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Report No: L111503509

Date: 11/18/2015



NVLAP LAB CODE 200927-0

**Report No:** L111503509

**Report Prepared For:** Revolution Lighting Technologies  
 4139 Guardian Street, Simi Valley, CA 93063

**Model Number:** 203220-015

**Test:** Electrical and Photometric tests

**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. Catalog number is 203220-015 . Received in working and undamaged condition. No modifications were necessary.

**Testing Condition:** GE232 ULTRAMAX-N driver was connected to two LED tubes from driver output. Photometric measurements were measured from a single LED tube while other lamp was powered and covered with black velvet to prevent light pollution. Input power of single measured lamp is calculated from total power divided by two.

**Sample Arrival Date:** 11/13/15

**Date of Tests:** 11/18/15 - 11/18/15

**Seasoning of Sample:** 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	11/10/15
Xitron Power Analyzer	2801	MT-EL02-1	12/9/15
BK Precision DC Power Supply	1747	PSDC-04	01/08/16
Fluke Digital Thermometer	52k/J	MT-TP02-GC	01/05/16
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.

**Test Summary**

<b>Manufacturer:</b>	Revolution Lighting Technologies	
<b>Model Number:</b>	203220-015	
<b>Driver Model Number:</b>	GE232 ULTRAMAX-N	
<b>Total Lumens:</b>	1672.24	
<b>Input Voltage (VAC/60Hz):</b>	120.00	
<b>Input Current (Amp):</b>	0.12	
<b>Input Power (W):</b>	14.25	
<b>Input Power Factor:</b>	1.00	
<b>Current ATHD @ 120V(%):</b>	6%	
<b>Current ATHD @ 277V(%):</b>	6% (0.05A, 14.2W, 0.96PF)	
<b>Efficacy:</b>	117	
<b>Color Rendering Index (CRI):</b>	83	
<b>Correlated Color Temperature (K):</b>	5122	
<b>Chromaticity Coordinate x:</b>	0.3423	
<b>Chromaticity Coordinate y:</b>	0.3565	
<b>Ambient Temperature (°C):</b>	25.0	
<b>Stabilization Time (Hours):</b>	0:25	
<b>Total Operating Time (Hours):</b>	1:00	
<b>Off State Power(W):</b>	0.00	

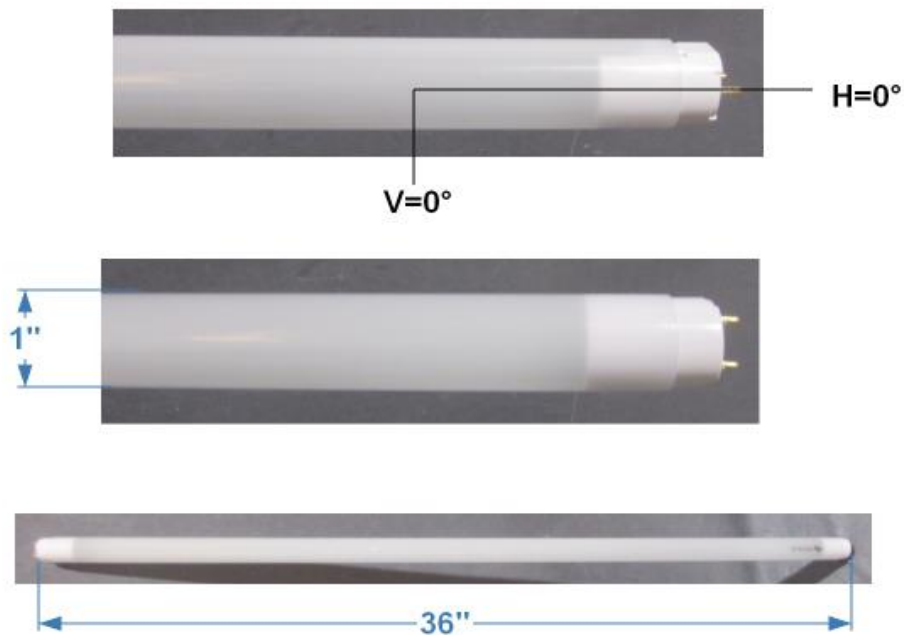
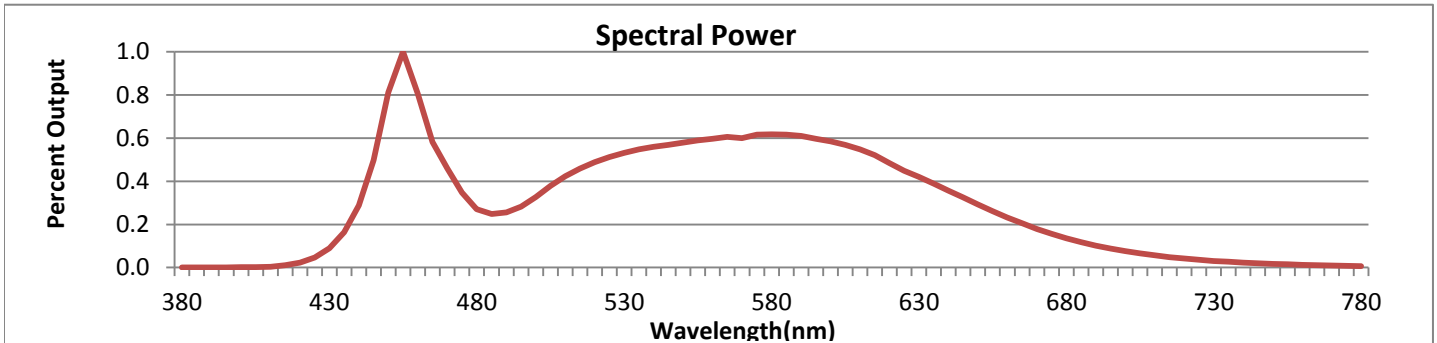


FIG. 1 LUMINAIRE

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



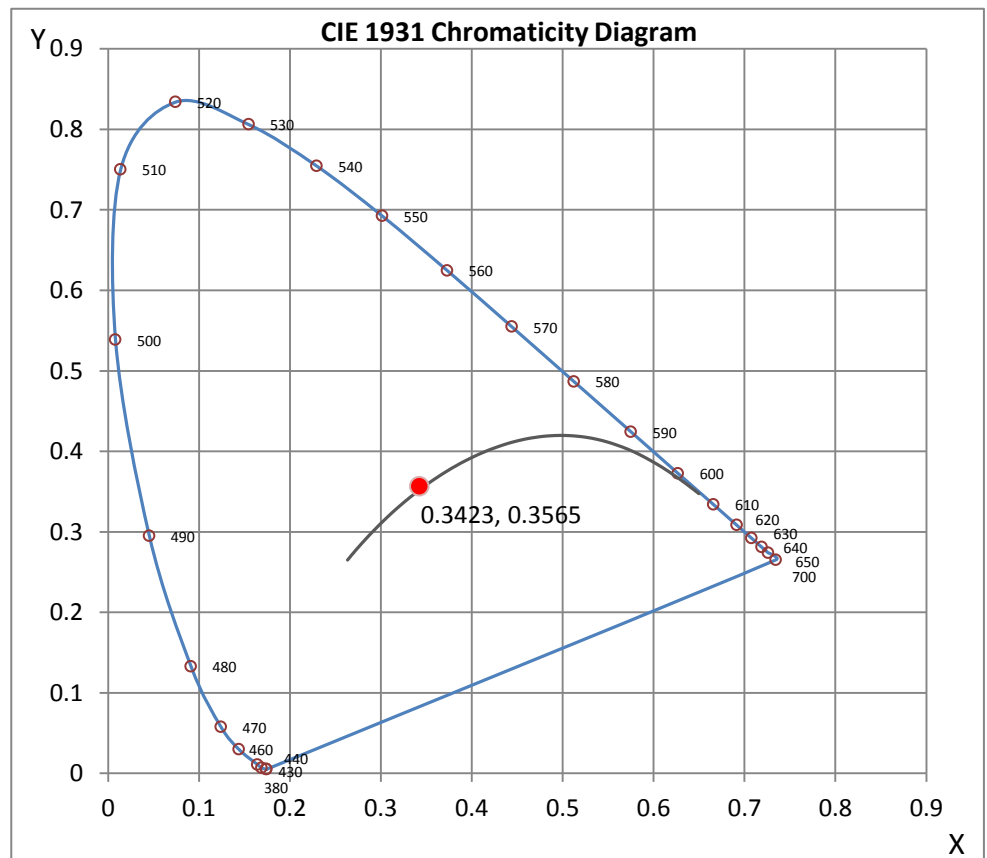
Wavelength	W/m <sup>2</sup> nm	440	0.2877	510	0.4235	580	0.6184	650	0.2927	720	0.0413
380	0.0008	450	0.8125	520	0.4892	590	0.6100	660	0.2322	730	0.0305
390	0.0009	460	0.8059	530	0.5316	600	0.5846	670	0.1786	740	0.0228
400	0.0014	470	0.4601	540	0.5603	610	0.5484	680	0.1357	750	0.0169
410	0.0042	480	0.2702	550	0.5800	620	0.4846	690	0.1021	760	0.0125
420	0.0232	490	0.2550	560	0.5969	630	0.4205	700	0.0764	770	0.0094
430	0.0895	500	0.3276	570	0.6005	640	0.3564	710	0.0567	780	0.0072

**CRI & CCT**

x	0.3423
y	0.3565
u'	0.2077
v'	0.4866
CRI	83.10
CCT	5122
Duv	0.00359

**R Values**

R1	81.56
R2	89.44
R3	93.29
R4	80.99
R5	80.96
R6	83.78
R7	87.33
R8	67.79
R9	10.73
R10	73.30
R11	79.30
R12	57.17
R13	83.97
R14	96.22



\*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.

### 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 : Keyur Patel

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: 10*



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# Photometric Test Report

**IES INDOOR REPORT**  
**PHOTOMETRIC FILENAME : L111503509.IES**

## DESCRIPTION INFORMATION (From Photometric File)

IESNA:LM-63-2002  
 [TEST] L111503509  
 [TESTLAB] LIGHT LABORATORY, INC.  
 [ISSUEDATE] 11/18/2015  
 [MANUFAC] REVOLUTION LIGHTING TECHNOLOGIES  
 [LUMCAT] 203220-015  
 [LUMINAIRE] 1"DIA. X 36"L. LED TUBE, DIFFUSED LENS  
 [BALLASTCAT] GE232 ULTRAMAX-N  
 [LAMPPOSITION] 0,0  
 [LAMPCAT] N/A  
 [OTHER] INDICATING THE CANDELA VALUES ARE ABSOLUTE AND  
 [MORE] SHOULD NOT BE FACTORED FOR DIFFERENT LAMP RATINGS.  
 [\_TEST CONDITION] GE232 ULTRAMAX-N DRIVER WAS CONNECTED  
 [MORE] TO TWO LED TUBES FROM DRIVER OUTPUT.  
 [MORE] PHOTOMETRIC MEASUREMENTS WERE MEASURED FROM A  
 [MORE] SINGLE LED TUBE WHILE OTHER LAMP WAS POWERED  
 [MORE] AND COVERED WITH BLACK VELVET TO PREVENT LIGHT POLLUTION.  
 [MORE] INPUT POWER OF SINGLE MEASURED LAMP IS CALCULATED FROM  
 [MORE] TOTAL POWER DIVIDED BY TWO.  
 [\_INPUT] 120VAC, 14.25W  
 [\_TEST PROCEDURE] IESNA:LM-79-08

## CHARACTERISTICS

Lumens Per Lamp	N.A. (absolute)
Total Lamp Lumens	N.A. (absolute)
Luminaire Lumens	1672
Total Luminaire Efficiency	N.A.
Luminaire Efficacy Rating (LER)	117
Total Luminaire Watts	14.25
Ballast Factor	1.00
CIE Type	Semi-Direct
Spacing Criterion (0-180)	1.20
Spacing Criterion (90-270)	1.40
Spacing Criterion (Diagonal)	1.44
Basic Luminous Shape	Rectangular w/Sides
Luminous Length (0-180)	2.71 ft
Luminous Width (90-270)	0.08 ft
Luminous Height	0.08 ft

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**LUMINANCE DATA (cd/sq.m)**

Angle In Degrees	Average 0-Deg	Average 45-Deg	Average 90-Deg
45	14421	10514	10501
55	13006	9385	9696
65	11171	8466	9019
75	8447	7827	8569
85	3647	7550	8294

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**CANDELA TABULATION**

	<u>0.0</u>	<u>22.5</u>	<u>45.0</u>	<u>67.5</u>	<u>90.0</u>
<b>0</b>	357.24	357.24	357.24	357.24	357.24
<b>5</b>	355.70	355.74	355.70	355.61	356.55
<b>10</b>	349.44	350.13	351.63	352.91	354.33
<b>15</b>	339.93	341.34	345.07	348.46	350.81
<b>20</b>	325.11	328.75	335.95	342.54	345.84
<b>25</b>	307.28	312.81	324.12	334.83	339.33
<b>30</b>	287.15	293.53	309.98	325.06	331.88
<b>35</b>	264.01	273.01	294.13	314.01	322.28
<b>40</b>	238.13	250.56	277.03	301.07	311.65
<b>45</b>	211.65	227.25	259.00	287.49	299.40
<b>50</b>	185.00	202.40	240.36	272.96	285.77
<b>55</b>	156.73	178.53	221.34	257.41	272.24
<b>60</b>	128.71	154.97	203.00	241.73	257.33
<b>65</b>	101.20	131.92	184.75	225.96	241.64
<b>70</b>	78.75	110.41	167.74	210.32	226.05
<b>75</b>	48.93	91.77	151.80	195.03	211.57
<b>80</b>	26.22	75.32	137.23	180.08	196.23
<b>85</b>	8.57	61.74	123.65	165.81	181.15
<b>90</b>	0.69	51.84	111.83	152.57	167.09
<b>95</b>	0.60	44.82	101.16	139.67	154.07
<b>100</b>	0.00	40.23	92.24	128.15	141.30
<b>105</b>	0.00	37.19	84.28	117.69	129.73
<b>110</b>	0.00	35.26	77.68	108.23	119.28
<b>115</b>	0.00	32.86	70.48	98.93	109.85
<b>120</b>	0.00	31.28	65.60	90.66	98.80
<b>125</b>	0.00	28.88	60.58	82.31	90.75
<b>130</b>	0.00	26.56	55.10	74.76	81.32
<b>135</b>	0.00	22.67	50.21	68.08	74.55
<b>140</b>	0.00	19.28	43.57	61.10	65.21
<b>145</b>	0.00	16.15	35.65	53.34	58.18
<b>150</b>	0.00	13.45	28.71	44.99	50.30
<b>155</b>	0.00	10.75	22.28	34.92	41.39
<b>160</b>	0.00	9.25	16.62	25.28	31.19
<b>165</b>	0.00	8.01	13.03	16.54	22.37
<b>170</b>	0.00	6.51	9.90	11.05	12.85
<b>175</b>	0.00	5.14	6.60	7.11	4.20
<b>180</b>	0.00	0.00	0.00	0.00	0.00

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**ZONAL LUMEN SUMMARY**

Zone	Lumens	%Lamp	%Fixt
0-20	131.26	N.A.	7.80
0-30	280.57	N.A.	16.80
0-40	464.39	N.A.	27.80
0-60	858.43	N.A.	51.30
0-80	1186.58	N.A.	71.00
0-90	1309.03	N.A.	78.30
10-90	1275.2	N.A.	76.30
20-40	333.13	N.A.	19.90
20-50	531.89	N.A.	31.80
40-70	571.38	N.A.	34.20
60-80	328.15	N.A.	19.60
70-80	150.81	N.A.	9.00
80-90	122.45	N.A.	7.30
90-110	180.11	N.A.	10.80
90-120	244.20	N.A.	14.60
90-130	292.96	N.A.	17.50
90-150	348.62	N.A.	20.80
90-180	363.21	N.A.	21.70
110-180	183.10	N.A.	10.90
0-180	1672.24	N.A.	100.00

Total Luminaire Efficiency = N.A.%

**ZONAL LUMEN SUMMARY**

Zone	Lumens
0-10	33.83
10-20	97.43
20-30	149.31
30-40	183.82
40-50	198.77
50-60	195.27
60-70	177.34
70-80	150.81
80-90	122.45
90-100	99.40
100-110	80.71
110-120	64.09
120-130	48.76
130-140	34.46
140-150	21.20
150-160	10.43
160-170	3.61
170-180	0.55



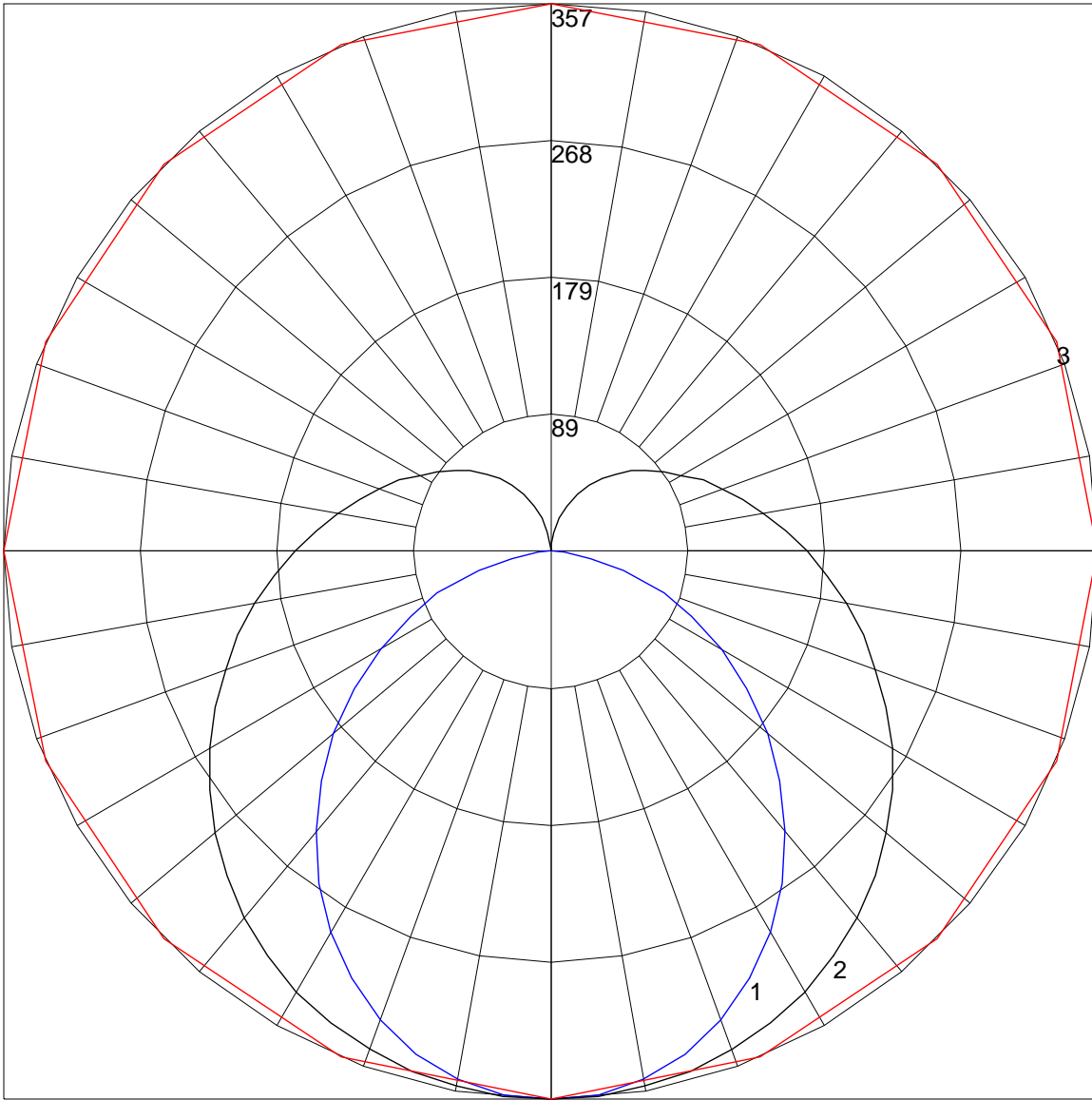
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**COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD**

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	114	114	114	114	109	109	109	109	99	99	99	90	90	90	82	82	82	78
1	101	95	90	85	96	91	86	82	82	78	75	75	72	69	68	65	63	59
2	91	81	74	67	86	78	71	65	70	65	60	64	59	55	58	54	51	47
3	82	71	62	55	78	67	59	53	61	55	49	56	50	45	50	46	42	39
4	75	62	53	46	71	59	51	44	54	47	41	49	43	38	44	40	36	33
5	69	55	46	39	65	53	44	38	48	41	35	44	38	33	40	35	31	28
6	63	49	40	33	60	47	39	32	43	36	30	39	33	29	36	31	27	24
7	58	45	36	29	55	43	34	28	39	32	27	36	30	25	33	27	23	21
8	54	40	32	26	51	39	31	25	36	29	24	33	27	22	30	25	21	19
9	51	37	29	23	48	36	28	22	33	26	21	30	24	20	28	23	19	17
10	47	34	26	21	45	33	25	20	30	24	19	28	22	18	26	21	17	15

POLAR GRAPH



Maximum Candela = 357.24 Located At Horizontal Angle = 0, Vertical Angle = 0  
# 1 - Vertical Plane Through Horizontal Angles (0 - 180) (Through Max. Cd.)  
# 2 - Vertical Plane Through Horizontal Angles (90 - 270)  
# 3 - Horizontal Cone Through Vertical Angle (0) (Through Max. Cd.)