

Cooper Lighting Solutions Photometric Lab
1121 Highway 74 South
Peachtree City, GA 30269



Scaled data based on original data using
LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-
State Lighting Products

Test Report Prepared for
Cooper Lighting Solutions
(formerly Eaton)

Brand: McGRAW-EDISON

Report Number: P406443

Luminaire Tested: **TT-D3-830-U-CQ-UPL**

Issue Date: 7/23/2020

Test Information

Test Method: LM-79-08
Report Number: P406443
REPORT IS FROM IESNA LM-79-08 TEST DATA - UPLIGHT (G2-2002-677-2) AND
Test Lab: INNOVATION CENTER
Issue Date: 7/23/2020
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)
Product Line: MCGRAW-EDISON
Catalog Number: TT-D3-830-U-CQ-UPL
Description: TOPTIER LED PARKING GARAGE LUMINAIRE WITH UPLIGHT
3000K, 80 CRI LEDS AND CONCENTRATED DISTRIBUTION
Light Source: -
Ballast/Driver: ELECTRONIC DRIVER

Summary

Lumens per Lamp: N/A
Luminaire Lumens: 6430.7 lumens
Efficiency: N/A
Efficacy: 116.5 lumens/watt
Luminous Opening: Vertical Cylinder (Dia: 1.12' x H: 0.1')
IES Classification: Type V - Short - Semi-Cutoff
BUG Rating: B2 - U4 - G1

Input Watts (W): 55.2
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

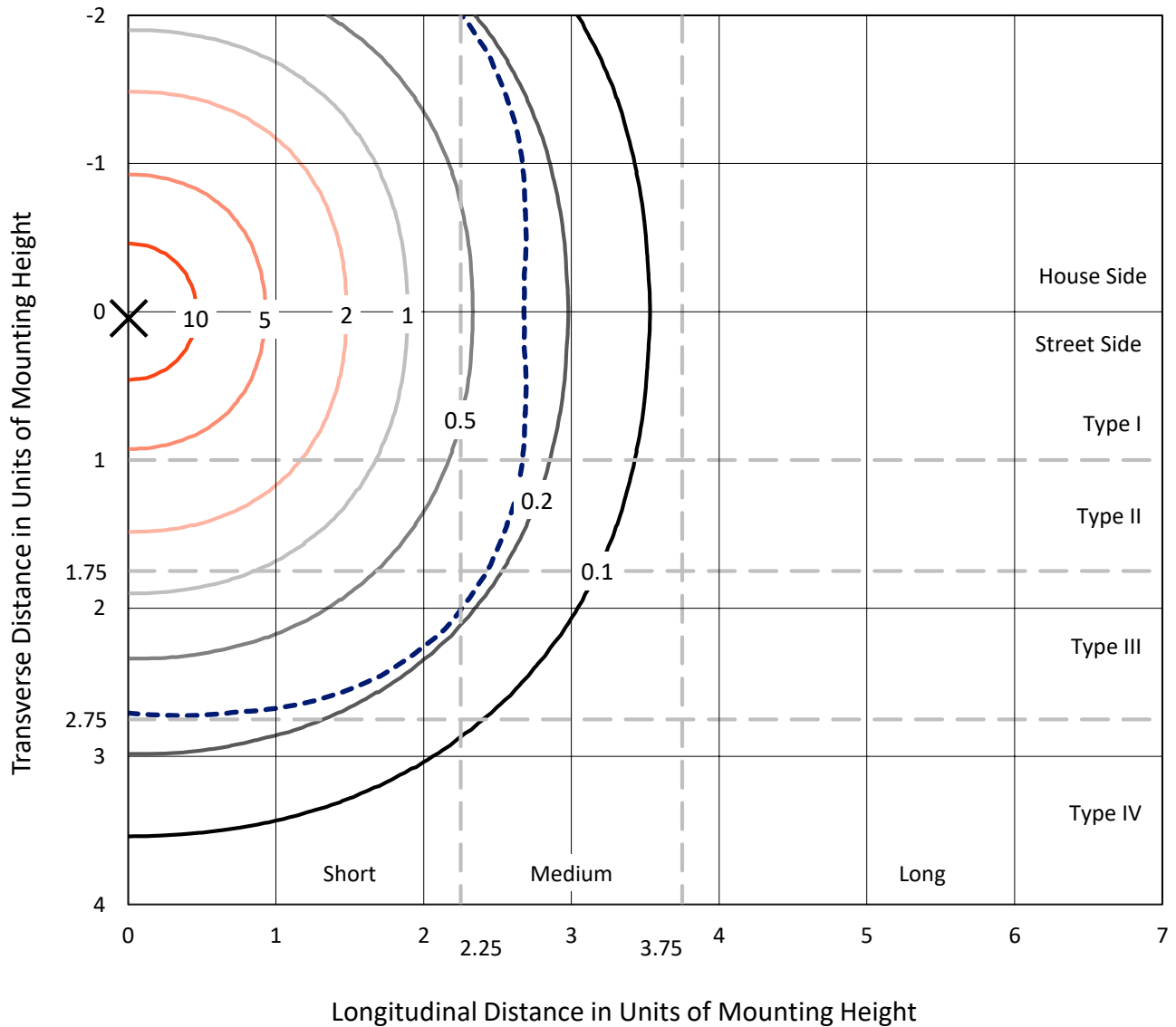


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Iso-Footcandle Lines of Horizontal Illumination

✕ Max cd
 - - - 1/2 Max cd

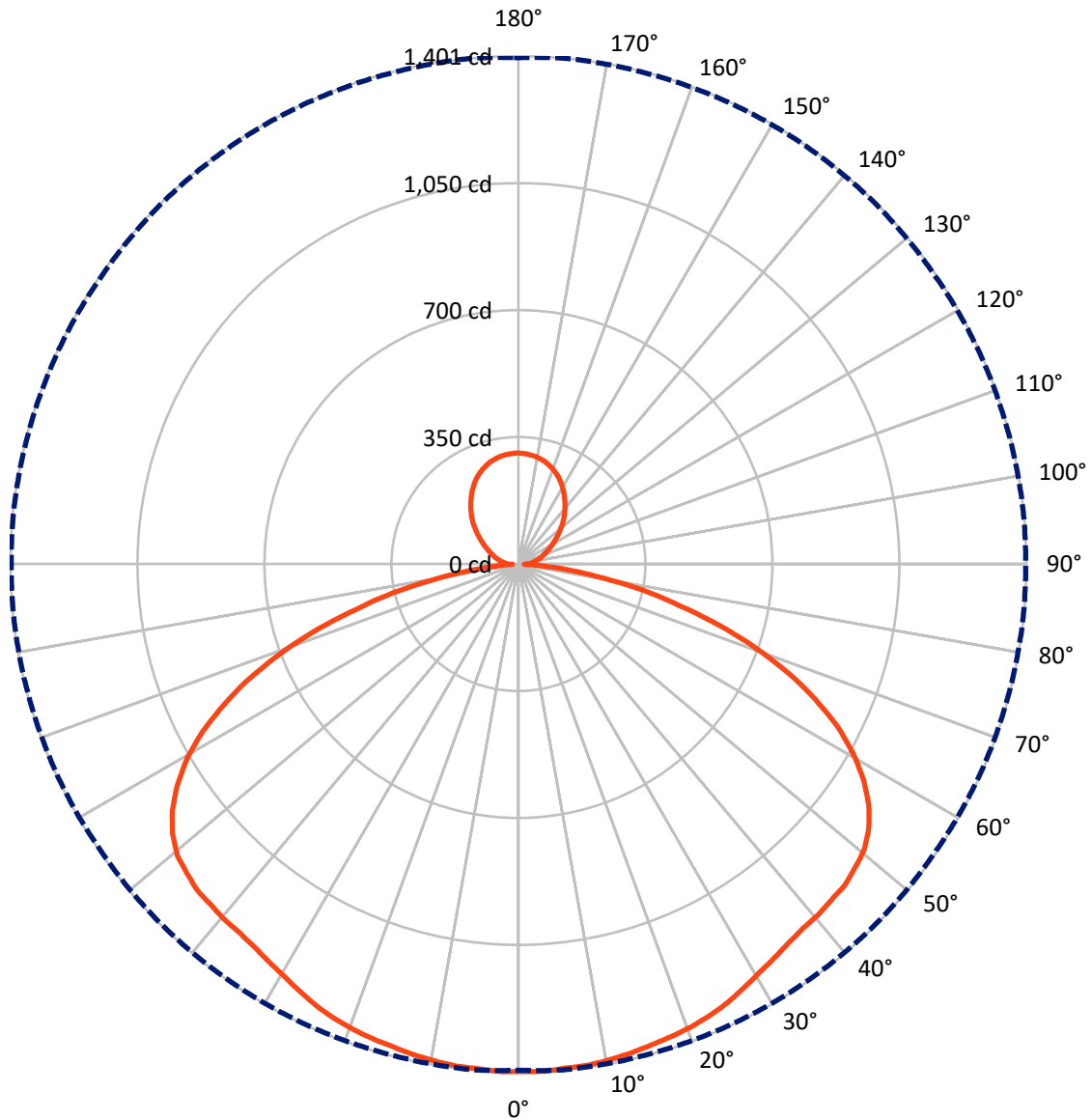


Based on 10 foot mounting height. Maximum calculated value = 14 fc
 Type V - Short - Semi-Cutoff

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Luminous Intensity Polar Plot



— Vertical Plane Through 5-Deg Lateral - - - Horizontal Cone Through 2.5-Deg Vertical

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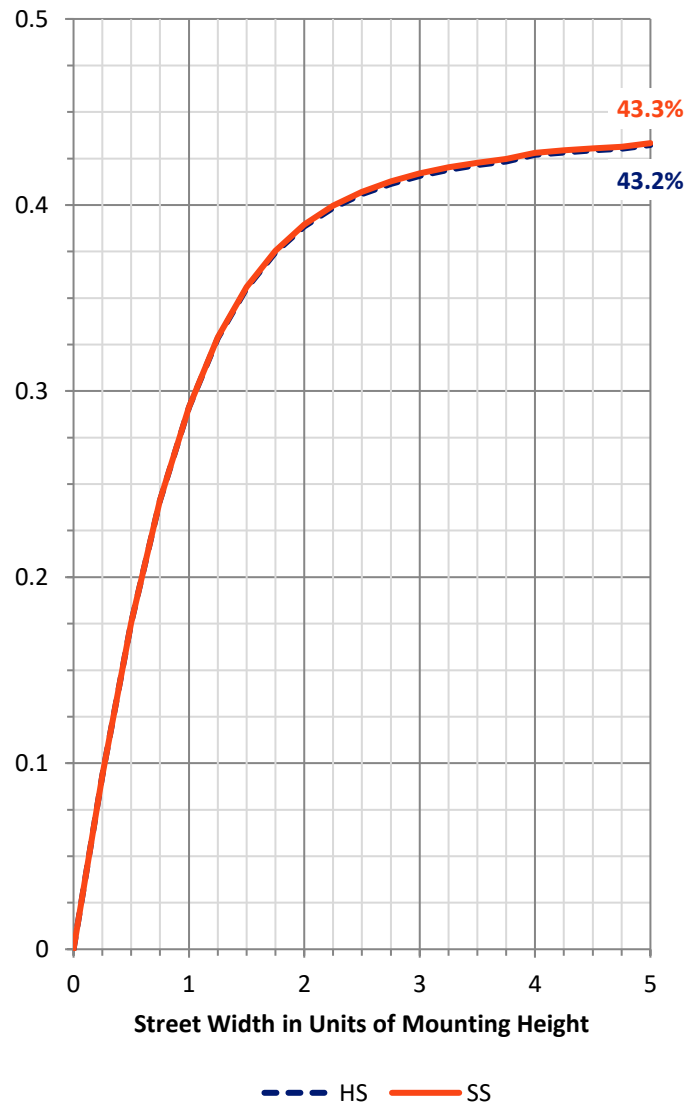
FLUX DISTRIBUTION:

| | | Downward | Upward | Total |
|--------------------|-----------|----------|--------|--------|
| House Side | Lumens | 2799.5 | 415.9 | 3215.4 |
| | % Fixture | 43.5 | 6.5 | 50.0 |
| Street Side | Lumens | 2799.5 | 415.9 | 3215.4 |
| | % Fixture | 43.5 | 6.5 | 50.0 |
| Total | Lumens | 5599.0 | 831.7 | 6430.7 |
| | % Fixture | 87.1 | 12.9 | 100.0 |

Coefficient of Utilization

ZONAL LUMENS:

| Zone | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10° | 133.1 | 2.1 |
| 10°-20° | 389.9 | 6.1 |
| 20°-30° | 620.0 | 9.6 |
| 30°-40° | 815.6 | 12.7 |
| 40°-50° | 998.3 | 15.5 |
| 50°-60° | 1081.3 | 16.8 |
| 60°-70° | 930.2 | 14.5 |
| 70°-80° | 523.0 | 8.1 |
| 80°-90° | 107.7 | 1.7 |
| 90°-100° | 42.6 | 0.7 |
| 100°-110° | 66.0 | 1.0 |
| 110°-120° | 91.9 | 1.4 |
| 120°-130° | 119.0 | 1.9 |
| 130°-140° | 138.7 | 2.2 |
| 140°-150° | 140.5 | 2.2 |
| 150°-160° | 121.9 | 1.9 |
| 160°-170° | 82.2 | 1.3 |
| 170°-180° | 28.9 | 0.4 |
| 0°-90° | 5599.0 | 87.1 |
| 0°-180° | 6430.7 | 100.0 |



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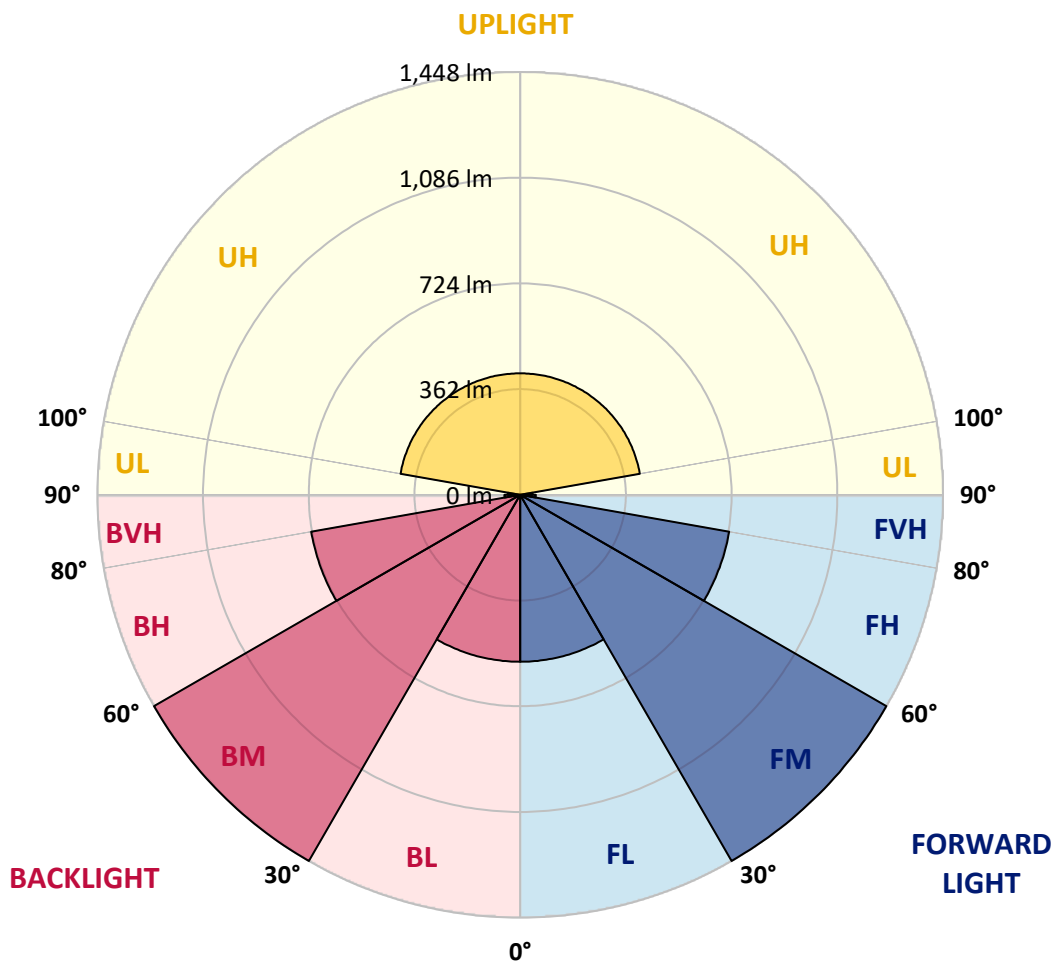
CATALOG NUMBER: TT-D3-830-U-CQ-UPL

LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:

| Zone | Lumens | % Fixture | Zone Rating/Lumen Limit | | |
|----------------|--------|-----------|-------------------------|--------|---------|
| | | | B | U | G |
| FL (0°-30°) | 571.5 | 8.9 | | | |
| FM (30°-60°) | 1447.6 | 22.5 | | | |
| FH (60°-80°) | 726.6 | 11.3 | | | G1/1800 |
| FVH (80°-90°) | 53.8 | 0.8 | | | G1/100 |
| BL (0°-30°) | 571.5 | 8.9 | B2/1000 | | |
| BM (30°-60°) | 1447.6 | 22.5 | B2/2500 | | |
| BH (60°-80°) | 726.6 | 11.3 | B2/1000 | | G1/1800 |
| BVH (80°-90°) | 53.8 | 0.8 | | | G1/100 |
| UL (90°-100°) | 42.6 | 0.7 | | U2/50 | |
| UH (100°-180°) | 415.9 | 6.5 | | U3/500 | |

BUG Rating: B2-U4-G1

Type V Short





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CANDELA DISTRIBUTION (FULL):

| | 0° | 5° | 15° | 25° | 35° | 45° | 55° | 65° | 75° | 85° | 90° |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0° | 1399.7 | 1399.7 | 1399.7 | 1399.7 | 1399.7 | 1399.7 | 1399.7 | 1399.7 | 1399.7 | 1399.7 | 1399.7 |
| 2.5° | 1396.1 | 1400.6 | 1398.8 | 1398.8 | 1398.8 | 1398.8 | 1397.0 | 1398.8 | 1398.8 | 1399.7 | 1398.8 |
| 5° | 1397.0 | 1396.1 | 1396.1 | 1397.0 | 1397.0 | 1397.9 | 1396.1 | 1397.0 | 1397.9 | 1397.9 | 1398.8 |
| 7.5° | 1394.4 | 1395.3 | 1393.5 | 1395.3 | 1393.5 | 1394.4 | 1394.4 | 1395.3 | 1394.4 | 1395.3 | 1397.0 |
| 10° | 1389.0 | 1389.9 | 1389.0 | 1389.0 | 1389.0 | 1390.8 | 1387.2 | 1389.9 | 1389.0 | 1389.9 | 1389.0 |
| 12.5° | 1379.2 | 1383.7 | 1381.9 | 1383.7 | 1383.7 | 1383.7 | 1381.0 | 1382.8 | 1383.7 | 1383.7 | 1383.7 |
| 15° | 1374.8 | 1375.7 | 1373.0 | 1376.6 | 1377.4 | 1378.3 | 1374.8 | 1376.6 | 1376.6 | 1377.4 | 1378.3 |
| 17.5° | 1365.0 | 1369.4 | 1368.5 | 1371.2 | 1370.3 | 1373.0 | 1372.1 | 1371.2 | 1370.3 | 1372.1 | 1370.3 |
| 20° | 1357.9 | 1362.3 | 1361.4 | 1364.1 | 1365.0 | 1367.7 | 1365.0 | 1365.0 | 1362.3 | 1363.2 | 1365.9 |
| 22.5° | 1350.7 | 1352.5 | 1352.5 | 1355.2 | 1355.2 | 1357.9 | 1355.2 | 1354.3 | 1354.3 | 1353.4 | 1356.1 |
| 25° | 1339.2 | 1340.0 | 1339.2 | 1341.8 | 1343.6 | 1345.4 | 1344.5 | 1342.7 | 1341.8 | 1341.8 | 1340.9 |
| 27.5° | 1320.5 | 1324.0 | 1325.8 | 1329.4 | 1330.3 | 1332.9 | 1329.4 | 1329.4 | 1327.6 | 1325.8 | 1326.7 |
| 30° | 1306.2 | 1308.0 | 1308.0 | 1316.0 | 1316.0 | 1320.5 | 1316.0 | 1315.1 | 1314.2 | 1313.3 | 1311.6 |
| 32.5° | 1292.9 | 1295.5 | 1298.2 | 1304.4 | 1308.9 | 1310.7 | 1308.0 | 1306.2 | 1301.8 | 1299.1 | 1298.2 |
| 35° | 1282.2 | 1283.1 | 1288.4 | 1297.3 | 1302.7 | 1307.1 | 1303.5 | 1299.1 | 1292.9 | 1288.4 | 1292.0 |
| 37.5° | 1274.2 | 1275.0 | 1283.1 | 1294.6 | 1304.4 | 1308.0 | 1302.7 | 1295.5 | 1285.7 | 1280.4 | 1278.6 |
| 40° | 1267.0 | 1272.4 | 1281.3 | 1297.3 | 1308.0 | 1313.3 | 1308.9 | 1299.1 | 1284.8 | 1274.2 | 1273.3 |
| 42.5° | 1263.5 | 1266.1 | 1279.5 | 1298.2 | 1313.3 | 1320.5 | 1314.2 | 1300.9 | 1283.1 | 1270.6 | 1269.7 |
| 45° | 1254.6 | 1262.6 | 1275.0 | 1299.1 | 1316.0 | 1324.9 | 1316.0 | 1299.1 | 1277.7 | 1263.5 | 1260.8 |
| 47.5° | 1247.4 | 1250.1 | 1269.7 | 1297.3 | 1317.8 | 1324.9 | 1316.0 | 1294.6 | 1267.9 | 1249.2 | 1247.4 |
| 50° | 1230.5 | 1236.8 | 1256.4 | 1285.7 | 1309.8 | 1316.9 | 1306.2 | 1277.7 | 1247.4 | 1227.0 | 1223.4 |
| 52.5° | 1204.7 | 1210.1 | 1233.2 | 1269.7 | 1292.9 | 1300.9 | 1284.8 | 1254.6 | 1219.0 | 1194.0 | 1194.0 |
| 55° | 1164.6 | 1172.7 | 1196.7 | 1234.1 | 1263.5 | 1270.6 | 1251.9 | 1219.8 | 1179.8 | 1154.8 | 1154.0 |
| 57.5° | 1116.6 | 1121.9 | 1147.7 | 1188.7 | 1217.2 | 1227.9 | 1209.2 | 1173.5 | 1133.5 | 1104.1 | 1101.4 |
| 60° | 1054.2 | 1061.4 | 1089.0 | 1128.1 | 1157.5 | 1166.4 | 1150.4 | 1114.8 | 1073.8 | 1042.7 | 1042.7 |
| 62.5° | 979.4 | 987.5 | 1015.1 | 1055.1 | 1085.4 | 1098.8 | 1076.5 | 1042.7 | 999.9 | 969.6 | 967.0 |
| 65° | 892.2 | 899.3 | 924.2 | 966.1 | 997.2 | 1007.0 | 990.1 | 954.5 | 913.5 | 885.1 | 882.4 |
| 67.5° | 794.2 | 804.0 | 829.0 | 864.6 | 891.3 | 903.8 | 893.1 | 861.0 | 818.3 | 788.9 | 786.2 |
| 70° | 688.3 | 695.4 | 715.0 | 747.9 | 778.2 | 787.1 | 771.1 | 749.7 | 709.6 | 682.9 | 679.4 |
| 72.5° | 575.2 | 581.4 | 597.5 | 628.6 | 650.0 | 661.6 | 652.7 | 625.1 | 593.0 | 570.7 | 574.3 |
| 75° | 461.2 | 460.3 | 478.1 | 500.4 | 520.0 | 528.0 | 521.8 | 504.0 | 474.6 | 455.9 | 455.0 |
| 77.5° | 347.3 | 356.2 | 362.4 | 381.1 | 397.1 | 403.4 | 394.4 | 380.2 | 357.9 | 342.8 | 345.5 |
| 80° | 244.0 | 238.6 | 250.2 | 261.8 | 272.5 | 278.7 | 273.4 | 265.3 | 250.2 | 238.6 | 236.8 |
| 82.5° | 149.6 | 145.1 | 150.5 | 161.2 | 168.3 | 170.1 | 171.0 | 161.2 | 154.9 | 146.0 | 147.8 |
| 85° | 65.9 | 66.8 | 71.2 | 78.4 | 79.2 | 80.1 | 80.1 | 78.4 | 71.2 | 70.3 | 68.6 |
| 87.5° | 16.0 | 16.0 | 16.9 | 19.6 | 19.6 | 20.5 | 20.5 | 17.8 | 16.9 | 15.1 | 16.0 |
| 90° | 30.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 | 29.1 |
| 92.5° | 34.8 | 34.2 | 34.2 | 33.8 | 33.8 | 33.8 | 33.8 | 33.8 | 33.8 | 33.8 | 33.8 |
| 95° | 39.4 | 39.4 | 39.4 | 38.5 | 38.5 | 38.5 | 38.5 | 38.5 | 38.5 | 38.5 | 38.5 |
| 97.5° | 44.6 | 44.6 | 44.6 | 44.2 | 44.2 | 44.2 | 44.2 | 44.2 | 44.2 | 44.2 | 44.2 |
| 100° | 49.8 | 49.8 | 49.8 | 49.8 | 49.8 | 49.8 | 49.8 | 49.8 | 49.8 | 49.8 | 49.8 |
| 102.5° | 55.9 | 55.9 | 55.9 | 55.9 | 55.9 | 55.9 | 55.9 | 56.4 | 55.9 | 55.9 | 55.9 |
| 105° | 62.0 | 62.0 | 62.0 | 62.0 | 62.0 | 62.0 | 62.0 | 62.9 | 62.0 | 62.0 | 62.0 |
| 107.5° | 68.6 | 68.6 | 69.0 | 69.0 | 69.0 | 69.0 | 69.0 | 69.5 | 69.0 | 69.0 | 69.0 |
| 110° | 75.1 | 75.1 | 76.1 | 76.1 | 76.1 | 76.1 | 76.1 | 76.1 | 76.1 | 76.1 | 76.1 |



REPORT NUMBER: P406443

CATALOG NUMBER: TT-D3-830-U-CQ-UPL

CANDELA DISTRIBUTION (continued):

| | 0° | 5° | 15° | 25° | 35° | 45° | 55° | 65° | 75° | 85° | 90° |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 112.5° | 83.1 | 83.1 | 84.0 | 84.0 | 84.0 | 84.0 | 84.6 | 84.6 | 84.0 | 84.0 | 84.0 |
| 115° | 91.1 | 91.1 | 92.0 | 92.0 | 92.0 | 92.0 | 93.0 | 93.0 | 92.0 | 92.0 | 92.0 |
| 117.5° | 100.5 | 100.5 | 101.0 | 101.4 | 101.4 | 101.4 | 102.4 | 102.4 | 101.4 | 101.4 | 101.4 |
| 120° | 109.9 | 109.9 | 109.9 | 110.8 | 110.8 | 110.8 | 111.8 | 111.8 | 110.8 | 110.8 | 110.8 |
| 122.5° | 120.7 | 120.7 | 121.2 | 121.6 | 121.6 | 121.6 | 122.6 | 122.6 | 122.1 | 122.1 | 121.6 |
| 125° | 131.5 | 131.5 | 132.4 | 132.4 | 132.4 | 132.4 | 133.4 | 133.4 | 133.4 | 133.4 | 132.4 |
| 127.5° | 143.2 | 143.2 | 144.2 | 144.2 | 144.2 | 144.2 | 145.1 | 145.1 | 145.1 | 145.1 | 144.2 |
| 130° | 155.0 | 155.0 | 155.9 | 155.9 | 155.9 | 155.9 | 156.8 | 156.8 | 156.8 | 156.8 | 155.9 |
| 132.5° | 167.2 | 167.2 | 167.6 | 167.6 | 167.6 | 168.1 | 168.6 | 168.6 | 168.6 | 168.6 | 168.1 |
| 135° | 179.4 | 179.4 | 179.4 | 179.4 | 179.4 | 180.3 | 180.3 | 180.3 | 180.3 | 180.3 | 180.3 |
| 137.5° | 191.2 | 190.6 | 191.2 | 190.6 | 191.2 | 191.6 | 191.6 | 191.6 | 191.6 | 191.6 | 191.6 |
| 140° | 202.9 | 201.9 | 202.9 | 201.9 | 202.9 | 202.9 | 202.9 | 202.9 | 202.9 | 202.9 | 202.9 |
| 142.5° | 213.7 | 213.2 | 213.7 | 212.7 | 213.7 | 213.7 | 213.7 | 213.7 | 213.7 | 213.7 | 213.7 |
| 145° | 224.5 | 224.5 | 224.5 | 223.5 | 224.5 | 224.5 | 224.5 | 224.5 | 224.5 | 224.5 | 224.5 |
| 147.5° | 235.8 | 235.3 | 235.8 | 234.8 | 235.8 | 235.8 | 235.8 | 235.8 | 235.8 | 235.8 | 235.8 |
| 150° | 247.0 | 246.1 | 247.0 | 246.1 | 247.0 | 247.0 | 247.0 | 247.0 | 247.0 | 247.0 | 247.0 |
| 152.5° | 256.0 | 255.5 | 256.4 | 255.5 | 256.0 | 256.0 | 256.4 | 256.0 | 256.0 | 256.0 | 256.0 |
| 155° | 264.9 | 264.9 | 265.8 | 264.9 | 264.9 | 264.9 | 265.8 | 264.9 | 264.9 | 264.9 | 264.9 |
| 157.5° | 272.4 | 272.4 | 273.3 | 272.4 | 272.4 | 272.4 | 273.3 | 272.4 | 272.4 | 272.4 | 272.4 |
| 160° | 279.9 | 279.9 | 280.8 | 279.9 | 279.9 | 279.9 | 280.8 | 279.9 | 279.9 | 279.9 | 279.9 |
| 162.5° | 286.0 | 286.0 | 286.9 | 286.0 | 286.0 | 286.0 | 286.9 | 286.0 | 286.0 | 286.0 | 286.0 |
| 165° | 292.1 | 292.1 | 293.0 | 292.1 | 292.1 | 292.1 | 293.0 | 292.1 | 292.1 | 292.1 | 292.1 |
| 167.5° | 295.8 | 295.8 | 296.8 | 295.8 | 295.8 | 295.8 | 296.8 | 295.8 | 295.8 | 295.8 | 295.8 |
| 170° | 299.6 | 299.6 | 300.5 | 299.6 | 299.6 | 299.6 | 300.5 | 299.6 | 299.6 | 299.6 | 299.6 |
| 172.5° | 302.0 | 302.0 | 302.8 | 302.0 | 302.4 | 302.0 | 302.8 | 302.0 | 302.0 | 302.0 | 302.0 |
| 175° | 304.3 | 304.3 | 305.2 | 304.3 | 305.2 | 304.3 | 305.2 | 304.3 | 304.3 | 304.3 | 304.3 |
| 177.5° | 305.2 | 305.2 | 305.7 | 305.2 | 305.7 | 305.2 | 305.7 | 305.2 | 305.2 | 305.2 | 305.2 |
| 180° | 306.2 | 306.2 | 306.2 | 306.2 | 306.2 | 306.2 | 306.2 | 306.2 | 306.2 | 306.2 | 306.2 |

LM-79-08: Approved Method: Electrical and Photometric Measurements of Solid-
State Lighting Products

Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

McGRAW-EDISON

Report Number: SP1-2006-844-5

Luminaire Tested: TT-D5-830-U-MQ

Test Date: 09/30/2020

Data applicable to product families TT-x-830 and TTN-x-830

Test Information

Test Method: LM-79-08
 Report Number: SP1-2006-844-5
 Test Lab: COOPER LIGHTING SOLUTIONS
 Photometer: SP1
 Measurement Geometry: 4π
 Issue Date: 09/30/2020
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)
 Product Line: MCGRAW-EDISON
 Catalog Number: **TT-D5-830-U-MQ**
 Description: MCGRAW EDISON

DISTRIBUTION

Spectral Parameters

CCT (K): 2996
 CIE u': 0.2496
 CIE v': 0.5255
 Duv: 0.0029
 CIE x: 0.4414
 CIE y: 0.4130
 CIE z: 0.1455
 Peak Wavelength (nm): 601
 Dominant Wavelength (nm): 581
 Purity: 56.8
 Rf: 85.7
 Rg: 94.5

| | | | |
|-----------|------|------|------|
| CRI (Ra): | 81.6 | | |
| R1: | 79.1 | R9: | -0.6 |
| R2: | 89.7 | R10: | 77.8 |
| R3: | 96.7 | R11: | 80.1 |
| R4: | 80.2 | R12: | 72.7 |
| R5: | 79.8 | R13: | 81.5 |
| R6: | 88.4 | R14: | 98.5 |
| R7: | 82.6 | | |
| R8: | 56.3 | | |

Test Conditions

Stabilization Time: 55M
 Operation Time: 12H
 Room Temperature (°C) / RH%: 25.5/43%
 Sphere Temperature (°C): 25.9



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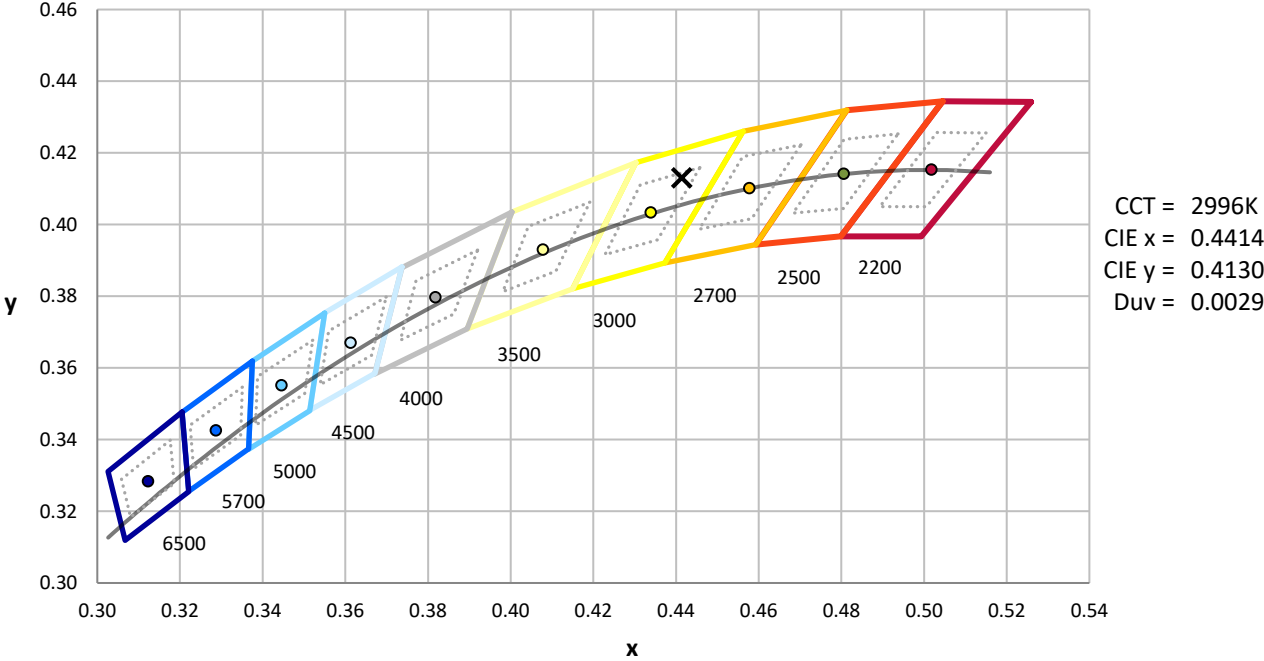
| Measurement and Test Equipment | | | |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument | Identification Number | Calibration Date | Calibration Due Date |
| Photometer | IN0058 | 7/29/2020 | 1/29/2021 |
| Power Meter | IN0071 | 12/3/2019 | 12/3/2020 |
| AC Power Source | IN0063 | 12/3/2019 | 12/3/2020 |
| DC Power Source | IN0208 | 12/3/2019 | 12/3/2020 |
| Sphere Thermometer | IN0085 | 12/3/2019 | 12/3/2020 |
| Room Thermometer | IN0046 | 12/3/2019 | 12/3/2020 |

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CIE 1931 Chromaticity Diagram



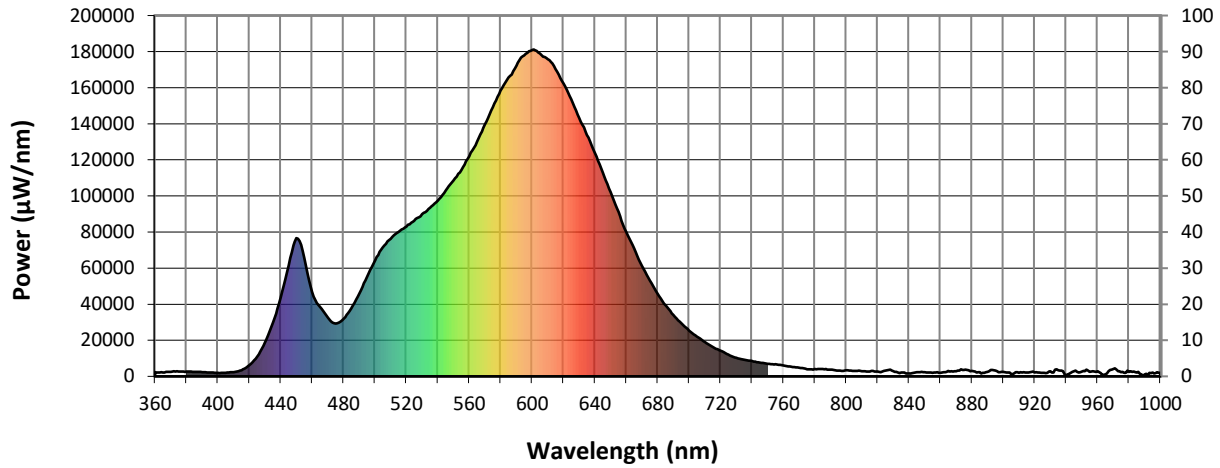
CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 3000K 4-step quadrangle

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Photopic Flux vs. Wavelength

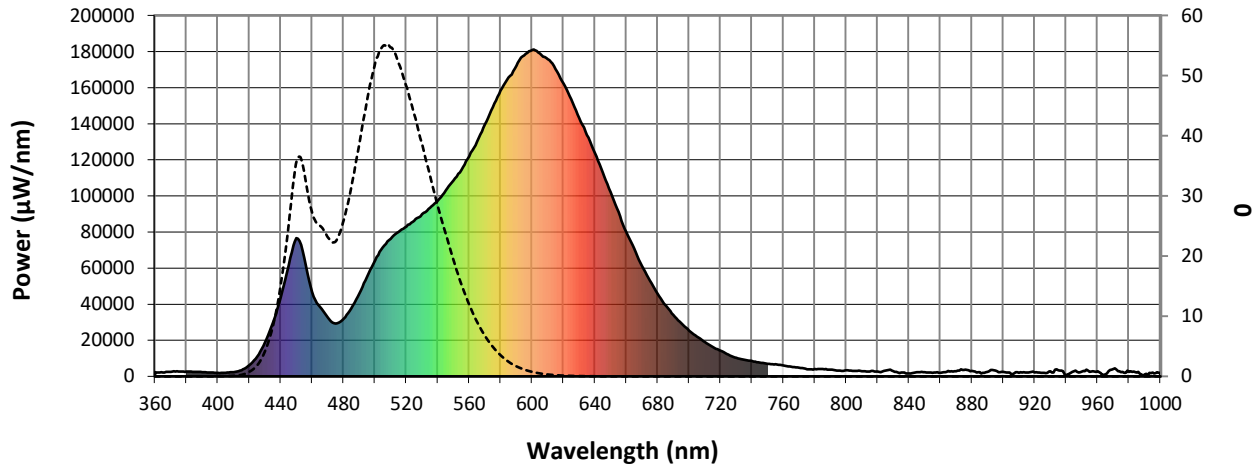


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| λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) |
|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|
| 360 | 2265 | 0.0 | 490 | 45874 | 6.5 | 620 | 162337 | 42.2 | 750 | 6976 | 0.0 | 880 | 2976 | 0.0 |
| 365 | 2167 | 0.0 | 495 | 55189 | 10.0 | 625 | 153641 | 33.9 | 755 | 6666 | 0.0 | 885 | 2283 | 0.0 |
| 370 | 2505 | 0.0 | 500 | 64204 | 14.2 | 630 | 143151 | 25.9 | 760 | 5969 | 0.0 | 890 | 2506 | 0.0 |
| 375 | 2720 | 0.0 | 505 | 71441 | 20.0 | 635 | 133763 | 20.1 | 765 | 5281 | 0.0 | 895 | 3132 | 0.0 |
| 380 | 2601 | 0.0 | 510 | 76219 | 26.2 | 640 | 123759 | 14.8 | 770 | 4732 | 0.0 | 900 | 2539 | 0.0 |
| 385 | 2461 | 0.0 | 515 | 79949 | 33.1 | 645 | 112859 | 10.9 | 775 | 3998 | 0.0 | 905 | 1252 | 0.0 |
| 390 | 2308 | 0.0 | 520 | 83077 | 40.3 | 650 | 102080 | 7.5 | 780 | 4027 | 0.0 | 910 | 1938 | 0.0 |
| 395 | 2104 | 0.0 | 525 | 86267 | 46.3 | 655 | 91102 | 5.2 | 785 | 4088 | 0.0 | 915 | 2171 | 0.0 |
| 400 | 1900 | 0.0 | 530 | 89871 | 52.9 | 660 | 79928 | 3.3 | 790 | 3700 | 0.0 | 920 | 2123 | 0.0 |
| 405 | 1945 | 0.0 | 535 | 93544 | 58.0 | 665 | 70694 | 2.2 | 795 | 3213 | 0.0 | 925 | 1954 | 0.0 |
| 410 | 2378 | 0.0 | 540 | 97371 | 63.4 | 670 | 61201 | 1.3 | 800 | 3403 | 0.0 | 930 | 2800 | 0.0 |
| 415 | 3437 | 0.0 | 545 | 103011 | 68.6 | 675 | 53092 | 0.9 | 805 | 3079 | 0.0 | 935 | 3314 | 0.0 |
| 420 | 6173 | 0.0 | 550 | 108560 | 73.8 | 680 | 45718 | 0.5 | 810 | 2921 | 0.0 | 940 | 553 | 0.0 |
| 425 | 11052 | 0.1 | 555 | 114473 | 78.2 | 685 | 39372 | 0.3 | 815 | 2705 | 0.0 | 945 | 2793 | 0.0 |
| 430 | 18756 | 0.1 | 560 | 121896 | 82.8 | 690 | 34120 | 0.2 | 820 | 2685 | 0.0 | 950 | 2629 | 0.0 |
| 435 | 29750 | 0.4 | 565 | 130192 | 86.6 | 695 | 29427 | 0.1 | 825 | 3246 | 0.0 | 955 | 2418 | 0.0 |
| 440 | 43697 | 0.7 | 570 | 139595 | 90.8 | 700 | 25380 | 0.1 | 830 | 2813 | 0.0 | 960 | 2857 | 0.0 |
| 445 | 61462 | 1.3 | 575 | 149225 | 92.8 | 705 | 22079 | 0.0 | 835 | 2097 | 0.0 | 965 | 1052 | 0.0 |
| 450 | 76648 | 2.0 | 580 | 158344 | 94.1 | 710 | 18938 | 0.0 | 840 | 1606 | 0.0 | 970 | 4009 | 0.0 |
| 455 | 65529 | 2.2 | 585 | 165704 | 92.1 | 715 | 16322 | 0.0 | 845 | 2347 | 0.0 | 975 | 2341 | 0.0 |
| 460 | 46753 | 1.9 | 590 | 172269 | 89.1 | 720 | 14132 | 0.0 | 850 | 2273 | 0.0 | 980 | 2439 | 0.0 |
| 465 | 38422 | 2.0 | 595 | 177895 | 84.3 | 725 | 12072 | 0.0 | 855 | 1971 | 0.0 | 985 | 2098 | 0.0 |
| 470 | 32450 | 2.0 | 600 | 180887 | 78.0 | 730 | 10271 | 0.0 | 860 | 1962 | 0.0 | 990 | 1159 | 0.0 |
| 475 | 29284 | 2.3 | 605 | 178880 | 69.3 | 735 | 9202 | 0.0 | 865 | 2989 | 0.0 | 995 | 2146 | 0.0 |
| 480 | 31922 | 3.0 | 610 | 175843 | 60.4 | 740 | 8451 | 0.0 | 870 | 2921 | 0.0 | 1000 | 1904 | 0.0 |
| 485 | 37800 | 4.5 | 615 | 170321 | 51.4 | 745 | 7632 | 0.0 | 875 | 3581 | 0.0 | | | |

REPORT NUMBER: SP1-2006-844-5

Scotopic Flux vs. Wavelength



Scotopic Lumens: 4357.3

S/P: 0.5

| λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) |
|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|
| 360 | 2265 | 0.0 | 490 | 45874 | 70.6 | 620 | 162337 | 2.0 | 750 | 6976 | 0.0 | 880 | 2976 | 0.0 |
| 365 | 2167 | 0.0 | 495 | 55189 | 89.2 | 625 | 153641 | 1.3 | 755 | 6666 | 0.0 | 885 | 2283 | 0.0 |
| 370 | 2505 | 0.0 | 500 | 64204 | 107.4 | 630 | 143151 | 0.8 | 760 | 5969 | 0.0 | 890 | 2506 | 0.0 |
| 375 | 2720 | 0.0 | 505 | 71441 | 121.4 | 635 | 133763 | 0.5 | 765 | 5281 | 0.0 | 895 | 3132 | 0.0 |
| 380 | 2601 | 0.0 | 510 | 76219 | 129.2 | 640 | 123759 | 0.3 | 770 | 4732 | 0.0 | 900 | 2539 | 0.0 |
| 385 | 2461 | 0.0 | 515 | 79949 | 132.5 | 645 | 112859 | 0.2 | 775 | 3998 | 0.0 | 905 | 1252 | 0.0 |
| 390 | 2308 | 0.0 | 520 | 83077 | 132.1 | 650 | 102080 | 0.1 | 780 | 4027 | 0.0 | 910 | 1938 | 0.0 |
| 395 | 2104 | 0.0 | 525 | 86267 | 129.1 | 655 | 91102 | 0.1 | 785 | 4088 | 0.0 | 915 | 2171 | 0.0 |
| 400 | 1900 | 0.0 | 530 | 89871 | 123.9 | 660 | 79928 | 0.0 | 790 | 3700 | 0.0 | 920 | 2123 | 0.0 |
| 405 | 1945 | 0.1 | 535 | 93544 | 116.6 | 665 | 70694 | 0.0 | 795 | 3213 | 0.0 | 925 | 1954 | 0.0 |
| 410 | 2378 | 0.1 | 540 | 97371 | 107.6 | 670 | 61201 | 0.0 | 800 | 3403 | 0.0 | 930 | 2800 | 0.0 |
| 415 | 3437 | 0.4 | 545 | 103011 | 98.8 | 675 | 53092 | 0.0 | 805 | 3079 | 0.0 | 935 | 3314 | 0.0 |
| 420 | 6173 | 1.0 | 550 | 108560 | 88.8 | 680 | 45718 | 0.0 | 810 | 2921 | 0.0 | 940 | 553 | 0.0 |
| 425 | 11052 | 2.7 | 555 | 114473 | 78.2 | 685 | 39372 | 0.0 | 815 | 2705 | 0.0 | 945 | 2793 | 0.0 |
| 430 | 18756 | 6.4 | 560 | 121896 | 68.1 | 690 | 34120 | 0.0 | 820 | 2685 | 0.0 | 950 | 2629 | 0.0 |
| 435 | 29750 | 13.3 | 565 | 130192 | 58.4 | 695 | 29427 | 0.0 | 825 | 3246 | 0.0 | 955 | 2418 | 0.0 |
| 440 | 43697 | 24.4 | 570 | 139595 | 49.3 | 700 | 25380 | 0.0 | 830 | 2813 | 0.0 | 960 | 2857 | 0.0 |
| 445 | 61462 | 41.2 | 575 | 149225 | 40.6 | 705 | 22079 | 0.0 | 835 | 2097 | 0.0 | 965 | 1052 | 0.0 |
| 450 | 76648 | 59.4 | 580 | 158344 | 32.6 | 710 | 18938 | 0.0 | 840 | 1606 | 0.0 | 970 | 4009 | 0.0 |
| 455 | 65529 | 57.3 | 585 | 165704 | 25.3 | 715 | 16322 | 0.0 | 845 | 2347 | 0.0 | 975 | 2341 | 0.0 |
| 460 | 46753 | 45.2 | 590 | 172269 | 19.2 | 720 | 14132 | 0.0 | 850 | 2273 | 0.0 | 980 | 2439 | 0.0 |
| 465 | 38422 | 40.6 | 595 | 177895 | 14.2 | 725 | 12072 | 0.0 | 855 | 1971 | 0.0 | 985 | 2098 | 0.0 |
| 470 | 32450 | 37.4 | 600 | 180887 | 10.2 | 730 | 10271 | 0.0 | 860 | 1962 | 0.0 | 990 | 1159 | 0.0 |
| 475 | 29284 | 36.6 | 605 | 178880 | 7.0 | 735 | 9202 | 0.0 | 865 | 2989 | 0.0 | 995 | 2146 | 0.0 |
| 480 | 31922 | 43.1 | 610 | 175843 | 4.8 | 740 | 8451 | 0.0 | 870 | 2921 | 0.0 | 1000 | 1904 | 0.0 |
| 485 | 37800 | 54.8 | 615 | 170321 | 3.2 | 745 | 7632 | 0.0 | 875 | 3581 | 0.0 | | | |

REPORT NUMBER: SP1-2006-844-5

Melanopic Flux vs. Wavelength



Melanopic Lumens: 11640.4 S/P: 1.33

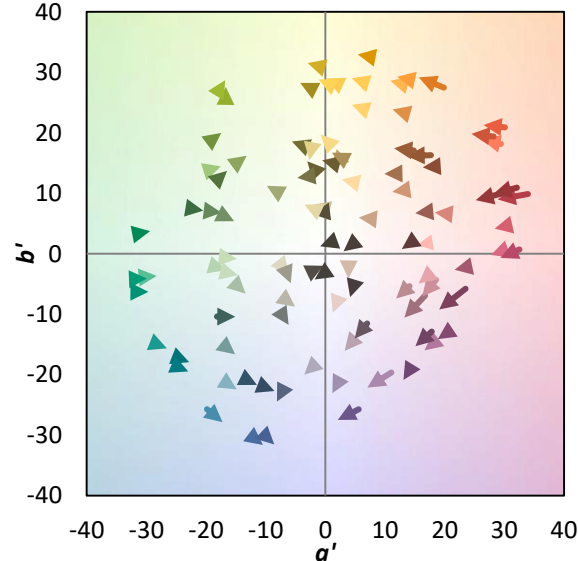
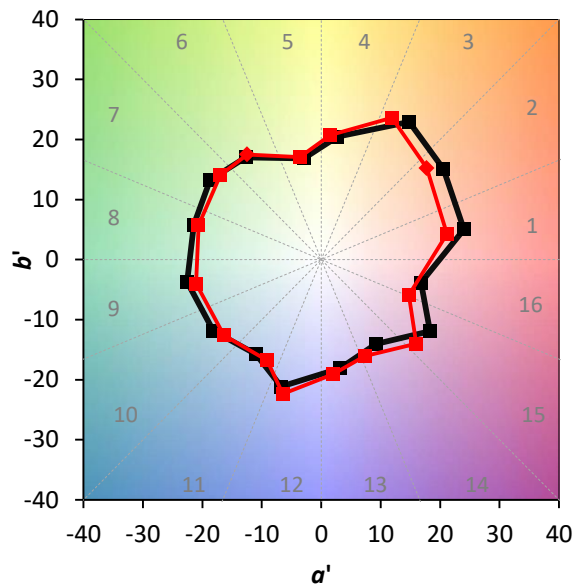
| λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) |
|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|
| 360 | 2265 | 0.0 | 490 | 45874 | 38.2 | 620 | 162337 | 0.1 | 750 | 6976 | 0.0 | 880 | 2976 | 0.0 |
| 365 | 2167 | 0.0 | 495 | 55189 | 45.6 | 625 | 153641 | 0.1 | 755 | 6666 | 0.0 | 885 | 2283 | 0.0 |
| 370 | 2505 | 0.0 | 500 | 64204 | 51.6 | 630 | 143151 | 0.0 | 760 | 5969 | 0.0 | 890 | 2506 | 0.0 |
| 375 | 2720 | 0.0 | 505 | 71441 | 54.8 | 635 | 133763 | 0.0 | 765 | 5281 | 0.0 | 895 | 3132 | 0.0 |
| 380 | 2601 | 0.0 | 510 | 76219 | 54.7 | 640 | 123759 | 0.0 | 770 | 4732 | 0.0 | 900 | 2539 | 0.0 |
| 385 | 2461 | 0.0 | 515 | 79949 | 52.2 | 645 | 112859 | 0.0 | 775 | 3998 | 0.0 | 905 | 1252 | 0.0 |
| 390 | 2308 | 0.0 | 520 | 83077 | 48.4 | 650 | 102080 | 0.0 | 780 | 4027 | 0.0 | 910 | 1938 | 0.0 |
| 395 | 2104 | 0.0 | 525 | 86267 | 43.7 | 655 | 91102 | 0.0 | 785 | 4088 | 0.0 | 915 | 2171 | 0.0 |
| 400 | 1900 | 0.0 | 530 | 89871 | 38.8 | 660 | 79928 | 0.0 | 790 | 3700 | 0.0 | 920 | 2123 | 0.0 |
| 405 | 1945 | 0.0 | 535 | 93544 | 33.7 | 665 | 70694 | 0.0 | 795 | 3213 | 0.0 | 925 | 1954 | 0.0 |
| 410 | 2378 | 0.1 | 540 | 97371 | 28.5 | 670 | 61201 | 0.0 | 800 | 3403 | 0.0 | 930 | 2800 | 0.0 |
| 415 | 3437 | 0.2 | 545 | 103011 | 23.9 | 675 | 53092 | 0.0 | 805 | 3079 | 0.0 | 935 | 3314 | 0.0 |
| 420 | 6173 | 0.7 | 550 | 108560 | 19.5 | 680 | 45718 | 0.0 | 810 | 2921 | 0.0 | 940 | 553 | 0.0 |
| 425 | 11052 | 1.7 | 555 | 114473 | 15.4 | 685 | 39372 | 0.0 | 815 | 2705 | 0.0 | 945 | 2793 | 0.0 |
| 430 | 18756 | 4.0 | 560 | 121896 | 12.0 | 690 | 34120 | 0.0 | 820 | 2685 | 0.0 | 950 | 2629 | 0.0 |
| 435 | 29750 | 7.9 | 565 | 130192 | 9.1 | 695 | 29427 | 0.0 | 825 | 3246 | 0.0 | 955 | 2418 | 0.0 |
| 440 | 43697 | 14.6 | 570 | 139595 | 6.8 | 700 | 25380 | 0.0 | 830 | 2813 | 0.0 | 960 | 2857 | 0.0 |
| 445 | 61462 | 24.2 | 575 | 149225 | 5.0 | 705 | 22079 | 0.0 | 835 | 2097 | 0.0 | 965 | 1052 | 0.0 |
| 450 | 76648 | 35.3 | 580 | 158344 | 3.5 | 710 | 18938 | 0.0 | 840 | 1606 | 0.0 | 970 | 4009 | 0.0 |
| 455 | 65529 | 34.3 | 585 | 165704 | 2.5 | 715 | 16322 | 0.0 | 845 | 2347 | 0.0 | 975 | 2341 | 0.0 |
| 460 | 46753 | 27.5 | 590 | 172269 | 1.7 | 720 | 14132 | 0.0 | 850 | 2273 | 0.0 | 980 | 2439 | 0.0 |
| 465 | 38422 | 25.1 | 595 | 177895 | 1.1 | 725 | 12072 | 0.0 | 855 | 1971 | 0.0 | 985 | 2098 | 0.0 |
| 470 | 32450 | 23.2 | 600 | 180887 | 0.8 | 730 | 10271 | 0.0 | 860 | 1962 | 0.0 | 990 | 1159 | 0.0 |
| 475 | 29284 | 22.4 | 605 | 178880 | 0.5 | 735 | 9202 | 0.0 | 865 | 2989 | 0.0 | 995 | 2146 | 0.0 |
| 480 | 31922 | 25.6 | 610 | 175843 | 0.3 | 740 | 8451 | 0.0 | 870 | 2921 | 0.0 | 1000 | 1904 | 0.0 |
| 485 | 37800 | 31.2 | 615 | 170321 | 0.2 | 745 | 7632 | 0.0 | 875 | 3581 | 0.0 | | | |

Summary

$R_f = 85.7$
 $R_g = 94.5$
 CIE $R_a = 81.6$
 $R_g = -0.6$

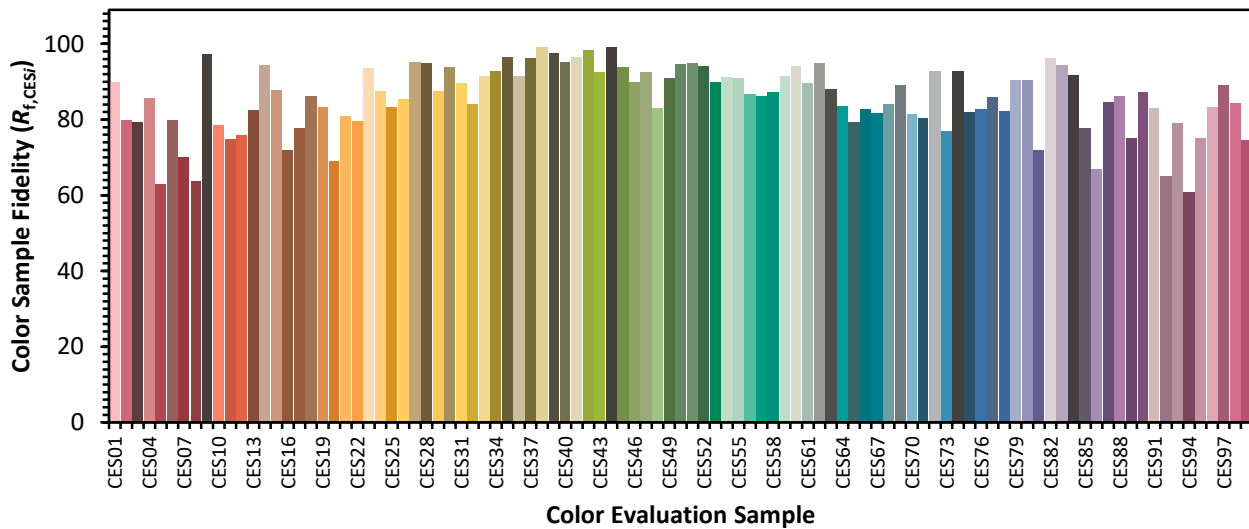


Color Vector Graphics



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

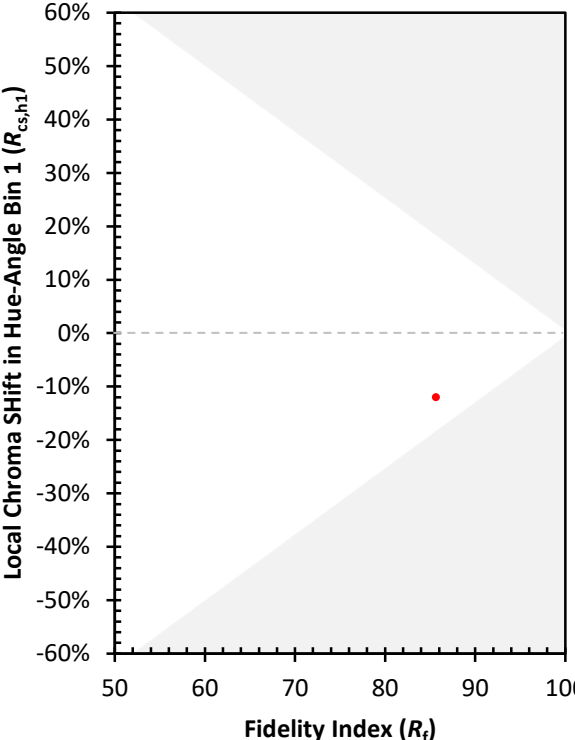
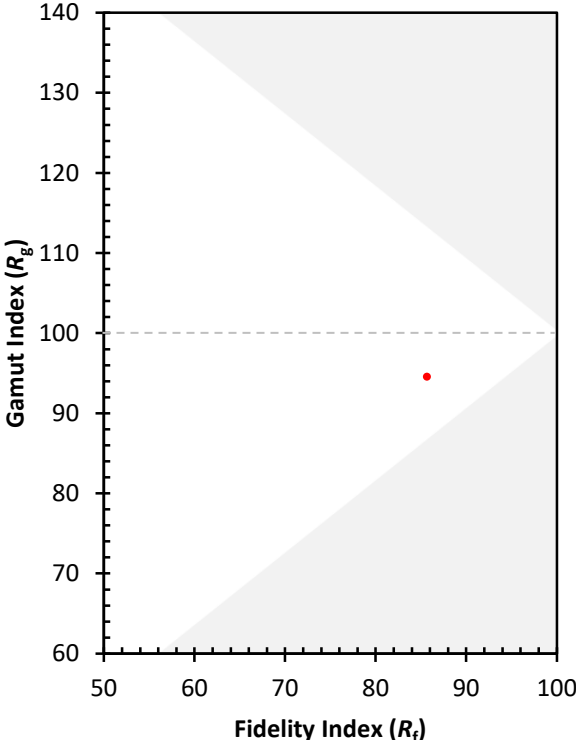
| | | | |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 85 | CES51 = 95 | CES76 = 83 |
| CES02 = 63 | CES27 = 95 | CES52 = 94 | CES77 = 86 |
| CES03 = 31 | CES28 = 95 | CES53 = 90 | CES78 = 82 |
| CES04 = 70 | CES29 = 88 | CES54 = 91 | CES79 = 91 |
| CES05 = 50 | CES30 = 94 | CES55 = 91 | CES80 = 90 |
| CES06 = 51 | CES31 = 90 | CES56 = 87 | CES81 = 72 |
| CES07 = 42 | CES32 = 84 | CES57 = 86 | CES82 = 96 |
| CES08 = 41 | CES33 = 92 | CES58 = 87 | CES83 = 94 |
| CES09 = 29 | CES34 = 93 | CES59 = 91 | CES84 = 92 |
| CES10 = 76 | CES35 = 96 | CES60 = 94 | CES85 = 78 |
| CES11 = 59 | CES36 = 91 | CES61 = 90 | CES86 = 67 |
| CES12 = 65 | CES37 = 96 | CES62 = 95 | CES87 = 85 |
| CES13 = 43 | CES38 = 99 | CES63 = 88 | CES88 = 86 |
| CES14 = 74 | CES39 = 98 | CES64 = 84 | CES89 = 75 |
| CES15 = 72 | CES40 = 95 | CES65 = 79 | CES90 = 87 |
| CES16 = 47 | CES41 = 97 | CES66 = 83 | CES91 = 83 |
| CES17 = 50 | CES42 = 98 | CES67 = 82 | CES92 = 65 |
| CES18 = 56 | CES43 = 93 | CES68 = 84 | CES93 = 79 |
| CES19 = 72 | CES44 = 99 | CES69 = 89 | CES94 = 61 |
| CES20 = 67 | CES45 = 94 | CES70 = 81 | CES95 = 75 |
| CES21 = 87 | CES46 = 90 | CES71 = 80 | CES96 = 83 |
| CES22 = 79 | CES47 = 93 | CES72 = 93 | CES97 = 89 |
| CES23 = 92 | CES48 = 83 | CES73 = 77 | CES98 = 84 |
| CES24 = 91 | CES49 = 91 | CES74 = 93 | CES99 = 75 |
| CES25 = 72 | CES50 = 95 | CES75 = 82 | |



Color Rendition by Hue-Angle Bin



Measure Comparisons



(END OF REPORT)