

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: P319537

Luminaire Tested: **GLEON-SA3D-830-U-SL2**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P319537  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-20)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA3D-830-U-SL2  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(3) 80 CRI, 3000K, 1200mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE II  
SPILL LIGHT ELIMINATOR OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 18440 lumens  
Efficiency: N/A  
Efficacy: 96.5 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1' x H: 0')  
IES Classification: Type III - Medium  
BUG Rating: B3 - U0 - G4

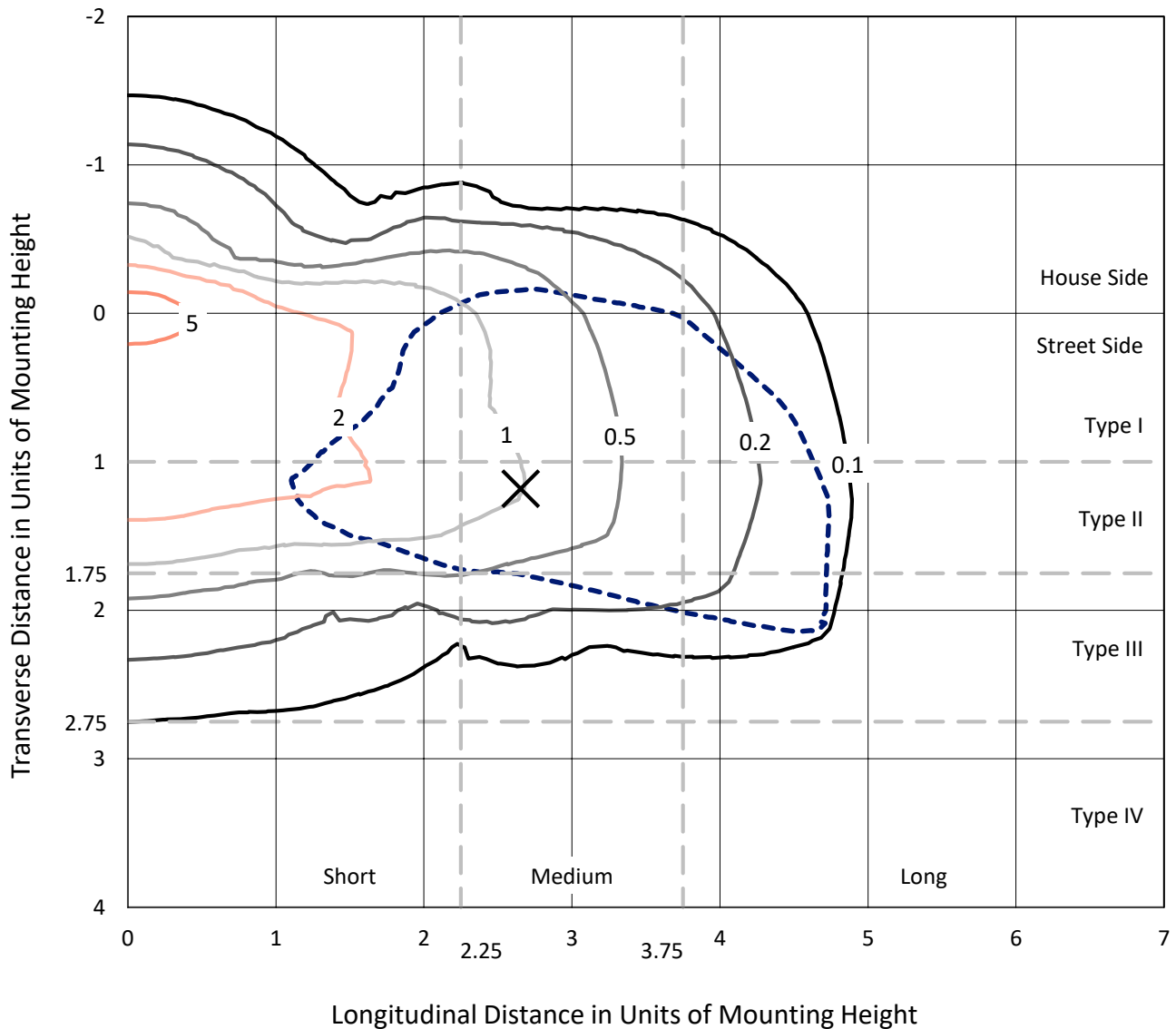
Input Watts (W): 191  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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## Iso-Footcandle Lines of Horizontal Illumination

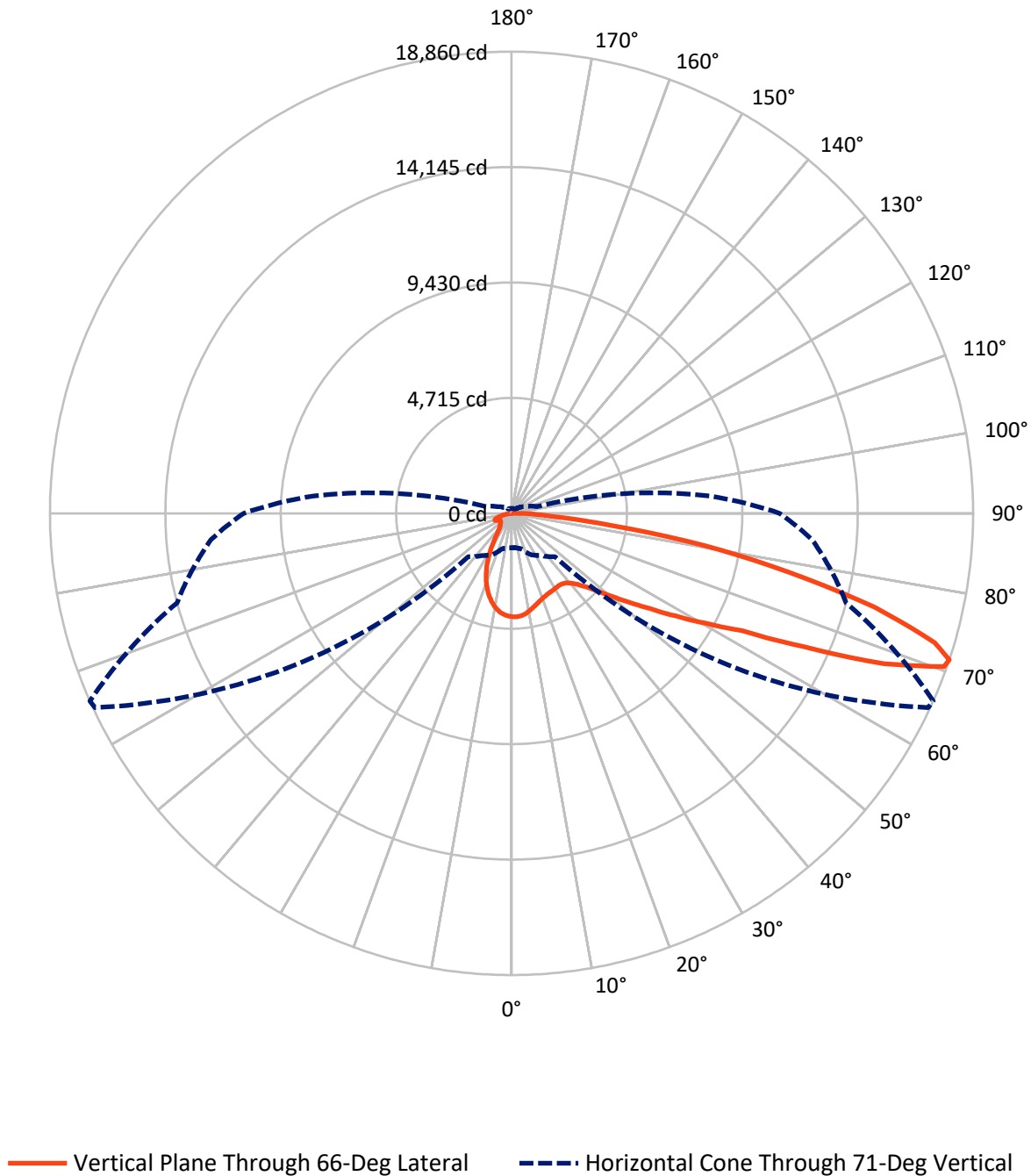
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 6.8 fc  
 Type III - Medium - N/A

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## Luminous Intensity Polar Plot



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CATALOG NUMBER: GLEON-SA3D-830-U-SL2

**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 3417.4   | 0.0    | 3417.4  |
|                    | % Fixture | 18.5     | 0.0    | 18.5    |
| <b>Street Side</b> | Lumens    | 15022.6  | 0.0    | 15022.6 |
|                    | % Fixture | 81.5     | 0.0    | 81.5    |
| <b>Total</b>       | Lumens    | 18440.0  | 0.0    | 18440.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 371.8   | 2.0       |
| 10°-20°   | 891.8   | 4.8       |
| 20°-30°   | 1197.9  | 6.5       |
| 30°-40°   | 1575.9  | 8.5       |
| 40°-50°   | 2292.5  | 12.4      |
| 50°-60°   | 3581.1  | 19.4      |
| 60°-70°   | 4485.9  | 24.3      |
| 70°-80°   | 3421.7  | 18.6      |
| 80°-90°   | 621.3   | 3.4       |
| 90°-100°  | 0.0     | 0.0       |
| 100°-110° | 0.0     | 0.0       |
| 110°-120° | 0.0     | 0.0       |
| 120°-130° | 0.0     | 0.0       |
| 130°-140° | 0.0     | 0.0       |
| 140°-150° | 0.0     | 0.0       |
| 150°-160° | 0.0     | 0.0       |
| 160°-170° | 0.0     | 0.0       |
| 170°-180° | 0.0     | 0.0       |
| 0°-90°    | 18440.0 | 100.0     |
| 0°-180°   | 18440.0 | 100.0     |

**Coefficient of Utilization**



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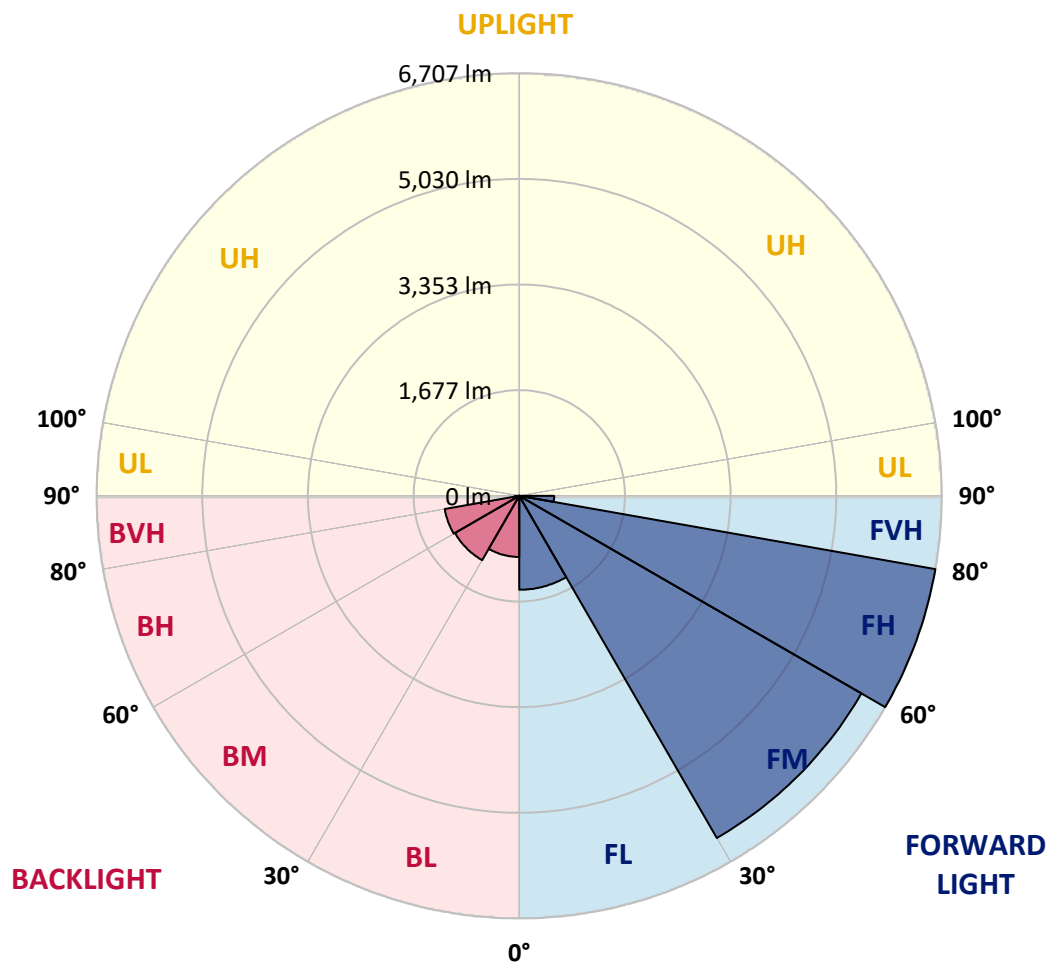
CATALOG NUMBER: GLEON-SA3D-830-U-SL2

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 1491.1 | 8.1       |                         |      |         |
| FM   | (30°-60°)   | 6270.5 | 34.0      |                         |      |         |
| FH   | (60°-80°)   | 6706.8 | 36.4      |                         |      | G3/7500 |
| FVH  | (80°-90°)   | 554.1  | 3.0       |                         |      | G4/750  |
| BL   | (0°-30°)    | 970.5  | 5.3       | B2/1000                 |      |         |
| BM   | (30°-60°)   | 1178.9 | 6.4       | B2/2500                 |      |         |
| BH   | (60°-80°)   | 1200.8 | 6.5       | B3/2500                 |      | G3/2500 |
| BVH  | (80°-90°)   | 67.3   | 0.4       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

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

Type III Medium



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CATALOG NUMBER: GLEON-SA3D-830-U-SL2

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°     | 55°     | 65°     | 66°     | 75°     | 85°     |
|-------|--------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------|
| 0°    | 4224.2 | 4224.2 | 4224.2 | 4224.2 | 4224.2 | 4224.2  | 4224.2  | 4224.2  | 4224.2  | 4224.2  | 4224.2  |
| 2.5°  | 4145.9 | 4139.6 | 4158.7 | 4178.4 | 4186.0 | 4198.8  | 4217.9  | 4228.7  | 4228.1  | 4230.0  | 4223.6  |
| 5°    | 3870.9 | 3862.6 | 3900.8 | 3932.0 | 3991.9 | 4059.4  | 4141.5  | 4200.1  | 4201.3  | 4234.4  | 4243.3  |
| 7.5°  | 3610.5 | 3604.8 | 3648.7 | 3699.0 | 3768.4 | 3871.5  | 4004.6  | 4130.7  | 4138.3  | 4228.1  | 4259.3  |
| 10°   | 3401.7 | 3400.4 | 3443.1 | 3497.8 | 3578.7 | 3693.9  | 3846.7  | 4031.3  | 4042.8  | 4197.5  | 4261.8  |
| 12.5° | 3238.7 | 3241.2 | 3278.2 | 3340.6 | 3425.9 | 3546.2  | 3711.7  | 3919.9  | 3938.4  | 4149.1  | 4247.2  |
| 15°   | 3118.4 | 3128.6 | 3158.5 | 3221.5 | 3305.5 | 3427.8  | 3597.8  | 3816.8  | 3844.8  | 4095.0  | 4238.9  |
| 17.5° | 3049.6 | 3061.1 | 3082.1 | 3134.3 | 3213.2 | 3331.0  | 3492.1  | 3732.1  | 3757.6  | 4053.6  | 4239.5  |
| 20°   | 3029.2 | 3038.8 | 3050.9 | 3082.7 | 3149.6 | 3256.5  | 3408.7  | 3655.7  | 3683.1  | 4020.5  | 4245.9  |
| 22.5° | 3069.3 | 3076.3 | 3077.6 | 3075.1 | 3115.8 | 3203.0  | 3348.2  | 3599.7  | 3629.0  | 3998.9  | 4250.4  |
| 25°   | 3155.3 | 3164.8 | 3157.8 | 3134.3 | 3120.9 | 3174.4  | 3317.0  | 3562.8  | 3592.0  | 3983.0  | 4241.4  |
| 27.5° | 3284.5 | 3285.8 | 3280.1 | 3249.5 | 3186.5 | 3177.6  | 3307.5  | 3541.1  | 3569.1  | 3964.5  | 4223.0  |
| 30°   | 3460.3 | 3468.5 | 3458.3 | 3417.0 | 3313.8 | 3228.5  | 3318.9  | 3520.1  | 3545.6  | 3940.9  | 4193.1  |
| 32.5° | 3665.9 | 3686.3 | 3685.6 | 3642.3 | 3494.6 | 3342.5  | 3366.0  | 3507.4  | 3527.1  | 3916.1  | 4156.8  |
| 35°   | 3879.2 | 3907.2 | 3959.4 | 3940.9 | 3758.2 | 3522.6  | 3456.4  | 3527.7  | 3541.1  | 3912.9  | 4131.3  |
| 37.5° | 4100.7 | 4128.7 | 4236.3 | 4286.0 | 4072.1 | 3780.5  | 3599.0  | 3599.7  | 3606.0  | 3951.8  | 4129.4  |
| 40°   | 4332.5 | 4362.4 | 4524.1 | 4653.4 | 4478.9 | 4107.1  | 3828.9  | 3749.9  | 3742.9  | 4047.3  | 4166.9  |
| 42.5° | 4657.2 | 4683.9 | 4878.1 | 5043.0 | 4930.3 | 4525.4  | 4146.6  | 3981.7  | 3967.0  | 4234.4  | 4287.3  |
| 45°   | 5067.8 | 5090.7 | 5297.0 | 5473.4 | 5415.4 | 5002.9  | 4545.8  | 4300.6  | 4298.1  | 4546.4  | 4531.1  |
| 47.5° | 5556.1 | 5574.0 | 5759.2 | 5929.9 | 5950.9 | 5552.3  | 5047.4  | 4792.8  | 4751.4  | 4974.2  | 4908.7  |
| 50°   | 6064.8 | 6084.6 | 6210.6 | 6394.0 | 6550.0 | 6287.7  | 5693.0  | 5395.7  | 5340.3  | 5539.0  | 5443.5  |
| 52.5° | 6401.6 | 6427.7 | 6537.2 | 6769.6 | 7223.6 | 7093.7  | 6456.4  | 6126.6  | 6042.6  | 6223.4  | 6150.1  |
| 55°   | 6251.4 | 6309.9 | 6477.4 | 6849.8 | 7762.2 | 8325.0  | 7398.0  | 6979.1  | 6884.2  | 7034.5  | 6991.2  |
| 57.5° | 5568.2 | 5648.5 | 5877.0 | 6451.9 | 7837.9 | 9409.9  | 8821.6  | 7983.1  | 7916.2  | 7873.0  | 7892.7  |
| 60°   | 4319.7 | 4396.8 | 4680.1 | 5429.4 | 7310.1 | 10201.9 | 10963.9 | 9220.8  | 9124.0  | 8714.6  | 8732.4  |
| 62.5° | 3057.2 | 3018.4 | 3212.6 | 3760.8 | 5940.0 | 10294.8 | 13401.7 | 10876.1 | 10557.8 | 9603.4  | 9525.1  |
| 65°   | 2331.5 | 2322.5 | 2409.8 | 2584.2 | 3597.8 | 9182.6  | 14853.9 | 13658.3 | 13161.1 | 10648.8 | 10464.2 |
| 67.5° | 1915.7 | 1899.8 | 1985.7 | 2239.8 | 2316.8 | 5924.1  | 14885.8 | 16886.2 | 16397.8 | 11950.1 | 11550.3 |
| 70°   | 1575.1 | 1557.3 | 1637.5 | 1965.4 | 2141.1 | 3004.4  | 12528.2 | 18776.4 | 18750.3 | 13597.8 | 12370.3 |
| 71°   | 1412.1 | 1399.4 | 1495.5 | 1859.7 | 2103.5 | 2504.0  | 10816.9 | 18781.5 | 18859.8 | 14155.5 | 12321.9 |
| 72.5° | 1149.8 | 1154.3 | 1256.1 | 1655.3 | 2075.5 | 2211.1  | 7950.0  | 17906.1 | 18071.6 | 14687.1 | 11882.0 |
| 75°   | 764.0  | 767.8  | 901.5  | 1273.3 | 2012.5 | 2163.4  | 4369.4  | 15025.2 | 15329.5 | 14368.8 | 10842.3 |
| 77.5° | 513.1  | 511.9  | 602.9  | 873.5  | 1753.4 | 2163.4  | 2561.9  | 11237.7 | 11572.0 | 11433.2 | 8358.7  |
| 80°   | 353.3  | 350.8  | 415.1  | 602.9  | 1327.4 | 2189.5  | 1980.7  | 7875.5  | 7976.7  | 6174.3  | 3397.2  |
| 82.5° | 216.5  | 218.4  | 271.2  | 425.9  | 903.4  | 1970.5  | 1869.9  | 4294.3  | 4184.1  | 1731.7  | 848.7   |
| 85°   | 124.1  | 123.5  | 173.2  | 288.4  | 580.0  | 1663.0  | 1823.4  | 1848.2  | 1695.4  | 521.4   | 306.9   |
| 87.5° | 44.6   | 47.7   | 93.0   | 159.8  | 332.3  | 1158.1  | 1547.1  | 961.4   | 866.5   | 235.6   | 138.8   |
| 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: P319537

CATALOG NUMBER: GLEON-SA3D-830-U-SL2

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 4224.2  | 4224.2 | 4224.2 | 4224.2 | 4224.2 | 4224.2 | 4224.2 | 4224.2 | 4224.2 | 4224.2 | 4224.2 |
| 2.5°  | 4219.2  | 4223.0 | 4218.5 | 4193.1 | 4171.4 | 4136.4 | 4116.7 | 4089.3 | 4081.0 | 4077.2 | 4087.4 |
| 5°    | 4235.1  | 4236.3 | 4198.8 | 4131.9 | 4056.8 | 3968.3 | 3904.6 | 3826.3 | 3789.4 | 3773.5 | 3783.7 |
| 7.5°  | 4249.7  | 4244.0 | 4161.9 | 4033.9 | 3895.1 | 3741.0 | 3604.1 | 3478.7 | 3405.5 | 3375.6 | 3378.1 |
| 10°   | 4251.6  | 4227.4 | 4095.6 | 3897.6 | 3682.4 | 3456.4 | 3246.3 | 3052.8 | 2930.6 | 2851.0 | 2875.2 |
| 12.5° | 4231.9  | 4191.1 | 3998.2 | 3721.3 | 3422.7 | 3114.5 | 2830.6 | 2540.3 | 2365.8 | 2285.0 | 2287.5 |
| 15°   | 4216.6  | 4142.8 | 3878.5 | 3513.7 | 3112.6 | 2704.5 | 2316.8 | 1975.6 | 1789.7 | 1706.9 | 1668.1 |
| 17.5° | 4203.9  | 4090.5 | 3739.7 | 3280.1 | 2746.6 | 2229.0 | 1762.9 | 1458.6 | 1356.7 | 1332.5 | 1322.3 |
| 20°   | 4186.0  | 4035.2 | 3585.0 | 3009.5 | 2329.5 | 1696.7 | 1287.3 | 1137.1 | 1137.7 | 1165.7 | 1169.5 |
| 22.5° | 4161.2  | 3972.1 | 3420.1 | 2705.8 | 1882.0 | 1235.8 | 1009.1 | 965.8  | 1009.7 | 1063.2 | 1072.8 |
| 25°   | 4124.3  | 3897.6 | 3236.8 | 2370.3 | 1435.0 | 949.9  | 862.0  | 860.1  | 913.6  | 969.6  | 977.9  |
| 27.5° | 4072.1  | 3800.2 | 3033.1 | 2009.9 | 1057.5 | 807.3  | 772.3  | 785.6  | 825.1  | 865.9  | 869.0  |
| 30°   | 4002.1  | 3686.9 | 2808.3 | 1629.9 | 828.9  | 718.8  | 715.0  | 727.1  | 751.3  | 779.9  | 782.5  |
| 32.5° | 3925.0  | 3571.7 | 2568.3 | 1261.9 | 709.9  | 671.0  | 674.9  | 680.6  | 692.1  | 703.5  | 706.1  |
| 35°   | 3855.0  | 3453.9 | 2322.5 | 958.8  | 653.2  | 639.8  | 637.3  | 636.0  | 637.3  | 633.5  | 634.1  |
| 37.5° | 3809.8  | 3356.5 | 2066.6 | 763.4  | 620.7  | 612.5  | 604.8  | 595.3  | 584.5  | 578.1  | 579.4  |
| 40°   | 3793.2  | 3283.9 | 1807.5 | 659.6  | 594.0  | 588.3  | 573.6  | 553.3  | 540.5  | 536.7  | 536.7  |
| 42.5° | 3837.8  | 3246.3 | 1557.3 | 607.4  | 571.7  | 562.2  | 538.0  | 514.4  | 504.9  | 504.2  | 503.6  |
| 45°   | 3974.0  | 3261.6 | 1319.2 | 578.7  | 551.3  | 532.9  | 501.1  | 481.3  | 474.9  | 476.2  | 475.6  |
| 47.5° | 4218.5  | 3357.8 | 1115.4 | 559.6  | 531.0  | 506.8  | 471.1  | 455.2  | 447.6  | 447.6  | 448.2  |
| 50°   | 4634.3  | 3582.5 | 953.1  | 543.7  | 513.8  | 482.6  | 449.5  | 429.7  | 419.6  | 418.9  | 418.9  |
| 52.5° | 5239.7  | 3984.9 | 851.9  | 530.3  | 494.7  | 460.9  | 427.8  | 403.0  | 390.9  | 388.4  | 387.1  |
| 55°   | 5998.6  | 4561.7 | 823.8  | 521.4  | 469.2  | 437.4  | 401.7  | 376.9  | 363.5  | 357.8  | 357.2  |
| 57.5° | 6847.3  | 5263.3 | 879.2  | 510.6  | 443.1  | 409.4  | 373.1  | 349.5  | 335.5  | 328.5  | 327.9  |
| 60°   | 7706.1  | 6029.2 | 1105.2 | 495.3  | 421.5  | 378.8  | 343.8  | 322.2  | 308.1  | 300.5  | 299.2  |
| 62.5° | 8566.3  | 6836.5 | 1566.8 | 494.0  | 406.2  | 349.5  | 313.9  | 295.4  | 282.0  | 273.8  | 271.9  |
| 65°   | 9536.5  | 7720.2 | 2091.4 | 527.8  | 401.1  | 322.8  | 283.3  | 268.7  | 257.2  | 249.6  | 248.9  |
| 67.5° | 10650.7 | 8717.8 | 2041.1 | 597.2  | 418.3  | 298.6  | 254.7  | 243.2  | 234.9  | 228.6  | 227.9  |
| 70°   | 11173.4 | 8561.8 | 1268.9 | 646.2  | 442.5  | 275.0  | 227.3  | 219.0  | 212.6  | 208.2  | 206.3  |
| 71°   | 10954.4 | 8129.5 | 1063.9 | 640.5  | 439.9  | 264.9  | 216.5  | 210.1  | 203.7  | 199.9  | 198.0  |
| 72.5° | 10357.2 | 7413.9 | 887.5  | 595.9  | 411.3  | 246.4  | 202.5  | 196.1  | 190.4  | 185.9  | 184.6  |
| 75°   | 9294.0  | 6621.3 | 710.5  | 476.2  | 327.9  | 208.2  | 177.6  | 170.6  | 166.2  | 163.6  | 161.1  |
| 77.5° | 6832.0  | 4725.3 | 549.4  | 376.3  | 241.3  | 170.0  | 151.5  | 146.4  | 142.0  | 138.2  | 136.2  |
| 80°   | 2617.3  | 1830.4 | 369.9  | 280.8  | 177.0  | 134.3  | 122.2  | 119.7  | 115.2  | 112.7  | 112.7  |
| 82.5° | 704.8   | 546.9  | 197.4  | 170.0  | 118.4  | 98.0   | 93.6   | 92.3   | 88.5   | 83.4   | 84.0   |
| 85°   | 285.2   | 241.3  | 110.8  | 93.6   | 72.6   | 57.9   | 63.0   | 63.7   | 59.2   | 52.8   | 53.5   |
| 87.5° | 125.4   | 102.5  | 61.8   | 41.4   | 31.8   | 22.3   | 28.6   | 28.6   | 26.1   | 21.6   | 19.7   |
| 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 (nm) | Power W <sup>Λ</sup> /nm | Lumens (Φ/nm) | λ (nm) | Power W <sup>Λ</sup> /nm | Lumens (Φ/nm) | λ (nm) | Power W <sup>Λ</sup> /nm | Lumens (Φ/nm) | λ (nm) | Power W <sup>Λ</sup> /nm | Lumens (Φ/nm) | λ (nm) | Power W <sup>Λ</sup> /nm | Lumens (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

$R_f = 81.5$   
 $R_g = 99.2$   
 $CIE R_a = 81.0$   
 $R_9 = 7.1$



### 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)