

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: P982822

Luminaire Tested: 22CZ-LD5-39-UNV-L835-SQP-CD1-U

Issue Date: 04/23/2025

**Test Information**

Test Method: LM-79-2019  
Report Number: P982822  
Test Lab: INNOVATION CENTER(P3)  
Issue Date: 04/23/2025  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: METALUX  
Catalog Number: 22CZ-LD5-39-UNV-L835-SQP-CD1-U  
Description: METALUX CRUZE 2x2 3900LM PACKAGE 80CRI 3500K TROFFER LENS WITH SQUARE PATTERN  
Light Source: 3500K CCT, 80 CRI LEDS  
Ballast/Driver: -

**Summary**

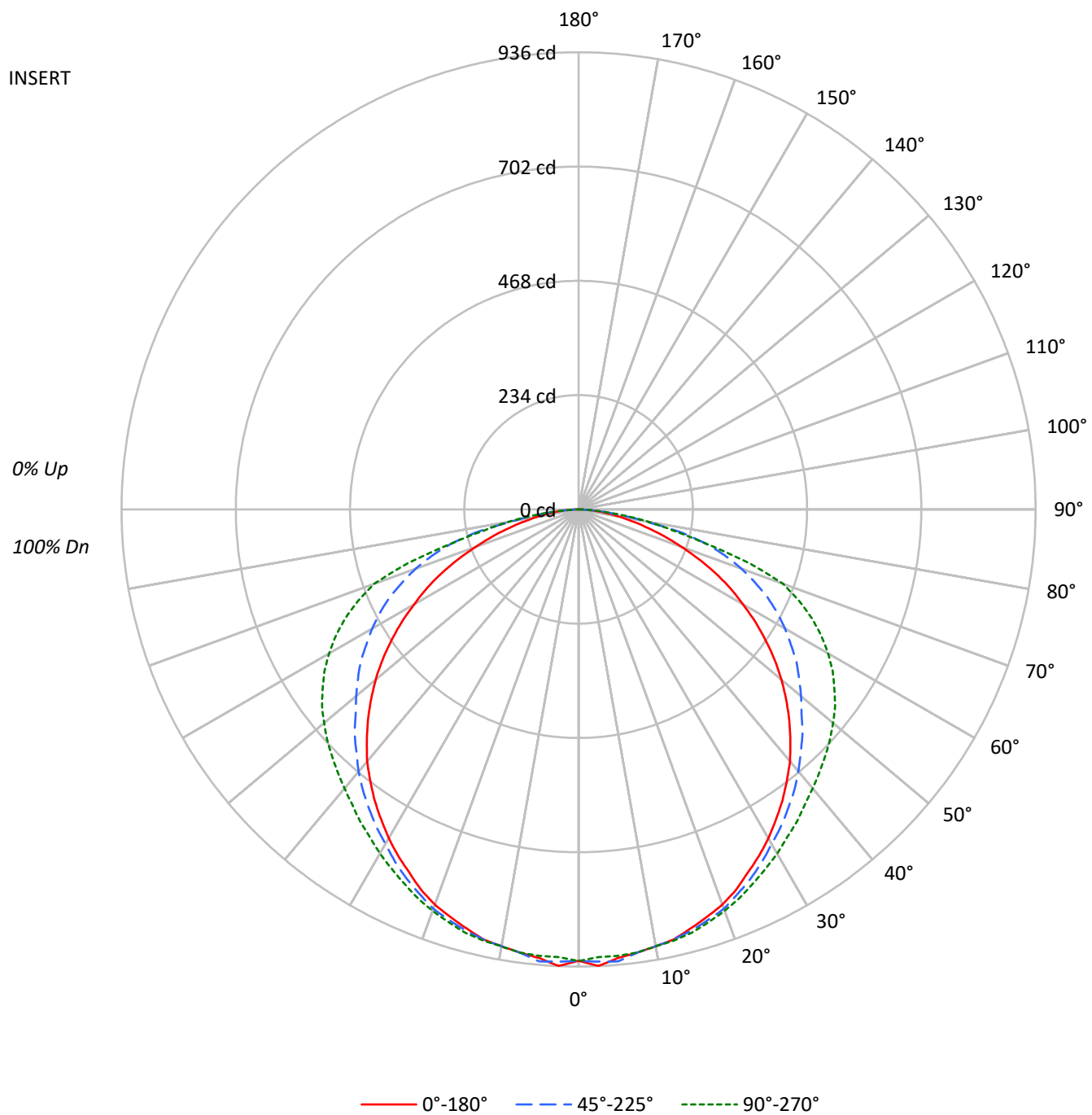
Lumens per Lamp: N/A  
Luminaire Lumens: 2910.2 lumens  
Efficiency: N/A  
Efficacy: 102.1 lumens/watt  
Spacing Criteria (0/90/45): 1.25 / 1.31 / 1.41  
Luminous Opening: Rectangular (W 2' x L: 2' x H: 0')  
CIE Type: Direct

Input Watts (W): 28.5  
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: 22CZ-LD5-39-UNV-L835-SQP-CD1-U

### Luminous Intensity Polar Plot



TEST NUMBER: P982822

CATALOG NUMBER: 22CZ-LD5-39-UNV-L835-SQP-CD1-U

**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  | 105 | 101 | 97  | 93  | 97  | 93  | 90  | 93  | 90  | 87  | 89  | 87  | 85  | 83  |    |    |
| 2   | 98  | 89  | 82  | 76  | 95  | 87  | 81  | 75  | 84  | 78  | 73  | 80  | 76  | 71  | 77  | 73  | 70  | 68  |    |    |
| 3   | 89  | 78  | 69  | 62  | 86  | 76  | 68  | 62  | 73  | 66  | 61  | 70  | 64  | 59  | 68  | 63  | 58  | 56  |    |    |
| 4   | 81  | 68  | 59  | 52  | 79  | 67  | 58  | 52  | 64  | 57  | 51  | 62  | 56  | 50  | 60  | 54  | 50  | 47  |    |    |
| 5   | 74  | 61  | 52  | 45  | 72  | 60  | 51  | 44  | 58  | 50  | 44  | 56  | 49  | 43  | 54  | 48  | 43  | 41  |    |    |
| 6   | 68  | 55  | 45  | 39  | 66  | 54  | 45  | 39  | 52  | 44  | 38  | 50  | 43  | 38  | 48  | 42  | 37  | 35  |    |    |
| 7   | 63  | 49  | 40  | 34  | 62  | 49  | 40  | 34  | 47  | 39  | 34  | 45  | 39  | 33  | 44  | 38  | 33  | 31  |    |    |
| 8   | 59  | 45  | 36  | 30  | 57  | 44  | 36  | 30  | 43  | 35  | 30  | 42  | 35  | 30  | 40  | 34  | 29  | 28  |    |    |
| 9   | 55  | 41  | 33  | 27  | 54  | 41  | 33  | 27  | 39  | 32  | 27  | 38  | 32  | 27  | 37  | 31  | 27  | 25  |    |    |
| 10  | 51  | 38  | 30  | 24  | 50  | 37  | 30  | 24  | 36  | 29  | 24  | 35  | 29  | 24  | 35  | 28  | 24  | 22  |    |    |

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

|     | 0°   | 45°  | 90°  |
|-----|------|------|------|
| 0°  | 2488 | 2488 | 2488 |
| 5°  | 2491 | 2509 | 2479 |
| 10° | 2482 | 2482 | 2482 |
| 15° | 2474 | 2487 | 2500 |
| 20° | 2466 | 2492 | 2505 |
| 25° | 2436 | 2476 | 2510 |
| 30° | 2416 | 2458 | 2528 |
| 35° | 2391 | 2457 | 2562 |
| 40° | 2366 | 2461 | 2620 |
| 45° | 2322 | 2468 | 2718 |
| 50° | 2271 | 2489 | 2848 |
| 55° | 2195 | 2556 | 3001 |
| 60° | 2093 | 2627 | 3175 |
| 65° | 1972 | 2720 | 3353 |
| 70° | 1760 | 2792 | 3504 |
| 75° | 1527 | 2796 | 2772 |
| 80° | 1296 | 2066 | 2241 |
| 85° | 1115 | 1396 | 1257 |

**MAXIMUM LUMINANCE 45°-90°:**

Horizontal Angle: 90°

Vertical Angle: 70°

Luminance: 3504 cd/sqm

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**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 87.8   | 3.0       |
| 10°-20°   | 252.0  | 8.7       |
| 20°-30°   | 384.1  | 13.2      |
| 30°-40°   | 470.0  | 16.1      |
| 40°-50°   | 505.7  | 17.4      |
| 50°-60°   | 489.8  | 16.8      |
| 60°-70°   | 414.9  | 14.3      |
| 70°-80°   | 250.8  | 8.6       |
| 80°-90°   | 55.1   | 1.9       |
| 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°    | 723.9  | 24.9      |
| 0°-40°    | 1193.9 | 41.0      |
| 0°-60°    | 2189.4 | 75.2      |
| 0°-90°    | 2910.2 | 100.0     |
| 90°-120°  | 0.0    | 0.0       |
| 90°-150°  | 0.0    | 0.0       |
| 90°-180°  | 0.0    | 0.0       |
| 0°-180°   | 2910.2 | 100.0     |

**CANDELA DISTRIBUTION:**

|     | 0°  | 22.5° | 45° | 67.5° | 90° | Flux |
|-----|-----|-------|-----|-------|-----|------|
| 0°  | 924 | 924   | 924 | 924   | 924 |      |
| 5°  | 922 | 922   | 929 | 924   | 918 | 88   |
| 15° | 888 | 890   | 893 | 895   | 897 | 251  |
| 25° | 820 | 825   | 834 | 841   | 845 | 379  |
| 35° | 728 | 732   | 748 | 768   | 780 | 455  |
| 45° | 610 | 622   | 649 | 689   | 714 | 470  |
| 55° | 468 | 488   | 545 | 608   | 640 | 418  |
| 65° | 310 | 344   | 427 | 495   | 527 | 305  |
| 75° | 147 | 199   | 269 | 273   | 267 | 158  |
| 85° | 36  | 43    | 45  | 43    | 41  | 41   |
| 90° | 0   | 0     | 0   | 0     | 0   |      |

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**CANDELA DISTRIBUTION (FULL):**

|       | 0°    | 22.5° | 45°   | 67.5° | 90°   |
|-------|-------|-------|-------|-------|-------|
| 0°    | 924.4 | 924.4 | 924.4 | 924.4 | 924.4 |
| 2.5°  | 935.6 | 933.5 | 926.7 | 922.2 | 917.6 |
| 5°    | 922.2 | 922.2 | 929.0 | 924.4 | 917.6 |
| 7.5°  | 915.4 | 915.4 | 915.4 | 926.7 | 915.4 |
| 10°   | 908.5 | 910.8 | 908.5 | 917.6 | 908.5 |
| 12.5° | 901.7 | 901.7 | 901.7 | 904.0 | 904.0 |
| 15°   | 888.1 | 890.4 | 892.7 | 894.9 | 897.2 |
| 17.5° | 874.7 | 877.0 | 881.5 | 883.8 | 886.0 |
| 20°   | 861.1 | 863.4 | 870.2 | 870.2 | 874.7 |
| 22.5° | 842.9 | 842.9 | 852.0 | 854.3 | 861.1 |
| 25°   | 820.4 | 825.0 | 834.0 | 840.7 | 845.2 |
| 27.5° | 800.0 | 804.6 | 813.6 | 822.7 | 829.5 |
| 30°   | 777.5 | 782.1 | 790.9 | 804.6 | 813.6 |
| 32.5° | 752.6 | 757.1 | 770.7 | 786.6 | 795.5 |
| 35°   | 727.8 | 732.3 | 748.0 | 768.4 | 779.8 |
| 37.5° | 700.6 | 707.4 | 725.5 | 748.0 | 761.6 |
| 40°   | 673.5 | 680.3 | 700.6 | 725.5 | 745.7 |
| 42.5° | 641.9 | 650.8 | 673.5 | 707.4 | 730.1 |
| 45°   | 610.2 | 621.5 | 648.6 | 689.4 | 714.2 |
| 47.5° | 576.3 | 587.7 | 619.2 | 671.2 | 698.3 |
| 50°   | 542.5 | 555.9 | 594.5 | 650.8 | 680.3 |
| 52.5° | 506.2 | 519.8 | 569.5 | 630.6 | 662.2 |
| 55°   | 467.8 | 488.2 | 544.8 | 607.9 | 639.7 |
| 57.5° | 429.4 | 452.1 | 515.3 | 583.1 | 617.0 |
| 60°   | 388.8 | 415.8 | 488.2 | 555.9 | 589.9 |
| 62.5° | 350.4 | 379.7 | 458.7 | 526.6 | 560.4 |
| 65°   | 309.7 | 343.6 | 427.1 | 495.0 | 526.6 |
| 67.5° | 266.6 | 309.7 | 391.0 | 456.4 | 488.2 |
| 70°   | 223.7 | 273.4 | 354.9 | 415.8 | 445.3 |
| 72.5° | 185.3 | 237.3 | 314.1 | 366.1 | 366.1 |
| 75°   | 146.9 | 198.9 | 268.9 | 273.4 | 266.6 |
| 77.5° | 113.1 | 162.8 | 210.3 | 192.1 | 196.6 |
| 80°   | 83.6  | 124.2 | 133.3 | 140.1 | 144.6 |
| 82.5° | 56.5  | 83.6  | 85.8  | 90.4  | 90.4  |
| 85°   | 36.1  | 42.9  | 45.2  | 42.9  | 40.7  |
| 87.5° | 15.9  | 18.2  | 13.6  | 9.1   | 6.8   |
| 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: SP3-2508-516-6

Test Date: 09/03/2025

Luminaire Tested: 24CZ-LD5-65-S-UNV-L935-CD1-U

Data in this report applies to families of products including 24CZ-LD5-65-S-UNV-L935-CD1-U

### Test Information

Test Method: LM-79-2019  
 Report Number: SP3-2508-516-6  
 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-L935-CD1-U**  
 Description: 2X4 CRUZE SB 6500LM 935 SMOOTH LENS

### Spectral Parameters

CCT (K): 3412  
 CIE  $u'$ : 0.2386  
 CIE  $v'$ : 0.5111  
 Duv: -0.0015  
 CIE x: 0.4087  
 CIE y: 0.3890  
 CIE z: 0.2023  
 Peak Wavelength (nm): 630  
 Dominant Wavelength (nm): 581  
 Purity: 39.41044  
 R<sub>f</sub>: 92.6  
 R<sub>g</sub>: 102

CRI (Ra): 96.3  
 R1: 99.2  
 R2: 97.9  
 R3: 94.7  
 R4: 96.6  
 R5: 98.4  
 R6: 96.1  
 R7: 95.6  
 R8: 92.0  
 R9: 78.4  
 R10: 93.0  
 R11: 94.5  
 R12: 81.5  
 R13: 99.0  
 R14: 95.8  
 R15: 96.7



### Test Conditions

Stabilization Time: 20M  
 Operation Time: 1H 20M  
 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**



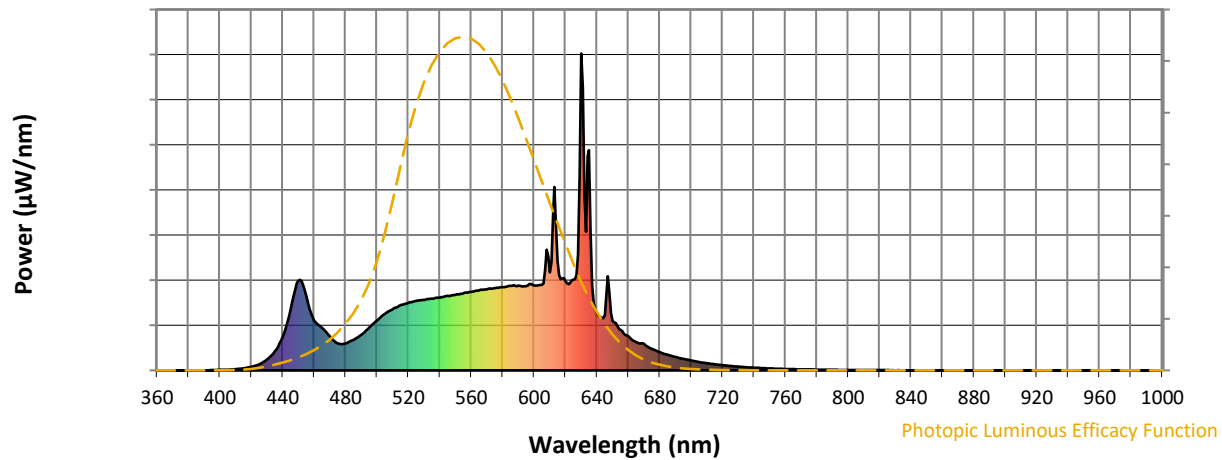
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 3500K 4-step quadrangle

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### Photopic Flux vs. Wavelength



### Photopic Lumens: NR

| $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) | $\lambda$<br>(nm) | Power<br>$\text{W}^{\wedge}/\text{nm}$ | Lumens<br>( $\phi/\text{nm}$ ) |
|-------------------|----------------------------------------|--------------------------------|-------------------|----------------------------------------|--------------------------------|-------------------|----------------------------------------|--------------------------------|-------------------|----------------------------------------|--------------------------------|-------------------|----------------------------------------|--------------------------------|
| 360               | 0                                      | NR                             | 490               | 112                                    | NR                             | 620               | 281                                    | NR                             | 750               | 6                                      | NR                             | 880               | 0                                      | NR                             |
| 365               | 0                                      | NR                             | 495               | 134                                    | NR                             | 625               | 286                                    | NR                             | 755               | 5                                      | NR                             | 885               | 0                                      | NR                             |
| 370               | 0                                      | NR                             | 500               | 157                                    | NR                             | 630               | 1000                                   | NR                             | 760               | 4                                      | NR                             | 890               | 0                                      | NR                             |
| 375               | 0                                      | NR                             | 505               | 178                                    | NR                             | 635               | 695                                    | NR                             | 765               | 4                                      | NR                             | 895               | 0                                      | NR                             |
| 380               | 0                                      | NR                             | 510               | 193                                    | NR                             | 640               | 181                                    | NR                             | 770               | 3                                      | NR                             | 900               | 0                                      | NR                             |
| 385               | 0                                      | NR                             | 515               | 206                                    | NR                             | 645               | 175                                    | NR                             | 775               | 3                                      | NR                             | 905               | 0                                      | NR                             |
| 390               | 0                                      | NR                             | 520               | 213                                    | NR                             | 650               | 156                                    | NR                             | 780               | 2                                      | NR                             | 910               | 0                                      | NR                             |
| 395               | 1                                      | NR                             | 525               | 219                                    | NR                             | 655               | 127                                    | NR                             | 785               | 2                                      | NR                             | 915               | 0                                      | NR                             |
| 400               | 2                                      | NR                             | 530               | 223                                    | NR                             | 660               | 108                                    | NR                             | 790               | 2                                      | NR                             | 920               | 0                                      | NR                             |
| 405               | 2                                      | NR                             | 535               | 226                                    | NR                             | 665               | 89                                     | NR                             | 795               | 2                                      | NR                             | 925               | 0                                      | NR                             |
| 410               | 4                                      | NR                             | 540               | 230                                    | NR                             | 670               | 84                                     | NR                             | 800               | 1                                      | NR                             | 930               | 0                                      | NR                             |
| 415               | 6                                      | NR                             | 545               | 235                                    | NR                             | 675               | 67                                     | NR                             | 805               | 1                                      | NR                             | 935               | 0                                      | NR                             |
| 420               | 11                                     | NR                             | 550               | 239                                    | NR                             | 680               | 57                                     | NR                             | 810               | 1                                      | NR                             | 940               | 0                                      | NR                             |
| 425               | 19                                     | NR                             | 555               | 243                                    | NR                             | 685               | 50                                     | NR                             | 815               | 1                                      | NR                             | 945               | 0                                      | NR                             |
| 430               | 34                                     | NR                             | 560               | 248                                    | NR                             | 690               | 42                                     | NR                             | 820               | 1                                      | NR                             | 950               | 0                                      | NR                             |
| 435               | 60                                     | NR                             | 565               | 253                                    | NR                             | 695               | 36                                     | NR                             | 825               | 1                                      | NR                             | 955               | 0                                      | NR                             |
| 440               | 106                                    | NR                             | 570               | 256                                    | NR                             | 700               | 31                                     | NR                             | 830               | 0                                      | NR                             | 960               | 0                                      | NR                             |
| 445               | 193                                    | NR                             | 575               | 260                                    | NR                             | 705               | 26                                     | NR                             | 835               | 0                                      | NR                             | 965               | 0                                      | NR                             |
| 450               | 283                                    | NR                             | 580               | 263                                    | NR                             | 710               | 22                                     | NR                             | 840               | 0                                      | NR                             | 970               | 0                                      | NR                             |
| 455               | 234                                    | NR                             | 585               | 266                                    | NR                             | 715               | 19                                     | NR                             | 845               | 0                                      | NR                             | 975               | 0                                      | NR                             |
| 460               | 157                                    | NR                             | 590               | 267                                    | NR                             | 720               | 16                                     | NR                             | 850               | 0                                      | NR                             | 980               | 0                                      | NR                             |
| 465               | 134                                    | NR                             | 595               | 266                                    | NR                             | 725               | 14                                     | NR                             | 855               | 0                                      | NR                             | 985               | 0                                      | NR                             |
| 470               | 107                                    | NR                             | 600               | 268                                    | NR                             | 730               | 12                                     | NR                             | 860               | 0                                      | NR                             | 990               | 0                                      | NR                             |
| 475               | 85                                     | NR                             | 605               | 269                                    | NR                             | 735               | 10                                     | NR                             | 865               | 0                                      | NR                             | 995               | 0                                      | NR                             |
| 480               | 85                                     | NR                             | 610               | 309                                    | NR                             | 740               | 8                                      | NR                             | 870               | 0                                      | NR                             | 1000              | 0                                      | NR                             |
| 485               | 96                                     | NR                             | 615               | 345                                    | NR                             | 745               | 7                                      | NR                             | 875               | 0                                      | NR                             |                   |                                        |                                |

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### Scotopic Flux vs. Wavelength



Scotopic Lumens: NR

S/P: 1.61

| 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    | 112                      | NR            | 620    | 281                      | NR            | 750    | 6                        | NR            | 880    | 0                        | NR            |
| 365    | 0                        | NR            | 495    | 134                      | NR            | 625    | 286                      | NR            | 755    | 5                        | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 157                      | NR            | 630    | 1000                     | NR            | 760    | 4                        | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 178                      | NR            | 635    | 695                      | NR            | 765    | 4                        | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 193                      | NR            | 640    | 181                      | NR            | 770    | 3                        | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 206                      | NR            | 645    | 175                      | NR            | 775    | 3                        | NR            | 905    | 0                        | NR            |
| 390    | 0                        | NR            | 520    | 213                      | NR            | 650    | 156                      | NR            | 780    | 2                        | NR            | 910    | 0                        | NR            |
| 395    | 1                        | NR            | 525    | 219                      | NR            | 655    | 127                      | NR            | 785    | 2                        | NR            | 915    | 0                        | NR            |
| 400    | 2                        | NR            | 530    | 223                      | NR            | 660    | 108                      | NR            | 790    | 2                        | NR            | 920    | 0                        | NR            |
| 405    | 2                        | NR            | 535    | 226                      | NR            | 665    | 89                       | NR            | 795    | 2                        | NR            | 925    | 0                        | NR            |
| 410    | 4                        | NR            | 540    | 230                      | NR            | 670    | 84                       | NR            | 800    | 1                        | NR            | 930    | 0                        | NR            |
| 415    | 6                        | NR            | 545    | 235                      | NR            | 675    | 67                       | NR            | 805    | 1                        | NR            | 935    | 0                        | NR            |
| 420    | 11                       | NR            | 550    | 239                      | NR            | 680    | 57                       | NR            | 810    | 1                        | NR            | 940    | 0                        | NR            |
| 425    | 19                       | NR            | 555    | 243                      | NR            | 685    | 50                       | NR            | 815    | 1                        | NR            | 945    | 0                        | NR            |
| 430    | 34                       | NR            | 560    | 248                      | NR            | 690    | 42                       | NR            | 820    | 1                        | NR            | 950    | 0                        | NR            |
| 435    | 60                       | NR            | 565    | 253                      | NR            | 695    | 36                       | NR            | 825    | 1                        | NR            | 955    | 0                        | NR            |
| 440    | 106                      | NR            | 570    | 256                      | NR            | 700    | 31                       | NR            | 830    | 0                        | NR            | 960    | 0                        | NR            |
| 445    | 193                      | NR            | 575    | 260                      | NR            | 705    | 26                       | NR            | 835    | 0                        | NR            | 965    | 0                        | NR            |
| 450    | 283                      | NR            | 580    | 263                      | NR            | 710    | 22                       | NR            | 840    | 0                        | NR            | 970    | 0                        | NR            |
| 455    | 234                      | NR            | 585    | 266                      | NR            | 715    | 19                       | NR            | 845    | 0                        | NR            | 975    | 0                        | NR            |
| 460    | 157                      | NR            | 590    | 267                      | NR            | 720    | 16                       | NR            | 850    | 0                        | NR            | 980    | 0                        | NR            |
| 465    | 134                      | NR            | 595    | 266                      | NR            | 725    | 14                       | NR            | 855    | 0                        | NR            | 985    | 0                        | NR            |
| 470    | 107                      | NR            | 600    | 268                      | NR            | 730    | 12                       | NR            | 860    | 0                        | NR            | 990    | 0                        | NR            |
| 475    | 85                       | NR            | 605    | 269                      | NR            | 735    | 10                       | NR            | 865    | 0                        | NR            | 995    | 0                        | NR            |
| 480    | 85                       | NR            | 610    | 309                      | NR            | 740    | 8                        | NR            | 870    | 0                        | NR            | 1000   | 0                        | NR            |
| 485    | 96                       | NR            | 615    | 345                      | NR            | 745    | 7                        | NR            | 875    | 0                        | NR            |        |                          |               |

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### Melanopic Flux vs. Wavelength



Melanopic Lumens: NR

M/P: 3.24

| 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    | 112                      | NR            | 620    | 281                      | NR            | 750    | 6                        | NR            | 880    | 0                        | NR            |
| 365    | 0                        | NR            | 495    | 134                      | NR            | 625    | 286                      | NR            | 755    | 5                        | NR            | 885    | 0                        | NR            |
| 370    | 0                        | NR            | 500    | 157                      | NR            | 630    | 1000                     | NR            | 760    | 4                        | NR            | 890    | 0                        | NR            |
| 375    | 0                        | NR            | 505    | 178                      | NR            | 635    | 695                      | NR            | 765    | 4                        | NR            | 895    | 0                        | NR            |
| 380    | 0                        | NR            | 510    | 193                      | NR            | 640    | 181                      | NR            | 770    | 3                        | NR            | 900    | 0                        | NR            |
| 385    | 0                        | NR            | 515    | 206                      | NR            | 645    | 175                      | NR            | 775    | 3                        | NR            | 905    | 0                        | NR            |
| 390    | 0                        | NR            | 520    | 213                      | NR            | 650    | 156                      | NR            | 780    | 2                        | NR            | 910    | 0                        | NR            |
| 395    | 1                        | NR            | 525    | 219                      | NR            | 655    | 127                      | NR            | 785    | 2                        | NR            | 915    | 0                        | NR            |
| 400    | 2                        | NR            | 530    | 223                      | NR            | 660    | 108                      | NR            | 790    | 2                        | NR            | 920    | 0                        | NR            |
| 405    | 2                        | NR            | 535    | 226                      | NR            | 665    | 89                       | NR            | 795    | 2                        | NR            | 925    | 0                        | NR            |
| 410    | 4                        | NR            | 540    | 230                      | NR            | 670    | 84                       | NR            | 800    | 1                        | NR            | 930    | 0                        | NR            |
| 415    | 6                        | NR            | 545    | 235                      | NR            | 675    | 67                       | NR            | 805    | 1                        | NR            | 935    | 0                        | NR            |
| 420    | 11                       | NR            | 550    | 239                      | NR            | 680    | 57                       | NR            | 810    | 1                        | NR            | 940    | 0                        | NR            |
| 425    | 19                       | NR            | 555    | 243                      | NR            | 685    | 50                       | NR            | 815    | 1                        | NR            | 945    | 0                        | NR            |
| 430    | 34                       | NR            | 560    | 248                      | NR            | 690    | 42                       | NR            | 820    | 1                        | NR            | 950    | 0                        | NR            |
| 435    | 60                       | NR            | 565    | 253                      | NR            | 695    | 36                       | NR            | 825    | 1                        | NR            | 955    | 0                        | NR            |
| 440    | 106                      | NR            | 570    | 256                      | NR            | 700    | 31                       | NR            | 830    | 0                        | NR            | 960    | 0                        | NR            |
| 445    | 193                      | NR            | 575    | 260                      | NR            | 705    | 26                       | NR            | 835    | 0                        | NR            | 965    | 0                        | NR            |
| 450    | 283                      | NR            | 580    | 263                      | NR            | 710    | 22                       | NR            | 840    | 0                        | NR            | 970    | 0                        | NR            |
| 455    | 234                      | NR            | 585    | 266                      | NR            | 715    | 19                       | NR            | 845    | 0                        | NR            | 975    | 0                        | NR            |
| 460    | 157                      | NR            | 590    | 267                      | NR            | 720    | 16                       | NR            | 850    | 0                        | NR            | 980    | 0                        | NR            |
| 465    | 134                      | NR            | 595    | 266                      | NR            | 725    | 14                       | NR            | 855    | 0                        | NR            | 985    | 0                        | NR            |
| 470    | 107                      | NR            | 600    | 268                      | NR            | 730    | 12                       | NR            | 860    | 0                        | NR            | 990    | 0                        | NR            |
| 475    | 85                       | NR            | 605    | 269                      | NR            | 735    | 10                       | NR            | 865    | 0                        | NR            | 995    | 0                        | NR            |
| 480    | 85                       | NR            | 610    | 309                      | NR            | 740    | 8                        | NR            | 870    | 0                        | NR            | 1000   | 0                        | NR            |
| 485    | 96                       | NR            | 615    | 345                      | NR            | 745    | 7                        | NR            | 875    | 0                        | NR            |        |                          |               |

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TM-30-18

### Summary

$R_f = 92.6$   
 $R_g = 102$   
 $\text{CIE } R_a = 96.3$   
 $R_9 = 78.4$



### Color Vector Graphics



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

|            |            |             |            |
|------------|------------|-------------|------------|
| CES01 = 86 | CES26 = 94 | CES51 = 97  | CES76 = 88 |
| CES02 = 63 | CES27 = 93 | CES52 = 96  | CES77 = 88 |
| CES03 = 32 | CES28 = 96 | CES53 = 95  | CES78 = 84 |
| CES04 = 70 | CES29 = 95 | CES54 = 95  | CES79 = 92 |
| CES05 = 50 | CES30 = 96 | CES55 = 95  | CES80 = 92 |
| CES06 = 51 | CES31 = 95 | CES56 = 98  | CES81 = 77 |
| CES07 = 43 | CES32 = 87 | CES57 = 98  | CES82 = 96 |
| CES08 = 42 | CES33 = 97 | CES58 = 98  | CES83 = 95 |
| CES09 = 29 | CES34 = 93 | CES59 = 100 | CES84 = 95 |
| CES10 = 75 | CES35 = 96 | CES60 = 94  | CES85 = 82 |
| CES11 = 58 | CES36 = 84 | CES61 = 95  | CES86 = 84 |
| CES12 = 64 | CES37 = 93 | CES62 = 90  | CES87 = 92 |
| CES13 = 44 | CES38 = 91 | CES63 = 95  | CES88 = 99 |
| CES14 = 74 | CES39 = 98 | CES64 = 95  | CES89 = 86 |
| CES15 = 72 | CES40 = 96 | CES65 = 92  | CES90 = 98 |
| CES16 = 48 | CES41 = 97 | CES66 = 93  | CES91 = 77 |
| CES17 = 49 | CES42 = 90 | CES67 = 92  | CES92 = 81 |
| CES18 = 56 | CES43 = 91 | CES68 = 91  | CES93 = 88 |
| CES19 = 71 | CES44 = 99 | CES69 = 92  | CES94 = 78 |
| CES20 = 67 | CES45 = 94 | CES70 = 89  | CES95 = 86 |
| CES21 = 86 | CES46 = 95 | CES71 = 85  | CES96 = 93 |
| CES22 = 78 | CES47 = 90 | CES72 = 95  | CES97 = 93 |
| CES23 = 91 | CES48 = 96 | CES73 = 84  | CES98 = 96 |
| CES24 = 90 | CES49 = 93 | CES74 = 91  | CES99 = 97 |
| CES25 = 71 | CES50 = 97 | CES75 = 86  |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)