

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: HALO

Report Number: P798559

Luminaire Tested: **LTSS4069FS1EWHR-935**

Issue Date: 04/03/2024



Test Information

Test Method: LM-79-08
Report Number: P798559
Test Lab: ETA Testing Technology(A2)
Issue Date: 04/03/2024
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)
Product Line: HALO
Catalog Number: LTSS4069FS1EWHR-935
Description: 4 inch 90 CRI COLOR TUNING RECESSED DOWNLIGHT with DRIVER ON BOARD AND SMOOTH SPRAY TRIM
Light Source: 3500K CCT, 90 CRI LEDS
Ballast/Driver: ELECTRONIC DRIVER

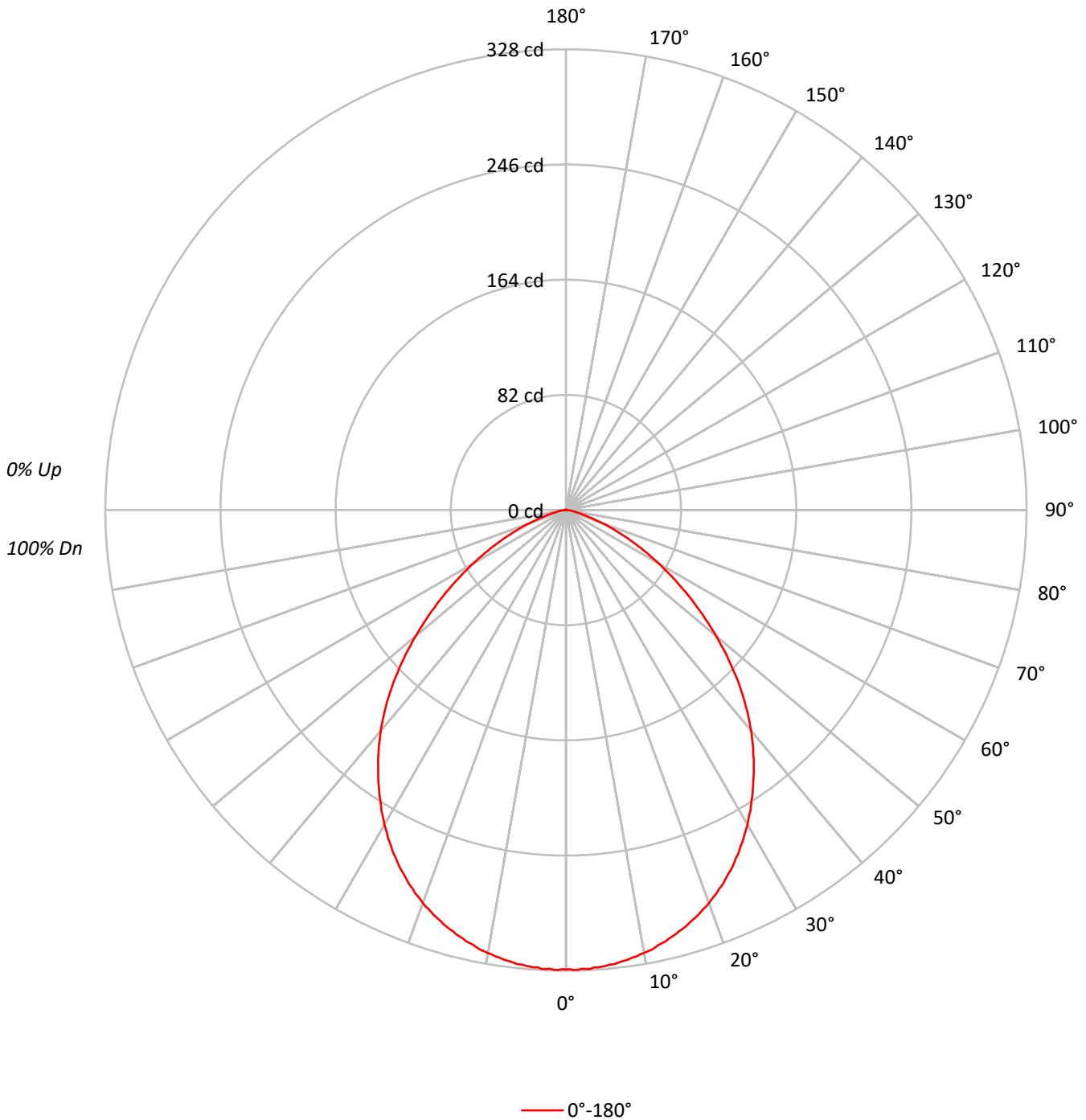
Summary

Lumens per Lamp: N/A
Luminaire Lumens: 689.5 lumens
Efficiency: N/A
Efficacy: 91.9 lumens/watt
Spacing Criteria (0/90/45): 1.18 / 1.18 / 1.26
Luminous Opening: Circular (Dia: 0.3' x H: 0')
CIE Type: Direct

Input Watts (W): 7.5
Input Voltage (V): 120
Input Current (A_{in}): 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: 25 FT

TEST NUMBER: P798559
CATALOG NUMBER: LTSS4069FS1EWHR-935

Luminous Intensity Polar Plot





TEST NUMBER: P798559
 CATALOG NUMBER: LTSS4069FS1EWHR-935

COEFFICIENT OF UTILIZATION - ZONAL CAVITY METHOD:

| | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|---|
| RF | 20 | | | | 20 | | | | 20 | | | | 20 | | | | 20 | | | | |
| RC | 80 | | | | 70 | | | | 50 | | | | 30 | | | | 10 | | | 0 | |
| RW | 70 | 50 | 30 | 10 | 70 | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 | 0 |
| RCR | | | | | | | | | | | | | | | | | | | | | |
| 0 | 119 | 119 | 119 | 119 | 116 | 116 | 116 | 116 | 111 | 111 | 111 | 106 | 106 | 106 | 102 | 102 | 102 | 100 | | | |
| 1 | 111 | 107 | 103 | 100 | 108 | 105 | 102 | 99 | 101 | 98 | 96 | 97 | 95 | 93 | 93 | 92 | 90 | 88 | | | |
| 2 | 102 | 95 | 90 | 85 | 100 | 94 | 88 | 84 | 90 | 86 | 82 | 87 | 83 | 80 | 84 | 81 | 78 | 76 | | | |
| 3 | 94 | 85 | 78 | 73 | 92 | 84 | 77 | 72 | 81 | 75 | 71 | 78 | 74 | 70 | 76 | 72 | 68 | 66 | | | |
| 4 | 87 | 77 | 69 | 63 | 85 | 75 | 68 | 63 | 73 | 67 | 62 | 71 | 65 | 61 | 69 | 64 | 60 | 58 | | | |
| 5 | 81 | 69 | 61 | 55 | 79 | 68 | 61 | 55 | 66 | 59 | 54 | 64 | 58 | 54 | 62 | 57 | 53 | 51 | | | |
| 6 | 75 | 63 | 55 | 49 | 73 | 62 | 54 | 49 | 60 | 53 | 48 | 59 | 52 | 48 | 57 | 52 | 47 | 46 | | | |
| 7 | 70 | 57 | 49 | 44 | 68 | 57 | 49 | 44 | 55 | 48 | 43 | 54 | 48 | 43 | 52 | 47 | 43 | 41 | | | |
| 8 | 65 | 53 | 45 | 39 | 64 | 52 | 44 | 39 | 51 | 44 | 39 | 49 | 43 | 39 | 48 | 43 | 39 | 37 | | | |
| 9 | 61 | 49 | 41 | 36 | 60 | 48 | 41 | 36 | 47 | 40 | 35 | 46 | 40 | 35 | 45 | 39 | 35 | 33 | | | |
| 10 | 57 | 45 | 38 | 33 | 56 | 44 | 37 | 32 | 43 | 37 | 32 | 43 | 36 | 32 | 42 | 36 | 32 | 30 | | | |

AVERAGE LUMINANCE (cd/sqm):

| | |
|-----|-------|
| | 0° |
| 0° | 49810 |
| 5° | 49802 |
| 10° | 49512 |
| 15° | 48982 |
| 20° | 48275 |
| 25° | 47130 |
| 30° | 45489 |
| 35° | 43314 |
| 40° | 40771 |
| 45° | 37429 |
| 50° | 33095 |
| 55° | 28328 |
| 60° | 23329 |
| 65° | 18052 |
| 70° | 12600 |
| 75° | 7413 |
| 80° | 4999 |
| 85° | 3494 |



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ZONAL LUMENS:

| Zone | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10° | 30.9 | 4.5 |
| 10°-20° | 87.6 | 12.7 |
| 20°-30° | 128.8 | 18.7 |
| 30°-40° | 145.4 | 21.1 |
| 40°-50° | 133.4 | 19.3 |
| 50°-60° | 95.6 | 13.9 |
| 60°-70° | 50.2 | 7.3 |
| 70°-80° | 14.8 | 2.2 |
| 80°-90° | 2.4 | 0.4 |
| 90°-100° | 0.0 | 0.0 |
| 100°-110° | 0.0 | 0.0 |
| 110°-120° | 0.1 | 0.0 |
| 120°-130° | 0.1 | 0.0 |
| 130°-140° | 0.1 | 0.0 |
| 140°-150° | 0.1 | 0.0 |
| 150°-160° | 0.1 | 0.0 |
| 160°-170° | 0.1 | 0.0 |
| 170°-180° | 0.0 | 0.0 |
| 0°-30° | 247.3 | 35.9 |
| 0°-40° | 392.7 | 57.0 |
| 0°-60° | 621.7 | 90.2 |
| 0°-90° | 689.1 | 99.9 |
| 90°-120° | 0.1 | 0.0 |
| 90°-150° | 0.3 | 0.0 |
| 90°-180° | 0.0 | 0.0 |
| 0°-180° | 689.5 | 100.0 |

CANDELA DISTRIBUTION:

| | 0° | Flux |
|------|-----|------|
| 0° | 327 | |
| 5° | 326 | 31 |
| 15° | 311 | 88 |
| 25° | 280 | 129 |
| 35° | 233 | 145 |
| 45° | 174 | 133 |
| 55° | 107 | 96 |
| 65° | 50 | 50 |
| 75° | 13 | 15 |
| 85° | 2 | 2 |
| 90° | 0 | 0 |
| 95° | 0 | 0 |
| 105° | 0 | 0 |
| 115° | 0 | 0 |
| 125° | 0 | 0 |
| 135° | 0 | 0 |
| 145° | 0 | 0 |
| 155° | 0 | 0 |
| 165° | 0 | 0 |
| 175° | 0 | 0 |
| 180° | 0 | 0 |



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CANDELA DISTRIBUTION (FULL):

| 0° | |
|-------|-------|
| 0° | 327.1 |
| 0.5° | 326.9 |
| 1° | 327.6 |
| 1.5° | 327.5 |
| 2° | 326.8 |
| 2.5° | 327.1 |
| 3° | 327.2 |
| 3.5° | 326.3 |
| 4° | 326.4 |
| 4.5° | 326.2 |
| 5° | 325.8 |
| 5.5° | 325.2 |
| 6° | 325.2 |
| 6.5° | 324.6 |
| 7° | 323.8 |
| 7.5° | 323.5 |
| 8° | 323.0 |
| 8.5° | 322.1 |
| 9° | 321.7 |
| 9.5° | 320.8 |
| 10° | 320.2 |
| 10.5° | 319.5 |
| 11° | 319.0 |
| 11.5° | 317.9 |
| 12° | 316.6 |
| 12.5° | 316.0 |
| 13° | 315.2 |
| 13.5° | 313.8 |
| 14° | 313.0 |
| 14.5° | 312.0 |
| 15° | 310.7 |
| 15.5° | 309.6 |
| 16° | 308.6 |
| 16.5° | 307.4 |
| 17° | 305.9 |
| 17.5° | 304.8 |
| 18° | 303.6 |
| 18.5° | 302.1 |
| 19° | 300.4 |
| 19.5° | 299.4 |
| 20° | 297.9 |
| 20.5° | 296.0 |
| 21° | 294.5 |
| 21.5° | 293.2 |
| 22° | 291.0 |



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CANDELA DISTRIBUTION (continued):

| | 0° |
|-------|-------|
| 22.5° | 289.6 |
| 23° | 288.0 |
| 23.5° | 285.9 |
| 24° | 283.9 |
| 24.5° | 282.2 |
| 25° | 280.5 |
| 25.5° | 278.2 |
| 26° | 276.0 |
| 26.5° | 274.3 |
| 27° | 272.2 |
| 27.5° | 269.6 |
| 28° | 267.7 |
| 28.5° | 265.5 |
| 29° | 262.9 |
| 29.5° | 260.8 |
| 30° | 258.7 |
| 30.5° | 255.9 |
| 31° | 253.4 |
| 31.5° | 251.3 |
| 32° | 248.6 |
| 32.5° | 245.9 |
| 33° | 243.5 |
| 33.5° | 241.0 |
| 34° | 238.2 |
| 34.5° | 235.6 |
| 35° | 233.0 |
| 35.5° | 230.2 |
| 36° | 227.4 |
| 36.5° | 224.9 |
| 37° | 222.3 |
| 37.5° | 219.2 |
| 38° | 216.6 |
| 38.5° | 213.9 |
| 39° | 210.7 |
| 39.5° | 208.0 |
| 40° | 205.1 |
| 40.5° | 202.1 |
| 41° | 199.0 |
| 41.5° | 196.1 |
| 42° | 193.0 |
| 42.5° | 189.7 |
| 43° | 186.8 |
| 43.5° | 183.3 |
| 44° | 180.1 |
| 44.5° | 176.9 |



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CANDELA DISTRIBUTION (continued):

| | 0° |
|-------|-------|
| 45° | 173.8 |
| 45.5° | 170.2 |
| 46° | 166.9 |
| 46.5° | 163.5 |
| 47° | 160.2 |
| 47.5° | 156.5 |
| 48° | 153.5 |
| 48.5° | 149.9 |
| 49° | 146.4 |
| 49.5° | 143.2 |
| 50° | 139.7 |
| 50.5° | 136.2 |
| 51° | 133.0 |
| 51.5° | 129.6 |
| 52° | 126.1 |
| 52.5° | 123.0 |
| 53° | 119.6 |
| 53.5° | 116.2 |
| 54° | 113.1 |
| 54.5° | 110.0 |
| 55° | 106.7 |
| 55.5° | 103.5 |
| 56° | 100.4 |
| 56.5° | 97.2 |
| 57° | 94.2 |
| 57.5° | 91.3 |
| 58° | 88.1 |
| 58.5° | 85.2 |
| 59° | 82.3 |
| 59.5° | 79.4 |
| 60° | 76.6 |
| 60.5° | 73.8 |
| 61° | 70.9 |
| 61.5° | 68.2 |
| 62° | 65.6 |
| 62.5° | 62.8 |
| 63° | 60.2 |
| 63.5° | 57.6 |
| 64° | 55.1 |
| 64.5° | 52.5 |
| 65° | 50.1 |
| 65.5° | 47.7 |
| 66° | 45.3 |
| 66.5° | 43.0 |
| 67° | 40.7 |



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CANDELA DISTRIBUTION (continued):

| | 0° |
|-------|------|
| 67.5° | 38.5 |
| 68° | 36.3 |
| 68.5° | 34.3 |
| 69° | 32.3 |
| 69.5° | 30.3 |
| 70° | 28.3 |
| 70.5° | 26.3 |
| 71° | 24.5 |
| 71.5° | 22.7 |
| 72° | 21.0 |
| 72.5° | 19.5 |
| 73° | 17.9 |
| 73.5° | 16.4 |
| 74° | 15.0 |
| 74.5° | 13.8 |
| 75° | 12.6 |
| 75.5° | 11.5 |
| 76° | 10.5 |
| 76.5° | 9.6 |
| 77° | 8.8 |
| 77.5° | 8.1 |
| 78° | 7.5 |
| 78.5° | 7.0 |
| 79° | 6.5 |
| 79.5° | 6.1 |
| 80° | 5.7 |
| 80.5° | 5.3 |
| 81° | 4.9 |
| 81.5° | 4.5 |
| 82° | 4.1 |
| 82.5° | 3.8 |
| 83° | 3.4 |
| 83.5° | 3.1 |
| 84° | 2.7 |
| 84.5° | 2.4 |
| 85° | 2.0 |
| 85.5° | 1.7 |
| 86° | 1.4 |
| 86.5° | 1.1 |
| 87° | 0.8 |
| 87.5° | 0.5 |
| 88° | 0.3 |
| 88.5° | 0.1 |
| 89° | 0.0 |
| 89.5° | 0.0 |



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CANDELA DISTRIBUTION (continued):

| | 0° |
|--------|-----|
| 90° | 0.0 |
| 90.5° | 0.0 |
| 91° | 0.0 |
| 91.5° | 0.0 |
| 92° | 0.0 |
| 92.5° | 0.0 |
| 93° | 0.0 |
| 93.5° | 0.0 |
| 94° | 0.0 |
| 94.5° | 0.0 |
| 95° | 0.0 |
| 95.5° | 0.0 |
| 96° | 0.0 |
| 96.5° | 0.0 |
| 97° | 0.0 |
| 97.5° | 0.0 |
| 98° | 0.0 |
| 98.5° | 0.0 |
| 99° | 0.0 |
| 99.5° | 0.0 |
| 100° | 0.0 |
| 100.5° | 0.0 |
| 101° | 0.0 |
| 101.5° | 0.0 |
| 102° | 0.0 |
| 102.5° | 0.0 |
| 103° | 0.0 |
| 103.5° | 0.0 |
| 104° | 0.0 |
| 104.5° | 0.0 |
| 105° | 0.0 |
| 105.5° | 0.0 |
| 106° | 0.0 |
| 106.5° | 0.0 |
| 107° | 0.0 |
| 107.5° | 0.0 |
| 108° | 0.0 |
| 108.5° | 0.0 |
| 109° | 0.0 |
| 109.5° | 0.0 |
| 110° | 0.0 |
| 110.5° | 0.0 |
| 111° | 0.0 |
| 111.5° | 0.0 |
| 112° | 0.0 |



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CANDELA DISTRIBUTION (continued):

| | 0° |
|--------|-----|
| 112.5° | 0.0 |
| 113° | 0.0 |
| 113.5° | 0.0 |
| 114° | 0.0 |
| 114.5° | 0.0 |
| 115° | 0.0 |
| 115.5° | 0.0 |
| 116° | 0.0 |
| 116.5° | 0.0 |
| 117° | 0.0 |
| 117.5° | 0.0 |
| 118° | 0.0 |
| 118.5° | 0.1 |
| 119° | 0.1 |
| 119.5° | 0.1 |
| 120° | 0.1 |
| 120.5° | 0.1 |
| 121° | 0.1 |
| 121.5° | 0.1 |
| 122° | 0.1 |
| 122.5° | 0.1 |
| 123° | 0.1 |
| 123.5° | 0.1 |
| 124° | 0.1 |
| 124.5° | 0.1 |
| 125° | 0.1 |
| 125.5° | 0.1 |
| 126° | 0.1 |
| 126.5° | 0.1 |
| 127° | 0.1 |
| 127.5° | 0.1 |
| 128° | 0.1 |
| 128.5° | 0.1 |
| 129° | 0.1 |
| 129.5° | 0.1 |
| 130° | 0.1 |
| 130.5° | 0.1 |
| 131° | 0.1 |
| 131.5° | 0.1 |
| 132° | 0.1 |
| 132.5° | 0.1 |
| 133° | 0.1 |
| 133.5° | 0.1 |
| 134° | 0.1 |
| 134.5° | 0.1 |



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CANDELA DISTRIBUTION (continued):

| | 0° |
|--------|-----|
| 135° | 0.1 |
| 135.5° | 0.1 |
| 136° | 0.1 |
| 136.5° | 0.1 |
| 137° | 0.1 |
| 137.5° | 0.1 |
| 138° | 0.1 |
| 138.5° | 0.1 |
| 139° | 0.1 |
| 139.5° | 0.1 |
| 140° | 0.1 |
| 140.5° | 0.1 |
| 141° | 0.1 |
| 141.5° | 0.1 |
| 142° | 0.1 |
| 142.5° | 0.1 |
| 143° | 0.1 |
| 143.5° | 0.1 |
| 144° | 0.1 |
| 144.5° | 0.1 |
| 145° | 0.1 |
| 145.5° | 0.1 |
| 146° | 0.1 |
| 146.5° | 0.1 |
| 147° | 0.1 |
| 147.5° | 0.1 |
| 148° | 0.1 |
| 148.5° | 0.1 |
| 149° | 0.1 |
| 149.5° | 0.1 |
| 150° | 0.1 |
| 150.5° | 0.1 |
| 151° | 0.1 |
| 151.5° | 0.1 |
| 152° | 0.1 |
| 152.5° | 0.1 |
| 153° | 0.1 |
| 153.5° | 0.1 |
| 154° | 0.1 |
| 154.5° | 0.1 |
| 155° | 0.2 |
| 155.5° | 0.2 |
| 156° | 0.2 |
| 156.5° | 0.2 |
| 157° | 0.2 |



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CATALOG NUMBER: LTSS4069FS1EWHR-935

CANDELA DISTRIBUTION (continued):

| | 0° |
|--------|-----|
| 157.5° | 0.2 |
| 158° | 0.2 |
| 158.5° | 0.2 |
| 159° | 0.2 |
| 159.5° | 0.2 |
| 160° | 0.2 |
| 160.5° | 0.2 |
| 161° | 0.2 |
| 161.5° | 0.2 |
| 162° | 0.2 |
| 162.5° | 0.2 |
| 163° | 0.2 |
| 163.5° | 0.2 |
| 164° | 0.2 |
| 164.5° | 0.2 |
| 165° | 0.2 |
| 165.5° | 0.2 |
| 166° | 0.2 |
| 166.5° | 0.2 |
| 167° | 0.2 |
| 167.5° | 0.2 |
| 168° | 0.2 |
| 168.5° | 0.2 |
| 169° | 0.2 |
| 169.5° | 0.2 |
| 170° | 0.2 |
| 170.5° | 0.2 |
| 171° | 0.2 |
| 171.5° | 0.2 |
| 172° | 0.2 |
| 172.5° | 0.2 |
| 173° | 0.2 |
| 173.5° | 0.2 |
| 174° | 0.2 |
| 174.5° | 0.2 |
| 175° | 0.2 |
| 175.5° | 0.2 |
| 176° | 0.2 |
| 176.5° | 0.2 |
| 177° | 0.2 |
| 177.5° | 0.2 |
| 178° | 0.2 |
| 178.5° | 0.2 |
| 179° | 0.2 |
| 179.5° | 0.2 |

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

Scaled Data Report



TEST NUMBER: P798559
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CANDELA DISTRIBUTION (continued):

180° | $\frac{0^\circ}{0.2}$

LM-79-2019: Approved Method: Electrical and Photometric Measurements of Solid-
State Lighting Products

Report Prepared for

Cooper Lighting Solutions

HALO

Report Number: SP1-2401-294-3

Test Date: 03/08/2024

Luminaire Tested: LT4069FS1EWHR-3500K

Data in this report applies to families of products LT4069FS1EWHR-3500K.

This test was performed under the Supervised Manufacturer's Testing Program.
The results of this test have not been influenced by sources from within Eaton or from external interests.

Test Information

Test Method: LM-79-2019
 Report Number: SP1-2401-294-3
 Test Lab: COOPER LIGHTING SOLUTIONS
 Photometer: SP1 - 76IN SPHERE
 Measurement Geometry: 4π
 Issue Date: 03/08/2024
 Manufacturer: COOPER LIGHTING SOLUTIONS
 Product Line: HALO
 Catalog Number: **LT4069FS1EWHR-3500K**
 Description: 4 INCH HALO LT 5CCT DOB .

Spectral Parameters

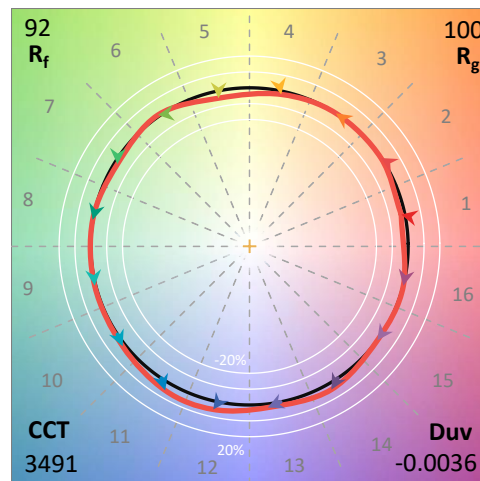
CCT (K): 3491
 CIE u': 0.2376
 CIE v': 0.5066
 Duv: -0.0036
 CIE x: 0.4020
 CIE y: 0.3809
 CIE z: 0.2171
 Peak Wavelength (nm): 632
 Dominant Wavelength (nm): 582
 Purity: 35.2

| | | | |
|-----------|------|------|------|
| CRI (Ra): | 96.7 | | |
| R1: | 96.5 | R9: | 91.8 |
| R2: | 97.9 | R10: | 98.8 |
| R3: | 96.9 | R11: | 96.3 |
| R4: | 99.1 | R12: | 79.6 |
| R5: | 97.4 | R13: | 96.9 |
| R6: | 93.9 | R14: | 96.6 |
| R7: | 95.8 | | |
| R8: | 96.1 | | |

Rf: 91.8
 Rg: 100.4

Test Conditions

Stabilization Time: 10M
 Operation Time: 12H
 Room Temperature (°C) / RH%: 25.8/43%
 Sphere Temperature (°C): 25.0



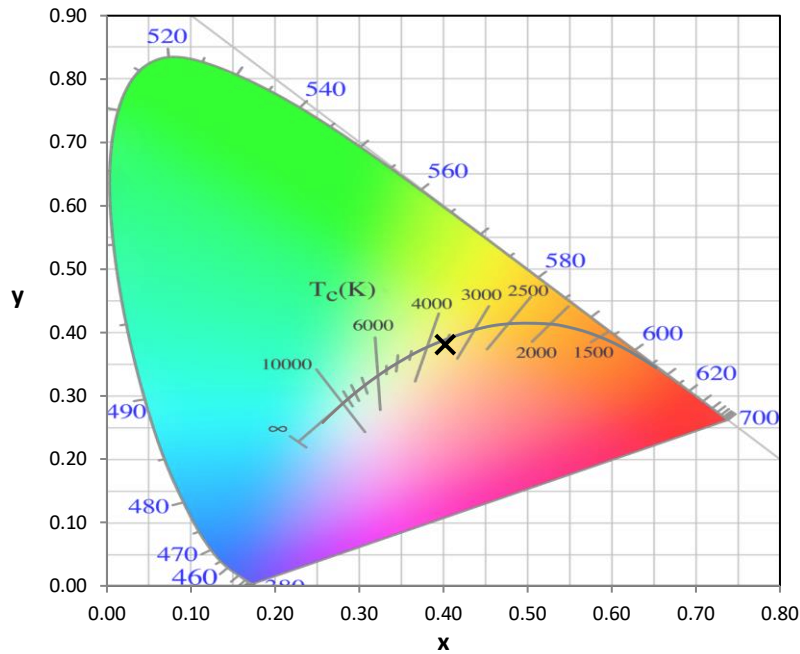
REPORT NUMBER: SP1-2401-294-3

| Measurement and Test Equipment | | | |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument | Identification Number | Calibration Date | Calibration Due Date |
| Photometer | 76INCH SPHERE IN0058 | 2/12/2024 | 8/12/2024 |
| Power Meter | XITRON 2801 IN0071 | 10/23/2023 | 10/23/2024 |
| AC Power Source | CHROMA 61603 IN0063 | 10/24/2023 | 10/24/2024 |
| DC Power Source | AGILENT E3634A IN0208 | 10/24/2023 | 10/24/2024 |
| Sphere Thermometer | ONSET IN0085 | 10/24/2023 | 10/24/2024 |
| Room Thermometer | ONSET IN0046 | 10/24/2023 | 10/24/2024 |

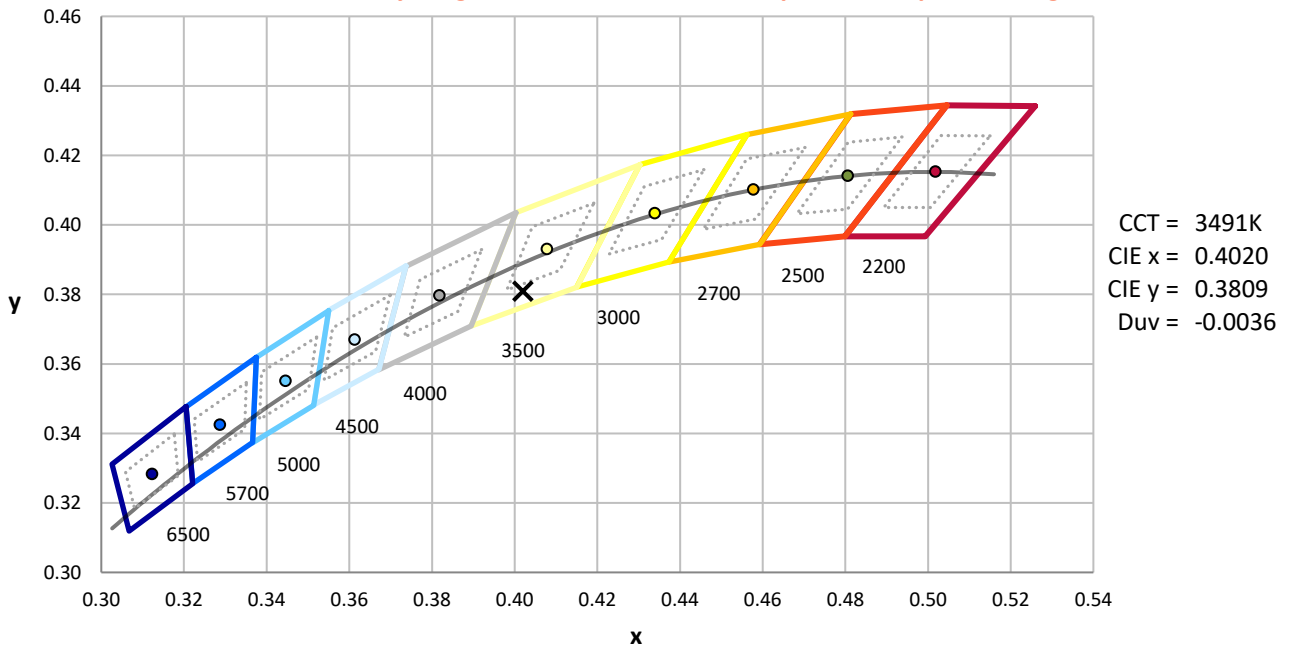
| Sample Number | Condition | Description |
|---------------|-----------|---------------|
| 2401-294-LM1 | Good | LT4069FS1EWHR |
| | | |
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| | | |
| | | |
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| | | |

REPORT NUMBER: SP1-2401-294-3

CIE 1931 Chromaticity Diagram



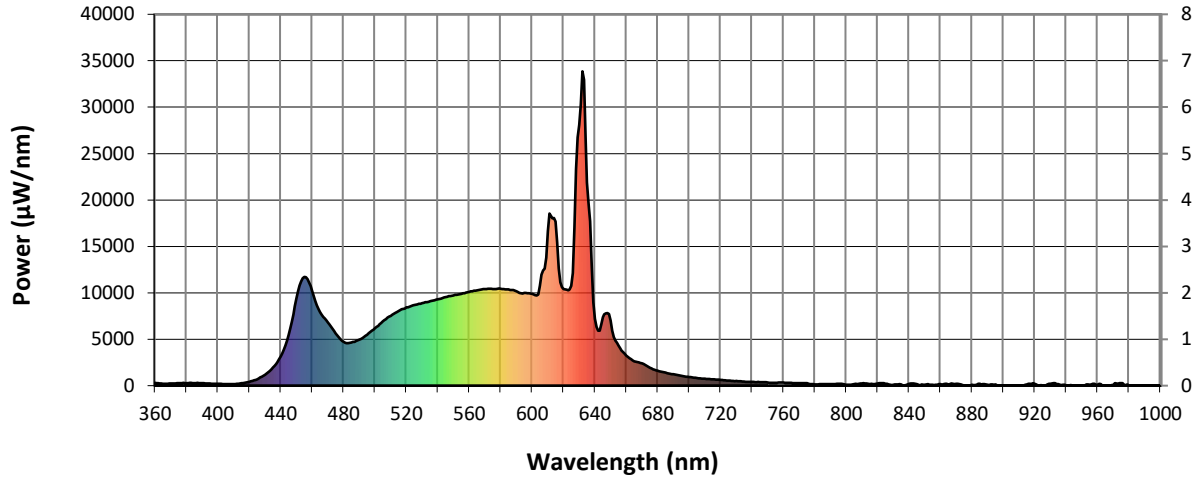
CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 3500K 7-step quadrangle

REPORT NUMBER: SP1-2401-294-3

Photopic Flux vs. Wavelength

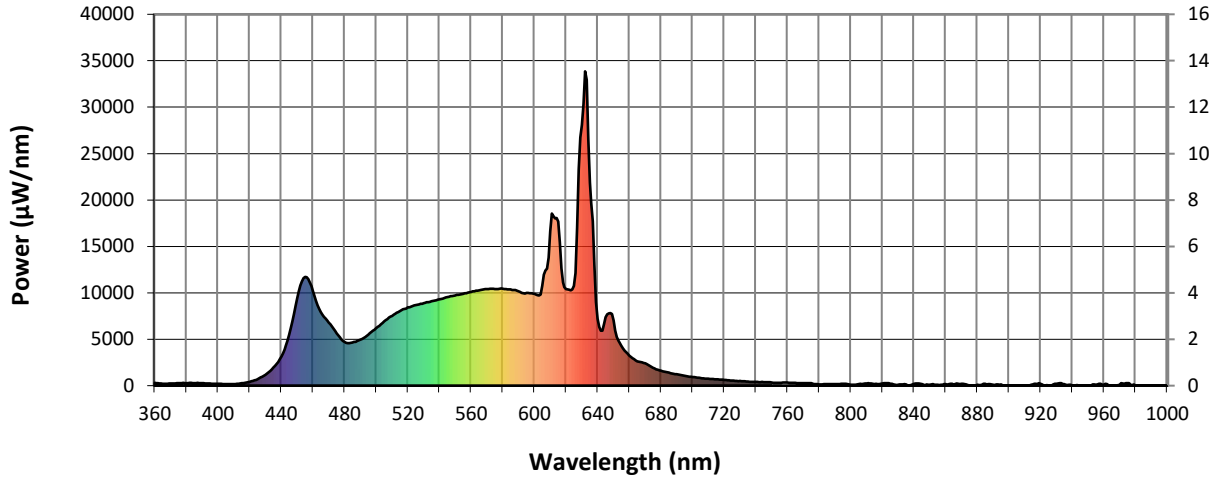


#####

| λ (nm) | Power ($\mu\text{W}/\text{nm}$) | Lumens (ϕ/nm) | λ (nm) | Power ($\mu\text{W}/\text{nm}$) | Lumens (ϕ/nm) | λ (nm) | Power ($\mu\text{W}/\text{nm}$) | Lumens (ϕ/nm) | λ (nm) | Power ($\mu\text{W}/\text{nm}$) | Lumens (ϕ/nm) | λ (nm) | Power ($\mu\text{W}/\text{nm}$) | Lumens (ϕ/nm) |
|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|-------------------|--------------------------------------|--------------------------------|
| 360 | 309 | NR | 490 | 4964 | NR | 620 | 10402 | NR | 750 | 333 | NR | 880 | 87 | NR |
| 365 | 205 | NR | 495 | 5481 | NR | 625 | 10741 | NR | 755 | 300 | NR | 885 | 199 | NR |
| 370 | 225 | NR | 500 | 6189 | NR | 630 | 28088 | NR | 760 | 322 | NR | 890 | 89 | NR |
| 375 | 284 | NR | 505 | 6912 | NR | 635 | 21867 | NR | 765 | 302 | NR | 895 | 114 | NR |
| 380 | 281 | NR | 510 | 7525 | NR | 640 | 7209 | NR | 770 | 268 | NR | 900 | 0 | NR |
| 385 | 274 | NR | 515 | 8022 | NR | 645 | 7380 | NR | 775 | 256 | NR | 905 | 0 | NR |
| 390 | 259 | NR | 520 | 8425 | NR | 650 | 7011 | NR | 780 | 139 | NR | 910 | 0 | NR |
| 395 | 219 | NR | 525 | 8692 | NR | 655 | 4296 | NR | 785 | 178 | NR | 915 | 139 | NR |
| 400 | 197 | NR | 530 | 8874 | NR | 660 | 3245 | NR | 790 | 169 | NR | 920 | 196 | NR |
| 405 | 168 | NR | 535 | 9095 | NR | 665 | 2620 | NR | 795 | 200 | NR | 925 | 0 | NR |
| 410 | 171 | NR | 540 | 9302 | NR | 670 | 2401 | NR | 800 | 98 | NR | 930 | 198 | NR |
| 415 | 258 | NR | 545 | 9528 | NR | 675 | 1933 | NR | 805 | 154 | NR | 935 | 152 | NR |
| 420 | 411 | NR | 550 | 9697 | NR | 680 | 1599 | NR | 810 | 234 | NR | 940 | 37 | NR |
| 425 | 697 | NR | 555 | 9888 | NR | 685 | 1393 | NR | 815 | 172 | NR | 945 | 0 | NR |
| 430 | 1161 | NR | 560 | 10108 | NR | 690 | 1222 | NR | 820 | 244 | NR | 950 | 0 | NR |
| 435 | 1943 | NR | 565 | 10260 | NR | 695 | 1067 | NR | 825 | 217 | NR | 955 | 103 | NR |
| 440 | 3135 | NR | 570 | 10411 | NR | 700 | 939 | NR | 830 | 85 | NR | 960 | 87 | NR |
| 445 | 5466 | NR | 575 | 10402 | NR | 705 | 821 | NR | 835 | 115 | NR | 965 | 0 | NR |
| 450 | 9379 | NR | 580 | 10447 | NR | 710 | 743 | NR | 840 | 196 | NR | 970 | 64 | NR |
| 455 | 11712 | NR | 585 | 10377 | NR | 715 | 677 | NR | 845 | 167 | NR | 975 | 254 | NR |
| 460 | 10232 | NR | 590 | 10148 | NR | 720 | 617 | NR | 850 | 112 | NR | 980 | 0 | NR |
| 465 | 7909 | NR | 595 | 9978 | NR | 725 | 548 | NR | 855 | 111 | NR | 985 | 0 | NR |
| 470 | 6801 | NR | 600 | 9893 | NR | 730 | 496 | NR | 860 | 155 | NR | 990 | 0 | NR |
| 475 | 5624 | NR | 605 | 10742 | NR | 735 | 430 | NR | 865 | 141 | NR | 995 | 0 | NR |
| 480 | 4709 | NR | 610 | 16642 | NR | 740 | 412 | NR | 870 | 189 | NR | 1000 | 0 | NR |
| 485 | 4661 | NR | 615 | 17674 | NR | 745 | 382 | NR | 875 | 43 | NR | | | |

REPORT NUMBER: SP1-2401-294-3

Scotopic Flux vs. Wavelength



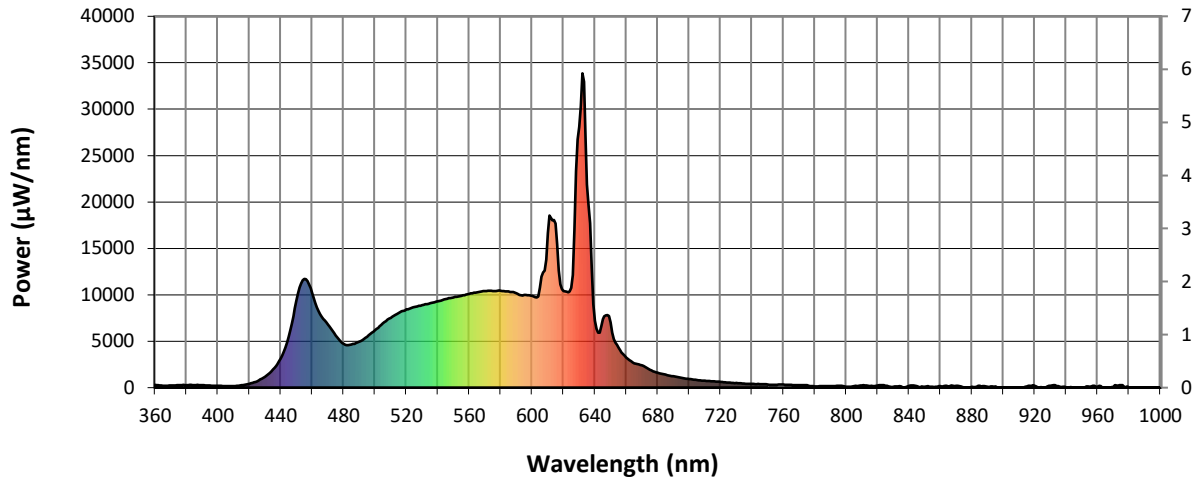
Scotopic Lumens: 1220.1

S/P: 1.69

| λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) |
|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|
| 360 | 309 | NR | 490 | 4964 | NR | 620 | 10402 | NR | 750 | 333 | NR | 880 | 87 | NR |
| 365 | 205 | NR | 495 | 5481 | NR | 625 | 10741 | NR | 755 | 300 | NR | 885 | 199 | NR |
| 370 | 225 | NR | 500 | 6189 | NR | 630 | 28088 | NR | 760 | 322 | NR | 890 | 89 | NR |
| 375 | 284 | NR | 505 | 6912 | NR | 635 | 21867 | NR | 765 | 302 | NR | 895 | 114 | NR |
| 380 | 281 | NR | 510 | 7525 | NR | 640 | 7209 | NR | 770 | 268 | NR | 900 | 0 | NR |
| 385 | 274 | NR | 515 | 8022 | NR | 645 | 7380 | NR | 775 | 256 | NR | 905 | 0 | NR |
| 390 | 259 | NR | 520 | 8425 | NR | 650 | 7011 | NR | 780 | 139 | NR | 910 | 0 | NR |
| 395 | 219 | NR | 525 | 8692 | NR | 655 | 4296 | NR | 785 | 178 | NR | 915 | 139 | NR |
| 400 | 197 | NR | 530 | 8874 | NR | 660 | 3245 | NR | 790 | 169 | NR | 920 | 196 | NR |
| 405 | 168 | NR | 535 | 9095 | NR | 665 | 2620 | NR | 795 | 200 | NR | 925 | 0 | NR |
| 410 | 171 | NR | 540 | 9302 | NR | 670 | 2401 | NR | 800 | 98 | NR | 930 | 198 | NR |
| 415 | 258 | NR | 545 | 9528 | NR | 675 | 1933 | NR | 805 | 154 | NR | 935 | 152 | NR |
| 420 | 411 | NR | 550 | 9697 | NR | 680 | 1599 | NR | 810 | 234 | NR | 940 | 37 | NR |
| 425 | 697 | NR | 555 | 9888 | NR | 685 | 1393 | NR | 815 | 172 | NR | 945 | 0 | NR |
| 430 | 1161 | NR | 560 | 10108 | NR | 690 | 1222 | NR | 820 | 244 | NR | 950 | 0 | NR |
| 435 | 1943 | NR | 565 | 10260 | NR | 695 | 1067 | NR | 825 | 217 | NR | 955 | 103 | NR |
| 440 | 3135 | NR | 570 | 10411 | NR | 700 | 939 | NR | 830 | 85 | NR | 960 | 87 | NR |
| 445 | 5466 | NR | 575 | 10402 | NR | 705 | 821 | NR | 835 | 115 | NR | 965 | 0 | NR |
| 450 | 9379 | NR | 580 | 10447 | NR | 710 | 743 | NR | 840 | 196 | NR | 970 | 64 | NR |
| 455 | 11712 | NR | 585 | 10377 | NR | 715 | 677 | NR | 845 | 167 | NR | 975 | 254 | NR |
| 460 | 10232 | NR | 590 | 10148 | NR | 720 | 617 | NR | 850 | 112 | NR | 980 | 0 | NR |
| 465 | 7909 | NR | 595 | 9978 | NR | 725 | 548 | NR | 855 | 111 | NR | 985 | 0 | NR |
| 470 | 6801 | NR | 600 | 9893 | NR | 730 | 496 | NR | 860 | 155 | NR | 990 | 0 | NR |
| 475 | 5624 | NR | 605 | 10742 | NR | 735 | 430 | NR | 865 | 141 | NR | 995 | 0 | NR |
| 480 | 4709 | NR | 610 | 16642 | NR | 740 | 412 | NR | 870 | 189 | NR | 1000 | 0 | NR |
| 485 | 4661 | NR | 615 | 17674 | NR | 745 | 382 | NR | 875 | 43 | NR | | | |

REPORT NUMBER: SP1-2401-294-3

Melanopic Flux vs. Wavelength



Melanopic Lumens: 499.3 M/P: 0.69

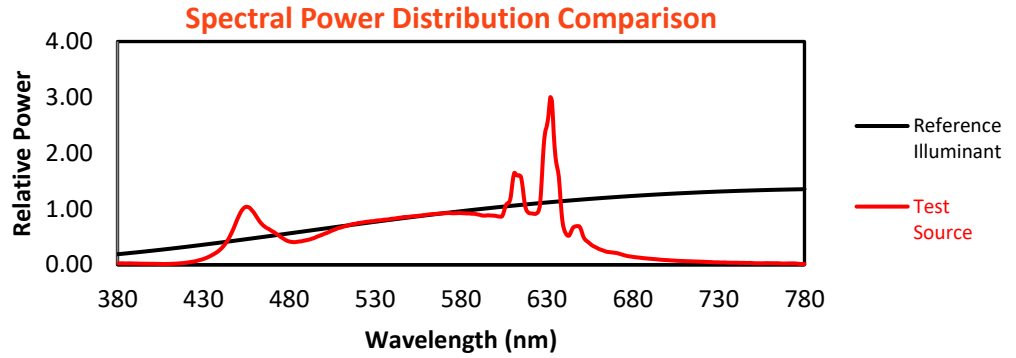
| λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) | λ (nm) | Power (µW/nm) | Lumens (φ/nm) |
|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|
| 360 | 309 | NR | 490 | 4964 | NR | 620 | 10402 | NR | 750 | 333 | NR | 880 | 87 | NR |
| 365 | 205 | NR | 495 | 5481 | NR | 625 | 10741 | NR | 755 | 300 | NR | 885 | 199 | NR |
| 370 | 225 | NR | 500 | 6189 | NR | 630 | 28088 | NR | 760 | 322 | NR | 890 | 89 | NR |
| 375 | 284 | NR | 505 | 6912 | NR | 635 | 21867 | NR | 765 | 302 | NR | 895 | 114 | NR |
| 380 | 281 | NR | 510 | 7525 | NR | 640 | 7209 | NR | 770 | 268 | NR | 900 | 0 | NR |
| 385 | 274 | NR | 515 | 8022 | NR | 645 | 7380 | NR | 775 | 256 | NR | 905 | 0 | NR |
| 390 | 259 | NR | 520 | 8425 | NR | 650 | 7011 | NR | 780 | 139 | NR | 910 | 0 | NR |
| 395 | 219 | NR | 525 | 8692 | NR | 655 | 4296 | NR | 785 | 178 | NR | 915 | 139 | NR |
| 400 | 197 | NR | 530 | 8874 | NR | 660 | 3245 | NR | 790 | 169 | NR | 920 | 196 | NR |
| 405 | 168 | NR | 535 | 9095 | NR | 665 | 2620 | NR | 795 | 200 | NR | 925 | 0 | NR |
| 410 | 171 | NR | 540 | 9302 | NR | 670 | 2401 | NR | 800 | 98 | NR | 930 | 198 | NR |
| 415 | 258 | NR | 545 | 9528 | NR | 675 | 1933 | NR | 805 | 154 | NR | 935 | 152 | NR |
| 420 | 411 | NR | 550 | 9697 | NR | 680 | 1599 | NR | 810 | 234 | NR | 940 | 37 | NR |
| 425 | 697 | NR | 555 | 9888 | NR | 685 | 1393 | NR | 815 | 172 | NR | 945 | 0 | NR |
| 430 | 1161 | NR | 560 | 10108 | NR | 690 | 1222 | NR | 820 | 244 | NR | 950 | 0 | NR |
| 435 | 1943 | NR | 565 | 10260 | NR | 695 | 1067 | NR | 825 | 217 | NR | 955 | 103 | NR |
| 440 | 3135 | NR | 570 | 10411 | NR | 700 | 939 | NR | 830 | 85 | NR | 960 | 87 | NR |
| 445 | 5466 | NR | 575 | 10402 | NR | 705 | 821 | NR | 835 | 115 | NR | 965 | 0 | NR |
| 450 | 9379 | NR | 580 | 10447 | NR | 710 | 743 | NR | 840 | 196 | NR | 970 | 64 | NR |
| 455 | 11712 | NR | 585 | 10377 | NR | 715 | 677 | NR | 845 | 167 | NR | 975 | 254 | NR |
| 460 | 10232 | NR | 590 | 10148 | NR | 720 | 617 | NR | 850 | 112 | NR | 980 | 0 | NR |
| 465 | 7909 | NR | 595 | 9978 | NR | 725 | 548 | NR | 855 | 111 | NR | 985 | 0 | NR |
| 470 | 6801 | NR | 600 | 9893 | NR | 730 | 496 | NR | 860 | 155 | NR | 990 | 0 | NR |
| 475 | 5624 | NR | 605 | 10742 | NR | 735 | 430 | NR | 865 | 141 | NR | 995 | 0 | NR |
| 480 | 4709 | NR | 610 | 16642 | NR | 740 | 412 | NR | 870 | 189 | NR | 1000 | 0 | NR |
| 485 | 4661 | NR | 615 | 17674 | NR | 745 | 382 | NR | 875 | 43 | NR | | | |

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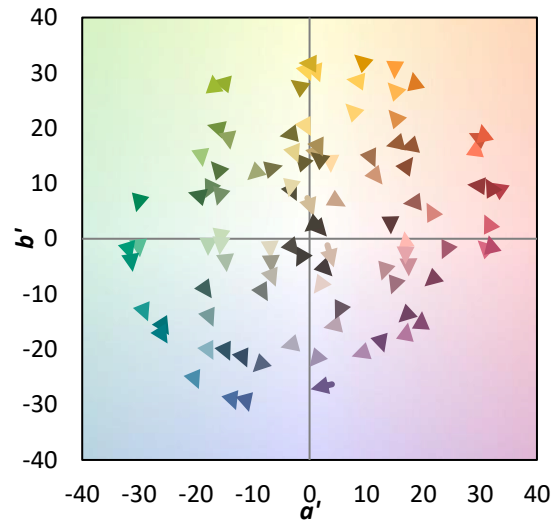
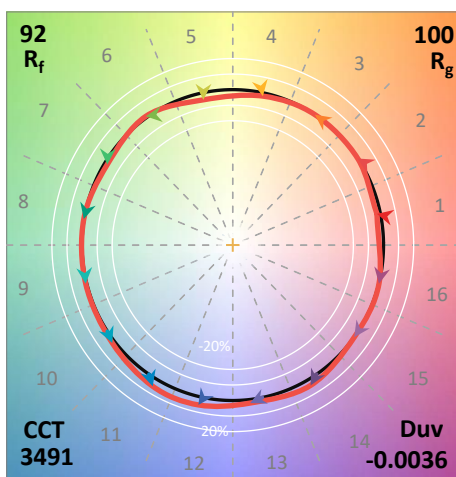
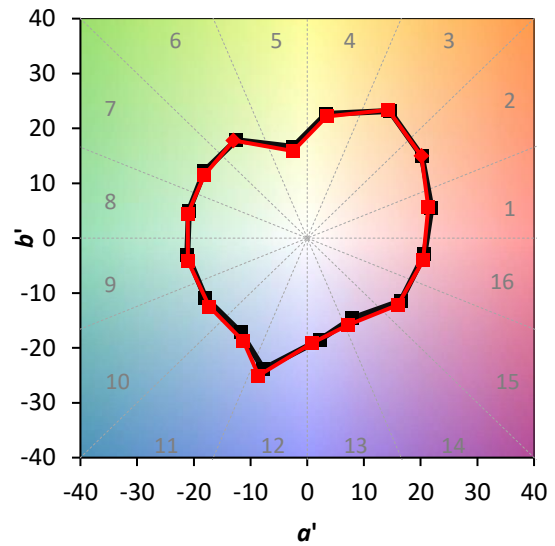
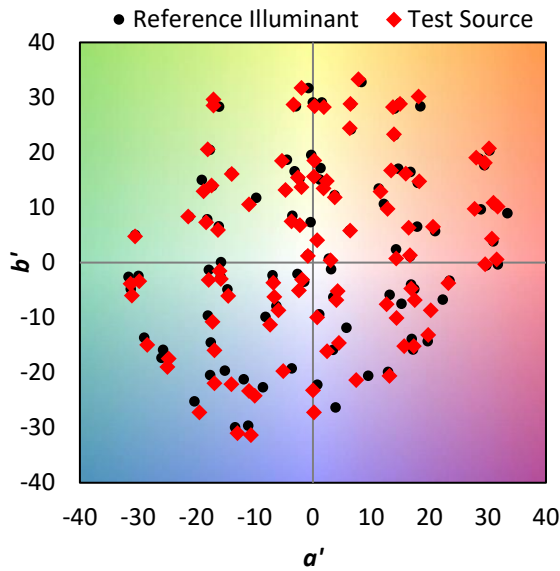
TM-30-18

Summary

$R_f = 91.8$
 $R_g = 100.4$
 CIE $R_a = 96.7$
 $R_9 = 91.8$



Color Vector Graphics

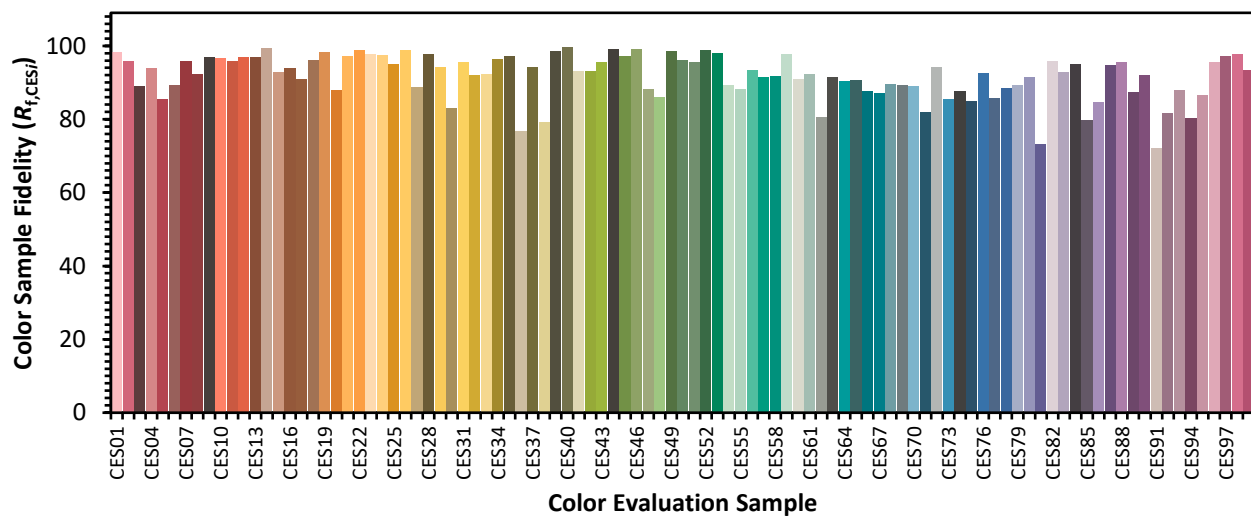


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Individual Sample Fidelity Index ($R_{f,i}$)

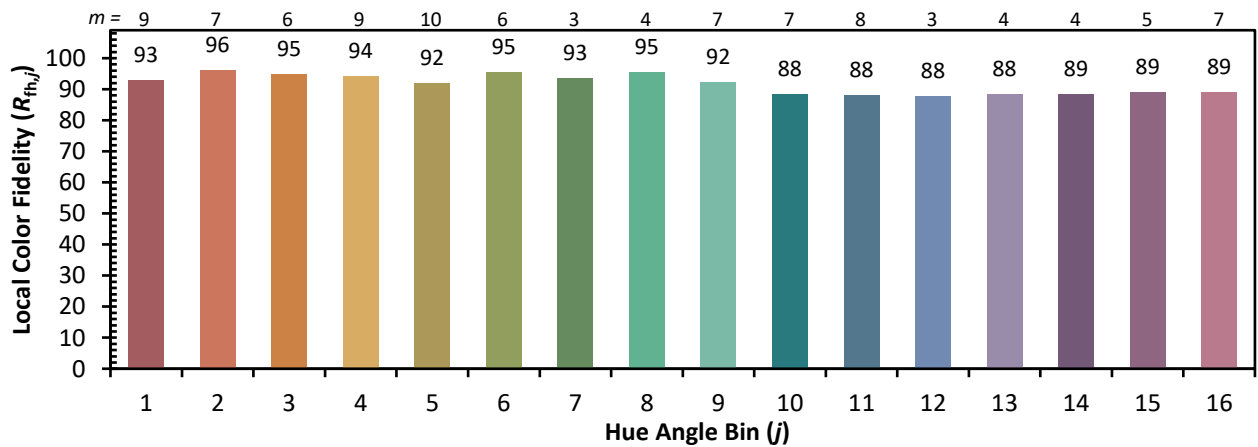
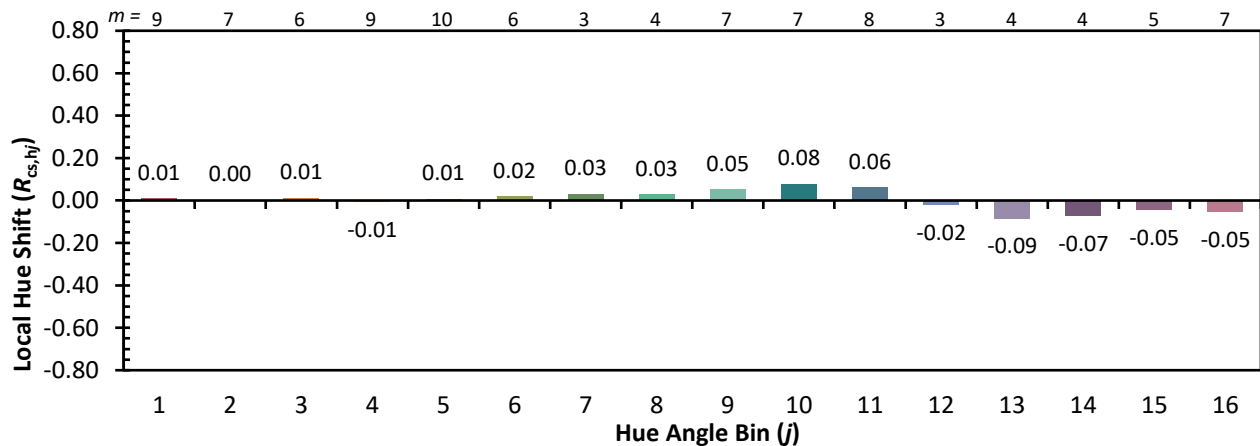
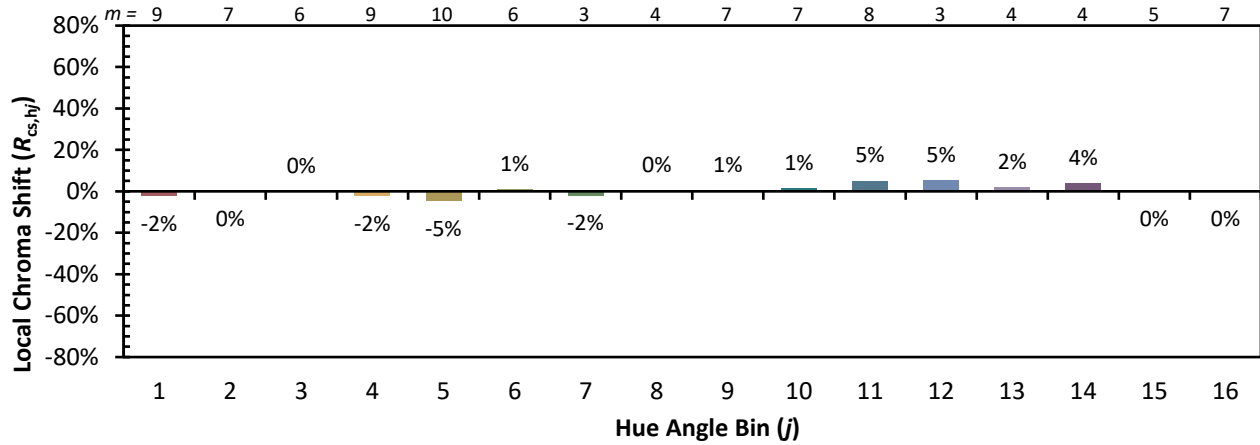
| | | | |
|------------|-------------|------------|------------|
| CES01 = 86 | CES26 = 99 | CES51 = 95 | CES76 = 92 |
| CES02 = 63 | CES27 = 89 | CES52 = 99 | CES77 = 86 |
| CES03 = 32 | CES28 = 98 | CES53 = 98 | CES78 = 88 |
| CES04 = 70 | CES29 = 94 | CES54 = 89 | CES79 = 89 |
| CES05 = 50 | CES30 = 83 | CES55 = 88 | CES80 = 91 |
| CES06 = 51 | CES31 = 96 | CES56 = 93 | CES81 = 73 |
| CES07 = 43 | CES32 = 92 | CES57 = 91 | CES82 = 96 |
| CES08 = 42 | CES33 = 92 | CES58 = 92 | CES83 = 93 |
| CES09 = 29 | CES34 = 96 | CES59 = 98 | CES84 = 95 |
| CES10 = 75 | CES35 = 97 | CES60 = 91 | CES85 = 80 |
| CES11 = 58 | CES36 = 77 | CES61 = 92 | CES86 = 85 |
| CES12 = 64 | CES37 = 94 | CES62 = 81 | CES87 = 95 |
| CES13 = 44 | CES38 = 79 | CES63 = 92 | CES88 = 96 |
| CES14 = 74 | CES39 = 99 | CES64 = 90 | CES89 = 87 |
| CES15 = 72 | CES40 = 100 | CES65 = 91 | CES90 = 92 |
| CES16 = 48 | CES41 = 93 | CES66 = 88 | CES91 = 72 |
| CES17 = 49 | CES42 = 93 | CES67 = 87 | CES92 = 82 |
| CES18 = 56 | CES43 = 95 | CES68 = 90 | CES93 = 88 |
| CES19 = 71 | CES44 = 99 | CES69 = 89 | CES94 = 80 |
| CES20 = 67 | CES45 = 97 | CES70 = 89 | CES95 = 86 |
| CES21 = 86 | CES46 = 99 | CES71 = 82 | CES96 = 96 |
| CES22 = 78 | CES47 = 88 | CES72 = 94 | CES97 = 97 |
| CES23 = 91 | CES48 = 86 | CES73 = 86 | CES98 = 98 |
| CES24 = 90 | CES49 = 98 | CES74 = 88 | CES99 = 93 |
| CES25 = 71 | CES50 = 96 | CES75 = 85 | |



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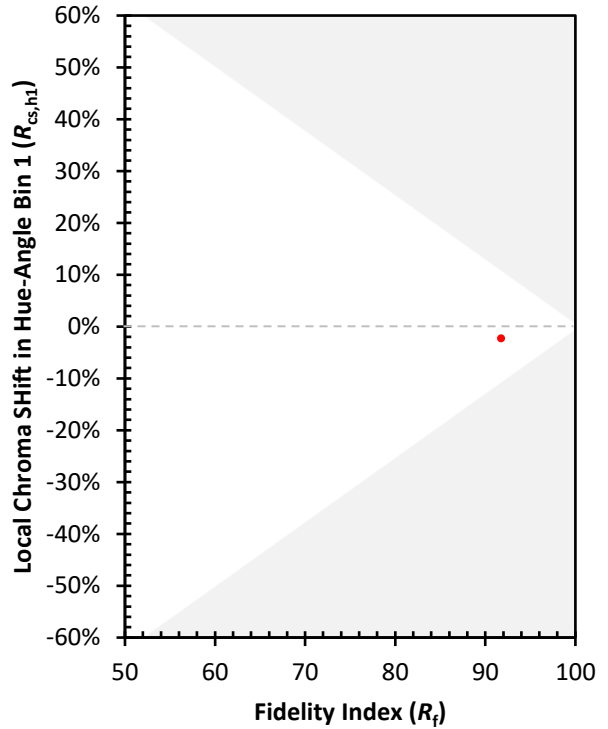
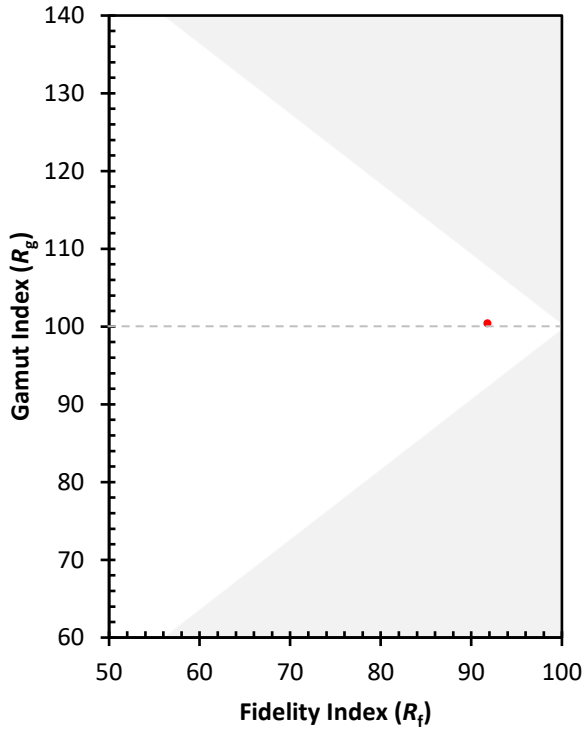
Color Rendition by Hue-Angle Bin



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Measure Comparisons



(END OF REPORT)