



# 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: CY2390	Driver Details: CY1013	
<b>Test Report</b>	L1512012-C1	<b>Description</b>	Clusters of 24 Cree XPE2 LED's	<b>Type</b> Commercial
<b>Test Date</b>	1 December 2015	<b>Manufacturer</b>	Cree	<b>Description</b> 34W
<b>Report Date</b>	8 December 2015	<b>Catalog No.</b>	LOG RO-120-48-40K-10x60-SI-NO	<b>Manufacturer</b> Meanwell
<b>Sphere Temperature</b>	25.4°C	<b>Serial No.</b>	SRIS 2229	<b>Catalog No.</b> LPF-40-24
<b>Humidity</b>	16.0 %	<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: 45 minutes**

**Tested By: Marc Viwonou Sena**

**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.

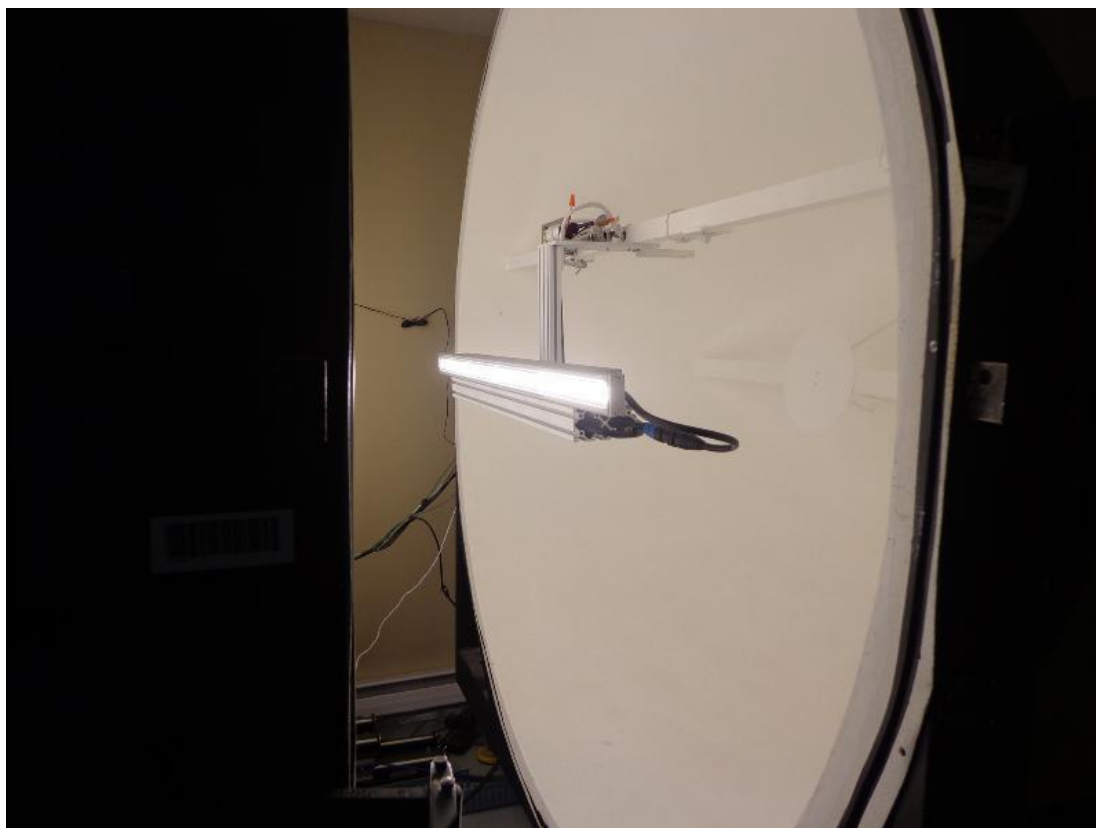


## Realization of Sphere Test

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	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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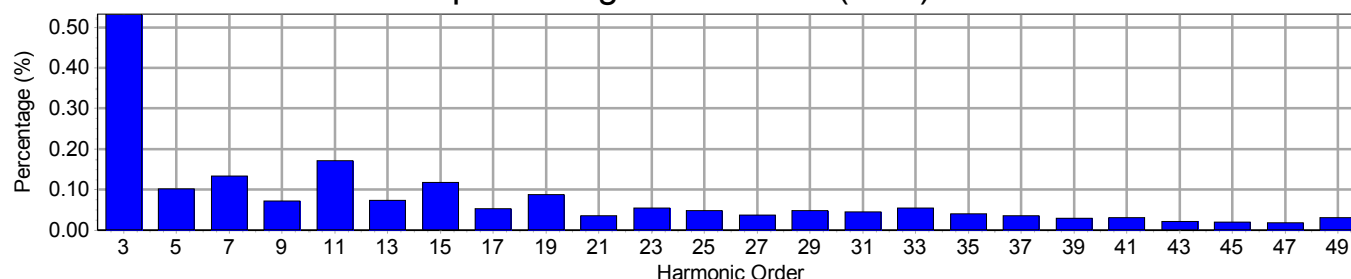
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## Electrical Measurements

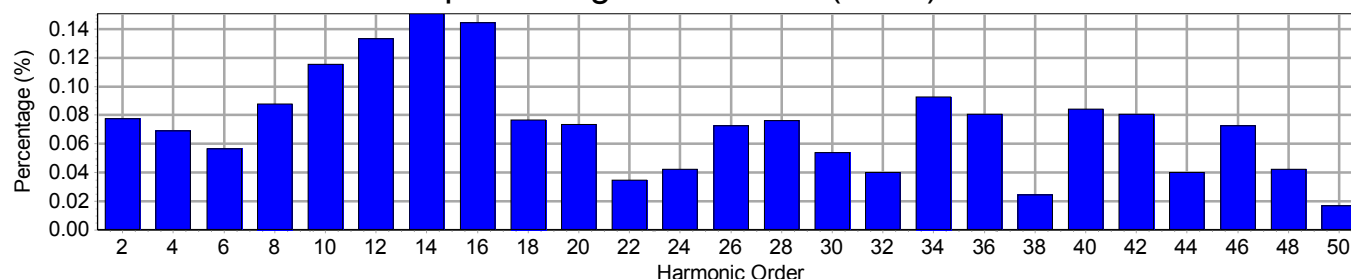
### Input

Frequency	60 Hz	Active Power	31.23 W	THDV [ANSI]	0.74 %
Voltage	120.0 V(rms)	Apparent Power	32.21 VA	THDA [ANSI]	8.10 %
Current	0.2683 A(rms)	Power Factor	0.970	Max. Harmonic At	3rd order

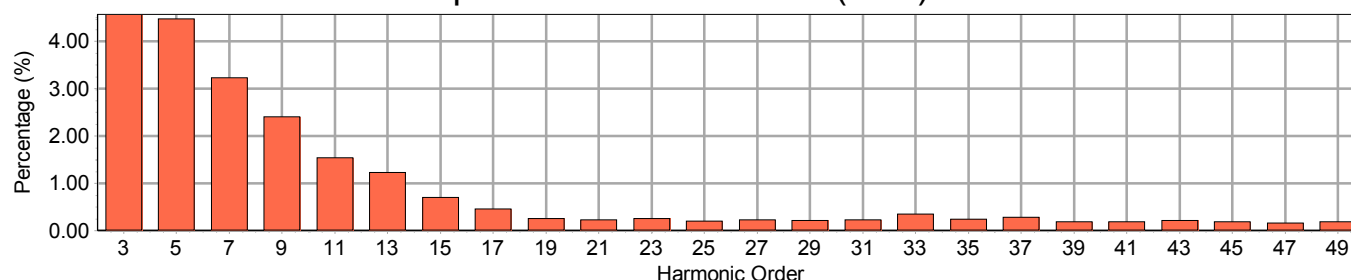
### Input Voltage Harmonics (Odd)



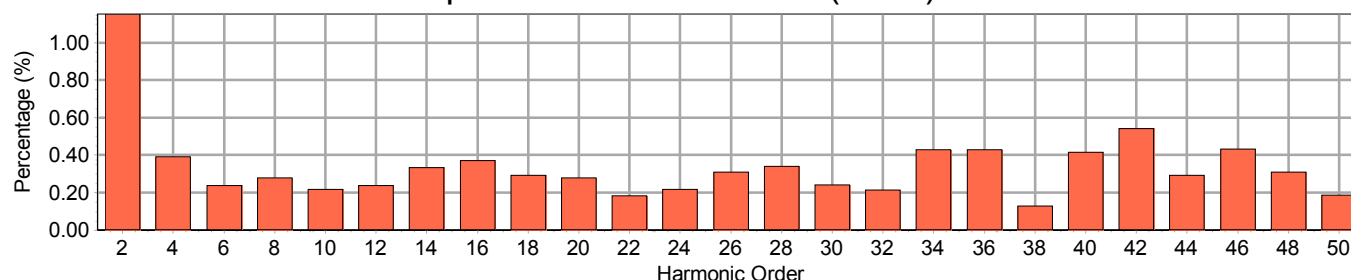
### Input Voltage Harmonics (Even)



### 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	0.077	1.155
3	180	0.533	4.583	4	240	0.069	0.390
5	300	0.102	4.475	6	360	0.057	0.236
7	420	0.134	3.240	8	480	0.088	0.279
9	540	0.072	2.403	10	600	0.116	0.216
11	660	0.171	1.535	12	720	0.133	0.237
13	780	0.073	1.221	14	840	0.151	0.334
15	900	0.118	0.693	16	960	0.144	0.372
17	1020	0.053	0.461	18	1080	0.076	0.291
19	1140	0.087	0.245	20	1200	0.073	0.278
21	1260	0.035	0.226	22	1320	0.035	0.182
23	1380	0.054	0.257	24	1440	0.042	0.216
25	1500	0.048	0.197	26	1560	0.073	0.309
27	1620	0.036	0.225	28	1680	0.076	0.341
29	1740	0.048	0.208	30	1800	0.054	0.241
31	1860	0.045	0.220	32	1920	0.040	0.213
33	1980	0.054	0.350	34	2040	0.093	0.428
35	2100	0.041	0.240	36	2160	0.080	0.430
37	2220	0.036	0.271	38	2280	0.025	0.129
39	2340	0.029	0.189	40	2400	0.084	0.417
41	2460	0.031	0.180	42	2520	0.080	0.542
43	2580	0.022	0.208	44	2640	0.040	0.292
45	2700	0.021	0.182	46	2760	0.072	0.433
47	2820	0.018	0.161	48	2880	0.042	0.308
49	2940	0.031	0.181	50	3000	0.017	0.187



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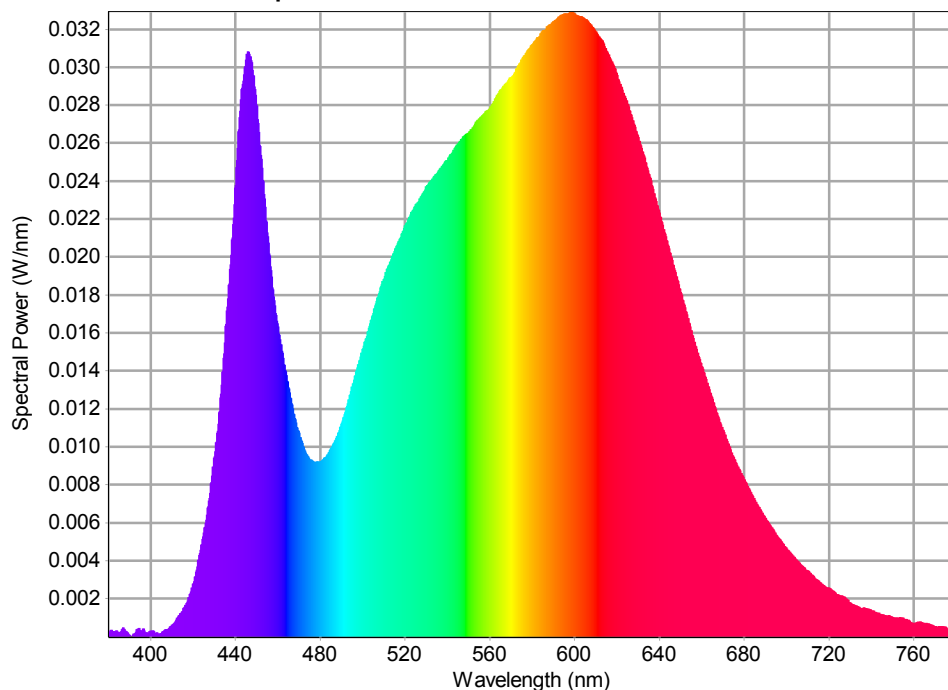
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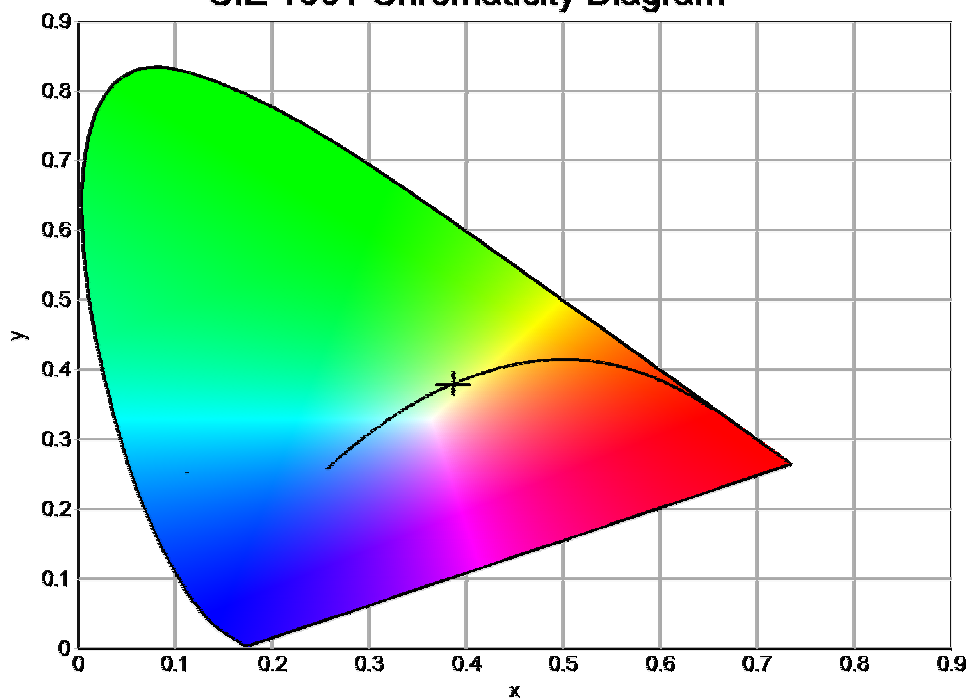
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## Spectral Power Distribution



Peak Wavelength	599 nm
Luminous Flux	1898 lm
Input Power	31.23 W
Lumens/Watt	60.8
Full Width/Half Maximum	150.78
Center Wavelength	579 nm
Centroid Wavelength	370 nm
Dominant Wavelength	487 nm
Excitation Purity	0.1585
Colorimetric Purity	0.0973

## CIE 1931 Chromaticity Diagram



x	0.3861	CCT	3871 K
y	0.3798	CRI	84
u	0.2276	L*	25.67
v	0.3358	a*	-4.58
u'	0.2276	b*	-14.44
v'	0.5038	Duv	0.0002
R1	82.5	R9	15.3
R2	88.4	R10	72.2
R3	92.9	R11	83.2
R4	84.0	R12	67.6
R5	82.6	R13	83.7
R6	84.4	R14	95.8
R7	86.9		
R8	67.5		



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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	0.00016	405	0.00019	430	0.00941	455	0.02129
381	0.00031	406	0.00028	431	0.01025	456	0.02019
382	0.00030	407	0.00040	432	0.01121	457	0.01897
383	0.00027	408	0.00037	433	0.01260	458	0.01791
384	0.00032	409	0.00052	434	0.01394	459	0.01703
385	0.00023	410	0.00063	435	0.01550	460	0.01633
386	0.00027	411	0.00071	436	0.01718	461	0.01567
387	0.00048	412	0.00088	437	0.01852	462	0.01505
388	0.00031	413	0.00105	438	0.02011	463	0.01434
389	0.00022	414	0.00122	439	0.02173	464	0.01377
390	0.00009	415	0.00134	440	0.02365	465	0.01313
391	0.00001	416	0.00156	441	0.02574	466	0.01259
392	0.00017	417	0.00178	442	0.02736	467	0.01204
393	0.00025	418	0.00207	443	0.02886	468	0.01151
394	0.00041	419	0.00238	444	0.02962	469	0.01105
395	0.00034	420	0.00277	445	0.03039	470	0.01072
396	0.00033	421	0.00314	446	0.03083	471	0.01037
397	0.00032	422	0.00370	447	0.03057	472	0.01002
398	0.00019	423	0.00430	448	0.02987	473	0.00971
399	0.00019	424	0.00483	449	0.02897	474	0.00952
400	0.00032	425	0.00547	450	0.02803	475	0.00933
401	0.00031	426	0.00600	451	0.02660	476	0.00929
402	0.00020	427	0.00680	452	0.02537	477	0.00921
403	0.00021	428	0.00756	453	0.02406	478	0.00921
404	0.00016	429	0.00847	454	0.02263	479	0.00923



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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	0.00923	505	0.01706	530	0.02373	555	0.02729
481	0.00929	506	0.01746	531	0.02386	556	0.02740
482	0.00943	507	0.01787	532	0.02400	557	0.02753
483	0.00951	508	0.01820	533	0.02413	558	0.02768
484	0.00970	509	0.01857	534	0.02430	559	0.02773
485	0.00991	510	0.01884	535	0.02439	560	0.02785
486	0.01012	511	0.01919	536	0.02458	561	0.02802
487	0.01032	512	0.01950	537	0.02472	562	0.02820
488	0.01057	513	0.01973	538	0.02487	563	0.02844
489	0.01088	514	0.02005	539	0.02505	564	0.02861
490	0.01121	515	0.02030	540	0.02512	565	0.02881
491	0.01155	516	0.02057	541	0.02533	566	0.02893
492	0.01193	517	0.02084	542	0.02545	567	0.02908
493	0.01230	518	0.02107	543	0.02564	568	0.02919
494	0.01272	519	0.02135	544	0.02585	569	0.02938
495	0.01316	520	0.02166	545	0.02597	570	0.02947
496	0.01354	521	0.02185	546	0.02612	571	0.02957
497	0.01398	522	0.02210	547	0.02626	572	0.02977
498	0.01435	523	0.02237	548	0.02639	573	0.03000
499	0.01474	524	0.02256	549	0.02649	574	0.03019
500	0.01515	525	0.02278	550	0.02657	575	0.03039
501	0.01553	526	0.02288	551	0.02671	576	0.03059
502	0.01584	527	0.02307	552	0.02683	577	0.03073
503	0.01628	528	0.02328	553	0.02703	578	0.03092
504	0.01667	529	0.02345	554	0.02719	579	0.03105





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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	0.03120	605	0.03254	630	0.02631	655	0.01614
581	0.03135	606	0.03246	631	0.02595	656	0.01573
582	0.03150	607	0.03231	632	0.02556	657	0.01533
583	0.03159	608	0.03217	633	0.02524	658	0.01496
584	0.03177	609	0.03206	634	0.02478	659	0.01462
585	0.03194	610	0.03189	635	0.02440	660	0.01426
586	0.03196	611	0.03168	636	0.02402	661	0.01393
587	0.03214	612	0.03154	637	0.02357	662	0.01356
588	0.03224	613	0.03142	638	0.02314	663	0.01322
589	0.03228	614	0.03111	639	0.02273	664	0.01285
590	0.03241	615	0.03087	640	0.02233	665	0.01253
591	0.03248	616	0.03068	641	0.02190	666	0.01217
592	0.03260	617	0.03042	642	0.02148	667	0.01183
593	0.03270	618	0.03020	643	0.02109	668	0.01149
594	0.03275	619	0.02995	644	0.02067	669	0.01118
595	0.03282	620	0.02958	645	0.02025	670	0.01091
596	0.03284	621	0.02926	646	0.01983	671	0.01063
597	0.03284	622	0.02898	647	0.01939	672	0.01030
598	0.03291	623	0.02866	648	0.01900	673	0.01003
599	0.03291	624	0.02839	649	0.01857	674	0.00971
600	0.03283	625	0.02808	650	0.01816	675	0.00946
601	0.03272	626	0.02773	651	0.01776	676	0.00919
602	0.03268	627	0.02736	652	0.01736	677	0.00896
603	0.03270	628	0.02701	653	0.01697	678	0.00875
604	0.03262	629	0.02666	654	0.01655	679	0.00850



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**Spectral Power Distribution Table (4/4)**

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680	0.00830	706	0.00390	732	0.00167	758	0.00081
681	0.00806	707	0.00375	733	0.00164	759	0.00074
682	0.00785	708	0.00367	734	0.00157	760	0.00068
683	0.00762	709	0.00354	735	0.00151	761	0.00072
684	0.00740	710	0.00348	736	0.00151	762	0.00079
685	0.00720	711	0.00337	737	0.00150	763	0.00078
686	0.00700	712	0.00326	738	0.00147	764	0.00074
687	0.00683	713	0.00313	739	0.00144	765	0.00067
688	0.00662	714	0.00301	740	0.00137	766	0.00071
689	0.00643	715	0.00295	741	0.00136	767	0.00068
690	0.00625	716	0.00283	742	0.00129	768	0.00063
691	0.00608	717	0.00275	743	0.00124	769	0.00058
692	0.00592	718	0.00266	744	0.00121	770	0.00056
693	0.00575	719	0.00258	745	0.00116	771	0.00050
694	0.00559	720	0.00258	746	0.00114	772	0.00054
695	0.00538	721	0.00248	747	0.00110	773	0.00056
696	0.00523	722	0.00241	748	0.00113	774	0.00051
697	0.00511	723	0.00233	749	0.00107	775	0.00052
698	0.00494	724	0.00223	750	0.00103	776	0.00042
699	0.00478	725	0.00219	751	0.00100	777	0.00035
700	0.00465	726	0.00217	752	0.00100	778	0.00029
701	0.00453	727	0.00212	753	0.00097	779	0.00037
702	0.00440	728	0.00201	754	0.00099	780	0.00046
703	0.00426	729	0.00193	755	0.00099		
704	0.00412	730	0.00179	756	0.00093		
705	0.00400	731	0.00172	757	0.00087		