# TEST REPORT

For

## P.Q.L., Inc.

2285 Ward Avenue / Simi Valley, CA 93065

| | | |
|---|---|---|
| **Model Number:** | HLT1CP2702CUW 40K<br>HLT1CP2702CUW 50K | |
| **Report Type:** | Electrical, Photometric and ISTMT tests according to the following standards and show the compliance to DLC Program SSL Technical Requirements V5.1 | |
| **Standards:** | ANSI/IES LM-79-19: Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products<br>ANSI C82.77-10-2014: Harmonic Emission Limits – Related Power Quality Requirements for Lighting<br>ANSI/UL 1598-2008: Standard for Safety of Luminaires<br>CIE 190:2010 Calculation and presentation of unified glare rating tables for indoor lighting luminaires<br>IES TM-30-18★: IES Method for Evaluating Light Source Color Rendition | |
| **Project Engineer:** | Sherry Gu | Sherry Gu |
| **Report Number:** | RKSB231018010-10-1 | |
| **Sample Size:** | One sample was received on 2023-10-18 and used for testing. | |
| **Test Date:** | 2023-10-27 to 2023-11-10 | |
| **Report Date:** | 2023-11-14 | |
| **Reviewed By:** | Seven Xia/ EE Engineer | Seven Xia |
| **Prepared By:** | Bay Area Compliance Laboratories Corp. (Kunshan).<br>No. 248 Chenghu Road, Kunshan, Jiangsu,<br>People's Republic of China<br>Tel: +86-0512-86175000<br>Fax: +86-0512-88934268 | |

## 1. Product Information and Description #

| | |
|---|---|
| Product Primary Use: | High-Bay Luminaires for Commercial and Industrial Buildings |
| Voltage and Frequency: | 120-277VAC, 50/60Hz |
| LED Source Manufacturer: | Seoul Semiconductor Co., LTD |
| LED Source Model: | STW8A32E-XX |
| Driver Model: | SIG320-I1120 120-277 W D1S (INT) |
| Auxiliary Ballast Model: | NA |
| Auxiliary Housing Model: | NA |
| White Tunable: | Yes |
| Field-Adjustable Light Output: | Yes |

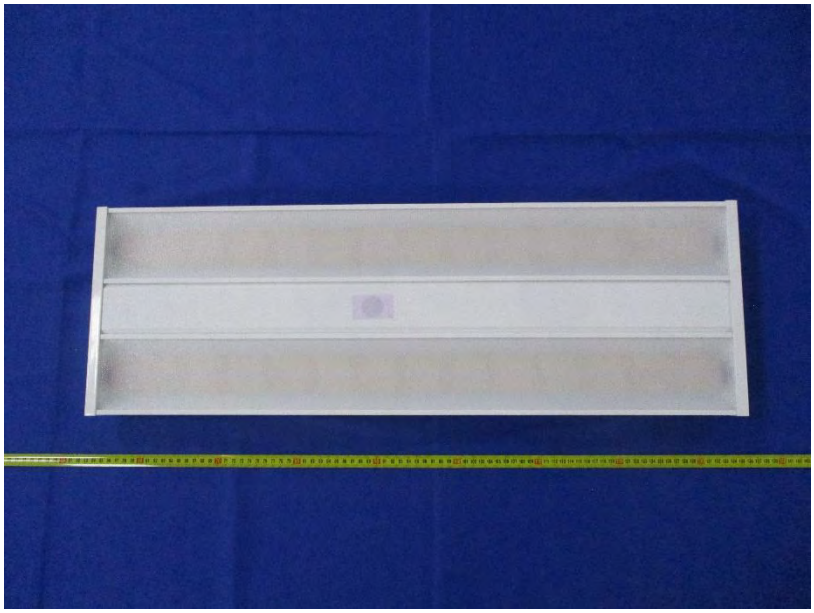
## 2. Product Rated Values#

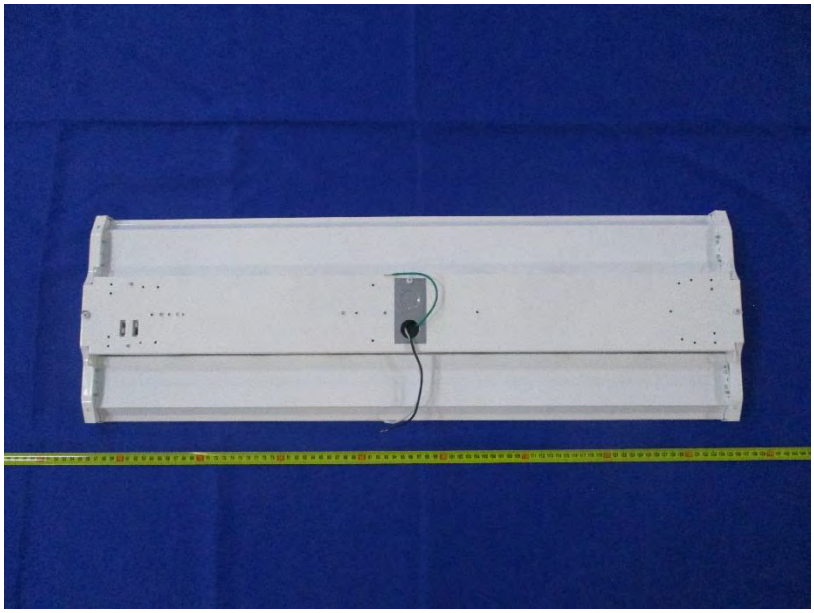
| Test Model | CCT(K) | Light Output (lm) | Power(W) | Luminous Efficacy (lm/W) |
|---|---|---|---|---|
| HLT1CP2702CUW 40K | 4000 | 40500 | 270 | 150 |
| | | 34960 | 230 | 152 |
| | | 30800 | 200 | 154 |
| HLT1CP2702CUW 50K | 5000 | 40770 | 270 | 151 |
| | | 35190 | 230 | 153 |
| | | 31000 | 200 | 155 |

## 3. Test List

| Test Model | Power(W) | Test Item | | | |
|---|---|---|---|---|---|
| | | Goniophotometer Test | Integrating Sphere Test | THDi and PF Test | In-Situ Temperature Measurement Test |
| HLT1CP2702CUW 40K | 270 | Yes | Yes | Yes | Yes |
| | 230 | Yes | Yes | Yes | NA |
| | 200 | Yes | Yes | Yes | NA |
| HLT1CP2702CUW 50K | 270 | Yes | Yes | Yes | NA |
| | 230 | Yes | NA | NA | NA |
| | 200 | Yes | NA | NA | NA |

## 4. Product Photo





LED Driver Photo

## 5. Test Result

**Test Model: HLT1CP2702CUW 40K**
**Control setting: 270W**

Integrating Sphere Test; Orientation: Downward; Test Voltage: 120V 60Hz;

| Test Item | Test Result | DLC Requirements | DLC Requirements(With tolerances only) | Conclusion |
|---|---|---|---|---|
| Light Output(lm) | 38389 | ≥10000 | ≥9000 | Pass |
| Power(W) | 260 | None. | None. | N/A |
| Total Efficacy(lm/W) | 147.67 | ≥135 | ≥130.95 | Pass |
| CCT(K) | 4102 | None [i] | None. | N/A |
| Duv | -0.00353 | None [i] | None. | N/A |
| IES $R_f$ | 84 | 70 | 69 | Pass |
| IES $R_g$ | 94 | 89 | 88 | |
| IES Rcs,h1 | -13% | -18%~23% | -19%~24% | |
| $R_a$ | 83.4 | ≥70 | ≥69 | |
| $R_9$ | 7 | ≥-40 | ≥-41 | |

Note:
i. White-tunable products are not required to meet the chromaticity requirements in DLC V5.1.

Goniophotometer Test; Orientation: Downward; Test Voltage: 120V 60Hz;

| Test Item | Test Result | DLC Requirements | DLC Requirements(With tolerances only) | Conclusion |
|---|---|---|---|---|
| Light Output(lm) | 38461.3 | ≥10000 | ≥9000 | Pass |
| Power(W) | 259.77 | None. | None. | N/A |
| Total Efficacy(lm/W) | 148.11 | ≥135 | ≥130.95 | Pass |
| Zonal Lumen Distribution(20-50°) | 59.17% | 20-50°≥30% | 20-50°≥20% | Pass |
| UGR crosswise view | 26.9 | <28 | No tolerances | Pass |
| UGR endwise view | 27.2 | <28 | No tolerances | Pass |

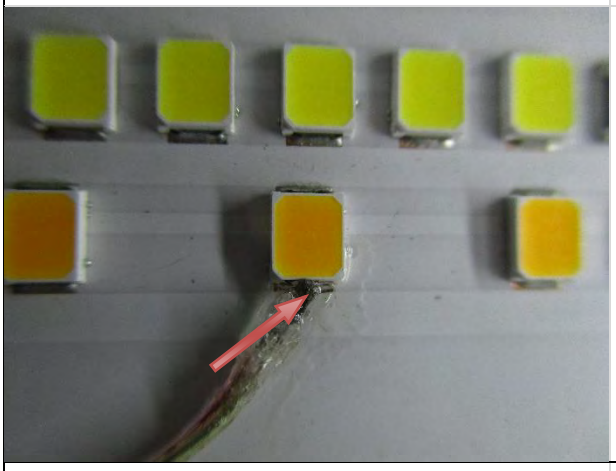
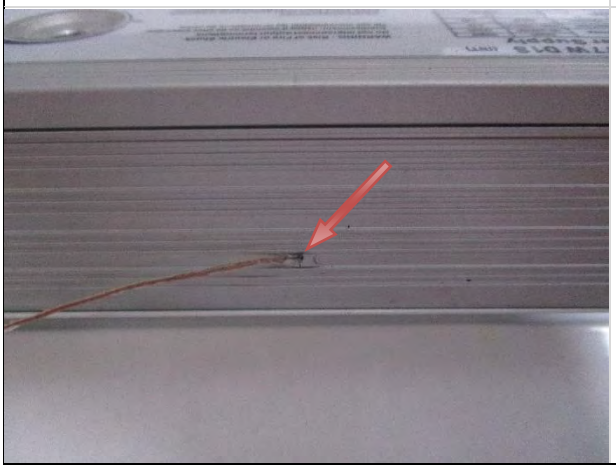
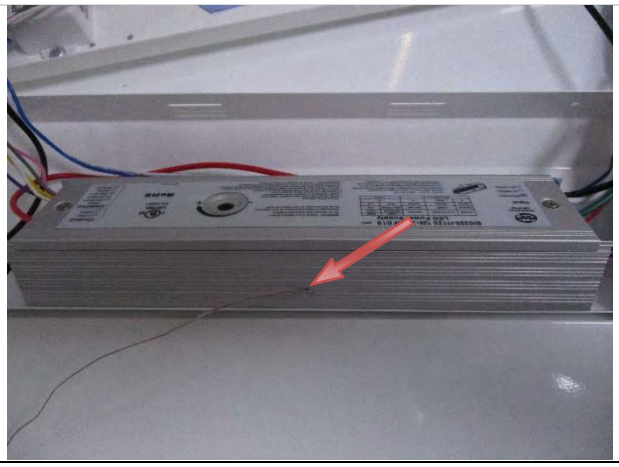
Integrating Sphere THDi、PF Test; Orientation: Downward;

| Test Voltage | Test Item | Test Result | DLC Requirements | DLC Requirements(With tolerances and/or allowances) | Conclusion |
|---|---|---|---|---|---|
| 120 | Power Factor | 0.999 | ≥0.9 | ≥0.87 | Pass |
| 120 | THDi | 1.75% | ≤20% | ≤25% | Pass |
| 277 | Power Factor | 0.9677 | ≥0.9 | ≥0.87 | Pass |
| 277 | THDi | 5.84% | ≤20% | ≤25% | Pass |

In-Situ Temperature Measurement Test: Test Voltage: 120V 60Hz;

| Test Item | Test Result | DLC Requirements | DLC Requirements(With tolerances and/or allowances) | Conclusion |
|---|---|---|---|---|
| $TMP_{LED}$(°C) | 88.5 | ≤105 | With tolerance of ⩽ 1.1°C or 0.4%, whichever is greater due to thermocouple tolerance | Pass |
| $TMP_c$(°C) | 68.6 | ≤90 | With tolerance of ⩽ 1.1°C or 0.4%, whichever is greater due to thermocouple tolerance | Pass |
| Drive Current/Individual LED source(mA) | 46.8 | ≤100 | With +5% tolerance | Pass |
| $L_{90}$ Lumen Maintenance Life (Hours) | 40000 | ≥36000 | None. | Pass |
| Color Maintenance | 0.0032 | ≤0.007 | ≤0.0074 | Pass |

Note:
1. The test results were measured directly from the test equipment.
2. The DLC requirements were listed according to DLC Technical Requirements V5.1.
3. The conclusion is for reference only. Test report that indicate product performance meets DLC Technical Requirements do not represent official DLC product qualification. All decisions regarding product qualification are made by the DLC.

| $TMP_{LED}$(Zoomed-in View) | $TMP_{LED}$(Bird's-eye View) |
|---|---|
|  |  |
| $TMP_c$(Zoomed-in View) | $TMP_c$ (Bird's-eye View) |
|  |  |

**Test Data**

**[Integrating Sphere System]**

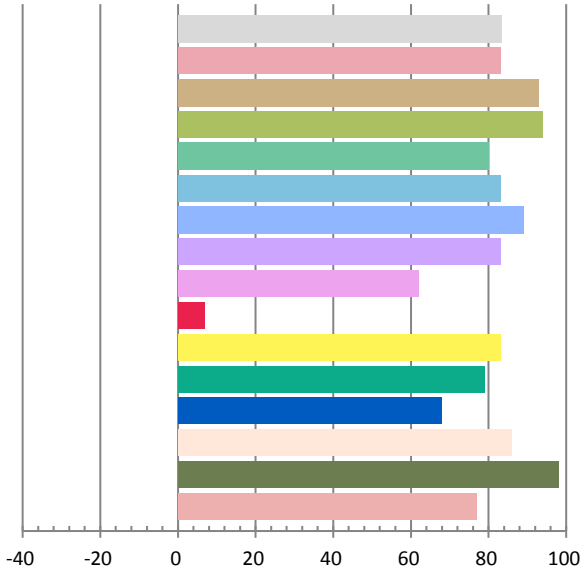
Photometric and Electrical Measurement Result

| Voltage (V) | Frequency (Hz) | Current (A) | Power (W) | Power Factor | Luminous Flux(lm) | Efficacy (lm/W) |
|---|---|---|---|---|---|---|
| 120.0 | 60 | 2.169 | 260 | 0.999 | 38389 | 147.67 |

| Radiant Flux (W) | CCT (K) | Duv | x | y | u' | v' |
|---|---|---|---|---|---|---|
| 118.871 | 4102 | -0.00353 | 0.3738 | 0.3652 | 0.2254 | 0.4954 |

**Color Rendering Index**

| Ra | | | |
|---|---|---|---|
| 83.4 | | | |
| R1 | R2 | R3 | R4 |
| 83 | 93 | 94 | 80 |
| R5 | R6 | R7 | R8 |
| 83 | 89 | 83 | 62 |
| R9 | R10 | R11 | R12 |
| 7 | 83 | 79 | 68 |
| R13 | R14 | R15 | |
| 86 | 98 | 77 | |



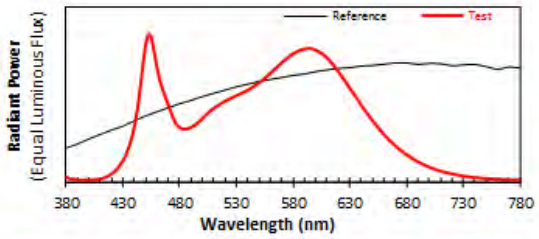
# ANSI/IES TM-30-18 Color Rendition Report

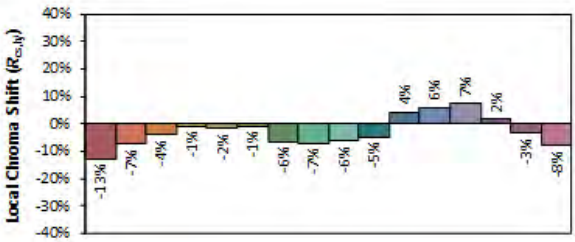
**Source:** User SPD

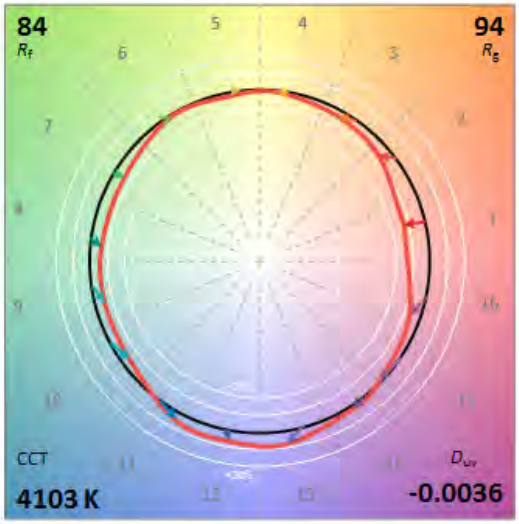
**Manufacturer:** P.Q.L., Inc.

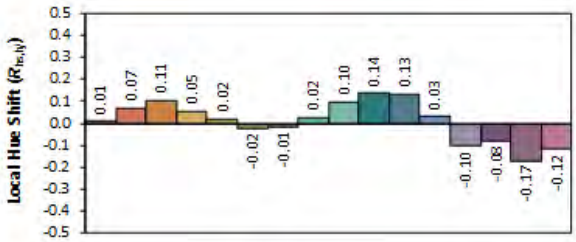
**Date:** 2023/11/1

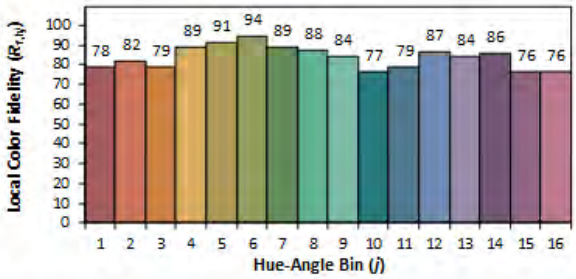
**Model:** HLT1CP2702CUW 4000K

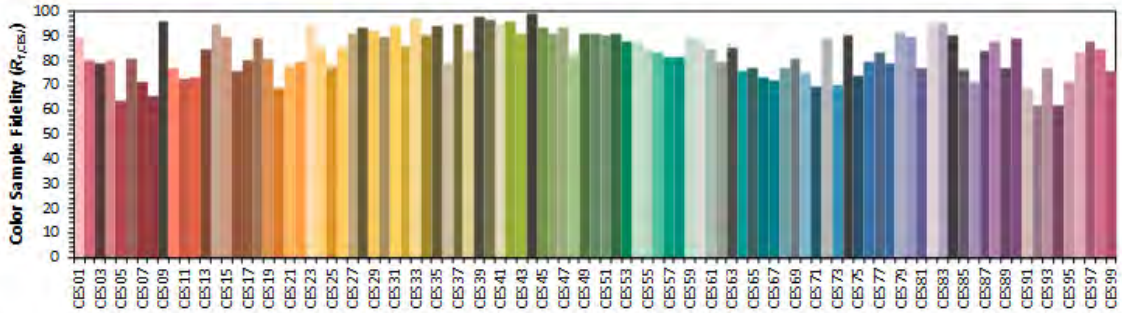



**Notes:** This is a recommended method for displaying ANSI/IES TM-30-18 information.

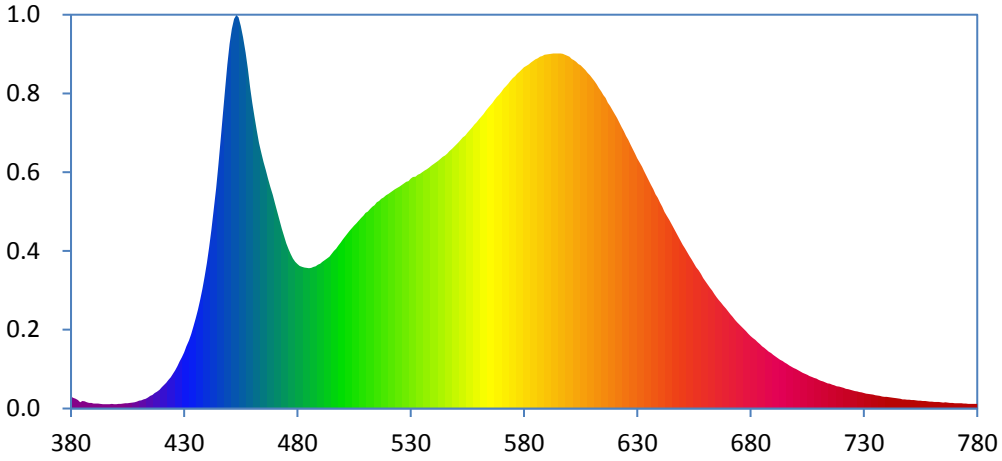
| | |
|---|---|
| $x$ | 0.3738 |
| $y$ | 0.3650 |
| $u'$ | 0.2254 |
| $v'$ | 0.4953 |

CIE 13.3-1995 (CRI)

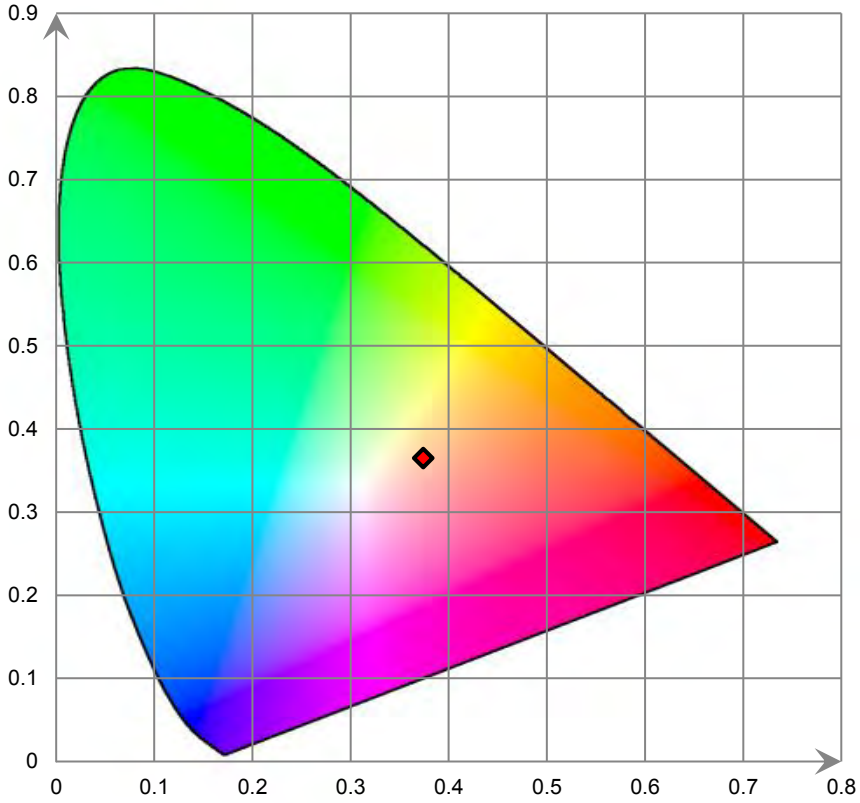
| | |
|---|---|
| $R_a$ | 83 |
| $R_9$ | 6 |

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

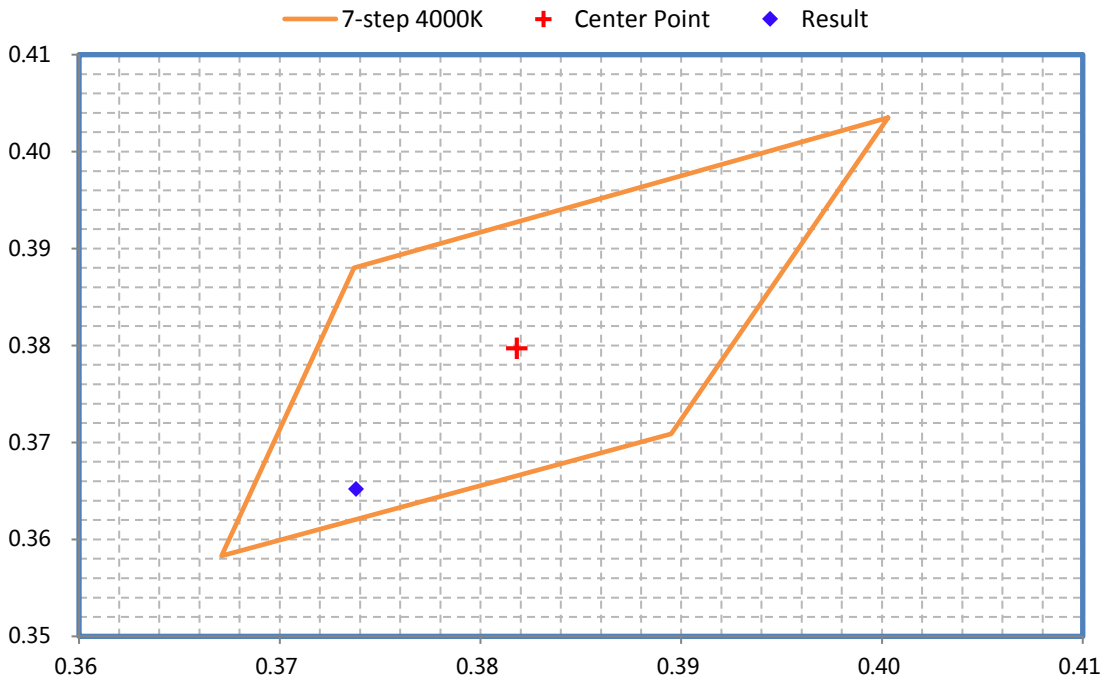
Relative Spectral Power Distribution




CIE 1931 x y Chromaticity Diagram



ANSI C78.377-2017 Chromaticity Quadrangles



[Goniophotometer System]

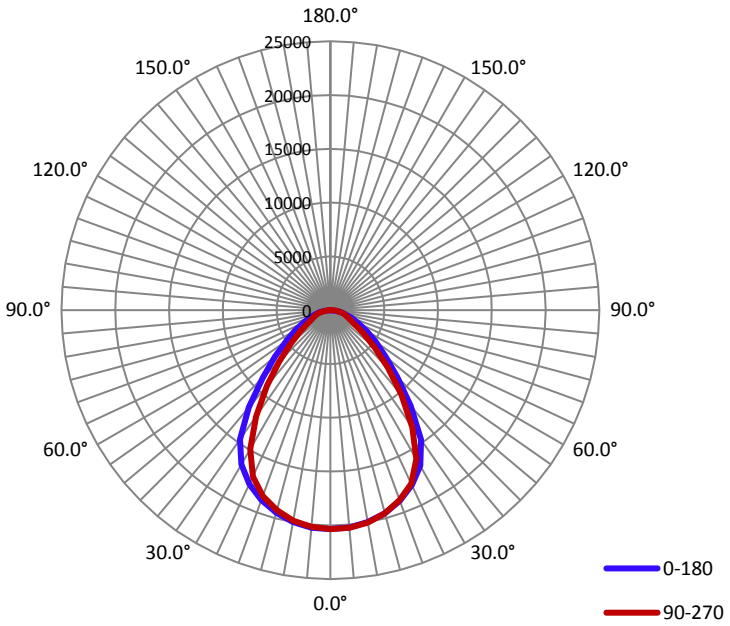
**Electrical Measurement**

| Input Voltage (V) | Frequency (Hz) | Input Current (A) | Power (W) | Power Factor |
|---|---|---|---|---|
| 120.0 | 60 | 2.165 | 259.77 | 1 |

Photometric Measurement

| Luminous Flux (lm) | Efficacy (lm/W) | $I_{max}$ (cd) | S/MH (C0/180) | S/MH (C90/270) |
|---|---|---|---|---|
| 38461.3 | 148.11 | 20352.0 | 1.21 | 1.14 |

**Luminous Intensity Distribution**




| | C0/180 | C45/225 | C90/270 | C135/315 | AVG. |
|---|---|---|---|---|---|
| Beam Angle (50% $I_{max}$): | 85.1 | 81.5 | 78.3 | 81.3 | 81.6 |
| Field Angle (10% $I_{max}$): | 140.3 | 136.3 | 127.2 | 136.4 | 135.1 |

**Luminous Intensity (cd) Distribution Data**

| C / γ | 0° | 22.5° | 45° | 67.5° | 90° | 112.5° | 135° | 157.5° |
|---|---|---|---|---|---|---|---|---|
| 0.0° | 20348.6 | 20348.6 | 20348.6 | 20348.6 | 20348.6 | 20348.6 | 20348.6 | 20348.6 |
| 5.0° | 20265.6 | 20264.9 | 20274.1 | 20284.3 | 20310.1 | 20307.9 | 20311.0 | 20307.7 |
| 10.0° | 19999.1 | 20011.3 | 19993.3 | 19994.7 | 20059.8 | 20042.0 | 20049.4 | 20044.3 |
| 15.0° | 19550.5 | 19507.5 | 19493.3 | 19532.9 | 19545.5 | 19540.5 | 19522.9 | 19563.0 |
| 20.0° | 18847.6 | 18786.1 | 18753.4 | 18771.2 | 18806.4 | 18794.4 | 18809.9 | 18846.9 |
| 25.0° | 17906.7 | 17866.2 | 17795.0 | 17762.7 | 17777.1 | 17781.7 | 17860.0 | 17946.3 |
| 30.0° | 16681.0 | 16592.0 | 16367.2 | 16107.3 | 15972.2 | 16092.6 | 16435.4 | 16693.1 |
| 35.0° | 14694.0 | 14638.6 | 14071.9 | 13451.0 | 13285.9 | 13495.4 | 14173.5 | 14731.3 |
| 40.0° | 11618.5 | 11692.5 | 11007.4 | 10548.6 | 10263.3 | 10497.4 | 11155.0 | 11939.0 |
| 45.0° | 8787.8 | 8729.5 | 8348.6 | 7993.2 | 7555.7 | 7885.8 | 8333.1 | 8905.1 |
| 50.0° | 6731.4 | 6461.9 | 6355.2 | 6124.8 | 5351.3 | 5983.0 | 6147.7 | 6399.4 |
| 55.0° | 5153.6 | 4528.2 | 4730.7 | 4699.5 | 3734.2 | 4561.2 | 4479.3 | 4368.1 |
| 60.0° | 3921.8 | 3092.3 | 3454.6 | 3643.4 | 2620.3 | 3481.0 | 3306.1 | 2946.8 |
| 65.0° | 2924.5 | 2158.7 | 2495.5 | 2813.2 | 1973.3 | 2667.4 | 2480.4 | 2093.2 |
| 70.0° | 2089.7 | 1632.5 | 1845.8 | 2115.1 | 1602.7 | 2035.0 | 1908.8 | 1603.1 |
| 75.0° | 1453.4 | 1304.1 | 1394.3 | 1557.3 | 1297.4 | 1510.7 | 1442.3 | 1262.0 |
| 80.0° | 1002.0 | 970.9 | 994.6 | 1094.9 | 945.4 | 1066.4 | 1001.9 | 931.2 |
| 85.0° | 515.3 | 522.9 | 539.7 | 604.8 | 472.4 | 595.9 | 527.9 | 513.3 |
| 90.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 95.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 105.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 115.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 125.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 135.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 145.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 155.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 160.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 165.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 170.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 175.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 180.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Luminous Intensity (cd) Distribution Data (cont.)**

| C / γ | 180° | 202.5° | 225° | 247.5° | 270° | 292.5° | 315° | 337.5° |
|---|---|---|---|---|---|---|---|---|
| 0.0° | 20348.6 | 20348.6 | 20348.6 | 20348.6 | 20348.6 | 20348.6 | 20348.6 | 20348.6 |
| 5.0° | 20285.3 | 20274.4 | 20249.5 | 20235.9 | 20215.2 | 20247.3 | 20233.1 | 20241.7 |
| 10.0° | 19988.9 | 19971.2 | 19950.3 | 19894.4 | 19859.7 | 19931.8 | 19899.2 | 19927.9 |
| 15.0° | 19491.3 | 19440.2 | 19384.7 | 19315.2 | 19247.8 | 19325.6 | 19355.6 | 19409.2 |
| 20.0° | 18778.2 | 18680.0 | 18584.0 | 18481.6 | 18370.4 | 18501.6 | 18560.7 | 18666.5 |
| 25.0° | 17844.8 | 17721.4 | 17471.2 | 17195.3 | 17049.6 | 17245.8 | 17468.6 | 17655.7 |
| 30.0° | 16565.5 | 16324.1 | 15788.6 | 15204.6 | 14896.8 | 15197.0 | 15733.3 | 16234.3 |
| 35.0° | 14651.1 | 14112.4 | 13160.6 | 12358.9 | 12060.6 | 12354.6 | 12961.3 | 13873.6 |
| 40.0° | 11792.6 | 11109.8 | 10178.7 | 9471.0 | 9170.1 | 9507.4 | 9932.5 | 10694.7 |
| 45.0° | 8889.8 | 8216.8 | 7677.1 | 7165.8 | 6752.6 | 7303.0 | 7611.9 | 7966.4 |
| 50.0° | 6715.8 | 5940.4 | 5762.9 | 5473.0 | 4834.3 | 5668.2 | 5867.1 | 5794.9 |
| 55.0° | 5011.5 | 4097.2 | 4264.8 | 4211.5 | 3373.2 | 4366.9 | 4386.5 | 3998.5 |
| 60.0° | 3766.1 | 2816.9 | 3194.3 | 3234.2 | 2387.9 | 3357.0 | 3235.7 | 2713.3 |
| 65.0° | 2798.7 | 2011.2 | 2408.7 | 2461.4 | 1839.2 | 2528.2 | 2382.1 | 1918.3 |
| 70.0° | 2025.8 | 1535.9 | 1823.3 | 1856.6 | 1491.3 | 1900.7 | 1767.4 | 1492.8 |
| 75.0° | 1450.0 | 1213.0 | 1336.9 | 1356.8 | 1173.7 | 1403.3 | 1311.9 | 1217.1 |
| 80.0° | 989.1 | 885.3 | 888.8 | 924.2 | 790.0 | 943.8 | 889.2 | 883.6 |
| 85.0° | 503.1 | 462.3 | 446.8 | 432.7 | 333.5 | 428.5 | 433.0 | 435.0 |
| 90.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 95.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 105.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 115.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 125.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 135.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 145.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 155.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 160.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 165.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 170.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 175.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 180.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Test Model: HLT1CP2702CUW 40K**
**Control setting: 230W**

THDi、PF Test; Orientation: Downward;

| Test Voltage | Test Item | Test Result | DLC Requirements | DLC Requirements(With tolerances and/or allowances) | Conclusion |
|---|---|---|---|---|---|
| 120 | Power Factor | 0.9985 | ≥0.9 | ≥0.87 | Pass |
| 120 | THDi | 1.74% | ≤20% | ≤25% | Pass |
| 277 | Power Factor | 0.9569 | ≥0.9 | ≥0.87 | Pass |
| 277 | THDi | 6.91% | ≤20% | ≤25% | Pass |

Note:
1. The test results were measured directly from the test equipment.
2. The DLC requirements were listed according to DLC Technical Requirements V5.1.
3. The conclusion is for reference only. Test report that indicate product performance meets DLC Technical Requirements do not represent official DLC product qualification. All decisions regarding product qualification are made by the DLC.

**Test Data**

**[Integrating Sphere System]**

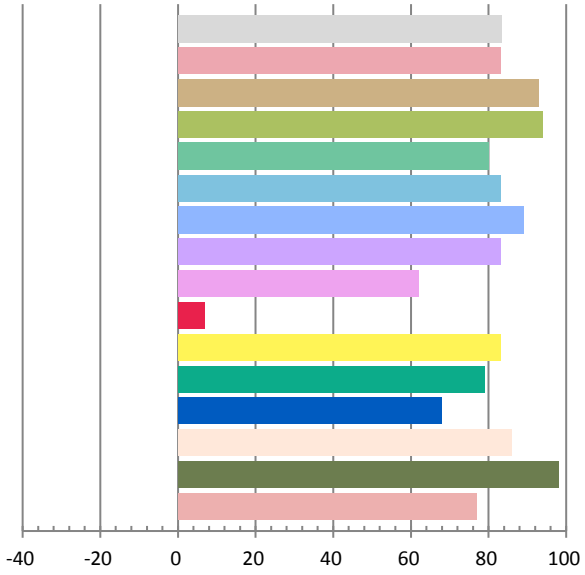
Photometric and Electrical Measurement Result

| Voltage (V) | Frequency (Hz) | Current (A) | Power (W) | Power Factor | Luminous Flux(lm) | Efficacy (lm/W) |
|---|---|---|---|---|---|---|
| 120.0 | 60 | 1.832 | 219.5 | 0.9985 | 33159 | 151.07 |

| Radiant Flux (W) | CCT (K) | Duv | x | y | u' | v' |
|---|---|---|---|---|---|---|
| 102.584 | 4080 | -0.00359 | 0.3747 | 0.3656 | 0.2258 | 0.4957 |

**Color Rendering Index**

| Ra | | | |
|---|---|---|---|
| 83.4 | | | |
| R1 | R2 | R3 | R4 |
| 83 | 93 | 94 | 80 |
| R5 | R6 | R7 | R8 |
| 83 | 89 | 83 | 62 |
| R9 | R10 | R11 | R12 |
| 7 | 83 | 79 | 68 |
| R13 | R14 | R15 | |
| 86 | 98 | 77 | |



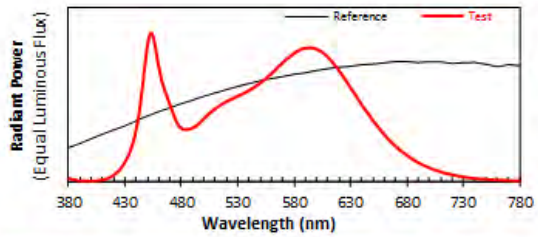
# ANSI/IES TM-30-18 Color Rendition Report

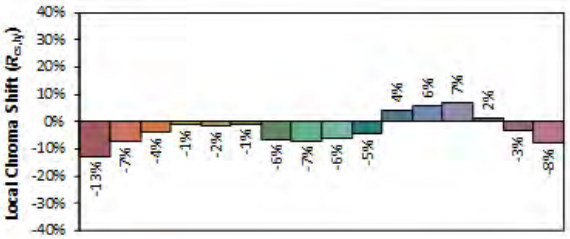
**Source:** User SPD

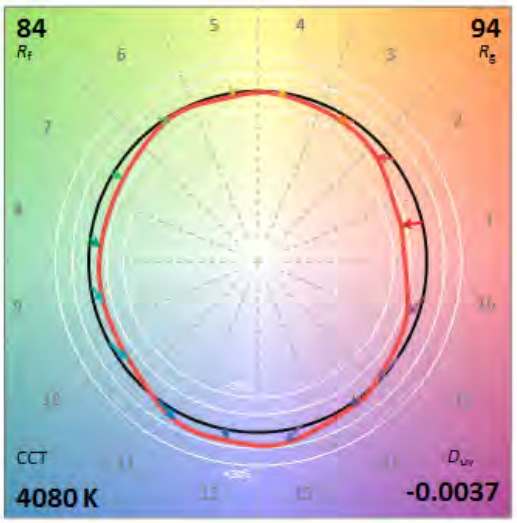
**Manufacturer:** P.Q.L., Inc.

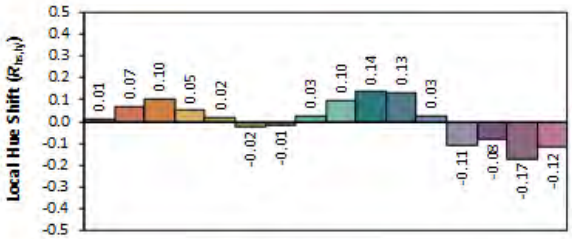
**Date:** 2023/11/1

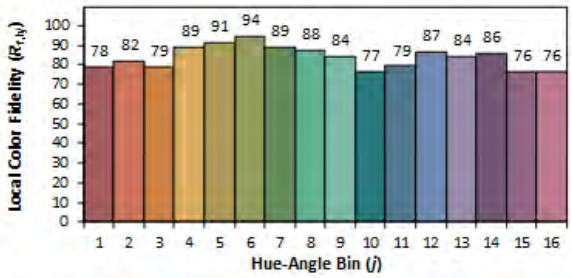
**Model:** HLT1CP2702CUW 4000K

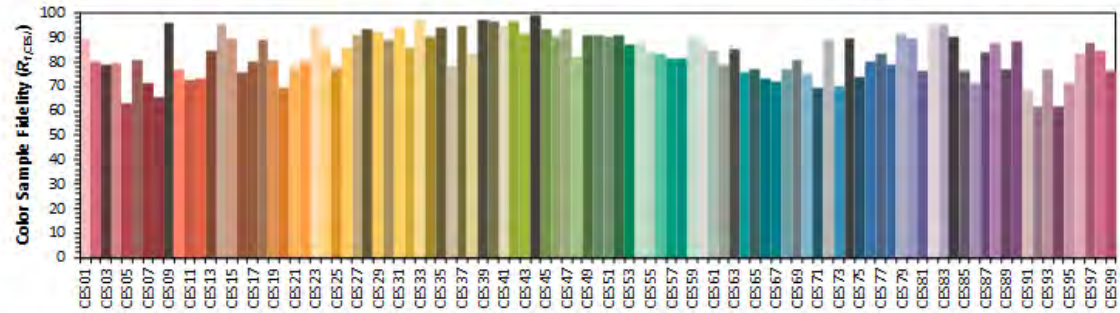



**Notes:** This is a recommended method for displaying ANSI/IES TM-30-18 information.

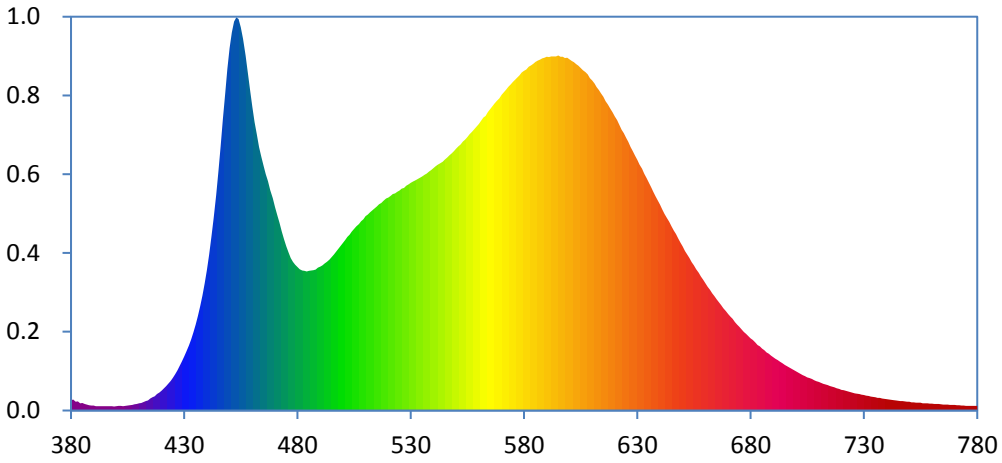
| | |
|---|---|
| $x$ | 0.3747 |
| $y$ | 0.3655 |
| $u'$ | 0.2258 |
| $v'$ | 0.4956 |

CIE 13.3-1995 (CRI)

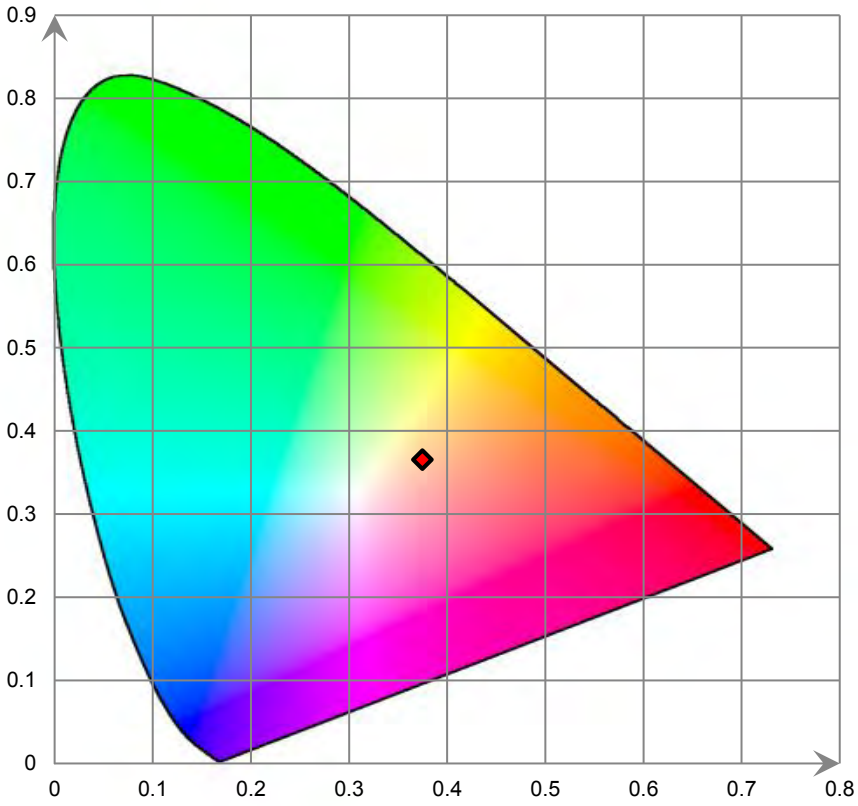
| | |
|---|---|
| $R_a$ | 83 |
| $R_9$ | 6 |

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

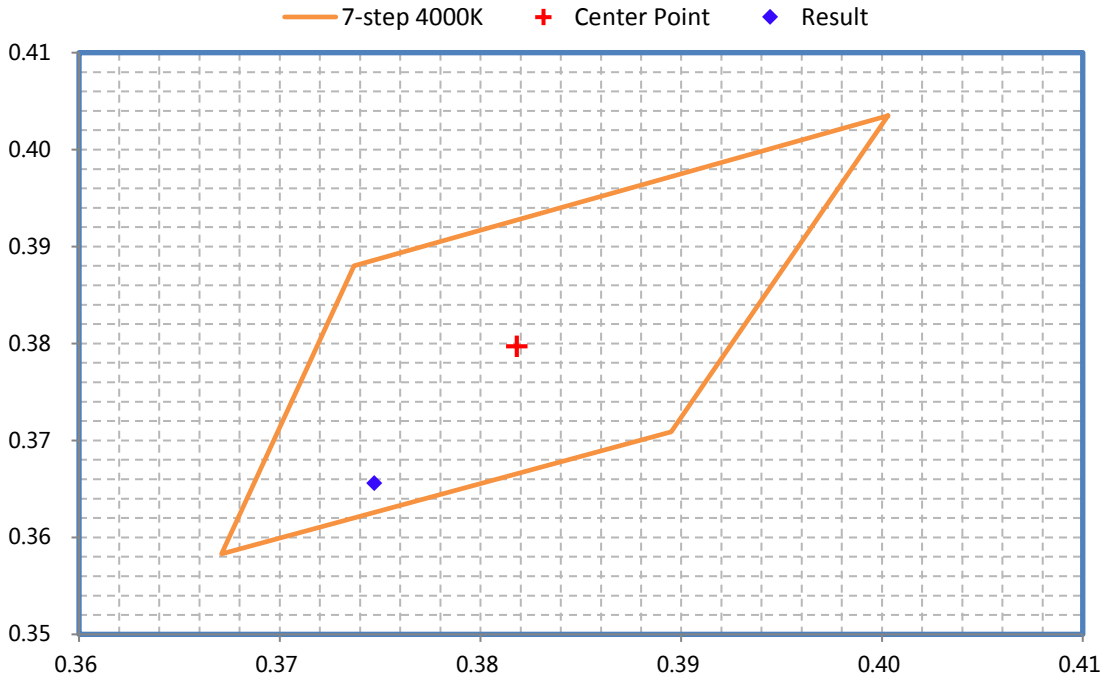
Relative Spectral Power Distribution




CIE 1931 x y Chromaticity Diagram



ANSI C78.377-2017 Chromaticity Quadrangles



[Goniophotometer System]

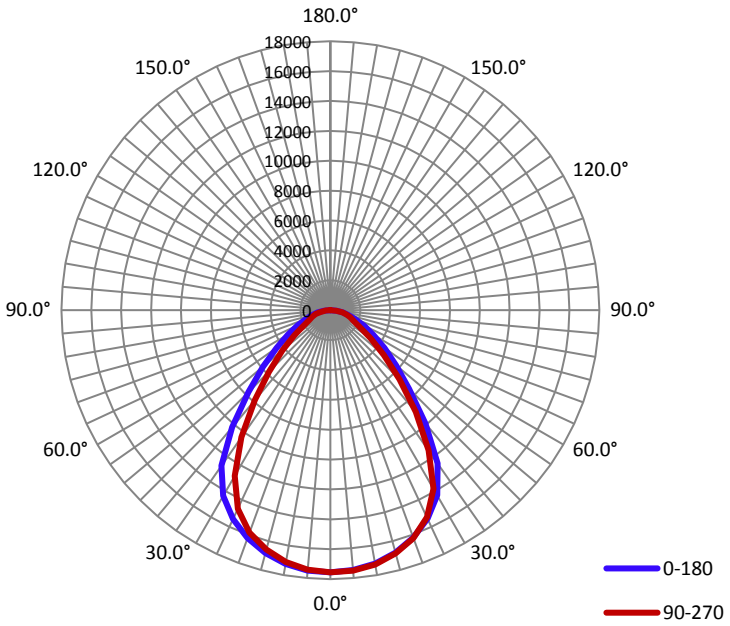
**Electrical Measurement**

| Input Voltage (V) | Frequency (Hz) | Input Current (A) | Power (W) | Power Factor |
|---|---|---|---|---|
| 120.0 | 60 | 1.831 | 219.46 | 0.999 |

Photometric Measurement

| Luminous Flux (lm) | Efficacy (lm/W) | $I_{max}$ (cd) | S/MH (C0/180) | S/MH (C90/270) |
|---|---|---|---|---|
| 33177.8 | 151.23 | 17574.4 | 1.21 | 1.14 |

**Luminous Intensity Distribution**




| | C0/180 | C45/225 | C90/270 | C135/315 | AVG. |
|---|---|---|---|---|---|
| Beam Angle (50% $I_{max}$): | 84.9 | 81.3 | 78.3 | 81.3 | 81.5 |
| Field Angle (10% $I_{max}$): | 140.6 | 136.8 | 127.5 | 136.4 | 135.3 |

**Luminous Intensity (cd) Distribution Data**

| C / γ | 0° | 22.5° | 45° | 67.5° | 90° | 112.5° | 135° | 157.5° |
|---|---|---|---|---|---|---|---|---|
| 0.0° | 17543.4 | 17543.4 | 17543.4 | 17543.4 | 17543.4 | 17543.4 | 17543.4 | 17543.4 |
| 5.0° | 17452.5 | 17442.3 | 17476.9 | 17482.6 | 17500.1 | 17482.0 | 17512.3 | 17509.1 |
| 10.0° | 17223.8 | 17226.8 | 17245.5 | 17245.4 | 17289.6 | 17261.5 | 17282.9 | 17271.8 |
| 15.0° | 16812.4 | 16789.5 | 16769.0 | 16813.1 | 16849.2 | 16862.6 | 16837.9 | 16849.5 |
| 20.0° | 16195.1 | 16160.2 | 16139.5 | 16203.7 | 16236.3 | 16221.2 | 16251.1 | 16273.9 |
| 25.0° | 15384.2 | 15325.9 | 15319.5 | 15296.2 | 15290.9 | 15358.6 | 15421.6 | 15484.2 |
| 30.0° | 14286.1 | 14224.6 | 14079.7 | 13860.2 | 13798.5 | 13914.1 | 14248.7 | 14444.0 |
| 35.0° | 12509.6 | 12492.7 | 12043.0 | 11593.0 | 11454.7 | 11685.2 | 12283.3 | 12801.0 |
| 40.0° | 9890.3 | 9974.8 | 9435.5 | 9042.4 | 8886.3 | 9136.9 | 9718.6 | 10406.1 |
| 45.0° | 7447.1 | 7434.8 | 7130.5 | 6900.0 | 6529.2 | 6837.1 | 7283.8 | 7822.0 |
| 50.0° | 5736.9 | 5487.5 | 5437.8 | 5265.6 | 4663.0 | 5192.1 | 5353.6 | 5637.2 |
| 55.0° | 4406.2 | 3860.7 | 4055.0 | 4044.1 | 3255.9 | 3972.1 | 3908.8 | 3836.4 |
| 60.0° | 3337.9 | 2638.0 | 2973.3 | 3137.3 | 2275.2 | 3048.1 | 2886.3 | 2596.6 |
| 65.0° | 2490.6 | 1848.1 | 2168.5 | 2429.0 | 1715.6 | 2342.5 | 2177.5 | 1845.1 |
| 70.0° | 1790.8 | 1393.7 | 1600.4 | 1831.6 | 1401.1 | 1777.9 | 1667.6 | 1416.2 |
| 75.0° | 1240.4 | 1119.6 | 1218.7 | 1353.8 | 1133.3 | 1320.9 | 1269.1 | 1105.0 |
| 80.0° | 846.0 | 831.0 | 861.5 | 947.5 | 831.5 | 937.4 | 884.5 | 824.8 |
| 85.0° | 425.6 | 438.0 | 464.7 | 519.2 | 414.4 | 543.2 | 472.8 | 460.0 |
| 90.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 95.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 105.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 115.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 125.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 135.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 145.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 155.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 160.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 165.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 170.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 175.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 180.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Luminous Intensity (cd) Distribution Data (cont.)**

| C / γ | 180° | 202.5° | 225° | 247.5° | 270° | 292.5° | 315° | 337.5° |
|---|---|---|---|---|---|---|---|---|
| 0.0° | 17543.4 | 17543.4 | 17543.4 | 17543.4 | 17543.4 | 17543.4 | 17543.4 | 17543.4 |
| 5.0° | 17493.4 | 17489.9 | 17481.5 | 17460.6 | 17438.2 | 17448.6 | 17440.0 | 17439.0 |
| 10.0° | 17241.3 | 17234.7 | 17190.8 | 17171.9 | 17103.1 | 17175.3 | 17178.1 | 17138.3 |
| 15.0° | 16828.0 | 16767.3 | 16705.7 | 16659.4 | 16580.7 | 16645.5 | 16653.6 | 16699.5 |
| 20.0° | 16218.5 | 16121.0 | 16011.6 | 15934.4 | 15841.2 | 15931.9 | 15991.2 | 16034.0 |
| 25.0° | 15421.9 | 15291.9 | 15056.5 | 14821.8 | 14674.6 | 14808.1 | 14984.0 | 15163.0 |
| 30.0° | 14341.3 | 14100.6 | 13597.9 | 13061.7 | 12805.1 | 13008.8 | 13501.4 | 13924.5 |
| 35.0° | 12714.3 | 12168.3 | 11390.5 | 10671.5 | 10372.7 | 10542.0 | 11075.9 | 11837.5 |
| 40.0° | 10219.1 | 9592.3 | 8823.1 | 8190.4 | 7863.0 | 8140.0 | 8506.5 | 9096.9 |
| 45.0° | 7755.8 | 7150.2 | 6643.4 | 6175.0 | 5828.3 | 6289.9 | 6510.7 | 6751.4 |
| 50.0° | 5861.0 | 5177.4 | 5006.1 | 4737.0 | 4187.3 | 4880.8 | 5004.2 | 4946.0 |
| 55.0° | 4386.0 | 3572.1 | 3721.5 | 3655.2 | 2924.8 | 3761.0 | 3741.7 | 3422.6 |
| 60.0° | 3286.6 | 2443.4 | 2817.8 | 2811.2 | 2064.0 | 2895.7 | 2775.6 | 2336.2 |
| 65.0° | 2446.4 | 1744.9 | 2126.4 | 2137.6 | 1593.0 | 2183.5 | 2045.6 | 1656.1 |
| 70.0° | 1785.6 | 1342.8 | 1612.2 | 1604.4 | 1299.2 | 1639.6 | 1509.8 | 1288.0 |
| 75.0° | 1289.2 | 1053.0 | 1172.6 | 1182.1 | 1018.7 | 1210.0 | 1115.9 | 1050.1 |
| 80.0° | 877.2 | 772.9 | 785.0 | 805.9 | 679.6 | 807.8 | 761.9 | 759.3 |
| 85.0° | 462.6 | 412.6 | 395.5 | 386.2 | 293.1 | 358.8 | 370.0 | 377.4 |
| 90.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 95.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 105.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 115.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 125.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 135.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 145.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 155.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 160.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 165.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 170.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 175.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 180.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Test Model: HLT1CP2702CUW 40K**
**Control setting: 200W**

THDi、PF Test; Orientation: Downward;

| Test Voltage | Test Item | Test Result | DLC Requirements | DLC Requirements(With tolerances and/or allowances) | Conclusion |
|---|---|---|---|---|---|
| 120 | Power Factor | 0.998 | ≥0.9 | ≥0.87 | Pass |
| 120 | THDi | 1.73% | ≤20% | ≤25% | Pass |
| 277 | Power Factor | 0.945 | ≥0.9 | ≥0.87 | Pass |
| 277 | THDi | 8.22% | ≤20% | ≤25% | Pass |

Note:
1. The test results were measured directly from the test equipment.
2. The DLC requirements were listed according to DLC Technical Requirements V5.1.
3. The conclusion is for reference only. Test report that indicate product performance meets DLC Technical Requirements do not represent official DLC product qualification. All decisions regarding product qualification are made by the DLC.

**Test Data**

**[Integrating Sphere System]**

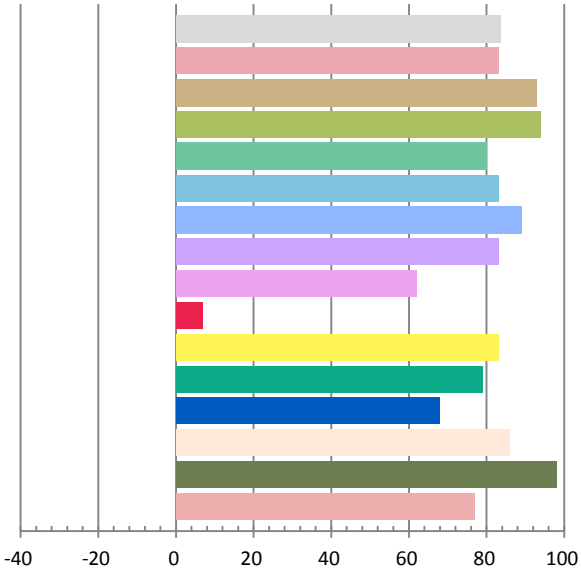
Photometric and Electrical Measurement Result

| Voltage (V) | Frequency (Hz) | Current (A) | Power (W) | Power Factor | Luminous Flux(lm) | Efficacy (lm/W) |
|---|---|---|---|---|---|---|
| 120.0 | 60 | 1.583 | 189.6 | 0.998 | 29258 | 154.32 |

| Radiant Flux (W) | CCT (K) | Duv | x | y | u' | v' |
|---|---|---|---|---|---|---|
| 90.371 | 4055 | -0.00357 | 0.3757 | 0.3663 | 0.2262 | 0.4962 |

**Color Rendering Index**

| Ra | | | |
|---|---|---|---|
| **83.5** | | | |
| R1 | R2 | R3 | R4 |
| 83 | 93 | 94 | 80 |
| R5 | R6 | R7 | R8 |
| 83 | 89 | 83 | 62 |
| R9 | R10 | R11 | R12 |
| 7 | 83 | 79 | 68 |
| R13 | R14 | R15 | |
| 86 | 98 | 77 | |



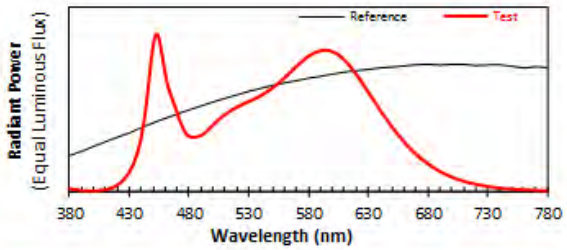
# ANSI/IES TM-30-18 Color Rendition Report

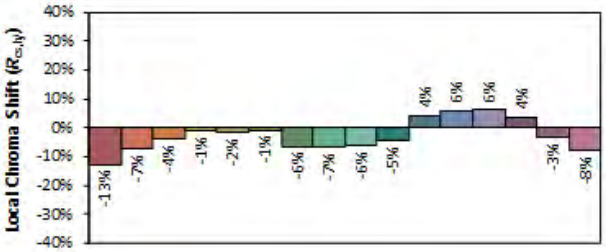
**Source:** User SPD

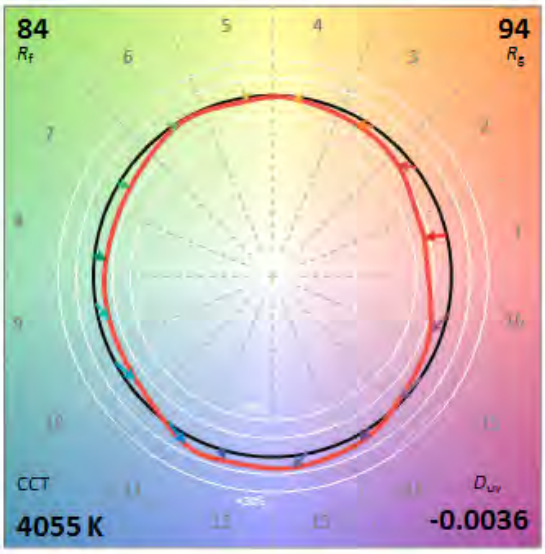
**Manufacturer:** P.Q.L., Inc.

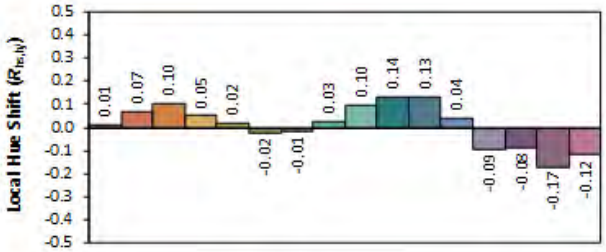
**Date:** 2023/11/1

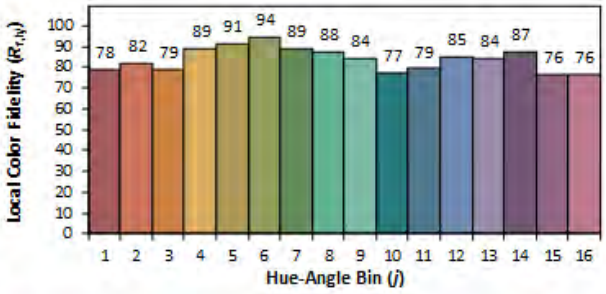
**Model:** HLT1CP2702CUW 4000K

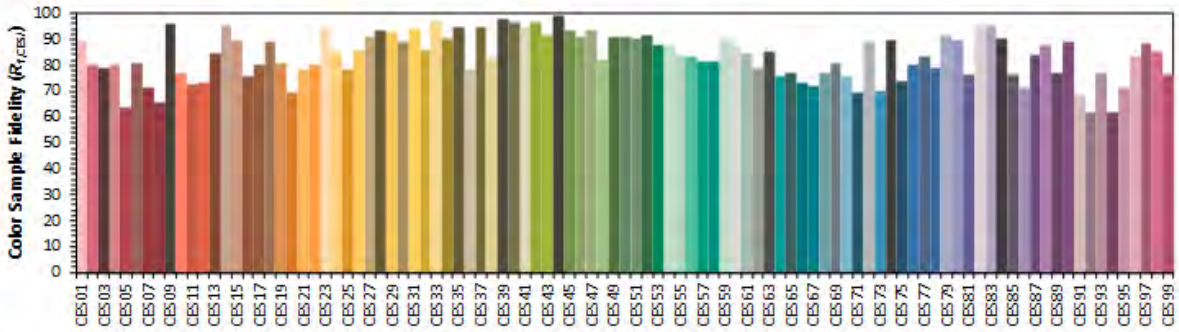



**Notes:** This is a recommended method for displaying ANSI/IES TM-30-18 information.

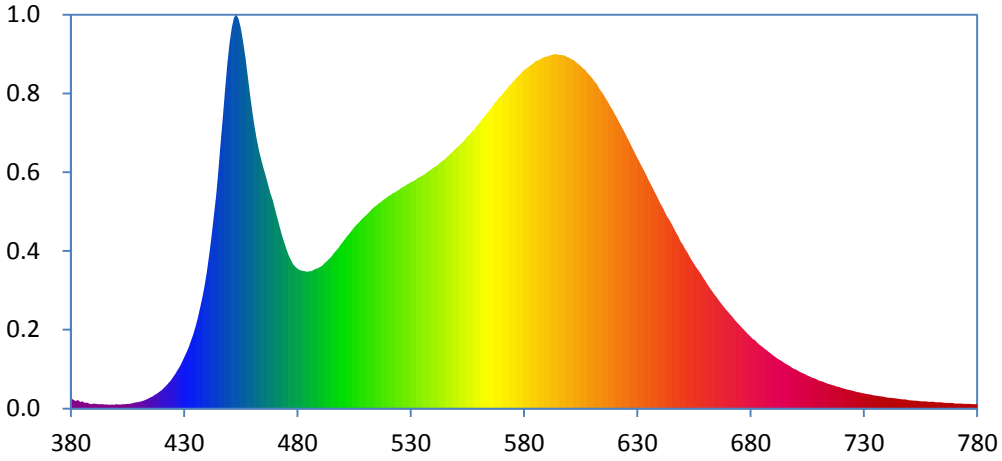
| | |
|---|---|
| $x$ | **0.3757** |
| $y$ | **0.3662** |
| $u'$ | **0.2262** |
| $v'$ | **0.4961** |

CIE 13.3-1995 (CRI)

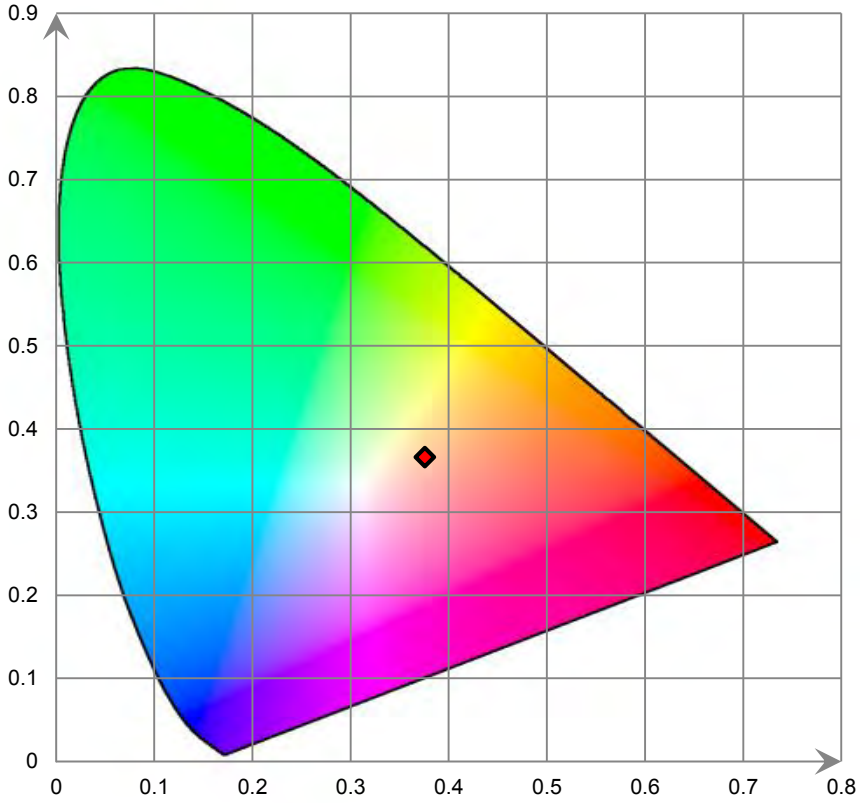
| | |
|---|---|
| $R_a$ | 83 |
| $R_9$ | 7 |

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

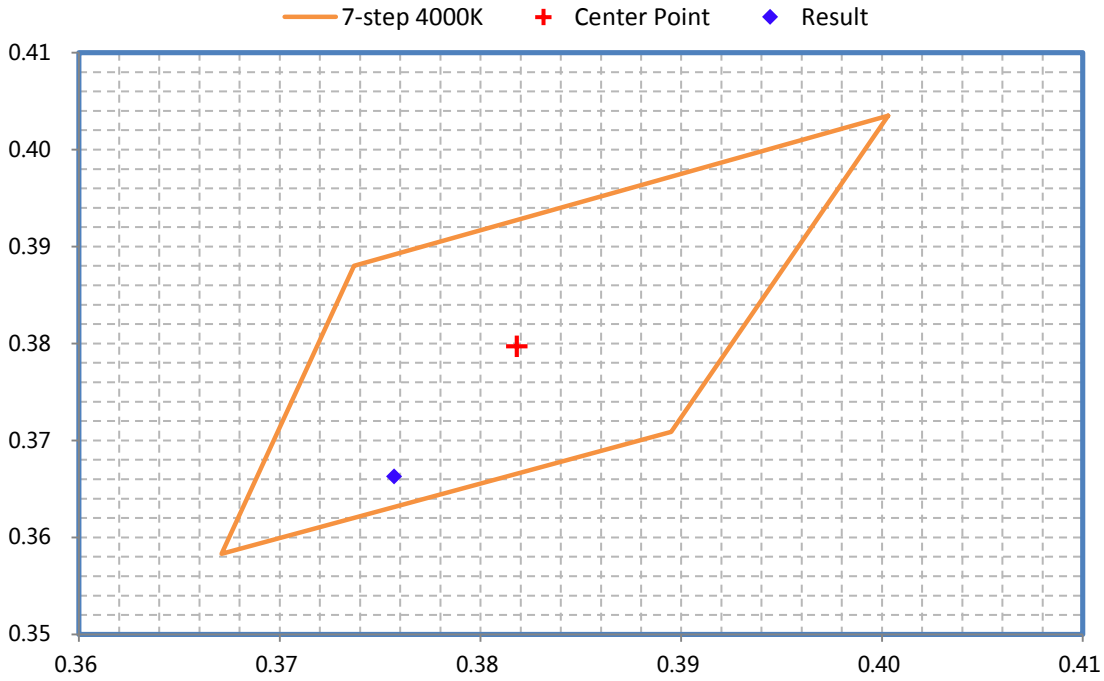
Relative Spectral Power Distribution




CIE 1931 x y Chromaticity Diagram



ANSI C78.377-2017 Chromaticity Quadrangles



[Goniophotometer System]

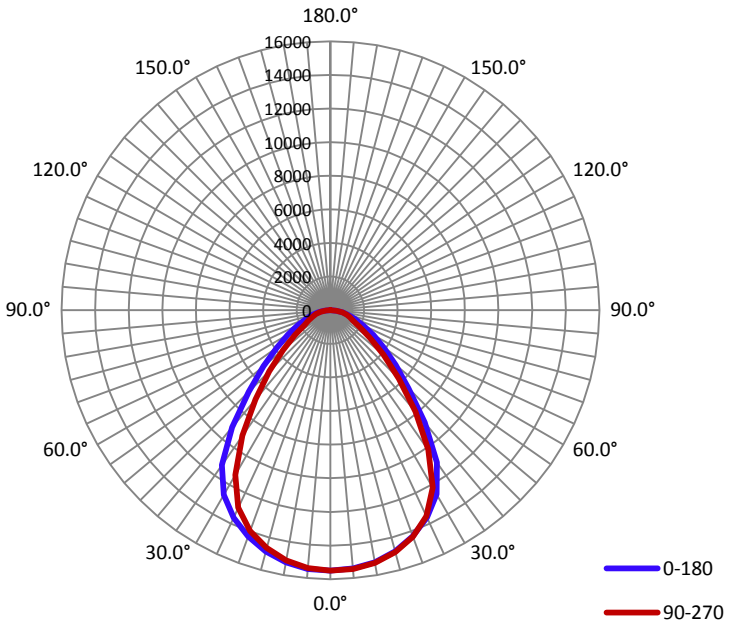
**Electrical Measurement**

| Input Voltage (V) | Frequency (Hz) | Input Current (A) | Power (W) | Power Factor |
|---|---|---|---|---|
| 120.0 | 60 | 1.581 | 189.57 | 0.999 |

Photometric Measurement

| Luminous Flux (lm) | Efficacy (lm/W) | $I_{max}$ (cd) | S/MH (C0/180) | S/MH (C90/270) |
|---|---|---|---|---|
| 29279.8 | 154.5 | 15504.9 | 1.21 | 1.14 |

**Luminous Intensity Distribution**




| | C0/180 | C45/225 | C90/270 | C135/315 | AVG. |
|---|---|---|---|---|---|
| Beam Angle (50% $I_{max}$): | 85.0 | 81.4 | 78.4 | 81.3 | 81.5 |
| Field Angle (10% $I_{max}$): | 140.4 | 136.7 | 127.4 | 136.4 | 135.2 |

**Luminous Intensity (cd) Distribution Data**

| C / γ | 0° | 22.5° | 45° | 67.5° | 90° | 112.5° | 135° | 157.5° |
|---|---|---|---|---|---|---|---|---|
| 0.0° | 15492.7 | 15492.7 | 15492.7 | 15492.7 | 15492.7 | 15492.7 | 15492.7 | 15492.7 |
| 5.0° | 15418.1 | 15418.8 | 15420.1 | 15423.1 | 15454.9 | 15434.7 | 15469.3 | 15466.7 |
| 10.0° | 15220.4 | 15218.1 | 15206.7 | 15224.4 | 15272.0 | 15254.0 | 15271.6 | 15254.4 |
| 15.0° | 14851.7 | 14832.7 | 14816.8 | 14863.6 | 14890.7 | 14885.3 | 14873.7 | 14907.7 |
| 20.0° | 14312.0 | 14278.1 | 14263.0 | 14305.9 | 14334.9 | 14343.8 | 14361.8 | 14381.7 |
| 25.0° | 13605.1 | 13571.9 | 13514.5 | 13520.2 | 13526.4 | 13561.8 | 13599.3 | 13687.9 |
| 30.0° | 12640.5 | 12583.1 | 12409.0 | 12241.9 | 12164.1 | 12308.9 | 12597.2 | 12753.5 |
| 35.0° | 11060.3 | 11032.2 | 10619.3 | 10220.5 | 10137.0 | 10352.4 | 10870.3 | 11323.1 |
| 40.0° | 8717.6 | 8760.5 | 8332.5 | 7998.2 | 7876.1 | 8060.5 | 8622.2 | 9162.0 |
| 45.0° | 6570.0 | 6560.0 | 6322.0 | 6092.3 | 5765.0 | 6061.4 | 6431.2 | 6916.5 |
| 50.0° | 5061.1 | 4836.5 | 4791.7 | 4677.1 | 4114.5 | 4585.3 | 4753.3 | 4977.0 |
| 55.0° | 3881.7 | 3403.8 | 3568.3 | 3589.5 | 2871.4 | 3504.6 | 3462.1 | 3425.9 |
| 60.0° | 2954.6 | 2320.6 | 2613.2 | 2772.5 | 2020.7 | 2692.2 | 2540.2 | 2302.5 |
| 65.0° | 2186.8 | 1625.4 | 1905.3 | 2138.7 | 1517.5 | 2067.0 | 1912.9 | 1627.8 |
| 70.0° | 1567.8 | 1224.7 | 1403.2 | 1619.3 | 1234.1 | 1566.6 | 1473.9 | 1249.4 |
| 75.0° | 1093.4 | 982.2 | 1064.8 | 1193.7 | 997.8 | 1164.5 | 1110.9 | 986.1 |
| 80.0° | 743.8 | 724.2 | 753.2 | 832.2 | 727.9 | 822.8 | 774.3 | 725.7 |
| 85.0° | 365.7 | 384.0 | 402.6 | 449.7 | 369.5 | 469.3 | 409.2 | 401.0 |
| 90.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 95.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 105.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 115.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 125.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 135.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 145.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 155.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 160.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 165.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 170.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 175.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 180.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Luminous Intensity (cd) Distribution Data (cont.)**

| C / γ | 180° | 202.5° | 225° | 247.5° | 270° | 292.5° | 315° | 337.5° |
|---|---|---|---|---|---|---|---|---|
| 0.0° | 15492.7 | 15492.7 | 15492.7 | 15492.7 | 15492.7 | 15492.7 | 15492.7 | 15492.7 |
| 5.0° | 15461.0 | 15448.6 | 15434.6 | 15416.0 | 15392.5 | 15403.3 | 15408.4 | 15391.4 |
| 10.0° | 15238.5 | 15223.4 | 15183.5 | 15143.2 | 15111.4 | 15157.1 | 15146.4 | 15154.7 |
| 15.0° | 14864.1 | 14816.7 | 14746.9 | 14706.0 | 14630.9 | 14688.2 | 14691.4 | 14740.3 |
| 20.0° | 14327.1 | 14247.0 | 14137.3 | 14071.1 | 13973.9 | 14054.4 | 14092.1 | 14162.3 |
| 25.0° | 13621.8 | 13509.7 | 13287.3 | 13084.4 | 12961.2 | 13060.8 | 13231.2 | 13397.9 |
| 30.0° | 12675.3 | 12465.0 | 12004.0 | 11525.2 | 11313.1 | 11475.3 | 11888.8 | 12298.2 |
| 35.0° | 11240.3 | 10763.9 | 10054.3 | 9416.1 | 9118.3 | 9289.5 | 9782.2 | 10461.1 |
| 40.0° | 9089.7 | 8501.2 | 7796.4 | 7229.2 | 6937.0 | 7169.5 | 7492.2 | 8044.2 |
| 45.0° | 6868.1 | 6327.8 | 5865.6 | 5443.5 | 5143.4 | 5537.8 | 5723.9 | 5967.1 |
| 50.0° | 5187.2 | 4577.3 | 4418.7 | 4176.4 | 3692.1 | 4296.7 | 4411.6 | 4363.3 |
| 55.0° | 3877.0 | 3132.1 | 3281.7 | 3223.3 | 2578.8 | 3313.1 | 3301.4 | 3020.5 |
| 60.0° | 2915.8 | 2150.3 | 2483.1 | 2468.8 | 1813.8 | 2549.4 | 2447.9 | 2062.5 |
| 65.0° | 2168.0 | 1535.5 | 1869.4 | 1879.5 | 1401.4 | 1917.7 | 1798.4 | 1461.8 |
| 70.0° | 1570.5 | 1179.2 | 1403.9 | 1411.1 | 1138.9 | 1442.3 | 1326.7 | 1133.7 |
| 75.0° | 1124.5 | 925.3 | 1024.4 | 1033.0 | 892.9 | 1053.4 | 980.7 | 922.7 |
| 80.0° | 765.5 | 671.4 | 688.3 | 708.2 | 591.6 | 711.7 | 662.8 | 666.4 |
| 85.0° | 400.1 | 353.9 | 343.8 | 335.6 | 243.6 | 308.6 | 321.2 | 324.7 |
| 90.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 95.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 105.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 115.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 125.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 135.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 145.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 155.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 160.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 165.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 170.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 175.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 180.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Test Model: HLT1CP2702CUW 50K**
**Control setting: 270W**

Integrating Sphere Test; Orientation: Downward; Test Voltage: 120V 60Hz;

| Test Item | Test Result | DLC Requirements | DLC Requirements(With tolerances only) | Conclusion |
|---|---|---|---|---|
| Light Output(lm) | 39381 | ≥10000 | ≥9000 | Pass |
| Power(W) | 266 | None. | None. | N/A |
| Total Efficacy(lm/W) | 148.05 | ≥135 | ≥130.95 | Pass |
| CCT(K) | 5130 | None [i] | None. | N/A |
| Duv | 0.000494 | None [i] | None. | N/A |
| IES $R_f$ | 82 | 70 | 69 | Pass |
| IES $R_g$ | 94 | 89 | 88 | |
| IES Rcs,h1 | -15% | -18%~23% | -19%~24% | |
| $R_a$ | 81.6 | ≥70 | ≥69 | |
| R9 | -6 | ≥-40 | ≥-41 | |

Note:
i. White-tunable products are not required to meet the chromaticity requirements in DLC V5.1.

Goniophotometer Test; Orientation: Downward; Test Voltage: 120V 60Hz;

| Test Item | Test Result | DLC Requirements | DLC Requirements(With tolerances only) | Conclusion |
|---|---|---|---|---|
| Light Output(lm) | 39420.9 | ≥10000 | ≥9000 | Pass |
| Power(W) | 265.79 | None. | None. | N/A |
| Total Efficacy(lm/W) | 148.37 | ≥135 | ≥130.95 | Pass |
| Zonal Lumen Distribution(20-50°) | 59.15% | 20-50°≥30% | 20-50°≥20% | Pass |
| UGR crosswise view | 27.1 | <28 | No tolerances | Pass |
| UGR endwise view | 26.8 | <28 | No tolerances | Pass |

Integrating Sphere THDi、PF Test; Orientation: Downward;

| Test Voltage | Test Item | Test Result | DLC Requirements | DLC Requirements(With tolerances and/or allowances) | Conclusion |
|---|---|---|---|---|---|
| 120 | Power Factor | 0.9989 | ≥0.9 | ≥0.87 | Pass |
| 120 | THDi | 1.78% | ≤20% | ≤25% | Pass |
| 277 | Power Factor | 0.9691 | ≥0.9 | ≥0.87 | Pass |
| 277 | THDi | 5.68% | ≤20% | ≤25% | Pass |

Note:
1. The test results were measured directly from the test equipment.
2. The DLC requirements were listed according to DLC Technical Requirements V5.1.
3. The conclusion is for reference only. Test report that indicate product performance meets DLC Technical Requirements do not represent official DLC product qualification. All decisions regarding product qualification are made by the DLC.

**Test Data**

**[Integrating Sphere System]**

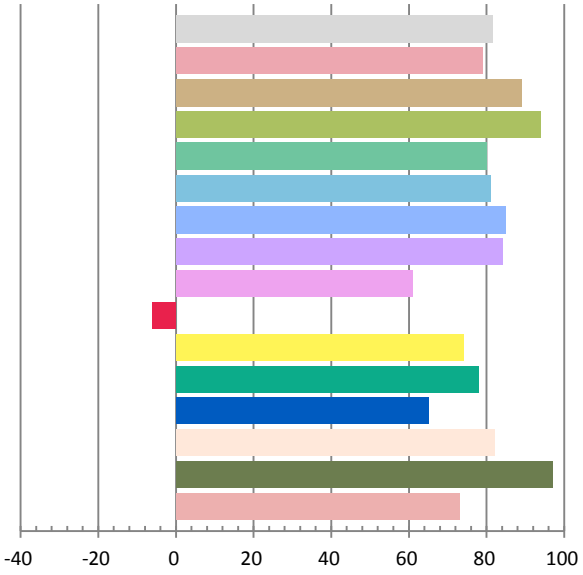
Photometric and Electrical Measurement Result

| Voltage (V) | Frequency (Hz) | Current (A) | Power (W) | Power Factor | Luminous Flux(lm) | Efficacy (lm/W) |
|---|---|---|---|---|---|---|
| 120.0 | 60 | 2.218 | 266 | 0.9989 | 39381 | 148.05 |

| Radiant Flux (W) | CCT (K) | Duv | x | y | u' | v' |
|---|---|---|---|---|---|---|
| 122.484 | 5130 | 0.000494 | 0.3416 | 0.3498 | 0.2098 | 0.4833 |

**Color Rendering Index**

| Ra | | | |
|---|---|---|---|
| **81.6** | | | |
| R1 | R2 | R3 | R4 |
| 79 | 89 | 94 | 80 |
| R5 | R6 | R7 | R8 |
| 81 | 85 | 84 | 61 |
| R9 | R10 | R11 | R12 |
| -6 | 74 | 78 | 65 |
| R13 | R14 | R15 | |
| 82 | 97 | 73 | |



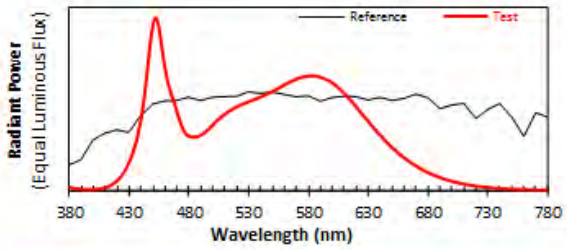
# ANSI/IES TM-30-18 Color Rendition Report

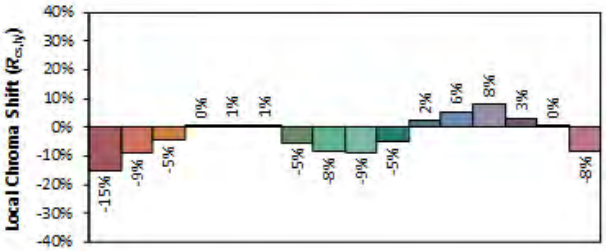
**Source:** User SPD

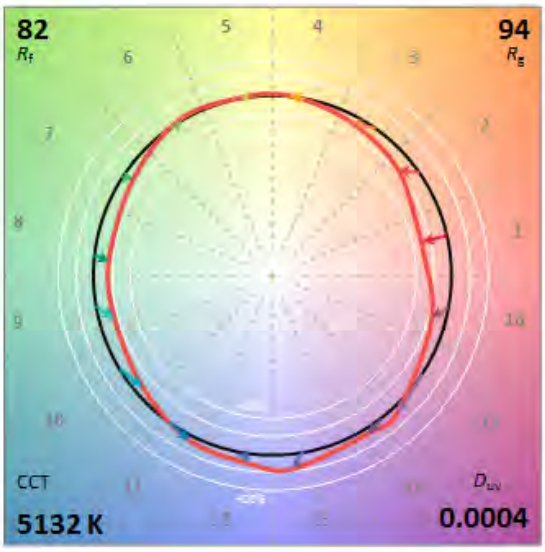
**Manufacturer:** P.Q.L., Inc.

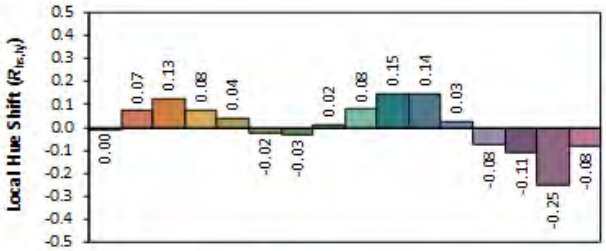
**Date:** 2023/11/1

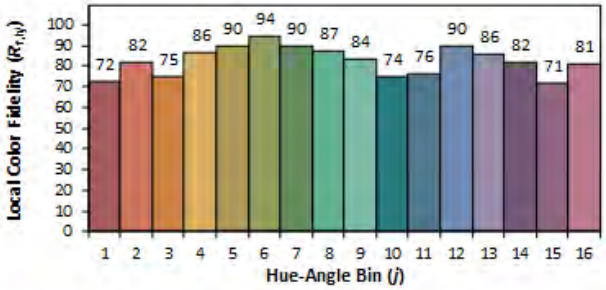
**Model:** HLT1CP2702CUW 5000K

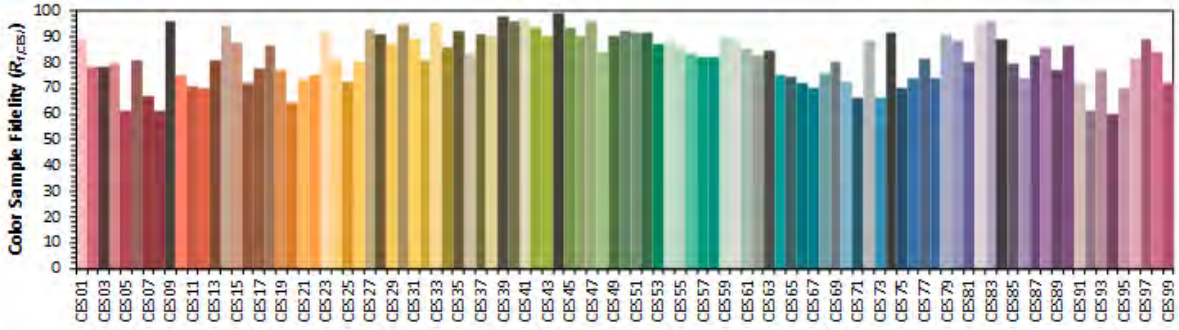



**Notes:** This is a recommended method for displaying ANSI/IES TM-30-18 information.

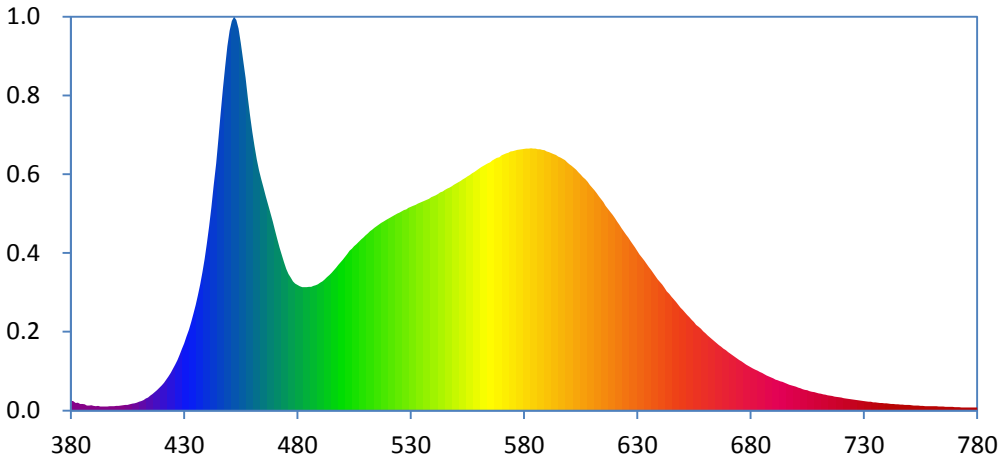
| | |
|---|---|
| $x$ | 0.3416 |
| $y$ | 0.3496 |
| $u'$ | 0.2098 |
| $v'$ | 0.4832 |

CIE 13.3-1995 (CRI)

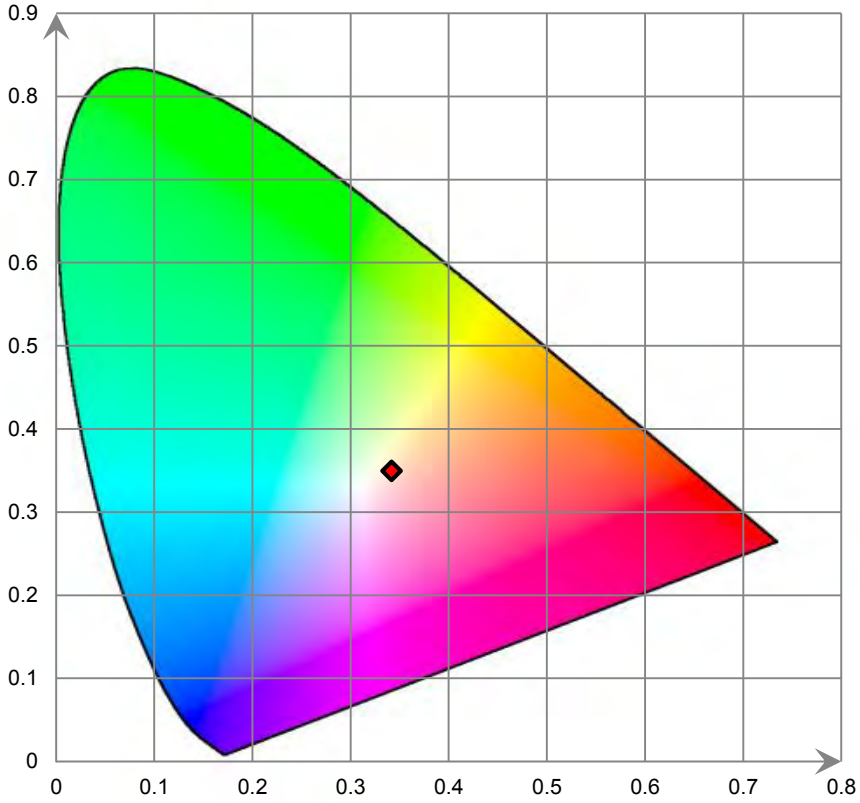
| | |
|---|---|
| $R_a$ | 82 |
| $R_9$ | -6 |

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

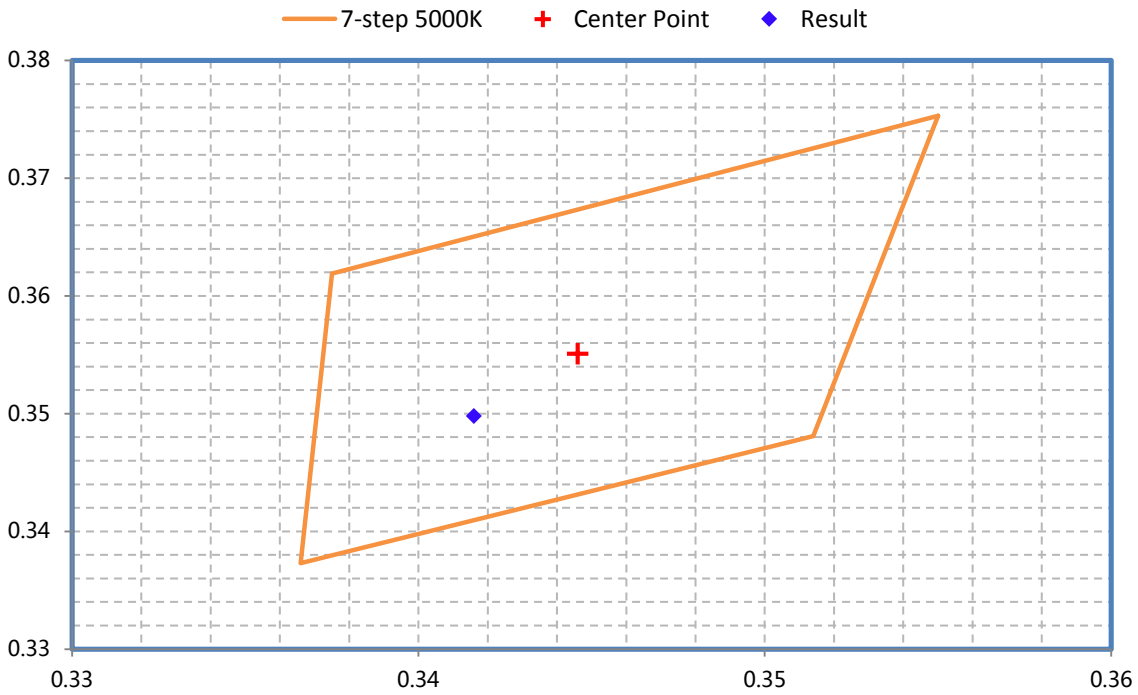
Relative Spectral Power Distribution




CIE 1931 x y Chromaticity Diagram



ANSI C78.377-2017 Chromaticity Quadrangles



[Goniophotometer System]

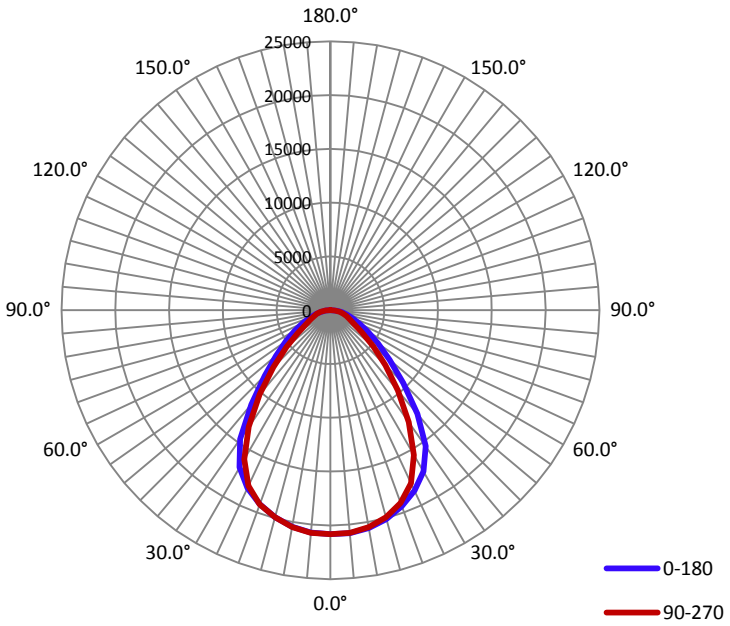
**Electrical Measurement**

| Input Voltage (V) | Frequency (Hz) | Input Current (A) | Power (W) | Power Factor |
|---|---|---|---|---|
| 120.0 | 60 | 2.216 | 265.79 | 1 |

Photometric Measurement

| Luminous Flux (lm) | Efficacy (lm/W) | $I_{max}$ (cd) | S/MH (C0/180) | S/MH (C90/270) |
|---|---|---|---|---|
| 39420.9 | 148.37 | 20835.3 | 1.21 | 1.14 |

**Luminous Intensity Distribution**




| | C0/180 | C45/225 | C90/270 | C135/315 | AVG. |
|---|---|---|---|---|---|
| Beam Angle (50% $I_{max}$): | 85.1 | 81.7 | 78.5 | 81.2 | 81.6 |
| Field Angle (10% $I_{max}$): | 140.4 | 136.1 | 127.4 | 136.7 | 135.2 |

**Luminous Intensity (cd) Distribution Data**

| C / γ | 0° | 22.5° | 45° | 67.5° | 90° | 112.5° | 135° | 157.5° |
|---|---|---|---|---|---|---|---|---|
| 0.0° | 20829.8 | 20829.8 | 20829.8 | 20829.8 | 20829.8 | 20829.8 | 20829.8 | 20829.8 |
| 5.0° | 20795.8 | 20790.5 | 20782.8 | 20762.8 | 20775.1 | 20756.0 | 20749.9 | 20754.3 |
| 10.0° | 20567.7 | 20539.4 | 20489.1 | 20464.5 | 20485.8 | 20439.4 | 20407.8 | 20457.6 |
| 15.0° | 20099.8 | 20039.4 | 19968.6 | 19869.3 | 19930.6 | 19840.1 | 19880.5 | 19925.6 |
| 20.0° | 19413.3 | 19297.1 | 19170.1 | 19022.1 | 19068.8 | 19010.4 | 19054.2 | 19195.5 |
| 25.0° | 18509.4 | 18345.8 | 18074.5 | 17786.7 | 17739.0 | 17732.3 | 17942.4 | 18189.8 |
| 30.0° | 17313.6 | 17016.0 | 16395.7 | 15760.8 | 15540.5 | 15663.2 | 16162.0 | 16733.1 |
| 35.0° | 15438.0 | 14823.8 | 13897.2 | 13014.0 | 12704.4 | 12756.8 | 13362.7 | 14312.2 |
| 40.0° | 12568.9 | 11792.9 | 10900.7 | 10084.8 | 9756.2 | 9937.3 | 10336.7 | 11048.4 |
| 45.0° | 9567.4 | 8841.5 | 8187.6 | 7645.3 | 7244.2 | 7644.0 | 7889.8 | 8252.6 |
| 50.0° | 7188.0 | 6441.0 | 6155.9 | 5849.3 | 5209.7 | 5935.6 | 6112.2 | 6018.8 |
| 55.0° | 5387.7 | 4484.2 | 4560.2 | 4498.6 | 3604.4 | 4581.0 | 4596.8 | 4166.1 |
| 60.0° | 4034.4 | 3063.4 | 3422.4 | 3449.8 | 2526.6 | 3517.5 | 3413.2 | 2819.6 |
| 65.0° | 3017.1 | 2175.3 | 2580.9 | 2621.2 | 1923.7 | 2646.4 | 2514.5 | 1995.6 |
| 70.0° | 2191.4 | 1654.2 | 1950.7 | 1967.9 | 1570.7 | 1992.6 | 1851.4 | 1541.1 |
| 75.0° | 1586.3 | 1303.4 | 1434.2 | 1447.3 | 1241.9 | 1471.8 | 1376.1 | 1258.7 |
| 80.0° | 1089.2 | 962.8 | 979.8 | 996.4 | 859.7 | 1007.7 | 944.5 | 922.6 |
| 85.0° | 611.2 | 551.6 | 527.4 | 522.7 | 389.0 | 483.5 | 486.2 | 477.6 |
| 90.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 95.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 105.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 115.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 125.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 135.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 145.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 155.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 160.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 165.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 170.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 175.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 180.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Luminous Intensity (cd) Distribution Data (cont.)**

| C / γ | 180° | 202.5° | 225° | 247.5° | 270° | 292.5° | 315° | 337.5° |
|---|---|---|---|---|---|---|---|---|
| 0.0° | 20829.8 | 20829.8 | 20829.8 | 20829.8 | 20829.8 | 20829.8 | 20829.8 | 20829.8 |
| 5.0° | 20747.6 | 20756.5 | 20765.1 | 20764.2 | 20770.3 | 20780.1 | 20787.5 | 20778.8 |
| 10.0° | 20445.5 | 20462.7 | 20462.6 | 20457.6 | 20470.5 | 20493.2 | 20508.8 | 20504.6 |
| 15.0° | 19930.7 | 19919.3 | 19906.6 | 19934.2 | 19927.8 | 19978.0 | 19973.4 | 20017.4 |
| 20.0° | 19191.9 | 19155.3 | 19135.3 | 19158.8 | 19202.4 | 19208.3 | 19235.2 | 19291.4 |
| 25.0° | 18228.3 | 18185.7 | 18121.5 | 18056.7 | 18018.7 | 18119.9 | 18257.9 | 18335.5 |
| 30.0° | 16874.2 | 16823.3 | 16593.3 | 16165.4 | 16013.3 | 16277.7 | 16753.4 | 17042.0 |
| 35.0° | 14631.3 | 14678.6 | 14000.1 | 13394.4 | 13224.3 | 13567.9 | 14312.0 | 15043.0 |
| 40.0° | 11444.4 | 11571.1 | 10912.3 | 10435.6 | 10223.5 | 10481.5 | 11240.9 | 12111.1 |
| 45.0° | 8609.3 | 8589.1 | 8287.1 | 7953.3 | 7489.2 | 7873.0 | 8406.8 | 8990.1 |
| 50.0° | 6612.1 | 6303.9 | 6279.2 | 6067.5 | 5326.7 | 5955.6 | 6194.1 | 6427.1 |
| 55.0° | 5043.5 | 4415.0 | 4629.0 | 4658.8 | 3704.8 | 4530.7 | 4514.1 | 4353.9 |
| 60.0° | 3836.7 | 3031.5 | 3334.5 | 3621.0 | 2617.3 | 3454.0 | 3340.9 | 2933.2 |
| 65.0° | 2839.2 | 2135.2 | 2405.8 | 2790.3 | 1992.2 | 2660.9 | 2528.2 | 2087.5 |
| 70.0° | 2007.3 | 1620.2 | 1787.8 | 2102.6 | 1626.7 | 2021.5 | 1942.9 | 1607.1 |
| 75.0° | 1397.5 | 1293.9 | 1353.1 | 1538.5 | 1304.2 | 1507.0 | 1462.8 | 1260.1 |
| 80.0° | 952.7 | 940.4 | 943.0 | 1055.8 | 918.6 | 1070.4 | 999.8 | 929.4 |
| 85.0° | 435.3 | 456.6 | 491.9 | 539.3 | 443.0 | 571.1 | 496.5 | 481.0 |
| 90.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 95.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 105.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 115.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 125.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 135.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 145.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 155.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 160.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 165.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 170.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 175.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 180.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Test Model: HLT1CP2702CUW_50K**
**Control setting: 230W**

**[Goniophotometer System]**

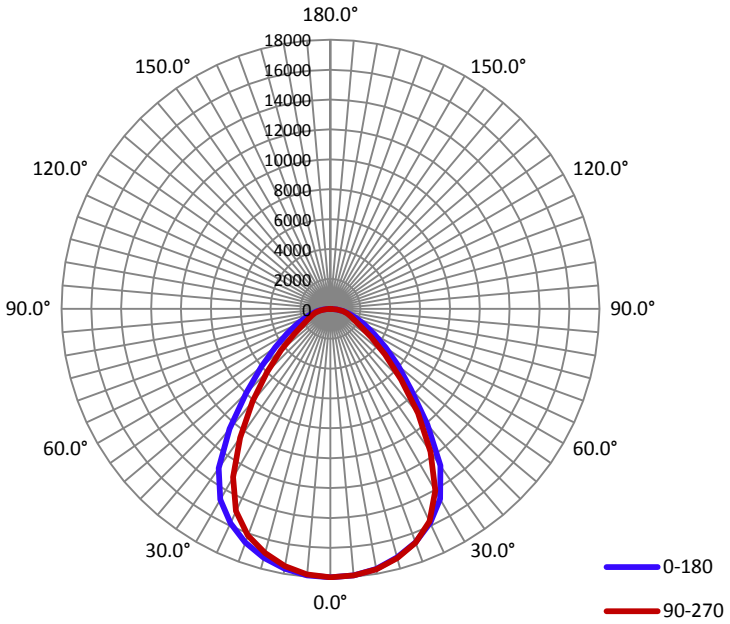
**Electrical Measurement**

| Input Voltage (V) | Frequency (Hz) | Input Current (A) | Power (W) | Power Factor |
|---|---|---|---|---|
| 120.0 | 60 | 1.873 | 224.5 | 0.999 |

Photometric Measurement

| Luminous Flux (lm) | Efficacy (lm/W) | $I_{max}$ (cd) | S/MH (C0/180) | S/MH (C90/270) |
|---|---|---|---|---|
| 33986.9 | 151.44 | 17980.9 | 1.21 | 1.14 |

**Luminous Intensity Distribution**




| | C0/180 | C45/225 | C90/270 | C135/315 | AVG. |
|---|---|---|---|---|---|
| Beam Angle (50% $I_{max}$): | 84.9 | 81.5 | 78.4 | 81.3 | 81.5 |
| Field Angle (10% $I_{max}$): | 140.6 | 136.9 | 127.3 | 136.5 | 135.3 |

**Luminous Intensity (cd) Distribution Data**

| C / γ | 0° | 22.5° | 45° | 67.5° | 90° | 112.5° | 135° | 157.5° |
|---|---|---|---|---|---|---|---|---|
| 0.0° | 17972.3 | 17972.3 | 17972.3 | 17972.3 | 17972.3 | 17972.3 | 17972.3 | 17972.3 |
| 5.0° | 17901.5 | 17883.6 | 17881.1 | 17886.0 | 17904.5 | 17906.3 | 17929.6 | 17936.3 |
| 10.0° | 17673.9 | 17667.9 | 17662.0 | 17668.9 | 17695.0 | 17707.7 | 17721.8 | 17707.3 |
| 15.0° | 17236.5 | 17219.2 | 17207.1 | 17250.8 | 17268.5 | 17288.9 | 17272.4 | 17310.4 |
| 20.0° | 16641.6 | 16587.9 | 16533.1 | 16602.7 | 16654.7 | 16647.9 | 16662.6 | 16717.8 |
| 25.0° | 15819.1 | 15764.0 | 15698.0 | 15723.4 | 15693.8 | 15753.8 | 15833.8 | 15891.4 |
| 30.0° | 14684.2 | 14617.1 | 14439.2 | 14165.7 | 14047.2 | 14233.5 | 14618.9 | 14837.3 |
| 35.0° | 12823.5 | 12808.5 | 12316.8 | 11824.4 | 11695.5 | 11945.6 | 12624.0 | 13146.0 |
| 40.0° | 10097.8 | 10227.6 | 9630.2 | 9253.2 | 9114.7 | 9344.7 | 9973.9 | 10662.9 |
| 45.0° | 7638.2 | 7609.7 | 7327.2 | 7060.9 | 6697.9 | 7033.9 | 7482.8 | 8029.9 |
| 50.0° | 5884.0 | 5612.5 | 5553.0 | 5387.2 | 4778.0 | 5338.6 | 5494.5 | 5791.2 |
| 55.0° | 4510.3 | 3944.1 | 4147.1 | 4134.3 | 3335.5 | 4076.1 | 4003.9 | 3980.0 |
| 60.0° | 3419.8 | 2692.1 | 3043.6 | 3211.2 | 2344.3 | 3130.8 | 2951.3 | 2676.9 |
| 65.0° | 2549.6 | 1873.5 | 2225.7 | 2480.2 | 1752.0 | 2405.7 | 2226.0 | 1897.1 |
| 70.0° | 1834.3 | 1424.8 | 1641.0 | 1883.4 | 1430.4 | 1826.7 | 1703.1 | 1457.6 |
| 75.0° | 1279.8 | 1146.2 | 1246.7 | 1380.4 | 1156.4 | 1356.0 | 1293.0 | 1143.3 |
| 80.0° | 868.2 | 843.1 | 880.4 | 969.7 | 846.1 | 962.1 | 904.3 | 847.7 |
| 85.0° | 432.1 | 449.3 | 476.2 | 530.0 | 427.1 | 552.1 | 479.5 | 475.4 |
| 90.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 95.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 105.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 115.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 125.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 135.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 145.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 155.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 160.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 165.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 170.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 175.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 180.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Luminous Intensity (cd) Distribution Data (cont.)**

| C / γ | 180° | 202.5° | 225° | 247.5° | 270° | 292.5° | 315° | 337.5° |
|---|---|---|---|---|---|---|---|---|
| 0.0° | 17972.3 | 17972.3 | 17972.3 | 17972.3 | 17972.3 | 17972.3 | 17972.3 | 17972.3 |
| 5.0° | 17920.0 | 17890.9 | 17887.7 | 17881.3 | 17846.7 | 17886.1 | 17882.8 | 17862.4 |
| 10.0° | 17671.2 | 17663.3 | 17606.7 | 17569.1 | 17495.5 | 17579.1 | 17578.3 | 17585.4 |
| 15.0° | 17257.0 | 17202.7 | 17095.2 | 17029.6 | 16926.7 | 17029.7 | 17043.3 | 17108.7 |
| 20.0° | 16644.2 | 16540.2 | 16385.9 | 16264.9 | 16145.1 | 16283.7 | 16336.7 | 16444.1 |
| 25.0° | 15836.3 | 15681.9 | 15388.9 | 15109.1 | 14934.3 | 15087.9 | 15314.2 | 15541.8 |
| 30.0° | 14745.8 | 14430.5 | 13858.5 | 13284.3 | 13015.0 | 13266.0 | 13741.4 | 14236.7 |
| 35.0° | 13016.7 | 12436.6 | 11634.8 | 10904.6 | 10551.2 | 10741.1 | 11299.0 | 12116.5 |
| 40.0° | 10492.9 | 9829.2 | 9063.4 | 8418.4 | 8091.3 | 8342.8 | 8671.6 | 9319.8 |
| 45.0° | 7957.2 | 7343.6 | 6871.6 | 6351.5 | 6006.9 | 6467.0 | 6652.0 | 6922.6 |
| 50.0° | 6014.4 | 5306.7 | 5152.1 | 4870.7 | 4303.9 | 5038.3 | 5135.9 | 5066.7 |
| 55.0° | 4501.0 | 3663.5 | 3836.7 | 3739.8 | 2995.1 | 3884.2 | 3841.6 | 3515.9 |
| 60.0° | 3368.2 | 2501.5 | 2899.7 | 2863.2 | 2099.9 | 2967.2 | 2845.1 | 2408.5 |
| 65.0° | 2505.9 | 1795.4 | 2179.1 | 2175.4 | 1621.8 | 2232.0 | 2087.1 | 1707.3 |
| 70.0° | 1828.3 | 1381.8 | 1639.0 | 1632.6 | 1319.6 | 1673.8 | 1538.1 | 1324.4 |
| 75.0° | 1312.2 | 1082.0 | 1194.8 | 1206.4 | 1037.5 | 1235.5 | 1141.4 | 1076.1 |
| 80.0° | 892.7 | 786.2 | 797.8 | 823.4 | 687.0 | 819.4 | 771.4 | 777.8 |
| 85.0° | 477.1 | 418.2 | 393.6 | 383.0 | 290.8 | 356.8 | 371.3 | 378.2 |
| 90.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 95.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 105.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 115.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 125.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 135.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 145.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 155.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 160.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 165.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 170.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 175.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 180.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Test Model: HLT1CP2702CUW_50K**
**Control setting: 200W**

**[Goniophotometer System]**

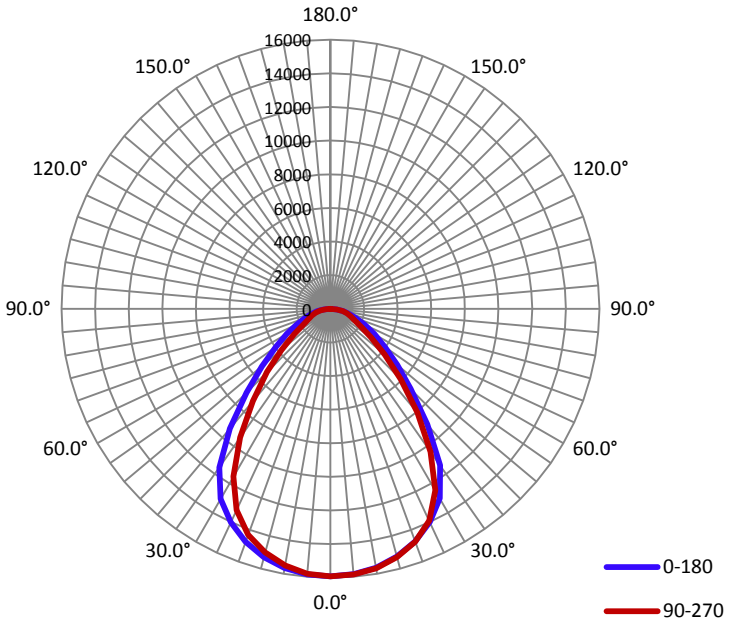
**Electrical Measurement**

| Input Voltage (V) | Frequency (Hz) | Input Current (A) | Power (W) | Power Factor |
|---|---|---|---|---|
| 120.0 | 60 | 1.62 | 194.21 | 0.999 |

Photometric Measurement

| Luminous Flux (lm) | Efficacy (lm/W) | $I_{max}$ (cd) | S/MH (C0/180) | S/MH (C90/270) |
|---|---|---|---|---|
| 30102 | 155.05 | 15930.9 | 1.21 | 1.14 |

**Luminous Intensity Distribution**




| | C0/180 | C45/225 | C90/270 | C135/315 | AVG. |
|---|---|---|---|---|---|
| Beam Angle (50% $I_{max}$): | 84.9 | 81.4 | 78.3 | 81.3 | 81.5 |
| Field Angle (10% $I_{max}$): | 140.4 | 136.8 | 127.3 | 136.4 | 135.2 |

**Luminous Intensity (cd) Distribution Data**

| C / γ | 0° | 22.5° | 45° | 67.5° | 90° | 112.5° | 135° | 157.5° |
|---|---|---|---|---|---|---|---|---|
| 0.0° | 15922.3 | 15922.3 | 15922.3 | 15922.3 | 15922.3 | 15922.3 | 15922.3 | 15922.3 |
| 5.0° | 15843.6 | 15848.5 | 15846.1 | 15850.3 | 15866.2 | 15869.4 | 15889.6 | 15903.3 |
| 10.0° | 15645.8 | 15651.3 | 15648.8 | 15663.3 | 15684.8 | 15688.3 | 15699.5 | 15695.4 |
| 15.0° | 15263.9 | 15254.5 | 15258.1 | 15283.1 | 15303.9 | 15321.7 | 15310.7 | 15340.4 |
| 20.0° | 14730.2 | 14699.9 | 14650.5 | 14725.7 | 14750.7 | 14768.9 | 14774.2 | 14826.3 |
| 25.0° | 13993.5 | 13953.1 | 13907.2 | 13940.0 | 13904.3 | 13966.4 | 14042.9 | 14113.9 |
| 30.0° | 13015.8 | 12976.4 | 12772.3 | 12557.4 | 12465.0 | 12635.3 | 12954.6 | 13150.1 |
| 35.0° | 11375.8 | 11376.5 | 10882.2 | 10469.8 | 10391.9 | 10602.4 | 11152.6 | 11652.3 |
| 40.0° | 8982.4 | 9022.4 | 8545.9 | 8240.7 | 8051.5 | 8310.6 | 8817.1 | 9446.3 |
| 45.0° | 6743.7 | 6760.0 | 6486.2 | 6252.4 | 5926.0 | 6258.1 | 6610.7 | 7109.6 |
| 50.0° | 5189.9 | 4962.5 | 4945.3 | 4797.1 | 4228.1 | 4722.7 | 4885.7 | 5125.9 |
| 55.0° | 3981.0 | 3492.1 | 3689.2 | 3681.6 | 2948.7 | 3609.1 | 3559.9 | 3518.1 |
| 60.0° | 3030.2 | 2379.3 | 2688.5 | 2855.4 | 2073.8 | 2770.5 | 2607.2 | 2380.9 |
| 65.0° | 2261.6 | 1665.7 | 1962.9 | 2195.6 | 1557.5 | 2135.3 | 1963.7 | 1679.8 |
| 70.0° | 1612.8 | 1260.9 | 1455.8 | 1665.9 | 1264.9 | 1612.8 | 1513.9 | 1291.9 |
| 75.0° | 1121.7 | 1010.8 | 1098.8 | 1231.4 | 1021.8 | 1199.1 | 1146.4 | 1011.0 |
| 80.0° | 765.9 | 745.8 | 773.0 | 865.0 | 743.0 | 847.0 | 793.9 | 754.2 |
| 85.0° | 386.3 | 390.5 | 416.4 | 467.6 | 383.6 | 484.4 | 418.5 | 424.8 |
| 90.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 95.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 105.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 115.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 125.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 135.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 145.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 155.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 160.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 165.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 170.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 175.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 180.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Luminous Intensity (cd) Distribution Data (cont.)**

| C / γ | 180° | 202.5° | 225° | 247.5° | 270° | 292.5° | 315° | 337.5° |
|---|---|---|---|---|---|---|---|---|
| 0.0° | 15922.3 | 15922.3 | 15922.3 | 15922.3 | 15922.3 | 15922.3 | 15922.3 | 15922.3 |
| 5.0° | 15866.2 | 15850.9 | 15848.8 | 15838.2 | 15820.5 | 15846.5 | 15842.9 | 15836.6 |
| 10.0° | 15664.7 | 15654.3 | 15594.0 | 15558.3 | 15495.3 | 15577.9 | 15574.5 | 15604.8 |
| 15.0° | 15291.4 | 15246.8 | 15148.6 | 15087.3 | 14996.2 | 15092.8 | 15101.0 | 15171.0 |
| 20.0° | 14743.2 | 14657.7 | 14524.3 | 14409.3 | 14305.0 | 14439.4 | 14474.4 | 14585.2 |
| 25.0° | 14013.7 | 13879.3 | 13634.8 | 13390.7 | 13207.6 | 13380.3 | 13566.4 | 13786.1 |
| 30.0° | 13055.3 | 12789.8 | 12281.5 | 11771.7 | 11526.9 | 11716.0 | 12180.6 | 12630.3 |
| 35.0° | 11535.1 | 11027.8 | 10310.6 | 9668.2 | 9348.3 | 9526.8 | 10022.5 | 10744.3 |
| 40.0° | 9295.0 | 8710.0 | 8039.4 | 7462.4 | 7164.7 | 7390.9 | 7711.4 | 8223.2 |
| 45.0° | 7047.7 | 6511.6 | 6057.8 | 5627.0 | 5320.7 | 5708.7 | 5899.1 | 6144.1 |
| 50.0° | 5329.3 | 4705.1 | 4562.3 | 4320.7 | 3815.6 | 4444.3 | 4552.3 | 4495.2 |
| 55.0° | 3986.6 | 3225.1 | 3401.7 | 3316.3 | 2636.4 | 3429.7 | 3405.9 | 3123.2 |
| 60.0° | 2982.7 | 2218.9 | 2568.0 | 2540.0 | 1859.5 | 2628.5 | 2520.2 | 2122.2 |
| 65.0° | 2217.2 | 1585.6 | 1931.9 | 1928.6 | 1433.2 | 1981.4 | 1852.3 | 1513.8 |
| 70.0° | 1616.2 | 1223.7 | 1450.4 | 1449.8 | 1169.9 | 1475.1 | 1363.5 | 1174.4 |
| 75.0° | 1163.8 | 959.4 | 1058.1 | 1070.0 | 917.3 | 1086.3 | 1010.7 | 954.5 |
| 80.0° | 789.5 | 693.7 | 708.2 | 731.0 | 604.9 | 728.8 | 681.2 | 689.8 |
| 85.0° | 406.2 | 366.3 | 352.9 | 346.4 | 248.9 | 310.0 | 330.4 | 336.8 |
| 90.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 95.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 105.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 115.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 125.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 135.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 145.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 155.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 160.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 165.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 170.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 175.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 180.0° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

## 6. Description of Test Equipment

| Device | Manufacture | Model No | Serial No | Calibration date | Calibration due date |
|---|---|---|---|---|---|
| 2.0m integrating sphere | EVERFINE | R98 | G121960CS1361154D | 2023-05-19 | 2024-05-18 |
| spectroradiometer | EVERFINE | HAAS-2000 | M12048CS1361148 | 2023-05-19 | 2024-05-18 |
| Digital CC&CV DC Power Supply | EVERFINE | WY305 | G115986CN1361134 | 2023-05-19 | 2024-05-18 |
| Thermal Meter | ANYMETRE | TH-20E | N/A | 2022-11-11 | 2023-11-10 |
| Standard Light Source | EVERFINE | D215S | G119786CS1361115 | 2023-08-10 | 2025-08-09 |
| Digital Power Meter | YOKOGAWA | WT210 | 91KB35700 | 2023-05-23 | 2024-05-22 |
| Intelligence ac power supply | EVERFINE | DPS1005 | G119890CS1361121 | 2023-05-19 | 2024-05-18 |
| AC Power Supply | INVENTFINE | CHP-5KVA | 900511765 | 2023-05-22 | 2024-05-21 |
| DC Power Supply | INVENTFINE | WL3010 | JWDMP030001 | 2023-05-22 | 2024-05-21 |
| Power Meter | INVENTFINE | WT500 | GSDSQ200007 | 2023-05-23 | 2024-05-22 |
| Goniophotometer | INVENTFINE | GPM-1900 | YWGCF120001 | 2022-11-14 | 2023-11-13 |
| Wireless Weather Station | ZHONGXING | KG218 | N/A | 2023-05-22 | 2024-05-21 |
| Standard Light Source | INVENTFINE | N/A | JWBYR040008 | 2021-12-23 | 2023-12-22 |
| Digital Multimeter | FLUKE | 115C | 37840512WS | 2023-05-22 | 2024-05-21 |
| Hybrid Recorder | YOKOGAWA | DR230 | 47JH0903 | 2023-05-22 | 2024-05-21 |
| Power Supply | SC | SC/BP-11003 | 1608110030553 | 2023-05-19 | 2024-05-18 |

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Kunshan) attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).

## 7. Test Method

Product was tested with no seasoning. All stabilization and measurements were made in compliance with IES LM-79-19. The ambient temperature of the sample was maintained at 25°C±1°C during measurement. And relative humidity is less than 65%. The product was operated in its intended orientation in application during all testing.

**Integrating Sphere System**
The system includes AC power source, digital power meter, DC power supply, Spectroradiometer, and integrating sphere. The integrating sphere system is calibrated by standard spectrum light source before measurement. 4π geometry was used during measurement.

**Goniophotometer System**
Type C goniophotometer was used for measuring luminous intensity distribution. The vertical angle (γ) test intervals were set no more than 1 degree while data for 5 degree intervals is reported. The horizontal angle (C plane) test intervals were set no more than 22.5 degree.

**ISTMT Test**
The LED which has the highest temperature was measured at the location of LED case which is specified by LED source manufacturer and detailed by LM-80 report. The drive current of LED package/module/ array was calculated as the total output current of the driver measured by multimeter, divided by the number of branches in parallel of LEDs.

# Directions

1. The information marked "superscript #" is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report.
2. This report may contain data that are not covered by the accreditation scope and shall be marked with an asterisk "★".
3. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
4. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
5. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.
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**********END OF REPORT**********