

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: P982898

Luminaire Tested: 24CZ-LD5-65-UNV-L840-CD1-U

Issue Date: 04/23/2025

**Test Information**

Test Method: LM-79-2019  
Report Number: P982898  
Test Lab: INNOVATION CENTER(P3)  
Issue Date: 04/23/2025  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: METALUX  
Catalog Number: 24CZ-LD5-65-UNV-L840-CD1-U  
Description: METALUX CRUZE 2x4 6500LM PACKAGE 80CRI 4000K TROFFER STANDARD LENS  
Light Source: 4000K CCT, 80 CRI LEDS  
Ballast/Driver: -

**Summary**

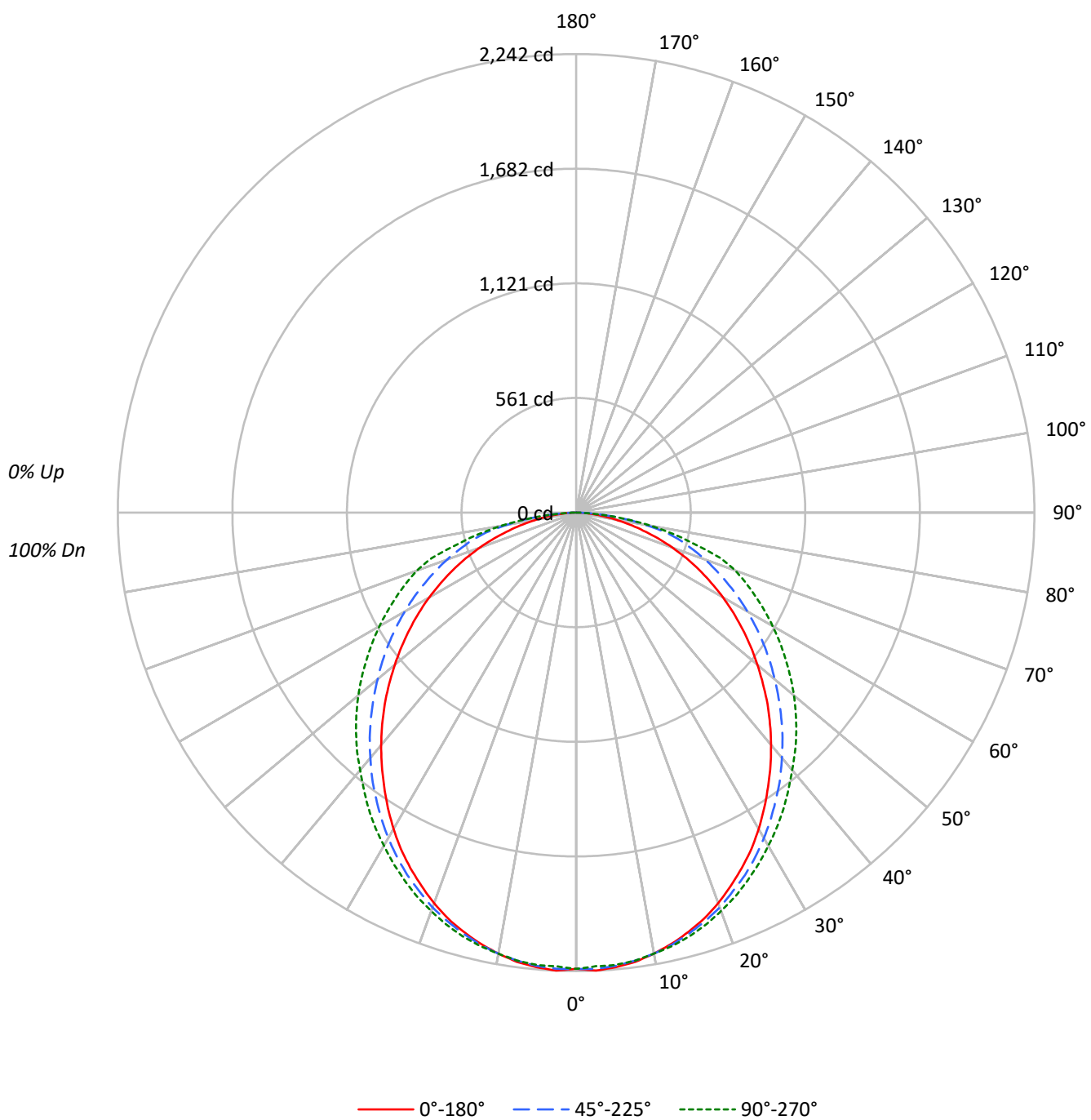
Lumens per Lamp: N/A  
Luminaire Lumens: 6349.0 lumens  
Efficiency: N/A  
Efficacy: 129.8 lumens/watt  
Spacing Criteria (0/90/45): 1.19 / 1.26 / 1.35  
Luminous Opening: Rectangular (W 2' x L: 4' x H: 0')  
CIE Type: Direct

Input Watts (W): 48.9  
Input Voltage (V): 120  
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: 28.75 FT

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CATALOG NUMBER: 24CZ-LD5-65-UNV-L840-CD1-U

### Luminous Intensity Polar Plot



TEST NUMBER: P982898

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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  | 30  | 10  | 50  | 30 | 10 |
| RCR |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |    |    |
| 0   | 119 | 119 | 119 | 119 | 116 | 116 | 116 | 116 | 111 | 111 | 111 | 106 | 106 | 106 | 102 | 102 | 102 | 100 |    |    |
| 1   | 108 | 103 | 99  | 95  | 106 | 101 | 97  | 93  | 97  | 93  | 90  | 93  | 90  | 88  | 89  | 87  | 85  | 83  |    |    |
| 2   | 98  | 90  | 83  | 77  | 96  | 88  | 81  | 76  | 84  | 79  | 74  | 81  | 76  | 72  | 78  | 74  | 71  | 68  |    |    |
| 3   | 89  | 79  | 70  | 63  | 87  | 77  | 69  | 63  | 74  | 67  | 62  | 71  | 65  | 61  | 69  | 64  | 60  | 57  |    |    |
| 4   | 82  | 69  | 60  | 54  | 79  | 68  | 60  | 53  | 66  | 58  | 52  | 63  | 57  | 52  | 61  | 56  | 51  | 49  |    |    |
| 5   | 75  | 62  | 53  | 46  | 73  | 61  | 52  | 46  | 59  | 51  | 45  | 57  | 50  | 45  | 55  | 49  | 44  | 42  |    |    |
| 6   | 69  | 56  | 47  | 40  | 67  | 55  | 46  | 40  | 53  | 45  | 40  | 51  | 44  | 39  | 50  | 44  | 39  | 37  |    |    |
| 7   | 64  | 51  | 42  | 35  | 63  | 50  | 41  | 35  | 48  | 41  | 35  | 47  | 40  | 35  | 45  | 39  | 35  | 33  |    |    |
| 8   | 60  | 46  | 38  | 32  | 58  | 45  | 37  | 32  | 44  | 37  | 31  | 43  | 36  | 31  | 42  | 36  | 31  | 29  |    |    |
| 9   | 56  | 42  | 34  | 28  | 55  | 42  | 34  | 28  | 41  | 33  | 28  | 40  | 33  | 28  | 39  | 32  | 28  | 26  |    |    |
| 10  | 52  | 39  | 31  | 26  | 51  | 39  | 31  | 26  | 38  | 31  | 26  | 37  | 30  | 26  | 36  | 30  | 25  | 24  |    |    |

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

|     | 0°   | 45°  | 90°  |
|-----|------|------|------|
| 0°  | 3002 | 3002 | 3002 |
| 5°  | 3013 | 3005 | 2999 |
| 10° | 2992 | 2992 | 2992 |
| 15° | 2957 | 2969 | 2987 |
| 20° | 2910 | 2941 | 2969 |
| 25° | 2847 | 2902 | 2947 |
| 30° | 2775 | 2856 | 2923 |
| 35° | 2689 | 2803 | 2905 |
| 40° | 2606 | 2750 | 2887 |
| 45° | 2519 | 2700 | 2897 |
| 50° | 2423 | 2654 | 2911 |
| 55° | 2331 | 2624 | 2934 |
| 60° | 2232 | 2604 | 2987 |
| 65° | 2118 | 2599 | 3081 |
| 70° | 1971 | 2642 | 3254 |
| 75° | 1763 | 2751 | 3121 |
| 80° | 1506 | 2627 | 2862 |
| 85° | 1167 | 2100 | 2001 |

**MAXIMUM LUMINANCE 45°-90°:**

Horizontal Angle: 90°

Vertical Angle: 72.5°

Luminance: 3315 cd/sqm

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**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 211.0  | 3.3       |
| 10°-20°   | 600.5  | 9.5       |
| 20°-30°   | 897.7  | 14.1      |
| 30°-40°   | 1064.4 | 16.8      |
| 40°-50°   | 1094.7 | 17.2      |
| 50°-60°   | 1001.3 | 15.8      |
| 60°-70°   | 807.6  | 12.7      |
| 70°-80°   | 524.3  | 8.3       |
| 80°-90°   | 147.5  | 2.3       |
| 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°    | 1709.2 | 26.9      |
| 0°-40°    | 2773.6 | 43.7      |
| 0°-60°    | 4869.6 | 76.7      |
| 0°-90°    | 6349.0 | 100.0     |
| 90°-120°  | 0.0    | 0.0       |
| 90°-150°  | 0.0    | 0.0       |
| 90°-180°  | 0.0    | 0.0       |
| 0°-180°   | 6349.0 | 100.0     |

**CANDELA DISTRIBUTION:**

|     | 0°   | 22.5° | 45°  | 67.5° | 90°  | Flux |
|-----|------|-------|------|-------|------|------|
| 0°  | 2231 | 2231  | 2231 | 2231  | 2231 |      |
| 5°  | 2231 | 2216  | 2225 | 2220  | 2220 | 212  |
| 15° | 2123 | 2112  | 2132 | 2140  | 2145 | 598  |
| 25° | 1918 | 1918  | 1955 | 1970  | 1985 | 883  |
| 35° | 1637 | 1652  | 1706 | 1741  | 1769 | 1024 |
| 45° | 1324 | 1348  | 1419 | 1484  | 1523 | 1020 |
| 55° | 994  | 1026  | 1119 | 1207  | 1251 | 889  |
| 65° | 665  | 704   | 816  | 922   | 968  | 658  |
| 75° | 339  | 402   | 529  | 594   | 600  | 362  |
| 85° | 76   | 125   | 136  | 134   | 130  | 91   |
| 90° | 0    | 0     | 0    | 0     | 0    |      |

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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 22.5°  | 45°    | 67.5°  | 90°    |
|-------|--------|--------|--------|--------|--------|
| 0°    | 2231.1 | 2231.1 | 2231.1 | 2231.1 | 2231.1 |
| 2.5°  | 2241.9 | 2224.7 | 2233.3 | 2229.0 | 2220.3 |
| 5°    | 2231.1 | 2216.0 | 2224.7 | 2220.3 | 2220.3 |
| 7.5°  | 2216.0 | 2200.8 | 2209.5 | 2209.5 | 2209.5 |
| 10°   | 2190.1 | 2177.1 | 2190.1 | 2190.1 | 2190.1 |
| 12.5° | 2159.8 | 2149.0 | 2164.1 | 2166.3 | 2170.7 |
| 15°   | 2123.1 | 2112.3 | 2131.8 | 2140.4 | 2144.7 |
| 17.5° | 2082.1 | 2073.4 | 2095.1 | 2105.8 | 2112.3 |
| 20°   | 2032.4 | 2025.9 | 2054.0 | 2064.8 | 2073.4 |
| 22.5° | 1976.2 | 1976.2 | 2004.3 | 2017.3 | 2032.4 |
| 25°   | 1917.9 | 1917.9 | 1954.6 | 1969.8 | 1984.9 |
| 27.5° | 1855.3 | 1857.5 | 1898.5 | 1920.1 | 1935.2 |
| 30°   | 1786.2 | 1794.9 | 1838.0 | 1863.9 | 1881.2 |
| 32.5° | 1712.7 | 1723.6 | 1773.2 | 1805.6 | 1827.2 |
| 35°   | 1637.1 | 1652.3 | 1706.3 | 1740.8 | 1768.9 |
| 37.5° | 1561.5 | 1581.0 | 1639.3 | 1678.1 | 1706.3 |
| 40°   | 1483.8 | 1505.4 | 1565.8 | 1611.2 | 1643.7 |
| 42.5° | 1403.9 | 1427.6 | 1494.6 | 1546.4 | 1585.3 |
| 45°   | 1324.0 | 1347.7 | 1419.0 | 1483.8 | 1522.7 |
| 47.5° | 1239.7 | 1267.9 | 1343.5 | 1419.0 | 1457.9 |
| 50°   | 1157.7 | 1187.9 | 1267.9 | 1349.9 | 1390.9 |
| 52.5° | 1075.6 | 1110.1 | 1194.4 | 1280.8 | 1321.8 |
| 55°   | 993.5  | 1025.9 | 1118.8 | 1207.3 | 1250.6 |
| 57.5° | 911.5  | 946.0  | 1043.2 | 1136.1 | 1181.4 |
| 60°   | 829.4  | 866.1  | 967.6  | 1064.8 | 1110.1 |
| 62.5° | 745.2  | 784.0  | 892.0  | 993.5  | 1038.8 |
| 65°   | 665.2  | 704.1  | 816.4  | 922.2  | 967.6  |
| 67.5° | 583.1  | 626.3  | 743.0  | 850.9  | 898.5  |
| 70°   | 501.1  | 548.6  | 671.7  | 779.7  | 827.2  |
| 72.5° | 419.0  | 473.0  | 598.3  | 706.3  | 740.8  |
| 75°   | 339.1  | 401.7  | 529.1  | 594.0  | 600.4  |
| 77.5° | 265.6  | 330.5  | 451.4  | 477.3  | 490.3  |
| 80°   | 194.3  | 265.6  | 339.1  | 371.5  | 369.4  |
| 82.5° | 129.6  | 203.0  | 244.1  | 248.4  | 244.1  |
| 85°   | 75.6   | 125.3  | 136.0  | 133.9  | 129.6  |
| 87.5° | 32.4   | 49.7   | 43.2   | 36.7   | 30.3   |
| 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: SP3-2508-516-7

Test Date: 09/03/2025

Luminaire Tested: 24CZ-LD5-65-S-UNV-L940-CD1-U

Data in this report applies to families of products including 24CZ-LD5-65-S-UNV-L940-CD1-U

### Test Information

Test Method: LM-79-2019  
 Report Number: SP3-2508-516-7  
 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-L940-CD1-U**  
 Description: 2X4 CRUZE SB 6500LM 940 SMOOTH LENS

### Spectral Parameters

CCT (K): 3955  
 CIE  $u'$ : 0.2264  
 CIE  $v'$ : 0.5014  
 Duv: -0.0009  
 CIE x: 0.3818  
 CIE y: 0.3758  
 CIE z: 0.2424  
 Peak Wavelength (nm): 630  
 Dominant Wavelength (nm): 579  
 Purity: 27.35334  
 R<sub>f</sub>: 90.3  
 R<sub>g</sub>: 99.3

CRI (Ra): 93.6  
 R1: 95.0  
 R2: 96.2  
 R3: 95.3  
 R4: 94.7  
 R5: 93.8  
 R6: 93.5  
 R7: 94.0  
 R8: 86.7  
 R9: 65.5  
 R10: 88.9  
 R11: 94.8  
 R12: 71.7  
 R13: 95.4  
 R14: 96.7  
 R15: 92.2



### Test Conditions

Stabilization Time: 22M  
 Operation Time: 1H 22M  
 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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### 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    | 171                      | NR            | 620    | 355                      | NR            | 750    | 8                        | NR            | 880    | 0                        | NR            |
| 365    | 0                        | NR            | 495    | 199                      | NR            | 625    | 352                      | NR            | 755    | 7                        | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 230                      | NR            | 630    | 1000                     | NR            | 760    | 6                        | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 257                      | NR            | 635    | 711                      | NR            | 765    | 5                        | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 278                      | NR            | 640    | 235                      | NR            | 770    | 4                        | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 295                      | NR            | 645    | 222                      | NR            | 775    | 4                        | NR            | 905    | 0                        | NR            |
| 390    | 1                        | NR            | 520    | 305                      | NR            | 650    | 198                      | NR            | 780    | 3                        | NR            | 910    | 0                        | NR            |
| 395    | 2                        | NR            | 525    | 313                      | NR            | 655    | 165                      | NR            | 785    | 3                        | NR            | 915    | 0                        | NR            |
| 400    | 3                        | NR            | 530    | 318                      | NR            | 660    | 142                      | NR            | 790    | 2                        | NR            | 920    | 0                        | NR            |
| 405    | 4                        | NR            | 535    | 323                      | NR            | 665    | 120                      | NR            | 795    | 2                        | NR            | 925    | 0                        | NR            |
| 410    | 6                        | NR            | 540    | 327                      | NR            | 670    | 110                      | NR            | 800    | 2                        | NR            | 930    | 0                        | NR            |
| 415    | 9                        | NR            | 545    | 333                      | NR            | 675    | 91                       | NR            | 805    | 2                        | NR            | 935    | 0                        | NR            |
| 420    | 15                       | NR            | 550    | 339                      | NR            | 680    | 77                       | NR            | 810    | 1                        | NR            | 940    | 0                        | NR            |
| 425    | 27                       | NR            | 555    | 343                      | NR            | 685    | 67                       | NR            | 815    | 1                        | NR            | 945    | 0                        | NR            |
| 430    | 48                       | NR            | 560    | 349                      | NR            | 690    | 57                       | NR            | 820    | 1                        | NR            | 950    | 0                        | NR            |
| 435    | 87                       | NR            | 565    | 355                      | NR            | 695    | 49                       | NR            | 825    | 1                        | NR            | 955    | 0                        | NR            |
| 440    | 155                      | NR            | 570    | 358                      | NR            | 700    | 42                       | NR            | 830    | 1                        | NR            | 960    | 0                        | NR            |
| 445    | 291                      | NR            | 575    | 363                      | NR            | 705    | 36                       | NR            | 835    | 1                        | NR            | 965    | 0                        | NR            |
| 450    | 475                      | NR            | 580    | 365                      | NR            | 710    | 30                       | NR            | 840    | 1                        | NR            | 970    | 0                        | NR            |
| 455    | 466                      | NR            | 585    | 367                      | NR            | 715    | 26                       | NR            | 845    | 1                        | NR            | 975    | 0                        | NR            |
| 460    | 308                      | NR            | 590    | 367                      | NR            | 720    | 22                       | NR            | 850    | 0                        | NR            | 980    | 0                        | NR            |
| 465    | 246                      | NR            | 595    | 364                      | NR            | 725    | 19                       | NR            | 855    | 0                        | NR            | 985    | 0                        | NR            |
| 470    | 202                      | NR            | 600    | 363                      | NR            | 730    | 16                       | NR            | 860    | 0                        | NR            | 990    | 0                        | NR            |
| 475    | 152                      | NR            | 605    | 361                      | NR            | 735    | 14                       | NR            | 865    | 0                        | NR            | 995    | 0                        | NR            |
| 480    | 140                      | NR            | 610    | 391                      | NR            | 740    | 11                       | NR            | 870    | 0                        | NR            | 1000   | 0                        | NR            |
| 485    | 152                      | NR            | 615    | 418                      | NR            | 745    | 10                       | NR            | 875    | 0                        | NR            |        |                          |               |

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### Scotopic Flux vs. Wavelength



Scotopic Lumens: NR

S/P: 1.77

| λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) |
|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|
| 360       | 0                           | NR               | 490       | 171                         | NR               | 620       | 355                         | NR               | 750       | 8                           | NR               | 880       | 0                           | NR               |
| 365       | 0                           | NR               | 495       | 199                         | NR               | 625       | 352                         | NR               | 755       | 7                           | NR               | 885       | 0                           | NR               |
| 370       | 0                           | NR               | 500       | 230                         | NR               | 630       | 1000                        | NR               | 760       | 6                           | NR               | 890       | 0                           | NR               |
| 375       | 0                           | NR               | 505       | 257                         | NR               | 635       | 711                         | NR               | 765       | 5                           | NR               | 895       | 0                           | NR               |
| 380       | 0                           | NR               | 510       | 278                         | NR               | 640       | 235                         | NR               | 770       | 4                           | NR               | 900       | 0                           | NR               |
| 385       | 0                           | NR               | 515       | 295                         | NR               | 645       | 222                         | NR               | 775       | 4                           | NR               | 905       | 0                           | NR               |
| 390       | 1                           | NR               | 520       | 305                         | NR               | 650       | 198                         | NR               | 780       | 3                           | NR               | 910       | 0                           | NR               |
| 395       | 2                           | NR               | 525       | 313                         | NR               | 655       | 165                         | NR               | 785       | 3                           | NR               | 915       | 0                           | NR               |
| 400       | 3                           | NR               | 530       | 318                         | NR               | 660       | 142                         | NR               | 790       | 2                           | NR               | 920       | 0                           | NR               |
| 405       | 4                           | NR               | 535       | 323                         | NR               | 665       | 120                         | NR               | 795       | 2                           | NR               | 925       | 0                           | NR               |
| 410       | 6                           | NR               | 540       | 327                         | NR               | 670       | 110                         | NR               | 800       | 2                           | NR               | 930       | 0                           | NR               |
| 415       | 9                           | NR               | 545       | 333                         | NR               | 675       | 91                          | NR               | 805       | 2                           | NR               | 935       | 0                           | NR               |
| 420       | 15                          | NR               | 550       | 339                         | NR               | 680       | 77                          | NR               | 810       | 1                           | NR               | 940       | 0                           | NR               |
| 425       | 27                          | NR               | 555       | 343                         | NR               | 685       | 67                          | NR               | 815       | 1                           | NR               | 945       | 0                           | NR               |
| 430       | 48                          | NR               | 560       | 349                         | NR               | 690       | 57                          | NR               | 820       | 1                           | NR               | 950       | 0                           | NR               |
| 435       | 87                          | NR               | 565       | 355                         | NR               | 695       | 49                          | NR               | 825       | 1                           | NR               | 955       | 0                           | NR               |
| 440       | 155                         | NR               | 570       | 358                         | NR               | 700       | 42                          | NR               | 830       | 1                           | NR               | 960       | 0                           | NR               |
| 445       | 291                         | NR               | 575       | 363                         | NR               | 705       | 36                          | NR               | 835       | 1                           | NR               | 965       | 0                           | NR               |
| 450       | 475                         | NR               | 580       | 365                         | NR               | 710       | 30                          | NR               | 840       | 1                           | NR               | 970       | 0                           | NR               |
| 455       | 466                         | NR               | 585       | 367                         | NR               | 715       | 26                          | NR               | 845       | 1                           | NR               | 975       | 0                           | NR               |
| 460       | 308                         | NR               | 590       | 367                         | NR               | 720       | 22                          | NR               | 850       | 0                           | NR               | 980       | 0                           | NR               |
| 465       | 246                         | NR               | 595       | 364                         | NR               | 725       | 19                          | NR               | 855       | 0                           | NR               | 985       | 0                           | NR               |
| 470       | 202                         | NR               | 600       | 363                         | NR               | 730       | 16                          | NR               | 860       | 0                           | NR               | 990       | 0                           | NR               |
| 475       | 152                         | NR               | 605       | 361                         | NR               | 735       | 14                          | NR               | 865       | 0                           | NR               | 995       | 0                           | NR               |
| 480       | 140                         | NR               | 610       | 391                         | NR               | 740       | 11                          | NR               | 870       | 0                           | NR               | 1000      | 0                           | NR               |
| 485       | 152                         | NR               | 615       | 418                         | NR               | 745       | 10                          | NR               | 875       | 0                           | NR               |           |                             |                  |

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### Melanopic Flux vs. Wavelength



Melanopic Lumens: NR

M/P: 3.69

| λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>W <sup>^</sup> /nm | Lumens<br>(φ/nm) |
|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|-----------|-----------------------------|------------------|
| 360       | 0                           | NR               | 490       | 171                         | NR               | 620       | 355                         | NR               | 750       | 8                           | NR               | 880       | 0                           | NR               |
| 365       | 0                           | NR               | 495       | 199                         | NR               | 625       | 352                         | NR               | 755       | 7                           | NR               | 885       | 0                           | NR               |
| 370       | 0                           | NR               | 500       | 230                         | NR               | 630       | 1000                        | NR               | 760       | 6                           | NR               | 890       | 0                           | NR               |
| 375       | 0                           | NR               | 505       | 257                         | NR               | 635       | 711                         | NR               | 765       | 5                           | NR               | 895       | 0                           | NR               |
| 380       | 0                           | NR               | 510       | 278                         | NR               | 640       | 235                         | NR               | 770       | 4                           | NR               | 900       | 0                           | NR               |
| 385       | 0                           | NR               | 515       | 295                         | NR               | 645       | 222                         | NR               | 775       | 4                           | NR               | 905       | 0                           | NR               |
| 390       | 1                           | NR               | 520       | 305                         | NR               | 650       | 198                         | NR               | 780       | 3                           | NR               | 910       | 0                           | NR               |
| 395       | 2                           | NR               | 525       | 313                         | NR               | 655       | 165                         | NR               | 785       | 3                           | NR               | 915       | 0                           | NR               |
| 400       | 3                           | NR               | 530       | 318                         | NR               | 660       | 142                         | NR               | 790       | 2                           | NR               | 920       | 0                           | NR               |
| 405       | 4                           | NR               | 535       | 323                         | NR               | 665       | 120                         | NR               | 795       | 2                           | NR               | 925       | 0                           | NR               |
| 410       | 6                           | NR               | 540       | 327                         | NR               | 670       | 110                         | NR               | 800       | 2                           | NR               | 930       | 0                           | NR               |
| 415       | 9                           | NR               | 545       | 333                         | NR               | 675       | 91                          | NR               | 805       | 2                           | NR               | 935       | 0                           | NR               |
| 420       | 15                          | NR               | 550       | 339                         | NR               | 680       | 77                          | NR               | 810       | 1                           | NR               | 940       | 0                           | NR               |
| 425       | 27                          | NR               | 555       | 343                         | NR               | 685       | 67                          | NR               | 815       | 1                           | NR               | 945       | 0                           | NR               |
| 430       | 48                          | NR               | 560       | 349                         | NR               | 690       | 57                          | NR               | 820       | 1                           | NR               | 950       | 0                           | NR               |
| 435       | 87                          | NR               | 565       | 355                         | NR               | 695       | 49                          | NR               | 825       | 1                           | NR               | 955       | 0                           | NR               |
| 440       | 155                         | NR               | 570       | 358                         | NR               | 700       | 42                          | NR               | 830       | 1                           | NR               | 960       | 0                           | NR               |
| 445       | 291                         | NR               | 575       | 363                         | NR               | 705       | 36                          | NR               | 835       | 1                           | NR               | 965       | 0                           | NR               |
| 450       | 475                         | NR               | 580       | 365                         | NR               | 710       | 30                          | NR               | 840       | 1                           | NR               | 970       | 0                           | NR               |
| 455       | 466                         | NR               | 585       | 367                         | NR               | 715       | 26                          | NR               | 845       | 1                           | NR               | 975       | 0                           | NR               |
| 460       | 308                         | NR               | 590       | 367                         | NR               | 720       | 22                          | NR               | 850       | 0                           | NR               | 980       | 0                           | NR               |
| 465       | 246                         | NR               | 595       | 364                         | NR               | 725       | 19                          | NR               | 855       | 0                           | NR               | 985       | 0                           | NR               |
| 470       | 202                         | NR               | 600       | 363                         | NR               | 730       | 16                          | NR               | 860       | 0                           | NR               | 990       | 0                           | NR               |
| 475       | 152                         | NR               | 605       | 361                         | NR               | 735       | 14                          | NR               | 865       | 0                           | NR               | 995       | 0                           | NR               |
| 480       | 140                         | NR               | 610       | 391                         | NR               | 740       | 11                          | NR               | 870       | 0                           | NR               | 1000      | 0                           | NR               |
| 485       | 152                         | NR               | 615       | 418                         | NR               | 745       | 10                          | NR               | 875       | 0                           | NR               |           |                             |                  |

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TM-30-18

### Summary

$R_f = 90.3$   
 $R_g = 99.3$   
 $CIE\ R_a = 93.6$   
 $R_9 = 65.5$



### Color Vector Graphics



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

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 93 | CES51 = 97 | CES76 = 85 |
| CES02 = 62 | CES27 = 90 | CES52 = 99 | CES77 = 87 |
| CES03 = 31 | CES28 = 95 | CES53 = 97 | CES78 = 82 |
| CES04 = 69 | CES29 = 96 | CES54 = 92 | CES79 = 93 |
| CES05 = 49 | CES30 = 89 | CES55 = 90 | CES80 = 92 |
| CES06 = 50 | CES31 = 97 | CES56 = 94 | CES81 = 80 |
| CES07 = 42 | CES32 = 89 | CES57 = 92 | CES82 = 96 |
| CES08 = 41 | CES33 = 98 | CES58 = 92 | CES83 = 96 |
| CES09 = 29 | CES34 = 93 | CES59 = 97 | CES84 = 93 |
| CES10 = 74 | CES35 = 95 | CES60 = 91 | CES85 = 80 |
| CES11 = 57 | CES36 = 77 | CES61 = 91 | CES86 = 84 |
| CES12 = 63 | CES37 = 94 | CES62 = 83 | CES87 = 91 |
| CES13 = 43 | CES38 = 83 | CES63 = 91 | CES88 = 98 |
| CES14 = 74 | CES39 = 99 | CES64 = 88 | CES89 = 85 |
| CES15 = 71 | CES40 = 98 | CES65 = 87 | CES90 = 96 |
| CES16 = 47 | CES41 = 96 | CES66 = 84 | CES91 = 70 |
| CES17 = 49 | CES42 = 92 | CES67 = 83 | CES92 = 76 |
| CES18 = 56 | CES43 = 93 | CES68 = 86 | CES93 = 85 |
| CES19 = 71 | CES44 = 99 | CES69 = 87 | CES94 = 76 |
| CES20 = 66 | CES45 = 97 | CES70 = 84 | CES95 = 81 |
| CES21 = 85 | CES46 = 97 | CES71 = 76 | CES96 = 92 |
| CES22 = 78 | CES47 = 94 | CES72 = 93 | CES97 = 95 |
| CES23 = 91 | CES48 = 89 | CES73 = 78 | CES98 = 95 |
| CES24 = 90 | CES49 = 96 | CES74 = 90 | CES99 = 93 |
| CES25 = 71 | CES50 = 98 | CES75 = 79 |            |



**Color Rendition by Hue-Angle Bin**


**Measure Comparisons**



(END OF REPORT)