

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: P323189

Luminaire Tested: **GLEON-SA5A-740-U-SL2-HSS**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P323189  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-21)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA5A-740-U-SL2-HSS  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(5) 70 CRI, 4000K, 615mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE II SPILL  
LIGHT ELIMINATOR OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 19293 lumens  
Efficiency: N/A  
Efficacy: 119.1 lumens/watt  
Luminous Opening: Rectangular (W 1.5' x L: 1' x H: 0')  
IES Classification: Type III - Medium  
BUG Rating: B2 - U0 - G3

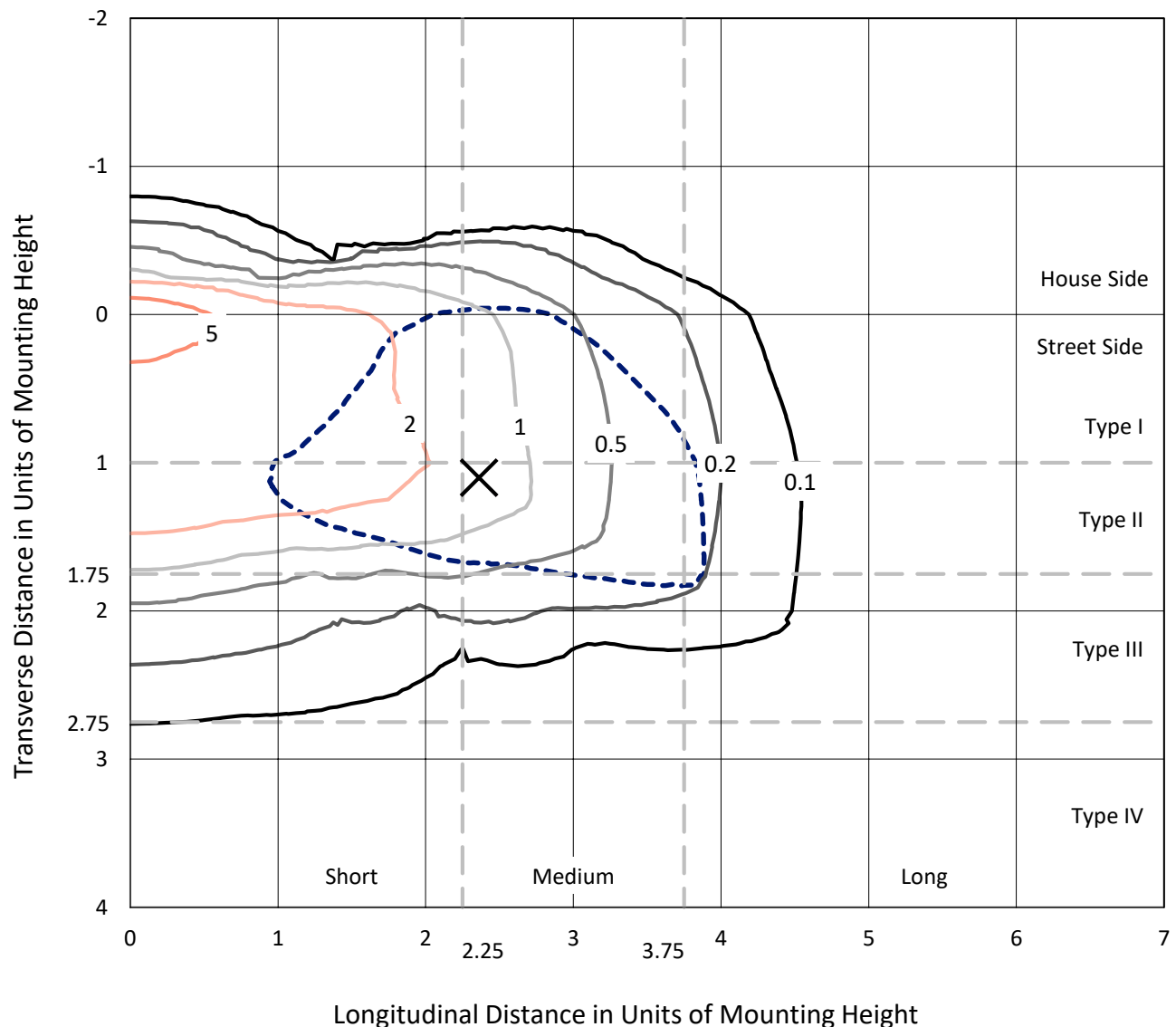
Input Watts (W): 162  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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## Iso-Footcandle Lines of Horizontal Illumination

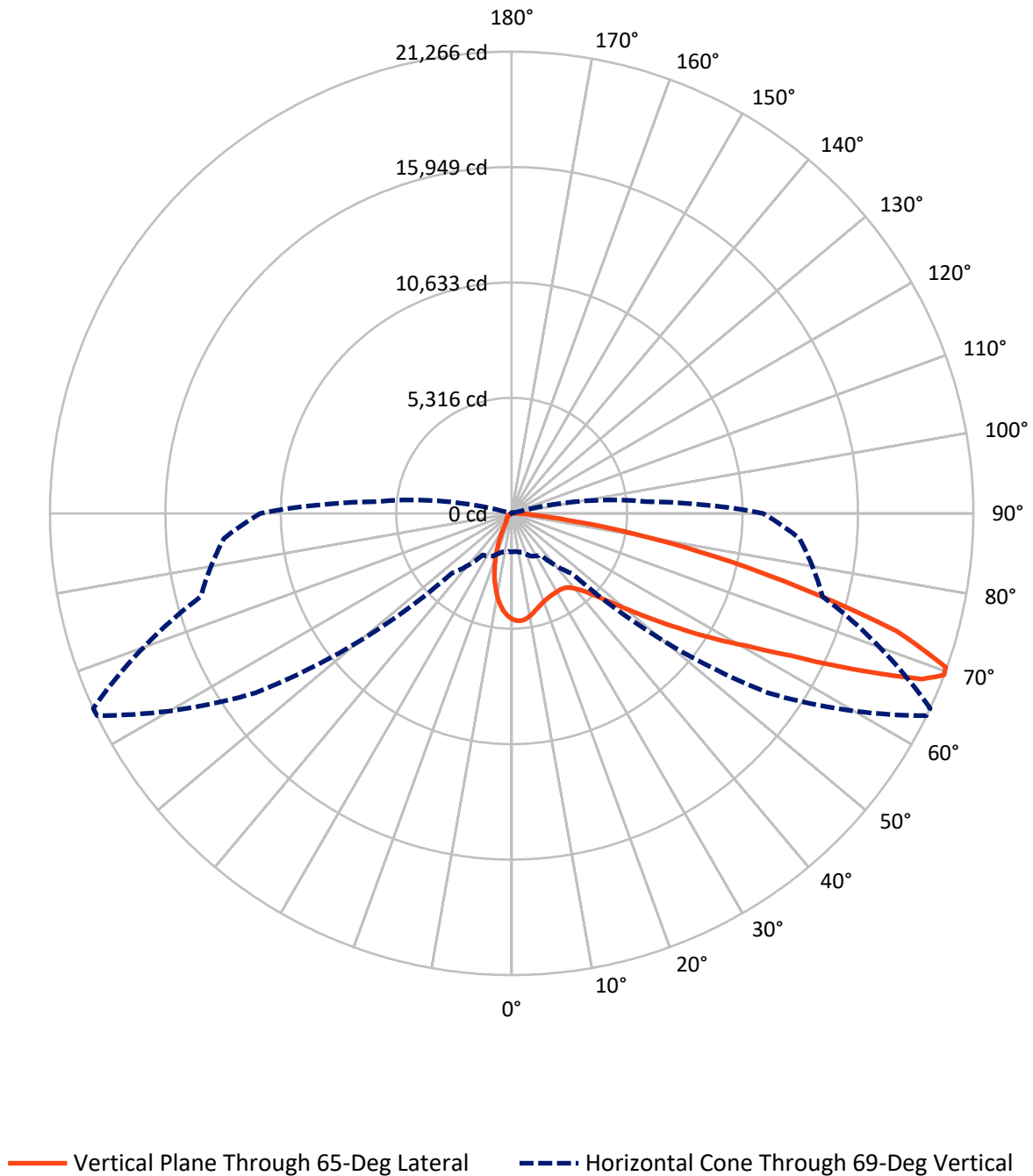
× Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 7.8 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    | 2274.2   | 0.0    | 2274.2  |
|                    | % Fixture | 11.8     | 0.0    | 11.8    |
| <b>Street Side</b> | Lumens    | 17018.8  | 0.0    | 17018.8 |
|                    | % Fixture | 88.2     | 0.0    | 88.2    |
| <b>Total</b>       | Lumens    | 19293.0  | 0.0    | 19293.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 407.7   | 2.1       |
| 10°-20°   | 892.4   | 4.6       |
| 20°-30°   | 1236.1  | 6.4       |
| 30°-40°   | 1723.5  | 8.9       |
| 40°-50°   | 2678.8  | 13.9      |
| 50°-60°   | 4300.5  | 22.3      |
| 60°-70°   | 4864.6  | 25.2      |
| 70°-80°   | 2857.0  | 14.8      |
| 80°-90°   | 332.3   | 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°    | 19293.0 | 100.0     |
| 0°-180°   | 19293.0 | 100.0     |

**Coefficient of Utilization**



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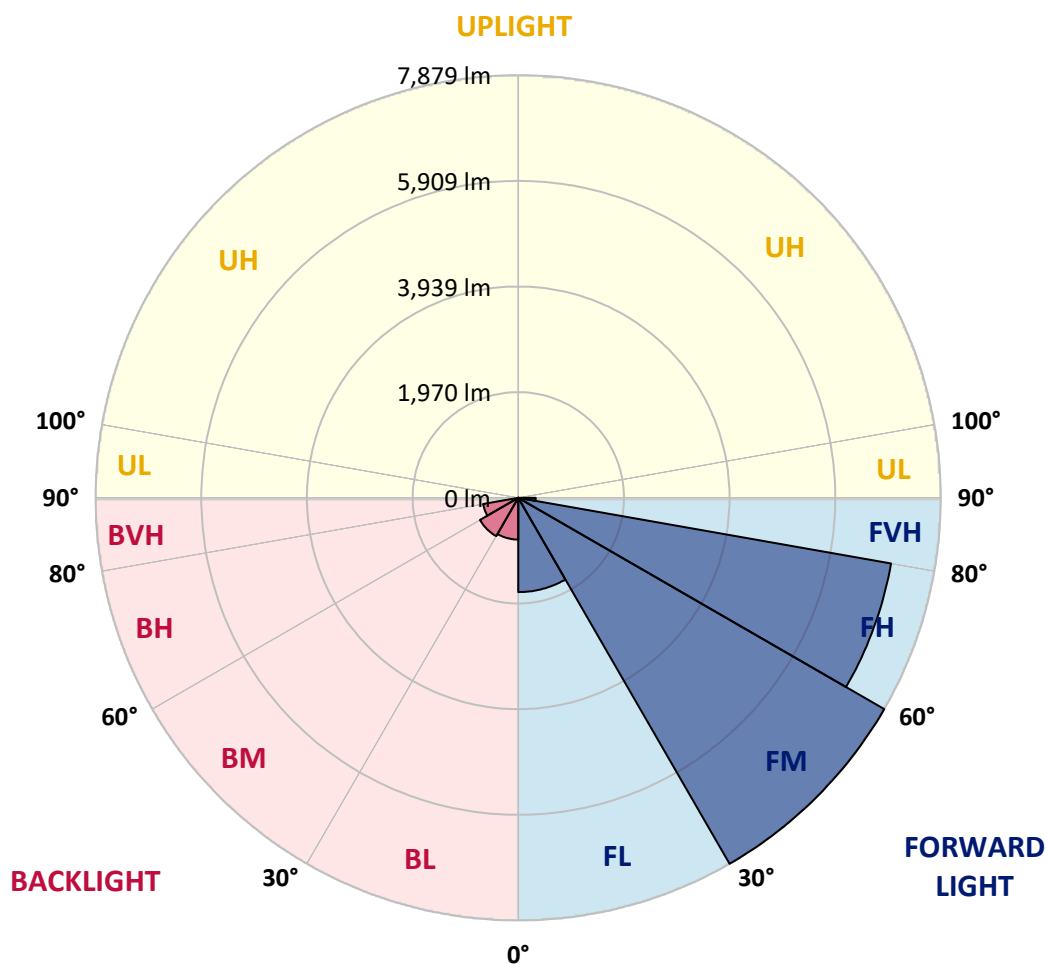
CATALOG NUMBER: GLEON-SA5A-740-U-SL2-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 1758.0 | 9.1       |                         |      |         |
| FM   | (30°-60°)   | 7878.7 | 40.8      |                         |      |         |
| FH   | (60°-80°)   | 7057.2 | 36.6      |                         |      | G3/7500 |
| FVH  | (80°-90°)   | 324.9  | 1.7       |                         |      | G3/500  |
| BL   | (0°-30°)    | 778.1  | 4.0       | B2/1000                 |      |         |
| BM   | (30°-60°)   | 824.1  | 4.3       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 664.5  | 3.4       | B2/1000                 |      | G2/1000 |
| BVH  | (80°-90°)   | 7.5    | 0.0       |                         |      | G0/10   |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B2-U0-G3**

Type III Medium



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°     | 55°     | 64°     | 65°     | 75°     | 85°     |
|-------|--------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------|
| 0°    | 4875.4 | 4875.4 | 4875.4 | 4875.4 | 4875.4 | 4875.4  | 4875.4  | 4875.4  | 4875.4  | 4875.4  | 4875.4  |
| 2.5°  | 4918.6 | 4906.4 | 4916.2 | 4937.4 | 4948.0 | 4948.0  | 4956.2  | 4946.4  | 4949.7  | 4926.0  | 4891.7  |
| 5°    | 4610.9 | 4592.1 | 4619.0 | 4678.6 | 4752.1 | 4815.0  | 4908.0  | 4957.0  | 4961.9  | 4962.7  | 4922.7  |
| 7.5°  | 4279.4 | 4262.3 | 4302.3 | 4372.5 | 4467.2 | 4583.9  | 4746.4  | 4888.4  | 4896.6  | 4973.3  | 4944.0  |
| 10°   | 4010.0 | 3997.8 | 4044.3 | 4119.4 | 4230.4 | 4361.1  | 4560.3  | 4757.8  | 4781.5  | 4951.3  | 4940.7  |
| 12.5° | 3796.1 | 3786.3 | 3830.4 | 3917.0 | 4030.4 | 4174.9  | 4383.1  | 4612.5  | 4644.3  | 4901.5  | 4924.4  |
| 15°   | 3640.2 | 3638.6 | 3675.3 | 3758.6 | 3884.3 | 4019.0  | 4232.1  | 4477.8  | 4514.5  | 4847.6  | 4921.9  |
| 17.5° | 3558.6 | 3561.0 | 3588.0 | 3659.0 | 3766.7 | 3900.6  | 4104.7  | 4364.3  | 4404.3  | 4799.5  | 4934.2  |
| 20°   | 3550.4 | 3552.9 | 3567.5 | 3607.5 | 3694.9 | 3813.3  | 4001.0  | 4268.8  | 4310.4  | 4763.5  | 4953.7  |
| 22.5° | 3622.2 | 3620.6 | 3624.7 | 3620.6 | 3669.6 | 3759.4  | 3932.5  | 4195.3  | 4243.5  | 4739.9  | 4969.3  |
| 25°   | 3760.2 | 3757.8 | 3756.1 | 3725.9 | 3693.3 | 3741.4  | 3903.9  | 4153.7  | 4199.4  | 4722.7  | 4978.2  |
| 27.5° | 3952.1 | 3950.4 | 3948.0 | 3898.2 | 3800.2 | 3770.0  | 3907.2  | 4138.2  | 4176.6  | 4708.8  | 4976.6  |
| 30°   | 4204.3 | 4215.7 | 4212.5 | 4143.1 | 3990.4 | 3857.4  | 3941.4  | 4130.0  | 4163.5  | 4681.9  | 4959.5  |
| 32.5° | 4500.7 | 4523.5 | 4541.5 | 4467.2 | 4276.2 | 4030.4  | 4020.6  | 4139.0  | 4163.5  | 4661.5  | 4928.4  |
| 35°   | 4808.4 | 4837.8 | 4903.9 | 4877.8 | 4626.4 | 4290.9  | 4157.0  | 4192.9  | 4213.3  | 4672.9  | 4913.7  |
| 37.5° | 5111.3 | 5146.4 | 5290.1 | 5366.0 | 5085.2 | 4635.4  | 4369.2  | 4326.0  | 4336.6  | 4742.3  | 4930.1  |
| 40°   | 5463.2 | 5516.2 | 5734.2 | 5856.7 | 5633.0 | 5096.6  | 4686.8  | 4554.5  | 4558.6  | 4895.0  | 5006.0  |
| 42.5° | 5925.2 | 5979.9 | 6215.9 | 6407.7 | 6250.1 | 5679.5  | 5117.8  | 4903.9  | 4899.9  | 5180.7  | 5184.8  |
| 45°   | 6488.5 | 6545.7 | 6789.8 | 7002.8 | 6931.8 | 6370.2  | 5669.7  | 5414.2  | 5409.3  | 5631.3  | 5523.6  |
| 47.5° | 7126.9 | 7183.3 | 7401.2 | 7620.8 | 7697.6 | 7176.7  | 6372.6  | 6110.5  | 6099.1  | 6257.5  | 6046.9  |
| 50°   | 7674.7 | 7711.5 | 7912.3 | 8207.8 | 8553.9 | 8167.8  | 7246.9  | 6994.7  | 6982.4  | 7089.4  | 6815.1  |
| 52.5° | 7873.9 | 7895.1 | 8099.2 | 8513.1 | 9376.9 | 9509.9  | 8395.6  | 8070.7  | 8061.7  | 8108.2  | 7838.0  |
| 55°   | 7470.6 | 7509.0 | 7759.6 | 8373.5 | 9822.6 | 11026.7 | 9845.4  | 9403.0  | 9335.2  | 9234.8  | 8907.4  |
| 57.5° | 6371.8 | 6433.0 | 6702.4 | 7518.8 | 9614.4 | 12230.1 | 11976.2 | 10910.0 | 10810.4 | 10196.5 | 9776.9  |
| 60°   | 4774.1 | 4849.3 | 5072.9 | 5953.8 | 8503.3 | 12658.7 | 14304.5 | 12589.3 | 12364.8 | 10962.2 | 10576.1 |
| 62.5° | 3276.1 | 3313.7 | 3465.5 | 4039.4 | 6262.4 | 11956.6 | 16252.3 | 14838.4 | 14428.6 | 11794.9 | 11440.6 |
| 65°   | 2502.2 | 2515.2 | 2577.3 | 2774.8 | 3729.2 | 9712.4  | 17027.1 | 17805.9 | 17310.4 | 12790.9 | 12337.8 |
| 67.5° | 2016.4 | 2005.8 | 2091.5 | 2374.0 | 2497.3 | 5925.2  | 16123.4 | 20613.4 | 20381.5 | 14122.4 | 13240.7 |
| 69°   | 1778.1 | 1763.4 | 1850.7 | 2178.9 | 2345.4 | 3917.0  | 14413.9 | 21251.0 | 21265.7 | 14825.3 | 13302.8 |
| 70°   | 1600.1 | 1609.9 | 1696.4 | 2063.0 | 2294.0 | 3074.5  | 12781.1 | 21088.5 | 21204.5 | 15088.2 | 12930.5 |
| 72.5° | 1068.6 | 1094.8 | 1268.6 | 1712.7 | 2205.8 | 2326.7  | 7717.2  | 18096.5 | 18542.3 | 14496.3 | 11093.7 |
| 75°   | 602.5  | 622.1  | 828.6  | 1291.5 | 2078.5 | 2215.6  | 4076.1  | 13332.2 | 13763.2 | 12122.3 | 8554.8  |
| 77.5° | 295.5  | 306.1  | 468.6  | 833.5  | 1738.1 | 2111.1  | 2312.0  | 9056.0  | 9548.3  | 7912.3  | 4838.6  |
| 80°   | 124.9  | 130.6  | 234.3  | 514.3  | 1242.5 | 2014.8  | 1716.8  | 5573.4  | 5634.6  | 3099.8  | 1289.1  |
| 82.5° | 48.2   | 49.8   | 98.8   | 320.8  | 789.4  | 1570.7  | 1436.0  | 2642.6  | 2578.9  | 583.7   | 293.9   |
| 85°   | 5.7    | 6.5    | 35.9   | 192.7  | 439.2  | 808.2   | 1166.6  | 1138.8  | 1053.9  | 115.9   | 151.0   |
| 87.5° | 0.0    | 0.0    | 2.4    | 58.8   | 130.6  | 378.8   | 606.6   | 472.7   | 426.1   | 37.6    | 78.4    |
| 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: P323189

CATALOG NUMBER: GLEON-SA5A-740-U-SL2-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 4875.4  | 4875.4 | 4875.4 | 4875.4 | 4875.4 | 4875.4 | 4875.4 | 4875.4 | 4875.4 | 4875.4 | 4875.4 |
| 2.5°  | 4863.1  | 4855.0 | 4810.9 | 4747.2 | 4686.8 | 4611.7 | 4539.8 | 4496.6 | 4462.3 | 4439.4 | 4466.4 |
| 5°    | 4876.2  | 4840.3 | 4706.4 | 4534.9 | 4366.8 | 4177.4 | 4001.0 | 3851.6 | 3792.9 | 3727.6 | 3756.9 |
| 7.5°  | 4872.1  | 4804.4 | 4563.5 | 4258.2 | 3949.6 | 3630.4 | 3328.3 | 3095.7 | 2974.9 | 2856.5 | 2886.7 |
| 10°   | 4851.7  | 4737.4 | 4372.5 | 3920.2 | 3458.2 | 2999.4 | 2570.8 | 2245.0 | 2063.0 | 1898.1 | 1921.7 |
| 12.5° | 4806.8  | 4647.6 | 4147.2 | 3533.3 | 2915.3 | 2310.3 | 1808.3 | 1391.1 | 1167.4 | 1068.6 | 1080.9 |
| 15°   | 4779.9  | 4560.3 | 3908.8 | 3141.4 | 2335.6 | 1609.1 | 1105.4 | 822.1  | 720.0  | 687.4  | 691.5  |
| 17.5° | 4766.8  | 4476.2 | 3662.2 | 2693.2 | 1743.0 | 1024.5 | 714.3  | 630.2  | 608.2  | 602.5  | 604.1  |
| 20°   | 4753.7  | 4391.3 | 3408.4 | 2249.9 | 1200.9 | 689.0  | 587.0  | 562.5  | 554.3  | 547.0  | 548.6  |
| 22.5° | 4731.7  | 4309.6 | 3135.7 | 1800.9 | 809.8  | 559.2  | 529.0  | 505.3  | 488.2  | 479.2  | 480.8  |
| 25°   | 4704.8  | 4223.9 | 2857.3 | 1341.3 | 591.1  | 498.8  | 470.2  | 436.8  | 416.3  | 400.0  | 400.8  |
| 27.5° | 4661.5  | 4118.6 | 2569.9 | 976.4  | 496.4  | 446.6  | 408.2  | 371.4  | 337.2  | 318.4  | 318.4  |
| 30°   | 4601.1  | 3999.4 | 2250.7 | 698.8  | 444.9  | 395.1  | 348.6  | 302.9  | 266.1  | 249.0  | 247.4  |
| 32.5° | 4534.1  | 3875.3 | 1928.3 | 529.8  | 404.1  | 347.0  | 293.9  | 245.7  | 213.1  | 199.2  | 198.4  |
| 35°   | 4477.0  | 3741.4 | 1606.6 | 444.1  | 363.3  | 300.4  | 242.5  | 201.6  | 175.5  | 164.1  | 163.3  |
| 37.5° | 4440.2  | 3607.5 | 1293.1 | 396.8  | 326.5  | 257.2  | 203.3  | 166.5  | 147.8  | 138.8  | 138.0  |
| 40°   | 4434.5  | 3508.0 | 1006.6 | 360.8  | 292.3  | 218.8  | 169.8  | 141.2  | 124.1  | 114.3  | 113.5  |
| 42.5° | 4508.8  | 3450.8 | 772.3  | 330.6  | 257.2  | 185.3  | 144.5  | 120.8  | 102.9  | 93.1   | 92.3   |
| 45°   | 4703.9  | 3468.8 | 594.3  | 303.7  | 222.1  | 156.7  | 122.5  | 100.4  | 84.1   | 76.7   | 75.1   |
| 47.5° | 5059.9  | 3592.9 | 472.7  | 276.8  | 188.6  | 133.1  | 104.5  | 83.3   | 69.4   | 62.0   | 61.2   |
| 50°   | 5693.4  | 3884.3 | 395.1  | 247.4  | 157.6  | 113.5  | 86.5   | 67.8   | 56.3   | 49.8   | 49.0   |
| 52.5° | 6534.2  | 4403.5 | 352.7  | 218.8  | 130.6  | 96.3   | 71.0   | 53.9   | 44.1   | 39.2   | 38.4   |
| 55°   | 7461.6  | 5032.1 | 324.9  | 187.8  | 106.9  | 80.0   | 56.3   | 42.5   | 34.3   | 30.2   | 28.6   |
| 57.5° | 8367.0  | 5576.6 | 298.8  | 157.6  | 89.0   | 65.3   | 44.9   | 33.5   | 26.9   | 22.9   | 22.0   |
| 60°   | 9198.9  | 6077.1 | 268.6  | 126.5  | 72.7   | 51.4   | 35.1   | 26.1   | 21.2   | 17.1   | 17.1   |
| 62.5° | 10089.5 | 6464.0 | 227.0  | 98.8   | 59.6   | 39.2   | 28.6   | 23.7   | 17.1   | 14.7   | 13.9   |
| 65°   | 11033.3 | 6751.4 | 178.0  | 76.7   | 46.5   | 29.4   | 23.7   | 24.5   | 13.9   | 10.6   | 9.8    |
| 67.5° | 11730.5 | 6694.3 | 131.4  | 60.4   | 35.9   | 22.9   | 22.9   | 26.1   | 12.2   | 8.2    | 7.3    |
| 69°   | 11577.0 | 6229.7 | 110.2  | 52.2   | 31.0   | 19.6   | 21.2   | 26.1   | 11.4   | 7.3    | 6.5    |
| 70°   | 11132.1 | 5715.4 | 97.1   | 46.5   | 27.8   | 18.0   | 20.4   | 25.3   | 10.6   | 7.3    | 6.5    |
| 72.5° | 9270.7  | 4304.7 | 75.9   | 35.1   | 22.0   | 14.7   | 17.1   | 22.0   | 10.6   | 7.3    | 5.7    |
| 75°   | 6973.5  | 2755.3 | 58.0   | 25.3   | 16.3   | 11.4   | 13.1   | 16.3   | 10.6   | 6.5    | 5.7    |
| 77.5° | 3794.5  | 993.5  | 41.6   | 17.1   | 11.4   | 9.0    | 9.0    | 12.2   | 9.8    | 4.9    | 3.3    |
| 80°   | 975.6   | 249.8  | 26.1   | 11.4   | 9.0    | 6.5    | 5.7    | 8.2    | 5.7    | 0.8    | 0.0    |
| 82.5° | 240.8   | 56.3   | 13.9   | 8.2    | 6.5    | 2.4    | 2.4    | 4.1    | 2.4    | 0.0    | 0.0    |
| 85°   | 132.3   | 27.8   | 9.0    | 5.7    | 3.3    | 0.0    | 0.0    | 0.8    | 0.0    | 0.0    | 0.0    |
| 87.5° | 67.8    | 8.2    | 2.4    | 1.6    | 0.8    | 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



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**TM-30-18**

**Measure Comparisons**



(END OF REPORT)