REPORT

25800 COMMERCENTRE DRIVE, LAKE FOREST, CA 92630

Project No. G103405222 Date: February 15, 2018

REPORT NO. 103405222LAX-001

TEST OF ONE ASYMETRIC LED

MODEL NO. AS1- LED- H- 35K- 4
LED MODEL NO. OSRAM LED BOARDS
DRIVER MODEL NO. OSRAM DRIVER

RENDERED TO

PRIMUS LIGHTING INC
3570 LEXINGTON AVE
EL MONTE, CA 91731

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

AUTHORIZATION: The testing performed was authorized by signed quote number Qu-00855497-2.

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: 2015: Specifications of the Chromaticity of Solid State Lighting Products

DESCRIPTION OF SAMPLE: The client submitted one production sample of model number AS1- LED- H- 35K- 4. The sample was received by Intertek on February 12, 2018, in undamaged condition and one sample was tested as received. The sample designation was LAN1802120830-001.

DATES OF TESTS: February 14, 2018

SUMMARY

Model No.:	AS1- LED- H- 35K- 4
Description:	ASYMETRIC LED

Criteria	Result
Total Lumen Output (Lumens)	3568
Total Power (W)	44.21
Luminaire Efficacy (LPW)	80.71
Power Factor at 120Vac	0.998
Power Factor at 277Vac	0.968
Current ATHD % at 120Vac	5.87
Current ATHD % at 277Vac	14.23
Correlated Color Temperature (CCT - K)	3445
Color Rendering Index (CRI - Ra)	82.1
Color Rendering Index (CRI - R9)	11.9
DUV	0.000
Chromaticity Coordinate (x)	0.408
Chromaticity Coordinate (y)	0.392
Chromaticity Coordinate (u')	0.237
Chromaticity Coordinate (v')	0.512

EQUIPMENT LIST

Equipment Used	Model Number	Control Number	Last Date Calibrated	Calibration Due Date	Date Used
Goniophotometer	6440T	000943	02/01/18	03/01/18	02/14/18
AC Source	CW1251P	000944	VBU	VBU	02/14/18
Power Analyzer	WT210	000945	11/10/17	11/10/18	02/14/18
Tape Measure	33-428	000684	01/04/18	01/04/19	02/14/18
Magnetic Level	581-9	001610	10/10/17	10/10/18	02/14/18
3m Sphere	CSTM-LMS-3M-3020	000830	01/29/18	02/28/18	02/14/18
Spectrometer	CDS-3020-T	000834	01/29/18	02/28/18	02/14/18
Power Supply (AC 3P / DC)	CSW5550-208-LAN	001339	VBU	VBU	02/14/18
Power Meter	WT333-D-C1/EX2/G5	001321	06/23/17	06/23/18	02/14/18
Stop Watch	365510	001379	11/08/17	11/08/18	02/14/18
Temp. & RH Meter	971	001180	12/21/17	12/21/18	02/14/18
DC Power Supply	LPS-100-0833	000832	01/24/18	01/24/19	02/14/18
Network TC Reader	iSD-TC	000825	03/25/17	03/25/18	02/14/18

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-3020 High Sensitivity Multi Channel Spectrometer and Two Meter or Three Meter 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.

RESULTS OF TEST

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

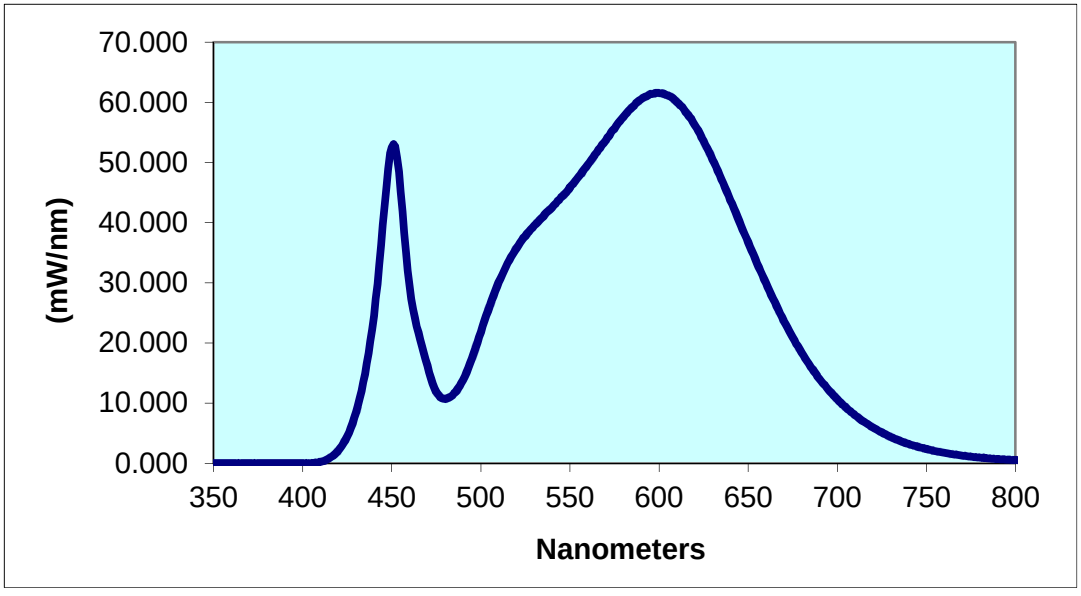
Intertek Sample No.	Base Orientation	Input Voltage {Vac}	Input Current (mA)	Input Power (Watts)	Input Power Factor	Current ATHD (%)
LAN1802120830-001	Up	120.0	368.9	44.19	0.998	5.87
		277.0	166.3	44.61	0.968	14.23

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')
3445	82.1	11.9	0.000	0.408	0.392	0.237	0.512

Spectral Distribution over Visible Wavelengths

nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm
350	0.000	440	24.55	530	39.50	620	56.26	710	7.982
355	0.000	445	39.63	535	41.01	625	53.59	715	6.884
360	0.000	450	52.49	540	42.53	630	50.52	720	5.938
365	0.000	455	45.19	545	44.19	635	47.21	725	5.131
370	0.000	460	29.45	550	45.85	640	43.75	730	4.378
375	0.000	465	21.68	555	47.68	645	40.28	735	3.754
380	0.000	470	16.22	560	49.62	650	36.76	740	3.221
385	0.000	475	11.85	565	51.67	655	33.25	745	2.755
390	0.000	480	10.70	570	53.63	660	29.93	750	2.360
395	0.000	485	11.66	575	55.62	665	26.75	755	2.023
400	0.007	490	13.85	580	57.55	670	23.67	760	1.723
405	0.034	495	17.42	585	59.22	675	20.93	765	1.483
410	0.241	500	21.83	590	60.57	680	18.42	770	1.264
415	0.819	505	26.20	595	61.41	685	16.07	775	1.087
420	2.071	510	30.07	600	61.58	690	14.06	780	0.932
425	4.465	515	33.27	605	61.18	695	12.25		
430	8.480	520	35.75	610	60.09	700	10.61		
435	14.84	525	37.76	615	58.38	705	9.226		

Spectral Data Over Visible Wavelengths



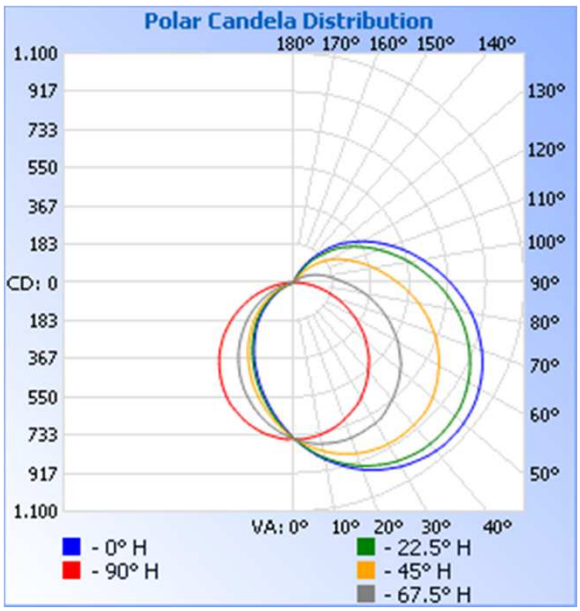
RESULTS OF TEST (cont'd)

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)
LAN1802120830-001	Up	120.1	369.0	44.21	0.998	3568	80.71

Intensity (Candlepower) Summary at 25°C - Candelas

Angle	0	22.5	45	67.5	90
0	750	750	750	750	750
5	808	806	787	772	752
10	864	855	822	786	741
15	913	900	852	794	725
20	957	937	874	795	701
25	992	968	889	788	672
30	1022	991	897	780	640
35	1041	1005	898	760	598
40	1056	1012	892	731	553
45	1059	1011	884	700	506
50	1056	1002	864	662	451
55	1044	987	834	619	395
60	1021	961	800	574	337
65	992	928	759	520	275
70	955	888	713	466	215
75	911	843	664	409	157
80	862	793	610	353	101
85	807	738	553	296	49
90	747	678	497	242	6
95	686	618	442	200	2
100	625	560	392	166	1
105	566	503	347	137	0
110	507	448	301	110	0
115	449	395	262	82	0
120	393	345	224	62	0
125	339	297	183	42	0
130	289	247	141	23	0
135	232	191	100	6	0
140	174	145	62	0	0
145	126	100	36	0	0
150	84	56	13	0	0
155	42	19	2	0	0
160	6	2	0	0	0

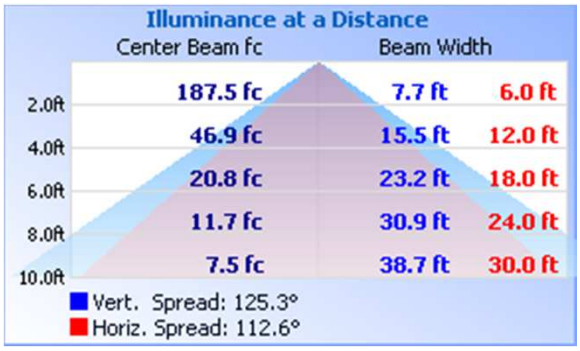


RESULTS OF TEST (cont'd)

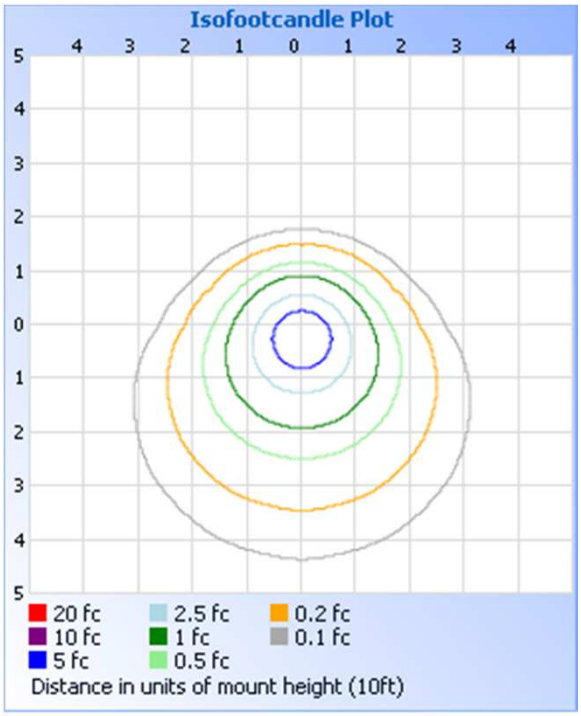
Illumination Plots

Mounting Height: 10 ft.

Illuminance - Cone of Light



Isoillumination Plot



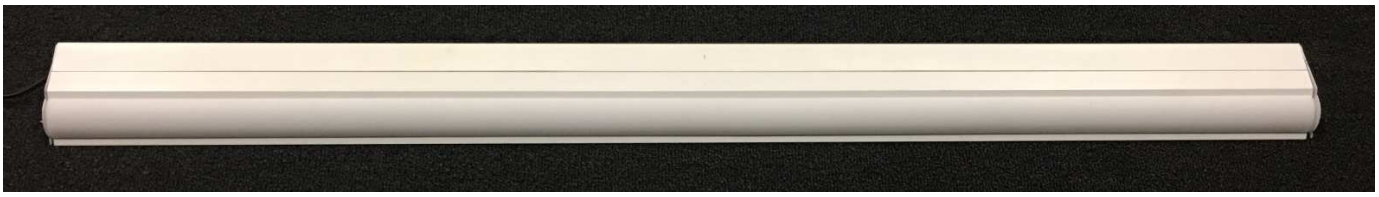
Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens	% Luminaire
0-30	596.7	16.7
0-40	998.6	28.0
0-60	1890	53.0
60-90	1032	28.9
0-90	2922	81.9
90-180	645.8	18.1
0-180	3568	100.0

Zonal Lumens and Percentages at 25°C

Zone	Lumens	% Luminaire
0-10	71.1	2.0
10-20	205.8	5.8
20-30	319.7	9.0
30-40	401.9	11.3
40-50	445.4	12.5
50-60	446.1	12.5
60-70	408.2	11.4
70-80	344.8	9.7
80-90	278.7	7.8
90-100	219.5	6.2
100-110	168.1	4.7
110-120	120.3	3.4
120-130	78.0	2.2
130-140	40.9	1.1
140-150	16.1	0.5
150-160	2.9	0.1
160-170	0.1	0.0

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:

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Lighting Division

Report Reviewed By:

Vladimir Kozak
Engineering Supervisor
Lighting Division

Attachment: None