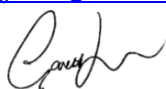


Report Number	GNC-20719
Customer	Astro Lighting Limited
Contact	Ross Dickson
Product Type	LED Table Light
Test Purpose	Generation of photometric data
Quote Reference	Q-LUX17-21659
Works Order Number	WO-11366
Test Item Reference	TI-14743
LAB Test Method Reference	TES-102000
Test Standards	LM-79-08; (BS) EN 13032-4:2015; CIE S025:2015
Lab Location Reference	LUX-TSI
Tested by	Mike Sewell
Date of Test	05/02/2018
Reviewed by	Menno Schakel
Number of products tested	1

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Authorised by: Gareth Jones
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Signed:



Date: 05/02/2018



7723 Enna Desk

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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 $+15^{\circ}$ 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	7723 Enna Desk
Part/Serial Number	1058035/36/37
Type of Product	LED Table Light
Base Type	Not Applicable - Luminaire
Driver Type	Internal
Test Time	30 mins
Operating Orientation	Base Up
Test Orientation	Base Up
Ambient Temperature	25.3°C
Manufacturer	Astro Lighting Limited
Date of Manufacture	Not Available
Thermal Management	Passive
Dimmable	No
Pre-Burning Time	0 hours
Stabilisation Time	60 mins
Humidity	20.8% RH
Averaging Applied	NONE



Driver Details		
Manufacturer		N/A
Model		N/A
Part/Serial #		N/A
Rated Voltage		N/A
Output	Current	N/A
	Voltage	N/A

Photometric Measurements	
Luminous Flux	102 lm
Luminous Efficacy	26 lm/W

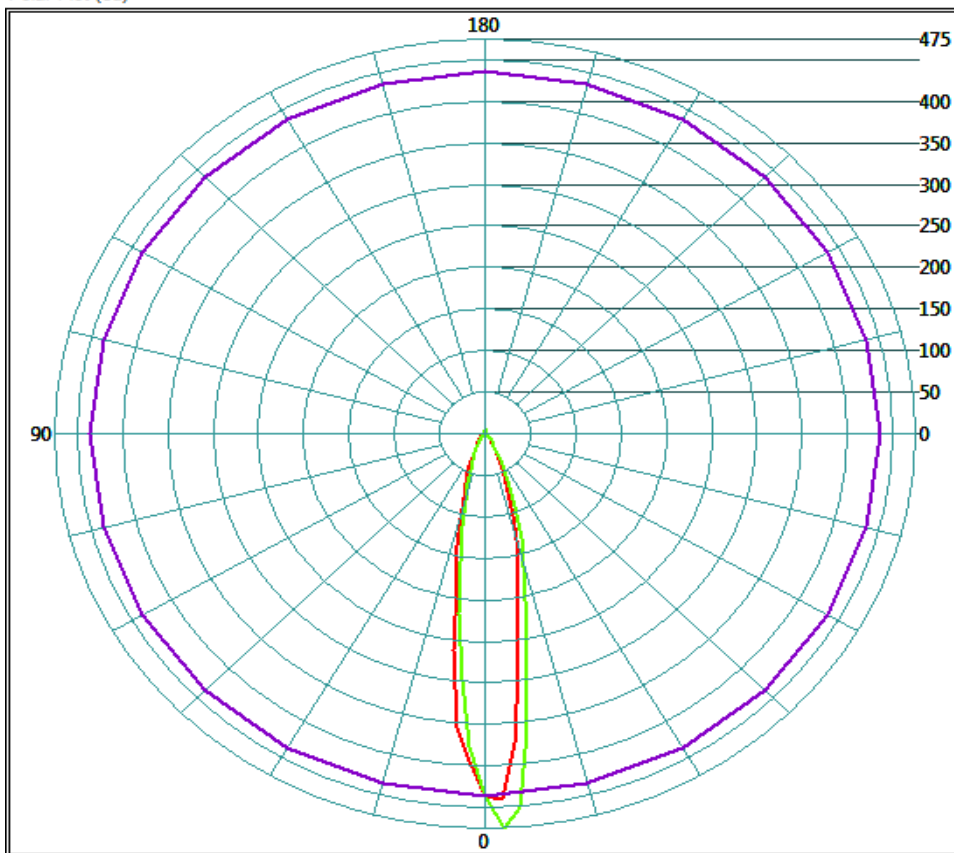
Dimension	Sample	Luminous Opening
Diameter/Width	120 mm	25 mm Φ
Length	241 mm	
Height/Depth	450 mm	0 mm

Electrical Measurements	
Frequency	60 Hz
Voltage	120.1 V
Current	0.061 A
Power	3.9 W
Power Factor	0.532
Apparent Power	7.4 VA

Goniophotometric Measurements

Beam Angle	Horizontal	18°
	Vertical	18°
On-axis Intensity		436 cd
Peak Intensity		475 cd
Peak Direction	Horizontal	270°
	Vertical	3°

Polar Plot (cd)



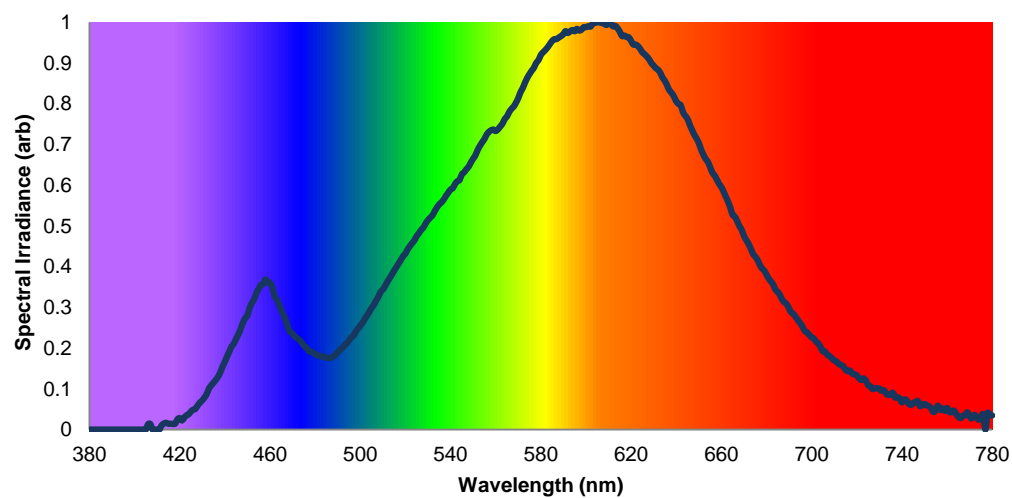
Mounting Height (m)	Beam Width (m)		Projected Illuminance (lux)
	C0-C180 plane	C90-270 plane	
0.5	0.2	0.2	1744
1	0.3	0.3	436
2	0.6	0.6	109
3	1.0	1.0	48
4	1.3	1.3	27
5	1.6	1.6	17
7.5	2.4	2.4	8
10	3.2	3.2	4
20	6.4	6.4	1

Appendices

On-axis Spectral Measurement

The following data was determined from an on-axis spectral measurement using a SP1000 spectrometer at a distance of 1000mm, for which these measurements and outputs are not accredited.

Spectral Irradiance versus Wavelength



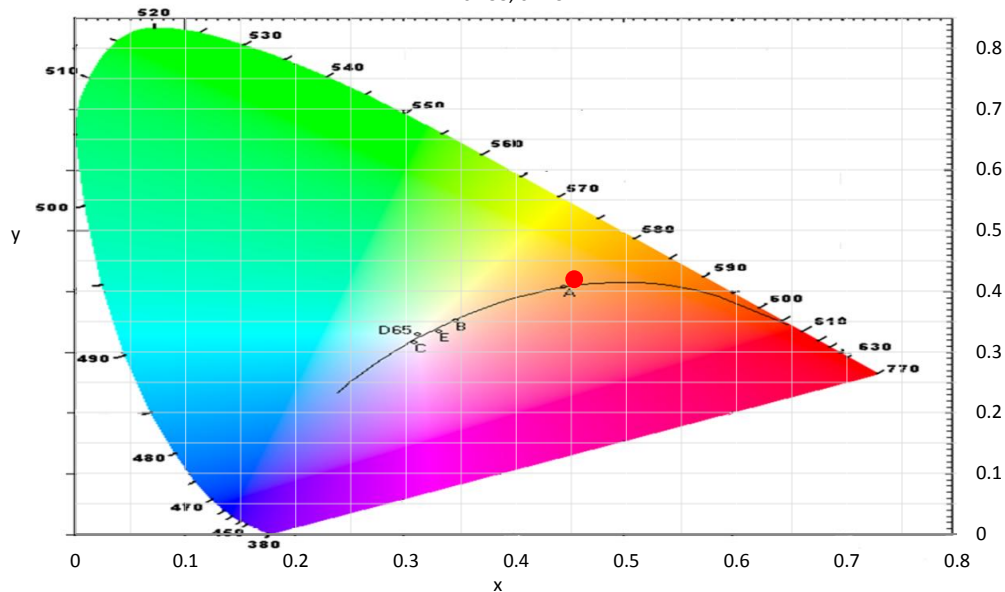
Colour Rendering Index Detail			
R1	78	R8	61
R2	88	R9	11
R3	96	R10	71
R4	78	R11	74
R5	77	R12	61
R6	83	R13	80
R7	86	R14	98

Colorimetric Details	
CCT	2866K
CRI (Ra)	81

Chromaticity Coordinates		
CIE 1931	x	0.4529
	y	0.4193
CIE 1960	u	0.2542
	v	0.3531
CIE 1976	u'	0.2542
	v'	0.5296
Duv		0.0034

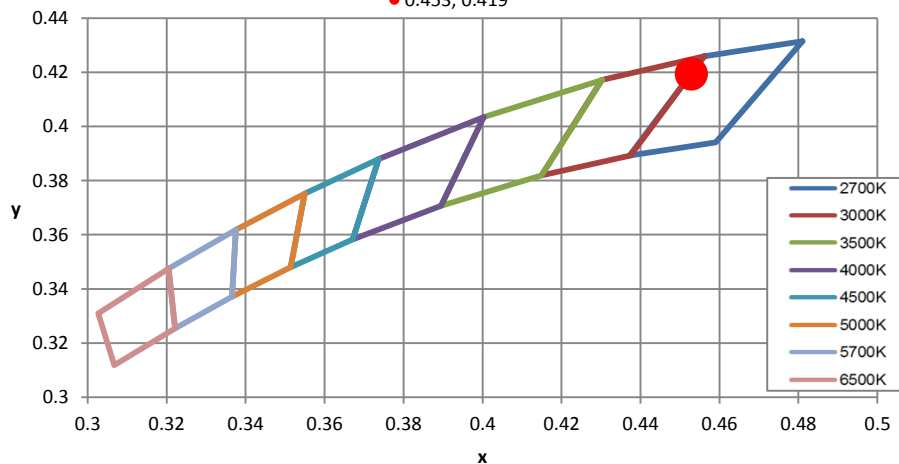
CIE 1931 Colour Chart

• 0.453, 0.419



CIE 1931 x, y Chromaticity Diagram - Nominal CCT Quadrangles

• 0.453, 0.419



Spectral Power Distribution

λ (nm)	Arb units	λ (nm)	Arb units	λ (nm)	Arb units	λ (nm)	Arb units
380	0.00E+00	430	7.19E-02	480	1.85E-01	530	5.14E-01
381	0.00E+00	431	7.89E-02	481	1.83E-01	531	5.20E-01
382	0.00E+00	432	8.77E-02	482	1.81E-01	532	5.26E-01
383	0.00E+00	433	1.01E-01	483	1.79E-01	533	5.36E-01
384	0.00E+00	434	1.09E-01	484	1.78E-01	534	5.46E-01
385	0.00E+00	435	1.15E-01	485	1.77E-01	535	5.53E-01
386	0.00E+00	436	1.22E-01	486	1.76E-01	536	5.58E-01
387	0.00E+00	437	1.30E-01	487	1.76E-01	537	5.65E-01
388	0.00E+00	438	1.41E-01	488	1.79E-01	538	5.74E-01
389	0.00E+00	439	1.55E-01	489	1.84E-01	539	5.82E-01
390	0.00E+00	440	1.66E-01	490	1.90E-01	540	5.89E-01
391	0.00E+00	441	1.79E-01	491	1.95E-01	541	5.93E-01
392	0.00E+00	442	1.92E-01	492	2.00E-01	542	6.03E-01
393	0.00E+00	443	2.04E-01	493	2.07E-01	543	6.10E-01
394	0.00E+00	444	2.11E-01	494	2.12E-01	544	6.13E-01
395	0.00E+00	445	2.23E-01	495	2.19E-01	545	6.27E-01
396	0.00E+00	446	2.34E-01	496	2.26E-01	546	6.32E-01
397	0.00E+00	447	2.47E-01	497	2.31E-01	547	6.39E-01
398	0.00E+00	448	2.62E-01	498	2.41E-01	548	6.46E-01
399	0.00E+00	449	2.73E-01	499	2.48E-01	549	6.56E-01
400	0.00E+00	450	2.80E-01	500	2.55E-01	550	6.65E-01
401	0.00E+00	451	2.99E-01	501	2.62E-01	551	6.73E-01
402	0.00E+00	452	3.11E-01	502	2.72E-01	552	6.86E-01
403	0.00E+00	453	3.20E-01	503	2.80E-01	553	6.96E-01
404	0.00E+00	454	3.35E-01	504	2.89E-01	554	7.05E-01
405	0.00E+00	455	3.46E-01	505	2.98E-01	555	7.13E-01
406	1.32E-02	456	3.55E-01	506	3.06E-01	556	7.24E-01
407	1.35E-02	457	3.58E-01	507	3.17E-01	557	7.31E-01
408	0.00E+00	458	3.69E-01	508	3.26E-01	558	7.35E-01
409	0.00E+00	459	3.61E-01	509	3.38E-01	559	7.37E-01
410	0.00E+00	460	3.61E-01	510	3.44E-01	560	7.33E-01
411	0.00E+00	461	3.50E-01	511	3.53E-01	561	7.37E-01
412	1.03E-02	462	3.28E-01	512	3.63E-01	562	7.44E-01
413	1.49E-02	463	3.19E-01	513	3.72E-01	563	7.51E-01
414	1.67E-02	464	3.08E-01	514	3.81E-01	564	7.62E-01
415	1.42E-02	465	2.93E-01	515	3.90E-01	565	7.69E-01
416	1.44E-02	466	2.81E-01	516	3.99E-01	566	7.80E-01
417	1.38E-02	467	2.68E-01	517	4.08E-01	567	7.88E-01
418	1.46E-02	468	2.50E-01	518	4.17E-01	568	7.93E-01
419	2.50E-02	469	2.40E-01	519	4.26E-01	569	8.03E-01
420	2.83E-02	470	2.36E-01	520	4.32E-01	570	8.14E-01
421	2.24E-02	471	2.29E-01	521	4.43E-01	571	8.28E-01
422	2.91E-02	472	2.24E-01	522	4.51E-01	572	8.39E-01
423	3.50E-02	473	2.20E-01	523	4.58E-01	573	8.52E-01
424	3.77E-02	474	2.14E-01	524	4.65E-01	574	8.64E-01
425	4.46E-02	475	2.07E-01	525	4.75E-01	575	8.73E-01
426	4.88E-02	476	2.02E-01	526	4.82E-01	576	8.81E-01
427	5.10E-02	477	1.95E-01	527	4.90E-01	577	8.89E-01
428	5.96E-02	478	1.91E-01	528	4.96E-01	578	9.01E-01
429	6.64E-02	479	1.90E-01	529	5.06E-01	579	9.07E-01
						580	9.20E-01

Spectral Power Distribution

λ (nm)	Arb units	λ (nm)	Arb units	λ (nm)	Arb units	λ (nm)	Arb units
581	9.26E-01	631	8.87E-01	681	3.71E-01	731	9.54E-02
582	9.32E-01	632	8.83E-01	682	3.63E-01	732	9.68E-02
583	9.39E-01	633	8.75E-01	683	3.56E-01	733	8.85E-02
584	9.46E-01	634	8.64E-01	684	3.44E-01	734	8.50E-02
585	9.54E-01	635	8.56E-01	685	3.38E-01	735	8.68E-02
586	9.59E-01	636	8.45E-01	686	3.30E-01	736	9.04E-02
587	9.59E-01	637	8.33E-01	687	3.19E-01	737	7.89E-02
588	9.63E-01	638	8.26E-01	688	3.13E-01	738	7.98E-02
589	9.66E-01	639	8.18E-01	689	3.08E-01	739	7.63E-02
590	9.71E-01	640	8.06E-01	690	2.97E-01	740	6.67E-02
591	9.78E-01	641	8.00E-01	691	2.88E-01	741	7.40E-02
592	9.74E-01	642	7.97E-01	692	2.84E-01	742	7.28E-02
593	9.78E-01	643	7.80E-01	693	2.76E-01	743	6.39E-02
594	9.81E-01	644	7.71E-01	694	2.68E-01	744	6.06E-02
595	9.78E-01	645	7.63E-01	695	2.61E-01	745	6.51E-02
596	9.84E-01	646	7.49E-01	696	2.52E-01	746	6.76E-02
597	9.80E-01	647	7.36E-01	697	2.42E-01	747	7.03E-02
598	9.82E-01	648	7.24E-01	698	2.38E-01	748	5.78E-02
599	9.88E-01	649	7.15E-01	699	2.32E-01	749	6.06E-02
600	9.88E-01	650	7.04E-01	700	2.27E-01	750	6.32E-02
601	9.90E-01	651	6.88E-01	701	2.23E-01	751	5.96E-02
602	9.90E-01	652	6.75E-01	702	2.16E-01	752	5.74E-02
603	9.96E-01	653	6.65E-01	703	2.11E-01	753	5.20E-02
604	9.99E-01	654	6.58E-01	704	2.02E-01	754	4.30E-02
605	1.00E+00	655	6.45E-01	705	1.92E-01	755	4.84E-02
606	1.00E+00	656	6.31E-01	706	1.91E-01	756	5.87E-02
607	9.98E-01	657	6.24E-01	707	1.83E-01	757	4.83E-02
608	9.97E-01	658	6.14E-01	708	1.80E-01	758	5.19E-02
609	9.94E-01	659	6.03E-01	709	1.75E-01	759	4.61E-02
610	9.97E-01	660	5.96E-01	710	1.70E-01	760	5.30E-02
611	9.97E-01	661	5.84E-01	711	1.67E-01	761	4.33E-02
612	9.90E-01	662	5.72E-01	712	1.61E-01	762	4.29E-02
613	9.91E-01	663	5.59E-01	713	1.59E-01	763	4.66E-02
614	9.86E-01	664	5.44E-01	714	1.56E-01	764	3.90E-02
615	9.77E-01	665	5.27E-01	715	1.47E-01	765	3.14E-02
616	9.66E-01	666	5.23E-01	716	1.43E-01	766	2.82E-02
617	9.68E-01	667	5.12E-01	717	1.45E-01	767	3.39E-02
618	9.64E-01	668	5.00E-01	718	1.38E-01	768	3.54E-02
619	9.63E-01	669	4.91E-01	719	1.36E-01	769	4.24E-02
620	9.55E-01	670	4.76E-01	720	1.33E-01	770	3.20E-02
621	9.46E-01	671	4.66E-01	721	1.26E-01	771	2.74E-02
622	9.45E-01	672	4.57E-01	722	1.22E-01	772	3.60E-02
623	9.42E-01	673	4.45E-01	723	1.26E-01	773	3.21E-02
624	9.35E-01	674	4.32E-01	724	1.21E-01	774	2.45E-02
625	9.27E-01	675	4.25E-01	725	1.09E-01	775	2.87E-02
626	9.22E-01	676	4.17E-01	726	1.06E-01	776	3.75E-02
627	9.16E-01	677	4.05E-01	727	9.96E-02	777	0.00E+00
628	9.09E-01	678	3.96E-01	728	1.01E-01	778	4.10E-02
629	9.00E-01	679	3.90E-01	729	1.01E-01	779	3.68E-02
630	8.94E-01	680	3.80E-01	730	1.01E-01	780	3.47E-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 -----