

Signify Classified - Internal  
Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



Scaled data based on original data using  
LM-79-08 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: P321753

Luminaire Tested: **GLEON-SA9A-830-U-T3R-HSS**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P321753  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-11)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA9A-830-U-T3R-HSS  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(9) 80 CRI, 3000K, 615mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE III  
ROADWAY OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 25463 lumens  
Efficiency: N/A  
Efficacy: 87.8 lumens/watt  
Luminous Opening: Rectangular (W 2.5' x L: 1' x H: 0')  
IES Classification: Type III - Medium  
BUG Rating: B2 - U0 - G4

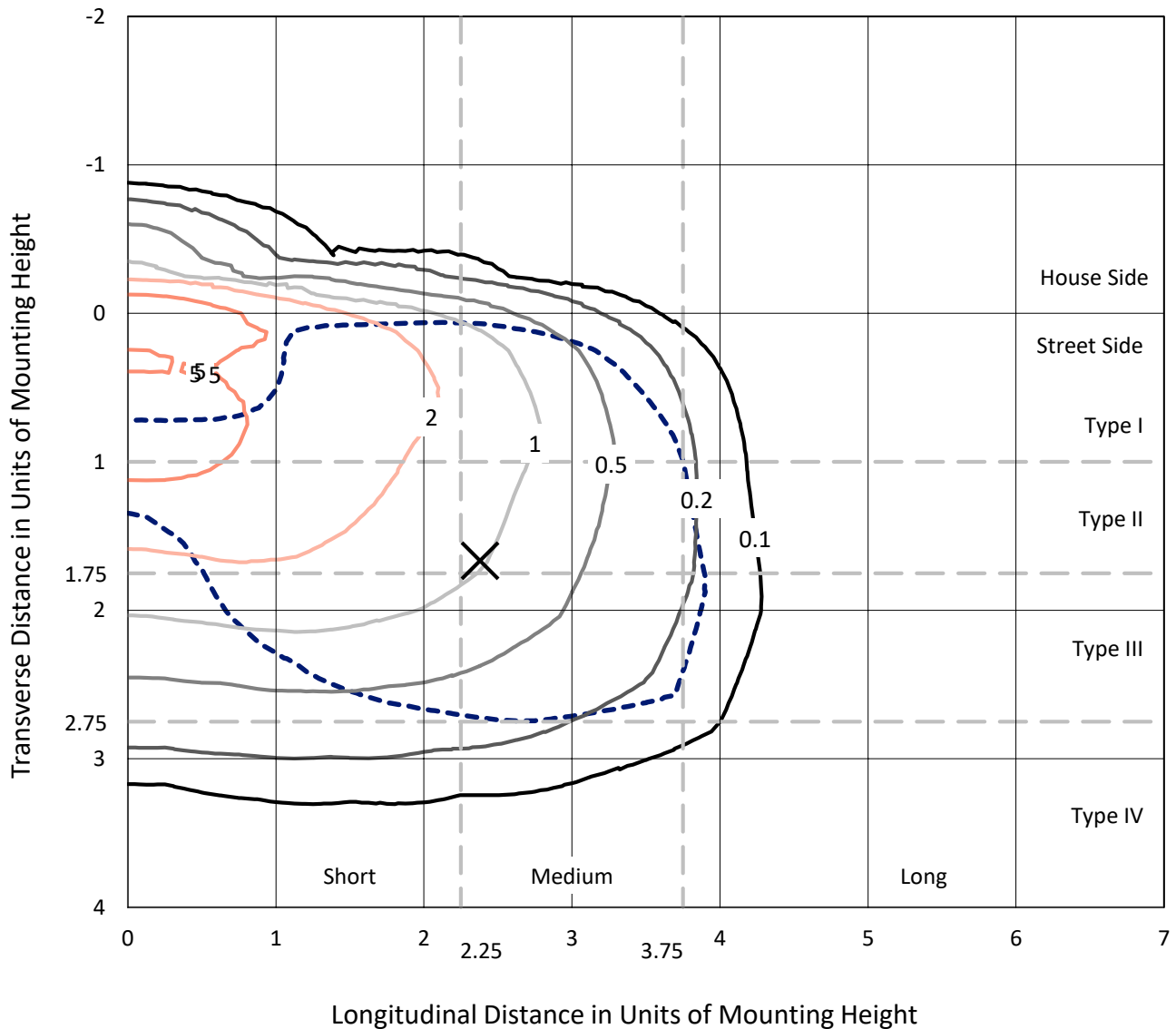
Input Watts (W): 290  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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## Iso-Footcandle Lines of Horizontal Illumination

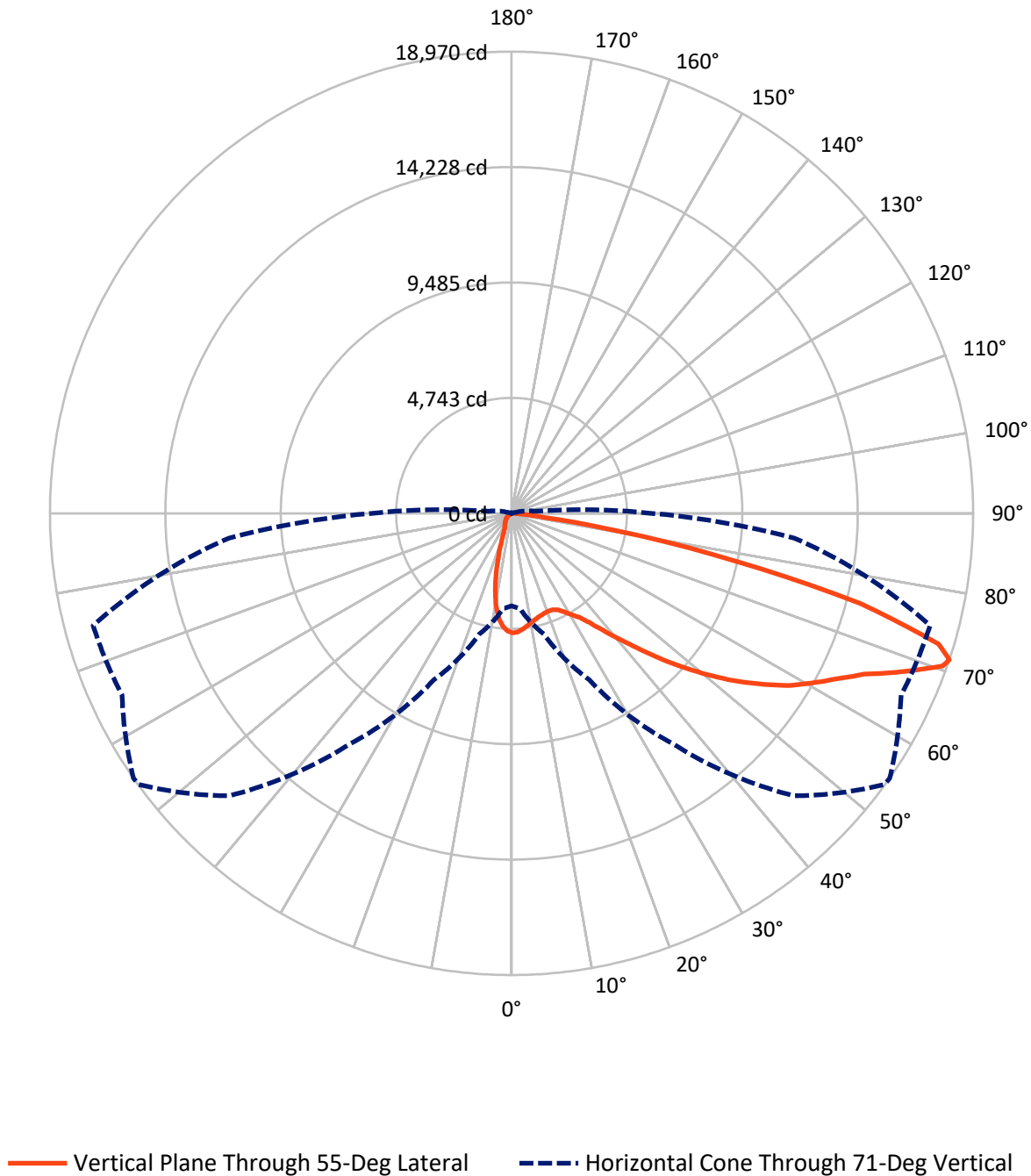
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 8.1 fc  
 Type III - Medium - N/A

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## Luminous Intensity Polar Plot



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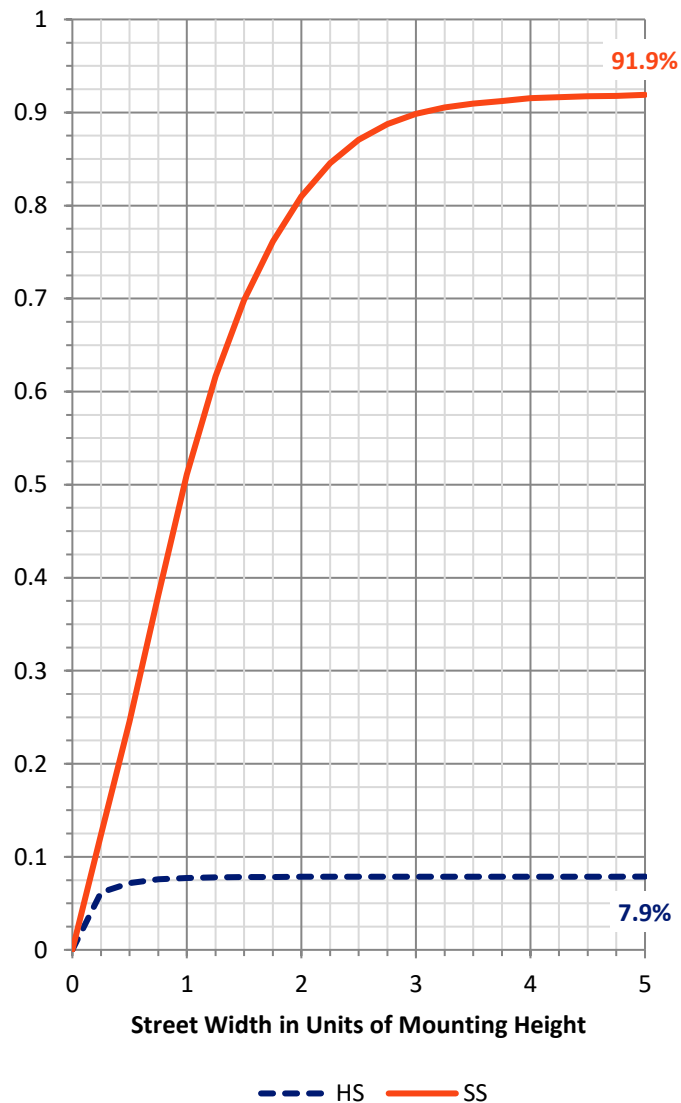
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 2016.0   | 0.0    | 2016.0  |
|                    | % Fixture | 7.9      | 0.0    | 7.9     |
| <b>Street Side</b> | Lumens    | 23447.0  | 0.0    | 23447.0 |
|                    | % Fixture | 92.1     | 0.0    | 92.1    |
| <b>Total</b>       | Lumens    | 25463.0  | 0.0    | 25463.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 418.7   | 1.6       |
| 10°-20°   | 945.2   | 3.7       |
| 20°-30°   | 1519.0  | 6.0       |
| 30°-40°   | 2580.9  | 10.1      |
| 40°-50°   | 4005.9  | 15.7      |
| 50°-60°   | 5385.8  | 21.2      |
| 60°-70°   | 6588.6  | 25.9      |
| 70°-80°   | 3852.2  | 15.1      |
| 80°-90°   | 166.5   | 0.7       |
| 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°    | 25463.0 | 100.0     |
| 0°-180°   | 25463.0 | 100.0     |

**Coefficient of Utilization**



REPORT NUMBER: P321753

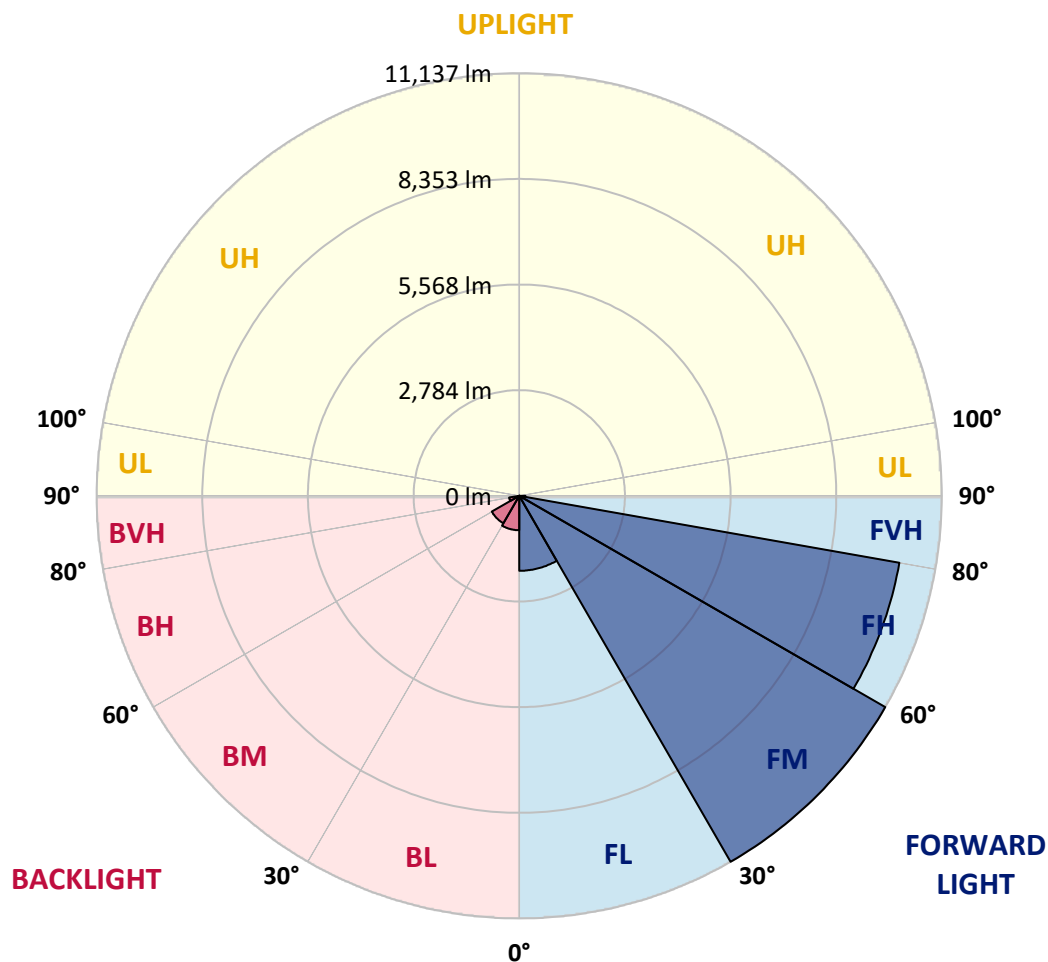
CATALOG NUMBER: GLEON-SA9A-830-U-T3R-HSS

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

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |          |
|------|-------------|---------|-----------|-------------------------|------|----------|
|      |             |         |           | B                       | U    | G        |
| FL   | (0°-30°)    | 1975.6  | 7.8       |                         |      |          |
| FM   | (30°-60°)   | 11136.8 | 43.7      |                         |      |          |
| FH   | (60°-80°)   | 10170.8 | 39.9      |                         |      | G4/12000 |
| FVH  | (80°-90°)   | 163.9   | 0.6       |                         |      | G2/225   |
| BL   | (0°-30°)    | 907.4   | 3.6       | B2/1000                 |      |          |
| BM   | (30°-60°)   | 835.9   | 3.3       | B1/1000                 |      |          |
| BH   | (60°-80°)   | 270.1   | 1.1       | B1/500                  |      | G1/500   |
| BVH  | (80°-90°)   | 2.6     | 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-G4**

Type III Medium





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 54°     | 55°     | 65°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 4910.6  | 4910.6  | 4910.6  | 4910.6  | 4910.6  | 4910.6  | 4910.6  | 4910.6  | 4910.6  | 4910.6  | 4910.6  |
| 2.5°  | 4766.6  | 4772.3  | 4792.9  | 4802.0  | 4823.7  | 4860.3  | 4878.6  | 4879.8  | 4909.5  | 4920.9  | 4930.1  |
| 5°    | 4429.3  | 4463.6  | 4497.9  | 4534.5  | 4600.8  | 4688.8  | 4775.7  | 4783.7  | 4879.8  | 4950.6  | 4988.4  |
| 7.5°  | 4138.9  | 4169.7  | 4210.9  | 4269.2  | 4363.0  | 4501.3  | 4646.5  | 4663.7  | 4845.5  | 5006.7  | 5091.3  |
| 10°   | 3840.5  | 3865.6  | 3925.1  | 4010.8  | 4140.0  | 4325.2  | 4520.8  | 4549.3  | 4814.6  | 5082.1  | 5230.8  |
| 12.5° | 3521.5  | 3536.3  | 3608.4  | 3731.9  | 3921.6  | 4157.2  | 4414.4  | 4452.2  | 4795.2  | 5169.0  | 5395.4  |
| 15°   | 3279.1  | 3285.9  | 3354.5  | 3482.6  | 3699.8  | 4006.3  | 4332.1  | 4377.8  | 4799.7  | 5273.1  | 5574.9  |
| 17.5° | 3217.3  | 3220.8  | 3257.4  | 3345.4  | 3537.5  | 3871.3  | 4266.9  | 4323.0  | 4813.4  | 5374.8  | 5755.6  |
| 20°   | 3467.7  | 3443.7  | 3406.0  | 3392.3  | 3474.6  | 3790.2  | 4228.1  | 4290.9  | 4831.7  | 5465.1  | 5917.9  |
| 22.5° | 4154.9  | 4084.0  | 3927.4  | 3718.1  | 3591.2  | 3795.9  | 4238.3  | 4301.2  | 4890.1  | 5576.1  | 6105.4  |
| 25°   | 5174.7  | 5076.4  | 4810.0  | 4398.4  | 4002.8  | 3960.5  | 4324.1  | 4388.1  | 5003.2  | 5708.7  | 6284.9  |
| 27.5° | 6335.2  | 6238.0  | 5912.2  | 5324.5  | 4650.0  | 4286.4  | 4520.8  | 4580.2  | 5171.3  | 5826.4  | 6422.1  |
| 30°   | 7446.6  | 7419.1  | 7035.0  | 6367.2  | 5464.0  | 4814.6  | 4774.6  | 4824.9  | 5295.9  | 5897.3  | 6530.7  |
| 32.5° | 8388.7  | 8345.2  | 8036.5  | 7387.1  | 6395.8  | 5449.1  | 5073.0  | 5087.8  | 5389.7  | 5988.8  | 6672.5  |
| 35°   | 9262.2  | 9208.4  | 8937.5  | 8323.5  | 7351.7  | 6224.3  | 5532.6  | 5510.9  | 5594.3  | 6172.9  | 6878.3  |
| 37.5° | 10024.8 | 10073.9 | 9773.2  | 9189.0  | 8209.2  | 7030.4  | 6152.3  | 6087.1  | 5914.5  | 6472.4  | 7176.7  |
| 40°   | 10662.8 | 10662.8 | 10506.1 | 10019.1 | 9135.3  | 7863.9  | 6853.2  | 6767.4  | 6395.8  | 6934.3  | 7555.2  |
| 42.5° | 10892.6 | 10941.7 | 11000.0 | 10724.5 | 9964.2  | 8730.5  | 7634.1  | 7544.9  | 7073.8  | 7589.5  | 8033.1  |
| 45°   | 10906.3 | 10984.0 | 11282.4 | 11281.3 | 10713.1 | 9591.5  | 8514.4  | 8472.1  | 7942.8  | 8431.0  | 8625.3  |
| 47.5° | 10713.1 | 10810.2 | 11301.9 | 11580.9 | 11306.5 | 10392.9 | 9477.1  | 9424.5  | 8963.8  | 9462.3  | 9245.0  |
| 50°   | 10414.7 | 10522.1 | 11093.8 | 11698.6 | 11710.1 | 11090.4 | 10491.3 | 10412.4 | 10087.7 | 10641.0 | 9885.3  |
| 52.5° | 9880.7  | 10088.8 | 10907.4 | 11726.1 | 11975.3 | 11692.9 | 11456.2 | 11421.9 | 11345.3 | 11776.4 | 10395.2 |
| 55°   | 8738.5  | 8969.5  | 10439.8 | 11735.2 | 12221.1 | 12226.8 | 12360.6 | 12369.8 | 12524.1 | 12837.4 | 10774.8 |
| 57.5° | 8198.9  | 8329.2  | 9623.5  | 11778.7 | 12585.8 | 12832.8 | 13282.1 | 13353.0 | 13592.0 | 13844.7 | 11208.1 |
| 60°   | 7859.3  | 8013.6  | 9221.0  | 11719.2 | 13158.7 | 13627.4 | 14136.2 | 14160.2 | 14416.3 | 14884.0 | 11794.7 |
| 62.5° | 7588.3  | 7740.4  | 8967.2  | 11490.5 | 13802.4 | 14583.3 | 14970.9 | 14973.1 | 15165.2 | 16122.2 | 12461.2 |
| 65°   | 6919.5  | 7047.5  | 8453.8  | 11233.3 | 14227.7 | 15528.8 | 15940.4 | 15925.5 | 16082.2 | 17427.9 | 13235.3 |
| 67.5° | 5952.2  | 6050.5  | 7405.4  | 10258.0 | 14067.6 | 16388.6 | 17403.9 | 17354.7 | 17164.9 | 18556.4 | 13539.4 |
| 70°   | 4601.9  | 4637.4  | 5836.7  | 8548.7  | 12567.6 | 16719.0 | 18818.2 | 18793.0 | 17829.2 | 18354.0 | 12424.6 |
| 71°   | 3803.9  | 3920.5  | 5143.9  | 7544.9  | 11562.6 | 16413.7 | 18955.4 | 18970.2 | 17662.3 | 17802.9 | 11657.5 |
| 72.5° | 2208.9  | 2308.4  | 3728.4  | 5794.4  | 9816.7  | 15140.1 | 18244.2 | 18351.7 | 16882.5 | 16193.1 | 9957.3  |
| 75°   | 473.3   | 506.5   | 1382.3  | 2804.6  | 5400.0  | 10611.3 | 14400.3 | 14783.3 | 13760.1 | 11016.0 | 6001.4  |
| 77.5° | 329.3   | 355.6   | 592.2   | 1272.5  | 1784.7  | 5243.3  | 8945.5  | 9377.6  | 8220.6  | 4140.0  | 1920.8  |
| 80°   | 260.7   | 290.4   | 461.9   | 628.8   | 482.5   | 1691.0  | 4190.3  | 4454.4  | 2741.7  | 923.8   | 323.6   |
| 82.5° | 145.2   | 172.6   | 360.2   | 339.6   | 185.2   | 321.3   | 1173.1  | 1326.3  | 548.8   | 186.4   | 76.6    |
| 85°   | 42.3    | 51.5    | 232.1   | 247.0   | 78.9    | 61.7    | 200.1   | 248.1   | 104.0   | 49.2    | 34.3    |
| 87.5° | 0.0     | 0.0     | 112.0   | 94.9    | 22.9    | 9.1     | 18.3    | 20.6    | 20.6    | 20.6    | 22.9    |
| 90°   | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |



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CATALOG NUMBER: GLEON-SA9A-830-U-T3R-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 4910.6 | 4910.6 | 4910.6 | 4910.6 | 4910.6 | 4910.6 | 4910.6 | 4910.6 | 4910.6 | 4910.6 | 4910.6 |
| 2.5°  | 4930.1 | 4938.1 | 4909.5 | 4871.8 | 4831.7 | 4782.6 | 4731.1 | 4691.1 | 4690.0 | 4670.5 | 4651.1 |
| 5°    | 4990.7 | 4986.1 | 4907.2 | 4787.2 | 4645.4 | 4497.9 | 4357.3 | 4198.3 | 4145.7 | 4080.6 | 4058.8 |
| 7.5°  | 5102.7 | 5070.7 | 4903.8 | 4640.8 | 4329.8 | 4021.1 | 3702.1 | 3380.8 | 3243.6 | 3120.2 | 3098.4 |
| 10°   | 5243.3 | 5182.7 | 4882.0 | 4421.3 | 3850.8 | 3281.4 | 2800.0 | 2363.3 | 2171.2 | 2023.7 | 2016.8 |
| 12.5° | 5389.7 | 5297.1 | 4821.5 | 4089.7 | 3223.1 | 2422.7 | 1868.2 | 1438.3 | 1278.3 | 1175.4 | 1184.5 |
| 15°   | 5542.9 | 5404.6 | 4691.1 | 3642.7 | 2508.5 | 1644.1 | 1147.9 | 895.2  | 831.2  | 804.9  | 811.8  |
| 17.5° | 5699.5 | 5478.9 | 4509.3 | 3104.2 | 1803.0 | 1061.0 | 794.6  | 723.7  | 723.7  | 729.4  | 731.7  |
| 20°   | 5835.6 | 5518.9 | 4241.8 | 2500.5 | 1222.2 | 772.9  | 695.1  | 684.9  | 690.6  | 699.7  | 700.9  |
| 22.5° | 5970.5 | 5521.2 | 3893.1 | 1888.8 | 855.2  | 676.9  | 662.0  | 657.4  | 660.8  | 671.1  | 672.3  |
| 25°   | 6080.3 | 5493.7 | 3456.3 | 1343.4 | 682.6  | 638.0  | 631.1  | 628.8  | 631.1  | 643.7  | 643.7  |
| 27.5° | 6124.9 | 5394.3 | 2923.5 | 944.4  | 611.7  | 594.5  | 592.2  | 594.5  | 598.0  | 607.1  | 608.3  |
| 30°   | 6129.4 | 5220.5 | 2342.7 | 683.7  | 554.5  | 536.2  | 540.8  | 548.8  | 545.4  | 543.1  | 545.4  |
| 32.5° | 6140.9 | 5019.2 | 1776.7 | 562.5  | 506.5  | 477.9  | 472.2  | 472.2  | 458.5  | 450.5  | 445.9  |
| 35°   | 6178.6 | 4782.6 | 1288.5 | 505.4  | 457.3  | 424.2  | 402.5  | 377.3  | 351.0  | 337.3  | 333.9  |
| 37.5° | 6238.0 | 4534.5 | 922.7  | 467.6  | 413.9  | 376.2  | 335.0  | 290.4  | 252.7  | 242.4  | 242.4  |
| 40°   | 6346.7 | 4278.4 | 682.6  | 437.9  | 379.6  | 332.7  | 271.0  | 212.7  | 178.4  | 172.6  | 172.6  |
| 42.5° | 6518.2 | 4008.5 | 544.2  | 411.6  | 349.9  | 288.1  | 206.9  | 154.4  | 129.2  | 125.8  | 124.6  |
| 45°   | 6696.5 | 3711.3 | 475.6  | 386.4  | 317.8  | 236.7  | 153.2  | 114.3  | 99.5   | 96.0   | 96.0   |
| 47.5° | 6874.9 | 3394.6 | 442.5  | 362.4  | 287.0  | 184.1  | 114.3  | 90.3   | 83.5   | 83.5   | 84.6   |
| 50°   | 7025.8 | 3064.1 | 418.5  | 336.1  | 247.0  | 139.5  | 90.3   | 76.6   | 74.3   | 78.9   | 80.0   |
| 52.5° | 7063.5 | 2739.4 | 388.7  | 303.0  | 197.8  | 106.3  | 74.3   | 67.5   | 67.5   | 67.5   | 67.5   |
| 55°   | 7040.7 | 2487.9 | 349.9  | 261.8  | 146.3  | 84.6   | 64.0   | 59.5   | 58.3   | 58.3   | 58.3   |
| 57.5° | 7118.4 | 2339.3 | 280.1  | 203.5  | 105.2  | 68.6   | 56.0   | 52.6   | 50.3   | 49.2   | 49.2   |
| 60°   | 7275.1 | 2242.1 | 200.1  | 146.3  | 78.9   | 57.2   | 48.0   | 44.6   | 41.2   | 38.9   | 38.9   |
| 62.5° | 7483.1 | 2157.5 | 148.6  | 108.6  | 60.6   | 45.7   | 40.0   | 36.6   | 32.0   | 29.7   | 29.7   |
| 65°   | 7643.2 | 2006.6 | 113.2  | 81.2   | 45.7   | 36.6   | 30.9   | 29.7   | 22.9   | 20.6   | 19.4   |
| 67.5° | 7398.5 | 1675.0 | 91.5   | 59.5   | 34.3   | 28.6   | 24.0   | 22.9   | 13.7   | 11.4   | 11.4   |
| 70°   | 6345.5 | 1166.2 | 73.2   | 43.4   | 25.2   | 22.9   | 19.4   | 14.9   | 10.3   | 9.1    | 9.1    |
| 71°   | 5754.4 | 974.1  | 66.3   | 36.6   | 21.7   | 21.7   | 18.3   | 12.6   | 9.1    | 8.0    | 8.0    |
| 72.5° | 4780.3 | 691.7  | 56.0   | 28.6   | 19.4   | 22.9   | 19.4   | 11.4   | 9.1    | 8.0    | 6.9    |
| 75°   | 2774.9 | 289.3  | 38.9   | 19.4   | 14.9   | 27.4   | 25.2   | 10.3   | 6.9    | 5.7    | 5.7    |
| 77.5° | 834.6  | 106.3  | 21.7   | 12.6   | 11.4   | 24.0   | 28.6   | 9.1    | 3.4    | 1.1    | 1.1    |
| 80°   | 152.1  | 45.7   | 13.7   | 8.0    | 8.0    | 14.9   | 21.7   | 4.6    | 0.0    | 0.0    | 0.0    |
| 82.5° | 53.7   | 22.9   | 8.0    | 4.6    | 3.4    | 6.9    | 10.3   | 0.0    | 0.0    | 0.0    | 0.0    |
| 85°   | 30.9   | 16.0   | 4.6    | 2.3    | 0.0    | 1.1    | 2.3    | 0.0    | 0.0    | 0.0    | 0.0    |
| 87.5° | 20.6   | 4.6    | 0.0    | 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

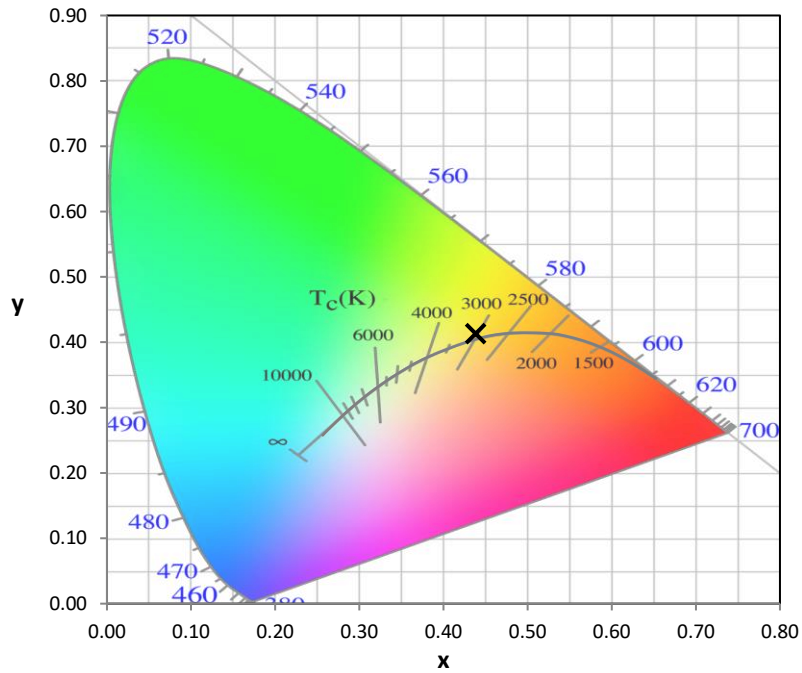
Stabilization Time: 20M  
 Operation Time: 1H 20M  
 Sphere Temperature (°C): 24.2

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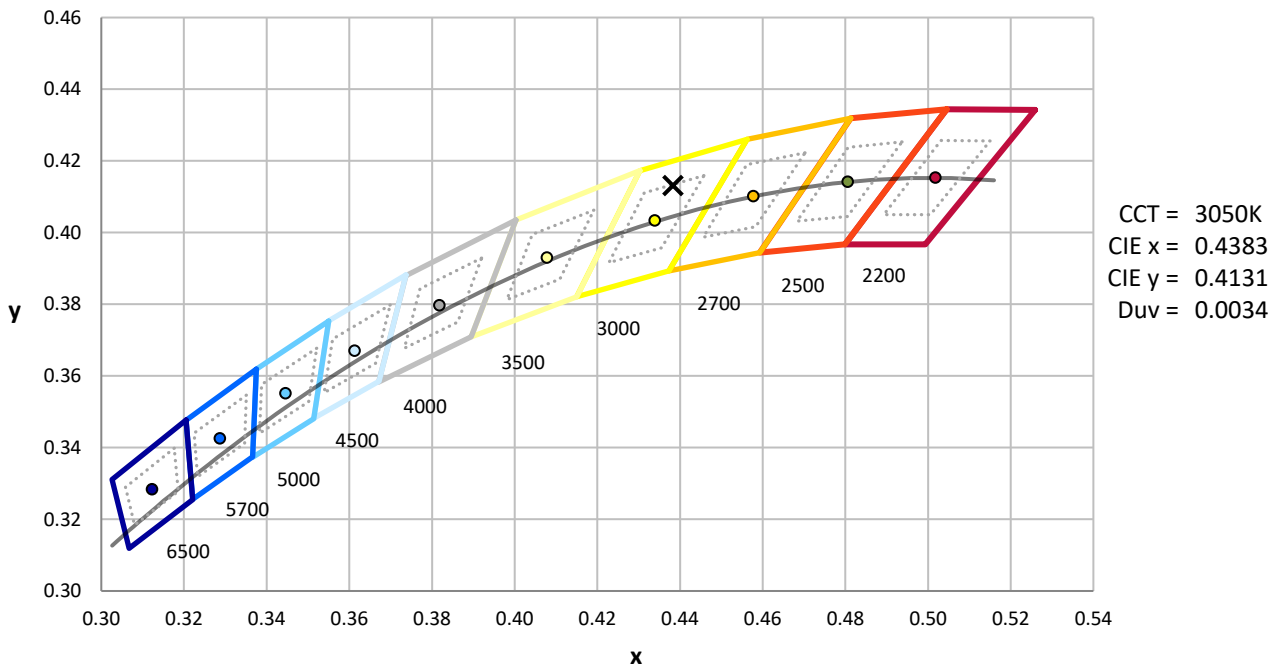
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| 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

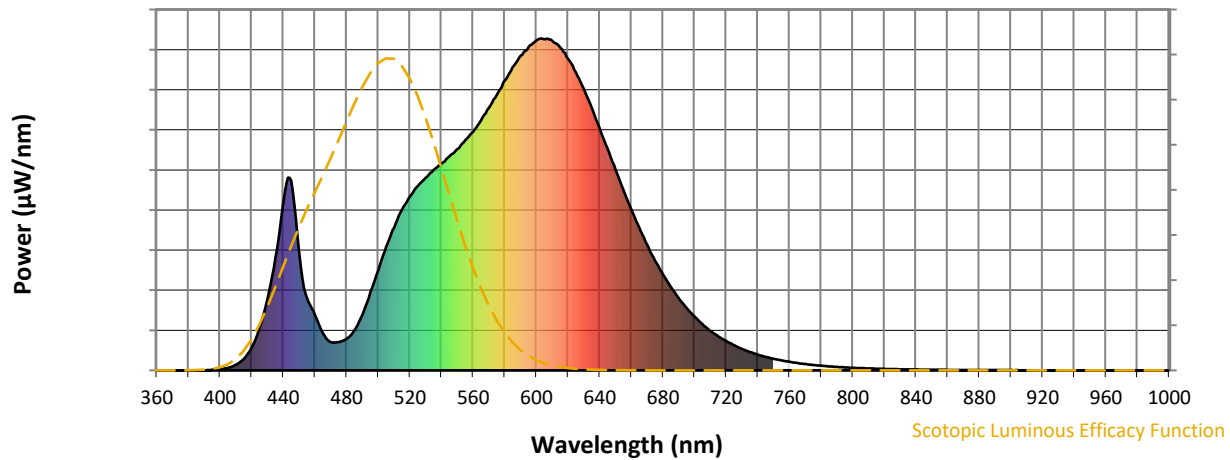


### Photopic Lumens: NR

| $\lambda$<br>(nm) | Power<br>$\text{W}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}/\text{nm}$ | 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



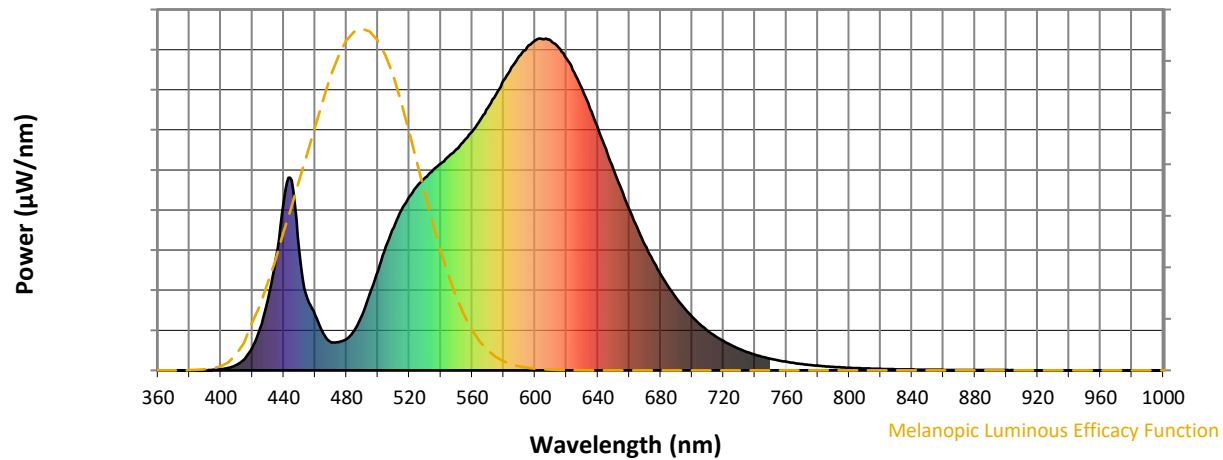
Scotopic Lumens: NR

S/P: 1.27

| λ (nm) | Power W <sup>^</sup> /nm | Lumens (Φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (Φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (Φ/nm) | λ (nm) | Power W <sup>^</sup> /nm | Lumens (Φ/nm) | λ (nm) | Power W <sup>^</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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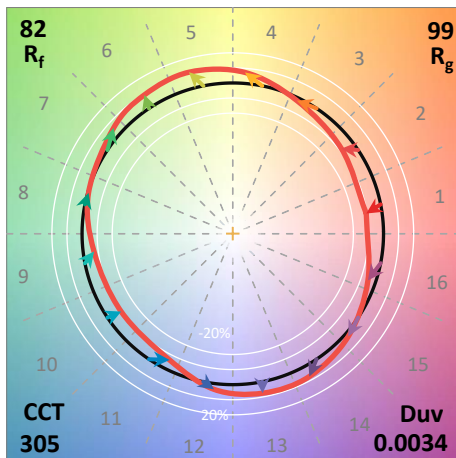
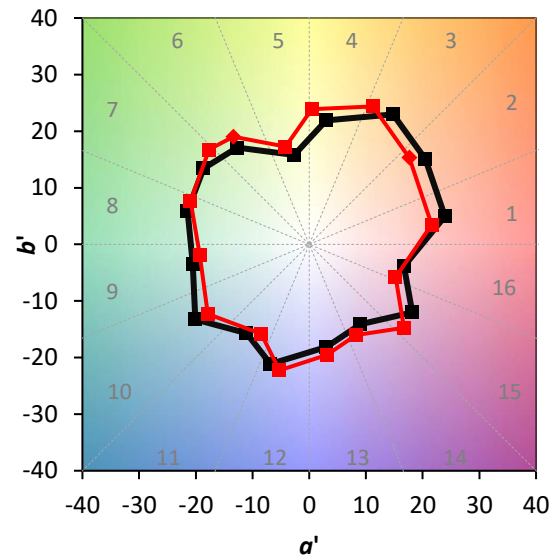
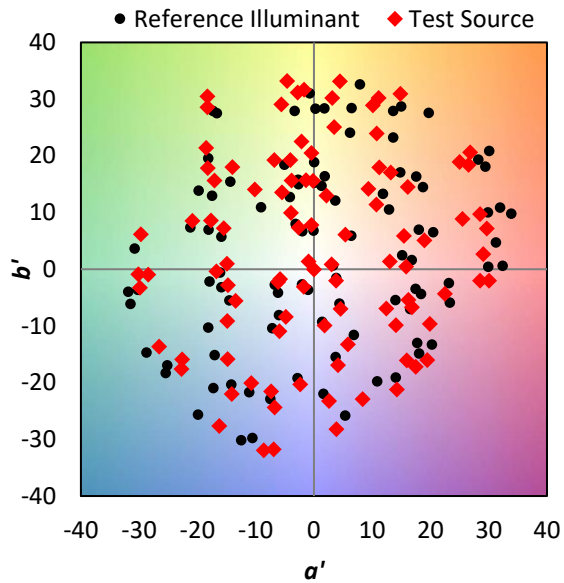
TM-30-18

### Summary

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



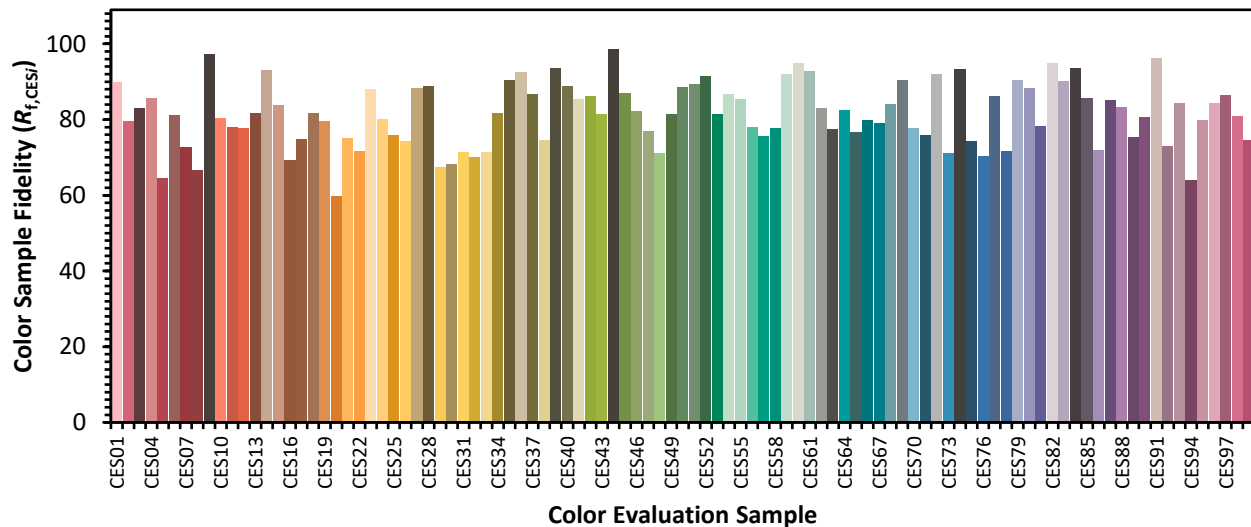
### Color Vector Graphics



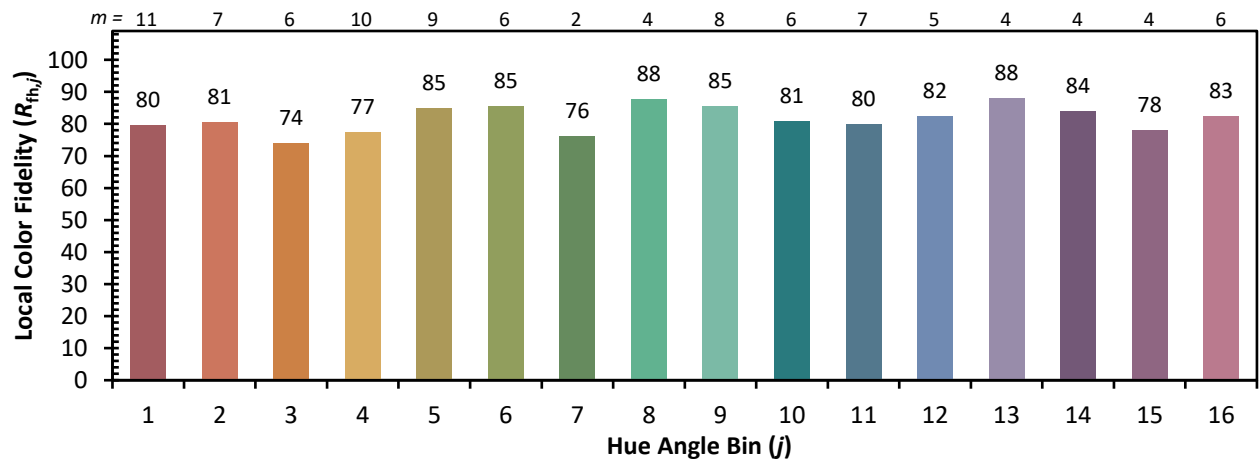
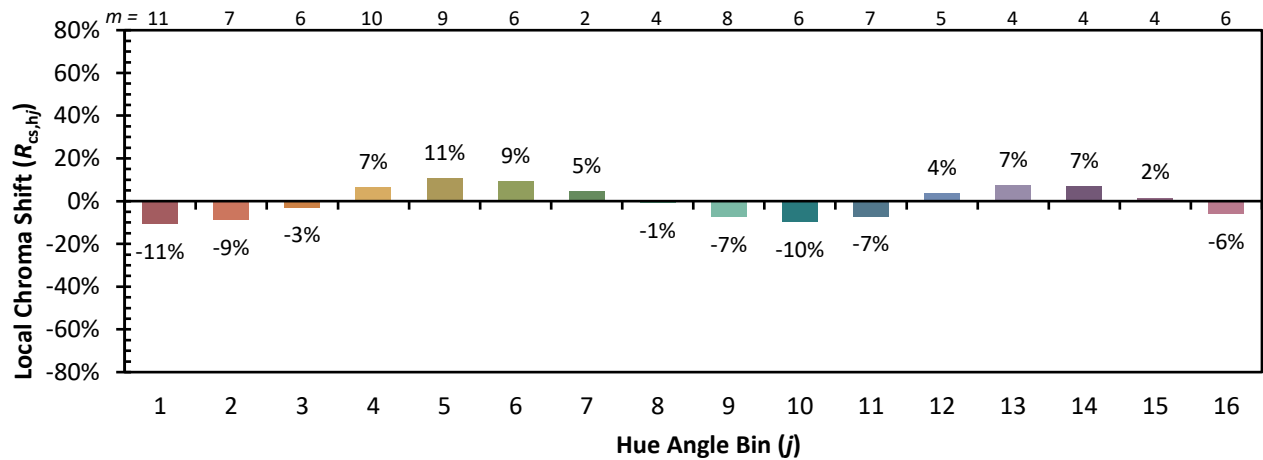


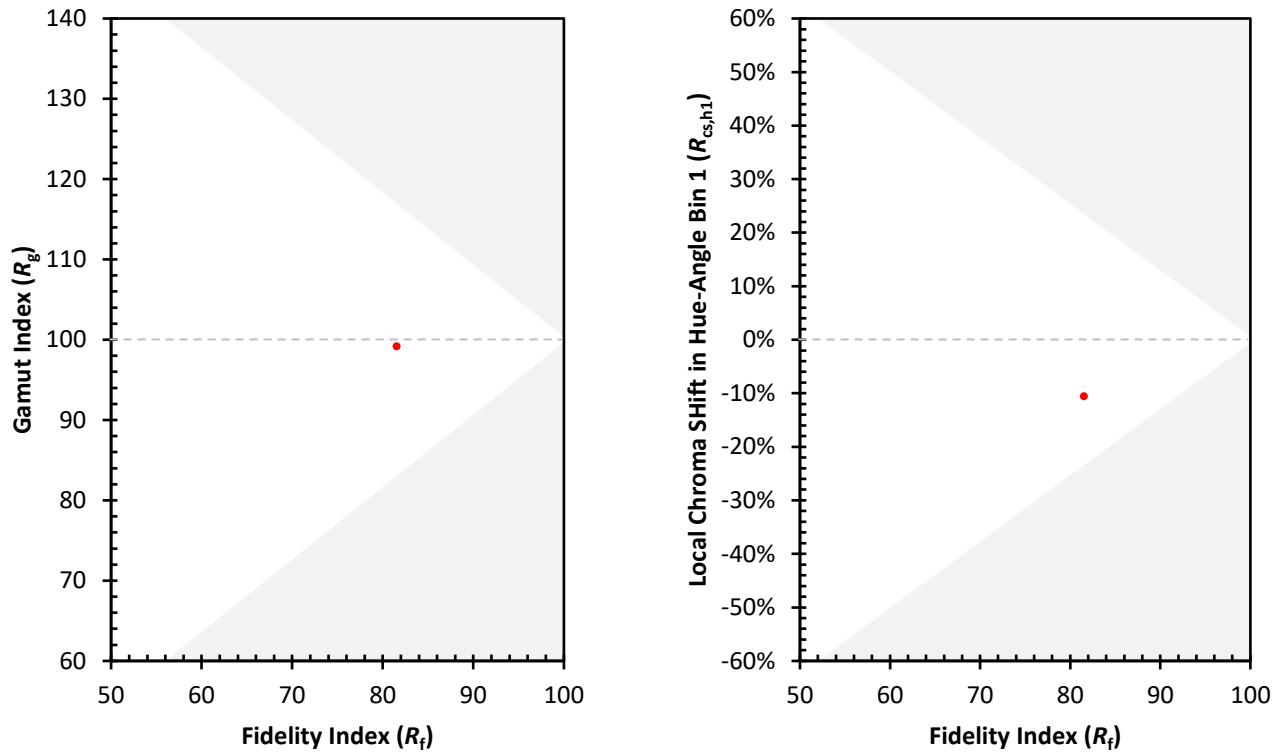
**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| 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)