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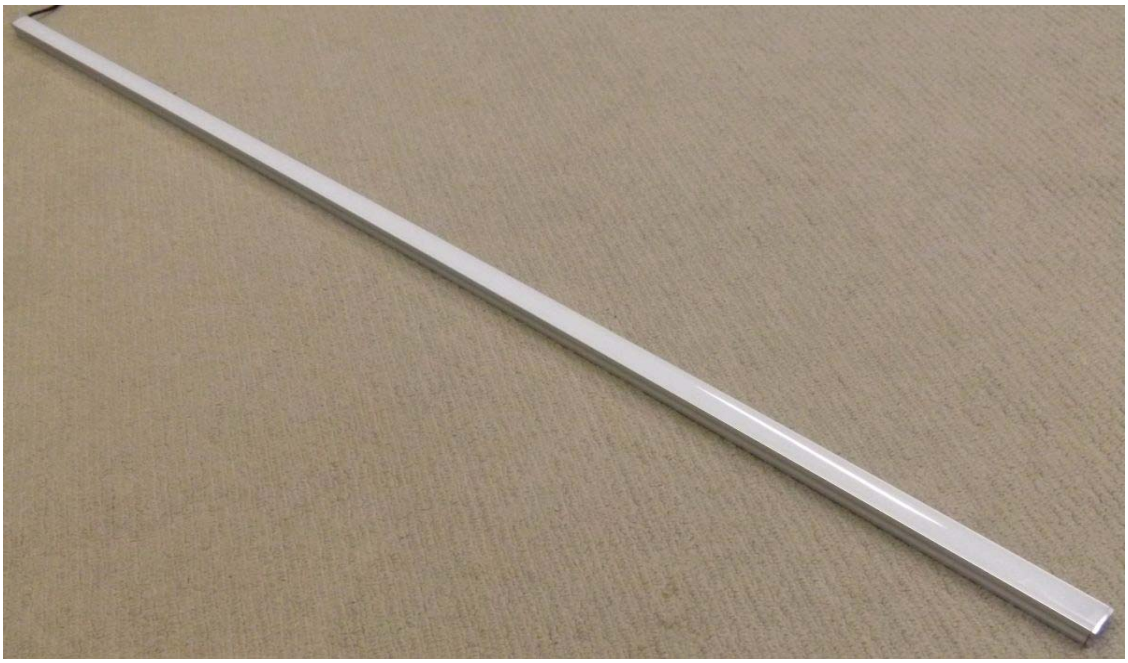
LightLab International
Brisbane QLD 4019.

Report of Test

LL20367

Hawko Lighting Surface-mount LED Luminaire. Product ID: ES-Surface 22W Opal Diffuser.
Extruded aluminium body with silver finish, extent ~ 1015 x 18 x 16 mm deep.
Opal diffuser forms luminous opening of 1010 x 15 x 0.5 mm deep.
Eighteen sections of Hawko LED strip centred 12 mm above L/O.
Remote Tridonic LCU 35W 24V SR TOP 100-277V 50/60Hz electronic driver.
Tested at 240 V 50 Hz.



Performance Summary

Luminous flux	1474	lm
Luminaire Power	25.4	W
Luminous Efficacy	58.1	lm/W
SHR Nominal	1.50	
SHR Maximum	1.66	

PREPARED FOR : Hawko Lighting, Caloundra. QLD. 4551.

ORIGINAL REPORT

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

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LM-79 Performance Data

Spectral	CIE 1931 (x, y)	(1)	(0.380, 0.376)
	CIE 1976 (u', v')	(1)	(0.225, 0.501)
	Correlated Colour Temperature (CCT)	(1)	4000 K
	Colour Spatial Uniformity	(2)	0.0010
	Colour Rendering Index (Ra)	(1)	84.3
	Special CRI 9 (R_9)	(1),(3)	19
	Distance from Planckian Locus (Duv)	(1),(3)	-0.0003
	Scotopic/Photopic Ratio	(1),(3)	1.68

Electrical	Voltage	240 V
	Frequency	50 Hz
	Current	0.110 A
	Power	25.4 W
	Power Factor	0.96
	Current THD	14.3 %

Performance data in accordance with IESNA LM-79-08. Spectral calculations are for a CIE 2° observer

(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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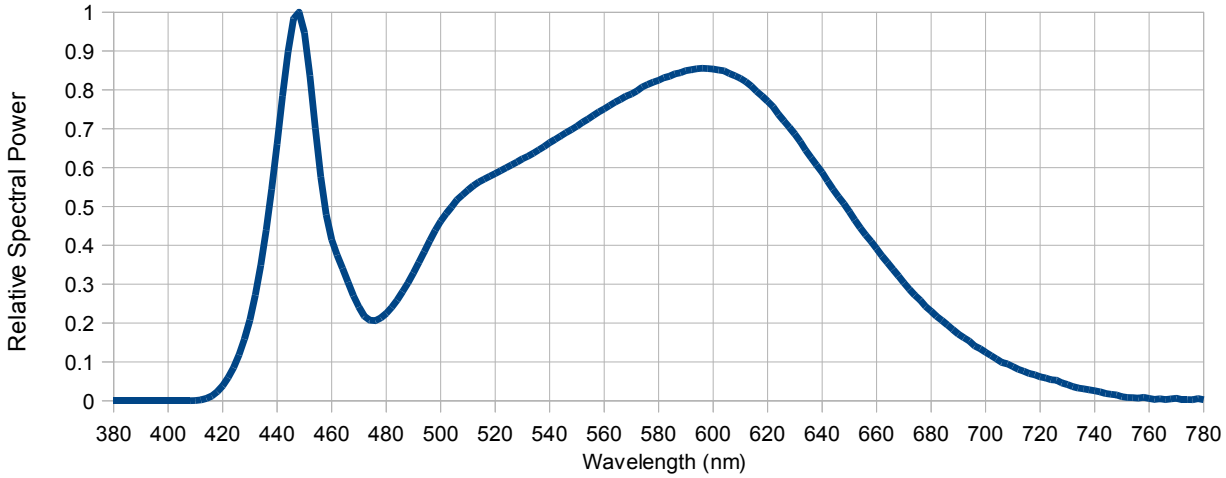
LM-79 Performance Data

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

380	1.41E-04	480	2.25E-01	580	8.25E-01	680	2.30E-01
385	9.98E-05	485	2.70E-01	585	8.38E-01	685	2.01E-01
390	1.97E-04	490	3.29E-01	590	8.50E-01	690	1.71E-01
395	2.35E-04	495	3.98E-01	595	8.55E-01	695	1.47E-01
400	2.63E-04	500	4.62E-01	600	8.54E-01	700	1.25E-01
405	2.34E-04	505	5.08E-01	605	8.46E-01	705	1.03E-01
410	6.71E-04	510	5.42E-01	610	8.30E-01	710	8.83E-02
415	8.84E-03	515	5.66E-01	615	8.03E-01	715	7.29E-02
420	3.86E-02	520	5.84E-01	620	7.71E-01	720	6.15E-02
425	1.02E-01	525	6.03E-01	625	7.29E-01	725	5.35E-02
430	2.08E-01	530	6.22E-01	630	6.86E-01	730	4.18E-02
435	3.94E-01	535	6.41E-01	635	6.35E-01	735	3.16E-02
440	6.60E-01	540	6.64E-01	640	5.87E-01	740	2.57E-02
445	9.41E-01	545	6.85E-01	645	5.35E-01	745	1.76E-02
450	9.47E-01	550	7.07E-01	650	4.86E-01	750	1.07E-02
455	6.39E-01	555	7.30E-01	655	4.36E-01	755	7.25E-03
460	4.15E-01	560	7.51E-01	660	3.91E-01	760	5.69E-03
465	3.23E-01	565	7.72E-01	665	3.47E-01	765	4.19E-03
470	2.41E-01	570	7.89E-01	670	3.04E-01	770	6.06E-03
475	2.07E-01	575	8.11E-01	675	2.65E-01	775	2.59E-03
						780	2.49E-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

Gamma angle (deg)	CIE 1976 (u',v') coordinates C 0 plane	C 90 plane
0	(0.226, 0.502)	(0.226, 0.502)
10	(0.226, 0.502)	(0.226, 0.502)
20	(0.226, 0.502)	(0.226, 0.502)
30	(0.226, 0.501)	(0.226, 0.502)
40	(0.225, 0.501)	(0.225, 0.501)
50	(0.225, 0.501)	(0.225, 0.501)
60	(0.225, 0.501)	(0.225, 0.501)
70	(0.225, 0.501)	(0.225, 0.501)
80	(0.225, 0.501)	(0.224, 0.501)
90	I <= 10 %	I <= 10 %

Spatial measurements

Gamma angle (deg)	CIE 1976 (u',v') coordinates C 0 plane	C 90 plane
90	I <= 10 %	I <= 10 %
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

Test procedure

All measurements were performed in an environmentally controlled laboratory employing suitable baffling to minimise stray light. The sample was mounted in its normal operating orientation on a rotating mirror goniophotometer and operated from a stabilised 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 and spectrally flat reflectance tile, spectral irradiance. The distribution locus comprises points in two or more C planes at no more than 10º gamma 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.

		Stabilisation Time	2 hour
Sample Orientation	Ceiling mount	Total Operation Time	3 hour

Equipment and uncertainties

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 %
C, Gamma Angles	± 0.5º		

PhotoResearch PR-670 spectroradiometer (380 - 780 nm., 2 nm. per pixel) measuring from a spectrally flat reflectance tile attached to goniophotometer arm at a distance from sample deemed >5 times the maximum observed luminous opening dimension.

CIE (x, y) coordinates	± 0.004	CCT	± 150 K
CIE (u', v') coordinates	± 0.0025	CRI (Ra)	± 2
Δ (u', v') Colour 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

Quantities marked with * : NATA accreditation does not cover the performance of this service.
IESNA LM-79-08 Calculator v5.2 (1st Jul 2016)

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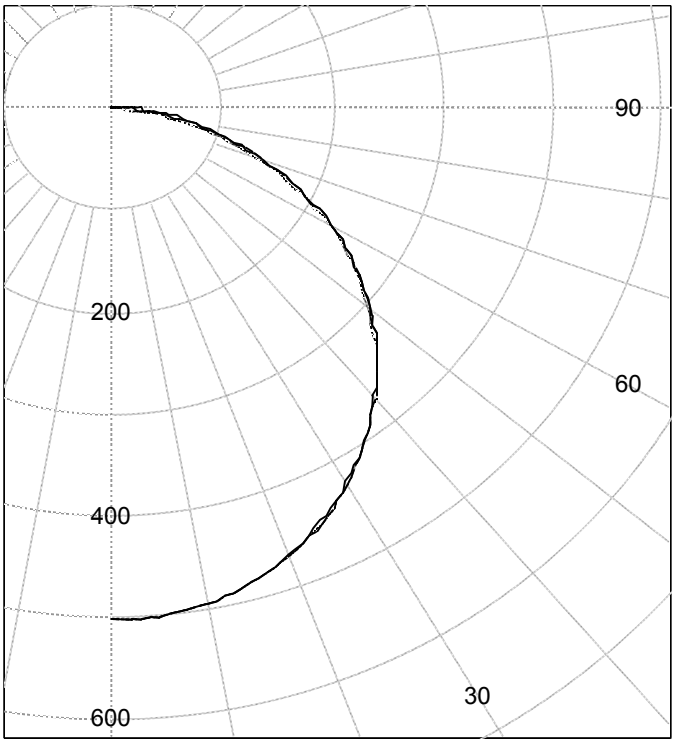
Legend: C0-Solid, C45-Dashed, C90-Grey (cd)



(Two plane symmetry) C0-C90

INTENSITY SUMMARY (cd)

	C-Plane					Flux
Gamma	C0	C22.5	C45	C67.5	C90	(lm)
0.0	503	503	503	503	503	
5.0	500	501	501	501	501	48
10.0	494	494	495	494	495	
15.0	483	483	483	483	484	136
20.0	467	468	469	468	469	
25.0	448	448	449	449	449	207
30.0	425	425	426	426	426	
35.0	398	399	400	399	400	250
40.0	369	370	371	370	371	
45.0	339	339	339	338	339	261
50.0	305	305	305	303	303	
55.0	269	268	268	265	266	238
60.0	228	229	229	225	225	
65.0	187	188	187	184	183	183
70.0	145	146	143	140	138	
75.0	106	105	101	97	95	107
80.0	70	68	62	55	52	
85.0	42	39	32	22	17	36
90.0	21	18	12	4	0	

AVERAGE LUMINANCE (cd / sq.m)

Gamma	C0	C45	C90
45.0	31625	31682	31648
55.0	30927	30823	30616
65.0	29156	29219	28633
75.0	27136	25735	24138
85.0	31705	24044	13063

ZONAL FLUX AND PERCENTAGES

Zone	Flux (lm)	% Lamp	% Luminaire
0-30	391	N / A	26.5
0-40	641	N / A	43.5
0-60	1140	N / A	77.4
0-90	1466	N / A	99.5
40-90	825	N / A	56.0
60-90	326	N / A	22.1
90-180	8	N / A	0.5
0-180	1474	N / A	100.0

Total Light Output = 1474 lm

SHR-NOM = 1.50
SHR-MAX = 1.66

Calculated using the TM5 fine grid method.

CERTIFIED BY:

Mikael Altoff
Authorised Signatory

Date of test 21-Jul-2017
Date of report 31-Jul-2017

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Intensity data (cd)

	C-Plane				
Gamma	**C0**	**C22.5**	**C45**	**C67.5**	**C90**
0.0	503	503	503	503	503
2.5	502	502	502	502	502
5.0	500	501	501	501	501
7.5	498	498	498	498	498
10.0	494	494	495	494	495
12.5	489	490	489	489	489
15.0	483	483	483	483	484
17.5	476	476	476	476	477
20.0	467	468	469	468	469
22.5	459	459	459	460	459
25.0	448	448	449	449	449
27.5	437	438	438	438	438
30.0	425	425	426	426	426
32.5	413	413	414	413	413
35.0	398	399	400	399	400
37.5	384	385	386	386	386
40.0	369	370	371	370	371
42.5	354	355	355	355	355
45.0	339	339	339	338	339
47.5	322	322	322	321	321
50.0	305	305	305	303	303
52.5	287	287	286	285	286
55.0	269	268	268	265	266
57.5	249	248	248	245	245
60.0	228	229	229	225	225
62.5	208	208	208	204	204
65.0	187	188	187	184	183
67.5	167	166	165	162	161
70.0	145	146	143	140	138
72.5	125	124	122	119	118
75.0	106	105	101	97	95
77.5	87	86	81	76	74
80.0	70	68	62	55	52
82.5	55	53	46	38	34
85.0	42	39	32	22	17
87.5	30	28	21	11	6
90.0	21	18	12	4	0

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Intensity data (cd)

	C-Plane				
Gamma	**C0**	**C22.5**	**C45**	**C67.5**	**C90**
90.0	21	18	12	4	0
92.5	14	11	6	1	0
95.0	8	6	3	0	0
97.5	4	3	1	0	1
100.0	2	1	0	0	0
102.5	0	0	0	0	1
105.0	0	0	0	0	0
107.5	0	0	0	0	0
110.0	0	0	0	0	0
112.5	0	0	0	0	0
115.0	0	0	0	0	0
117.5	1	0	0	0	0
120.0	0	0	0	0	0
122.5	0	0	0	1	0
125.0	0	0	0	0	0
127.5	1	0	0	1	0
130.0	0	0	1	1	0
132.5	1	1	1	0	0
135.0	1	0	1	1	1
137.5	1	1	1	1	1
140.0	1	1	1	1	1
142.5	1	1	1	1	1
145.0	1	1	1	1	1
147.5	1	1	1	1	1
150.0	2	1	1	1	1
152.5	1	1	1	1	1
155.0	2	1	1	1	2
157.5	1	1	1	1	1
160.0	1	1	1	1	1
162.5	1	1	1	1	2
165.0	1	1	1	1	2
167.5	1	2	2	1	1
170.0	1	1	1	2	1
172.5	1	1	2	1	1
175.0	2	1	1	2	1
177.5	1	2	1	2	2
180.0	2	2	2	2	2

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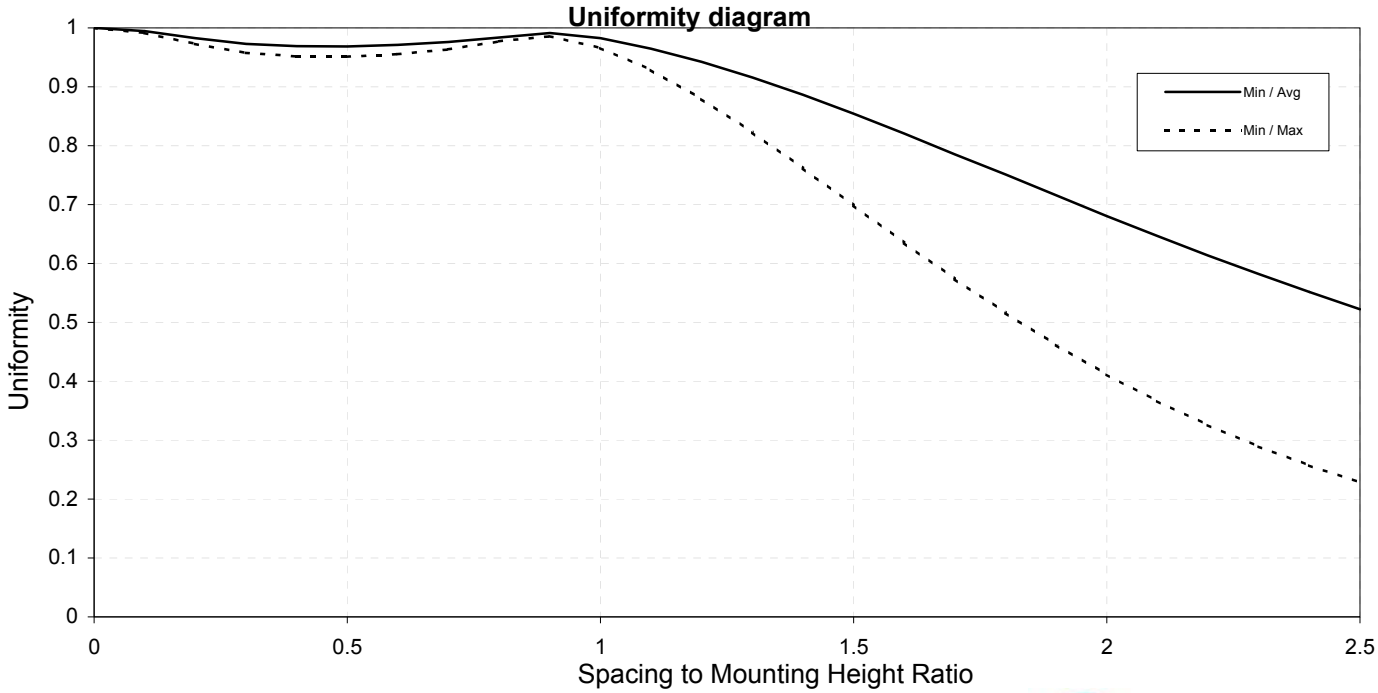

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Test Distance: 8.0 metres

Test Temperature: 25.2 degrees Celsius

Significance: This laboratory has no control over 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.

Special Notes:

The intensity values contained in this report are shown as tested. When using these values in calculations the appropriate Ballast Factor and Manufacturer's rated lumens MUST be taken into account.

It should also be noted that prorating the lumen output for the use of other lamp/ballast combinations, or for use in different environmental conditions, than that tested may produce erroneous results.
The generic term "LOR" is used in this report, it denotes the "Light Output Ratio Luminaire" as defined in Australian Standard AS1680, Part 3, 1991, Section 1.3.9.

This report is free of erasures and corrections.

Photometric intensity values are reported using the CIE Cgamma coordinate system as described in CIE Publication number 121.

Uncertainties: At the 95% confidence interval with a factor k = 2, the uncertainties for this report are :-

Temperature	+/- 1 degree Celsius
Light Output Ratio	+/- 4%
Luminous Intensity	+/- 4%
Angular displacement	+/- 0.5 degrees.

Testing Procedure: Tested in accordance with the applicable sections of CIE Publication Number 121; and with reference to Australian Standard AS1680, Part 3, 1991.

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