REPORT

545 E. Algonquin Rd., Arlington Heights, IL 60005

Project No. G102748333 Date: February 18, 2017

REPORT NO. 102748333CHI-023

TEST OF ONE LED ROADWAY/AREA LUMINAIRE

MODEL NO. APL-WW200
LED MODEL NO. SAMSUNG LH351B
DRIVER MODEL NO. MEANWELL HLG-240H-36A

RENDERED TO

SUPER BRIGHT LEDS, INC.
4400 EARTH CITY EXPRESSWAY
SAINT LOUIS, MO 63045

TEST: Electrical and Photometric tests as required to the IESNA test standard.

AUTHORIZATION: The testing performed was authorized by signed quote number Qu-00723537-3.

STANDARDS USED: The following American National Standards or Illuminating Engineering Society of North America Test Guides were used in part or totally to test each specimen:

IESNA LM-79 - 2008: Electrical and Photometric Measurements of Solid State Lighting

ANSI NEMA ANSLG C78.377: 2012: Specifications of the Chromaticity of Solid State Lighting Products

DESCRIPTION OF SAMPLE: The client submitted one Production sample of model number APL-WW200. The sample was received by Intertek on February 10, 2017, in undamaged condition and one sample was tested as received. The sample designation was AH02102017050950C.

DATES OF TESTS: February 16, 2017 through February 18, 2017.

SUMMARY

Model No.: APL-WW200
Description: LED Roadway/Area Luminaire

	Result	
Criteria	Sphere	Goniometer
Total Lumen Output (Lumens)	23717	22574
Total Power (W)	204.2	204.3
Luminaire Efficacy (LPW)	116.1	110.5

Criteria	Result
Power Factor at 120Vac	0.995
Power Factor at 277Vac	0.924
Current ATHD % at 120Vac	4.87
Current ATHD % at 277Vac	13.15
Correlated Color Temperature (CCT - K)	2975
Color Rendering Index (CRI - Ra)	73.1
Color Rendering Index (CRI - R9)	-24.6
DUV	0.000
Chromaticity Coordinate (x)	0.439
Chromaticity Coordinate (y)	0.405
Chromaticity Coordinate (u')	0.251
Chromaticity Coordinate (v')	0.522
BUG Rating	B3-U0-G3
IES Classification	Type I
Longitudinal Classification	Very Short

EQUIPMENT LIST

Equipment Used	Model Number	Control Number	Last Date Calibrated	Calibration Due Date	Date Used
Yokogawa Power Meter	WT210	146919	07/11/16	07/11/17	02/18/17
Omega Newport Thermometer	DPI8-C24	146920	10/07/16	10/07/17	02/18/17
LSI High Speed Mirror Goniometer	6440T	146928	VBU	VBU	02/18/17
Newport Thermohygrometer	iServer	146956	01/06/17	01/06/18	02/18/17
Pacific, AC power supply	118-ACX	CHI0358	VBU	VBU	02/18/17
Labsphere Spectroradiometer	CDS1100	CHI0091	VBU	VBU	02/16/17
3 Meter Sphere	SPR600	CHI0088	VBU	VBU	02/16/17
Elgar AC Power Supply	CW1251M	146112	VBU	VBU	02/16/17
Sorenson DC Power Supply	XFR150-8	146846	VBU	VBU	02/16/17
Newport Humidity Recorder	iTHX-SD	146382	06/27/16	06/27/17	02/16/17
Yokogawa Power Meter	WT1600	146768	1/1017	01/10/18	02/16/17
Fluke J/K Temperature Meter	52	146004	01/10/17	01/10/18	02/16/17

TEST METHODS

Seasoning in Sample Orientation – LED Products

No seasoning was performed in accordance with IESNA LM-79.

Photometric and Electrical Measurements – Integrating Sphere Method

A Labsphere Model CDS 1100 CCD Array Spectroradiometer and Two Meter or Ten Foot Sphere was used to measure correlated color temperature, chromaticity coordinates, and the color rendering index for each SSL unit.

Ambient temperature was measured at a position inside the sphere. Each SSL unit was operated on the client provided driver at the rated input voltage in its designated orientation. Each SSL unit was allowed to stabilize for at least thirty minutes before measurements were made. Electrical measurements including voltage, current, and power were measured using the Xitron or Yokogawa Power Analyzer.

The calibration of the sphere photometer-spectroradiometer system is traceable to the National Institute of Standards and Technology.

Photometric and Electrical Measurements – Distribution Method

A LSI Type C High Speed Model 6440 Mirror Goniometer was used to measure the intensity (candelas) at each angle of distribution for each sample.

Ambient temperature was measured equal to the height of the sample mounted on the Goniometer equipment. Each sample was operated at input rated voltage in its designated orientation. Each sample was allowed to stabilize for at least thirty minutes before measurements were made. Electrical measurements including voltage, current, and power were measured using the Xitron or Yokogawa Power Analyzer.

Some graphics were created with Photometrics Plus software.

BUG Ratings (Backlight, Uplight, Glare) – for Outdoor Fixtures Only

Zonal Lumens were calculated and grouped using the formula in IESNA TM-15-11 for each zone as defined in
the BUG addendum. The maximum lumen rating in each zone was compared against the BUG zonal requirements of Energy Star. Photometric Toolbox software was used to calculate results.

RESULTS OF TEST

Photometric and Electrical Measurements at Ambient Temperature (25°C +/- 1°C) - Integrating Sphere Method

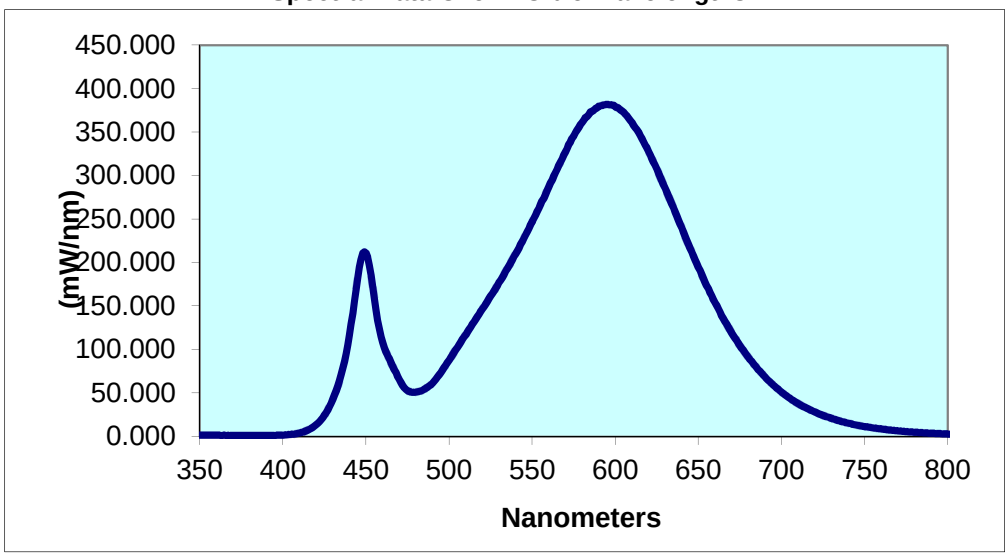
Intertek Sample No.	Base Orientation	Input Voltage {VAC}	Input Current (mA)	Input Power (Watts)	Input Power Factor	Current ATHD (%)	Luminous Flux (Lumens)	Lumen Efficacy (LPW)
AH02102017050950C	UP	120.0	1710	204.2	0.995	4.87	23717	116.1
		277.0	773.0	197.9	0.924	13.15		

Correlated Color Temperature (K)	CRI -Ra	CRI -R9	DUV	CIE 31' Chromaticity Coordinate (x)	CIE 31' Chromaticity Coordinate (y)	CIE 76' Chromaticity Coordinate (u')	CIE 76' Chromaticity Coordinate (v')
2975	73.1	-24.6	0.000	0.439	0.405	0.251	0.522

Spectral Distribution over Visible Wavelengths

nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm
350	1.430	440	116.8	530	176.9	620	327.7	710	37.85
355	1.440	445	182.3	535	193.1	625	307.4	715	32.69
360	1.376	450	211.1	540	209.7	630	285.3	720	28.33
365	1.370	455	158.5	545	227.9	635	262.7	725	24.38
370	1.159	460	108.3	550	247.0	640	239.5	730	21.01
375	1.115	465	85.45	555	266.7	645	216.7	735	18.05
380	1.056	470	65.50	560	286.8	650	194.7	740	15.48
385	1.023	475	52.64	565	307.4	655	173.9	745	13.35
390	1.100	480	51.01	570	327.4	660	154.4	750	11.53
395	1.287	485	54.36	575	345.6	665	136.0	755	9.971
400	1.660	490	61.53	580	361.2	670	119.4	760	8.693
405	2.466	495	73.79	585	373.2	675	104.5	765	7.505
410	4.162	500	87.95	590	379.8	680	91.19	770	6.468
415	7.422	505	102.8	595	381.6	685	79.36	775	5.594
420	13.58	510	117.1	600	379.2	690	68.72	780	4.884
425	24.64	515	132.0	605	372.7	695	59.43		
430	42.65	520	146.5	610	361.0	700	51.13		
435	71.13	525	161.5	615	346.0	705	44.02		

Spectral Data Over Visible Wavelengths



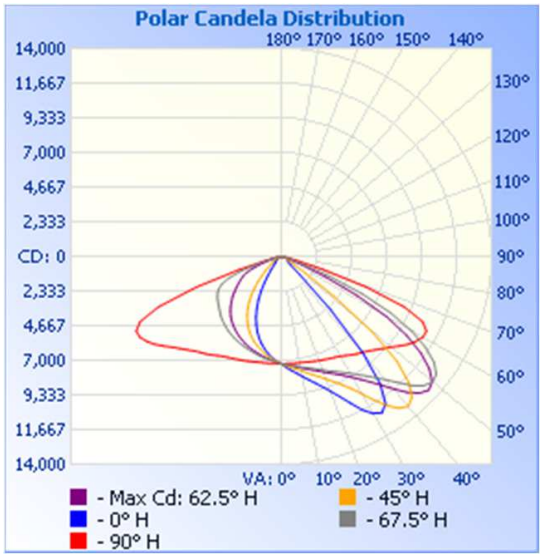
RESULTS OF TEST (cont'd)

Photometric and Electrical Measurements at Ambient Temperature (25°C +/- 1°C) – Distribution Method

Intertek Sample No.	Base Orientation	Input Voltage {VAC}	Input Current (mA)	Input Power (Watts)	Input Power Factor	Absolute Luminous Flux (Lumens)	Lumen Efficacy (LPW)
AH02102017050950C	UP	120.0	1711	204.3	0.995	22574	110.5

Intensity (Candlepower) Summary at 25°C - Candelas

Angle	0	25	45	67.5	90
0	7216	7216	7216	7216	7216
5	7700	7608	7507	7370	7226
10	8221	8033	7836	7561	7264
15	8841	8568	8260	7803	7336
20	9684	9286	8794	8138	7452
25	10891	10343	9523	8545	7587
30	12202	11863	10668	9082	7766
35	12088	12699	12249	9820	8094
40	8391	10962	13162	10842	8421
45	1711	5095	12000	12279	8884
50	656	853	7878	13149	9499
55	531	553	2013	12414	10305
60	468	472	590	10003	10878
65	405	408	393	5909	10376
70	334	338	304	1595	6021
75	252	257	228	393	1206
80	152	152	143	162	265
85	58	57	58	69	69
90	0	0	0	0	0

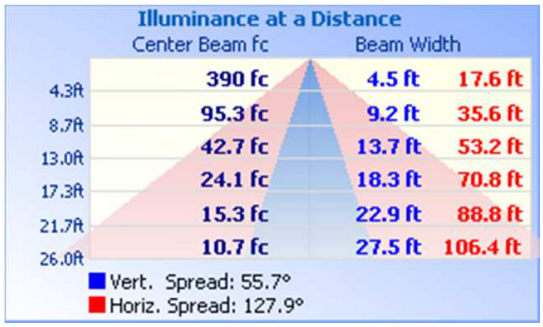


RESULTS OF TEST (cont'd)

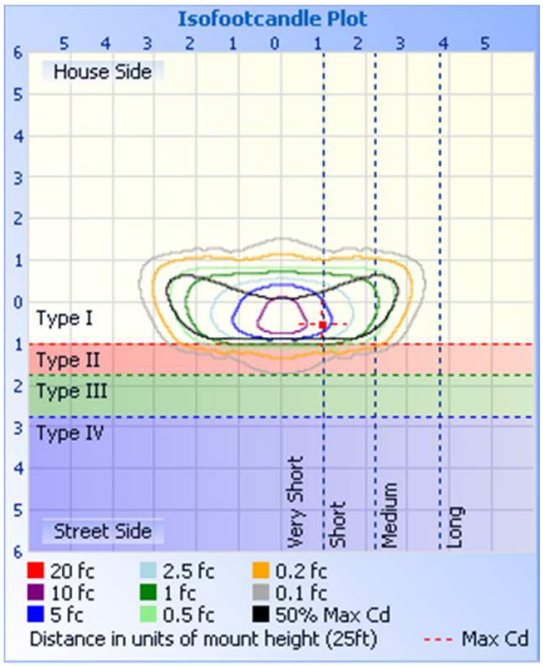
Illumination Plots

Mounting Height: 25 ft.

Illuminance - Cone of Light



Isoillumination Plot



Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens	% Luminaire
0-30	6199	27.5
0-40	10952	48.5
0-60	19214	85.1
60-90	3360	14.9
0-90	22574	100.0
90-180	0.0	0.0
0-180	22574	100.0

Luminaire Classification System (LCS)

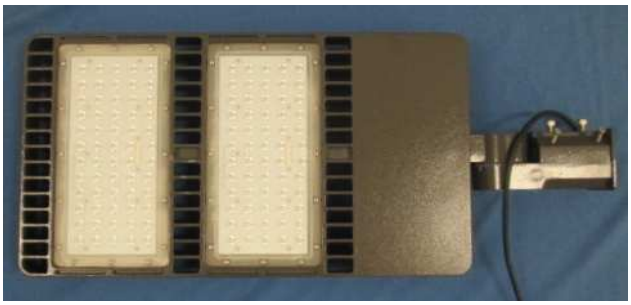
LCS	Zone	Lumens	% Luminaire
FL	(0-30)	3742.1	16.6
FM	(30-60)	9196.1	40.7
FH	(60-80)	1662.1	7.4
FVH	(80-90)	36.4	0.2
BL	(0-30)	2456.1	10.9
BM	(30-60)	3822.6	16.9
BH	(60-80)	1624.0	7.2
BVH	(80-90)	39.2	0.2
UL	(90-100)	0.0	0.0
UH	(100-180)	0.0	0.0
Total		22578.6	100.0

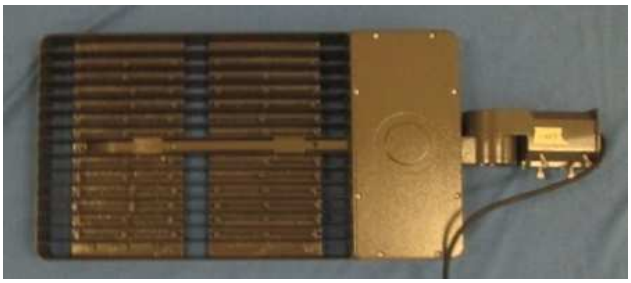
Zonal Lumens and Percentages at 25°C

Zone	Lumens	% Luminaire
0-10	689.8	3.1
10-20	2060	9.1
20-30	3449	15.3
30-40	4753	21.1
40-50	4554	20.2
50-60	3708	16.4
60-70	2641	11.7
70-80	643.6	2.9
80-90	75.6	0.3

BUG Rating: B3-U0-G3
IES Classification: Type I
Longitudinal Classification: Very Short

PICTURES (not to scale)





CONCLUSION

The results tabulated in this report are representative of the actual test samples submitted for this report only. The data is provided to the client for further evaluation. Compliance to the referenced specification requirements was not determined in this report.

In Charge Of Tests:

Hector Huitron
Associate Engineer
Lighting Division

Report Reviewed By:

Timothy Quigley
Engineer
Lighting Division

Attachment: None