


Report Number	GNC-20541
Customer	Astro Lighting Limited
Contact	David Green
Product Type	LED Up & Down light
Test Purpose	Generation of photometric data
Quote Reference	Q-LUX18-22157
Works Order Number	WO-11188
Test Item Reference	TI-14612
LAB Test Method Reference	TES-102000
Test Standards	LM-79-08; (BS) EN 13032-4:2015; CIE S025:2015
Lab Location Reference	LUX-TSI
Tested by	Mike Sewell
Date of Test	20/02/2018
Reviewed by	Menno Schakel
Number of products tested	1

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7428 Bloc LED

Date: 20/02/2018

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Nomenclature

Lamp Orientation described below relates to the position in which a lamp is designed to operate for maximum performance and safety, these include:

BD - Base Down (bulb is vertically positioned with the metal base at the bottom, glass up)
BU - Base Up (bulb is vertically positioned with the metal base at the top, glass hanging down)
HBD - Horizontal +15° to Base Down
H45 - Horizontal to -45° only
VBU - Vertical Base Up $\pm 15^\circ$
VBD - Vertical Base Down $\pm 15^\circ$
HBU - Base Up $\pm 90^\circ$ (bulb can be operated in a base up or horizontal position)
HOR - Horizontal Burn (bulb is positioned with the metal base parallel to the ground)
H75 - Horizontal $\pm 75^\circ$ (bulb should not be operated within 15° of vertical)
U - Universal Burn (burn can be operated in any position)

Test Conditions

Measurements were made with an ambient temperature of $25^\circ\text{C} \pm 1^\circ\text{C}$. Measurements were taken only after sufficient time for thermal stabilisation has been allowed. Thermal stabilisation according to LM-79-08 was achieved before measurements are measured and reported.

Calibrations

The far field Type C Goniophotometer is calibrated using an intensity lamp calibrated by a NVLAP accredited calibration laboratory.

Test Equipment

UL LSI Custom Far-Field Type C Moving Mirror Goniophotometer measures intensity as a function of angle. On-axis spectral measurements taken using spectrometer, for which these measurements and outputs are not accredited.

Data Formats

IES (15 deg azimuth and 2.5 deg inclination) and LDT (15 deg C planes and 2.5 deg gamma angles)

Spectral Data file from which the calculation of chromaticity and CRI etc. have been performed and the derived results from the LightMtrX software are provided as a text file format.

All photometric data for LED products will be provided in ABSOLUTE photometric format and all non-LED data will be in relative photometric format with lamp lumens measured separately, where possible, for LOR estimation.

Product Name	7428 Bloc LED
Part/Serial Number	N/A
Type of Product	LED Up & Down light
Base Type	Not Applicable - Luminaire
Driver Type	External AC transformer
Test Time	30 mins
Operating Orientation	Base Up
Test Orientation	Base Up
Ambient Temperature	25.4°C
Manufacturer	Astro Lighting Limited
Date of Manufacture	Not Available
Thermal Management	Passive
Dimmable	No
Pre-Burning Time	0 hours
Stabilisation Time	75 mins
Humidity	28.8% RH
Averaging Applied	NONE



Driver Details		
Manufacturer	SELF	
Model	SLT3-3501SC	
Part/Serial #	N/A	
Rated Voltage	100-240V	
Output	Current	0.350 A
	Voltage	N/A

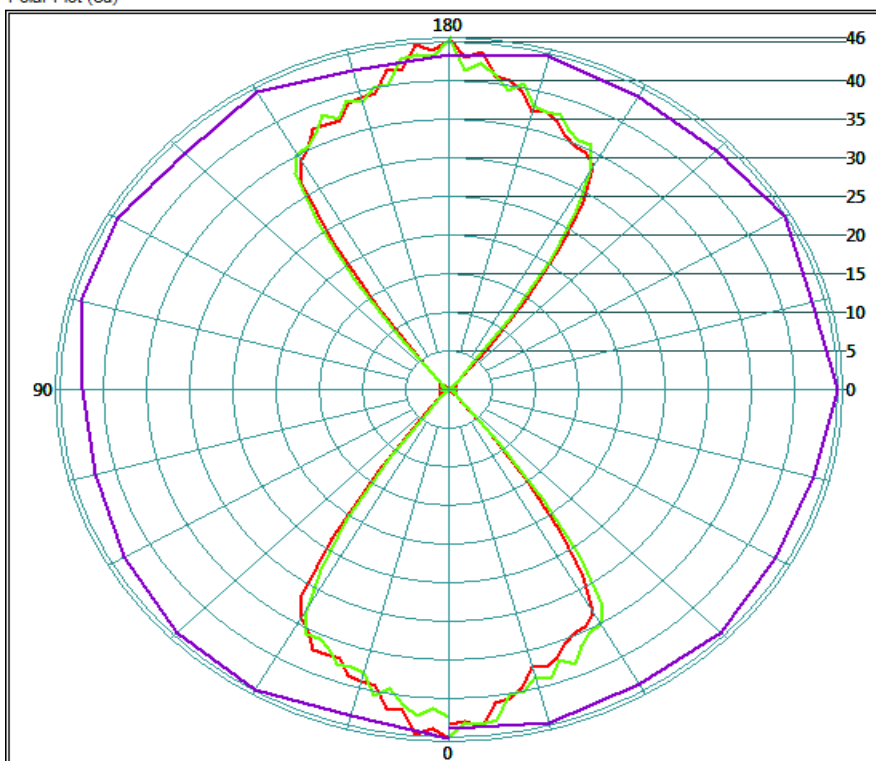
Photometric Measurements	
Luminous Flux	95 lm
Luminous Efficacy	28 lm/W

Dimension	Sample	Luminous Opening
Diameter/Width	35 mm	12 mm Φ
Length	50 mm	
Height/Depth	100 mm	0 mm

Electrical Measurements	
Frequency	60 Hz
Voltage	120.0 V
Current	0.058 A
Power	3.4 W
Power Factor	0.495
Apparent Power	6.9 VA

Goniophotometric Measurements		
Beam Angle	Horizontal	70°
	Vertical	70°
On-axis Intensity		45 cd
Peak Intensity		46 cd
Peak Direction	Horizontal	330°
	Vertical	3°

Polar Plot (cd)



0.00	Red
180.00	Red
90.00	Green
270.00	Green
0.00	Purple

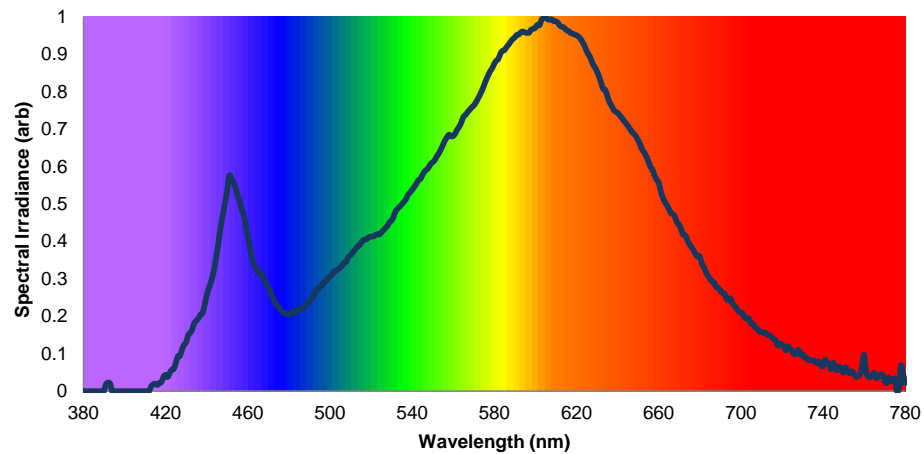
Mounting Height (m)	Beam Width (m)		Projected Illuminance (lux)
	C0-C180 plane	C90-270 plane	
0.5	0.7	0.7	181
1	1.4	1.4	45
2	2.8	2.8	11
3	4.2	4.2	5
4	5.6	5.6	3
5	7.0	7.0	2
7.5	10.5	10.5	1
10	14.0	14.0	0
20	28.0	28.0	0

Appendices

On-axis Spectral Measurement

The following data was determined from an on-axis spectral measurement using a SP1000 spectrometer at a distance of 1500mm, for which these measurements and outputs are not accredited.

Spectral Irradiance versus Wavelength

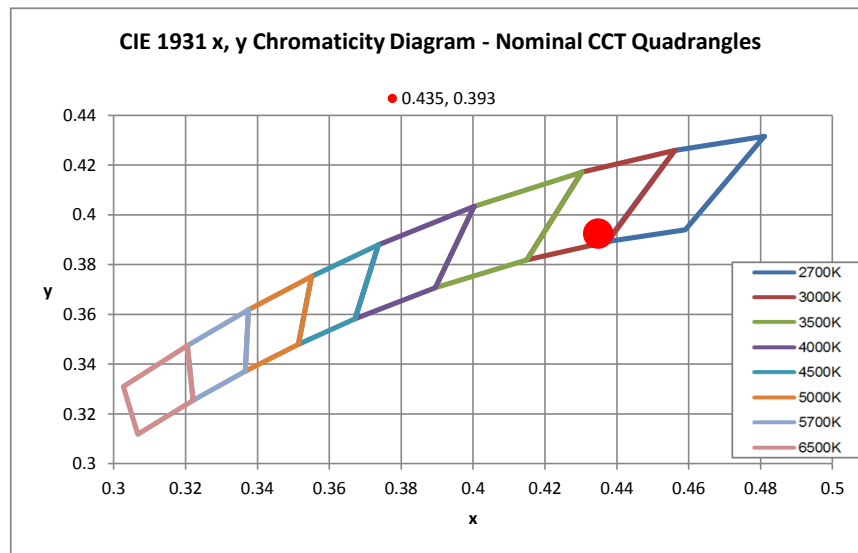
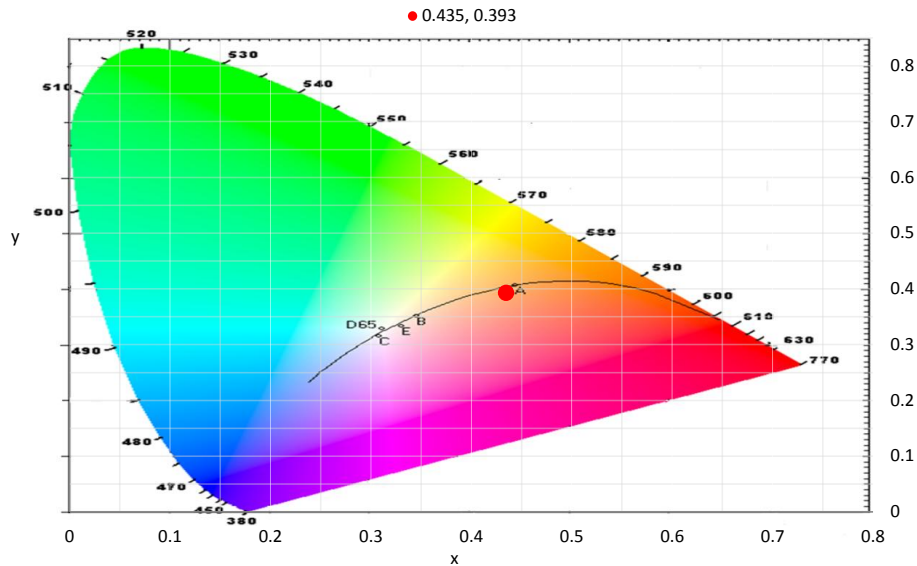


Colour Rendering Index Detail			
R1	82	R8	62
R2	93	R9	17
R3	95	R10	82
R4	80	R11	78
R5	82	R12	76
R6	90	R13	85
R7	82	R14	98

Colorimetric Details	
CCT	2937K
CRI (Ra)	83

Chromaticity Coordinates		
CIE 1931	x	0.4348
	y	0.3925
CIE 1960	u	0.2543
	v	0.3443
CIE 1976	u'	0.2543
	v'	0.5164
Duv		0.0046

CIE 1931 Colour Chart



Spectral Power Distribution

λ (nm)	Arb units	λ (nm)	Arb units	λ (nm)	Arb units	λ (nm)	Arb units
380	0.00E+00	430	1.30E-01	480	2.04E-01	530	4.56E-01
381	0.00E+00	431	1.49E-01	481	2.09E-01	531	4.66E-01
382	0.00E+00	432	1.56E-01	482	2.14E-01	532	4.81E-01
383	0.00E+00	433	1.65E-01	483	2.08E-01	533	4.88E-01
384	0.00E+00	434	1.82E-01	484	2.13E-01	534	4.93E-01
385	0.00E+00	435	1.88E-01	485	2.19E-01	535	4.99E-01
386	0.00E+00	436	1.95E-01	486	2.19E-01	536	5.06E-01
387	0.00E+00	437	2.04E-01	487	2.24E-01	537	5.13E-01
388	0.00E+00	438	2.08E-01	488	2.30E-01	538	5.25E-01
389	0.00E+00	439	2.29E-01	489	2.36E-01	539	5.31E-01
390	0.00E+00	440	2.55E-01	490	2.40E-01	540	5.38E-01
391	1.86E-02	441	2.73E-01	491	2.47E-01	541	5.45E-01
392	2.28E-02	442	2.89E-01	492	2.54E-01	542	5.54E-01
393	2.07E-02	443	3.09E-01	493	2.67E-01	543	5.63E-01
394	0.00E+00	444	3.36E-01	494	2.73E-01	544	5.67E-01
395	0.00E+00	445	3.69E-01	495	2.77E-01	545	5.77E-01
396	0.00E+00	446	4.06E-01	496	2.82E-01	546	5.87E-01
397	0.00E+00	447	4.44E-01	497	2.90E-01	547	5.92E-01
398	0.00E+00	448	4.74E-01	498	2.94E-01	548	5.97E-01
399	0.00E+00	449	5.05E-01	499	3.02E-01	549	6.07E-01
400	0.00E+00	450	5.36E-01	500	3.06E-01	550	6.12E-01
401	0.00E+00	451	5.76E-01	501	3.12E-01	551	6.17E-01
402	0.00E+00	452	5.68E-01	502	3.19E-01	552	6.27E-01
403	0.00E+00	453	5.58E-01	503	3.22E-01	553	6.35E-01
404	0.00E+00	454	5.46E-01	504	3.26E-01	554	6.46E-01
405	0.00E+00	455	5.25E-01	505	3.30E-01	555	6.58E-01
406	0.00E+00	456	5.10E-01	506	3.36E-01	556	6.70E-01
407	0.00E+00	457	4.86E-01	507	3.43E-01	557	6.79E-01
408	0.00E+00	458	4.74E-01	508	3.46E-01	558	6.85E-01
409	0.00E+00	459	4.44E-01	509	3.59E-01	559	6.81E-01
410	0.00E+00	460	4.16E-01	510	3.63E-01	560	6.82E-01
411	0.00E+00	461	3.87E-01	511	3.70E-01	561	6.88E-01
412	0.00E+00	462	3.55E-01	512	3.77E-01	562	6.99E-01
413	1.29E-02	463	3.39E-01	513	3.84E-01	563	7.07E-01
414	1.83E-02	464	3.28E-01	514	3.89E-01	564	7.19E-01
415	2.03E-02	465	3.17E-01	515	3.94E-01	565	7.33E-01
416	1.67E-02	466	3.21E-01	516	4.03E-01	566	7.38E-01
417	2.21E-02	467	3.09E-01	517	4.05E-01	567	7.45E-01
418	2.40E-02	468	2.97E-01	518	4.07E-01	568	7.52E-01
419	3.81E-02	469	2.87E-01	519	4.12E-01	569	7.58E-01
420	4.36E-02	470	2.76E-01	520	4.13E-01	570	7.63E-01
421	3.75E-02	471	2.67E-01	521	4.13E-01	571	7.71E-01
422	4.84E-02	472	2.53E-01	522	4.16E-01	572	7.81E-01
423	5.71E-02	473	2.40E-01	523	4.20E-01	573	7.92E-01
424	5.93E-02	474	2.31E-01	524	4.19E-01	574	8.03E-01
425	7.51E-02	475	2.26E-01	525	4.24E-01	575	8.17E-01
426	9.34E-02	476	2.17E-01	526	4.30E-01	576	8.31E-01
427	9.38E-02	477	2.12E-01	527	4.36E-01	577	8.43E-01
428	1.11E-01	478	2.09E-01	528	4.42E-01	578	8.55E-01
429	1.24E-01	479	2.07E-01	529	4.51E-01	579	8.63E-01
						580	8.75E-01

Spectral Power Distribution

λ (nm)	Arb units	λ (nm)	Arb units	λ (nm)	Arb units	λ (nm)	Arb units
581	8.83E-01	631	8.41E-01	681	3.42E-01	731	8.98E-02
582	8.88E-01	632	8.26E-01	682	3.32E-01	732	8.93E-02
583	9.02E-01	633	8.08E-01	683	3.19E-01	733	8.34E-02
584	9.09E-01	634	8.05E-01	684	3.08E-01	734	8.25E-02
585	9.12E-01	635	7.90E-01	685	3.01E-01	735	8.23E-02
586	9.20E-01	636	7.73E-01	686	2.92E-01	736	8.11E-02
587	9.26E-01	637	7.64E-01	687	2.91E-01	737	7.45E-02
588	9.34E-01	638	7.54E-01	688	2.79E-01	738	7.91E-02
589	9.41E-01	639	7.47E-01	689	2.76E-01	739	7.31E-02
590	9.45E-01	640	7.44E-01	690	2.69E-01	740	6.62E-02
591	9.52E-01	641	7.38E-01	691	2.63E-01	741	8.42E-02
592	9.53E-01	642	7.31E-01	692	2.61E-01	742	7.64E-02
593	9.59E-01	643	7.24E-01	693	2.49E-01	743	7.32E-02
594	9.61E-01	644	7.17E-01	694	2.43E-01	744	5.87E-02
595	9.58E-01	645	7.10E-01	695	2.48E-01	745	7.60E-02
596	9.58E-01	646	7.02E-01	696	2.34E-01	746	6.16E-02
597	9.58E-01	647	6.94E-01	697	2.29E-01	747	5.59E-02
598	9.66E-01	648	6.88E-01	698	2.21E-01	748	6.59E-02
599	9.68E-01	649	6.81E-01	699	2.13E-01	749	5.77E-02
600	9.71E-01	650	6.70E-01	700	2.11E-01	750	4.99E-02
601	9.79E-01	651	6.60E-01	701	2.08E-01	751	6.41E-02
602	9.78E-01	652	6.46E-01	702	1.95E-01	752	5.37E-02
603	9.92E-01	653	6.38E-01	703	1.96E-01	753	4.82E-02
604	9.98E-01	654	6.27E-01	704	1.94E-01	754	5.33E-02
605	1.00E+00	655	6.15E-01	705	1.81E-01	755	4.71E-02
606	9.94E-01	656	6.00E-01	706	1.80E-01	756	3.85E-02
607	9.93E-01	657	5.92E-01	707	1.70E-01	757	4.01E-02
608	9.94E-01	658	5.78E-01	708	1.68E-01	758	4.44E-02
609	9.89E-01	659	5.65E-01	709	1.59E-01	759	6.61E-02
610	9.88E-01	660	5.59E-01	710	1.58E-01	760	9.71E-02
611	9.85E-01	661	5.37E-01	711	1.56E-01	761	5.31E-02
612	9.77E-01	662	5.18E-01	712	1.56E-01	762	3.85E-02
613	9.74E-01	663	5.07E-01	713	1.51E-01	763	3.69E-02
614	9.72E-01	664	4.98E-01	714	1.49E-01	764	4.28E-02
615	9.65E-01	665	4.88E-01	715	1.45E-01	765	4.92E-02
616	9.63E-01	666	4.76E-01	716	1.39E-01	766	3.45E-02
617	9.59E-01	667	4.74E-01	717	1.36E-01	767	4.07E-02
618	9.56E-01	668	4.66E-01	718	1.22E-01	768	4.46E-02
619	9.54E-01	669	4.51E-01	719	1.28E-01	769	4.30E-02
620	9.51E-01	670	4.45E-01	720	1.25E-01	770	2.66E-02
621	9.48E-01	671	4.33E-01	721	1.18E-01	771	2.19E-02
622	9.42E-01	672	4.18E-01	722	1.09E-01	772	3.68E-02
623	9.33E-01	673	4.17E-01	723	1.20E-01	773	2.65E-02
624	9.23E-01	674	4.04E-01	724	1.14E-01	774	3.10E-02
625	9.09E-01	675	3.94E-01	725	1.07E-01	775	3.28E-02
626	9.00E-01	676	3.85E-01	726	9.83E-02	776	0.00E+00
627	8.89E-01	677	3.77E-01	727	1.02E-01	777	3.49E-03
628	8.74E-01	678	3.66E-01	728	1.11E-01	778	6.81E-02
629	8.66E-01	679	3.60E-01	729	9.68E-02	779	4.81E-02
630	8.55E-01	680	3.61E-01	730	9.98E-02	780	2.14E-02

Measurement Uncertainty

The following is the reported expanded uncertainty of the UL 6440T Type C Mirror Goniophotometer.

Parameter	Uncertainty
Total Luminous Flux (%)	± 4.9
Luminous Intensity (%)	± 4.9
Temperature (°C)	± 1.0
Voltage DC TY720 (%)	± 0.017
Current DC TY720 (%)	± 0.10
Voltage AC WT210 (%)	± 0.059
Current AC WT210 (%)	± 0.025
Power AC WT210 (%)	± 0.23
Frequency (50/60 Hz) WT210 (%)	± 0.004
Power Factor WT210 (%)	± 0.06

The reported expanded uncertainty is based on the combined standard uncertainty multiplied by a coverage factor of $k = 2$. This value of k gives a coverage probability of approximately 95%, assuming a normal distribution. This determination of the measurement uncertainty has been done in accordance with international requirements including UKAS, BIPM Guide to the Expression of Uncertainty in Measurement and CIE 198:2011 and CIE S 025/E:2015.

Electrical measurement equipment used for the determination of results for this report, are compliant and meet the performance requirements of the measurement standards used.

----- END OF REPORT -----