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Report No: L111503507

Date: 11/18/2015



NVLAP LAB CODE 200927-0

**Report No:** L111503507

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

**Model Number:** 203220-012

**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 203220-012 . 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>	203220-012	
<b>Driver Model Number:</b>	GE232 ULTRAMAX-N	
<b>Total Lumens:</b>	1621.27	
<b>Input Voltage (VAC/60Hz):</b>	120.00	
<b>Input Current (Amp):</b>	0.12	
<b>Input Power (W):</b>	14.28	
<b>Input Power Factor:</b>	1.00	
<b>Current ATHD @ 120V(%):</b>	6%	
<b>Current ATHD @ 277V(%):</b>	6% (0.05A, 14.23W, 0.96PF)	
<b>Efficacy:</b>	114	
<b>Color Rendering Index (CRI):</b>	84	
<b>Correlated Color Temperature (K):</b>	3551	
<b>Chromaticity Coordinate x:</b>	0.4019	
<b>Chromaticity Coordinate y:</b>	0.3877	
<b>Ambient Temperature (°C):</b>	25.0	
<b>Stabilization Time (Hours):</b>	0:35	
<b>Total Operating Time (Hours):</b>	1:05	
<b>Off State Power(W):</b>	0.00	

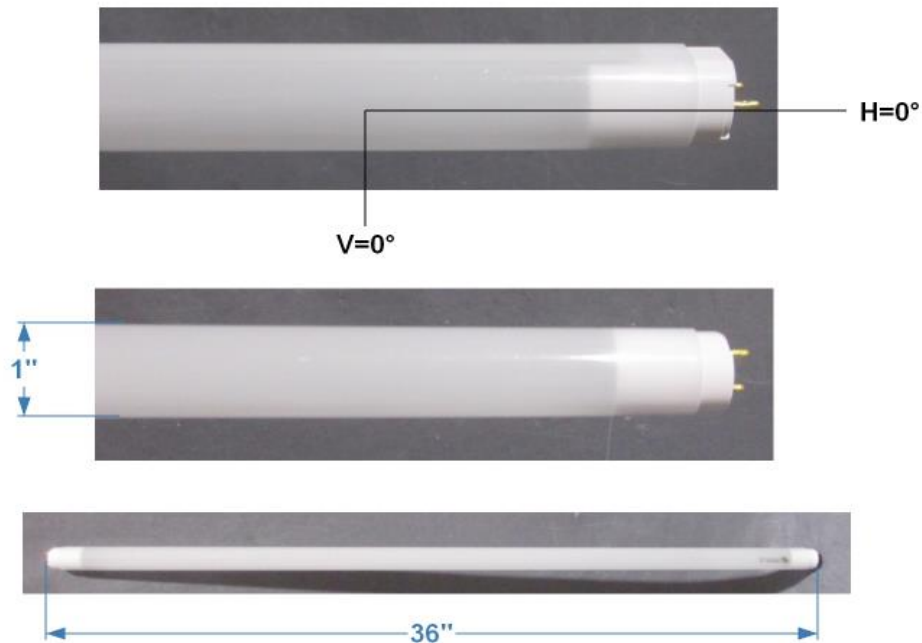
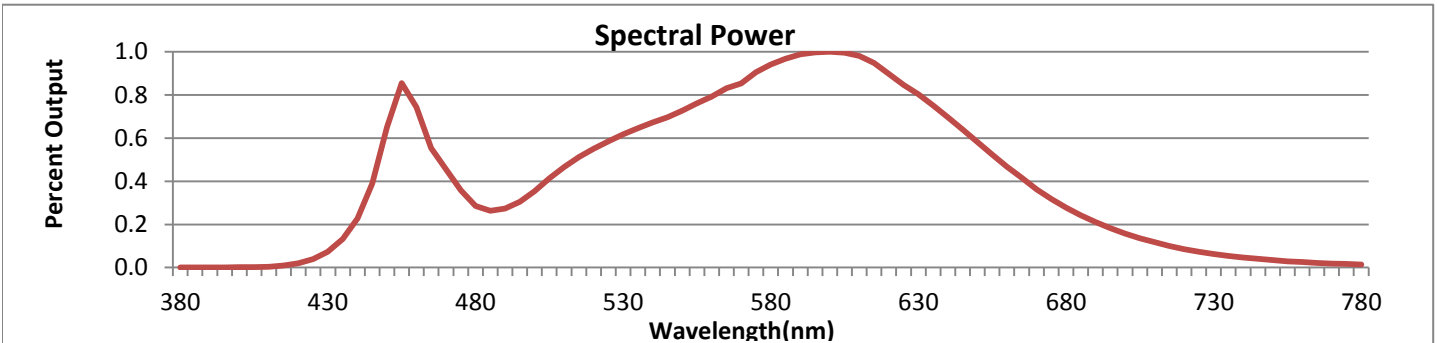


FIG. 1 LUMINAIRE

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



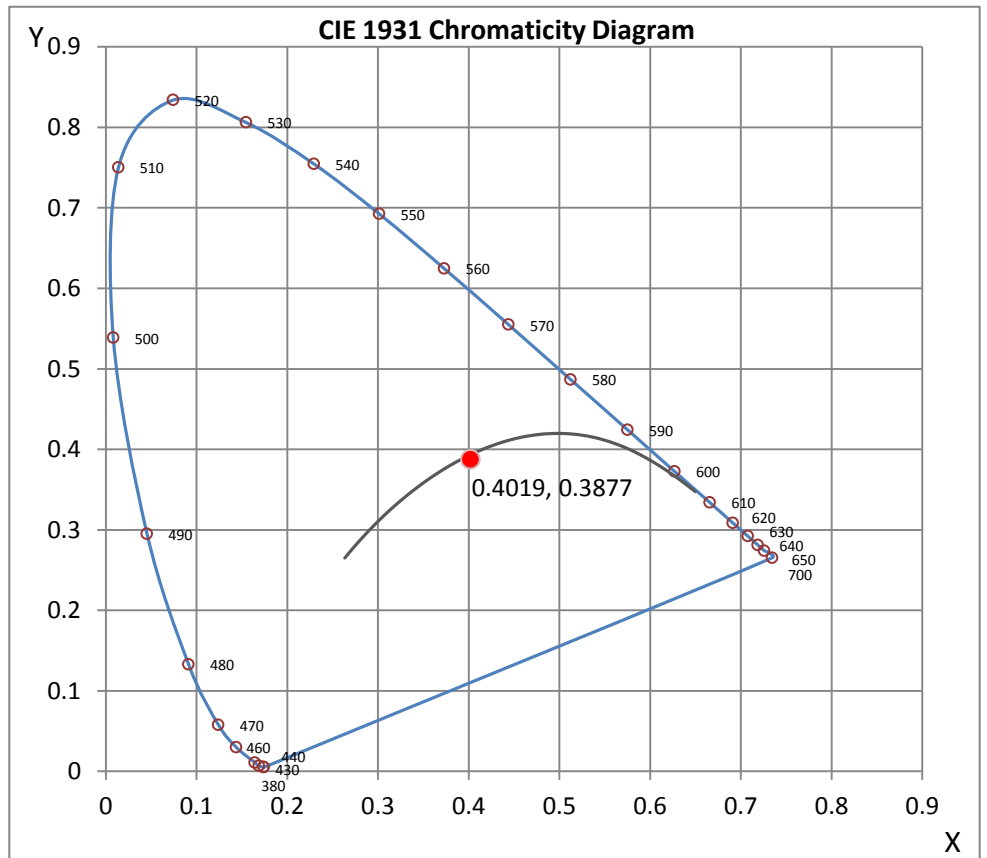
Wavelength	W/m <sup>2</sup> nm	440	0.2275	510	0.4667	580	0.9414	650	0.5822	720	0.0850
380	0.0010	450	0.6499	520	0.5517	590	0.9891	660	0.4683	730	0.0629
390	0.0010	460	0.7435	530	0.6171	600	1.0000	670	0.3627	740	0.0463
400	0.0014	470	0.4541	540	0.6721	610	0.9818	680	0.2780	750	0.0343
410	0.0038	480	0.2849	550	0.7284	620	0.8981	690	0.2108	760	0.0251
420	0.0196	490	0.2729	560	0.7926	630	0.8028	700	0.1578	770	0.0189
430	0.0733	500	0.3538	570	0.8536	640	0.6961	710	0.1174	780	0.0141

**CRI & CCT**

x	0.4019
y	0.3877
u'	0.2347
v'	0.5095
CRI	84.20
CCT	3551
Duv	-0.00057

**R Values**

R1	83.18
R2	91.95
R3	96.24
R4	81.08
R5	82.22
R6	88.05
R7	85.32
R8	65.33
R9	17.62
R10	79.59
R11	79.31
R12	63.20
R13	85.61
R14	98.19



\*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*

*\*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 INDOOR REPORT**  
**PHOTOMETRIC FILENAME : L111503507.IES**

**DESCRIPTION INFORMATION (From Photometric File)**

IESNA:LM-63-2002  
 [TEST] L111503507  
 [TESTLAB] LIGHT LABORATORY, INC.  
 [ISSUEDATE] 11/18/2015  
 [MANUFAC] REVOLUTION LIGHTING TECHNOLOGIES  
 [LUMCAT] 203220-012  
 [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, 14.28W  
 [\_TEST PROCEDURE] IESNA:LM-79-08

**CHARACTERISTICS**

Lumens Per Lamp	N.A. (absolute)
Total Lamp Lumens	N.A. (absolute)
Luminaire Lumens	1621
Total Luminaire Efficiency	N.A.
Luminaire Efficacy Rating (LER)	114
Total Luminaire Watts	14.28
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	14030	10149	10107
55	12621	9072	9321
65	10943	8192	8696
75	8285	7571	8253
85	3719	7312	8004

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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>	346.12	346.12	346.12	346.12	346.12
<b>5</b>	344.73	344.90	344.86	344.86	344.21
<b>10</b>	339.42	340.06	341.56	342.37	343.19
<b>15</b>	329.13	330.68	334.62	338.34	339.24
<b>20</b>	314.74	318.04	325.11	331.96	334.19
<b>25</b>	298.11	302.70	313.19	323.99	327.68
<b>30</b>	277.98	284.10	299.48	314.39	319.54
<b>35</b>	255.61	263.88	284.53	303.43	310.11
<b>40</b>	230.68	242.46	267.44	291.04	299.83
<b>45</b>	205.91	219.92	250.00	277.81	288.17
<b>50</b>	179.52	195.97	231.96	263.92	275.15
<b>55</b>	152.10	172.62	213.97	248.80	261.70
<b>60</b>	125.11	150.09	196.10	234.02	247.90
<b>65</b>	99.14	127.81	178.75	218.55	232.99
<b>70</b>	75.06	106.98	162.38	203.43	218.42
<b>75</b>	47.99	89.20	146.83	188.82	203.77
<b>80</b>	25.28	72.88	132.65	174.59	189.29
<b>85</b>	8.74	59.77	119.75	160.71	174.81
<b>90</b>	1.03	49.91	108.10	147.77	161.27
<b>95</b>	0.00	43.27	97.60	135.30	148.76
<b>100</b>	0.00	38.99	89.16	124.29	136.33
<b>105</b>	0.00	36.16	82.56	114.14	125.36
<b>110</b>	0.00	33.89	75.66	105.01	115.25
<b>115</b>	0.00	32.65	69.54	96.66	106.26
<b>120</b>	0.00	30.72	64.10	88.69	97.43
<b>125</b>	0.00	28.71	58.87	80.72	87.92
<b>130</b>	0.00	26.48	53.90	73.31	80.03
<b>135</b>	0.00	23.82	49.06	66.15	72.24
<b>140</b>	0.00	20.52	43.32	59.64	64.10
<b>145</b>	0.00	17.57	36.55	52.57	56.98
<b>150</b>	0.00	14.22	30.42	44.99	49.96
<b>155</b>	0.00	11.23	23.99	35.99	41.65
<b>160</b>	0.00	9.64	18.21	26.86	31.96
<b>165</b>	0.00	8.27	13.41	17.70	23.22
<b>170</b>	0.00	6.77	10.07	11.23	13.20
<b>175</b>	0.00	5.40	6.81	7.03	5.31
<b>180</b>	0.00	0.00	0.00	0.00	0.00

**IES INDOOR REPORT**  
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**ZONAL LUMEN SUMMARY**

Zone	Lumens	%Lamp	%Fixt
0-20	127.23	N.A.	7.80
0-30	271.65	N.A.	16.80
0-40	449.28	N.A.	27.70
0-60	830.10	N.A.	51.20
0-80	1147.59	N.A.	70.80
0-90	1266.1	N.A.	78.10
10-90	1233.3	N.A.	76.10
20-40	322.05	N.A.	19.90
20-50	514.14	N.A.	31.70
40-70	552.39	N.A.	34.10
60-80	317.49	N.A.	19.60
70-80	145.92	N.A.	9.00
80-90	118.51	N.A.	7.30
90-110	174.39	N.A.	10.80
90-120	237.00	N.A.	14.60
90-130	284.75	N.A.	17.60
90-150	340.01	N.A.	21.00
90-180	355.16	N.A.	21.90
110-180	180.78	N.A.	11.20
0-180	1621.27	N.A.	100.00

Total Luminaire Efficiency = N.A.%

**ZONAL LUMEN SUMMARY**

Zone	Lumens
0-10	32.80
10-20	94.43
20-30	144.42
30-40	177.63
40-50	192.09
50-60	188.73
60-70	171.57
70-80	145.92
80-90	118.51
90-100	96.07
100-110	78.31
110-120	62.61
120-130	47.75
130-140	33.94
140-150	21.32
150-160	10.80
160-170	3.78
170-180	0.57



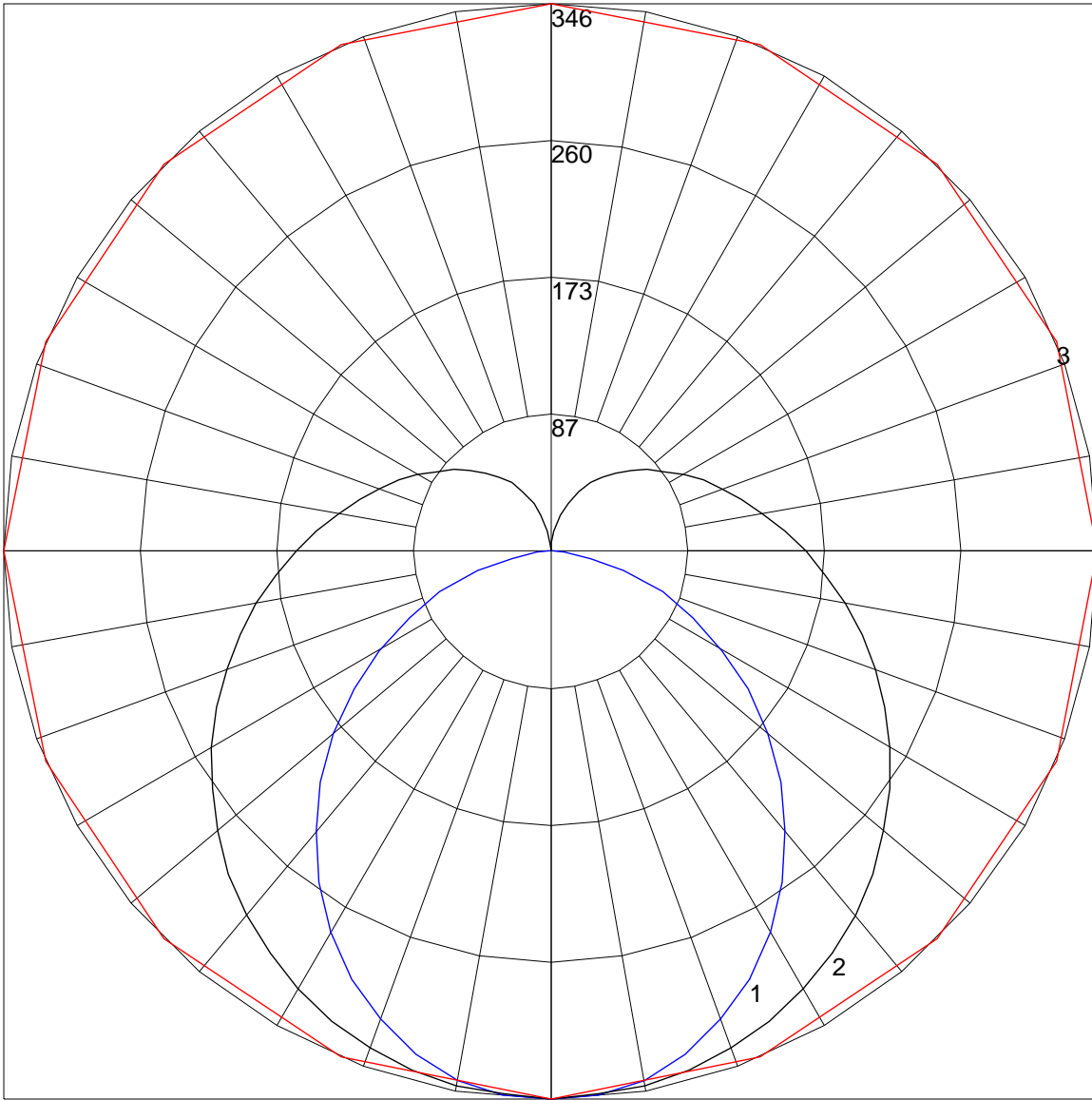
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**COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD**

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

POLAR GRAPH



Maximum Candela = 346.12 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.)