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Test #: L04130401

Date: 5/2/2013



NVLAP LAB CODE 200927-0

Test Report: L04130401

Model Number: TVL4000 WW

Report Prepared For: ELATION LIGHTING
 6122 S. EASTERN AVE; COMMERCE, CA 90040

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

Description of Sample: Client submitted the sample. Fixture catalog number is TVL4000 WW. Received in working and undamaged condition. No modifications were necessary.

Sample Arrival Date: 3/28/13

Date of Tests: 4/1/13 - 5/2/13

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 | 01/04/14 |
| Xitron Power Analysis System | 2503AH | MT-EL01 | 01/09/14 |
| Fluke Digital Thermometer | 52k/J | MT-TP02-GC | 01/04/14 |
| 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: | ELATION LIGHTING |
| Model Number: | TVL4000 WW |
| LAMPCAT: | N/A |
| Driver Model Number: | N/A |
| Total Lumens: | 3822.11 |
| Input Voltage (VAC/60Hz): | 110.00 |
| Input Current (Amp): | 1.29 |
| Input Power (W): | 74.80 |
| Input Power Factor: | 0.5258 |
| Total Harmonic Distortion @ 120V(%): | 158.8% |
| Total Harmonic Distortion @ 277V(%): | N/A |
| Efficacy: | 51.10 |
| Color Rendering Index (CRI): | 89.30 |
| Correlated Color Temperature (K): | 3208 |
| Chromaticity Coordinate x: | 0.4279 |
| Chromaticity Coordinate y: | 0.4105 |
| Ambient Temperature (°F): | 77.0 |
| Stabilization Time (Hours): | 0:20 |
| Total Operating Time (Hours): | 0:55 |
| Off State Power(W): | 0.00 |

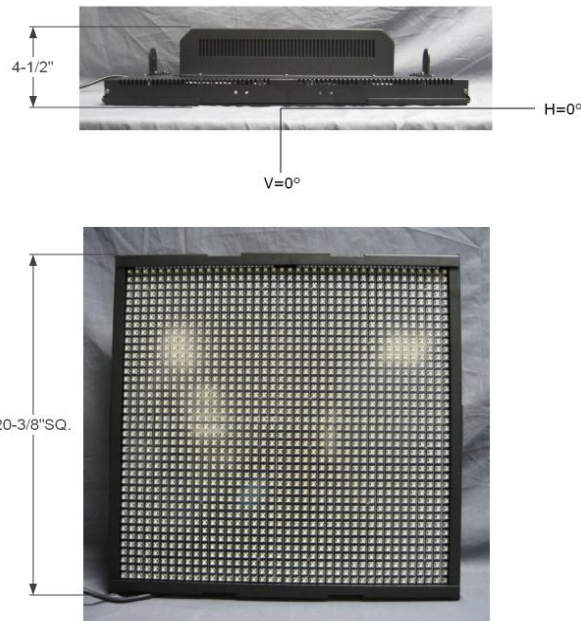
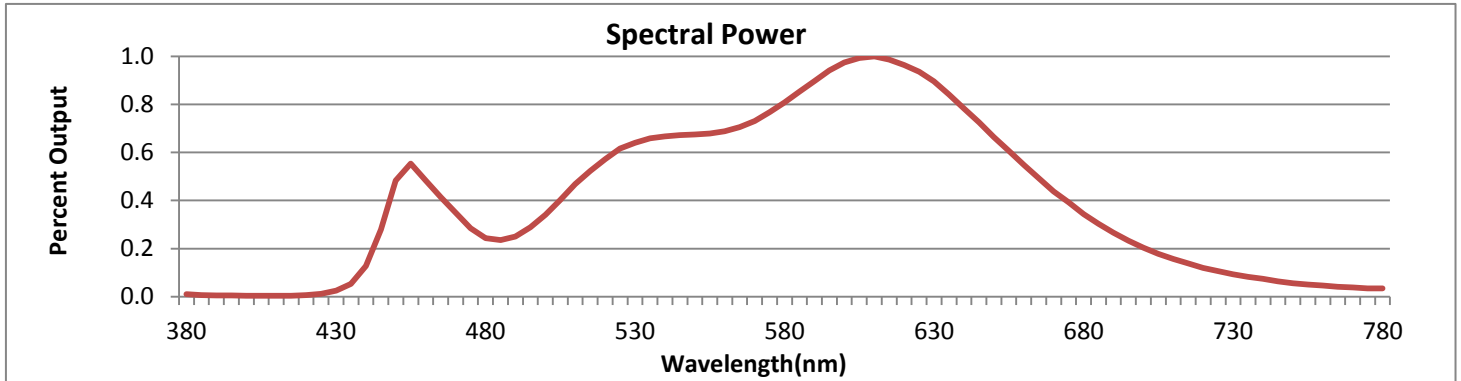


FIG.1 LUMINAIRE

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



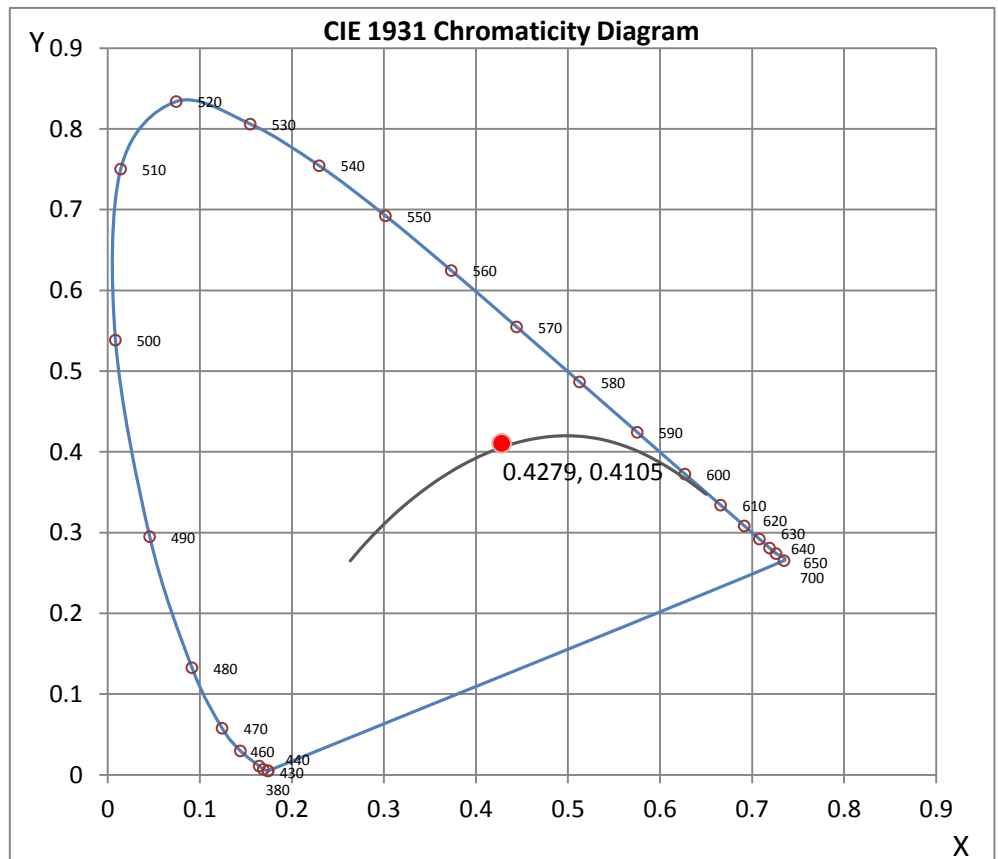
| Wavelength | W/m ² nm | 440 | 0.2191 | 510 | 0.8041 | 580 | 1.3881 | 650 | 1.1404 | 720 | 0.2058 |
|------------|---------------------|-----|--------|-----|--------|-----|--------|-----|--------|-----|--------|
| 380 | 0.0169 | 450 | 0.8297 | 520 | 0.9837 | 590 | 1.5421 | 660 | 0.9425 | 730 | 0.1596 |
| 390 | 0.0079 | 460 | 0.8300 | 530 | 1.1013 | 600 | 1.6758 | 670 | 0.7519 | 740 | 0.1265 |
| 400 | 0.0062 | 470 | 0.6023 | 540 | 1.1470 | 610 | 1.7178 | 680 | 0.5907 | 750 | 0.0961 |
| 410 | 0.0064 | 480 | 0.4185 | 550 | 1.1607 | 620 | 1.6558 | 690 | 0.4580 | 760 | 0.0793 |
| 420 | 0.0101 | 490 | 0.4295 | 560 | 1.1831 | 630 | 1.5391 | 700 | 0.3491 | 770 | 0.0645 |
| 430 | 0.0418 | 500 | 0.5850 | 570 | 1.2567 | 640 | 1.3442 | 710 | 0.2689 | 780 | 0.0576 |

CRI & CCT

| | |
|-----|---------|
| x | 0.4279 |
| y | 0.4105 |
| u' | 0.2421 |
| v' | 0.5226 |
| CRI | 89.30 |
| CCT | 3208 |
| Duv | 0.00396 |

R Values

| | |
|-----|-------|
| R1 | 89.49 |
| R2 | 93.76 |
| R3 | 97.01 |
| R4 | 89.68 |
| R5 | 88.11 |
| R6 | 92.44 |
| R7 | 90.10 |
| R8 | 73.80 |
| R9 | 36.66 |
| R10 | 83.61 |
| R11 | 90.48 |
| R12 | 67.73 |
| R13 | 90.85 |
| R14 | 97.48 |



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

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.

Test Report Released by:



Jeff Ahn
Engineering Manager

Test Report Reviewed by:



Steve Kang
Quality Assurance

**Attached are photometric data reports. Total number of pages: 9*



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Photometric Test Report

IES INDOOR REPORT
PHOTOMETRIC FILENAME : L04130401.IES

DESCRIPTION INFORMATION (From Photometric File)

IESNA:LM-63-2002
 [TEST] L04130401
 [TESTLAB] LIGHT LABORATORY, INC.
 [ISSUEDATE] 05/02/2013
 [MANUFAC] ELATION LIGHTING
 [LUMCAT] TVL4000 WW
 [LUMINAIRE] 4-1/2"H. X 20-3/8"SQ. LED FIXTURE
 [MORE] NO LENS WARM WHITE
 [OTHER] INDICATING THE CANDELA VALUES ARE ABSOLUTE AND
 [MORE] SHOULD NOT BE FACTORED FOR DIFFERENT LAMP RATINGS.
 [INPUT] 110VAC, 74.80W
 [TEST PROCEDURE] IESNA:LM-79-08

CHARACTERISTICS

| | |
|---------------------------------|-----------------|
| Lumens Per Lamp | N.A. (absolute) |
| Total Lamp Lumens | N.A. (absolute) |
| Luminaire Lumens | 3822 |
| Total Luminaire Efficiency | N.A. |
| Luminaire Efficacy Rating (LER) | 51 |
| Total Luminaire Watts | 74.8 |
| Ballast Factor | 1.00 |
| CIE Type | Direct |
| Spacing Criterion (0-180) | 0.38 |
| Spacing Criterion (90-270) | 0.40 |
| Spacing Criterion (Diagonal) | 0.44 |
| Basic Luminous Shape | Rectangular |
| Luminous Length (0-180) | 1.56 ft |
| Luminous Width (90-270) | 1.56 ft |
| Luminous Height | 0.00 ft |

LUMINANCE DATA (cd/sq.m)

| Angle In Degrees | Average 0-Deg | Average 45-Deg | Average 90-Deg |
|---------------------|------------------|-------------------|-------------------|
| 45 | 2500 | 2531 | 2612 |
| 55 | 1810 | 1764 | 1803 |
| 65 | 1432 | 1412 | 1391 |
| 75 | 1144 | 1468 | 1195 |
| 85 | 1724 | 2231 | 1724 |

IES INDOOR REPORT
PHOTOMETRIC FILENAME : L04130401.IES

CANDELA TABULATION

| | <u>0.0</u> | <u>22.5</u> | <u>45.0</u> | <u>67.5</u> | <u>90.0</u> |
|-----------|------------|-------------|-------------|-------------|-------------|
| 0 | 10487 | 10487 | 10487 | 10487 | 10487 |
| 5 | 8861 | 8884 | 8923 | 8959 | 8971 |
| 10 | 5846 | 5880 | 5968 | 6047 | 6091 |
| 15 | 3501 | 3535 | 3610 | 3678 | 3699 |
| 20 | 2162 | 2192 | 2240 | 2271 | 2275 |
| 25 | 1432 | 1459 | 1519 | 1524 | 1516 |
| 30 | 1025 | 1044 | 1096 | 1092 | 1072 |
| 35 | 755 | 771 | 799 | 801 | 789 |
| 40 | 549 | 557 | 570 | 583 | 580 |
| 45 | 400 | 402 | 405 | 420 | 418 |
| 50 | 302 | 301 | 299 | 309 | 308 |
| 55 | 235 | 232 | 229 | 233 | 234 |
| 60 | 182 | 181 | 180 | 181 | 183 |
| 65 | 137 | 132 | 135 | 135 | 133 |
| 70 | 78 | 88 | 89 | 90 | 80 |
| 75 | 67 | 90 | 86 | 86 | 70 |
| 80 | 57 | 71 | 60 | 68 | 56 |
| 85 | 34 | 50 | 44 | 49 | 34 |
| 90 | 0 | 0 | 0 | 0 | 0 |

IES INDOOR REPORT
PHOTOMETRIC FILENAME : L04130401.IES

ZONAL LUMEN SUMMARY

| Zone | Lumens | %Lamp | %Fixt |
|---------|---------|-------|--------|
| 0-20 | 1813.3 | N.A. | 47.40 |
| 0-30 | 2528.41 | N.A. | 66.20 |
| 0-40 | 3027.67 | N.A. | 79.20 |
| 0-60 | 3564.64 | N.A. | 93.30 |
| 0-80 | 3780.61 | N.A. | 98.90 |
| 0-90 | 3822.11 | N.A. | 100.00 |
| 10-90 | 3057.57 | N.A. | 80.00 |
| 20-40 | 1214.37 | N.A. | 31.80 |
| 20-50 | 1539.35 | N.A. | 40.30 |
| 40-70 | 669.53 | N.A. | 17.50 |
| 60-80 | 215.97 | N.A. | 5.70 |
| 70-80 | 83.41 | N.A. | 2.20 |
| 80-90 | 41.50 | N.A. | 1.10 |
| 90-110 | 0.00 | N.A. | 0.00 |
| 90-120 | 0.00 | N.A. | 0.00 |
| 90-130 | 0.00 | N.A. | 0.00 |
| 90-150 | 0.00 | N.A. | 0.00 |
| 90-180 | 0.00 | N.A. | 0.00 |
| 110-180 | 0.00 | N.A. | 0.00 |
| 0-180 | 3822.11 | N.A. | 100.00 |

Total Luminaire Efficiency = N.A.%

ZONAL LUMEN SUMMARY

| Zone | Lumens |
|---------|---------|
| 0-10 | 764.54 |
| 10-20 | 1048.76 |
| 20-30 | 715.11 |
| 30-40 | 499.26 |
| 40-50 | 324.99 |
| 50-60 | 211.98 |
| 60-70 | 132.56 |
| 70-80 | 83.41 |
| 80-90 | 41.50 |
| 90-100 | 0.00 |
| 100-110 | 0.00 |
| 110-120 | 0.00 |
| 120-130 | 0.00 |
| 130-140 | 0.00 |
| 140-150 | 0.00 |
| 150-160 | 0.00 |
| 160-170 | 0.00 |
| 170-180 | 0.00 |

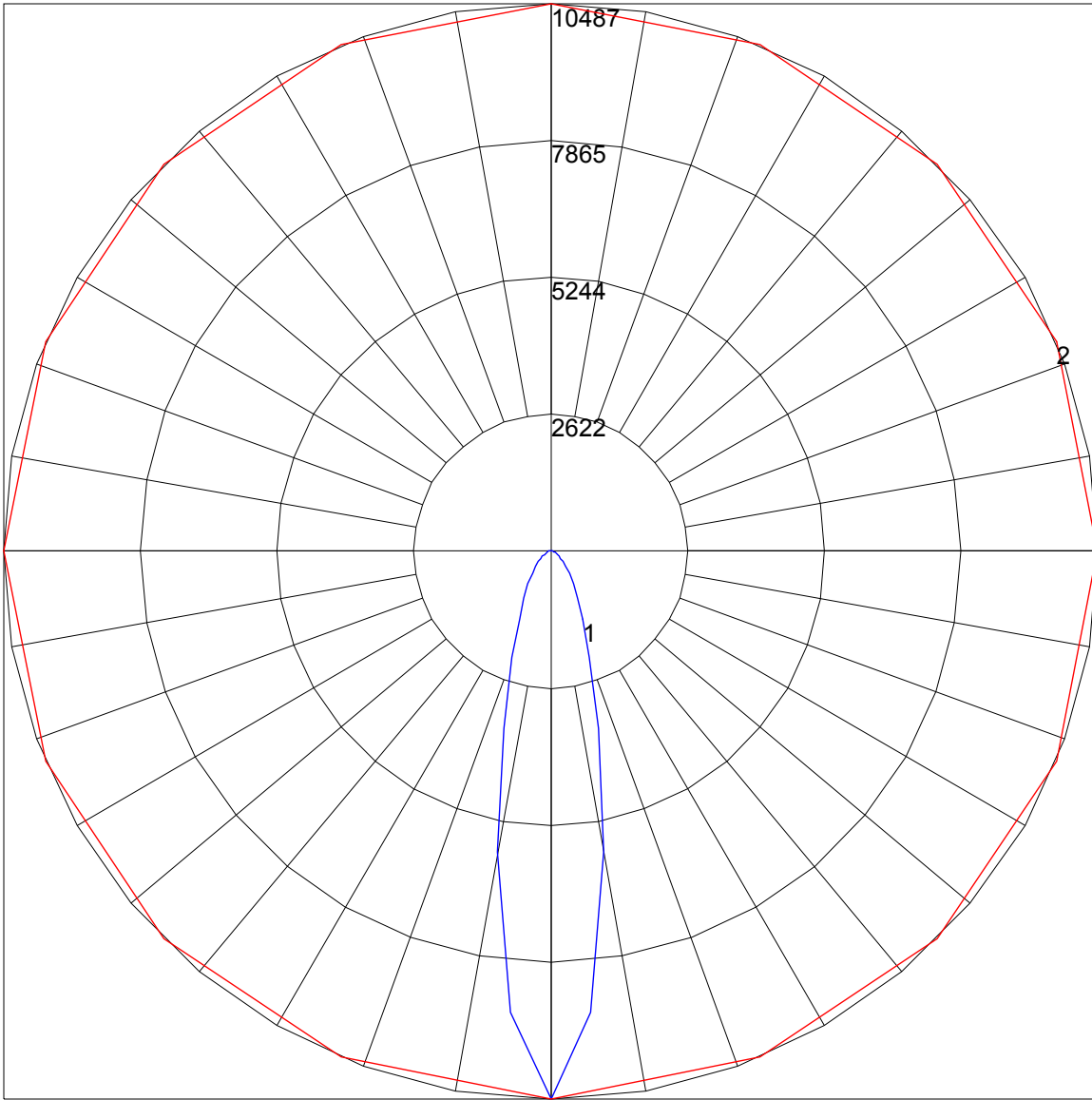
IES INDOOR REPORT
PHOTOMETRIC FILENAME : L04130401.IES

COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

Effective Floor Cavity Reflectance 0.20

| RC | 80 | | | | 70 | | | | 50 | | | 30 | | | 10 | | | 0 | |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | RW | 70 | 50 | 30 | 10 | 70 | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 | 0 |
| 0 | 119 | 119 | 119 | 119 | 119 | 116 | 116 | 116 | 116 | 111 | 111 | 111 | 106 | 106 | 106 | 102 | 102 | 102 | 100 |
| 1 | 113 | 109 | 106 | 104 | 104 | 110 | 107 | 105 | 102 | 103 | 101 | 99 | 99 | 98 | 96 | 96 | 94 | 93 | 91 |
| 2 | 106 | 101 | 96 | 93 | 93 | 104 | 99 | 95 | 92 | 96 | 92 | 89 | 93 | 90 | 88 | 90 | 88 | 86 | 84 |
| 3 | 101 | 94 | 88 | 84 | 84 | 99 | 92 | 87 | 83 | 90 | 85 | 82 | 87 | 84 | 81 | 85 | 82 | 79 | 78 |
| 4 | 96 | 87 | 82 | 77 | 77 | 94 | 86 | 81 | 77 | 84 | 79 | 76 | 82 | 78 | 75 | 80 | 77 | 74 | 72 |
| 5 | 91 | 82 | 76 | 71 | 71 | 89 | 81 | 75 | 71 | 79 | 74 | 70 | 78 | 73 | 70 | 76 | 72 | 69 | 68 |
| 6 | 87 | 77 | 71 | 67 | 67 | 85 | 77 | 71 | 67 | 75 | 70 | 66 | 74 | 69 | 66 | 72 | 68 | 65 | 64 |
| 7 | 83 | 73 | 67 | 63 | 63 | 81 | 73 | 67 | 63 | 71 | 66 | 62 | 70 | 65 | 62 | 69 | 65 | 62 | 60 |
| 8 | 79 | 70 | 64 | 59 | 59 | 78 | 69 | 63 | 59 | 68 | 63 | 59 | 67 | 62 | 59 | 66 | 62 | 58 | 57 |
| 9 | 76 | 66 | 60 | 56 | 56 | 75 | 66 | 60 | 56 | 65 | 60 | 56 | 64 | 59 | 56 | 63 | 59 | 56 | 54 |
| 10 | 73 | 63 | 58 | 54 | 54 | 72 | 63 | 57 | 54 | 62 | 57 | 54 | 61 | 57 | 53 | 61 | 56 | 53 | 52 |

POLAR GRAPH



Maximum Candela = 10487 Located At Horizontal Angle = 0, Vertical Angle = 0
1 - Vertical Plane Through Horizontal Angles (0 - 180) (Through Max. Cd.)
2 - Horizontal Cone Through Vertical Angle (0) (Through Max. Cd.)