

VISUAL COMFORT AND COMPANY TEST REPORT

SCOPE OF WORK

LED Performance Testing

MODEL NUMBER

EC3RS-199304DN-UNV-W

PROJECT NUMBER

G104941221

REPORT NUMBER

104941221CHI-088

ISSUE DATE

9/30/2022

REVISED DATE

None

TEST DATES

2022-09-02 through 2022-09-27.

DOCUMENT CONTROL NUMBER

RTTDS-R-AMER-Test-3407

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REPORT NUMBER

104941221CHI-088

MODEL NUMBER(s)

EC3RS-199304DN-UNV-W

REPORT RENDERED TO:

VISUAL COMFORT AND COMPANY
7400 LINDER AVE
SKOKIE, IL 60077
USA

STATEMENT OF LIMITATION

NVLAP Lab Code 600186-0. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

AUTHORIZATION

The testing performed was authorized by signed quote number Qu-01236637-1.

TEST STANDARDS

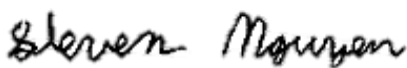
IESNA LM-79 - 2008: Electrical and Photometric Measurements of Solid State Lighting

ANSI/IES LM-79-19 Optical and Electrical Measurements of Solid-State Lighting Products

ANSI NEMA ANSLG C78.377: 2017: Specifications for the Chromaticity of Solid State Lighting (SSL) Products

IES TM-30-18: IES Method for Evaluating Light Source Color Rendition

In Charge of Testing:



Steven Nguyen
Engineer
Lighting Division

Reviewer:



Jeff Davis
N.A. Technical Lead
Lighting Division

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SAMPLE INFORMATION

REPORT NO. 104941221CHI-088

ITEMS RECEIVED

| Item No. | Control No. | Model No. | Description | Type | Received |
|----------|------------------|----------------------|------------------------|------------|-----------|
| 1 | AH08252022081536 | EC3RS-199304DN-UNV-W | 3" DOWNLIGHT LUMINAIRE | Production | 8/25/2022 |

TESTED SAMPLE CONFIGURATIONS

| Config No. | Tested Model No. | Item Nos. Utilized |
|------------|----------------------|--------------------|
| 1 | EC3RS-199304DN-UNV-W | 1 |

SAMPLE PHOTOS - TESTED CONFIGURATIONS



SUMMARY

REPORT NO. 104941221CHI-088

PRODUCT INFORMATION AND SUMMARY OF DATA

| | |
|----------------------|-------------------------------|
| Product Model No.: | EC3RS-199304DN-UNV-W |
| Product Description: | 3" DOWNLIGHT LUMINAIRE |
| LED Model No.: | Bridgelux / BXRE-30G2000-C-81 |
| Driver Model No.: | ERP / ESS030W-0500-42 |
| Light Source: | LED |

| Criteria | Results | |
|---------------------------------------|-----------------|--------------------|
| | Goniophotometer | Integrating Sphere |
| Light Output (lumens) | 1852.7 | 1796.5 |
| Input Power (W) @ 120VAC (Vac) | 19.73 | 19.69 |
| Lumen Efficacy (lm/W) | 93.9 | 91.2 |
| Input Power Factor (I) @ 120VAC (Vac) | 0.986 | 0.990 |

| Criteria | Results |
|----------------------------------|---------|
| Input ATHD (%) @ 120VAC (Vac) | 11.43 |
| Correlated Color Temperature (K) | 2993 |
| Color Rendering Index - Ra (I) | 92.0 |
| Color Rendering Index - R9 (I) | 69.6 |
| Duv (I) | -0.0014 |
| Chromaticity Coordinate (x) | 0.435 |
| Chromaticity Coordinate (y) | 0.400 |
| Chromaticity Coordinate (u') | 0.251 |
| Chromaticity Coordinate (v') | 0.520 |

TEST METHODS

SEASONING IN SAMPLE ORIENTATION - LED PRODUCTS

No seasoning was performed in accordance with IESNA LM-79.

INTEGRATING SPHERE TESTING

A spectroradiometer and integrating sphere were used to measure the spectral distribution for each EUT resulting in photometric and colorimetric data. Electrical measurements of the unit were measured using a power analyzer. Each EUT was operated at the rated input voltage of the system in its designated orientation. The ambient temperature was measured at a position inside the sphere and stabilization procedures to LM-79 were followed.

TYPE C GONIOPHOTOMETER DISTRIBUTION TESTING

A Type C Mirror Goniophotometer system was used to measure the luminous intensity (candela) at each angle of distribution for the EUT. Electrical measurements of the unit were measured using a power analyzer. Each EUT was operated at the rated input voltage of the system in its designated orientation. The ambient temperature was measured at a position near the EUT at equal height and stabilization procedures to LM-79 were followed.

TYPE C GONIOPHOTOMETER DISTRIBUTION TESTING

REPORT NO. 104941221CHI-088

| Test Configuration | Tested Model No. | Pass/Fail/NA |
|--------------------|----------------------|--------------|
| 1 | EC3RS-199304DN-UNV-W | NA |

PHOTOMETRIC AND ELECTRICAL MEASUREMENTS (25°C +/- 1°C)

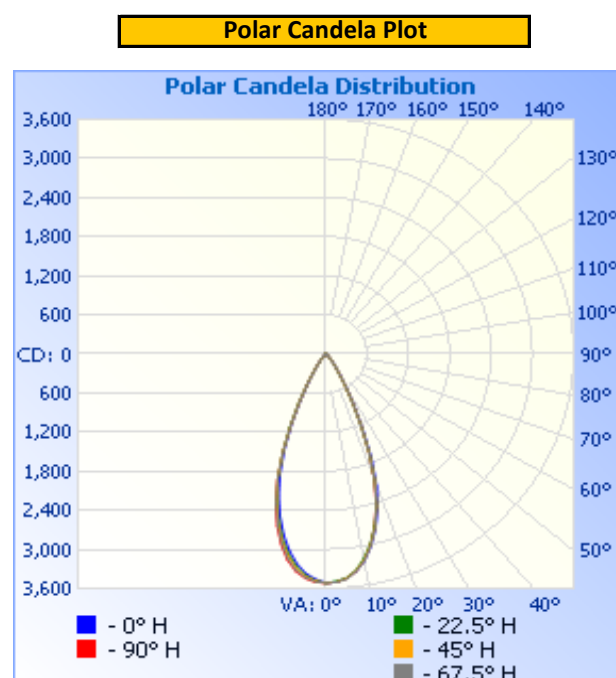
| Base Orientation | Input Voltage (Vac) | Input Current (mA) | Input Power (W) | Input Power Factor () |
|------------------|---------------------|--------------------|-----------------|------------------------|
| Up | 120.06 | 166.6 | 19.73 | 0.986 |

| Light Output (lm) | Lumen Efficacy (lm/W) |
|-------------------|-----------------------|
| 1852.7 | 93.9 |

INTENSITY SUMMARY - CANDELA

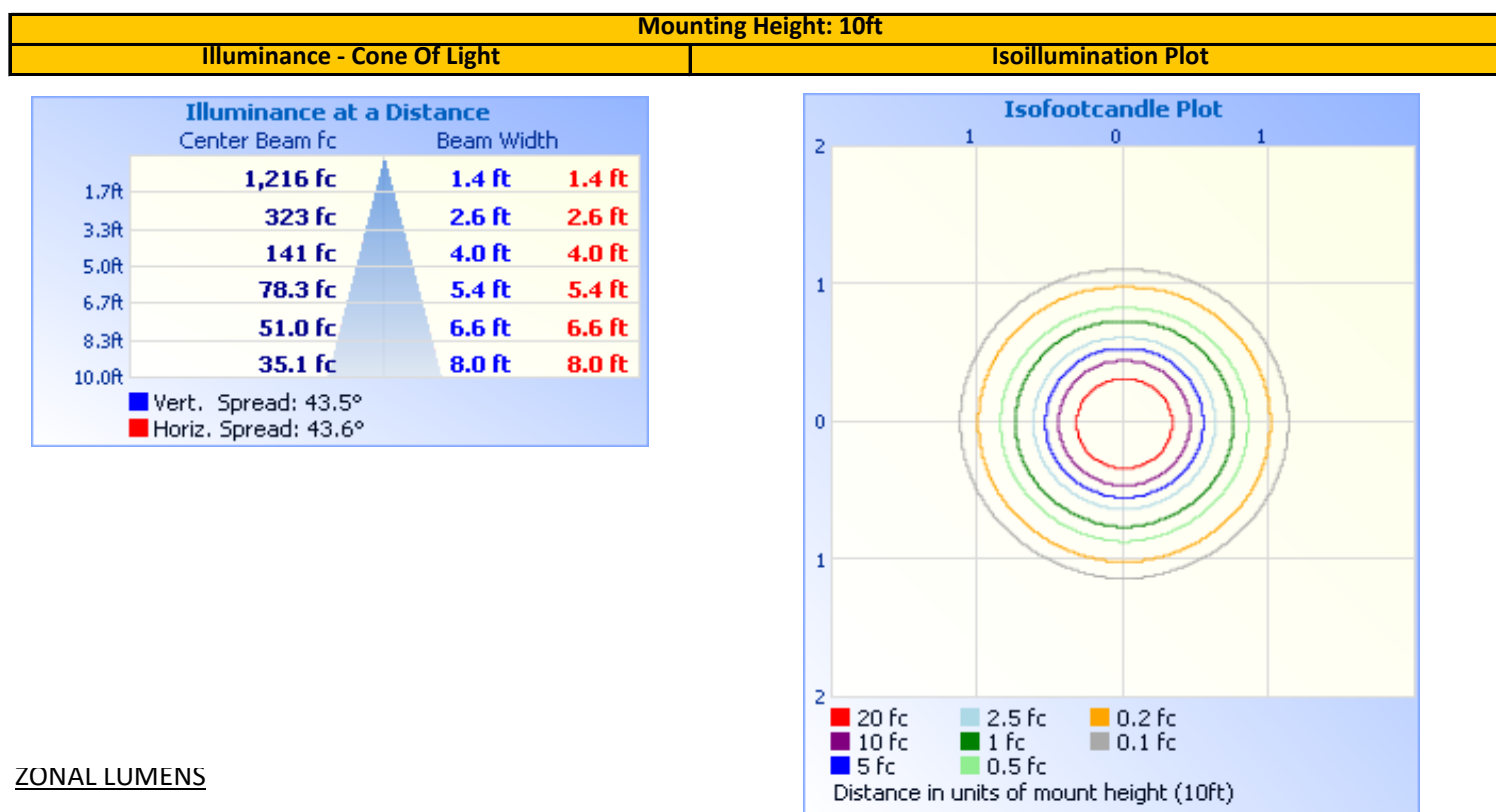
| Angle | 0 | 22.5 | 45 | 67.5 | 90 |
|-------|------|------|------|------|------|
| 0 | 3513 | 3513 | 3513 | 3513 | 3513 |
| 5 | 3454 | 3447 | 3454 | 3465 | 3454 |
| 10 | 3220 | 3184 | 3204 | 3222 | 3212 |
| 15 | 2780 | 2737 | 2757 | 2763 | 2735 |
| 20 | 2155 | 2084 | 2094 | 2079 | 2057 |
| 25 | 1266 | 1195 | 1210 | 1206 | 1207 |
| 30 | 586 | 546 | 550 | 557 | 564 |
| 35 | 266 | 246 | 243 | 246 | 251 |
| 40 | 129 | 119 | 117 | 118 | 118 |
| 45 | 61 | 57 | 57 | 57 | 58 |
| 50 | 26 | 23 | 24 | 24 | 25 |
| 55 | 10 | 10 | 10 | 10 | 10 |
| 60 | 8 | 7 | 7 | 7 | 7 |
| 65 | 5 | 5 | 5 | 5 | 5 |
| 70 | 2 | 2 | 2 | 2 | 2 |
| 75 | 2 | 2 | 2 | 2 | 2 |
| 80 | 1 | 1 | 1 | 1 | 1 |
| 85 | 1 | 0 | 0 | 0 | 1 |
| 90 | 0 | 0 | 0 | 0 | 0 |
| 95 | 0 | 0 | 0 | 0 | 0 |
| 100 | 0 | 0 | 0 | 0 | 0 |
| 105 | 0 | 0 | 0 | 0 | 0 |
| 110 | 0 | 0 | 0 | 0 | 0 |
| 115 | 0 | 0 | 0 | 0 | 0 |
| 120 | 0 | 0 | 0 | 0 | 0 |
| 125 | 0 | 0 | 0 | 0 | 0 |
| 130 | 0 | 0 | 0 | 0 | 0 |
| 135 | 0 | 0 | 0 | 0 | 0 |
| 140 | 0 | 0 | 0 | 0 | 0 |
| 145 | 0 | 0 | 0 | 0 | 0 |
| 150 | 0 | 0 | 0 | 0 | 0 |
| 155 | 0 | 0 | 0 | 0 | 0 |
| 160 | 0 | 0 | 0 | 0 | 0 |
| 165 | 0 | 0 | 0 | 0 | 0 |
| 170 | 0 | 0 | 0 | 0 | 0 |
| 175 | 0 | 0 | 0 | 0 | 0 |
| 180 | 0 | 0 | 0 | 0 | 0 |

Entire luminous intensity matrix found in .IES file



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ILLUMINANCE SUMMARY



ZONAL LUMENS

| Zonal Lumen Summary | | | | | |
|---------------------|---------|-----------|---------|--------|-------|
| Zone | Lumens | Luminaire | Zone | Lumens | Total |
| 0-30 | 1,617.5 | 87.3% | 0-10 | 319.4 | 17.2% |
| 0-40 | 1,788.1 | 96.5% | 10-20 | 741.4 | 40.0% |
| 0-60 | 1,845.8 | 99.6% | 20-30 | 556.7 | 30.0% |
| 60-90 | 6.9 | 0.4% | 30-40 | 170.6 | 9.2% |
| 70-100 | 2.3 | 0.1% | 40-50 | 47.0 | 2.5% |
| 90-120 | 0.0 | 0.0% | 50-60 | 10.7 | 0.6% |
| 0-90 | 1,852.7 | 100.0% | 60-70 | 4.6 | 0.2% |
| 90-180 | 0.0 | 0.0% | 70-80 | 1.8 | 0.1% |
| 0-180 | 1,852.7 | 100.0% | 80-90 | 0.5 | 0.0% |
| | | | 90-100 | 0.0 | 0.0% |
| | | | 100-110 | 0.0 | 0.0% |
| | | | 110-120 | 0.0 | 0.0% |
| | | | 120-130 | 0.0 | 0.0% |
| | | | 130-140 | 0.0 | 0.0% |
| | | | 140-150 | 0.0 | 0.0% |
| | | | 150-160 | 0.0 | 0.0% |
| | | | 160-170 | 0.0 | 0.0% |
| | | | 170-180 | 0.0 | 0.0% |

INTEGRATING SPHERE TESTING

REPORT NO. 104941221CHI-088

| Test Configuration | Tested Model No. | Pass/Fail/NA |
|--------------------|----------------------|--------------|
| 1 | EC3RS-199304DN-UNV-W | NA |

PHOTOMETRIC, COLORIMETRIC, AND ELECTRICAL MEASUREMENTS (25°C +/- 1°C)

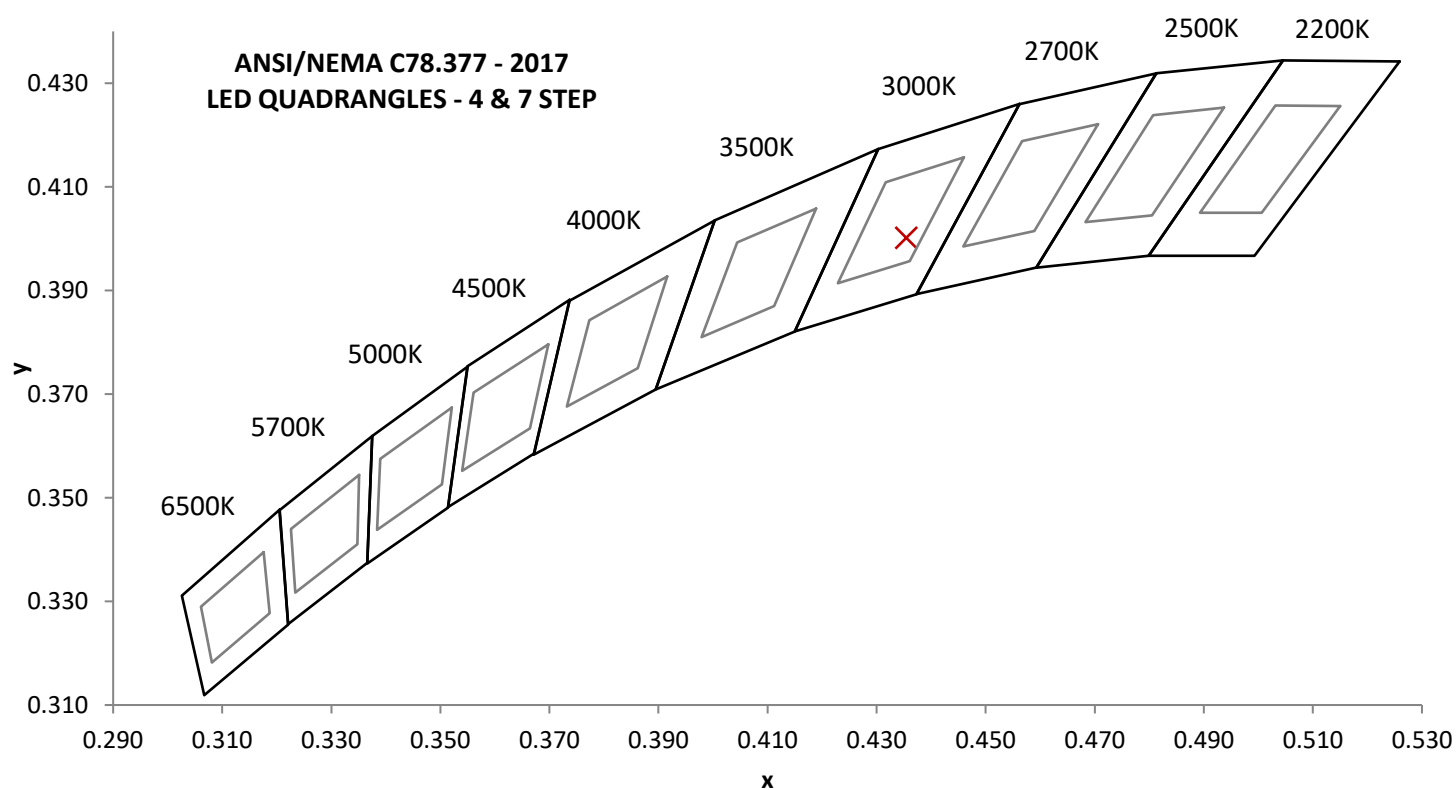
| Base Orientation |
|------------------|
| Up |

| Input Voltage (Vac) | Input Current (mA) | Input Power (W) | Input Power Factor () | Input ATHD (%) |
|---------------------|--------------------|-----------------|------------------------|----------------|
| 120.00 | 165.7 | 19.69 | 0.990 | 11.43 |

Measured at 120(Vac)

| Light Output (lm) | Lumen Efficacy (lm/W) | CCT (K) | CRI - Ra () | CRI - R9 () |
|-------------------|-----------------------|---------|--------------|--------------|
| 1796.5 | 91.2 | 2993 | 92.0 | 69.6 |

| Duv () | 1931 Chrom (x) | 1931 Chrom (y) | 1976 Chrom (u') | 1976 Chrom (v') |
|---------|----------------|----------------|-----------------|-----------------|
| -0.0014 | 0.435 | 0.400 | 0.251 | 0.520 |

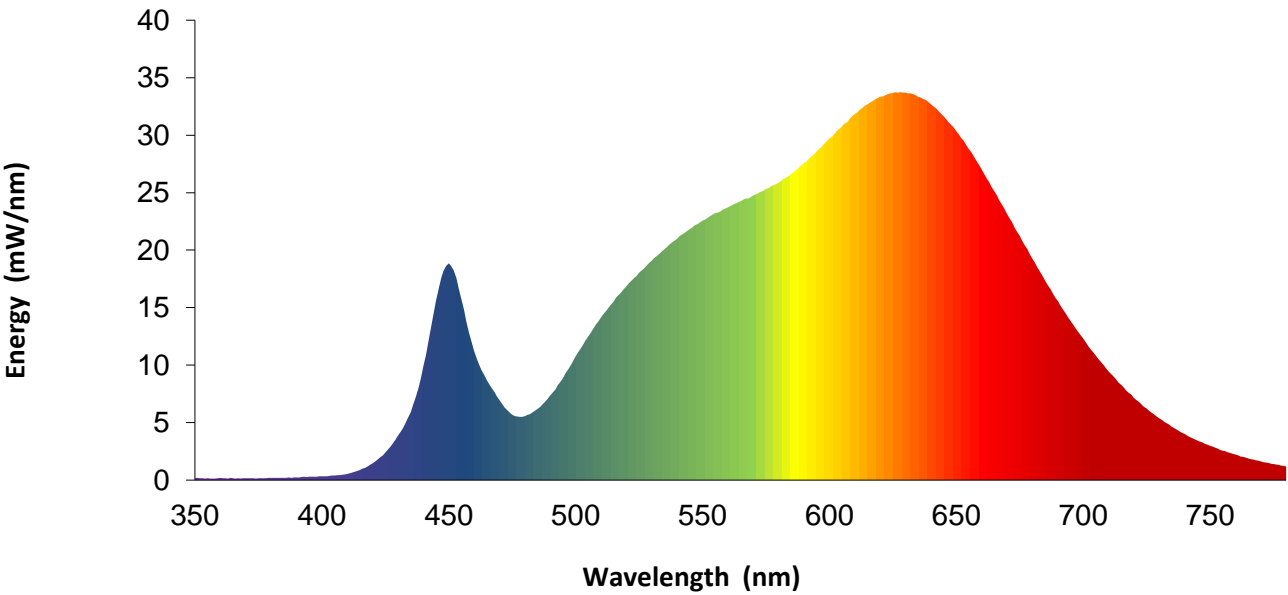


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SPECTRAL DISTRIBUTION OVER WAVELENGTHS

| nm | mW/nm | | nm | mW/nm | | nm | mW/nm | | nm | mW/nm |
|-----|-------|--|-----|-------|--|-----|-------|--|-----|-------|
| 350 | 0.2 | | 460 | 11.3 | | 570 | 24.8 | | 680 | 19.3 |
| 355 | 0.2 | | 465 | 8.7 | | 575 | 25.3 | | 685 | 17.4 |
| 360 | 0.2 | | 470 | 7.0 | | 580 | 25.9 | | 690 | 15.6 |
| 365 | 0.2 | | 475 | 5.7 | | 585 | 26.6 | | 695 | 13.8 |
| 370 | 0.2 | | 480 | 5.6 | | 590 | 27.6 | | 700 | 12.3 |
| 375 | 0.2 | | 485 | 6.2 | | 595 | 28.6 | | 705 | 10.8 |
| 380 | 0.2 | | 490 | 7.4 | | 600 | 29.7 | | 710 | 9.5 |
| 385 | 0.2 | | 495 | 8.9 | | 605 | 30.7 | | 715 | 8.3 |
| 390 | 0.2 | | 500 | 10.8 | | 610 | 31.9 | | 720 | 7.2 |
| 395 | 0.3 | | 505 | 12.5 | | 615 | 32.7 | | 725 | 6.2 |
| 400 | 0.3 | | 510 | 14.1 | | 620 | 33.4 | | 730 | 5.4 |
| 405 | 0.4 | | 515 | 15.6 | | 625 | 33.7 | | 735 | 4.6 |
| 410 | 0.5 | | 520 | 16.8 | | 630 | 33.7 | | 740 | 4.0 |
| 415 | 0.9 | | 525 | 18.0 | | 635 | 33.3 | | 745 | 3.4 |
| 420 | 1.5 | | 530 | 19.1 | | 640 | 32.7 | | 750 | 3.0 |
| 425 | 2.4 | | 535 | 20.1 | | 645 | 31.6 | | 755 | 2.6 |
| 430 | 3.8 | | 540 | 21.0 | | 650 | 30.4 | | 760 | 2.2 |
| 435 | 5.9 | | 545 | 21.8 | | 655 | 28.8 | | 765 | 1.9 |
| 440 | 9.9 | | 550 | 22.6 | | 660 | 27.0 | | 770 | 1.6 |
| 445 | 15.6 | | 555 | 23.2 | | 665 | 25.1 | | 775 | 1.4 |
| 450 | 18.8 | | 560 | 23.7 | | 670 | 23.1 | | 780 | 1.2 |
| 455 | 15.7 | | 565 | 24.3 | | 675 | 21.2 | | --- | --- |

Without correction of sample absorption.



Portrayed color in graphic is estimated by wavelength (nm) and may not be exact - it is a visual representation only

EQUIPMENT LIST

REPORT NO. 104941221CHI-088

| # | Equipment | Model No | Control No. | Last Cal | Cal Due |
|----|----------------------------------|----------|-------------|-----------|-----------|
| 1 | Yokogawa Power Meter | WT310E | CHI0664 | 3/30/2022 | 3/30/2023 |
| 2 | Omega Thermometer | DPI8-C24 | 146920 | 10/4/2021 | 10/4/2022 |
| 3 | LSI High Speed Mirror Goniometer | 6440T | 146928 | VBU | VBU |
| 4 | Newport Thermohygrometer | iServer | CHI0452 | 2/3/2022 | 2/3/2023 |
| 5 | Chroma Power Supply | 61604 | CHI0371 | VBU | VBU |
| 8 | Newport Humidity Recorder | iServer | 146961 | 9/21/2021 | 9/21/2022 |
| 9 | Labsphere Spectroradiometer | CDS2600 | CHI0539 | VBU | VBU |
| 10 | 3 Meter Sphere | SPR600 | CHI0088 | VBU | VBU |
| 11 | Elgar AC Power Supply | CW1251 | 146112 | VBU | VBU |
| 12 | Sorenson DC Power Supply | XFR150-8 | 146846 | VBU | VBU |
| 13 | Yokogawa Power Meter | WT1600 | 146769 | 4/5/2022 | 4/5/2023 |
| 17 | Omega thermometer | USB TC08 | EQAH002615 | 4/5/2022 | 4/5/2023 |
| 26 | Xitron Power Analyzer | XT-2640 | CHI0611 | 7/6/2022 | 7/6/2023 |

Note: Standard sources listed above are traceable to NIST: National Institute of Standards and Technology

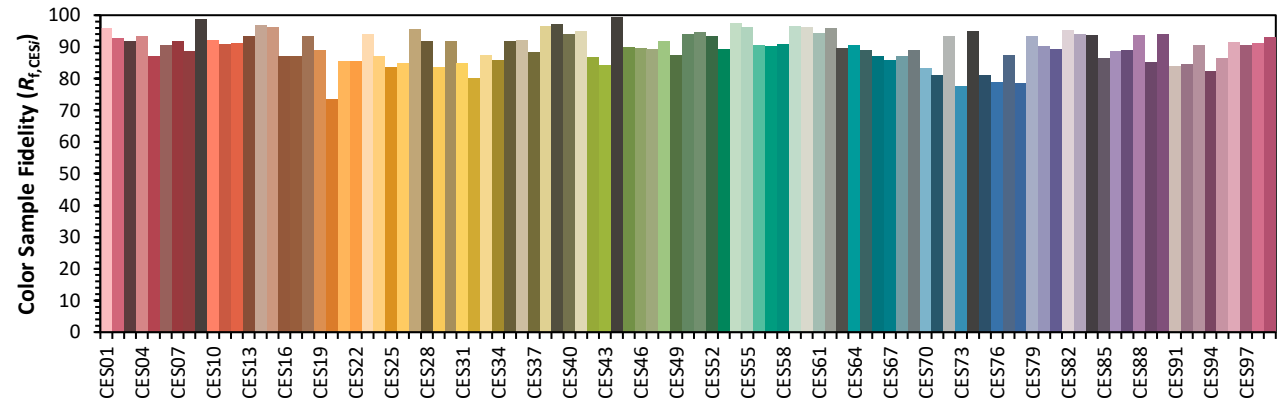
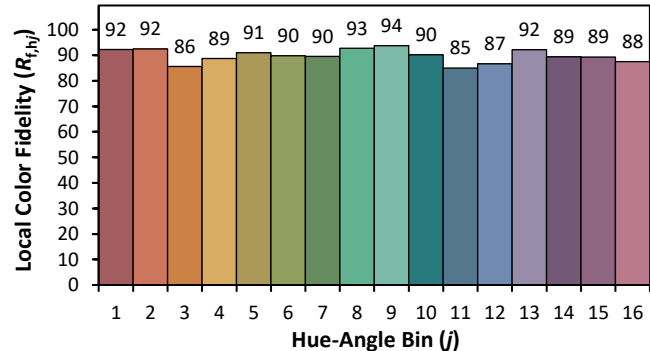
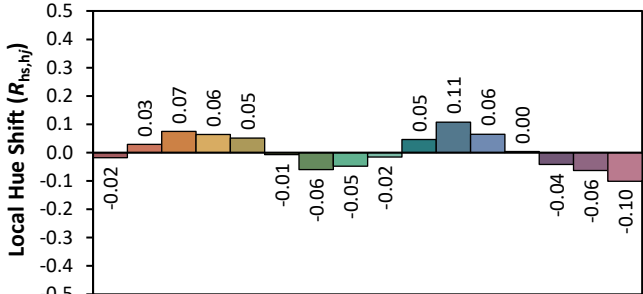
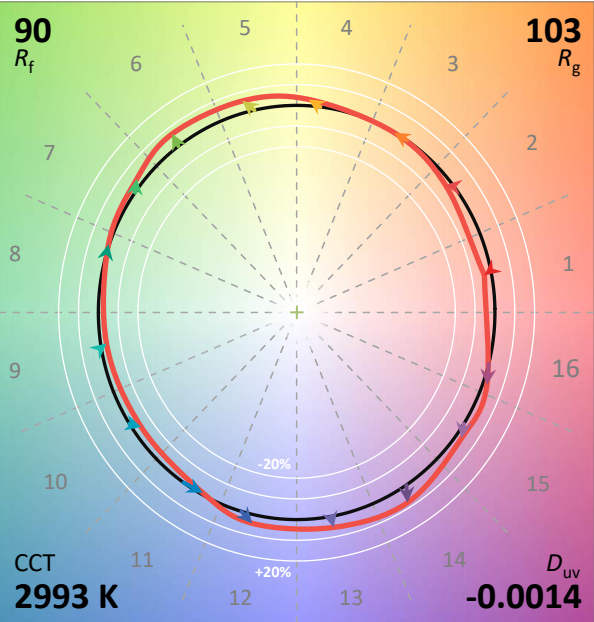
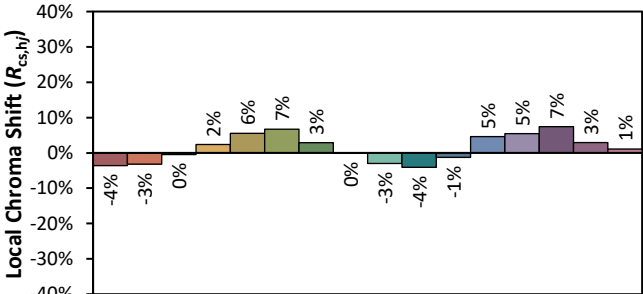
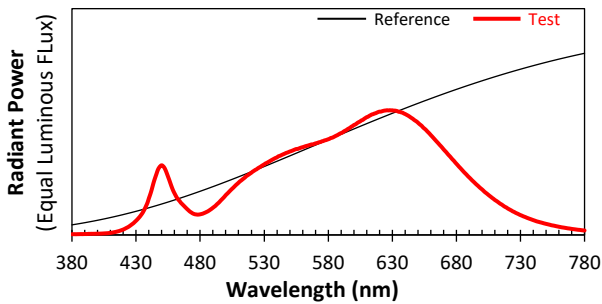
REVISION HISTORY

| # | Revision Date | Updated By | Reviewed By | Description of Change |
|-----|---------------|------------|-------------|-----------------------|
| --- | None | --- | --- | --- |
| --- | --- | --- | --- | --- |
| --- | --- | --- | --- | --- |

| Test Configuration | Tested Model No. | Pass/Fail/NA |
|--------------------|----------------------|--------------|
| 1 | EC3RS-199304DN-UNV-W | NA |

ANSI/IES TM-30-18 Color Rendition Report

| | | | |
|---------|----------|---------------|----------------------------|
| Source: | User SPD | Manufacturer: | VISUAL COMFORT AND COMPANY |
| Date: | 9/2/2022 | Model: | EC3RS-199304DN-UNV-W |



| | | | |
|--------|--|----|--------|
| Notes: | This is a recommended method for displaying ANSI/IES TM-30-18 information. | x | 0.4354 |
| | | y | 0.4001 |
| | | u' | 0.2513 |
| | | v' | 0.5196 |