

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: P359497

Luminaire Tested: NVN-SA3D-740-U-SL3

Issue Date: 3/3/2020

### Test Information

Test Method: LM-79-2019  
Report Number: P359497  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-22)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: STREETWORKS  
Catalog Number: NVN-SA3D-740-U-SL3  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(3) 70 CRI, 4000K, 1200mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE III  
SPILL LIGHT ELIMINATOR OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

### Summary

Lumens per Lamp: N/A  
Luminaire Lumens: 23581 lumens  
Efficiency: N/A  
Efficacy: 123.5 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

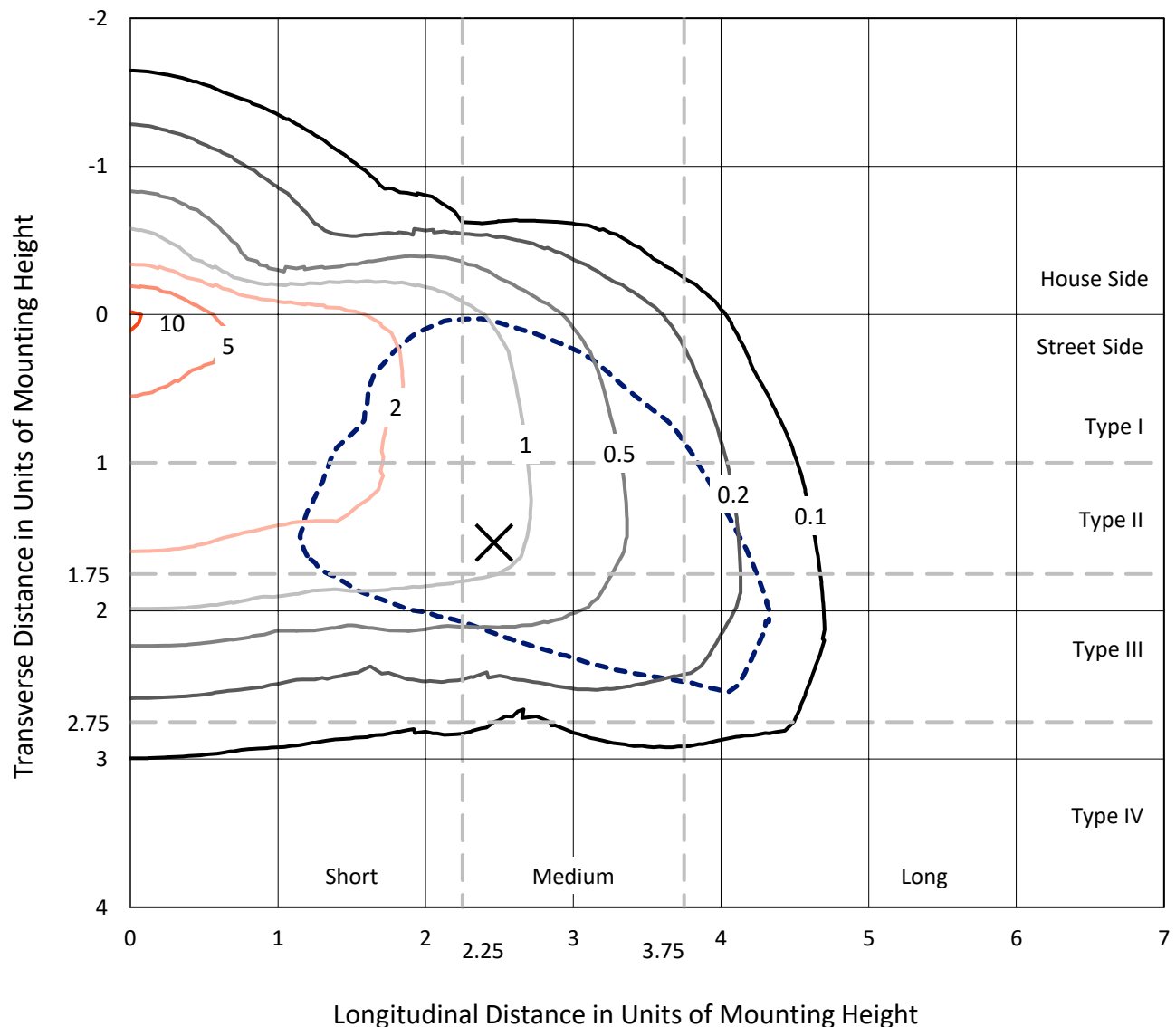
Input Watts (W): 191  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



REPORT NUMBER: P359497  
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## Iso-Footcandle Lines of Horizontal Illumination

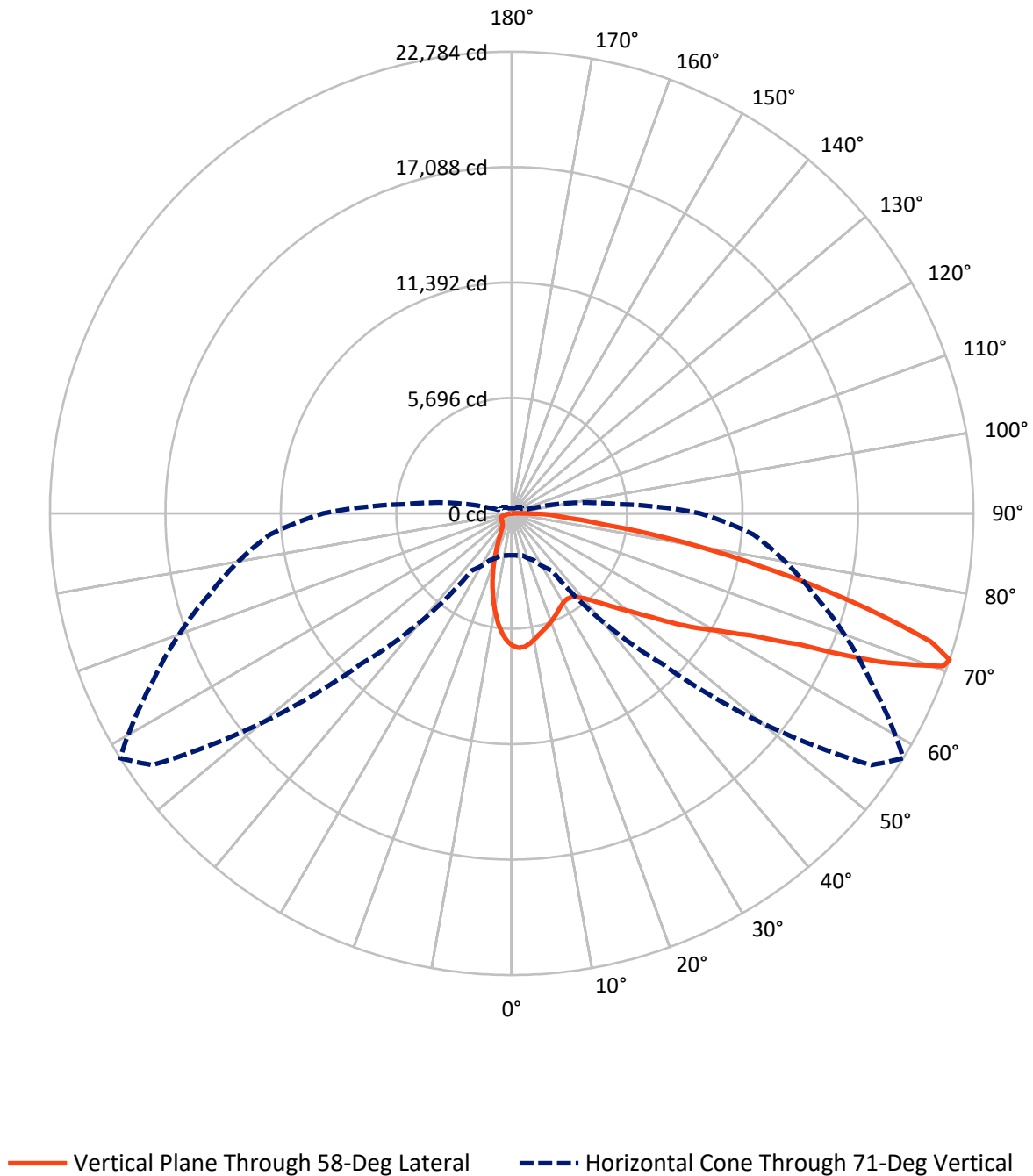
× Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 10.5 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    | 3525.5   | 0.0    | 3525.5  |
|                    | % Fixture | 15.0     | 0.0    | 15.0    |
| <b>Street Side</b> | Lumens    | 20055.5  | 0.0    | 20055.5 |
|                    | % Fixture | 85.0     | 0.0    | 85.0    |
| <b>Total</b>       | Lumens    | 23581.0  | 0.0    | 23581.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 563.6   | 2.4       |
| 10°-20°   | 1253.3  | 5.3       |
| 20°-30°   | 1592.9  | 6.8       |
| 30°-40°   | 2029.0  | 8.6       |
| 40°-50°   | 2877.2  | 12.2      |
| 50°-60°   | 4452.6  | 18.9      |
| 60°-70°   | 6061.6  | 25.7      |
| 70°-80°   | 4043.8  | 17.1      |
| 80°-90°   | 707.0   | 3.0       |
| 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°    | 23581.0 | 100.0     |
| 0°-180°   | 23581.0 | 100.0     |

**Coefficient of Utilization**



REPORT NUMBER: P359497

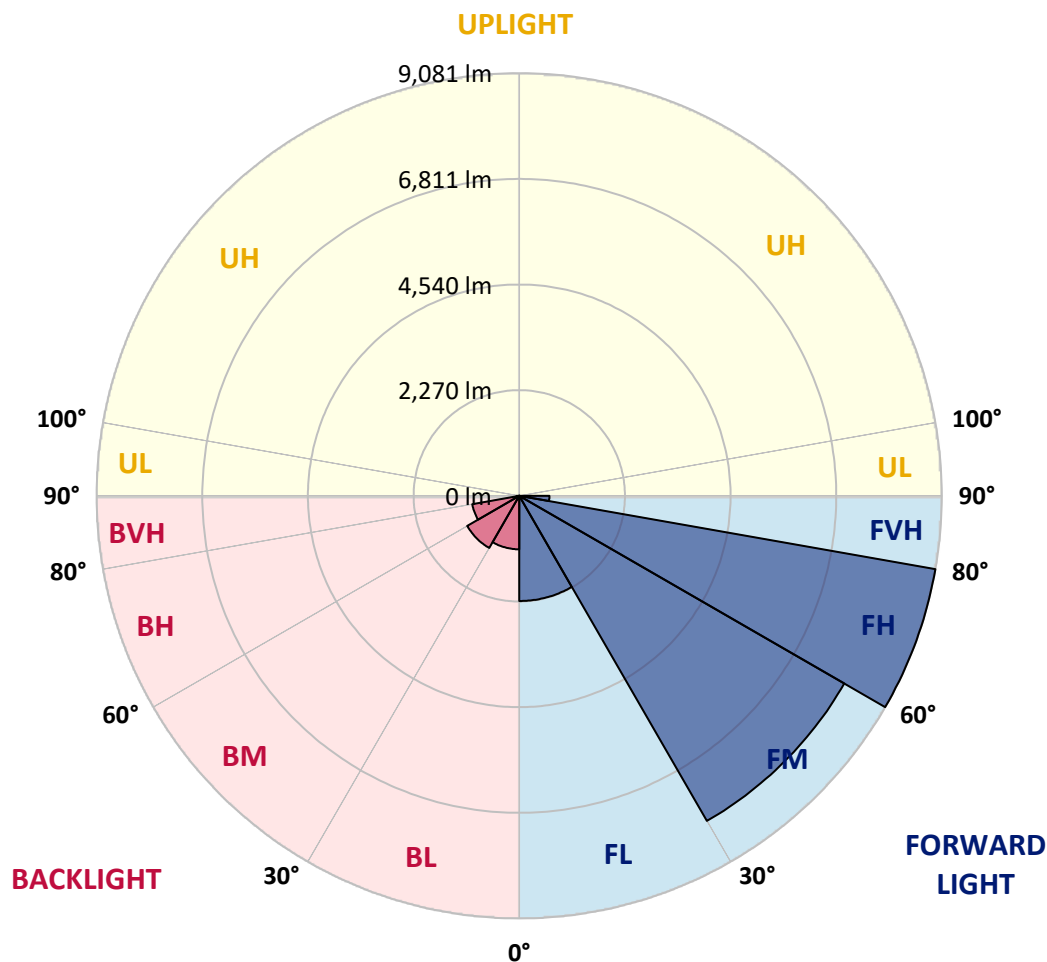
CATALOG NUMBER: NVN-SA3D-740-U-SL3

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |          |
|------|-------------|--------|-----------|-------------------------|------|----------|
|      |             |        |           | B                       | U    | G        |
| FL   | (0°-30°)    | 2260.6 | 9.6       |                         |      |          |
| FM   | (30°-60°)   | 8065.8 | 34.2      |                         |      |          |
| FH   | (60°-80°)   | 9080.8 | 38.5      |                         |      | G4/12000 |
| FVH  | (80°-90°)   | 648.3  | 2.7       |                         |      | G4/750   |
| BL   | (0°-30°)    | 1149.2 | 4.9       | B3/2500                 |      |          |
| BM   | (30°-60°)   | 1292.9 | 5.5       | B2/2500                 |      |          |
| BH   | (60°-80°)   | 1024.7 | 4.3       | B3/2500                 |      | G3/2500  |
| BVH  | (80°-90°)   | 58.7   | 0.2       |                         |      | 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





REPORT NUMBER: P359497

CATALOG NUMBER: NVN-SA3D-740-U-SL3

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°     | 45°     | 55°     | 58°     | 65°     | 75°     | 85°     |
|-------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 6533.5 | 6533.5 | 6533.5 | 6533.5 | 6533.5  | 6533.5  | 6533.5  | 6533.5  | 6533.5  | 6533.5  | 6533.5  |
| 2.5°  | 6706.8 | 6697.8 | 6701.1 | 6694.5 | 6678.9  | 6663.3  | 6640.3  | 6644.4  | 6612.4  | 6564.7  | 6505.6  |
| 5°    | 6580.3 | 6577.0 | 6601.7 | 6615.7 | 6627.2  | 6618.1  | 6611.5  | 6619.8  | 6572.9  | 6507.2  | 6404.6  |
| 7.5°  | 6315.0 | 6278.9 | 6310.1 | 6356.9 | 6401.3  | 6434.9  | 6479.3  | 6485.1  | 6455.5  | 6386.5  | 6251.8  |
| 10°   | 5938.0 | 5903.5 | 5949.5 | 6022.6 | 6111.3  | 6191.8  | 6281.3  | 6297.8  | 6303.5  | 6241.1  | 6077.6  |
| 12.5° | 5547.0 | 5520.7 | 5566.7 | 5669.4 | 5816.4  | 5940.5  | 6083.4  | 6108.0  | 6158.9  | 6117.1  | 5916.6  |
| 15°   | 5197.1 | 5187.2 | 5243.1 | 5344.1 | 5513.3  | 5703.1  | 5909.2  | 5954.4  | 6040.7  | 6026.7  | 5791.0  |
| 17.5° | 4894.8 | 4892.3 | 4935.0 | 5041.0 | 5228.3  | 5468.1  | 5735.9  | 5812.3  | 5940.5  | 5956.9  | 5687.5  |
| 20°   | 4669.7 | 4664.8 | 4694.4 | 4772.4 | 4965.4  | 5237.3  | 5548.6  | 5653.8  | 5838.6  | 5896.1  | 5580.7  |
| 22.5° | 4549.0 | 4548.2 | 4549.0 | 4585.9 | 4743.7  | 4996.7  | 5366.3  | 5494.4  | 5739.2  | 5847.6  | 5462.4  |
| 25°   | 4528.4 | 4526.0 | 4507.9 | 4503.8 | 4593.3  | 4795.4  | 5185.6  | 5326.9  | 5644.7  | 5814.0  | 5349.9  |
| 27.5° | 4581.8 | 4585.1 | 4561.3 | 4522.7 | 4540.8  | 4663.2  | 5028.7  | 5179.8  | 5569.2  | 5807.4  | 5271.8  |
| 30°   | 4692.7 | 4691.1 | 4670.6 | 4630.3 | 4595.0  | 4613.9  | 4917.0  | 5068.1  | 5518.2  | 5836.1  | 5218.4  |
| 32.5° | 4815.1 | 4824.2 | 4820.0 | 4797.9 | 4745.3  | 4669.7  | 4883.3  | 5031.2  | 5503.5  | 5905.1  | 5195.4  |
| 35°   | 4962.2 | 4972.0 | 5001.6 | 5018.8 | 4957.2  | 4835.7  | 4955.6  | 5083.7  | 5546.2  | 6034.9  | 5232.4  |
| 37.5° | 5101.8 | 5127.3 | 5210.2 | 5283.3 | 5230.8  | 5095.2  | 5147.8  | 5239.0  | 5678.4  | 6239.4  | 5331.8  |
| 40°   | 5262.8 | 5285.0 | 5420.5 | 5575.7 | 5567.5  | 5427.1  | 5457.5  | 5518.2  | 5911.7  | 6532.7  | 5511.7  |
| 42.5° | 5421.3 | 5465.7 | 5662.0 | 5882.1 | 5945.4  | 5821.3  | 5869.8  | 5901.8  | 6240.3  | 6921.2  | 5825.5  |
| 45°   | 5632.4 | 5680.1 | 5952.8 | 6218.1 | 6365.9  | 6296.1  | 6373.3  | 6385.7  | 6653.4  | 7450.2  | 6281.3  |
| 47.5° | 5952.0 | 6006.2 | 6324.1 | 6602.5 | 6828.4  | 6835.8  | 6963.1  | 6958.2  | 7169.3  | 8055.6  | 6855.5  |
| 50°   | 6449.7 | 6527.8 | 6788.2 | 7048.5 | 7322.9  | 7475.7  | 7645.7  | 7621.9  | 7787.8  | 8700.4  | 7516.7  |
| 52.5° | 7101.9 | 7138.1 | 7331.1 | 7523.3 | 7864.2  | 8206.7  | 8450.7  | 8429.3  | 8489.3  | 9363.3  | 8267.5  |
| 55°   | 7778.0 | 7805.1 | 7884.7 | 7989.9 | 8448.2  | 9006.8  | 9522.6  | 9489.0  | 9337.0  | 10051.6 | 9009.3  |
| 57.5° | 8385.8 | 8440.8 | 8495.9 | 8539.4 | 9036.4  | 9843.0  | 10619.2 | 10621.7 | 10257.0 | 10794.2 | 9775.6  |
| 60°   | 8480.3 | 8528.7 | 8892.6 | 9236.0 | 10042.6 | 10958.5 | 11793.0 | 11768.4 | 11209.0 | 11600.0 | 10629.9 |
| 62.5° | 7496.2 | 7605.5 | 8213.3 | 9126.7 | 11011.9 | 12998.8 | 13290.5 | 13260.1 | 12347.5 | 12593.1 | 11624.6 |
| 65°   | 5372.0 | 5496.1 | 6229.6 | 7602.2 | 10542.0 | 15247.1 | 15992.9 | 15583.8 | 13899.9 | 13814.5 | 12789.4 |
| 67.5° | 3099.2 | 3128.8 | 3446.6 | 4549.0 | 8026.8  | 15364.5 | 20115.6 | 19543.0 | 16310.8 | 15200.2 | 13359.4 |
| 70°   | 2291.7 | 2290.9 | 2366.5 | 2799.4 | 4343.6  | 12539.7 | 22076.3 | 22589.7 | 18848.9 | 15656.1 | 12553.6 |
| 71°   | 2072.4 | 2074.9 | 2159.5 | 2548.0 | 3440.1  | 10496.0 | 21659.8 | 22783.5 | 19517.6 | 15431.1 | 11970.4 |
| 72.5° | 1772.6 | 1780.8 | 1898.3 | 2285.2 | 2893.8  | 7238.3  | 19865.9 | 21620.4 | 19834.6 | 14875.8 | 11057.9 |
| 75°   | 1344.7 | 1363.5 | 1526.2 | 1926.2 | 2644.9  | 3670.9  | 14580.1 | 17264.4 | 17620.1 | 13126.2 | 8216.6  |
| 77.5° | 959.4  | 980.8  | 1164.8 | 1619.8 | 2514.3  | 2766.5  | 9764.1  | 12593.1 | 12966.8 | 8412.1  | 3706.2  |
| 80°   | 606.2  | 631.7  | 770.5  | 1288.8 | 2362.4  | 2626.9  | 6135.9  | 8464.7  | 7070.7  | 2691.8  | 943.0   |
| 82.5° | 355.7  | 375.4  | 478.1  | 841.9  | 1929.5  | 2529.9  | 3610.1  | 4691.9  | 2751.7  | 813.2   | 428.8   |
| 85°   | 206.2  | 215.2  | 298.2  | 536.4  | 1401.3  | 2387.8  | 2652.3  | 2622.8  | 1194.3  | 397.6   | 202.9   |
| 87.5° | 96.1   | 106.8  | 176.6  | 280.1  | 777.9   | 1730.7  | 2096.2  | 1811.2  | 742.6   | 186.5   | 95.3    |
| 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: P359497

CATALOG NUMBER: NVN-SA3D-740-U-SL3

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 6533.5  | 6533.5 | 6533.5 | 6533.5 | 6533.5 | 6533.5 | 6533.5 | 6533.5 | 6533.5 | 6533.5 | 6533.5 |
| 2.5°  | 6476.8  | 6462.9 | 6404.6 | 6352.8 | 6298.6 | 6227.9 | 6149.9 | 6140.1 | 6092.4 | 6101.5 | 6085.0 |
| 5°    | 6348.7  | 6313.4 | 6172.9 | 6045.6 | 5895.3 | 5760.6 | 5614.4 | 5547.0 | 5450.1 | 5443.5 | 5418.9 |
| 7.5°  | 6165.5  | 6099.8 | 5882.1 | 5640.6 | 5399.1 | 5169.1 | 4941.6 | 4792.1 | 4639.3 | 4574.4 | 4568.7 |
| 10°   | 5959.3  | 5847.6 | 5527.3 | 5170.0 | 4821.7 | 4485.7 | 4160.5 | 3919.8 | 3702.9 | 3600.3 | 3596.1 |
| 12.5° | 5763.9  | 5598.7 | 5159.3 | 4673.0 | 4196.6 | 3761.2 | 3315.2 | 2999.0 | 2727.1 | 2635.9 | 2597.3 |
| 15°   | 5597.9  | 5365.5 | 4801.2 | 4179.3 | 3601.1 | 2996.5 | 2488.9 | 2156.2 | 1904.9 | 1817.8 | 1801.4 |
| 17.5° | 5436.9  | 5137.9 | 4434.0 | 3680.7 | 2981.7 | 2317.2 | 1808.7 | 1561.5 | 1427.6 | 1392.3 | 1391.5 |
| 20°   | 5276.8  | 4903.8 | 4050.4 | 3170.7 | 2382.9 | 1733.2 | 1390.7 | 1279.8 | 1234.6 | 1230.5 | 1223.9 |
| 22.5° | 5095.2  | 4655.8 | 3647.1 | 2658.9 | 1859.7 | 1362.7 | 1182.0 | 1137.7 | 1131.9 | 1146.7 | 1146.7 |
| 25°   | 4925.2  | 4409.3 | 3238.0 | 2157.9 | 1446.5 | 1136.8 | 1055.5 | 1046.5 | 1062.1 | 1088.4 | 1090.8 |
| 27.5° | 4766.7  | 4172.0 | 2838.8 | 1712.6 | 1159.0 | 1001.3 | 967.6  | 978.3  | 1006.2 | 1036.6 | 1037.4 |
| 30°   | 4636.1  | 3947.7 | 2451.1 | 1349.6 | 979.1  | 900.3  | 894.5  | 915.9  | 946.3  | 970.1  | 975.8  |
| 32.5° | 4535.0  | 3756.3 | 2076.5 | 1085.1 | 861.7  | 824.7  | 829.6  | 847.7  | 866.6  | 879.7  | 888.8  |
| 35°   | 4488.2  | 3592.0 | 1730.7 | 915.1  | 786.9  | 766.4  | 772.9  | 782.8  | 791.0  | 800.9  | 808.3  |
| 37.5° | 4496.4  | 3464.7 | 1421.9 | 809.1  | 736.8  | 726.1  | 726.1  | 726.1  | 726.1  | 731.1  | 731.9  |
| 40°   | 4572.8  | 3391.6 | 1170.5 | 741.7  | 703.1  | 691.6  | 682.6  | 674.4  | 667.8  | 671.1  | 669.5  |
| 42.5° | 4768.3  | 3385.0 | 986.5  | 699.0  | 676.0  | 657.1  | 639.1  | 627.6  | 619.3  | 622.6  | 624.3  |
| 45°   | 5100.1  | 3467.2 | 862.5  | 668.6  | 650.6  | 621.8  | 598.8  | 586.5  | 580.7  | 591.4  | 593.1  |
| 47.5° | 5529.7  | 3646.2 | 786.9  | 646.5  | 626.7  | 589.0  | 564.3  | 552.8  | 554.5  | 570.1  | 574.2  |
| 50°   | 6083.4  | 3937.0 | 750.8  | 632.5  | 610.3  | 561.0  | 535.6  | 525.7  | 530.6  | 552.8  | 557.7  |
| 52.5° | 6691.2  | 4355.9 | 754.9  | 628.4  | 599.6  | 540.5  | 513.4  | 501.9  | 510.1  | 530.6  | 534.7  |
| 55°   | 7392.7  | 4859.5 | 823.1  | 634.1  | 584.0  | 527.3  | 495.3  | 475.6  | 482.2  | 501.1  | 504.3  |
| 57.5° | 8172.2  | 5436.1 | 960.2  | 632.5  | 564.3  | 515.0  | 476.4  | 446.8  | 451.8  | 463.3  | 466.6  |
| 60°   | 8983.8  | 6132.7 | 1173.0 | 637.4  | 555.3  | 500.2  | 451.0  | 414.0  | 412.3  | 422.2  | 423.8  |
| 62.5° | 9958.0  | 6938.5 | 1416.1 | 640.7  | 561.0  | 481.3  | 417.3  | 381.1  | 376.2  | 378.7  | 380.3  |
| 65°   | 10961.7 | 7521.7 | 1324.9 | 627.6  | 579.1  | 465.7  | 387.7  | 349.1  | 340.1  | 338.4  | 339.2  |
| 67.5° | 10993.0 | 6896.6 | 929.0  | 601.3  | 586.5  | 457.5  | 365.5  | 322.0  | 307.2  | 301.5  | 300.6  |
| 70°   | 9858.6  | 5602.9 | 723.7  | 573.3  | 556.9  | 444.4  | 345.0  | 299.8  | 277.6  | 268.6  | 267.8  |
| 71°   | 9305.0  | 5157.6 | 685.9  | 559.4  | 534.7  | 431.2  | 336.0  | 290.0  | 267.0  | 257.1  | 255.5  |
| 72.5° | 8436.7  | 4623.7 | 639.9  | 537.2  | 492.0  | 397.6  | 318.7  | 276.0  | 252.2  | 240.7  | 238.2  |
| 75°   | 6054.6  | 3023.6 | 549.5  | 478.9  | 407.4  | 317.1  | 279.3  | 248.1  | 227.5  | 213.6  | 211.9  |
| 77.5° | 2332.8  | 1203.4 | 415.6  | 398.4  | 312.1  | 248.1  | 230.0  | 214.4  | 199.6  | 185.6  | 184.8  |
| 80°   | 721.2   | 538.0  | 303.1  | 299.8  | 225.9  | 184.8  | 179.1  | 175.0  | 169.2  | 154.4  | 151.1  |
| 82.5° | 385.2   | 308.9  | 208.6  | 193.9  | 147.9  | 123.2  | 129.8  | 131.4  | 132.2  | 116.6  | 115.0  |
| 85°   | 184.0   | 163.5  | 117.5  | 110.1  | 86.2   | 69.0   | 79.7   | 86.2   | 87.1   | 71.5   | 66.5   |
| 87.5° | 87.9    | 85.4   | 55.0   | 41.9   | 32.0   | 23.0   | 27.9   | 34.5   | 37.8   | 27.1   | 23.8   |
| 90°   | 0.0     | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

LM-79-08: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

MCGRAW, INVUE, LUMARK AND STREETWORKS

DATA VALID FOR LUMINAIRES UTILIZING SA LIGHT ENGINES

Report Number: SP1-2101-121-2

Luminaire Tested: IFLD-S-SA2A-740-U-T3R-HSS

Test Date: 03/05/2021

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2101-121-2  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 03/05/2021  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: STREETWORKS  
 Catalog Number: **IFLD-S-SA2A-740-U-T3R-HSS**  
 Description: STREETWORKS INF FLOOD

SHIELD, DRIVER PROGRAMMED @ 615mA.

### Spectral Parameters

|                           |         |           |      |      |       |
|---------------------------|---------|-----------|------|------|-------|
| CCT (K):                  | 3905    | CRI (Ra): | 71.2 |      |       |
| CIE u':                   | 0.2273  | R1:       | 68.9 | R9:  | -29.7 |
| CIE v':                   | 0.5024  | R2:       | 77.0 | R10: | 46.2  |
| Duv:                      | -0.0008 | R3:       | 84.0 | R11: | 68.8  |
| CIE x:                    | 0.3841  | R4:       | 71.6 | R12: | 45.6  |
| CIE y:                    | 0.3774  | R5:       | 68.9 | R13: | 69.5  |
| CIE z:                    | 0.2385  | R6:       | 68.3 | R14: | 90.7  |
| Peak Wavelength (nm):     | 443     | R7:       | 78.7 |      |       |
| Dominant Wavelength (nm): | 579     | R8:       | 52.2 |      |       |
| Purity:                   | 28.7    |           |      |      |       |
| Rf:                       | 71.7    |           |      |      |       |
| Rg:                       | 96.9    |           |      |      |       |



### Test Conditions

Stabilization Time: 211M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.8/312%  
 Sphere Temperature (°C): 24.1

REPORT NUMBER: SP1-2101-121-2

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 1/31/2021        | 7/31/2021            |
| Power Meter                    | IN0071                | 12/1/2020        | 12/1/2021            |
| AC Power Source                | IN0063                | 12/1/2020        | 12/1/2021            |
| DC Power Source                | IN0208                | 12/1/2020        | 12/1/2021            |
| Sphere Thermometer             | IN0085                | 12/1/2020        | 12/1/2021            |
| Room Thermometer               | IN0046                | 12/1/2020        | 12/1/2021            |

REPORT NUMBER: SP1-2101-121-2

**CIE 1931 Chromaticity Diagram**



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



Point lies inside the ANSI 4000K 4-step quadrangle

REPORT NUMBER: SP1-2101-121-2

### 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       | 2304             | 0.0              | 490       | 19043            | 2.7              | 620       | 97577            | 25.4             | 750       | 4830             | 0.0              | 880       | 3505             | 0.0              |
| 365       | 2150             | 0.0              | 495       | 26606            | 4.8              | 625       | 90158            | 19.9             | 755       | 4664             | 0.0              | 885       | 2991             | 0.0              |
| 370       | 2146             | 0.0              | 500       | 36376            | 8.0              | 630       | 82240            | 14.9             | 760       | 4006             | 0.0              | 890       | 2327             | 0.0              |
| 375       | 2332             | 0.0              | 505       | 47714            | 13.3             | 635       | 74361            | 11.2             | 765       | 3715             | 0.0              | 895       | 2775             | 0.0              |
| 380       | 2527             | 0.0              | 510       | 58741            | 20.2             | 640       | 66994            | 8.0              | 770       | 3696             | 0.0              | 900       | 2141             | 0.0              |
| 385       | 2304             | 0.0              | 515       | 68716            | 28.5             | 645       | 60405            | 5.8              | 775       | 3117             | 0.0              | 905       | 2421             | 0.0              |
| 390       | 2064             | 0.0              | 520       | 77136            | 37.4             | 650       | 53806            | 3.9              | 780       | 3062             | 0.0              | 910       | 2200             | 0.0              |
| 395       | 1856             | 0.0              | 525       | 83567            | 44.9             | 655       | 47610            | 2.7              | 785       | 2907             | 0.0              | 915       | 2716             | 0.0              |
| 400       | 1856             | 0.0              | 530       | 89283            | 52.6             | 660       | 42018            | 1.8              | 790       | 2655             | 0.0              | 920       | 2656             | 0.0              |
| 405       | 2374             | 0.0              | 535       | 94097            | 58.4             | 665       | 36742            | 1.2              | 795       | 2467             | 0.0              | 925       | 2671             | 0.0              |
| 410       | 4084             | 0.0              | 540       | 96845            | 63.1             | 670       | 32105            | 0.7              | 800       | 2609             | 0.0              | 930       | 3292             | 0.0              |
| 415       | 8543             | 0.0              | 545       | 100829           | 67.1             | 675       | 27946            | 0.5              | 805       | 2293             | 0.0              | 935       | 3188             | 0.0              |
| 420       | 18394            | 0.1              | 550       | 105648           | 71.8             | 680       | 24146            | 0.3              | 810       | 2188             | 0.0              | 940       | 1997             | 0.0              |
| 425       | 37987            | 0.2              | 555       | 110017           | 75.1             | 685       | 21191            | 0.2              | 815       | 2386             | 0.0              | 945       | 2623             | 0.0              |
| 430       | 67605            | 0.5              | 560       | 114586           | 77.9             | 690       | 18544            | 0.1              | 820       | 2712             | 0.0              | 950       | 2969             | 0.0              |
| 435       | 102160           | 1.2              | 565       | 118987           | 79.1             | 695       | 16058            | 0.1              | 825       | 2473             | 0.0              | 955       | 2277             | 0.0              |
| 440       | 135103           | 2.1              | 570       | 122326           | 79.5             | 700       | 14133            | 0.0              | 830       | 1969             | 0.0              | 960       | 4267             | 0.0              |
| 445       | 140126           | 2.9              | 575       | 125968           | 78.4             | 705       | 12309            | 0.0              | 835       | 1917             | 0.0              | 965       | 2034             | 0.0              |
| 450       | 102339           | 2.7              | 580       | 127613           | 75.8             | 710       | 11142            | 0.0              | 840       | 2248             | 0.0              | 970       | 3586             | 0.0              |
| 455       | 58751            | 2.0              | 585       | 129466           | 71.9             | 715       | 10143            | 0.0              | 845       | 2266             | 0.0              | 975       | 2505             | 0.0              |
| 460       | 36892            | 1.5              | 590       | 128813           | 66.6             | 720       | 9072             | 0.0              | 850       | 2558             | 0.0              | 980       | 2666             | 0.0              |
| 465       | 24637            | 1.3              | 595       | 126387           | 59.9             | 725       | 8130             | 0.0              | 855       | 2767             | 0.0              | 985       | 2934             | 0.0              |
| 470       | 16738            | 1.0              | 600       | 123477           | 53.2             | 730       | 7149             | 0.0              | 860       | 2826             | 0.0              | 990       | 4120             | 0.0              |
| 475       | 13456            | 1.1              | 605       | 118718           | 46.0             | 735       | 6311             | 0.0              | 865       | 2385             | 0.0              | 995       | 3858             | 0.0              |
| 480       | 13081            | 1.2              | 610       | 112091           | 38.5             | 740       | 5711             | 0.0              | 870       | 3194             | 0.0              | 1000      | 3405             | 0.0              |
| 485       | 14734            | 1.7              | 615       | 105039           | 31.7             | 745       | 5111             | 0.0              | 875       | 3189             | 0.0              |           |                  |                  |

REPORT NUMBER: SP1-2101-121-2

### Scotopic Flux vs. Wavelength


**Scotopic Lumens: 10425.8**
**S/P: 1.47**

| $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>( $\mu\text{W/nm}$ ) | Lumens<br>( $\Phi/\text{nm}$ ) |
|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|-------------------|-------------------------------|--------------------------------|
| 360               | 2304                          | 0.0                            | 490               | 19043                         | 29.3                           | 620               | 97577                         | 1.2                            | 750               | 4830                          | 0.0                            | 880               | 3505                          | 0.0                            |
| 365               | 2150                          | 0.0                            | 495               | 26606                         | 43.0                           | 625               | 90158                         | 0.8                            | 755               | 4664                          | 0.0                            | 885               | 2991                          | 0.0                            |
| 370               | 2146                          | 0.0                            | 500               | 36376                         | 60.8                           | 630               | 82240                         | 0.5                            | 760               | 4006                          | 0.0                            | 890               | 2327                          | 0.0                            |
| 375               | 2332                          | 0.0                            | 505               | 47714                         | 81.1                           | 635               | 74361                         | 0.3                            | 765               | 3715                          | 0.0                            | 895               | 2775                          | 0.0                            |
| 380               | 2527                          | 0.0                            | 510               | 58741                         | 99.6                           | 640               | 66994                         | 0.2                            | 770               | 3696                          | 0.0                            | 900               | 2141                          | 0.0                            |
| 385               | 2304                          | 0.0                            | 515               | 68716                         | 113.9                          | 645               | 60405                         | 0.1                            | 775               | 3117                          | 0.0                            | 905               | 2421                          | 0.0                            |
| 390               | 2064                          | 0.0                            | 520               | 77136                         | 122.6                          | 650               | 53806                         | 0.1                            | 780               | 3062                          | 0.0                            | 910               | 2200                          | 0.0                            |
| 395               | 1856                          | 0.0                            | 525               | 83567                         | 125.0                          | 655               | 47610                         | 0.0                            | 785               | 2907                          | 0.0                            | 915               | 2716                          | 0.0                            |
| 400               | 1856                          | 0.0                            | 530               | 89283                         | 123.1                          | 660               | 42018                         | 0.0                            | 790               | 2655                          | 0.0                            | 920               | 2656                          | 0.0                            |
| 405               | 2374                          | 0.1                            | 535               | 94097                         | 117.3                          | 665               | 36742                         | 0.0                            | 795               | 2467                          | 0.0                            | 925               | 2671                          | 0.0                            |
| 410               | 4084                          | 0.2                            | 540               | 96845                         | 107.0                          | 670               | 32105                         | 0.0                            | 800               | 2609                          | 0.0                            | 930               | 3292                          | 0.0                            |
| 415               | 8543                          | 0.9                            | 545               | 100829                        | 96.7                           | 675               | 27946                         | 0.0                            | 805               | 2293                          | 0.0                            | 935               | 3188                          | 0.0                            |
| 420               | 18394                         | 3.0                            | 550               | 105648                        | 86.4                           | 680               | 24146                         | 0.0                            | 810               | 2188                          | 0.0                            | 940               | 1997                          | 0.0                            |
| 425               | 37987                         | 9.3                            | 555               | 110017                        | 75.2                           | 685               | 21191                         | 0.0                            | 815               | 2386                          | 0.0                            | 945               | 2623                          | 0.0                            |
| 430               | 67605                         | 23.0                           | 560               | 114586                        | 64.0                           | 690               | 18544                         | 0.0                            | 820               | 2712                          | 0.0                            | 950               | 2969                          | 0.0                            |
| 435               | 102160                        | 45.7                           | 565               | 118987                        | 53.4                           | 695               | 16058                         | 0.0                            | 825               | 2473                          | 0.0                            | 955               | 2277                          | 0.0                            |
| 440               | 135103                        | 75.5                           | 570               | 122326                        | 43.2                           | 700               | 14133                         | 0.0                            | 830               | 1969                          | 0.0                            | 960               | 4267                          | 0.0                            |
| 445               | 140126                        | 93.8                           | 575               | 125968                        | 34.3                           | 705               | 12309                         | 0.0                            | 835               | 1917                          | 0.0                            | 965               | 2034                          | 0.0                            |
| 450               | 102339                        | 79.3                           | 580               | 127613                        | 26.3                           | 710               | 11142                         | 0.0                            | 840               | 2248                          | 0.0                            | 970               | 3586                          | 0.0                            |
| 455               | 58751                         | 51.3                           | 585               | 129466                        | 19.8                           | 715               | 10143                         | 0.0                            | 845               | 2266                          | 0.0                            | 975               | 2505                          | 0.0                            |
| 460               | 36892                         | 35.6                           | 590               | 128813                        | 14.3                           | 720               | 9072                          | 0.0                            | 850               | 2558                          | 0.0                            | 980               | 2666                          | 0.0                            |
| 465               | 24637                         | 26.0                           | 595               | 126387                        | 10.1                           | 725               | 8130                          | 0.0                            | 855               | 2767                          | 0.0                            | 985               | 2934                          | 0.0                            |
| 470               | 16738                         | 19.3                           | 600               | 123477                        | 7.0                            | 730               | 7149                          | 0.0                            | 860               | 2826                          | 0.0                            | 990               | 4120                          | 0.0                            |
| 475               | 13456                         | 16.8                           | 605               | 118718                        | 4.7                            | 735               | 6311                          | 0.0                            | 865               | 2385                          | 0.0                            | 995               | 3858                          | 0.0                            |
| 480               | 13081                         | 17.7                           | 610               | 112091                        | 3.0                            | 740               | 5711                          | 0.0                            | 870               | 3194                          | 0.0                            | 1000              | 3405                          | 0.0                            |
| 485               | 14734                         | 21.4                           | 615               | 105039                        | 1.9                            | 745               | 5111                          | 0.0                            | 875               | 3189                          | 0.0                            |                   |                               |                                |

REPORT NUMBER: SP1-2101-121-2

### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 3927.2**      **M/P: 0.55**

| 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       | 2304             | 0.0              | 490       | 19043            | 15.8             | 620       | 97577            | 0.1              | 750       | 4830             | 0.0              | 880       | 3505             | 0.0              |
| 365       | 2150             | 0.0              | 495       | 26606            | 22.0             | 625       | 90158            | 0.0              | 755       | 4664             | 0.0              | 885       | 2991             | 0.0              |
| 370       | 2146             | 0.0              | 500       | 36376            | 29.2             | 630       | 82240            | 0.0              | 760       | 4006             | 0.0              | 890       | 2327             | 0.0              |
| 375       | 2332             | 0.0              | 505       | 47714            | 36.6             | 635       | 74361            | 0.0              | 765       | 3715             | 0.0              | 895       | 2775             | 0.0              |
| 380       | 2527             | 0.0              | 510       | 58741            | 42.2             | 640       | 66994            | 0.0              | 770       | 3696             | 0.0              | 900       | 2141             | 0.0              |
| 385       | 2304             | 0.0              | 515       | 68716            | 44.9             | 645       | 60405            | 0.0              | 775       | 3117             | 0.0              | 905       | 2421             | 0.0              |
| 390       | 2064             | 0.0              | 520       | 77136            | 44.9             | 650       | 53806            | 0.0              | 780       | 3062             | 0.0              | 910       | 2200             | 0.0              |
| 395       | 1856             | 0.0              | 525       | 83567            | 42.4             | 655       | 47610            | 0.0              | 785       | 2907             | 0.0              | 915       | 2716             | 0.0              |
| 400       | 1856             | 0.0              | 530       | 89283            | 38.6             | 660       | 42018            | 0.0              | 790       | 2655             | 0.0              | 920       | 2656             | 0.0              |
| 405       | 2374             | 0.0              | 535       | 94097            | 33.9             | 665       | 36742            | 0.0              | 795       | 2467             | 0.0              | 925       | 2671             | 0.0              |
| 410       | 4084             | 0.2              | 540       | 96845            | 28.3             | 670       | 32105            | 0.0              | 800       | 2609             | 0.0              | 930       | 3292             | 0.0              |
| 415       | 8543             | 0.6              | 545       | 100829           | 23.4             | 675       | 27946            | 0.0              | 805       | 2293             | 0.0              | 935       | 3188             | 0.0              |
| 420       | 18394            | 2.1              | 550       | 105648           | 19.0             | 680       | 24146            | 0.0              | 810       | 2188             | 0.0              | 940       | 1997             | 0.0              |
| 425       | 37987            | 5.9              | 555       | 110017           | 14.8             | 685       | 21191            | 0.0              | 815       | 2386             | 0.0              | 945       | 2623             | 0.0              |
| 430       | 67605            | 14.3             | 560       | 114586           | 11.3             | 690       | 18544            | 0.0              | 820       | 2712             | 0.0              | 950       | 2969             | 0.0              |
| 435       | 102160           | 27.3             | 565       | 118987           | 8.4              | 695       | 16058            | 0.0              | 825       | 2473             | 0.0              | 955       | 2277             | 0.0              |
| 440       | 135103           | 45.1             | 570       | 122326           | 6.0              | 700       | 14133            | 0.0              | 830       | 1969             | 0.0              | 960       | 4267             | 0.0              |
| 445       | 140126           | 55.3             | 575       | 125968           | 4.2              | 705       | 12309            | 0.0              | 835       | 1917             | 0.0              | 965       | 2034             | 0.0              |
| 450       | 102339           | 47.2             | 580       | 127613           | 2.9              | 710       | 11142            | 0.0              | 840       | 2248             | 0.0              | 970       | 3586             | 0.0              |
| 455       | 58751            | 30.8             | 585       | 129466           | 1.9              | 715       | 10143            | 0.0              | 845       | 2266             | 0.0              | 975       | 2505             | 0.0              |
| 460       | 36892            | 21.7             | 590       | 128813           | 1.3              | 720       | 9072             | 0.0              | 850       | 2558             | 0.0              | 980       | 2666             | 0.0              |
| 465       | 24637            | 16.1             | 595       | 126387           | 0.8              | 725       | 8130             | 0.0              | 855       | 2767             | 0.0              | 985       | 2934             | 0.0              |
| 470       | 16738            | 12.0             | 600       | 123477           | 0.5              | 730       | 7149             | 0.0              | 860       | 2826             | 0.0              | 990       | 4120             | 0.0              |
| 475       | 13456            | 10.3             | 605       | 118718           | 0.3              | 735       | 6311             | 0.0              | 865       | 2385             | 0.0              | 995       | 3858             | 0.0              |
| 480       | 13081            | 10.5             | 610       | 112091           | 0.2              | 740       | 5711             | 0.0              | 870       | 3194             | 0.0              | 1000      | 3405             | 0.0              |
| 485       | 14734            | 12.1             | 615       | 105039           | 0.1              | 745       | 5111             | 0.0              | 875       | 3189             | 0.0              |           |                  |                  |

### Summary

$R_f = 71.7$   
 $R_g = 96.9$   
 CIE  $R_a = 71.2$   
 $R_g = -29.7$



### Color Vector Graphics



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 55 | CES51 = 86 | CES76 = 45 |
| CES02 = 61 | CES27 = 80 | CES52 = 87 | CES77 = 68 |
| CES03 = 30 | CES28 = 79 | CES53 = 74 | CES78 = 49 |
| CES04 = 70 | CES29 = 51 | CES54 = 81 | CES79 = 77 |
| CES05 = 47 | CES30 = 60 | CES55 = 80 | CES80 = 75 |
| CES06 = 50 | CES31 = 56 | CES56 = 69 | CES81 = 75 |
| CES07 = 40 | CES32 = 52 | CES57 = 67 | CES82 = 90 |
| CES08 = 39 | CES33 = 62 | CES58 = 69 | CES83 = 85 |
| CES09 = 29 | CES34 = 65 | CES59 = 86 | CES84 = 87 |
| CES10 = 74 | CES35 = 81 | CES60 = 91 | CES85 = 83 |
| CES11 = 57 | CES36 = 92 | CES61 = 85 | CES86 = 72 |
| CES12 = 63 | CES37 = 74 | CES62 = 81 | CES87 = 77 |
| CES13 = 42 | CES38 = 69 | CES63 = 72 | CES88 = 77 |
| CES14 = 74 | CES39 = 92 | CES64 = 69 | CES89 = 72 |
| CES15 = 71 | CES40 = 86 | CES65 = 64 | CES90 = 75 |
| CES16 = 46 | CES41 = 84 | CES66 = 63 | CES91 = 91 |
| CES17 = 49 | CES42 = 75 | CES67 = 60 | CES92 = 66 |
| CES18 = 56 | CES43 = 70 | CES68 = 67 | CES93 = 80 |
| CES19 = 72 | CES44 = 98 | CES69 = 77 | CES94 = 56 |
| CES20 = 65 | CES45 = 80 | CES70 = 57 | CES95 = 72 |
| CES21 = 86 | CES46 = 77 | CES71 = 53 | CES96 = 78 |
| CES22 = 78 | CES47 = 74 | CES72 = 84 | CES97 = 83 |
| CES23 = 92 | CES48 = 66 | CES73 = 47 | CES98 = 73 |
| CES24 = 91 | CES49 = 76 | CES74 = 96 | CES99 = 63 |
| CES25 = 72 | CES50 = 85 | CES75 = 52 |            |



**Color Rendition by Hue-Angle Bin**


**Measure Comparisons**


(END OF REPORT)