REPORT

25800 COMMERCENTRE DRIVE, LAKE FOREST, CA 92630

Project No. G102406056 Date: June 3, 2016

REPORT NO. 102406056LAX-064

TEST OF ONE LED LAMP

MODEL NO. SP20-11-60D-927-03
LED MODEL NO. SORAA
DRIVER MODEL NO. SORAA

RENDERED TO

SORAA
6500 KAISER DR. SUITE 110
FREMONT, CA 94555

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

STATEMENT OF LIMITATION: This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the federal government.

AUTHORIZATION: The testing performed was authorized by signed quote number Qu-00660665.

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

DESCRIPTION OF SAMPLE: The client submitted one production sample of model number SP20-11-60D-927-03. The sample was received by Intertek on June 2, 2016, in undamaged condition and one sample was tested as received. The sample designation was LAN1606021358-003.

DATES OF TESTS: June 2, 2016 through June 3, 2016.

SUMMARY

Model No.:	SP20-11-60D-927-03
Description:	LED LAMP

	Result	
Criteria	Sphere	Goniometer
Total Lumen Output (Lumens)	555.0	547.4
Total Power (W)	10.30	10.33
Luminaire Efficacy (LPW)	53.88	52.99

Criteria	Result
Power Factor	0.942
Current ATHD %	32.31
Correlated Color Temperature (CCT - K)	2734
Color Rendering Index (CRI - Ra)	94.5
Color Rendering Index (CRI - R9)	96.6
DUV	0.002
Chromaticity Coordinate (x)	0.454
Chromaticity Coordinate (y)	0.404
Chromaticity Coordinate (u')	0.261
Chromaticity Coordinate (v')	0.524

EQUIPMENT LIST

Equipment Used	Model Number	Control Number	Last Date Calibrated	Calibration Due Date
LapSphere 2M Integrating Sphere	LMS760	000835	05/18/16	06/18/16
LabSphere Spectrometer	CDS-3020	000838	05/18/16	06/18/16
California Instruments Power Supply	CSW5550	001339	VBU	VBU
Yokogawa Power Meter	WT333	001320	06/03/15	06/03/16
Extech Instruments Stop Watch	365510	001379	11/19/15	11/19/16
Temp & HR Meter	971	001178	12/18/15	12/18/16
DC Power Supply	LPS-100-0833	000836	05/11/16	05/11/17
LSI High Speed Mirror Goniometer	6440T	000943	05/11/16	06/11/16
Elgar Power Supply	CW1251	000944	VBU	VBU
Yokogawa Power Analyzer	WT210	000945	12/04/15	12/04/16
Tape Measure	C1-25	000915	12/04/15	12/04/16

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 CDS 3020 Spectrometer and Two 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 Yokogawa Power Analyzer.

The calibration of the sphere spectrometer 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 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

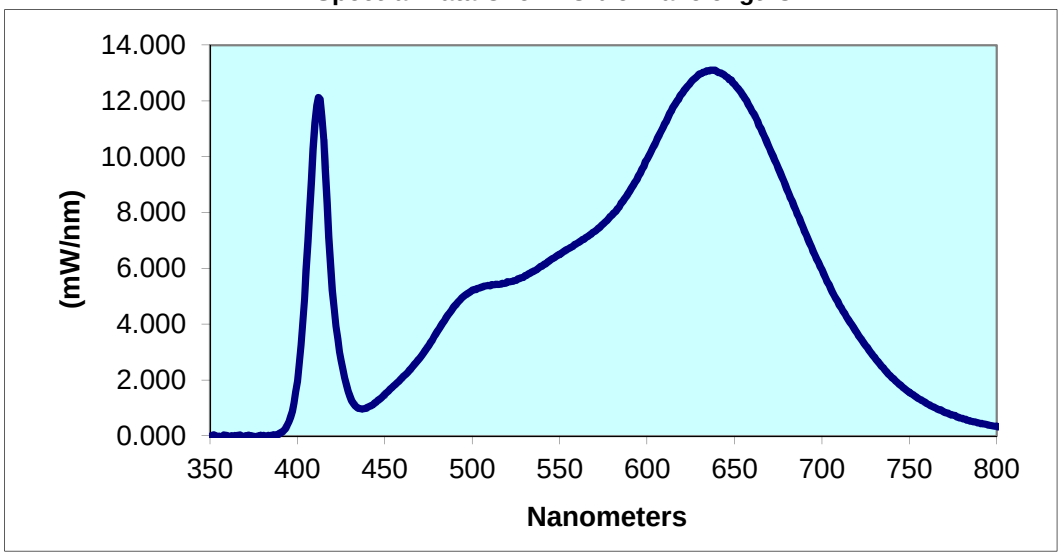
Intertek Sample No.	Base Orientation	Input Voltage {Vac}	Input Current (mA)	Input Power (Watts)	Input Power Factor	Current ATHD (%)	Luminous Flux (Lumens)	Lumen Efficacy (LPW)
LAN1606021358-003	UP	120.0	91.10	10.30	0.942	32.31	555.0	53.88

Correlated Color Temperature (K)	CRI -Ra	CRI -R9	DUV	CIE 31' Chromaticity Coordinate	CIE 31' Chromaticity Coordinate (y)	CIE 76' Chromaticity Coordinate (u')	CIE 76' Chromaticity Coordinate (v')
2734	94.5	96.6	0.002	0.454	0.404	0.261	0.524

Spectral Distribution over Visible Wavelengths

nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm
350	-0.138	440	1.024	530	5.739	620	12.270	710	4.682
355	-0.013	445	1.221	535	5.899	625	12.680	715	4.167
360	-0.006	450	1.493	540	6.095	630	12.970	720	3.692
365	-0.010	455	1.794	545	6.318	635	13.070	725	3.237
370	0.000	460	2.100	550	6.508	640	13.060	730	2.806
375	-0.013	465	2.426	555	6.706	645	12.880	735	2.439
380	0.014	470	2.785	560	6.899	650	12.590	740	2.094
385	0.020	475	3.232	565	7.112	655	12.180	745	1.810
390	0.110	480	3.749	570	7.330	660	11.630	750	1.558
395	0.511	485	4.231	575	7.603	665	11.010	755	1.343
400	1.962	490	4.666	580	7.918	670	10.290	760	1.163
405	5.914	495	4.997	585	8.319	675	9.592	765	1.001
410	11.220	500	5.222	590	8.780	680	8.836	770	0.855
415	10.620	505	5.324	595	9.313	685	8.087	775	0.742
420	5.217	510	5.375	600	9.913	690	7.332	780	0.629
425	2.710	515	5.430	605	10.540	695	6.609		
430	1.413	520	5.515	610	11.180	700	5.940		
435	0.991	525	5.579	615	11.790	705	5.290		

Spectral Data Over Visible Wavelengths



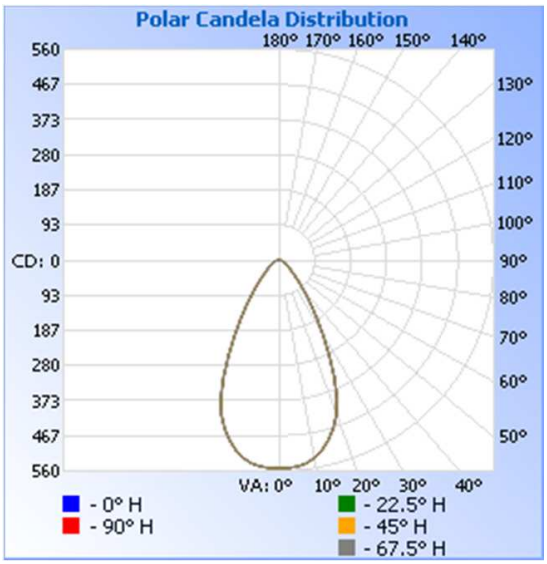
RESULTS OF TEST (cont'd)

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 (Lumens Per Watt)
LAN1606021358-003	UP	120.1	90.99	10.33	0.945	547.4	52.99

Intensity (Candlepower) Summary at 25°C - Candelas

Angle	0	22.5	45	67.5	90
0	553	553	553	553	553
5	550	550	550	550	550
10	533	533	533	533	533
15	495	495	495	495	495
20	437	437	437	437	437
25	341	341	341	341	341
30	231	231	231	231	231
35	149	149	149	149	149
40	94	94	94	94	94
45	61	61	61	61	61
50	41	41	41	41	41
55	31	31	31	31	31
60	24	24	24	24	24
65	18	18	18	18	18
70	14	14	14	14	14
75	10	10	10	10	10
80	7	7	7	7	7
85	3	3	3	3	3
90	0	0	0	0	0

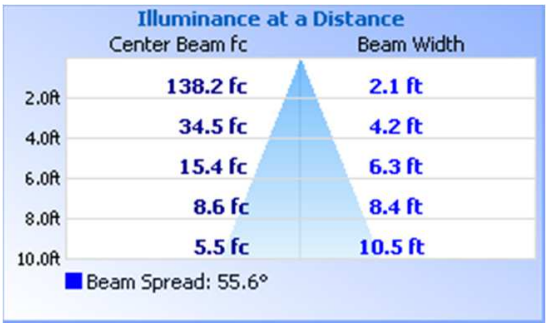


RESULTS OF TEST (cont'd)

Illumination Plots

Mounting Height: 10 ft.

Illuminance - Cone of Light



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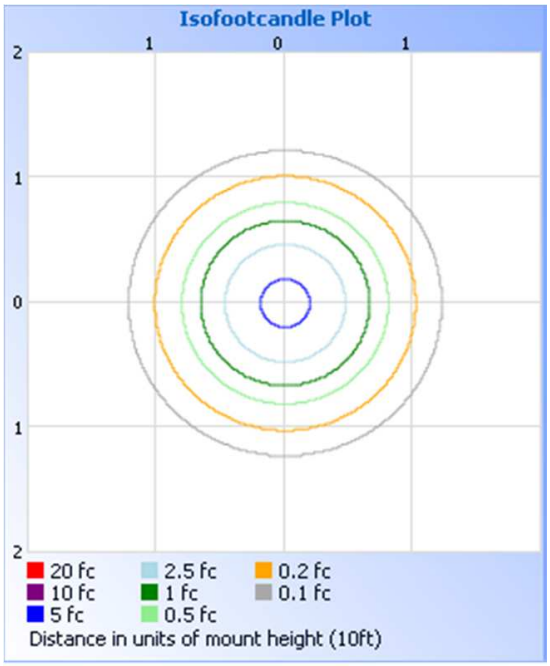

Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens	% Luminaire
0-30	343.0	62.7
0-40	438.2	80.0
0-60	514.5	94.0
60-90	32.8	6.0
0-90	547.3	100.0
90-180	0.0	0.0
0-180	547.4	100.0

Zonal Lumens and Percentages at 25°C

Zone	Lumens	% Luminaire
0-10	51.9	9.5
10-20	137.8	25.2
20-30	153.3	28.0
30-40	95.1	17.4
40-50	48.3	8.8
50-60	28.1	5.1
60-70	18.4	3.4
70-80	10.9	2.0
80-90	3.4	0.6

PICTURE (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:

Kenda Branch
Lighting Performance Team Leac
Lighting Division

Report Reviewed By:

Timothy Quigley
Engineer
Lighting Division

Attachment: None