

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



Scaled data based on original data using  
LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for  
Cooper Lighting Solutions  
(formerly Eaton)

Brand: INVUE

Report Number: P472245

Luminaire Tested: **CCP-VA1-835-U-T2**

Issue Date: 01/27/2021



**Test Information**

Test Method: LM-79-08  
Report Number: P472245  
Test Lab: INNOVATION CENTER(G3)  
Issue Date: 01/27/2021  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: INVUE  
Catalog Number: CCP-VA1-835-U-T2  
Description: INVUE CLEARCURVE POLE MOUNT Wave Stream LUMINAIRE WITH T2  
DISTRIBUTION LENS  
Light Source: 3500K CCT, 80 CRI LEDS  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 2587.1 lumens  
Efficiency: N/A  
Efficacy: 86.8 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 0.54' x H: 0')  
IES Classification: Type II - Short  
BUG Rating: B2 - U0 - G2

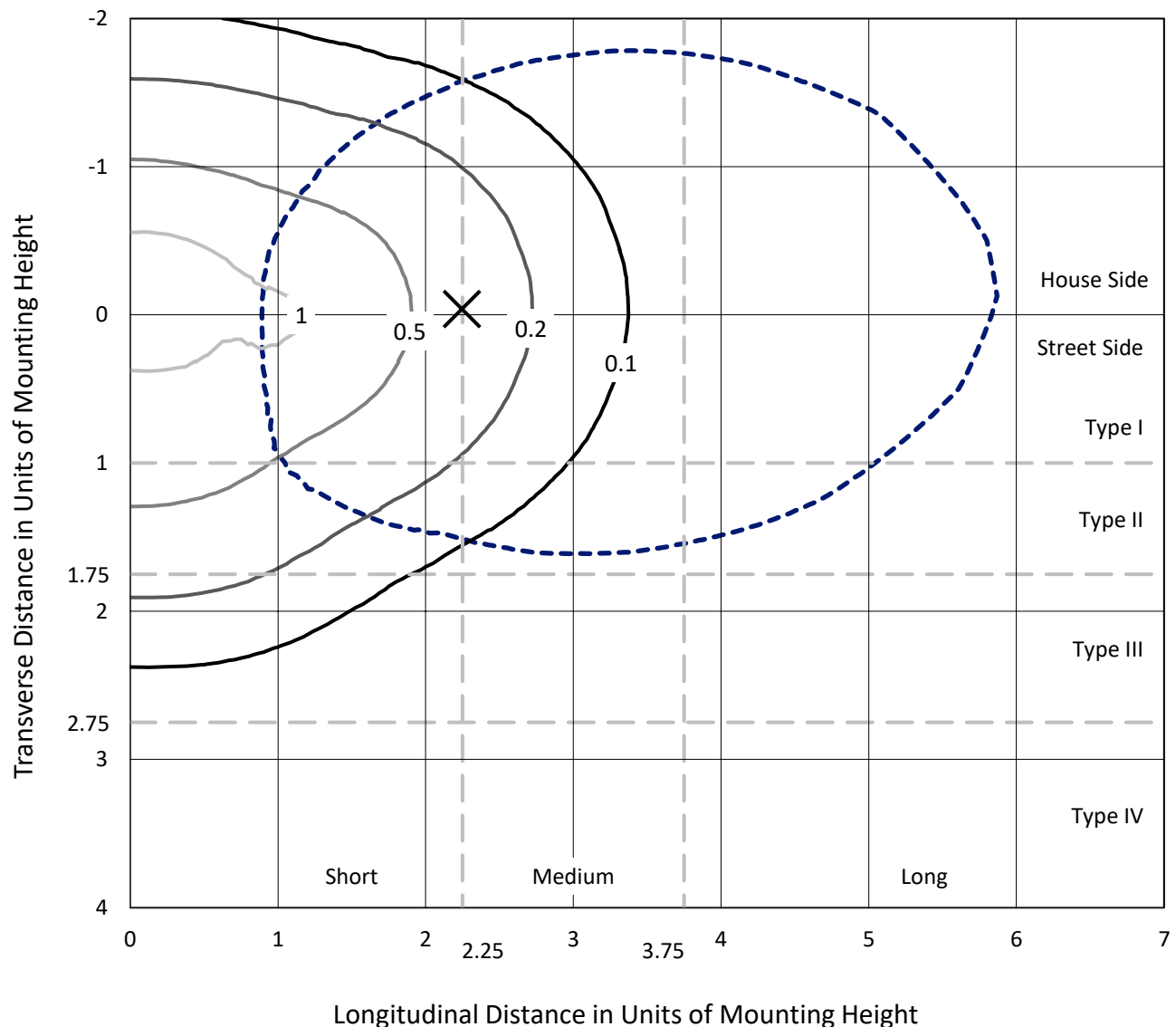
Input Watts (W): 29.8  
Input Voltage (V): 120  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 25 FT

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CATALOG NUMBER: CCP-VA1-835-U-T2

## Iso-Footcandle Lines of Horizontal Illumination

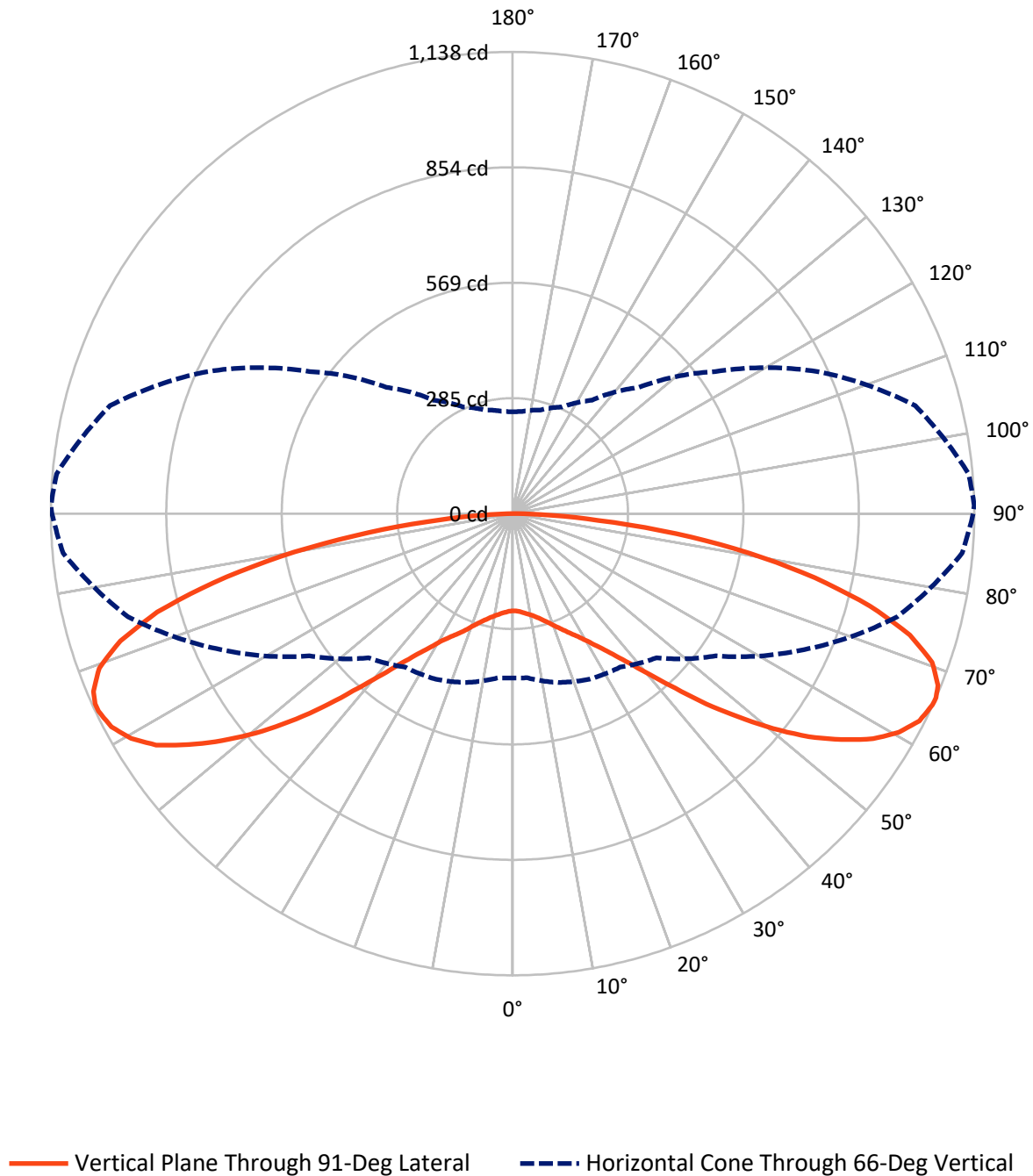
× Max cd  
 - - - 1/2 Max cd



Based on 15 foot mounting height. Maximum calculated value = 1.1 fc  
 Type II - Short - N/A

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CATALOG NUMBER: CCP-VA1-835-U-T2

## Luminous Intensity Polar Plot



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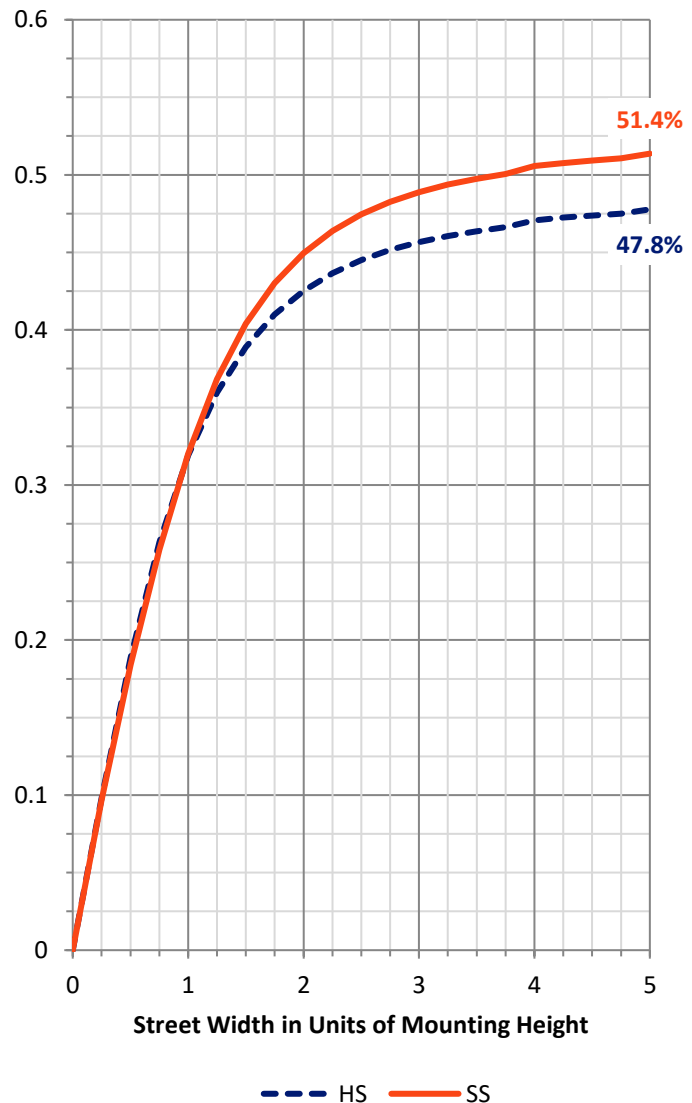
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 1248.7   | 0.0    | 1248.7 |
|                    | % Fixture | 48.3     | 0.0    | 48.3   |
| <b>Street Side</b> | Lumens    | 1338.4   | 0.0    | 1338.4 |
|                    | % Fixture | 51.7     | 0.0    | 51.7   |
| <b>Total</b>       | Lumens    | 2587.1   | 0.0    | 2587.1 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 23.6   | 0.9       |
| 10°-20°   | 77.2   | 3.0       |
| 20°-30°   | 149.4  | 5.8       |
| 30°-40°   | 245.1  | 9.5       |
| 40°-50°   | 388.2  | 15.0      |
| 50°-60°   | 535.3  | 20.7      |
| 60°-70°   | 601.1  | 23.2      |
| 70°-80°   | 449.2  | 17.4      |
| 80°-90°   | 118.0  | 4.6       |
| 90°-100°  | 0.0    | 0.0       |
| 100°-110° | 0.0    | 0.0       |
| 110°-120° | 0.0    | 0.0       |
| 120°-130° | 0.0    | 0.0       |
| 130°-140° | 0.0    | 0.0       |
| 140°-150° | 0.0    | 0.0       |
| 150°-160° | 0.0    | 0.0       |
| 160°-170° | 0.0    | 0.0       |
| 170°-180° | 0.0    | 0.0       |
| 0°-90°    | 2587.1 | 100.0     |
| 0°-180°   | 2587.1 | 100.0     |

**Coefficient of Utilization**



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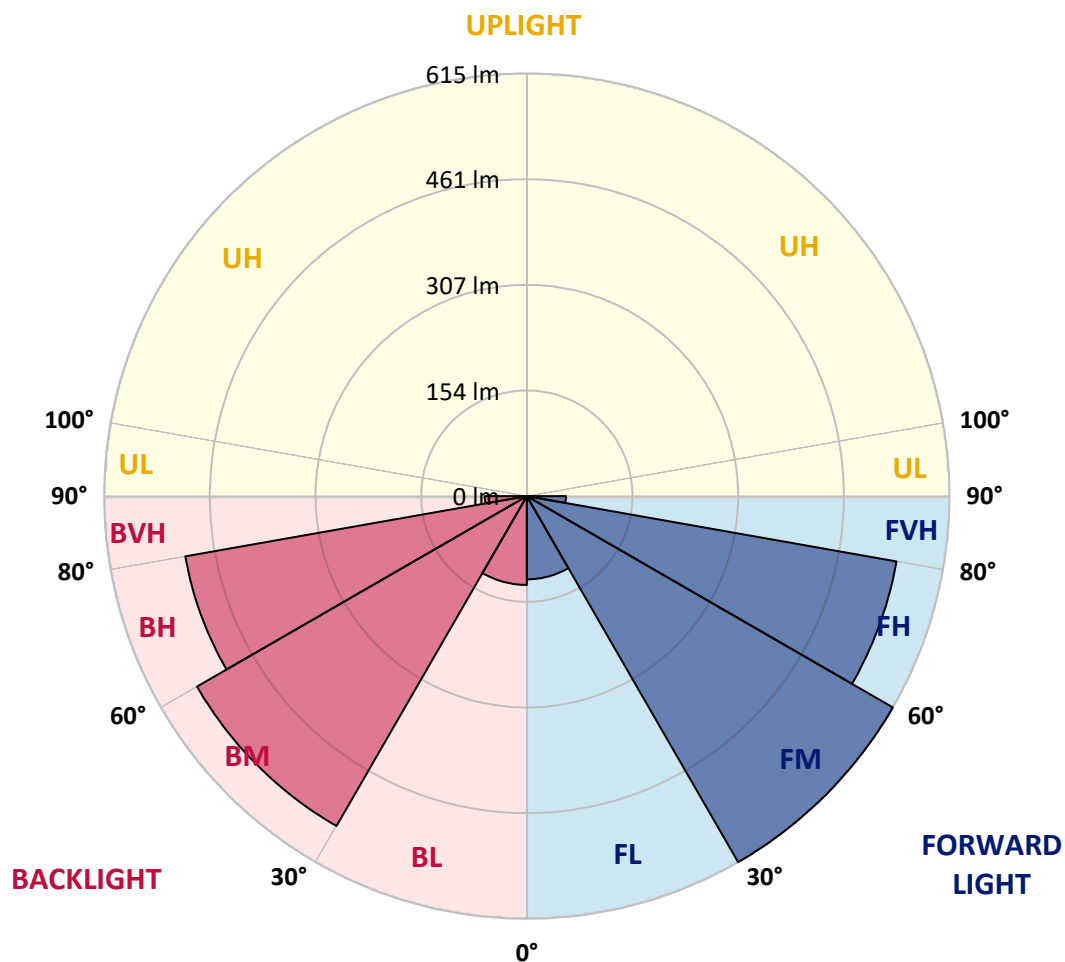
CATALOG NUMBER: CCP-VA1-835-U-T2

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 121.0  | 4.7       |                         |      |         |
| FM   | (30°-60°)   | 614.6  | 23.8      |                         |      |         |
| FH   | (60°-80°)   | 546.0  | 21.1      |                         |      | G0/660  |
| FVH  | (80°-90°)   | 56.8   | 2.2       |                         |      | G1/100  |
| BL   | (0°-30°)    | 129.2  | 5.0       | B1/500                  |      |         |
| BM   | (30°-60°)   | 553.9  | 21.4      | B1/1000                 |      |         |
| BH   | (60°-80°)   | 504.3  | 19.5      | B2/1000                 |      | G2/1000 |
| BVH  | (80°-90°)   | 61.2   | 2.4       |                         |      | G1/100  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B2-U0-G2**

Type II Short



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°    | 5°    | 15°   | 25°   | 35°   | 45°   | 55°   | 65°   | 75°   | 85°    | 90°    |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|
| 0°    | 239.7 | 239.7 | 239.7 | 239.7 | 239.7 | 239.7 | 239.7 | 239.7 | 239.7 | 239.7  | 239.7  |
| 2.5°  | 240.6 | 240.6 | 240.6 | 240.6 | 241.6 | 241.6 | 241.6 | 241.6 | 241.6 | 240.6  | 240.6  |
| 5°    | 242.5 | 242.5 | 242.5 | 242.5 | 243.4 | 243.4 | 243.4 | 243.4 | 244.3 | 244.3  | 244.3  |
| 7.5°  | 244.3 | 244.3 | 245.2 | 245.2 | 246.1 | 246.1 | 247.0 | 247.0 | 248.0 | 248.9  | 248.9  |
| 10°   | 248.0 | 248.0 | 248.9 | 248.9 | 250.7 | 251.6 | 252.5 | 252.5 | 254.4 | 254.4  | 254.4  |
| 12.5° | 252.5 | 253.4 | 254.4 | 255.3 | 257.1 | 258.0 | 258.9 | 259.9 | 260.8 | 261.7  | 261.7  |
| 15°   | 259.9 | 258.9 | 260.8 | 262.6 | 263.5 | 265.3 | 266.3 | 267.2 | 269.0 | 270.8  | 270.8  |
| 17.5° | 265.3 | 266.3 | 267.2 | 269.0 | 270.8 | 273.6 | 275.4 | 277.2 | 279.1 | 280.9  | 280.9  |
| 20°   | 272.7 | 271.7 | 275.4 | 278.1 | 280.0 | 283.6 | 286.4 | 290.0 | 291.9 | 293.7  | 294.6  |
| 22.5° | 279.1 | 280.0 | 281.8 | 285.5 | 289.1 | 294.6 | 300.1 | 302.9 | 305.6 | 307.4  | 310.2  |
| 25°   | 287.3 | 288.2 | 291.0 | 294.6 | 300.1 | 306.5 | 312.9 | 316.6 | 319.3 | 323.0  | 325.7  |
| 27.5° | 295.5 | 295.5 | 300.1 | 305.6 | 312.0 | 320.2 | 327.6 | 331.2 | 335.8 | 340.4  | 342.2  |
| 30°   | 304.7 | 304.7 | 309.3 | 316.6 | 325.7 | 334.9 | 341.3 | 348.6 | 355.0 | 359.6  | 363.2  |
| 32.5° | 318.4 | 318.4 | 323.9 | 331.2 | 341.3 | 352.3 | 361.4 | 368.7 | 377.0 | 385.2  | 392.5  |
| 35°   | 334.0 | 334.9 | 342.2 | 351.3 | 363.2 | 377.0 | 385.2 | 395.3 | 404.4 | 418.1  | 425.5  |
| 37.5° | 358.7 | 359.6 | 367.8 | 379.7 | 391.6 | 406.2 | 420.0 | 431.9 | 445.6 | 461.1  | 466.6  |
| 40°   | 395.3 | 398.0 | 406.2 | 411.7 | 422.7 | 433.7 | 453.8 | 474.0 | 497.7 | 518.8  | 522.4  |
| 42.5° | 461.1 | 458.4 | 452.9 | 451.1 | 453.8 | 465.7 | 487.7 | 518.8 | 560.9 | 587.4  | 587.4  |
| 45°   | 486.8 | 486.8 | 487.7 | 485.8 | 484.0 | 492.3 | 517.9 | 567.3 | 626.8 | 663.4  | 670.7  |
| 47.5° | 491.3 | 492.3 | 500.5 | 507.8 | 509.6 | 518.8 | 549.9 | 614.9 | 694.5 | 748.4  | 753.0  |
| 50°   | 491.3 | 493.2 | 504.1 | 517.0 | 526.1 | 538.9 | 577.3 | 656.9 | 761.3 | 823.5  | 835.4  |
| 52.5° | 489.5 | 491.3 | 503.2 | 518.8 | 533.4 | 551.7 | 601.1 | 700.9 | 820.7 | 904.9  | 910.4  |
| 55°   | 484.9 | 486.8 | 501.4 | 517.9 | 534.3 | 559.0 | 620.3 | 738.4 | 878.4 | 972.6  | 982.7  |
| 57.5° | 479.4 | 482.2 | 497.7 | 515.1 | 530.7 | 560.9 | 633.2 | 767.7 | 925.0 | 1033.0 | 1051.3 |
| 60°   | 468.5 | 473.0 | 490.4 | 507.8 | 522.4 | 554.5 | 639.6 | 790.5 | 959.8 | 1076.9 | 1095.2 |
| 62.5° | 446.5 | 451.1 | 470.3 | 489.5 | 504.1 | 538.9 | 635.9 | 801.5 | 979.9 | 1104.4 | 1123.6 |
| 65°   | 419.1 | 420.9 | 441.9 | 462.1 | 476.7 | 513.3 | 620.3 | 799.7 | 984.5 | 1113.5 | 1135.5 |
| 66°   | 405.3 | 406.2 | 430.9 | 450.2 | 462.1 | 502.3 | 611.2 | 793.3 | 981.8 | 1112.6 | 1135.5 |
| 67.5° | 380.6 | 385.2 | 406.2 | 426.4 | 440.1 | 477.6 | 589.2 | 778.6 | 970.8 | 1103.4 | 1127.2 |
| 70°   | 337.6 | 341.3 | 358.7 | 378.8 | 393.4 | 429.1 | 541.7 | 735.6 | 930.5 | 1065.9 | 1093.4 |
| 72.5° | 291.0 | 293.7 | 312.0 | 326.6 | 335.8 | 374.2 | 484.0 | 665.2 | 860.1 | 995.5  | 1022.0 |
| 75°   | 241.6 | 243.4 | 259.9 | 269.9 | 278.1 | 312.0 | 407.2 | 574.6 | 749.4 | 881.1  | 915.9  |
| 77.5° | 190.3 | 191.2 | 205.0 | 214.1 | 214.1 | 243.4 | 323.0 | 465.7 | 614.9 | 736.5  | 762.2  |
| 80°   | 140.0 | 139.1 | 147.3 | 151.9 | 154.6 | 173.8 | 232.4 | 342.2 | 468.5 | 563.6  | 588.3  |
| 82.5° | 91.5  | 90.6  | 96.1  | 97.9  | 97.9  | 109.8 | 146.4 | 216.8 | 307.4 | 382.5  | 397.1  |
| 85°   | 48.5  | 50.3  | 49.4  | 49.4  | 49.4  | 54.0  | 73.2  | 113.5 | 163.8 | 205.0  | 215.0  |
| 87.5° | 8.2   | 8.2   | 8.2   | 9.1   | 11.0  | 14.6  | 19.2  | 32.0  | 46.7  | 63.1   | 71.4   |
| 90°   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0    | 0.0    |



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**CANDELA DISTRIBUTION (continued):**

|       | 91°    | 95°    | 105°   | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 239.7  | 239.7  | 239.7  | 239.7 | 239.7 | 239.7 | 239.7 | 239.7 | 239.7 | 239.7 | 239.7 |
| 2.5°  | 240.6  | 241.6  | 241.6  | 241.6 | 241.6 | 241.6 | 241.6 | 241.6 | 241.6 | 241.6 | 241.6 |
| 5°    | 244.3  | 244.3  | 244.3  | 245.2 | 245.2 | 245.2 | 245.2 | 245.2 | 245.2 | 245.2 | 245.2 |
| 7.5°  | 248.9  | 248.9  | 249.8  | 249.8 | 249.8 | 250.7 | 250.7 | 249.8 | 249.8 | 249.8 | 249.8 |
| 10°   | 254.4  | 254.4  | 255.3  | 256.2 | 256.2 | 257.1 | 257.1 | 256.2 | 256.2 | 255.3 | 255.3 |
| 12.5° | 261.7  | 262.6  | 263.5  | 264.4 | 265.3 | 265.3 | 264.4 | 263.5 | 262.6 | 261.7 | 261.7 |
| 15°   | 270.8  | 271.7  | 272.7  | 274.5 | 274.5 | 274.5 | 273.6 | 272.7 | 270.8 | 269.9 | 270.8 |
| 17.5° | 281.8  | 282.7  | 284.6  | 285.5 | 286.4 | 285.5 | 285.5 | 284.6 | 284.6 | 283.6 | 283.6 |
| 20°   | 295.5  | 296.4  | 299.2  | 300.1 | 300.1 | 301.0 | 303.8 | 305.6 | 308.3 | 309.3 | 309.3 |
| 22.5° | 309.3  | 311.1  | 313.8  | 317.5 | 319.3 | 323.0 | 323.9 | 325.7 | 324.8 | 322.1 | 322.1 |
| 25°   | 325.7  | 327.6  | 333.0  | 337.6 | 341.3 | 343.1 | 341.3 | 338.5 | 334.0 | 330.3 | 329.4 |
| 27.5° | 343.1  | 345.9  | 354.1  | 360.5 | 362.3 | 360.5 | 353.2 | 346.8 | 341.3 | 336.7 | 334.9 |
| 30°   | 365.1  | 369.6  | 378.8  | 382.5 | 381.5 | 374.2 | 363.2 | 355.0 | 346.8 | 341.3 | 340.4 |
| 32.5° | 392.5  | 397.1  | 405.3  | 406.2 | 400.8 | 387.0 | 372.4 | 361.4 | 351.3 | 344.9 | 344.0 |
| 35°   | 425.5  | 430.0  | 434.6  | 431.9 | 416.3 | 398.9 | 380.6 | 365.1 | 355.0 | 347.7 | 347.7 |
| 37.5° | 467.5  | 470.3  | 470.3  | 456.6 | 432.8 | 409.9 | 387.0 | 368.7 | 357.8 | 350.4 | 349.5 |
| 40°   | 522.4  | 521.5  | 508.7  | 482.2 | 451.1 | 420.0 | 391.6 | 372.4 | 358.7 | 351.3 | 350.4 |
| 42.5° | 588.3  | 581.9  | 554.5  | 511.5 | 468.5 | 429.1 | 397.1 | 373.3 | 357.8 | 350.4 | 349.5 |
| 45°   | 668.8  | 657.9  | 608.5  | 545.3 | 486.8 | 437.4 | 399.8 | 372.4 | 355.0 | 346.8 | 345.9 |
| 47.5° | 748.4  | 742.0  | 674.3  | 581.0 | 505.1 | 446.5 | 401.7 | 369.6 | 349.5 | 337.6 | 337.6 |
| 50°   | 832.6  | 817.1  | 740.2  | 624.0 | 524.3 | 452.9 | 401.7 | 365.1 | 340.4 | 327.6 | 325.7 |
| 52.5° | 914.1  | 898.5  | 807.0  | 667.0 | 545.3 | 459.3 | 399.8 | 358.7 | 332.1 | 318.4 | 316.6 |
| 55°   | 983.6  | 970.8  | 872.0  | 715.5 | 567.3 | 463.9 | 397.1 | 351.3 | 323.9 | 311.1 | 309.3 |
| 57.5° | 1047.6 | 1034.8 | 928.7  | 756.7 | 588.3 | 466.6 | 390.7 | 342.2 | 313.8 | 301.0 | 300.1 |
| 60°   | 1094.3 | 1084.2 | 977.2  | 795.1 | 605.7 | 466.6 | 381.5 | 331.2 | 302.9 | 290.0 | 289.1 |
| 62.5° | 1125.4 | 1115.3 | 1012.0 | 820.7 | 616.7 | 460.2 | 367.8 | 316.6 | 289.1 | 277.2 | 274.5 |
| 65°   | 1137.3 | 1128.2 | 1027.5 | 830.8 | 614.9 | 447.4 | 349.5 | 298.3 | 271.7 | 259.9 | 258.0 |
| 66°   | 1138.2 | 1128.2 | 1027.5 | 829.0 | 610.3 | 440.1 | 341.3 | 290.0 | 264.4 | 252.5 | 250.7 |
| 67.5° | 1130.9 | 1121.7 | 1021.1 | 819.8 | 597.5 | 426.4 | 324.8 | 276.3 | 250.7 | 238.8 | 237.9 |
| 70°   | 1097.0 | 1089.7 | 986.3  | 785.0 | 567.3 | 396.2 | 297.4 | 249.8 | 225.1 | 216.8 | 214.1 |
| 72.5° | 1023.8 | 1015.6 | 916.8  | 720.1 | 517.9 | 355.0 | 262.6 | 218.7 | 198.5 | 188.5 | 187.6 |
| 75°   | 910.4  | 906.7  | 810.7  | 634.1 | 446.5 | 305.6 | 222.3 | 184.8 | 168.4 | 161.0 | 161.0 |
| 77.5° | 762.2  | 754.8  | 673.4  | 524.3 | 366.9 | 247.0 | 178.4 | 150.1 | 137.2 | 130.8 | 131.8 |
| 80°   | 592.9  | 587.4  | 518.8  | 393.4 | 277.2 | 185.7 | 133.6 | 114.4 | 105.2 | 101.6 | 99.7  |
| 82.5° | 406.2  | 391.6  | 345.9  | 260.8 | 180.2 | 125.4 | 92.4  | 79.6  | 75.0  | 74.1  | 73.2  |
| 85°   | 211.4  | 216.8  | 182.1  | 138.2 | 97.9  | 69.5  | 55.8  | 51.2  | 49.4  | 50.3  | 50.3  |
| 87.5° | 69.5   | 71.4   | 54.9   | 42.1  | 32.0  | 24.7  | 21.0  | 20.1  | 17.4  | 19.2  | 20.1  |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |



LM-79-08: Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

INVUE

Report Number: SP1-2005-785-22

Luminaire Tested: WIS-VA3-835-U-T4FT

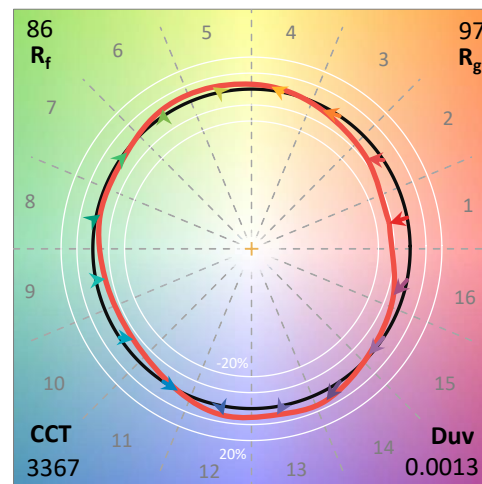
Test Date: 09/08/2020

### Test Information

Test Method: LM-79-08  
 Report Number: SP1-2005-785-22  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1  
 Measurement Geometry:  $4\pi$   
 Issue Date: 09/08/2020  
 Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
 Product Line: INVUE  
 Catalog Number: **WIS-VA-3-835-U-T4FT**  
 Description: INVUE WALL PACK VA

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 3367   | CRI (Ra): | 83.4 |      |      |
| CIE u':                   | 0.2385 | R1:       | 81.2 | R9:  | 7.1  |
| CIE v':                   | 0.5156 | R2:       | 89.8 | R10: | 77.4 |
| Duv:                      | 0.0013 | R3:       | 97.0 | R11: | 83.4 |
| CIE x:                    | 0.4144 | R4:       | 83.1 | R12: | 73.6 |
| CIE y:                    | 0.3981 | R5:       | 82.1 | R13: | 83.1 |
| CIE z:                    | 0.1876 | R6:       | 87.8 | R14: | 98.6 |
| Peak Wavelength (nm):     | 601    | R7:       | 84.7 |      |      |
| Dominant Wavelength (nm): | 580    | R8:       | 61.6 |      |      |
| Purity:                   | 44.1   |           |      |      |      |
| Rf:                       | 85.9   |           |      |      |      |
| Rg:                       | 96.9   |           |      |      |      |



### Test Conditions

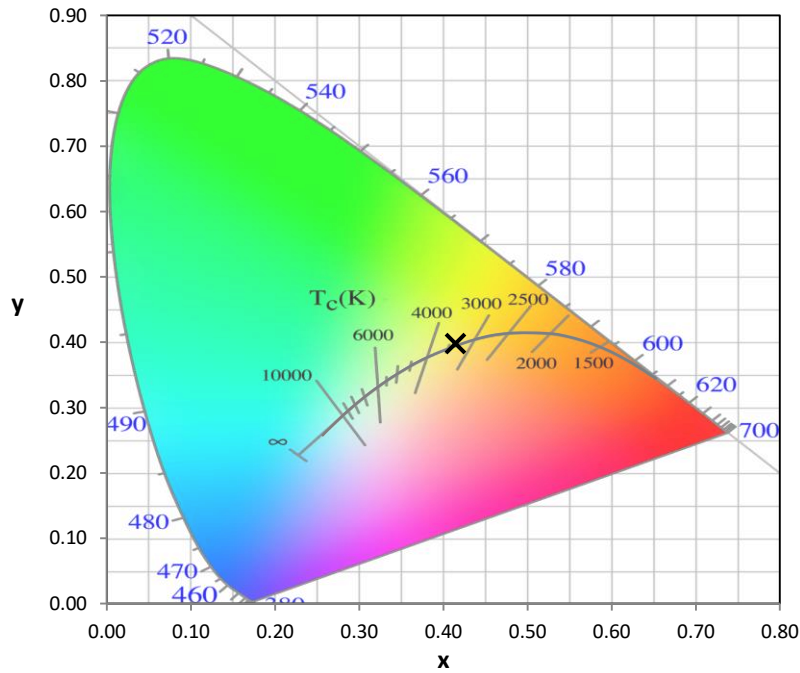
Stabilization Time: 67M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.0/46%  
 Sphere Temperature (°C): 24.0

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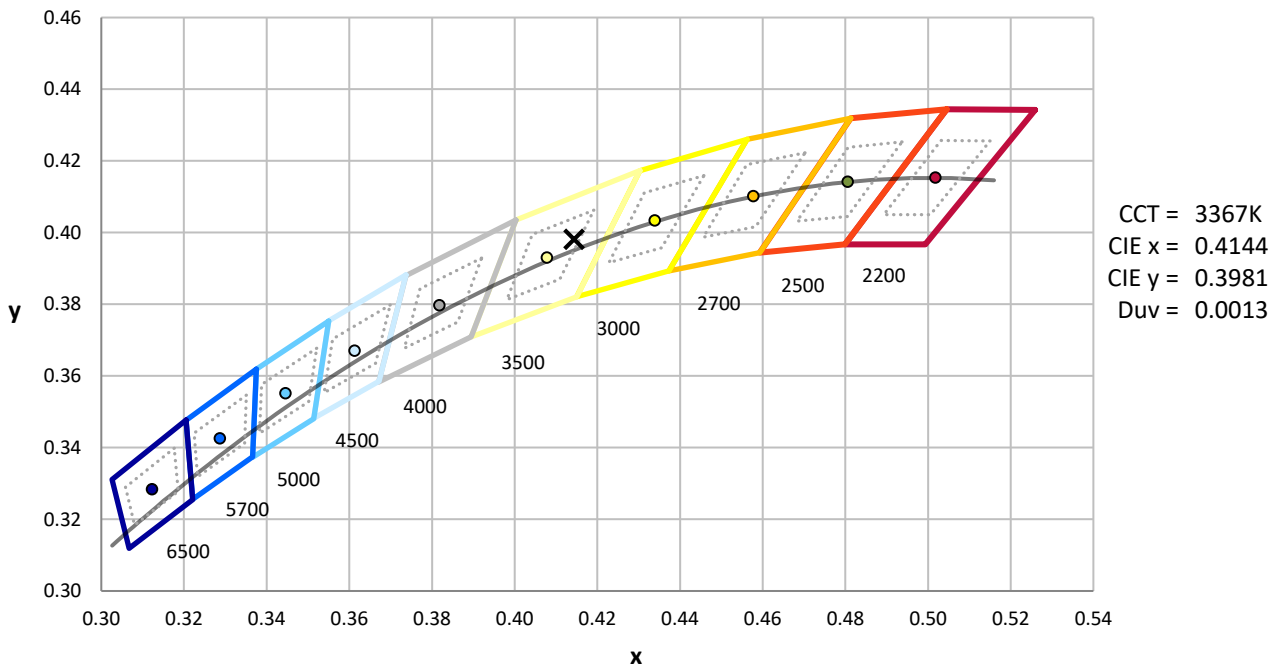
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 7/29/2020        | 1/29/2021            |
| Power Meter                    | IN0071                | 12/3/2020        | 12/3/2020            |
| AC Power Source                | IN0063                | 12/3/2020        | 12/3/2020            |
| DC Power Source                | IN0208                | 12/3/2020        | 12/3/2020            |
| Sphere Thermometer             | IN0085                | 12/3/2020        | 12/3/2020            |
| Room Thermometer               | IN0046                | 12/3/2020        | 12/3/2020            |

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**CIE 1931 Chromaticity Diagram**



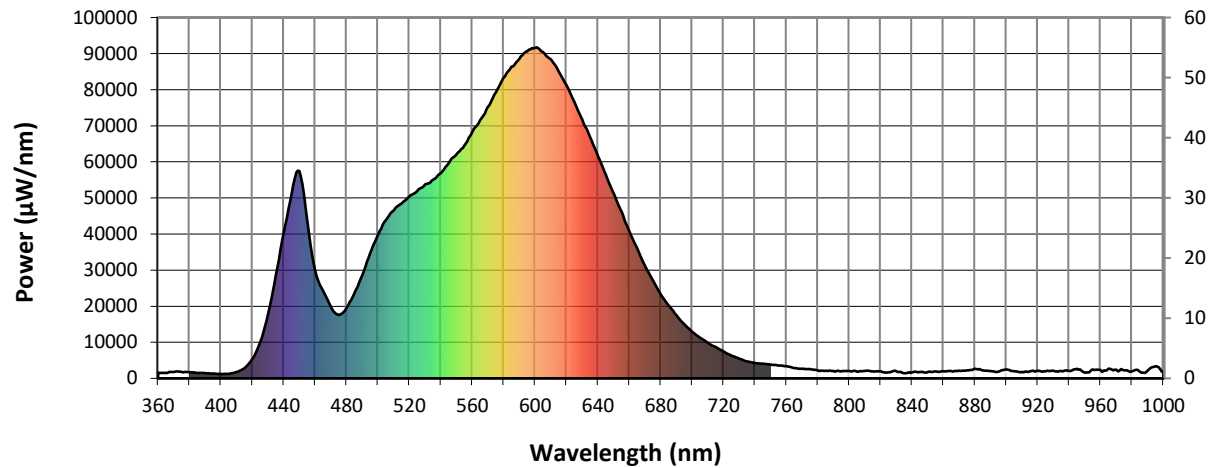
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 3500K 4-step quadrangle

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### Photopic Flux vs. Wavelength

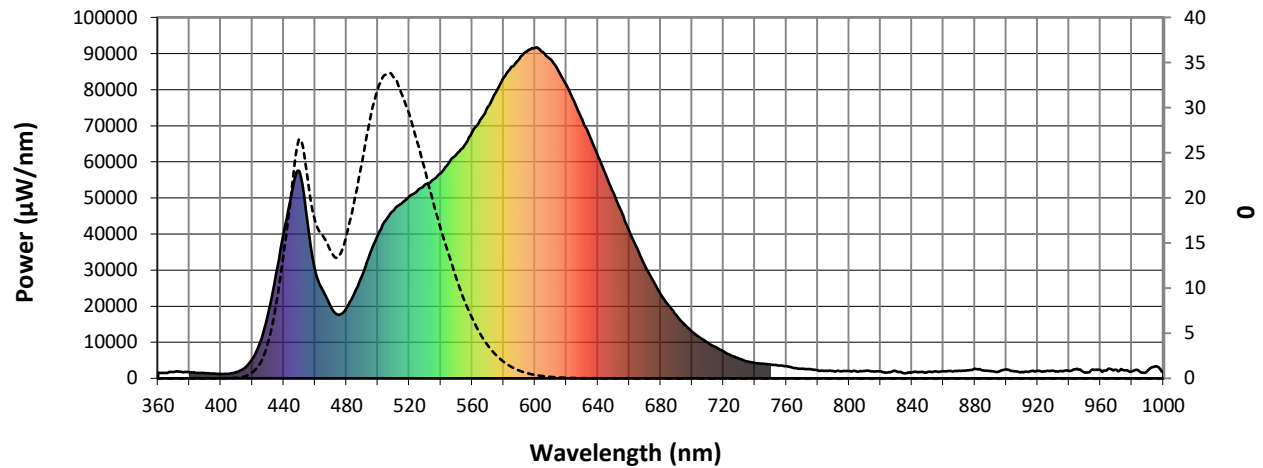


#####

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 1643             | 0.0              | 490       | 28622            | 4.1              | 620       | 81207            | 21.1             | 750       | 3846             | 0.0              | 880       | 2622             | 0.0              |
| 365       | 1520             | 0.0              | 495       | 34557            | 6.3              | 625       | 76716            | 16.9             | 755       | 3519             | 0.0              | 885       | 2243             | 0.0              |
| 370       | 1802             | 0.0              | 500       | 39800            | 8.8              | 630       | 71708            | 13.0             | 760       | 3368             | 0.0              | 890       | 2081             | 0.0              |
| 375       | 1769             | 0.0              | 505       | 43851            | 12.3             | 635       | 66921            | 10.1             | 765       | 2855             | 0.0              | 895       | 1881             | 0.0              |
| 380       | 1679             | 0.0              | 510       | 46532            | 16.0             | 640       | 61633            | 7.4              | 770       | 2693             | 0.0              | 900       | 2480             | 0.0              |
| 385       | 1485             | 0.0              | 515       | 48456            | 20.1             | 645       | 56361            | 5.4              | 775       | 2536             | 0.0              | 905       | 1958             | 0.0              |
| 390       | 1455             | 0.0              | 520       | 50477            | 24.5             | 650       | 51385            | 3.8              | 780       | 2227             | 0.0              | 910       | 1735             | 0.0              |
| 395       | 1324             | 0.0              | 525       | 51864            | 27.8             | 655       | 46205            | 2.7              | 785       | 2107             | 0.0              | 915       | 1963             | 0.0              |
| 400       | 1202             | 0.0              | 530       | 53736            | 31.6             | 660       | 40823            | 1.7              | 790       | 2005             | 0.0              | 920       | 2064             | 0.0              |
| 405       | 1271             | 0.0              | 535       | 55031            | 34.1             | 665       | 35968            | 1.1              | 795       | 1994             | 0.0              | 925       | 1969             | 0.0              |
| 410       | 1753             | 0.0              | 540       | 56881            | 37.1             | 670       | 31229            | 0.7              | 800       | 2045             | 0.0              | 930       | 2173             | 0.0              |
| 415       | 2819             | 0.0              | 545       | 59674            | 39.7             | 675       | 27129            | 0.5              | 805       | 1910             | 0.0              | 935       | 2053             | 0.0              |
| 420       | 5364             | 0.0              | 550       | 62076            | 42.2             | 680       | 23366            | 0.3              | 810       | 2060             | 0.0              | 940       | 2078             | 0.0              |
| 425       | 10089            | 0.1              | 555       | 64554            | 44.1             | 685       | 20236            | 0.2              | 815       | 1930             | 0.0              | 945       | 2656             | 0.0              |
| 430       | 17744            | 0.1              | 560       | 68182            | 46.3             | 690       | 17552            | 0.1              | 820       | 1947             | 0.0              | 950       | 1571             | 0.0              |
| 435       | 28789            | 0.3              | 565       | 71544            | 47.6             | 695       | 14991            | 0.1              | 825       | 1656             | 0.0              | 955       | 2480             | 0.0              |
| 440       | 40235            | 0.6              | 570       | 75176            | 48.9             | 700       | 12957            | 0.0              | 830       | 1993             | 0.0              | 960       | 2276             | 0.0              |
| 445       | 51214            | 1.1              | 575       | 79236            | 49.3             | 705       | 11301            | 0.0              | 835       | 1455             | 0.0              | 965       | 2688             | 0.0              |
| 450       | 57466            | 1.5              | 580       | 83316            | 49.5             | 710       | 9834             | 0.0              | 840       | 1654             | 0.0              | 970       | 2355             | 0.0              |
| 455       | 43576            | 1.5              | 585       | 86387            | 48.0             | 715       | 8691             | 0.0              | 845       | 1789             | 0.0              | 975       | 2216             | 0.0              |
| 460       | 29961            | 1.2              | 590       | 88571            | 45.8             | 720       | 7415             | 0.0              | 850       | 1806             | 0.0              | 980       | 1965             | 0.0              |
| 465       | 24272            | 1.3              | 595       | 90667            | 43.0             | 725       | 6340             | 0.0              | 855       | 1940             | 0.0              | 985       | 1873             | 0.0              |
| 470       | 19791            | 1.2              | 600       | 91594            | 39.5             | 730       | 5448             | 0.0              | 860       | 1986             | 0.0              | 990       | 2127             | 0.0              |
| 475       | 17585            | 1.4              | 605       | 90498            | 35.0             | 735       | 4721             | 0.0              | 865       | 2055             | 0.0              | 995       | 3367             | 0.0              |
| 480       | 19565            | 1.9              | 610       | 88416            | 30.4             | 740       | 4296             | 0.0              | 870       | 2122             | 0.0              | 1000      | 1864             | 0.0              |
| 485       | 23624            | 2.8              | 615       | 85127            | 25.7             | 745       | 4067             | 0.0              | 875       | 2183             | 0.0              |           |                  |                  |

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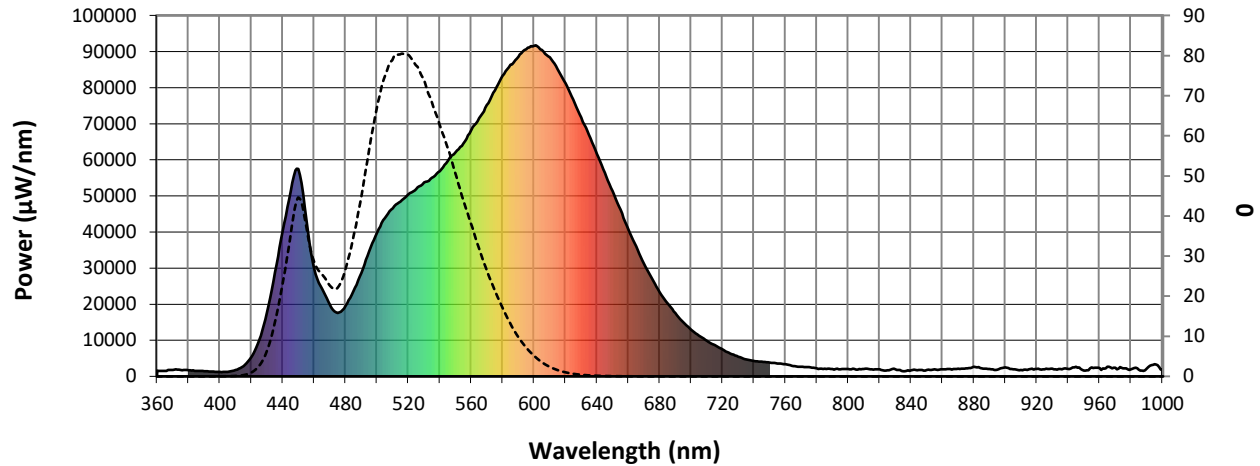
### Scotopic Flux vs. Wavelength


**Scotopic Lumens: 2745.1**
**S/P: 0.57**

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 1643             | 0.0              | 490       | 28622            | 44.1             | 620       | 81207            | 1.0              | 750       | 3846             | 0.0              | 880       | 2622             | 0.0              |
| 365       | 1520             | 0.0              | 495       | 34557            | 55.9             | 625       | 76716            | 0.6              | 755       | 3519             | 0.0              | 885       | 2243             | 0.0              |
| 370       | 1802             | 0.0              | 500       | 39800            | 66.6             | 630       | 71708            | 0.4              | 760       | 3368             | 0.0              | 890       | 2081             | 0.0              |
| 375       | 1769             | 0.0              | 505       | 43851            | 74.5             | 635       | 66921            | 0.3              | 765       | 2855             | 0.0              | 895       | 1881             | 0.0              |
| 380       | 1679             | 0.0              | 510       | 46532            | 78.9             | 640       | 61633            | 0.2              | 770       | 2693             | 0.0              | 900       | 2480             | 0.0              |
| 385       | 1485             | 0.0              | 515       | 48456            | 80.3             | 645       | 56361            | 0.1              | 775       | 2536             | 0.0              | 905       | 1958             | 0.0              |
| 390       | 1455             | 0.0              | 520       | 50477            | 80.2             | 650       | 51385            | 0.1              | 780       | 2227             | 0.0              | 910       | 1735             | 0.0              |
| 395       | 1324             | 0.0              | 525       | 51864            | 77.6             | 655       | 46205            | 0.0              | 785       | 2107             | 0.0              | 915       | 1963             | 0.0              |
| 400       | 1202             | 0.0              | 530       | 53736            | 74.1             | 660       | 40823            | 0.0              | 790       | 2005             | 0.0              | 920       | 2064             | 0.0              |
| 405       | 1271             | 0.0              | 535       | 55031            | 68.6             | 665       | 35968            | 0.0              | 795       | 1994             | 0.0              | 925       | 1969             | 0.0              |
| 410       | 1753             | 0.1              | 540       | 56881            | 62.9             | 670       | 31229            | 0.0              | 800       | 2045             | 0.0              | 930       | 2173             | 0.0              |
| 415       | 2819             | 0.3              | 545       | 59674            | 57.2             | 675       | 27129            | 0.0              | 805       | 1910             | 0.0              | 935       | 2053             | 0.0              |
| 420       | 5364             | 0.9              | 550       | 62076            | 50.8             | 680       | 23366            | 0.0              | 810       | 2060             | 0.0              | 940       | 2078             | 0.0              |
| 425       | 10089            | 2.5              | 555       | 64554            | 44.1             | 685       | 20236            | 0.0              | 815       | 1930             | 0.0              | 945       | 2656             | 0.0              |
| 430       | 17744            | 6.0              | 560       | 68182            | 38.1             | 690       | 17552            | 0.0              | 820       | 1947             | 0.0              | 950       | 1571             | 0.0              |
| 435       | 28789            | 12.9             | 565       | 71544            | 32.1             | 695       | 14991            | 0.0              | 825       | 1656             | 0.0              | 955       | 2480             | 0.0              |
| 440       | 40235            | 22.5             | 570       | 75176            | 26.5             | 700       | 12957            | 0.0              | 830       | 1993             | 0.0              | 960       | 2276             | 0.0              |
| 445       | 51214            | 34.3             | 575       | 79236            | 21.6             | 705       | 11301            | 0.0              | 835       | 1455             | 0.0              | 965       | 2688             | 0.0              |
| 450       | 57466            | 44.5             | 580       | 83316            | 17.2             | 710       | 9834             | 0.0              | 840       | 1654             | 0.0              | 970       | 2355             | 0.0              |
| 455       | 43576            | 38.1             | 585       | 86387            | 13.2             | 715       | 8691             | 0.0              | 845       | 1789             | 0.0              | 975       | 2216             | 0.0              |
| 460       | 29961            | 28.9             | 590       | 88571            | 9.9              | 720       | 7415             | 0.0              | 850       | 1806             | 0.0              | 980       | 1965             | 0.0              |
| 465       | 24272            | 25.6             | 595       | 90667            | 7.2              | 725       | 6340             | 0.0              | 855       | 1940             | 0.0              | 985       | 1873             | 0.0              |
| 470       | 19791            | 22.8             | 600       | 91594            | 5.2              | 730       | 5448             | 0.0              | 860       | 1986             | 0.0              | 990       | 2127             | 0.0              |
| 475       | 17585            | 22.0             | 605       | 90498            | 3.6              | 735       | 4721             | 0.0              | 865       | 2055             | 0.0              | 995       | 3367             | 0.0              |
| 480       | 19565            | 26.4             | 610       | 88416            | 2.4              | 740       | 4296             | 0.0              | 870       | 2122             | 0.0              | 1000      | 1864             | 0.0              |
| 485       | 23624            | 34.2             | 615       | 85127            | 1.6              | 745       | 4067             | 0.0              | 875       | 2183             | 0.0              |           |                  |                  |

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### Melanopic Flux vs. Wavelength


**Melanopic Lumens: 7094.9**
**S/P: 1.48**

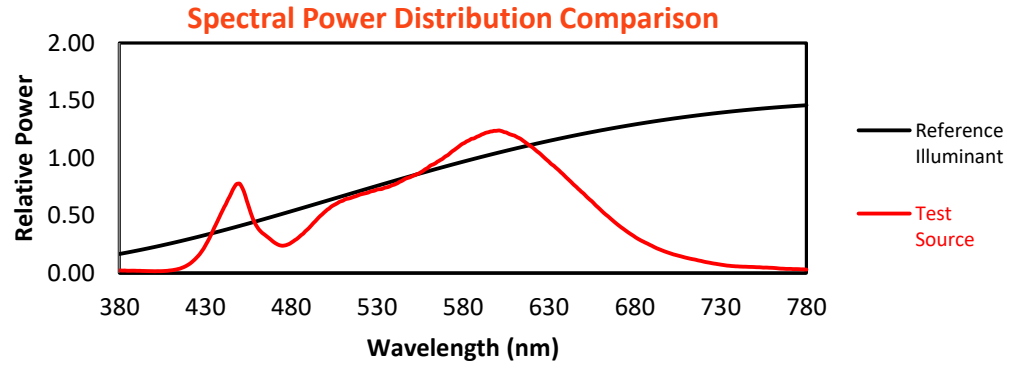
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 1643             | 0.0              | 490       | 28622            | 23.8             | 620       | 81207            | 0.1              | 750       | 3846             | 0.0              | 880       | 2622             | 0.0              |
| 365       | 1520             | 0.0              | 495       | 34557            | 28.5             | 625       | 76716            | 0.0              | 755       | 3519             | 0.0              | 885       | 2243             | 0.0              |
| 370       | 1802             | 0.0              | 500       | 39800            | 32.0             | 630       | 71708            | 0.0              | 760       | 3368             | 0.0              | 890       | 2081             | 0.0              |
| 375       | 1769             | 0.0              | 505       | 43851            | 33.7             | 635       | 66921            | 0.0              | 765       | 2855             | 0.0              | 895       | 1881             | 0.0              |
| 380       | 1679             | 0.0              | 510       | 46532            | 33.4             | 640       | 61633            | 0.0              | 770       | 2693             | 0.0              | 900       | 2480             | 0.0              |
| 385       | 1485             | 0.0              | 515       | 48456            | 31.7             | 645       | 56361            | 0.0              | 775       | 2536             | 0.0              | 905       | 1958             | 0.0              |
| 390       | 1455             | 0.0              | 520       | 50477            | 29.4             | 650       | 51385            | 0.0              | 780       | 2227             | 0.0              | 910       | 1735             | 0.0              |
| 395       | 1324             | 0.0              | 525       | 51864            | 26.3             | 655       | 46205            | 0.0              | 785       | 2107             | 0.0              | 915       | 1963             | 0.0              |
| 400       | 1202             | 0.0              | 530       | 53736            | 23.2             | 660       | 40823            | 0.0              | 790       | 2005             | 0.0              | 920       | 2064             | 0.0              |
| 405       | 1271             | 0.0              | 535       | 55031            | 19.8             | 665       | 35968            | 0.0              | 795       | 1994             | 0.0              | 925       | 1969             | 0.0              |
| 410       | 1753             | 0.1              | 540       | 56881            | 16.6             | 670       | 31229            | 0.0              | 800       | 2045             | 0.0              | 930       | 2173             | 0.0              |
| 415       | 2819             | 0.2              | 545       | 59674            | 13.9             | 675       | 27129            | 0.0              | 805       | 1910             | 0.0              | 935       | 2053             | 0.0              |
| 420       | 5364             | 0.6              | 550       | 62076            | 11.1             | 680       | 23366            | 0.0              | 810       | 2060             | 0.0              | 940       | 2078             | 0.0              |
| 425       | 10089            | 1.6              | 555       | 64554            | 8.7              | 685       | 20236            | 0.0              | 815       | 1930             | 0.0              | 945       | 2656             | 0.0              |
| 430       | 17744            | 3.7              | 560       | 68182            | 6.7              | 690       | 17552            | 0.0              | 820       | 1947             | 0.0              | 950       | 1571             | 0.0              |
| 435       | 28789            | 7.7              | 565       | 71544            | 5.0              | 695       | 14991            | 0.0              | 825       | 1656             | 0.0              | 955       | 2480             | 0.0              |
| 440       | 40235            | 13.4             | 570       | 75176            | 3.7              | 700       | 12957            | 0.0              | 830       | 1993             | 0.0              | 960       | 2276             | 0.0              |
| 445       | 51214            | 20.2             | 575       | 79236            | 2.6              | 705       | 11301            | 0.0              | 835       | 1455             | 0.0              | 965       | 2688             | 0.0              |
| 450       | 57466            | 26.5             | 580       | 83316            | 1.9              | 710       | 9834             | 0.0              | 840       | 1654             | 0.0              | 970       | 2355             | 0.0              |
| 455       | 43576            | 22.8             | 585       | 86387            | 1.3              | 715       | 8691             | 0.0              | 845       | 1789             | 0.0              | 975       | 2216             | 0.0              |
| 460       | 29961            | 17.7             | 590       | 88571            | 0.9              | 720       | 7415             | 0.0              | 850       | 1806             | 0.0              | 980       | 1965             | 0.0              |
| 465       | 24272            | 15.9             | 595       | 90667            | 0.6              | 725       | 6340             | 0.0              | 855       | 1940             | 0.0              | 985       | 1873             | 0.0              |
| 470       | 19791            | 14.2             | 600       | 91594            | 0.4              | 730       | 5448             | 0.0              | 860       | 1986             | 0.0              | 990       | 2127             | 0.0              |
| 475       | 17585            | 13.4             | 605       | 90498            | 0.2              | 735       | 4721             | 0.0              | 865       | 2055             | 0.0              | 995       | 3367             | 0.0              |
| 480       | 19565            | 15.7             | 610       | 88416            | 0.2              | 740       | 4296             | 0.0              | 870       | 2122             | 0.0              | 1000      | 1864             | 0.0              |
| 485       | 23624            | 19.5             | 615       | 85127            | 0.1              | 745       | 4067             | 0.0              | 875       | 2183             | 0.0              |           |                  |                  |

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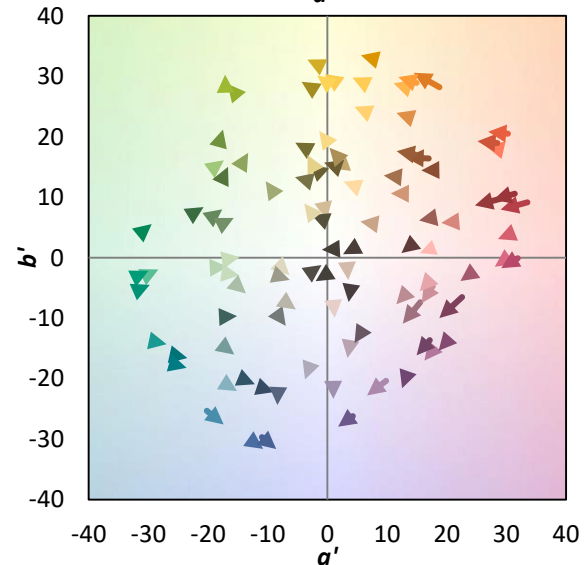
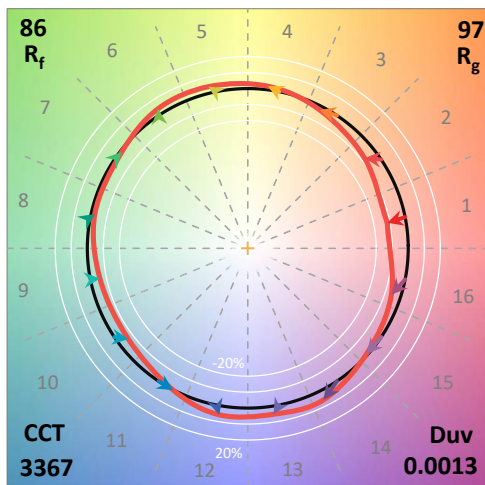
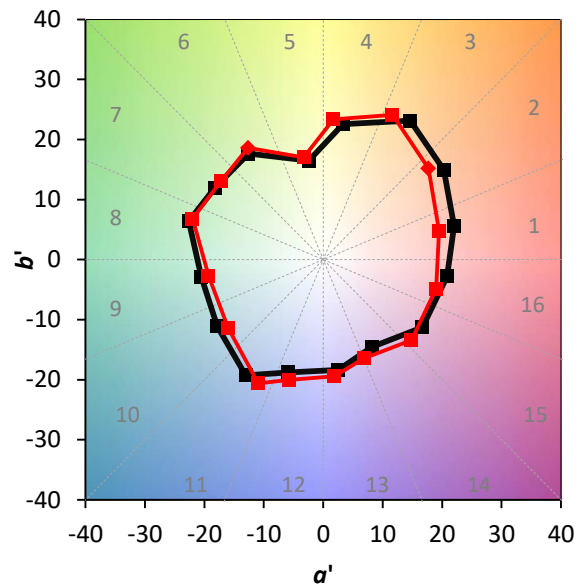
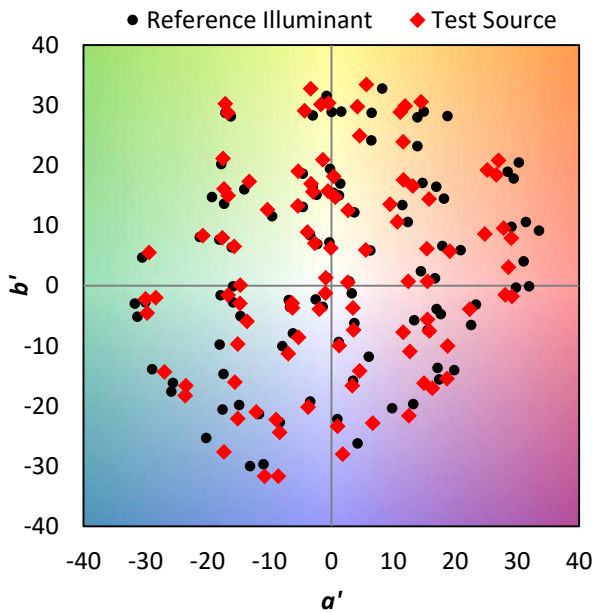
TM-30-18

### Summary

$R_f = 85.9$   
 $R_g = 96.9$   
 CIE  $R_a = 83.4$   
 $R_9 = 7.1$



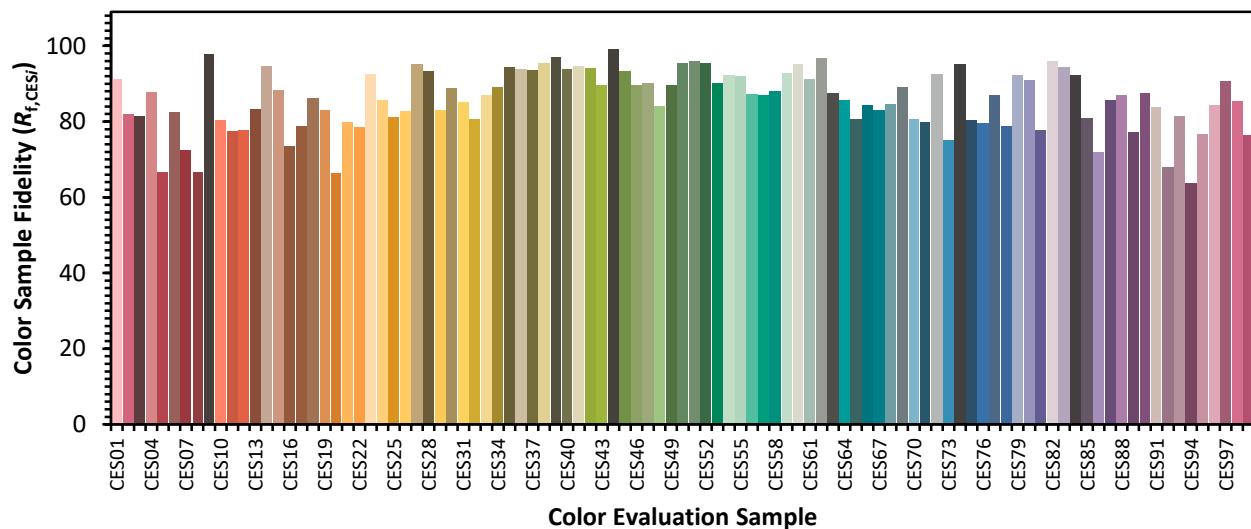
### Color Vector Graphics

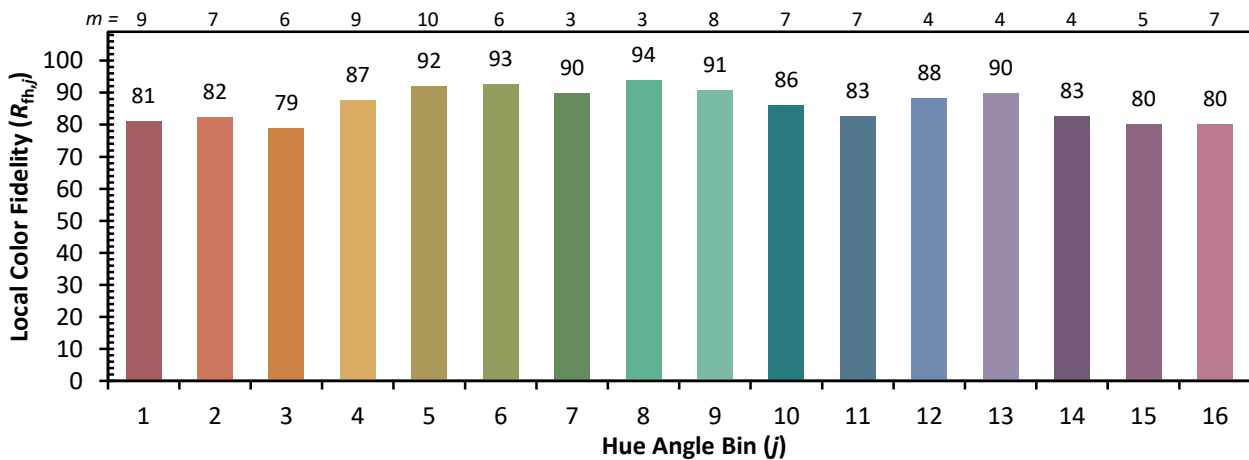
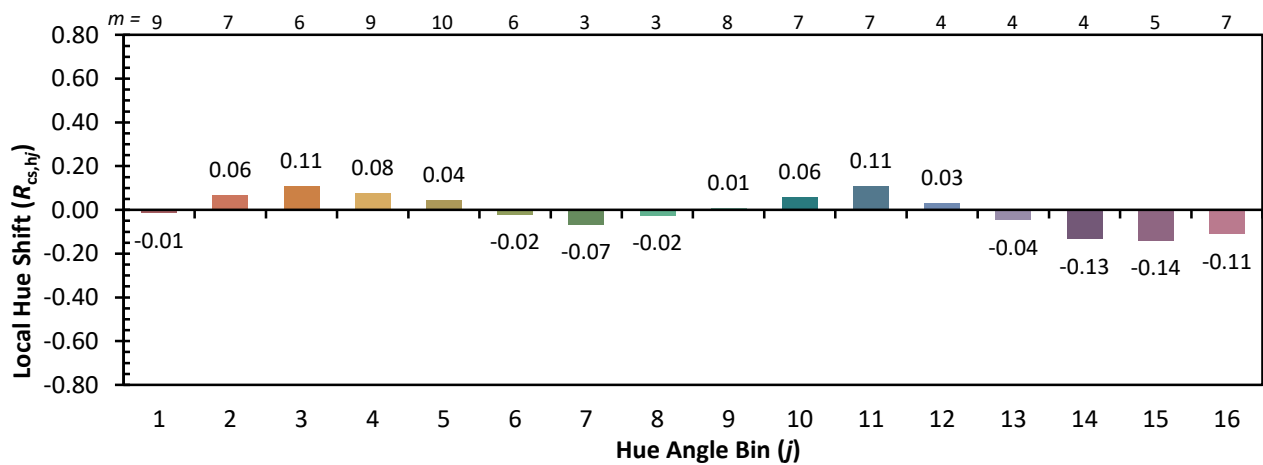
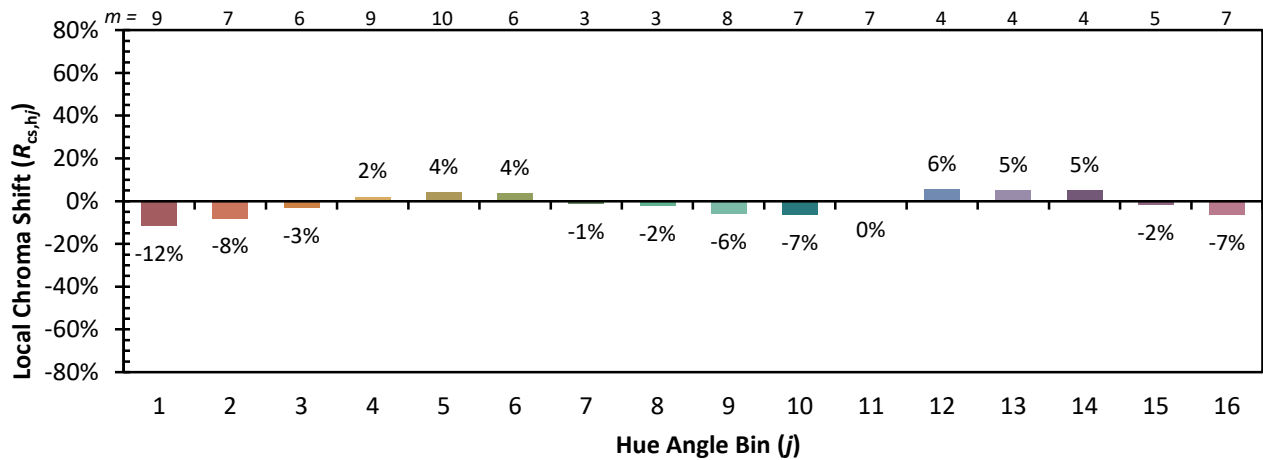




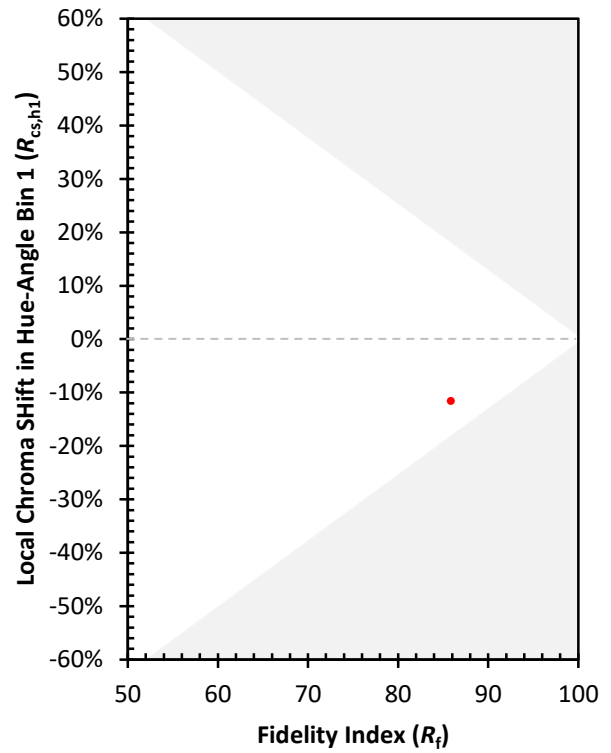
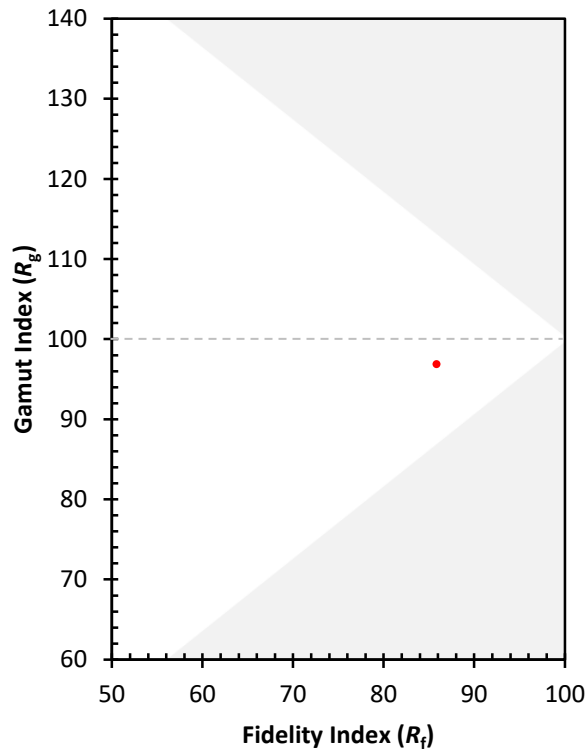
**Individual Sample Fidelity Index ( $R_{fi}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 83 | CES51 = 96 | CES76 = 80 |
| CES02 = 62 | CES27 = 95 | CES52 = 96 | CES77 = 87 |
| CES03 = 31 | CES28 = 93 | CES53 = 90 | CES78 = 79 |
| CES04 = 70 | CES29 = 83 | CES54 = 92 | CES79 = 92 |
| CES05 = 49 | CES30 = 89 | CES55 = 92 | CES80 = 91 |
| CES06 = 51 | CES31 = 85 | CES56 = 87 | CES81 = 78 |
| CES07 = 41 | CES32 = 81 | CES57 = 87 | CES82 = 96 |
| CES08 = 40 | CES33 = 87 | CES58 = 88 | CES83 = 94 |
| CES09 = 29 | CES34 = 89 | CES59 = 93 | CES84 = 92 |
| CES10 = 75 | CES35 = 94 | CES60 = 95 | CES85 = 81 |
| CES11 = 58 | CES36 = 94 | CES61 = 91 | CES86 = 72 |
| CES12 = 64 | CES37 = 94 | CES62 = 97 | CES87 = 86 |
| CES13 = 43 | CES38 = 95 | CES63 = 88 | CES88 = 87 |
| CES14 = 74 | CES39 = 97 | CES64 = 86 | CES89 = 77 |
| CES15 = 71 | CES40 = 94 | CES65 = 81 | CES90 = 87 |
| CES16 = 47 | CES41 = 95 | CES66 = 84 | CES91 = 84 |
| CES17 = 50 | CES42 = 94 | CES67 = 83 | CES92 = 68 |
| CES18 = 56 | CES43 = 90 | CES68 = 85 | CES93 = 81 |
| CES19 = 72 | CES44 = 99 | CES69 = 89 | CES94 = 64 |
| CES20 = 66 | CES45 = 93 | CES70 = 81 | CES95 = 77 |
| CES21 = 86 | CES46 = 90 | CES71 = 80 | CES96 = 84 |
| CES22 = 78 | CES47 = 90 | CES72 = 93 | CES97 = 91 |
| CES23 = 92 | CES48 = 84 | CES73 = 75 | CES98 = 86 |
| CES24 = 91 | CES49 = 90 | CES74 = 95 | CES99 = 76 |
| CES25 = 72 | CES50 = 95 | CES75 = 80 |            |



**Color Rendition by Hue-Angle Bin**


**Measure Comparisons**



(END OF REPORT)