

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: INVUE

Report Number: P553746

Luminaire Tested: **LXS-VA2-830-U-AST-A**

Issue Date: 7/13/2021

**Test Information**

Test Method: LM-79-08  
Report Number: P553746  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1803-687-3)  
Test Lab: INNOVATION CENTER  
Issue Date: 7/13/2021  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: LXS-VA2-830-U-AST-A  
Description: LUXESCAPE OUTDOOR ARCHITECTURAL LUMINAIRE  
80 CRI, 3000K LEDS AND TYPE IV OPTIC, ARM MOUNT  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 4157 lumens  
Efficiency: N/A  
Efficacy: 86.6 lumens/watt  
Luminous Opening: Circular (Dia: 1.62' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B1 - U0 - G2

Input Watts (W): 48  
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: 28.75 FT



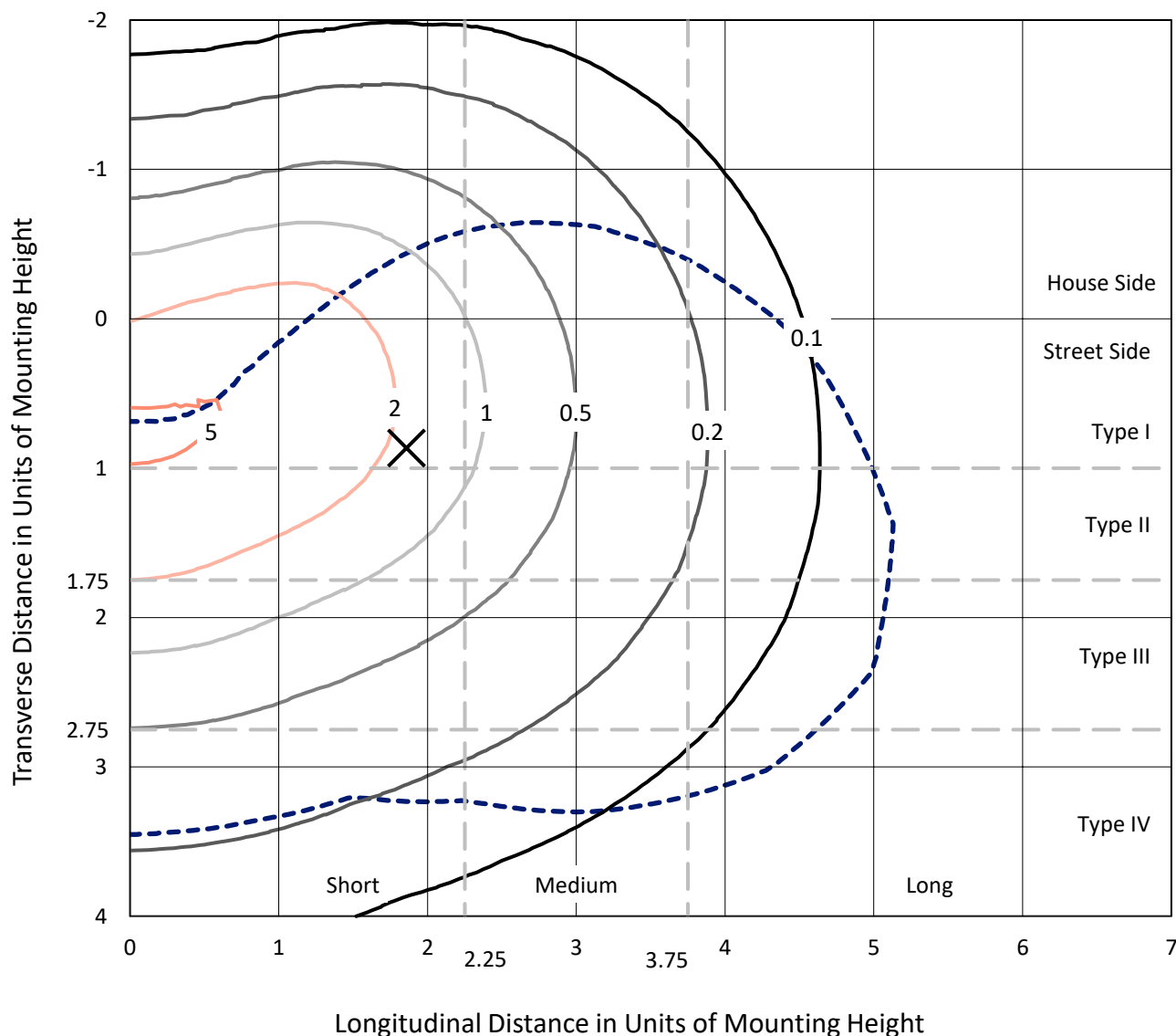
REPORT NUMBER: P553746

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## Iso-Footcandle Lines of Horizontal Illumination

× Max cd

--- 1/2 Max cd



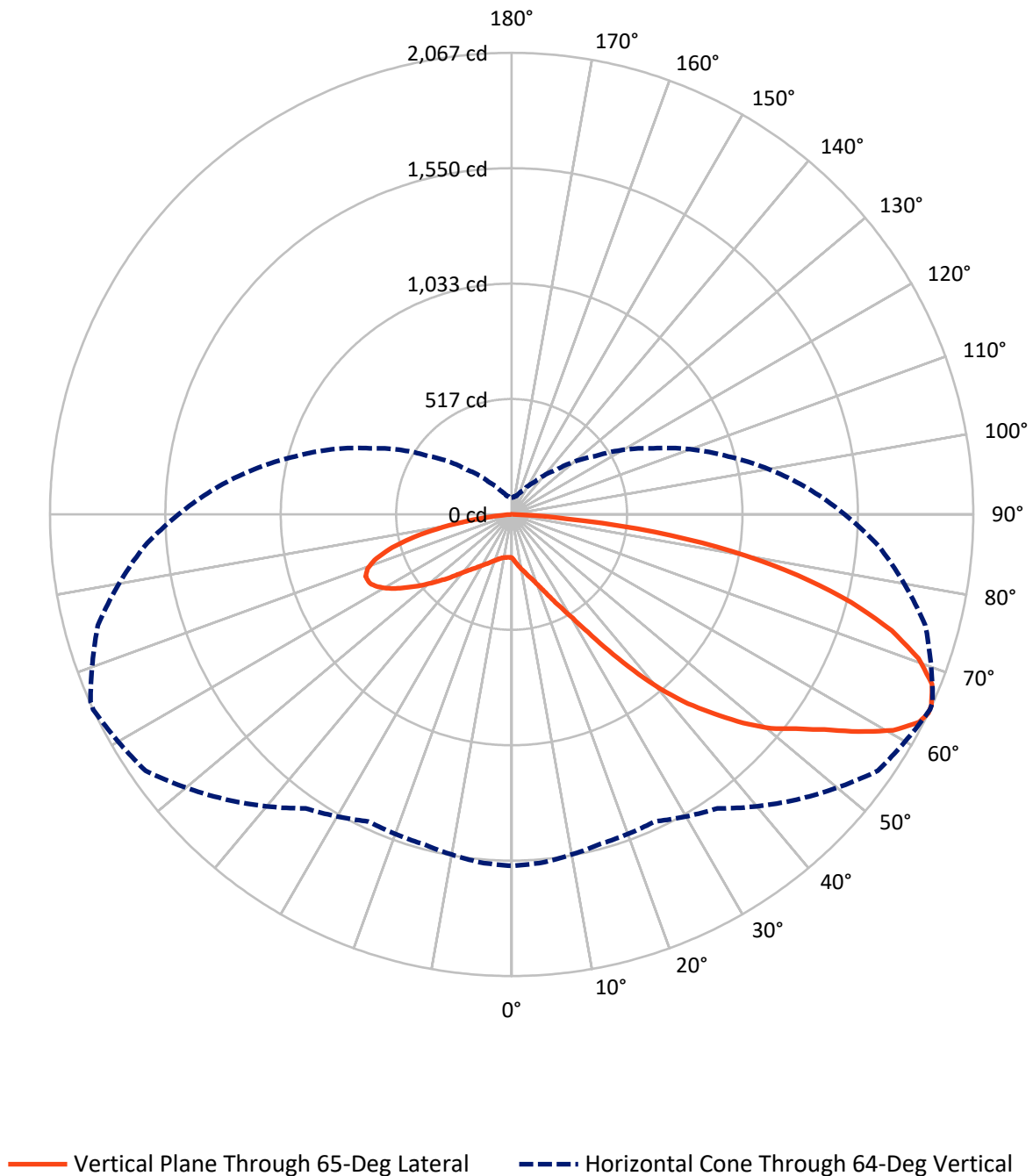
Based on 10 foot mounting height. Maximum calculated value = 6.2 fc

Type IV - Short - N/A

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CATALOG NUMBER: LXS-VA2-830-U-AST-A

## Luminous Intensity Polar Plot



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CATALOG NUMBER: LXS-VA2-830-U-AST-A

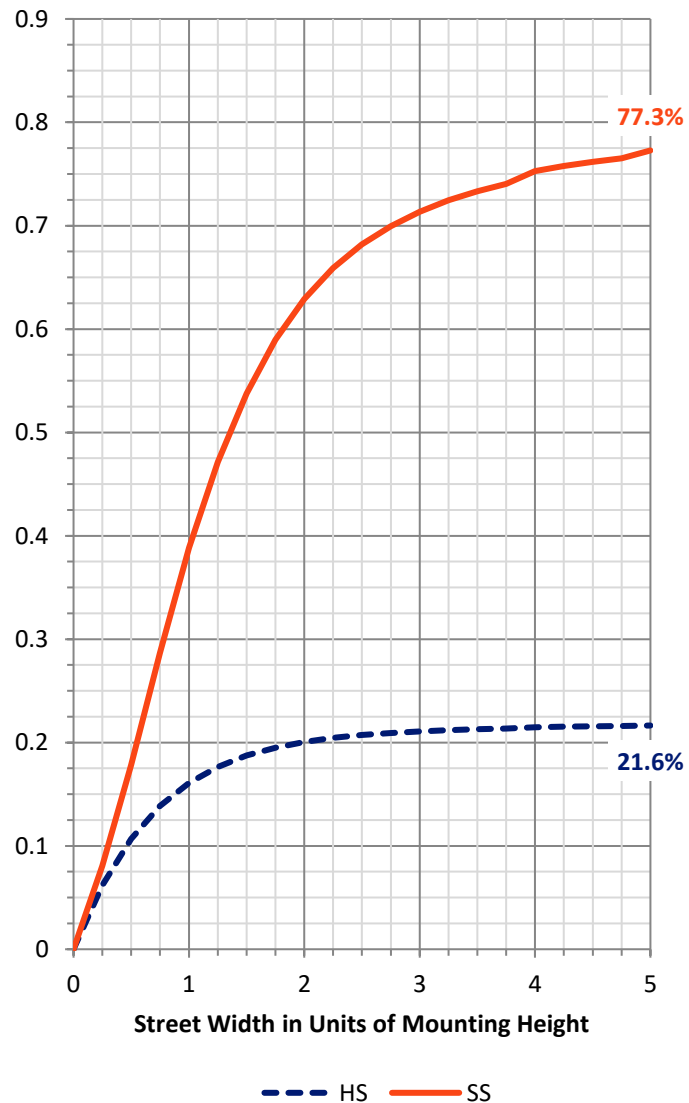
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 902.6    | 0.0    | 902.6  |
|                    | % Fixture | 21.7     | 0.0    | 21.7   |
| <b>Street Side</b> | Lumens    | 3254.4   | 0.0    | 3254.4 |
|                    | % Fixture | 78.3     | 0.0    | 78.3   |
| <b>Total</b>       | Lumens    | 4157.0   | 0.0    | 4157.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 20.0   | 0.5       |
| 10°-20°   | 69.5   | 1.7       |
| 20°-30°   | 154.0  | 3.7       |
| 30°-40°   | 341.4  | 8.2       |
| 40°-50°   | 605.4  | 14.6      |
| 50°-60°   | 884.7  | 21.3      |
| 60°-70°   | 1070.4 | 25.8      |
| 70°-80°   | 824.9  | 19.8      |
| 80°-90°   | 186.8  | 4.5       |
| 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°    | 4157.0 | 100.0     |
| 0°-180°   | 4157.0 | 100.0     |

**Coefficient of Utilization**



REPORT NUMBER: P553746

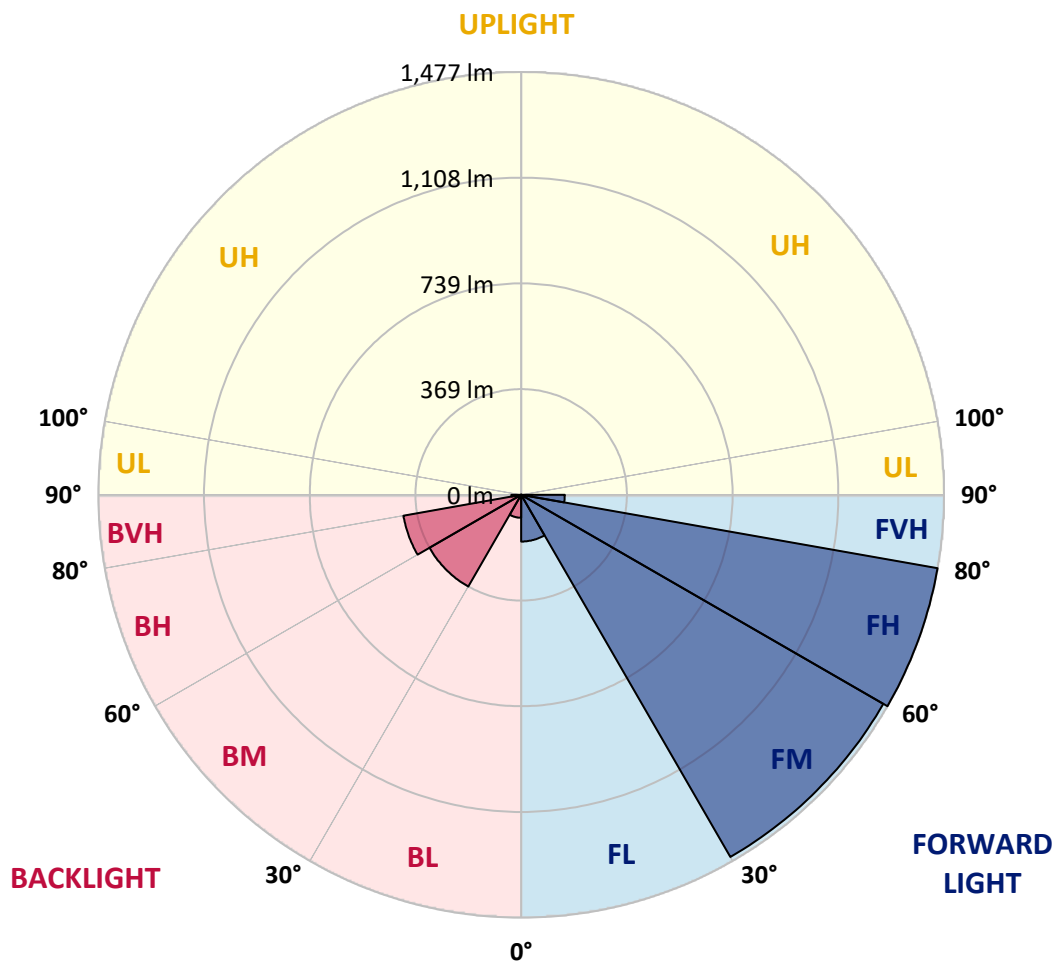
CATALOG NUMBER: LXS-VA2-830-U-AST-A

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 163.3  | 3.9       |                         |      |         |
| FM   | (30°-60°)   | 1461.3 | 35.2      |                         |      |         |
| FH   | (60°-80°)   | 1477.5 | 35.5      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 152.4  | 3.7       |                         |      | G2/225  |
| BL   | (0°-30°)    | 80.2   | 1.9       | B0/110                  |      |         |
| BM   | (30°-60°)   | 370.2  | 8.9       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 417.8  | 10.1      | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 34.4   | 0.8       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B1-U0-G2**

Type IV Short



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 65°    | 66°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 194.0  | 194.0  | 194.0  | 194.0  | 194.0  | 194.0  | 194.0  | 194.0  | 194.0  | 194.0  | 194.0  |
| 2.5°  | 218.0  | 218.0  | 216.4  | 216.4  | 214.8  | 211.6  | 210.0  | 205.2  | 205.2  | 202.0  | 198.8  |
| 5°    | 235.7  | 235.7  | 235.7  | 234.1  | 232.5  | 229.3  | 226.1  | 219.6  | 219.6  | 213.2  | 208.4  |
| 7.5°  | 251.7  | 251.7  | 250.1  | 250.1  | 246.9  | 245.3  | 242.1  | 234.1  | 234.1  | 226.1  | 216.4  |
| 10°   | 274.2  | 272.6  | 271.0  | 269.4  | 266.1  | 261.3  | 258.1  | 250.1  | 248.5  | 238.9  | 227.7  |
| 12.5° | 295.0  | 295.0  | 295.0  | 293.4  | 290.2  | 283.8  | 275.8  | 266.1  | 266.1  | 253.3  | 238.9  |
| 15°   | 319.1  | 317.5  | 317.5  | 315.8  | 314.2  | 309.4  | 298.2  | 287.0  | 285.4  | 272.6  | 253.3  |
| 17.5° | 355.9  | 354.3  | 351.1  | 344.7  | 339.9  | 336.7  | 327.1  | 307.8  | 307.8  | 293.4  | 272.6  |
| 20°   | 400.8  | 399.2  | 394.4  | 388.0  | 376.8  | 367.2  | 359.1  | 336.7  | 333.5  | 317.5  | 291.8  |
| 22.5° | 458.5  | 455.3  | 448.9  | 440.9  | 431.3  | 410.4  | 396.0  | 373.6  | 367.2  | 344.7  | 315.8  |
| 25°   | 538.7  | 535.5  | 522.7  | 498.6  | 482.6  | 469.8  | 440.9  | 418.5  | 412.0  | 378.4  | 344.7  |
| 27.5° | 607.6  | 606.0  | 599.6  | 585.2  | 551.5  | 533.9  | 500.2  | 473.0  | 466.6  | 421.7  | 378.4  |
| 30°   | 711.9  | 707.0  | 691.0  | 673.4  | 657.3  | 618.9  | 586.8  | 538.7  | 532.3  | 477.8  | 421.7  |
| 32.5° | 897.8  | 888.2  | 859.4  | 806.5  | 780.8  | 735.9  | 700.6  | 628.5  | 617.3  | 553.1  | 476.2  |
| 35°   | 1125.5 | 1114.3 | 1061.4 | 984.4  | 910.7  | 878.6  | 817.7  | 747.1  | 727.9  | 647.7  | 541.9  |
| 37.5° | 1234.5 | 1228.1 | 1191.2 | 1122.3 | 1051.8 | 1003.7 | 950.7  | 885.0  | 862.6  | 760.0  | 618.9  |
| 40°   | 1305.1 | 1303.5 | 1273.0 | 1218.5 | 1172.0 | 1117.5 | 1088.6 | 1027.7 | 1005.3 | 885.0  | 715.1  |
| 42.5° | 1351.6 | 1350.0 | 1332.3 | 1284.2 | 1265.0 | 1228.1 | 1212.1 | 1157.6 | 1139.9 | 1014.9 | 819.3  |
| 45°   | 1364.4 | 1359.6 | 1351.6 | 1348.4 | 1324.3 | 1330.7 | 1330.7 | 1273.0 | 1261.8 | 1143.1 | 934.7  |
| 47.5° | 1409.3 | 1404.5 | 1370.8 | 1362.8 | 1377.2 | 1420.5 | 1434.9 | 1394.9 | 1386.8 | 1261.8 | 1040.5 |
| 50°   | 1406.1 | 1406.1 | 1407.7 | 1374.0 | 1431.7 | 1478.2 | 1515.1 | 1505.5 | 1499.1 | 1370.8 | 1152.8 |
| 52.5° | 1430.1 | 1425.3 | 1402.9 | 1420.5 | 1447.8 | 1526.3 | 1590.5 | 1593.7 | 1595.3 | 1475.0 | 1255.4 |
| 55°   | 1593.7 | 1593.7 | 1544.0 | 1500.7 | 1540.8 | 1640.2 | 1715.5 | 1699.5 | 1696.3 | 1582.4 | 1354.8 |
| 57.5° | 1664.2 | 1657.8 | 1620.9 | 1574.4 | 1637.0 | 1760.4 | 1855.0 | 1834.2 | 1824.5 | 1694.7 | 1449.4 |
| 60°   | 1637.0 | 1627.3 | 1608.1 | 1587.3 | 1667.4 | 1814.9 | 1954.4 | 1962.4 | 1954.4 | 1797.3 | 1540.8 |
| 62.5° | 1614.5 | 1606.5 | 1560.0 | 1560.0 | 1640.2 | 1822.9 | 1997.7 | 2047.4 | 2039.4 | 1880.7 | 1617.7 |
| 64°   | 1572.8 | 1564.8 | 1527.9 | 1516.7 | 1606.5 | 1805.3 | 2000.9 | 2066.6 | 2063.4 | 1917.5 | 1651.4 |
| 65°   | 1518.3 | 1516.7 | 1495.9 | 1481.4 | 1580.8 | 1786.1 | 1991.3 | 2065.0 | 2065.0 | 1932.0 | 1662.6 |
| 67.5° | 1375.6 | 1367.6 | 1391.6 | 1388.4 | 1503.9 | 1720.3 | 1933.6 | 2029.8 | 2028.2 | 1925.5 | 1659.4 |
| 70°   | 1239.3 | 1232.9 | 1253.8 | 1276.2 | 1399.7 | 1609.7 | 1830.9 | 1932.0 | 1930.4 | 1851.8 | 1604.9 |
| 72.5° | 1103.1 | 1111.1 | 1115.9 | 1141.5 | 1253.8 | 1460.6 | 1675.4 | 1779.6 | 1776.4 | 1712.3 | 1495.9 |
| 75°   | 973.2  | 963.6  | 968.4  | 979.6  | 1087.0 | 1277.8 | 1475.0 | 1569.6 | 1568.0 | 1513.5 | 1324.3 |
| 77.5° | 808.1  | 803.2  | 804.8  | 803.2  | 905.9  | 1066.2 | 1228.1 | 1309.9 | 1308.3 | 1257.0 | 1090.2 |
| 80°   | 631.7  | 620.5  | 622.1  | 614.1  | 700.6  | 824.1  | 944.3  | 1002.1 | 992.4  | 952.4  | 811.3  |
| 82.5° | 437.7  | 424.9  | 421.7  | 412.0  | 481.0  | 559.5  | 625.3  | 647.7  | 636.5  | 599.6  | 495.4  |
| 85°   | 189.2  | 171.6  | 195.6  | 195.6  | 216.4  | 235.7  | 250.1  | 245.3  | 238.9  | 222.9  | 166.7  |
| 87.5° | 0.0    | 0.0    | 0.0    | 0.0    | 1.6    | 0.0    | 1.6    | 1.6    | 1.6    | 1.6    | 1.6    |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

REPORT NUMBER: P553746

CATALOG NUMBER: LXS-VA2-830-U-AST-A

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 194.0  | 194.0  | 194.0  | 194.0 | 194.0 | 194.0 | 194.0 | 194.0 | 194.0 | 194.0 | 194.0 |
| 2.5°  | 198.8  | 197.2  | 194.0  | 192.4 | 190.8 | 189.2 | 187.6 | 186.0 | 186.0 | 186.0 | 184.4 |
| 5°    | 205.2  | 202.0  | 197.2  | 192.4 | 189.2 | 184.4 | 181.2 | 178.0 | 176.4 | 174.8 | 174.8 |
| 7.5°  | 211.6  | 208.4  | 200.4  | 194.0 | 186.0 | 179.6 | 173.2 | 169.9 | 166.7 | 165.1 | 165.1 |
| 10°   | 221.3  | 216.4  | 205.2  | 195.6 | 184.4 | 176.4 | 168.3 | 163.5 | 160.3 | 160.3 | 158.7 |
| 12.5° | 230.9  | 224.5  | 213.2  | 198.8 | 184.4 | 174.8 | 166.7 | 160.3 | 155.5 | 153.9 | 153.9 |
| 15°   | 245.3  | 237.3  | 221.3  | 203.6 | 187.6 | 174.8 | 163.5 | 153.9 | 149.1 | 145.9 | 145.9 |
| 17.5° | 259.7  | 250.1  | 230.9  | 210.0 | 192.4 | 174.8 | 160.3 | 150.7 | 144.3 | 141.1 | 141.1 |
| 20°   | 277.4  | 266.1  | 242.1  | 218.0 | 197.2 | 174.8 | 158.7 | 147.5 | 139.5 | 136.3 | 136.3 |
| 22.5° | 298.2  | 283.8  | 254.9  | 226.1 | 200.4 | 176.4 | 158.7 | 144.3 | 134.7 | 129.9 | 129.9 |
| 25°   | 322.3  | 304.6  | 269.4  | 237.3 | 205.2 | 179.6 | 157.1 | 139.5 | 129.9 | 125.1 | 125.1 |
| 27.5° | 351.1  | 331.9  | 285.4  | 248.5 | 211.6 | 182.8 | 155.5 | 137.9 | 126.7 | 120.2 | 120.2 |
| 30°   | 384.8  | 360.7  | 306.2  | 261.3 | 219.6 | 184.4 | 157.1 | 136.3 | 123.5 | 117.0 | 115.4 |
| 32.5° | 429.7  | 397.6  | 330.3  | 275.8 | 229.3 | 187.6 | 157.1 | 133.1 | 120.2 | 113.8 | 113.8 |
| 35°   | 484.2  | 442.5  | 359.1  | 291.8 | 237.3 | 192.4 | 157.1 | 133.1 | 117.0 | 110.6 | 109.0 |
| 37.5° | 551.5  | 495.4  | 394.4  | 311.0 | 248.5 | 197.2 | 157.1 | 131.5 | 113.8 | 107.4 | 105.8 |
| 40°   | 631.7  | 559.5  | 432.9  | 333.5 | 259.7 | 202.0 | 160.3 | 129.9 | 113.8 | 105.8 | 105.8 |
| 42.5° | 721.5  | 636.5  | 481.0  | 362.3 | 275.8 | 210.0 | 161.9 | 129.9 | 112.2 | 102.6 | 102.6 |
| 45°   | 819.3  | 721.5  | 537.1  | 397.6 | 295.0 | 218.0 | 163.5 | 131.5 | 109.0 | 101.0 | 99.4  |
| 47.5° | 926.7  | 811.3  | 599.6  | 432.9 | 312.6 | 227.7 | 166.7 | 129.9 | 107.4 | 99.4  | 97.8  |
| 50°   | 1026.1 | 905.9  | 668.6  | 473.0 | 333.5 | 235.7 | 169.9 | 128.3 | 105.8 | 97.8  | 96.2  |
| 52.5° | 1122.3 | 997.2  | 739.1  | 516.3 | 355.9 | 246.9 | 173.2 | 128.3 | 104.2 | 94.6  | 93.0  |
| 55°   | 1213.7 | 1082.2 | 808.1  | 561.1 | 381.6 | 258.1 | 176.4 | 128.3 | 102.6 | 93.0  | 91.4  |
| 57.5° | 1297.1 | 1162.4 | 872.2  | 607.6 | 408.8 | 269.4 | 178.0 | 126.7 | 101.0 | 89.8  | 88.2  |
| 60°   | 1383.6 | 1240.9 | 929.9  | 650.9 | 434.5 | 279.0 | 179.6 | 125.1 | 96.2  | 86.6  | 85.0  |
| 62.5° | 1457.4 | 1306.7 | 979.6  | 686.2 | 448.9 | 282.2 | 178.0 | 120.2 | 91.4  | 80.2  | 78.6  |
| 64°   | 1491.1 | 1332.3 | 1003.7 | 700.6 | 455.3 | 282.2 | 176.4 | 117.0 | 86.6  | 77.0  | 75.4  |
| 65°   | 1503.9 | 1345.2 | 1013.3 | 707.0 | 458.5 | 282.2 | 173.2 | 115.4 | 83.4  | 75.4  | 73.8  |
| 67.5° | 1508.7 | 1350.0 | 1019.7 | 710.3 | 455.3 | 275.8 | 165.1 | 107.4 | 70.5  | 67.3  | 65.7  |
| 70°   | 1463.8 | 1309.9 | 989.2  | 687.8 | 436.1 | 259.7 | 153.9 | 96.2  | 59.3  | 56.1  | 57.7  |
| 72.5° | 1362.8 | 1220.1 | 923.5  | 636.5 | 400.8 | 235.7 | 136.3 | 83.4  | 49.7  | 48.1  | 49.7  |
| 75°   | 1199.3 | 1071.0 | 809.7  | 554.7 | 347.9 | 203.6 | 115.4 | 65.7  | 38.5  | 40.1  | 41.7  |
| 77.5° | 994.0  | 883.4  | 655.7  | 445.7 | 275.8 | 158.7 | 88.2  | 44.9  | 28.9  | 32.1  | 32.1  |
| 80°   | 727.9  | 641.3  | 469.8  | 311.0 | 190.8 | 105.8 | 54.5  | 27.3  | 19.2  | 22.4  | 22.4  |
| 82.5° | 434.5  | 373.6  | 266.1  | 173.2 | 102.6 | 51.3  | 24.0  | 11.2  | 9.6   | 12.8  | 12.8  |
| 85°   | 153.9  | 126.7  | 81.8   | 48.1  | 25.7  | 11.2  | 4.8   | 1.6   | 1.6   | 0.0   | 0.0   |
| 87.5° | 1.6    | 0.0    | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |

Signify Classified - Internal  
Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



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

Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

INVUE

Report Number: SP1-2205-670-2

Test Date: 07/01/2022

Luminaire Tested: LXS-VA2-830-U-SYM-C

Data in this report applies to families of products including LXS-VA2-830.

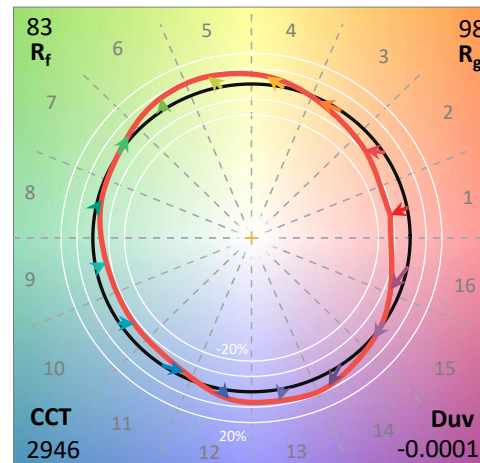
### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2205-670-2  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 07/01/2022  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: INVUE  
 Catalog Number: **LXS-VA2-830-U-SYM-C**  
 Description: INVUE LUXESCAPE

CANTILEVER MOUNT

### Spectral Parameters

|                           |         |           |      |      |      |
|---------------------------|---------|-----------|------|------|------|
| CCT (K):                  | 2946    | CRI (Ra): | 81.3 |      |      |
| CIE u':                   | 0.2525  | R1:       | 79.2 | R9:  | 5.4  |
| CIE v':                   | 0.5223  | R2:       | 88.2 | R10: | 73.5 |
| Duv:                      | -0.0001 | R3:       | 96.1 | R11: | 79.6 |
| CIE x:                    | 0.4406  | R4:       | 80.2 | R12: | 68.9 |
| CIE y:                    | 0.4050  | R5:       | 79.2 | R13: | 80.9 |
| CIE z:                    | 0.1544  | R6:       | 85.2 | R14: | 97.9 |
| Peak Wavelength (nm):     | 605     | R7:       | 83.2 |      |      |
| Dominant Wavelength (nm): | 583     | R8:       | 58.9 |      |      |
| Purity:                   | 53.9    |           |      |      |      |
| Rf:                       | 82.5    |           |      |      |      |
| Rg:                       | 98.2    |           |      |      |      |



### Test Conditions

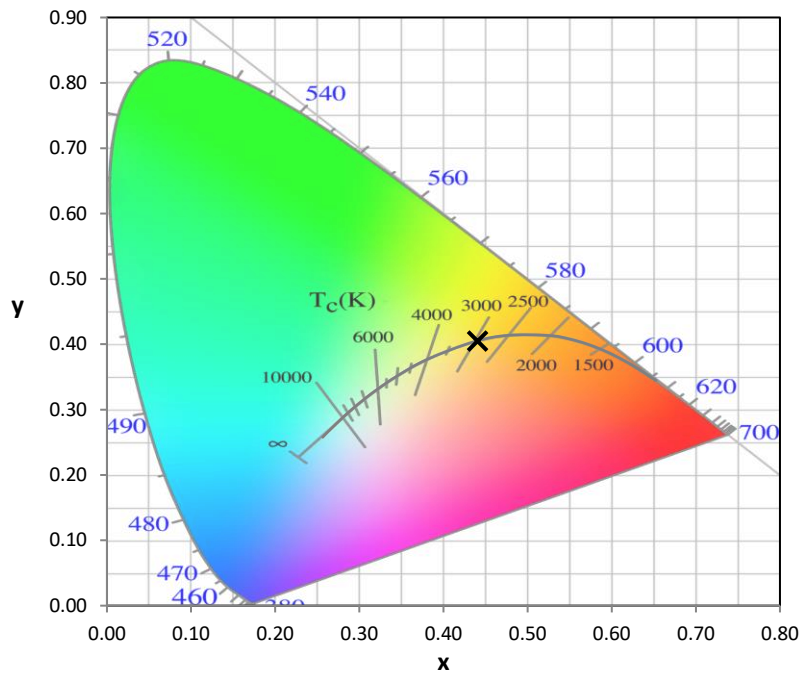
Stabilization Time: 165M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.4/61%  
 Sphere Temperature (°C): 24.8

REPORT NUMBER: SP1-2205-670-2

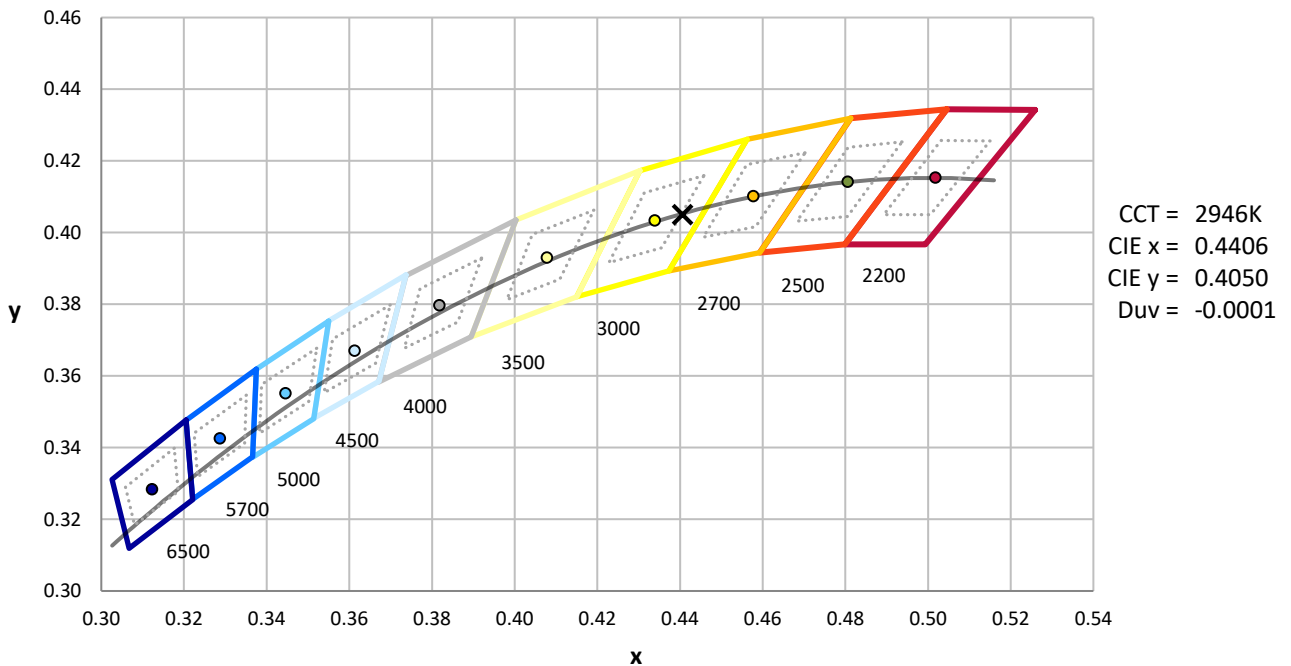
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | 76INCH SPHERE IN0058  | 2/7/2022         | 8/7/2022             |
| Power Meter                    | XITRON 2801 IN0071    | 11/29/2021       | 11/29/2022           |
| AC Power Source                | CHROMA 61603 IN0063   | 11/29/2021       | 11/29/2022           |
| DC Power Source                | AGILENT E3634A IN0208 | 11/29/2021       | 11/29/2022           |
| Sphere Thermometer             | ONSET IN0085          | 11/29/2021       | 11/29/2022           |
| Room Thermometer               | ONSET IN0046          | 11/29/2021       | 11/29/2022           |

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**CIE 1931 Chromaticity Diagram**



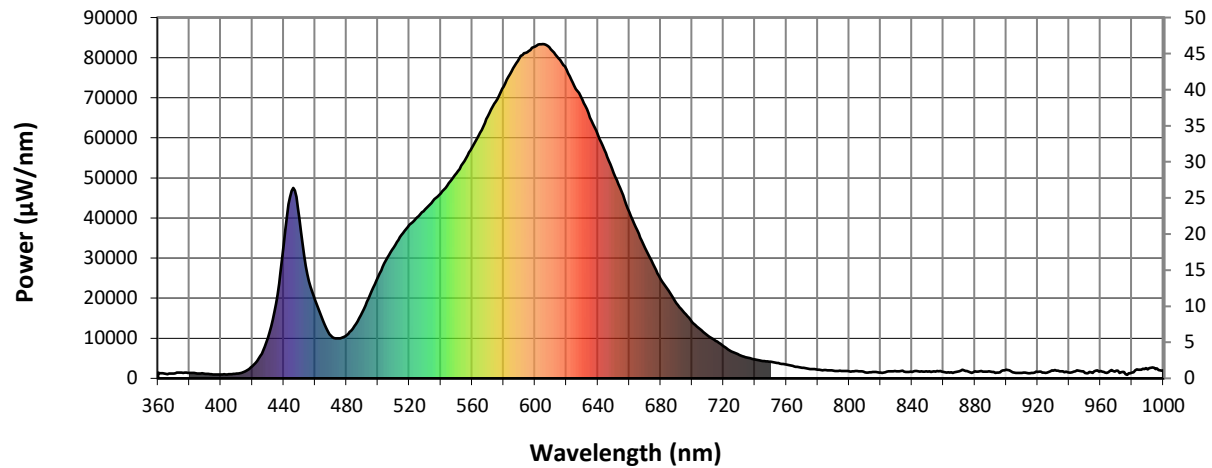
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 3000K 4-step quadrangle

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**Photopic Flux vs. Wavelength**

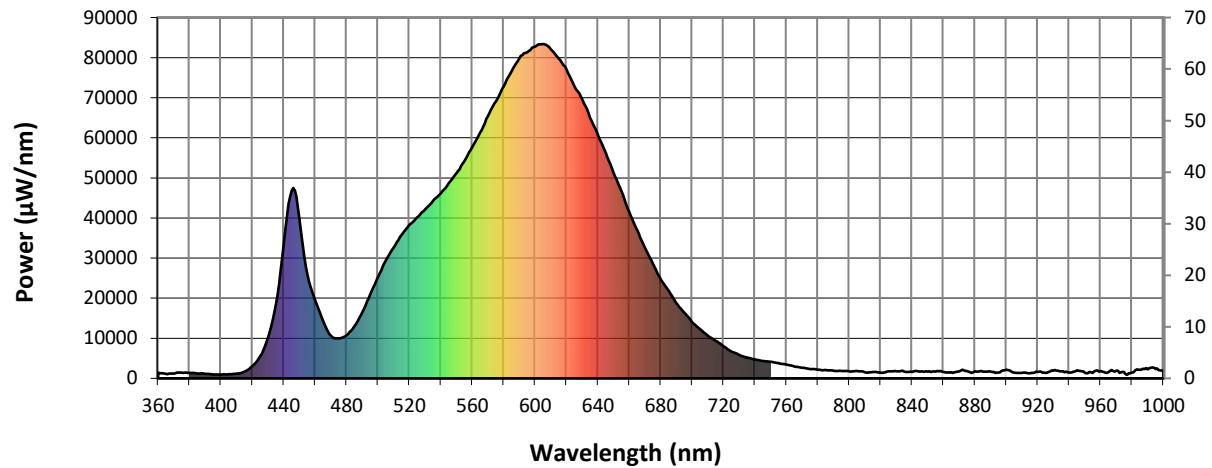


#####

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 1420             | NR               | 490       | 16514            | NR               | 620       | 77010            | NR               | 750       | 4160             | NR               | 880       | 1762             | NR               |
| 365       | 1119             | NR               | 495       | 20848            | NR               | 625       | 72968            | NR               | 755       | 3799             | NR               | 885       | 1708             | NR               |
| 370       | 1220             | NR               | 500       | 25312            | NR               | 630       | 69621            | NR               | 760       | 3466             | NR               | 890       | 1652             | NR               |
| 375       | 1467             | NR               | 505       | 29412            | NR               | 635       | 65088            | NR               | 765       | 2959             | NR               | 895       | 1448             | NR               |
| 380       | 1377             | NR               | 510       | 32642            | NR               | 640       | 60775            | NR               | 770       | 2669             | NR               | 900       | 2147             | NR               |
| 385       | 1218             | NR               | 515       | 35719            | NR               | 645       | 56160            | NR               | 775       | 2323             | NR               | 905       | 1442             | NR               |
| 390       | 1140             | NR               | 520       | 38312            | NR               | 650       | 51260            | NR               | 780       | 2193             | NR               | 910       | 1354             | NR               |
| 395       | 993              | NR               | 525       | 40145            | NR               | 655       | 46645            | NR               | 785       | 2066             | NR               | 915       | 1289             | NR               |
| 400       | 970              | NR               | 530       | 42169            | NR               | 660       | 41488            | NR               | 790       | 1919             | NR               | 920       | 1620             | NR               |
| 405       | 1007             | NR               | 535       | 44277            | NR               | 665       | 36962            | NR               | 795       | 1855             | NR               | 925       | 1376             | NR               |
| 410       | 1171             | NR               | 540       | 46132            | NR               | 670       | 32536            | NR               | 800       | 1774             | NR               | 930       | 1957             | NR               |
| 415       | 1658             | NR               | 545       | 48654            | NR               | 675       | 28594            | NR               | 805       | 1859             | NR               | 935       | 1749             | NR               |
| 420       | 3022             | NR               | 550       | 51200            | NR               | 680       | 24774            | NR               | 810       | 1499             | NR               | 940       | 1429             | NR               |
| 425       | 5554             | NR               | 555       | 54216            | NR               | 685       | 21857            | NR               | 815       | 1560             | NR               | 945       | 1972             | NR               |
| 430       | 10172            | NR               | 560       | 57652            | NR               | 690       | 18796            | NR               | 820       | 1460             | NR               | 950       | 1386             | NR               |
| 435       | 18521            | NR               | 565       | 61264            | NR               | 695       | 16368            | NR               | 825       | 1779             | NR               | 955       | 1357             | NR               |
| 440       | 33279            | NR               | 570       | 65389            | NR               | 700       | 14086            | NR               | 830       | 1786             | NR               | 960       | 1800             | NR               |
| 445       | 46769            | NR               | 575       | 69020            | NR               | 705       | 12272            | NR               | 835       | 1700             | NR               | 965       | 1500             | NR               |
| 450       | 39883            | NR               | 580       | 72747            | NR               | 710       | 10582            | NR               | 840       | 1604             | NR               | 970       | 1903             | NR               |
| 455       | 25958            | NR               | 585       | 76555            | NR               | 715       | 9375             | NR               | 845       | 1660             | NR               | 975       | 1631             | NR               |
| 460       | 19577            | NR               | 590       | 79922            | NR               | 720       | 7989             | NR               | 850       | 1661             | NR               | 980       | 1405             | NR               |
| 465       | 14390            | NR               | 595       | 81358            | NR               | 725       | 6739             | NR               | 855       | 1690             | NR               | 985       | 2143             | NR               |
| 470       | 10591            | NR               | 600       | 82761            | NR               | 730       | 5847             | NR               | 860       | 1607             | NR               | 990       | 2213             | NR               |
| 475       | 9960             | NR               | 605       | 83375            | NR               | 735       | 5164             | NR               | 865       | 1492             | NR               | 995       | 2325             | NR               |
| 480       | 10779            | NR               | 610       | 82032            | NR               | 740       | 4742             | NR               | 870       | 1768             | NR               | 1000      | 2016             | NR               |
| 485       | 12985            | NR               | 615       | 79853            | NR               | 745       | 4333             | NR               | 875       | 1864             | NR               |           |                  |                  |

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**Scotopic Flux vs. Wavelength**



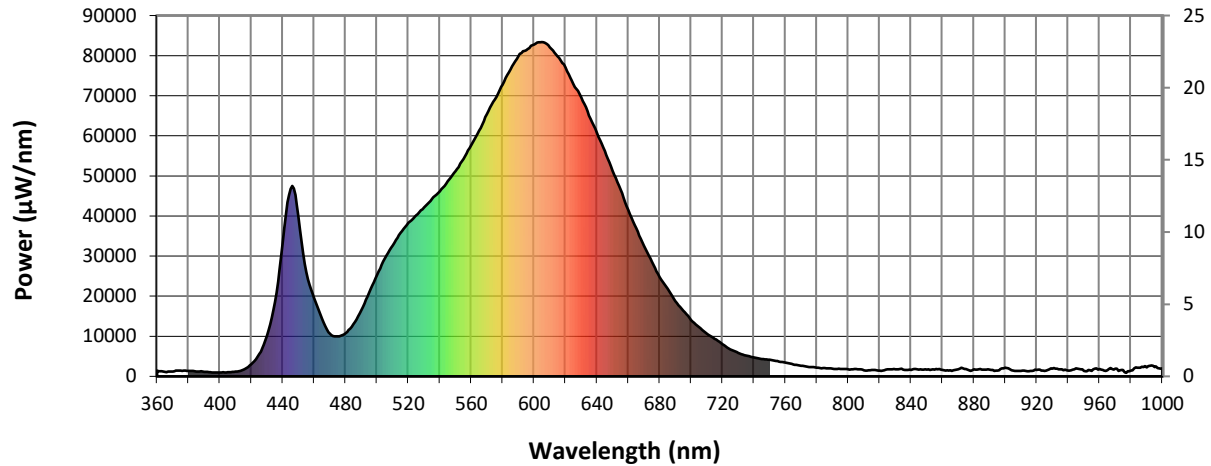
**Scotopic Lumens: 5220.3**

**S/P: 1.28**

| 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       | 1420             | NR               | 490       | 16514            | NR               | 620       | 77010            | NR               | 750       | 4160             | NR               | 880       | 1762             | NR               |
| 365       | 1119             | NR               | 495       | 20848            | NR               | 625       | 72968            | NR               | 755       | 3799             | NR               | 885       | 1708             | NR               |
| 370       | 1220             | NR               | 500       | 25312            | NR               | 630       | 69621            | NR               | 760       | 3466             | NR               | 890       | 1652             | NR               |
| 375       | 1467             | NR               | 505       | 29412            | NR               | 635       | 65088            | NR               | 765       | 2959             | NR               | 895       | 1448             | NR               |
| 380       | 1377             | NR               | 510       | 32642            | NR               | 640       | 60775            | NR               | 770       | 2669             | NR               | 900       | 2147             | NR               |
| 385       | 1218             | NR               | 515       | 35719            | NR               | 645       | 56160            | NR               | 775       | 2323             | NR               | 905       | 1442             | NR               |
| 390       | 1140             | NR               | 520       | 38312            | NR               | 650       | 51260            | NR               | 780       | 2193             | NR               | 910       | 1354             | NR               |
| 395       | 993              | NR               | 525       | 40145            | NR               | 655       | 46645            | NR               | 785       | 2066             | NR               | 915       | 1289             | NR               |
| 400       | 970              | NR               | 530       | 42169            | NR               | 660       | 41488            | NR               | 790       | 1919             | NR               | 920       | 1620             | NR               |
| 405       | 1007             | NR               | 535       | 44277            | NR               | 665       | 36962            | NR               | 795       | 1855             | NR               | 925       | 1376             | NR               |
| 410       | 1171             | NR               | 540       | 46132            | NR               | 670       | 32536            | NR               | 800       | 1774             | NR               | 930       | 1957             | NR               |
| 415       | 1658             | NR               | 545       | 48654            | NR               | 675       | 28594            | NR               | 805       | 1859             | NR               | 935       | 1749             | NR               |
| 420       | 3022             | NR               | 550       | 51200            | NR               | 680       | 24774            | NR               | 810       | 1499             | NR               | 940       | 1429             | NR               |
| 425       | 5554             | NR               | 555       | 54216            | NR               | 685       | 21857            | NR               | 815       | 1560             | NR               | 945       | 1972             | NR               |
| 430       | 10172            | NR               | 560       | 57652            | NR               | 690       | 18796            | NR               | 820       | 1460             | NR               | 950       | 1386             | NR               |
| 435       | 18521            | NR               | 565       | 61264            | NR               | 695       | 16368            | NR               | 825       | 1779             | NR               | 955       | 1357             | NR               |
| 440       | 33279            | NR               | 570       | 65389            | NR               | 700       | 14086            | NR               | 830       | 1786             | NR               | 960       | 1800             | NR               |
| 445       | 46769            | NR               | 575       | 69020            | NR               | 705       | 12272            | NR               | 835       | 1700             | NR               | 965       | 1500             | NR               |
| 450       | 39883            | NR               | 580       | 72747            | NR               | 710       | 10582            | NR               | 840       | 1604             | NR               | 970       | 1903             | NR               |
| 455       | 25958            | NR               | 585       | 76555            | NR               | 715       | 9375             | NR               | 845       | 1660             | NR               | 975       | 1631             | NR               |
| 460       | 19577            | NR               | 590       | 79922            | NR               | 720       | 7989             | NR               | 850       | 1661             | NR               | 980       | 1405             | NR               |
| 465       | 14390            | NR               | 595       | 81358            | NR               | 725       | 6739             | NR               | 855       | 1690             | NR               | 985       | 2143             | NR               |
| 470       | 10591            | NR               | 600       | 82761            | NR               | 730       | 5847             | NR               | 860       | 1607             | NR               | 990       | 2213             | NR               |
| 475       | 9960             | NR               | 605       | 83375            | NR               | 735       | 5164             | NR               | 865       | 1492             | NR               | 995       | 2325             | NR               |
| 480       | 10779            | NR               | 610       | 82032            | NR               | 740       | 4742             | NR               | 870       | 1768             | NR               | 1000      | 2016             | NR               |
| 485       | 12985            | NR               | 615       | 79853            | NR               | 745       | 4333             | NR               | 875       | 1864             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 1923.7 S/P: 0.47**

| 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       | 1420             | NR               | 490       | 16514            | NR               | 620       | 77010            | NR               | 750       | 4160             | NR               | 880       | 1762             | NR               |
| 365       | 1119             | NR               | 495       | 20848            | NR               | 625       | 72968            | NR               | 755       | 3799             | NR               | 885       | 1708             | NR               |
| 370       | 1220             | NR               | 500       | 25312            | NR               | 630       | 69621            | NR               | 760       | 3466             | NR               | 890       | 1652             | NR               |
| 375       | 1467             | NR               | 505       | 29412            | NR               | 635       | 65088            | NR               | 765       | 2959             | NR               | 895       | 1448             | NR               |
| 380       | 1377             | NR               | 510       | 32642            | NR               | 640       | 60775            | NR               | 770       | 2669             | NR               | 900       | 2147             | NR               |
| 385       | 1218             | NR               | 515       | 35719            | NR               | 645       | 56160            | NR               | 775       | 2323             | NR               | 905       | 1442             | NR               |
| 390       | 1140             | NR               | 520       | 38312            | NR               | 650       | 51260            | NR               | 780       | 2193             | NR               | 910       | 1354             | NR               |
| 395       | 993              | NR               | 525       | 40145            | NR               | 655       | 46645            | NR               | 785       | 2066             | NR               | 915       | 1289             | NR               |
| 400       | 970              | NR               | 530       | 42169            | NR               | 660       | 41488            | NR               | 790       | 1919             | NR               | 920       | 1620             | NR               |
| 405       | 1007             | NR               | 535       | 44277            | NR               | 665       | 36962            | NR               | 795       | 1855             | NR               | 925       | 1376             | NR               |
| 410       | 1171             | NR               | 540       | 46132            | NR               | 670       | 32536            | NR               | 800       | 1774             | NR               | 930       | 1957             | NR               |
| 415       | 1658             | NR               | 545       | 48654            | NR               | 675       | 28594            | NR               | 805       | 1859             | NR               | 935       | 1749             | NR               |
| 420       | 3022             | NR               | 550       | 51200            | NR               | 680       | 24774            | NR               | 810       | 1499             | NR               | 940       | 1429             | NR               |
| 425       | 5554             | NR               | 555       | 54216            | NR               | 685       | 21857            | NR               | 815       | 1560             | NR               | 945       | 1972             | NR               |
| 430       | 10172            | NR               | 560       | 57652            | NR               | 690       | 18796            | NR               | 820       | 1460             | NR               | 950       | 1386             | NR               |
| 435       | 18521            | NR               | 565       | 61264            | NR               | 695       | 16368            | NR               | 825       | 1779             | NR               | 955       | 1357             | NR               |
| 440       | 33279            | NR               | 570       | 65389            | NR               | 700       | 14086            | NR               | 830       | 1786             | NR               | 960       | 1800             | NR               |
| 445       | 46769            | NR               | 575       | 69020            | NR               | 705       | 12272            | NR               | 835       | 1700             | NR               | 965       | 1500             | NR               |
| 450       | 39883            | NR               | 580       | 72747            | NR               | 710       | 10582            | NR               | 840       | 1604             | NR               | 970       | 1903             | NR               |
| 455       | 25958            | NR               | 585       | 76555            | NR               | 715       | 9375             | NR               | 845       | 1660             | NR               | 975       | 1631             | NR               |
| 460       | 19577            | NR               | 590       | 79922            | NR               | 720       | 7989             | NR               | 850       | 1661             | NR               | 980       | 1405             | NR               |
| 465       | 14390            | NR               | 595       | 81358            | NR               | 725       | 6739             | NR               | 855       | 1690             | NR               | 985       | 2143             | NR               |
| 470       | 10591            | NR               | 600       | 82761            | NR               | 730       | 5847             | NR               | 860       | 1607             | NR               | 990       | 2213             | NR               |
| 475       | 9960             | NR               | 605       | 83375            | NR               | 735       | 5164             | NR               | 865       | 1492             | NR               | 995       | 2325             | NR               |
| 480       | 10779            | NR               | 610       | 82032            | NR               | 740       | 4742             | NR               | 870       | 1768             | NR               | 1000      | 2016             | NR               |
| 485       | 12985            | NR               | 615       | 79853            | NR               | 745       | 4333             | NR               | 875       | 1864             | NR               |           |                  |                  |

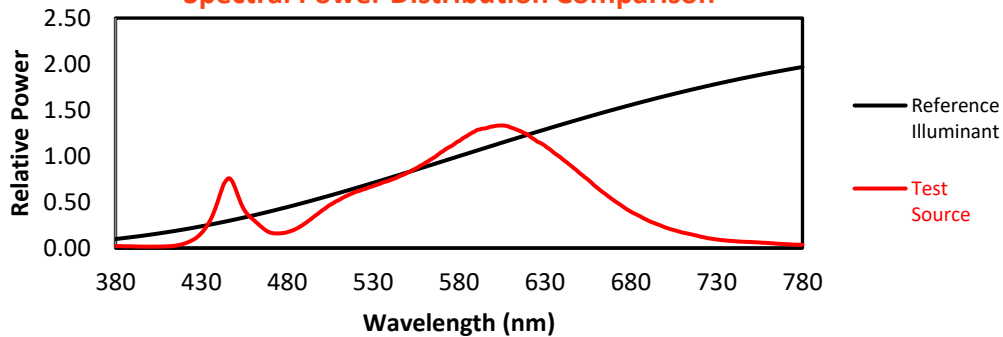
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**TM-30-18**

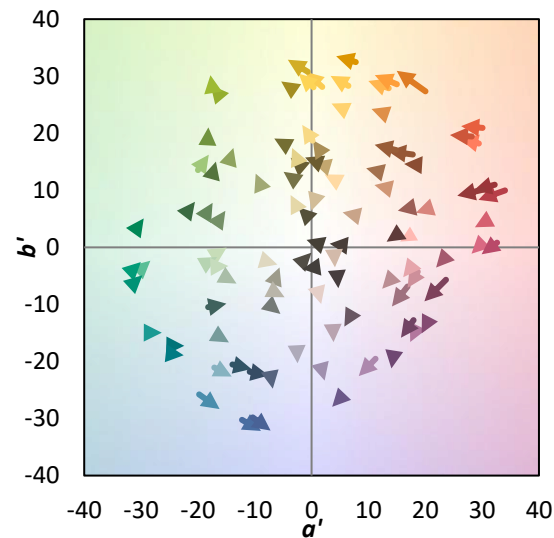
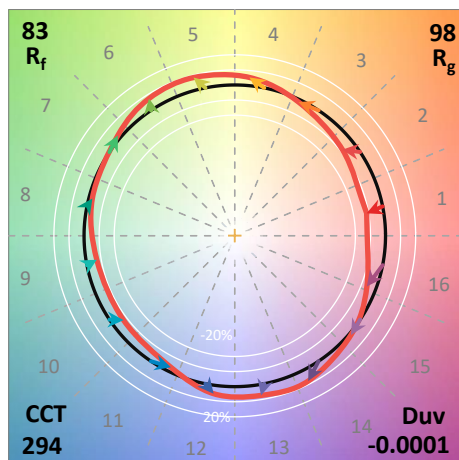
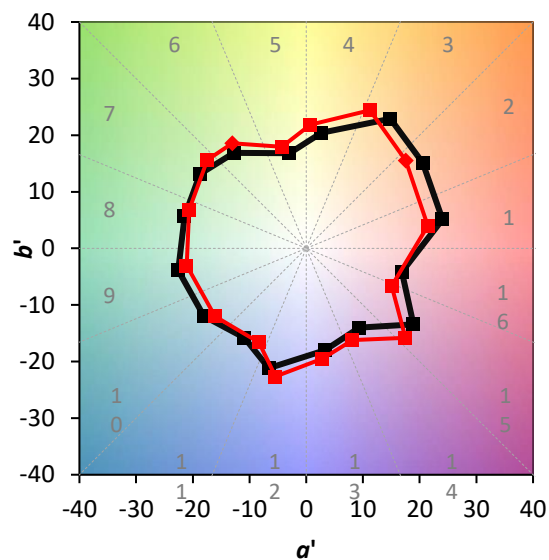
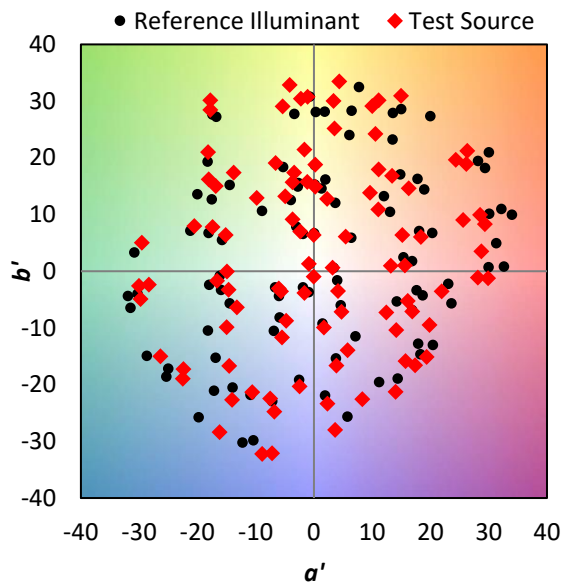
**Summary**

$R_f = 82.5$   
 $R_g = 98.2$   
 CIE  $R_a = 81.3$   
 $R_g = 5.4$

**Spectral Power Distribution Comparison**



**Color Vector Graphics**

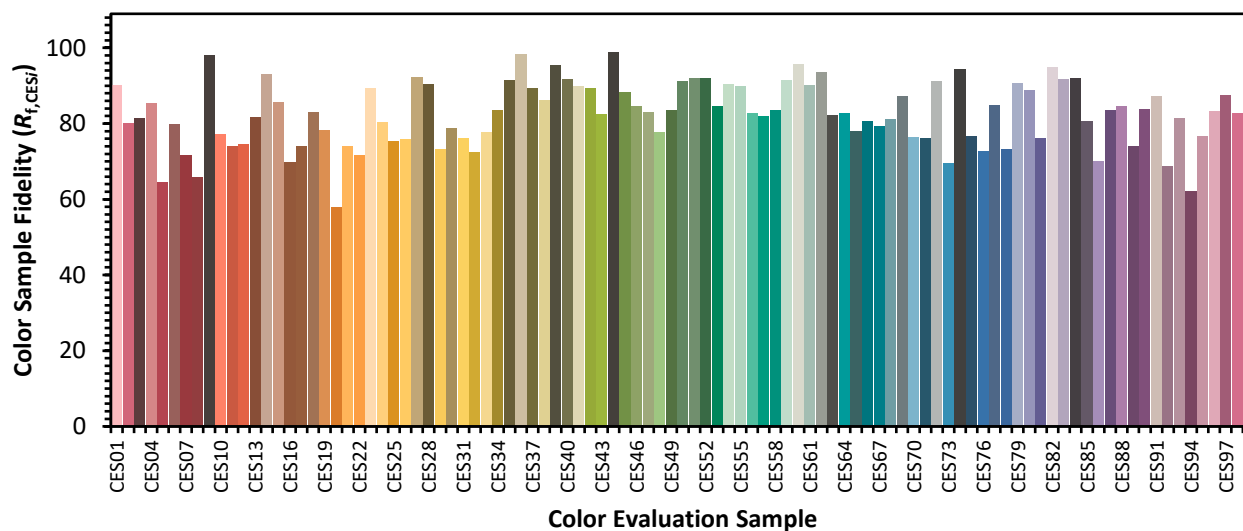


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Individual Sample Fidelity Index ( $R_{fi}$ )

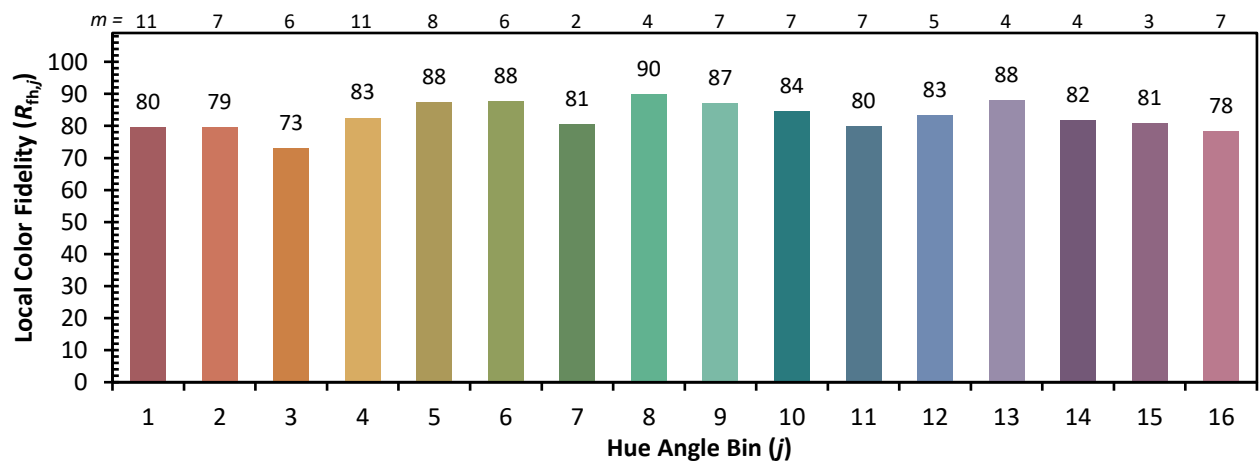
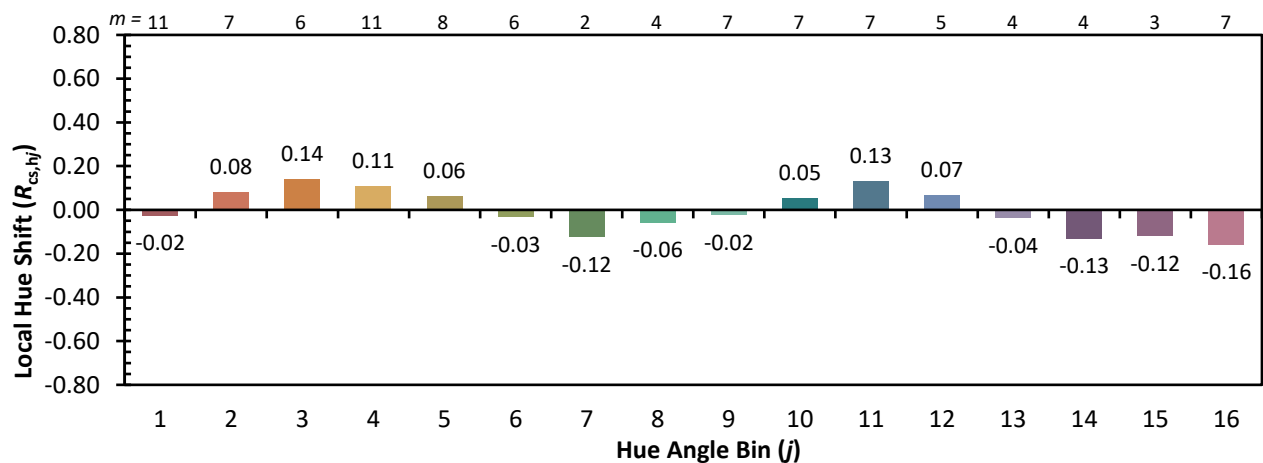
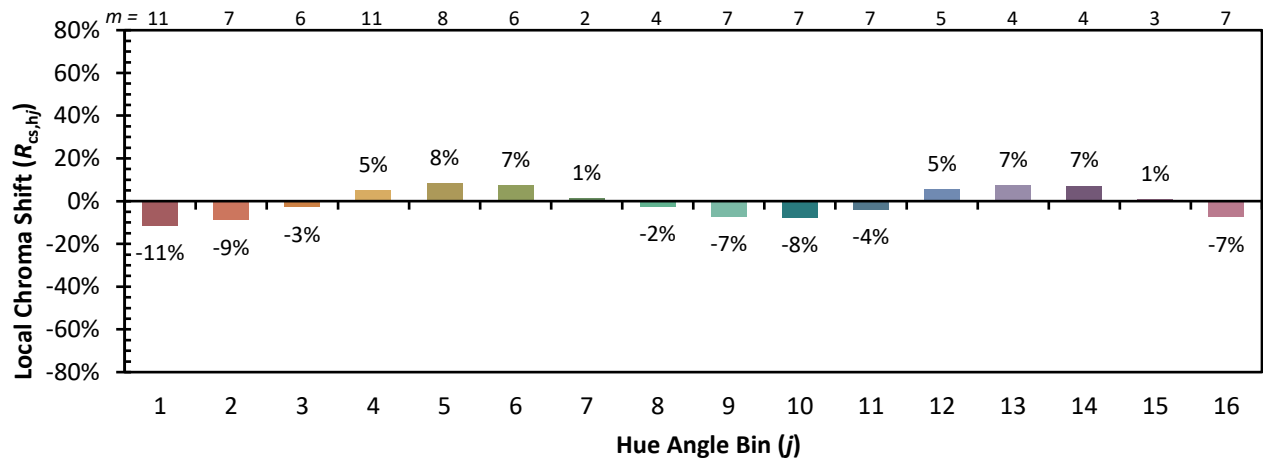
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 76 | CES51 = 92 | CES76 = 73 |
| CES02 = 63 | CES27 = 92 | CES52 = 92 | CES77 = 85 |
| CES03 = 31 | CES28 = 90 | CES53 = 85 | CES78 = 73 |
| CES04 = 71 | CES29 = 73 | CES54 = 90 | CES79 = 91 |
| CES05 = 50 | CES30 = 79 | CES55 = 90 | CES80 = 89 |
| CES06 = 51 | CES31 = 76 | CES56 = 83 | CES81 = 76 |
| CES07 = 42 | CES32 = 73 | CES57 = 82 | CES82 = 95 |
| CES08 = 41 | CES33 = 78 | CES58 = 84 | CES83 = 92 |
| CES09 = 29 | CES34 = 83 | CES59 = 91 | CES84 = 92 |
| CES10 = 76 | CES35 = 92 | CES60 = 96 | CES85 = 81 |
| CES11 = 59 | CES36 = 98 | CES61 = 90 | CES86 = 70 |
| CES12 = 65 | CES37 = 89 | CES62 = 93 | CES87 = 84 |
| CES13 = 44 | CES38 = 86 | CES63 = 82 | CES88 = 85 |
| CES14 = 74 | CES39 = 95 | CES64 = 83 | CES89 = 74 |
| CES15 = 72 | CES40 = 92 | CES65 = 78 | CES90 = 84 |
| CES16 = 48 | CES41 = 90 | CES66 = 81 | CES91 = 87 |
| CES17 = 50 | CES42 = 89 | CES67 = 79 | CES92 = 69 |
| CES18 = 57 | CES43 = 82 | CES68 = 81 | CES93 = 81 |
| CES19 = 72 | CES44 = 99 | CES69 = 87 | CES94 = 62 |
| CES20 = 67 | CES45 = 88 | CES70 = 76 | CES95 = 77 |
| CES21 = 87 | CES46 = 85 | CES71 = 76 | CES96 = 83 |
| CES22 = 79 | CES47 = 83 | CES72 = 91 | CES97 = 88 |
| CES23 = 92 | CES48 = 78 | CES73 = 70 | CES98 = 83 |
| CES24 = 91 | CES49 = 84 | CES74 = 94 | CES99 = 75 |
| CES25 = 72 | CES50 = 91 | CES75 = 77 |            |



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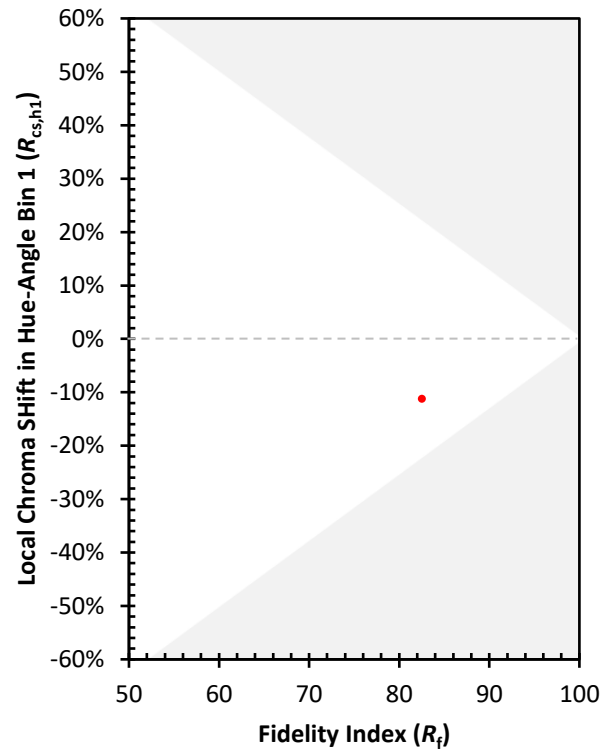
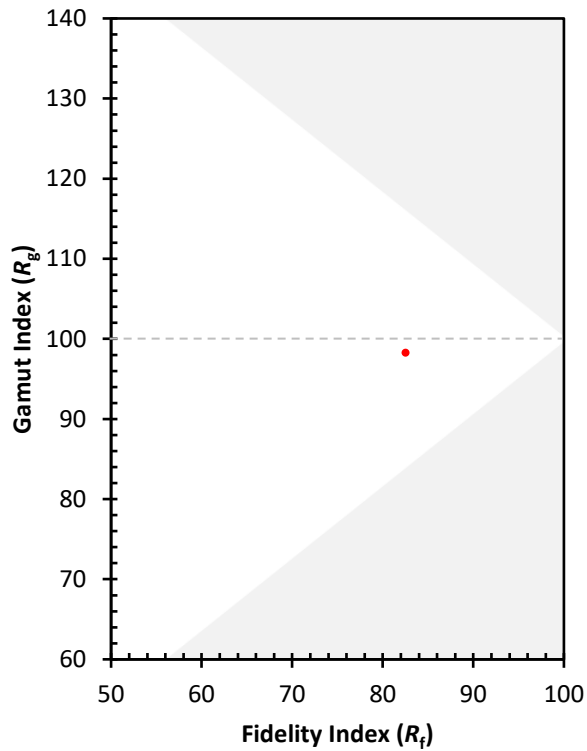
**Color Rendition by Hue-Angle Bin**



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**Measure Comparisons**



(END OF REPORT)