



REPORT

25800 COMMERCENTRE DRIVE, LAKE FOREST, CA 92630

Project No. G101844208

Original Release Date: October 30, 2014

Revision Date: November 11, 2014

REPORT NO. 101844208LAX-006

TEST OF ONE LINEAR RETROFIT

RETROFIT MODEL NO. RKL45U4535(DV)
LED MODEL NO. SAMSUNG LM561B
DRIVER MODEL NO. HANSOL HPL45W1B-DIM
TROFFER MODEL NO. LITHONIA 2GT8 FIXTURES

RENDERED TO

MAXLITE, INC.
12 YORK AVENUE
WEST CALDWELL, NJ 07006

Revision Note November 11, 2014: Revised report to correct the products model number.

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

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 500553301.

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

Energy Star Manufacturer's Guide Version 2.1 (2010): Guide for Qualifying Solid State Lighting Luminaires

DESCRIPTION OF SAMPLE: The client submitted one production sample of model number RKL45U4535(DV). The sample was received by Intertek on October 22, 2014 with the lens slightly damaged, and one sample was tested as received. The sample designation was LAN1410221013-007.

DATES OF TESTS: October 28, 2014 through October 29, 2014

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SUMMARY

Model No.:	RKL45U4535(DV)
Description:	Linear Retrofit

Criteria	Result	
	Sphere	Goniometer
Total Lumen Output (Lumens)	4072	3900
Total Power (W)	44.70	44.59
Luminaire Efficacy (LPW)	91.1	87.46

Criteria	Result
Power Factor at 120.02Vac	0.988
Power Factor at 277.02Vac	0.901
Current ATHD % at 120.02Vac	13.62
Current ATHD % at 277.02Vac	21.38
Correlated Color Temperature (CCT - K)	3418
Color Rendering Index (CRI - Ra)	83.4
Color Rendering Index (CRI - R9)	17.8
DUV	0.003
Chromaticity Coordinate (x)	0.407
Chromaticity Coordinate (y)	0.386
Chromaticity Coordinate (u')	0.239
Chromaticity Coordinate (v')	0.510
Maximum In-Situ Source Temperature Point (°C)	39.8
Spacing Criteria (0-180°)	1.24
Spacing Criteria (90-270°)	1.24

EQUIPMENT LIST

Equipment Used	Model Number	Control Number	Last Date Calibrated	Calibration Due Date
DC Power Supply	LPS-100-0833	000832	05/20/14	05/20/15
LapSphere 3M Integrating Sphere	CA-11821-LRT	000830	10/03/14	11/03/14
LabSphere Spectrometer	CDS-3020	000834	10/03/14	11/03/14
California Instruments Power Supply	CSW5550	001338	06/05/14	06/05/15
Yokogawa Power Meter	WT333	001320	05/15/14	05/15/15
Extech Instruments Stop Watch	365510	001380	11/05/13	11/05/14
Temp. & RH Meter	971	001178	12/03/13	12/03/14
LSI High Speed Mirror Goniometer	6440T	000943	10/03/14	11/03/14
Elgar Power Supply	CW1251	000944	05/29/14	05/29/15
Yokogawa Power Analyzer	WT210	000945	11/14/13	11/14/14
Temp. & RH Meter	971	001178	12/03/13	12/03/14
Extech Instruments Stop Watch	365510	001380	11/05/13	11/05/14
Tape Measure	33-428	000684	12/09/13	12/09/14
Thermometer	52II	1262	09/05/14	09/05/15
Power Meter	WT333-D-C1/EX2/G5	1320	05/05/14	05/05/15
Power Supply (AC 3P / DC)	CSW5550-208-LAN	1338	06/09/14	06/09/15

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 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 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.

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

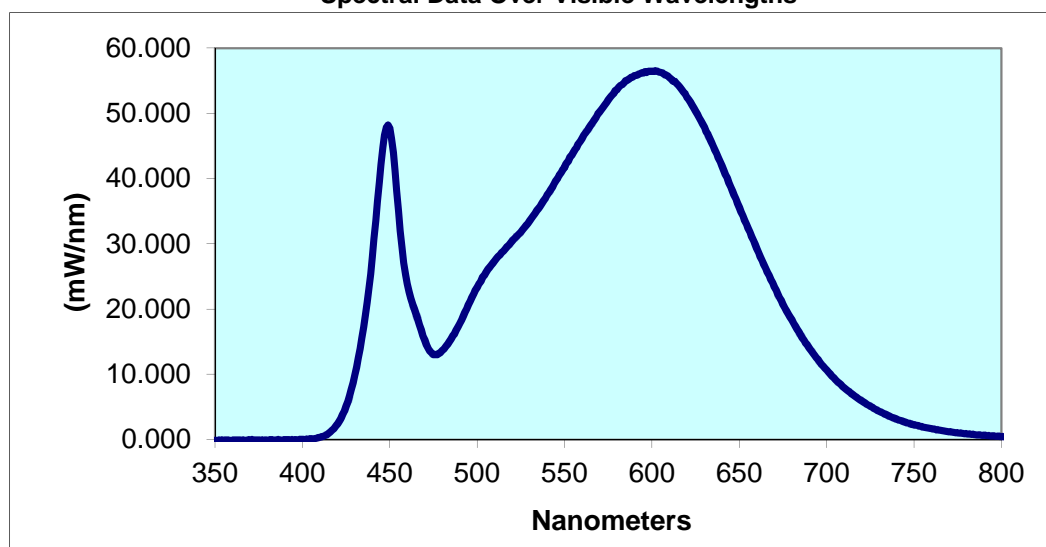
Photometric and Electrical Measurements at Ambient Temperature (25°C +/- 1°C) - Integrating Sphere Method

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)
LAN1410221013-007	UP	120.0	377.0	44.70	0.988	13.62	4072	91.1
		277.0	185.7	46.38	0.901	21.38		
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')	
3418	83.4	17.8	0.003	0.407	0.386	0.239	0.510	

Spectral Distribution over Visible Wavelengths

nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm
350	-0.129	440	27.980	530	33.560	620	52.490	710	7.959
355	-0.108	445	42.150	535	35.370	625	50.370	715	6.872
360	-0.102	450	47.630	540	37.480	630	47.840	720	5.927
365	-0.079	455	35.010	545	39.640	635	44.990	725	5.093
370	-0.046	460	23.890	550	41.770	640	42.010	730	4.331
375	-0.100	465	19.200	555	44.050	645	38.740	735	3.670
380	-0.085	470	15.200	560	46.150	650	35.530	740	3.143
385	-0.068	475	13.000	565	48.260	655	32.380	745	2.664
390	-0.029	480	13.650	570	50.220	660	29.300	750	2.270
395	-0.028	485	15.420	575	52.060	665	26.250	755	1.934
400	-0.006	490	17.780	580	53.700	670	23.410	760	1.674
405	0.078	495	20.670	585	55.000	675	20.750	765	1.429
410	0.326	500	23.370	590	55.820	680	18.330	770	1.196
415	0.984	505	25.630	595	56.200	685	16.060	775	1.033
420	2.368	510	27.390	600	56.450	690	14.020	780	0.869
425	5.104	515	28.910	605	56.280	695	12.210		
430	9.828	520	30.430	610	55.500	700	10.630		
435	17.220	525	31.800	615	54.340	705	9.198		

Spectral Data Over Visible Wavelengths



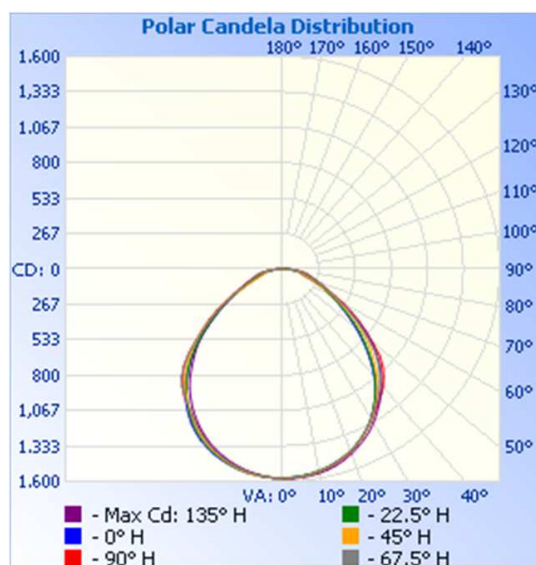
RESULTS OF TEST (cont'd)

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)
LAN1410221013-007	UP	120.0	375.7	44.59	0.989	3900	87.46

Intensity (Candlepower) Summary at 25°C - Candelas

Angle	0	22.5	45	67.5	90
0	1576	1576	1576	1576	1576
5	1564	1564	1568	1570	1571
10	1543	1542	1546	1550	1552
15	1507	1508	1512	1511	1516
20	1458	1457	1458	1460	1465
25	1391	1389	1395	1391	1392
30	1300	1303	1307	1303	1309
35	1189	1186	1203	1213	1227
40	1050	1055	1084	1113	1151
45	887	899	939	992	1044
50	717	739	793	830	870
55	562	575	621	653	686
60	434	424	456	491	515
65	335	314	323	360	366
70	257	237	219	275	274
75	186	179	156	211	216
80	138	126	124	150	167
85	72	69	73	88	99
90	5	4	9	16	21

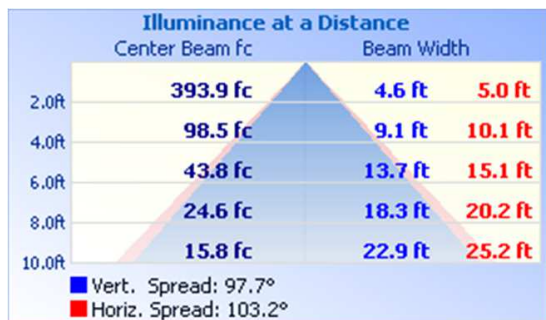


RESULTS OF TEST (cont'd)

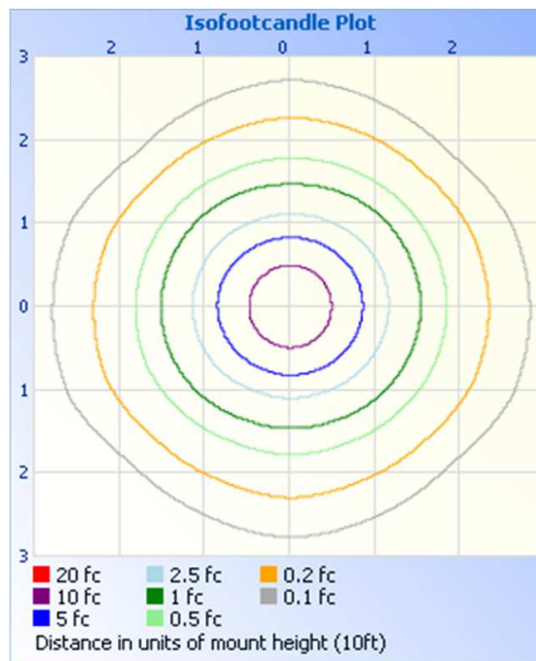
Illumination Plots

Mounting Height: 10 ft.

Illuminance - Cone of Light



Isoillumination Plot



Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens	% Luminaire
0-30	1218	31.2
0-40	1978	50.7
0-60	3284	84.2
60-90	614.0	15.7
0-90	3898	100.0
90-180	1.6	0.0
0-180	3900	100.0

Zonal Lumens and Percentages at 25°C

Zone	Lumens	% Luminaire
0-10	149.1	3.8
10-20	426.7	10.9
20-30	642.7	16.5
30-40	759.3	19.5
40-50	744.0	19.1
50-60	562.7	14.4
60-70	336.1	8.6
70-80	194.0	5.0
80-90	83.9	2.2
90-100	1.6	0.0

Spacing Criteria

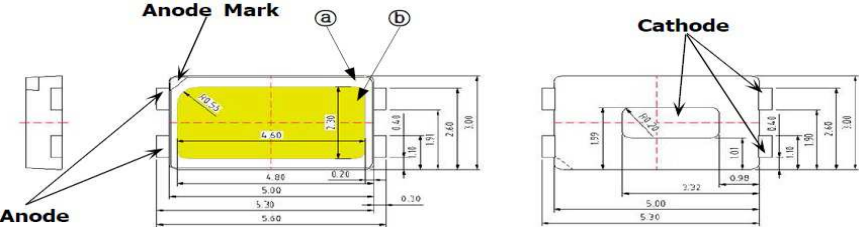
0-180°	1.24
90-270°	1.24

RESULTS OF TEST (cont'd)

In-Situ Maximum Measured LED Source Temperature

Manufacturer Supplied Documentation:

LED model identified as:



2) Ts point & measurement method

- ① Measure the nearest point to the thermal pad. If necessary, remove PSR of PCB to reach Ts point.

LED junction temperature		T _J		110 °C		-	
Thermal resistance		R _{th, j-s}		16 °C/W		Junction to solder point	
Forward Voltage ¹⁾ (V _F) (@65 mA, T _s = 25 °C)	V	-	-	WA	AZ	2.70	2.80
					A1	2.80	2.90
					A2	2.90	3.00
					A3	3.00	3.10
					A4	3.10	3.20

Maximum Junction Temperature from LED specification (T_J) = 110°C
 Thermal Resistance Formula from LED specification = 16°C/W
 Maximum Forward Voltage (V_f) from LED specification = 3.2V
 Measured LED Current = 20mA
 Calculated LED Wattage = V_f x Measured LED Current = 0.064W
 Maximum Source Temperature (T_s) = T_J - (LED Wattage x Thermal Resistance) = 109°C

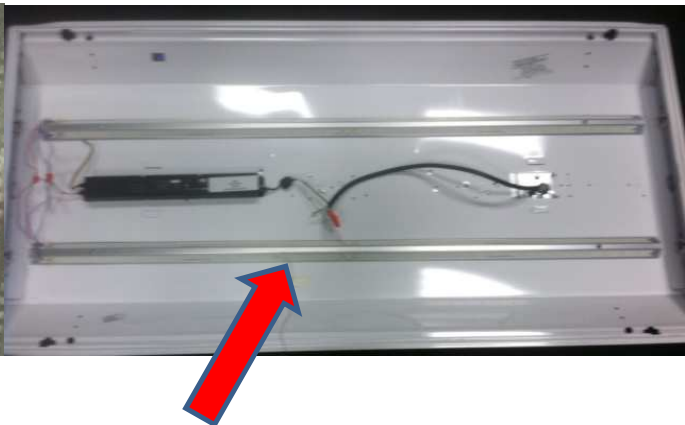
Maximum Measured Manufacturer Designated Source Temperature

Sample No.	Maximum Measured Source Temperature (°C)	Location	Maximum Rated Source Temperature (°C)
LAN1410221013-007	39.8	Per diagram	109

In-Situ Picture – Ts



In-Situ Picture – Ts locator



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:



Erik Linares
Technician
Lighting Division

Attachment: None

Report Reviewed By:



Jeffrey Davis
Engineering Manager
Lighting Division