

Scaled data based on original data using  
LM-79-2019 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for  
Cooper Lighting Solutions

Brand: STREETWORKS

Report Number: P364164

Luminaire Tested: NVN-SA2B-727-U-AFL-HSS

Issue Date: 3/3/2020

### Test Information

Test Method: LM-79-2019  
Report Number: P364164  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-30)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: STREETWORKS  
Catalog Number: NVN-SA2B-727-U-AFL-HSS  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(2) 70 CRI, 2700K, 800mA LIGHTSQUARES WITH 16 LEDS EACH AND AUTOMOTIVE  
FRONTLINE OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

### Summary

Lumens per Lamp: N/A  
Luminaire Lumens: 8209 lumens  
Efficiency: N/A  
Efficacy: 96.6 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 1' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B1 - U0 - G1

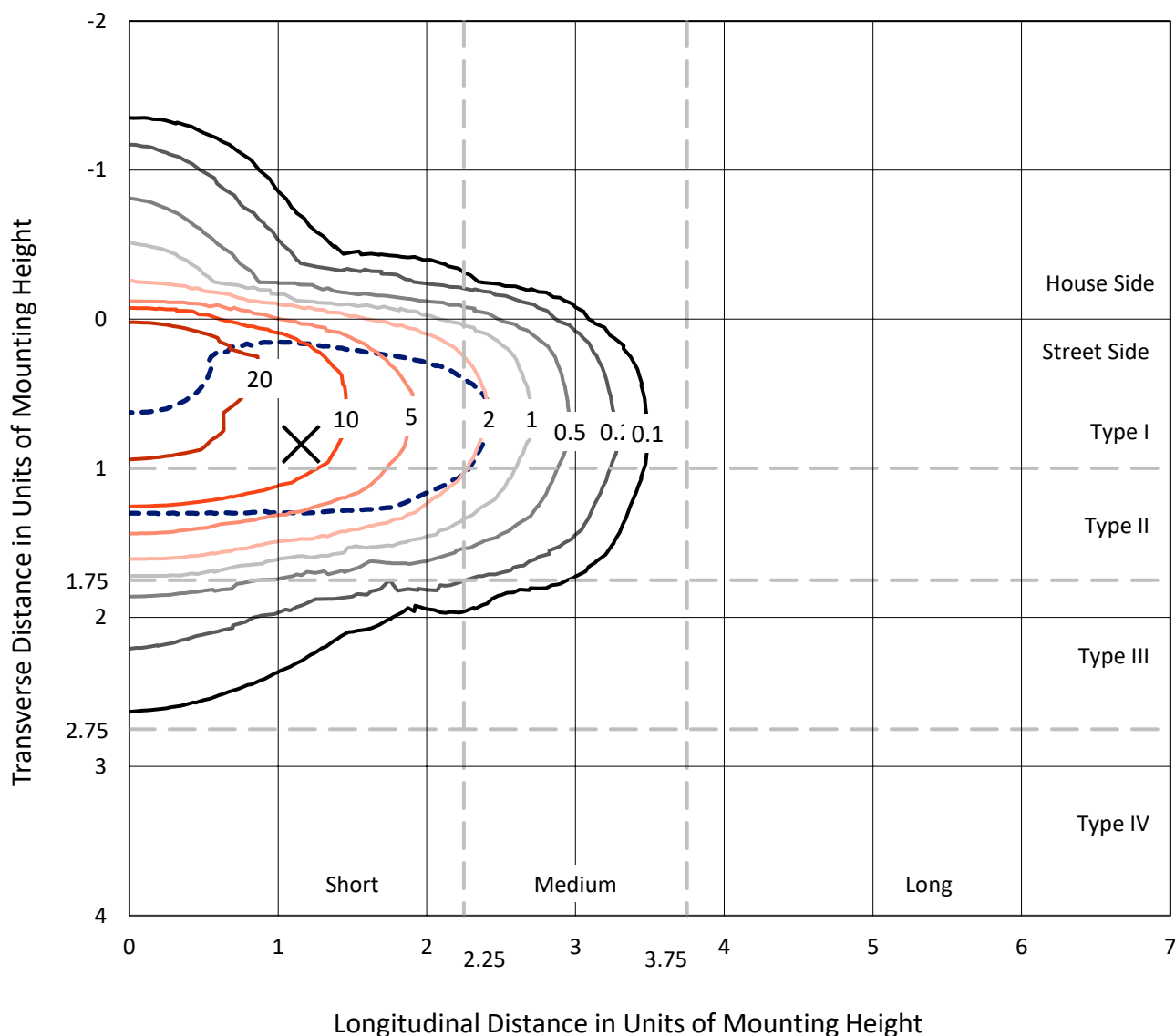
Input Watts (W): 85  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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## Iso-Footcandle Lines of Horizontal Illumination

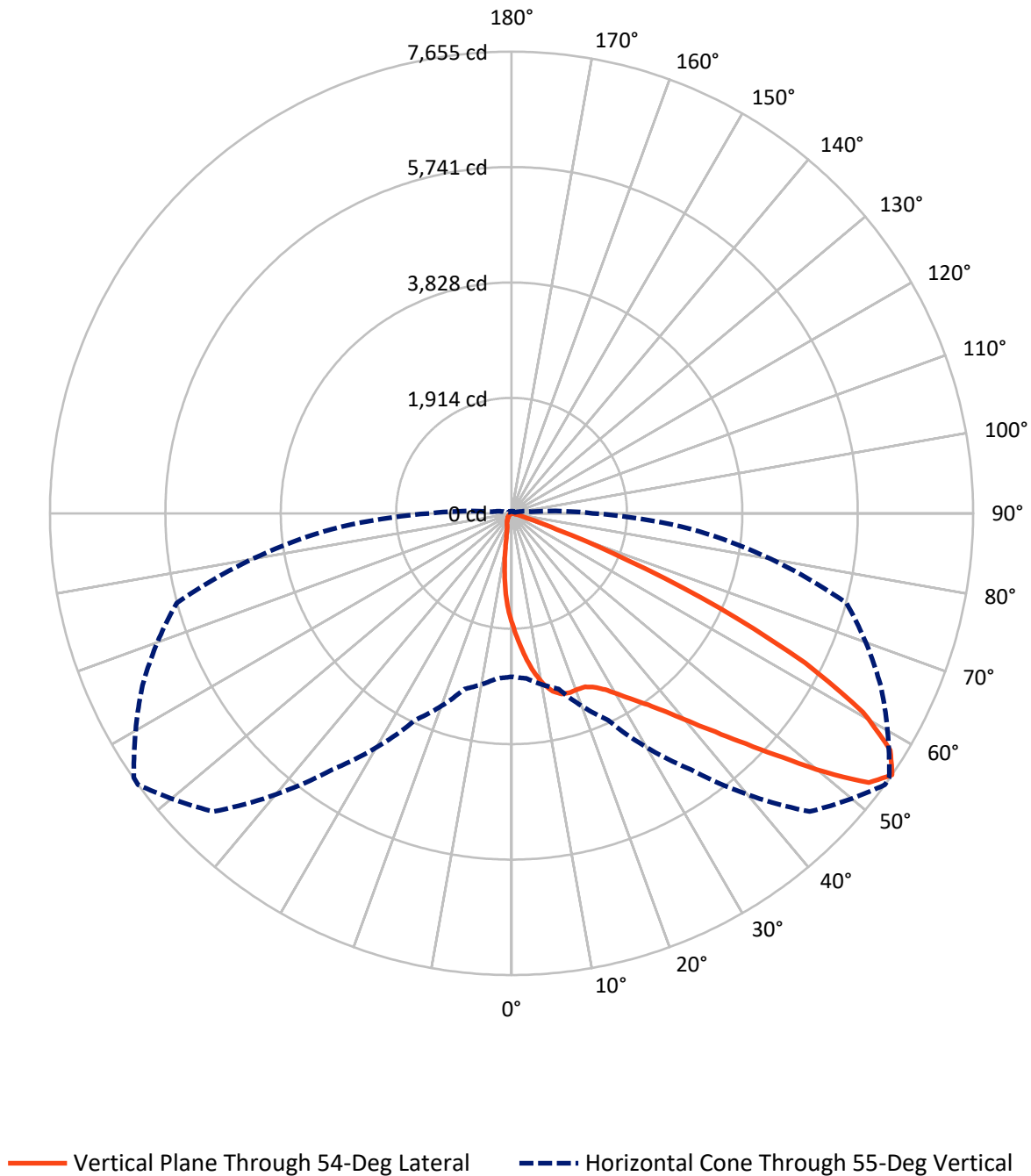
× Max cd  
 - - - 1/2 Max cd



Based on 10 foot mounting height. Maximum calculated value = 28.2 fc  
 Type II - Short - N/A

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## Luminous Intensity Polar Plot



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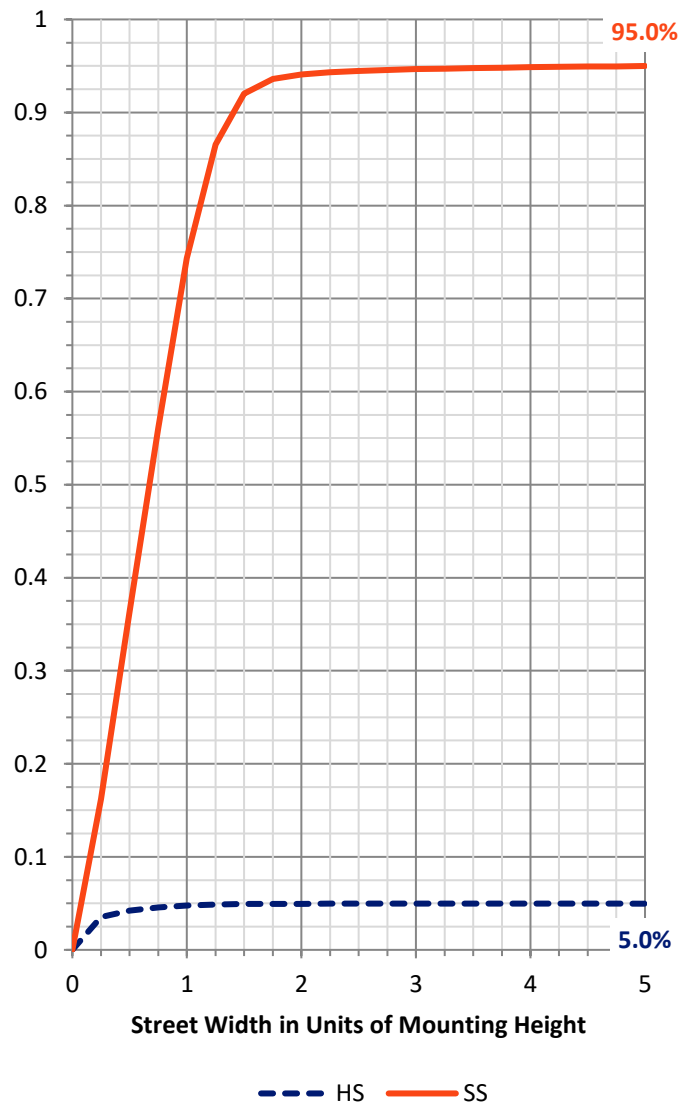
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 409.6    | 0.0    | 409.6  |
|                    | % Fixture | 5.0      | 0.0    | 5.0    |
| <b>Street Side</b> | Lumens    | 7799.4   | 0.0    | 7799.4 |
|                    | % Fixture | 95.0     | 0.0    | 95.0   |
| <b>Total</b>       | Lumens    | 8209.0   | 0.0    | 8209.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 169.3  | 2.1       |
| 10°-20°   | 464.3  | 5.7       |
| 20°-30°   | 792.7  | 9.7       |
| 30°-40°   | 1272.2 | 15.5      |
| 40°-50°   | 2033.0 | 24.8      |
| 50°-60°   | 2178.4 | 26.5      |
| 60°-70°   | 1118.5 | 13.6      |
| 70°-80°   | 169.4  | 2.1       |
| 80°-90°   | 11.0   | 0.1       |
| 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°    | 8209.0 | 100.0     |
| 0°-180°   | 8209.0 | 100.0     |

**Coefficient of Utilization**



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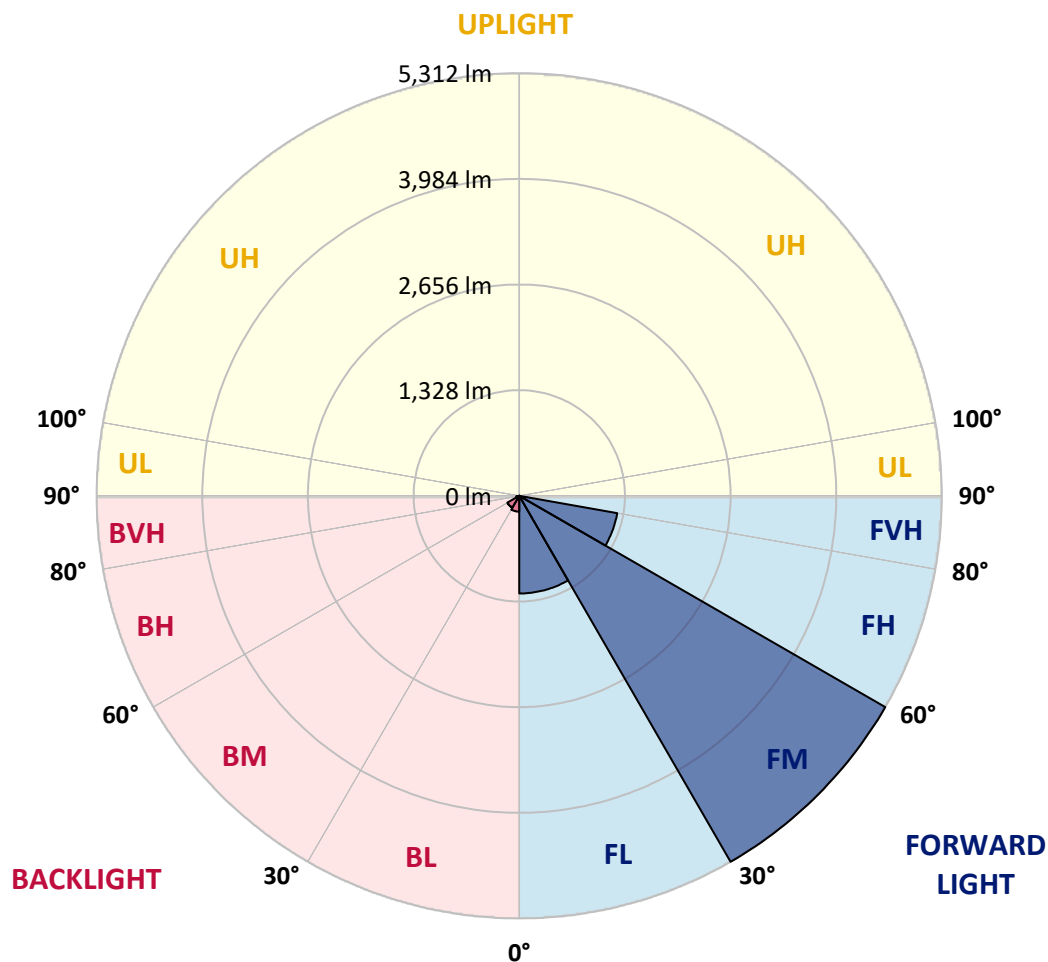
CATALOG NUMBER: NVN-SA2B-727-U-AFL-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 1227.1 | 14.9      |                         |      |         |
| FM   | (30°-60°)   | 5311.6 | 64.7      |                         |      |         |
| FH   | (60°-80°)   | 1250.2 | 15.2      |                         |      | G1/1800 |
| FVH  | (80°-90°)   | 10.6   | 0.1       |                         |      | G1/100  |
| BL   | (0°-30°)    | 199.3  | 2.4       | B1/500                  |      |         |
| BM   | (30°-60°)   | 172.1  | 2.1       | B0/220                  |      |         |
| BH   | (60°-80°)   | 37.7   | 0.5       | B0/110                  |      | G0/110  |
| BVH  | (80°-90°)   | 0.4    | 0.0       |                         |      | G0/10   |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

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

Type II Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 54°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1838.5 | 1838.5 | 1838.5 | 1838.5 | 1838.5 | 1838.5 | 1838.5 | 1838.5 | 1838.5 | 1838.5 | 1838.5 |
| 2.5°  | 2307.1 | 2272.8 | 2273.8 | 2258.2 | 2201.1 | 2156.5 | 2110.0 | 2099.1 | 2026.7 | 1950.9 | 1877.8 |
| 5°    | 2706.0 | 2680.8 | 2674.8 | 2644.6 | 2565.2 | 2481.2 | 2391.2 | 2370.3 | 2228.8 | 2073.5 | 1920.7 |
| 7.5°  | 2910.9 | 2911.2 | 2906.3 | 2895.3 | 2845.6 | 2764.1 | 2654.2 | 2632.2 | 2439.7 | 2206.8 | 1965.4 |
| 10°   | 2851.3 | 2864.8 | 2892.4 | 2929.0 | 2966.9 | 2956.6 | 2874.0 | 2854.2 | 2645.0 | 2347.9 | 2015.0 |
| 12.5° | 2712.4 | 2714.1 | 2745.0 | 2804.9 | 2914.1 | 3026.1 | 3027.5 | 3020.8 | 2841.0 | 2495.4 | 2069.6 |
| 15°   | 2643.2 | 2650.0 | 2661.3 | 2699.9 | 2803.5 | 2982.8 | 3111.2 | 3120.7 | 3020.8 | 2652.1 | 2127.8 |
| 17.5° | 2688.6 | 2698.2 | 2688.6 | 2693.2 | 2753.1 | 2914.4 | 3125.7 | 3150.2 | 3177.8 | 2807.0 | 2182.7 |
| 20°   | 2811.6 | 2820.5 | 2803.5 | 2784.7 | 2796.4 | 2894.6 | 3115.4 | 3148.4 | 3300.8 | 2944.6 | 2228.8 |
| 22.5° | 2977.5 | 2981.1 | 2955.2 | 2924.3 | 2915.8 | 2961.9 | 3123.9 | 3158.0 | 3399.4 | 3069.0 | 2257.9 |
| 25°   | 3160.1 | 3163.3 | 3131.0 | 3095.6 | 3075.4 | 3094.2 | 3193.8 | 3219.3 | 3486.2 | 3187.7 | 2274.5 |
| 27.5° | 3359.0 | 3361.8 | 3321.4 | 3277.8 | 3254.4 | 3255.1 | 3309.0 | 3336.3 | 3578.8 | 3323.2 | 2288.0 |
| 30°   | 3569.2 | 3567.8 | 3530.6 | 3469.9 | 3440.2 | 3439.5 | 3474.9 | 3502.6 | 3712.8 | 3496.9 | 2306.4 |
| 32.5° | 3805.3 | 3802.5 | 3749.6 | 3674.5 | 3640.8 | 3645.8 | 3677.3 | 3693.3 | 3879.0 | 3681.9 | 2339.4 |
| 35°   | 4116.2 | 4108.1 | 4028.3 | 3935.1 | 3873.0 | 3871.2 | 3897.8 | 3910.6 | 4091.0 | 3906.0 | 2394.4 |
| 37.5° | 4519.6 | 4512.2 | 4404.1 | 4268.6 | 4181.4 | 4148.8 | 4180.4 | 4196.7 | 4393.4 | 4193.5 | 2482.6 |
| 40°   | 4917.4 | 4910.0 | 4845.8 | 4721.7 | 4587.4 | 4509.0 | 4533.8 | 4551.2 | 4771.0 | 4542.3 | 2593.9 |
| 42.5° | 5191.8 | 5198.2 | 5220.5 | 5230.8 | 5104.9 | 4940.4 | 4951.8 | 4969.9 | 5167.7 | 4915.3 | 2721.2 |
| 45°   | 5264.1 | 5277.9 | 5404.1 | 5651.9 | 5699.1 | 5570.8 | 5452.0 | 5461.9 | 5570.8 | 5288.2 | 2848.5 |
| 47.5° | 5046.8 | 5072.3 | 5315.9 | 5776.7 | 6175.9 | 6266.7 | 6041.9 | 6028.8 | 5957.5 | 5589.9 | 2938.9 |
| 50°   | 4553.0 | 4576.4 | 4891.9 | 5573.6 | 6320.6 | 6931.0 | 6748.8 | 6710.2 | 6296.8 | 5770.4 | 2970.8 |
| 52.5° | 3838.3 | 3866.6 | 4122.9 | 4934.1 | 6047.9 | 7227.4 | 7418.1 | 7385.9 | 6545.7 | 5784.5 | 2976.1 |
| 55°   | 2710.6 | 2745.0 | 3016.2 | 3781.6 | 5184.0 | 6991.6 | 7655.3 | 7645.7 | 6752.3 | 5747.0 | 2987.5 |
| 57.5° | 1523.3 | 1548.1 | 1840.6 | 2424.1 | 3796.8 | 6089.8 | 7407.5 | 7470.9 | 6877.1 | 5681.7 | 3004.5 |
| 60°   | 676.4  | 683.1  | 834.5  | 1206.8 | 2222.8 | 4654.0 | 6698.1 | 6805.2 | 6770.1 | 5594.5 | 3033.2 |
| 62.5° | 375.1  | 369.4  | 369.4  | 501.6  | 966.0  | 2881.1 | 5461.9 | 5638.8 | 6313.1 | 5491.4 | 3034.6 |
| 65°   | 293.9  | 288.6  | 273.3  | 275.5  | 368.0  | 1278.7 | 3782.3 | 4096.7 | 5445.3 | 5189.0 | 2932.5 |
| 67.5° | 249.2  | 244.6  | 229.4  | 223.3  | 228.7  | 421.9  | 2078.1 | 2404.6 | 4131.8 | 4403.0 | 2540.1 |
| 70°   | 210.6  | 207.4  | 199.6  | 192.1  | 178.7  | 208.5  | 795.2  | 1017.1 | 2546.1 | 2929.0 | 1733.9 |
| 72.5° | 169.5  | 168.0  | 170.9  | 164.5  | 148.2  | 139.0  | 271.9  | 329.3  | 1143.6 | 1307.1 | 714.3  |
| 75°   | 146.1  | 145.3  | 146.8  | 140.4  | 122.0  | 96.8   | 138.3  | 151.0  | 322.6  | 319.8  | 144.6  |
| 77.5° | 95.0   | 96.1   | 121.6  | 118.8  | 104.9  | 64.5   | 71.6   | 77.3   | 97.8   | 73.4   | 44.0   |
| 80°   | 60.6   | 59.9   | 61.7   | 98.6   | 94.3   | 49.3   | 35.8   | 37.6   | 47.1   | 36.2   | 21.3   |
| 82.5° | 36.9   | 36.2   | 40.4   | 46.1   | 47.5   | 34.4   | 22.0   | 22.3   | 29.4   | 23.4   | 11.3   |
| 85°   | 3.2    | 4.3    | 24.5   | 22.7   | 16.3   | 10.6   | 10.6   | 11.3   | 15.6   | 13.8   | 6.4    |
| 87.5° | 0.0    | 0.0    | 4.3    | 6.4    | 3.5    | 3.9    | 3.9    | 4.3    | 6.0    | 6.0    | 3.2    |
| 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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CATALOG NUMBER: NVN-SA2B-727-U-AFL-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 1838.5 | 1838.5 | 1838.5 | 1838.5 | 1838.5 | 1838.5 | 1838.5 | 1838.5 | 1838.5 | 1838.5 | 1838.5 |
| 2.5°  | 1839.9 | 1803.0 | 1728.6 | 1657.0 | 1596.4 | 1537.9 | 1471.2 | 1405.3 | 1374.4 | 1362.0 | 1349.3 |
| 5°    | 1843.1 | 1767.2 | 1613.7 | 1459.2 | 1298.9 | 1154.6 | 1031.6 | 905.4  | 842.3  | 814.7  | 801.9  |
| 7.5°  | 1847.3 | 1731.8 | 1483.6 | 1224.1 | 966.0  | 770.3  | 599.5  | 489.6  | 442.1  | 434.6  | 416.2  |
| 10°   | 1848.1 | 1688.9 | 1332.6 | 964.6  | 647.7  | 464.4  | 357.3  | 300.6  | 279.7  | 276.2  | 270.1  |
| 12.5° | 1849.5 | 1638.2 | 1164.9 | 714.3  | 431.8  | 310.6  | 258.4  | 239.6  | 234.0  | 233.6  | 233.6  |
| 15°   | 1853.7 | 1585.0 | 990.9  | 514.7  | 310.2  | 246.0  | 226.9  | 219.4  | 217.3  | 218.4  | 218.0  |
| 17.5° | 1853.7 | 1522.3 | 820.0  | 383.6  | 250.6  | 221.2  | 210.6  | 205.6  | 204.9  | 206.0  | 206.3  |
| 20°   | 1840.3 | 1446.0 | 663.3  | 298.5  | 222.3  | 205.3  | 195.7  | 191.1  | 189.3  | 190.0  | 190.4  |
| 22.5° | 1808.0 | 1352.5 | 535.7  | 247.1  | 203.5  | 190.7  | 180.4  | 173.4  | 170.5  | 170.9  | 170.9  |
| 25°   | 1757.7 | 1241.5 | 419.0  | 213.8  | 188.2  | 175.1  | 163.1  | 154.9  | 153.1  | 152.8  | 153.5  |
| 27.5° | 1693.1 | 1118.8 | 333.6  | 188.2  | 170.2  | 157.8  | 145.7  | 139.0  | 137.5  | 137.9  | 138.3  |
| 30°   | 1629.7 | 991.6  | 263.0  | 166.6  | 150.0  | 138.3  | 129.0  | 125.9  | 125.9  | 126.9  | 127.3  |
| 32.5° | 1571.5 | 869.3  | 208.1  | 147.8  | 131.9  | 121.2  | 115.9  | 115.6  | 117.3  | 118.1  | 118.4  |
| 35°   | 1521.6 | 756.2  | 172.3  | 133.3  | 117.7  | 108.5  | 106.7  | 108.1  | 110.3  | 111.7  | 112.0  |
| 37.5° | 1486.1 | 655.1  | 150.7  | 121.2  | 106.7  | 99.3   | 98.9   | 101.7  | 104.6  | 107.8  | 108.5  |
| 40°   | 1471.2 | 569.7  | 135.8  | 110.6  | 97.8   | 92.2   | 91.1   | 95.0   | 100.3  | 104.9  | 105.6  |
| 42.5° | 1458.8 | 499.9  | 123.0  | 100.3  | 90.8   | 82.6   | 82.2   | 87.2   | 93.6   | 98.2   | 99.3   |
| 45°   | 1448.2 | 443.8  | 111.3  | 89.3   | 81.5   | 70.9   | 72.0   | 78.3   | 83.3   | 88.3   | 89.3   |
| 47.5° | 1426.2 | 397.8  | 98.6   | 77.6   | 67.4   | 60.6   | 62.7   | 68.4   | 72.3   | 79.8   | 80.8   |
| 50°   | 1386.8 | 360.2  | 85.4   | 63.5   | 54.9   | 52.5   | 55.7   | 59.6   | 64.5   | 70.9   | 71.6   |
| 52.5° | 1360.3 | 331.8  | 74.1   | 53.2   | 45.4   | 46.1   | 49.3   | 50.7   | 53.5   | 56.0   | 55.3   |
| 55°   | 1345.0 | 316.2  | 64.9   | 46.1   | 38.6   | 40.8   | 41.5   | 39.7   | 38.3   | 35.8   | 34.7   |
| 57.5° | 1343.2 | 302.0  | 57.8   | 40.1   | 34.0   | 35.1   | 32.6   | 26.6   | 21.6   | 18.8   | 18.1   |
| 60°   | 1340.4 | 284.7  | 52.1   | 33.7   | 30.1   | 28.7   | 23.4   | 14.5   | 10.3   | 9.6    | 9.6    |
| 62.5° | 1309.6 | 257.7  | 47.9   | 28.4   | 25.5   | 21.6   | 13.5   | 6.7    | 5.7    | 6.0    | 6.0    |
| 65°   | 1211.4 | 220.2  | 43.6   | 23.0   | 20.2   | 15.6   | 6.7    | 3.9    | 2.1    | 2.5    | 2.5    |
| 67.5° | 1029.9 | 175.5  | 39.0   | 17.7   | 15.2   | 9.9    | 3.9    | 1.8    | 0.0    | 0.0    | 0.0    |
| 70°   | 689.5  | 108.8  | 33.0   | 12.4   | 9.9    | 6.0    | 2.8    | 0.4    | 0.0    | 0.0    | 0.0    |
| 72.5° | 264.5  | 58.8   | 26.6   | 7.4    | 6.4    | 4.3    | 1.8    | 0.0    | 0.0    | 0.0    | 0.0    |
| 75°   | 59.6   | 38.6   | 18.4   | 5.3    | 4.6    | 2.8    | 0.7    | 0.0    | 0.0    | 0.0    | 0.0    |
| 77.5° | 22.7   | 28.0   | 10.6   | 3.5    | 3.2    | 1.8    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 80°   | 11.0   | 16.7   | 5.0    | 2.1    | 1.8    | 0.7    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 82.5° | 5.7    | 6.4    | 2.1    | 1.1    | 0.7    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 85°   | 3.2    | 3.2    | 1.1    | 0.7    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 87.5° | 1.8    | 1.1    | 0.4    | 0.4    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

Signify Classified - Internal  
Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



LM-79-2008: Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Report Prepared for

Cooper Lighting Solutions

McGRAW-EDISON

Report Number: SP1-1908-441-1-R4

Test Date: 08/20/2019

Luminaire Tested: SA1C-727-U-5WQ

### Test Information

Test Method: LM-79-2008  
 Report Number: SP1-1908-441-1-R4  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 10/28/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: MCGRAW-EDISON  
 Catalog Number: **SA1C-727-U-5WQ**  
 Description: MCGRAW EDISON ROADWAY AND AREA LUMINAIRE

\*\*\*THIS IS A REVISION OF SP1-1908-441-1-R3. TO UPDATE THE CATALOG NUMBER.\*\*\*TESTED IN SITU. (1) 70 CRI, 2700K, 1050MA LIGHTSQUARE WITH 16 LEDS AND TYPE V WIDE OPTICS.

### Spectral Parameters

|                           |        |           |      |      |       |
|---------------------------|--------|-----------|------|------|-------|
| CCT (K):                  | 2741   | CRI (Ra): | 71.5 |      |       |
| CIE u':                   | 0.2605 | R1:       | 69.2 | R9:  | -16.1 |
| CIE v':                   | 0.5272 | R2:       | 79.4 | R10: | 51.4  |
| Duv:                      | 0.0005 | R3:       | 87.8 | R11: | 63.1  |
| CIE x:                    | 0.4573 | R4:       | 69.4 | R12: | 42.0  |
| CIE y:                    | 0.4113 | R5:       | 66.4 | R13: | 70.2  |
| CIE z:                    | 0.1313 | R6:       | 69.8 | R14: | 92.4  |
| Peak Wavelength (nm):     | 602    | R7:       | 79.8 |      |       |
| Dominant Wavelength (nm): | 583    | R8:       | 50.1 |      |       |
| Purity:                   | 61.2   |           |      |      |       |
| Rf:                       | 69.9   |           |      |      |       |
| Rg:                       | 98.3   |           |      |      |       |



### Test Conditions

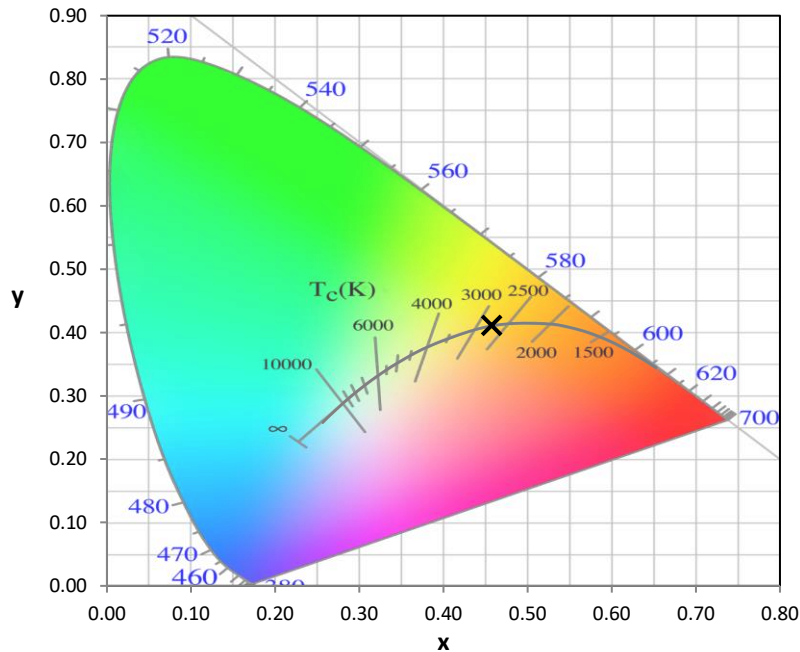
Stabilization Time: 56M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.3./42%  
 Sphere Temperature (°C): 25.7

REPORT NUMBER: SP1-1908-441-1-R4

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 6/28/2019        | 12/28/2019           |
| Power Meter                    | IN0071                | 12/5/2018        | 12/5/2019            |
| AC Power Source                | IN0063                | 12/5/2018        | 12/5/2019            |
| DC Power Source                | IN0208                | 12/5/2018        | 12/5/2019            |
| Sphere Thermometer             | IN0085                | 12/5/2018        | 12/5/2019            |
| Room Thermometer               | IN0046                | 12/5/2018        | 12/5/2019            |

REPORT NUMBER: SP1-1908-441-1-R4

CIE 1931 Chromaticity Diagram



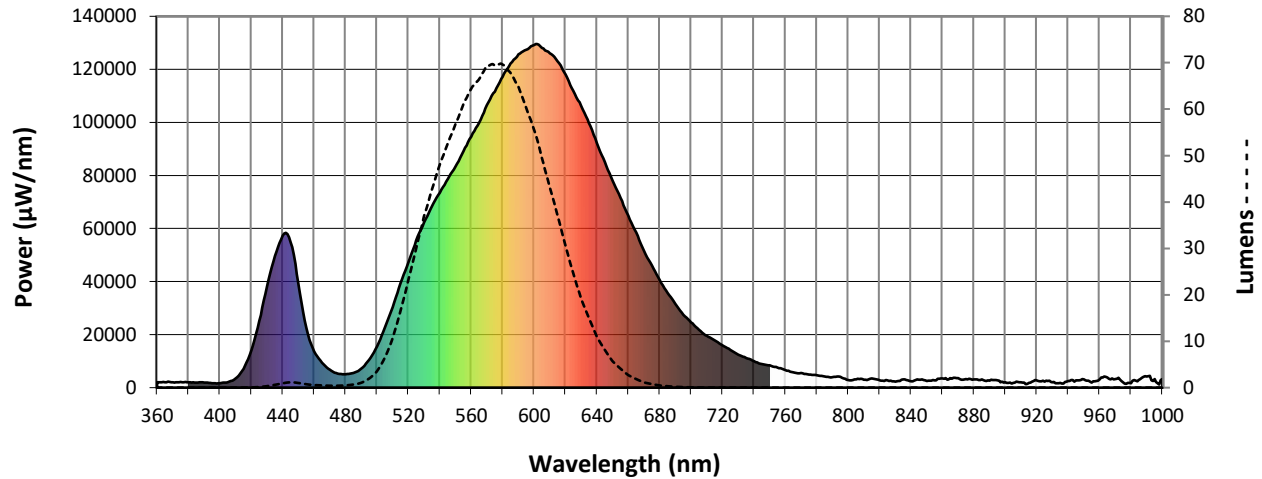
CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 2700K 4-step quadrangle

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**Photopic Flux vs. Wavelength**



**Photopic Lumens: 6211.7**

| 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       | 2044             | 0.0              | 490       | 7179             | 1.0              | 620       | 118034           | 30.7             | 750       | 8362             | 0.0              | 880       | 3128             | 0.0              |
| 365       | 2016             | 0.0              | 495       | 10476            | 1.9              | 625       | 111884           | 24.7             | 755       | 7635             | 0.0              | 885       | 3110             | 0.0              |
| 370       | 2020             | 0.0              | 500       | 15549            | 3.4              | 630       | 106119           | 19.2             | 760       | 6582             | 0.0              | 890       | 2632             | 0.0              |
| 375       | 2137             | 0.0              | 505       | 22477            | 6.3              | 635       | 99706            | 15.0             | 765       | 5777             | 0.0              | 895       | 2709             | 0.0              |
| 380       | 2046             | 0.0              | 510       | 30417            | 10.4             | 640       | 92142            | 11.0             | 770       | 5474             | 0.0              | 900       | 2016             | 0.0              |
| 385       | 1925             | 0.0              | 515       | 39274            | 16.3             | 645       | 84987            | 8.2              | 775       | 4977             | 0.0              | 905       | 1748             | 0.0              |
| 390       | 1893             | 0.0              | 520       | 47282            | 22.9             | 650       | 78016            | 5.7              | 780       | 4723             | 0.0              | 910       | 2046             | 0.0              |
| 395       | 1695             | 0.0              | 525       | 55413            | 29.7             | 655       | 71541            | 4.1              | 785       | 4219             | 0.0              | 915       | 1844             | 0.0              |
| 400       | 1633             | 0.0              | 530       | 62377            | 36.7             | 660       | 64863            | 2.7              | 790       | 3969             | 0.0              | 920       | 2734             | 0.0              |
| 405       | 2065             | 0.0              | 535       | 68520            | 42.5             | 665       | 58485            | 1.9              | 795       | 4122             | 0.0              | 925       | 2307             | 0.0              |
| 410       | 3449             | 0.0              | 540       | 73435            | 47.8             | 670       | 51641            | 1.1              | 800       | 2864             | 0.0              | 930       | 2039             | 0.0              |
| 415       | 7117             | 0.0              | 545       | 78677            | 52.4             | 675       | 46030            | 0.8              | 805       | 3151             | 0.0              | 935       | 1784             | 0.0              |
| 420       | 13992            | 0.0              | 550       | 83331            | 56.6             | 680       | 40590            | 0.5              | 810       | 3022             | 0.0              | 940       | 2464             | 0.0              |
| 425       | 25176            | 0.1              | 555       | 89120            | 60.9             | 685       | 35691            | 0.3              | 815       | 3471             | 0.0              | 945       | 2794             | 0.0              |
| 430       | 38151            | 0.3              | 560       | 94613            | 64.3             | 690       | 31631            | 0.2              | 820       | 2749             | 0.0              | 950       | 3090             | 0.0              |
| 435       | 49673            | 0.6              | 565       | 99818            | 66.4             | 695       | 27437            | 0.1              | 825       | 2729             | 0.0              | 955       | 1866             | 0.0              |
| 440       | 57273            | 0.9              | 570       | 106526           | 69.3             | 700       | 24589            | 0.1              | 830       | 2282             | 0.0              | 960       | 3110             | 0.0              |
| 445       | 54802            | 1.1              | 575       | 111610           | 69.4             | 705       | 21832            | 0.0              | 835       | 3140             | 0.0              | 965       | 3880             | 0.0              |
| 450       | 39184            | 1.0              | 580       | 117163           | 69.6             | 710       | 19500            | 0.0              | 840       | 2365             | 0.0              | 970       | 3243             | 0.0              |
| 455       | 22506            | 0.8              | 585       | 122201           | 67.9             | 715       | 17870            | 0.0              | 845       | 3024             | 0.0              | 975       | 2014             | 0.0              |
| 460       | 13692            | 0.6              | 590       | 125662           | 65.0             | 720       | 15924            | 0.0              | 850       | 2510             | 0.0              | 980       | 1688             | 0.0              |
| 465       | 9446             | 0.5              | 595       | 127415           | 60.4             | 725       | 14268            | 0.0              | 855       | 2739             | 0.0              | 985       | 2827             | 0.0              |
| 470       | 6698             | 0.4              | 600       | 129155           | 55.7             | 730       | 12438            | 0.0              | 860       | 3515             | 0.0              | 990       | 4172             | 0.0              |
| 475       | 5328             | 0.4              | 605       | 128057           | 49.6             | 735       | 11255            | 0.0              | 865       | 3600             | 0.0              | 995       | 3177             | 0.0              |
| 480       | 5081             | 0.5              | 610       | 126031           | 43.3             | 740       | 9951             | 0.0              | 870       | 3609             | 0.0              | 1000      | 3241             | 0.0              |
| 485       | 5579             | 0.7              | 615       | 123059           | 37.1             | 745       | 8870             | 0.0              | 875       | 3208             | 0.0              |           |                  |                  |

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Scotopic Flux vs. Wavelength



Scotopic Lumens: 6474.3

S/P: 1.04

| 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       | 2044             | 0.0              | 490       | 7179             | 6.0              | 620       | 118034           | 0.1              | 750       | 8362             | 0.0              | 880       | 3128             | 0.0              |
| 365       | 2016             | 0.0              | 495       | 10476            | 8.6              | 625       | 111884           | 0.1              | 755       | 7635             | 0.0              | 885       | 3110             | 0.0              |
| 370       | 2020             | 0.0              | 500       | 15549            | 12.5             | 630       | 106119           | 0.0              | 760       | 6582             | 0.0              | 890       | 2632             | 0.0              |
| 375       | 2137             | 0.0              | 505       | 22477            | 17.3             | 635       | 99706            | 0.0              | 765       | 5777             | 0.0              | 895       | 2709             | 0.0              |
| 380       | 2046             | 0.0              | 510       | 30417            | 21.8             | 640       | 92142            | 0.0              | 770       | 5474             | 0.0              | 900       | 2016             | 0.0              |
| 385       | 1925             | 0.0              | 515       | 39274            | 25.7             | 645       | 84987            | 0.0              | 775       | 4977             | 0.0              | 905       | 1748             | 0.0              |
| 390       | 1893             | 0.0              | 520       | 47282            | 27.5             | 650       | 78016            | 0.0              | 780       | 4723             | 0.0              | 910       | 2046             | 0.0              |
| 395       | 1695             | 0.0              | 525       | 55413            | 28.1             | 655       | 71541            | 0.0              | 785       | 4219             | 0.0              | 915       | 1844             | 0.0              |
| 400       | 1633             | 0.0              | 530       | 62377            | 27.0             | 660       | 64863            | 0.0              | 790       | 3969             | 0.0              | 920       | 2734             | 0.0              |
| 405       | 2065             | 0.0              | 535       | 68520            | 24.7             | 665       | 58485            | 0.0              | 795       | 4122             | 0.0              | 925       | 2307             | 0.0              |
| 410       | 3449             | 0.1              | 540       | 73435            | 21.5             | 670       | 51641            | 0.0              | 800       | 2864             | 0.0              | 930       | 2039             | 0.0              |
| 415       | 7117             | 0.5              | 545       | 78677            | 18.3             | 675       | 46030            | 0.0              | 805       | 3151             | 0.0              | 935       | 1784             | 0.0              |
| 420       | 13992            | 1.6              | 550       | 83331            | 15.0             | 680       | 40590            | 0.0              | 810       | 3022             | 0.0              | 940       | 2464             | 0.0              |
| 425       | 25176            | 3.9              | 555       | 89120            | 12.0             | 685       | 35691            | 0.0              | 815       | 3471             | 0.0              | 945       | 2794             | 0.0              |
| 430       | 38151            | 8.1              | 560       | 94613            | 9.3              | 690       | 31631            | 0.0              | 820       | 2749             | 0.0              | 950       | 3090             | 0.0              |
| 435       | 49673            | 13.3             | 565       | 99818            | 7.0              | 695       | 27437            | 0.0              | 825       | 2729             | 0.0              | 955       | 1866             | 0.0              |
| 440       | 57273            | 19.1             | 570       | 106526           | 5.2              | 700       | 24589            | 0.0              | 830       | 2282             | 0.0              | 960       | 3110             | 0.0              |
| 445       | 54802            | 21.6             | 575       | 111610           | 3.7              | 705       | 21832            | 0.0              | 835       | 3140             | 0.0              | 965       | 3880             | 0.0              |
| 450       | 39184            | 18.1             | 580       | 117163           | 2.6              | 710       | 19500            | 0.0              | 840       | 2365             | 0.0              | 970       | 3243             | 0.0              |
| 455       | 22506            | 11.8             | 585       | 122201           | 1.8              | 715       | 17870            | 0.0              | 845       | 3024             | 0.0              | 975       | 2014             | 0.0              |
| 460       | 13692            | 8.1              | 590       | 125662           | 1.2              | 720       | 15924            | 0.0              | 850       | 2510             | 0.0              | 980       | 1688             | 0.0              |
| 465       | 9446             | 6.2              | 595       | 127415           | 0.8              | 725       | 14268            | 0.0              | 855       | 2739             | 0.0              | 985       | 2827             | 0.0              |
| 470       | 6698             | 4.8              | 600       | 129155           | 0.5              | 730       | 12438            | 0.0              | 860       | 3515             | 0.0              | 990       | 4172             | 0.0              |
| 475       | 5328             | 4.1              | 605       | 128057           | 0.4              | 735       | 11255            | 0.0              | 865       | 3600             | 0.0              | 995       | 3177             | 0.0              |
| 480       | 5081             | 4.1              | 610       | 126031           | 0.2              | 740       | 9951             | 0.0              | 870       | 3609             | 0.0              | 1000      | 3241             | 0.0              |
| 485       | 5579             | 4.6              | 615       | 123059           | 0.1              | 745       | 8870             | 0.0              | 875       | 3208             | 0.0              |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 2145.7 M/P: 0.35**

| 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       | 2044             | 0.0              | 490       | 7179             | 11.1             | 620       | 118034           | 1.5              | 750       | 8362             | 0.0              | 880       | 3128             | 0.0              |
| 365       | 2016             | 0.0              | 495       | 10476            | 16.9             | 625       | 111884           | 0.9              | 755       | 7635             | 0.0              | 885       | 3110             | 0.0              |
| 370       | 2020             | 0.0              | 500       | 15549            | 26.0             | 630       | 106119           | 0.6              | 760       | 6582             | 0.0              | 890       | 2632             | 0.0              |
| 375       | 2137             | 0.0              | 505       | 22477            | 38.2             | 635       | 99706            | 0.4              | 765       | 5777             | 0.0              | 895       | 2709             | 0.0              |
| 380       | 2046             | 0.0              | 510       | 30417            | 51.6             | 640       | 92142            | 0.2              | 770       | 5474             | 0.0              | 900       | 2016             | 0.0              |
| 385       | 1925             | 0.0              | 515       | 39274            | 65.1             | 645       | 84987            | 0.1              | 775       | 4977             | 0.0              | 905       | 1748             | 0.0              |
| 390       | 1893             | 0.0              | 520       | 47282            | 75.2             | 650       | 78016            | 0.1              | 780       | 4723             | 0.0              | 910       | 2046             | 0.0              |
| 395       | 1695             | 0.0              | 525       | 55413            | 82.9             | 655       | 71541            | 0.1              | 785       | 4219             | 0.0              | 915       | 1844             | 0.0              |
| 400       | 1633             | 0.0              | 530       | 62377            | 86.0             | 660       | 64863            | 0.0              | 790       | 3969             | 0.0              | 920       | 2734             | 0.0              |
| 405       | 2065             | 0.1              | 535       | 68520            | 85.4             | 665       | 58485            | 0.0              | 795       | 4122             | 0.0              | 925       | 2307             | 0.0              |
| 410       | 3449             | 0.2              | 540       | 73435            | 81.1             | 670       | 51641            | 0.0              | 800       | 2864             | 0.0              | 930       | 2039             | 0.0              |
| 415       | 7117             | 0.7              | 545       | 78677            | 75.4             | 675       | 46030            | 0.0              | 805       | 3151             | 0.0              | 935       | 1784             | 0.0              |
| 420       | 13992            | 2.3              | 550       | 83331            | 68.1             | 680       | 40590            | 0.0              | 810       | 3022             | 0.0              | 940       | 2464             | 0.0              |
| 425       | 25176            | 6.2              | 555       | 89120            | 60.9             | 685       | 35691            | 0.0              | 815       | 3471             | 0.0              | 945       | 2794             | 0.0              |
| 430       | 38151            | 13.0             | 560       | 94613            | 52.9             | 690       | 31631            | 0.0              | 820       | 2749             | 0.0              | 950       | 3090             | 0.0              |
| 435       | 49673            | 22.2             | 565       | 99818            | 44.8             | 695       | 27437            | 0.0              | 825       | 2729             | 0.0              | 955       | 1866             | 0.0              |
| 440       | 57273            | 32.0             | 570       | 106526           | 37.6             | 700       | 24589            | 0.0              | 830       | 2282             | 0.0              | 960       | 3110             | 0.0              |
| 445       | 54802            | 36.7             | 575       | 111610           | 30.4             | 705       | 21832            | 0.0              | 835       | 3140             | 0.0              | 965       | 3880             | 0.0              |
| 450       | 39184            | 30.4             | 580       | 117163           | 24.1             | 710       | 19500            | 0.0              | 840       | 2365             | 0.0              | 970       | 3243             | 0.0              |
| 455       | 22506            | 19.7             | 585       | 122201           | 18.7             | 715       | 17870            | 0.0              | 845       | 3024             | 0.0              | 975       | 2014             | 0.0              |
| 460       | 13692            | 13.2             | 590       | 125662           | 14.0             | 720       | 15924            | 0.0              | 850       | 2510             | 0.0              | 980       | 1688             | 0.0              |
| 465       | 9446             | 10.0             | 595       | 127415           | 10.2             | 725       | 14268            | 0.0              | 855       | 2739             | 0.0              | 985       | 2827             | 0.0              |
| 470       | 6698             | 7.7              | 600       | 129155           | 7.3              | 730       | 12438            | 0.0              | 860       | 3515             | 0.0              | 990       | 4172             | 0.0              |
| 475       | 5328             | 6.7              | 605       | 128057           | 5.0              | 735       | 11255            | 0.0              | 865       | 3600             | 0.0              | 995       | 3177             | 0.0              |
| 480       | 5081             | 6.9              | 610       | 126031           | 3.4              | 740       | 9951             | 0.0              | 870       | 3609             | 0.0              | 1000      | 3241             | 0.0              |
| 485       | 5579             | 8.1              | 615       | 123059           | 2.3              | 745       | 8870             | 0.0              | 875       | 3208             | 0.0              |           |                  |                  |

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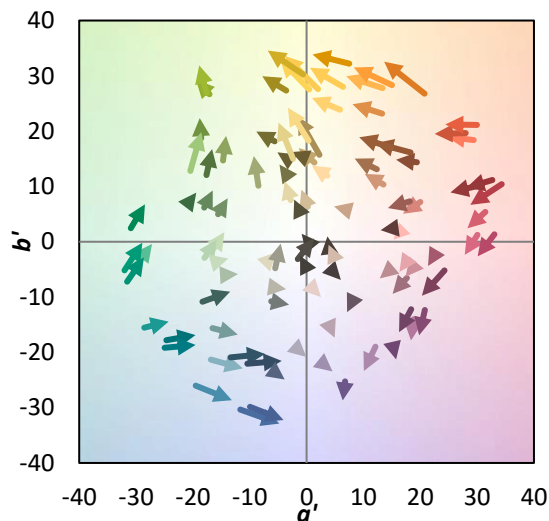
**TM-30-18**

### Summary

$R_f = 69.9$   
 $R_g = 98.3$   
 $CIE R_a = 71.5$   
 $R_9 = -16.1$



### Color Vector Graphics



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**TM-30-18**

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

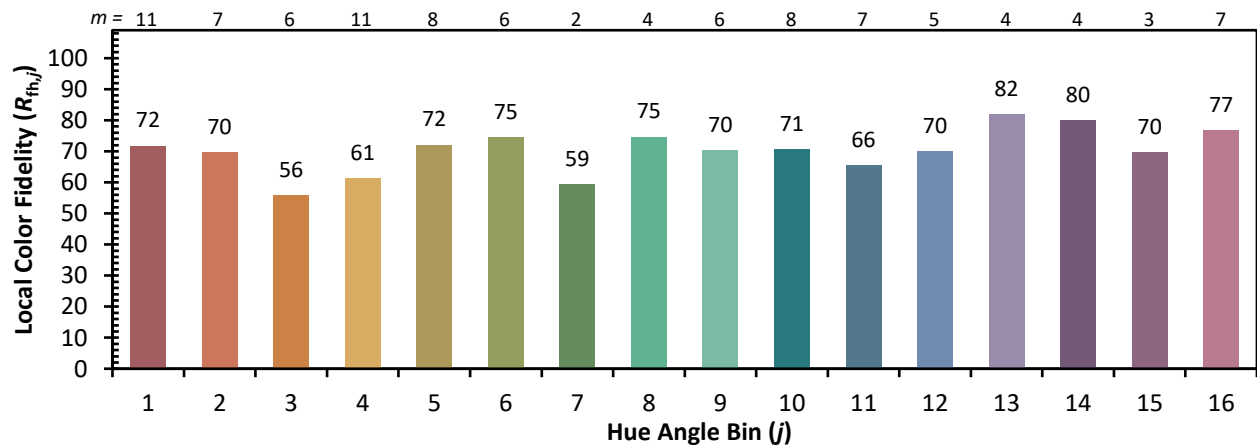
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|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 54 | CES51 = 77 | CES76 = 48 |
| CES02 = 63 | CES27 = 74 | CES52 = 80 | CES77 = 75 |
| CES03 = 31 | CES28 = 80 | CES53 = 66 | CES78 = 56 |
| CES04 = 71 | CES29 = 44 | CES54 = 77 | CES79 = 81 |
| CES05 = 50 | CES30 = 46 | CES55 = 74 | CES80 = 80 |
| CES06 = 52 | CES31 = 50 | CES56 = 63 | CES81 = 73 |
| CES07 = 42 | CES32 = 49 | CES57 = 60 | CES82 = 91 |
| CES08 = 41 | CES33 = 53 | CES58 = 63 | CES83 = 84 |
| CES09 = 29 | CES34 = 66 | CES59 = 85 | CES84 = 90 |
| CES10 = 77 | CES35 = 82 | CES60 = 89 | CES85 = 87 |
| CES11 = 60 | CES36 = 78 | CES61 = 85 | CES86 = 65 |
| CES12 = 66 | CES37 = 75 | CES62 = 69 | CES87 = 78 |
| CES13 = 43 | CES38 = 53 | CES63 = 68 | CES88 = 73 |
| CES14 = 74 | CES39 = 91 | CES64 = 68 | CES89 = 68 |
| CES15 = 71 | CES40 = 85 | CES65 = 65 | CES90 = 68 |
| CES16 = 48 | CES41 = 76 | CES66 = 62 | CES91 = 91 |
| CES17 = 50 | CES42 = 76 | CES67 = 60 | CES92 = 71 |
| CES18 = 57 | CES43 = 65 | CES68 = 68 | CES93 = 82 |
| CES19 = 73 | CES44 = 98 | CES69 = 77 | CES94 = 57 |
| CES20 = 67 | CES45 = 75 | CES70 = 60 | CES95 = 78 |
| CES21 = 88 | CES46 = 70 | CES71 = 57 | CES96 = 80 |
| CES22 = 80 | CES47 = 63 | CES72 = 86 | CES97 = 79 |
| CES23 = 92 | CES48 = 51 | CES73 = 52 | CES98 = 71 |
| CES24 = 91 | CES49 = 68 | CES74 = 90 | CES99 = 64 |
| CES25 = 73 | CES50 = 77 | CES75 = 58 |            |



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Color Rendition by Hue-Angle Bin



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**TM-30-18**

**Measure Comparisons**



(END OF REPORT)