



REPORT

25800 COMMERCE DRIVE, LAKE FOREST, CA 92630

Project No. G102267194

Date: April 29, 2016

REPORT NO. 102267194LAX-014

TEST OF ONE LED REPLACEMENT LAMP FOR WALL PACK

MODEL NO. DEG-070120
LED MODEL NO. CREE XM-L2
DRIVER MODEL NO. MAGTECH Q22-U12-C1400-XP

RENDERED TO

DIFFERENTIAL ENERGY GLOBAL LTD.
1540 LEADER INTERNATIONAL DRIVE
POR ORCHARD, WA 98367

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-00636610.

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 DEG-070120. The sample was received by Intertek on February 25, 2016, in undamaged condition and one sample was tested with MagTech Q22-U12-C1400-XP driver installed. The sample designation was LAN1602251534-007.

DATES OF TESTS: April 7, 2016 through April 26, 2016.

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SUMMARY

Model No.:	DEG-070120
Description:	LED Replacement Lamp for Wall Pack

Criteria	Result	
	Sphere	Goniometer
Total Lumen Output (Lumens)	1345	1395
Total Power (W)	20.79	20.78
Luminaire Efficacy (LPW)	64.69	67.13

Criteria	Result
Power Factor at 109.99Vac	0.996
Power Factor at 277.03Vac	0.957
Current ATHD % at 109.99Vac	8.32
Current ATHD % at 277.03Vac	11.11
Correlated Color Temperature (CCT - K)	4532
Color Rendering Index (CRI - Ra)	73.4
Color Rendering Index (CRI - R9)	-17.2
DUV	0.002
Chromaticity Coordinate (x)	0.361
Chromaticity Coordinate (y)	0.369
Chromaticity Coordinate (u')	0.215
Chromaticity Coordinate (v')	0.495
Maximum In-Situ Source Temperature Point (°C)	52.7

EQUIPMENT LIST

Equipment Used	Model Number	Control Number	Last Date Calibrated	Calibration Due Date	Date Used
DC Power Supply	LPS-100-0833	000836	05/07/15	05/07/16	04/26/16
LapSphere 3M Integrating Sphere	CA-11821-LRT	000830	04/08/16	05/08/16	04/26/16
LabSphere Spectrometer	CDS-3020	000834	04/08/16	05/08/16	04/26/16
California Instruments Power Supply	CSW5550	001339	VBV	VBV	04/26/16
Yokogawa Power Meter	WT333	001320	06/03/15	06/03/16	04/26/16
Extech Instruments Stop Watch	365510	001379	11/19/15	11/19/16	04/26/16
LSI High Speed Mirror Goniometer	6440T	000943	03/08/16	04/08/16	04/07/16
Elgar Power Supply	CW1251	000944	VBV	VBV	04/07/16
Yokogawa Power Analyzer	WT210	000945	12/04/15	12/04/16	04/07/16
Tape Measure	C1-25	000915	12/04/15	12/04/16	04/07/16
AC Source	CW1251P	001336	VBV	VBV	04/28/16
Multimeter	87 V	000323	07/28/15	07/27/16	04/28/16
Thermometer	52 Series II	001018	01/19/15	01/19/16	04/28/16

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 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

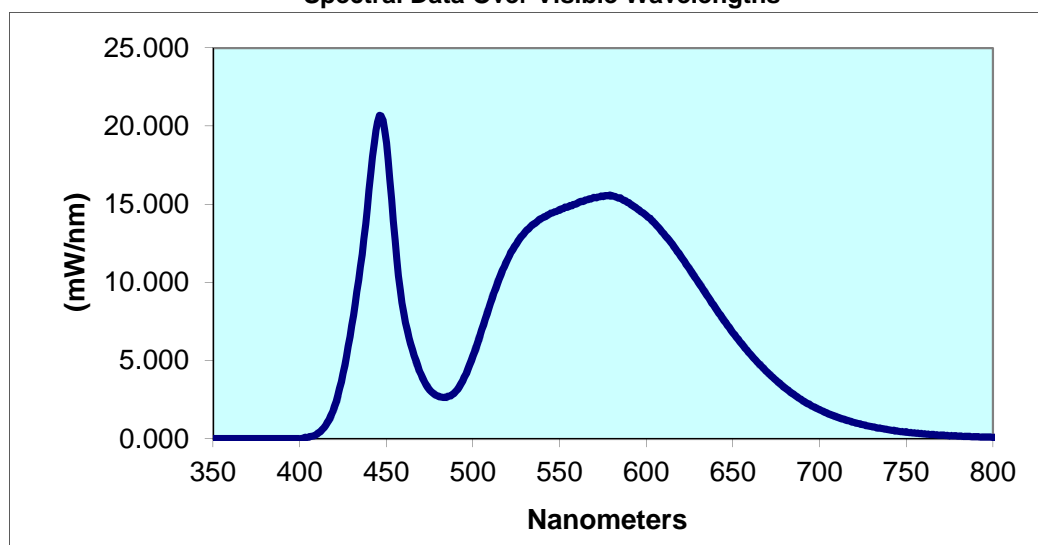
Photometric and Electrical Measurements at Ambient Temperature (25°C +/- 1°C) - Integrating Sphere Method

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)
LAN1602251534-007	UP	110.0 277.0	189.9 79.40	20.79 21.04	0.996 0.957	8.32 11.11	1345	64.69
Correlated Color Temperature	CRI -Ra	CRI -R9	DUV	CIE 31' Chromaticity y	CIE 31' Chromaticity Coordinate (y)	CIE 76' Chromaticity Coordinate (u')	CIE 76' Chromaticity Coordinate (v')	
4532	73.4	-17.2	0.002	0.361	0.369	0.215	0.495	

Spectral Distribution over Visible Wavelengths

nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm
350	0.005	440	15.91	530	13.23	620	11.65	710	1.392
355	0.005	445	20.28	535	13.73	625	10.85	715	1.209
360	0.005	450	18.92	540	14.13	630	10.01	720	1.047
365	0.005	455	12.67	545	14.43	635	9.175	725	0.909
370	0.005	460	8.033	550	14.64	640	8.349	730	0.781
375	0.005	465	5.691	555	14.86	645	7.530	735	0.669
380	0.005	470	4.117	560	15.06	650	6.776	740	0.573
385	0.005	475	3.120	565	15.27	655	6.070	745	0.501
390	0.005	480	2.725	570	15.44	660	5.414	750	0.424
395	0.005	485	2.678	575	15.51	665	4.798	755	0.363
400	0.005	490	3.031	580	15.53	670	4.244	760	0.316
405	0.111	495	3.935	585	15.40	675	3.726	765	0.267
410	0.317	500	5.305	590	15.10	680	3.267	770	0.231
415	0.862	505	6.961	595	14.68	685	2.850	775	0.198
420	2.052	510	8.647	600	14.27	690	2.464	780	0.172
425	4.184	515	10.20	605	13.76	695	2.136		
430	7.227	520	11.51	610	13.14	700	1.858		
435	10.98	525	12.47	615	12.45	705	1.610		

Spectral Data Over Visible Wavelengths



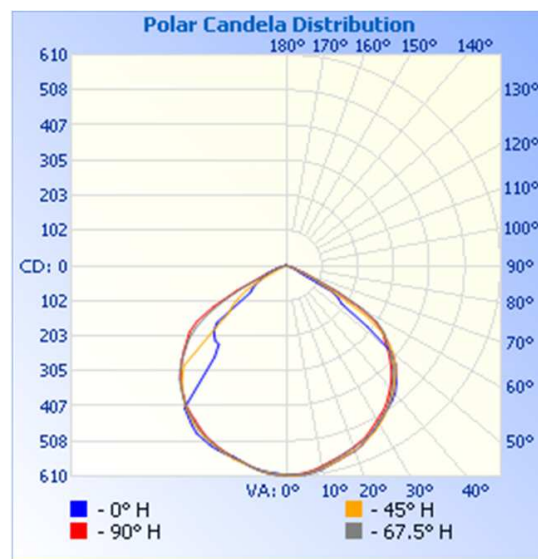
RESULTS OF TEST

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)
LAN1602251534-007	UP	110.0	190.0	20.78	0.994	1395	67.13

Intensity (Candlepower) Summary at 25°C - Candelas

Angle	0	25	45	67.5	90
0	606	606	606	606	606
5	608	606	607	606	603
10	598	596	596	592	589
15	583	583	583	576	574
20	571	572	570	562	560
25	549	552	553	547	542
30	528	532	531	525	517
35	504	507	503	502	494
40	481	480	476	468	461
45	442	444	441	431	423
50	393	389	396	385	378
55	193	239	327	340	335
60	152	151	167	250	239
65	32	36	77	99	81
70	26	25	22	21	26
75	14	11	8	6	5
80	5	4	3	2	2
85	1	1	1	1	2
90	0	1	1	0	0



RESULTS OF TEST

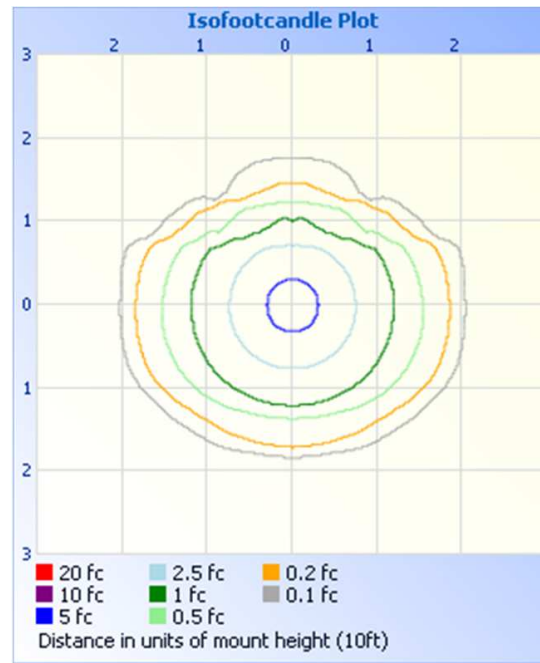
Illumination Plots

Mounting Height: 10 ft.

Illuminance - Cone of Light



Isoillumination Plot



Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens	% Luminaire
0-30	473.9	34.0
0-40	783.6	56.2
0-60	1310	93.9
60-90	84.4	6.1
0-90	1394	100.0
90-180	0.1	0.0
0-180	1395	100.0

Zonal Lumens and Percentages at 25°C

Zone	Lumens	% Luminaire
0-10	57.2	4.1
10-20	163.5	11.7
20-30	253.2	18.2
30-40	309.7	22.2
40-50	304.7	21.9
50-60	221.7	15.9
60-70	71.3	5.1
70-80	11.6	0.8
80-90	1.5	0.1
90-100	0.1	0.0

RESULTS OF TEST (cont'd)

In-Situ Maximum Measured LED Source Temperature

Manufacturer Supplied Documentation:

LED model identified as:

Characteristics	Unit	Minimum	Typical	Maximum
Thermal resistance, junction to solder point	$^{\circ}\text{C}/\text{W}$		2.5	
Viewing angle (FWHM)	degrees		125	
Temperature coefficient of voltage	$\text{mV}/^{\circ}\text{C}$		-1.6	
ESD withstand voltage (HBM per Mil-Std-883D)	V			8000
DC forward current	mA			3000
Reverse voltage	V			-5
Forward voltage (@ 700 mA, 85 $^{\circ}\text{C}$)	V		2.85	3.15
Forward voltage (@ 1500 mA, 85 $^{\circ}\text{C}$)	V		3.05	
Forward voltage (@ 3000 mA, 85 $^{\circ}\text{C}$)	V		3.3	
LED junction temperature	$^{\circ}\text{C}$			150



Maximum Junction Temperature from LED specification (T_j) = 150 $^{\circ}\text{C}$

Thermal Resistance Formula from LED specification = 2.5 $^{\circ}\text{C}/\text{W}$

Maximum Forward Voltage (V_f) from LED specification = 3.05V

Measured LED Current = 1419mA

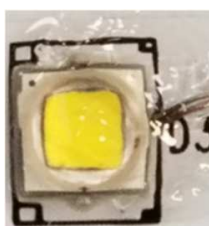
Calculated LED Wattage = $V_f \times \text{Measured LED Current} = 4.328\text{W}$

Maximum Source Temperature (T_s) = $T_j - (\text{LED Wattage} \times \text{Thermal Resistance}) = 139.2^{\circ}\text{C}$

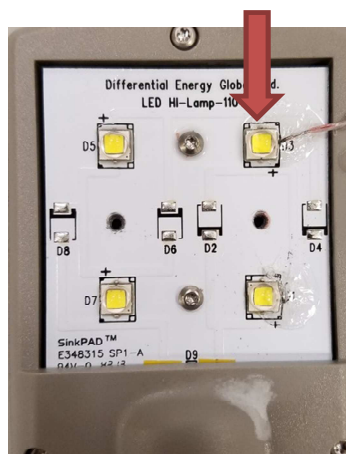
Maximum Measured Manufacturer Designated Source Temperature

Sample No.	Maximum Measured Source Temperature ($^{\circ}\text{C}$)	Location	Maximum Rated Source Temperature ($^{\circ}\text{C}$)	Ambient Temperature ($^{\circ}\text{C}$)
LAN1602251534-007	52.7	Per diagram	139.2	25.8

In-Situ Picture – T_s



In-Situ Picture – T_s location



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:



Jesse Reyna
Engineer
Lighting Division

Report Reviewed By:



Kenda Branch
Lighting Performance Team Lead
Lighting Division

Attachment: DLC Technical Requirements

DLC Technical Requirements V3.1

ao.) Screw-base Replacements for HID Lamps in Outdoor Full Cut-off Wall-mounted Area Luminaires

Fixture MODEL NO.

DEG-070120

Criteria	Technical Requirements Including Tolerance	Results
Minimum Light Output (lm)	270	1345
Minimum Luminaire Efficacy (lm/W)	63.05	64.69
Maximum Allowable CCTs (K)	6022	4532
Minimum CRI	63	73.44
Minimum L70 Lumen Maintenance (Hrs)	70	87.82
Maximum ATHD	25	11.11
Minimum Power Factor	0.873	0.957
Zonal Lumen Density	≥97%	100%
Zonal Lumen Density Cont	≤13%	0.10

Pass or Fail
Premium / Standard

PASS
Standard

Per Design Lights Consortium a pass or fail indication on this test report does not indicate final DLC evaluation