



# 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: CY2614	Driver Details: CY1101	
<b>Test Report</b>	L1606275-C1	<b>Description</b>	Clusters of CREE XPE2 LED's	<b>Type</b> Commercial
<b>Test Date</b>	27 June 2016	<b>Manufacturer</b>	Cree	<b>Description</b> 71W
<b>Report Date</b>	7 July 2016	<b>Catalog No.</b>	LOG-HO-120-48-40K-30x30-SI-NO	<b>Manufacturer</b> Mean Well
<b>Sphere Temperature</b>	25.4°C	<b>Serial No.</b>	SRIS 2437	<b>Catalog No.</b> LPF-60-24
<b>Humidity</b>	43.0 %	<b>Drive Current</b>	300 mA	<b>Voltage</b> 120.00 V
<b>Lamp Type</b>	SSL	<b>Color</b>	White	<b>Power Factor</b> 0.9900

**Stabilization Time: 55 minutes**

**Tested By: George Hedrei**

**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	27E224420	2016/05/06	2017/05/06
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	MY41025831	2016/05/05	2017/05/05
Voltage Multimeter	HP Agilent	HP34401A	US36010444	2016/05/05	2017/05/05

## Spectrometer Equipment

Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
Spectrometer	Ocean Optics	USB2000N	USB2E3364	2016/05/30	2017/05/30

## Environment Equipment

Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
Temperature Humidity Sensor	Omega	HH311	091203915	2014/10/30	2016/10/30



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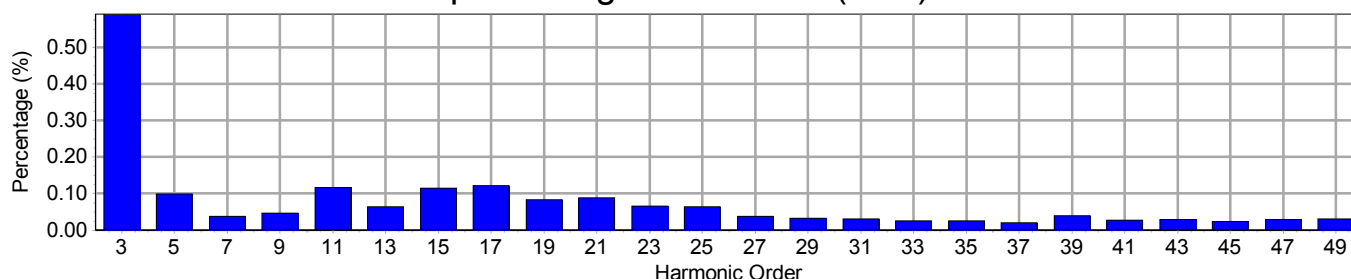
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## Electrical Measurements

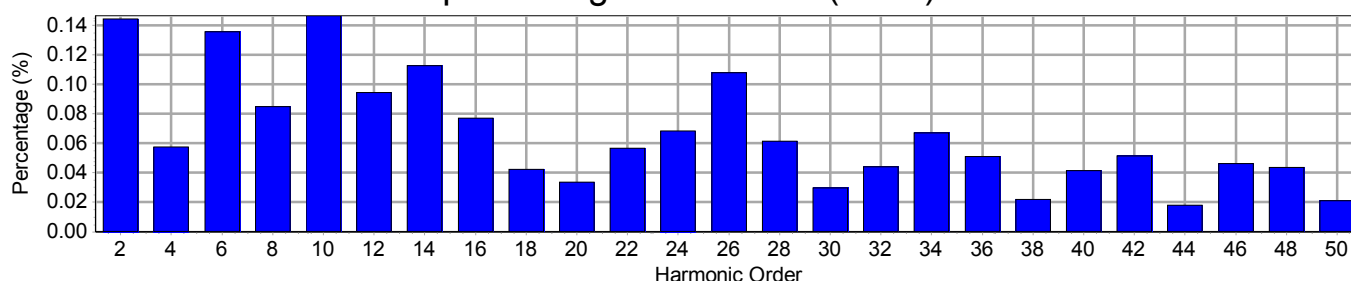
### Input

Frequency	60 Hz	Active Power	62.18 W	THDV [ANSI]	0.76 %
Voltage	120.1 V(rms)	Apparent Power	62.59 VA	THDA [ANSI]	5.16 %
Current	0.5210 A(rms)	Power Factor	0.993	Max. Harmonic At	5th order

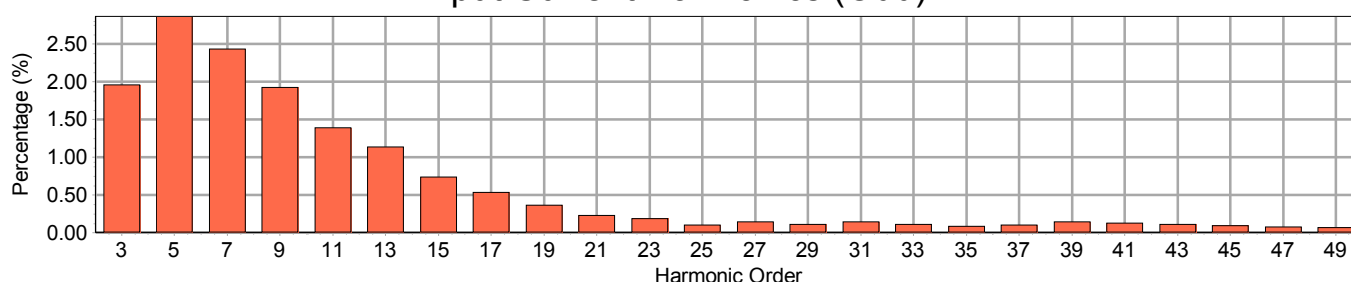
### Input Voltage Harmonics (Odd)



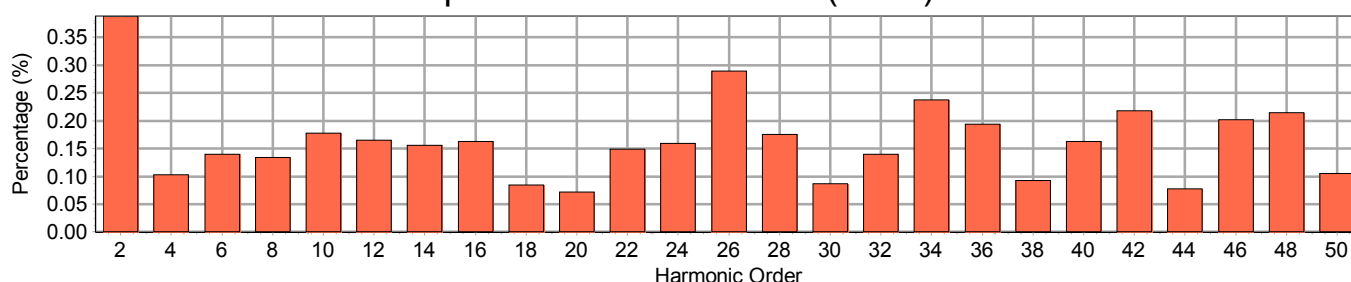
### Input Voltage Harmonics (Even)



### 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	0.144	0.389
3	180	0.593	1.957	4	240	0.058	0.103
5	300	0.099	2.865	6	360	0.136	0.140
7	420	0.037	2.427	8	480	0.085	0.135
9	540	0.046	1.920	10	600	0.147	0.178
11	660	0.116	1.388	12	720	0.095	0.165
13	780	0.063	1.128	14	840	0.113	0.156
15	900	0.114	0.734	16	960	0.077	0.163
17	1020	0.122	0.534	18	1080	0.042	0.085
19	1140	0.084	0.358	20	1200	0.033	0.072
21	1260	0.088	0.226	22	1320	0.057	0.149
23	1380	0.066	0.184	24	1440	0.068	0.159
25	1500	0.065	0.099	26	1560	0.108	0.290
27	1620	0.038	0.142	28	1680	0.062	0.176
29	1740	0.033	0.103	30	1800	0.030	0.086
31	1860	0.031	0.140	32	1920	0.044	0.140
33	1980	0.026	0.108	34	2040	0.067	0.238
35	2100	0.026	0.080	36	2160	0.051	0.194
37	2220	0.020	0.097	38	2280	0.022	0.093
39	2340	0.040	0.141	40	2400	0.041	0.163
41	2460	0.027	0.123	42	2520	0.052	0.218
43	2580	0.028	0.107	44	2640	0.018	0.078
45	2700	0.024	0.087	46	2760	0.046	0.201
47	2820	0.030	0.074	48	2880	0.044	0.214
49	2940	0.030	0.061	50	3000	0.021	0.106



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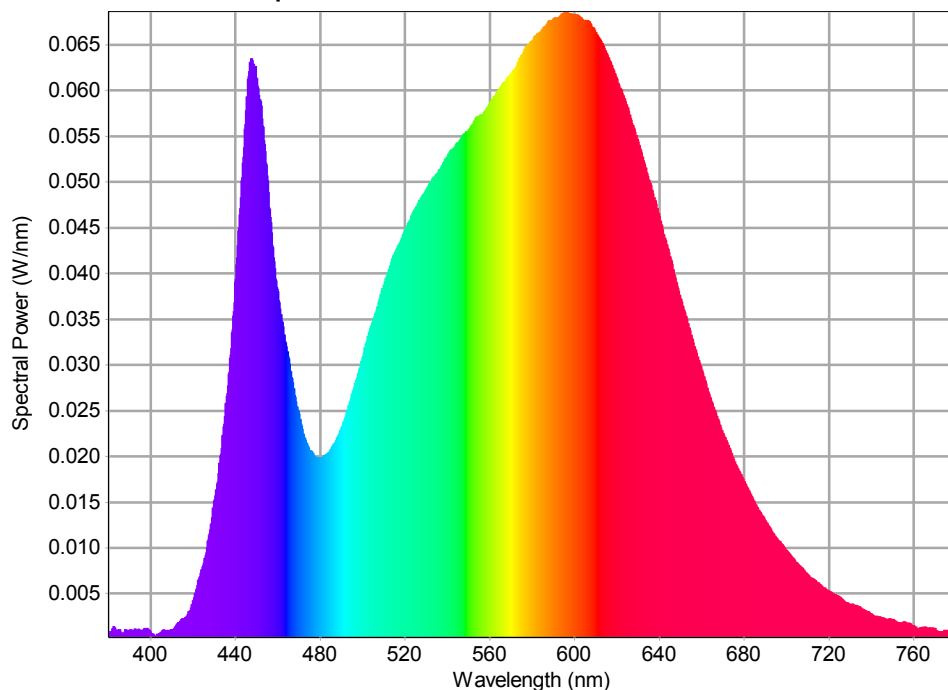
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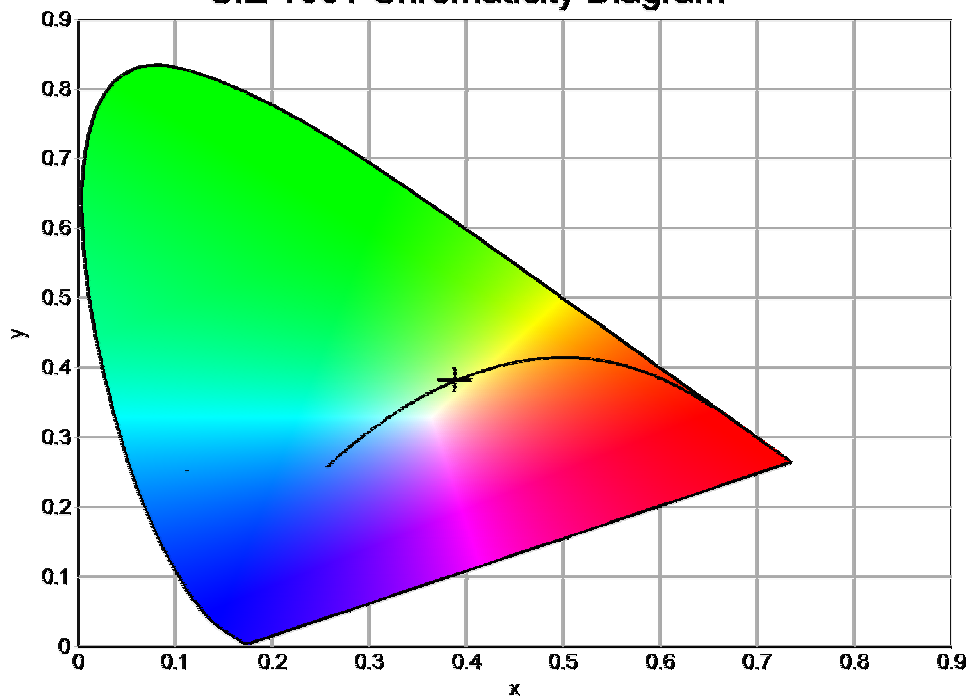
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## Spectral Power Distribution



Peak Wavelength	596 nm
Luminous Flux	3964 lm
Input Power	62.18 W
Lumens/Watt	63.8
Full Width/Half Maximum	149.75
Center Wavelength	579 nm
Centroid Wavelength	371 nm
Dominant Wavelength	488 nm
Excitation Purity	0.1532
Colorimetric Purity	0.0998

## CIE 1931 Chromaticity Diagram



x	0.3875	CCT	3862 K
y	0.3833	CRI	83
u	0.2272	L*	25.67
v	0.3370	a*	-4.89
u'	0.2272	b*	-13.57
v'	0.5055	Duv	0.0010
R1	81.7	R9	12.6
R2	88.5	R10	72.3
R3	93.6	R11	81.6
R4	83.0	R12	64.3
R5	81.6	R13	83.2
R6	84.2	R14	96.3
R7	87.0		
R8	66.3		



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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	0.00093	405	0.00080	430	0.01517	455	0.05075
381	0.00060	406	0.00113	431	0.01640	456	0.04723
382	0.00115	407	0.00090	432	0.01817	457	0.04449
383	0.00136	408	0.00091	433	0.02009	458	0.04180
384	0.00086	409	0.00102	434	0.02232	459	0.03944
385	0.00113	410	0.00109	435	0.02444	460	0.03803
386	0.00083	411	0.00120	436	0.02664	461	0.03616
387	0.00072	412	0.00161	437	0.02905	462	0.03482
388	0.00112	413	0.00190	438	0.03180	463	0.03335
389	0.00104	414	0.00202	439	0.03542	464	0.03202
390	0.00095	415	0.00232	440	0.03910	465	0.03091
391	0.00105	416	0.00233	441	0.04309	466	0.02935
392	0.00096	417	0.00257	442	0.04648	467	0.02813
393	0.00107	418	0.00304	443	0.05016	468	0.02674
394	0.00114	419	0.00350	444	0.05378	469	0.02548
395	0.00102	420	0.00424	445	0.05786	470	0.02466
396	0.00100	421	0.00506	446	0.06129	471	0.02359
397	0.00128	422	0.00591	447	0.06313	472	0.02250
398	0.00123	423	0.00681	448	0.06332	473	0.02181
399	0.00111	424	0.00763	449	0.06240	474	0.02123
400	0.00085	425	0.00839	450	0.06144	475	0.02073
401	0.00060	426	0.00925	451	0.05955	476	0.02055
402	0.00042	427	0.01078	452	0.05881	477	0.02014
403	0.00060	428	0.01202	453	0.05616	478	0.01997
404	0.00066	429	0.01339	454	0.05337	479	0.01985



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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	0.01984	505	0.03492	530	0.04918	555	0.05726
481	0.01993	506	0.03566	531	0.04958	556	0.05741
482	0.02014	507	0.03637	532	0.04999	557	0.05757
483	0.02030	508	0.03731	533	0.05040	558	0.05786
484	0.02047	509	0.03813	534	0.05060	559	0.05821
485	0.02079	510	0.03874	535	0.05096	560	0.05864
486	0.02127	511	0.03953	536	0.05132	561	0.05905
487	0.02157	512	0.04018	537	0.05161	562	0.05938
488	0.02208	513	0.04085	538	0.05213	563	0.05974
489	0.02258	514	0.04164	539	0.05255	564	0.06008
490	0.02315	515	0.04218	540	0.05286	565	0.06037
491	0.02376	516	0.04271	541	0.05329	566	0.06082
492	0.02447	517	0.04315	542	0.05359	567	0.06102
493	0.02518	518	0.04362	543	0.05372	568	0.06130
494	0.02598	519	0.04429	544	0.05414	569	0.06167
495	0.02684	520	0.04480	545	0.05435	570	0.06184
496	0.02759	521	0.04526	546	0.05463	571	0.06223
497	0.02839	522	0.04579	547	0.05515	572	0.06250
498	0.02912	523	0.04631	548	0.05532	573	0.06295
499	0.03004	524	0.04688	549	0.05556	574	0.06352
500	0.03083	525	0.04720	550	0.05576	575	0.06386
501	0.03188	526	0.04766	551	0.05610	576	0.06430
502	0.03266	527	0.04809	552	0.05638	577	0.06484
503	0.03361	528	0.04848	553	0.05690	578	0.06503
504	0.03430	529	0.04878	554	0.05719	579	0.06529





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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	0.06548	605	0.06763	630	0.05444	655	0.03332
581	0.06588	606	0.06774	631	0.05368	656	0.03249
582	0.06610	607	0.06757	632	0.05280	657	0.03175
583	0.06631	608	0.06706	633	0.05198	658	0.03092
584	0.06645	609	0.06685	634	0.05111	659	0.03024
585	0.06684	610	0.06638	635	0.05029	660	0.02952
586	0.06704	611	0.06599	636	0.04968	661	0.02877
587	0.06732	612	0.06560	637	0.04875	662	0.02796
588	0.06771	613	0.06524	638	0.04805	663	0.02715
589	0.06763	614	0.06464	639	0.04716	664	0.02649
590	0.06789	615	0.06417	640	0.04630	665	0.02578
591	0.06801	616	0.06364	641	0.04539	666	0.02513
592	0.06803	617	0.06313	642	0.04433	667	0.02448
593	0.06815	618	0.06250	643	0.04365	668	0.02385
594	0.06844	619	0.06193	644	0.04282	669	0.02318
595	0.06853	620	0.06128	645	0.04190	670	0.02257
596	0.06867	621	0.06057	646	0.04105	671	0.02213
597	0.06853	622	0.06014	647	0.03995	672	0.02156
598	0.06846	623	0.05950	648	0.03909	673	0.02100
599	0.06839	624	0.05883	649	0.03814	674	0.02041
600	0.06838	625	0.05824	650	0.03732	675	0.01971
601	0.06834	626	0.05738	651	0.03653	676	0.01920
602	0.06819	627	0.05647	652	0.03578	677	0.01874
603	0.06803	628	0.05595	653	0.03503	678	0.01823
604	0.06769	629	0.05515	654	0.03413	679	0.01777



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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	0.01731	706	0.00814	732	0.00378	758	0.00181
681	0.01681	707	0.00787	733	0.00370	759	0.00163
682	0.01635	708	0.00765	734	0.00366	760	0.00153
683	0.01593	709	0.00732	735	0.00351	761	0.00138
684	0.01541	710	0.00711	736	0.00336	762	0.00115
685	0.01498	711	0.00686	737	0.00324	763	0.00132
686	0.01454	712	0.00670	738	0.00306	764	0.00137
687	0.01412	713	0.00654	739	0.00299	765	0.00139
688	0.01380	714	0.00634	740	0.00285	766	0.00135
689	0.01345	715	0.00622	741	0.00264	767	0.00125
690	0.01303	716	0.00598	742	0.00251	768	0.00129
691	0.01264	717	0.00575	743	0.00252	769	0.00129
692	0.01231	718	0.00567	744	0.00252	770	0.00124
693	0.01187	719	0.00548	745	0.00246	771	0.00094
694	0.01153	720	0.00534	746	0.00234	772	0.00093
695	0.01116	721	0.00522	747	0.00217	773	0.00088
696	0.01089	722	0.00506	748	0.00227	774	0.00092
697	0.01068	723	0.00494	749	0.00231	775	0.00100
698	0.01038	724	0.00481	750	0.00224	776	0.00103
699	0.01006	725	0.00470	751	0.00212	777	0.00096
700	0.00976	726	0.00447	752	0.00194	778	0.00087
701	0.00950	727	0.00427	753	0.00190	779	0.00094
702	0.00923	728	0.00404	754	0.00183	780	0.00088
703	0.00893	729	0.00398	755	0.00193		
704	0.00861	730	0.00387	756	0.00192		
705	0.00837	731	0.00390	757	0.00179		