



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: CY2397	Driver Details: CY963	
Test Report	L1512032-C1	Description	4 Clusters of 12 Cree XPE2 LED's	Type Commercial
Test Date	3 December 2015	Manufacturer	Cree	Description 61W
Report Date	8 December 2015	Catalog No.	LOGI-HO-120/277-48-35K-10x60-SI-NO	Manufacturer Mean Well
Sphere Temperature	23.0 °C	Serial No.	SRIS 2220	Catalog No. LPF-60-24
Humidity	20.2 %	Diameter	N/A mm	Voltage 120.00 V
Lamp Type	SSL	Color	White	Power Factor 0.9900

Stabilization Time: 10 min

Tested By: AFWJk 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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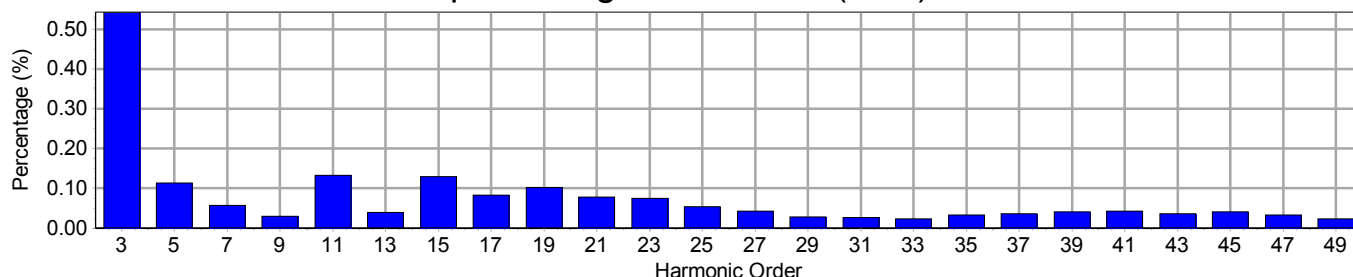
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Electrical Measurements

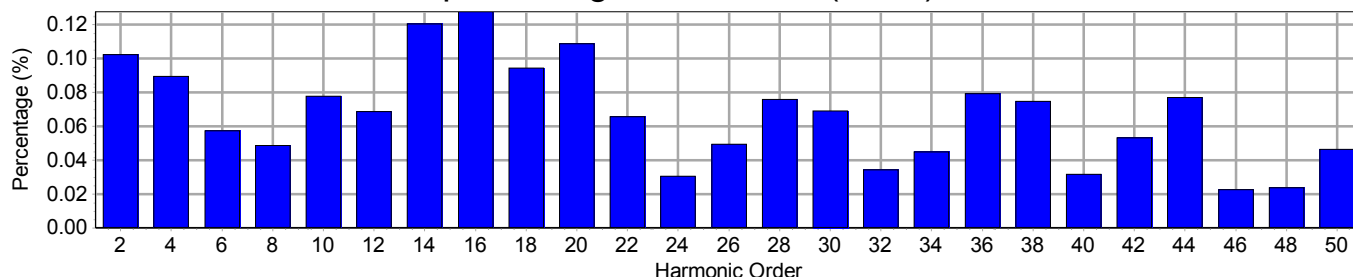
Input

Frequency	60 Hz	Active Power	61.45 W	THDV [ANSI]	0.71 %
Voltage	120.1 V(rms)	Apparent Power	61.93 VA	THDA [ANSI]	5.65 %
Current	0.5156 A(rms)	Power Factor	0.992	Max. Harmonic At	5th order

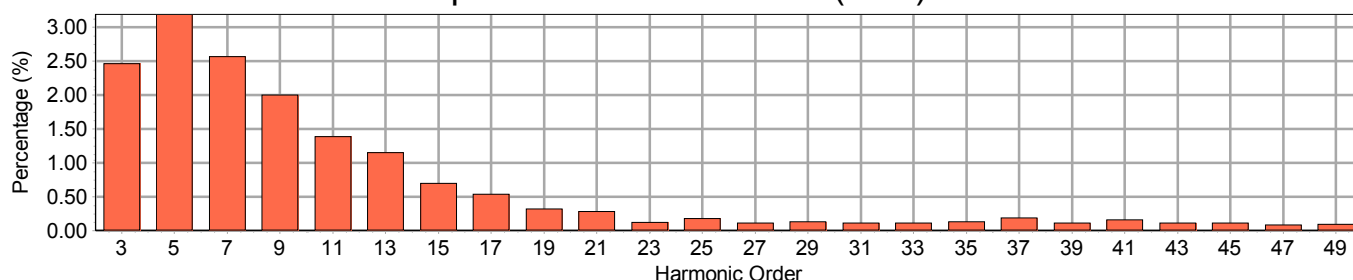
Input Voltage Harmonics (Odd)



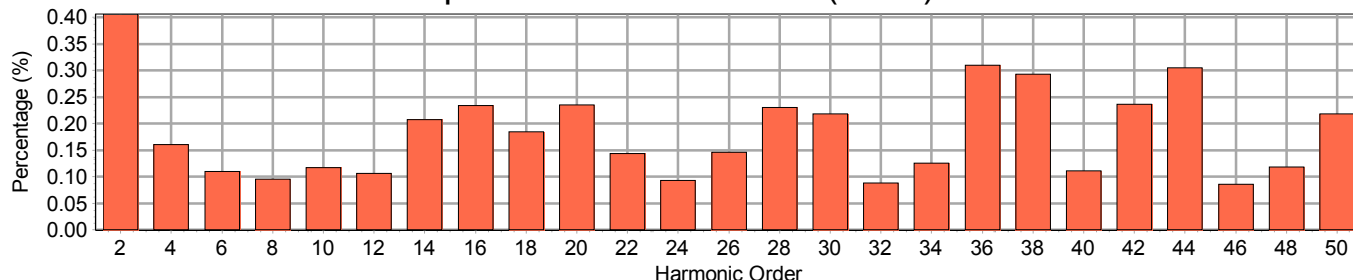
Input Voltage Harmonics (Even)



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	0.102	0.407
3	180	0.544	2.457	4	240	0.089	0.161
5	300	0.114	3.193	6	360	0.057	0.110
7	420	0.057	2.567	8	480	0.048	0.096
9	540	0.030	1.994	10	600	0.078	0.118
11	660	0.132	1.383	12	720	0.069	0.107
13	780	0.040	1.149	14	840	0.120	0.207
15	900	0.129	0.696	16	960	0.128	0.234
17	1020	0.084	0.535	18	1080	0.094	0.185
19	1140	0.103	0.320	20	1200	0.109	0.236
21	1260	0.078	0.281	22	1320	0.066	0.143
23	1380	0.074	0.116	24	1440	0.030	0.093
25	1500	0.055	0.174	26	1560	0.049	0.146
27	1620	0.043	0.106	28	1680	0.076	0.230
29	1740	0.028	0.128	30	1800	0.069	0.219
31	1860	0.026	0.112	32	1920	0.034	0.089
33	1980	0.023	0.106	34	2040	0.045	0.126
35	2100	0.033	0.123	36	2160	0.079	0.309
37	2220	0.036	0.182	38	2280	0.075	0.293
39	2340	0.041	0.106	40	2400	0.031	0.111
41	2460	0.043	0.153	42	2520	0.053	0.237
43	2580	0.036	0.105	44	2640	0.077	0.305
45	2700	0.041	0.113	46	2760	0.022	0.086
47	2820	0.032	0.079	48	2880	0.024	0.119
49	2940	0.024	0.085	50	3000	0.046	0.218



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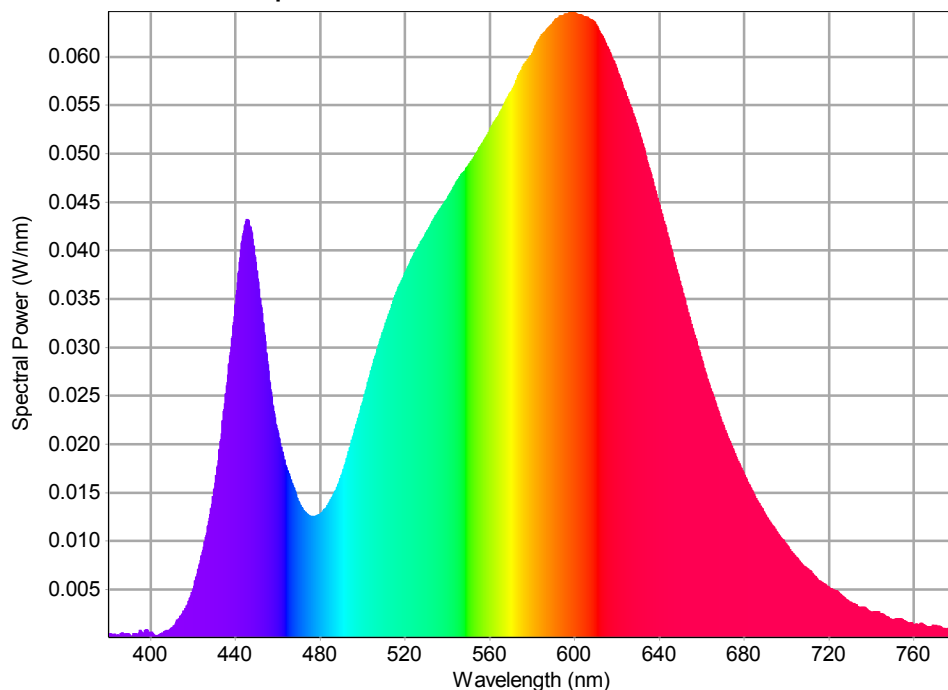
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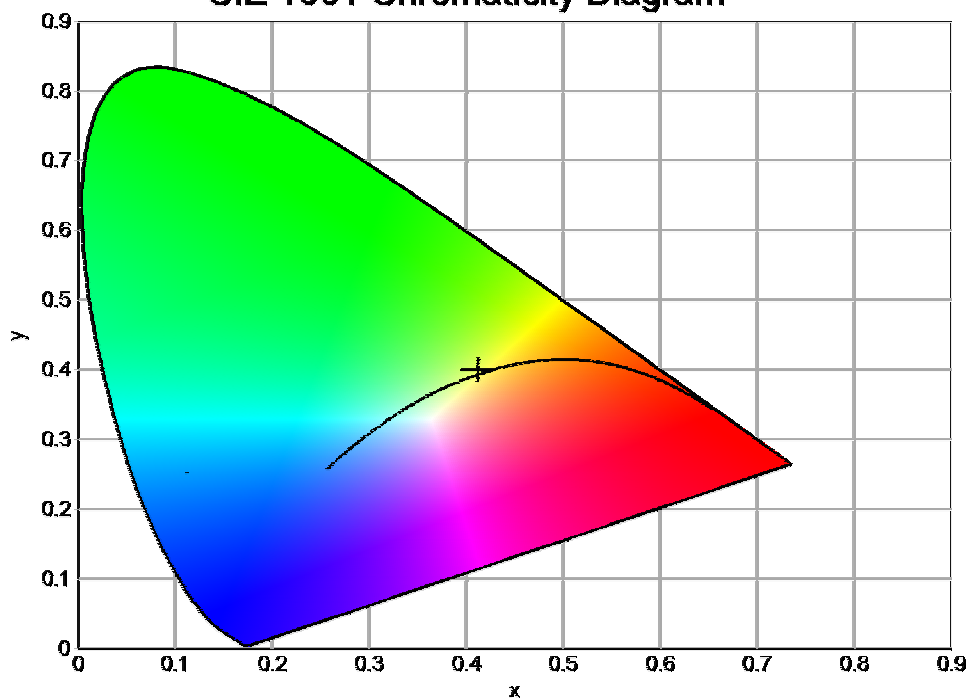
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Spectral Power Distribution



Peak Wavelength	599 nm
Luminous Flux	3547 lm
Input Power	61.45 W
Lumens/Watt	57.7
Full Width/Half Maximum	144.45
Center Wavelength	583 nm
Centroid Wavelength	386 nm
Dominant Wavelength	491 nm
Excitation Purity	0.0881
Colorimetric Purity	0.0715

CIE 1931 Chromaticity Diagram



x	0.4116	CCT	3442 K
y	0.4002	CRI	81
u	0.2359	L*	25.67
v	0.3440	a*	-3.90
u'	0.2359	b*	-7.00
v'	0.5161	Duv	0.0027
R1	79.0	R9	4.7
R2	86.2	R10	67.8
R3	92.9	R11	79.8
R4	81.3	R12	63.8
R5	78.8	R13	80.1
R6	81.9	R14	95.8
R7	85.7		
R8	62.3		



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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	0.00052	405	0.00051	430	0.01536	455	0.02858
381	0.00047	406	0.00050	431	0.01680	456	0.02657
382	0.00029	407	0.00074	432	0.01836	457	0.02493
383	0.00045	408	0.00075	433	0.02031	458	0.02340
384	0.00029	409	0.00089	434	0.02242	459	0.02209
385	0.00031	410	0.00110	435	0.02421	460	0.02120
386	0.00049	411	0.00130	436	0.02608	461	0.02012
387	0.00049	412	0.00167	437	0.02827	462	0.01928
388	0.00044	413	0.00186	438	0.03005	463	0.01842
389	0.00050	414	0.00226	439	0.03229	464	0.01761
390	0.00038	415	0.00251	440	0.03437	465	0.01700
391	0.00014	416	0.00284	441	0.03672	466	0.01636
392	0.00047	417	0.00332	442	0.03882	467	0.01579
393	0.00051	418	0.00382	443	0.04084	468	0.01521
394	0.00039	419	0.00443	444	0.04207	469	0.01451
395	0.00081	420	0.00502	445	0.04308	470	0.01398
396	0.00058	421	0.00591	446	0.04321	471	0.01355
397	0.00060	422	0.00663	447	0.04243	472	0.01318
398	0.00093	423	0.00757	448	0.04119	473	0.01296
399	0.00061	424	0.00852	449	0.03956	474	0.01277
400	0.00065	425	0.00944	450	0.03794	475	0.01263
401	0.00050	426	0.01041	451	0.03603	476	0.01259
402	0.00029	427	0.01153	452	0.03438	477	0.01256
403	0.00029	428	0.01281	453	0.03260	478	0.01262
404	0.00036	429	0.01387	454	0.03063	479	0.01272



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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	0.01280	505	0.02839	530	0.04187	555	0.05063
481	0.01301	506	0.02911	531	0.04221	556	0.05098
482	0.01330	507	0.02985	532	0.04262	557	0.05126
483	0.01351	508	0.03061	533	0.04303	558	0.05166
484	0.01393	509	0.03123	534	0.04344	559	0.05198
485	0.01429	510	0.03184	535	0.04380	560	0.05244
486	0.01471	511	0.03256	536	0.04414	561	0.05289
487	0.01515	512	0.03319	537	0.04442	562	0.05326
488	0.01559	513	0.03378	538	0.04480	563	0.05362
489	0.01614	514	0.03445	539	0.04512	564	0.05389
490	0.01680	515	0.03517	540	0.04544	565	0.05436
491	0.01744	516	0.03570	541	0.04583	566	0.05473
492	0.01817	517	0.03625	542	0.04617	567	0.05523
493	0.01890	518	0.03673	543	0.04658	568	0.05565
494	0.01967	519	0.03716	544	0.04700	569	0.05612
495	0.02045	520	0.03771	545	0.04733	570	0.05639
496	0.02120	521	0.03817	546	0.04767	571	0.05677
497	0.02203	522	0.03859	547	0.04799	572	0.05727
498	0.02272	523	0.03911	548	0.04820	573	0.05781
499	0.02354	524	0.03956	549	0.04856	574	0.05831
500	0.02432	525	0.03991	550	0.04886	575	0.05862
501	0.02517	526	0.04030	551	0.04920	576	0.05922
502	0.02596	527	0.04068	552	0.04946	577	0.05948
503	0.02682	528	0.04107	553	0.04989	578	0.05977
504	0.02757	529	0.04142	554	0.05018	579	0.06009



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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	0.06034	605	0.06417	630	0.05252	655	0.03243
581	0.06086	606	0.06416	631	0.05179	656	0.03165
582	0.06137	607	0.06394	632	0.05107	657	0.03096
583	0.06176	608	0.06387	633	0.05030	658	0.03019
584	0.06211	609	0.06370	634	0.04934	659	0.02948
585	0.06243	610	0.06338	635	0.04862	660	0.02872
586	0.06259	611	0.06293	636	0.04785	661	0.02789
587	0.06290	612	0.06249	637	0.04709	662	0.02718
588	0.06317	613	0.06219	638	0.04625	663	0.02647
589	0.06335	614	0.06171	639	0.04546	664	0.02581
590	0.06363	615	0.06117	640	0.04472	665	0.02523
591	0.06390	616	0.06081	641	0.04386	666	0.02457
592	0.06403	617	0.06023	642	0.04307	667	0.02392
593	0.06426	618	0.05971	643	0.04237	668	0.02321
594	0.06428	619	0.05933	644	0.04150	669	0.02259
595	0.06435	620	0.05859	645	0.04062	670	0.02205
596	0.06447	621	0.05810	646	0.03982	671	0.02143
597	0.06449	622	0.05749	647	0.03892	672	0.02088
598	0.06468	623	0.05677	648	0.03812	673	0.02040
599	0.06465	624	0.05635	649	0.03729	674	0.01989
600	0.06462	625	0.05566	650	0.03646	675	0.01934
601	0.06444	626	0.05510	651	0.03566	676	0.01879
602	0.06440	627	0.05446	652	0.03485	677	0.01830
603	0.06437	628	0.05388	653	0.03400	678	0.01783
604	0.06416	629	0.05322	654	0.03321	679	0.01735



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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	0.01688	706	0.00797	732	0.00353	758	0.00158
681	0.01639	707	0.00770	733	0.00344	759	0.00159
682	0.01593	708	0.00747	734	0.00323	760	0.00138
683	0.01556	709	0.00735	735	0.00319	761	0.00152
684	0.01510	710	0.00715	736	0.00321	762	0.00138
685	0.01464	711	0.00699	737	0.00318	763	0.00152
686	0.01425	712	0.00672	738	0.00298	764	0.00148
687	0.01389	713	0.00643	739	0.00281	765	0.00135
688	0.01352	714	0.00624	740	0.00264	766	0.00121
689	0.01314	715	0.00596	741	0.00276	767	0.00117
690	0.01274	716	0.00587	742	0.00276	768	0.00122
691	0.01238	717	0.00573	743	0.00274	769	0.00133
692	0.01201	718	0.00561	744	0.00255	770	0.00129
693	0.01171	719	0.00541	745	0.00255	771	0.00120
694	0.01146	720	0.00524	746	0.00239	772	0.00126
695	0.01108	721	0.00511	747	0.00224	773	0.00113
696	0.01074	722	0.00497	748	0.00217	774	0.00102
697	0.01043	723	0.00492	749	0.00199	775	0.00093
698	0.01019	724	0.00484	750	0.00196	776	0.00102
699	0.00994	725	0.00462	751	0.00199	777	0.00103
700	0.00965	726	0.00442	752	0.00202	778	0.00103
701	0.00934	727	0.00420	753	0.00202	779	0.00077
702	0.00898	728	0.00402	754	0.00205	780	0.00076
703	0.00879	729	0.00387	755	0.00186		
704	0.00846	730	0.00373	756	0.00176		
705	0.00827	731	0.00363	757	0.00163		



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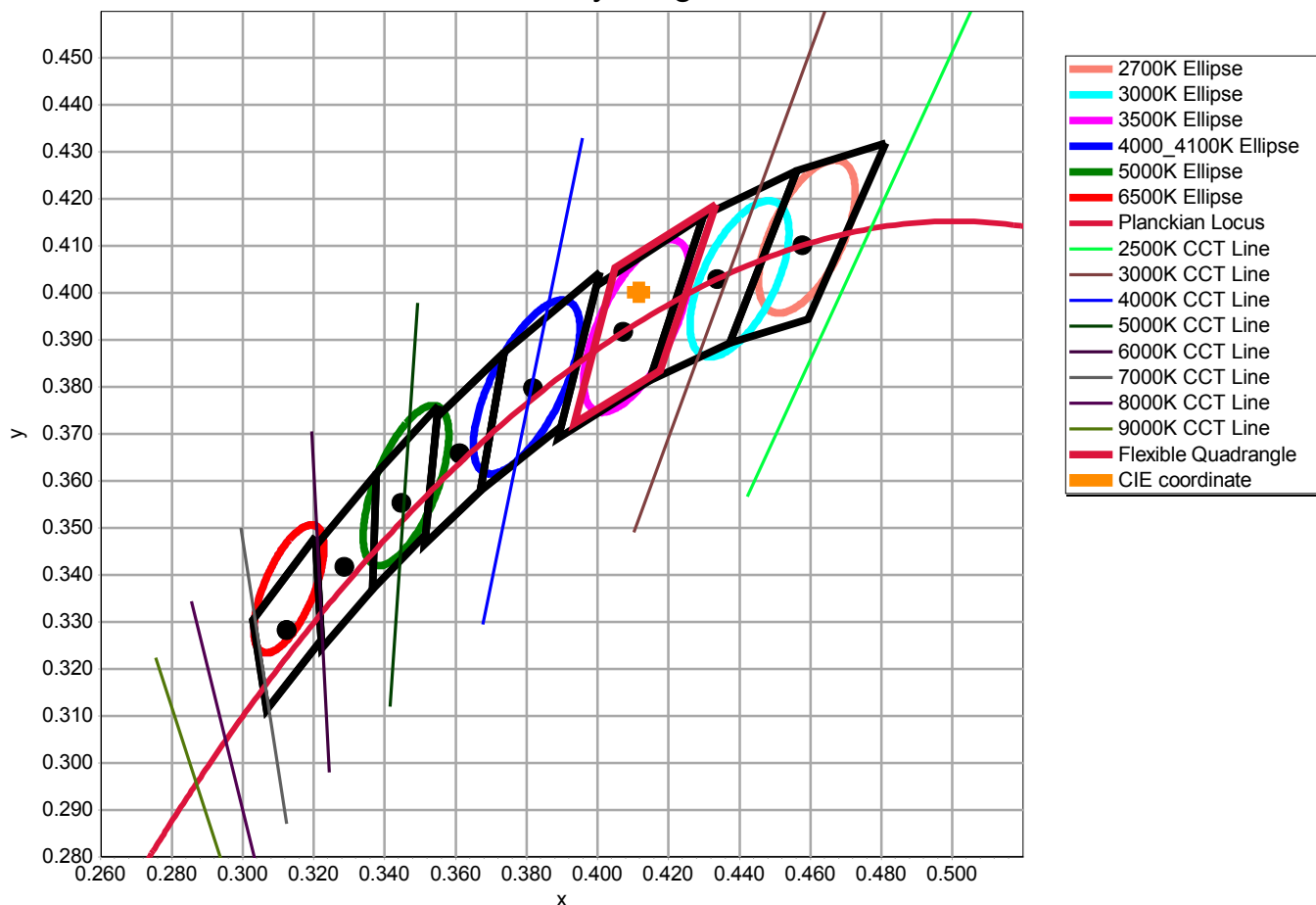
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CIE Chromaticity Diagram for Indoor SSL products

CIE 1931 Chromaticity Diagram



Chromaticity tolerance of Flexible CCT at nominal CCT of 3400K

		x		y	
		Center Point		0.4115	0.3946
Min CCT	3178	Tolerance	A	0.4334	0.4189
Max CCT	3622		B	0.4049	0.4053
Delta T	222		C	0.3934	0.3722
Center Duv	0.0004	Quadrangle	D	0.4176	0.3834