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ACCREDITED

NVLAP LAB CODE 201042-0

# Photometric Test Report

Relevant Standards
IES LM-79-2008
ANSI C78.377-2011, ANSI C82.77-2002
CIE 13.3-1995, CIE 15-2004, IES TM-30-15, UL 1598-2008

**Prepared For**

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1000 Kieley Pl
Cincinnati, OH 45217
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**Catalog Number**

**L224SS1B30DC000,R224SS1B30DC000**

Order Number
11621025
Test Number
11621025.11

Test Date

2017-02-13 - 2017-02-23

Prepared By

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Approved By

Tiffany Hamm, Project Handler

The results contained in this report pertain only to the tested sample.
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# Table of Contents


**Summary of Results** Page 3

**Integrating Sphere Results** Page 4

**Distribution Results**

Conditions / Summary of Results / Polar Plot / Zonal Lumens Page 5
Candela Tabulation / Average Luminance Page 6
Coefficients of Utilization / Cone of Light Page 7
ISOFootcandle Plot Page 8

**In-Situ Results** Page 9


Laboratory results may not be representative of field performance
Ballast factors have not been applied

Testing was performed in a 2-meter integrating sphere using the 4π geometry method.

Absorption correction was employed for Sphere measurement

**Luminaire Description:** Tested in A.L.P. EL 2x2 housing, white steel housing, prismatic lens enclosure
**Lamp:** 224 white LEDs
**Mounting:** Surface – Ceiling
**Ballast/Driver:** Philips X1040C110V054BSTI

**Luminaire**

### Luminaire Characteristics

| | |
|---|---|
| Luminous Length: | 21.00 in. |
| Luminous Width: | 21.00 in. |

## Summary of Results

### Integrating Sphere

| | |
|---|---|
| Luminous Flux: | 4343 Lumens |
| Efficacy: | 124.7 lm/w |
| CCT: | 3129 K |
| CRI (Ra): | 83.4 |

### Distribution

| | |
|---|---|
| Total Luminaire Output: | 4289 Lumens |
| Luminaire Efficacy: | 123 lm/w |
| Maximum Candela: | 1850 Candela |

### Electrical Data at 277 VAC

| | |
|---|---|
| Test Temperature: | 25.0 °C |
| Voltage: | 276.9 VAC |
| Current: | 0.1291 A |
| Power: | 34.60 W |
| Power Factor: | 0.968 |
| Frequency: | 60 Hz |
| Current THD: | 9.89 % |

### In-Situ

| | |
|---|---|
| LED Temperature: | 41.0 °C |
| Driver Temperature: | 50.0 °C |
| Measured LED Current: | 0.04630 A |

Temperature is offset to an ambient temperature of 25°C as described in UL1598-2008.

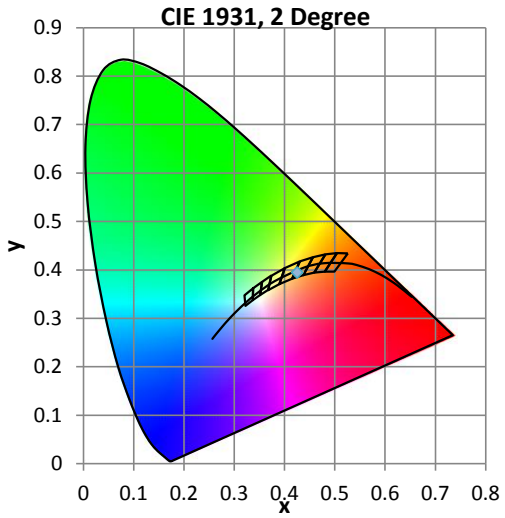
# Color Quality - Integrating Sphere

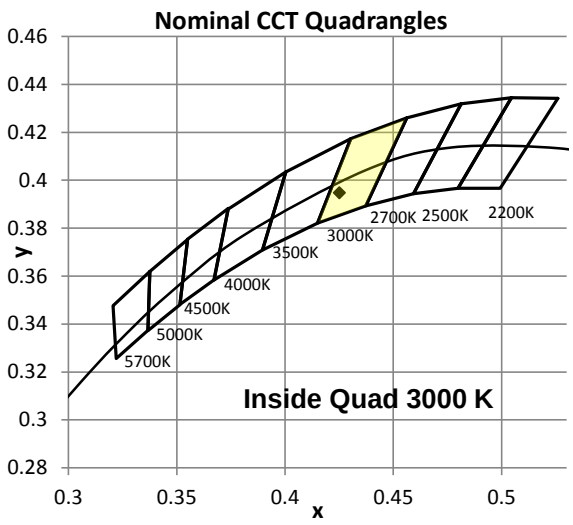
Integrating Sphere Test Conditions

| Temperature | Voltage | Current | Power | Power Factor | Frequency | Current THD |
|---|---|---|---|---|---|---|
| 25.1 °C | 119.9 VAC | 0.2914 A | 34.83 W | 0.997 | 60 Hz | 6.21 % |

## Summary of Results

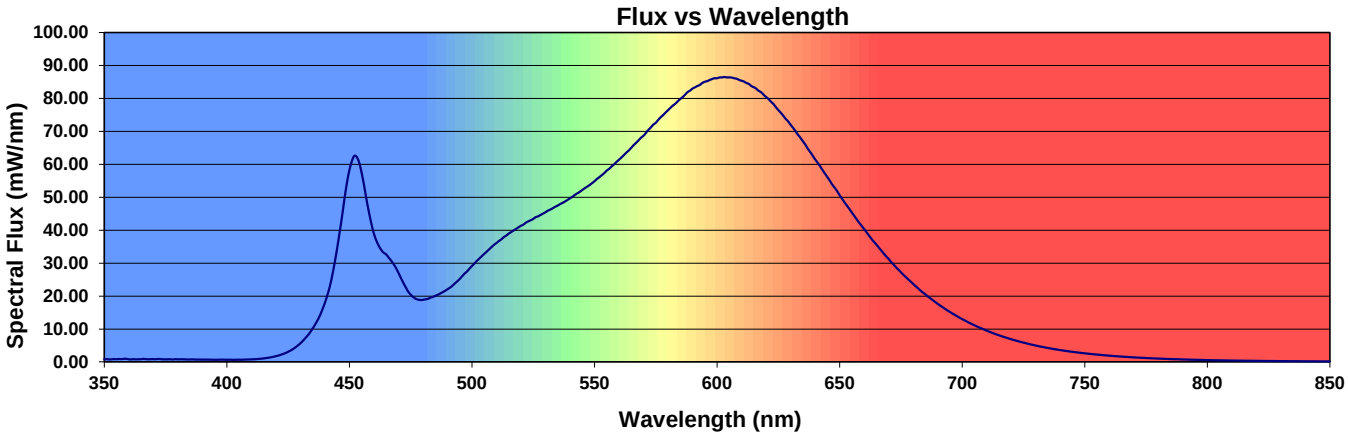
| | | | |
|---|---|---|---|
| **Total Output:** | 4343 Lumens | **Chromaticity (x):** | 0.4251 |
| **Efficacy:** | 124.7 lm/w | **Chromaticity (y):** | 0.3947 |
| **CCT:** | 3129 K | **Chromaticity (u'):** | 0.2470 |
| **CRI (Ra):** | 83.4 | **Chromaticity (v'):** | 0.5159 |
| **CRI (R9):** | 11.8 | **TM-30 $R_f$:** | 82.7 |
| **Peak Wavelength:** | 603.1 nm | **TM-30 $R_g$:** | 96.2 |
| **Dominant Wavelength:** | 583.1 nm | **Duv:** | -0.0025 |
| **S/P Ratio:** | 1.417 | | |




## Color Rendering Index Detail

| Ra (CRI) | R1 | R2 | R3 | R4 | R5 | R6 | R7 | R8 | R9 | R10 | R11 | R12 | R13 | R14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 83.4 | 82.3 | 92.2 | 95.7 | 80.7 | 82.4 | 89.8 | 82.7 | 60.9 | 11.8 | 81.7 | 79.7 | 70.6 | 84.9 | 98.5 |



# Distribution - Goniophotometer

Distribution Test Conditions

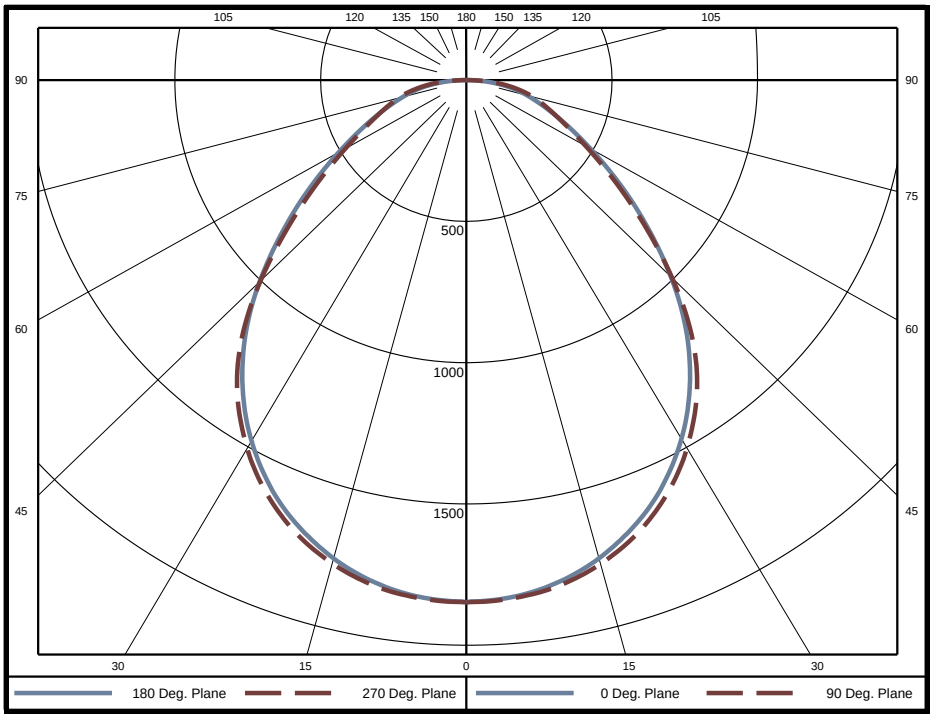
| Temperature | Voltage | Current | Power | Power Factor | Frequency | Current THD |
|---|---|---|---|---|---|---|
| 25.3 °C | 120.0 VAC | 0.2915 A | 34.87 W | 0.997 | 60 Hz | 6.23 % |

## Summary of Results

**Spacing Criteria**
0-180: 1.19
90-270: 1.19

**Total Lumen Output:** 4289 Lumens
**Luminaire Efficacy:** 123.0 lm/w
**Maximum Candela:** 1850 Candela

## Polar Plot




## Zonal Lumen Summary

| Zone | Lumens | % of Luminaire | Zone | Lumens | % of Luminaire | Zone | Lumens | % of Luminaire |
|---|---|---|---|---|---|---|---|---|
| 0-5 | 44.1 | 1.0% | 60-65 | 205.6 | 4.8% | 120-125 | 0 | 0.0% |
| 5-10 | 130.7 | 3.0% | 65-70 | 165.1 | 3.8% | 125-130 | 0 | 0.0% |
| 10-15 | 212.3 | 4.9% | 70-75 | 133.4 | 3.1% | 130-135 | 0 | 0.0% |
| 15-20 | 285.2 | 6.6% | 75-80 | 103.7 | 2.4% | 135-140 | 0 | 0.0% |
| 20-25 | 346.1 | 8.1% | 80-85 | 68.2 | 1.6% | 140-145 | 0 | 0.0% |
| 25-30 | 391.4 | 9.1% | 85-90 | 24.9 | 0.6% | 145-150 | 0 | 0.0% |
| 30-35 | 418.0 | 9.7% | 90-95 | 0 | 0.0% | 150-155 | 0 | 0.0% |
| 35-40 | 423.4 | 9.9% | 95-100 | 0 | 0.0% | 155-160 | 0 | 0.0% |
| 40-45 | 404.8 | 9.4% | 100-105 | 0 | 0.0% | 160-165 | 0 | 0.0% |
| 45-50 | 364.6 | 8.5% | 105-110 | 0 | 0.0% | 165-170 | 0 | 0.0% |
| 50-55 | 311.8 | 7.3% | 110-115 | 0 | 0.0% | 170-175 | 0 | 0.0% |
| 55-60 | 255.9 | 6.0% | 115-120 | 0 | 0.0% | 175-180 | 0 | 0.0% |

| Zone | Lumens | % of Luminaire |
|---|---|---|
| 0-40 | 2251 | 52.5% |
| 0-60 | 3588 | 83.7% |
| 0-90 | 4289 | 100.0% |
| 90-180 | 0 | 0.0% |

## Candela Tabulation

Horizontal Angle (Degrees)

| Vertical Angle (Degrees) | 0 | 22.5 | 45 | 67.5 | 90 | 112.5 | 135 | 157.5 | 180 | 202.5 | 225 | 247.5 | 270 | 292.5 | 315 | 337.5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1848 | 1848 | 1848 | 1848 | 1848 | 1848 | 1848 | 1848 | 1848 | 1848 | 1848 | 1848 | 1848 | 1848 | 1848 | 1848 |
| 5 | 1836 | 1840 | 1841 | 1840 | 1841 | 1840 | 1841 | 1840 | 1836 | 1840 | 1841 | 1840 | 1841 | 1840 | 1841 | 1840 |
| 10 | 1805 | 1811 | 1814 | 1816 | 1818 | 1816 | 1814 | 1811 | 1805 | 1811 | 1814 | 1816 | 1818 | 1816 | 1814 | 1811 |
| 15 | 1753 | 1760 | 1766 | 1770 | 1774 | 1770 | 1766 | 1760 | 1753 | 1760 | 1766 | 1770 | 1774 | 1770 | 1766 | 1760 |
| 20 | 1681 | 1688 | 1695 | 1704 | 1709 | 1704 | 1695 | 1688 | 1681 | 1688 | 1695 | 1704 | 1709 | 1704 | 1695 | 1688 |
| 25 | 1589 | 1594 | 1603 | 1614 | 1621 | 1614 | 1603 | 1594 | 1589 | 1594 | 1603 | 1614 | 1621 | 1614 | 1603 | 1594 |
| 30 | 1473 | 1478 | 1485 | 1499 | 1509 | 1499 | 1485 | 1478 | 1473 | 1478 | 1485 | 1499 | 1509 | 1499 | 1485 | 1478 |
| 35 | 1336 | 1338 | 1344 | 1362 | 1374 | 1362 | 1344 | 1338 | 1336 | 1338 | 1344 | 1362 | 1374 | 1362 | 1344 | 1338 |
| 40 | 1178 | 1177 | 1181 | 1195 | 1208 | 1195 | 1181 | 1177 | 1178 | 1177 | 1181 | 1195 | 1208 | 1195 | 1181 | 1177 |
| 45 | 998 | 997 | 1002 | 1000 | 1002 | 1000 | 1002 | 997 | 998 | 997 | 1002 | 1000 | 1002 | 1000 | 1002 | 997 |
| 50 | 813 | 817 | 816 | 796 | 794 | 796 | 816 | 817 | 813 | 817 | 816 | 796 | 794 | 796 | 816 | 817 |
| 55 | 645 | 643 | 633 | 618 | 618 | 618 | 633 | 643 | 645 | 643 | 633 | 618 | 618 | 618 | 633 | 643 |
| 60 | 499 | 490 | 478 | 476 | 477 | 476 | 478 | 490 | 499 | 490 | 478 | 476 | 477 | 476 | 478 | 490 |
| 65 | 384 | 371 | 359 | 370 | 375 | 370 | 359 | 371 | 384 | 371 | 359 | 370 | 375 | 370 | 359 | 371 |
| 70 | 293 | 284 | 273 | 296 | 301 | 296 | 273 | 284 | 293 | 284 | 273 | 296 | 301 | 296 | 273 | 284 |
| 75 | 222 | 220 | 216 | 232 | 241 | 232 | 216 | 220 | 222 | 220 | 216 | 232 | 241 | 232 | 216 | 220 |
| 80 | 157 | 154 | 159 | 167 | 174 | 167 | 159 | 154 | 157 | 154 | 159 | 167 | 174 | 167 | 159 | 154 |
| 85 | 80 | 81 | 85 | 95 | 96 | 95 | 85 | 81 | 80 | 81 | 85 | 95 | 96 | 95 | 85 | 81 |
| 90 | 4 | 9 | 10 | 11 | 11 | 11 | 10 | 9 | 4 | 9 | 10 | 11 | 11 | 11 | 10 | 9 |
| 95 | 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 |
| 105 | 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 |
| 115 | 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 |
| 125 | 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 |
| 135 | 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 |
| 145 | 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 |
| 155 | 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 |
| 165 | 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 |
| 175 | 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 |

## Average Luminance (cd/m$^2$)

Horizontal Angle (Degrees)

| Vertical Angle (Degrees) | 0 | 45 | 90 |
|---|---|---|---|
| 0 | 6496 | 6496 | 6496 |
| 45 | 4959 | 4980 | 4980 |
| 55 | 3950 | 3878 | 3787 |
| 65 | 3193 | 2983 | 3115 |
| 75 | 3009 | 2939 | 3274 |
| 85 | 3223 | 3432 | 3852 |

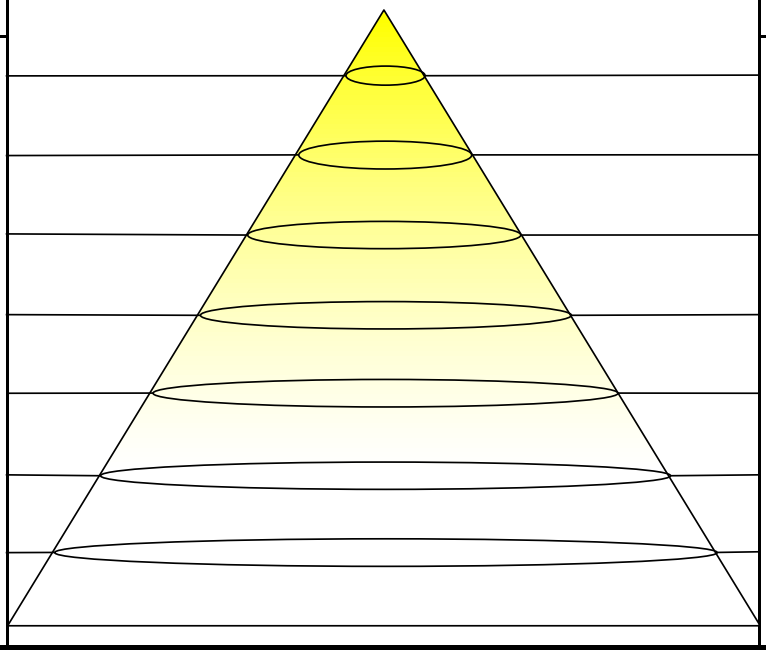
## Utilization of Lumens - Zonal Cavity Method

| Effective Floor Cavity Reflectance 20% | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ceiling Cavity Reflectance | 80 | | | | 70 | | | | 50 | | | 30 | | | 10 | | | 0 |
| Wall Reflectance | 70 | 50 | 30 | 10 | 70 | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 | 0 |
| Room Cavity Ratio (RCR) | ** Values are expressed as Lumens delivered to the task surface ** | | | | | | | | | | | | | | | | | |
| 0 | 5106 | 5106 | 5106 | 5106 | 4987 | 4987 | 4987 | 4987 | 4765 | 4765 | 4765 | 4563 | 4563 | 4563 | 4376 | 4376 | 4376 | 4289 |
| 1 | 4692 | 4499 | 4326 | 4170 | 4577 | 4402 | 4245 | 4102 | 4221 | 4091 | 3973 | 4054 | 3949 | 3851 | 3901 | 3816 | 3737 | 3649 |
| 2 | 4302 | 3970 | 3695 | 3465 | 4191 | 3890 | 3638 | 3424 | 3739 | 3527 | 3344 | 3601 | 3424 | 3269 | 3472 | 3327 | 3197 | 3107 |
| 3 | 3951 | 3526 | 3197 | 2935 | 3847 | 3459 | 3154 | 2909 | 3333 | 3073 | 2858 | 3217 | 2995 | 2809 | 3109 | 2922 | 2762 | 2672 |
| 4 | 3640 | 3155 | 2799 | 2528 | 3544 | 3099 | 2767 | 2511 | 2993 | 2705 | 2477 | 2895 | 2646 | 2444 | 2804 | 2589 | 2412 | 2323 |
| 5 | 3365 | 2842 | 2477 | 2207 | 3278 | 2795 | 2452 | 2195 | 2706 | 2404 | 2172 | 2623 | 2358 | 2149 | 2546 | 2313 | 2127 | 2040 |
| 6 | 3121 | 2577 | 2212 | 1950 | 3041 | 2537 | 2192 | 1941 | 2461 | 2154 | 1925 | 2391 | 2117 | 1908 | 2324 | 2082 | 1892 | 1808 |
| 7 | 2904 | 2350 | 1991 | 1739 | 2832 | 2316 | 1975 | 1733 | 2251 | 1944 | 1721 | 2191 | 1915 | 1709 | 2134 | 1886 | 1697 | 1615 |
| 8 | 2711 | 2155 | 1805 | 1564 | 2646 | 2125 | 1792 | 1560 | 2070 | 1767 | 1550 | 2018 | 1742 | 1541 | 1968 | 1719 | 1532 | 1454 |
| 9 | 2539 | 1985 | 1646 | 1417 | 2480 | 1960 | 1636 | 1414 | 1912 | 1615 | 1407 | 1867 | 1595 | 1400 | 1824 | 1575 | 1393 | 1317 |
| 10 | 2385 | 1838 | 1510 | 1293 | 2331 | 1816 | 1502 | 1290 | 1774 | 1484 | 1284 | 1735 | 1468 | 1279 | 1697 | 1451 | 1273 | 1201 |

| Beam and Field Information | |
|---|---|
| CIE Type: | Direct |
| Center Beam Intenisty: | 1848 Candela |
| Central Cone Intensity: | 1845 Candela |
| Beam Flux: | 2806.4 Lumens |
| Beam Angle (0-180): | 93.9 Degrees |
| Beam Angle (90-270): | 93.6 Degrees |
| Field Angle (0-180): | 155.8 Degrees |
| Field Angle (90-270): | 158.5 Degrees |

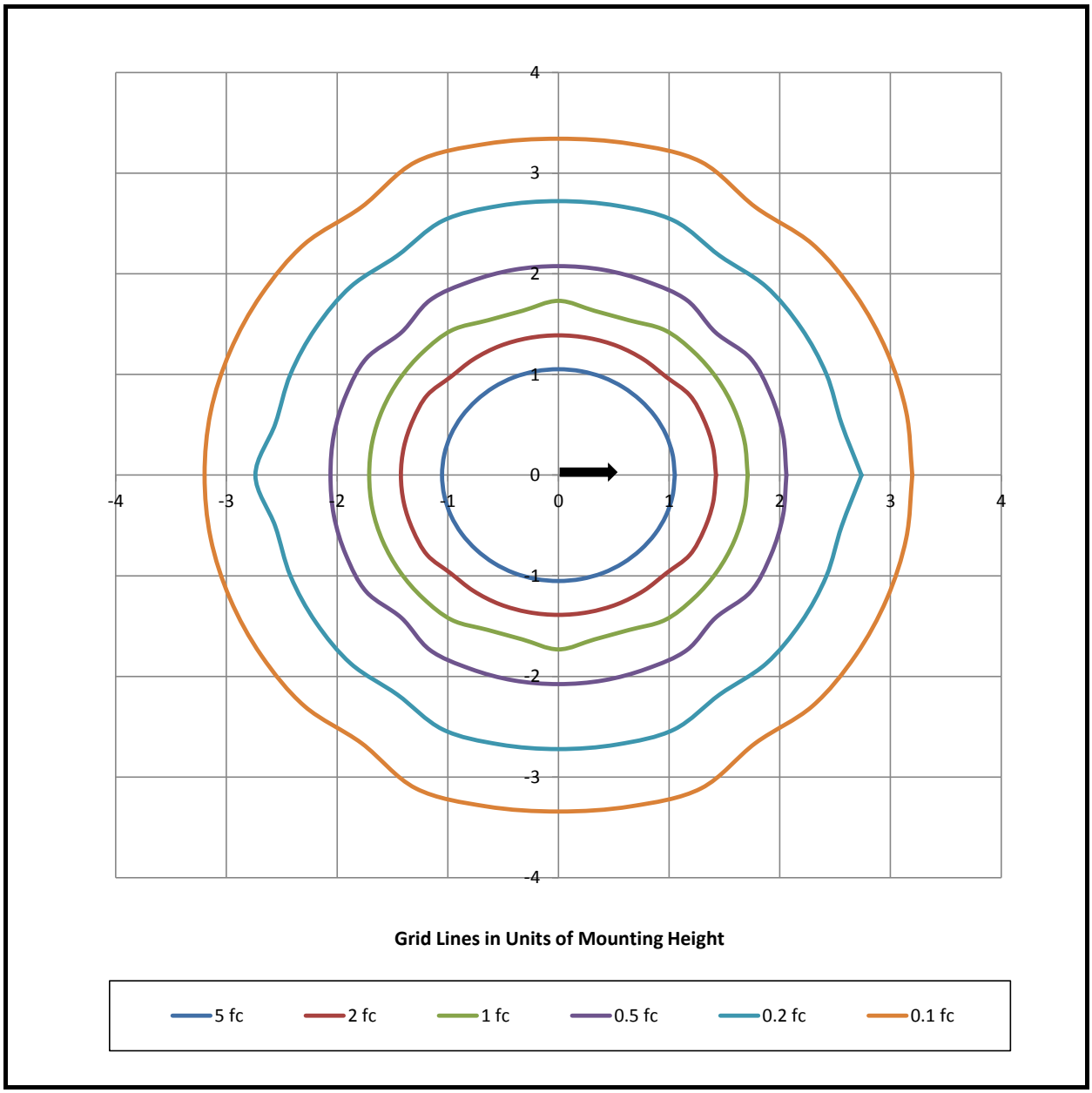
## Cone of Light Tabulation

| Mounting Height (Feet) | Footcandles at Nadir | Diameter (Feet) |
|---|---|---|
| 4.00 | 116 | 4.79 |
| 6.00 | 51.3 | 7.19 |
| 8.00 | 28.9 | 9.59 |
| 10.0 | 18.5 | 12.0 |
| 12.0 | 12.8 | 14.4 |
| 14.0 | 9.43 | 16.8 |
| 16.0 | 7.22 | 19.2 |



## ISOFootcandle Plot

**Mounting Height - 8 Feet**



# In-Situ Test

In-Situ Test Conditions

| Temperature | Voltage | Current | Power | Power Factor | Frequency | Current THD |
|---|---|---|---|---|---|---|
| 24.2 °C | 120.0 VAC | N/A | N/A | N/A | 60 Hz | N/A |

## Summary of Results

| | | |
|---|---|---|
| LED Temperature: | 41.0 | °C |
| Driver Temperature: | 50.0 | °C |
| Measured LED Current: | 0.04630 | A |

Temperatures are offset to an ambient temperature of 25°C as described in UL1598-2008

**LED Temperature Location**

**Driver Temperature Location**