

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: P319156

Luminaire Tested: **GLEON-SA2B-827-U-T4W**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P319156  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-18)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA2B-827-U-T4W  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(2) 80 CRI, 2700K, 800mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV WIDE OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 8535 lumens  
Efficiency: N/A  
Efficacy: 100.4 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 1' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B2 - U0 - G2

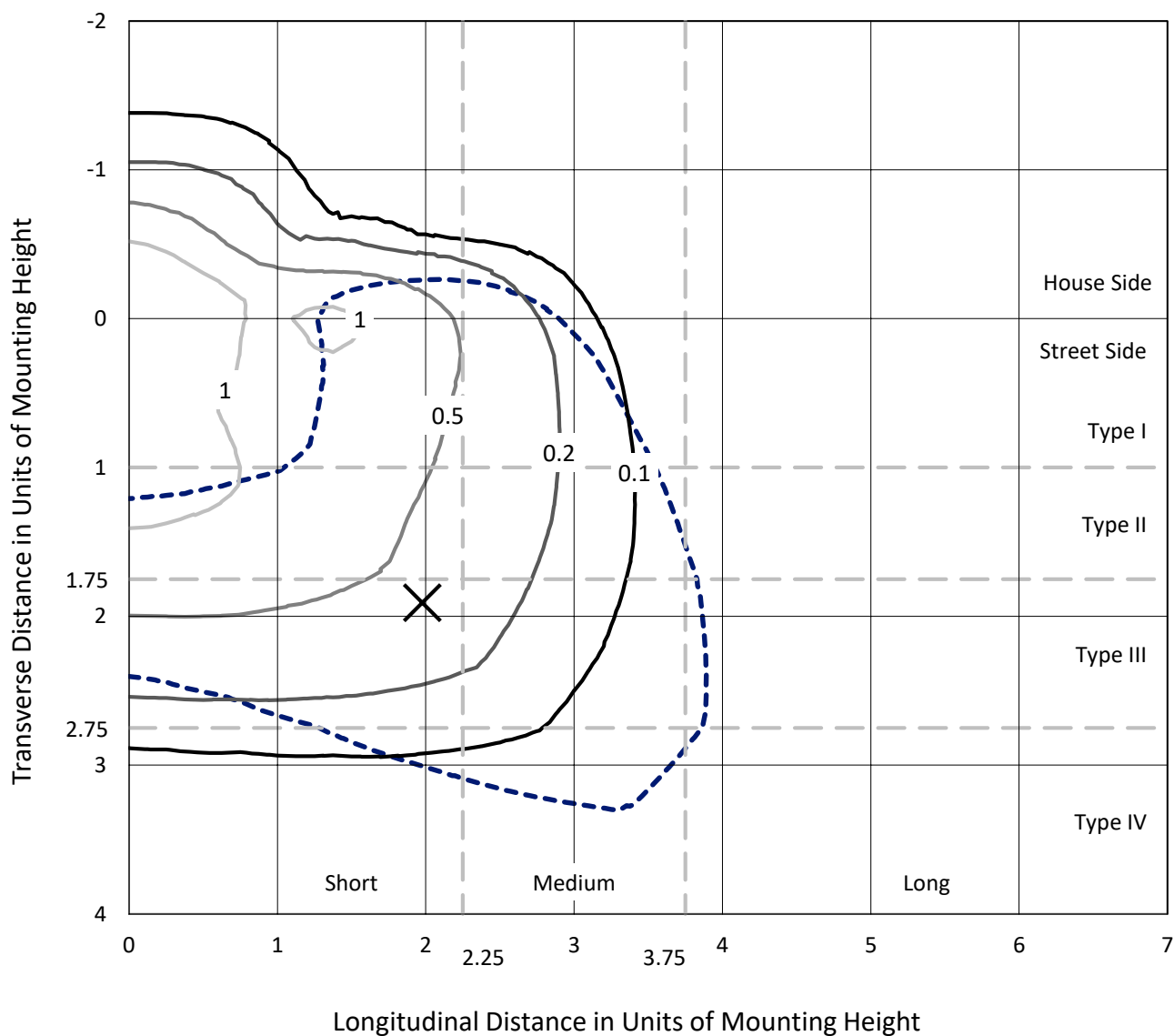
Input Watts (W): 85  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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## Iso-Footcandle Lines of Horizontal Illumination

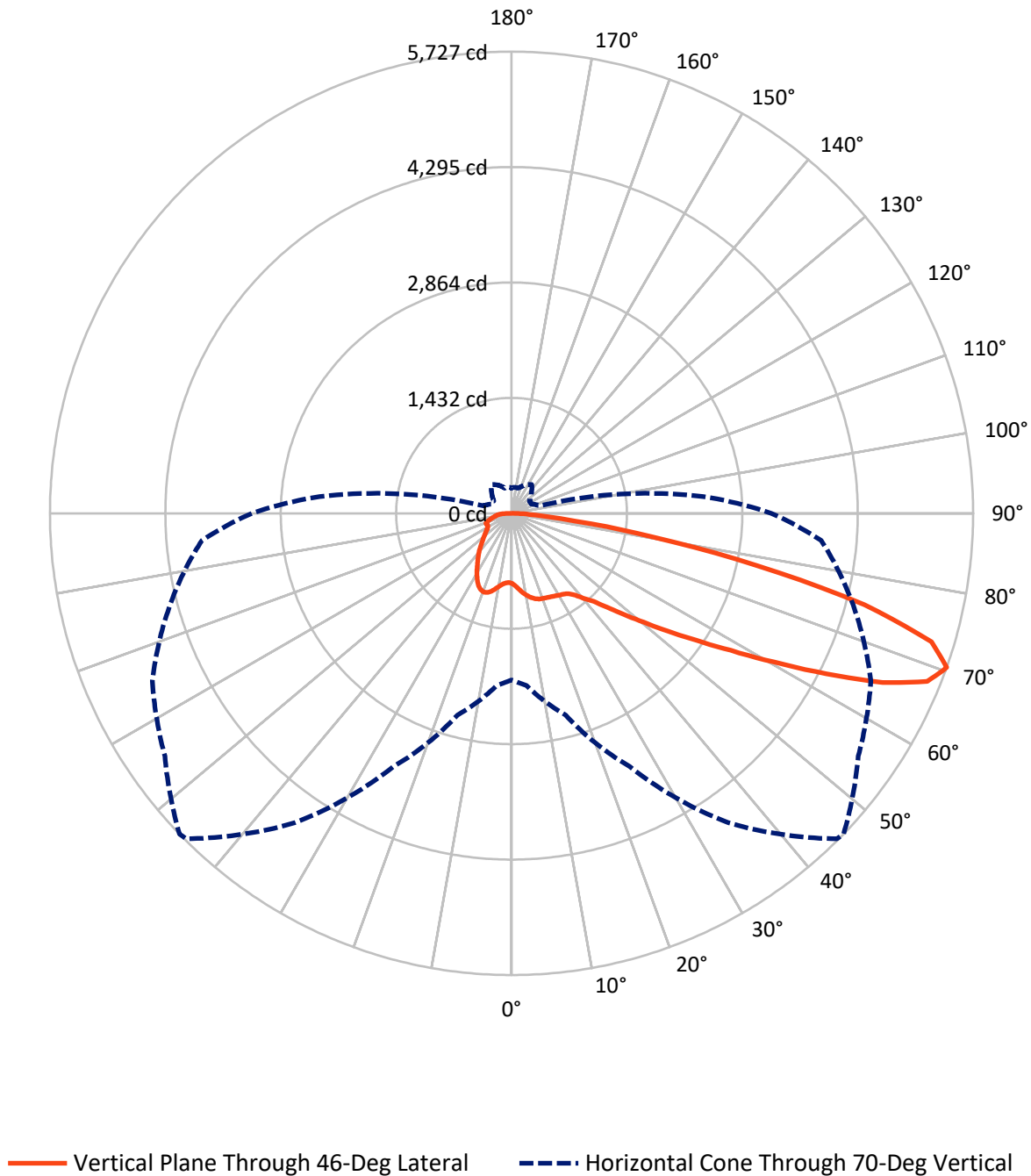
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 1.7 fc  
 Type IV - Short - N/A

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## Luminous Intensity Polar Plot



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**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 1956.2   | 0.0    | 1956.2 |
|                    | % Fixture | 22.9     | 0.0    | 22.9   |
| <b>Street Side</b> | Lumens    | 6578.8   | 0.0    | 6578.8 |
|                    | % Fixture | 77.1     | 0.0    | 77.1   |
| <b>Total</b>       | Lumens    | 8535.0   | 0.0    | 8535.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 88.6   | 1.0       |
| 10°-20°   | 295.3  | 3.5       |
| 20°-30°   | 492.4  | 5.8       |
| 30°-40°   | 698.8  | 8.2       |
| 40°-50°   | 1027.9 | 12.0      |
| 50°-60°   | 1740.7 | 20.4      |
| 60°-70°   | 2471.0 | 29.0      |
| 70°-80°   | 1501.1 | 17.6      |
| 80°-90°   | 219.1  | 2.6       |
| 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°    | 8535.0 | 100.0     |
| 0°-180°   | 8535.0 | 100.0     |

**Coefficient of Utilization**



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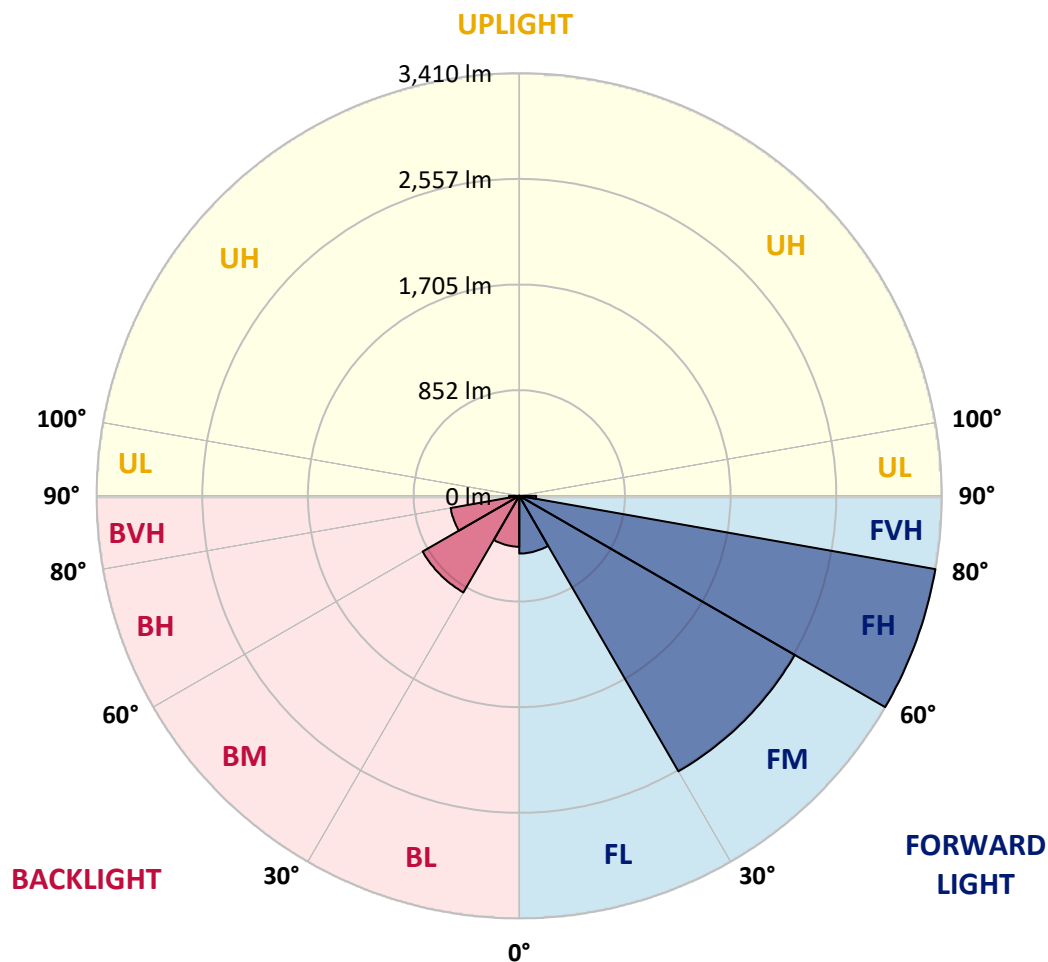
CATALOG NUMBER: GLEON-SA2B-827-U-T4W

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 465.7  | 5.5       |                         |      |         |
| FM   | (30°-60°)   | 2566.9 | 30.1      |                         |      |         |
| FH   | (60°-80°)   | 3409.7 | 39.9      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 136.5  | 1.6       |                         |      | G2/225  |
| BL   | (0°-30°)    | 410.7  | 4.8       | B1/500                  |      |         |
| BM   | (30°-60°)   | 900.5  | 10.6      | B1/1000                 |      |         |
| BH   | (60°-80°)   | 562.4  | 6.6       | B2/1000                 |      | G2/1000 |
| BVH  | (80°-90°)   | 82.6   | 1.0       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B2-U0-G2**

Type IV Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 46°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 869.5  | 869.5  | 869.5  | 869.5  | 869.5  | 869.5  | 869.5  | 869.5  | 869.5  | 869.5  | 869.5  |
| 2.5°  | 913.1  | 913.7  | 914.8  | 911.9  | 903.7  | 901.4  | 900.5  | 892.0  | 886.5  | 878.3  | 871.3  |
| 5°    | 986.1  | 986.7  | 984.9  | 976.7  | 958.6  | 945.2  | 944.0  | 924.8  | 907.2  | 888.5  | 874.5  |
| 7.5°  | 1062.3 | 1063.2 | 1057.7 | 1042.2 | 1016.8 | 993.4  | 991.9  | 965.6  | 939.1  | 910.7  | 889.7  |
| 10°   | 1129.8 | 1126.3 | 1117.2 | 1095.6 | 1065.5 | 1036.9 | 1035.7 | 1008.3 | 977.6  | 943.4  | 915.4  |
| 12.5° | 1174.8 | 1171.9 | 1160.2 | 1133.9 | 1100.9 | 1074.6 | 1072.3 | 1046.8 | 1017.1 | 979.7  | 946.1  |
| 15°   | 1199.6 | 1201.7 | 1185.9 | 1156.1 | 1124.0 | 1101.8 | 1099.7 | 1081.6 | 1055.0 | 1017.3 | 978.8  |
| 17.5° | 1202.8 | 1204.6 | 1189.4 | 1159.9 | 1133.6 | 1118.4 | 1117.5 | 1105.6 | 1086.3 | 1050.1 | 1009.8 |
| 20°   | 1184.1 | 1185.3 | 1172.7 | 1148.5 | 1131.3 | 1126.6 | 1126.3 | 1121.0 | 1106.7 | 1074.6 | 1035.5 |
| 22.5° | 1157.0 | 1157.8 | 1148.8 | 1131.3 | 1125.4 | 1132.7 | 1134.8 | 1132.7 | 1122.5 | 1092.4 | 1055.6 |
| 25°   | 1150.2 | 1149.7 | 1140.3 | 1122.5 | 1127.5 | 1142.9 | 1145.6 | 1146.4 | 1139.4 | 1113.2 | 1081.3 |
| 27.5° | 1182.7 | 1180.6 | 1162.8 | 1134.2 | 1137.4 | 1156.1 | 1159.6 | 1168.1 | 1163.7 | 1140.6 | 1110.5 |
| 30°   | 1276.4 | 1272.9 | 1236.4 | 1178.6 | 1162.8 | 1172.4 | 1176.8 | 1190.3 | 1191.1 | 1171.9 | 1149.4 |
| 32.5° | 1434.7 | 1430.4 | 1364.9 | 1261.5 | 1205.7 | 1189.1 | 1193.2 | 1213.3 | 1224.1 | 1209.2 | 1185.0 |
| 35°   | 1634.8 | 1629.9 | 1544.0 | 1402.6 | 1277.6 | 1220.9 | 1223.9 | 1239.9 | 1261.5 | 1240.5 | 1208.4 |
| 37.5° | 1843.4 | 1831.4 | 1748.7 | 1568.5 | 1391.8 | 1289.0 | 1289.0 | 1291.0 | 1301.3 | 1257.4 | 1235.8 |
| 40°   | 2050.8 | 2038.8 | 1964.0 | 1763.6 | 1539.6 | 1396.2 | 1389.5 | 1344.2 | 1336.0 | 1298.3 | 1291.0 |
| 42.5° | 2243.5 | 2240.0 | 2195.9 | 1984.2 | 1713.1 | 1501.6 | 1492.3 | 1415.5 | 1417.2 | 1393.8 | 1394.1 |
| 45°   | 2448.6 | 2448.6 | 2412.7 | 2206.7 | 1915.2 | 1671.0 | 1661.7 | 1548.7 | 1566.2 | 1555.4 | 1581.4 |
| 47.5° | 2616.0 | 2621.2 | 2616.2 | 2438.7 | 2150.4 | 1886.3 | 1869.4 | 1733.3 | 1782.3 | 1819.4 | 1895.1 |
| 50°   | 2786.8 | 2795.0 | 2795.9 | 2693.1 | 2434.6 | 2142.2 | 2122.9 | 1978.3 | 2087.9 | 2194.2 | 2342.8 |
| 52.5° | 3034.8 | 3053.2 | 2979.9 | 2946.9 | 2782.7 | 2446.0 | 2427.0 | 2293.5 | 2476.3 | 2625.6 | 2881.8 |
| 55°   | 3264.7 | 3248.6 | 3196.3 | 3216.8 | 3155.4 | 2791.8 | 2777.5 | 2660.3 | 2909.2 | 3103.2 | 3435.8 |
| 57.5° | 3389.1 | 3387.9 | 3440.5 | 3528.1 | 3557.4 | 3218.2 | 3206.3 | 3092.3 | 3397.3 | 3543.0 | 3956.1 |
| 60°   | 3535.2 | 3537.2 | 3667.5 | 3866.4 | 3986.7 | 3749.3 | 3744.0 | 3657.5 | 3871.3 | 3953.7 | 4364.1 |
| 62.5° | 3555.6 | 3592.4 | 3816.7 | 4159.1 | 4388.6 | 4369.7 | 4381.3 | 4166.7 | 4295.5 | 4281.4 | 4668.8 |
| 65°   | 3320.5 | 3369.0 | 3775.0 | 4247.6 | 4788.2 | 5048.2 | 5059.0 | 4678.7 | 4629.9 | 4561.6 | 4777.7 |
| 67.5° | 2838.5 | 2910.4 | 3351.4 | 4055.1 | 4919.9 | 5549.7 | 5564.9 | 5075.6 | 4907.4 | 4656.5 | 4515.4 |
| 70°   | 2065.7 | 2145.4 | 2589.4 | 3463.3 | 4685.1 | 5710.1 | 5727.3 | 5251.2 | 4917.9 | 4386.3 | 3854.7 |
| 72.5° | 1247.8 | 1310.3 | 1676.3 | 2549.6 | 3954.3 | 5418.0 | 5448.6 | 5028.6 | 4490.0 | 3715.4 | 2846.4 |
| 75°   | 548.0  | 588.9  | 810.5  | 1469.2 | 2830.9 | 4482.7 | 4521.0 | 4304.2 | 3648.2 | 2700.1 | 1682.4 |
| 77.5° | 233.4  | 245.1  | 332.4  | 638.2  | 1600.4 | 3063.1 | 3115.7 | 3144.9 | 2475.2 | 1469.2 | 710.9  |
| 80°   | 145.5  | 150.1  | 188.1  | 288.9  | 748.9  | 1720.4 | 1777.1 | 1850.4 | 1229.1 | 540.1  | 248.3  |
| 82.5° | 88.5   | 93.8   | 125.0  | 174.7  | 389.9  | 779.9  | 807.0  | 858.7  | 477.0  | 233.4  | 128.5  |
| 85°   | 53.2   | 57.0   | 76.5   | 110.4  | 222.0  | 306.7  | 306.4  | 338.8  | 224.6  | 150.1  | 67.8   |
| 87.5° | 25.4   | 28.3   | 40.9   | 57.2   | 111.9  | 115.1  | 107.8  | 122.1  | 136.4  | 98.4   | 34.2   |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

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**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 869.5  | 869.5  | 869.5  | 869.5  | 869.5  | 869.5  | 869.5  | 869.5  | 869.5  | 869.5  | 869.5  |
| 2.5°  | 869.0  | 867.8  | 864.0  | 861.1  | 860.5  | 858.7  | 857.3  | 858.2  | 859.3  | 859.6  | 859.6  |
| 5°    | 868.7  | 865.5  | 860.5  | 858.5  | 861.1  | 864.6  | 869.0  | 874.8  | 878.3  | 880.9  | 882.7  |
| 7.5°  | 882.7  | 876.6  | 871.0  | 869.8  | 875.1  | 884.4  | 894.4  | 906.6  | 915.1  | 921.0  | 922.1  |
| 10°   | 906.1  | 898.5  | 892.9  | 894.1  | 903.4  | 916.9  | 930.9  | 946.7  | 959.5  | 967.4  | 968.0  |
| 12.5° | 932.9  | 925.6  | 920.4  | 925.3  | 940.8  | 957.2  | 971.8  | 985.5  | 997.2  | 1005.1 | 1005.1 |
| 15°   | 963.9  | 958.6  | 952.5  | 963.9  | 984.9  | 999.5  | 1005.7 | 1012.4 | 1018.8 | 1024.6 | 1023.5 |
| 17.5° | 993.7  | 988.7  | 985.5  | 998.9  | 1020.9 | 1027.6 | 1023.5 | 1018.5 | 1018.5 | 1021.7 | 1022.3 |
| 20°   | 1019.4 | 1015.0 | 1017.1 | 1030.2 | 1041.6 | 1034.6 | 1019.4 | 1003.6 | 997.2  | 998.9  | 1000.7 |
| 22.5° | 1041.9 | 1039.8 | 1046.0 | 1052.1 | 1043.9 | 1019.4 | 991.4  | 970.0  | 962.1  | 961.6  | 962.1  |
| 25°   | 1068.2 | 1067.9 | 1075.5 | 1064.4 | 1028.2 | 982.9  | 945.2  | 924.5  | 920.1  | 923.6  | 929.4  |
| 27.5° | 1100.9 | 1104.1 | 1107.9 | 1067.3 | 996.0  | 927.7  | 889.4  | 875.1  | 879.5  | 888.0  | 893.5  |
| 30°   | 1142.7 | 1151.4 | 1143.2 | 1060.0 | 949.9  | 864.6  | 828.1  | 824.0  | 836.0  | 847.9  | 853.8  |
| 32.5° | 1183.3 | 1197.0 | 1177.1 | 1041.0 | 890.3  | 797.7  | 769.4  | 768.2  | 782.8  | 794.5  | 802.7  |
| 35°   | 1216.0 | 1243.1 | 1202.5 | 1003.3 | 821.4  | 736.1  | 715.3  | 707.4  | 712.7  | 726.4  | 735.8  |
| 37.5° | 1258.6 | 1303.9 | 1220.1 | 945.8  | 746.6  | 685.2  | 661.0  | 642.9  | 638.2  | 643.8  | 648.4  |
| 40°   | 1336.6 | 1396.5 | 1228.2 | 865.5  | 673.6  | 634.4  | 609.9  | 583.3  | 564.9  | 551.5  | 551.8  |
| 42.5° | 1464.0 | 1517.1 | 1223.0 | 767.9  | 606.1  | 584.8  | 557.0  | 526.3  | 496.6  | 466.2  | 463.8  |
| 45°   | 1670.8 | 1696.5 | 1207.2 | 664.5  | 546.8  | 532.8  | 506.8  | 476.1  | 436.4  | 401.9  | 398.7  |
| 47.5° | 2001.7 | 1944.7 | 1182.7 | 574.2  | 494.5  | 488.7  | 464.7  | 429.4  | 387.3  | 359.6  | 357.2  |
| 50°   | 2453.0 | 2303.1 | 1170.7 | 502.4  | 448.4  | 450.1  | 430.5  | 393.2  | 353.4  | 333.0  | 330.6  |
| 52.5° | 2992.7 | 2720.5 | 1193.8 | 446.9  | 411.3  | 417.4  | 402.8  | 367.7  | 334.4  | 318.4  | 316.0  |
| 55°   | 3552.7 | 3152.8 | 1218.6 | 406.6  | 376.2  | 388.2  | 383.2  | 354.3  | 324.2  | 309.3  | 307.3  |
| 57.5° | 4032.0 | 3475.6 | 1168.9 | 373.9  | 345.0  | 363.7  | 368.0  | 345.8  | 319.0  | 305.5  | 303.2  |
| 60°   | 4333.7 | 3605.5 | 1038.7 | 343.2  | 320.1  | 344.1  | 359.3  | 343.5  | 321.0  | 319.8  | 318.1  |
| 62.5° | 4476.9 | 3594.2 | 843.3  | 319.0  | 304.6  | 335.6  | 365.7  | 356.6  | 344.4  | 354.9  | 355.8  |
| 65°   | 4412.6 | 3422.4 | 628.0  | 302.9  | 293.5  | 338.8  | 385.0  | 381.5  | 351.1  | 361.6  | 363.1  |
| 67.5° | 3989.6 | 3012.6 | 465.0  | 288.9  | 281.3  | 347.9  | 420.0  | 389.6  | 337.9  | 345.5  | 340.9  |
| 70°   | 3224.7 | 2388.4 | 358.7  | 273.1  | 268.7  | 346.7  | 435.8  | 384.7  | 323.6  | 325.4  | 312.8  |
| 72.5° | 2223.7 | 1628.7 | 291.8  | 258.5  | 250.6  | 316.0  | 424.7  | 372.4  | 311.7  | 298.2  | 281.6  |
| 75°   | 1209.2 | 874.2  | 248.0  | 243.3  | 218.8  | 277.5  | 404.3  | 363.7  | 300.9  | 283.0  | 273.7  |
| 77.5° | 475.8  | 362.8  | 215.3  | 222.6  | 191.3  | 245.1  | 381.5  | 347.0  | 286.0  | 262.6  | 257.9  |
| 80°   | 194.2  | 185.2  | 178.5  | 192.5  | 164.4  | 214.4  | 354.0  | 327.4  | 268.1  | 243.6  | 234.3  |
| 82.5° | 110.1  | 115.1  | 138.7  | 151.9  | 133.5  | 197.5  | 340.9  | 311.7  | 246.8  | 218.2  | 207.1  |
| 85°   | 56.4   | 67.5   | 96.7   | 108.9  | 98.1   | 168.0  | 314.0  | 272.8  | 198.0  | 167.1  | 168.0  |
| 87.5° | 27.2   | 37.7   | 61.0   | 68.3   | 63.7   | 121.5  | 234.5  | 197.7  | 154.2  | 122.1  | 118.3  |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

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

Report Prepared for

Cooper Lighting Solutions

Invue

Report Number: SP1-2407-157-9

Test Date: 10/03/2024

Luminaire Tested: EMM2-HTN-SA1A-827-U-5WQ

Data applicable to all product families utilizing light square engine

### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2407-157-9  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 10/03/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: Invue  
 Catalog Number: **EMM2-HTN-SA1A-827-U-5WQ**  
 Description: Epic Modern Light Square 40W 5WQ Optic

### Spectral Parameters

CCT (K): 2764  
 CIE  $u'$ : 0.2591  
 CIE  $v'$ : 0.5290  
 Duv: 0.0020  
 CIE x: 0.4581  
 CIE y: 0.4156  
 CIE z: 0.1263  
 Peak Wavelength (nm): 603  
 Dominant Wavelength (nm): 583  
 Purity: 62.2537  
 R<sub>f</sub>: 84.7  
 R<sub>g</sub>: 94.6

CRI (Ra): 80.9  
 R1: 78.8  
 R2: 89.9  
 R3: 96.2  
 R4: 79.1  
 R5: 79.1  
 R6: 88.8  
 R7: 81.3  
 R8: 54.3  
 R9: -1.5  
 R10: 77.9  
 R11: 78.9  
 R12: 71.6  
 R13: 81.2  
 R14: 98.5  
 R15: 69.9



### Test Conditions

Stabilization Time: 81M  
 Operation Time: 2H 21M  
 Sphere Temperature (°C): 25.2

REPORT NUMBER: SP1-2407-157-9

| 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**



Point lies inside the ANSI 2700K 4-step quadrangle

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### Photopic Flux vs. Wavelength



### Photopic Lumens: 4337.9

| 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       | 0                | 0.0              | 490       | 18018            | 2.6              | 620       | 87426            | 22.8             | 750       | 2680             | 0.0              | 880       | 58               | 0.0              |
| 365       | 0                | 0.0              | 495       | 22295            | 3.9              | 625       | 83013            | 18.2             | 755       | 2287             | 0.0              | 885       | 46               | 0.0              |
| 370       | 0                | 0.0              | 500       | 26478            | 5.8              | 630       | 78077            | 14.1             | 760       | 1944             | 0.0              | 890       | 45               | 0.0              |
| 375       | 0                | 0.0              | 505       | 30524            | 8.5              | 635       | 72080            | 10.7             | 765       | 1653             | 0.0              | 895       | 41               | 0.0              |
| 380       | 0                | 0.0              | 510       | 33611            | 11.5             | 640       | 66249            | 7.9              | 770       | 1413             | 0.0              | 900       | 38               | 0.0              |
| 385       | 0                | 0.0              | 515       | 36490            | 15.2             | 645       | 59973            | 5.7              | 775       | 1198             | 0.0              | 905       | 33               | 0.0              |
| 390       | 0                | 0.0              | 520       | 38610            | 18.7             | 650       | 53972            | 3.9              | 780       | 1025             | 0.0              | 910       | 30               | 0.0              |
| 395       | 0                | 0.0              | 525       | 40511            | 21.9             | 655       | 48369            | 2.7              | 785       | 874              | 0.0              | 915       | 23               | 0.0              |
| 400       | 48               | 0.0              | 530       | 42223            | 24.9             | 660       | 42641            | 1.8              | 790       | 747              | 0.0              | 920       | 24               | 0.0              |
| 405       | 201              | 0.0              | 535       | 44137            | 27.6             | 665       | 37602            | 1.1              | 795       | 639              | 0.0              | 925       | 22               | 0.0              |
| 410       | 457              | 0.0              | 540       | 46032            | 30.0             | 670       | 32798            | 0.7              | 800       | 547              | 0.0              | 930       | 22               | 0.0              |
| 415       | 925              | 0.0              | 545       | 48553            | 32.5             | 675       | 28558            | 0.5              | 805       | 473              | 0.0              | 935       | 17               | 0.0              |
| 420       | 1816             | 0.0              | 550       | 51408            | 34.9             | 680       | 24782            | 0.3              | 810       | 401              | 0.0              | 940       | 13               | 0.0              |
| 425       | 3217             | 0.0              | 555       | 54711            | 37.4             | 685       | 21386            | 0.2              | 815       | 351              | 0.0              | 945       | 6                | 0.0              |
| 430       | 5520             | 0.0              | 560       | 58847            | 40.0             | 690       | 18413            | 0.1              | 820       | 307              | 0.0              | 950       | 10               | 0.0              |
| 435       | 9225             | 0.1              | 565       | 63386            | 42.4             | 695       | 15721            | 0.1              | 825       | 261              | 0.0              | 955       | 11               | 0.0              |
| 440       | 15522            | 0.2              | 570       | 68196            | 44.3             | 700       | 13432            | 0.0              | 830       | 228              | 0.0              | 960       | 8                | 0.0              |
| 445       | 27642            | 0.6              | 575       | 73613            | 46.0             | 705       | 11513            | 0.0              | 835       | 193              | 0.0              | 965       | 12               | 0.0              |
| 450       | 36602            | 0.9              | 580       | 79207            | 47.1             | 710       | 9780             | 0.0              | 840       | 174              | 0.0              | 970       | 3                | 0.0              |
| 455       | 28292            | 0.9              | 585       | 84248            | 47.0             | 715       | 8356             | 0.0              | 845       | 151              | 0.0              | 975       | 8                | 0.0              |
| 460       | 21166            | 0.9              | 590       | 88397            | 45.7             | 720       | 7161             | 0.0              | 850       | 123              | 0.0              | 980       | 2                | 0.0              |
| 465       | 19092            | 1.0              | 595       | 91428            | 43.4             | 725       | 6067             | 0.0              | 855       | 106              | 0.0              | 985       | 13               | 0.0              |
| 470       | 14951            | 0.9              | 600       | 93452            | 40.3             | 730       | 5164             | 0.0              | 860       | 95               | 0.0              | 990       | 16               | 0.0              |
| 475       | 12606            | 1.0              | 605       | 93959            | 36.4             | 735       | 4393             | 0.0              | 865       | 82               | 0.0              | 995       | 20               | 0.0              |
| 480       | 13323            | 1.3              | 610       | 93079            | 32.0             | 740       | 3694             | 0.0              | 870       | 77               | 0.0              | 1000      | 0                | 0.0              |
| 485       | 15164            | 1.8              | 615       | 90707            | 27.3             | 745       | 3157             | 0.0              | 875       | 65               | 0.0              |           |                  |                  |

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### Scotopic Flux vs. Wavelength


**Scotopic Lumens: 5286.7**
**S/P: 1.22**

| $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W}/\text{nm}$ ) | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|
| 360               | 0                                    | 0.0                            | 490               | 18018                                | 75.9                           | 620               | 87426                                | 0.4                            | 750               | 2680                                 | 0.0                            | 880               | 58                                   | 0.0                            |
| 365               | 0                                    | 0.0                            | 495               | 22295                                | 93.2                           | 625               | 83013                                | 0.2                            | 755               | 2287                                 | 0.0                            | 885               | 46                                   | 0.0                            |
| 370               | 0                                    | 0.0                            | 500               | 26478                                | 107.8                          | 630               | 78077                                | 0.1                            | 760               | 1944                                 | 0.0                            | 890               | 45                                   | 0.0                            |
| 375               | 0                                    | 0.0                            | 505               | 30524                                | 118.7                          | 635               | 72080                                | 0.1                            | 765               | 1653                                 | 0.0                            | 895               | 41                                   | 0.0                            |
| 380               | 0                                    | 0.0                            | 510               | 33611                                | 122.2                          | 640               | 66249                                | 0.1                            | 770               | 1413                                 | 0.0                            | 900               | 38                                   | 0.0                            |
| 385               | 0                                    | 0.0                            | 515               | 36490                                | 120.8                          | 645               | 59973                                | 0.0                            | 775               | 1198                                 | 0.0                            | 905               | 33                                   | 0.0                            |
| 390               | 0                                    | 0.0                            | 520               | 38610                                | 113.9                          | 650               | 53972                                | 0.0                            | 780               | 1025                                 | 0.0                            | 910               | 30                                   | 0.0                            |
| 395               | 0                                    | 0.0                            | 525               | 40511                                | 104.1                          | 655               | 48369                                | 0.0                            | 785               | 874                                  | 0.0                            | 915               | 23                                   | 0.0                            |
| 400               | 48                                   | 0.0                            | 530               | 42223                                | 92.4                           | 660               | 42641                                | 0.0                            | 790               | 747                                  | 0.0                            | 920               | 24                                   | 0.0                            |
| 405               | 201                                  | 0.0                            | 535               | 44137                                | 80.5                           | 665               | 37602                                | 0.0                            | 795               | 639                                  | 0.0                            | 925               | 22                                   | 0.0                            |
| 410               | 457                                  | 0.1                            | 540               | 46032                                | 68.2                           | 670               | 32798                                | 0.0                            | 800               | 547                                  | 0.0                            | 930               | 22                                   | 0.0                            |
| 415               | 925                                  | 0.3                            | 545               | 48553                                | 57.1                           | 675               | 28558                                | 0.0                            | 805               | 473                                  | 0.0                            | 935               | 17                                   | 0.0                            |
| 420               | 1816                                 | 1.1                            | 550               | 51408                                | 46.7                           | 680               | 24782                                | 0.0                            | 810               | 401                                  | 0.0                            | 940               | 13                                   | 0.0                            |
| 425               | 3217                                 | 2.5                            | 555               | 54711                                | 37.4                           | 685               | 21386                                | 0.0                            | 815               | 351                                  | 0.0                            | 945               | 6                                    | 0.0                            |
| 430               | 5520                                 | 5.9                            | 560               | 58847                                | 29.4                           | 690               | 18413                                | 0.0                            | 820               | 307                                  | 0.0                            | 950               | 10                                   | 0.0                            |
| 435               | 9225                                 | 12.5                           | 565               | 63386                                | 22.5                           | 695               | 15721                                | 0.0                            | 825               | 261                                  | 0.0                            | 955               | 11                                   | 0.0                            |
| 440               | 15522                                | 26.3                           | 570               | 68196                                | 16.9                           | 700               | 13432                                | 0.0                            | 830               | 228                                  | 0.0                            | 960               | 8                                    | 0.0                            |
| 445               | 27642                                | 55.2                           | 575               | 73613                                | 12.4                           | 705               | 11513                                | 0.0                            | 835               | 193                                  | 0.0                            | 965               | 12                                   | 0.0                            |
| 450               | 36602                                | 85.4                           | 580               | 79207                                | 9.0                            | 710               | 9780                                 | 0.0                            | 840               | 174                                  | 0.0                            | 970               | 3                                    | 0.0                            |
| 455               | 28292                                | 75.1                           | 585               | 84248                                | 6.3                            | 715               | 8356                                 | 0.0                            | 845               | 151                                  | 0.0                            | 975               | 8                                    | 0.0                            |
| 460               | 21166                                | 63.2                           | 590               | 88397                                | 4.4                            | 720               | 7161                                 | 0.0                            | 850               | 123                                  | 0.0                            | 980               | 2                                    | 0.0                            |
| 465               | 19092                                | 63.2                           | 595               | 91428                                | 3.0                            | 725               | 6067                                 | 0.0                            | 855               | 106                                  | 0.0                            | 985               | 13                                   | 0.0                            |
| 470               | 14951                                | 54.2                           | 600               | 93452                                | 2.0                            | 730               | 5164                                 | 0.0                            | 860               | 95                                   | 0.0                            | 990               | 16                                   | 0.0                            |
| 475               | 12606                                | 48.8                           | 605               | 93959                                | 1.3                            | 735               | 4393                                 | 0.0                            | 865               | 82                                   | 0.0                            | 995               | 20                                   | 0.0                            |
| 480               | 13323                                | 54.2                           | 610               | 93079                                | 0.9                            | 740               | 3694                                 | 0.0                            | 870               | 77                                   | 0.0                            | 1000              | 0                                    | 0.0                            |
| 485               | 15164                                | 63.3                           | 615               | 90707                                | 0.5                            | 745               | 3157                                 | 0.0                            | 875               | 65                                   | 0.0                            |                   |                                      |                                |

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### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 9797**

**M/P: 2.26**

| 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       | 0                | 0.0              | 490       | 18018            | 27.7             | 620       | 87426            | 1.1              | 750       | 2680             | 0.0              | 880       | 58               | 0.0              |
| 365       | 0                | 0.0              | 495       | 22295            | 36.0             | 625       | 83013            | 0.7              | 755       | 2287             | 0.0              | 885       | 46               | 0.0              |
| 370       | 0                | 0.0              | 500       | 26478            | 44.2             | 630       | 78077            | 0.4              | 760       | 1944             | 0.0              | 890       | 45               | 0.0              |
| 375       | 0                | 0.0              | 505       | 30524            | 51.8             | 635       | 72080            | 0.3              | 765       | 1653             | 0.0              | 895       | 41               | 0.0              |
| 380       | 0                | 0.0              | 510       | 33611            | 57.0             | 640       | 66249            | 0.2              | 770       | 1413             | 0.0              | 900       | 38               | 0.0              |
| 385       | 0                | 0.0              | 515       | 36490            | 60.5             | 645       | 59973            | 0.1              | 775       | 1198             | 0.0              | 905       | 33               | 0.0              |
| 390       | 0                | 0.0              | 520       | 38610            | 61.4             | 650       | 53972            | 0.1              | 780       | 1025             | 0.0              | 910       | 30               | 0.0              |
| 395       | 0                | 0.0              | 525       | 40511            | 60.6             | 655       | 48369            | 0.0              | 785       | 874              | 0.0              | 915       | 23               | 0.0              |
| 400       | 48               | 0.0              | 530       | 42223            | 58.2             | 660       | 42641            | 0.0              | 790       | 747              | 0.0              | 920       | 24               | 0.0              |
| 405       | 201              | 0.0              | 535       | 44137            | 55.0             | 665       | 37602            | 0.0              | 795       | 639              | 0.0              | 925       | 22               | 0.0              |
| 410       | 457              | 0.0              | 540       | 46032            | 50.9             | 670       | 32798            | 0.0              | 800       | 547              | 0.0              | 930       | 22               | 0.0              |
| 415       | 925              | 0.1              | 545       | 48553            | 46.6             | 675       | 28558            | 0.0              | 805       | 473              | 0.0              | 935       | 17               | 0.0              |
| 420       | 1816             | 0.3              | 550       | 51408            | 42.0             | 680       | 24782            | 0.0              | 810       | 401              | 0.0              | 940       | 13               | 0.0              |
| 425       | 3217             | 0.8              | 555       | 54711            | 37.4             | 685       | 21386            | 0.0              | 815       | 351              | 0.0              | 945       | 6                | 0.0              |
| 430       | 5520             | 1.9              | 560       | 58847            | 32.9             | 690       | 18413            | 0.0              | 820       | 307              | 0.0              | 950       | 10               | 0.0              |
| 435       | 9225             | 4.1              | 565       | 63386            | 28.4             | 695       | 15721            | 0.0              | 825       | 261              | 0.0              | 955       | 11               | 0.0              |
| 440       | 15522            | 8.7              | 570       | 68196            | 24.1             | 700       | 13432            | 0.0              | 830       | 228              | 0.0              | 960       | 8                | 0.0              |
| 445       | 27642            | 18.5             | 575       | 73613            | 20.0             | 705       | 11513            | 0.0              | 835       | 193              | 0.0              | 965       | 12               | 0.0              |
| 450       | 36602            | 28.3             | 580       | 79207            | 16.3             | 710       | 9780             | 0.0              | 840       | 174              | 0.0              | 970       | 3                | 0.0              |
| 455       | 28292            | 24.7             | 585       | 84248            | 12.9             | 715       | 8356             | 0.0              | 845       | 151              | 0.0              | 975       | 8                | 0.0              |
| 460       | 21166            | 20.4             | 590       | 88397            | 9.8              | 720       | 7161             | 0.0              | 850       | 123              | 0.0              | 980       | 2                | 0.0              |
| 465       | 19092            | 20.1             | 595       | 91428            | 7.3              | 725       | 6067             | 0.0              | 855       | 106              | 0.0              | 985       | 13               | 0.0              |
| 470       | 14951            | 17.2             | 600       | 93452            | 5.3              | 730       | 5164             | 0.0              | 860       | 95               | 0.0              | 990       | 16               | 0.0              |
| 475       | 12606            | 15.7             | 605       | 93959            | 3.7              | 735       | 4393             | 0.0              | 865       | 82               | 0.0              | 995       | 20               | 0.0              |
| 480       | 13323            | 18.0             | 610       | 93079            | 2.5              | 740       | 3694             | 0.0              | 870       | 77               | 0.0              | 1000      | 0                | 0.0              |
| 485       | 15164            | 21.9             | 615       | 90707            | 1.7              | 745       | 3157             | 0.0              | 875       | 65               | 0.0              |           |                  |                  |

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TM-30-18

### Summary

$R_f = 84.7$   
 $R_g = 94.6$   
 $CIE R_a = 80.9$   
 $R_g = -1.5$



### Color Vector Graphics



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 84 | CES51 = 95 | CES76 = 81 |
| CES02 = 63 | CES27 = 95 | CES52 = 94 | CES77 = 84 |
| CES03 = 31 | CES28 = 94 | CES53 = 89 | CES78 = 81 |
| CES04 = 71 | CES29 = 87 | CES54 = 91 | CES79 = 89 |
| CES05 = 50 | CES30 = 94 | CES55 = 90 | CES80 = 89 |
| CES06 = 52 | CES31 = 89 | CES56 = 86 | CES81 = 69 |
| CES07 = 43 | CES32 = 82 | CES57 = 85 | CES82 = 96 |
| CES08 = 41 | CES33 = 91 | CES58 = 86 | CES83 = 93 |
| CES09 = 29 | CES34 = 92 | CES59 = 91 | CES84 = 92 |
| CES10 = 77 | CES35 = 96 | CES60 = 94 | CES85 = 76 |
| CES11 = 60 | CES36 = 90 | CES61 = 89 | CES86 = 65 |
| CES12 = 66 | CES37 = 96 | CES62 = 94 | CES87 = 84 |
| CES13 = 44 | CES38 = 98 | CES63 = 87 | CES88 = 86 |
| CES14 = 74 | CES39 = 98 | CES64 = 82 | CES89 = 73 |
| CES15 = 72 | CES40 = 95 | CES65 = 78 | CES90 = 88 |
| CES16 = 48 | CES41 = 96 | CES66 = 81 | CES91 = 82 |
| CES17 = 50 | CES42 = 97 | CES67 = 80 | CES92 = 64 |
| CES18 = 57 | CES43 = 91 | CES68 = 83 | CES93 = 78 |
| CES19 = 73 | CES44 = 99 | CES69 = 88 | CES94 = 59 |
| CES20 = 67 | CES45 = 93 | CES70 = 80 | CES95 = 74 |
| CES21 = 87 | CES46 = 89 | CES71 = 79 | CES96 = 83 |
| CES22 = 79 | CES47 = 92 | CES72 = 92 | CES97 = 88 |
| CES23 = 92 | CES48 = 83 | CES73 = 75 | CES98 = 83 |
| CES24 = 91 | CES49 = 90 | CES74 = 91 | CES99 = 74 |
| CES25 = 72 | CES50 = 94 | CES75 = 81 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)