

Report of Test LL18059

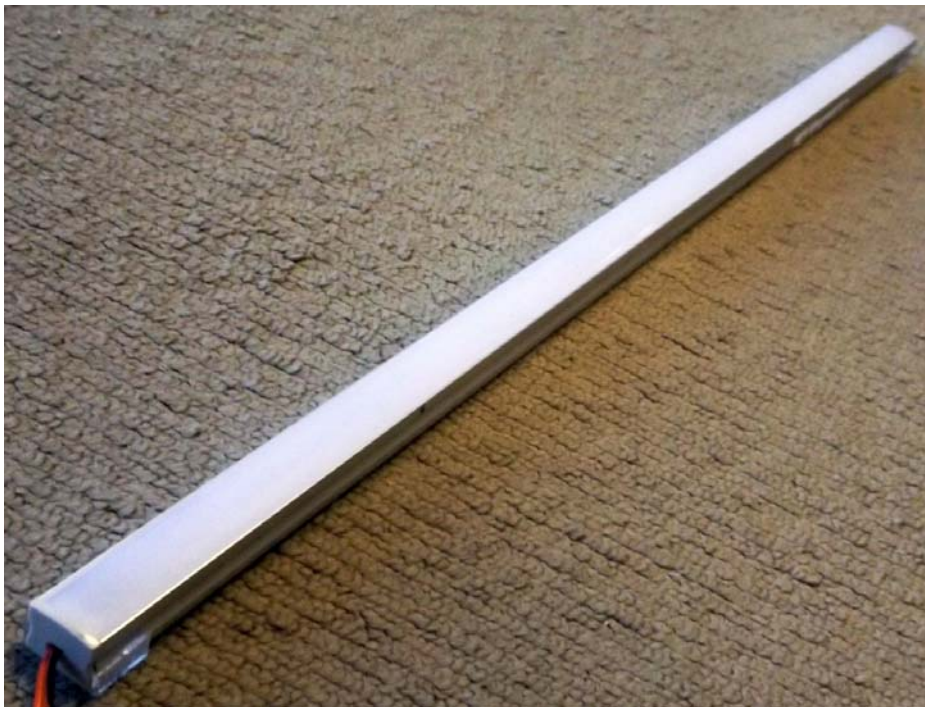
Product ID: Hawko ES-Surface c/w superFLEX 15w/mtr LED Strip 4000K.

Hawko Lighting Group Australia. Silver finish extruded aluminium housing and grey plastic endcaps, extent ~
524 x 17 x 17 mm deep. Opal diffuser forms luminous opening of 520 x 16 x 1 mm deep.

Five Hawko 24V LED strip sections with total of 35 "Samsung" LEDs centred 12 mm above L/O.

Remote KSAS0252400125HA 100-240V~ 50/60Hz AC adaptor.

Tested at 240 V 50 Hz.

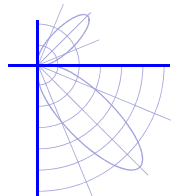


Performance Summary

Luminous flux	389 lm
Luminaire Power	7.55 W
Luminous Efficacy	51.5 lm/W
SHR Nominal	1.50
SHR Maximum	1.64

PREPARED FOR : Hawko Lighting Group Australia Pty. Ltd., Caloundra. QLD. 4551.





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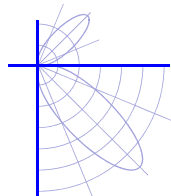
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LM-79 Performance Data

Spectral	CIE 1931 (x, y) ⁽¹⁾	(0.382, 0.383)
	CIE 1976 (u', v') ⁽¹⁾	(0.224, 0.504)
	Correlated Colour Temperature (CCT) ⁽¹⁾	4000 K
	Colour Spatial Uniformity ⁽²⁾	0.0007
	Colour Rendering Index (Ra) ⁽¹⁾	84
	Special CRI 9 (R _g) ^{(1),(3)}	17
	Distance from Planckian Locus (Duv) ^{(1),(3)}	0.0023
	Scotopic/Photopic Ratio ^{(1),(3)}	1.69

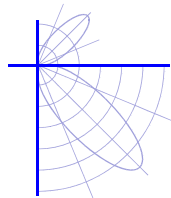
Electrical	Voltage	240 V
	Frequency	50 Hz
	Current	0.081 A
	Power	7.55 W
	Power Factor	0.39
	Current THD	234.0 %

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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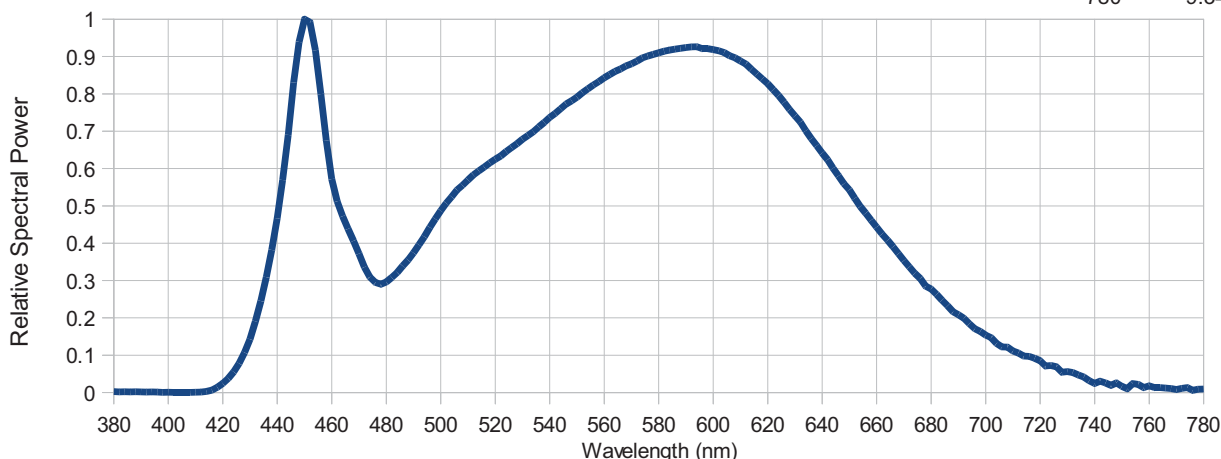
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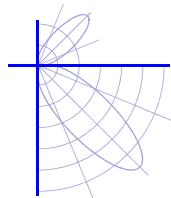
LM-79 Performance Data

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

380	2.31E-03	480	2.96E-01	580	9.10E-01	680	2.77E-01
385	1.78E-03	485	3.30E-01	585	9.18E-01	685	2.40E-01
390	1.51E-03	490	3.74E-01	590	9.24E-01	690	2.08E-01
395	1.25E-03	495	4.30E-01	595	9.24E-01	695	1.77E-01
400	7.14E-04	500	4.87E-01	600	9.18E-01	700	1.54E-01
405	3.33E-04	505	5.33E-01	605	9.07E-01	705	1.27E-01
410	9.95E-04	510	5.69E-01	610	8.88E-01	710	1.11E-01
415	4.80E-03	515	5.99E-01	615	8.60E-01	715	9.74E-02
420	2.43E-02	520	6.25E-01	620	8.27E-01	720	8.52E-02
425	6.65E-02	525	6.51E-01	625	7.86E-01	725	7.08E-02
430	1.43E-01	530	6.78E-01	630	7.41E-01	730	5.62E-02
435	2.77E-01	535	7.05E-01	635	6.91E-01	735	4.44E-02
440	4.66E-01	540	7.37E-01	640	6.42E-01	740	2.41E-02
445	7.60E-01	545	7.66E-01	645	5.90E-01	745	2.26E-02
450	1.00E+00	550	7.91E-01	650	5.43E-01	750	1.68E-02
455	8.58E-01	555	8.19E-01	655	4.90E-01	755	2.28E-02
460	5.72E-01	560	8.43E-01	660	4.43E-01	760	1.82E-02
465	4.55E-01	565	8.63E-01	665	3.99E-01	765	1.26E-02
470	3.72E-01	570	8.80E-01	670	3.54E-01	770	8.29E-03
475	3.02E-01	575	8.99E-01	675	3.12E-01	775	9.59E-03
						780	9.34E-03



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



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Tested at 240 V 50 Hz.

LM-79 Performance Data

Spatial measurements

Gamma angle (deg)	CIE 1976 (u',v') coordinates	
	C 0 plane	C 90 plane
0	(0.224, 0.505)	(0.224, 0.505)
10	(0.224, 0.505)	(0.224, 0.505)
20	(0.224, 0.505)	(0.224, 0.505)
30	(0.224, 0.505)	(0.224, 0.505)
40	(0.224, 0.504)	(0.224, 0.505)
50	(0.224, 0.504)	(0.224, 0.504)
60	(0.224, 0.504)	(0.224, 0.504)
70	(0.223, 0.504)	(0.224, 0.504)
80	(0.223, 0.505)	(0.223, 0.504)
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 10° 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.

Sample Orientation	Ceiling mount	Stabilisation Time	16 hour
		Total Operation Time	17.25 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	± 0.5°		

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.

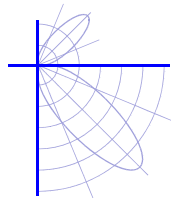
CIE (x, y) coordinates	± 0.004	CCT	± 150 K
CIE (u', v') coordinates	± 0.0025	CRI (Ra)	± 2
Δ (u', v') Colour difference	± 0.001	Scotopic / Photopic Ratio *	± 0.02
Relative Spectral Irradiance *	± 2 %	R9 *	± 2

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 v4.9 (23rd Sep 2014)



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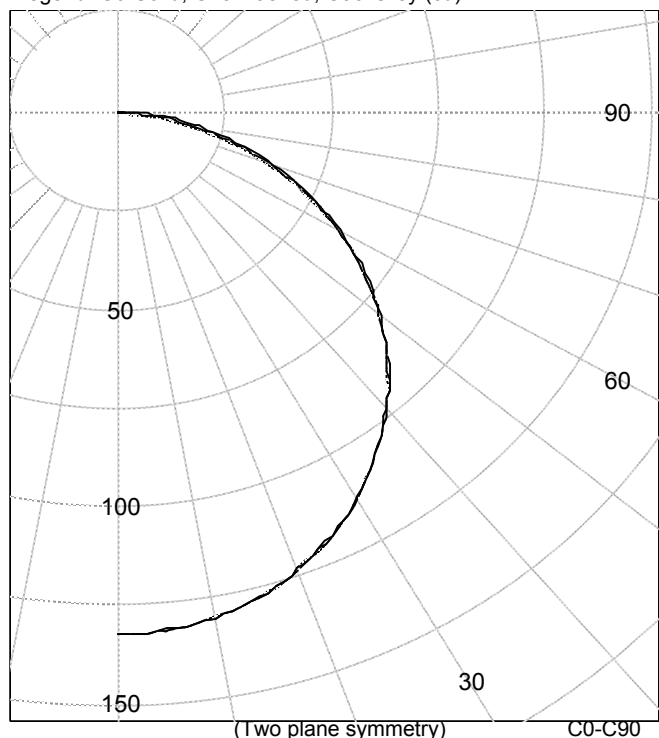
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Legend: C0-Solid, C45-Dashed, C90-Grey (cd)



AVERAGE LUMINANCE (cd / sq.m)

Gamma	C0	C45	C90
45.0	14307	14601	15192
55.0	13551	13856	14715
65.0	12435	12687	13634
75.0	10757	10680	11552
85.0	9632	8249	5875

INTENSITY SUMMARY (cd)

Gamma	C-Plane					Flux (lm)
	C0	C22.5	C45	C67.5	C90	
0.0	133	133	133	133	133	13
5.0	132	132	132	132	132	
10.0	130	130	130	130	130	
15.0	127	128	128	128	128	36
20.0	124	124	124	124	124	55
25.0	119	118	119	119	119	
30.0	113	112	113	113	113	
35.0	106	106	106	106	106	66
40.0	98	98	98	98	98	69
45.0	89	89	90	89	89	
50.0	80	80	80	80	80	
55.0	70	70	70	70	70	63
60.0	60	60	60	59	59	48
65.0	50	49	49	48	48	
70.0	39	38	38	36	36	
75.0	29	28	27	25	25	28
80.0	19	19	17	14	14	10
85.0	12	11	9	6	4	
90.0	6	6	4	1	0	

ZONAL FLUX AND PERCENTAGES

Zone	Flux (lm)	% Lamp	% Luminaire
0-30	103	N / A	26.5
0-40	169	N / A	43.5
0-60	301	N / A	77.4
0-90	387	N / A	99.6
40-90	218	N / A	56.0
60-90	86	N / A	22.2
90-180	2	N / A	0.4
0-180	389	N / A	100.0

Light Output Ratio = N / A

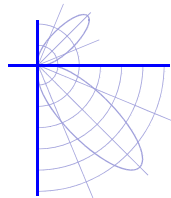
SHR-NOM = 1.50
SHR-MAX = 1.64

Calculated using the TM5
fine grid method.

CERTIFIED BY:

Kevin Monaghan
Authorised Signatory

Date of test 13-Oct-2014
Date of report 22-Oct-2014



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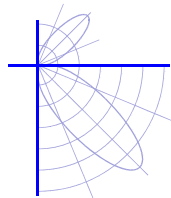
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Intensity data (cd)					
Gamma	C-Plane				
	C0	C22.5	C45	C67.5	C90
0.0	133	133	133	133	133
2.5	133	132	133	133	133
5.0	132	132	132	132	132
7.5	131	131	132	132	131
10.0	130	130	130	130	130
12.5	129	129	129	129	129
15.0	127	128	128	128	128
17.5	126	126	126	126	126
20.0	124	124	124	124	124
22.5	121	121	121	121	121
25.0	119	118	119	119	119
27.5	116	116	116	116	116
30.0	113	112	113	113	113
32.5	109	109	110	109	109
35.0	106	106	106	106	106
37.5	102	102	102	102	102
40.0	98	98	98	98	98
42.5	94	94	94	94	94
45.0	89	89	90	89	89
47.5	85	85	85	85	85
50.0	80	80	80	80	80
52.5	76	75	75	75	75
55.0	70	70	70	70	70
57.5	66	66	65	65	65
60.0	60	60	60	59	59
62.5	55	55	54	54	54
65.0	50	49	49	48	48
67.5	44	44	43	42	43
70.0	39	38	38	36	36
72.5	34	33	32	31	30
75.0	29	28	27	25	25
77.5	24	23	22	20	19
80.0	19	19	17	14	14
82.5	15	15	12	10	8
85.0	12	11	9	6	4
87.5	9	8	6	3	1
90.0	6	6	4	1	0



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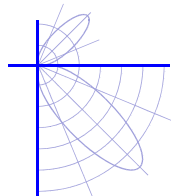
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Gamma	C-Plane				
	C0	C22.5	C45	C67.5	C90
90.0	6	6	4	1	0
92.5	4	4	2	0	0
95.0	3	2	1	0	0
97.5	2	1	0	0	0
100.0	1	1	0	0	0
102.5	0	0	0	0	0
105.0	0	0	0	0	0
107.5	0	0	0	0	0
110.0	0	0	0	0	0
112.5	0	0	0	0	0
115.0	0	0	0	0	0
117.5	0	0	0	0	0
120.0	0	0	0	0	0
122.5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



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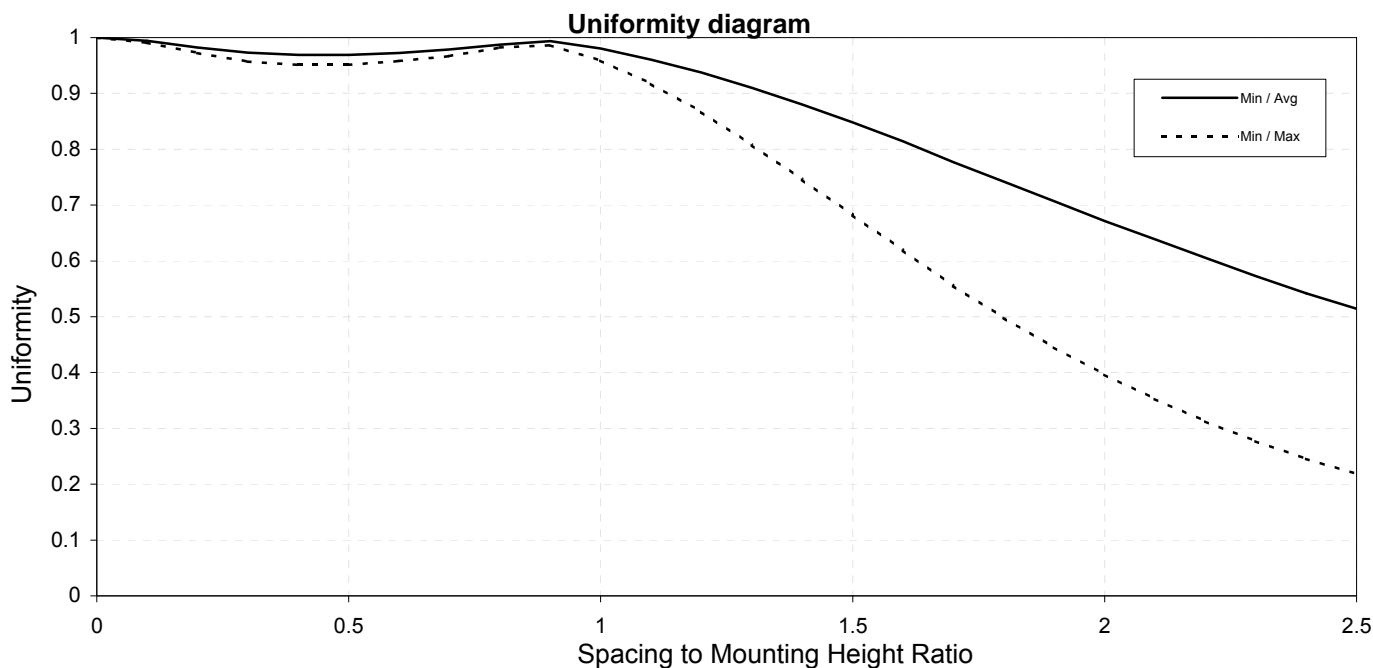
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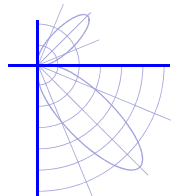
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Test Distance: 8.0 metres

Test Temperature: 24.9 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.