

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



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: P361849

Luminaire Tested: NVN-SA3D-722-U-SL2

Issue Date: 3/3/2020

### Test Information

Test Method: LM-79-2019  
Report Number: P361849  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-20)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: STREETWORKS  
Catalog Number: NVN-SA3D-722-U-SL2  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(3) 70 CRI, 2200K, 1200mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE II  
SPILL LIGHT ELIMINATOR OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

### Summary

Lumens per Lamp: N/A  
Luminaire Lumens: 17017 lumens  
Efficiency: N/A  
Efficacy: 89.1 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 1.5' x H: 0')  
IES Classification: Type III - Medium  
BUG Rating: B3 - U0 - G4

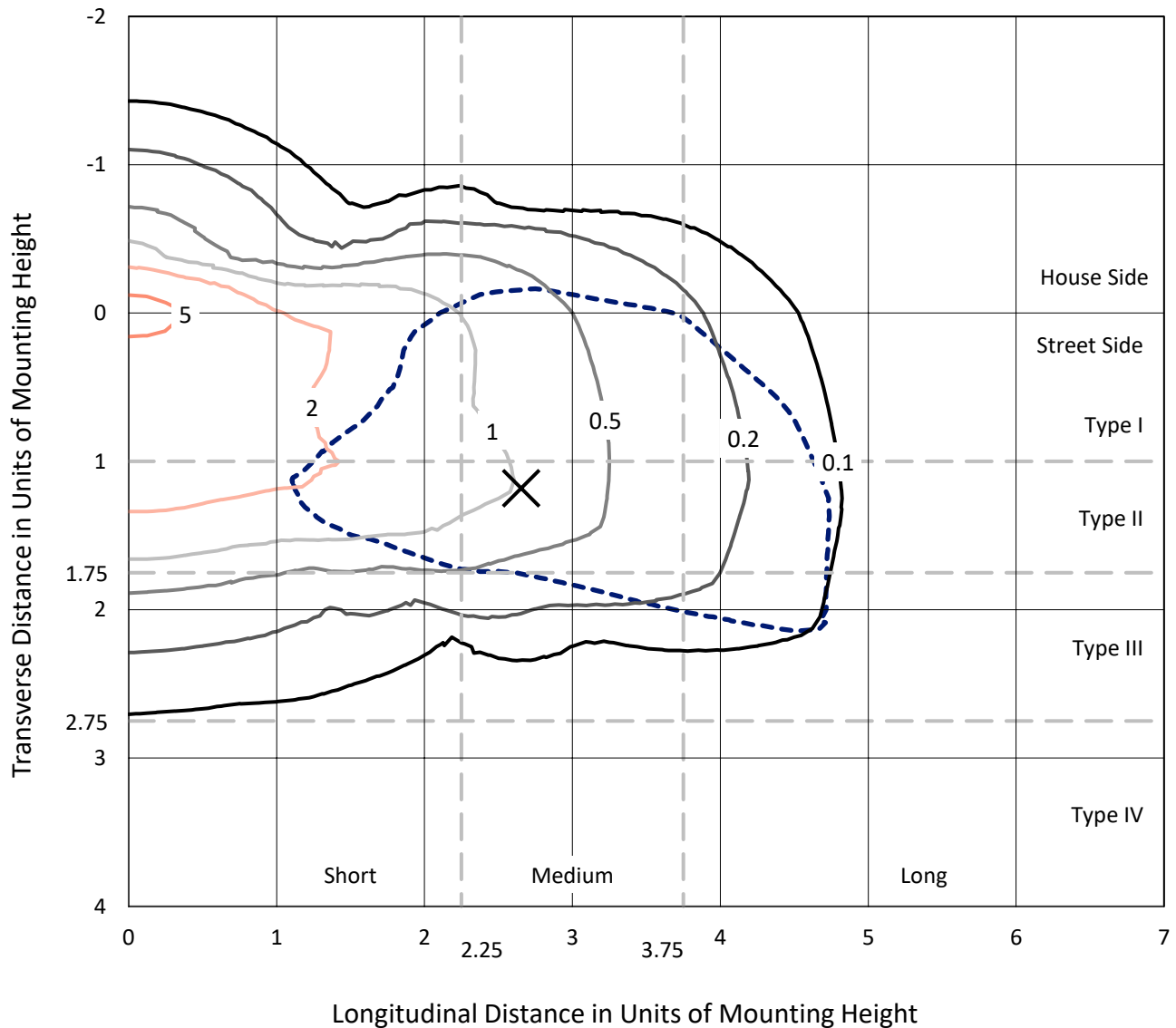
Input Watts (W): 191  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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## Iso-Footcandle Lines of Horizontal Illumination

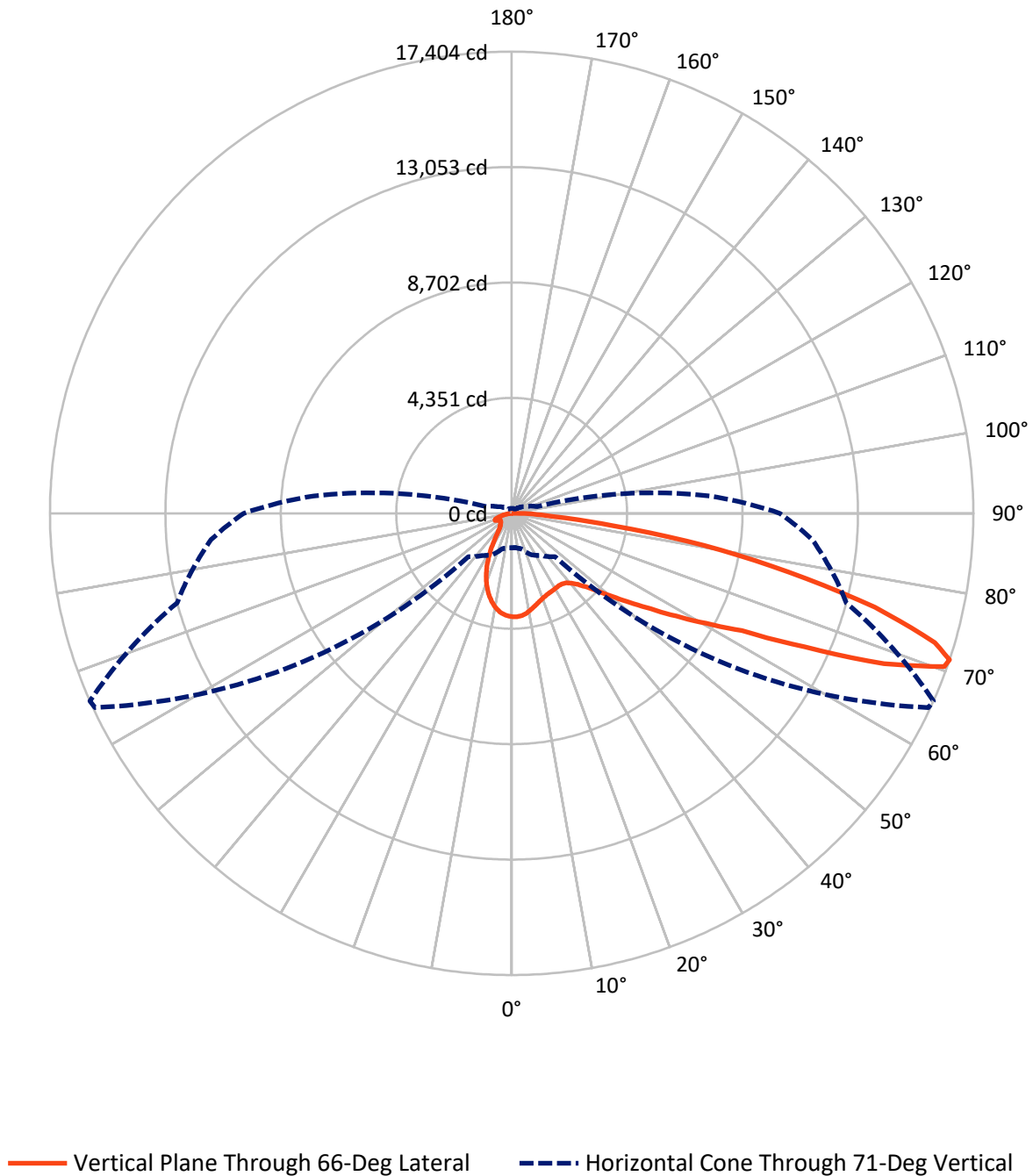
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 6.2 fc  
 Type III - Medium - N/A

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## Luminous Intensity Polar Plot



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CATALOG NUMBER: NVN-SA3D-722-U-SL2

**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 3153.7   | 0.0    | 3153.7  |
|                    | % Fixture | 18.5     | 0.0    | 18.5    |
| <b>Street Side</b> | Lumens    | 13863.3  | 0.0    | 13863.3 |
|                    | % Fixture | 81.5     | 0.0    | 81.5    |
| <b>Total</b>       | Lumens    | 17017.0  | 0.0    | 17017.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 343.1   | 2.0       |
| 10°-20°   | 823.0   | 4.8       |
| 20°-30°   | 1105.5  | 6.5       |
| 30°-40°   | 1454.3  | 8.5       |
| 40°-50°   | 2115.6  | 12.4      |
| 50°-60°   | 3304.7  | 19.4      |
| 60°-70°   | 4139.7  | 24.3      |
| 70°-80°   | 3157.7  | 18.6      |
| 80°-90°   | 573.4   | 3.4       |
| 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°    | 17017.0 | 100.0     |
| 0°-180°   | 17017.0 | 100.0     |

**Coefficient of Utilization**



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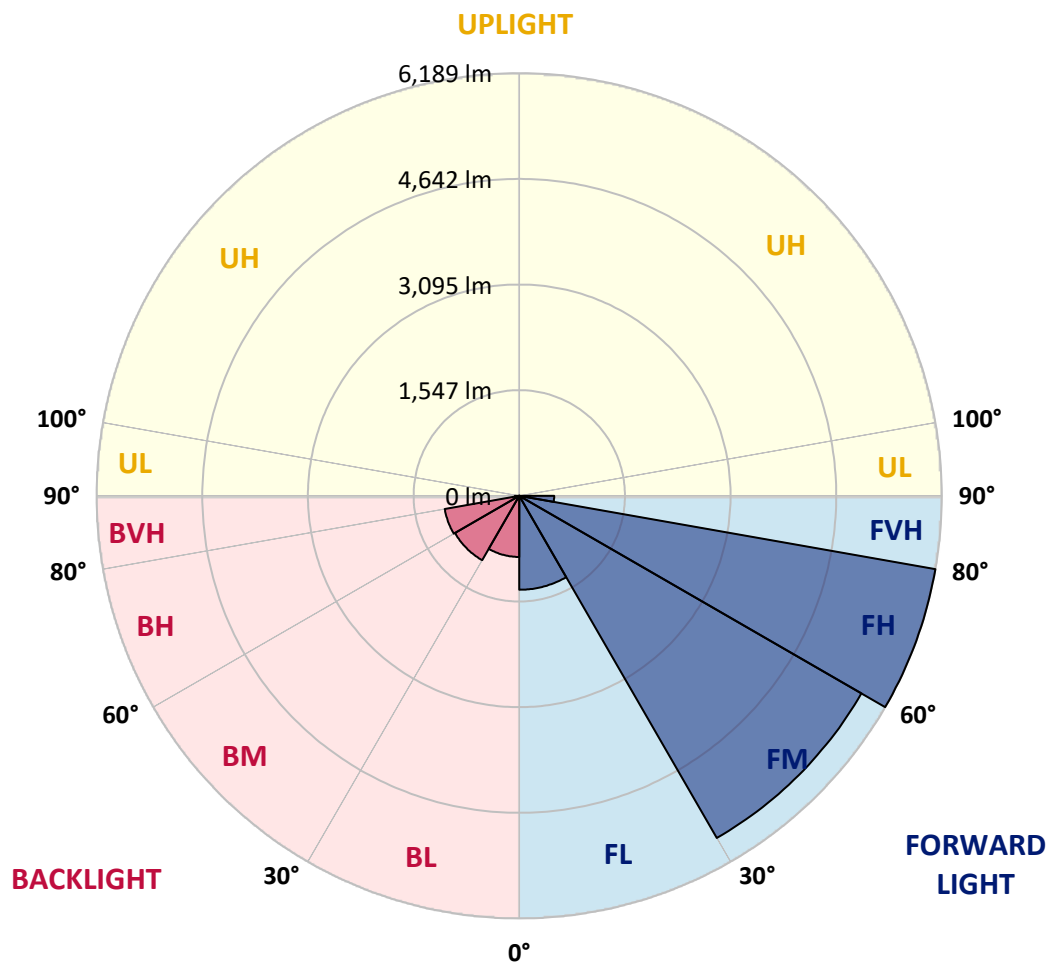
CATALOG NUMBER: NVN-SA3D-722-U-SL2

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 1376.1 | 8.1       |                         |      |         |
| FM   | (30°-60°)   | 5786.6 | 34.0      |                         |      |         |
| FH   | (60°-80°)   | 6189.3 | 36.4      |                         |      | G3/7500 |
| FVH  | (80°-90°)   | 511.3  | 3.0       |                         |      | G4/750  |
| BL   | (0°-30°)    | 895.6  | 5.3       | B2/1000                 |      |         |
| BM   | (30°-60°)   | 1087.9 | 6.4       | B2/2500                 |      |         |
| BH   | (60°-80°)   | 1108.1 | 6.5       | B3/2500                 |      | G3/2500 |
| BVH  | (80°-90°)   | 62.1   | 0.4       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B3-U0-G4**

Type III Medium



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°     | 65°     | 66°     | 75°     | 85°     |
|-------|--------|--------|--------|--------|--------|--------|---------|---------|---------|---------|---------|
| 0°    | 3898.3 | 3898.3 | 3898.3 | 3898.3 | 3898.3 | 3898.3 | 3898.3  | 3898.3  | 3898.3  | 3898.3  | 3898.3  |
| 2.5°  | 3826.0 | 3820.1 | 3837.7 | 3856.0 | 3863.0 | 3874.8 | 3892.4  | 3902.4  | 3901.8  | 3903.6  | 3897.7  |
| 5°    | 3572.2 | 3564.5 | 3599.8 | 3628.6 | 3683.8 | 3746.1 | 3821.9  | 3875.9  | 3877.1  | 3907.7  | 3915.9  |
| 7.5°  | 3331.9 | 3326.6 | 3367.1 | 3413.6 | 3477.6 | 3572.8 | 3695.6  | 3811.9  | 3818.9  | 3901.8  | 3930.6  |
| 10°   | 3139.2 | 3138.0 | 3177.4 | 3227.9 | 3302.5 | 3408.9 | 3549.9  | 3720.2  | 3730.8  | 3873.6  | 3932.9  |
| 12.5° | 2988.8 | 2991.1 | 3025.2 | 3082.8 | 3161.5 | 3272.5 | 3425.3  | 3617.4  | 3634.5  | 3828.9  | 3919.4  |
| 15°   | 2877.7 | 2887.1 | 2914.7 | 2972.9 | 3050.5 | 3163.3 | 3320.1  | 3522.2  | 3548.1  | 3779.0  | 3911.8  |
| 17.5° | 2814.3 | 2824.8 | 2844.2 | 2892.4 | 2965.3 | 3074.0 | 3222.6  | 3444.1  | 3467.6  | 3740.8  | 3912.4  |
| 20°   | 2795.5 | 2804.3 | 2815.4 | 2844.8 | 2906.5 | 3005.2 | 3145.6  | 3373.6  | 3398.9  | 3710.3  | 3918.2  |
| 22.5° | 2832.5 | 2838.9 | 2840.1 | 2837.8 | 2875.4 | 2955.9 | 3089.8  | 3321.9  | 3348.9  | 3690.3  | 3922.4  |
| 25°   | 2911.8 | 2920.6 | 2914.2 | 2892.4 | 2880.1 | 2929.4 | 3061.0  | 3287.8  | 3314.8  | 3675.6  | 3914.1  |
| 27.5° | 3031.1 | 3032.2 | 3027.0 | 2998.8 | 2940.6 | 2932.4 | 3052.2  | 3267.8  | 3293.7  | 3658.6  | 3897.1  |
| 30°   | 3193.2 | 3200.9 | 3191.5 | 3153.3 | 3058.1 | 2979.4 | 3062.8  | 3248.5  | 3272.0  | 3636.8  | 3869.5  |
| 32.5° | 3383.0 | 3401.8 | 3401.2 | 3361.3 | 3225.0 | 3084.5 | 3106.3  | 3236.7  | 3254.9  | 3613.9  | 3836.0  |
| 35°   | 3579.8 | 3605.7 | 3653.9 | 3636.8 | 3468.2 | 3250.8 | 3189.7  | 3255.5  | 3267.8  | 3611.0  | 3812.5  |
| 37.5° | 3784.3 | 3810.1 | 3909.4 | 3955.3 | 3757.8 | 3488.8 | 3321.3  | 3321.9  | 3327.8  | 3646.8  | 3810.7  |
| 40°   | 3998.1 | 4025.8 | 4175.0 | 4294.3 | 4133.3 | 3790.2 | 3533.4  | 3460.6  | 3454.1  | 3734.9  | 3845.4  |
| 42.5° | 4297.8 | 4322.5 | 4501.7 | 4653.8 | 4549.8 | 4176.2 | 3826.6  | 3674.4  | 3660.9  | 3907.7  | 3956.4  |
| 45°   | 4676.7 | 4697.9 | 4888.3 | 5051.0 | 4997.5 | 4616.8 | 4195.0  | 3968.8  | 3966.4  | 4195.6  | 4181.5  |
| 47.5° | 5127.4 | 5143.8 | 5314.8 | 5472.3 | 5491.6 | 5123.9 | 4657.9  | 4422.9  | 4384.7  | 4590.4  | 4529.9  |
| 50°   | 5596.8 | 5615.0 | 5731.4 | 5900.6 | 6044.5 | 5802.5 | 5253.7  | 4979.3  | 4928.2  | 5111.5  | 5023.4  |
| 52.5° | 5907.6 | 5931.7 | 6032.8 | 6247.2 | 6666.1 | 6546.3 | 5958.1  | 5653.8  | 5576.3  | 5743.1  | 5675.5  |
| 55°   | 5769.0 | 5823.0 | 5977.5 | 6321.2 | 7163.2 | 7682.5 | 6827.1  | 6440.5  | 6353.0  | 6491.6  | 6451.7  |
| 57.5° | 5138.5 | 5212.6 | 5423.5 | 5954.0 | 7233.1 | 8683.7 | 8140.8  | 7367.0  | 7305.4  | 7265.4  | 7283.6  |
| 60°   | 3986.4 | 4057.5 | 4318.9 | 5010.5 | 6746.0 | 9414.6 | 10117.9 | 8509.2  | 8419.9  | 8042.1  | 8058.6  |
| 62.5° | 2821.3 | 2785.5 | 2964.7 | 3470.5 | 5481.7 | 9500.4 | 12367.5 | 10036.8 | 9743.0  | 8862.3  | 8790.0  |
| 65°   | 2151.5 | 2143.3 | 2223.8 | 2384.8 | 3320.1 | 8474.0 | 13707.7 | 12604.3 | 12145.4 | 9827.0  | 9656.7  |
| 67.5° | 1767.9 | 1753.2 | 1832.5 | 2066.9 | 2138.0 | 5467.0 | 13737.1 | 15583.1 | 15132.4 | 11027.9 | 10659.0 |
| 70°   | 1453.6 | 1437.1 | 1511.1 | 1813.7 | 1975.9 | 2772.6 | 11561.4 | 17327.5 | 17303.4 | 12548.5 | 11415.7 |
| 71°   | 1303.1 | 1291.4 | 1380.1 | 1716.2 | 1941.2 | 2310.8 | 9982.1  | 17332.2 | 17404.4 | 13063.2 | 11371.1 |
| 72.5° | 1061.1 | 1065.2 | 1159.2 | 1527.6 | 1915.3 | 2040.5 | 7336.5  | 16524.3 | 16677.1 | 13553.7 | 10965.1 |
| 75°   | 705.0  | 708.6  | 831.9  | 1175.1 | 1857.2 | 1996.4 | 4032.2  | 13865.7 | 14146.6 | 13260.0 | 10005.6 |
| 77.5° | 473.5  | 472.4  | 556.4  | 806.1  | 1618.1 | 1996.4 | 2364.2  | 10370.5 | 10679.0 | 10550.9 | 7713.7  |
| 80°   | 326.1  | 323.7  | 383.1  | 556.4  | 1225.0 | 2020.5 | 1827.8  | 7267.8  | 7361.2  | 5697.9  | 3135.1  |
| 82.5° | 199.8  | 201.5  | 250.3  | 393.1  | 833.7  | 1818.4 | 1725.6  | 3962.9  | 3861.3  | 1598.1  | 783.2   |
| 85°   | 114.6  | 114.0  | 159.8  | 266.2  | 535.2  | 1534.6 | 1682.7  | 1705.6  | 1564.6  | 481.2   | 283.2   |
| 87.5° | 41.1   | 44.1   | 85.8   | 147.5  | 306.7  | 1068.7 | 1427.7  | 887.2   | 799.6   | 217.4   | 128.1   |
| 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: P361849

CATALOG NUMBER: NVN-SA3D-722-U-SL2

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 3898.3  | 3898.3 | 3898.3 | 3898.3 | 3898.3 | 3898.3 | 3898.3 | 3898.3 | 3898.3 | 3898.3 | 3898.3 |
| 2.5°  | 3893.6  | 3897.1 | 3893.0 | 3869.5 | 3849.5 | 3817.2 | 3799.0 | 3773.7 | 3766.1 | 3762.5 | 3771.9 |
| 5°    | 3908.3  | 3909.4 | 3874.8 | 3813.1 | 3743.7 | 3662.1 | 3603.3 | 3531.1 | 3497.0 | 3482.3 | 3491.7 |
| 7.5°  | 3921.8  | 3916.5 | 3840.7 | 3722.6 | 3594.5 | 3452.3 | 3326.0 | 3210.3 | 3142.7 | 3115.1 | 3117.4 |
| 10°   | 3923.5  | 3901.2 | 3779.6 | 3596.9 | 3398.3 | 3189.7 | 2995.8 | 2817.2 | 2704.4 | 2631.0 | 2653.3 |
| 12.5° | 3905.3  | 3867.7 | 3689.7 | 3434.1 | 3158.6 | 2874.2 | 2612.2 | 2344.2 | 2183.3 | 2108.6 | 2111.0 |
| 15°   | 3891.2  | 3823.1 | 3579.2 | 3242.6 | 2872.4 | 2495.8 | 2138.0 | 1823.1 | 1651.5 | 1575.2 | 1539.3 |
| 17.5° | 3879.5  | 3774.9 | 3451.2 | 3027.0 | 2534.6 | 2056.9 | 1626.9 | 1346.0 | 1252.0 | 1229.7 | 1220.3 |
| 20°   | 3863.0  | 3723.8 | 3308.4 | 2777.3 | 2149.8 | 1565.8 | 1188.0 | 1049.3 | 1049.9 | 1075.8 | 1079.3 |
| 22.5° | 3840.1  | 3665.6 | 3156.2 | 2497.0 | 1736.7 | 1140.4 | 931.2  | 891.3  | 931.8  | 981.2  | 990.0  |
| 25°   | 3806.0  | 3596.9 | 2987.0 | 2187.4 | 1324.3 | 876.6  | 795.5  | 793.8  | 843.1  | 894.8  | 902.4  |
| 27.5° | 3757.8  | 3507.0 | 2799.0 | 1854.8 | 975.9  | 745.0  | 712.7  | 725.0  | 761.4  | 799.0  | 802.0  |
| 30°   | 3693.2  | 3402.4 | 2591.6 | 1504.1 | 765.0  | 663.3  | 659.8  | 671.0  | 693.3  | 719.7  | 722.1  |
| 32.5° | 3622.1  | 3296.0 | 2370.1 | 1164.5 | 655.1  | 619.3  | 622.8  | 628.1  | 638.6  | 649.2  | 651.6  |
| 35°   | 3557.5  | 3187.4 | 2143.3 | 884.8  | 602.8  | 590.5  | 588.1  | 586.9  | 588.1  | 584.6  | 585.2  |
| 37.5° | 3515.8  | 3097.5 | 1907.1 | 704.4  | 572.8  | 565.2  | 558.2  | 549.3  | 539.4  | 533.5  | 534.7  |
| 40°   | 3500.5  | 3030.5 | 1668.0 | 608.7  | 548.2  | 542.9  | 529.4  | 510.6  | 498.8  | 495.3  | 495.3  |
| 42.5° | 3541.6  | 2995.8 | 1437.1 | 560.5  | 527.6  | 518.8  | 496.5  | 474.7  | 465.9  | 465.3  | 464.7  |
| 45°   | 3667.4  | 3009.9 | 1217.4 | 534.1  | 508.8  | 491.8  | 462.4  | 444.2  | 438.3  | 439.5  | 438.9  |
| 47.5° | 3893.0  | 3098.6 | 1029.4 | 516.4  | 490.0  | 467.7  | 434.8  | 420.1  | 413.0  | 413.0  | 413.6  |
| 50°   | 4276.6  | 3306.0 | 879.5  | 501.8  | 474.1  | 445.3  | 414.8  | 396.6  | 387.2  | 386.6  | 386.6  |
| 52.5° | 4835.4  | 3677.4 | 786.1  | 489.4  | 456.5  | 425.4  | 394.8  | 371.9  | 360.7  | 358.4  | 357.2  |
| 55°   | 5535.7  | 4209.7 | 760.3  | 481.2  | 433.0  | 403.6  | 370.7  | 347.8  | 335.5  | 330.2  | 329.6  |
| 57.5° | 6318.9  | 4857.1 | 811.4  | 471.2  | 408.9  | 377.8  | 344.3  | 322.6  | 309.6  | 303.2  | 302.6  |
| 60°   | 7111.5  | 5563.9 | 1020.0 | 457.1  | 388.9  | 349.6  | 317.3  | 297.3  | 284.4  | 277.3  | 276.1  |
| 62.5° | 7905.2  | 6308.9 | 1445.9 | 455.9  | 374.8  | 322.6  | 289.7  | 272.6  | 260.3  | 252.6  | 250.9  |
| 65°   | 8800.6  | 7124.4 | 1930.0 | 487.1  | 370.1  | 297.9  | 261.5  | 247.9  | 237.4  | 230.3  | 229.7  |
| 67.5° | 9828.8  | 8045.1 | 1883.6 | 551.1  | 386.0  | 275.6  | 235.0  | 224.4  | 216.8  | 210.9  | 210.3  |
| 70°   | 10311.2 | 7901.1 | 1170.9 | 596.3  | 408.3  | 253.8  | 209.7  | 202.1  | 196.2  | 192.1  | 190.4  |
| 71°   | 10109.1 | 7502.2 | 981.8  | 591.1  | 406.0  | 244.4  | 199.8  | 193.9  | 188.0  | 184.5  | 182.7  |
| 72.5° | 9557.9  | 6841.8 | 819.0  | 549.9  | 379.5  | 227.4  | 186.8  | 181.0  | 175.7  | 171.6  | 170.4  |
| 75°   | 8576.8  | 6110.3 | 655.7  | 439.5  | 302.6  | 192.1  | 163.9  | 157.5  | 153.3  | 151.0  | 148.6  |
| 77.5° | 6304.8  | 4360.7 | 507.0  | 347.2  | 222.7  | 156.9  | 139.8  | 135.1  | 131.0  | 127.5  | 125.7  |
| 80°   | 2415.3  | 1689.2 | 341.4  | 259.1  | 163.3  | 124.0  | 112.8  | 110.5  | 106.3  | 104.0  | 104.0  |
| 82.5° | 650.4   | 504.7  | 182.1  | 156.9  | 109.3  | 90.5   | 86.4   | 85.2   | 81.7   | 77.0   | 77.6   |
| 85°   | 263.2   | 222.7  | 102.2  | 86.4   | 67.0   | 53.5   | 58.2   | 58.8   | 54.6   | 48.8   | 49.4   |
| 87.5° | 115.7   | 94.6   | 57.0   | 38.2   | 29.4   | 20.6   | 26.4   | 26.4   | 24.1   | 20.0   | 18.2   |
| 90°   | 0.0     | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

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

Report Prepared for

Cooper Lighting Solutions

McGRAW-EDISON

Report Number: SP1-1908-441-10-R4

Test Date: 10/25/2019

Luminaire Tested: SA1C-722-U-5WQ

Data in this report applies to families of products SA1C-722-U-5WQ.

### Test Information

Test Method: LM-79-2008 Report  
 Number: SP1-1908-441-10-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-722-U-5WQ**  
 Description: MCGRAW EDISON ROADWAY AND AREA LUMINAIRE

\*\*\*THIS IS A REVISION OF SP1-1908-441-4-R3. TO UPDATE THE CATALOG INFORMATION.\*\*\*TESTED IN SITU. ROADWAY AND AREA LUMINAIRE. (1) 70 CRI, 5000K, 1050MA LIGHTSQUARE WITH 16 LEDS AND TYPE V WIDE OPTICS.

### Spectral Parameters

|                           |         |           |      |      |       |
|---------------------------|---------|-----------|------|------|-------|
| CCT (K):                  | 2237    | CRI (Ra): | 72.0 |      |       |
| CIE u':                   | 0.2876  | R1:       | 68.9 | R9:  | -17.4 |
| CIE v':                   | 0.5346  | R2:       | 83.0 | R10: | 61.3  |
| Duv:                      | -0.0006 | R3:       | 95.2 | R11: | 59.8  |
| CIE x:                    | 0.5005  | R4:       | 66.2 | R12: | 50.5  |
| CIE y:                    | 0.4134  | R5:       | 65.9 | R13: | 71.1  |
| CIE z:                    | 0.0860  | R6:       | 76.3 | R14: | 96.9  |
| Peak Wavelength (nm):     | 603     | R7:       | 76.7 |      |       |
| Dominant Wavelength (nm): | 587     | R8:       | 43.8 |      |       |
| Purity:                   | 74.5    |           |      |      |       |
| Rf:                       | 69.8    |           |      |      |       |
| Rg:                       | 99.2    |           |      |      |       |



### Test Conditions

Stabilization Time: 71M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.7/41%  
 Sphere Temperature (°C): 25.6

REPORT NUMBER: SP1-1908-441-10-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 2200K 4-step quadrangle

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**Photopic Flux vs. Wavelength**



#####

| 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       | 1768             | NR               | 490       | 5206             | NR               | 620       | 130919           | NR               | 750       | 8553             | NR               | 880       | 2713             | NR               |
| 365       | 1569             | NR               | 495       | 7286             | NR               | 625       | 125335           | NR               | 755       | 7696             | NR               | 885       | 2316             | NR               |
| 370       | 1594             | NR               | 500       | 10654            | NR               | 630       | 118388           | NR               | 760       | 6978             | NR               | 890       | 2539             | NR               |
| 375       | 1744             | NR               | 505       | 15189            | NR               | 635       | 111855           | NR               | 765       | 6377             | NR               | 895       | 1933             | NR               |
| 380       | 1659             | NR               | 510       | 20541            | NR               | 640       | 104062           | NR               | 770       | 5600             | NR               | 900       | 2216             | NR               |
| 385       | 1504             | NR               | 515       | 26492            | NR               | 645       | 96365            | NR               | 775       | 5000             | NR               | 905       | 2067             | NR               |
| 390       | 1541             | NR               | 520       | 32294            | NR               | 650       | 88651            | NR               | 780       | 4709             | NR               | 910       | 1959             | NR               |
| 395       | 1355             | NR               | 525       | 38123            | NR               | 655       | 81152            | NR               | 785       | 4305             | NR               | 915       | 1874             | NR               |
| 400       | 1243             | NR               | 530       | 43232            | NR               | 660       | 73523            | NR               | 790       | 4040             | NR               | 920       | 1484             | NR               |
| 405       | 1417             | NR               | 535       | 48012            | NR               | 665       | 66123            | NR               | 795       | 3642             | NR               | 925       | 1914             | NR               |
| 410       | 2147             | NR               | 540       | 52623            | NR               | 670       | 58677            | NR               | 800       | 3594             | NR               | 930       | 1948             | NR               |
| 415       | 3837             | NR               | 545       | 57516            | NR               | 675       | 52349            | NR               | 805       | 3190             | NR               | 935       | 2079             | NR               |
| 420       | 7159             | NR               | 550       | 62613            | NR               | 680       | 46159            | NR               | 810       | 3241             | NR               | 940       | 2263             | NR               |
| 425       | 12599            | NR               | 555       | 68554            | NR               | 685       | 40525            | NR               | 815       | 2732             | NR               | 945       | 1688             | NR               |
| 430       | 19019            | NR               | 560       | 75325            | NR               | 690       | 35615            | NR               | 820       | 2612             | NR               | 950       | 1560             | NR               |
| 435       | 24875            | NR               | 565       | 82533            | NR               | 695       | 31158            | NR               | 825       | 2966             | NR               | 955       | 2826             | NR               |
| 440       | 29103            | NR               | 570       | 90909            | NR               | 700       | 27409            | NR               | 830       | 2574             | NR               | 960       | 1477             | NR               |
| 445       | 29901            | NR               | 575       | 99621            | NR               | 705       | 24204            | NR               | 835       | 2633             | NR               | 965       | 1568             | NR               |
| 450       | 24862            | NR               | 580       | 108484           | NR               | 710       | 21558            | NR               | 840       | 2526             | NR               | 970       | 2030             | NR               |
| 455       | 15942            | NR               | 585       | 116679           | NR               | 715       | 19222            | NR               | 845       | 2631             | NR               | 975       | 1986             | NR               |
| 460       | 9916             | NR               | 590       | 123752           | NR               | 720       | 17310            | NR               | 850       | 2079             | NR               | 980       | 2540             | NR               |
| 465       | 7051             | NR               | 595       | 129324           | NR               | 725       | 15280            | NR               | 855       | 2309             | NR               | 985       | 1139             | NR               |
| 470       | 5227             | NR               | 600       | 134082           | NR               | 730       | 13282            | NR               | 860       | 2528             | NR               | 990       | 2018             | NR               |
| 475       | 4257             | NR               | 605       | 135698           | NR               | 735       | 11753            | NR               | 865       | 2121             | NR               | 995       | 3445             | NR               |
| 480       | 4052             | NR               | 610       | 135144           | NR               | 740       | 10654            | NR               | 870       | 2751             | NR               | 1000      | 3704             | NR               |
| 485       | 4298             | NR               | 615       | 134180           | NR               | 745       | 9451             | NR               | 875       | 2317             | NR               |           |                  |                  |

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**Scotopic Flux vs. Wavelength**



**Scotopic Lumens: 4696.9**

**S/P: 0.85**

| 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       | 1768             | NR               | 490       | 5206             | NR               | 620       | 130919           | NR               | 750       | 8553             | NR               | 880       | 2713             | NR               |
| 365       | 1569             | NR               | 495       | 7286             | NR               | 625       | 125335           | NR               | 755       | 7696             | NR               | 885       | 2316             | NR               |
| 370       | 1594             | NR               | 500       | 10654            | NR               | 630       | 118388           | NR               | 760       | 6978             | NR               | 890       | 2539             | NR               |
| 375       | 1744             | NR               | 505       | 15189            | NR               | 635       | 111855           | NR               | 765       | 6377             | NR               | 895       | 1933             | NR               |
| 380       | 1659             | NR               | 510       | 20541            | NR               | 640       | 104062           | NR               | 770       | 5600             | NR               | 900       | 2216             | NR               |
| 385       | 1504             | NR               | 515       | 26492            | NR               | 645       | 96365            | NR               | 775       | 5000             | NR               | 905       | 2067             | NR               |
| 390       | 1541             | NR               | 520       | 32294            | NR               | 650       | 88651            | NR               | 780       | 4709             | NR               | 910       | 1959             | NR               |
| 395       | 1355             | NR               | 525       | 38123            | NR               | 655       | 81152            | NR               | 785       | 4305             | NR               | 915       | 1874             | NR               |
| 400       | 1243             | NR               | 530       | 43232            | NR               | 660       | 73523            | NR               | 790       | 4040             | NR               | 920       | 1484             | NR               |
| 405       | 1417             | NR               | 535       | 48012            | NR               | 665       | 66123            | NR               | 795       | 3642             | NR               | 925       | 1914             | NR               |
| 410       | 2147             | NR               | 540       | 52623            | NR               | 670       | 58677            | NR               | 800       | 3594             | NR               | 930       | 1948             | NR               |
| 415       | 3837             | NR               | 545       | 57516            | NR               | 675       | 52349            | NR               | 805       | 3190             | NR               | 935       | 2079             | NR               |
| 420       | 7159             | NR               | 550       | 62613            | NR               | 680       | 46159            | NR               | 810       | 3241             | NR               | 940       | 2263             | NR               |
| 425       | 12599            | NR               | 555       | 68554            | NR               | 685       | 40525            | NR               | 815       | 2732             | NR               | 945       | 1688             | NR               |
| 430       | 19019            | NR               | 560       | 75325            | NR               | 690       | 35615            | NR               | 820       | 2612             | NR               | 950       | 1560             | NR               |
| 435       | 24875            | NR               | 565       | 82533            | NR               | 695       | 31158            | NR               | 825       | 2966             | NR               | 955       | 2826             | NR               |
| 440       | 29103            | NR               | 570       | 90909            | NR               | 700       | 27409            | NR               | 830       | 2574             | NR               | 960       | 1477             | NR               |
| 445       | 29901            | NR               | 575       | 99621            | NR               | 705       | 24204            | NR               | 835       | 2633             | NR               | 965       | 1568             | NR               |
| 450       | 24862            | NR               | 580       | 108484           | NR               | 710       | 21558            | NR               | 840       | 2526             | NR               | 970       | 2030             | NR               |
| 455       | 15942            | NR               | 585       | 116679           | NR               | 715       | 19222            | NR               | 845       | 2631             | NR               | 975       | 1986             | NR               |
| 460       | 9916             | NR               | 590       | 123752           | NR               | 720       | 17310            | NR               | 850       | 2079             | NR               | 980       | 2540             | NR               |
| 465       | 7051             | NR               | 595       | 129324           | NR               | 725       | 15280            | NR               | 855       | 2309             | NR               | 985       | 1139             | NR               |
| 470       | 5227             | NR               | 600       | 134082           | NR               | 730       | 13282            | NR               | 860       | 2528             | NR               | 990       | 2018             | NR               |
| 475       | 4257             | NR               | 605       | 135698           | NR               | 735       | 11753            | NR               | 865       | 2121             | NR               | 995       | 3445             | NR               |
| 480       | 4052             | NR               | 610       | 135144           | NR               | 740       | 10654            | NR               | 870       | 2751             | NR               | 1000      | 3704             | NR               |
| 485       | 4298             | NR               | 615       | 134180           | NR               | 745       | 9451             | NR               | 875       | 2317             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 1470.8 M/P: 0.27**

| 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       | 1768             | NR               | 490       | 5206             | NR               | 620       | 130919           | NR               | 750       | 8553             | NR               | 880       | 2713             | NR               |
| 365       | 1569             | NR               | 495       | 7286             | NR               | 625       | 125335           | NR               | 755       | 7696             | NR               | 885       | 2316             | NR               |
| 370       | 1594             | NR               | 500       | 10654            | NR               | 630       | 118388           | NR               | 760       | 6978             | NR               | 890       | 2539             | NR               |
| 375       | 1744             | NR               | 505       | 15189            | NR               | 635       | 111855           | NR               | 765       | 6377             | NR               | 895       | 1933             | NR               |
| 380       | 1659             | NR               | 510       | 20541            | NR               | 640       | 104062           | NR               | 770       | 5600             | NR               | 900       | 2216             | NR               |
| 385       | 1504             | NR               | 515       | 26492            | NR               | 645       | 96365            | NR               | 775       | 5000             | NR               | 905       | 2067             | NR               |
| 390       | 1541             | NR               | 520       | 32294            | NR               | 650       | 88651            | NR               | 780       | 4709             | NR               | 910       | 1959             | NR               |
| 395       | 1355             | NR               | 525       | 38123            | NR               | 655       | 81152            | NR               | 785       | 4305             | NR               | 915       | 1874             | NR               |
| 400       | 1243             | NR               | 530       | 43232            | NR               | 660       | 73523            | NR               | 790       | 4040             | NR               | 920       | 1484             | NR               |
| 405       | 1417             | NR               | 535       | 48012            | NR               | 665       | 66123            | NR               | 795       | 3642             | NR               | 925       | 1914             | NR               |
| 410       | 2147             | NR               | 540       | 52623            | NR               | 670       | 58677            | NR               | 800       | 3594             | NR               | 930       | 1948             | NR               |
| 415       | 3837             | NR               | 545       | 57516            | NR               | 675       | 52349            | NR               | 805       | 3190             | NR               | 935       | 2079             | NR               |
| 420       | 7159             | NR               | 550       | 62613            | NR               | 680       | 46159            | NR               | 810       | 3241             | NR               | 940       | 2263             | NR               |
| 425       | 12599            | NR               | 555       | 68554            | NR               | 685       | 40525            | NR               | 815       | 2732             | NR               | 945       | 1688             | NR               |
| 430       | 19019            | NR               | 560       | 75325            | NR               | 690       | 35615            | NR               | 820       | 2612             | NR               | 950       | 1560             | NR               |
| 435       | 24875            | NR               | 565       | 82533            | NR               | 695       | 31158            | NR               | 825       | 2966             | NR               | 955       | 2826             | NR               |
| 440       | 29103            | NR               | 570       | 90909            | NR               | 700       | 27409            | NR               | 830       | 2574             | NR               | 960       | 1477             | NR               |
| 445       | 29901            | NR               | 575       | 99621            | NR               | 705       | 24204            | NR               | 835       | 2633             | NR               | 965       | 1568             | NR               |
| 450       | 24862            | NR               | 580       | 108484           | NR               | 710       | 21558            | NR               | 840       | 2526             | NR               | 970       | 2030             | NR               |
| 455       | 15942            | NR               | 585       | 116679           | NR               | 715       | 19222            | NR               | 845       | 2631             | NR               | 975       | 1986             | NR               |
| 460       | 9916             | NR               | 590       | 123752           | NR               | 720       | 17310            | NR               | 850       | 2079             | NR               | 980       | 2540             | NR               |
| 465       | 7051             | NR               | 595       | 129324           | NR               | 725       | 15280            | NR               | 855       | 2309             | NR               | 985       | 1139             | NR               |
| 470       | 5227             | NR               | 600       | 134082           | NR               | 730       | 13282            | NR               | 860       | 2528             | NR               | 990       | 2018             | NR               |
| 475       | 4257             | NR               | 605       | 135698           | NR               | 735       | 11753            | NR               | 865       | 2121             | NR               | 995       | 3445             | NR               |
| 480       | 4052             | NR               | 610       | 135144           | NR               | 740       | 10654            | NR               | 870       | 2751             | NR               | 1000      | 3704             | NR               |
| 485       | 4298             | NR               | 615       | 134180           | NR               | 745       | 9451             | NR               | 875       | 2317             | NR               |           |                  |                  |

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### Summary

$R_f = 69.8$   
 $R_g = 99.2$   
 CIE  $R_a = 72.0$   
 $R_g = -17.4$



### Color Vector Graphics



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 87 | CES26 = 56 | CES51 = 74 | CES76 = 56 |
| CES02 = 65 | CES27 = 76 | CES52 = 76 | CES77 = 81 |
| CES03 = 32 | CES28 = 83 | CES53 = 65 | CES78 = 63 |
| CES04 = 72 | CES29 = 46 | CES54 = 78 | CES79 = 84 |
| CES05 = 52 | CES30 = 48 | CES55 = 75 | CES80 = 84 |
| CES06 = 52 | CES31 = 51 | CES56 = 65 | CES81 = 63 |
| CES07 = 44 | CES32 = 51 | CES57 = 62 | CES82 = 92 |
| CES08 = 42 | CES33 = 53 | CES58 = 66 | CES83 = 83 |
| CES09 = 29 | CES34 = 70 | CES59 = 84 | CES84 = 92 |
| CES10 = 78 | CES35 = 85 | CES60 = 90 | CES85 = 81 |
| CES11 = 61 | CES36 = 78 | CES61 = 84 | CES86 = 56 |
| CES12 = 68 | CES37 = 80 | CES62 = 70 | CES87 = 78 |
| CES13 = 45 | CES38 = 53 | CES63 = 68 | CES88 = 72 |
| CES14 = 75 | CES39 = 90 | CES64 = 69 | CES89 = 62 |
| CES15 = 72 | CES40 = 84 | CES65 = 67 | CES90 = 67 |
| CES16 = 49 | CES41 = 75 | CES66 = 64 | CES91 = 90 |
| CES17 = 51 | CES42 = 79 | CES67 = 63 | CES92 = 67 |
| CES18 = 57 | CES43 = 64 | CES68 = 69 | CES93 = 79 |
| CES19 = 74 | CES44 = 98 | CES69 = 80 | CES94 = 52 |
| CES20 = 68 | CES45 = 73 | CES70 = 63 | CES95 = 76 |
| CES21 = 89 | CES46 = 67 | CES71 = 63 | CES96 = 78 |
| CES22 = 81 | CES47 = 60 | CES72 = 87 | CES97 = 77 |
| CES23 = 92 | CES48 = 48 | CES73 = 56 | CES98 = 71 |
| CES24 = 92 | CES49 = 64 | CES74 = 87 | CES99 = 65 |
| CES25 = 74 | CES50 = 74 | CES75 = 66 |            |



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Color Rendition by Hue-Angle Bin



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**Measure Comparisons**



(END OF REPORT)