



Les Industries Spectralux Inc. Spectralux Industries Inc.

2750 Sabourin, Saint-Laurent (Quebec) H4S 1M2 Canada
Tel.: (514) 332-0082 Fax: (514) 332-3590 www.spectralux.ca

ISO/IEC 17025
NVLAP
NVLAP LAB CODE: 200899-0

Sphere Test Report

Standard(s) CIE 84-1989, IESNA LM-16-93, IESNA LM-58-94, IES LM-79-08, ANSI C82.77-2002

Customer Lumenpulse, 1751 Richardson, suite 1505, Montréal, Québec, Canada, H3K 1G6

General Information		Lamp Details: CY2399	Driver Details: CY1013	
Test Report	L1512043-C1	Description	Clusters of 24 Cree XPE2 LED's	Type Commercial
Test Date	4 December 2015	Manufacturer	Cree	Description 34W
Report Date	8 December 2015	Catalog No.	LOGI-RO-120/277-48-40K-10x60-SI-NO	Manufacturer Meanwell
Sphere Temperature	22.6 °C	Serial No.	SRIS 2222	Catalog No. LPF-40-24
Humidity	22.6 %	Diameter	N/A mm	Voltage 120.00 V
Lamp Type	SSL	Color	White	Power Factor 0.9900

Stabilization Time: () 'a]bi hYg

Tested By: AUFWJ]k cbc i 'GYbU

Approved Signatory: Chrisnel Blot

Signature:

Notes

- 1) Field performance may differ from laboratory measurements. Results are valid for tested material only.
- 2) The original electronic file or paper report cannot be edited in whole or in part without written consent of Spectra Lux Industries Inc.
- 3) This test report describes the performance of a single product and does not necessarily represent the average performance of a group of the same SSL product.



Realization of Sphere Test

A 4π sphere-spectroradiometer equipped with auxiliary lamp to correct self-absorption was used during the measurements of electrical, photometric and colorimetric properties of the sample under test. The size of the integrating sphere used is large enough to ensure that the measurement errors due to effects of baffle and self-absorption by the sample test are not significant.

During the test, a commercial driver was used and adjusted to nominal electrical characteristics specified by the driver manufacturer or the client. Good electrical contacts have been used to ensure the control of electrical parameters of the commercial driver and an adequate stabilization period prior to collecting data. The self-absorbance was measured and a geometrical correction factor was applied to the luminous flux value to take into account the sphere configuration.

Results of the measurements are traceable to reference standards developed and maintained by the National Institute of Standards and Technology (NIST) and National Research Council of Canada (NRC).





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Electrical Equipment

Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
Auxiliary Power Supply	American Reliance	SPS150-7	B10155	N.P.C.R.	N.P.C.R.
Test Power Supply	iRDC	CIF-3000A	974997	N.P.C.R.	N.P.C.R.
Input Power Meter	Yokogawa	WT210	91L236540	2015/10/22	2016/10/22
Output Power Meter	N/A	N/A	N/A	N.P.C.R.	N.P.C.R.
Shunt Resistor	Fluke	Y5020	5675014	2015/08/06	2016/08/06
Current Multimeter	HP Agilent	HP34401A	US36121202	2015/08/06	2016/08/06
Voltage Multimeter	Fluke	Fluke8842A	4282317	2014/10/31	2016/10/31

Spectrometer Equipment

Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
Spectrometer	Ocean Optics	USB2000N	USB2E3864	2015/08/24	2016/08/24

Environment Equipment

Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
Temperature Humidity Sensor	Omega	HH311	120504176	2014/04/16	2016/04/16



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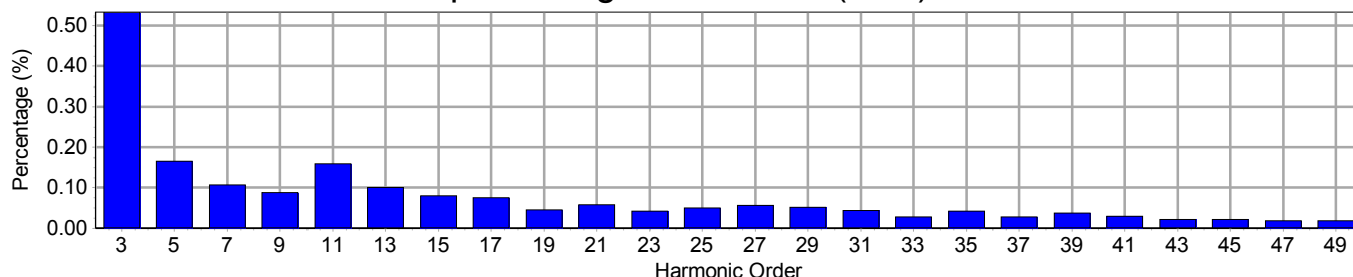
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Electrical Measurements

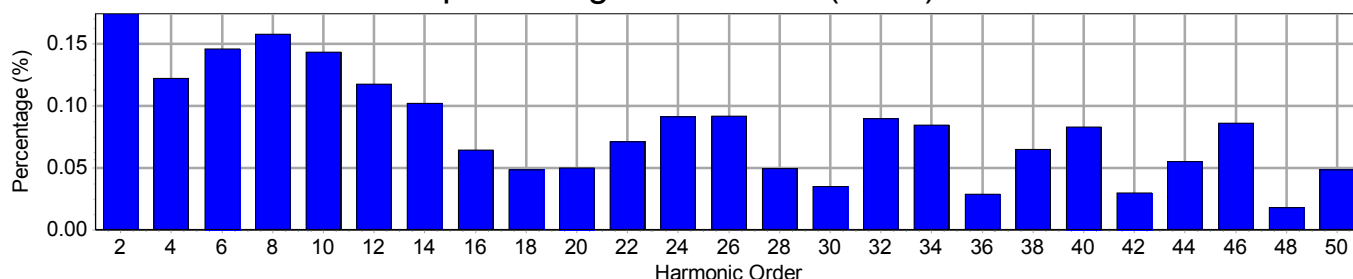
Input

Frequency	60 Hz	Active Power	31.13 W	THDV [ANSI]	0.77 %
Voltage	120.2 V(rms)	Apparent Power	32.06 VA	THDA [ANSI]	7.96 %
Current	0.2668 A(rms)	Power Factor	0.971	Max. Harmonic At	3rd order

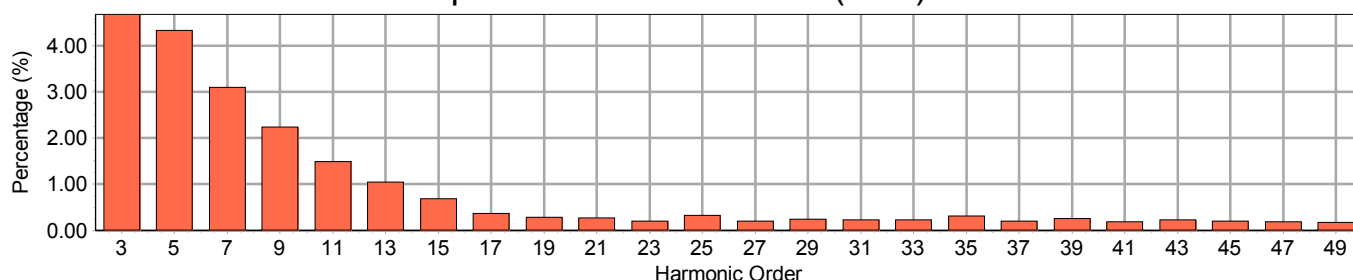
Input Voltage Harmonics (Odd)



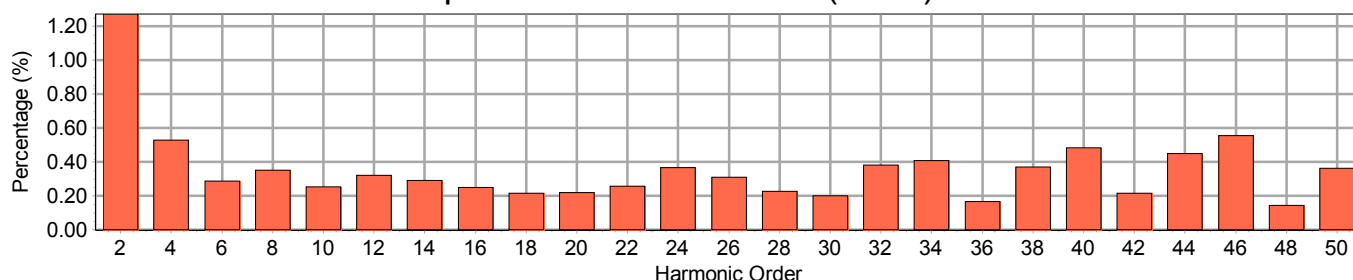
Input Voltage Harmonics (Even)



Input Current Harmonics (Odd)



Input Current Harmonics (Even)





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Harmonic Measurements

Odd Harmonics				Even Harmonics			
Harmonic Order	Frequency (HZ)	Voltage Harmonics (%)	Current Harmonics (%)	Harmonic Order	Frequency (HZ)	Voltage Harmonics (%)	Current Harmonics (%)
1	60	100.000	100.000	2	120	0.175	1.275
3	180	0.534	4.681	4	240	0.122	0.529
5	300	0.166	4.322	6	360	0.146	0.289
7	420	0.106	3.093	8	480	0.157	0.353
9	540	0.088	2.239	10	600	0.143	0.254
11	660	0.159	1.495	12	720	0.117	0.322
13	780	0.101	1.043	14	840	0.102	0.292
15	900	0.080	0.680	16	960	0.064	0.250
17	1020	0.075	0.368	18	1080	0.048	0.217
19	1140	0.045	0.288	20	1200	0.050	0.222
21	1260	0.057	0.267	22	1320	0.071	0.258
23	1380	0.041	0.196	24	1440	0.091	0.366
25	1500	0.049	0.330	26	1560	0.092	0.312
27	1620	0.057	0.194	28	1680	0.049	0.230
29	1740	0.052	0.249	30	1800	0.035	0.201
31	1860	0.044	0.225	32	1920	0.090	0.381
33	1980	0.027	0.233	34	2040	0.085	0.411
35	2100	0.042	0.311	36	2160	0.029	0.167
37	2220	0.028	0.202	38	2280	0.065	0.373
39	2340	0.038	0.254	40	2400	0.083	0.484
41	2460	0.029	0.182	42	2520	0.030	0.219
43	2580	0.022	0.222	44	2640	0.055	0.451
45	2700	0.021	0.201	46	2760	0.086	0.556
47	2820	0.019	0.190	48	2880	0.018	0.147
49	2940	0.018	0.178	50	3000	0.048	0.362



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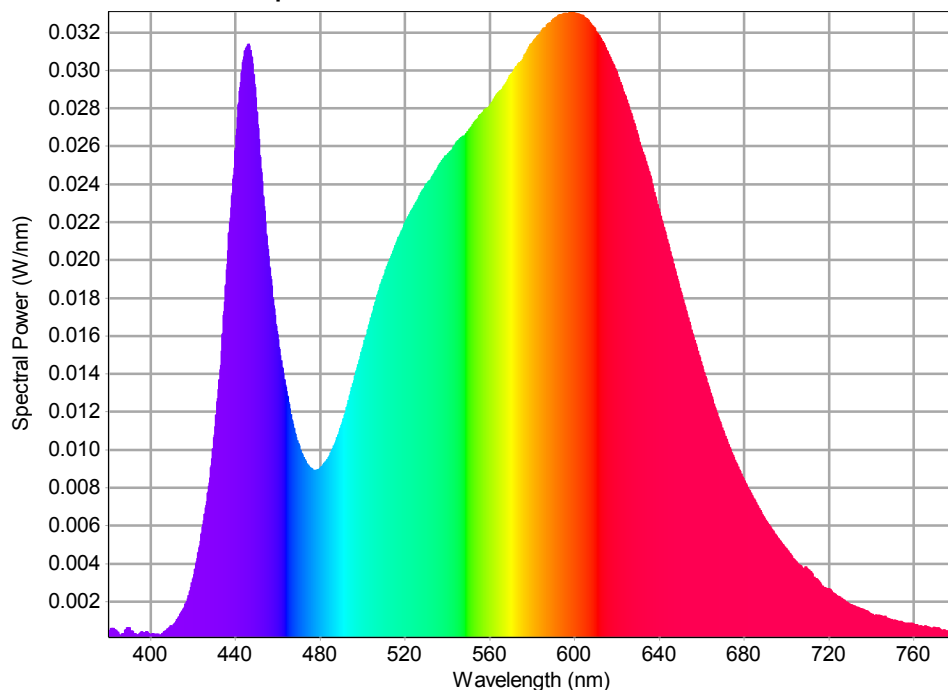
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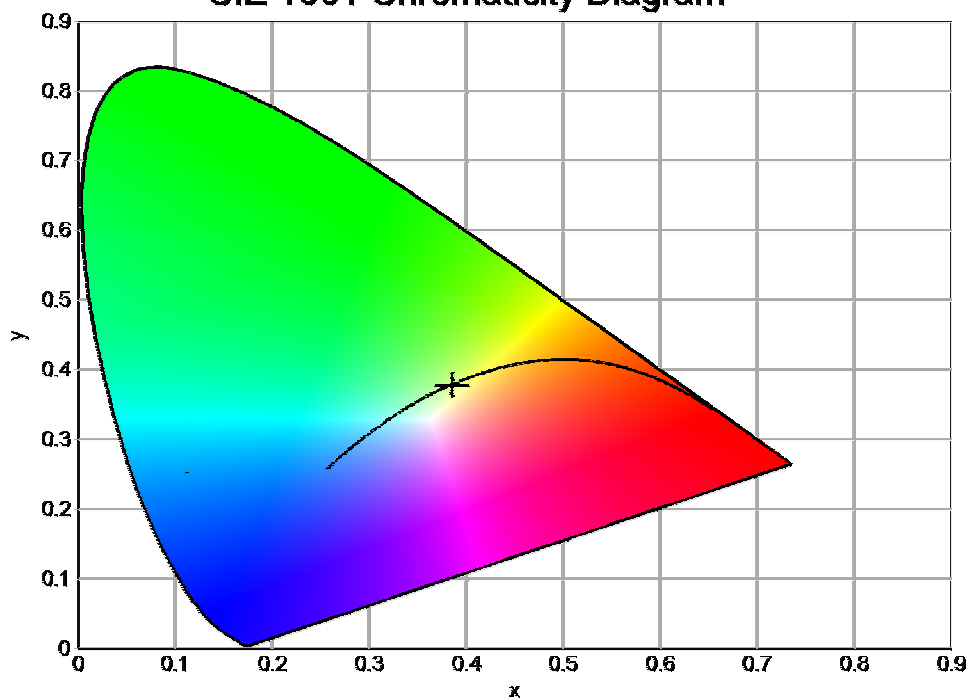
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Spectral Power Distribution



Peak Wavelength	599 nm
Luminous Flux	1916 lm
Input Power	31.13 W
Lumens/Watt	61.6
Full Width/Half Maximum	151.55
Center Wavelength	579 nm
Centroid Wavelength	369 nm
Dominant Wavelength	487 nm
Excitation Purity	0.1620
Colorimetric Purity	0.0976

CIE 1931 Chromaticity Diagram



x	0.3850	CCT	3890 K
y	0.3784	CRI	84
u	0.2275	L*	25.67
v	0.3353	a*	-4.52
u'	0.2275	b*	-14.86
v'	0.5030	Duv	0.0006
R1	82.6	R9	15.9
R2	88.1	R10	71.5
R3	92.3	R11	83.6
R4	84.2	R12	68.2
R5	82.7	R13	83.6
R6	84.1	R14	95.5
R7	86.8		
R8	67.9		



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Spectral Power Distribution Table (1/4)

Wavelength (nm)	Spectral Power (W/nm)	Wavelength (nm)	Spectral Power (W/nm)	Wavelength (nm)	Spectral Power (W/nm)	Wavelength (nm)	Spectral Power (W/nm)
380	0.00051	405	0.00026	430	0.01068	455	0.02078
381	0.00050	406	0.00038	431	0.01185	456	0.01967
382	0.00060	407	0.00046	432	0.01319	457	0.01867
383	0.00054	408	0.00059	433	0.01426	458	0.01761
384	0.00046	409	0.00069	434	0.01610	459	0.01663
385	0.00031	410	0.00073	435	0.01781	460	0.01581
386	0.00016	411	0.00083	436	0.01952	461	0.01499
387	0.00030	412	0.00097	437	0.02143	462	0.01439
388	0.00053	413	0.00117	438	0.02277	463	0.01372
389	0.00064	414	0.00137	439	0.02429	464	0.01311
390	0.00063	415	0.00152	440	0.02578	465	0.01252
391	0.00048	416	0.00174	441	0.02752	466	0.01189
392	0.00034	417	0.00199	442	0.02891	467	0.01136
393	0.00028	418	0.00232	443	0.02991	468	0.01091
394	0.00022	419	0.00278	444	0.03073	469	0.01051
395	0.00036	420	0.00320	445	0.03119	470	0.01022
396	0.00042	421	0.00373	446	0.03139	471	0.00987
397	0.00037	422	0.00429	447	0.03108	472	0.00963
398	0.00044	423	0.00488	448	0.03038	473	0.00942
399	0.00033	424	0.00557	449	0.02930	474	0.00923
400	0.00028	425	0.00630	450	0.02786	475	0.00909
401	0.00035	426	0.00696	451	0.02639	476	0.00901
402	0.00029	427	0.00773	452	0.02483	477	0.00894
403	0.00027	428	0.00855	453	0.02342	478	0.00894
404	0.00024	429	0.00957	454	0.02201	479	0.00897



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Spectral Power Distribution Table (2/4)

Wavelength (nm)	Spectral Power (W/nm)	Wavelength (nm)	Spectral Power (W/nm)	Wavelength (nm)	Spectral Power (W/nm)	Wavelength (nm)	Spectral Power (W/nm)
480	0.00904	505	0.01736	530	0.02402	555	0.02763
481	0.00916	506	0.01779	531	0.02414	556	0.02773
482	0.00930	507	0.01817	532	0.02424	557	0.02785
483	0.00944	508	0.01855	533	0.02445	558	0.02799
484	0.00961	509	0.01886	534	0.02464	559	0.02803
485	0.00985	510	0.01916	535	0.02478	560	0.02814
486	0.01010	511	0.01950	536	0.02501	561	0.02834
487	0.01034	512	0.01979	537	0.02518	562	0.02851
488	0.01065	513	0.02006	538	0.02535	563	0.02870
489	0.01096	514	0.02033	539	0.02550	564	0.02884
490	0.01129	515	0.02066	540	0.02558	565	0.02896
491	0.01164	516	0.02093	541	0.02571	566	0.02907
492	0.01203	517	0.02122	542	0.02581	567	0.02924
493	0.01243	518	0.02148	543	0.02600	568	0.02940
494	0.01285	519	0.02166	544	0.02618	569	0.02966
495	0.01329	520	0.02198	545	0.02632	570	0.02981
496	0.01368	521	0.02220	546	0.02643	571	0.02994
497	0.01415	522	0.02240	547	0.02653	572	0.03015
498	0.01450	523	0.02262	548	0.02654	573	0.03027
499	0.01494	524	0.02280	549	0.02668	574	0.03042
500	0.01536	525	0.02300	550	0.02681	575	0.03049
501	0.01578	526	0.02317	551	0.02700	576	0.03072
502	0.01611	527	0.02343	552	0.02716	577	0.03092
503	0.01657	528	0.02365	553	0.02733	578	0.03112
504	0.01696	529	0.02378	554	0.02744	579	0.03136



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Spectral Power Distribution Table (3/4)

Wavelength (nm)	Spectral Power (W/nm)	Wavelength (nm)	Spectral Power (W/nm)	Wavelength (nm)	Spectral Power (W/nm)	Wavelength (nm)	Spectral Power (W/nm)
580	0.03145	605	0.03279	630	0.02647	655	0.01635
581	0.03163	606	0.03272	631	0.02605	656	0.01597
582	0.03176	607	0.03255	632	0.02572	657	0.01562
583	0.03187	608	0.03239	633	0.02542	658	0.01522
584	0.03200	609	0.03230	634	0.02503	659	0.01487
585	0.03221	610	0.03208	635	0.02469	660	0.01447
586	0.03224	611	0.03190	636	0.02429	661	0.01410
587	0.03241	612	0.03174	637	0.02380	662	0.01377
588	0.03253	613	0.03154	638	0.02337	663	0.01338
589	0.03251	614	0.03135	639	0.02294	664	0.01303
590	0.03274	615	0.03109	640	0.02255	665	0.01265
591	0.03280	616	0.03086	641	0.02214	666	0.01230
592	0.03285	617	0.03061	642	0.02175	667	0.01197
593	0.03295	618	0.03038	643	0.02132	668	0.01162
594	0.03294	619	0.03013	644	0.02091	669	0.01134
595	0.03303	620	0.02984	645	0.02047	670	0.01104
596	0.03304	621	0.02953	646	0.02006	671	0.01074
597	0.03299	622	0.02924	647	0.01962	672	0.01044
598	0.03309	623	0.02888	648	0.01921	673	0.01016
599	0.03312	624	0.02863	649	0.01876	674	0.00988
600	0.03304	625	0.02828	650	0.01836	675	0.00961
601	0.03301	626	0.02793	651	0.01796	676	0.00935
602	0.03299	627	0.02761	652	0.01754	677	0.00912
603	0.03294	628	0.02724	653	0.01715	678	0.00887
604	0.03288	629	0.02687	654	0.01677	679	0.00861



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Spectral Power Distribution Table (4/4)

Wavelength (nm)	Spectral Power (W/nm)	Wavelength (nm)	Spectral Power (W/nm)	Wavelength (nm)	Spectral Power (W/nm)	Wavelength (nm)	Spectral Power (W/nm)
680	0.00840	706	0.00396	732	0.00179	758	0.00086
681	0.00818	707	0.00385	733	0.00174	759	0.00089
682	0.00794	708	0.00374	734	0.00169	760	0.00084
683	0.00775	709	0.00386	735	0.00165	761	0.00082
684	0.00751	710	0.00371	736	0.00163	762	0.00072
685	0.00735	711	0.00363	737	0.00153	763	0.00074
686	0.00713	712	0.00352	738	0.00154	764	0.00071
687	0.00691	713	0.00331	739	0.00143	765	0.00069
688	0.00671	714	0.00323	740	0.00135	766	0.00073
689	0.00651	715	0.00312	741	0.00130	767	0.00067
690	0.00631	716	0.00295	742	0.00131	768	0.00063
691	0.00615	717	0.00283	743	0.00127	769	0.00062
692	0.00600	718	0.00276	744	0.00128	770	0.00065
693	0.00583	719	0.00270	745	0.00124	771	0.00059
694	0.00566	720	0.00270	746	0.00123	772	0.00061
695	0.00550	721	0.00260	747	0.00115	773	0.00052
696	0.00535	722	0.00248	748	0.00111	774	0.00051
697	0.00519	723	0.00239	749	0.00109	775	0.00048
698	0.00505	724	0.00231	750	0.00103	776	0.00047
699	0.00491	725	0.00226	751	0.00105	777	0.00043
700	0.00478	726	0.00219	752	0.00103	778	0.00035
701	0.00464	727	0.00211	753	0.00097	779	0.00033
702	0.00448	728	0.00201	754	0.00098	780	0.00028
703	0.00430	729	0.00194	755	0.00092		
704	0.00419	730	0.00187	756	0.00090		
705	0.00405	731	0.00185	757	0.00088		



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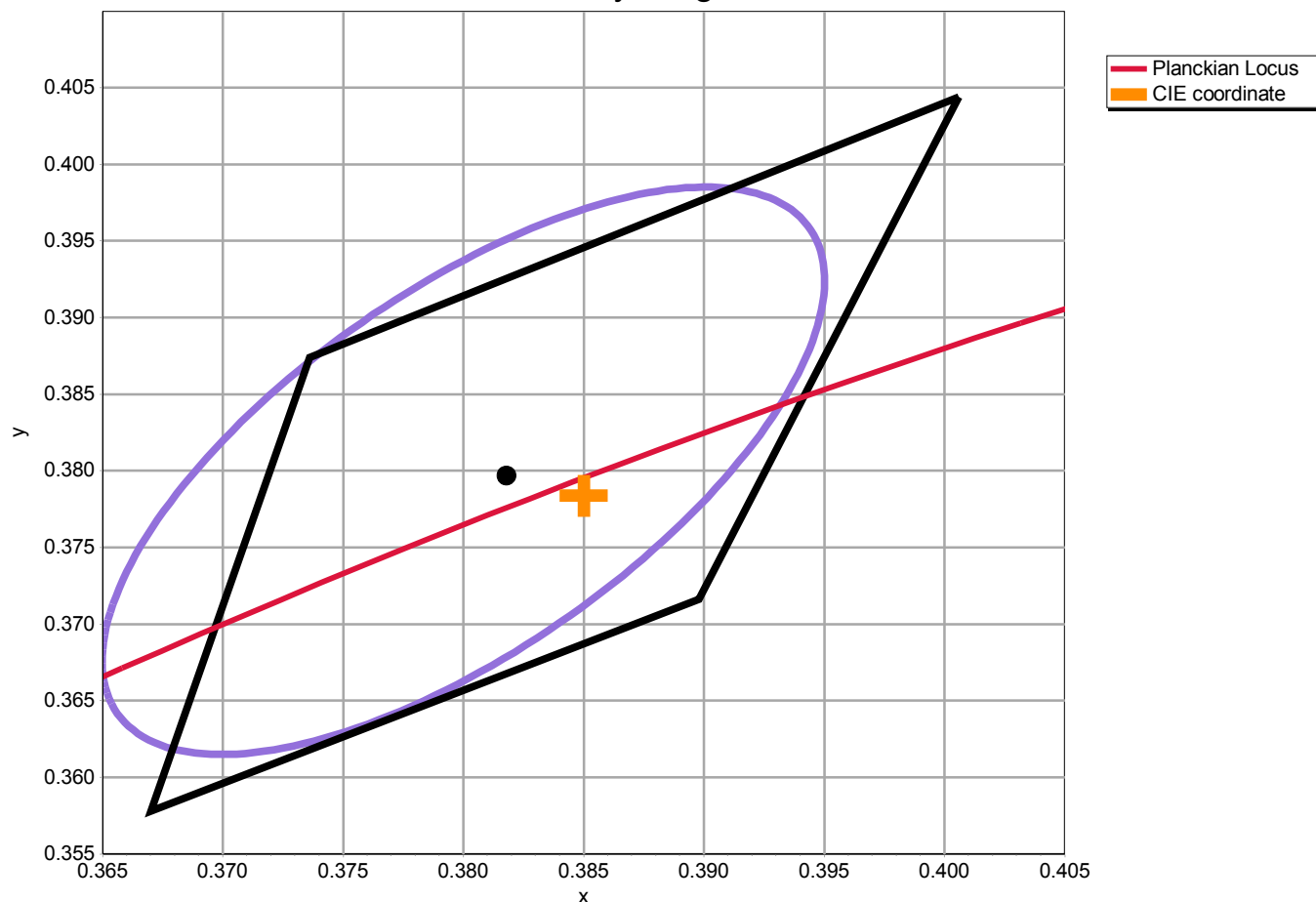
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CIE Chromaticity Diagram for Indoor SSL products

CIE 1931 Chromaticity Diagram



Chromaticity tolerance for 4000K nominal CCT

Min CCT	3710
Max CCT	4260
Delta T	275
Center Duv	0.0010