

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: P553751

Luminaire Tested: **LXS-VA2-830-U-ASW-S**

Issue Date: 7/13/2021

**Test Information**

Test Method: LM-79-08  
Report Number: P553751  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1803-687-16-R2)  
Test Lab: INNOVATION CENTER  
Issue Date: 7/13/2021  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: LXS-VA2-830-U-ASW-S  
Description: LUXESCAPE OUTDOOR ARCHITECTURAL LUMINAIRE  
80 CRI, 3000K LEDS AND TYPE III OPTIC, SPIDER MOUNT  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 3631 lumens  
Efficiency: N/A  
Efficacy: 75.6 lumens/watt  
Luminous Opening: Circular (Dia: 1.62' x H: 0')  
IES Classification: Type III - Short  
BUG Rating: B1 - U0 - G1

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



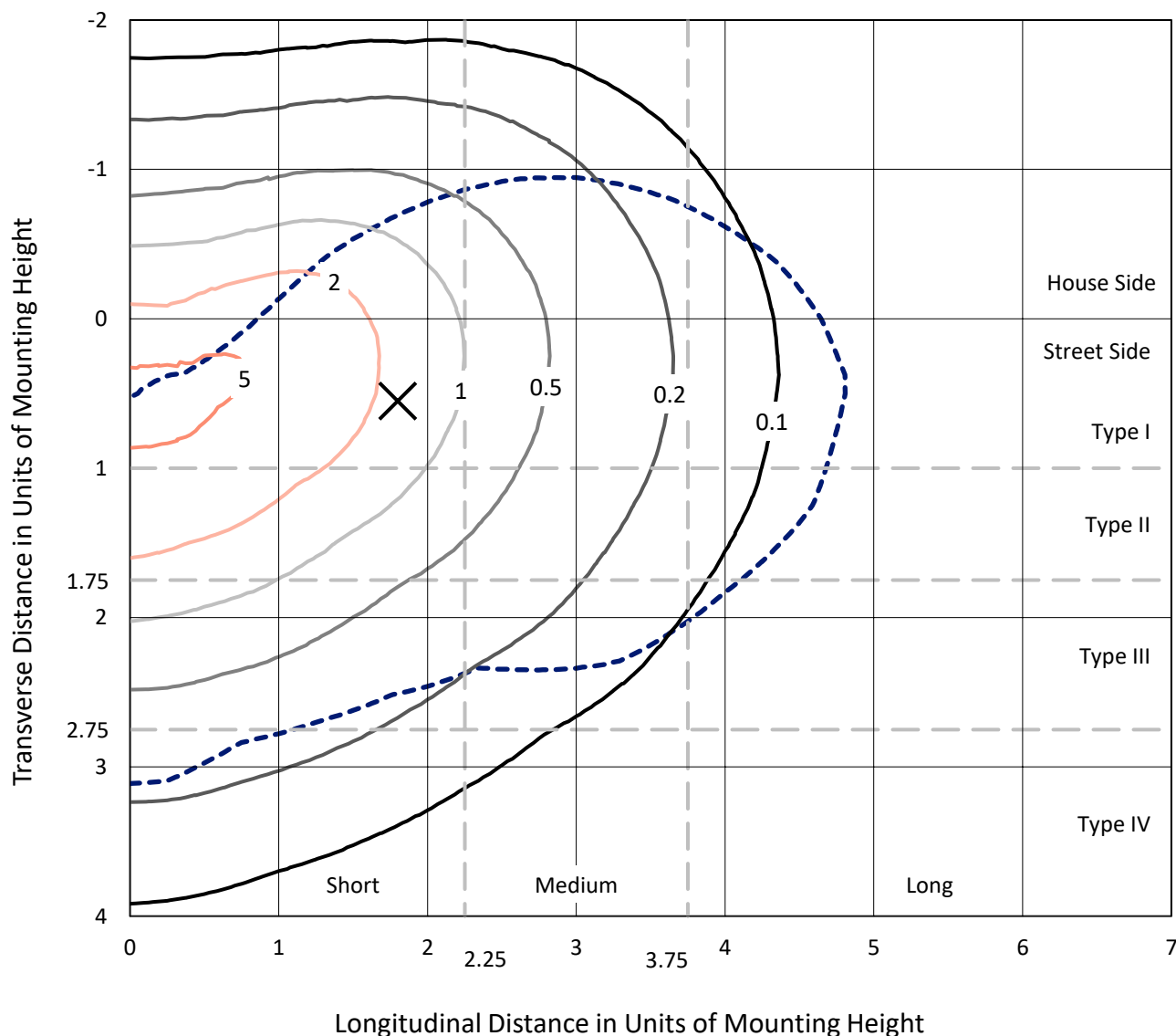
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CATALOG NUMBER: LXS-VA2-830-U-ASW-S

## Iso-Footcandle Lines of Horizontal Illumination

× Max cd

--- 1/2 Max cd

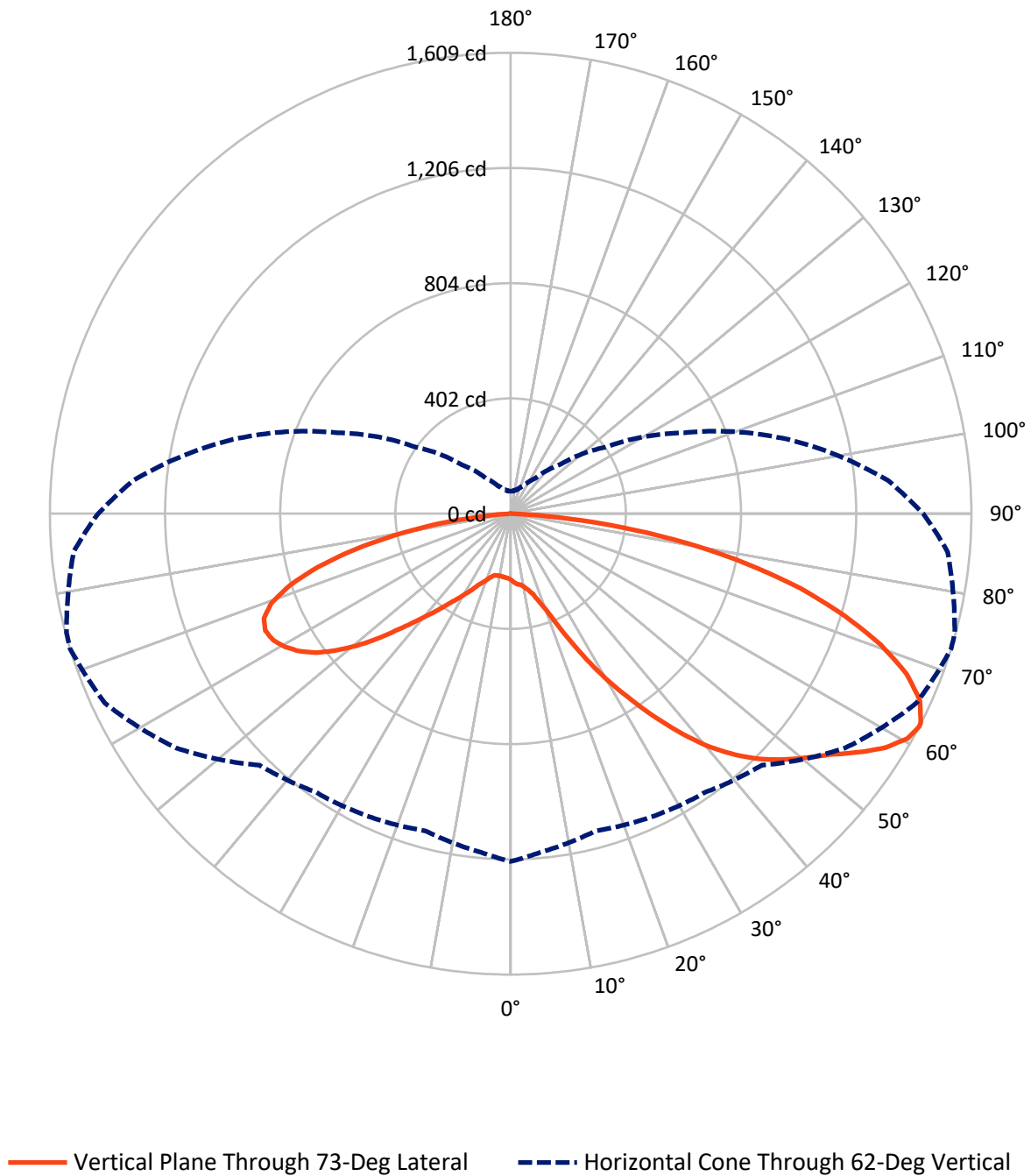


Based on 10 foot mounting height. Maximum calculated value = 6.1 fc  
 Type III - Short - N/A

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CATALOG NUMBER: LXS-VA2-830-U-ASW-S

## Luminous Intensity Polar Plot



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CATALOG NUMBER: LXS-VA2-830-U-ASW-S

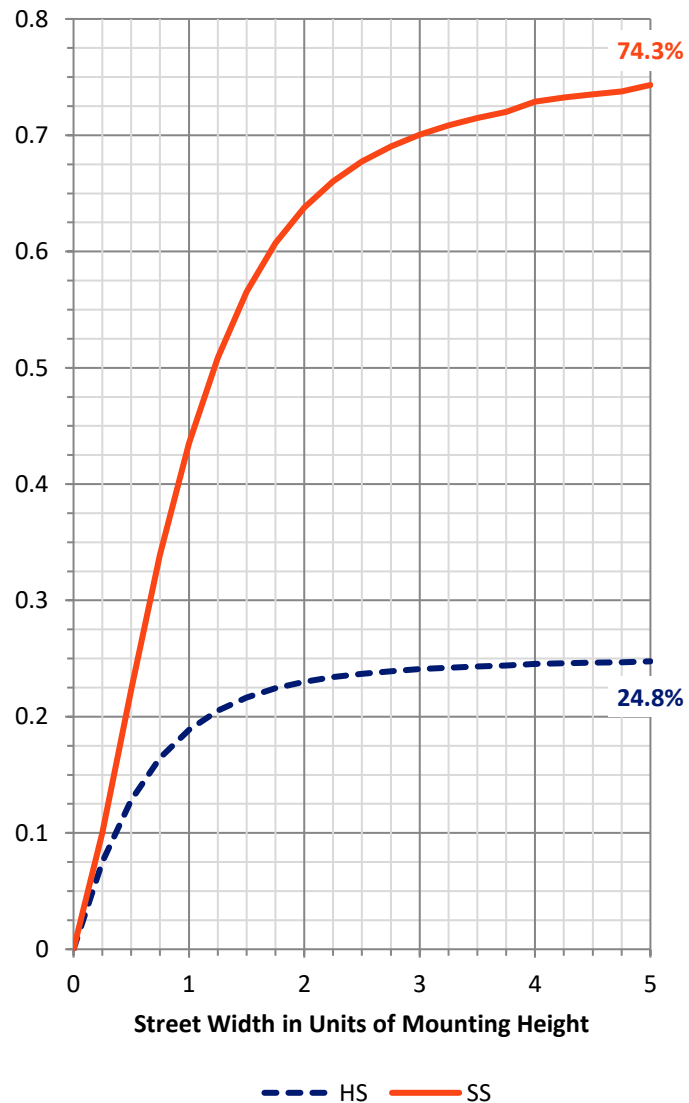
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 905.7    | 0.0    | 905.7  |
|                    | % Fixture | 24.9     | 0.0    | 24.9   |
| <b>Street Side</b> | Lumens    | 2725.3   | 0.0    | 2725.3 |
|                    | % Fixture | 75.1     | 0.0    | 75.1   |
| <b>Total</b>       | Lumens    | 3631.0   | 0.0    | 3631.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 23.1   | 0.6       |
| 10°-20°   | 84.1   | 2.3       |
| 20°-30°   | 206.2  | 5.7       |
| 30°-40°   | 386.3  | 10.6      |
| 40°-50°   | 580.2  | 16.0      |
| 50°-60°   | 783.2  | 21.6      |
| 60°-70°   | 839.5  | 23.1      |
| 70°-80°   | 591.5  | 16.3      |
| 80°-90°   | 136.9  | 3.8       |
| 90°-100°  | 0.0    | 0.0       |
| 100°-110° | 0.0    | 0.0       |
| 110°-120° | 0.0    | 0.0       |
| 120°-130° | 0.0    | 0.0       |
| 130°-140° | 0.0    | 0.0       |
| 140°-150° | 0.0    | 0.0       |
| 150°-160° | 0.0    | 0.0       |
| 160°-170° | 0.0    | 0.0       |
| 170°-180° | 0.0    | 0.0       |
| 0°-90°    | 3631.0 | 100.0     |
| 0°-180°   | 3631.0 | 100.0     |

**Coefficient of Utilization**



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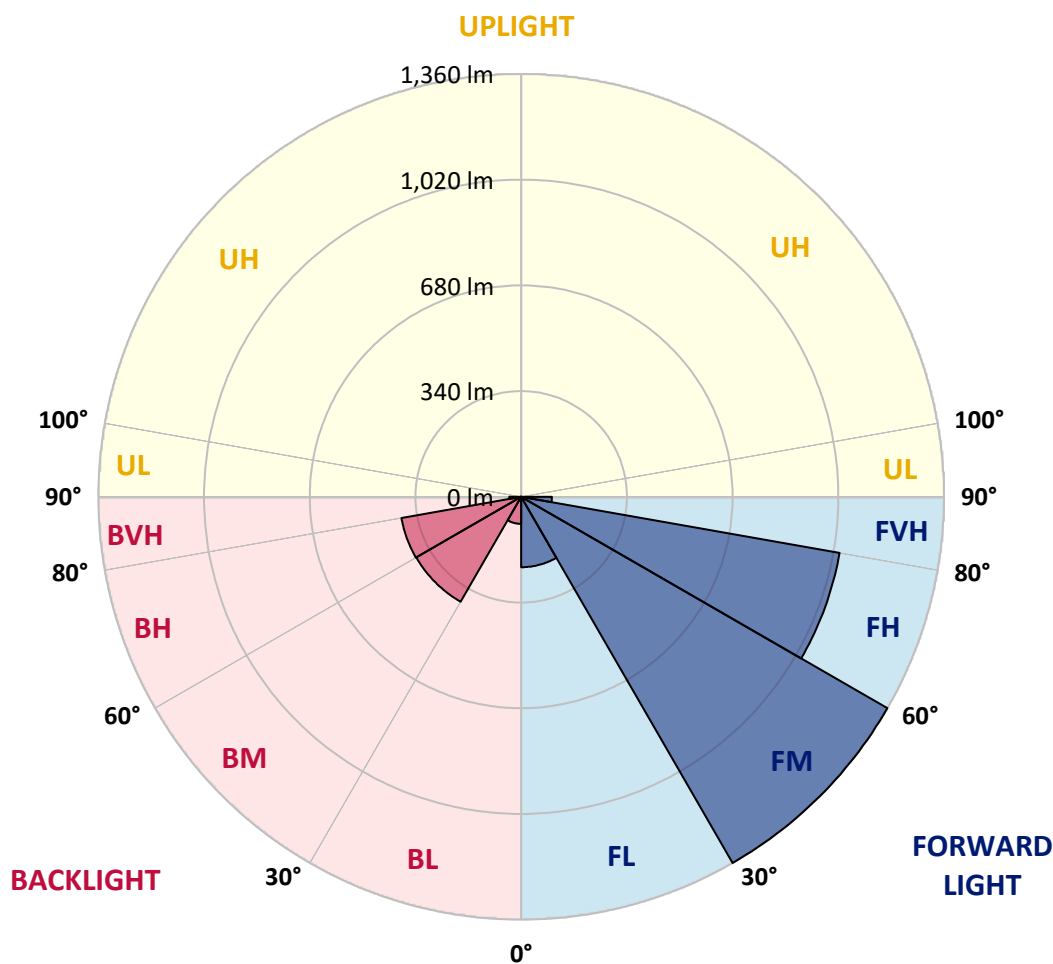
CATALOG NUMBER: LXS-VA2-830-U-ASW-S

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 226.4  | 6.2       |                         |      |         |
| FM   | (30°-60°)   | 1360.0 | 37.5      |                         |      |         |
| FH   | (60°-80°)   | 1039.9 | 28.6      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 98.9   | 2.7       |                         |      | G1/100  |
| BL   | (0°-30°)    | 87.0   | 2.4       | B0/110                  |      |         |
| BM   | (30°-60°)   | 389.7  | 10.7      | B1/1000                 |      |         |
| BH   | (60°-80°)   | 391.1  | 10.8      | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 37.9   | 1.0       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B1-U0-G1**

Type III Short



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°    | 65°    | 73°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 231.2  | 231.2  | 231.2  | 231.2  | 231.2  | 231.2  | 231.2  | 231.2  | 231.2  | 231.2  | 231.2  |
| 2.5°  | 261.7  | 260.0  | 260.0  | 258.4  | 255.2  | 252.0  | 248.8  | 244.0  | 240.8  | 239.2  | 234.4  |
| 5°    | 285.7  | 284.1  | 282.5  | 277.7  | 272.9  | 266.5  | 260.0  | 253.6  | 247.2  | 245.6  | 237.6  |
| 7.5°  | 313.0  | 311.4  | 308.2  | 297.0  | 285.7  | 276.1  | 266.5  | 258.4  | 250.4  | 248.8  | 239.2  |
| 10°   | 348.3  | 346.7  | 338.7  | 322.7  | 305.0  | 290.5  | 277.7  | 268.1  | 260.0  | 256.8  | 244.0  |
| 12.5° | 380.4  | 378.8  | 366.0  | 346.7  | 330.7  | 314.6  | 297.0  | 284.1  | 272.9  | 269.7  | 252.0  |
| 15°   | 460.7  | 457.5  | 444.7  | 399.7  | 375.6  | 354.8  | 332.3  | 308.2  | 290.5  | 285.7  | 261.7  |
| 17.5° | 622.8  | 619.6  | 610.0  | 536.2  | 473.5  | 423.8  | 386.9  | 351.5  | 322.7  | 317.8  | 285.7  |
| 20°   | 683.8  | 688.7  | 706.3  | 687.0  | 618.0  | 512.1  | 452.7  | 406.1  | 361.2  | 353.2  | 313.0  |
| 22.5° | 722.4  | 730.4  | 765.7  | 768.9  | 736.8  | 630.9  | 529.7  | 475.2  | 423.8  | 409.3  | 351.5  |
| 25°   | 749.6  | 762.5  | 823.5  | 842.8  | 812.3  | 740.0  | 642.1  | 569.9  | 500.8  | 484.8  | 402.9  |
| 27.5° | 778.5  | 791.4  | 860.4  | 889.3  | 870.0  | 815.5  | 772.1  | 672.6  | 590.7  | 566.7  | 465.5  |
| 30°   | 854.0  | 858.8  | 932.6  | 935.9  | 916.6  | 894.1  | 881.3  | 770.5  | 682.2  | 656.5  | 532.9  |
| 32.5° | 977.6  | 969.6  | 1029.0 | 1008.1 | 968.0  | 966.4  | 963.1  | 874.9  | 775.3  | 749.6  | 608.4  |
| 35°   | 1067.5 | 1069.1 | 1122.1 | 1075.5 | 1035.4 | 1024.1 | 1033.8 | 974.4  | 874.9  | 844.4  | 696.7  |
| 37.5° | 1112.4 | 1117.3 | 1163.8 | 1138.1 | 1094.8 | 1077.1 | 1099.6 | 1062.7 | 976.0  | 943.9  | 786.6  |
| 40°   | 1151.0 | 1155.8 | 1178.3 | 1173.4 | 1144.5 | 1117.3 | 1154.2 | 1139.7 | 1070.7 | 1043.4 | 881.3  |
| 42.5° | 1163.8 | 1165.4 | 1157.4 | 1189.5 | 1163.8 | 1147.8 | 1195.9 | 1205.5 | 1151.0 | 1131.7 | 977.6  |
| 45°   | 1134.9 | 1146.1 | 1136.5 | 1173.4 | 1175.0 | 1170.2 | 1231.2 | 1260.1 | 1221.6 | 1202.3 | 1070.7 |
| 47.5° | 1112.4 | 1117.3 | 1128.5 | 1186.3 | 1186.3 | 1176.6 | 1258.5 | 1301.9 | 1282.6 | 1268.1 | 1151.0 |
| 50°   | 1208.7 | 1194.3 | 1155.8 | 1234.4 | 1216.8 | 1210.4 | 1297.0 | 1346.8 | 1338.8 | 1325.9 | 1223.2 |
| 52.5° | 1273.0 | 1248.9 | 1175.0 | 1245.7 | 1255.3 | 1260.1 | 1356.4 | 1406.2 | 1396.6 | 1383.7 | 1292.2 |
| 55°   | 1385.3 | 1348.4 | 1252.1 | 1271.4 | 1279.4 | 1295.4 | 1419.0 | 1478.4 | 1470.4 | 1454.4 | 1364.5 |
| 57.5° | 1362.9 | 1324.3 | 1252.1 | 1276.2 | 1277.8 | 1301.9 | 1457.6 | 1541.0 | 1541.0 | 1528.2 | 1441.5 |
| 60°   | 1293.8 | 1255.3 | 1202.3 | 1228.0 | 1237.6 | 1279.4 | 1454.4 | 1573.1 | 1592.4 | 1582.8 | 1507.3 |
| 62°   | 1213.6 | 1186.3 | 1146.1 | 1167.0 | 1186.3 | 1240.9 | 1425.5 | 1563.5 | 1608.5 | 1605.2 | 1531.4 |
| 62.5° | 1194.3 | 1168.6 | 1130.1 | 1151.0 | 1170.2 | 1229.6 | 1415.8 | 1557.1 | 1606.9 | 1606.9 | 1533.0 |
| 65°   | 1098.0 | 1083.5 | 1041.8 | 1069.1 | 1086.8 | 1149.4 | 1346.8 | 1502.5 | 1569.9 | 1581.2 | 1526.6 |
| 67.5° | 976.0  | 982.4  | 948.7  | 972.8  | 990.4  | 1051.4 | 1250.5 | 1409.4 | 1489.7 | 1508.9 | 1478.4 |
| 70°   | 886.1  | 881.3  | 850.8  | 866.8  | 889.3  | 948.7  | 1138.1 | 1287.4 | 1370.9 | 1393.4 | 1380.5 |
| 72.5° | 789.8  | 788.2  | 744.8  | 752.9  | 778.5  | 836.3  | 1008.1 | 1136.5 | 1218.4 | 1244.1 | 1253.7 |
| 75°   | 688.7  | 679.0  | 635.7  | 635.7  | 656.5  | 706.3  | 865.2  | 964.8  | 1048.2 | 1062.7 | 1083.5 |
| 77.5° | 577.9  | 569.9  | 521.7  | 528.1  | 536.2  | 579.5  | 703.1  | 775.3  | 844.4  | 858.8  | 874.9  |
| 80°   | 455.9  | 451.1  | 404.5  | 402.9  | 407.7  | 438.2  | 542.6  | 574.7  | 626.0  | 635.7  | 654.9  |
| 82.5° | 319.4  | 313.0  | 277.7  | 271.3  | 271.3  | 290.5  | 358.0  | 372.4  | 390.1  | 396.5  | 404.5  |
| 85°   | 154.1  | 150.9  | 134.8  | 134.8  | 128.4  | 136.4  | 158.9  | 158.9  | 162.1  | 154.1  | 166.9  |
| 87.5° | 4.8    | 4.8    | 4.8    | 4.8    | 3.2    | 3.2    | 3.2    | 3.2    | 3.2    | 3.2    | 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: P553751

CATALOG NUMBER: LXS-VA2-830-U-ASW-S

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 231.2  | 231.2  | 231.2  | 231.2 | 231.2 | 231.2 | 231.2 | 231.2 | 231.2 | 231.2 | 231.2 |
| 2.5°  | 232.8  | 229.6  | 226.3  | 223.1 | 221.5 | 219.9 | 218.3 | 216.7 | 216.7 | 215.1 | 215.1 |
| 5°    | 232.8  | 229.6  | 224.7  | 219.9 | 215.1 | 211.9 | 210.3 | 207.1 | 205.5 | 203.9 | 205.5 |
| 7.5°  | 234.4  | 229.6  | 223.1  | 216.7 | 210.3 | 205.5 | 200.7 | 197.4 | 195.8 | 194.2 | 194.2 |
| 10°   | 237.6  | 231.2  | 221.5  | 213.5 | 207.1 | 199.1 | 194.2 | 189.4 | 187.8 | 186.2 | 186.2 |
| 12.5° | 242.4  | 234.4  | 223.1  | 211.9 | 202.3 | 195.8 | 189.4 | 184.6 | 181.4 | 178.2 | 178.2 |
| 15°   | 250.4  | 239.2  | 224.7  | 211.9 | 200.7 | 192.6 | 184.6 | 178.2 | 171.8 | 170.2 | 170.2 |
| 17.5° | 269.7  | 255.2  | 234.4  | 215.1 | 202.3 | 191.0 | 179.8 | 170.2 | 165.3 | 162.1 | 162.1 |
| 20°   | 293.8  | 276.1  | 248.8  | 221.5 | 203.9 | 187.8 | 176.6 | 165.3 | 158.9 | 155.7 | 155.7 |
| 22.5° | 321.0  | 301.8  | 264.9  | 229.6 | 207.1 | 187.8 | 173.4 | 160.5 | 150.9 | 146.1 | 146.1 |
| 25°   | 362.8  | 332.3  | 282.5  | 240.8 | 211.9 | 187.8 | 170.2 | 155.7 | 144.5 | 139.7 | 139.7 |
| 27.5° | 415.8  | 372.4  | 308.2  | 256.8 | 216.7 | 187.8 | 166.9 | 150.9 | 139.7 | 134.8 | 133.2 |
| 30°   | 471.9  | 419.0  | 333.9  | 272.9 | 223.1 | 187.8 | 163.7 | 144.5 | 131.6 | 126.8 | 126.8 |
| 32.5° | 537.8  | 473.5  | 366.0  | 288.9 | 231.2 | 189.4 | 160.5 | 138.1 | 125.2 | 120.4 | 120.4 |
| 35°   | 608.4  | 536.2  | 399.7  | 305.0 | 239.2 | 189.4 | 155.7 | 133.2 | 120.4 | 114.0 | 114.0 |
| 37.5° | 693.5  | 602.0  | 444.7  | 325.9 | 247.2 | 189.4 | 154.1 | 131.6 | 117.2 | 110.8 | 109.2 |
| 40°   | 785.0  | 680.6  | 491.2  | 348.3 | 256.8 | 194.2 | 154.1 | 130.0 | 115.6 | 109.2 | 107.6 |
| 42.5° | 874.9  | 768.9  | 547.4  | 375.6 | 272.9 | 200.7 | 155.7 | 130.0 | 114.0 | 105.9 | 104.3 |
| 45°   | 963.1  | 857.2  | 611.6  | 415.8 | 290.5 | 205.5 | 155.7 | 128.4 | 110.8 | 102.7 | 101.1 |
| 47.5° | 1049.8 | 945.5  | 687.0  | 460.7 | 306.6 | 211.9 | 155.7 | 126.8 | 107.6 | 99.5  | 99.5  |
| 50°   | 1131.7 | 1030.6 | 762.5  | 502.4 | 322.7 | 218.3 | 157.3 | 123.6 | 104.3 | 96.3  | 96.3  |
| 52.5° | 1207.1 | 1107.6 | 833.1  | 545.8 | 341.9 | 224.7 | 157.3 | 122.0 | 101.1 | 93.1  | 93.1  |
| 55°   | 1276.2 | 1173.4 | 897.3  | 585.9 | 361.2 | 231.2 | 157.3 | 118.8 | 97.9  | 89.9  | 89.9  |
| 57.5° | 1343.6 | 1234.4 | 945.5  | 621.2 | 378.8 | 237.6 | 157.3 | 115.6 | 94.7  | 86.7  | 85.1  |
| 60°   | 1406.2 | 1290.6 | 980.8  | 650.1 | 394.9 | 240.8 | 154.1 | 110.8 | 89.9  | 81.9  | 81.9  |
| 62°   | 1439.9 | 1322.7 | 1001.7 | 667.8 | 404.5 | 240.8 | 150.9 | 107.6 | 86.7  | 78.7  | 78.7  |
| 62.5° | 1444.7 | 1327.5 | 1006.5 | 671.0 | 406.1 | 240.8 | 149.3 | 105.9 | 86.7  | 78.7  | 77.1  |
| 65°   | 1444.7 | 1332.4 | 1016.1 | 679.0 | 407.7 | 237.6 | 144.5 | 99.5  | 80.3  | 72.2  | 72.2  |
| 67.5° | 1406.2 | 1300.2 | 1001.7 | 671.0 | 399.7 | 227.9 | 134.8 | 91.5  | 73.8  | 65.8  | 65.8  |
| 70°   | 1322.7 | 1228.0 | 953.5  | 643.7 | 380.4 | 213.5 | 123.6 | 83.5  | 65.8  | 59.4  | 57.8  |
| 72.5° | 1197.5 | 1114.0 | 865.2  | 590.7 | 348.3 | 192.6 | 110.8 | 73.8  | 57.8  | 51.4  | 51.4  |
| 75°   | 1032.2 | 963.1  | 744.8  | 515.3 | 305.0 | 166.9 | 93.1  | 62.6  | 49.8  | 44.9  | 43.3  |
| 77.5° | 833.1  | 770.5  | 595.5  | 417.4 | 250.4 | 138.1 | 77.1  | 51.4  | 41.7  | 36.9  | 36.9  |
| 80°   | 611.6  | 560.2  | 431.8  | 306.6 | 187.8 | 102.7 | 57.8  | 40.1  | 32.1  | 28.9  | 28.9  |
| 82.5° | 369.2  | 353.2  | 269.7  | 191.0 | 118.8 | 67.4  | 40.1  | 27.3  | 22.5  | 20.9  | 20.9  |
| 85°   | 142.9  | 125.2  | 99.5   | 78.7  | 54.6  | 32.1  | 20.9  | 16.1  | 14.4  | 12.8  | 11.2  |
| 87.5° | 1.6    | 4.8    | 6.4    | 8.0   | 9.6   | 8.0   | 6.4   | 4.8   | 6.4   | 6.4   | 6.4   |
| 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.

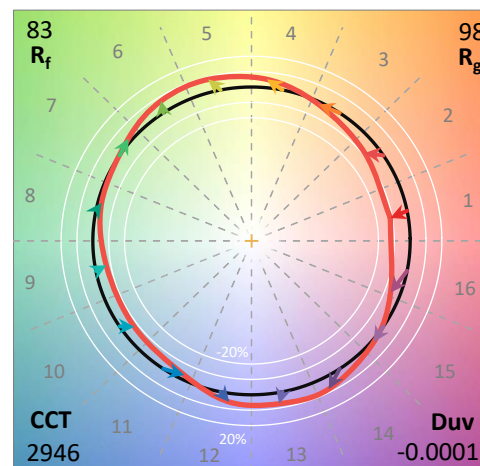
### Test Information

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

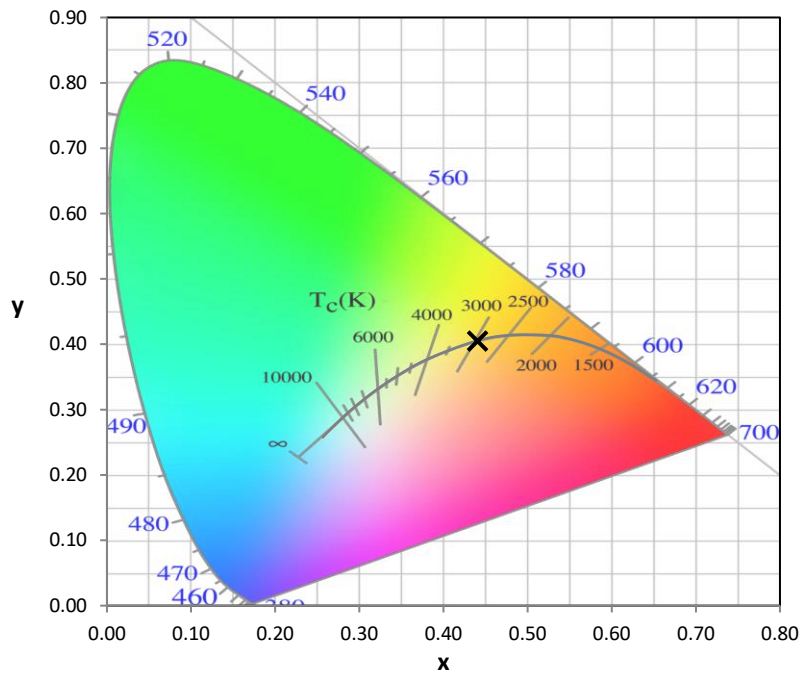
Stabilization Time: 165M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.4/61%  
 Sphere Temperature (°C): 24.8

REPORT NUMBER: SP1-2205-670-2

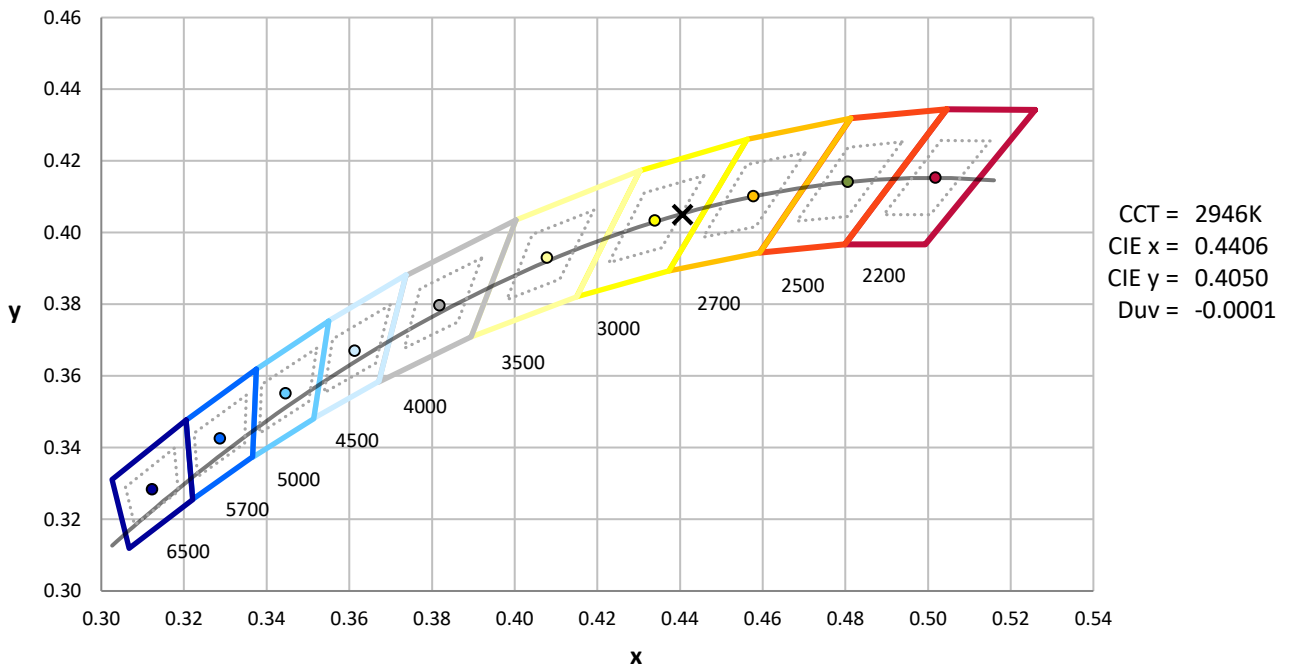
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| 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**



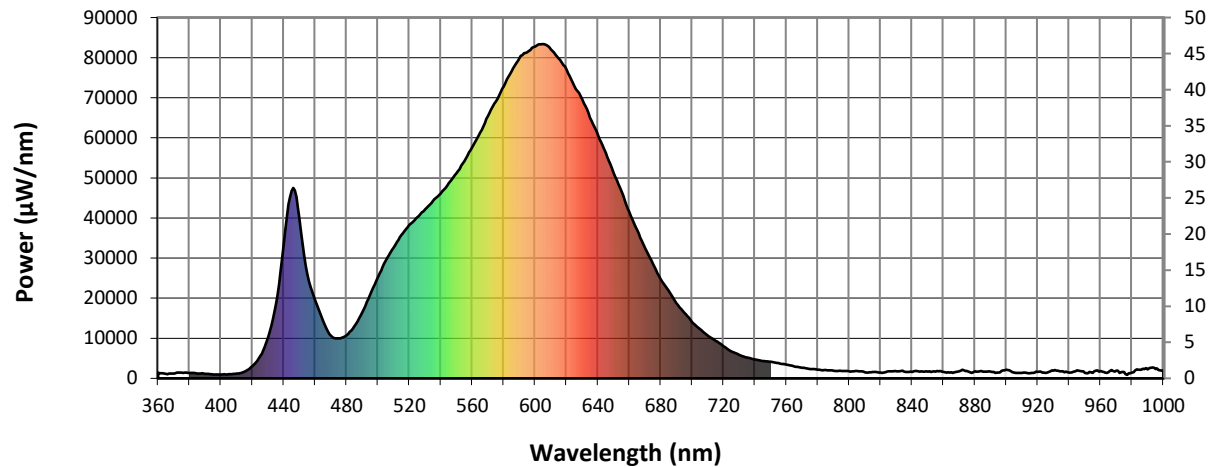
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 3000K 4-step quadrangle

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**Photopic Flux vs. Wavelength**

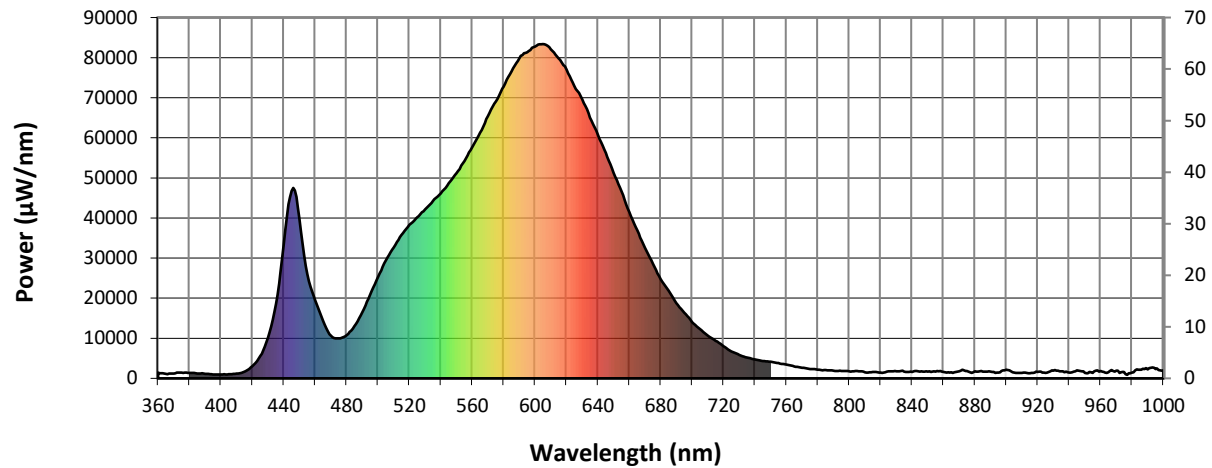


#####

| 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**



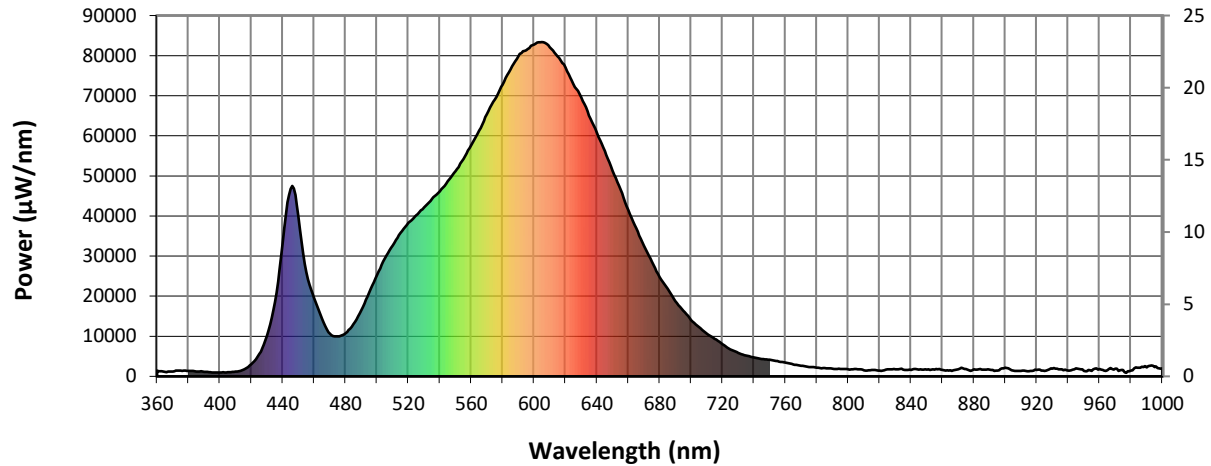
**Scotopic Lumens: 5220.3**

**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               |           |                  |                  |

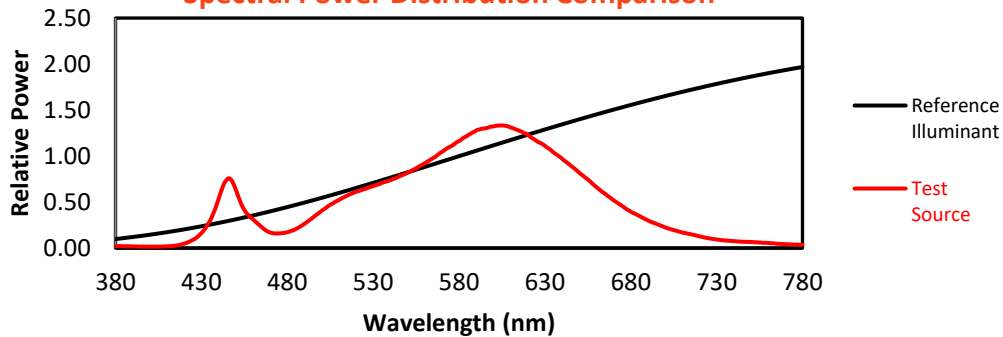
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**TM-30-18**

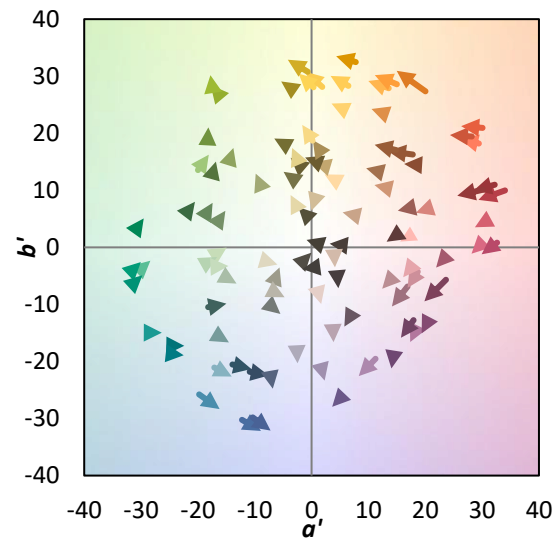
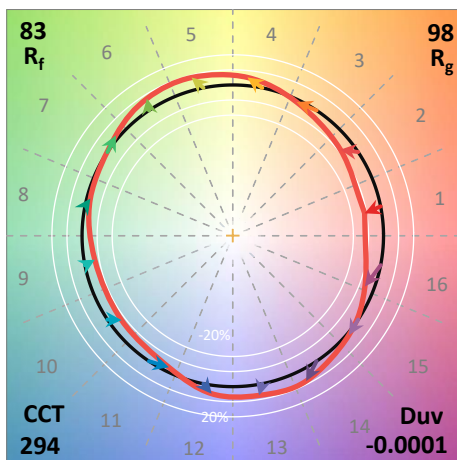
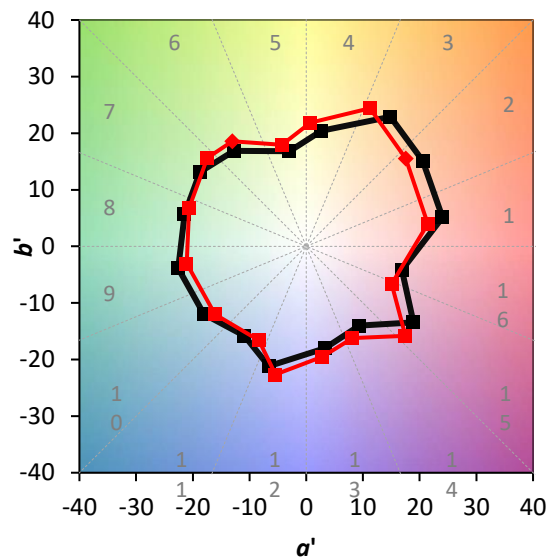
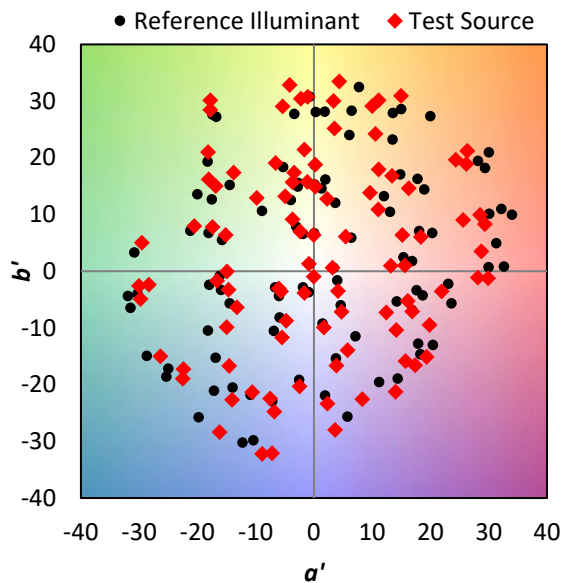
**Summary**

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

**Spectral Power Distribution Comparison**



**Color Vector Graphics**

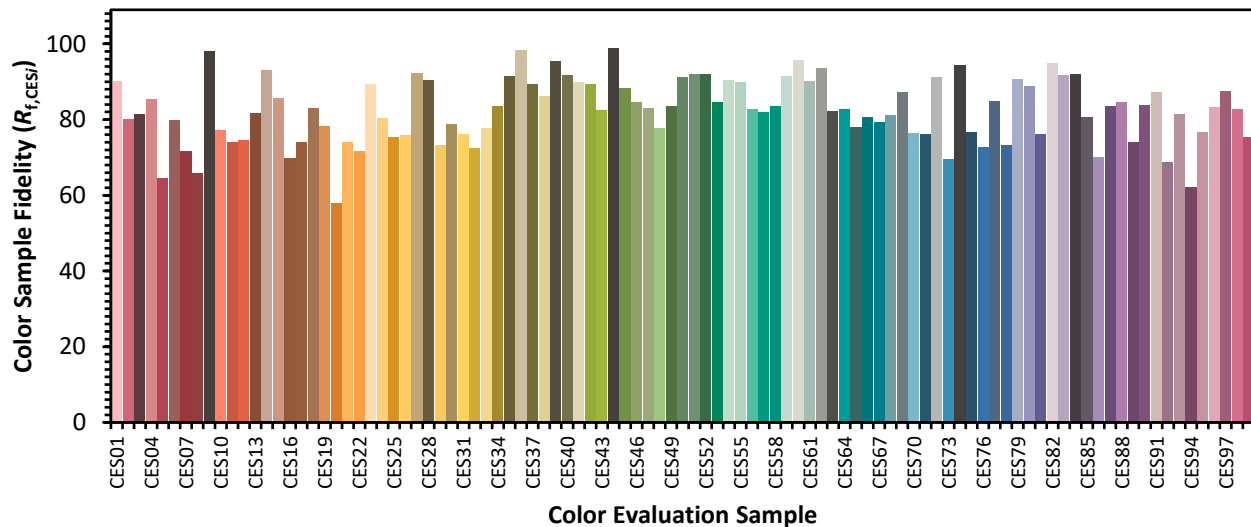


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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

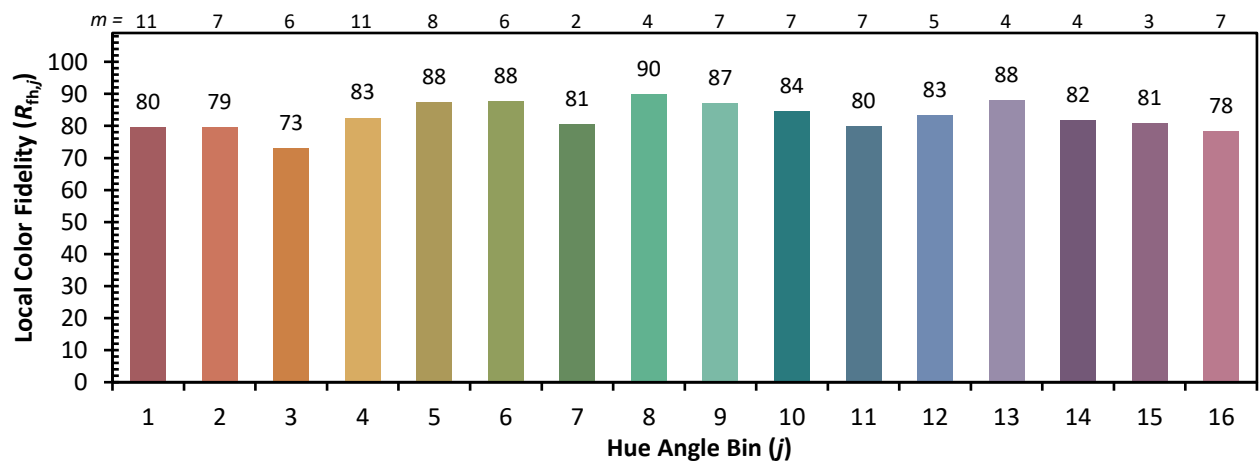
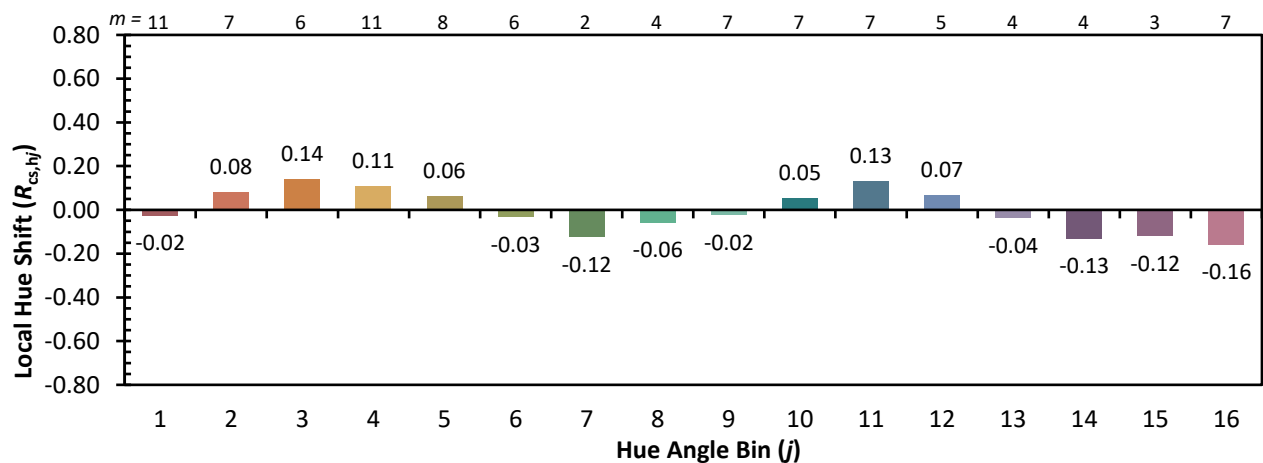
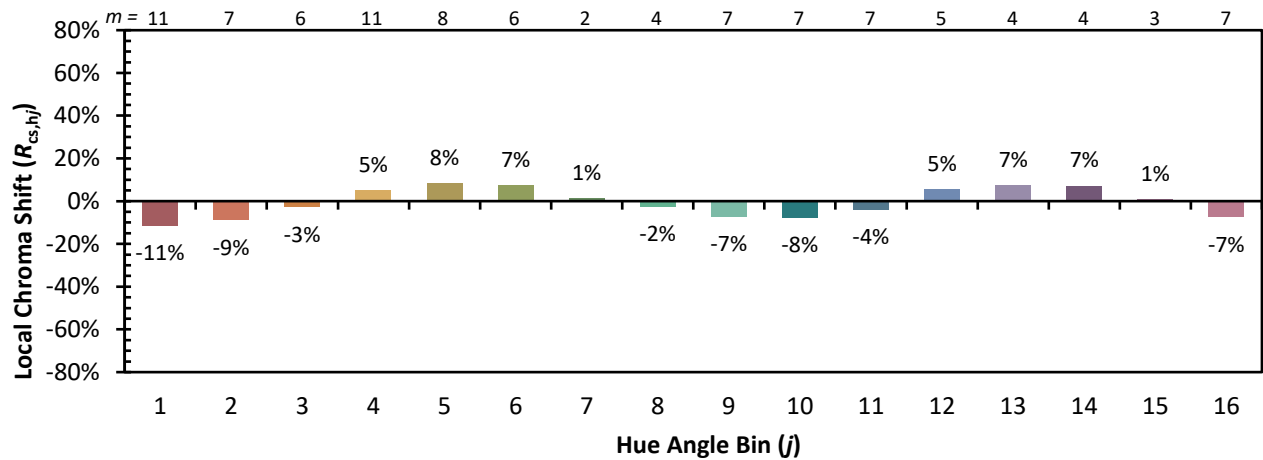
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 76 | CES51 = 92 | CES76 = 73 |
| CES02 = 63 | CES27 = 92 | CES52 = 92 | CES77 = 85 |
| CES03 = 31 | CES28 = 90 | CES53 = 85 | CES78 = 73 |
| CES04 = 71 | CES29 = 73 | CES54 = 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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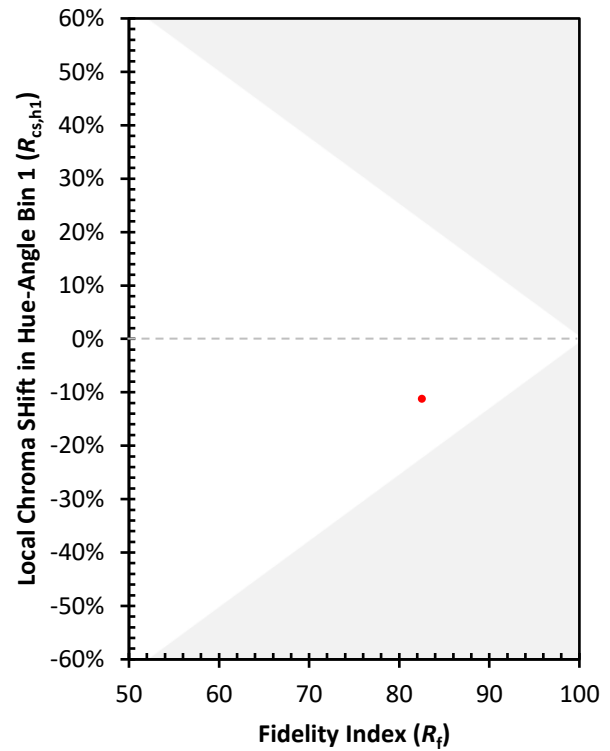
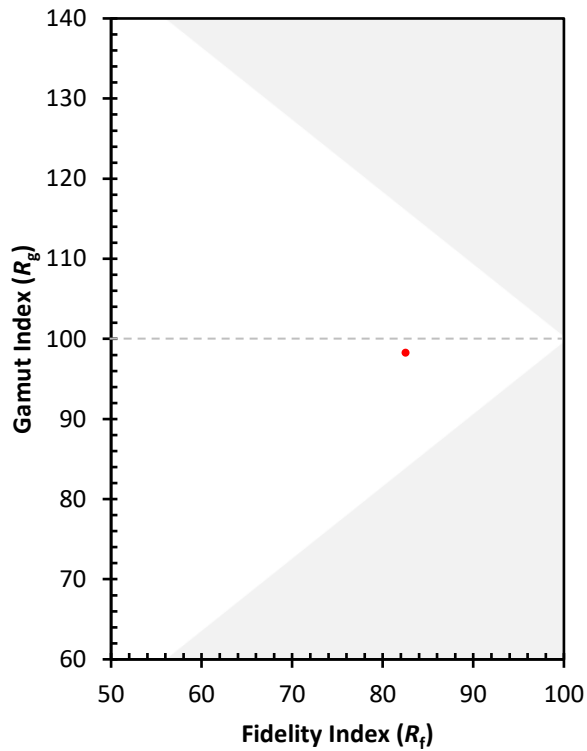
**Color Rendition by Hue-Angle Bin**



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**TM-30-18**

**Measure Comparisons**



(END OF REPORT)