



REPORT

545 E. Algonquin Rd., Arlington Heights, IL 60005

Project No. G101518786

Date: November 19, 2014

REPORT NO. 101518786CHI-070

TEST OF ONE LED RECESSED FIXTURE - 20° OPTIC

MODEL NO. EMO11L-LH9352AN-B
LED MODEL NO. CITIZEN CLU024-1203B8-353H5D2
DRIVER MODEL NO. LTF DA18W440C40BF-0000

RENDERED TO

GENERATION BRANDS
7400 LINDER AVE
SKOKIE, IL 60077

TEST: Electrical and Photometric tests as required to the IESNA test standard.

STATEMENT OF LIMITATION: This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

AUTHORIZATION: The testing performed was authorized by signed quote number 500506211.

STANDARDS USED: The following American National Standards or Illuminating Engineering Society of North America Test Guides were used in part or totally to test each specimen:

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

ANSI NEMA ANSLG C78.377: 2012: Specifications of the Chromaticity of Solid State Lighting Products

DESCRIPTION OF SAMPLE: The client submitted one production sample of model number EMO11L-LH9352AN-B. The sample was received by Intertek on October 29, 2014, in undamaged condition and one sample was tested as received. The sample designation was AH10292014041553.

DATE OF TESTS: November 17, 2014

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SUMMARY

| | |
|--------------|----------------------------------|
| Model No.: | EMO11L-LH9352AN-B |
| Description: | LED Recessed Fixture - 20° Optic |

| Criteria | Result | |
|-----------------------------|--------|------------|
| | Sphere | Goniometer |
| Total Lumen Output (Lumens) | 1267 | 1262 |
| Total Power (W) | 18.79 | 18.77 |
| Luminaire Efficacy (LPW) | 67.43 | 67.23 |

| Criteria | Result |
|--|--------|
| Power Factor | 0.981 |
| Current ATHD % | 10.62 |
| Correlated Color Temperature (CCT - K) | 3398 |
| Color Rendering Index (CRI - Ra) | 92.5 |
| Color Rendering Index (CRI - R9) | 69.5 |
| DUV | 0.001 |
| Chromaticity Coordinate (x) | 0.412 |
| Chromaticity Coordinate (y) | 0.396 |
| Chromaticity Coordinate (u') | 0.238 |
| Chromaticity Coordinate (v') | 0.515 |

EQUIPMENT LIST

| Equipment Used | Model Number | Control Number | Last Date Calibrated | Calibration Due Date |
|----------------------------------|--------------|----------------|----------------------|----------------------|
| Labsphere Spectroradiometer | CDS1100 | CHI0091 | VBV | VBV |
| 3 Meter Sphere | SPR600 | CHI0088 | VBV | VBV |
| Elgar AC Power Supply | CW1251M | 146112 | VBV | VBV |
| Sorenson DC Power Supply | XFR150-8 | 146846 | VBV | VBV |
| Newport Humidity Recorder | iTHX-SD | 146382 | 07/02/14 | 07/02/15 |
| Yokogawa Power Meter | WT1600 | 146768 | 01/16/14 | 01/16/15 |
| Omega Temperature Meter | MDSi8 | 146139 | 04/02/14 | 04/02/15 |
| Yokogawa Power Meter | WT210 | 146919 | 07/16/14 | 07/16/15 |
| Omega Thermometer | DPI8-C24 | 146920 | 12/04/13 | 12/04/14 |
| LSI High Speed Mirror Goniometer | 6440T | 146928 | VBV | VBV |
| Newport Hygrometer | iServer | 146956 | 01/02/14 | 01/02/15 |
| Elgar, AC Power Supply | CW1251P | 146918 | VBV | VBV |
| Cole-Parmer Triple Timer | 94440-00 | CHI0041 | 04/01/14 | 04/01/15 |

TEST METHODS

Seasoning in Sample Orientation – LED Products

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

Photometric and Electrical Measurements – Integrating Sphere Method

A Labsphere Model CDS 1100 CCD Array Spectroradiometer and Three Meter Sphere was used to measure correlated color temperature, chromaticity coordinates, and the color rendering index for each SSL unit.

Ambient temperature was measured at a position inside the sphere. Each SSL unit was operated on the client provided driver at the rated input voltage in its designated orientation. Each SSL unit was allowed to stabilize for at least thirty minutes before measurements were made. Electrical measurements including voltage, current, and power were measured using the Xitron or Yokogawa Power Analyzer.

The calibration of the sphere photometer-spectroradiometer system is traceable to the National Institute of Standards and Technology.

Photometric and Electrical Measurements – Distribution Method

A LSI Type C High Speed Model 6440 Mirror Goniometer was used to measure the intensity (candelas) at each angle of distribution for each sample.

Ambient temperature was measured equal to the height of the sample mounted on the Goniometer equipment. Each sample was operated at input rated voltage in its designated orientation. Each sample was allowed to stabilize for at least thirty minutes before measurements were made. Electrical measurements including voltage, current, and power were measured using the Xitron or Yokogawa Power Analyzer.

Some graphics were created with Photometrics Plus software.

RESULTS OF TEST

Photometric and Electrical Measurements at Ambient Temperature (25°C +/- 1°C) - Integrating Sphere Method

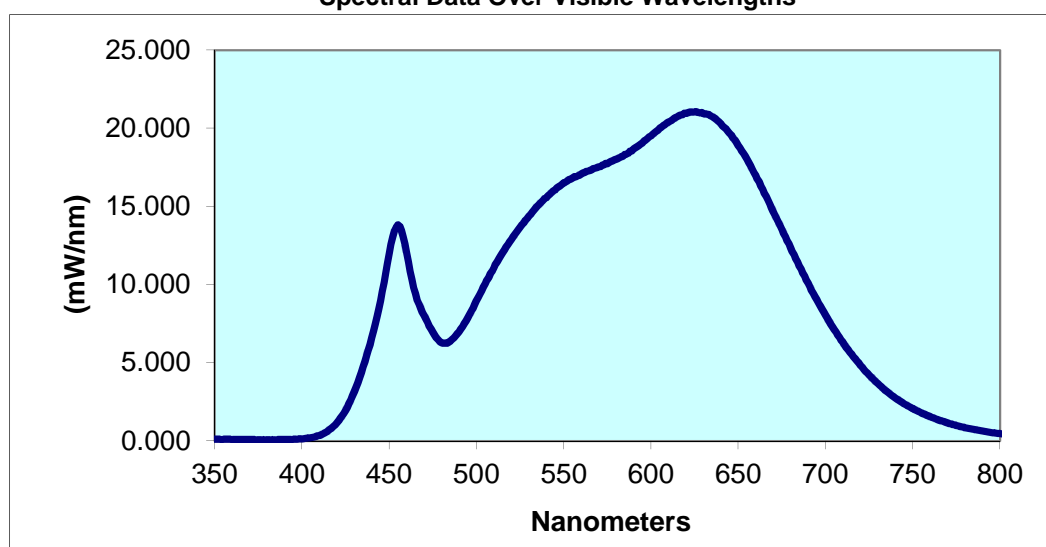
| Intertek Sample No. | Base Orientation | Input Voltage {Vac} | Input Current (mA) | Input Power (Watts) | Input Power Factor | Current ATHD (%) | Luminous Flux (Lumens) | Lumen Efficacy (LPW) |
|---------------------|------------------|---------------------|--------------------|---------------------|--------------------|------------------|------------------------|----------------------|
| AH10292014041553 | UP | 120.0 | 159.7 | 18.79 | 0.981 | 10.62 | 1267 | 67.43 |

| Correlated Color Temperature | CRI -Ra | CRI -R9 | DUV | CIE 31' Chromaticity Coordinate | CIE 31' Chromaticity Coordinate (y) | CIE 76' Chromaticity Coordinate (u') | CIE 76' Chromaticity Coordinate (v') |
|------------------------------|---------|---------|-------|---------------------------------|-------------------------------------|--------------------------------------|--------------------------------------|
| 3398 | 92.5 | 69.5 | 0.001 | 0.412 | 0.396 | 0.238 | 0.515 |

Spectral Distribution over Visible Wavelengths

| nm | mW/nm | nm | mW/nm | nm | mW/nm | nm | mW/nm | nm | mW/nm |
|-----|-------|-----|-------|-----|-------|-----|-------|-----|-------|
| 350 | 0.1 | 440 | 6.593 | 530 | 14.38 | 620 | 20.96 | 710 | 6.288 |
| 355 | 0.099 | 445 | 8.969 | 535 | 15.04 | 625 | 21.06 | 715 | 5.523 |
| 360 | 0.094 | 450 | 12 | 540 | 15.56 | 630 | 20.96 | 720 | 4.837 |
| 365 | 0.089 | 455 | 13.82 | 545 | 16.07 | 635 | 20.74 | 725 | 4.218 |
| 370 | 0.079 | 460 | 12.07 | 550 | 16.51 | 640 | 20.3 | 730 | 3.667 |
| 375 | 0.074 | 465 | 9.414 | 555 | 16.82 | 645 | 19.68 | 735 | 3.178 |
| 380 | 0.073 | 470 | 8.006 | 560 | 17.09 | 650 | 18.91 | 740 | 2.752 |
| 385 | 0.073 | 475 | 6.959 | 565 | 17.3 | 655 | 18.01 | 745 | 2.385 |
| 390 | 0.084 | 480 | 6.291 | 570 | 17.53 | 660 | 16.98 | 750 | 2.072 |
| 395 | 0.101 | 485 | 6.393 | 575 | 17.74 | 665 | 15.85 | 755 | 1.794 |
| 400 | 0.136 | 490 | 6.995 | 580 | 18.02 | 670 | 14.7 | 760 | 1.554 |
| 405 | 0.213 | 495 | 7.874 | 585 | 18.33 | 675 | 13.51 | 765 | 1.343 |
| 410 | 0.361 | 500 | 8.95 | 590 | 18.67 | 680 | 12.35 | 770 | 1.156 |
| 415 | 0.652 | 505 | 10.05 | 595 | 19.06 | 685 | 11.2 | 775 | 0.99 |
| 420 | 1.149 | 510 | 11.08 | 600 | 19.53 | 690 | 10.09 | 780 | 0.852 |
| 425 | 1.966 | 515 | 12.04 | 605 | 20 | 695 | 9.032 | | |
| 430 | 3.155 | 520 | 12.9 | 610 | 20.4 | 700 | 8.049 | | |
| 435 | 4.73 | 525 | 13.68 | 615 | 20.74 | 705 | 7.135 | | |

Spectral Data Over Visible Wavelengths



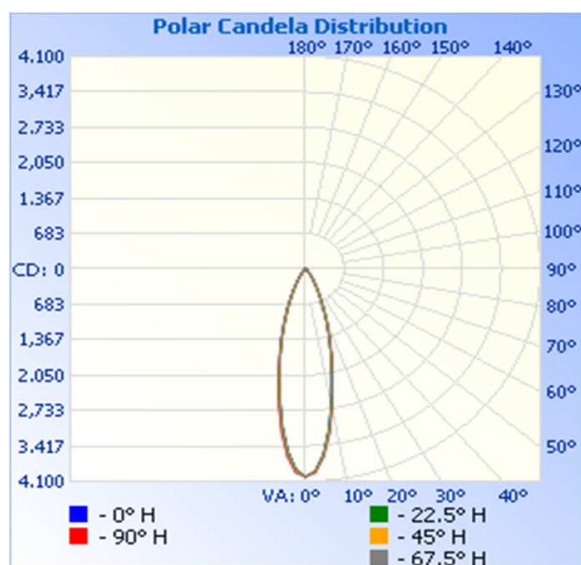
RESULTS OF TEST

Photometric and Electrical Measurements at Ambient Temperature (25°C +/- 1°C) – Distribution Method

| Intertek Sample No. | Base Orientation | Input Voltage {Vac} | Input Current (mA) | Input Power (Watts) | Input Power Factor | Absolute Luminous Flux (Lumens) | Lumen Efficacy (Lumens Per Watt) |
|---------------------|------------------|---------------------|--------------------|---------------------|--------------------|---------------------------------|----------------------------------|
| AH10292014041553 | UP | 120.0 | 159.4 | 18.77 | 0.981 | 1262 | 67.23 |

Intensity (Candlepower) Summary at 25°C - Candelas

| Angle | 0 | 22.5 | 45 | 67.5 | 90 |
|-------|------|------|------|------|------|
| 0 | 4004 | 4004 | 4004 | 4004 | 4004 |
| 5 | 3589 | 3589 | 3610 | 3627 | 3632 |
| 10 | 2613 | 2620 | 2653 | 2683 | 2682 |
| 15 | 1720 | 1717 | 1732 | 1761 | 1765 |
| 20 | 1071 | 1066 | 1077 | 1091 | 1094 |
| 25 | 606 | 601 | 608 | 625 | 623 |
| 30 | 323 | 322 | 326 | 333 | 333 |
| 35 | 180 | 178 | 178 | 183 | 183 |
| 40 | 104 | 103 | 101 | 103 | 102 |
| 45 | 58 | 58 | 58 | 58 | 57 |
| 50 | 34 | 34 | 34 | 34 | 34 |
| 55 | 21 | 20 | 20 | 21 | 21 |
| 60 | 13 | 13 | 13 | 13 | 13 |
| 65 | 8 | 8 | 8 | 8 | 8 |
| 70 | 2 | 3 | 3 | 3 | 3 |
| 75 | 0 | 0 | 1 | 0 | 0 |
| 80 | 0 | 0 | 0 | 0 | 0 |
| 85 | 0 | 0 | 0 | 0 | 0 |
| 90 | 0 | 0 | 0 | 0 | 0 |



Coefficients Of Utilization - Zonal Cavity Method

Effective Floor Cavity Reflectance: 20%

| RCC %: | 80 | | | | 70 | | | | 50 | | | | 30 | | | | 10 | | | | 0 |
|--------|-----------|-----------|-----------|----------|-----------|-----------|-----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|--|--|---|
| RW %: | <u>70</u> | <u>50</u> | <u>30</u> | <u>0</u> | <u>70</u> | <u>50</u> | <u>30</u> | <u>0</u> | <u>50</u> | <u>30</u> | <u>20</u> | <u>50</u> | <u>30</u> | <u>20</u> | <u>50</u> | <u>30</u> | <u>20</u> | <u>0</u> | | | |
| RCR: 0 | 1.19 | 1.19 | 1.19 | 1.19 | 1.16 | 1.16 | 1.16 | 1.00 | 1.11 | 1.11 | 1.11 | 1.06 | 1.06 | 1.06 | 1.02 | 1.02 | 1.02 | 1.00 | | | |
| 1 | 1.14 | 1.12 | 1.10 | 1.08 | 1.12 | 1.10 | 1.08 | .95 | 1.06 | 1.04 | 1.03 | 1.02 | 1.01 | 1.00 | .99 | .98 | .97 | .95 | | | |
| 2 | 1.10 | 1.05 | 1.02 | .99 | 1.08 | 1.04 | 1.01 | .91 | 1.01 | .98 | .96 | .98 | .96 | .94 | .95 | .93 | .92 | .90 | | | |
| 3 | 1.05 | 1.00 | .96 | .92 | 1.03 | .98 | .95 | .87 | .96 | .93 | .90 | .94 | .91 | .89 | .91 | .89 | .87 | .86 | | | |
| 4 | 1.01 | .95 | .90 | .86 | .99 | .94 | .89 | .83 | .92 | .88 | .85 | .90 | .87 | .84 | .88 | .85 | .83 | .82 | | | |
| 5 | .97 | .90 | .85 | .82 | .96 | .89 | .85 | .79 | .88 | .84 | .81 | .86 | .83 | .80 | .85 | .82 | .79 | .78 | | | |
| 6 | .93 | .86 | .81 | .77 | .92 | .85 | .81 | .76 | .84 | .80 | .77 | .83 | .79 | .76 | .81 | .78 | .76 | .75 | | | |
| 7 | .90 | .82 | .77 | .74 | .89 | .82 | .77 | .72 | .81 | .76 | .73 | .79 | .76 | .73 | .78 | .75 | .73 | .71 | | | |
| 8 | .87 | .79 | .74 | .71 | .86 | .78 | .74 | .70 | .77 | .73 | .70 | .76 | .73 | .70 | .76 | .72 | .70 | .68 | | | |
| 9 | .84 | .76 | .71 | .68 | .83 | .75 | .71 | .67 | .75 | .70 | .67 | .74 | .70 | .67 | .73 | .70 | .67 | .66 | | | |
| 10 | .81 | .73 | .68 | .65 | .80 | .73 | .68 | .64 | .72 | .68 | .65 | .71 | .67 | .65 | .71 | .67 | .65 | .63 | | | |

RESULTS OF TEST

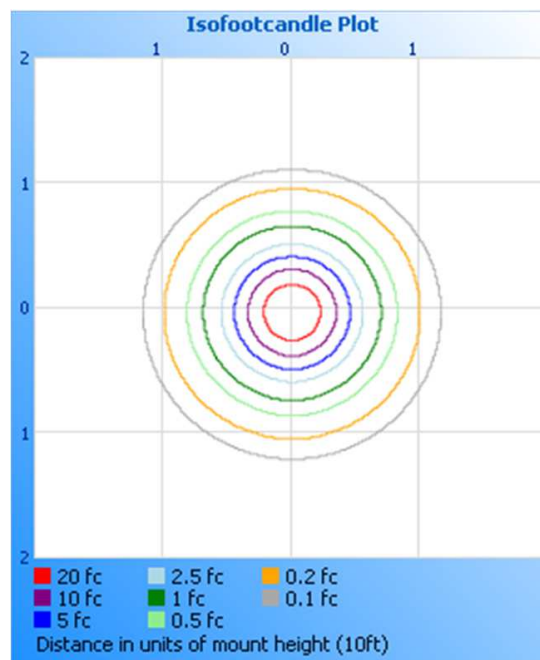
Illumination Plots

Mounting Height: 10 ft.

Illuminance - Cone of Light



Isoillumination Plot



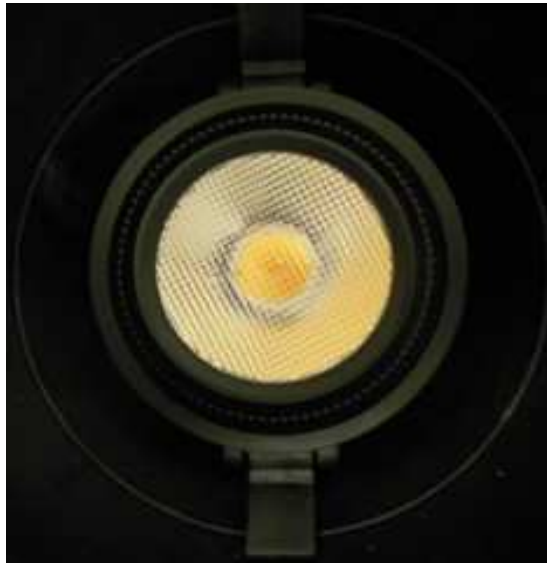
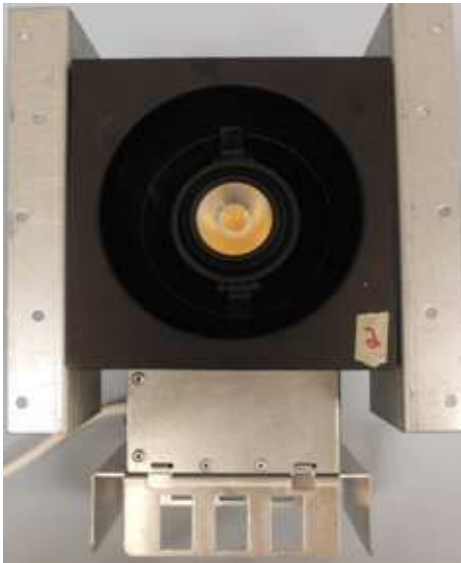
Zonal Lumen Summary and Percentages at 25°C

| Zone | Lumens | % Luminaire |
|--------|--------|-------------|
| 0-30 | 1072 | 84.9 |
| 0-40 | 1188 | 94.1 |
| 0-60 | 1253 | 99.3 |
| 60-90 | 9.3 | 0.7 |
| 0-90 | 1262 | 100.0 |
| 90-180 | 0.0 | 0.0 |
| 0-180 | 1262 | 100.0 |

Zonal Lumens and Percentages at 25°C

| Zone | Lumens | % Luminaire |
|-------|--------|-------------|
| 0-10 | 309.5 | 24.5 |
| 10-20 | 478.1 | 37.9 |
| 20-30 | 284.3 | 22.5 |
| 30-40 | 115.9 | 9.2 |
| 40-50 | 46.0 | 3.6 |
| 50-60 | 19.1 | 1.5 |
| 60-70 | 8.1 | 0.6 |
| 70-80 | 1.0 | 0.1 |
| 80-90 | 0.3 | 0.0 |

PICTURE (not to scale)



CONCLUSIONS

The results tabulated in this report are representative of the actual test samples submitted for this report only. The data is provided to the client for further evaluation. Compliance to the referenced specification requirements was not determined in this report.

In Charge Of Tests:



Kenneth Prettyman
Technician
Lighting Division

Attachment: None

Report Reviewed By:



Tim Quigley
Engineer
Lighting Division