

# REPORT

25800 COMMERCENTRE DRIVE, LAKE FOREST, CA 92630

Project No. G104160086

Date: November 26, 2019

REPORT NO. 104160086LAX-004

TEST OF ONE LED LUMINAIRE

MODEL NO. S1-LED35-HO-SAL  
LED MODEL NO. LUMILEDS 2835E 9V  
DRIVER MODEL NO. OSRAM OTI 50W G2

RENDERED TO

PRUDENTIAL LIGHTING  
1774 E 21ST STREET  
LOS ANGELES, CA 90058

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

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

**AUTHORIZATION:** The testing performed was authorized by signed quote number Qu-01019626-1.

**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

UL 1598-2009: Underwriters Laboratories Inc. Standard for Safety - Luminaires

**DESCRIPTION OF SAMPLE:** The client submitted one prototype sample of model number S1-LED35-HO-SAL. The sample was received by Intertek on November 18, 2019, in undamaged condition and one sample was tested as received. The sample designation was LAN1911181404-001.

**DATES OF TESTS:** November 21, 2019 through November 26, 2019.

# SUMMARY

Model No.:	S1-LED35-HO-SAL
Description:	LED Luminaire

Criteria	Result	
	Sphere	Goniometer
Total Lumen Output (Lumens)	6759	6457
Total Power (W)	50.23	49.70
Luminaire Efficacy (LPW)	134.6	129.9

Criteria	Result
Power Factor at 120Vac	0.989
Power Factor at 277Vac	0.933
Current ATHD % at 120Vac	7.93
Current ATHD % at 277Vac	14.55
Correlated Color Temperature (CCT - K)	3518
Color Rendering Index (CRI - Ra)	82.2
Color Rendering Index (CRI - R9)	2.0
DUV	0.001
Chromaticity Coordinate (x)	0.406
Chromaticity Coordinate (y)	0.395
Chromaticity Coordinate (u')	0.234
Chromaticity Coordinate (v')	0.513
Maximum In-Situ Source Temperature Point (°C)	63.2
Maximum In-Situ Driver Case Temperature (°C)	70.7

# EQUIPMENT LIST

Equipment Used	Model Number	Control Number	Last Date Calibrated	Calibration Due Date	Date Used
Goniophotometer	6440T	000943	VBV	VBV	11/21/19
AC Source	CW1251P	000944	VBV	VBV	11/21/19
Power Analyzer	WT210	000945	10/02/19	10/02/20	11/21/19
Tape Measure	33-428	001491	VBV	VBV	11/21/19
Magnetic Level	581-9	001610	10/11/19	10/11/20	11/21/19
Temp. & RH Meter	971	001177	01/29/19	01/29/20	11/21/19
Thermometer	DPi8-C24	001782	10/15/19	10/15/20	11/21/19
3m Sphere	CSTM-LMS-3M-3020	000830	VBV	VBV	11/22/19
Spectrometer	CDS-3020-T	000834	VBV	VBV	11/22/19
Power Supply (AC 3P / DC)	CSW5550-208-LAN	001339	VBV	VBV	11/22/19
Power Meter	WT330	001319	07/02/19	07/02/20	11/22/19
Temp. & RH Meter	971	001177	01/29/19	01/29/20	11/22/19
DC Power Supply	LPS-100-0833	000832	01/31/19	01/31/20	11/22/19
Network TC Reader	iSD-TC	000824	02/01/19	02/01/20	11/22/19
AC Source	CW1251P-V	001334	VBV	VBV	11/26/19
Power Meter	WT330	001322	10/02/19	10/02/20	11/26/19
Thermometer	52 Series II	001018	01/21/19	01/21/20	11/26/19
True RMS Multimeter	87	000322	11/27/18	11/27/19	11/26/19
Temp. & RH Meter	971	001177	01/29/19	01/29/20	11/26/19

## 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.

### In-Situ Maximum Measured Power Supply Case and LED Source Point Temperature

Power supply case and/or LED source operating temperature measurements were taken on one test sample per model with a thermocouple and Fluke 87 temperature meter. The SSL sample was allowed to reach thermal equilibrium for seven and a half hours before measurements were taken. Power supply or source temperature measurements were measured at the TMPPS or TS point as indicated by the included diagram in accordance with manufacturers declared hot spot location, or at a hot spot location found with a thermal camera when no diagram from the manufacturer is given. The maximum temperature was recorded for the sample. A simulated ceiling or other enclosure may be used in accordance to UL 1598 or UL 153 as applicable.

## RESULTS OF TEST

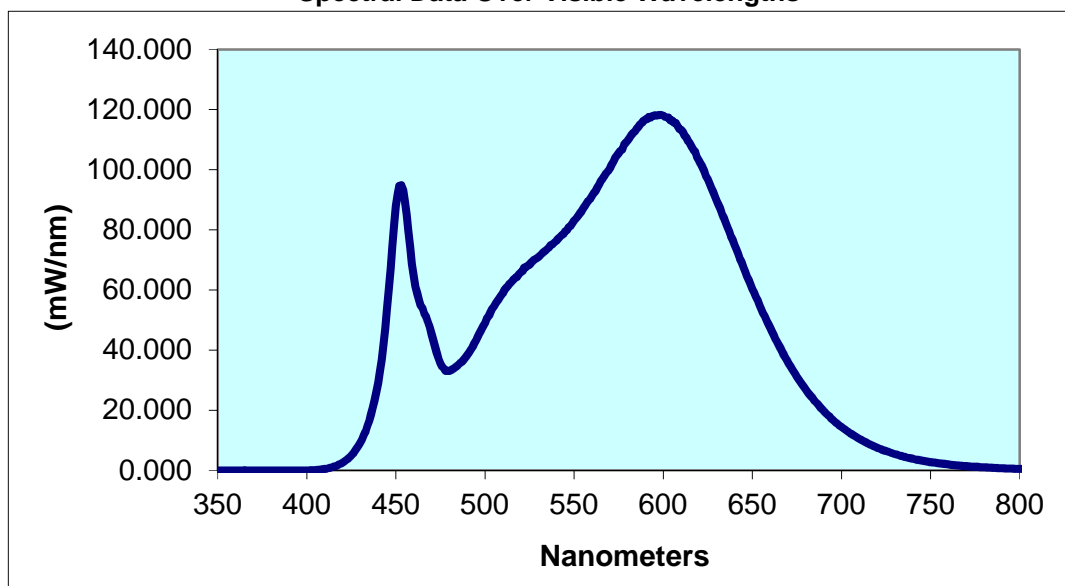
### Photometric and Electrical Measurements at Ambient Temperature (25°C +/- 1°C) - Integrating Sphere Method

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)
LAN1911181404-001	Up	120.0 276.9	423.3 190.0	50.23 49.11	0.989 0.933	7.93 14.55	6759	134.6
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')	
3518	82.2	2.0	0.001	0.406	0.395	0.234	0.513	

### Spectral Distribution over Visible Wavelengths

nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm
350	0.000	440	29.19	530	70.95	620	103.2	710	10.49
355	0.000	445	53.40	535	73.72	625	96.85	715	8.912
360	0.000	450	87.98	540	76.30	630	89.64	720	7.578
365	0.037	455	89.79	545	79.54	635	82.40	725	6.429
370	0.000	460	64.60	550	83.11	640	75.08	730	5.445
375	0.000	465	53.83	555	87.04	645	67.63	735	4.586
380	0.000	470	45.19	560	91.25	650	60.32	740	3.863
385	0.000	475	35.65	565	96.16	655	53.64	745	3.285
390	0.000	480	33.10	570	100.5	660	47.49	750	2.776
395	0.000	485	35.13	575	105.5	665	41.54	755	2.311
400	0.000	490	38.32	580	109.6	670	36.10	760	1.979
405	0.113	495	43.28	585	113.5	675	31.21	765	1.676
410	0.476	500	49.00	590	116.7	680	26.90	770	1.430
415	1.204	505	54.62	595	118.1	685	23.08	775	1.196
420	2.527	510	58.84	600	118.0	690	19.82	780	1.018
425	4.973	515	62.78	605	116.4	695	16.92		
430	9.185	520	65.85	610	113.3	700	14.46		
435	16.50	525	68.45	615	108.8	705	12.34		

**Spectral Data Over Visible Wavelengths**



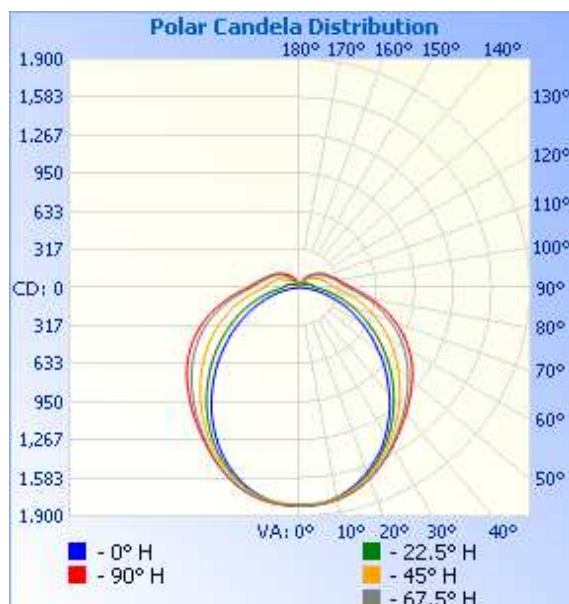
RESULTS OF TEST (cont'd)

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)
LAN1911181404-001	Up	120.0	419.0	49.70	0.988	6457	129.9

Intensity (Candlepower) Summary at 25°C - Candelas

Angle	0	22.5	45	67.5	90
0	1809	1809	1809	1809	1809
5	1807	1804	1799	1810	1810
10	1772	1774	1775	1789	1791
15	1712	1722	1731	1748	1752
20	1631	1651	1666	1687	1692
25	1534	1561	1584	1609	1615
30	1420	1454	1487	1519	1529
35	1292	1336	1383	1428	1446
40	1153	1211	1278	1340	1366
45	1014	1082	1170	1254	1288
50	869	952	1062	1168	1212
55	733	823	956	1082	1133
60	595	697	851	991	1047
65	471	580	747	895	951
70	350	469	644	793	846
75	242	365	543	688	736
80	142	272	449	582	624
85	64	195	364	486	520
90	0	135	294	400	429
95	0	122	263	354	378
100	0	112	238	316	336
105	0	98	216	284	302
110	0	85	196	258	274
115	0	75	174	234	251
120	0	67	152	210	228
125	0	60	134	183	202
130	0	54	118	160	178
135	0	48	104	140	156
140	0	42	90	122	136
145	0	37	77	105	116
150	0	32	65	89	95
155	0	27	52	72	75
160	0	23	41	55	57
165	0	21	30	41	28
170	0	19	24	27	16
175	0	17	18	18	12



## RESULTS OF TEST (cont'd)

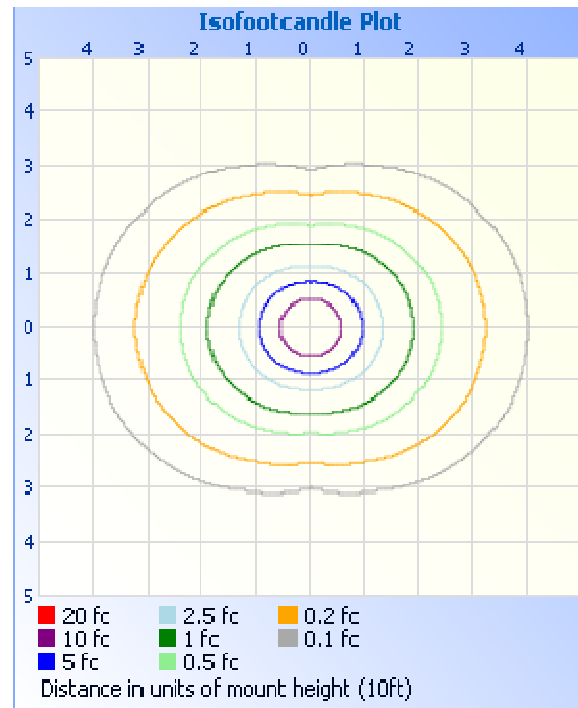
### Illumination Plots

Mounting Height: 10 ft.

Illuminance - Cone of Light



Isoillumination Plot



Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens	% Luminaire
0-30	1386	21.5
0-40	2246	34.8
0-60	3985	61.7
60-90	1632	25.3
0-90	5617	87.0
90-180	839.9	13.0
0-180	6457	100.0

#### Spacing Criterion at 25°C

Spacing Criterion (0-180)	1.18
Spacing Criterion (90-270)	1.26
Spacing Criterion (Diagonal)	1.36

Zonal Lumens and Percentages at 25°C

Zone	Lumens	% Luminaire
0-10	171.4	2.7
10-20	488.1	7.6
20-30	726.7	11.3
30-40	860.3	13.3
40-50	894.4	13.9
50-60	843.7	13.1
60-70	721.6	11.2
70-80	546.9	8.5
80-90	363.9	5.6
90-100	254.4	3.9
100-110	199.6	3.1
110-120	149.5	2.3
120-130	102.8	1.6
130-140	65.6	1.0
140-150	39.2	0.6
150-160	20.0	0.3
160-170	7.4	0.1
170-180	1.5	0.0

## RESULTS OF TEST (cont'd)

### In-Situ Maximum Measured LED Source Temperature

#### Manufacturer Supplied Documentation:

PART NUMBER	FORWARD VOLTAGE <sup>(1)</sup> (V <sub>f</sub> )			TYPICAL TEMPERATURE COEFFICIENT OF FORWARD VOLTAGE <sup>(2)</sup> (mV/°C)	TYPICAL THERMAL RESISTANCE—JUNCTION TO SOLDER PAD (°C/W)
	MINIMUM	TYPICAL	MAXIMUM		
L128-xxxxEC3500001	8.7	9.1	9.9	-3.0 to -6.0	15
L128-xxxxEC35000B1	8.7	9.3	9.9	-3.0 to -6.0	15

LED Junction Temperature <sup>(1)</sup> (DC & Pulse)

125°C for L128-xxxxEC35000x1  
125°C for L128-xxxxEB3500001  
115°C for L128-xxxxEA3500001  
125°C for L128-xxxxCx35000x1  
125°C for L128-xxxxHA35000x1



Maximum Junction Temperature from LED specification (T<sub>j</sub>) = 125°C

Thermal Resistance Formula from LED specification = 15°C/W

Maximum Forward Voltage (V<sub>f</sub>) from LED specification = 9.9V

Measured LED Current = 27mA

Calculated LED Wattage = V<sub>f</sub> x Measured LED Current = 0.267W

Maximum Source Temperature (T<sub>s</sub>) = T<sub>j</sub> – (LED Wattage x Thermal Resistance) = 121°C

### Maximum Measured Manufacturer Designated Source Temperature

Sample No.	Maximum Measured Source Temperature (°C)	Location	Maximum Rated Source Temperature (°C)
LAN1911181404-001	63.2	Per specs above	121.0

### LED In-Situ Picture – T<sub>s</sub>



### LED In-Situ Picture – T<sub>s</sub> Location





RESULTS OF TEST (cont'd)

In-Situ Maximum Measured Power Supply Case Temperature

Manufacturer Supplied Documentation:

Case Temperature (T <sub>c</sub> )	85°C Max, 75°C – 5 Year Warranty <sup>1)</sup>
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Sample No.	Maximum Measured Source Temperature (°C)	Location	Maximum Rated Source Temperature (°C)
LAN1911181404-001	70.7	Per specs above	85.0

Driver In-Situ Picture – Ts Location





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:



Erik Linares  
Associate Engineer  
Lighting Division

Attachment: None

Report Reviewed By:



Vladimir Kozak  
Engineering Supervisor  
Lighting Division