

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: P363600

Luminaire Tested: NVN-SA2D-727-U-SL3-HSS

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-2019  
Report Number: P363600  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-23)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: STREETWORKS  
Catalog Number: NVN-SA2D-727-U-SL3-HSS  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(2) 70 CRI, 2700K, 1200mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE III  
SPILL LIGHT ELIMINATOR OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 11272 lumens  
Efficiency: N/A  
Efficacy: 87.4 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 1' x H: 0')  
IES Classification: Type III - Medium  
BUG Rating: B1 - U0 - G2

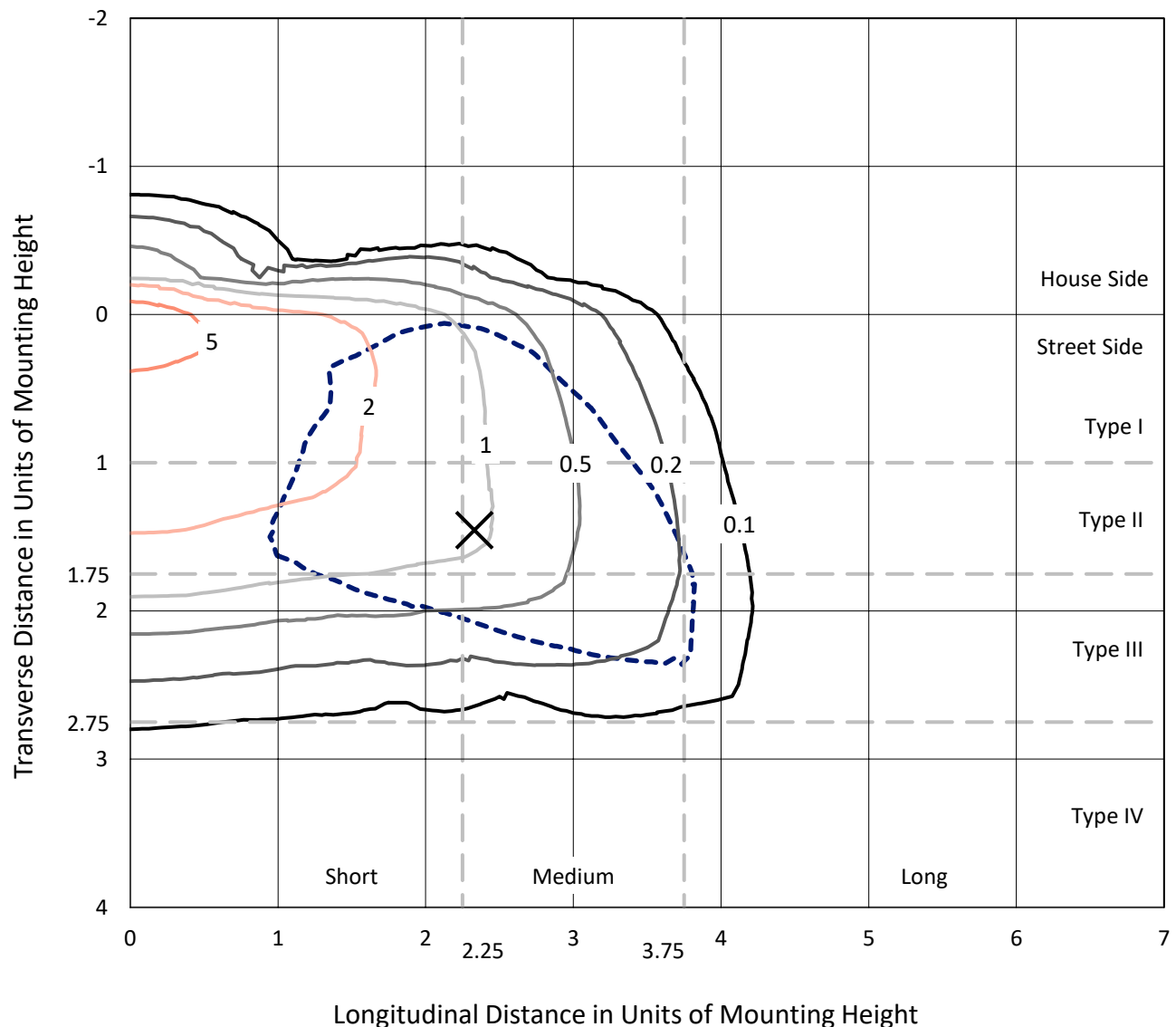
Input Watts (W): 129  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



REPORT NUMBER: P363600  
 CATALOG NUMBER: NVN-SA2D-727-U-SL3-HSS

## Iso-Footcandle Lines of Horizontal Illumination

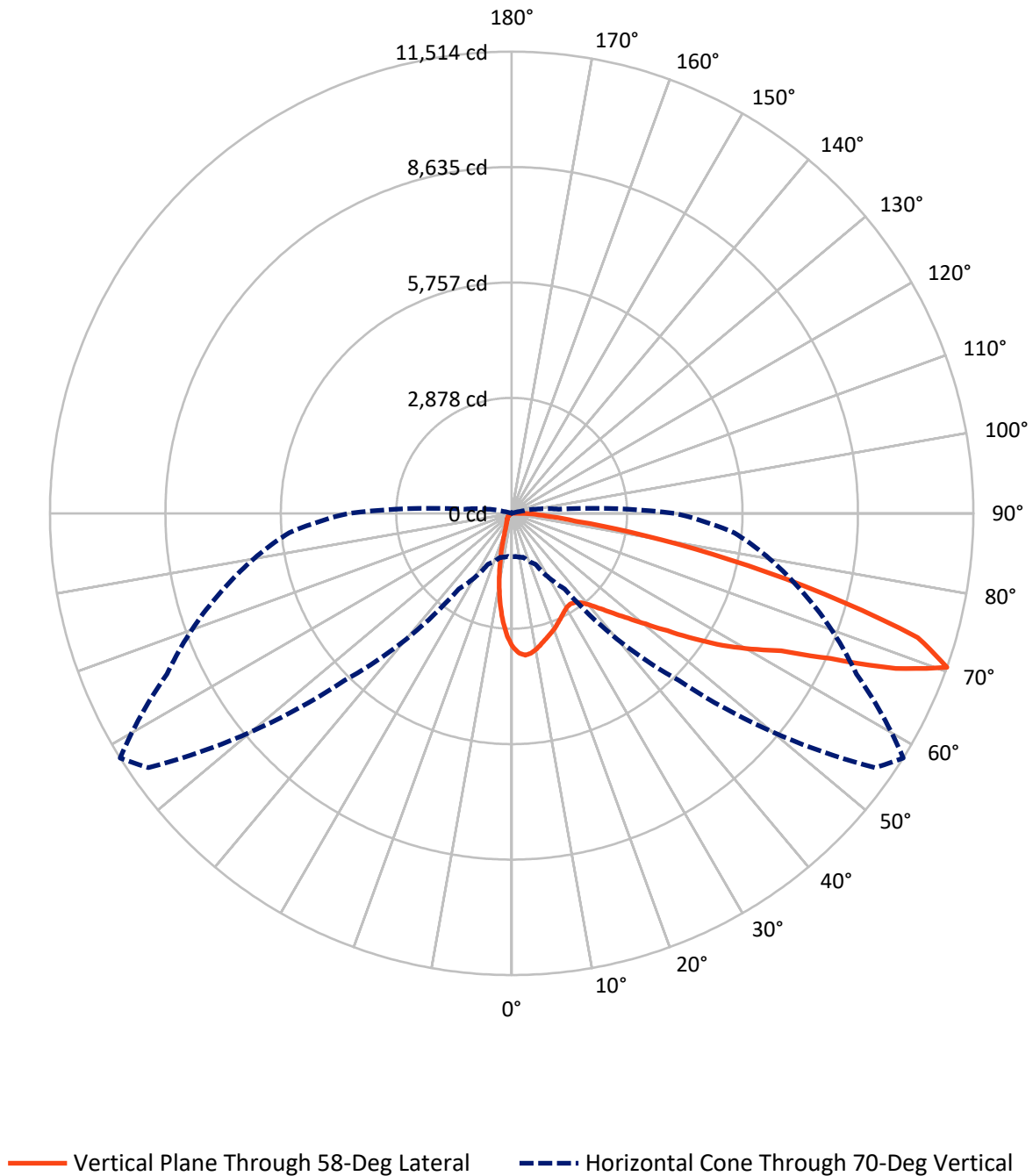
✕ Max cd  
 - - - 1/2 Max cd



Based on 20 foot mounting height. Maximum calculated value = 8.5 fc  
 Type III - Medium - N/A

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## Luminous Intensity Polar Plot



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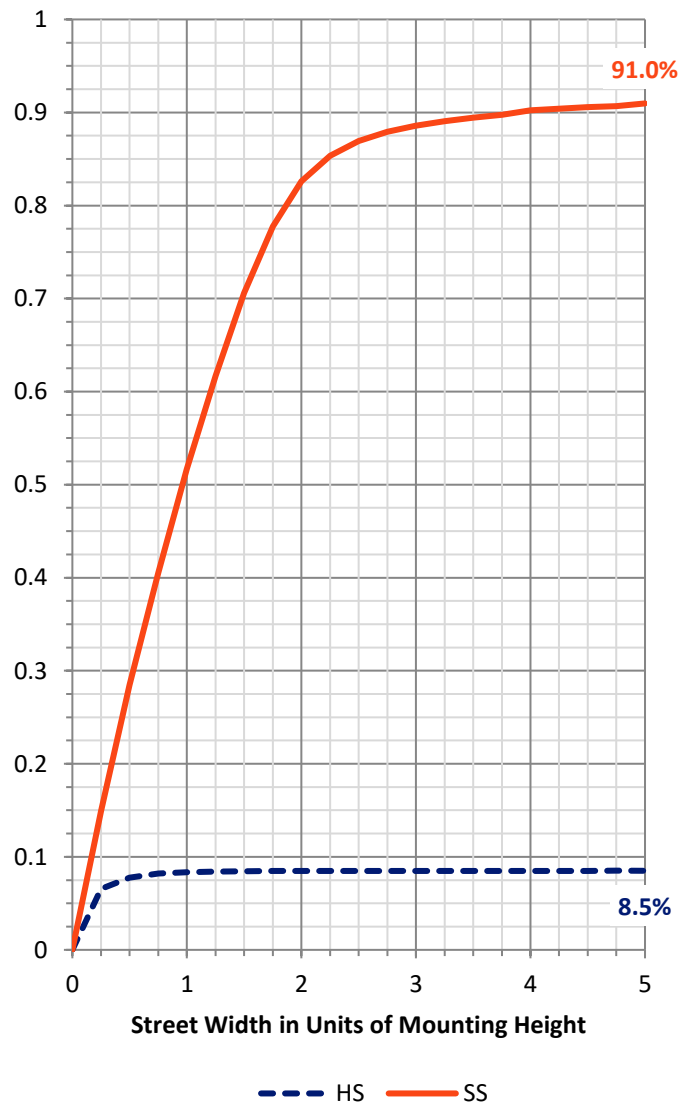
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 964.6    | 0.0    | 964.6   |
|                    | % Fixture | 8.6      | 0.0    | 8.6     |
| <b>Street Side</b> | Lumens    | 10307.4  | 0.0    | 10307.4 |
|                    | % Fixture | 91.4     | 0.0    | 91.4    |
| <b>Total</b>       | Lumens    | 11272.0  | 0.0    | 11272.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 272.3   | 2.4       |
| 10°-20°   | 571.5   | 5.1       |
| 20°-30°   | 751.3   | 6.7       |
| 30°-40°   | 995.0   | 8.8       |
| 40°-50°   | 1487.2  | 13.2      |
| 50°-60°   | 2382.4  | 21.1      |
| 60°-70°   | 3003.0  | 26.6      |
| 70°-80°   | 1619.8  | 14.4      |
| 80°-90°   | 189.6   | 1.7       |
| 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°    | 11272.0 | 100.0     |
| 0°-180°   | 11272.0 | 100.0     |

**Coefficient of Utilization**



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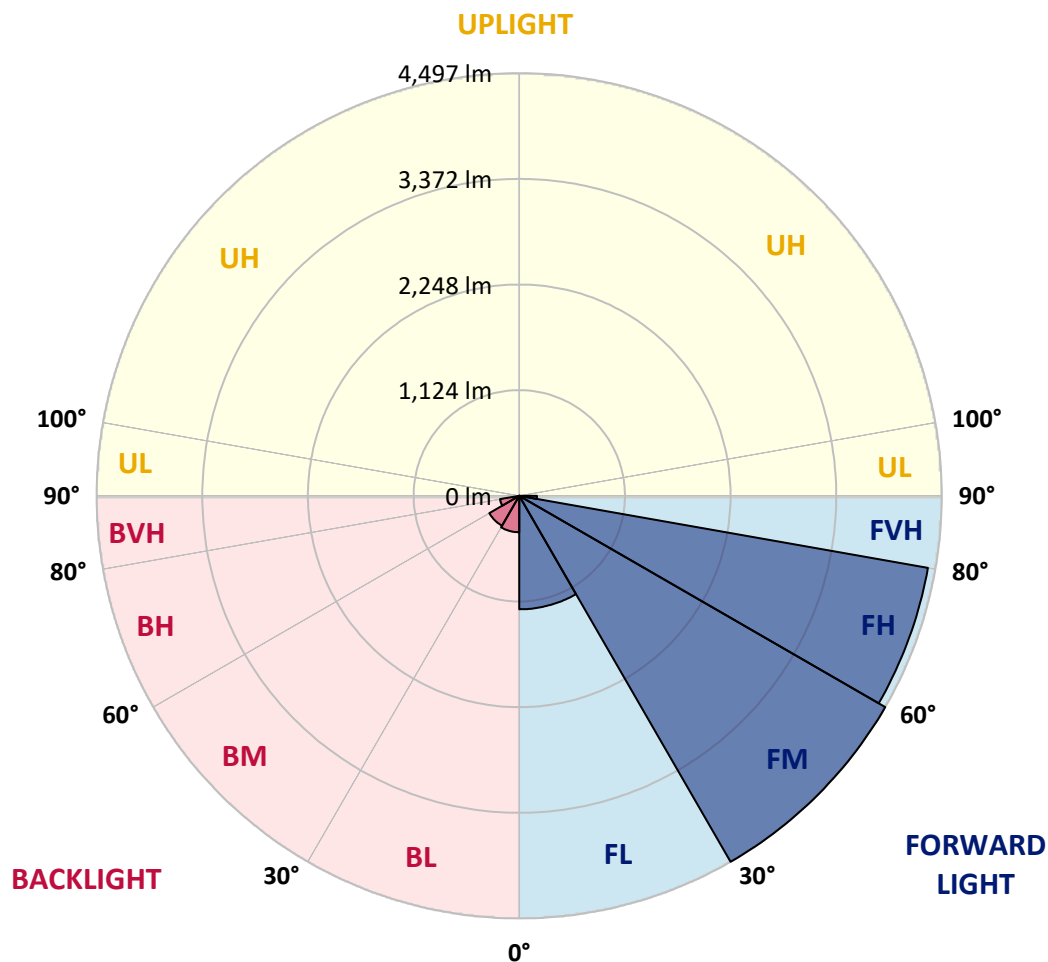
CATALOG NUMBER: NVN-SA2D-727-U-SL3-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 1207.5 | 10.7      |                         |      |         |
| FM   | (30°-60°)   | 4496.6 | 39.9      |                         |      |         |
| FH   | (60°-80°)   | 4415.4 | 39.2      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 188.0  | 1.7       |                         |      | G2/225  |
| BL   | (0°-30°)    | 387.6  | 3.4       | B1/500                  |      |         |
| BM   | (30°-60°)   | 368.0  | 3.3       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 207.4  | 1.8       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 1.6    | 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-G2**

Type III Medium



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°     | 58°     | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|---------|---------|--------|--------|--------|
| 0°    | 3329.7 | 3329.7 | 3329.7 | 3329.7 | 3329.7 | 3329.7 | 3329.7  | 3329.7  | 3329.7 | 3329.7 | 3329.7 |
| 2.5°  | 3605.8 | 3596.9 | 3593.6 | 3588.0 | 3566.4 | 3545.3 | 3503.6  | 3491.9  | 3465.6 | 3403.3 | 3337.2 |
| 5°    | 3608.6 | 3608.1 | 3618.0 | 3615.6 | 3608.1 | 3598.3 | 3568.3  | 3552.8  | 3508.3 | 3419.2 | 3298.3 |
| 7.5°  | 3434.7 | 3443.6 | 3465.6 | 3483.4 | 3504.1 | 3530.8 | 3534.5  | 3519.5  | 3483.0 | 3386.9 | 3226.6 |
| 10°   | 3201.3 | 3215.3 | 3246.3 | 3281.4 | 3335.3 | 3388.8 | 3436.6  | 3434.7  | 3422.0 | 3327.4 | 3140.3 |
| 12.5° | 2967.4 | 2983.8 | 3019.4 | 3071.4 | 3147.8 | 3235.0 | 3320.3  | 3332.0  | 3353.1 | 3273.9 | 3060.7 |
| 15°   | 2762.6 | 2776.6 | 2811.8 | 2875.5 | 2970.2 | 3087.4 | 3212.5  | 3234.1  | 3288.4 | 3232.2 | 2994.1 |
| 17.5° | 2588.7 | 2597.6 | 2623.4 | 2694.1 | 2803.8 | 2945.8 | 3108.5  | 3150.6  | 3231.7 | 3199.4 | 2936.5 |
| 20°   | 2467.3 | 2468.7 | 2485.6 | 2535.2 | 2644.9 | 2803.8 | 3000.7  | 3061.1  | 3171.7 | 3171.3 | 2876.9 |
| 22.5° | 2407.3 | 2402.6 | 2405.9 | 2434.5 | 2515.1 | 2668.3 | 2892.9  | 2964.6  | 3117.8 | 3147.4 | 2816.5 |
| 25°   | 2396.0 | 2392.3 | 2382.9 | 2386.7 | 2435.4 | 2549.8 | 2784.1  | 2867.1  | 3070.5 | 3132.8 | 2764.0 |
| 27.5° | 2431.2 | 2434.9 | 2419.0 | 2402.1 | 2405.9 | 2472.9 | 2687.6  | 2783.7  | 3032.1 | 3132.8 | 2726.9 |
| 30°   | 2502.0 | 2503.8 | 2492.1 | 2470.1 | 2440.6 | 2451.3 | 2620.5  | 2716.6  | 3012.8 | 3154.4 | 2703.5 |
| 32.5° | 2580.2 | 2590.5 | 2589.1 | 2571.3 | 2529.1 | 2485.6 | 2604.6  | 2692.3  | 3011.4 | 3202.2 | 2701.2 |
| 35°   | 2677.3 | 2689.0 | 2708.7 | 2704.9 | 2660.9 | 2589.1 | 2659.0  | 2727.9  | 3039.1 | 3280.9 | 2726.5 |
| 37.5° | 2780.4 | 2798.2 | 2840.4 | 2860.5 | 2831.9 | 2750.8 | 2780.8  | 2830.1  | 3113.2 | 3408.4 | 2790.7 |
| 40°   | 2880.2 | 2900.4 | 2977.2 | 3056.4 | 3034.9 | 2951.4 | 2965.5  | 3004.9  | 3244.9 | 3591.7 | 2912.5 |
| 42.5° | 2978.2 | 3008.2 | 3121.1 | 3251.4 | 3277.2 | 3210.6 | 3218.1  | 3249.5  | 3440.3 | 3843.9 | 3111.7 |
| 45°   | 3095.3 | 3129.1 | 3296.4 | 3457.2 | 3526.1 | 3497.0 | 3528.9  | 3549.5  | 3695.8 | 4177.1 | 3380.3 |
| 47.5° | 3267.4 | 3306.3 | 3511.6 | 3694.8 | 3815.7 | 3834.5 | 3898.7  | 3912.3  | 4018.7 | 4565.2 | 3730.4 |
| 50°   | 3603.0 | 3613.7 | 3799.3 | 3965.7 | 4140.1 | 4252.6 | 4325.7  | 4336.0  | 4409.6 | 4989.4 | 4167.7 |
| 52.5° | 4025.3 | 4032.3 | 4137.3 | 4248.8 | 4447.1 | 4676.8 | 4847.8  | 4862.4  | 4877.8 | 5402.8 | 4599.4 |
| 55°   | 4444.7 | 4443.8 | 4513.2 | 4578.8 | 4805.7 | 5139.4 | 5510.6  | 5519.5  | 5408.4 | 5795.1 | 4929.4 |
| 57.5° | 4706.8 | 4732.1 | 4837.5 | 4921.9 | 5238.7 | 5666.7 | 6181.8  | 6214.6  | 5965.7 | 6085.7 | 5255.6 |
| 60°   | 4623.3 | 4635.5 | 4869.4 | 5181.6 | 5778.2 | 6416.1 | 6860.9  | 6869.4  | 6384.7 | 6375.8 | 5668.1 |
| 62.5° | 3939.0 | 3945.6 | 4313.0 | 4956.6 | 6051.5 | 7388.2 | 7680.2  | 7542.9  | 6866.6 | 6778.4 | 6161.6 |
| 65°   | 2699.8 | 2742.4 | 3049.4 | 3844.8 | 5549.5 | 7998.0 | 8948.6  | 8721.2  | 7601.0 | 7358.7 | 6607.8 |
| 67.5° | 1589.9 | 1580.9 | 1732.8 | 2318.7 | 4075.9 | 7593.1 | 10552.9 | 10327.0 | 8602.7 | 7747.3 | 6477.1 |
| 70°   | 1086.0 | 1079.9 | 1138.0 | 1403.8 | 2300.9 | 5890.2 | 11057.7 | 11513.8 | 9487.1 | 7485.7 | 5574.3 |
| 72.5° | 775.2  | 778.5  | 864.3  | 1090.7 | 1444.6 | 3431.9 | 9509.1  | 10588.6 | 9210.1 | 6525.8 | 4237.1 |
| 75°   | 526.4  | 535.3  | 658.1  | 894.8  | 1266.4 | 1745.9 | 6748.0  | 8049.1  | 7499.8 | 4742.8 | 2435.4 |
| 77.5° | 283.1  | 292.9  | 437.8  | 720.9  | 1145.1 | 1213.0 | 4340.7  | 5539.6  | 4711.0 | 2132.1 | 705.9  |
| 80°   | 118.1  | 123.7  | 204.8  | 524.0  | 989.4  | 1065.4 | 2554.0  | 3359.2  | 2007.5 | 420.4  | 157.5  |
| 82.5° | 51.1   | 53.9   | 85.3   | 312.6  | 739.6  | 899.4  | 1352.2  | 1616.1  | 608.4  | 92.3   | 79.2   |
| 85°   | 9.8    | 10.3   | 35.2   | 165.5  | 472.0  | 507.6  | 876.5   | 859.1   | 273.3  | 39.8   | 57.7   |
| 87.5° | 0.0    | 0.0    | 8.4    | 52.0   | 138.7  | 276.5  | 534.8   | 528.2   | 92.8   | 19.2   | 21.6   |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0     | 0.0     | 0.0    | 0.0    | 0.0    |



REPORT NUMBER: P363600

CATALOG NUMBER: NVN-SA2D-727-U-SL3-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 3329.7 | 3329.7 | 3329.7 | 3329.7 | 3329.7 | 3329.7 | 3329.7 | 3329.7 | 3329.7 | 3329.7 | 3329.7 |
| 2.5°  | 3303.4 | 3271.1 | 3203.1 | 3119.2 | 3055.0 | 2984.3 | 2928.0 | 2856.8 | 2825.8 | 2827.2 | 2810.4 |
| 5°    | 3229.4 | 3162.8 | 3012.4 | 2822.6 | 2676.3 | 2525.4 | 2395.6 | 2266.2 | 2189.8 | 2165.0 | 2141.5 |
| 7.5°  | 3123.5 | 3018.0 | 2778.0 | 2485.6 | 2238.1 | 1996.2 | 1785.8 | 1600.6 | 1483.5 | 1426.3 | 1405.2 |
| 10°   | 3003.9 | 2855.8 | 2508.5 | 2123.2 | 1769.8 | 1442.7 | 1169.9 | 932.7  | 838.0  | 773.8  | 757.4  |
| 12.5° | 2899.0 | 2698.3 | 2245.1 | 1751.6 | 1332.1 | 937.4  | 677.3  | 529.6  | 465.4  | 440.1  | 435.9  |
| 15°   | 2800.1 | 2551.2 | 1991.5 | 1415.0 | 922.4  | 577.0  | 430.7  | 380.6  | 365.6  | 361.4  | 361.4  |
| 17.5° | 2706.8 | 2411.0 | 1743.6 | 1083.7 | 610.3  | 404.5  | 356.7  | 345.4  | 340.8  | 340.3  | 340.8  |
| 20°   | 2609.3 | 2270.9 | 1499.9 | 794.0  | 426.1  | 342.6  | 329.5  | 323.4  | 322.0  | 322.0  | 322.0  |
| 22.5° | 2516.0 | 2130.7 | 1262.7 | 567.1  | 341.7  | 312.6  | 306.1  | 301.8  | 300.4  | 300.0  | 299.0  |
| 25°   | 2426.5 | 1997.6 | 1031.2 | 400.7  | 300.0  | 286.4  | 280.8  | 275.1  | 270.9  | 268.6  | 267.2  |
| 27.5° | 2352.9 | 1879.0 | 815.6  | 321.5  | 270.9  | 259.2  | 252.2  | 243.7  | 233.4  | 228.7  | 226.9  |
| 30°   | 2294.3 | 1770.8 | 628.5  | 271.4  | 243.7  | 232.0  | 221.2  | 206.7  | 191.7  | 183.7  | 183.3  |
| 32.5° | 2248.4 | 1664.4 | 477.1  | 240.0  | 219.4  | 204.8  | 189.4  | 171.1  | 153.7  | 144.8  | 144.4  |
| 35°   | 2225.9 | 1570.6 | 364.7  | 217.0  | 197.8  | 179.5  | 160.3  | 140.1  | 123.3  | 114.8  | 113.9  |
| 37.5° | 2240.9 | 1491.4 | 284.5  | 197.8  | 179.5  | 158.4  | 135.9  | 114.8  | 99.8   | 92.3   | 91.9   |
| 40°   | 2295.7 | 1440.8 | 231.1  | 181.4  | 164.0  | 138.3  | 113.9  | 94.2   | 81.6   | 75.5   | 75.0   |
| 42.5° | 2412.4 | 1422.1 | 197.3  | 167.8  | 149.0  | 119.5  | 94.7   | 77.8   | 66.1   | 61.9   | 60.9   |
| 45°   | 2607.4 | 1449.7 | 174.4  | 154.7  | 133.6  | 101.7  | 78.3   | 63.7   | 53.4   | 50.2   | 49.7   |
| 47.5° | 2867.1 | 1522.4 | 158.0  | 142.0  | 119.5  | 85.8   | 65.2   | 51.6   | 43.6   | 40.3   | 39.8   |
| 50°   | 3201.7 | 1637.7 | 144.4  | 129.4  | 106.4  | 72.6   | 53.9   | 40.8   | 33.7   | 31.4   | 31.4   |
| 52.5° | 3565.9 | 1775.0 | 132.2  | 117.6  | 93.3   | 60.5   | 43.6   | 31.4   | 26.7   | 23.9   | 23.9   |
| 55°   | 3866.8 | 1895.0 | 119.1  | 108.7  | 77.3   | 50.2   | 33.3   | 23.9   | 19.7   | 18.3   | 18.3   |
| 57.5° | 4167.3 | 2022.9 | 104.1  | 93.3   | 61.9   | 40.8   | 25.3   | 17.8   | 14.5   | 13.6   | 13.6   |
| 60°   | 4556.8 | 2179.5 | 89.5   | 75.9   | 48.7   | 30.9   | 18.7   | 12.7   | 10.8   | 10.3   | 10.3   |
| 62.5° | 4985.2 | 2271.4 | 76.4   | 60.9   | 38.0   | 23.0   | 13.6   | 8.4    | 8.0    | 8.0    | 7.5    |
| 65°   | 5247.2 | 2141.5 | 64.2   | 48.7   | 29.5   | 17.3   | 8.9    | 6.1    | 7.0    | 6.6    | 5.6    |
| 67.5° | 4913.0 | 1676.6 | 52.5   | 38.0   | 23.0   | 13.1   | 5.6    | 4.2    | 7.5    | 6.1    | 4.7    |
| 70°   | 4067.9 | 1173.6 | 40.8   | 26.7   | 18.3   | 11.2   | 3.7    | 2.8    | 8.0    | 6.1    | 3.7    |
| 72.5° | 3044.3 | 785.6  | 32.3   | 17.8   | 13.6   | 9.8    | 3.3    | 1.4    | 7.0    | 5.2    | 3.3    |
| 75°   | 1663.4 | 316.4  | 25.8   | 11.2   | 8.4    | 7.0    | 2.3    | 0.9    | 4.7    | 3.7    | 2.3    |
| 77.5° | 437.8  | 83.4   | 18.7   | 7.5    | 4.7    | 2.8    | 1.4    | 0.5    | 2.3    | 1.9    | 0.9    |
| 80°   | 111.6  | 32.3   | 12.2   | 5.2    | 3.3    | 1.4    | 0.0    | 0.0    | 0.5    | 0.0    | 0.0    |
| 82.5° | 59.5   | 13.6   | 7.5    | 3.7    | 1.9    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 85°   | 45.0   | 8.9    | 4.2    | 2.3    | 0.5    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 87.5° | 17.3   | 2.8    | 1.4    | 0.0    | 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

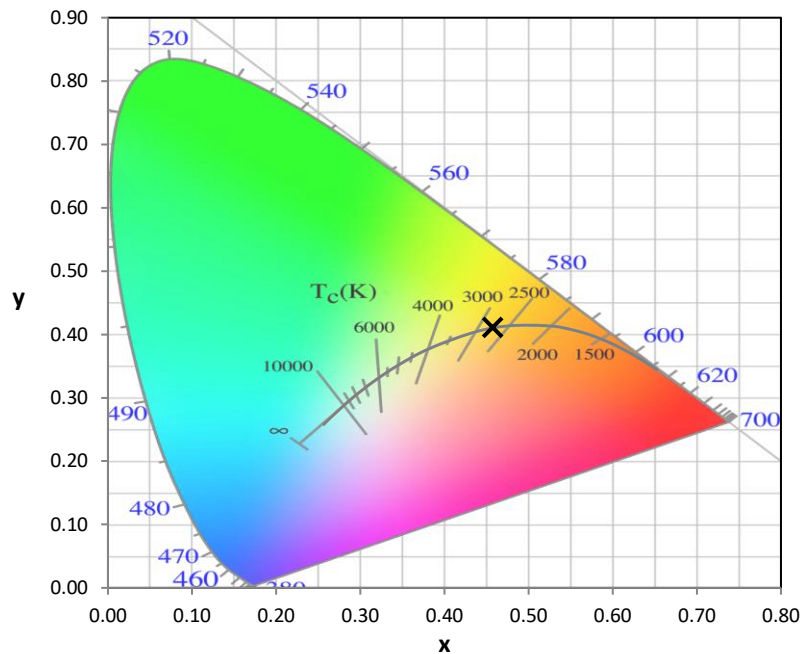
Stabilization Time: 56M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.3./42%  
 Sphere Temperature (°C): 25.7

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            |

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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: 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 ( $R_{f,i}$ )**

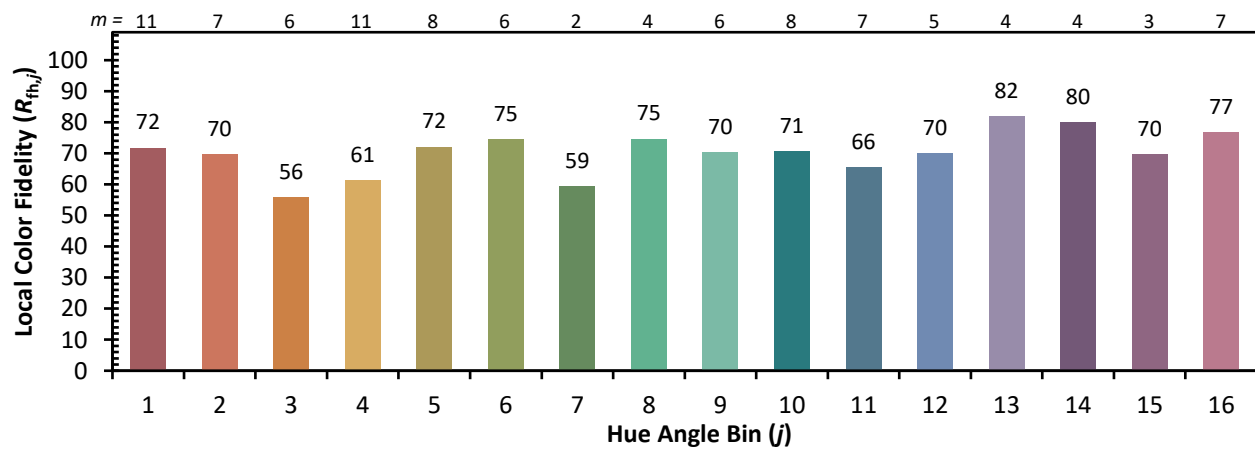
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 54 | CES51 = 77 | CES76 = 48 |
| CES02 = 63 | CES27 = 74 | CES52 = 80 | CES77 = 75 |
| CES03 = 31 | CES28 = 80 | CES53 = 66 | CES78 = 56 |
| CES04 = 71 | CES29 = 44 | CES54 = 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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**TM-30-18**

Color Rendition by Hue-Angle Bin



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**TM-30-18**

**Measure Comparisons**



(END OF REPORT)