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: P406326

Luminaire Tested: **TT-D2-735-U-CQ-UPL**

Issue Date: 7/23/2020

Report Generated By E9812814

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



**Test Information**

| | |
|---|---|
| Test Method: | LM-79-08 |
| Report Number: | P406326 |
| | 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-D2-735-U-CQ-UPL |
| Description: | TOPTIER LED PARKING GARAGE LUMINAIRE WITH UPLIGHT |
| | 3500K, 70 CRI LEDS AND CONCENTRATED DISTRIBUTION |
| Light Source: | - |
| Ballast/Driver: | ELECTRONIC DRIVER |

**Summary**

| | |
|---|---|
| Lumens per Lamp: | N/A |
| Luminaire Lumens: | 5760.7 lumens |
| Efficiency: | N/A |
| Efficacy: | 122.0 lumens/watt |
| Luminous Opening: | Vertical Cylinder (Dia: 1.12' x H: 0.1') |
| IES Classification: | Type V - Short - Non-Cutoff |
| BUG Rating: | B2 - U4 - G1 |

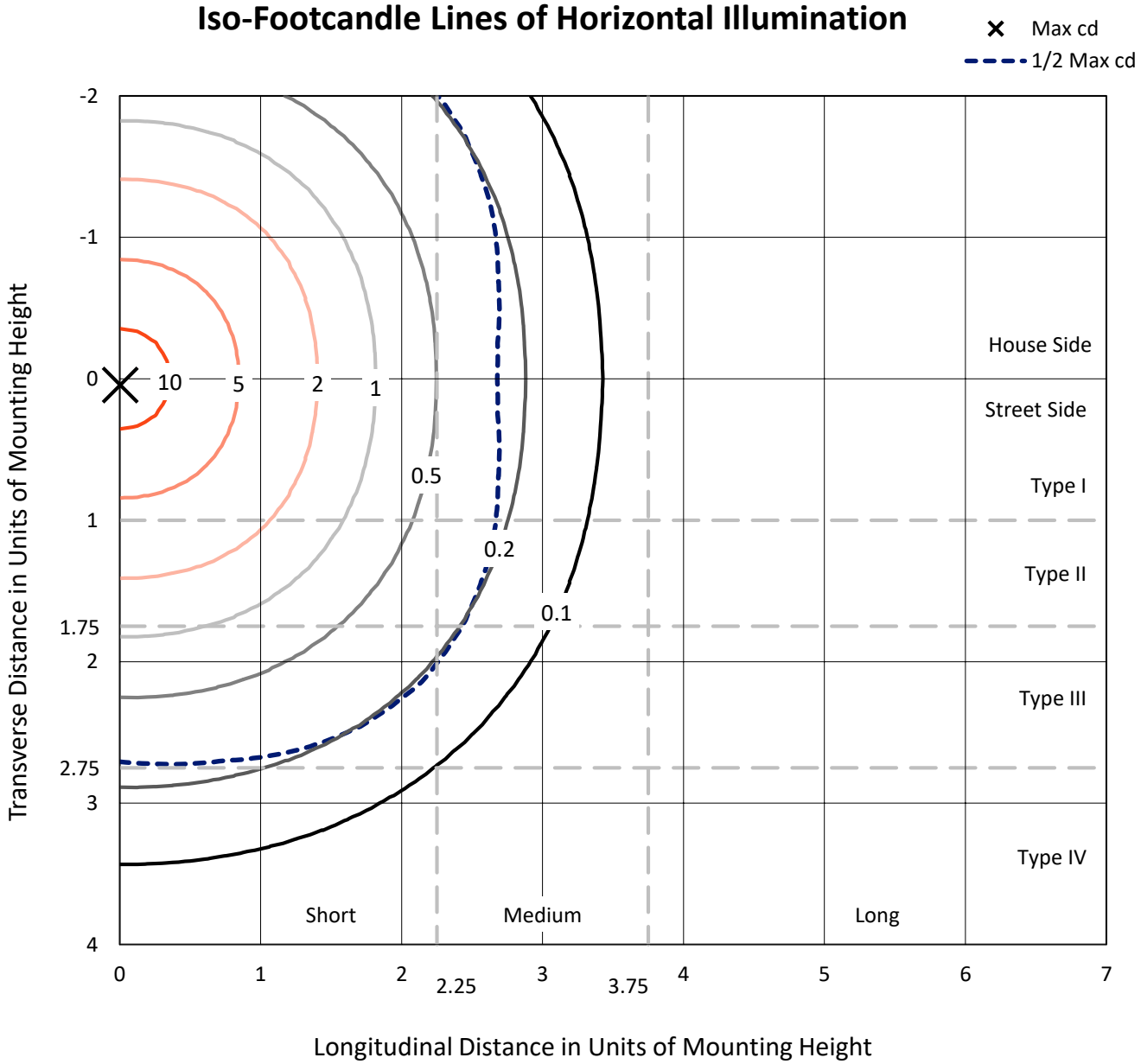
| | |
|---|---|
| Input Watts (W): | 47.2 |
| Input Voltage (V): | NR |
| Input Current (Ain): | NR |
| Voltage Rise (V): | NR |
| Power Factor: | NR |
| Total Harmonic Distortion (THDi): | NR |
| Frequency (hertz): | 60 |
| Stabilization Time: | NR |
| Operation Time: | NR |
| Ambient Temperature (°C): | NR |
| Test Distance: | 28.75 FT |

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

Scaled Data Report

REPORT NUMBER: P406326
CATALOG NUMBER: TT-D2-735-U-CQ-UPL

## Iso-Footcandle Lines of Horizontal Illumination



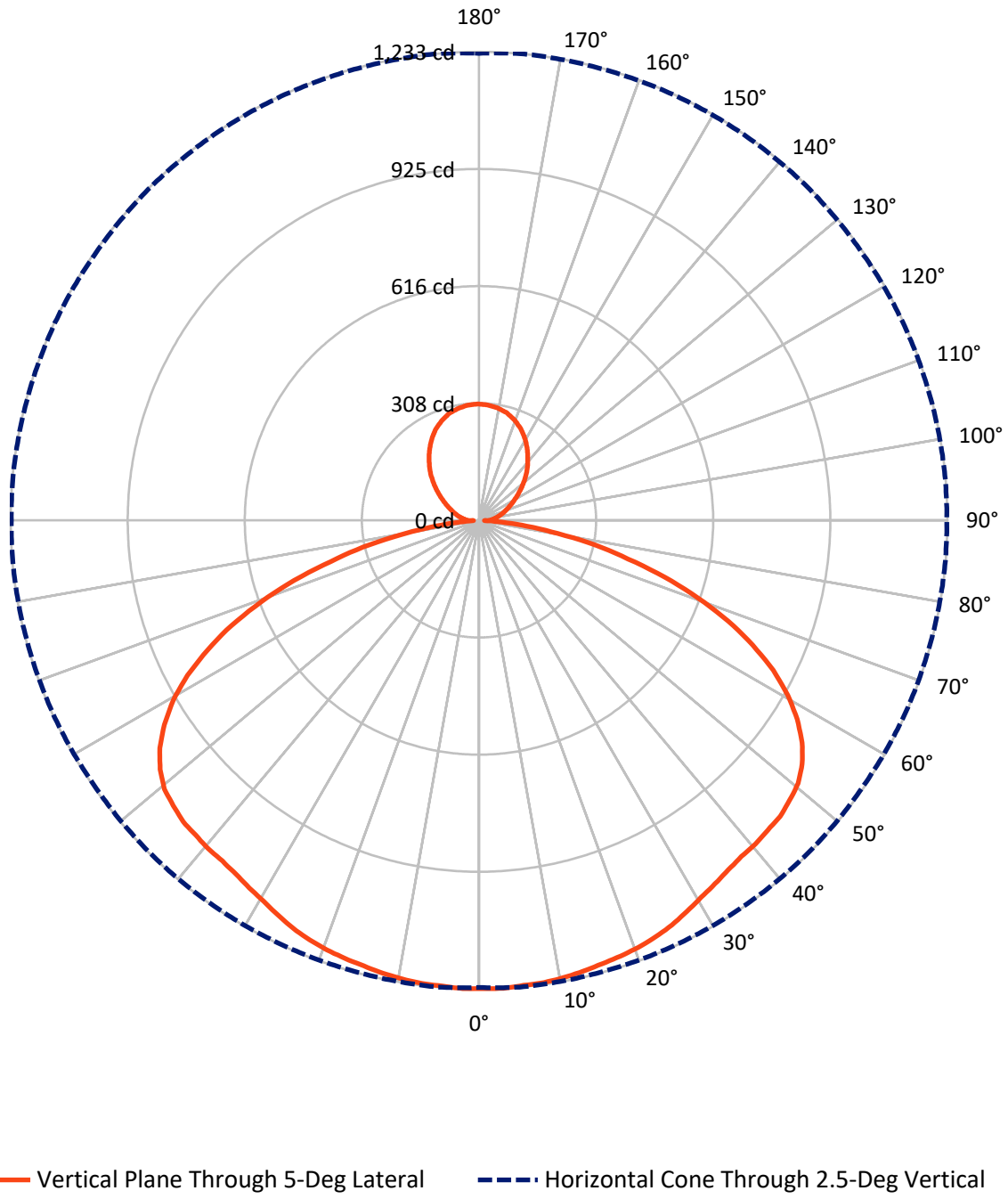

Based on 10 foot mounting height. Maximum calculated value = 12.3 fc
Type V - Short - Non-Cutoff

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



REPORT NUMBER: P406326
CATALOG NUMBER: TT-D2-735-U-CQ-UPL

## Luminous Intensity Polar Plot



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

Scaled Data Report

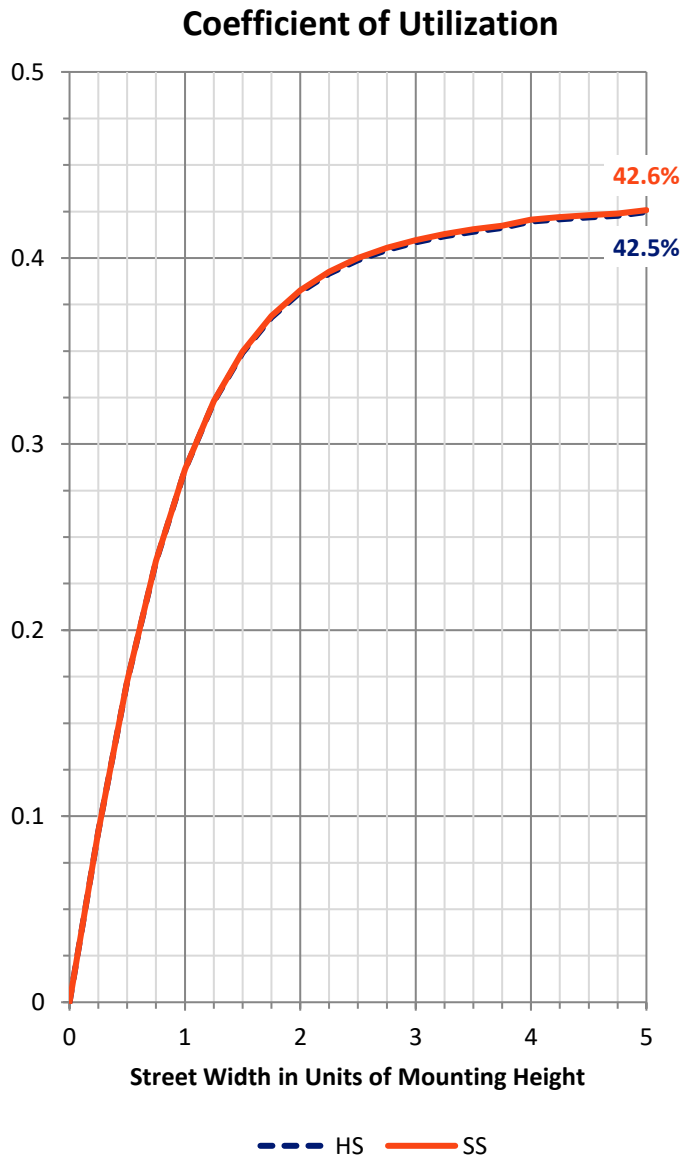
REPORT NUMBER: P406326
CATALOG NUMBER: TT-D2-735-U-CQ-UPL

**FLUX DISTRIBUTION:**

| | | Downward | Upward | Total |
|---|---|---|---|---|
| **House Side** | Lumens | 2464.5 | 415.9 | 2880.4 |
| | % Fixture | 42.8 | 7.2 | 50.0 |
| **Street Side** | Lumens | 2464.5 | 415.9 | 2880.4 |
| | % Fixture | 42.8 | 7.2 | 50.0 |
| **Total** | Lumens | 4929.0 | 831.7 | 5760.7 |
| | % Fixture | 85.6 | 14.4 | 100.0 |

**ZONAL LUMENS:**

| Zone | Lumens | % Fixture |
|---|---|---|
| 0°-10° | 117.2 | 2.0 |
| 10°-20° | 343.2 | 6.0 |
| 20°-30° | 545.8 | 9.5 |
| 30°-40° | 717.9 | 12.5 |
| 40°-50° | 878.7 | 15.3 |
| 50°-60° | 951.8 | 16.5 |
| 60°-70° | 818.8 | 14.2 |
| 70°-80° | 460.3 | 8.0 |
| 80°-90° | 95.3 | 1.7 |
| 90°-100° | 42.6 | 0.7 |
| 100°-110° | 66.0 | 1.1 |
| 110°-120° | 91.9 | 1.6 |
| 120°-130° | 119.0 | 2.1 |
| 130°-140° | 138.7 | 2.4 |
| 140°-150° | 140.5 | 2.4 |
| 150°-160° | 121.9 | 2.1 |
| 160°-170° | 82.2 | 1.4 |
| 170°-180° | 28.9 | 0.5 |
| 0°-90° | 4929.0 | 85.6 |
| 0°-180° | 5760.7 | 100.0 |



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

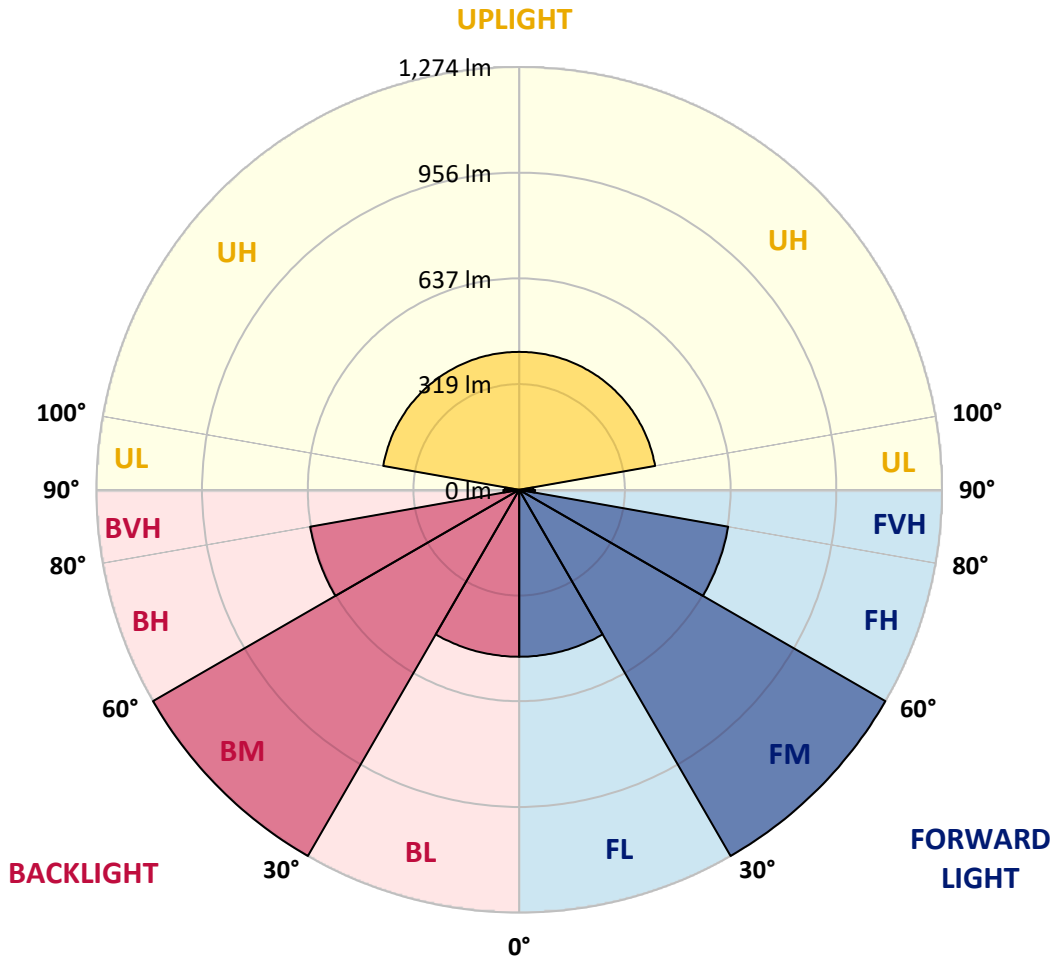
Scaled Data Report

REPORT NUMBER: P406326
CATALOG NUMBER: TT-D2-735-U-CQ-UPL

## LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:

| Zone | | Lumens | % Fixture | Zone Rating/Lumen Limit B | U | G |
|---|---|---|---|---|---|---|
| FL | (0°-30°) | 503.1 | 8.7 | | | |
| FM | (30°-60°) | 1274.2 | 22.1 | | | |
| FH | (60°-80°) | 639.6 | 11.1 | | | G0/660 |
| FVH | (80°-90°) | 47.6 | 0.8 | | | G1/100 |
| BL | (0°-30°) | 503.1 | 8.7 | B2/1000 | | |
| BM | (30°-60°) | 1274.2 | 22.1 | B2/2500 | | |
| BH | (60°-80°) | 639.6 | 11.1 | B2/1000 | | G0/660 |
| BVH | (80°-90°) | 47.6 | 0.8 | | | G1/100 |
| UL | (90°-100°) | 42.6 | 0.7 | | U2/50 | |
| UH | (100°-180°) | 415.9 | 7.2 | | U3/500 | |

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



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

Scaled Data Report

REPORT NUMBER: P406326
CATALOG NUMBER: TT-D2-735-U-CQ-UPL

**CANDELA DISTRIBUTION (FULL):**

| | 0° | 5° | 15° | 25° | 35° | 45° | 55° | 65° | 75° | 85° | 90° |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° | 1232.1 | 1232.1 | 1232.1 | 1232.1 | 1232.1 | 1232.1 | 1232.1 | 1232.1 | 1232.1 | 1232.1 | 1232.1 |
| 2.5° | 1229.0 | 1232.9 | 1231.3 | 1231.3 | 1231.3 | 1231.3 | 1229.7 | 1231.3 | 1231.3 | 1232.1 | 1231.3 |
| 5° | 1229.7 | 1229.0 | 1229.0 | 1229.7 | 1229.7 | 1230.5 | 1229.0 | 1229.7 | 1230.5 | 1230.5 | 1231.3 |
| 7.5° | 1227.4 | 1228.2 | 1226.6 | 1228.2 | 1226.6 | 1227.4 | 1227.4 | 1228.2 | 1227.4 | 1228.2 | 1229.7 |
| 10° | 1222.7 | 1223.5 | 1222.7 | 1222.7 | 1222.7 | 1224.3 | 1221.1 | 1223.5 | 1222.7 | 1223.5 | 1222.7 |
| 12.5° | 1214.1 | 1218.0 | 1216.4 | 1218.0 | 1218.0 | 1218.0 | 1215.6 | 1217.2 | 1218.0 | 1218.0 | 1218.0 |
| 15° | 1210.1 | 1210.9 | 1208.6 | 1211.7 | 1212.5 | 1213.3 | 1210.1 | 1211.7 | 1211.7 | 1212.5 | 1213.3 |
| 17.5° | 1201.5 | 1205.4 | 1204.7 | 1207.0 | 1206.2 | 1208.6 | 1207.8 | 1207.0 | 1206.2 | 1207.8 | 1206.2 |
| 20° | 1195.3 | 1199.2 | 1198.4 | 1200.7 | 1201.5 | 1203.9 | 1201.5 | 1201.5 | 1199.2 | 1200.0 | 1202.3 |
| 22.5° | 1189.0 | 1190.6 | 1190.6 | 1192.9 | 1192.9 | 1195.3 | 1192.9 | 1192.1 | 1192.1 | 1191.3 | 1193.7 |
| 25° | 1178.8 | 1179.6 | 1178.8 | 1181.1 | 1182.7 | 1184.3 | 1183.5 | 1181.9 | 1181.1 | 1181.1 | 1180.4 |
| 27.5° | 1162.3 | 1165.5 | 1167.0 | 1170.2 | 1171.0 | 1173.3 | 1170.2 | 1170.2 | 1168.6 | 1167.0 | 1167.8 |
| 30° | 1149.8 | 1151.4 | 1151.4 | 1158.4 | 1158.4 | 1162.3 | 1158.4 | 1157.6 | 1156.8 | 1156.1 | 1154.5 |
| 32.5° | 1138.0 | 1140.4 | 1142.7 | 1148.2 | 1152.1 | 1153.7 | 1151.4 | 1149.8 | 1145.9 | 1143.5 | 1142.7 |
| 35° | 1128.6 | 1129.4 | 1134.1 | 1142.0 | 1146.7 | 1150.6 | 1147.4 | 1143.5 | 1138.0 | 1134.1 | 1137.3 |
| 37.5° | 1121.6 | 1122.4 | 1129.4 | 1139.6 | 1148.2 | 1151.4 | 1146.7 | 1140.4 | 1131.8 | 1127.1 | 1125.5 |
| 40° | 1115.3 | 1120.0 | 1127.8 | 1142.0 | 1151.4 | 1156.1 | 1152.1 | 1143.5 | 1131.0 | 1121.6 | 1120.8 |
| 42.5° | 1112.2 | 1114.5 | 1126.3 | 1142.7 | 1156.1 | 1162.3 | 1156.8 | 1145.1 | 1129.4 | 1118.4 | 1117.7 |
| 45° | 1104.3 | 1111.4 | 1122.4 | 1143.5 | 1158.4 | 1166.3 | 1158.4 | 1143.5 | 1124.7 | 1112.2 | 1109.8 |
| 47.5° | 1098.1 | 1100.4 | 1117.7 | 1142.0 | 1160.0 | 1166.3 | 1158.4 | 1139.6 | 1116.1 | 1099.6 | 1098.1 |
| 50° | 1083.2 | 1088.7 | 1105.9 | 1131.8 | 1152.9 | 1159.2 | 1149.8 | 1124.7 | 1098.1 | 1080.0 | 1076.9 |
| 52.5° | 1060.4 | 1065.1 | 1085.5 | 1117.7 | 1138.0 | 1145.1 | 1131.0 | 1104.3 | 1073.0 | 1051.0 | 1051.0 |
| 55° | 1025.2 | 1032.2 | 1053.4 | 1086.3 | 1112.2 | 1118.4 | 1102.0 | 1073.8 | 1038.5 | 1016.6 | 1015.8 |
| 57.5° | 982.9 | 987.6 | 1010.3 | 1046.3 | 1071.4 | 1080.8 | 1064.4 | 1033.0 | 997.7 | 971.9 | 969.5 |
| 60° | 928.0 | 934.3 | 958.6 | 993.0 | 1018.9 | 1026.7 | 1012.6 | 981.3 | 945.2 | 917.8 | 917.8 |
| 62.5° | 862.2 | 869.2 | 893.5 | 928.8 | 955.4 | 967.2 | 947.6 | 917.8 | 880.2 | 853.5 | 851.2 |
| 65° | 785.3 | 791.6 | 813.6 | 850.4 | 877.8 | 886.4 | 871.6 | 840.2 | 804.2 | 779.1 | 776.7 |
| 67.5° | 699.1 | 707.7 | 729.7 | 761.0 | 784.6 | 795.5 | 786.1 | 757.9 | 720.3 | 694.4 | 692.1 |
| 70° | 605.9 | 612.1 | 629.4 | 658.4 | 685.0 | 692.9 | 678.7 | 659.9 | 624.7 | 601.2 | 598.0 |
| 72.5° | 506.3 | 511.8 | 525.9 | 553.3 | 572.2 | 582.3 | 574.5 | 550.2 | 522.0 | 502.4 | 505.5 |
| 75° | 406.0 | 405.2 | 420.9 | 440.5 | 457.7 | 464.8 | 459.3 | 443.6 | 417.8 | 401.3 | 400.5 |
| 77.5° | 305.7 | 313.5 | 319.0 | 335.5 | 349.6 | 355.0 | 347.2 | 334.7 | 315.1 | 301.8 | 304.1 |
| 80° | 214.8 | 210.1 | 220.2 | 230.4 | 239.8 | 245.3 | 240.6 | 233.6 | 220.2 | 210.1 | 208.5 |
| 82.5° | 131.7 | 127.8 | 132.5 | 141.9 | 148.1 | 149.7 | 150.5 | 141.9 | 136.4 | 128.5 | 130.1 |
| 85° | 58.0 | 58.8 | 62.7 | 69.0 | 69.8 | 70.5 | 70.5 | 69.0 | 62.7 | 61.9 | 60.4 |
| 87.5° | 14.1 | 14.1 | 14.9 | 17.2 | 17.2 | 18.0 | 18.0 | 15.7 | 14.9 | 13.3 | 14.1 |
| 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 |

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

Scaled Data Report

REPORT NUMBER: P406326
CATALOG NUMBER: TT-D2-735-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 |

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

MCGRAW EDISON

Report Number: SP1-2411-284-1

Test Date: 11/15/2024

Luminaire Tested: TTN-D0-735-U-WQ

Data in this report applies to families of products including TT-xx-735 and TTN-xx-735

Report Generated By FNC07603 / LDUCLS01DT446
Version: v7.04

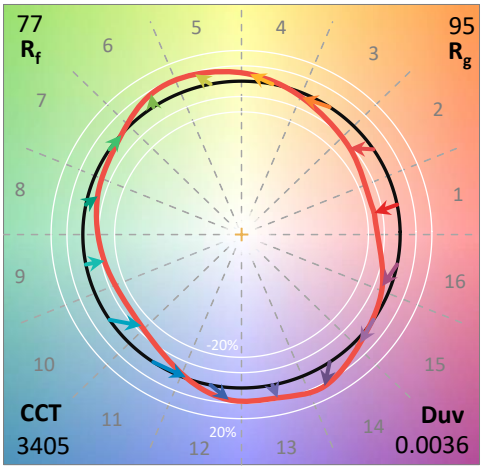
## Test Information

| | |
|---|---|
| Test Method: | LM-79-2019 |
| Report Number: | SP1-2411-284-1 |
| Test Lab: | COOPER LIGHTING SOLUTIONS |
| Photometer: | SP1 - 76IN SPHERE |
| Measurement Geometry: | 4π |
| Issue Date: | 11/15/2024 |
| Manufacturer: | COOPER LIGHTING SOLUTIONS |
| Product Line: | MCGRAW EDISON |
| Catalog Number: | **TTN-D0-735-U-WQ** |
| Description: | TOPTIER NANO LED PARKING GARAGE LUMINAIRE. 3500K, 70 CRI LEDS AND WIDE DISTRIBUTION |

## Spectral Parameters

| | |
|---|---|
| CCT (K): | 3405 |
| CIE u': | 0.2365 |
| CIE v': | 0.5180 |
| Duv: | 0.0036 |
| CIE x: | 0.4148 |
| CIE y: | 0.4038 |
| CIE z: | 0.1814 |
| Peak Wavelength (nm): | 596 |
| Dominant Wavelength (nm): | 579 |
| Purity: | 45.70672 |
| Rf: | 76.6 |
| Rg: | 95.4 |

| | |
|---|---|
| CRI (Ra): | 73.9 |
| R1: | 71.3 |
| R2: | 80.3 |
| R3: | 87.8 |
| R4: | 73.2 |
| R5: | 69.8 |
| R6: | 71.8 |
| R7: | 82.8 |
| R8: | 54.1 |
| R9: | -18.0 |
| R10: | 53.1 |
| R11: | 68.6 |
| R12: | 42.6 |
| R13: | 72.5 |
| R14: | 92.7 |
| R15: | 64.3 |




## Test Conditions

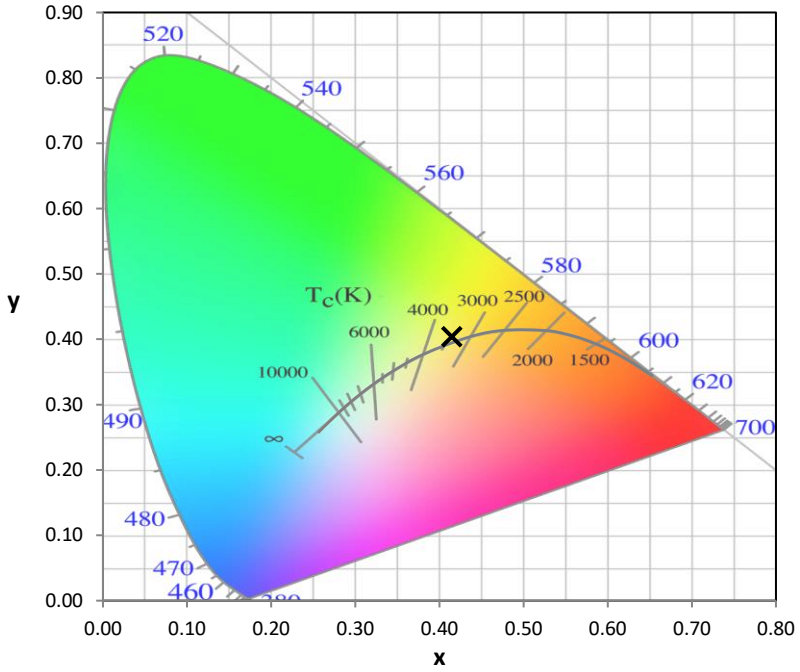
| | |
|---|---|
| Stabilization Time: | 38M |
| Operation Time: | 1H 38M |
| Sphere Temperature (°C): | 24.9 |

REPORT NUMBER: SP1-2411-284-1

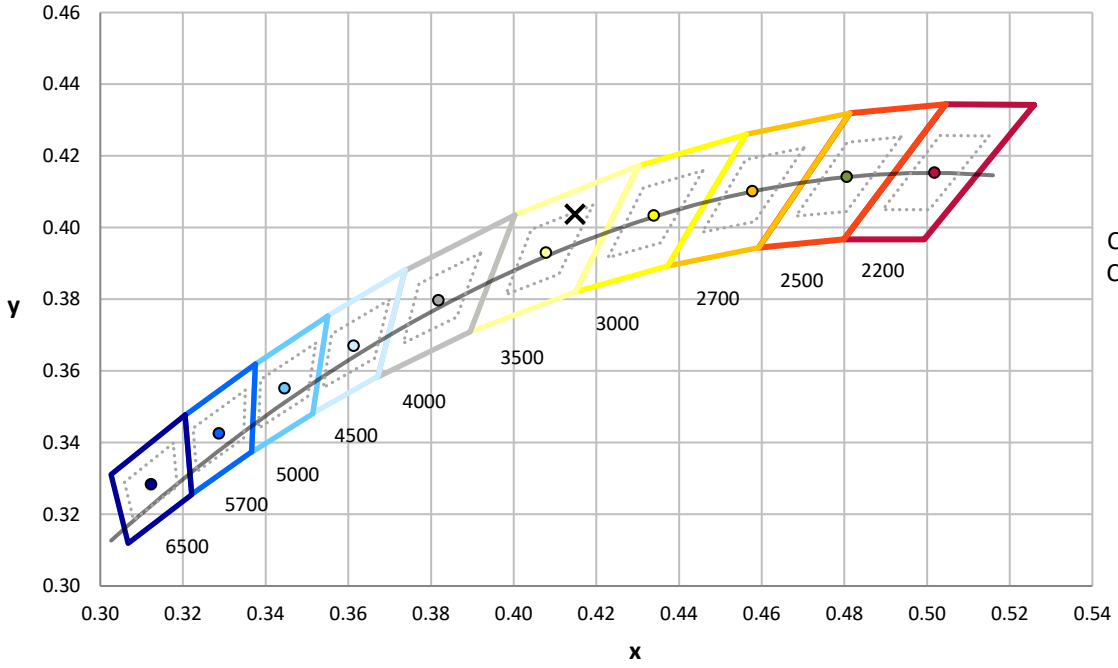
| Measurement and Test Equipment | | | |
|---|---|---|---|
| Instrument | Identification Number | Calibration Date | Calibration Due Date |
| Photometer | IN0058 | 6/18/2024 | 12/18/2024 |
| Power Meter | INXT2011004 | 2/8/2024 | 2/8/2025 |
| AC Power Source | IN0063 | 10/22/2024 | 10/22/2025 |
| DC Power Source | IN0208 | 10/22/2024 | 10/22/2025 |
| Sphere Thermometer | IN0085 | 10/22/2024 | 10/22/2025 |
| Room Thermometer | IN0046 | 10/22/2024 | 10/22/2025 |

REPORT NUMBER: SP1-2411-284-1

## CIE 1931 Chromaticity Diagram




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

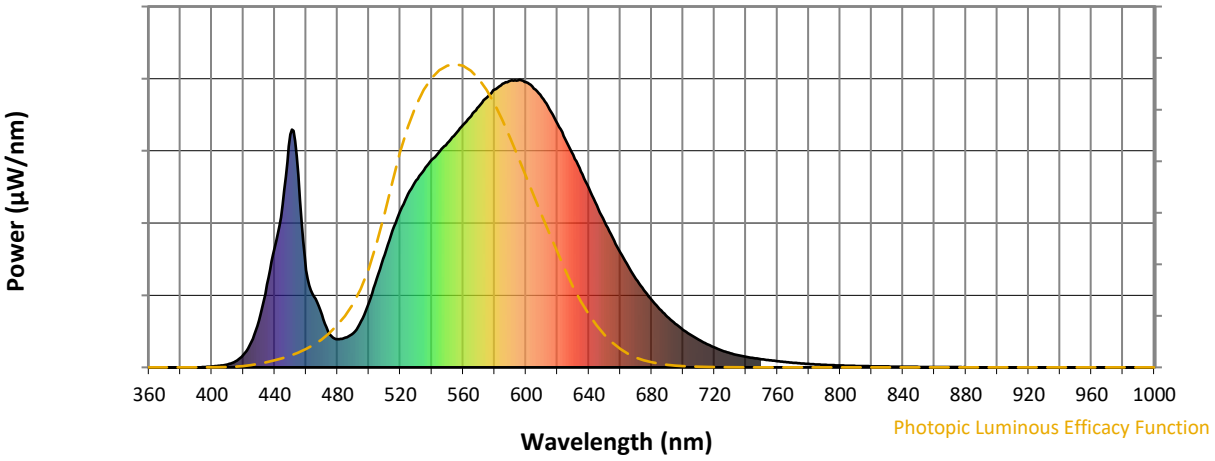



CCT = 3405K
CIE x = 0.4148
CIE y = 0.4038
Duv = 0.0036

Point lies inside the ANSI 3500K 4-step quadrangle

REPORT NUMBER: SP1-2411-284-1

## Photopic Flux vs. Wavelength

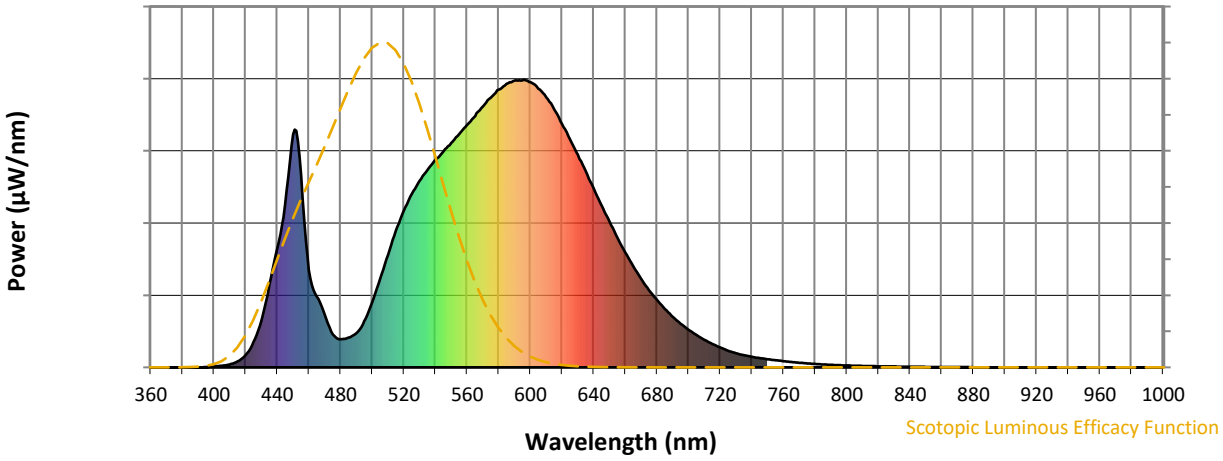



## Photopic Lumens: NR

| 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 | 119 | NR | 620 | 846 | NR | 750 | 28 | NR | 880 | 1 | NR |
| 365 | 0 | NR | 495 | 160 | NR | 625 | 793 | NR | 755 | 25 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 225 | NR | 630 | 739 | NR | 760 | 22 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 308 | NR | 635 | 681 | NR | 765 | 19 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 392 | NR | 640 | 623 | NR | 770 | 16 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 474 | NR | 645 | 563 | NR | 775 | 14 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 545 | NR | 650 | 506 | NR | 780 | 12 | NR | 910 | 0 | NR |
| 395 | 1 | NR | 525 | 603 | NR | 655 | 451 | NR | 785 | 10 | NR | 915 | 0 | NR |
| 400 | 3 | NR | 530 | 649 | NR | 660 | 399 | NR | 790 | 9 | NR | 920 | 0 | NR |
| 405 | 5 | NR | 535 | 687 | NR | 665 | 352 | NR | 795 | 8 | NR | 925 | 0 | NR |
| 410 | 11 | NR | 540 | 721 | NR | 670 | 307 | NR | 800 | 6 | NR | 930 | 0 | NR |
| 415 | 21 | NR | 545 | 751 | NR | 675 | 268 | NR | 805 | 6 | NR | 935 | 0 | NR |
| 420 | 43 | NR | 550 | 779 | NR | 680 | 234 | NR | 810 | 5 | NR | 940 | 0 | NR |
| 425 | 88 | NR | 555 | 811 | NR | 685 | 203 | NR | 815 | 4 | NR | 945 | 0 | NR |
| 430 | 163 | NR | 560 | 843 | NR | 690 | 176 | NR | 820 | 4 | NR | 950 | 0 | NR |
| 435 | 288 | NR | 565 | 873 | NR | 695 | 152 | NR | 825 | 3 | NR | 955 | 0 | NR |
| 440 | 416 | NR | 570 | 907 | NR | 700 | 131 | NR | 830 | 3 | NR | 960 | 0 | NR |
| 445 | 566 | NR | 575 | 938 | NR | 705 | 112 | NR | 835 | 3 | NR | 965 | 0 | NR |
| 450 | 810 | NR | 580 | 965 | NR | 710 | 96 | NR | 840 | 2 | NR | 970 | 0 | NR |
| 455 | 669 | NR | 585 | 986 | NR | 715 | 81 | NR | 845 | 2 | NR | 975 | 0 | NR |
| 460 | 338 | NR | 590 | 997 | NR | 720 | 69 | NR | 850 | 2 | NR | 980 | 0 | NR |
| 465 | 246 | NR | 595 | 997 | NR | 725 | 58 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 182 | NR | 600 | 991 | NR | 730 | 49 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 115 | NR | 605 | 968 | NR | 735 | 42 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 97 | NR | 610 | 939 | NR | 740 | 37 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 103 | NR | 615 | 896 | NR | 745 | 32 | NR | 875 | 1 | NR | | | |

REPORT NUMBER: SP1-2411-284-1

## Scotopic Flux vs. Wavelength

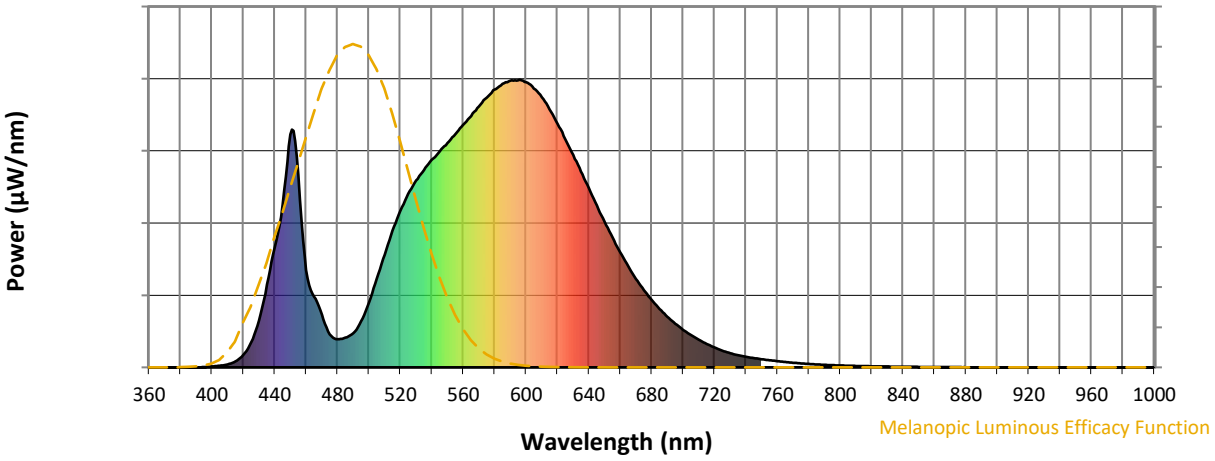



**Scotopic Lumens: NR** **S/P: 1.33**

| 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 | 119 | NR | 620 | 846 | NR | 750 | 28 | NR | 880 | 1 | NR |
| 365 | 0 | NR | 495 | 160 | NR | 625 | 793 | NR | 755 | 25 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 225 | NR | 630 | 739 | NR | 760 | 22 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 308 | NR | 635 | 681 | NR | 765 | 19 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 392 | NR | 640 | 623 | NR | 770 | 16 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 474 | NR | 645 | 563 | NR | 775 | 14 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 545 | NR | 650 | 506 | NR | 780 | 12 | NR | 910 | 0 | NR |
| 395 | 1 | NR | 525 | 603 | NR | 655 | 451 | NR | 785 | 10 | NR | 915 | 0 | NR |
| 400 | 3 | NR | 530 | 649 | NR | 660 | 399 | NR | 790 | 9 | NR | 920 | 0 | NR |
| 405 | 5 | NR | 535 | 687 | NR | 665 | 352 | NR | 795 | 8 | NR | 925 | 0 | NR |
| 410 | 11 | NR | 540 | 721 | NR | 670 | 307 | NR | 800 | 6 | NR | 930 | 0 | NR |
| 415 | 21 | NR | 545 | 751 | NR | 675 | 268 | NR | 805 | 6 | NR | 935 | 0 | NR |
| 420 | 43 | NR | 550 | 779 | NR | 680 | 234 | NR | 810 | 5 | NR | 940 | 0 | NR |
| 425 | 88 | NR | 555 | 811 | NR | 685 | 203 | NR | 815 | 4 | NR | 945 | 0 | NR |
| 430 | 163 | NR | 560 | 843 | NR | 690 | 176 | NR | 820 | 4 | NR | 950 | 0 | NR |
| 435 | 288 | NR | 565 | 873 | NR | 695 | 152 | NR | 825 | 3 | NR | 955 | 0 | NR |
| 440 | 416 | NR | 570 | 907 | NR | 700 | 131 | NR | 830 | 3 | NR | 960 | 0 | NR |
| 445 | 566 | NR | 575 | 938 | NR | 705 | 112 | NR | 835 | 3 | NR | 965 | 0 | NR |
| 450 | 810 | NR | 580 | 965 | NR | 710 | 96 | NR | 840 | 2 | NR | 970 | 0 | NR |
| 455 | 669 | NR | 585 | 986 | NR | 715 | 81 | NR | 845 | 2 | NR | 975 | 0 | NR |
| 460 | 338 | NR | 590 | 997 | NR | 720 | 69 | NR | 850 | 2 | NR | 980 | 0 | NR |
| 465 | 246 | NR | 595 | 997 | NR | 725 | 58 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 182 | NR | 600 | 991 | NR | 730 | 49 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 115 | NR | 605 | 968 | NR | 735 | 42 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 97 | NR | 610 | 939 | NR | 740 | 37 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 103 | NR | 615 | 896 | NR | 745 | 32 | NR | 875 | 1 | NR | | | |

REPORT NUMBER: SP1-2411-284-1

## Melanopic Flux vs. Wavelength




**Melanopic Lumens: NR** **M/P: 2.47**

| 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 | 119 | NR | 620 | 846 | NR | 750 | 28 | NR | 880 | 1 | NR |
| 365 | 0 | NR | 495 | 160 | NR | 625 | 793 | NR | 755 | 25 | NR | 885 | 0 | NR |
| 370 | 0 | NR | 500 | 225 | NR | 630 | 739 | NR | 760 | 22 | NR | 890 | 0 | NR |
| 375 | 0 | NR | 505 | 308 | NR | 635 | 681 | NR | 765 | 19 | NR | 895 | 0 | NR |
| 380 | 0 | NR | 510 | 392 | NR | 640 | 623 | NR | 770 | 16 | NR | 900 | 0 | NR |
| 385 | 0 | NR | 515 | 474 | NR | 645 | 563 | NR | 775 | 14 | NR | 905 | 0 | NR |
| 390 | 0 | NR | 520 | 545 | NR | 650 | 506 | NR | 780 | 12 | NR | 910 | 0 | NR |
| 395 | 1 | NR | 525 | 603 | NR | 655 | 451 | NR | 785 | 10 | NR | 915 | 0 | NR |
| 400 | 3 | NR | 530 | 649 | NR | 660 | 399 | NR | 790 | 9 | NR | 920 | 0 | NR |
| 405 | 5 | NR | 535 | 687 | NR | 665 | 352 | NR | 795 | 8 | NR | 925 | 0 | NR |
| 410 | 11 | NR | 540 | 721 | NR | 670 | 307 | NR | 800 | 6 | NR | 930 | 0 | NR |
| 415 | 21 | NR | 545 | 751 | NR | 675 | 268 | NR | 805 | 6 | NR | 935 | 0 | NR |
| 420 | 43 | NR | 550 | 779 | NR | 680 | 234 | NR | 810 | 5 | NR | 940 | 0 | NR |
| 425 | 88 | NR | 555 | 811 | NR | 685 | 203 | NR | 815 | 4 | NR | 945 | 0 | NR |
| 430 | 163 | NR | 560 | 843 | NR | 690 | 176 | NR | 820 | 4 | NR | 950 | 0 | NR |
| 435 | 288 | NR | 565 | 873 | NR | 695 | 152 | NR | 825 | 3 | NR | 955 | 0 | NR |
| 440 | 416 | NR | 570 | 907 | NR | 700 | 131 | NR | 830 | 3 | NR | 960 | 0 | NR |
| 445 | 566 | NR | 575 | 938 | NR | 705 | 112 | NR | 835 | 3 | NR | 965 | 0 | NR |
| 450 | 810 | NR | 580 | 965 | NR | 710 | 96 | NR | 840 | 2 | NR | 970 | 0 | NR |
| 455 | 669 | NR | 585 | 986 | NR | 715 | 81 | NR | 845 | 2 | NR | 975 | 0 | NR |
| 460 | 338 | NR | 590 | 997 | NR | 720 | 69 | NR | 850 | 2 | NR | 980 | 0 | NR |
| 465 | 246 | NR | 595 | 997 | NR | 725 | 58 | NR | 855 | 1 | NR | 985 | 0 | NR |
| 470 | 182 | NR | 600 | 991 | NR | 730 | 49 | NR | 860 | 1 | NR | 990 | 0 | NR |
| 475 | 115 | NR | 605 | 968 | NR | 735 | 42 | NR | 865 | 1 | NR | 995 | 0 | NR |
| 480 | 97 | NR | 610 | 939 | NR | 740 | 37 | NR | 870 | 1 | NR | 1000 | 0 | NR |
| 485 | 103 | NR | 615 | 896 | NR | 745 | 32 | NR | 875 | 1 | NR | | | |

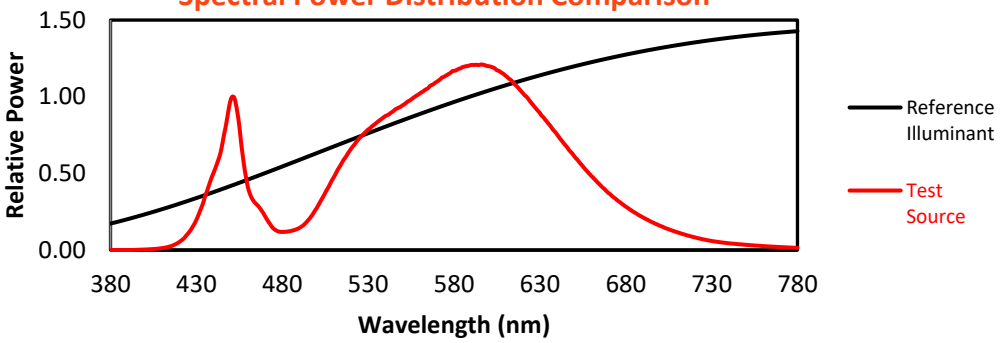
REPORT NUMBER: SP1-2411-284-1

# TM-30-18

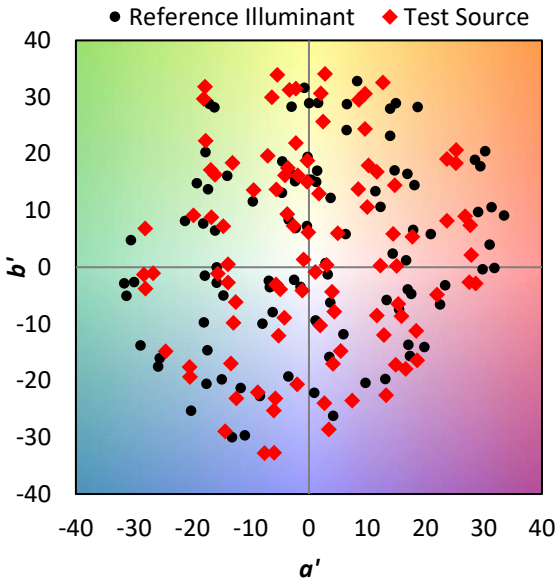
## Summary

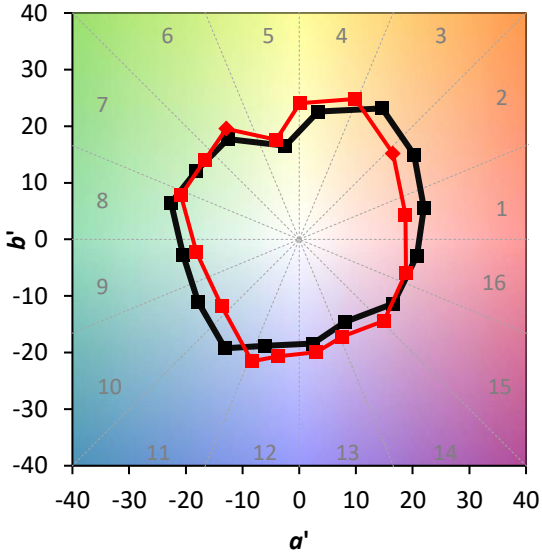
$R_f$ = 76.6
$R_g$ = 95.4
CIE $R_a$ = 73.9
$R_9$ = -18.0

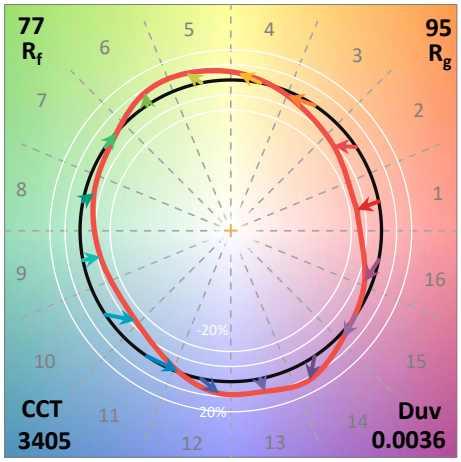
## Spectral Power Distribution Comparison

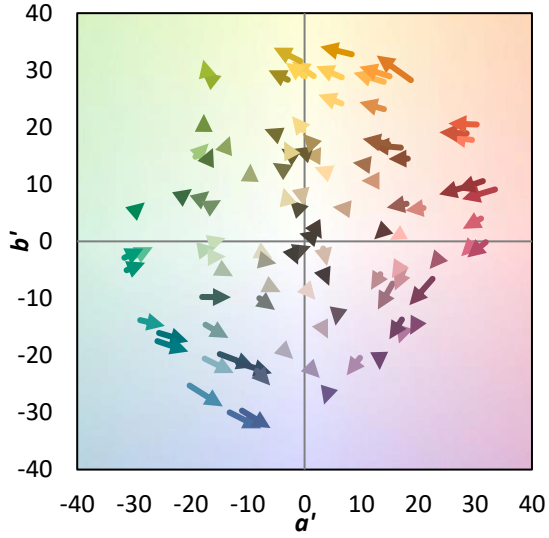



## Color Vector Graphics



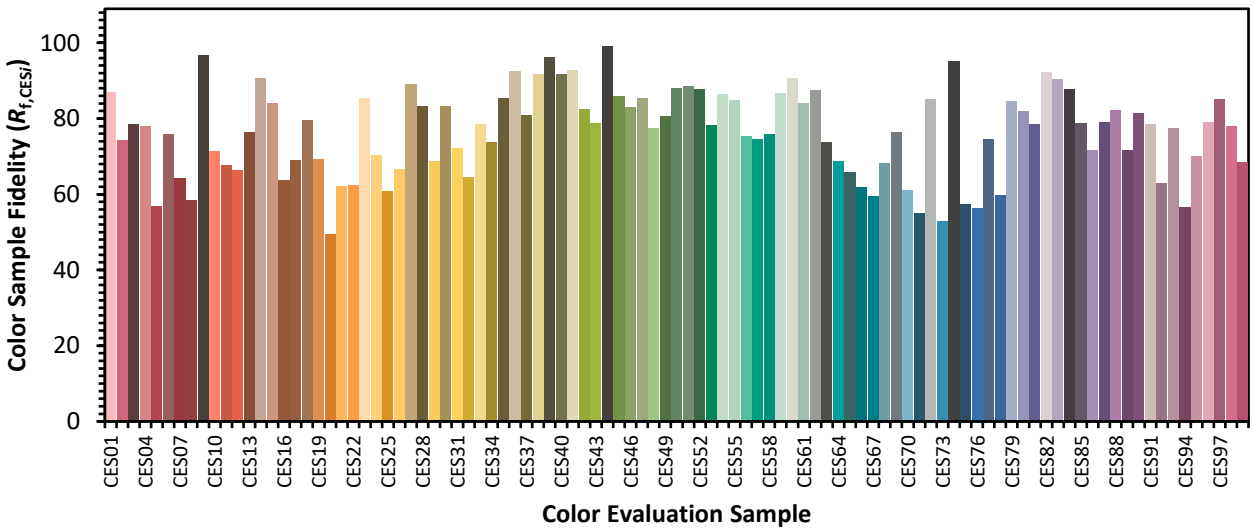



REPORT NUMBER: SP1-2411-284-1

# TM-30-18

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

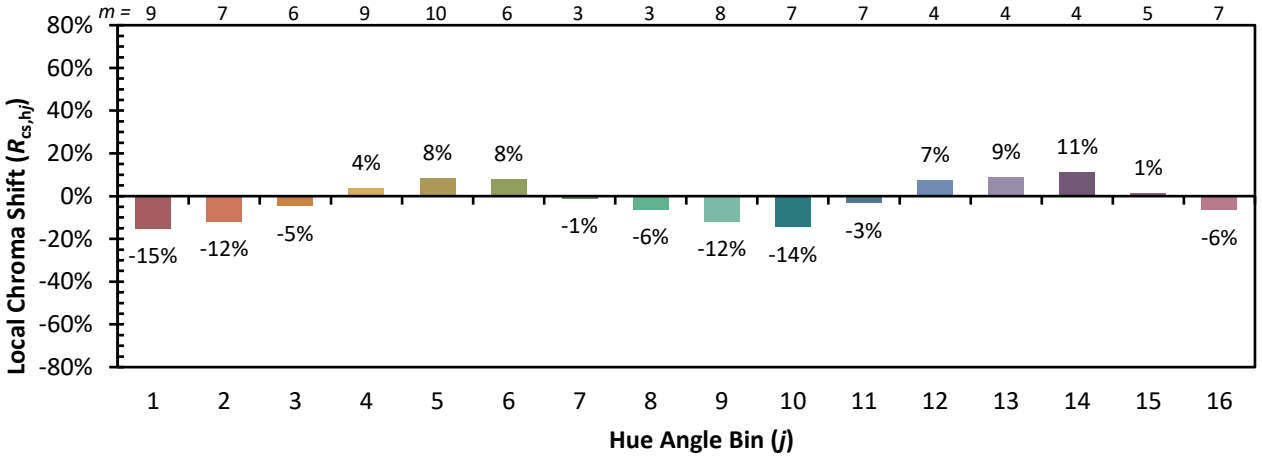
| | | | |
|---|---|---|---|
| CES01 = 86 | CES26 = 67 | CES51 = 88 | CES76 = 56 |
| CES02 = 62 | CES27 = 89 | CES52 = 88 | CES77 = 75 |
| CES03 = 31 | CES28 = 83 | CES53 = 78 | CES78 = 60 |
| CES04 = 70 | CES29 = 69 | CES54 = 86 | CES79 = 85 |
| CES05 = 48 | CES30 = 83 | CES55 = 85 | CES80 = 82 |
| CES06 = 51 | CES31 = 72 | CES56 = 75 | CES81 = 78 |
| CES07 = 41 | CES32 = 65 | CES57 = 75 | CES82 = 92 |
| CES08 = 40 | CES33 = 78 | CES58 = 76 | CES83 = 90 |
| CES09 = 29 | CES34 = 74 | CES59 = 87 | CES84 = 88 |
| CES10 = 75 | CES35 = 86 | CES60 = 91 | CES85 = 79 |
| CES11 = 58 | CES36 = 93 | CES61 = 84 | CES86 = 72 |
| CES12 = 64 | CES37 = 81 | CES62 = 88 | CES87 = 79 |
| CES13 = 43 | CES38 = 92 | CES63 = 74 | CES88 = 82 |
| CES14 = 74 | CES39 = 96 | CES64 = 69 | CES89 = 72 |
| CES15 = 71 | CES40 = 92 | CES65 = 66 | CES90 = 82 |
| CES16 = 47 | CES41 = 93 | CES66 = 62 | CES91 = 79 |
| CES17 = 50 | CES42 = 83 | CES67 = 60 | CES92 = 63 |
| CES18 = 56 | CES43 = 79 | CES68 = 68 | CES93 = 77 |
| CES19 = 72 | CES44 = 99 | CES69 = 76 | CES94 = 56 |
| CES20 = 65 | CES45 = 86 | CES70 = 61 | CES95 = 70 |
| CES21 = 86 | CES46 = 83 | CES71 = 55 | CES96 = 79 |
| CES22 = 79 | CES47 = 85 | CES72 = 85 | CES97 = 85 |
| CES23 = 92 | CES48 = 78 | CES73 = 53 | CES98 = 78 |
| CES24 = 91 | CES49 = 81 | CES74 = 95 | CES99 = 68 |
| CES25 = 72 | CES50 = 88 | CES75 = 57 | |

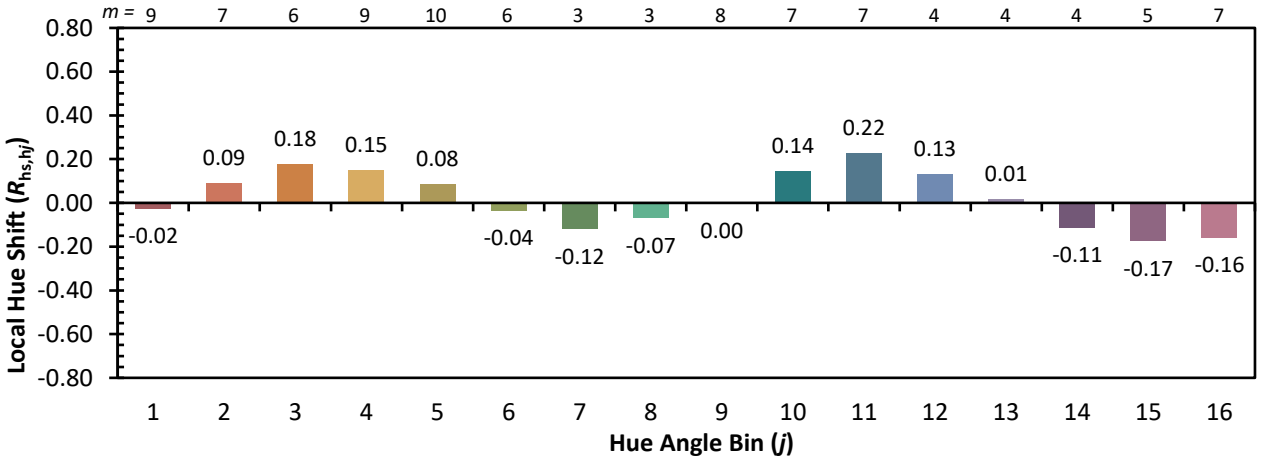


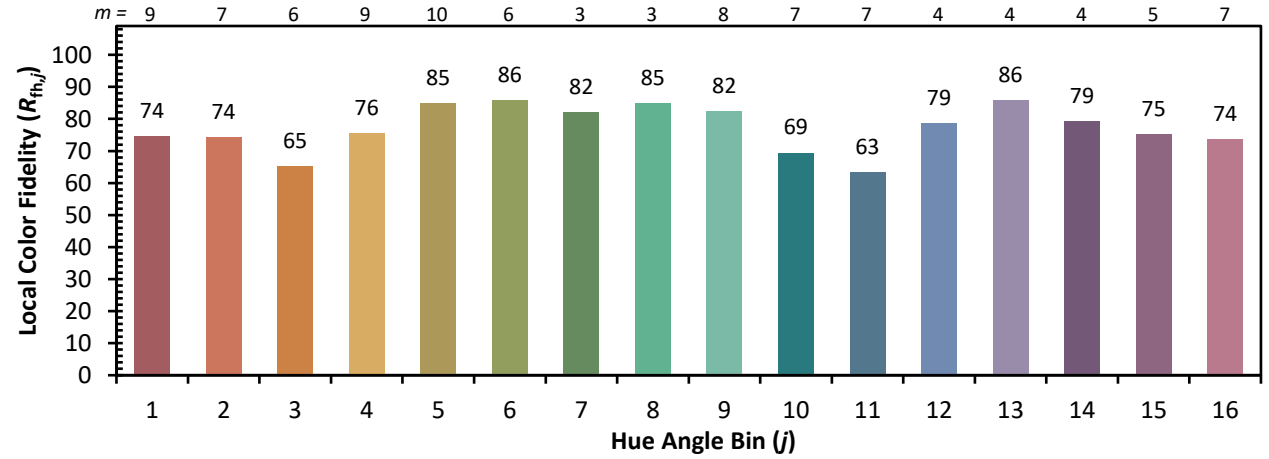
REPORT NUMBER: SP1-2411-284-1

**TM-30-18**

## Color Rendition by Hue-Angle Bin



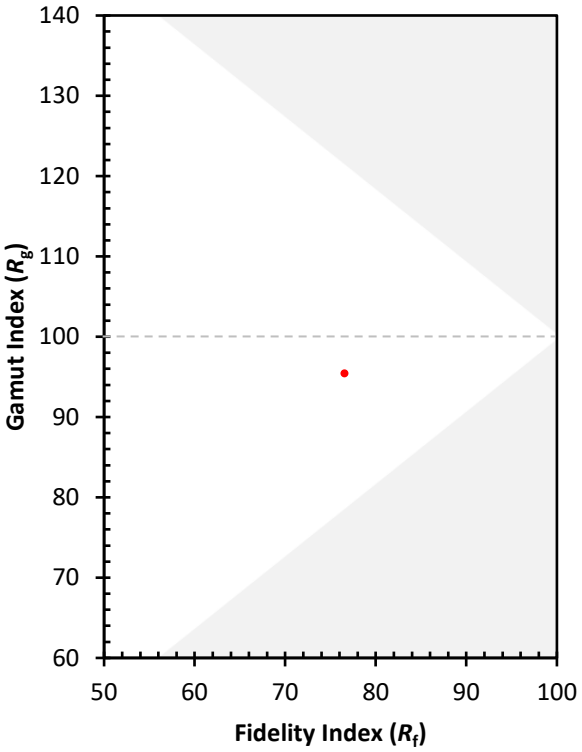



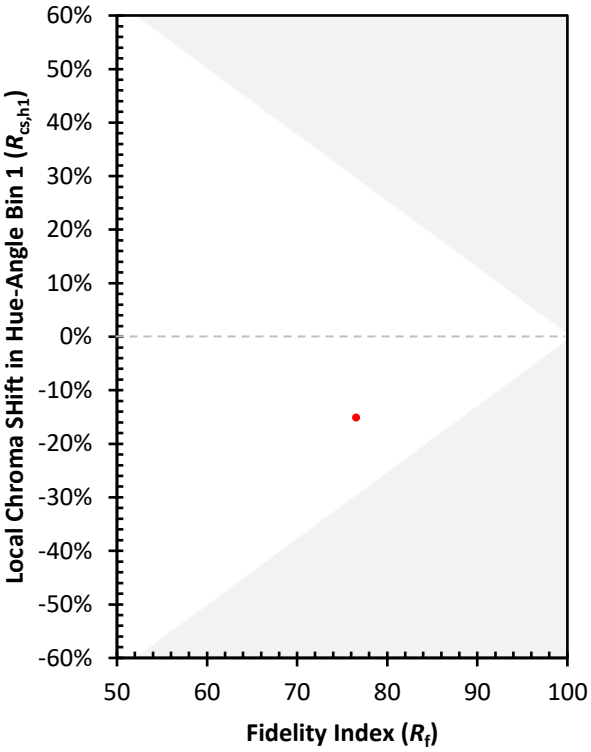



REPORT NUMBER: SP1-2411-284-1

# TM-30-18

## Measure Comparisons




(END OF REPORT)