



# 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](http://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: CY2410	Driver Details: CY963	
<b>Test Report</b>	L1603103-C1	<b>Description</b>	Clusters of 48 Cree XPE2 LED's	<b>Type</b> Commercial
<b>Test Date</b>	10 March 2016	<b>Manufacturer</b>	Cree	<b>Description</b> 61W
<b>Report Date</b>	10 March 2016	<b>Catalog No.</b>	LOG-HO-120-48-30K-WWLF-WH-NO	<b>Manufacturer</b> Mean Well
<b>Sphere Temperature</b>	24.9 °C	<b>Serial No.</b>	SRIS 2255	<b>Catalog No.</b> LPF-60-24
<b>Humidity</b>	29.2 %	<b>Diameter</b>	N/A mm	<b>Voltage</b> 120.00 V
<b>Lamp Type</b>	SSL	<b>Color</b>	White	<b>Power Factor</b> 0.9900

**Stabilization Time:** %\ c i f '

**Tested By:** ; Ycf[ Y< YXfY]

.....**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  $4\pi$  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	6010009	2015/07/08	2016/07/08
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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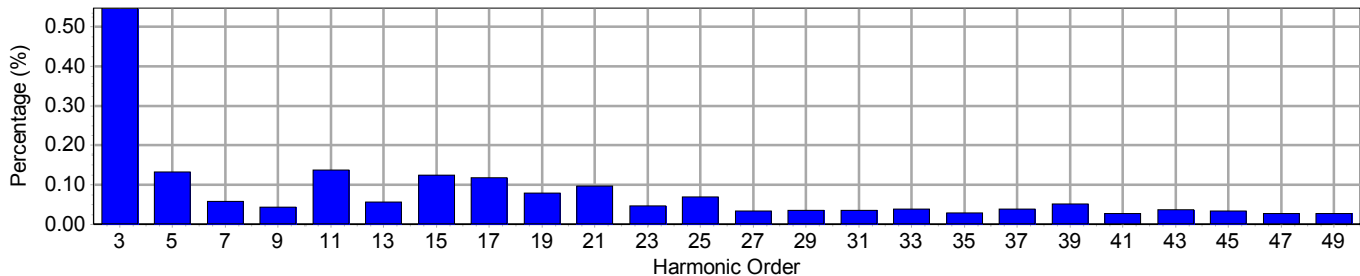
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## Electrical Measurements

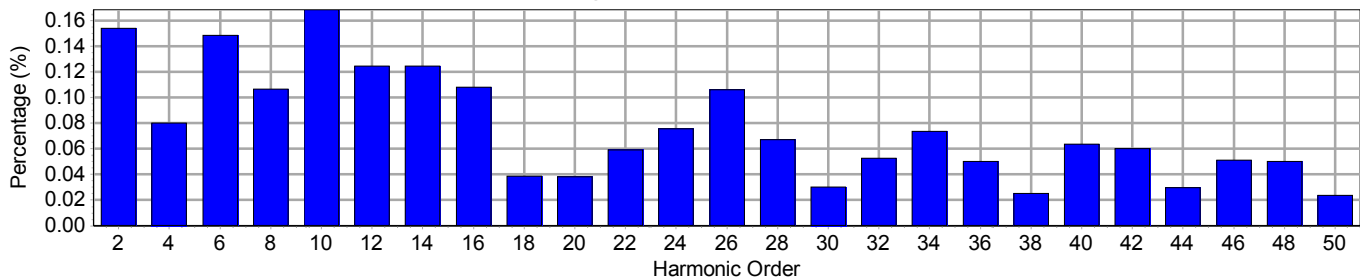
### Input

Frequency	60 Hz	Active Power	61.04 W	THDV [ANSI]	0.77 %
Voltage	120.1 V(rms)	Apparent Power	61.45 VA	THDA [ANSI]	5.45 %
Current	0.5115 A(rms)	Power Factor	0.993	Max. Harmonic At	5th order

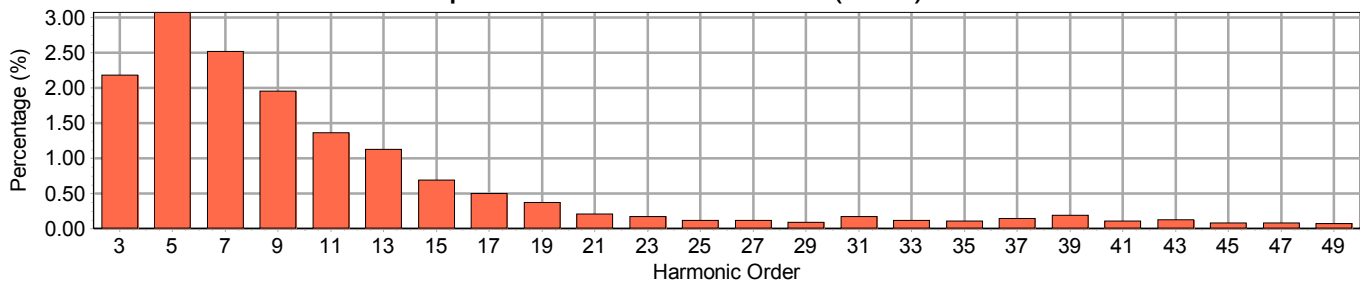
### Input Voltage Harmonics (Odd)



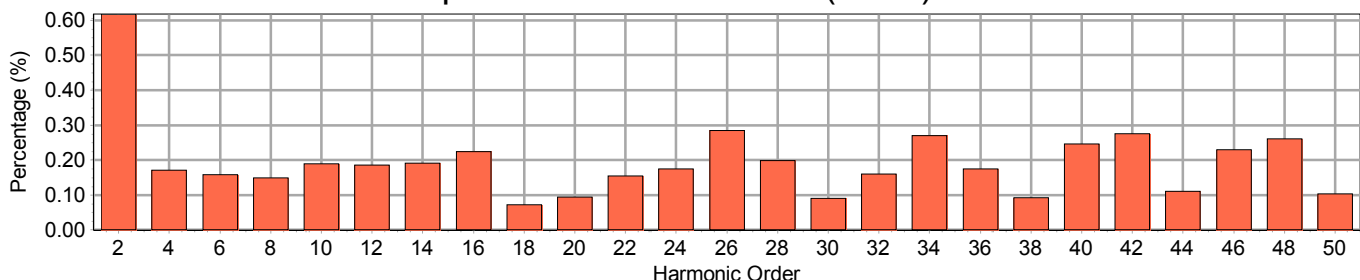
### Input Voltage Harmonics (Even)



### 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	0.154	0.619
3	180	0.549	2.181	4	240	0.080	0.171
5	300	0.132	3.082	6	360	0.148	0.158
7	420	0.058	2.523	8	480	0.107	0.148
9	540	0.042	1.954	10	600	0.169	0.189
11	660	0.138	1.367	12	720	0.125	0.185
13	780	0.056	1.127	14	840	0.124	0.192
15	900	0.125	0.692	16	960	0.108	0.224
17	1020	0.118	0.496	18	1080	0.038	0.073
19	1140	0.079	0.366	20	1200	0.038	0.094
21	1260	0.097	0.204	22	1320	0.059	0.155
23	1380	0.047	0.170	24	1440	0.075	0.175
25	1500	0.069	0.112	26	1560	0.106	0.284
27	1620	0.033	0.114	28	1680	0.067	0.198
29	1740	0.035	0.090	30	1800	0.030	0.090
31	1860	0.034	0.165	32	1920	0.053	0.160
33	1980	0.038	0.113	34	2040	0.074	0.269
35	2100	0.028	0.107	36	2160	0.050	0.176
37	2220	0.039	0.139	38	2280	0.025	0.093
39	2340	0.052	0.188	40	2400	0.064	0.246
41	2460	0.027	0.103	42	2520	0.060	0.276
43	2580	0.037	0.126	44	2640	0.030	0.110
45	2700	0.033	0.080	46	2760	0.051	0.231
47	2820	0.027	0.074	48	2880	0.050	0.261
49	2940	0.026	0.072	50	3000	0.023	0.103



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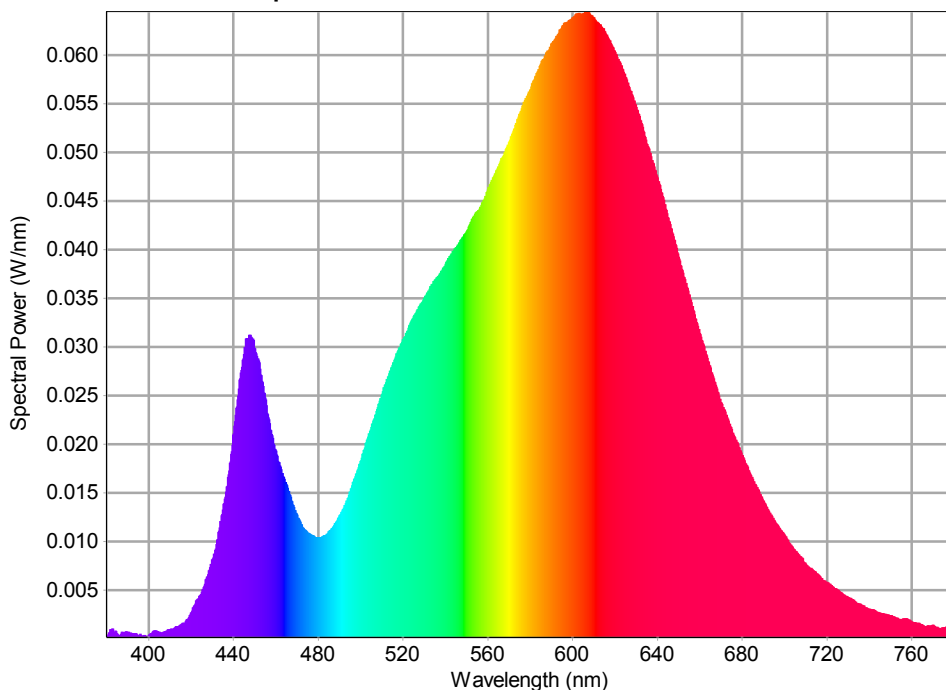
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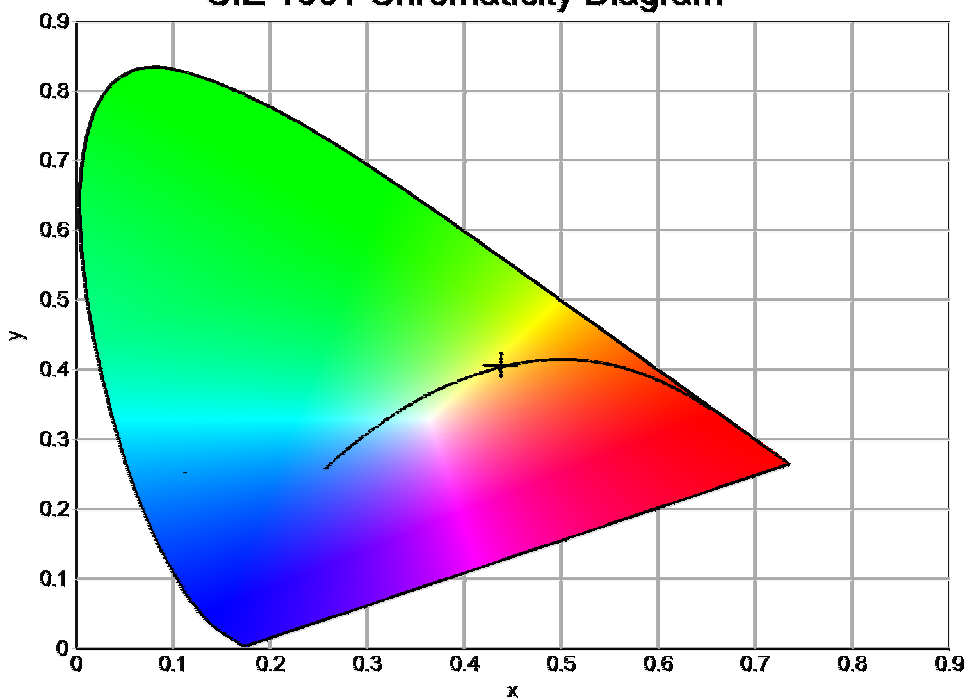
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## Spectral Power Distribution



Peak Wavelength	607 nm
Luminous Flux	3231 lm
Input Power	61.04 W
Lumens/Watt	52.9
Full Width/Half Maximum	136.06
Center Wavelength	591 nm
Centroid Wavelength	404 nm
Dominant Wavelength	494 nm
Excitation Purity	0.0250
Colorimetric Purity	0.0239

## CIE 1931 Chromaticity Diagram



x	0.4371	CCT	3021 K
y	0.4070	CRI	82
u	0.2494	L*	25.67
v	0.3484	a*	-1.35
u'	0.2494	b*	-1.80
v'	0.5225	Duv	0.0011
R1	80.0	R9	8.5
R2	88.2	R10	72.3
R3	95.3	R11	79.1
R4	80.8	R12	65.9
R5	79.4	R13	81.6
R6	84.7	R14	97.0
R7	84.7		
R8	61.1		



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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	0.00022	405	0.00070	430	0.00812	455	0.02480
381	0.00047	406	0.00060	431	0.00872	456	0.02319
382	0.00097	407	0.00069	432	0.00969	457	0.02217
383	0.00102	408	0.00079	433	0.01094	458	0.02107
384	0.00073	409	0.00096	434	0.01205	459	0.02004
385	0.00058	410	0.00096	435	0.01324	460	0.01934
386	0.00037	411	0.00100	436	0.01440	461	0.01829
387	0.00048	412	0.00107	437	0.01564	462	0.01780
388	0.00063	413	0.00126	438	0.01728	463	0.01704
389	0.00070	414	0.00132	439	0.01898	464	0.01641
390	0.00058	415	0.00142	440	0.02094	465	0.01589
391	0.00058	416	0.00160	441	0.02302	466	0.01520
392	0.00058	417	0.00161	442	0.02460	467	0.01456
393	0.00060	418	0.00198	443	0.02663	468	0.01383
394	0.00058	419	0.00225	444	0.02792	469	0.01322
395	0.00041	420	0.00266	445	0.02925	470	0.01273
396	0.00053	421	0.00322	446	0.03084	471	0.01226
397	0.00021	422	0.00362	447	0.03091	472	0.01179
398	0.00041	423	0.00409	448	0.03127	473	0.01138
399	0.00027	424	0.00440	449	0.03085	474	0.01115
400	0.00034	425	0.00475	450	0.02993	475	0.01091
401	0.00056	426	0.00533	451	0.02905	476	0.01080
402	0.00073	427	0.00609	452	0.02859	477	0.01062
403	0.00081	428	0.00663	453	0.02718	478	0.01055
404	0.00075	429	0.00732	454	0.02600	479	0.01040



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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	0.01041	505	0.02173	530	0.03502	555	0.04396
481	0.01040	506	0.02242	531	0.03537	556	0.04419
482	0.01052	507	0.02302	532	0.03575	557	0.04459
483	0.01065	508	0.02382	533	0.03621	558	0.04505
484	0.01075	509	0.02444	534	0.03652	559	0.04553
485	0.01102	510	0.02507	535	0.03688	560	0.04616
486	0.01124	511	0.02582	536	0.03714	561	0.04670
487	0.01150	512	0.02638	537	0.03740	562	0.04717
488	0.01186	513	0.02695	538	0.03779	563	0.04764
489	0.01219	514	0.02755	539	0.03814	564	0.04812
490	0.01265	515	0.02816	540	0.03852	565	0.04852
491	0.01303	516	0.02867	541	0.03894	566	0.04916
492	0.01347	517	0.02930	542	0.03932	567	0.04956
493	0.01393	518	0.02982	543	0.03958	568	0.05000
494	0.01447	519	0.03029	544	0.03995	569	0.05060
495	0.01513	520	0.03076	545	0.04025	570	0.05107
496	0.01577	521	0.03114	546	0.04050	571	0.05165
497	0.01644	522	0.03161	547	0.04096	572	0.05224
498	0.01698	523	0.03222	548	0.04125	573	0.05280
499	0.01763	524	0.03272	549	0.04154	574	0.05342
500	0.01824	525	0.03312	550	0.04189	575	0.05397
501	0.01901	526	0.03349	551	0.04236	576	0.05452
502	0.01969	527	0.03388	552	0.04283	577	0.05516
503	0.02046	528	0.03434	553	0.04334	578	0.05560
504	0.02107	529	0.03460	554	0.04370	579	0.05602





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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	0.05644	605	0.06427	630	0.05467	655	0.03540
581	0.05713	606	0.06445	631	0.05400	656	0.03457
582	0.05757	607	0.06450	632	0.05335	657	0.03378
583	0.05814	608	0.06424	633	0.05263	658	0.03294
584	0.05852	609	0.06410	634	0.05172	659	0.03217
585	0.05915	610	0.06387	635	0.05094	660	0.03140
586	0.05961	611	0.06346	636	0.05040	661	0.03070
587	0.05994	612	0.06332	637	0.04961	662	0.03004
588	0.06045	613	0.06317	638	0.04897	663	0.02928
589	0.06061	614	0.06278	639	0.04819	664	0.02851
590	0.06117	615	0.06251	640	0.04742	665	0.02785
591	0.06146	616	0.06211	641	0.04676	666	0.02712
592	0.06177	617	0.06163	642	0.04588	667	0.02641
593	0.06210	618	0.06123	643	0.04509	668	0.02569
594	0.06260	619	0.06086	644	0.04422	669	0.02500
595	0.06293	620	0.06032	645	0.04335	670	0.02434
596	0.06329	621	0.05977	646	0.04263	671	0.02383
597	0.06338	622	0.05940	647	0.04176	672	0.02331
598	0.06352	623	0.05896	648	0.04106	673	0.02272
599	0.06369	624	0.05831	649	0.04020	674	0.02211
600	0.06386	625	0.05777	650	0.03923	675	0.02154
601	0.06406	626	0.05716	651	0.03840	676	0.02094
602	0.06426	627	0.05646	652	0.03765	677	0.02047
603	0.06435	628	0.05598	653	0.03694	678	0.01998
604	0.06415	629	0.05535	654	0.03616	679	0.01941



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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	0.01889	706	0.00884	732	0.00403	758	0.00200
681	0.01835	707	0.00856	733	0.00385	759	0.00195
682	0.01786	708	0.00834	734	0.00369	760	0.00179
683	0.01735	709	0.00792	735	0.00362	761	0.00171
684	0.01681	710	0.00771	736	0.00351	762	0.00164
685	0.01643	711	0.00742	737	0.00342	763	0.00159
686	0.01593	712	0.00720	738	0.00322	764	0.00145
687	0.01556	713	0.00713	739	0.00314	765	0.00142
688	0.01510	714	0.00696	740	0.00309	766	0.00133
689	0.01464	715	0.00674	741	0.00300	767	0.00118
690	0.01421	716	0.00659	742	0.00299	768	0.00139
691	0.01380	717	0.00629	743	0.00284	769	0.00138
692	0.01336	718	0.00606	744	0.00272	770	0.00141
693	0.01294	719	0.00595	745	0.00265	771	0.00120
694	0.01262	720	0.00582	746	0.00259	772	0.00120
695	0.01223	721	0.00562	747	0.00253	773	0.00111
696	0.01186	722	0.00549	748	0.00247	774	0.00104
697	0.01156	723	0.00531	749	0.00250	775	0.00113
698	0.01123	724	0.00519	750	0.00239	776	0.00120
699	0.01099	725	0.00507	751	0.00227	777	0.00119
700	0.01066	726	0.00483	752	0.00219	778	0.00109
701	0.01032	727	0.00472	753	0.00213	779	0.00105
702	0.00993	728	0.00452	754	0.00203	780	0.00087
703	0.00964	729	0.00438	755	0.00201		
704	0.00931	730	0.00428	756	0.00209		
705	0.00904	731	0.00419	757	0.00207		