



REPORT

25800 COMMERCENTRE DRIVE, LAKE FOREST, CA 92630

Project No. G102267194

Date: April 29, 2016

REPORT NO. 102267194LAX-015

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-C1100-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

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

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 as received. 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)	1125	1115
Total Power (W)	16.80	16.36
Luminaire Efficacy (LPW)	66.96	68.15

Criteria	Result
Power Factor at 110.01Vac	0.996
Power Factor at 277.02Vac	0.920
Current ATHD % at 110.01Vac	6.15
Current ATHD % at 277.02Vac	10.71
Correlated Color Temperature (CCT - K)	4495
Color Rendering Index (CRI - Ra)	73.4
Color Rendering Index (CRI - R9)	-18.3
DUV	0.003
Chromaticity Coordinate (x)	0.363
Chromaticity Coordinate (y)	0.373
Chromaticity Coordinate (u')	0.215
Chromaticity Coordinate (v')	0.497
Maximum In-Situ Source Temperature Point (°C)	47.8

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	04/27/16
Multimeter	87 V	000323	07/28/15	07/27/16	04/27/16
Thermometer	52 Series II	001018	01/07/16	01/07/17	04/27/16

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

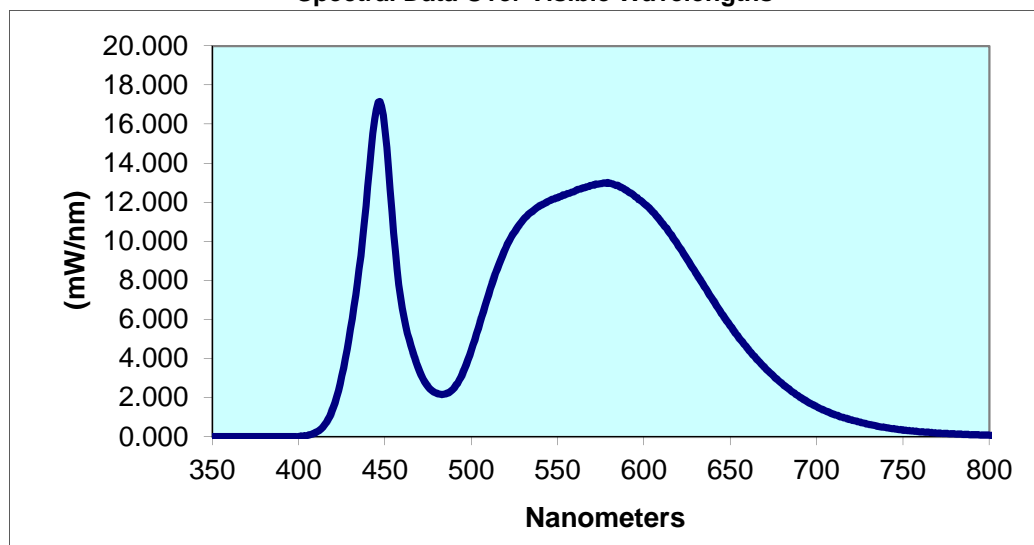
Photometric and Electrical Measurements at Ambient Temperature (25°C +/- 1°C) - Integrating Sphere Method

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	146.9 65.75	16.80 16.76	0.996 0.920	6.15 10.71	1125	66.96
Correlated Color Temperature	CRI -Ra	CRI -R9	DUV	CIE 31' Chromaticity Coordinate	CIE 31' Chromaticity Coordinate (y)	CIE 76' Chromaticity Coordinate (u')	CIE 76' Chromaticity Coordinate (v')	
4495	73.4	-18.3	0.003	0.363	0.373	0.215	0.497	

Spectral Distribution over Visible Wavelengths

nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm
350	0.001	440	12.82	530	11.11	620	9.767	710	1.156
355	0.001	445	16.75	535	11.52	625	9.087	715	0.997
360	0.001	450	15.72	540	11.84	630	8.383	720	0.867
365	0.001	455	10.44	545	12.08	635	7.691	725	0.753
370	0.001	460	6.592	550	12.24	640	6.992	730	0.641
375	0.001	465	4.666	555	12.42	645	6.298	735	0.551
380	0.001	470	3.363	560	12.59	650	5.676	740	0.472
385	0.001	475	2.552	565	12.75	655	5.068	745	0.404
390	0.001	480	2.231	570	12.87	660	4.523	750	0.347
395	0.001	485	2.201	575	12.96	665	4.007	755	0.301
400	0.015	490	2.501	580	12.97	670	3.536	760	0.250
405	0.075	495	3.268	585	12.87	675	3.109	765	0.229
410	0.227	500	4.438	590	12.62	680	2.717	770	0.190
415	0.614	505	5.849	595	12.29	685	2.368	775	0.166
420	1.481	510	7.277	600	11.94	690	2.047	780	0.143
425	3.122	515	8.589	605	11.52	695	1.778		
430	5.506	520	9.684	610	11.00	700	1.538		
435	8.588	525	10.49	615	10.42	705	1.332		

Spectral Data Over Visible Wavelengths



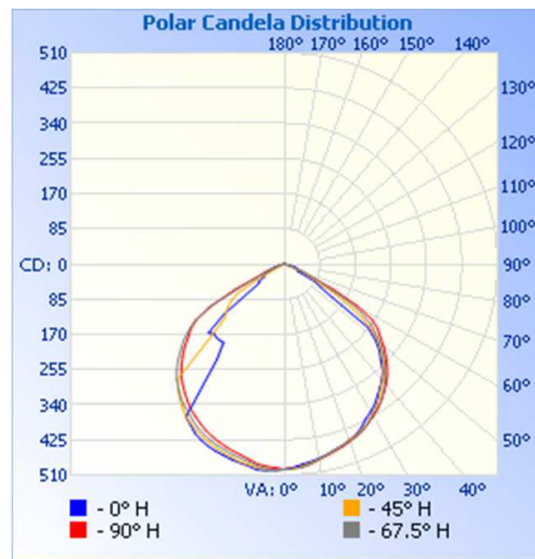
RESULTS OF TEST

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	149.5	16.36	0.994	1115	68.15

Intensity (Candlepower) Summary at 25°C - Candelas

Angle	0	25	45	67.5	90
0	496	496	496	496	496
5	486	487	491	493	491
10	477	474	479	479	480
15	465	466	466	466	468
20	452	453	453	455	457
25	436	434	440	443	444
30	412	417	420	422	425
35	389	393	395	404	403
40	363	365	366	374	378
45	326	330	334	340	348
50	284	286	294	299	311
55	139	197	229	254	273
60	83	85	127	166	199
65	48	33	57	74	65
70	32	30	20	19	22
75	22	18	11	4	5
80	6	4	2	2	2
85	1	1	1	1	1
90	0	0	0	0	0



RESULTS OF TEST

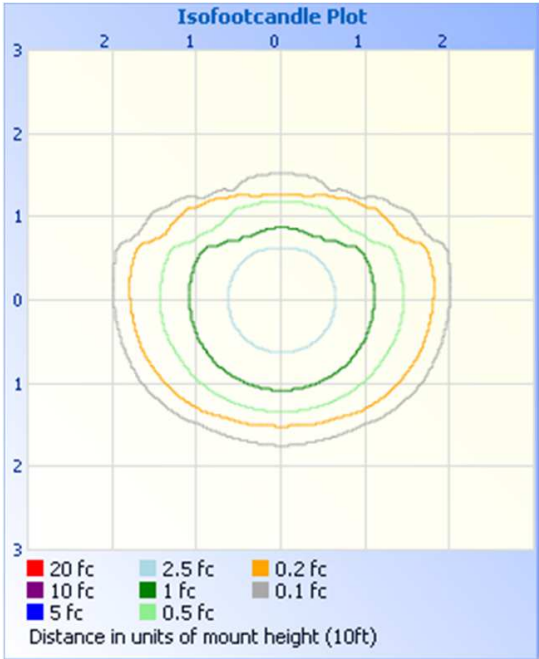
Illumination Plots

Mounting Height: 10 ft.

Illuminance - Cone of Light



Isoillumination Plot



Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens	% Luminaire
0-30	387.9	34.8
0-40	634.8	56.9
0-60	1047	93.9
60-90	67.8	6.1
0-90	1115	100.0
90-180	0.0	0.0
0-180	1115	100.0

Zonal Lumens and Percentages at 25°C

Zone	Lumens	% Luminaire
0-10	46.8	4.2
10-20	133.9	12.0
20-30	207.2	18.6
30-40	247.0	22.2
40-50	240.6	21.6
50-60	171.4	15.4
60-70	55.8	5.0
70-80	10.9	1.0
80-90	1.1	0.1

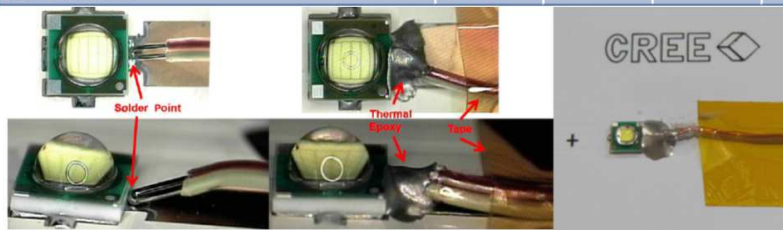
RESULTS OF TEST (cont'd)

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 = 1093mA

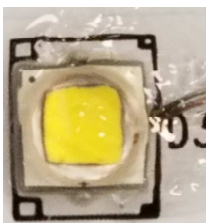
Calculated LED Wattage = $V_f \times \text{Measured LED Current} = 3.334\text{W}$

Maximum Source Temperature (T_s) = $T_j - (\text{LED Wattage} \times \text{Thermal Resistance}) = 141.7^{\circ}\text{C}$

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	47.8	Per diagram	141.7	25.1

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	Results
Minimum Light Output (lm)	270	1115
Minimum Luminaire Efficacy (lm/W)	63.05	66.96
Maximum Allowable CCTs (K)	6022	4495
Minimum CRI	63	73.35
Minimum L70 Lumen Maintenance (Hrs)	70	87.82
Maximum ATHD	25	10.71
Minimum Power Factor	0.873	0.920
Zonal Lumen Density	≥97%	100%
Zonal Lumen Density Cont	≤13%	0.1%

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