

# Test Report

Report Number: L16047

Date: Jun 13, 2016

Issued by:

Dialight Optics Laboratory  
1501 Route 34 South, Farmingdale, NJ 07727

Test of one LED Dual Vigilant Floodlight  
Unit manufacturer: Dialight Corporation  
Unit model number: FLx966xC2NG

Issued to:

Dialight Corporation  
1501 Route 34 South, Farmingdale, NJ 07727

**Tests performed:** Photometric characterization and temperature measurement per the described standards.

**Dates of test:** June 2, 2016 through June 7, 2016

**Standards used:** All tests are performed in accordance with procedures and guidelines prescribed by the American National Standards Institute (ANSI) or Illuminating Engineering Society of North America (IES):

- IES LM-79:2008: Electrical and Photometric Measurements of Solid-State Lighting Products
- ANSI/UL 1598:2008: Underwriters Laboratories Inc. Standard for Safety: Luminaires
- ENERGY STAR Manufacturer's Guide for Qualifying Solid State Lighting Luminaires Version 2.1

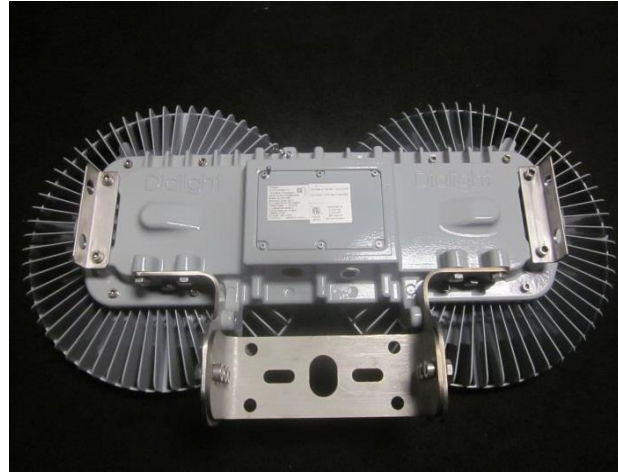
**Description of sample:**

Sample Number: L16047  
Manufacturer: Dialight Corporation  
Product Name: LED Dual Vigilant Floodlight  
Description: LED Dual Vigilant Floodlight  
Model Number: FLx966xC2NG

## Report Summary

Sample number L16047  
Dialight unit model number FLx966xC2NG

### Photograph(s) of sample:



\*Photographs not to scale. For reference only.

### Summary of Results:

|                    | <u>Integrating Sphere</u> | <u>Goniophotometer</u> |
|--------------------|---------------------------|------------------------|
| Luminous Flux:     | 37530 (lumens)            | 37995 (lumens)         |
| Electrical Power:  | 287.7 (W)                 | 287.4 (W)              |
| Luminous Efficacy: | 130.5 (lumens/W)          | 132.2 (lumens/W)       |

### Electrical Measurements:

Input Power (120VAC): 287.7 (W)  
 Power Factor (120VAC): 0.995  
 Current ATHD % (120VAC): 7.943  
 Input Power (277VAC): 281.2 (W)  
 Power Factor (277VAC): 0.971  
 Current ATHD % (277VAC): 14.08

### Color Measurements:

Correlated Color Temperature (CCT): 4948  
 Color Rendering Index (CRI): 78.4  
 Chromaticity Coordinate (x): 0.347  
 Chromaticity Coordinate (y): 0.356  
 Chromaticity Coordinate (u'): 0.211  
 Chromaticity Coordinate (v'): 0.325  
 DUV: 0.0014

### Temperature Measurements:

In Situ LED Source Temperature: 55.8 (°C)

## Test Results: Integrating Sphere

Results include unit color, flux, efficacy and electrical power for sample number L16047.

Dialight unit model number FLx966xC2NG

### Test Conditions:

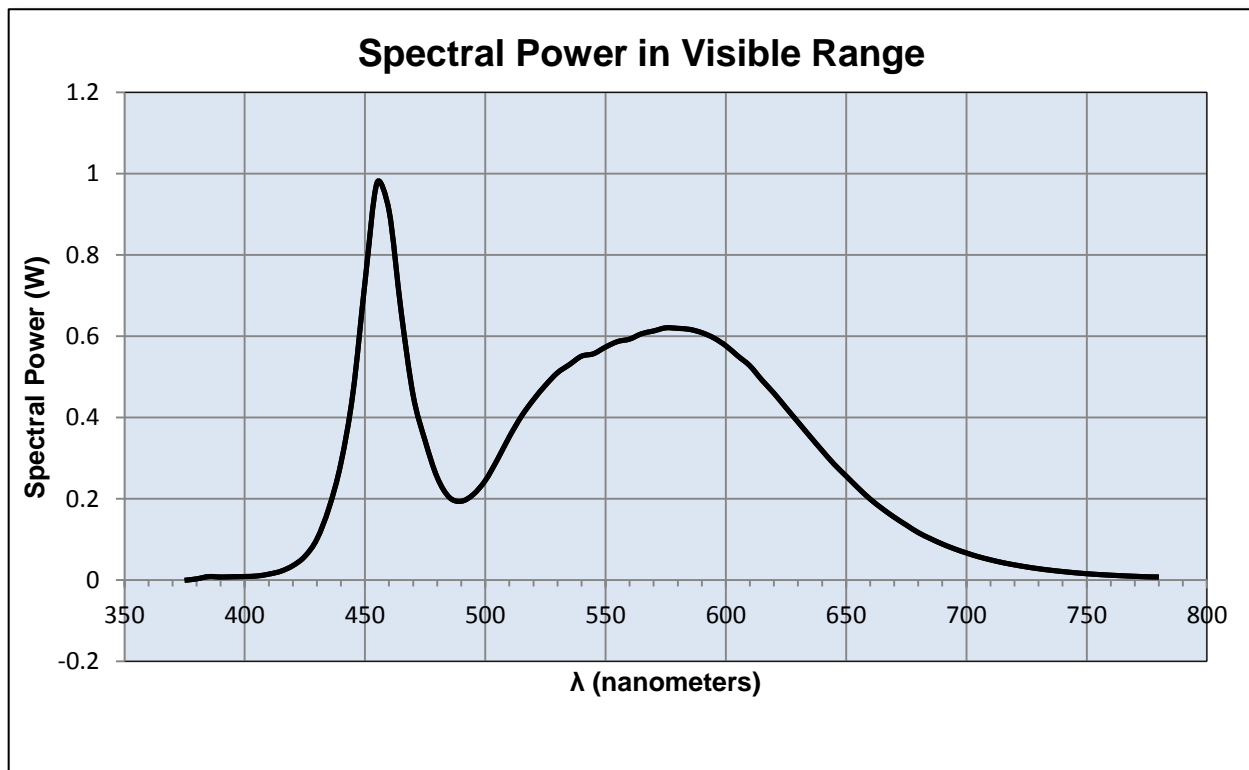
Ambient Temperature:  $25 \pm 1$  (°C)

### Electrical Measurements:

Input Voltage: 120 (VAC)  
Input Current: 2.408 (A)  
Input Power: 287.7 (W)  
Input Power Factor: 0.995  
Current ATHD: 7.943 (%)

### Photometric measurements:

Luminous Flux: 37530 (lumens)  
Luminous Efficacy: 130.5 (lumens/W)  
Correlated Color Temperature (CCT): 4948 (K)  
CRI -Ra: 78.4  
CRI -R9: -8.9  
DUV: 0.0014  
CIE Coordinate (x): 0.347  
CIE Coordinate (y): 0.356  
CIE Coordinate (u'): 0.211  
CIE Coordinate (v'): 0.325



## Test Results: Integrating Sphere

Results continued from previous page.

### Tabulated Spectral Power in Visible Range:

| $\lambda(\text{nm})$ | (W/nm) | $\lambda(\text{nm})$ | (W/nm) | $\lambda(\text{nm})$ | (W/nm) |
|----------------------|--------|----------------------|--------|----------------------|--------|
| 375                  | -0.001 | 515                  | 0.403  | 655                  | 0.226  |
| 380                  | 0.003  | 520                  | 0.443  | 660                  | 0.199  |
| 385                  | 0.008  | 525                  | 0.479  | 665                  | 0.176  |
| 390                  | 0.007  | 530                  | 0.510  | 670                  | 0.155  |
| 395                  | 0.008  | 535                  | 0.530  | 675                  | 0.135  |
| 400                  | 0.009  | 540                  | 0.551  | 680                  | 0.117  |
| 405                  | 0.010  | 545                  | 0.557  | 685                  | 0.102  |
| 410                  | 0.014  | 550                  | 0.573  | 690                  | 0.089  |
| 415                  | 0.022  | 555                  | 0.587  | 695                  | 0.077  |
| 420                  | 0.035  | 560                  | 0.593  | 700                  | 0.067  |
| 425                  | 0.058  | 565                  | 0.606  | 705                  | 0.057  |
| 430                  | 0.101  | 570                  | 0.613  | 710                  | 0.050  |
| 435                  | 0.177  | 575                  | 0.620  | 715                  | 0.043  |
| 440                  | 0.288  | 580                  | 0.619  | 720                  | 0.037  |
| 445                  | 0.460  | 585                  | 0.616  | 725                  | 0.032  |
| 450                  | 0.733  | 590                  | 0.609  | 730                  | 0.028  |
| 455                  | 0.977  | 595                  | 0.596  | 735                  | 0.024  |
| 460                  | 0.909  | 600                  | 0.576  | 740                  | 0.021  |
| 465                  | 0.661  | 605                  | 0.551  | 745                  | 0.018  |
| 470                  | 0.455  | 610                  | 0.527  | 750                  | 0.016  |
| 475                  | 0.342  | 615                  | 0.492  | 755                  | 0.014  |
| 480                  | 0.253  | 620                  | 0.460  | 760                  | 0.012  |
| 485                  | 0.204  | 625                  | 0.424  | 765                  | 0.010  |
| 490                  | 0.194  | 630                  | 0.389  | 770                  | 0.009  |
| 495                  | 0.210  | 635                  | 0.353  | 775                  | 0.008  |
| 500                  | 0.245  | 640                  | 0.319  | 780                  | 0.007  |
| 505                  | 0.296  | 645                  | 0.285  |                      |        |
| 510                  | 0.352  | 650                  | 0.256  |                      |        |

## Test Results: Goniometer

Results include unit flux, distribution, efficacy, and electrical power for sample number L16047.  
Dialight unit model number FLx966xC2NG

### Electrical Measurements:

Input Voltage: 120 (VAC)  
Input current: 2.4 (A)  
Input Power: 287.4 (W)  
Power Factor: 0.995

### Photometric measurements:

Absolute Luminous Flux: 37995 (lumens)  
Luminous Efficacy: 132.2 (lumens/W)

### Intensity Summary:

| <u>INTENSITY (CANDLEPOWER) SUMMARY</u> |       |       |       |       |        |               |
|--|-------|-------|-------|-------|--------|---------------|
| ANGLE                                  | ALONG | 135   | 202.5 | 270   | ACROSS | OUTPUT LUMENS |
| 0                                      | 45717 | 45717 | 45717 | 45717 | 0      |               |
| 5                                      | 43219 | 42850 | 42911 | 42623 | 0      | 1630          |
| 15                                     | 27725 | 26987 | 27170 | 26679 | 0      | 6843          |
| 25                                     | 16461 | 16157 | 16238 | 15884 | 0      | 7621          |
| 35                                     | 12105 | 12065 | 12099 | 11980 | 0      | 7491          |
| 45                                     | 9405  | 9325  | 9322  | 9330  | 0      | 7497          |
| 55                                     | 4579  | 4328  | 4343  | 4266  | 0      | 5430          |
| 65                                     | 403   | 345   | 351   | 314   | 0      | 1347          |
| 75                                     | 65    | 63    | 62    | 62    | 0      | 101           |
| 85                                     | 15    | 15    | 14    | 16    | 0      | 35            |
| 95                                     | 0     | 0     | 0     | 0     | 0      | 1             |
| 105                                    | 0     | 0     | 0     | 0     | 0      | 0             |
| 115                                    | 0     | 0     | 0     | 0     | 0      | 0             |
| 125                                    | 0     | 0     | 0     | 0     | 0      | 0             |
| 135                                    | 0     | 0     | 0     | 0     | 0      | 0             |
| 145                                    | 0     | 0     | 0     | 0     | 0      | 0             |
| 155                                    | 0     | 0     | 0     | 0     | 0      | 0             |
| 165                                    | 0     | 0     | 0     | 0     | 0      | 0             |
| 175                                    | 0     | 0     | 0     | 0     | 0      | 0             |
| 180                                    | 0     | 0     | 0     | 0     | 0      | 0             |

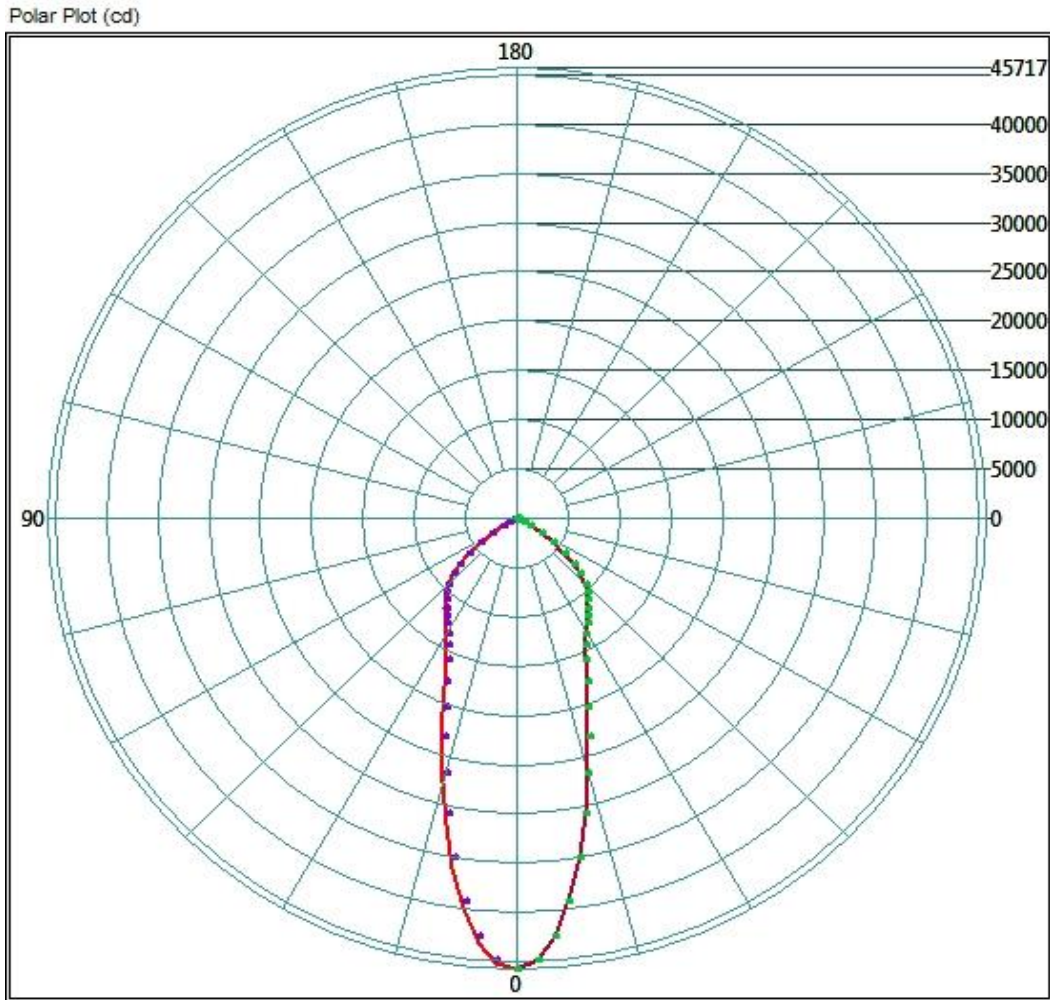
### ZONAL LUMEN AND PERCENTAGES

| ZONE   | LUMENS   | % LUMINAIRE |
|--------|----------|-------------|
| 0-30   | 19810.93 | 52.1%       |
| 0-40   | 27397.06 | 72.1%       |
| 0-60   | 37574.46 | 98.9%       |
| 60-90  | 817.14   | 2.2%        |
| 0-90   | 37994.76 | 100.0%      |
| 90-180 | 0        | 0.0%        |
| 0-180  | 37994.76 | 100.0%      |

## Test Results: Goniometer

Results continued from previous page.

### Polar Plot:



|                            |   |   |
|----------------------------|---|---|
| Target % of Peak Intensity | Beam Angle to % Intensity Value (degrees) | Beam Angle to Specified % Intensity Value (degrees) [-] |
| 50.00                      | 36.05                                     | 36.05   |

|                             |            |                              |            |   |   |
|-----------------------------|------------|------------------------------|------------|---|---|
| Beam Spread (at 50% Max CD) |            | Field Spread (at 10% Max CD) |            | IESNA LM-35-02 Floodlight Designation   |   |
| (deg) Horiz                 | (deg) Vert | (deg) Horiz                  | (deg) Vert | IESNA LM-35-02 Floodlight H Designation | IESNA LM-35-02 Floodlight V Designation |
| 36.15                       | 36.15      | 109.08                       | 109.08     | 6                                       | 6                                       |

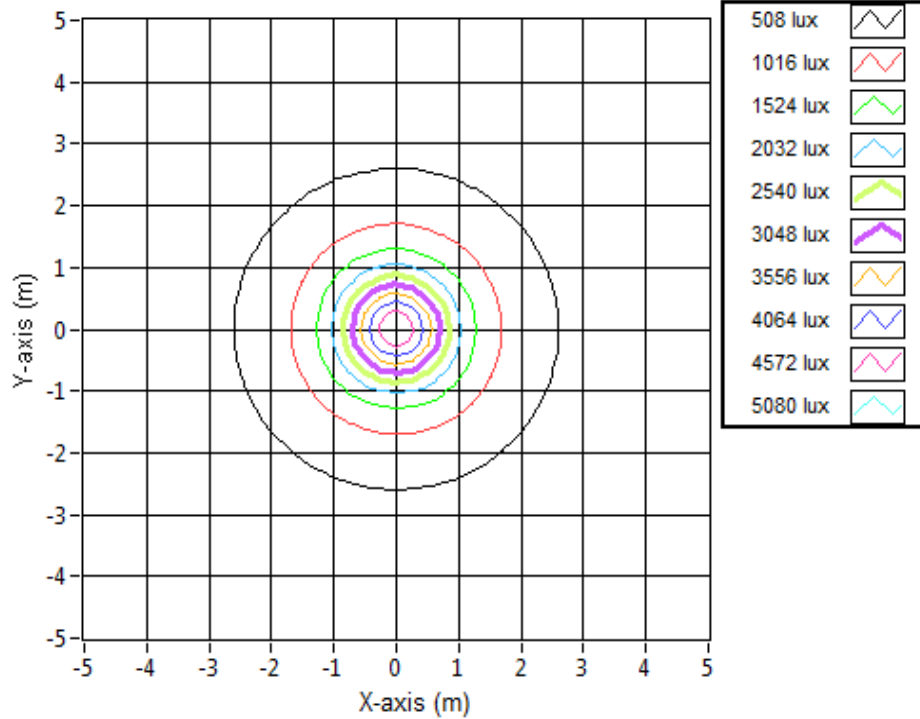
|                     |           |                 |               |                |                |                 |
|---------------------|-----------|-----------------|---------------|----------------|----------------|-----------------|
| Total Luminous Flux | Field (%) | Field Flux (lm) | Beam Flux (%) | Beam Flux (lm) | Beam Spill (%) | Spill Flux (lm) |
| 37827.86            | 92.74     | 35082.20        | 25.96         | 9819.58        | 7.26           | 2745.66         |

## Test Results: Goniometer

Results continued from previous page.

### Illuminance Plot:

Illuminance Contour Graph



### Illuminance-Cone of Light:

| Mounting Height (m) | Beam Cone Width (m) | Orthogonal Beam Cone Width (m) | Projected Illuminance (lux) |
|---------------------|---------------------|--------------------------------|-----------------------------|
| 3.048               | 1.99                | 1.96                           | 4920.9                      |
| 6.096               | 3.99                | 3.93                           | 1230.2                      |
| 9.144               | 5.98                | 5.89                           | 546.8                       |
| 12.192              | 7.97                | 7.85                           | 307.6                       |
| 15.24               | 9.97                | 9.82                           | 196.8                       |
| 18.288              | 11.96               | 11.78                          | 136.7                       |
| 21.336              | 13.95               | 13.75                          | 100.4                       |
| 24.384              | 15.95               | 15.71                          | 76.9                        |
| 27.432              | 17.94               | 17.67                          | 60.8                        |
| 30.48               | 19.93               | 19.64                          | 49.2                        |

## Test Results: In Situ Temperature Measurement Test

Results include maximum LED chip temperature for sample number L16047.  
Dialight unit model number FLx966xC2NG

LED identified as Nichia part number NT2W757.

LED drive current (as indicated by customer): 100 (mA)

### LED Specifications:

LED specifications are taken from LED manufacturer datasheet:

Maximum Forward Current (If): 300 (mA)  
Maximum Rated Power Dissipation: 1.05 (W)  
Maximum Junction Temp. (Tj): 120 (°C)  
Thermal Resistance (Rth): 18 (°C/W)

### Derived Specifications:

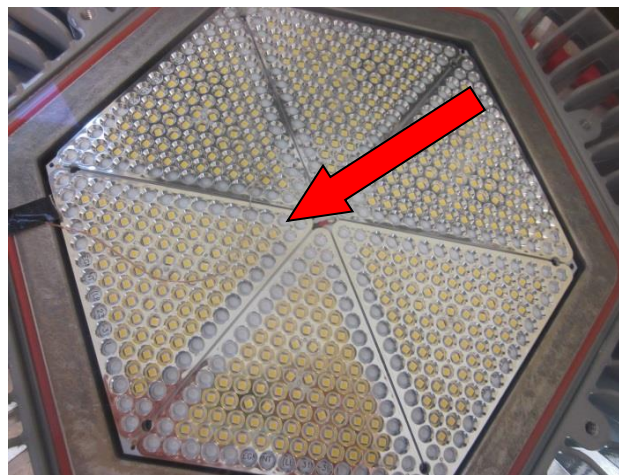
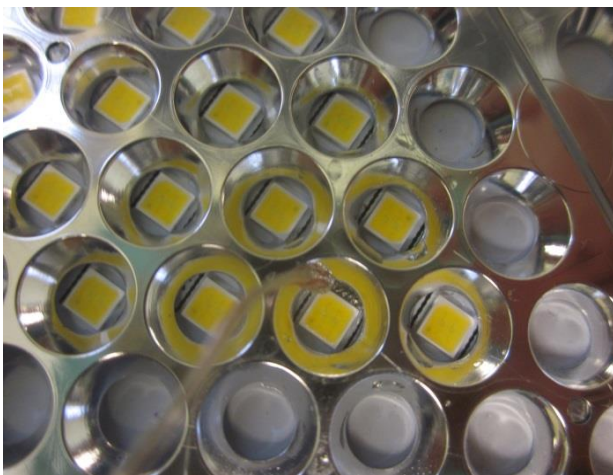
Maximum Power at Indicated Current: 0.35 (W)  
Maximum Source Temperature: 113.7 (°C)

### Test Conditions:

Temperature Measurement Location: See Photographs Below  
Ambient Temperature:  $25^{\circ} \pm 5^{\circ}$  (°C)  
Ambient temperature at time of measurement: 23.5 (°C)  
Relative humidity at time of measurement: 35%

### Results:

**Measured LED source temperature: 55.8 (°C)**





**Equipment Used:**

| Equipment Name                         | Model Number     |
|--|------------------|
| Omega TC                               | Dpi8             |
| Fluke 8808A Digit Multimeter           | 8808A            |
| YOKOGAWA Digital Power Meter           | 11/26/3981       |
| LSI High Speed Mirror Goniometer       | 6240T            |
| Instrument System Spectrometer         | CAS140B-151      |
| Instrument System 1.5 Meter Sphere     | ISP1500          |
| Volttech Power Analyzer                | PM1000+          |
| Delta Elektronika DC Power Supply      | SM.300-5         |
| Elgar AC Power Supply                  | CW1251P          |
| Instek AC Power Supply                 | APS-9501         |
| Sorensen DC Power Supply               | XHR150-7         |
| Extech Hygro-Thermometer               | 4/16/3120        |
| Extech Hygro-Thermometer               | 4/16/3120        |
| Fluke 52II Thermometer                 | 52II Thermometer |
| Volttech Power Analyzer                | PM1000+          |
| BK Precision                           | 1715A            |
| TDK-Lambda                             | GEN1500W         |
| Fluke 8808A Digit Multimeter           | 8808A            |
| TPI Digital Thermometer 343            | TPI 343          |
| TPI Digital Thermometer 343            | TPI 343          |
| Step-Up Transformer                    |                  |
| Omega TC                               | Dpi8-C24         |
| Agilent True RMS OLED Multimeter       | U1273A           |
| Adaptive Power Systems AC Power Supply | FC-210           |
| Xitron Power Analyzer                  | XT2640           |

**Additional Notes:**

Samples are received and tested in new and undamaged condition, unless otherwise noted. The results shown in this report are representative only of the test samples submitted. This data has been issued to the assignee for further evaluation. This report shall not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government. This report shall not be reproduced, except in full, without the express written permission of Dialight Optics Laboratory.

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Lighting Division

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Dialight Optics Laboratory  
Optical Engineer  
Approved Signatory