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: P821574

Luminaire Tested: **TT-D2-750-12VDC-CQ-UPL**

Issue Date: 7/23/2020

Report Generated By 670245763

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

Scaled Data Report

**Test Information**

| | |
|---|---|
| Test Method: | LM-79-08 |
| Report Number: | P821574 |
| | REPORT IS FROM IESNA LM-79-08 TEST DATA - UPLIGHT (G2-2002-677-3) AND |
| Test Lab: | INNOVATION CENTER |
| Issue Date: | 7/23/2020 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS (FORMERLY EATON) |
| Product Line: | McGRAW-EDISON |
| Catalog Number: | TT-D2-750-12VDC-CQ-UPL |
| Description: | TOPTIER LED PARKING GARAGE LUMINAIRE WITH UPLIGHT WITH UPLIGHT |
| | 5000K, 70 CRI LEDS AND CONCENTRATED DISTRIBUTION |
| Light Source: | - |
| Ballast/Driver: | ELECTRONIC DRIVER |

**Summary**

| | |
|---|---|
| Lumens per Lamp: | N/A |
| Luminaire Lumens: | 6115.4 lumens |
| Efficiency: | N/A |
| Efficacy: | 160.9 lumens/watt |
| Luminous Opening: | Vertical Cylinder (Dia: 1.12' x H: 0.1') |
| IES Classification: | Type V - Short |
| BUG Rating: | B2 - U4 - G1 |

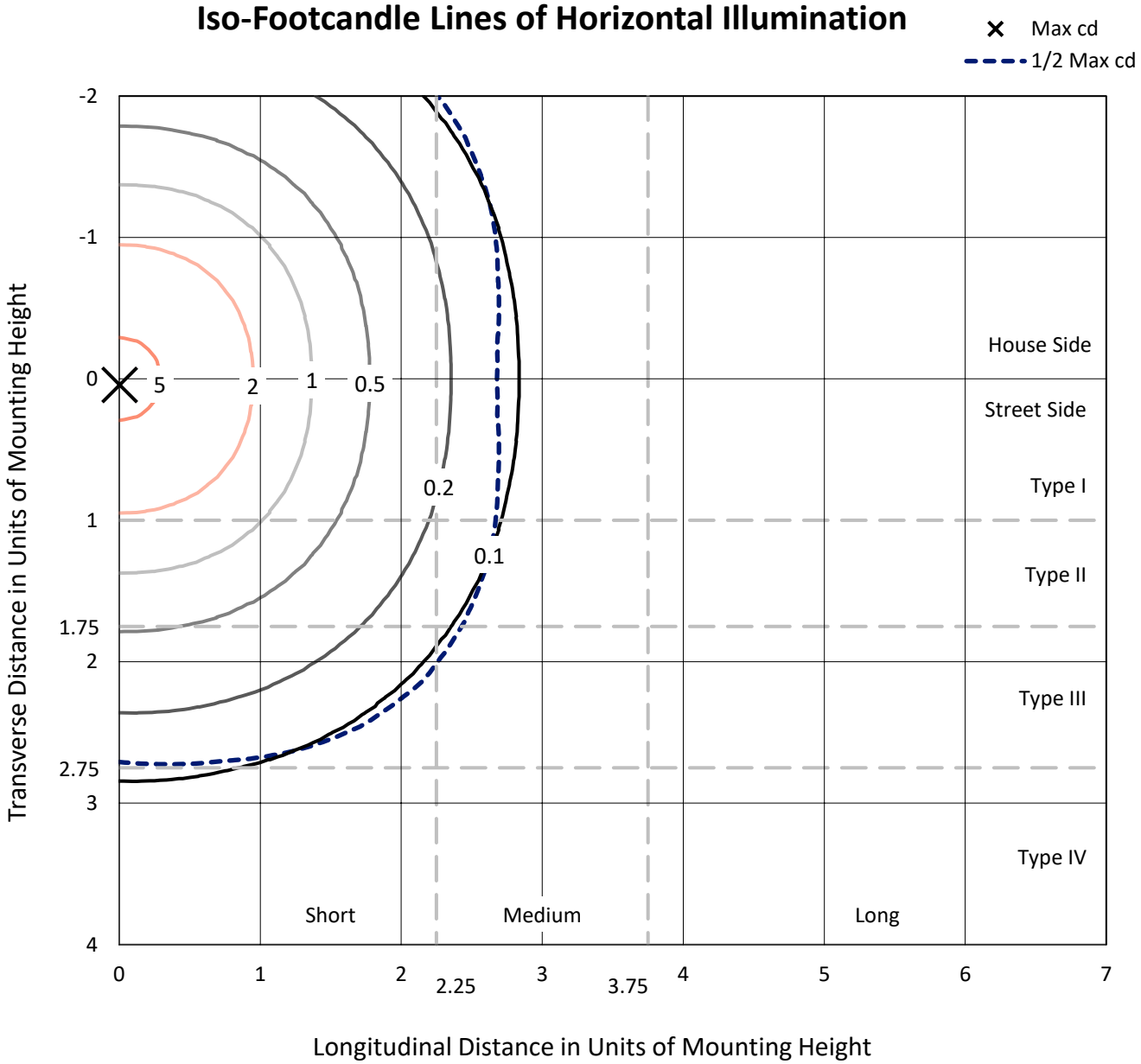
| | |
|---|---|
| Input Watts (W): | 38 |
| Input Voltage (V): | NR |
| Input Current (Ain): | NR |
| Voltage Rise (V): | NR |
| Power Factor: | NR |
| Total Harmonic Distortion (THDi): | NR |
| Frequency (hertz): | 60 |
| Stabilization Time: | NR |
| Operation Time: | NR |
| Ambient Temperature (°C): | NR |
| Test Distance: | 25 FT |

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Scaled Data Report

REPORT NUMBER: P821574
CATALOG NUMBER: TT-D2-750-12VDC-CQ-UPL

## Iso-Footcandle Lines of Horizontal Illumination



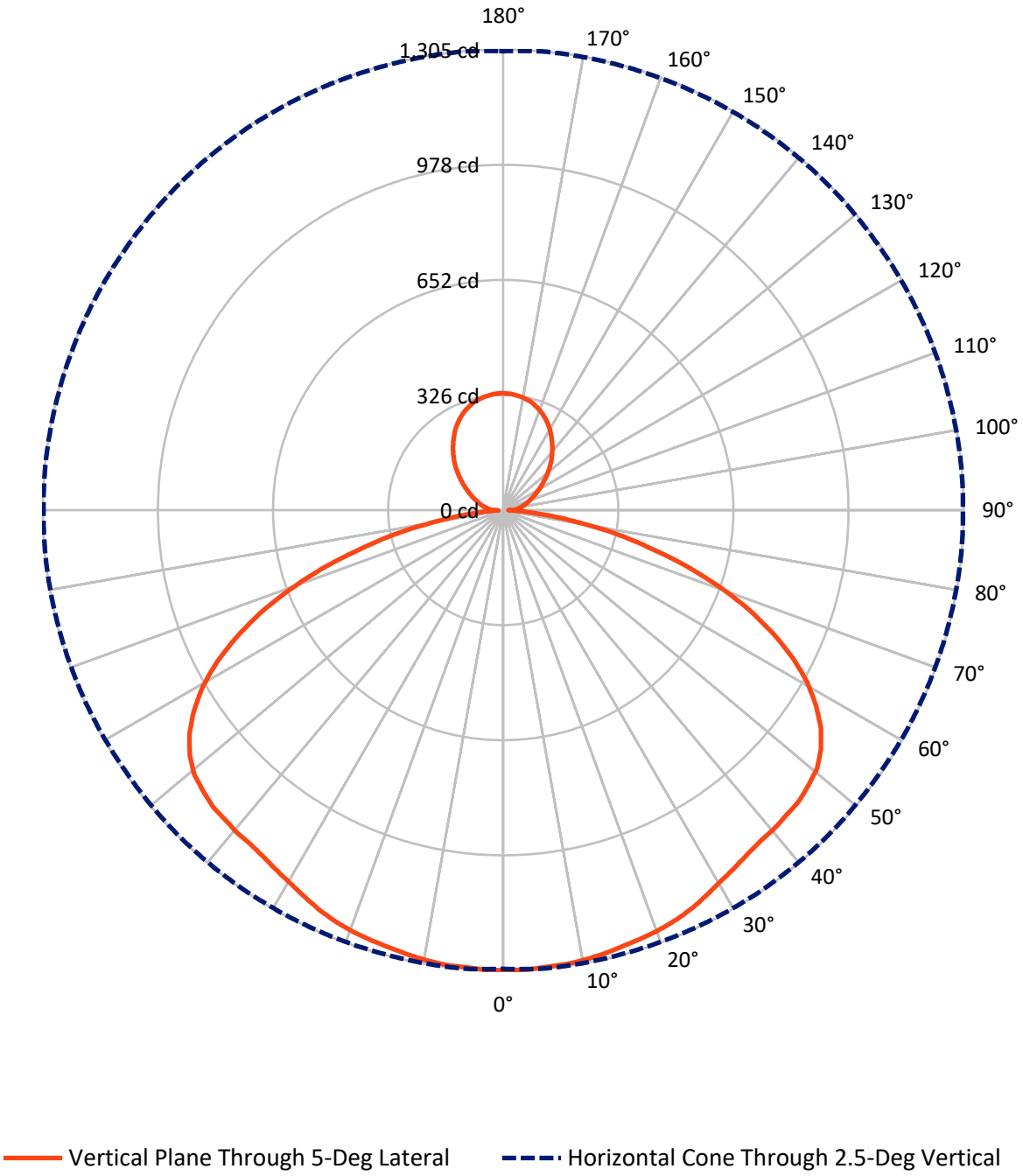

Based on 15 foot mounting height. Maximum calculated value = 5.8 fc
Type V - Short - N/A

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REPORT NUMBER: P821574
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## Luminous Intensity Polar Plot



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Scaled Data Report

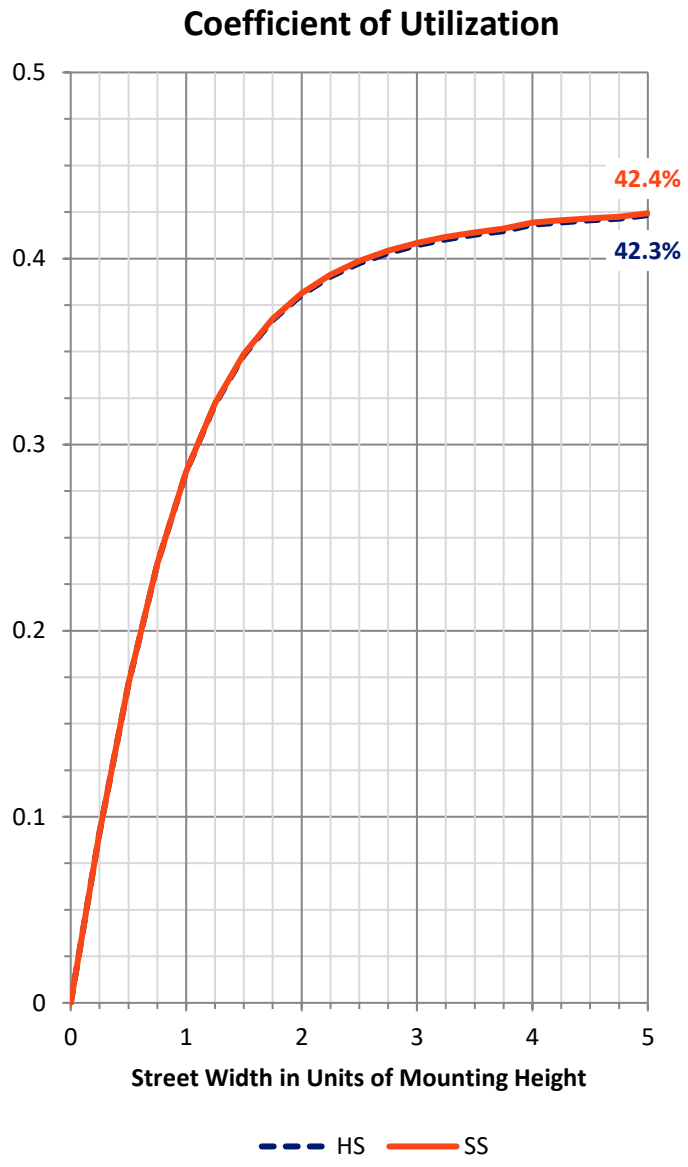
REPORT NUMBER: P821574
CATALOG NUMBER: TT-D2-750-12VDC-CQ-UPL

**FLUX DISTRIBUTION:**

| | | Downward | Upward | Total |
|---|---|---|---|---|
| **House Side** | Lumens | 2607.7 | 450.0 | 3057.7 |
| | % Fixture | 42.6 | 7.4 | 50.0 |
| **Street Side** | Lumens | 2607.7 | 450.0 | 3057.7 |
| | % Fixture | 42.6 | 7.4 | 50.0 |
| **Total** | Lumens | 5215.3 | 900.0 | 6115.4 |
| | % Fixture | 85.3 | 14.7 | 100.0 |

**ZONAL LUMENS:**

| Zone | Lumens | % Fixture |
|---|---|---|
| 0°-10° | 124.0 | 2.0 |
| 10°-20° | 363.1 | 5.9 |
| 20°-30° | 577.5 | 9.4 |
| 30°-40° | 759.6 | 12.4 |
| 40°-50° | 929.8 | 15.2 |
| 50°-60° | 1007.0 | 16.5 |
| 60°-70° | 866.4 | 14.2 |
| 70°-80° | 487.1 | 8.0 |
| 80°-90° | 100.9 | 1.6 |
| 90°-100° | 46.1 | 0.8 |
| 100°-110° | 71.4 | 1.2 |
| 110°-120° | 99.4 | 1.6 |
| 120°-130° | 128.8 | 2.1 |
| 130°-140° | 150.0 | 2.5 |
| 140°-150° | 152.1 | 2.5 |
| 150°-160° | 131.9 | 2.2 |
| 160°-170° | 89.0 | 1.5 |
| 170°-180° | 31.3 | 0.5 |
| 0°-90° | 5215.3 | 85.3 |
| 0°-180° | 6115.4 | 100.0 |



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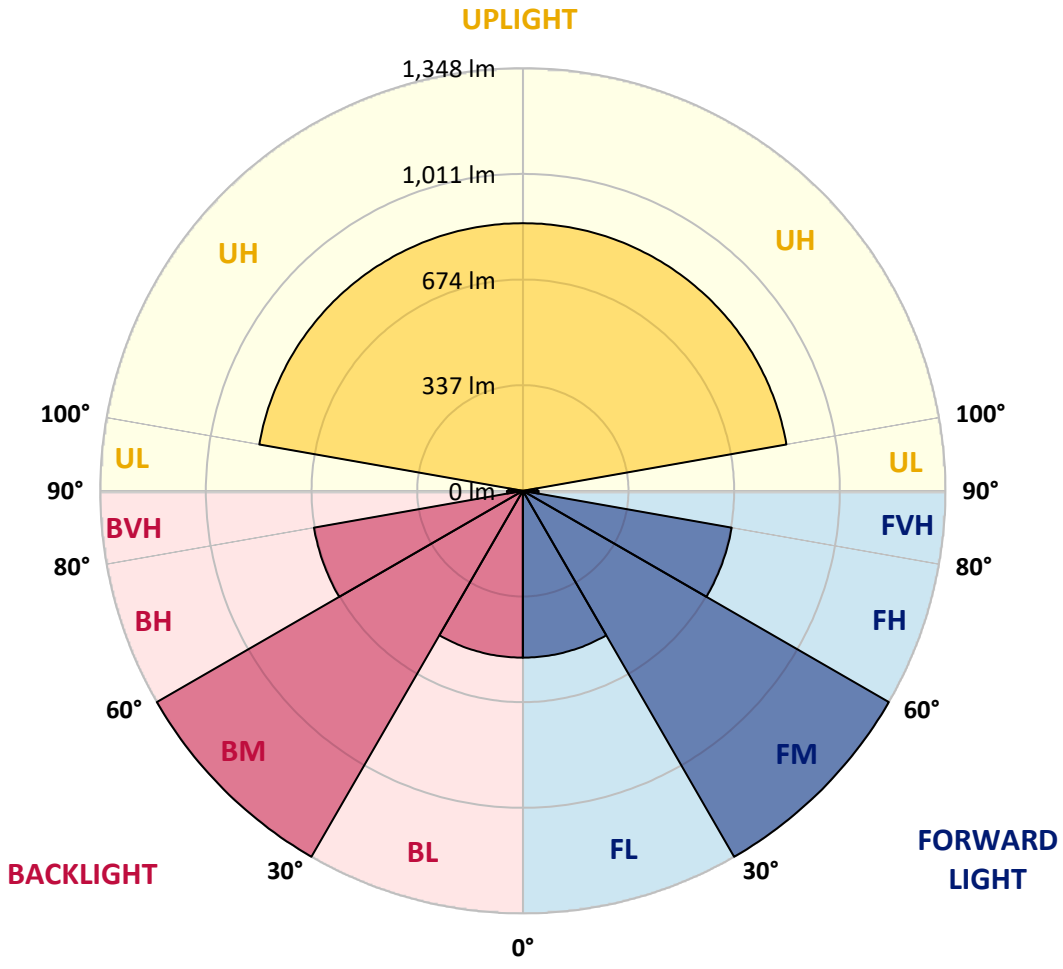
Scaled Data Report

REPORT NUMBER: P821574
CATALOG NUMBER: TT-D2-750-12VDC-CQ-UPL

## LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:

| Zone | | Lumens | % Fixture | Zone Rating/Lumen Limit B | U | G |
|---|---|---|---|---|---|---|
| FL | (0°-30°) | 532.3 | 8.7 | | | |
| FM | (30°-60°) | 1348.2 | 22.0 | | | |
| FH | (60°-80°) | 676.7 | 11.1 | | | G1/1800 |
| FVH | (80°-90°) | 50.4 | 0.8 | | | G1/100 |
| BL | (0°-30°) | 532.3 | 8.7 | B2/1000 | | |
| BM | (30°-60°) | 1348.2 | 22.0 | B2/2500 | | |
| BH | (60°-80°) | 676.7 | 11.1 | B2/1000 | | G1/1800 |
| BVH | (80°-90°) | 50.4 | 0.8 | | | G1/100 |
| UL | (90°-100°) | 46.1 | 0.8 | | U2/50 | |
| UH | (100°-180°) | 853.9 | 14.0 | | U4/1000 | |

**BUG Rating: B2-U4-G1**
Type V Short



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Scaled Data Report

REPORT NUMBER: P821574
CATALOG NUMBER: TT-D2-750-12VDC-CQ-UPL

**CANDELA DISTRIBUTION (FULL):**

| | 0° | 5° | 15° | 25° | 35° | 45° | 55° | 65° | 75° | 85° | 90° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 1303.6 | *1303.6* | 1303.6 | 1303.6 | 1303.6 | 1303.6 | 1303.6 | 1303.6 | 1303.6 | 1303.6 | 1303.6 |
| 2.5° | *1300.3* | *1304.5* | *1302.8* | *1302.8* | *1302.8* | *1302.8* | *1301.2* | *1302.8* | *1302.8* | *1303.6* | *1302.8* |
| 5° | 1301.2 | *1300.3* | 1300.3 | 1301.2 | 1301.2 | 1302.0 | 1300.3 | 1301.2 | 1302.0 | 1302.0 | 1302.8 |
| 7.5° | 1298.7 | *1299.5* | 1297.8 | 1299.5 | 1297.8 | 1298.7 | 1298.7 | 1299.5 | 1298.7 | 1299.5 | 1301.2 |
| 10° | 1293.7 | *1294.5* | 1293.7 | 1293.7 | 1293.7 | 1295.3 | 1292.0 | 1294.5 | 1293.7 | 1294.5 | 1293.7 |
| 12.5° | 1284.6 | *1288.7* | 1287.1 | 1288.7 | 1288.7 | 1288.7 | 1286.2 | 1287.9 | 1288.7 | 1288.7 | 1288.7 |
| 15° | 1280.4 | *1281.2* | 1278.8 | 1282.1 | 1282.9 | 1283.7 | 1280.4 | 1282.1 | 1282.1 | 1282.9 | 1283.7 |
| 17.5° | 1271.3 | *1275.4* | 1274.6 | 1277.1 | 1276.3 | 1278.8 | 1277.9 | 1277.1 | 1276.3 | 1277.9 | 1276.3 |
| 20° | 1264.7 | *1268.8* | 1268.0 | 1270.5 | 1271.3 | 1273.8 | 1271.3 | 1271.3 | 1268.8 | 1269.6 | 1272.1 |
| 22.5° | 1258.0 | *1259.7* | 1259.7 | 1262.2 | 1262.2 | 1264.7 | 1262.2 | 1261.3 | 1261.3 | 1260.5 | 1263.0 |
| 25° | 1247.2 | *1248.1* | 1247.2 | 1249.7 | 1251.4 | 1253.1 | 1252.2 | 1250.6 | 1249.7 | 1249.7 | 1248.9 |
| 27.5° | 1229.8 | *1233.2* | 1234.8 | 1238.1 | 1239.0 | 1241.4 | 1238.1 | 1238.1 | 1236.5 | 1234.8 | 1235.6 |
| 30° | 1216.6 | *1218.2* | 1218.2 | 1225.7 | 1225.7 | 1229.8 | 1225.7 | 1224.9 | 1224.0 | 1223.2 | 1221.5 |
| 32.5° | 1204.1 | *1206.6* | 1209.1 | 1214.9 | 1219.1 | 1220.7 | 1218.2 | 1216.6 | 1212.4 | 1209.9 | 1209.1 |
| 35° | 1194.2 | *1195.0* | 1200.0 | 1208.3 | 1213.2 | 1217.4 | 1214.1 | 1209.9 | 1204.1 | 1200.0 | 1203.3 |
| 37.5° | 1186.7 | *1187.5* | 1195.0 | 1205.8 | 1214.9 | 1218.2 | 1213.2 | 1206.6 | 1197.5 | 1192.5 | 1190.9 |
| 40° | 1180.1 | *1185.1* | 1193.3 | 1208.3 | 1218.2 | 1223.2 | 1219.1 | 1209.9 | 1196.7 | 1186.7 | 1185.9 |
| 42.5° | 1176.8 | *1179.2* | 1191.7 | 1209.1 | 1223.2 | 1229.8 | 1224.0 | 1211.6 | 1195.0 | 1183.4 | 1182.6 |
| 45° | 1168.5 | *1175.9* | 1187.5 | 1209.9 | 1225.7 | 1234.0 | 1225.7 | 1209.9 | 1190.0 | 1176.8 | 1174.3 |
| 47.5° | 1161.8 | *1164.3* | 1182.6 | 1208.3 | 1227.3 | 1234.0 | 1225.7 | 1205.8 | 1180.9 | 1163.5 | 1161.8 |
| 50° | 1146.1 | *1151.9* | 1170.1 | 1197.5 | 1219.9 | 1226.5 | 1216.6 | 1190.0 | 1161.8 | 1142.8 | 1139.4 |
| 52.5° | 1122.0 | *1127.0* | 1148.6 | 1182.6 | 1204.1 | 1211.6 | 1196.7 | 1168.5 | 1135.3 | 1112.1 | 1112.1 |
| 55° | 1084.7 | *1092.2* | 1114.6 | 1149.4 | 1176.8 | 1183.4 | 1166.0 | 1136.1 | 1098.8 | 1075.6 | 1074.8 |
| 57.5° | 1039.9 | *1044.9* | 1069.0 | 1107.1 | 1133.6 | 1143.6 | 1126.2 | 1093.0 | 1055.7 | 1028.3 | 1025.8 |
| 60° | 981.9 | *988.5* | 1014.2 | 1050.7 | 1078.1 | 1086.4 | 1071.4 | 1038.3 | 1000.1 | 971.1 | 971.1 |
| 62.5° | 912.2 | *919.7* | 945.4 | 982.7 | 1010.9 | 1023.3 | 1002.6 | 971.1 | 931.3 | 903.1 | 900.6 |
| 65° | 830.9 | *837.6* | 860.8 | 899.8 | 928.8 | 937.9 | 922.2 | 889.0 | 850.8 | 824.3 | 821.8 |
| 67.5° | 739.7 | *748.8* | 772.1 | 805.2 | 830.1 | 841.7 | 831.8 | 801.9 | 762.1 | 734.7 | 732.3 |
| 70° | 641.0 | *647.7* | 665.9 | 696.6 | 724.8 | 733.1 | 718.2 | 698.3 | 660.9 | 636.1 | 632.7 |
| 72.5° | 535.7 | *541.5* | 556.5 | 585.5 | 605.4 | 616.2 | 607.9 | 582.2 | 552.3 | 531.6 | 534.9 |
| 75° | 429.6 | *428.7* | 445.3 | 466.1 | 484.3 | 491.8 | 486.0 | 469.4 | 442.0 | 424.6 | 423.8 |
| 77.5° | 323.4 | *331.7* | 337.5 | 354.9 | 369.9 | 375.7 | 367.4 | 354.1 | 333.4 | 319.3 | 321.8 |
| 80° | 227.2 | *222.2* | 233.0 | 243.8 | 253.8 | 259.6 | 254.6 | 247.1 | 233.0 | 222.2 | 220.6 |
| 82.5° | 139.3 | *135.2* | 140.1 | 150.1 | 156.7 | 158.4 | 159.2 | 150.1 | 144.3 | 136.0 | 137.7 |
| 85° | 61.4 | *62.2* | 66.3 | 73.0 | 73.8 | 74.6 | 74.6 | 73.0 | 66.3 | 65.5 | 63.9 |
| 87.5° | 14.9 | *14.9* | 15.8 | 18.2 | 18.2 | 19.1 | 19.1 | 16.6 | 15.8 | 14.1 | 14.9 |
| 90° | 32.5 | *31.5* | 31.5 | 31.5 | 31.5 | 31.5 | 31.5 | 31.5 | 31.5 | 31.5 | 31.5 |
| 92.5° | 37.6 | *37.1* | 37.1 | 36.6 | 36.6 | 36.6 | 36.6 | 36.6 | 36.6 | 36.6 | 36.6 |
| 95° | 42.7 | *42.7* | 42.7 | 41.7 | 41.7 | 41.7 | 41.7 | 41.7 | 41.7 | 41.7 | 41.7 |
| 97.5° | 48.3 | *48.3* | 48.3 | 47.8 | 47.8 | 47.8 | 47.8 | 47.8 | 47.8 | 47.8 | 47.8 |
| 100° | 53.9 | *53.9* | 53.9 | 53.9 | 53.9 | 53.9 | 53.9 | 53.9 | 53.9 | 53.9 | 53.9 |
| 102.5° | 60.5 | *60.5* | 60.5 | 60.5 | 60.5 | 60.5 | 60.5 | 61.0 | 60.5 | 60.5 | 60.5 |
| 105° | 67.1 | *67.1* | 67.1 | 67.1 | 67.1 | 67.1 | 67.1 | 68.1 | 67.1 | 67.1 | 67.1 |
| 107.5° | 74.2 | *74.2* | 74.7 | 74.7 | 74.7 | 74.7 | 74.7 | 75.2 | 74.7 | 74.7 | 74.7 |
| 110° | 81.3 | *81.3* | 82.3 | 82.3 | 82.3 | 82.3 | 82.3 | 82.3 | 82.3 | 82.3 | 82.3 |

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Scaled Data Report

REPORT NUMBER: P821574
CATALOG NUMBER: TT-D2-750-12VDC-CQ-UPL

**CANDELA DISTRIBUTION (continued):**

| | 0° | 5° | 15° | 25° | 35° | 45° | 55° | 65° | 75° | 85° | 90° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 112.5° | 89.9 | *89.9* | 90.9 | 90.9 | 90.9 | 90.9 | 91.4 | 91.4 | 90.9 | 90.9 | 90.9 |
| 115° | 98.6 | *98.6* | 99.6 | 99.6 | 99.6 | 99.6 | 100.6 | 100.6 | 99.6 | 99.6 | 99.6 |
| 117.5° | 108.8 | *108.8* | 109.2 | 109.8 | 109.8 | 109.8 | 110.8 | 110.8 | 109.8 | 109.8 | 109.8 |
| 120° | 118.9 | *118.9* | 118.9 | 119.9 | 119.9 | 119.9 | 121.0 | 121.0 | 119.9 | 119.9 | 119.9 |
| 122.5° | 130.6 | *130.6* | 131.1 | 131.6 | 131.6 | 131.6 | 132.6 | 132.6 | 132.1 | 132.1 | 131.6 |
| 125° | 142.3 | *142.3* | 143.3 | 143.3 | 143.3 | 143.3 | 144.3 | 144.3 | 144.3 | 144.3 | 143.3 |
| 127.5° | 155.0 | *155.0* | 156.0 | 156.0 | 156.0 | 156.0 | 157.0 | 157.0 | 157.0 | 157.0 | 156.0 |
| 130° | 167.7 | *167.7* | 168.7 | 168.7 | 168.7 | 168.7 | 169.7 | 169.7 | 169.7 | 169.7 | 168.7 |
| 132.5° | 180.9 | *180.9* | 181.4 | 181.4 | 181.4 | 181.9 | 182.4 | 182.4 | 182.4 | 182.4 | 181.9 |
| 135° | 194.1 | *194.1* | 194.1 | 194.1 | 194.1 | 195.1 | 195.1 | 195.1 | 195.1 | 195.1 | 195.1 |
| 137.5° | 206.8 | *206.3* | 206.8 | 206.3 | 206.8 | 207.3 | 207.3 | 207.3 | 207.3 | 207.3 | 207.3 |
| 140° | 219.5 | *218.5* | 219.5 | 218.5 | 219.5 | 219.5 | 219.5 | 219.5 | 219.5 | 219.5 | 219.5 |
| 142.5° | 231.2 | *230.7* | 231.2 | 230.2 | 231.2 | 231.2 | 231.2 | 231.2 | 231.2 | 231.2 | 231.2 |
| 145° | 242.9 | *242.9* | 242.9 | 241.9 | 242.9 | 242.9 | 242.9 | 242.9 | 242.9 | 242.9 | 242.9 |
| 147.5° | 255.1 | *254.6* | 255.1 | 254.1 | 255.1 | 255.1 | 255.1 | 255.1 | 255.1 | 255.1 | 255.1 |
| 150° | 267.3 | *266.3* | 267.3 | 266.3 | 267.3 | 267.3 | 267.3 | 267.3 | 267.3 | 267.3 | 267.3 |
| 152.5° | 277.0 | *276.5* | 277.5 | 276.5 | 277.0 | 277.0 | 277.5 | 277.0 | 277.0 | 277.0 | 277.0 |
| 155° | 286.6 | *286.6* | 287.6 | 286.6 | 286.6 | 286.6 | 287.6 | 286.6 | 286.6 | 286.6 | 286.6 |
| 157.5° | 294.8 | *294.8* | 295.8 | 294.8 | 294.8 | 294.8 | 295.8 | 294.8 | 294.8 | 294.8 | 294.8 |
| 160° | 302.9 | *302.9* | 303.9 | 302.9 | 302.9 | 302.9 | 303.9 | 302.9 | 302.9 | 302.9 | 302.9 |
| 162.5° | 309.5 | *309.5* | 310.5 | 309.5 | 309.5 | 309.5 | 310.5 | 309.5 | 309.5 | 309.5 | 309.5 |
| 165° | 316.1 | *316.1* | 317.1 | 316.1 | 316.1 | 316.1 | 317.1 | 316.1 | 316.1 | 316.1 | 316.1 |
| 167.5° | 320.2 | *320.2* | 321.2 | 320.2 | 320.2 | 320.2 | 321.2 | 320.2 | 320.2 | 320.2 | 320.2 |
| 170° | 324.2 | *324.2* | 325.2 | 324.2 | 324.2 | 324.2 | 325.2 | 324.2 | 324.2 | 324.2 | 324.2 |
| 172.5° | 326.8 | *326.8* | 327.8 | 326.8 | 327.2 | 326.8 | 327.8 | 326.8 | 326.8 | 326.8 | 326.8 |
| 175° | 329.3 | *329.3* | 330.3 | 329.3 | 330.3 | 329.3 | 330.3 | 329.3 | 329.3 | 329.3 | 329.3 |
| 177.5° | 330.3 | *330.3* | 330.8 | 330.3 | 330.8 | 330.3 | 330.8 | 330.3 | 330.3 | 330.3 | 330.3 |
| 180° | 331.3 | *331.3* | 331.3 | 331.3 | 331.3 | 331.3 | 331.3 | 331.3 | 331.3 | 331.3 | 331.3 |

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

Streetworks

Report Number: SP1-2407-176-6

Test Date: 09/26/2024

Luminaire Tested: MEM2-HTN-VA-30-750-U-WQ

Data in this report applies to families of products including MEM2-HTN-VA-30-750-U-WQ

Report Generated By FNC07603 / LDUCLS01DT446
Version: v7.04

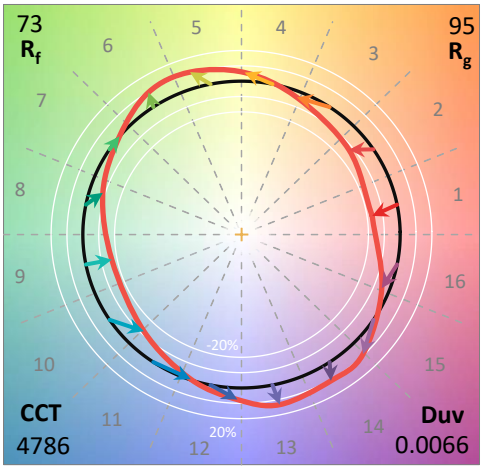
## Test Information

| | |
|---|---|
| Test Method: | LM-79-2019 |
| Report Number: | SP1-2407-176-6 |
| Test Lab: | COOPER LIGHTING SOLUTIONS |
| Photometer: | SP1 - 76IN SPHERE |
| Measurement Geometry: | 4π |
| Issue Date: | 09/27/2024 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS |
| Product Line: | Streetworks |
| Catalog Number: | **MEM2-HTN-VA-30-750-U-WQ** |
| Description: | EPIC MODERN VISUAL COMFORT 30W WAVESTREAM WIDE |

## Spectral Parameters

| | |
|---|---|
| CCT (K): | 4786 |
| CIE u': | 0.2093 |
| CIE v': | 0.4953 |
| Duv: | 0.0066 |
| CIE x: | 0.3533 |
| CIE y: | 0.3716 |
| CIE z: | 0.2751 |
| Peak Wavelength (nm): | 449 |
| Dominant Wavelength (nm): | 570 |
| Purity: | 17.53512 |
| Rf: | 73 |
| Rg: | 94.6 |

| | | | | | |
|---|---|---|---|---|---|
| CRI (Ra): | 70.9 | | | | |
| R1: | 67.8 | R9: | -29.8 | | |
| R2: | 75.1 | R10: | 40.9 | | |
| R3: | 80.6 | R11: | 67.4 | | |
| R4: | 71.6 | R12: | 35.3 | | |
| R5: | 67.8 | R13: | 68.5 | | |
| R6: | 65.4 | R14: | 89.0 | | |
| R7: | 82.0 | R15: | 60.9 | | |
| R8: | 57.0 | | | | |




## Test Conditions

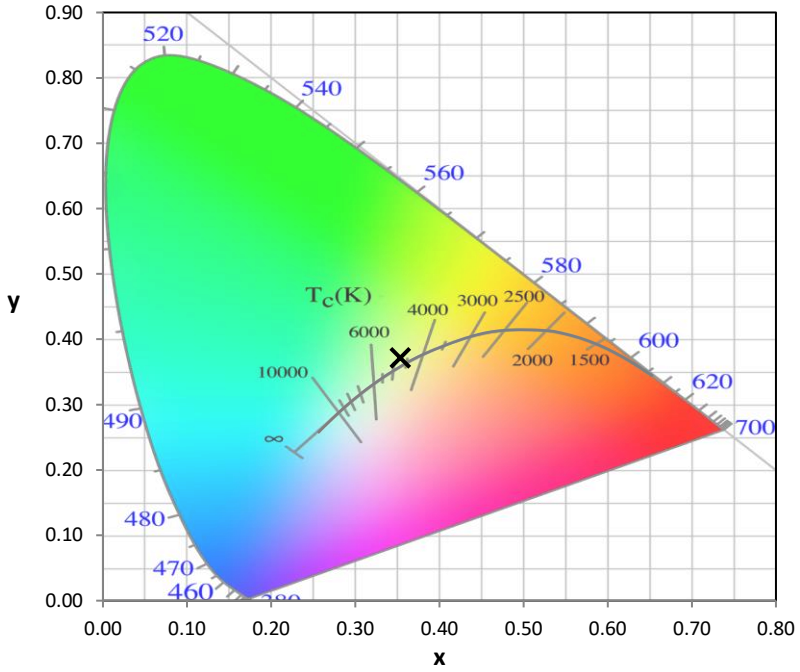
| | |
|---|---|
| Stabilization Time: | 45M |
| Operation Time: | 1H 45M |
| Sphere Temperature (°C): | 25.2 |

REPORT NUMBER: SP1-2407-176-6

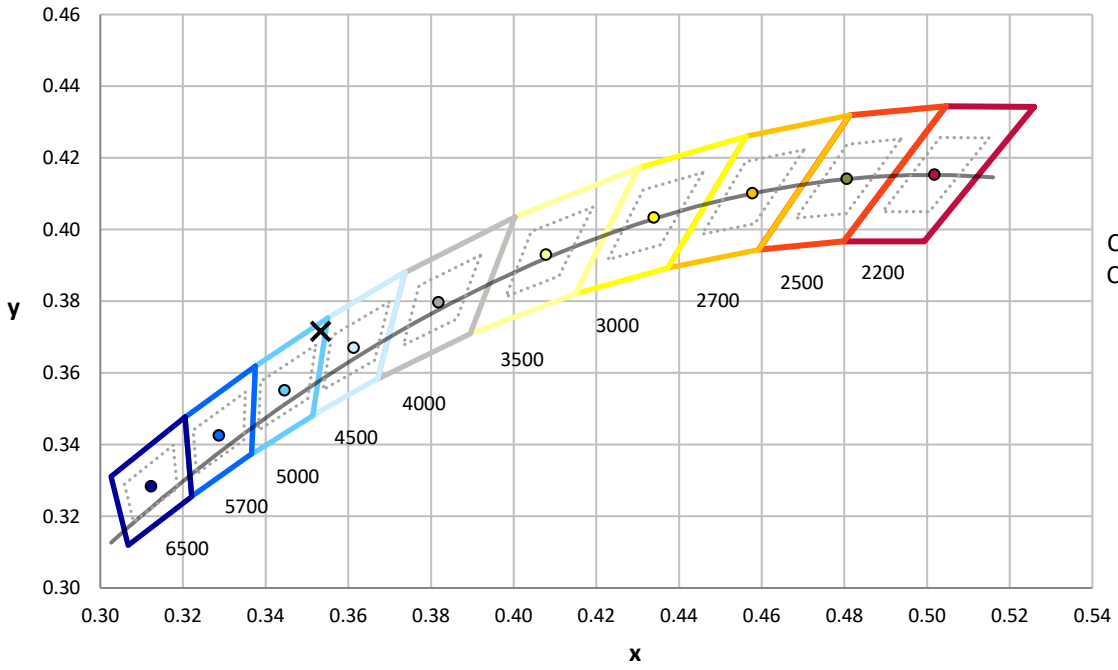
| Measurement and Test Equipment | | | |
|---|---|---|---|
| Instrument | Identification Number | Calibration Date | Calibration Due Date |
| Photometer | IN0058 | 6/18/2024 | 12/18/2024 |
| Power Meter | INXT2011004 | 2/8/2024 | 2/8/2025 |
| AC Power Source | IN0063 | 10/24/2023 | 10/24/2024 |
| DC Power Source | IN0208 | 10/24/2023 | 10/24/2024 |
| Sphere Thermometer | IN0085 | 10/24/2023 | 10/24/2024 |
| Room Thermometer | IN0046 | 10/24/2023 | 10/24/2024 |

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## CIE 1931 Chromaticity Diagram




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

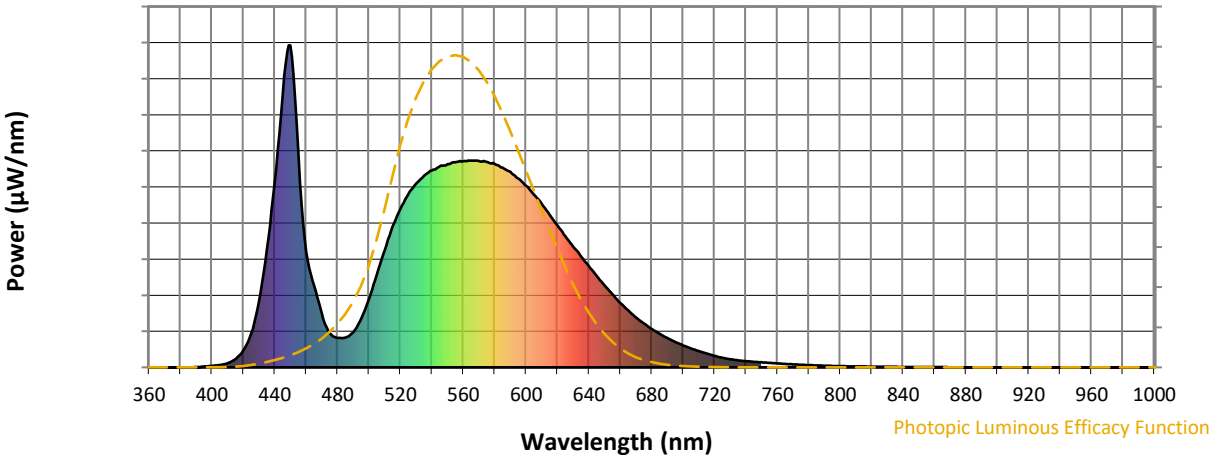



CCT = 4786K
CIE x = 0.3533
CIE y = 0.3716
Duv = 0.0066

Point lies inside the ANSI 5000K 7-step quadrangle

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## Photopic Flux vs. Wavelength

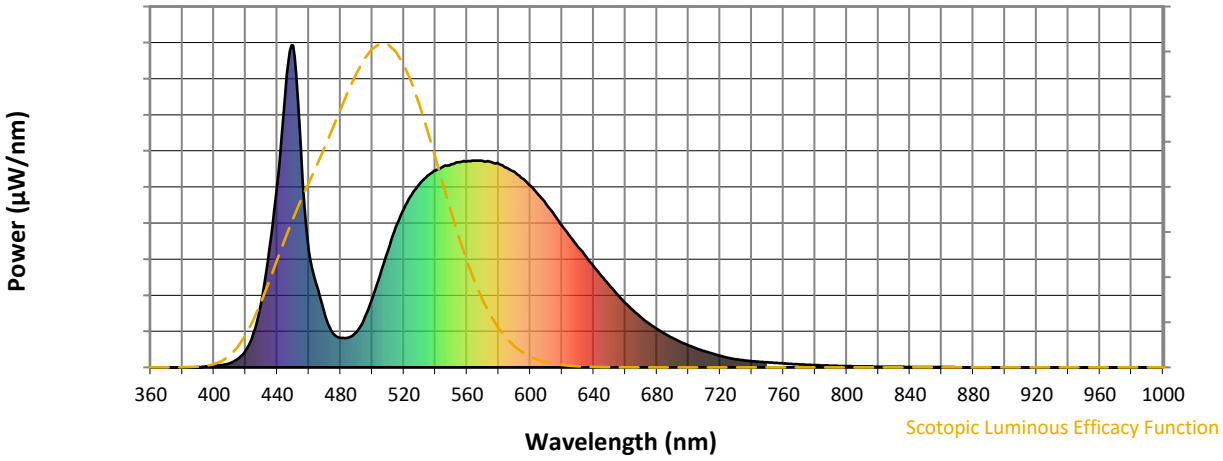



## Photopic Lumens: NR

| λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 360 | 0 | NR | 490 | 110 | NR | 620 | 440 | NR | 750 | 16 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 150 | NR | 625 | 407 | NR | 755 | 14 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 213 | NR | 630 | 375 | NR | 760 | 12 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 288 | NR | 635 | 345 | NR | 765 | 11 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 364 | NR | 640 | 314 | NR | 770 | 9 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 436 | NR | 645 | 283 | NR | 775 | 8 | NR | 905 | 0 | NR |
| 390 | 1 | NR | 520 | 492 | NR | 650 | 254 | NR | 780 | 7 | NR | 910 | 0 | NR |
| 395 | 3 | NR | 525 | 537 | NR | 655 | 227 | NR | 785 | 6 | NR | 915 | 0 | NR |
| 400 | 5 | NR | 530 | 570 | NR | 660 | 200 | NR | 790 | 5 | NR | 920 | 0 | NR |
| 405 | 7 | NR | 535 | 595 | NR | 665 | 177 | NR | 795 | 4 | NR | 925 | 0 | NR |
| 410 | 13 | NR | 540 | 611 | NR | 670 | 155 | NR | 800 | 4 | NR | 930 | 0 | NR |
| 415 | 25 | NR | 545 | 624 | NR | 675 | 136 | NR | 805 | 3 | NR | 935 | 0 | NR |
| 420 | 52 | NR | 550 | 631 | NR | 680 | 119 | NR | 810 | 3 | NR | 940 | 0 | NR |
| 425 | 106 | NR | 555 | 637 | NR | 685 | 104 | NR | 815 | 3 | NR | 945 | 0 | NR |
| 430 | 204 | NR | 560 | 640 | NR | 690 | 91 | NR | 820 | 2 | NR | 950 | 0 | NR |
| 435 | 369 | NR | 565 | 642 | NR | 695 | 79 | NR | 825 | 2 | NR | 955 | 0 | NR |
| 440 | 573 | NR | 570 | 641 | NR | 700 | 68 | NR | 830 | 2 | NR | 960 | 0 | NR |
| 445 | 844 | NR | 575 | 638 | NR | 705 | 59 | NR | 835 | 2 | NR | 965 | 0 | NR |
| 450 | 999 | NR | 580 | 632 | NR | 710 | 50 | NR | 840 | 1 | NR | 970 | 0 | NR |
| 455 | 668 | NR | 585 | 620 | NR | 715 | 43 | NR | 845 | 1 | NR | 975 | 0 | NR |
| 460 | 361 | NR | 590 | 607 | NR | 720 | 36 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 255 | NR | 595 | 586 | NR | 725 | 30 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 165 | NR | 600 | 564 | NR | 730 | 25 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 106 | NR | 605 | 537 | NR | 735 | 22 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 91 | NR | 610 | 507 | NR | 740 | 19 | NR | 870 | 0 | NR | 1000 | 0 | NR |
| 485 | 93 | NR | 615 | 474 | NR | 745 | 17 | NR | 875 | 0 | NR | | | |

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## Scotopic Flux vs. Wavelength

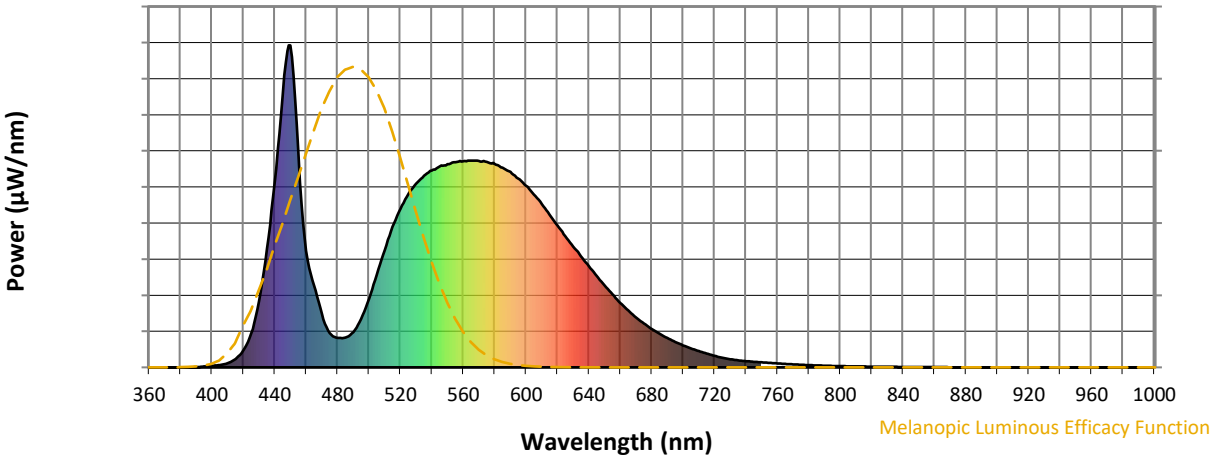



**Scotopic Lumens: NR** **S/P: 1.69**

| λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 360 | 0 | NR | 490 | 110 | NR | 620 | 440 | NR | 750 | 16 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 150 | NR | 625 | 407 | NR | 755 | 14 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 213 | NR | 630 | 375 | NR | 760 | 12 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 288 | NR | 635 | 345 | NR | 765 | 11 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 364 | NR | 640 | 314 | NR | 770 | 9 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 436 | NR | 645 | 283 | NR | 775 | 8 | NR | 905 | 0 | NR |
| 390 | 1 | NR | 520 | 492 | NR | 650 | 254 | NR | 780 | 7 | NR | 910 | 0 | NR |
| 395 | 3 | NR | 525 | 537 | NR | 655 | 227 | NR | 785 | 6 | NR | 915 | 0 | NR |
| 400 | 5 | NR | 530 | 570 | NR | 660 | 200 | NR | 790 | 5 | NR | 920 | 0 | NR |
| 405 | 7 | NR | 535 | 595 | NR | 665 | 177 | NR | 795 | 4 | NR | 925 | 0 | NR |
| 410 | 13 | NR | 540 | 611 | NR | 670 | 155 | NR | 800 | 4 | NR | 930 | 0 | NR |
| 415 | 25 | NR | 545 | 624 | NR | 675 | 136 | NR | 805 | 3 | NR | 935 | 0 | NR |
| 420 | 52 | NR | 550 | 631 | NR | 680 | 119 | NR | 810 | 3 | NR | 940 | 0 | NR |
| 425 | 106 | NR | 555 | 637 | NR | 685 | 104 | NR | 815 | 3 | NR | 945 | 0 | NR |
| 430 | 204 | NR | 560 | 640 | NR | 690 | 91 | NR | 820 | 2 | NR | 950 | 0 | NR |
| 435 | 369 | NR | 565 | 642 | NR | 695 | 79 | NR | 825 | 2 | NR | 955 | 0 | NR |
| 440 | 573 | NR | 570 | 641 | NR | 700 | 68 | NR | 830 | 2 | NR | 960 | 0 | NR |
| 445 | 844 | NR | 575 | 638 | NR | 705 | 59 | NR | 835 | 2 | NR | 965 | 0 | NR |
| 450 | 999 | NR | 580 | 632 | NR | 710 | 50 | NR | 840 | 1 | NR | 970 | 0 | NR |
| 455 | 668 | NR | 585 | 620 | NR | 715 | 43 | NR | 845 | 1 | NR | 975 | 0 | NR |
| 460 | 361 | NR | 590 | 607 | NR | 720 | 36 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 255 | NR | 595 | 586 | NR | 725 | 30 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 165 | NR | 600 | 564 | NR | 730 | 25 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 106 | NR | 605 | 537 | NR | 735 | 22 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 91 | NR | 610 | 507 | NR | 740 | 19 | NR | 870 | 0 | NR | 1000 | 0 | NR |
| 485 | 93 | NR | 615 | 474 | NR | 745 | 17 | NR | 875 | 0 | NR | | | |

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## Melanopic Flux vs. Wavelength




**Melanopic Lumens: NR** **M/P: 3.36**

| λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) | λ (nm) | Power W^/nm | Lumens (ϕ/nm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 360 | 0 | NR | 490 | 110 | NR | 620 | 440 | NR | 750 | 16 | NR | 880 | 0 | NR |
| 365 | 0 | NR | 495 | 150 | NR | 625 | 407 | NR | 755 | 14 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 213 | NR | 630 | 375 | NR | 760 | 12 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 288 | NR | 635 | 345 | NR | 765 | 11 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 364 | NR | 640 | 314 | NR | 770 | 9 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 436 | NR | 645 | 283 | NR | 775 | 8 | NR | 905 | 0 | NR |
| 390 | 1 | NR | 520 | 492 | NR | 650 | 254 | NR | 780 | 7 | NR | 910 | 0 | NR |
| 395 | 3 | NR | 525 | 537 | NR | 655 | 227 | NR | 785 | 6 | NR | 915 | 0 | NR |
| 400 | 5 | NR | 530 | 570 | NR | 660 | 200 | NR | 790 | 5 | NR | 920 | 0 | NR |
| 405 | 7 | NR | 535 | 595 | NR | 665 | 177 | NR | 795 | 4 | NR | 925 | 0 | NR |
| 410 | 13 | NR | 540 | 611 | NR | 670 | 155 | NR | 800 | 4 | NR | 930 | 0 | NR |
| 415 | 25 | NR | 545 | 624 | NR | 675 | 136 | NR | 805 | 3 | NR | 935 | 0 | NR |
| 420 | 52 | NR | 550 | 631 | NR | 680 | 119 | NR | 810 | 3 | NR | 940 | 0 | NR |
| 425 | 106 | NR | 555 | 637 | NR | 685 | 104 | NR | 815 | 3 | NR | 945 | 0 | NR |
| 430 | 204 | NR | 560 | 640 | NR | 690 | 91 | NR | 820 | 2 | NR | 950 | 0 | NR |
| 435 | 369 | NR | 565 | 642 | NR | 695 | 79 | NR | 825 | 2 | NR | 955 | 0 | NR |
| 440 | 573 | NR | 570 | 641 | NR | 700 | 68 | NR | 830 | 2 | NR | 960 | 0 | NR |
| 445 | 844 | NR | 575 | 638 | NR | 705 | 59 | NR | 835 | 2 | NR | 965 | 0 | NR |
| 450 | 999 | NR | 580 | 632 | NR | 710 | 50 | NR | 840 | 1 | NR | 970 | 0 | NR |
| 455 | 668 | NR | 585 | 620 | NR | 715 | 43 | NR | 845 | 1 | NR | 975 | 0 | NR |
| 460 | 361 | NR | 590 | 607 | NR | 720 | 36 | NR | 850 | 1 | NR | 980 | 0 | NR |
| 465 | 255 | NR | 595 | 586 | NR | 725 | 30 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 165 | NR | 600 | 564 | NR | 730 | 25 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 106 | NR | 605 | 537 | NR | 735 | 22 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 91 | NR | 610 | 507 | NR | 740 | 19 | NR | 870 | 0 | NR | 1000 | 0 | NR |
| 485 | 93 | NR | 615 | 474 | NR | 745 | 17 | NR | 875 | 0 | NR | | | |

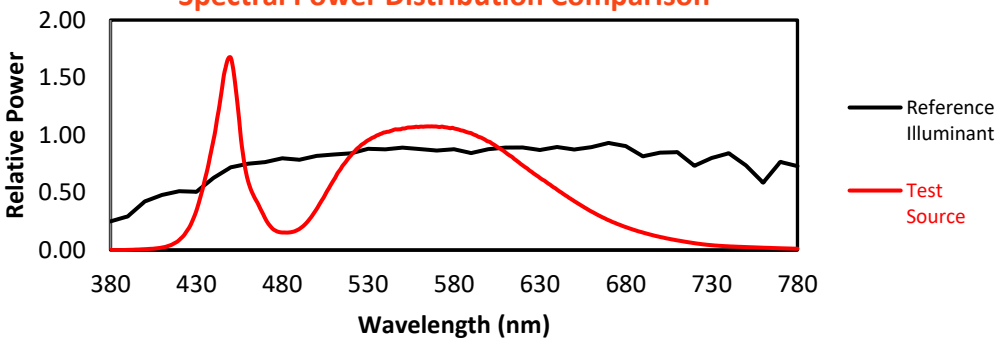
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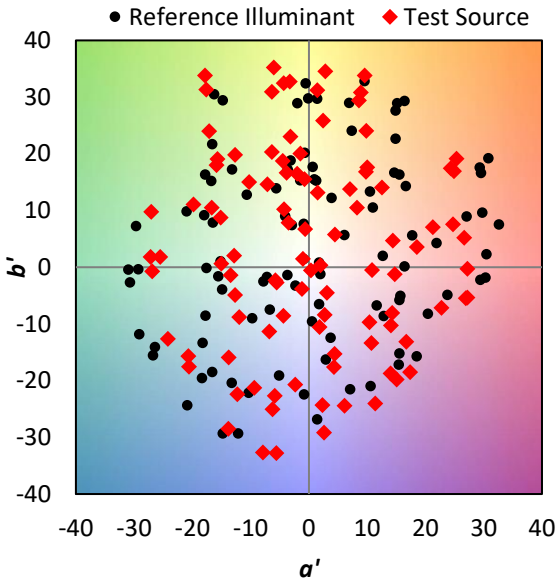
## Summary

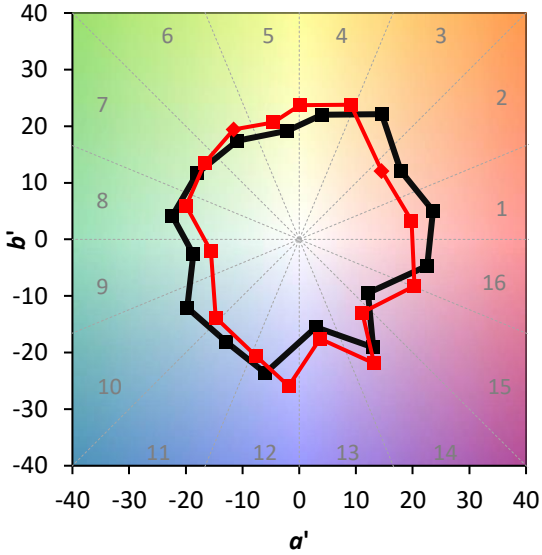
$R_f$ = 73
$R_g$ = 94.6
CIE $R_a$ = 70.9
$R_9$ = -29.8

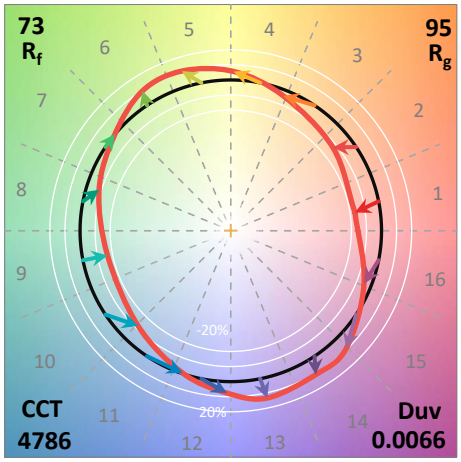
## Spectral Power Distribution Comparison

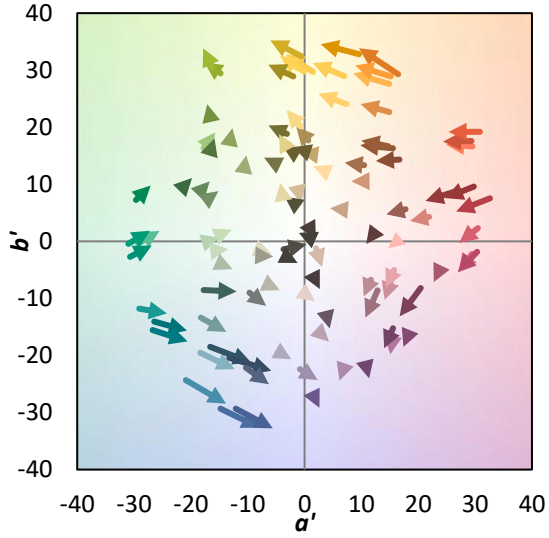



## Color Vector Graphics



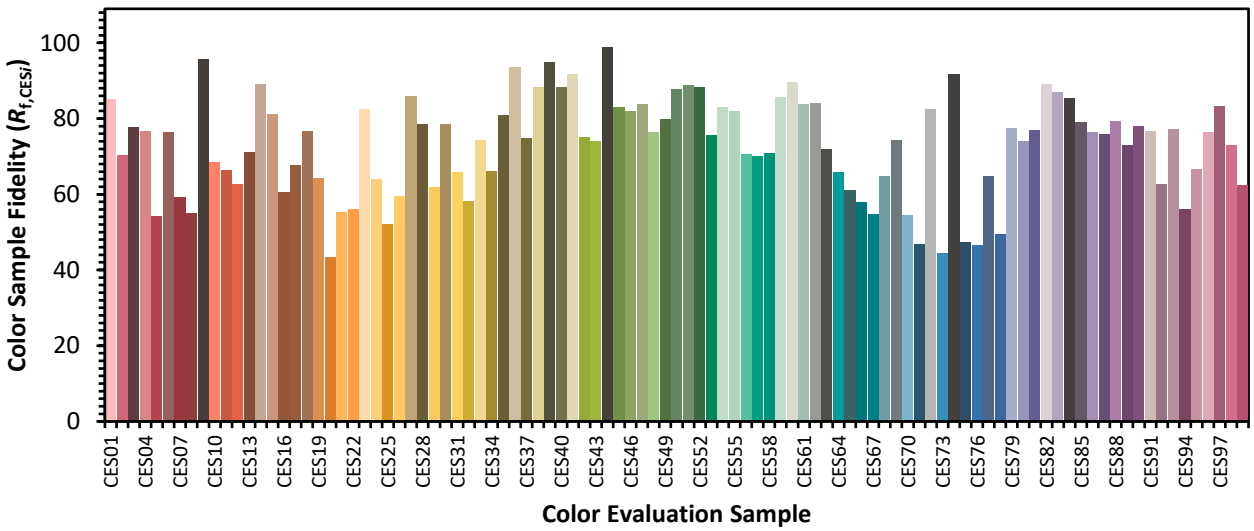



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## Individual Sample Fidelity Index ($R_{f,i}$)

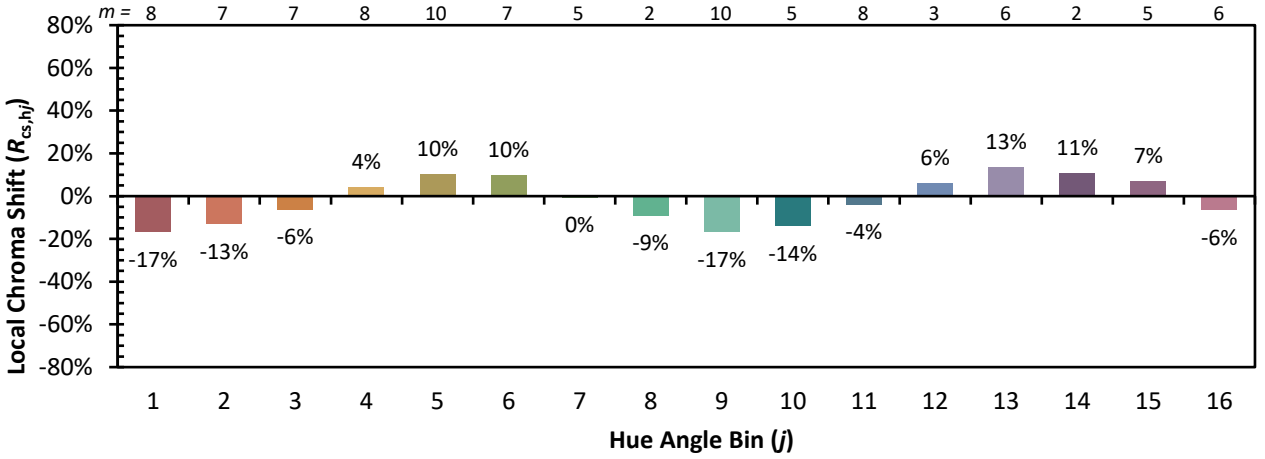
| | | | |
|---|---|---|---|
| CES01 = 85 | CES26 = 60 | CES51 = 89 | CES76 = 46 |
| CES02 = 59 | CES27 = 86 | CES52 = 88 | CES77 = 65 |
| CES03 = 30 | CES28 = 78 | CES53 = 76 | CES78 = 49 |
| CES04 = 69 | CES29 = 62 | CES54 = 83 | CES79 = 78 |
| CES05 = 46 | CES30 = 79 | CES55 = 82 | CES80 = 74 |
| CES06 = 50 | CES31 = 66 | CES56 = 71 | CES81 = 77 |
| CES07 = 39 | CES32 = 58 | CES57 = 70 | CES82 = 89 |
| CES08 = 38 | CES33 = 74 | CES58 = 71 | CES83 = 87 |
| CES09 = 29 | CES34 = 66 | CES59 = 86 | CES84 = 86 |
| CES10 = 72 | CES35 = 81 | CES60 = 90 | CES85 = 79 |
| CES11 = 56 | CES36 = 94 | CES61 = 84 | CES86 = 76 |
| CES12 = 61 | CES37 = 75 | CES62 = 84 | CES87 = 76 |
| CES13 = 41 | CES38 = 88 | CES63 = 72 | CES88 = 79 |
| CES14 = 74 | CES39 = 95 | CES64 = 66 | CES89 = 73 |
| CES15 = 70 | CES40 = 88 | CES65 = 61 | CES90 = 78 |
| CES16 = 46 | CES41 = 92 | CES66 = 58 | CES91 = 77 |
| CES17 = 49 | CES42 = 75 | CES67 = 55 | CES92 = 63 |
| CES18 = 55 | CES43 = 74 | CES68 = 65 | CES93 = 77 |
| CES19 = 71 | CES44 = 99 | CES69 = 74 | CES94 = 56 |
| CES20 = 64 | CES45 = 83 | CES70 = 55 | CES95 = 67 |
| CES21 = 85 | CES46 = 82 | CES71 = 47 | CES96 = 76 |
| CES22 = 77 | CES47 = 84 | CES72 = 82 | CES97 = 83 |
| CES23 = 91 | CES48 = 76 | CES73 = 44 | CES98 = 73 |
| CES24 = 90 | CES49 = 80 | CES74 = 92 | CES99 = 62 |
| CES25 = 71 | CES50 = 88 | CES75 = 47 | |

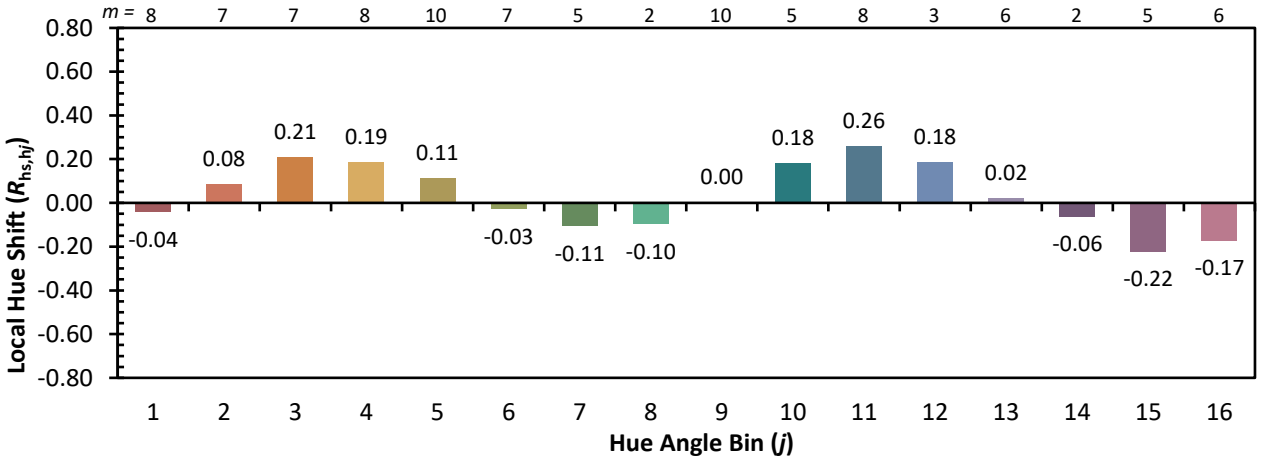


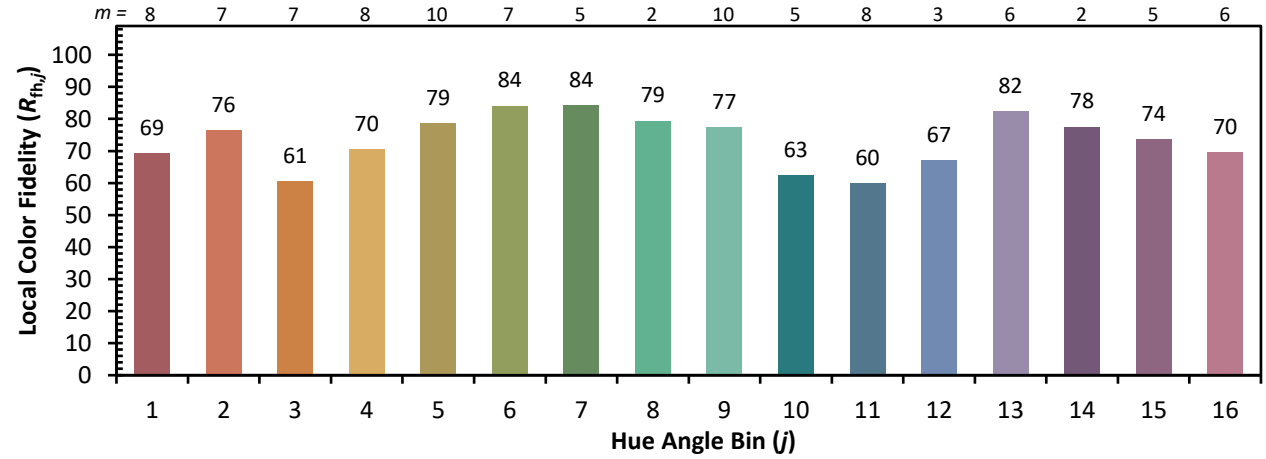
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## Color Rendition by Hue-Angle Bin



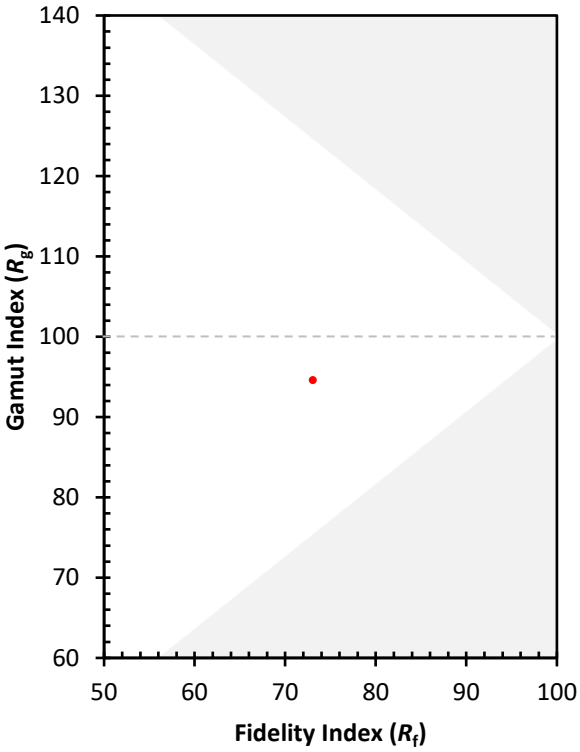



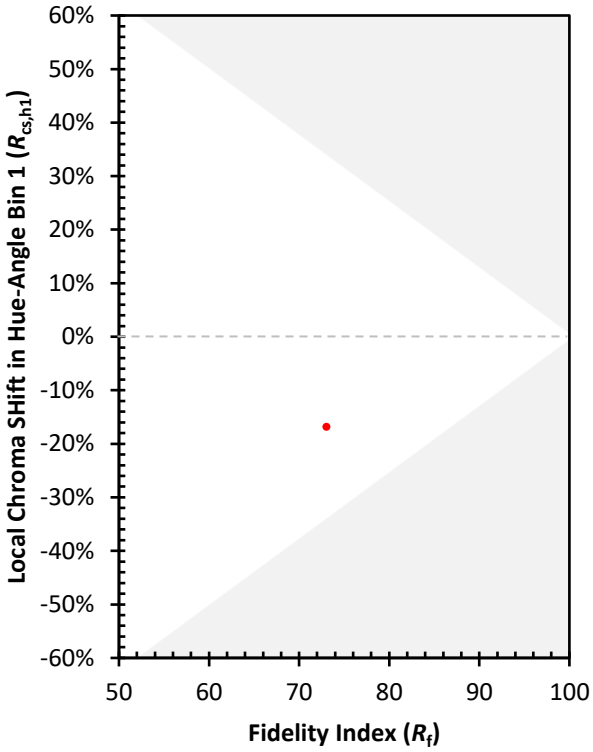



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### Measure Comparisons




(END OF REPORT)