Quantum Cascade Solutions
Avenue des Pâquiers 1
CH-2072 St-Blaise
T: +41 32 729 95 10
F: +41 32 729 95 19

Datasheet for #sbcw13584 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.

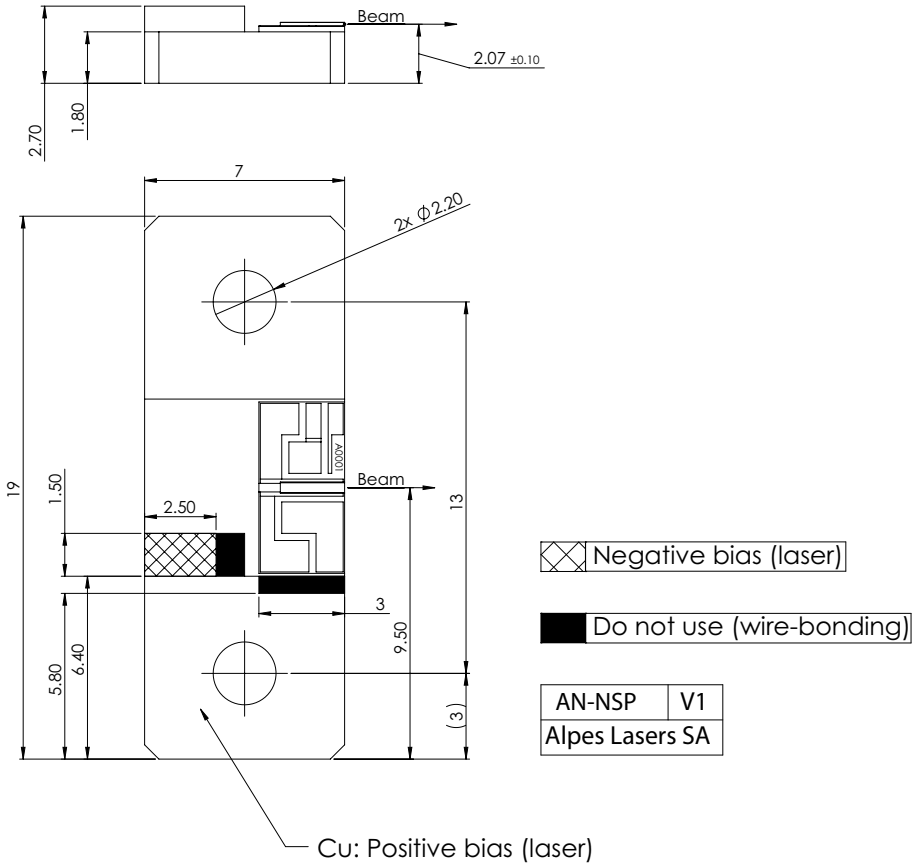

Figure 1: Mechanical and electrical interface for #sbcw13584 DN

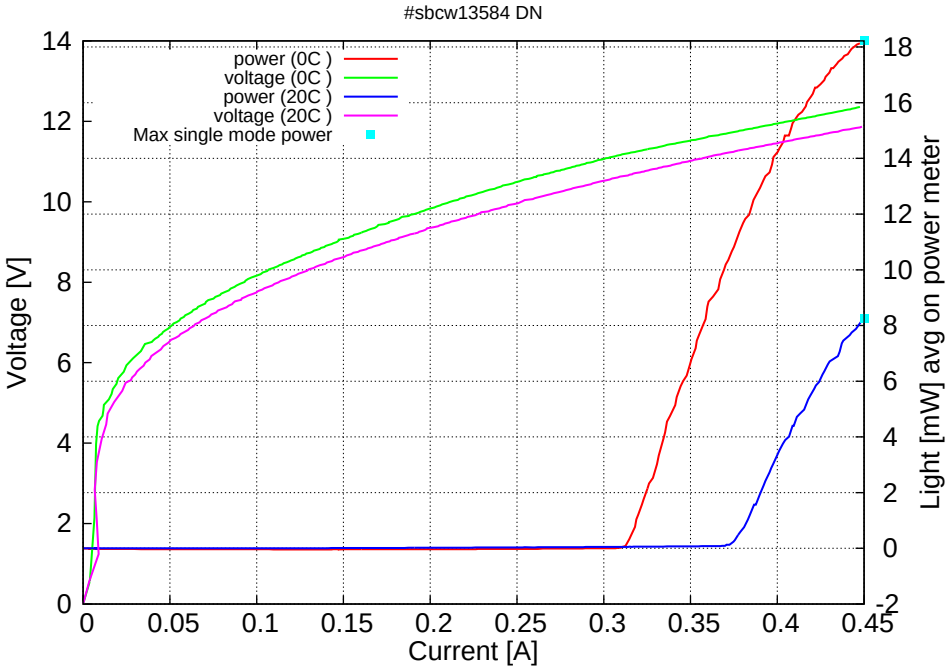

Figure 2: voltage and avg power vs current in continuous-wave operation (the solid squares indicate the maximum singlemode emitted power)

Note: at 0C: Ith=0.31A / Vth=11.2V (2-wires measurements). Maximum operation current: 0.45A for all temperatures.

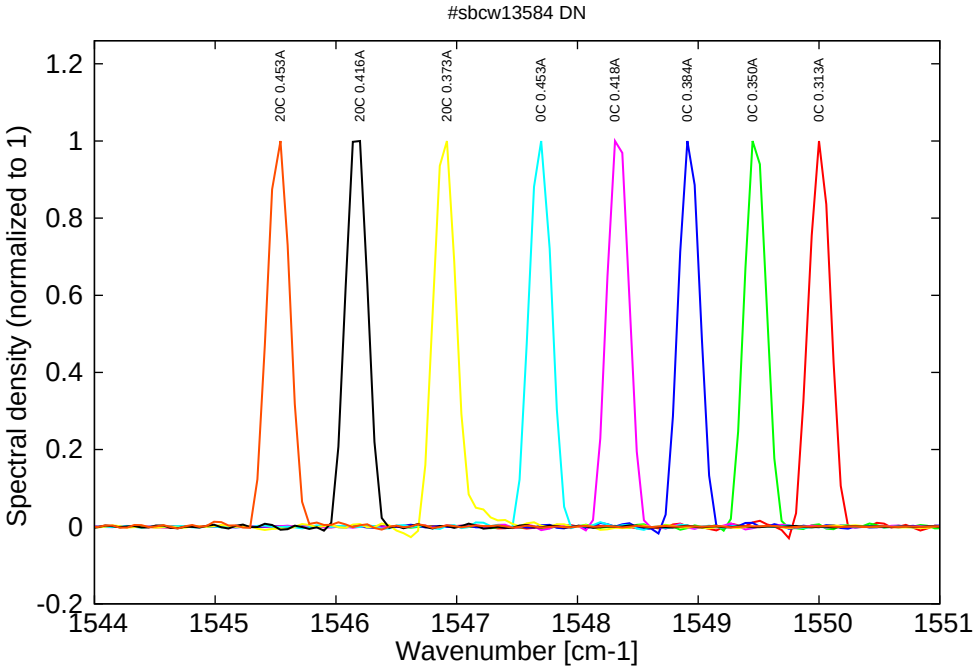

Figure 3: spectra at 0C and 20C in continuous-wave operation (front resistor current I_F = 0A and back resistor current I_B = 0A)

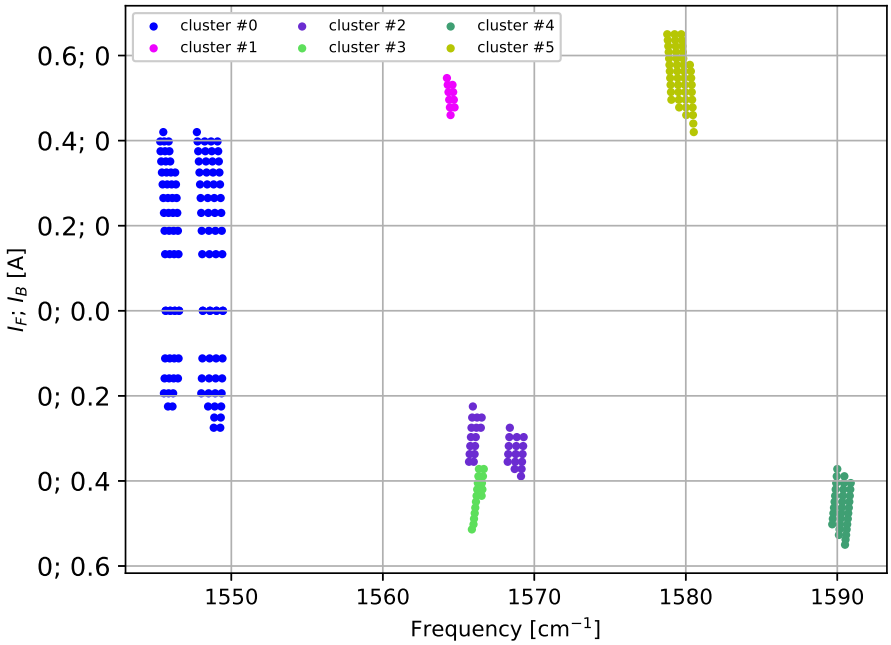

Figure 4: Emission frequency as a function of electrical current on the front resistor I_F or back resistor I_B. Either the back or the front resistors are heated, while no electrical current is flowing through the other resistor.

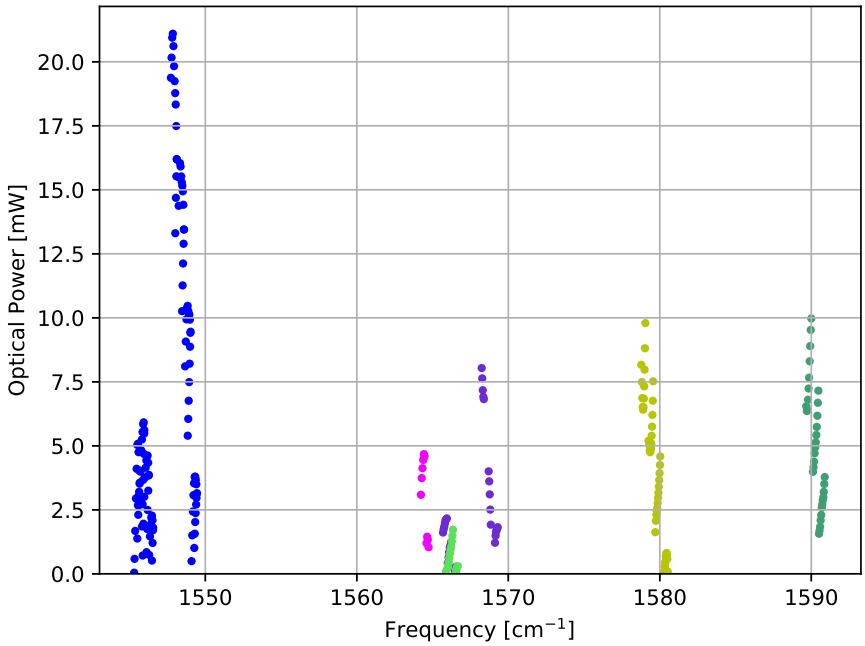

Figure 5: Optical power as a function of emission frequency.

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 - 0.28	0.0 - 1.2	0	0	0.34 - 0.45	11.4 - 12.4	1545.5 - 1549.4	0 - 20	16
#0-Front	0	0	0.00 - 0.42	0.0 - 1.8	0.34 - 0.45	11.3 - 12.4	1545.3 - 1549.4	0 - 20	21
#1-Front	0	0	0.46 - 0.55	2.0 - 2.4	0.43 - 0.45	11.5 - 11.7	1564.2 - 1564.7	20	5
#2-Back	0.23 - 0.39	1.0 - 1.7	0	0	0.37 - 0.45	11.6 - 12.2	1565.7 - 1569.3	0 - 20	8
#3-Back	0.37 - 0.51	1.6 - 2.3	0	0	0.43 - 0.45	11.6 - 11.8	1565.9 - 1566.7	20	2
#4-Back	0.37 - 0.55	1.6 - 2.4	0	0	0.37 - 0.42	11.4 - 12.1	1589.7 - 1590.9	0	10
#5-Front	0	0	0.42 - 0.65	1.7 - 2.7	0.34 - 0.42	11.1 - 11.9	1578.8 - 1580.5	0	10

Table 1: Overview of the clusters.

I_F [A]	V_F [V]	I_B [A]	V_B [V]	Pel_R [W]	I_L [A]	V_L [V]	P_L [W]	P_{tot} [W]	P_{opt} [mW]	T [C]	freq [cm^{-1}]
0.0	0.0	0.194	0.861	0.17	0.425	12.26	5.21	5.38	13	0	1548.02
0.0	0.0	0.159	0.684	0.11	0.425	12.29	5.22	5.33	15	0	1548.05
0.0	0.0	0.112	0.449	0.05	0.425	12.33	5.24	5.29	16	0	1548.09
0.0	0.0	0.0	0.0	0.00	0.425	12.41	5.28	5.28	16	0	1548.11
0.0	0.0	0.0	0.0	0.00	0.425	12.41	5.28	5.28	16	0	1548.12
0.0	0.0	0.225	1.025	0.23	0.397	11.98	4.76	4.99	10	0	1548.47
0.0	0.0	0.194	0.861	0.17	0.397	12.01	4.77	4.93	11	0	1548.50
0.0	0.0	0.159	0.684	0.11	0.397	12.03	4.78	4.88	12	0	1548.53
0.0	0.0	0.112	0.449	0.05	0.397	12.07	4.79	4.84	13	0	1548.56
0.0	0.0	0.0	0.0	0.00	0.397	12.15	4.82	4.82	13	0	1548.58
0.0	0.0	0.0	0.0	0.00	0.397	12.14	4.82	4.82	13	0	1548.60
0.0	0.0	0.275	1.249	0.34	0.37	11.70	4.33	4.67	5	0	1548.84
0.0	0.0	0.251	1.133	0.28	0.37	11.71	4.33	4.62	6	0	1548.87
0.0	0.0	0.225	1.025	0.23	0.37	11.73	4.34	4.57	7	0	1548.90
0.0	0.0	0.194	0.861	0.17	0.37	11.75	4.35	4.52	7	0	1548.93
0.0	0.0	0.159	0.684	0.11	0.37	11.78	4.36	4.47	8	0	1548.96
0.0	0.0	0.112	0.449	0.05	0.37	11.82	4.37	4.42	9	0	1548.99
0.0	0.0	0.0	0.0	0.00	0.37	11.91	4.41	4.41	9	0	1549.01
0.0	0.0	0.0	0.0	0.00	0.37	11.88	4.39	4.39	9	0	1549.02
0.0	0.0	0.275	1.249	0.34	0.342	11.43	3.91	4.25	1	0	1549.27
0.0	0.0	0.251	1.133	0.28	0.342	11.45	3.92	4.20	2	0	1549.30
0.0	0.0	0.225	1.025	0.23	0.342	11.47	3.92	4.15	2	0	1549.33
0.0	0.0	0.194	0.861	0.17	0.342	11.49	3.93	4.10	2	0	1549.36
0.0	0.0	0.159	0.684	0.11	0.342	11.52	3.94	4.05	3	0	1549.39
0.0	0.0	0.112	0.449	0.05	0.342	11.56	3.95	4.00	3	0	1549.42
0.0	0.0	0.0	0.0	0.00	0.342	11.65	3.98	3.98	3	0	1549.44
0.0	0.0	0.0	0.0	0.00	0.342	11.61	3.97	3.97	3	0	1549.45
0.0	0.0	0.194	0.882	0.17	0.446	11.97	5.34	5.51	3	20	1545.55
0.0	0.0	0.159	0.701	0.11	0.446	11.99	5.35	5.46	3	20	1545.59
0.0	0.0	0.112	0.463	0.05	0.446	12.02	5.36	5.41	3	20	1545.63
0.0	0.0	0.0	0.0	0.00	0.446	12.14	5.42	5.42	4	20	1545.66
0.0	0.0	0.0	0.0	0.00	0.446	12.08	5.39	5.39	4	20	1545.67
0.0	0.0	0.225	1.034	0.23	0.429	11.80	5.06	5.29	2	20	1545.82
0.0	0.0	0.194	0.882	0.17	0.429	11.82	5.07	5.24	3	20	1545.86
0.0	0.0	0.159	0.701	0.11	0.429	11.84	5.08	5.19	4	20	1545.90
0.0	0.0	0.112	0.463	0.05	0.429	11.87	5.09	5.14	5	20	1545.93
0.0	0.0	0.0	0.0	0.00	0.429	11.98	5.14	5.14	5	20	1545.96
0.0	0.0	0.0	0.0	0.00	0.429	11.93	5.12	5.12	6	20	1545.97
0.0	0.0	0.225	1.034	0.23	0.412	11.65	4.80	5.03	1	20	1546.12
0.0	0.0	0.194	0.882	0.17	0.412	11.67	4.81	4.98	2	20	1546.16
0.0	0.0	0.159	0.701	0.11	0.412	11.69	4.82	4.93	2	20	1546.19
0.0	0.0	0.112	0.463	0.05	0.412	11.72	4.83	4.88	3	20	1546.23
0.0	0.0	0.0	0.0	0.00	0.412	11.83	4.88	4.88	4	20	1546.26
0.0	0.0	0.0	0.0	0.00	0.412	11.77	4.85	4.85	4	20	1546.27
0.0	0.0	0.159	0.701	0.11	0.395	11.54	4.56	4.67	1	20	1546.48
0.0	0.0	0.112	0.463	0.05	0.395	11.57	4.57	4.62	1	20	1546.52

continued on next page

I_F [A]	V_F [V]	I_B [A]	V_B [V]	Pel_R [W]	I_L [A]	V_L [V]	P_L [W]	P_{tot} [W]	P_{opt} [mW]	T [C]	freq [cm^{-1}]
0.0	0.0	0.0	0.0	0.00	0.395	11.67	4.61	4.61	2	20	1546.54
0.0	0.0	0.0	0.0	0.00	0.395	11.62	4.59	4.59	2	20	1546.56

Table 2:

I_F [A]	V_F [V]	I_B [A]	V_B [V]	Pel_R [W]	I_L [A]	V_L [V]	P_L [W]	P_{tot} [W]	P_{opt} [mW]	T [C]	freq [cm^{-1}]
0.42	1.729	0.0	0.0	0.73	0.425	12.01	5.11	5.83	19	0	1547.73
0.398	1.638	0.0	0.0	0.65	0.425	12.03	5.11	5.77	20	0	1547.77
0.375	1.543	0.0	0.0	0.58	0.425	12.06	5.12	5.70	21	0	1547.81
0.351	1.443	0.0	0.0	0.51	0.425	12.08	5.13	5.64	21	0	1547.85
0.325	1.333	0.0	0.0	0.43	0.425	12.11	5.15	5.58	21	0	1547.90
0.297	1.214	0.0	0.0	0.36	0.425	12.14	5.16	5.52	20	0	1547.94
0.265	1.075	0.0	0.0	0.28	0.425	12.17	5.17	5.46	19	0	1547.97
0.23	0.921	0.0	0.0	0.21	0.425	12.21	5.19	5.40	19	0	1548.01
0.188	0.735	0.0	0.0	0.14	0.425	12.25	5.21	5.34	18	0	1548.05
0.133	0.486	0.0	0.0	0.06	0.425	12.31	5.23	5.30	17	0	1548.08
0.0	0.0	0.0	0.0	0.00	0.425	12.41	5.28	5.28	16	0	1548.11
0.0	0.0	0.0	0.0	0.00	0.425	12.41	5.28	5.28	16	0	1548.12
0.398	1.638	0.0	0.0	0.65	0.397	11.79	4.68	5.33	14	0	1548.24
0.375	1.543	0.0	0.0	0.58	0.397	11.81	4.69	5.27	15	0	1548.28
0.351	1.443	0.0	0.0	0.51	0.397	11.83	4.70	5.20	16	0	1548.32
0.325	1.333	0.0	0.0	0.43	0.397	11.86	4.71	5.14	16	0	1548.37
0.297	1.214	0.0	0.0	0.36	0.397	11.89	4.72	5.08	16	0	1548.41
0.265	1.075	0.0	0.0	0.28	0.397	11.92	4.73	5.02	15	0	1548.44
0.23	0.921	0.0	0.0	0.21	0.397	11.96	4.75	4.96	15	0	1548.48
0.188	0.735	0.0	0.0	0.14	0.397	12.00	4.76	4.90	15	0	1548.52
0.133	0.486	0.0	0.0	0.06	0.397	12.05	4.79	4.85	14	0	1548.55
0.0	0.0	0.0	0.0	0.00	0.397	12.15	4.82	4.82	13	0	1548.58
0.0	0.0	0.0	0.0	0.00	0.397	12.14	4.82	4.82	13	0	1548.60
0.398	1.638	0.0	0.0	0.65	0.37	11.55	4.27	4.93	8	0	1548.66
0.375	1.543	0.0	0.0	0.58	0.37	11.57	4.28	4.86	9	0	1548.71
0.351	1.443	0.0	0.0	0.51	0.37	11.59	4.29	4.80	10	0	1548.75
0.325	1.333	0.0	0.0	0.43	0.37	11.62	4.30	4.73	10	0	1548.79
0.297	1.214	0.0	0.0	0.36	0.37	11.65	4.31	4.67	10	0	1548.83
0.265	1.075	0.0	0.0	0.28	0.37	11.68	4.32	4.61	10	0	1548.87
0.23	0.921	0.0	0.0	0.21	0.37	11.71	4.33	4.54	10	0	1548.91
0.188	0.735	0.0	0.0	0.14	0.37	11.75	4.35	4.49	10	0	1548.95
0.133	0.486	0.0	0.0	0.06	0.37	11.81	4.37	4.43	10	0	1548.98
0.0	0.0	0.0	0.0	0.00	0.37	11.91	4.41	4.41	9	0	1549.01
0.0	0.0	0.0	0.0	0.00	0.37	11.88	4.39	4.39	9	0	1549.02
0.398	1.638	0.0	0.0	0.65	0.342	11.30	3.86	4.52	0	0	1549.09
0.375	1.543	0.0	0.0	0.58	0.342	11.32	3.87	4.45	2	0	1549.13
0.351	1.443	0.0	0.0	0.51	0.342	11.34	3.88	4.39	2	0	1549.18
0.325	1.333	0.0	0.0	0.43	0.342	11.37	3.89	4.32	3	0	1549.21
0.297	1.214	0.0	0.0	0.36	0.342	11.39	3.90	4.26	4	0	1549.25
0.265	1.075	0.0	0.0	0.28	0.342	11.42	3.91	4.19	4	0	1549.30
0.23	0.921	0.0	0.0	0.21	0.342	11.45	3.92	4.13	4	0	1549.33
0.188	0.735	0.0	0.0	0.14	0.342	11.49	3.93	4.07	4	0	1549.37
0.133	0.486	0.0	0.0	0.06	0.342	11.55	3.95	4.01	3	0	1549.40
0.0	0.0	0.0	0.0	0.00	0.342	11.65	3.98	3.98	3	0	1549.44
0.0	0.0	0.0	0.0	0.00	0.342	11.61	3.97	3.97	3	0	1549.45
0.398	1.723	0.0	0.0	0.69	0.446	11.78	5.25	5.94	0	20	1545.30

continued on next page

I_F [A]	V_F [V]	I_B [A]	V_B [V]	Pel_R [W]	I_L [A]	V_L [V]	P_L [W]	P_{tot} [W]	P_{opt} [mW]	T [C]	freq [cm^{-1}]
0.375	1.619	0.0	0.0	0.61	0.446	11.80	5.26	5.87	1	20	1545.33
0.351	1.515	0.0	0.0	0.53	0.446	11.82	5.27	5.81	2	20	1545.37
0.325	1.398	0.0	0.0	0.45	0.446	11.85	5.28	5.74	3	20	1545.42
0.297	1.267	0.0	0.0	0.38	0.446	11.88	5.30	5.67	4	20	1545.46
0.42	1.821	0.0	0.0	0.76	0.429	11.61	4.98	5.75	1	20	1545.51
0.265	1.114	0.0	0.0	0.30	0.446	11.91	5.31	5.61	5	20	1545.51
0.23	0.946	0.0	0.0	0.22	0.446	11.94	5.33	5.54	5	20	1545.55
0.398	1.723	0.0	0.0	0.69	0.429	11.63	4.99	5.68	2	20	1545.57
0.188	0.747	0.0	0.0	0.14	0.446	11.98	5.34	5.48	5	20	1545.59
0.375	1.619	0.0	0.0	0.61	0.429	11.65	5.00	5.61	3	20	1545.62
0.133	0.486	0.0	0.0	0.06	0.446	12.03	5.36	5.43	4	20	1545.63
0.0	0.0	0.0	0.0	0.00	0.446	12.14	5.42	5.42	4	20	1545.66
0.0	0.0	0.0	0.0	0.00	0.446	12.08	5.39	5.39	4	20	1545.67
0.351	1.515	0.0	0.0	0.53	0.429	11.68	5.01	5.54	3	20	1545.67
0.325	1.398	0.0	0.0	0.45	0.429	11.70	5.02	5.47	4	20	1545.72
0.297	1.267	0.0	0.0	0.38	0.429	11.73	5.03	5.41	5	20	1545.77
0.265	1.114	0.0	0.0	0.30	0.429	11.76	5.04	5.34	5	20	1545.81
0.23	0.946	0.0	0.0	0.22	0.429	11.79	5.06	5.28	6	20	1545.85
0.398	1.723	0.0	0.0	0.69	0.412	11.48	4.73	5.42	1	20	1545.86
0.188	0.747	0.0	0.0	0.14	0.429	11.83	5.07	5.22	6	20	1545.89
0.375	1.619	0.0	0.0	0.61	0.412	11.51	4.74	5.35	2	20	1545.91
0.133	0.486	0.0	0.0	0.06	0.429	11.88	5.10	5.16	6	20	1545.93
0.0	0.0	0.0	0.0	0.00	0.429	11.98	5.14	5.14	5	20	1545.96
0.351	1.515	0.0	0.0	0.53	0.412	11.53	4.75	5.28	3	20	1545.97
0.0	0.0	0.0	0.0	0.00	0.429	11.93	5.12	5.12	6	20	1545.97
0.325	1.398	0.0	0.0	0.45	0.412	11.55	4.76	5.21	4	20	1546.02
0.297	1.267	0.0	0.0	0.38	0.412	11.58	4.77	5.15	4	20	1546.06
0.265	1.114	0.0	0.0	0.30	0.412	11.61	4.78	5.08	4	20	1546.11
0.23	0.946	0.0	0.0	0.22	0.412	11.64	4.80	5.01	5	20	1546.15
0.188	0.747	0.0	0.0	0.14	0.412	11.68	4.81	4.95	5	20	1546.19
0.133	0.486	0.0	0.0	0.06	0.412	11.73	4.83	4.90	4	20	1546.23
0.0	0.0	0.0	0.0	0.00	0.412	11.83	4.88	4.88	4	20	1546.26
0.0	0.0	0.0	0.0	0.00	0.412	11.77	4.85	4.85	4	20	1546.27
0.325	1.398	0.0	0.0	0.45	0.395	11.40	4.50	4.96	1	20	1546.29
0.297	1.267	0.0	0.0	0.38	0.395	11.43	4.51	4.89	1	20	1546.34
0.265	1.114	0.0	0.0	0.30	0.395	11.46	4.53	4.82	2	20	1546.39
0.23	0.946	0.0	0.0	0.22	0.395	11.49	4.54	4.76	2	20	1546.43
0.188	0.747	0.0	0.0	0.14	0.395	11.53	4.55	4.69	2	20	1546.47
0.133	0.486	0.0	0.0	0.06	0.395	11.57	4.57	4.64	2	20	1546.51
0.0	0.0	0.0	0.0	0.00	0.395	11.67	4.61	4.61	2	20	1546.54
0.0	0.0	0.0	0.0	0.00	0.395	11.62	4.59	4.59	2	20	1546.56

Table 3:

Details of cluster #1-Front

I_F [A]	V_F [V]	I_B [A]	V_B [V]	Pel_R [W]	I_L [A]	V_L [V]	P_L [W]	P_{tot} [W]	P_{opt} [mW]	T [C]	freq [cm^{-1}]
0.547	2.37	0.0	0.0	1.30	0.446	11.59	5.17	6.47	3	20	1564.23
0.531	2.311	0.0	0.0	1.23	0.446	11.61	5.18	6.41	4	20	1564.29
0.514	2.24	0.0	0.0	1.15	0.446	11.63	5.19	6.34	4	20	1564.34
0.496	2.156	0.0	0.0	1.07	0.446	11.66	5.20	6.27	4	20	1564.38
0.478	2.077	0.0	0.0	0.99	0.446	11.68	5.21	6.20	5	20	1564.43
0.46	1.999	0.0	0.0	0.92	0.446	11.71	5.22	6.14	5	20	1564.47
0.531	2.311	0.0	0.0	1.23	0.429	11.47	4.92	6.15	1	20	1564.60
0.514	2.24	0.0	0.0	1.15	0.429	11.48	4.93	6.08	1	20	1564.64
0.496	2.156	0.0	0.0	1.07	0.429	11.51	4.94	6.01	1	20	1564.69
0.478	2.077	0.0	0.0	0.99	0.429	11.54	4.95	5.94	1	20	1564.74

Table 4:

Details of cluster #2-Back

I_F [A]	V_F [V]	I_B [A]	V_B [V]	Pel_R [W]	I_L [A]	V_L [V]	P_L [W]	P_{tot} [W]	P_{opt} [mW]	T [C]	freq [cm^{-1}]
0.0	0.0	0.355	1.58	0.56	0.425	12.12	5.15	5.71	8	0	1568.24
0.0	0.0	0.337	1.527	0.51	0.425	12.14	5.16	5.67	8	0	1568.28
0.0	0.0	0.318	1.428	0.45	0.425	12.16	5.17	5.62	7	0	1568.31
0.0	0.0	0.297	1.38	0.41	0.425	12.18	5.18	5.59	7	0	1568.35
0.0	0.0	0.275	1.249	0.34	0.425	12.20	5.18	5.53	7	0	1568.38
0.0	0.0	0.372	1.635	0.61	0.397	11.85	4.71	5.31	4	0	1568.70
0.0	0.0	0.355	1.58	0.56	0.397	11.87	4.71	5.27	4	0	1568.74
0.0	0.0	0.337	1.527	0.51	0.397	11.89	4.72	5.23	3	0	1568.77
0.0	0.0	0.318	1.428	0.45	0.397	11.90	4.73	5.18	3	0	1568.81
0.0	0.0	0.297	1.38	0.41	0.397	11.93	4.74	5.14	2	0	1568.84
0.0	0.0	0.389	1.72	0.67	0.37	11.59	4.29	4.96	1	0	1569.12
0.0	0.0	0.372	1.635	0.61	0.37	11.61	4.29	4.90	1	0	1569.16
0.0	0.0	0.355	1.58	0.56	0.37	11.62	4.30	4.86	2	0	1569.19
0.0	0.0	0.337	1.527	0.51	0.37	11.64	4.31	4.82	2	0	1569.23
0.0	0.0	0.318	1.428	0.45	0.37	11.66	4.31	4.77	2	0	1569.26
0.0	0.0	0.297	1.38	0.41	0.37	11.68	4.32	4.73	2	0	1569.30
0.0	0.0	0.355	1.572	0.56	0.446	11.85	5.28	5.84	2	20	1565.69
0.0	0.0	0.337	1.519	0.51	0.446	11.86	5.29	5.80	2	20	1565.73
0.0	0.0	0.318	1.428	0.45	0.446	11.88	5.30	5.75	2	20	1565.77
0.0	0.0	0.297	1.346	0.40	0.446	11.89	5.30	5.70	2	20	1565.82
0.0	0.0	0.275	1.244	0.34	0.446	11.91	5.31	5.65	2	20	1565.85
0.0	0.0	0.251	1.153	0.29	0.446	11.93	5.32	5.61	2	20	1565.90
0.0	0.0	0.225	1.034	0.23	0.446	11.95	5.33	5.56	2	20	1565.94
0.0	0.0	0.355	1.572	0.56	0.429	11.70	5.02	5.58	0	20	1566.00
0.0	0.0	0.337	1.519	0.51	0.429	11.71	5.02	5.54	1	20	1566.06
0.0	0.0	0.318	1.428	0.45	0.429	11.73	5.03	5.48	1	20	1566.09
0.0	0.0	0.297	1.346	0.40	0.429	11.74	5.04	5.44	1	20	1566.14
0.0	0.0	0.275	1.244	0.34	0.429	11.76	5.04	5.39	1	20	1566.18
0.0	0.0	0.251	1.153	0.29	0.429	11.78	5.05	5.34	1	20	1566.22
0.0	0.0	0.275	1.244	0.34	0.412	11.61	4.78	5.13	0	20	1566.47
0.0	0.0	0.251	1.153	0.29	0.412	11.63	4.79	5.08	0	20	1566.52

Table 5:

Details of cluster #3-Back

I_F [A]	V_F [V]	I_B [A]	V_B [V]	Pel_R [W]	I_L [A]	V_L [V]	P_L [W]	P_{tot} [W]	P_{opt} [mW]	T [C]	freq [cm^{-1}]
0.0	0.0	0.514	2.314	1.19	0.446	11.68	5.21	6.40	0	20	1565.88
0.0	0.0	0.502	2.255	1.13	0.446	11.70	5.22	6.35	0	20	1565.99
0.0	0.0	0.489	2.19	1.07	0.446	11.71	5.22	6.29	0	20	1566.02
0.0	0.0	0.476	2.143	1.02	0.446	11.73	5.23	6.25	0	20	1566.07
0.0	0.0	0.463	2.087	0.97	0.446	11.74	5.24	6.20	1	20	1566.10
0.0	0.0	0.449	2.013	0.90	0.446	11.76	5.24	6.15	1	20	1566.15
0.0	0.0	0.435	1.943	0.85	0.446	11.78	5.25	6.10	1	20	1566.19
0.0	0.0	0.42	1.866	0.78	0.446	11.79	5.26	6.04	1	20	1566.23
0.0	0.0	0.405	1.786	0.72	0.446	11.80	5.26	5.99	1	20	1566.27
0.0	0.0	0.389	1.736	0.68	0.446	11.82	5.27	5.95	1	20	1566.31
0.0	0.0	0.372	1.645	0.61	0.446	11.83	5.28	5.89	2	20	1566.34
0.0	0.0	0.435	1.943	0.85	0.429	11.62	4.99	5.83	0	20	1566.52
0.0	0.0	0.405	1.786	0.72	0.429	11.65	5.00	5.72	0	20	1566.54
0.0	0.0	0.42	1.866	0.78	0.429	11.64	4.99	5.78	0	20	1566.57
0.0	0.0	0.389	1.736	0.68	0.429	11.67	5.01	5.68	0	20	1566.61
0.0	0.0	0.372	1.645	0.61	0.429	11.69	5.01	5.63	0	20	1566.66

Table 6:

Details of cluster #4-Back

I_F [A]	V_F [V]	I_B [A]	V_B [V]	Pel_R [W]	I_L [A]	V_L [V]	P_L [W]	P_{tot} [W]	P_{opt} [mW]	T [C]	freq [cm^{-1}]
0.0	0.0	0.502	2.234	1.12	0.425	11.97	5.09	6.21	7	0	1589.67
0.0	0.0	0.489	2.155	1.05	0.425	11.98	5.09	6.15	6	0	1589.71
0.0	0.0	0.476	2.081	0.99	0.425	11.99	5.10	6.09	6	0	1589.74
0.0	0.0	0.463	2.025	0.94	0.425	12.01	5.10	6.04	7	0	1589.78
0.0	0.0	0.449	1.967	0.88	0.425	12.02	5.11	5.99	7	0	1589.82
0.0	0.0	0.435	1.922	0.84	0.425	12.04	5.12	5.95	8	0	1589.86
0.0	0.0	0.42	1.855	0.78	0.425	12.05	5.12	5.90	8	0	1589.89
0.0	0.0	0.405	1.781	0.72	0.425	12.07	5.13	5.85	9	0	1589.93
0.0	0.0	0.389	1.72	0.67	0.425	12.09	5.14	5.81	10	0	1589.96
0.0	0.0	0.372	1.635	0.61	0.425	12.10	5.14	5.75	10	0	1590.00
0.0	0.0	0.527	2.346	1.24	0.397	11.68	4.64	5.87	4	0	1590.11
0.0	0.0	0.514	2.266	1.16	0.397	11.69	4.64	5.81	4	0	1590.15
0.0	0.0	0.502	2.234	1.12	0.397	11.71	4.65	5.77	4	0	1590.18
0.0	0.0	0.489	2.155	1.05	0.397	11.72	4.65	5.71	5	0	1590.22
0.0	0.0	0.476	2.081	0.99	0.397	11.73	4.66	5.65	5	0	1590.26
0.0	0.0	0.463	2.025	0.94	0.397	11.75	4.66	5.60	5	0	1590.30
0.0	0.0	0.449	1.967	0.88	0.397	11.77	4.67	5.55	5	0	1590.33
0.0	0.0	0.435	1.922	0.84	0.397	11.78	4.68	5.51	6	0	1590.36
0.0	0.0	0.42	1.855	0.78	0.397	11.80	4.68	5.46	6	0	1590.40
0.0	0.0	0.405	1.781	0.72	0.397	11.82	4.69	5.41	7	0	1590.43
0.0	0.0	0.389	1.72	0.67	0.397	11.83	4.70	5.37	7	0	1590.47
0.0	0.0	0.55	2.415	1.33	0.37	11.41	4.22	5.55	2	0	1590.51
0.0	0.0	0.538	2.371	1.28	0.37	11.43	4.23	5.50	2	0	1590.55
0.0	0.0	0.527	2.346	1.24	0.37	11.43	4.23	5.47	2	0	1590.58
0.0	0.0	0.514	2.266	1.16	0.37	11.45	4.23	5.40	2	0	1590.62
0.0	0.0	0.502	2.234	1.12	0.37	11.46	4.24	5.36	2	0	1590.65
0.0	0.0	0.489	2.155	1.05	0.37	11.47	4.25	5.30	3	0	1590.69
0.0	0.0	0.476	2.081	0.99	0.37	11.49	4.25	5.24	3	0	1590.72
0.0	0.0	0.463	2.025	0.94	0.37	11.51	4.26	5.19	3	0	1590.76
0.0	0.0	0.449	1.967	0.88	0.37	11.52	4.26	5.14	3	0	1590.79
0.0	0.0	0.435	1.922	0.84	0.37	11.53	4.27	5.10	3	0	1590.82
0.0	0.0	0.42	1.855	0.78	0.37	11.55	4.27	5.05	4	0	1590.86
0.0	0.0	0.405	1.781	0.72	0.37	11.57	4.28	5.00	4	0	1590.89

Table 7:

Details of cluster #5-Front

I_F [A]	V_F [V]	I_B [A]	V_B [V]	Pel_R [W]	I_L [A]	V_L [V]	P_L [W]	P_{tot} [W]	P_{opt} [mW]	T [C]	freq [cm^{-1}]
0.65	2.707	0.0	0.0	1.76	0.425	11.75	4.99	6.75	8	0	1578.77
0.636	2.645	0.0	0.0	1.68	0.425	11.77	5.00	6.68	7	0	1578.81
0.622	2.577	0.0	0.0	1.60	0.425	11.79	5.01	6.61	7	0	1578.84
0.608	2.528	0.0	0.0	1.54	0.425	11.80	5.02	6.55	7	0	1578.87
0.593	2.453	0.0	0.0	1.45	0.425	11.82	5.02	6.48	6	0	1578.90
0.578	2.387	0.0	0.0	1.38	0.425	11.84	5.03	6.41	7	0	1578.92
0.563	2.323	0.0	0.0	1.31	0.425	11.86	5.04	6.35	7	0	1578.95
0.547	2.253	0.0	0.0	1.23	0.425	11.87	5.05	6.28	7	0	1578.97
0.531	2.187	0.0	0.0	1.16	0.425	11.89	5.05	6.22	8	0	1578.99
0.514	2.117	0.0	0.0	1.09	0.425	11.91	5.06	6.15	9	0	1579.02
0.496	2.04	0.0	0.0	1.01	0.425	11.93	5.07	6.08	10	0	1579.05
0.65	2.707	0.0	0.0	1.76	0.397	11.51	4.57	6.33	5	0	1579.26
0.636	2.645	0.0	0.0	1.68	0.397	11.53	4.58	6.26	5	0	1579.30
0.622	2.577	0.0	0.0	1.60	0.397	11.54	4.58	6.18	5	0	1579.33
0.608	2.528	0.0	0.0	1.54	0.397	11.56	4.59	6.13	5	0	1579.36
0.593	2.453	0.0	0.0	1.45	0.397	11.57	4.59	6.05	5	0	1579.39
0.578	2.387	0.0	0.0	1.38	0.397	11.59	4.60	5.98	5	0	1579.41
0.563	2.323	0.0	0.0	1.31	0.397	11.61	4.61	5.92	5	0	1579.44
0.547	2.253	0.0	0.0	1.23	0.397	11.63	4.62	5.85	5	0	1579.46
0.531	2.187	0.0	0.0	1.16	0.397	11.64	4.62	5.78	6	0	1579.49
0.514	2.117	0.0	0.0	1.09	0.397	11.67	4.63	5.72	6	0	1579.51
0.496	2.04	0.0	0.0	1.01	0.397	11.69	4.64	5.65	7	0	1579.54
0.478	1.966	0.0	0.0	0.94	0.397	11.70	4.65	5.59	8	0	1579.56
0.65	2.707	0.0	0.0	1.76	0.37	11.27	4.17	5.93	2	0	1579.70
0.636	2.645	0.0	0.0	1.68	0.37	11.29	4.18	5.86	2	0	1579.74
0.622	2.577	0.0	0.0	1.60	0.37	11.30	4.18	5.78	2	0	1579.78
0.608	2.528	0.0	0.0	1.54	0.37	11.32	4.19	5.73	2	0	1579.80
0.593	2.453	0.0	0.0	1.45	0.37	11.33	4.19	5.65	3	0	1579.83
0.578	2.387	0.0	0.0	1.38	0.37	11.35	4.20	5.58	3	0	1579.86
0.563	2.323	0.0	0.0	1.31	0.37	11.37	4.21	5.51	3	0	1579.88
0.547	2.253	0.0	0.0	1.23	0.37	11.38	4.21	5.44	3	0	1579.91
0.531	2.187	0.0	0.0	1.16	0.37	11.40	4.22	5.38	3	0	1579.93
0.514	2.117	0.0	0.0	1.09	0.37	11.42	4.23	5.31	4	0	1579.96
0.496	2.04	0.0	0.0	1.01	0.37	11.44	4.23	5.25	4	0	1579.98
0.478	1.966	0.0	0.0	0.94	0.37	11.46	4.24	5.18	4	0	1580.01
0.46	1.89	0.0	0.0	0.87	0.37	11.48	4.25	5.12	5	0	1580.03
0.578	2.387	0.0	0.0	1.38	0.342	11.10	3.80	5.18	0	0	1580.27
0.563	2.323	0.0	0.0	1.31	0.342	11.11	3.80	5.11	0	0	1580.33
0.547	2.253	0.0	0.0	1.23	0.342	11.13	3.81	5.04	0	0	1580.35
0.531	2.187	0.0	0.0	1.16	0.342	11.15	3.81	4.97	1	0	1580.39
0.514	2.117	0.0	0.0	1.09	0.342	11.17	3.82	4.91	1	0	1580.39
0.496	2.04	0.0	0.0	1.01	0.342	11.19	3.83	4.84	1	0	1580.42
0.478	1.966	0.0	0.0	0.94	0.342	11.21	3.83	4.77	1	0	1580.45
0.46	1.89	0.0	0.0	0.87	0.342	11.23	3.84	4.71	1	0	1580.47
0.44	1.81	0.0	0.0	0.80	0.342	11.25	3.85	4.65	1	0	1580.49

continued on next page

I_F [A]	V_F [V]	I_B [A]	V_B [V]	Pel_R [W]	I_L [A]	V_L [V]	P_L [W]	P_{tot} [W]	P_{opt} [mW]	T [C]	freq [cm^{-1}]
0.42	1.729	0.0	0.0	0.73	0.342	11.28	3.86	4.58	0	0	1580.53

Table 8: