

# Report of Test LL21934

Empyrean Lighting 160 W LED Highbay. Product ID: Polaris-HB-160W-NW-120.

Cast aluminium body with black finish, extent ~ 390 mm diameter x 135 mm deep.

Clear planar glass lens forms luminous opening of 198 mm diameter.

One HB198-3030-6V-193-V3.0 PCB centred ~ 20 mm above L/O.

One Mean Well HBG-160-60B 100-240V~ 50/60Hz electronic driver.

Tested at 240 V 50 Hz.

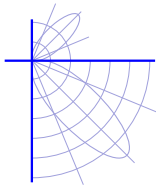


## Performance Summary

Luminous flux	18375 lm
Luminaire Power	156.9 W
Luminous Efficacy	117 lm/W
SHR Nominal	1.50
SHR Maximum	1.60

**PREPARED FOR : Empyrean Lighting, 11/9 Capital Pl., Birtinya, QLD 4557.**





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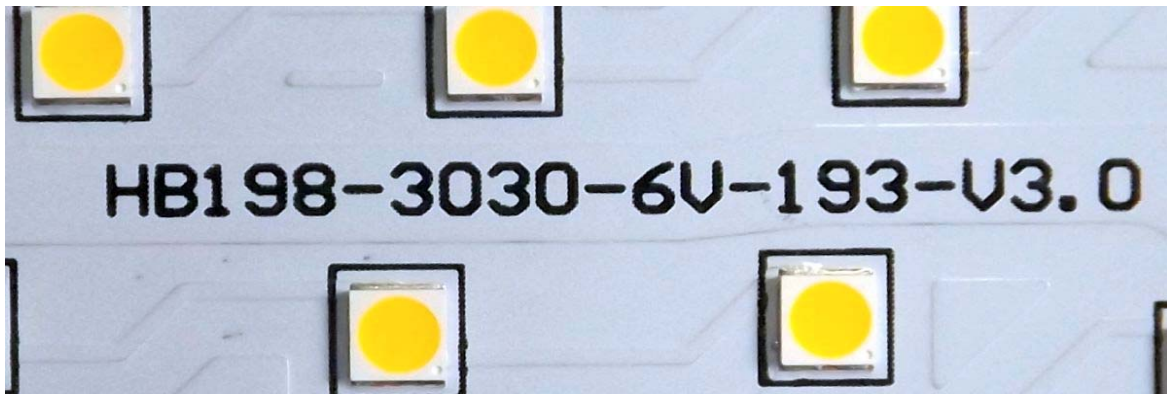
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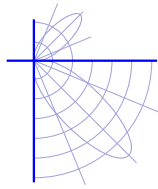
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### LM-79 Performance Data

<b>Spectral</b>	CIE 1931 (x, y) <sup>(1)</sup>	(0.382, 0.381)
	CIE 1976 (u', v') <sup>(1)</sup>	(0.224, 0.504)
	Correlated Colour Temperature (CCT) <sup>(1)</sup>	4000 K
	Spatial Δ (u', v') Uniformity <sup>(2)</sup>	5.74E-03
	Colour Rendering Index (Ra) <sup>(1)</sup>	82.7
	Special CRI 9 (R <sub>9</sub> ) <sup>(1),(3)</sup>	7.9
	Distance from Planckian Locus (Duv) <sup>(1),(3)</sup>	1.61E-03
	Scotopic/Photopic Ratio <sup>(1),(3)</sup>	1.68

<b>Electrical</b>	Voltage	240.0 V
	Frequency	50.0 Hz
	Current	0.677 A
	Power	157 W
	Power Factor	0.97
	Current THD	13.6 %

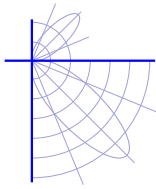
Performance data in accordance with IESNA LM-79-08. Spectral calculations are for a CIE 2° observer

(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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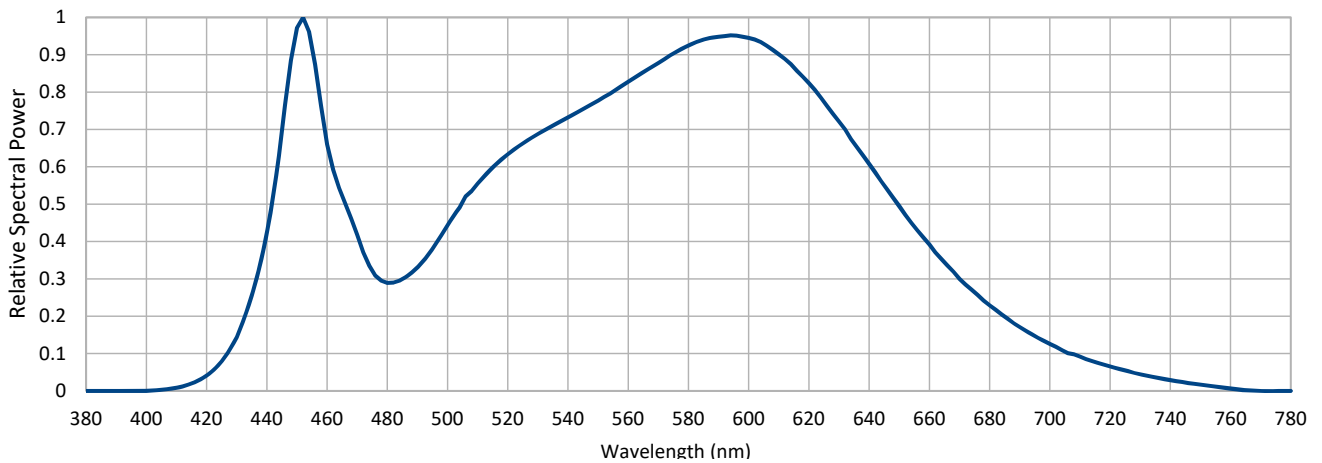
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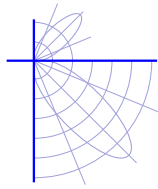
**LM-79 Performance Data**

**Relative spectral power distribution**

(Relative to peak = 1, weighted average of spatial measurements)

$\lambda$ (nm)	Relative Power	$\lambda$ (nm)	Relative Power	$\lambda$ (nm)	Relative Power	$\lambda$ (nm)	Relative Power	$\lambda$ (nm)	Relative Power
380	0.000	460	0.660	540	0.732	620	0.824	700	0.126
385	0.000	465	0.522	545	0.755	625	0.774	705	0.105
390	0.000	470	0.418	550	0.777	630	0.721	710	0.092
395	0.000	475	0.322	555	0.802	635	0.663	715	0.077
400	0.000	480	0.289	560	0.828	640	0.608	720	0.065
405	0.003	485	0.300	565	0.853	645	0.550	725	0.055
410	0.008	490	0.331	570	0.878	650	0.495	730	0.045
415	0.020	495	0.381	575	0.904	655	0.440	735	0.036
420	0.041	500	0.443	580	0.925	660	0.392	740	0.029
425	0.080	505	0.506	585	0.941	665	0.345	745	0.022
430	0.144	510	0.555	590	0.948	670	0.300	750	0.017
435	0.257	515	0.598	595	0.952	675	0.264	755	0.011
440	0.423	520	0.633	600	0.945	680	0.229	760	0.006
445	0.697	525	0.663	605	0.929	685	0.199	765	0.002
450	0.972	530	0.688	610	0.901	690	0.171	770	0.000
455	0.918	535	0.710	615	0.866	695	0.147	775	0.000
								780	0.000





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Tested at 240 V 50 Hz.

### LM-79 Performance Data

#### Spatial measurements

Gamma angle (°)	CIE 1976 (u',v') coordinates	
	C 0.0° plane	C 90.0° plane
0.0	( 0.224, 0.499)	( 0.224, 0.498)
10.0	( 0.224, 0.499)	( 0.224, 0.499)
20.0	( 0.224, 0.500)	( 0.224, 0.500)
30.0	( 0.224, 0.501)	( 0.224, 0.501)
40.0	( 0.224, 0.503)	( 0.224, 0.503)
50.0	( 0.224, 0.506)	( 0.224, 0.505)
60.0	( 0.224, 0.508)	( 0.225, 0.507)
70.0	( 0.224, 0.509)	( 0.225, 0.509)
-	-	-
-	-	-

#### Spatial measurements

Gamma angle (°)	CIE 1976 (u',v') coordinates	
	C 0.0° plane	C 90.0° plane
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

#### 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                      Pendant mount                      Stabilisation & total operation time    2.25 / 2.75 hours

#### 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 (grating with 380 - 780 nm range, 2 nm / pixel, 5 nm bandwidth, incandescent/halogen calibration source). Measurements off 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
Spatial Δ (u', v') uniformity	± 0.001	Scotopic / Photopic Ratio *	± 0.02
Rel. Spectral Irradiance *	± 2 %	R9 *	± 2
Duv *	± 5E-04		

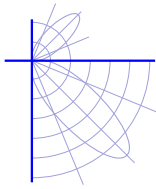
Yokogawa WT210 power meter connected in circuit to the sample electrical supply

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.

Calculator / report version 1.0.10 / 5.9 (14th Dec 2017)





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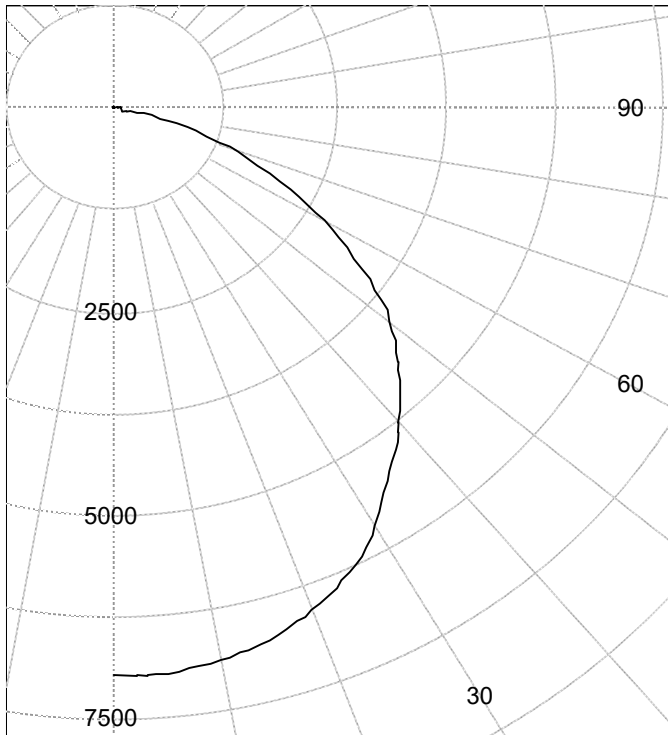
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One Mean Well HBG-160-60B 100-240V~ 50/60Hz electronic driver.

Tested at 240 V 50 Hz.

Legend: All planes - Solid (cd)



(Rotational symmetry)

### AVERAGE LUMINANCE (cd / sq.m)

Gamma	C0
45.0	209553
55.0	193774
65.0	158622
75.0	91249
85.0	16067

### INTENSITY SUMMARY (cd)

Gamma	All Planes	Flux (lm)	Gamma	C0	Flux (lm)
0	6978		90	0	
5	6962	662	95	0	0
10	6894		100	0	
15	6757	1907	105	0	0
20	6548		110	0	
25	6299	2898	115	0	0
30	5922		120	0	
35	5455	3417	125	0	0
40	5024		130	0	
45	4562	3521	135	0	0
50	4068		140	0	
55	3422	3061	145	0	0
60	2754		150	0	
65	2064	2042	155	0	0
70	1370		160	0	
75	727	791	165	0	0
80	254		170	0	
85	43	76	175	0	0
90	0		180	0	

### ZONAL FLUX AND PERCENTAGES

Zone	Flux (lm)	%Lamp	%Luminaire
0-30	5467	N / A	29.8
0-40	8884	N / A	48.4
0-60	15466	N / A	84.2
0-90	18375	N / A	100.0
40-90	9490	N / A	51.6
60-90	2909	N / A	15.8
90-180	0	N / A	0.0
0-180	18375	N / A	100.0

Total Light Output = 18375 lm

SHR-NOM = 1.50

SHR-MAX = 1.60

Calculated using the TM5

fine grid method.

Date of test

18-Jun-2019

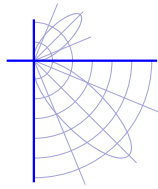
Date of report

26-Jun-2019

CERTIFIED BY:

Toby Southgate  
Authorised Signatory





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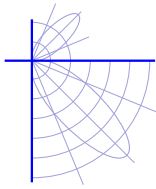
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Tested at 240 V 50 Hz.

**Intensity (cd) and Flux (lm) data**

Gamma	Intensity	Flux	Gamma	Intensity	Flux
0.0	6978		90.0	0	
2.5	6975		92.5	0	
5.0	6962	662	95.0	0	
7.5	6936		97.5	0	0
10.0	6894		100.0	0	
12.5	6837		102.5	0	
15.0	6757	1907	105.0	0	
17.5	6661		107.5	0	0
20.0	6548		110.0	0	
22.5	6429		112.5	0	
25.0	6299	2898	115.0	0	
27.5	6142		117.5	0	0
30.0	5922		120.0	0	
32.5	5671		122.5	0	
35.0	5455	3417	125.0	0	
37.5	5234		127.5	0	0
40.0	5024		130.0	0	
42.5	4799		132.5	0	
45.0	4562	3521	135.0	0	
47.5	4323		137.5	0	0
50.0	4068		140.0	0	
52.5	3788		142.5	0	
55.0	3422	3061	145.0	0	
57.5	3085		147.5	0	0
60.0	2754		150.0	0	
62.5	2433		152.5	0	
65.0	2064	2042	155.0	0	
67.5	1700		157.5	0	0
70.0	1370		160.0	0	
72.5	1025		162.5	0	
75.0	727	791	165.0	0	
77.5	455		167.5	0	0
80.0	254		170.0	0	
82.5	113		172.5	0	
85.0	43	76	175.0	0	
87.5	11		177.5	0	0
90.0	0		180.0	0	





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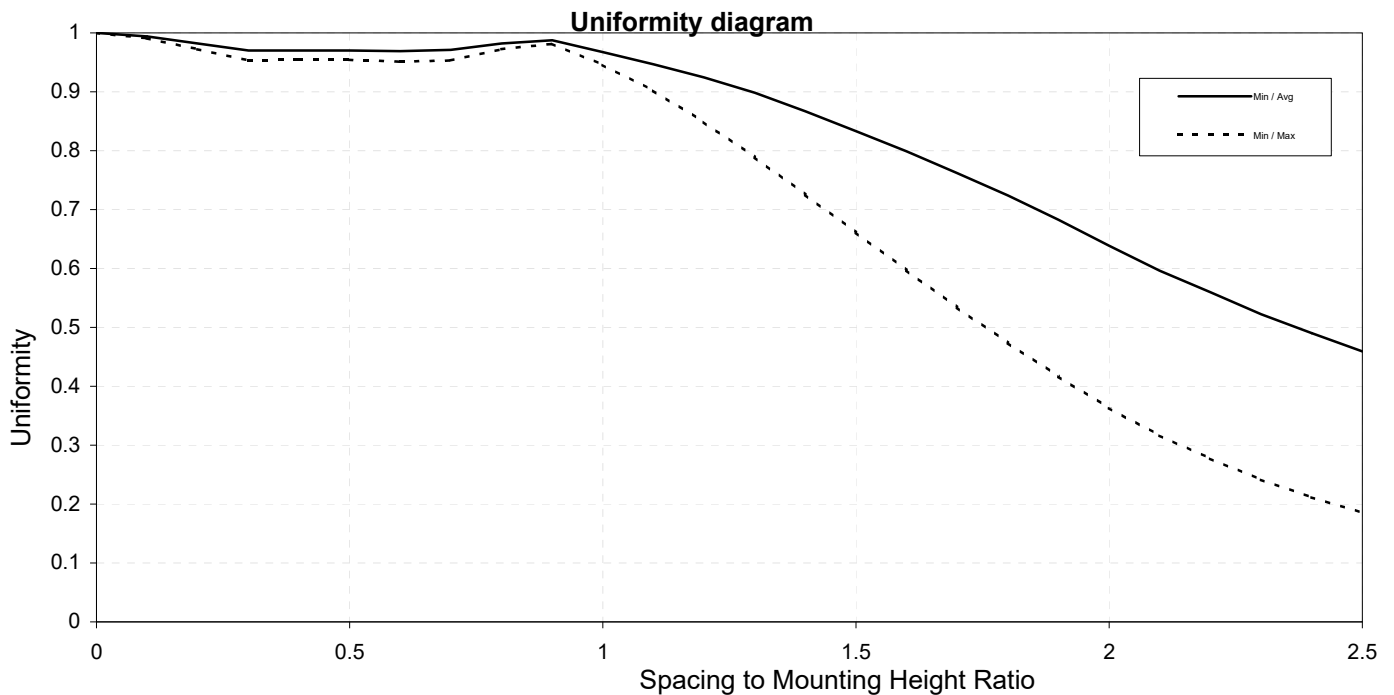
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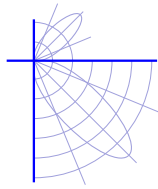
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Tested at 240 V 50 Hz.

**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.

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.

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

**Measurement Uncertainties:** Measurement uncertainties are available on request

