

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: METALUX

Report Number: P860066

Luminaire Tested: **SPHB-30HE-W-L850-CD**

Issue Date: 7/11/2024

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



**Test Information**

Test Method: LM-79-08  
Report Number: P860066  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G3-2404-343-6)  
Test Lab: INNOVATION CENTER  
Issue Date: 7/11/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: METALUX  
Catalog Number: SPHB-30HE-W-L850-CD  
Description: 30000 Lumen High Efficacy Select Pro High Bay with Wide Lens and,  
5000K 80CRI LEDs  
Light Source: -  
Ballast/Driver: -

Luminaire Equipment: Sample No.   Condition   Description

**Summary**

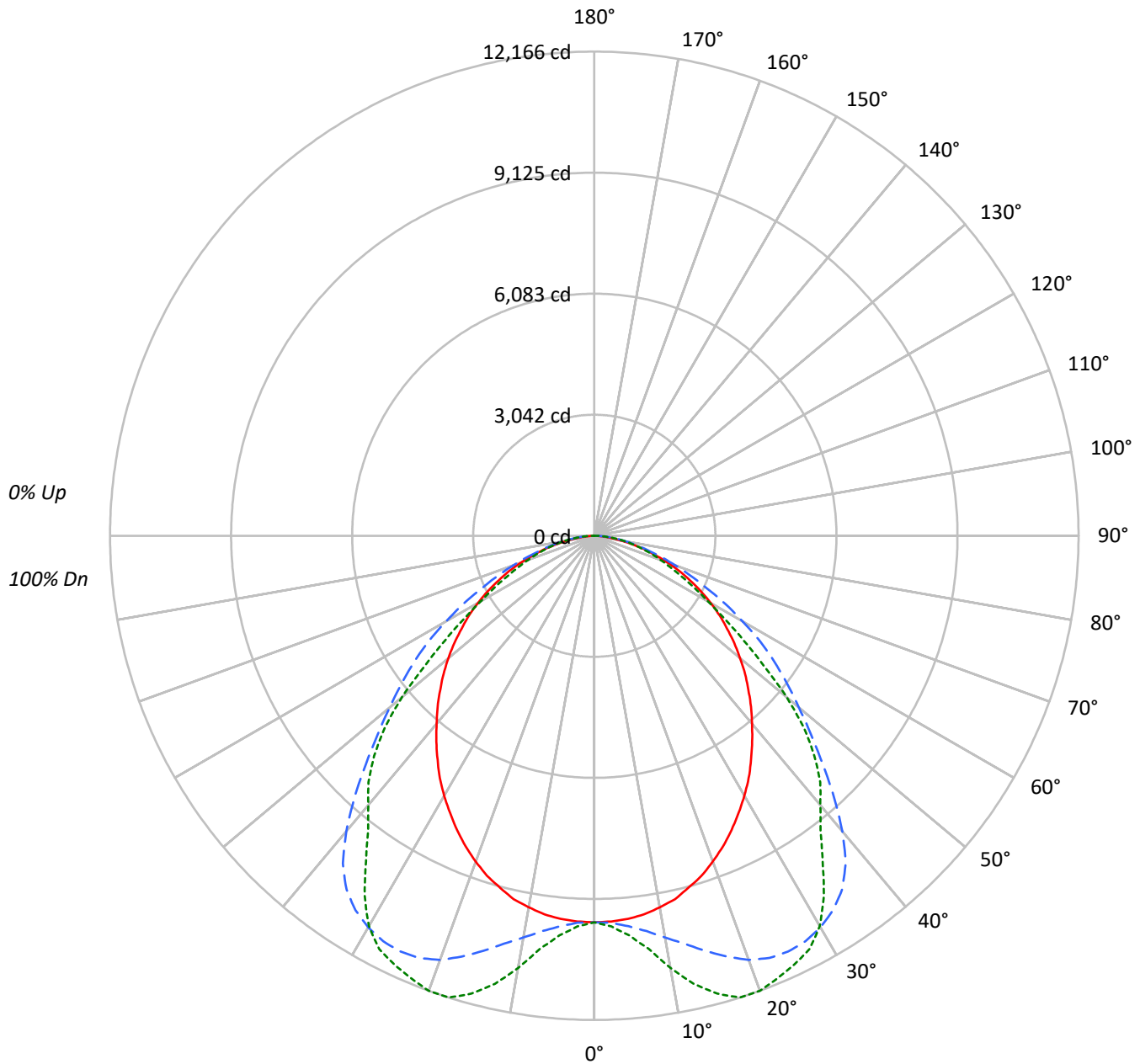
Lumens per Lamp: N/A  
Luminaire Lumens: 30557.0 lumens  
Efficiency: N/A  
Efficacy: 172.1 lumens/watt  
Spacing Criteria (0/90/45): 1.16 / 1.5 / 1.51  
Luminous Opening: Rectangular (W 1' x L: 2.04' x H: 0')  
CIE Type: Direct

Input Watts (W): 177.6  
Input Voltage (V): NR  
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

TEST NUMBER: P860066

CATALOG NUMBER: SPHB-30HE-W-L850-CD

### Luminous Intensity Polar Plot





TEST NUMBER: P860066

CATALOG NUMBER: SPHB-30HE-W-L850-CD

**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   | 110 | 105 | 101 | 98  | 107 | 103 | 99  | 96  | 99  | 96  | 93  | 95  | 92  | 90  | 91  | 89  | 87  | 85  |    |    |
| 2   | 100 | 92  | 86  | 81  | 98  | 91  | 85  | 80  | 87  | 82  | 78  | 84  | 80  | 76  | 81  | 77  | 74  | 72  |    |    |
| 3   | 92  | 82  | 74  | 68  | 89  | 80  | 73  | 67  | 77  | 71  | 66  | 74  | 69  | 65  | 72  | 67  | 64  | 62  |    |    |
| 4   | 84  | 73  | 64  | 58  | 82  | 71  | 63  | 57  | 69  | 62  | 57  | 66  | 61  | 56  | 64  | 59  | 55  | 53  |    |    |
| 5   | 77  | 65  | 56  | 50  | 75  | 64  | 56  | 50  | 62  | 55  | 49  | 60  | 54  | 49  | 58  | 52  | 48  | 46  |    |    |
| 6   | 72  | 59  | 50  | 44  | 70  | 58  | 49  | 43  | 56  | 49  | 43  | 54  | 48  | 43  | 53  | 47  | 42  | 40  |    |    |
| 7   | 66  | 53  | 45  | 39  | 65  | 52  | 44  | 38  | 51  | 43  | 38  | 49  | 43  | 38  | 48  | 42  | 38  | 36  |    |    |
| 8   | 62  | 48  | 40  | 34  | 60  | 48  | 40  | 34  | 46  | 39  | 34  | 45  | 39  | 34  | 44  | 38  | 34  | 32  |    |    |
| 9   | 58  | 44  | 36  | 31  | 56  | 44  | 36  | 31  | 43  | 36  | 31  | 42  | 35  | 30  | 41  | 35  | 30  | 29  |    |    |
| 10  | 54  | 41  | 33  | 28  | 53  | 40  | 33  | 28  | 39  | 33  | 28  | 39  | 32  | 28  | 38  | 32  | 28  | 26  |    |    |

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

|     | 0°    | 45°   | 90°   |
|-----|-------|-------|-------|
| 0°  | 51242 | 51242 | 51242 |
| 5°  | 51187 | 52152 | 53389 |
| 10° | 50782 | 54905 | 59066 |
| 15° | 49988 | 58992 | 65062 |
| 20° | 48906 | 63684 | 68312 |
| 25° | 47494 | 67119 | 69207 |
| 30° | 45949 | 69219 | 69019 |
| 35° | 44224 | 69915 | 64403 |
| 40° | 42442 | 66757 | 60830 |
| 45° | 40837 | 60512 | 58362 |
| 50° | 39246 | 55021 | 51738 |
| 55° | 37451 | 50836 | 42103 |
| 60° | 35598 | 45321 | 34675 |
| 65° | 33147 | 38944 | 30065 |
| 70° | 30156 | 33250 | 27192 |
| 75° | 25897 | 27905 | 24931 |
| 80° | 20243 | 23935 | 23124 |
| 85° | 13688 | 20311 | 19058 |



TEST NUMBER: P860066

CATALOG NUMBER: SPHB-30HE-W-L850-CD

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 953.5   | 3.1       |
| 10°-20°   | 3023.4  | 9.9       |
| 20°-30°   | 4948.0  | 16.2      |
| 30°-40°   | 6036.2  | 19.8      |
| 40°-50°   | 5978.3  | 19.6      |
| 50°-60°   | 4780.6  | 15.6      |
| 60°-70°   | 2982.3  | 9.8       |
| 70°-80°   | 1461.2  | 4.8       |
| 80°-90°   | 383.2   | 1.3       |
| 90°-100°  | 10.1    | 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°    | 8925.0  | 29.2      |
| 0°-40°    | 14961.2 | 49.0      |
| 0°-60°    | 25720.1 | 84.2      |
| 0°-90°    | 30546.9 | 100.0     |
| 90°-120°  | 10.1    | 0.0       |
| 90°-150°  | 10.1    | 0.0       |
| 90°-180°  | 10.0    | 0.0       |
| 0°-180°   | 30557.0 | 100.0     |

**CANDELA DISTRIBUTION:**

|      | 0°   | 22.5° | 45°   | 67.5° | 90°   | Flux |
|------|------|-------|-------|-------|-------|------|
| 0°   | 9712 | 9712  | 9712  | 9712  | 9712  |      |
| 5°   | 9664 | 9707  | 9846  | 10018 | 10080 | 917  |
| 15°  | 9151 | 9684  | 10799 | 11659 | 11910 | 2580 |
| 25°  | 8158 | 9539  | 11529 | 11863 | 11887 | 3754 |
| 35°  | 6866 | 9174  | 10854 | 10274 | 9998  | 4295 |
| 45°  | 5473 | 8502  | 8109  | 7837  | 7821  | 4227 |
| 55°  | 4071 | 6528  | 5526  | 4992  | 4577  | 3647 |
| 65°  | 2655 | 3663  | 3119  | 2587  | 2408  | 2632 |
| 75°  | 1270 | 1556  | 1369  | 1253  | 1223  | 1349 |
| 85°  | 226  | 321   | 336   | 318   | 315   | 280  |
| 90°  | 1    | 33    | 60    | 75    | 78    | 13   |
| 95°  | 1    | 5     | 5     | 4     | 2     | 0    |
| 105° | 0    | 0     | 0     | 0     | 0     | 0    |
| 115° | 0    | 0     | 0     | 0     | 0     | 0    |
| 125° | 0    | 0     | 0     | 0     | 0     | 0    |
| 135° | 0    | 0     | 0     | 0     | 0     | 0    |
| 145° | 0    | 0     | 0     | 0     | 0     | 0    |
| 155° | 0    | 0     | 0     | 0     | 0     | 0    |
| 165° | 0    | 0     | 0     | 0     | 0     | 0    |
| 175° | 0    | 0     | 0     | 0     | 0     | 0    |
| 180° | 0    | 0     | 0     | 0     | 0     |      |



TEST NUMBER: P860066

CATALOG NUMBER: SPHB-30HE-W-L850-CD

**CANDELA DISTRIBUTION (FULL):**

|        | 0°     | 22.5°  | 45°     | 67.5°   | 90°     |
|--------|--------|--------|---------|---------|---------|
| 0°     | 9711.5 | 9711.5 | 9711.5  | 9711.5  | 9711.5  |
| 2.5°   | 9701.7 | 9698.1 | 9733.4  | 9797.8  | 9827.0  |
| 5°     | 9664.1 | 9706.6 | 9846.4  | 10017.8 | 10079.8 |
| 7.5°   | 9596.0 | 9710.3 | 10019.0 | 10333.9 | 10467.6 |
| 10°    | 9478.1 | 9712.7 | 10247.6 | 10803.1 | 11024.3 |
| 12.5°  | 9356.5 | 9704.2 | 10501.6 | 11288.1 | 11530.0 |
| 15°    | 9151.1 | 9683.5 | 10799.4 | 11658.9 | 11910.5 |
| 17.5°  | 8960.2 | 9659.2 | 11086.3 | 11973.7 | 12164.6 |
| 20°    | 8709.8 | 9623.9 | 11341.6 | 12069.7 | 12165.8 |
| 22.5°  | 8447.2 | 9596.0 | 11482.6 | 12005.3 | 12034.5 |
| 25°    | 8157.9 | 9538.9 | 11528.8 | 11863.1 | 11887.4 |
| 27.5°  | 7849.2 | 9487.8 | 11485.0 | 11686.8 | 11707.5 |
| 30°    | 7541.6 | 9395.4 | 11361.0 | 11412.1 | 11328.2 |
| 32.5°  | 7219.5 | 9303.0 | 11160.5 | 10930.7 | 10735.0 |
| 35°    | 6865.7 | 9174.2 | 10854.1 | 10274.3 | 9998.4  |
| 37.5°  | 6516.9 | 9050.2 | 10376.4 | 9540.1  | 9332.2  |
| 40°    | 6161.9 | 8897.0 | 9692.0  | 8854.5  | 8831.4  |
| 42.5°  | 5826.4 | 8731.7 | 8917.7  | 8320.8  | 8398.6  |
| 45°    | 5472.7 | 8501.9 | 8109.3  | 7837.0  | 7821.2  |
| 47.5°  | 5137.1 | 8184.7 | 7373.9  | 7302.1  | 7140.5  |
| 50°    | 4781.0 | 7747.1 | 6702.8  | 6634.8  | 6302.9  |
| 52.5°  | 4432.1 | 7189.1 | 6103.6  | 5848.3  | 5364.5  |
| 55°    | 4071.1 | 6527.8 | 5526.1  | 4992.5  | 4576.8  |
| 57.5°  | 3735.6 | 5800.9 | 4939.0  | 4247.3  | 3874.1  |
| 60°    | 3373.3 | 5064.2 | 4294.7  | 3593.3  | 3285.8  |
| 62.5°  | 3018.3 | 4338.5 | 3711.2  | 3036.6  | 2832.4  |
| 65°    | 2654.9 | 3662.6 | 3119.2  | 2586.8  | 2408.1  |
| 67.5°  | 2307.2 | 3077.9 | 2607.5  | 2180.8  | 2061.7  |
| 70°    | 1954.7 | 2496.9 | 2155.3  | 1831.9  | 1762.6  |
| 72.5°  | 1591.2 | 1994.8 | 1743.2  | 1546.2  | 1494.0  |
| 75°    | 1270.3 | 1556.0 | 1368.8  | 1253.3  | 1222.9  |
| 77.5°  | 945.7  | 1157.3 | 1069.7  | 1001.7  | 993.1   |
| 80°    | 666.2  | 835.1  | 787.7   | 774.3   | 761.0   |
| 82.5°  | 425.5  | 545.8  | 560.4   | 551.9   | 542.2   |
| 85°    | 226.1  | 320.9  | 335.5   | 318.5   | 314.8   |
| 87.5°  | 91.2   | 139.8  | 150.7   | 166.5   | 171.4   |
| 90°    | 1.2    | 32.8   | 59.6    | 75.4    | 77.8    |
| 92.5°  | 1.2    | 7.3    | 8.5     | 8.5     | 7.3     |
| 95°    | 1.2    | 4.9    | 4.9     | 3.6     | 2.4     |
| 97.5°  | 0.0    | 0.0    | 0.0     | 0.0     | 0.0     |
| 100°   | 0.0    | 0.0    | 0.0     | 0.0     | 0.0     |
| 102.5° | 0.0    | 0.0    | 0.0     | 0.0     | 0.0     |
| 105°   | 0.0    | 0.0    | 0.0     | 0.0     | 0.0     |



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CATALOG NUMBER: SPHB-30HE-W-L850-CD

**CANDELA DISTRIBUTION (continued):**

|        | 0°  | 22.5° | 45° | 67.5° | 90° |
|--------|-----|-------|-----|-------|-----|
| 112.5° | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 115°   | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 117.5° | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 120°   | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 122.5° | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 125°   | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 127.5° | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 130°   | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 132.5° | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 135°   | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 137.5° | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 140°   | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 142.5° | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 145°   | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 147.5° | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 150°   | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 152.5° | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 155°   | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 157.5° | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 160°   | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 162.5° | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 165°   | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 167.5° | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 170°   | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 172.5° | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 175°   | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 177.5° | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |
| 180°   | 0.0 | 0.0   | 0.0 | 0.0   | 0.0 |



Report Generated By 670246072 / DESKTOP-50001EG





— 0°-180°    - - 45°-225°    - - - 90°-270°







|        |     |     |     |     |     |
|--------|-----|-----|-----|-----|-----|
| 107.5° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110°   | 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: SP1-2309-187-6

Test Date: 10/10/2023

Luminaire Tested: SPHB-2436SE-M-UNV-L84050-CD-U (36K LUMEN 5000K)

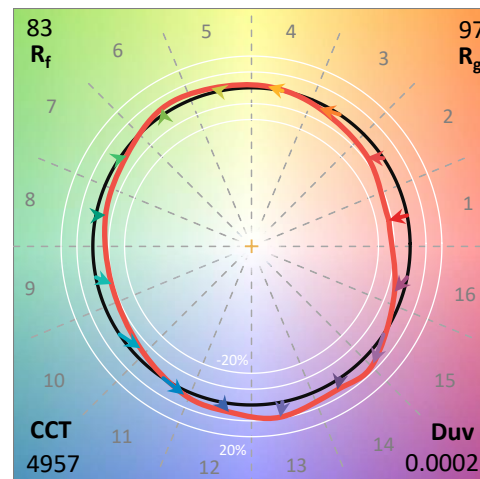
Data in this report applies to families of products including SPHB-2436SE-M-UNV-L84050-CD-U (36K LUMEN 5000K).

### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2309-187-6  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 10/10/2023  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: METALUX  
 Catalog Number: **SPHB-2436SE-M-UNV-L84050-CD-U (36K LUMEN 5000K)**  
 Description: SPHB SELECT, MEDIUM LENS, 36K LUMENS, 5000K

### Spectral Parameters

|                           |        |           |      |      |      |
|---------------------------|--------|-----------|------|------|------|
| CCT (K):                  | 4957   | CRI (Ra): | 83.0 |      |      |
| CIE u':                   | 0.2117 | R1:       | 81.6 | R9:  | 13.4 |
| CIE v':                   | 0.4855 | R2:       | 88.2 | R10: | 70.8 |
| Duv:                      | 0.0002 | R3:       | 91.8 | R11: | 80.4 |
| CIE x:                    | 0.3463 | R4:       | 82.0 | R12: | 55.2 |
| CIE y:                    | 0.3530 | R5:       | 81.2 | R13: | 83.4 |
| CIE z:                    | 0.3007 | R6:       | 82.2 | R14: | 95.6 |
| Peak Wavelength (nm):     | 452    | R7:       | 88.1 |      |      |
| Dominant Wavelength (nm): | 573    | R8:       | 69.2 |      |      |
| Purity:                   | 10     |           |      |      |      |
| Rf:                       | 83     |           |      |      |      |
| Rg:                       | 96.6   |           |      |      |      |



### Test Conditions

Stabilization Time: 10M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.8/38%  
 Sphere Temperature (°C): 24.2

REPORT NUMBER: SP1-2309-187-6

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | 76INCH SPHERE IN0058  | 8/9/2023         | 2/9/2024             |
| Power Meter                    | XITRON 2801 IN0071    | 11/29/2022       | 11/29/2023           |
| AC Power Source                | CHROMA 61603 IN0063   | 11/28/2022       | 11/28/2023           |
| DC Power Source                | AGILENT E3634A IN0208 | 11/28/2022       | 11/28/2023           |
| Sphere Thermometer             | ONSET IN0085          | 11/28/2022       | 11/28/2023           |
| Room Thermometer               | ONSET IN0046          | 11/28/2022       | 11/28/2023           |

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CIE 1931 Chromaticity Diagram



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



Point lies inside the ANSI 5000K 4-step quadrangle

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**Photopic Flux vs. Wavelength**



#####

| 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       | 16466            | NR               | 490       | 226060           | NR               | 620       | 461721           | NR               | 750       | 25725            | NR               | 880       | 22907            | NR               |
| 365       | 15834            | NR               | 495       | 262555           | NR               | 625       | 431803           | NR               | 755       | 23611            | NR               | 885       | 20279            | NR               |
| 370       | 15705            | NR               | 500       | 311885           | NR               | 630       | 403609           | NR               | 760       | 23080            | NR               | 890       | 16993            | NR               |
| 375       | 16161            | NR               | 505       | 357744           | NR               | 635       | 372123           | NR               | 765       | 19807            | NR               | 895       | 19274            | NR               |
| 380       | 17604            | NR               | 510       | 398986           | NR               | 640       | 341468           | NR               | 770       | 19668            | NR               | 900       | 19961            | NR               |
| 385       | 15901            | NR               | 515       | 433700           | NR               | 645       | 309940           | NR               | 775       | 19158            | NR               | 905       | 18541            | NR               |
| 390       | 15561            | NR               | 520       | 460798           | NR               | 650       | 281489           | NR               | 780       | 15443            | NR               | 910       | 17677            | NR               |
| 395       | 13649            | NR               | 525       | 477719           | NR               | 655       | 251312           | NR               | 785       | 15332            | NR               | 915       | 22715            | NR               |
| 400       | 12726            | NR               | 530       | 489588           | NR               | 660       | 226441           | NR               | 790       | 15443            | NR               | 920       | 20431            | NR               |
| 405       | 12867            | NR               | 535       | 500614           | NR               | 665       | 197313           | NR               | 795       | 12716            | NR               | 925       | 18281            | NR               |
| 410       | 14858            | NR               | 540       | 509478           | NR               | 670       | 174037           | NR               | 800       | 14486            | NR               | 930       | 24254            | NR               |
| 415       | 22758            | NR               | 545       | 518634           | NR               | 675       | 150402           | NR               | 805       | 13381            | NR               | 935       | 22361            | NR               |
| 420       | 40173            | NR               | 550       | 526082           | NR               | 680       | 133071           | NR               | 810       | 13493            | NR               | 940       | 21374            | NR               |
| 425       | 73606            | NR               | 555       | 535227           | NR               | 685       | 115398           | NR               | 815       | 13669            | NR               | 945       | 28437            | NR               |
| 430       | 132581           | NR               | 560       | 544645           | NR               | 690       | 99841            | NR               | 820       | 13949            | NR               | 950       | 12992            | NR               |
| 435       | 230438           | NR               | 565       | 553668           | NR               | 695       | 87508            | NR               | 825       | 15609            | NR               | 955       | 16488            | NR               |
| 440       | 382216           | NR               | 570       | 563202           | NR               | 700       | 76178            | NR               | 830       | 16481            | NR               | 960       | 22861            | NR               |
| 445       | 630161           | NR               | 575       | 570117           | NR               | 705       | 66441            | NR               | 835       | 17363            | NR               | 965       | 29851            | NR               |
| 450       | 918124           | NR               | 580       | 573472           | NR               | 710       | 60098            | NR               | 840       | 16960            | NR               | 970       | 10276            | NR               |
| 455       | 893762           | NR               | 585       | 571600           | NR               | 715       | 54539            | NR               | 845       | 20190            | NR               | 975       | 29525            | NR               |
| 460       | 612059           | NR               | 590       | 567612           | NR               | 720       | 48071            | NR               | 850       | 20506            | NR               | 980       | 26199            | NR               |
| 465       | 443338           | NR               | 595       | 561157           | NR               | 725       | 42545            | NR               | 855       | 18525            | NR               | 985       | 27187            | NR               |
| 470       | 344255           | NR               | 600       | 547832           | NR               | 730       | 38502            | NR               | 860       | 19090            | NR               | 990       | 30712            | NR               |
| 475       | 249784           | NR               | 605       | 530525           | NR               | 735       | 33410            | NR               | 865       | 17185            | NR               | 995       | 15047            | NR               |
| 480       | 207499           | NR               | 610       | 513131           | NR               | 740       | 29667            | NR               | 870       | 18599            | NR               | 1000      | 14588            | NR               |
| 485       | 208029           | NR               | 615       | 491003           | NR               | 745       | 27521            | NR               | 875       | 20800            | NR               |           |                  |                  |

REPORT NUMBER: SP1-2309-187-6

Scotopic Flux vs. Wavelength



Scotopic Lumens: 69332.4

S/P: 1.93

| 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       | 16466            | NR               | 490       | 226060           | NR               | 620       | 461721           | NR               | 750       | 25725            | NR               | 880       | 22907            | NR               |
| 365       | 15834            | NR               | 495       | 262555           | NR               | 625       | 431803           | NR               | 755       | 23611            | NR               | 885       | 20279            | NR               |
| 370       | 15705            | NR               | 500       | 311885           | NR               | 630       | 403609           | NR               | 760       | 23080            | NR               | 890       | 16993            | NR               |
| 375       | 16161            | NR               | 505       | 357744           | NR               | 635       | 372123           | NR               | 765       | 19807            | NR               | 895       | 19274            | NR               |
| 380       | 17604            | NR               | 510       | 398986           | NR               | 640       | 341468           | NR               | 770       | 19668            | NR               | 900       | 19961            | NR               |
| 385       | 15901            | NR               | 515       | 433700           | NR               | 645       | 309940           | NR               | 775       | 19158            | NR               | 905       | 18541            | NR               |
| 390       | 15561            | NR               | 520       | 460798           | NR               | 650       | 281489           | NR               | 780       | 15443            | NR               | 910       | 17677            | NR               |
| 395       | 13649            | NR               | 525       | 477719           | NR               | 655       | 251312           | NR               | 785       | 15332            | NR               | 915       | 22715            | NR               |
| 400       | 12726            | NR               | 530       | 489588           | NR               | 660       | 226441           | NR               | 790       | 15443            | NR               | 920       | 20431            | NR               |
| 405       | 12867            | NR               | 535       | 500614           | NR               | 665       | 197313           | NR               | 795       | 12716            | NR               | 925       | 18281            | NR               |
| 410       | 14858            | NR               | 540       | 509478           | NR               | 670       | 174037           | NR               | 800       | 14486            | NR               | 930       | 24254            | NR               |
| 415       | 22758            | NR               | 545       | 518634           | NR               | 675       | 150402           | NR               | 805       | 13381            | NR               | 935       | 22361            | NR               |
| 420       | 40173            | NR               | 550       | 526082           | NR               | 680       | 133071           | NR               | 810       | 13493            | NR               | 940       | 21374            | NR               |
| 425       | 73606            | NR               | 555       | 535227           | NR               | 685       | 115398           | NR               | 815       | 13669            | NR               | 945       | 28437            | NR               |
| 430       | 132581           | NR               | 560       | 544645           | NR               | 690       | 99841            | NR               | 820       | 13949            | NR               | 950       | 12992            | NR               |
| 435       | 230438           | NR               | 565       | 553668           | NR               | 695       | 87508            | NR               | 825       | 15609            | NR               | 955       | 16488            | NR               |
| 440       | 382216           | NR               | 570       | 563202           | NR               | 700       | 76178            | NR               | 830       | 16481            | NR               | 960       | 22861            | NR               |
| 445       | 630161           | NR               | 575       | 570117           | NR               | 705       | 66441            | NR               | 835       | 17363            | NR               | 965       | 29851            | NR               |
| 450       | 918124           | NR               | 580       | 573472           | NR               | 710       | 60098            | NR               | 840       | 16960            | NR               | 970       | 10276            | NR               |
| 455       | 893762           | NR               | 585       | 571600           | NR               | 715       | 54539            | NR               | 845       | 20190            | NR               | 975       | 29525            | NR               |
| 460       | 612059           | NR               | 590       | 567612           | NR               | 720       | 48071            | NR               | 850       | 20506            | NR               | 980       | 26199            | NR               |
| 465       | 443338           | NR               | 595       | 561157           | NR               | 725       | 42545            | NR               | 855       | 18525            | NR               | 985       | 27187            | NR               |
| 470       | 344255           | NR               | 600       | 547832           | NR               | 730       | 38502            | NR               | 860       | 19090            | NR               | 990       | 30712            | NR               |
| 475       | 249784           | NR               | 605       | 530525           | NR               | 735       | 33410            | NR               | 865       | 17185            | NR               | 995       | 15047            | NR               |
| 480       | 207499           | NR               | 610       | 513131           | NR               | 740       | 29667            | NR               | 870       | 18599            | NR               | 1000      | 14588            | NR               |
| 485       | 208029           | NR               | 615       | 491003           | NR               | 745       | 27521            | NR               | 875       | 20800            | NR               |           |                  |                  |

REPORT NUMBER: SP1-2309-187-6

**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 29078.2 M/P: 0.81**

| 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       | 16466            | NR               | 490       | 226060           | NR               | 620       | 461721           | NR               | 750       | 25725            | NR               | 880       | 22907            | NR               |
| 365       | 15834            | NR               | 495       | 262555           | NR               | 625       | 431803           | NR               | 755       | 23611            | NR               | 885       | 20279            | NR               |
| 370       | 15705            | NR               | 500       | 311885           | NR               | 630       | 403609           | NR               | 760       | 23080            | NR               | 890       | 16993            | NR               |
| 375       | 16161            | NR               | 505       | 357744           | NR               | 635       | 372123           | NR               | 765       | 19807            | NR               | 895       | 19274            | NR               |
| 380       | 17604            | NR               | 510       | 398986           | NR               | 640       | 341468           | NR               | 770       | 19668            | NR               | 900       | 19961            | NR               |
| 385       | 15901            | NR               | 515       | 433700           | NR               | 645       | 309940           | NR               | 775       | 19158            | NR               | 905       | 18541            | NR               |
| 390       | 15561            | NR               | 520       | 460798           | NR               | 650       | 281489           | NR               | 780       | 15443            | NR               | 910       | 17677            | NR               |
| 395       | 13649            | NR               | 525       | 477719           | NR               | 655       | 251312           | NR               | 785       | 15332            | NR               | 915       | 22715            | NR               |
| 400       | 12726            | NR               | 530       | 489588           | NR               | 660       | 226441           | NR               | 790       | 15443            | NR               | 920       | 20431            | NR               |
| 405       | 12867            | NR               | 535       | 500614           | NR               | 665       | 197313           | NR               | 795       | 12716            | NR               | 925       | 18281            | NR               |
| 410       | 14858            | NR               | 540       | 509478           | NR               | 670       | 174037           | NR               | 800       | 14486            | NR               | 930       | 24254            | NR               |
| 415       | 22758            | NR               | 545       | 518634           | NR               | 675       | 150402           | NR               | 805       | 13381            | NR               | 935       | 22361            | NR               |
| 420       | 40173            | NR               | 550       | 526082           | NR               | 680       | 133071           | NR               | 810       | 13493            | NR               | 940       | 21374            | NR               |
| 425       | 73606            | NR               | 555       | 535227           | NR               | 685       | 115398           | NR               | 815       | 13669            | NR               | 945       | 28437            | NR               |
| 430       | 132581           | NR               | 560       | 544645           | NR               | 690       | 99841            | NR               | 820       | 13949            | NR               | 950       | 12992            | NR               |
| 435       | 230438           | NR               | 565       | 553668           | NR               | 695       | 87508            | NR               | 825       | 15609            | NR               | 955       | 16488            | NR               |
| 440       | 382216           | NR               | 570       | 563202           | NR               | 700       | 76178            | NR               | 830       | 16481            | NR               | 960       | 22861            | NR               |
| 445       | 630161           | NR               | 575       | 570117           | NR               | 705       | 66441            | NR               | 835       | 17363            | NR               | 965       | 29851            | NR               |
| 450       | 918124           | NR               | 580       | 573472           | NR               | 710       | 60098            | NR               | 840       | 16960            | NR               | 970       | 10276            | NR               |
| 455       | 893762           | NR               | 585       | 571600           | NR               | 715       | 54539            | NR               | 845       | 20190            | NR               | 975       | 29525            | NR               |
| 460       | 612059           | NR               | 590       | 567612           | NR               | 720       | 48071            | NR               | 850       | 20506            | NR               | 980       | 26199            | NR               |
| 465       | 443338           | NR               | 595       | 561157           | NR               | 725       | 42545            | NR               | 855       | 18525            | NR               | 985       | 27187            | NR               |
| 470       | 344255           | NR               | 600       | 547832           | NR               | 730       | 38502            | NR               | 860       | 19090            | NR               | 990       | 30712            | NR               |
| 475       | 249784           | NR               | 605       | 530525           | NR               | 735       | 33410            | NR               | 865       | 17185            | NR               | 995       | 15047            | NR               |
| 480       | 207499           | NR               | 610       | 513131           | NR               | 740       | 29667            | NR               | 870       | 18599            | NR               | 1000      | 14588            | NR               |
| 485       | 208029           | NR               | 615       | 491003           | NR               | 745       | 27521            | NR               | 875       | 20800            | NR               |           |                  |                  |

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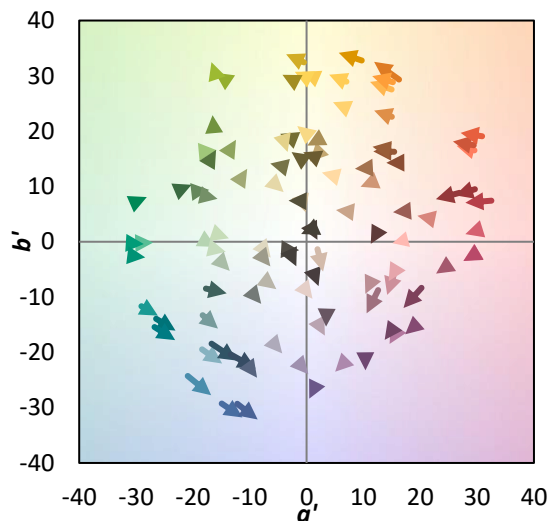
**TM-30-18**

**Summary**

$R_f = 83$   
 $R_g = 96.6$   
 CIE  $R_a = 83.0$   
 $R_g = 13.4$



**Color Vector Graphics**



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

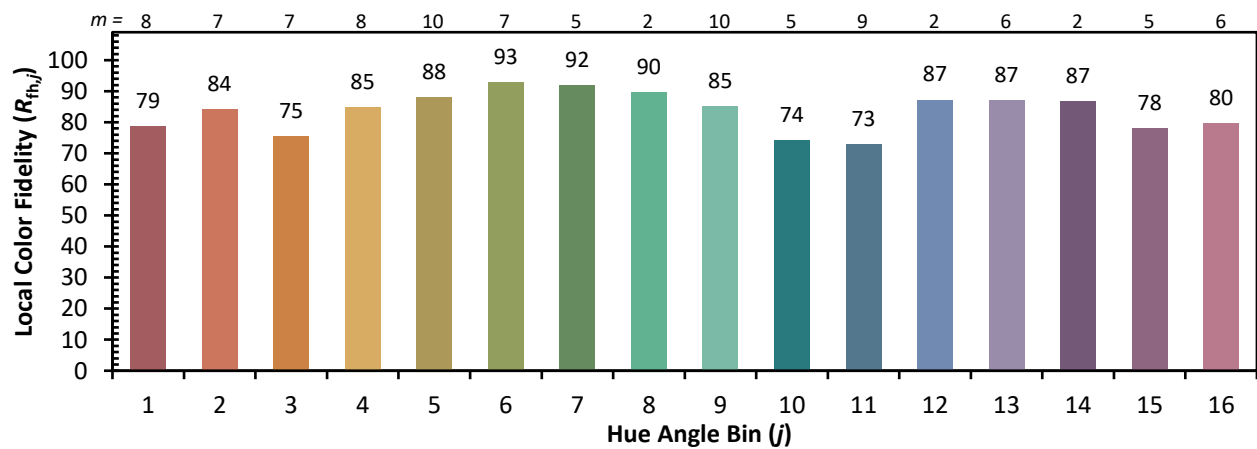
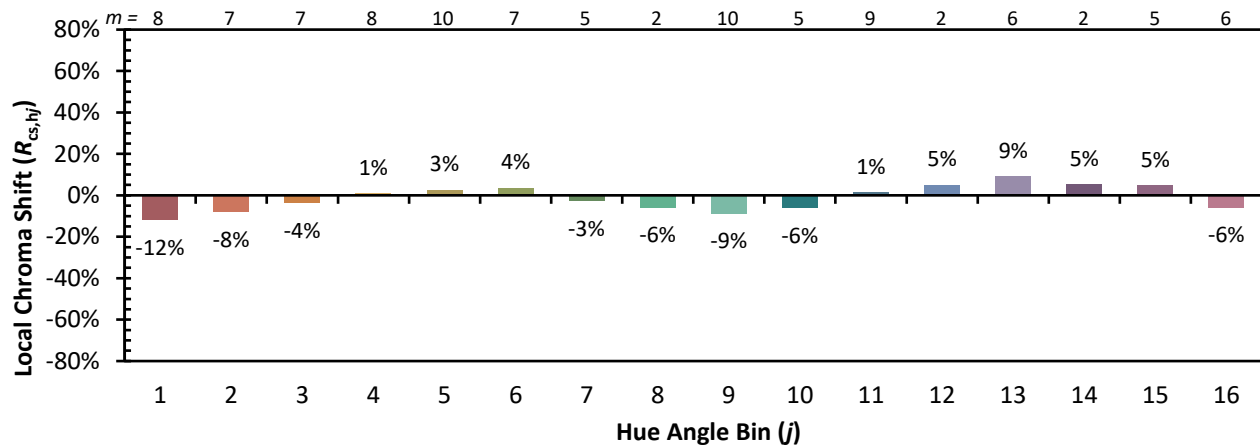
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 78 | CES51 = 94 | CES76 = 69 |
| CES02 = 60 | CES27 = 93 | CES52 = 94 | CES77 = 78 |
| CES03 = 30 | CES28 = 88 | CES53 = 89 | CES78 = 69 |
| CES04 = 69 | CES29 = 83 | CES54 = 90 | CES79 = 89 |
| CES05 = 47 | CES30 = 96 | CES55 = 88 | CES80 = 86 |
| CES06 = 50 | CES31 = 85 | CES56 = 85 | CES81 = 85 |
| CES07 = 40 | CES32 = 77 | CES57 = 84 | CES82 = 94 |
| CES08 = 39 | CES33 = 92 | CES58 = 84 | CES83 = 95 |
| CES09 = 29 | CES34 = 81 | CES59 = 91 | CES84 = 89 |
| CES10 = 73 | CES35 = 89 | CES60 = 90 | CES85 = 80 |
| CES11 = 56 | CES36 = 84 | CES61 = 87 | CES86 = 80 |
| CES12 = 62 | CES37 = 87 | CES62 = 83 | CES87 = 84 |
| CES13 = 42 | CES38 = 93 | CES63 = 83 | CES88 = 89 |
| CES14 = 74 | CES39 = 98 | CES64 = 76 | CES89 = 80 |
| CES15 = 71 | CES40 = 95 | CES65 = 75 | CES90 = 90 |
| CES16 = 46 | CES41 = 99 | CES66 = 72 | CES91 = 72 |
| CES17 = 49 | CES42 = 87 | CES67 = 70 | CES92 = 68 |
| CES18 = 56 | CES43 = 86 | CES68 = 75 | CES93 = 80 |
| CES19 = 71 | CES44 = 99 | CES69 = 80 | CES94 = 66 |
| CES20 = 64 | CES45 = 92 | CES70 = 70 | CES95 = 73 |
| CES21 = 85 | CES46 = 91 | CES71 = 63 | CES96 = 84 |
| CES22 = 77 | CES47 = 95 | CES72 = 88 | CES97 = 91 |
| CES23 = 91 | CES48 = 88 | CES73 = 63 | CES98 = 86 |
| CES24 = 90 | CES49 = 90 | CES74 = 91 | CES99 = 77 |
| CES25 = 71 | CES50 = 94 | CES75 = 65 |            |



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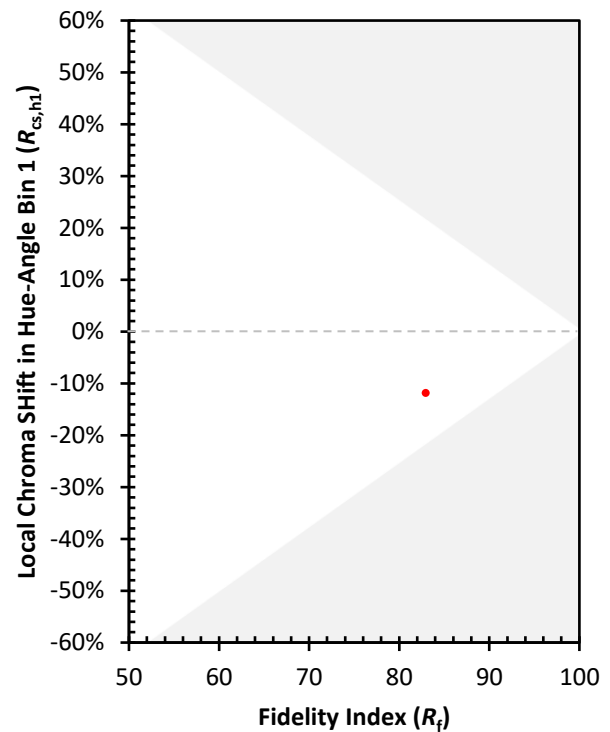
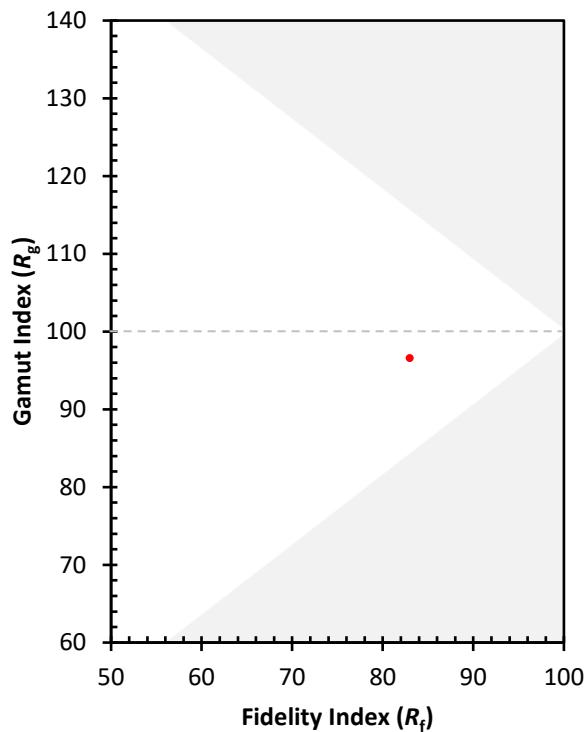
**Color Rendition by Hue-Angle Bin**



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**Measure Comparisons**



(END OF REPORT)