

Datasheet for #sbcw10087 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.

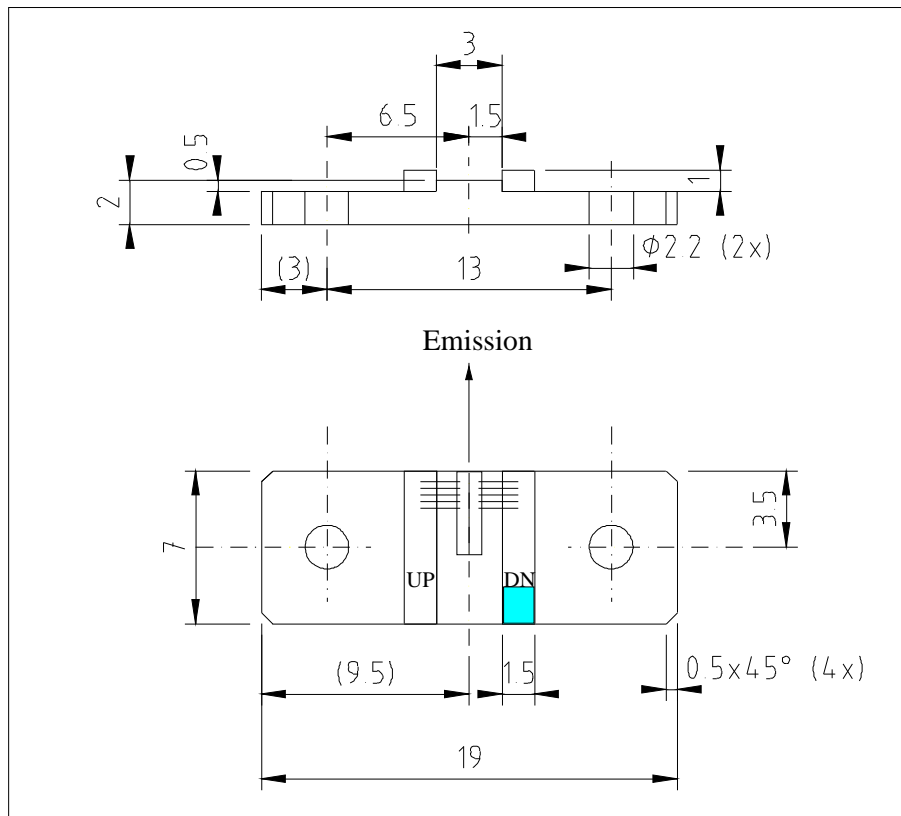


Figure 1: Support mounting for #sbcw10087 DN (please note that the laser is connected to the DN pad drawn in blue)

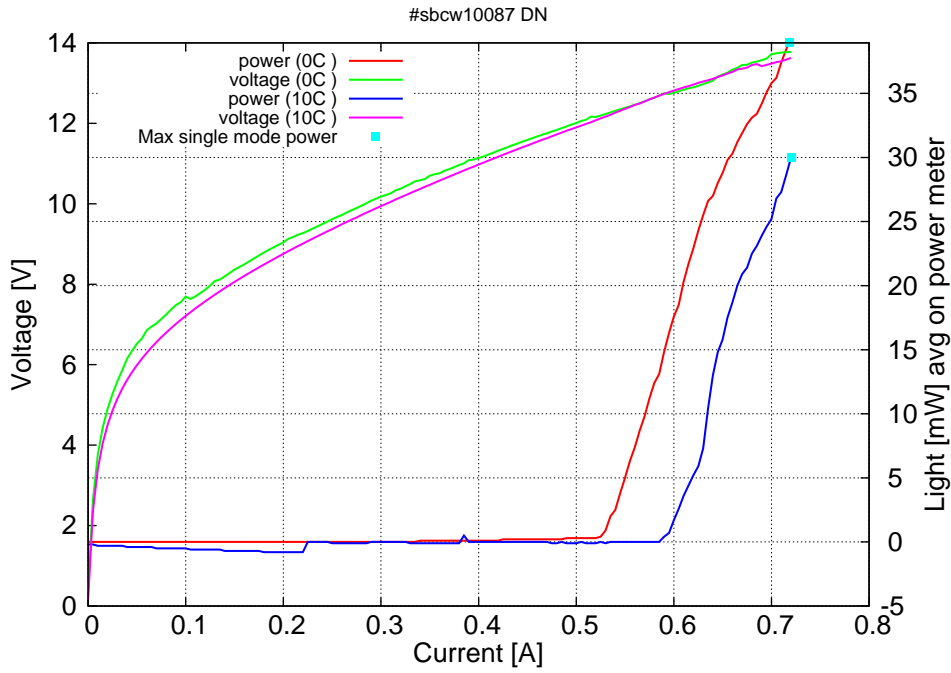


Figure 2: voltage and avg power vs current in continuous-wave operation (the solid squares indicate the maximum singlemode emitted power)

Note: at 0C: $I_{th}=0.54A$ / $V_{th}=12.3V$ (2-wires measurements). Maximum operation current: 0.72A for all temperatures.

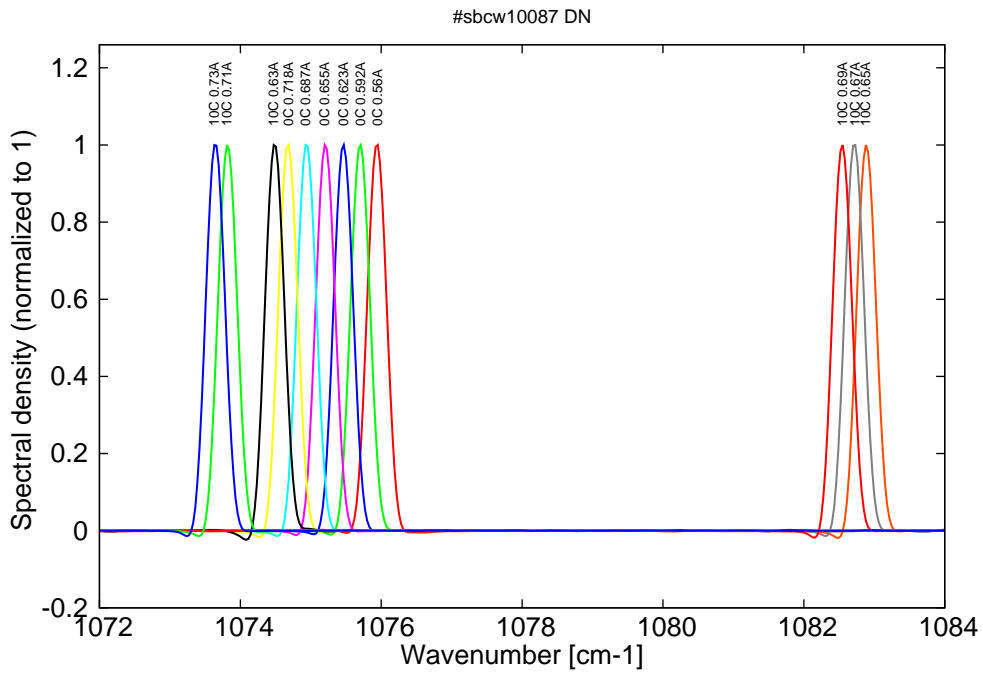


Figure 3: spectra at 0C and 10C in continuous-wave operation (front resistor current $I_F = 0A$ and back resistor current $I_B = 0A$)

Vernier characterization

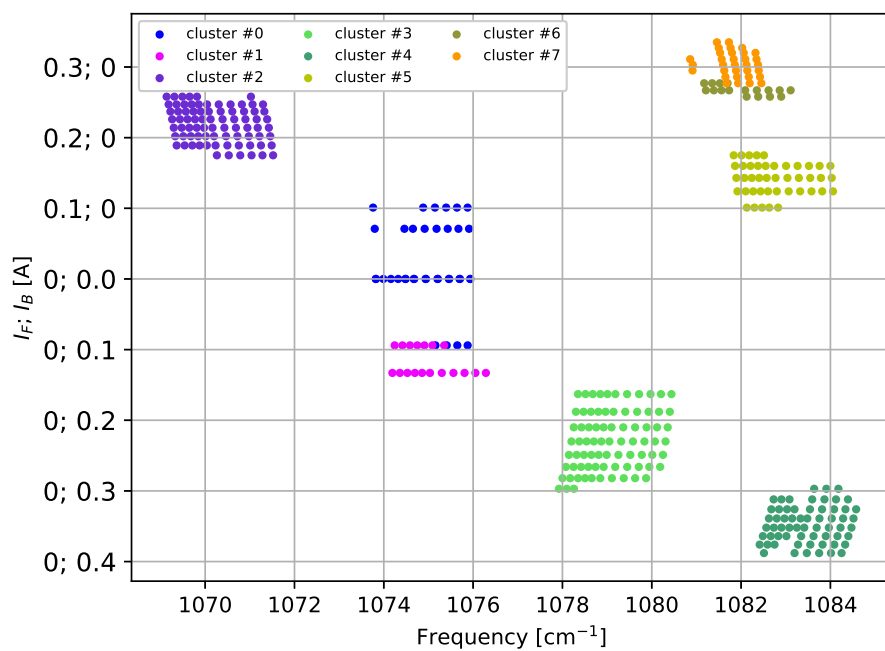


Figure 4: Emission frequency as a function of electrical current on the front resistor I_F or back resistor I_B . Either the back or the front resistors are heated, while no electrical current is flowing through the other resistor.

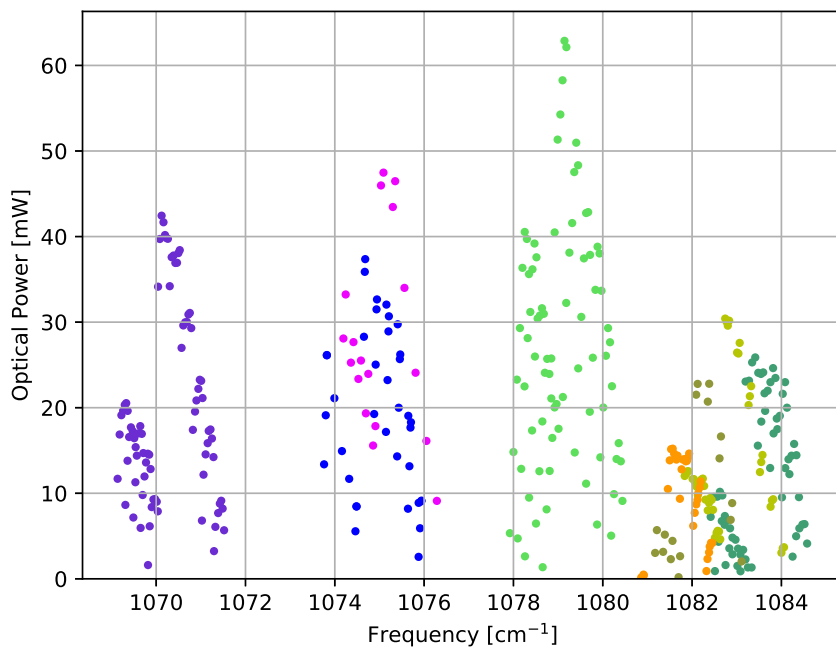


Figure 5: Optical power as a function of emission frequency.

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	0.00 - 0.09	0.0 - 3.4	0	0	0.56 - 0.72	12.3 - 13.7	1073.8 - 1075.9	0 - 10	37
#0-Front	0	0	0.00 - 0.10	0.0 - 4.0	0.56 - 0.72	12.4 - 13.7	1073.8 - 1075.9	0 - 10	37
#1-Back	0.09 - 0.13	2.8 - 4.5	0	0	0.56 - 0.72	12.2 - 13.5	1074.2 - 1076.3	0 - 10	47
#2-Front	0	0	0.17 - 0.26	5.9 - 7.8	0.56 - 0.72	12.0 - 13.4	1069.1 - 1071.5	0 - 10	42
#3-Back	0.16 - 0.30	4.6 - 7.5	0	0	0.56 - 0.72	12.0 - 13.3	1077.9 - 1080.4	0 - 10	63
#4-Back	0.30 - 0.39	7.8 - 9.6	0	0	0.59 - 0.72	12.0 - 13.1	1082.4 - 1084.6	0 - 10	26
#5-Front	0	0	0.10 - 0.17	3.5 - 5.6	0.56 - 0.72	12.3 - 13.6	1081.8 - 1084.1	0 - 10	30
#6-Front	0	0	0.26 - 0.28	7.6 - 8.0	0.59 - 0.72	12.3 - 13.2	1081.2 - 1083.1	0 - 10	23
#7-Front	0	0	0.28 - 0.34	8.2 - 9.4	0.62 - 0.72	12.4 - 13.2	1080.9 - 1082.5	0 - 10	15

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	0.0	0.0	0.00	0.718	13.61	9.77	9.77	36	0	1074.67
0.0	0.0	0.0	0.0	0.00	0.718	13.68	9.82	9.82	37	0	1074.68
0.0	0.0	0.0	0.0	0.00	0.687	13.38	9.19	9.19	31	0	1074.93
0.0	0.0	0.0	0.0	0.00	0.687	13.56	9.32	9.32	33	0	1074.94
0.0	0.0	0.094	3.411	0.32	0.655	13.05	8.55	8.87	32	0	1075.16
0.0	0.0	0.0	0.0	0.00	0.655	13.15	8.61	8.61	29	0	1075.20
0.0	0.0	0.0	0.0	0.00	0.655	13.33	8.73	8.73	31	0	1075.21
0.0	0.0	0.094	3.411	0.32	0.623	12.77	7.95	8.27	30	0	1075.41
0.0	0.0	0.0	0.0	0.00	0.623	12.98	8.08	8.08	26	0	1075.46
0.0	0.0	0.0	0.0	0.00	0.623	13.10	8.16	8.16	26	0	1075.47
0.0	0.0	0.094	3.411	0.32	0.592	12.52	7.41	7.73	19	0	1075.65
0.0	0.0	0.0	0.0	0.00	0.592	12.73	7.54	7.54	18	0	1075.69
0.0	0.0	0.0	0.0	0.00	0.592	12.84	7.60	7.60	18	0	1075.71
0.0	0.0	0.094	3.411	0.32	0.56	12.28	6.88	7.20	9	0	1075.88
0.0	0.0	0.0	0.0	0.00	0.56	12.49	7.00	7.00	9	0	1075.93
0.0	0.0	0.0	0.0	0.00	0.56	12.57	7.04	7.04	9	0	1075.94
0.0	0.0	0.0	0.0	0.00	0.71	13.53	9.61	9.61	26	10	1073.82
0.0	0.0	0.0	0.0	0.00	0.71	13.47	9.57	9.57	26	10	1073.82
0.0	0.0	0.0	0.0	0.00	0.69	13.40	9.25	9.25	21	10	1073.99
0.0	0.0	0.0	0.0	0.00	0.67	13.26	8.88	8.88	15	10	1074.16
0.0	0.0	0.0	0.0	0.00	0.65	13.08	8.50	8.50	12	10	1074.32
0.0	0.0	0.0	0.0	0.00	0.63	12.95	8.16	8.16	8	10	1074.48
0.0	0.0	0.0	0.0	0.00	0.63	12.90	8.12	8.12	8	10	1074.49

Table 2:

Details of cluster #0-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}]
0.071	3.022	0.0	0.0	0.21	0.718	13.68	9.82	10.04	28	0	1074.65
0.0	0.0	0.0	0.0	0.00	0.718	13.61	9.77	9.77	36	0	1074.67
0.0	0.0	0.0	0.0	0.00	0.718	13.68	9.82	9.82	37	0	1074.68
0.101	4.02	0.0	0.0	0.41	0.687	13.38	9.19	9.60	19	0	1074.88
0.071	3.022	0.0	0.0	0.21	0.687	13.47	9.25	9.47	25	0	1074.91
0.0	0.0	0.0	0.0	0.00	0.687	13.38	9.19	9.19	31	0	1074.93
0.0	0.0	0.0	0.0	0.00	0.687	13.56	9.32	9.32	33	0	1074.94
0.101	4.02	0.0	0.0	0.41	0.655	13.15	8.62	9.02	17	0	1075.15
0.071	3.022	0.0	0.0	0.21	0.655	13.24	8.67	8.89	23	0	1075.18
0.0	0.0	0.0	0.0	0.00	0.655	13.15	8.61	8.61	29	0	1075.20
0.0	0.0	0.0	0.0	0.00	0.655	13.33	8.73	8.73	31	0	1075.21
0.101	4.02	0.0	0.0	0.41	0.623	12.90	8.04	8.45	14	0	1075.40
0.071	3.022	0.0	0.0	0.21	0.623	12.99	8.09	8.31	20	0	1075.43
0.0	0.0	0.0	0.0	0.00	0.623	12.98	8.08	8.08	26	0	1075.46
0.0	0.0	0.0	0.0	0.00	0.623	13.10	8.16	8.16	26	0	1075.47
0.101	4.02	0.0	0.0	0.41	0.592	12.63	7.48	7.88	8	0	1075.64
0.071	3.022	0.0	0.0	0.21	0.592	12.76	7.56	7.77	13	0	1075.67
0.0	0.0	0.0	0.0	0.00	0.592	12.73	7.54	7.54	18	0	1075.69
0.0	0.0	0.0	0.0	0.00	0.592	12.84	7.60	7.60	18	0	1075.71
0.101	4.02	0.0	0.0	0.41	0.56	12.38	6.93	7.34	3	0	1075.88
0.071	3.022	0.0	0.0	0.21	0.56	12.50	7.00	7.22	6	0	1075.91
0.0	0.0	0.0	0.0	0.00	0.56	12.49	7.00	7.00	9	0	1075.93
0.0	0.0	0.0	0.0	0.00	0.56	12.57	7.04	7.04	9	0	1075.94
0.101	3.503	0.0	0.0	0.35	0.71	13.33	9.47	9.82	13	10	1073.76
0.071	2.602	0.0	0.0	0.18	0.71	13.37	9.49	9.68	19	10	1073.80
0.0	0.0	0.0	0.0	0.00	0.71	13.53	9.61	9.61	26	10	1073.82
0.0	0.0	0.0	0.0	0.00	0.71	13.47	9.57	9.57	26	10	1073.82
0.0	0.0	0.0	0.0	0.00	0.69	13.40	9.25	9.25	21	10	1073.99
0.0	0.0	0.0	0.0	0.00	0.67	13.26	8.88	8.88	15	10	1074.16
0.0	0.0	0.0	0.0	0.00	0.65	13.08	8.50	8.50	12	10	1074.32
0.071	2.602	0.0	0.0	0.18	0.63	12.80	8.06	8.25	6	10	1074.46
0.0	0.0	0.0	0.0	0.00	0.63	12.95	8.16	8.16	8	10	1074.48
0.0	0.0	0.0	0.0	0.00	0.63	12.90	8.12	8.12	8	10	1074.49

Table 3:

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	0.133	4.536	0.60	0.718	13.39	9.62	10.22	46	0	1075.03
0.0	0.0	0.094	3.411	0.32	0.718	13.46	9.67	9.99	47	0	1075.09
0.0	0.0	0.133	4.536	0.60	0.687	13.17	9.05	9.65	43	0	1075.30
0.0	0.0	0.094	3.411	0.32	0.687	13.25	9.10	9.42	46	0	1075.35
0.0	0.0	0.133	4.536	0.60	0.655	12.93	8.47	9.08	34	0	1075.56
0.0	0.0	0.133	4.536	0.60	0.623	12.69	7.90	8.51	24	0	1075.81
0.0	0.0	0.133	4.536	0.60	0.592	12.45	7.37	7.97	16	0	1076.05
0.0	0.0	0.133	4.536	0.60	0.56	12.21	6.84	7.44	9	0	1076.29
0.0	0.0	0.133	3.849	0.51	0.71	13.36	9.49	10.00	28	10	1074.19
0.0	0.0	0.094	2.811	0.26	0.71	13.37	9.49	9.76	33	10	1074.24
0.0	0.0	0.133	3.849	0.51	0.69	13.25	9.14	9.66	25	10	1074.36
0.0	0.0	0.094	2.811	0.26	0.69	13.23	9.13	9.39	28	10	1074.42
0.0	0.0	0.133	3.849	0.51	0.67	13.06	8.75	9.26	23	10	1074.53
0.0	0.0	0.094	2.811	0.26	0.67	13.09	8.77	9.03	26	10	1074.59
0.0	0.0	0.133	3.849	0.51	0.65	12.90	8.39	8.90	19	10	1074.70
0.0	0.0	0.094	2.811	0.26	0.65	12.94	8.41	8.67	24	10	1074.75
0.0	0.0	0.133	3.849	0.51	0.63	12.75	8.03	8.55	16	10	1074.86
0.0	0.0	0.094	2.811	0.26	0.63	12.81	8.07	8.33	18	10	1074.91

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]
0.247	7.599	0.0	0.0	1.88	0.718	13.23	9.50	11.37	34	0	1070.04
0.237	7.375	0.0	0.0	1.75	0.718	13.28	9.53	11.28	40	0	1070.08
0.226	7.148	0.0	0.0	1.62	0.718	13.26	9.52	11.13	42	0	1070.12
0.214	6.848	0.0	0.0	1.47	0.718	13.28	9.53	11.00	42	0	1070.16
0.202	6.626	0.0	0.0	1.34	0.718	13.33	9.57	10.91	40	0	1070.20
0.189	6.306	0.0	0.0	1.19	0.718	13.40	9.62	10.81	40	0	1070.23
0.175	5.979	0.0	0.0	1.05	0.718	13.41	9.63	10.68	40	0	1070.26
0.247	7.599	0.0	0.0	1.88	0.687	13.00	8.93	10.81	34	0	1070.30
0.237	7.375	0.0	0.0	1.75	0.687	13.05	8.96	10.71	38	0	1070.35
0.226	7.148	0.0	0.0	1.62	0.687	13.03	8.95	10.56	38	0	1070.39
0.214	6.848	0.0	0.0	1.47	0.687	13.05	8.96	10.43	37	0	1070.43
0.202	6.626	0.0	0.0	1.34	0.687	13.08	8.99	10.32	37	0	1070.47
0.189	6.306	0.0	0.0	1.19	0.687	13.18	9.05	10.24	38	0	1070.50
0.175	5.979	0.0	0.0	1.05	0.687	13.19	9.06	10.10	38	0	1070.53
0.247	7.599	0.0	0.0	1.88	0.655	12.77	8.36	10.24	27	0	1070.57
0.237	7.375	0.0	0.0	1.75	0.655	12.80	8.38	10.13	30	0	1070.61
0.226	7.148	0.0	0.0	1.62	0.655	12.80	8.38	10.00	30	0	1070.65
0.214	6.848	0.0	0.0	1.47	0.655	12.81	8.39	9.86	30	0	1070.69
0.202	6.626	0.0	0.0	1.34	0.655	12.88	8.43	9.77	31	0	1070.72
0.189	6.306	0.0	0.0	1.19	0.655	12.94	8.48	9.67	31	0	1070.75
0.175	5.979	0.0	0.0	1.05	0.655	12.94	8.48	9.52	29	0	1070.79
0.247	7.599	0.0	0.0	1.88	0.623	12.53	7.81	9.68	17	0	1070.82
0.237	7.375	0.0	0.0	1.75	0.623	12.54	7.82	9.56	20	0	1070.87
0.226	7.148	0.0	0.0	1.62	0.623	12.56	7.82	9.44	21	0	1070.90
0.214	6.848	0.0	0.0	1.47	0.623	12.58	7.83	9.30	22	0	1070.94
0.202	6.626	0.0	0.0	1.34	0.623	12.62	7.86	9.20	23	0	1070.98
0.189	6.306	0.0	0.0	1.19	0.623	12.70	7.91	9.10	23	0	1071.01
0.258	7.806	0.0	0.0	2.01	0.592	12.28	7.27	9.28	7	0	1071.02
0.175	5.979	0.0	0.0	1.05	0.623	12.70	7.91	8.96	21	0	1071.04
0.247	7.599	0.0	0.0	1.88	0.592	12.29	7.28	9.15	12	0	1071.06
0.237	7.375	0.0	0.0	1.75	0.592	12.31	7.29	9.03	15	0	1071.11
0.226	7.148	0.0	0.0	1.62	0.592	12.32	7.29	8.91	16	0	1071.15
0.214	6.848	0.0	0.0	1.47	0.592	12.34	7.30	8.77	17	0	1071.18
0.202	6.626	0.0	0.0	1.34	0.592	12.39	7.34	8.67	17	0	1071.22
0.189	6.306	0.0	0.0	1.19	0.592	12.44	7.37	8.56	16	0	1071.25
0.175	5.979	0.0	0.0	1.05	0.592	12.46	7.38	8.43	14	0	1071.28
0.247	7.599	0.0	0.0	1.88	0.56	12.04	6.74	8.62	3	0	1071.30
0.237	7.375	0.0	0.0	1.75	0.56	12.06	6.75	8.50	6	0	1071.33
0.226	7.148	0.0	0.0	1.62	0.56	12.08	6.76	8.38	8	0	1071.39
0.214	6.848	0.0	0.0	1.47	0.56	12.09	6.77	8.24	9	0	1071.43
0.202	6.626	0.0	0.0	1.34	0.56	12.12	6.79	8.13	9	0	1071.46
0.189	6.306	0.0	0.0	1.19	0.56	12.18	6.82	8.01	8	0	1071.49
0.175	5.979	0.0	0.0	1.05	0.56	12.21	6.84	7.88	6	0	1071.52
0.258	7.422	0.0	0.0	1.91	0.71	13.12	9.31	11.23	12	10	1069.14
0.247	7.207	0.0	0.0	1.78	0.71	13.12	9.31	11.09	17	10	1069.18
0.237	7.024	0.0	0.0	1.66	0.71	13.12	9.32	10.98	19	10	1069.22

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}]
0.226	6.746	0.0	0.0	1.52	0.71	13.15	9.33	10.86	20	10	1069.26
0.214	6.434	0.0	0.0	1.38	0.71	13.20	9.37	10.75	20	10	1069.30
0.258	7.422	0.0	0.0	1.91	0.69	12.97	8.95	10.86	9	10	1069.31
0.202	6.156	0.0	0.0	1.24	0.71	13.21	9.38	10.62	21	10	1069.33
0.247	7.207	0.0	0.0	1.78	0.69	12.96	8.95	10.73	14	10	1069.36
0.189	5.867	0.0	0.0	1.11	0.71	13.27	9.42	10.53	20	10	1069.36
0.237	7.024	0.0	0.0	1.66	0.69	12.97	8.95	10.62	17	10	1069.39
0.226	6.746	0.0	0.0	1.52	0.69	13.00	8.97	10.50	18	10	1069.44
0.214	6.434	0.0	0.0	1.38	0.69	13.05	9.00	10.38	17	10	1069.48
0.258	7.422	0.0	0.0	1.91	0.67	12.82	8.59	10.50	7	10	1069.49
0.202	6.156	0.0	0.0	1.24	0.69	13.06	9.01	10.25	16	10	1069.51
0.247	7.207	0.0	0.0	1.78	0.67	12.82	8.59	10.37	11	10	1069.53
0.189	5.867	0.0	0.0	1.11	0.69	13.11	9.04	10.15	15	10	1069.54
0.237	7.024	0.0	0.0	1.66	0.67	12.83	8.59	10.26	14	10	1069.57
0.226	6.746	0.0	0.0	1.52	0.67	12.85	8.61	10.13	17	10	1069.60
0.214	6.434	0.0	0.0	1.38	0.67	12.90	8.64	10.02	18	10	1069.64
0.258	7.422	0.0	0.0	1.91	0.65	12.67	8.23	10.15	6	10	1069.65
0.202	6.156	0.0	0.0	1.24	0.67	12.91	8.65	9.89	17	10	1069.68
0.247	7.207	0.0	0.0	1.78	0.65	12.67	8.24	10.02	10	10	1069.70
0.189	5.867	0.0	0.0	1.11	0.67	12.94	8.67	9.78	15	10	1069.71
0.237	7.024	0.0	0.0	1.66	0.65	12.68	8.24	9.91	12	10	1069.74
0.226	6.746	0.0	0.0	1.52	0.65	12.70	8.25	9.78	14	10	1069.77
0.214	6.434	0.0	0.0	1.38	0.65	12.75	8.29	9.66	15	10	1069.81
0.258	7.422	0.0	0.0	1.91	0.63	12.52	7.89	9.80	2	10	1069.82
0.202	6.156	0.0	0.0	1.24	0.65	12.75	8.29	9.53	15	10	1069.84
0.247	7.207	0.0	0.0	1.78	0.63	12.52	7.89	9.67	6	10	1069.86
0.189	5.867	0.0	0.0	1.11	0.65	12.78	8.31	9.42	13	10	1069.87
0.237	7.024	0.0	0.0	1.66	0.63	12.54	7.90	9.56	8	10	1069.90
0.226	6.746	0.0	0.0	1.52	0.63	12.56	7.91	9.44	9	10	1069.94
0.214	6.434	0.0	0.0	1.38	0.63	12.61	7.94	9.32	9	10	1069.97
0.202	6.156	0.0	0.0	1.24	0.63	12.61	7.95	9.19	9	10	1070.01
0.189	5.867	0.0	0.0	1.11	0.63	12.64	7.96	9.07	8	10	1070.04

Table 5:

Details of cluster #3-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	0.282	7.542	2.13	0.718	13.14	9.44	11.56	26	0	1078.85
0.0	0.0	0.266	7.2	1.92	0.718	13.15	9.44	11.36	40	0	1078.92
0.0	0.0	0.249	6.939	1.73	0.718	13.16	9.45	11.18	51	0	1078.99
0.0	0.0	0.23	6.513	1.50	0.718	13.20	9.48	10.98	54	0	1079.05
0.0	0.0	0.21	6.161	1.29	0.718	13.24	9.51	10.80	58	0	1079.10
0.0	0.0	0.282	7.542	2.13	0.687	12.92	8.88	11.00	21	0	1079.11
0.0	0.0	0.188	5.786	1.09	0.718	13.28	9.54	10.62	63	0	1079.14
0.0	0.0	0.266	7.2	1.92	0.687	12.92	8.88	10.79	32	0	1079.18
0.0	0.0	0.163	5.181	0.84	0.718	13.33	9.57	10.41	62	0	1079.19
0.0	0.0	0.249	6.939	1.73	0.687	12.95	8.90	10.63	38	0	1079.25
0.0	0.0	0.23	6.513	1.50	0.687	12.98	8.92	10.42	42	0	1079.32
0.0	0.0	0.21	6.161	1.29	0.687	13.02	8.94	10.24	48	0	1079.36
0.0	0.0	0.282	7.542	2.13	0.655	12.69	8.31	10.44	15	0	1079.37
0.0	0.0	0.188	5.786	1.09	0.687	13.06	8.97	10.06	51	0	1079.41
0.0	0.0	0.163	5.181	0.84	0.687	13.11	9.00	9.85	48	0	1079.45
0.0	0.0	0.266	7.2	1.92	0.655	12.69	8.31	10.23	25	0	1079.45
0.0	0.0	0.249	6.939	1.73	0.655	12.71	8.32	10.05	31	0	1079.52
0.0	0.0	0.23	6.513	1.50	0.655	12.74	8.35	9.85	37	0	1079.58
0.0	0.0	0.282	7.542	2.13	0.623	12.44	7.75	9.88	11	0	1079.63
0.0	0.0	0.21	6.161	1.29	0.655	12.78	8.37	9.67	43	0	1079.63
0.0	0.0	0.188	5.786	1.09	0.655	12.82	8.40	9.48	43	0	1079.67
0.0	0.0	0.266	7.2	1.92	0.623	12.45	7.75	9.67	20	0	1079.71
0.0	0.0	0.163	5.181	0.84	0.655	12.87	8.43	9.27	38	0	1079.72
0.0	0.0	0.249	6.939	1.73	0.623	12.47	7.77	9.50	26	0	1079.78
0.0	0.0	0.23	6.513	1.50	0.623	12.50	7.79	9.29	34	0	1079.84
0.0	0.0	0.282	7.542	2.13	0.592	12.21	7.23	9.35	6	0	1079.87
0.0	0.0	0.21	6.161	1.29	0.623	12.54	7.81	9.11	39	0	1079.88
0.0	0.0	0.188	5.786	1.09	0.623	12.58	7.84	8.93	38	0	1079.93
0.0	0.0	0.266	7.2	1.92	0.592	12.21	7.23	9.15	14	0	1079.95
0.0	0.0	0.163	5.181	0.84	0.623	12.62	7.86	8.71	34	0	1079.97
0.0	0.0	0.249	6.939	1.73	0.592	12.24	7.24	8.97	20	0	1080.01
0.0	0.0	0.23	6.513	1.50	0.592	12.27	7.26	8.76	26	0	1080.07
0.0	0.0	0.21	6.161	1.29	0.592	12.32	7.29	8.58	29	0	1080.12
0.0	0.0	0.188	5.786	1.09	0.592	12.35	7.31	8.40	28	0	1080.16
0.0	0.0	0.266	7.2	1.92	0.56	11.98	6.71	8.63	5	0	1080.19
0.0	0.0	0.163	5.181	0.84	0.592	12.40	7.34	8.18	23	0	1080.21
0.0	0.0	0.249	6.939	1.73	0.56	12.02	6.73	8.46	10	0	1080.25
0.0	0.0	0.23	6.513	1.50	0.56	12.04	6.74	8.24	14	0	1080.31
0.0	0.0	0.21	6.161	1.29	0.56	12.09	6.77	8.07	16	0	1080.36
0.0	0.0	0.188	5.786	1.09	0.56	12.13	6.79	7.88	14	0	1080.40
0.0	0.0	0.163	5.181	0.84	0.56	12.17	6.81	7.66	9	0	1080.44
0.0	0.0	0.297	7.475	2.22	0.71	13.12	9.31	11.53	5	10	1077.92
0.0	0.0	0.282	7.141	2.01	0.71	13.13	9.32	11.33	15	10	1078.00
0.0	0.0	0.266	6.849	1.82	0.71	13.10	9.30	11.12	23	10	1078.08
0.0	0.0	0.297	7.475	2.22	0.69	12.98	8.96	11.18	5	10	1078.10
0.0	0.0	0.249	6.496	1.62	0.71	13.15	9.33	10.95	29	10	1078.15

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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	0.282	7.141	2.01	0.69	12.99	8.96	10.98	13	10	1078.17
0.0	0.0	0.23	6.09	1.40	0.71	13.17	9.35	10.75	36	10	1078.20
0.0	0.0	0.266	6.849	1.82	0.69	12.96	8.94	10.76	22	10	1078.25
0.0	0.0	0.21	5.67	1.19	0.71	13.20	9.37	10.56	41	10	1078.25
0.0	0.0	0.297	7.475	2.22	0.67	12.85	8.61	10.83	3	10	1078.26
0.0	0.0	0.188	5.17	0.97	0.71	13.26	9.42	10.39	40	10	1078.30
0.0	0.0	0.249	6.496	1.62	0.69	12.98	8.96	10.57	28	10	1078.32
0.0	0.0	0.163	4.558	0.74	0.71	13.33	9.46	10.20	36	10	1078.35
0.0	0.0	0.282	7.141	2.01	0.67	12.83	8.60	10.61	9	10	1078.35
0.0	0.0	0.23	6.09	1.40	0.69	13.03	8.99	10.39	31	10	1078.38
0.0	0.0	0.266	6.849	1.82	0.67	12.82	8.59	10.41	17	10	1078.42
0.0	0.0	0.21	5.67	1.19	0.69	13.06	9.01	10.20	36	10	1078.43
0.0	0.0	0.188	5.17	0.97	0.69	13.14	9.06	10.04	39	10	1078.47
0.0	0.0	0.249	6.496	1.62	0.67	12.87	8.62	10.24	26	10	1078.48
0.0	0.0	0.282	7.141	2.01	0.65	12.68	8.24	10.26	6	10	1078.50
0.0	0.0	0.163	4.558	0.74	0.69	13.18	9.09	9.84	38	10	1078.52
0.0	0.0	0.23	6.09	1.40	0.67	12.89	8.63	10.04	30	10	1078.54
0.0	0.0	0.266	6.849	1.82	0.65	12.68	8.24	10.06	13	10	1078.58
0.0	0.0	0.21	5.67	1.19	0.67	12.92	8.66	9.85	31	10	1078.59
0.0	0.0	0.188	5.17	0.97	0.67	12.98	8.70	9.67	32	10	1078.64
0.0	0.0	0.249	6.496	1.62	0.65	12.72	8.27	9.89	18	10	1078.65
0.0	0.0	0.282	7.141	2.01	0.63	12.53	7.90	9.91	1	10	1078.65
0.0	0.0	0.163	4.558	0.74	0.67	13.03	8.73	9.47	31	10	1078.68
0.0	0.0	0.23	6.09	1.40	0.65	12.74	8.28	9.68	24	10	1078.70
0.0	0.0	0.266	6.849	1.82	0.63	12.53	7.90	9.72	8	10	1078.74
0.0	0.0	0.21	5.67	1.19	0.65	12.76	8.29	9.48	26	10	1078.76
0.0	0.0	0.188	5.17	0.97	0.65	12.83	8.34	9.31	24	10	1078.80
0.0	0.0	0.249	6.496	1.62	0.63	12.57	7.92	9.54	13	10	1078.81
0.0	0.0	0.163	4.558	0.74	0.65	12.88	8.37	9.12	21	10	1078.85
0.0	0.0	0.23	6.09	1.40	0.63	12.59	7.93	9.33	16	10	1078.87
0.0	0.0	0.21	5.67	1.19	0.63	12.61	7.94	9.13	20	10	1078.92
0.0	0.0	0.188	5.17	0.97	0.63	12.68	7.99	8.96	20	10	1078.96
0.0	0.0	0.163	4.558	0.74	0.63	12.73	8.02	8.76	18	10	1079.01

Table 6:

Details of cluster #4-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	0.388	9.559	3.71	0.718	13.00	9.33	13.04	23	0	1083.20
0.0	0.0	0.376	9.28	3.49	0.718	13.00	9.33	12.82	23	0	1083.27
0.0	0.0	0.364	9.093	3.31	0.718	13.03	9.35	12.66	25	0	1083.34
0.0	0.0	0.352	8.93	3.14	0.718	13.02	9.35	12.49	26	0	1083.41
0.0	0.0	0.388	9.559	3.71	0.687	12.77	8.77	12.48	16	0	1083.47
0.0	0.0	0.339	8.627	2.92	0.718	13.04	9.36	12.29	24	0	1083.48
0.0	0.0	0.326	8.361	2.73	0.718	13.07	9.39	12.11	24	0	1083.54
0.0	0.0	0.376	9.28	3.49	0.687	12.76	8.77	12.26	18	0	1083.55
0.0	0.0	0.312	8.124	2.53	0.718	13.09	9.40	11.94	24	0	1083.59
0.0	0.0	0.364	9.093	3.31	0.687	12.79	8.79	12.10	22	0	1083.62
0.0	0.0	0.297	7.829	2.33	0.718	13.14	9.44	11.76	20	0	1083.64
0.0	0.0	0.352	8.93	3.14	0.687	12.79	8.78	11.93	22	0	1083.69
0.0	0.0	0.388	9.559	3.71	0.655	12.55	8.22	11.93	13	0	1083.75
0.0	0.0	0.339	8.627	2.92	0.687	12.81	8.80	11.73	23	0	1083.75
0.0	0.0	0.326	8.361	2.73	0.687	12.84	8.82	11.55	25	0	1083.81
0.0	0.0	0.376	9.28	3.49	0.655	12.52	8.20	11.69	17	0	1083.82
0.0	0.0	0.312	8.124	2.53	0.687	12.87	8.84	11.38	23	0	1083.87
0.0	0.0	0.364	9.093	3.31	0.655	12.54	8.21	11.52	19	0	1083.90
0.0	0.0	0.297	7.829	2.33	0.687	12.91	8.87	11.19	17	0	1083.91
0.0	0.0	0.352	8.93	3.14	0.655	12.55	8.22	11.36	19	0	1083.96
0.0	0.0	0.388	9.559	3.71	0.623	12.28	7.65	11.36	10	0	1084.01
0.0	0.0	0.339	8.627	2.92	0.655	12.57	8.24	11.16	22	0	1084.03
0.0	0.0	0.326	8.361	2.73	0.655	12.61	8.26	10.98	23	0	1084.08
0.0	0.0	0.376	9.28	3.49	0.623	12.27	7.65	11.14	13	0	1084.09
0.0	0.0	0.312	8.124	2.53	0.655	12.63	8.27	10.81	20	0	1084.13
0.0	0.0	0.364	9.093	3.31	0.623	12.30	7.66	10.97	14	0	1084.16
0.0	0.0	0.297	7.829	2.33	0.655	12.68	8.30	10.63	12	0	1084.18
0.0	0.0	0.352	8.93	3.14	0.623	12.31	7.67	10.81	14	0	1084.23
0.0	0.0	0.388	9.559	3.71	0.592	12.04	7.13	10.84	3	0	1084.25
0.0	0.0	0.339	8.627	2.92	0.623	12.34	7.68	10.61	16	0	1084.28
0.0	0.0	0.376	9.28	3.49	0.592	12.04	7.13	10.62	5	0	1084.33
0.0	0.0	0.326	8.361	2.73	0.623	12.37	7.71	10.43	14	0	1084.34
0.0	0.0	0.312	8.124	2.53	0.623	12.40	7.72	10.26	10	0	1084.39
0.0	0.0	0.364	9.093	3.31	0.592	12.06	7.14	10.45	6	0	1084.40
0.0	0.0	0.352	8.93	3.14	0.592	12.08	7.15	10.29	6	0	1084.47
0.0	0.0	0.339	8.627	2.92	0.592	12.11	7.17	10.09	6	0	1084.52
0.0	0.0	0.326	8.361	2.73	0.592	12.13	7.18	9.91	4	0	1084.58
0.0	0.0	0.376	8.972	3.37	0.71	12.94	9.19	12.56	7	10	1082.42
0.0	0.0	0.364	8.794	3.20	0.71	12.96	9.20	12.40	10	10	1082.49
0.0	0.0	0.388	9.268	3.60	0.69	12.82	8.85	12.44	1	10	1082.51
0.0	0.0	0.352	8.535	3.00	0.71	12.95	9.19	12.20	10	10	1082.56
0.0	0.0	0.376	8.972	3.37	0.69	12.79	8.83	12.20	4	10	1082.59
0.0	0.0	0.339	8.247	2.80	0.71	12.99	9.22	12.02	10	10	1082.62
0.0	0.0	0.364	8.794	3.20	0.69	12.81	8.84	12.04	7	10	1082.67
0.0	0.0	0.326	8.025	2.62	0.71	12.96	9.20	11.81	10	10	1082.68
0.0	0.0	0.312	7.762	2.42	0.71	13.07	9.28	11.70	6	10	1082.73

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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	0.352	8.535	3.00	0.69	12.81	8.84	11.84	7	10	1082.73
0.0	0.0	0.376	8.972	3.37	0.67	12.65	8.48	11.85	2	10	1082.75
0.0	0.0	0.339	8.247	2.80	0.69	12.83	8.85	11.65	7	10	1082.80
0.0	0.0	0.364	8.794	3.20	0.67	12.68	8.49	11.70	4	10	1082.83
0.0	0.0	0.326	8.025	2.62	0.69	12.80	8.83	11.45	6	10	1082.85
0.0	0.0	0.312	7.762	2.42	0.69	12.91	8.91	11.33	3	10	1082.90
0.0	0.0	0.352	8.535	3.00	0.67	12.67	8.49	11.49	5	10	1082.90
0.0	0.0	0.339	8.247	2.80	0.67	12.69	8.50	11.30	5	10	1082.97
0.0	0.0	0.364	8.794	3.20	0.65	12.54	8.15	11.35	2	10	1083.01
0.0	0.0	0.326	8.025	2.62	0.67	12.66	8.48	11.10	4	10	1083.03
0.0	0.0	0.352	8.535	3.00	0.65	12.53	8.14	11.15	3	10	1083.08
0.0	0.0	0.312	7.762	2.42	0.67	12.77	8.56	10.98	1	10	1083.08
0.0	0.0	0.339	8.247	2.80	0.65	12.54	8.15	10.95	3	10	1083.14
0.0	0.0	0.326	8.025	2.62	0.65	12.53	8.14	10.76	2	10	1083.20
0.0	0.0	0.352	8.535	3.00	0.63	12.37	7.79	10.80	1	10	1083.25
0.0	0.0	0.339	8.247	2.80	0.63	12.39	7.81	10.60	1	10	1083.33

Table 7:

Details of cluster #5-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]
0.16	5.608	0.0	0.0	0.90	0.718	13.44	9.65	10.55	30	0	1082.74
0.143	5.114	0.0	0.0	0.73	0.718	13.57	9.75	10.48	30	0	1082.77
0.124	4.606	0.0	0.0	0.57	0.718	13.60	9.76	10.33	30	0	1082.80
0.101	4.02	0.0	0.0	0.41	0.718	13.60	9.76	10.17	30	0	1082.83
0.16	5.608	0.0	0.0	0.90	0.687	13.24	9.10	9.99	26	0	1083.01
0.143	5.114	0.0	0.0	0.73	0.687	13.35	9.17	9.90	26	0	1083.04
0.124	4.606	0.0	0.0	0.57	0.687	13.37	9.18	9.75	28	0	1083.07
0.16	5.608	0.0	0.0	0.90	0.655	13.00	8.52	9.41	20	0	1083.27
0.143	5.114	0.0	0.0	0.73	0.655	13.12	8.59	9.32	21	0	1083.29
0.124	4.606	0.0	0.0	0.57	0.655	13.13	8.60	9.17	23	0	1083.32
0.16	5.608	0.0	0.0	0.90	0.623	12.75	7.94	8.84	12	0	1083.52
0.143	5.114	0.0	0.0	0.73	0.623	12.87	8.02	8.75	14	0	1083.55
0.124	4.606	0.0	0.0	0.57	0.623	12.89	8.03	8.60	14	0	1083.58
0.16	5.608	0.0	0.0	0.90	0.592	12.50	7.40	8.30	8	0	1083.76
0.143	5.114	0.0	0.0	0.73	0.592	12.62	7.47	8.20	9	0	1083.79
0.124	4.606	0.0	0.0	0.57	0.592	12.64	7.48	8.05	9	0	1083.82
0.16	5.608	0.0	0.0	0.90	0.56	12.27	6.87	7.77	3	0	1084.00
0.143	5.114	0.0	0.0	0.73	0.56	12.37	6.93	7.66	4	0	1084.03
0.124	4.606	0.0	0.0	0.57	0.56	12.40	6.94	7.51	4	0	1084.06
0.175	5.539	0.0	0.0	0.97	0.71	13.25	9.41	10.38	12	10	1081.83
0.16	5.149	0.0	0.0	0.82	0.71	13.24	9.40	10.23	12	10	1081.86
0.143	4.714	0.0	0.0	0.67	0.71	13.28	9.43	10.11	13	10	1081.89
0.124	4.167	0.0	0.0	0.52	0.71	13.27	9.42	9.94	13	10	1081.92
0.175	5.539	0.0	0.0	0.97	0.69	13.10	9.04	10.01	12	10	1082.01
0.16	5.149	0.0	0.0	0.82	0.69	13.12	9.05	9.87	12	10	1082.04
0.143	4.714	0.0	0.0	0.67	0.69	13.13	9.06	9.73	11	10	1082.07
0.124	4.167	0.0	0.0	0.52	0.69	13.12	9.06	9.57	11	10	1082.10
0.101	3.503	0.0	0.0	0.35	0.69	13.18	9.10	9.45	10	10	1082.13
0.175	5.539	0.0	0.0	0.97	0.67	12.94	8.67	9.64	11	10	1082.18
0.16	5.149	0.0	0.0	0.82	0.67	12.97	8.69	9.51	12	10	1082.21
0.143	4.714	0.0	0.0	0.67	0.67	12.99	8.70	9.37	12	10	1082.24
0.124	4.167	0.0	0.0	0.52	0.67	12.98	8.70	9.22	11	10	1082.27
0.101	3.503	0.0	0.0	0.35	0.67	13.03	8.73	9.08	9	10	1082.30
0.175	5.539	0.0	0.0	0.97	0.65	12.79	8.32	9.28	8	10	1082.35
0.16	5.149	0.0	0.0	0.82	0.65	12.82	8.33	9.16	9	10	1082.38
0.143	4.714	0.0	0.0	0.67	0.65	12.83	8.34	9.02	9	10	1082.40
0.124	4.167	0.0	0.0	0.52	0.65	12.84	8.34	8.86	9	10	1082.44
0.101	3.503	0.0	0.0	0.35	0.65	12.89	8.38	8.73	8	10	1082.47
0.175	5.539	0.0	0.0	0.97	0.63	12.64	7.97	8.94	5	10	1082.51
0.16	5.149	0.0	0.0	0.82	0.63	12.67	7.98	8.81	5	10	1082.55
0.143	4.714	0.0	0.0	0.67	0.63	12.69	7.99	8.67	6	10	1082.57
0.124	4.167	0.0	0.0	0.52	0.63	12.70	8.00	8.52	6	10	1082.60
0.101	3.503	0.0	0.0	0.35	0.63	12.74	8.03	8.38	5	10	1082.63

Table 8:

Details of cluster #6-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}]
0.267	8.02	0.0	0.0	2.14	0.718	13.22	9.49	11.64	22	0	1082.09
0.258	7.806	0.0	0.0	2.01	0.718	13.22	9.49	11.50	23	0	1082.12
0.267	8.02	0.0	0.0	2.14	0.687	12.99	8.92	11.06	21	0	1082.35
0.258	7.806	0.0	0.0	2.01	0.687	12.99	8.92	10.94	23	0	1082.38
0.267	8.02	0.0	0.0	2.14	0.655	12.75	8.35	10.49	14	0	1082.61
0.258	7.806	0.0	0.0	2.01	0.655	12.76	8.36	10.37	17	0	1082.65
0.267	8.02	0.0	0.0	2.14	0.623	12.51	7.79	9.94	7	0	1082.86
0.258	7.806	0.0	0.0	2.01	0.623	12.52	7.80	9.81	9	0	1082.90
0.267	8.02	0.0	0.0	2.14	0.592	12.27	7.27	9.41	2	0	1083.11
0.277	7.788	0.0	0.0	2.16	0.71	13.11	9.31	11.46	3	10	1081.17
0.267	7.602	0.0	0.0	2.03	0.71	13.11	9.31	11.34	6	10	1081.21
0.277	7.788	0.0	0.0	2.16	0.69	12.96	8.94	11.10	3	10	1081.35
0.267	7.602	0.0	0.0	2.03	0.69	12.96	8.94	10.97	5	10	1081.39
0.277	7.788	0.0	0.0	2.16	0.67	12.80	8.58	10.74	2	10	1081.52
0.267	7.602	0.0	0.0	2.03	0.67	12.81	8.58	10.61	4	10	1081.56
0.277	7.788	0.0	0.0	2.16	0.65	12.65	8.23	10.38	0	10	1081.70
0.267	7.602	0.0	0.0	2.03	0.65	12.66	8.23	10.26	3	10	1081.73

Table 9:

Details of cluster #7-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}]
0.335	9.392	0.0	0.0	3.15	0.718	13.11	9.42	12.56	11	0	1081.46
0.327	9.184	0.0	0.0	3.00	0.718	13.12	9.42	12.42	14	0	1081.50
0.32	9.048	0.0	0.0	2.90	0.718	13.13	9.43	12.32	15	0	1081.53
0.311	8.89	0.0	0.0	2.76	0.718	13.14	9.43	12.20	15	0	1081.57
0.303	8.665	0.0	0.0	2.63	0.718	13.15	9.44	12.07	15	0	1081.60
0.295	8.48	0.0	0.0	2.50	0.718	13.16	9.45	11.95	14	0	1081.62
0.286	8.301	0.0	0.0	2.37	0.718	13.17	9.46	11.83	14	0	1081.65
0.277	8.234	0.0	0.0	2.28	0.718	13.22	9.49	11.77	14	0	1081.67
0.335	9.392	0.0	0.0	3.15	0.687	12.89	8.86	12.00	9	0	1081.73
0.327	9.184	0.0	0.0	3.00	0.687	12.89	8.86	11.86	13	0	1081.76
0.32	9.048	0.0	0.0	2.90	0.687	12.91	8.87	11.76	14	0	1081.80
0.311	8.89	0.0	0.0	2.76	0.687	12.91	8.87	11.64	14	0	1081.83
0.303	8.665	0.0	0.0	2.63	0.687	12.93	8.88	11.51	14	0	1081.86
0.295	8.48	0.0	0.0	2.50	0.687	12.93	8.89	11.39	14	0	1081.89
0.286	8.301	0.0	0.0	2.37	0.687	12.95	8.90	11.27	14	0	1081.91
0.277	8.234	0.0	0.0	2.28	0.687	12.99	8.92	11.20	15	0	1081.93
0.327	9.184	0.0	0.0	3.00	0.655	12.67	8.30	11.30	6	0	1082.03
0.32	9.048	0.0	0.0	2.90	0.655	12.67	8.30	11.19	8	0	1082.06
0.311	8.89	0.0	0.0	2.76	0.655	12.68	8.31	11.07	9	0	1082.09
0.303	8.665	0.0	0.0	2.63	0.655	12.70	8.32	10.94	9	0	1082.12
0.295	8.48	0.0	0.0	2.50	0.655	12.70	8.32	10.82	10	0	1082.14
0.286	8.301	0.0	0.0	2.37	0.655	12.72	8.33	10.70	11	0	1082.17
0.277	8.234	0.0	0.0	2.28	0.655	12.74	8.34	10.62	11	0	1082.19
0.32	9.048	0.0	0.0	2.90	0.623	12.44	7.75	10.64	1	0	1082.32
0.311	8.89	0.0	0.0	2.76	0.623	12.45	7.76	10.52	2	0	1082.34
0.303	8.665	0.0	0.0	2.63	0.623	12.46	7.76	10.39	3	0	1082.38
0.295	8.48	0.0	0.0	2.50	0.623	12.46	7.77	10.27	4	0	1082.39
0.286	8.301	0.0	0.0	2.37	0.623	12.48	7.78	10.15	4	0	1082.42
0.277	8.234	0.0	0.0	2.28	0.623	12.50	7.79	10.07	4	0	1082.45
0.311	8.479	0.0	0.0	2.64	0.69	12.91	8.91	11.54	0	10	1080.86
0.295	8.179	0.0	0.0	2.41	0.69	12.93	8.92	11.33	0	10	1080.91
0.303	8.304	0.0	0.0	2.52	0.69	12.92	8.92	11.43	0	10	1080.92

Table 10: