LightLab
INTERNATIONAL

LightLab International, LLC
Phoenix AZ 85085

Lab Code 200989-0

This document is issued in accordance with the accreditation requirements of NVLAP. The laboratory is accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to the SI system of units.

Report of Test

LLI-16282-6

Clarte Lighting - 6" downlight luminaire. Product ID: PAR 20 / Spot
Extruded aluminum housing with semi-specular trim ring.
Six LEDs mounted in circular array to white PCB with clear plastic array of individual lenses.
PCB mounted to extruded aluminum heat sink.
One Clarte driver. Model: 615E28XP20N3HC5
Operating at 120 VAC and 60 Hz.

Performance Summary

Total Light Output	1865 lm	Min Power Factor	0.86 @ 277 V
Luminaire Power	26.6 W	Max THD(i)*	11.5 % @ 277 V
Luminous Efficacy	70.1 lm/W		
CCT	3010 K		
CIE(x,y) 1931	(0.436, 0.403)		
CRI	82		

PREPARED FOR : Clarte Lighting, Azusa, CA

USA west coast LightLab International, LLC
24825 N. 16th Avenue
Suite 125
Phoenix, AZ, 85085
Ph : +1 623-434-1499
Fx : +1 623-434-1492
www.lightlabint.com
(issuing laboratory)

USA east coast LightLab Int'l Allentown LLC
905 Harrison Street
Suite 135
Allentown, PA 18103
Ph: +1 484-273-0705
www.lightlabint.com

Australasia & S.E. Asia LightLab International
50 Redcliffe Gardens Drive
Clontarf
Queensland, 4019, Australia
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Fx : +61 7 3283 8751
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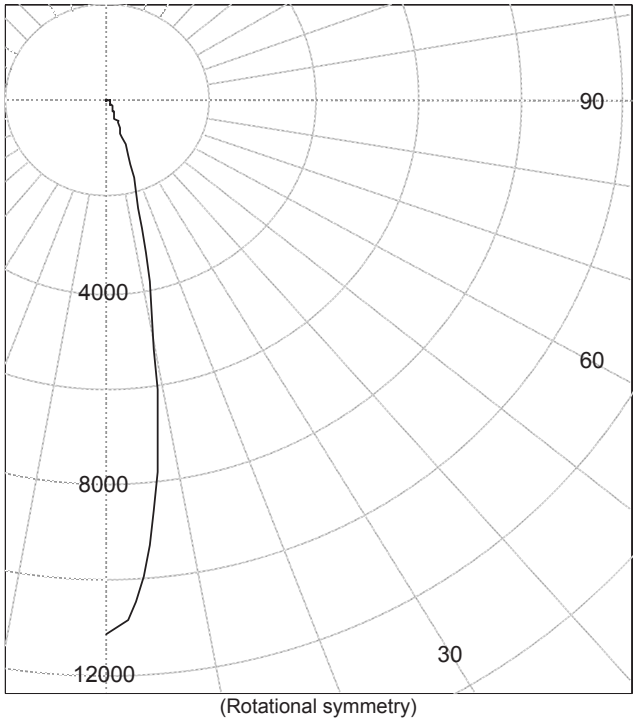
Legend: All planes - Solid (cd)



(Rotational symmetry)

INTENSITY SUMMARY (cd)

Gamma	All Planes	Flux (lm)	Gamma	C0	Flux (lm)
0	11174		90	0	
5	9332	754	95	0	0
10	5281		100	0	
15	2307	669	105	0	0
20	977		110	0	
25	422	213	115	0	0
30	220		120	0	
35	144	94	125	0	0
40	112		130	0	
45	92	71	135	0	0
50	72		140	0	
55	48	46	145	0	0
60	41		150	0	
65	14	17	155	0	0
70	2		160	0	
75	1	1	165	0	0
80	0		170	0	
85	0	0	175	0	0
90	0		180	0	

ZONAL FLUX AND PERCENTAGES

Zone	Flux (lm)	%Lamp	%Luminaire
0-30	1635	N / A	87.7
0-40	1729	N / A	92.7
0-60	1846	N / A	99.0
0-90	1865	N / A	100.0
40-90	136	N / A	7.3
60-90	19	N / A	1.0
90-180	0	N / A	0.0
0-180	1865	N / A	100.0

Total Light Output = 1,865 lm

Signed:

Ryder Tunney
Authorized Signatory

Date of test 13-Oct-2016
Date of report 21-Oct-2016

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Operating at 120 VAC and 60 Hz.

Intensity (cd) and Flux (lm) data

Gamma	Intensity	Flux	Gamma	Intensity	Flux
0.0	11174		90.0	0	
2.5	10688		92.5	0	
5.0	9332	754	95.0	0	
7.5	7361		97.5	0	0
10.0	5281		100.0	0	
12.5	3546		102.5	0	
15.0	2307	669	105.0	0	
17.5	1496		107.5	0	0
20.0	977		110.0	0	
22.5	640		112.5	0	
25.0	422	213	115.0	0	
27.5	296		117.5	0	0
30.0	220		120.0	0	
32.5	174		122.5	0	
35.0	144	94	125.0	0	
37.5	124		127.5	0	0
40.0	112		130.0	0	
42.5	102		132.5	0	
45.0	92	71	135.0	0	
47.5	83		137.5	0	0
50.0	72		140.0	0	
52.5	55		142.5	0	
55.0	48	46	145.0	0	
57.5	46		147.5	0	0
60.0	41		150.0	0	
62.5	32		152.5	0	
65.0	14	17	155.0	0	
67.5	4		157.5	0	0
70.0	2		160.0	0	
72.5	1		162.5	0	
75.0	1	1	165.0	0	
77.5	1		167.5	0	0
80.0	0		170.0	0	
82.5	0		172.5	0	
85.0	0	0	175.0	0	
87.5	0		177.5	0	0
90.0	0		180.0	0	

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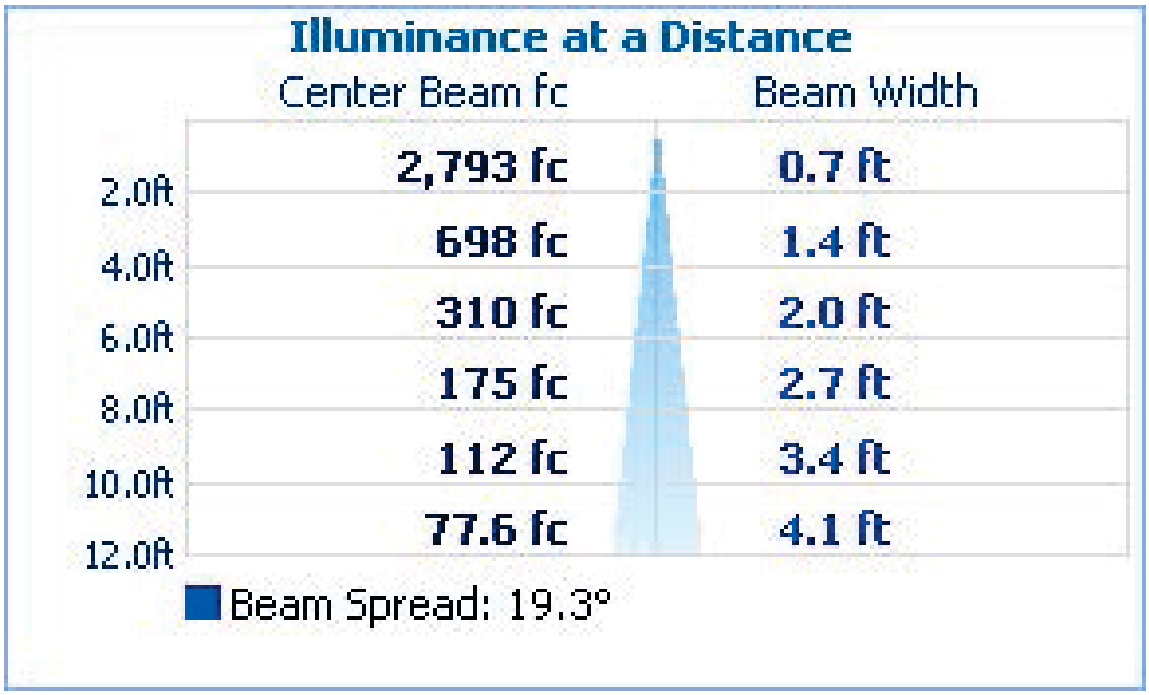

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LM-79 Performance Data

Spectral	CIE 1931 (x, y) (1)	(0.436, 0.403)	
	CIE 1976 (u', v') (1)	(0.250, 0.521)	
	Correlated Color Temperature (CCT) (1)	3010	K
	Color Spatial Uniformity (2)	0.0036	
	Color Rendering Index (Ra) (1)	81.5	
	Special CRI 9 (R_9) (1),(3)	7	
	Distance from Planckian Locus (Duv) (1),(3)	-0.0004	
	Scotopic/Photopic Ratio (1),(3)	1.31	

Electrical	Voltage	120	V	(Setpoint 1)
	Frequency	60	Hz	
	Current	0.229	A	
	Power	26.6	W	
	Power Factor	0.969		
	Current THD	10.28	%	
	Voltage	277	V	(Setpoint 2)
	Frequency	60	Hz	
	Current	0.115	A	
	Power	27.3	W	
	Power Factor	0.859		
	Current THD	11.51	%	

Performance data in accordance with IESNA LM-79-08. Spectral calculations are for a CIE 2° observer
Photometric and spectral values were measured at Setpoint 1
(1) Value is computed from the weighted average of the spatial measurements
(2) Value is the maximum deviation of the spatial u' and v' measurements from the weighted average
(3) Quantity is in addition to the scope of IESNA LM-79-08

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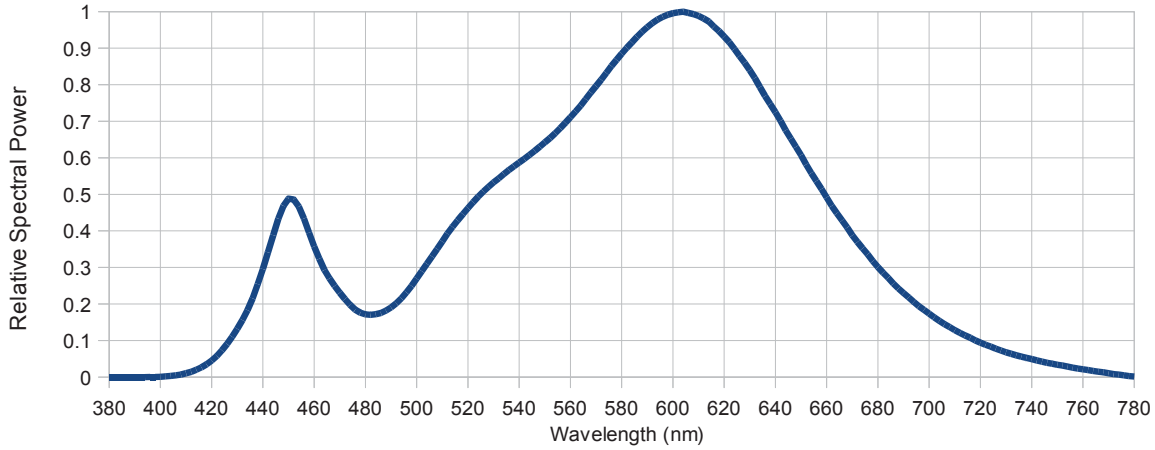
LM-79 Performance Data

Summary Relative Spectral Irradiance Distribution (wavelength – nm, irradiance – relative to peak = 1)

380	0.00E+00	480	1.72E-01	580	8.85E-01	680	3.01E-01
385	0.00E+00	485	1.74E-01	585	9.23E-01	685	2.64E-01
390	0.00E+00	490	1.90E-01	590	9.58E-01	690	2.30E-01
395	0.00E+00	495	2.23E-01	595	9.82E-01	695	2.00E-01
400	6.52E-04	500	2.70E-01	600	9.96E-01	700	1.74E-01
405	3.75E-03	505	3.20E-01	605	9.98E-01	705	1.49E-01
410	1.03E-02	510	3.71E-01	610	9.88E-01	710	1.28E-01
415	2.31E-02	515	4.20E-01	615	9.66E-01	715	1.11E-01
420	4.50E-02	520	4.62E-01	620	9.32E-01	720	9.40E-02
425	8.17E-02	525	5.01E-01	625	8.88E-01	725	8.03E-02
430	1.32E-01	530	5.33E-01	630	8.40E-01	730	6.80E-02
435	1.99E-01	535	5.61E-01	635	7.81E-01	735	5.76E-02
440	2.95E-01	540	5.87E-01	640	7.25E-01	740	4.89E-02
445	4.11E-01	545	6.13E-01	645	6.64E-01	745	4.06E-02
450	4.88E-01	550	6.42E-01	650	6.07E-01	750	3.35E-02
455	4.50E-01	555	6.74E-01	655	5.47E-01	755	2.71E-02
460	3.57E-01	560	7.11E-01	660	4.92E-01	760	2.12E-02
465	2.82E-01	565	7.52E-01	665	4.38E-01	765	1.57E-02
470	2.31E-01	570	7.96E-01	670	3.88E-01	770	1.05E-02
475	1.91E-01	575	8.42E-01	675	3.44E-01	775	5.56E-03
						780	1.46E-03



* The spectral power distribution combines the weighted spectral power distributions of all spatial measurements.

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LM-79 Performance Data

Spatial measurements

Vertical angle (deg)	CIE 1976 (u',v') coordinates Horizontal 0 plane	Horizontal 90 plane
0	(0.252, 0.521)	(0.251, 0.521)
2	(0.252, 0.522)	(0.252, 0.522)
4	(0.252, 0.522)	(0.251, 0.522)
6	(0.251, 0.521)	(0.251, 0.522)
8	(0.251, 0.521)	(0.251, 0.522)
10	(0.250, 0.521)	(0.251, 0.521)
12	(0.250, 0.520)	(0.250, 0.521)
14	(0.249, 0.519)	(0.249, 0.520)
16	(0.248, 0.518)	(0.248, 0.519)
18	(0.248, 0.518)	(0.248, 0.519)

Spatial measurements

Vertical angle (deg)	CIE 1976 (u',v') coordinates Horizontal 0 plane	Horizontal 90 plane
18	(0.248, 0.518)	(0.248, 0.519)
20	I <= 10 %	I <= 10 %
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

Test procedure

All measurements were performed in an environmentally controlled laboratory employing suitable baffling to minimize stray light. The sample was mounted in its normal operating orientation on a rotating mirror goniophotometer and operated from a stabilized supply. The photometric output was monitored and measurements were performed once stability was achieved.

The goniophotometer was used to measure the spatial distribution of both luminous intensity and, in conjunction with a spectroradiometer, spectral irradiance. The distribution locus comprises points in two or more planes (as indicated in the table above) at no more than 10º vertical intervals. The CIE (x,y) coordinates and other derived metrics (CIE (u', v'), CCT and CRI) are calculated from the weighted sum (weighted for intensity and represented solid angle) of the measured spectral irradiances.

		Stabilization Time	1.25 hour
Sample Orientation	Horizontal	Total Operation Time	2.25 hour

Equipment and uncertainties

LightLab International R80A C-gamma rotating mirror goniophotometer with a test distance of 8 m.

Luminous Intensity	± 4 %	Temperature	± 1 °C
Luminous Flux	± 4 %	Luminous Efficacy	± 4.5 %
Horizontal, Vertical Angles	± 0.25º		

PhotoResearch PR-670 spectroradiometer (380 - 780 nm., 2 nm. per pixel) measuring at a distance from the sample deemed greater than five times the maximum observed luminous opening dimension.

CIE (x, y) coordinates	± 0.003	CCT	± 100 K
CIE (u', v') coordinates	± 0.002	CRI (Ra)	± 2
Δ (u', v') Color difference	± 0.001	Scotopic / Photopic Ratio *	± 0.02
Relative Spectral Irradiance *	± 2 %	R9 *	± 2

Yokogawa WT210 power meter connected in circuit to the sample electrical supply

Voltage	± 0.5 %	Frequency *	± 0.1 Hz
Current	± 0.5 %	Power	± 0.5 %
Current THD *	± 3 %	Power Factor	± 0.02

This report contains data that are not covered by the NVLAP accreditation. Quantities marked with * are not covered.
IESNA LM-79-08 Calculator v5.1 (28th Jun 2016)

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Test Distance	8.0 m
Test Temperature	24.8 °C

Notes

The laboratory has not participated in the selection of samples to be tested. All testing is performed on the understanding that the significance of the report is limited to the extent that the test sample is representative of production units.

Tested in accordance with the applicable sections of publications: IES LM-79-08 (Sec. 12), IES LM-16-93, IES LM-58-13, CIE 13.3:1995, CIE 15:2004, ANSI C78.377:2011, ANSI C82.77:2002.

The luminous intensity values, and other derived quantities, contained in this report are based on the absolute data, as measured.

Prorating the performance of the sample for the use of other component combinations (such as lamp / LED / Ballast / driver), or for use in different environmental conditions than that tested, may produce erroneous results.

This report is free of erasures and corrections.

Photometric intensity values are reported using the CIE Gamma coordinate system as defined in CIE publication number 121.

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This report must not be used by the customer to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the Federal Government.

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