

Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



Scaled data based on original data using  
LM-79-2019 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for  
Cooper Lighting Solutions

Brand: METALUX

Report Number: P982752

Luminaire Tested: 22CZ-LD5-24SE-UNV-L850-HRP-CD1-U

Issue Date: 04/23/2025

**Test Information**

Test Method: LM-79-2019  
Report Number: P982752  
Test Lab: INNOVATION CENTER(P3)  
Issue Date: 04/23/2025  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: METALUX  
Catalog Number: 22CZ-LD5-24SE-UNV-L850-HRP-CD1-U  
Description: METALUX CRUZE 2x2 2400LM STANDARD EFFICACY PACKAGE 80CRI 5000K TROFFER LENS WITH FILM INSERT  
Light Source: 5000K CCT, 80 CRI LEDS  
Ballast/Driver: -

**Summary**

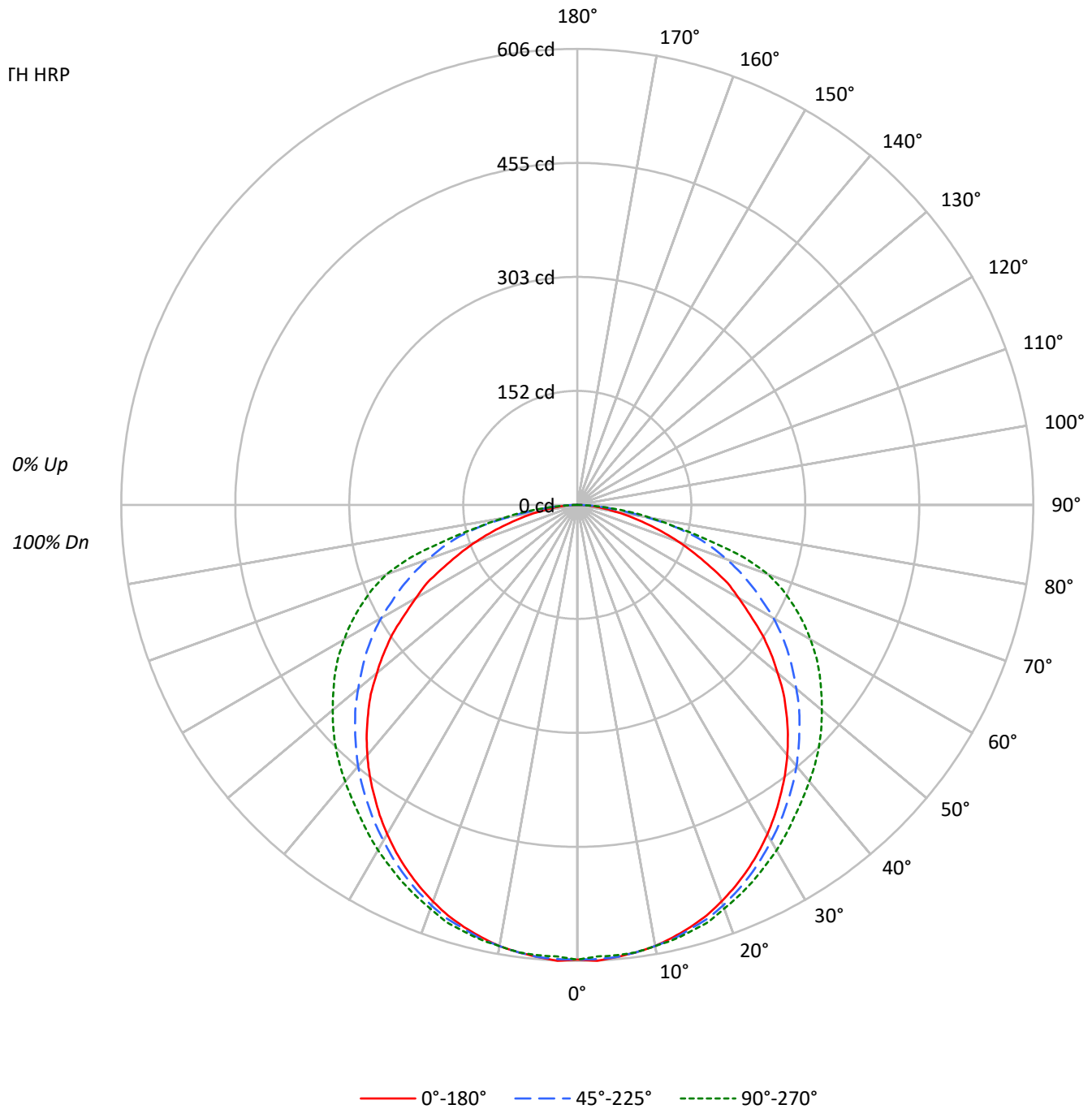
Lumens per Lamp: N/A  
Luminaire Lumens: 1855.5 lumens  
Efficiency: N/A  
Efficacy: 100.3 lumens/watt  
Spacing Criteria (0/90/45): 1.24 / 1.3 / 1.4  
Luminous Opening: Rectangular (W 2' x L: 2' x H: 0')  
CIE Type: Direct

Input Watts (W): 18.5  
Input Voltage (V): 120  
Input Current (A<sub>in</sub>): 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: 28.75 FT

TEST NUMBER: P982752

CATALOG NUMBER: 22CZ-LD5-24SE-UNV-L850-HRP-CD1-U

### Luminous Intensity Polar Plot



TEST NUMBER: P982752

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**COEFFICIENT OF UTILIZATION - ZONAL CAVITY METHOD:**

|     |     |     |     |     |     |     |     |     |     |     |     |  |     |     |     |  |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|-----|-----|-----|--|-----|
| RF  | 20  |     |     |     | 20  |     |     |     | 20  |     |     |  | 20  |     |     |  | 20  |
| RC  | 80  |     |     |     | 70  |     |     |     | 50  |     |     |  | 30  |     |     |  | 10  |
| RW  | 70  | 50  | 30  | 10  | 70  | 50  | 30  | 10  | 50  | 30  | 10  |  | 50  | 30  | 10  |  | 50  |
| RCR |     |     |     |     |     |     |     |     |     |     |     |  |     |     |     |  |     |
| 0   | 119 | 119 | 119 | 119 | 116 | 116 | 116 | 116 | 111 | 111 | 111 |  | 106 | 106 | 106 |  | 102 |
| 1   | 108 | 103 | 99  | 95  | 105 | 101 | 97  | 93  | 97  | 93  | 90  |  | 93  | 90  | 87  |  | 89  |
| 2   | 98  | 89  | 82  | 76  | 95  | 87  | 81  | 75  | 84  | 78  | 73  |  | 80  | 76  | 72  |  | 77  |
| 3   | 89  | 78  | 69  | 63  | 86  | 76  | 68  | 62  | 73  | 67  | 61  |  | 71  | 65  | 60  |  | 68  |
| 4   | 81  | 69  | 60  | 53  | 79  | 67  | 59  | 52  | 65  | 57  | 52  |  | 63  | 56  | 51  |  | 60  |
| 5   | 75  | 61  | 52  | 45  | 72  | 60  | 51  | 45  | 58  | 50  | 44  |  | 56  | 49  | 44  |  | 54  |
| 6   | 69  | 55  | 46  | 39  | 67  | 54  | 45  | 39  | 52  | 44  | 39  |  | 50  | 44  | 38  |  | 49  |
| 7   | 64  | 50  | 41  | 34  | 62  | 49  | 40  | 34  | 47  | 40  | 34  |  | 46  | 39  | 34  |  | 45  |
| 8   | 59  | 45  | 37  | 31  | 58  | 45  | 36  | 31  | 43  | 36  | 30  |  | 42  | 35  | 30  |  | 41  |
| 9   | 55  | 42  | 33  | 28  | 54  | 41  | 33  | 27  | 40  | 32  | 27  |  | 39  | 32  | 27  |  | 38  |
| 10  | 52  | 38  | 30  | 25  | 50  | 38  | 30  | 25  | 37  | 30  | 25  |  | 36  | 29  | 25  |  | 35  |

**AVERAGE LUMINANCE (cd/sqm):**

|     | 0°   | 45°  | 90°  |
|-----|------|------|------|
| 0°  | 1626 | 1626 | 1626 |
| 5°  | 1629 | 1629 | 1623 |
| 10° | 1627 | 1627 | 1627 |
| 15° | 1618 | 1624 | 1634 |
| 20° | 1606 | 1622 | 1635 |
| 25° | 1590 | 1613 | 1639 |
| 30° | 1570 | 1601 | 1646 |
| 35° | 1547 | 1595 | 1656 |
| 40° | 1525 | 1592 | 1685 |
| 45° | 1496 | 1589 | 1729 |
| 50° | 1455 | 1590 | 1776 |
| 55° | 1407 | 1605 | 1845 |
| 60° | 1333 | 1620 | 1925 |
| 65° | 1245 | 1634 | 2022 |
| 70° | 1127 | 1660 | 2124 |
| 75° | 970  | 1685 | 1860 |
| 80° | 792  | 1410 | 1533 |
| 85° | 651  | 1028 | 1133 |

**MAXIMUM LUMINANCE 45°-90°:**

Horizontal Angle: 90°

Vertical Angle: 70°

Luminance: 2124 cd/sqm

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**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 57.3   | 3.1       |
| 10°-20°   | 164.7  | 8.9       |
| 20°-30°   | 250.4  | 13.5      |
| 30°-40°   | 304.7  | 16.4      |
| 40°-50°   | 324.6  | 17.5      |
| 50°-60°   | 307.0  | 16.5      |
| 60°-70°   | 253.1  | 13.6      |
| 70°-80°   | 155.6  | 8.4       |
| 80°-90°   | 38.0   | 2.0       |
| 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°-30°    | 472.4  | 25.5      |
| 0°-40°    | 777.2  | 41.9      |
| 0°-60°    | 1408.8 | 75.9      |
| 0°-90°    | 1855.5 | 100.0     |
| 90°-120°  | 0.0    | 0.0       |
| 90°-150°  | 0.0    | 0.0       |
| 90°-180°  | 0.0    | 0.0       |
| 0°-180°   | 1855.5 | 100.0     |

**CANDELA DISTRIBUTION:**

|     | 0°  | 22.5° | 45° | 67.5° | 90° | Flux |
|-----|-----|-------|-----|-------|-----|------|
| 0°  | 604 | 604   | 604 | 604   | 604 |      |
| 5°  | 603 | 603   | 603 | 602   | 601 | 57   |
| 15° | 581 | 582   | 583 | 585   | 586 | 164  |
| 25° | 535 | 538   | 543 | 549   | 552 | 247  |
| 35° | 471 | 475   | 485 | 498   | 504 | 295  |
| 45° | 393 | 400   | 418 | 441   | 454 | 303  |
| 55° | 300 | 311   | 342 | 375   | 393 | 267  |
| 65° | 196 | 214   | 257 | 298   | 318 | 194  |
| 75° | 93  | 119   | 162 | 177   | 179 | 100  |
| 85° | 21  | 28    | 33  | 36    | 37  | 25   |
| 90° | 0   | 0     | 0   | 0     | 0   |      |

TEST NUMBER: P982752

CATALOG NUMBER: 22CZ-LD5-24SE-UNV-L850-HRP-CD1-U

**CANDELA DISTRIBUTION (FULL):**

|       | 0°    | 22.5° | 45°   | 67.5° | 90°   |
|-------|-------|-------|-------|-------|-------|
| 0°    | 604.2 | 604.2 | 604.2 | 604.2 | 604.2 |
| 2.5°  | 606.5 | 605.3 | 604.2 | 602.0 | 600.8 |
| 5°    | 603.1 | 603.1 | 603.1 | 602.0 | 600.8 |
| 7.5°  | 599.7 | 599.7 | 599.7 | 599.7 | 599.7 |
| 10°   | 595.3 | 595.3 | 595.3 | 595.3 | 595.3 |
| 12.5° | 588.6 | 589.7 | 590.8 | 590.8 | 591.9 |
| 15°   | 580.9 | 582.0 | 583.1 | 585.3 | 586.4 |
| 17.5° | 572.0 | 573.1 | 576.4 | 578.7 | 580.9 |
| 20°   | 560.8 | 561.9 | 566.5 | 568.7 | 570.9 |
| 22.5° | 548.6 | 550.9 | 555.3 | 559.7 | 561.9 |
| 25°   | 535.4 | 537.6 | 543.1 | 548.6 | 552.0 |
| 27.5° | 520.9 | 523.1 | 529.8 | 537.6 | 540.9 |
| 30°   | 505.3 | 507.6 | 515.3 | 524.3 | 529.8 |
| 32.5° | 488.7 | 492.0 | 500.9 | 512.0 | 517.5 |
| 35°   | 470.9 | 475.3 | 485.4 | 497.6 | 504.2 |
| 37.5° | 453.2 | 457.6 | 469.8 | 484.2 | 492.0 |
| 40°   | 434.2 | 439.8 | 453.2 | 469.8 | 479.8 |
| 42.5° | 414.3 | 421.0 | 435.4 | 455.4 | 467.6 |
| 45°   | 393.2 | 399.8 | 417.6 | 440.9 | 454.3 |
| 47.5° | 372.1 | 379.9 | 399.8 | 425.4 | 439.8 |
| 50°   | 347.6 | 356.5 | 379.9 | 409.9 | 424.3 |
| 52.5° | 324.3 | 335.5 | 360.9 | 393.2 | 408.8 |
| 55°   | 299.9 | 311.0 | 342.1 | 375.4 | 393.2 |
| 57.5° | 272.1 | 285.4 | 322.1 | 357.6 | 376.5 |
| 60°   | 247.6 | 261.0 | 301.0 | 338.8 | 357.6 |
| 62.5° | 225.5 | 237.7 | 277.6 | 318.7 | 338.8 |
| 65°   | 195.5 | 214.4 | 256.6 | 297.7 | 317.6 |
| 67.5° | 168.8 | 189.9 | 234.3 | 273.2 | 295.5 |
| 70°   | 143.3 | 165.5 | 211.0 | 248.7 | 269.9 |
| 72.5° | 117.7 | 142.2 | 187.7 | 221.0 | 232.1 |
| 75°   | 93.3  | 118.8 | 162.1 | 176.6 | 178.9 |
| 77.5° | 71.1  | 96.6  | 131.0 | 129.9 | 132.1 |
| 80°   | 51.1  | 73.3  | 91.0  | 94.4  | 98.9  |
| 82.5° | 34.4  | 51.1  | 58.9  | 64.5  | 68.9  |
| 85°   | 21.1  | 27.8  | 33.3  | 35.5  | 36.7  |
| 87.5° | 10.0  | 11.1  | 11.1  | 8.9   | 8.9   |
| 90°   | 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

Metalux

Report Number: SP3-2508-516-8

Test Date: 09/03/2025

Luminaire Tested: 24CZ-LD5-65-S-UNV-L950-CD1-U

Data in this report applies to families of products including 24CZ-LD5-65-S-UNV-L950-CD1-U

### Test Information

Test Method: LM-79-2019  
 Report Number: SP3-2508-516-8  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP3 - 3M SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 09/05/2025  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: Metalux  
 Catalog Number: **24CZ-LD5-65-S-UNV-L950-CD1-U**  
 Description: 2X4 CRUZE SB 6500LM 950 SMOOTH LENS

### Spectral Parameters

CCT (K): 5019  
 CIE  $u'$ : 0.2113  
 CIE  $v'$ : 0.4842  
 Duv: -0.0002  
 CIE x: 0.3445  
 CIE y: 0.3508  
 CIE z: 0.3046  
 Peak Wavelength (nm): 630  
 Dominant Wavelength (nm): 572  
 Purity: 8.636369  
 R<sub>f</sub>: 89.8  
 R<sub>g</sub>: 98.5

CRI (Ra): 94.6  
 R1: 96.4  
 R2: 98.4  
 R3: 96.9  
 R4: 94.5  
 R5: 94.5  
 R6: 93.5  
 R7: 93.6  
 R8: 89.4  
 R9: 74.6  
 R10: 94.2  
 R11: 95.5  
 R12: 70.8  
 R13: 98.0  
 R14: 98.0  
 R15: 95.0



### Test Conditions

Stabilization Time: M  
 Operation Time: 1H 0M  
 Sphere Temperature (°C): 25.0

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| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | 3M SPHERE IN02505     | 7/1/2025         | 1/1/2026             |
| Power Meter                    | XITRON INXT2011006    | 1/20/2025        | 1/20/2026            |
| AC Power Source                | CHROMA 61604 IN6064A  | 10/22/2024       | 10/22/2025           |
| DC Power Source                | EYSIGHT N5770A IN0534 | 10/22/2024       | 10/22/2025           |
| Sphere Thermometer             | TANDD IN4036E         | 10/22/2024       | 10/22/2025           |
|                                |                       |                  |                      |

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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 5000K 4-step quadrangle

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### Photopic Flux vs. Wavelength



### Photopic Lumens: NR

| 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    | 249                      | NR            | 620    | 343                      | NR            | 750    | 8                        | NR            | 880    | 0                        | NR            |
| 365    | 0                        | NR            | 495    | 269                      | NR            | 625    | 339                      | NR            | 755    | 7                        | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 296                      | NR            | 630    | 1000                     | NR            | 760    | 6                        | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 325                      | NR            | 635    | 705                      | NR            | 765    | 5                        | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 347                      | NR            | 640    | 221                      | NR            | 770    | 4                        | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 363                      | NR            | 645    | 210                      | NR            | 775    | 4                        | NR            | 905    | 0                        | NR            |
| 390    | 1                        | NR            | 520    | 371                      | NR            | 650    | 186                      | NR            | 780    | 3                        | NR            | 910    | 0                        | NR            |
| 395    | 3                        | NR            | 525    | 378                      | NR            | 655    | 155                      | NR            | 785    | 3                        | NR            | 915    | 0                        | NR            |
| 400    | 4                        | NR            | 530    | 381                      | NR            | 660    | 132                      | NR            | 790    | 2                        | NR            | 920    | 0                        | NR            |
| 405    | 5                        | NR            | 535    | 383                      | NR            | 665    | 111                      | NR            | 795    | 2                        | NR            | 925    | 0                        | NR            |
| 410    | 7                        | NR            | 540    | 385                      | NR            | 670    | 102                      | NR            | 800    | 2                        | NR            | 930    | 0                        | NR            |
| 415    | 10                       | NR            | 545    | 389                      | NR            | 675    | 84                       | NR            | 805    | 1                        | NR            | 935    | 0                        | NR            |
| 420    | 17                       | NR            | 550    | 391                      | NR            | 680    | 72                       | NR            | 810    | 1                        | NR            | 940    | 0                        | NR            |
| 425    | 29                       | NR            | 555    | 392                      | NR            | 685    | 62                       | NR            | 815    | 1                        | NR            | 945    | 0                        | NR            |
| 430    | 53                       | NR            | 560    | 393                      | NR            | 690    | 53                       | NR            | 820    | 1                        | NR            | 950    | 0                        | NR            |
| 435    | 97                       | NR            | 565    | 394                      | NR            | 695    | 45                       | NR            | 825    | 1                        | NR            | 955    | 0                        | NR            |
| 440    | 173                      | NR            | 570    | 391                      | NR            | 700    | 39                       | NR            | 830    | 1                        | NR            | 960    | 0                        | NR            |
| 445    | 321                      | NR            | 575    | 389                      | NR            | 705    | 33                       | NR            | 835    | 1                        | NR            | 965    | 0                        | NR            |
| 450    | 597                      | NR            | 580    | 385                      | NR            | 710    | 28                       | NR            | 840    | 1                        | NR            | 970    | 0                        | NR            |
| 455    | 795                      | NR            | 585    | 382                      | NR            | 715    | 24                       | NR            | 845    | 1                        | NR            | 975    | 0                        | NR            |
| 460    | 615                      | NR            | 590    | 375                      | NR            | 720    | 21                       | NR            | 850    | 0                        | NR            | 980    | 0                        | NR            |
| 465    | 438                      | NR            | 595    | 367                      | NR            | 725    | 17                       | NR            | 855    | 0                        | NR            | 985    | 0                        | NR            |
| 470    | 372                      | NR            | 600    | 361                      | NR            | 730    | 15                       | NR            | 860    | 0                        | NR            | 990    | 0                        | NR            |
| 475    | 290                      | NR            | 605    | 355                      | NR            | 735    | 13                       | NR            | 865    | 0                        | NR            | 995    | 0                        | NR            |
| 480    | 236                      | NR            | 610    | 383                      | NR            | 740    | 11                       | NR            | 870    | 0                        | NR            | 1000   | 0                        | NR            |
| 485    | 232                      | NR            | 615    | 408                      | NR            | 745    | 9                        | NR            | 875    | 0                        | NR            |        |                          |               |

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### Scotopic Flux vs. Wavelength



Scotopic Lumens: NR

S/P: 2.11

| λ<br>(nm) | Power<br>W <sup>λ</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>λ</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>λ</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>λ</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>λ</sup> /nm | Lumens<br>(φ/nm) |
|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|
| 360       | 0                           | NR               | 490       | 249                         | NR               | 620       | 343                         | NR               | 750       | 8                           | NR               | 880       | 0                           | NR               |
| 365       | 0                           | NR               | 495       | 269                         | NR               | 625       | 339                         | NR               | 755       | 7                           | NR               | 885       | 0                           | NR               |
| 370       | 0                           | NR               | 500       | 296                         | NR               | 630       | 1000                        | NR               | 760       | 6                           | NR               | 890       | 0                           | NR               |
| 375       | 0                           | NR               | 505       | 325                         | NR               | 635       | 705                         | NR               | 765       | 5                           | NR               | 895       | 0                           | NR               |
| 380       | 0                           | NR               | 510       | 347                         | NR               | 640       | 221                         | NR               | 770       | 4                           | NR               | 900       | 0                           | NR               |
| 385       | 0                           | NR               | 515       | 363                         | NR               | 645       | 210                         | NR               | 775       | 4                           | NR               | 905       | 0                           | NR               |
| 390       | 1                           | NR               | 520       | 371                         | NR               | 650       | 186                         | NR               | 780       | 3                           | NR               | 910       | 0                           | NR               |
| 395       | 3                           | NR               | 525       | 378                         | NR               | 655       | 155                         | NR               | 785       | 3                           | NR               | 915       | 0                           | NR               |
| 400       | 4                           | NR               | 530       | 381                         | NR               | 660       | 132                         | NR               | 790       | 2                           | NR               | 920       | 0                           | NR               |
| 405       | 5                           | NR               | 535       | 383                         | NR               | 665       | 111                         | NR               | 795       | 2                           | NR               | 925       | 0                           | NR               |
| 410       | 7                           | NR               | 540       | 385                         | NR               | 670       | 102                         | NR               | 800       | 2                           | NR               | 930       | 0                           | NR               |
| 415       | 10                          | NR               | 545       | 389                         | NR               | 675       | 84                          | NR               | 805       | 1                           | NR               | 935       | 0                           | NR               |
| 420       | 17                          | NR               | 550       | 391                         | NR               | 680       | 72                          | NR               | 810       | 1                           | NR               | 940       | 0                           | NR               |
| 425       | 29                          | NR               | 555       | 392                         | NR               | 685       | 62                          | NR               | 815       | 1                           | NR               | 945       | 0                           | NR               |
| 430       | 53                          | NR               | 560       | 393                         | NR               | 690       | 53                          | NR               | 820       | 1                           | NR               | 950       | 0                           | NR               |
| 435       | 97                          | NR               | 565       | 394                         | NR               | 695       | 45                          | NR               | 825       | 1                           | NR               | 955       | 0                           | NR               |
| 440       | 173                         | NR               | 570       | 391                         | NR               | 700       | 39                          | NR               | 830       | 1                           | NR               | 960       | 0                           | NR               |
| 445       | 321                         | NR               | 575       | 389                         | NR               | 705       | 33                          | NR               | 835       | 1                           | NR               | 965       | 0                           | NR               |
| 450       | 597                         | NR               | 580       | 385                         | NR               | 710       | 28                          | NR               | 840       | 1                           | NR               | 970       | 0                           | NR               |
| 455       | 795                         | NR               | 585       | 382                         | NR               | 715       | 24                          | NR               | 845       | 1                           | NR               | 975       | 0                           | NR               |
| 460       | 615                         | NR               | 590       | 375                         | NR               | 720       | 21                          | NR               | 850       | 0                           | NR               | 980       | 0                           | NR               |
| 465       | 438                         | NR               | 595       | 367                         | NR               | 725       | 17                          | NR               | 855       | 0                           | NR               | 985       | 0                           | NR               |
| 470       | 372                         | NR               | 600       | 361                         | NR               | 730       | 15                          | NR               | 860       | 0                           | NR               | 990       | 0                           | NR               |
| 475       | 290                         | NR               | 605       | 355                         | NR               | 735       | 13                          | NR               | 865       | 0                           | NR               | 995       | 0                           | NR               |
| 480       | 236                         | NR               | 610       | 383                         | NR               | 740       | 11                          | NR               | 870       | 0                           | NR               | 1000      | 0                           | NR               |
| 485       | 232                         | NR               | 615       | 408                         | NR               | 745       | 9                           | NR               | 875       | 0                           | NR               |           |                             |                  |

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### Melanopic Flux vs. Wavelength



Melanopic Lumens: NR

M/P: 4.62

| 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    | 249                      | NR            | 620    | 343                      | NR            | 750    | 8                        | NR            | 880    | 0                        | NR            |
| 365    | 0                        | NR            | 495    | 269                      | NR            | 625    | 339                      | NR            | 755    | 7                        | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 296                      | NR            | 630    | 1000                     | NR            | 760    | 6                        | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 325                      | NR            | 635    | 705                      | NR            | 765    | 5                        | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 347                      | NR            | 640    | 221                      | NR            | 770    | 4                        | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 363                      | NR            | 645    | 210                      | NR            | 775    | 4                        | NR            | 905    | 0                        | NR            |
| 390    | 1                        | NR            | 520    | 371                      | NR            | 650    | 186                      | NR            | 780    | 3                        | NR            | 910    | 0                        | NR            |
| 395    | 3                        | NR            | 525    | 378                      | NR            | 655    | 155                      | NR            | 785    | 3                        | NR            | 915    | 0                        | NR            |
| 400    | 4                        | NR            | 530    | 381                      | NR            | 660    | 132                      | NR            | 790    | 2                        | NR            | 920    | 0                        | NR            |
| 405    | 5                        | NR            | 535    | 383                      | NR            | 665    | 111                      | NR            | 795    | 2                        | NR            | 925    | 0                        | NR            |
| 410    | 7                        | NR            | 540    | 385                      | NR            | 670    | 102                      | NR            | 800    | 2                        | NR            | 930    | 0                        | NR            |
| 415    | 10                       | NR            | 545    | 389                      | NR            | 675    | 84                       | NR            | 805    | 1                        | NR            | 935    | 0                        | NR            |
| 420    | 17                       | NR            | 550    | 391                      | NR            | 680    | 72                       | NR            | 810    | 1                        | NR            | 940    | 0                        | NR            |
| 425    | 29                       | NR            | 555    | 392                      | NR            | 685    | 62                       | NR            | 815    | 1                        | NR            | 945    | 0                        | NR            |
| 430    | 53                       | NR            | 560    | 393                      | NR            | 690    | 53                       | NR            | 820    | 1                        | NR            | 950    | 0                        | NR            |
| 435    | 97                       | NR            | 565    | 394                      | NR            | 695    | 45                       | NR            | 825    | 1                        | NR            | 955    | 0                        | NR            |
| 440    | 173                      | NR            | 570    | 391                      | NR            | 700    | 39                       | NR            | 830    | 1                        | NR            | 960    | 0                        | NR            |
| 445    | 321                      | NR            | 575    | 389                      | NR            | 705    | 33                       | NR            | 835    | 1                        | NR            | 965    | 0                        | NR            |
| 450    | 597                      | NR            | 580    | 385                      | NR            | 710    | 28                       | NR            | 840    | 1                        | NR            | 970    | 0                        | NR            |
| 455    | 795                      | NR            | 585    | 382                      | NR            | 715    | 24                       | NR            | 845    | 1                        | NR            | 975    | 0                        | NR            |
| 460    | 615                      | NR            | 590    | 375                      | NR            | 720    | 21                       | NR            | 850    | 0                        | NR            | 980    | 0                        | NR            |
| 465    | 438                      | NR            | 595    | 367                      | NR            | 725    | 17                       | NR            | 855    | 0                        | NR            | 985    | 0                        | NR            |
| 470    | 372                      | NR            | 600    | 361                      | NR            | 730    | 15                       | NR            | 860    | 0                        | NR            | 990    | 0                        | NR            |
| 475    | 290                      | NR            | 605    | 355                      | NR            | 735    | 13                       | NR            | 865    | 0                        | NR            | 995    | 0                        | NR            |
| 480    | 236                      | NR            | 610    | 383                      | NR            | 740    | 11                       | NR            | 870    | 0                        | NR            | 1000   | 0                        | NR            |
| 485    | 232                      | NR            | 615    | 408                      | NR            | 745    | 9                        | NR            | 875    | 0                        | NR            |        |                          |               |

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TM-30-18

### Summary

$R_f = 89.8$   
 $R_g = 98.5$   
 $\text{CIE } R_a = 94.6$   
 $R_9 = 74.6$



### Color Vector Graphics



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

|            |             |            |            |
|------------|-------------|------------|------------|
| CES01 = 85 | CES26 = 96  | CES51 = 93 | CES76 = 88 |
| CES02 = 61 | CES27 = 88  | CES52 = 97 | CES77 = 87 |
| CES03 = 31 | CES28 = 96  | CES53 = 95 | CES78 = 85 |
| CES04 = 69 | CES29 = 93  | CES54 = 89 | CES79 = 93 |
| CES05 = 48 | CES30 = 81  | CES55 = 86 | CES80 = 93 |
| CES06 = 50 | CES31 = 95  | CES56 = 90 | CES81 = 80 |
| CES07 = 41 | CES32 = 93  | CES57 = 87 | CES82 = 96 |
| CES08 = 40 | CES33 = 91  | CES58 = 87 | CES83 = 95 |
| CES09 = 29 | CES34 = 95  | CES59 = 96 | CES84 = 93 |
| CES10 = 73 | CES35 = 96  | CES60 = 89 | CES85 = 81 |
| CES11 = 56 | CES36 = 74  | CES61 = 89 | CES86 = 85 |
| CES12 = 62 | CES37 = 95  | CES62 = 78 | CES87 = 93 |
| CES13 = 42 | CES38 = 76  | CES63 = 89 | CES88 = 96 |
| CES14 = 74 | CES39 = 98  | CES64 = 84 | CES89 = 87 |
| CES15 = 71 | CES40 = 98  | CES65 = 86 | CES90 = 93 |
| CES16 = 47 | CES41 = 92  | CES66 = 81 | CES91 = 68 |
| CES17 = 48 | CES42 = 95  | CES67 = 80 | CES92 = 78 |
| CES18 = 56 | CES43 = 96  | CES68 = 85 | CES93 = 86 |
| CES19 = 70 | CES44 = 99  | CES69 = 85 | CES94 = 79 |
| CES20 = 65 | CES45 = 100 | CES70 = 84 | CES95 = 82 |
| CES21 = 85 | CES46 = 96  | CES71 = 75 | CES96 = 93 |
| CES22 = 77 | CES47 = 91  | CES72 = 92 | CES97 = 96 |
| CES23 = 91 | CES48 = 84  | CES73 = 80 | CES98 = 94 |
| CES24 = 90 | CES49 = 97  | CES74 = 89 | CES99 = 92 |
| CES25 = 70 | CES50 = 95  | CES75 = 78 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)