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Test #: L061402504R01

Date: 7/9/2014



NVLAP LAB CODE 200927-0

Test Report: L061402504R01

Model Number: LED MV120V R20 5W 3.5K FL

Report Prepared For: Moon Visions Lighting
 780 S. Floyd Rd., Suite 2B, Richardson, TX 75080

Test: Electrical and Photometric tests as required by the IESNA test standards.

Standards Used: Appropriate part or all test guidelines were used for test performed:
IESNA LM79: 2008 Approved Methods for Electrical and Photometric Measurements of Solid-State Lighting Products
ANSI NEMA ANSLG C78.377: 2008 Specification of the Chromaticity of Solid State Lighting Products
ANSI C82.77:2002: Harmonic Emission Limits-Related Quality Requirements for Lighting Equipment

Description of Sample: Client submitted the sample. Fixture catalog number is LED MV120V R20 5W 3.5K FL .
 Received in working and undamaged condition. No modifications were necessary.

Testing Condition: Photometry (IES file) and LM-79 report is from the previous Light Laboratory test L051409105R01.

Sample Arrival Date: 5/16/14

Date of Tests: 6/3/14 - 6/9/14

Seasoning of Sample SSL: No seasoning was performed in accordance with IESNA LM-79.

Equipment List

| Equipment Used | Model No | Stock No | Calibration Due Date |
|-----------------------------------|------------|------------|----------------------|
| Chroma Programmable AC Source | 61604 | PS-AC02 | -- |
| Yokogawa Digital Power Meter | WT210 | MT-EL06-S1 | 01/04/15 |
| Xitron Power Analysis System | 2503AH | MT-EL01 | 01/09/15 |
| BK Precision DC Power Supply | 1747 | PSDC-04 | 01/08/15 |
| Fluke Digital Thermometer | 52k/J | MT-TP02-GC | 01/04/15 |
| LLI Type C Goniophotometer System | RMG-C-MKII | CD-LL04-GC | -- |
| LLI 2M Sphere | 2MR97 | CD-SN03-S2 | -- |
| LLI Spectroradiometer | SPR-3000 | MT-SC01-S2 | Before Use |

*All Results in accordance to IESNA LM-79-2008: Approved Method for the Electrical and Photometric Testing of Solid-State Lighting.

LM-79 Test Summary

| | |
|---|---------------------------|
| Manufacturer: | Moon Visions Lighting |
| Model Number: | LED MV120V R20 5W 3.5K FL |
| LAMPCAT: | N/A |
| Driver Model Number: | N/A |
| Total Lumens: | 387.70 |
| Input Voltage (VAC/60Hz): | 120.00 |
| Input Current (Amp): | 0.04 |
| Input Power (W): | 4.61 |
| Input Power Factor: | 0.94 |
| Total Harmonic Distortion @ 120V(%): | 14% |
| Total Harmonic Distortion @ 277V(%): | N/A |
| Efficacy: | 84 |
| Color Rendering Index (CRI): | 82 |
| Correlated Color Temperature (K): | 3551 |
| Chromaticity Coordinate x: | 0.4027 |
| Chromaticity Coordinate y: | 0.3898 |
| Ambient Temperature (°F): | 77.0 |
| Stabilization Time (Hours): | 0:45 |
| Total Operating Time (Hours): | 1:45 |
| Off State Power(W): | 0.00 |

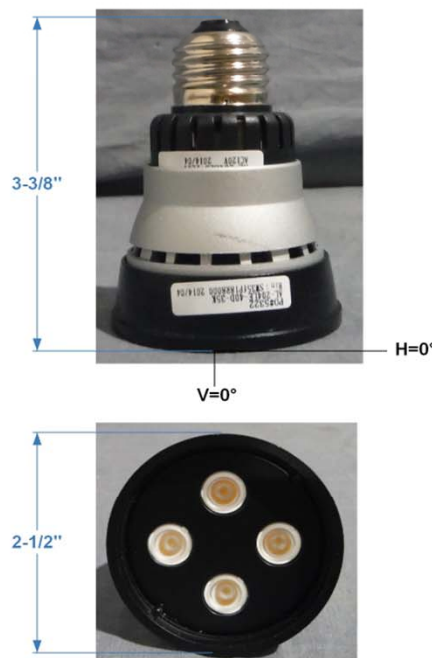
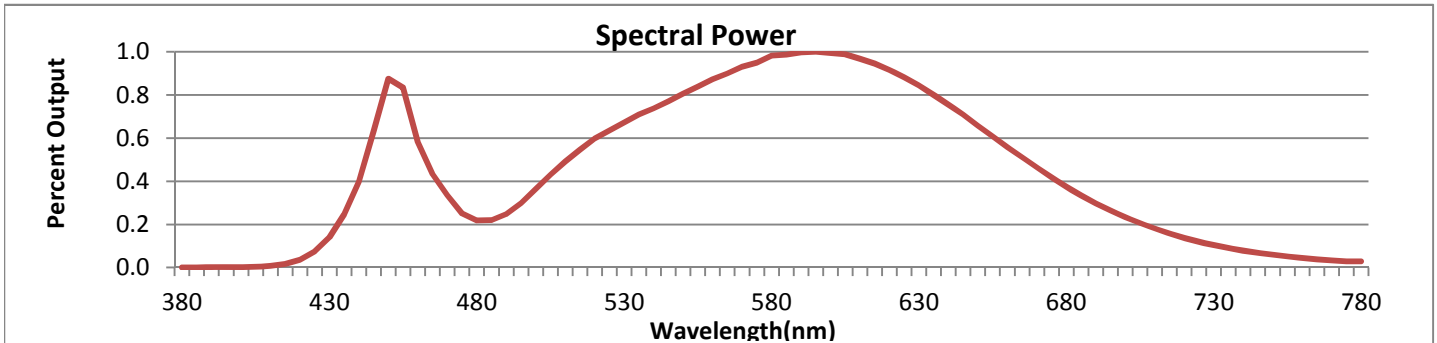


FIG.1 LUMINAIRE

*All Results in accordance to IESNA LM-79-2008: Approved Method for the Electrical and Photometric Testing of Solid-State Lighting.



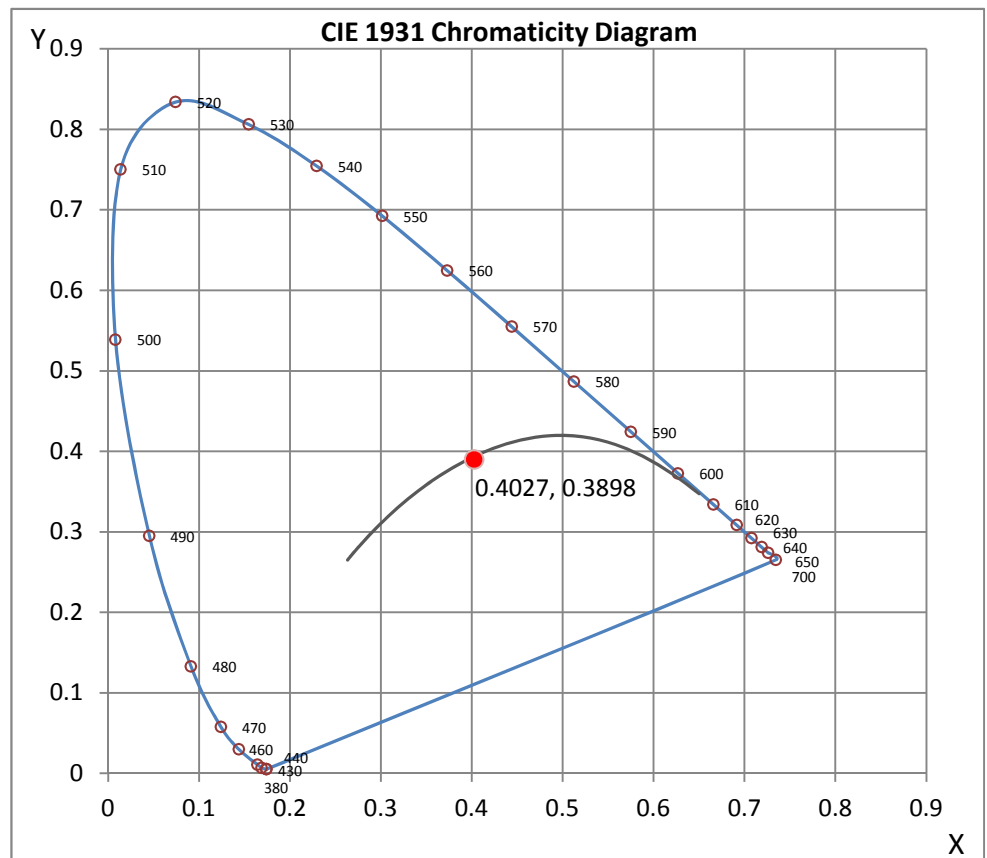
| Wavelength | W/m ² nm | 440 | 0.0023 | 510 | 0.0029 | 580 | 0.0057 | 650 | 0.0038 | 720 | 0.0008 |
|------------|---------------------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|
| 380 | 0.0000 | 450 | 0.0051 | 520 | 0.0035 | 590 | 0.0058 | 660 | 0.0033 | 730 | 0.0006 |
| 390 | 0.0000 | 460 | 0.0034 | 530 | 0.0039 | 600 | 0.0058 | 670 | 0.0027 | 740 | 0.0005 |
| 400 | 0.0000 | 470 | 0.0020 | 540 | 0.0043 | 610 | 0.0056 | 680 | 0.0022 | 750 | 0.0003 |
| 410 | 0.0000 | 480 | 0.0013 | 550 | 0.0047 | 620 | 0.0053 | 690 | 0.0017 | 760 | 0.0003 |
| 420 | 0.0002 | 490 | 0.0014 | 560 | 0.0051 | 630 | 0.0049 | 700 | 0.0014 | 770 | 0.0002 |
| 430 | 0.0008 | 500 | 0.0021 | 570 | 0.0054 | 640 | 0.0044 | 710 | 0.0011 | 780 | 0.0002 |

CRI & CCT

| | |
|-----|---------|
| x | 0.4027 |
| y | 0.3898 |
| u' | 0.2344 |
| v' | 0.5105 |
| CRI | 82.10 |
| CCT | 3551 |
| Duv | 0.00017 |

R Values

| | |
|-----|-------|
| R1 | 80.44 |
| R2 | 87.55 |
| R3 | 92.50 |
| R4 | 80.60 |
| R5 | 79.33 |
| R6 | 81.62 |
| R7 | 87.33 |
| R8 | 67.54 |
| R9 | 19.00 |
| R10 | 69.79 |
| R11 | 77.65 |
| R12 | 58.16 |
| R13 | 81.75 |
| R14 | 95.40 |



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Test Methods

Photometric Measurements - Goniophotometer

A Custom Light Laboratory Type C Rotating Mirror Goniophotometer was used to measure candelas(intensity) at each angle of distribution as defined by IESNA for the appropriate fixture type.

Ambient temperature is set to 25°C and is measured from the center of the fixture, within 1ft from the outside of the fixture. Temperature is maintained at 25°C throughout the testing process and the sample is stabilized for at least 30mins and longer as necessary for the sample to achieve stabilization.

Electrical measurements are measured using the listed equipment.

Spectral Measurements - Integrating Sphere

A Sensing Spectroradiometer SPR-3000, in conjunction with Light Laboratory 2 meter integrating sphere was used to measure chromaticity coordinates, correlated color temperature(CCT) and the color rendering index(CRI) for each sample.

Ambient temperature is set to 25°C and is measured from the center of the fixture, within 1ft from the outside of the fixture. Temperature is maintained at 25°C throughout the testing process and the sample is stabilized for at least 30mins and longer as necessary for the sample to achieve stabilization.

Electrical measurements are measured using the listed equipment.

Disclaimers:

This report must not be used by the customer to claim product certification, approval or endorsement by NVLAP, NIST or any agency of Federal Government.

Report Prepared by : Wilson Khounlavong

Test Report Released by:

Test Report Reviewed by:

Jeff Ahn
 Engineering Manager

Steve Kang
 Quality Assurance

**Attached are photometric data reports. Total number of pages: 8*

**All Results in accordance to IESNA LM-79-2008: Approved Method for the Electrical and Photometric Testing of Solid-State Lighting.*



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Photometric Test Report

IES FLOOD REPORT

PHOTOMETRIC FILENAME : L061402504R01.IES

DESCRIPTIVE INFORMATION (From Photometric File)

IESNA:LM-63-2002
[TEST] L061402504R01
[TESTLAB] LIGHT LABORATORY, INC.
[ISSUE DATE] 6/16/2014
[MANUFAC] MOON VISIONS LIGHTING
[LUMCAT] LED MV120V R20 5W 3.5K FL
[LUMINAIRE] 2-1/2"DIA. X 3-3/8"H. LED LAMP
[MORE] NO LENS
[LAMP POSITION] 0,0
[LAMP CAT] N/A
[OTHER] CANDELA AND ELECTRICAL VALUES ARE FROM
[MORE] LIGHT LABORATORY TEST L051409105R01
[OTHER] INDICATING THE CANDELA VALUES ARE ABSOLUTE AND
[MORE] SHOULD NOT BE FACTORED FOR DIFFERENT LAMP RATINGS.
[INPUT] 120VAC, 4.61W
[TEST PROCEDURE] IESNA:LM-79-08

Note: Candela values converted from Type-C to Type-B

CHARACTERISTICS

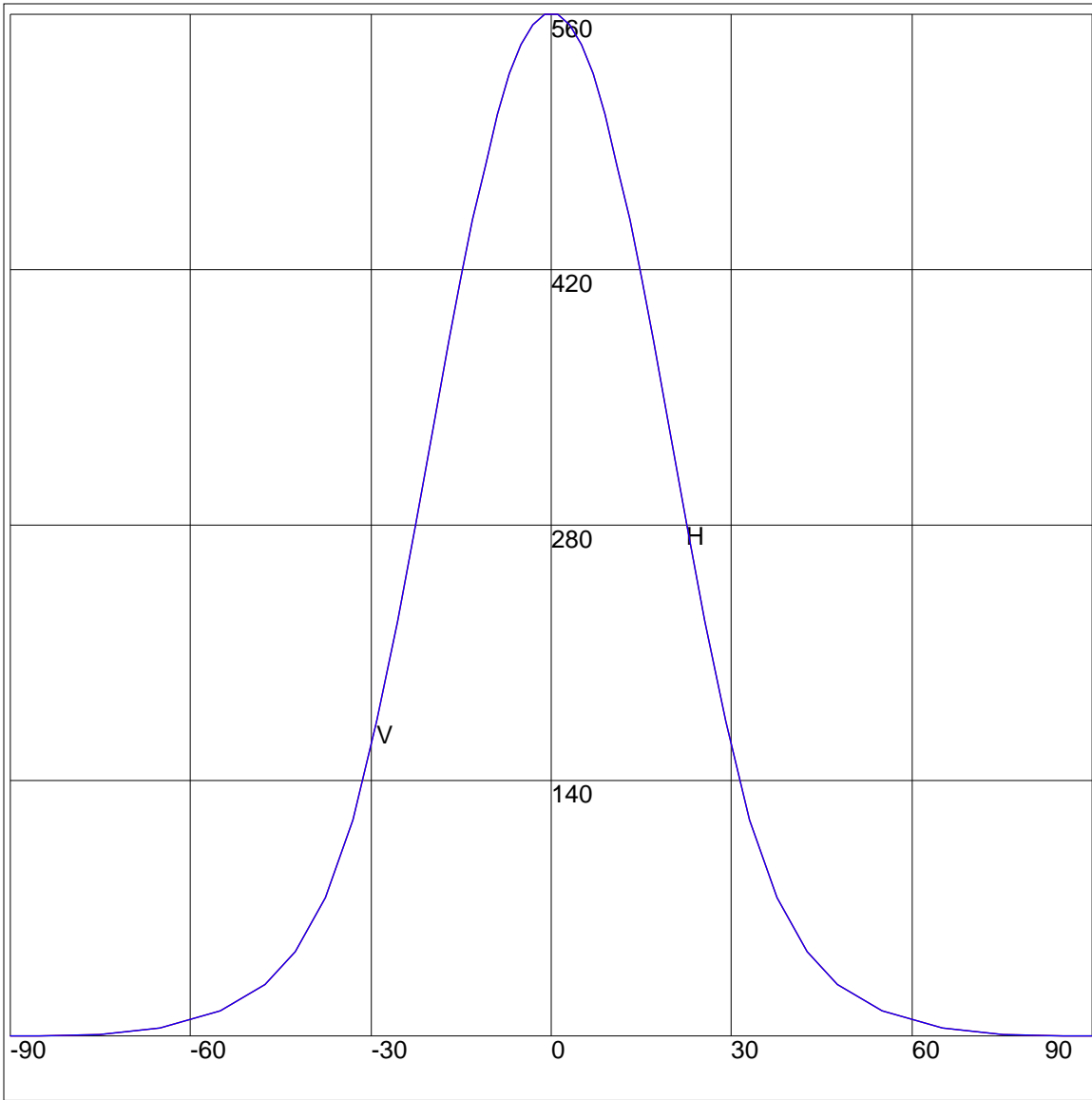
| | |
|------------------------------|-----------------|
| NEMA Type | 5 H x 5 V |
| Maximum Candela | 559.91 |
| Maximum Candela Angle | 0H 0V |
| Horizontal Beam Angle (50%) | 45.1 |
| Vertical Beam Angle (50%) | 45.1 |
| Horizontal Field Angle (10%) | 81.8 |
| Vertical Field Angle (10%) | 81.8 |
| Lumens Per Lamp | N.A. (absolute) |
| Total Lamp Lumens | N.A. (absolute) |
| Beam Lumens | 197 |
| Beam Efficiency | N.A. |
| Field Lumens | 342 |
| Field Efficiency | N.A. |
| Spill Lumens | 46 |
| Luminaire Lumens | 388 |
| Total Efficiency | N.A. |
| Total Luminaire Watts | 4.61 |
| Ballast Factor | 1.00 |

IES FLOOD REPORT
PHOTOMETRIC FILENAME : L061402504R01.IES

AXIAL CANDELA

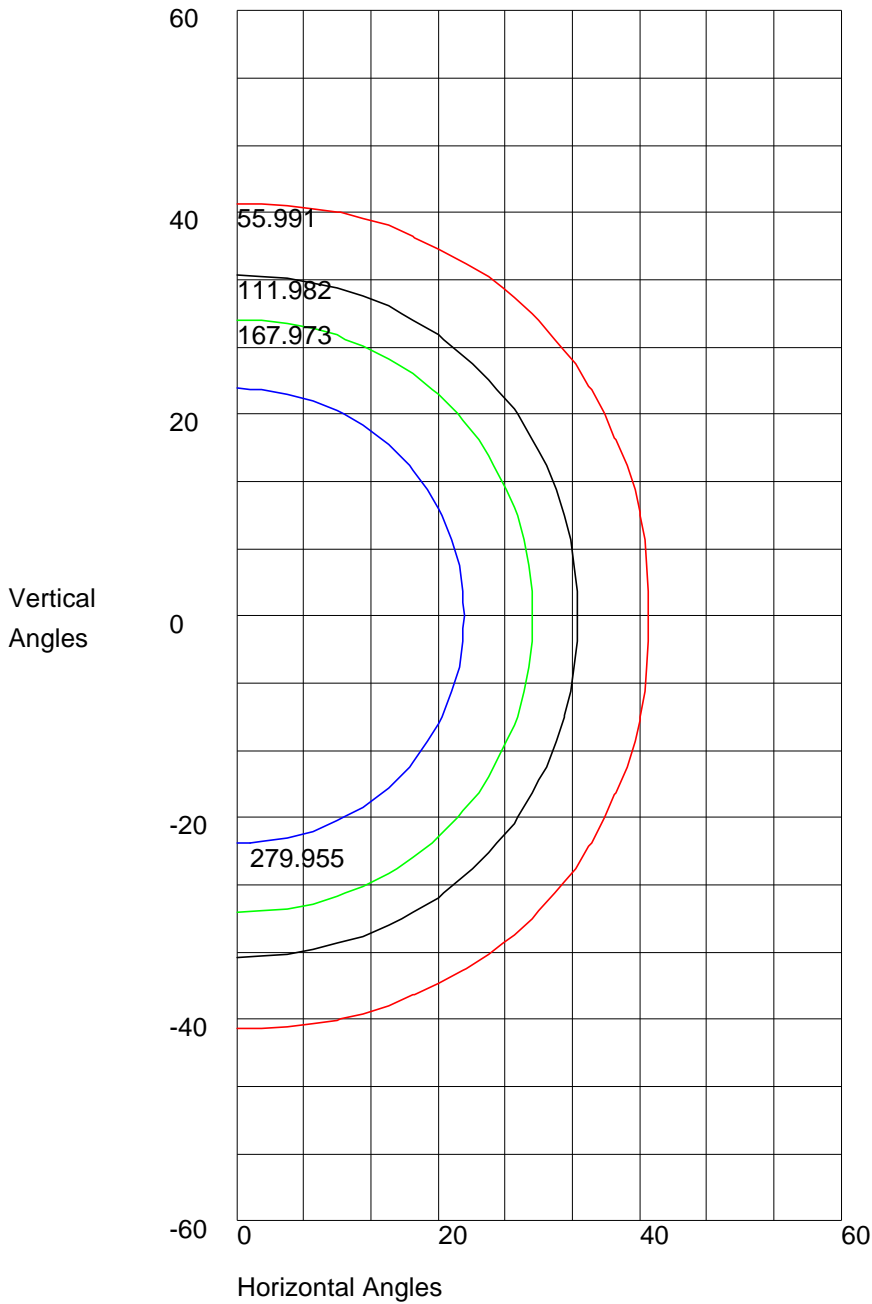
| DEG. | HOR. | DEG. | VERT. |
|-------|--------|-------|--------|
| 90 | 0 | 90 | 0 |
| 85 | 0 | 85 | 0 |
| 75 | 1.15 | 75 | 1.15 |
| 65 | 4.92 | 65 | 4.92 |
| 55 | 14 | 55 | 14 |
| 47.5 | 28.62 | 47.5 | 28.62 |
| 42.5 | 46.51 | 42.5 | 46.51 |
| 37.5 | 76.29 | 37.5 | 76.29 |
| 33 | 118.63 | 33 | 118.63 |
| 29 | 172.43 | 29 | 172.43 |
| 25.5 | 227.73 | 25.5 | 227.73 |
| 22.5 | 281.27 | 22.5 | 281.27 |
| 19.5 | 337.2 | 19.5 | 337.2 |
| 17 | 381.1 | 17 | 381.1 |
| 15 | 414.85 | 15 | 414.85 |
| 13 | 447.09 | 13 | 447.09 |
| 11 | 477.19 | 11 | 477.19 |
| 9 | 504.85 | 9 | 504.85 |
| 7 | 527.57 | 7 | 527.57 |
| 5 | 543 | 5 | 543 |
| 3 | 554.48 | 3 | 554.48 |
| 1 | 559.84 | 1 | 559.84 |
| 0 | 559.91 | 0 | 559.91 |
| -1 | 559.84 | -1 | 559.84 |
| -3 | 554.48 | -3 | 554.48 |
| -5 | 543 | -5 | 543 |
| -7 | 527.57 | -7 | 527.57 |
| -9 | 504.85 | -9 | 504.85 |
| -11 | 477.19 | -11 | 477.19 |
| -13 | 447.09 | -13 | 447.09 |
| -15 | 414.85 | -15 | 414.85 |
| -17 | 381.1 | -17 | 381.1 |
| -19.5 | 337.2 | -19.5 | 337.2 |
| -22.5 | 281.27 | -22.5 | 281.27 |
| -25.5 | 227.73 | -25.5 | 227.73 |
| -29 | 172.43 | -29 | 172.43 |
| -33 | 118.63 | -33 | 118.63 |
| -37.5 | 76.29 | -37.5 | 76.29 |
| -42.5 | 46.51 | -42.5 | 46.51 |
| -47.5 | 28.62 | -47.5 | 28.62 |
| -55 | 14 | -55 | 14 |
| -65 | 4.92 | -65 | 4.92 |
| -75 | 1.15 | -75 | 1.15 |
| -85 | 0 | -85 | 0 |
| -90 | 0 | -90 | 0 |

AXIAL CANDELA DISPLAY



Maximum Candela = 559.91 Located At Horizontal Angle = 0, Vertical Angle = 0
H - Horizontal Axial Candela
V - Vertical Axial Candela

ISOCANDELA CURVES



Maximum Candela = 559.91 Located At Horizontal Angle = 0, Vertical Angle = 0
50% Maximum Candela = 279.955
10% Maximum Candela = 55.991