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Report No: L111503508

Date: 11/18/2015



NVLAP LAB CODE 200927-0

Report No: L111503508

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

Model Number: 203220-013

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 203220-013 . 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

Manufacturer:	Revolution Lighting Technologies	
Model Number:	203220-013	
Driver Model Number:	GE232 ULTRAMAX-N	
Total Lumens:	1615.40	
Input Voltage (VAC/60Hz):	120.00	
Input Current (Amp):	0.12	
Input Power (W):	14.29	
Input Power Factor:	1.00	
Current ATHD @ 120V(%):	7%	
Current ATHD @ 277V(%):	6% (0.05A, 14.24W, 0.96PF)	
Efficacy:	113	
Color Rendering Index (CRI):	82	
Correlated Color Temperature (K):	4036	
Chromaticity Coordinate x:	0.3796	
Chromaticity Coordinate y:	0.3785	
Ambient Temperature (°C):	25.0	
Stabilization Time (Hours):	0:35	
Total Operating Time (Hours):	1:05	
Off State Power(W):	0.00	

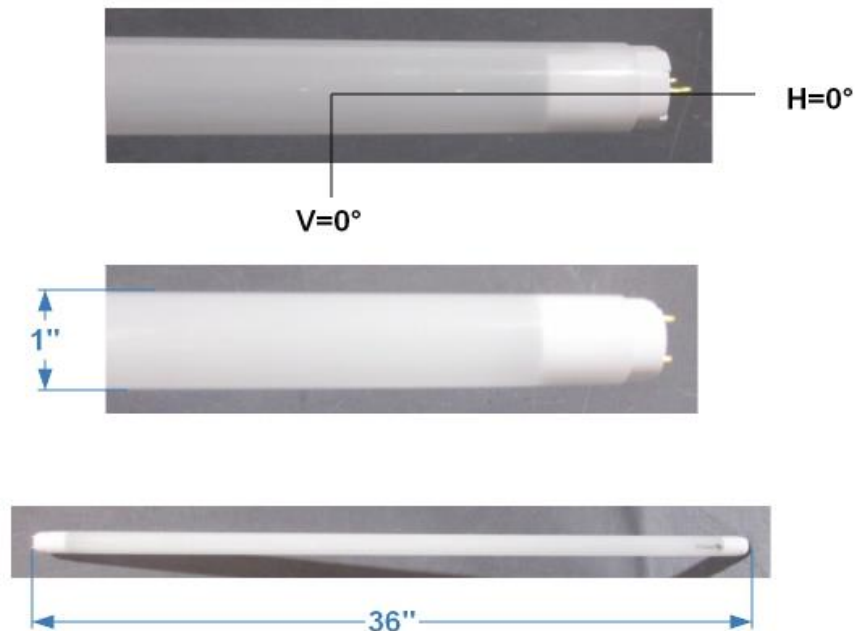
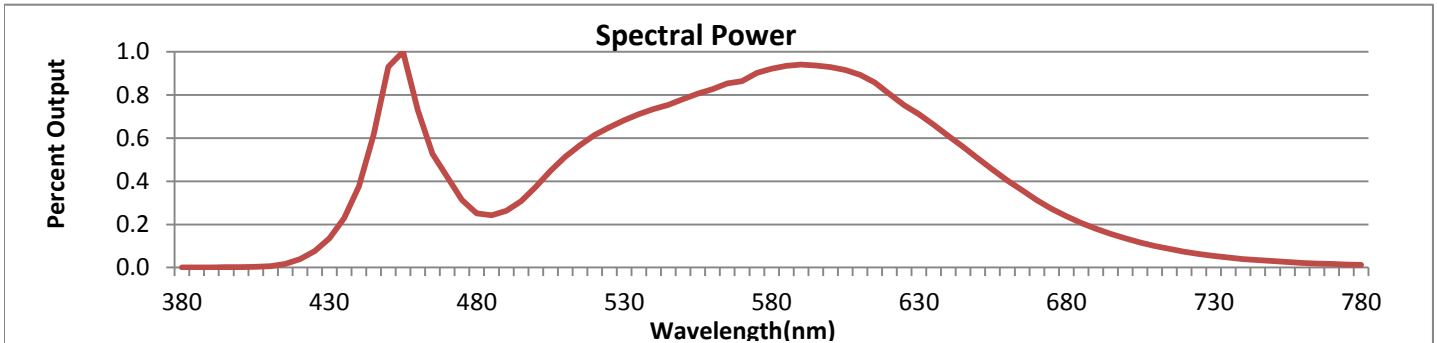


FIG. 1 LUMINAIRE

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



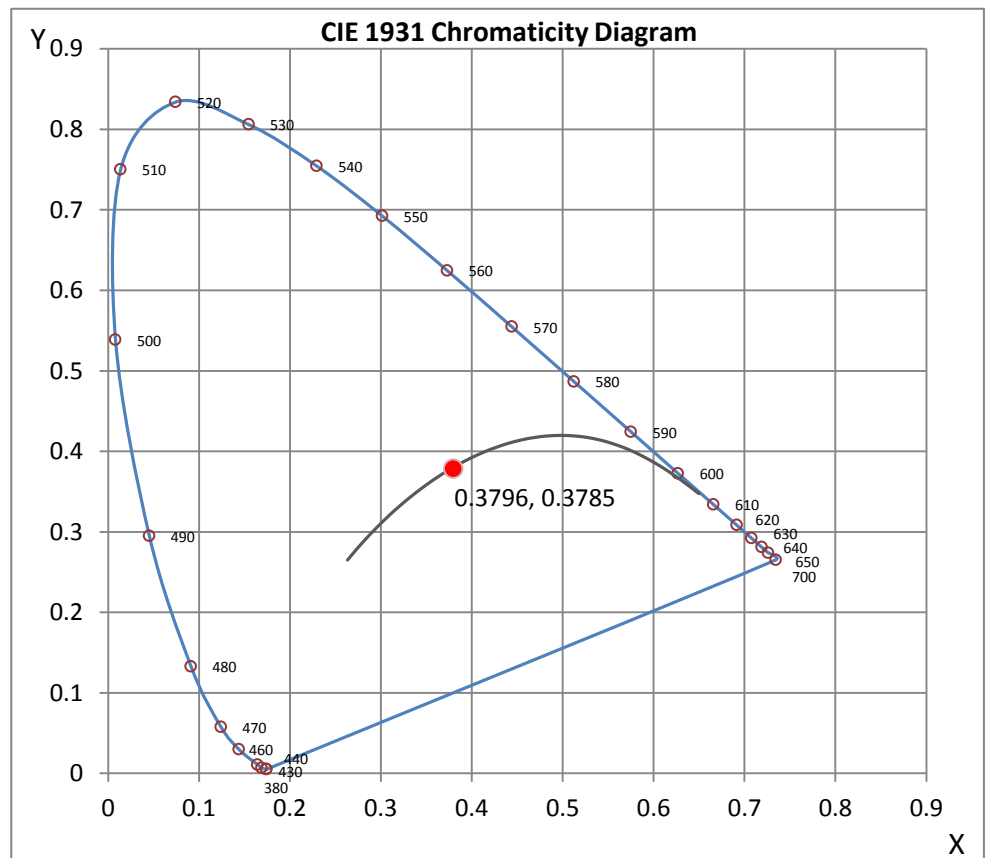
Wavelength	W/m ² nm	440	0.3754	510	0.5144	580	0.9226	650	0.5067	720	0.0728
380	0.0011	450	0.9307	520	0.6142	590	0.9415	660	0.4048	730	0.0538
390	0.0011	460	0.7312	530	0.6830	600	0.9297	670	0.3115	740	0.0397
400	0.0019	470	0.4206	540	0.7347	610	0.8933	680	0.2384	750	0.0297
410	0.0064	480	0.2507	550	0.7805	620	0.8055	690	0.1802	760	0.0219
420	0.0387	490	0.2634	560	0.8278	630	0.7107	700	0.1350	770	0.0165
430	0.1349	500	0.3745	570	0.8643	640	0.6104	710	0.1004	780	0.0124

CRI & CCT

x	0.3796
y	0.3785
u'	0.2239
v'	0.5022
CRI	82.30
CCT	4036
Duv	0.00107

R Values

R1	80.82
R2	88.15
R3	92.92
R4	80.96
R5	79.85
R6	82.53
R7	87.14
R8	66.23
R9	11.67
R10	70.69
R11	78.74
R12	56.04
R13	82.60
R14	95.70



*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 : L111503508.IES

DESCRIPTION INFORMATION (From Photometric File)

IESNA:LM-63-2002
 [TEST] L111503508
 [TESTLAB] LIGHT LABORATORY, INC.
 [ISSUE DATE] 11/18/2015
 [MANUFAC] REVOLUTION LIGHTING TECHNOLOGIES
 [LUMCAT] 203220-013
 [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, 14.29W
 [TEST PROCEDURE] IESNA:LM-79-08

CHARACTERISTICS

Lumens Per Lamp	N.A. (absolute)
Total Lamp Lumens	N.A. (absolute)
Luminaire Lumens	1615
Total Luminaire Efficiency	N.A.
Luminaire Efficacy Rating (LER)	113
Total Luminaire Watts	14.29
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

IES INDOOR REPORT
PHOTOMETRIC FILENAME : L111503508.IES

LUMINANCE DATA (cd/sq.m)

Angle In Degrees	Average 0-Deg	Average 45-Deg	Average 90-Deg
45	14007	10137	10168
55	12685	9016	9384
65	10962	8113	8760
75	8476	7447	8308
85	4341	7129	8043

**IES INDOOR REPORT
PHOTOMETRIC FILENAME : L111503508.IES**

CANDELA TABULATION

	<u>0.0</u>	<u>22.5</u>	<u>45.0</u>	<u>67.5</u>	<u>90.0</u>
0	345.16	345.16	345.16	345.16	345.16
5	343.10	343.66	343.31	344.86	343.19
10	338.22	338.90	340.10	342.41	341.90
15	328.28	329.69	333.97	338.64	338.82
20	313.97	317.18	324.59	332.43	334.19
25	297.00	301.76	313.07	324.72	328.10
30	277.03	283.50	299.27	315.25	320.56
35	255.61	263.62	283.85	304.33	311.65
40	231.02	241.90	266.84	291.90	301.28
45	205.57	219.02	249.70	278.75	289.89
50	179.52	195.20	231.28	264.65	277.29
55	152.87	171.34	212.64	249.48	263.49
60	126.05	148.84	194.43	234.27	249.78
65	99.31	125.75	177.03	218.94	234.70
70	78.49	104.54	160.20	203.60	219.96
75	49.10	87.40	144.43	188.65	205.14
80	27.16	69.62	129.82	174.04	190.49
85	10.20	56.13	116.75	160.33	175.66
90	2.40	46.66	105.40	147.34	162.21
95	2.23	40.23	95.33	135.05	149.44
100	0.00	36.38	86.85	123.86	137.36
105	0.00	33.93	80.16	114.10	126.48
110	0.00	32.35	73.95	105.06	116.37
115	0.00	31.19	68.04	96.66	106.94
120	0.00	29.86	62.73	88.52	98.11
125	0.00	28.19	57.54	80.81	88.86
130	0.00	25.75	53.98	73.78	80.98
135	0.00	22.79	49.36	67.22	73.52
140	0.00	19.28	43.27	60.24	66.41
145	0.00	16.71	37.06	53.00	59.04
150	0.00	13.54	30.55	46.14	50.56
155	0.00	10.97	23.78	37.10	42.59
160	0.00	9.60	17.82	27.42	34.10
165	0.00	8.14	13.45	17.74	23.74
170	0.00	6.64	10.07	11.48	13.97
175	0.00	6.00	6.77	6.90	5.57
180	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	126.98	N.A.	7.90
0-30	271.33	N.A.	16.80
0-40	449.05	N.A.	27.80
0-60	829.82	N.A.	51.40
0-80	1145.93	N.A.	70.90
0-90	1262.94	N.A.	78.20
10-90	1230.23	N.A.	76.20
20-40	322.07	N.A.	19.90
20-50	514.24	N.A.	31.80
40-70	551.85	N.A.	34.20
60-80	316.10	N.A.	19.60
70-80	145.03	N.A.	9.00
80-90	117.01	N.A.	7.20
90-110	172.10	N.A.	10.70
90-120	234.09	N.A.	14.50
90-130	281.60	N.A.	17.40
90-150	337.13	N.A.	20.90
90-180	352.46	N.A.	21.80
110-180	180.36	N.A.	11.20
0-180	1615.4	N.A.	100.00

Total Luminaire Efficiency = N.A.%

ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	32.71
10-20	94.27
20-30	144.35
30-40	177.72
40-50	192.17
50-60	188.60
60-70	171.07
70-80	145.03
80-90	117.01
90-100	94.83
100-110	77.27
110-120	61.99
120-130	47.51
130-140	34.07
140-150	21.46
150-160	10.93
160-170	3.82
170-180	0.58

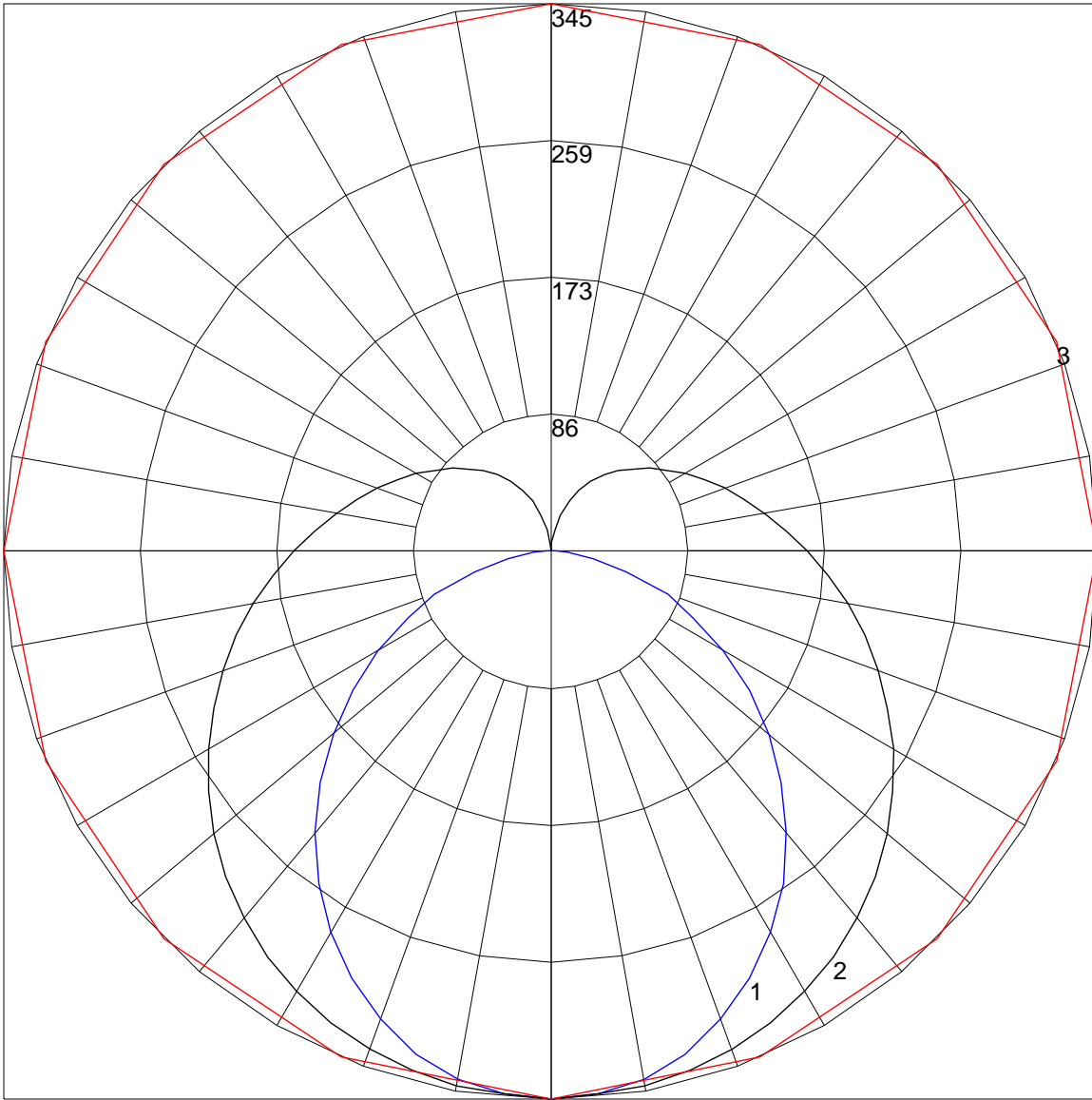
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COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

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	82	82	78	75	75	72	69	68	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	56	50	46	50	46	42	39
4	75	62	53	46	46	71	59	51	44	54	47	41	49	43	38	44	40	36	33
5	69	55	46	39	39	65	53	44	38	48	41	35	44	38	33	40	35	31	28
6	63	49	40	34	34	60	47	39	33	43	36	31	39	33	29	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	41	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 = 345.16 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.)