



3933 US ROUTE 11, CORTLAND, NEW YORK 13045

Project No. G102322298

Date: July 1, 2016

REPORT NO. 102322298CRT-033

TEST OF ONE 6" DOWNLIGHT LED 4000K DIMMABLE

MODEL NO. LED 6" DOWNLIGHT D6-L1200-C40-E PART NO. 99350

RENDERED TO:

VERBATIM AMERICAS 1200 W.T. HARRIS BLVD. CHARLOTTE, NC 28269

TESTS:

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 NVLAP, NIST, or any agency of the federal government.

AUTHORIZATION The testing performed was authorized by signed quote number Qu-00647973.

STANDARDS USED:

IESNA LM-79 - 2008: Electrical and Photometric Measurements of Solid State Lighting ANSI NEMA ANSLG C78.377: 2011: Specifications of the Chromaticity of Solid State Lighting Products

DESCRIPTION OF SAMPLE: The client submitted one production sample of model number LED 6" DOWNLIGHT D6-L1200-C40-E. The sample was received by Intertek on June 20, 2016 in undamaged condition and one sample was tested as received. The sample designation was CRT1606201051-001C.

DATE OF TESTS:

June 21, 2016 through July 1, 2016.

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to copy or distribute this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.



SUMMARY:

		-					
MODEL NO. LED 6" DOWNLIGHT D6-L1200-C40-E							
DESCRIPTION: 6" Downlight LED 4000K Dimmable							
Criteria	Integrating Sphere	Goniophotometer					
Light Output (Lumens)	1399	1396					
Total Power (W)	17.12	17.10					
Lumen Efficacy (Lm/W)	81.70	81.70					
Power Factor ()	0.904	0.901					
Criteria	Res	ults					
Current ATHD (%)	42.	95					
Correlated Color Temp. (CCT-K)	39 [.]	18					
Color Rendering Index (CRI - Ra)	83	.6					
CRI - R9	11	.4					
DUV ()	0.0	03					
Chromaticity Coordinate (x)	0.3	86					
Chromaticity Coordinate (v)	0.3	86					
Chromaticity Coordinate (u)	0.2	25					
Chromaticity Coordinate (v')	0.5	06					

EQUIPMENT LIST

Equipment Used	Model No.	Control No.	Last Cal.	Cal. Due
LSI High Speed Mirror Goniometer	6440		06/02/16	07/02/16
Elgar AC Power Supply	CW1251		VBU	VBU
Sorenson DC Power Supply	XG 150-10		VBU	VBU
Yokogawa Power Analyzer	WT210	E464	05/02/16	05/02/17
Omega Thermometer	DPi8-C24	M263	05/02/16	05/02/17
M-D Building Products Digital Level	Smart Tool	L112	04/08/16	04/08/17
NIST Luminous Intensity Standard Source	NBS10322	N1427	12/12/14	12/12/16
NIST Luminous Intensity Standard Source	NBS10215	N1432	12/12/14	12/12/16
NIST Luminous Intensity Standard Source	960629-3	N1428	12/12/14	12/12/16
NIST Luminous Flux Standard Source	NBS10428	N1424	12/17/14	12/17/16
2M Integrating Sphere Spectrometer System	CDS 600	W/N308	06/15/16	07/15/16
Yokogawa Power Analyzer	WT1600	E474	04/25/16	04/25/17
Extech Hygro-Thermometer	445715	T1550	01/08/16	01/08/17
Fisher Scientific Stopwatch	14-649-9	N1404	08/22/15	08/22/16
Sorensen DC Power Supply	XFR 35-35		VBU	VBU
Xantrex DC Power Supply	XTR 150-5.6		VBU	VBU
Elgar AC Power Supply	CW1251		VBU	VBU
Secondary Spectral Intensity Standard Source	BS5186	RF5186	01/27/16	01/27/17
Secondary Luminous Flux Standard Source	BS3616		01/27/16	01/27/17
Secondary Luminous Flux Standard Source	BS4116		01/27/16	01/27/17
Secondary Luminous Flux Standard Source	BS3612		01/27/16	01/27/17



TEST METHODS:

<u>Seasoning in Sample Orientation – LED Products</u> No seasoning was performed in accordance with IESNA LM-79.

Photometric and Electrical Measurements – Integrating Sphere Method

A Labsphere Model CDS 1100 CCD Array Spectroradiometer and two meter or ten foot 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. Stabilization procedures to LM-79 were followed. Electrical measurements including voltage, current, and power were measured using a 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 the SSL sample.

Ambient temperature was measured equal to the height of the sample mounted on the goniometer equipment. The SSL sample was operated on the client provided driver at rated input volts in its designated orientation. The SSL sample was allowed to stabilize for at least thirty minutes before measurements were made. Stabilization procedures to LM-79 were followed. Electrical measurements including voltage, current, and power were measured using a power analyzer.



RESULTS:

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

		Input	Input	Input	Input	Light	Lumen
	Base	Voltage	Current	Power	Power	Output	Efficacy
Intertek Control No.	Orientation	(VAC)	(mA)	(W)	Factor ()	(Lumens)	(Im/W)
CRT1606201051-001C	Base Up	120.06	158.0	17.10	0.901	1396	81.70

Intensity (Candlepower) Summary at 25°C - Candelas

Angle	0	22.5	45	67.5	90
0	651	651	651	651	651
5	647	647	646	646	646
10	633	634	633	633	633
15	612	612	612	612	612
20	582	582	582	582	582
25	544	544	544	544	543
30	500	499	499	499	499
35	452	452	451	451	451
40	401	400	400	400	400
45	344	344	344	344	344
50	285	285	285	285	284
55	225	225	225	226	225
60	168	166	169	168	167
65	116	116	113	117	118
70	72	72	72	72	73
75	38	37	37	38	38
80	16	16	16	16	16
85	6	6	6	6	6
90	0	0	0	0	0





Illumination Plots

)	Illuminance at a	Distance	
C	lenter Beam fc	Beam Wid	ith
1.78	225 fc	3.6 ft	3.6 ft
3.38	59.8 fc	7.0 ft	7.0 ft
5.0ft	26.0 fc	10.6 ft	10.5 ft
6.7 R	14.5 fc	14.2 ft	14.1 ft
8.3R	9.45 fc	17.5 ft	17.5 ft
10.0 R	6.51 fc	21.1 ft	21.1 ft

Mounting Height: 10ft

Isoillumination Plot



Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens	% Luminaire
0-30	483.4	34.6
0-40	765.2	54.8
0-60	1231.1	88.2
60-90	165.0	11.8
0-90	1396.2	100.0
90-180	0.0	0.0
0-180	1396.2	100.0

Zonal Lumens and Percentages at 25°C

Zone	Lumens	% Luminaire
0-10	61.3	4.4
10-20	172.2	12.3
20-30	249.9	17.9
30-40	281.9	20.2
40-50	264.6	19.0
50-60	201.3	14.4
60-70	116.2	8.3
70-80	41.9	3.0
80-90	7.0	0.5



RESULTS:





RESULTS:

Spectral	Distribution	Over	Visible	Wavelengths
Opectiai	Distribution		VISIDIC	Marcicing ing

nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm
350	0.201	460	13.751	570	18.559	680	5.534
355	0.179	465	11.347	575	19.078	685	4.817
360	0.125	470	9.281	580	19.577	690	4.206
365	0.244	475	7.644	585	19.868	695	3.656
370	0.187	480	6.964	590	20.122	700	3.179
375	0.113	485	7.222	595	20.167	705	2.760
380	0.127	490	7.780	600	20.037	710	2.407
385	0.166	495	8.678	605	19.606	715	2.079
390	0.075	500	9.779	610	19.116	720	1.825
395	0.122	505	10.885	615	18.551	725	1.576
400	0.085	510	11.715	620	17.742	730	1.402
405	0.143	515	12.483	625	16.744	735	1.188
410	0.264	520	13.332	630	15.561	740	1.064
415	0.480	525	13.821	635	14.428	745	0.878
420	0.900	530	14.328	640	13.225	750	0.735
425	1.633	535	14.832	645	12.148	755	0.697
430	2.873	540	15.318	650	11.014	760	0.679
435	4.857	545	15.761	655	9.974	765	0.549
440	8.153	550	16.260	660	8.895	770	0.490
445	12.920	555	16.941	665	7.962	775	0.341
450	17.822	560	17.367	670	7.074	780	0.365
455	17.468	565	17.967	675	6.180		

Spectral Data Over Visible Wavelengths







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:

Melanie Brittain

Melanie Brittain Associate Engineer Lighting Division

Attachments: IES File - CRT1606201051-001C

Report Reviewed By:

Jeffrey Davis Engineering Supervisor Lighting Division