

FIELD PERFORMANCE MAY DIFFER FROM LABORATORY PERFORMANCE

REPORT NUMBER: P510468  
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## Luminous Intensity Polar Plot



FIELD PERFORMANCE MAY DIFFER FROM LABORATORY PERFORMANCE

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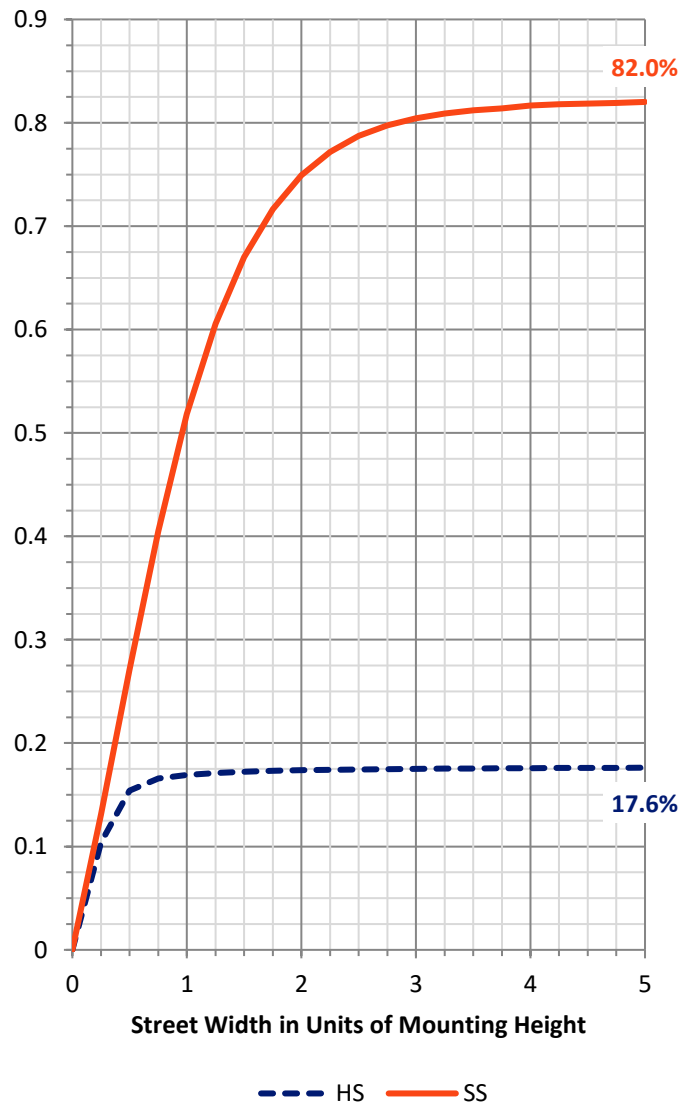
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 6838.9   | 0.0    | 6838.9  |
|                    | % Fixture | 17.9     | 0.0    | 17.9    |
| <b>Street Side</b> | Lumens    | 31426.1  | 0.0    | 31426.1 |
|                    | % Fixture | 82.1     | 0.0    | 82.1    |
| <b>Total</b>       | Lumens    | 38265.0  | 0.0    | 38265.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 575.3   | 1.5       |
| 10°-20°   | 1776.0  | 4.6       |
| 20°-30°   | 3081.1  | 8.1       |
| 30°-40°   | 4647.7  | 12.1      |
| 40°-50°   | 6444.4  | 16.8      |
| 50°-60°   | 7954.8  | 20.8      |
| 60°-70°   | 8475.7  | 22.1      |
| 70°-80°   | 4849.9  | 12.7      |
| 80°-90°   | 460.2   | 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°    | 38265.0 | 100.0     |
| 0°-180°   | 38265.0 | 100.0     |

**Coefficient of Utilization**



REPORT NUMBER: P510468

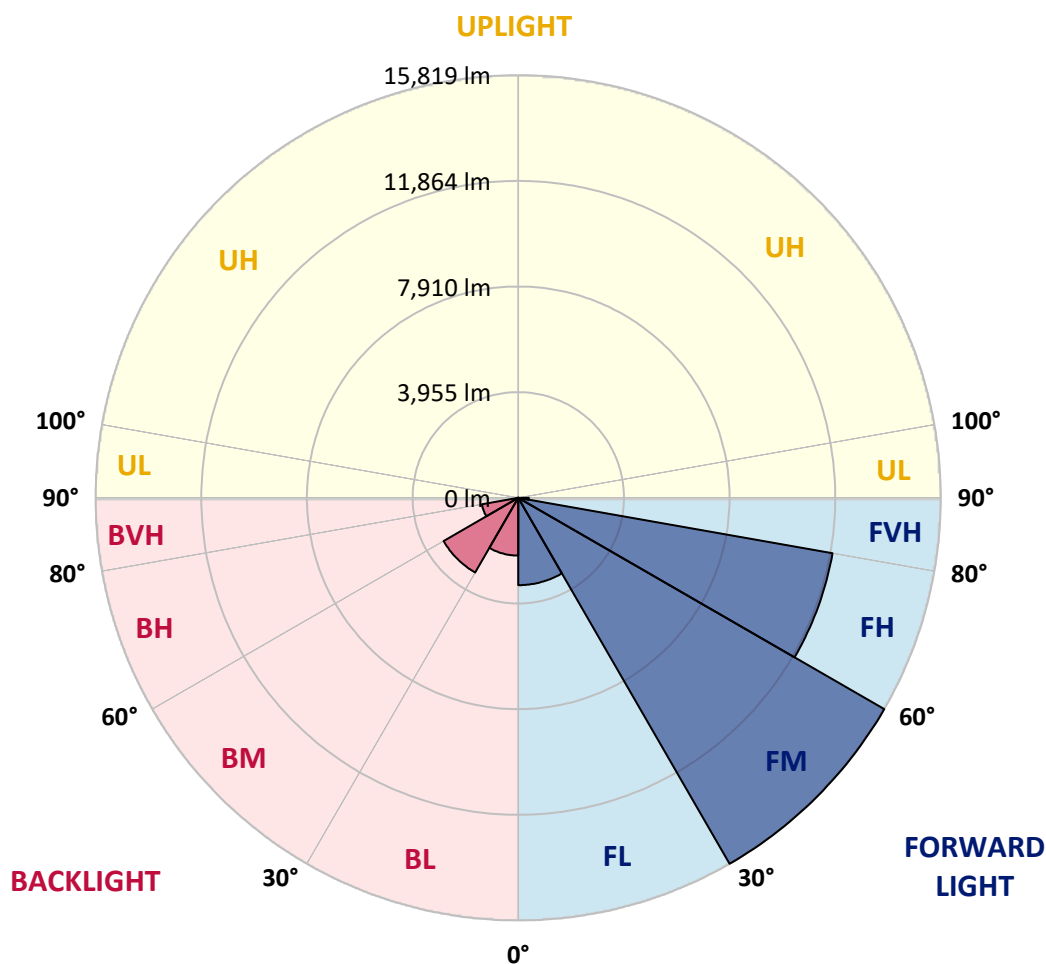
CATALOG NUMBER: CST-CA10-310-727-U-T3-HSS

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |          |
|------|-------------|---------|-----------|-------------------------|------|----------|
|      |             |         |           | B                       | U    | G        |
| FL   | (0°-30°)    | 3268.3  | 8.5       |                         |      |          |
| FM   | (30°-60°)   | 15819.3 | 41.3      |                         |      |          |
| FH   | (60°-80°)   | 11945.3 | 31.2      |                         |      | G4/12000 |
| FVH  | (80°-90°)   | 393.2   | 1.0       |                         |      | G3/500   |
| BL   | (0°-30°)    | 2164.0  | 5.7       | B3/2500                 |      |          |
| BM   | (30°-60°)   | 3227.6  | 8.4       | B3/5000                 |      |          |
| BH   | (60°-80°)   | 1380.3  | 3.6       | B3/2500                 |      | G3/2500  |
| BVH  | (80°-90°)   | 67.0    | 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



FIELD PERFORMANCE MAY DIFFER FROM LABORATORY PERFORMANCE

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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 55°     | 65°     | 66°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 5814.6  | 5814.6  | 5814.6  | 5814.6  | 5814.6  | 5814.6  | 5814.6  | 5814.6  | 5814.6  | 5814.6  | 5814.6  |
| 2.5°  | 5758.5  | 5750.9  | 5744.2  | 5755.9  | 5762.6  | 5773.5  | 5789.5  | 5800.4  | 5803.7  | 5813.8  | 5826.4  |
| 5°    | 5850.7  | 5849.8  | 5840.6  | 5835.6  | 5821.3  | 5816.3  | 5819.6  | 5833.1  | 5833.9  | 5846.5  | 5885.9  |
| 7.5°  | 6031.7  | 6030.0  | 6007.4  | 5997.3  | 5967.2  | 5933.6  | 5908.5  | 5911.0  | 5910.2  | 5922.7  | 5975.6  |
| 10°   | 6305.0  | 6291.6  | 6259.7  | 6228.7  | 6170.0  | 6107.1  | 6061.0  | 6019.1  | 6019.1  | 6037.6  | 6096.3  |
| 12.5° | 6613.4  | 6631.9  | 6588.3  | 6541.3  | 6443.3  | 6330.1  | 6249.6  | 6202.7  | 6197.7  | 6206.9  | 6248.8  |
| 15°   | 6996.5  | 6996.5  | 6967.1  | 6900.1  | 6813.8  | 6656.2  | 6490.2  | 6430.7  | 6422.3  | 6441.6  | 6439.1  |
| 17.5° | 7428.2  | 7440.7  | 7385.4  | 7351.9  | 7219.4  | 7045.1  | 6837.2  | 6734.1  | 6734.1  | 6721.6  | 6663.7  |
| 20°   | 7978.9  | 7910.1  | 7916.0  | 7860.7  | 7763.4  | 7510.3  | 7299.1  | 7149.0  | 7147.4  | 7122.2  | 6959.6  |
| 22.5° | 8577.3  | 8539.6  | 8506.9  | 8458.3  | 8324.2  | 8097.9  | 7804.5  | 7656.1  | 7652.8  | 7590.8  | 7349.4  |
| 25°   | 9167.4  | 9195.9  | 9159.9  | 9071.0  | 8973.0  | 8726.5  | 8403.0  | 8257.1  | 8256.3  | 8153.2  | 7811.2  |
| 27.5° | 9774.3  | 9805.3  | 9793.6  | 9713.1  | 9582.3  | 9389.6  | 9083.6  | 8893.3  | 8881.6  | 8814.5  | 8384.5  |
| 30°   | 10444.9 | 10417.2 | 10453.2 | 10418.9 | 10353.5 | 10039.2 | 9762.6  | 9541.3  | 9569.8  | 9549.7  | 9035.8  |
| 32.5° | 10932.7 | 10950.3 | 11068.5 | 11071.8 | 11003.1 | 10770.1 | 10432.3 | 10296.5 | 10341.8 | 10314.9 | 9836.3  |
| 35°   | 11373.6 | 11402.1 | 11554.6 | 11704.7 | 11755.0 | 11500.1 | 11156.5 | 11148.1 | 11206.8 | 11370.2 | 10939.4 |
| 37.5° | 11752.4 | 11772.6 | 11986.3 | 12181.6 | 12344.2 | 12169.9 | 11920.1 | 12217.7 | 12304.0 | 12638.4 | 12077.7 |
| 40°   | 11979.6 | 12005.6 | 12282.2 | 12557.1 | 12847.1 | 12785.1 | 12761.6 | 13465.7 | 13547.0 | 13841.3 | 12908.3 |
| 42.5° | 11851.4 | 11902.5 | 12363.5 | 12866.4 | 13293.1 | 13417.1 | 13738.2 | 14643.4 | 14736.5 | 14761.6 | 13724.7 |
| 45°   | 11622.5 | 11686.2 | 12201.7 | 13015.6 | 13711.3 | 14109.5 | 14720.5 | 15603.2 | 15654.3 | 15583.0 | 14401.2 |
| 47.5° | 11376.1 | 11444.0 | 12019.8 | 12971.2 | 14047.4 | 14915.0 | 15598.1 | 16506.7 | 16542.8 | 16324.0 | 15082.6 |
| 50°   | 11096.1 | 11159.0 | 11778.4 | 12867.3 | 14300.6 | 15675.2 | 16500.0 | 17287.9 | 17422.9 | 16990.4 | 15612.4 |
| 52.5° | 10755.8 | 10822.9 | 11480.0 | 12704.6 | 14522.7 | 16239.4 | 17295.5 | 18170.6 | 18179.8 | 17823.6 | 16209.2 |
| 55°   | 10314.9 | 10431.4 | 11105.4 | 12423.0 | 14639.2 | 16723.8 | 17988.7 | 19338.2 | 19397.7 | 19053.2 | 16708.7 |
| 57.5° | 9824.6  | 9926.0  | 10654.4 | 12047.5 | 14534.4 | 17091.8 | 19103.5 | 20590.5 | 20582.9 | 19891.4 | 17145.4 |
| 60°   | 9176.6  | 9248.7  | 10066.8 | 11556.3 | 14196.6 | 17536.9 | 20264.4 | 21932.4 | 21919.0 | 20712.8 | 17426.2 |
| 62.5° | 8345.2  | 8417.2  | 9186.7  | 10786.0 | 13700.4 | 17835.3 | 21052.3 | 22937.4 | 22898.9 | 21310.5 | 17512.6 |
| 65°   | 7381.2  | 7510.3  | 8178.3  | 9786.0  | 12822.8 | 17639.2 | 21432.9 | 23529.2 | 23467.2 | 21766.5 | 17306.4 |
| 67.5° | 6477.6  | 6587.4  | 7116.3  | 8409.7  | 11527.8 | 16843.7 | 21164.6 | 23681.8 | 23663.3 | 21832.7 | 16723.8 |
| 70°   | 5198.5  | 5238.8  | 5723.3  | 6830.5  | 9591.6  | 15140.5 | 20237.6 | 23329.7 | 23338.1 | 21222.5 | 15553.7 |
| 72.5° | 3558.2  | 3656.2  | 3871.7  | 4745.9  | 6979.7  | 12040.8 | 17443.0 | 20996.2 | 20997.8 | 19029.7 | 13551.2 |
| 75°   | 1913.6  | 2065.3  | 2316.8  | 2750.1  | 3901.8  | 7726.6  | 14008.1 | 17422.1 | 17454.7 | 15866.4 | 10770.9 |
| 77.5° | 948.8   | 1003.3  | 1149.2  | 1471.0  | 1788.7  | 3645.3  | 9009.0  | 13077.6 | 13155.6 | 12179.1 | 7346.0  |
| 80°   | 434.2   | 443.4   | 454.3   | 451.8   | 684.8   | 1599.3  | 3867.5  | 7854.0  | 7877.4  | 7243.8  | 3353.7  |
| 82.5° | 339.5   | 337.8   | 342.8   | 311.8   | 313.5   | 616.9   | 1338.6  | 2057.0  | 2193.6  | 1726.7  | 1063.7  |
| 85°   | 205.4   | 204.5   | 220.4   | 171.0   | 210.4   | 333.6   | 675.6   | 820.6   | 830.7   | 675.6   | 550.7   |
| 87.5° | 78.0    | 75.4    | 69.6    | 61.2    | 70.4    | 93.9    | 233.9   | 301.8   | 295.0   | 209.6   | 190.3   |
| 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: P510468

CATALOG NUMBER: CST-CA10-310-727-U-T3-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°     | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 5814.6  | 5814.6  | 5814.6 | 5814.6 | 5814.6 | 5814.6 | 5814.6 | 5814.6 | 5814.6 | 5814.6 | 5814.6 |
| 2.5°  | 5837.2  | 5864.1  | 5913.5 | 5951.2 | 5963.8 | 6004.1 | 6042.6 | 6049.3 | 6077.0 | 6087.9 | 6123.9 |
| 5°    | 5910.2  | 5955.4  | 6032.5 | 6083.7 | 6106.3 | 6173.4 | 6217.0 | 6238.7 | 6231.2 | 6235.4 | 6275.6 |
| 7.5°  | 6016.6  | 6059.4  | 6121.4 | 6183.4 | 6194.3 | 6206.1 | 6201.9 | 6198.5 | 6169.2 | 6144.0 | 6181.7 |
| 10°   | 6113.9  | 6154.1  | 6192.6 | 6201.9 | 6146.5 | 6115.5 | 6060.2 | 6017.5 | 5960.5 | 5934.5 | 5964.7 |
| 12.5° | 6250.5  | 6258.9  | 6221.1 | 6170.9 | 6051.8 | 5941.2 | 5851.5 | 5773.5 | 5703.1 | 5654.5 | 5694.8 |
| 15°   | 6394.7  | 6362.0  | 6252.2 | 6105.5 | 5921.1 | 5762.6 | 5616.0 | 5486.0 | 5369.5 | 5341.0 | 5351.9 |
| 17.5° | 6585.8  | 6496.9  | 6275.6 | 6029.2 | 5742.5 | 5496.1 | 5307.5 | 5143.2 | 4990.7 | 4927.0 | 4921.1 |
| 20°   | 6818.8  | 6675.5  | 6323.4 | 5932.8 | 5531.3 | 5203.6 | 4911.9 | 4666.3 | 4455.9 | 4283.2 | 4287.4 |
| 22.5° | 7122.2  | 6914.3  | 6395.5 | 5832.2 | 5297.4 | 4860.7 | 4436.6 | 4019.2 | 3673.0 | 3523.8 | 3486.9 |
| 25°   | 7522.9  | 7212.7  | 6497.8 | 5740.9 | 5035.9 | 4424.9 | 3825.6 | 3236.3 | 2870.0 | 2725.0 | 2709.1 |
| 27.5° | 8021.6  | 7613.4  | 6653.7 | 5639.4 | 4756.0 | 3907.7 | 3046.0 | 2468.5 | 2132.4 | 1979.8 | 1928.7 |
| 30°   | 8588.2  | 8107.1  | 6813.8 | 5533.8 | 4417.3 | 3243.0 | 2322.7 | 1756.9 | 1412.4 | 1275.7 | 1258.1 |
| 32.5° | 9321.7  | 8732.4  | 7051.8 | 5367.9 | 3922.8 | 2549.0 | 1620.2 | 1096.4 | 862.5  | 803.8  | 787.1  |
| 35°   | 10363.5 | 9578.1  | 7346.0 | 5158.3 | 3287.4 | 1780.3 | 1004.2 | 642.1  | 517.2  | 487.8  | 482.0  |
| 37.5° | 11335.0 | 10408.0 | 7642.7 | 4810.4 | 2496.2 | 1111.5 | 574.2  | 411.6  | 383.9  | 384.7  | 386.4  |
| 40°   | 12105.3 | 10975.4 | 7882.5 | 4352.8 | 1642.0 | 631.2  | 399.0  | 342.0  | 342.8  | 340.3  | 338.6  |
| 42.5° | 12791.0 | 11428.1 | 7990.6 | 3676.4 | 951.4  | 422.5  | 346.2  | 315.2  | 307.6  | 310.1  | 308.5  |
| 45°   | 13358.4 | 11889.9 | 7781.0 | 2916.1 | 560.8  | 378.9  | 326.9  | 292.5  | 284.2  | 297.6  | 299.2  |
| 47.5° | 13955.2 | 12328.3 | 7460.0 | 2196.9 | 455.1  | 360.4  | 309.3  | 275.8  | 271.6  | 288.3  | 290.0  |
| 50°   | 14457.3 | 12646.0 | 6912.7 | 1655.5 | 434.2  | 340.3  | 293.4  | 259.0  | 258.2  | 273.3  | 273.3  |
| 52.5° | 14877.3 | 12837.9 | 6263.1 | 1278.3 | 419.9  | 322.7  | 277.4  | 243.1  | 243.1  | 248.1  | 248.9  |
| 55°   | 15173.2 | 12799.4 | 5875.8 | 1005.8 | 404.9  | 305.9  | 260.7  | 228.0  | 217.9  | 214.6  | 216.3  |
| 57.5° | 15226.8 | 12697.1 | 5426.5 | 784.6  | 387.2  | 290.0  | 245.6  | 210.4  | 191.9  | 189.4  | 188.6  |
| 60°   | 15192.4 | 12472.5 | 4913.5 | 655.5  | 367.1  | 274.9  | 230.5  | 191.9  | 173.5  | 167.6  | 169.3  |
| 62.5° | 15049.1 | 12074.3 | 4320.9 | 575.0  | 347.0  | 263.2  | 213.7  | 179.4  | 162.6  | 155.1  | 155.1  |
| 65°   | 14616.6 | 11504.3 | 3440.8 | 503.8  | 321.9  | 250.6  | 200.3  | 174.3  | 155.9  | 147.5  | 145.8  |
| 67.5° | 13666.1 | 10321.6 | 2585.9 | 441.7  | 297.6  | 237.2  | 198.7  | 173.5  | 152.6  | 140.8  | 139.1  |
| 70°   | 12391.2 | 8866.5  | 1765.3 | 388.1  | 270.7  | 224.6  | 197.8  | 174.3  | 149.2  | 134.1  | 132.4  |
| 72.5° | 10344.3 | 6989.8  | 1016.7 | 337.8  | 243.9  | 212.9  | 194.5  | 175.2  | 143.3  | 124.9  | 122.4  |
| 75°   | 7772.7  | 4902.7  | 596.8  | 290.0  | 217.9  | 195.3  | 185.2  | 170.2  | 134.1  | 114.0  | 111.5  |
| 77.5° | 4674.7  | 2289.1  | 449.3  | 240.6  | 186.9  | 171.8  | 165.1  | 155.9  | 122.4  | 105.6  | 103.1  |
| 80°   | 1715.0  | 869.2   | 352.9  | 192.8  | 148.4  | 149.2  | 142.5  | 136.6  | 111.5  | 97.2   | 95.6   |
| 82.5° | 747.7   | 531.4   | 260.7  | 146.7  | 116.5  | 133.3  | 117.3  | 112.3  | 95.6   | 87.2   | 83.8   |
| 85°   | 453.5   | 316.8   | 167.6  | 99.7   | 80.5   | 90.5   | 82.1   | 86.3   | 73.8   | 68.7   | 66.2   |
| 87.5° | 150.0   | 94.7    | 74.6   | 48.6   | 40.2   | 37.7   | 36.9   | 44.4   | 41.9   | 38.6   | 38.6   |
| 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: SP1-2104-215-5

Luminaire Tested: CST-CA6-230-727-U-T4

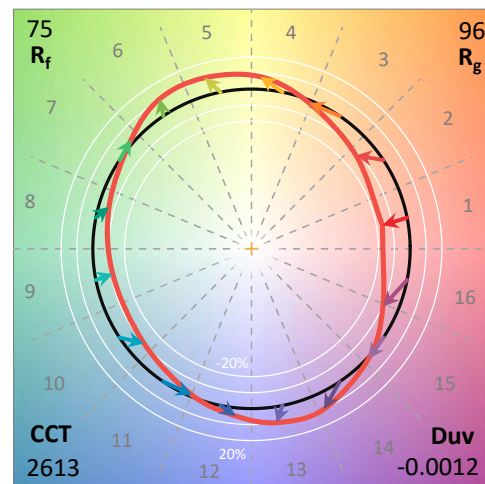
Test Date: 04/22/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2104-215-5  
 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-CA6-230-727-U-T4**  
 Description: STREETWORKS HIGH MAST LUMINAIRE

### Spectral Parameters

|                           |         |           |      |      |       |
|---------------------------|---------|-----------|------|------|-------|
| CCT (K):                  | 2613    | CRI (Ra): | 72.6 |      |       |
| CIE u':                   | 0.2668  | R1:       | 69.4 | R9:  | -28.6 |
| CIE v':                   | 0.5272  | R2:       | 84.5 | R10: | 65.5  |
| Duv:                      | -0.0012 | R3:       | 95.0 | R11: | 63.4  |
| CIE x:                    | 0.4648  | R4:       | 67.5 | R12: | 56.9  |
| CIE y:                    | 0.4082  | R5:       | 68.5 | R13: | 72.3  |
| CIE z:                    | 0.1270  | R6:       | 79.7 | R14: | 97.8  |
| Peak Wavelength (nm):     | 603     | R7:       | 75.4 |      |       |
| Dominant Wavelength (nm): | 585     | R8:       | 41.2 |      |       |
| Purity:                   | 62.2    |           |      |      |       |
|                           |         |           |      |      |       |
| Rf:                       | 75.3    |           |      |      |       |
| Rg:                       | 95.8    |           |      |      |       |



### Test Conditions

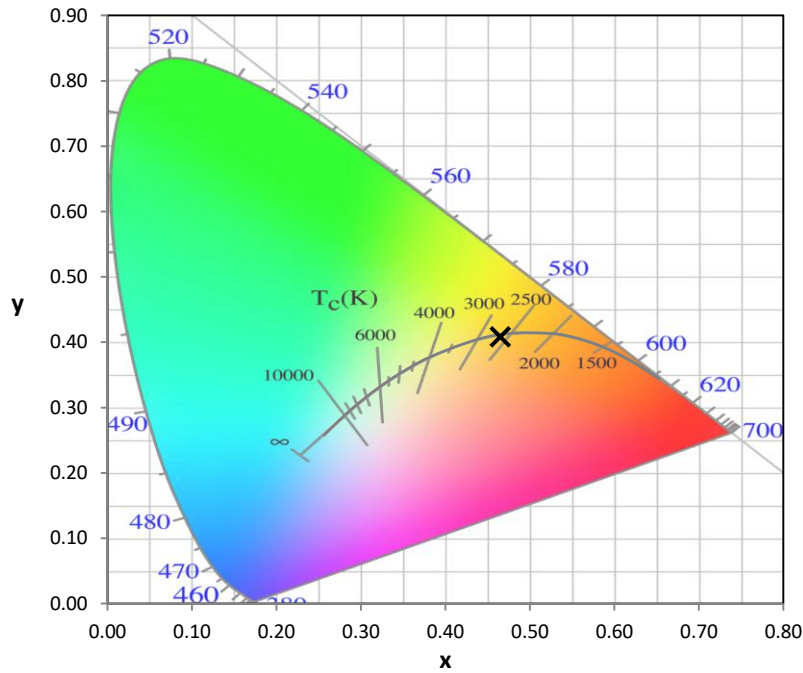
Stabilization Time: 121M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.5/25%  
 Sphere Temperature (°C): 24.8

REPORT NUMBER: SP1-2104-215-5

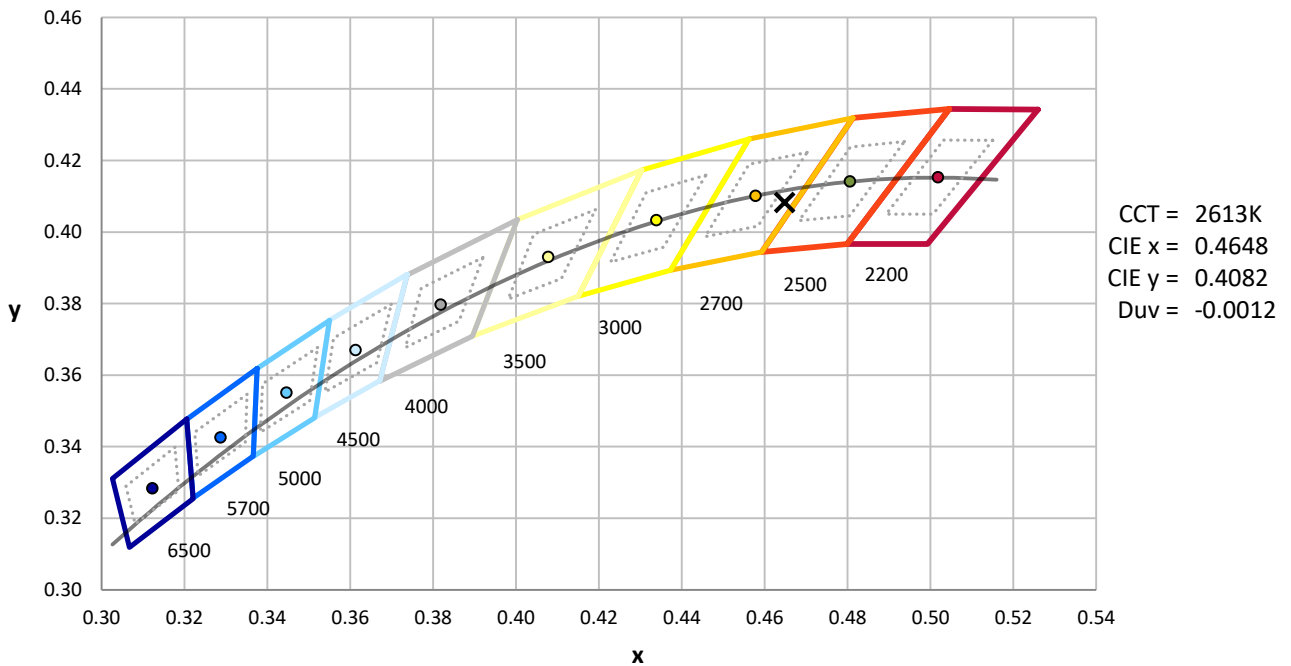
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| 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: SP1-2104-215-5

**CIE 1931 Chromaticity Diagram**



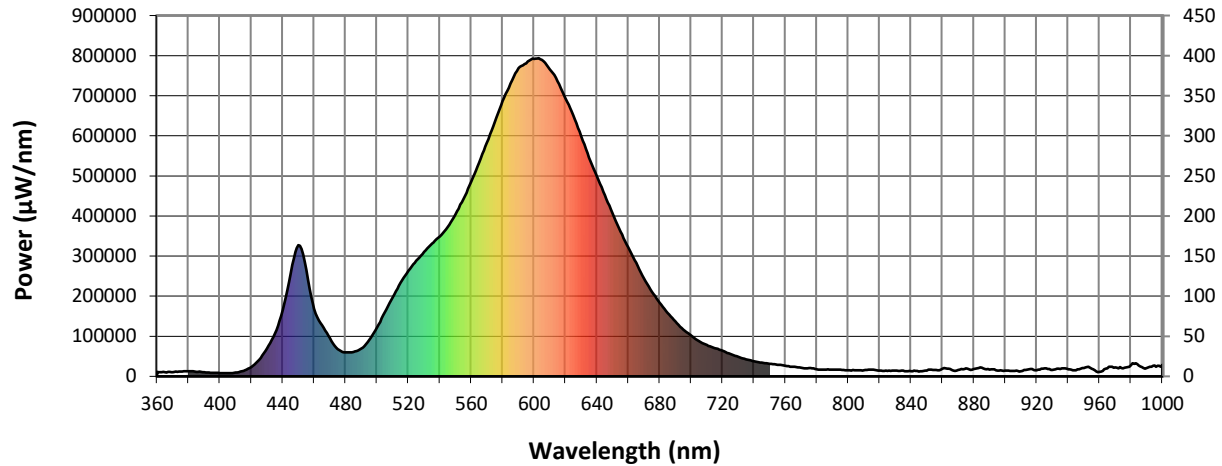
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 2700K 7-step quadrangle

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### Photopic Flux vs. Wavelength

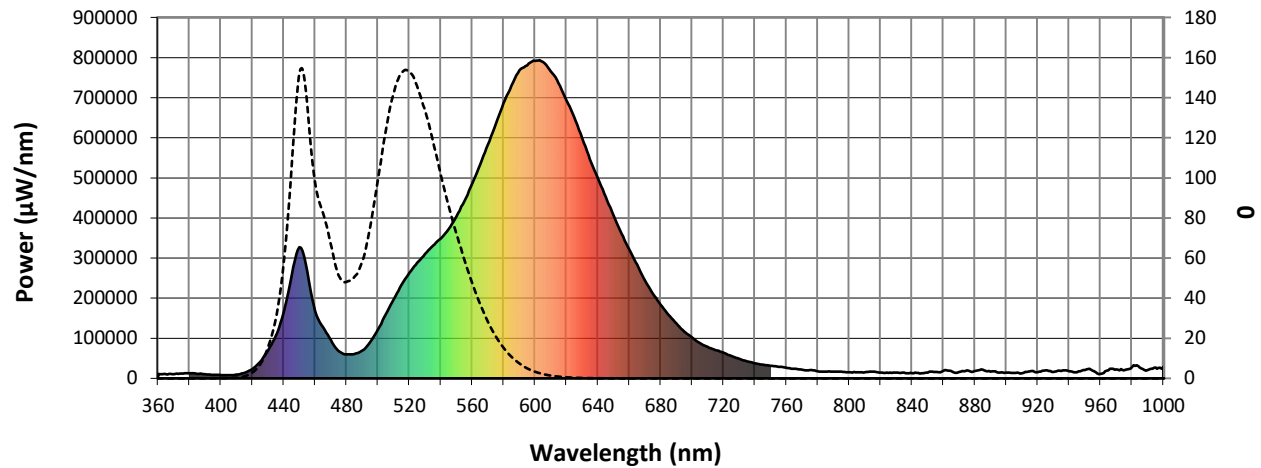


#####

| 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       | 11220            | 0.0              | 490       | 69401            | 9.9              | 620       | 692536           | 180.2            | 750       | 31541            | 0.0              | 880       | 18253            | 0.0              |
| 365       | 10182            | 0.0              | 495       | 90053            | 16.3             | 625       | 651217           | 143.7            | 755       | 28760            | 0.0              | 885       | 21369            | 0.0              |
| 370       | 10420            | 0.0              | 500       | 121940           | 26.9             | 630       | 598624           | 108.3            | 760       | 26534            | 0.0              | 890       | 16745            | 0.0              |
| 375       | 12164            | 0.0              | 505       | 159641           | 44.7             | 635       | 546251           | 82.1             | 765       | 24261            | 0.0              | 895       | 14205            | 0.0              |
| 380       | 12715            | 0.0              | 510       | 197034           | 67.7             | 640       | 499000           | 59.6             | 770       | 21584            | 0.0              | 900       | 14113            | 0.0              |
| 385       | 11387            | 0.0              | 515       | 232805           | 96.4             | 645       | 451749           | 43.5             | 775       | 20805            | 0.0              | 905       | 13457            | 0.0              |
| 390       | 10503            | 0.0              | 520       | 263165           | 127.6            | 650       | 406338           | 29.7             | 780       | 17853            | 0.0              | 910       | 12811            | 0.0              |
| 395       | 8950             | 0.0              | 525       | 288012           | 154.6            | 655       | 360522           | 20.7             | 785       | 17033            | 0.0              | 915       | 17471            | 0.0              |
| 400       | 8271             | 0.0              | 530       | 310825           | 183.0            | 660       | 321663           | 13.4             | 790       | 16986            | 0.0              | 920       | 15483            | 0.0              |
| 405       | 7777             | 0.0              | 535       | 330894           | 205.2            | 665       | 283133           | 9.0              | 795       | 16655            | 0.0              | 925       | 19757            | 0.0              |
| 410       | 9299             | 0.0              | 540       | 349086           | 227.5            | 670       | 244093           | 5.3              | 800       | 15070            | 0.0              | 930       | 16307            | 0.0              |
| 415       | 13971            | 0.0              | 545       | 372506           | 247.9            | 675       | 210996           | 3.5              | 805       | 15366            | 0.0              | 935       | 18687            | 0.0              |
| 420       | 23461            | 0.1              | 550       | 403721           | 274.3            | 680       | 183942           | 2.1              | 810       | 15472            | 0.0              | 940       | 17986            | 0.0              |
| 425       | 41887            | 0.2              | 555       | 442032           | 301.9            | 685       | 158373           | 1.4              | 815       | 17184            | 0.0              | 945       | 15266            | 0.0              |
| 430       | 69840            | 0.6              | 560       | 485515           | 329.9            | 690       | 137120           | 0.8              | 820       | 14166            | 0.0              | 950       | 21027            | 0.0              |
| 435       | 106868           | 1.3              | 565       | 532962           | 354.4            | 695       | 116757           | 0.5              | 825       | 13854            | 0.0              | 955       | 19232            | 0.0              |
| 440       | 164642           | 2.6              | 570       | 582457           | 378.7            | 700       | 102093           | 0.3              | 830       | 14283            | 0.0              | 960       | 11261            | 0.0              |
| 445       | 256049           | 5.3              | 575       | 634550           | 394.8            | 705       | 87819            | 0.2              | 835       | 14112            | 0.0              | 965       | 20156            | 0.0              |
| 450       | 327314           | 8.5              | 580       | 686476           | 407.9            | 710       | 78011            | 0.1              | 840       | 13092            | 0.0              | 970       | 22393            | 0.0              |
| 455       | 265614           | 8.9              | 585       | 730571           | 405.9            | 715       | 70264            | 0.1              | 845       | 12158            | 0.0              | 975       | 20121            | 0.0              |
| 460       | 168394           | 6.9              | 590       | 768228           | 397.2            | 720       | 63584            | 0.0              | 850       | 14790            | 0.0              | 980       | 28091            | 0.0              |
| 465       | 127370           | 6.6              | 595       | 780593           | 370.0            | 725       | 55749            | 0.0              | 855       | 15683            | 0.0              | 985       | 27040            | 0.0              |
| 470       | 94724            | 5.9              | 600       | 791888           | 341.3            | 730       | 48683            | 0.0              | 860       | 19011            | 0.0              | 990       | 20772            | 0.0              |
| 475       | 67810            | 5.3              | 605       | 789088           | 305.6            | 735       | 42520            | 0.0              | 865       | 18194            | 0.0              | 995       | 26800            | 0.0              |
| 480       | 59825            | 5.7              | 610       | 765121           | 262.9            | 740       | 37531            | 0.0              | 870       | 15713            | 0.0              | 1000      | 28539            | 0.0              |
| 485       | 61079            | 7.2              | 615       | 735839           | 222.1            | 745       | 34522            | 0.0              | 875       | 19703            | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2104-215-5

### Scotopic Flux vs. Wavelength



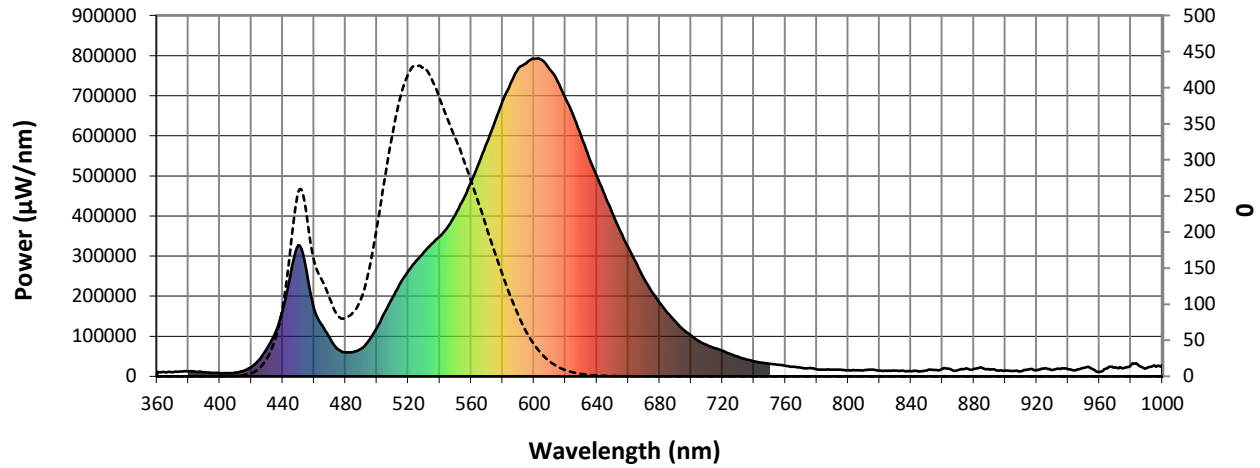
Scotopic Lumens: 37163.1

S/P: 1.07

| 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       | 11220            | 0.0              | 490       | 69401            | 106.9            | 620       | 692536           | 8.7              | 750       | 31541            | 0.0              | 880       | 18253            | 0.0              |
| 365       | 10182            | 0.0              | 495       | 90053            | 145.6            | 625       | 651217           | 5.5              | 755       | 28760            | 0.0              | 885       | 21369            | 0.0              |
| 370       | 10420            | 0.0              | 500       | 121940           | 204.0            | 630       | 598624           | 3.4              | 760       | 26534            | 0.0              | 890       | 16745            | 0.0              |
| 375       | 12164            | 0.0              | 505       | 159641           | 271.4            | 635       | 546251           | 2.1              | 765       | 24261            | 0.0              | 895       | 14205            | 0.0              |
| 380       | 12715            | 0.0              | 510       | 197034           | 334.0            | 640       | 499000           | 1.3              | 770       | 21584            | 0.0              | 900       | 14113            | 0.0              |
| 385       | 11387            | 0.0              | 515       | 232805           | 385.9            | 645       | 451749           | 0.8              | 775       | 20805            | 0.0              | 905       | 13457            | 0.0              |
| 390       | 10503            | 0.0              | 520       | 263165           | 418.3            | 650       | 406338           | 0.5              | 780       | 17853            | 0.0              | 910       | 12811            | 0.0              |
| 395       | 8950             | 0.1              | 525       | 288012           | 430.9            | 655       | 360522           | 0.3              | 785       | 17033            | 0.0              | 915       | 17471            | 0.0              |
| 400       | 8271             | 0.1              | 530       | 310825           | 428.5            | 660       | 321663           | 0.2              | 790       | 16986            | 0.0              | 920       | 15483            | 0.0              |
| 405       | 7777             | 0.2              | 535       | 330894           | 412.3            | 665       | 283133           | 0.1              | 795       | 16655            | 0.0              | 925       | 19757            | 0.0              |
| 410       | 9299             | 0.6              | 540       | 349086           | 385.7            | 670       | 244093           | 0.1              | 800       | 15070            | 0.0              | 930       | 16307            | 0.0              |
| 415       | 13971            | 1.4              | 545       | 372506           | 357.2            | 675       | 210996           | 0.0              | 805       | 15366            | 0.0              | 935       | 18687            | 0.0              |
| 420       | 23461            | 3.9              | 550       | 403721           | 330.1            | 680       | 183942           | 0.0              | 810       | 15472            | 0.0              | 940       | 17986            | 0.0              |
| 425       | 41887            | 10.2             | 555       | 442032           | 302.1            | 685       | 158373           | 0.0              | 815       | 17184            | 0.0              | 945       | 15266            | 0.0              |
| 430       | 69840            | 23.8             | 560       | 485515           | 271.4            | 690       | 137120           | 0.0              | 820       | 14166            | 0.0              | 950       | 21027            | 0.0              |
| 435       | 106868           | 47.8             | 565       | 532962           | 239.1            | 695       | 116757           | 0.0              | 825       | 13854            | 0.0              | 955       | 19232            | 0.0              |
| 440       | 164642           | 92.0             | 570       | 582457           | 205.6            | 700       | 102093           | 0.0              | 830       | 14283            | 0.0              | 960       | 11261            | 0.0              |
| 445       | 256049           | 171.5            | 575       | 634550           | 172.8            | 705       | 87819            | 0.0              | 835       | 14112            | 0.0              | 965       | 20156            | 0.0              |
| 450       | 327314           | 253.7            | 580       | 686476           | 141.4            | 710       | 78011            | 0.0              | 840       | 13092            | 0.0              | 970       | 22393            | 0.0              |
| 455       | 265614           | 232.1            | 585       | 730571           | 111.7            | 715       | 70264            | 0.0              | 845       | 12158            | 0.0              | 975       | 20121            | 0.0              |
| 460       | 168394           | 162.6            | 590       | 768228           | 85.5             | 720       | 63584            | 0.0              | 850       | 14790            | 0.0              | 980       | 28091            | 0.0              |
| 465       | 127370           | 134.5            | 595       | 780593           | 62.2             | 725       | 55749            | 0.0              | 855       | 15683            | 0.0              | 985       | 27040            | 0.0              |
| 470       | 94724            | 109.1            | 600       | 791888           | 44.6             | 730       | 48683            | 0.0              | 860       | 19011            | 0.0              | 990       | 20772            | 0.0              |
| 475       | 67810            | 84.8             | 605       | 789088           | 31.0             | 735       | 42520            | 0.0              | 865       | 18194            | 0.0              | 995       | 26800            | 0.0              |
| 480       | 59825            | 80.8             | 610       | 765121           | 20.7             | 740       | 37531            | 0.0              | 870       | 15713            | 0.0              | 1000      | 28539            | 0.0              |
| 485       | 61079            | 88.5             | 615       | 735839           | 13.6             | 745       | 34522            | 0.0              | 875       | 19703            | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2104-215-5

### Melanopic Flux vs. Wavelength

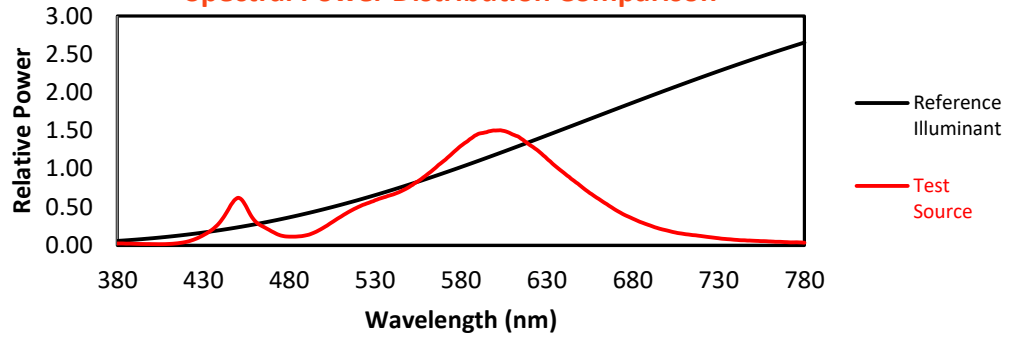

**Melanopic Lumens: 13012.4      M/P: 0.38**

| 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       | 11220            | 0.0              | 490       | 69401            | 57.8             | 620       | 692536           | 0.5              | 750       | 31541            | 0.0              | 880       | 18253            | 0.0              |
| 365       | 10182            | 0.0              | 495       | 90053            | 74.3             | 625       | 651217           | 0.3              | 755       | 28760            | 0.0              | 885       | 21369            | 0.0              |
| 370       | 10420            | 0.0              | 500       | 121940           | 98.0             | 630       | 598624           | 0.2              | 760       | 26534            | 0.0              | 890       | 16745            | 0.0              |
| 375       | 12164            | 0.0              | 505       | 159641           | 122.5            | 635       | 546251           | 0.1              | 765       | 24261            | 0.0              | 895       | 14205            | 0.0              |
| 380       | 12715            | 0.0              | 510       | 197034           | 141.5            | 640       | 499000           | 0.1              | 770       | 21584            | 0.0              | 900       | 14113            | 0.0              |
| 385       | 11387            | 0.0              | 515       | 232805           | 152.1            | 645       | 451749           | 0.0              | 775       | 20805            | 0.0              | 905       | 13457            | 0.0              |
| 390       | 10503            | 0.0              | 520       | 263165           | 153.2            | 650       | 406338           | 0.0              | 780       | 17853            | 0.0              | 910       | 12811            | 0.0              |
| 395       | 8950             | 0.0              | 525       | 288012           | 146.1            | 655       | 360522           | 0.0              | 785       | 17033            | 0.0              | 915       | 17471            | 0.0              |
| 400       | 8271             | 0.1              | 530       | 310825           | 134.3            | 660       | 321663           | 0.0              | 790       | 16986            | 0.0              | 920       | 15483            | 0.0              |
| 405       | 7777             | 0.1              | 535       | 330894           | 119.1            | 665       | 283133           | 0.0              | 795       | 16655            | 0.0              | 925       | 19757            | 0.0              |
| 410       | 9299             | 0.4              | 540       | 349086           | 102.2            | 670       | 244093           | 0.0              | 800       | 15070            | 0.0              | 930       | 16307            | 0.0              |
| 415       | 13971            | 0.9              | 545       | 372506           | 86.5             | 675       | 210996           | 0.0              | 805       | 15366            | 0.0              | 935       | 18687            | 0.0              |
| 420       | 23461            | 2.7              | 550       | 403721           | 72.5             | 680       | 183942           | 0.0              | 810       | 15472            | 0.0              | 940       | 17986            | 0.0              |
| 425       | 41887            | 6.5              | 555       | 442032           | 59.6             | 685       | 158373           | 0.0              | 815       | 17184            | 0.0              | 945       | 15266            | 0.0              |
| 430       | 69840            | 14.8             | 560       | 485515           | 47.9             | 690       | 137120           | 0.0              | 820       | 14166            | 0.0              | 950       | 21027            | 0.0              |
| 435       | 106868           | 28.5             | 565       | 532962           | 37.4             | 695       | 116757           | 0.0              | 825       | 13854            | 0.0              | 955       | 19232            | 0.0              |
| 440       | 164642           | 55.0             | 570       | 582457           | 28.5             | 700       | 102093           | 0.0              | 830       | 14283            | 0.0              | 960       | 11261            | 0.0              |
| 445       | 256049           | 101.0            | 575       | 634550           | 21.1             | 705       | 87819            | 0.0              | 835       | 14112            | 0.0              | 965       | 20156            | 0.0              |
| 450       | 327314           | 150.8            | 580       | 686476           | 15.4             | 710       | 78011            | 0.0              | 840       | 13092            | 0.0              | 970       | 22393            | 0.0              |
| 455       | 265614           | 139.2            | 585       | 730571           | 10.9             | 715       | 70264            | 0.0              | 845       | 12158            | 0.0              | 975       | 20121            | 0.0              |
| 460       | 168394           | 99.2             | 590       | 768228           | 7.5              | 720       | 63584            | 0.0              | 850       | 14790            | 0.0              | 980       | 28091            | 0.0              |
| 465       | 127370           | 83.2             | 595       | 780593           | 5.0              | 725       | 55749            | 0.0              | 855       | 15683            | 0.0              | 985       | 27040            | 0.0              |
| 470       | 94724            | 67.8             | 600       | 791888           | 3.3              | 730       | 48683            | 0.0              | 860       | 19011            | 0.0              | 990       | 20772            | 0.0              |
| 475       | 67810            | 51.8             | 605       | 789088           | 2.2              | 735       | 42520            | 0.0              | 865       | 18194            | 0.0              | 995       | 26800            | 0.0              |
| 480       | 59825            | 48.1             | 610       | 765121           | 1.4              | 740       | 37531            | 0.0              | 870       | 15713            | 0.0              | 1000      | 28539            | 0.0              |
| 485       | 61079            | 50.3             | 615       | 735839           | 0.9              | 745       | 34522            | 0.0              | 875       | 19703            | 0.0              |           |                  |                  |

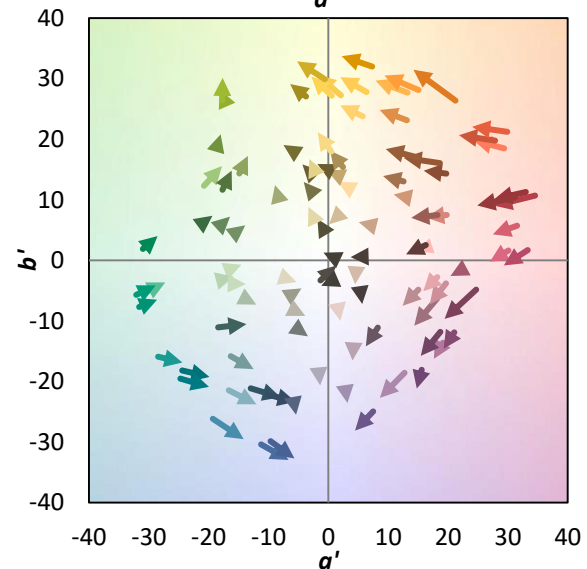
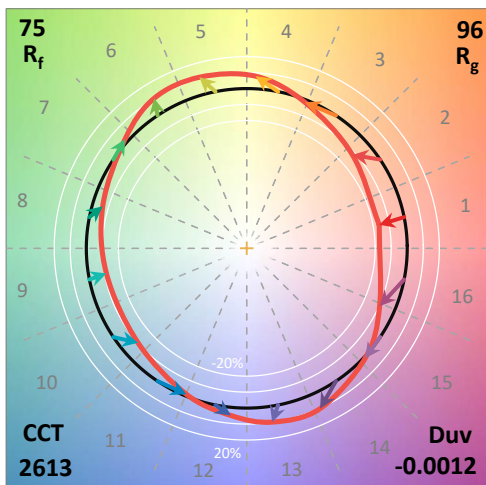
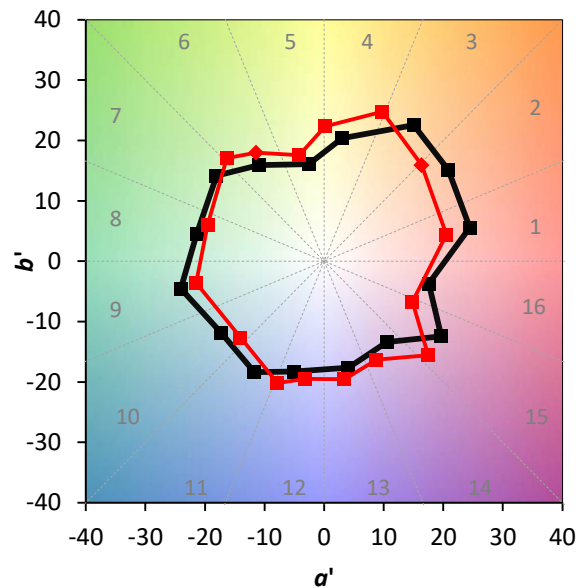
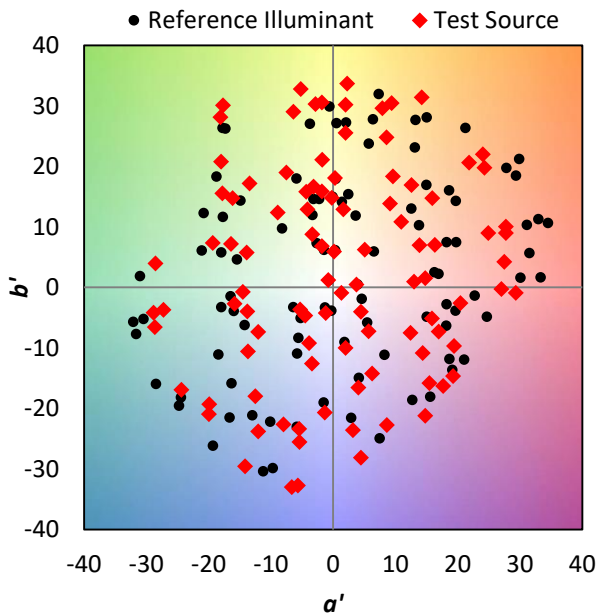
### Summary

$R_f = 75.3$   
 $R_g = 95.8$   
 CIE  $R_a = 72.6$   
 $R_g = -28.6$

### Spectral Power Distribution Comparison



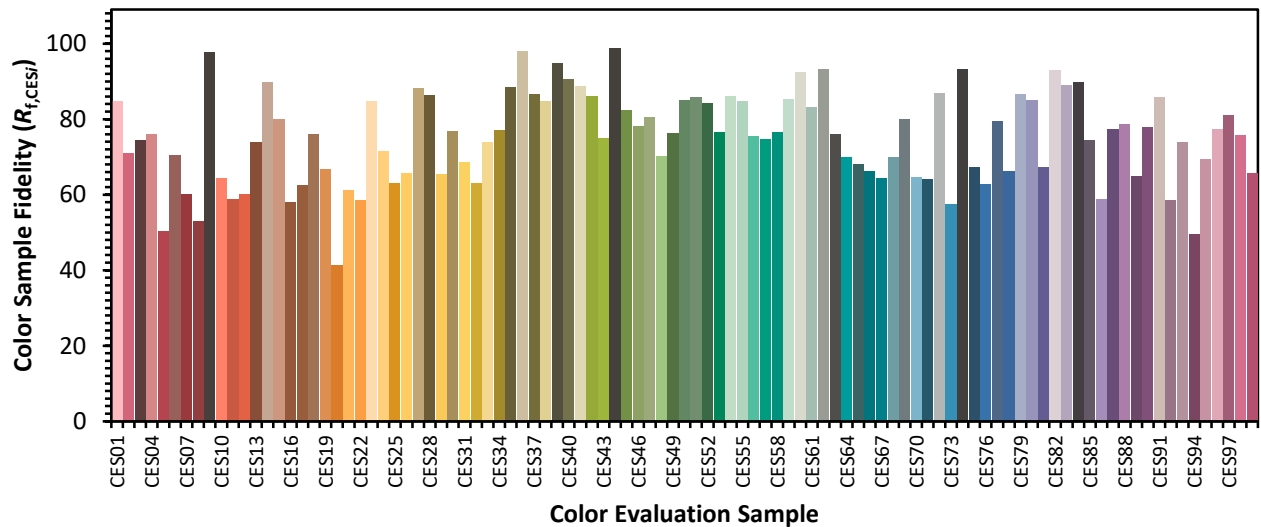
### Color Vector Graphics



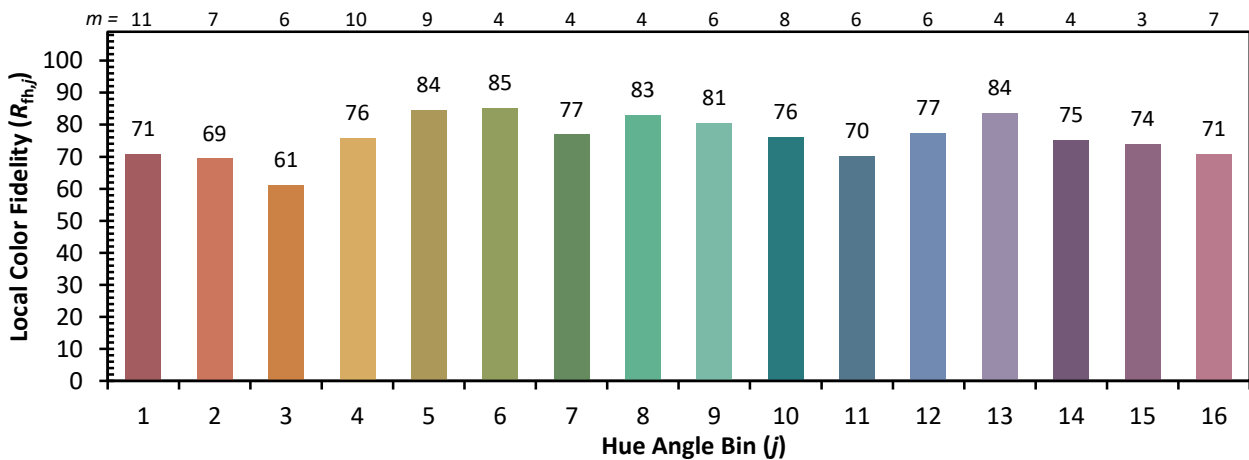
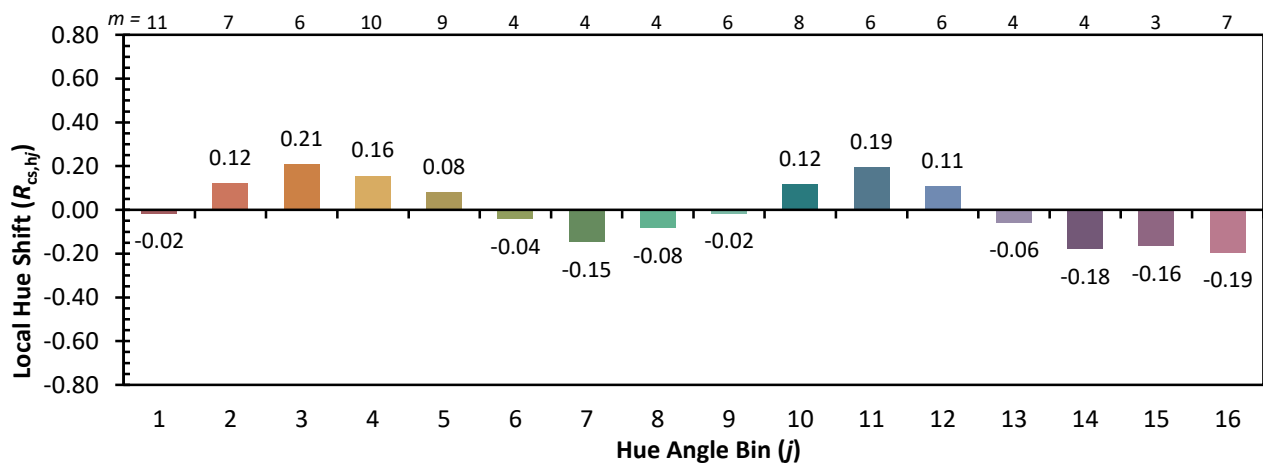
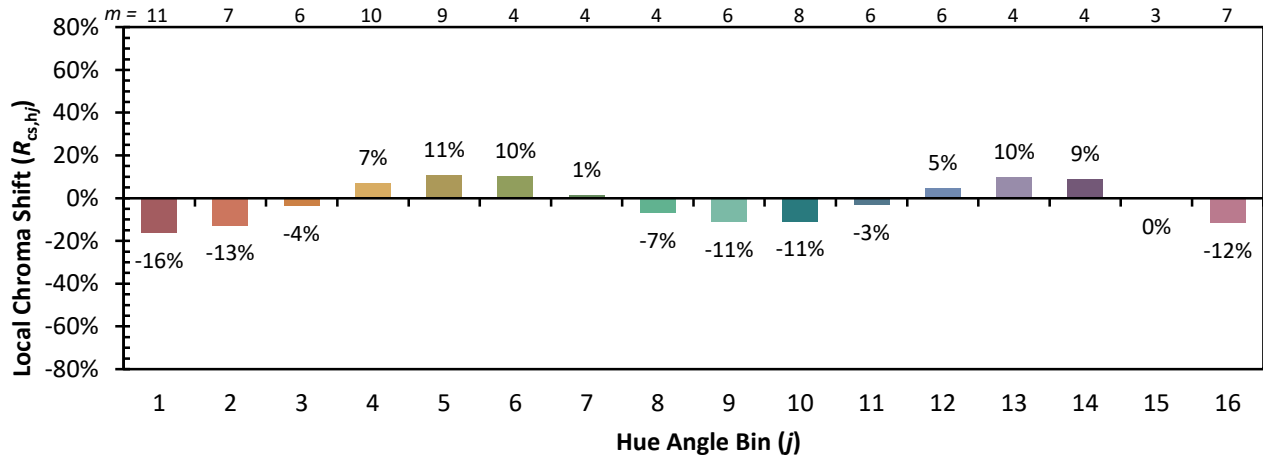


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

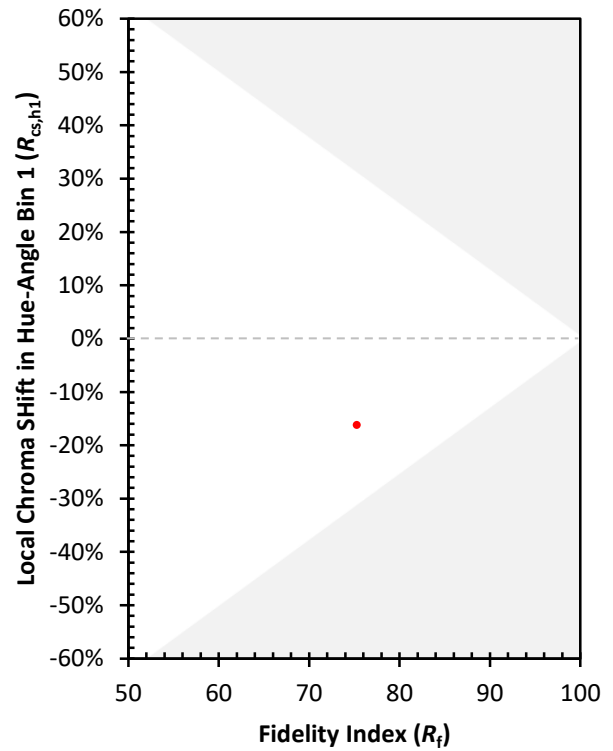
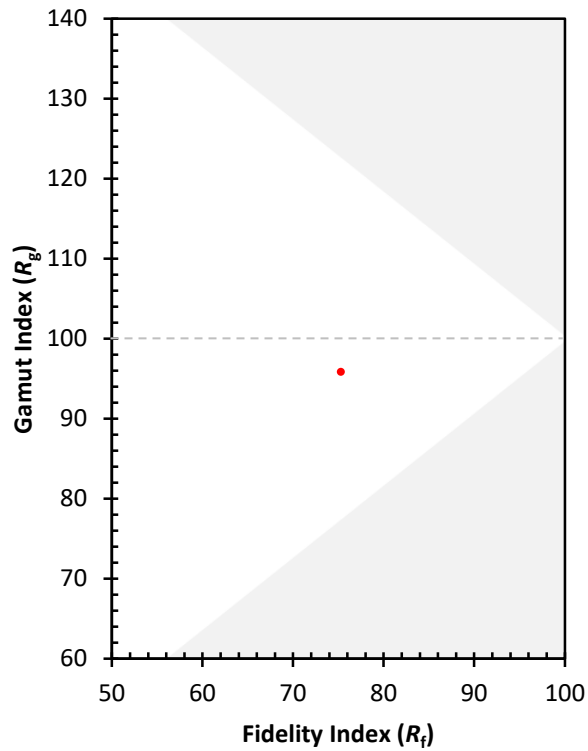
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 87 | CES26 = 66 | CES51 = 86 | CES76 = 63 |
| CES02 = 64 | CES27 = 88 | CES52 = 84 | CES77 = 79 |
| CES03 = 31 | CES28 = 86 | CES53 = 77 | CES78 = 66 |
| CES04 = 71 | CES29 = 65 | CES54 = 86 | CES79 = 87 |
| CES05 = 50 | CES30 = 77 | CES55 = 85 | CES80 = 85 |
| CES06 = 52 | CES31 = 69 | CES56 = 75 | CES81 = 67 |
| CES07 = 42 | CES32 = 63 | CES57 = 75 | CES82 = 93 |
| CES08 = 41 | CES33 = 74 | CES58 = 77 | CES83 = 89 |
| CES09 = 29 | CES34 = 77 | CES59 = 85 | CES84 = 90 |
| CES10 = 77 | CES35 = 88 | CES60 = 92 | CES85 = 74 |
| CES11 = 60 | CES36 = 98 | CES61 = 83 | CES86 = 59 |
| CES12 = 66 | CES37 = 86 | CES62 = 93 | CES87 = 77 |
| CES13 = 44 | CES38 = 85 | CES63 = 76 | CES88 = 79 |
| CES14 = 74 | CES39 = 95 | CES64 = 70 | CES89 = 65 |
| CES15 = 72 | CES40 = 91 | CES65 = 68 | CES90 = 78 |
| CES16 = 48 | CES41 = 89 | CES66 = 66 | CES91 = 86 |
| CES17 = 51 | CES42 = 86 | CES67 = 64 | CES92 = 59 |
| CES18 = 57 | CES43 = 75 | CES68 = 70 | CES93 = 74 |
| CES19 = 73 | CES44 = 99 | CES69 = 80 | CES94 = 50 |
| CES20 = 67 | CES45 = 83 | CES70 = 65 | CES95 = 69 |
| CES21 = 88 | CES46 = 78 | CES71 = 64 | CES96 = 77 |
| CES22 = 80 | CES47 = 80 | CES72 = 87 | CES97 = 81 |
| CES23 = 92 | CES48 = 70 | CES73 = 58 | CES98 = 76 |
| CES24 = 91 | CES49 = 76 | CES74 = 93 | CES99 = 66 |
| CES25 = 73 | CES50 = 85 | CES75 = 67 |            |



### Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)