LIGHT LABORATORY INC.
8165 E Kaiser Blvd. Anaheim, CA 92808
www.lightlaboratory.com

NVLAP TESTING
NVLAP LAB CODE 200927-0

Report No: **L021702104** **Issue Date: 2/14/2017**

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

Model Number: **204401-111**

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. Received in working and undamaged condition. No modifications were necessary.

Testing Condition: Fixture is tested with no special conditions.

Sample Arrival Date: 2/8/17

Date of Tests: 2/9/17 - 2/14/17

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	11/28/17
ITECH	IT6122	PS-DC03-S1	11/28/17
Fluke Digital Thermometer	52k/J	MT-TP02-GC	11/28/17
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.

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Test Summary	
Manufacturer:	Revolution Lighting Technologies
Model Number:	204401-111
Driver Model Number:	N/A
Total Lumens:	1500.57
Input Voltage (VAC/60Hz):	120.00
Input Current (Amp):	0.10
Input Power (W):	11.50
Input Power Factor:	0.99
Current ATHD @ 120V(%):	6%
Current ATHD @ 277V(%):	N/A
Efficacy:	130
Color Rendering Index (CRI):	82
Correlated Color Temperature (K):	3032
Chromaticity Coordinate x:	0.4351
Chromaticity Coordinate y:	0.4043
Ambient Temperature (°C):	25.0
Stabilization Time (Hours):	0:05
Total Operating Time (Hours):	1:05

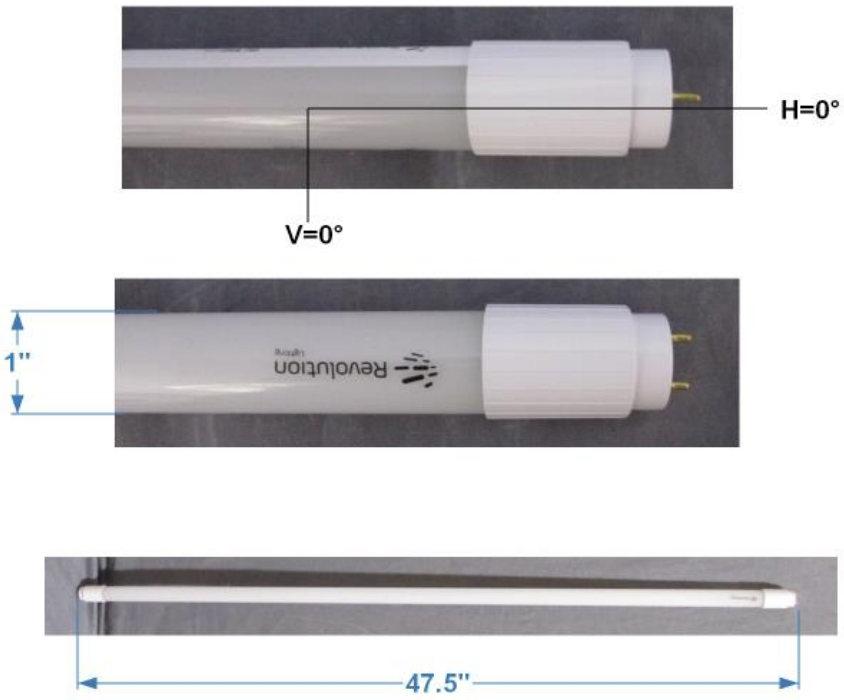

FIG. 1 LUMINAIRE

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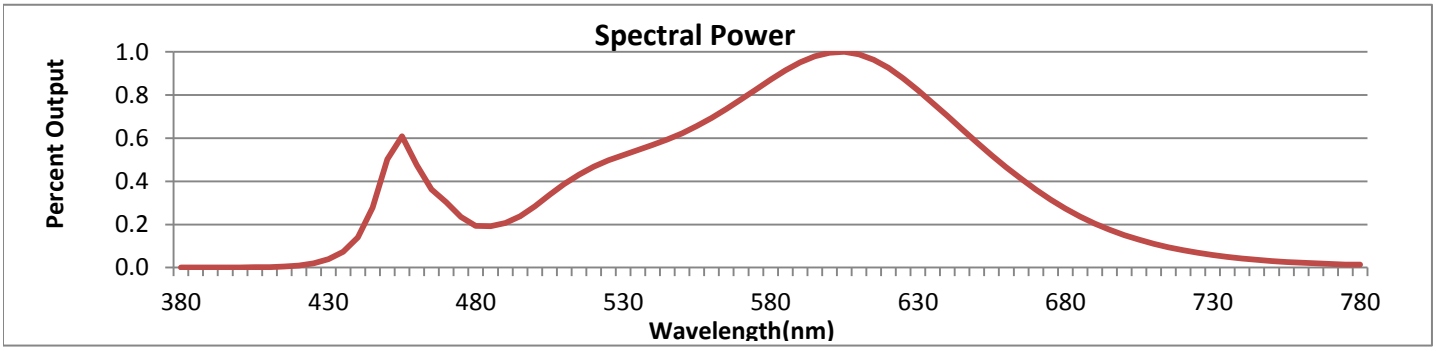


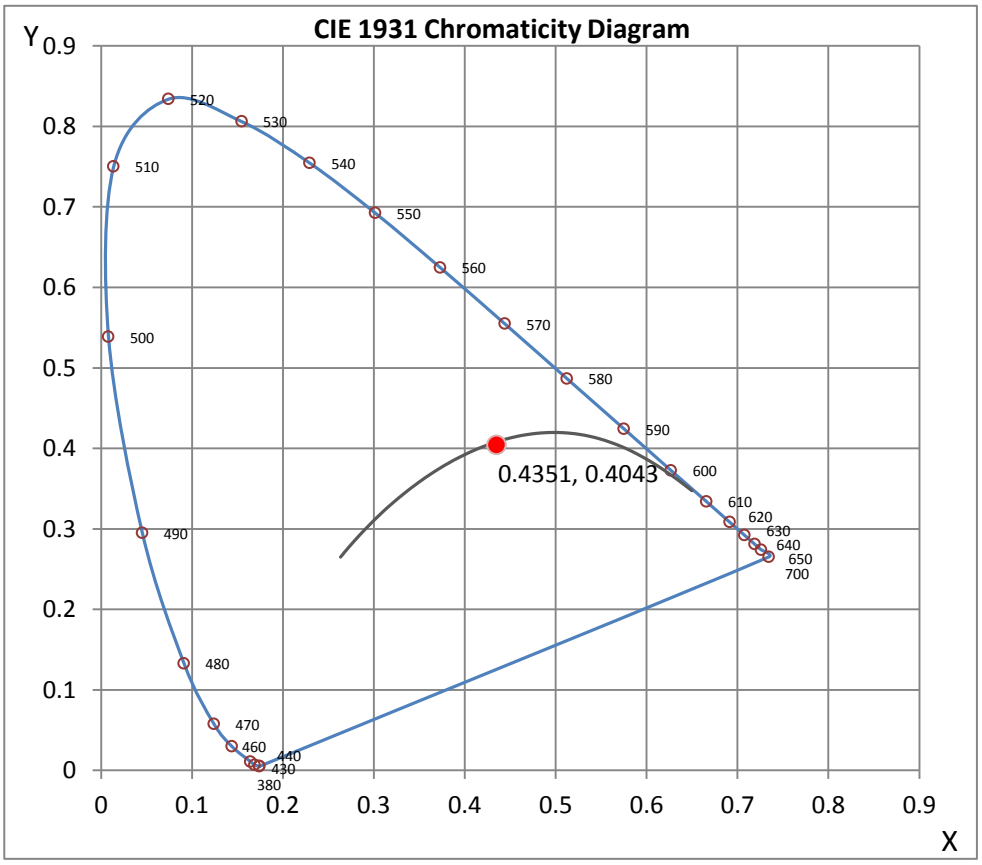
Wavelength	W/m²nm	440	0.1393	510	0.3882	580	0.8722	650	0.5814	720	0.0801
380	0.0007	450	0.5022	520	0.4675	590	0.9517	660	0.4656	730	0.0584
390	0.0007	460	0.4755	530	0.5218	600	0.9961	670	0.3614	740	0.0422
400	0.0010	470	0.3032	540	0.5686	610	0.9895	680	0.2741	750	0.0308
410	0.0021	480	0.1941	550	0.6219	620	0.9267	690	0.2045	760	0.0226
420	0.0097	490	0.2074	560	0.6932	630	0.8223	700	0.1507	770	0.0165
430	0.0384	500	0.2845	570	0.7798	640	0.7034	710	0.1100	780	0.0143

CRI & CCT

x	0.4351
y	0.4043
u'	0.2493
v'	0.5212
CRI	82.20
CCT	3032
Duv	0.00034

R Values

R1	80.86
R2	90.91
R3	96.51
R4	79.42
R5	80.21
R6	88.19
R7	82.82
R8	58.99
R9	7.06
R10	78.37
R11	77.99
R12	65.08
R13	83.33
R14	98.67



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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 : 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: 9*

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Photometric Test Report

IES INDOOR REPORT
PHOTOMETRIC FILENAME : L021702104.IES

DESCRIPTION INFORMATION (From Photometric File)

IESNA:LM-63-2002
[TEST] L021702104
[TESTLAB] LIGHT LABORATORY, INC.
[ISSUEDATE] 2/14/2017
[MANUFAC] REVOLUTION LIGHTING TECHNOLOGIES
[LUMCAT] 204401-111
[LUMINAIRE] 4FT LED TUBE
[BALLASTCAT] N/A
[LAMPPOSITION] 0,0
[LAMPCAT] N/A
[OTHER] INDICATING THE CANDELA VALUES ARE ABSOLUTE AND
[MORE] SHOULD NOT BE FACTORED FOR DIFFERENT LAMP RATINGS.
[INPUT] 120VAC, 11.50W
[TEST PROCEDURE] IESNA:LM-79-08

CHARACTERISTICS

Lumens Per Lamp	N.A. (absolute)
Total Lamp Lumens	N.A. (absolute)
Luminaire Lumens	1501
Total Luminaire Efficiency	N.A.
Luminaire Efficacy Rating (LER)	130
Total Luminaire Watts	11.5
Ballast Factor	1.00
CIE Type	Semi-Direct
Spacing Criterion (0-180)	1.22
Spacing Criterion (90-270)	1.44
Spacing Criterion (Diagonal)	1.48
Basic Luminous Shape	Rectangular w/Sides
Luminous Length (0-180)	3.63 ft
Luminous Width (90-270)	0.08 ft
Luminous Height	0.06 ft

LUMINANCE DATA (cd/sq.m)

Angle In Degrees	Average 0-Deg	Average 45-Deg	Average 90-Deg
45	9766	7863	8021
55	9014	7382	7742
65	7989	6987	7565
75	6323	6799	7524
85	3116	6907	7644

IES INDOOR REPORT
PHOTOMETRIC FILENAME : L021702104.IES

CANDELA TABULATION

	0.0	22.5	45.0	67.5	90.0
0	304.60	304.60	304.60	304.60	304.60
5	303.08	303.42	303.21	303.91	303.83
10	298.27	299.02	300.55	302.63	302.59
15	290.21	291.63	295.36	299.39	300.51
20	278.92	281.99	288.72	294.70	296.94
25	265.47	269.41	279.71	289.42	293.54
30	248.78	255.42	269.12	283.36	288.80
35	231.01	238.98	257.79	276.14	283.07
40	211.00	221.63	244.75	267.79	275.93
45	189.57	203.07	231.51	258.37	268.04
50	166.82	183.47	217.60	247.49	259.07
55	142.91	163.04	202.86	235.62	248.36
60	119.66	142.95	187.70	223.70	237.32
65	94.41	123.43	172.43	211.00	225.20
70	69.67	104.79	157.77	197.88	213.07
75	46.92	87.36	143.65	184.47	199.79
80	25.66	71.54	129.99	170.85	186.09
85	8.72	58.50	116.96	157.44	172.22
90	1.33	48.08	104.83	144.61	159.10
95	0.42	40.11	93.54	131.74	145.23
100	0.00	34.38	83.78	119.24	132.44
105	0.00	30.23	75.02	107.66	119.99
110	0.00	27.36	66.89	96.99	108.20
115	0.00	25.12	59.54	86.73	96.57
120	0.00	23.38	53.19	77.10	86.03
125	0.00	21.88	47.66	68.34	76.31
130	0.00	20.72	42.31	60.24	67.18
135	0.00	19.31	37.53	52.81	58.62
140	0.00	17.98	32.92	46.00	50.82
145	0.00	16.86	28.23	39.57	43.68
150	0.00	15.49	24.29	34.00	37.28
155	0.00	13.29	21.55	28.32	31.55
160	0.00	11.58	19.06	23.00	26.82
165	0.00	10.63	15.36	18.73	22.42
170	0.00	9.67	11.92	13.20	16.36
175	0.00	8.47	9.80	9.84	9.05
180	0.00	0.00	0.00	0.00	0.00

IES INDOOR REPORT
PHOTOMETRIC FILENAME : L021702104.IES

ZONAL LUMEN SUMMARY

Zone	Lumens	%Lamp	%Fixt
0-20	112.35	N.A.	7.50
0-30	241.35	N.A.	16.10
0-40	402.64	N.A.	26.80
0-60	759.22	N.A.	50.60
0-80	1067.14	N.A.	71.10
0-90	1183.23	N.A.	78.90
10-90	1154.35	N.A.	76.90
20-40	290.28	N.A.	19.30
20-50	468.29	N.A.	31.20
40-70	521.93	N.A.	34.80
60-80	307.92	N.A.	20.50
70-80	142.57	N.A.	9.50
80-90	116.09	N.A.	7.70
90-110	165.04	N.A.	11.00
90-120	219.78	N.A.	14.60
90-130	259.41	N.A.	17.30
90-150	303.32	N.A.	20.20
90-180	317.34	N.A.	21.10
110-180	152.30	N.A.	10.10
0-180	1500.57	N.A.	100.00

Total Luminaire Efficiency = N.A.%

ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	28.88
10-20	83.47
20-30	128.99
30-40	161.29
40-50	178.01
50-60	178.58
60-70	165.35
70-80	142.57
80-90	116.09
90-100	92.61
100-110	72.43
110-120	54.74
120-130	39.63
130-140	27.04
140-150	16.87
150-160	9.25
160-170	4.00
170-180	0.77

IES INDOOR REPORT
PHOTOMETRIC FILENAME : L021702104.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	114	114	114	114	109	109	109	109	99	99	99	91	91	91	83	83	83	79
1	101	95	89	84	96	90	85	81	82	78	75	75	71	69	68	65	63	59
2	90	81	73	66	86	77	70	64	70	64	59	64	59	55	57	54	50	47
3	82	70	61	54	77	67	59	52	61	54	48	55	50	45	50	45	41	38
4	74	61	52	45	70	59	50	43	53	46	40	49	43	38	44	39	35	32
5	68	55	45	38	64	52	43	37	48	40	34	43	37	32	39	34	30	27
6	63	49	39	33	59	47	38	32	43	35	30	39	33	28	36	30	26	23
7	58	44	35	29	55	42	34	28	39	31	26	35	29	24	32	27	23	21
8	54	40	31	25	51	38	30	25	35	28	23	32	26	22	30	24	20	18
9	50	36	28	22	48	35	27	22	32	25	21	30	24	19	27	22	18	16
10	47	34	26	20	45	32	25	20	30	23	19	28	22	18	25	20	17	15

IES INDOOR REPORT
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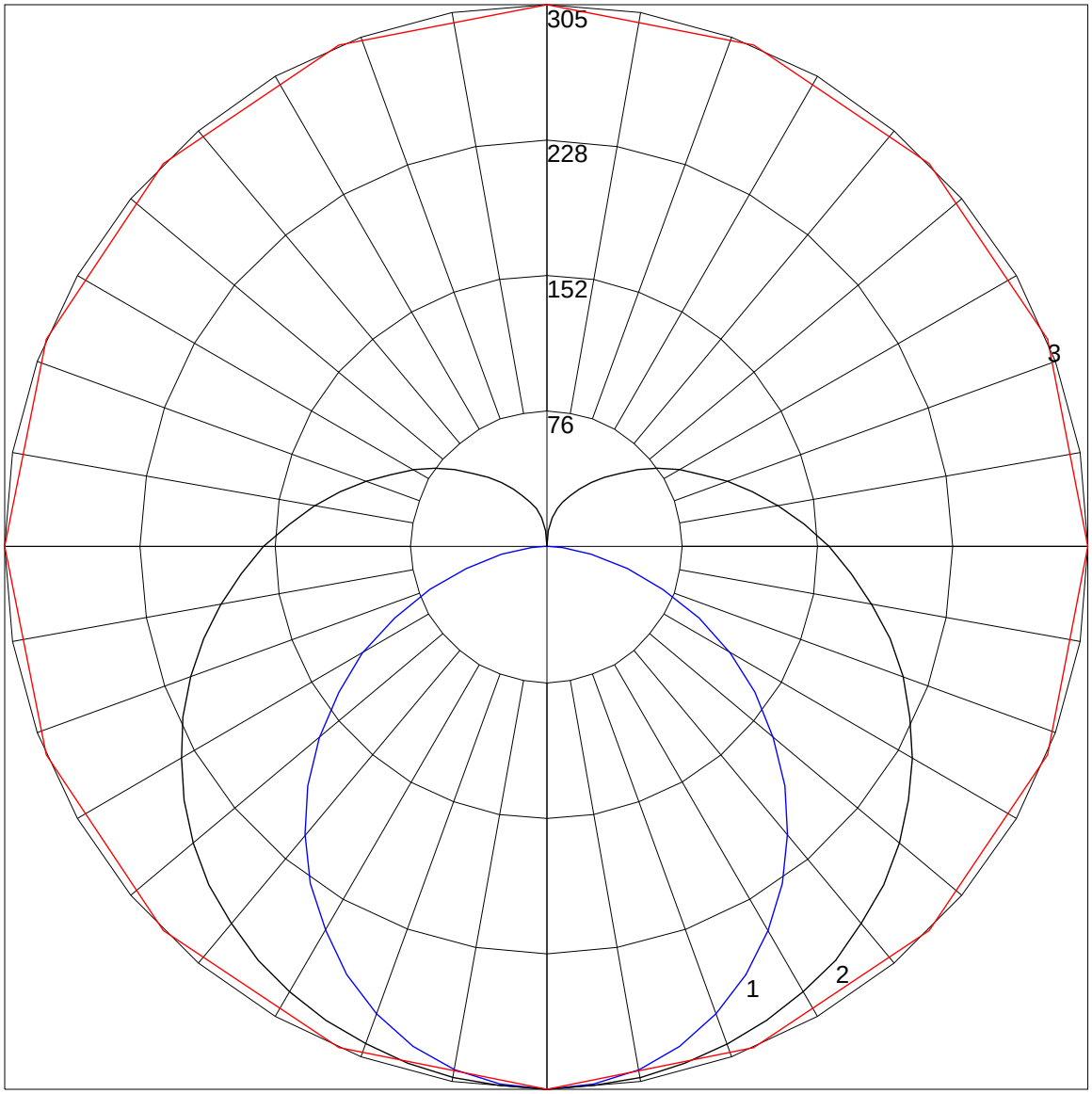
POLAR GRAPH



Maximum Candela = 304.6 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.)