

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: P323678

Luminaire Tested: **GLEON-SA4B-830-U-SL3-HSS**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P323678  
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-SA4B-830-U-SL3-HSS  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(4) 80 CRI, 3000K, 800mA 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: 15650 lumens  
Efficiency: N/A  
Efficacy: 91.5 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1' x H: 0')  
IES Classification: Type III - Medium  
BUG Rating: B2 - U0 - G3

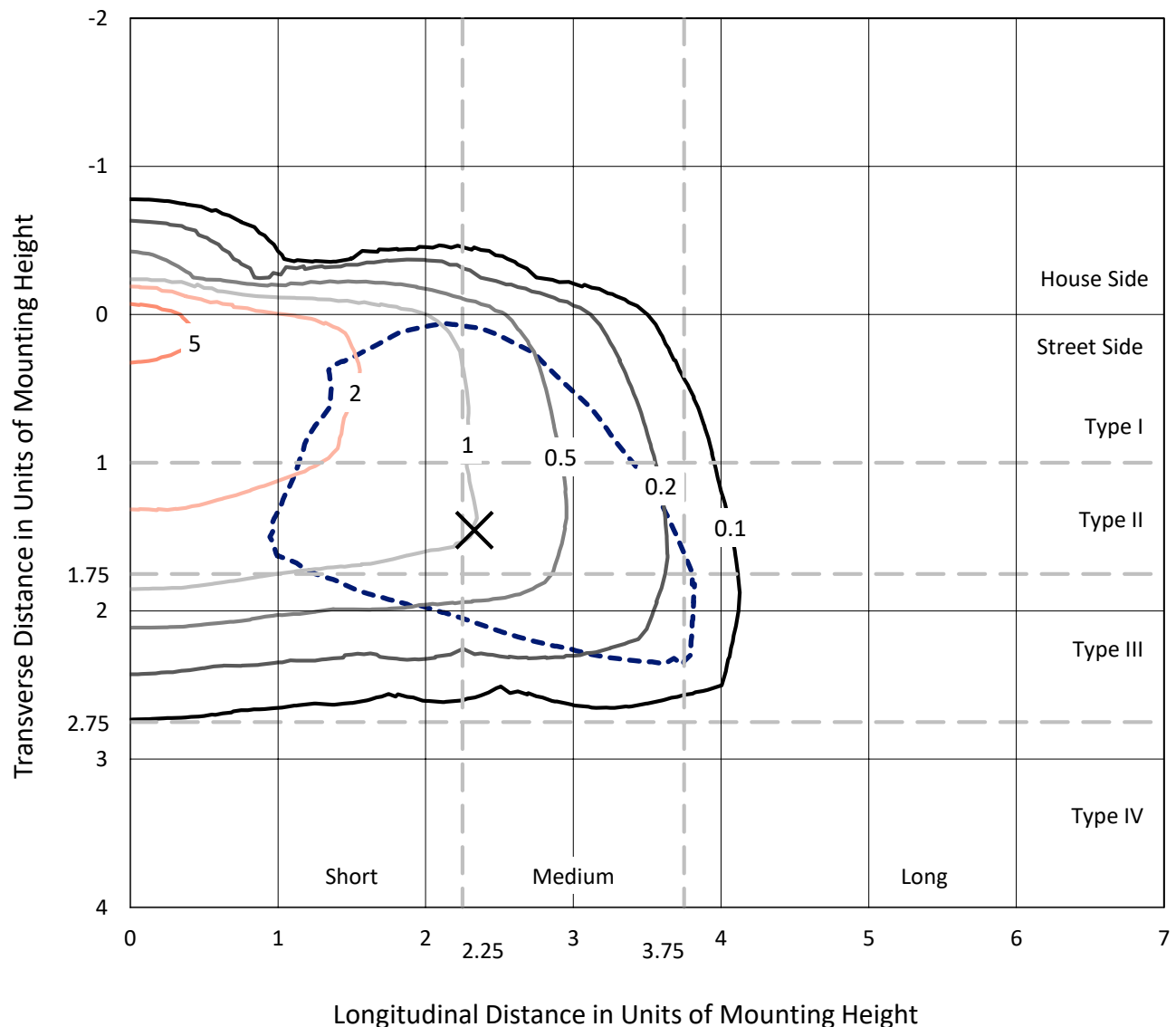
Input Watts (W): 171  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



REPORT NUMBER: P323678  
 CATALOG NUMBER: GLEON-SA4B-830-U-SL3-HSS

## Iso-Footcandle Lines of Horizontal Illumination

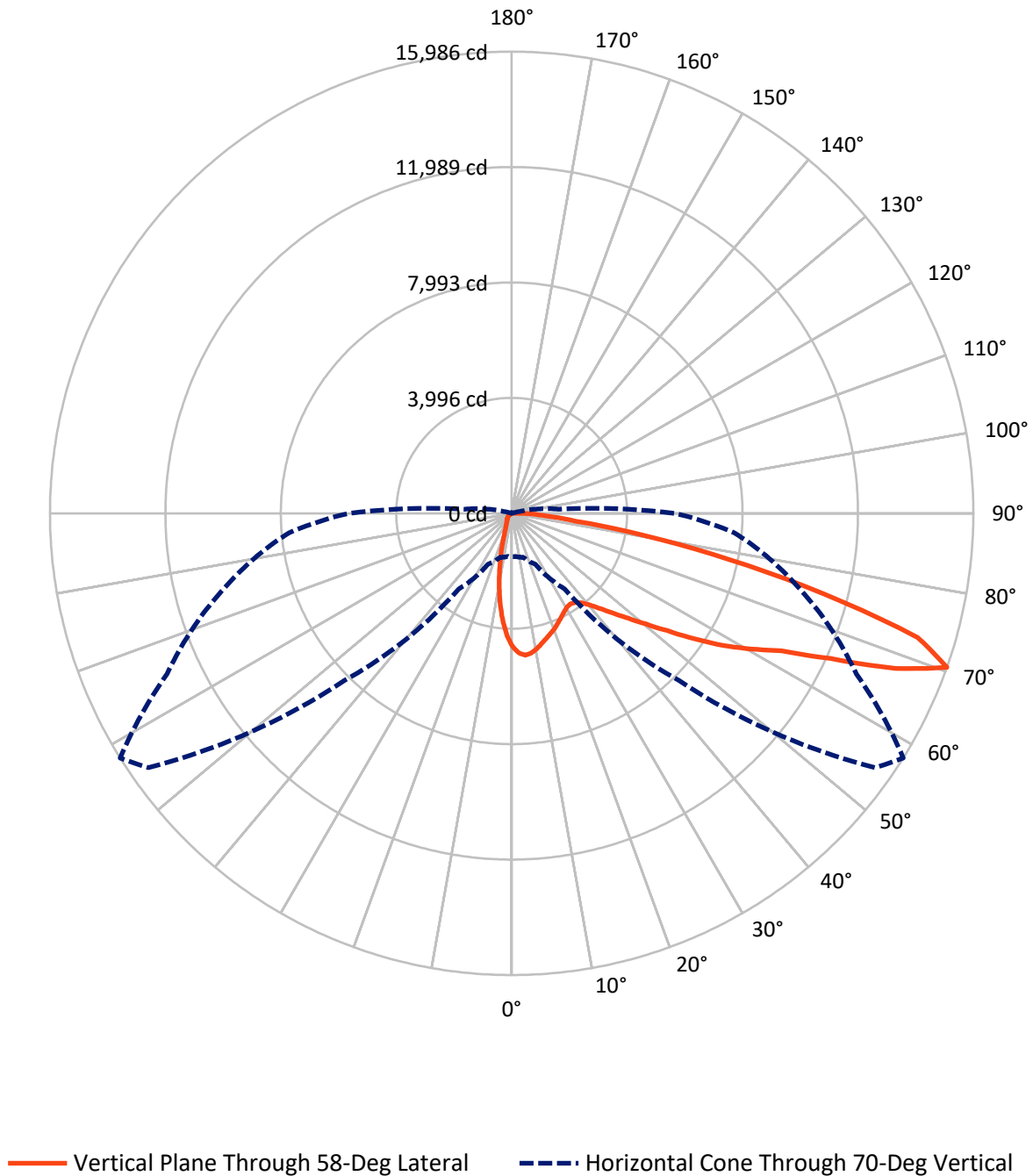
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 7.5 fc  
 Type III - Medium - N/A

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## Luminous Intensity Polar Plot



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CATALOG NUMBER: GLEON-SA4B-830-U-SL3-HSS

**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 1339.3   | 0.0    | 1339.3  |
|                    | % Fixture | 8.6      | 0.0    | 8.6     |
| <b>Street Side</b> | Lumens    | 14310.7  | 0.0    | 14310.7 |
|                    | % Fixture | 91.4     | 0.0    | 91.4    |
| <b>Total</b>       | Lumens    | 15650.0  | 0.0    | 15650.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 378.0   | 2.4       |
| 10°-20°   | 793.4   | 5.1       |
| 20°-30°   | 1043.1  | 6.7       |
| 30°-40°   | 1381.4  | 8.8       |
| 40°-50°   | 2064.8  | 13.2      |
| 50°-60°   | 3307.7  | 21.1      |
| 60°-70°   | 4169.4  | 26.6      |
| 70°-80°   | 2248.9  | 14.4      |
| 80°-90°   | 263.2   | 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°    | 15650.0 | 100.0     |
| 0°-180°   | 15650.0 | 100.0     |

**Coefficient of Utilization**



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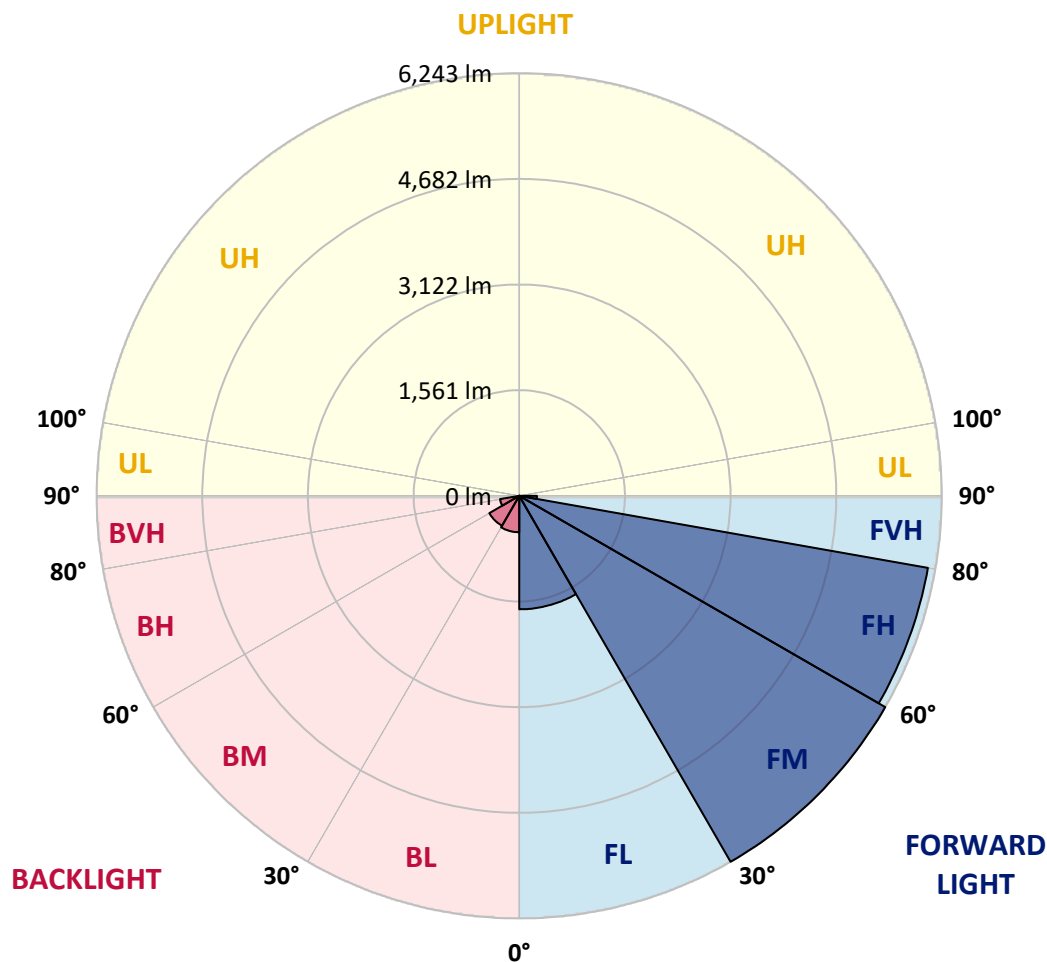
CATALOG NUMBER: GLEON-SA4B-830-U-SL3-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 1676.4 | 10.7      |                         |      |         |
| FM   | (30°-60°)   | 6243.0 | 39.9      |                         |      |         |
| FH   | (60°-80°)   | 6130.3 | 39.2      |                         |      | G3/7500 |
| FVH  | (80°-90°)   | 261.0  | 1.7       |                         |      | G3/500  |
| BL   | (0°-30°)    | 538.1  | 3.4       | B2/1000                 |      |         |
| BM   | (30°-60°)   | 510.9  | 3.3       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 288.0  | 1.8       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 2.3    | 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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CATALOG NUMBER: GLEON-SA4B-830-U-SL3-HSS

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°     | 55°     | 58°     | 65°     | 75°     | 85°    |
|-------|--------|--------|--------|--------|--------|---------|---------|---------|---------|---------|--------|
| 0°    | 4622.9 | 4622.9 | 4622.9 | 4622.9 | 4622.9 | 4622.9  | 4622.9  | 4622.9  | 4622.9  | 4622.9  | 4622.9 |
| 2.5°  | 5006.2 | 4993.9 | 4989.3 | 4981.5 | 4951.6 | 4922.3  | 4864.4  | 4848.1  | 4811.7  | 4725.1  | 4633.3 |
| 5°    | 5010.1 | 5009.5 | 5023.1 | 5019.9 | 5009.5 | 4995.8  | 4954.2  | 4932.7  | 4870.9  | 4747.2  | 4579.3 |
| 7.5°  | 4768.7 | 4781.1 | 4811.7 | 4836.4 | 4865.0 | 4902.1  | 4907.3  | 4886.5  | 4835.7  | 4702.3  | 4479.8 |
| 10°   | 4444.6 | 4464.2 | 4507.1 | 4555.9 | 4630.7 | 4704.9  | 4771.3  | 4768.7  | 4751.1  | 4619.7  | 4360.0 |
| 12.5° | 4119.9 | 4142.7 | 4192.1 | 4264.4 | 4370.4 | 4491.5  | 4609.9  | 4626.2  | 4655.5  | 4545.5  | 4249.4 |
| 15°   | 3835.5 | 3855.0 | 3903.9 | 3992.4 | 4123.8 | 4286.5  | 4460.2  | 4490.2  | 4565.7  | 4487.6  | 4157.0 |
| 17.5° | 3594.1 | 3606.5 | 3642.3 | 3740.5 | 3892.8 | 4090.0  | 4315.8  | 4374.3  | 4486.9  | 4442.0  | 4077.0 |
| 20°   | 3425.6 | 3427.5 | 3450.9 | 3519.9 | 3672.2 | 3892.8  | 4166.1  | 4250.1  | 4403.6  | 4403.0  | 3994.3 |
| 22.5° | 3342.3 | 3335.8 | 3340.3 | 3380.0 | 3491.9 | 3704.7  | 4016.4  | 4116.0  | 4328.8  | 4369.8  | 3910.4 |
| 25°   | 3326.6 | 3321.4 | 3308.4 | 3313.6 | 3381.3 | 3540.1  | 3865.5  | 3980.6  | 4263.1  | 4349.6  | 3837.5 |
| 27.5° | 3375.4 | 3380.7 | 3358.5 | 3335.1 | 3340.3 | 3433.4  | 3731.4  | 3864.8  | 4209.7  | 4349.6  | 3786.1 |
| 30°   | 3473.7 | 3476.3 | 3460.0 | 3429.5 | 3388.5 | 3403.4  | 3638.3  | 3771.8  | 4183.0  | 4379.6  | 3753.5 |
| 32.5° | 3582.4 | 3596.7 | 3594.7 | 3570.0 | 3511.5 | 3450.9  | 3616.2  | 3737.9  | 4181.1  | 4445.9  | 3750.3 |
| 35°   | 3717.1 | 3733.4 | 3760.7 | 3755.5 | 3694.3 | 3594.7  | 3691.7  | 3787.4  | 4219.5  | 4555.3  | 3785.4 |
| 37.5° | 3860.3 | 3885.0 | 3943.6 | 3971.5 | 3931.8 | 3819.3  | 3860.9  | 3929.2  | 4322.3  | 4732.3  | 3874.6 |
| 40°   | 3998.9 | 4026.8 | 4133.6 | 4243.5 | 4213.6 | 4097.8  | 4117.3  | 4172.0  | 4505.1  | 4986.7  | 4043.8 |
| 42.5° | 4134.9 | 4176.5 | 4333.4 | 4514.3 | 4550.1 | 4457.6  | 4468.1  | 4511.7  | 4776.5  | 5336.8  | 4320.3 |
| 45°   | 4297.6 | 4344.4 | 4576.7 | 4799.9 | 4895.6 | 4855.3  | 4899.5  | 4928.1  | 5131.2  | 5799.5  | 4693.2 |
| 47.5° | 4536.4 | 4590.4 | 4875.4 | 5129.9 | 5297.8 | 5323.8  | 5412.9  | 5431.8  | 5579.5  | 6338.3  | 5179.3 |
| 50°   | 5002.3 | 5017.3 | 5275.0 | 5506.0 | 5748.1 | 5904.3  | 6005.8  | 6020.1  | 6122.3  | 6927.2  | 5786.5 |
| 52.5° | 5588.7 | 5598.4 | 5744.2 | 5899.1 | 6174.3 | 6493.2  | 6730.7  | 6750.9  | 6772.4  | 7501.2  | 6385.8 |
| 55°   | 6171.1 | 6169.8 | 6266.1 | 6357.2 | 6672.2 | 7135.5  | 7650.9  | 7663.2  | 7509.0  | 8045.9  | 6843.9 |
| 57.5° | 6534.8 | 6570.0 | 6716.4 | 6833.5 | 7273.4 | 7867.6  | 8582.8  | 8628.3  | 8282.8  | 8449.4  | 7296.9 |
| 60°   | 6419.0 | 6435.9 | 6760.7 | 7194.1 | 8022.5 | 8908.1  | 9525.7  | 9537.4  | 8864.5  | 8852.2  | 7869.5 |
| 62.5° | 5468.9 | 5478.0 | 5988.2 | 6881.7 | 8401.8 | 10257.8 | 10663.2 | 10472.5 | 9533.5  | 9411.2  | 8554.8 |
| 65°   | 3748.3 | 3807.5 | 4233.8 | 5338.1 | 7704.9 | 11104.4 | 12424.1 | 12108.5 | 10553.2 | 10216.8 | 9174.3 |
| 67.5° | 2207.3 | 2195.0 | 2405.8 | 3219.3 | 5658.9 | 10542.2 | 14651.7 | 14338.0 | 11943.9 | 10756.3 | 8992.7 |
| 70°   | 1507.8 | 1499.3 | 1580.0 | 1949.0 | 3194.5 | 8178.0  | 15352.5 | 15985.7 | 13171.9 | 10393.1 | 7739.4 |
| 72.5° | 1076.3 | 1080.9 | 1200.0 | 1514.3 | 2005.6 | 4764.8  | 13202.4 | 14701.1 | 12787.3 | 9060.4  | 5882.8 |
| 75°   | 730.8  | 743.2  | 913.7  | 1242.3 | 1758.3 | 2424.0  | 9368.9  | 11175.3 | 10412.7 | 6585.0  | 3381.3 |
| 77.5° | 393.1  | 406.7  | 607.8  | 1000.9 | 1589.8 | 1684.1  | 6026.6  | 7691.2  | 6540.7  | 2960.3  | 980.0  |
| 80°   | 164.0  | 171.8  | 284.4  | 727.5  | 1373.7 | 1479.2  | 3545.9  | 4663.9  | 2787.2  | 583.7   | 218.7  |
| 82.5° | 70.9   | 74.8   | 118.4  | 434.1  | 1026.9 | 1248.8  | 1877.4  | 2243.8  | 844.7   | 128.2   | 110.0  |
| 85°   | 13.7   | 14.3   | 48.8   | 229.7  | 655.3  | 704.8   | 1216.9  | 1192.8  | 379.4   | 55.3    | 80.0   |
| 87.5° | 0.0    | 0.0    | 11.7   | 72.2   | 192.6  | 383.9   | 742.5   | 733.4   | 128.8   | 26.7    | 29.9   |
| 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: P323678

CATALOG NUMBER: GLEON-SA4B-830-U-SL3-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 4622.9 | 4622.9 | 4622.9 | 4622.9 | 4622.9 | 4622.9 | 4622.9 | 4622.9 | 4622.9 | 4622.9 | 4622.9 |
| 2.5°  | 4586.5 | 4541.6 | 4447.2 | 4330.7 | 4241.6 | 4143.3 | 4065.2 | 3966.3 | 3923.4 | 3925.3 | 3901.9 |
| 5°    | 4483.7 | 4391.3 | 4182.4 | 3918.8 | 3715.8 | 3506.2 | 3326.0 | 3146.4 | 3040.3 | 3005.8 | 2973.3 |
| 7.5°  | 4336.6 | 4190.2 | 3857.0 | 3450.9 | 3107.3 | 2771.5 | 2479.4 | 2222.3 | 2059.6 | 1980.2 | 1951.0 |
| 10°   | 4170.7 | 3965.0 | 3482.8 | 2947.9 | 2457.2 | 2003.0 | 1624.3 | 1295.0 | 1163.5 | 1074.4 | 1051.6 |
| 12.5° | 4024.9 | 3746.4 | 3117.1 | 2431.9 | 1849.4 | 1301.5 | 940.3  | 735.3  | 646.2  | 611.1  | 605.2  |
| 15°   | 3887.6 | 3542.0 | 2765.0 | 1964.6 | 1280.7 | 801.1  | 598.0  | 528.4  | 507.6  | 501.7  | 501.7  |
| 17.5° | 3758.1 | 3347.5 | 2420.8 | 1504.5 | 847.3  | 561.6  | 495.2  | 479.6  | 473.1  | 472.4  | 473.1  |
| 20°   | 3622.7 | 3152.9 | 2082.4 | 1102.4 | 591.5  | 475.7  | 457.5  | 449.0  | 447.1  | 447.1  | 447.1  |
| 22.5° | 3493.2 | 2958.3 | 1753.1 | 787.4  | 474.4  | 434.1  | 424.9  | 419.1  | 417.1  | 416.5  | 415.2  |
| 25°   | 3368.9 | 2773.5 | 1431.7 | 556.4  | 416.5  | 397.6  | 389.8  | 382.0  | 376.1  | 372.9  | 370.9  |
| 27.5° | 3266.8 | 2608.9 | 1132.3 | 446.4  | 376.1  | 359.9  | 350.1  | 338.4  | 324.1  | 317.6  | 315.0  |
| 30°   | 3185.4 | 2458.5 | 872.7  | 376.8  | 338.4  | 322.1  | 307.2  | 287.0  | 266.2  | 255.1  | 254.4  |
| 32.5° | 3121.7 | 2310.8 | 662.5  | 333.2  | 304.6  | 284.4  | 262.9  | 237.5  | 213.4  | 201.1  | 200.4  |
| 35°   | 3090.4 | 2180.7 | 506.3  | 301.3  | 274.6  | 249.2  | 222.6  | 194.6  | 171.1  | 159.4  | 158.1  |
| 37.5° | 3111.2 | 2070.7 | 395.0  | 274.6  | 249.2  | 220.0  | 188.7  | 159.4  | 138.6  | 128.2  | 127.5  |
| 40°   | 3187.4 | 2000.4 | 320.8  | 251.8  | 227.8  | 192.0  | 158.1  | 130.8  | 113.2  | 104.8  | 104.1  |
| 42.5° | 3349.4 | 1974.4 | 274.0  | 233.0  | 206.9  | 165.9  | 131.5  | 108.0  | 91.8   | 85.9   | 84.6   |
| 45°   | 3620.1 | 2012.8 | 242.1  | 214.7  | 185.5  | 141.2  | 108.7  | 88.5   | 74.2   | 69.6   | 69.0   |
| 47.5° | 3980.6 | 2113.6 | 219.3  | 197.2  | 165.9  | 119.1  | 90.5   | 71.6   | 60.5   | 56.0   | 55.3   |
| 50°   | 4445.3 | 2273.7 | 200.4  | 179.6  | 147.7  | 100.9  | 74.8   | 56.6   | 46.9   | 43.6   | 43.6   |
| 52.5° | 4950.9 | 2464.4 | 183.5  | 163.3  | 129.5  | 83.9   | 60.5   | 43.6   | 37.1   | 33.2   | 33.2   |
| 55°   | 5368.7 | 2631.0 | 165.3  | 151.0  | 107.4  | 69.6   | 46.2   | 33.2   | 27.3   | 25.4   | 25.4   |
| 57.5° | 5785.8 | 2808.6 | 144.5  | 129.5  | 85.9   | 56.6   | 35.1   | 24.7   | 20.2   | 18.9   | 18.9   |
| 60°   | 6326.6 | 3026.0 | 124.3  | 105.4  | 67.7   | 42.9   | 26.0   | 17.6   | 15.0   | 14.3   | 14.3   |
| 62.5° | 6921.4 | 3153.5 | 106.1  | 84.6   | 52.7   | 31.9   | 18.9   | 11.7   | 11.1   | 11.1   | 10.4   |
| 65°   | 7285.2 | 2973.3 | 89.2   | 67.7   | 41.0   | 24.1   | 12.4   | 8.5    | 9.8    | 9.1    | 7.8    |
| 67.5° | 6821.2 | 2327.7 | 72.9   | 52.7   | 31.9   | 18.2   | 7.8    | 5.9    | 10.4   | 8.5    | 6.5    |
| 70°   | 5647.9 | 1629.5 | 56.6   | 37.1   | 25.4   | 15.6   | 5.2    | 3.9    | 11.1   | 8.5    | 5.2    |
| 72.5° | 4226.6 | 1090.7 | 44.9   | 24.7   | 18.9   | 13.7   | 4.6    | 2.0    | 9.8    | 7.2    | 4.6    |
| 75°   | 2309.5 | 439.3  | 35.8   | 15.6   | 11.7   | 9.8    | 3.3    | 1.3    | 6.5    | 5.2    | 3.3    |
| 77.5° | 607.8  | 115.8  | 26.0   | 10.4   | 6.5    | 3.9    | 2.0    | 0.7    | 3.3    | 2.6    | 1.3    |
| 80°   | 154.9  | 44.9   | 16.9   | 7.2    | 4.6    | 2.0    | 0.0    | 0.0    | 0.7    | 0.0    | 0.0    |
| 82.5° | 82.6   | 18.9   | 10.4   | 5.2    | 2.6    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 85°   | 62.5   | 12.4   | 5.9    | 3.3    | 0.7    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 87.5° | 24.1   | 3.9    | 2.0    | 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-79-2019: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

MCGRAW EDISON

Report Number: SP1-2408-195-9

Test Date: 08/07/2024

Luminaire Tested: GALN-SB1A-830-U-5WQ

Data in this report applies to families of products including GALN-SB1A-830-U-5WQ.

### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2408-195-9  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 08/07/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: MCGRAW EDISON  
 Catalog Number: **GALN-SB1A-830-U-5WQ**  
 Description: GALLEON AREA AND ROADWAY LUMINAIRE. (1) 80 CRI, 3000K, 350MA HIGH DENSITY LIGHTSQUARE WITH 26 LEDS AND TYPE V WIDE OPTICS

### Spectral Parameters

CCT (K): 3050  
 CIE  $u'$ : 0.2476  
 CIE  $v'$ : 0.5251  
 Duv: 0.0034  
 CIE x: 0.4383  
 CIE y: 0.4131  
 CIE z: 0.1487  
 Peak Wavelength (nm): 603  
 Dominant Wavelength (nm): 581  
 Purity: 55.55201  
 R<sub>f</sub>: 81.5  
 R<sub>g</sub>: 99.2

CRI (Ra): 81.0  
 R1: 79.6  
 R2: 85.6  
 R3: 92.0  
 R4: 82.6  
 R5: 78.9  
 R6: 81.7  
 R7: 85.2  
 R8: 62.0  
 R9: 7.1  
 R10: 67.0  
 R11: 82.7  
 R12: 63.2  
 R13: 80.3  
 R14: 95.0  
 R15: 71.7



### Test Conditions

Stabilization Time: 20M  
 Operation Time: 1H 20M  
 Sphere Temperature (°C): 24.2

REPORT NUMBER: SP1-2408-195-9

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 6/18/2024        | 12/18/2024           |
| Power Meter                    | INXT2011004           | 2/8/2024         | 2/8/2025             |
| AC Power Source                | IN0063                | 10/24/2023       | 10/24/2024           |
| DC Power Source                | IN0208                | 10/24/2023       | 10/24/2024           |
| Sphere Thermometer             | IN0085                | 10/24/2023       | 10/24/2024           |
| Room Thermometer               | IN0046                | 10/24/2023       | 10/24/2024           |

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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 3000K 4-step quadrangle

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### Photopic Flux vs. Wavelength



### Photopic Lumens: NR

| $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|
| 360               | 0                                    | NR                             | 490               | 168                                  | NR                             | 620               | 940                                  | NR                             | 750               | 35                                   | NR                             | 880               | 1                                    | NR                             |
| 365               | 0                                    | NR                             | 495               | 233                                  | NR                             | 625               | 897                                  | NR                             | 755               | 30                                   | NR                             | 885               | 1                                    | NR                             |
| 370               | 0                                    | NR                             | 500               | 300                                  | NR                             | 630               | 847                                  | NR                             | 760               | 26                                   | NR                             | 890               | 1                                    | NR                             |
| 375               | 0                                    | NR                             | 505               | 372                                  | NR                             | 635               | 790                                  | NR                             | 765               | 22                                   | NR                             | 895               | 1                                    | NR                             |
| 380               | 0                                    | NR                             | 510               | 430                                  | NR                             | 640               | 730                                  | NR                             | 770               | 19                                   | NR                             | 900               | 1                                    | NR                             |
| 385               | 0                                    | NR                             | 515               | 483                                  | NR                             | 645               | 668                                  | NR                             | 775               | 16                                   | NR                             | 905               | 1                                    | NR                             |
| 390               | 0                                    | NR                             | 520               | 524                                  | NR                             | 650               | 605                                  | NR                             | 780               | 14                                   | NR                             | 910               | 0                                    | NR                             |
| 395               | 2                                    | NR                             | 525               | 555                                  | NR                             | 655               | 545                                  | NR                             | 785               | 12                                   | NR                             | 915               | 0                                    | NR                             |
| 400               | 4                                    | NR                             | 530               | 581                                  | NR                             | 660               | 485                                  | NR                             | 790               | 10                                   | NR                             | 920               | 0                                    | NR                             |
| 405               | 7                                    | NR                             | 535               | 604                                  | NR                             | 665               | 430                                  | NR                             | 795               | 9                                    | NR                             | 925               | 0                                    | NR                             |
| 410               | 17                                   | NR                             | 540               | 623                                  | NR                             | 670               | 378                                  | NR                             | 800               | 8                                    | NR                             | 930               | 0                                    | NR                             |
| 415               | 34                                   | NR                             | 545               | 645                                  | NR                             | 675               | 331                                  | NR                             | 805               | 7                                    | NR                             | 935               | 0                                    | NR                             |
| 420               | 68                                   | NR                             | 550               | 667                                  | NR                             | 680               | 290                                  | NR                             | 810               | 6                                    | NR                             | 940               | 0                                    | NR                             |
| 425               | 128                                  | NR                             | 555               | 693                                  | NR                             | 685               | 251                                  | NR                             | 815               | 5                                    | NR                             | 945               | 0                                    | NR                             |
| 430               | 214                                  | NR                             | 560               | 719                                  | NR                             | 690               | 218                                  | NR                             | 820               | 4                                    | NR                             | 950               | 0                                    | NR                             |
| 435               | 339                                  | NR                             | 565               | 754                                  | NR                             | 695               | 188                                  | NR                             | 825               | 4                                    | NR                             | 955               | 0                                    | NR                             |
| 440               | 507                                  | NR                             | 570               | 791                                  | NR                             | 700               | 162                                  | NR                             | 830               | 3                                    | NR                             | 960               | 0                                    | NR                             |
| 445               | 573                                  | NR                             | 575               | 830                                  | NR                             | 705               | 139                                  | NR                             | 835               | 3                                    | NR                             | 965               | 0                                    | NR                             |
| 450               | 356                                  | NR                             | 580               | 873                                  | NR                             | 710               | 119                                  | NR                             | 840               | 3                                    | NR                             | 970               | 0                                    | NR                             |
| 455               | 217                                  | NR                             | 585               | 913                                  | NR                             | 715               | 102                                  | NR                             | 845               | 2                                    | NR                             | 975               | 0                                    | NR                             |
| 460               | 168                                  | NR                             | 590               | 948                                  | NR                             | 720               | 88                                   | NR                             | 850               | 2                                    | NR                             | 980               | 0                                    | NR                             |
| 465               | 113                                  | NR                             | 595               | 974                                  | NR                             | 725               | 76                                   | NR                             | 855               | 2                                    | NR                             | 985               | 0                                    | NR                             |
| 470               | 85                                   | NR                             | 600               | 994                                  | NR                             | 730               | 65                                   | NR                             | 860               | 1                                    | NR                             | 990               | 0                                    | NR                             |
| 475               | 85                                   | NR                             | 605               | 998                                  | NR                             | 735               | 55                                   | NR                             | 865               | 1                                    | NR                             | 995               | 0                                    | NR                             |
| 480               | 94                                   | NR                             | 610               | 994                                  | NR                             | 740               | 47                                   | NR                             | 870               | 1                                    | NR                             | 1000              | 0                                    | NR                             |
| 485               | 120                                  | NR                             | 615               | 973                                  | NR                             | 745               | 41                                   | NR                             | 875               | 1                                    | NR                             |                   |                                      |                                |

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### Scotopic Flux vs. Wavelength



Scotopic Lumens: NR

S/P: 1.27

| λ<br>(nm) | Power<br>W <sup>Λ</sup> /nm | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>W <sup>Λ</sup> /nm | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>W <sup>Λ</sup> /nm | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>W <sup>Λ</sup> /nm | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>W <sup>Λ</sup> /nm | Lumens<br>(Φ/nm) |
|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|
| 360       | 0                           | NR               | 490       | 168                         | NR               | 620       | 940                         | NR               | 750       | 35                          | NR               | 880       | 1                           | NR               |
| 365       | 0                           | NR               | 495       | 233                         | NR               | 625       | 897                         | NR               | 755       | 30                          | NR               | 885       | 1                           | NR               |
| 370       | 0                           | NR               | 500       | 300                         | NR               | 630       | 847                         | NR               | 760       | 26                          | NR               | 890       | 1                           | NR               |
| 375       | 0                           | NR               | 505       | 372                         | NR               | 635       | 790                         | NR               | 765       | 22                          | NR               | 895       | 1                           | NR               |
| 380       | 0                           | NR               | 510       | 430                         | NR               | 640       | 730                         | NR               | 770       | 19                          | NR               | 900       | 1                           | NR               |
| 385       | 0                           | NR               | 515       | 483                         | NR               | 645       | 668                         | NR               | 775       | 16                          | NR               | 905       | 1                           | NR               |
| 390       | 0                           | NR               | 520       | 524                         | NR               | 650       | 605                         | NR               | 780       | 14                          | NR               | 910       | 0                           | NR               |
| 395       | 2                           | NR               | 525       | 555                         | NR               | 655       | 545                         | NR               | 785       | 12                          | NR               | 915       | 0                           | NR               |
| 400       | 4                           | NR               | 530       | 581                         | NR               | 660       | 485                         | NR               | 790       | 10                          | NR               | 920       | 0                           | NR               |
| 405       | 7                           | NR               | 535       | 604                         | NR               | 665       | 430                         | NR               | 795       | 9                           | NR               | 925       | 0                           | NR               |
| 410       | 17                          | NR               | 540       | 623                         | NR               | 670       | 378                         | NR               | 800       | 8                           | NR               | 930       | 0                           | NR               |
| 415       | 34                          | NR               | 545       | 645                         | NR               | 675       | 331                         | NR               | 805       | 7                           | NR               | 935       | 0                           | NR               |
| 420       | 68                          | NR               | 550       | 667                         | NR               | 680       | 290                         | NR               | 810       | 6                           | NR               | 940       | 0                           | NR               |
| 425       | 128                         | NR               | 555       | 693                         | NR               | 685       | 251                         | NR               | 815       | 5                           | NR               | 945       | 0                           | NR               |
| 430       | 214                         | NR               | 560       | 719                         | NR               | 690       | 218                         | NR               | 820       | 4                           | NR               | 950       | 0                           | NR               |
| 435       | 339                         | NR               | 565       | 754                         | NR               | 695       | 188                         | NR               | 825       | 4                           | NR               | 955       | 0                           | NR               |
| 440       | 507                         | NR               | 570       | 791                         | NR               | 700       | 162                         | NR               | 830       | 3                           | NR               | 960       | 0                           | NR               |
| 445       | 573                         | NR               | 575       | 830                         | NR               | 705       | 139                         | NR               | 835       | 3                           | NR               | 965       | 0                           | NR               |
| 450       | 356                         | NR               | 580       | 873                         | NR               | 710       | 119                         | NR               | 840       | 3                           | NR               | 970       | 0                           | NR               |
| 455       | 217                         | NR               | 585       | 913                         | NR               | 715       | 102                         | NR               | 845       | 2                           | NR               | 975       | 0                           | NR               |
| 460       | 168                         | NR               | 590       | 948                         | NR               | 720       | 88                          | NR               | 850       | 2                           | NR               | 980       | 0                           | NR               |
| 465       | 113                         | NR               | 595       | 974                         | NR               | 725       | 76                          | NR               | 855       | 2                           | NR               | 985       | 0                           | NR               |
| 470       | 85                          | NR               | 600       | 994                         | NR               | 730       | 65                          | NR               | 860       | 1                           | NR               | 990       | 0                           | NR               |
| 475       | 85                          | NR               | 605       | 998                         | NR               | 735       | 55                          | NR               | 865       | 1                           | NR               | 995       | 0                           | NR               |
| 480       | 94                          | NR               | 610       | 994                         | NR               | 740       | 47                          | NR               | 870       | 1                           | NR               | 1000      | 0                           | NR               |
| 485       | 120                         | NR               | 615       | 973                         | NR               | 745       | 41                          | NR               | 875       | 1                           | NR               |           |                             |                  |

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### Melanopic Flux vs. Wavelength


**Melanopic Lumens: NR**
**M/P: 2.32**

| $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^\wedge/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|
| 360               | 0                                    | NR                             | 490               | 168                                  | NR                             | 620               | 940                                  | NR                             | 750               | 35                                   | NR                             | 880               | 1                                    | NR                             |
| 365               | 0                                    | NR                             | 495               | 233                                  | NR                             | 625               | 897                                  | NR                             | 755               | 30                                   | NR                             | 885               | 1                                    | NR                             |
| 370               | 0                                    | NR                             | 500               | 300                                  | NR                             | 630               | 847                                  | NR                             | 760               | 26                                   | NR                             | 890               | 1                                    | NR                             |
| 375               | 0                                    | NR                             | 505               | 372                                  | NR                             | 635               | 790                                  | NR                             | 765               | 22                                   | NR                             | 895               | 1                                    | NR                             |
| 380               | 0                                    | NR                             | 510               | 430                                  | NR                             | 640               | 730                                  | NR                             | 770               | 19                                   | NR                             | 900               | 1                                    | NR                             |
| 385               | 0                                    | NR                             | 515               | 483                                  | NR                             | 645               | 668                                  | NR                             | 775               | 16                                   | NR                             | 905               | 1                                    | NR                             |
| 390               | 0                                    | NR                             | 520               | 524                                  | NR                             | 650               | 605                                  | NR                             | 780               | 14                                   | NR                             | 910               | 0                                    | NR                             |
| 395               | 2                                    | NR                             | 525               | 555                                  | NR                             | 655               | 545                                  | NR                             | 785               | 12                                   | NR                             | 915               | 0                                    | NR                             |
| 400               | 4                                    | NR                             | 530               | 581                                  | NR                             | 660               | 485                                  | NR                             | 790               | 10                                   | NR                             | 920               | 0                                    | NR                             |
| 405               | 7                                    | NR                             | 535               | 604                                  | NR                             | 665               | 430                                  | NR                             | 795               | 9                                    | NR                             | 925               | 0                                    | NR                             |
| 410               | 17                                   | NR                             | 540               | 623                                  | NR                             | 670               | 378                                  | NR                             | 800               | 8                                    | NR                             | 930               | 0                                    | NR                             |
| 415               | 34                                   | NR                             | 545               | 645                                  | NR                             | 675               | 331                                  | NR                             | 805               | 7                                    | NR                             | 935               | 0                                    | NR                             |
| 420               | 68                                   | NR                             | 550               | 667                                  | NR                             | 680               | 290                                  | NR                             | 810               | 6                                    | NR                             | 940               | 0                                    | NR                             |
| 425               | 128                                  | NR                             | 555               | 693                                  | NR                             | 685               | 251                                  | NR                             | 815               | 5                                    | NR                             | 945               | 0                                    | NR                             |
| 430               | 214                                  | NR                             | 560               | 719                                  | NR                             | 690               | 218                                  | NR                             | 820               | 4                                    | NR                             | 950               | 0                                    | NR                             |
| 435               | 339                                  | NR                             | 565               | 754                                  | NR                             | 695               | 188                                  | NR                             | 825               | 4                                    | NR                             | 955               | 0                                    | NR                             |
| 440               | 507                                  | NR                             | 570               | 791                                  | NR                             | 700               | 162                                  | NR                             | 830               | 3                                    | NR                             | 960               | 0                                    | NR                             |
| 445               | 573                                  | NR                             | 575               | 830                                  | NR                             | 705               | 139                                  | NR                             | 835               | 3                                    | NR                             | 965               | 0                                    | NR                             |
| 450               | 356                                  | NR                             | 580               | 873                                  | NR                             | 710               | 119                                  | NR                             | 840               | 3                                    | NR                             | 970               | 0                                    | NR                             |
| 455               | 217                                  | NR                             | 585               | 913                                  | NR                             | 715               | 102                                  | NR                             | 845               | 2                                    | NR                             | 975               | 0                                    | NR                             |
| 460               | 168                                  | NR                             | 590               | 948                                  | NR                             | 720               | 88                                   | NR                             | 850               | 2                                    | NR                             | 980               | 0                                    | NR                             |
| 465               | 113                                  | NR                             | 595               | 974                                  | NR                             | 725               | 76                                   | NR                             | 855               | 2                                    | NR                             | 985               | 0                                    | NR                             |
| 470               | 85                                   | NR                             | 600               | 994                                  | NR                             | 730               | 65                                   | NR                             | 860               | 1                                    | NR                             | 990               | 0                                    | NR                             |
| 475               | 85                                   | NR                             | 605               | 998                                  | NR                             | 735               | 55                                   | NR                             | 865               | 1                                    | NR                             | 995               | 0                                    | NR                             |
| 480               | 94                                   | NR                             | 610               | 994                                  | NR                             | 740               | 47                                   | NR                             | 870               | 1                                    | NR                             | 1000              | 0                                    | NR                             |
| 485               | 120                                  | NR                             | 615               | 973                                  | NR                             | 745               | 41                                   | NR                             | 875               | 1                                    | NR                             |                   |                                      |                                |

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TM-30-18

### Summary

$R_f = 81.5$   
 $R_g = 99.2$   
 $CIE R_a = 81.0$   
 $R_g = 7.1$



### Color Vector Graphics



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 74 | CES51 = 89 | CES76 = 70 |
| CES02 = 63 | CES27 = 88 | CES52 = 92 | CES77 = 86 |
| CES03 = 31 | CES28 = 89 | CES53 = 81 | CES78 = 72 |
| CES04 = 70 | CES29 = 67 | CES54 = 87 | CES79 = 90 |
| CES05 = 50 | CES30 = 68 | CES55 = 85 | CES80 = 88 |
| CES06 = 51 | CES31 = 71 | CES56 = 78 | CES81 = 78 |
| CES07 = 42 | CES32 = 70 | CES57 = 76 | CES82 = 95 |
| CES08 = 41 | CES33 = 71 | CES58 = 78 | CES83 = 90 |
| CES09 = 29 | CES34 = 82 | CES59 = 92 | CES84 = 94 |
| CES10 = 76 | CES35 = 90 | CES60 = 95 | CES85 = 86 |
| CES11 = 59 | CES36 = 93 | CES61 = 93 | CES86 = 72 |
| CES12 = 65 | CES37 = 87 | CES62 = 83 | CES87 = 85 |
| CES13 = 43 | CES38 = 75 | CES63 = 77 | CES88 = 83 |
| CES14 = 74 | CES39 = 94 | CES64 = 83 | CES89 = 75 |
| CES15 = 71 | CES40 = 89 | CES65 = 77 | CES90 = 81 |
| CES16 = 47 | CES41 = 85 | CES66 = 80 | CES91 = 96 |
| CES17 = 50 | CES42 = 86 | CES67 = 79 | CES92 = 73 |
| CES18 = 56 | CES43 = 81 | CES68 = 84 | CES93 = 84 |
| CES19 = 72 | CES44 = 99 | CES69 = 91 | CES94 = 64 |
| CES20 = 66 | CES45 = 87 | CES70 = 78 | CES95 = 80 |
| CES21 = 87 | CES46 = 82 | CES71 = 76 | CES96 = 84 |
| CES22 = 79 | CES47 = 77 | CES72 = 92 | CES97 = 87 |
| CES23 = 92 | CES48 = 71 | CES73 = 71 | CES98 = 81 |
| CES24 = 91 | CES49 = 81 | CES74 = 93 | CES99 = 74 |
| CES25 = 72 | CES50 = 89 | CES75 = 74 |            |



**Color Rendition by Hue-Angle Bin**


**Measure Comparisons**



(END OF REPORT)