



# 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: CY2409	Driver Details: CY963	
<b>Test Report</b>	L1603105-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-120-48-35K-WWLF-WH-NO	<b>Manufacturer</b> Mean Well
<b>Sphere Temperature</b>	24.3 °C	<b>Serial No.</b>	SRIS 2254	<b>Catalog No.</b> LPF-60-24
<b>Humidity</b>	31.3 %	<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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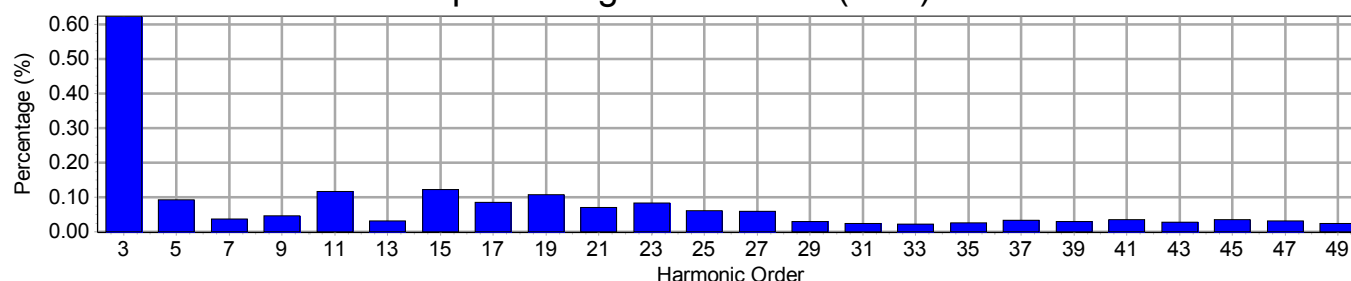
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## Electrical Measurements

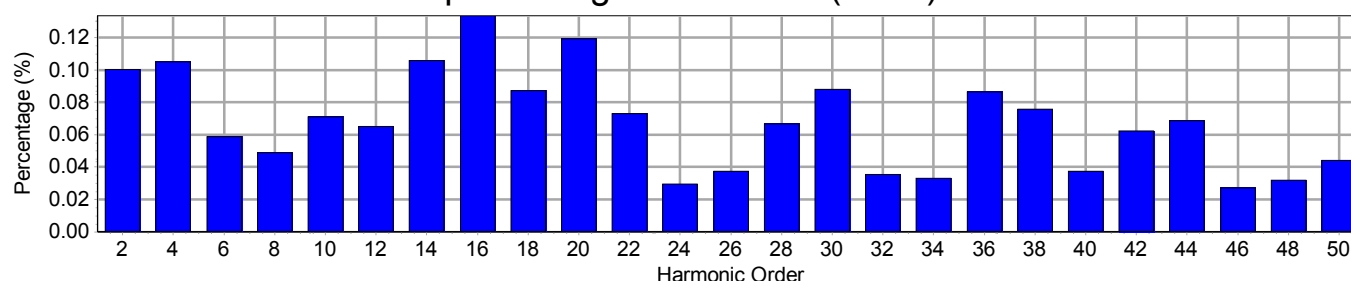
### Input

Frequency	60 Hz	Active Power	61.04 W	THDV [ANSI]	0.77 %
Voltage	120.2 V(rms)	Apparent Power	61.43 VA	THDA [ANSI]	5.14 %
Current	0.5112 A(rms)	Power Factor	0.994	Max. Harmonic At	5th order

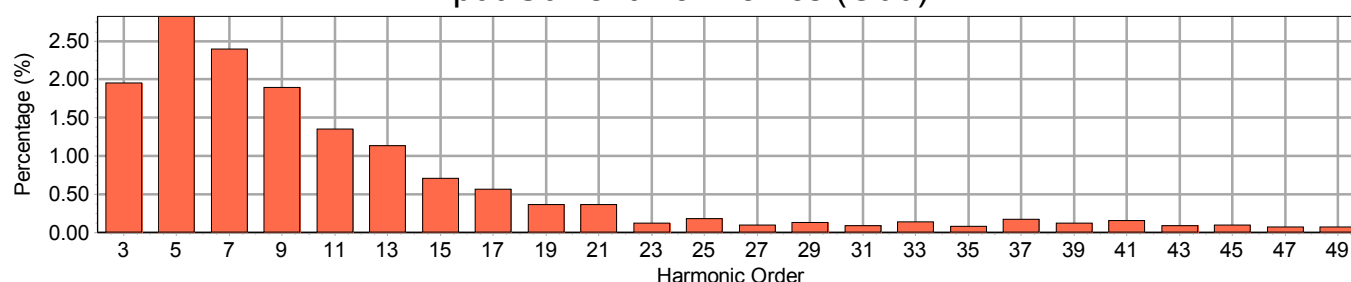
### Input Voltage Harmonics (Odd)



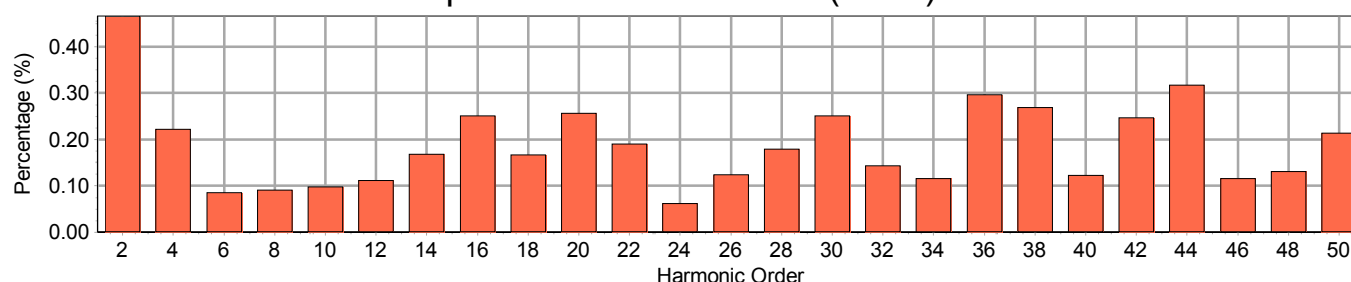
### Input Voltage Harmonics (Even)



### 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	0.100	0.467
3	180	0.625	1.958	4	240	0.105	0.222
5	300	0.094	2.828	6	360	0.059	0.086
7	420	0.039	2.400	8	480	0.049	0.090
9	540	0.048	1.892	10	600	0.071	0.098
11	660	0.117	1.354	12	720	0.065	0.111
13	780	0.032	1.130	14	840	0.106	0.168
15	900	0.124	0.709	16	960	0.134	0.251
17	1020	0.086	0.567	18	1080	0.087	0.167
19	1140	0.108	0.366	20	1200	0.119	0.257
21	1260	0.072	0.366	22	1320	0.073	0.189
23	1380	0.084	0.119	24	1440	0.030	0.061
25	1500	0.062	0.178	26	1560	0.037	0.124
27	1620	0.060	0.097	28	1680	0.067	0.179
29	1740	0.031	0.130	30	1800	0.088	0.250
31	1860	0.026	0.088	32	1920	0.036	0.143
33	1980	0.022	0.139	34	2040	0.033	0.115
35	2100	0.026	0.078	36	2160	0.086	0.297
37	2220	0.035	0.169	38	2280	0.076	0.269
39	2340	0.031	0.120	40	2400	0.037	0.123
41	2460	0.035	0.152	42	2520	0.062	0.246
43	2580	0.029	0.092	44	2640	0.069	0.318
45	2700	0.036	0.100	46	2760	0.027	0.116
47	2820	0.033	0.074	48	2880	0.032	0.130
49	2940	0.025	0.069	50	3000	0.044	0.214



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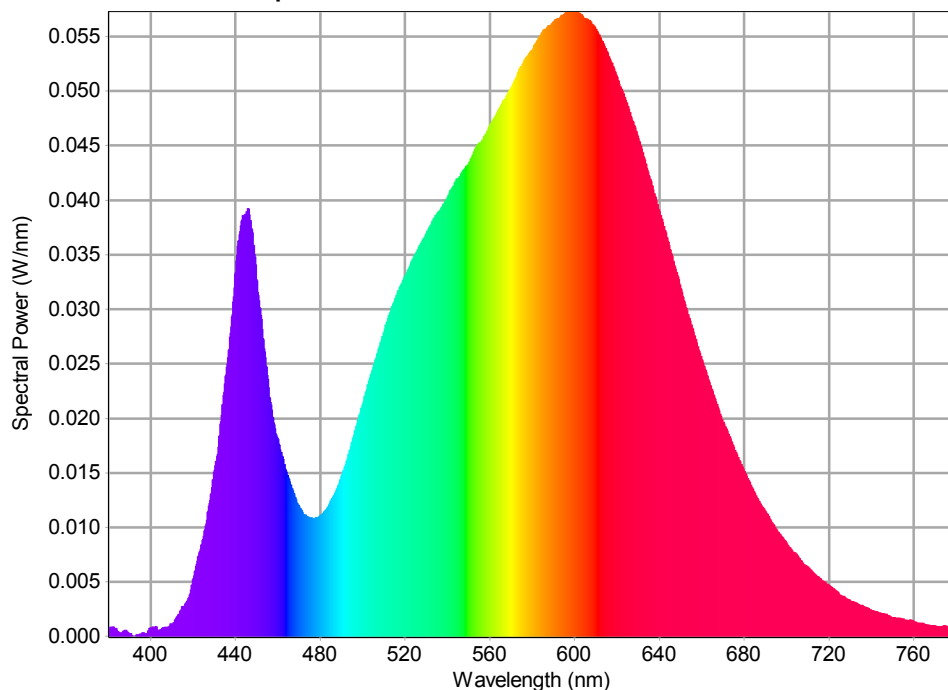
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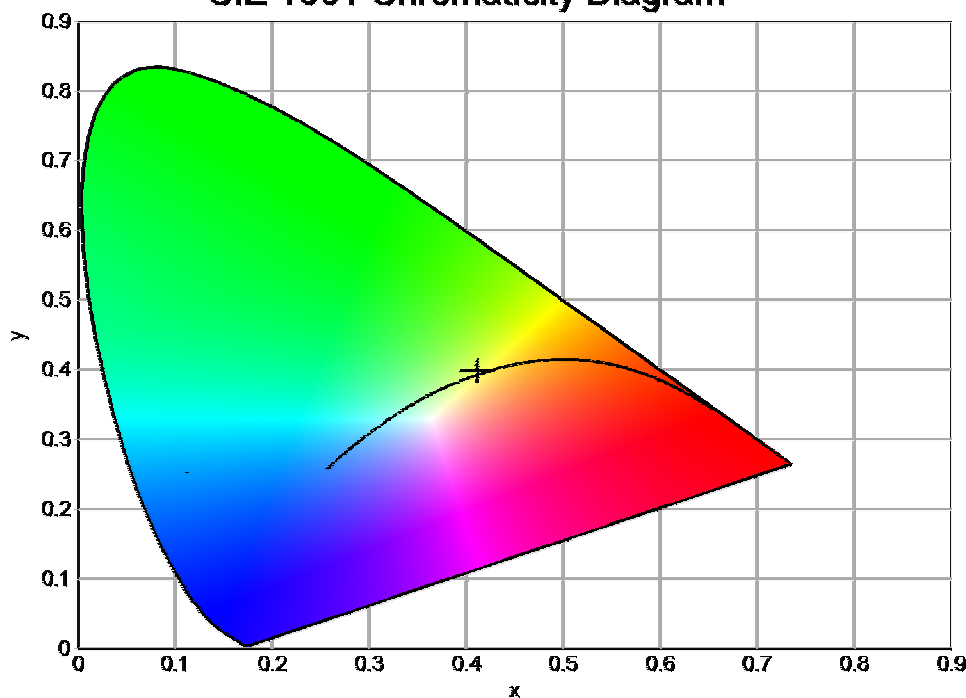
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## Spectral Power Distribution



Peak Wavelength	599 nm
Luminous Flux	3140 lm
Input Power	61.04 W
Lumens/Watt	51.4
Full Width/Half Maximum	143.79
Center Wavelength	583 nm
Centroid Wavelength	385 nm
Dominant Wavelength	491 nm
Excitation Purity	0.0906
Colorimetric Purity	0.0720

## CIE 1931 Chromaticity Diagram



x	0.4107	CCT	3454 K
y	0.3993	CRI	80
u	0.2357	L*	25.67
v	0.3437	a*	-3.89
u'	0.2357	b*	-7.31
v'	0.5156	Duv	0.0025
R1	78.1	R9	2.3
R2	85.5	R10	66.3
R3	92.4	R11	78.8
R4	80.5	R12	62.9
R5	77.9	R13	79.3
R6	80.8	R14	95.5
R7	85.2		
R8	61.4		



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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	0.00048	405	0.00068	430	0.01513	455	0.02396
381	0.00089	406	0.00087	431	0.01610	456	0.02196
382	0.00088	407	0.00089	432	0.01738	457	0.02078
383	0.00068	408	0.00087	433	0.01950	458	0.01964
384	0.00059	409	0.00103	434	0.02125	459	0.01861
385	0.00036	410	0.00116	435	0.02319	460	0.01812
386	0.00023	411	0.00130	436	0.02475	461	0.01715
387	0.00050	412	0.00171	437	0.02624	462	0.01656
388	0.00064	413	0.00205	438	0.02843	463	0.01581
389	0.00044	414	0.00235	439	0.03072	464	0.01508
390	0.00023	415	0.00276	440	0.03323	465	0.01457
391	0.00013	416	0.00284	441	0.03579	466	0.01393
392	0.00000	417	0.00321	442	0.03686	467	0.01342
393	0.00006	418	0.00358	443	0.03808	468	0.01283
394	0.00014	419	0.00432	444	0.03848	469	0.01227
395	0.00026	420	0.00527	445	0.03876	470	0.01194
396	0.00037	421	0.00602	446	0.03930	471	0.01163
397	0.00026	422	0.00694	447	0.03817	472	0.01125
398	0.00030	423	0.00770	448	0.03707	473	0.01115
399	0.00055	424	0.00844	449	0.03504	474	0.01101
400	0.00082	425	0.00922	450	0.03277	475	0.01087
401	0.00088	426	0.01020	451	0.03082	476	0.01090
402	0.00085	427	0.01140	452	0.02949	477	0.01079
403	0.00069	428	0.01251	453	0.02735	478	0.01092
404	0.00056	429	0.01368	454	0.02559	479	0.01094



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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	0.01110	505	0.02472	530	0.03692	555	0.04526
481	0.01125	506	0.02539	531	0.03733	556	0.04535
482	0.01146	507	0.02596	532	0.03771	557	0.04566
483	0.01173	508	0.02667	533	0.03809	558	0.04604
484	0.01202	509	0.02725	534	0.03844	559	0.04637
485	0.01246	510	0.02785	535	0.03878	560	0.04684
486	0.01280	511	0.02859	536	0.03896	561	0.04720
487	0.01316	512	0.02917	537	0.03926	562	0.04751
488	0.01360	513	0.02969	538	0.03960	563	0.04785
489	0.01410	514	0.03027	539	0.03993	564	0.04825
490	0.01469	515	0.03078	540	0.04029	565	0.04856
491	0.01520	516	0.03128	541	0.04067	566	0.04902
492	0.01583	517	0.03176	542	0.04106	567	0.04927
493	0.01641	518	0.03226	543	0.04134	568	0.04958
494	0.01707	519	0.03264	544	0.04180	569	0.05002
495	0.01783	520	0.03306	545	0.04203	570	0.05029
496	0.01852	521	0.03344	546	0.04220	571	0.05068
497	0.01925	522	0.03382	547	0.04262	572	0.05115
498	0.01994	523	0.03435	548	0.04286	573	0.05153
499	0.02064	524	0.03475	549	0.04314	574	0.05204
500	0.02127	525	0.03506	550	0.04333	575	0.05230
501	0.02205	526	0.03549	551	0.04378	576	0.05269
502	0.02267	527	0.03585	552	0.04415	577	0.05306
503	0.02342	528	0.03624	553	0.04467	578	0.05326
504	0.02405	529	0.03656	554	0.04501	579	0.05359





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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	0.05379	605	0.05662	630	0.04568	655	0.02860
581	0.05422	606	0.05662	631	0.04506	656	0.02795
582	0.05450	607	0.05651	632	0.04441	657	0.02732
583	0.05486	608	0.05619	633	0.04374	658	0.02660
584	0.05511	609	0.05601	634	0.04296	659	0.02600
585	0.05551	610	0.05572	635	0.04230	660	0.02542
586	0.05571	611	0.05529	636	0.04176	661	0.02484
587	0.05581	612	0.05494	637	0.04100	662	0.02426
588	0.05607	613	0.05462	638	0.04036	663	0.02362
589	0.05608	614	0.05412	639	0.03962	664	0.02304
590	0.05637	615	0.05371	640	0.03899	665	0.02251
591	0.05656	616	0.05325	641	0.03836	666	0.02189
592	0.05667	617	0.05274	642	0.03763	667	0.02134
593	0.05671	618	0.05233	643	0.03705	668	0.02074
594	0.05701	619	0.05184	644	0.03626	669	0.02020
595	0.05704	620	0.05132	645	0.03550	670	0.01969
596	0.05729	621	0.05066	646	0.03485	671	0.01927
597	0.05730	622	0.05022	647	0.03404	672	0.01887
598	0.05730	623	0.04980	648	0.03343	673	0.01838
599	0.05726	624	0.04921	649	0.03274	674	0.01790
600	0.05720	625	0.04867	650	0.03194	675	0.01738
601	0.05720	626	0.04808	651	0.03122	676	0.01690
602	0.05717	627	0.04736	652	0.03049	677	0.01647
603	0.05706	628	0.04690	653	0.02989	678	0.01603
604	0.05673	629	0.04636	654	0.02924	679	0.01561



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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	0.01519	706	0.00717	732	0.00315	758	0.00154
681	0.01476	707	0.00694	733	0.00306	759	0.00151
682	0.01434	708	0.00661	734	0.00296	760	0.00134
683	0.01393	709	0.00655	735	0.00284	761	0.00133
684	0.01352	710	0.00640	736	0.00281	762	0.00124
685	0.01317	711	0.00616	737	0.00272	763	0.00123
686	0.01277	712	0.00598	738	0.00267	764	0.00122
687	0.01241	713	0.00580	739	0.00252	765	0.00116
688	0.01206	714	0.00559	740	0.00246	766	0.00107
689	0.01180	715	0.00548	741	0.00237	767	0.00110
690	0.01151	716	0.00531	742	0.00231	768	0.00104
691	0.01123	717	0.00513	743	0.00224	769	0.00100
692	0.01084	718	0.00503	744	0.00218	770	0.00103
693	0.01048	719	0.00484	745	0.00210	771	0.00094
694	0.01023	720	0.00474	746	0.00210	772	0.00096
695	0.00985	721	0.00460	747	0.00207	773	0.00096
696	0.00958	722	0.00444	748	0.00198	774	0.00101
697	0.00935	723	0.00425	749	0.00187	775	0.00101
698	0.00910	724	0.00413	750	0.00173	776	0.00097
699	0.00885	725	0.00387	751	0.00176	777	0.00089
700	0.00855	726	0.00372	752	0.00170	778	0.00084
701	0.00826	727	0.00370	753	0.00167	779	0.00089
702	0.00806	728	0.00348	754	0.00165	780	0.00072
703	0.00780	729	0.00340	755	0.00165		
704	0.00769	730	0.00329	756	0.00150		
705	0.00746	731	0.00322	757	0.00148		