

Datasheet for #sbcw12207 DN

Recommendations:

Please read the User Manual and have a look at the FAQ at <http://www.alpeslasers.ch/?a=142>

WARNING: Operating the laser with higher current or voltage than specified in this document may cause damage and will result in loss of warranty, unless Alpes Lasers has permitted to do so!

WARNING: Beware of the polarity of the laser. This laser has to be powered with negative current on the laser contact (= bonding pad, corresponding to the label "laser" on the LLH) and the positive current on the base contact (= submount, corresponding to the label "base" on the LLH). To use with a power-supply ILX Lightwave LDX-3232 or equivalent.



Figure 1: Support mounting for #sbcw12207 DN

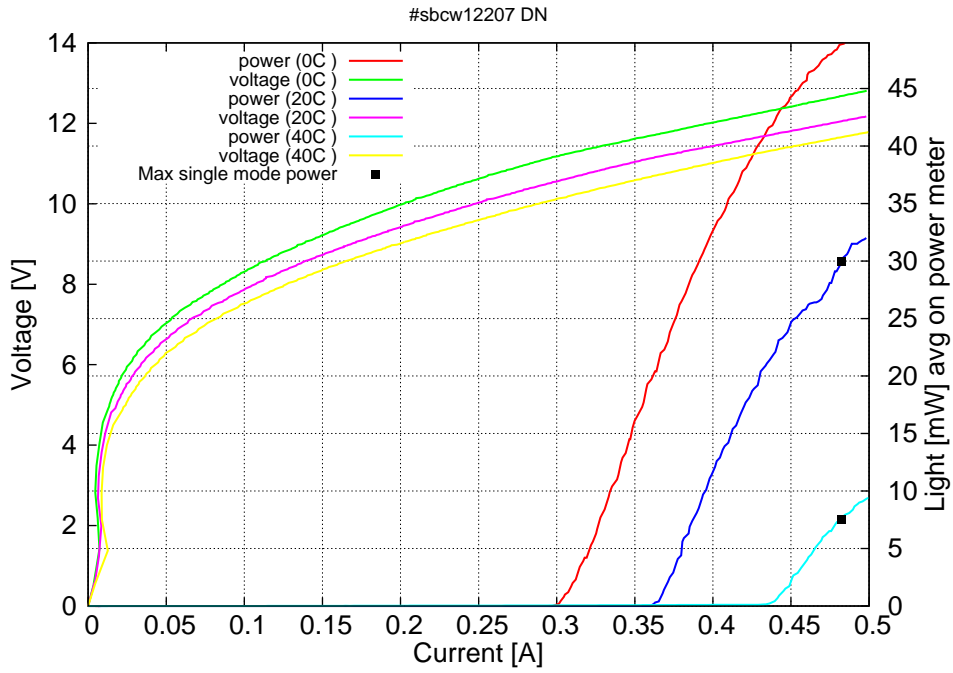


Figure 2: voltage and avg power vs current in continuous-wave operation (the solid squares indicate the maximum singlemode emitted power)

Note: at 0C: $I_{th}=0.30A$ / $V_{th}=11.2V$ (2-wires measurements). Maximum operation current: 0.50A for all temperatures.

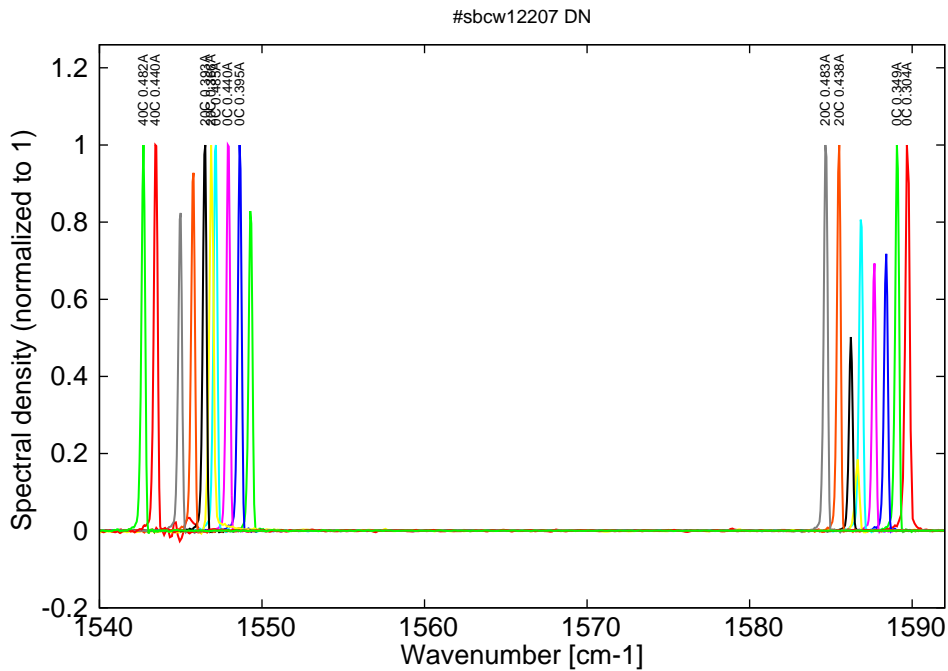


Figure 3: spectra at 0C, 20C and 40C in continuous-wave operation (front resistor current $I_F = 0A$ and back resistor current $I_B = 0A$)

Vernier characterization

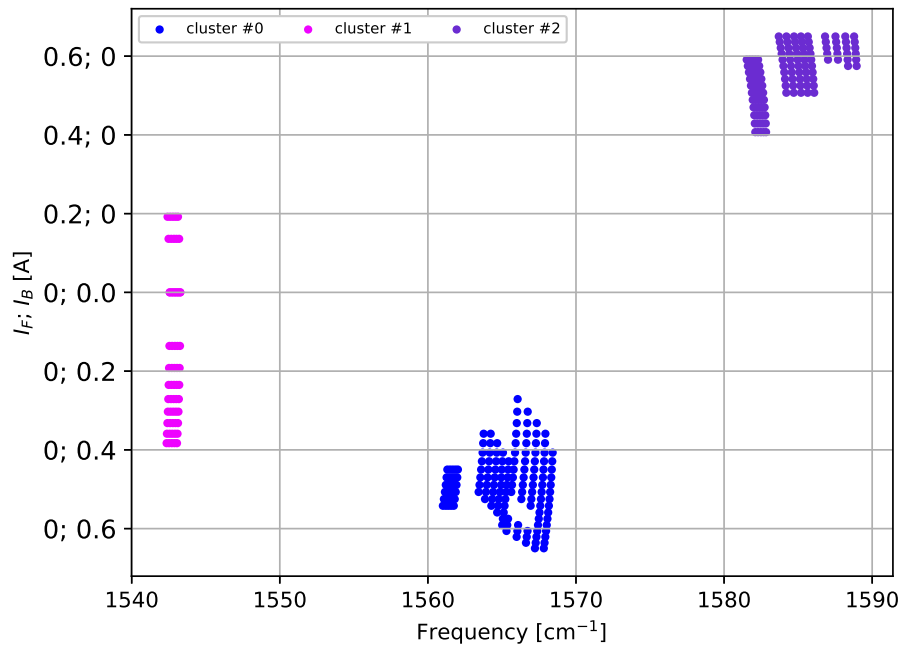


Figure 4: Emission frequency as a function of electrical current on the front resistor I_F or back resistor I_B . Either the back or the front resistors are heated, while no electrical current is flowing through the other resistor.

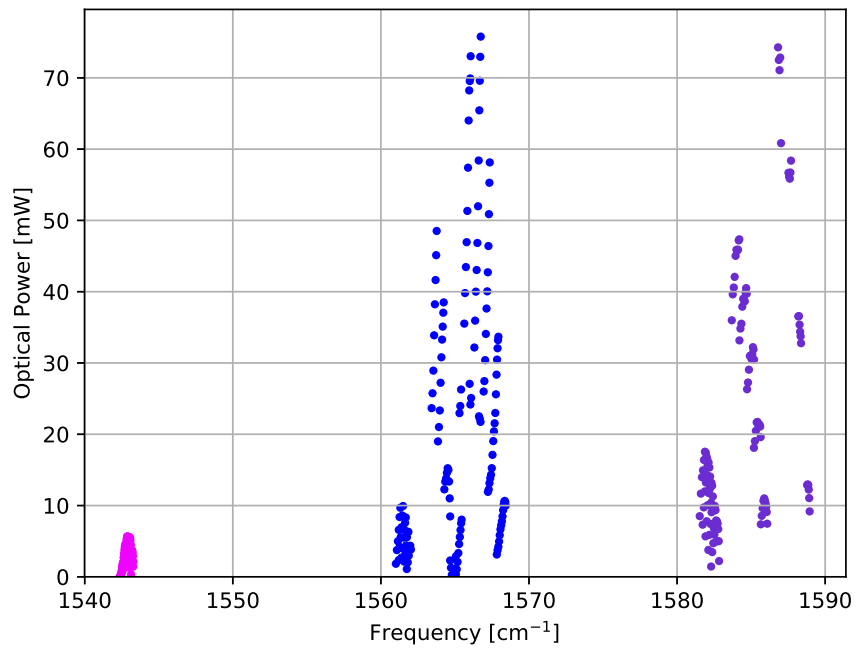


Figure 5: Optical power as a function of emission frequency.

Cluster	I_B [A]	V_B [V]	I_F [A]	V_F [V]	I_L [A]	V_L [V]	Freq [cm ⁻¹]	T [C]	P_{opt} [mW]
#0-Back	0.27 - 0.65	1.0 - 2.5	0	0	0.34 - 0.50	11.0 - 12.8	1561.0 - 1568.4	0 - 40	76
#1-Back	0.00 - 0.38	0.0 - 1.5	0	0	0.46 - 0.50	11.5 - 12.2	1542.4 - 1543.3	40	6
#1-Front	0	0	0.00 - 0.19	0.0 - 0.8	0.46 - 0.50	11.7 - 12.2	1542.4 - 1543.3	40	5
#2-Front	0	0	0.41 - 0.65	1.8 - 2.9	0.34 - 0.50	11.0 - 12.1	1581.5 - 1589.0	0 - 40	74

Table 1: Overview of the clusters.

Details of cluster #0-Back

I_F	V_F	I_B	V_B	P_{elR}	I_L	V_L	P_L	P_{tot}	P_{opt}	T	freq
[A]	[V]	[A]	[V]	[W]	[A]	[V]	[W]	[W]	[mW]	[C]	[cm ⁻¹]
0.0	0.0	0.606	2.364	1.43	0.5	12.52	6.26	7.69	23	0	1565.31
0.0	0.0	0.591	2.306	1.36	0.5	12.53	6.26	7.63	24	0	1565.36
0.0	0.0	0.575	2.245	1.29	0.5	12.53	6.27	7.56	26	0	1565.41
0.0	0.0	0.507	1.972	1.00	0.5	12.57	6.28	7.28	36	0	1565.63
0.0	0.0	0.489	1.902	0.93	0.5	12.57	6.29	7.22	40	0	1565.68
0.0	0.0	0.47	1.825	0.86	0.5	12.59	6.29	7.15	43	0	1565.74
0.0	0.0	0.45	1.743	0.78	0.5	12.60	6.30	7.09	47	0	1565.79
0.0	0.0	0.429	1.66	0.71	0.5	12.61	6.31	7.02	51	0	1565.84
0.0	0.0	0.407	1.572	0.64	0.5	12.63	6.31	6.95	57	0	1565.88
0.0	0.0	0.383	1.476	0.57	0.5	12.65	6.32	6.89	64	0	1565.93
0.0	0.0	0.359	1.381	0.50	0.5	12.67	6.33	6.83	68	0	1565.96
0.0	0.0	0.621	2.418	1.50	0.459	12.15	5.58	7.08	27	0	1565.99
0.0	0.0	0.332	1.273	0.42	0.5	12.70	6.35	6.77	70	0	1566.00
0.0	0.0	0.303	1.157	0.35	0.5	12.73	6.36	6.71	70	0	1566.03
0.0	0.0	0.606	2.364	1.43	0.459	12.17	5.59	7.02	24	0	1566.04
0.0	0.0	0.271	1.027	0.28	0.5	12.76	6.38	6.66	73	0	1566.06
0.0	0.0	0.591	2.306	1.36	0.459	12.18	5.59	6.95	25	0	1566.09
0.0	0.0	0.525	2.043	1.07	0.459	12.21	5.60	6.68	32	0	1566.31
0.0	0.0	0.507	1.972	1.00	0.459	12.22	5.61	6.61	36	0	1566.36
0.0	0.0	0.489	1.902	0.93	0.459	12.23	5.61	6.54	40	0	1566.41
0.0	0.0	0.47	1.825	0.86	0.459	12.24	5.62	6.48	43	0	1566.46
0.0	0.0	0.45	1.743	0.78	0.459	12.25	5.62	6.41	47	0	1566.51
0.0	0.0	0.429	1.66	0.71	0.459	12.27	5.63	6.34	52	0	1566.56
0.0	0.0	0.407	1.572	0.64	0.459	12.28	5.64	6.28	58	0	1566.60
0.0	0.0	0.636	2.487	1.58	0.418	11.79	4.93	6.51	23	0	1566.62
0.0	0.0	0.383	1.476	0.57	0.459	12.31	5.65	6.21	65	0	1566.65
0.0	0.0	0.621	2.418	1.50	0.418	11.80	4.93	6.43	22	0	1566.67
0.0	0.0	0.359	1.381	0.50	0.459	12.33	5.66	6.16	70	0	1566.68
0.0	0.0	0.332	1.273	0.42	0.459	12.36	5.67	6.10	73	0	1566.71
0.0	0.0	0.606	2.364	1.43	0.418	11.81	4.94	6.37	22	0	1566.73
0.0	0.0	0.303	1.157	0.35	0.459	12.39	5.69	6.04	76	0	1566.74
0.0	0.0	0.542	2.111	1.14	0.418	11.85	4.95	6.10	26	0	1566.94
0.0	0.0	0.525	2.043	1.07	0.418	11.86	4.96	6.03	27	0	1566.99
0.0	0.0	0.507	1.972	1.00	0.418	11.87	4.96	5.96	30	0	1567.04
0.0	0.0	0.489	1.902	0.93	0.418	11.88	4.97	5.90	34	0	1567.09
0.0	0.0	0.47	1.825	0.86	0.418	11.90	4.97	5.83	38	0	1567.13
0.0	0.0	0.45	1.743	0.78	0.418	11.91	4.98	5.76	40	0	1567.18
0.0	0.0	0.429	1.66	0.71	0.418	11.93	4.99	5.70	43	0	1567.22
0.0	0.0	0.65	2.536	1.65	0.376	11.41	4.29	5.94	12	0	1567.23
0.0	0.0	0.407	1.572	0.64	0.418	11.95	4.99	5.63	46	0	1567.26
0.0	0.0	0.636	2.487	1.58	0.376	11.42	4.30	5.88	12	0	1567.28
0.0	0.0	0.383	1.476	0.57	0.418	11.97	5.00	5.57	51	0	1567.29
0.0	0.0	0.359	1.381	0.50	0.418	12.00	5.02	5.51	55	0	1567.33
0.0	0.0	0.621	2.418	1.50	0.376	11.43	4.30	5.80	13	0	1567.33
0.0	0.0	0.332	1.273	0.42	0.418	12.03	5.03	5.45	58	0	1567.35
0.0	0.0	0.606	2.364	1.43	0.376	11.45	4.30	5.74	14	0	1567.38

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I_F	V_F	I_B	V_B	P_{elR}	I_L	V_L	P_L	P_{tot}	P_{opt}	T	freq
[A]	[V]	[A]	[V]	[W]	[A]	[V]	[W]	[W]	[mW]	[C]	[cm ⁻¹]
0.0	0.0	0.591	2.306	1.36	0.376	11.46	4.31	5.67	14	0	1567.44
0.0	0.0	0.575	2.245	1.29	0.376	11.46	4.31	5.60	15	0	1567.49
0.0	0.0	0.559	2.18	1.22	0.376	11.47	4.31	5.53	17	0	1567.54
0.0	0.0	0.542	2.111	1.14	0.376	11.48	4.32	5.46	19	0	1567.59
0.0	0.0	0.525	2.043	1.07	0.376	11.50	4.32	5.40	20	0	1567.63
0.0	0.0	0.507	1.972	1.00	0.376	11.51	4.33	5.33	22	0	1567.68
0.0	0.0	0.489	1.902	0.93	0.376	11.52	4.33	5.26	23	0	1567.72
0.0	0.0	0.47	1.825	0.86	0.376	11.54	4.34	5.20	26	0	1567.77
0.0	0.0	0.45	1.743	0.78	0.376	11.56	4.35	5.13	28	0	1567.81
0.0	0.0	0.65	2.536	1.65	0.335	11.04	3.70	5.35	3	0	1567.83
0.0	0.0	0.429	1.66	0.71	0.376	11.58	4.36	5.07	30	0	1567.84
0.0	0.0	0.636	2.487	1.58	0.335	11.04	3.70	5.28	4	0	1567.88
0.0	0.0	0.407	1.572	0.64	0.376	11.60	4.36	5.00	32	0	1567.88
0.0	0.0	0.383	1.476	0.57	0.376	11.63	4.37	4.94	33	0	1567.91
0.0	0.0	0.621	2.418	1.50	0.335	11.06	3.71	5.21	4	0	1567.93
0.0	0.0	0.359	1.381	0.50	0.376	11.66	4.38	4.88	34	0	1567.93
0.0	0.0	0.606	2.364	1.43	0.335	11.07	3.71	5.14	5	0	1567.98
0.0	0.0	0.591	2.306	1.36	0.335	11.09	3.71	5.08	6	0	1568.02
0.0	0.0	0.575	2.245	1.29	0.335	11.10	3.72	5.01	7	0	1568.07
0.0	0.0	0.559	2.18	1.22	0.335	11.11	3.72	4.94	7	0	1568.12
0.0	0.0	0.542	2.111	1.14	0.335	11.12	3.72	4.87	8	0	1568.17
0.0	0.0	0.525	2.043	1.07	0.335	11.13	3.73	4.80	8	0	1568.21
0.0	0.0	0.507	1.972	1.00	0.335	11.15	3.73	4.73	9	0	1568.25
0.0	0.0	0.489	1.902	0.93	0.335	11.16	3.74	4.67	10	0	1568.29
0.0	0.0	0.47	1.825	0.86	0.335	11.18	3.75	4.60	11	0	1568.33
0.0	0.0	0.45	1.743	0.78	0.335	11.20	3.75	4.54	11	0	1568.36
0.0	0.0	0.429	1.66	0.71	0.335	11.23	3.76	4.47	10	0	1568.40
0.0	0.0	0.407	1.572	0.64	0.335	11.26	3.77	4.41	10	0	1568.42
0.0	0.0	0.507	2.013	1.02	0.5	12.11	6.06	7.08	24	20	1563.42
0.0	0.0	0.489	1.935	0.95	0.5	12.12	6.06	7.01	26	20	1563.49
0.0	0.0	0.47	1.854	0.87	0.5	12.14	6.07	6.94	29	20	1563.54
0.0	0.0	0.45	1.771	0.80	0.5	12.15	6.08	6.87	34	20	1563.59
0.0	0.0	0.429	1.682	0.72	0.5	12.17	6.09	6.81	38	20	1563.65
0.0	0.0	0.407	1.59	0.65	0.5	12.19	6.10	6.74	42	20	1563.69
0.0	0.0	0.383	1.489	0.57	0.5	12.22	6.11	6.68	45	20	1563.73
0.0	0.0	0.359	1.389	0.50	0.5	12.24	6.12	6.62	49	20	1563.77
0.0	0.0	0.525	2.087	1.10	0.473	11.88	5.62	6.71	19	20	1563.85
0.0	0.0	0.507	2.013	1.02	0.473	11.89	5.62	6.64	21	20	1563.92
0.0	0.0	0.489	1.935	0.95	0.473	11.90	5.63	6.58	23	20	1563.98
0.0	0.0	0.47	1.854	0.87	0.473	11.91	5.64	6.51	27	20	1564.03
0.0	0.0	0.45	1.771	0.80	0.473	11.93	5.64	6.44	31	20	1564.08
0.0	0.0	0.429	1.682	0.72	0.473	11.95	5.65	6.37	33	20	1564.13
0.0	0.0	0.407	1.59	0.65	0.473	11.97	5.66	6.31	35	20	1564.17
0.0	0.0	0.383	1.489	0.57	0.473	12.00	5.68	6.25	37	20	1564.21
0.0	0.0	0.359	1.389	0.50	0.473	12.03	5.69	6.19	39	20	1564.24
0.0	0.0	0.542	2.163	1.17	0.445	11.63	5.18	6.35	12	20	1564.28
0.0	0.0	0.525	2.087	1.10	0.445	11.64	5.18	6.28	13	20	1564.34
0.0	0.0	0.507	2.013	1.02	0.445	11.66	5.19	6.21	14	20	1564.40

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I_F	V_F	I_B	V_B	P_{elR}	I_L	V_L	P_L	P_{tot}	P_{opt}	T	freq
[A]	[V]	[A]	[V]	[W]	[A]	[V]	[W]	[W]	[mW]	[C]	[cm ⁻¹]
0.0	0.0	0.489	1.935	0.95	0.445	11.67	5.19	6.14	15	20	1564.46
0.0	0.0	0.47	1.854	0.87	0.445	11.69	5.20	6.07	15	20	1564.51
0.0	0.0	0.45	1.771	0.80	0.445	11.70	5.21	6.00	15	20	1564.56
0.0	0.0	0.429	1.682	0.72	0.445	11.72	5.22	5.94	13	20	1564.60
0.0	0.0	0.407	1.59	0.65	0.445	11.75	5.23	5.87	11	20	1564.65
0.0	0.0	0.559	2.234	1.25	0.418	11.39	4.76	6.01	2	20	1564.68
0.0	0.0	0.383	1.489	0.57	0.445	11.77	5.24	5.81	8	20	1564.68
0.0	0.0	0.542	2.163	1.17	0.418	11.40	4.77	5.94	1	20	1564.73
0.0	0.0	0.525	2.087	1.10	0.418	11.42	4.77	5.87	0	20	1564.79
0.0	0.0	0.507	2.013	1.02	0.418	11.43	4.78	5.80	0	20	1564.86
0.0	0.0	0.489	1.935	0.95	0.418	11.45	4.79	5.73	0	20	1564.95
0.0	0.0	0.47	1.854	0.87	0.418	11.46	4.79	5.66	0	20	1564.95
0.0	0.0	0.45	1.771	0.80	0.418	11.49	4.80	5.60	0	20	1564.99
0.0	0.0	0.591	2.369	1.40	0.39	11.13	4.34	5.74	0	20	1565.02
0.0	0.0	0.429	1.682	0.72	0.418	11.51	4.81	5.53	1	20	1565.03
0.0	0.0	0.575	2.303	1.32	0.39	11.14	4.35	5.67	0	20	1565.06
0.0	0.0	0.407	1.59	0.65	0.418	11.53	4.82	5.47	3	20	1565.07
0.0	0.0	0.559	2.234	1.25	0.39	11.15	4.35	5.60	1	20	1565.12
0.0	0.0	0.542	2.163	1.17	0.39	11.17	4.36	5.53	2	20	1565.18
0.0	0.0	0.525	2.087	1.10	0.39	11.18	4.36	5.46	3	20	1565.23
0.0	0.0	0.507	2.013	1.02	0.39	11.20	4.37	5.39	5	20	1565.28
0.0	0.0	0.489	1.935	0.95	0.39	11.21	4.37	5.32	6	20	1565.33
0.0	0.0	0.47	1.854	0.87	0.39	11.23	4.38	5.25	7	20	1565.38
0.0	0.0	0.45	1.771	0.80	0.39	11.25	4.39	5.19	8	20	1565.42
0.0	0.0	0.429	1.682	0.72	0.39	11.28	4.40	5.12	8	20	1565.45
0.0	0.0	0.542	2.283	1.24	0.5	11.72	5.86	7.10	2	40	1561.01
0.0	0.0	0.525	2.199	1.15	0.5	11.73	5.87	7.02	4	40	1561.08
0.0	0.0	0.507	2.117	1.07	0.5	11.75	5.87	6.95	5	40	1561.15
0.0	0.0	0.542	2.283	1.24	0.49	11.64	5.70	6.94	2	40	1561.20
0.0	0.0	0.489	2.055	1.00	0.5	11.76	5.88	6.89	7	40	1561.21
0.0	0.0	0.47	1.977	0.93	0.5	11.78	5.89	6.82	8	40	1561.26
0.0	0.0	0.525	2.199	1.15	0.49	11.65	5.71	6.86	4	40	1561.27
0.0	0.0	0.45	1.924	0.87	0.5	11.80	5.90	6.76	10	40	1561.31
0.0	0.0	0.507	2.117	1.07	0.49	11.67	5.72	6.79	6	40	1561.33
0.0	0.0	0.542	2.283	1.24	0.48	11.56	5.55	6.79	3	40	1561.39
0.0	0.0	0.489	2.055	1.00	0.49	11.68	5.72	6.73	7	40	1561.40
0.0	0.0	0.47	1.977	0.93	0.49	11.70	5.73	6.66	9	40	1561.45
0.0	0.0	0.525	2.199	1.15	0.48	11.57	5.55	6.71	4	40	1561.45
0.0	0.0	0.45	1.924	0.87	0.49	11.72	5.74	6.61	10	40	1561.50
0.0	0.0	0.507	2.117	1.07	0.48	11.59	5.56	6.63	6	40	1561.52
0.0	0.0	0.542	2.283	1.24	0.47	11.48	5.40	6.63	2	40	1561.57
0.0	0.0	0.489	2.055	1.00	0.48	11.60	5.57	6.57	7	40	1561.58
0.0	0.0	0.47	1.977	0.93	0.48	11.62	5.58	6.51	8	40	1561.63
0.0	0.0	0.525	2.199	1.15	0.47	11.49	5.40	6.56	3	40	1561.64
0.0	0.0	0.45	1.924	0.87	0.48	11.64	5.59	6.45	8	40	1561.68
0.0	0.0	0.507	2.117	1.07	0.47	11.51	5.41	6.48	4	40	1561.70
0.0	0.0	0.542	2.283	1.24	0.46	11.40	5.24	6.48	1	40	1561.75
0.0	0.0	0.489	2.055	1.00	0.47	11.52	5.42	6.42	6	40	1561.76

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I_F	V_F	I_B	V_B	P_{elR}	I_L	V_L	P_L	P_{tot}	P_{opt}	T	freq
[A]	[V]	[A]	[V]	[W]	[A]	[V]	[W]	[W]	[mW]	[C]	[cm ⁻¹]
0.0	0.0	0.47	1.977	0.93	0.47	11.54	5.42	6.35	6	40	1561.81
0.0	0.0	0.525	2.199	1.15	0.46	11.41	5.25	6.40	2	40	1561.81
0.0	0.0	0.45	1.924	0.87	0.47	11.56	5.43	6.30	6	40	1561.86
0.0	0.0	0.507	2.117	1.07	0.46	11.43	5.26	6.33	3	40	1561.88
0.0	0.0	0.489	2.055	1.00	0.46	11.44	5.26	6.27	4	40	1561.93
0.0	0.0	0.47	1.977	0.93	0.46	11.46	5.27	6.20	4	40	1561.98
0.0	0.0	0.45	1.924	0.87	0.46	11.48	5.28	6.15	4	40	1562.03

Table 2:

Details of cluster #1-Back

I_F	V_F	I_B	V_B	P_{elR}	I_L	V_L	P_L	P_{tot}	P_{opt}	T	freq
[A]	[V]	[A]	[V]	[W]	[A]	[V]	[W]	[W]	[mW]	[C]	[cm ⁻¹]
0.0	0.0	0.383	1.442	0.55	0.5	11.87	5.93	6.49	0	40	1542.36
0.0	0.0	0.359	1.539	0.55	0.5	11.88	5.94	6.49	0	40	1542.38
0.0	0.0	0.332	1.484	0.49	0.5	11.90	5.95	6.44	0	40	1542.41
0.0	0.0	0.303	1.344	0.41	0.5	11.93	5.96	6.37	0	40	1542.44
0.0	0.0	0.271	1.227	0.33	0.5	11.95	5.98	6.31	1	40	1542.47
0.0	0.0	0.235	1.096	0.26	0.5	11.98	5.99	6.25	1	40	1542.50
0.0	0.0	0.192	0.907	0.17	0.5	12.01	6.01	6.18	1	40	1542.52
0.0	0.0	0.383	1.442	0.55	0.49	11.79	5.77	6.33	1	40	1542.53
0.0	0.0	0.136	0.676	0.09	0.5	12.06	6.03	6.12	2	40	1542.55
0.0	0.0	0.359	1.539	0.55	0.49	11.80	5.78	6.34	1	40	1542.56
0.0	0.0	0.0	0.0	0.00	0.5	12.17	6.08	6.08	2	40	1542.56
0.0	0.0	0.0	0.0	0.00	0.5	12.14	6.07	6.07	2	40	1542.57
0.0	0.0	0.332	1.484	0.49	0.49	11.82	5.79	6.28	2	40	1542.59
0.0	0.0	0.303	1.344	0.41	0.49	11.84	5.80	6.21	3	40	1542.62
0.0	0.0	0.271	1.227	0.33	0.49	11.87	5.82	6.15	3	40	1542.65
0.0	0.0	0.235	1.096	0.26	0.49	11.90	5.83	6.09	4	40	1542.68
0.0	0.0	0.192	0.907	0.17	0.49	11.93	5.85	6.02	4	40	1542.71
0.0	0.0	0.383	1.442	0.55	0.48	11.70	5.62	6.17	2	40	1542.71
0.0	0.0	0.136	0.676	0.09	0.49	11.97	5.87	5.96	5	40	1542.73
0.0	0.0	0.359	1.539	0.55	0.48	11.72	5.63	6.18	3	40	1542.74
0.0	0.0	0.0	0.0	0.00	0.49	12.09	5.93	5.93	4	40	1542.75
0.0	0.0	0.0	0.0	0.00	0.49	12.06	5.91	5.91	5	40	1542.76
0.0	0.0	0.332	1.484	0.49	0.48	11.74	5.63	6.13	4	40	1542.78
0.0	0.0	0.303	1.344	0.41	0.48	11.76	5.65	6.05	5	40	1542.81
0.0	0.0	0.271	1.227	0.33	0.48	11.79	5.66	5.99	5	40	1542.83
0.0	0.0	0.235	1.096	0.26	0.48	11.82	5.67	5.93	6	40	1542.86
0.0	0.0	0.383	1.442	0.55	0.47	11.62	5.46	6.01	3	40	1542.89
0.0	0.0	0.192	0.907	0.17	0.48	11.85	5.69	5.86	6	40	1542.89
0.0	0.0	0.136	0.676	0.09	0.48	11.89	5.71	5.80	6	40	1542.91
0.0	0.0	0.359	1.539	0.55	0.47	11.63	5.47	6.02	4	40	1542.92
0.0	0.0	0.0	0.0	0.00	0.48	12.01	5.77	5.77	4	40	1542.93
0.0	0.0	0.0	0.0	0.00	0.48	11.98	5.75	5.75	5	40	1542.94
0.0	0.0	0.332	1.484	0.49	0.47	11.66	5.48	5.97	4	40	1542.95
0.0	0.0	0.303	1.344	0.41	0.47	11.68	5.49	5.90	5	40	1542.98
0.0	0.0	0.271	1.227	0.33	0.47	11.71	5.50	5.83	5	40	1543.01
0.0	0.0	0.235	1.096	0.26	0.47	11.73	5.51	5.77	6	40	1543.04
0.0	0.0	0.383	1.442	0.55	0.46	11.54	5.31	5.86	2	40	1543.06
0.0	0.0	0.192	0.907	0.17	0.47	11.77	5.53	5.70	5	40	1543.06
0.0	0.0	0.136	0.676	0.09	0.47	11.81	5.55	5.64	5	40	1543.09
0.0	0.0	0.359	1.539	0.55	0.46	11.56	5.32	5.87	3	40	1543.09
0.0	0.0	0.0	0.0	0.00	0.47	11.94	5.61	5.61	4	40	1543.10
0.0	0.0	0.0	0.0	0.00	0.47	11.89	5.59	5.59	5	40	1543.11
0.0	0.0	0.332	1.484	0.49	0.46	11.58	5.32	5.82	3	40	1543.13
0.0	0.0	0.303	1.344	0.41	0.46	11.60	5.34	5.74	4	40	1543.16
0.0	0.0	0.271	1.227	0.33	0.46	11.62	5.35	5.68	4	40	1543.18
0.0	0.0	0.235	1.096	0.26	0.46	11.65	5.36	5.62	4	40	1543.21

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I_F	V_F	I_B	V_B	P_{elR}	I_L	V_L	P_L	P_{tot}	P_{opt}	T	freq
[A]	[V]	[A]	[V]	[W]	[A]	[V]	[W]	[W]	[mW]	[C]	[cm ⁻¹]
0.0	0.0	0.192	0.907	0.17	0.46	11.69	5.38	5.55	3	40	1543.24
0.0	0.0	0.136	0.676	0.09	0.46	11.73	5.39	5.49	3	40	1543.26
0.0	0.0	0.0	0.0	0.00	0.46	11.88	5.46	5.46	1	40	1543.27
0.0	0.0	0.0	0.0	0.00	0.46	11.81	5.43	5.43	2	40	1543.28

Table 3:

Details of cluster #1-Front

I_F	V_F	I_B	V_B	P_{elR}	I_L	V_L	P_L	P_{tot}	P_{opt}	T	freq
[A]	[V]	[A]	[V]	[W]	[A]	[V]	[W]	[W]	[mW]	[C]	[cm^{-1}]
0.192	0.847	0.0	0.0	0.16	0.5	12.05	6.02	6.19	0	40	1542.42
0.136	0.556	0.0	0.0	0.08	0.5	12.08	6.04	6.12	0	40	1542.49
0.0	0.0	0.0	0.0	0.00	0.5	12.17	6.08	6.08	2	40	1542.56
0.0	0.0	0.0	0.0	0.00	0.5	12.14	6.07	6.07	2	40	1542.57
0.192	0.847	0.0	0.0	0.16	0.49	11.97	5.86	6.03	1	40	1542.60
0.136	0.556	0.0	0.0	0.08	0.49	12.00	5.88	5.96	2	40	1542.67
0.0	0.0	0.0	0.0	0.00	0.49	12.09	5.93	5.93	4	40	1542.75
0.0	0.0	0.0	0.0	0.00	0.49	12.06	5.91	5.91	5	40	1542.76
0.192	0.847	0.0	0.0	0.16	0.48	11.88	5.70	5.87	2	40	1542.78
0.136	0.556	0.0	0.0	0.08	0.48	11.92	5.72	5.80	3	40	1542.85
0.0	0.0	0.0	0.0	0.00	0.48	12.01	5.77	5.77	4	40	1542.93
0.0	0.0	0.0	0.0	0.00	0.48	11.98	5.75	5.75	5	40	1542.94
0.192	0.847	0.0	0.0	0.16	0.47	11.80	5.55	5.71	1	40	1542.96
0.136	0.556	0.0	0.0	0.08	0.47	11.84	5.56	5.64	3	40	1543.03
0.0	0.0	0.0	0.0	0.00	0.47	11.94	5.61	5.61	4	40	1543.10
0.0	0.0	0.0	0.0	0.00	0.47	11.89	5.59	5.59	5	40	1543.11
0.192	0.847	0.0	0.0	0.16	0.46	11.72	5.39	5.55	0	40	1543.12
0.136	0.556	0.0	0.0	0.08	0.46	11.75	5.41	5.48	1	40	1543.20
0.0	0.0	0.0	0.0	0.00	0.46	11.88	5.46	5.46	1	40	1543.27
0.0	0.0	0.0	0.0	0.00	0.46	11.81	5.43	5.43	2	40	1543.28

Table 4:

Details of cluster #2-Front

I_F	V_F	I_B	V_B	P_{elR}	I_L	V_L	P_L	P_{tot}	P_{opt}	T	freq
[A]	[V]	[A]	[V]	[W]	[A]	[V]	[W]	[W]	[mW]	[C]	[cm ⁻¹]
0.65	2.713	0.0	0.0	1.76	0.459	12.05	5.53	7.29	74	0	1586.82
0.636	2.657	0.0	0.0	1.69	0.459	12.07	5.54	7.23	73	0	1586.87
0.621	2.589	0.0	0.0	1.61	0.459	12.10	5.55	7.16	71	0	1586.92
0.606	2.525	0.0	0.0	1.53	0.459	12.12	5.56	7.09	73	0	1586.96
0.591	2.46	0.0	0.0	1.45	0.459	12.13	5.57	7.02	61	0	1587.02
0.65	2.713	0.0	0.0	1.76	0.418	11.70	4.89	6.65	57	0	1587.52
0.636	2.657	0.0	0.0	1.69	0.418	11.72	4.90	6.59	56	0	1587.57
0.621	2.589	0.0	0.0	1.61	0.418	11.74	4.91	6.52	56	0	1587.61
0.606	2.525	0.0	0.0	1.53	0.418	11.77	4.92	6.45	57	0	1587.65
0.591	2.46	0.0	0.0	1.45	0.418	11.79	4.93	6.38	58	0	1587.69
0.65	2.713	0.0	0.0	1.76	0.376	11.35	4.27	6.03	37	0	1588.18
0.636	2.657	0.0	0.0	1.69	0.376	11.36	4.27	5.96	37	0	1588.23
0.621	2.589	0.0	0.0	1.61	0.376	11.38	4.28	5.89	35	0	1588.27
0.606	2.525	0.0	0.0	1.53	0.376	11.40	4.29	5.82	34	0	1588.31
0.591	2.46	0.0	0.0	1.45	0.376	11.42	4.29	5.75	34	0	1588.34
0.575	2.389	0.0	0.0	1.37	0.376	11.45	4.30	5.68	33	0	1588.37
0.65	2.713	0.0	0.0	1.76	0.335	10.98	3.68	5.44	13	0	1588.78
0.636	2.657	0.0	0.0	1.69	0.335	11.00	3.68	5.37	13	0	1588.82
0.621	2.589	0.0	0.0	1.61	0.335	11.02	3.69	5.30	13	0	1588.86
0.606	2.525	0.0	0.0	1.53	0.335	11.04	3.70	5.23	12	0	1588.89
0.591	2.46	0.0	0.0	1.45	0.335	11.06	3.70	5.16	11	0	1588.92
0.575	2.389	0.0	0.0	1.37	0.335	11.08	3.71	5.09	9	0	1588.95
0.65	2.851	0.0	0.0	1.85	0.5	11.94	5.97	7.82	36	20	1583.69
0.636	2.784	0.0	0.0	1.77	0.5	11.95	5.97	7.74	40	20	1583.76
0.621	2.707	0.0	0.0	1.68	0.5	11.97	5.98	7.66	41	20	1583.83
0.606	2.634	0.0	0.0	1.60	0.5	11.98	5.99	7.59	42	20	1583.89
0.591	2.562	0.0	0.0	1.51	0.5	11.99	6.00	7.51	45	20	1583.95
0.575	2.485	0.0	0.0	1.43	0.5	12.01	6.01	7.44	46	20	1584.01
0.559	2.408	0.0	0.0	1.35	0.5	12.03	6.02	7.36	46	20	1584.06
0.542	2.331	0.0	0.0	1.26	0.5	12.06	6.03	7.29	46	20	1584.12
0.525	2.251	0.0	0.0	1.18	0.5	12.08	6.04	7.22	47	20	1584.16
0.507	2.163	0.0	0.0	1.10	0.5	12.10	6.05	7.15	47	20	1584.20
0.65	2.851	0.0	0.0	1.85	0.473	11.71	5.54	7.39	33	20	1584.21
0.636	2.784	0.0	0.0	1.77	0.473	11.72	5.55	7.32	35	20	1584.28
0.621	2.707	0.0	0.0	1.68	0.473	11.74	5.55	7.23	36	20	1584.35
0.606	2.634	0.0	0.0	1.60	0.473	11.75	5.56	7.16	38	20	1584.40
0.591	2.562	0.0	0.0	1.51	0.473	11.78	5.57	7.08	39	20	1584.46
0.575	2.485	0.0	0.0	1.43	0.473	11.79	5.58	7.01	39	20	1584.52
0.559	2.408	0.0	0.0	1.35	0.473	11.81	5.59	6.93	39	20	1584.57
0.542	2.331	0.0	0.0	1.26	0.473	11.83	5.60	6.86	40	20	1584.62
0.525	2.251	0.0	0.0	1.18	0.473	11.84	5.60	6.78	41	20	1584.66
0.507	2.163	0.0	0.0	1.10	0.473	11.88	5.62	6.71	40	20	1584.70
0.65	2.851	0.0	0.0	1.85	0.445	11.48	5.11	6.96	26	20	1584.72
0.636	2.784	0.0	0.0	1.77	0.445	11.49	5.11	6.88	27	20	1584.79
0.621	2.707	0.0	0.0	1.68	0.445	11.51	5.12	6.80	29	20	1584.85
0.606	2.634	0.0	0.0	1.60	0.445	11.52	5.13	6.72	31	20	1584.91

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I_F	V_F	I_B	V_B	P_{elR}	I_L	V_L	P_L	P_{tot}	P_{opt}	T	freq
[A]	[V]	[A]	[V]	[W]	[A]	[V]	[W]	[W]	[mW]	[C]	[cm ⁻¹]
0.591	2.562	0.0	0.0	1.51	0.445	11.54	5.13	6.65	31	20	1584.97
0.575	2.485	0.0	0.0	1.43	0.445	11.56	5.14	6.57	31	20	1585.02
0.559	2.408	0.0	0.0	1.35	0.445	11.58	5.15	6.50	31	20	1585.08
0.542	2.331	0.0	0.0	1.26	0.445	11.60	5.16	6.42	32	20	1585.12
0.525	2.251	0.0	0.0	1.18	0.445	11.62	5.17	6.35	32	20	1585.16
0.65	2.851	0.0	0.0	1.85	0.418	11.26	4.70	6.56	18	20	1585.19
0.507	2.163	0.0	0.0	1.10	0.445	11.65	5.18	6.28	30	20	1585.20
0.636	2.784	0.0	0.0	1.77	0.418	11.27	4.71	6.48	19	20	1585.26
0.621	2.707	0.0	0.0	1.68	0.418	11.28	4.72	6.40	20	20	1585.32
0.606	2.634	0.0	0.0	1.60	0.418	11.30	4.72	6.32	22	20	1585.38
0.591	2.562	0.0	0.0	1.51	0.418	11.32	4.73	6.24	22	20	1585.43
0.575	2.485	0.0	0.0	1.43	0.418	11.33	4.74	6.17	21	20	1585.48
0.559	2.408	0.0	0.0	1.35	0.418	11.36	4.75	6.09	21	20	1585.53
0.542	2.331	0.0	0.0	1.26	0.418	11.38	4.76	6.02	21	20	1585.57
0.525	2.251	0.0	0.0	1.18	0.418	11.40	4.76	5.95	21	20	1585.61
0.507	2.163	0.0	0.0	1.10	0.418	11.42	4.77	5.87	20	20	1585.64
0.65	2.851	0.0	0.0	1.85	0.39	11.02	4.30	6.15	7	20	1585.66
0.636	2.784	0.0	0.0	1.77	0.39	11.03	4.30	6.07	9	20	1585.72
0.621	2.707	0.0	0.0	1.68	0.39	11.05	4.31	5.99	10	20	1585.78
0.606	2.634	0.0	0.0	1.60	0.39	11.06	4.31	5.91	11	20	1585.83
0.591	2.562	0.0	0.0	1.51	0.39	11.08	4.32	5.84	11	20	1585.88
0.575	2.485	0.0	0.0	1.43	0.39	11.10	4.33	5.76	11	20	1585.94
0.559	2.408	0.0	0.0	1.35	0.39	11.12	4.34	5.68	10	20	1585.98
0.542	2.331	0.0	0.0	1.26	0.39	11.14	4.34	5.61	10	20	1586.02
0.525	2.251	0.0	0.0	1.18	0.39	11.16	4.35	5.53	9	20	1586.05
0.507	2.163	0.0	0.0	1.10	0.39	11.19	4.36	5.46	7	20	1586.09
0.591	2.715	0.0	0.0	1.60	0.5	11.66	5.83	7.43	9	40	1581.53
0.575	2.63	0.0	0.0	1.51	0.5	11.67	5.83	7.35	12	40	1581.61
0.559	2.55	0.0	0.0	1.43	0.5	11.68	5.84	7.27	14	40	1581.68
0.591	2.715	0.0	0.0	1.60	0.49	11.57	5.67	7.28	7	40	1581.73
0.542	2.471	0.0	0.0	1.34	0.5	11.70	5.85	7.19	15	40	1581.75
0.575	2.63	0.0	0.0	1.51	0.49	11.59	5.68	7.19	10	40	1581.80
0.525	2.39	0.0	0.0	1.25	0.5	11.71	5.86	7.11	16	40	1581.82
0.559	2.55	0.0	0.0	1.43	0.49	11.60	5.68	7.11	12	40	1581.87
0.507	2.302	0.0	0.0	1.17	0.5	11.73	5.86	7.03	18	40	1581.88
0.591	2.715	0.0	0.0	1.60	0.48	11.49	5.52	7.12	6	40	1581.92
0.489	2.229	0.0	0.0	1.09	0.5	11.75	5.87	6.96	17	40	1581.94
0.542	2.471	0.0	0.0	1.34	0.49	11.62	5.69	7.03	13	40	1581.95
0.47	2.135	0.0	0.0	1.00	0.5	11.77	5.88	6.89	17	40	1581.99
0.575	2.63	0.0	0.0	1.51	0.48	11.51	5.52	7.04	8	40	1582.00
0.525	2.39	0.0	0.0	1.25	0.49	11.63	5.70	6.95	14	40	1582.01
0.45	2.039	0.0	0.0	0.92	0.5	11.79	5.90	6.81	17	40	1582.04
0.559	2.55	0.0	0.0	1.43	0.48	11.52	5.53	6.95	10	40	1582.07
0.507	2.302	0.0	0.0	1.17	0.49	11.65	5.71	6.87	16	40	1582.07
0.429	1.943	0.0	0.0	0.83	0.5	11.82	5.91	6.74	16	40	1582.08
0.407	1.846	0.0	0.0	0.75	0.5	11.85	5.92	6.67	13	40	1582.11
0.591	2.715	0.0	0.0	1.60	0.47	11.41	5.36	6.97	4	40	1582.11
0.489	2.229	0.0	0.0	1.09	0.49	11.66	5.72	6.81	16	40	1582.13

continued on next page

I_F	V_F	I_B	V_B	P_{elR}	I_L	V_L	P_L	P_{tot}	P_{opt}	T	freq
[A]	[V]	[A]	[V]	[W]	[A]	[V]	[W]	[W]	[mW]	[C]	[cm ⁻¹]
0.542	2.471	0.0	0.0	1.34	0.48	11.53	5.54	6.88	12	40	1582.14
0.47	2.135	0.0	0.0	1.00	0.49	11.69	5.73	6.73	15	40	1582.18
0.575	2.63	0.0	0.0	1.51	0.47	11.42	5.37	6.88	6	40	1582.19
0.525	2.39	0.0	0.0	1.25	0.48	11.55	5.54	6.80	12	40	1582.20
0.45	2.039	0.0	0.0	0.92	0.49	11.71	5.74	6.65	14	40	1582.23
0.559	2.55	0.0	0.0	1.43	0.47	11.44	5.38	6.80	7	40	1582.26
0.507	2.302	0.0	0.0	1.17	0.48	11.56	5.55	6.72	13	40	1582.27
0.429	1.943	0.0	0.0	0.83	0.49	11.74	5.75	6.58	13	40	1582.27
0.591	2.715	0.0	0.0	1.60	0.46	11.33	5.21	6.82	1	40	1582.30
0.407	1.846	0.0	0.0	0.75	0.49	11.77	5.76	6.52	10	40	1582.30
0.489	2.229	0.0	0.0	1.09	0.48	11.58	5.56	6.65	13	40	1582.32
0.542	2.471	0.0	0.0	1.34	0.47	11.45	5.38	6.72	9	40	1582.33
0.47	2.135	0.0	0.0	1.00	0.48	11.60	5.57	6.57	13	40	1582.37
0.575	2.63	0.0	0.0	1.51	0.46	11.34	5.22	6.73	3	40	1582.37
0.525	2.39	0.0	0.0	1.25	0.47	11.47	5.39	6.64	10	40	1582.39
0.45	2.039	0.0	0.0	0.92	0.48	11.63	5.58	6.50	11	40	1582.41
0.559	2.55	0.0	0.0	1.43	0.46	11.36	5.22	6.65	5	40	1582.45
0.507	2.302	0.0	0.0	1.17	0.47	11.48	5.40	6.56	9	40	1582.45
0.429	1.943	0.0	0.0	0.83	0.48	11.65	5.59	6.43	9	40	1582.46
0.407	1.846	0.0	0.0	0.75	0.48	11.68	5.61	6.36	7	40	1582.49
0.489	2.229	0.0	0.0	1.09	0.47	11.50	5.41	6.50	9	40	1582.51
0.542	2.471	0.0	0.0	1.34	0.46	11.37	5.23	6.57	6	40	1582.52
0.47	2.135	0.0	0.0	1.00	0.47	11.52	5.42	6.42	10	40	1582.56
0.525	2.39	0.0	0.0	1.25	0.46	11.38	5.24	6.49	7	40	1582.58
0.45	2.039	0.0	0.0	0.92	0.47	11.55	5.43	6.34	9	40	1582.60
0.429	1.943	0.0	0.0	0.83	0.47	11.56	5.44	6.27	8	40	1582.64
0.507	2.302	0.0	0.0	1.17	0.46	11.40	5.24	6.41	8	40	1582.64
0.407	1.846	0.0	0.0	0.75	0.47	11.60	5.45	6.20	5	40	1582.67
0.489	2.229	0.0	0.0	1.09	0.46	11.42	5.25	6.34	8	40	1582.69
0.47	2.135	0.0	0.0	1.00	0.46	11.44	5.26	6.27	7	40	1582.74
0.45	2.039	0.0	0.0	0.92	0.46	11.46	5.27	6.19	7	40	1582.78
0.429	1.943	0.0	0.0	0.83	0.46	11.49	5.29	6.12	5	40	1582.81
0.407	1.846	0.0	0.0	0.75	0.46	11.52	5.30	6.05	2	40	1582.84

Table 5: