

Datasheet for #sbcw13587 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.

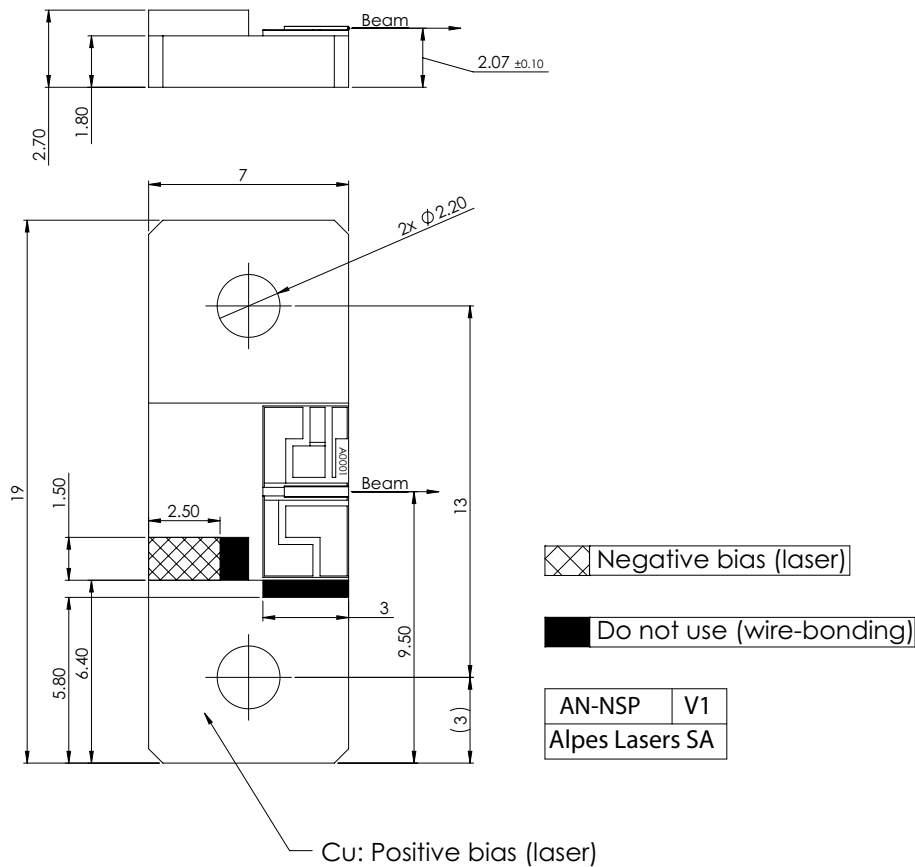


Figure 1: Mechanical and electrical interface for #sbcw13587 DN

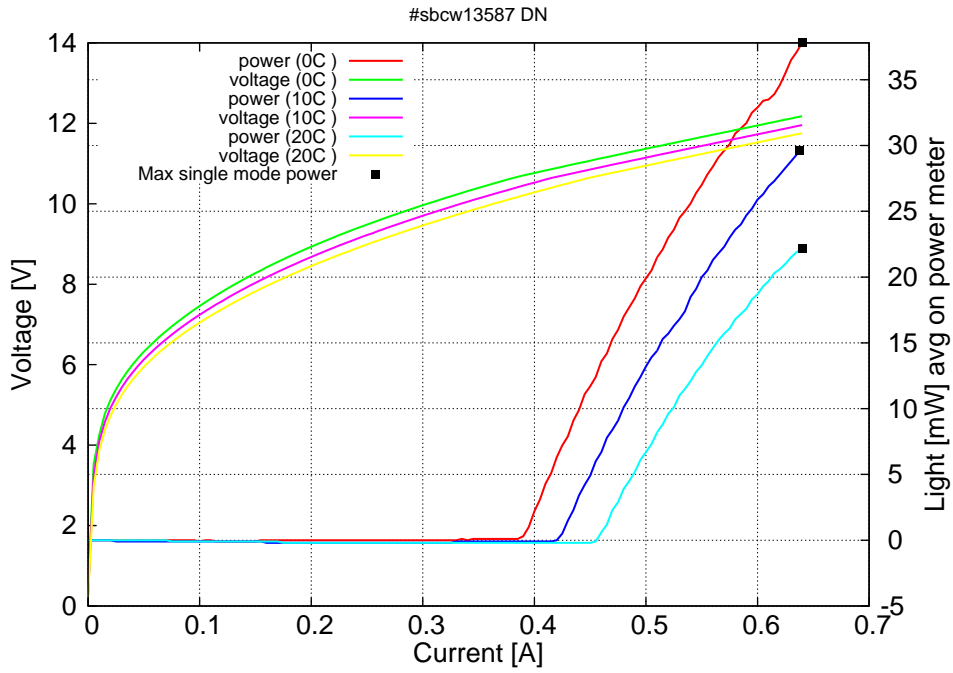


Figure 2: voltage and avg power vs current in continuous-wave operation (the solid squares indicate the maximum singlemode emitted power)

Note: at 0C: $I_{th}=0.39A$ / $V_{th}=10.7V$ (2-wires measurements). Maximum operation current: 0.64A for all temperatures.

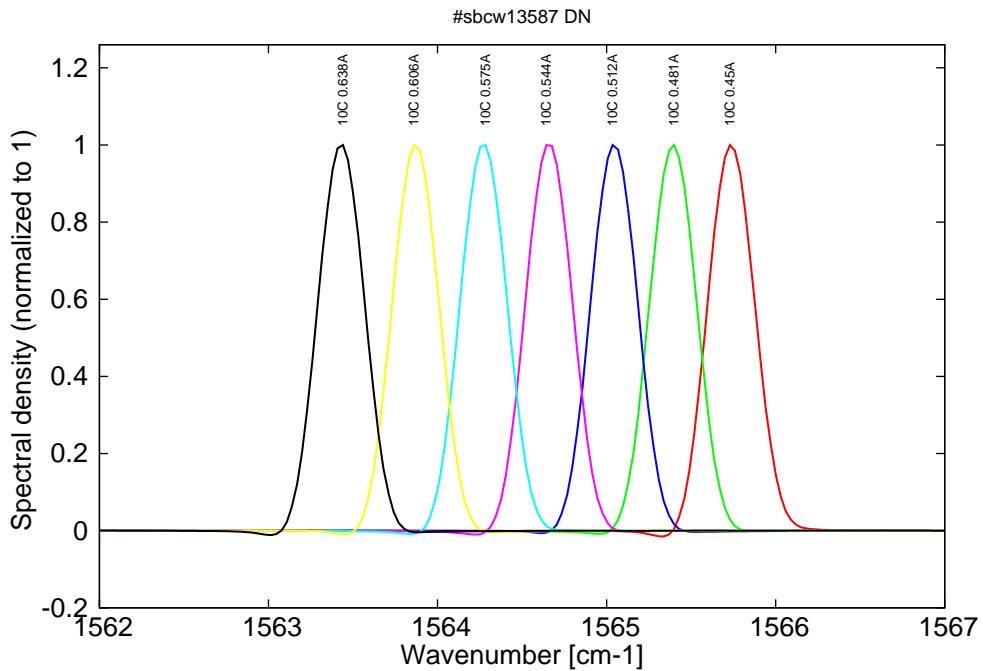


Figure 3: spectra at 10C in continuous-wave operation (front resistor current $I_F = 0A$ and back resistor current $I_B = 0A$)

Vernier characterization

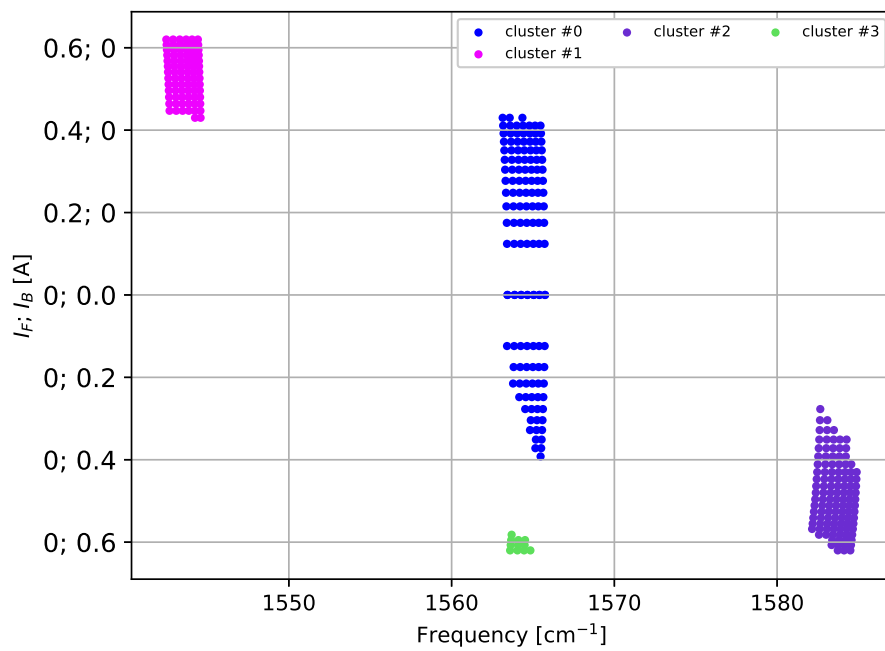


Figure 4: Emission frequency as a function of electrical current on the front resistor I_F or back resistor I_B . Either the back or the front resistors are heated, while no electrical current is flowing through the other resistor.

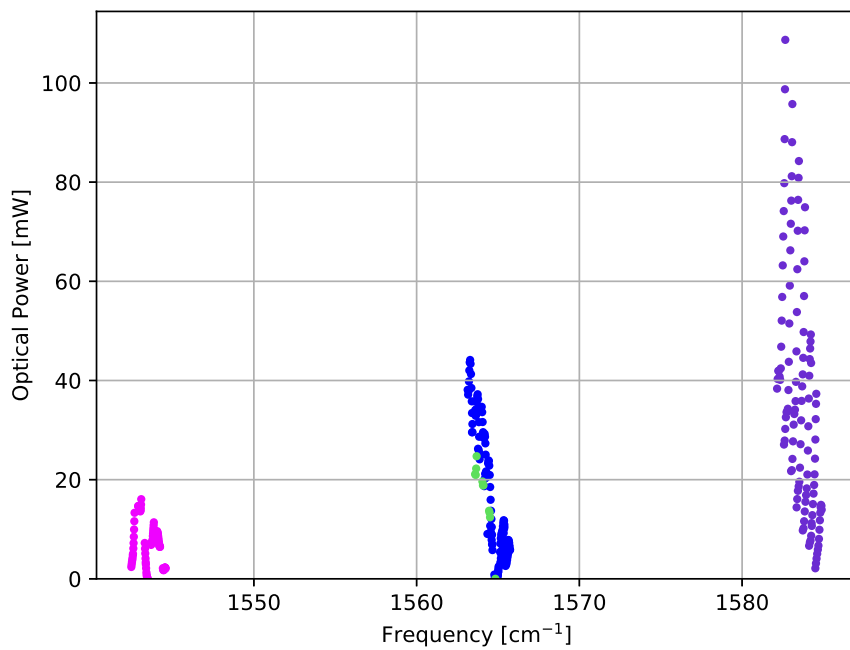


Figure 5: Optical power as a function of emission frequency.

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 - 0.39	0.0 - 1.3	0	0	0.45 - 0.64	10.7 - 12.1	1563.4 - 1565.7	10	31
#0-Front	0	0	0.00 - 0.43	0.0 - 1.4	0.45 - 0.64	10.6 - 12.1	1563.1 - 1565.7	10	44
#1-Front	0	0	0.43 - 0.62	1.4 - 2.1	0.45 - 0.61	10.4 - 11.5	1542.5 - 1544.6	10	16
#2-Back	0.28 - 0.62	0.9 - 2.1	0	0	0.45 - 0.64	10.5 - 11.8	1582.1 - 1584.9	10	109
#3-Back	0.58 - 0.62	2.0 - 2.1	0	0	0.54 - 0.64	11.0 - 11.6	1563.6 - 1564.8	10	25

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	0.124	0.333	0.04	0.638	11.93	7.61	7.66	30	10	1563.40
0.0	0.0	0.0	0.0	0.00	0.638	12.09	7.71	7.71	31	10	1563.43
0.0	0.0	0.0	0.0	0.00	0.638	12.01	7.66	7.66	30	10	1563.43
0.0	0.0	0.215	0.666	0.14	0.606	11.69	7.09	7.23	26	10	1563.78
0.0	0.0	0.175	0.52	0.09	0.606	11.72	7.10	7.19	26	10	1563.81
0.0	0.0	0.124	0.333	0.04	0.606	11.75	7.12	7.16	25	10	1563.84
0.0	0.0	0.0	0.0	0.00	0.606	11.90	7.21	7.21	25	10	1563.87
0.0	0.0	0.0	0.0	0.00	0.606	11.82	7.17	7.17	24	10	1563.87
0.0	0.0	0.248	0.785	0.19	0.575	11.49	6.61	6.80	19	10	1564.16
0.0	0.0	0.215	0.666	0.14	0.575	11.51	6.62	6.76	20	10	1564.18
0.0	0.0	0.175	0.52	0.09	0.575	11.54	6.63	6.72	21	10	1564.22
0.0	0.0	0.124	0.333	0.04	0.575	11.57	6.65	6.69	21	10	1564.24
0.0	0.0	0.0	0.0	0.00	0.575	11.70	6.73	6.73	22	10	1564.27
0.0	0.0	0.0	0.0	0.00	0.575	11.65	6.70	6.70	20	10	1564.27
0.0	0.0	0.277	0.889	0.25	0.544	11.29	6.14	6.39	11	10	1564.52
0.0	0.0	0.248	0.785	0.19	0.544	11.31	6.15	6.35	10	10	1564.55
0.0	0.0	0.215	0.666	0.14	0.544	11.33	6.16	6.31	9	10	1564.58
0.0	0.0	0.175	0.52	0.09	0.544	11.36	6.18	6.27	8	10	1564.61
0.0	0.0	0.124	0.333	0.04	0.544	11.38	6.19	6.23	7	10	1564.64
0.0	0.0	0.0	0.0	0.00	0.544	11.51	6.26	6.26	7	10	1564.66
0.0	0.0	0.0	0.0	0.00	0.544	11.46	6.24	6.24	6	10	1564.66
0.0	0.0	0.328	1.071	0.35	0.512	11.07	5.67	6.02	0	10	1564.82
0.0	0.0	0.304	0.985	0.30	0.512	11.09	5.68	5.97	0	10	1564.86
0.0	0.0	0.277	0.889	0.25	0.512	11.10	5.68	5.93	0	10	1564.91
0.0	0.0	0.248	0.785	0.19	0.512	11.12	5.69	5.89	0	10	1564.93
0.0	0.0	0.215	0.666	0.14	0.512	11.14	5.70	5.85	0	10	1564.97
0.0	0.0	0.175	0.52	0.09	0.512	11.17	5.72	5.81	1	10	1564.99
0.0	0.0	0.124	0.333	0.04	0.512	11.20	5.73	5.77	1	10	1565.02
0.0	0.0	0.0	0.0	0.00	0.512	11.32	5.79	5.79	3	10	1565.04
0.0	0.0	0.0	0.0	0.00	0.512	11.27	5.77	5.77	2	10	1565.05
0.0	0.0	0.372	1.227	0.46	0.481	10.86	5.22	5.68	3	10	1565.15
0.0	0.0	0.351	1.153	0.40	0.481	10.87	5.23	5.63	4	10	1565.18
0.0	0.0	0.328	1.071	0.35	0.481	10.88	5.24	5.59	5	10	1565.21
0.0	0.0	0.304	0.985	0.30	0.481	10.90	5.24	5.54	5	10	1565.24
0.0	0.0	0.277	0.889	0.25	0.481	10.92	5.25	5.50	6	10	1565.27
0.0	0.0	0.248	0.785	0.19	0.481	10.93	5.26	5.45	7	10	1565.30
0.0	0.0	0.215	0.666	0.14	0.481	10.96	5.27	5.41	8	10	1565.32
0.0	0.0	0.175	0.52	0.09	0.481	10.98	5.28	5.37	9	10	1565.35
0.0	0.0	0.124	0.333	0.04	0.481	11.01	5.30	5.34	10	10	1565.37
0.0	0.0	0.0	0.0	0.00	0.481	11.09	5.34	5.34	11	10	1565.39
0.0	0.0	0.0	0.0	0.00	0.481	11.08	5.33	5.33	10	10	1565.40
0.0	0.0	0.392	1.298	0.51	0.45	10.65	4.79	5.30	3	10	1565.47
0.0	0.0	0.372	1.227	0.46	0.45	10.66	4.80	5.26	3	10	1565.50
0.0	0.0	0.351	1.153	0.40	0.45	10.68	4.81	5.21	3	10	1565.53
0.0	0.0	0.328	1.071	0.35	0.45	10.69	4.81	5.16	4	10	1565.56
0.0	0.0	0.304	0.985	0.30	0.45	10.71	4.82	5.12	4	10	1565.58

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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	0.277	0.889	0.25	0.45	10.72	4.83	5.07	5	10	1565.61
0.0	0.0	0.248	0.785	0.19	0.45	10.74	4.84	5.03	5	10	1565.64
0.0	0.0	0.215	0.666	0.14	0.45	10.77	4.84	4.99	6	10	1565.67
0.0	0.0	0.175	0.52	0.09	0.45	10.79	4.86	4.95	6	10	1565.69
0.0	0.0	0.124	0.333	0.04	0.45	10.82	4.87	4.91	6	10	1565.72
0.0	0.0	0.0	0.0	0.00	0.45	10.90	4.90	4.90	6	10	1565.73
0.0	0.0	0.0	0.0	0.00	0.45	10.89	4.90	4.90	6	10	1565.74

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]
0.43	1.433	0.0	0.0	0.62	0.638	11.72	7.48	8.10	38	10	1563.14
0.411	1.366	0.0	0.0	0.56	0.638	11.73	7.49	8.05	37	10	1563.17
0.392	1.298	0.0	0.0	0.51	0.638	11.75	7.50	8.00	38	10	1563.19
0.372	1.228	0.0	0.0	0.46	0.638	11.76	7.51	7.96	40	10	1563.22
0.351	1.153	0.0	0.0	0.40	0.638	11.78	7.52	7.92	42	10	1563.24
0.328	1.072	0.0	0.0	0.35	0.638	11.79	7.53	7.88	44	10	1563.26
0.304	0.986	0.0	0.0	0.30	0.638	11.81	7.54	7.84	44	10	1563.29
0.277	0.89	0.0	0.0	0.25	0.638	11.83	7.55	7.79	43	10	1563.31
0.248	0.786	0.0	0.0	0.19	0.638	11.85	7.56	7.76	41	10	1563.34
0.215	0.666	0.0	0.0	0.14	0.638	11.88	7.58	7.72	38	10	1563.37
0.175	0.52	0.0	0.0	0.09	0.638	11.91	7.60	7.69	36	10	1563.39
0.124	0.331	0.0	0.0	0.04	0.638	11.95	7.62	7.66	33	10	1563.40
0.0	0.0	0.0	0.0	0.00	0.638	12.09	7.71	7.71	31	10	1563.43
0.0	0.0	0.0	0.0	0.00	0.638	12.01	7.66	7.66	30	10	1563.43
0.43	1.433	0.0	0.0	0.62	0.606	11.54	6.99	7.61	36	10	1563.57
0.411	1.366	0.0	0.0	0.56	0.606	11.55	7.00	7.56	34	10	1563.60
0.392	1.298	0.0	0.0	0.51	0.606	11.56	7.01	7.52	33	10	1563.63
0.372	1.228	0.0	0.0	0.46	0.606	11.58	7.02	7.47	33	10	1563.65
0.351	1.153	0.0	0.0	0.40	0.606	11.60	7.03	7.43	34	10	1563.68
0.328	1.072	0.0	0.0	0.35	0.606	11.61	7.04	7.39	36	10	1563.70
0.304	0.986	0.0	0.0	0.30	0.606	11.63	7.05	7.35	37	10	1563.72
0.277	0.89	0.0	0.0	0.25	0.606	11.64	7.06	7.30	37	10	1563.75
0.248	0.786	0.0	0.0	0.19	0.606	11.67	7.07	7.27	36	10	1563.77
0.215	0.666	0.0	0.0	0.14	0.606	11.69	7.08	7.23	34	10	1563.80
0.175	0.52	0.0	0.0	0.09	0.606	11.72	7.10	7.19	32	10	1563.83
0.124	0.331	0.0	0.0	0.04	0.606	11.76	7.12	7.17	29	10	1563.84
0.0	0.0	0.0	0.0	0.00	0.606	11.90	7.21	7.21	25	10	1563.87
0.0	0.0	0.0	0.0	0.00	0.606	11.82	7.17	7.17	24	10	1563.87
0.411	1.366	0.0	0.0	0.56	0.575	11.37	6.54	7.10	35	10	1564.00
0.392	1.298	0.0	0.0	0.51	0.575	11.39	6.55	7.06	34	10	1564.03
0.372	1.228	0.0	0.0	0.46	0.575	11.40	6.55	7.01	32	10	1564.06
0.351	1.153	0.0	0.0	0.40	0.575	11.42	6.56	6.97	30	10	1564.08
0.328	1.072	0.0	0.0	0.35	0.575	11.43	6.57	6.92	28	10	1564.11
0.304	0.986	0.0	0.0	0.30	0.575	11.45	6.58	6.88	28	10	1564.13
0.277	0.89	0.0	0.0	0.25	0.575	11.47	6.59	6.84	29	10	1564.16
0.248	0.786	0.0	0.0	0.19	0.575	11.49	6.61	6.80	29	10	1564.18
0.215	0.666	0.0	0.0	0.14	0.575	11.51	6.62	6.76	29	10	1564.20
0.175	0.52	0.0	0.0	0.09	0.575	11.54	6.64	6.73	27	10	1564.23
0.124	0.331	0.0	0.0	0.04	0.575	11.57	6.65	6.69	25	10	1564.24
0.0	0.0	0.0	0.0	0.00	0.575	11.70	6.73	6.73	22	10	1564.27
0.0	0.0	0.0	0.0	0.00	0.575	11.65	6.70	6.70	20	10	1564.27
0.43	1.433	0.0	0.0	0.62	0.544	11.19	6.09	6.70	9	10	1564.35
0.411	1.366	0.0	0.0	0.56	0.544	11.19	6.09	6.65	23	10	1564.39
0.392	1.298	0.0	0.0	0.51	0.544	11.21	6.10	6.61	24	10	1564.41
0.372	1.228	0.0	0.0	0.46	0.544	11.22	6.10	6.56	24	10	1564.44
0.351	1.153	0.0	0.0	0.40	0.544	11.24	6.11	6.52	23	10	1564.46

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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]
0.328	1.072	0.0	0.0	0.35	0.544	11.25	6.12	6.47	21	10	1564.49
0.304	0.986	0.0	0.0	0.30	0.544	11.27	6.13	6.43	19	10	1564.52
0.277	0.89	0.0	0.0	0.25	0.544	11.29	6.14	6.39	16	10	1564.55
0.248	0.786	0.0	0.0	0.19	0.544	11.31	6.15	6.35	14	10	1564.57
0.215	0.666	0.0	0.0	0.14	0.544	11.33	6.16	6.31	12	10	1564.60
0.175	0.52	0.0	0.0	0.09	0.544	11.36	6.18	6.27	10	10	1564.62
0.124	0.331	0.0	0.0	0.04	0.544	11.39	6.20	6.24	9	10	1564.63
0.0	0.0	0.0	0.0	0.00	0.544	11.51	6.26	6.26	7	10	1564.66
0.0	0.0	0.0	0.0	0.00	0.544	11.46	6.24	6.24	6	10	1564.66
0.411	1.366	0.0	0.0	0.56	0.512	11.01	5.64	6.20	1	10	1564.78
0.392	1.298	0.0	0.0	0.51	0.512	11.02	5.64	6.15	0	10	1564.81
0.372	1.228	0.0	0.0	0.46	0.512	11.04	5.65	6.11	0	10	1564.82
0.351	1.153	0.0	0.0	0.40	0.512	11.05	5.66	6.06	0	10	1564.85
0.328	1.072	0.0	0.0	0.35	0.512	11.06	5.67	6.02	0	10	1564.86
0.304	0.986	0.0	0.0	0.30	0.512	11.08	5.67	5.97	0	10	1564.90
0.277	0.89	0.0	0.0	0.25	0.512	11.10	5.68	5.93	0	10	1564.92
0.248	0.786	0.0	0.0	0.19	0.512	11.12	5.69	5.89	0	10	1564.94
0.215	0.666	0.0	0.0	0.14	0.512	11.14	5.71	5.85	1	10	1564.97
0.175	0.52	0.0	0.0	0.09	0.512	11.17	5.72	5.81	1	10	1565.00
0.124	0.331	0.0	0.0	0.04	0.512	11.21	5.74	5.78	2	10	1565.02
0.0	0.0	0.0	0.0	0.00	0.512	11.32	5.79	5.79	3	10	1565.04
0.0	0.0	0.0	0.0	0.00	0.512	11.27	5.77	5.77	2	10	1565.05
0.411	1.366	0.0	0.0	0.56	0.481	10.82	5.21	5.77	5	10	1565.13
0.392	1.298	0.0	0.0	0.51	0.481	10.84	5.21	5.72	7	10	1565.15
0.372	1.228	0.0	0.0	0.46	0.481	10.85	5.22	5.68	8	10	1565.17
0.351	1.153	0.0	0.0	0.40	0.481	10.87	5.23	5.63	9	10	1565.20
0.328	1.072	0.0	0.0	0.35	0.481	10.88	5.23	5.59	9	10	1565.23
0.304	0.986	0.0	0.0	0.30	0.481	10.90	5.24	5.54	10	10	1565.26
0.277	0.89	0.0	0.0	0.25	0.481	10.92	5.25	5.50	10	10	1565.28
0.248	0.786	0.0	0.0	0.19	0.481	10.94	5.26	5.46	11	10	1565.30
0.215	0.666	0.0	0.0	0.14	0.481	10.96	5.27	5.41	11	10	1565.33
0.175	0.52	0.0	0.0	0.09	0.481	10.99	5.29	5.38	12	10	1565.35
0.124	0.331	0.0	0.0	0.04	0.481	11.02	5.30	5.34	12	10	1565.37
0.0	0.0	0.0	0.0	0.00	0.481	11.09	5.34	5.34	11	10	1565.39
0.0	0.0	0.0	0.0	0.00	0.481	11.08	5.33	5.33	10	10	1565.40
0.411	1.366	0.0	0.0	0.56	0.45	10.64	4.79	5.35	5	10	1565.46
0.392	1.298	0.0	0.0	0.51	0.45	10.65	4.79	5.30	6	10	1565.49
0.372	1.228	0.0	0.0	0.46	0.45	10.66	4.80	5.26	6	10	1565.52
0.351	1.153	0.0	0.0	0.40	0.45	10.68	4.81	5.21	6	10	1565.54
0.328	1.072	0.0	0.0	0.35	0.45	10.70	4.81	5.16	7	10	1565.56
0.304	0.986	0.0	0.0	0.30	0.45	10.71	4.82	5.12	7	10	1565.59
0.277	0.89	0.0	0.0	0.25	0.45	10.73	4.83	5.08	8	10	1565.61
0.248	0.786	0.0	0.0	0.19	0.45	10.75	4.84	5.03	8	10	1565.64
0.215	0.666	0.0	0.0	0.14	0.45	10.77	4.85	4.99	8	10	1565.66
0.175	0.52	0.0	0.0	0.09	0.45	10.80	4.86	4.95	7	10	1565.69
0.124	0.331	0.0	0.0	0.04	0.45	10.84	4.88	4.92	7	10	1565.71
0.0	0.0	0.0	0.0	0.00	0.45	10.90	4.90	4.90	6	10	1565.73
0.0	0.0	0.0	0.0	0.00	0.45	10.89	4.90	4.90	6	10	1565.74

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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]

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]
0.62	2.122	0.0	0.0	1.32	0.606	11.37	6.89	8.20	2	10	1542.47
0.607	2.072	0.0	0.0	1.26	0.606	11.38	6.90	8.15	3	10	1542.49
0.595	2.027	0.0	0.0	1.21	0.606	11.39	6.90	8.11	3	10	1542.51
0.582	1.981	0.0	0.0	1.15	0.606	11.40	6.91	8.06	4	10	1542.53
0.568	1.925	0.0	0.0	1.09	0.606	11.42	6.92	8.01	4	10	1542.54
0.555	1.879	0.0	0.0	1.04	0.606	11.43	6.93	7.97	5	10	1542.56
0.541	1.828	0.0	0.0	0.99	0.606	11.44	6.93	7.92	5	10	1542.57
0.526	1.774	0.0	0.0	0.93	0.606	11.46	6.94	7.88	6	10	1542.59
0.511	1.721	0.0	0.0	0.88	0.606	11.47	6.95	7.83	7	10	1542.61
0.496	1.667	0.0	0.0	0.83	0.606	11.49	6.96	7.79	8	10	1542.62
0.48	1.61	0.0	0.0	0.77	0.606	11.51	6.97	7.75	10	10	1542.64
0.464	1.553	0.0	0.0	0.72	0.606	11.52	6.98	7.70	12	10	1542.65
0.447	1.494	0.0	0.0	0.67	0.606	11.54	6.99	7.66	13	10	1542.67
0.62	2.122	0.0	0.0	1.32	0.575	11.19	6.43	7.75	15	10	1542.89
0.607	2.072	0.0	0.0	1.26	0.575	11.20	6.44	7.70	15	10	1542.91
0.595	2.027	0.0	0.0	1.21	0.575	11.21	6.45	7.65	15	10	1542.92
0.582	1.981	0.0	0.0	1.15	0.575	11.22	6.45	7.61	15	10	1542.94
0.568	1.925	0.0	0.0	1.09	0.575	11.24	6.46	7.55	14	10	1542.96
0.555	1.879	0.0	0.0	1.04	0.575	11.25	6.47	7.51	14	10	1542.96
0.541	1.828	0.0	0.0	0.99	0.575	11.26	6.48	7.47	14	10	1542.98
0.526	1.774	0.0	0.0	0.93	0.575	11.28	6.48	7.42	14	10	1543.01
0.511	1.721	0.0	0.0	0.88	0.575	11.29	6.49	7.37	14	10	1543.02
0.496	1.667	0.0	0.0	0.83	0.575	11.31	6.50	7.33	14	10	1543.04
0.48	1.61	0.0	0.0	0.77	0.575	11.32	6.51	7.28	14	10	1543.05
0.464	1.553	0.0	0.0	0.72	0.575	11.34	6.52	7.24	15	10	1543.07
0.447	1.494	0.0	0.0	0.67	0.575	11.36	6.53	7.20	16	10	1543.08
0.62	2.122	0.0	0.0	1.32	0.544	11.01	5.99	7.30	7	10	1543.30
0.607	2.072	0.0	0.0	1.26	0.544	11.02	5.99	7.25	6	10	1543.31
0.595	2.027	0.0	0.0	1.21	0.544	11.03	6.00	7.21	5	10	1543.33
0.582	1.981	0.0	0.0	1.15	0.544	11.04	6.01	7.16	4	10	1543.34
0.568	1.925	0.0	0.0	1.09	0.544	11.06	6.01	7.11	3	10	1543.36
0.555	1.879	0.0	0.0	1.04	0.544	11.07	6.02	7.06	3	10	1543.36
0.541	1.828	0.0	0.0	0.99	0.544	11.08	6.03	7.02	2	10	1543.38
0.526	1.774	0.0	0.0	0.93	0.544	11.10	6.04	6.97	1	10	1543.40
0.511	1.721	0.0	0.0	0.88	0.544	11.11	6.04	6.92	1	10	1543.41
0.496	1.667	0.0	0.0	0.83	0.544	11.13	6.05	6.88	0	10	1543.43
0.48	1.61	0.0	0.0	0.77	0.544	11.14	6.06	6.83	0	10	1543.44
0.464	1.553	0.0	0.0	0.72	0.544	11.16	6.07	6.79	0	10	1543.46
0.447	1.494	0.0	0.0	0.67	0.544	11.18	6.08	6.75	0	10	1543.47
0.62	2.122	0.0	0.0	1.32	0.512	10.82	5.54	6.85	7	10	1543.69
0.607	2.072	0.0	0.0	1.26	0.512	10.83	5.55	6.80	7	10	1543.71
0.595	2.027	0.0	0.0	1.21	0.512	10.84	5.55	6.76	7	10	1543.72
0.582	1.981	0.0	0.0	1.15	0.512	10.86	5.56	6.71	7	10	1543.74
0.568	1.925	0.0	0.0	1.09	0.512	10.87	5.56	6.66	7	10	1543.76
0.555	1.879	0.0	0.0	1.04	0.512	10.88	5.57	6.61	8	10	1543.76
0.541	1.828	0.0	0.0	0.99	0.512	10.89	5.58	6.57	8	10	1543.78

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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]
0.526	1.774	0.0	0.0	0.93	0.512	10.91	5.58	6.52	9	10	1543.79
0.511	1.721	0.0	0.0	0.88	0.512	10.92	5.59	6.47	9	10	1543.81
0.496	1.667	0.0	0.0	0.83	0.512	10.94	5.60	6.43	10	10	1543.82
0.48	1.61	0.0	0.0	0.77	0.512	10.95	5.61	6.38	10	10	1543.83
0.464	1.553	0.0	0.0	0.72	0.512	10.97	5.62	6.34	11	10	1543.84
0.447	1.494	0.0	0.0	0.67	0.512	10.99	5.62	6.29	11	10	1543.85
0.62	2.122	0.0	0.0	1.32	0.481	10.64	5.12	6.43	10	10	1544.05
0.607	2.072	0.0	0.0	1.26	0.481	10.65	5.12	6.38	9	10	1544.07
0.595	2.027	0.0	0.0	1.21	0.481	10.66	5.13	6.33	9	10	1544.09
0.582	1.981	0.0	0.0	1.15	0.481	10.67	5.13	6.29	9	10	1544.10
0.568	1.925	0.0	0.0	1.09	0.481	10.68	5.14	6.23	9	10	1544.12
0.555	1.879	0.0	0.0	1.04	0.481	10.70	5.14	6.19	8	10	1544.13
0.541	1.828	0.0	0.0	0.99	0.481	10.71	5.15	6.14	8	10	1544.14
0.526	1.774	0.0	0.0	0.93	0.481	10.72	5.16	6.09	7	10	1544.16
0.511	1.721	0.0	0.0	0.88	0.481	10.74	5.17	6.04	7	10	1544.17
0.496	1.667	0.0	0.0	0.83	0.481	10.75	5.17	6.00	7	10	1544.19
0.48	1.61	0.0	0.0	0.77	0.481	10.77	5.18	5.95	7	10	1544.20
0.464	1.553	0.0	0.0	0.72	0.481	10.78	5.19	5.91	7	10	1544.21
0.447	1.494	0.0	0.0	0.67	0.481	10.80	5.19	5.86	6	10	1544.22
0.43	1.433	0.0	0.0	0.62	0.481	10.82	5.20	5.82	6	10	1544.23
0.62	2.122	0.0	0.0	1.32	0.45	10.45	4.70	6.02	2	10	1544.41
0.607	2.072	0.0	0.0	1.26	0.45	10.46	4.71	5.96	2	10	1544.43
0.595	2.027	0.0	0.0	1.21	0.45	10.47	4.71	5.92	2	10	1544.45
0.582	1.981	0.0	0.0	1.15	0.45	10.47	4.71	5.87	2	10	1544.46
0.568	1.925	0.0	0.0	1.09	0.45	10.50	4.72	5.82	2	10	1544.48
0.555	1.879	0.0	0.0	1.04	0.45	10.51	4.73	5.77	2	10	1544.48
0.541	1.828	0.0	0.0	0.99	0.45	10.52	4.73	5.72	2	10	1544.50
0.526	1.774	0.0	0.0	0.93	0.45	10.54	4.74	5.67	2	10	1544.51
0.511	1.721	0.0	0.0	0.88	0.45	10.55	4.75	5.63	2	10	1544.52
0.496	1.667	0.0	0.0	0.83	0.45	10.56	4.75	5.58	2	10	1544.53
0.48	1.61	0.0	0.0	0.77	0.45	10.58	4.76	5.53	2	10	1544.54
0.464	1.553	0.0	0.0	0.72	0.45	10.59	4.77	5.49	2	10	1544.55
0.447	1.494	0.0	0.0	0.67	0.45	10.61	4.77	5.44	2	10	1544.56
0.43	1.433	0.0	0.0	0.62	0.45	10.62	4.78	5.40	2	10	1544.58

Table 4:

Details of cluster #2-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	0.568	1.917	1.09	0.638	11.63	7.42	8.51	38	10	1582.15
0.0	0.0	0.555	1.87	1.04	0.638	11.63	7.42	8.46	40	10	1582.19
0.0	0.0	0.541	1.82	0.98	0.638	11.64	7.43	8.41	42	10	1582.22
0.0	0.0	0.526	1.769	0.93	0.638	11.64	7.43	8.36	42	10	1582.26
0.0	0.0	0.511	1.715	0.88	0.638	11.65	7.43	8.31	41	10	1582.30
0.0	0.0	0.496	1.662	0.82	0.638	11.66	7.44	8.26	40	10	1582.34
0.0	0.0	0.48	1.607	0.77	0.638	11.67	7.44	8.21	42	10	1582.38
0.0	0.0	0.464	1.551	0.72	0.638	11.67	7.45	8.17	47	10	1582.40
0.0	0.0	0.447	1.493	0.67	0.638	11.68	7.45	8.12	52	10	1582.43
0.0	0.0	0.43	1.433	0.62	0.638	11.69	7.46	8.08	57	10	1582.46
0.0	0.0	0.411	1.365	0.56	0.638	11.71	7.47	8.03	63	10	1582.50
0.0	0.0	0.392	1.298	0.51	0.638	11.72	7.48	7.98	69	10	1582.53
0.0	0.0	0.372	1.227	0.46	0.638	11.73	7.49	7.94	74	10	1582.56
0.0	0.0	0.582	1.965	1.14	0.606	11.44	6.93	8.07	27	10	1582.57
0.0	0.0	0.351	1.153	0.40	0.638	11.75	7.50	7.90	80	10	1582.59
0.0	0.0	0.328	1.071	0.35	0.638	11.77	7.51	7.86	89	10	1582.61
0.0	0.0	0.568	1.917	1.09	0.606	11.44	6.93	8.02	28	10	1582.62
0.0	0.0	0.304	0.985	0.30	0.638	11.79	7.52	7.82	99	10	1582.63
0.0	0.0	0.555	1.87	1.04	0.606	11.45	6.94	7.97	30	10	1582.65
0.0	0.0	0.277	0.889	0.25	0.638	11.81	7.54	7.78	109	10	1582.65
0.0	0.0	0.541	1.82	0.98	0.606	11.45	6.94	7.93	33	10	1582.69
0.0	0.0	0.526	1.769	0.93	0.606	11.46	6.94	7.87	34	10	1582.73
0.0	0.0	0.511	1.715	0.88	0.606	11.46	6.95	7.82	34	10	1582.77
0.0	0.0	0.496	1.662	0.82	0.606	11.47	6.95	7.78	34	10	1582.81
0.0	0.0	0.48	1.607	0.77	0.606	11.48	6.96	7.73	38	10	1582.85
0.0	0.0	0.464	1.551	0.72	0.606	11.49	6.96	7.68	44	10	1582.87
0.0	0.0	0.447	1.493	0.67	0.606	11.50	6.97	7.63	51	10	1582.90
0.0	0.0	0.43	1.433	0.62	0.606	11.51	6.97	7.59	59	10	1582.93
0.0	0.0	0.411	1.365	0.56	0.606	11.52	6.98	7.54	66	10	1582.96
0.0	0.0	0.392	1.298	0.51	0.606	11.54	6.99	7.50	72	10	1582.99
0.0	0.0	0.582	1.965	1.14	0.575	11.25	6.47	7.61	22	10	1583.01
0.0	0.0	0.372	1.227	0.46	0.606	11.55	7.00	7.46	76	10	1583.02
0.0	0.0	0.351	1.153	0.40	0.606	11.57	7.01	7.42	81	10	1583.05
0.0	0.0	0.568	1.917	1.09	0.575	11.26	6.47	7.56	22	10	1583.05
0.0	0.0	0.328	1.071	0.35	0.606	11.59	7.02	7.38	88	10	1583.07
0.0	0.0	0.304	0.985	0.30	0.606	11.62	7.04	7.34	96	10	1583.09
0.0	0.0	0.555	1.87	1.04	0.575	11.26	6.48	7.51	24	10	1583.09
0.0	0.0	0.541	1.82	0.98	0.575	11.27	6.48	7.46	28	10	1583.13
0.0	0.0	0.526	1.769	0.93	0.575	11.28	6.48	7.41	31	10	1583.17
0.0	0.0	0.511	1.715	0.88	0.575	11.28	6.49	7.36	33	10	1583.21
0.0	0.0	0.496	1.662	0.82	0.575	11.29	6.49	7.32	34	10	1583.25
0.0	0.0	0.48	1.607	0.77	0.575	11.30	6.50	7.27	36	10	1583.29
0.0	0.0	0.464	1.551	0.72	0.575	11.31	6.50	7.22	40	10	1583.31
0.0	0.0	0.447	1.493	0.67	0.575	11.32	6.51	7.18	46	10	1583.34
0.0	0.0	0.607	2.056	1.25	0.544	11.06	6.02	7.26	14	10	1583.35
0.0	0.0	0.43	1.433	0.62	0.575	11.33	6.52	7.13	54	10	1583.37

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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	0.595	2.012	1.20	0.544	11.06	6.02	7.21	16	10	1583.39
0.0	0.0	0.411	1.365	0.56	0.575	11.35	6.52	7.08	62	10	1583.39
0.0	0.0	0.392	1.298	0.51	0.575	11.36	6.53	7.04	70	10	1583.42
0.0	0.0	0.582	1.965	1.14	0.544	11.07	6.02	7.17	18	10	1583.43
0.0	0.0	0.372	1.227	0.46	0.575	11.38	6.54	7.00	76	10	1583.44
0.0	0.0	0.351	1.153	0.40	0.575	11.40	6.56	6.96	81	10	1583.47
0.0	0.0	0.568	1.917	1.09	0.544	11.07	6.02	7.11	19	10	1583.48
0.0	0.0	0.328	1.071	0.35	0.575	11.42	6.57	6.92	84	10	1583.49
0.0	0.0	0.555	1.87	1.04	0.544	11.08	6.03	7.07	20	10	1583.52
0.0	0.0	0.541	1.82	0.98	0.544	11.09	6.03	7.02	22	10	1583.55
0.0	0.0	0.526	1.769	0.93	0.544	11.09	6.04	6.97	27	10	1583.59
0.0	0.0	0.511	1.715	0.88	0.544	11.10	6.04	6.92	32	10	1583.63
0.0	0.0	0.496	1.662	0.82	0.544	11.11	6.04	6.87	36	10	1583.66
0.0	0.0	0.48	1.607	0.77	0.544	11.12	6.05	6.82	39	10	1583.69
0.0	0.0	0.464	1.551	0.72	0.544	11.13	6.05	6.77	41	10	1583.73
0.0	0.0	0.62	2.103	1.30	0.512	10.86	5.56	6.86	10	10	1583.73
0.0	0.0	0.447	1.493	0.67	0.544	11.14	6.06	6.73	45	10	1583.76
0.0	0.0	0.607	2.056	1.25	0.512	10.87	5.56	6.81	10	10	1583.77
0.0	0.0	0.43	1.433	0.62	0.544	11.16	6.07	6.69	50	10	1583.78
0.0	0.0	0.411	1.365	0.56	0.544	11.17	6.08	6.64	57	10	1583.81
0.0	0.0	0.595	2.012	1.20	0.512	10.87	5.57	6.76	12	10	1583.81
0.0	0.0	0.392	1.298	0.51	0.544	11.19	6.09	6.60	64	10	1583.83
0.0	0.0	0.372	1.227	0.46	0.544	11.21	6.10	6.55	70	10	1583.84
0.0	0.0	0.582	1.965	1.14	0.512	10.88	5.57	6.71	14	10	1583.85
0.0	0.0	0.351	1.153	0.40	0.544	11.23	6.11	6.51	75	10	1583.86
0.0	0.0	0.568	1.917	1.09	0.512	10.88	5.57	6.66	16	10	1583.89
0.0	0.0	0.555	1.87	1.04	0.512	10.89	5.58	6.61	17	10	1583.93
0.0	0.0	0.541	1.82	0.98	0.512	10.90	5.58	6.56	18	10	1583.97
0.0	0.0	0.526	1.769	0.93	0.512	10.90	5.58	6.51	21	10	1584.01
0.0	0.0	0.511	1.715	0.88	0.512	10.91	5.59	6.46	26	10	1584.04
0.0	0.0	0.496	1.662	0.82	0.512	10.92	5.59	6.42	31	10	1584.07
0.0	0.0	0.48	1.607	0.77	0.512	10.93	5.60	6.37	36	10	1584.10
0.0	0.0	0.62	2.103	1.30	0.481	10.67	5.13	6.43	7	10	1584.12
0.0	0.0	0.464	1.551	0.72	0.512	10.95	5.60	6.32	41	10	1584.13
0.0	0.0	0.447	1.493	0.67	0.512	10.96	5.61	6.28	44	10	1584.16
0.0	0.0	0.607	2.056	1.25	0.481	10.67	5.13	6.38	7	10	1584.16
0.0	0.0	0.43	1.433	0.62	0.512	10.97	5.62	6.24	46	10	1584.18
0.0	0.0	0.411	1.365	0.56	0.512	10.99	5.63	6.19	48	10	1584.20
0.0	0.0	0.595	2.012	1.20	0.481	10.68	5.14	6.33	8	10	1584.20
0.0	0.0	0.392	1.298	0.51	0.512	11.01	5.64	6.15	49	10	1584.22
0.0	0.0	0.372	1.227	0.46	0.512	11.03	5.65	6.10	44	10	1584.24
0.0	0.0	0.582	1.965	1.14	0.481	10.69	5.14	6.28	9	10	1584.24
0.0	0.0	0.351	1.153	0.40	0.512	11.05	5.66	6.06	11	10	1584.27
0.0	0.0	0.568	1.917	1.09	0.481	10.70	5.14	6.23	11	10	1584.28
0.0	0.0	0.555	1.87	1.04	0.481	10.70	5.15	6.19	13	10	1584.32
0.0	0.0	0.541	1.82	0.98	0.481	10.71	5.15	6.14	15	10	1584.35
0.0	0.0	0.526	1.769	0.93	0.481	10.72	5.16	6.09	17	10	1584.39
0.0	0.0	0.511	1.715	0.88	0.481	10.73	5.16	6.04	19	10	1584.43

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]
0.0	0.0	0.496	1.662	0.82	0.481	10.74	5.17	5.99	21	10	1584.45
0.0	0.0	0.48	1.607	0.77	0.481	10.75	5.17	5.94	24	10	1584.48
0.0	0.0	0.62	2.103	1.30	0.45	10.47	4.71	6.02	2	10	1584.50
0.0	0.0	0.464	1.551	0.72	0.481	10.77	5.18	5.90	28	10	1584.50
0.0	0.0	0.447	1.493	0.67	0.481	10.78	5.19	5.85	32	10	1584.52
0.0	0.0	0.607	2.056	1.25	0.45	10.48	4.72	5.96	3	10	1584.54
0.0	0.0	0.43	1.433	0.62	0.481	10.80	5.19	5.81	35	10	1584.54
0.0	0.0	0.411	1.365	0.56	0.481	10.82	5.20	5.76	37	10	1584.56
0.0	0.0	0.595	2.012	1.20	0.45	10.49	4.72	5.92	4	10	1584.57
0.0	0.0	0.582	1.965	1.14	0.45	10.49	4.72	5.87	5	10	1584.61
0.0	0.0	0.568	1.917	1.09	0.45	10.50	4.73	5.82	6	10	1584.65
0.0	0.0	0.555	1.87	1.04	0.45	10.51	4.73	5.77	7	10	1584.69
0.0	0.0	0.541	1.82	0.98	0.45	10.52	4.73	5.72	8	10	1584.72
0.0	0.0	0.526	1.769	0.93	0.45	10.53	4.74	5.67	10	10	1584.75
0.0	0.0	0.511	1.715	0.88	0.45	10.54	4.74	5.62	12	10	1584.78
0.0	0.0	0.496	1.662	0.82	0.45	10.55	4.75	5.57	13	10	1584.80
0.0	0.0	0.48	1.607	0.77	0.45	10.57	4.76	5.53	14	10	1584.83
0.0	0.0	0.464	1.551	0.72	0.45	10.58	4.76	5.48	15	10	1584.85
0.0	0.0	0.447	1.493	0.67	0.45	10.60	4.77	5.44	15	10	1584.87
0.0	0.0	0.43	1.433	0.62	0.45	10.62	4.78	5.39	14	10	1584.89

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	0.62	2.103	1.30	0.638	11.60	7.40	8.70	21	10	1563.59
0.0	0.0	0.607	2.056	1.25	0.638	11.61	7.40	8.65	21	10	1563.63
0.0	0.0	0.595	2.012	1.20	0.638	11.61	7.41	8.61	22	10	1563.66
0.0	0.0	0.582	1.965	1.14	0.638	11.62	7.42	8.56	25	10	1563.69
0.0	0.0	0.62	2.103	1.30	0.606	11.41	6.92	8.22	20	10	1564.04
0.0	0.0	0.607	2.056	1.25	0.606	11.42	6.92	8.17	19	10	1564.08
0.0	0.0	0.595	2.012	1.20	0.606	11.43	6.93	8.12	19	10	1564.11
0.0	0.0	0.62	2.103	1.30	0.575	11.23	6.46	7.76	14	10	1564.45
0.0	0.0	0.607	2.056	1.25	0.575	11.24	6.46	7.71	13	10	1564.48
0.0	0.0	0.595	2.012	1.20	0.575	11.25	6.47	7.67	12	10	1564.51
0.0	0.0	0.62	2.103	1.30	0.544	11.05	6.01	7.31	0	10	1564.84

Table 6: