

Scaled data based on original data using  
LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for  
Cooper Lighting Solutions  
(formerly Eaton)

Brand: McGRAW-EDISON

Report Number: P323513

Luminaire Tested: **GLEON-SA9A-740-U-SL3-HSS**

Issue Date: 3/3/2020

### Test Information

Test Method: LM-79-08  
Report Number: P323513  
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 (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA9A-740-U-SL3-HSS  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(9) 70 CRI, 4000K, 615mA 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: 35592 lumens  
Efficiency: N/A  
Efficacy: 122.7 lumens/watt  
Luminous Opening: Rectangular (W 2.5' x L: 1' x H: 0')  
IES Classification: Type III - Medium  
BUG Rating: B3 - U0 - G5

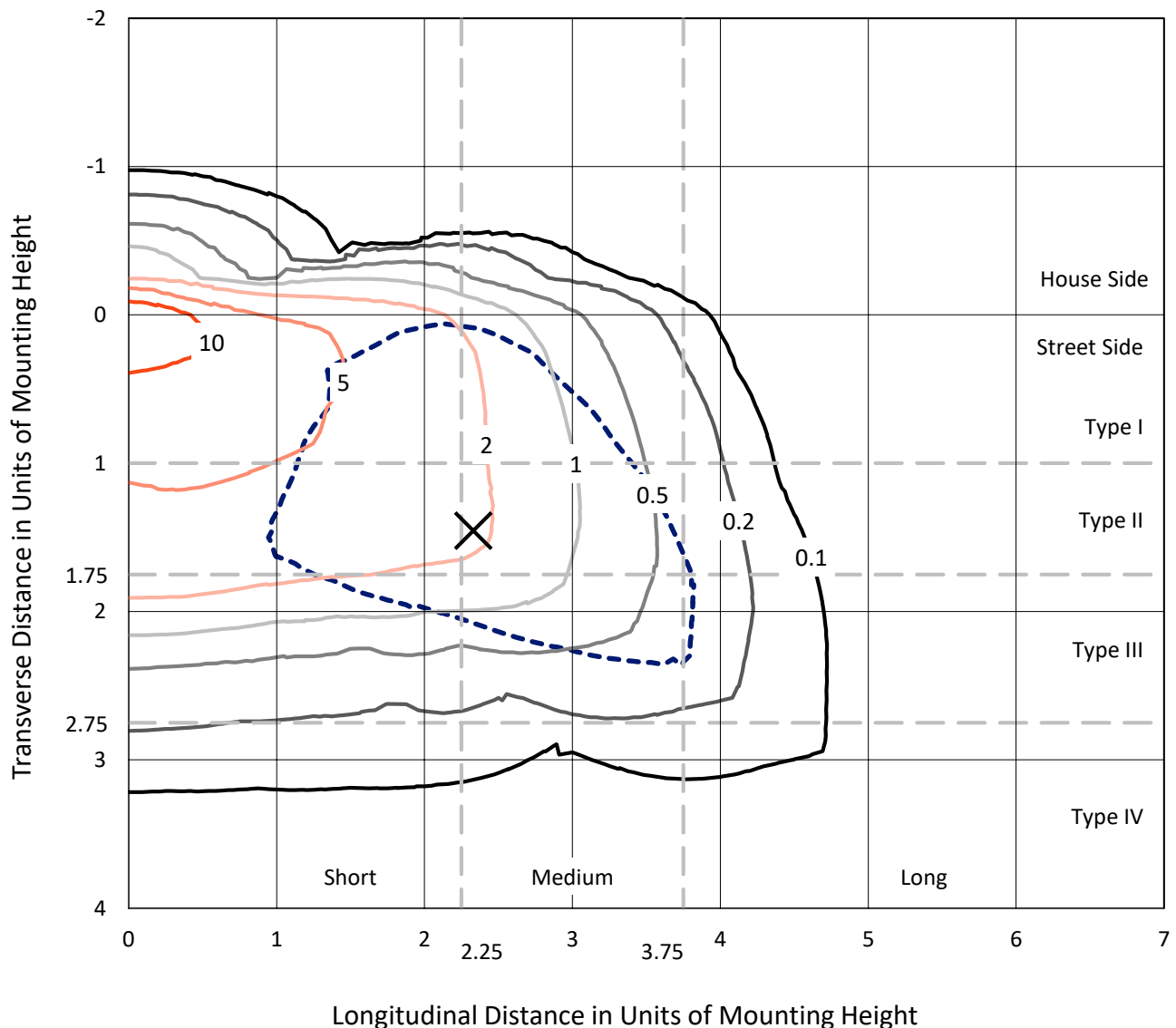
Input Watts (W): 290  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



REPORT NUMBER: P323513  
CATALOG NUMBER: GLEON-SA9A-740-U-SL3-HSS

## Iso-Footcandle Lines of Horizontal Illumination

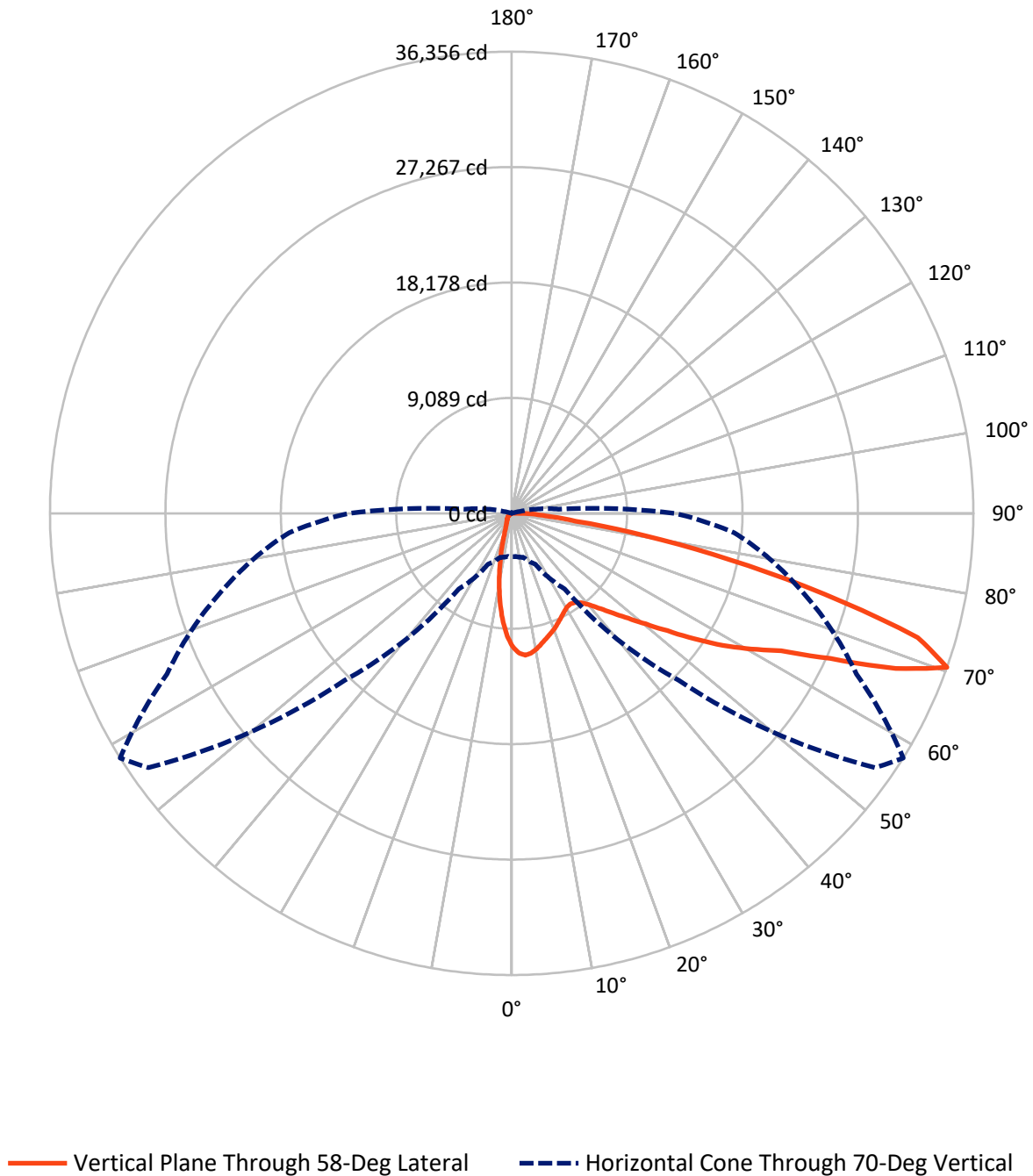
✕ Max cd  
- - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 17.1 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    | 3045.9   | 0.0    | 3045.9  |
|                    | % Fixture | 8.6      | 0.0    | 8.6     |
| <b>Street Side</b> | Lumens    | 32546.1  | 0.0    | 32546.1 |
|                    | % Fixture | 91.4     | 0.0    | 91.4    |
| <b>Total</b>       | Lumens    | 35592.0  | 0.0    | 35592.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 859.8   | 2.4       |
| 10°-20°   | 1804.4  | 5.1       |
| 20°-30°   | 2372.2  | 6.7       |
| 30°-40°   | 3141.7  | 8.8       |
| 40°-50°   | 4695.9  | 13.2      |
| 50°-60°   | 7522.6  | 21.1      |
| 60°-70°   | 9482.2  | 26.6      |
| 70°-80°   | 5114.6  | 14.4      |
| 80°-90°   | 598.7   | 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°    | 35592.0 | 100.0     |
| 0°-180°   | 35592.0 | 100.0     |

**Coefficient of Utilization**



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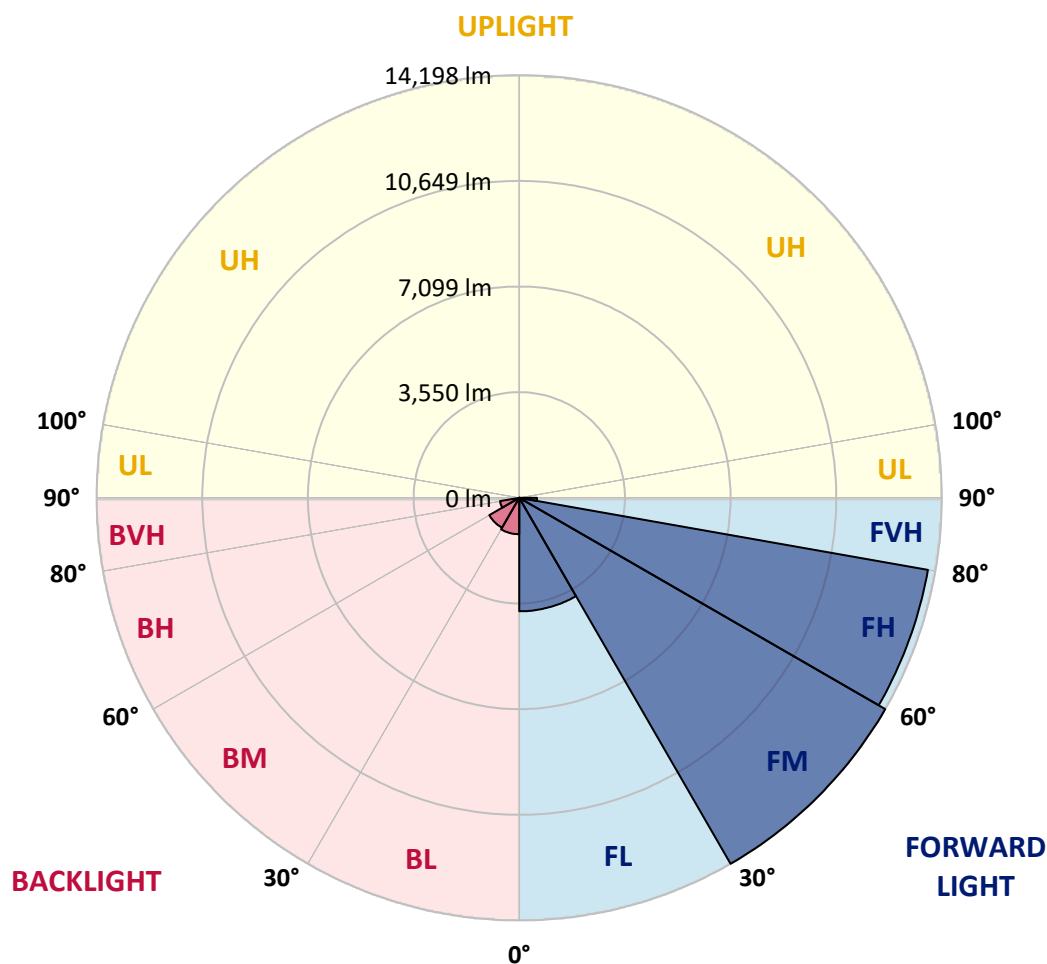
CATALOG NUMBER: GLEON-SA9A-740-U-SL3-HSS

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|---------|-----------|-------------------------|------|---------|
|      |             |         |           | B                       | U    | G       |
| FL   | (0°-30°)    | 3812.6  | 10.7      |                         |      |         |
| FM   | (30°-60°)   | 14198.2 | 39.9      |                         |      |         |
| FH   | (60°-80°)   | 13941.8 | 39.2      |                         |      | G5      |
| FVH  | (80°-90°)   | 593.5   | 1.7       |                         |      | G4/750  |
| BL   | (0°-30°)    | 1223.7  | 3.4       | B3/2500                 |      |         |
| BM   | (30°-60°)   | 1162.0  | 3.3       | B2/2500                 |      |         |
| BH   | (60°-80°)   | 655.0   | 1.8       | B2/1000                 |      | G2/1000 |
| BVH  | (80°-90°)   | 5.2     | 0.0       |                         |      | G0/10   |
| UL   | (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0     | 0.0       |                         | U0/0 |         |

**BUG Rating: B3-U0-G5**

Type III Medium





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 55°     | 58°     | 65°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 10513.7 | 10513.7 | 10513.7 | 10513.7 | 10513.7 | 10513.7 | 10513.7 | 10513.7 | 10513.7 | 10513.7 | 10513.7 |
| 2.5°  | 11385.4 | 11357.3 | 11346.9 | 11329.2 | 11261.1 | 11194.5 | 11062.8 | 11025.8 | 10942.9 | 10746.1 | 10537.4 |
| 5°    | 11394.3 | 11392.8 | 11423.9 | 11416.5 | 11392.8 | 11361.7 | 11267.0 | 11218.2 | 11077.6 | 10796.4 | 10414.6 |
| 7.5°  | 10845.2 | 10873.3 | 10942.9 | 10999.1 | 11064.3 | 11148.6 | 11160.5 | 11113.1 | 10997.7 | 10694.3 | 10188.1 |
| 10°   | 10108.2 | 10152.6 | 10250.3 | 10361.3 | 10531.5 | 10700.2 | 10851.1 | 10845.2 | 10805.3 | 10506.3 | 9915.8  |
| 12.5° | 9369.7  | 9421.5  | 9534.0  | 9698.2  | 9939.5  | 10214.8 | 10484.1 | 10521.1 | 10587.7 | 10337.6 | 9664.2  |
| 15°   | 8722.9  | 8767.3  | 8878.3  | 9079.6  | 9378.6  | 9748.6  | 10143.7 | 10211.8 | 10383.5 | 10205.9 | 9454.0  |
| 17.5° | 8173.9  | 8202.0  | 8283.4  | 8506.9  | 8853.2  | 9301.6  | 9815.2  | 9948.4  | 10204.4 | 10102.3 | 9272.0  |
| 20°   | 7790.6  | 7795.0  | 7848.3  | 8005.2  | 8351.5  | 8853.2  | 9474.8  | 9665.7  | 10015.0 | 10013.5 | 9084.1  |
| 22.5° | 7601.1  | 7586.3  | 7596.7  | 7687.0  | 7941.5  | 8425.5  | 9134.4  | 9360.8  | 9844.8  | 9938.0  | 8893.1  |
| 25°   | 7565.6  | 7553.8  | 7524.2  | 7536.0  | 7689.9  | 8051.0  | 8791.0  | 9053.0  | 9695.3  | 9892.1  | 8727.4  |
| 27.5° | 7676.6  | 7688.4  | 7638.1  | 7584.8  | 7596.7  | 7808.3  | 8486.1  | 8789.5  | 9573.9  | 9892.1  | 8610.5  |
| 30°   | 7900.1  | 7906.0  | 7869.0  | 7799.4  | 7706.2  | 7740.2  | 8274.5  | 8577.9  | 9513.2  | 9960.2  | 8536.5  |
| 32.5° | 8147.2  | 8179.8  | 8175.4  | 8119.1  | 7985.9  | 7848.3  | 8224.2  | 8500.9  | 9508.8  | 10111.2 | 8529.1  |
| 35°   | 8453.6  | 8490.6  | 8552.7  | 8540.9  | 8401.8  | 8175.4  | 8395.9  | 8613.4  | 9596.1  | 10359.8 | 8609.0  |
| 37.5° | 8779.2  | 8835.4  | 8968.6  | 9032.3  | 8942.0  | 8685.9  | 8780.7  | 8936.1  | 9830.0  | 10762.3 | 8811.7  |
| 40°   | 9094.4  | 9158.1  | 9400.8  | 9650.9  | 9582.8  | 9319.4  | 9363.8  | 9488.1  | 10245.8 | 11341.0 | 9196.5  |
| 42.5° | 9403.7  | 9498.4  | 9855.1  | 10266.6 | 10348.0 | 10137.8 | 10161.5 | 10260.6 | 10863.0 | 12137.2 | 9825.5  |
| 45°   | 9773.7  | 9880.3  | 10408.6 | 10916.3 | 11133.8 | 11042.1 | 11142.7 | 11207.8 | 11669.6 | 13189.5 | 10673.5 |
| 47.5° | 10316.9 | 10439.7 | 11087.9 | 11666.6 | 12048.4 | 12107.6 | 12310.4 | 12353.3 | 12689.3 | 14414.9 | 11779.1 |
| 50°   | 11376.5 | 11410.6 | 11996.6 | 12522.0 | 13072.6 | 13427.8 | 13658.6 | 13691.2 | 13923.6 | 15754.3 | 13159.9 |
| 52.5° | 12710.0 | 12732.2 | 13063.7 | 13415.9 | 14042.0 | 14767.1 | 15307.3 | 15353.2 | 15402.0 | 17059.6 | 14522.9 |
| 55°   | 14034.6 | 14031.6 | 14250.6 | 14457.8 | 15174.1 | 16227.9 | 17400.0 | 17428.1 | 17077.4 | 18298.4 | 15564.8 |
| 57.5° | 14861.9 | 14941.8 | 15274.8 | 15541.2 | 16541.6 | 17892.8 | 19519.3 | 19622.9 | 18837.1 | 19215.9 | 16594.9 |
| 60°   | 14598.4 | 14636.9 | 15375.4 | 16361.1 | 18245.1 | 20259.3 | 21663.8 | 21690.4 | 20160.2 | 20132.0 | 17897.3 |
| 62.5° | 12437.7 | 12458.4 | 13618.7 | 15650.7 | 19107.9 | 23328.8 | 24250.8 | 23817.2 | 21681.6 | 21403.3 | 19455.7 |
| 65°   | 8524.6  | 8659.3  | 9628.7  | 12140.2 | 17522.8 | 25254.2 | 28255.6 | 27537.8 | 24000.7 | 23235.5 | 20864.6 |
| 67.5° | 5020.1  | 4991.9  | 5471.4  | 7321.4  | 12869.8 | 23975.5 | 33321.5 | 32608.2 | 27163.4 | 24462.4 | 20451.7 |
| 70°   | 3429.1  | 3409.9  | 3593.4  | 4432.5  | 7265.2  | 18598.8 | 34915.5 | 36355.5 | 29956.1 | 23636.6 | 17601.3 |
| 72.5° | 2447.9  | 2458.2  | 2729.1  | 3443.9  | 4561.3  | 10836.3 | 30025.6 | 33434.0 | 29081.4 | 20605.6 | 13378.9 |
| 75°   | 1662.0  | 1690.1  | 2077.9  | 2825.3  | 3998.9  | 5512.9  | 21307.1 | 25415.5 | 23681.0 | 14975.8 | 7689.9  |
| 77.5° | 893.9   | 925.0   | 1382.3  | 2276.2  | 3615.6  | 3830.2  | 13706.0 | 17491.8 | 14875.2 | 6732.4  | 2228.8  |
| 80°   | 373.0   | 390.7   | 646.7   | 1654.6  | 3124.2  | 3364.0  | 8064.4  | 10606.9 | 6338.7  | 1327.5  | 497.3   |
| 82.5° | 161.3   | 170.2   | 269.4   | 987.1   | 2335.4  | 2840.1  | 4269.7  | 5102.9  | 1921.0  | 291.6   | 250.1   |
| 85°   | 31.1    | 32.6    | 111.0   | 522.4   | 1490.3  | 1602.8  | 2767.5  | 2712.8  | 862.8   | 125.8   | 182.0   |
| 87.5° | 0.0     | 0.0     | 26.6    | 164.3   | 438.1   | 873.2   | 1688.6  | 1667.9  | 293.0   | 60.7    | 68.1    |
| 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: P323513

CATALOG NUMBER: GLEON-SA9A-740-U-SL3-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°     | 105°    | 115°    | 125°    | 135°    | 145°    | 155°    | 165°    | 175°    | 180°    |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 10513.7 | 10513.7 | 10513.7 | 10513.7 | 10513.7 | 10513.7 | 10513.7 | 10513.7 | 10513.7 | 10513.7 | 10513.7 |
| 2.5°  | 10430.8 | 10328.7 | 10114.1 | 9849.2  | 9646.4  | 9423.0  | 9245.4  | 9020.4  | 8922.7  | 8927.2  | 8873.9  |
| 5°    | 10197.0 | 9986.8  | 9511.8  | 8912.4  | 8450.6  | 7974.1  | 7564.1  | 7155.7  | 6914.4  | 6836.0  | 6762.0  |
| 7.5°  | 9862.5  | 9529.5  | 8771.8  | 7848.3  | 7066.9  | 6303.2  | 5638.7  | 5054.1  | 4684.1  | 4503.5  | 4437.0  |
| 10°   | 9485.1  | 9017.5  | 7920.8  | 6704.3  | 5588.4  | 4555.3  | 3694.0  | 2945.1  | 2646.2  | 2443.4  | 2391.6  |
| 12.5° | 9153.6  | 8520.2  | 7089.1  | 5530.6  | 4206.1  | 2959.9  | 2138.6  | 1672.4  | 1469.6  | 1389.7  | 1376.4  |
| 15°   | 8841.3  | 8055.5  | 6288.4  | 4468.0  | 2912.6  | 1821.8  | 1360.1  | 1201.7  | 1154.4  | 1141.1  | 1141.1  |
| 17.5° | 8546.8  | 7613.0  | 5505.5  | 3421.7  | 1926.9  | 1277.2  | 1126.3  | 1090.7  | 1075.9  | 1074.5  | 1075.9  |
| 20°   | 8239.0  | 7170.5  | 4735.9  | 2507.1  | 1345.3  | 1081.9  | 1040.4  | 1021.2  | 1016.7  | 1016.7  | 1016.7  |
| 22.5° | 7944.5  | 6727.9  | 3987.0  | 1790.8  | 1078.9  | 987.1   | 966.4   | 953.1   | 948.7   | 947.2   | 944.2   |
| 25°   | 7661.8  | 6307.6  | 3255.9  | 1265.4  | 947.2   | 904.3   | 886.5   | 868.7   | 855.4   | 848.0   | 843.6   |
| 27.5° | 7429.5  | 5933.2  | 2575.1  | 1015.3  | 855.4   | 818.4   | 796.2   | 769.6   | 737.0   | 722.2   | 716.3   |
| 30°   | 7244.5  | 5591.3  | 1984.6  | 856.9   | 769.6   | 732.6   | 698.5   | 652.7   | 605.3   | 580.1   | 578.7   |
| 32.5° | 7099.4  | 5255.4  | 1506.6  | 757.7   | 692.6   | 646.7   | 597.9   | 540.2   | 485.4   | 457.3   | 455.8   |
| 35°   | 7028.4  | 4959.4  | 1151.4  | 685.2   | 624.5   | 566.8   | 506.1   | 442.5   | 389.2   | 362.6   | 359.6   |
| 37.5° | 7075.7  | 4709.3  | 898.3   | 624.5   | 566.8   | 500.2   | 429.2   | 362.6   | 315.2   | 291.6   | 290.1   |
| 40°   | 7248.9  | 4549.4  | 729.6   | 572.7   | 518.0   | 436.6   | 359.6   | 297.5   | 257.5   | 238.3   | 236.8   |
| 42.5° | 7617.4  | 4490.2  | 623.1   | 529.8   | 470.6   | 377.4   | 299.0   | 245.7   | 208.7   | 195.4   | 192.4   |
| 45°   | 8233.1  | 4577.5  | 550.5   | 488.4   | 421.8   | 321.2   | 247.2   | 201.3   | 168.7   | 158.4   | 156.9   |
| 47.5° | 9053.0  | 4806.9  | 498.7   | 448.4   | 377.4   | 270.8   | 205.7   | 162.8   | 137.6   | 127.3   | 125.8   |
| 50°   | 10109.7 | 5171.0  | 455.8   | 408.5   | 336.0   | 229.4   | 170.2   | 128.8   | 106.6   | 99.2    | 99.2    |
| 52.5° | 11259.6 | 5604.6  | 417.4   | 371.5   | 294.5   | 190.9   | 137.6   | 99.2    | 84.4    | 75.5    | 75.5    |
| 55°   | 12209.8 | 5983.5  | 375.9   | 343.4   | 244.2   | 158.4   | 105.1   | 75.5    | 62.2    | 57.7    | 57.7    |
| 57.5° | 13158.4 | 6387.6  | 328.6   | 294.5   | 195.4   | 128.8   | 79.9    | 56.2    | 45.9    | 42.9    | 42.9    |
| 60°   | 14388.3 | 6881.9  | 282.7   | 239.8   | 153.9   | 97.7    | 59.2    | 40.0    | 34.0    | 32.6    | 32.6    |
| 62.5° | 15741.0 | 7171.9  | 241.2   | 192.4   | 119.9   | 72.5    | 42.9    | 26.6    | 25.2    | 25.2    | 23.7    |
| 65°   | 16568.3 | 6762.0  | 202.8   | 153.9   | 93.2    | 54.8    | 28.1    | 19.2    | 22.2    | 20.7    | 17.8    |
| 67.5° | 15513.0 | 5293.9  | 165.8   | 119.9   | 72.5    | 41.4    | 17.8    | 13.3    | 23.7    | 19.2    | 14.8    |
| 70°   | 12844.7 | 3705.8  | 128.8   | 84.4    | 57.7    | 35.5    | 11.8    | 8.9     | 25.2    | 19.2    | 11.8    |
| 72.5° | 9612.4  | 2480.4  | 102.1   | 56.2    | 42.9    | 31.1    | 10.4    | 4.4     | 22.2    | 16.3    | 10.4    |
| 75°   | 5252.4  | 999.0   | 81.4    | 35.5    | 26.6    | 22.2    | 7.4     | 3.0     | 14.8    | 11.8    | 7.4     |
| 77.5° | 1382.3  | 263.4   | 59.2    | 23.7    | 14.8    | 8.9     | 4.4     | 1.5     | 7.4     | 5.9     | 3.0     |
| 80°   | 352.2   | 102.1   | 38.5    | 16.3    | 10.4    | 4.4     | 0.0     | 0.0     | 1.5     | 0.0     | 0.0     |
| 82.5° | 188.0   | 42.9    | 23.7    | 11.8    | 5.9     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |
| 85°   | 142.1   | 28.1    | 13.3    | 7.4     | 1.5     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |
| 87.5° | 54.8    | 8.9     | 4.4     | 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     |

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            |

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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 4000K 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       | 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              |           |                  |                  |

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### Scotopic Flux vs. Wavelength



Scotopic Lumens: 10425.8

S/P: 1.47

| 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            | 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              |           |                  |                  |

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### 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              |           |                  |                  |

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TM-30-18

### 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)